

## Full-Wave Vacuum Rectifier

### NOVAR TYPE

For Power Supplies of Equipment Having  
High DC Power Output Requirements

#### Electrical:

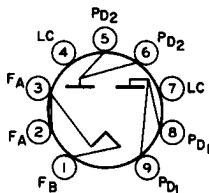
Filament Characteristics and Ratings:

|   |                 |
|---|-----------------|
| Voltage (AC) . . . . .                    | 5.0 ± 0.5 volts |
| Current at filament volts = 5.0 . . . . . | 3.000 amp       |

#### Mechanical:

|  |   |
|--|---|
| Operating Position . . . . .                   | Vertical, base down or up, or<br>Horizontal with pins 2 and 7 in vertical plane |
| Maximum Overall Length . . . . .               | 3.880"  |
| Seated Length . . . . .                        | 3.250" to 3.500"  |
| Diameter . . . . .                             | 1.438" to 1.562"  |
| Dimensional Outline (JEDEC No.12-99) . . . . . | See <i>General Section</i>  |
| Bulb . . . . .                                 | T12   |
| Base . . . . .                                 | Large-Button Novar 9-Pin with Exhaust Tip<br>(JEDEC No.E9-88)                   |
| Basing Designation for BOTTOM VIEW . . . . .   | 9QJ   |

- Pin 1 - Filament End B
- Pin 2 - Filament End A
- Pin 3 - Filament End A
- Pin 4 - See Note
- Pin 5 - Plate No.2
- Pin 6 - Plate No.2
- Pin 7 - See Note
- Pin 8 - Plate No.1
- Pin 9 - Plate No.1



**Note:** May be used as tie point for ac line providing the peak value of the ac voltage does not exceed 200 volts.

### FULL-WAVE RECTIFIER

**Maximum Ratings, Design-Maximum Values:**

|   |  |
|---|--|
| Peak Inverse Plate Voltage . . . . .                                      | 1700 volts                             |
| AC Plate Supply Voltage Per Plate (RMS,<br>without load) . . . . .        | See accompanying <i>Rating Chart I</i> |
| Peak Plate Current Per Plate . . . . .                                    | 1 amp                                  |
| Hot-Switching Transient Plate Current<br>per plate <sup>a</sup> . . . . . | 5 amp                                  |
| DC Output Current . . . . .   | See accompanying <i>Rating Chart I</i> |

#### Typical Operation:

*With capacitor-input filter*

|   |     |     |      |       |
|---|-----|-----|------|-------|
| AC Plate-to-Plate Supply Voltage<br>(RMS, without load) . . . . . | 600 | 900 | 1100 | volts |
| Filter-Input Capacitor <sup>b</sup> . . . . .                     | 40  | 40  | 40   | μf    |
| Total Effective Plate Supply<br>Impedance Per Plate . . . . .     | 21  | 67  | 97   | ohms  |



DC Output Voltage (Approx.) at  
input to filter at load ma =

|                 |     |     |     |       |
|-----------------|-----|-----|-----|-------|
| 300 . . . . .   | 290 | -   | -   | volts |
| 275 . . . . .   | -   | 460 | -   | volts |
| 162 . . . . .   | -   | -   | 630 | volts |
| 150 . . . . .   | 335 | -   | -   | volts |
| 137.5 . . . . . | -   | 520 | -   | volts |
| 81 . . . . .    | -   | -   | 680 | volts |

*With choke-input filter*

AC Plate-to-Plate Supply Voltage

(RMS, without load) . . . . . 900 1100 volts

Filter-Input Choke. . . . . 10 10 henrys

DC Output Voltage at input to filter

(Approx.) at load ma =

|                 |     |     |       |
|-----------------|-----|-----|-------|
| 348 . . . . .   | 340 | -   | volts |
| 275 . . . . .   | -   | 440 | volts |
| 174 . . . . .   | 355 | -   | volts |
| 137.5 . . . . . | -   | 455 | volts |

<sup>a</sup> Even occasional hot-switching with capacitor-input circuits permits the flow of plate current having magnitudes which can adversely affect the life and reliability of rectifier tubes. If capacitor-input circuits are to be used, protect the circuits against the adverse effects of possible hot-switching, and do not exceed a hot-switching transient plate current per plate of 5 amperes during the initial cycles of the hot-switching transient. If hot-switching is required in operation, the use of choke-input circuits is recommended. Such circuits limit the hot-switching current to a value no higher than that of the peak plate current.

<sup>b</sup> values of capacitance higher than those indicated may be used, provided the effective plate supply impedance is increased to prevent exceeding the maximum peak-plate-current rating.

## RATING CHARTS and OPERATION CHARACTERISTICS

*Rating Chart I* represents graphically the relationships between maximum ac voltage input and 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 relationship between maximum rectification efficiency and maximum dc output current per plate for conditions of capacitor-input filter.

A choice of operating values of dc output current per plate and rectification efficiency should be made such that they fall within the area of permissible operation to insure that the maximum peak-plate-current rating will not be exceeded. If the operating values chosen fall outside the permissible operating area, a different choice of parameters should be made. For a given value of ac voltage input and dc output current, it is possible to reduce the rectification efficiency either by increasing the plate supply resistance per plate or by using a smaller value of input filter capacitor.

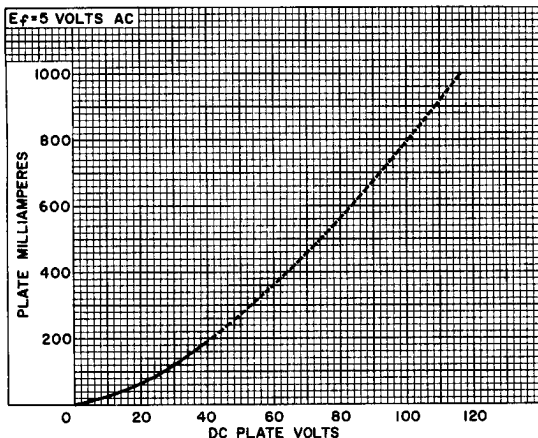


*Rating Chart III* represents graphically the relationships between minimum effective plate supply resistance per plate and maximum ac plate supply voltage per plate under no-load conditions of capacitor-input filter when occasional hot-switching is employed.

If occasional hot-switching is required with capacitor-input circuits, it is important to protect the tube and the circuits against the flow of plate currents having magnitudes in excess of the maximum hot-switching-current rating of 5 amperes. To limit the hot-switching current, adequate series plate supply resistance per plate is necessary. This resistance value may be determined with the formula shown in legend of *Rating Chart III*. To insure that the maximum hot-switching current is not exceeded, the value of series plate supply resistance per plate should be equal to or greater than the minimum value indicated by the curve.

If appreciable series inductance is present in the plate supply, a value of series plate supply resistance smaller than that indicated by the curve may be employed provided it is experimentally determined that the combined effect of inductance and plate supply resistance used are adequate to limit the hot-switching current to the indicated maximum-rated value.

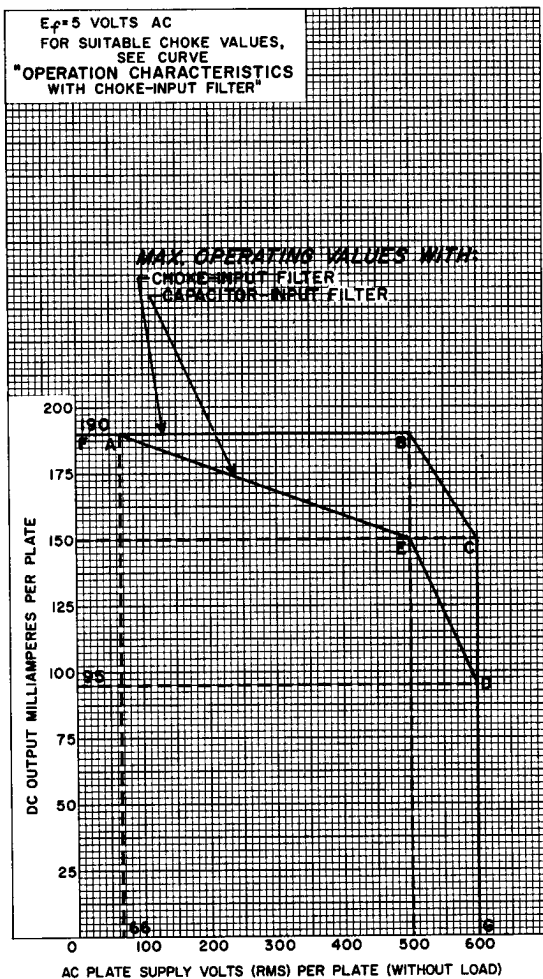
## AVERAGE PLATE CHARACTERISTIC Each Plate



92CS-8440RI



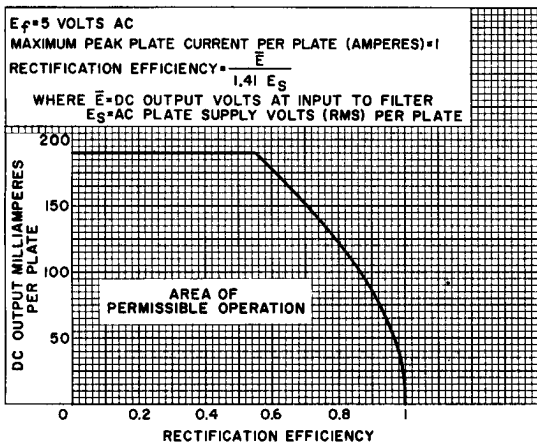
## RATING CHART I



92CM-11200RI

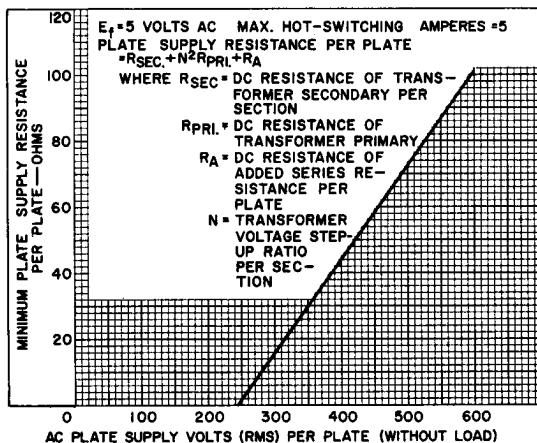


## RATING CHART II Capacitor-Input Filter



92CS-1120I

## RATING CHART III Capacitor-Input Filter



92CS-11194



## OPERATION CHARACTERISTICS

### Full-Wave Circuit, Capacitor-Input Filter

$E_f = 5$  VOLTS AC

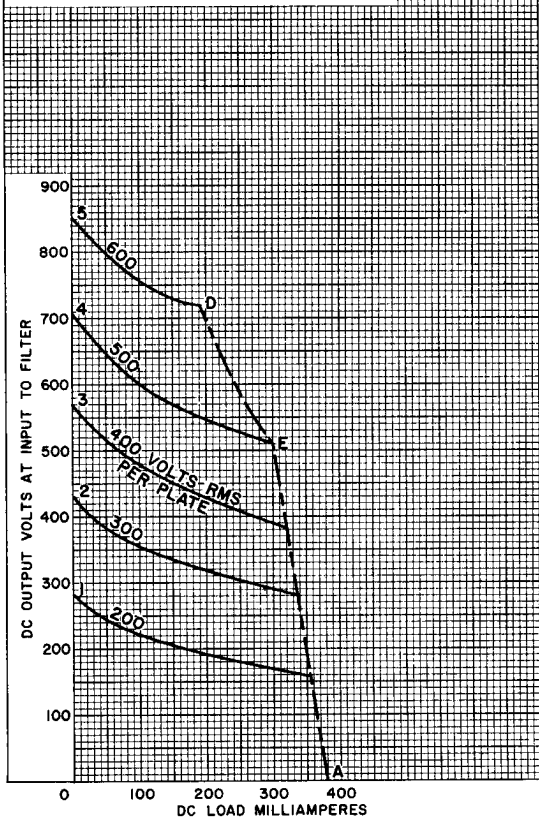
SUPPLY FREQUENCY (CPS) = 60

CAPACITOR (C) INPUT TO FILTER:  $40\mu f$

TOTAL EFFECTIVE PLATE SUPPLY IMPEDANCE

| PER PLATE | CURVE | 1  | 2  | 3  | 4  | 5   |
|-----------|-------|----|----|----|----|-----|
|           | OHMS  | 11 | 20 | 52 | 82 | 112 |

CURRENT- AND VOLTAGE-BOUNDARY LINE 'DEA' IS THE SAME SHOWN ON RATING CHART 1

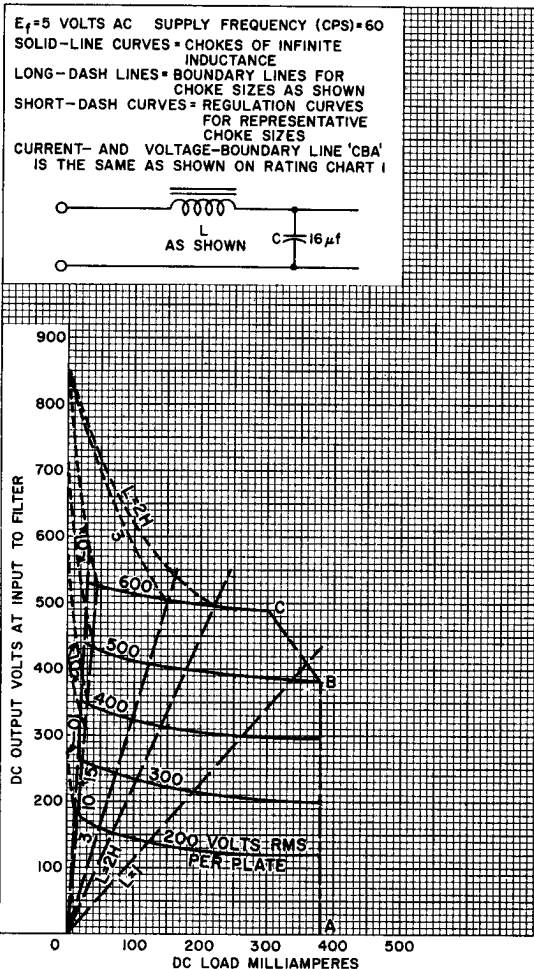


92CM-11197



## OPERATION CHARACTERISTICS

### Full-Wave Circuit, Choke-Input Filter



92CM-11199

