FULL-WAVE VACUUM RECTIFIER TYPE 3DG4

The 3DG4 is a glass-octal, full-wave high-vacuum rectifier having a directly heated coated cathode and designed for service in power supplies of high current requirements. The tube may be mounted in any position. Like all power handling tubes, the 3DG4 should be adequately ventilated.

ELECTRICAL

Cathode	Directly Heated Coated Cathode	
Voltage (ac or d-c)	3.3 ± 10%	Volts
Current	3.8	Amperes

MECHANICAL

Bulb	T-12	
Base	Short, Medium Shell Octal, 5-Pin	
Basing	5DE	
Mounting Position	Any	

RECTIFIER SERVICE

MAXIMUM RATINGS

Design Maximum Values

Peak Inverse Plate Voltage	1050 max.	Volts
AC Plate Supply Voltage Each Plate (RMS)	See Rating Chart 1	
Maximum DC Output Current Each Plate	See Rating Chart 1	
Steady-State Peak Plate Current Each Plate (See Chart II)	1200 max.	Ma.
Transient Peak Plate Current Each Plate (See Chart III)	6.5 max.	Ampere
Bulb Temperature	200 max.	°C

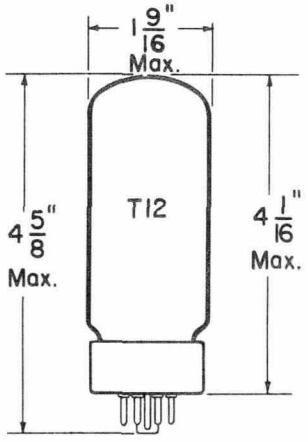
TYPICAL OPERATION AS FULL-WAVE RECTIFIER

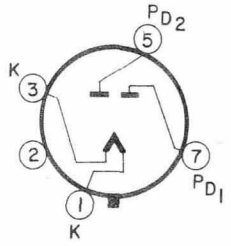
Capacitor Input to Filter

AC Plate Supply Voltage Each Plate (RMS)	275	Volts
Input Capacitor	40	μf
Effective Plate Supply Resistance Each Plate	32	Ohms
DC Output Current	350	Ma.
DC Output Voltage at Filter Input	300	Volts

AVERAGE CHARACTERISTICS

Tube Voltage Drop (Measured with Tube Conducting 350 Ma. Each Plate)	25	Volts





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APPLICATION NOTES

The application of maximum ratings to practical circuit design is clarified by the use of Rating Charts I, II, III. These charts present limiting conditions beyond which operation of the 3DG4 is not permitted. The charts together with laboratory measurements provide analysis of rectifier circuit operation.

The maximum ratings for ac plate supply voltage and dc output current are interdependent, and they are related to the type of filter circuit. The boundaries in Chart I for capacitor-input and for choke-input operation are based on limits of supply voltage, output current and plate dissipation. With capacitor-input filter, operation is permissible within the area bounded by points F A E D G; with choke-input filter, operation is permissible within the area bounded by points F A B C D G.

Chart II defines the permissible area of operation based on the maximum steady-state peak plate current. The rectification efficiency is defined by the equation:

$$\text{Rectification Efficiency} = \frac{\bar{E}}{\sqrt{2}\ Es}$$

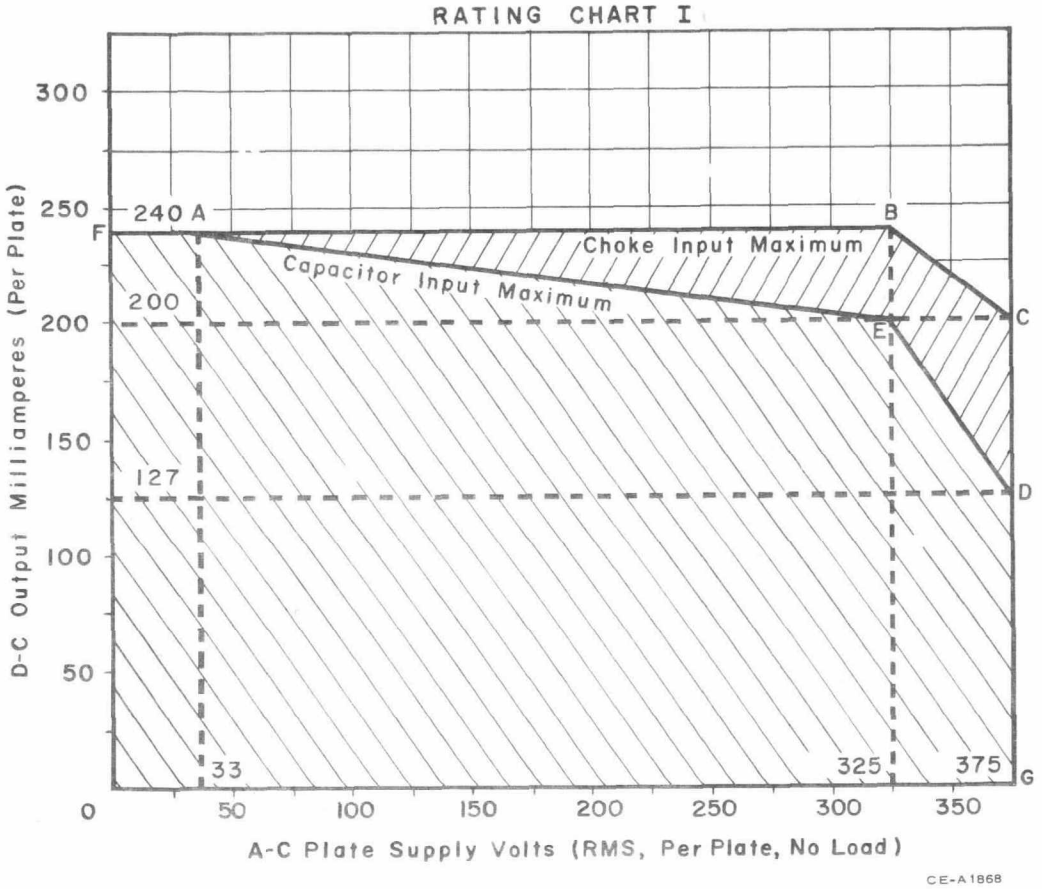
where $\bar{E}$ is the dc output voltage at input to filter and Es is the rms plate supply voltage per plate.

Chart III defines the minimum value of effective plate-supply resistance per plate for specific plate supply voltages such that the transient peak plate current per plate will be within the required maximum rating. This resistance consists of:

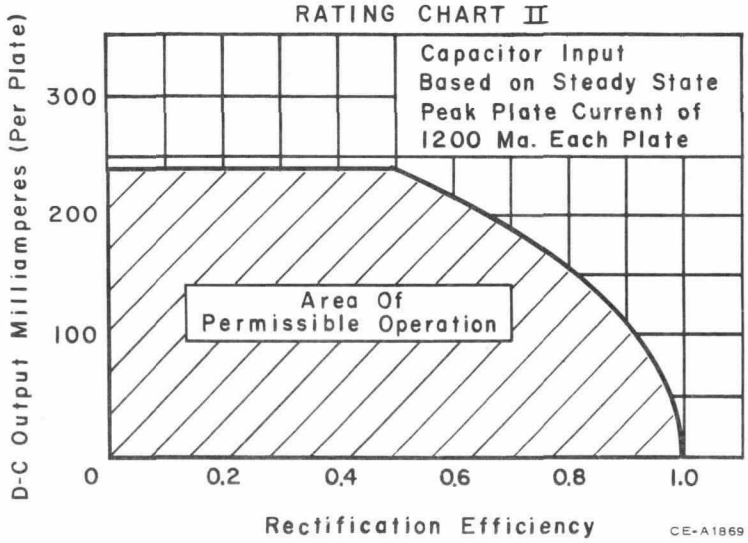
$$R_S = N^2 R_{PRI.} + R_{SEC.} + R_A$$

where N is the voltage step-up ratio of the plate transformer, $R_{PRI.}$ is the dc resistance of the transformer primary, $R_{SEC.}$ is the average dc resistance of each transformer secondary section, and R_A is the additional resistance required.

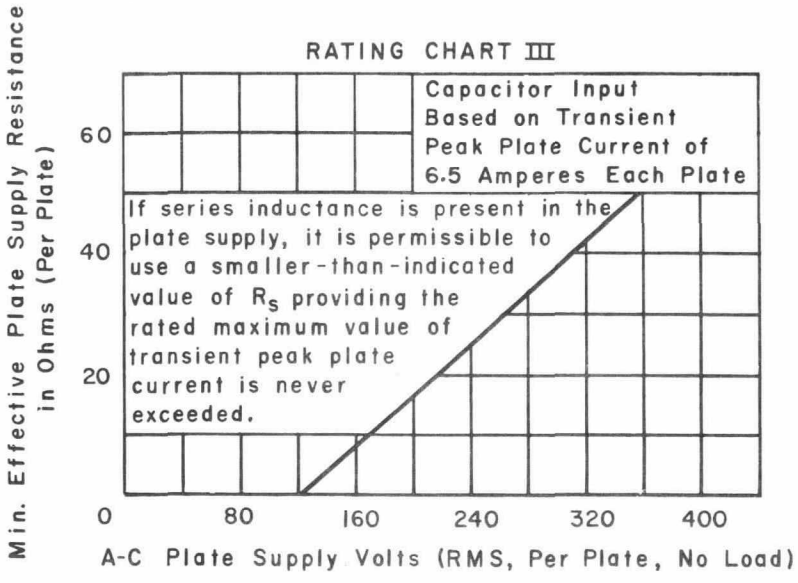
In these considerations, dc output voltage is measured at the input to the filter, and plate supply voltage is measured under no-load conditions.



RATING CHART II



RATING CHART III



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