

December 15, 1963

FULL-WAVE VACUUM RECTIFIER TYPE 5AS4A

The 5AS4A is a glass-octal full-wave high-vacuum rectifier designed for service in power supplies of equipment requiring high current. The tube should be mounted vertically, but horizontal mounting is permissible if pins 1 and 4 are in a vertical plane. Like all power handling tubes, the 5AS4A should be adequately ventilated.

ELECTRICAL

Cathode..... Coated Filament
Heater:
Voltage (ac or dc) 5.0 Volts
Current 3.0 Amperes

MECHANICAL

Bulb T-12
Base Short Medium Shell Octal 5-Pin (JEDEC B5-121)
Short Medium Shell Octal 8-Pin (JEDEC B8-118)
Outline 12-15
Basing 5T
Mounting Position Vertical or Horizontal-with Pins
1 and 4 in Vertical Plane

RECTIFIER SERVICE

MAXIMUM RATINGS

Design Center Values

Peak Inverse Plate Voltage 1550 max. Volts
Maximum AC Plate Supply Voltage
Each Plate (RMS) 550 max. Volts
Maximum DC Output Current
Each Plate See Chart I
Steady-State Peak Plate Current
Each Plate (See Chart II) 1.0 max. Ampere
Transient Peak Plate Current
Each Plate (See Chart III) 4.6 max. Amperes

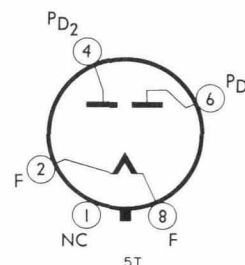
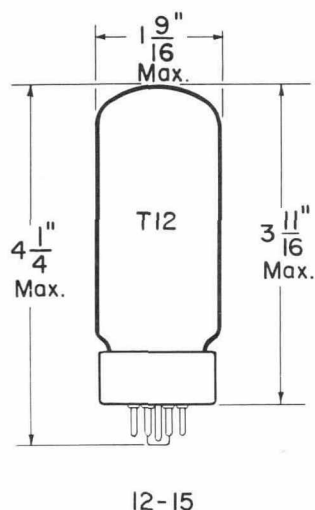
TYPICAL OPERATION AS FULL-WAVE RECTIFIER

	Input to Filter			
	Capacitor	Choke		
AC Plate Supply Voltage				
Each Plate (RMS)	300	450	550	Volts
Input Capacitor	40	40	-	μ f
Input Choke	-	-	10	Henrys
Effective Plate Supply				
Resistance Each Plate	21	67	-	Ohms
DC Output Current	300	275	275	Ma.
DC Output Voltage at Filter Input	290	460	420	Volts

AVERAGE CHARACTERISTICS

Tube Voltage Drop

Tube Conducting
225 ma. Each Plate 44 Volts
275 ma. Each Plate 50 Volts
300 ma. Each Plate 54 Volts



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 5AS4A 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 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

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

where E is the dc output voltage at input to filter and E_s 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.

If a capacitor greater than $40 \mu\text{fd}$ is used the effective plate-supply impedance should be increased to prevent exceeding the maximum peak plate current rating.

