DESCRIPTION

The ML-6424 and ML-6425 are general-purpose triodes suitable for industrial heating, AM broadcasting and pulse modulation. These tubes feature coaxial mounting structures providing high-dissipation, low-inductance rf electrode terminals. The cathode of each type consists of sturdy, self-supporting, stress-free, thoriated-tungsten filaments.

The ML-6424 has a water-cooled, heavy-wall anode capable of dissipating 20 kW. The ML-6425 has a forced-air-cooled, heavy-wall anode with high-efficiency disc fins.

The ML-6425-F has an anode fin construction which fits tube supports used with the type 5604.

These tubes will operate with plate voltages up to 12.5 kV in CW operation or 35 kV in pulse modulator service. Maximum ratings apply at frequencies up to 30 Mc. Useful power output can be obtained at frequencies up to 70 Mc with reduced ratings. In a typical pulse modulator application these tubes are capable of switching 900 kW.

GENERAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Electrical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament Voltage</td>
<td>7.0 volts</td>
</tr>
<tr>
<td>Filament Current</td>
<td>120 amps</td>
</tr>
<tr>
<td>Filament Starting Current, maximum</td>
<td>550 amps</td>
</tr>
<tr>
<td>Filament Cold Resistance</td>
<td>0.007 ohms</td>
</tr>
<tr>
<td>Amplification Factor</td>
<td>20</td>
</tr>
<tr>
<td>Interelectrode Capacitances</td>
<td></td>
</tr>
<tr>
<td>Grid-Plate</td>
<td>27 μF</td>
</tr>
<tr>
<td>Grid-Filament</td>
<td>34 μF</td>
</tr>
<tr>
<td>Plate-Filament</td>
<td>2.0 μF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical, anode down</td>
<td></td>
</tr>
<tr>
<td>Type of Cooling ML-6424</td>
<td></td>
</tr>
<tr>
<td>Type of Cooling ML-6425 &amp; ML-6425-F</td>
<td></td>
</tr>
<tr>
<td>Air flow on anode:</td>
<td></td>
</tr>
<tr>
<td>ML-6425, minimum for 12.5 kW dissipation</td>
<td>7 cfm</td>
</tr>
<tr>
<td>ML-6425-F, minimum for 11 kW dissipation</td>
<td>50 °C</td>
</tr>
<tr>
<td>Maximum outgoing water temperature</td>
<td>70 °C</td>
</tr>
<tr>
<td>Maximum incoming air temperature</td>
<td>165 °C</td>
</tr>
<tr>
<td>Net Weight, approximately</td>
<td>10 lbs</td>
</tr>
<tr>
<td>ML-6424</td>
<td></td>
</tr>
<tr>
<td>ML-6425</td>
<td></td>
</tr>
<tr>
<td>ML-6425-F</td>
<td></td>
</tr>
</tbody>
</table>

*When used with Machlett ML-6425 Air Distributor F-17797.
†At frequencies up to 15 Mc, normal cabinet ventilation should be sufficient to cool glass portion of tube. At higher frequencies or high ambient temperature, auxiliary air flow of 25-50 cfm may be required and should be distributed to maintain uniform glass temperature, not greater than 165°C, around the circumference of the seals.
Audio-Frequency Power Amplifier and Modulator
Class B

Maximum Ratings, Absolute Values

D-C Plate Voltage .......................... 12500 volts
Max.-Signal D-C Plate Current* .............. 3.5 amps
Max.-Signal Plate Input* .................. 40 amps
Plate Dissipation* .............................................
ML-6424 .................................. 20 kW
ML-6425 .................................. 12.5 kW
ML-6425-F .................................. 11 kW

Typical Operation (Values are for two tubes)
ML-6424
D-C Plate Voltage .......................... 8500 12000 volts
D-C Grid Voltage .......................... —380 —560 volts
Peak-A-F Grid-to-Grid Voltage .............. 2020 2260 volts
Peak A-F Plate-to-Plate Voltage ............ 14000 20400 volts
Zero-Signal D-C Plate Current .................. 0.4 0.6 amp
Max.-Signal D-C Plate Current .............. 6.9 6.5 amps
Effective Load Resistance, Plate-to-Plate ...... 2550 3900 ohms
Max.-Signal Driving Power, approx. ....... 400 260 watts
Max.-Signal Power Output, approx. ...... 38 53 kW

* Averaged over any a-f cycle of sine-wave form.

Radio-Frequency Power Amplifier
Class B

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

Maximum Ratings, Absolute Values

D-C Plate Voltage .......................... 12500 volts
D-C Plate Current .......................... 2.8 2.5 amps
ML-6424 & ML-6425-F ......................
Plate Input .............................................
ML-6424 .................................. 30.0 kW
ML-6425 .................................. 19.0 kW
ML-6425-F .................................. 16.5 kW
Plate Dissipation ..........................................
ML-6424 .................................. 20 kW
ML-6425 .................................. 12.5 kW
ML-6425-F .................................. 11 kW

Typical Operation
ML-6424
D-C Plate Voltage .......................... 10000 10000 volts
D-C Grid Voltage .......................... —420 —420 volts
Peak R-F Grid Voltage ....................... 510 540 volts
Peak R-F Plate Voltage ....................... 4200 4200 volts
D-C Plate Current .......................... 1.65 1.80 amps
D-C Grid Current .......................... 0 0 mA
R-F Load Resistance ......................... 1600 1500 ohms
Driving Power, approx.§ ................. 170 200 watts
Power Output, approx. .............. 5.5 6.0 kW

§ At crest of a-f cycle with modulation factor of 1.0.

Plate-Modulated R-F Power Amplifier
Class C Telephony

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

Maximum Ratings, Absolute Values

D-C Plate Voltage .......................... 9000 volts
D-C Grid Voltage .......................... —2000 volts
D-C Plate Current .......................... 2.5 0.50 amp
D-C Grid Current .......................... 0.30 amp
Plate Input .............................................
ML-6424 .................................. 22 kW
ML-6425 .................................. 8 kW
ML-6425-F .................................. 7.5 kW
Plate Dissipation ..........................................
ML-6424 .................................. 13 kW
ML-6425 .................................. 8 kW
ML-6425-F .................................. 7.5 kW

Typical Operation
ML-6424
D-C Plate Voltage .......................... 8500 12000 volts
D-C Grid Voltage .......................... —1400 0 volts
Peak R-F Grid Voltage ....................... 2000 0 volts
Peak R-F Plate Voltage ....................... 7000 0 volts
D-C Plate Current .......................... 1.8 0.17 amp
D-C Grid Current .......................... 0.17 0.17 amp
R-F Load Resistance ......................... 2200 0 ohms
Driving Power, approx. ................. 330 0 watts
Power Output, approx. .............. 12.1 0 kW

R-F Power Amplifier and Oscillator
Class C Telegraphy

Key-down conditions per tube without amplitude modulation.†

Maximum Ratings, Absolute Values

D-C Plate Voltage .......................... 12500 volts
D-C Grid Voltage .......................... —2000 volts
D-C Plate Current .......................... 3.5 0.50 amp
D-C Grid Current .......................... 0.30 amp
Plate Input .............................................
ML-6424 .................................. 40 kW
ML-6425 .................................. 12.5 kW
ML-6425-F .................................. 11 kW
Plate Dissipation ..........................................
ML-6424 .................................. 20 kW
ML-6425 .................................. 12.5 kW
ML-6425-F .................................. 11 kW

Typical Operation
ML-6424
D-C Plate Voltage .......................... 10000 12000 12000 volts
D-C Grid Voltage .......................... —1000 —1000 —1000 volts
Peak R-F Grid Voltage ....................... 1750 1620 1740 volts
Peak R-F Plate Voltage ....................... 8400 10500 10500 volts
D-C Plate Current .......................... 3.2 2.6 3.3 3.3 amp
D-C Grid Current .......................... 0.25 0.25 0.25 0.25 amp
R-F Load Resistance ......................... 1450 2300 1800 ohms
Driving Power, approx. ................. 430 250 430 430 watts
Power Output, approx. .............. 24.4 24.2 30.6 30.6 kW

† Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115% of the carrier conditions.

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Conditions</th>
<th>Limits</th>
<th>Minimum</th>
<th>Boguey</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid Voltage</td>
<td>e = 1500 volts; i = 14 amps</td>
<td>e =</td>
<td></td>
<td>950 volts</td>
<td></td>
</tr>
<tr>
<td>Grid Current</td>
<td>1500 volts; i = 14 amps</td>
<td>I =</td>
<td></td>
<td>4.0 amps</td>
<td></td>
</tr>
<tr>
<td>Plate Voltage</td>
<td>E = 0 Vdc; I = 1.5 Adc</td>
<td>E =</td>
<td></td>
<td>2.8 3.2 3.6 kVdc</td>
<td></td>
</tr>
<tr>
<td>Plate Voltage</td>
<td>—200 Vdc; I = 1.5 Adc</td>
<td>E =</td>
<td></td>
<td>6.4 7.2 8.0 kVdc</td>
<td></td>
</tr>
<tr>
<td>Grid Voltage</td>
<td>E = 10.0 kVdc; I = 0.02 A dc</td>
<td>E =</td>
<td></td>
<td>—470 —560 —650 kVdc; P =</td>
<td>25</td>
</tr>
<tr>
<td>Plate Power Output</td>
<td>ML-6424, ML-6425</td>
<td>I =</td>
<td></td>
<td>3.3 A dc; I = 0.25 A dc; P =</td>
<td>21</td>
</tr>
<tr>
<td>Plate Power Output</td>
<td>ML-6425-F</td>
<td>I =</td>
<td></td>
<td>2.6 A dc; I = 0.15 A dc; P =</td>
<td>21</td>
</tr>
<tr>
<td>ML-6424</td>
<td>ML-6425</td>
<td>ML-6425-F</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MAXIMUM FREQUENCY RATINGS

Frequency ....... 30 50 70 Mc
Percent Maximum Rated Plate Voltage and Plate Input
Class B .......... 100 90 70
Class C .......... 100 75 60

Maximum ratings apply up to 30 Mc except as noted. The tube may be operated at higher frequencies provided the maximum values of plate voltage and power input are reduced according to the tabulation on the right. (other maximum ratings are the same as shown above). Special attention should be given to adequate ventilation of the bulb at the higher frequencies.
Pulse Modulator or Pulse Amplifier

Maximum Ratings, Absolute Values

- D-C Plate Voltage: 35 kV
- Peak Plate Voltage: 35 kV
- Peak Positive Grid Voltage: -4800 volts
- Pulse Cathode Current: 45 amps
- Grid Dissipation: 400 watts
- Plate Dissipation: 12.5 kW
- Pulse Duration, approximate*: 1000 μsec
- Duty Factor*: 0.03

Typical Operation

- D-C Plate Voltage: 30 kV
- D-C Grid Voltage: -2000 volts
- Pulse Positive Grid Voltage: 1500 volts
- Pulse Plate Current: 36 amps
- Pulse Grid Current: 4 amps
- Pulse Driving Power: 16 kW
- Pulse Power Output: 900 kW
- Plate Output Voltage: 25 kW

*When ordering for this application add the suffix "P" to the Machlett tube number.

*For applications requiring longer pulse duration or higher duty factors, consult the Machlett Engineering Department.

WARNING: Operation of this tube may produce x-rays. Adequate rayproof shielding must therefore be provided in the equipment.

COOLING CHARACTERISTICS — ML-6424

COOLING CHARACTERISTICS — ML-6425

COOLING CHARACTERISTICS — ML-6425-F
CONSTANT GRID-VOLTAGE CHARACTERISTICS

$E_f = 7.0$ VOLTS

PLATE CURRENT
GRID CURRENT

$e_c =$ PEAK POSITIVE GRID VOLTAGE

PLATE VOLTAGE = KILOVOLTS

PEAK CURRENT = AMPERES