

# AMPEREX TUBE TYPE 6078

The 6078 is a three-electrode, forced-air cooled tube designed for use as a radio-frequency power amplifier, oscillator and modulator. The anode is capable of dissipating 45 kw. The cathode is a thoriated-tungsten filament. Maximum ratings apply up to 15 Mc. At reduced ratings it may be operated up to 30 megacycles.

## GENERAL CHARACTERISTICS

### ELECTRICAL DATA

|  | Min. | Bogey | Max. |         |
|--|------|-------|------|---------|
| Filament Voltage                             | 16.6 | 17.5  | 18.4 | volts   |
| Filament Current at Bogey Voltage            | 180  | 196   | 212  | amperes |
| Filament Starting Current <sup>1</sup>       | —    | —     | 420  | amperes |
| Filament Cold Resistance                     | —    | 0.012 | —    | ohms    |
| Amplification Factor (Ib=5 amps., Eb=10 kv.) | 23   | 27    | 31   |         |
| Peak Cathode Current <sup>2</sup>            | —    | —     | 120  | amperes |
| Direct Interelectrode Capacitances           |      |       |      |         |
| Grid-Plate                                   | 77   | 86    | 95   | μμf     |
| Grid-Filament                                | 98   | 116   | 134  | μμf     |
| Plate-Filament                               | 2.5  | 3.4   | 4.3  | μμf     |

### MECHANICAL DATA

Mounting Position—vertical, anode down

Air Cooling of Anode—Cooling must be started before filament voltage is applied, and continued for 5 minutes after filament voltage is removed.

### COOLING DATA

| Plate Dissipation (kilowatts) | Elevation (feet) | Max. Inlet Air Temperature (degrees C.) | Air Flow (cu. ft./min.) | Inlet Air Pressure (inches water) |
|-------------------------------|------------------|---|-------------------------|-----------------------------------|
| 30                            | 0                | 35                                      | 1235                    | 4.45                              |
|                               | 0                | 45                                      | 1412                    | 5.58                              |
|                               | 5,000            | 35                                      | 1483                    | 5.3                               |
| 45                            | 10,000           | 25                                      | 1553                    | 5.15                              |
|                               | 0                | 35                                      | 1907                    | 10.72                             |
|                               | 0                | 45                                      | 2205                    | 13.1                              |
|                               | 5,000            | 35                                      | 2277                    | 12.56                             |
|                               | 10,000           | 25                                      | 2401                    | 12.44                             |

Above 6 Mc the anode and grid-seals must be cooled. This is accomplished by air flowing through the slots provided at the top of the air flow chamber. In certain cases, e.g. at low anode dissipation and cooling with the minimum quantity of air, the air flow to the seals will not be sufficient to maintain the seal temperature below the max. permissible value at frequencies above 6 Mc. Consequently, in these cases, a larger quantity of air must be supplied.

Glass Temperature at Seals . . . . . max. 180° C.  
 Net Weight (approx.) . . . . . 66 Pounds

### ACCESSORIES

Air Flow Chamber . . . . . Amperex #S-3740  
 Filament Connector . . . . . Amperex #S-3739

<sup>1</sup>Peak value.  
<sup>2</sup>Represents maximum usable cathode current (plate current plus grid current) for any condition of operation.

## MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

### Audio-Frequency Power Amplifier and Modulator—Class B

|   | Maximum Ratings, Absolute Values |      |               |
|---|----------------------------------|------|---------------|
|   | CCS                              |      |               |
| D.C. Plate Voltage                                    | 12 kilovolts max.                |      |               |
| Maximum Signal D.C. Plate Current <sup>1</sup>        | 12 amperes max.                  |      |               |
| Maximum Signal Plate Input <sup>1</sup>               | 162 kilowatts max.               |      |               |
| Plate Dissipation                                     | 45 kilowatts max.                |      |               |
| Typical Operation                                     |                                  |      |               |
| Unless otherwise specified, values are for two tubes. |                                  |      |               |
|   | CCS                              |      | CCS           |
| D.C. Plate Voltage                                    | 8                                | 8.5  | 9 kilovolts   |
| D.C. Grid Voltage                                     | -300                             | -325 | -350 volts    |
| Peak A-F Grid to Grid Voltage                         | 1120                             | 1200 | 1300 volts    |
| Zero Signal D.C. Plate Current                        | 0.5                              | 0.5  | 0.5 amperes   |
| Maximum Signal D.C. Plate Current                     | 8.2                              | 8.8  | 9.6 amperes   |
| Effective Load Resistance, Plate to Plate             | 2210                             | 2120 | 2080 ohms     |
| Maximum Signal Driving Power, approximate             | 0.5                              | 0.6  | 0.8 kilowatts |
| Maximum Signal Power Output, approximate              | 46.8                             | 54   | 62 kilowatts  |
| D.C. Plate Voltage                                    | 10                               | 10   | 12 kilovolts  |
| D.C. Grid Voltage                                     | -400                             | -375 | -450 volts    |
| Peak A-F Grid to Grid Voltage                         | 1450                             | 1480 | 2060 volts    |
| Zero Signal D.C. Plate Current                        | 0.4                              | 1    | 1.3 amperes   |
| Maximum Signal D.C. Plate Current                     | 10.8                             | 13.2 | 24 amperes    |
| Effective Load Resistance, Plate to Plate             | 2050                             | 1700 | 1200 ohms     |
| Maximum Signal Driving Power, approximate             | 1                                | 1.2  | 4.8 kilowatts |
| Maximum Signal Power Output, approximate              | 77                               | 93   | 202 kilowatts |

### Plate-Modulated Radio-Frequency Power Amplifier—Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0.

|                                | Maximum Ratings, Absolute Values |  |  |
|--------------------------------|----------------------------------|--|--|
|                                | CCS                              |  |  |
| D.C. Plate Voltage             | 10 kilovolts max.                |  |  |
| D.C. Grid Voltage              | -1200 volts max.                 |  |  |
| D.C. Plate Current             | 9 amperes max.                   |  |  |
| D.C. Grid Current              | 3 amperes max.                   |  |  |
| Plate Input                    | 90 kilowatts max.                |  |  |
| Plate Dissipation              | 30 kilowatts max.                |  |  |
| Typical Operation              |                                  |  |  |
|                                | CCS                              |  |  |
| D.C. Plate Voltage             | 10 kilovolts                     |  |  |
| D.C. Grid Voltage              | -1050 volts                      |  |  |
| Peak R-F Grid Voltage          | 1750 volts                       |  |  |
| D.C. Plate Current             | 8.5 amperes                      |  |  |
| D.C. Grid Current, approximate | 2.6 amperes                      |  |  |
| Driving Power, approximate     | 4.1 kilowatts                    |  |  |
| Power Output, approximate      | 65 kilowatts                     |  |  |

### Radio-Frequency Power Amplifier and Oscillator—Class C Telegraphy

Key-down conditions per tube without amplitude modulation<sup>1</sup>

|   | Maximum Ratings, Absolute Values |     |               |
|---|----------------------------------|-----|---------------|
|   | CCS                              |     |               |
| D.C. Plate Voltage  | 12 kilovolts max. <sup>2</sup>   |     |               |
| D.C. Grid Voltage   | -1250 volts max.                 |     |               |
| D.C. Plate Current  | 12 amperes max.                  |     |               |
| D.C. Grid Current   | 3 amperes max.                   |     |               |
| Plate Input   | 144 kilowatts max. <sup>2</sup>  |     |               |
| Plate Dissipation   | 45 kilowatts max.                |     |               |
| Typical Operation   |                                  |     |               |
|   | CCS                              |     |               |
| D.C. Plate Voltage  | 12 kilovolts                     |     |               |
| D.C. Grid Voltage   | -1000 volts                      |     |               |
| Peak R-F Grid Voltage   | 1700 volts                       |     |               |
| D.C. Plate Current  | 12 amperes                       |     |               |
| D.C. Grid Current, approximate  | 2.25 amperes                     |     |               |
| Driving Power, approximate  | 3.5 kilowatts                    |     |               |
| Power Output, approximate   | 108 kilowatts                    |     |               |
| Maximum ratings apply up to 15 megacycles. The tube may be operated at higher frequencies provided the maximum values of plate voltage and power input are reduced according to the tabulation below (other maximum ratings are the same as shown above). Special attention should be given to adequate ventilation of the bulb at these frequencies. |                                  |     |               |
| At frequencies up to 4 megacycles the plate voltage and input in Class C telephony and as radio-frequency Class B amplifier may be increased as mentioned under these headings.   |                                  |     |               |
| Frequency   | 15                               | 20  | 30 megacycles |
| Percentage of Maximum   |                                  |     |               |
| Rated Plate Voltage   |                                  |     |               |
| Class B   | 100                              | 100 | 83 per cent   |
| Class C Plate Telegraphy  | 100                              | 100 | 80 per cent   |
| Class C Telegraphy  | 100                              | 100 | 83 per cent   |
| Percentage of Maximum   |                                  |     |               |
| Rated Plate Input   |                                  |     |               |
| Class B   | 100                              | 87  | 47 per cent   |
| Class C Plate Telegraphy  | 100                              | 82  | 50 per cent   |
| Class C Telegraphy  | 100                              | 87  | 47 per cent   |

### Characteristic Range Values for Equipment Design

| Characteristic     | Conditions   | Limits   |       |               |
|--------------------|--|----------|-------|---------------|
|                    |  | Min.     | Bogey | Max.          |
| Grid Voltage       | Eb=2.5 kilovolts<br>Ib=70 amperes                                      | —        | —     | 980 volts     |
| Grid Current       | Eb=2.5 kilovolts<br>Ib=70 amperes                                      | —        | —     | 25 amperes    |
| Plate Voltage      | Ea=0 volts<br>Ib=5 amperes   | Eb: 2.6  | 3.1   | 3.6 kilovolts |
| Grid Voltage       | Eb=12 kilovolts<br>Ib=4.2 amperes                                      | Ec: -280 | -320  | -375 volts    |
| Plate Power Output | Ea=12 kilovolts<br>Ib=12 amperes<br>Ic=2.25 amperes<br>f=15 megacycles | Pa: 100  | —     | — kilowatts   |
| Plate Power Output | Ea=10 kilovolts<br>Ib=6.7 amperes<br>Ic=1.4 amperes<br>f=30 megacycles | Pa: 45   | —     | — kilowatts   |
| Plate Current      | Ea=12 kilovolts<br>Ic=500 volts  | Ib: —    | —     | 0.25 amperes  |

<sup>1</sup>Averaged over any audio-frequency cycle of sine-wave form.  
<sup>2</sup>Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115 per cent of the carrier conditions.

<sup>3</sup>At frequencies up to 4 megacycles the plate voltage and the plate input may be increased to 15 kilovolts and 186 kilowatts respectively.

