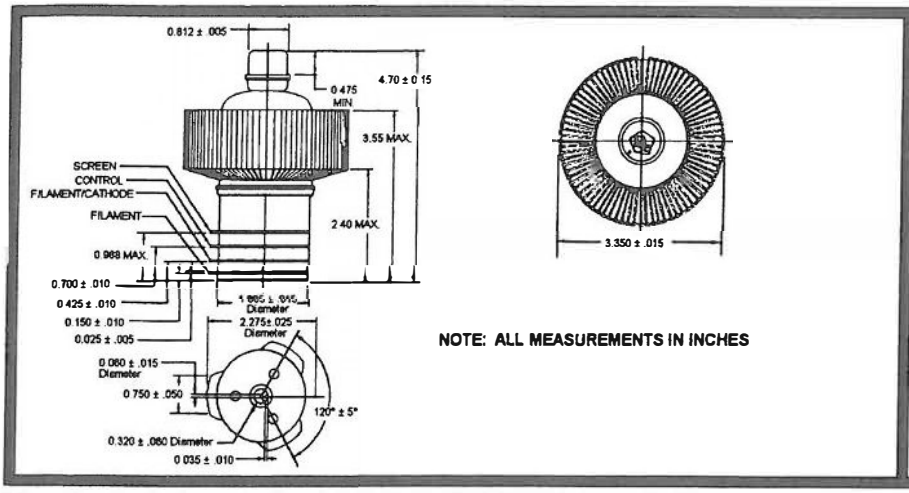

PL8168/ 4CX1000A

Radial-Beam Power Tetrode

The Penta Laboratories PL8168/4CX1000A is radial beam tetrode which is rated for 1000 watts maximum plate dissipation. Construction is metal/ceramic and cooling is via forced-air.

The high current, low voltage and high gain design of the PL8168/4CX1000A makes it ideally suited for use in audio amplifier or Class AB_1 RF linear amplifier applications. The tube is capable of producing 1630 watts of peak envelope output power at its rated maximum plate voltage of 3000 volts, and two tubes operating in Class AB_1 will produce 3260 watts of audio power output.

ELECTRICAL CHARACTERISTICS

Cathode-Oxide Coated Unipotential		
Heater Voltage	6.0	volts
Heater Current	9.0	amperes
Minimum Cathode Heating Time	5	minutes
Transconductance (I_b = 1 Adc)	37,000	µmhos
Interelectrode Capacitances (In a shielded fixture)		
Grounded-Cathode Circuit Configuration		
Feedback	0.015	pF
Input	81	pF
Output	11.8	pF
Grounded Grid and Screen Circuit Configuration		
Feedback	0.004	pF
Input	35.5	pF
Output	12	pF
Frequency of Maximum Rating (CW)	110	MHz

MECHANICAL CHARACTERISTICS

Base	Special Locking
Recommended Socket	Penta PL-800
Recommended Chimney	Penta PL-806
Maximum Overall Dimensions	
Length	4.85 inches
Diameter	3.50 inches
Net Weight	27.5 ounces
Operating Position	Any
Maximum Operating Temperature of Anode and Ceramic/Metal Seals	250°C

Revised 23 Nov 2022

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ELECTRON TUBES FOR INDUSTRY

COOLING

Sufficient cooling should be provided to the anode and ceramic/metal seals to maintain surface temperatures below the rated maximum temperature of 250°C. It should be noted however, that tube life can often be substantially increased by operating the tube below its rated maximum temperature.

At sea level and with ambient air temperatures up to 35°C, an air-flow of 27.5 CFM with an accompanying pressure drop of 0.25 inches of water will provide adequate cooling under most conditions. At higher altitudes, higher ambient air temperature, or when the PL8168/4CX1000A is operated at very high frequencies, increased air flow will be required. For instance, at 10,000 feet above sea level, 38.5 CFM of cooling air and a pressure drop of 0.3 inches of water will be required.

When there is uncertainty regarding the required air flow, it should be noted that the sole criterion which can be reliably used for judging cooling effectiveness is tube surface temperature, which can usually be determined by using any number of temperature sensitive paints currently available.

PLATE DISSIPATION

Under all classes of operation, the maximum plate dissipation allowable for the PL8168/4CX1000A is 1000 watts. During tuning, plate dissipation may be permitted to rise above the stated maximums for brief periods of time.

SCREEN OPERATION

Under no conditions should the screen dissipation be allowed to exceed 12 watts. In that excessive screen dissipation is likely to result where plate voltage, plate load, or bias voltage are removed, suitable precautions should be taken to avoid these conditions while filament and screen voltages are applied.

Tetrode tubes may on occasion exhibit reversed screen current, and this behavior is prominent in the PL8168/4CX1000A; under certain conditions, negative screen currents approximating 25 milliamperes may be encountered. Regardless of current, screen voltage must be maintained constant. If the screen power supply is such that negative screen current induces increased voltage, it is crucial that some method of stabilization be employed (bleeder resistors, voltage regulator tubes, electron tube regulator circuit, etc).

GRID OPERATION

The PL8168/4CX1000A has an average grid dissipation rating of 0 watts. Although average grid current rating is zero, peak grid currents of up to 5 milliamperes may be permitted. Tube life can be extended by maintaining grid bias and driving power at or near the recommended values whenever possible.

FILAMENT VOLTAGE

The PL8168/4CX1000A is designed to operate with 6.0 volts applied to the filament. Under no circumstances should filament voltage be allowed to deviate from this value by more than 5%. The useful life of the tube can be extended by adhering to this value as closely as possible.

The cathode and one side of the filament are internally connected.

NOTE ON TYPICAL OPERATION DATA

The data shown in the following Typical Operation section is calculated or measured based on industry standard published characteristic curves. It is assumed that RF gird voltage is adjusted in order to obtain the the specified plate current, plate voltage, and bias. Under this procedure, little variation in power output will occur when the tube is changed or replaced. Although grid current may vary slightly from tube to tube, it is relevant only in-so-far as it results in the appropriate plate current, and should pose no problem given that the circuit voltage is not allowed to vary with current. If a grid resistor is used as the source of grid bias, it is crucial that this resistor be adjustable so that the required bias voltage may be obtained when the correct RF grid voltage is applied.

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MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

AF Power Amplifier or Modulator-Class AB_1 Grid Driven (Sinusoidal Wave)

Maximum Ratings

DC Plate Voltage	3000 Volts
DC Screen Voltage	400 Volts
DC Plate Current	1.0 Ampere
Plate Dissipation	1000 Watts
Screen Dissipation	12 Watts
Grid Dissipation	0 Watts

Typical Operation (Two Tubes)

DC Plate Voltage	2000	2500	3000	Volts
DC Screen Voltage	325	325	325	Volts
Approximate Grid Voltage	-60	-60	-60	Volts
Zero-Signal Plate Current	500	500	500	mAdc
Maximum-Signal Plate Current	1.78	1.77	1.75	Adc
Zero-Signal Screen Current	16	12	10	mAdc
Maximum-Signal Screen Current	70	70	70	mAdc
Plate Power Output	1860	2600	3260	Watts
Plate to Plate Load Resistance	2040	2850	3860	Ω

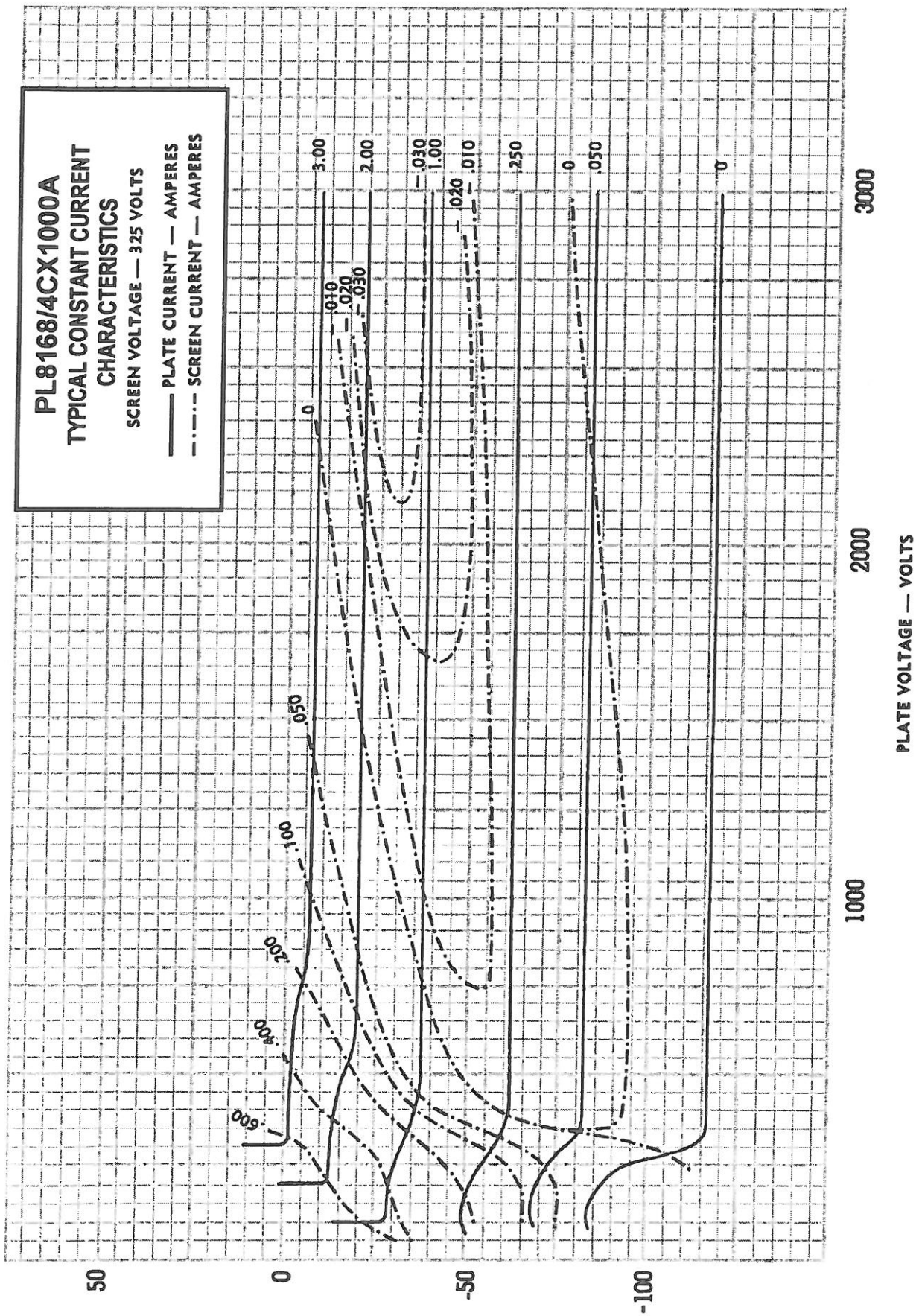
RF Linear Amplifier-Class AB_1 Grid Driven

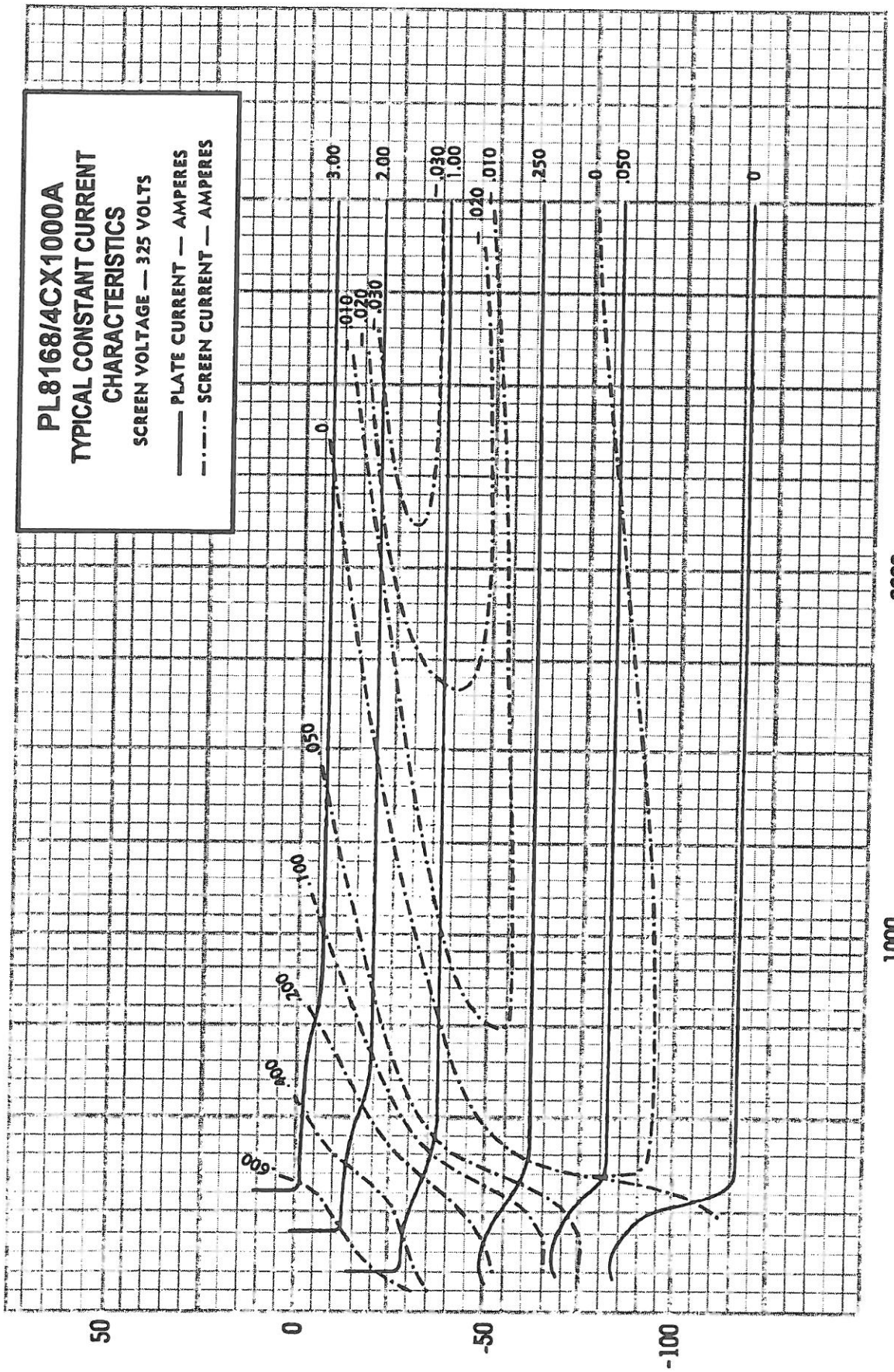
Maximum Ratings

DC Plate Voltage	3000 Volts
DC Screen Voltage	400 Volts
DC Plate Current	1.0 Ampere
Plate Dissipation	1000 Watts
Screen Dissipation	12 Watts
Grid Dissipation	0 Watts

Typical Operation

DC Plate Voltage	2000	2500	3000	Volts
DC Screen Voltage	325	325	325	Volts
Grid Voltage	-60	-60	-60	Volts
Zero-Signal Plate Current	250	250	250	mAdc
Approximate Single Tone Plate Current	890	885	875	mAdc
Approximate Two Tone Plate Current	645	650	635	mAdc
Zero-Signal Screen Current	8	6	5	mAdc
Approximate Single Tone Screen Current	35	35	35	mAdc
Approximate Two Tone Screen Current	10	8	8	mAdc
Plate Power Output	930	1300	1630	Watts


PL8168/4CX1000A
TYPICAL CONSTANT CURRENT CHARACTERISTICS
SCREEN VOLTAGE — 325 VOLTS
—— PLATE CURRENT — AMPERES
-·-·- SCREEN CURRENT — AMPERES
3.00
2.00
1.00
.250
0
.050
0
.030
.020
.010
.030
.020
.010
0
.050
.100
.200
.400
.600
50
0
-50
-100
GRID VOLTAGE — VOLTS
1000
2000
3000
PLATE VOLTAGE — VOLTS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—— PLATE CURRENT — AMPERES
-·-·- SCREEN CURRENT — AMPERES
3.00
2.00
1.00
.250
0
.050
.030
.020
.010
0
.010
.020
.030
.050
.100
.200
.400
.600
50
0
-50
-100
GRID VOLTAGE — VOLTS
1000
2000
3000
PLATE VOLTAGE — VOLTS