

# **EIMAC** **power grid tubes**

QUICK REFERENCE CATALOG 175

(1975)



# **EIMAC** **power grid tubes**

QUICK REFERENCE CATALOG 175

(1975)

**EIMAC**  
**division of varian**  
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**division of varian**

# TUBE TYPE INDEX

To find a specific tube, first look for the initial numerical portion of the type number. Tubes are listed sequentially according to this number. When more than one tube has the same initial number, the tubes will be

listed alphabetically by the first set of letter designations. Within these parameters, tubes are then listed numerically or alphabetically by the remaining number of letter designations.

| TUBE             | PAGE | TUBE            | PAGE | TUBE             | PAGE | TUBE            | PAGE |
|------------------|------|-----------------|------|------------------|------|-----------------|------|
| 2C39A            | 16   | 4CV250,000A     | 77   | 6775/4-400C      | 88   | 8660/4CX1500B   | 66   |
| 2C39BA           | 16   | 4CW800B         | 78   | 6816             | 72   | 8661/4CW10,000A | 79   |
| 2C39WA           | 16   | 4CW800F         | 78   | 6884             | 72   | 8745/7815/7815R | 17   |
| 3CPX1500A7       | 29   | 4CW2000A/8244   | 78   | 7034/4X150A      | 71   | 8755            | 21   |
| 3CV30,000A3      | 44   | 4CW10,000A/8661 | 79   | 7203/4CX250B     | 58   | 8755A           | 21   |
| 3CV30,000H3      | 44   | 4CW25,000A      | 79   | 7211             | 19   | 8757            | 21   |
| 3CW5,000A1/8240  | 46   | 4CW50,000E      | 80   | 7289/2C39A       | 16   | 8809/4CX600J    | 64   |
| 3CW5,000A3/8242  | 46   | 4CW50,000J      | 80   | 7480             | 45   | 8847            | 22   |
| 3CW5,000F1/8241  | 46   | 4CW100,000D     | 81   | 7580W/4CX250R    | 60   | 8847A           | 22   |
| 3CW5,000F3/8243  | 46   | 4CW100,000E     | 82   | 7609             | 71   | 8873            | 56   |
| 3CW5,000H3       | 47   | 4CW250,000A     | 83   | 7698             | 19   | 8874            | 41   |
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| 3CW30,000H3      | 50   | 4CX300A/8167    | 61   | 7855/Y-503       | 18   | 8906AL          | 23   |
| 3CW30,000H7      | 51   | 4CX300Y/8561    | 61   | 7855KAL          | 18   | 8907            | 23   |
| 3CW40,000H3      | 51   | 4CX350A/8321    | 62   | 8158/3CX10,000A1 | 35   | 8907AL          | 23   |
| 3CX100A5         | 16   | 4CX350F/8322    | 62   | 8159/3CX10,000A3 | 35   | 8909/4CX5000J   | 67   |
| 3CX400U7/8961    | 21   | 4CX350FJ/8904   | 62   | 8160/3CX10,000A7 | 36   | 8910/4CX15,000J | 70   |
| 3CX1000A7/8283   | 30   | 4CX600B         | 63   | 8161/3CX2500A3   | 31   | 8921/4CX600JA   | 64   |
| 3CX1500A7/8877   | 30   | 4CX600F         | 63   | 8162/3CX3000F7   | 33   | 8930            | 73   |
| 3CX2500A3/8161   | 31   | 4CX600J/8809    | 64   | 8163/3-400Z      | 54   | 8933            | 24   |
| 3CX2500F3/8251   | 31   | 4CX600JA/8921   | 64   | 8164/3-1000Z     | 55   | 8938            | 42   |
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| 3CX3000F7/8162   | 33   | 4CX3000A/8169   | 66   | 8169/4CX3000A    | 66   | 8957/4CX250BC   | 59   |
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| 3CX10,000A3/8159 | 35   | 4CX10,000D/8171 | 68   | 8188/4PR400A     | 91   | 8962            | 42   |
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| 3CX20,000A7      | 39   | 4PR400A/8188    | 91   | 8243/3CW5000F3   | 46   |                 |      |
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| 4-65A/8165       | 86   | 5CX1500A        | 95   | 8252W/4PR60C     | 90   |                 |      |
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| 4-1000A/8166     | 88   | X-2177          | 53   | 8349/4CX35,000C  | 70   |                 |      |
| 4D21/4-125A      | 86   | Y-503/7855      | 18   | 8351/4CV100,000C | 76   |                 |      |
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| 4CS250R          | 92   | Y-519           | 26   | 8403             | 20   |                 |      |
| 4CV8000A         | 74   | Y-540           | 27   | 8533             | 20   |                 |      |
| 4CV35,000A       | 74   | Y-579           | 27   | 8533W            | 20   |                 |      |
| 4CV50,000E       | 75   | Y-579A          | 28   | 8561/4CX300Y     | 61   |                 |      |
| 4CV50,000J       | 75   | 6696A           | 52   | 8590/4CPX250K    | 57   |                 |      |
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QUICK REFERENCE GUIDE TO CATALOG CONTENTS

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## INTRODUCTION

The EIMAC division of Varian manufactures a complete line of power grid tubes and accessories, including diodes, triodes, tetrodes, pentodes and associated equipment.

EIMAC employs over 600 persons at the division's main plant in San Carlos, California, and another 400 at a recently-expanded facility in Salt Lake City, Utah.

Major production activity at the San Carlos plant includes the manufacture of ceramic/metal power grid tubes. Glass power tubes and a wide line of planar triodes and X-ray tubes are major production items at the Salt Lake City plant.

These two facilities, among the most modern electron tube production plants in the world, have all manufacturing areas designed on a product flow system for maximum efficiency. Clean rooms for critical assembly work are ventilated and filtered for maximum product yield and reliability. Giant EIMAC-developed rotary vacuum pumps provide a high production rate. Facilities for processing ceramic materials include some of

the most modern equipment available. Extensive environmental test equipment is at hand for checking product performance under unusual conditions of shock, vibration, humidity and high altitude.

Quality assurance procedures are very strict, and include both operator surveillance, batch sampling and statistical controls.

The EIMAC development and circuit techniques laboratories are especially designed for production of experimental tube types and for modification of existing designs to meet special customer requirements. New tube types and circuit techniques are continually explored in the EIMAC laboratories.

Power grid tube Application Engineering information and Marketing Services are available from the San Carlos facility of EIMAC. Planar triode application information is available at the Salt Lake plant. Marketing and application information on all EIMAC products are available from any of the Varian/EIMAC Electron Device Group field offices throughout the world.

## INTERPRETATION OF CATALOG DATA

Data provided for EIMAC products in this catalog include maximum ratings, typical operation, characteristics and a brief description of the product.

The **maximum rating** is an absolute limit on a particular operating parameter or on a combination of parameters. Operation above the maximum rating of any parameter is not recommended, as it may impair the performance or the life of the product.

Data provided under **typical operation** represent operating conditions within the maximum ratings that are suitable for a particular application and do not imply that the product cannot be operated satisfactorily under other conditions in the same application.

The term **plate output power** is the calculated output power from the tube itself and is equal to plate input minus plate dissipation. The term **useful power output** is the output measured at the load of the output circuit, and does not include power lost in the circuit.

Information furnished by EIMAC in this catalog is believed to be accurate and reliable. Characteristics and operating values are based upon performance tests or calculated data. These figures may change without notice as the result of additional data or product refinement. EIMAC division of Varian should be consulted before using this catalog information for final equipment design.

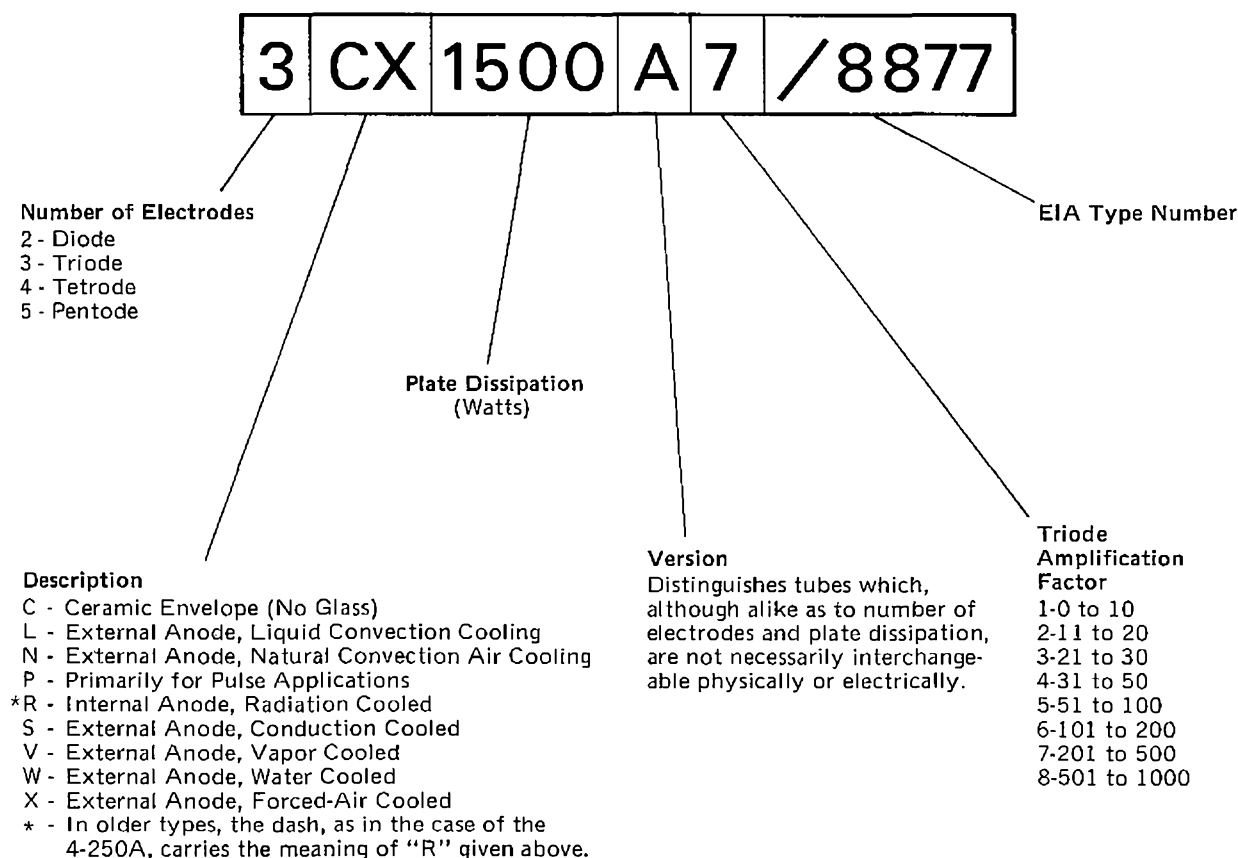
# EIMAC TUBE TYPE NUMBERING SYSTEM

EIMAC tube types are identified by either a non-descriptive, sequentially-assigned 4-digit type number, standardized and registered with the ELECTRONIC INDUSTRIES ASSOCIATION (EIA) for non-duplication throughout the world, or by an EIMAC-originated coded numbering system, designed to convey descriptive information about the tube. Many tube types can be identified with either number, and are branded with both.

In general, the EIMAC type number consists of: a numeral indicating the number

of electrodes, one or more letters denoting special characteristics, a numeral representing the plate dissipation rating, and a final letter to distinguish the tube from others which may bear similar or preceding letters and numerals. Triode types carry an additional number to indicate their approximate amplification factor.

To illustrate the system, a typical 1500-watt, ceramic, external-anode, forced-air cooled EIMAC triode is broken down as follows:



# POWER GRID TUBE SELECTION GUIDE

The EIMAC Power Grid Tube Selection Guide is arranged for ease in making type selections by use rather than tube type. The Guide is applications-oriented.

\*Tube types are listed according to the principle modes of service for which they are rated. Under each mode of service, EIMAC tube types suitable for the application are tabulated in descending order of the most significant tube parameter in the left hand column. For example, in the POWER AMPLIFIER tabulation, tube types are listed in

descending order of typical rf power output; PULSE REGULATOR tubes are listed in descending order of peak current capability. This format places emphasis on tube application and facilitates comparison in terms of the significant ratings of the EIMAC types available for a given application.

After preliminary selection of a tube type (or types) from the Guide, the final choice should be based upon the complete ratings from the EIMAC data sheet for the tube in question and consultation with the EIMAC Application Engineering Department.

## RADIO FREQUENCY POWER AMPLIFIER

### Linear Service

| Peak Env.<br>Power†<br>Typical<br>(kW) | Rated<br>Anode<br>Diss.<br>(kW) | Frequency*<br>F1 / upper<br>useful<br>(MHz) | Inter-Mod.<br>Distortion<br>Typical‡ |             | Cooling | EIMAC<br>Type<br>Number | Tube<br>Type        |
|----------------------------------------|---------------------------------|---------------------------------------------|--------------------------------------|-------------|---------|-------------------------|---------------------|
|                                        |                                 |                                             | 3rd<br>(dB)                          | 5th<br>(dB) |         |                         |                     |
| 1180                                   | 1250                            | 30 / 50                                     | —                                    | —           | water   | X-2159                  | Tetrode             |
| 600                                    | 650                             | 50 / 100                                    | —                                    | —           | water   | X-2170                  | Tetrode             |
| 230                                    | 250                             | 30 / 50                                     | -31                                  | -43         | vapor   | 4CV250,000A             | Tetrode             |
| 230                                    | 250                             | 30 / 50                                     | -31                                  | -43         | water   | 4CW250,000A             | Tetrode             |
| 168                                    | 100                             | 108 / 150                                   | —                                    | —           | water   | 4CW100,000E             | Tetrode             |
| 123                                    | 100                             | 30 / 50                                     | -26                                  | -40         | vapor   | 4CV100,000C             | Tetrode             |
| 105                                    | 50                              | 110 / 220                                   | —                                    | —           | vapor   | 3CV50,000A7             | Triode <sup>1</sup> |
| 55                                     | 35                              | 30 / 50                                     | -30                                  | -40         | air     | 4CX35,000C              | Tetrode             |
| 45                                     | 50                              | 110 / 200                                   | -46                                  | -60         | vapor   | 4CV50,000J              | Tetrode             |
| 45                                     | 50                              | 110 / 200                                   | -46                                  | -60         | water   | 4CW50,000J              | Tetrode             |
| 27.5                                   | 20                              | 250 / 500                                   | —                                    | —           | air     | 8963                    | Triode <sup>2</sup> |
| 27.5                                   | 20                              | 110 / 220                                   | —                                    | —           | air     | 3CX20,000A7             | Triode <sup>2</sup> |
| 17                                     | 15                              | 110 / 220                                   | -40                                  | -39         | air     | 3CX15,000A7             | Triode <sup>1</sup> |
| 17                                     | 20                              | 140 / 220                                   | -40                                  | -39         | water   | 3CW20,000A7             | Triode <sup>1</sup> |
| 17                                     | 10                              | 140 / 220                                   | -40                                  | -39         | air     | 3CX10,000A7             | Triode <sup>1</sup> |
| 14                                     | 10                              | 100 / 220                                   | -30                                  | -36         | air     | 4CX10,000D              | Tetrode             |
| 12                                     | 15                              | 110 / 220                                   | -41                                  | -41         | air     | 4CX15,000J              | Tetrode             |
| 10.5                                   | 10                              | 100 / 220                                   | -35                                  | -40         | air     | 4CX10,000J              | Tetrode             |
| 10                                     | 5                               | 100 / 220                                   | -30                                  | -38         | air     | 4CX5000A                | Tetrode             |
| 10                                     | 5                               | 100 / 220                                   | -30                                  | -38         | air     | 4CX5000R                | Tetrode             |
| 5.8                                    | 3                               | 150 / 220                                   | -40                                  | -43         | air     | 5CX3000A                | Pentode             |
| 5.3                                    | 5                               | 30 / —                                      | -26                                  | -40         | air     | 290                     | Pentode             |
| 5.5                                    | 3                               | 110 / —                                     | -51                                  | -45         | air     | 3CX3000A7               | Triode <sup>1</sup> |
| 5.3                                    | 3                               | 150 / 220                                   | -32                                  | -36         | air     | 4CX3000A                | Tetrode             |
| 5.8                                    | 3                               | 30 / —                                      | -26                                  | -41         | air     | 264/8576                | Pentode             |
| 3.3                                    | 5                               | 100 / 220                                   | -41                                  | -44         | air     | 4CX5000J                | Tetrode             |
| 2.06                                   | 1                               | 220 / 400                                   | -31                                  | -39         | air     | 3CX1000A7               | Triode <sup>1</sup> |

‡ Plate power output, calculated or measured at low frequency.

\* F1 is the maximum frequency at which maximum ratings apply. Operation at the upper useful frequency normally involves operation at reduced anode voltage and reduced plate input power.

† Calculated or measured by two-tone method at 2.0 MHz.

1. Grounded grid 2. VHF TV

# RADIO FREQUENCY POWER AMPLIFIER—LINEAR, CONTINUED

| Peak Env.<br>Power†<br>Typical<br>(Watts) | Rated<br>Anode<br>Diss.<br>(Watts) | Frequency*<br>F1/ upper<br>useful<br>(MHz) | Inter-Mod.<br>Distortion<br>Typical† |     | Cooling    | EIMAC<br>Type<br>Number | Tube<br>Type        |
|-------------------------------------------|------------------------------------|--------------------------------------------|--------------------------------------|-----|------------|-------------------------|---------------------|
|                                           |                                    |                                            | 3rd                                  | 5th |            |                         |                     |
| 2050                                      | 1500                               | 220 / 400                                  | -38                                  | -44 | air        | 3CX1500A7               | Triode <sup>1</sup> |
| 2030                                      | 1500                               | 500 / —                                    | -44                                  | -44 | air        | 8938                    | Triode <sup>1</sup> |
| 1785                                      | 1500                               | 110 / 220                                  | -33                                  | -42 | air        | 5CX1500A                | Pentode             |
| 1160                                      | 1000                               | 110 / 220                                  | -43                                  | -47 | air        | 4CX1500B                | Tetrode             |
| 1080                                      | 1000                               | 110 / —                                    | -29                                  | -37 | air        | 3-1000Z                 | Triode <sup>1</sup> |
| 940                                       | 500                                | 110 / —                                    | -40                                  | -45 | air        | 3-500Z                  | Triode <sup>1</sup> |
| 645                                       | 500                                | 110 / —                                    | -33                                  | -41 | air        | 5-500A                  | Pentode             |
| 590                                       | 200                                | 500 / 900                                  | -35                                  | -36 | conduction | 8873                    | Triode <sup>1</sup> |
| 590                                       | 400                                | 500 / 900                                  | -35                                  | -36 | air        | 8874                    | Triode <sup>1</sup> |
| 590                                       | 300                                | 500 / 900                                  | -35                                  | -36 | air        | 8875                    | Triode <sup>1</sup> |
| 590                                       | 400                                | 110 / —                                    | -28                                  | -35 | air        | 3-400Z                  | Triode <sup>1</sup> |
| 580                                       | 600                                | 30 / —                                     | -43                                  | -43 | air        | 4CX600J                 | Tetrode             |
| 495                                       | 400                                | 110 / —                                    | —                                    | —   | air        | 4-400C                  | Tetrode             |
| 350                                       | 350                                | 500 / —                                    | -27                                  | -50 | air        | 8930                    | Tetrode             |
| 295                                       | 250                                | 500 / —                                    | -25                                  | -30 | air        | 4CX250R                 | Tetrode             |
| 295                                       | 250                                | 500 / —                                    | -25                                  | -30 | conduction | 4CS250R                 | Tetrode             |
| 263                                       | 350                                | 30 / 220                                   | -30                                  | -35 | air        | 4CX350A                 | Tetrode             |
| 263                                       | 350                                | 30 / 220                                   | -30                                  | -35 | air        | 4CX350F                 | Tetrode             |
| 263                                       | 350                                | 30 / 220                                   | -40                                  | -45 | air        | 4CX350FJ                | Tetrode             |
| 226                                       | 200                                | 500 / —                                    | —                                    | —   | conduction | 8560A                   | Tetrode             |

\* Plate power output, calculated or measured at low frequency.

† F1 is the maximum frequency at which maximum ratings apply. Operation at the upper useful frequency normally involves operation at reduced anode voltage and reduced plate input power.

† Calculated or measured by two-tone method at 2.0 MHz.

1. Grounded grid

## RF POWER AMPLIFIER

### Class C, CW or FM Service

| Plate Pwr.<br>Output<br>Typical* | Rated<br>Plate<br>Diss. | Freq.†<br>F1/ upper<br>useful | Power<br>Gain* | Cooling | EIMAC<br>Type<br>Number | Tube<br>Type        |
|----------------------------------|-------------------------|-------------------------------|----------------|---------|-------------------------|---------------------|
| (kW)                             | (kW)                    | (MHz)                         |                |         |                         |                     |
| 1650                             | 1250                    | 30 / 50                       | x200           | water   | X-2159                  | Tetrode             |
| 1050                             | 650                     | 50 / 100                      | x300           | water   | X-2170                  | Tetrode             |
| 460                              | 250                     | 30 / 50                       | x150           | vapor   | 4CV250,000A             | Tetrode             |
| 460                              | 250                     | 30 / 50                       | x150           | water   | 4CW250,000A             | Tetrode             |
| 220                              | 100                     | 108 / 150                     | x1800          | water   | 4CW100,000E             | Tetrode             |
| 168                              | 100                     | 30 / 50                       | x1350          | vapor   | 4CV100,000C             | Tetrode             |
| 165                              | 100                     | 30 / 50                       | x140           | water   | 4CW100,000D             | Tetrode             |
| 137                              | 50                      | 110 / 220                     | x900           | vapor   | 4CV50,000E              | Tetrode             |
| 137                              | 50                      | 110 / 220                     | x900           | water   | 4CW50,000E              | Tetrode             |
| 110                              | 35                      | 30 / 50                       | x425           | air     | 4CX35,000C              | Tetrode             |
| 80                               | 60                      | 40 / 80                       | x130           | water   | 6696A                   | Triode              |
| 80                               | 80                      | 40 / 80                       | x130           | vapor   | 7480                    | Triode              |
| 80                               | 35                      | 40 / 80                       | x130           | air     | 6697A                   | Triode              |
| 64                               | 20                      | 90 / 150                      | x66            | air     | 3CX20,000A3             | Triode              |
| 64                               | 20                      | 90 / 150                      | x66            | air     | 3CX20,000H3             | Triode              |
| 42                               | 25                      | 100 / 150                     | x37            | water   | 3CW25,000A3             | Triode              |
| 36.5                             | 15                      | 110 / 225                     | x166           | air     | 4CX15,000A              | Tetrode             |
| 30.0                             | 15                      | 100 / 150                     | x45            | air     | 3CX15,000A3             | Triode              |
| 25.0                             | 15                      | 110 / 160                     | x50            | air     | 3CX15,000A7             | Triode              |
| 24.5                             | 10                      | 140 / 200                     | x6             | air     | 3CX10,000A3             | Triode <sup>1</sup> |
| 24.5                             | 20                      | 140 / 200                     | x6             | water   | 3CW20,000A3             | Triode <sup>1</sup> |
| 16                               | 5                       | 100 / 220                     | x1050          | air     | 4CX5000A                | Tetrode             |

\* Power output and power gain are calculated or measured at low frequency.

† F1 is the maximum frequency at which maximum ratings apply. Operation at the upper useful frequency normally involves operation at reduced anode voltage and reduced plate input power.

1. Grounded grid

# RF FREQUENCY POWER AMPLIFIER—CLASS C, CW or FM, CONTINUED

| Plate Pwr.<br>Output<br>Typical* | Rated<br>Plate<br>Diss. | Frequency†<br>F1/ upper<br>useful | Power<br>Gain* | Cooling    | EIMAC<br>Type<br>Number | Tube<br>Type        |
|----------------------------------|-------------------------|-----------------------------------|----------------|------------|-------------------------|---------------------|
| (Watts)                          | (Watts)                 | (MHz)                             |                |            |                         |                     |
| 16,000                           | 10,000                  | 100 / 220                         | x1050          | air        | 4CX10,000D              | Tetrode             |
| 16,000                           | 10,000                  | 100 / 220                         | x1050          | water      | 4CW10,000A              | Tetrode             |
| 16,000                           | 5000                    | 100 / 220                         | x1050          | air        | 4CX5000R                | Tetrode             |
| 11,000                           | 3000                    | 150 / 220                         | x260           | air        | 4CX3000A                | Tetrode             |
| 10,000                           | 4000                    | 75 / 150                          | x73            | air        | 3CX2500A3               | Triode              |
| 10,000                           | 4000                    | 75 / 150                          | x73            | air        | 3CX2500F3               | Triode              |
| 10,000                           | 5000                    | 75 / 150                          | x73            | water      | 3CW5000A3               | Triode              |
| 10,000                           | 5000                    | 75 / 150                          | x73            | water      | 3CW5000F3               | Triode              |
| 8500                             | 3000                    | 150 / 220                         | x160           | air        | 5CX3000A                | Pentode             |
| 3400                             | 1000                    | 110 / —                           | x225           | air        | 4-1000A                 | Tetrode             |
| 3200                             | 1500                    | 110 / 220                         | x350           | air        | 4CX1500A                | Tetrode             |
| 3180                             | 1500                    | 110 / 220                         | x350           | air        | 5CX1500A                | Pentode             |
| 2600§                            | 1500                    | 250 / —                           | x33            | air        | 3CX1500A7               | Triode <sup>1</sup> |
| 1500§§                           | 1500                    | 500 / —                           | x30            | air        | 8938                    | Triode <sup>1</sup> |
| 1265                             | 500                     | 110 / —                           | x140           | air        | 4-500A                  | Pentode             |
| 1100                             | 400                     | 110 / —                           | x190           | air        | 4-400C                  | Tetrode             |
| 1000                             | 250                     | 110 / —                           | x190           | air        | 4-250A                  | Tetrode             |
| 840                              | 350                     | 100 / 150                         | x31            | air        | 5867A                   | Triode              |
| 805                              | 250                     | 60 / —                            | x9             | air        | 6569                    | Triode <sup>1</sup> |
| 805                              | 500                     | 110 / —                           | x67            | air        | 4-500A                  | Tetrode             |
| 745                              | 400                     | 60 / —                            | x8             | air        | 6580                    | Triode <sup>1</sup> |
| 680                              | 1500                    | — / 900                           | x10            | air        | 8962                    | Triode <sup>2</sup> |
| 600                              | 300                     | 110 / 220                         | x158           | air        | 4CX300Y                 | Tetrode             |
| 500                              | 300                     | 500 / —                           | x177           | air        | 4CX300A                 | Tetrode             |
| 450                              | 350                     | 500 / —                           | —              | air        | 8930                    | Tetrode             |
| 380                              | 250                     | 500 / —                           | x190           | conduction | 4CS250R                 | Tetrode             |
| 380                              | 250                     | 500 / —                           | x130           | air        | 4CX250BC                | Tetrode             |
| 380                              | 250                     | 500 / —                           | x130           | air        | 4CX250FG                | Tetrode             |
| 380                              | 250                     | 500 / 1500                        | x130           | air        | 4CX250K                 | Tetrode             |
| 380                              | 250                     | 500 / 1500                        | x130           | air        | 4CX250M                 | Tetrode             |
| 380                              | 250                     | 500 / —                           | x190           | air        | 4CX250R                 | Tetrode             |
| 380                              | 250                     | 150 / 500                         | x130           | air        | 4X150A                  | Tetrode             |
| 380                              | 250                     | 150 / 500                         | x130           | air        | 7609                    | Tetrode             |
| 380                              | 250                     | 500 / —                           | x130           | conduction | 8560A                   | Tetrode             |
| 375                              | 125                     | 120 / —                           | x150           | air        | 4-125A                  | Tetrode             |
| 320                              | 200                     | 500 / —                           | x35            | conduction | 8873                    | Triode              |
| 320                              | 400                     | 500 / —                           | x35            | air        | 8874                    | Triode              |
| 320                              | 300                     | 500 / —                           | x35            | air        | 8875                    | Triode              |
| 270                              | 65                      | 150 / —                           | x160           | convection | 4-65A                   | Tetrode             |
| 216                              | 400                     | 1000 / —                          | 11.5           | air        | 3CX400U7                | Triode <sup>2</sup> |
| 100                              | 115                     | 1215 / —                          | x27 @ 400 MHz  | air        | 6816                    | Tetrode             |
| 100                              | 115                     | 1215 / —                          | x27 @ 400 MHz  | air        | 6884                    | Tetrode             |
| 100                              | 115                     | 1215 / —                          | x27 @ 400 MHz  | air        | 7457                    | Tetrode             |
| 100                              | 115                     | 1215 / —                          | x27 @ 400 MHz  | conduction | 7843                    | Tetrode             |

\* Power output and power gain are calculated or measured at low frequency.

† F1 is the maximum frequency at which maximum ratings apply. Operation at the upper useful frequency normally involves operation at reduced anode voltage and reduced plate input power.

§ Power output shown is measured useful, delivered to load, at 104 MHz.

§ § Useful power output, measured at 430 MHz

1. Grounded grid 2. 900 MHz

# RF POWER AMPLIFIER

## Class C — Plate Modulated Service

| Carrier Pwr.<br>Output<br>Typical* | Plate Diss.<br>at Typical<br>Conditions | Frequency†<br>F1 / upper<br>useful | Power<br>Gain* | Cooling    | EIMAC<br>Type<br>Number | Tube<br>Type |
|------------------------------------|-----------------------------------------|------------------------------------|----------------|------------|-------------------------|--------------|
| (kW - W)                           | (kW - W)                                | (MHz)                              |                |            |                         |              |
| 1375 kW                            | 800 kW                                  | 30 / 50                            | x200           | water      | X-2159                  | Tetrode      |
| 700 kW                             | 160 kW                                  | 50 / 100                           | x290           | water      | X-2170                  | Tetrode      |
| 285 kW                             | 119 kW                                  | 30 / 50                            | x120           | vapor      | 4CV250,000A             | Tetrode      |
| 285 kW                             | 119 kW                                  | 30 / 50                            | x120           | water      | 4CW250,000A             | Tetrode      |
| 140 kW                             | 47 kW                                   | 30 / 50                            | x110           | vapor      | 4CV100,000C             | Tetrode      |
| 140 kW                             | 35 kW                                   | 108 / 150                          | x260           | water      | 4CW100,000E             | Tetrode      |
| 138 kW                             | 22 kW                                   | 30 / 50                            | x160           | water      | 4CW100,000D             | Tetrode      |
| 110 kW                             | 22 kW                                   | 110 / 220                          | x160           | water      | 4CW50,000E              | Tetrode      |
| 110 kW                             | 22 kW                                   | 110 / 220                          | x160           | vapor      | 4CV50,000E              | Tetrode      |
| 60 kW                              | 20 kW                                   | 40 / 80                            | x30            | water      | 6696A                   | Triode       |
| 60 kW                              | 20 kW                                   | 40 / 80                            | x30            | air        | 6697A                   | Triode       |
| 60 kW                              | 20 kW                                   | 40 / 80                            | x30            | vapor      | 7480                    | Triode       |
| 55 kW                              | 13 kW                                   | 30 / 50                            | x440           | air        | 4CX35,000C              | Tetrode      |
| 27.5 kW                            | 7.5 kW                                  | 90 / 150                           | x18            | air        | 3CX20,000A3             | Triode       |
| 27.5 kW                            | 7.5 kW                                  | 90 / 150                           | x18            | air        | 3CX20,000H3             | Triode       |
| 23.5 kW                            | 5.8 kW                                  | 110 / 225                          | x155           | air        | 4CX15,000A              | Tetrode      |
| 23.5 kW                            | 5.8 kW                                  | 110 / 225                          | x155           | vapor      | 4CV35,000A              | Tetrode      |
| 18.0 kW                            | 5.4 kW                                  | 100 / 150                          | x37            | air        | 3CX15,000A3             | Triode       |
| 12.4 kW                            | 2.6 kW                                  | 140 / 200                          | x24            | air        | 3CX10,000A3             | Triode       |
| 8500 W                             | 3500 W                                  | 100 / 220                          | x230           | air        | 4CX10,000D              | Tetrode      |
| 8500 W                             | 3500 W                                  | 100 / 220                          | x230           | air        | 4CX5000A                | Tetrode      |
| 8500 W                             | 3500 W                                  | 100 / 220                          | x230           | air        | 4CX5000R                | Tetrode      |
| 5750 W                             | 1250 W                                  | 150 / 220                          | x190           | air        | 4CX3000A                | Tetrode      |
| 5300 W                             | 950 W                                   | 75 / 150                           | x45            | air        | 3CX2500A3               | Triode       |
| 5300 W                             | 950 W                                   | 75 / 150                           | x45            | air        | 3CX2500F3               | Triode       |
| 2630 W                             | 670 W                                   | 110 / —                            | x290           | air        | 4-1000A                 | Tetrode      |
| 2320 W                             | 780 W                                   | 110 / 220                          | x230           | air        | 4CX1500A                | Tetrode      |
| 1960 W                             | 575 W                                   | 110 / 220                          | x195           | air        | 5CX1500A                | Pentode      |
| 1765 W                             | 485 W                                   | 110 / —                            | x50            | air        | 3-1000Z                 | Triode       |
| 830 W                              | 245 W                                   | 110 / —                            | x140           | air        | 4-500A                  | Tetrode      |
| 785 W                              | 280 W                                   | 110 / —                            | x110           | air        | 5-500A                  | Pentode      |
| 640 W                              | 185 W                                   | 110 / —                            | x25            | air        | 3-500Z                  | Triode       |
| 630 W                              | 195 W                                   | 110 / —                            | x190           | air        | 4-400C                  | Tetrode      |
| 510 W                              | 165 W                                   | 110 / —                            | x160           | air        | 4-250A                  | Tetrode      |
| 300 W                              | 80 W                                    | 120 / —                            | x90            | air        | 4-125A                  | Tetrode      |
| 300 W                              | 200 W                                   | 110 / 220                          | x175           | air        | 4CX300 Y                | Tetrode      |
| 270 W                              | 280 W                                   | 500 / —                            | —              | air        | 8930                    | Tetrode      |
| 235 W                              | 65 W                                    | 500 / —                            | x160           | conduction | 4CS250R                 | Tetrode      |
| 235 W                              | 65 W                                    | 500 / —                            | x135           | air        | 4CX250BC                | Tetrode      |
| 235 W                              | 65 W                                    | 500 / —                            | x135           | air        | 4CX250F                 | Tetrode      |
| 235 W                              | 65 W                                    | 500 / 1500                         | x135           | air        | 4CX250K                 | Tetrode      |
| 235 W                              | 65 W                                    | 500 / 1500                         | x135           | air        | 4CX250M                 | Tetrode      |
| 235 W                              | 65 W                                    | 500 / —                            | x160           | air        | 4CX250R                 | Tetrode      |
| 235 W                              | 65 W                                    | 500 / —                            | x135           | air        | 4CX300A                 | Tetrode      |
| 235 W                              | 65 W                                    | 150 / 500                          | x135           | air        | 4X150A                  | Tetrode      |
| 235 W                              | 65 W                                    | 150 / 500                          | x135           | air        | 7609                    | Tetrode      |
| 235 W                              | 65 W                                    | 500 / —                            | x135           | conduction | 8560A                   | Tetrode      |
| 210 W                              | 45 W                                    | 150 / —                            | x65            | convection | 4-65A                   | Tetrode      |
| 45 W                               | 45 W                                    | 1215 / —                           | x15 @ 400 MHz  | air        | 6884                    | Tetrode      |
| 45 W                               | 45 W                                    | 1215 / —                           | x15 @ 400 MHz  | air        | 7457                    | Tetrode      |
| 45 W                               | 45 W                                    | 1215 / —                           | x15 @ 400 MHz  | conduction | 7843                    | Tetrode      |

\* Power output and power gain are calculated or measured at low frequency.

† F1 is the maximum frequency at which maximum ratings apply. Operating at the upper useful frequency normally involves operation at reduced anode voltage and reduced plate input power.

# OSCILLATOR OR AMPLIFIER

## Class C — Industrial Service

| Plate Pwr.<br>Output<br>Typical* | Rated<br>Plate<br>Diss. | Filament<br>Heating<br>Power | Frequency†<br>F1 / upper<br>useful | Cooling | EIMAC<br>Type<br>Number | Tube<br>Type |
|----------------------------------|-------------------------|------------------------------|------------------------------------|---------|-------------------------|--------------|
| (kW)                             | (kW)                    | (Watts)                      | (MHz)                              |         |                         |              |
| 1800                             | 1000                    | 26640                        | 30 / 60                            | water   | X-2176                  | Triode       |
| 900                              | 500                     | 13320                        | 30 / 60                            | water   | X-2177                  | Triode       |
| 80                               | 60                      | 2665                         | 40 / 80                            | water   | 6696A                   | Triode       |
| 80                               | 35                      | 2665                         | 40 / 80                            | air     | 6697A                   | Triode       |
| 80                               | 80                      | 2665                         | 40 / 80                            | vapor   | 7480                    | Triode       |
| 70                               | 40                      | 1600                         | 90 / —                             | water   | 3CW40,000H3             | Triode       |
| 60                               | 20                      | 1600                         | 90 / —                             | air     | 3CX20,000H3             | Triode       |
| 42                               | 30                      | 1020                         | 90 / —                             | water   | 3CW30,000H3             | Triode       |
| 42                               | 30                      | 1020                         | 100 / —                            | vapor   | 3CV30,000H3             | Triode       |
| 41.2                             | 15                      | 1020                         | 90 / —                             | air     | 3CX15,000H3             | Triode       |
| 29                               | 10                      | 742                          | 90 / —                             | air     | 3CX10,000H3             | Triode       |
| 28                               | 20                      | 742                          | 90 / —                             | water   | 3CW20,000H3             | Triode       |
| 20.6                             | 10                      | 566                          | 90 / —                             | water   | 3CW10,000H3             | Triode       |
| 18.6                             | 5                       | 566                          | 90 / —                             | air     | 3CX5000H3               | Triode       |
| 10                               | 5                       | 379                          | 75 / 150                           | water   | 3CW5000H3               | Triode       |
| 5                                | 2.5                     | 379                          | 75 / 150                           | air     | 3CX2500A3/F3/H3         | Triode       |
| 1.2                              | 0.3                     | 125                          | 40 / 80                            | air     | 304TL                   | Triode       |
| 0.68                             | 0.35                    | 70                           | 100 / —                            | air     | 5867A                   | Triode       |

\* Calculated or measured at low frequency.

† F1 is the maximum frequency at which maximum ratings apply. Operation at the upper useful frequency normally involves operation at reduced anode voltage and reduced plate input power.

## REGULATOR SERVICE

| Maximum<br>Pass<br>Current<br>(A dc) | Maximum<br>Hold-off<br>Voltage<br>(kVdc) | Minimum<br>Tube<br>Drop<br>(Vdc) | Rated<br>Anode<br>Diss.<br>(kW) | Cooling    | EIMAC<br>Type<br>Number | Tube<br>Type |
|--------------------------------------|------------------------------------------|----------------------------------|---------------------------------|------------|-------------------------|--------------|
| 300                                  | 40                                       | 3000                             | 1250                            | water      | X-2159                  | Tetrode      |
| 150                                  | 40                                       | 2500                             | 650                             | water      | X-2170                  | Tetrode      |
| 50                                   | 40                                       | 4400                             | 250                             | water      | 4CW250,000A             | Tetrode      |
| 35                                   | 40                                       | 2700                             | 100                             | water      | 4CW100,000E             | Tetrode      |
| 30                                   | 40                                       | 3300                             | 100                             | water      | 4CW100,000D             | Tetrode      |
| 15                                   | 35                                       | 3000                             | 50                              | water      | 4CW50,000E              | Tetrode      |
| 15                                   | 40                                       | 2200                             | 35                              | air        | 4CX35,000C              | Tetrode      |
| 7.5                                  | 10                                       | 1500                             | 20                              | water      | 3CW20,000A1             | Triode       |
| 7.5                                  | 20                                       | 1200                             | 20                              | water      | 3CW20,000A7             | Triode       |
| 7                                    | 10                                       | 1300                             | 12                              | air        | 3CX10,000A1             | Triode       |
| 6                                    | 20                                       | 800                              | 25                              | water      | 4CW25,000A              | Tetrode      |
| 4                                    | 20                                       | 500                              | 15                              | air        | 3CX15,000A7             | Triode       |
| 4                                    | 15                                       | 2000                             | 10                              | water      | 4CW10,000A              | Tetrode      |
| 3                                    | 12                                       | 1300                             | 5                               | water      | 3CW5000A1               | Triode       |
| 2                                    | 12                                       | 1000                             | 3                               | air        | 3CX3000F1               | Triode       |
| 2                                    | 6                                        | 1000                             | 2                               | water      | 4CW2000A                | Tetrode      |
| 1                                    | 8                                        | 250                              | 1.5                             | air        | 3CX1500A7               | Triode       |
| 1                                    | 6                                        | 500                              | 1                               | air        | 4CX1000A                | Tetrode      |
| 1                                    | 6                                        | 500                              | 0.8                             | water      | 4CW800B                 | Tetrode      |
| 1                                    | 6                                        | 500                              | 0.8                             | water      | 4CW800F                 | Tetrode      |
| 0.8                                  | 4.5                                      | 300                              | 0.4                             | air        | 8874                    | Triode       |
| 0.8                                  | 4.5                                      | 300                              | 0.3                             | air        | 8875                    | Triode       |
| 0.8                                  | 4.5                                      | 300                              | 0.2                             | convection | 8873                    | Triode       |
| 0.6                                  | 30                                       | 500                              | 1                               | air        | 4PR1000A                | Tetrode      |
| 0.6                                  | 8                                        | 400                              | 0.5                             | air        | 3-500Z                  | Triode       |
| 0.2                                  | 20                                       | 1800                             | 0.4                             | air        | 4PR400A                 | Tetrode      |
| 0.2                                  | 50                                       | 1000                             | 0.25                            | air        | 4PR250C                 | Tetrode      |
| 0.1                                  | 18                                       | 1200                             | 0.125                           | air        | 4PR125A                 | Tetrode      |
| 0.1                                  | 15                                       | 500                              | 0.065                           | convection | 4PR65A                  | Tetrode      |

# RF POWER AMPLIFIER

## Grid Pulsed Service

| Peak RF<br>Pwr. Output<br>Typical $\beta$<br>(kW) | Rated<br>Anode<br>Diss.<br>(kW) | Frequency†<br>F1 / upper<br>useful<br>(MHz) | Maximum<br>Anode<br>Voltage<br>(kVdc) | Maximum<br>Anode<br>Current $\beta$<br>(A) | Cooling    | EIMAC<br>Type<br>Number | Tube<br>Type |
|---------------------------------------------------|---------------------------------|---------------------------------------------|---------------------------------------|--------------------------------------------|------------|-------------------------|--------------|
| 3900                                              | 1250                            | 30 / 50                                     | 30                                    | 195                                        | water      | X-2159                  | Tetrode      |
| 2000                                              | 650                             | 50 / 100                                    | 30                                    | 100                                        | water      | X-2170                  | Tetrode      |
| 1000                                              | 100                             | 108 / 150                                   | 30                                    | 50                                         | water      | 4CW100,000E             | Tetrode      |
| 500                                               | 50                              | 110 / 220                                   | 30                                    | 33                                         | vapor      | 4CV50,000E              | Tetrode      |
| 500                                               | 50                              | 110 / 220                                   | 30                                    | 33                                         | water      | 4CW50,000E              | Tetrode      |
| 160                                               | 15                              | 110 / 225                                   | 12                                    | 20                                         | air        | 4CX15,000A              | Tetrode      |
| 80                                                | 10                              | 110 / 220                                   | 10                                    | 13                                         | air        | 4CX10,000D              | Tetrode      |
| 80                                                | 10                              | 110 / 220                                   | 10                                    | 13                                         | air        | 4CX5000A                | Tetrode      |
| 80                                                | 10                              | 100 / 220                                   | 10                                    | 13                                         | air        | 4CX5000R                | Tetrode      |
| 35                                                | 1.5                             | — / 500                                     | 20                                    | 8                                          | air        | 3CPX1500A7              | Triode       |
| 34                                                | 1.0                             | 110 / —                                     | 15                                    | 3.5                                        | air        | 4PR1000A                | Tetrode      |
| 28*                                               | 0.25                            | 500 / 1500                                  | 7                                     | 6.0                                        | air        | 4CPX250K                | Tetrode      |
| 28*                                               | 0.25                            | 500 / 1500                                  | 7                                     | 6.0                                        | air        | 4CX250K                 | Tetrode      |
| 28*                                               | 0.25                            | 500 / 1500                                  | 7.0                                   | 6.0                                        | air        | 4CX250M                 | Tetrode      |
| 26                                                | 1500                            | 500 / —                                     | 5                                     | 8                                          | air        | 8938                    | Triode       |
| 11                                                | 0.40                            | 110 / —                                     | 10                                    | 1.7                                        | air        | 4PR400A                 | Tetrode      |
| 10‡                                               | 0.25                            | 500 / 1500                                  | 5.5                                   | 0.8                                        | air        | 4CPX250K                | Tetrode      |
| 4.0                                               | 0.125                           | 120 / —                                     | 9.0                                   | 0.7                                        | air        | 4PR125A                 | Tetrode      |
| 2.6                                               | 0.300                           | 110 / 220                                   | 3.0                                   | 1.3                                        | air        | 4CX300Y                 | Tetrode      |
| 2.0                                               | 0.065                           | 150 / —                                     | 7.5                                   | 0.4                                        | convection | 4PR65A                  | Tetrode      |
| 1.6                                               | 0.20                            | 500 / —                                     | 3.0                                   | 0.8                                        | conduction | 8873                    | Triode       |
| 1.6                                               | 0.40                            | 500 / —                                     | 3.0                                   | 0.8                                        | air        | 8874                    | Triode       |
| 1.6                                               | 0.30                            | 500 / —                                     | 3.0                                   | 0.8                                        | air        | 8875                    | Triode       |
| 1.6                                               | 0.25                            | 500 / —                                     | 3.0                                   | 0.8                                        | air        | 4CX250B}                | Tetrode      |
| 1.6                                               | 0.25                            | 500 / —                                     | 3.0                                   | 0.8                                        | air        | 4CX250F}                |              |
| 1.6                                               | 0.25                            | 500 / 1500                                  | 3.0                                   | 0.8                                        | air        | 4CX250K}                |              |
| 1.6                                               | 0.25                            | 500 / 1500                                  | 3.0                                   | 0.8                                        | air        | 4CX250M}                |              |

$\beta$  Average during the pulse. Power output data is anode power (does not include circuit losses), calculated or measured at low frequency.

† F1 is the maximum frequency at which maximum ratings apply. Operation at the upper useful frequency normally involves operation at reduced anode voltage and reduced anode power input.

\* Anode and screen-grid pulsed

‡ Cathode driven, screen pulsed

# AF POWER AMPLIFIER

OR

## MODULATOR SERVICE

| AF Pwr. Output<br>Typical*<br>(2 tubes)<br>(kW - W) | Typical*<br>Plate Diss.<br>Per Tube<br>(kW - W) | Class of<br>Service | Driving<br>Power<br>(2 tubes) | Cooling | EIMAC<br>Type<br>Number                   | Tube<br>Type |
|-----------------------------------------------------|-------------------------------------------------|---------------------|-------------------------------|---------|-------------------------------------------|--------------|
| 1900 kW                                             | 420 kW                                          | AB1                 | 0                             | water   | X-2159                                    | Tetrode      |
| 950 kW                                              | 210 kW                                          | AB1                 | 0                             | water   | X-2170                                    | Tetrode      |
| 660 kW                                              | 260 kW                                          | AB1                 | 0                             | vapor   | 4CV250,000A                               | Tetrode      |
| 660 kW                                              | 260 kW                                          | AB1                 | 0                             | water   | 4CW250,000A                               | Tetrode      |
| 246 kW                                              | 57 kW                                           | AB1                 | 0                             | vapor   | 4CV100,000C                               | Tetrode      |
| 246 kW                                              | 57 kW                                           | AB1                 | 0                             | water   | 4CW100,000D                               | Tetrode      |
| 200 kW                                              | 46 kW                                           | AB1                 | 0                             | water   | 4CW100,000E                               | Tetrode      |
| 195 kW                                              | 42 kW                                           | AB1                 | 0                             | water   | 4CW50,000E                                | Tetrode      |
| 195 kW                                              | 42 kW                                           | AB1                 | 0                             | vapor   | 4CV50,000E                                | Tetrode      |
| 195 kW                                              | 42 kW                                           | AB1                 | 0                             | vapor   | 4CV50,000J                                | Tetrode      |
| 195 kW                                              | 42 kW                                           | AB1                 | 0                             | water   | 4CW50,000J                                | Tetrode      |
| 152 kW                                              | 44 kW                                           | AB2                 | 600                           | water   | 6696A                                     | Triode       |
| 152 kW                                              | 44 kW                                           | AB2                 | 600                           | air     | 6697A                                     | Triode       |
| 152 kW                                              | 44 kW                                           | AB2                 | 600                           | vapor   | 7480                                      | Triode       |
| 70 kW                                               | 20 kW                                           | AB1                 | 0                             | air     | 4CX35,000C                                | Tetrode      |
| 66 kW                                               | 20.5 kW                                         | AB1                 | 0                             | vapor   | 4CV35,000A                                | Tetrode      |
| 57 kW                                               | 14 kW                                           | AB1                 | 0                             | water   | 4CW25,000A                                | Tetrode      |
| 57 kW                                               | 14 kW                                           | AB1                 | 0                             | air     | 4CX15,000A                                | Tetrode      |
| 31.9 kW                                             | 9 kW                                            | AB1                 | 0                             | air     | 4CX10,000D                                | Tetrode      |
| 29.1 kW                                             | 10 kW                                           | AB1                 | 0                             | air     | 3CX10,000A1                               | Triode       |
| 29.1 kW                                             | 10 kW                                           | AB1                 | 0                             | water   | 3CW20,000A1                               | Triode       |
| 17.5 kW                                             | 4.2 kW                                          | AB1                 | 0                             | air     | 4CX5000A                                  | Tetrode      |
| 17.5 kW                                             | 4.2 kW                                          | AB1                 | 0                             | air     | 4CX5000R                                  | Tetrode      |
| 1.45 kW                                             | 4.75 kW                                         | AB1                 | 0                             | vapor   | 4CV8000A                                  | Tetrode      |
| 13.0 kW                                             | 2.5 kW                                          | B                   | 113                           | water   | 3CW5000A3                                 | Triode       |
| 13.0 kW                                             | 2.5 kW                                          | B                   | 113                           | air     | 3CX2500A3                                 | Triode       |
| 13.0 kW                                             | 2.5 kW                                          | B                   | 113                           | air     | 3CX2500F3                                 | Triode       |
| 13.0 kW                                             | 2.5 kW                                          | B                   | 113                           | water   | 3CW5000F3                                 | Triode       |
| 11.4 kW                                             | 3.3 kW                                          | AB1                 | 0                             | air     | 4CX3000A                                  | Tetrode      |
| 10.0 kW                                             | 2.95 kW                                         | AB1                 | 0                             | water   | 3CW5000A1                                 | Triode       |
| 10.0 kW                                             | 2.95 kW                                         | AB1                 | 0                             | water   | 3CW5000F1                                 | Triode       |
| 10.0 kW                                             | 2.95 kW                                         | AB1                 | 0                             | air     | 3CX3000A1                                 | Triode       |
| 10.0 kW                                             | 2.95 kW                                         | AB1                 | 0                             | air     | 3CX3000F1                                 | Triode       |
| 3.9 kW                                              | 900 W                                           | AB2                 | 4.7                           | air     | 4-1000A                                   | Tetrode      |
| 3.22 kW                                             | 920 W                                           | AB1                 | 0                             | air     | 5CX1500A                                  | Pentode      |
| 3.2 kW                                              | 920 W                                           | AB1                 | 0                             | air     | 4CX1500A                                  | Tetrode      |
| 1.72 kW                                             | 500 W                                           | AB1                 | 0                             | air     | 4-500A                                    | Tetrode      |
| 1.66 kW                                             | 458 W                                           | AB1                 | 0                             | air     | 5-500A                                    | Pentode      |
| 1.75 kW                                             | 400 W                                           | AB2                 | 3.5                           | air     | 4-400C                                    | Tetrode      |
| 1.42 kW                                             | 445 W                                           | AB2                 | 25                            | air     | 3-500Z                                    | Triode       |
| 1.31 kW                                             | 340 W                                           | B                   | 26                            | air     | 3-400Z                                    | Triode       |
| 1.04 kW                                             | 190 W                                           | AB2                 | 1.9                           | air     | 4-250A                                    | Tetrode      |
| 800 W                                               | 225 W                                           | AB1                 | 0                             | air     | 4CX300A                                   | Tetrode      |
| 780 W                                               | 350 W                                           | AB1                 | 0                             | air     | 8930                                      | Tetrode      |
| 600 W                                               | 200 W                                           | AB1                 | 0                             | air     | { 4CX250BC<br>4CX250F<br>4X150A<br>7609 } | Tetrode      |
| 400 W                                               | 125 W                                           | AB2                 | 1.0                           | air     | 4-125A                                    | Tetrode      |
| 270 W                                               | 63 W                                            | AB2                 | 1.3                           | air     | 4-65A                                     | Tetrode      |

\* Measured in watts, unless otherwise specified.

# SWITCH TUBE OR PULSED REGULATOR SERVICE

| Peak<br>Anode<br>Current<br>(A) | Maximum<br>Hold-off<br>Voltage<br>(kVdc) | Rated<br>Anode<br>Diss.<br>(kW) | Cooling    | EIMAC<br>Type<br>Number | Tube<br>Type          |
|---------------------------------|------------------------------------------|---------------------------------|------------|-------------------------|-----------------------|
| 780                             | 60                                       | 1250                            | water      | X-2159                  | Tetrode               |
| 400                             | 60                                       | 650                             | water      | X-2170                  | Tetrode               |
| 300                             | 40                                       | 250                             | water      | 4CW250,000A             | Tetrode               |
| 150                             | 75                                       | 35                              | air        | Y-546                   | Tetrode <sup>1</sup>  |
| 150                             | 75                                       | 100                             | water      | Y-647                   | Tetrode <sup>2</sup>  |
| 150                             | 40                                       | 100                             | water      | 4CW100,000D             | Tetrode               |
| 150                             | 75                                       | 100                             | water      | Y-676                   | Tetrode <sup>3</sup>  |
| 150                             | 40                                       | 100                             | water      | 4CW100,000E             | Tetrode               |
| 150                             | 40                                       | 35                              | air        | 4CX35,000C              | Tetrode               |
| 130                             | 25                                       | 60                              | water      | 6696A                   | Triode                |
| 130                             | 25                                       | 35                              | air        | 6697A                   | Triode                |
| 100                             | 50                                       | 5                               | air        | X-2187                  | Triode <sup>4</sup>   |
| 100                             | 35                                       | 50                              | water      | 4CW50,000E              | Tetrode               |
| 100                             | 35                                       | 50                              | vapor      | 4CV50,000E              | Tetrode               |
| 70                              | 20                                       | 25                              | water      | 4CW25,000A              | Tetrode               |
| 60                              | 20                                       | 15                              | air        | 4CX15,000A              | Tetrode               |
| 60                              | 30                                       | 15                              | air        | Y-456                   | Tetrode <sup>5</sup>  |
| 50                              | 30                                       | 25                              | water      | Y-569                   | Tetrode <sup>6</sup>  |
| 50                              | 15                                       | 1.5                             | air        | 3CPX1500A7              | Triode                |
| 40                              | 15                                       | 10                              | air        | 4CX10,000D              | Tetrode               |
| 40                              | 18                                       | 5                               | air        | Y-573                   | Pentode <sup>7</sup>  |
| 40                              | 18                                       | 3                               | air        | Y-574                   | Pentode <sup>8</sup>  |
| 40                              | 20                                       | 6.0                             | water      | Y-633                   | Tetrode <sup>9</sup>  |
| 40                              | 20                                       | 20                              | water      | 3CW20,000A7             | Triode                |
| 40                              | 15                                       | 5                               | air        | 4CX5000A                | Tetrode               |
| 40                              | 15                                       | 5                               | air        | 4CX5000R                | Tetrode               |
| 40                              | 25                                       | 10                              | water      | Y-442                   | Tetrode <sup>10</sup> |
| 25                              | 20                                       | 3                               | air        | 4CX3000A                | Tetrode               |
| 18                              | 20                                       | 0.06                            | air        | 4PR60C                  | Tetrode               |
| 15                              | 10                                       | 3                               | air        | 3CX3000F7               | Triode                |
| 12                              | 12                                       | 1                               | air        | Y-575                   | Pentode <sup>11</sup> |
| 12                              | 4                                        | 0.6                             | air        | 4CX600B/F               | Tetrode               |
| 12                              | 4                                        | 0.8                             | water      | 4CW800B/F               | Tetrode               |
| 12                              | 25                                       | 0.75                            | air        | 8941                    | Planar<br>Triode      |
| 12                              | 20                                       | 0.75                            | air        | 8942                    | Planar<br>Triode      |
| 12                              | 6.5                                      | 0.75                            | air        | 8940                    | Planar<br>Triode      |
| 10                              | 50                                       | 1.0                             | air        | 8960                    | Tetrode               |
| 10                              | 7                                        | 1.5                             | air        | 4CX1500A                | Tetrode               |
| 8                               | 30                                       | 1.0                             | air        | 4PR1000A                | Tetrode               |
| 8                               | 40                                       | 1.0                             | air        | Y-364                   | Tetrode <sup>12</sup> |
| 8                               | 7.5 (oil)                                | 0.6                             | air or oil | 8954                    | Tetrode               |
| 6                               | 12                                       | 0.15                            | air        | Y-518                   | Planar<br>Triode      |
| 6                               | 7                                        | 0.25                            | air        | 4CPX250K                | Tetrode               |
| 6                               | 4                                        | 0.15                            | air        | Y-519                   | Planar<br>Triode      |
| 5                               | 12                                       | 0.15                            | air        | Y-540                   | Planar<br>Triode      |

1. Specially processed 4CX35,000C  
4. Focused oxide cathode  
7. Specially processed Type 290  
10. Specially processed 4CX5000R

2. Specially processed 4CW100,000D  
5. Specially processed 4CX15,000A  
8. Specially processed Type 8576/264  
11. Specially processed 8295A

3. Specially processed 4CW100,000E  
6. Prototype: 4CW25,000A  
9. Prototype: 4CX5000R  
12. Specially processed 4PR1000A

SWITCH TUBE OR PULSED REGULATOR SERVICE, CONTINUED

| Peak<br>Anode<br>Current<br>(A) | Maximum<br>Hold-off<br>Voltage<br>(kVdc) | Rated<br>Anode<br>Diss.<br>(Watts) | Cooling    | EIMAC<br>Type<br>Number | Tube<br>Type         |
|---------------------------------|------------------------------------------|------------------------------------|------------|-------------------------|----------------------|
| 5                               | 10                                       | 150                                | air        | 8755                    | Planar<br>Triode     |
| 5                               | 4                                        | 150                                | air        | 8847                    | Planar<br>Triode     |
| 5                               | 3.5                                      | 100                                | air        | 7211                    | Planar<br>Triode     |
| 5                               | 3.5                                      | 150                                | air        | 8757                    | Planar<br>Triode     |
| 5                               | 3.5                                      | 100                                | air        | 8403                    | Planar<br>Triode     |
| 4                               | 50                                       | 250                                | air        | 4PR250C                 | Tetrode              |
| 4                               | 20                                       | 400                                | air        | 4PR400A                 | Tetrode              |
| 3                               | 10                                       | 400                                | air        | Y-504                   | Triode <sup>13</sup> |
| 3                               | 4.5                                      | 100                                | air        | 7815RAL                 | Planar<br>Triode     |
| 3                               | 3.5                                      | 100                                | air        | 7815R                   | Planar<br>Triode     |
| 3                               | 3.5                                      | 100                                | air        | 7855                    | Planar<br>Triode     |
| 3                               | 3.5                                      | 150                                | air        |                         | Planar<br>Triode     |
| 2.1                             | 18                                       | 125                                | air        | 4PR125A                 | Tetrode              |
| 1.5                             | 4.5                                      | 100                                | air        | 8745                    | Planar<br>Triode     |
| 1.2                             | 15                                       | 65                                 | convection | 4PR65A                  | Tetrode              |

13. Specially processed 3-400Z

## EIMAC PLANAR TRIODES

EIMAC planar triodes provide greater power, higher efficiency and more reliability than "standard" designs. Many EIMAC planars include internal shielding to reduce degradation effects caused by cathode sublimation. Other types feature a cool cathode to provide long tube life. A broad choice of anodes is available for a wide selection of cooling techniques. High quality and rigid inspection of all planars provide low failure rate and low cost per tube operating hour.

You are not limited by listed planar types. EIMAC's Application Engineering Department is ready to help you design planars into your equipment, or to propose new planar designs to glove-fit your requirements. Write for our planar triode brochure or contact Product Manager, EIMAC division of Varian, 1678 South Pioneer Road, Salt Lake City, Utah 84104. Phone: (801) 487-7561.

### 2C39A, 2C39BA, 2C39WA, 3CX100A5, 7289



These ceramic/metal planar UHF triodes are usable to 3000 MHz as power amplifiers, oscillators, or frequency multipliers. Narrow mechanical tolerances and exacting electrical testing assure tube-to-tube uniformity.

Of these types, only the 7289 is now recommended for Military equipment usage, and is specified as the replacement to be used in older equipments originally supplied with 2C39A, 2C39WA, or 3CX100A5.

The 2C39BA is specially tested for emission and control characteristics, for applications which are unusually sensitive to these parameters.

All the types are identical in appearance and dimensionally the same.

#### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 100 watts                 |
| Grid Dissipation (Max.)               | 2 watts                   |
| Frequency for Max. Ratings (CW)       | 2500 MHz                  |
| (Pulsed)                              | 3000 MHz                  |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Heater: Voltage (2C39A)               | .6.3 volts                |
| (remaining types)                     | .6.0 volts                |
| Current (2C39A)                       | 1.03 amperes              |
| (remaining types)                     | 1.00 ampere               |
| Capacitances: Grid-Cathode            | .6.3 pF                   |
| Grid-Plate                            | 2.01 pF                   |
| Plate-Cathode                         | 0.035 pF                  |
| Amplification Factor (Mu)             | 100                       |
| Transconductance (Sm)                 | 25 mmhos                  |
| Base                                  | Special, Coaxial          |
| Socket                                | Special                   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 2.70 in; 68.60 mm         |
| Maximum Diameter                      | 1.27 in; 32.20 mm         |
| Weight (approximate)                  | 2.5 oz; 71 gm             |
| Operating Position (all types)        | Any                       |

| Class of Operation | Type of Service                 | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |      |                   |                      |
|--------------------|---------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|------|-------------------|----------------------|
|                    |                                 | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty | Pulse Length (μs) | Output Power (watts) |
| C                  | RF Amp. or Osc.                 | 1000                  | 0.100                | 0.125                  | 500               | 900                   | 0.09                 | —    | —                 | 40*                  |
| C                  | RF Amp. or Osc.                 | 1000                  | 0.100                | 0.125                  | 2500              | 900                   | 0.09                 | —    | —                 | 17*                  |
| C                  | Plate Modulated RF Amp. or Osc. | 600                   | 0.100                | 0.125                  | 500               | 600                   | 0.065                | —    | —                 | 16*                  |

\*Useful Power Output, delivered to the load.

Planar Triodes  
**7815, 7815AL,  
7815RAL, 8745/7815R**

These ceramic/metal planar UHF triodes are intended for pulse and high altitude applications. Electrically similar to the 7289, they feature a longer grid-anode ceramic insulator with a higher voltage breakdown rating. Pulse ratings apply to 70,000 feet altitude, making these tubes especially suitable for airborne applications.

The 7815 and 7815AL are identical except for special tests performed on the 7815AL to prove reliability in airline DME and transponder usage. Both have a knurled-knob anode assembly.

The 7815RAL, and 8745/7815R have a 100-watt transverse cooler on the anode, and are identical except for special high-voltage processing and testing on the 8745/7815R.

### CHARACTERISTICS

|                                          |                           |
|------------------------------------------|---------------------------|
| Plate Dissipation (Max.) (7815 & 7815AL) | 10 watts                  |
| Plate Dissipation (Max.) (8745/7815R)    | 100 watts                 |
| Grid Dissipation (Max.)                  | 2 watts                   |
| Frequency for Max. Ratings (Pulsed)      | 3000 MHz                  |
| Cooling (7815 & 7815AL)                  | Conduction or Forced Air  |
| Cooling (8745/7815R, 7815RAL)            | Forced Air                |
| Cathode                                  | Oxide-coated Unipotential |
| Heater:                                  |                           |
| Voltage (7815AL)                         | 5.7 volts                 |
| (remaining types)                        | 6.0 volts                 |
| Current (7815AL)                         | 0.95 ampere               |
| (remaining types)                        | 1.00 ampere               |
| Capacitances:                            |                           |
| Grid-Cathode                             | 6.3 pF                    |
| Grid-Plate                               | 1.98 pF                   |
| Plate-Cathode                            | 0.025 pF                  |
| Amplification Factor (Mu)                | 100                       |
| Transconductance (Sm)                    | 25 mmhos                  |
| Base                                     | Special, Coaxial          |
| Socket                                   | Special                   |
| Maximum Seal & Anode Core Temperature    | 250°C                     |
| Maximum Length (all types)               | 2.70 in; 68.60 mm         |
| Maximum Diameter:                        |                           |
| (7815 & 7815AL)                          | 1.20 in; 30.50 mm         |
| (8745/7815R, 7815RAL)                    | 1.27 in; 32.20 mm         |
| Weight (approximate):                    |                           |
| (7815 & 7815AL)                          | 1.8 oz; 51 gm             |
| (8745/7815R, 7815RAL)                    | 2.5 oz; 71 gm             |
| Operating Position (all types)           | Any                       |



7815  
7815AL

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                   |                      |
|--------------------|---------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length (μs) | Output Power (watts) |
| C                  | Grid-pulsed Amp. or Osc.  | 2500                  | 3.0                  | 4.8                    | 1100              | 2200                  | 1.9                  | 0.002  | 3                 | 2000*                |
| C                  | Plate-pulsed Amp. or Osc. | 3500                  | 3.0                  | 4.8                    | 3000              | 3500                  | 3.0                  | 0.0033 | 6                 | 1600*                |

#### TYPE 8745 ONLY

|   |                           |      |     |     |      |      |     |        |   |       |
|---|---------------------------|------|-----|-----|------|------|-----|--------|---|-------|
| C | Grid-pulsed Amp. or Osc.  | 3500 | 3.0 | 4.8 | 1100 | 2200 | 1.9 | 0.002  | 3 | 2000* |
| C | Plate-pulsed Amp. or Osc. | 4500 | 3.0 | 4.8 | 3000 | 3500 | 3.0 | 0.0025 | 3 | 1600* |

\*Useful Power Output, delivered to the load.



8745/7815R,  
7815RAL

## Planar Triodes

# 7855, 7855KAL, Y-503



7855

These ceramic/metal planar UHF triodes feature rugged design, high transconductance and high  $\mu$ , a frequency-stable anode, and an arc-resistant cathode, all to assure stable operation under adverse conditions and minimize catastrophic failure due to an arc during circuit malfunction.

Test evaluation of the 7855KAL is based on the operating conditions found in commercial airborne applications, such as transponders, emphasizing cathode emission capability at reduced heater voltage and high-voltage holdoff.

The 7855 has a 100-watt transverse cooler, while the 7855KAL includes a knurled-knob anode assembly and is rated for lower plate dissipation.

The Y-503 is a 7855 with a threaded anode shank, to allow conduction, heat-sink, or liquid cooling.

## CHARACTERISTICS

|                                       |                                |
|---------------------------------------|--------------------------------|
| Plate Dissipation (Max.) (7855)       | 100 watts                      |
| Plate Dissipation (Max.) (7855KAL)    | 10 watts                       |
| Plate Dissipation (Max.) (Y-503)      | Dependent on Cooling Technique |
| Grid Dissipation (Max.)               | 2 watts                        |
| Frequency for Max. Ratings (CW)       | 2500 MHz                       |
| (Pulsed)                              | 3000 MHz                       |
| Cooling (7855)                        | Forced Air                     |
| Cooling (7855KAL)                     | Conduction or Forced Air       |
| Cooling (Y-503)                       | Technique Optional             |
| Cathode                               | Oxide-coated Unipotential      |
| Heater: Voltage (7855 & Y-503)        | 6.0 volts                      |
| (7855 KAL)                            | 5.7 volts                      |
| Current (7855 & Y-503)                | 1.0 ampere                     |
| (7855KAL)                             | 0.95 ampere                    |
| Capacitances: Grid-Cathode            | 6.8 pF                         |
| Grid-Plate                            | 2.5 pF                         |
| Plate-Cathode                         | 0.035 pF                       |
| Amplification Factor ( $\mu$ )        | 80                             |
| Transconductance ( $S_m$ )            | 25 mmhos                       |
| Base                                  | Special, Coaxial               |
| Socket                                | Special                        |
| Maximum Seal & Anode Core Temperature | 250°C                          |
| Maximum Length:                       |                                |
| (7855 & 7855KAL)                      | 2.40 in; 60.96 mm              |
| (Y-503)                               | 1.81 in; 45.97 mm              |
| Maximum Diameter (7855)               | 1.27 in; 32.20 mm              |
| (7855KAL)                             | 1.20 in; 30.50 mm              |
| (Y-503)                               | 0.79 in; 20.00 mm              |
| Operating Position (all types)        | Any                            |
| Weight (approximate) (7855)           | 2.0 oz; 57 gm                  |
| (7855KAL)                             | 1.4 oz; 40 gm                  |
| (Y-503)                               | 0.65 oz; 18 gm                 |
| Operating Position (all types)        | Any                            |

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |       |                         |                      |
|--------------------|---------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|-------|-------------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty  | Pulse Length ( $\mu$ s) | Output Power (watts) |
| C                  | Grid-pulsed Amp. or Osc.  | 2500                  | 3.0                  | 4.5                    | 1100              | 2000                  | 1.3                  | 0.001 | 0.5                     | 750*                 |
| C                  | Plate-pulsed Amp. or Osc. | 3500                  | 3.0                  | 4.5                    | —                 | —                     | —                    | —     | —                       | —                    |

\*Useful Power Output, delivered to the load.



7855KAL



Y-503

These ceramic/metal planar UHF triodes feature a large cathode area and a long grid-plate ceramic insulator, resulting in higher current ratings and making them useful in pulse service and high altitude environments. Features are high  $\mu$ , high transconductance, great mechanical strength, and an arc-resistant extended interface cathode to assure long and reliable life under adverse conditions.

The 7211 and 7698 are identical except for the installation of a 100-watt transverse cooler on the anode of the 7211, while the 7698 carries a knurled-knob assembly on its anode.

### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.) (7211)       | 100 watts                 |
| Plate Dissipation (Max.) (7698)       | 10 watts                  |
| Grid Dissipation (Max.) (both types)  | 2 watts                   |
| Frequency for Max. Ratings (CW)       | 2500 MHz                  |
| (Pulsed)                              | 3000 MHz                  |
| Cooling (7211)                        | Forced Air                |
| Cooling (7698)                        | Conduction or Forced Air  |
| Cathode                               | Oxide-coated Unipotential |
| Heater: Voltage                       | 6.3 volts                 |
| Current                               | 1.3 amperes               |
| Capacitances: Grid-Cathode            | 8.0 pF                    |
| Grid-Plate                            | 2.25 pF                   |
| Plate-Cathode                         | 0.06 pF                   |
| Amplification Factor ( $\mu$ )        | 80                        |
| Transconductance ( $S_m$ )            | 30 mmhos                  |
| Base                                  | Special, Coaxial          |
| Socket                                | Special                   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length (both types)           | 2.70 in; 68.60 mm         |
| Maximum Diameter (7211)               | 1.27 in; 32.20 mm         |
| (7698)                                | 1.20 in; 30.50 mm         |
| Weight (approximate) (7211)           | 2.2 oz; 63 gm             |
| (7698)                                | 1.6 oz; 48 gm             |
| Operating Position (both types)       | Any                       |



| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                         |                      |
|--------------------|---------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length ( $\mu$ s) | Output Power (watts) |
| C                  | RF Amp. (gnd. grid)       | 2500                  | 0.150                | 0.190                  | 700               | 630                   | 0.140                | —      | —                       | 45*                  |
| C                  | RF Osc. (gnd. grid)       | 2500                  | 0.150                | 0.190                  | 2500              | 1000                  | 0.140                | —      | —                       | 30*                  |
| C                  | Grid-pulsed Amp. or Osc.  | 2500                  | 5.0                  | 7.5                    | 1100              | 2200                  | 2.5                  | 0.002  | 3                       | 2500†                |
| C                  | Plate-pulsed Amp. or Osc. | 3500                  | 5.0                  | 7.5                    | 3000              | 3500                  | 4.8                  | 0.0025 | 3                       | 3000†                |

\* Useful Power Output, delivered to the load.

† Useful Pulse Power, delivered to the load.

**7289** see 2C39A



7698  
(see 7211)

## Planar Triodes

**8403**

The 8403 is a rugged, high-mu planar triode of ceramic/metal construction, for use as a grid-pulsed, plate pulsed, or CW oscillator, frequency multiplier, or amplifier up to 3000 MHz.

The tube incorporates a frequency-stable anode and a cathode designed for high current capability.

**CHARACTERISTICS**

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 100 watts                 |
| Grid Dissipation (Max.)               | 2 watts                   |
| Frequency for Max. Ratings (CW)       | 2500 MHz                  |
| (Pulsed)                              | 2000 MHz                  |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Heater: Voltage                       | 6.3 volts                 |
| Current                               | 1.3 amperes               |
| Capacitances: Grid-Cathode            | 8.0 pF                    |
| Grid-Plate                            | 3.1 pF                    |
| Plate-Cathode                         | 0.065 pF                  |
| Amplification Factor (Mu)             | 80                        |
| Transconductance (Sm)                 | 30 mmhos                  |
| Base                                  | Special, Coaxial          |
| Socket                                | Special                   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 2.39 in; 60.60 mm         |
| Maximum Diameter                      | 1.27 in; 32.20 mm         |
| Weight (approximate)                  | 2.0 oz; 57 gm             |
| Operating Position                    | Any                       |

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                   |                      |
|--------------------|---------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length (μs) | Output Power (watts) |
| C                  | RF Amp. or Osc.           | 1000                  | 0.150                | 0.190                  | 2500              | 900                   | 0.140                | —      | —                 | 25*                  |
| C                  | Grid-pulsed Amp. or Osc.  | 2500                  | 5.0                  | 7.5                    | 1090              | 2000                  | 4.0                  | 0.005  | 0.5               | 1000†                |
| C                  | Plate-pulsed Amp. or Osc. | 3000                  | 5.0                  | 7.5                    | 3000              | 3500                  | 5.0                  | 0.0025 | 3                 | 2000†                |

\*Useful Power Output, delivered to the load.

† Useful Pulse Power, delivered to the load.

**8533, 8533W**

The 8533 is a planar triode designed for use as a grid or plate pulsed oscillator, amplifier, frequency multiplier, or switch tube at high plate voltage.

The design incorporates an extended grid-to-anode ceramic insulator and a matrix cathode of the arc-resistant extended-interface type, permitting reliable operation up to 8 kVdc in RF or pulse modulator applications.

The 8533W is identical to the 8533 except that the four lower radiator fins have a maximum diameter of 1.13 in. (28.7 mm) as opposed to the normal diameter of 1.27 in. (32.11 mm).

**CHARACTERISTICS**

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 100 watts                 |
| Grid Dissipation (Max.)               | 1.5 watts                 |
| Frequency for Max. Ratings (Pulsed)   | 3000 MHz                  |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Heater: Voltage                       | 6.3 volts                 |
| Current                               | 1.3 amperes               |
| Capacitances: Grid-Cathode            | 8.0 pF                    |
| Grid-Plate                            | 1.65 pF                   |
| Plate-Cathode                         | 0.06 pF                   |
| Amplification Factor (Mu)             | 145                       |
| Nominal Cutoff Amp. Factor (Mu)       | 90                        |
| Transconductance (Sm)                 | 30 mmhos                  |
| Base                                  | Special, Coaxial          |
| Socket                                | Special                   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 2.70 in; 68.60 mm         |
| Maximum Diameter                      | 1.27 in; 32.20 mm         |
| Weight (approximate)                  | 2.2 oz; 63 gm             |
| Operating Position                    | Any                       |

| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                   |                      |
|--------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length (μs) | Output Power (watts) |
| C                  | Grid-pulsed Amp. or Osc.       | 8000                  | 5.0                  | 7.5                    | 1030              | 8000                  | 5.0                  | 0.0033 | 1                 | 15,000†              |
| C                  | Plate-pulsed Amp. or Osc.      | 10,000                | 5.0                  | 7.5                    | —                 | —                     | —                    | —      | —                 | —                    |
| —                  | Switch Tube or Pulse Modulator | 8000                  | —                    | 7.5                    | —                 | —                     | —                    | —      | —                 | —                    |

† Useful Pulse Power, delivered to the load.

**8745** see 7815

## Planar Triodes 8755, 8755A



### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . Dependent on Cooling Technique  
Grid Dissipation (Max.) . . . . . 1.5 watts  
Frequency for Max. Ratings (CW) . . . . . 2500 MHz  
(Pulsed) . . . . . 3000 MHz  
Cooling . . . . . Technique Optional  
Cathode . . . . . Oxide-coated Unipotential  
Heater: Voltage . . . . . 6.3 volts  
Current . . . . . 1.3 amperes  
Capacitances: Grid-Cathode . . . . . 9.5 pF  
Grid-Plate . . . . . 1.05 pF  
Plate-Cathode . . . . . 0.06 pF  
Amplification Factor ( $\mu$ ) . . . . . 135  
Nominal Cutoff Amp. Factor ( $\mu$ ) . . . . . 90  
Transconductance ( $S_m$ ) . . . . . 30 mmhos  
Anode . Threaded stud, 3/8-24 UNF, for heat transfer;  
Concentric flange for electrical contact.  
Base . . . . . Special, Coaxial  
Socket . . . . . Special  
Maximum Seal & Anode Core Temperature . . 250°C  
Maximum Length . . . . . 1.37 in; 34.80 mm  
Maximum Diameter . . . . . 0.785 in; 19.94 mm  
Weight (approximate) . . . . . 0.56 oz; 16 gm  
Operating Position (both types) . . . . . Any

The 8755 and 8755A are miniature ceramic/metal rugged planar triodes for advanced airborne and space applications up to 3000 MHz. The tubes are identical except the 8755A includes an internal spewing shield and will exhibit longer life in most applications.

The tubes are intended for use as an amplifier, oscillator, or frequency multiplier, either grid or plate pulsed, and may also be used in modulator or regulator service. Both tubes have a frequency-stable anode design and an arc-resistant cathode to assure stable and reliable life under adverse conditions.

Both tubes are supplied without radiator, and may be conduction, convection, heat-sink, or liquid cooled. Radiators for forced-air cooling, permitting up to 150 watts of dissipation, are available.

| Class of Operation      Type of Service |                                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |       |                         |                      |
|-----------------------------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|-------|-------------------------|----------------------|
|                                         |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty  | Pulse Length ( $\mu$ s) | Output Power (watts) |
| C                                       | Grid-pulsed Amp. or Osc.       | 8000                  | 5.0                  | 7.5                    | 1180              | 1750                  | 1.0                  | 0.001 | 3.5                     | 650†                 |
| C                                       | Plate-pulsed Amp. or Osc.      | 10,000                | 5.0                  | 7.5                    | —                 | —                     | —                    | —     | —                       | —                    |
| —                                       | Switch Tube or Pulse Modulator | 8000                  | —                    | 7.5                    | —                 | —                     | —                    | —     | —                       | —                    |

† Useful Pulse Power, delivered to the load.

## 8757



### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . Dependent on Cooling Technique  
Grid Dissipation (Max.) . . . . . 1.5 watts  
Frequency for Max. Ratings (CW) . . . . . 3000 MHz  
(Pulsed) . . . . . 3500 MHz  
Cooling . . . . . Technique Optional  
Cathode . . . . . Oxide-coated Unipotential  
Heater: Voltage . . . . . 6.3 volts  
Current . . . . . 1.3 amperes  
Capacitances: Grid-Cathode . . . . . 9.0 pF  
Grid-Plate . . . . . 1.65 pF  
Plate-Cathode . . . . . 0.04 pF  
Amplification Factor ( $\mu$ ) . . . . . 75  
Nominal Cutoff Amp. Factor ( $\mu$ ) . . . . . 60  
Transconductance ( $S_m$ ) . . . . . 30 mmhos  
Anode . Threaded stud, 3/8-24 UNF, for heat transfer;  
Concentric flange for electrical contact.  
Base . . . . . Special, Coaxial  
Socket . . . . . Special  
Maximum Seal & Anode Core Temperature . . 250°C  
Maximum Length . . . . . 1.30 in; 33.00 mm  
Maximum Diameter . . . . . 0.785 in; 19.94 mm  
Weight (approximate) . . . . . 0.56 oz; 16 gm  
Operating Position . . . . . Any

The 8757 is a miniature, frequency-stable, ceramic/metal rugged planar triode for advanced airborne and space applications up to 3500 MHz.

It may be used as an amplifier, oscillator, or frequency multiplier in the CW, grid or plate pulsed mode, as well as a modulator or regulator.

The tube has an anode designed to produce exceptional frequency stability, and an arc-resistant cathode, both assuring stable, reliable, and long-life operation under adverse conditions.

The 8757 is supplied without radiator and may be conduction, convection, heat-sink, or liquid cooled. Radiators for forced-air cooling, permitting an anode dissipation up to 150 watts, are available.

| Class of Operation      Type of Service |                                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                         |                      |
|-----------------------------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------------|----------------------|
|                                         |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length ( $\mu$ s) | Output Power (watts) |
| C                                       | RF Amp. or Osc.                | 2500                  | 0.250                | —                      | —                 | —                     | —                    | —      | —                       | —                    |
| C                                       | Grid-pulsed Amp. or Osc.       | 3000                  | 5.0                  | —                      | 3500              | 2500                  | 5.0                  | 0.0033 | 1.0                     | 3000†                |
| C                                       | Plate-pulsed Amp. or Osc.      | 3500                  | 5.0                  | —                      | —                 | —                     | —                    | —      | —                       | —                    |
| —                                       | Switch Tube or Pulse Modulator | 3500                  | —                    | 7.5                    | —                 | —                     | —                    | —      | —                       | —                    |

† Useful Pulse Power, delivered to the load.

## Planar Triodes 8847, 8847A



The 8847 and 8847A are miniature, ceramic/metal, rugged planar triodes for advanced airborne and space applications up to 3500 MHz.

The 8847A is identical to the 8847 except that heater power is reduced 25%. The tube should be used where input power consumption and heat dissipation are of major concern. Both tubes are supplied without radiator and may be conduction, convection, heat-sink, or liquid cooled. Radiators permitting forced-air cooling with up to 150 watts of anode dissipation are available.

Both tubes have a frequency-stable anode design and an arc-resistant cathode, for stable, reliable, and long-life operation under adverse conditions. Either tube may be used as an amplifier, oscillator, or frequency multiplier, in the CW mode, or grid or plate pulsed, as well as a modulator or regulator.

### CHARACTERISTICS

|                                       |                                                                                         |
|---------------------------------------|-----------------------------------------------------------------------------------------|
| Plate Dissipation (Max.)              | Dependent on Cooling Technique                                                          |
| Grid Dissipation (Max.)               | 1.5 watts                                                                               |
| Frequency for Max. Ratings (CW)       | 3000 MHz                                                                                |
| (Pulsed)                              | 3500 MHz                                                                                |
| Cooling                               | Technique Optional                                                                      |
| Cathode                               | Oxide-coated Unipotential                                                               |
| Heater: Voltage (8847)                | 6.3 volts                                                                               |
| (8847A)                               | 6.0 volts                                                                               |
| Current (8847)                        | 1.30 amperes                                                                            |
| (8847A)                               | 0.95 ampere                                                                             |
| Capacitances: Grid-Cathode            | 9.5 pF                                                                                  |
| Grid-Plate                            | 1.4 pF                                                                                  |
| Plate-Cathode                         | 0.06 pF                                                                                 |
| Amplification Factor (Mu)             | 75                                                                                      |
| Nominal Cutoff Amp. Factor (Mu)       | 60                                                                                      |
| Transconductance (Sm)                 | 30 mmhos                                                                                |
| Anode                                 | Threaded stud, 3/8-24 UNF, for heat transfer; Concentric flange for electrical contact. |
| Base                                  | Special, Coaxial                                                                        |
| Maximum Seal & Anode Core Temperature | 250°C                                                                                   |
| Maximum Length                        | 1.37 in; 34.80 mm                                                                       |
| Maximum Diameter                      | 0.785 in; 19.94 mm                                                                      |
| Weight (approximate)                  | 0.56 oz; 16 gm                                                                          |
| Operating Position (both types)       | Any                                                                                     |

| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                   |                      |
|--------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length (μs) | Output Power (watts) |
| C                  | RF Amp. or Osc.                | 2500                  | 0.250                | —                      | —                 | —                     | —                    | —      | —                 | —                    |
| C                  | Grid-pulsed Amp. or Osc.       | 3000                  | 5.0                  | —                      | 1600              | 3000                  | 3.0                  | 0.0033 | 6                 | 3000†                |
| C                  | Plate-pulsed Amp. or Osc.      | 3500                  | 5.0                  | —                      | —                 | —                     | —                    | —      | —                 | —                    |
| —                  | Switch Tube or Pulse Modulator | 3500                  | —                    | 7.5                    | —                 | —                     | —                    | —      | —                 | —                    |

† Useful Pulse Power, delivered to the load.

## 8892



The 8892 is a compact, rugged ceramic/metal planar triode intended for CW use or as a plate or grid pulsed oscillator or amplifier. It features high power output, high plate efficiency, and excellent frequency stability under severe environmental conditions.

The construction of the 8892 readily lends itself to cavity circuit operation, resulting in a very compact RF source. The tube is capable of providing up to 1 kW of peak power at 6000 MHz.

### CHARACTERISTICS

|                                                                                              |                           |
|----------------------------------------------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                                                                     | .50 watts                 |
| Grid Dissipation (Max.)                                                                      | 1.5 watts                 |
| Frequency for Max. Ratings (Pulsed)                                                          | 6000 MHz                  |
| Cooling                                                                                      | Conduction and Forced Air |
| Cathode                                                                                      | Oxide-coated Unipotential |
| Heater: Voltage                                                                              | 6.3 volts                 |
| Current                                                                                      | 0.65 ampere               |
| Capacitances: Grid-Cathode                                                                   | 5.0 pF                    |
| Grid-Plate                                                                                   | 1.6 pF                    |
| Plate-Cathode                                                                                | 0.06 pF                   |
| Amplification Factor (Mu)                                                                    | 60                        |
| Transconductance (Sm)                                                                        | 30 mmhos                  |
| Anode: 1/8 in. dia. smooth stud for heat transfer; Concentric flange for electrical contact. |                           |
| Grid & Cathode Contacts: Concentric Flanges                                                  |                           |
| Base Heater Contacts: Pin Type, isolated heater                                              |                           |
| Maximum Seal & Anode Core Temperature                                                        | 250°C                     |
| Maximum Length                                                                               | 1.13 in; 28.70 mm         |
| Maximum Diameter                                                                             | 0.76 in; 19.25 mm         |
| Weight (approximate)                                                                         | 0.25 oz; 7 gm             |
| Operating Position                                                                           | Any                       |

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                   |                      |
|--------------------|---------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length (μs) | Output Power (watts) |
| C                  | Grid-pulsed Amp. or Osc.  | 2000                  | 3.0                  | 4.2                    | 5000              | 2000                  | 2.0                  | 0.0025 | 3                 | 1000†                |
| C                  | Plate-pulsed Amp. or Osc. | 2500                  | 3.0                  | 4.2                    | —                 | —                     | —                    | —      | —                 | —                    |

† Useful Pulse Power, delivered to the load.

The 8893 is a compact, rugged ceramic/metal planar triode intended for CW use or as a plate or grid pulsed oscillator or amplifier. It features high power output, high plate efficiency, and excellent frequency stability under severe environmental conditions.

The construction of the 8893 readily lends itself to cavity circuit operation, resulting in a very compact RF source.

The 8893 is supplied with a threaded anode shank, and the anode is capable of 100 watts dissipation with appropriate forced air, conduction, heat-sink, or liquid cooling.

## CHARACTERISTICS

Plate Dissipation (Max.) . . . . . Dependent on Cooling Technique  
Grid Dissipation (Max.) . . . . . 1.5 watts  
Frequency for Max. Ratings (Pulsed) . . . 4000 MHz  
Cooling . . . . . Technique Optional  
Cathode . . . . . Oxide-coated Unipotential  
Heater: Voltage . . . . . 6.3 volts  
Current . . . . . 1.3 amperes  
Capacitances: Grid-Cathode . . . . . 8.5 pF  
Grid-Plate . . . . . 2.15 pF  
Plate-Cathode . . . . . 0.1 pF  
Amplification Factor ( $\mu$ ) . . . . . 60  
Transconductance . . . . . 30 mmhos  
Anode: . . . Threaded stud, 10-32, for heat transfer;  
Concentric flange for electrical contact.  
Grid & Cathode Contacts . . . . . Concentric Flanges  
Base Heater Contacts . . . . . Pin Type, heater isolated  
Maximum Seal & Anode Core Temperature . . 250°C  
Maximum Length . . . . . 1.07 in; 27.18 mm  
Maximum Diameter . . . . . 0.76 in; 19.25 mm  
Weight (approximate) . . . . . 0.35 oz; 10 gm  
Operating Position . . . . . Any



| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |      |                         |                      |
|--------------------|---------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|------|-------------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty | Pulse Length ( $\mu$ s) | Output Power (watts) |
| C                  | RF Amp. or Osc.           | 2000                  | —                    | —                      | —                 | —                     | —                    | —    | —                       | —                    |
| C                  | Grid-pulsed Amp. or Osc.  | 2000                  | 5.0                  | 6.5                    | 2500              | 1500                  | 3.0                  | 0.01 | 3                       | 1000†                |
| C                  | Plate-pulsed Amp. or Osc. | 3500                  | 5.0                  | 6.5                    | —                 | —                     | —                    | —    | —                       | —                    |

† Useful Pulse Power, delivered to the load.

## 8906, 8906AL, 8907, 8907AL

These rugged ceramic/metal planar triodes are designed for CW use or as a grid or plate pulsed oscillator, amplifier, or frequency multiplier up to 3000 MHz, as well as for pulse modulator or voltage-regulator service.

The 8906 and 8906AL, and the 8907 and 8907AL, are electrically identical except for special tests performed on the AL versions to prove reliability in airline DME and transponder service.

These tubes have unusually low heater power requirements for their high current capability. They normally can be used to replace types 7815 or 7815R, at the same heater voltage, where higher current capability and/or longer life are required. They can normally also replace types 7211 and 7698 when a 25% lower heater power requirement is desired.

The cathode of these tubes is of the arc-resistant, extended-interface type, well proven for reliable, long-life operation under adverse conditions.

## CHARACTERISTICS

Plate Dissipation (Max.) (8906 & 8906AL) . . 10 watts  
Plate Dissipation (Max.) (8907 & 8907AL) . 100 watts  
Grid Dissipation (Max.) (all types) . . . . 1.5 watts  
Frequency for Max. Ratings (CW) . . . . . 2500 MHz  
(Pulsed) . . . . . 3000 MHz  
Cooling (8906 & 8906AL) . . . . . Conduction & Convection  
Cooling (8907 & 8907AL) . . . . . Forced Air  
Cathode . . . . . Oxide-coated Unipotential  
Heater: Voltage (8906 & 8907) . . . . . 6.0 volts  
(8906AL & 8907AL) . . . . . 5.7 volts  
Current (8906 & 8907) . . . . . 1.0 ampere  
(8906AL & 8907AL) . . . . . 0.95 ampere  
Capacitances: Grid-Cathode . . . . . 8.0 pF  
Grid-Plate . . . . . 1.98 pF  
Plate-Cathode . . . . . 0.06 pF  
Amplification Factor ( $\mu$ ) . . . . . 80  
Nominal Cutoff Amp. Factor ( $\mu$ ) . . . . . 60  
Transconductance . . . . . 30 mmhos  
Base . . . . . Special, Coaxial  
Socket . . . . . Special  
Maximum Seal & Anode Core Temperature . . 250°C  
Maximum Length (all types) . . . . . 2.70 in; 68.60 mm  
Maximum Diameter  
(8906 & 8906AL) . . . . . 1.20 in; 30.50 mm  
(8907 & 8907AL) . . . . . 1.27 in; 32.20 mm  
Weight (approximate)  
(8906 & 8906AL) . . . . . 1.8 oz. 48 gm  
(8907 & 8907AL) . . . . . 2.2 oz; 63 gm  
Operating Position (all types) . . . . . Any



| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                         |                      |
|--------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length ( $\mu$ s) | Output Power (watts) |
| C                  | RF Amp. (gnd. grid)            | 2500                  | 0.15                 | —                      | 700               | 630                   | 0.14                 | —      | —                       | 45*                  |
| C                  | RF Amp. (gnd. grid)            | 2500                  | 0.15                 | —                      | 2500              | 1000                  | 0.14                 | —      | —                       | 30*                  |
| C                  | Grid-pulsed Amp.               | 3500                  | 5.0                  | —                      | 1100              | 2200                  | 2.5                  | 0.002  | 3                       | 2500†                |
| C                  | Plate-pulsed Osc.              | 4500                  | 5.0                  | —                      | 3000              | 3500                  | 4.8                  | 0.0025 | 3                       | 3000†                |
| —                  | Switch Tube or Pulse Modulator | 3500                  | —                    | 7.5                    | —                 | —                     | —                    | —      | —                       | —                    |

\* Useful Power Output, delivered to the load.

† Useful Pulse Power, delivered to the load.

## Planar Triodes 8933



The 8933 is a miniature, ceramic/metal, rugged planar triode for advanced airborne and space applications up to 3000 MHz where high RF pulse power is required, or for switch tube service up to 8 kVdc.

In addition to low inter-electrode capacitance, high transconductance and amplification factor, the 8933 has an arc-resistant cathode and a spewing shield, assuring stable, reliable long-life operation under adverse conditions.

The 8933 is supplied without radiator and may be conduction, convection, heat-sink, or liquid cooled. Radiators for forced-air cooling, permitting an anode dissipation up to 150 watts, are available.

### CHARACTERISTICS

|                                       |                                                                                                     |
|---------------------------------------|-----------------------------------------------------------------------------------------------------|
| Plate Dissipation (Max.)              | Dependent on Cooling Technique                                                                      |
| Grid Dissipation (Max.)               | 1.5 watts                                                                                           |
| Frequency for Max. Ratings (CW)       | 2500 MHz                                                                                            |
| (Pulsed)                              | 3000 MHz                                                                                            |
| Cooling                               | Technique Optional                                                                                  |
| Cathode                               | Oxide-coated Unipotential                                                                           |
| Heater: Voltage                       | 6.3 volts                                                                                           |
| Current                               | 1.3 amperes                                                                                         |
| Capacitances: Grid-Cathode            | 9.5 pF                                                                                              |
| Grid-Plate                            | 1.4 pF                                                                                              |
| Plate-Cathode                         | 0.06 pF                                                                                             |
| Amplification Factor (Mu)             | 120                                                                                                 |
| Transconductance (Sm)                 | 30 mmhos                                                                                            |
| Anode:                                | Threaded stud, 0.3125-24 UNF-2A thread for heat transfer; Concentric flange for electrical contact. |
| Base                                  | Special, Coaxial                                                                                    |
| Maximum Seal & Anode Core Temperature | 250°C                                                                                               |
| Maximum Length                        | 1.50 in; 38.10 mm                                                                                   |
| Maximum Diameter                      | 0.95 in; 24.13 mm                                                                                   |
| Weight (approximate)                  | 0.7 oz; 19 gm                                                                                       |
| Operating Position                    | Any                                                                                                 |

| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                   |                      |
|--------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length (μs) | Output Power (watts) |
| C                  | Grid-pulsed Amp. or Osc.       | 8000                  | 5.0                  | 7.5                    | 1030              | 5000                  | 3.3                  | 0.0033 | 0.5               | 8000†                |
| C                  | Grid-pulsed Amp. or Osc.       | 8000                  | 5.0                  | 7.5                    | 1030              | 4700                  | 1.5                  | 0.0033 | 0.5               | 3250‡                |
| C                  | Plate-pulsed Amp. or Osc.      | 10,000                | 5.0                  | 7.5                    | —                 | —                     | —                    | —      | —                 | —                    |
| —                  | Switch Tube or Pulse Modulator | 8000                  | —                    | 7.5                    | —                 | —                     | —                    | —      | —                 | —                    |

† Useful Pulse Power, delivered to the load. Approximate stage gain = 6 dB.

‡ Useful Pulse Power, delivered to the load. Approximate stage gain = 10 dB.

## 8940



The 8940 is a ceramic/metal rugged planar triode for advanced airborne, ground, and space applications up to 3000 MHz.

The tube may be used as an amplifier, oscillator, or frequency multiplier, in the grid or plate pulsed mode, as well as a modulator or series regulator tube. Design features include a large area arc-resistant cathode and a vaporization shield to assure stable and reliable long-life operation under adverse conditions.

The 8940 is normally supplied without radiator and may be conduction, convection, heat-sink, or liquid cooled, such as immersion cooling in an insulating medium (e.g., FC-75). Radiators for forced-air cooling as well as heat-sink adaptors, permitting anode dissipation up to 750 watts, are available.

### CHARACTERISTICS

|                                       |                                                                                     |
|---------------------------------------|-------------------------------------------------------------------------------------|
| Plate Dissipation (Max.)              | Dependent on Cooling Technique                                                      |
| Grid Dissipation (Max.)               | 2.0 watts                                                                           |
| Frequency for Max. Ratings (CW)       | 2500 MHz                                                                            |
| (Pulsed)                              | 3000 MHz                                                                            |
| Cooling                               | Technique Optional                                                                  |
| Cathode                               | Oxide-coated Unipotential                                                           |
| Heater: Voltage                       | 6.3 volts                                                                           |
| Current                               | 2.25 amperes                                                                        |
| Capacitances: Grid-Cathode            | 16.0 pF                                                                             |
| Grid-Plate                            | 0.4 pF                                                                              |
| Plate-Cathode                         | 0.11 pF                                                                             |
| Amplification Factor (Mu)             | 65                                                                                  |
| Transconductance (Sm)                 | 100 mmhos                                                                           |
| Anode:                                | Threaded stud, 1/2-20 UNF for heat transfer; Tapered flange for electrical contact. |
| Grid, Cathode/Heater Contacts         | Special, Coaxial                                                                    |
| Heater Contact                        | Special                                                                             |
| Maximum Seal & Anode Core Temperature | 250°C                                                                               |
| Maximum Length                        | 1.98 in; 50.29 mm                                                                   |
| Maximum Diameter                      | 1.37 in; 34.80 mm                                                                   |
| Weight (approximate)                  | 2.0 oz; 56 gm                                                                       |
| Operating Position                    | Any                                                                                 |

| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                   |                      |
|--------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length (μs) | Output Power (watts) |
| C                  | Grid-pulsed Amp. or Osc.       | 4000                  | 12                   | —                      | 1200              | 4000                  | 3.0                  | 0.01   | 500               | 6000†                |
| C                  | Plate-pulsed Amp. or Osc.      | 6500                  | 12                   | —                      | 2000              | 3500                  | 10.0                 | 0.0033 | 6                 | 10,000†              |
| —                  | Switch Tube or Pulse Modulator | 4000                  | —                    | 16                     | —                 | —                     | —                    | 0.0033 | 6                 | —                    |
| A, B, or C         | RF Amp. or Osc.                | 4000                  | 0.6                  | —                      | 800               | 1400                  | 0.32                 | —      | —                 | 180*                 |

\* Useful Power Output, delivered to the load.

† Useful Pulse Power, delivered to the load.

## CHARACTERISTICS

Plate Dissipation (Max.) . . . . . Dependent on Cooling Technique  
 Grid Dissipation (Max.) . . . . . 2.0 watts  
 Frequency for Max. Ratings (Pulsed) . . . 2000 MHz  
 Cooling . . . . . Technique Optional  
 Cathode . . . . . Oxide-coated Unipotential  
 Heater: Voltage . . . . . 6.3 volts  
 Current . . . . . 2.25 amperes  
 Capacitances: Grid-Cathode . . . . . 14.0 pF  
 Grid-Plate . . . . . 2.5 pF  
 Plate-Cathode . . . . . 0.11 pF  
 Amplification Factor ( $\mu$ ) . . . . . 200  
 Transconductance ( $S_m$ ) . . . . . 75 mmhos  
 Anode: Threaded stud, 1/2-20 UNF for heat transfer;  
 Tapered flange for electrical contact.  
 Grid, Cathode/Heater contacts . . . Special, Coaxial  
 Heater Contact . . . . . Special  
 Maximum Seal & Anode Core Temperature . . 250°C  
 Maximum Length . . . . . 2.23 in; 56.64 mm  
 Maximum Diameter . . . . . 1.36 in; 34.54 mm  
 Weight (approximate) . . . . . 2.0 oz; 56 gm  
 Operating Position . . . . . Any



| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                         |                      |
|--------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length ( $\mu$ s) | Output Power (watts) |
| B or C             | Grid-pulsed Amp. or Osc.       | 10,000                | 12                   | —                      | —                 | —                     | —                    | —      | —                       | —                    |
| B or C             | Plate-pulsed Amp. or Osc.      | 15,000                | 12                   | —                      | —                 | —                     | —                    | —      | —                       | —                    |
| —                  | Switch Tube or Pulse Modulator | 15,000                | —                    | 16                     | —                 | —                     | —                    | 0.0033 | 6                       | —                    |

## 8942

## CHARACTERISTICS

Plate Dissipation (Max.) . . . . . Dependent on Cooling Technique  
 Grid Dissipation (Max.) . . . . . 2.0 watts  
 Frequency for Max. Ratings (Pulsed) . . . 2000 MHz  
 Cooling . . . . . Technique Optional  
 Cathode . . . . . Oxide-coated Unipotential  
 Heater: Voltage . . . . . 6.3 volts  
 Current . . . . . 2.25 amperes  
 Capacitances: Grid-Cathode . . . . . 15.0 pF  
 Grid-Plate . . . . . 3.0 pF  
 Plate-Cathode . . . . . 0.11 pF  
 Amplification Factor ( $\mu$ ) . . . . . 115  
 Transconductance ( $S_m$ ) . . . . . 90 mmhos  
 Anode: Threaded stud, 1/2-20 UNF for heat transfer;  
 Tapered flange for electrical contact.  
 Grid, Cathode/Heater contacts . . . Special, Coaxial  
 Heater Contact . . . . . Special  
 Maximum Seal & Anode Core Temperature . . 250°C  
 Maximum Length . . . . . 2.23 in; 56.64 mm  
 Maximum Diameter . . . . . 1.36 in; 34.54 mm  
 Weight (approximate) . . . . . 2.0 oz; 56 gm  
 Operating Position . . . . . Any



| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |       |                         |                      |
|--------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|-------|-------------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty  | Pulse Length ( $\mu$ s) | Output Power (watts) |
| C                  | Grid-pulsed Amp. or Osc.       | 6000                  | 12                   | —                      | —                 | —                     | —                    | —     | —                       | —                    |
| C                  | Plate-pulsed Amp. or Osc.      | 7500                  | 12                   | —                      | 1300              | 7500                  | 12                   | 0.001 | 1.0                     | 30,000†              |
| —                  | Switch Tube or Pulse Modulator | 8000                  | —                    | 16                     | —                 | —                     | —                    | —     | —                       | —                    |

† Useful Pulse Power, delivered to the load.

Y-503 see 7855

## Planar Triodes

### Y-518



The Y-518 is a miniature ceramic/metal rugged planar triode for advanced airborne, ground, and space applications up to 3000 MHz.

The Y-518 may be used as an amplifier, oscillator, or frequency multiplier in the CW mode, grid or plate pulsed mode, or as a modulator or regulator. Design features include an arc-resistant cathode to assure stable, reliable, and long-life operation under adverse conditions.

The tube is supplied without radiator, with a threaded anode shank, and may be conduction, convection, heat-sink, or liquid cooled. Radiators for forced-air cooling, as well as heat-sink adaptors, permitting anode dissipation up to 300 watts, are available.

### CHARACTERISTICS

|                                                                                                |                                |
|------------------------------------------------------------------------------------------------|--------------------------------|
| Plate Dissipation (Max.)                                                                       | Dependent on Cooling Technique |
| Grid Dissipation (Max.)                                                                        | 1.5 watts                      |
| Frequency for Max. Ratings (CW)                                                                | 2500 MHz                       |
| (Pulsed)                                                                                       | 3000 MHz                       |
| Cooling                                                                                        | Technique Optional             |
| Cathode                                                                                        | Oxide-coated Unipotential      |
| Heater: Voltage                                                                                | 6.3 volts                      |
| Current                                                                                        | 1.3 amperes                    |
| Capacitances: Grid-Cathode                                                                     | 9.7 pF                         |
| Grid-Plate                                                                                     | 1.2 pF                         |
| Plate-Cathode                                                                                  | 0.065 pF                       |
| Amplification Factor (Mu)                                                                      | 135                            |
| Transconductance (Sm)                                                                          | 40 mmhos                       |
| Anode: Threaded stud, 3/8-24 UNF, for heat transfer; Concentric flange for electrical contact. |                                |
| Base                                                                                           | Special, Coaxial               |
| Maximum Seal & Anode Core Temperature                                                          | 250°C                          |
| Maximum Length                                                                                 | 1.37 in; 34.80 mm              |
| Maximum Diameter                                                                               | 0.785 in; 19.90 mm             |
| Weight (approximate)                                                                           | 0.56 oz; 16 gm                 |
| Operating Position                                                                             | Any                            |

| Class of Operation      Type of Service |                                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |       |                   |                      |
|-----------------------------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|-------|-------------------|----------------------|
|                                         |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty  | Pulse Length (μs) | Output Power (watts) |
| C                                       | RF Amp. or Osc.                | 7500                  | 0.3                  | —                      | —                 | —                     | —                    | —     | —                 | —                    |
| C                                       | Grid-pulsed Amp. or Osc.       | 8000                  | 6.0                  | —                      | 1100              | 4000                  | 1.8                  | 0.001 | 12                | 2500†                |
| C                                       | Plate-pulsed Amp. or Osc.      | 10,000                | 6.0                  | —                      | —                 | —                     | —                    | —     | —                 | —                    |
| —                                       | Switch Tube or Pulse Modulator | 10,000                | —                    | 9.0                    | —                 | —                     | —                    | —     | —                 | —                    |

† Useful Pulse Power, delivered to the load.

### Y-519



The Y-519 is a miniature, frequency-stable, ceramic/metal, rugged planar triode for advanced airborne and space applications up to 3000 MHz.

The Y-519 may be used as an amplifier, oscillator, or frequency multiplier in the CW and the grid or plate pulsed mode, as well as a modulator or series regulator tube. Design features include an arc-resistant cathode to assure stable and long-life operation under adverse conditions.

The Y-519 is supplied without radiator and may be conduction, convection, heat-sink, or liquid cooled. Radiators for forced-air cooling, permitting an anode dissipation up to 300 watts, and beryllium oxide heat-sink adaptors, are also available.

### CHARACTERISTICS

|                                                                                                |                                |
|------------------------------------------------------------------------------------------------|--------------------------------|
| Plate Dissipation (Max.)                                                                       | Dependent on Cooling Technique |
| Grid Dissipation (Max.)                                                                        | 1.5 watts                      |
| Frequency for Max. Ratings (CW)                                                                | 2500 MHz                       |
| (Pulsed)                                                                                       | 3000 MHz                       |
| Cooling                                                                                        | Technique Optional             |
| Cathode                                                                                        | Oxide-coated Unipotential      |
| Heater: Voltage                                                                                | 6.3 volts                      |
| Current                                                                                        | 1.3 amperes                    |
| Capacitances: Grid-Cathode                                                                     | 9.75 pF                        |
| Grid-Plate                                                                                     | 1.70 pF                        |
| Plate-Cathode                                                                                  | 0.065 pF                       |
| Amplification Factor (Mu)                                                                      | 75                             |
| Transconductance (Sm)                                                                          | 40 mmhos                       |
| Anode: Threaded stud, 3/8-24 UNF-2A, for heat transfer; tapered flange for electrical contact. |                                |
| Base                                                                                           | Special, Coaxial               |
| Maximum Seal & Anode Core Temperature                                                          | 250°C                          |
| Maximum Length                                                                                 | 1.37 in; 34.80 mm              |
| Maximum Diameter                                                                               | 0.78 in; 19.90 mm              |
| Weight (approximate)                                                                           | 0.56 oz; 16 gm                 |
| Operating Position                                                                             | Any                            |

| Class of Operation<br>Type of Service |                                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                   |                      |
|---------------------------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------|----------------------|
|                                       |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length (μs) | Output Power (watts) |
| C                                     | RF Amp. or Osc.                | 3000                  | 0.3                  | —                      | 1600              | 1800                  | 0.2                  | —      | —                 | 80*                  |
| C                                     | Grid-pulsed Amp. or Osc.       | 3000                  | 6.0                  | —                      | 1600              | 3000                  | 3.0                  | 0.0033 | 200               | 3500†                |
| C                                     | Plate-pulsed Amp. or Osc.      | 3500                  | 6.0                  | —                      | —                 | —                     | —                    | —      | —                 | —                    |
| —                                     | Switch Tube or Pulse Modulator | 3000                  | —                    | 9.0                    | —                 | —                     | —                    | —      | —                 | —                    |

\* Useful Power Output, delivered to the load.

† Useful Pulse Power, delivered to the load.

**Y-540****CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . Dependent on Cooling Technique  
 Grid Dissipation (Max.) . . . . . 1.5 watts  
 Cooling . . . . . Technique Optional  
 Cathode . . . . . Oxide-coated Unipotential  
 Heater: Voltage . . . . . 6.3 volts  
           Current . . . . . 1.3 amperes  
 Capacitances: Grid-Cathode . . . . . 9.0 pF  
                   Grid-Plate . . . . . 1.4 pF  
                   Plate-Cathode . . . . . 0.06 pF  
 Amplification Factor (Mu) . . . . . 145  
 Transconductance (Sm) . . . . . 30 mmhos  
 Anode: . . Threaded stud, 5/16-24 UNF-2A for heat transfer and electrical contact.  
 Grid, Cathode, Heater Contacts: . Special, Solder Tabs  
 Maximum Seal & Anode Core Temperature . . 250°C  
 Maximum Length . . . . . 1.56 in; 39.60 mm  
 Maximum Diameter . . . . . 0.78 in; 19.90 mm  
 Weight (approximate) . . . . . 0.56 oz; 16 gm  
 Operating Position . . . . . Any

The Y-540 is a rugged ceramic/metal planar triode designed for switch tube or pulsed regulator service in advanced ground, airborne, or space applications.

Design features include an arc-resistant cathode to assure stable and reliable long-life operation under adverse conditions. An added feature is the increased grid-to-cathode insulator length to permit operation at high plate voltages and/or higher altitudes.

The Y-540 is normally supplied without a radiator and may be conduction, convection, heat-sink, or liquid cooled, as immersion cooling in an insulating medium (e.g., FC-75). Radiators for forced-air cooling, as well as heat-sink adaptors, permitting anode dissipation up to 150 watts, are available. The tube is supplied with solder tabs on the cathode, heater, and grid terminals.

| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |      |                   |                      |
|--------------------|--------------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|------|-------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty | Pulse Length (μs) | Output Power (watts) |
| —                  | Switch Tube or Pulse Modulator | 8000                  | 5.0                  | 6.5                    | —                 | —                     | —                    | —    | —                 | —                    |

**Y-579****CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . 150 watts  
 Grid Dissipation (Max.) . . . . . 1.5 watts  
 Frequency for Max. Ratings (CW) . . . . . 2500 MHz  
 Cooling . . . . . Forced Air  
 Cathode . . . . . Oxide-coated Unipotential  
 Heater: Voltage . . . . . 6.0 volts  
           Current . . . . . 1.3 amperes  
 Capacitances: Grid-Cathode . . . . . 6.5 pF  
                   Grid-Plate . . . . . 2.0 pF  
                   Plate-Cathode . . . . . 0.035 pF  
 Amplification Factor (Mu) . . . . . 100  
 Transconductance (Sm) . . . . . 25 mmhos  
 Base . . . . . Special, Coaxial Socket  
 Maximum Seal & Anode Core Temperature . . 250°C  
 Maximum Length . . . . . 2.70 in; 68.60 mm  
 Maximum Diameter . . . . . 1.27 in; 32.20 mm  
 Weight (approximate) . . . . . 2.2 oz; 63 gm  
 Operating Position . . . . . Any

The Y-579 is a rugged ceramic/metal planar triode designed for use in TV translator service up to 3000 MHz. The tube may also be used in CW mixer, oscillator, or amplifier service. The Y-579 is supplied with an air-cooling radiator for forced-air cooling.

The Y-579 has a specially designed dispenser-type cathode which permits the high average current ratings needed in TV translator service and which is particularly insensitive to back heating.

| Class of Operation | Type of Service         | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |      |                   |            |
|--------------------|-------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|------|-------------------|------------|
|                    |                         | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty | Pulse Length (μs) | Gain (dB)  |
| C                  | RF Amp. or Osc.         | 2500                  | 0.4                  | —                      | —                 | —                     | —                    | —    | —                 | —          |
| A                  | TV Translator Amplifier | —                     | —                    | —                      | 400<br>800        | 1300                  | 0.09                 | —    | —                 | 15*<br>13† |

\*Peak Sync. level.

† Approximate average level.

## Planar Triodes

### Y-579A



The Y-579A is a high-gain (up to 20 dB) version of the basic Y-579. It is a rugged ceramic/metal planar triode designed for use in TV translator service up to 3000 MHz. The tube may also be used in CW oscillator or mixer and amplifier service.

The Y-579A has higher  $\mu$  and transconductance than the Y-579, and includes the specially designed dispenser-type cathode which permits the high average current ratings needed in TV translator service and which is particularly insensitive to back heating. The high  $\mu$  and  $S_m$  make this tube ideally suited for applications where high gain is required; gain in excess of 18 dB may be expected with suitable cavity design.

The tube is supplied with an air-cooling radiator for forced-air cooling.

## CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 150 watt  
 Grid Dissipation (Max.) . . . . . 1.5 watt  
 Frequency for Max. Ratings (CW) . . . . . 3000 MHz  
 Cooling . . . . . Forced Air  
 Cathode . . . . . Oxide-coated Unipotential  
 Heater: Voltage . . . . . 6.0 volt  
 Current . . . . . 1.3 ampere  
 Capacitances: Grid-Cathode . . . . . 7.0 pF  
 Grid-Plate . . . . . 2.0 pF  
 Plate-Cathode . . . . . 0.035 pF  
 Amplification Factor ( $\mu$ ) . . . . . 200  
 Transconductance ( $S_m$ ) . . . . . 30 mmho  
 Base . . . . . Special, Coaxial  
 Socket . . . . . Special  
 Maximum Seal & Anode Core Temperature . . . . . 250°C  
 Maximum Length . . . . . 2.70 in; 68.60 mm  
 Maximum Diameter . . . . . 1.26 in; 32.20 mm  
 Weight (approximate) . . . . . 2.2 oz; 63 gm  
 Operating Position . . . . . Any

| Class of Operation | Type of Service         | MAXIMUM RATINGS       |                      |                        | TYPICAL OPERATION |                       |                      |        |                         |            |
|--------------------|-------------------------|-----------------------|----------------------|------------------------|-------------------|-----------------------|----------------------|--------|-------------------------|------------|
|                    |                         | Plate Voltage (volts) | Plate Current (amps) | Cathode Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Plate Current (amps) | Duty   | Pulse Length ( $\mu$ s) | Gain (dB)  |
| C                  | RF Amp. or Osc.         | 2500                  | 0.4                  | —                      | —                 | —                     | —                    | —      | —                       | —          |
| A                  | TV Translator Amplifier | —                     | —                    | —                      | 400<br>800        | 1300<br>—             | 0.09<br>—            | —<br>— | —<br>—                  | 20*<br>18† |

\*Peak Sync. level.

† Approximate average level.

## External Anode, Forced Air Cooled Triodes 3CPX1500A7

The 3CPX1500A7 is a rugged ceramic/metal high-mu power triode, designed with beam-forming cathode and control-grid geometry to allow the simplicity of design and circuit advantages of a triode with the gain of a tetrode.

The tube is intended for pulse modulator or pulse regulator service. The external anode may be forced-air cooled, or for higher voltage holdoff capability the complete tube may be liquid immersed for both insulation improvement and cooling.

### CHARACTERISTICS

|                                       |                                |
|---------------------------------------|--------------------------------|
| Plate Dissipation (Max.)              | 1500 watts                     |
| Grid Dissipation (Max.)               | 25 watts                       |
| Cooling                               | Liquid Immersion or Forced Air |
| Cathode:                              |                                |
| Voltage                               | 5.5 volts                      |
| Current                               | 11.2 amperes                   |
| Capacitances (Gnd. Cath. Connection): |                                |
| Input                                 | 38.5 pF                        |
| Output                                | 0.1 pF                         |
| Feed-through                          | 10 pF                          |
| Amplification Factor                  | 200                            |
| Transconductance                      | 55,000 $\mu$ mhos              |
| Base                                  | Special 7-pin                  |
| Recommended Air System Socket         | SK-2200                        |
| Recommended Air Chimney               | SK-2216                        |
| Maximum Seal & Anode Core Temperature | 250° C                         |
| Maximum Length                        | 4.02 in; 102.00 mm             |
| Maximum Diameter                      | 3.38 in; 86.00 mm              |
| Weight (approximate)                  | 24.0 oz; 685 gm                |
| Operating Position                    | Any                            |



| Type of Cooling | Type of Service              | MAXIMUM RATINGS    |                      | TYPICAL OPERATION |                    |                      |                     |                   |
|-----------------|------------------------------|--------------------|----------------------|-------------------|--------------------|----------------------|---------------------|-------------------|
|                 |                              | Plate Voltage (kV) | Plate Current (amps) | Driven Element    | Plate Voltage (kV) | Plate Current (amps) | Drive Power (watts) | Output Power (kW) |
| Forced-Air      | Pulse Regulator or Modulator | 10.0               | 50.0†                | Grid              | 10.0               | 40.0                 | 700                 | 306†              |
| Liquid-Immersed | Pulse Regulator or Modulator | 15.0               | 50.0†                | Grid              | 15.0               | 40.0                 | 735                 | 506†              |

† $t_p = 10 \mu$ sec, see pulse rating curve for longer pulse.

## 3CX400U7/8961

The 3CX400U7/8961 is designed for use above 200 MHz as a CW, pulse, or linear RF amplifier, particularly in the 806 to 950 MHz portion of the spectrum allocated to land mobile service. This high-mu triode is designed with beam-forming cathode and control-grid geometry, is of ceramic/metal construction, and has an anode rated for 400 watts of dissipation with forced-air cooling.

With an amplification factor of over 200 and minimum current interception by the grid the tube has excellent power gain in cathode-driven (grounded grid) circuitry. Over 200 watts of useful CW RF power may be obtained with better than 33% efficiency and better than 10 dB of gain in the UHF region.

### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 400 watts                 |
| Grid Dissipation (Max.)               | 5 watts                   |
| Frequency for Max. Ratings (CW)       | 1000 MHz                  |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Voltage                               | 6.3 volts                 |
| Current                               | 3.0 amperes               |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 18.4 pF                   |
| Output                                | 6.1 pF                    |
| Feed-through                          | 0.07 pF                   |
| Amplification Factor                  | 240                       |
| Transconductance                      | 29,000 $\mu$ mhos         |
| Base                                  | Special, Coaxial          |
| Recommended Air-System Socket         | None; collets available   |
| Maximum Seal & Anode Core Temperature | 250° C                    |
| Maximum Length                        | 2.50 in; 63.70 mm         |
| Maximum Diameter                      | 2.10 in; 52.90 mm         |
| Weight (approximate)                  | 5.5 oz; 155 gm            |
| Operating Position                    | Any                       |



| Class of Operation | Type of Service    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                |                       |                      |                     |                      |
|--------------------|--------------------|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Driven Element | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier | 1500                  | 0.40                 | 850               | Cath.          | 1500                  | 0.40                 | 13                  | 225†                 |

†Useful Power Output

## External Anode, Forced Air Cooled Triodes

### 3CX1000A7/8283



The 3CX1000A7/8283 ceramic/metal zero-bias triode is intended for Class AB<sub>2</sub> linear amplifier service in either grid-driven or cathode-driven configuration. It is recommended for use as a grid-driven push-pull audio amplifier or modulator and as a cathode driven linear amplifier through the VHF-TV bands.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 1000 watts  
Grid Dissipation (Max.) . . . . . .45 watts  
Frequency for Max. Ratings (CW) . . . . . 220 MHz  
Cooling . . . . . Forced Air  
Filament . . . . . Thoriated tungsten mesh  
Voltage . . . . . 5.0 volts  
Current . . . . . 30.5 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 32.0 pF  
Output . . . . . 0.1 pF  
Feed-through . . . . . 14.0 pF  
Capacitances (Gnd. Grid Connection):  
Input . . . . . 32.0 pF  
Output . . . . . 14.0 pF  
Feed-through . . . . . 0.1 pF  
Amplification Factor . . . . . 200  
Base . . . . . Special Breechblock  
Recommended Air-System Socket . SK-860 or SK-870  
Recommended Air Chimney . . . . . SK-816  
Maximum Seal & Anode Core Temperature . . 250°C  
Maximum Length . . . . . 4.80 in; 121.90 mm  
Maximum Diameter . . . . . 3.38 in; 85.80 mm  
Weight (approximate) . . . . . 2.0 lb; 0.91 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 3500                  | 0.70                 | Grid              | —                     | —                    | —                   | —                    |
| C                  | RF Power Amplifier Plate Modulated | 2000                  | 0.55                 | Grid              | —                     | —                    | —                   | —                    |
| AB <sub>2</sub>    | RF Linear Amplifier                | 3500                  | 1.0                  | Cath.             | 3500                  | 0.86                 | 100                 | 2060                 |
| AB <sub>2</sub>    | AF Amplifier or Modulator          | 3500                  | 1.0                  | Grid              | 2500                  | 2.0*                 | 44                  | 3100*                |

\*Two tubes.

### 3CX1500A7/8877



The 3CX1500A7/8877 ceramic/metal power triode is designed for use as a cathode-driven Class AB<sub>2</sub> or Class B amplifier, in audio or RF applications including the VHF band, or as a cathode driven plate modulated Class C RF amplifier. As a linear amplifier, high power gain may be obtained without sacrifice of low intermodulation distortion characteristics. Low grid interception and high amplification factor combine to make drive requirements exceptionally low for a tube of this power capacity.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 1500 watts  
Grid Dissipation (Max.) . . . . . .25 watts  
Frequency for Max. Ratings (CW) . . . . . 250 MHz  
Cooling . . . . . Forced Air  
Cathode . . . . . Oxide-coated Unipotential  
Voltage . . . . . 5.0 volts  
Current . . . . . 10.5 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 38.5 pF  
Output . . . . . 0.1 pF  
Feed-through . . . . . 10.2 pF  
Capacitances (Gnd. Grid Connection):  
Input . . . . . 38.5 pF  
Output . . . . . 10.2 pF  
Feed-through . . . . . 0.1 pF  
Amplification Factor . . . . . 200  
Transconductance . . . . . 55,000  $\mu$ hos  
Base . . . . . Special 7-pin  
Recommended Air-System Socket  
Grounded Grid . . . . . SK-2210  
Recommended Air-System Socket  
Grounded Cathode . . . . . SK-2200  
Recommended Air Chimney . . . . . SK-2216  
Maximum Seal & Anode Core Temperature . . 250°C  
Maximum Length . . . . . 4.02 in; 102.20 mm  
Maximum Diameter . . . . . 3.38 in; 85.80 mm  
Weight (approximate) . . . . . 1.6 lbs; 0.7 kg  
Operating Position . . . . . Any

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                |                       |                      |                     |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------------|---------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Driven Element | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) |
| C                  | RF Power Amplifier Plate Modulated | 3200                  | 0.80                 | 30                | Cath.          | 2400                  | 0.60                 | 41                  |
| B                  | RF Linear Amplifier                | 4000                  | 1.0                  | 108               | Cath.          | 4000                  | 1.0                  | 78                  |
| AB <sub>2</sub>    | RF Linear Amplifier                | 4000                  | 1.0                  | 220               | Cath.          | 2500                  | 1.0                  | 57                  |
| AB <sub>2</sub>    | RF Linear Amplifier                | 4000                  | 1.0                  | 30                | Cath.          | 3500                  | 1.0                  | 64                  |

†Useful Power Output.

# External Anode, Forced Air Cooled Triodes

## 3CX2500A3/8161 3CX2500F3/8251

### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 4000 watts                |
| Grid Dissipation (Max.)               | 150 watts                 |
| Frequency for Max. Ratings (CW)       | 75 MHz                    |
| Cooling                               | Forced Air                |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 7.5 volts                 |
| Current (3CX2500A3)                   | 51.5 amperes              |
| (3CX2500F3)                           | 50.5 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 35.0 pF                   |
| Output                                | 0.9 pF                    |
| Feed-through                          | 20.0 pF                   |
| Amplification Factor                  | 20                        |
| Transconductance                      | 20,000 $\mu$ mhos         |
| Base (3CX2500A3)                      | Coaxial                   |
| (3CX2500F3)                           | Flexible leads            |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length (3CX2500A3)            | 9.00 in; 228.60 mm        |
| (3CX2500F3)                           | 18.44 in; 468.40 mm       |
| Maximum Diameter (both types)         | 4.16 in; 105.70 mm        |
| Weight (approximate) (3CX2500A3)      | 6.2 lb; 2.8 kg            |
| (3CX2500F3)                           | 7.5 lb; 3.4 kg            |
| Operating Position                    | Vertical, base up or down |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 6000                  | 2.5                  | Grid              | 6000                  | 2.1                  | 136                 | 10,000               |
| C                  | RF Power Amplifier Plate Modulated | 5500                  | 2.0                  | Grid              | 5000                  | 1.3                  | 115                 | 5300                 |
| AB                 | AF Amplifier or Modulator          | 6000                  | 2.5                  | Grid              | 6000                  | 3.0*                 | 113                 | 13,000*              |

\*Two tubes.

## 3CX2500H3

### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 4000 watts                |
| Grid Dissipation (Max.)               | 150 watts                 |
| Frequency for Max. Ratings (CW)       | 75 MHz                    |
| Cooling                               | Forced Air                |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 7.5 volts                 |
| Current                               | 50.0 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 35.0 pF                   |
| Output                                | 0.9 pF                    |
| Feed-through                          | 20.0 pF                   |
| Amplification Factor                  | 20                        |
| Base                                  | Flexible filament leads   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 18.44 in; 468.40 mm       |
| Maximum Diameter                      | 4.25 in; 107.90 mm        |
| Weight (approximate)                  | 6.5 lb; 3.0 kg            |
| Operating Position                    | Vertical, base up or down |



| Class of Operation | Type of Service          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                      |                     |                      |
|--------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                          | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Industrial Oscillator | 6000                  | 2.5                  | 6000                  | 2.1                  | 136                 | 10,000               |

# External Anode, Forced Air Cooled Triodes

## 3CX3000A1/8238

## 3CX3000F1/8239



The 3CX3000A1/8238 low- $\mu$  power triode is forced-air cooled and is intended for use as an audio amplifier or modulator. Available high plate current under Class AB<sub>1</sub> operating conditions permits high power gain with a minimum of distortion. The tube is coaxial in construction.

The 3CX3000F1/8239 is identical except for the addition of flexible filament and grid leads on the base which can simplify some installations.

### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 3000 watts  
 Grid Dissipation (Max.) . . . . . 50 watts  
 Cooling . . . . . Forced Air  
 Filament . . . . . Thoriated tungsten  
     Voltage . . . . . 7.5 volts  
     Current (3CX3000A1) . . . . . 51.5 amperes  
     (3CX3000F1) . . . . . 50.5 amperes  
 Amplification Factor . . . . . 5.0  
 Transconductance . . . . . 11,000  $\mu$ mhos  
 Base (3CX3000A1) . . . . . Coaxial  
     (3CX3000F1) . . . . . Flexible leads  
 Maximum Seal & Anode Core Temperature . . . . . 250°C  
 Maximum Length (3CX3000A1) . . . . . 9.00 in; 228.60 mm  
     (3CX3000F1) . . . . . 18.44 in; 464.40 mm  
 Maximum Diameter (both types) . . . . . 4.16 in; 105.70 mm  
 Weight (approximate) (3CX3000A1) . . . . . 6.2 lb; 2.8 kg  
     (3CX3000F1) . . . . . 7.5 lb; 3.4 kg  
 Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | AF Amplifier or Modulator | 6000                  | 2.5                  | Grid              | 5500                  | 2.2*                 | 0                   | 8250*                |

\*Two tubes.



3CX3000F1/8239

# 3CX3000A7

## 3CX3000F7/8162

### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 3000 watts                |
| Grid Dissipation (Max.)               | 225 watts                 |
| Frequency for Max. Ratings (CW)       | 110 MHz                   |
| Cooling                               | Forced Air                |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 7.5 volts                 |
| Current (3CX3000A7)                   | 51.5 amperes              |
| (3CX3000F7)                           | 50.5 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 38.0 pF                   |
| Output                                | 0.6 pF                    |
| Feed-through                          | 24.0 pF                   |
| Capacitances (Gnd. Grid. Connection): |                           |
| Input                                 | 38.0 pF                   |
| Output                                | 24.0 pF                   |
| Feed-through                          | 0.6 pF                    |
| Amplification Factor                  | 160                       |
| Base (3CX3000A7)                      | Special, Coaxial          |
| (3CX3000F7)                           | Flexible leads            |
| Maximum Seal & Anode Core Temperature | 250° C                    |
| Maximum Length (3CX3000A7)            | 9.00 in; 228.60 mm        |
| (3CX3000F7)                           | 18.44 in; 468.40 mm       |
| Maximum Diameter (both types)         | 4.15 in; 105.50 mm        |
| Weight (approximate) (3CX3000A7)      | 6.2 lb; 2.8 kg            |
| (3CX3000F7)                           | 7.5 lb; 3.4 kg            |
| Operating Position                    | Vertical, base up or down |



The 3CX3000A7 high-mu forced-air cooled power triode provides relatively high power output as an amplifier, oscillator, or modulator at low plate voltages. The tube has a low inductance cylindrical filament-stem structure which readily becomes part of a linear filament tank circuit for VHF operation. The grid provides good shielding between the input and output circuits for grounded-grid applications and conveniently terminates in a ring between the plate and filament terminals. Operation with zero grid bias in many applications offers circuit simplicity by eliminating the bias supply. Grounded-grid operation is attractive, since a power gain of over twenty times can be obtained.

The 3CX3000F7/8162 tube is identical except for the addition of flexible leads on the base for grid and filament connections which can simplify socketing in low frequency applications.

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier        | 5000                  | 2.5                  | Cath.             | 4800                  | 1.5                  | 435                 | 5500†                |
| AB <sub>2</sub>    | RF Linear Amplifier       | 5000                  | 2.5                  | Cath.             | 4800                  | 2.0                  | 410                 | 7260                 |
| AB <sub>2</sub>    | RF Linear Amplifier       | 5000                  | 2.5                  | Grid              | 4000                  | 0.74                 | 11.5                | 1130                 |
|                    | AM Service                |                       |                      |                   |                       |                      |                     |                      |
| AB <sub>2</sub>    | AF Amplifier or Modulator | 5000                  | 2.5                  | Grid              | 4000                  | 3.6*                 | 115                 | 10,500*              |

\*Two tubes, † Useful Power Output.



3CX3000F7/8162

## External Anode, Forced Air Cooled Triodes

### 3CX5000A3



The 3CX5000A3 is an air-cooled, ceramic/metal power triode designed primarily for use as a power oscillator in industrial heating applications. It is also recommended for use as a grounded-grid FM amplifier, as a conventional plate-modulated amplifier, or as a linear amplifier.

The air-cooled anode is conservatively rated at 5 kW dissipation with low pressure drop. Plentiful reserve emission is available from the 560-watt filament. The grid structure is rated at 100 watts making this tube an excellent choice for severe applications.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 5000 watt  
Grid Dissipation (Max.) . . . . . 100 watt  
Frequency for Max. Ratings (CW) . . . . . 110 MHz  
Cooling . . . . . Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 7.5 volt  
Current . . . . . 75.0 ampere  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 51.0 pf  
Output . . . . . 1.5 pf  
Feed-through . . . . . 25.0 pf  
Amplification Factor . . . . . 18  
Base . . . . . Special, Coaxial  
Recommended Air-System Socket . . . . . SK-1300  
Recommended Air Chimney . . . . . Y-46  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 8.75 in; 222.20 mm  
Maximum Diameter . . . . . 6.40 in; 162.70 mm  
Weight (approximate) . . . . . 9.5 lb; 4.3 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7500                  | 3.0                  | Grid              | —                     | —                    | —                   | —                    |
| C                  | RF Power Amplifier Plate Modulated | 5000                  | 2.5                  | Grid              | —                     | —                    | —                   | —                    |
| C                  | RF Industrial Oscillator           | 10,000                | 3.0                  | —                 | 9000                  | 2.5                  | 208                 | 18,600               |
| B or AB            | AF Amplifier or Modulator          | 7500                  | 4.0                  | Grid              | —                     | —                    | —                   | —                    |

### 3CX5000H3



The 3CX5000H3 is an air-cooled ceramic/metal power triode intended for use in industrial radio-frequency heating services, or for conventional RF or audio amplifier or modulator applications. The air-cooled anode is conservatively rated at 5 kW dissipation with low pressure drop.

Full input may be run up to 90 MHz. The 100-watt grid structure makes this tube an excellent choice for severe applications.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 5000 watt  
Grid Dissipation (Max.) . . . . . 100 watt  
Frequency for Max. Ratings (CW) . . . . . 90 MHz  
Cooling . . . . . Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 7.5 volt  
Current . . . . . 74.5 ampere  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 51.0 pf  
Output . . . . . 1.5 pf  
Feed-through . . . . . 25.0 pf  
Amplification Factor . . . . . 18  
Base . . . . . Flexible filament lead  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 17.50 in; 444.50 mm  
Maximum Diameter . . . . . 6.45 in; 163.80 mm  
Weight (approximate) . . . . . 10.0 lb; 4.5 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7500                  | 3.0                  | Grid              | —                     | —                    | —                   | —                    |
| C                  | RF Power Amplifier Plate Modulated | 5000                  | 2.5                  | Grid              | —                     | —                    | —                   | —                    |
| C                  | RF Industrial Oscillator           | 10,000                | 3.0                  | —                 | 9000                  | 2.5                  | 208                 | 18,600               |
| B or AB            | AF Amplifier or Modulator          | 7500                  | 4.0                  | Grid              | —                     | —                    | —                   | —                    |

**3CX10,000A1/8158**

The 3CX10,000A1/8158 ceramic/metal, air-cooled power triode is primarily intended for use as an audio amplifier or modulator, or for voltage regulator applications where high current capability and low tube voltage drop are important. Up to 12 kW of anode power can be dissipated by the air-cooled anode. A water-cooled version, the 3CW20,000A1, is available with a 20 kW dissipation rating.

**CHARACTERISTICS**

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 12,000 watts              |
| Grid Dissipation (Max.)               | 100 watts                 |
| Cooling                               | Forced Air                |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 7.5 volts                 |
| Current                               | 99.0 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 51.0 pF                   |
| Output                                | 4.1 pF                    |
| Feed-through                          | 28.5 pF                   |
| Amplification Factor                  | 6.0                       |
| Transconductance                      | 20,000 $\mu$ mhos         |
| Base                                  | Coaxial                   |
| Recommended Air-System Socket         | SK-1300                   |
| Recommended Air Chimney               | SK-1306                   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 8.75 in; 222.20 mm        |
| Maximum Diameter                      | 7.05 in; 179.10 mm        |
| Weight (approximate)                  | 12.0 lb; 5.5 kg           |
| Operating Position                    | Vertical, base up or down |



| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | AF Amplifier or Modulator | 7000                  | 5.0                  | Grid              | 7000                  | 7.0*                 | 0                   | 29,100*              |
| A                  | AF Amplifier or Modulator | 7000                  | 5.0                  | Grid              | 2500                  | 4.0                  | 0                   | 1800                 |
| A                  | Voltage Regulator         | 10,000                | 5.0                  | —                 | —                     | —                    | —                   | —                    |

\*Two tubes.

**3CX10,000A3/8159**

The 3CX10,000A3/8159 is a medium-mu, ceramic/metal, forced-air cooled power triode intended for use as a power oscillator in industrial heating applications or as an RF power amplifier in Class C or Class AB<sub>2</sub> linear service.

**CHARACTERISTICS**

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 10,000 watts              |
| Grid Dissipation (Max.)               | 250 watts                 |
| Frequency for Max. Ratings (CW)       | 160 MHz                   |
| Cooling                               | Forced Air                |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 7.5 volts                 |
| Current                               | 99.0 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 53.0 pF                   |
| Output                                | 1.4 pF                    |
| Feed-through                          | 34.0 pF                   |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 53.0 pF                   |
| Output                                | 34.0 pF                   |
| Feed-through                          | 1.4 pF                    |
| Amplification Factor                  | 20                        |
| Base                                  | Coaxial                   |
| Recommended Air-System Socket         | SK-1300                   |
| Recommended Air Chimney               | SK-1306                   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 8.75 in; 222.20 mm        |
| Maximum Diameter                      | 7.05 in; 179.10 mm        |
| Weight (approximate)                  | 12.0 lb; 5.5 kg           |
| Operating Position                    | Vertical, base up or down |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7000                  | 4.0                  | Cath.             | 7000                  | 4.0                  | 4100                | 24,500               |
| C                  | RF Power Amplifier Plate Modulated | 5500                  | 3.0                  | Grid              | 5000                  | 3.0                  | 515                 | 12,400               |
| C                  | RF Industrial Oscillator           | 7000                  | 4.0                  | —                 | 7000                  | 4.0                  | —                   | 22,400               |
| AB <sub>2</sub>    | RF Linear Amplifier                | 7000                  | 5.0                  | Cath.             | 7000                  | 4.0                  | 2050                | 20,000               |

## External Anode, Forced Air Cooled Triodes

### 3CX10,000A7/8160



The 3CX10,000A7 ceramic/metal power triode is intended for use as a zero-bias Class B amplifier in audio or RF applications, or as a Class C amplifier, CW or modulated.

Operation in Class B with zero grid bias offers circuit simplicity by eliminating the bias supply, and in addition, grounded-grid operation is attractive since a power gain as high as twenty times can be obtained with the tube.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 10,000 watts  
Grid Dissipation (Max.) . . . . . 500 watts  
Frequency for Max. Ratings (CW) . . . . . 160 MHz  
Cooling . . . . . Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 7.5 volts  
Current . . . . . 99.0 amperes  
Capacitances (Gnd. Cath. Connection)  
Input . . . . . 59.0 pF  
Output . . . . . 0.2 pF  
Feed-through . . . . . 36.0 pF  
Amplification Factor . . . . . 200  
Base . . . . . Coaxial  
Recommended Air-System Socket . . . . . SK-1306  
or SK-1320  
Recommended Air Chimney . . . . . SK-1306  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 8.75 in; 222.20 mm  
Maximum Diameter . . . . . 7.05 in; 179.10 mm  
Weight (approximate) . . . . . 12.0 lb; 5.5 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 8000                  | 4.0                  | Cath.             | 7600                  | 3.7                  | 1510                | 22,500               |
| C                  | RF Power Amplifier Plate Modulated | 6500                  | 3.0                  | Grid              | 5000                  | 3.0                  | 380                 | 11,900               |
| B                  | RF Linear Amplifier                | 8000                  | 5.0                  | Cath.             | 7000                  | 5.0                  | 1540                | 24,200               |
| B                  | RF Linear Amplifier AM Service     | 8000                  | 5.0                  | Cath.             | 7000                  | 2.4                  | 330                 | 5600                 |
| B                  | AF Amplifier or Modulator          | 8000                  | 5.0                  | Grid              | 7000                  | 10.0*                | 560                 | 47,700*              |

\*Two tubes.

### 3CX10,000H3



The 3CX10,000H3 ceramic/metal power triode is designed primarily for use in industrial RF heating service. Its air-cooled anode is conservatively rated at 10 kW of dissipation capability.

Input of 40 kW is permissible up to 90 MHz. Connection and mounting are simplified, with no socket necessary; the grid termination is a heavy mounting flange, and flexible leads are used for the filament lines.

This tube is an excellent choice for severe applications.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 10,000 watts  
Grid Dissipation (Max.) . . . . . 250 watts  
Frequency for Max. Ratings (CW) . . . . . 90 MHz  
Cooling . . . . . Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 7.5 volts  
Current . . . . . 99.0 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 53.0 pF  
Output . . . . . 1.4 pF  
Feed-through . . . . . 34.0 pF  
Amplification Factor . . . . . 20  
Base . . . . . Flexible filament leads  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 17.75 in; 450.80 mm  
Maximum Diameter . . . . . 7.05 in; 179.10 mm  
Weight (approximate) . . . . . 13.0 lb; 5.9 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|--------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                          | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Industrial Oscillator | 10,000                | 4.0                  | —                 | 9000                  | 4.0                  | 570                 | 29,000               |

**3CX15,000A3**

The 3CX15,000A3 is an air-cooled, ceramic/metal power triode designed primarily for use as a power oscillator in industrial radio frequency heating applications. It is also recommended for use as a conventional plate-modulated amplifier, or as a linear amplifier. The one kilowatt filament and rugged 500 watt grid structure make this tube especially suitable for heavy duty service.

**CHARACTERISTICS**

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 15,000 watts              |
| Grid Dissipation (Max.)               | 500 watts                 |
| Frequency for Max. Ratings (CW)       | 100 MHz                   |
| Cooling                               | Forced Air                |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 6.3 volts                 |
| Current                               | 160 amperes               |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 55.0 pF                   |
| Output                                | 1.4 pF                    |
| Feed-through                          | 34.0 pF                   |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 55.0 pF                   |
| Output                                | 34.0 pF                   |
| Feed-through                          | 1.4 pF                    |
| Amplification Factor                  | 20                        |
| Base                                  | Coaxial                   |
| Recommended Air-System Socket         | SK-1300                   |
| Recommended Air Chimney               | SK-1306                   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 8.75 in; 222.30 mm        |
| Maximum Diameter                      | 7.05 in; 179.10 mm        |
| Weight (approximate)                  | 12.0 lb; 5.5 kg           |
| Operating Position                    | Vertical, base up or down |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 8000                  | 6.0                  | Grid              | 8000                  | 5.9                  | 740                 | 34,000               |
| C                  | RF Power Amplifier Plate Modulated | 6500                  | 5.0                  | Grid              | 5000                  | 3.9                  | 490                 | 18,000               |
| B or AB            | RF Linear Amplifier                | 8000                  | 6.0                  | Grid              | 7000                  | 4.8                  | 215                 | 23,000               |

The 3CX15,000A7 ceramic/metal power triode is intended for use as a zero-bias Class B RF amplifier or Class C power amplifier or oscillator. It is also recommended for use as a grounded grid FM amplifier. Class B operation with zero bias offers circuit simplicity by eliminating the bias supply. In addition, grounded-grid operation is attractive since a power gain as high as twenty times can be obtained.

**CHARACTERISTICS**

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 15,000 watts              |
| Grid Dissipation (Max.)               | 500 watts                 |
| Frequency for Max. Ratings (CW)       | 110 MHz                   |
| Cooling                               | Forced Air                |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 6.3 volts                 |
| Current                               | 160 amperes               |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 61.0 pF                   |
| Output                                | 0.2 pF                    |
| Feed-through                          | 36.0 pF                   |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 61.0 pF                   |
| Output                                | 36.0 pF                   |
| Feed-through                          | 0.2 pF                    |
| Amplification Factor                  | 200                       |
| Base                                  | Coaxial                   |
| Recommended Air-System Socket         | SK-1300 or SK-1320        |
| Recommended Air Chimney               | SK-1306                   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 8.75 in; 222.30 mm        |
| Maximum Diameter                      | 7.05 in; 179.10 mm        |
| Weight (approximate)                  | 12.0 lb; 5.5 kg           |
| Operating Position                    | Vertical, base up or down |

**3CX15,000A7**

| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier  | 8000                  | 5.0                  | Grid              | 7000                  | 4.0                  | 430                 | 21,300               |
| AB                 | RF Linear Amplifier | 8000                  | 6.0                  | Cath.             | 7000                  | 5.9                  | 1750                | 29,600               |

## External Anode, Forced Air Cooled Triodes

### 3CX15,000H3



The 3CX15,000H3 is an air-cooled, ceramic/metal power triode designed primarily for use in industrial radio-frequency heating services. Its air-cooled anode is rated at 15 kW of plate dissipation.

Full ratings apply up to 90 MHz. Plentiful reserve emission is available from its one kilowatt filament. The grid structure is rated at 500 watts making this tube an excellent choice for severe application.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 15,000 watts  
Grid Dissipation (Max.) . . . . . 500 watts  
Frequency for Max. Ratings (CW) . . . . . 90 MHz  
Cooling . . . . . Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 6.3 volts  
Current . . . . . 160 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 55.0 pF  
Output . . . . . 1.4 pF  
Feed-through . . . . . 34.0 pF  
Amplification Factor . . . . . 20  
Base . . . . . Flexible filament leads  
Recommended Air Chimney . . . . . SK-1306  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 17.75 in; 450.80 mm  
Maximum Diameter . . . . . 7.05 in; 179.10 mm  
Weight (approximate) . . . . . 13.0 lb; 5.9 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|--------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                          | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Industrial Oscillator | 12,000                | 6.0                  | —                 | 10,000                | 5.0                  | 650                 | 41,200               |

### 3CX20,000A3



The 3CX20,000A3 is a ceramic/metal power triode for industrial oscillator or general communications service. It is recommended for Class C amplifier service, or Class B radio frequency and audio frequency amplifier use.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 20,000 watts  
Grid Dissipation (Max.) . . . . . 750 watts  
Frequency for Max. Ratings (CW) . . . . . 90 MHz  
Cooling . . . . . Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 10.0 volts  
Current . . . . . 160 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 70.0 pF  
Output . . . . . 2.3 pF  
Feed-through . . . . . 43.0 pF  
Base . . . . . Coaxial  
Recommended Air-System Socket . . . . . SK-1300  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 10.00 in; 254.0 mm  
Maximum Diameter . . . . . 8.00 in; 203.0 mm  
Weight (approximate) . . . . . 19.5 lb; 8.8 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 12,000                | 8.0                  | Grid              | 10,000                | 7.9                  | 960                 | 64,000               |
| C                  | RF Power Amplifier Plate Modulated | 6500                  | 5.5                  | Grid              | 6500                  | 5.0                  | 1500                | 27,500               |
| B or AB            | RF Linear Amplifier                | 8000                  | 8.0                  | Grid              | 7500                  | 7.4                  | 400                 | 40,000               |
| AB                 | AF Amplifier or Modulator          | 8000                  | 8.0                  | Grid              | 7500                  | 14.8*                | 800                 | 80,000*              |

\*Two tubes.

## External Anode, Forced Air Cooled Triodes **3CX20,000A7**



### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 20,000 watts  
 Grid Dissipation (Max.) . . . . . 500 watts  
 Frequency for Max. Ratings (CW) . . . . . 110 MHz  
 Cooling . . . . . Forced Air  
 Filament . . . . . Thoriated tungsten  
   Voltage . . . . . 6.3 volts  
   Current . . . . . 160 amperes  
 Capacitances (Gnd. Cath. Connection):  
   Input . . . . . 61.0 pF  
   Output . . . . . 0.2 pF  
   Feed-through . . . . . 36.0 pF  
 Capacitances (Gnd. Grid Connection):  
   Input . . . . . 61.0 pF  
   Output . . . . . 36.0 pF  
   Feed-through . . . . . 0.2 pF  
 Amplification Factor . . . . . 200  
 Base . . . . . Coaxial  
 Recommended Air-System Socket . . . . . SK-1300 or SK-1320  
 Maximum Seal & Anode Core Temperature . . . . . 250°C  
 Maximum Length . . . . . 8.75 in; 222.20 mm  
 Maximum Diameter . . . . . 8.31 in; 211.10 mm  
 Weight (approximate). . . . . 13.5 lb; 6.15 kg  
 Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                |                       |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Driven Element | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier  | 8000                  | 5.0                  | 110               | Grid           | 7000                  | 4.0                  | 430                 | 21,300               |
| C                  | RF Power Amplifier  | 8000                  | 5.0                  | 110               | Cath.          | 7800                  | 4.2                  | 2300                | 27,500               |
| B                  | RF Power Amplifier  | 8000                  | 6.0                  | 216               | Cath.          | 7200                  | 5.8                  | 1700                | 27,500               |
| AB                 | TV Servicet         |                       |                      |                   |                |                       |                      |                     |                      |
| AB                 | RF Linear Amplifier | 8000                  | 6.0                  | 110               | Cath.          | 7000                  | 5.0                  | 1540                | 24,200               |

†Peak Sync. Level

## 3CX20,000H3



### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 20,000 watts  
 Grid Dissipation (Max.) . . . . . 750 watts  
 Frequency for Max. Ratings (CW) . . . . . 90 MHz  
 Cooling . . . . . Forced Air  
 Filament . . . . . Thoriated tungsten  
   Voltage . . . . . 10.0 volts  
   Current . . . . . 160 amperes  
 Capacitances (Gnd. Cath. Connection):  
   Input . . . . . 70.0 pF  
   Output . . . . . 2.3 pF  
   Feed-through . . . . . 43.0 pF  
 Base . . . . . Flexible filament leads  
 Maximum Seal & Anode Core Temperature . . . . . 250°C  
 Maximum Length . . . . . 19.00 in; 482.60 mm  
 Maximum Diameter . . . . . 8.00 in; 203.20 mm  
 Weight (approximate) . . . . . 20.0 lb; 9.1 kg  
 Operating Position . . . . . Vertical, anode up or down

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier        | 12,000                | 8.0                  | Grid              | 10,000                | 7.9                  | 960                 | 64,000               |
| C                  | RF Power Amplifier        | 6500                  | 5.5                  | Grid              | 6500                  | 5.0                  | 1500                | 27,500               |
|                    | Plate Modulated           |                       |                      |                   |                       |                      |                     |                      |
| AB                 | AF Amplifier or Modulator | 8000                  | 8.0                  | Grid              | 7500                  | 14.8*                | 800                 | 80,000*              |

\*Two tubes.

# External Anode, Forced Air Cooled Triodes

## 6697A



The 6697A is a forced-air cooled ceramic/metal power triode designed for AM broadcast and communications amplifiers and for industrial heating service.

Low-loss ceramic and metal construction permits operation at full ratings at frequencies up to 30 MHz. Useful power output can be obtained at frequencies up to 60 MHz at reduced plate voltage.

The 6697A anode is capable of dissipating 35 kW. A water cooled version of this tube, type 6696A, and a vapor cooled version, type 7480, are also available.

## CHARACTERISTICS

|                                       |                     |
|---------------------------------------|---------------------|
| Plate Dissipation (Max.)              | 35,000 watts        |
| Grid Dissipation (Max.)               | 1000 watts          |
| Frequency for Max. Ratings (CW)       | 30 MHz              |
| Cooling                               | Forced Air          |
| Filament                              | Thoriated tungsten  |
| Voltage                               | 13.0 volts          |
| Current                               | 200 amperes         |
| Capacitances (Gnd. Cath. Connection): |                     |
| Input                                 | 75.0 pF             |
| Output                                | 2.6 pF              |
| Feed-through                          | 52.0 pF             |
| Amplification Factor                  | 20                  |
| Base                                  | Coaxial             |
| Maximum Seal & Envelope Temperature   | 200°C               |
| Maximum Length                        | 19.87 in; 504.80 mm |
| Maximum Diameter                      | 5.28 in; 134.10 mm  |
| Weight (approximate)                  | 43.0 lb; 19.5 kg    |
| Operating Position                    | Vertical, base up   |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 16,000                | 11.0                 | Grid              | 15,000                | 7.0                  | 600                 | 80,000               |
| C                  | RF Power Amplifier Plate Modulated | 10,000                | 8.5                  | Grid              | 9500                  | 8.4                  | 2000                | 60,000               |
| AB                 | RF Linear Amplifier                | 16,000                | 11.0                 | Cath.             | 12,000                | 5.2                  | 3500                | 43,000               |
| AB                 | RF Linear Amplifier AM Service     | 16,000                | 9.0                  | Grid              | 12,000                | 4.3                  | 450                 | 18,000               |
| AB                 | AF Amplifier or Modulator          | 16,000                | 11.0                 | Grid              | 10,000                | 17.4*                | 550                 | 110,000*             |

\*Two tubes.

**8158** see 3CX10,000A1

**8159** see 3CX10,000A3

**8160** see 3CX10,000A7

**8161** see 3CX2500A3

**8162** see 3CX3000F7

**8238** see 3CX3000A1

**8239** see 3CX3000F1

**8251** see 3CX2500F3

**8283** see 3CX1000A7

**CHARACTERISTICS**

These are compact external-anode, ceramic/metal triodes intended for use in zero-bias Class B amplifiers in audio or RF applications. The two types differ only in method of cooling and anode dissipation; the 8874 requires axial-flow forced-air cooling and is rated for 400 watts; and the 8875 has a transverse cooler for forced-air cooling and is rated for 300 watts.

Operation with zero grid bias simplifies circuitry by eliminating the normal bias supply. In addition, grounded-grid operation is attractive since a power gain as high as twenty times can be obtained with these types in a cathode-driven circuit.

Plate Dissipation (Max.): (8874) . . . . . 400 watts  
(8875) . . . . . 300 watts  
Grid Dissipation (Max.) . . . . . 5 watts  
Frequency for Max. Ratings (CW) . . . . . 500 MHz  
Cooling . . . . . Forced Air  
Cathode: . . . . . Oxide-coated Unipotential  
Voltage . . . . . 6.3 volts  
Current . . . . . 3.0 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 20.5 pF  
Output . . . . . 0.03 pF  
Feed-through . . . . . 6.0 pF  
Capacitances (Gnd. Grid Connection):  
Input . . . . . 20.5 pF  
Output . . . . . 6.0 pF  
Feed-through . . . . . 0.03 pF  
Cathode-Heater . . . . . 6.0 pF  
Amplification Factor . . . . . 240  
Transconductance† . . . . . 29,000  $\mu$ mhos  
Base . . . . . Large Wafer Elevenar 11-pin with Ring  
(JEDEC No. E11-81)  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length: (8874) . . . . . 2.14 in; 54.40 mm  
(8875) . . . . . 2.18 in; 55.50 mm  
Maximum Diameter: (8874) . . . . . 1.64 in; 41.70 mm  
(8875) . . . . . 2.52 in; 64.00 mm  
Weight (approximate): (8874) . . . . . 4.3 oz; 122 gm  
(8875) . . . . . 8.6 oz; 244 gm  
Operating Position . . . . . Any



| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                |                       |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Driven Element | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier  | 2200                  | 0.35                 | 110               | Grid           | 2000                  | 0.25                 | 9.0                 | 305*                 |
| AB <sub>2</sub>    | RF Linear Amplifier | 2200                  | 0.35                 | 30                | Cath.          | 2000                  | 0.50‡                | 26                  | 587*                 |
| AB <sub>2</sub>    | RF Linear Amplifier | 2200                  | 0.35                 | 432               | Cath.          | 2000                  | 0.50‡                | 27                  | 505*                 |

\*Useful Power Output.

† At  $I_b = 250$  mA

‡ Single-tone Intermittent Voice Service value.



8875

**8877** see 3CX1500A7

## External Anode, Forced Air Cooled Triodes

### 8938



The 8938 is a rugged coaxial-base ceramic/metal power triode designed for use as a cathode driven Class AB<sub>2</sub> or Class C amplifier.

It is recommended for VHF or UHF service as a linear amplifier, power amplifier, or pulse amplifier. Linearity and power gain are both excellent due to the low ratio of grid to plate current, and the relatively high amplification factor. Low grid interception of available emission current is due to the beam forming geometry of the special grid and cathode design.

The 8938 is a practical size for use in ground based or mobile equipment in CW or PEP power levels of 1 to 2.5 kW. It is useful at frequencies higher than the upper frequency of maximum ratings, 500 MHz.

### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 1500 watts                |
| Grid Dissipation (Max.)               | .20 watts                 |
| Frequency for Max. Ratings (CW)       | 500 MHz                   |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Voltage                               | 5.0 volts                 |
| Current                               | 10.5 amperes              |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 35.5 pF                   |
| Output                                | 12.4 pF                   |
| Feed-through                          | 0.14 pF                   |
| Amplification Factor                  | 125                       |
| Transconductance                      | 55,000 $\mu$ hos          |
| Base                                  | Coaxial                   |
| Recommended Air-System Socket†        | SK-2220                   |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 3.68 in; 93.40 mm         |
| Maximum Diameter                      | 3.38 in; 85.80 mm         |
| Weight (approximate)                  | 25 oz; 709 gm             |
| Operating Position                    | Any                       |

| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                |                       |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Driven Element | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier  | 4000                  | 1.0                  | 400               | Cath.          | 3000                  | 1.0                  | 83                  | 1570†                |
| AB <sub>2</sub>    | RF Linear Amplifier | 4000                  | 1.0                  | 30                | Cath.          | 3500                  | 0.97                 | 50                  | 2030†                |

† Useful Power Output.

‡ Collets available—see 8962.

## 8961 see 3CX400U7

### 8962



The 8962 is a high- $\mu$  triode designed with beam-forming cathode and control grid geometry, with a forced-air cooled external anode rated at 1500 watts dissipation, and coaxial base terminals. This focused-triode design makes possible the simplicity and circuit advantages of a triode combined with the gain of a tetrode.

The tube is intended for use above 200 MHz, with good gain in cathode driven (grounded grid) circuitry, and is especially useful in the 806 to 950 MHz band allocated to land mobile services, where typical gain of 10 dB may be obtained in a suitable amplifier.

### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 1500 watts                |
| Grid Dissipation (Max.)               | 30 watts                  |
| Frequency for Max. Ratings (CW)       | 1000 MHz                  |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Voltage                               | 4.5 volts                 |
| Current                               | 11 amperes                |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 28.0 pF                   |
| Output                                | 13.0 pF                   |
| Feed-through                          | 0.04 pF                   |
| Amplification Factor                  | 300                       |
| Transconductance                      | 50,000 $\mu$ hos          |
| Base                                  | Special, Coaxial          |
| Available Contact Collets:            |                           |
| Anode                                 | Part No. 135304           |
| Grid                                  | 135305                    |
| Cathode                               | 135306                    |
| Heater                                | 135307                    |
| Heater (center pin)                   | 135310                    |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 3.50 in; 89.00 mm         |
| Maximum Diameter                      | 3.40 in; 86.00 mm         |
| Weight (approximate)                  | 25 oz; 709 gm             |
| Operating Position                    | Any                       |

| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                |                       |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Driven Element | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| B                  | RF Linear Amplifier | 2000                  | 1.0                  | 850               | Cath.          | 2000                  | 1.0                  | 68                  | 680*                 |

\* Useful, measured at the load.

**CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . 20,000 watts  
 Grid Dissipation (Max.) . . . . . 100 watts  
 Frequency for Max. Ratings (CW) . . . . . 250 MHz  
 Cooling . . . . . Forced Air  
 Cathode . . . . . Oxide-coated Unipotential  
 Voltage . . . . . 18.0 volts  
 Current . . . . . 11 amperes  
 Capacitances (Gnd. Grid Connection):  
   Input . . . . . 82.0 pF  
   Output . . . . . 21.0 pF  
   Plate-Cathode . . . . . 0.1 pF  
 Amplification Factor . . . . . 260  
 Transconductance . . . . . 90,000  $\mu$ mhos  
 Base . . . . . Special, Coaxial  
 Maximum Seal & Anode Core Temperature . . . 250°C  
 Maximum Length . . . . . 6.70 in; 170.00 mm  
 Maximum Diameter . . . . . 9.18 in; 233.00 mm  
 Weight (approximate) . . . . . 21.5 lb; 9.7 kg  
 Operating Position . . . . . Any

| Class of Operation | Type of Service         | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|-------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                         | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| B                  | RF Amplifier Television | 10,000                | 5.0                  | Cath.             | 8350                  | 3.6*<br>4.7†         | 280*<br>480†        | 16,500*<br>27,500†   |

\*Blanking level.      †Sync level.

## External Anode, Vapor Cooled Triodes

### 3CV30,000A3



The 3CV30,000A3 is a vapor-cooled, ceramic/metal power triode designed primarily for use in industrial radio-frequency heating service. Its vapor-cooled anode is conservatively rated at 30 kW of plate dissipation when mounted in a BR-200 boiler.

Full input of 60 kW is permissible up to 100 MHz. Large reserve emission is available from its one kilowatt filament and the grid structure is rated at one ampere making this tube an excellent choice for severe applications.

It is also recommended as a grounded grid FM amplifier, a conventional plate-modulated amplifier or as a linear amplifier in new equipment designs.

#### CHARACTERISTICS

|                                       |                      |
|---------------------------------------|----------------------|
| Plate Dissipation (Max.)              | 30,000 watts         |
| Grid Dissipation (Max.)               | 500 watts            |
| Frequency for Max. Ratings (CW)       | 100 MHz              |
| Cooling                               | Vapor and Forced Air |
| Filament                              | Thoriated tungsten   |
| Voltage                               | 6.3 volts            |
| Current                               | 160 amperes          |
| Capacitances (Gnd. Cath. Connection): |                      |
| Input                                 | 55.0 pF              |
| Output                                | 1.4 pF               |
| Feed-through                          | 34.0 pF              |
| Amplification Factor                  | 20                   |
| Base                                  | Coaxial              |
| Recommended Air-System Socket         | SK-1310              |
| Recommended Boiler                    | BR-200               |
| Maximum Seal Temperature              | 250°C                |
| Maximum Length                        | 8.62 in; 218.90 mm   |
| Maximum Diameter                      | 7.75 in; 196.80 mm   |
| Weight (approximate)                  | 18.0 lb; 8.2 kg      |
| Operating Position                    | Vertical, base up    |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier Plate Modulated | 7000                  | 5.0                  | Grid              | 7000                  | 5.0                  | 750                 | 27,500               |
| C                  | RF Industrial Oscillator           | 10,000                | 6.0                  | —                 | 10,000                | 6.0                  | 365                 | 42,000               |
| AB <sub>2</sub>    | RF Linear Amplifier                | 10,000                | 6.0                  | Grid              | 10,000                | 6.0                  | 240                 | 41,000               |

### 3CV30,000H3



The 3CV30,000H3 is a vapor-cooled, ceramic/metal power triode designed primarily for use in industrial radio-frequency heating service. Its vapor-cooled anode is conservatively rated at 30 kW of plate dissipation when mounted in a BR-200 boiler.

Full input of 60 kW is permissible up to 100 MHz. Large reserve emission is available from its one kilowatt filament and the grid structure is rated at one ampere making this tube an excellent choice for severe applications.

It is also recommended as an audio amplifier, a conventional plate-modulated amplifier or as a linear amplifier in new equipment designs.

#### CHARACTERISTICS

|                                       |                         |
|---------------------------------------|-------------------------|
| Plate Dissipation (Max.)              | 30,000 watts            |
| Grid Dissipation (Max.)               | 500 watts               |
| Frequency for Max. Ratings (CW)       | 100 MHz                 |
| Cooling                               | Vapor and Forced Air    |
| Filament                              | Thoriated tungsten      |
| Voltage                               | 6.3 volts               |
| Current                               | 160 amperes             |
| Capacitances (Gnd. Cath. Connection): |                         |
| Input                                 | 55.0 pF                 |
| Output                                | 1.4 pF                  |
| Feed-through                          | 34.0 pF                 |
| Amplification Factor                  | 20                      |
| Base                                  | Flexible filament leads |
| Recommended Boiler                    | BR-200                  |
| Maximum Seal Temperature              | 250°C                   |
| Maximum Length                        | 17.63 in; 447.80 mm     |
| Maximum Diameter                      | 7.75 in; 196.80 mm      |
| Weight (approximate)                  | 18.0 lb; 8.2 kg         |
| Operating Position                    | Vertical, base up       |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier Plate Modulated | 7000                  | 5.0                  | Grid              | 7000                  | 5.0                  | 750                 | 27,500               |
| C                  | RF Industrial Oscillator           | 10,000                | 6.0                  | —                 | 10,000                | 6.0                  | 365                 | 42,000               |
| AB <sub>2</sub>    | AF Amplifier or Modulator          | 10,000                | 6.0                  | Grid              | 9600                  | 6.2*                 | 50                  | 36,000*              |

\*Two tubes.

The 7480 is a vapor-cooled ceramic/metal triode designed for AM broadcast and communications amplifiers and for industrial heating service.

Low-loss ceramic and metal construction permits operation at full ratings at frequencies up to 30 MHz. Useful power output can be obtained at frequencies up to 60 MHz at reduced plate voltage.

The 7480 anode is capable of dissipating 80 kW continuously, and higher power during intermittent operation or momentary overloads. A water cooled version of this tube, type 6696A, and a forced-air cooled version, type 6697A, are also available.

### CHARACTERISTICS

|                                       |                      |
|---------------------------------------|----------------------|
| Plate Dissipation (Max.)              | 80,000 watts         |
| Grid Dissipation (Max.)               | 1000 watts           |
| Frequency for Max. Ratings (CW)       | 30 MHz               |
| Cooling                               | Vapor and Forced Air |
| Filament                              | Thoriated tungsten   |
| Voltage                               | 13 volts             |
| Current                               | 200 amperes          |
| Capacitances (Gnd. Cath. Connection): |                      |
| Input                                 | 75.0 pF              |
| Output                                | 2.6 pF               |
| Feed-through                          | 52.0 pF              |
| Amplification Factor                  | 20                   |
| Base                                  | Coaxial              |
| Recommended Terminal Connectors       | SK-1600 Series       |
| Recommended Boiler                    | BR-400 Series        |
| Maximum Seal & Envelope Temperature   | 200°C                |
| Maximum Length                        | 20.13 in; 511.30 mm  |
| Maximum Diameter                      | 7.12 in; 180.80 mm   |
| Weight (approximate)                  | 50.0 lb; 22.7 kg     |
| Operating Position                    | Vertical, base up    |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 16,000                | 11.0                 | Grid              | 15,000                | 7.0                  | 600                 | 80,000               |
| C                  | RF Power Amplifier Plate Modulated | 10,000                | 8.5                  | Grid              | 9500                  | 8.4                  | 2000                | 60,000               |
| AB                 | RF Linear Amplifier                | 16,000                | 11.0                 | Cath.             | 12,000                | 9.8                  | 8200                | 83,000               |
| AB                 | RF Linear Amplifier (AM Service)   | 16,000                | 9.0                  | Grid              | 12,000                | 6.8                  | 1500                | 28,000               |
| AB                 | AF Amplifier or Modulator          | 16,000                | 11.0                 | Grid              | 12,000                | 20.0*                | 600                 | 152,000*             |

\*Two tubes.

# External Anode, Water Cooled Triodes

## 3CW5000A1/8240

## 3CW5000F1/8241



The 3CW5000A1/8240 and 3CW5000F1/8241 are low- $\mu$  water-cooled power triodes intended for use as audio amplifiers or modulators. Their maximum rated plate dissipation is 5000 watts. The two types are identical except for the addition of flexible leads for the grid and filament terminals on the 3CW5000F1/8241.

Two of these tubes, in Class AB<sub>1</sub> audio service, will deliver more than 10 kW maximum-signal plate output power at 6000 plate volts without drawing grid current.

These two types are electrically identical to the air-cooled 3CX3000A1/8238 except for the plate dissipation rating.

### CHARACTERISTICS

|                                   |                           |
|-----------------------------------|---------------------------|
| Plate Dissipation (Max.)          | 5000 watts                |
| Grid Dissipation (Max.)           | 50 watts                  |
| Cooling                           | Water and Forced Air      |
| Filament                          | Thoriated tungsten        |
| Voltage                           | 7.5 volts                 |
| Current (3CW5000A1)               | 51.5 amperes              |
| (3CW5000F1)                       | 50.5 amperes              |
| Amplification Factor              | 4.9                       |
| Transconductance†                 | 11,000 $\mu$ mhos         |
| Base (3CW5000A1)                  | Coaxial                   |
| (3CW5000F1)                       | Flexible filament leads   |
| Maximum Seal Temperature          | 250°C                     |
| Maximum Flexible Lead Temperature | 175°C                     |
| Maximum Length (3CW5000A1)        | 12.62 in; 320.50 mm       |
| (3CW5000F1)                       | 22.06 in; 560.30 mm       |
| Maximum Diameter (both types)     | 3.63 in; 92.10 mm         |
| Weight (approximate) (3CW5000A1)  | 4.8 lb; 2.2 kg            |
| (3CW5000F1)                       | 6.0 lb; 2.7 kg            |
| Operating Position                | Vertical, base up or down |

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | AF Amplifier or Modulator | 6000                  | 2.5                  | Grid              | 6000                  | 2.7*                 | 0                   | 10,000*              |

\*Two tubes.

†At  $I_b = 10$  A

## 3CW5000A3/8242

## 3CW5000F3/8243



The 3CW5000A3 and 3CW5000F3 are medium- $\mu$  water-cooled power triodes intended for use in amplifier, oscillator, or modulator service. Their maximum rated anode dissipation is 5000 watts. The two types are identical except for the addition of flexible leads for the grid and filament terminals of the 3CW5000F3/8243.

These tubes are water-cooled versions of the air-cooled 3CX2500A3/8161 and 3CX2500F3/8251.

The water-cooled tubes are recommended for industrial applications or installations where reserve anode dissipation is required.

### CHARACTERISTICS

|                                      |                           |
|--------------------------------------|---------------------------|
| Plate Dissipation (Max.)             | 5000 watts                |
| Grid Dissipation (Max.)              | 150 watts                 |
| Frequency for Max. Ratings (CW)      | 75 MHz                    |
| Cooling                              | Water and Forced Air      |
| Filament                             | Thoriated tungsten        |
| Voltage                              | 7.5 volts                 |
| Current (3CW5000A3)                  | 51.5 amperes              |
| (3CW5000F3)                          | 50.5 amperes              |
| Capacitances (Gnd. Cath. Connection) |                           |
| Input                                | 35.0 pF                   |
| Output                               | 0.9 pF                    |
| Feed-through                         | 20.0 pF                   |
| Amplification Factor                 | 20                        |
| Transconductance†                    | 20,000 $\mu$ mhos         |
| Base (3CW5000A3)                     | Coaxial                   |
| (3CW5000F3)                          | Flexible filament leads   |
| Maximum Seal Temperature             | 250°C                     |
| Maximum Flexible Lead Temperature    | 175°C                     |
| Maximum Length (3CW5000A3)           | 12.62 in; 320.50 mm       |
| (3CW5000F3)                          | 22.06 in; 560.30 mm       |
| Maximum Diameter (both types)        | 3.63 in; 92.10 mm         |
| Weight (approximate) (3CW5000A3)     | 4.8 lb; 2.2 kg            |
| (3CW5000F3)                          | 6.0 lb; 2.7 kg            |
| Operating Position                   | Vertical, base up or down |

| Class of Operation | Type of Service                       | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|---------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                       | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                    | 6000                  | 2.5                  | Grid              | 6000                  | 2.1                  | 136                 | 10,000               |
| C                  | RF Power Amplifier<br>Plate Modulated | 5000                  | 2.0                  | Grid              | 5000                  | 1.5                  | 76                  | 5580                 |
| AB <sub>2</sub>    | AF Amplifier or Modulator             | 6000                  | 2.5                  | Grid              | 6000                  | 3.0*                 | 113                 | 13,000*              |
| AB <sub>2</sub>    | AF Amplifier or Modulator             | 6000                  | 2.5                  | Grid              | 5000                  | 2.3*                 | 59                  | 8000*                |

\*Two tubes.

†At  $I_b = 10$  A

**3CW5000H3**

The 3CW5000H3 is a water-cooled, ceramic/metal power triode designed primarily for use in industrial radio-frequency heating services. Its water-cooled anode is conservatively rated at 5 kW of plate dissipation with low water flow and pressure drop.

Input of 12.5 kW is permissible up to 75 MHz. Plentiful reserve emission is available from its 375 watt filament. The grid structure is rated at 150 watts making this tube an excellent choice for severe applications.

**CHARACTERISTICS**

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 5000 watts                |
| Grid Dissipation (Max.)               | 150 watts                 |
| Frequency for Max. Ratings (CW)       | 75 MHz                    |
| Cooling                               | Water and Forced Air      |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 7.5 volts                 |
| Current                               | 50.5 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 35.0 pF                   |
| Output                                | 0.9 pF                    |
| Feed-through                          | 20.0 pF                   |
| Amplification Factor                  | 20                        |
| Transconductance                      | 20,000 $\mu$ mhos         |
| Base                                  | Flexible filament leads   |
| Maximum Seal Temperature              | 250°C                     |
| Maximum Flexible Lead Temperature     | 175°C                     |
| Maximum Length                        | 18.56 in; 471.40 mm       |
| Maximum Diameter                      | 5.42 in; 137.70 mm        |
| Weight (approximate)                  | 7.5 lb; 3.4 kg            |
| Operating Position                    | Vertical, base up or down |



| Class of Operation | Type of Service          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                      |                     |                      |
|--------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                          | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Industrial Oscillator | 6000                  | 2.5                  | 6000                  | 2.1                  | 136                 | 10,000               |

†At  $I_b - 0.83$  A

**3CW10,000H3**

The 3CW10,000H3 is a water-cooled, ceramic/metal power triode designed primarily for use in industrial radio-frequency heating services. Its water-cooled anode is conservatively rated at 10 kW of plate dissipation with low water flow and pressure drop.

Input of 30 kW is permissible up to 90 MHz. Plentiful reserve emission is available from its 560 watt filament. The grid structure is rated at 150 watts making this tube an excellent choice for severe applications.

**CHARACTERISTICS**

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 10,000 watts              |
| Grid Dissipation (Max.)               | 100 watts                 |
| Frequency for Max. Ratings (CW)       | 90 MHz                    |
| Cooling                               | Water and Forced Air      |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 7.5 volts                 |
| Current                               | 75.0 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 51.0 pF                   |
| Output                                | 1.5 pF                    |
| Feed-through                          | 25.0 pF                   |
| Amplification Factor                  | 20                        |
| Base                                  | Flexible filament leads   |
| Maximum Seal Temperature              | 250°C                     |
| Maximum Flexible Lead Temperature     | 175°C                     |
| Maximum Length                        | 18.75 in; 476.20 mm       |
| Maximum Diameter                      | 6.80 in; 172.70 mm        |
| Weight (approximate)                  | 10 lb; 4.54 kg            |
| Operating Position                    | Vertical, base up or down |



| Class of Operation | Type of Service          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                      |                     |                      |
|--------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                          | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Industrial Oscillator | 10,000                | 3.0                  | 9000                  | 2.9                  | —                   | 20,600               |

## External Anode, Water Cooled Triodes

### 3CW20,000A1



The 3CW20,000A1 is a ceramic/metal power triode intended primarily for use as an audio amplifier or modulator. This tube is also recommended for voltage-regulator applications where high current capability and low tube drop are important. Up to 20 kW of plate power can be dissipated on its water-cooled anode. Except for plate dissipation, the tube is electrically identical to the 3CX10,000A1/8158.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 20,000 watts  
Grid Dissipation (Max.) . . . . . 100 watts  
Frequency for Max. Ratings (CW) . . . . . 110 MHz  
Cooling . . . . . Water and Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 7.5 volts  
Current . . . . . 99.0 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 51.0 pF  
Output . . . . . 4.0 pF  
Feed-through . . . . . 29.0 pF  
Amplification Factor . . . . . 6.0  
Transconductance . . . . . 20,000  $\mu$ mhos  
Base . . . . . Coaxial  
Recommended Air-System Socket . . . . . SK-300  
Maximum Seal Temperature . . . . . 250°C  
Maximum Length . . . . . 11.22 in; 284.90 mm  
Maximum Diameter . . . . . 4.65 in; 118.10 mm  
Weight (approximate) . . . . . 11.5 lb; 5.2 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Industrial Oscillator  | 5000                  | 4.0                  | —                 | 5000                  | 2.8                  | 385                 | 11,000               |
| AB <sub>1</sub>    | AF Amplifier or Modulator | 7000                  | 5.0                  | Grid              | 7000                  | 7.0*                 | 0                   | 29,100*              |
| A                  | AF Amplifier or Modulator | 7000                  | 5.0                  | Grid              | 2500                  | 4.0                  | 0                   | 1800                 |
| A                  | Voltage Regulator         | 10,000                | 5.0                  | Grid              | 5000                  | 2.0                  | —                   | —                    |

\*Two tubes.

† At  $I_b = 2.0$  A

### 3CW20,000A3



The 3CW20,000A3 is a ceramic/metal power triode intended primarily for use as a power oscillator in industrial-heating applications. It is also recommended for use as a grounded-grid FM amplifier, as a conventional plate-modulated amplifier, or as a linear amplifier.

#### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 20,000 watts  
Grid Dissipation (Max.) . . . . . 250 watts  
Frequency for Max. Ratings (CW) . . . . . 110 MHz  
Cooling . . . . . Water and Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 7.5 volts  
Current . . . . . 99.0 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 53.0 pF  
Output . . . . . 1.4 pF  
Feed-through . . . . . 34.0 pF  
Capacitances (Gnd. Grid Connection):  
Input . . . . . 53.0 pF  
Output . . . . . 34.0 pF  
Feed-through . . . . . 1.4 pF  
Amplification Factor . . . . . 20  
Base . . . . . Coaxial  
Recommended Air-System Socket . . . . . SK-1300  
Maximum Seal Temperature . . . . . 250°C  
Maximum Length . . . . . 11.22 in; 285.00 mm  
Maximum Diameter . . . . . 4.65 in; 118.10 mm  
Weight (approximate) . . . . . 11.5 lb; 5.2 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7000                  | 4.0                  | Cath.             | 7000                  | 4.0                  | 4100                | 24,500               |
| C                  | RF Power Amplifier Plate Modulated | 5500                  | 3.0                  | Grid              | 5000                  | 3.0                  | 515                 | 12,400               |
| C                  | RF Industrial Oscillator           | 7000                  | 4.0                  | —                 | 7000                  | 4.0                  | —                   | 22,400               |
| AB <sub>2</sub>    | RF Linear Amplifier                | 7000                  | 5.0                  | Cath.             | 7000                  | 4.0                  | 2050                | 20,000               |

## External Anode, Water Cooled Triodes **3CW20,000A7**

The 3CW20,000A7 is a ceramic/metal power triode intended to be used as a zero-bias Class-B amplifier in audio or radio-frequency applications. Operation with zero grid bias offers circuit simplicity by eliminating the bias supply. In addition, grounded-grid operation is attractive since a power gain as high as twenty times can be obtained.

The 3CW20,000A7 is electrically identical to the air-cooled 3CX10,000A7 except for its 20kW plate dissipation rating.

### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 20,000 watts  
Grid Dissipation (Max.) . . . . . 500 watts  
Frequency for Max. Ratings (CW) . . . . . 110 MHz  
Cooling . . . . . Water and Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 7.5 volts  
Current . . . . . 99.0 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 59.0 pF  
Output . . . . . 0.2 pF  
Feed-through . . . . . 36.0 pF  
Capacitances (Gnd. Grid Connection)  
Input . . . . . 59.0 pF  
Output . . . . . 36.0 pF  
Feed-through . . . . . 0.2 pF  
Amplification Factor . . . . . 200  
Base . . . . . Coaxial  
Recommended Air-System Socket . . . . . SK-1300  
Maximum Seal Temperature . . . . . 250°C  
Maximum Length . . . . . 11.22 in; 285.00 mm  
Maximum Diameter . . . . . 4.65 in; 118.10 mm  
Weight (approximate) . . . . . 11.5 lb; 5.2 kg  
Operating Position . . . . . Vertical, base up or down



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7000                  | 4.0                  | Grid              | 7000                  | 4.0                  | 530                 | 21,300               |
| C                  | RF Power Amplifier Plate Modulated | 5500                  | 3.0                  | Grid              | 5000                  | 3.0                  | 380                 | 11,900               |
| B                  | RF Linear Amplifier                | 7000                  | 5.0                  | Cath.             | 7000                  | 5.0                  | 1540                | 24,200               |
| B                  | RF Linear Amplifier (AM Service)   | 7000                  | 5.0                  | Cath.             | 7000                  | 2.4                  | 330                 | 5650†                |
| B                  | AF Amplifier or Modulator          | 7000                  | 5.0                  | Grid              | 7000                  | 10.0*                | 560                 | 47,700*              |

\*Two tubes.

†Carrier Power.

## **3CW20,000H3**

The 3CW20,000H3 is a water-cooled, ceramic/metal power triode designed primarily for use in industrial radio-frequency heating services. Its water-cooled anode is conservatively rated at 20 kW of plate dissipation with low water flow and pressure drop.

Input of 40 kilowatts is permissible up to 90 MHz. Plentiful reserve emission is available from its 750 watt filament. The grid structure is rated at 250 watts, making this tube an excellent choice for severe applications.

### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 20,000 watts  
Grid Dissipation (Max.) . . . . . 250 watts  
Frequency for Max. Ratings (CW) . . . . . 90 MHz  
Cooling . . . . . Water and Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 7.5 volts  
Current . . . . . 99.0 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 53.0 pF  
Output . . . . . 1.4 pF  
Feed-through . . . . . 34.0 pF  
Amplification Factor . . . . . 20  
Base . . . . . Flexible filament leads  
Maximum Seal Temperature . . . . . 250°C  
Maximum Flexible Lead Temperature . . . . . 175°C  
Maximum Length . . . . . 18.25 in; 463.50 mm  
Maximum Diameter . . . . . 6.75 in; 171.40 mm  
Weight (approximate) . . . . . 12 lb; 5.5 kg  
Operating Position . . . . . Vertical, base up or down



| Class of Operation | Type of Service          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                      |                     |                      |
|--------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                          | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Industrial Oscillator | 12,000                | 4.0                  | 10,000                | 4.0                  | 340                 | 28,000               |

## External Anode, Water Cooled Triodes 3CW20,000H7



The 3CW20,000H7 is a ceramic/metal power triode intended for use as a dc voltage or current regulator, or in high-voltage switch tube or pulsed regulator service.

In addition, since the tube is identical to the 3CW20,000A7 except for the anode and grid flanges and the addition of the filament flying leads, the tube is useful as a zero-bias Class B amplifier in audio or RF applications. Operation with zero grid bias offers circuit simplicity by eliminating the bias supply. In addition, grounded-grid operation is attractive since a power gain as high as twenty times can be obtained.

The anode dissipation rating is 20 kW with water cooling.

### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 20,000 watts  
Grid Dissipation (Max.) . . . . . 500 watts  
Frequency for Max. Ratings (CW) . . . . . 110 MHz  
Cooling . . . . . Water and Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 7.5 volts  
Current . . . . . 100 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 59.0 pF  
Output . . . . . 0.2 pF  
Feed-through . . . . . 36.0 pF  
Amplification Factor . . . . . 200  
Base . . . . . Flexible filament leads  
Maximum Seal Temperature . . . . . 250°C  
Maximum Flexible Lead Temperature . . . . . 175°C  
Maximum Length . . . . . 20.70 in; 525.80 mm  
Maximum Diameter . . . . . 6.75 in; 171.40 mm  
Weight (approximate) . . . . . 12 lb; 5.5 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service                  | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|----------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                  | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| B                  | RF Linear Amplifier              | 7000                  | 5.0                  | Cath.             | 7000                  | 5.0                  | 1540                | 24,200               |
| B                  | RF Linear Amplifier (AM Service) | 7000                  | 5.0                  | Cath.             | 7000                  | 2.4                  | 330                 | 5650†                |
| B                  | AF Amplifier or Modulator        | 7000                  | 5.0                  | Grid              | 7000                  | 10.0*                | 560                 | 47,700*              |

\*Two tubes.

†Carrier Power.

## 3CW30,000H3



The 3CW30,000H3 is a water-cooled, ceramic/metal power triode designed primarily for use in industrial radio-frequency heating services. Its water-cooled anode is conservatively rated at 30 kW of plate dissipation with low water flow and pressure drop.

Input of 60 kW is permissible from its one kilowatt filament. The grid structure is rated at 500 watts making this tube an excellent choice for severe applications.

### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 30,000 watts  
Grid Dissipation (Max.) . . . . . 500 watts  
Frequency for Max. Ratings (CW) . . . . . 90 MHz  
Cooling . . . . . Water and Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 6.3 volts  
Current . . . . . 160 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 53.0 pF  
Output . . . . . 1.4 pF  
Feed-through . . . . . 34.0 pF  
Amplification Factor . . . . . 20  
Base . . . . . Flexible filament leads  
Maximum Seal Temperature . . . . . 250°C  
Maximum Flexible Lead Temperature . . . . . 175°C  
Maximum Length . . . . . 18.50 in; 469.90 mm  
Maximum Diameter . . . . . 6.75 in; 171.40 mm  
Weight (approximate) . . . . . 12 lb; 5.5 kg  
Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                      |                     |                      |
|--------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                          | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Industrial Oscillator | 12,000                | 6.0                  | 10,000                | 6.0                  | 365                 | 42,000               |

## 3CW30,000H7

The 3CW30,000H7 is a water-cooled, ceramic/metal power triode designed for use as a zero-bias Class B RF amplifier, Class C power amplifier or oscillator, or for voltage regulator service. Its water-cooled anode is conservatively rated at 30 kW of dissipation capability with low water flow and pressure drop.

Input of 48 kW is permissible up to 110 MHz. Plentiful reserve emission is available from its one kilowatt filament.

Class B operation with zero grid bias offers circuit simplification by eliminating the bias supply. In addition, grounded grid operation is attractive since a power gain as high as twenty times can be obtained.

### CHARACTERISTICS

|                                      |                           |
|--------------------------------------|---------------------------|
| Plate Dissipation (Max.)             | 30,000 watts              |
| Grid Dissipation (Max.)              | 500 watts                 |
| Frequency for Max. Ratings (CW)      | 110 MHz                   |
| Cooling                              | Water and Forced Air      |
| Filament                             | Thoriated tungsten        |
| Voltage                              | 6.3 volts                 |
| Current                              | 160 amperes               |
| Capacitances (Gnd. Cath. Connection) |                           |
| Input                                | 56.0 pF                   |
| Output                               | 0.2 pF                    |
| Feed-through                         | 36.0 pF                   |
| Capacitances (Gnd. Grid Connection)  |                           |
| Input                                | 56.0 pF                   |
| Output                               | 36.0 pF                   |
| Feed-through                         | 0.2 pF                    |
| Amplification Factor                 | 200                       |
| Base                                 | Flexible filament leads   |
| Maximum Seal Temperature             | 250°C                     |
| Maximum Flexible Lead Temperature    | 175°C                     |
| Maximum Length                       | 18.50 in; 469.90 mm       |
| Maximum Diameter                     | 6.75 in; 171.40 mm        |
| Weight (approximate)                 | 12 lb; 5.5 kg             |
| Operating Position                   | Vertical, base up or down |



| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier  | 8000                  | 5.0                  | Grid              | 7000                  | 4.0                  | 430                 | 21,300               |
| AB                 | RF Linear Amplifier | 8000                  | 6.0                  | Cath.             | 7000                  | 5.0                  | 1540                | 24,200               |
| A                  | Voltage Regulator   | 28,000                | 6.0                  | Grid              | —                     | —                    | —                   | —                    |

## 3CW40,000H3

The 3CW40,000H3 is a water-cooled, ceramic/metal power triode designed primarily for use in industrial radio-frequency heating services. Its water-cooled anode is conservatively rated at 40 kW of plate dissipation with low waterflow and pressure drop.

Input of 80 kW is permissible up to 90 MHz. Plentiful reserve emission is available from its 1500 watt filament. The grid structure is rated at 750 watts, making this tube an excellent choice for severe applications.

### CHARACTERISTICS

|                                      |                           |
|--------------------------------------|---------------------------|
| Plate Dissipation (Max.)             | 40,000 watts              |
| Grid Dissipation (Max.)              | 750 watts                 |
| Frequency for Max. Ratings (CW)      | 90 MHz                    |
| Cooling                              | Water and Forced Air      |
| Filament                             | Thoriated tungsten        |
| Voltage                              | 10.0 volts                |
| Current                              | 160 amperes               |
| Capacitances (Gnd. Cath. Connection) |                           |
| Input                                | 70.0 pF                   |
| Output                               | 2.3 pF                    |
| Feed-through                         | 43.0 pF                   |
| Amplification Factor                 | 20                        |
| Base                                 | Flexible filament leads   |
| Maximum Seal Temperature             | 250°C                     |
| Maximum Flexible Lead Temperature    | 175°C                     |
| Maximum Length                       | 21.23 in; 539.20 mm       |
| Maximum Diameter                     | 6.75 in; 171.40 mm        |
| Weight (approximate)                 | 14 lb; 6.4 kg             |
| Operating Position                   | Vertical, base up or down |



| Class of Operation | Type of Service          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                      |                     |                      |
|--------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                          | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Industrial Oscillator | 12,000                | 9.0                  | 10,000                | 9.0                  | 1040                | 70,000               |

**6696A**

The 6696A is a water-cooled, ceramic/metal triode designed for industrial heating service. It is recommended also for use in broadcast and communications amplifiers.

Low-loss ceramic and metal construction permits operation at full ratings at frequencies up to 30 MHz. Useful power output can be obtained at frequencies up to 60 MHz at reduced plate voltage.

The 6696A anode is capable of dissipating 60 kW at a moderate rate of water flow. A forced-air cooled version of this tube, type 6697A, and a vapor cooled version, type 7480, are also available.

**CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . 60,000 watts  
 Grid Dissipation (Max.) . . . . . 1,000 watts  
 Frequency for Max. Ratings (CW) . . . . . 30 MHz  
 Cooling . . . . . Water and Forced Air  
 Filament . . . . . Thoriated tungsten  
 Voltage . . . . . 13.0 volts  
 Current . . . . . 200 amperes  
 Capacitances (Gnd. Cath. Connection):  
   Input . . . . . 75.0 pF  
   Output . . . . . 2.6 pF  
   Feed-through . . . . . 52.0 pF  
 Amplification Factor . . . . . 20  
 Base . . . . . Coaxial  
 Maximum Seal & Envelope Temperature . . . . . 200°C  
 Maximum Length . . . . . 19.87 in; 504.80 mm  
 Maximum Diameter . . . . . 5.28 in; 134.10 mm  
 Weight (approximate) . . . . . 17 lb; 7.7 kg  
 Operating Position . . . . . Vertical, base up

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 16,000                | 11.0                 | Grid              | 15,000                | 7.0                  | 600                 | 80,000               |
| C                  | RF Power Amplifier Plate Modulated | 10,000                | 8.5                  | Grid              | 9500                  | 8.4                  | 2000                | 60,000               |
| AB                 | RF Linear Amplifier                | 16,000                | 11.0                 | Cath.             | 12,000                | 9.8                  | 8200                | 83,000               |
| AB                 | RF Linear Amplifier (AM Service)   | 16,000                | 9.0                  | Grid              | 12,000                | 6.8                  | 1500                | 28,000               |
| AB                 | AF Amplifier or Modulator          | 16,000                | 11.0                 | Grid              | 12,000                | 20.0*                | 600                 | 152,000*             |

\*Two tubes.

**8240** see 3CW5000A1

**8241** see 3CW5000F1

**8242** see 3CW5000A3

**8243** see 3CW5000F3

**X-2176**

The X-2176 industrial triode is designed for very high power industrial heating service in the megawatt power range.

The X-2176 has a two-section thoriated-tungsten cathode mounted on water-cooled supports. The two sections may be fed in quadrature, series, or parallel. The maximum anode dissipation of the tube is 1,250,000 watts steady-state.

Provision is made for large-diameter coaxial terminals to the grid and the three RF cathode terminals. Filament power and filament support cooling water connections are made through three special couplings with knurled and threaded clamping rings.

**TENTATIVE CHARACTERISTICS\***

Plate Dissipation (Max.) . . . . . 1,250,000 watts  
 Grid Dissipation (Max.) . . . . . 12,000 watts  
 Frequency for Max. Ratings (CW) . . . . . 30 MHz  
 Cooling . . . . . Water and Forced Air  
 Filament . . . . . Two section, Thoriated tungsten  
 Voltage/section . . . . . 18.5 volts  
 Current/section . . . . . 700 amperes  
 Capacitances (Gnd. Cath. Connection):  
 Input . . . . . 900 pF  
 Output . . . . . 25.0 pF  
 Feed-through . . . . . 350 pF  
 Amplification Factor . . . . . 20  
 Base . . . . . Special  
 Recommended Cooling Water/Filament  
 Power Connector (3 required) . . . Eimac SK-2310  
 Recommended RF Return Connector,  
 Filament to Ground (1 required) . Eimac SK-2315  
 Maximum Seal & Anode Core Temperature . . 200°C  
 Maximum Length . . . . . 25.31 in; 642.90 mm  
 Maximum Diameter . . . . . 17.03 in; 432.60 mm  
 Weight (approximate) . . . . . 170 lb; 77 kg  
 Operation Position . . . . . Vertical, base down



| Class of Operation | Type of Service    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                |                       |                      |                     |                          |
|--------------------|--------------------|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------------|---------------------|--------------------------|
|                    |                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Driven Element | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (kilowatts) |
| C                  | RF Power Amplifier | 20,000                | 125                  | 30                | —              | 20,000                | 123                  | —                   | 2090                     |

\*The design of this tube is subject to change, and this data is supplied for guidance only.  
 Before establishing any equipment design for this tube contact: Product Manager,  
 EIMAC Div. of Varian.

†Cathode current maximum.

**X-2177**

The X-2177 industrial triode is designed for very high power industrial heating service in the half-megawatt power range.

The X-2177 has a thoriated-tungsten cathode mounted on water-cooled supports. The maximum anode dissipation of the tube is 650,000 watts steady-state.

Provision is made for large-diameter coaxial terminals to the grid and the two RF cathode terminals. Filament power and filament support cooling-water connections are made through two special couplings with knurled and threaded clamping rings.

**TENTATIVE CHARACTERISTICS\***

Plate Dissipation (Max.) . . . . . 625,000 watts  
 Grid Dissipation (Max.) . . . . . 6000 watts  
 Frequency for Max. Ratings (CW) . . . . . 30 MHz  
 Cooling . . . . . Water and Forced Air  
 Filament . . . . . Thoriated tungsten  
 Voltage . . . . . 18.5 volts  
 Current . . . . . 700 amperes  
 Capacitances (Gnd. Cath. Connection):  
 Input . . . . . 350 pF  
 Output . . . . . 15.0 pF  
 Feed-through . . . . . 210 pF  
 Base . . . . . Special  
 Recommended Cooling Water/Filament  
 Power Connector (2 required) . . . Eimac SK-2310  
 Recommended RF Return Connector,  
 Filament to Ground (1 required) . Eimac SK-2315  
 Maximum Seal & Anode Core Temperature . . 200°C  
 Maximum Length . . . . . 16.85 in; 428.00 mm  
 Maximum Diameter . . . . . 17.03 in; 432.60 mm  
 Weight (approximate) . . . . . 100 lb; 45 kg  
 Operating Position . . . . . Vertical, base down



| Class of Operation | Type of Service    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                |                       |                      |                     |                          |
|--------------------|--------------------|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------------|---------------------|--------------------------|
|                    |                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Driven Element | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (kilowatts) |
| C                  | RF Power Amplifier | 20,000                | 65                   | 30                | —              | 20,000                | 60                   | —                   | 1050                     |

\*The design of this tube is subject to change, and this data is supplied for guidance only.  
 Before establishing any equipment design for this tube contact: Product Manager,  
 EIMAC Div. of Varian.

†Cathode current maximum.

# Internal Anode, Radiation Cooled Triodes

## 3-400Z/8163



The 3-400Z/8163 is intended for use as a zero-bias Class B amplifier, in audio or radio-frequency applications, or in Class C service.

Operation with zero grid bias simplifies associated circuitry by eliminating the bias supply, and grounded grid operation is attractive since a power gain as high as twenty times can be obtained with this tube in a cathode-driven circuit.

### CHARACTERISTICS

|                                      |                           |
|--------------------------------------|---------------------------|
| Plate Dissipation (Max.)             | 400 watts                 |
| Grid Dissipation (Max.)              | 20 watts                  |
| Frequency for Max. Ratings (CW)      | 110 MHz                   |
| Cooling                              | Radiation and Forced Air  |
| Filament                             | Thoriated tungsten        |
| Voltage                              | 5.0 volts                 |
| Current                              | 14.1 amperes              |
| Capacitances (Gnd. Grid Connection): |                           |
| Input                                | 7.5 pF                    |
| Output                               | 4.1 pF                    |
| Feed-through                         | 0.10 pF                   |
| Amplification Factor                 | 200                       |
| Base                                 | 5 Pin Special             |
| Recommended Air-System Socket        | SK-410                    |
| Recommended Air Chimney              | SK-416                    |
| Maximum Seal Temperature             | 200°C                     |
| Maximum Length                       | 5.37 in; 136.40 mm        |
| Maximum Diameter                     | 3.56 in; 90.40 mm         |
| Weight (approximate)                 | 7.0 oz; 198.0 gm          |
| Operating Position                   | Vertical, base up or down |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 4000                  | 0.35                 | Grid              | 3000                  | 0.33                 | 25                  | 730                  |
| C                  | RF Power Amplifier Plate Modulated | 3000                  | 0.27                 | Grid              | 3000                  | 0.24                 | 18                  | 550                  |
| B                  | RF Linear Amplifier                | 4000                  | 0.40                 | Cath.             | 2500                  | 0.27                 | 44                  | 560                  |
| B                  | AF Amplifier or Modulator          | 4000                  | 0.40                 | Grid              | 3000                  | 0.66*                | 26                  | 1310*                |

\*Two tubes

## 3-500Z



The 3-500Z is intended for use as a zero-bias Class B amplifier in audio or radio frequency applications, or in Class C service.

Operation with zero grid bias simplifies associated circuitry by eliminating the bias supply and grounded grid operation is attractive since a power gain as high as twenty times can be obtained with this tube in a cathode-driven circuit.

### CHARACTERISTICS

|                                        |                           |
|----------------------------------------|---------------------------|
| Plate Dissipation (Max.)               | 500 watts                 |
| Grid Dissipation (Max.)                | 20 watts                  |
| Frequency for Max. Ratings (CW)        | 110 MHz                   |
| Cooling                                | Radiation and Forced Air  |
| Filament                               | Thoriated tungsten        |
| Voltage                                | 5.0 volts                 |
| Current                                | 14.1 amperes              |
| Capacitances (Gnd. Grid Connection):   |                           |
| Input                                  | 8.3 pF                    |
| Output                                 | 4.7 pF                    |
| Feed-through                           | 0.1 pF                    |
| Amplification Factor                   | 130                       |
| Base                                   | 5 Pin Special             |
| Recommended Air-System Socket          | SK-410                    |
| Recommended Air Chimney                | SK-406                    |
| Recommended Heat Dissipating Connector | HR-6                      |
| Maximum Plate Seal Temperature         | 225°C                     |
| Maximum Base Seal Temperature          | 200°C                     |
| Maximum Length                         | 6.00 in; 152.40 mm        |
| Maximum Diameter                       | 3.44 in; 87.40 mm         |
| Weight (approximate)                   | 7.0 oz; 198.0 gm          |
| Operating Position                     | Vertical, base up or down |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier Plate Modulated | 3000                  | 0.27                 | Grid              | 3000                  | 0.27                 | 25                  | 640                  |
| C                  | RF Power Amplifier                 | 4000                  | 0.35                 | Grid              | 3000                  | 0.35                 | 30                  | 720†                 |
| AB <sub>2</sub>    | RF Linear Amplifier                | 4000                  | 0.40                 | Cath.             | 3000                  | 0.33                 | 87                  | 750†                 |
| AB <sub>2</sub>    | AF Amplifier or Modulator          | 4000                  | 0.40                 | Cath.             | 3000                  | 0.40                 | —                   | 740†                 |
|                    |                                    |                       |                      | Grid              | 3000                  | 0.77*                | 25                  | 1420*                |

\*Two tubes.

†Useful, delivered to the load.

**3-1000Z/8164**

The 3-1000Z/8164 is intended for use as a Class B amplifier in either the grid or cathode driven connection, for Class C amplifier service, or as Class B audio amplifiers or modulators. At a plate voltage of 3000 volts, 2 kW PEP input can be run with a single 3-1000Z, providing a power gain of over 20 in a cathode-driven circuit.

**CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . 1000 watts  
 Grid Dissipation (Max.) . . . . . 50 watts  
 Frequency for Max. Ratings (CW) . . . . . 110 MHz  
 Cooling . . . . . Radiation and Forced Air  
 Filament . . . . . Thoriated tungsten  
 Voltage . . . . . 7.5 volts  
 Current . . . . . 21.4 amperes  
 Capacitances (Gnd. Cath. Connection):  
 Input . . . . . 17.0 pF  
 Output . . . . . 0.2 pF  
 Feed-through . . . . . 7.5 pF  
 Capacitances (Gnd. Grid Connection):  
 Input . . . . . 17.0 pF  
 Output . . . . . 7.5 pF  
 Feed-through . . . . . 0.2 pF  
 Amplification Factor . . . . . 200  
 Base . . . . . 5 Pin Special  
 Recommended Air-System Socket . . . . . SK-510  
 Recommended Air Chimney . . . . . SK-516  
 Recommended Heat Dissipating Connector . . . . . HR-8  
 Maximum Plate Seal Temperature . . . . . 225°C  
 Maximum Base Seal Temperature . . . . . 200°C  
 Maximum Length . . . . . 7.88 in; 200.20 mm  
 Maximum Diameter . . . . . 5.25 in; 133.40 mm  
 Weight (approximate) . . . . . 1.2 lb; 0.54 kg  
 Operating Position . . . . . Vertical, base up or down



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Driven Element    | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 6000                  | 0.70                 | Grid              | 6000                  | 0.70                 | 57                  | 3200                 |
| C                  | RF Power Amplifier Plate Modulated | 4500                  | 0.55                 | Grid              | 4500                  | 0.50                 | 35                  | 1765                 |
| B                  | RF Linear Amplifier                | 6000                  | 0.80                 | Cath.             | 3000                  | 0.67                 | 47                  | 1080                 |
| B                  | AF Amplifier or Modulator          | 6000                  | 0.80                 | Grid              | 5000                  | 1.0*                 | 28                  | 3560*                |

\*Two tubes.

**8163** see 3-400Z  
**8164** see 3-1000Z

# External Anode, Conduction-Cooled Triode

## 8873



This compact external-anode, ceramic/metal high-mu triode is intended for use in zero-bias Class-B or AB amplifiers in audio or radio-frequency applications, but may also be used in Class-C service or as a pulse modulator or regulator.

The 8873 is designed for conduction cooling and is nominally rated for 200 watts of anode dissipation. A beryllium-oxide thermal link is available to insulate the anode from the heat sink while allowing for heat conduction from the anode to the sink.

Operation with zero bias simplifies associated circuitry by eliminating the bias supply. In addition, grounded-grid operation is attractive since a power gain as high as twenty times can be obtained with an 8873 in a cathode-driven circuit.

## CHARACTERISTICS

|                                       |                                                          |
|---------------------------------------|----------------------------------------------------------|
| Plate Dissipation <sup>1</sup> (Max.) | 200 watts                                                |
| Grid Dissipation (Max.)               | 5 watts                                                  |
| Frequency for Max. Ratings (CW)       | 500 MHz                                                  |
| Cooling                               | Conduction                                               |
| Cathode                               | Oxide-coated Unipotential                                |
| Voltage                               | 6.3 volts                                                |
| Current                               | 3.0 amperes                                              |
| Capacitances (Gnd. Cath. Connection)  |                                                          |
| Input                                 | 20.5 pF                                                  |
| Output                                | 0.03 pF                                                  |
| Feed-through                          | 6.0 pF                                                   |
| Capacitances (Gnd. Grid Connection)   |                                                          |
| Input                                 | 20.5 pF                                                  |
| Output                                | 6.0 pF                                                   |
| Feed-through                          | 0.03 pF                                                  |
| Cathode to heater                     | 6.0 pF                                                   |
| Transconductance††                    | 29,000 $\mu$ mhos                                        |
| Base                                  | Large Wafer Elevenar 11-Pin with ring (JEDEC No. E11-81) |
| Recommended BeO Thermal Link          | EIMAC SK-1920                                            |
| Maximum Seal & Anode Core Temperature | 250°C                                                    |
| Maximum Length                        | 2.14 in; 54.41 mm                                        |
| Maximum Diameter                      | 1.64 in; 41.66 mm                                        |
| Weight (approximate)                  | 8.5 oz; 241 gm                                           |
| Operating Position                    | Any                                                      |

<sup>1</sup>Dissipation capability is dependent on cooling technique.

| Class of Operation | Type of Service              | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                |                       |                      |                     |                      |
|--------------------|------------------------------|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------------|---------------------|----------------------|
|                    |                              | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Driven Element | Plate Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>2</sub>    | RF Linear Amplifier          | 2200                  | 0.35                 | 30                | Cath.          | 2000                  | 0.50*<br>0.31**      | 26                  | 587†                 |
| AB <sub>2</sub>    | RF Linear Amplifier          | 2200                  | 0.35                 | 150               | Cath.          | 2000                  | 0.40*<br>0.245*      | 17.5                | 526†                 |
| AB <sub>2</sub>    | RF Linear Amplifier          | 2200                  | 0.35                 | 432               | Cath.          | 2000                  | 0.50*<br>0.30**      | 27                  | 505†                 |
| C                  | RF Power Amplifier           | 2200                  | 0.35                 | 110               | Grid           | 2000                  | 0.250                | 9.0                 | 305†                 |
| —                  | Pulse Modulator or Regulator | 4500                  | 6.0                  |                   |                |                       |                      |                     |                      |

\*Single-tone Intermittent Voice Service value

\*\*Two-tone plate current

†Useful power output

††At  $I_b = 250$  mA

**4CPX250K/8590**

The 4CPX250K/8590 is a compact forced-air cooled, external anode radial-beam tetrode, intended for wideband grid-pulsed radio frequency amplifier and pulse modulator service.

The 4CPX250K/8590 has a maximum anode dissipation of 250 watts and is capable of delivering pulse output power in excess of 10 kW with 10 dB gain when cathode driven at 450 MHz.

The tube is of coaxial construction and especially designed for cavity operation.

**CHARACTERISTICS**

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 250 watts                 |
| Screen Dissipation (Max.)                              | .12 watts                 |
| Grid Dissipation (Max.)                                | 2 watts                   |
| Frequency for Max. Ratings (CW)                        | 500 MHz                   |
| (Pulsed)                                               | 500 MHz                   |
| Cooling                                                | Forced Air                |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage                                                | .6.0 volts                |
| Current                                                | .2.7 amperes              |
| Capacitances (Gnd. Grid Connection):                   |                           |
| Input                                                  | 14.0 pF                   |
| Output                                                 | 4.1 pF                    |
| Feed-through                                           | 0.006 pF                  |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | .5                        |
| Base                                                   | Coaxial                   |
| Maximum Seal & Anode Core Temperature                  | 250°C                     |
| Maximum Length                                         | 2.81 in; 71.40 mm         |
| Maximum Diameter                                       | 1.64 in; 41.60 mm         |
| Weight (approximate)                                   | 4 oz; 114 gm              |
| Operating Position                                     | Any                       |



| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|--------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier             | 2500                  | 0.25                 | —                 | 2500                  | 250                    | 0.25                 | 2.8                 | 500                  |
| C or B             | RF Power Amplifier             | 5500                  | 6.0†                 | 500               | 5500                  | 1000†                  | —                    | 1000†               | 10,000‡              |
| —                  | Grid & Screen Pulsed           |                       |                      |                   |                       |                        |                      |                     |                      |
| —                  | Switch Tube or Pulse Modulator | 7000                  | 6.0†                 | —                 | 6000                  | 750                    | 3.5†                 | —                   | 17,500†              |

†Pulse value

‡Useful Power Output

## External Anode, Forced Air Cooled Tetrodes

### 4CX250B/7203 4CX250FG/8621



The 4CX250B/7203 and 4CX250FG/8621 are ceramic/metal forced-air cooled, external-anode radial-beam tetrodes with a maximum plate dissipation rating of 250 watts and a maximum input-power rating of 500 watts. The 4CX250B/7203 is designed to operate with a heater voltage of 6.0 volts, while the 4CX250FG/8621 is designed for operation at a heater voltage of 26.5 volts. Otherwise, the two tube types have identical characteristics.

### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 250 watts                 |
| Screen Dissipation (Max.)             | .12 watts                 |
| Grid Dissipation (Max.)               | 2 watts                   |
| Frequency for Max. Ratings (CW)       | 500 MHz                   |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Voltage (4CX250B)                     | 6.0 volts                 |
| (4CX250FG)                            | 26.5 volts                |
| Current (4CX250B)                     | 2.6 amperes               |
| (4CX250FG)                            | 0.54 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 15.7 pF                   |
| Output                                | .45 pF                    |
| Feed-through                          | 0.04 pF                   |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 13.0 pF                   |
| Output                                | .45 pF                    |
| Feed-through                          | 0.01 pF                   |
| Amplification Factor ( $g_{1-92}$ )   | 5                         |
| Base                                  | 9-Pin Special             |
| Recommended Air-System Socket         | SK-600 Series             |
| Recommended Air Chimney               | SK-606 Series             |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 2.46 in; 62.50 mm         |
| Maximum Diameter                      | 1.64 in; 41.70 mm         |
| Weight (approximate)                  | 4 oz; 113 gm              |
| Operating Position                    | Any                       |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 2000                  | 0.25                 | 175               | 2000                  | 300                    | 0.25                 | 2.9                 | 390                  |
| C                  | RF Power Amplifier Plate Modulated | 1500                  | 0.20                 | 175               | 1500                  | 250                    | 0.20                 | 1.7                 | 235                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 2000                  | 0.25                 | 175               | 2000                  | 350                    | 0.25                 | —                   | 300                  |
| AB <sub>1</sub>    | RF Linear Amplifier (AM Service)   | 2000                  | 0.25                 | 175               | 2000                  | 350                    | 0.15                 | —                   | 65†                  |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 2000                  | 0.25                 | —                 | 2000                  | 350                    | 0.50*                | —                   | 600*                 |

\*Two tubes

†Carrier Power

# External Anode, Forced Air Cooled Tetrodes

## 4CX250BC/8957

The 4CX250BC/8957 is a ceramic/metal, forced-air cooled, external-anode radial-beam tetrode with a maximum plate dissipation rating of 250 watts and a maximum input power rating of 500 watts. It is intended for use as an oscillator, amplifier, or modulator.

The 4CX250BC/8957 is especially recommended as a premium-quality replacement for the 4CX250B/7203, in applications where long life and consistent performance are of prime concern and the closer heater voltage tolerance and increased cathode warmup time are acceptable.

### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 250 watts                 |
| Screen Dissipation (Max.)                              | .12 watts                 |
| Grid Dissipation (Max.)                                | 2 watts                   |
| Frequency for Max. Ratings (CW)                        | 500 MHz                   |
| Cooling                                                | Forced Air                |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage                                                | 6.0 volts                 |
| Current                                                | 2.4 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 15.7 pF                   |
| Output                                                 | .45 pF                    |
| Feed-through                                           | 0.04 pF                   |
| Capacitances (Gnd. Grid Connection):                   |                           |
| Input                                                  | 13.0 pF                   |
| Output                                                 | .45 pF                    |
| Feed-through                                           | 0.01 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5                         |
| Base                                                   | 9-Pin Special             |
| Recommended Air-System Socket                          | SK-600 Series             |
| Recommended Air Chimney                                | SK-606 Series             |
| Maximum Seal & Anode Core Temperature                  | 250°C                     |
| Maximum Length                                         | 2.46 in; 62.50 mm         |
| Maximum Diameter                                       | 1.64 in; 41.70 mm         |
| Weight (approximate)                                   | 4 oz; 113 gm              |
| Operating Position                                     | Any                       |



| Class of Operation      Type of Service |                                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|-----------------------------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                                         |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                                       | RF Power Amplifier                 | 2000                  | 0.25                 | 175               | 2000                  | 300                    | 0.25                 | 2.9                 | 390                  |
| C                                       | RF Power Amplifier Plate Modulated | 1500                  | 0.20                 | 175               | 1500                  | 250                    | 0.20                 | 1.7                 | 235                  |
| AB <sub>1</sub>                         | RF Linear Amplifier                | 2000                  | 0.25                 | 175               | 2000                  | 350                    | 0.25                 | —                   | 300                  |
| AB <sub>1</sub>                         | RF Linear Amplifier (AM Service)   | 2000                  | 0.25                 | 175               | 2000                  | 350                    | 0.15                 | —                   | 65†                  |
| AB <sub>1</sub>                         | AF Amplifier or Modulator          | 2000                  | 0.25                 | —                 | 2000                  | 350                    | 0.50*                | —                   | 600*                 |

\*Two tubes

†Carrier Power

## External Anode, Forced Air Cooled Tetrodes

### 4CX250K/8245, 4CX250M/8246



The 4CX250K/8245 is a compact, forced-air cooled, external-anode radial-beam tetrode with a maximum plate dissipation rating of 250 watts and a maximum input-power rating of 500 watts.

The tube has a 6.0 volt heater and all element terminals are coaxial so the tube lends itself to cavity designs for VHF and UHF service.

The 4CX250M/8246 is identical except it is designed for a heater voltage of 26.5 volts at a current of 0.50 amperes.

#### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 250 watts                 |
| Screen Dissipation (Max.)                              | 12 watts                  |
| Grid Dissipation (Max.)                                | 2 watts                   |
| Frequency for Max. Ratings (CW)                        | 500 MHz                   |
| (Pulsed)                                               | 1500 MHz                  |
| Cooling                                                | Forced Air                |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage                                                | 6.0 volts                 |
| Current                                                | 2.7 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 27.0 pF                   |
| Output                                                 | 4.7 pF                    |
| Feed-through                                           | 0.04 pF                   |
| Capacitances (Gnd. Grid Connection):                   |                           |
| Input                                                  | 17.0 pF                   |
| Output                                                 | 4.7 pF                    |
| Feed-through                                           | 0.01 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5                         |
| Base                                                   | Special, Coaxial          |
| Maximum Seal & Anode Core Temperature                  | 250°C                     |
| Maximum Length                                         | 2.81 in; 71.40 mm         |
| Maximum Diameter                                       | 1.64 in; 41.70 mm         |
| Weight (approximate)                                   | 4 oz; 113 gm              |
| Operating Position                                     | Any                       |

| Class of Operation | Type of Service                          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                          | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                       | 2000                  | 0.25                 | 500               | 2000                  | 300                    | 0.25                 | —                   | 225*                 |
| C                  | RF Power Amplifier Plate Modulated       | 1500                  | 0.20                 | 175               | 1500                  | 250                    | 0.20                 | 1.7                 | 300                  |
| C                  | RF Power Amplifier Plate & Screen Pulsed | 7000                  | 7.0†                 | 1200              | 7000‡                 | 1200‡                  | 6.0                  | —                   | 17,000§              |
| B                  | RF Linear Amplifier TV Service           | 2000                  | 0.25                 | 216               | 2000                  | 350                    | 0.25                 | 5.5                 | 250                  |
| AB <sub>1</sub>    | RF Linear Amplifier                      | 2000                  | 0.25                 | 175               | 2000                  | 350                    | 0.25                 | —                   | 300                  |

\*Useful Power Output

†Cathode Current, pulse

‡Pulse Voltage Values

§ Pulse Power

### 4CX250R/7580W



The 4CX250R/7580W is a compact, high-perveance radial-beam tetrode designed specifically for use in Class AB<sub>1</sub> linear amplifiers where shock and/or vibration preclude the use of non-ruggedized tube types. The 4CX250R will replace the 4CX250B in equipments where the range of bias adjustment will tolerate this higher perveance tube and where tuning range can compensate for the small differences in input and output capacitances.

The 4CX250R/7580W will deliver more output power in most linear amplifiers which presently employ the 4CX250B and it will operate with maximum rated plate and screen voltages applied in equipments where shock and/or vibration is experienced.

#### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 250 watts                 |
| Screen Dissipation (Max.)                              | 12 watts                  |
| Grid Dissipation (Max.)                                | 2 watts                   |
| Frequency for Max. Ratings (CW)                        | 500 MHz                   |
| Cooling                                                | Forced Air                |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage                                                | 6.0 volts                 |
| Current                                                | 2.6 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 17.5 pF                   |
| Output                                                 | 4.8 pF                    |
| Feed-through                                           | 0.04 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5                         |
| Base                                                   | 9-Pin Special             |
| Recommended Air-System Socket                          | SK-600 Series             |
| Recommended Air Chimney                                | SK-606 Series             |
| Maximum Seal & Anode Core Temperature                  | 250°C                     |
| Maximum Length                                         | 2.46 in; 62.50 mm         |
| Maximum Diameter                                       | 1.64 in; 41.70 mm         |
| Weight (approximate)                                   | 4 oz; 113 gm              |
| Operating Position                                     | Any                       |

| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|--------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | RF Linear Amplifier            | 2000                  | 0.25                 | 2000                  | 400                    | 0.25                 | —                   | 300                  |
| AB <sub>1</sub>    | RF Linear Amplifier AM Service | 2000                  | 0.25                 | 2000                  | 400                    | 0.17                 | —                   | 100†                 |
| AB <sub>1</sub>    | AF Amplifier or Modulator      | 2000                  | 0.25                 | 2000                  | 350                    | 0.50*                | —                   | 595*                 |

\*Two tubes

†Carrier Power

## External Anode, Forced Air Cooled Tetrodes 4CX300A/8167

The 4CX300A/8167 is a compact integral-finned external-anode power tetrode having a maximum plate-dissipation rating of 300 watts. It may be operated at frequencies up to 500 MHz.

The ceramic/metal construction and the internally-unitized electrode structure combine to make the 4CX300A/8167 especially durable and free from mechanically-induced noise under conditions of severe acceleration caused by shock or vibration.

### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 300 watts                 |
| Screen Dissipation (Max.)                              | 12 watts                  |
| Grid Dissipation (Max.)                                | 2 watts                   |
| Frequency for Max. Ratings (CW)                        | 500 MHz                   |
| Cooling                                                | Forced Air                |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage                                                | 6.0 volts                 |
| Current                                                | 2.9 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 29.0 pF                   |
| Output                                                 | 4.0 pF                    |
| Feed-through                                           | 0.04 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.8                       |
| Transconductance†                                      | 12,000 μmhos              |
| Base                                                   | Special, Breechblock      |
| Recommended Air-System Socket                          | SK-700 Series             |
| Recommended Air Chimney                                | SK-606                    |
| Maximum Seal & Anode Core Temperature                  | 250°C                     |
| Maximum Length                                         | 2.50 in; 63.50 mm         |
| Maximum Diameter                                       | 1.64 in; 41.60 mm         |
| Weight (approximate)                                   | 4 oz; 113 gm              |
| Operating Position                                     | Any                       |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 2000                  | 0.25                 | 30                | 2000                  | 250                    | 0.25                 | 2.9                 | 390                  |
| C                  | RF Power Amplifier                 | 2000                  | 0.25                 | 500               | 2000                  | 250                    | 0.25                 | —                   | 225‡                 |
| C                  | RF Power Amplifier Plate Modulated | 1500                  | 0.20                 | 30                | 1500                  | 250                    | 0.20                 | 1.7                 | 235                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 2500                  | 0.25                 | 30                | 2500                  | 350                    | 0.25                 | —                   | 400                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 2500                  | 0.25                 | 30                | 2500                  | 350                    | 0.15                 | —                   | 85                   |
|                    | AM Service                         |                       |                      |                   |                       |                        |                      |                     |                      |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 2500                  | 0.25                 | —                 | 2500                  | 350                    | 0.50*                | —                   | 800*                 |

\*Two tubes

†At I<sub>b</sub> = 200 mA

‡Useful Power Output

## 4CX300Y/8561

The 4CX300Y/8561 is a compact integral-finned external-anode power tetrode having a maximum plate-dissipation rating of 400 watts. It may be operated at maximum ratings to 110 MHz.

The ceramic/metal construction and the internally-unitized electrode structure combine to make the 4CX300Y/8561 especially durable and free from mechanically-induced noise under conditions of severe acceleration caused by shock or vibration.

### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 400 watts                 |
| Screen Dissipation (Max.)                              | 8 watts                   |
| Grid Dissipation (Max.)                                | 1 watt                    |
| Frequency for Max. Ratings (CW)                        | 110 MHz                   |
| Cooling                                                | Forced Air                |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage                                                | 6.0 volts                 |
| Current                                                | 3.5 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 34.0 pF                   |
| Output                                                 | 4.5 pF                    |
| Feed-through                                           | 0.04 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5.6                       |
| Transconductance†                                      | 15,400 μmhos              |
| Base                                                   | Special, Breechblock      |
| Recommended Air-System Socket                          | SK-700 Series             |
| Recommended Air Chimney                                | SK-606                    |
| Maximum Seal & Anode Core Temperature                  | 250°C                     |
| Maximum Length                                         | 2.50 in; 63.50 mm         |
| Maximum Diameter                                       | 1.64 in; 41.60 mm         |
| Weight (approximate)                                   | 4 oz; 113 gm              |
| Operating Position                                     | Any                       |



| Class of Operation<br>Type of Service |                                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|---------------------------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                                       |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                                     | RF Power Amplifier                 | 2000                  | 0.40                 | 2000                  | 250                    | 0.40                 | 3.8                 | 600                  |
| C                                     | RF Power Amplifier Plate Modulated | 1500                  | 0.30                 | 1500                  | 250                    | 0.30                 | 1.7                 | 300                  |
| AB <sub>1</sub>                       | RF Linear Amplifier                | 2000                  | 0.40                 | 2000                  | 400                    | 0.38                 | —                   | 415                  |
| AB <sub>1</sub>                       | RF Linear Amplifier AM Service     | 2000                  | 0.40                 | 2000                  | 400                    | 0.20                 | —                   | 115‡                 |
| AB <sub>1</sub>                       | AF Amplifier or Modulator          | 2000                  | 0.40                 | 2000                  | 400                    | 0.75*                | —                   | 890*                 |

\*Two tubes

†At I<sub>b</sub> = 200 mA

‡Carrier output

## External Anode, Forced Air Cooled Tetrodes

### 4CX350A/8321, 4CX350F/8322



The 4CX350A/8321 is a compact radial-beam tetrode with a maximum plate dissipation of 350 watts and is intended for Class AB audio or RF amplifier service. The tube is externally identical to the 4CX250B but contains rugged internal construction features. Amplification factor and cathode area have been increased over the basic 4CX250B to give higher transconductance and figure of merit. The tube is of ceramic/metal construction.

The 4CX350F/8322 is identical except it is designed for a heater voltage of 26.5 volts at a current of 0.73 amperes.

#### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 350 watts                 |
| Screen Dissipation (Max.)                              | 8 watts                   |
| Grid Dissipation (Max.)                                | 0 watts                   |
| Frequency for Max. Ratings (CW)                        | 110 MHz                   |
| Cooling                                                | Forced Air                |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage                                                | 6.0 volts                 |
| Current                                                | 2.9 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 23.6 pF                   |
| Output                                                 | 5.6 pF                    |
| Feed-through                                           | 0.03 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 13                        |
| Transconductance†                                      | 22,000 μmhos              |
| Base                                                   | 9-Pin Special             |
| Recommended Air-System Socket                          | SK-600 Series             |
| Recommended Air Chimney                                | SK-606 Series             |
| Maximum Seal & Anode Core Temperature                  | 250°C                     |
| Maximum Length                                         | 2.47 in; 62.60 mm         |
| Maximum Diameter                                       | 1.64 in; 41.60 mm         |
| Weight (approximate)                                   | 4 oz; 113 gm              |
| Operating Position                                     | Any                       |

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | RF Linear Amplifier       | 2500                  | 0.30                 | 2200                  | 400                    | 0.29                 | —                   | 385                  |
| AB <sub>1</sub>    | AF Amplifier or Modulator | 2500                  | 0.30                 | 2200                  | 400                    | 0.58*                | —                   | 770*                 |

\*Two tubes

†At I<sub>b</sub> = 150 mA

### 4CX350FJ/8904



The 4CX350FJ/8904 is a compact radial-beam tetrode with a maximum plate dissipation of 350 watts, intended for Class AB linear RF amplifier service. The tube has rugged internal construction features.

The 4CX350FJ/8904 may be used as an exact replacement for the 4CX350F/8322 in most applications, requiring only minor circuit adjustment and retuning. The tube has improved intermodulation distortion characteristics. It contains a 26.5 volt heater, and is recommended for new equipment designs.

#### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 350 watts                 |
| Screen Dissipation (Max.)                              | 8.0 watts                 |
| Grid Dissipation (Max.)                                | 0 watts                   |
| Frequency for Max. Ratings (CW)                        | 110 MHz                   |
| Cooling                                                | Forced Air                |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage                                                | 26.5 volts                |
| Current                                                | 0.65 amperes              |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 22.0 pF                   |
| Output                                                 | 5.9 pF                    |
| Feed-through                                           | 0.033 pF                  |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 17                        |
| Transconductance†                                      | 22,000 μmhos              |
| Base                                                   | 9-Pin Special             |
| Recommended Air-System Socket                          | SK-600 Series             |
| Recommended Air Chimney                                | SK-606 Series             |
| Maximum Seal & Anode Core Temperature                  | 250°C                     |
| Maximum Length                                         | 2.46 in; 62.60 mm         |
| Maximum Diameter                                       | 1.64 in; 41.60 mm         |
| Weight (approximate)                                   | 4 oz; 113 gm              |
| Operating Position                                     | Any                       |

| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | RF Linear Amplifier | 2500                  | 0.30                 | 30                | 2200                  | 400                    | 0.23                 | —                   | 250*                 |

\*Useful Power Output

†At I<sub>b</sub> = 150 mA

**4CX600B, 4CX600F**

The 4CX600B and 4CX600F are ceramic/metal, air cooled radial-beam tetrodes designed for use in wideband amplifiers, particularly distributed amplifiers.

The mechanical and electrical features of these tubes are compatible with wideband amplifier circuit requirements; i.e., low lead inductance, low input and output capacitances, small size and high transconductance.

Rugged construction consisting of a unitized electrode structure and direct mounting to the chassis combine to make the 4CX600B and 4CX600F suitable for environments of severe shock and vibration.

The maximum rated plate dissipation of either type is 600 watts.

**CHARACTERISTICS**

|                                         |                             |
|-----------------------------------------|-----------------------------|
| Plate Dissipation (Max.)                | 600 watts                   |
| Screen Dissipation (Max.)               | 15 watts                    |
| Grid Dissipation (Max.)                 | 3 watts                     |
| Frequency for Max. Ratings (CW)         | 500 MHz                     |
| Cooling                                 | Forced Air                  |
| Cathode                                 | Oxide-coated Unipotential   |
| Voltage (4CX600B)                       | 6.0 volts                   |
| (4CX600F)                               | 26.5 volts                  |
| Current (4CX600B)                       | 4.3 amperes                 |
| (4CX600F)                               | 1.05 amperes                |
| Capacitances (Gnd. Cath. Connection):   |                             |
| Input                                   | 45.0 pF                     |
| Output                                  | 5.8 pF                      |
| Feed-through                            | 0.15 pF                     |
| Input Conductance                       |                             |
| (I <sub>b</sub> = 0.6 Adc, F = 30 MHz): | 0.1 × 10 <sup>-3</sup> mhos |
| Transconductance                        |                             |
| (I <sub>b</sub> = 0.6 Adc)              | 41,000 μmhos                |
| Base                                    | Special                     |
| Recommended Screen Bypass Capacitor     | SK-680                      |
| Maximum Seal & Anode Core Temperature   | 250°C                       |
| Maximum Length                          | 2.45 in; 62.20 mm           |
| Maximum Diameter                        | 2.08 in; 52.80 mm           |
| Weight (approximate)                    | 7 oz; 198 gm                |
| Operating Position                      | Any                         |



| Class of Operation | Type of Service                       | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|---------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                       | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| B                  | RF Power Amplifier TV Service         | 2500                  | 0.60                 | 865               | 2000                  | 300                    | 0.60†                | 52‡                 | 585†‡                |
| AB                 | RF Power Amplifier                    | 2500                  | 0.60                 | 432               | 1830                  | 300                    | 0.60                 | 25                  | 700†                 |
| AB                 | RF Power Amplifier                    | 2500                  | 0.60                 | 865               | 2000                  | 300                    | 0.60                 | 52                  | 585†                 |
| AB                 | RF Linear Amplifier Broadband Service | 3000                  | 0.60                 | —                 | 2500                  | 275                    | 0.59                 | —                   | 1000                 |

†Useful Power Output

‡Sync. level

## External Anode, Forced Air Cooled Tetrodes

### 4CX600J/8809 4CX600JA/8921



The 4CX600J/8809 is a ceramic-metal, forced-air cooled, radial beam tetrode with a rated maximum plate dissipation of 600 watts. It is a low-voltage, high-current tube specifically designed for exceptionally low intermodulation distortion and low grid interception. The low distortion characteristics make the 4CX600J/8809 especially suitable for radio-frequency and audio-frequency linear amplifier service.

The 4CX600JA/8921 has a larger anode cooler for reduced cooling air pressure-drop. It is electrically identical to the 4CX600J.

#### CHARACTERISTICS

|                                        |                           |
|----------------------------------------|---------------------------|
| Plate Dissipation (Max.)               | 600 watts                 |
| Screen Dissipation (Max.)              | .15 watts                 |
| Grid Dissipation (Max.)                | .1 watt                   |
| Frequency for Max. Ratings (CW)        | 110 MHz                   |
| Cooling                                | Forced Air                |
| Cathode                                | Oxide-coated Unipotential |
| Voltage                                | 6.0 volts                 |
| Current                                | .5.4 amperes              |
| Capacitances (Gnd. Cath. Connection):  |                           |
| Input                                  | 50.0 pF                   |
| Output                                 | .6.3 pF                   |
| Feed-through                           | 0.13 pF                   |
| Transconductance                       |                           |
| ( $I_b = 0.3$ Adc, $E_{c2} = 350$ Vdc) | 27,000 $\mu$ mos          |
| Base                                   | 9-Pin Special             |
| Recommended Air-System Socket          | SK-607                    |
| Recommended Air Chimney (4CX600J)      | SK-646                    |
| (4CX600JA)                             | SK-656                    |
| Maximum Seal & Anode Core Temperature  | 250°C                     |
| Maximum Length (both types)            | 2.71 in; 68.80 mm         |
| Maximum Diameter (4CX600J)             | 2.08 in; 52.80 mm         |
| (4CX600JA)                             | 2.52 in; 64.00 mm         |
| Weight (approximate) (4CX600J)         | 7.7 oz; 218 gm            |
| (4CX600JA)                             | 9.0 oz; 255 gm            |
| Operating Position                     | Any                       |

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB                 | RF Linear Amplifier       | 3000                  | 0.60                 | 30                | 2500                  | 350                    | 0.68†                | —                   | 1100†                |
| AB                 | AF Amplifier or Modulator | 3000                  | 0.60                 | —                 | 2800                  | 350                    | 1.1*                 | —                   | 1985*                |

\*Two tubes

†1-tone value; 2-tone  $I_b \approx 0.475A$

†Useful power output; intermodulation distortion products  $\approx -40$  dB in circuit with 11  $\Omega$  unbypassed cathode resistor.

### 4CX1000A/8168



The 4CX1000A/8168 is a ceramic-metal, forced-air cooled, radial-beam tetrode with a rated maximum plate dissipation of 1000 watts. It is a low-voltage, high-current tube specifically designed for Class AB<sub>1</sub> RF linear-amplifier or audio-amplifier applications where its high gain may be used to advantage. At its rated maximum plate voltage of 3000 volts, it is capable of producing 1630 watts of peak-envelope output power. Two 4CX1000A/8168s operating in Class AB<sub>1</sub> will produce 3260 watts of audio power.

#### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 1000 watts                |
| Screen Dissipation (Max.)             | .12 watts                 |
| Grid Dissipation (Max.)               | 0 watts                   |
| Frequency for Max. Ratings (CW)       | 110 MHz                   |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Voltage                               | 6.0 volts                 |
| Current                               | .9.0 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 81.0 pF                   |
| Output                                | 11.8 pF                   |
| Feed-through                          | 0.015 pF                  |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 35.5 pF                   |
| Output                                | 12.0 pF                   |
| Feed-through                          | 0.004 pF                  |
| Transconductance†                     | 37,000 $\mu$ mos          |
| Base                                  | Special, Breechblock      |
| Recommended Air-System Socket         | SK-800 Series             |
| Recommended Air Chimney               | SK-806                    |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 4.80 in; 122.00 mm        |
| Maximum Diameter                      | 3.37 in; 85.50 mm         |
| Weight (approximate)                  | 27 oz; 0.77 kg            |
| Operating Position                    | Any                       |

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | RF Linear Amplifier       | 3000                  | 1.0                  | 30                | 3000                  | 325                    | 0.88                 | —                   | 1630                 |
| AB <sub>1</sub>    | AF Amplifier or Modulator | 3000                  | 1.0                  | —                 | 3000                  | 325                    | 1.8*                 | —                   | 3260*                |

\*Two tubes

†At  $I_b = 1.0 A$

## External Anode, Forced Air Cooled Tetrodes 4CX1000K/8352

The 4CX1000K/8352 is a ceramic/metal forced-air cooled, radial-beam tetrode with a rated maximum plate dissipation of 1000 watts. It is a low-voltage, high-current tube specifically designed for Class AB<sub>1</sub> RF linear-amplifier applications where its high gain and low distortion characteristics may be used to advantage. The 4CX1000K/8352 is similar to the 4CX1000A/8168 but contains a solid screen ring that improves isolation between input and output circuits and permits use of the tube in UHF service.

### CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 1000 watts                |
| Screen Dissipation (Max.)             | .12 watts                 |
| Grid Dissipation (Max.)               | 0 watts                   |
| Frequency for Max. Ratings (CW)       | 110 MHz                   |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Voltage                               | .6.0 volts                |
| Current                               | .9.0 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 84.0 pF                   |
| Output                                | 13.3 pF                   |
| Feed-through                          | 0.015 pF                  |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 35.0 pF                   |
| Output                                | 13.3 pF                   |
| Feed-through                          | 0.003 pF                  |
| Transconductance                      | 37,000 $\mu$ hos          |
| Base                                  | Special, Breechblock      |
| Recommended Air-System Socket         | SK-820 or SK-830          |
| Recommended Air Chimney               | SK-806                    |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 4.80 in; 122.00 mm        |
| Maximum Diameter                      | 3.37 in; 85.50 mm         |
| Weight (approximate)                  | 27 oz; 0.77 kg            |
| Operating Position                    | Any                       |



| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | RF Linear Amplifier       | 3000                  | 1.0                  | 3000                  | 325                    | 0.88                 | —                   | 1630                 |
| AB <sub>1</sub>    | AF Amplifier or Modulator | 3000                  | 1.0                  | 3000                  | 325                    | 1.8*                 | —                   | 3260*                |

\*Two tubes

†At  $I_b = 1.0$  A

The 4CX1500A is a general purpose tetrode for use up to and through VHF. Insulation is ceramic and the thoriated tungsten filament is a rugged mesh design. The screen terminal is a continuous ring which allows good isolation between the plate circuit and the control grid circuit.

The 4CX1500A is recommended for use as a Class C power amplifier, Class B<sub>1</sub> or Class AB<sub>1</sub> linear amplifier, as a regulator, and in pulse modulator service.

### CHARACTERISTICS

|                                                        |                         |
|--------------------------------------------------------|-------------------------|
| Plate Dissipation (Max.)                               | 1500 watts              |
| Screen Dissipation (Max.)                              | .75 watts               |
| Grid Dissipation (Max.)                                | .25 watts               |
| Frequency for Max. Ratings (CW)                        | 150 MHz                 |
| Cooling                                                | Forced Air              |
| Filament                                               | Thoriated tungsten mesh |
| Voltage                                                | .5.0 volts              |
| Current                                                | .38.5 amperes           |
| Capacitances (Gnd. Cath. Connection):                  |                         |
| Input                                                  | 78.0 pF                 |
| Output                                                 | 10.5 pF                 |
| Feed-through                                           | 0.25 pF                 |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | .5.5                    |
| Transconductance                                       | 26,000 $\mu$ hos        |
| Base                                                   | Special, Breechblock    |
| Recommended Air-System Socket                          | SK-831                  |
| Recommended Air Chimney                                | SK-806                  |
| Maximum Seal & Anode Core Temperature                  | 250°C                   |
| Maximum Length                                         | 4.90 in; 124.50 mm      |
| Maximum Diameter                                       | 3.37 in; 85.60 mm       |
| Weight (approximate)                                   | 30 oz; 850 gm           |
| Operating Position                                     | Vertical                |



| Class of Operation      Type of Service |                                       | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|-----------------------------------------|---------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                                         |                                       | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                                       | RF Power Amplifier                    | 5000                  | 1.0                  | 30                | 4000                  | 500                    | 0.80                 | 3.6                 | 2500                 |
| C                                       | RF Power Amplifier                    | 5000                  | 1.0                  | 220               | 3000                  | 500                    | 1.0                  | 31.5                | 1500‡                |
| C                                       | RF Power Amplifier<br>Plate Modulated | 3500                  | 0.8                  | 30                | 3400                  | 500                    | 0.90                 | 10                  | 2320*                |
| AB                                      | RF Linear Amplifier                   | 4000                  | 1.0                  | 30                | 3900                  | 600                    | 0.75                 | —                   | 1850                 |
| AB                                      | AF Amplifier or Modulator             | 4000                  | 1.0                  | —                 | 3900                  | 600                    | 1.5*                 | —                   | 3700*                |

\*Two tubes

†At  $I_b = 1.0$  A

‡Useful power output

# External Anode, Forced Air Cooled Tetrodes

## 4CX1500B/8660



The 4CX1500B/8660 is a ceramic/metal, forced-air cooled, radial-beam tetrode with a rated maximum plate dissipation of 1500 watts. It is a low-voltage, high-current tube specifically designed for exceptionally low intermodulation distortion and low grid interception. The low distortion characteristics make the 4CX1500B/8660 especially suitable for radio-frequency and audio-frequency linear amplifier service.

### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 1500 watts  
Screen Dissipation (Max.) . . . . . 12 watts  
Grid Dissipation (Max.) . . . . . 1 watt  
Frequency for Max. Ratings (CW) . . . . . 110 MHz  
Cooling . . . . . Forced Air  
Cathode . . . . . Oxide-coated Unipotential  
Voltage . . . . . 6.0 volts  
Current . . . . . 10.0 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 81.5 pF  
Output . . . . . 11.8 pF  
Feed-through . . . . . 0.02 pF  
Transconductance . . . . . 30,000  $\mu$ mhos  
Base . . . . . Special, Breechblock  
Recommended Air-System Socket . . . . . SK-800B  
Recommended Air Chimney . . . . . SK-806  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 4.80 in; 121.90 mm  
Maximum Diameter . . . . . 3.37 in; 85.60 mm  
Weight (approximate) . . . . . 27 oz; 0.77 kg  
Operating Position . . . . . Any

| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB                 | RF Linear Amplifier       | 3000                  | 0.90                 | 2900                  | 225                    | 0.71                 | —                   | 1100†                |
| AB <sub>1</sub>    | AF Amplifier or Modulator | 3000                  | 0.90                 | 2900                  | 325                    | 1.7*                 | —                   | 2774*                |

\*Two tubes

†At  $I_b = 0.5 A$

‡Useful power output

## 4CX3000A/8169



The 4CX3000A/8169 is a ceramic/metal power tetrode designed to be used as a Class AB<sub>1</sub> linear amplifier in audio or radio-frequency applications. Its characteristics of low intermodulation distortion make it especially suitable for single sideband service.

This tube is unique in that a production test is included to insure minimum distortion products. The 4CX3000A/8169 must produce a minimum of 5300 watts in Class AB<sub>1</sub> service with 1M distortion at least 32 dB down, 3rd order.

The tube is also recommended for use as a Class C radio-frequency power amplifier and plate-modulated radio-frequency power amplifier.

### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 3500 watts  
Screen Dissipation (Max.) . . . . . 175 watts  
Grid Dissipation (Max.) . . . . . 50 watts  
Frequency for Max. Ratings (CW) . . . . . 150 MHz  
Cooling . . . . . Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 9.0 volts  
Current . . . . . 41.5 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 130 pF  
Output . . . . . 12.5 pF  
Feed-through . . . . . 1.0 pF  
Capacitances (Gnd. Grid Connection):  
Input . . . . . 61.0 pF  
Output . . . . . 12.5 pF  
Feed-through . . . . . 0.1 pF  
Amplification Factor ( $g_{1-2}$ ) . . . . . 5.5  
Base . . . . . Special, Breechblock  
Recommended Air-System Socket . . . . . SK-1400  
Recommended Air Chimney . . . . . SK-1406  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 7.90 in; 200.70 mm  
Maximum Diameter . . . . . 4.63 in; 117.60 mm  
Weight (approximate) . . . . . 5.5 lb; 2.5 kg  
Operating Position . . . . . Vertical

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7000                  | 2.0                  | 7000                  | 500                    | 1.9                  | 41                  | 11,000               |
| C                  | RF Power Amplifier Plate Modulated | 5000                  | 1.4                  | 5000                  | 500                    | 1.4                  | 31                  | 5750                 |
| AB                 | RF Linear Amplifier                | 7000                  | 2.0                  | 5000                  | 850                    | 1.7                  | —                   | 5300†                |
| AB                 | AF Amplifier or Modulator          | 6000                  | 2.0                  | 6000                  | 850                    | 3.1*                 | —                   | 12,400*              |

\*Two tubes

†Useful output power

## External Anode, Forced Air Cooled Tetrodes 4CX5000A/8170

The 4CX5000A/8170 is a compact high-power ceramic/metal tetrode cooled by forced air. It is useful as an oscillator, amplifier, or modulator at frequencies up to 220 MHz and is particularly suited for use as a linear single-sideband amplified, Class AB<sub>1</sub> audio amplifier, or as a screen-modulated radio-frequency amplifier.

A pair of these tubes will deliver 17.5 kW of audio-frequency or radio-frequency power with zero driving power. The rated plate dissipation is 5 kW for most classes of services and 6 kW for Class AB operation.

### CHARACTERISTICS

|                                                        |                    |
|--------------------------------------------------------|--------------------|
| Plate Dissipation (Max.)                               | 5000 watts         |
| Screen Dissipation (Max.)                              | 250 watts          |
| Grid Dissipation (Max.)                                | 75 watts           |
| Frequency for Max. Ratings (CW)                        | 100 MHz            |
| Cooling                                                | Forced Air         |
| Filament                                               | Thoriated tungsten |
| Voltage                                                | 7.5 volts          |
| Current                                                | 75.0 amperes       |
| Capacitances (Gnd. Cath. Connection):                  |                    |
| Input                                                  | 115 pF             |
| Output                                                 | 20.5 pF            |
| Feed-through                                           | 0.7 pF             |
| Capacitances (Gnd. Grid Connection):                   |                    |
| Input                                                  | 53.0 pF            |
| Output                                                 | 20.5 pF            |
| Feed-through                                           | 0.1 pF             |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                |
| Base                                                   | Special, Coaxial   |
| Recommended Air-System Socket                          | SK-300 Series      |
| Recommended Air Chimney                                | SK-306             |
| Maximum Seal & Anode Core Temperature                  | 250°C              |
| Maximum Length                                         | 9.13 in; 231.80 mm |
| Maximum Diameter                                       | 4.94 in; 125.40 mm |
| Weight (approximate)                                   | 9.5 lb; 4.31 kg    |
| Operating Position                                     | Vertical           |



| Class of Operation | Type of Service                     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|-------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                     | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                  | 7500±                 | 3.0‡                 | 30                | 7500                  | 500                    | 2.8                  | 150                 | 16,000               |
| C                  | RF Power Amplifier Plate Modulated  | 5500                  | 2.5                  | 30                | 5000                  | 500                    | 1.4                  | 25                  | 5800                 |
| C                  | RF Power Amplifier Screen Modulated | 7500                  | 3.0                  | 30                | 7500                  | 350                    | 1.1                  | 11                  | 3550                 |
| AB <sub>1</sub>    | RF Linear Amplifier                 | 7500                  | 4.0                  | 30                | 7500                  | 1250                   | 1.9                  | —                   | 10,000               |
| AB <sub>1</sub>    | AF Amplifier or Modulator           | 7500                  | 4.0                  | —                 | 7000                  | 1250                   | 3.7*                 | —                   | 17,500*              |

\*Two tubes

‡Derated values apply above 30 MHz, to 220 MHz.

## 4CX5000J/8909

The 4CX5000J/8909 is a compact, high-power, ceramic/metal, forced-air cooled tetrode with a rated maximum plate dissipation of 6000 watts. It incorporates rugged internal construction features, including a mesh filament/cathode.

The 4CX5000J/8909 is specifically designed for exceptionally low intermodulation distortion in radio-frequency linear amplifier service.

### CHARACTERISTICS

|                                                        |                         |
|--------------------------------------------------------|-------------------------|
| Plate Dissipation (Max.)                               | 6000 watts              |
| Screen Dissipation (Max.)                              | 250 watts               |
| Grid Dissipation (Max.)                                | 75 watts                |
| Frequency for Max. Ratings (CW)                        | 100 MHz                 |
| Cooling                                                | Forced Air              |
| Filament                                               | Thoriated tungsten mesh |
| Voltage                                                | 7.5 volts               |
| Current                                                | 103 amperes             |
| Capacitances (Gnd. Cath. Connection):                  |                         |
| Input                                                  | 120.0 pF                |
| Output                                                 | 20.5 pF                 |
| Feed-through                                           | 0.7 pF                  |
| Capacitances (Gnd. Grid Connection):                   |                         |
| Input                                                  | 56.0 pF                 |
| Output                                                 | 21.5 pF                 |
| Feed-through                                           | 0.10 pF                 |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                     |
| Base                                                   | Special, Coaxial        |
| Recommended Air-System Socket                          | SK-300 Series           |
| Recommended Air Chimney                                | SK-306                  |
| Maximum Seal & Anode Core Temperature                  | 250°C                   |
| Maximum Length                                         | 9.13 in; 231.80 mm      |
| Maximum Diameter                                       | 4.94 in; 125.40 mm      |
| Weight (approximate)                                   | 9.5 lb; 4.31 kg         |
| Operating Position                                     | Vertical                |



| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | RF Linear Amplifier | 7500                  | 4.0                  | 4050                  | 800                    | 1.7                  | —                   | 3150†                |

†Useful power output; intermodulation distortion products ≈ 40 dB.

## External Anode, Forced Air Cooled Tetrodes

### 4CX5000R/8170W



The 4CX5000R/8170W is a compact, high-power, ceramic/metal tetrode. It is directly interchangeable with the 4CX5000A/8170 but incorporates more rugged internal construction features, including a sturdy mesh cathode, which allows it to meet demanding vibration and shock specifications.

The 4CX5000R/8170W is useful up to 110 MHz and is recommended for use as a radio-frequency linear amplifier, a Class AB<sub>1</sub> audio amplifier, or a Class C power amplifier or plate-modulated amplifier.

#### CHARACTERISTICS

|                                                        |                    |
|--------------------------------------------------------|--------------------|
| Plate Dissipation (Max.)                               | 5000 watts         |
| Screen Dissipation (Max.)                              | 250 watts          |
| Grid Dissipation (Max.)                                | .75 watts          |
| Frequency for Max. Ratings (CW)                        | 100 MHz            |
| Cooling                                                | Forced Air         |
| Filament                                               | Thoriated tungsten |
| Voltage                                                | .75 volts          |
| Current                                                | .75.0 amperes      |
| Capacitances (Gnd. Cath. Connection):                  |                    |
| Input                                                  | 115 pF             |
| Output                                                 | 20.5 pF            |
| Feed-through                                           | .07 pF             |
| Capacitances (Gnd. Grid Connection):                   |                    |
| Input                                                  | 53.0 pF            |
| Output                                                 | 21.5 pF            |
| Feed-through                                           | .01 pF             |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                |
| Base                                                   | Special, Coaxial   |
| Recommended Air-System Socket                          | SK-300 Series      |
| Recommended Air Chimney                                | SK-306             |
| Maximum Seal & Anode Core Temperature                  | 250°C              |
| Maximum Length                                         | 9.13 in; 232.00 mm |
| Maximum Diameter                                       | 4.94 in; 125.00 mm |
| Weight (approximate)                                   | 9.5 lb; 4.31 kg    |
| Operating Position                                     | Vertical           |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7500                  | 3.0                  | 6500                  | 750                    | 2.3                  | 100                 | 10,000†              |
| C                  | RF Power Amplifier Plate Modulated | 5000                  | 2.5                  | 5000                  | 500                    | 1.4                  | 25                  | 5800                 |
| AB <sub>1</sub>    | RF Linear Amplifier                | 7500                  | 4.0                  | 7500                  | 1250                   | 1.9                  | —                   | 10,000               |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 7500                  | 4.0                  | 7000                  | 1250                   | 3.7*                 | —                   | 17,500*              |

\*Two tubes

†Useful output power

### 4CX10,000D/8171



The 4CX10,000D/8171 is a ceramic/metal tetrode which is identical electrically to the 4CX5000A/8170 except for its rated plate dissipation. Its increased dissipation capability, resulting from a larger cooler, is most useful in linear applications where plate dissipation is generally the limiting factor.

The larger cooler also allows the 4CX10,000D/8171 to be used in place of the 4CX5000A/8170 with less cooling for any given plate dissipation, or results in cooler operation at any given air-flow rate.

The 4CX10,000D/8171 is useful as an oscillator, amplifier, or modulator at frequencies up to 110 megahertz and is particularly suited for use as a linear RF amplifier or Class AB<sub>1</sub> audio amplifier.

#### CHARACTERISTICS

|                                                        |                    |
|--------------------------------------------------------|--------------------|
| Plate Dissipation (Max.)                               | 10,000 watts       |
| Screen Dissipation (Max.)                              | 250 watts          |
| Grid Dissipation (Max.)                                | .75 watts          |
| Frequency for Max. Ratings (CW)                        | 100 MHz            |
| Cooling                                                | Forced Air         |
| Filament                                               | Thoriated tungsten |
| Voltage                                                | .75 volts          |
| Current                                                | .75.0 amperes      |
| Capacitances (Gnd. Cath. Connection):                  |                    |
| Input                                                  | 115 pF             |
| Output                                                 | 20.5 pF            |
| Feed-through                                           | .07 pF             |
| Capacitances (Gnd. Grid Connection):                   |                    |
| Input                                                  | 53.0 pF            |
| Output                                                 | 20.5 pF            |
| Feed-through                                           | .01 pF             |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                |
| Base                                                   | Special, Coaxial   |
| Recommended Air-System Socket                          | SK-300A            |
| Recommended Air Chimney                                | SK-1306            |
| Maximum Seal & Anode Core Temperature                  | 250°C              |
| Maximum Length                                         | 9.13 in; 232.00 mm |
| Maximum Diameter                                       | 7.05 in; 179.00 mm |
| Weight (approximate)                                   | 12.0 lb; 5.50 kg   |
| Operating Position                                     | Vertical           |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7500‡                 | 3.0‡                 | 30                | 7500                  | 500                    | 2.8                  | 150                 | 16,000               |
| C                  | RF Power Amplifier Plate Modulated | 5000                  | 2.5                  | 30                | 5000                  | 500                    | 1.4                  | 25                  | 5800                 |
| AB <sub>1</sub>    | RF Linear Amplifier                | 7500                  | 4.0                  | 30                | 7500                  | 1500                   | 3.3                  | —                   | 15,950               |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 7500                  | 4.0                  | 30                | 7500                  | 1500                   | 6.7*                 | —                   | 31,900*              |

\*Two tubes

‡Derated values apply above 30 MHz.

# External Anode, Forced-Air Cooled Tetrodes

## 4CX10,000J

The 4CX10,000J is a compact, high-power, ceramic/metal, forced-air cooled tetrode with a rated maximum plate dissipation of 12 kW. It incorporates rugged internal construction features, including a mesh filament.

The 4CX10,000J is specifically designed for exceptionally low intermodulation distortion in radio-frequency linear amplifier service.

### CHARACTERISTICS

|                                                        |                         |
|--------------------------------------------------------|-------------------------|
| Plate Dissipation (Max.)                               | 12,000 watts            |
| Screen Dissipation (Max.)                              | 250 watts               |
| Grid Dissipation (Max.)                                | .75 watts               |
| Frequency for Max. Ratings (CW)                        | 100 MHz                 |
| Cooling                                                | Forced Air              |
| Filament                                               | Thoriated tungsten mesh |
| Voltage                                                | 7.5 volts               |
| Current                                                | 103 amperes             |
| Capacitances (Gnd. Cath. Connection):                  |                         |
| Input                                                  | 120 pF                  |
| Output                                                 | 20.5 pF                 |
| Feed-through                                           | 0.7 pF                  |
| Capacitances (Gnd. Grid Connection):                   |                         |
| Input                                                  | 56.0 pF                 |
| Output                                                 | 21.5 pF                 |
| Feed-through                                           | 0.10 pF                 |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                     |
| Base                                                   | Special, Coaxial        |
| Recommended Air-System Socket                          | SK-300A                 |
| Recommended Air Chimney                                | SK-1306                 |
| Maximum Seal & Anode Core Temperature                  | 250°C                   |
| Maximum Length                                         | 9.13 in; 232.00 mm      |
| Maximum Diameter                                       | 7.05 in; 179.00 mm      |
| Weight (approximate)                                   | 12.2 lb; 5.50 kg        |
| Operating Position                                     | Vertical                |



| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | RF Linear Amplifier | 7500                  | 4.0                  | 7500                  | 1600                   | 2.2                  | —                   | 10,000†              |

†Useful output power

## 4CX15,000A/8281

The 4CX15,000A/8281 is a ceramic/metal power tetrode intended for use in audio or radio frequency applications. It features a new type of internal mechanical structure which results in higher RF operating efficiency. Low RF losses in this mechanical structure permit operation of the 4CX15,000A/8281 at full ratings up to 110 MHz, and at reduced ratings, to 225 MHz.

The 4CX15,000A/8281 is also recommended for radio-frequency linear power amplifier service, and for television linear amplifier service.

### CHARACTERISTICS

|                                                        |                    |
|--------------------------------------------------------|--------------------|
| Plate Dissipation (Max.)                               | 15,000 watts       |
| Screen Dissipation (Max.)                              | 450 watts          |
| Grid Dissipation (Max.)                                | 200 watts          |
| Frequency for Max. Ratings (CW)                        | 110 MHz            |
| Cooling                                                | Forced Air         |
| Filament                                               | Thoriated tungsten |
| Voltage                                                | 7.5 volts          |
| Current                                                | 160 amperes        |
| Capacitances (Gnd. Cath. Connection):                  |                    |
| Input                                                  | 160.5 pF           |
| Output                                                 | 24.5 pF            |
| Feed-through                                           | 1.5 pF             |
| Capacitances (Gnd. Grid Connection):                   |                    |
| Input                                                  | 67.0 pF            |
| Output                                                 | 25.5 pF            |
| Feed-through                                           | 0.2 pF             |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                |
| Base                                                   | Special, Coaxial   |
| Recommended Air-System Socket                          | SK-300A            |
| Recommended Air Chimney                                | SK-316             |
| Maximum Seal & Anode Core Temperature                  | 250°C              |
| Maximum Length                                         | 9.38 in; 238.00 mm |
| Maximum Diameter                                       | 7.58 in; 193.0 mm  |
| Weight (approximate)                                   | 12.8 lb; 5.80 kg   |
| Operating Position                                     | Vertical           |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 10,000                | 6.0                  | 10,000                | 750                    | 4.6                  | 220                 | 36,500               |
| C                  | RF Power Amplifier Plate Modulated | 8000                  | 4.0                  | 8000                  | 750                    | 3.7                  | 150                 | 23,500               |
| AB <sub>1</sub>    | RF Linear Amplifier                | 10,000                | 6.0                  | 10,000                | 1500                   | 4.3                  | —                   | 28,500               |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 10,000                | 6.0                  | 10,000                | 1500                   | 8.5*                 | —                   | 57,000*              |

\*Two tubes

## External Anode, Forced Air Cooled Tetrodes 4CX15,000J/8910



The 4CX15,000J/8910 is a ceramic/metal, forced-air cooled power tetrode intended for use in audio or radio frequency applications. The internal structure features a mesh filament and a mechanical design which assures good strength and high RF operating efficiency.

Full ratings on the 4CX15,000J/8910 apply to 110 MHz, and it is especially recommended for radio frequency linear amplifier service.

### CHARACTERISTICS

|                                       |                         |
|---------------------------------------|-------------------------|
| Plate Dissipation (Max.)              | 15,000 watts            |
| Screen Dissipation (Max.)             | 450 watts               |
| Grid Dissipation (Max.)               | 200 watts               |
| Frequency for Max. Ratings (CW)       | 110 MHz                 |
| Cooling                               | Forced Air              |
| Filament                              | Thoriated tungsten mesh |
| Voltage                               | 7.5 volts               |
| Current                               | 158 amperes             |
| Capacitances (Gnd. Cath. Connection): |                         |
| Input                                 | 160.5 pF                |
| Output                                | 26.5 pF                 |
| Feed-through                          | 1.5 pF                  |
| Capacitances (Gnd. Grid Connection):  |                         |
| Input                                 | 67.0 pF                 |
| Output                                | 27.5 pF                 |
| Feed-through                          | 0.2 pF                  |
| Amplification Factor ( $g_{1-92}$ )   | 4.5                     |
| Base                                  | Special, Coaxial        |
| Recommended Air-System Socket         | SK-300A                 |
| Recommended Air Chimney               | SK-316                  |
| Maximum Seal & Anode Core Temperature | 250°C                   |
| Maximum Length                        | 9.38 in; 238.00 mm      |
| Maximum Diameter                      | 7.58 in; 193.00 mm      |
| Weight (approximate)                  | 12.8 lb; 5.80 kg        |
| Operating Position                    | Axis Vertical           |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 10,000                | 5.0                  | 10,000                | 750                    | 4.6                  | 220                 | 36,500               |
| C                  | RF Power Amplifier Plate Modulated | 8000                  | 4.0                  | 8000                  | 750                    | 3.7                  | 150                 | 23,500               |
| AB <sub>1</sub>    | RF Linear Amplifier                | 10,000                | 6.0                  | 7500                  | 1250                   | 2.9                  | —                   | 12,000†              |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 10,000                | 6.0                  | 10,000                | 1500                   | 8.5*                 | —                   | 57,000*              |

\*Two tubes

†Useful output power, -39 dB-3rd; -39 dB-5th order products

## 4CX35,000C/8349



The 4CX35,000C/8349 is a ceramic/metal, forced-air cooled power tetrode intended for use at the 50 to 150 kW output power level. It is recommended for use as a Class C RF amplifier or oscillator, a Class AB RF linear amplifier, or a Class AB push-pull AF amplifier or modulator. The 4CX35,000C/8349 is also useful as a plate and screen modulated Class C RF amplifier.

### CHARACTERISTICS

|                                       |                          |
|---------------------------------------|--------------------------|
| Plate Dissipation (Max.)              | 35,000 watts             |
| Screen Dissipation (Max.)             | 1750 watts               |
| Grid Dissipation (Max.)               | 500 watts                |
| Frequency for Max. Ratings (CW)       | 30 MHz                   |
| Cooling                               | Forced Air               |
| Filament                              | Thoriated tungsten       |
| Voltage                               | 10.0 volts               |
| Current                               | 295 amperes              |
| Capacitances (Gnd. Cath. Connection): |                          |
| Input                                 | 440 pF                   |
| Output                                | 55.0 pF                  |
| Feed-through                          | 2.30 pF                  |
| Capacitances (Gnd. Grid Connection):  |                          |
| Input                                 | 175 pF                   |
| Output                                | 57.0 pF                  |
| Feed-through                          | 0.4 pF                   |
| Amplification Factor ( $g_{1-92}$ )   | 4.5                      |
| Base                                  | Special, graduated rings |
| Recommended Air-System Socket         | SK-1500 Series           |
| Maximum Seal & Anode Core Temperature | 250°C                    |
| Maximum Length                        | 17.34 in; 440.00 mm      |
| Maximum Diameter                      | 9.75 in; 248.00 mm       |
| Weight (approximate)                  | 50 lb; 22.70 kg          |
| Operating Position                    | Vertical                 |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 20,000                | 15.0                 | 19,000                | 750                    | 7.0                  | 258                 | 110                  |
| C                  | RF Power Amplifier Plate Modulated | 14,000                | 15.0                 | 12,000                | 750                    | 5.4                  | 125                 | 55                   |
| AB <sub>1</sub>    | RF Linear Amplifier                | 20,000                | 15.0                 | 15,000                | 1500                   | 5.7                  | —                   | 55                   |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 20,000                | 15.0                 | 12,000                | 1500                   | 9.2*                 | —                   | 70*                  |

\*Two tubes

External Anode, Forced Air Cooled Tetrodes  
**4X150A/7034, 7609**

**CHARACTERISTICS**



Plate Dissipation (Max.) . . . . . 250 watts  
 Screen Dissipation (Max.) . . . . . 12 watts  
 Grid Dissipation (Max.) . . . . . 2 watts  
 Frequency for Max. Ratings (CW) . . . . . 150 MHz  
 Cooling . . . . . Forced Air  
 Cathode . . . . . Oxide-coated Unipotential  
 Voltage (4X150A) . . . . . 6.0 volts  
                   (7609) . . . . . 26.5 volts  
 Current (4X150A) . . . . . 2.6 amperes  
                   (7609) . . . . . 0.51 ampere  
 Capacitances (Gnd. Cath. Connection):  
   Input . . . . . 15.7 pF  
   Output . . . . . 4.4 pF  
   Feed-through . . . . . 0.03 pF  
 Amplification Factor ( $g_1$ - $g_2$ ) . . . . . 5  
 Base . . . . . 9-Pin Special  
 Recommended Air-System Socket . . . . . SK-600 Series  
 Recommended Air Chimney . . . . . SK-606 Series  
 Maximum Ceramic Seal &  
   Anode Core Temperature . . . . . 250°C  
 Maximum Glass Seal Temperature . . . . . 200°C  
 Maximum Length . . . . . 2.42 in; 61.30 mm  
 Maximum Diameter . . . . . 1.64 in; 41.70 mm  
 Weight (approximate) . . . . . 4 oz; 113 gm  
 Operating Position . . . . . Any

| Class of Operation      Type of Service |                                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|-----------------------------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                                         |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                                       | RF Power Amplifier                 | 2000                  | 0.25                 | 2000                  | 250                    | 0.25                 | 2.9                 | 390                  |
| C                                       | RF Power Amplifier Plate Modulated | 1600                  | 0.20                 | 1600                  | 250                    | 0.20                 | 3.6                 | 250                  |
| AB <sub>1</sub>                         | RF Linear Amplifier                | 2000                  | 0.25                 | 2000                  | 350                    | 0.25                 | —                   | 300                  |
| AB <sub>1</sub>                         | AF Amplifier or Modulator          | 2000                  | 0.25                 | 2000                  | 350                    | 0.50*                | —                   | 600*                 |

\*Two tubes

# External Anode, Forced Air Cooled Tetrodes

## 6816, 6884



The 6816 and 6884 are compact external-anode ceramic/metal radial-beam tetrodes for use in RF power amplifier service, RF linear power amplifier applications, and as audio frequency amplifiers or modulators. The 6816 has a 6.3 volt heater, while the 6884 has a 26.5 volt heater. Both are otherwise identical, and they are designed for transverse-flow forced air cooling.

The tubes have an F<sub>1</sub> rating of 1215 MHz for full-rated power input and are tested to show a useful power output of 80 watts at 400 MHz and 40 watts at 1200 MHz.

## CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 115 watts                 |
| Screen Dissipation (Max.)                              | 4.5 watts                 |
| Grid Dissipation (Max.)                                | 1.0 watts                 |
| Frequency for Max. Ratings (CW)                        | 1215 MHz                  |
| Cooling                                                | Forced Air                |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage (6816)                                         | 6.3 volts                 |
| (6884)                                                 | 26.5 volts                |
| Current (6816)                                         | .20 amperes               |
| (6884)                                                 | 0.53 amperes              |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 30.5 pF                   |
| Output                                                 | 4.7 pF                    |
| Feed-through                                           | 0.05 pF                   |
| Capacitances (Gnd. Grid Connection):                   |                           |
| Input                                                  | 13.0 pF                   |
| Output                                                 | 4.7 pF                    |
| Feed-through                                           | 0.01 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 18                        |
| Base                                                   | Special, Coaxial          |
| Maximum Seal & Anode Core Temperature                  | 250°C                     |
| Maximum Length                                         | 1.93 in; 49.00 mm         |
| Maximum Diameter                                       | 1.27 in; 32.50 mm         |
| Weight (approximate)                                   | 2.0 oz; 57 gm             |
| Operating Position                                     | Any                       |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 1000                  | 0.18                 | 400               | 900                   | 300                    | 0.17                 | 3                   | 80†                  |
| C                  | RF Power Amplifier                 | 1000                  | 0.18                 | 1200              | 900                   | 300                    | 0.17                 | 5                   | 40†                  |
| C                  | RF Power Amplifier Plate Modulated | 800                   | 0.15                 | 400               | 700                   | 250                    | 0.13                 | 3                   | 45†                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 1000                  | 0.18                 | 30                | 850                   | 300                    | 0.10                 | —                   | 40†                  |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 1000                  | 0.18                 | —                 | 850                   | 300                    | 0.20*                | —                   | 80                   |
| AB <sub>2</sub>    | AF Amplifier or Modulator          | 1000                  | 0.18                 | —                 | 850                   | 300                    | 0.35*                | —                   | 140                  |

\*Two tubes

† Useful output power

# External Anode, Forced Air Cooled Tetrodes 8930

The 8930 is a compact, high-perveance tetrode with a maximum plate dissipation of 350 watts. It is electrically identical to the 4CX250R/7580W but the larger anode radiator assembly allows higher dissipation with low air flow and pressure drop characteristics.

The tube has rugged internal construction features for reliable operation under heavy shock or vibration conditions.

## CHARACTERISTICS

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 350 watts                 |
| Screen Dissipation (Max.)             | 12 watts                  |
| Grid Dissipation (Max.)               | 2 watts                   |
| Frequency for Max. Ratings (CW)       | 500 MHz                   |
| Cooling                               | Forced Air                |
| Cathode                               | Oxide-coated Unipotential |
| Voltage                               | 6.0 volts                 |
| Current                               | 2.6 amperes               |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 17.5 pF                   |
| Output                                | 4.9 pF                    |
| Feed-through                          | 0.03 pF                   |
| Amplification Factor ( $a_{1-92}$ )   | 5                         |
| Base                                  | 9-Pin Special             |
| Recommended Air-System Socket         | SK-600 Series             |
| Recommended Air Chimney               | SK-646                    |
| Maximum Seal & Anode Core Temperature | 250°C                     |
| Maximum Length                        | 2.46 in; 62.60 mm         |
| Maximum Diameter                      | 2.08 in; 52.80 mm         |
| Weight (approximate)                  | 5.5 oz; 156 gm            |
| Operating Position                    | Any                       |



| Class of Operation      Type of Service |                                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|-----------------------------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                                         |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                                       | RF Power Amplifier                 | 2400                  | 0.25                 | —                 | —                     | —                      | —                    | —                   | —                    |
| C                                       | RF Power Amplifier Plate Modulated | 1800                  | 0.20                 | —                 | —                     | —                      | —                    | —                   | —                    |
| AB <sub>1</sub>                         | RF Linear Amplifier                | 2400                  | 0.25                 | —                 | 2000                  | 350                    | 0.29†                | —                   | 350†                 |
| AB <sub>1</sub>                         | RF Linear Amplifier A/M Service    | 2400                  | 0.25                 | 400               | 2000                  | 400                    | 0.17§                | 4                   | 65                   |
| AB <sub>1</sub>                         | AF Amplifier or Modulator          | 2400                  | 0.25                 | —                 | 2000                  | 350                    | 0.50*                | —                   | 595*                 |

\* Two tubes

† 1-tone value; 2 tone  $I_b \approx 0.20A$

§ Carrier value;  $I_b = 0.20A$  with 90% modulation.

## External Anode, Vapor Cooled Tetrodes

### 4CV8000A



The 4CV8000A is a ceramic/metal vapor-cooled power tetrode designed to be used as a Class AB<sub>1</sub> linear amplifier in audio or radio-frequency applications. Its characteristic of low intermodulation distortion makes it specially suitable for single-sideband service. The vapor-cooled anode has a dissipation rating of 8 kW when mounted in an EIMAC BR-101 boiler.

The 4CV8000A is also recommended for Class C radio-frequency power amplifier and plate-modulated radio-frequency power amplifier service.

#### CHARACTERISTICS

|                                                        |                                                |
|--------------------------------------------------------|------------------------------------------------|
| Plate Dissipation (Max.)                               | 8,000 watts                                    |
| Screen Dissipation (Max.)                              | 175 watts                                      |
| Grid Dissipation (Max.)                                | 50 watts                                       |
| Frequency for Max. Ratings (CW)                        | 150 MHz                                        |
| Cooling                                                | Vapor and Forced Air                           |
| Filament                                               | Thoriated tungsten                             |
| Voltage                                                | 9.0 volts                                      |
| Current                                                | 41.5 amperes                                   |
| Capacitances (Gnd. Cath. Connection):                  |                                                |
| Input                                                  | 130 pF                                         |
| Output                                                 | 12.5 pF                                        |
| Feed-through                                           | 0.8 pF                                         |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5.5                                            |
| Base                                                   | Special Ring and Breachblock Terminal Surfaces |
| Recommended Air-System Socket                          | SK-1490 Series                                 |
| Recommended Boiler                                     | BR-101                                         |
| Maximum Seal Temperature                               | 250°C                                          |
| Maximum Anode Flange Temperature                       | 110°C                                          |
| Maximum Length (less Boiler)                           | 7.98 in; 202.70 mm                             |
| Maximum Diameter (less Boiler)                         | 7.87 in; 199.90 mm                             |
| Weight (approximate) (less Boiler)                     | 7.0 lb; 3.2 kg                                 |
| Operating Position                                     | Axis Vertical, base up                         |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7000                  | 2.0                  | 30                | 7000                  | 500                    | 1.9                  | 47                  | 11,000               |
| C                  | RF Power Amplifier Plate Modulated | 5000                  | 1.4                  | 30                | 5000                  | 400                    | 1.3                  | 42                  | 5500                 |
| AB <sub>1</sub>    | RF Linear Amplifier                | 7000                  | 2.0                  | 30                | 6000                  | 850                    | 2.0                  | —                   | 7250                 |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 7000                  | 2.0                  | —                 | 6000                  | 850                    | 4.0*                 | —                   | 14,500*              |

\*Two tubes

### 4CV35,000A



The 4CV35,000A is a ceramic/metal power tetrode intended for use as a Class C amplifier in radio-frequency applications. It features a new type of internal mechanical structure which results in higher RF operating efficiency. Low RF losses in this mechanical structure permit operation of the 4CV35,000A at full ratings up to 110 MHz. The 4CV35,000A is also recommended for Class AB audio-frequency and radio-frequency linear power amplifier service. The vapor-cooled anode is rated at 35 kW of plate dissipation, making the tube attractive for low efficiency applications.

#### CHARACTERISTICS

|                                                        |                          |
|--------------------------------------------------------|--------------------------|
| Plate Dissipation (Max.)                               | 35,000 watts             |
| Screen Dissipation (Max.)                              | 450 watts                |
| Grid Dissipation (Max.)                                | 200 watts                |
| Frequency for Max. Ratings (CW)                        | 110 MHz                  |
| Cooling                                                | Vapor and Forced Air     |
| Filament                                               | Thoriated tungsten       |
| Voltage                                                | 6.3 volts                |
| Current                                                | 160 amperes              |
| Capacitances (Gnd. Cath. Connection):                  |                          |
| Input                                                  | 161 pF                   |
| Output                                                 | 24.5 pF                  |
| Feed-through                                           | 1.5 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                      |
| Base                                                   | Special, Coaxial         |
| Recommended Air-System Socket                          | SK-310 Series            |
| Recommended Boiler                                     | BR-200                   |
| Maximum Seal Temperature                               | 250°C                    |
| Maximum Flange Temperature                             | 110°C                    |
| Maximum Length (less Boiler)                           | 9.50 in; 241.30 mm       |
| Maximum Diameter (less Boiler)                         | 7.75 in; 196.80 mm       |
| Weight (approximate) (less Boiler)                     | 20 lb; 9.1 kg            |
| Operating Position                                     | Axis Vertical, base down |

| Class of Operation<br>Type of Service |                                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|---------------------------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                                       |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                                     | RF Power Amplifier                 | 10,000                | 5.0                  | 10,000                | 750                    | 4.8                  | 225                 | 38,000               |
| C                                     | RF Power Amplifier Plate Modulated | 8000                  | 4.0                  | 8000                  | 750                    | 3.6                  | 150                 | 23,500               |
| AB <sub>1</sub>                       | RF Linear Amplifier                | 10,000                | 6.0                  | 10,000                | 1500                   | 5.3                  | —                   | 33,000               |
| AB <sub>1</sub>                       | AF Amplifier or Modulator          | 10,000                | 6.0                  | 10,000                | 1500                   | 10.7*                | —                   | 66,000*              |

\*Two tubes

**4CV50,000E**

The 4CV50,000E is a ceramic/metal, vapor-cooled power tetrode intended for use at the 50 to 100 kW output power level. This tube is characterized by low input and feedback capacitances and low internal lead inductances. A rugged mesh thoriated tungsten filament provides adequate emission over the long operating life. It is recommended for use as a Class C RF amplifier or oscillator, a Class AB<sub>1</sub> RF linear amplifier or a Class AB push-pull AF amplifier or modulator. The 4CV50,000E is also useful as a plate and screen modulated Class C RF amplifier. The vapor cooled anode is rated at 50 kW dissipation.

**CHARACTERISTICS**

|                                                        |                         |
|--------------------------------------------------------|-------------------------|
| Plate Dissipation (Max.)                               | 50,000 watts            |
| Screen Dissipation (Max.)                              | 1,500 watts             |
| Grid Dissipation (Max.)                                | 400 watts               |
| Frequency for Max. Ratings (CW)                        | 110 MHz                 |
| Cooling                                                | Vapor and Forced Air    |
| Filament                                               | Thoriated tungsten mesh |
| Voltage                                                | 12.0 volts              |
| Current                                                | 215 amperes             |
| Capacitances (Gnd. Cath. Connection):                  |                         |
| Input                                                  | 310.0 pF                |
| Output                                                 | 52.0 pF                 |
| Feed-through                                           | 0.7 pF                  |
| Capacitances (Gnd. Grid Connection):                   |                         |
| Input                                                  | 140 pF                  |
| Output                                                 | 52.0 pF                 |
| Feed-through                                           | 0.4 pF                  |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                     |
| Base                                                   | Special                 |
| Recommended Air-System Socket                          | SK-2000 Series          |
| Recommended Boiler                                     | BR-700 Series           |
| Maximum Seal & Envelope Temperature                    | 250°C                   |
| Maximum Length (less Boiler)                           | 11.50 in; 292.10 mm     |
| Maximum Diameter (less Boiler)                         | 9.53 in; 242.00 mm      |
| Weight (approximate) (less Boiler)                     | 31.5 lb; 14.3 kg        |
| Operating Position                                     | Vertical, base down     |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 17,500                | 12.0                 | 15,000                | 1500                   | 11.5                 | 150                 | 137,000              |
| C                  | RF Power Amplifier Plate Modulated | 15,000                | 12.0                 | 14,000                | 750                    | 9.25                 | 685                 | 110,000              |
| AB <sub>1</sub>    | RF Linear Amplifier                | 17,500                | 12.0                 | 10,000                | 1800                   | 9.14                 | —                   | 57,000               |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 17,500                | 12.0                 | 15,000                | 1250                   | 18.6*                | —                   | 195,000*             |

\*Two tubes

**4CV50,000J**

The 4CV50,000J is a ceramic/metal, vapor-cooled power tetrode intended for use at the 50 to 100 kW output power level. This tube is characterized by low input and feedback capacitances and low internal lead inductances. A rugged mesh thoriated tungsten filament provides adequate emission over the long operating life. It is recommended for use as a class AB<sub>1</sub> RF linear amplifier. The vapor cooled anode is rated at 50 kW dissipation.

**CHARACTERISTICS**

|                                                        |                         |
|--------------------------------------------------------|-------------------------|
| Plate Dissipation (Max.)                               | 50,000 watts            |
| Screen Dissipation (Max.)                              | 1,500 watts             |
| Grid Dissipation (Max.)                                | 400 watts               |
| Frequency for Max. Ratings (CW)                        | 110 MHz                 |
| Cooling                                                | Vapor and Forced Air    |
| Filament                                               | Thoriated tungsten mesh |
| Voltage                                                | 12.0 volts              |
| Current                                                | 215 amperes             |
| Capacitances (Gnd. Cath. Connection):                  |                         |
| Input                                                  | 320.0 pF                |
| Output                                                 | 48.0 pF                 |
| Feed-through                                           | 1.0 pF                  |
| Capacitances (Gnd. Grid Connection):                   |                         |
| Input                                                  | 125 pF                  |
| Output                                                 | 50.0 pF                 |
| Feed-through                                           | 0.3 pF                  |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                     |
| Base                                                   | Special                 |
| Recommended Air-System Socket                          | SK-2000 Series          |
| Recommended Boiler                                     | BR-710, 720             |
| Maximum Seal & Envelope Temperature                    | 250°C                   |
| Maximum Length (less Boiler)                           | 11.50 in; 292.10 mm     |
| Maximum Diameter (less Boiler)                         | 9.53 in; 242.00 mm      |
| Weight (approximate) (less Boiler)                     | 31.5 lb; 14.3 kg        |
| Operating Position                                     | Vertical, base down     |



| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB <sub>1</sub>    | RF Linear Amplifier | 17,500                | 12.0                 | 8300                  | 1500                   | 9.8                  | —                   | 45,000               |



**4CV250,000A****CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . 250,000 watts  
 Screen Dissipation (Max.) . . . . . 3,500 watts  
 Grid Dissipation (Max.) . . . . . 1,500 watts  
 Frequency for Max. Ratings (CW) . . . . . 30 MHz  
 Cooling . . . . . Vapor and Water  
 Filament . . . . . Thoriated tungsten  
 Voltage . . . . . 12.0 volts  
 Current . . . . . 660 amperes  
 Capacitances (Gnd. Cath. Connection):  
   Input . . . . . 74.5 pF  
   Output . . . . . 124 pF  
   Feed-through . . . . . 6.0 pF  
 Capacitances (Gnd. Grid Connection):  
   Input . . . . . 324 pF  
   Output . . . . . 128 pF  
   Feed-through . . . . . 1.2 pF  
 Amplification Factor ( $g_1$ - $g_2$ ) . . . . . 4.5  
 Base . . . . . Special  
 Recommended Base Contact  
   Accessories . . . . . SK-1700 Series  
 Recommended Boiler . . . . . BR610  
 Maximum Seal & Envelope Temperature . . . . . 200°C  
 Maximum Length (less Boiler) . . . . . 28.02 in; 17.17 cm  
 Maximum Diameter (less Boiler) . . . . . 15.06 in; 38.26 cm  
 Weight (approximate) (less Boiler) . . . . . 180 lb; 82 kg  
 Operating Position . . . . . Vertical, base up



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 20,000                | 40.0                 | 19,000                | 800                    | 32.5                 | 3000                | 460,000              |
| C                  | RF Power Amplifier Plate Modulated | 17,500                | 30.0                 | 15,000                | 800                    | 22.8                 | 1630                | 280,000              |
| AB <sub>1</sub>    | RF Linear Amplifier                | 20,000                | 40.0                 | 20,000                | 1800                   | 23.0                 | —                   | 330,000              |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 20,000                | 40.0                 | 20,000                | 1800                   | 46.0*                | —                   | 660,000*             |

\*Two tubes

## External Anode, Water Cooled Tetraodes

### 4CW800B, 4CW800F



The 4CW800B and 4CW800F are ceramic/metal, liquid cooled radial-beam tetraodes designed for use in distributed amplifiers and VHF/UHF power amplifiers.

The mechanical and electrical features of these tubes are compatible with distributed amplifier circuit requirements, i.e., low lead inductance, low input and output capacitance and small size.

Ruggedized construction consisting of a unitized electrode structure and direct mounting to the chassis, combine to make the 4CW800B and 4CW800F suitable for environments of severe shock and vibration.

The maximum rated plate dissipation is 800 watts for both types.

### CHARACTERISTICS

|                                       |                             |
|---------------------------------------|-----------------------------|
| Plate Dissipation (Max.)              | 800 watts                   |
| Screen Dissipation (Max.)             | 15 watts                    |
| Grid Dissipation (Max.)               | 3 watts                     |
| Frequency for Max. Ratings (CW)       | 500 MHz                     |
| Cooling                               | Liquid                      |
| Cathode                               | Oxide-coated Unipotential   |
| Voltage (4CW800B)                     | 6.0 volts                   |
| (4CW800F)                             | 26.5 volts                  |
| Current (4CW800B)                     | 4.4 amperes                 |
| (4CW800F)                             | 1.1 amperes                 |
| Capacitances (Gnd. Cath. Connection): |                             |
| Input                                 | 45.0 pF                     |
| Output                                | 5.8 pF                      |
| Feed-through                          | 0.15 pF                     |
| Input Conductance                     |                             |
| (I <sub>b</sub> = 600 mAdc)           | 0.1 × 10 <sup>-3</sup> mhos |
| Transconductance                      |                             |
| (I <sub>b</sub> = 600 mAdc)           | 40,000 μmhos                |
| Base                                  | Special                     |
| Recommended screen bypass capacitor   | SK-680                      |
| Maximum Seal & Envelope Temperature   | 250°C                       |
| Maximum Length                        | 3.00 in; 76.20 mm           |
| Maximum Diameter                      | 2.03 in; 51.60 mm           |
| Weight (approximate)                  | 7 oz; 198.0 gm              |
| Operating Position                    | Any                         |

| Class of Operation | Type of Service                       | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|---------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                       | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| B                  | RF Linear Amplifier                   | 3000                  | 0.6                  | 140-250           | 2500                  | 300                    | 0.60                 | —                   | 820†                 |
| B                  | RF Linear Amplifier                   | 3000                  | 0.6                  | 432               | 2000                  | 300                    | 0.60                 | ‡                   | 770†                 |
| B                  | RF Linear Amplifier                   | 3000                  | 0.6                  | 865               | 2000                  | 300                    | 0.60                 | §                   | 550†                 |
| AB                 | RF Linear Amplifier Broadband Service | 3000                  | 0.6                  | —                 | 2500                  | 275                    | 0.58                 | —                   | 1000                 |

† Useful Output Power

‡ Power Gain approx. 15.3 dB

§ Power Gain approx. 9 dB

### 4CW2000A/8244



The 4CW2000A/8244 is a ceramic/metal water-cooled radial-beam tetrode with a rated maximum plate dissipation of 2000 watts. It is a low-voltage high current tube designed for Class AB<sub>1</sub> RF linear amplifier or audio amplifier applications where its high gain may be used to advantage. It is also recommended for voltage or current regulator service. As a regulator, the maximum dc plate voltage rating is 6000 volts. The 4CW2000A/8244 is the water-cooled version of the 4CX1000A/8168.

### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 2000 watts                |
| Screen Dissipation (Max.)                              | 12 watts                  |
| Grid Dissipation (Max.)                                | 0 watts                   |
| Frequency for Max. Ratings (CW)                        | 110 MHz                   |
| Cooling                                                | Water                     |
| Cathode                                                | Oxide-coated Unipotential |
| Voltage                                                | 6.0 volts                 |
| Current                                                | 9.0 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 81.5 pF                   |
| Output                                                 | 11.8 pF                   |
| Feed-through                                           | 0.015 pF                  |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 3.8                       |
| Transconductance†                                      | 37,000 μmhos              |
| Base                                                   | Special, Breechblock      |
| Recommended Air-System Socket                          | SK-800 Series             |
| Maximum Seal & Envelope Temperature                    | 250°C                     |
| Maximum Length                                         | 5.69 in; 144.50 mm        |
| Maximum Diameter                                       | 2.66 in; 67.60 mm         |
| Weight (approximate)                                   | 27 oz; 766 gm             |
| Operating Position                                     | Vertical, base up or down |

| Class of Operation   | Type of Service                   | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|----------------------|-----------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                      |                                   | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| B or AB <sub>1</sub> | RF Linear Amplifier (Grid Driven) | 3000                  | 1.0                  | 30                | 3000                  | 325                    | 0.87                 | 0                   | 1630                 |
| AB                   | AF Amplifier or Modulator         | 3000                  | 1.0                  | —                 | 3000                  | 325                    | 1.7*                 | —                   | 3260*                |

\* Two tubes

† At I<sub>b</sub> = 1.0 A

**4CW10,000A/8661****CHARACTERISTICS**

The 4CW10,000A is a water-cooled, ceramic/metal power tetrode which is electrically identical to the 4CX10,000D/8171 (and 4CX5000A/8170, except for plate dissipation). The water-cooled anode is equipped with an integral water jacket and is rated at 12 kW dissipation.

The 4CW10,000A is useful as an oscillator, amplifier or modulator at frequencies up to 110 MHz, and is particularly suited for use as a linear RF amplifier or Class AB audio amplifier.

A pair of these tubes operating Class AB will deliver more than 30 kW of audio-frequency or radio-frequency plate output power.

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 12,000 watts              |
| Screen Dissipation (Max.)             | 250 watts                 |
| Grid Dissipation (Max.)               | .75 watts                 |
| Frequency for Max. Ratings (CW)       | 110 MHz                   |
| Cooling                               | Water and Forced Air      |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 7.5 volts                 |
| Current                               | 75.0 amperes              |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 115 pF                    |
| Output                                | 20.5 pF                   |
| Feed-through                          | 0.7 pF                    |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 53.0 pF                   |
| Output                                | 20.5 pF                   |
| Feed-through                          | 0.10 pF                   |
| Amplification Factor ( $g_{1-92}$ )   | 4.5                       |
| Base                                  | Special, Coaxial          |
| Recommended Air-System Socket         | SK-300A Series            |
| Maximum Seal & Envelope Temperature   | 250°C                     |
| Maximum Length                        | 10.81 in; 274.60 mm       |
| Maximum Diameter                      | 4.66 in; 118.40 mm        |
| Weight (approximate)                  | 7.5 lbs; 3.4 kg           |
| Operating Position                    | Vertical, base up or down |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 7500                  | 3.0†                 | 30                | 7500                  | 500                    | 2.8                  | 150                 | 16,000               |
| C                  | RF Power Amplifier Plate Modulated | 5000                  | 2.5                  | 30                | 5000                  | 500                    | 2.4                  | 120                 | 8500                 |
| AB <sub>1</sub>    | RF Linear Amplifier                | 7500                  | 4.0                  | 30                | 7500                  | 1500                   | 3.3                  | —                   | 15,950               |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 7500                  | 4.0                  | —                 | 7500                  | 1500                   | 6.6*                 | —                   | 31,900*              |

\*Two tubes

**4CW25,000A****CHARACTERISTICS**

The 4CW25,000A is a ceramic/metal power tetrode intended for use in audio or radio frequency applications. It features a new type of internal mechanical structure which results in higher RF operating efficiency. Low RF losses in this mechanical structure permit operation of the 4CW25,000A at full ratings up to 110 MHz, and at reduced ratings, to 225 MHz.

The 4CW25,000A is recommended for RF linear power amplifier service, for television linear amplifier service, and as a switch tube for pulsed regulator service.

|                                       |                           |
|---------------------------------------|---------------------------|
| Plate Dissipation (Max.)              | 25,000 watts              |
| Screen Dissipation (Max.)             | 450 watts                 |
| Grid Dissipation (Max.)               | 200 watts                 |
| Frequency for Max. Ratings (CW)       | 110 MHz                   |
| Cooling                               | Water and Forced Air      |
| Filament                              | Thoriated tungsten        |
| Voltage                               | 6.3 volts                 |
| Current                               | 160 amperes               |
| Capacitances (Gnd. Cath. Connection): |                           |
| Input                                 | 160 pF                    |
| Output                                | 24.5 pF                   |
| Feed-through                          | 1.5 pF                    |
| Capacitances (Gnd. Grid Connection):  |                           |
| Input                                 | 67.0 pF                   |
| Output                                | 25.5 pF                   |
| Feed-through                          | 0.2 pF                    |
| Amplification Factor ( $g_{1-92}$ )   | 4.5                       |
| Base                                  | Special, Coaxial          |
| Recommended Air-System Socket         | SK-300A Series            |
| Maximum Seal & Envelope Temperature   | 250°C                     |
| Maximum Length                        | 12.69 in; 322.00 mm       |
| Maximum Diameter                      | 4.75 in; 121.00 mm        |
| Weight (approximate)                  | 13.5 lb; 6.1 kg           |
| Operating Position                    | Vertical, base up or down |

| Class of Operation<br>Type of Service |                                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|---------------------------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                                       |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                                     | RF Power Amplifier                 | 10,000                | 5.0                  | 10,000                | 750                    | 4.5                  | 220                 | 36,500               |
| C                                     | RF Power Amplifier Plate Modulated | 8,000                 | 4.0                  | 8,000                 | 750                    | 3.6                  | 150                 | 23,500               |
| AB <sub>1</sub>                       | RF Linear Amplifier                | 10,000                | 6.0                  | 10,000                | 1500                   | 4.2                  | —                   | 28,500               |
| AB <sub>1</sub>                       | AF Amplifier or Modulator          | 10,000                | 6.0                  | 10,000                | 1500                   | 8.5*                 | —                   | 57,000*              |

\*Two tubes

## External Anode, Water Cooled Tetrodes

### 4CW50,000E



The 4CW50,000E is a ceramic/metal, water-cooled power tetrode intended for use at the 50 to 100 kW output power level. This tube is characterized by low input and feedback capacitances and low internal lead inductances. A rugged mesh thoriated tungsten filament provides adequate emission over the long operating life. It is recommended for use as a Class C RF amplifier or oscillator, a Class AB RF linear amplifier or a Class AB push-pull AF amplifier or modulator. The 4CW50,000E is also useful as a plate and screen modulated Class C RF amplifier. The water-cooled anode is rated at 50 kW plate dissipation.

#### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 50,000 watts              |
| Screen Dissipation (Max.)                              | 1,500 watts               |
| Grid Dissipation (Max.)                                | 400 watts                 |
| Frequency for Max. Ratings (CW)                        | 110 MHz                   |
| Cooling                                                | Water and Forced Air      |
| Filament                                               | Thoriated tungsten mesh   |
| Voltage                                                | 12.0 volts                |
| Current                                                | 215 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 310 pF                    |
| Output                                                 | 52.0 pF                   |
| Feed-through                                           | 0.7 pF                    |
| Capacitances (Gnd. Grid Connection):                   |                           |
| Input                                                  | 140 pF                    |
| Output                                                 | 52.0 pF                   |
| Feed-through                                           | 0.3 pF                    |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                       |
| Base                                                   | Special, Coaxial          |
| Recommended Air-System Socket                          | SK-2000 Series            |
| Recommended Water Jacket                               | SK-2050                   |
| Maximum Seal & Envelope Temperature                    | 250°C                     |
| Maximum Length                                         | 11.50 in; 292.00 mm       |
| Maximum Diameter                                       | 9.53 in; 242.00 mm        |
| Weight (approximate)                                   | 35.0 lb; 15.9 kg          |
| Operating Position                                     | Vertical, base up or down |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 17,500                | 12.0                 | 15,000                | 1500                   | 11.5                 | 150                 | 137,000              |
| C                  | RF Power Amplifier Plate Modulated | 15,000                | 12.0                 | 14,000                | 750                    | 9.2                  | 685                 | 110,000              |
| AB <sub>1</sub>    | RF Linear Amplifier                | 17,500                | 12.0                 | 10,000                | 1800                   | 9.1                  | —                   | 57,000               |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 17,500                | 12.0                 | 15,000                | 1250                   | 18.6*                | —                   | 195,000*             |

\*Two tubes

### 4CW50,000J



The 4CW50,000J is a ceramic/metal, water-cooled power tetrode intended for use at the 50 to 100 kW output power level. This tube is characterized by low input and feedback capacitances and low internal lead inductances. A rugged mesh thoriated tungsten filament provides adequate emission over the long operating life. It is recommended for use as a Class AB<sub>1</sub> RF linear amplifier. The water-cooled anode is rated at 50 kW plate dissipation.

#### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 50,000 watts              |
| Screen Dissipation (Max.)                              | 1,500 watts               |
| Grid Dissipation (Max.)                                | 300 watts                 |
| Frequency for Max. Ratings (CW)                        | 110 MHz                   |
| Cooling                                                | Water and Forced Air      |
| Filament                                               | Thoriated tungsten mesh   |
| Voltage                                                | 12.0 volts                |
| Current                                                | 215 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 310 pF                    |
| Output                                                 | 48.0 pF                   |
| Feed-through                                           | 1.0 pF                    |
| Capacitances (Gnd. Grid Connection):                   |                           |
| Input                                                  | 123 pF                    |
| Output                                                 | 50.0 pF                   |
| Feed-through                                           | 0.3 pF                    |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 4.5                       |
| Base                                                   | Special, Coaxial          |
| Recommended Air-System Socket                          | SK-2000 Series            |
| Recommended Water Jacket                               | SK-2050                   |
| Maximum Seal & Envelope Temperature                    | 250°C                     |
| Maximum Length                                         | 11.50 in; 292.00 mm       |
| Maximum Diameter                                       | 9.53 in; 242.00 mm        |
| Weight (approximate)                                   | 35 lb; 15.9 kg            |
| Operating Position                                     | Vertical, base up or down |

| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| AB                 | RF Linear Amplifier | 17,500                | 12.0                 | 8300                  | 1500                   | 9.8                  | —                   | 45,000               |

External Anode, Water Cooled Tetrodes  
**4CW100,000D**



**CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . 100,000 watts  
 Screen Dissipation (Max.) . . . . . 1,750 watts  
 Grid Dissipation (Max.) . . . . . 500 watts  
 Frequency for Max. Ratings (CW) . . . . . 30 MHz  
 Cooling . . . . . Water and Forced Air  
 Filament . . . . . Thoriated tungsten  
 Voltage . . . . . 10.0 volts  
 Current . . . . . 295 amperes  
 Capacitances (Gnd. Cath. Connection):  
 Input . . . . . 440 pF  
 Output . . . . . 55.0 pF  
 Feed-through . . . . . 2.3 pF  
 Capacitances (Gnd. Grid Connection):  
 Input . . . . . 175 pF  
 Output . . . . . 57.0 pF  
 Feed-through . . . . . 0.4 pF  
 Amplification Factor (g<sub>1</sub>-g<sub>2</sub>) . . . . . 4.5  
 Base . . . . . Special Graduated Rings  
 Recommended Air-System Socket . . . SK-1500 Series  
 Maximum Seal & Envelope Temperature . . . 250°C  
 Maximum Length . . . . . 18.00 in; 457.00 mm  
 Maximum Diameter . . . . . 8.00 in; 203.00 mm  
 Weight (approximate) . . . . . 60.0 lb; 27.2 kg  
 Operating Position . . . . . Vertical, base up or down

| Class of Operation      Type of Service |                                       | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                          |
|-----------------------------------------|---------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|--------------------------|
|                                         |                                       | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (kilowatts) |
| C                                       | RF Power Amplifier                    | 20,000                | 15.0                 | 19,000                | 750                    | 10.6                 | 1165                | 165                      |
| C                                       | RF Power Amplifier<br>Plate Modulated | 17,500                | 15.0                 | 16,000                | 750                    | 10.0                 | 870                 | 138                      |
| AB <sub>1</sub>                         | RF Linear Amplifier                   | 20,000                | 15.0                 | 18,000                | 1500                   | 10.0                 | —                   | 123                      |
| AB <sub>1</sub>                         | AF Amplifier or Modulator             | 20,000                | 15.0                 | 18,000                | 1500                   | 20.0*                | —                   | 246*                     |
|                                         | Switch Tube or Pulse Modulator        | 40,000                | 200‡                 | 38,000                | 1500                   | 112†                 | 16,800†             | 3600†                    |

\*Two tubes

‡Pulse cathode current

†Pulse value

# External Anode, Water Cooled Tetrodes

## 4CW100,000E



The 4CW100,000E is a ceramic/metal, high-power tetrode for applications requiring tube outputs from 100 to 250 kW. It is ideal for use as a Class C RF amplifier or oscillator, a Class AB RF linear amplifier, or a Class AB push-pull AF amplifier or modulator as well as a plate- and screen-modulated Class C RF amplifier. In pulse-modulator service, it can deliver a peak output of 4 megawatts. The tube is characterized by low input and feedback capacitances and low internal lead inductances. Its rugged mesh thoriated-tungsten filament provides ample emission for long operating life. The water-cooled anode dissipates 100 kW when used with the EIMAC SK-2100 water jacket.

## CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 100,000 watts  
 Screen Dissipation (Max.) . . . . . 1,750 watts  
 Grid Dissipation (Max.) . . . . . 500 watts  
 Frequency for Max. Ratings (CW) . . . . . 108 MHz  
 Cooling . . . . . Water and Forced Air  
 Filament . . . . . Thoriated tungsten  
     Voltage . . . . . 15.5 volts  
     Current . . . . . 215 amperes  
 Capacitances (Gnd. Cath. Connection):  
     Input . . . . . 370 pF  
     Output . . . . . 60.0 pF  
     Feed-through . . . . . 1.0 pF  
 Capacitances (Gnd. Grid Connection):  
     Input . . . . . 175 pF  
     Output . . . . . 60.0 pF  
     Feed-through . . . . . 0.35 pF  
 Base . . . . . Special, Coaxial  
 Recommended Air-System Socket . . . . . SK-2000 Series  
 Recommended Water Jacket . . . . . SK-2100  
 Maximum Seal & Envelope Temperature . . . . . 250°C  
 Maximum Length . . . . . 12.82 in; 325.60 mm  
 Maximum Diameter . . . . . 9.53 in; 242.10 mm  
 Weight (approximate)  
     (tube only) . . . . . 38.5 lb; 17.5 kg  
 Operating Position . . . . . Vertical, base up or down

| Class of Operation | Type of Service                       | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                          |  |
|--------------------|---------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|--------------------------|--|
|                    |                                       | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (kilowatts) |  |
| C                  | RF Power Amplifier                    | 20,000                | 16.0                 | 20,000                | 1500                   | 15.2                 | 120                 | 220                      |  |
| C                  | RF Power Amplifier<br>Plate Modulated | 17,500                | 16.0                 | 15,000                | 750                    | 11.7                 | 530                 | 140                      |  |
| AB <sub>1</sub>    | RF Linear Amplifier                   | 20,000                | 16.0                 | 18,000                | 1500                   | 13.5                 | —                   | 168                      |  |
| AB <sub>1</sub>    | AF Amplifier or Modulator             | 20,000                | 16.0                 | 15,000                | 1500                   | 19.5*                | —                   | 200*                     |  |

\*Two tubes

**4CW250,000A**

The 4CW250,000A is a ceramic/metal, water-cooled, power tetrode intended for use at the 250 to 500 kW output power level. It is recommended as a Class C amplifier or oscillator; a Class AB RF linear amplifier; a Class AB push-pull AF amplifier or modulator; a plate or screen modulated Class C RF amplifier; or for pulse modulator or regulator service.

**CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . 250,000 watts  
 Screen Dissipation (Max.) . . . . . 3,500 watts  
 Grid Dissipation (Max.) . . . . . 1,500 watts  
 Frequency for Max. Ratings (CW) . . . . . 50 MHz  
 Cooling . . . . . Water and Forced Air  
 Filament . . . . . Thoriated tungsten  
 Voltage . . . . . 12.0 volts  
 Current . . . . . 660 amperes  
 Capacitances (Gnd. Cath. Connection):  
 Input . . . . . 745 pF  
 Output . . . . . 124 pF  
 Feed-through . . . . . 6.0 pF  
 Capacitances (Gnd. Grid Connection):  
 Input . . . . . 324 pF  
 Output . . . . . 128 pF  
 Feed-through . . . . . 1.2 pF  
 Amplification Factor ( $g_{1-92}$ ) . . . . . 4.5  
 Base . . . . . Special  
 Recommended Base Contact  
 Accessories . . . . . SK-1700 Series  
 Recommended Anode Water Jacket . . . . . SK-1720  
 Maximum Seal & Envelope Temperature . . . . . 200°C  
 Maximum Length . . . . . 27.65 in; 70.23 cm  
 Maximum Diameter . . . . . 13.06 in; 33.17 cm  
 Weight (approximate) . . . . . 98.0 lb; 44.5 kg  
 Operating Position . . . . . Vertical, base up or down



| Class of Operation | Type of Service                       | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                          |
|--------------------|---------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|--------------------------|
|                    |                                       | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (kilowatts) |
| C                  | RF Power Amplifier                    | 20,000                | 40.0                 | 19,000                | 800                    | 32.5                 | 3000                | 460                      |
| C                  | RF Power Amplifier<br>Plate Modulated | 17,500                | 30.0                 | 14,000                | 800                    | 29.0                 | 2320                | 285                      |
| AB <sub>1</sub>    | RF Linear Amplifier                   | 20,000                | 40.0                 | 20,000                | 1800                   | 23.0                 | —                   | 330                      |
| AB <sub>1</sub>    | AF Amplifier or Modulator             | 20,000                | 40.0                 | 20,000                | 1800                   | 46.0*                | —                   | 660*                     |

\*Two tubes

## External Anode, Water Cooled Tetrodes

### X-2159



The X-2159 is a ceramic/metal, water-cooled power tetrode designed for very-high-powered medium-frequency or high-frequency broadcast service and very-low-frequency communication in the megawatt power range.

The X-2159 has a two-section thoriated-tungsten filament mounted on water-cooled supports. The two sections may be fed in quadrature to reduce hum contributed by an ac power source. The maximum anode dissipation rating is 1250 kW steady state.

Large-diameter coaxial terminals are used for the control grid and the RF filament terminals. Filament power and filament support cooling-water connections are made through three special couplings with threaded clamping rings.

### CHARACTERISTICS

|                                       |                                 |
|---------------------------------------|---------------------------------|
| Plate Dissipation (Max.)              | 1,250 kilowatts                 |
| Screen Dissipation (Max.)             | 15 kilowatts                    |
| Grid Dissipation (Max.)               | 4.0 kilowatts                   |
| Frequency for Max. Ratings (CW)       | 30 MHz                          |
| Cooling                               | Water and Forced Air            |
| Filament                              | Thoriated tungsten, two-section |
| Voltage/section                       | 18.5 volts                      |
| Current/section                       | 700 amperes                     |
| Capacitances (Gnd. Cath. Connection): |                                 |
| Input                                 | 1650 pF                         |
| Output                                | 260 pF                          |
| Feed-through                          | 10.0 pF                         |
| Capacitances (Gnd. Grid Connection):  |                                 |
| Input                                 | 675 pF                          |
| Output                                | 260 pF                          |
| Feed-through                          | 1.0 pF                          |
| Amplification Factor ( $a_{1-a2}$ )   | 4.5                             |
| Base Terminals                        | Special, Coaxial                |
| Recommended Filament Power/Water      |                                 |
| Connectors (3 required)               | SK-2310                         |
| Recommended Filament RF               |                                 |
| Connector (1 required)                | SK-2315                         |
| Recommended Anode Water               |                                 |
| Connectors (2 required)               | SK-2320 or SK-2321              |
| Maximum Seal & Envelope Temperature   | 200°C                           |
| Maximum Length                        | 23.75 in; 60.30 cm              |
| Maximum Diameter                      | 17.03 in; 43.30 cm              |
| Weight (approximate)                  | 175.0 lb; 80.0 kg               |
| Operating Position                    | Vertical, base down             |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                          |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|--------------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (kilowatts) |
| C                  | RF Power Amplifier                 | 22,500                | 125                  | 21,500                | 1000                   | 125                  | 7000                | 2158                     |
| C                  | RF Power Amplifier Plate Modulated | 17,500                | 100                  | 17,500                | 1000                   | 95.0                 | 6465                | 1384                     |
| AB <sub>1</sub>    | RF Linear Amplifier                | 22,500                | 125                  | 20,000                | 1500                   | 86.5                 | —                   | 1225                     |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 22,500                | 125                  | 17,500                | 1500                   | 146*                 | —                   | 1384*                    |

\*Two tubes

### X-2170



The X-2170 is a ceramic/metal, water-cooled power tetrode designed for very-high-powered medium-frequency or high-frequency broadcast service and very-low-frequency communication in the half-megawatt power range.

The X-2170 has a thoriated-tungsten filament mounted on water-cooled supports.

The maximum anode dissipation rating is 650 kW steady state.

Large-diameter coaxial terminals are used for the control grid and the RF filament terminals. Filament power and filament support cooling-water connections are made through special couplings with threaded clamping rings.

### CHARACTERISTICS

|                                       |                      |
|---------------------------------------|----------------------|
| Plate Dissipation (Max.)              | 650,000 watts        |
| Screen Dissipation (Max.)             | 7,500 watts          |
| Grid Dissipation (Max.)               | 2,000 watts          |
| Frequency for Max. Ratings (CW)       | 70 MHz               |
| Cooling                               | Water and Forced Air |
| Filament                              | Thoriated tungsten   |
| Voltage                               | 18.5 volts           |
| Current                               | 700 amperes          |
| Capacitances (Gnd. Cath. Connection): |                      |
| Input                                 | 1000 pF              |
| Output                                | 165 pF               |
| Feed-through                          | 5.0 pF               |
| Amplification Factor ( $g_{1-g2}$ )   | 4.5                  |
| Base                                  | Special, Coaxial     |
| Recommended Filament Power/Water      |                      |
| Connectors (2 required)               | SK-2310              |
| Recommended Filament RF               |                      |
| Connector (1 required)                | SK-2315              |
| Recommended Anode Water               |                      |
| Connectors (2 required)               | SK-2320 or SK-2321   |
| Maximum Seal & Envelope Temperature   | 200°C                |
| Maximum Length                        | 18.75 in; 476.20 mm  |
| Maximum Diameter                      | 17.03 in; 432.60 mm  |
| Weight (approximate)                  | 153.0 lb; 69.5 kg    |
| Operating Position                    | Vertical, base down  |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                          |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|--------------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (kilowatts) |
| C                  | RF Power Amplifier                 | 22,500                | 65.0                 | 21,000                | 2500                   | 63.0                 | 3500                | 1050                     |
| C                  | RF Power Amplifier Plate Modulated | 17,500                | 50.0                 | 17,500                | 800                    | 50.0                 | 800                 | 700                      |
| AB <sub>1</sub>    | RF Linear Amplifier                | 22,500                | 65.0                 | 20,000                | 1500                   | 45.0                 | —                   | 610                      |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 22,500                | 65.0                 | 17,500                | 1500                   | 78.0*                | —                   | 950*                     |

\*Two tubes

# External Anode, Water Cooled Tetrodes 8959

## CHARACTERISTICS

The 8959 is a ceramic/metal high power tetrode for applications requiring tube outputs from 100 to 250 kW. It is ideal for use as a Class C RF amplifier or oscillator, a Class AB RF linear amplifier, or a Class AB push-pull audio amplifier or modulator, as well as a plate and screen modulated Class C RF amplifier.

In pulse modulator service it can deliver a peak output of 4 megawatts.

The tube is characterized by low input and feedback capacitances and low internal lead inductances. Its rugged mesh thoriated tungsten filament provides ample emission for long operating life.

The water-cooled anode dissipates 100 kW when used with an EIMAC SK-2100 Series water jacket.

Plate Dissipation (Max.) . . . . . 100,000 watts  
Screen Dissipation (Max.) . . . . . 1,750 watts  
Grid Dissipation (Max.) . . . . . 500 watts  
Frequency for Max. Ratings (CW) . . . . . 108 MHz  
Cooling . . . . . Water and Forced Air  
Filament . . . . . Thoriated tungsten  
Voltage . . . . . 15.5 volts  
Current . . . . . 215 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 370 pF  
Output . . . . . 60.0 pF  
Feed-through . . . . . 1.0 pF  
Capacitances (Gnd. Grid Connection):  
Input . . . . . 175 pF  
Output . . . . . 60.0 pF  
Feed-through . . . . . 0.35 pF  
Base . . . . . Special, Coaxial  
Recommended Air-System Socket . . . SK-2000 Series  
Maximum Seal & Envelope Temperature . . . 250°C  
Maximum Length . . . . . 12.57 in; 319.30 mm  
Maximum Diameter . . . . . 8.26 in; 209.80 mm  
Weight (approximate) (tube only) . . . 38.5 lb; 17.5 kg  
Operating Position . . . . . Vertical, base up or down



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                          |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|--------------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (kilowatts) |
| C                  | RF Power Amplifier                 | 20,000                | 16.0                 | 20,000                | 1500                   | 15.2                 | 120                 | 220                      |
| C                  | RF Power Amplifier Plate Modulated | 17,500                | 16.0                 | 15,000                | 750                    | 11.7                 | 530                 | 140                      |
| AB <sub>1</sub>    | RF Linear Amplifier                | 20,000                | 16.0                 | 18,000                | 1500                   | 13.5                 | —                   | 168                      |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 20,000                | 16.0                 | 15,000                | 1500                   | 19.5*                | —                   | 200*                     |
|                    | Switch Tube or Pulse Modulator     | 40,000                | 200†                 | 40,000                | 2500                   | 110                  | —                   | 4100                     |

\*Two tubes

†Cathode current, pulse

## Internal Anode, Radiation Cooled Tetrodes

### 4-65A/8165



The 4-65A/8165 is a small radial-beam tetrode with a maximum plate-dissipation rating of 65 watts. In most applications, no forced air is required, normal radiation and convection cooling being adequate.

Short, heavy leads and low interelectrode capacities assure stable, efficient operation at high frequencies and permit its use at maximum ratings through 150 MHz. The 4-65A/8165 is equally useful in audio amplifier or modulator service.

#### CHARACTERISTICS

|                                        |                           |
|----------------------------------------|---------------------------|
| Plate Dissipation (Max.)               | .65 watts                 |
| Screen Dissipation (Max.)              | .10 watts                 |
| Grid Dissipation (Max.)                | .5 watts                  |
| Frequency for Max. Ratings (CW)        | 150 MHz                   |
| Cooling                                | Convection & Radiation    |
| Filament                               | Thoriated tungsten        |
| Voltage                                | 6.0 volts                 |
| Current                                | .35 amperes               |
| Capacitances (Gnd. Cath. Connection):  |                           |
| Input                                  | .71 pF                    |
| Output                                 | .23 pF                    |
| Feed-through                           | .01 pF                    |
| Amplification Factor ( $g_{1-2}$ )     | .6                        |
| Base                                   | 5-Pin Special             |
| Recommended Heat Dissipating Connector | HR-6                      |
| Maximum Seal Temperature               | 200°C                     |
| Maximum Envelope Temperature           | 225°C                     |
| Maximum Length                         | 4.37 in; 111.00 mm        |
| Maximum Diameter                       | 2.38 in; 60.40 mm         |
| Weight (approximate)                   | .3 oz; 85.0 gm            |
| Operating Position                     | Vertical, base up or down |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 3000                  | 0.15                 | 3000                  | 250                    | 0.11                 | 1.6                 | 270                  |
| C                  | RF Power Amplifier Plate Modulated | 2500                  | 0.12                 | 2500                  | 250                    | 0.10                 | 3.1                 | 210                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 3000                  | 0.15                 | 3000                  | 400                    | 0.06                 | —                   | 120                  |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 3000                  | 0.15                 | 3000                  | 400                    | 0.12*                | —                   | 240*                 |

\*Two tubes

### 4-125A/4D21



The 4-125A/4D21 is a radial-beam tetrode intended for use as an amplifier, oscillator, or modulator. It has a maximum plate-dissipation rating of 125 watts and a maximum plate-voltage rating of 3 kV at frequencies up to 120 MHz.

The low grid-plate capacitance of this tetrode together with its low driving-power requirement allows considerable simplification of the associated circuit and driver stage.

#### CHARACTERISTICS

|                                        |                           |
|----------------------------------------|---------------------------|
| Plate Dissipation (Max.)               | 125 watts                 |
| Screen Dissipation (Max.)              | .20 watts                 |
| Grid Dissipation (Max.)                | .5 watts                  |
| Frequency for Max. Ratings (CW)        | 120 MHz                   |
| Cooling                                | Radiation & Forced Air    |
| Filament                               | Thoriated tungsten        |
| Voltage                                | 5.0 volts                 |
| Current                                | 6.5 amperes               |
| Capacitances (Gnd. Cath. Connection):  |                           |
| Input                                  | 10.8 pF                   |
| Output                                 | 3.0 pF                    |
| Feed-through                           | 0.05 pF                   |
| Amplification Factor ( $g_{1-2}$ )     | .59                       |
| Base                                   | 5-Pin Special             |
| Recommended Heat Dissipating Connector | HR-6                      |
| Maximum Seal Temperature               | 200°C                     |
| Maximum Envelope Temperature           | 225°C                     |
| Maximum Length                         | 5.69 in; 144.50 mm        |
| Maximum Diameter                       | 2.81 in; 71.40 mm         |
| Weight (approximate)                   | .65 oz; 184.0 gm          |
| Operating Position                     | Vertical, base up or down |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 3000                  | 0.22                 | 3000                  | 350                    | 0.17                 | 2.5                 | 375                  |
| C                  | RF Power Amplifier Plate Modulated | 2500                  | 0.20                 | 2500                  | 350                    | 0.15                 | 3.3                 | 300                  |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 3000                  | 0.22                 | 2500                  | 600                    | 0.23*                | —                   | 330*                 |
| AB <sub>2</sub>    | AF Amplifier or Modulator          | 3000                  | 0.22                 | 2500                  | 350                    | 0.26*                | 2.4                 | 400*                 |

\*Two tubes

**4-250A/5D22**

The 4-250A/5D22 is a compact, ruggedly constructed power tetrode having a maximum plate dissipation rating of 250 watts. It is intended for use as an amplifier, oscillator or modulator. The low grid-plate capacitance of this tetrode coupled with its low driving-power requirement allows considerable simplification of the associated circuit and driver stage.

The 4-250A/5D22 is cooled by radiation from the plate and by circulation of forced-air through the base, around the envelope, and over the plate seal.

**CHARACTERISTICS**

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 250 watts                 |
| Screen Dissipation (Max.)                              | 35 watts                  |
| Grid Dissipation (Max.)                                | 10 watts                  |
| Frequency for Max. Ratings (CW)                        | 110 MHz                   |
| Cooling                                                | Radiation & Forced Air    |
| Filament                                               | Thoriated tungsten        |
| Voltage                                                | 5.0 volts                 |
| Current                                                | 14.5 amperes              |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 12.7 pF                   |
| Output                                                 | 4.5 pF                    |
| Feed-through                                           | 0.12 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5.1                       |
| Transconductance†                                      | 4000 μmhos                |
| Base                                                   | 5-Pin Special             |
| Recommended Air-System Socket                          | SK-400 Series             |
| Recommended Air Chimney                                | SK-406                    |
| Recommended Heat Dissipating Connector                 | HR-6                      |
| Maximum Plate Seal Temperature                         | 200°C                     |
| Maximum Base Seal Temperature                          | 170°C                     |
| Maximum Length                                         | 6.38 in; 162.00 mm        |
| Maximum Diameter                                       | 3.56 in; 90.40 mm         |
| Weight (approximate)                                   | 8 oz; 227 gm              |
| Operating Position                                     | Vertical, base up or down |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 4000                  | 0.35                 | 4000                  | 500                    | 0.31                 | 2.5                 | 1000                 |
| C                  | RF Power Amplifier Plate Modulated | 3200                  | 0.27                 | 3000                  | 400                    | 0.23                 | 3.2                 | 510                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 4000                  | 0.35                 | 3000                  | 600                    | 0.20                 | —                   | 350                  |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 4000                  | 0.35                 | 3000                  | 600                    | 0.42*                | —                   | 750*                 |
| AB <sub>2</sub>    | AF Amplifier or Modulator          | 4000                  | 0.35                 | 3000                  | 300                    | 0.47*                | 4.6                 | 1040*                |

\*Two tubes

†At I<sub>b</sub> = 100 mA

## Internal Anode, Radiation Cooled Tetrodes

## 4-400C/6775



The 4-400C/6775 is a compact, ruggedly constructed, broadcast-quality tetrode having a maximum plate dissipation rating of 400 watts. It is intended for use as an amplifier, oscillator, or modulator. The low grid-plate capacitance of this tetrode coupled with its low driving-power requirement allows considerable simplification of the associated circuit and driver stage.

The 4-400C/6775 is cooled by radiation from the plate and by circulation of forced-air through the base, around the envelope, and over the plate seal. Cooling can be greatly simplified by using an EIMAC SK-400 Series Air-System Socket, and its accompanying glass chimney.

The 4-400C/6775 is especially recommended for applications where long life and consistent performance are of prime consideration.

## CHARACTERISTICS

|                                                        |                        |
|--------------------------------------------------------|------------------------|
| Plate Dissipation (Max.)                               | 400 watts              |
| Screen Dissipation (Max.)                              | .35 watts              |
| Grid Dissipation (Max.)                                | .10 watts              |
| Frequency for Max. Ratings (CW)                        | 110 MHz                |
| Cooling                                                | Radiation & Forced Air |
| Filament                                               | Thoriated tungsten     |
| Voltage                                                | 5.0 volts              |
| Current                                                | 14.7 amperes           |
| Capacitances (Gnd. Cath. Connection):                  |                        |
| Input                                                  | 12.5 pF                |
| Output                                                 | 4.7 pF                 |
| Feed-through                                           | 0.12 pF                |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5.1                    |
| Transconductance†                                      | 4000 $\mu$ mhos        |
| Base                                                   | 5-Pin Special          |
| Recommended Air-System Socket                          | SK-400 Series          |
| Recommended Air Chimney                                | SK-406                 |
| Recommended Heat Dissipating Connector                 | HR-6                   |
| Maximum Plate Seal Temperature                         | 225°C                  |
| Maximum Base Seal Temperature                          | 200°C                  |
| Maximum Length                                         | 6.38 in; 162.00 mm     |
| Maximum Diameter                                       | 3.56 in; 90.40 mm      |
| Weight (approximate)                                   | 9.0 oz; 255 gm         |
| Operating Position                                     | Any                    |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 4000                  | 0.35                 | 75                | 4000                  | 500                    | 0.35                 | 5.8                 | 1100                 |
| C                  | RF Power Amplifier                 | 4000                  | 0.35                 | 110               | 4000                  | 500                    | 0.54*                | 20                  | 1440†                |
| C                  | RF Power Amplifier Plate Modulated | 3200                  | 0.27                 | 75                | 3000                  | 500                    | 0.27                 | 3.5                 | 630                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 4000                  | 0.35                 | 75                | 3000                  | 750                    | 0.29                 | —                   | 470†                 |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 4000                  | 0.35                 | —                 | 4000                  | 750                    | 0.59*                | —                   | 1540*                |
| AB <sub>2</sub>    | AF Amplifier or Modulator          | 4000                  | 0.35                 | —                 | 4000                  | 500                    | 0.64*                | 7.0                 | 1750†                |

\*Two tubes

†Useful Output Power

‡ At I<sub>b</sub> = 100mA

## 4-500A

The 4-500A is a compact, ruggedly constructed, broadcast-quality tetrode having a maximum plate dissipation rating of 500 watts. It is intended for use as an amplifier, oscillator, or modulator. The low grid-plate capacitance of this tetrode coupled with its low driving-power requirement allows considerable simplification of the associated circuit and driver stage.

The 4-500A is cooled by radiation from the plate and by circulation of forced-air through the base, around the envelope, and over the plate seal. Cooling can be greatly simplified by using an EIMAC SK-400 Series Air-System Socket, and its accompanying glass chimney.

The 4-500A is especially recommended for applications where long life and consistent performance are of prime consideration.

## CHARACTERISTICS

|                                        |                           |
|----------------------------------------|---------------------------|
| Plate Dissipation (Max.)               | 500 watts                 |
| Screen Dissipation (Max.)              | .35 watts                 |
| Grid Dissipation (Max.)                | .12 watts                 |
| Frequency for Max. Ratings (CW)        | 110 MHz                   |
| Cooling                                | Radiation & Forced Air    |
| Filament                               | Thoriated tungsten        |
| Voltage                                | 10.0 volts                |
| Current                                | 10.2 amperes              |
| Capacitances (Gnd. Cath. Connection):  |                           |
| Input                                  | 15.0 pF                   |
| Output                                 | 5.0 pF                    |
| Feed-through                           | 0.15 pF                   |
| Amplification Factor ( $g_{1-2}$ )     | 5.5                       |
| Base                                   | 5-Pin Special             |
| Recommended Air-System Socket          | SK-410 Series             |
| Recommended Air Chimney                | SK-426                    |
| Recommended Heat Dissipating Connector | HR-6                      |
| Maximum Base Seal Temperature          | 200°C                     |
| Maximum Plate Seal Temperature         | 225°C                     |
| Maximum Length                         | 7.00 in; 177.80 mm        |
| Maximum Diameter                       | 3.56 in; 90.40 mm         |
| Weight (approximate)                   | 8.7 oz; 245 gm            |
| Operating Position                     | Vertical, base up or down |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 4000                  | 0.45                 | 75                | 3800                  | 500                    | 0.45                 | 9.0                 | 1265                 |
| C                  | RF Power Amplifier Plate Modulated | 3200                  | 0.35                 | 30                | 3200                  | 500                    | 0.34                 | 5.8                 | 830                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 4000                  | 0.45                 | 30                | 4000                  | 750                    | 0.32                 | —                   | 773                  |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 4000                  | 0.45                 | —                 | 3800                  | 750                    | 0.72*                | —                   | 1720*                |

\*Two tubes

The 4-1000A/8166 is a radial-beam tetrode with a maximum plate dissipation rating of 1000 watts. Intended for use as an amplifier, oscillator, or modulator, the 4-1000A/8166 is capable of efficient operation well into the VHF range.

In FM broadcast service on 110 MHz, two 4-1000A/8166 tetrodes will deliver a useful output power of over 5 kW.

In class AB<sub>1</sub>, a pair of 4-1000A/8166 tetrodes will deliver 3800 watts of output power.

Cooling of the tube is accomplished by radiation from the plate and by circulation of forced-air through the base and around the envelope. Cooling can be simplified through the use of an EIMAC SK-500 Series Air-System Socket and its accompanying glass chimney.

## CHARACTERISTICS

|                                        |                           |
|----------------------------------------|---------------------------|
| Plate Dissipation (Max.)               | 1000 watts                |
| Screen Dissipation (Max.)              | .75 watts                 |
| Grid Dissipation (Max.)                | .25 watts                 |
| Frequency for Max. Ratings (CW)        | 110 MHz                   |
| Cooling                                | Radiation & Forced Air    |
| Filament                               | Thoriated tungsten        |
| Voltage                                | 7.5 volts                 |
| Current                                | 21.3 amperes              |
| Capacitances (Gnd. Cath. Connection):  |                           |
| Input                                  | 28.1 pF                   |
| Output                                 | 8.1 pF                    |
| Feed-through                           | 0.3 pF                    |
| Amplification Factor ( $g_{1-2}$ )     | 6.9                       |
| Transconductance                       | 10,000 $\mu$ mhos         |
| Base                                   | 5-Pin Special             |
| Recommended Air-System Socket          | SK-500 Series             |
| Recommended Air Chimney                | SK-506                    |
| Recommended Heat Dissipating Connector | HR-8                      |
| Maximum Seal Temperature               | 200°C                     |
| Maximum Envelope Temperature           | 225°C                     |
| Maximum Length                         | 9.63 in; 244.60 mm        |
| Maximum Diameter                       | 5.25 in; 133.30 mm        |
| Weight (approximate)                   | 1.5 lb; 0.68 kg           |
| Operating Position                     | Vertical, base up or down |

## 4-1000A/8166



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 6000                  | 0.70                 | 30                | 6000                  | 500                    | 0.70                 | 15                  | 3400                 |
| C                  | RF Power Amplifier                 | 6000                  | 0.70                 | 110               | 6000                  | 500                    | 1.25*                | 400                 | 5200*†               |
| C                  | RF Power Amplifier Plate Modulated | 5000                  | 0.60                 | 30                | 5000                  | 500                    | 0.60                 | 11                  | 2440†                |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 6000                  | 0.70                 | —                 | 6000                  | 1000                   | 0.95*                | —                   | 3840*                |
| AB <sub>2</sub>    | AF Amplifier or Modulator          | 6000                  | 0.70                 | —                 | 6000                  | 500                    | 0.95*                | 9.4                 | 3900*                |

\*Two tubes

†Useful Output Power

## Internal Anode, Radiation Cooled Tetrodes

### 4PR60C/8252W



The 4PR60C/8252W is a high-vacuum tetrode intended for pulse-modulator service in circuits employing inductive or resistive loads. This tube unilaterally replaces the 715C and the 5D21 and supersedes the 4PR60B/8252. The internal structure of the tube has been strengthened to minimize the effects of shock and vibration.

The 4PR60C/8252W has a maximum plate dissipation rating of 60 watts, is cooled by radiation and convection, and delivers pulse output power in the region of 300 kW with less than one kW of pulse driving power.

#### CHARACTERISTICS

|                                        |                           |
|----------------------------------------|---------------------------|
| Plate Dissipation (Max.)               | 60 watts                  |
| Screen Dissipation (Max.)              | 8 watts                   |
| Grid Dissipation (Max.)                | 1 watt                    |
| Cooling                                | Radiation or Forced Air   |
| Cathode                                | Oxide-coated Unipotential |
| Voltage                                | 26.0 volts                |
| Current                                | 2.1 amperes               |
| Capacitances (Gnd. Cath. Connection):  |                           |
| Input                                  | 43.0 pF                   |
| Output                                 | 8.5 pF                    |
| Feed-through                           | 1.5 pF                    |
| Base                                   | 4-Pin Special             |
| Recommended Heat Dissipating Connector | HR-8                      |
| Maximum Seal & Envelope Temperature    | 200°C                     |
| Maximum Length                         | 6.00 in; 152.40 mm        |
| Maximum Diameter                       | 3.06 in; 77.90 mm         |
| Weight (approximate)                   | 12 oz; 0.34 kg            |
| Operating Position                     | Any                       |

| Class of Operation | Type of Service                | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|--------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| —                  | Switch Tube or Pulse Modulator | 20,000                | 18.0†                | 20,000                | 1250                   | 18.0                 | —                   | 337,000†             |

† During the pulse

### 4PR250C/8248



The 4PR250C/8248 is a pulse tetrode intended for use in pulse-modulator, switch tube, pulsed-amplifier, and pulsed-oscillator service. This compact, high vacuum, radial-beam tetrode, incorporating a tantalum plate and non-emitting grids, is recommended for use in new equipments where voltages to 50 kV are required.

Cooling of the tube is accomplished by radiation from the plate and by circulation of forced-air through the base and around the envelope. Cooling can be simplified by the use of the EIMAC SK-410 Air-System Socket.

#### CHARACTERISTICS

|                                                        |                           |
|--------------------------------------------------------|---------------------------|
| Plate Dissipation (Max.)                               | 250 watts                 |
| Screen Dissipation (Max.)                              | 25 watts                  |
| Grid Dissipation (Max.)                                | 5 watts                   |
| Frequency for Max. Ratings (Pulsed)                    | 100 MHz                   |
| Cooling                                                | Forced Air                |
| Filament                                               | Thoriated tungsten        |
| Voltage                                                | 5.0 volts                 |
| Current                                                | 14.7 amperes              |
| Capacitances (Gnd. Cath. Connection):                  |                           |
| Input                                                  | 12.5 pF                   |
| Output                                                 | 3.3 pF                    |
| Feed-through                                           | 0.12 pF                   |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5.1                       |
| Base                                                   | 5-Pin Special             |
| Recommended Air-System Socket                          | SK-400 Series             |
| Recommended Heat Dissipating Connector                 | HR-8                      |
| Maximum Seal & Envelope Temperature                    | 200°C                     |
| Maximum Length                                         | 7.63 in; 193.70 mm        |
| Maximum Diameter                                       | 3.59 in; 91.30 mm         |
| Weight (approximate)                                   | 12.5 oz; 355 gm           |
| Operating Position                                     | Vertical, base up or down |

| Class of Operation | Type of Service                          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                          | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier Plate & Screen Pulsed | 35,000                | 5.5*                 | 35,000†               | 1500†                  | 0.9†                 | 4.5‡                | 26,500†              |
| C                  | RF Power Amplifier Grid Pulsed           | 25,000                | 5.5*                 | 25,000                | 1500                   | 0.94†                | 4.7†                | 19,000†              |
| —                  | Switch Tube or Pulse Modulator           | 50,000                | 4.0                  | 50,000                | 1500                   | 4.0†                 | 25†                 | 192,000†             |

\* Cathode peak current

† Pulse values

‡ When used as a plate and screen pulsed amplifier, the grid drive must also be pulsed to avoid overheating the grid.

**4PR400A/8188**

The 4PR400A/8188 is a pulse tetrode intended for use in pulse-modulator, pulsed-amplifier, and pulsed-oscillator service. This compact, high vacuum, radial-beam tetrode is recommended for use in new equipments where high voltage, high current, or high duty factor is encountered.

Cooling of the tube is accomplished by radiation from the plate and by circulation of forced-air through the base and around the envelope. Cooling can be simplified by the use of the EIMAC SK-410 Air-System Socket and the SK-406 Air Chimney.

**CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . 400 watts  
 Screen Dissipation (Max.) . . . . . 35 watts  
 Grid Dissipation (Max.) . . . . . 10 watts  
 Frequency for Max. Ratings (Pulsed) . . . . 110 MHz  
 Cooling . . . . . Forced Air  
 Filament . . . . . Thoriated tungsten  
 Voltage . . . . . 5.0 volts  
 Current . . . . . 14.7 amperes  
 Capacitances (Gnd. Cath. Connection):  
 Input . . . . . 12.5 pF  
 Output . . . . . 4.7 pF  
 Feed-through . . . . . 0.12 pF  
 Amplification Factor ( $g_{1-2}$ ) . . . . . 5.1  
 Base . . . . . 5-Pin Special  
 Recommended Air-System Socket . . . SK-400 Series  
 Recommended Air Chimney . . . . . SK-406  
 Recommended Heat Dissipating Connector . . HR-6  
 Maximum Seal & Envelope Temperature . . . 200°C  
 Maximum Length . . . . . 6.37 in; 161.90 mm  
 Maximum Diameter . . . . . 3.56 in; 90.50 mm  
 Weight (approximate) . . . . . 9.0 oz; 255.0 gm  
 Operating Position . . . . . Vertical, base up or down



| Class of Operation | Type of Service                          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                          | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier Plate & Screen Pulsed | 15,000                | 5.4*                 | 15,000†               | 1500†                  | 0.87†                | 9.0‡                | 10,500†              |
| C                  | RF Power Amplifier Grid Pulsed           | 10,000                | 5.4*                 | 10,000                | 1500                   | 0.87†                | 8.5†                | 6,600†               |
| —                  | Switch Tube or Pulse Modulator           | 20,000                | 4.0                  | 20,000                | 1500                   | 3.5†                 | 35†                 | 64,000†              |

\*Cathode peak current

†Pulse Value

‡When used as a plate and screen pulsed amplifier, the grid drive must also be pulsed to avoid overheating the grid.

**4PR1000A/8189\*\***

The 4PR1000A/8189 is a pulse tetrode intended for use in pulse-modulator, pulsed-amplifier, and pulsed-oscillator service. This compact, high vacuum, radial-beam tetrode is recommended for use in new equipments where high voltage, high current, or high duty factor is encountered.

Cooling of the tube is accomplished by radiation from the plate and by circulation of forced-air through the base and around the envelope. Cooling can be simplified by the use of the EIMAC SK-510 Air-System Socket and the SK-506 Air Chimney.

**CHARACTERISTICS**

Plate Dissipation (Max.) . . . . . 1000 watts  
 Screen Dissipation (Max.) . . . . . 75 watts  
 Grid Dissipation (Max.) . . . . . 25 watts  
 Frequency for Max. Ratings (Pulsed) . . . . 110 MHz  
 Cooling . . . . . Forced Air  
 Filament . . . . . Thoriated tungsten  
 Voltage . . . . . 7.5 volts  
 Current . . . . . 21.3 amperes  
 Capacitances (Gnd. Cath. Connection):  
 Input . . . . . 28.1 pF  
 Output . . . . . 8.1 pF  
 Feed-through . . . . . 0.25 pF  
 Base . . . . . 5-Pin Special  
 Recommended Air-System Socket . . . SK-500 Series  
 Recommended Air Chimney . . . . . SK-506  
 Recommended Heat Dissipating Connector . . HR-8  
 Maximum Seal & Envelope Temperature . . . 200°C  
 Maximum Length . . . . . 9.62 in; 244.50 mm  
 Maximum Diameter . . . . . 5.25 in; 133.30 mm  
 Weight (approximate) . . . . . 1.5 lb; 0.68 kg  
 Operating Position . . . . . Vertical, base up or down



| Class of Operation | Type of Service                          | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                          | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier Plate & Screen Pulsed | 20,000                | 12.0*                | 20,000†               | 1500†                  | 1.95†                | 15.7‡               | 31,500†              |
| C                  | RF Power Amplifier Grid Pulsed           | 15,000                | 12.0*                | 15,000                | 1500                   | 1.95†                | 15.2†               | 23,000†              |
| —                  | Switch Tube or Pulse Modulator           | 30,000                | 8.0                  | 30,000                | 1500                   | 8.0†                 | 116†                | 220,000†             |

\*Cathode peak current

†Pulse Value

‡When used as a plate and screen pulsed amplifier, the grid drive must also be pulsed to avoid overheating the grid.

\*\*For operation at 50 kV use type 8960, similar in all respects to 4PR1000A/8189

**8960**

## External Anode, Conduction Cooled Tetrodes 4CS250R



The 4CS250R is a compact, conduction cooled, high permeance radial beam tetrode. It is electrically identical to the 4CX250R except that the maximum dissipation of the 4CS250R is limited only by the maximum allowable anode and ceramic/metal seal temperatures. A beryllium oxide (BeO) thermal link is brazed to the anode providing an electrically isolated, low thermal resistance path between the anode and the heat sink. Ruggedized construction allows the 4CS250R to be operated in applications where shock and/or vibration is experienced.

### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . Dependent on Cooling Technique  
Screen Dissipation (Max.) . . . . . 12 watts  
Grid Dissipation (Max.) . . . . . 2 watts  
Frequency for Max. Ratings (CW) . . . . . 500 MHz  
Cooling . . . . . Conduction  
Cathode . . . . . Oxide-coated Unipotential  
Voltage . . . . . 6.0 volts  
Current . . . . . 2.6 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 17.0 pF  
Output . . . . . 4.7 pF  
Feed-through . . . . . 0.04 pF  
Base . . . . . 9-Pin Special  
Recommended Air-System Socket . . . . . SK-660,  
SK-661 Series  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 2.46 in; 62.60 mm  
Maximum Diameter . . . . . 1.76 in; 44.90 mm  
Weight (approximate) . . . . . 5 oz; 141.7 gm  
Operating Position . . . . . Any

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 2000                  | 0.25                 | 175               | 2000                  | 250                    | 0.24                 | 1.1                 | 379                  |
| C                  | RF Power Amplifier Plate Modulated | 1500                  | 0.20                 | —                 | 1500                  | 250                    | 0.20                 | 1.7                 | 235                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 2000                  | 0.25                 | —                 | 2000                  | 400                    | 0.24                 | —                   | 470†                 |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 2000                  | 0.25                 | —                 | 2000                  | 350                    | 0.50*                | —                   | 595*                 |

\*Two tubes

†Useful PEP Output Power

## 7843



The 7843 is a compact external anode radial-beam tetrode for use in RF power amplifier service, RF linear power amplifier applications, and as an audio frequency amplifier or modulator. The tube is designed to be conduction cooled and has a 26.5 volt heater.

The 7843 has an  $F_1$  rating of 1215 MHz for full-rated power input and is tested to show a useful power output of 80 watts at 400 MHz.

The 7843 is identical to the Type 6884 except for the anode configuration and cooling technique required.

### CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 115 watts  
Screen Dissipation (Max.) . . . . . 4.5 watts  
Grid Dissipation (Max.) . . . . . 1.0 watts  
Frequency for Max. Ratings (CW) . . . . . 1215 MHz  
Cooling . . . . . Conduction  
Cathode . . . . . Oxide-coated Unipotential  
Voltage . . . . . 26.5 volts  
Current . . . . . 0.53 amperes  
Capacitances (Gnd. Cath. Connection):  
Input . . . . . 30.5 pF  
Output . . . . . 4.7 pF  
Feed-through . . . . . 0.05 pF  
Capacitances (Gnd. Grid Connection):  
Input . . . . . 13.0 pF  
Output . . . . . 4.7 pF  
Feed-through . . . . . 0.01 pF  
Amplification Factor (91-92) . . . . . 18  
Base . . . . . Special, Coaxial  
Maximum Seal & Anode Core Temperature . . . . . 250°C  
Maximum Length . . . . . 1.95 in; 49.60 mm  
Maximum Diameter . . . . . 1.12 in; 28.40 mm  
Weight (approximate) . . . . . 1.7 oz; 48.2 gm  
Operating Position . . . . . Any

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION |                       |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Freq. (MHz)       | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 1000                  | 0.18                 | 400               | 900                   | 300                    | 0.17                 | 3                   | 80†                  |
| C                  | RF Power Amplifier Plate Modulated | 800                   | 0.15                 | 400               | 700                   | 250                    | 0.13                 | 3                   | 45†                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 1000                  | 0.18                 | 30                | 850                   | 300                    | 0.10                 | —                   | 40†                  |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 1000                  | 0.18                 | —                 | 850                   | 300                    | 0.20*                | —                   | 80                   |
| AB <sub>2</sub>    | AF Amplifier or Modulator          | 1000                  | 0.18                 | —                 | 850                   | 300                    | 0.35*                | —                   | 140                  |

\*Two tubes

†Useful output power

## CHARACTERISTICS

|                                       |                                |
|---------------------------------------|--------------------------------|
| Plate Dissipation (Max.)              | 600 watts                      |
| Screen Dissipation (Max.)             | .15 watts                      |
| Grid Dissipation (Max.)               | 4 watts                        |
| Cooling                               | Conduction or Liquid Immersion |
| Cathode                               | Oxide-coated Unipotential      |
| Voltage                               | 6.0 volts                      |
| Current                               | .5.6 amperes                   |
| Capacitances (Gnd. Cath. Connection): |                                |
| Input                                 | 50.0 pF                        |
| Output                                | .6.2 pF                        |
| Feed-through                          | 0.14 pF                        |
| Base                                  | Special, Solder-tab Terminals  |
| Maximum Seal & Anode Core Temperature | 250°C                          |
| Maximum Length                        | 2.52 in; 64.01 mm              |
| Maximum Diameter                      | 1.77 in; 44.96 mm              |
| Weight (approximate)                  | 6.0 oz; 170 gm                 |
| Operating Position                    | Any                            |



The 8954 is designed for switch-tube (or modulator) and voltage regulator service, with anode current up to 8 amperes with short pulses (to 2 microseconds) and derated values of anode current at longer pulse lengths.

The tube has an oxide cathode and all electrical connections are made to solder tabs which are integral to the tube elements.

The 8954 is supplied bare-anode and is intended to be cooled by heat sink, or liquid immersion, or a combination, and is nominally rated for 600 watts of anode dissipation.

The tube is rated to operate at 5.5 kVdc in air, at sea level, or 7.5 kVdc in an insulating oil environment. The tube is designed to withstand brief fault conditions which may raise the instantaneous anode voltage to 12 kV.

| Class of Operation | Type of Service                                | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                                | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| —                  | Switch Tube or Pulse Modulator (Air Operation) | 5500                  | 8.0                  | —                     | —                      | —                    | —                   | —                    |
| —                  | Switch Tube or Pulse Modulator (Oil Immersed)  | 7500                  | 8.0                  | —                     | —                      | —                    | —                   | —                    |

# Internal anode, Radiation Cooled Pentodes 5-500A



The 5-500A is a compact, ruggedly constructed radial-beam power pentode having a maximum plate dissipation rating of 500 watts. It is intended for use as an amplifier, oscillator or modulator. The high plate current rating, low grid-plate capacitance and low driving power requirements permit maximum power capability to be combined with circuit simplicity and economic driver requirements.

The 5-500A is cooled by radiation from the plate and by circulation of forced-air through the base, around the envelope and over the plate seal. Cooling may be greatly simplified by the use of the EIMAC SK-400 or SK-410 Air System Socket and the accompanying EIMAC SK-426 glass chimney.

The suppressor element of the 5-500A terminates at the tube base shell, and is designed to be operated at ground (zero) potential. The base shell must be grounded by means of suitable spring clips.

## CHARACTERISTICS

|                                        |                           |
|----------------------------------------|---------------------------|
| Plate Dissipation (Max.)               | 500 watts                 |
| Screen Dissipation (Max.)              | .35 watts                 |
| Grid Dissipation (Max.)                | .12 watts                 |
| Cooling                                | Forced Air                |
| Filament                               | Thoriated tungsten        |
| Voltage                                | 10.0 volts                |
| Current                                | 10.2 amperes              |
| Capacitances (Gnd. Cath. Connection):  |                           |
| Input                                  | 17.0 pF                   |
| Output                                 | 10.8 pF                   |
| Feed-through                           | 0.1 pF                    |
| Base                                   | 5-Pin Special             |
| Recommended Air-System Socket          | SK-400 Series             |
| Recommended Air Chimney                | SK-426                    |
| Recommended Heat Dissipating Connector | HR-6                      |
| Maximum Seal & Envelope Temperature    | 200°C                     |
| Maximum Length                         | 7.00 in; 177.80 mm        |
| Maximum Diameter                       | 3.56 in; 90.40 mm         |
| Weight (approximate)                   | 11 oz; 312 gm             |
| Operating Position                     | Vertical, base up or down |

| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 4000                  | 0.45                 | 4000                  | 500                    | 0.45                 | 14                  | 1300                 |
| C                  | RF Power Amplifier Plate Modulated | 3200                  | 0.35                 | 3100                  | 470                    | 0.26                 | 6                   | 580                  |
| AB <sub>1</sub>    | RF Linear Amplifier                | 4000                  | 0.45                 | 4000                  | 750                    | 0.32                 | —                   | 832                  |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 4000                  | 0.45                 | 4000                  | 750                    | 0.65*                | —                   | 1664*                |

\*Two tubes

# 5CX1500A

The 5CX1500A is a ceramic/metal power pentode designed for use as a Class AB<sub>1</sub> linear amplifier in audio or radio frequency applications. Its characteristic low intermodulation distortion makes it especially suitable for single sideband service. The filament is a rugged mesh type.

The tube is also recommended for use as a Class C RF power amplifier in CW, FM and AM service.

## CHARACTERISTICS

|                                                        |                              |
|--------------------------------------------------------|------------------------------|
| Plate Dissipation (Max.)                               | 1500 watts                   |
| Suppressor Dissipation (Max.)                          | .25 watts                    |
| Screen Dissipation (Max.)                              | .75 watts                    |
| Grid Dissipation (Max.)                                | .25 watts                    |
| Frequency for Max. Ratings (CW)                        | 110 MHz                      |
| Cooling                                                | Forced Air                   |
| Filament                                               | Thoriated tungsten mesh      |
| Voltage                                                | 5.0 volts                    |
| Current                                                | 40 amperes                   |
| Capacitances (Gnd. Cath. Connection):                  |                              |
| Input                                                  | 75.0 pF                      |
| Output                                                 | 16.5 pF                      |
| Feed-through                                           | 0.2 pF                       |
| Capacitances (Gnd. Grid Connection):                   |                              |
| Input                                                  | 34.5 pF                      |
| Output                                                 | 16.5 pF                      |
| Feed-through                                           | 0.05 pF                      |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5.5                          |
| Transconductance†                                      | 24,000 μmhos                 |
| Base                                                   | Special Ring and Breechblock |
| Recommended Air-System Socket                          | SK-840 Series                |
| Recommended Air Chimney                                | SK-806                       |
| Maximum Seal & Anode Core Temperature                  | 250°C                        |
| Maximum Length                                         | 4.95 in; 125.70 mm           |
| Maximum Diameter                                       | 3.37 in; 85.60 mm            |
| Weight (approximate)                                   | 30 oz; 850 gm                |
| Operating Position                                     | Vertical, base up or down    |



| Class of Operation | Type of Service                    | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|------------------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                                    | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier                 | 5000                  | 1.0                  | 4500                  | 500                    | 0.90                 | 9.0                 | 3180                 |
| C                  | RF Power Amplifier Plate Modulated | 3500                  | 0.8                  | 3200                  | 500                    | 0.80                 | 10                  | 1958                 |
| AB <sub>1</sub>    | RF Linear Amplifier                | 4000                  | 1.0                  | 4000                  | 500                    | 0.7                  | —                   | 1785                 |
| AB <sub>1</sub>    | AF Amplifier or Modulator          | 4000                  | 1.0                  | 3800                  | 500                    | 1.3*                 | —                   | 3220*                |

\*Two tubes †A + I<sub>b</sub> = 1.0 A

# 5CX3000A

The 5CX3000A is a ceramic/metal power pentode designed for use as a Class AB<sub>1</sub> linear amplifier in audio or radio-frequency applications. Its characteristics of low intermodulation distortion make it especially suitable for single side-band service.

## CHARACTERISTICS

|                                                        |                            |
|--------------------------------------------------------|----------------------------|
| Plate Dissipation (Max.)                               | 4000 watts                 |
| Suppressor Dissipation (Max.)                          | 100 watts                  |
| Screen Dissipation (Max.)                              | 175 watts                  |
| Grid Dissipation (Max.)                                | .50 watts                  |
| Frequency for Max. Ratings (CW)                        | 150 MHz                    |
| Cooling                                                | Forced Air                 |
| Filament                                               | Thoriated tungsten         |
| Voltage                                                | 9.0 volts                  |
| Current                                                | 41.5 amperes               |
| Capacitances (Gnd. Cath. Connection):                  |                            |
| Input                                                  | 135 pF                     |
| Output                                                 | 21.0 pF                    |
| Feed-through                                           | 0.4 pF                     |
| Capacitances (Gnd. Grid Connection):                   |                            |
| Input                                                  | 61.0 pF                    |
| Output                                                 | 21.0 pF                    |
| Amplification Factor (g <sub>1</sub> -g <sub>2</sub> ) | 5.5                        |
| Base                                                   | Special Ring & Breechblock |
| Recommended Air-System Socket                          | SK-1420 Series             |
| Recommended Air Chimney                                | SK-1426                    |
| Maximum Seal & Anode Core Temperature                  | 250°C                      |
| Maximum Length                                         | 6.84 in; 173.70 mm         |
| Maximum Diameter                                       | 4.63 in; 117.60 mm         |
| Weight (approximate)                                   | 5.5 lb; 2.5 kg             |
| Operating Position                                     | Vertical, base up or down  |



| Class of Operation | Type of Service           | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|---------------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                           | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier        | 7000                  | 2.0                  | 6800                  | 500                    | 1.6                  | 52                  | 8500                 |
| AB <sub>1</sub>    | RF Linear Amplifier       | 7000                  | 2.0                  | 6000                  | 850                    | 1.4                  | —                   | 5500                 |
| AB <sub>1</sub>    | AF Amplifier or Modulator | 7000                  | 2.0                  | 6000                  | 850                    | 2.9*                 | —                   | 11,000*              |

\*Two tubes

# External Anode, Forced Air Tetrodes

## 8295A



The 8295A is a ceramic/metal, forced-air cooled, radial beam pentode with a rated maximum plate dissipation of 1000 watts. It is capable of high power gain and excellent efficiency at relatively low plate voltage. The 8295A is a direct replacement for the 8295.

This external-anode tube is especially suited for Class AB<sub>1</sub> linear RF amplifier service, but will also provide excellent performance in Class AB<sub>2</sub>, Class B, and Class C service.

## CHARACTERISTICS

Plate Dissipation (Max.) . . . . . 1000 watts  
 Screen Dissipation (Max.) . . . . . 30 watts  
 Frequency for Max. Ratings (CW) . . . . . 30 MHz  
 Cooling . . . . . Forced Air  
 Cathode . . . . . Oxide-coated Unipotential  
 Voltage . . . . . 6.0 volts  
 Current . . . . . 8.2 amperes  
 Capacitances (Gnd. Cath. Connection):  
   Input . . . . . 40.0 pF  
   Output . . . . . 18.5 pF  
   Feed-through . . . . . 0.09 pF  
 Amplification Factor (g<sub>1</sub>-g<sub>2</sub>) . . . . . 3.4  
 Base . . . . . 7-Pin Special  
 Recommended Air-System Socket  
   (includes integral chimney) . . SK-184 or SK-184A  
 Maximum Seal & Anode Core Temperature . . 250°C  
 Maximum Length . . . . . 5.05 in; 128.00 mm  
 Maximum Diameter . . . . . 4.03 in; 102.00 mm  
 Weight (approximate) . . . . . 2.8 lb; 1.27 kg  
 Operating Position . . . . . Any

| Class of Operation | Type of Service     | MAXIMUM RATINGS       |                      | TYPICAL OPERATION     |                        |                      |                     |                      |
|--------------------|---------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|---------------------|----------------------|
|                    |                     | Plate Voltage (volts) | Plate Current (amps) | Plate Voltage (volts) | Screen Voltage (volts) | Plate Current (amps) | Drive Power (watts) | Output Power (watts) |
| C                  | RF Power Amplifier  | 3000                  | 1.0                  | 3000                  | 500*                   | 0.82                 | 2.1                 | 1770†                |
| AB <sub>1</sub>    | RF Linear Amplifier | 3000                  | 0.8                  | 3000                  | 500*                   | 0.80                 | —                   | 1700†                |

\*Suppressor grid voltage = +35 Vdc

†Useful Power Output

## RECOMMENDED REPLACEMENT TYPES

The following EIMAC types, currently in production, are for renewal use and are not suggested for new equipment design. Data on these tubes may

be obtained from the Power Grid Tube Division of EIMAC.

|             |                |             |          |             |       |           |
|-------------|----------------|-------------|----------|-------------|-------|-----------|
| 2X1000A     | 4CV20,000A     | 4X500A      | 152TH    | 284         | 826   | 7815BAL   |
| 2-01C       | 4CX125C        | 4-400A/8438 | 152TL    | 290         | 1000T | 7815XAL   |
| 2-25A       | 4CX125F        | 4-400B/7527 | 175A     | 290A        | 1500T | 7855K     |
| 2-50A       | 4D21A          | 6C21        | 177WA    | 304TH       | 2000T | 8020/100R |
| 2-150D      | 4E27A/5-125B   | 25T         | 250R     | 304TL       | 5867A | 8560A     |
| 2-2000A     | 4PR65A/8187    | 35T         | 250TH    | 322         | 6155  | 8560AS    |
| 3C24        | 4PR125A/8247   | 75TH        | 250TL    | 450TH       | 6156  | 8756      |
| 3CV1500A7   | 4PR1000B       | 75TL        | 253      | 450TL       | 6569  | 8906XAL   |
| 3-200A3/592 | 4W300B/8249    | 100TH       | 254W     | 592/3-200A3 | 6580  | 8944      |
| 4CN15A      | 4W20,000A/8173 | 100TL       | 264/8576 | 750TL       | 7457  |           |
| 4CV1500B    | 4X150G/8172    |             |          |             |       |           |

## EIMAC EQUIVALENT LIST

This index lists tubes of other manufacturers for which EIMAC types are suggested as equivalents. The data sheet for the particular EIMAC type should

be consulted before direct replacement is made because of possible mechanical or electrical differences.

| TUBE TYPE | EIMAC EQUIV.    | TUBE TYPE   | EIMAC EQUIV.  | TUBE TYPE  | EIMAC EQUIV.    |
|-----------|-----------------|-------------|---------------|------------|-----------------|
| AC55      | 4CX5000A/8170   | ITW-10-1    | 3CW10,000H3   | 3H/151J    | 7289            |
| AY3-65    | 4-65A/8165      | Q 160-1     | 4-125A        | 3HC/151JYY | 3CX100A5        |
| B1109     | 3C24            | Q 400-1     | 4-400A/8438   | 3SO35T     | 5867A           |
| B1135     | 100TH           | QB3-200     | 4-65A/8165    | 4F15R      | 4X150A/7034     |
| BW194     | 6696A           | QB3-300     | 6155          | 4F17R      | 4X150G/8172     |
| C112      | 6156            | QB3-300A    | 4-125A        | 4F20R      | 7609            |
| C1108     | 4-125A          | QB3.5-750   | 6156          | 4F21       | 4-125A          |
| C1112     | 4-250A/5D22     | QB3.5-750GH | 4-250A/5D22   | 4F84       | 7843            |
| C1136     | 4-400A/8438     | QB4-250B    | 4-250A/5D22   | 4H135M     | 4X150A/7034     |
| CV-427    | 4PR60C/8252W    | QB4-1100GA  | 4-400A/8438   | 4H160M     | 4CX250B/7203    |
| CV-668    | 35T             | QBL4/800    | 4X500A        | 4HC/160M   | 4CX250B/7203    |
| CV-789    | 3C24            | QE61/250    | 4CX250B/7203  | 4K84       | 2-450A          |
| CV-824    | 4-125A          | QEL1/150    | 4X150A/7034   | 4SO16-T    | 4-125A          |
| CV-998    | 2000T           | QEL1/150H   | 7609          | 4SO40T     | 4-250A/5D22     |
| CV-1102   | 4-250A/5D22     | QEL2/200    | 7580          | 4T10R      | 7289            |
| CV-1350   | 5867A           | QEL2/275    | 4CX250B/7203  | 4T16       | 100TL           |
| CV-1905   | 4-65A/8165      | QV1-150     | 4X150A/7304   | 4T17       | 100TH           |
| CV-2130   | 6155            | QV1-150D    | 7609          | 4T25R      | 4X150G/8172     |
| CV-2131   | 6156            | QV1-150G    | 4X150G/8172   | 5F15R      | 4X150A/7034     |
| CV-2159   | 4X150A/7034     | QV2-250G    | 4CX250B/7203  | 5F16R      | 7609            |
| CV-2416   | 4PR60C/8252W    | QY3-65A     | 4-65/8165     | 5F17R      | 4X150G/8172     |
| CV-2487   | 4CX250B/7203    | QY3-125     | 6155          | 5F20RA     | 4CX250B/7203    |
| CV-2516   | 7289            | QY3-125B    | 4-125A        | 5F22       | 4-250A/5D22     |
| CV-2519   | 4X150A/7304     | QY4-250     | 6156          | 5F22A      | 6156            |
| CV-2552   | 100TH           | QY4-250B    | 4-250A/5D22   | 5F23       | 4-400A/8438     |
| CV-2572   | 450TH           | QY4-400     | 4-400B/7527   | 5F23A      | 7527/4-400B     |
| CV-2589   | 250TH           | QY4-400VB   | 4-400A/8438   | 5F25R      | 4CX250FG        |
| CV-2611   | 304TH           | QY4-500A    | 4X500A        | 5F35R      | 4CX350A/8321    |
| CV-2711   | 1500T           | RS-630      | 100TH         | 5T20       | 250TL           |
| CV-2752   | 4PR60C/8252W    | RS-685      | 4-125A        | 5T21       | 250TH           |
| CV-2963   | 4-125A          | RS-1002A    | 4-250A/5D22   | 5T30       | 450TL           |
| CV-2964   | 4-250A/5D22     | RS-1007     | 4-125A        | 5T31       | 450TH           |
| CV-2967   | 8020/100R       | RS-1026     | 5867A         | 5T34       | 304TL           |
| CV-3879   | 4-400A/8438     | RS-2016     | 4CX5000A/8170 | 5T35       | 304TH           |
| CV-3880   | 4-1000A/8166    | RS-2793     | 4CX5000A/8170 | 6F50R      | 4X500A          |
| CV-3893   | 4X150G/8172     | RS-4791     | 4CX1000A/8168 | 6F50RA     | 4X500A          |
| CV-3991   | 7609            | RY-12-100   | 8020/100R     | 6T35       | 750TL           |
| CV-5176   | 2-01C           | T-130-1     | 100TH         | 7F25       | 4-1000A/8166    |
| CV-5430   | 7289            | T-150-1     | 250TL         | 7F25A      | 4-1000A/8166    |
| CV-5959   | 4-400B/7527     | T-300-1     | 450TH         | 7T40       | 1000T           |
| CV-6122   | 4-65A/8165      | T-380-1     | 3-400Z/8163   | 7T45       | 1500T           |
| CV-6131   | 4PR60C/8252W    | T-1000-1    | 3-1000Z/8164  | 8F10R      | 4CX5000A/8170   |
| CV-6137   | 4CX250B/7203    | TAW12-35    | 6696A         | 8F11R      | 4CX10,000D/8171 |
| CV-6184   | 4CX10,000D/8171 | TB-3/350    | 100TH         | 9T69       | 6696A           |
| CV-8295   | 4CX5000A/8170   | TB-4/800    | 250TH         | 35R        | 2-50A           |
| CV-8698   | 4CX350A/8321    | TB-750      | 5867A         | 381        | 7289            |
| CV-11106  | 5CX1500A        | TD-1-100A   | 7289          | 152RA      | 2-150D          |
| CV-11107  | 4CX35,000C/8349 | TH-4327     | 4E27A/5-125B  | 451        | 8020/100R       |
| DET-18    | 35T             | TT-16       | 4-125A        | 2100       | 8020/100R       |
| E-250A    | 6156            | TT-16D      | 6155          | 2000R      | 2-2000A         |
| E-900     | 250TH           | 2T24        | 3C24          | 3861B      | 4X150A/7034     |
| E-3033    | 4CX10,000D/8171 | 3C200       | 250TH         | 7525       | 4-1000A/8166    |
| ET-1000   | 250TH           | 3F65        | 4-65A/8165    |            |                 |

# EIMAC/JEDEC CROSS-REFERENCE LIST

## EIMAC to JEDEC

| EIMAC No.   | JEDEC No. | EIMAC No.   | JEDEC No. | EIMAC No. | JEDEC No. | EIMAC No. | JEDEC No. |
|-------------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|
| 2-01C       | —         | 3CX20,000H3 | —         | 4PR60B    | 8252      | 6884      | 6884      |
| 2-25A       | —         | 4-65A       | 8165      | 4PR60C    | 8252W     | 6894      | 6894      |
| 2-50A       | —         | 4-125A      | 4D21      | 4PR65A    | 8187      | 6895      | 6895      |
| 2-150D      | —         | 4-250A      | 5D22      | 4PR125A   | 8247      | 7211      | 7211      |
| 2-240A      | —         | 4-400A      | 8438      | 4PR250C   | 8248      | 7457      | 7457      |
| 2-2000A     | —         | 4-400B      | 7527      | 4PR400A   | 8188      | 7480      | 7480      |
| 2C39A       | 2C39A     | 4-400C      | 6775      | 4PR1000A  | 8189      | 7609      | 7609      |
| 2C39WA      | 2C39WA    | 4-500A      | —         | 4PR1000B  | —         | 7698      | 7698      |
| 2X1000A     | —         | 4-1000A     | 8166      | 4W300B    | 8249      | 7815AL    | 7815AL    |
| 2X3000F     | —         | 4CN15A      | —         | 4X150A    | 7034      | 7815RAL   | 7815RAL   |
| 3C24        | 3C24      | 4CPX250K    | 8590      | 4X150G    | 8172      | 7815X     | 7815X     |
| 3-200A3     | 592       | 4CS250R     | —         | 4X500A    | —         | 7815XAL   | 7815XAL   |
| 3-400Z      | 8163      | 4CV1500B    | —         | 5-125B    | 4E27A     | 7843      | 7843      |
| 3-500Z      | —         | 4CV8000A    | —         | 5-500A    | —         | 7855      | 7855      |
| 3-1000Z     | 8164      | 4CV20,000A  | —         | 5CX1500A  | —         | 7855AL    | 7855AL    |
| 3CPN10A5    | 7815      | 4CV35,000A  | —         | 5CX3000A  | —         | 7855K     | 7855K     |
| 3CPX100A5   | 7815R     | 4CV50,000E  | —         | 6C21      | 6C21      | 7855KAL   | 7855KAL   |
| 3CPX1500A7  | —         | 4CV50,000J  | —         | 25T       | 25T       | 8295A     | 8295A     |
| 3CV1500A7   | —         | 4CV100,000C | 8351      | 35T       | 35T       | 8403      | 8403      |
| 3CV30,000A1 | —         | 4CV250,000A | —         | 35TG      | 35TG      | 8432      | 8432      |
| 3CV30,000A3 | —         | 4CW800B     | —         | 75TH      | 75TH      | 8533W     | 8533W     |
| 3CV30,000H3 | —         | 4CW800F     | —         | 75TL      | 75TL      | 8560A     | 8560A     |
| 3CV50,000A7 | —         | 4CW2000A    | 8244      | 100R      | 8020      | 8560AS    | 8560AS    |
| 3CW5000A1   | 8240      | 4CW10,000A  | 8661      | 100TH     | 100TH     | 8745      | 8745      |
| 3CW5000A3   | 8242      | 4CW25,000A  | —         | 100TL     | 100TL     | 8755      | 8755      |
| 3CW5000F1   | 8241      | 4CW50,000E  | —         | 152TH     | 152TH     | 8755A     | 8755A     |
| 3CW5000F3   | 8243      | 4CW50,000J  | —         | 152TL     | 152TL     | 8756      | 8756      |
| 3CW5000H3   | —         | 4CW100,000D | —         | 175A      | —         | 8757      | 8757      |
| 3CW10,000A3 | —         | 4CW100,000E | —         | 177A      | —         | 8847      | 8847      |
| 3CW10,000H3 | —         | 4CW250,000A | —         | 177WA     | 6549W     | 8847A     | 8847A     |
| 3CW20,000A1 | —         | 4CX125C     | —         | 250R      | —         | 8873      | 8873      |
| 3CW20,000A3 | —         | 4CX125F     | —         | 250TH     | 250TH     | 8874      | 8874      |
| 3CW20,000A7 | —         | 4CX250B     | 7203      | 250TL     | 250TL     | 8875      | 8875      |
| 3CW20,000H3 | —         | 4CX250BC    | 8957      | 253       | 253       | 8876      | 8876      |
| 3CW20,000H7 | —         | 4CX250FG    | 8621      | 254W      | —         | 8892      | 8892      |
| 3CW30,000H3 | —         | 4CX250K     | 8245      | 264       | 8576      | 8893      | 8893      |
| 3CW30,000H7 | —         | 4CX250M     | 8246      | 279       | —         | 8906      | 8906      |
| 3CW40,000H3 | —         | 4CX250R     | 7580W     | 284       | —         | 8906AL    | 8906AL    |
| 3CX100A5    | 7289      | 4CX300A     | 8167      | 290       | —         | 8906BAL   | 8906BAL   |
| 3CX100F5    | 8250      | 4CX300Y     | 8561      | 294       | —         | 8906X     | 8906X     |
| 3CX400U7    | 8961      | 4CX350A     | 8321      | 304TH     | 304TH     | 8906XAL   | 8906XAL   |
| 3CX1000A7   | 8283      | 4CX350F     | 8322      | 304TL     | 304TL     | 8907      | 8907      |
| 3CX1500A7   | 8877      | 4CX350FJ    | 8904      | 322       | —         | 8911      | 8911      |
| 3CX2500A3   | 8161      | 4CX600B     | —         | 450TH     | 450TH     | 8912      | 8912      |
| 3CX2500F3   | 8251      | 4CX600F     | —         | 450TL     | 450TL     | 8930      | 8930      |
| 3CX2500H3   | —         | 4CX600J     | 8809      | 750TL     | 750TL     | 8933      | 8933      |
| 3CX3000A1   | 8238      | 4CX600JA    | 8921      | 826       | 826       | 8938      | 8938      |
| 3CX3000A7   | —         | 4CX1000A    | 8168      | 1000T     | 1000T     | 8940      | 8940      |
| 3CX3000F1   | 8239      | 4CX1000K    | 8352      | 1500T     | 1500T     | 8941      | 8941      |
| 3CX3000F7   | 8162      | 4CX1500A    | —         | 2000T     | 2000T     | 8942      | 8942      |
| 3CX5000A3   | —         | 4CX1500B    | 8660      | 5867A     | 5867A     | 8944      | 8944      |
| 3CX5000H3   | —         | 4CX3000A    | 8169      | 6155      | 6155      | 8954      | 8954      |
| 3CX10,000A1 | 8158      | 4CX5000A    | 8170      | 6156      | 6156      | 8959      | 8959      |
| 3CX10,000A3 | 8159      | 4CX5000J    | 8909      | 6549      | 6549      | 8960      | 8960      |
| 3CX10,000A7 | 8160      | 4CX5000R    | 8170W     | 6569      | 6569      | 8962      | 8962      |
| 3CX10,000H3 | —         | 4CX10,000D  | 8171      | 6580      | 6580      | 8963      | 8963      |
| 3CX15,000A3 | —         | 4CX10,000J  | —         | 6696A     | 6696A     | 8964      | 8964      |
| 3CX15,000A7 | —         | 4CX15,000A  | 8281      | 6697A     | 6697A     | 8965      | 8965      |
| 3CX15,000H3 | —         | 4CX15,000J  | 8910      | 6775      | 6775      |           |           |
| 3CX20,000A3 | —         | 4CX35,000C  | 8349      | 6816      | 6816      |           |           |
| 3CX20,000A7 | —         | 4D21A       | 4D21A     |           |           |           |           |

# JEDEC/EIMAC CROSS-REFERENCE LIST

## JEDEC to EIMAC

| JEDEC No. | EIMAC No. | JEDEC No. | EIMAC No.   | JEDEC No. | EIMAC No.  |
|-----------|-----------|-----------|-------------|-----------|------------|
| 2C39A     | 2C39A     | 7843      | 7843        | 8661      | 4CW10,000A |
| 2C39WA    | 2C39WA    | 7855      | 7855        | 8745      | 8745       |
| 3C24      | 3C24      | 7855AL    | 7855AL      | 8755      | 8755       |
| 4D21      | 4-125A    | 7855K     | 7855K       | 8755A     | 8755A      |
| 4D21A     | 4D21A     | 7855KAL   | 7855KAL     | 8756      | 8756       |
| 4E27A     | 5-125B    | 8020      | 100R        | 8757      | 8757       |
| 5D22      | 4-250A    | 8158      | 3CX10,000A1 | 8809      | 4CX600J    |
| 6C21      | 6C21      | 8159      | 3CX10,000A3 | 8847      | 8847       |
| 25T       | 25T       | 8160      | 3CX10,000A7 | 8847A     | 8847A      |
| 35T       | 35T       | 8161      | 3CX2500A3   | 8873      | 8873       |
| 35TG      | 35TG      | 8162      | 3CX3000F7   | 8874      | 8874       |
| 75TH      | 75TH      | 8163      | 3-400Z      | 8875      | 8875       |
| 75TL      | 75TL      | 8164      | 3-1000Z     | 8877      | 3CX1500A7  |
| 100TH     | 100TH     | 8165      | 4-65A       | 8892      | 8892       |
| 100TL     | 100TL     | 8166      | 4-1000A     | 8893      | 8893       |
| 152TH     | 152TH     | 8167      | 4CX300A     | 8904      | 4CX350FJ   |
| 152TL     | 152TL     | 8168      | 4CX1000A    | 8906      | 8906       |
| 250TH     | 250TH     | 8169      | 4CX3000A    | 8906AL    | 8906AL     |
| 250TL     | 250TL     | 8170      | 4CX5000A    | 8906BAL   | 8906BAL    |
| 253       | 253       | 8170W     | 4CX5000R    | 8906X     | 8906X      |
| 304TH     | 304TH     | 8171      | 4CX10,000D  | 8906XAL   | 8906XAL    |
| 304TL     | 304TL     | 8172      | 4X150G      | 8907      | 8907       |
| 450TH     | 450TH     | 8187      | 4PR65A      | 8909      | 4CX5000J   |
| 450TL     | 450TL     | 8188      | 4PR400A     | 8910      | 4CX15,000J |
| 592       | 3-200A3   | 8189      | 4PR1000A    | 8911      | 8911       |
| 750TL     | 750TL     | 8238      | 3CX3000A1   | 8912      | 8912       |
| 826       | 826       | 8239      | 3CX3000F1   | 8921      | 4CX600JA   |
| 1000T     | 1000T     | 8240      | 3CW5000A1   | 8930      | 8930       |
| 1500T     | 1500T     | 8241      | 3CW5000F1   | 8933      | 8933       |
| 2000T     | 2000T     | 8242      | 3CW5000A3   | 8938      | 8938       |
| 5867A     | 5867A     | 8243      | 3CW5000F3   | 8940      | 8940       |
| 6155      | 6155      | 8244      | 4CW2000A    | 8941      | 8941       |
| 6156      | 6156      | 8245      | 4CX250K     | 8942      | 8942       |
| 6549W     | 177WA     | 8246      | 4CX250M     | 8944      | 8944       |
| 6569      | 6569      | 8247      | 4PR125A     | 8954      | 8954       |
| 6580      | 6580      | 8248      | 4PR250C     | 8957      | 4CX250BC   |
| 6696A     | 6696A     | 8249      | 4W300B      | 8959      | 8959       |
| 6697A     | 6697A     | 8250      | 3CX100F5    | 8960      | 8960       |
| 6775      | 4-400C    | 8251      | 3CX2500F3   | 8961      | 3CX400U7   |
| 6816      | 6816      | 8252      | 4PR60B      | 8962      | 8962       |
| 6884      | 6884      | 8252W     | 4PR60C      | 8963      | 8963       |
| 6894      | 6894      | 8281      | 4CX15,000A  | 8964      | 8964       |
| 6895      | 6895      | 8283      | 3CX1000A7   | 8965      | 8965       |
| 7034      | 4X150A    | 8295A     | 8295A       |           |            |
| 7203      | 4CX250B   | 8321      | 4CX350A     |           |            |
| 7211      | 7211      | 8322      | 4CX350F     |           |            |
| 7289      | 3CX100A5  | 8349      | 4CX35,000C  |           |            |
| 7457      | 7457      | 8351      | 4CV100,000C |           |            |
| 7480      | 7480      | 8352      | 4CX1000K    |           |            |
| 7527      | 4-400B    | 8403      | 8403        |           |            |
| 7580W     | 4CX250R   | 8432      | 8432        |           |            |
| 7609      | 7609      | 8438      | 4-400A      |           |            |
| 7698      | 7698      | 8533W     | 8533W       |           |            |
| 7815      | 3CPN10A5  | 8560A     | 8560A       |           |            |
| 7815AL    | 7815AL    | 8560AS    | 8560AS      |           |            |
| 7815R     | 3CPX100A5 | 8561      | 4CX300Y     |           |            |
| 7815RAL   | 7815RAL   | 8576      | 264         |           |            |
| 7815X     | 7815X     | 8590      | 4CPX250K    |           |            |
| 7815XAL   | 7815XAL   | 8621      | 4CX250FG    |           |            |
|           |           | 8660      | 4CX1500B    |           |            |

## SOCKETS

These sockets and accessories are specifically designed for use with EIMAC tubes. Choice of the proper socket insures longer tube life and better performance. All sockets incorporate low loss insulating materials. All metal parts are plated for corrosion protection. Tube contact surfaces are non-ferrous spring alloy, silver plated for good RF conductivity and heat treated for positive contact and long life. Open construction permits adequate air flow for tube cooling.



**SK-184**

SK-184A, SK-209B, SK-265A and SK-291A resemble SK-184 in general appearance



**SK-300A**

SK-300 and SK-310 resemble SK-300A in general appearance



**SK-400 SK-406**

SK-500 resembles SK-400 in general appearance  
SK-416, SK-506, and SK-516 resemble SK-406



**SK-410**

SK-510 resembles SK-410 in general appearance



**SK-600 SK-606**

SK-600A, SK-602, SK-602A, SK-607, SK-610, SK-610A, SK-611 and SK-611A resemble SK-600 in general appearance



**SK-620 SK-626 SK-636B**

SK-620A, SK-630 and SK-630A resemble SK-620



**SK-640**



**SK-650 SK-655**



**SK-660 SK-660A**



**SK-680**



**SK-700**

SK-710, SK-711A, and SK-712A resemble SK-700 in appearance

## CUSTOM SOCKET DESIGN

For special applications which require features different from these standard sockets, custom designed sockets are offered. These may be modifications of the standard sockets or completely new designs, manufactured to customer drawings or EIMAC design. Common modifications include: contact spacing, mounting features, encapsulation of components, grounded contacts, by-pass capacitors, insulating materials, contact materials, and plating.



SK-740



SK-760

SK-761 and SK-770 resemble SK-760



SK-800B SK-806

SK-810B and SK-890 resemble SK-800B



SK-820

SK-830A, SK-831, SK-840, SK-860, SK-861 and SK-871 resembles SK-820



SK-900 SK-906



SK-1300 SK-1306

SK-1310 and SK-1320 resemble SK-1300



SK-1400 SK-1406

SK-1420, SK-1470, and SK-1490 resemble SK-1400



SK-1500

SK-1510 resembles SK-1500



SK-2000

SK-2001 and SK-2011 resemble SK-2000



SK-2200 SK-2216

SK-2210 resembles SK-2200



SK-2220

## SOCKETS AND CHIMNEYS

| Air-System<br>Socket | Tube                      | Bypass Capacitor |                 |                     | Grounded<br>Contacts | Chimney           |
|----------------------|---------------------------|------------------|-----------------|---------------------|----------------------|-------------------|
|                      |                           | PF               | Voltage<br>DCWV | Element<br>Bypassed |                      |                   |
| SK-184               | 8295A                     | 2000             | 1000            | screen              | none                 | C-184<br>included |
|                      |                           | 2500             | 500             | suppressor          |                      |                   |
| SK-184A              | 8295A                     | 2000             | 1000            | screen              | suppressor           | C-184<br>included |
| SK-209B              | 8432                      | 2000             | 1000            | screen              | suppressor           | C-209<br>included |
| SK-265A              | 8576/264                  | 2000             | 1000            | screen              | suppressor           | C-265<br>included |
| SK-291A              | 290/290A                  | 2000             | 1000            | screen              | suppressor           | C-291<br>included |
| SK-300A*             | <u>4CX5000A</u><br>8170   | none             | —               | —                   | none                 | SK-306            |
|                      | <u>4CX5000R</u><br>8170W  |                  |                 |                     |                      | none<br>required  |
|                      | 4CX5000J                  |                  |                 |                     |                      | SK-1306           |
|                      | 4CW10,000A<br>4CW25,000A  |                  |                 |                     |                      |                   |
|                      | <u>4CX10,000D</u><br>8171 |                  |                 |                     |                      | SK-316            |
|                      | 4CX10,000J                |                  |                 |                     |                      |                   |
|                      | <u>4CX15,000A</u><br>8181 | none             | —               | —                   | none                 | none<br>required  |
|                      | <u>4CX15,000J</u><br>8910 |                  |                 |                     |                      |                   |
| SK-310               | 4CV20,000A<br>4CV35,000A  | none             | —               | —                   | none                 | none<br>required  |

\*Low air pressure drop.

## SOCKETS AND CHIMNEYS

| Air-System<br>Socket | Tube                                                                                                                                      | Bypass Capacitor |                 |                     | Grounded<br>Contacts | Chimney          |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|---------------------|----------------------|------------------|
|                      |                                                                                                                                           | PF               | Voltage<br>DCWV | Element<br>Bypassed |                      |                  |
| SK-400               | <u>4-125A</u><br>4D21<br><br>4D21A<br><br><u>4PR125A</u><br>8247<br><br><u>4PR250C</u><br>8248                                            | —                | —               | —                   | none                 | none<br>required |
|                      | <u>4-250A</u><br>5D22<br><br><u>4-400A</u><br>8438<br><br><u>4-400C</u><br>6775<br><br><u>4PR400A</u><br>8188<br><br>175A<br>6569<br>6580 |                  |                 |                     |                      | SK-406           |
|                      | 4-500A<br>5-500A                                                                                                                          |                  |                 |                     |                      | SK-426           |
|                      | same as<br>SK-400<br>plus:<br><br>6155                                                                                                    |                  |                 |                     |                      | none<br>required |
|                      | 3-500Z<br><br><u>4-400B</u><br>7627<br><br>5867A<br>6156<br><br><u>3-400Z</u><br>8163                                                     |                  |                 |                     |                      | SK-406           |
| SK-500               | <u>4-1000A</u><br>8166<br><br><u>4PR1000A</u><br>8189<br><br>4PR1000B<br>279<br>284<br>8960                                               | —                | —               | —                   | none                 | SK-506           |
|                      |                                                                                                                                           |                  |                 |                     |                      |                  |

## SOCKETS AND CHIMNEYS

| Air-System<br>Socket            | Tube                                                                                                                                              | Bypass Capacitor |                 |                     | Grounded<br>Contacts | Chimney |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|---------------------|----------------------|---------|
|                                 |                                                                                                                                                   | PF               | Voltage<br>DCWV | Element<br>Bypassed |                      |         |
| SK-510                          | same as<br>SK-500                                                                                                                                 | —                | —               | —                   | none                 | SK-506  |
|                                 | plus:<br><u>3-1000Z</u><br>8164                                                                                                                   |                  |                 |                     |                      | SK-516  |
| SK-600<br>SK-602**              | <u>4CX250B</u><br>7203<br><br><u>4CX250BC</u><br>8957<br><br><u>4CX250FG</u><br>8621<br><br><u>4CX250R</u><br>7850W<br><br><u>4CX350A</u><br>8321 | 2700             | 400             | screen              | none                 | SK-606  |
| SK-600A*<br>SK-602A†<br>SK-611‡ | <u>4CX350F</u><br>8322<br><br><u>4CX350FJ</u><br>8904<br><br><u>4X150A</u><br>7034<br><br>7609                                                    |                  | 1000            |                     |                      |         |
|                                 | 8930                                                                                                                                              | none<br>required |                 |                     |                      |         |
|                                 | <u>4W300B</u><br>8249                                                                                                                             |                  |                 |                     |                      |         |

\*Same as SK-600 with encapsulated bypass capacitor.

\*\*Modified SK-600. Cutout machined in base shield.

†Same as SK-602 with encapsulated bypass capacitor.

‡SK-600 body with contacts and Kel-F retainer ring furnished separately; no bypass capacitor.

|          |                         |      |      |        |         |                          |
|----------|-------------------------|------|------|--------|---------|--------------------------|
| SK-607   | <u>4CX600J</u><br>8809  | 2700 | 1000 | screen | none    | SK-646                   |
|          | <u>4CX600JA</u><br>8921 |      |      |        |         | SK-656                   |
| SK-610   | same as<br>SK-600       | 2700 | 400  | screen | cathode | see<br>SK-600<br>listing |
| SK-610A* |                         |      | 1000 |        |         |                          |

\*Same as SK-610 with encapsulated bypass capacitor.

## SOCKETS AND CHIMNEYS

| Air-System<br>Socket | Tube              | Bypass Capacitor |                 |                     | Grounded<br>Contacts   | Chimney               |
|----------------------|-------------------|------------------|-----------------|---------------------|------------------------|-----------------------|
|                      |                   | PF               | Voltage<br>DCWV | Element<br>Bypassed |                        |                       |
| SK-612               | same as<br>SK-600 | 2700             | 400             | screen              | cathode,<br>one heater | see SK-600<br>listing |
| SK-620<br>SK-620A*   | same as<br>SK-600 | 1100             | 1000            | screen              | none                   | SK-626 or<br>SK-636B† |

\*Same as SK-620 with encapsulated bypass capacitor.

†Chimney includes anode connector, clamp and socket hold-down provision.

|        |                   |     |     |         |        |                       |
|--------|-------------------|-----|-----|---------|--------|-----------------------|
| SK-621 | same as<br>SK-600 | 525 | 500 | cathode | screen | SK-626 or<br>SK-636B† |
|--------|-------------------|-----|-----|---------|--------|-----------------------|

†Chimney includes anode connector, clamp and socket hold-down provision.

|                    |                   |      |      |        |         |                       |
|--------------------|-------------------|------|------|--------|---------|-----------------------|
| SK-630<br>SK-630A* | same as<br>SK-600 | 1100 | 1000 | screen | cathode | SK-626 or<br>SK-636B† |
|--------------------|-------------------|------|------|--------|---------|-----------------------|

\*Same as SK-630 with encapsulated bypass capacitor.

†Chimney includes anode connector, clamp and socket hold-down provision.

|                   |                   |      |      |        |      |                       |
|-------------------|-------------------|------|------|--------|------|-----------------------|
| SK-640            | same as<br>SK-600 | —    | —    | —      | none | see SK-600<br>listing |
| SK-650<br>SK-655* | same as<br>SK-600 | 1100 | 1000 | screen | none | SK-626                |

\*SK-650 is a lightweight, simplified socket. SK-655 is matching bypass capacitor. It can also be used with coaxial-based tubes in family (e.g., 4CPX250K).

|                                 |                                       |   |   |   |      |                                                              |
|---------------------------------|---------------------------------------|---|---|---|------|--------------------------------------------------------------|
| SK-660*<br>SK-660A*†<br>SK-661‡ | same as<br>SK-600<br>plus:<br>4CS250R | — | — | — | none | none<br>required<br>for<br>4CS250R<br>see SK-600<br>listing. |
|---------------------------------|---------------------------------------|---|---|---|------|--------------------------------------------------------------|

\*High alumina ceramic body for heat-sink application; with threaded inserts.

†Same as SK-660, threaded inserts deleted.

‡BeO body for heat-sink application.

|         |                    |      |     |        |      |                   |
|---------|--------------------|------|-----|--------|------|-------------------|
| SK-680* | 4CW800B<br>4CW800F | 6000 | 500 | screen | none | none<br>required  |
|         | 4CX600B<br>4CX600F |      |     |        |      | none<br>available |

\*SK-680 is a screen bypass unit and fastens directly to tube.

|        |                                        |      |     |        |            |                  |
|--------|----------------------------------------|------|-----|--------|------------|------------------|
| SK-700 | 4CX125C<br>4CX125F                     | 1100 | 400 | screen | one heater | none<br>required |
|        | 4CX300A<br>8167<br><br>4CX300Y<br>8561 |      |     |        |            | SK-606           |

## SOCKETS AND CHIMNEYS

| Air-System<br>Socket | Tube              | Bypass Capacitor |                 |                     | Grounded<br>Contacts  | Chimney |
|----------------------|-------------------|------------------|-----------------|---------------------|-----------------------|---------|
|                      |                   | PF               | Voltage<br>DCWV | Element<br>Bypassed |                       |         |
| SK-710<br>SK-711A*   | same as<br>SK-700 | 1100             | 400             | screen              | cathode<br>one heater | SK-606  |
| SK-712A*             |                   |                  |                 |                     | one heater            |         |

\*Same as SK-710 with encapsulated bypass capacitor.

|                   |                                      |   |   |   |        |                   |
|-------------------|--------------------------------------|---|---|---|--------|-------------------|
| SK-740            | same as<br>SK-700<br>plus:<br>4CN15A | — | — | — | none   | none<br>available |
| SK-760<br>SK-761* | same as<br>SK-700<br>plus:<br>4CN15A | — | — | — | none   | integral          |
| SK-770            |                                      |   |   |   | screen |                   |

\*SK-761 is a low capacitance version of the SK-760

|                     |                         |      |     |        |                       |                  |
|---------------------|-------------------------|------|-----|--------|-----------------------|------------------|
| SK-800B             | 4CV1500B                | 1500 | 400 | screen | none                  | none<br>required |
| SK-810B<br>SK-890B* | <u>4CX1000A</u><br>8168 |      |     |        | cathode<br>one heater | SK-806           |
|                     | <u>4CX1500B</u><br>8660 |      |     |        |                       | none<br>required |
|                     | <u>4CW2000A</u><br>8244 |      |     |        |                       |                  |

\*Same as SK-800B with screen bypass capacitor isolated from screen contacts.

|         |                                            |      |      |         |            |                  |
|---------|--------------------------------------------|------|------|---------|------------|------------------|
| SK-820  | <u>4CX1000K</u><br>8352                    | 500  | 400  | cathode | screen     | SK-806           |
| SK-830A | <u>4CX1000K</u><br>8352                    | 2500 | 1000 | screen  | cathode    | SK-806           |
| SK-831  | <u>4CX1500A</u><br><u>4CX1000K</u><br>8352 | 2500 | 1000 | screen  | none       | SK-806           |
| SK-840  | 5CX1500A                                   | 2500 | 1000 | screen  | suppressor | SK-806           |
| SK-860  | <u>3CX1000A7</u><br>8283                   | —    | —    | —       | none       | SK-816           |
| SK-861  | 3CV1500A7                                  | —    | —    | —       | none       | none<br>required |
| SK-870  | <u>3CX1000A7</u><br>8283                   | —    | —    | —       | grid       | SK-816           |
| SK-871  | 3CV1500A7                                  | —    | —    | —       | grid       | none<br>required |

## SOCKETS AND CHIMNEYS

| Air-System<br>Socket | Tube                                                     | Bypass Capacitor |                  |                     | Grounded<br>Contacts | Chimney                   |
|----------------------|----------------------------------------------------------|------------------|------------------|---------------------|----------------------|---------------------------|
|                      |                                                          | PF               | Voltage<br>DCV/V | Element<br>Bypassed |                      |                           |
| SK-900               | 4X500A                                                   | 650              | 700              | screen              | none                 | SK-906                    |
| SK-1300              | 3CW10,000A3<br>3CW20,000A1<br>3CW20,000A3<br>3CW20,000A7 | —                | —                | —                   | none                 | none<br>required          |
|                      | 3CX5000A3                                                |                  |                  |                     |                      | Y-463                     |
|                      | <u>3CX10,000A1</u><br>8158                               |                  |                  |                     |                      | SK-1306                   |
|                      | <u>3CX10,000A3</u><br>8159                               |                  |                  |                     |                      |                           |
|                      | <u>3CX10,000A7</u><br>8160                               |                  |                  |                     |                      |                           |
|                      | 3CX15,000A3<br>3CX15,000A7                               |                  |                  |                     |                      | none<br>available         |
|                      | 3CX20,000A3<br>3CX20,000A7                               |                  |                  |                     |                      |                           |
| SK-1310              | 3CV30,000A1<br>3CV30,000A3                               | —                | —                | —                   | —                    | none<br>required          |
| SK-1320              | 3CX5000A3                                                | —                | —                | —                   | grid                 | Y-463                     |
|                      | same as<br>SK-1300                                       |                  |                  |                     |                      | see<br>SK-1300<br>listing |
| SK-1400A             | <u>4CX3000A</u><br>8169                                  | 1800             | 1000             | screen              | none                 | SK-1406                   |
| SK-1420              | 5CX3000A                                                 | 1800             | 1000             | screen              | suppressor           | SK-1426                   |
| SK-1470A             | <u>4CX3000A</u><br>8169                                  | —                | —                | —                   | screen               | SK-1406                   |
| SK-1490              | 4CV8000A                                                 | —                | —                | —                   | —                    | none<br>required          |
| SK-1500*<br>SK-1510† | <u>4CX35,000C</u><br>8349                                | —                | —                | —                   | —                    | none<br>available         |
|                      | 4CV100,000C<br>4CW100,000D                               |                  |                  |                     |                      | none<br>required          |

\*Special assembly for stem cooling and mounting flanges. Bypass capacitors available.

†Modified SK-1500. Tube seating device added.

|                    |                            |                                                           |  |  |   |   |
|--------------------|----------------------------|-----------------------------------------------------------|--|--|---|---|
| SK-1710<br>SK-1712 | 4CV250,000A<br>4CW250,000A | Filament Connector (2 required)<br>Control Grid Connector |  |  | — | — |
|--------------------|----------------------------|-----------------------------------------------------------|--|--|---|---|

## SOCKETS AND CHIMNEYS

| Air-System Socket | Tube                                                                | Bypass Capacitor       |              |                  | Grounded Contacts | Chimney       |
|-------------------|---------------------------------------------------------------------|------------------------|--------------|------------------|-------------------|---------------|
|                   |                                                                     | PF                     | Voltage DCWV | Element Bypassed |                   |               |
| SK-1920           | 8873<br>8560A<br>8560AS                                             | Anode BeO Thermal Link |              |                  | —                 | —             |
| SK-2000*          | 4CV50,000E<br>4CV50,000J<br>4CW50,000E<br>4CW50,000J<br>4CW100,000E | 7200                   | 4000         | screen           | filament          | none required |

\*Recommended for video or pulse regulator applications.

|          |                          |        |      |        |      |               |
|----------|--------------------------|--------|------|--------|------|---------------|
| SK-2001* | same as SK-2000          | 7200   | 4000 | screen | none | none required |
| SK-2011† | same as SK-2000          | 11,000 | 4000 | screen | none | none required |
| SK-2200  | <u>3CX1500A7</u><br>8877 | —      | —    | —      | none | SK-2216       |
| SK-2210  | <u>3CX1500A7</u><br>8877 | —      | —    | —      | grid | SK-2216       |
| SK-2220  | 8938‡                    | —      | —    | —      | grid | SK-2216       |

\*Recommended for video or pulse regulator applications.

‡Note: Collets are available separately; see collet listing.

†Preferred for radio frequency applications

## TUBE COLLETS

For 3CW5000A1, 3CW5000A3, 3CX2500A3 and 3CX3000A7

| Terminal         | EIMAC Part Number |
|------------------|-------------------|
| Filament (inner) | 149575            |
| Filament (outer) | 149576            |

For 3CX400U7

| Terminal       | EIMAC Part Number |
|----------------|-------------------|
| Heater (inner) | 008290            |
| Heater (outer) | 008291            |
| Cathode        | 008292            |
| Grid           | 882931            |
| Anode          | 154418            |

For 4X150G, 4CX250K, 4CX250M, 4CPX250K

| Terminal | EIMAC Part Number |
|----------|-------------------|
| Heater   | 008290            |
| Cathode  | 008291            |
| Grid     | 008292            |
| Screen   | 882931            |
| Anode    | 008294            |

For 8873, 8874, 8875

| Terminal          | EIMAC Part Number |
|-------------------|-------------------|
| Grid              | 882931            |
| Anode (8874 only) | 008294            |

For 8877/3CX1500A7

| Terminal | EIMAC Part Number |
|----------|-------------------|
| Grid     | 135305            |
| Anode    | 135304            |

For 8938, 8962

| Terminal       | EIMAC Part Number |
|----------------|-------------------|
| Heater (inner) | 135310            |
| Heater (outer) | 135307            |
| Cathode        | 135306            |
| Grid           | 135305            |
| Anode          | 135304            |

For 8963

| Terminal       | EIMAC Part Number |
|----------------|-------------------|
| Heater (inner) | 154373            |
| Heater (outer) | 154374            |
| Grid           | 154375            |
| Anode          | 154376            |

For X-2159, X-2170, X-2176, X-2177

| Terminal                           | EIMAC Part Number |
|------------------------------------|-------------------|
| Filament power and water connector | SK-2310           |
| X-2159 (3 required)                |                   |
| X-2170 (2 required)                |                   |
| X-2176 (3 required)                |                   |
| X-2177 (2 required)                |                   |
| Filament RF Connector              | SK-2315           |
| X-2159 (1 required)                |                   |
| X-2170 (1 required)                |                   |
| X-2176 (1 required)                |                   |
| X-2177 (1 required)                |                   |
| Anode Water Connector              | SK-2320           |
| X-2159 (2 required)                |                   |
| X-2170 (2 required)                |                   |
| Alternate Anode Water Connector    | SK-2321           |
| X-2159 (2 required)                |                   |
| X-2170 (2 required)                |                   |

## HEAT DISSIPATING CONNECTORS

EIMAC HR Heat-Dissipating Connectors are used to make electrical connections to the plate and grid terminals of EIMAC Tubes, and at the same time, provide efficient heat transfer from the tube element and glass seal to the air. These connectors are machined from solid dural rod and are supplied with the necessary set screws. For marking per MIL-STD-130B add prefix letter "M" to the part number for connectors HR-4 through HR-10. Note HR-1 through HR-3 are too small to permit marking.



| TYPE  | Height   | Dia.   | Hole Dia. |
|-------|----------|--------|-----------|
| HR-1  | 11/16"   | 1/2"   | .052"     |
| HR-2  | 11/16"   | 1/2"   | .062"     |
| HR-3  | 11/16"   | 1/2"   | .072"     |
| HR-4  | 7/8"     | 3/4"   | .102"     |
| HR-5  | 7/8"     | 3/4"   | .127"     |
| HR-6  | 7/8"     | 3/4"   | .367"     |
| HR-7  | 1-11/32" | 1-3/8" | .127"     |
| HR-8  | 1-11/32" | 1-3/8" | .575"     |
| HR-9  | 4-11/32" | 1-3/8" | .569"     |
| HR-10 | 1-11/32" | 1-3/8" | .510"     |

## RECOMMENDED CONNECTORS FOR USE WITH EACH EIMAC TUBE TYPE

| Tube          | Plate Connector | Grid Connector |
|---------------|-----------------|----------------|
| 2-25A         | HR-1            | —              |
| 2-50A         | HR-3            | —              |
| 2-150D        | HR-6            | —              |
| 2-2000A       | HR-8            | —              |
| 3C24          | HR-1            | HR-1           |
| 3-500Z        | HR-6            | —              |
| 3-1000Z/8164  | HR-8            | —              |
| 4-65A         | HR-6            | —              |
| 4-125A/4D21   | HR-6            | —              |
| 4-250A/5D22   | HR-6            | —              |
| 4-400A/8438   | HR-6            | —              |
| 4-400B/7527   | HR-6            | —              |
| 4-400C        | HR-6            | —              |
| 4PR60C/8252W  | HR-8            | —              |
| 4PR65A/8187   | HR-6            | —              |
| 4PR125A/8247  | HR-6            | —              |
| 4PR250C/8248  | HR-6            | —              |
| 4PR1000A/8189 | HR-8            | —              |
| 4-500A        | HR-6            | —              |
| 4-1000A/8189  | HR-8            | —              |
| 5-500A        | HR-6            | —              |
| 6C21          | HR-8            | HR-8           |
| 25T           | HR-1            | —              |
| 35T           | HR-3            | —              |
| 75TH-TL       | HR-3            | HR-2           |
| 100TH-TL      | HR-6            | HR-2           |
| 152TH-TL      | HR-5            | HR-6           |
| 175A          | HR-6            | —              |
| 177WA         | HR-6            | —              |
| 250R          | HR-6            | —              |
| 250TH-TL      | HR-6            | HR-3           |
| 253           | HR-8            | —              |
| 254W          | HR-3            | HR-3           |
| 279           | HR-6            | —              |
| 284           | HR-6            | —              |

| Tube        | Plate Connector | Grid Connector |
|-------------|-----------------|----------------|
| 304TH-TL    | HR-7            | HR-6           |
| 450TH-TL    | HR-8            | HR-8           |
| 592/3-200A3 | HR-10           | HR-5           |
| 750TL       | HR-8            | HR-8           |
| 1000T       | HR-9            | HR-9           |
| 1500T       | HR-8            | HR-8           |
| 2000T       | HR-8            | HR-8           |
| 5867A       | HR-6            | —              |
| 6155        | HR-6            | —              |
| 6156        | HR-6            | —              |
| 6559        | HR-6            | —              |
| 6580        | HR-6            | —              |
| 6775        | HR-6            | —              |
| 7527        | HR-6            | —              |
| 8960        | HR-6            | —              |

## TUBE PULLERS



SK-604

This tube puller is designed for use in removing coaxial-base and 9-pin-base tubes from their sockets without damage. The 4X150 series and 4CX250 series tubes may be removed with this puller. SK-604A has a bonderize finish, SK-604B is nickel-plated.

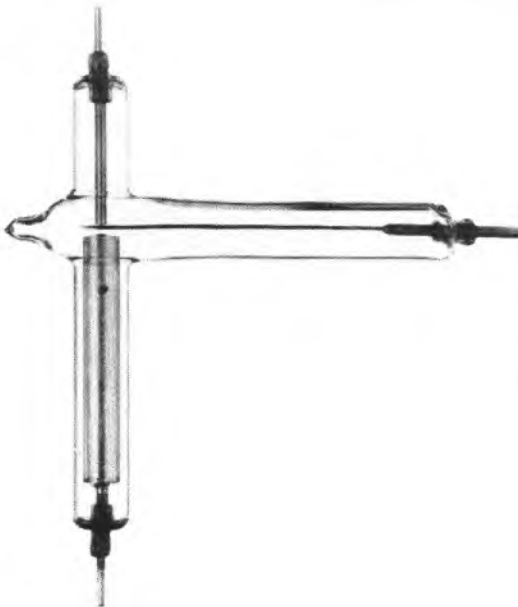


SK-605

These special pliers are designed for use in removing breechblock base tubes from their sockets without damage. The 4CX300 series and 4CX1000 series tubes may be removed with these pliers.

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## VACUUM SWITCHES

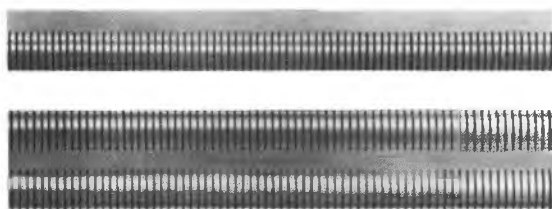


EIMAC Vacuum Switches are designed for pulse service or RF switching. For details inquire EIMAC, Division of Varian.

| Type | Intended Service | Insulation | Current      | Peak Test Voltage | DC Coil      |
|------|------------------|------------|--------------|-------------------|--------------|
| VS-2 | RF               | Glass      | 5a (30 MHz)  | 20 KV             | 12 V<br>24 V |
| VS-4 | RF               | Glass      | 5a (30 MHz)  | 20 KV             | 12 V<br>24 V |
| VS-6 | Pulse            | Glass      | 150a (Pulse) | 22 KV             | 12 V<br>24 V |

12- or 24- volt coils available on order

## PREFORMED CONTACT FINGER STOCK



EIMAC Preformed Finger Stock is a prepared strip of spring material slotted and formed into a series of fingers designed to make a sliding contact. It is especially suitable for making connections to tubes with coaxial terminals or to moving parts, such as long-line and cavity circuits or screen-room doors. EIMAC finger stock is available in 9 different shapes and sizes, three of which incorporate "spooned" contact fingers. All sizes come in standard 36 inch lengths. Standard stock is heat treated and silver plated. EIMAC Contact Finger Stock is available on special factory order in the following semi-finished states: Slotted and formed (Not heat treated or plated). Slotted, formed, and heat treated (Not plated) Slotted, formed, and plated (Not heat treated).

| Type   | Finger Radius<br>(inches) | Finger Width<br>(inches) | Slot Width<br>(inches) | Slot Depth<br>(inches) | Comments                            |
|--------|---------------------------|--------------------------|------------------------|------------------------|-------------------------------------|
| CF-100 | 1/16                      | 1/8                      | 0.040                  | 9/32                   | spooned                             |
| CF-200 | 1/16                      | 1/8                      | 0.040                  | 9/32                   | double-edged                        |
| CF-300 | 13/64                     | 1/8                      | 0.040                  | 19/32                  | finger tip has reverse radius       |
| CF-400 | 13/64                     | 1/8                      | 0.040                  | 35/64                  | double-edged                        |
| CF-500 | 16/32                     | 1/8                      | 0.040                  | 7/8                    | finger tip has reverse radius       |
| CF-600 | 15/32                     | 1/8                      | 0.040                  | 29/32                  | double-edged with reverse tip radii |
| CF-700 | 1/16                      | 1/8                      | 0.040                  | 9/32                   | spooned                             |
| CF-800 | 1/16                      | 1/8                      | 0.040                  | 15/32                  | spooned and bent                    |
| CF-900 | 0.030                     | 1/16                     | 0.020                  | 15/64                  | smallest fingers                    |

# VARIAN/EIMAC SALES OFFICE LOCATIONS

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