FULL-WAVE VACUUM RECTIFIER

Intended for critical industrial and aircraft applications where 10,000-hour life, extreme uniformity, rigid construction, and exceptional stability are paramount.

GENERAL DATA

Electrical:
Heaters, Pure Tungsten, for Unipotential Cathodes:
Of Units 1 & 2 connected in Series Parallel
Voltage ............ 12.6 ± 5%* 6.3 ± 5%* volts
Current ............ 1.2 2.4 amp

Mechanical:
Mounting Position .............................................. Any
Maximum Overall Length ...................................... 4-1/4"
Maximum Seated Length ...................................... 3-11/16"
Maximum Diameter ............................................ 1-23/32"
Bulb ................... Short Jumbo-Shell Octal 8-Pin, Non Hygroscopic
Bottom View
(JETEC No.B8-71)

RECTIFIER

Maximum Ratings, Absolute Values: For supply frequency of 60 cps

For Altitudes up to 40000 Feet

PEAK INVERSE PLATE VOLTAGE .............. 1120 max. volts
PEAK VOLTAGE BETWEEN PLATE OF
UNIT No.1 AND PLATE OF UNIT No.2 ........ 1120 max. volts
PEAK PLATE CURRENT PER PLATE ............... 375 max. ma
AC PLATE SUPPLY VOLTAGE (RMS) PER PLATE . See Rating Chart I
DC OUTPUT CURRENT PER PLATE ............... See Rating Chart I

HOT-SWITCHING CURRENT:
Even occasional hot-switching with capacitor-input circuits permits
the flow of plate currents having magnitudes which can adversely af-
fected the life and reliability of tubes designed for life values in the
order of 10000 hours. If capacitor-input circuits are to be used, 
protect the circuits against the possibility of hot-switching and do not
exceed a maximum peak current value per plate of 3 amperes during
the initial cycles of the hot-switching transient. If hot-switching
is required in operation, the use of choke-input circuits is recom-
...
FULL-WAVE VACUUM RECTIFIER

PEAK HEATER-CATHODE VOLTAGE:
Heater negative with respect to cathode... 400 max. volts
Heater positive with respect to cathode... 400 max. volts
BULB TEMPERATURE.......................... 200 max. °C

Typical Operation as Full-Wave Rectifier
with Capacitor-Input Filter:
AC Plate-to-Plate Supply Voltage (RMS)........ 700 volts
Filter-Input Capacitor.......................... 10 μf
Effective Plate-Supply Resistance per Plate... 350 ohms
DC Output Voltage at Input to Filter (Approx.):
At half-load current of 55 ma................. 415 volts
At full-load current of 110 ma............... 355 volts
Voltage Regulation (Approx.):
Half-load to full-load current.............. 60 volts

Typical Operation as Full-Wave Rectifier
with Choke-Input Filter:
AC Plate-to-Plate Supply Voltage (RMS)........ 700 volts
Filter Input Choke............................ 10 henries
DC Output Voltage at Input to Filter (Approx.):
At half-load current of 67.5 ma............. 305 volts
At full-load current of 135 ma............. 300 volts
Voltage Regulation (Approx.):
Half-load to full-load current............ 5 volts

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:
Impact Acceleration......................... 500 max. g
Tubes are held rigid in three different positions in a Navy Type, High Impact (flyweight) Shock Machine and are subjected to 500 g impact acceleration.

Fatigue Rating:
Vibrational Acceleration.................... 2.5 max. g
Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

<table>
<thead>
<tr>
<th>Note</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Current</td>
<td>1</td>
<td>2.30</td>
</tr>
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</table>

*For maximum reliability, it is recommended that the cathode of each unit be connected directly to the mid-point or one side of the heater winding.

*Higher values of capacitance than indicated may be used but the effective plate-supply resistance should be increased to prevent exceeding the maximum rating for peak plate current. See Rating Chart II.

APRIL 1, 1953

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 1
FULL-WAVE VACUUM RECTIFIER

<table>
<thead>
<tr>
<th>Note</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater-Cathode Current:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heater negative with respect to cathode</td>
<td>1, 2</td>
<td>30 μamp</td>
</tr>
<tr>
<td>Heater positive with respect to cathode</td>
<td>1, 2</td>
<td>30 μamp</td>
</tr>
<tr>
<td>Tube Voltage Drop</td>
<td>1, 3</td>
<td>15 19 volts</td>
</tr>
</tbody>
</table>

Note 1: With 6.3 volts on heater of unit No. 1 connected in parallel with heater of unit No. 2.

Note 2: With 300 volts between heater and cathode.

Note 3: With dc voltage per plate adjusted to give dc plate current of 150 mA, per unit.

RATING CHARTS and OPERATION CHARACTERISTICS

Rating Chart I represents graphically the relationships between absolute maximum ac voltage input and absolute maximum dc output current derived from the fundamental ratings for conditions of capacitor-input and choke-input filters. This graphical presentation gives the equipment designer considerable latitude in choice of operating conditions.

Rating Chart II represents graphically the relationships between maximum rectification efficiency and absolute maximum dc output current per plate for conditions of capacitor input to filter.

Rating Chart III represents graphically the relationships between minimum plate-supply resistance per plate and absolute maximum ac plate-supply voltage per plate under no-load conditions for conditions of capacitor input to filter when occasional hot-switching is employed.
The Operation Characteristics for the 5690 in Full-Wave Circuit with 4 μF, 10 μF, and 20 μF Capacitor Input to Filter show not only typical operating curves for different plate-supply voltages and different effective plate-supply resistances, but also by means of boundary line "AED" the limiting current and voltage relationships presented on Rating Chart I.

The Operation Characteristics for the 5690 in Full-Wave Circuit with Choke Input to Filter show not only typical operating curves for different plate-supply voltages but also by means of boundary line "ABC" the limiting current and voltage relationships presented on Rating Chart I. These curves also give information as to the effect of various sizes of chokes on regulation. The solid-line curves show the dc voltage outputs which would be obtained if the filter chokes had infinite inductance. The long-dash lines radiating from the zero position are boundary lines for various sizes of chokes as indicated. The intersection of one of these lines with a solid-line curve indicates the point on the curve at which the choke no longer behaves as though it had infinite inductance. To the left of the choke boundary line, the regulation curves depart from the solid-line curves as shown by the representative short-dash regulation curves.
E_F = 6.3 VOLTS/UNIT
MAX. PEAK PLATE CURRENT PER PLATE = 375 MA
RECTIFICATION EFFICIENCY = \frac{E}{\sqrt{2} E_S}

WHERE \ E = DC OUTPUT VOLTS AT INPUT TO FILTER
E_S = AC PLATE SUPPLY VOLTS (RMS) PER PLATE
RATING CHART III
CAPACITOR INPUT TO FILTER

$E_c = 6.3\text{ VOLTS/UNIT}$  MAX. HOT-SWITCHING CUR. = 3 AMP.
PLATE-SUPPLY RESISTANCE PER PLATE = $R_{\text{sec}} + N^2 R_{\text{pri}} + R_A$

WHERE

$R_{\text{sec}} = \text{DC RESISTANCE OF TRANSFORMER SECONDARY PER SECTION}$

$R_{\text{pri}} = \text{DC RESISTANCE OF TRANSFORMER PRIMARY}$

$R_A = \text{DC RESISTANCE OF ADDED SERIES RESISTANCE PER PLATE}$

$N = \text{TRANSFORMER VOLTAGE STEP-UP RATIO PER SECTION}$

AC PLATE SUPPLY VOLTS (RMS) PER PLATE—NO LOAD

MINIMUM PLATE-SUPPLY RESISTANCE PER PLATE—OHMS

JAN. 9, 1953  TUBE DEPARTMENT  92CM-7895
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
OPERATION CHARACTERISTICS
FULL-WAVE CIRCUIT, CAPACITOR INPUT TO FILTER

$E_p = 6.3$ VOLTS/UNIT
CAPACITOR (C) INPUT TO FILTER: $C = 4 \mu F$
TOTAL EFFECTIVE PLATE-SUPPLY RESISTANCE (OHMS) = $R_s$
SUPPLY FREQUENCY = 60 CPS

CURRENT-AND-VOLTAGE BOUNDARY LINE 'DEA IS THE SAME AS SHOWN ON RATING CHART I

MAY 9, 1952
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, MARRISON, NEW JERSEY

92CM-7794
OPERATION CHARACTERISTICS
FULL-WAVE CIRCUIT, CAPACITOR INPUT TO FILTER

$E_F = 6.3 \text{ VOLTS/UNIT}$
CAPACITOR (C) INPUT TO FILTER: $C = 10 \mu F$
TOTAL EFFECTIVE PLATE - SUPPLY RESISTANCE (OHMS) = $R_S$
SUPPLY FREQUENCY = 60 CPS

CURRENT-AND-VOLTAGE BOUNDARY LINE 'DEA' IS THE SAME AS SHOWN ON RATING CHART I

MAY 12, 1952
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
operation characteristics
full-wave circuit, capacitor input to filter

E_p = 6.3 volts/unit
Capacitor (C) input to filter: C = 20 \mu F
Total effective plate-supply resistance (ohms) = R_s
Supply frequency = 60 cps

Current-and-voltage boundary line 'DEA' is the same as shown on rating chart I

DC output volts at input to filter
DC load milliamperes

May 7, 1952
Tube Department
Radio Corporation of America, Harrison, New Jersey
OPERATION CHARACTERISTICS
FULL-WAVE CIRCUIT, CHOKE INPUT TO FILTER

$E_f = 6.3$ VOLTS/UNIT
SUPPLY FREQ. = 60 CPS
SOLID-LINE CURVES = CHOKE OF INFINITE
INDUCTANCE
LONG-DASH LINES = BOUNDARY LINES FOR
CHOKE SIZES AS SHOWN
SHORT-DASH CURVES = REGULATION CURVES
FOR REPRESENTATIVE
CHOKE SIZES
CURRENT-AND-VOLTAGE BOUNDARY LINE 'CBA'
IS THE SAME AS SHOWN ON RATING CHART I

![Diagram with labels and values](image-url)

MAY 15, 1952
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7796