

SVETLANA TECHNICAL DATA

3CPX800A7

High-Mu Power Triode



The Svetlana™ 3CPX800A7 is a high performance ceramic/metal high-mu power triode designed for use in communications and industrial service. The principal use is for pulsed RF amplifier, pulse modulator, or regulator service. When operated as a pulse modulator, the Svetlana 3CPX800A7 will hold off a maximum plate voltage of 4500 volts. Maximum plate current is 8 amps at a pulse duration of 100 microseconds. The Svetlana 3CPX800A7 is a direct replacement for the model 3CPX800A7 manufactured in the United States.

Characteristics

Electrical

Cathode:	Oxide-coated unipotential	
Heater Voltage (AC or DC)	13.5 ± 0.6	V
Heater Current @ 13.5V	1.5	A
Minimum warm-up time	3	min.
Amplification factor (average)	200	
Maximum Frequency for Full Ratings	500	MHz
Interelectrode capacitances, with grid grounded:		
Input	25.5	pF
Output	6.1	pF
Plate-Cathode	0.04	pF

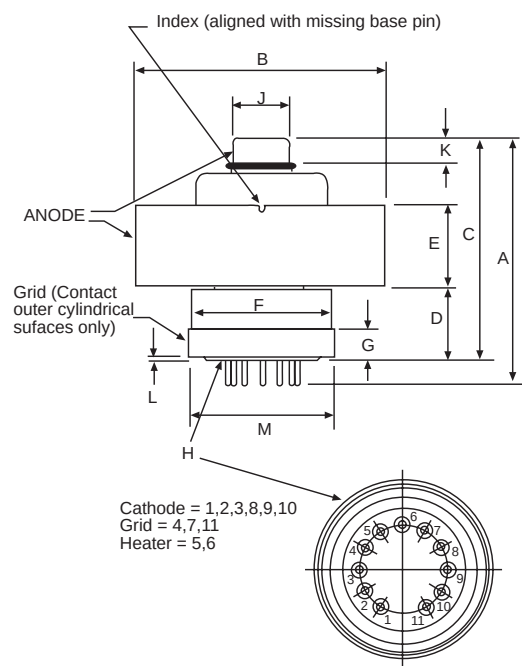
Mechanical

Cooling	Forced air
Base	large 11 pin wafer (EIA E11-81)
Socket	11 pin E.F. Johnson #124-311-100
Anode Connector	Svetlana AC-1
Operating position-	any
Maximum dimensions:	
Diameter	64 mm (2.52 in.)
Length	67 mm (2.63 in)
Maximum operating temperature	250° C
Net weight (average)	.341 kg (0.75 lb.)

Maximum ratings, Pulse Modulator or Switch Tube Service

DC plate voltage	4500	V
Maximum-signal DC plate current (Duty = 0.005)	8	A
Plate Dissipation	800	W
Grid Dissipation	4.0	W
DC grid current (average)	60	mA

Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	59.44	66.88	2.344	2.633
B	63.119	63.881	2.485	2.515
C	54.66	59.74	2.152	2.352
D	19.964	23.013	.786	.906
E	18.034	20.066	.710	.790
F	—	35.712	—	1.406
G	4.750	—	.187	—
H	BASE: E11-81 (EIA DESIGNATION)			
J	14.199	14.554	0.559	0.573
K	6.096	—	0.240	—
M	35.992	36.398	1.417	1.433



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Svetlana 3CPX800A7 High-Mu Power Triode



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Typical Operation

Plate voltage	4500	V
Pulse plate current	5	A
Grid voltage	-50	V
Pulse positive grid voltage	70	V
Pulse grid current	0.20	A
Pulse duration	10	μsec
Duty	0.005	
Pulse driving power	25	W
Pulse output power	20	kW
Pulse output voltage	4	kV

Pulsed RF Amplifier, Cathode Driven, Class AB2 - Drive

Pulsed Maximum Ratings (to 500 MHz)

DC plate voltage	3500	V
Plate current (average)	0.6	A
Peak plate current (average during pulse)	2.5	A
Plate dissipation (average)	800	W
Grid current (average)	0.06	A
Grid dissipation (average)	4.0	W

Typical Operation

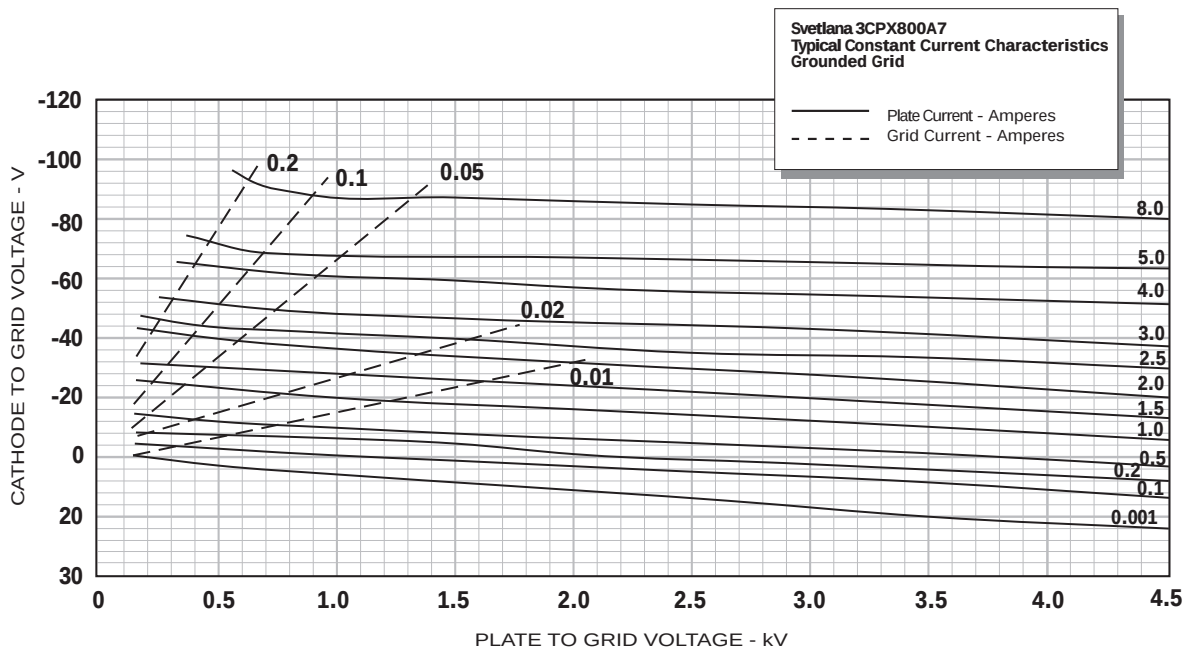
DC plate voltage	3500	V
DC cathode voltage	+15	V
Zero signal plate current	20	mA
Pulse plate current	2.5	A
Pulse grid current	105	mA
RF cathode voltage	130**	V
Cathode input impedance	30	ohms
Power output	6.0	kW
Duty	0.01	
RF driving power	320**	W
Resonant load impedance	660	Ohms

**Peak

Cooling Air at 25°C

Anode* Dissipation Watts	Sea Level		5,000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
400	6	0.09	7	0.10
600	11	0.20	14	0.23
800	19	0.50	23	0.57

Note: When cooling air inlet temperature is raised to 50°C, flow rate must be increased approximately 40%.



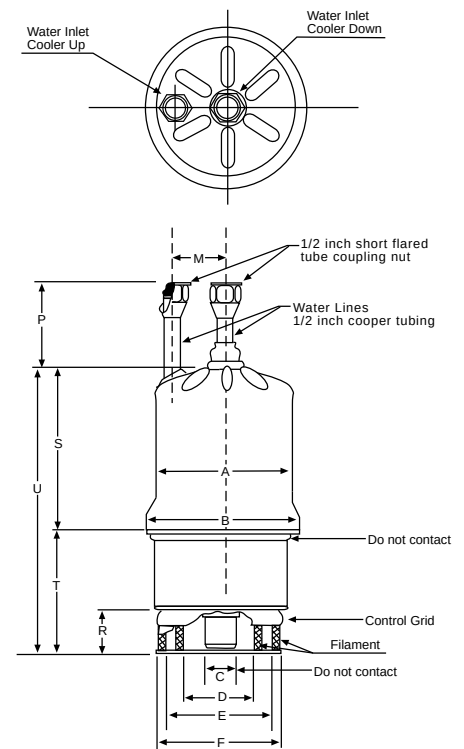


Svetlana 3CW20,000A7 High-Mu Power Triode

The Svetlana™ 3CW20,000A7 is a high-performance ceramic/metal, water cooled power triode designed for use in zero-bias, class B RF or audio amplifiers. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, providing enhanced linearity, less noise, reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area, giving superior VHF performance to 200MHz.

The Svetlana 3CW20,000A7 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CW20,000A7 manufactured in the United States.

Svetlana 3CW20,000A7 Outline drawing



General Characteristics

Electrical

Filament	Thoriated-tungsten mesh
Voltage	7.50 ±0.37V
Current @ 7.50V	100A
Amplification factor (average)	200
Direct interelectrode capacitances (grounded grid):	
Input	59.0pF
Output	36.0pF
Feedback	0.2pF
Direct interelectrode capacitances (grounded filament):	
Input	59.0pF
Output	0.2pF
Feedback	36.0pF
Maximum frequency for full ratings (CW)	200 MHz

Mechanical

Cooling	Water and forced air
Base	Coaxial
Socketing	Svetlana SK1300, SK1320 or equiv.
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	284.99 mm (11.22 in.)
Diameter	119.40 mm (4.7in.)
Net weight	5.45 kg (12 lb)

Dimensional Data

	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	103.99	105.56	4.094	4.156
B	116.69	119.40	4.594	4.700
C	18.29	19.30	0.720	0.760
D	48.16	49.17	1.896	1.936
E	79.58	80.59	3.133	3.173
F	96.32	97.33	3.792	3.832
N	49.20	55.55	1.937	2.187
P	58.73	71.43	2.312	2.812
R	25.04	26.67	0.986	1.050
S	121.41	127.64	4.780	5.025
T	79.45	37.07	3.128	3.428
U	200.74	213.44	7.903	8.403



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Svetlana 3CW20,000A7

High-Mu Power Triode



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Cathode-Driven Radio Frequency Linear Amplifier, Class B

Maximum Ratings			
DC plate voltage	7,000	V	
DC plate current	5.0	A	
Plate dissipation	20	kW	
Grid dissipation	500	W	
Typical Operation			
DC plate voltage	7000	7000	V
Zero-signal DC plate current*	0.60	0.60	A
Single-tone DC plate current	3.72	5.00	A
Grid bias	0	0	V
Single-tone DC grid current*	0.71	1.00	A
Peak driving power	885	1540	W
Single-tone plate output power	17.7	24.2	kW
Resonant load impedance	1020	745	Ohms
Driving impedance	35	32	Ohms

*Approximate values

Cathode-Driven Class C RF Amplifier, CW or FM

Maximum Ratings			
DC plate voltage	7,000	V	
DC plate current	4.0	A	
Plate dissipation	20	kW	
Grid dissipation	500	W	
Typical Operation			
DC plate voltage	5000	7000	V
DC grid voltage	-210	-210	V
DC plate current	4.0	4.0	A
DC grid current*	0.84	0.775	A
Peak RF grid voltage*	510	555	V
Driving power	420	530	W
Plate output power	14.0	21.3	kW

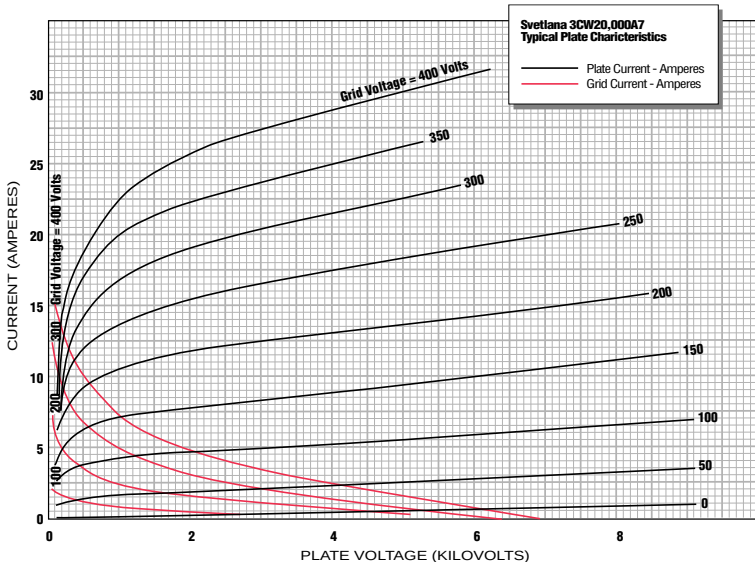
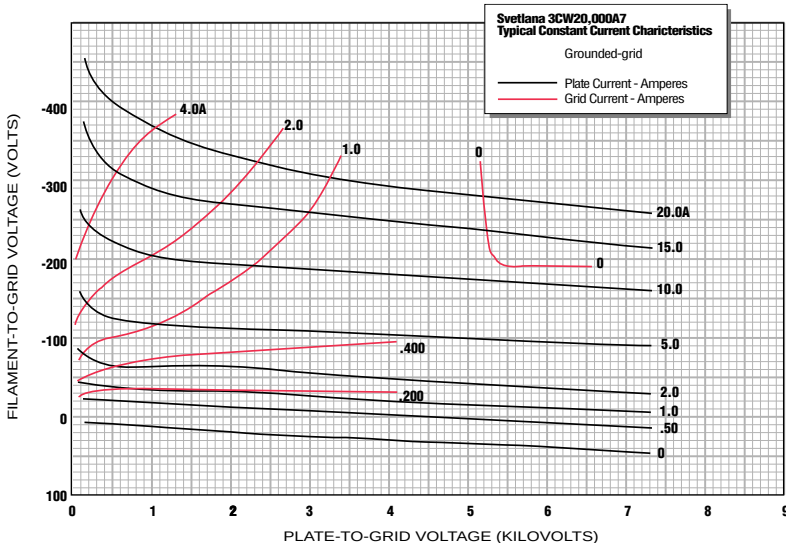
Audio Frequency Amplifier or Modulator, Class B Grid Driven

Maximum ratings (per tube)			
DC plate voltage	7000	V	
DC plate current	5.0	A	
Plate dissipation	12	kW	
Grid dissipation	500	W	

Typical Operation (two tubes sinusoidal waveform)

DC plate voltage	5000	7000	Vdc
DC grid voltage	0	0	V
Zero-signal DC plate current*	1.2	1.2	A
Maximum-signal DC plate current	10	10	A
Maximum-signal DC grid current*	1.2	2.1	A
Peak AF grid voltage**	240	310	V
Peak driving power	290	560	W
Plate output power	31.0	47.7	kW
Load resistance (plate-to-plate)	1030	1520	Ohms

*Approximate values **Per tube



Svetlana 3CW20,000H3

Medium-Mu

Industrial Power Triode

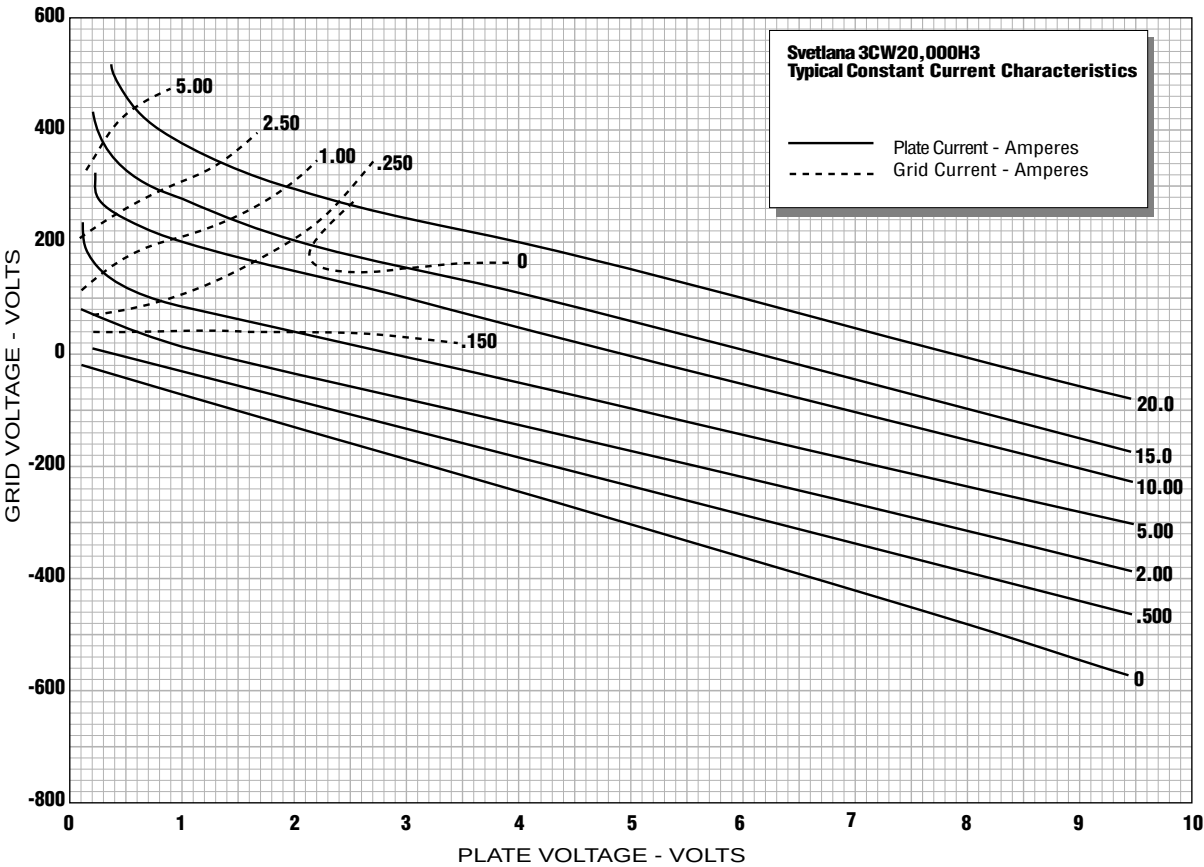


Typical Operation (under load)

(Frequencies to 30MHz)			
DC plate voltage	7,000	10,000	V
DC plate current	4.0	4.0	A
DC grid voltage	-670	-800	V
DC grid current	275	315	mA
Peak RF grid voltage	340	340	V
Driving power	260	350	W
Grid dissipation	78	46	W
Plate input power	28,000	40,000	W
Plate dissipation	9,000	12,000	W
Plate output power	19,000	28,000	W
Approximate load impedance	720	1270	Ohms

Minimum Water Cooling Requirements*		
Anode Dissipation Watts	Water Flow GPM	Pressure Drop PSI
10,000	6.3	4.9
15,000	9.0	9.2
20,000	12.0	15.0

* A minimum of 40 CFM of air must be directed onto the center filament contact ring.



SVETLANA TECHNICAL DATA

3CW20,000H3

Medium-Mu Industrial Power Triode



The Svetlana™ 3CW20,000H3 is a high-performance ceramic/metal power triode designed for use in oscillator, amplifier, or modulator service. The ceramic is glazed to facilitate cleaning when used in an industrial environment. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, contributing to longer life. The mesh filament also provides improved RF efficiency at VHF operation. Flexible leads connect to the filament terminals and flanges are connected to the grid and plate. The flanges provide a convenient way to mount the tube.

The Svetlana 3CW20,000H3 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CW20,000H3 manufactured in the United States.

Characteristics

Electrical

Filament:	Thoriated-tungsten mesh	
Voltage	7.5 ± 0.37	V
Current @ 7.5V	100± 10.0	A
Amplification factor (average)	20	
Direct interelectrode capacitances, with filament grounded:		
Input	53.0	pF
Output	1.3	pF
Feedback	34	pF
Maximum frequency for full ratings (CW)	90	MHz

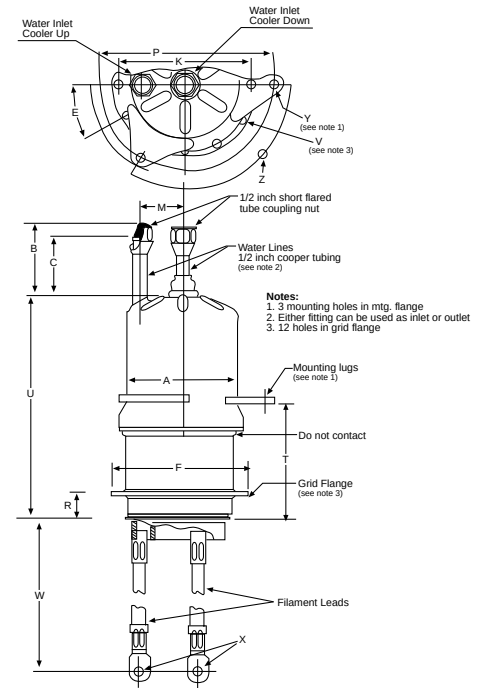
Mechanical

Cooling	Water and forced air
Base	Flying leads/flange
Socketing	None. Mounting flanges
Operating position	Vertical, base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	26.54 cm (10.45 in)
Diameter	17.15 cm (6.75 in.)
Net weight	5.46 kg (12 lb.)

RF Power Amplifier or Oscillator, Class C, (Filtered DC Plate Power Supply)

Maximum Ratings		
DC plate voltage	12,000	V
DC plate current	4.0	A
Plate dissipation	20	kW
Grid dissipation	250	W
DC grid voltage	-1000	V
DC grid current	0.6	A
Plate input power	40	kW

Svetlana Outline drawing



Dimensional Data

	Millimeters			Inches		
	Min.	Max.	Nom.	Min.	Max.	Nom.
A	103.99	105.56	—	4.094	4.156	—
B	56.72	71.42	—	2.312	2.812	—
C	49.20	55.55	—	1.937	2.187	—
E	—	—	30°	—	—	30°
F	127.76	129.29	—	5.030	5.090	—
K	112.40	112.90	—	4.425	4.445	—
M	38.10	44.45	—	1.500	1.750	—
P	151.31	153.04	—	5.957	6.025	—
R	17.78	21.84	—	.700	.860	—
T	110.49	113.03	—	4.350	4.450	—
U	200.74	213.44	—	7.903	8.403	—
V	—	—	6.35	—	—	.250
W	215.90	228.60	—	8.500	9.000	—
X	—	—	9.91	—	—	.390
Y	—	—	6.73	—	—	.265
Z	—	—	120°	—	—	120°



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SVETLANA TECHNICAL DATA

3CW20,000H7 High-Mu Power Triode

The Svetlana™ 3CW20,000H7 is a high-performance ceramic/metal, water cooled power triode designed for use in zero-bias class B RF, audio amplifier, DC voltage or current regulator, or high voltage pulsed or switch tube service.

A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, providing enhanced linearity, less noise, reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area, giving superior VHF performance to 200MHz. The anode and grid flanges provide ease of mounting regardless of application.

The Svetlana 3CW20,000H7 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CW20,000H7 manufactured in the United States.

Characteristics

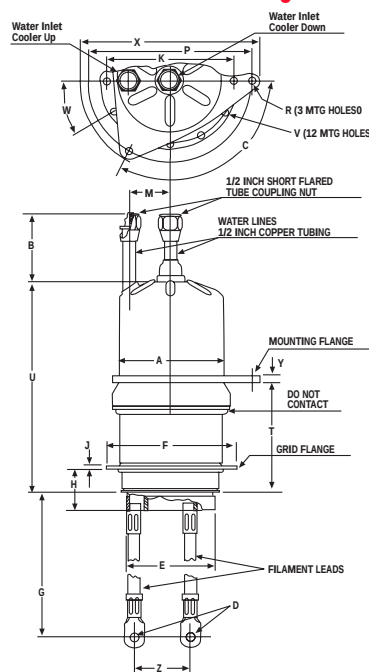
Electrical

Filament	Thoriated-tungsten mesh
Voltage	7.50 ±0.37V
Current @ 7.50V	100A
Amplification factor (average)	200
Direct interelectrode capacitances:	
Grid to filament	59.0pF
Grid to anode	36.0pF
Filament to anode	0.2pF
Maximum frequency for full ratings (CW)	200 MHz

Mechanical

Cooling	Water and forced air
Base	Grid contact flange and flying leads
Operating position	Vertical, Anode up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	285 mm (11.22 in.)
Diameter	119.4 mm (4.7in.)
Net weight	5.45 kg (12 lb)

Svetlana Outline drawing



Dimensional Data

	Millimeters			Inches		
	Min.	Max.	Ref.	Min.	Max.	Ref.
A	103.99	105.56	----	4.094	4.156	----
B	56.72	71.42	----	2.312	2.812	----
C	118°	122°	----	118°	122°	----
D	----	----	9.91	----	----	0.390
E	82.04	83.06	----	3.230	3.270	----
F	127.76	129.29	----	5.030	5.090	----
G	215.90	228.60	----	8.500	9.000	----
H	31.24	39.62	----	1.229	1.560	----
J	----	----	3.18	----	----	0.125
K	112.40	112.90	----	4.425	4.445	----
M	38.10	44.45	----	1.500	1.750	----
P	151.31	153.04	----	5.957	6.025	----
R	----	----	6.73	----	----	0.265
T	110.49	113.03	----	4.350	4.450	----
U	200.74	213.44	----	7.903	8.403	----
V	----	----	6.35	----	----	0.250
W	29°	31°	----	29°	31°	----
X	----	----	171.45	----	----	6.750
Y	----	----	6.35	----	----	0.250
Z	----	----	50.80	----	----	2.000



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Svetlana 3CW20,000H7 High-Mu Power Triode

Cathode-Driven Radio Frequency Linear Amplifier, Class B

Maximum Ratings

DC plate voltage	7,000	V
DC plate current	5.0	A
Plate dissipation	20	kW
Grid dissipation	500	W

Typical Operation

DC plate voltage	7000	7000	V
Zero-signal DC plate current*	0.60	0.60	A
Single-tone DC plate current	3.72	5.00	A
Grid bias	0	0	V
Single-tone DC grid current*	0.71	1.00	A
Peak driving power	885	1540	W
Single-tone plate output power	17.7	24.2	kW
Resonant load impedance	1020	745	Ohms
Driving impedance	35	32	Ohms

Cathode-Driven Class C RF Amplifier, CW or FM

Maximum Ratings

DC plate voltage	7,000	V
DC plate current	4.0	A
Plate dissipation	20	kW
Grid dissipation	500	W

Typical Operation

DC plate voltage	5000	7000	V
DC grid voltage	-210	-230	V
DC plate current	4.0	4.0	A
DC grid current*	0.84	0.775	A
Peak RF grid voltage*	510	555	V
Driving power	420	530	W
Plate output power	14.0	21.3	kW

Audio Frequency Amplifier or Modulator, Class B Grid Driven

Maximum ratings (per tube)

DC plate voltage	7000	V
DC plate current	5.0	A
Plate dissipation	20	kW
Grid dissipation	500	W

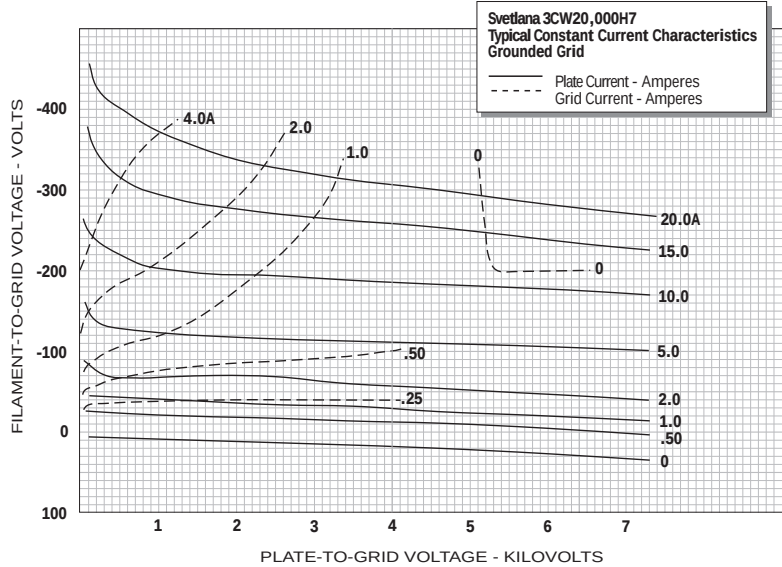
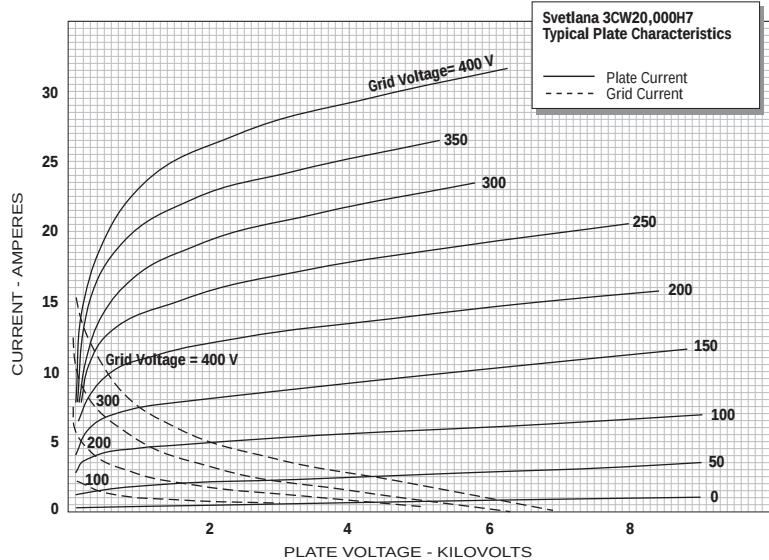
Typical Operation (two tubes, sinusoidal waveform)

DC plate voltage	5000	7000	Vdc
DC grid voltage	0	0	V
Zero-signal DC plate current*	0.8	1.2	A
Maximum-signal DC plate current	10	10	A
Maximum-signal DC grid current*	1.2	2.1	A
Peak AF grid voltage**	240	310	V
Peak driving power	290	560	W
Plate output power	31.0	47.7	kW
Load resistance (plate-to-plate)	1030	1520	Ohms

*Approximate values **Per tube



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Svetlana 3CW30,000H3 Medium-Mu Industrial Triode



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Typical Operation (Filtered DC Power)

DC plate voltage	10,000	7000	V
DC grid voltage	-800	-600	V
DC plate current	6.0	6.0	A
DC grid current*	0.315	0.66	A
Peak RF grid voltage*	360	440	V
Driving power	365	660	W
Plate output power	42	30	kW
Plate dissipation	18	12	kW
Load impedance*	750	600	ohms

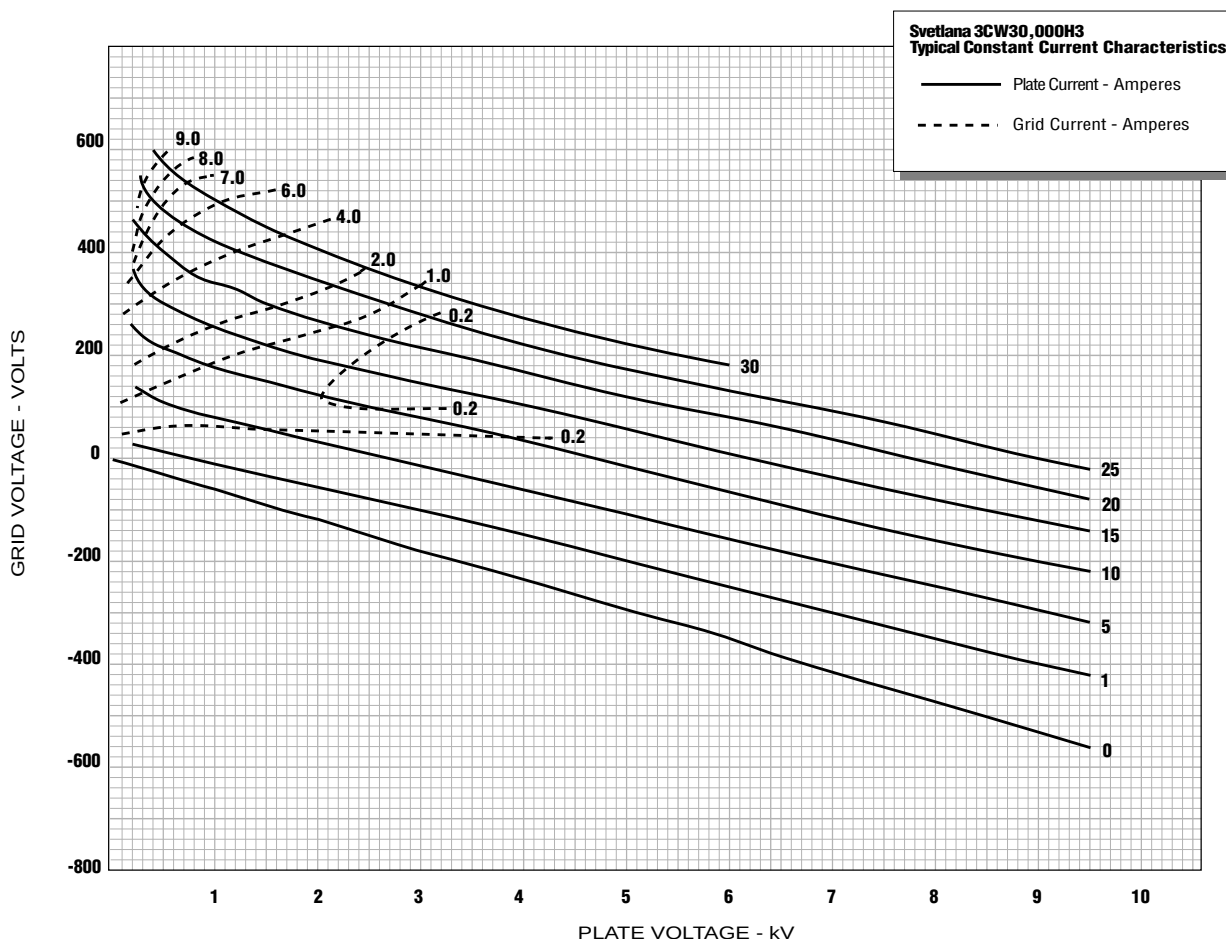
*Approximate values

Minimum Cooling Water-Flow Requirements

Plate dissipation (kW)	Water flow (gpm)	Pressure drop (approx. psi.)
15	12	13.5
20	13	15.0
30	14	17.0

NOTES:

1. Maximum system pressure is 50 PSIG
2. 50 CFM of forced air cooling must be directed onto the base and filament areas.





SVETLANA TECHNICAL DATA

3CW30,000H3

Medium-Mu Industrial Triode

The Svetlana™ 3CW30,000H3 is a high-performance ceramic/metal, water-cooled power triode designed primarily for use in industrial RF applications as an oscillator. A modern mesh filament is used. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament providing reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area, giving superior VHF performance to 90MHz.

The Svetlana 3CW30,000H3 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CW30,000H3 manufactured in the United States.

Characteristics

Electrical

Filament	Thoriated-tungsten mesh	
Voltage	6.3 ± 0.3	V
Current @ 6.3V	160	A
Amplification factor	20	
Direct interelectrode capacitances (grounded cathode)		
Input	53.0	pF
Output	1.3	pF
Feedback	34.0	pF
Maximum frequency for full ratings	90	MHz

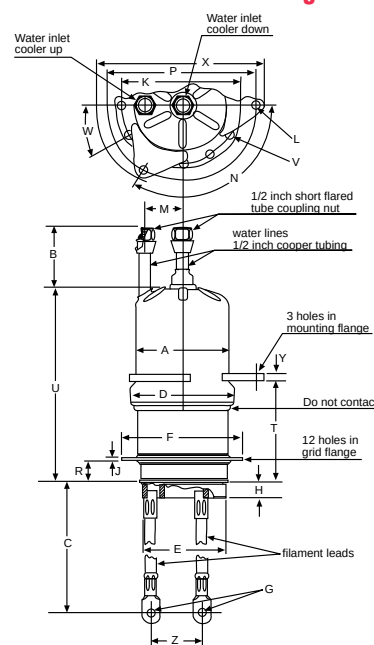
Mechanical

Cooling	Water and forced air	
Base	Flying leads/flange	
Operating position	Vertical, Base up or down	
Maximum operating temperature	250°	C
Maximum dimensions:		
Length	302.7 mm (11.92 in.)	
Diameter	171.5 mm (6.75 in.)	
Net Weight	5.45 kg (12 lb)	

Class C RF Oscillator

Maximum Ratings		
DC plate voltage	12,000	V
DC plate current	6.0	A
Grid voltage	-1000	V
Grid current	1.0	A
Plate dissipation	30	kW
Plate input power	60	kW

Svetlana Outline drawing



Dimensional Data

	Millimeters			Inches		
	Min.	Max.	Ref.	Min.	Max.	Ref.
A	103.99	105.56	—	4.094	4.156	—
B	56.72	71.42	—	2.312	2.812	—
C	215.90	228.60	—	8.500	9.000	—
D	116.69	119.40	—	4.594	4.700	—
E	82.04	83.06	—	3.230	3.270	—
F	127.76	129.29	—	5.030	5.090	—
G	—	—	9.91	—	—	.390
H	13.46	17.8	—	.530	.7	—
J	—	—	3.18	—	—	.125
K	112.40	112.90	—	4.425	4.445	—
L	—	6.73	—	—	—	.265
M	38.10	44.45	—	1.500	1.750	—
N	118°	112°	—	118°	122°	—
P	151.31	153.04	—	5.957	6.025	—
R	17.78	21.84	—	.700	.860	—
T	110.49	113.03	—	4.350	4.450	—
U	200.74	213.44	—	7.903	8.403	—
V	—	—	6.35	—	—	.250
W	29°	31°	—	29°	31°	—
X	—	—	171.45	—	—	6.750
Y	—	—	6.35	—	—	.250
Z	—	—	50.80	—	—	2.000



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SVETLANA TECHNICAL DATA

3CX10,000A3/8159

Medium-Mu Power Triode



The Svetlana™ 3CX10,000A3/8159 is a high-performance ceramic/metal power triode designed for use in industrial heating, communications and broadcast FM applications. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, providing enhanced linearity, less noise, reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area, giving superior VHF performance.

The Svetlana™ 3CX10,000A3/8159 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia, and is an exact replacement for the 3CX10,000A3/8159 manufactured in the United States.

Characteristics

Electrical

Filament	Thoriated-tungsten mesh	
Voltage	7.50 ± 0.37	V
Current @ 7.50V	100	A
Amplification factor (average)	20	
Direct interelectrode capacitances (grounded grid):		
Input	53.0	pF
Output	34.0	pF
Feedback	1.5	pF
Direct interelectrode capacitances (grounded filament):		
Input	53.0	pF
Output	1.5	pF
Feedback	34.0	pF
Maximum frequency for full ratings (CW)	140	MHz

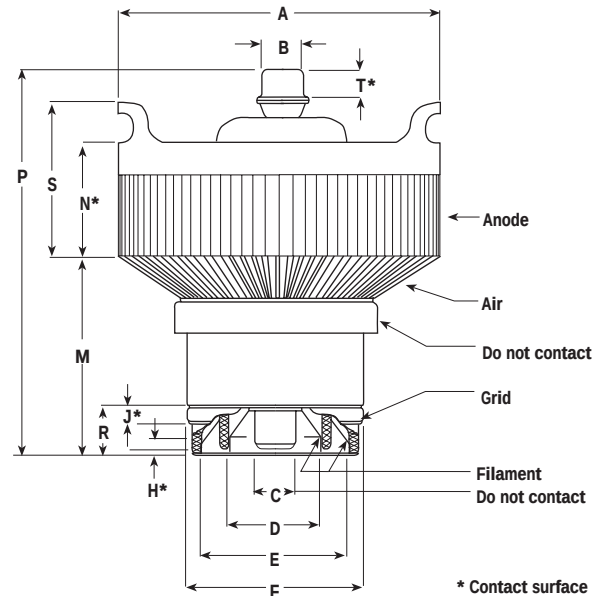
Mechanical

Cooling	Forced air
Base	Coaxial
Socketing	Svetlana SK1300, SK1320 or equiv.
Air chimney	Eimac 1306 or equiv.
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum dimensions:	

Cathode-Driven RF Linear Amplifier, Class AB

Maximum Ratings		
DC plate voltage	7,000	V
DC plate current	5.0	A
Plate dissipation	12	kW
Grid dissipation	250	W

Svetlana Outline drawing



Dimensional Data				
Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	175.97	179.07	6.928	7.050
B	21.72	22.73	0.855	0.895
C	18.29	19.30	0.720	0.760
D	48.16	49.17	1.896	1.936
E	79.58	80.59	3.133	3.173
F	96.32	97.33	3.792	3.832
H	4.78	—	0.188	—
J	4.78	—	0.188	—
M	100.33	109.22	3.950	4.300
N	61.26	70.82	2.412	2.788
P	209.55	222.25	8.250	8.750
R	25.04	26.67	0.986	1.050
S	86.66	96.22	3.412	3.788
T	9.53	—	0.375	—



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Svetlana 3CX10,000A3/8159

Medium-Mu Power Triode

Cathode-Driven RF Linear Amplifier, Class AB

Typical Operation				
DC plate voltage	6000	7000	V	
Zero-signal DC plate current	0.5	0.5	A	
Single-tone DC plate current	4.0	4.0	A	
Zero-signal DC grid voltage*	-270	-325	V	
Single-tone DC grid current*	0.3	0.25	A	
Peak driving power	1950	2050	W	
Single-tone plate output power	18	20	kW	

Cathode-Driven Class C RF Amplifier, CW or FM

Maximum Ratings				
DC plate voltage		7,000	V	
DC plate current		4.0	A	
Plate dissipation		10	kW	
Grid dissipation		250	W	
Typical operation				
DC plate voltage	6000	7000	V	
DC grid voltage	-535	-625	V	
DC plate current	4.0	4.0	A	
DC grid current*	0.545	0.53	A	
Peak RF cathode voltage*		400	V	
Driving power*		1510	W	
Plate output power	20.5	24.5	kW	

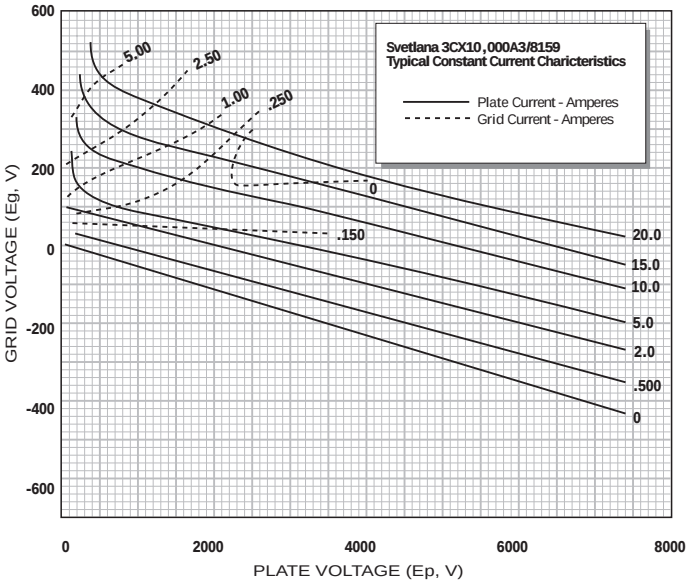
RF Industrial Oscillator, Class C

Maximum ratings (per tube)				
DC plate voltage		7000	V	
DC plate current		4.0	A	
Plate dissipation		10	kW	
Grid dissipation		250	W	

*Approximate values

Base-to-Anode Air Flow				
*	Sea Level		10,000 Feet	
Anode Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
4000	110	0.25	160	0.36
8000	270	0.95	390	1.40
12,000	448	2.00	650	2.90

* Because the power dissipated by the filament represents about 750 watts and because grid dissipation can, under some conditions, represent another 250 watts, allowance has been made in preparing this tabulation for an additional 1000 watts.



Svetlana 3CX10,000A7/8160 High-Mu Power Triode



The Svetlana™ 3CX10,000A7/8160 is a high-performance ceramic/metal power triode designed for use in zero-bias, class B RF or audio amplifiers. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, providing enhanced linearity, less noise, reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area, giving superior VHF performance.

The Svetlana 3CX10,000A7/8160 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CX10,000A7/8160 manufactured in the United States.



Svetlana 3CX10,000A7/8160

General Characteristics

Electrical

Filament	Thoriated-tungsten mesh
Voltage	7.50 ±0.37V
Current @ 7.50V	100A
Amplification factor (average)	200
Direct interelectrode capacitances (grounded grid):	
Input	59.0pF
Output	36.0pF
Feedback	0.2pF
Direct interelectrode capacitances (grounded filament):	
Input	59.0pF
Output	0.2pF
Feedback	36.0pF
Maximum frequency for full ratings (CW)	160 MHz

Mechanical

Cooling	Forced air
Base	Coaxial
Socketing	Eimac 1300 or equiv.
Air chimney	Eimac 1306 or equiv.
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	222.25 mm (8.75 in.)
Diameter	179.07 mm (7.05 in.)
Net weight	5.45 kg (12 lb)

Cathode-Driven Radio Frequency Linear Amplifier, Class B

Maximum Ratings			
DC plate voltage	10,000		V
DC plate current	5.0		A
Plate dissipation	12		kW
Grid dissipation	500		W
Typical operation			
DC plate voltage	7000	7000	V
Zero-signal DC plate current*	0.60	0.60	A
Single-tone DC plate current	3.72	5.00	A
Grid bias	0	0	V
Single-tone DC grid current*	0.71	1.00	A
Peak driving power	885	1540	W
Single-tone plate output power	17.7	24.2	kW
Resonant load impedance	1020	745	Ohms
Driving impedance	35	32	Ohms

*Approximate values

High-Mu Power Triode

Cathode-Driven Class C RF Amplifier, CW or FM

Maximum Ratings		
DC plate voltage	10,000	V
DC plate current	4.0	A
Plate dissipation	10	kW
Grid dissipation	500	W
Typical operation		
DC plate voltage	7600	V
DC grid voltage	-110	V
DC plate current	3.68	A
DC grid current*	0.78	A
Peak RF cathode voltage*	400	V
Driving power*	1510	W
Plate output power	22.5	kW

Audio Frequency Amplifier or Modulator, Class AB, Grid Driven

Maximum ratings (per tube)		
DC plate voltage	8000	V
DC plate current	5.0	A
Plate dissipation	12	kW
Grid dissipation	500	W

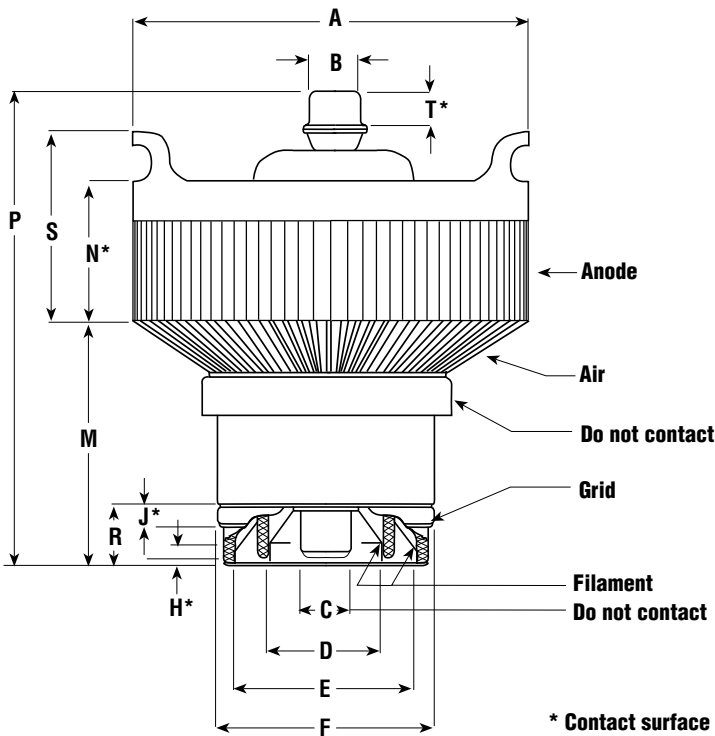
Typical operation (two tubes, sinusoidal waveform)

DC plate voltage	7000	7000	Vdc
DC grid voltage	0	0	V
Zero-signal DC plate current*	1.2	1.2	A
Maximum-signal DC plate current	7.5	7.5	A
Maximum-signal DC grid current*	1.5	2.1	A
Peak AF grid voltage**	250	250	V
Peak driving power	315	560	W
Plate output power	35.6	47.7	kW
Load resistance (plate-to-plate)	2000	1520	Ohms

*Approximate Values **Per tube

3CX10,000A7/8160

3CX10,000A7/8160 Outline Drawing



Dimensional Data				
Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	175.97	179.07	6.928	7.050
B	21.72	22.73	0.855	0.895
C	18.29	19.30	0.720	0.760
D	48.16	49.17	1.896	1.936
E	79.58	80.59	3.133	3.173
F	96.32	97.33	3.792	3.832
H	4.78	—	0.188	—
J	4.78	—	0.188	—
M	100.33	109.22	3.950	4.300
N	61.26	70.82	2.412	2.788
P	209.55	222.25	8.250	8.750
R	25.04	26.67	0.986	1.050
S	86.66	96.22	3.412	3.788
T	9.53	—	0.375	—

High-Mu Power Triode

Electrical Application

Filament Operation The rated filament voltage for the 3CX10,000A7/8160 is 7.50 volts. Filament voltage, as measured at the socket, should be maintained within 5% of this value to obtain maximum tube life.

Input Circuit A resonant tank circuit is recommended for grounded-grid operation. In a single-ended circuit the loaded “Q” should be at least 3. This technique increases linearity and output power.

Mechanical Application

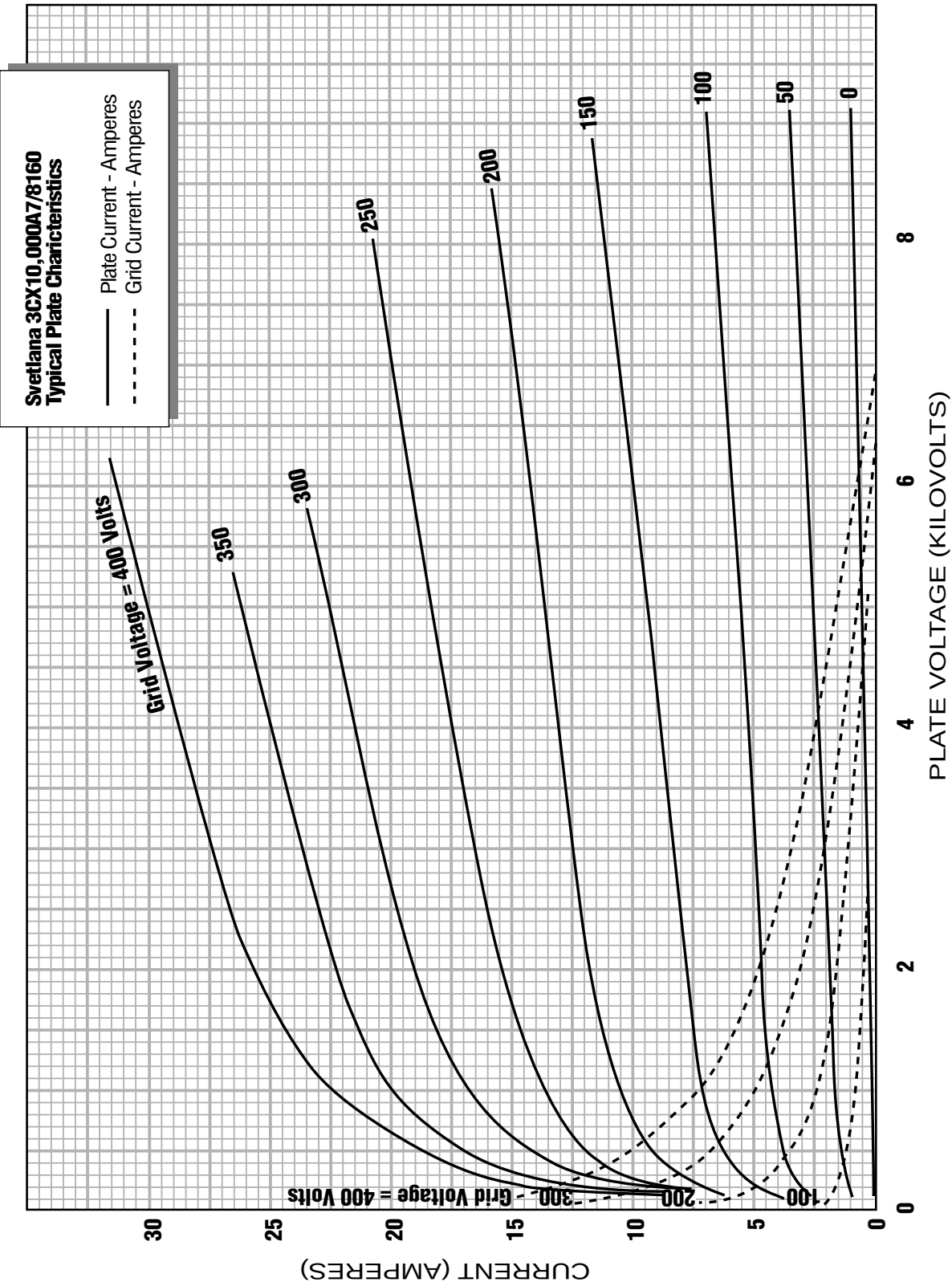
Mounting The 3CX10,000A7/8160 must be mounted with its axis vertical. The base of the tube may be up or down.

Cooling Sufficient forced-air circulation must be provided to keep the temperature of the anode core and the temperatures of the ceramic/metal seals below 225°C. Airflow requirements to maintain these temperatures below 225°C with an inlet-air temperature of 50°C are tabulated. At frequencies above 30 MHz or at higher inlet-air temperatures, more airflow will be required.

*	Sea Level		10,000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
Anode Dissipation Watts				
4000	105	0.24	154	0.35
8000	253	0.90	370	1.45
12,000	483	2.25	710	3.40

** Because the power dissipated by the filament represents about 750 watts and because grid dissipation can, under some conditions, represent another 500 watts, allowance has been made in preparing this tabulation for an additional 1250 watts.*

3CX10,000A7/8160



Svetlana 3CX10,000H3 Medium-Mu Industrial Power Triode



The Svetlana™ 3CX10,000H3 is a rugged high-performance industrial ceramic/metal power triode designed for use in amplifier, oscillator, or modulator service. The ceramic is glazed to facilitate cleaning when used in an industrial environment. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, contributing to longer life. The mesh filament also provides improved RF efficiency at VHF operation. Flexible leads connect to the filament terminals and a flange is connected to the grid. The flange provides a convenient way to mount the tube.

The Svetlana 3CX10,000H3 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CX10,000H3 manufactured in the United States.



Svetlana 3CX10,000H3

General Characteristics

Electrical

Filament	Thoriated-tungsten mesh
Voltage	7.50 ±0.37 V
Current @ 7.50V	99 ±5 A
Amplification factor (average)	20
Direct interelectrode capacitances (grounded filament):	
Input	53.0 pF
Output	1.5 pF
Feedback	34 pF
Maximum frequency for full ratings (CW)	90 MHz

Mechanical

Cooling	Forced air
Base	Flying leads/flange
Socketing	None. Mounting flange
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length (including filament leads)	45.09 cm (17.75 in.)
Diameter	17.91cm (7.05 in.)
Net weight	5.5 kg (12 lb)

RF Power Amplifier or Oscillator, Class C, (Filtered DC Plate Power Supply)

Maximum Ratings			
DC plate voltage	10,000	V	
DC plate current	5.0	A	
Plate dissipation	10,000	W	
Grid dissipation	250	W	
DC grid voltage	-1000	V	
DC grid current	0.6	A	
Plate input power	40,000	W	

Typical Operation

(Frequencies to 30MHz)			
DC plate voltage	7000	9000	V
DC plate current	4.0	4.0	A
DC grid voltage*	-670	-930	V
DC grid current*	275	430	mA
Peak RF grid voltage*	340	390	V
Driving Power*	260	570	W
Plate input power	28,000	36,000	W
Plate dissipation	9000	7000	W
Plate output power	19,000	29,000	W
Approximate load impedance	720	1100	Ohms

Audio or Radio Frequency Amplifier Service, Class AB or B

Maximum Ratings (per tube)		
DC plate voltage	7500	V
DC plate current	5.0	A
Plate dissipation	12,000	W
Grid dissipation	250	W

*Approximate values

Medium-Mu Industrial Power Triode

Electrical Application

Filament Operation The rated filament voltage for the 3CX10,000H3 is 7.50 volts. Filament voltage, as measured at the filament seals, should be maintained within 5% of this value to obtain maximum tube life.

High Frequency Operation Useful operation of the 3CX10,000H3 may be obtained to 140 MHz. Class C service at this frequency requires a reduction of maximum plate voltage to 7000 volts.

Mechanical Application

Mounting The 3CX10,000H3 must be mounted with its axis vertical. The base of the tube may be up or down.

Filament Connections The Svetlana 3CX10,000H3 filament connections are made via the attached flexible leads.

Grid Connection The mounting flange is also the electrical connection to the grid.

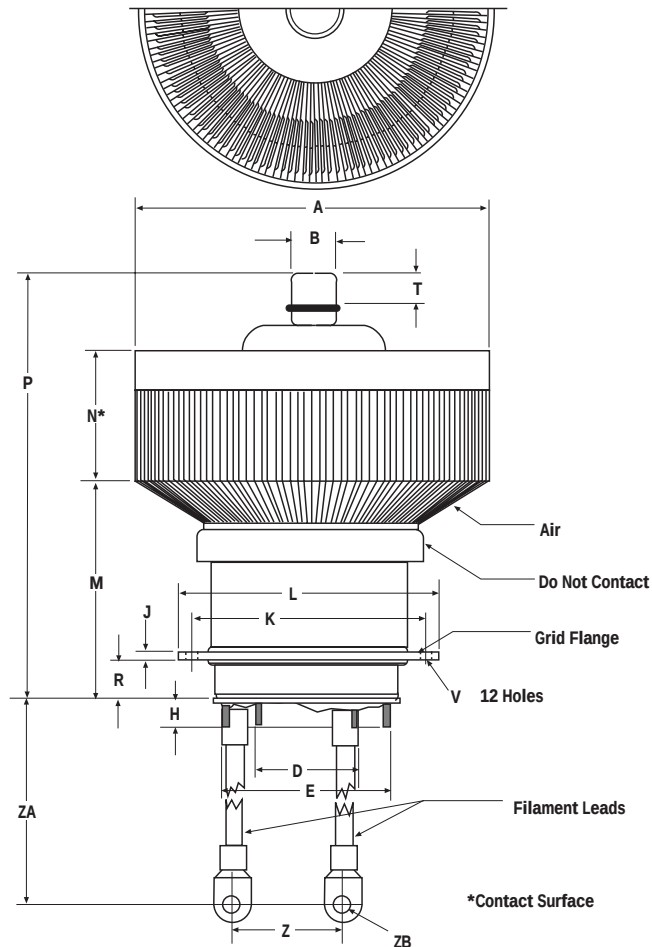
Cooling Sufficient forced-air circulation must be provided to keep the temperature of the anode core and the temperatures of the ceramic/metal seals below 250°C. Airflow requirements to maintain these temperatures below 225°C with an inlet-air temperature of 40°C are tabulated. Additional stem cooling is required. 10 cfm of airflow must be directed over the lead-to-tube connections for the filament leads. At frequencies above 30 MHz or at higher inlet-air temperatures or higher altitudes, more airflow will be required. The joints between the filament leads and the tube surfaces must be adequately cooled.

Base-to-Anode Air Flow				
Anode* Dissipation Watts	Sea Level		5000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
4000	85	0.18	105	0.21
6000	145	0.38	175	0.46
8000	215	0.68	260	0.82
10,000	295	1.08	360	1.32
12,000	390	1.62	470	1.95

** Adequate cooling allowance is included for approximately 1000 watts of additional dissipation of filament and grid power*

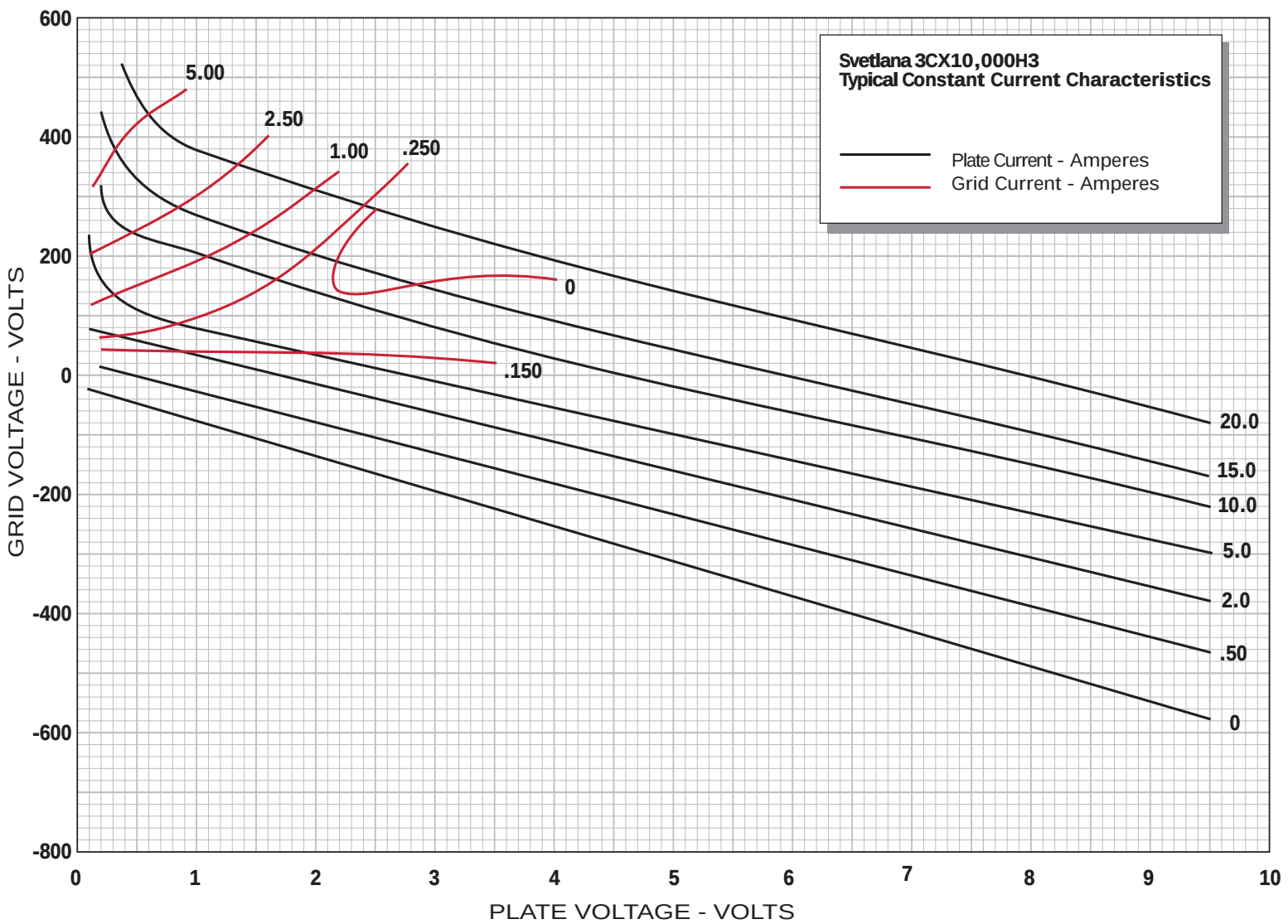
Svetlana 3CX10,000H3

Svetlana 3CX10,000H3 Outline Drawing



Dimensional Data						
Dim.	Millimeters			Inches		
	Ref.	Min.	Max.	Ref.	Min.	Max.
A	—	175.97	179.07	—	6.928	7.050
B	—	21.72	27.50	—	0.855	0.895
D	47.63	—	—	1.875	—	—
E	82.55	—	—	3.250	—	—
H	—	13.46	17.78	—	0.530	0.700
J	3.18	—	—	0.125	—	—
K	—	112.4	112.9	—	4.425	4.445
L	—	127.62	129.29	—	5.030	5.090
M	—	100.33	109.22	—	3.950	4.300
N	—	61.27	70.82	—	2.412	2.788
P	—	209.55	222.25	—	8.250	8.750
R	—	17.78	21.84	—	0.800	0.860
T	—	9.53	—	—	0.375	—
V	6.35	—	—	0.250	—	—
Z	50.8	—	—	2.000	—	—
ZA	—	215.9	228.6	—	8.500	9.00
ZB	9.91	—	—	0.390	—	—

Medium-Mu Industrial Power Triode



Svetlana 3CX15,000A3 Medium-Mu Power Triode



The Svetlana™ 3CX15,000A3 is a high-performance ceramic/metal power triode designed for use in industrial heating, communications and AM broadcast applications. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, providing enhanced linearity, less noise, reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area, giving superior VHF performance.

The Svetlana 3CX15,000A3 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CX15,000A3 manufactured in the United States.



Svetlana 3CX15,000A3

General Characteristics

Electrical

Filament	Thoriated-tungsten mesh
Voltage	6.3 ±0.3 V
Current @ 7.50V	160 A
Amplification factor (average)	20
Direct interelectrode capacitances (grounded grid):	
Input	55.0 pF
Output	34.0 pF
Feedback	1.4 pF
Direct interelectrode capacitances (grounded filament):	
Input	55.0 pF
Output	1.4 pF
Feedback	34.0 pF
Maximum frequency for full ratings (CW)	100 MHz

Mechanical

Cooling	Forced air
Base	Coaxial
Socketing	Svetlana SK1300, 1320 or equiv.
Air chimney	Eimac SK1306 or equiv.
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	222.25 mm (8.75 in.)
Diameter	179.07 mm (7.05 in.)
Net weight	5.45 kg (12 lb)

Cathode-Driven Radio Frequency Linear Amplifier, Class AB₂

Maximum Ratings		
DC plate voltage	8,000	V
DC plate current	6.0	A
Plate dissipation	15	kW
Grid dissipation	500	W

Typical operation

DC plate voltage	7000	V
Zero-signal DC plate current	1.5	A
Single-tone DC plate current	4.8	A
Zero-signal DC grid voltage*	-270	V
Max DC grid current	0.4	A
Peak RF grid voltage	540	V
Peak driving power	215	W
Single-tone plate output power	23	kW
Resonant load impedance	730ohms	

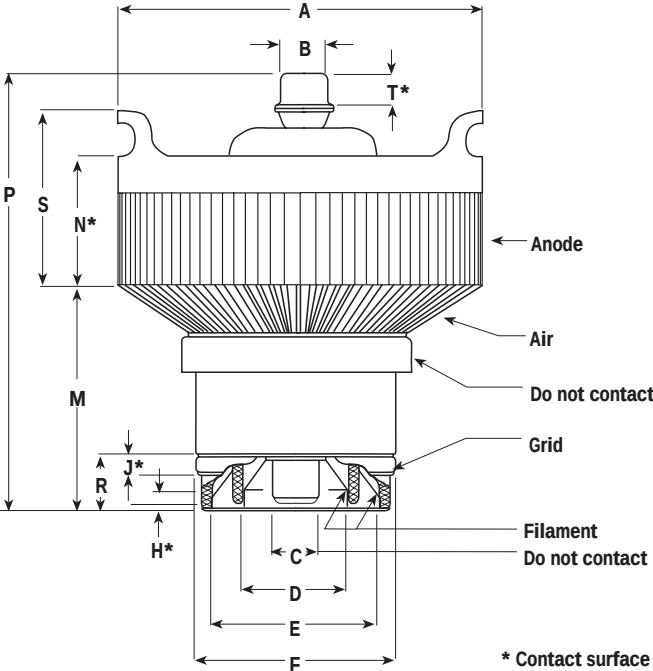
*Approximate values

Medium-Mu Power Triode

RF Industrial Oscillator or Amplifier, Class C

Maximum ratings (per tube)		
DC plate voltage	8000	V
DC plate current	6.0	A
Plate dissipation	15	kW
Grid dissipation	500	W
Typical operation		
DC plate voltage	7000	V
DC grid voltage	-600	V
Maximum-signal DC plate current	6.0	A
Maximum-signal DC grid current	0.66	A
Peak AF grid voltage	1040	V
Driving power	660	W
Plate input power	42	kW
Plate output power	30	kW
Plate dissipation	12	kW
Resonant load impedance	600	ohms

3CX15,000A3 Outline Drawing



Dimensional Data				
Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	175.97	179.07	6.928	7.050
B	21.72	22.73	0.855	0.895
C	18.29	19.30	0.720	0.760
D	48.16	49.17	1.896	1.936
E	79.58	80.59	3.133	3.173
F	96.32	97.33	3.792	3.832
H	4.78	—	0.188	—
J	4.78	—	0.188	—
M	100.33	109.22	3.950	4.300
N	61.26	70.82	2.412	2.788
P	209.55	222.25	8.250	8.750
R	25.04	26.67	0.986	1.050
S	86.66	96.22	3.412	3.788
T	9.53	—	0.375	—

Svetlana 3CX15,000A3

Electrical Application

Filament Operation The rated filament voltage for the 3CX15,000A3 is 6.30 volts. Filament voltage, as measured at the socket, should be maintained within 5% of this value to obtain maximum tube life.

Grid Operation A recommended maximum grid current is 1.0 Adc. This value should not be exceeded for more than very short periods such as during tuning. Over-current protection in the grid circuit should be provided. Ordinarily it will not be necessary to operate with more than 0.4 to 0.6 amperes grid current to obtain reasonable efficiency. In industrial heating service with varying loads, grid current should be monitored continuously with a DC current meter. The absolute maximum grid dissipation rating is 500 watts.

Plate Operation Absolute maximum plate voltage rating of 8 kV and maximum plate current of 6.0 amperes should not be applied simultaneously as rated plate dissipation may be exceeded. Plate overcurrent protection should be provided to remove plate voltage quickly in the event of an over-load or an arc-over at the load. In addition, current limiting power supply resistors should be used. These precautions are especially important in industrial service having wide variations in plate current loading.

Spark gaps from plate to ground should be used to prevent transient voltages from flashing across the tube envelope during any fault conditions.

High Frequency Operation The 3CX15,000A3 is usable to 140 MHz. At this frequency, absolute maximum plate voltage must be reduced to 7000 Vdc Class A, B, or C service. The Svetlana 3CX15,000A3 mesh filament construction gives enhanced performance at VHF frequencies.

Mechanical Application

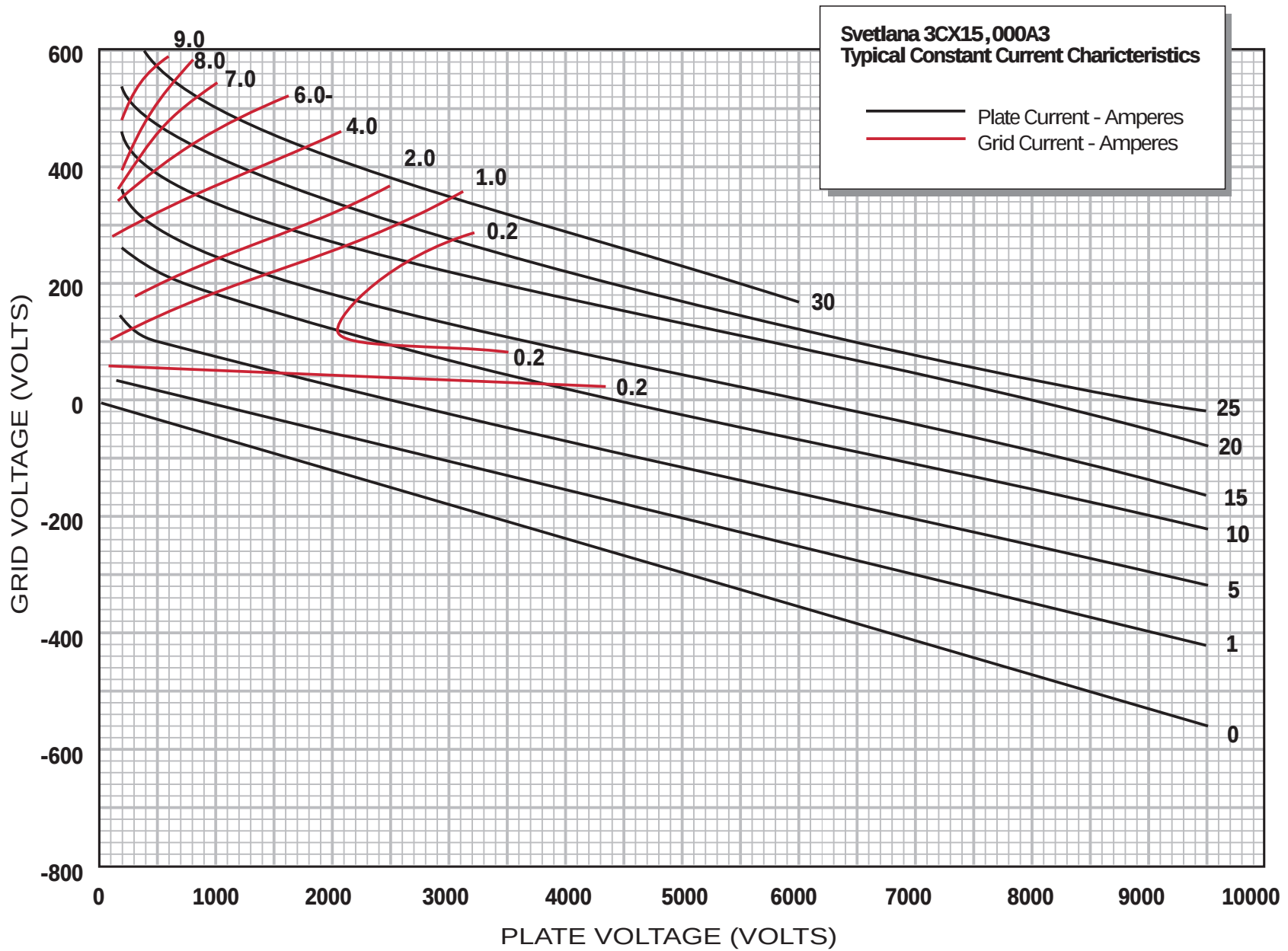
Mounting The 3CX15,000A3 must be mounted with its axis vertical. The base of the tube may be up or down.

Cooling Sufficient forced-air circulation must be provided to keep the temperature of the anode core and the temperatures of the ceramic/metal seals below 250°C. Airflow requirements to maintain these temperatures below 225°C with an inlet-air temperature of 40°C are tabulated for base to anode direction

*	Sea Level		10,000 Feet	
Anode Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
5000	85	0.2	160	0.36
10,000	360	2.0	390	1.40
15,000	970	10.5	650	2.90

* An additional 1500 watts has been included in preparing this tabulation to compensate for grid and filament power.

Medium-Mu Power Triode



Svetlana 3CX15,000H3 Medium-Mu Industrial Power Triode



The Svetlana™ 3CX15,000H3 is a high-performance ceramic/metal power triode designed for use in oscillator, amplifier, or modulator service. The ceramic is glazed to facilitate cleaning when used in an industrial environment. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, contributing to longer life. The mesh filament also provides improved RF efficiency at VHF operation. Flexible leads connect to the filament terminals and a flange is connected to the grid. The flange provides a convenient way to mount the tube. The Svetlana 3CX15,000H3 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CX15,000H3 manufactured in the United States.



Svetlana 3CX15,000H3

General Characteristics

Electrical

Filament	Thoriated-tungsten mesh
Voltage	6.3 $\pm$ 0.315 V
Current @ 7.50V	162 $\pm$ 10.0 A
Amplification factor (average)	20
Direct interelectrode capacitances (grounded filament):	
Input	55.0 pF
Output	1.5 pF
Feedback	34 pF
Maximum frequency for full ratings (CW)	90 MHz

Mechanical

Cooling	Forced air
Base	Flying leads/flange
Socketing	None. Mounting flange
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	45.09 cm (17.75 in.)
Diameter	17.91 cm (7.05 in.)
Net weight	5.91 kg (13 lb)

RF Power Oscillator or Amplifier, Class C, (Filtered DC Plate Power Supply)

Maximum Ratings			
DC plate voltage	12,000	V	
DC plate current	6.0	A	
Plate dissipation	15,000	W	
Grid dissipation	500	W	
DC grid voltage	-1000	V	
DC grid current	-1.0	A	
Plate input power	60,000	W	

Typical Operation (under load)

(Frequencies to 30MHz)			
DC plate voltage	7000	10,000	V
DC plate current	6.0	5.0	A
DC grid voltage	-600	-800	V
DC grid current	660	542	mA
Peak RF grid voltage	440	400	V
Driving Power	660	650	W
Grid dissipation	78	46	W
Plate input power	42,000	50,000	W
Plate dissipation	12,000	8,800	W
Plate output power	30,000	41,200	W
Approximate load impedance	600	1025	Ohms

Medium-Mu Industrial Power Triode

Electrical Application

Filament Operation The rated filament voltage for the 3CX15,000H3 is 6.30 volts. Filament voltage, as measured at the filament seals, should be maintained within 5% of this value. Maximum tube life will be obtained at -5%.

Control Grid Operation The maximum grid current rating should never be exceeded except for short periods such as tuning. Overcurrent protection in the grid circuit should be provided although in most applications the grid current will not exceed 0.6A. The widely varying loads in most industrial applications emphasises the need for continuous grid current monitoring.

Plate Operation Maximum plate voltage and current should never be permitted simultaneously. Plate current overload protection should be adjusted to remove plate voltage quickly in the event of an arc or other current overload. An added measure of safety is a spark gap from plate to ground to protect against an over voltage condition.

Mechanical Application

Mounting The 3CX15,000H3 must be mounted with its axis vertical. The base of the tube may be up or down.

Filament Connections The Svetlana 3CX15,000H3 filament connections are made via the attached flexible leads.

Grid Connection The mounting flange is also the electrical connection to the grid.

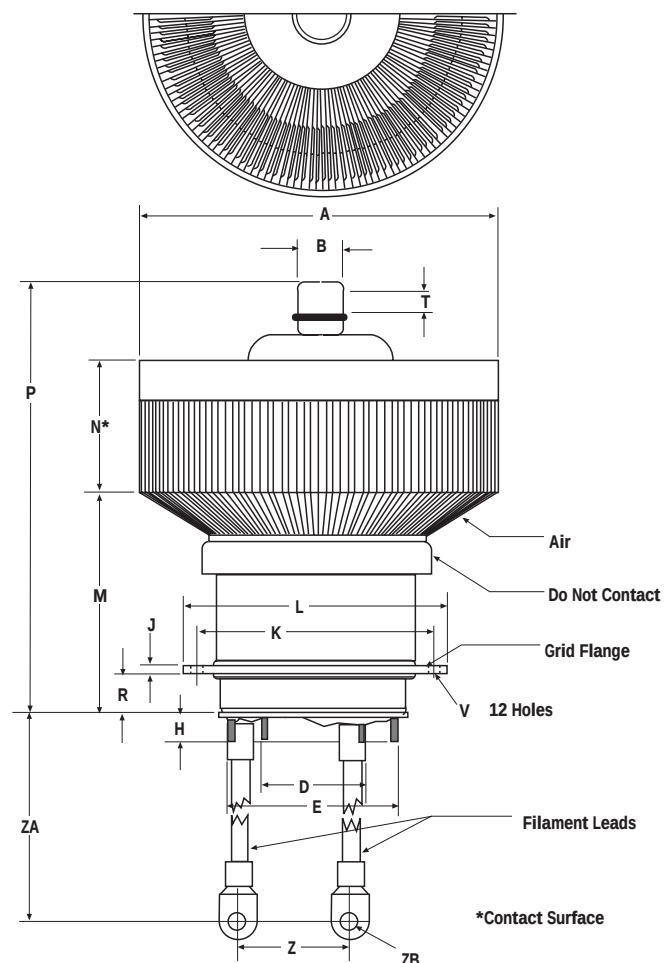
Cooling Sufficient forced-air circulation must be provided to keep the temperature of the anode core and the temperatures of the ceramic/metal seals below 250°C. Airflow requirements to maintain these temperatures below 225°C with an inlet-air temperature of 50°C are tabulated. Adequate airflow must be directed over the lead-to-tube connections for the grid and filament leads. At frequencies above 30 MHz or at higher inlet-air temperatures or higher altitudes, more airflow will be required. The joints between the filament leads and the tube surfaces must be adequately cooled.

Anode-to-Base Air Flow ¹				
Anode Dissipation Watts	Sea Level		5000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
7500	361	1.63	433	1.96
10,000	606	3.26	728	3.92
15,000	1260	10.00	1510	12.00

¹ A minimum of 16 cfm must be directed into the filament-stem structure below the outer filament contact ring to maintain the base seals below 250° C.

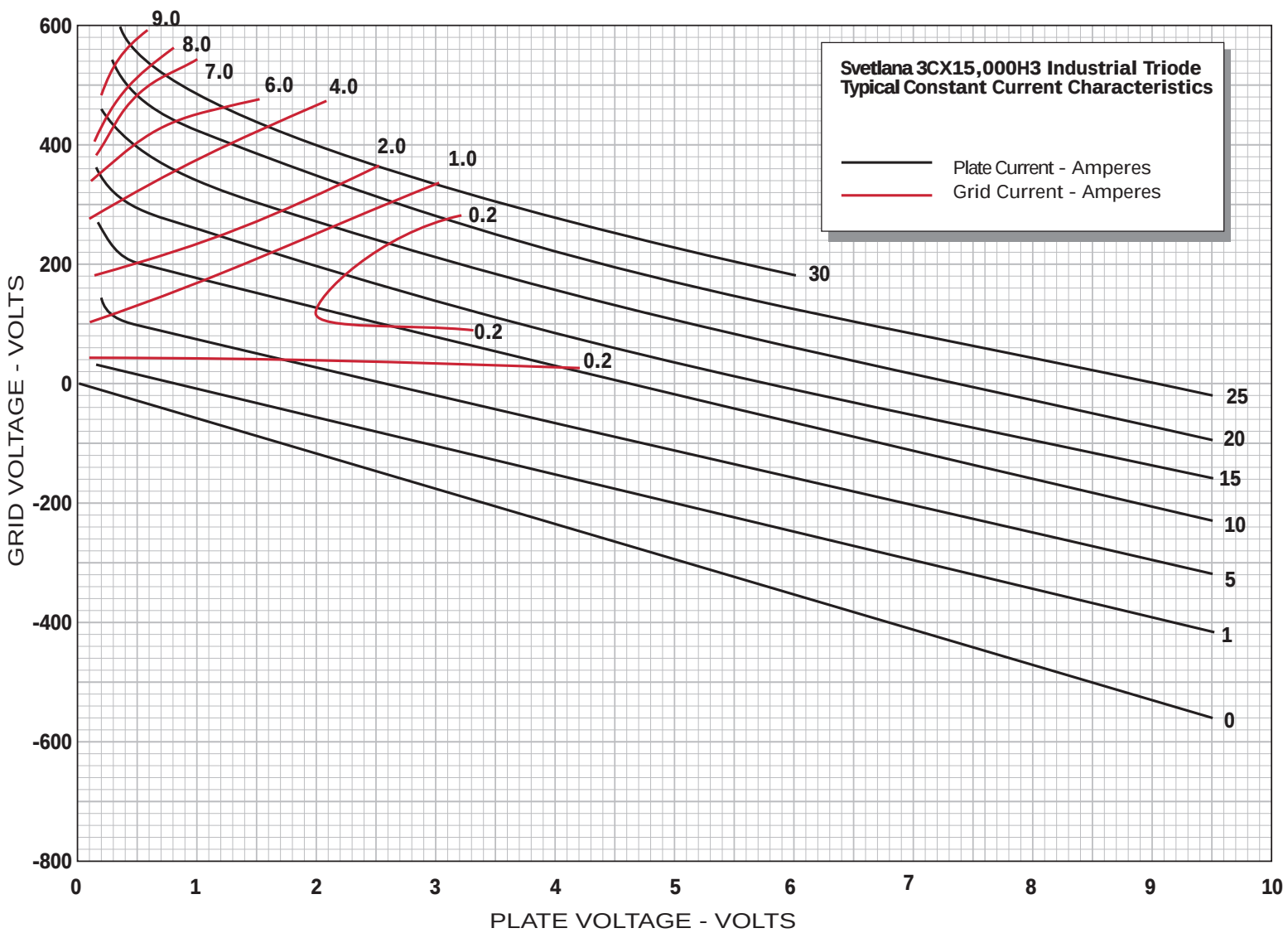
Svetlana 3CX15,000H3

Svetlana 3CX15,000H3 Industrial Triode Outline Drawing



Dimensional Data						
Dim.	Millimeters			Inches		
	Ref	Min.	Max.	Ref	Min.	Max.
A	—	175.97	179.07	—	6.928	7.050
B	—	21.72	22.73	—	0.855	0.895
D	47.63	—	—	1.875	—	—
E	82.55	—	—	3.250	—	—
H	—	13.46	17.78	—	0.530	0.700
J	3.18	—	—	0.125	—	—
K	—	112.40	112.90	—	4.425	4.445
L	—	127.62	129.29	—	5.030	5.090
M	—	100.33	109.22	—	3.950	4.300
N	—	61.27	70.82	—	2.412	2.788
P	—	209.55	222.25	—	8.250	8.750
R	—	17.78	21.84	—	0.700	0.860
T	—	9.53	—	—	0.375	—
V	6.35	—	—	0.250	—	—
Z	50.8	—	—	2.000	—	—
ZA	—	215.9	228.6	—	8.500	9.000
ZB	9.91	—	—	0.390	—	—

Medium-Mu Power Industrial Triode



Svetlana 3CX2500H3 Medium-Mu Power Triode



The Svetlana™ 3CX2500H3 is a high-performance ceramic/metal power triode designed for use in amplifier, oscillator, or modulator service. The ceramic is glazed to facilitate cleaning when used in an industrial environment. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, contributing to longer life. Flexible leads connect to the filament terminals and a flange is connected to the grid. The flange provides a convenient way to mount the tube.

The Svetlana 3CX2500H3 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CX2500H3 manufactured in the United States.



Svetlana 3CX2500H3

General Characteristics

Electrical

Filament	Thoriated-tungsten mesh
Voltage	7.50 ±0.37 V
Current @ 7.50V	51.5 A
Amplification factor (average)	22
Direct interelectrode capacitances (grounded filament):*	
Input	36.0 pF
Output	0.9 pF
Feedback	20 pF
Maximum frequency for full ratings (CW)	75 MHz

Mechanical

Cooling	Forced air
Base	Flying leads/flange
Socketing	None. Mounting flange
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum operating temperature- Filament leads/tube base joints	150° C
Maximum dimensions:	
Length	46.83 cm (18.44 in.)
Diameter	10.79 cm (4.25 in.)
Net weight	2.9 kg (6.5 lb)

* Capacitance values are for a cold tube measured in a shielded fixture

RF Power Amplifier or Oscillator, Class C, FM or CW

Maximum Ratings			
DC plate voltage	6000	V	
DC plate current	2.5	A	
Plate dissipation	4000	W	
Grid dissipation	150	W	
DC grid voltage	-1000	V	
DC grid current	0.4	A	

Typical Operation

(Frequencies to 30MHz)				
DC plate voltage	4000	5000	6000	V
DC plate current	2.5	2.5	2.08	A
DC grid voltage*	-300	-450	-500	V
DC grid current*	245	265	180	mA
Peak RF grid voltage*	580	750	765	V
Driving Power*	142	197	136	W
Grid dissipation*	68	78	46	W
Plate input power	10,000	12,500	12,500	W
Plate dissipation	2500	2500	2500	W
Plate output power	7500	10,000	10,000	W

*Approximate values

Medium-Mu Power Triode

Plate-Modulated RF Amplifier, Class C Telephony

<i>Maximum Ratings</i>		
DC plate voltage	5500	V
DC plate current	2.0	A
Plate dissipation	2670	W
Grid dissipation	150	W
DC grid voltage	-1000	V

Typical Operation

(Frequencies to 110MHz)

DC plate voltage	4000	4500	5000	V
DC plate current	1.67	1.47	1.25	A
DC grid voltage	-450	-500	-550	V
DC grid current*	180	140	150	mA
Peak RF grid voltage*	685	715	760	V
Driving power	125	100	115	W
Grid dissipation*	43	30	32	W
DC plate input power	6670	6615	6250	W
Plate dissipation	1670	1315	950	W
Plate output power	5000	5300	5300	W

Audio Frequency Amplifier or Modulator, Class A or B

<i>Maximum Ratings (per tube)</i>		
DC plate voltage	6000	V
DC plate current	2.5	A
Plate dissipation	4000	W
Grid dissipation	150	W
DC grid voltage	-1000	V

Typical Operation (two tubes sinusoidal waveform)

DC plate voltage	4000	5000	6000	V
Zero-signal DC plate current*	0.6	0.5	0.4	A
Maximum-signal DC plate current	4.0	3.2	3.0	A
DC grid voltage **	-150	-190	-240	V
Peak AF grid voltage (per tube)*	340	360	390	V
Maximum-signal peak driving power*	340	230	225	W
Maximum-signal nominal driving power*	170	115	113	W
Load resistance, plate-to-plate	2200	3600	4650	Ohms
Maximum-signal plate output power	11,000	11,000	13,000	W

* Approximate values ** Adjust to give stated zero-signal plate current

Range Values for Equipment Design

	Min.	Max.	
Filament current at 7.5V	48.0	54.0	A
<i>Interelectrode capacitances (Grounded-Filament Connection)*</i>			
Input	29.2	40.2	pF
Output	0.6	1.2	pF
Feedback	16.8	23.2	pF
DC grid bias for $E_b = 3000$, $I_b = 0.83A$	-67	-100	V

*Capacitance values are for a cold tube in a shielded fixture.

Svetlana 3CX2500H3

Electrical Application

Filament Operation The rated filament voltage for the 3CX2500H3 is 7.50 volts. Filament voltage, as measured at the filament seals, should be maintained within 5% of this value to obtain maximum tube life.

Mechanical Application

Mounting The 3CX2500H3 must be mounted with its axis vertical. The base of the tube may be up or down.

Filament Connections The Svetlana 3CX2500H3 filament connections are made via the attached flexible leads.

Grid Connection The mounting flange is also the electrical connection to the grid.

Cooling Sufficient forced-air circulation must be provided to keep the temperature of the anode core and the temperatures of the ceramic/metal seals below 250°C. Airflow requirements to maintain these temperatures below 225°C with an inlet-air temperature of 40°C are tabulated. Adequate airflow must be directed over the lead-to-tube connections for the grid and filament leads. At frequencies above 30 MHz or at higher inlet-air temperatures or higher altitudes, more airflow will be required. The joints between the filament leads and the tube surfaces must be adequately cooled.

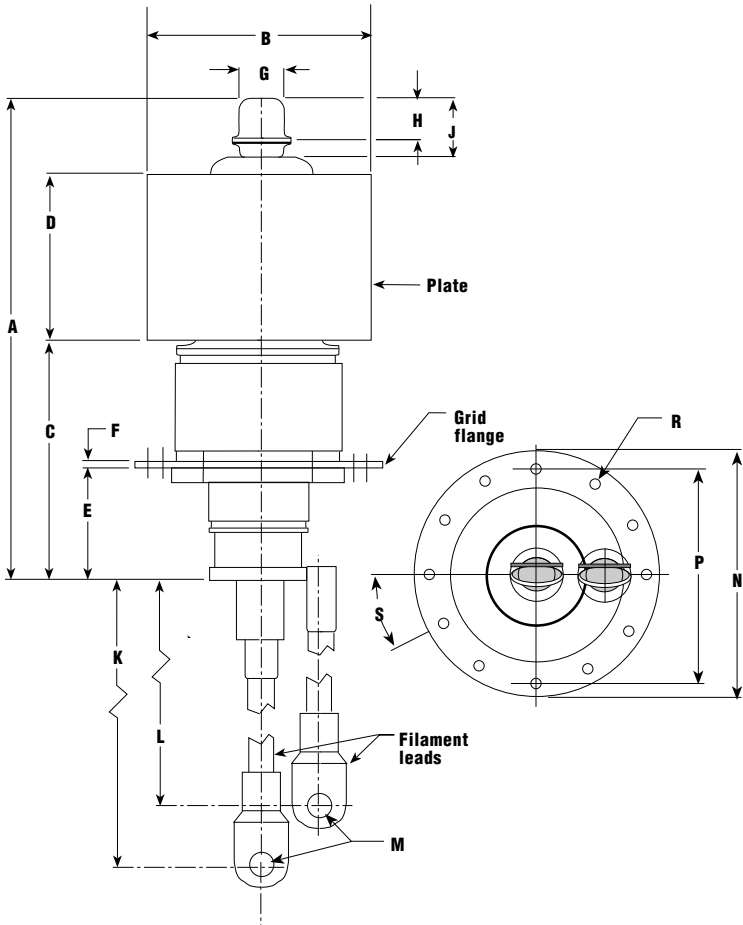
Dimensional Data						
Dim.	Millimeters			Inches		
	Min.	Max.	Nom.	Min.	Max.	Nom.
A	203.20	228.60	—	8.000	9.000	—
B	103.96	107.90	—	4.093	4.248	—
C	98.43	107.95	—	3.875	4.250	—
D	74.60	77.77	—	2.937	3.062	—
E	43.26	49.61	—	1.703	1.953	—
F	—	—	3.18	—	—	0.125
G	19.84	21.41	—	0.781	0.843	—
H	17.45	20.62	—	0.687	0.812	—
J	25.40	28.58	—	1.000	1.125	—
K	227.00	239.70	—	8.937	9.437	—
L	201.60	214.30	—	7.937	8.437	—
M	—	—	9.91	—	—	0.390
N	107.44	107.95	—	4.230	4.250	—
P	97.92	98.68	—	3.855	3.885	—
R	—	—	6.35	—	—	0.250
S	29°	31°	—	29°	31°	—

Base-to-Anode Air Flow				
Anode Dissipation Watts	Sea Level		5000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
2500	36	0.6	43	0.72
4000	67	1.20	80	1.45

Anode-to-Base Air Flow ¹				
Anode Dissipation Watts	Sea Level		5000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
2500	42	0.70	50	0.84
4000	84	1.70	101	2.00

¹ When air is supplied in the anode-to-base direction, a minimum of 5 cfm must be directed into the filament-stem structure between the inner and outer filament terminals to maintain the base seals below 250° C. A separate air system is not required with base-to-anode airflow.

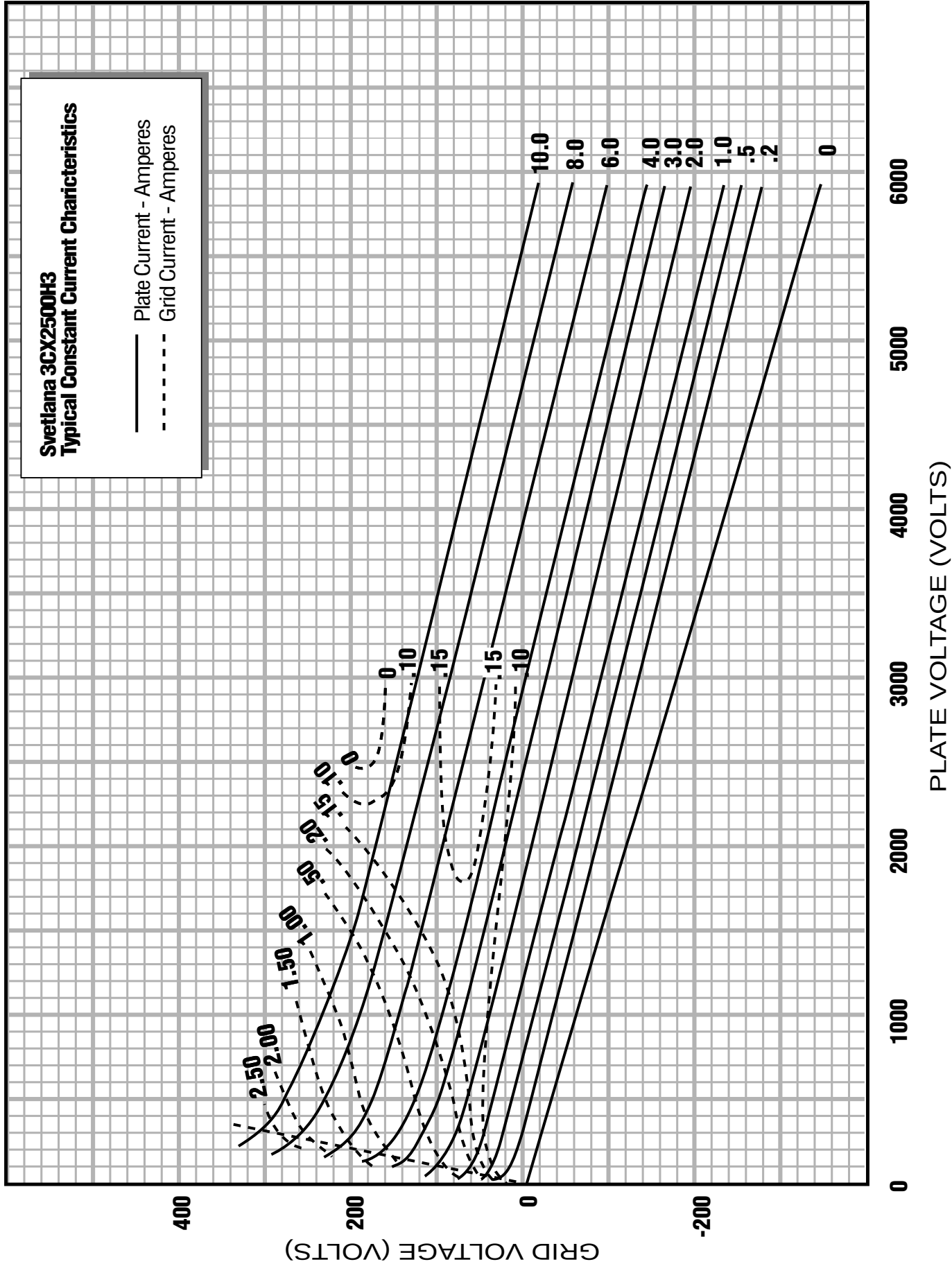
Svetlana 3CX2500H3 Outline Drawing



Notes:

1. There are 12 holes in grid flange.
2. Grid flange and filament leads are oriented as shown.

Medium-Mu Power Triode



3CX3000A7

High-Mu Power Triode



The Svetlana™ 3CX3000A7 is a high-performance ceramic/metal power triode designed for use in zero-bias, class AB, or class B RF or audio amplifiers. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, providing enhanced linearity, less noise, reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area, giving superior VHF performance.

The Svetlana 3CX3000A7 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CX3000A7 manufactured in the United States.



Svetlana 3CX3000A7

General Characteristics

Electrical		
Filament	Thoriated-tungsten mesh	
Voltage	7.50 ±0.37	V
Current @ 7.50V	51.5	A
Amplification factor (average)	160	
Direct interelectrode capacitances (grounded grid):		
Input	38.0	pF
Output	24.0	pF
Feedback	0.6	pF
Direct interelectrode capacitances (grounded filament):		
Input	38.0	pF
Output	0.6	pF
Feedback	24.0	pF
Maximum frequency for full ratings (CW)	110	MHz

Mechanical

Cooling	Forced air	
Base	Coaxial	
Socketing	Via spring collets	
Operating position	Vertical, Base up or down	
Maximum operating temperature	250°	C
Maximum dimensions:		
Length	228.60 mm (9.000 in.)	
Diameter	105.56 mm (4.156 in.)	
Net weight	2.8 kg (6.2 lb)	

Cathode-Driven Radio Frequency Linear Amplifier, Class AB₂

Maximum Ratings		
DC plate voltage	5000	V
DC plate current	2.5	A
Plate dissipation	4000	W
Grid dissipation	225	W

Typical Operation

(Frequencies to 30MHz)				
Plate Voltage	4000	4800	4800	V
Zero-signal plate current*	0.25	0.35	0.35	A
Single-tone plate current	2.00	1.68	2.00	A
Grid bias	0	0	0	V
Single-tone grid current*	0.61	0.46	0.60	A
Peak driving power	420	293	410	W
Plate dissipation	2285	2275	2775	W
Single-tone plate output power	6030	6000	7266	W
Resonant load impedance	1210	1720	1425	Ohms
Driving impedance	47.5	50.0	46.3	Ohms

*Approximate values

High-Mu Power Triode

Cathode-Driven Class C RF Amplifier, CW or FM

Maximum Ratings

DC Plate voltage	5000	V
DC Plate current	2.5	A
Plate dissipation	4000	W
Grid dissipation	225	W

Typical operation

(Frequencies to 110MHz)

Plate voltage	3500	4800	V
Grid voltage	-50	-60	V
Plate current	1.30	1.54	A
Grid current*	0.42	0.48	A
Peak RF cathode voltage*	220	267	V
Calculated driving power*	310	435	W
Plate dissipation	985	1480	W
Useful output power	3300	5500	W

Audio Frequency Amplifier or Modulator, Class AB₂ Grid Driven

Maximum Ratings (per tube)

DC plate voltage	5000	V
DC plate current	2.5	A
Plate dissipation	3000	W
Grid dissipation	225	W

Typical Operation (two tubes, sinusoidal waveform)

Plate voltage	4000	V
Zero-signal plate current*	0.50	A
Maximum-signal plate current	3.58	A
Maximum-signal grid current*	0.58	A
Peak AF grid voltage**	190	V
Peak driving power	115	W
Maximum-signal plate dissipation	1850	W
Plate output power	10,500	W
Load resistance (plate-to-plate)	2720	Ohms

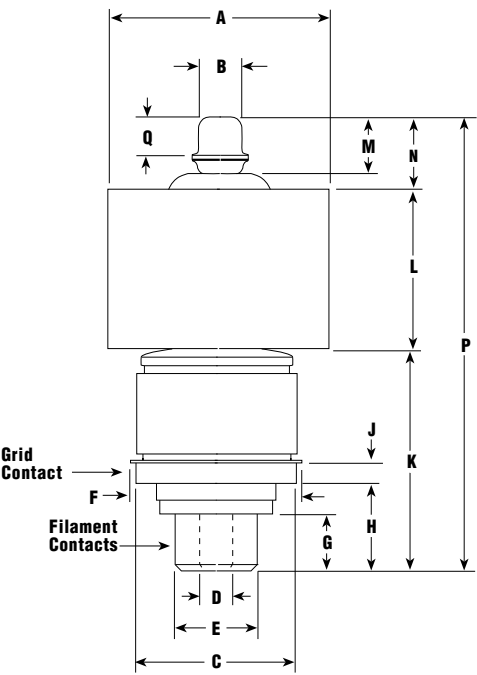
*Approximate values **Per tube

Svetlana 3CX3000A7

Range Values for Equipment Design

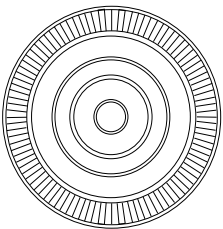
	Min.	Max.	
Filament current at 7.5V	48.0	54.0	A
Interelectrode capacitances (Grounded-Grid Connection)			
Input	30.0	45.0	pF
Output	20.0	28.0	pF
Feedback	—	1.0	pF
Interelectrode capacitances (Grounded-Filament Connection)			
Input	30.0	45.0	pF
Output		1.0	pF
Feedback	20.0	28.0	pF
Zero-Bias plate current ($E_b = 5000V$)	0.36	0.52	A
Cut-off bias ($E_b = 5000V$, $I_b = 1.0$ mA)	—	-45	V

Svetlana 3CX3000A7 Outline Drawing



Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	103.99	105.56	4.094	4.156
B	19.83	21.44	0.781	0.844
C	75.95	76.45	2.990	3.010
D	15.62	16.13	0.615	0.635
E	37.85	38.35	1.490	1.510
F	—	92.08	—	3.625
G	20.65	23.80	0.813	0.937
H	34.92	41.28	1.375	1.625
J	9.93	10.72	0.391	0.422
K	98.43	107.95	3.875	4.250
L	74.60	77.80	2.937	3.063
N	30.15	42.85	1.187	1.687
P	203.20	228.60	8.000	9.000
Q	17.45	20.65	0.687	0.813



High-Mu Power Triode

Electrical Application

Filament Operation The rated filament voltage for the 3CX3000A7 is 7.50 volts. Filament voltage, as measured at the filament collets, should be maintained within 5% of this value to obtain maximum tube life.

Input Circuit A resonant tank circuit is recommended for grounded-grid operation. In a single-ended circuit the loaded “Q” should be at least 3. This technique increases linearity and output power.

Mechanical Application

Mounting The 3CX3000A7 must be mounted with its axis vertical. The base of the tube may be up or down.

Filament Connections The Svetlana 3CX3000A7 filament connections require spring collets designed for a contact surface temperature of 250°C and with adequate symmetrical contact surface area for the filament and RF current.

Cooling Sufficient forced-air circulation must be provided to keep the temperature of the anode core and the temperatures of the ceramic/metal seals below 250°C. Airflow requirements to maintain these temperatures below 225°C with an inlet-air temperature of 40°C are tabulated. At frequencies above 30 MHz or at higher inlet-air temperatures, more airflow will be required.

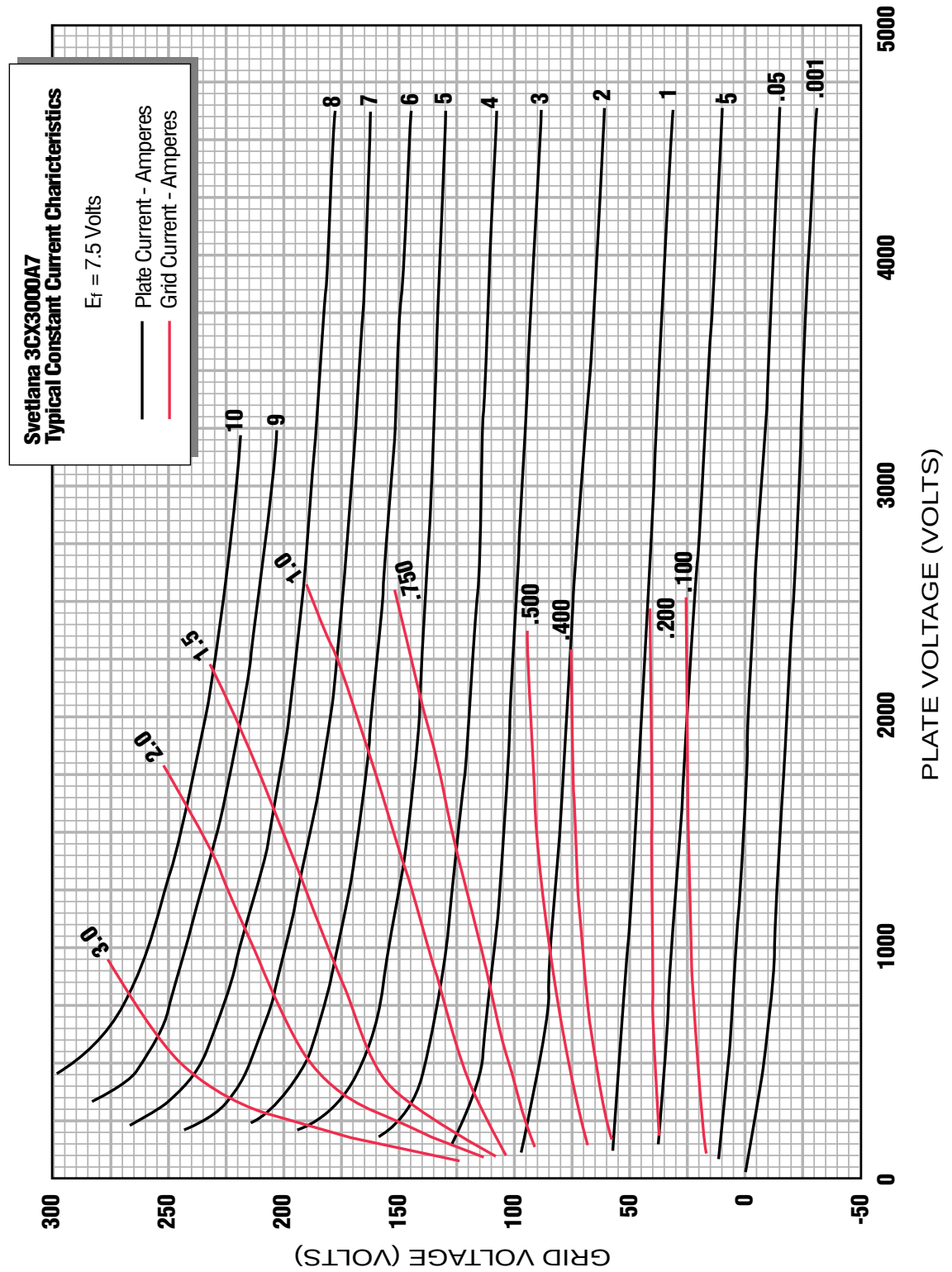
Base-to-Anode Air Flow				
*	Sea Level		5000 Feet	
Anode Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
2500	36	0.60	43	.72
4000	67	1.20	80	1.45

Anode-to-Base Air Flow ¹				
*	Sea Level		5000 Feet	
Anode Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
2500	42	0.70	50	0.84
4000	84	1.70	100	2.00

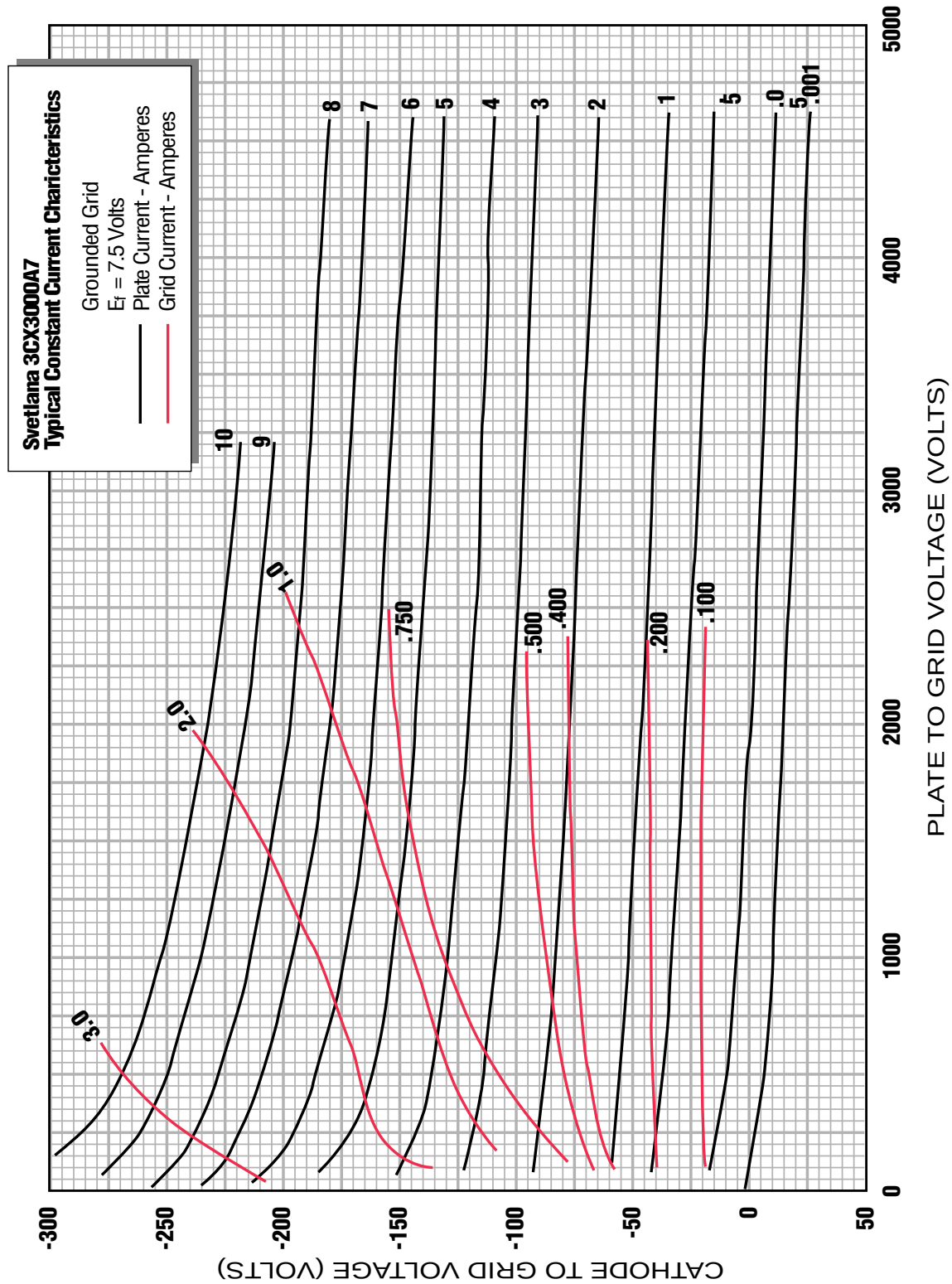
* Because the power dissipated by the filament represents about 385 watts and because grid dissipation can, under some conditions, represent another 225 watts, allowance has been made in preparing this tabulation for an additional 610 watts.

¹ When air is supplied in the anode-to-base direction, a minimum of 3 cfm must be directed into the filament-stem structure between the inner and outer filament terminals to maintain the base seals below 250° C. A separate air system is not required with base-to-anode airflow.

Svetlana 3CX3000A7



High-Mu Power Triode



Svetlana 3CX3000F7/8162 High-Mu Power Triode



The Svetlana™ 3CX3000F7/8162 is a high-performance ceramic/metal power triode designed for use in zero-bias, class AB, or class B RF or audio amplifiers. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, providing enhanced linearity, less noise, reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area. The Svetlana 3CX3000F7/8162 utilizes flying leads precluding the need for a socket.

The Svetlana 3CX3000F7/8162 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CX3000F7/8162 manufactured in the United States.



Svetlana 3CX3000F7/8162

General Characteristics

Electrical

Filament	Thoriated-tungsten mesh
Voltage	7.50 ±0.37V
Current @ 7.50V	51.5A
Amplification factor (average)	160
Direct interelectrode capacitances (grounded grid):	
Input	38.0pF
Output	24.0pF
Feedback	0.6pF
Direct interelectrode capacitances (grounded filament):	
Input	38.0pF
Output	0.6pF
Feedback	24.0pF
Maximum frequency for full ratings (CW)	75 MHz

Mechanical

Cooling	Forced air
Base	Coaxial with special leads
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	469 mm (18.4 in.)
Diameter	105.56 mm (4.156 in.)
Net weight	3.4 kg (7.5 lb)

Cathode-Driven Radio Frequency Linear Amplifier, Class AB₂

Maximum Ratings		
DC plate voltage	5000	V
DC plate current	2.5	A
Plate dissipation	4000	W
Grid dissipation	225	W

Typical Operation

(Frequencies to 30MHz)				
Plate Voltage	4000	4800	4800	V
Zero-signal plate current*	0.25	0.35	0.35	A
Single-tone plate current	2.00	1.68	2.00	A
Grid bias	0	0	0	V
Single-tone grid current*	0.61	0.46	0.60	A
Peak driving power	420	293	410	W
Plate dissipation	2285	2275	2775	W
Single-tone plate output power	6030	6000	7266	W
Resonant load impedance	1210	1720	1425	Ohms
Driving impedance	47.5	50.0	46.3	Ohms

*Approximate values

High-Mu Power Triode

Cathode-Driven Class C RF Amplifier, CW or FM

Maximum Ratings			
DC Plate voltage	5000	V	
DC Plate current	2.5	A	
Plate dissipation	4000	W	
Grid dissipation	225	W	
Typical operation			
(Frequencies to 110MHz)			
Plate voltage	3500	4800	V
Grid voltage	-50	-60	V
Plate current	1.30	1.54	A
Grid current*	0.42	0.48	A
Peak RF cathode voltage*	220	267	V
Calculated driving power*	310	435	W
Plate dissipation	985	1480	W
Useful output power	3300	5500	W

Audio Frequency Amplifier or Modulator, Class AB₂ Grid Driven

Maximum Ratings (per tube)			
DC plate voltage	5000	V	
DC plate current	2.5	A	
Plate dissipation	4000	W	
Grid dissipation	225	W	
Typical Operation (two tubes, sinusoidal waveform)			
Plate voltage	4000	V	
Zero-signal plate current*	0.50	A	
Maximum-signal plate current	3.58	A	
Maximum-signal grid current*	0.58	A	
Peak AF grid voltage**	190	V	
Peak driving power	115	W	
Maximum-signal plate dissipation	1850	W	
Plate output power	10,500	W	
Load resistance (plate-to-plate)	2720	Ohms	

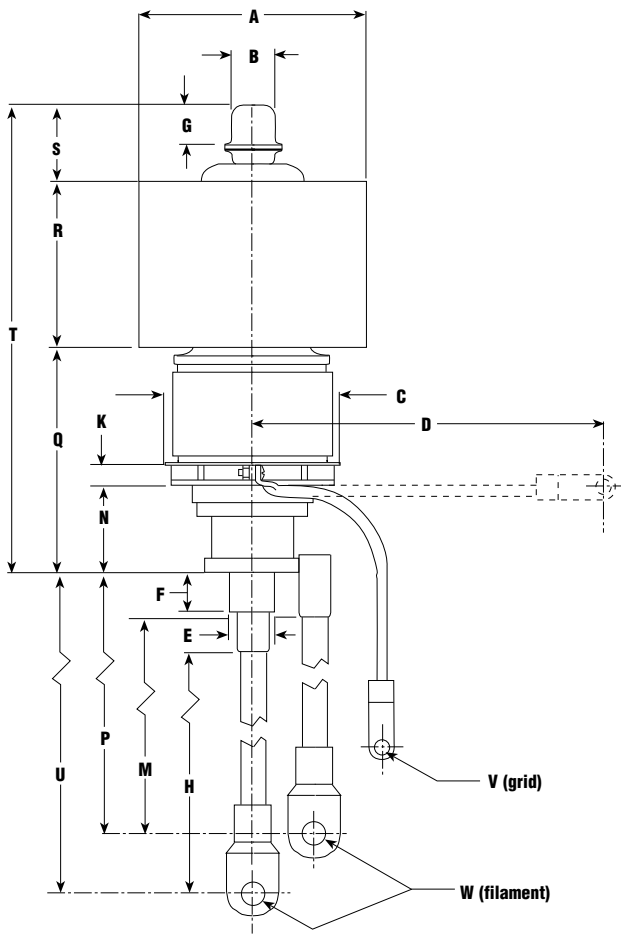
*Approximate values **Per tube

Svetlana 3CX3000F7/8162

Range Values for Equipment Design

	Min.	Max.	
Filament current at 7.5V	48.0	54.0	A
Interelectrode capacitances (Grounded-Grid Connection)			
Input	30.0	45.0	pF
Output	20.0	28.0	pF
Feedback	—	1.0	pF
Interelectrode capacitances (Grounded-Filament Connection)			
Input	30.0	45.0	pF
Output		1.0	pF
Feedback	20.0	28.0	pF
Zero-Bias plate current ($E_b = 5000V$)	0.36	0.52	A
Cut-off bias ($E_b = 5000V$, $I_b = 1.0\text{ mA}$)	—	-45	V

Svetlana 3CX3000F7/8162 Outline Drawing



Dimensional Data				
Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	103.99	105.56	4.094	4.156
B	19.84	21.44	0.781	0.844
C	—	92.08	—	3.625
D	161.93	168.28	6.375	6.625
E	21.82	22.61	0.859	0.890
F	20.62	23.80	0.812	0.937
G	17.45	20.65	0.687	0.813
H	177.80	190.50	7.000	7.500
K	9.53	11.10	0.375	0.437
M	177.80	190.50	7.000	7.500
N	34.93	41.28	1.375	1.625
P	201.60	214.30	7.937	8.437
Q	98.43	107.95	3.875	4.250
R	201.60	214.30	2.937	3.063
S	30.15	42.85	1.187	1.687
T	203.20	228.60	8.000	9.000
U	227.00	239.70	8.937	9.437
V	4.93	5.08	0.194	0.200
W	9.78	10.03	0.385	0.395

High-Mu Power Triode

Electrical Application

Filament Operation The rated filament voltage for the 3CX3000F7/8162 is 7.50 volts. Filament voltage, as measured at the filament collets, should be maintained within 5% of this value to obtain maximum tube life.

Input Circuit A resonant tank circuit is recommended for grounded-grid operation. In a single-ended circuit the loaded “Q” should be at least 3. This technique increases linearity and output power.

Mechanical Application

Mounting The 3CX3000F7/8162 must be mounted with its axis vertical. The base of the tube may be up or down.

Filament Connections The Svetlana 3CX3000F7/8162 filament connections require spring collets designed for a contact surface temperature of 250°C and with adequate symmetrical contact surface area for the filament and RF current.

Cooling Sufficient forced-air circulation must be provided to keep the temperature of the anode core and the temperatures of the ceramic/metal seals below 250°C. Airflow requirements to maintain these temperatures below 225°C with an inlet-air temperature of 40°C are tabulated. At frequencies above 30 MHz or at higher inlet-air temperatures, more airflow will be required.

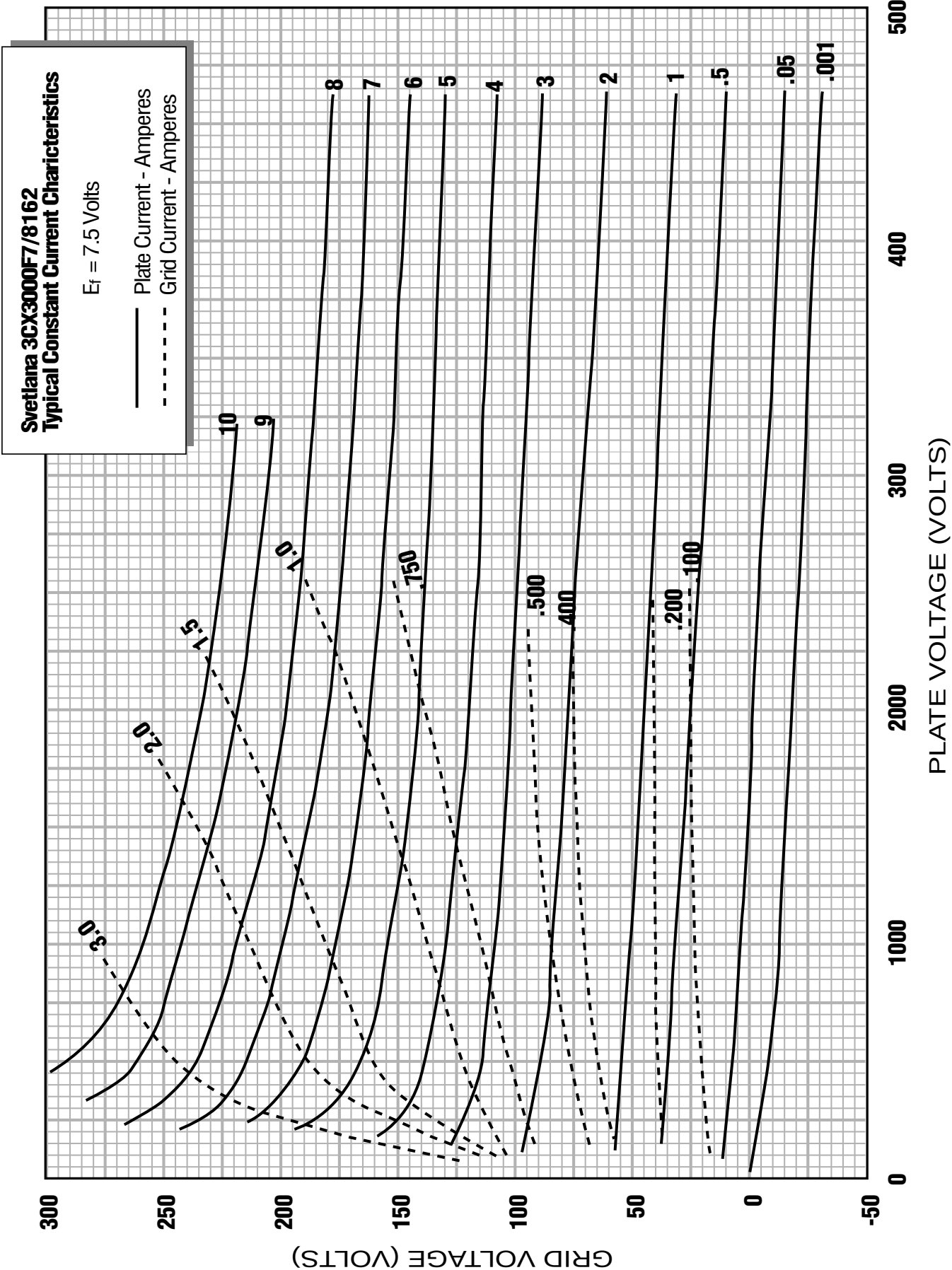
Base-to-Anode Air Flow				
*	Sea Level		5000 Feet	
Anode Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
2500	36	0.60	43	.72
4000	67	1.20	80	1.45

Anode-to-Base Air Flow ¹				
*	Sea Level		5000 Feet	
Anode Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
2500	42	0.70	50	0.84
4000	84	1.70	100	2.00

* Because the power dissipated by the filament represents about 385 watts and because grid dissipation can, under some conditions, represent another 225 watts, allowance has been made in preparing this tabulation for an additional 610 watts.

¹ When air is supplied in the anode-to-base direction, a minimum of 3 cfm must be directed into the filament-stem structure between the inner and outer filament terminals to maintain the base seals below 250° C. A separate air system is not required with base-to-anode airflow.

Svetlana 3CX3000F7/8162

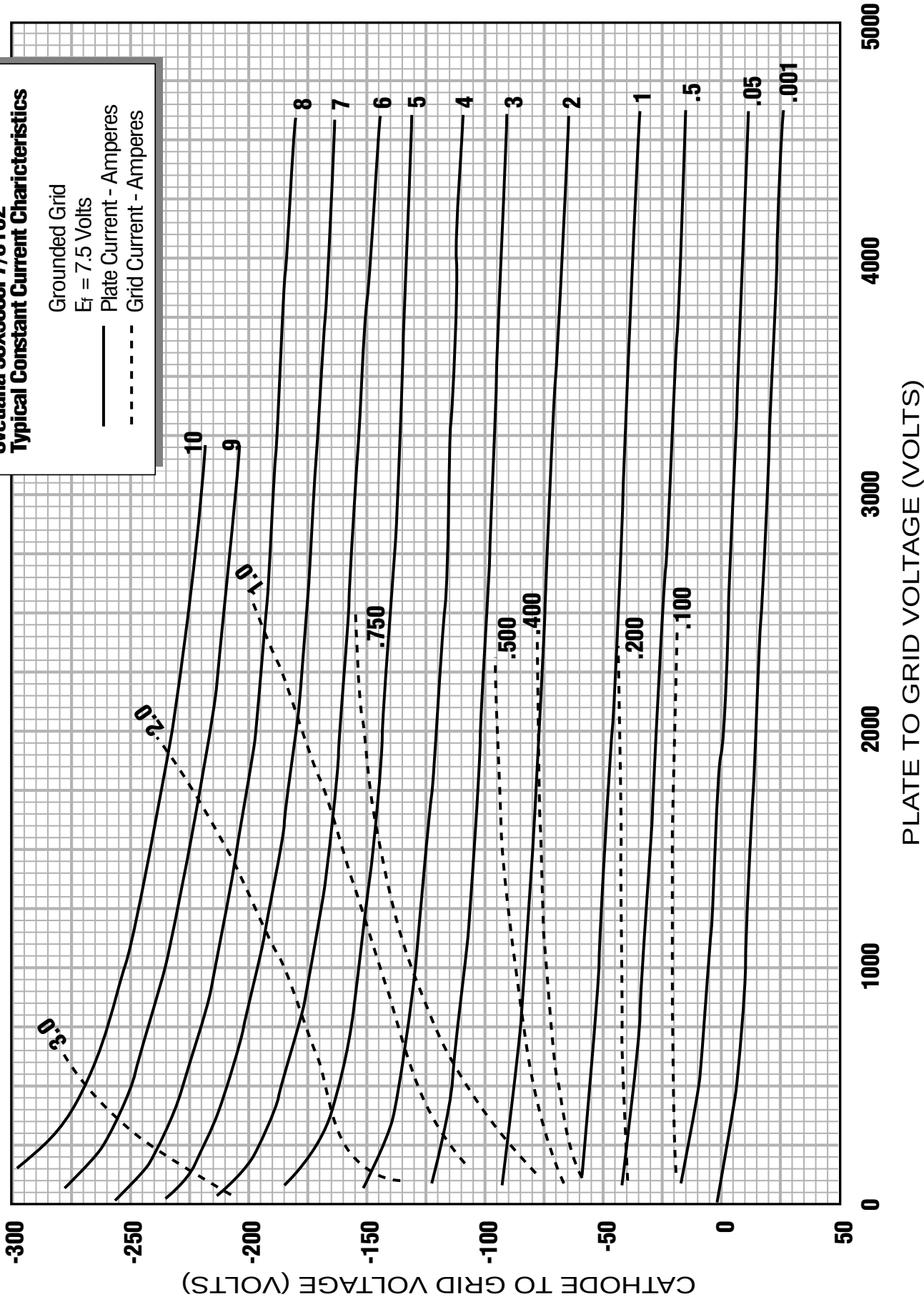


High-Mu Power Triode

Svetlana 3CX3000F7/8162
Typical Constant Current Characteristics

Grounded Grid
 $E_f = 7.5$ Volts

— Plate Current - Amperes
- - - Grid Current - Amperes



Svetlana 3CX300A1 Audio Power Triode



The Svetlana 3CX300A1 is a ceramic-metal forced-air-cooled power triode intended for use in high-end audio amplifier equipment requiring high power, low plate resistance and exceptional linearity. Ceramic-metal transmitting-tube construction gives the 3CX300A1 extreme ruggedness and freedom from microphonics. The large cathode and the grid are rigidly mounted on coaxial cones terminating in rugged ceramic-metal seals. The anode is machined from solid copper, to insure high power handling capability. The 3CX300A1 is suitable for single-ended Class A1 or push-pull Class A1 or AB1 operation. The Svetlana 3CX300A1 is manufactured at the Svetlana factory in St. Petersburg, Russia, using the same processes and materials as Svetlana's large RF power tubes. Thus, quality and reliability are assured to strict transmitting-tube standards.

General Characteristics

Electrical

Cathode:	Oxide-coated, unipotential	
Voltage (AC or DC)	6.3±0.3	V
Current	2.65	A
Heater-cathode voltage (max)	±100	V _{peak}
Amplification factor	9	
Transconductance	20,000	μS
Plate resistance	450	ohms
Interelectrode capacitances (typical), with cathode grounded :		
Input	25	pF
Output	1	pF
Feedback	10	pF

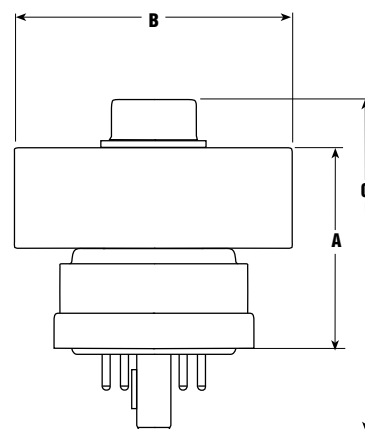
Mechanical

Cooling	Radiation and convection, or forced-air (see below)
Base	Ceramic, special 8-pin with center contact
Basing diagram	see below
Socket	Svetlana SK2A or equivalent
Anode connector	Svetlana AC-5 or equivalent
Operating position:	Any (vertical for convection cooling)
(Note: for operation at >30W dissipation, forced-air cooling is required---consult cooling data on reverse.)	

Nominal dimensions:

Diameter	42 mm (1.656 in)
Base to top	52 mm (2.055 in)
Overall height	72 mm (2.836 in)
Net weight	200 gm

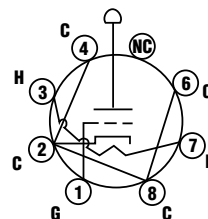
Svetlana 3CX300A1 Outline drawing



Dimensional Data

Dim.	Millimeters	Inches
A	52	2.055
C	72	2.836
B	42	1.656

Base pin connections bottom view



Top Cap= Anode
Center Guide Pin on Base= Control Grid



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Svetlana 3CX300A1 Audio Power Triode

Maximum Ratings

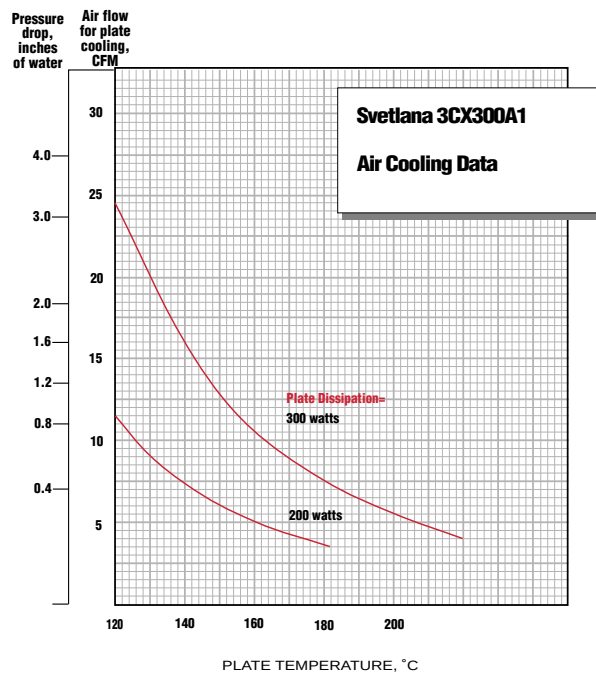
DC plate voltage	1800	V
Maximum signal DC plate current	470	mA
Plate dissipation w/forced-air cooling	300	W
Plate dissipation w/convection cooling	30	W
Grid dissipation (maximum)	1	W
Operating temperature (metal/ceramic seals or metal core)	250	C
Control grid maximum negative voltage	-400	V

Typical Operation, Class A, Audio Amplifier (single tube)

Plate voltage	500	V
Grid voltage	-55	V
Peak grid drive	120	VP-P
Plate current, no signal	80	mA
Plate current, max signal	95	mA
Effective load resistance	1600	ohms
Distortion at 1 watt into 8 ohms	0.67	%
Power output at 5% distortion	15	W

Typical Operation, Class AB1, Audio Power Amplifier, Push-Pull

Plate voltage	500	V
Grid voltage	-45	V
Peak grid drive	100	VP-P
Plate current, no signal (both tubes)	300	mA
Load resistance, plate-to-plate	2000	ohms
Power output	40	W



The flow rate for base cooling must be determined for satisfactory cooling to obtain base temperature not more than 220°C.

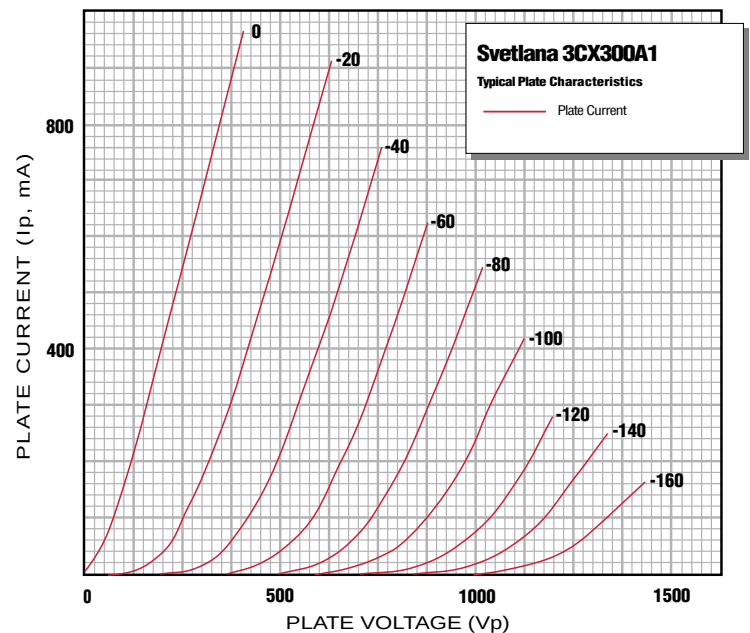
If the temperature of ambient air will increase, air flow must be increased in accordance with Table 1.

Table 1

Ambient Air Temperature, °C	25	40	55	70
Correction Factor	1	1.2	1.5	1.9



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SVETLANA TECHNICAL DATA

3CX400A7/8874 High-Mu Power Triode



The Svetlana™ 3CX400A7/8874 is a high performance ceramic/metal power triode designed for use in communications, paging and commercial service. The principal use is as an RF amplifier, in Class A, B or C service. The Svetlana 3CX400A7/8874 may also be operated as a pulse modulator with an increase in maximum plate voltage up to 3500 volts. Maximum plate current is 6 amps at a pulse duration of 100 microseconds.

The Svetlana 3CX400A7/8874 is a direct replacement for the model 3CX400A7/8874 manufactured in the United States.

Characteristics

Electrical

Cathode:	Oxide-coated unipotential	
Heater voltage (AC or DC)	6.3 ± 0.3	V
Heater current @ 6.3V	3.0	A
Transconductance (average)	29,000	μmhos
Maximum frequency at full ratings	500	MHz
Interelectrode capacitances, with cathode grounded:		
Input	20.5	pF
Output	0.03	pF
Grid-Plate	6.0	pF
Interelectrode capacitances, with grid grounded:		
Input	20.5	pF
Output	6.0	pF
Plate-Cathode	.03	pF

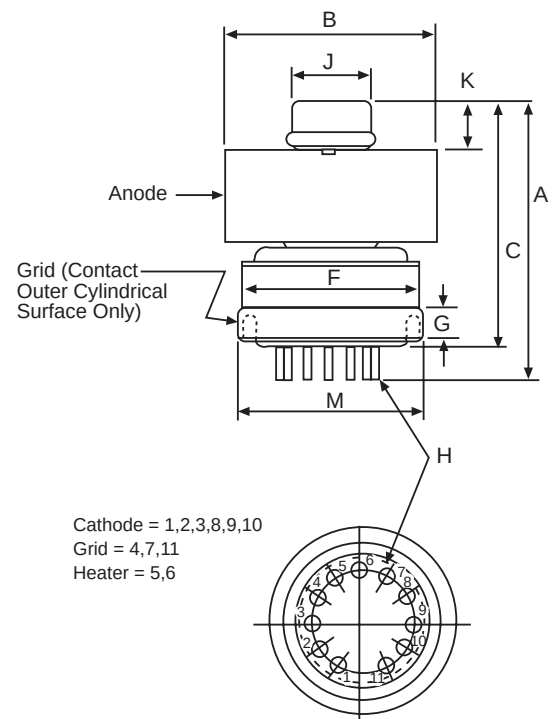
Mechanical

Cooling	Forced air
Base	11 pin with ring EIA No. E11-81
Socket	E.F. Johnson #124-311-100
Operating position-	Vertical, base up or down
Nominal dimensions:	
Diameter	41.7 mm (1.64 in.)
Length	54.6 mm (2.15 in)
Maximum operating temperature	250° C
Net weight (average)	122 g (0.269 lb.)

Maximum ratings

DC plate voltage	2200	V
Maximum-signal DC plate current	350	mA
Plate Dissipation	400	W
Grid Dissipation	5	W

Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	50.85	54.41	2.002	2.142
B	40.89	41.66	1.610	1.640
C	45.97	48.51	1.810	1.910
F	—	35.71	—	1.406
G	4.75	—	0.187	—
H	BASE: E11-81 (EIA DESIGNATION)			
J	13.75	14.55	0.541	0.573
K	6.10	—	0.240	—
M	35.99	36.40	1.417	1.433



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Svetlana 3CX400A7/8874

High-Mu Power Triode



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Typical Operation, Class AB₂ Cathode Driven

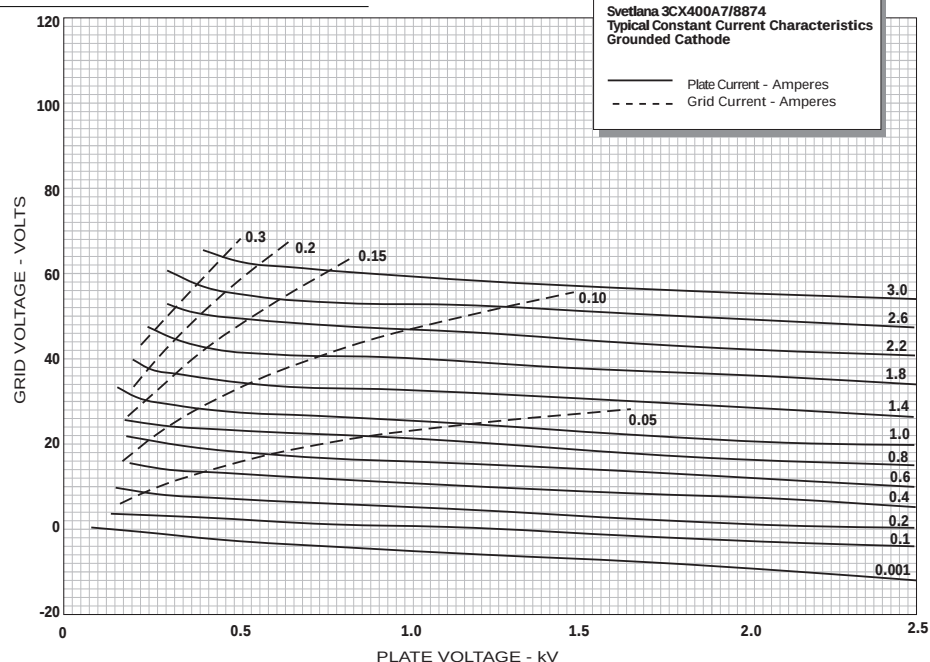
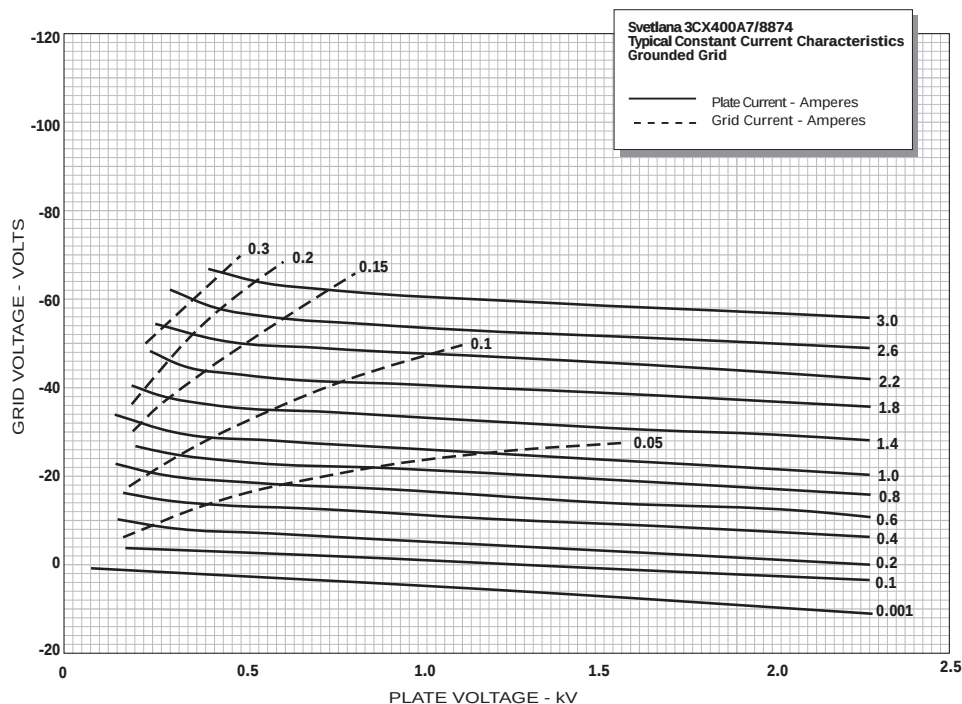
Frequency in MHz		30	150	432
DC plate voltage		2000	2000	2000
V				
Cathode voltage		8.2	9.8	8.2
V				
Peak RF grid-cathode voltage	67	50	67	V
Two tone plate current	312	245	300	mA
Zero signal plate current	22	10	22	mA
Two tone grid current	12	10	39	mA
Peak RF driving power	26	18	27	W
Power output (approx.)	587	526	505	W

Cooling Data

Anode Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water
200	4.0	0.11
300	6.0	0.22
400	8.6	0.37

Heater/Cathode Operation

Frequency MHz	Heater Voltage
<300	6.3
301-400	6.0
401-500	5.7





SVETLANA TECHNICAL DATA

3CX4500F3/YU108

Medium-Mu Industrial Triode

The Svetlana™ 3CX4500F3/YU108 is a high-performance ceramic/metal power triode designed for use in amplifier, oscillator, or modulator service. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, contributing to longer life. Flexible leads connect to the filament terminals and a flange is connected to the grid. The flange provides a convenient way to mount the tube.

The Svetlana 3CX4500F3/YU108 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CX4500F3/YU108 manufactured in the United States.

Characteristics

Electrical

Filament:	Thoriated-tungsten mesh	
Voltage	7.0± 0.35	V
Current @ 7.0V	78	A
Amplification factor (average)	22	
Direct interelectrode capacitances, with filament grounded*:		
Input	35.0	pF
Output	0.9	pF
Feedback	20	pF
Maximum frequency for full ratings (CW)	75	MHz

Mechanical

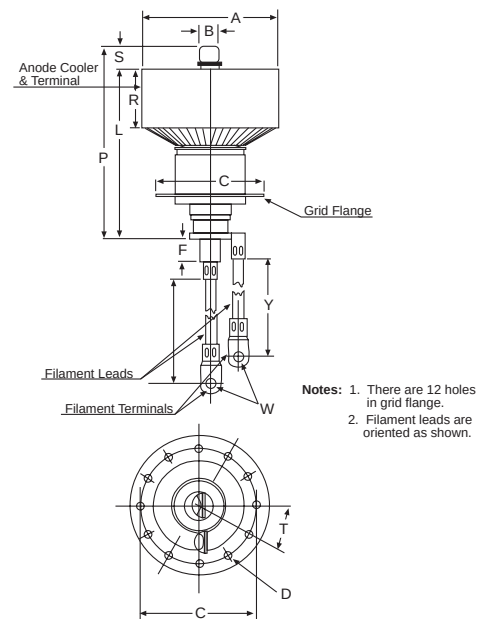
Cooling	Forced air
Base	Flying leads/flange
Socketing	None. Mounting flange
Operating position	Vertical, base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	46.83 cm (18.44 in.)
Diameter	10.79 cm (4.25 in.)
Net weight	2.9 kg (6.5 lb.)

RF Power Amplifier or Oscillator, Class C, FM or CW

Maximum Ratings:		
DC plate voltage	9,000	V
DC plate current	3.0	A
Plate dissipation	6000	W
Grid dissipation	300	W
DC grid voltage	-1000	V
DC grid current	0.8	A

*Capacitance values are for a cold tube measured in a shielded fixture

Svetlana Outline drawing



Dimensional Data

	Inches			Millimeters		
	Min.	Max.	Ref.	Min.	Max.	Ref.
A	6.000	6.125	—	152.4	155.58	—
B	.781	.843	—	19.8	21.40	—
C	4.230	4.255	—	107.4	108.1	—
D	.230	.265	—	5.84	6.73	—
F	.812	.937	—	20.6	21.2	—
G	3.855	3.885	—	97.9	98.7	—
L	—	3.325	—	—	84.5	—
P	8.000	9.000	—	203.2	228.6	—
R	—	2.57	—	—	65.1	—
S	1.000	1.125	—	25.4	28.6	—
T	—	—	30°	—	—	30°
W	.385	.395	—	9.78	10.1	—
Y	7.000	7.500	—	177.8	190.5	—
Z	7.000	7.500	—	177.8	190.5	—



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Svetlana 3CX4500F3/YU108

Medium-Mu Industrial Triode



Typical Operation

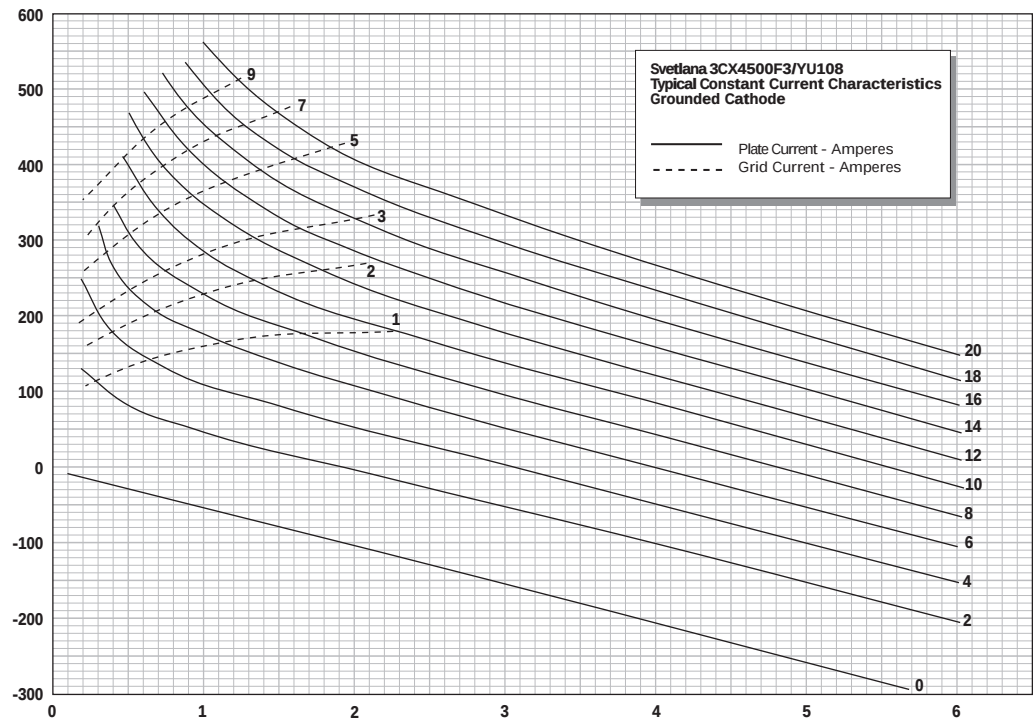
(Frequencies to 30MHz)		
DC plate voltage	8,000	
V		
DC plate current	2.75	A
DC grid voltage*	-705	V
DC grid current	680	mA
Peak positive RF grid voltage*	346	V
Driving power*	710	W
Grid resistor	1040	Ohms
Plate input power	22,000	W
Plate dissipation	4,800	W
Plate output power	15,000	W
Approximate load impedance	1437	Ohms

*Approximate values

Base-to-Anode Air Flow				
Anode Dissipation Watts	Sea Level		5000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
4500	125	0.18	155	0.23

Anode-to-Base Air Flow ¹				
Anode Dissipation Watts	Sea Level		5000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
4500	250	0.6	310	0.75

1. When air is supplied in the anode-to-base direction, a minimum of 5 cfm must be directed into the filament-stem structure between the inner and outer filament terminals to maintain the base seals below 250° C. A separate air system is not required with base-to-anode airflow.



Svetlana 3CX6000A7 / YU148 High-Mu Power Triode



The Svetlana™ 3CX6000A7 / YU148 is a high-performance ceramic/metal power triode designed for use in zero-bias, RF amplifier service, and modulator service. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, providing enhanced linearity, less noise, reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area, giving superior VHF performance.

The Svetlana 3CX6000A7 / YU148 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 3CX6000A7 / YU148 manufactured in the United States.



Svetlana 3CX6000A7 / YU148

General Characteristics

Electrical

Filament	Thoriated-tungsten mesh
Voltage	7.0 ±0.35 V
Current @ 7.0V	78 A
Amplification factor (average)	200
Direct interelectrode capacitances (grounded grid)	
Input	42 pF
Output	24.5 pF
Feedback	0.28 pF

Mechanical

Cooling	Forced air
Base	Coaxial
Socketing	Via spring collets
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	228.60 mm (9.000 in.)
Diameter	155.58 mm (6.125 in.)
Net weight	3.64 kg (8.01 lb)

Cathode-Driven Class C RF Amplifier, CW or FM

Maximum Ratings		
DC Plate voltage	7000	V
DC Plate current	3.5	A
Plate dissipation	6000	W
Grid dissipation	225	W

Typical operation

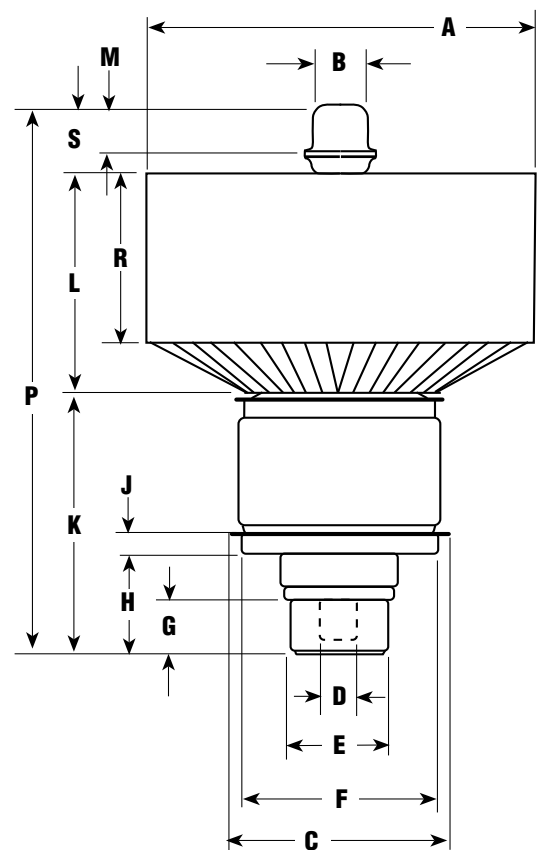
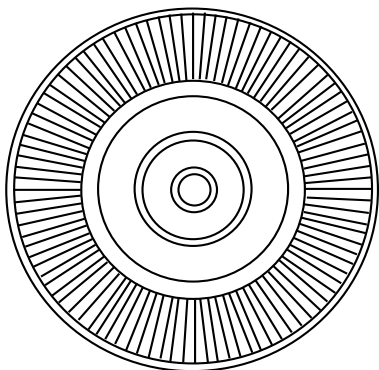
(Frequencies to 110MHz)

Plate voltage	4800	5700	6000	V
Grid voltage	0	0	-100	V
Plate current	2.3	2.5	2.56	A
Grid current*	0.32	0.33	0.48	A
Peak RF cathode voltage*	215	224	340	V
Calculated driving power*	500	600	800	W
Plate dissipation	3200	4100	3900	W
Useful output power	8000	10000	12000	W

*Approximate values

High-Mu Power Triode

Svetlana 3CX6000A7/YU148 Outline Drawing



Dimensional Data				
Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	152.4	155.58	6.00	6.125
B	19.8	21.4	0.78	0.843
C	—	92.1	—	3.625
D	15.6	16.1	0.614	0.635
E	37.6	38.4	1.488	1.512
F	75.9	76.4	2.988	3.010
G	20.6	23.8	0.811	0.937
H	34.9	41.3	1.374	1.626
J	9.5	11.1	0.374	0.437
K	96.4	107.9	3.874	4.250
L	—	84.5	—	3.327
M	17.5	20.6	0.688	0.812
P	203.2	226.6	8.000	9.000
R	—	65.1	—	2.563
S	25.4	28.6	1.000	1.126

Svetlana 3CX6000A7 / YU148

Electrical Application

Filament Operation The rated filament voltage for the 3CX6000A7/YU148 is 7.00 volts. Filament voltage, as measured at the filament collets, should be maintained within 5% of this value to obtain maximum tube life.

Input Circuit A resonant tank circuit is recommended for grounded-grid operation. In a single-ended circuit the loaded “Q” should be at least 5. This technique increases linearity and output power.

Mechanical Application

Mounting The 3CX6000A7/YU148 must be mounted with its axis vertical. The base of the tube may be up or down.

Filament Connections The Svetlana 3CX6000A7/YU148 filament connections require spring collets designed for a contact surface temperature of 250°C and with adequate symmetrical contact surface area for the filament and RF current.

Cooling Sufficient forced-air circulation must be provided to keep the temperature of the anode core and the temperatures of the ceramic/metal seals below 250°C. Airflow requirements to maintain these temperatures below 225°C with an inlet-air temperature of 50°C are tabulated. At frequencies above 40 MHz or at higher inlet-air temperatures, more airflow will be required.

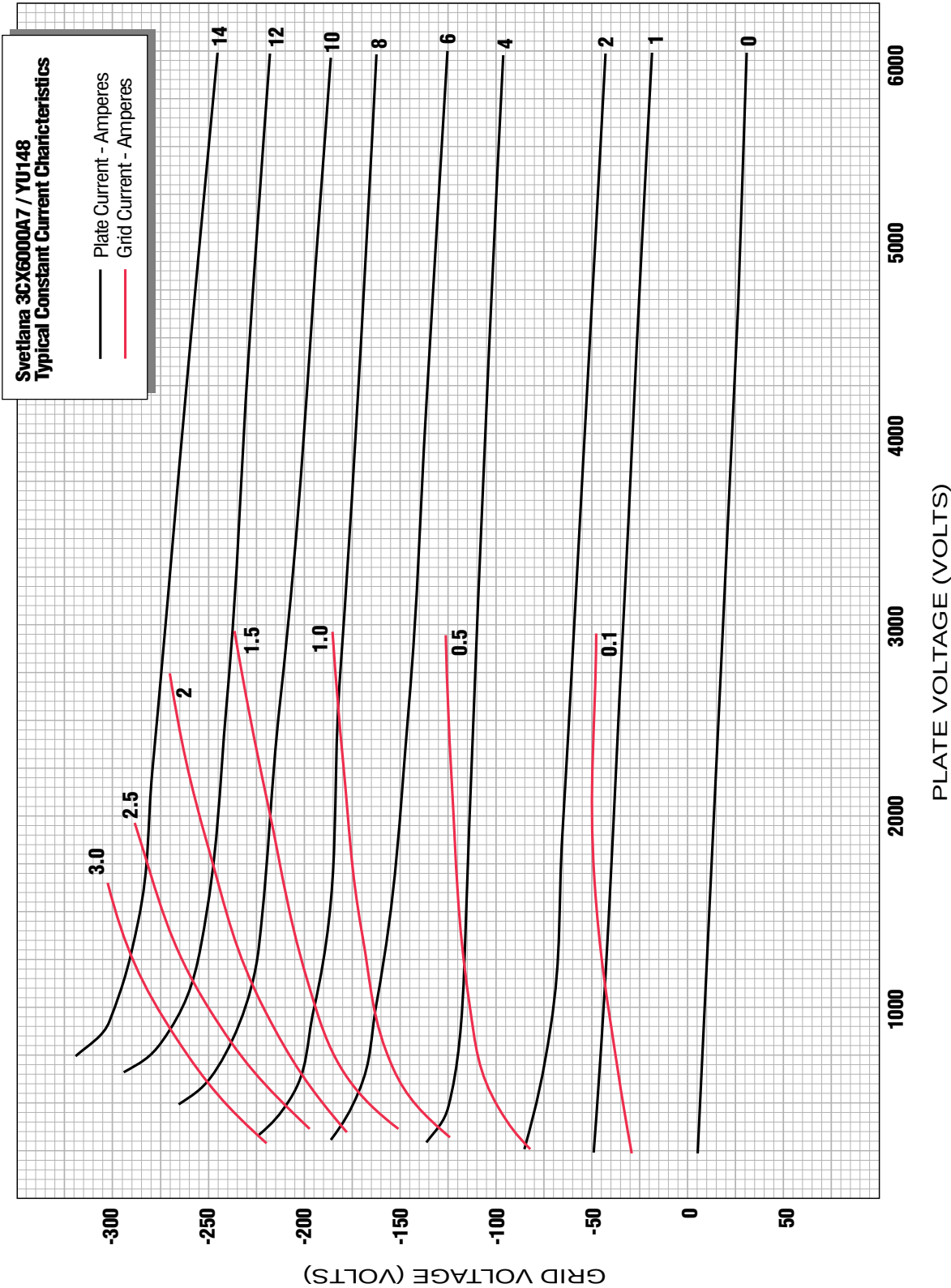
Base-to-Anode Air Flow		
*	Sea Level	
Anode Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water
5000	142	0.22
6000	205	0.40

Anode-to-Base Air Flow ¹		
*	Sea Level	
Anode Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water
4500	250	1.0
5000	300	1.2

* Because the power dissipated by the filament represents about 546 watts and because grid dissipation can, under some conditions, represent another 225 watts, allowance has been made in preparing this tabulation for an additional 771 watts.

¹ When air is supplied in the anode-to-base direction, a minimum of 5 cfm must be directed into the filament-stem structure between the inner and outer filament terminals to maintain the base seals below 250° C. A separate air system is not required with base-to-anode airflow.

High-Mu Power Triode





SVETLANA TECHNICAL DATA

3CX6000H3

Medium-Mu Industrial Triode

The Svetlana™ 3CX6000H3 is a highly reliable ceramic/metal power triode designed for use in amplifier or oscillator service. A modern mesh filament is used, ensuring better mechanical rigidity and long lasting concentricity of the filament, contributing to longer life. Flexible leads connect to the filament terminals and a mounting flange provides the grid connection. The flange provides a convenient way to mount the tube.

The Svetlana 3CX6000H3 is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia.

Characteristics

Electrical

<i>Filament:</i>	<i>Thoriated-tungsten mesh</i>	
Voltage	5.0± 0.25	V
Current @ 5.0V	72	A
Amplification factor (average)	22	
<i>Direct interelectrode capacitances, with filament grounded*:</i>		
Input	50.0	pF
Output	1.2	pF
Feedback	30	pF
Maximum usable frequency (CW)	90	MHz

Mechanical

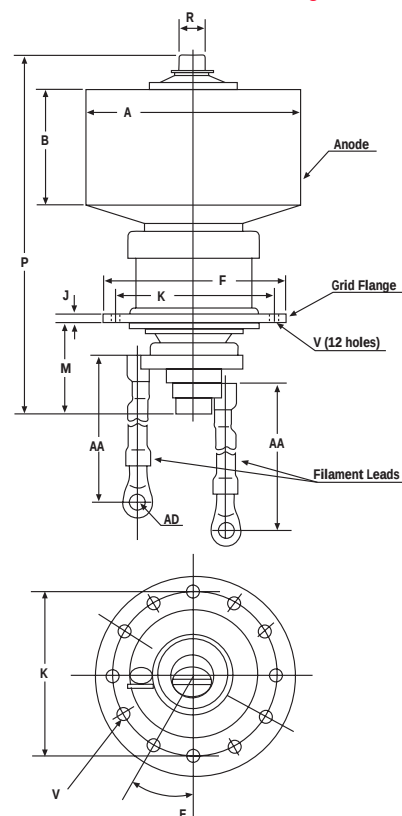
Cooling	Forced air
Base	Flying leads
Mounting	Grid flange
Maximum operating temperature	250° C
Maximum dimensions:	
Length	26.5 cm (10.44 in)
Diameter	15.2 cm (5.98 in.)
Net weight	2.9 kg (6.5 lb.)

RF Power Amplifier or Oscillator, Class C, CW

<i>Maximum Ratings:</i>		
DC plate voltage	8,000	V
Plate dissipation	6000	W
Grid dissipation	400	W
DC grid voltage	-550	V
DC grid current	0.45	A

*Capacitance values are for a cold tube measured in a shielded fixture

Svetlana Outline drawing



Dimensional Data

	Inches			Millimeters		
	Min.	Max.	Ref.	Min.	Max.	Ref.
A	5.84	5.95	—	148.5	151.5	—
B	3.30	3.39	—	84	86	—
E	—	—	30°	—	—	30°
F	5.03	5.09	—	127.8	129.2	—
J	0.11	0.16	—	3	4	—
K	—	—	4.41	—	—	112
M	2.38	2.50	—	60.5	63.5	—
P	—	10.44	—	—	265	—
R	0.68	0.71	—	17.3	18	—
V	—	—	0.26	—	—	6.5
AA	8.18	8.67	—	208	220	—
AD	—	—	0.39	—	—	10



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Svetlana 3CX6000H3

Medium-Mu Industrial Triode



Typical Operation, Grounded Cathode

(Frequency MHz)	60	
DC plate voltage	8,000	V
DC plate current	1.56	A
DC grid voltage*	-400	V
DC grid current	290	mA
Peak positive RF grid voltage*	765	V
Plate input power	12,480	W
Plate dissipation	3480	W
Plate output power	9000	W
Efficiency	72	%

*Approximate values

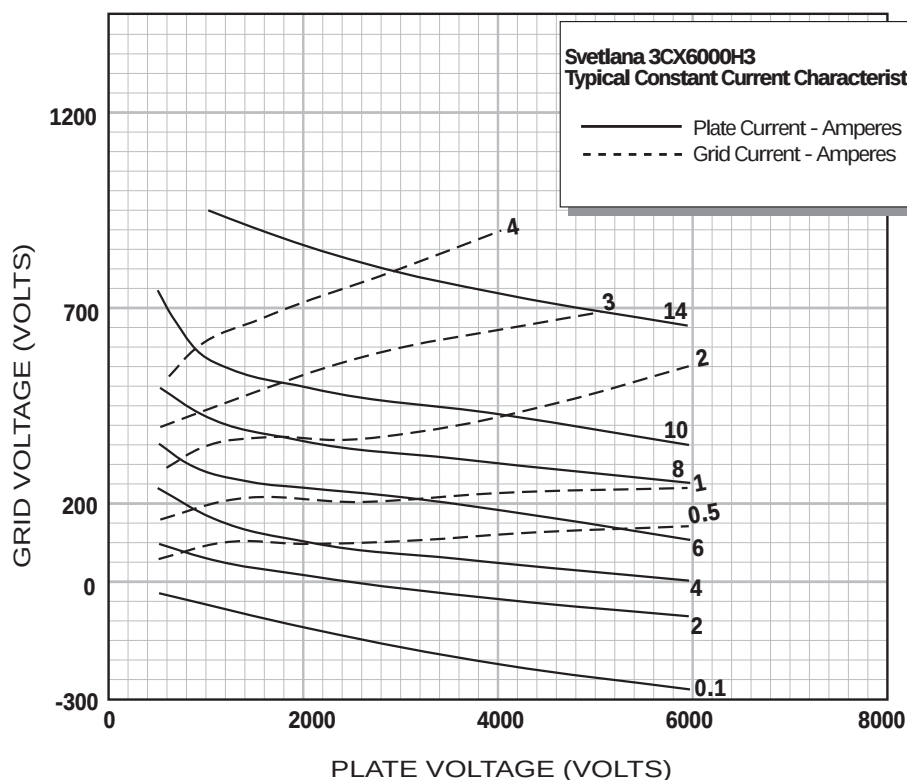
Cooling

Base to Anode¹

Anode Dissipation Watts	Sea Level		10,000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
2000	105	0.2	153	0.29
3000	170	0.3	248	0.44
4000	195	0.6	285	0.88
5000	325	1.3	475	1.90
6000	445	2.2	650	3.21

1 The cooling requirements above are based on 50°C ambient air and maintaining the envelope temperature below 200°C.

2 Anode to base air flow is acceptable provided a separate air stream of 5 CFM is directed onto the filament stem at the base of the tube.



SVETLANA TECHNICAL DATA

3CX800A7 High-Mu Power Triode



The Svetlana™ 3CX800A7 is a high performance ceramic/metal high-mu power triode designed for use in communications and industrial service. The principal use is as Class AB₂, Class B and Class C RF amplifiers.

The Svetlana 3CX800A7 may also be operated as a pulse modulator operating at maximum plate voltages to 4500 volts. Maximum plate current is 8 amps at a pulse duration of 100 microseconds.

The Svetlana 3CX800A7 is a direct replacement for the model 3CX800A7 manufactured in the United States.

Characteristics

Electrical

<i>Cathode</i>	<i>Oxide-coated unipotential</i>	
<i>Heater Voltage (AC or DC)</i>	<i>13.5 ± 0.6</i>	<i>V</i>
<i>Heater Current @ 13.5V</i>	<i>1.5</i>	<i>A</i>
<i>Amplification factor (average)</i>	<i>200</i>	
<i>Maximum Frequency for Full Ratings:</i>		
<i>CCS</i>	<i>350</i>	<i>MHz</i>
<i>ICAS</i>	<i>450</i>	<i>MHz</i>
<i>Interelectrode capacitances, with grid grounded:</i>		
<i>Input</i>	<i>26.0</i>	<i>pF</i>
<i>Output</i>	<i>6.1</i>	<i>pF</i>
<i>Plate-Cathode</i>	<i>0.05</i>	<i>pF</i>

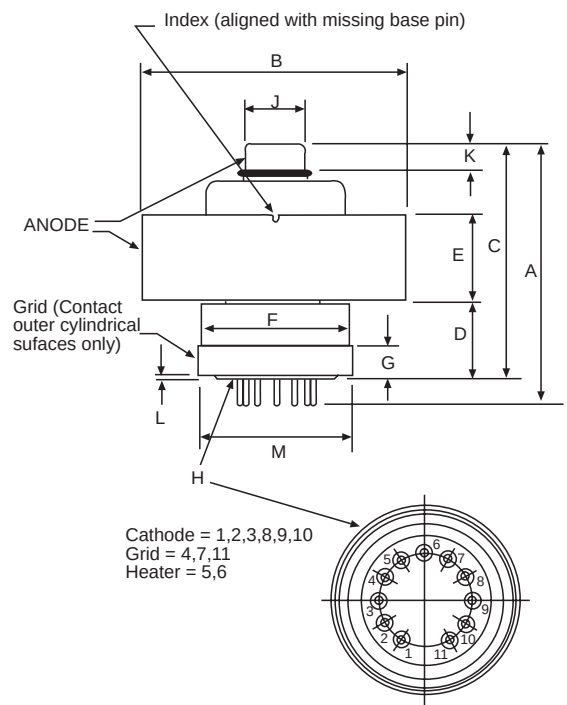
Mechanical

Cooling	Forced air
Base	large 11 pin wafer (EIA E11-81)
Socket	11 pin E.F. Johnson #124-311-100
Anode Connector	Svetlana AC-1
Operating position-	any
Maximum dimensions:	
Diameter	64 mm (2.52 in.)
Length	67 mm (2.63 in)
Maximum operating temperature	250° C
Net weight (average)	.341 kg (0.75 lb.)

Maximum ratings

DC plate voltage	2500	V
Maximum-signal DC plate current	600	mA
Plate Dissipation	800	W
Grid Dissipation	4.0	W
DC grid current	60	mA

Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	59.44	66.88	2.344	2.633
B	63.119	63.881	2.485	2.515
C	54.66	59.74	2.152	2.352
D	19.964	23.013	.786	.906
E	18.034	20.066	.710	.790
F	—	35.712	—	1.406
G	4.750	—	.187	—
H	BASE: E11-81 (EIA DESIGNATION)			
J	14.199	14.554	0.559	0.573
K	6.096	—	0.240	—
M	35.992	36.398	1.417	1.433

4/97



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Svetlana 3CX800A7 High-Mu Power Triode



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Typical Operation, Class AB₂, Grounded Grid

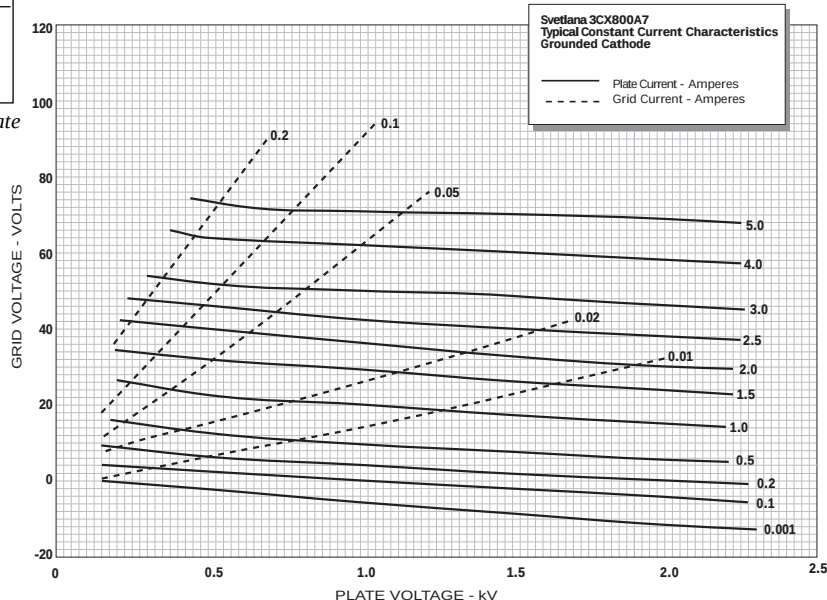
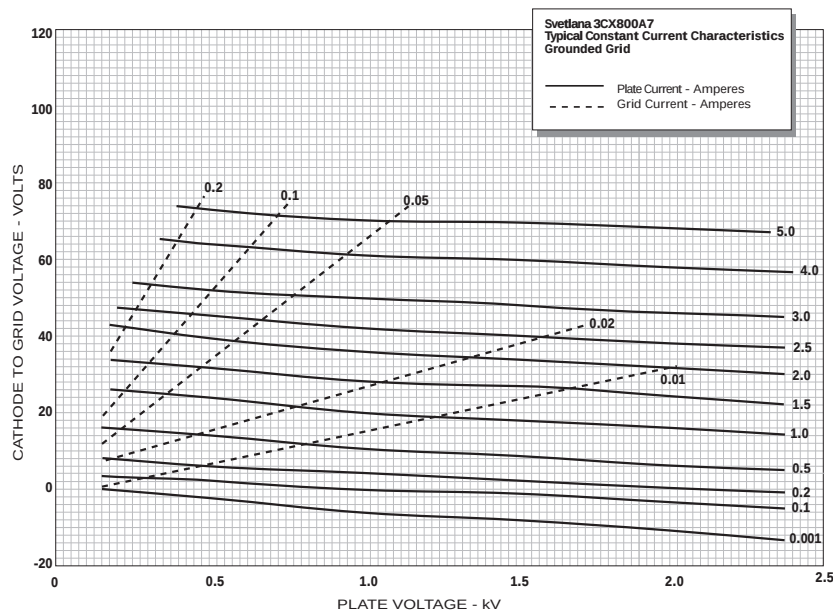
	CW	SSB	
DC plate voltage	2200	2200	V
DC cathode voltage	+8.2	+8.2	V
Zero signal plate current	-	15	mA
Plate current	500	313*	mA
DC grid current	36	16	mA
Cathode input impedance	54	54	ohms
Power output	750	750	W
RF driving power	23	23**	W
Resonant load impedance	2700	2700	Ohms

*Two tone **Peak

Cooling Air at 25°C

	Sea Level		5,000 Feet	
Anode* Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
400	6	0.09	7	0.10
600	11	0.20	14	0.23
800	19	0.50	23	0.57

Note: When cooling air inlet temperature is raised to 50°C, flow rate must be increased approximately 40%.





SVETLANA TECHNICAL DATA

4CPW10,000R

Pulse Modulator Tetrode

The Svetlana™ 4CPW10,000R is a liquid cooled ceramic metal tetrode designed for pulse modulator or regulator use with HF or microwave high power electron tubes. The Svetlana 4CPW10,000R has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness. This modern mesh filament design is superior to the old hairpin design of the 1950's. The high voltage standoff of the Svetlana 4CPW10,000R is 25 KVDC and the peak current rating is 24 amperes. The Svetlana 4CPW10,000R is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for the 4CPW10,000 or Y442 manufactured in the United States, England and elsewhere.

Characteristics

Electrical

Filament:	Thoriated tungsten mesh	
Voltage	7.5±0.37	V
Current, at 7.5 Volts	75	A
Amplification factor (average)		
Grid to screen	4.5	
Direct interelectrode capacitances (grounded filament):		
Cin	115	pF
Cout	20	pF
Cgp	0.7	pF

Mechanical

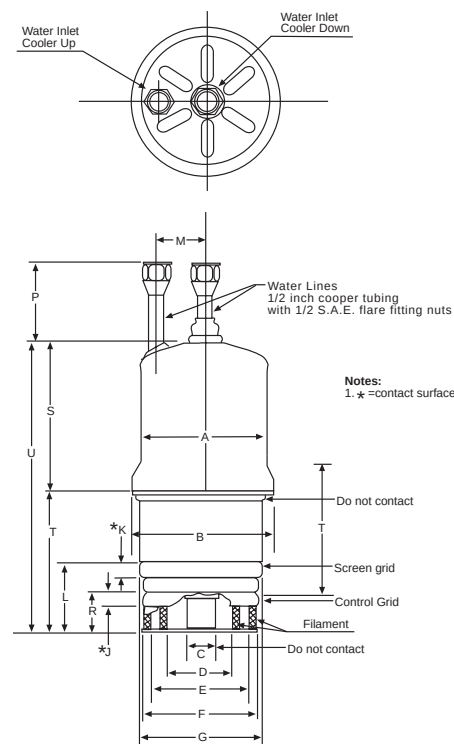
Maximum overall dimensions:		
Length	29.06 cm (11.44 in)	
Diameter	11.83 cm (4.66 in)	
Net Weight	3.4 kg (7.5 lb)	
Operating Position	Axis vertical, base up or down	
Maximum operating temperature, ceramic/metal or anode core	250° C	
Cooling	Water and forced air	
Base Coaxial, designed for use with Svetlana SK300A		

Pulse Modulator or Switch Tube Service

Absolute Maximum Ratings

Plate voltage	25	kV
Screen voltage	2.0	kV
Grid voltage	2.0	kV
Peak plate current (average during pulse)	24	A
Plate dissipation	10	kW
Screen dissipation	250	W
Grid dissipation	75	W

Svetlana Outline drawing



Dimensional Data

	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	103.8	105.6	4.094	4.156
B	116.6	118.3	4.594	4.656
C	15.2	19.3	.600	.760
D	48.1	49.2	1.896	1.936
E	79.5	80.6	3.133	3.173
F	96.3	97.4	3.792	3.832
G	101.0	102.2	3.980	4.020
J	4.7	—	.188	—
K	4.7	—	.188	—
L	44.8	46.4	1.764	1.826
M	38.1	44.5	1.500	1.750
P	58.7	71.5	2.312	2.812
R	25.0	26.7	.986	1.050
S	121.4	127.7	4.780	5.025
T	85.1	92.7	3.350	3.650
U	206.3	219.1	8.125	8.625



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Svetlana 4CPW10,000R Pulse Modulator Tetrode



Typical Operation

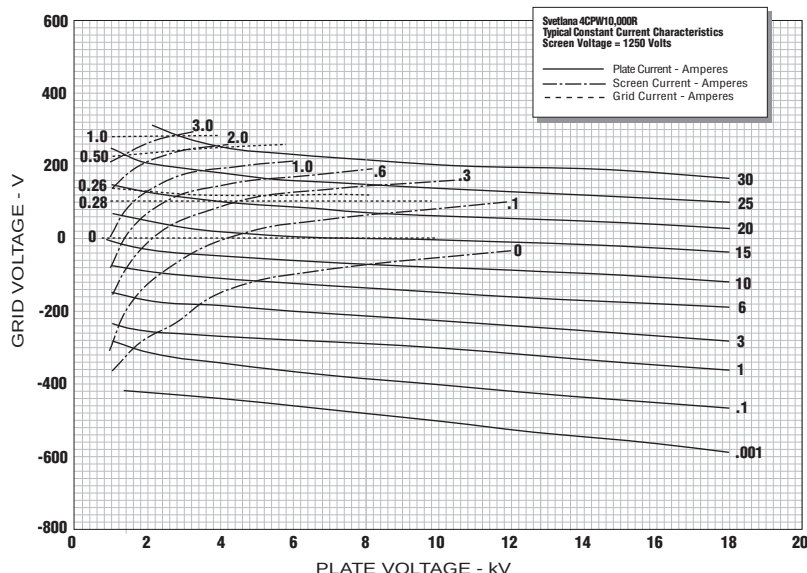
DC plate voltage	20.0	kV
DC screen voltage	1250	V
DC grid voltage	-700	V
Peak plate current	20.0	A
Peak screen current*(average during pulse)	1.4	A
Peak grid current* (average during pulse)	0.26	A
Peak rf grid voltage*	140	V
Peak output voltage	18.5	kV
Peak input power	400	kW
Peak output power	370	kW

Minimum Cooling Requirements

Cooling of the base may be accomplished by directing approximately 30 CFM of air through the Svetlana SK300A air system socket and over the filament and grid seals. Anode cooling is accomplished by circulating water through the integral water jacket as listed in the table below for several dissipation levels.

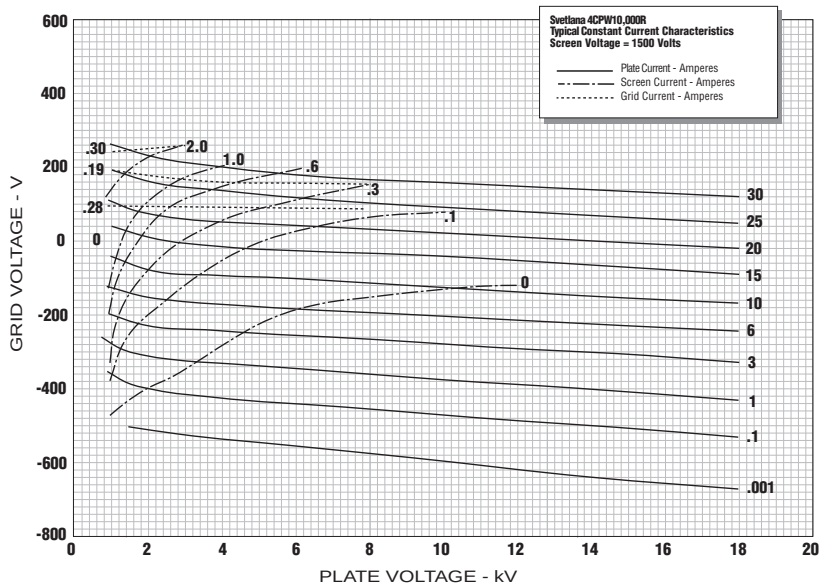
Minimum Cooling Water Requirement

Plate Dissipation (kw)	Quantity (gpm)	Pressure Drop (psi)
6	4.0	2.2
8	5.1	3.1
10	6.3	4.3



NOTES:

1. Since power dissipated by the filaments represented about 560 watts and grid plus screen dissipation can represent another 325 watts, an extra 900 watts has been added to plate dissipation in preparing this tabulation.
2. Maximum outlet-water temperature must never exceed 70°C and inlet-water pressure should be limited to 50 psi.





Svetlana 4CW10,000A/8661 Radial Beam Power Tetrode

The Svetlana™ 4CW10,000A/8661 is a liquid cooled ceramic metal tetrode designed for audio and radio frequency applications. It is particularly well-suited for modulator and linear amplifier use. The Svetlana 4CW10,000A/8661 has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness. This modern mesh filament design is superior to the old hairpin design of the 1950's. In some applications, the input circuit may need minor tuning to use the Svetlana 4CW10,000A/8661 as a replacement because of the low inductance of the Svetlana mesh filament.

The Svetlana 4CW10,000A/8661 is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for the 4CW10,000A/8661 manufactured in the United States, England and elsewhere.

General Characteristics

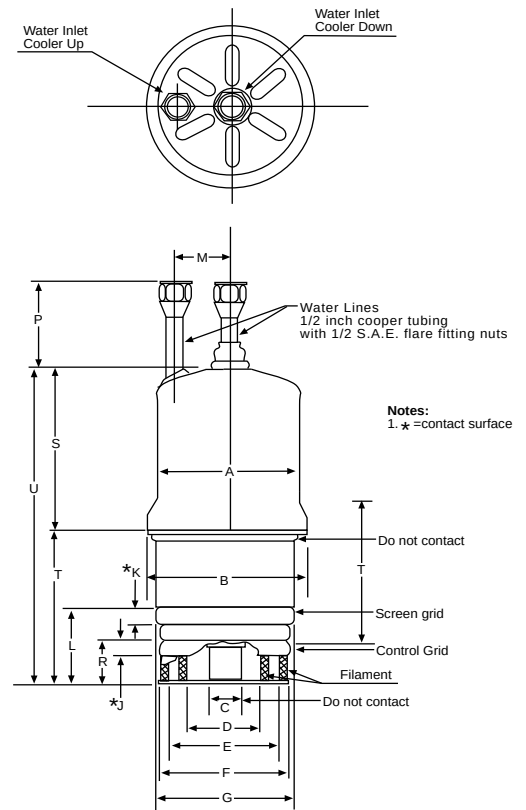
Electrical

Filament:	Thoriated tungsten mesh	
Voltage	7.5±0.37	V
Current, at 7.5 Volts	75	A
Amplification factor (average)		
Grid to screen	4.5	
Direct interelectrode capacitances (grounded filament):		
Cin	122	pF
Cout	23	pF
Cgp	1.0	pF
Direct interelectrode capacitances (grounded grid):		
Cin	58	pF
Cout	23	pF
Cpk	0.16	pF
Maximum frequency for full ratings (CW)	30	MHz

Mechanical

Maximum overall dimensions:		
Length	29.06 cm	(11.44 in)
Diameter	11.83 cm	(4.66 in)
Net Weight	3.4 kg	(7.5 lb)
Operating Position	Axis vertical, base up or down	
Maximum operating temperature, ceramic/metal or anode core	250°	
Cooling	Water and forced air	
Base	Coaxial, designed for use with Svetlana SK300A	

Svetlana 4CW10,000A/8661 Outline drawing



Dimensional Data

	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	103.8	105.6	4.094	4.156
B	116.6	118.3	4.594	4.656
C	18.2	19.3	.720	.760
D	48.1	49.2	1.896	1.936
E	79.5	80.6	3.133	3.173
F	96.3	97.4	3.792	3.832
G	101.0	102.2	3.980	4.020
J	4.7	—	.188	—
K	4.7	—	.188	—
L	44.8	46.4	1.764	1.826
M	38.1	44.5	1.500	1.750
P	58.7	71.5	2.312	2.812
R	25.0	26.7	.986	1.050
S	121.4	127.7	4.780	5.025
T	85.1	92.7	3.350	3.650
U	206.3	219.1	8.125	8.625



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Svetlana 4CW10,000A/8661 Radial Beam Power Tetrode



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**Oscillator, RF Power Amplifier or Grid Driven, Class C FM
Telephony - Carrier Conditions**

Absolute maximum ratings	at 110MHz	at 30MHz	
DC plate voltage	6500	7500	V
DC screen voltage	1500	1500	V
DC plate current	2.6	3.0	A
Plate dissipation	10.0	10.0	kW
Screen dissipation	250	250	W
Grid dissipation	75	75	W

Typical Operation at 30MHz

DC plate voltage	7500	V
DC screen voltage	500	V
DC grid bias voltage	-350	V
DC plate current	2.8	A
DC screen current*	6.5	A
DC grid current*	0.25	A
Peak rf grid voltage*	590	V
Grid driving power	150	W
Plate dissipation	5.0	kW
Plate output power	16.0	kW

RF Linear Amplifier, Grid Driven, Class AB1

Absolute Maximum Ratings

DC plate voltage	7500	V
DC screen voltage	1500	V
DC plate current	4.0	A
Plate dissipation	12,000	W
Screen dissipation	250	W
Grid dissipation	75	W

Typical Operation (Frequencies at 30 MHz)

DC plate voltage	7500	V
DC screen voltage	1500	V
DC grid voltage**	-340	V
Zero-signal DC plate current	0.5	A
Single-tone DC plate current	3.3	A
Single-tone DC screen current*	0.125	A
Peak RF grid voltage*	320	V
Plate dissipation	9050	W
Single-tone plate output power	15.95	kW

* Approximate values **Adjust for specified zero-signal plate current

Minimum Cooling Requirements

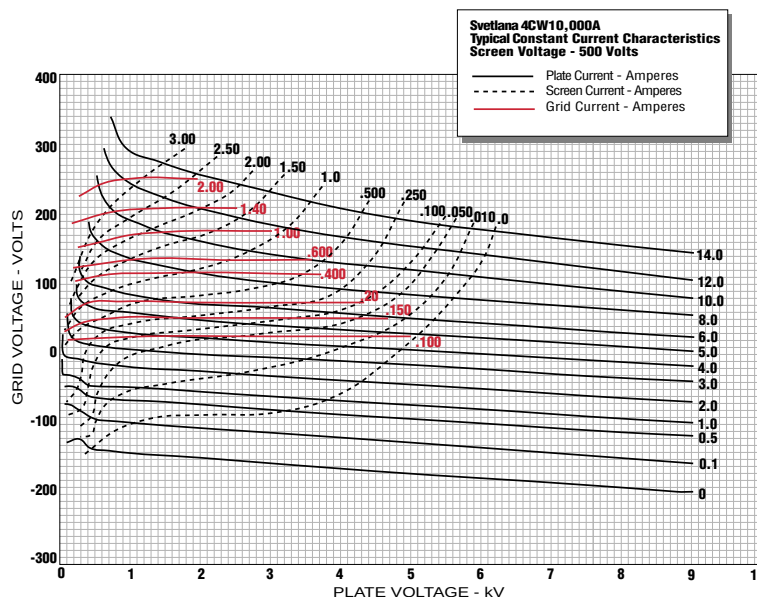
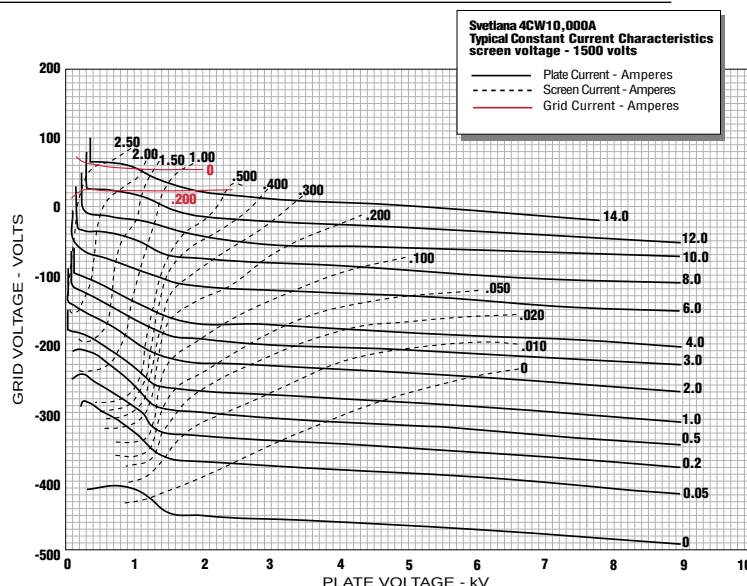
Cooling of the base may be accomplished by directing approximately 30 CFM of air through the socket and over the filament and grid seals. Anode cooling is accomplished by circulating water through the integral water jacket as listed in the table below for several dissipation levels.

Minimum Cooling Water Requirement

Plate Dissipation (kw)	Quantity (gpm)	Pressure Drop (psi)
6	4.0	2.2
8	5.1	3.1
10	6.3	4.3
12	7.4	5.5

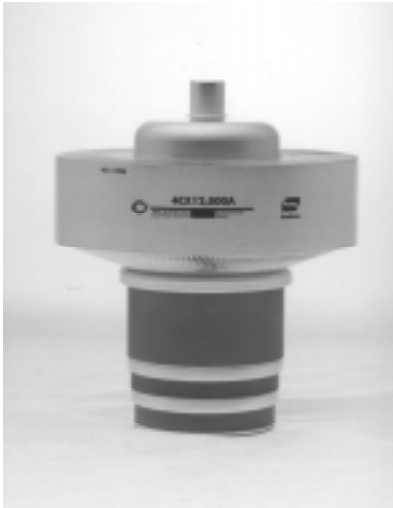
NOTES:

1. Since power dissipated by the filaments represented about 560 watts and grid plus screen dissipation can represent another 325 watts, an extra 900 watts has been added to plate dissipation in preparing tabulation.
2. Maximum outlet-water temperature must never exceed 70°C and inlet-water pressure should be limited to 50 psi.



SVETLANA TECHNICAL DATA

4CX12,000A/8989 Radial Beam Power Tetrode



The Svetlana™ 4CX12,000A/8989 is an air cooled power tetrode designed for audio and radio frequency applications. It is particularly well-suited for use in VHF FM broadcast transmitters in the Band II 88-108 MHz frequency range and has full performance ratings to 250MHz. The Svetlana 4CX12,000A/8989 has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness and good VHF electrical performance. This modern mesh filament design is superior to the old hairpin design of the 1950's.

The Svetlana 4CX12,000A/8989 is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for the 4CX12,000A/8989 manufactured in the United States.

Characteristics

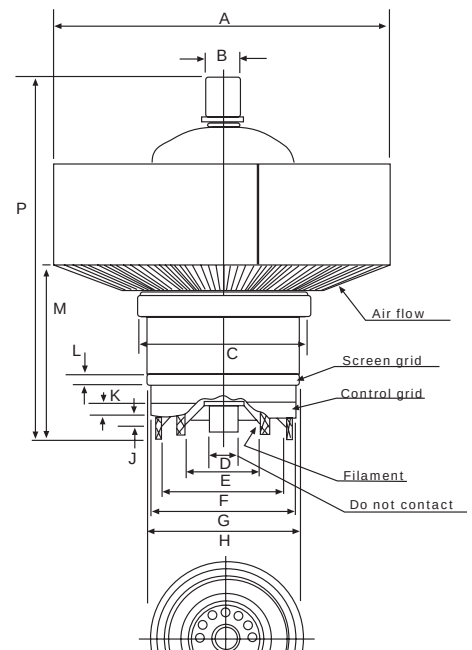
Electrical

Filament:	Thoriated-tungsten mesh	
Voltage	6.5 ± 0.3	V
Current @ 6.5V	105	A
Amplification factor (average)		
Grid to screen	6.7	
Direct interelectrode capacitances (grounded cathode):		
Cin	160	pF
Cout	18.5	pF
Cpk	1.0	pF
Direct interelectrode capacitance (grounded grid):		
Cin	70	pF
Cout	18.5	pF
Cgk	0.1	pF
Maximum frequency for full ratings (CW)	250	MHz

Mechanical

Maximum overall dimensions:		
Length	23.5 cm (9.24 in)	
Diameter	19.8 cm (7.76 in.)	
Net weight	6.4 kg (14 lb.)	
Operating position	Axis vertical, base up or down	
Maximum operating temperature, ceramic/metal seals or envelope	250° C	
Cooling	Forced air	
Base	Coaxial, design for use with Svetlana SK300A socket	

Svetlana Outline drawing



Dimensional Data

	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	195.58	197.10	7.700	7.760
B	21.72	22.73	.855	.895
C	109.22	110.79	4.300	4.362
D	15.24	19.30	.600	.760
E	48.16	49.17	1.896	1.936
F	79.58	80.59	3.133	3.173
G	96.32	97.33	3.792	3.832
H	101.09	102.11	3.980	4.020
J	4.78	—	.188	—
K	4.78	—	.188	—
L	4.78	—	.188	—
M	120.65	122.68	4.750	4.830
P	225.55	234.69	8.880	9.240



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Svetlana 4CX12,000A/8989

Radial Beam Power Tetrode

Radio Frequency Power Amplifier Class C FM

Absolute Maximum Ratings:

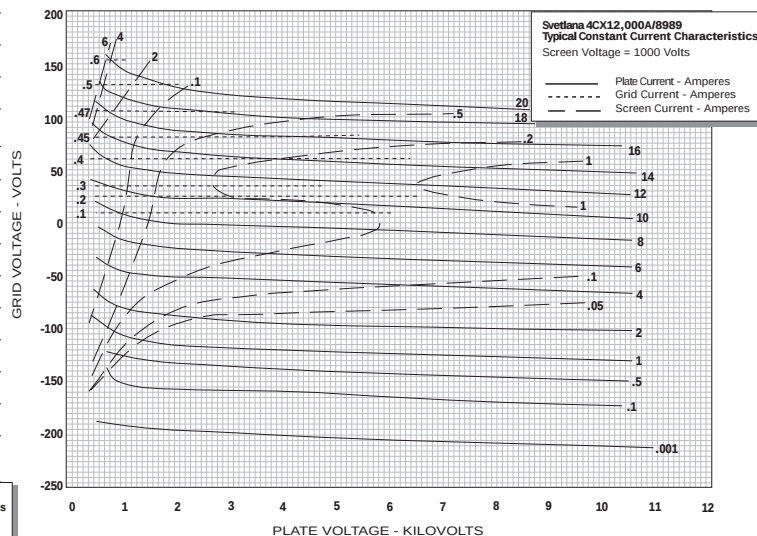
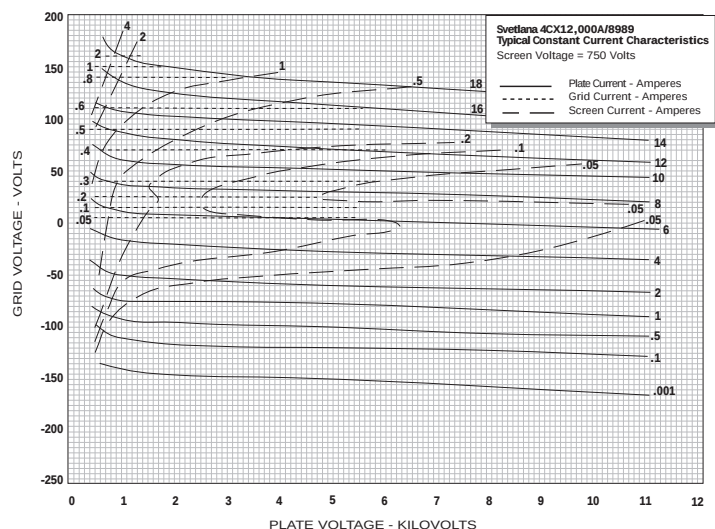
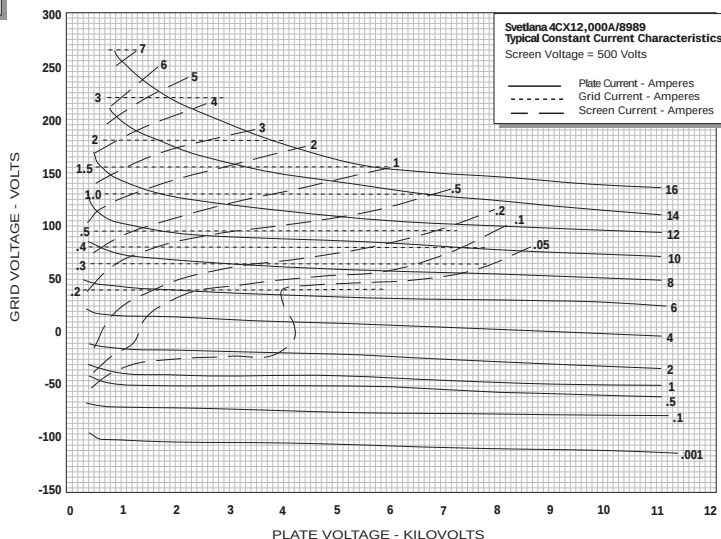
DC plate voltage	10,000	V
DC screen voltage	2,000	V
DC grid voltage	-500	V
DC plate current	3.5	A
Plate dissipation	12	kW
Screen dissipation	300	W
Grid dissipation	150	W

Typical Operation (Frequencies to 110 MHz)

DC plate voltage	8.0	8.0	10.0	kVdc
DC screen voltage	750	800	800	Vdc
DC grid voltage	-300	-400	-300	Vdc
DC plate current	1.6	2.58	2.81	Adc
DC screen current	115	120	130	mA
DC grid current	51	38	32	mA
Driving Power	165	250	275	W
Plate dissipation	1.8	4.9	5.6	kW
Plate output power	11	15.8	22.5	kW



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Cooling

Inlet Air Temperature = 25°C

Plate Dissipation Watts	Sea Level		5,000 Feet		10,000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
7500	120	0.27	140	0.40	170	0.40
12500	260	1.12	310	1.14	380	1.29

Inlet Air Temperature = 50°C

Plate Dissipation Watts	Sea Level		5,000 Feet		10,000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
7500	160	0.41	190	0.45	230	0.56
12500	360	1.58	440	1.74	530	2.05

Svetlana 4CX15,000R

Radial Beam Power Tetrode

Radio Frequency Power Amplifier Class C FM

Absolute Maximum Ratings:

DC plate voltage	10,000	V
DC screen voltage	2,000	V
DC grid voltage	-750	V
DC plate current	5.0	A
Plate dissipation	15	kW
Screen dissipation	450	W
Grid dissipation	200	W

Typical Operation (Frequencies to 110 MHz)

DC plate voltage	7.5	10.0	kVdc
DC screen voltage	750	750	Vdc
DC grid voltage	-510	-300	Vdc
DC plate current	4.65	4.55	Adc
DC screen current	590	540	mA
DC grid current	300	270	mA
Driving Power	220	220	W
Plate dissipation	8.1	9.0	kW
Plate output power	26.7	36.5	kW

Minimum Cooling Air-Flow Requirements

Sea Level		
Plate Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water
7,500	230	0.7
12,500	490	2.7
15,000	645	4.6

Note:

At altitudes significantly above sea level, the flow rate must be increased for equivalent cooling. At 5,000 feet above sea level, both the flow rate and the pressure drop should be increased by a factor of 1.20, while at 10,000 feet both flow rate and pressure drop must be increased by 1.46.



SVETLANA TECHNICAL DATA

4CX15,000R Radial Beam Power Tetrode



The Svetlana™ 4CX15,000R is an air cooled power tetrode designed for audio and radio frequency applications. It is particularly well-suited for use in VHF FM broadcast transmitters in the Band II 88-108 MHz frequency range and has full performance ratings to 110MHz. The Svetlana 4CX15,000R has a directly-heated, superior engineered thoriated tungsten mesh filament for mechanical ruggedness and good VHF electrical performance. This modern mesh filament design is superior to other mesh filament designs.

The Svetlana 4CX15,000R is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for any 4CX15,000R.

Characteristics

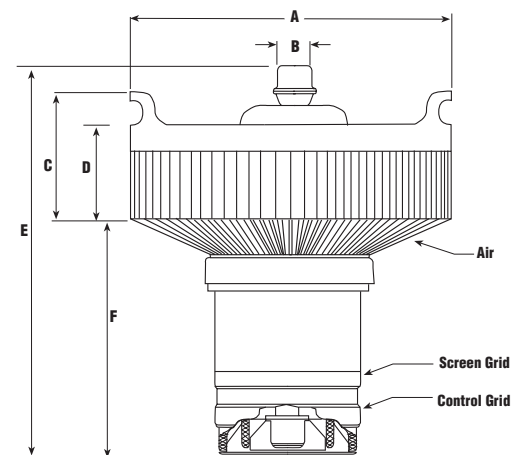
Electrical

Filament:	Thoriated-tungsten mesh	
Voltage	6.3 ± 0.3	V
Current @ 6.3V	164	A
Amplification factor (average)		
Grid to screen	4.5	
Direct interelectrode capacitances (grounded cathode):		
Cin	158	pF
Cout	25.8	pF
Cpk	1.3	pF
Direct interelectrode capacitance (grounded grid):		
Cin	67	pF
Cout	25.6	pF
Cgk	0.21	pF
Maximum frequency for full ratings (CW)	110	MHz

Mechanical

Maximum overall dimensions:		
Length	23.8 cm (9.38 in)	
Diameter	19.3 cm (7.58 in.)	
Net weight	5.8 kg (12.8 lb.)	
Operating position	Axis vertical, base up or down	
Maximum operating temperature, ceramic/metal seals or envelope	250° C	
Cooling	Forced air	
Base	Coaxial, design for use with Svetlana SK300A socket	

Svetlana Outline drawing



Dimensional Data

	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	189	193	7.46	7.58
B	21.7	22.7	0.855	0.895
C	90.4	93.6	3.56	3.68
D	61.3	70.8	2.41	2.79
E	22.8	23.8	9.0	9.38
F	118	122	4.66	4.78



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10/97

Svetlana 4CX1500A Power Tetrode



The Svetlana 4CX1500A is a high-performance ceramic/metal, forced air-cooled, power tetrode designed for use in Class AB₁ or Class C RF amplifier service. It may also be used for audio frequency modulator, pulse modulator and DC power regulator service. The 4CX1500A filament is precision fabricated in a cylindrical mesh configuration for exceptional mechanical stability and long life.

The Svetlana 4CX1500A is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for the 4CX1500A manufactured in the United States.



Svetlana 4CX1500A

General Characteristics

Electrical

Filament: Thoriated tungsten	
Voltage	5.0 ± 0.25 V
Current, at 5.0 volts	38.5 ± 2.0 A
Transconductance (Average):	
$I_b = 1.0$ Adc, $E_{c2} = 500$ Vdc	26,000 μ mhos
Amplification factor (average):	
Grid to Screen	5.5
Direct interelectrode capacitance (grounded cathode):	
Input	78 pF
Output	10.5 pF
Feedback	0.25 pF
Frequency of maximum rating:	
CW	150 MHz

Mechanical

Cooling	Forced air
Base	Ring and breechblock
Recommended air system socket	SK-831
Recommended (air) chimney	SK-806
Operating position	Axis vertical, base down or up
Maximum operating temperature	250°C
Maximum dimensions:	
Length	124.5 mm (4.9 in.)
Diameter	85.6 mm (3.37 in.)
Net weight	850 gm (30 oz.)

Radio Frequency Linear Amplifier Class C (CW conditions)

Absolute maximum ratings

Plate voltage	5000	Volts
Screen voltage	750	Volts
Plate dissipation	1500	Watts
DC plate current	1.0	Amps
Screen dissipation	75	Watts
Grid dissipation	25	Watts

Typical Operation

Frequencies	**30 MHz	**30 MHz	***220 MHz	
Plate voltage	3000	4000	3000	Vdc
Screen voltage	500	500	500	Vdc
Grid voltage	-200	-200	-116	Vdc
Plate current	800	800	1000	mAdc
Screen current	36	37	35	mAdc
Grid current	17	15	0	mAdc
Peak rf grid voltage	240	240		Volts
Calculated driving power	4.1	3.6	31.5	Watts
Plate input power	2400	3200	3000	Watts
Plate dissipation	600	700		Watts
Plate output power	1800	2500	1500	Watts
Resonant load impedance	1720	2570		ohms

*Approximate value **Calculated ***Measured

Power Tetrode

Radio Frequency Linear Amplifier, Grid Driven, Class AB₁

Absolute maximum ratings

DC plate voltage	4000	Volts
DC screen voltage	750	Volts
Plate dissipation	1500	Watts
DC plate current	1.0	Amps
Screen dissipation	75	Watts
Grid dissipation	25	Watts

Typical Operation

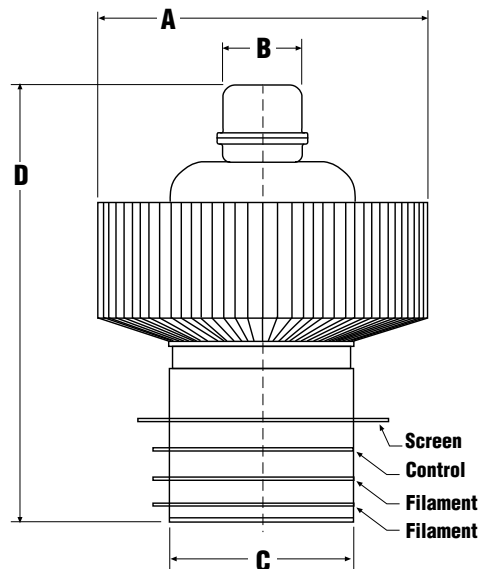
(Frequencies to 30 MHz)

Plate voltage	2500	3900	Vdc
Screen voltage	600	600	Vdc
Grid voltage	-105	-110	Vdc
Zero signal plate current	250	200	mAdc
Max signal plate current	765	750	mAdc
Max signal screen current*	46	40	mAdc
Peak rf grid voltage	95	100	Volts
Peak driving power	0	0	Watts
Max signal plate dissipation	820	1070	Watts
Max signal useful output power	1080	1850	Watts
Resonant load impedance	1670	2900	ohms

*Approximate values

Svetlana 4CX1500A

4CX1500A Outline Drawing



Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	84.7	85.6	3.33	3.37
B	20.5	20.8	0.81	0.82
C	47.4	48.3	1.87	1.90
D	118.7	124.5	4.68	4.9

Electrical Application

Filament operation The rated filament voltage for the 4CX1500A is 5.0 volts. Filament voltage, as measured at the socket, should be maintained within $\pm 5\%$ of this value to obtain maximum tube life.

Grid operation The rated dissipation of the grid is 25 watts. This is approximately the product of DC grid current and peak positive grid voltage. Operation at bias and drive levels near those listed will insure safe operation.

Screen operation The power dissipated by the screen must not exceed 75 watts. Screen dissipation, in cases where there is no AC applied to the screen, is the simple product of the screen voltage and the screen current. If the screen voltage is modulated, the screen dissipation will depend on RMS screen current and voltage.

Screen dissipation is likely to rise to

excessive values when the plate voltage, bias voltage, or plate load are removed with filament and screen voltages applied. Suitable protective means must be provided to limit the screen dissipation to 75 watts in the event of a circuit failure.

Plate operation The plate dissipation rating of the 4CX1500A is 1500 watts. The tube and associated circuitry should be protected against surge current in the event of an arc with a current limiting resistance of 10 - 25 ohms in series with the lead from the power supply to the plate. The resistor should be capable of withstanding the surge current. It should not be used as a fuse.

Power Tetrode

Mechanical Application

Mounting The 4CX1500A must be operated with its axis vertical. The base of the tube may be down or up at the convenience of the equipment designer.

Socket The Svetlana 4CX1500A is designed for the SK-831 socket and SK-806 chimney. The use of recommended airflow rate through the socket provides effective forced-air cooling of the tube. Air forced into the bottom of the socket passes over the tube terminals through the Air Chimney and exits through the anode cooling fins.

Cooling The maximum temperature rating for the anode core and the metal/ceramic seals of the 4CX1500A is 250°C. Sufficient forced-air circulation must be provided to keep the temperature of the anode at the base of the cooling fins and the temperature of the ceramic/metal seals below 250°C. Air-flow requirements to maintain seal temperature at 225°C in 50°C ambient air are tabulated below (for operation below 30 MHz).

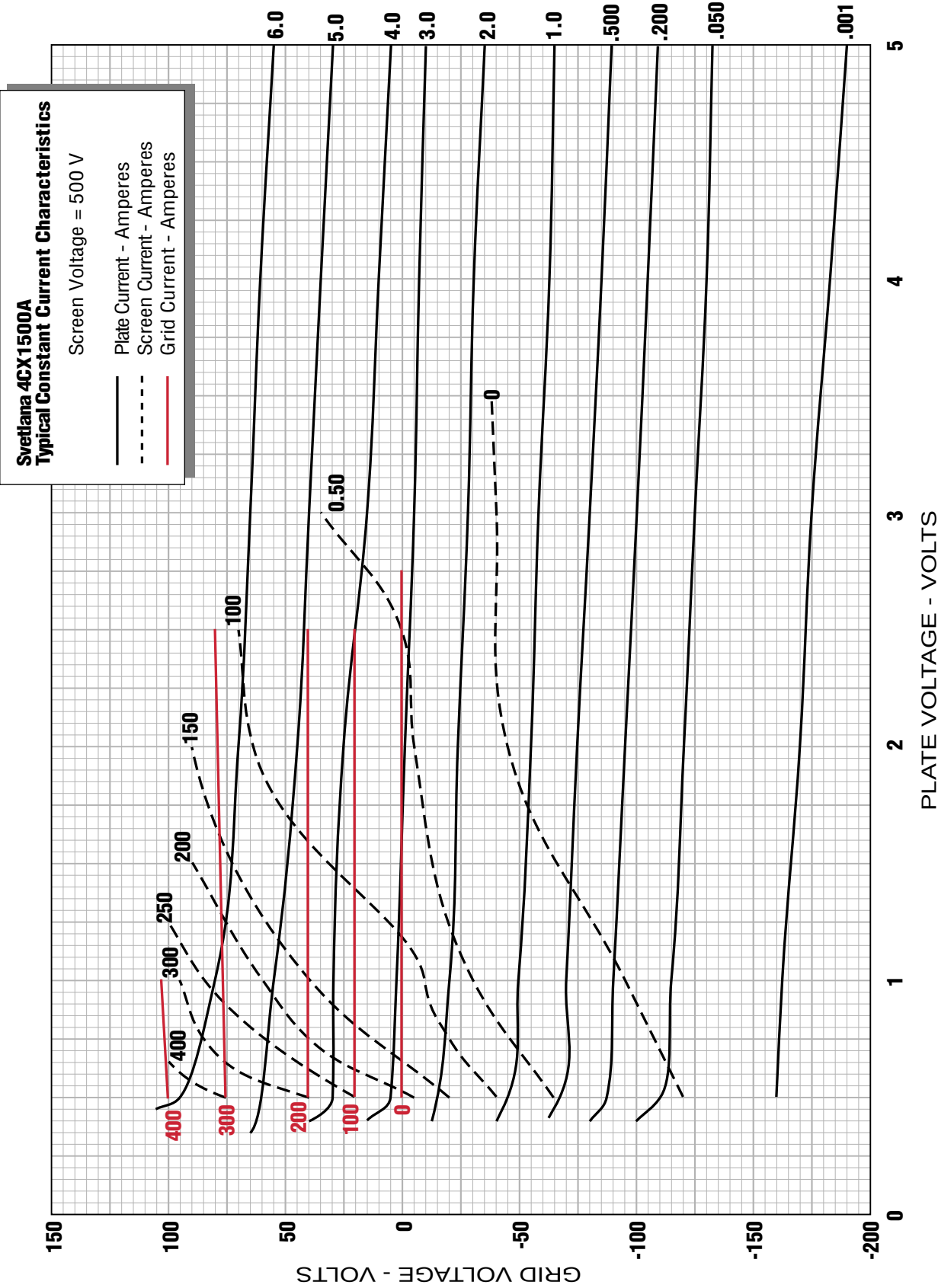
The blower selected in a given application must be capable of supplying the desired air flow at a back pressure equal to the pressure drop shown above plus any drop encountered in ducts and filters.

At other altitudes and ambient temperatures the flow rate must be modified to obtain equivalent cooling. The flow rate and corresponding pressure differential must be determined individually in such cases, using rated maximum temperatures as the criteria for satisfactory cooling.

Minimum Cooling Air-Flow Requirements				
Plate dissipation (watts)	Sea Level		6,000 feet	
	Air flow (CFM)	Pressure drop (Inches of water)	Air Flow (CFM)	Pressure Drop (Inches of water)
1000	27	0.33	33	0.40
1550	47	0.76	58	.95

Since the power dissipated by the filament represents about 200 watts and since grid plus screen dissipation can, under some conditions, represent another 100 watts, allowance has been made in preparing this tabulation for an additional 300 watts dissipation.

Svetlana 4CX1500A





SVETLANA TECHNICAL DATA

4CX1600B

High Performance Tetrode



The Svetlana™ 4CX1600B is a high-performance ceramic/metal tetrode with a plate dissipation rating of 1600 Watts with forced air cooling. The performance characteristics and internal configuration of the 4CX1600B allow its use as a high gain grid-driven RF amplifier or a grounded grid amplifier. A recommended mode of operation is in grid-driven service with a passive (resistive) 50-Ohm untuned input circuit. This eliminates the need for multiple input tuned circuits and neutralization. In this mode, a simple, stable, low-cost amplifier design with good intermodulation performance can be achieved.

As a linear power amplifier, the 4CX1600B will conservatively produce 1500 Watts PEP SSB, and 1500 Watts Key Down CW in any of the three modes: grid-driven, grid-driven passive input, and cathode-driven. Because of the unique internal geometry of the Svetlana 4CX1600B, the tube will operate efficiently at low plate voltage. Improved electron ballistics using a double-focused electron trap configuration contribute to the superior performance.

Characteristics

Electrical

<i>Cathode:</i>	<i>Oxide-coated</i>	
Voltage	12.6 ± 0.6	V
Current, at 12.6 volts	4.4 ± 0.3	A
Voltage, cathode-heater, max.	± 100	V
Warm-up time	2.5	min.
Transconductance	50	mA/V
<i>Direct interelectrode capacitances (grounded cathode):</i>		
C in	86	pF
C out	12	pF
C gp	0.15	pF
Maximum frequency for full ratings	250	MHz

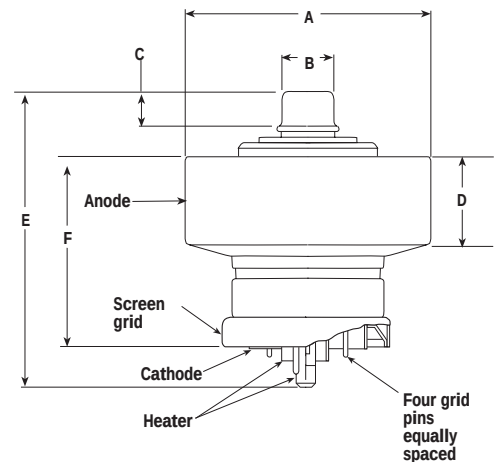
Mechanical

<i>Maximum overall dimensions:</i>		
Length	109 mm (4.29 in.)	
Diameter	86 mm (3.39 in.)	
Net weight	750 g (1.65 lb.)	
Operating position	Any	
Cooling	Forced air	
Maximum operating envelope temperature	250° C	
Recommended Socket	Svetlana SK3A	
Recommended Anode Connector	Svetlana AC-2	
Recommended Air System Chimney	Svetlana CH1600B	

Radio Frequency Linear Amplifier, Maximum ratings

DC plate voltage	3.3	kV
DC screen voltage	350	V
DC grid voltage	-150	V
DC Plate current	1.4	A
Plate dissipation	1.6	kW
Screen dissipation	20	W
Grid current	5	mA

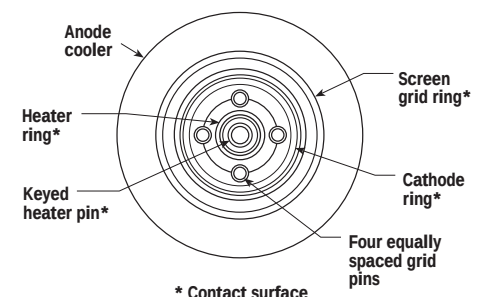
Svetlana Outline drawing



Tube Dimensional Data

Dim.	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	3.34	3.39	84.8	86
B	0.67	0.75	17	19
C	0.394	—	10	—
D	1.14	1.22	29	31
E	—	4.29	—	109
F	2.60	2.70	66.1	68.6

Bottom View



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7/98

Svetlana 4CX1600B

High Performance Tetrode



Typical Operation, Grid Driven, Single Tone

Frequency	75	75	75	MHz
Power output	1600	1500	1650	W
DC plate voltage	2400	2400	3200	V
DC screen voltage	350	350	240	V
Bias voltage ¹	-53	-70	-57	V
Zero-signal plate current	500	200	200	mA
DC plate current	1100	870	740	mA
DC screen current	20	48	21	mA
DC grid current	0	0	0	mA
Driving voltage	50	88	55	V
Driving power ²	25	77	30	W
CW plate input power	2640	2088	2368	W
Intermodulation distortion: ³ 3rd order	-36	-30	-31	dB
5th order	-58	-34	-41	dB
Efficiency	61	72	70	%
Cathode resistance	0	24	0	Ohms

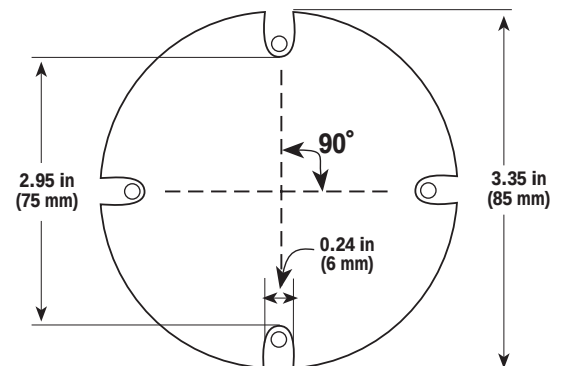
Notes:

1. Approximate value, adjust to specified zero-signal plate current.
2. The driving power is determined by the 50-Ohm resistive input circuit.
3. Intermodulation distortion measured by two-tone method referenced to one of two equal tones.

Typical Operation, FM Broadcast Amplifier, Grid Driven

Power output	1650	1650	W
DC plate voltage	2500	3200	V
DC screen voltage	350	260	V
Bias voltage	-90	-98	V
DC plate current	950	650	mA
DC screen current	54	18	mA
DC grid current	0	0	mA
Plate input power (CW)	2375	2080	W
Efficiency	69	79	%

Chassis Cutout Drawing: Svetlana SK3A



Note: Four socket mounting tabs at 90°. Drill four holes to clear 10/32 mounting bolts on an 85 mm diameter bolt circle.

Svetlana 4CX1600B

High Performance Tetrode



Electrical Application

Grid-Driven Operation The internal geometry of the 4CX1600B has a crossover feature which facilitates convenient circuit design for high-performance grid-driven RF power amplifiers. The screen grid and cathode external terminations are large coaxial connections closely adjacent so they can be effectively by-passed together. The grid termination consists of four pins which extend through the cathode connecting cone, eliminating common lead inductance. This configuration provides excellent input/output isolation.

Linear operation The operating data under typical operation, grid-driven, reflects the use of a resistance in the cathode lead of 24 Ohms. This resistance provides degeneration which reduces gain, reduces resting current, and improves linearity when an amplifier is operating at high efficiency.

Plate operation The inside surface of the 4CX1600B plate has a series of deep recesses into which electron beamlets, formed by double grid focusing, are directed. This combination of double focusing and anode electron traps promotes high conversion efficiency and enhanced linearity at low plate voltage. The rated maximum plate dissipation of the 4CX1600B is 1600 Watts. The tube and associated circuits should be protected in the event of an internal arc by including a series current-limiting resistance in the DC lead from the power supply to the plate. Its value must be 25 Ohms or more. The resistor should be capable of withstanding the high surge current caused by the arc, and should not be used as a fuse.

Control grid operation The maximum grid current rating of the 4CX1600B is 5 milliamperes. The grid and associated circuitry should be protected against current surges in the event of internal arcs by a source impedance of greater than 50 Ohms. For stability, the source impedance should not exceed 1000 Ohms.

Screen grid operation The maximum rated power dissipation for the screen grid is 20 Watts. The screen terminates externally in a large coaxial ring to facilitate low inductance r.f. connection with ground and cathode (see cathode operation).

The screen current may reverse under certain conditions and produce negative screen current. This is a normal characteristic of most tetrodes. The screen power supply should be designed with this characteristic in mind, so that the correct operating voltage will be maintained on the screen under all conditions. A current path from screen to cathode must be provided and the source impedance should not exceed 10,000 Ohms. When plate voltage, plate load or bias voltage is removed, screen grid voltage should be turned off automatically. Otherwise, the screen-grid power dissipation rating will be exceeded.

Cathode operation The Svetlana 4CX1600B cathode surface has alternate vertical emissive areas and non-emissive areas. This striped cathode configuration together with aligned grids maintains the grid current at the lowest possible level for enhanced linearity.

Mounting The SK3A socket is available from Svetlana for use with the 4CX1600B. The tube may be mounted in any position. The SK3A has a built-in annular 0.01 μ F screen bypass capacitor suitable for use at HF and VHF. The capacitor is removable for certain applications. Contact Svetlana for this technical information.

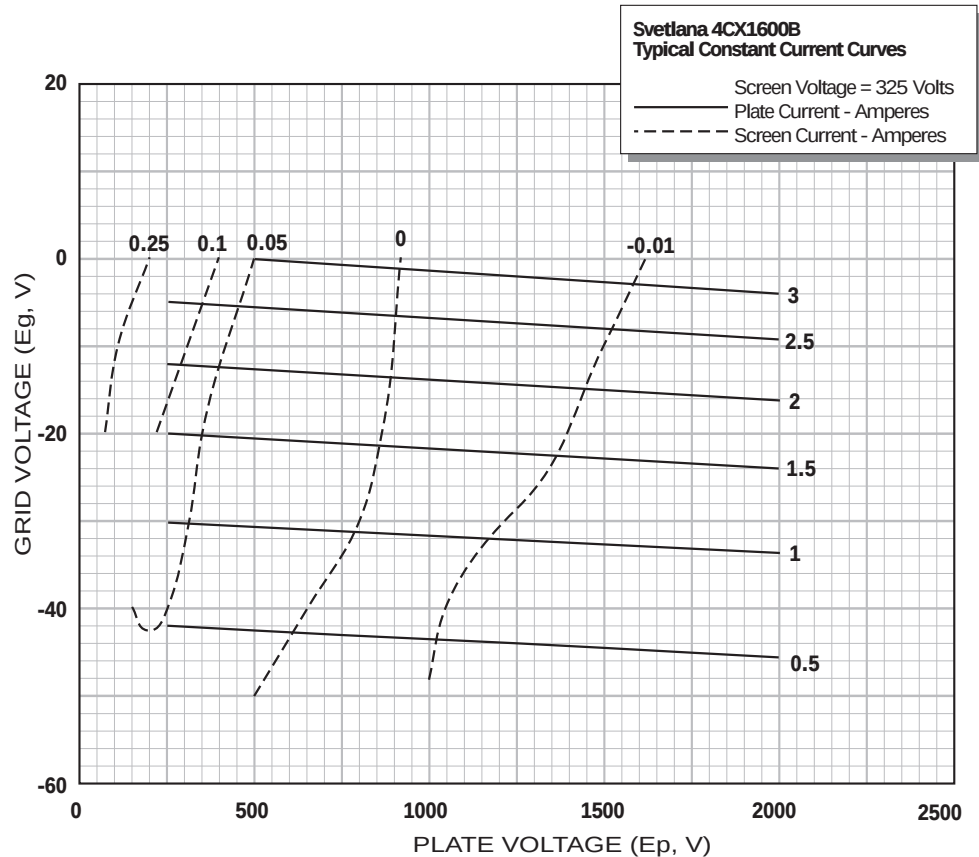
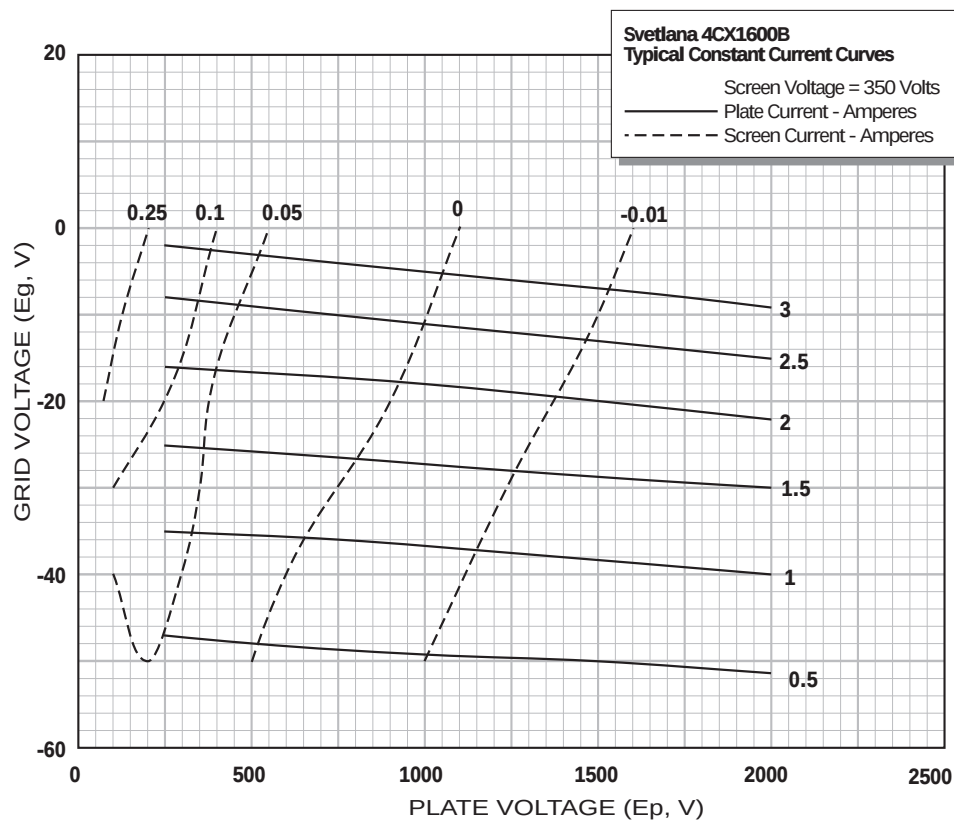
4CX1600B Air-Flow Requirements				
Plate dissipation(watts)	Cooling air at 25°C		Cooling air at 50°C	
	Air Flow CFM	Pressure drop inches of water	Air Flow CFM	Pressure drop inches of water
Sea level				
1000	22	0.20	27	0.33
1600	36	0.40	47	0.76
6,000 feet				
1000	27	0.25	33	0.40
1600	44	0.50	58	0.95

Svetlana 4CX1600B

High Performance Tetrode



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SVETLANA TECHNICAL DATA

4CX20,000A/8990 Radial Beam Power Tetrode



The Svetlana™ 4CX20,000A/8990 is a high-performance ceramic/metal power tetrode designed for audio and radio frequency applications. It is particularly well-suited for use in VHF FM broadcast transmitters in the Band II 88-108 MHz frequency range. The Svetlana 4CX20,000A/8990 has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness and good VHF electrical performance.

The Svetlana 4CX20,000A/8990 is manufactured in the Svetlana factory in St. Petersburg, Russia, and is a direct replacement for the 4CX20,000A/8990 manufactured in the United States.

Characteristics

Electrical

Filament	Thoriated-tungsten mesh	
Voltage	10.0 ± 0.5	V
Current @ 10.0V	140	A
Amplification factor (average):		
Grid to screen	6.7	
Direct interelectrode capacitances (grounded cathode):		
Cin	190	pF
Cout	23.5	pF
Cgp	1.5	pF
Direct interelectrode capacitance (grounded grid):		
Cin	83	pF
Cout	24.5	pF
Cgk	0.2	pF
Maximum frequency for full ratings (CW)	110	MHz

Mechanical

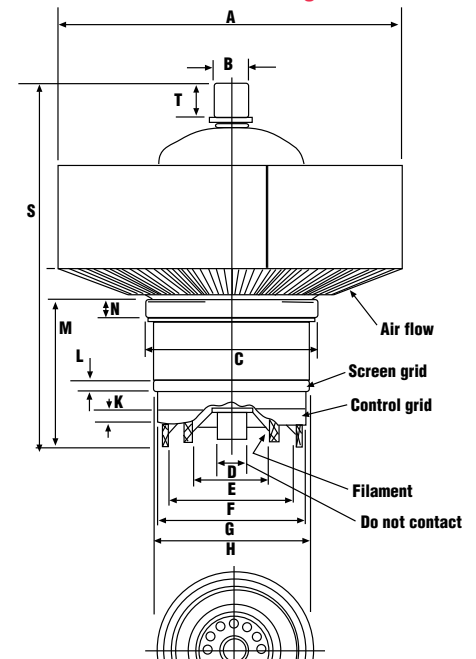
Maximum overall dimensions:		
Length	25 cm (9.84 in.)	
Diameter	22.4 cm (8.80 in.)	
Net weight	6.35 kg (14.0 lb.)	
Operating position	Axis vertical, base up or down	
Maximum operating temperature, ceramic/metal seals or envelope	250° C	
Cooling	Forced air	
Base	Coaxial, for use with Svetlana SK300A (HF) socket	

Radio Frequency Power Amplifier Class C FM

Absolute Maximum Ratings:

DC plate voltage	10,000	V
DC screen voltage	2,000	V
DC plate current	5.0	A
Plate dissipation	20	kW
Screen dissipation	450	W
Grid dissipation	200	W

Svetlana Outline drawing



Dimensional Data

	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	220.22	223.52	8.670	8.800
B	21.72	22.73	.855	.895
C	111.91	113.49	4.406	4.468
D	15.24	19.30	.600	.760
E	48.16	49.17	1.896	1.936
F	79.58	80.59	3.133	3.173
G	96.32	97.33	3.792	3.832
H	101.09	102.11	3.980	4.020
K	4.78	—	.188	—
L	4.78	—	.188	—
M	94.44	96.04	3.718	3.781
N	5.56	—	.219	—
S	240.41	249.94	9.465	9.840
T	12.70	—	.500	—



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Svetlana 4CX20,000A/8990 Radial Beam Power Tetrode



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Typical Operation (Frequencies to 110 MHz)

DC plate voltage	9.0	10.0	kVdc
DC screen voltage	800	1000	Vdc
DC grid voltage	-300	-460	Vdc
DC plate current	4.15	4.65	Adc
DC screen current	0.2	0.25	Adc
DC grid current	38	59	mAdc
Driving power	360	375	W
Plate dissipation	8.5	11.3	kW
Plate output power	28.9	35.2	kW

Audio Frequency Power Amplifier or Modulator, Grid Driven, Class AB1

Absolute Maximum Ratings

DC plate voltage	10.0	kV
DC screen voltage	2500	V
DC plate current	6.0	A
Plate dissipation	20.0	kW
Screen Dissipation	450	W
Grid Dissipation	200	W

Typical Operation (two tubes)

DC plate voltage	7800	7800	7800	kVdc
DC screen voltage	500	750	1500	Vdc
DC grid voltage	-70	-125	-250	Vdc
Zero-signal plate current	0.75	0.75	1.0	Adc
Maximum signal plate current	3.4	5.2	9.2	Adc
Maximum signal screen current	0.09	0.22	0.6	Adc
Peak AF grid voltage	65	115	200	V
Driving Power	0	0	0	W
Load resistance plate-to-plate	6300	3500	1600	Ohms
Maximum signal plate dissipation	6.0	7.0	13.5	kW
Plate output power	14.5	26.0	44.0	kW

Cooling

Base-to-Anode Air Flow

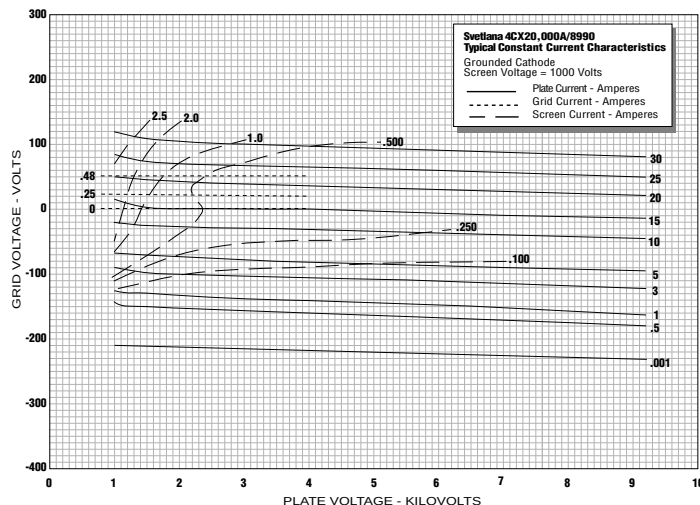
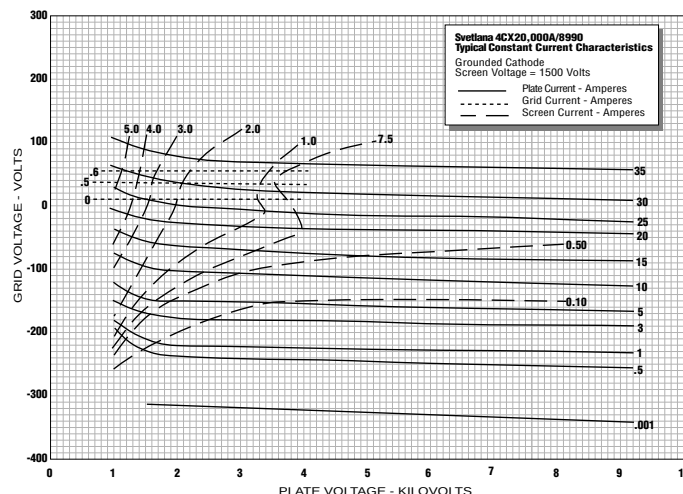
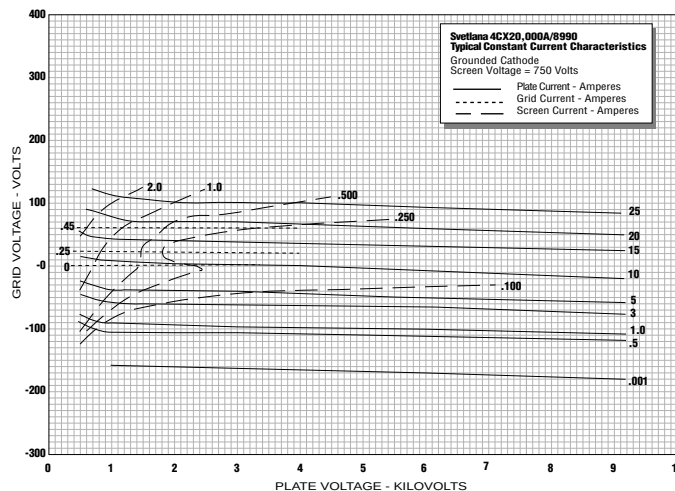
Sea Level			10,000 Feet		
Plate Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water	
12.5	255	0.6	375	0.7	
15.0	365	1.0	535	1.2	
17.5	500	1.5	730	1.9	
20.0	650	2.4	955	3.0	

1. Inlet air at 25°. For each 10° increase in air temperature cooling, flow rate should be increased 20%

2. Air must be passed around the base of the tube and through the socket, to assure adequate cooling of the tube base and the socket contacts.

3. Minimum air flow requirements for a maximum anode temperature of 225°C are shown in the table.

4. Air flow must be applied before or simultaneously with the application of power, including the tube filament, and should normally be maintained for several minutes after all power is removed from the tube.



SVETLANA TECHNICAL DATA

4CX20,000B

Radial Beam Power Tetrode



The Svetlana™ 4CX20,000B is a high-performance ceramic/metal power tetrode designed for audio and radio frequency applications. It is particularly well-suited for use in AM broadcast transmitters and pulse modulator service. The Svetlana 4CX20,000B has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness and has excellent high voltage stand-off capability.

The Svetlana 4CX20,000B is manufactured in the Svetlana factory in St. Petersburg, Russia, and is a direct replacement for the 4CX20,000B manufactured in the United States.

Characteristics

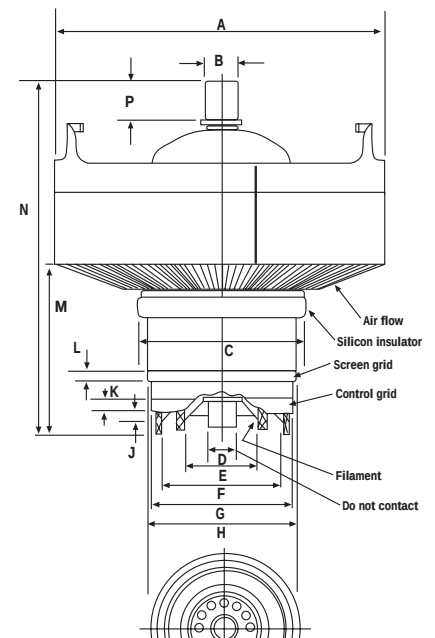
Electrical

Filament:	Thoriated-tungsten mesh	
Voltage	10.0 ± 0.5	V
Current @ 10.0V	140	A
Amplification factor (average):		
Grid to screen	6.7	
Direct interelectrode capacitances (grounded cathode):		
Cin	190	pF
Cout	23.5	pF
Cgp	1.5	pF
Direct interelectrode capacitance (grounded grid):		
Cin	83	pF
Cout	24.5	pF
Cgk	0.2	pF
Maximum frequency for full ratings (CW)	30	MHz

Mechanical

Maximum overall dimensions:		
Length	25 cm (9.84 in.)	
Diameter	22.4 cm (8.80 in.)	
Net weight	6.35 kg (14.0 lb.)	
Operating position	Axis vertical, base up or down	
Maximum operating temperature, ceramic/metal seals or envelope	250° C	
Cooling	Forced air	
Base	Coaxial, for use with Svetlana SK300A socket	

Svetlana Outline drawing



Dimensional Data

	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	221.74	225.04	8.730	8.860
B	21.72	22.73	.855	.895
C	116.66	118.26	4.593	4.656
D	15.24	19.30	.600	.760
E	48.16	49.17	1.896	1.936
F	79.58	80.59	3.133	3.173
G	96.32	97.33	3.792	3.832
H	101.09	102.11	3.980	4.020
J	4.78	—	.188	—
K	4.78	—	.188	—
L	4.78	—	.188	—
M	123.01	124.61	4.906	—
N	240.41	249.94	9.465	9.840
P	12.70	—	.500	—



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Svetlana 4CX20,000B

Radial Beam Power Tetrode



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Radio Frequency Power Amplifier Class C AM

Absolute Maximum Ratings:

DC plate voltage	10,000	
V		
DC grid voltage-	1000	
V		
DC screen voltage	2,000	V
DC plate current	5.0	A
Plate dissipation	20	kW
Screen dissipation	450	W
Grid dissipation	200	W

Typical Operation (Frequencies to 30 MHz, Carrier Conditions)

DC plate voltage	7.8	kVdc
DC screen voltage	750	Vdc
DC grid voltage	300	Vdc
Peak AF screen voltage (100% modulation)	750	Vdc
DC plate current	4.6	Adc
DC screen current*	0.220	Adc
DC grid current*	0.108	Adc
Driving power(calculated)	35	W
Plate dissipation	6.9	kW
Plate impedance	845	Ohms
Plate output power	29	kW

Pulse Modulator or Regulator Service

Absolute Maximum Ratings

DC plate voltage	35	kV
DC screen voltage	2500	V
DC grid voltage	-15	kV
Rear DC cathode current	80	A
Plate dissipation	20.0	W
Screen dissipation	450	W
Grid dissipation	200	W
Maximum pulse length	100	mS

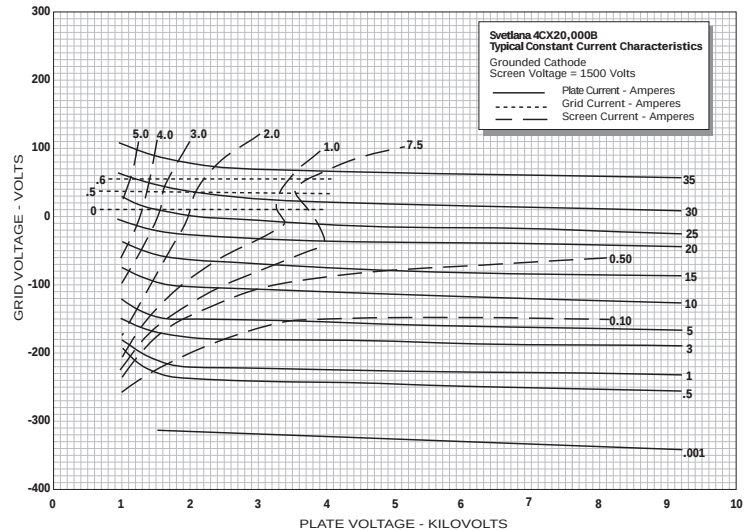
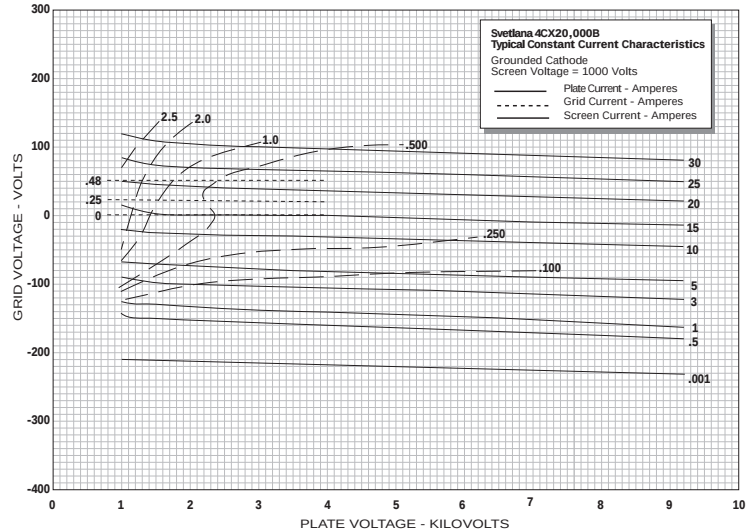
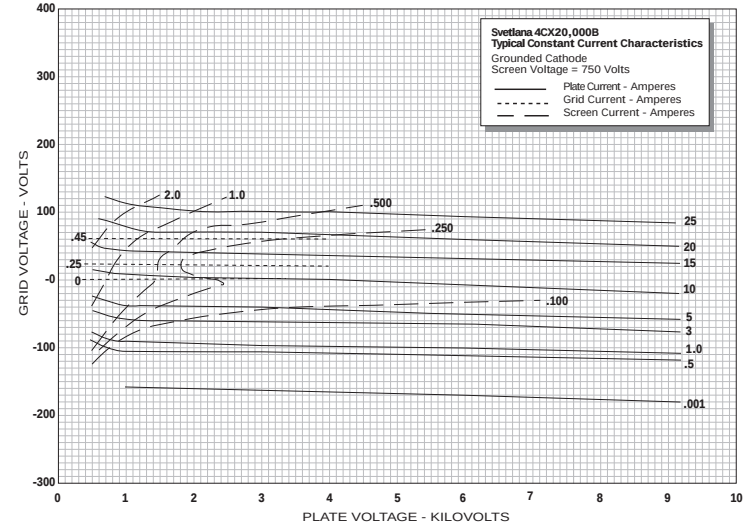
*Approximate value

Cooling

Base-to-Anode Air Flow

Sea Level			10,000 Feet	
Plate Dissipation Watts	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
12.5	257	0.6	377	0.7
15.0	367	1.0	537	1.2
17.5	500	1.5	730	1.9
20.0	652	2.4	955	3.0

- For each 10° increase in air temperature cooling, flow rate should be increased 20%
- Air must be passed around the base of the tube and through the socket, to assure adequate cooling of the tube base and the socket contacts.
- Minimum air flow requirements for a maximum anode temperature of 225°C are shown in the table.
- Air flow must be applied before or simultaneously with the applicaiton of power, including the tube filament, and should normally be maintained for several minutes after all power is removed from the tube.



SVETLANA TECHNICAL DATA

4CX20,000C

Radial Beam Power Tetrode



The Svetlana™ 4CX20,000C is a high-performance ceramic/metal power tetrode designed for audio and radio frequency applications. It is particularly well-suited for use in VHF FM broadcast transmitters in the Band II 88-108 MHz frequency range. The Svetlana 4CX20,000C has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness and good VHF electrical performance.

The Svetlana 4CX20,000C is manufactured in the Svetlana factory in St. Petersburg, Russia, and is a direct replacement for the 4CX20,000C manufactured in the United States.

Characteristics

Electrical

Filament:	Thoriated-tungsten mesh	
Voltage	10.0 ± 0.5	V
Current @ 10.0V	140	A
Amplification factor (average):		
Grid to screen	6.7	
Direct interelectrode capacitances (grounded cathode):		
Cin	195	pF
Cout	22.7	pF
Cgp	0.6	pF
Direct interelectrode capacitance (grounded grid):		
Cin	87.4	pF
Cout	23.1	pF
Cpk	0.08	pF
Maximum frequency for full ratings (CW)	110	MHz

Mechanical

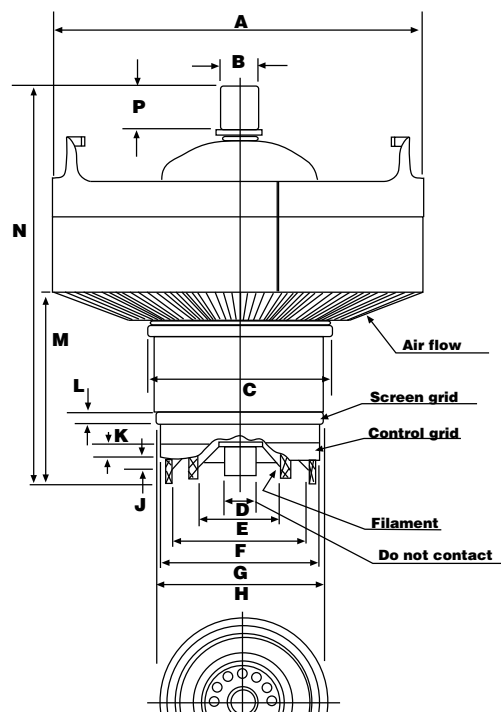
Maximum overall dimensions:		
Length	25 cm (9.84 in.)	
Diameter	22.4 cm (8.80 in.)	
Net weight	9.06 kg (20.0 lb.)	
Operating position	Axis vertical, base up or down	
Maximum operating temperature, ceramic/metal seals or envelope	250° C	
Cooling	Forced air	
Base	Coaxial, for use with Svetlana SK300A socket	

Radio Frequency Power Amplifier Class C FM

Absolute Maximum Ratings:

DC plate voltage	12,500	V
DC screen voltage	2,000	V
DC plate current	5.0	A
Plate dissipation	20	kW
Screen dissipation	450	W
Grid dissipation	200	W

Svetlana Outline drawing



Dimensional Data

	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	221.74	225.04	8.730	8.860
B	21.72	22.73	.855	.895
C	111.91	113.49	4.406	4.468
D	15.24	19.30	.600	.760
E	48.16	49.17	1.896	1.936
F	79.58	80.59	3.133	3.173
G	96.32	97.33	3.792	3.832
H	101.09	102.11	3.980	4.020
K	4.78	—	.188	—
L	4.78	—	.188	—
M	123.01	124.61	4.843	4.906
N	240.41	249.94	9.465	9.840
P	12.70	—	.500	—



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Svetlana 4CX3500A Radial Beam Power Tetrode



The Svetlana™ 4CX3500A is designed for audio and radio frequency applications. It features an improved anode-to-screen-grid ceramic envelope which eliminates the cracking problem traditional with 4CX3500A's manufactured in the United States. The Svetlana 4CX3500A has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness and good VHF electrical performance.

The Svetlana 4CX3500A is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be directly interchangeable with the 4CX3500A manufactured in the United States.



Svetlana 4CX3500A

General Characteristics

Electrical

Filament:	Thoriated tungsten mesh
Voltage	5.0 ± 0.25V
Current, at 5.0 Volts	90
Amplification factor (average):	
Grid to screen	4.5
Direct interelectrode capacitances (grounded cathode):	
Cin	115 pF
Cout	15.6 pF
Cgp	0.63 pF
Direct interelectrode capacitances (grids grounded):	
Cin	63.8 pF
Cout	16.2 pF
Cpk	0.06 pF
Maximum frequency for full ratings (CW)	220 MHz

Mechanical

Maximum overall dimensions:	
Length	184.2 mm (7.25 in.)
Diameter	125.5 mm (4.94 in.)
Net weight*	2.5 kg (5.5 lb)
Operating position	Axis vertical, base up or down
Maximum operating temperature, ceramic/metal seals or envelope	250° C
Cooling	Forced air
Base	Coaxial, designed for use with SK340 (HF) or SK350 (VHF) sockets
Recommended chimney	SK306 (HF) or SK356 (VHF)
Anode connector	Svetlana AC-3

Radio Frequency Power Amplifier Class C FM or Telegraphy

Absolute maximum ratings

DC plate voltage	6000 V
DC screen voltage	1500 V
DC grid voltage	-500 V
DC plate current	2.0 A
Plate dissipation	3500 W
Screen dissipation	165 W
Grid dissipation	50 W

Typical Operation

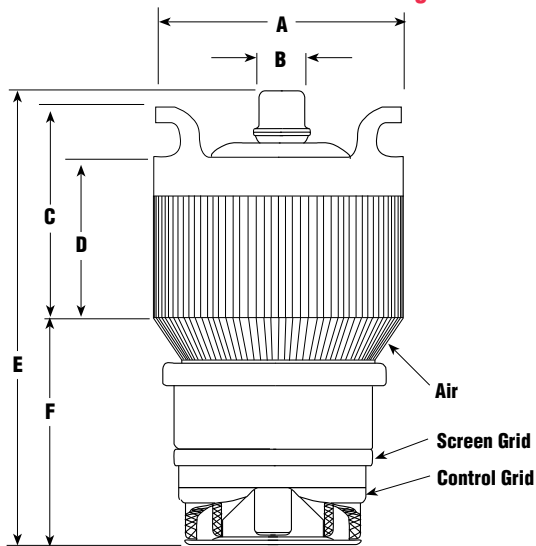
(Frequencies to 110 MHz)

DC plate voltage	4000	4300	V
DC screen voltage	500	700	V
DC grid voltage	-300	-400	V
DC plate current	1.5	1.9	A
DC screen current*	140	123	mA
DC grid current*	84	63	mA
Driving power	56	66	W
Useful output power	3800	5500	W

* Approximate values

Radial Beam Power Tetrode

Svetlana 4CX3500A Outline Drawing



Dimensional Data				
Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	122	125	4.81	4.94
B	21.7	22.7	0.855	0.895
C	57.8	67	2.36	2.73
D	33.3	42.5	1.36	1.73
E	176	182	6.93	7.17
F	85.1	94.3	3.47	3.85

Electrical Application

Plate operation The rated maximum plate dissipation of the 4CX3500A is 3500 Watts. This power may be safely sustained with adequate air cooling. The tube must be protected from damage which may be caused by an internal arc occurring at high plate voltage. A protective resistance should always be connected in series with each tube anode to help absorb power-supply stored energy if an internal arc should occur.

Control-grid operation The maximum control grid dissipation is 50 Watts, determined (approximately) by the product of the dc grid current and the peak positive grid voltage.

Screen-grid operation The maximum screen grid dissipation is 165 Watts. With no ac applied to the screen grid, dissipation is the product of dc screen voltage and the dc screen current. Plate voltage, plate loading or bias voltage must never be removed while filament and screen voltages are present.

Filament operation Svetlana recommends that a new tube, or a tube which has been in storage for some period of time, be operated with only filament voltage applied for a period of from 30 to 60 minutes before full operation begins. Once normal operation has been established, a minimum filament warm-up time of four to five seconds is sufficient for full filament emission. Filament voltage should be measured at the socket.

At rated nominal filament voltage, the peak emission capability of the tube is many times that needed for communication service. A reduction in filament voltage will lower the filament temperature, and this reduction will substantially increase life expectancy. The correct value of filament voltage should be determined for the particular applications. Svetlana recommends that the tube be operated at full nominal voltage for an initial stabilization period of 100 to 200 hours before any action is taken to operate at reduced voltage. The voltage should gradually be reduced until there is a slight degradation in performance—such as power output or distortion. The voltage should then be increased a few tenths of a Volt above the value where performance degradation was first noted. The operating point should be rechecked after 24 hours.

Svetlana 4CX3500A

Mechanical Application

Mounting The Svetlana 4CX3500A must be mounted vertically, base up or down. The tube should be protected from vibration and shock.

Storage If the 4CX3500A is to be stored as a spare, it should be kept in its original packaging to minimize the possibility of handling damage.

Cooling The 4CX3500A requires forced-air cooling in all applications. The tube socket should be mounted in a pressurized compartment so that the cooling air passes through the socket and is guided to the anode cooling fins by an air chimney. If cooling air is not passed around the base of the tube and through the socket, arrangements must be made to assure adequate cooling of the tube base and socket contacts. An air interlock system should be provided to remove all voltages from the tube for partial or full failure of the air system.

Adequate movement of cooling air around the base of the tube keeps the tube base and the socket contact fingers at safe operating temperatures.

Although the maximum temperature rating for seals and the anode core is 250° C, good engineering practice requires that a safety factor be allowed. The table shows cooling parameters with the cooling air at 50° C and maximum tube anode temperature of 225° C. The figures are for the tube with air passing in a base-to-anode direction. Pressure drop values shown are approximate and are for the appropriate tube/socket/chimney combination.

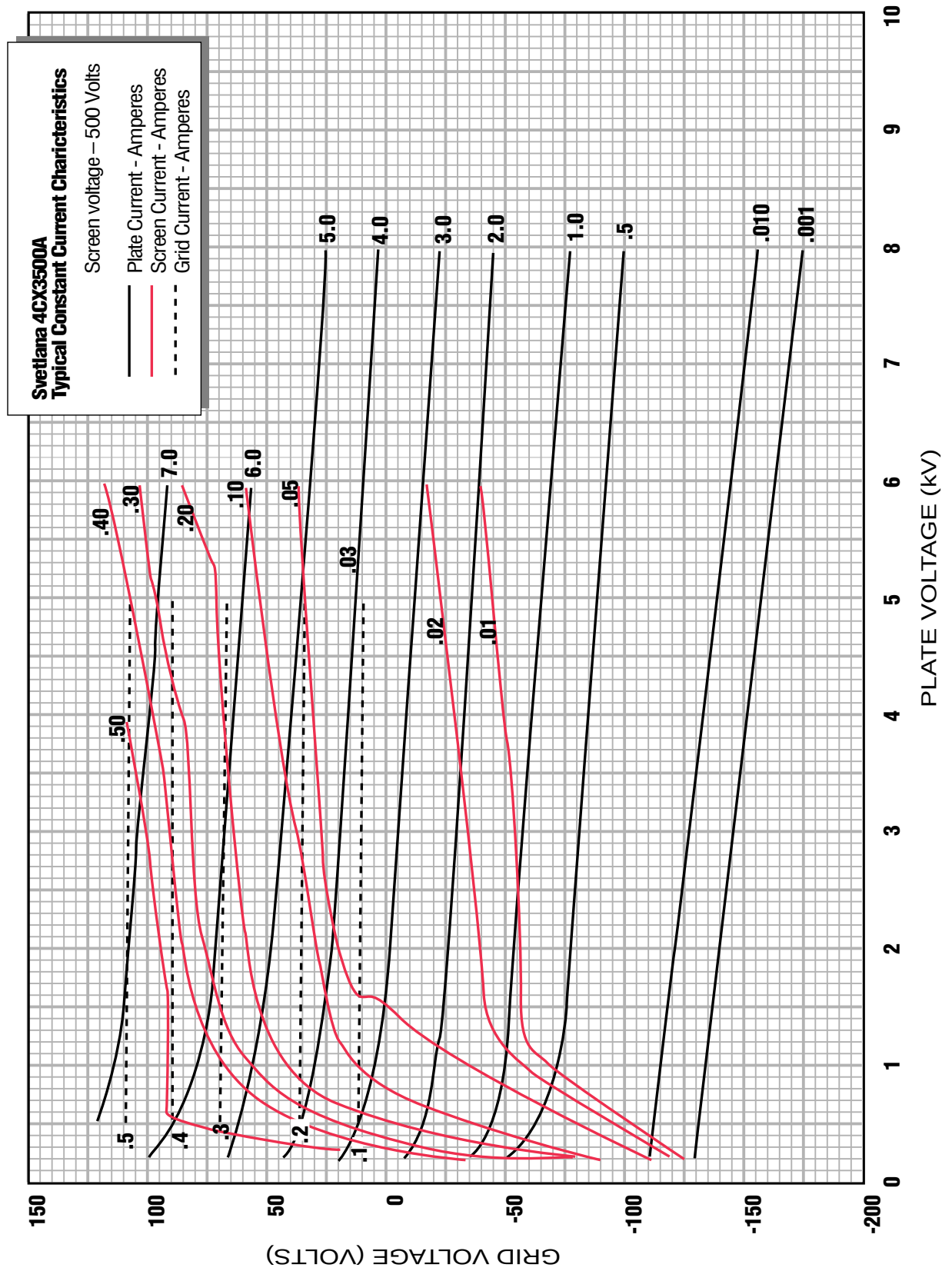
Minimum Cooling Air-Flow Requirements

Sea Level		
Plate dissipation (Watts)	Air flow (CFM)	Pressure drop (Inches of water)
3500	241	1.9

At altitudes significantly above sea level, the flow rate must be increased for equivalent cooling. At 5,000 feet above sea level, both the flow rate and the pressure drop should be increased by a factor of 1.20, while at 10,000 feet both flow rate and pressure drop must be increased by 1.46.

Special applications If the user needs to operate this tube under conditions widely different from those given in this publication, contact any location of Svetlana Electron Devices for technical assistance.

Radial Beam Power Tetrode



SVETLANA TECHNICAL DATA

4CX400A

Radial Beam Power Tetrode



The Svetlana 4CX400A is a compact, high-perveance radial beam tetrode having a plate dissipation rating of 400 Watts. Because of the unique internal geometry of the Svetlana 4CX400A, the tube will operate at low plate voltage with high efficiency. This advantage is possible through the use of an electron trapping configuration which reduces secondary emission.

Characteristics

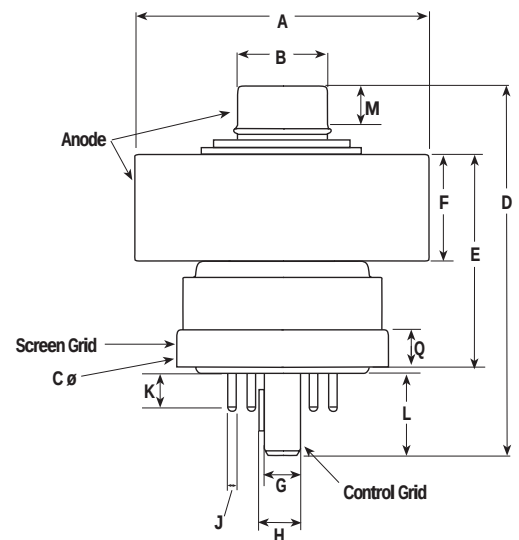
Electrical

Heater	Min.	Nom.	Max.	
Voltage (AC or DC)	6.0	6.3	6.6	V
Current	2.95	3.15	3.335	A
Cathode	Oxide-coated, unipotential			
Cathode-to-heater potential, max.			±100	V
Transconductance ($I_b = 400$ mA, $E_b = -1000$ V $V_1 E_{c2} = 325$ V)			26,000	μmhos
Amplification factor, grid-to-screen			6.5	
Direct interelectrode capacitances, max.				
Grounded cathode				
Input			24	pF
Output			7	pF
Feedback			0.008	pF
Maximum frequency for full ratings			500	MHz

Mechanical

Operating position	Any
Recommended socket	Svetlana SK2A or Eimac/Johnson SK-600 series
Plate connector	Svetlana AC-1
Maximum dimensions	
Height	67 mm (2.6 in.)
Diameter	51 mm (2.0 in.)
Maximum operating temperatures	
Ceramic-to-metal seals	250°C
Anode core	250°C
Cooling	Forced air
Maximum net weight	220 g (0.5 lb.)

Svetlana Outline drawing



Dimensional Data						
Dim	Millimeters			Inches		
	Min	Max	Nom	Min	Max	Nom
A	50.4	51.6	-	1.984	2.031	-
B	13.7	14.3	-	0.539	0.563	-
C	35.5	36.5	-	1.398	1.437	-
D	-	67.0	-	-	2.638	-
E	37.5	40.5	-	1.476	1.594	-
F	18.7	19.3	-	0.736	0.760	-
G	6.48	6.73	-	0.255	0.265	-
H	7.63	7.97	-	0.300	0.314	-
J	1.17	1.3	-	0.046	0.051	-
K	4.5	-	-	0.177	-	-
L	13.4	14.4	-	0.528	0.567	-
M	5.0	-	-	0.197	-	-
N	-	-	17.5	-	-	0.688
P	1.8	2.1	-	0.071	0.083	-
Q	3	-	-	0.118	-	-



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Svetlana 4CX400A

Radial Beam Power Tetrode



Radio Frequency Linear Amplifier Class-AB SSB operation

Maximum Ratings	CCS	ICAS	
DC plate voltage	2500	2500	V
DC screen voltage	325	400	V
DC grid voltage	-60	-60	V
DC plate current	350	410	mA
Plate dissipation	400	400	W
Screen dissipation	8	8	W
Grid dissipation	2	2	W

Typical Operation

(Peak-envelope conditions except where noted, grid driven)

DC plate voltage	2200	2500	V
DC screen voltage	325	400	V
DC grid voltage*	-30.5	-38	V
Zero-signal DC plate current	100	160	mA
Single tone DC plate current	270	400	mA
Single tone DC screen current	24	20	mA
Single tone DC grid current	0	0-2	mA
Peak rf grid voltage	30	-	V
Plate output power	405	610	W
Resonant load impedance	4800	3500	Ohms
Efficiency	68	61	%
Intermodulation distortion:			
3rd order***	-32	-30	dB
5th order***	-44	-42	dB

* Adjust to specified zero-signal dc plate current ** Approximate values

***Intermodulation distortion measured reference to one of two equal tones

Electrical Operation

Plate Operation The maximum rated plate dissipation of the Svetlana 4CX400A is 400 Watts. The tube and associated circuits should be protected in the event of an internal arc by including a series current limiting resistance in the DC lead from the power supply to the plate. Its value must be 25 Ohms or more. The resistor should be capable of withstanding the high surge current caused by an arc. It should not be used as a fuse.

Screen-Grid Operation The maximum rated power dissipation for the screen grid is 8 Watts. The screen grid current may

reverse under certain conditions. This is a normal characteristic of most tetrodes. The screen power supply should be designed with this characteristic in mind, so that the correct operating voltage will be maintained. A current path from screen to cathode should be provided by a bleeder resistor or shunt regulator connected between screen and cathode and arranged to pass approximately 15 milliamperes per connected screen.

Cathode Operation The cathode is internally connected to the four even-numbered base pins, and all four of the corresponding socket terminals should be used to make connection to the external circuits. At radio frequencies, it is impor-

tant to keep the cathode leads short and direct and to use conductors with large areas to minimize the inductive reactances in series with the cathode leads.

Svetlana recommends that rated heater voltage be applied for a minimum of 30 seconds before other operating voltages are applied.

Where the circuit design requires the cathode and heater to be operated at different potentials, the rated maximum heater-to-cathode voltage is 100 Volts regardless of polarity.

Tube Ratings The ICAS (Intermittant Commercial and Amateur Service) ratings are for those less stringent applications in which higher power than maximum

Svetlana 4CX400A Radial Beam Power Tetrode



ratings is desired and the service is not continuous. The 4CX400A may be operated in this manner (SSB Voice application and 50% duty CW conditions) as shown in the operating data.

Linear Operation The 4CX400A may be operated in the grid driven configuration. If the input circuit consists of a DC blocked 50 ohm non-inductive resistor from grid to ground, the amplifier will be fully stable without neutralization. The 50 ohm resistor also provides an excellent termination for the exciter. Input VSWR can be improved at 30 MHz by adding a small inductor in series with the resistor. The VSWR will continue to be flat over the HF spectrum below 30 MHz, when the inductor is added.

Most of the drive power will be dissipated in the resistor. The drive power will be essentially the same for one, two or three tubes in parallel.

Improved intermodulation performance and lower zero signal power dissipation can be achieved by introducing a 27 ohm noninductive 6 Watt resistor into the cathode return of each tube. Somewhat more drive power is required (total is substantially less than 100 watts) but the reduction in zero signal resting current to 100 mA per tube and the improved 3rd order and 5th order products are worthwhile.

Mechanical Application

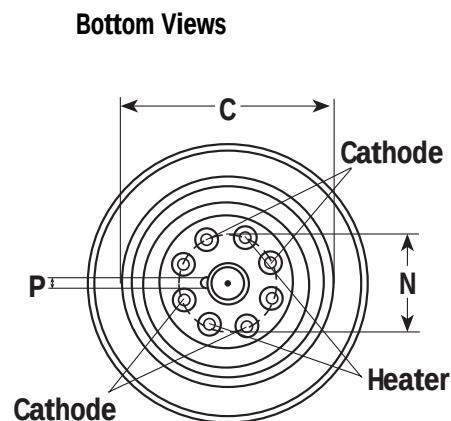
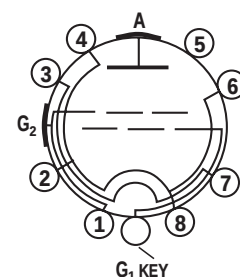
Mounting The 4CX400A may be operated in any position. A Svetlana SK2A or an Eimac/Johnson Air-System Socket, SK-600 series, or a socket designed for the 4CX250 series and having equivalent characteristics, is recommended. The Svetlana SK2A does not include a screen bypass capacitor.

Cooling The 4CX400A has a high-efficiency anode cooler. Sufficient

cooling must be provided for the anode, base seals and body seals to maintain operating temperatures below the rated maximum values. Air requirements to maintain seal temperatures at 225°C in 50°C ambient air are shown in the Minimum Cooling Air-Flow Requirements table. Sufficient flow must be provided through the socket/base area by submounting the SK2A.

Shock and Vibration The Svetlana 4CX400A is designed for the shock and vibration encountered in military applications.

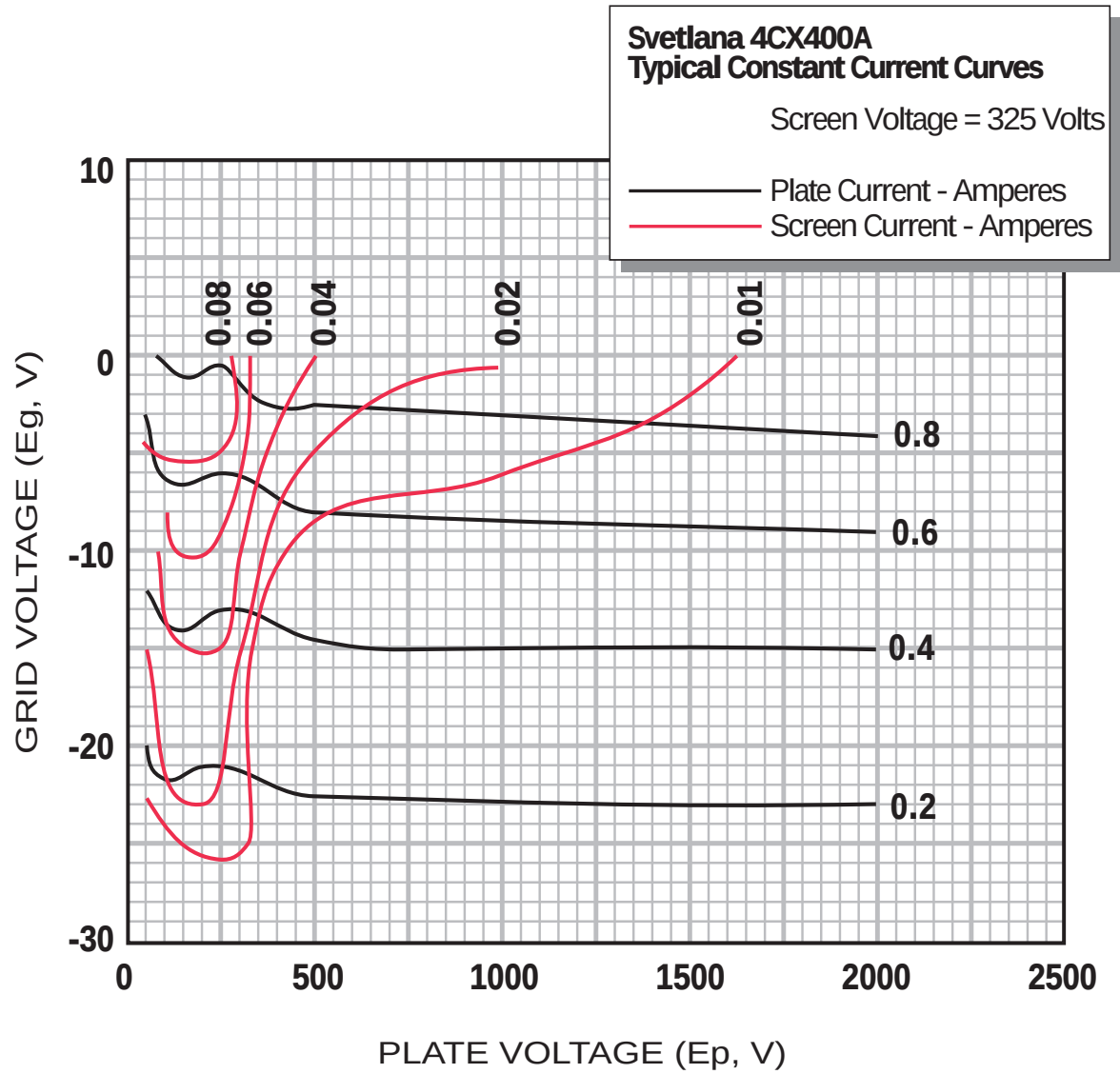
Minimum Cooling Air-Flow Requirements				
Plate dissipation (Watts)	Sea Level		10,000 feet	
	Air flow (CFM)	Pressure drop (Inches of water)	Air Flow (CFM)	Pressure drop (Inches of water)
200	5.0	0.10	7.5	0.15
300	6.0	0.15	8.7	0.22
400	8.0	0.20	11.5	0.03



- 1 Screen Grid
- 2,4,6,8 Cathode
- 3,7 Heater
- 5 Internal Connection

Svetlana 4CX400A

Radial Beam Power Tetrode



Svetlana 4CX5000A/8170 Radial Beam Power Tetrode



The Svetlana™ 4CX5000A/8170 is designed for audio and radio frequency applications. It is particularly well-suited for use in VHF FM broadcast transmitters in the Band II 88-108 MHz frequency range. The Svetlana 4CX5000A/8170 has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness and good VHF electrical performance. This modern mesh filament design is superior to the old hairpin design of the 1950's. In some VHF applications, the input circuit may need minor tuning to use the Svetlana 4CX5000A/8170 as a replacement because of the low inductance of the Svetlana mesh filament. No adjustments are required in Audio, MF or HF equipment.

The Svetlana 4CX5000A/8170 is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for the 4CX5000A/8170 manufactured in the United States, England and elsewhere.



Svetlana 4CX5000A/8170

General Characteristics

Electrical

Filament:	Thoriated tungsten mesh
Voltage	$7.5 \pm 0.37V$
Current, at 7.5 Volts	75A
Amplification factor (average):	
Grid to screen	4.5
Direct interelectrode capacitances (grounded filament):	
Cin	122 pF
Cout	23 pF
Cgp	1.0 pF
Direct interelectrode capacitances (grounded grid):	
Cin	58 pF
Cout	23 pF
Cpk	0.16 pF
Maximum frequency for full ratings (CW)	110 MHz

Mechanical

Maximum overall dimensions:	
Length	23.18 cm (9.13 in.)
Diameter	12.54 cm (4.94 in.)
Net weight	4.3 kg (9.5 lb)
Operating position	Axis vertical, base up or down
Maximum operating temperature, ceramic/metal seals or envelope	250° C
Cooling	Forced air
Base	Coaxial, designed for use with SK300 series sockets
Chimney	SK306 or SK356
Anode connector	Svetlana AC-3

Radio Frequency Power Amplifier Class C FM

Absolute maximum ratings

DC plate voltage	7500	V
DC screen voltage	1500	V
DC grid voltage	-500	V
DC plate current	3.0	A
Plate dissipation	5	kW
Screen dissipation	250	W
Grid dissipation	75	W

Typical Operation

(Frequencies to 110 MHz)

DC plate voltage	6500	V
DC screen voltage	750	V
DC grid voltage	-350	V
DC plate current	2.3	A
DC screen current*	0.2	A
DC grid current*	0.05	A
Measured driving power	100	W
Useful output power	10	kW

* Approximate values

Radial Beam Power Tetrode

Plate Modulated RF Power Amplifier, Grid Driven, Class C Telephony - Carrier Conditions

Absolute maximum ratings

DC plate voltage	5500	V
DC screen voltage	1000	V
DC grid voltage	-500	V
DC plate current	2.5	A
Plate dissipation	3.5	kW
Screen dissipation	250	W
Grid dissipation	75	W

Typical Operation

DC plate voltage	5000	V
DC screen voltage	500	V
Peak AF screen voltage (100% mod.)	450	V
DC grid bias voltage	-400	V
DC plate current	1.4	A
DC screen current*	0.26	A
DC grid current*	0.05	A
Peak rf grid voltage*	520	V
Grid driving power (calculated)	25	W
Plate dissipation	1100	W
Plate output power	5800	W

Audio Frequency Power Amplifier or Modulator, Grid Driven, Class AB₁

Absolute maximum ratings

DC plate voltage	7500	V
DC screen voltage	1500	V
DC plate current	4.0	A
Plate dissipation	6000	W
Screen dissipation	250	W
Grid dissipation	75	W

Typical Operation (two tubes, sinusoidal waveform)

DC plate voltage	5000	7000	V
DC screen voltage	1250	1250	V
DC grid voltage**	-280	-325	V
Zero-signal plate current	1.0	0.70	A
Maximum signal plate current	4.40	3.65	A
Maximum signal screen current*	0.33	0.24	A
Peak AF grid voltage	240	235	V
Driving power	0	0	W
Load resistance plate-to-plate	2370	4100	Ohms
Maximum signal plate dissipation	4200	4200	W
Plate output power	13.5	17.5	kW

* Approximate values ** Adjust for specified zero-signal plate current

Svetlana 4CX5000A/8170

RF Linear Amplifier, Grid Driven, Class- AB₁

Absolute Maximum Ratings

DC plate voltage	7500	V
DC screen voltage	1600	V
DC plate current	4.0	A
Plate dissipation	6000	W
Screen dissipation	250	W
Grid dissipation	75	W

Typical Operation (Frequencies to 110 MHz)

DC plate voltage	7500	V
DC screen voltage	1250	V
DC grid voltage**	-300	V
Zero-signal DC plate current	0.5	A
Single-tone DC plate current	1.90	A
Single-tone DC screen current*	0.20	A
Peak RF grid voltage*	300	V
Plate dissipation	4200	W
Single-tone plate output power	10	kW

* Approximate values ** Adjust for specified zero-signal plate current

Electrical Application

Plate operation The rated maximum plate dissipation of the tube for class AB applications is 6 kilowatts. This power may be safely sustained with adequate air cooling. The tube must be protected from damage which may be caused by an internal arc occurring at high plate voltage. A protective resistance should always be connected in series with each tube anode to help absorb power-supply stored energy if an internal arc should occur.

Control-grid operation The maximum control grid dissipation is 75 Watts, determined (approximately) by the product of the dc grid current and the peak positive grid voltage.

Screen-grid operation The maximum screen grid dissipation is 250 Watts. With no ac applied to the screen grid, dissipation is the product of dc screen voltage and the dc screen current. Plate voltage, plate loading or bias voltage must never be removed while filament

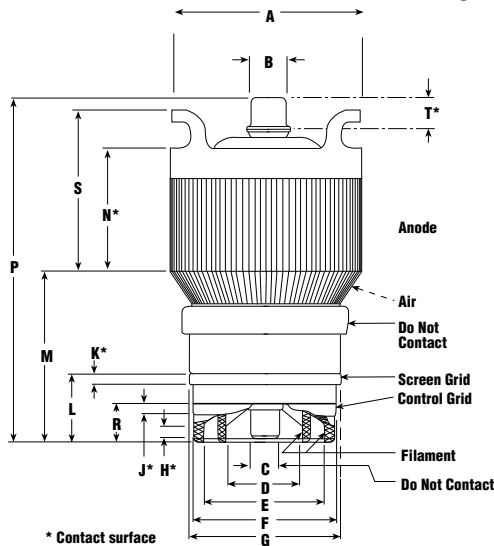
and screen voltages are present.

Filament operation Svetlana recommends that a new tube, or a tube which has been in storage for some period of time, be operated with only filament voltage applied for a period of from 30 to 60 minutes before full operation begins. Once normal operation has been established, a minimum filament warm-up time of four to five seconds is sufficient for full filament emission. Filament voltage should be measured at the socket.

At rated nominal filament voltage, the peak emission capability of the tube is many times that needed for communication service. A reduction in filament voltage will lower the filament temperature, and this reduction will substantially increase life expectancy. The correct value of filament voltage should be determined for the particular application. Svetlana recommends that the tube be operated at full nominal voltage for an initial stabilization period of 100 to 200 hours before any action is taken to operate at reduced voltage. The voltage should gradually be reduced until there is a slight degradation in performance—such as power output or distortion. The voltage should then be increased a few tenths of a Volt above the value where performance degradation was first noted. The operating point should be rechecked after 24 hours.

Radial Beam Power Tetrode

Svetlana 4CX5000A/8170 Outline Drawing



Mechanical Application

Mounting The Svetlana 4CX5000A/8170 must be mounted vertically, base up or down. The tube should be protected from vibration and shock.

Storage If the 4CX5000A/8170 is to be stored as a spare, it should be kept in its original packaging to minimize the possibility of handling damage.

Cooling The 4CX5000A/8170 requires forced-air cooling in all applications. The tube socket should be mounted in a pressurized compartment so that the cooling air passes through the socket and is guided to the anode cooling fins by an air chimney. If cooling air is not passed around the base of the tube and through the socket, arrangements must be made to assure adequate cooling of the tube base and socket contacts.

Adequate movement of cooling air around the base of the tube keeps the tube base and the socket contact fingers at safe operating temperatures.

Although the maximum temperature rating for seals and the anode core is 250° C, good engineering practice requires that a safety factor be allowed. The table shows cooling parameters with the cooling air at 50° C and maximum tube anode temperature of 200° C. The figures are for the tube with air passing in a base-to-anode direction. Pressure drop values shown are approximate and are for the tube/socket/chimney combination.

Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	122.22	125.43	4.812	4.938
B	21.72	22.73	0.855	0.895
C	18.29	19.30	0.720	0.760
D	48.16	49.17	1.896	1.936
E	79.58	80.59	3.133	3.173
F	96.32	97.33	3.792	3.832
G	101.09	102.11	3.980	4.020
H	4.78	—	0.188	—
J	4.78	—	0.188	—
K	4.78	—	0.188	—
L	44.81	46.38	1.764	1.826
M	106.38	115.90	4.188	4.563
N	73.03	82.55	2.875	3.250
P	219.08	231.78	8.625	9.125
R	25.04	26.67	0.986	1.050
S	98.43	107.95	3.875	4.250
T	9.53	—	0.375	—

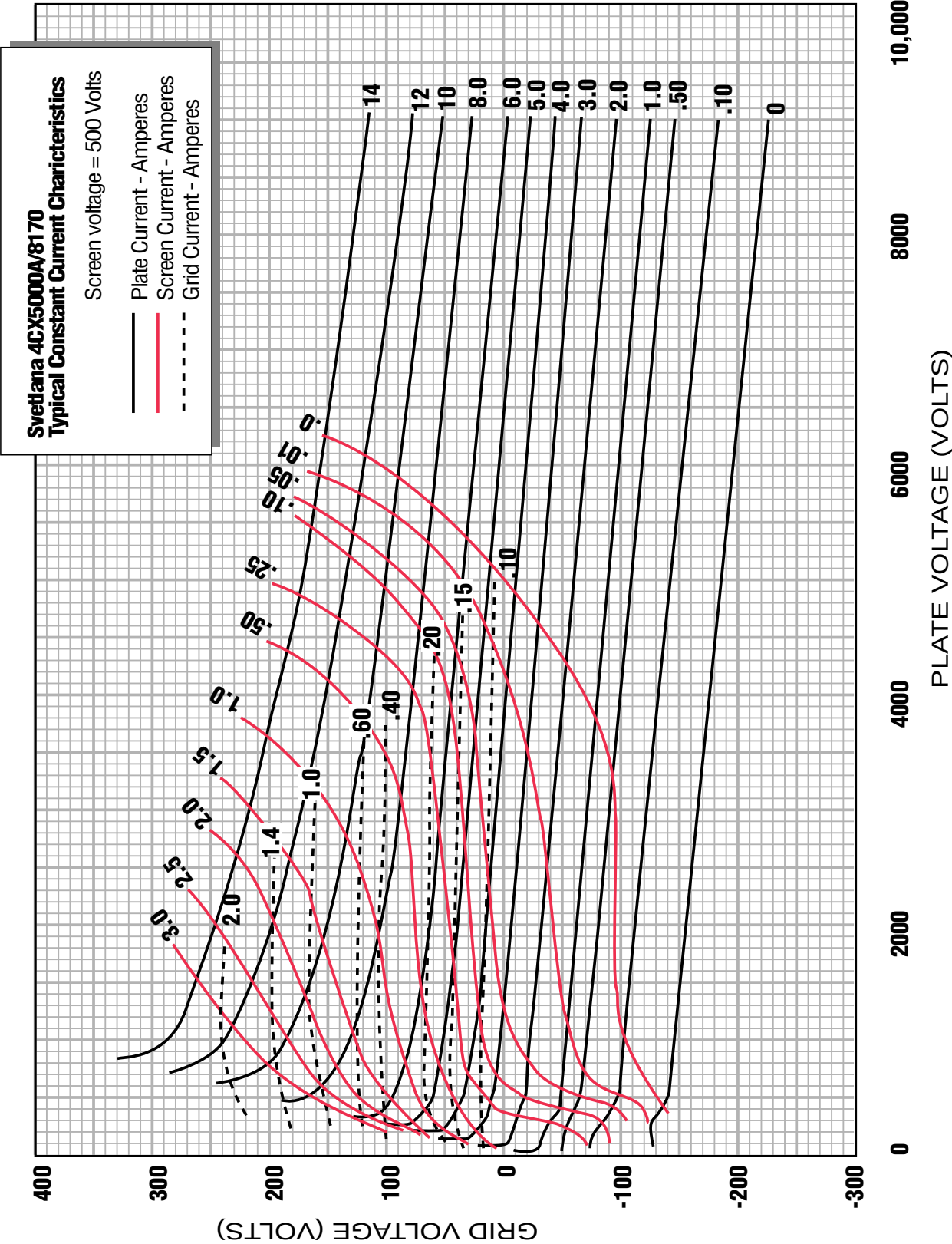
Minimum Cooling Air-Flow Requirements

Sea Level		
Plate dissipation (Watts)	Air flow (CFM)	Pressure drop (Inches of water)
2000	75	0.4
4000	145	1.1
6000	230	2.0

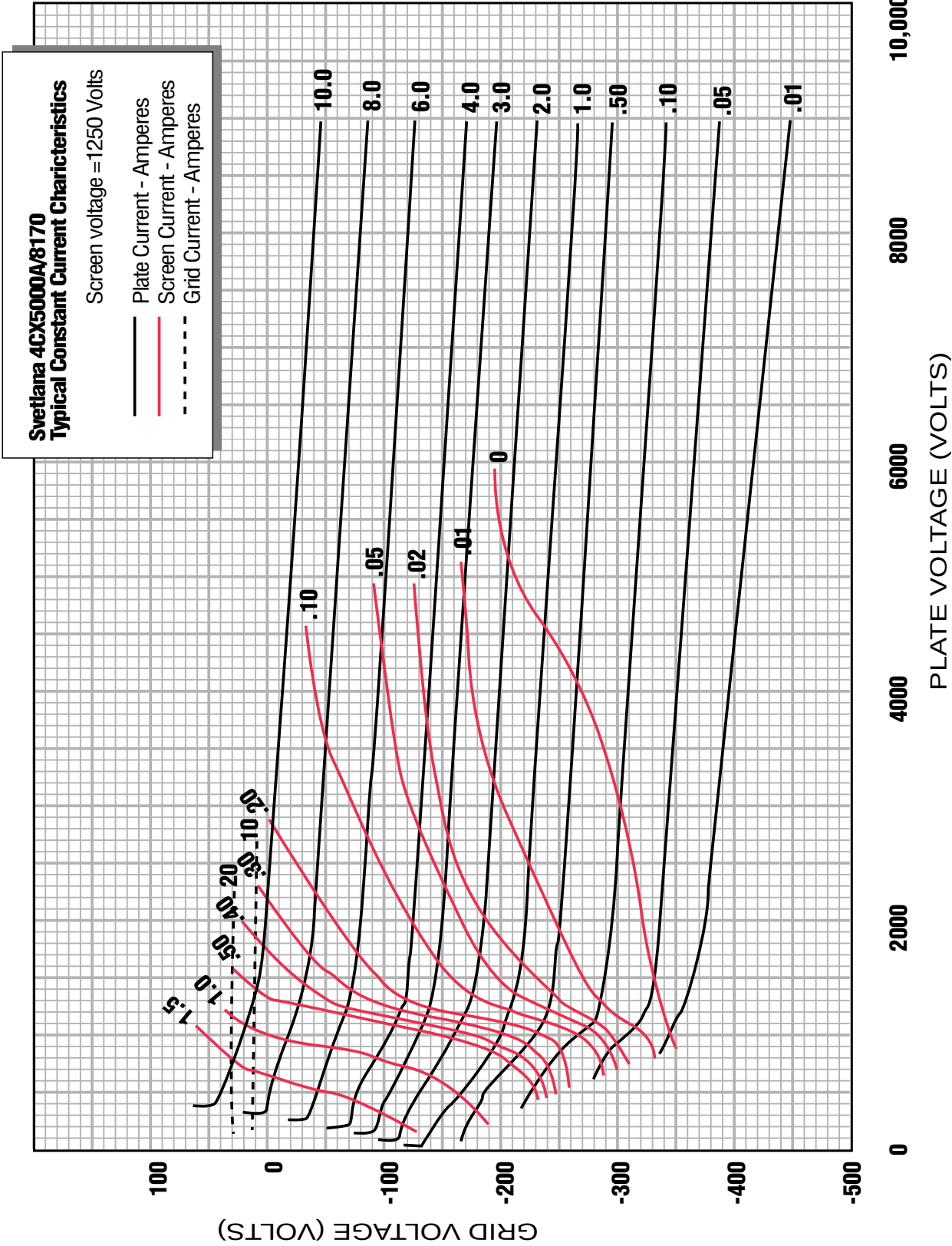
At altitudes significantly above sea level, the flow rate must be increased for equivalent cooling. At 5,000 feet above sea level, both the flow rate and the pressure drop should be increased by a factor of 1.20, while at 10,000 feet both flow rate and pressure drop must be increased by 1.46.

Special applications If the user needs to operate this tube under conditions widely different from those given in this publication, contact any location of Svetlana Electron Devices for technical assistance.

Svetlana 4CX5000A/8170



Radial Beam Power Tetrode



Svetlana 4CX5000R/8170W Radial Beam Power Tetrode



The Svetlana™ 4CX5000R/8170W is designed for audio and radio frequency applications. The Svetlana 4CX5000R/8170W has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness to withstand the shock and vibration encountered in military applications.

The Svetlana 4CX5000R/8170W is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for the 4CX5000R/8170W manufactured in the United States.



Svetlana 4CX5000R/8170W

General Characteristics

Electrical

Filament:	Thoriated tungsten mesh
Voltage	$7.5 \pm 0.37V$
Current, at 7.5 Volts	75A
Amplification factor (average):	
Grid to screen	4.5
Direct interelectrode capacitances (grounded filament):	
Cin	122 pF
Cout	23 pF
Cgp	1.0 pF
Direct interelectrode capacitances (grounded grid):	
Cin	58 pF
Cout	23 pF
Cpk	0.16 pF
Maximum frequency for full ratings (CW)	110 MHz

Mechanical

Maximum overall dimensions:	
Length	23.18 cm (9.13 in.)
Diameter	12.54 cm (4.94 in.)
Net weight	4.3 kg (9.5 lb)
Operating position	Axis vertical, base up or down
Maximum operating temperature, ceramic/metal seals or envelope	250° C
Cooling	Forced air
Base	Coaxial, designed for use with SK300 series sockets
Chimney	SK306 or SK356

Radio Frequency Power Amplifier Class C FM

Absolute maximum ratings

DC plate voltage	7500V
DC screen voltage	1500 V
DC grid voltage	-500 V
DC plate current	3.0 A
Plate dissipation	5 kW
Screen dissipation	250 W
Grid dissipation	75 W

Typical Operation

(Frequencies to 110 MHz)	
DC plate voltage	6500 V
DC screen voltage	750 V
DC grid voltage	-350 V
DC plate current	2.3 A
DC screen current*	0.2 A
DC grid current*	0.05 A
Measured driving power	100 W
Useful output power	10 kW

* Approximate values

Radial Beam Power Tetrode

Plate Modulated RF Power Amplifier, Grid Driven, Class C Telephony

Carrier Conditions

Absolute maximum ratings

DC plate voltage	5500 V
DC screen voltage	1000 V
DC grid voltage	-500 V
DC plate current	2.5 A
Plate dissipation	3.5 kW
Screen dissipation	250 W
Grid dissipation	75 W

Typical Operation

DC plate voltage	5000 V
DC screen voltage	500 V
Peak AF screen voltage (100% mod.)	450 V
DC grid bias voltage	-400 V
DC plate current	1.4 A
DC screen current*	0.26 A
DC grid current*	0.05 A
Peak rf grid voltage*	520 V
Grid driving power (calculated)	25 W
Plate dissipation	1100 W
Plate output power	5800 W

Audio Frequency Power Amplifier or Modulator, Grid Driven, Class AB₁

Absolute maximum ratings

DC plate voltage	7500 V
DC screen voltage	1500 V
DC plate current	4.0 A
Plate dissipation	6000 W
Screen dissipation	250 W
Grid dissipation	75 W

Typical Operation (two tubes, sinusoidal waveform)

DC plate voltage	5000	7000 V
DC screen voltage	1250	1250 V
DC grid voltage**	-280	-325 V
Zero-signal plate current	1.0	0.70 A
Maximum signal plate current	4.40	3.65 A
Maximum signal screen current*	0.33	0.24 A
Peak AF grid voltage	240	235 V
Driving power	0	0 W
Load resistance plate-to-plate	2370	4100 Ohms
Maximum signal plate dissipation	4200	4200 W
Plate output power	13.5	17.5 kW

* Approximate values ** Adjust for specified zero-signal plate current

Svetlana 4CX5000R/8170W

RF Linear Amplifier, Grid Driven, Class- AB₁

Absolute Maximum Ratings

DC plate voltage	7500 V
DC screen voltage	1600 V
DC plate current	4.0 A
Plate dissipation	6000 W
Screen dissipation	250 W
Grid dissipation	75 W

Typical Operation (Frequencies to 110 MHz)

DC plate voltage	7500 V
DC screen voltage	1250 V
DC grid voltage**	-300 V
Zero-signal DC plate current	0.5 A
Single-tone DC plate current	1.90 A
Single-tone DC screen current*	0.20 A
Peak RF grid voltage*	300 V
Plate dissipation	4200 W
Single-tone plate output power	10 kW

* Approximate values ** Adjust for specified zero-signal plate current

Electrical Application

Plate operation The rated maximum plate dissipation of the tube is 6 kilowatts for Class AB and Class B applications. This power may be safely sustained with adequate air cooling. The tube must be protected from damage which may be caused by an internal arc occurring at high plate voltage. A protective resistance should always be connected in series with each tube anode to help absorb power-supply stored energy if an internal arc should occur.

Control-grid operation The maximum control grid dissipation is 75 Watts, determined (approximately) by the product of the dc grid current and the peak positive grid voltage.

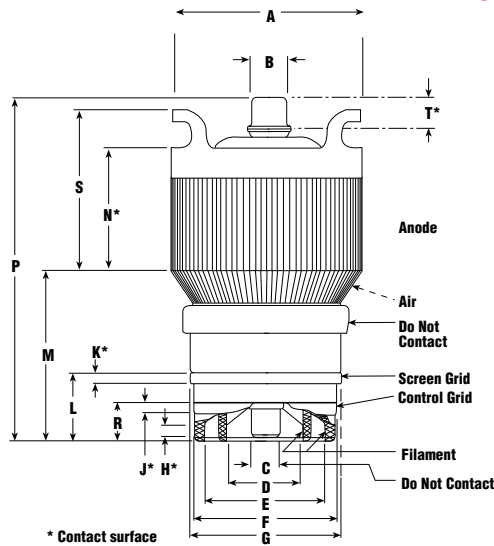
Screen-grid operation The maximum screen grid dissipation is 250 Watts. With no ac applied to the screen grid, dissipation is the product of dc screen voltage and the dc screen current. Plate voltage, plate loading or bias voltage must never be removed while filament and screen voltages are present.

Filament operation Svetlana recommends that a new tube, or a tube which has been in storage for some period of time, be operated with only filament voltage applied for a period of from 30 to 60 minutes before full operation begins. Once normal operation has been established, a minimum filament warm-up time of four to five seconds is sufficient for full filament emission. Filament voltage should be measured at the socket.

At rated nominal filament voltage, the peak emission capability of the tube is many times that needed for communication service. A reduction in filament voltage will lower the filament temperature, and this reduction will substantially increase life expectancy. The correct value of filament voltage should be determined for the particular application. Svetlana recommends that the tube be operated at full nominal voltage for an initial stabilization period of 100 to 200 hours before any action is taken to operate at reduced voltage. The voltage should gradually be reduced until there is a slight degradation in performance—such as power output or distortion. The voltage should then be increased a few tenths of a Volt above the value where performance degradation was first noted. The operating point should be rechecked after 24 hours.

Radial Beam Power Tetrode

Svetlana 4CX5000R/8170W Outline Drawing



Mechanical Application

Mounting The Svetlana 4CX5000R/8170W must be mounted vertically, base up or down. The tube is rated for shock and vibration as encountered in military applications.

Storage If the 4CX5000R/8170W is to be stored as a spare, it should be kept in its original packaging to minimize the possibility of handling damage.

Cooling The 4CX5000R/8170W requires forced-air cooling in all applications. The tube socket should be mounted in a pressurized compartment so that the cooling air passes through the socket and is guided to the anode cooling fins by an air chimney. If cooling air is not passed around the base of the tube and through the socket, arrangements must be made to assure adequate cooling of the tube base and socket contacts.

Adequate movement of cooling air around the base of the tube keeps the tube base and the socket contact fingers at safe operating temperatures.

Although the maximum temperature rating for seals and the anode core is 250° C, good engineering practice requires that a safety factor be allowed. The table shows cooling parameters with the cooling air at 50° C and maximum tube anode temperature of 200° C. The figures are for the tube with air passing in a base-to-anode direction. Pressure drop values shown are approximate and are for the tube/socket/chimney combination.

Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	122.22	125.43	4.812	4.938
B	21.72	22.73	0.855	0.895
C	18.29	19.30	0.720	0.760
D	48.16	49.17	1.896	1.936
E	79.58	80.59	3.133	3.173
F	96.32	97.33	3.792	3.832
G	101.09	102.11	3.980	4.020
H	4.78	—	0.188	—
J	4.78	—	0.188	—
K	4.78	—	0.188	—
L	44.81	46.38	1.764	1.826
M	106.38	115.90	4.188	4.563
N	73.03	82.55	2.875	3.250
P	219.08	231.78	8.625	9.125
R	25.04	26.67	0.986	1.050
S	98.43	107.95	3.875	4.250
T	9.53	—	0.375	—

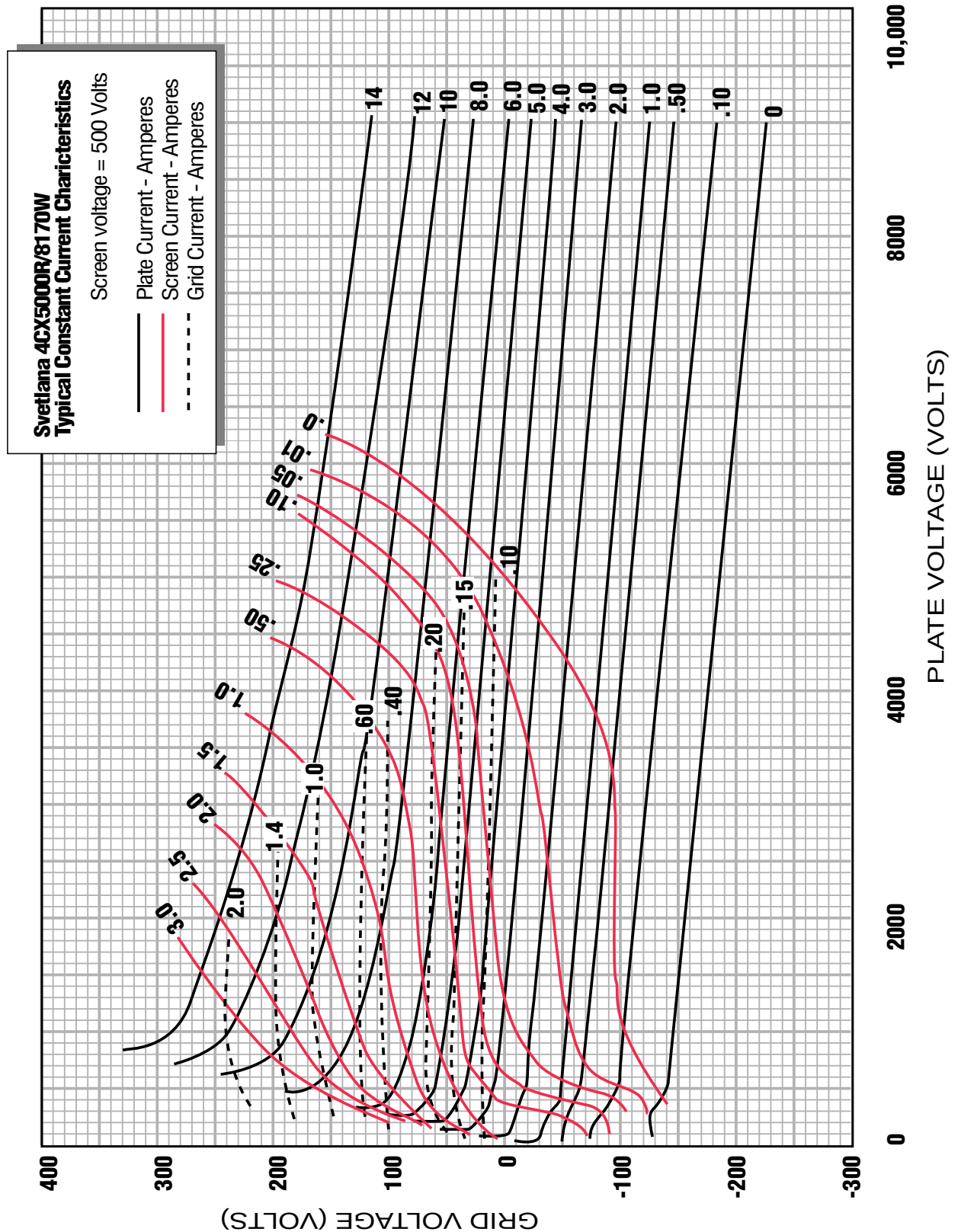
Minimum Cooling Air-Flow Requirements

Sea Level		
Plate dissipation (Watts)	Air flow (CFM)	Pressure drop (Inches of water)
2000	75	0.4
4000	145	1.1
6000	230	2.0

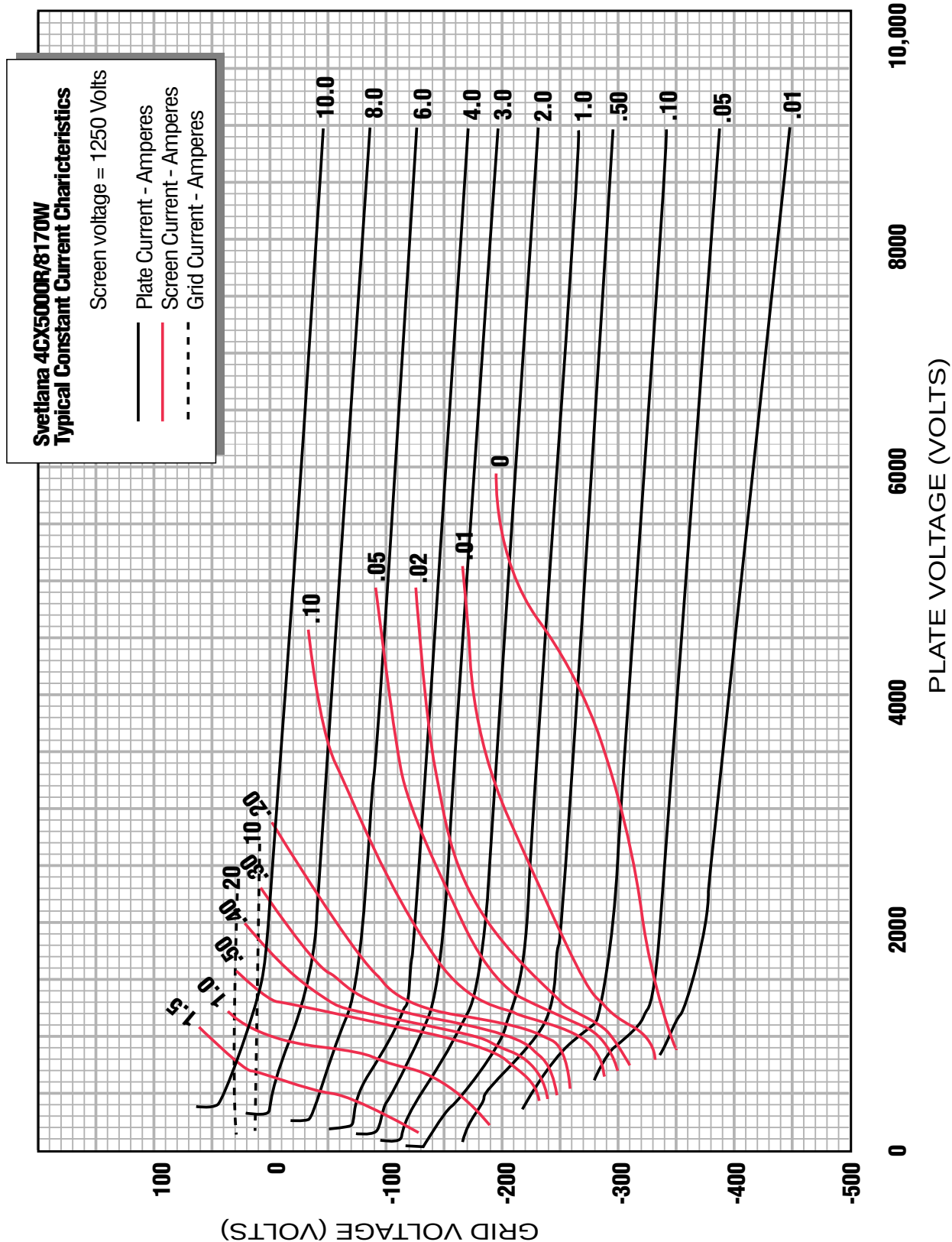
At altitudes significantly above sea level, the flow rate must be increased for equivalent cooling. At 5,000 feet above sea level, both the flow rate and the pressure drop should be increased by a factor of 1.20, while at 10,000 feet both flow rate and pressure drop must be increased by 1.46.

Special applications If the user needs to operate this tube under conditions widely different from those given in this publication, contact any location of Svetlana Electron Devices for technical assistance.

Svetlana 4CX5000R/8170W



Radial Beam Power Tetrode



Svetlana 4CX7500A Radial Beam Power Tetrode



The Svetlana™ 4CX7500A is designed for audio and radio frequency applications. The Svetlana 4CX7500A has a directly-heated thoriated tungsten mesh filament for mechanical ruggedness, good VHF electrical performance and high RF efficiency.

The Svetlana 4CX7500A is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be directly interchangeable with the 4CX7500A manufactured in the United States.



Svetlana 4CX7500A

General Characteristics

Electrical

Filament:	Thoriated tungsten mesh
Voltage	7.0 ± 0.35V
Current, at 7.0 Volts	110 A
Amplification factor (average):	
Grid to screen	4.5
Direct interelectrode capacitances (grounded cathode):	
Cin	145 pF
Cout	20 pF
Cgp	0.5 pF
Direct interelectrode capacitances (grids grounded):	
Cin	74.1 pF
Cout	20.6 pF
Cpk	0.065 pF
Maximum frequency for full ratings (CW)	220 MHz

Mechanical

Maximum overall dimensions:	
Length	246.9 mm (9.72 in.)
Diameter	143.8 mm (5.66 in.)
Net weight*	3.5 kg (7.7 lb)
Operating position	Axis vertical, base up or down
Maximum operating temperature, ceramic/metal seals or envelope	250° C
Cooling	Forced air
Base	Coaxial, designed for use with SK340 (HF) or SK350 (VHF) sockets
Recommended chimney	For SK340 or SK350 use SK346 (VHF)
Anode connector	Svetlana AC-3

Radio Frequency Power Amplifier Class C FM or Telegraphy

Absolute maximum ratings

DC plate voltage	7500	V
DC screen voltage	1500	V
DC grid voltage	-500	V
DC plate current	3.0	A
Plate dissipation	7500	W
Screen dissipation	165	W
Grid dissipation	50	W

Typical Operation

(Frequencies to 110 MHz)

DC plate voltage	6500	6500	6500	V
DC screen voltage	635	750	750	V
DC grid voltage	-460	-275	-400	V
DC plate current	2.1	2.2	2.4	A
DC screen current*	195	128	140	mA
DC grid current*	185	90	95	mA
Driving power	247	100	130	W
Efficiency	79	77	77	%
Useful output power	10,800	11,100	12,100	W

* Approximate values

Notes: Capacitance values are for a cold tube as measured in a special shielded fixture.

Radial Beam Power Tetrode

Radio Frequency Linear Amplifier, Class AB1

Maximum:

DC plate voltage	7500	V
DC screen voltage	1500	V
DC grid voltage	-500	V
DC plate current	3.0	A
Plate dissipation	7500	W
Screen dissipation	165	W
Grid dissipation	50	W

Typical Operation, Peak Envelope or Modulation Peak Conditions (frequencies below 30 MHz)

Plate voltage	7500	VVdc
Zero signal plate current	750	mAdc
Max. signal plate current	2.2	Adc
Screen voltage	1250	Vdc
Screen current*	95	mAdc
Grid bias voltage**	-190	Vdc
Grid current*	0	mAdc
Useful power out***	10	kW
Driving power*	0	W
Intermodulation Distortion Products****		
3rd Order products	-32	dB
5th Order products	-44	dB

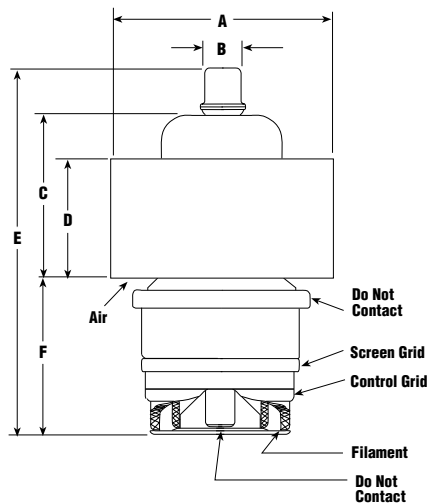
* Approximate values ** Adjust to specified zero-signal plate current

*** PEP output or rf power at crest of modulation envelope delivered to load

**** Referenced against one tone of a two equal tone signal

Svetlana 4CX7500A

Svetlana 4CX7500A Outline Drawing



Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	140.7	143.8	5.54	5.66
B	21.7	22.7	0.854	0.894
C	117.7	140.0	4.63	5.51
D	71.4	81.0	2.81	3.19
E	215.1	246.9	8.47	9.72
F	97.4	106.9	3.84	4.21

Electrical Application

Plate operation The rated maximum plate dissipation of the 4CX7500A is 7500 Watts. This power may be safely sustained with adequate air cooling. The tube must be protected from damage which may be caused by an internal arc occurring at high plate voltage. A protective resistance should always be connected in series with each tube anode to help absorb power-supply stored energy if an internal arc should occur.

Control-grid operation The maximum control grid dissipation is 50 Watts, determined (approximately) by the product of the dc grid current and the peak positive grid voltage.

Screen-grid operation The maximum screen grid dissipation is 165 Watts. With no ac applied to the screen grid, dissipation is the product of dc screen voltage and the dc screen current. Plate voltage, plate loading or bias voltage must never be removed while filament and screen voltages are present.

The screen current may reverse under certain conditions and produce negative indications on the screen current meter. This is a normal characteristic of most tetrodes. The screen power supply should be designed with this characteristic in mind, so that the correct operating voltage will be maintained on the screen under all conditions. A current path from the screen to cathode must be provided by a bleeder resistor or a shunt regulator connected between screen and cathode and arranged to pass approximately 10%

of the average screen current per connected tube. A series regulated power supply can be used only when an adequate bleeder resistor is provided.

Filament operation Svetlana recommends that a new tube, or a tube which has been in storage for some period of time, be operated with only filament voltage applied for a period of from 30 to 60 minutes before full operation begins. Once normal operation has been established, a minimum filament warm-up time of four to five seconds is sufficient for full filament emission. Filament voltage should be measured at the socket.

At rated nominal filament voltage, the peak emission capability of the tube is many times that needed for communication service. A reduction in filament voltage will lower the filament temperature, and this reduction will substantially increase life expectancy. The correct value of filament voltage should be determined for the particular applications. Svetlana recommends that the tube be operated at full nominal voltage for an initial stabilization period of 100 to 200 hours before any action is taken to operate at reduced voltage. The voltage should gradually be reduced until there is a slight degradation in performance—such as power output or distortion. The voltage should then be increased a few tenths of a Volt above the value where performance degradation was first noted. The operating point should be rechecked after 24 hours.

Radial Beam Power Tetrode

Mechanical Application

Mounting The Svetlana 4CX7500A must be mounted vertically, base up or down. The tube should be protected from vibration and shock.

Storage If the 4CX7500A is to be stored as a spare, it should be kept in its original packaging to minimize the possibility of handling damage.

Cooling The 4CX7500A requires forced-air cooling in all applications. The tube socket should be mounted in a pressurized compartment so that the cooling air passes through the socket and is guided to the anode cooling fins by an air chimney. If cooling air is not passed around the base of the tube and through the socket, arrangements must be made to assure adequate cooling of the tube base and socket contacts. An air interlock system should be provided to remove all voltages, including filament voltage, from the tube for partial or full failure of the air system.

Adequate movement of cooling air around the base of the tube keeps the tube base and the socket contact fingers at safe operating temperatures.

Although the maximum temperature rating for seals and the anode core is 250° C, good engineering practice requires that a safety factor be allowed. The table shows cooling parameters with the cooling air at 50° C and maximum tube anode temperature of 225° C. The figures are for the tube with air passing in a base-to-anode direction. Pressure drop values shown are approximate and are for the appropriate tube/socket/chimney combination.

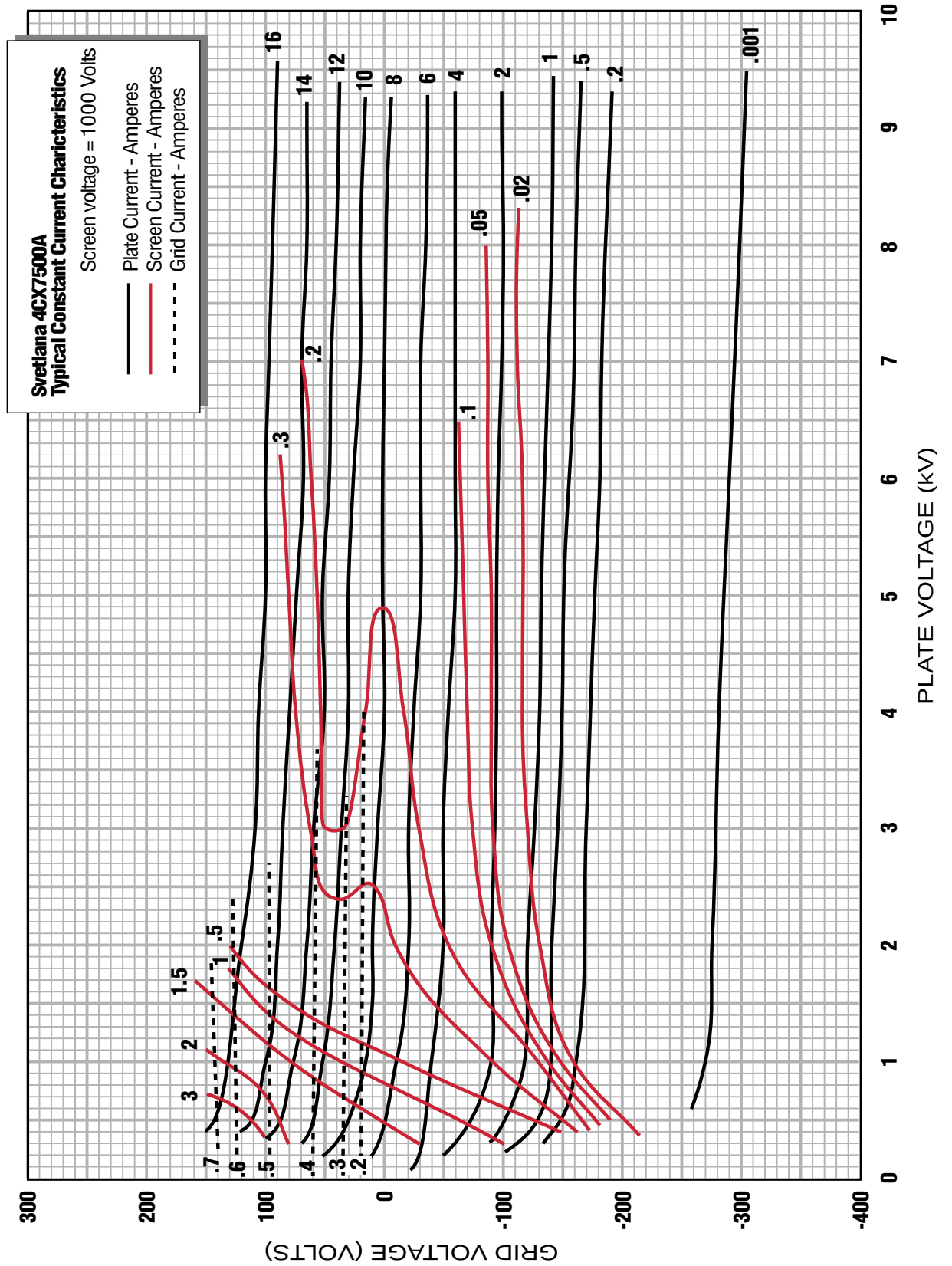
Minimum Cooling Air-Flow Requirements

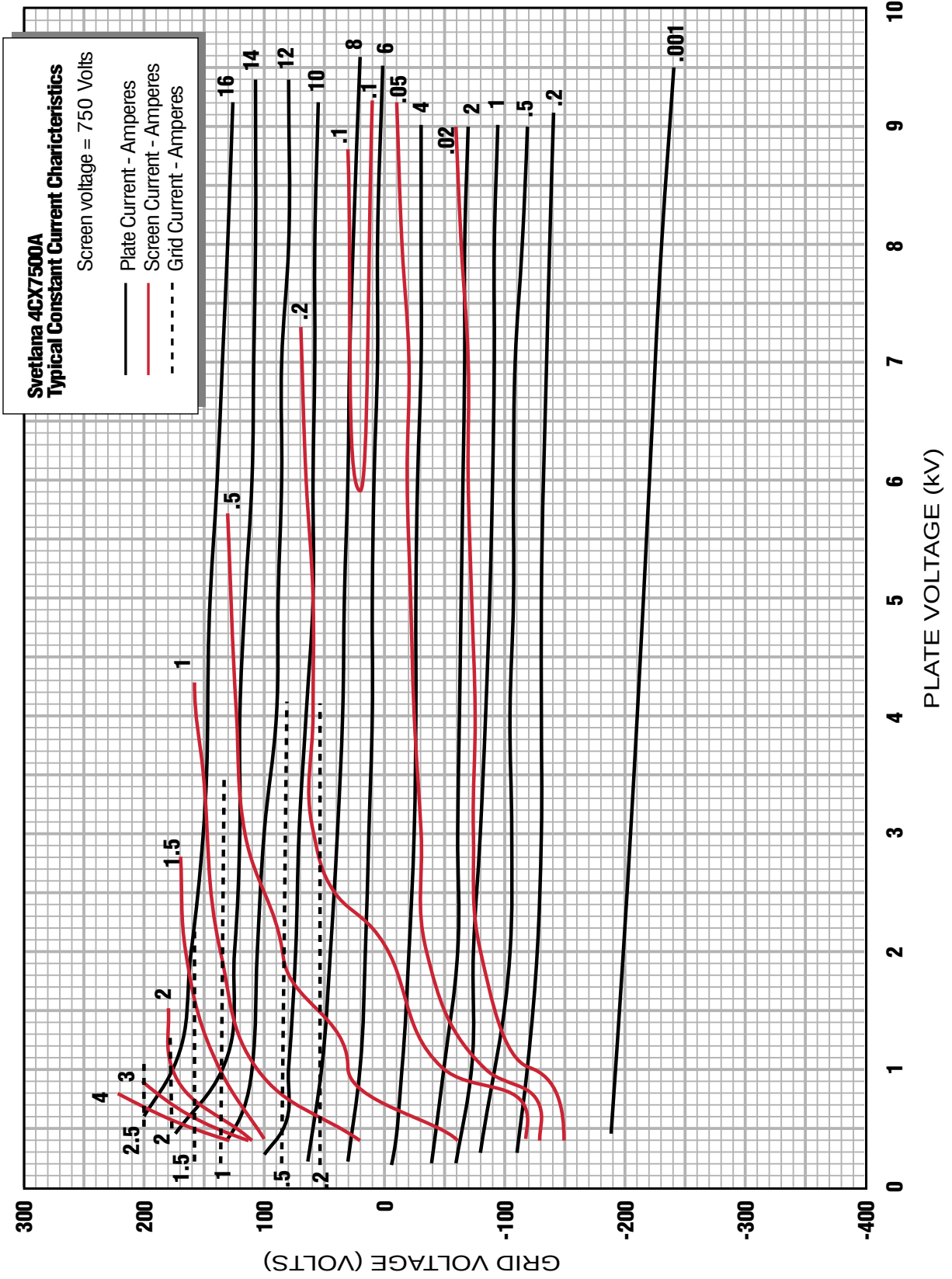
Sea Level		
Plate dissipation (Watts)	Air flow (CFM)	Pressure drop (Inches of water)
7500	592	7.9

At altitudes significantly above sea level, the flow rate must be increased for equivalent cooling. At 5,000 feet above sea level, both the flow rate and the pressure drop should be increased by a factor of 1.21, while at 10,000 feet both flow rate and pressure drop must be increased by 1.46.

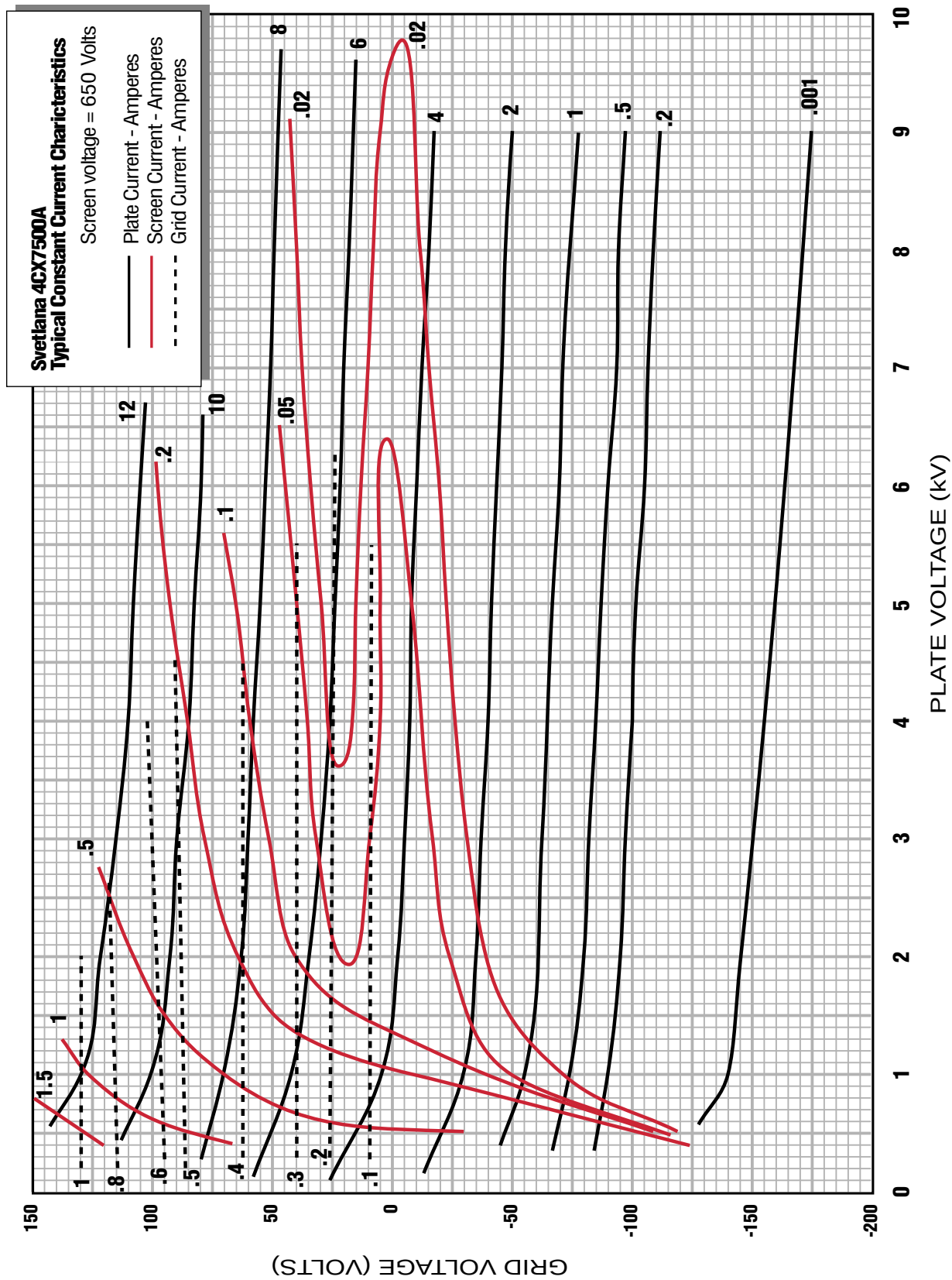
Special applications If the user needs to operate this tube under conditions widely different from those given in this publication, contact any location of Svetlana Electron Devices for technical assistance.

Svetlana 4CX7500A

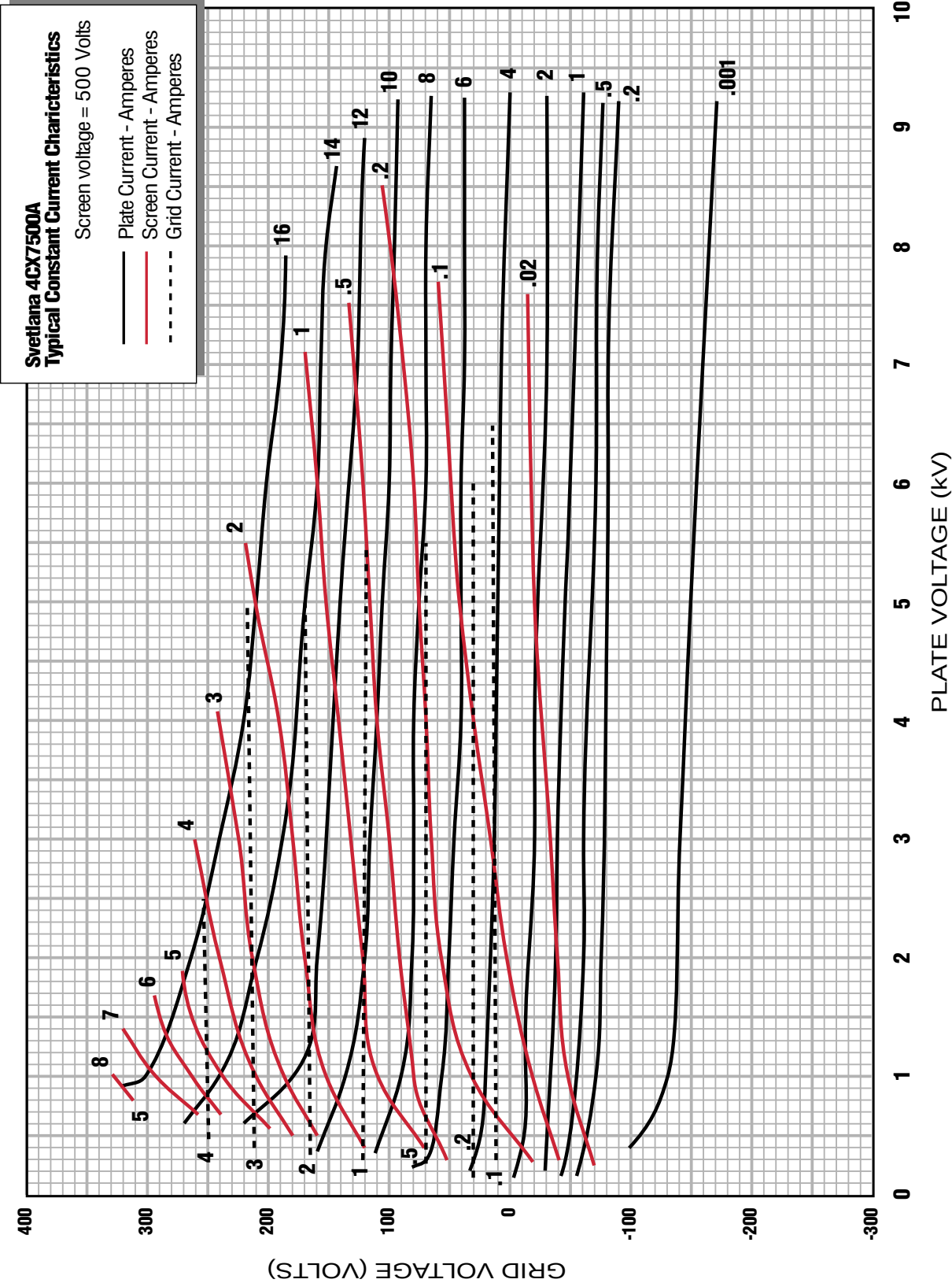




Radial Beam Power Tetrode



Radial Beam Power Tetrode



SVETLANA TECHNICAL DATA

4CX800A

High Performance Tetrode



The Svetlana 4CX800A is a high-performance ceramic metal tetrode with a plate dissipation rating of 800 watts with forced air cooling. The performance characteristics of the 4CX800A allow its use as a high gain grid-driven RF amplifier or in grounded grid service. A recommended mode of operation is in grid-driven service with a passive (resistive) 50 ohm untuned input circuit. This eliminates the need for multiple input tuned circuits and neutralization. In this mode, an exceptionally simple, stable, low-cost amplifier with good intermodulation performance can be designed.

As a linear power amplifier, the 4CX800A will conservatively produce 750 watts PEP SSB, and 750 watts Key Down CW in any of the three modes: grid-driven, grid-driven passive input, and cathode-driven. Because of the high performance characteristics of the 4CX800A, the tube will operate efficiently at low plate voltage.

Characteristics

Electrical

<i>Cathode:</i>	<i>Oxide-coated</i>	
Voltage	12.6 ± 0.7	V
Current, at 12.6 volts	3.6 ± 0.3	A
Voltage cathode-heater, max.	± 100	V
Warm-up time	2.5	min.
Amplification factor, grid-to-screen	6.5 ± 2	
<i>Direct interelectrode capacitance (grounded cathode):</i>		
Input	51 ± 5	pF
Output	11 ± 2	pF
Feedback	0.09	pF
Frequency for maximum ratings	150	MHz

Mechanical

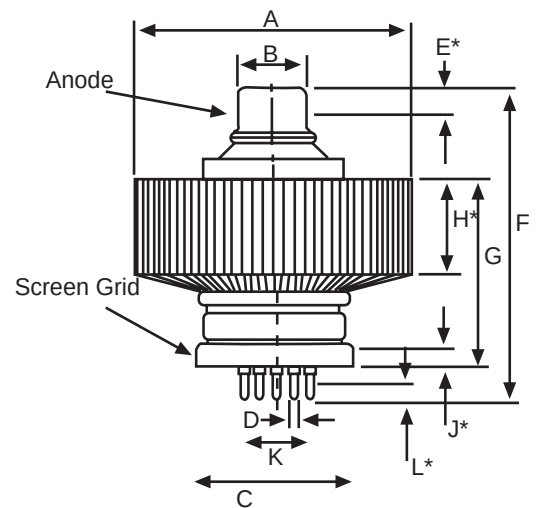
<i>Maximum overall dimensions:</i>		
Length	90 mm (3.51 in.)	
Diameter	72 mm (2.81 in.)	
Net weight	550 g (1.21 lb.)	
Operating position	Any	
Cooling	Forced air	
Maximum operating envelope temperature	200°C	
Recommended socket	Svetlana SK-1A	
Recommended anode connector	Svetlana AC-1	

Radio Frequency Linear Amplifier Class AB₁

Maximum ratings

DC plate voltage	2.5	kV
DC screen voltage	350	V
DC grid voltage	-150	V
DC Plate current	0.8	A
Plate dissipation	800	W
Screen dissipation	15	W
Grid dissipation	2	W

Svetlana Outline drawing



*Contact Surface

Dimensional Data

Dim.	Inches			Millimeters		
	Min.	Max.	Ref.	Min.	Max.	Ref.
A	2.756	2.835		70	72	
B	0.669	0.748		17	19	
C	1.988	2.028		50.5	51.5	
D	0.053	0.060		1.34	1.53	
E	0.394	—		10	—	
F	—	3.543		—	90	
G	2.008	2.126		51	54	
H	0.747	0.860		20	22	
J	0.197	—		5	—	
K	—	—	0.7	—	—	175
L	0.3	0.37		7.6	9.4	

Note: Ref. dimensions are for reference



Svetlana
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Svetlana 4CX800A

High Performance Tetrode



Svetlana
ELECTRON DEVICES

Typical Operation (grid driven, single tone)

Frequency	60	60	MHz
Power output	550	780	W
DC plate voltage	2	2.2	kV
DC screen voltage	300	350	V
Bias voltage*	-37	-47	V
Zero-signal plate current	300	360	mA
DC plate current	465	630	mA
DC screen current	30	30	mA
Peak rf grid voltage	30	35	V
Plate dissipation	380	600	W
Intermodulation distortion measured by two tone method at 1 MHz:			
3rd order		-30	dB
5th order		-40	dB

Typical Operation, Linear with Cathode Resistance

	Grid Driven		Cathode Driven		
DC plate voltage	2200	2200	2200	2200	V
Bias voltage	-56	-57	-57	-63	V
Zero signal plate current	160	150	100	70	mA
DC plate current	550	520	590	490	mA
Plate input power	1200	1150	1300	1100	W
Driving voltage	75	77	52	64	V
DC grid current	0	0	0	0	mA
Driving power	56 ¹	59 ¹	27 ¹	41 ¹	W
Power output	750	750	750	750	W
Intermodulation distortion					
3rd order	-30 ²	-30 ²	-32 ²	-32 ³	dB
5th order	-43 ²	-42 ²	-40 ²	-35 ³	dB
Efficiency	63	65	58	68	%
Zero-signal plate dissipation	352	330	200	154	W
DC screen voltage	350	350	300	300	V
DC screen current	24	24	20	17	mA
Cathode resistance	24 ⁴	33 ⁴	0	24 ⁴	ohms

Typical Operation, FM Broadcast Power Amplifier

	CCS
DC Plate Voltage	2200 V
Bias Voltage	-70 V
Driving Voltage	80 V
DC Plate Current	500 mA
DC Screen Current	30 mA
DC Grid Current	12 mA
Power Output	800 W
Screen Dissipation	8 W
Grid Dissipation	1 W
Efficiency	73 %

* Approximate value adjusted to specified zero-signal plate current

Notes:

1. The drive power is determined with a 50 ohm resistive input circuit.
2. The intermodulation distortion level does not deteriorate with decreasing drive voltage.
3. The level of intermodulation distortion with decreasing drive voltage does not deteriorate to less than -28 dB and -35 dB respectively corresponding to a driving voltage of 50 V.
4. Increasing the resistance in the cathode circuit decreases the zero-signal plate current and increases the drive power required.

Svetlana 4CX800A

High Performance Tetrode



Linear Operation Operating conditions with feedback are shown in the table on the previous page under Typical Operation, Linear with Cathode Resistance. This mode of operation is recommended for linear amplifier service where low zero signal plate current together with good intermodulation performance is required. These conditions were optimized for 750 watts power output, low zero signal plate current and intermodulation performance. A resistor is introduced in the cathode circuit to provide degeneration for improved linearity and reduced zero signal plate current. Increasing the resistance in the cathode circuit decreases the zero signal plate current and increases the required drive power. The drive power shown in the table was determined using a 50 ohm resistor for the input circuit. Note that no input tuned circuit or neutralization is required.

Plate Operation The rated maximum plate dissipation power of the 4CX800A is 800 watts. The tube and associated circuits should be protected in the event of an internal

arc by including a series current limiting resistance in the DC lead from the power supply to the plate. Its value must be 25 ohms or more. The resistor should be capable of withstanding the high surge current caused by the arc, and should not be used as a fuse.

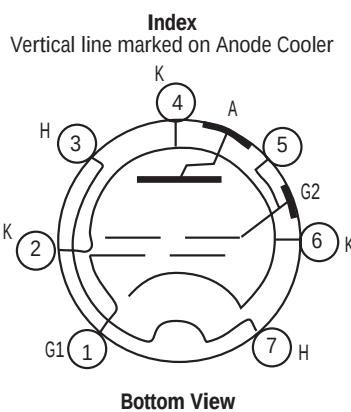
Control Grid Operation The maximum grid dissipation rating of the 4CX800A is 2 watts. The grid should not be driven unless screen and plate voltage is applied. The grid and associated circuitry should be protected against current surges in the event of internal arcs by a source impedance of greater than 50 ohms. For stability, the source impedance should not exceed 1K ohms.

Screen Grid Operation The maximum rated power dissipation for the screen grid is 15 watts. The screen current may reverse under certain conditions and produce negative current. This is a normal characteristic of most tetrodes. The screen power supply should be designed with this characteristic in mind. A current path from screen to cathode must be provided and the source impedance should

not exceed 3K ohms. When plate voltage, plate load or bias voltage is removed, screen grid voltage should be turned off automatically. Otherwise, screen grid power dissipation will be exceeded.

Cathode Operation The cathode is internally connected to pins 2, 4 and 6. Three of the corresponding socket terminals should be used to make connection to the external circuits. At radio frequencies, it is important to keep the cathode leads short and direct and to use conductors with large areas to minimize the inductive reactances in series with the cathode leads.

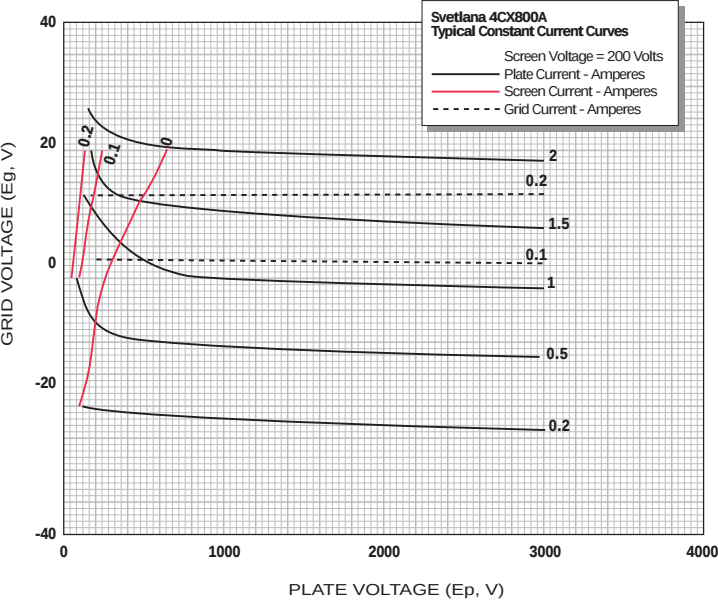
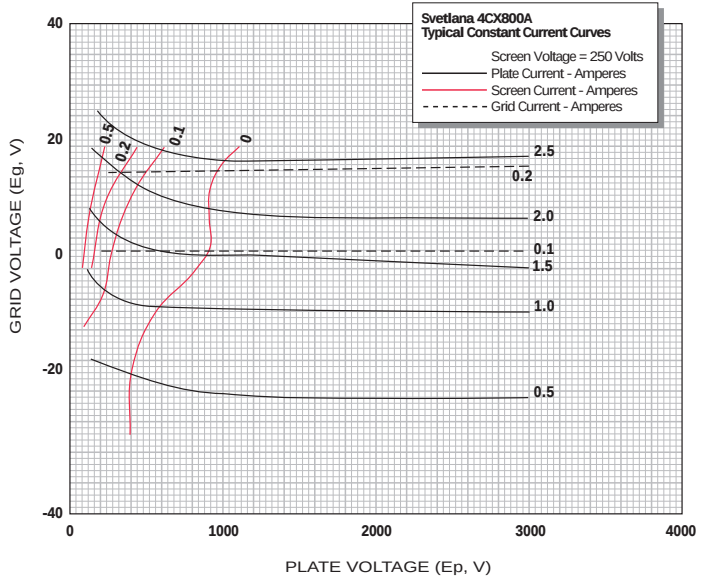
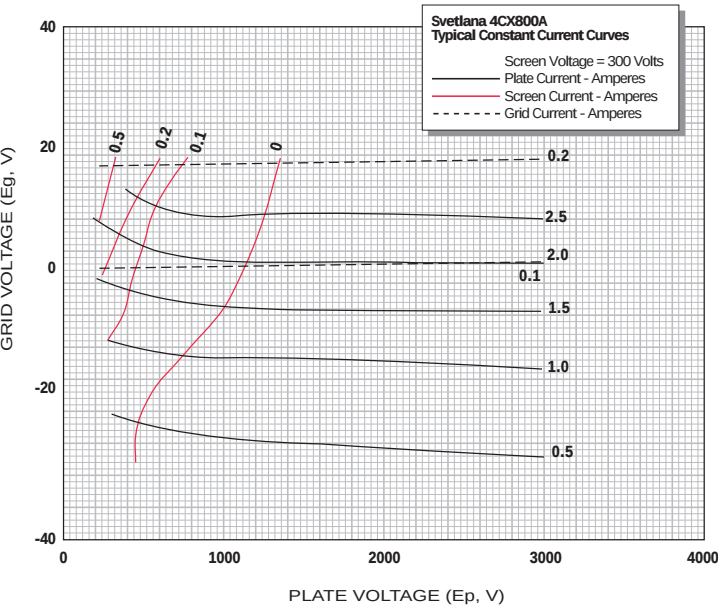
Mounting The Svetlana SK-1A socket is available for use with the 4CX800A. The SK-1A has a built-in annular screen bypass capacitor of 0.01 μ F suitable for use at HF and VHF. The tube may be mounted in any orientation.



Svetlana 4CX800A Air-Flow Requirements				
Plate power dissipation (Watts)	Sea level		5,000 feet	
	Air flow CFM	Pressure drop in./water	Air flow CFM	Pressure drop in./water
Cooling air at 25°C				
400	6	0.1	7	0.2
600	12	0.2	14	0.3
800	20	0.5	25	0.6
Cooling air at 50°C				
400	8	0.2	10	0.2
600	17	0.4	21	0.4
800	29	0.835	35	0.6

Svetlana 4CX800A

High Performance Tetrode



4X150A/7034

Radial Beam Power Tetrode

The Svetlana 4X150A/7034 is a compact radial beam tetrode. The 4X150A is intended for Class AB SSB linear RF amplifier service. It is intended for stationary and mobile equipment designs with power amplification at frequencies up to 500 MHz. The 4X150A has an indirectly-heated oxide cathode.

The Svetlana 4X150A is manufactured with rugged, all metal/ceramic construction and will withstand severe military environments. Further, the anode is capable of dissipating 250 watts with forced air cooling, and is rated accordingly. These improved characteristics make the Svetlana 4X150A fully equivalent to the 4CX250B.

The Svetlana 4X150A/7034 is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for the 4X150A/7034 manufactured in the United States, England and elsewhere.



Svetlana 4X150A/7034

General Characteristics

Heater: Voltage (AC or DC)	Min.	Nom.	Max.
	5.7	6.0	6.3
Cathode:	Oxide-coated, unipotential		
Cathode-to-heater potential	± 150		V
Direct interelectrode capacitances, max.			
Grounded cathode:			
Input			15.7 pF
Output			4.5 pF
Feedback			0.04 pF
Mechanical			
Operating Position			Any
Base			Special 9-pin
Recommended socket		Eimac or Johnson SK-600 series	
Maximum dimensions			
Height		64 mm (2.52 in.)	
Diameter		41.6 mm (1.64 in.)	
Maximum operating temperatures			
Ceramic-to-metal seals			250° C
Anode core			250° C
Cooling			Forced air
Maximum net weight		150 g (4.8 oz.)	
Approximate shipping weight		0.7 Kg.(1.5 lb.)	

Radio Frequency Linear Amplifier, Class-AB₁, SSB Operation

Maximum ratings			
DC plate voltage		2000	V
DC screen voltage		400	V
DC plate current		250	mA
Plate dissipation		250	W
Screen dissipation		12	W
Grid dissipation		2	W

Typical Operation

(Peak-envelope conditions except where noted, grid driven)

Plate voltage	1000	1500	2200	Vdc
Screen voltage	350	350	350	Vdc
Grid voltage*	-55	-55	-55	Vdc
Zero-signal plate current	100	100	100	mA _{dc}
Single tone plate current	250	250	250	mA _{dc}
Two-tone plate current	190	190	190	mA _{dc}
Single-tone screen current**	10	8	5	mA _{dc}
Two-tone screen current**	2	-1	-2	mA _{dc}
Single-tone grid current**	0	0	0	mA _{dc}
Peak rf grid Voltage**	50	50	50	V
Plate output power	120	215	300	W
Resonant load impedance	2000	3000	4000	ohms

* Adjust to specified zero-signal dc plate current ** Approximate values

Radial Beam Power Tetrode

Plate operation

Because of the all ceramic/metal construction and brazed anode cooler, the maximum rated plate dissipation power of the Svetlana 4X150A/7034 is 250 watts. This rating may be exceeded for brief periods during circuit adjustment without damage to the tube. The tube and associated circuits should be protected in the event of an internal arc by including a series current limiting resistance in the DC lead from the power supply to the plate. Its value must be 25 ohms or more. The resistor should be capable of withstanding the high surge current caused by the arc. It should not be used as a fuse.

Control-grid operation

The maximum grid dissipation rating of the 4X150A is two watts. The grid current is 2.0 milliamperes. The grid and associated circuitry should be protected against current surges in the event of internal arcs by a source impedance of greater than 50 ohms. For stability, the source impedance should not exceed 10K ohms.

Screen-grid operation

The maximum rated power dissipation for the screen grid is 12 watts, and the screen input power should be kept below that level. The product of the peak screen voltage and the indicated DC screen current approximates the screen input power except when the screen current indication is near zero or negative.

In the usual tetrode amplifier, where no signal voltage appears between cathode and screen, the peak screen voltage is equal to the DC screen voltage.

When signal voltages appear between screen and cathode, as in the case of screen-modulated amplifiers or cathode-driven tetrode amplifiers, the peak screen-to-cathode voltage is the sum of the DC screen voltage and the peak AC or RF signal voltage applied to screen or cathode.

The screen current may reverse under certain conditions, and produce negative current indications on the screen milliammeter. This is a normal characteristic of most tetrodes. The screen power supply should be designed with this characteristic in mind, so that the correct operating voltage will be maintained on

the screen under all conditions. A current path from screen to cathode must be provided by a bleeder resistor or shunt regulator connected between screen and cathode and arranged to pass approximately 15 milliamperes per connected screen.

The screen grid and associated circuits should be protected against current surges in the event of internal arcs by a source impedance of greater than 50 ohms. For stability, the source impedance should not exceed 10K ohms.

Cathode operation

The cathode is internally connected to the four even-numbered base pins, and all four of the corresponding socket terminals should be used to make connection to the external circuits. At radio frequencies, it is important to keep the cathode leads short and direct and to use conductors with large areas to minimize the inductive reactances in series with the cathode leads.

Svetlana recommends that rated heater voltage be applied for a minimum of 30 seconds before other operating voltages are applied.

Where the current design requires the cathode and heater to be operated at different potentials, the rated maximum heater-to-cathode voltage is 150 volts regardless of polarity.

Heater Operation

The rated heater voltage for the 4X150A is 6.0 volts and this voltage should be maintained as closely as practicable. Short-time variations of the voltage of $\pm 10\%$ of the rated value will not damage the tube, but variations in performance must be expected. The heater voltage should be maintained within $\pm 5\%$ of its rated value to minimize variations in performance and to obtain maximum tube life.

Multiple operation

Tubes operating in parallel or push-pull must share load equally. Svetlana believes that it is good engineering practice to provide for individual metering and individual adjustment of the bias or screen voltage to equalize the inputs.

Where overload protection is provided, it should be capable of protecting the surviving tube(s) in the event that one tube should fail.

Svetlana 4X150A/7034

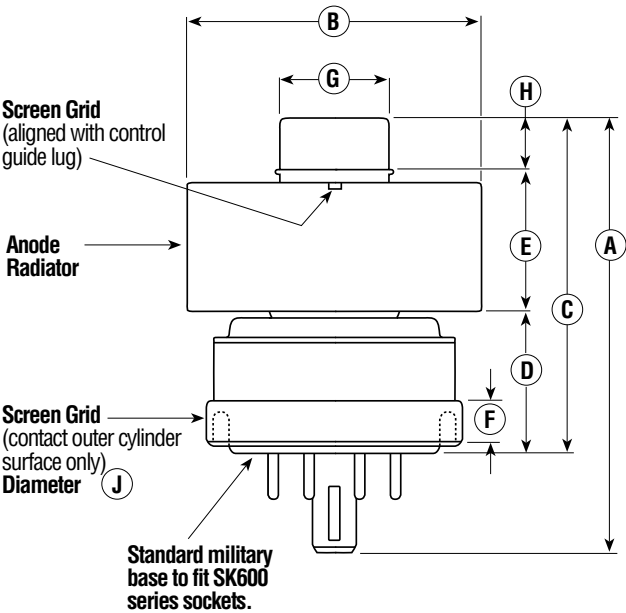
Mechanical Mounting

The 4X150A may be operated in any position. An Eimac or Johnson Air-System Socket, SK-600 series, or a socket having equivalent characteristics, is recommended. Sockets are available with or without built-in screen by-pass capacitors and may be obtained with either grounded or ungrounded cathode terminals.

Cooling

Sufficient cooling must be provided for the anode, base seals and body seals to maintain operating temperatures below the rated maximum values. Air requirements to maintain seal temperatures at 225°C in 50°C ambient air are shown in the table at upper right. These requirements apply when an air system socket is used with an anode chimney and when air-flow is in the base-to-anode direction.

4X150A/7034 Outline Drawing



Minimum Cooling Air-Flow Requirements				
Plate dissipation (watts)	Sea Level		10,000 feet	
	Air flow (CFM)	Pressure drop (Inches of water)	Air Flow (CFM)	Pressure Drop (Inches of water)
200	5.0	0.52	7.3	0.76
250	6.4	0.82	9.3	1.20

Dimensional Data		
Dim.	Millimeters	Inches
A	64	2.52
B	41.6	1.64
C	40	1.57
D	21	0.83
E	19	0.75
F	4	0.16
G	14	0.55
H	5	0.20
J	36	1.42

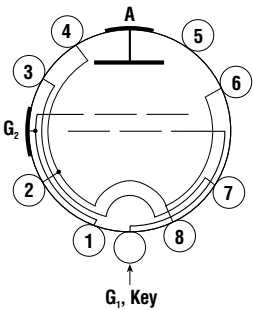
Vibration

The Svetlana 4X150A/7034 is capable of satisfactorily withstanding shock and vibration typically encountered in military applications. The tubes will function well in mobile airborne and mobile truck installations and similar environments.

Special applications

If it is desirable to operate this tube under conditions widely different from those given in this publication, contact any location of Svetlana Electron Devices (listed on the back panel).

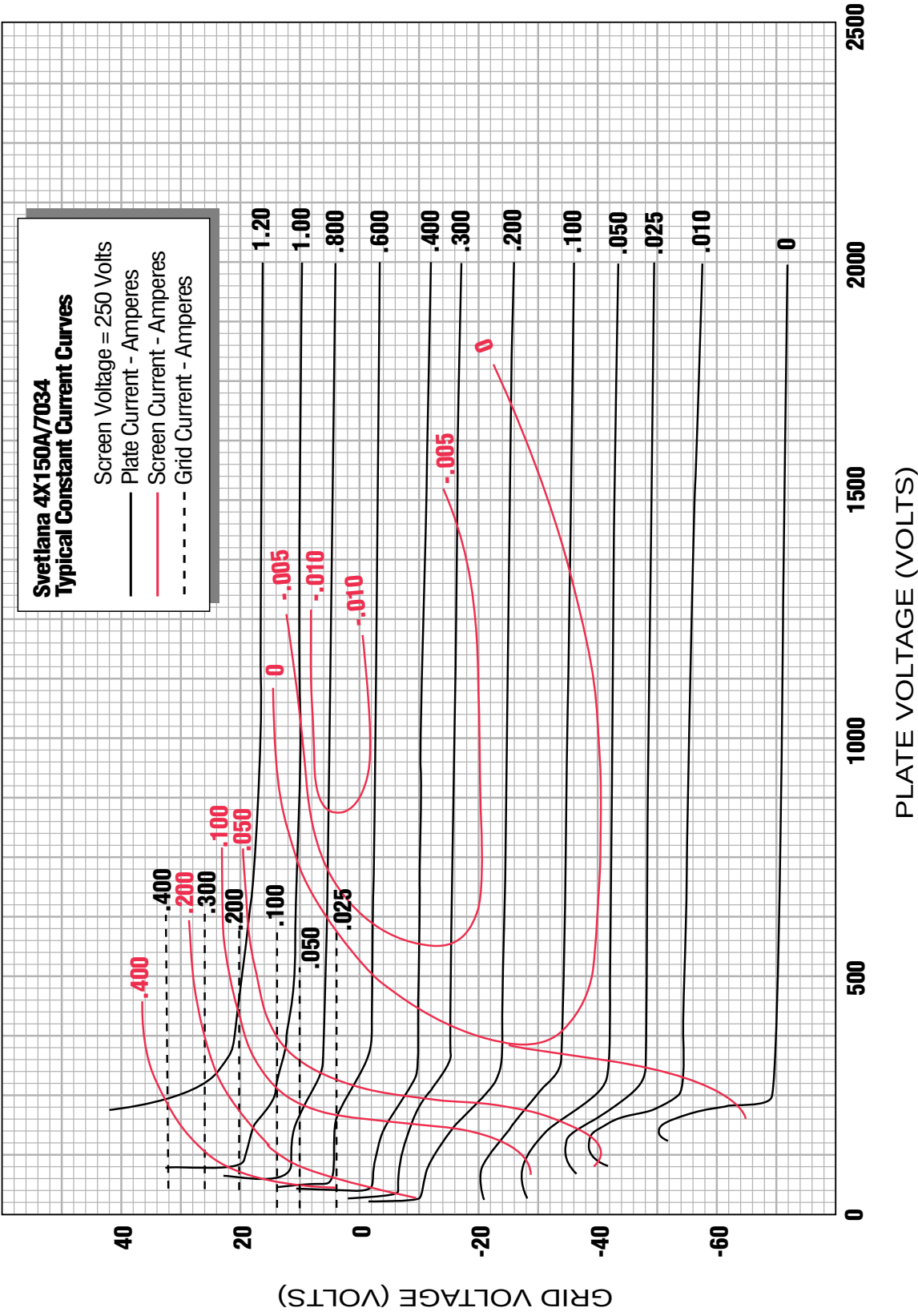
Bottom View



4X150A/7034 Connection Diagram

Connection	Electrode
1	Screen Grid
2, 4, 6, 8	Cathode
3, 7	Heater
5	Internal connection (do not use for external connection)
G ₂ (coaxial ring)	Screen Grid
G ₁ (key)	Control Grid
A (external)	Anode

Radial Beam Power Tetrode





SVETLANA TECHNICAL DATA

572B

High-Mu Power Triode

The Svetlana™ 572B is a high-mu power triode intended for use in class AB, class B and class C RF and Audio amplifiers. The Svetlana 572B features a massive graphite anode for high peak overload capability and a high average plate dissipation of 160 Watts. The Svetlana 572B also features a low loss ceramic base and a bonded-ceramic plate cap thermal insulator for high power RF transmitting tube capability.

The Svetlana 572B has a superior getter system based on titanium adhered to the external surface of the graphite anode. The titanium coating covers the entire anode area extended by the inherent micro surface roughness of graphite. The Svetlana 572B envelope is fabricated from hard glass intended specifically for the high-temperature operation of transmitting tubes.

The internal tube parts are supported by low loss ceramic insulators for high-temperature operation and high voltage hold-off. The internal structure is well supported and is aligned with respect to the base pins to avoid internal shorts in equipment designed for horizontal tube mounting.

The Svetlana 572B may be used as a direct drop-in replacement in equipment designed for the 811A, T160L or 572B.

Characteristics

Electrical

Filament:	Thoriated-tungsten
Voltage (AC or DC)	6.3 V $\pm$ 0.3V
Current	4 A
Amplification factor (average)	170
Direct interelectrode capacitances:	
Grid to plate	6.0pF
Grid to filament	5.9 pF
Plate to filament	0.8 pF
Maximum frequency for full ratings	30 MHz

Mechanical

Cooling	Radiation and forced air
Base	Ceramic, standard small four pin
Plate cap	Standard medium cap 14 mm dia. with ceramic thermal insulation
Plate connector	Svetlana PC-1A or equivalent
Socket	Svetlana SK4A, Standard small, four contact
Operating position-Axis vertical, base down or horizontal w/ pins 1 and 4 in vertical plane	

Nominal dimensions:

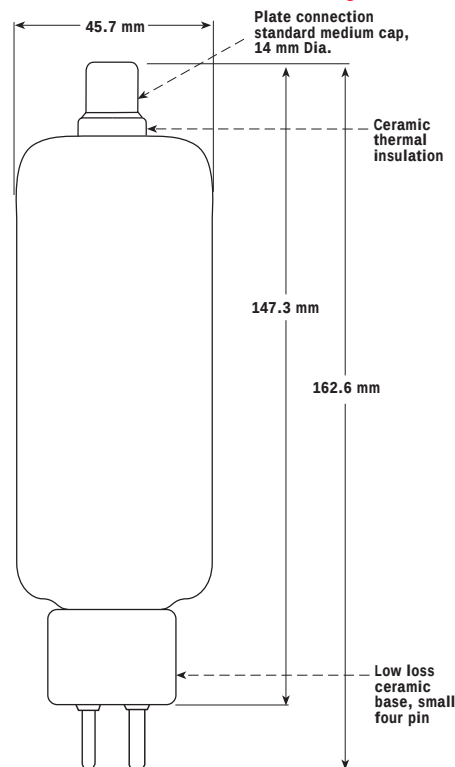
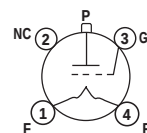
Diameter	45.7 mm (1.8 in.)
Base to plate cap	147.3 mm (5.8 in.)
Overall height	162.6 mm (6.4 in.)
Net weight	113 gm

Linear RF Power Amplifier, Class B Grounded Grid, Maximum ratings

	ICAS*
DC plate voltage	2750 V
DC plate current	275 mA
Plate dissipation	160 W
DC Plate input	600 W
DC Grid current	50 mA

*Intermittant commercial and amateur service

Svetlana Outline drawing



Base pin connections,
bottom view

Notes:

The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal tube mounting.



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Svetlana 572B

High-Mu Power Triode



Svetlana
ELECTRON DEVICES

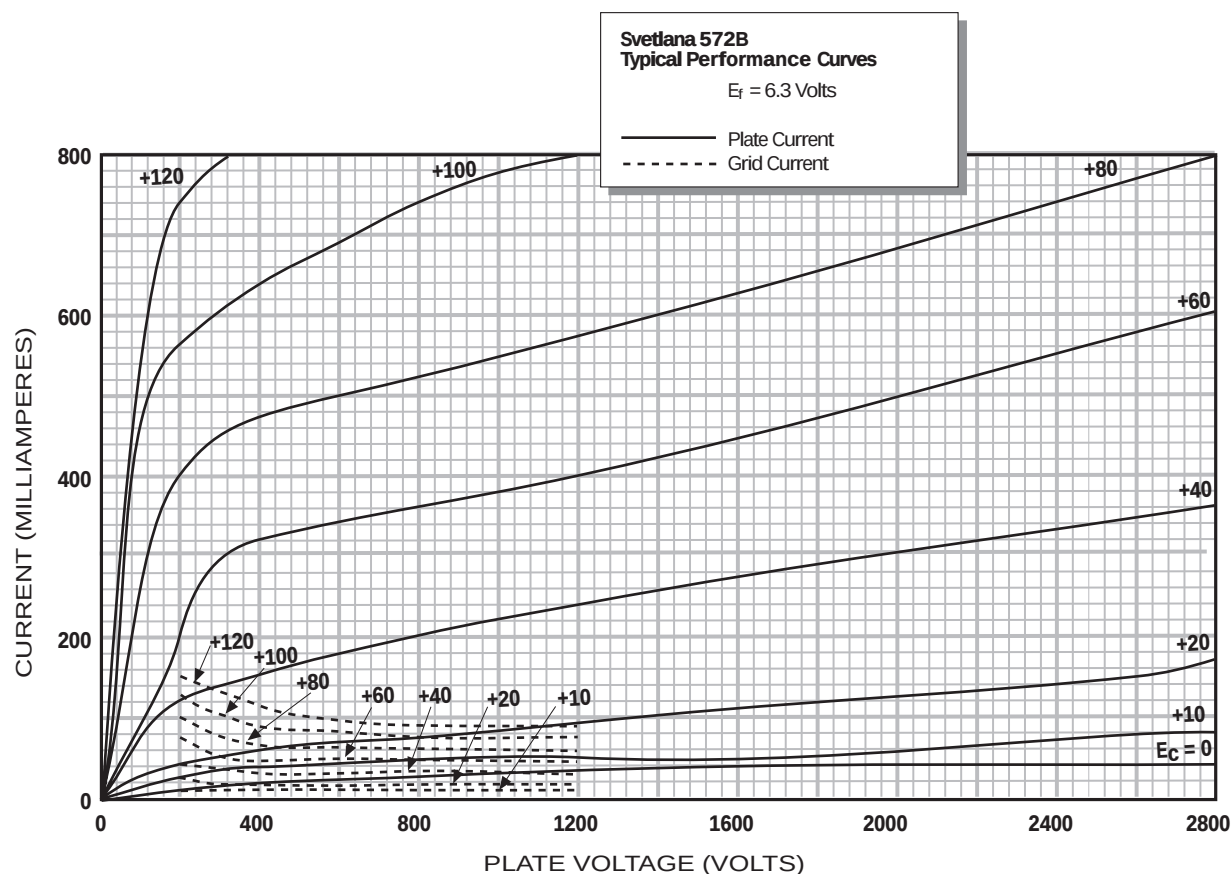
Typical Operation, Grounded Grid Linear Amplifier

(frequencies to 30 MHz)		ICAS**
DC plate voltage	2400	V
DC grid voltage	-2	V
Zero-signal DC plate current **	45	mA
Single-tone DC plate current	250	mA
Driving power	50	W
Single-tone useful output power **	300	W

** Approximate value

Mechanical Application

Mounting: The Svetlana 572B may be operated with its axis vertical and the base down, or horizontally with pins 1 and 4 in a vertical plane.



Versions of the 572B designed for audio amplifier service are available.
Ask for SV572 Series data.

SVETLANA TECHNICAL DATA

5CX1500A Power Pentode



The Svetlana 5CX1500A is a high-performance ceramic/metal power pentode designed for use as a highly linear Class AB1 linear amplifier. It may also be used as a high-gain Class C amplifier in HF radio frequency industrial processing applications such as plasma generation, sputtering and semiconductor manufacturing. The 5CX1500A filament is precision fabricated in a cylindrical mesh configuration for exceptional mechanical stability and long life.

The Svetlana 5CX1500A is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for the 5CX1500A manufactured in the United States

Characteristics

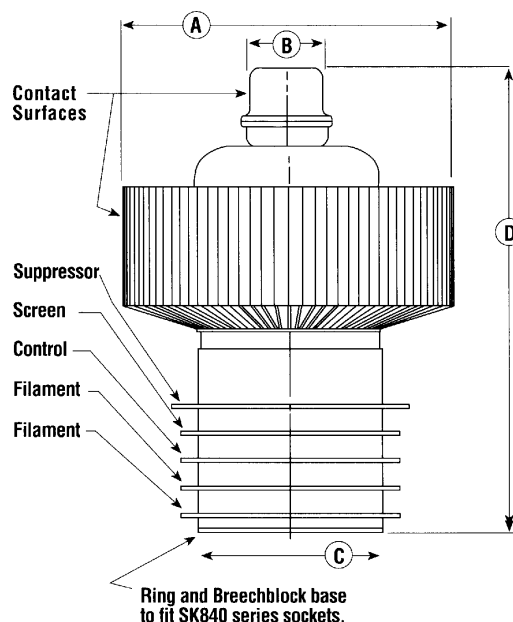
Electrical

Filament:	Thoriated tungsten
Voltage	5.0 ± 0.25 V
Current, at 5.0 volts	38.5 A
Transconductance (Average):	
$I_b = 1.0$ Adc, $E_{c2} = 500$ Vdc	24,000 μ mhos
Amplification factor (average):	
Grid to Screen	5.5
Direct interelectrode capacitance (grounded cathode):	
Input	75 pF
Output	17.8 pF
Feedback	0.20 pF
Frequency of maximum rating:	
CW	110 MHz

Mechanical

Cooling	Forced air
Base	Ring and breechblock
Recommended air system socket	SK-840 series
Recommended (air) chimney	SK-806
Operating position	Axis vertical, base down or up
Maximum operating temperature	250°C
Maximum dimensions:	
Length	130 mm (5.2 in.)
Diameter	85.6 mm (3.37 in.)
Net weight	850 gm (30 oz.)

Svetlana Outline drawing



Dimensional Data				
Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	84.7	85.6	3.33	3.37
B	20.5	20.8	0.81	0.82
C	47.5	48.3	1.87	1.90
D	124	131	4.90	5.15



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5CX1500A

Power Pentode



Radio Frequency Power Amplifier (CW conditions)

Absolute maximum ratings

Plate voltage	5000	V
Screen voltage	750	V
Plate dissipation	1500	W
Suppressor dissipation	25	W
Screen dissipation	75	W
Grid dissipation	25	W

Typical Operation

(Frequencies to 30 MHz)

Plate voltage	3000	4000	4500	Vdc
Suppressor voltage	0	0	0	Vdc
Screen voltage	500	500	500	Vdc
Grid voltage	-200	-200	-200	Vdc
Plate current	900	800	900	mA _{dc}
Screen current	94	66	88	mA _{dc}
Grid current	35	25	34	mA _{dc}
Peak rf grid voltage	255	245	255	v
Calculated driving power	9.0	6.5	9.0	W
Plate input power	2700	3200	4050	W
Plate dissipation	720	850	870	W
Plate output power	1980	2350	3180	W
Resonant load impedance	1570	2240	2520	ohms

Plate operation The plate dissipation rating of the 5CX1500A is 1500 watts. The tube and associated circuitry should be protected against surge current in the event of an arc with a current limiting resistance of 10 - 25 ohms in series with the lead from the power supply to the plate. The resistor should be capable of withstanding the surge current. It should not be used as a fuse.

Minimum Cooling Air-Flow Requirements				
Plate dissipation (watts)	Sea Level		6,000 feet	
	Air flow (CFM)	Pressure drop (Inches of water)	Air Flow (CFM)	Pressure Drop (Inches of water)
1000	27	0.33	33	0.40
1550	47	0.76	58	.95

Since the power dissipated by the filament represents about 200 watts and since grid plus screen plus suppressor dissipation can, under some conditions, represent another 125 watts, allowance has been made in preparing this tabulation for an additional 325 watts dissipation.

5CX1500B

Power Pentode



The Svetlana 5CX1500B is a high-performance ceramic/metal power pentode designed for use as a highly linear Class AB₁ linear amplifier. The pentode is ideal for VHF service and is recommended for use in FM broadcast transmitters. The 5CX1500B filament is precision fabricated in a cylindrical mesh configuration for exceptional mechanical stability and long life.

The Svetlana 5CX1500B is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for both the 5CX1500B and 5CX1500A manufactured in the United States.



5CX1500B

General Characteristics

Electrical

Filament:	Thoriated tungsten
Voltage	5.0 ± 0.25 V
Current, at 5.0 volts	38.5 A
Transconductance (Average):	
$I_b = 1.0 \text{ Adc}$, $E_{c2} = 500 \text{ Vdc}$	24,000 μmhos
Amplification factor (average):	
Grid to Screen	5.5
Direct interelectrode capacitance (grounded cathode):	
Input	75 pF
Output	17.8 pF
Feedback	0.20 pF
Frequency of maximum rating:	
CW	110 MHz

Mechanical

Cooling	Forced air
Base	Ring and breechblock
Recommended air system socket	SK-840 series
Recommended (air) chimney	SK-806
Operating position	Axis vertical, base down or up
Maximum operating temperature	250°C
Maximum dimensions:	
Length	130 mm (5.2 in.)
Diameter	85.6 mm (3.37 in.)
Net weight	850 gm (30 oz.)

Radio Frequency Linear Amplifier Class C (CW conditions)

Absolute maximum ratings

Plate voltage	5000 volts
Screen voltage	750 volts
Plate dissipation	1500 watts
Suppressor dissipation	25 watts
Screen dissipation	75 watts
Grid dissipation	25 watts

Typical Operation

(Frequencies to 30 MHz)

Plate voltage	3000	4000	4500	Vdc
Suppressor voltage	0	0	0	Vdc
Screen voltage	500	500	500	Vdc
Grid voltage	-200	-200	-200	Vdc
Plate current	900	800	900	mAdc
Screen current	94	66	88	mAdc
Grid current	35	25	34	mAdc
Peak rf grid voltage	255	245	255	v
Calculated driving power	9.0	6.5	9.0	W
Plate input power	2700	3200	4050	W
Plate dissipation	720	850	870	W
Plate output power	1980	2350	3180	W
Resonant load impedance	1570	2240	2520	ohms

Power Pentode

Radio Frequency Linear Amplifier, Grid Driven, Class AB₁

Absolute maximum ratings

DC plate voltage	4000	volts
DC screen voltage	750	volts
Plate dissipation	1500	watts
Suppressor dissipation	25	watts
Screen dissipation	75	watts
Grid dissipation	25	watts

Typical Operation

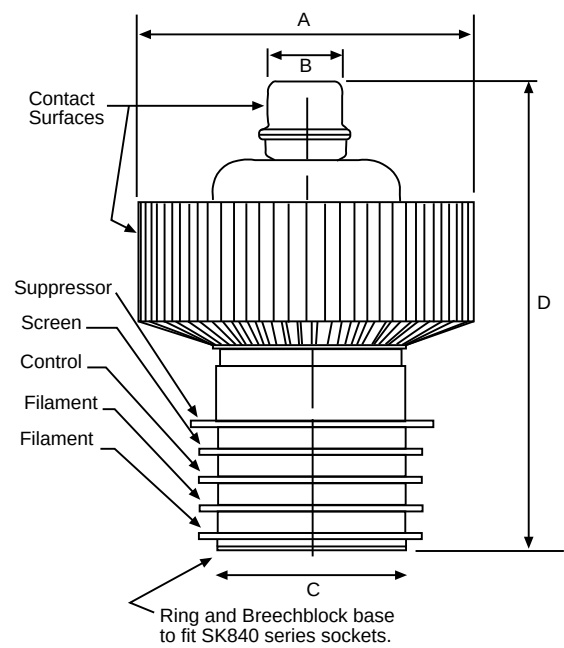
(Frequencies to 30 MHz)

Plate voltage	2500	3000	4000	Vdc
Suppressor voltage	0	0	0	Vdc
Screen voltage	500	500	500	Vdc
Grid voltage	-87	-89	-90	Vdc
Zero signal plate current	250	250	250	mAdc
Single-tone plate current	660	690	690	mAdc
Two-tone plate current	470	480	485	mAdc
Single-tone screen current	79	71	59	mAdc
Two-tone screen current	36	32	25	mAdc
Peak rf grid voltage	87	89	90	v
Peak driving power	0	0	0	W
Single tone useful output power	1090	1330	1785	W
Resonant load impedance	2340	2680	3500	ohms

Range Values for Equipment Design

	Min.	Max.	
Filament: current at 5.0 volts	38	43	A
Interelectrode capacitances (grounded grid connection)			
Input	32	37	pF
Output	14.5	18.5	pF
Feedback	—	0.05	pF
Interelectrode capacitances (grounded cathode connection)			
Input	70	80	pF
Output	14.5	18.5	pF
Feedback	—	0.25	pF

5CX1500B Outline Drawing



Dimensional Data				
Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	84.7	85.6	3.33	3.37
B	20.5	20.8	0.81	0.82
C	47.5	48.3	1.87	1.90
D	124	131	4.90	5.15

Electrical Application

Filament operation The rated filament voltage for the 5CX1500B is 5.0 volts. Filament voltage, as measured at the socket, should be maintained within $\pm 5\%$ of this value to obtain maximum tube life.

Grid operation The rated dissipation of the grid is 25 watts. This is approximately the product of DC grid current and peak positive grid voltage. Operation at bias and drive levels near those listed will insure safe operation.

Screen operation The power dissipated by the screen must not exceed 75 watts. Screen dissipation, in cases where there is no AC applied to the screen, is the simple product of the screen voltage and the screen current. If the screen voltage is modulated, the screen dissipation will depend on RMS screen current and voltage.

Screen dissipation is likely to rise to excessive values when the plate voltage, bias voltage, or plate load are removed with filament and screen voltages applied. Suitable protective means must be provided to limit the screen dissipation to 75 watts in the event of a circuit failure.

Suppressor operation The rated dissipation of the suppressor is 25 watts. Suppressor current will be zero or very nearly zero for all typical operating conditions specified. The 5CX1500B has been designed for zero voltage operation of the suppressor grid for most applications.

Plate operation The plate dissipation rating of the 5CX1500B is 1500 watts. The tube and associated circuitry should be protected against surge current in the event of an arc with a current limiting resistance of 10 - 25 ohms in series with the lead from the power supply to the plate. The resistor should be capable of withstanding the surge current. It should not be used as a fuse.

Mechanical Application

Mounting The 5CX1500B must be operated with its axis vertical. The base of the tube may be down or up at the convenience of the equipment designer.

Socket The Svetlana 5CX1500B is designed for the Eimac SK-840 socket and SK-806 chimney. The use of recommended airflow rate through the socket provides effective forced-air cooling of the tube. Air forced into the bottom of the socket passes over the tube terminals through the Air Chimney and exits through the anode cooling fins.

Cooling

The maximum temperature rating for the anode core and the metal/ceramic seals of the 5CX1500B is 250°C. Sufficient forced-air circulation must be provided to keep the temperature of the anode at the base of the cooling fins and the temperature of the ceramic/metal seals below 250°C. Air-flow requirements to maintain seal temperature at 225°C in 50°C ambient air are tabulated at upper right (for operation below 30 MHz).

Minimum Cooling Air-Flow Requirements				
	Sea Level		6,000 feet	
Plate dissipation (watts)	Air flow (CFM)	Pressure drop (Inches of water)	Air Flow (CFM)	Pressure Drop (Inches of water)
1000	27	0.33	33	0.40
1550	47	0.76	58	.95

Since the power dissipated by the filament represents about 200 watts and since grid plus screen plus suppressor dissipation can, under some conditions, represent another 125 watts, allowance has been made in preparing this tabulation for an additional 325 watts dissipation.

The blower selected in a given application must be capable of supplying the desired air flow at a back pressure equal to the pressure drop shown above plus any drop encountered in ducts and filters.

At other altitudes and ambient temperatures the flow rate must be modified to obtain equivalent cooling. The flow rate and corresponding pressure differential must be determined individually in such cases, using rated maximum temperatures as the criteria for satisfactory cooling.

Svetlana power grid tubes

Svetlana offers a line of well-engineered, carefully-constructed power grid tubes for both OEM- and end-user applications. As Russia's leading designer and manufacturer of power grid tubes, Svetlana's product line features power tubes at all levels up to and exceeding one megawatt, and includes high-performance triodes, tetrodes and pentodes.

Svetlana power tubes are designed for single sideband transmission, UHF and VHF television, FM broadcast, industrial heating, medical and scientific applications including high voltage pulse modulator service. And, the Svetlana line features a broad range of tubes designed specifically for very high power broadband distributed amplifiers.

Svetlana Electron Devices, Inc., manages the worldwide marketing, sales and support for the recently-privatized Svetlana in St. Petersburg, Russia. Svetlana Electron Devices has its corporate headquarters in Huntsville, Alabama with sales and support offices in cities throughout the world.

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ELECTRON DEVICES

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SVETLANA TECHNICAL DATA

SV6550C

High Performance Audio Beam Power Pentode



The Svetlana™ SV6550C is a glass envelope beam power pentode. It is intended for ultra linear audio frequency power amplification service. Close manufacturing specification tolerances and improved processing provide improved reliability and superior sonic performance. The new SV6550C features: increased peak cathode emission from new cathode materials; stable operation from extended processing and aging; gold-plated grid; new tri-plate anode; single-piece beam forming electrode; precise grid/screen alignment; improved vacuum processing; and comprehensive static and audio amplifier testing before and after aging.

The Svetlana SV6550C is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for any 6550.

Characteristics

Electrical

Heater:	Min.	Nom.	Max.	
Voltage (AC or DC)	5.7	6.3	6.9	V
Current		1.6		A
Cathode:	Oxide-coated, unipotential			
Cathode-to-heater potential, max.		-300*/200**		V
Direct interelectrode capacitances, max.***				
Grid no.1 to cathode and grid no.3, grid no.2, base sleeve and heater			18.5	pF
Plate to cathode and grid no.3, grid no.2, base sleeve and heater			12.5	pF
Grid no.1 to plate (max)			1.1	pF

Mechanical

Operating Position	Any
Base	Large wafer octal 8-pin with metal sleeve
Maximum dimensions:	
Height	116 mm (4.57 in.)
Seated height	106 mm (4.173 in.)
Diameter	46 mm (1.81 in.)
Cooling	Convection cooled
Envelope Temperature (max)	250°C
Approximate net weight	100 g (3.5 oz.)

AF Power Amplifier, Maximum ratings

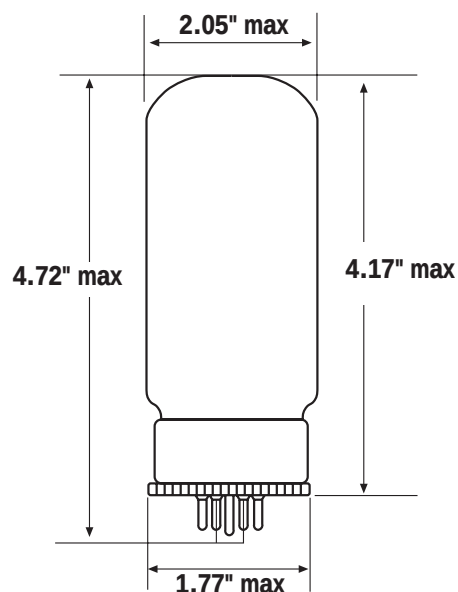
DC plate voltage	680	V
Grid no.2 DC (screen) voltage	400	V
Grid no.1 (control) voltage	-300	V
DC cathode current	175	mA
Plate dissipation	35	W
Grid no.2 (screen) dissipation	6	W

*Max with heater negative to cathode

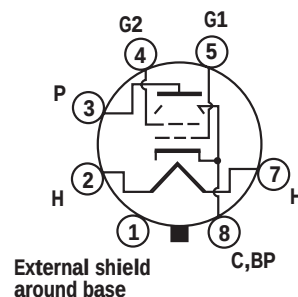
**Max with heater positive to cathode

***Without external shielding

Svetlana Outline drawing



Bottom View



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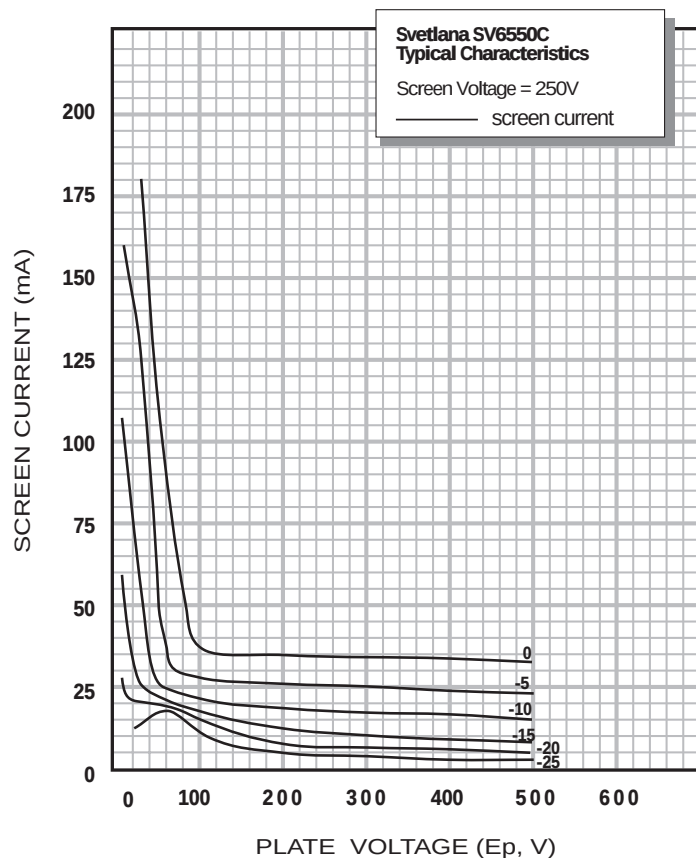
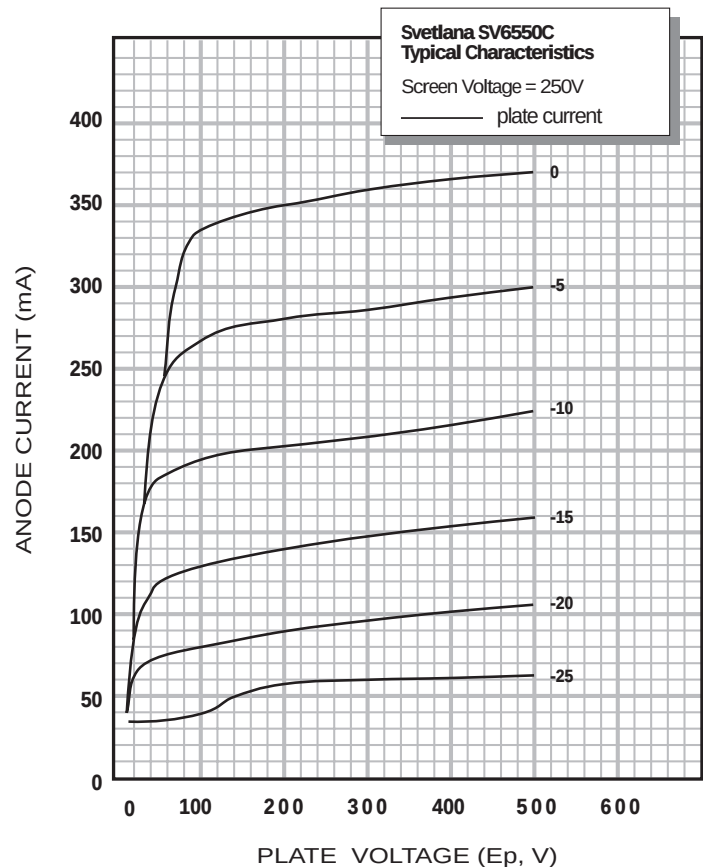
Svetlana SV6550C

High Performance Audio Beam Power Pentode



Typical Operation Class A₁ (single tube)

DC plate voltage	400	V
Grid no.2 DC (screen) voltage	225	V
Grid no.1 DC (control) voltage	-22	V
Peak AF grid no.1 (control) voltage	22	V
Zero-signal plate current	87	mA
Max signal plate current	105	mA
Zero signal grid no.2 (screen) current	4	mA _{dc}
Max signal grid no.2 (screen) current	18	mA
Transconductance (nominal)	9500	μS
Load resistance	3000	ohms
Signal output at 5% distortion	12	W





Svetlana 6AS7

Dual Power Triode for High Performance Audio Applications

The Svetlana™ 6AS7 is a glass envelope, dual power triode with high transconductance and high plate current capacity. Each triode has a plate dissipation rating of 13 Watts with convection cooling. It is intended for low distortion audio frequency power amplification service in either single or push-pull/parallel tube applications. The Svetlana 6AS7 has an indirectly-heated unipotential cathode. The heater may be DC operated for the absolute best hum/noise performance.

The Svetlana 6AS7A was originally designed as a series pass tube in regulated power supplies. Low plate resistance makes it an excellent choice in OTL and other high performance audio circuits. Close manufacturing specification tolerances and improved processing provides enhanced reliability and superior sonic performance.

The Svetlana 6AS7 is manufactured in the Svetlana factory in Russia, and is designed to be a direct replacement for any 6AS7.

General Characteristics

Electrical

Heater:	Min.	Nom.	Max.	
Voltage (AC or DC)	5.7	6.3	6.9	V
Current		2.5		A
Cathode:		Oxide-coated, unipotential		
Cathode-to-heater potential, max.			± 300	V
Direct interelectrode capacitances, max.***				
Grid to cathode			8	pF
Plate to cathode			3	pF
Grid no.1 to plate			11	pF

Mechanical

Operating Position**	Any
Base	JEDEC 8BD, octal 8-pin
Maximum dimensions:	
Height	140 mm (5.51 in.)
Diameter	52 mm (2.05 in.)
Cooling	Convection
Approximate net weight	90g (3.2 oz.)

**When mounting horizontally, pins 1 & 8 must be in the same horizontal plane

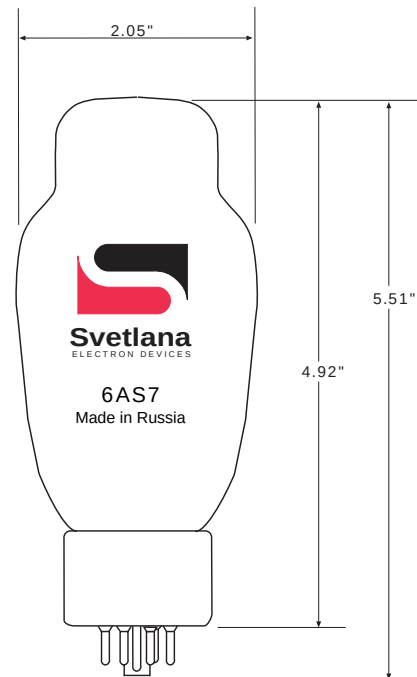
***Without external shielding, nominal values

AF Power Amplifier

Maximum ratings (per triode)

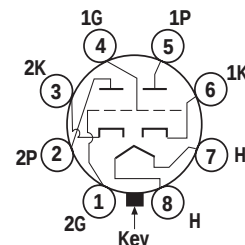
DC plate voltage	250	V
Transconductance (typical)	5500	μS
Grid no.1 (control) voltage	-150	V
DC cathode current	130	mA
Plate Resistance	280	Ω
Plate dissipation	13	W
Bulb temperature (surface hottest point)	250°	C

Svetlana 6AS7 Outline Drawing



Bottom View

Octal Base Connections



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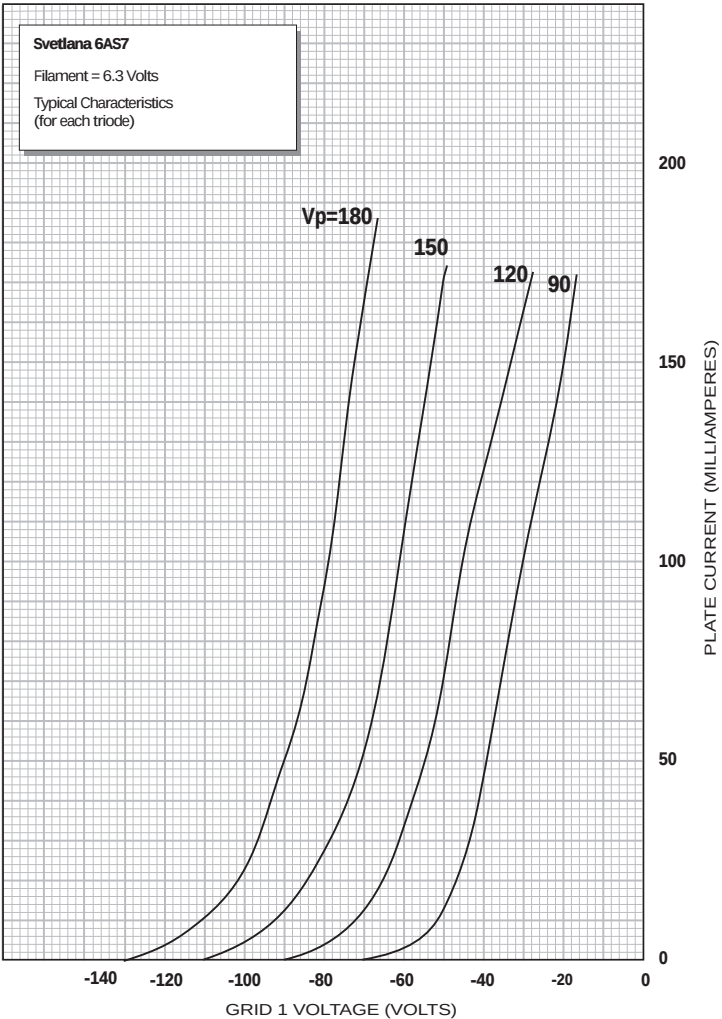
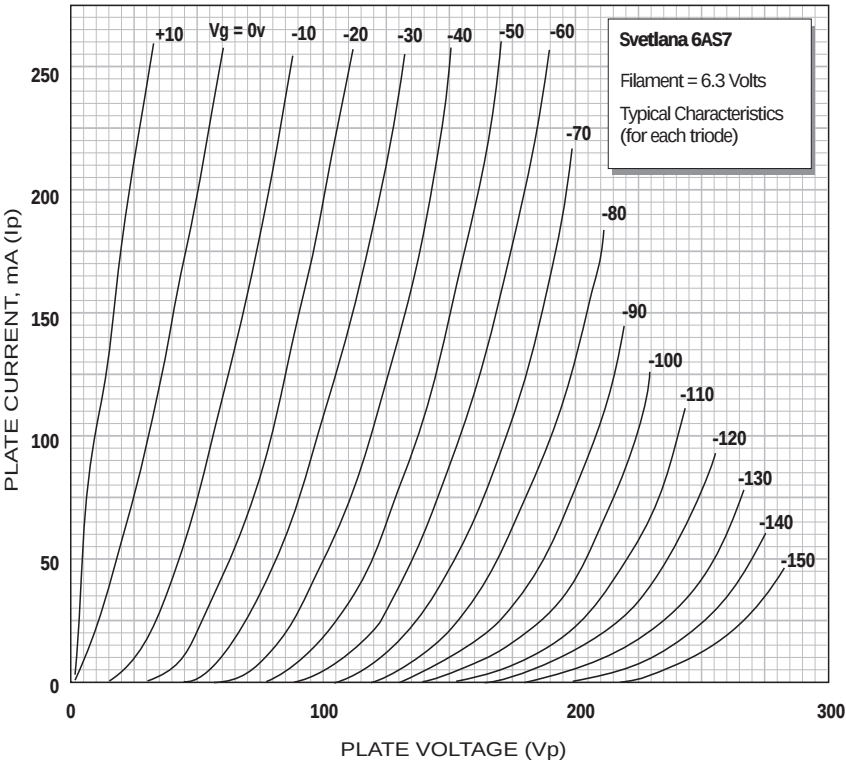
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Svetlana 6AS7

Dual Power Triode for High Performance Audio Applications

Typical Operation, Audio Power Amplifier, Class A,
Two Triodes, Push Pull

Plate voltage	250	V
Zero signal plate current	80	mA
Max signal plate current	110	mA
Cathode resistor (each triode)	1250	Ohms
Peak grid to grid AF signal	250	Vp-p
Effective Load resistance	6000	Ohms
Power output	10	W





Svetlana 6BM8

High Performance Audio

Dual Package, Triode and Pentode

The Svetlana™ 6BM8 is a single glass envelope containing both a power pentode and triode. It has a pentode plate dissipation rating of 7 Watts with convection cooling. A single 6BM8 may be used as an economical low power mono block amplifier or a pair of 6BM8's, in ultra linear configuration are an excellent choice for more power. The 6BM8 is also a great choice as a driver for higher power tubes, such as the Svetlana SV811 and SV572 series triodes. It has an indirectly-heated oxide cathode, which may be DC operated for the absolute best hum/noise performance.

Close manufacturing specification tolerances and improved processing provide enhanced reliability and superior sonic performance. The high sensitivity of Svetlana 6BM8's is an economical method to achieve high quality sound with a minimum of components.

The Svetlana 6BM8 is manufactured in the Svetlana factory in Russia, and is designed to be a direct replacement for any 6BM8 or ECL82.

General Characteristics

Electrical

Heater:	Min.	Nom.	Max.	
Voltage (AC or DC)	5.7	6.3	6.9	V
Current		0.78		A
Cathode:	Oxide-coated, unipotential			
Cathode-to-heater potential, max.			100	V
Direct interelectrode capacitances, max.*	Triode		Pentode	
Grid no. 1 to cathode	2.7		9.3	
Plate to cathode	4		8	
Grid no.1 to plate	4		0.3	

Mechanical

Operating Position	Any
Base	9-pin miniature
Socket	Svetlana SK-9A or similar
Basing diagram	JEDEC 9EX
Maximum dimensions:	
Height	78 mm (3.07 in.)
Seated height	71 mm (2.80 in.)
Diameter	22.2 mm (0.87 in.)
Cooling	Convection
Approximate net weight	20 g (0.7 oz.)

*Without external shielding, nominal values

Maximum Ratings

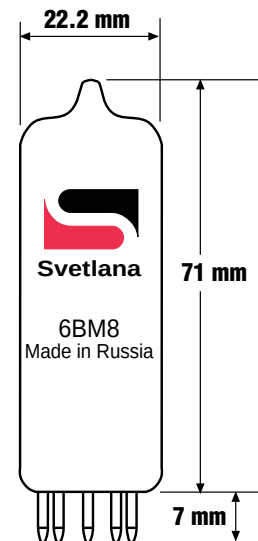
	Triode	Pentode	
DC plate voltage	300	600**	V
Cathode current	15	50	mA
Grid no.2 voltage	—	300	V
Plate resistance	—	20,000	Ohms
Plate dissipation	1	7	W

**Maximum peak positive pulse voltage 2500V

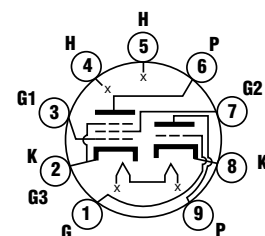
AF Power Amplifier

Average ratings	Triode	Pentode	
DC plate voltage	300	300	V
Grid no.2 DC (screen) voltage	—	200	V
Grid no.1 (control) voltage	-1.3	-24	V
DC plate current	1.1	40	mA
Grid no.2 DC (screen) current	—	8	mA
Amplification Factor	70	9.5	μ
Transconductance	2500	6400	μS
Plate load	150,000 Ohms	7000 Ohms	
Output power		1.8	W

Outline Drawing 6BM8 Triode and Pentode



Bottom View 9-pin Miniature Base Connections



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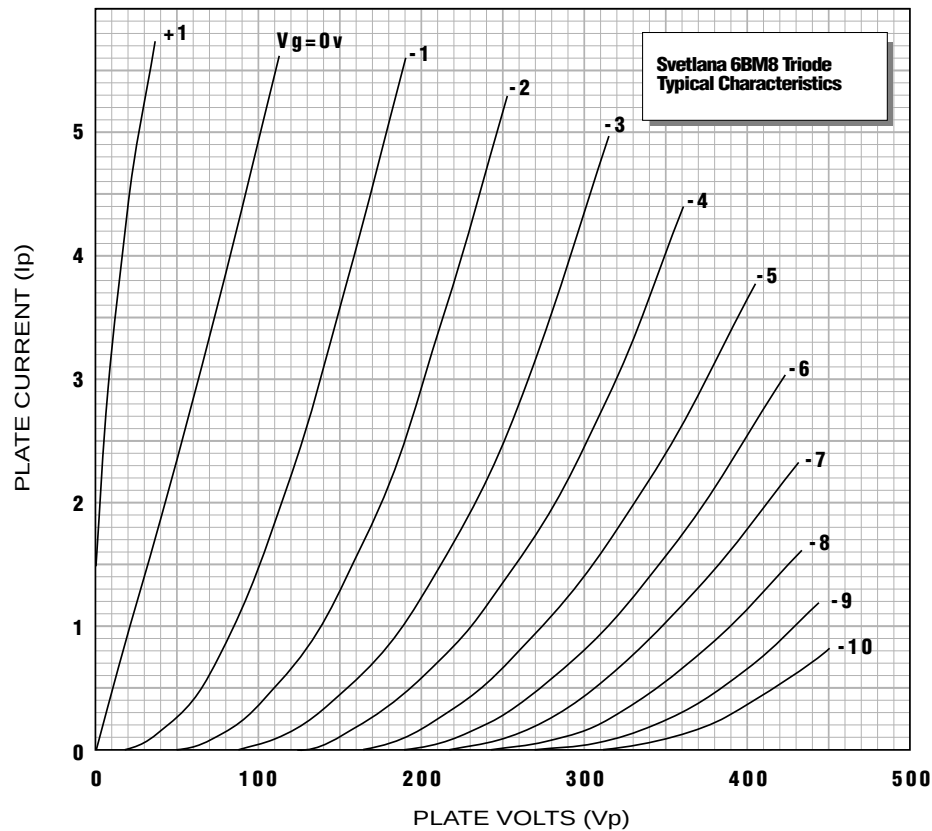
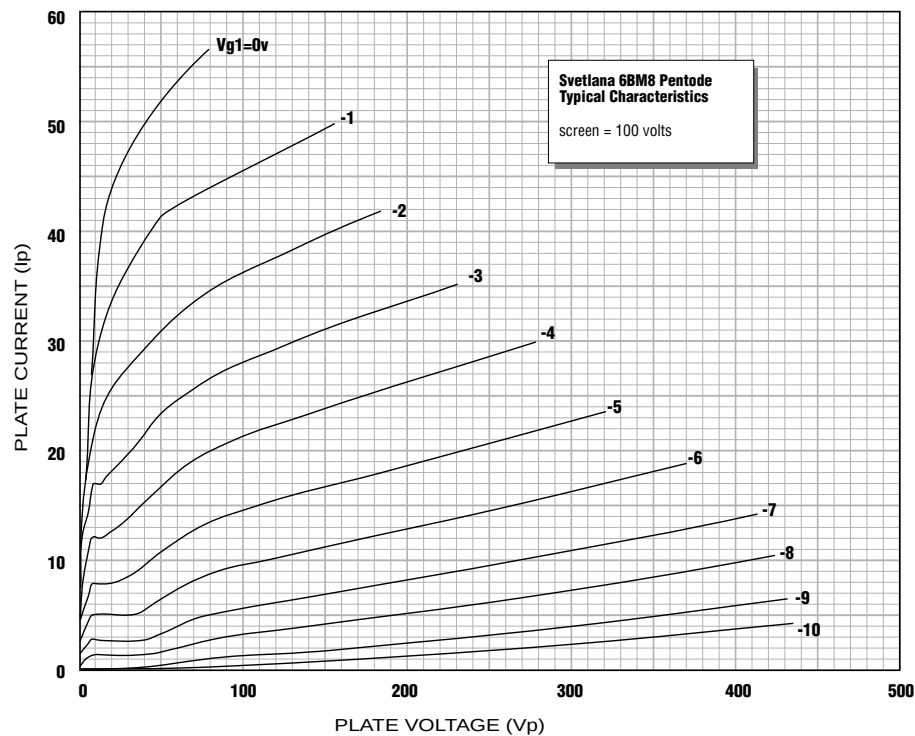
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Svetlana 6BM8

High Performance Audio

Dual Package, Triode and Pentode



SVETLANA TECHNICAL DATA

6D22S

High Performance Half-Wave Rectifier



The Svetlana™ 6D22S is a glass-envelope power diode for use as a half-wave B+ rectifier in high-quality audio amplifiers. Originally intended for color-TV damper-diode service, the 6D22S is similar to the 6DL3 except for base connections and some ratings. The 6D22S features very slow warmup (30 seconds typical), making it an excellent, rugged power-on delay device for audio amplifiers. Its warm-up time is longer than that of common rectifier tubes (such as the 5AR4/GZ34), and it is lower in cost than electronic delay relays.

Its heater may be operated from the same supply as other tubes in amplifier, up to $V_b=600$ volts. Its high pulse current capability gives sound quality which is superior to commonly-used rectifier tubes.

Characteristics

Electrical

Cathode	Oxide-coated, unipotential		
Voltage (AC or DC)	6.3 volts AC or DC (± 0.6 volts)		
Current	1.9	Amps	
Heater-cathode voltage	+200 volts, -600 volts, continuous		
Interelectrode capacitances (typical):			
Anode to cathode	12.0	pF	

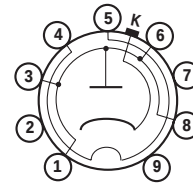
Mechanical

Base	standard 9-pin magnoval, glass button	
Basing diagram	see below	
Socket	Svetlana SK509 or similar	
Cathode connector	1/4" sweep-tube size (Svetlana PC509 or similar)	
Operating position	Any (vertical for convection cooling)	
Nominal dimensions:		
Height of glass envelope		76.0 mm (2.99 in.)
Diameter of glass envelope		28.5 mm (1.12 in.)
Overall height		95 mm (3.74 in.)
Net weight		80 g (2.82 oz.)

Maximum ratings

Peak inverse anode voltage	6000	V
Peak anode current	1	A
Anode current, continuous	300	mA
Anode dissipation	11	W
Envelope temperature	200°	C

Svetlana Outline drawing



1, 3, 6, 8	Anode
2, 7, 9	No Connection
4, 5	Heater
K	Cathode (top cap)



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Svetlana 6D22S

High Performance

Half-Wave Rectifier



Svetlana designs and builds audio tubes modeled after the great American and European designs. Strict Russian Military standards and quality control give these tubes the sound you want and the quality you expect from Svetlana.

Visit our extensive web site where you will find a wealth of information about all the Svetlana products. From complete data sheets of each tube to "Technical Bulletins" for popular RF and audio tube applications, this site offers the most comprehensive downloadable tube library in the industry. Online help is just a click away. Visit the "Ask the Experts" section and get direct answers to your most pressing tube questions. Our experts cover the whole tube spectrum: Broadcast, Industrial/Scientific/Medical, Communications, Amateur Radio, HiFi and Guitar. But that's not all. Use the Svetlana Home Page as a jumping-off point to browse the industry's best web sites. The list of "Related Web Sites" is even broken down into categories so your search is directly related to what you're looking for. The "What's New" section keeps you posted on the very latest developments from the Svetlana factory in Russia and the "Distributors" section will show you exactly where to get the Svetlana products you've been hearing about.

www.svetlana.com

Svetlana SV6L6GC

High Performance Audio Beam Power Tetrode



The Svetlana SV6L6GC is a glass envelope beam-power tetrode intended for high-power audio amplifier service. Close manufacturing specification tolerances and improved processing provide improved reliability and superior sonic performance. The Svetlana SV6L6GC is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for any 6L6 type.

The Svetlana SV6L6GC features:

- Design and construction based on the Sylvania 6L6GC/STR387
- Extra-rugged construction for use in music amplifiers--thick mica spacers and extra bracing reduce microphonic effects and resist mechanical and thermal shocks
- Increased peak cathode emission from new cathode materials
- Gold-plated grid and extended processing and aging for stability and reliability
- Tri-plate anode for superior dissipation
- Precise grid/screen alignment
- Comprehensive static and audio amplifier testing before and after aging
- May be operated in inverted position--base fits into socket clamps in Fender guitar amplifiers

General Characteristics

	min	typ	max	
Heater Voltage (AC or DC)	5.7	6.3	6.9	V
Heater Current @6.3V		0.9		A
Cathode:	oxide-coated, unipotential			
Cathode-to-heater potential			±200	V
Direct interelectrode capacitances :				
Grid no. 1 to plate			0.6	pF
Grid no. 1 to cathode, heater, grid no. 2, and beam forming plates			10	pF
Plate to cathode, heater, grid no. 2, and beam forming plates			6.5	pF

Mechanical

Operating position	Any
Base	Large wafer octal 8-pin
Basing diagram	JEDEC 7AC
Cooling	Radiation and convection
Envelope temperature (max)	250 C
Nominal dimensions:	
Diameter	38.8mm (1.528 in.)
Base to top	93mm (3.605 in.)
Overall height	108mm (4.252 in.)
Diameter of base	34mm (1.339 in.)
Net weight	65 grams

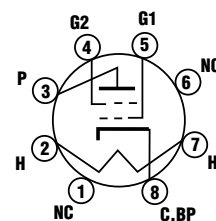
Maximum ratings

DC plate voltage VP	500	V
Screen grid voltage Vg2	500	V
Plate Dissipation	30	W
Screen Grid Dissipation	5	W

Svetlana SV6L6GC Outline drawing



Base pin connections bottom view



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Svetlana SV6L6GC

High Performance Audio

Beam Power Tetrode



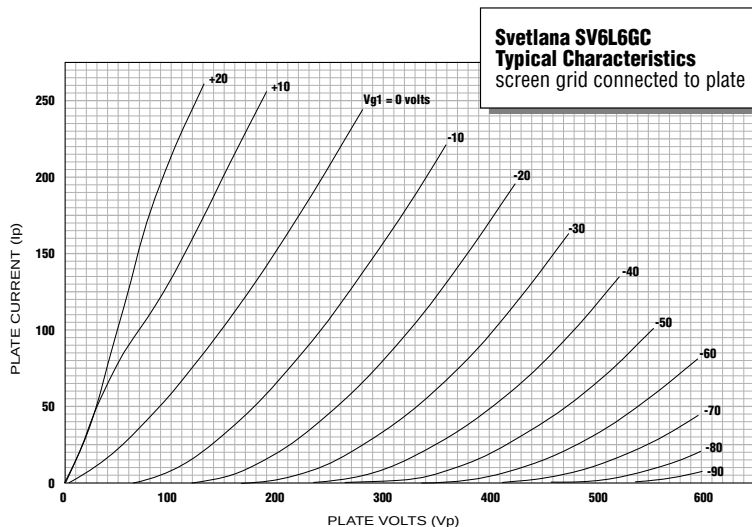
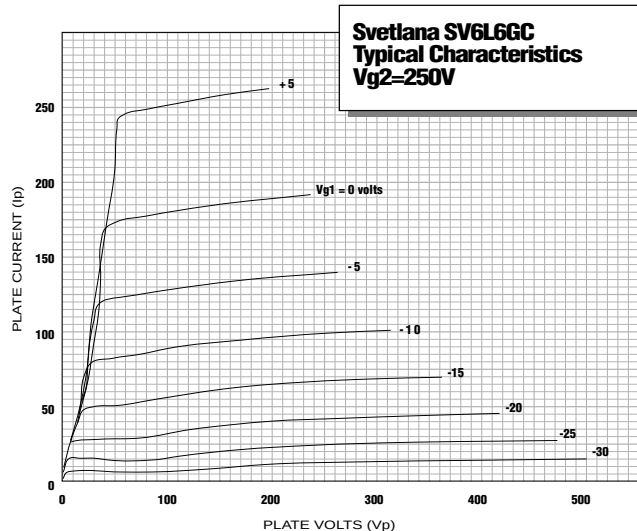
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ELECTRON DEVICES

Typical Operation, Class A, Audio Power Amplifier, Single Tube Connection

	tetrode	triode	
DC plate voltage	350	250	V
Screen grid voltage	250		V
Control grid bias voltage	-18	-20	V
Peak AF grid voltage	18	20	V
Zero-signal plate current	54	40	mA
Maximum-signal plate current	66	44	mA
Zero-signal screen grid current	2.5		mA
Maximum-signal screen current	7		mA
Plate resistance (approx)	33000	1700	ohms
Transconductance (approx)	5200	4700	μS
Load Resistance	4200	5000	ohms
Total harmonic distortion	15	5	%
Maximum signal power output	10.8	1.4	W

Typical Operation, Class AB₁, Audio Power Amplifier (Values for two tubes)

DC plate voltage	450	V
Screen grid voltage	400	V
Control grid bias voltage	-37	V
Peak AF grid-to-grid voltage	70	V
Zero-signal plate current	116	mA
Maximum-signal plate current	210	mA
Zero-signal screen grid current	5.6	mA
Maximum-signal screen current	22	mA
Load Resistance, plate-to-plate	5600	ohms
Total harmonic distortion	1.8	%
Maximum signal power output	55	W



SVETLANA TECHNICAL DATA

6N1P Dual Audio Triode



The Svetlana™ 6N1P is a miniature glass-envelope small-signal dual triode intended for use as a line-level amplifier or driver in high-quality audio amplifiers. Except for higher heater-current consumption, it is a direct plug-in replacement for the 6DJ8, ECC88 or 6922 in most high-level audio applications. Features include very low distortion—optimized for line stages; medium transconductance; internally shielded between sections, allowing their use at differing signal levels; higher plate-voltage and dissipation rating than 6DJ8 types; and larger cathode than 6DJ8 types, giving it longer life and more transient current capability.

Characteristics

Electrical

Cathode	Oxide-coated, unipotential	
Heater voltage (AC or DC)	6.3 volts AC or DC (± 0.6 volts)	
Heater current	600 mA $\pm$ 35 mA	
Heater-cathode voltage	± 100 volts peak	
Amplification factor (nominal)	33	
Transconductance (nominal)	7500	μS
Plate resistance (nominal)	4400	ohms
Interelectrode capacitances (typical), per section, with cathode grounded:		
Grid to cathode	3.2	pF
Anode to cathode	1.5	pF
Grid to anode	1.6	pF

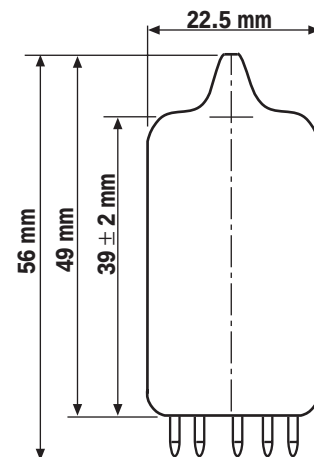
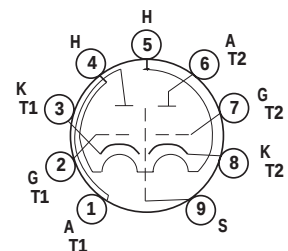
Mechanical

Base	standard 9-pin miniature, glass button	
Basing diagram	JEDEC 9AJ	
Socket	9-pin miniature	
Operating position	Any	
Nominal dimensions:		
Height of glass envelope	49 mm	(1.93 in.)
Diameter of glass envelope	22.5 mm	(.88 in.)
Overall height	56 mm	(2.20 in.)
Net weight	15 g	(.50 oz.)

Maximum ratings

Anode voltage, DC	250	V
Anode dissipation, per triode	2.2	W
Cathode current, continuous, per triode	20	mA
Maximum grid-circuit resistance	0.5	megohm

Svetlana Outline drawing



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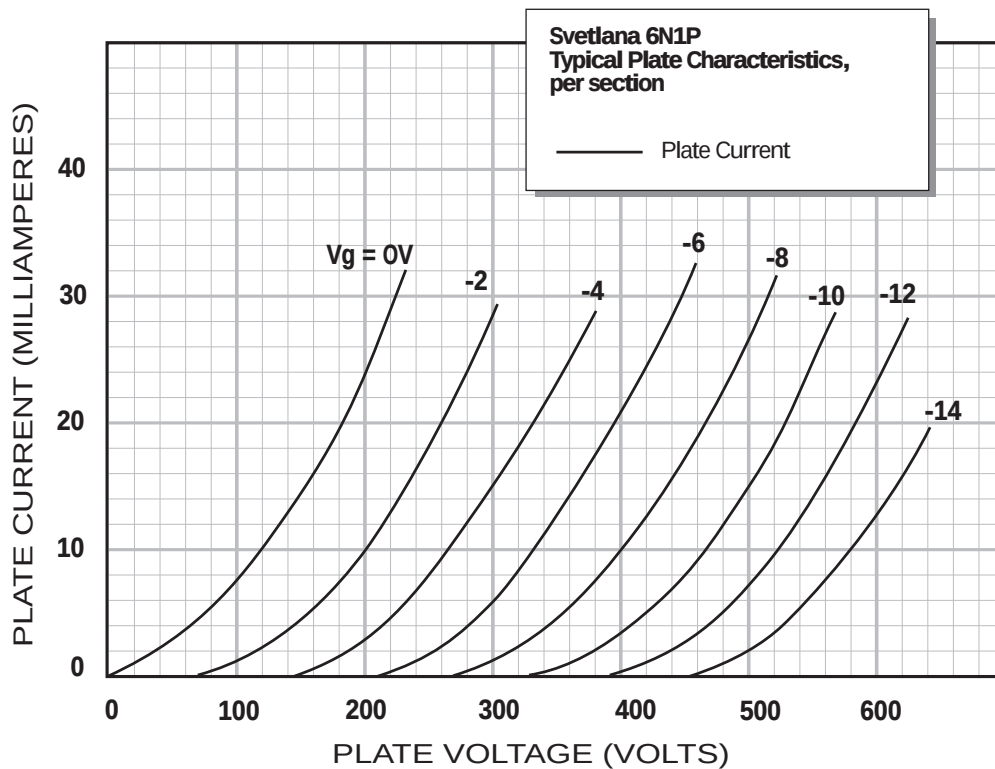
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Svetlana 6N1P

Dual Audio Triode





SVETLANA TECHNICAL DATA

812A

Medium-Mu Power Triode



he Svetlana™ 812A is a high perveance, easy to drive medium-mu triode closely modeled after the original RCA design. Improvements include a low loss easy to clean ceramic base and a ceramic thermal insulator under the plate cap. The Svetlana 812A may be used as an AF power amplifier, modulator or RF amplifier at full ratings to 30MHz and reduced ratings to 100MHz.

The Svetlana 812A is designed to be a direct replacement for any 812A now in service.

Characteristics

Electrical

Filament:	Thoriated-tungsten
Voltage (AC or DC)	6.3 ± 0.3 V
Current	4 A
Amplification factor (average)	29
Maximum frequency for full ratings	30 MHz
Interelectrode capacitances:	
Grid to filament	5.4 pF
Plate to filament	0.77 pF
Grid to plate	5.5 pF

Mechanical

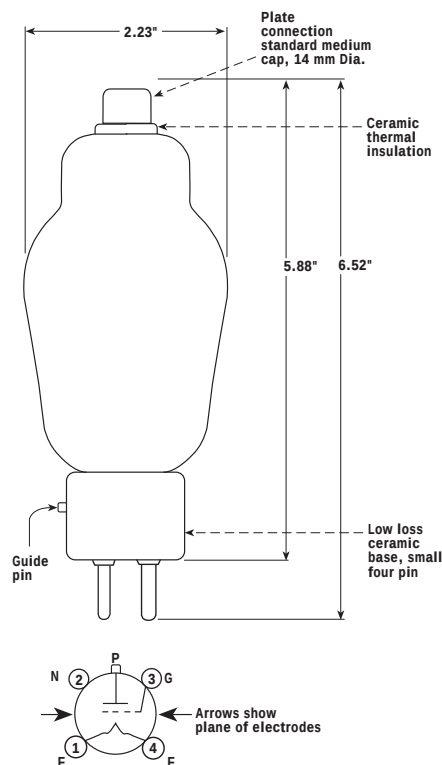
Cooling	Convection
Base	Ceramic standard 4 pin
Socket	Svetlana SK4A
Plate connector	PC1A or equivalent
Operating position-	Vertical or Horizontal (pins 1 & 4 in vertical plane)
Maximum dimensions:	
Diameter	57 mm (2.23 in.)
Length	166 mm (6.52 in)
Net weight (average)	113 gm (4 oz)

Maximum ratings	CCS**	ICAS***	
DC plate voltage	1250	1500	V
Maximum-signal DC plate current	175	175	mA
Plate Dissipation	45	65	W
Grid Dissipation	7	7	W
DC grid voltage	-200	-200	V

** Continuous commercial service

*** Intermittent commercial and amateur service

Svetlana Outline drawing



Frequency (MHz)	Plate Voltage and plate input
60	89%
80	70%
100	55%

At maximum CCS ratings, the plate shows no color. At ICAS ratings, the plate shows barely perceptible red color.



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Svetlana 812A

Medium-Mu Power Triode



Typical Operation, Class C (Frequencies to 30 MHz)	CCS**	ICAS***	
DC plate voltage	1250	1500	V
DC grid voltage	-90	-120	V
Peak grid voltage	200	240	V
Plate current	140	170	mA
DC grid current	30	30	mA
Grid drive power*	5.4	6.5	W
Power output *	130	190	W
Plate dissipation	45	65	W

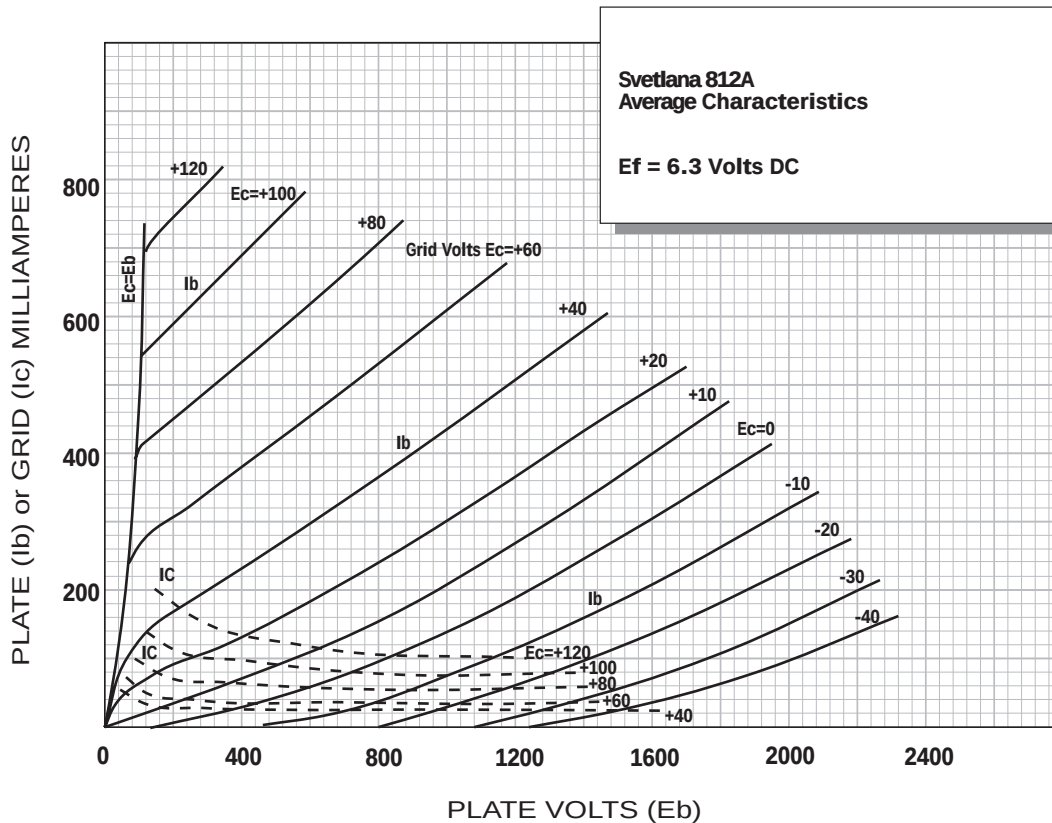
Typical Operation, Class B values for 2 tubes (AF Power Amplifier and Modulator)

DC plate voltage	1250	1500	V
DC grid voltage	-40	-48	V
Peak grid voltage	225	270	V
Plate current	260	310	mA
Zero signal plate current	22	28	mA
Grid driving power*	3.5	5	W
Power output *	235	340	W
Effective load resistance	12,200	13,200	ohms

* approximate

** Continuous commercial service

*** Intermittant commercial and amateur service





Svetlana 8161R Medium-Mu Power Triode

The Svetlana™ 8161R is a high-performance ceramic/metal power triode designed for use in amplifier, oscillator, or modulator service. A modern mesh filament is used, replacing the old-fashioned hairpin construction. The improved mesh filament design ensures better mechanical rigidity and long lasting concentricity of the filament, providing enhanced linearity, less noise, reduced warm-up variation and longer life. The low-inductance, mesh-filament basket also forms a natural extension of the cylindrical stem geometry into the active area, giving superior VHF performance.

The Svetlana 8161R is manufactured in the Svetlana Electron Devices complex in St. Petersburg, Russia. Svetlana has achieved the improved performance described above with exact replacement compatibility with the 8161R manufactured in the United States.

General Characteristics

Electrical

Filament	Thoriated-tungsten mesh
Voltage	7.50 ±0.37V
Current @ 7.50V	51.5A
Amplification factor (average)	22
Direct interelectrode capacitances (grounded filament):	
Input	35.0pF
Feedback	20pF
Output	0.9pF
Maximum frequency for full ratings (CW)	120+ MHz

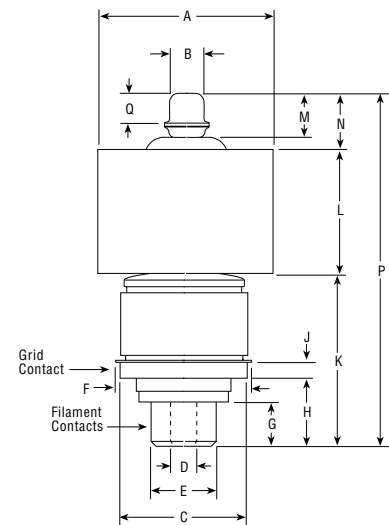
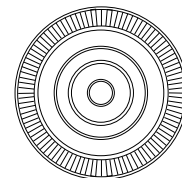
Mechanical

Cooling	Forced air
Base	Coaxial
Socketing	Via spring collets
Operating position	Vertical, Base up or down
Maximum operating temperature	250° C
Maximum dimensions:	
Length	228.60 mm (9.000 in.)
Diameter	105.56 mm (4.156 in.)
Net weight	2.8 kg (6.2 lb)

Maximum Ratings

	Plate Modulated RF Amplifier, Class C Telephony	Audio Frequency Amplifier or Modulator, Class AB2	RF Power Amplifier or Oscillator, Class C, FM or CW	
DC plate voltage	5500	6000	6000	V
DC plate current	2.0	2.5	2.5	A
Plate dissipation	2670	4000	4000	W
Grid dissipation	150	150	150	W
DC grid voltage	-1000	-1000	-1000	V
DC grid current			0.4	A

Svetlana 8161R Outline drawing



Dimensional Data

	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	103.99	105.56	4.094	4.156
B	19.83	21.44	0.781	0.844
C	75.95	76.45	2.990	3.010
D	15.62	16.13	0.615	0.635
E	37.85	38.35	1.490	1.510
F	—	92.08	—	3.625
G	20.65	23.80	0.813	0.937
H	34.92	41.28	1.375	1.625
J	9.93	10.72	0.391	0.422
K	98.43	107.95	3.875	4.250
L	74.60	77.80	2.937	3.063
N	30.15	42.85	1.187	1.687
P	203.20	228.60	8.000	9.000
Q	17.45	20.65	0.687	0.813



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Svetlana 8161R Medium-Mu Power Triode



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Typical Operation

RF Power Amplifier or Oscillator, Class C FM or CW (Frequencies to 110MHz)

DC plate voltage	4000	5000	6000	V
DC plate current	2.5	2.5	2.08	A
DC grid voltage*	-300	-450	-500	V
DC grid current*	245	265	180	V
Peak RF grid voltage*	580	750	765	V
Driving Power*	142	197	136	W
Grid dissipation*	68	78	46	W
Plate input power	10,000	12,500	12,500	W
Plate dissipation	2500	2500	2500	W
Plate output power	7500	10,000	10,000	W

*Approximate values

Plate Modulated RF Amplifier, Class C Telephony (Frequencies to 30MHz)

DC plate voltage	4000	4500	5000	V
DC plate current	1.67	1.47	1.25	A
DC grid voltage	-450	-500	-550	V
DC grid current*	180	140	150	mA
Peak RF grid voltage*	685	715	760	V
Driving power	125	100	115	W
Grid dissipation*	43	30	32	W
DC plate input power	6670	6615	6250	W
Plate dissipation	1670	1315	950	W
Plate output power	5000	5300	5300	W

Audio Frequency Amplifier or Modulator, Class AB₂

Maximum Ratings (per tube)

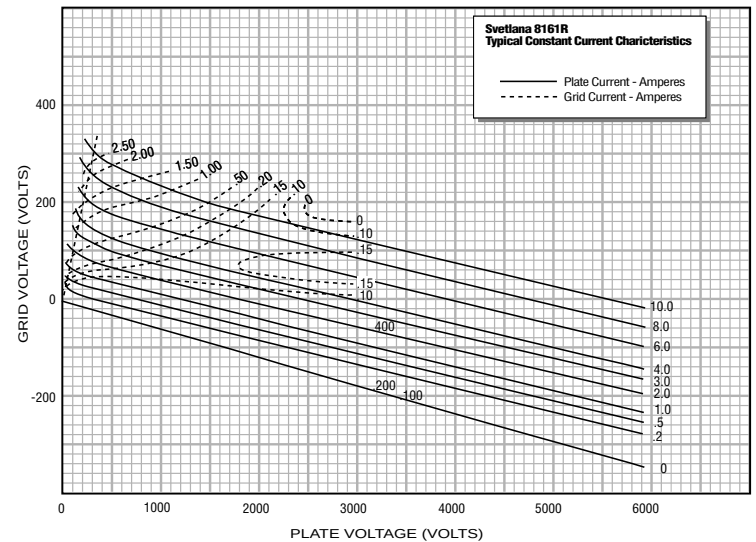
DC plate voltage	6000	V
DC plate current	2.5	A
Plate dissipation	4000	W
Grid dissipation	150	W
DC grid voltage	-1000	V

Typical Operation (two tubes sinusoidal waveform)

DC plate voltage	4000	5000	6000	V
Zero-signal DC plate current*	0.6	0.5	0.4	A
Maximum-signal DC plate current	4.0	3.2	3.0	A
DC grid voltage**	-150	-190	-240	V
Peak AF grid voltage (per tube)*	340	360	390	V
Maximum-signal peak driving power*	340	230	225	W
Maximum-signal nominal driving power*	170	115	113	W
Load resistance, plate-to-plate	2200	3600	4650	Ohms
Maximum-signal plate output power	11,000	11,000	13,000	W

*Approximate values

**Adjust to give stated zero-signal plate current



Base-to-Anode Air Flow

Anode Dissipation Watts	Sea Level		5000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
2500	36	0.6	43	0.72
4000	67	1.20	80	1.45

Anode-to-Base Air Flow¹

Anode Dissipation Watts	Sea Level		5000 Feet	
	Air Flow CFM	Pressure Drop Inches of Water	Air Flow CFM	Pressure Drop Inches of Water
2500	42	0.70	50	0.84
4000	84	1.70	101	2.00

¹ When air is supplied in the anode-to-base direction, a minimum of 3 cfm must be directed into the filament-stem structure between the inner and outer filament terminals to maintain the base seals below 250° C. A separate air system is not required with base-to-anode airflow.

SVETLANA TECHNICAL DATA

8560AS

Conduction-cooled Radial Beam Power Tetrode



The Svetlana™ 8560AS is a compact metal/ceramic radial beam tetrode having a plate dissipation rating of 200 Watts with conduction cooling. The 8560AS is intended for Class AB SSB linear and FM CW RF amplifier service. The 8560AS has an indirectly-heated oxide cathode.

The inside-contact surface of the screen-grid ring is carefully controlled to mate with Motorola Micor® equipment sockets. The welded plate cap is rugged so it will not be damaged when used with tube removal devices.

The Svetlana 8560AS is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for the 8560AS manufactured in the United States.

Characteristics

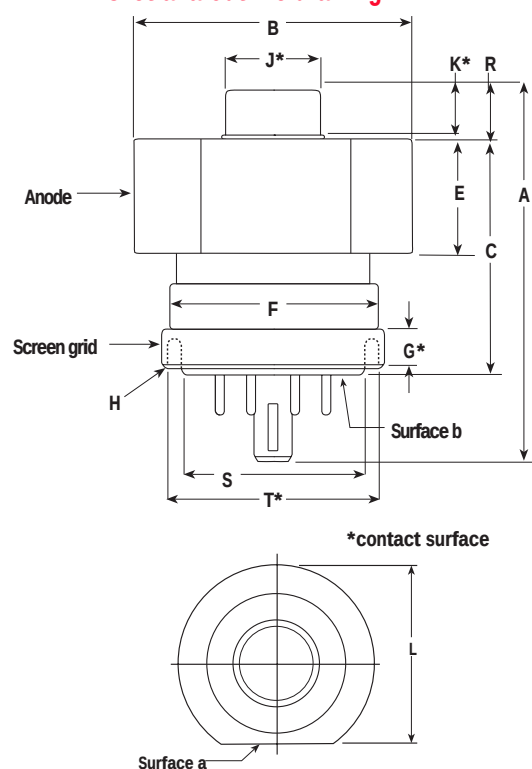
Electrical

	Min.	Nom.	Max.
Heater Voltage (AC or DC)	5.7	6.0	6.3 V
Cathode: Oxide-coated, unipotential			
Cathode-to-heater potential, max.			± 150 V
Direct interelectrode capacitances, max., Grounded cathode:			
Input			15.7 pF
Output			4.5 pF
Feedback			0.04 pF
Maximum frequency for full ratings (CW)			500 MHz

Mechanical

Operating Position	Any
Base	Special 9-pin
Recommended socket	Svetlana SK2A or Eimac/Johnson SK-660 series
Maximum dimensions:	
Height	62.1 mm (2.445 in.)
Diameter	41.4 mm (1.630 in.)
Maximum operating temperature; ceramic to metal seals	250° C
Cooling	Conduction
Maximum net weight	235 g (8.3 oz.)
Approximate shipping weight	700 g (1.5 lb.)

Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	58.55	62.10	2.305	2.445
B	41.15	41.40	1.620	1.630
C	38.86	40.39	1.530	1.590
E	16.76	18.80	0.660	0.740
F		35.71		1.406
G	4.75		0.187	
H	Standard base to fit MICOR® equip.			
J	14.20	14.53	0.559	0.572
K	6.10		0.240	
L	38.74	39.12	1.525	1.540
N	89°	91°	89°	91°
R	6.86	7.87	0.270	0.310
S		30.33		1.194
T	33.98		1.338	



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8560AS

Conduction-cooled Radial Beam Power Tetrode

Radio Frequency Linear Amplifier, Class-AB₁, SSB Operation

Maximum ratings

DC plate voltage	2000 V
DC screen voltage	400 V
DC plate current	250 mA
Plate dissipation	200 W
Screen dissipation	12 W
Grid dissipation	2 W

Typical Operation

(Peak-envelope conditions except where noted, grid driven)

DC plate voltage	1000	1500	2000	V
DC screen voltage	350	350	350	V
DC grid voltage*	-55	-55	-55	V
Zero-signal plate current	100	100	100	mA
Single tone plate current	250	250	250	mA
Two-tone plate current	190	190	190	mA
Single-tone screen current**	10	8	5	mA
Two-tone screen current**	2	-1	-2	mA
Single-tone grid current**	0	0	0	mA
Peak rf grid Voltage**	50	50	50	V
Plate output power	120	215	300	W
Resonant load impedance	2000	3000	4000	Ohms

* Adjust to specified zero-signal dc plate current ** Approximate values

Electrical Application

Plate operation The maximum rated plate dissipation is 200 Watts. This rating may be exceeded for brief periods during circuit adjustment without damage to the tube. The tube and associated circuits should be protected in the event of an internal arc by including a series current limiting resistance in the DC lead from the power supply to the plate. Its value must be 25 Ohms or more. The resistor should be capable of withstanding the high surge current caused by the arc. It should not be used as a fuse.

Mechanical Application

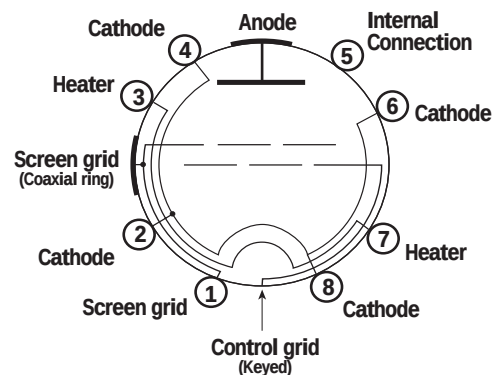
Mounting The 8560AS may be mounted in any position. The heat sink configuration may determine the mounting position of the tube. Ideally, the anode should be clamped to a heat sink or insulating thermal link and the socket should be semi-floating, mechanically.

Socket A socket designed to fit the JEDEC B8-236 base should be used. The Svetlana 8560AS base dimensions are controlled to mate with Motorola MICOR[®] equipment. For new designs, the Svetlana SK2A or Johnson/Eimac SK-660 series is suggested. The Svetlana SK2A does not include a screen by-pass capacitor.

Cooling Sufficient cooling must be provided for the anode, base seals and body seals to maintain operating temperatures below the rated maximum values. Total conduction cooling or a combination of forced air and conduction cooling may be used. The use of sufficient pressure and thermal-conducting compound between the anode flat and the heat sink or thermal link is necessary for good heat transfer.



Svetlana 8560AS Bottom View



Svetlana EF86

High-Performance Audio

Small-Signal Pentode



The Svetlana EF86 is a glass envelope miniature pentode intended for high-quality audio preamplifier service. Close manufacturing specification tolerances and improved processing provide improved reliability and superior sonic performance. The Svetlana EF86 is manufactured in the Svetlana factory in Russia, and is designed to be a direct replacement for any EF86 or 6267 type.

The Svetlana EF86 features:

- Low microphonics and low heater hum induction - suitable for input stages in high-gain microphone preamps, phono preamps or as a gain stage in condenser microphones
- Electrostatic shield is built-in, covers entire inner structure—no external shield required
- Low distortion in pentode or triode connection
- Extended processing and aging for stability and reliability
- Comprehensive static and audio amplifier testing before and after aging

General Characteristics

Electrical

	<i>min.</i>	<i>typ.</i>	<i>max.</i>	
Heater Voltage (AC or DC)	5.7	6.3	6.9	V
Heater Current (typical)		0.2		A
Cathode:		oxide-coated, unipotential		
Cathode-to-heater potential		± 100		V

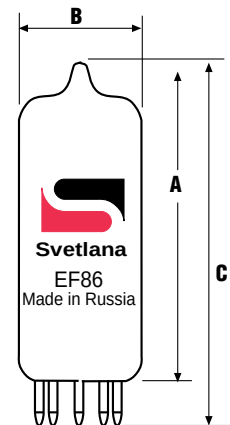
Mechanical

Operating position:	Any	
Base	9-pin miniature noval	
Basing diagram	JEDEC 9CQ	
Socket	Svetlana SK9A or equivalent	
Cooling	Radiation and convection	
Envelope temperature (max)	200	C
Nominal dimensions:		
Diameter	22 mm (0.867 in)	
Base to top	46.5 mm (1.836 in)	
Overall height	55.5 mm (2.180 in)	
Net weight	13 gm	

Maximum Ratings

DC plate voltage V_p	300	V
Screen grid voltage V_{g2}	200	V
Plate dissipation	1	W
Screen grid dissipation	0.2	W
Cathode current	6.0	mA

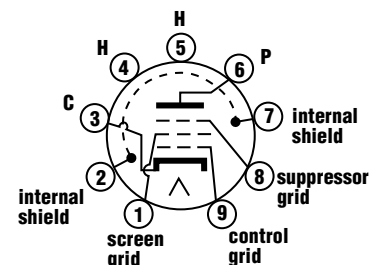
Svetlana EF86 Outline drawing



Dimensional Data

Dim.	Millimeters	Inches
A	46.5	1.835
C	55.5	2.180
B	22	0.867

Base pin connections bottom view



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Svetlana EF86

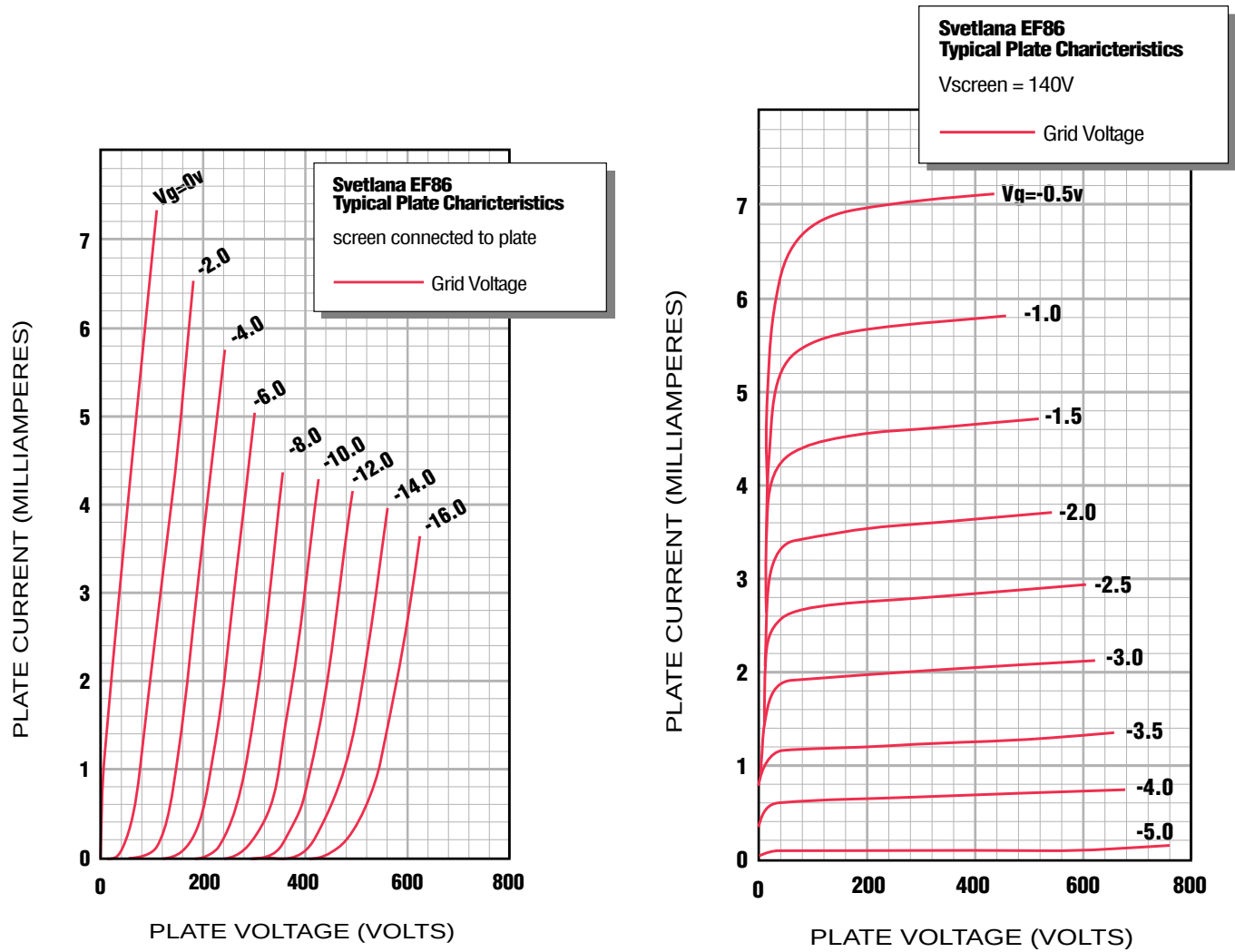
High-Performance Audio

Small-Signal Pentode



Typical operation, Class A Connection, Small-signal amplifier

	<i>pentode</i>	<i>triode</i>	
DC plate Voltage	250	250	V
Screen grid voltage	140		V
Cathode bias resistor	1k	3.9k	ohms
Zero-signal plate current	3	0.65	mA
Zero-signal screen grid current	0.6		mA
Plate resistance (approx)	2.5 megohms	65k	ohms
Load resistance	220k	220k	ohms
Total harmonic distortion	5	3.5	%
Maximum voltage output	50	39	vrms





SVETLANA TECHNICAL DATA

EL34/6CA7

High Performance Audio Power Pentode

The Svetlana™ EL34 is a glass envelope power pentode having a plate dissipation rating of 25 Watts with convection cooling. It is intended for audio frequency power amplification service in either pentode, ultralinear or triode connection and single or push-pull/parallel applications. The Svetlana EL34 has an indirectly-heated oxide cathode, which may be DC operated for the absolute best hum/noise performance.

The Svetlana EL34 plate is made from a laminated material that improves heat transfer and has superior performance under overload conditions which are often seen with guitar amplifiers. Close manufacturing specification tolerances and improved processing provide enhanced reliability and superior sonic performance. The high sensitivity of a pair or quad of Svetlana EL34's is an economical method to achieve high quality sound with a minimum of driving stage components.

The Svetlana EL34 is manufactured with the original Mullard design in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for any EL34/6CA7 or equivalent. The Svetlana EL34 gives electrical and audio performance very similar to that of the original Mullard EL34.

Characteristics

Electrical

Heater:	Min.	Nom.	Max.	
Voltage (AC or DC)	5.7	6.3	6.9	V
Current		1.6		A
Cathode:	Oxide-coated, unipotential			
Cathode-to-heater potential, max.			100	V
Direct interelectrode capacitances, max.***				
Grid no.1 to cathode and grid no.3, grid no.2, base sleeve and heater			<16	pF
Plate to cathode and grid no.3, grid no.2, base sleeve and heater			<0.6	pF
Grid no.1 to plate			<1.1	pF

Mechanical

Operating Position	Any
Base	JEDEC #8ET, octal, 8-pin
Maximum dimensions:	
Height	113 mm (4.45 in.)
Seated height	98 mm (3.86 in.)
Diameter	32 mm (1.26 in.)
Cooling	Convection
Approximate net weight	60 g (2.1 oz.)

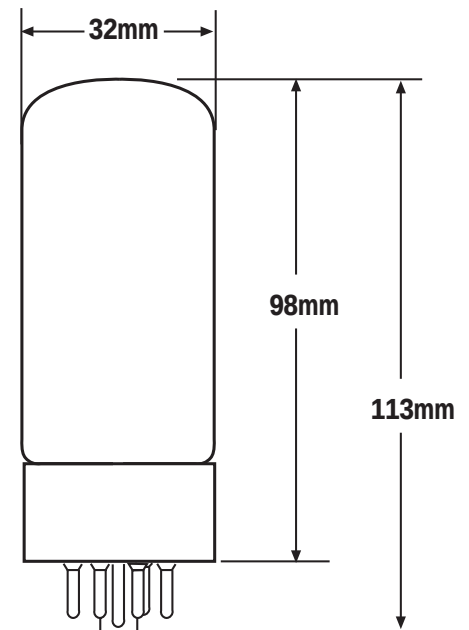
***Without external shielding, nominal values

AF Power Amplifier

Maximum ratings

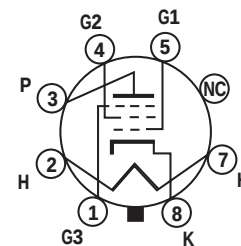
DC plate voltage	800	V
Grid no.2 DC (screen) voltage	500	V
Grid no.1 (control) voltage	-100	V
DC cathode current	150	mA
Plate dissipation	25	W
Grid no.2 DC (screen) dissipation	8	W
Bulb temperature (surface hottest point)	250°	C

Svetlana Outline drawing



Bottom View

Octal Base Connections



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Svetlana EL34/6CA7

High Performance Audio

Power Pentode



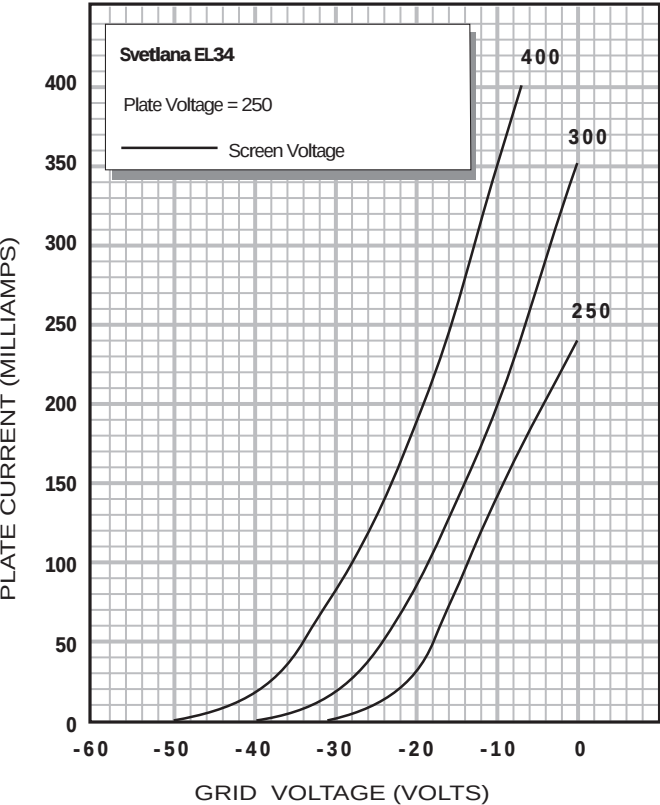
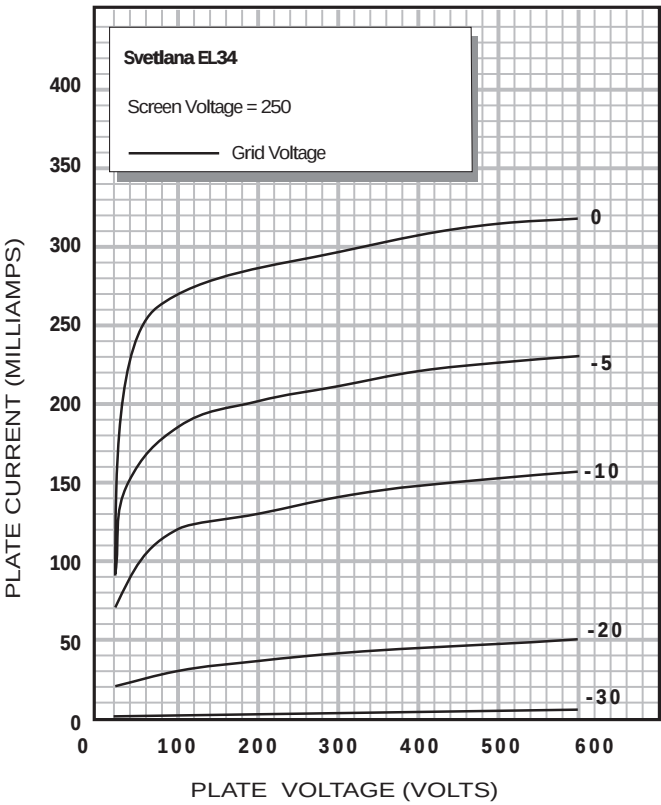
Typical Operation

AF Power Amplifier, Class A1 (single tube)		
Plate Voltage	250	V
Grid 2 Screen Voltage	250	V
Grid 1 Control Voltage*	-14	V
Peak AF Grid 1 Control Voltage	14	V
Zero Signal Plate Current	100	mA
Maximum Signal Plate Current	105	mA
Zero Signal Grid 2 Screen Current (avg)	15	mA
Transconductance (nominal)	11,000	μ S
Load Resistance	2000	Ohms
Output Power at 5% distortion	10	W

* Approximate Value (set to zero signal plate current)

Typical Performance

EL34 Curves



SVETLANA TECHNICAL DATA

EL509/6KG6

High Performance Beam Power Tetrode



The Svetlana EL509/6KG6 is a beam power tetrode intended for use in class A, AB or B audio amplifiers and for class B or C RF amplification. Close manufacturing specification tolerances and improved high voltage processing provides improved reliability and superior performance.

The Svetlana EL509/6KG6 features:

Increased peak cathode emission from new cathode materials; Stable operation from extended processing and aging; Gold-plated grid; Precise grid/screen alignment; Extra-heavy glass envelope for ruggedness; Improved vacuum processing; Comprehensive testing before and after aging.

The Svetlana EL509/6KG6 is manufactured in Russia at the Svetlana factory and is designed to be a direct replacement for any 6KG6 or EL509. The strict manufacturing and quality controls at the Svetlana plant assure functionality and long life.

Characteristics

Electrical

Heater:	min	nom	max	
Voltage (AC or DC)	5.7	6.3	6.9	V
Current @6.3 volts		2.5		A
Transconductance (nominal)			18,000	μS
Plate resistance (nominal)			8000	ohms
Interelectrode capacitances (typical):				
Grid to plate			2.5	pF
Grid to cathode			25	pF

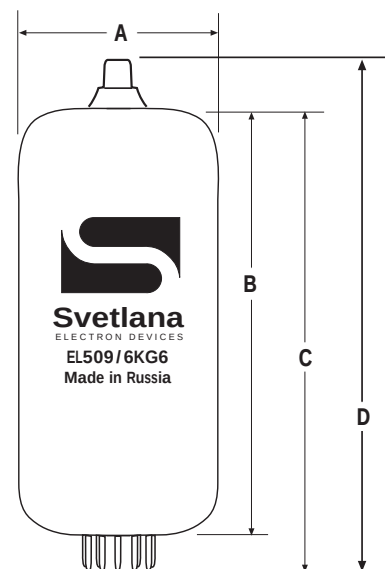
Mechanical

Cooling	Radiation and convection
Base	Nine pin magnoval, glass button
Basing diagram	JEDEC 9RJ
Socket	Svetlana SK509 or equivalent
Anode connector	1/4" plate clip, standard sweep tube type
Operation position	Axis vertical, base down or horizontal
Nominal dimensions:	
Diameter	45.6mm (1.75 in)
Base to top of envelope	96.6 mm (3.81 in)
Overall height (not including plate cap)	105.3 mm (4.145 in)
Overall height (including plate cap)	117.9 mm (4.641 in)
Net weight	110 gm

Maximum Ratings

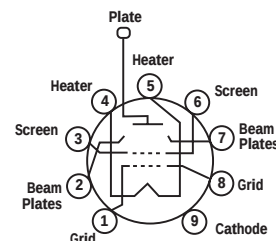
DC plate voltage	900	V
DC plate voltage, pulsed	8000	V
DC cathode current	500	mA
DC screen grid voltage	300	V
Screen dissipation	7	W
Plate dissipation	35	W

Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters	Inches
A	45.6	1.75
B	96.6	3.81
C	105.3	4.145
D	117.9	4.641



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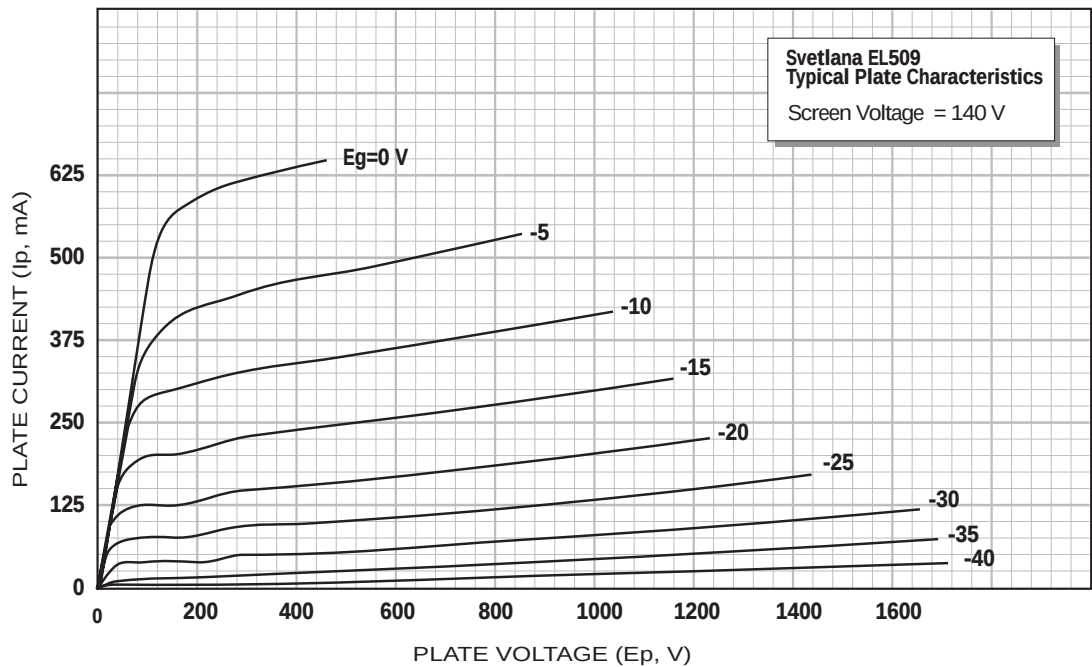
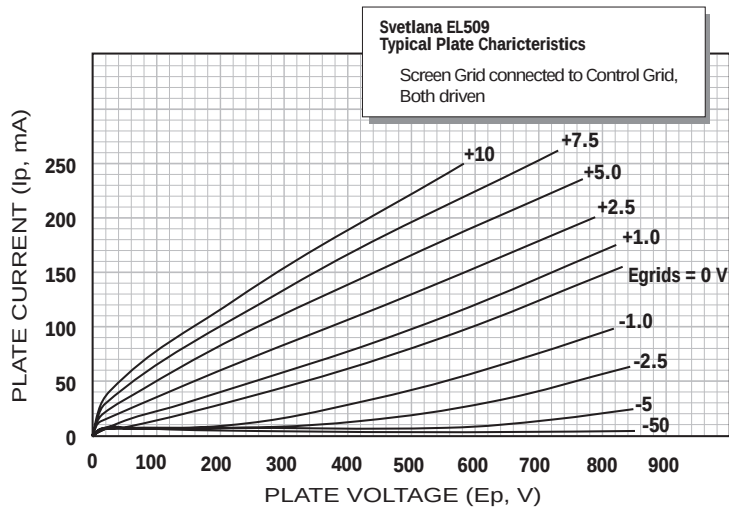
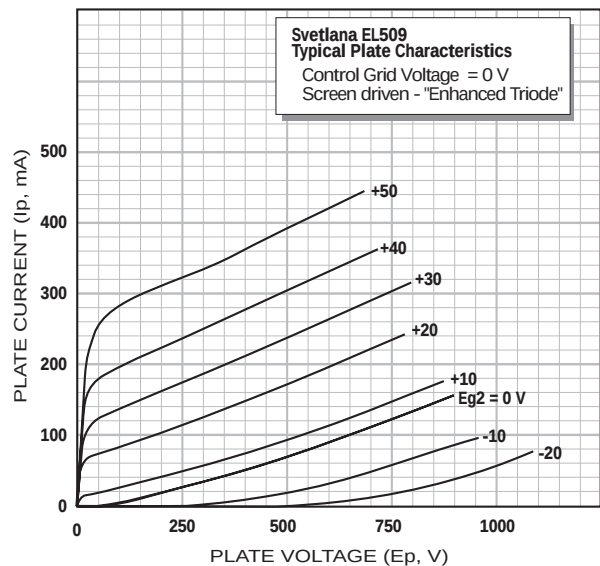
Svetlana EL509/6KG6

High Performance

Beam Power Tetrode

Typical Operation, Class A1, Audio Amplifier (single tube)

Plate voltage	500	V
Screen voltage	280	V
Grid no.1 voltage	-82	V
Peak grid drive	50	Vp-p
Plate current, no signal	70	mA
Plate current, max signal	100	mA
Effective load resistance	1650	ohms
Distortion at 1 watt into 8 ohms	0.9	%
Power output at 5% distortion	14	W



SVETLANA TECHNICAL DATA

GMI-42B Shielded-Grid Pulse Triode



The Svetlana™ GMI-42B is a metal-ceramic shielded-grid triode intended for use as a shunt regulator or pulse modulator in high-voltage systems. It features anode operating voltage of 33 kV and a plate dissipation of 500 watts using forced-air cooling. The GMI-42B has a shielding electrode connected internally to the cathode via short, low-impedance straps. This design permits operation with low grid current, and results in favorably low grid-anode capacitance. The presence of the ground-potential shield adjacent to the anode protects the cathode and the grid from damage due to transient arcs.

Features: --extremely rugged
--plate currents up to 33 amps (duty cycle 0.2%)

Characteristics

Electrical

<i>Cathode</i>	<i>Oxide-coated, unipotential</i>	
Voltage (AC or DC)	26.0 (± 2.5)	V
Current	3400(± 250)	mA
Heating time	3	min
Heater-cathode voltage, peak	±100	V
Amplification factor (nominal)	<10	
Transconductance (nominal)	400	uS
<i>Interelectrode capacitances (typical), with cathode grounded:</i>		
Input	<130	pF
Output	<25	pF
Feedback	<2	pF

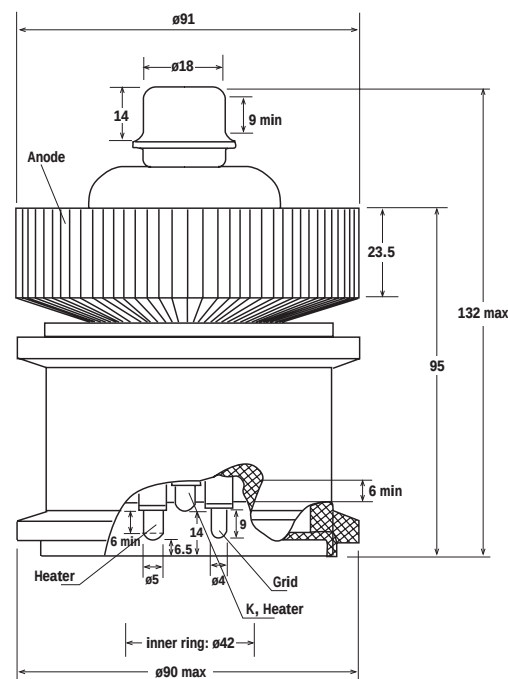
Mechanical

<i>Basing diagram</i>	<i>see below</i>
<i>Socket</i>	<i>customer-fabricated</i>
<i>Anode cap</i>	<i>approx. 11/16in (18 mm) diameter</i>
<i>Anode connector</i>	<i>Svetlana AC-5 (modified)</i>
<i>Operating position</i>	<i>Any</i>
<i>Cooling</i>	<i>Forced-air (see diagram)</i>

Nominal dimensions:

Height from base to anode top	95 mm (3 3/4 in)
Diameter of anode cooler	91 mm (3 9/16 in)
Outside diameter of base	90 mm (3 17/32 in)
Diameter of cathode and heater pins	5 mm (3/16 in)
Length of cathode and heater pins	9 mm (3/8 in)
Diameter of grid pin	4 mm (5/32 in)
Length of grid pin	9 mm (3/8 in)
Overall height	132 mm (5 3/16 in.)
Net weight	1.2 kg

Svetlana Outline drawing



Svetlana
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3/98

Svetlana GMI-42B Shielded-Grid Pulse Triode



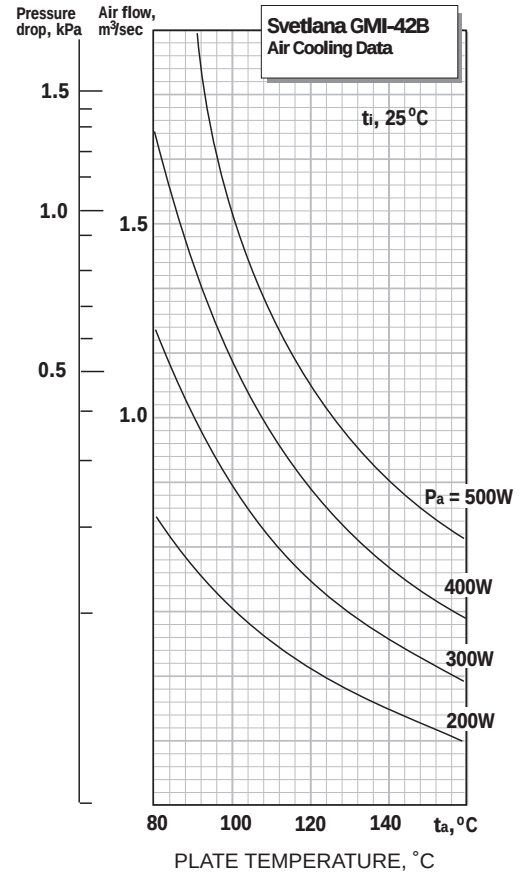
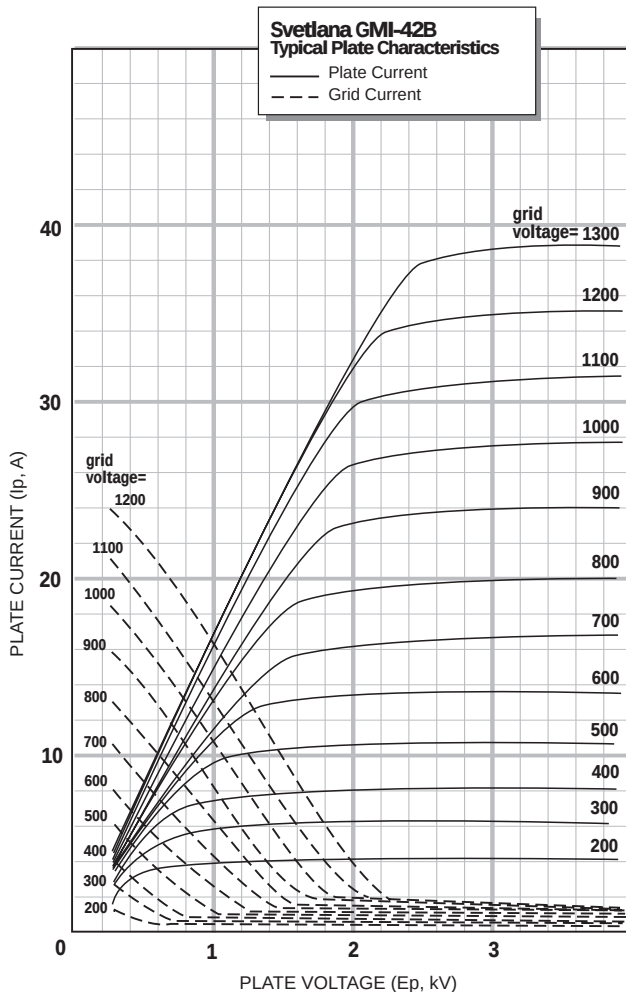
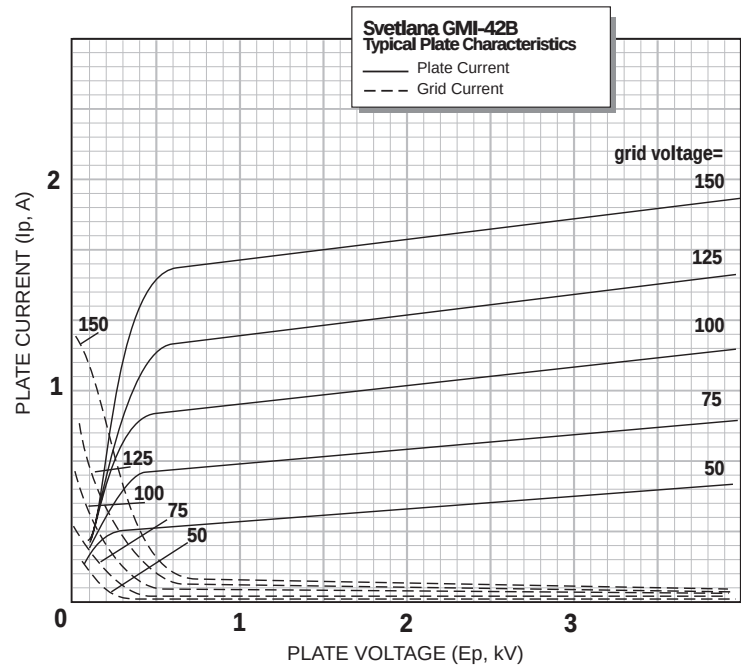
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Maximum ratings

Anode voltage	33	kV
Anode dissipation	500	W
Cathode current, pulse (max duration 50 μ s at max current)	33	A
Grid voltage, negative	-600	V
Grid voltage, positive (in pulse)	1400	V
Maximum grid dissipation	25	W
Seal temperature	250	$^{\circ}$ C

Typical operation as a switch:

Anode voltage	2.5	kV
Grid voltage, negative	-200	V
Grid voltage when switched on, positive	1350	V
Pulse duration	10	μ s
Duty factor	0.002	
Anode current when switched on	30	A
Grid current when switched on	<4.5	A





SVETLANA TECHNICAL DATA

GP-5 Beam Triode



The Svetlana™ GP-5 is a glass-envelope beam power triode intended for use as a shunt regulator or pulse modulator in high-voltage systems. It features anode operating voltage of 30 kV and a plate dissipation of 37.5 watts. Originally intended for color-TV voltage stabilization, the GP-5 is similar to the Telefunken ED500 and may be used to retrofit equipment which uses the American type 6BK4 or other high-voltage beam triodes.

Characteristics

Electrical

Cathode	oxide-coated, unipotential	
Voltage (AC or DC)	6.3 (± 0.6)	V
Current	210 (± 20)	mA
Heater-cathode voltage, peak	± 200	V
Amplification factor (nominal)	2750	
Transconductance (nominal)	700	μS
Interelectrode capacitances (typical), with cathode grounded:		
Input	4.0	pF
Output	1.5	pF
Feedback	≤ 0.1	pF

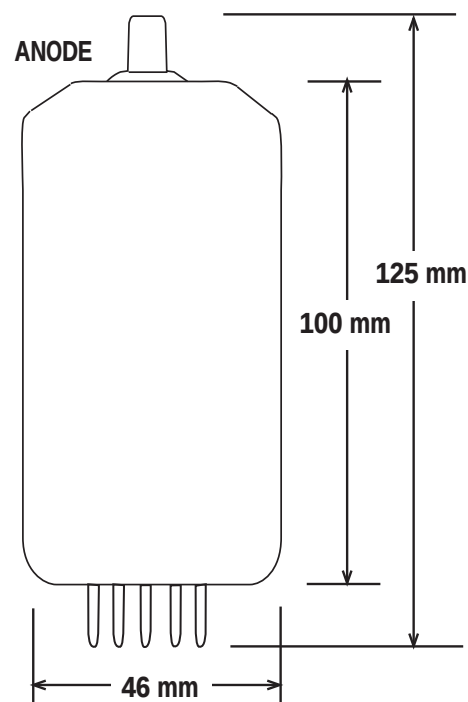
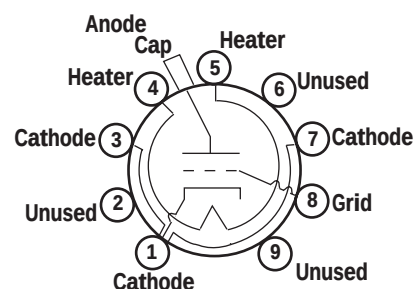
Mechanical

Base	standard magnoval, glass button
Basing diagram	see below
Socket	Svetlana SK509 or similar
Anode cap	approx. 3/8 in (9 mm) diameter
Anode connector	same as 6BK4 or 807
Operating position	Any (vertical for convection cooling)
Nominal dimensions:	
Height of glass envelope	100 mm (3 7/8 in)
Diameter of glass envelope	46 mm (1 3/4 in)
Overall height	125 mm (4 7/8 in.)
Net weight	115 g

Maximum ratings

Anode voltage	30,000	V
Anode dissipation	37.5	W
Anode current, continuous	2.0	mA
Grid voltage	-450	V
Maximum grid-circuit resistance	3 megohms	
Envelope temperature	250	°C

Svetlana Outline drawing



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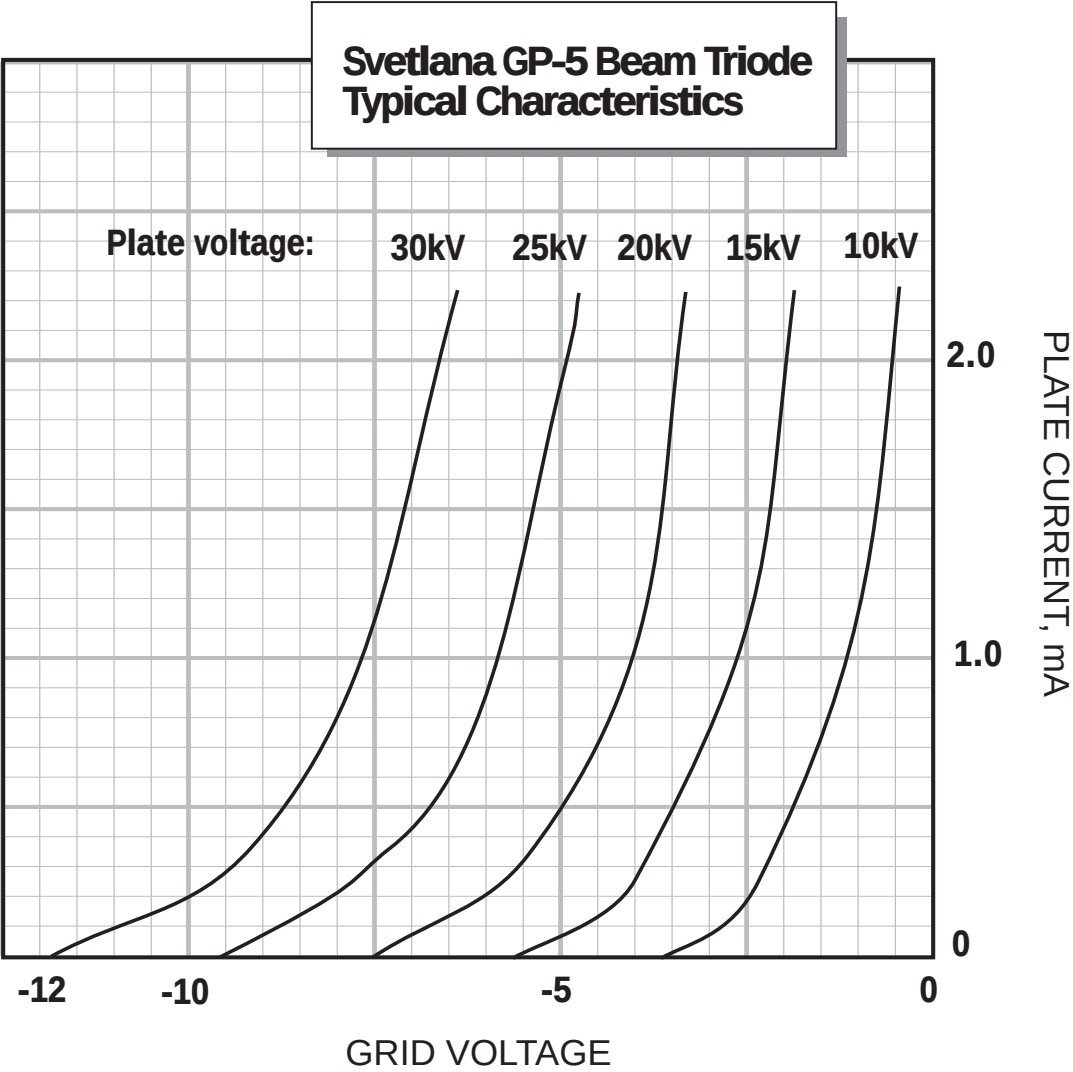
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1/98

Svetlana GP-5 Beam Triode



ISTOK TECHNICAL DATA

ISTOK IMG-915-100KA

Industrial Magnetron



The ISTOK™ IMG-915-100KA Industrial Magnetron is a 915 MHz fixed-tuned, electromagnet-focused 100 kW CW magnetron. It features ceramic-metal construction, liquid and air cooling, and very rugged construction for industrial applications.

The IMG-915-100KA is one of the few 100kW 915MHz magnetrons with a completely new design for conservative 100kW operation. A significant feature of this design is the RF output coupling structure. It is the only industrial magnetron available with direct conduction cooling through the vacuum envelope to the air cooling stream. The unique design provides exceptional cooling for handling 100kW RF power output conservatively.

Solenoids and wave guide transitions/launchers manufactured in the West for 60 and 75 kW magnetrons are plug compatible. This magnetron is designed for an industrial environment. It meets all electrical performance criteria under the temperature and shock/vibration conditions encountered in industrial applications.

The ISTOK IMG-915-100KA magnetron is manufactured in Fryazino, Russia, near Moscow. The strict manufacturing and quality control procedures for Russian military products are enforced throughout the Fryazino plant for all products.

General Characteristics

Electrical (Magnetron)

Center Frequency	915 ± 5	MHz
RF Output (Nominal)	100	kW
Filament		
Nominal Voltage	14.5	Vac
Nominal Current at 14.5 Volts	115	A

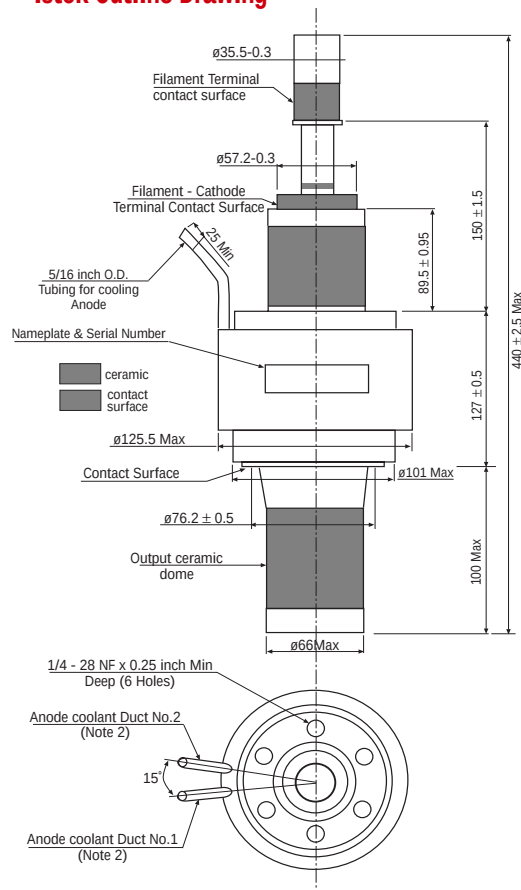
Electrical (Solenoid)

Resistance	12	Ω
Current (max)	7.0	A

Mechanical (Magnetron)

Cooling	Air and Liquid	
Anode Cooling, liquid	11 gal/min (40 l/min)	
Cathode Cooling, air	9 CFM (1/4 m³/min)	
Dome Cooling, air	35 CFM (1m³/min)	
Operating Position	Vertical, Dome Down or Up	
Maximum Dimensions		
Length	440 ± 2	mm
Diameter	126	mm
Weight	6.5 kg (14.3 lbs)	
RF Output:	Magnetron Antenna (Dome) to WR-975 Transition	
Shock	5	G
Vibration	10 - 80	Hz
Ambient Operating Temperatures		
Maximum	+70°	C
Minimum	-55°	C
Humidity at 40° C	98	%

Istok Outline Drawing



Notes:

1. Dimensions in millimeters.
2. Recommended direction of anode coolant flow: Duct No.2 is IN and Duct No.1 is OUT when tube is operated with output ceramic dome DOWN. With output ceramic dome UP, the flow should be reversed.
3. Magnetron may be delivered with customer specified 37° or 45° flared fittings on cooling lines.
4. RF Gasket and pole piece supplied with each magnetron.



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ISTOK IMG-915-100KA Industrial Magnetron



Mechanical (Solenoid)

Cooling	Liquid	
Maximum Dimensions:		
Height	172	mm
Outer Diameter	325	mm
Weight	50 kg	(110 lbs)

Maximum Ratings, CW Oscillator

Anode Voltage	25	kV
Anode Current	7.0	A
Load VSWR**	1.5:1	Max

Typical Operation * 915 MHz

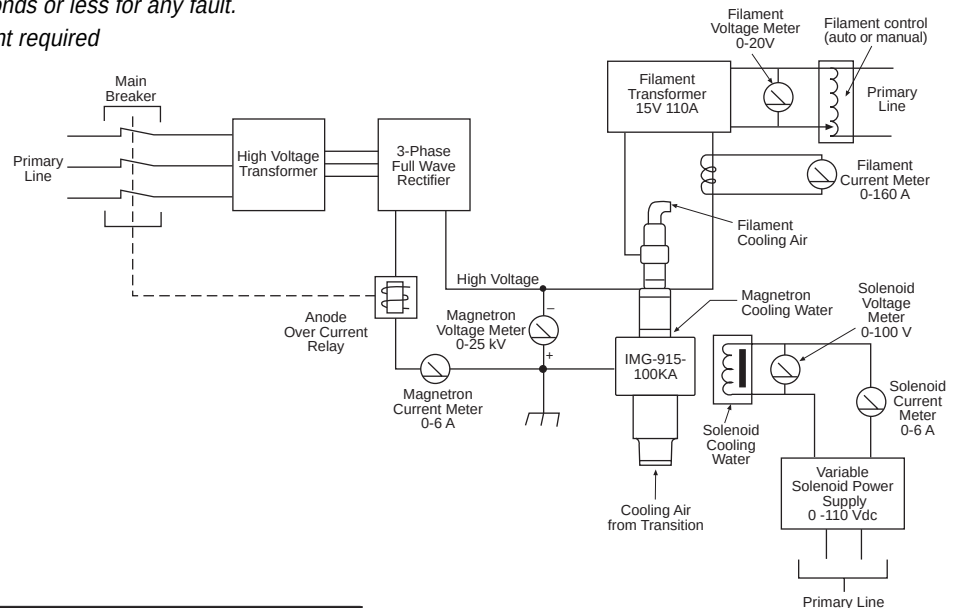
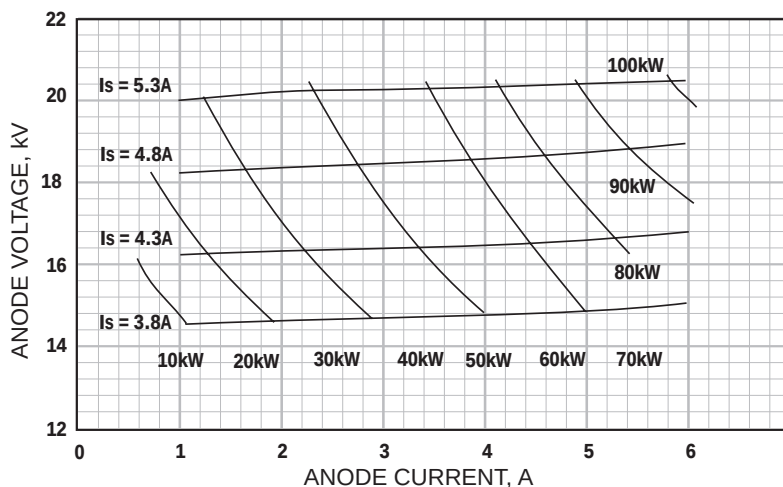
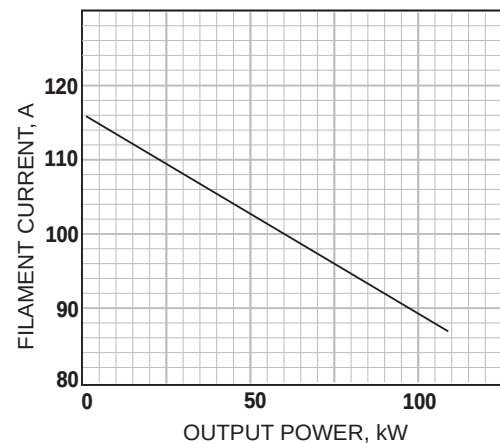
Filament Current	78	A
Anode Voltage	19.8	kV
Anode Current	6.1	A
Solenoid Current***	5.0	A
RF Output	102	kW
Efficiency	84	%

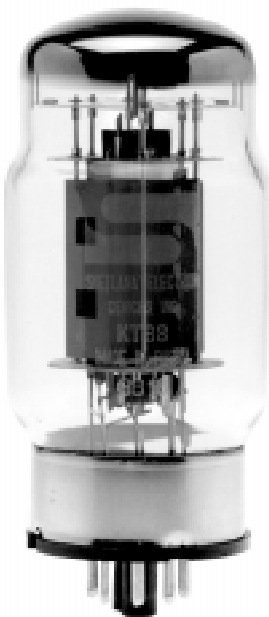
* Each IMG-915-100KA is delivered with a performance certificate including recommended operating data.

**Anode voltage to be removed in 10 milliseconds or less for any fault.

***Proper on off sequencing of solenoid current required

Application Drawing





SVETLANA TECHNICAL DATA

KT88

High Performance Audio Beam Power Tetrode

The Svetlana™ KT88 is a glass envelope beam power tetrode. It is intended for audio frequency power amplification service. High plate dissipation rating, close manufacturing specification tolerances and thorough processing provides improved reliability and superior sonic performance.

The Svetlana KT88 is manufactured in the Svetlana factory in St. Petersburg, Russia, and is designed to be a direct replacement for any KT88, KT90, KT99 or 6550.

The new KT88 features greatly enhanced sonic performance: Increased peak cathode emission from new cathode materials; Stable operation from extended processing and aging; Gold-plated grid; New tri-plate anode; Single-piece beam forming electrode; Precise grid/screen alignment; Improved vacuum processing; comprehensive static and audio amplifier testing before and after aging.

Characteristics

Electrical

Heater:	Min.	Nom.	Max.	
Voltage (AC or DC)	5.7	6.3	6.9	V
Current		1.6		A
Cathode:	Oxide-coated, unipotential			
Cathode-to-heater potential, max.		-250*/250**		V
Direct interelectrode capacitances***				
Grid no.1 to cathode and grid no.3, grid no.2, base sleeve and heater			16.0	pF
Plate to cathode and grid no.3, grid no.2, base sleeve and heater			12.0	pF
Grid no.1 to plate			1.2	pF

Mechanical

Operating Position	Any
Base	Large wafer octal 8-pin with metal sleeve
Nominal dimensions:	
Height	117 mm (4.61 in.)
Seated height	103.5 mm (4.08 in.)
Diameter	51 mm (2.0 in.)
Cooling	Convection cooled
Envelope Temperature (max)	250°C
Approximate net weight	90 g (3.0 oz.)

*Max with heater negative to cathode **Max with heater positive to cathode

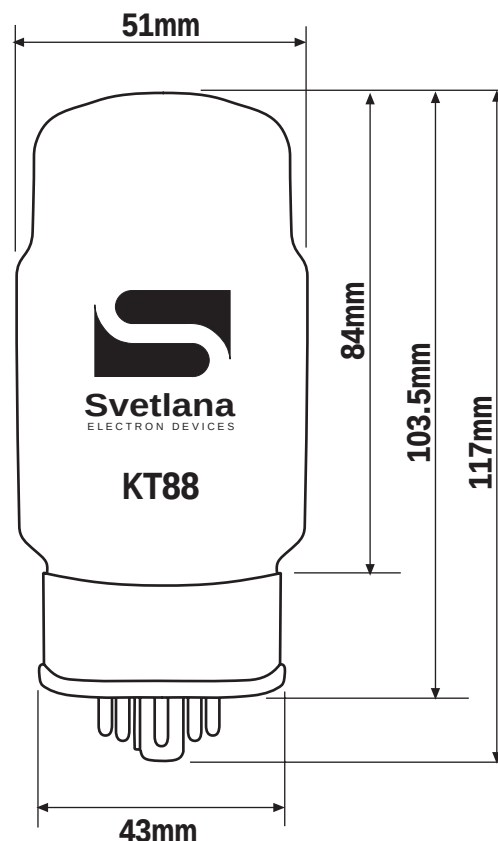
***Without external shielding

AF Power Amplifier

Maximum ratings

DC plate voltage	800	V
Grid no.2 DC (screen) voltage	600	V
Grid no.1 (control) voltage	-300	V
DC cathode current	230	mA
Plate dissipation	42	W
Grid no.2 (screen) dissipation	8	W

Svetlana Outline drawing



Svetlana
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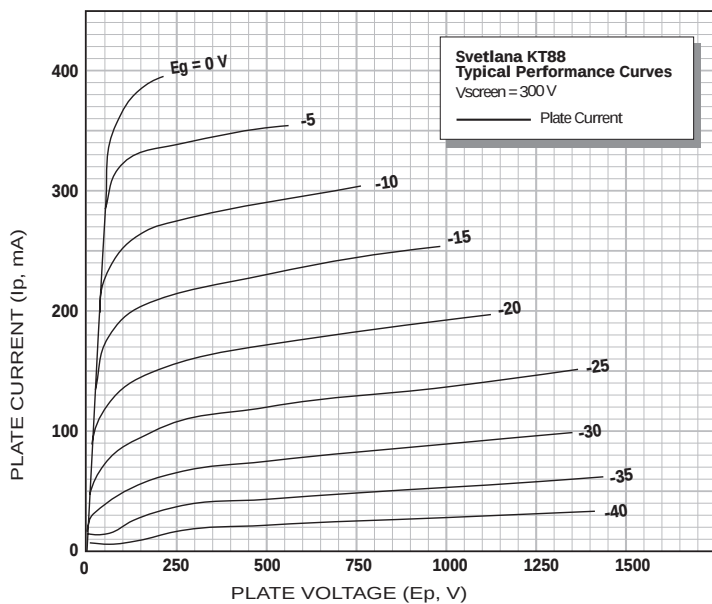
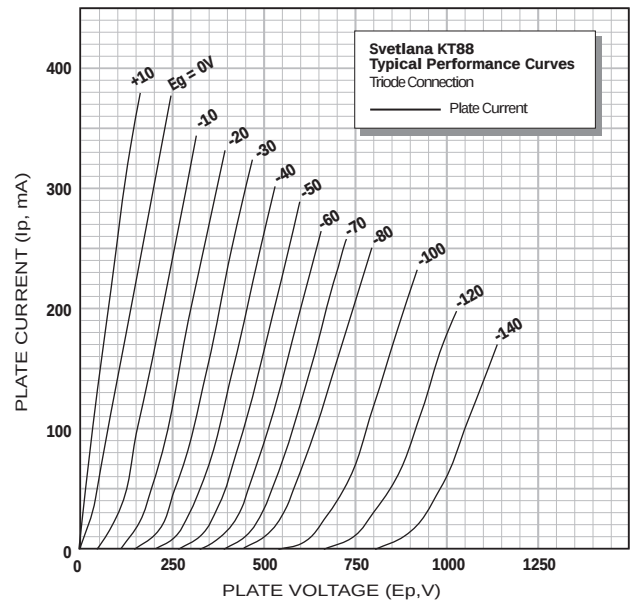
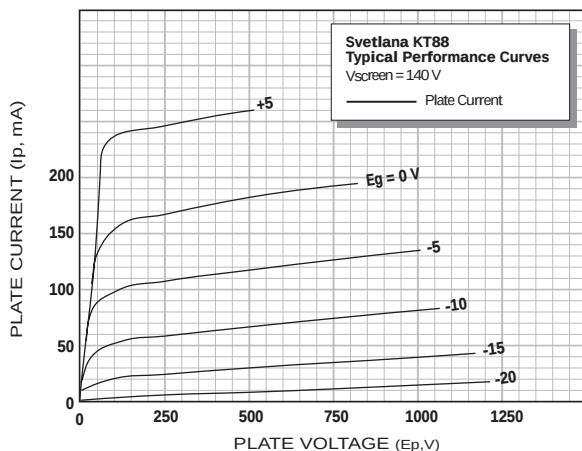
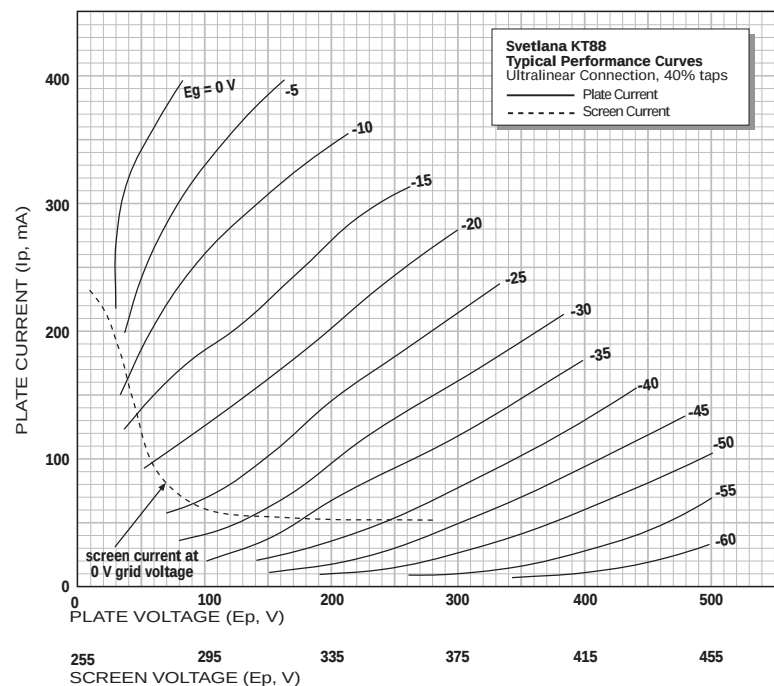
Svetlana KT88

High Performance Audio Beam Power Tetrode



Typical Operation Class A₁ (single tube)

DC plate voltage	400	V
Grid no.2 DC (screen) voltage	225	V
Grid no.1 DC (control) voltage	-16.5	V
Peak AF grid no.1 (control) voltage	16.5	V
Zero-signal plate current	87	mA
Max signal plate current	105	mA
Zero signal grid no.2 (screen) current	4	mA _{dc}
Max signal grid no.2 (screen) current	18	mA
Transconductance	11.5	mA/Volt
Signal output	19	W



SVETLANA TECHNICAL DATA

Svetlana NL1096 Industrial Power Triode



he Svetlana™ NL1096 is a high performance ceramic/metal power triode designed for use in industrial service. Typical use is as a Class C high power oscillator for dielectric heating equipment.

The Svetlana NL1096 is a direct replacements for United States manufactured triodes of the same type.

Characteristics

Electrical

Filament	Thoriated-tungsten mesh	
Voltage	7.5 ± 0.37	V
Current @ 7.5 V	100	A
Amplification factor (average)	20	
Interelectrode capacitances (typical), with filament grounded:		
Input	53	pF
Output	1.5	pF
Feedback	34	pF

Mechanical

Cooling	Forced air
Base	Coaxial
Operating position	Vertical, base up or down
Maximum dimensions:	
Length	261.88 mm (10.310 in)
Diameter	179.07 mm (7.050 in.)
Maximum operating temperature	250° C

Maximum ratings, CW

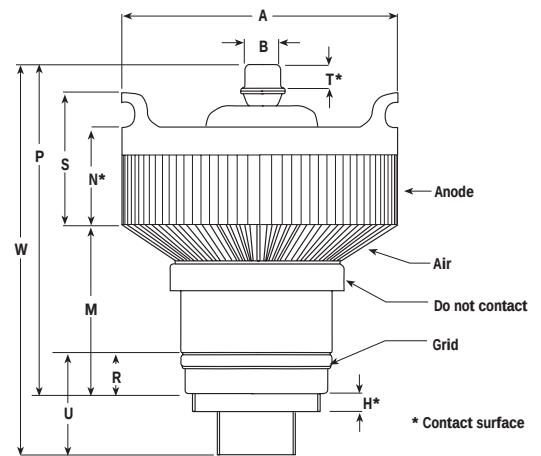
DC plate voltage	10,000	V
Maximum-signal DC plate current	4.0	A
Plate Dissipation	10	kW
Grid Dissipation	250	W

Typical Operation

DC plate voltage	7000	9000	V
Plate current	4.0	4.0	A
DC grid voltage	-620	-930	V
DC grid current*	0.275	0.43	A
Peak cathode RF voltage*	370	390	V
Driving power*	260	570	W
Plate Power output	19	29	kW

*Approximate values

Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	175.97	179.07	6.928	7.050
B	21.72	22.73	0.855	0.895
H	11.43	—	0.45	—
M	100.33	109.22	3.950	4.300
N	61.26	70.82	2.412	2.788
P	209.55	222.25	8.250	8.750
R	25.04	26.67	0.986	1.050
S	86.66	96.22	3.412	3.788
T	9.53	—	0.375	—
U	—	66.68	—	2.625
W	259.20	261.88	10.008	10.310



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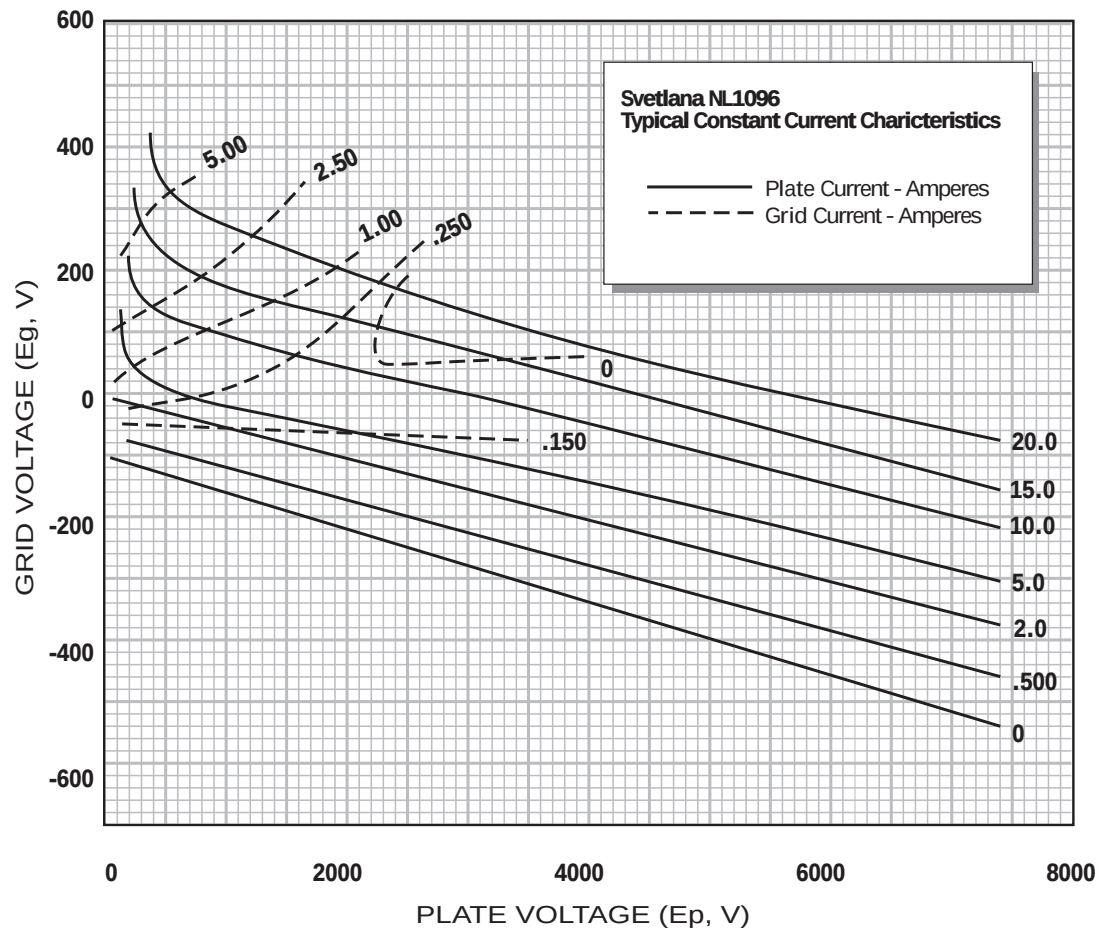
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Svetlana NL1096

Industrial Power Triode



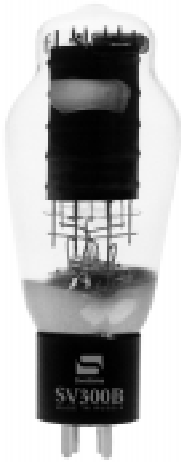
Minumum Cooling Air Flow Requirements				
Anode-to-Base Air Flow				
Anode Dissipation, Watts	Sea Level		5000 Feet	
	Air Flow, CFM	Pressure Drop, Inches of Water	Air Flow, CFM	Pressure Drop, Inches of Water
4000	85	0.18	105	0.21
6000	145	0.38	125	0.46
8000	215	0.68	260	0.82
10,000	235	1.08	360	0.32

Because the power dissipated by the filament represents about 250 watts and because grid dissipation can, under some conditions, represent another 250 watts, allowance has been made in preparing this tabulation for an additional 1000 watts.

SVETLANA TECHNICAL DATA

SV300B

Low-Mu Audio Power Triode



The Svetlana SV300B is a power triode intended for use in class A, AB or B audio amplifiers. It is one of the lowest-distortion tubes ever made, and is a close duplicate of the original Western Electric™ 300B.

The Svetlana SV300B uses ultra-pure carbonized nickel plate material and a proprietary oxide coating on the filament to give Western Electric™-like performance. The internal structure is well-supported and is aligned with respect to the base pins to avoid internal shorts in equipment designed for horizontal tube mounting. The filament is center-tapped to insure low hum.

The Svetlana SV300B is manufactured in Russia at the Svetlana factory in St. Petersburg. The strict manufacturing and quality controls at the Svetlana plant assure functionality and sound as good as Western Electric™ manufactured products.

Characteristics

Electrical

Filament:	Oxide-coated tungsten	
Voltage (AC or DC)	5.0±0.3	V
Current	1.2	A
Amplification factor	3.85	
Transconductance	5500	μS
Plate resistance	700	ohms
Interelectrode capacitances (typical), with filament grounded :		
Grid to plate	15	pF
Grid to filament	9	pF

Mechanical

Cooling	Radiation and convection
Base	standard small four pin
Basing diagram	JEDEC 4D
Socket	Svetlana SK4A or equivalent

Operating position:

Axis vertical, base down or horizontal with pins 1 and 4 in horizontal plane

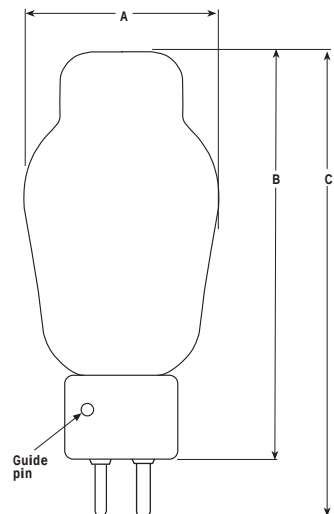
Nominal dimensions:

Diameter	59.0mm (2.3125 in)
Base to top	137.2 mm (5.4063 in)
Overall height	152.5 mm (6.0 in)
Net weight	90 gm

Maximum Ratings

DC plate voltage	450	V
Maximum signal DC plate current	100	mA
Plate dissipation	40	W

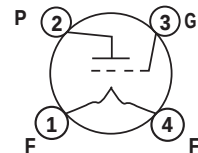
Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters	Inches
A	59.0	2.3125
C	152.5	6
B	137.2	5.4063

Base pin connections bottom view



1 Filament
2 Plate

3 Grid
4 Filament



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Svetlana SV300B

Low-Mu Audio Power Triode



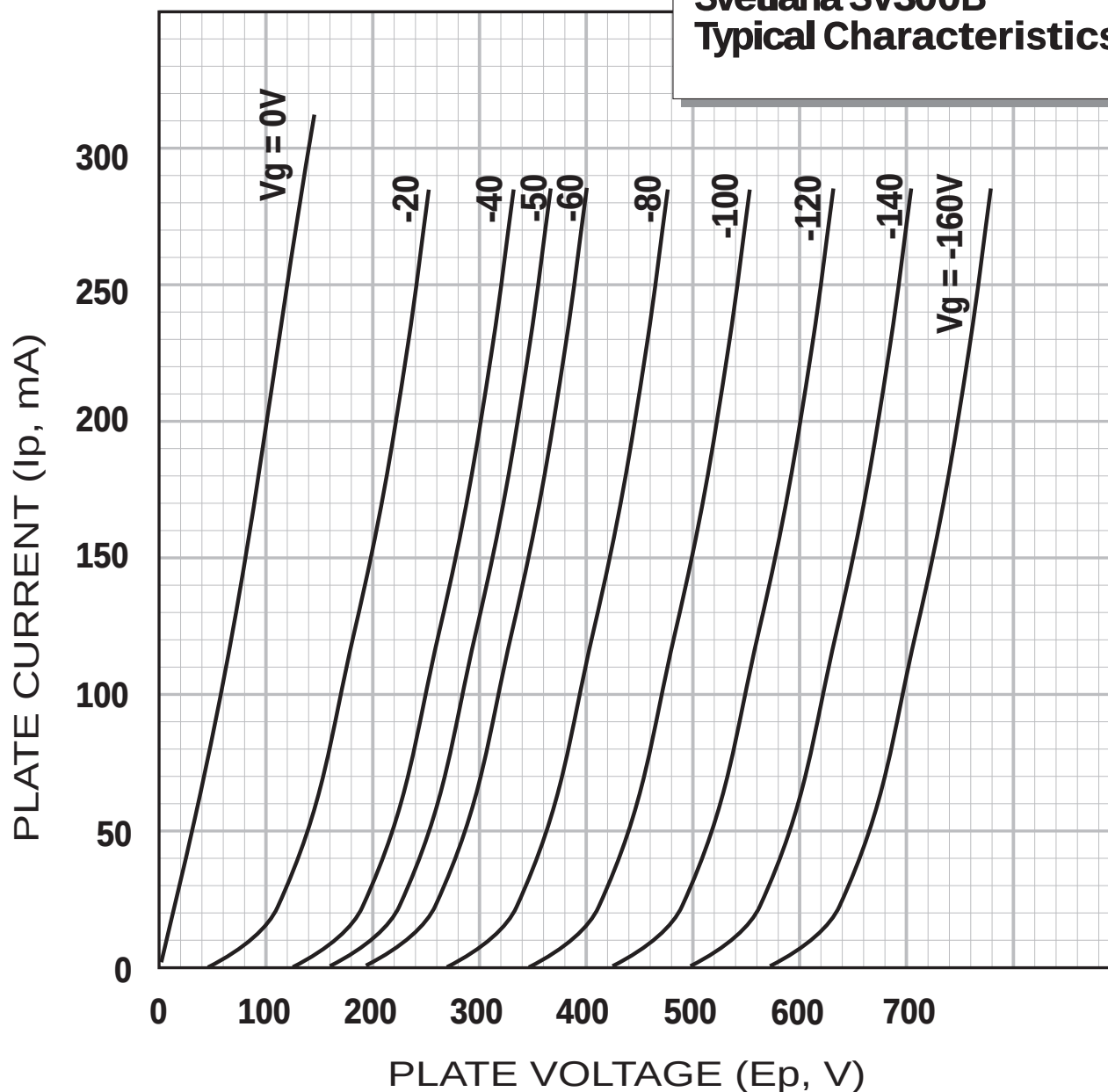
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ELECTRON DEVICES

Typical Operation, Class A, Audio Amplifier

Plate voltage	450	V
Grid voltage	-100	V
Peak grid drive	200	VP-P
Plate current, no signal	60	mA
Plate current, max signal	65	mA
Effective load resistance	5500	ohms
Distortion at 1 watt into 8 ohms	0.10	%
Power output at 5% distortion	10	W

*Notes: The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal mounting. Pins 1 and 4 should be in a horizontal plane when mounting the device horizontally.

Svetlana SV300B Typical Characteristics





SVETLANA TECHNICAL DATA

SV572-10

High Performance Audio Power Triode



he Svetlana™ SV572-10 is a power triode intended for use in class A, AB, or B audio amplifiers. It is one of the lowest distortion tubes ever made.

Features:

- Massive graphite anode for high power capability, 125 Watt rating
- Directly heated thoriated tungsten filament for soft glow and warm sound
- Transmitting tube design, hard glass envelope with white ceramic base
- Low microphonic construction with ceramic internal spacers and mica supports
- Excellent gettering enhanced by titanium bonded with the graphite anode surface. Titanium has an index of gas absorption 10 times greater than barium
- Superb aesthetic appearance
- The SV572-10 delivers performance and sound superior to 100-watt triodes such as the antique 211 or 845. The SV572-10 has lower plate resistance, lower filament power, and smaller physical size.

Characteristics

Electrical

Filament:	Thoriated-tungsten
Voltage (AC or DC)	6.3 ± 0.3 V
Current	4 A
Amplification factor (nominal)	9.5
Transconductance (nominal)	4500 μ S
Plate resistance (nominal)	2100 ohms
Interelectrode capacitances (typical), with filament grounded:	
Grid to plate	5 pF
Grid to filament	6.4 pF

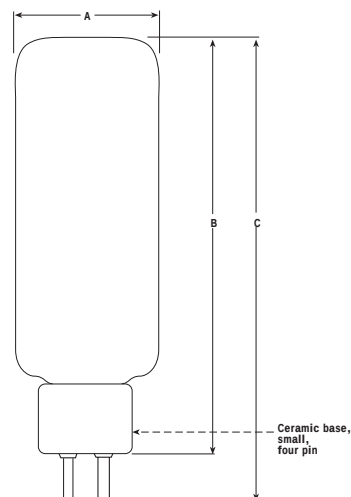
Mechanical

Cooling	Radiation and convection
Base	Ceramic, four pin, small
Basing diagram	JEDEC 4D
Socket	Svetlana SK4A or equivalent
Operating position- Axis vertical, base down or horizontal w/pins 1 and 4 in vertical plane (Adequate surrounding clearance for cooling must be maintained)	
Nominal dimensions:	
Diameter	45.7 mm (1.8 in.)
Base to top	127 mm (5.0 in)
Overall height	138.2 mm (5.44 in.)
Net weight	106 g

Maximum ratings

DC plate voltage	1000 V
Maximum-signal DC plate current	210 mA
Plate Dissipation	125 W
Grid Current	50 mA

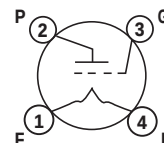
Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters	Inches
A	45.7	1.80
B	127	5.00
C	138.2	5.44

Base pin connections bottom view



- | | |
|------------|------------|
| 1 Filament | 3 Grid |
| 2 Plate | 4 Filament |

Notes:

The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal mounting. The anode may be operated at red heat without decreasing lifetime, as long as dissipation is kept below 125 watts.



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Svetlana SV572-10

High Performance

Audio Power Triode



Typical Operation, Single Tube, Class A

Class of Operation	A2	A2	
DC plate voltage	500	1000	V
Grid voltage	-18	-61	V
Peak grid drive	120	325	VP-P
DC Plate current, zero signal	80	100	mA
DC Plate current, max signal	110	150	mA
Plate load resistance	5000	5000	ohms
Distortion at max output	1.0	5.0	%
Power output at distortion above	9.5	46.0	W

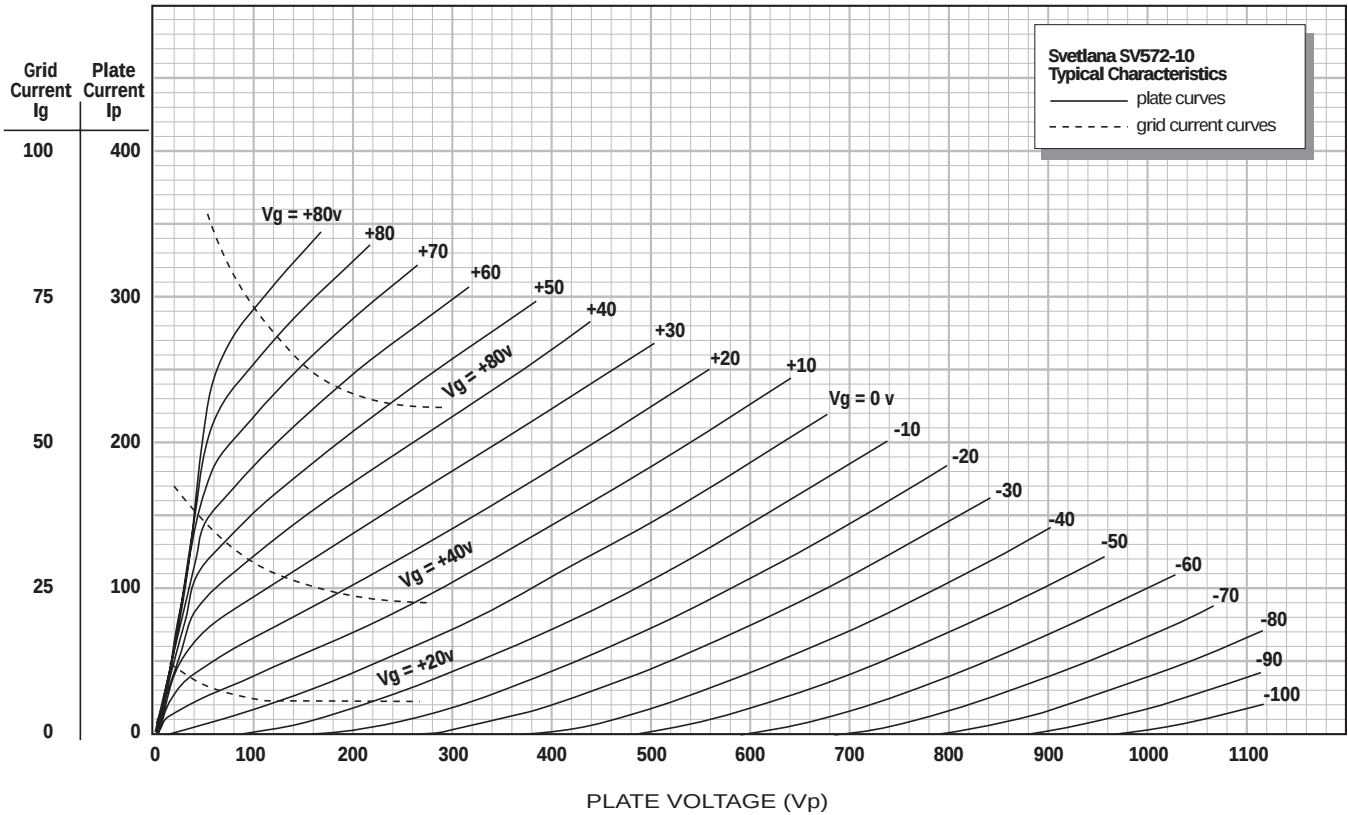
Typical Operation, Push Pull, Two Tubes

Class of Operation	AB2	AB2	
DC Plate voltage	450	1000	V
Grid voltage	-22	-70	V
Peak grid drive, grid-to-grid	320	440	VP-P
DC Plate current, zero signal	150	200	mA
DC Plate current, max signal	240	280	mA
Plate load resistance	9600	9600	ohms
Distortion at max output	3.0	5.0	%
Power output at distortion above	30	88	W

(Note: allow for contact potential and secondary emission in grid biasing.)

Note: The 572-10 is one product in a series of four similar products as follows:

TUBE	μ
SV572-3	3.5
SV572-10	10
SV572-30	30
SV572-160	160





SVETLANA TECHNICAL DATA

SV572-160

High Performance Audio Power Triode



The Svetlana™ SV572-160 is a power triode intended for use in class A, AB, or B audio amplifiers. It features:

- Directly heated thoriated tungsten filament for soft glow and warm sound
- Hard glass envelope with white ceramic base
- Low microphonic construction with ceramic internal spacers
- Graphite plate with titanium coating for extremely high power capability and inherent gettering
- Superb aesthetic appearance
- The SV572-160 has a plate dissipation of 125 watts maximum, and is intended for audio applications where triodes of the 811A type are normally used, while giving superior performance.

Characteristics

Electrical

Filament:	Thoriated-tungsten	
Voltage (AC or DC)	6.3 ± 0.3	V
Current	4	A
Amplification factor (nominal)	160	
Transconductance (nominal)	9000	μS
Plate resistance (nominal)	17,000	ohms
Interelectrode capacitances (typical), with filament grounded:		
Grid to plate	8	pF
Grid to filament	7	pF

Mechanical

Cooling	Radiation and convection
Base	Ceramic, four pin, small
Basing diagram	JEDEC 4D
Socket	Svetlana SK4A or equivalent
Operating position-	Axis vertical, base down or horizontal w/pins 1 and 4 in vertical plane (Adequate surrounding clearance for cooling must be maintained)

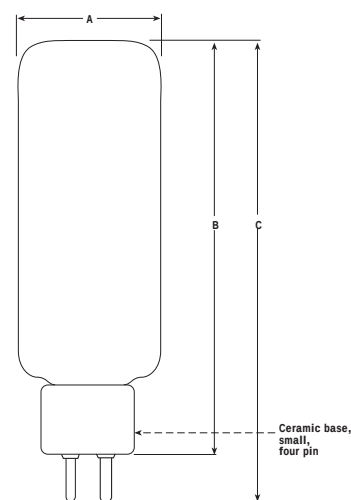
Nominal dimensions:

Diameter	45.7 mm (1.8 in.)
Base to top	127 mm (5.0 in.)
Overall height	138.2 mm (5.44 in.)
Net weight	106 g

Maximum ratings

DC plate voltage	1000	V
Maximum-signal DC plate current	210	mA
Plate Dissipation	125	W
Grid Current	50	mA

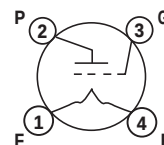
Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters	Inches
A	45.7	1.80
B	127	5.00
C	138.2	5.44

Base pin connections bottom view



- | | |
|------------|------------|
| 1 Filament | 3 Grid |
| 2 Plate | 4 Filament |

Notes:

The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal mounting.

The anode may be operated at red heat without decreasing lifetime, as long as dissipation is kept below 125 watts.



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Svetlana SV572-160

High Performance

Audio Power Triode



Typical Operation, Class A₂, Single Tube

DC Plate voltage	1000	V
Grid voltage	+5	V
Peak grid-to-grid drive	80	VP-P
DC Plate current, zero signal	50	mA
DC Plate current, max signal	70	mA
Plate load resistance	10,000	ohms
Distortion at max output	5.0	%
Power output at distortion above	15.3	W

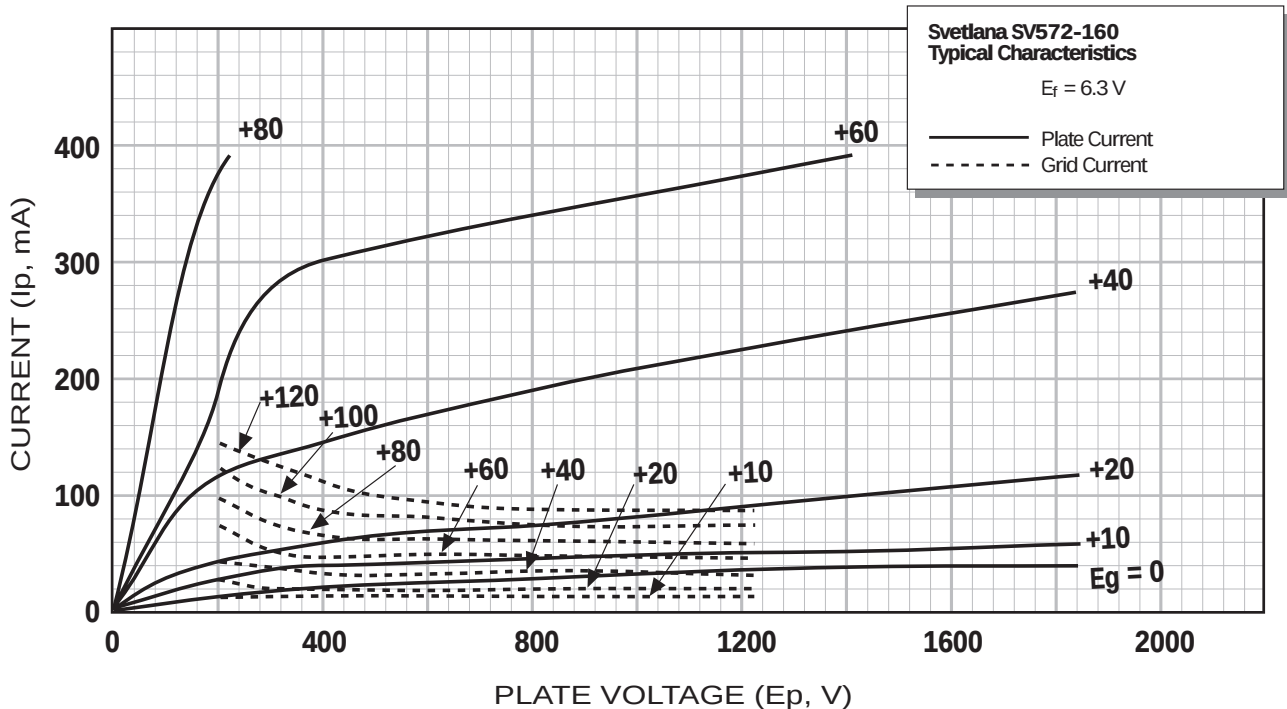
Typical Operation, Class AB₂, Push-Pull, Two Tubes

DC Plate voltage	1000	V
Grid voltage	+5	V
Peak grid-to-grid drive	300	VP-P
DC Plate current, zero signal	50	mA
DC Plate current, max signal	85	mA
Plate load resistance	9600	ohms
Distortion at max. output	10.0	%
Power output at distortion above	32	W

(Note: allow for contact potential and secondary emission in grid biasing.)

Note: The 572-160 is one product in a series of four similar products as follows:

TUBE	μ
SV572-3	3.5
SV572-10	10
SV572-30	30
SV572-160	160



SVETLANA TECHNICAL DATA

SV572-3

Low-Mu Audio Power Triode



The Svetlana™ SV572-3 is a power triode intended for use in class A, AB, or B audio amplifiers. It features:

- Directly heated thoriated tungsten filament for soft glow and warm sound
- Hard glass envelope with white ceramic base
- Low microphonic construction with ceramic internal spacers
- Graphite plate with titanium coating for extremely high power capability and inherent gettering
- Superb aesthetic appearance
- The SV572-3 has a plate dissipation of 125 watts maximum, making it useful in applications where a 100-watt triode (211 or 845) would normally be used, while having lower plate resistance, lower filament power and a smaller physical size.

Characteristics

Electrical

Filament:	Thoriated-tungsten
Voltage (AC or DC)	6.3 ± 0.3 V
Current	4 A
Amplification factor (nominal)	3.5
Transconductance (nominal)	1800 μ S
Plate resistance (nominal)	1900 ohms
Interelectrode capacitances (typical), with filament grounded:	
Grid to plate	8 pF
Grid to filament	7 pF

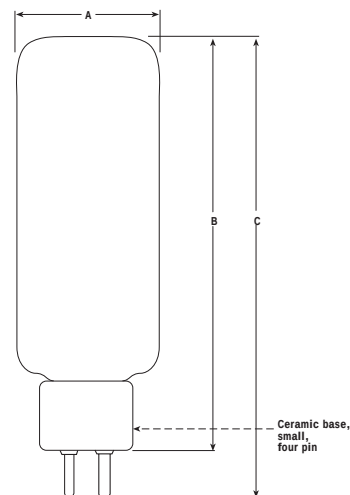
Mechanical

Cooling	Radiation and convection
Base	Ceramic, four pin, small
Basing diagram	JEDEC 4D
Socket	Svetlana SK4A or equivalent
Operating position- Axis vertical, base down or horizontal w/pins 1 and 4 in vertical plane (maintain at least 4 inches clearance from other components)	
Nominal dimensions:	
Diameter	45.7 mm (1.8 in.)
Base to top	127 mm (5.0 in.)
Overall height	138.2 mm (5.44 in.)
Net weight	106 g

Maximum ratings

DC plate voltage	1000 V
Maximum-signal DC plate current	210 mA
Plate Dissipation	125 W
Grid Current	50 mA

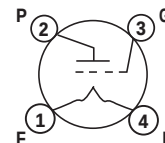
Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters	Inches
A	45.7	1.80
B	127	5.00
C	138.2	5.44

Base pin connections bottom view



- | | |
|------------|------------|
| 1 Filament | 3 Grid |
| 2 Plate | 4 Filament |

Notes:

The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal mounting. The anode may be operated at red heat without decreasing lifetime, as long as dissipation is kept below 125 watts.



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Svetlana SV572-3

Low-Mu Audio Power Triode



Typical Operation, Single Tube, Class A

Class of Operation	A1	A1	A2	
DC plate voltage	500	900	900	V
Grid voltage	-78	-180	-180	V
Peak grid drive	150	340	470	VP-P
DC plate current, zero signal	80	100	100	mA
DC plate current, max signal	85	120	140	mA
Plate load resistance	5000	5000	5000	ohms
Distortion at max output	0.3	0.35	1.0	%
Power output at distortion above	3.6	20	41.6	W

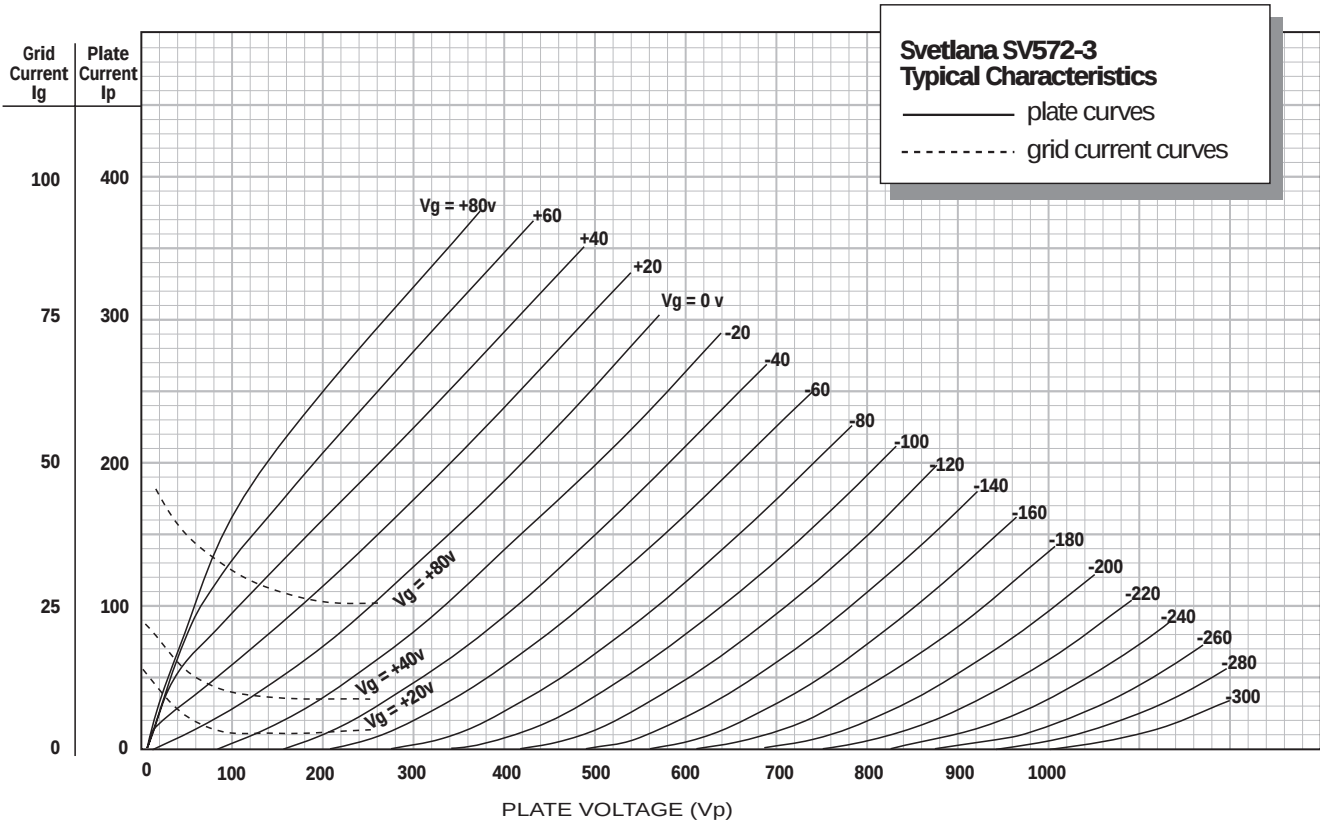
Typical Operation, Push-Pull, Two Tubes

Class of Operation	AB1	AB1	AB2	
DC plate voltage	450	900	900	V
Grid voltage	-87	-178	-178	V
Peak grid drive, grid-to-grid	348	640	1080	VP-P
DC Plate current, zero signal	150	220	220	mA
DC Plate current, max signal	175	260	380	mA
Plate load resistance	9600	9600	9600	ohms
Distortion at max output	0.14	1.0	3.0	%
Power output at distortion above	12	39	128	W

(Note: allow for contact potential and secondary emission in grid biasing.)

Note: The 572-3 is one product in a series of four similar products as follows:

TUBE	μ
SV572-3	3.5
SV572-10	10
SV572-30	30
SV572-160	160





SVETLANA TECHNICAL DATA

SV572-30

Medium-Mu Audio Power Triode



The Svetlana™ SV572-30 is a power triode intended for use in class A, AB, or B audio amplifiers. It features:

- Directly heated thoriated tungsten filament for soft glow and warm sound
- Hard glass envelope with white ceramic base
- Low microphonic construction with ceramic internal spacers
- Graphite plate with titanium coating for extremely high power capability and inherent gettering
- Superb aesthetic appearance
- The SV572-30 has a plate dissipation of 125 watts maximum, making it useful in applications where a triode such as 812A or 8005 would normally be used, while having no plate cap and a smaller physical size than the old types.

Characteristics

Electrical

Filament:	Thoriated-tungsten
Voltage (AC or DC)	6.3 ± 0.3 V
Current	4 A
Amplification factor (nominal)	29.5
Transconductance (nominal)	6500 μ S
Plate resistance (nominal)	4600 ohms
Interelectrode capacitances (typical), with filament grounded:	
Grid to plate	8 pF
Grid to filament	7 pF

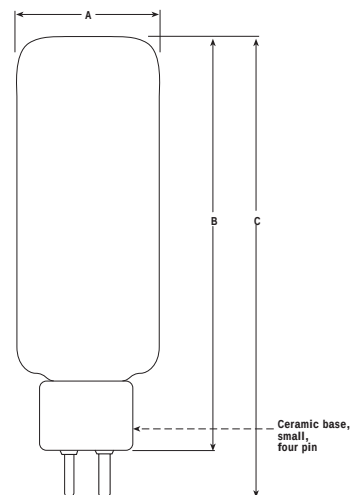
Mechanical

Cooling	Radiation and convection
Base	Ceramic, four pin, small
Basing diagram	JEDEC 4D
Socket	Svetlana SK4A or equivalent
Operating position- Axis vertical, base down or horizontal w/pins 1 and 4 in vertical plane (maintain at least 4 inches clearance from other components)	
Nominal dimensions:	
Diameter	45.7 mm (1.8 in.)
Base to top	127 mm (5.0 in.)
Overall height	138.2 mm (5.44 in.)
Net weight	106 g

Maximum ratings

DC plate voltage	1000 V
Maximum-signal DC plate current	210 mA
Plate Dissipation	125 W
Grid Current	50 mA

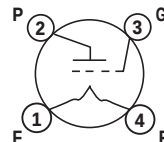
Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters	Inches
A	45.7	1.80
B	127	5.00
C	138.2	5.44

Base pin connections bottom view



- | | |
|------------|------------|
| 1 Filament | 3 Grid |
| 2 Plate | 4 Filament |

Notes:

The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal mounting. The anode may be operated at red heat without decreasing lifetime, as long as dissipation is kept below 125 watts.



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Svetlana SV572-30

Medium-Mu Audio Power Triode



Typical Operation, Single, Class A

Class of Operation	A2	A2	
DC plate voltage	500	1000	V
Grid voltage	+5	0	V
Peak grid drive	110	175	VP-P
DC Plate current, zero signal	60	100	mA
DC Plate current, max signal	80	150	mA
Plate load resistance	10,000	10,000	ohms
Distortion at max output	5.0	10.0	%
Power output at distortion above	9	29	W

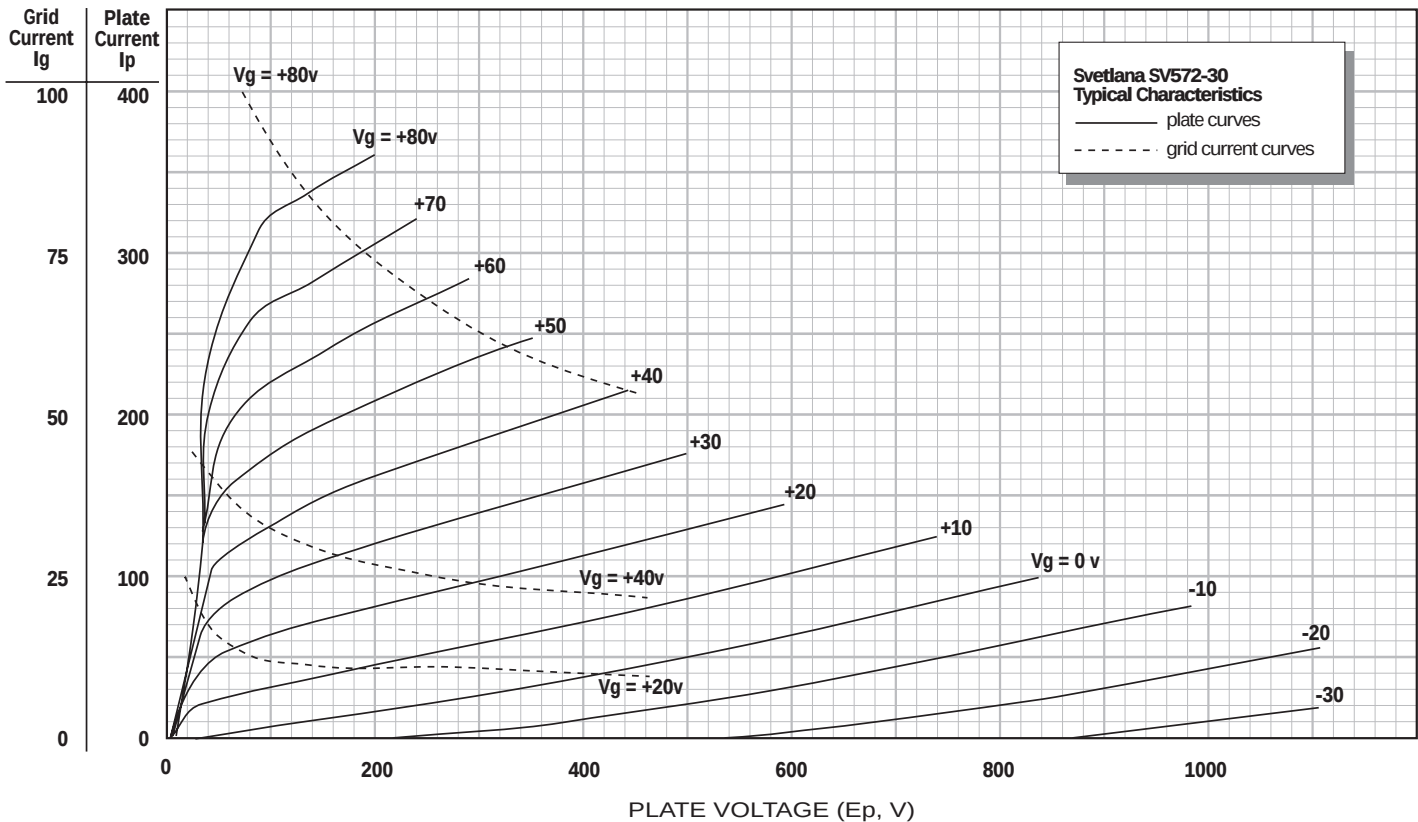
Typical Operation, Push-Pull, Two Tubes

Class of Operation	AB2	
DC Plate voltage	1000	V
Grid voltage	-10	V
Peak grid drive, grid-to-grid	320	VP-P
DC Plate current, zero signal	150	mA
DC Plate current, max signal	230	mA
Plate load resistance	9600	ohms
Distortion at max output	5.0	%
Power output at distortion above	78	W

(Note: allow for contact potential and secondary emission in grid biasing.)

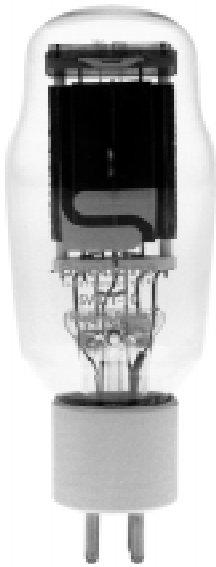
Note: The 572-30 is one product in a series of four similar products as follows:

TUBE	μ
SV572-3	3.5
SV572-10	10
SV572-30	30
SV572-160	160



SVETLANA TECHNICAL DATA

Svetlana SV811-10 Low-Mu Power Triode



The Svetlana™ SV811-10 is a power triode intended for use in class A, AB, or B audio amplifiers. This tube features:

- Directly heated thoriated tungsten filament for soft glow and warm sound.
- Hard glass envelope with white ceramic base
- Low microphonic internal construction
- Titanium gettering system
- Tri-plate anode
- Superb aesthetic appearance

Characteristics

Electrical

Filament:	Thoriated-tungsten	
Voltage (AC or DC)	6.3 ± 0.3	V
Current	4	A
Amplification factor	10	
Transconductance	3800	μS
Plate resistance	2500	ohms
Interelectrode capacitances (typical), with filament grounded:		
Grid to plate	8	pF
Grid to filament	7	pF

Mechanical

Cooling	Radiation and convection	
Base	Ceramic, four pin, small	
Basing diagram	JEDEC 4D	
Socket	Svetlana SK4 or equivalent	
Operating position-	Axis vertical, base down or horizontal w/ pins 1 and 4 in vertical plane	

Nominal dimensions:

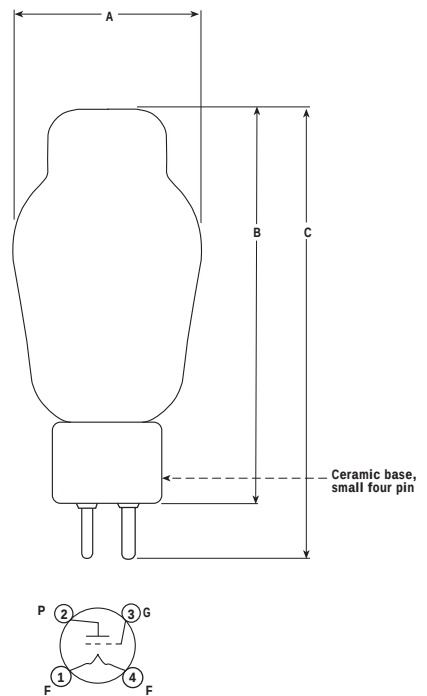
Diameter	57 mm (2.23 in.)
Base to top	133 mm (5.25 in.)
Overall height	150 mm (5.89 in.)

Net weight	100 g
------------	-------

Maximum ratings

DC plate voltage	800	V
Maximum-signal DC plate current	160	mA
Plate Dissipation	65	W
Grid Current	50	mA

Svetlana Outline drawing



Notes:

The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal mounting.

1 Filament
2 Plate

3 Grid
4 Filament

Dimensional Data

Dim.	Millimeters	Inches
A	57	2.23
B	133	5.25
C	150	5.89



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Svetlana SV811-10

Low-Mu Power Triode



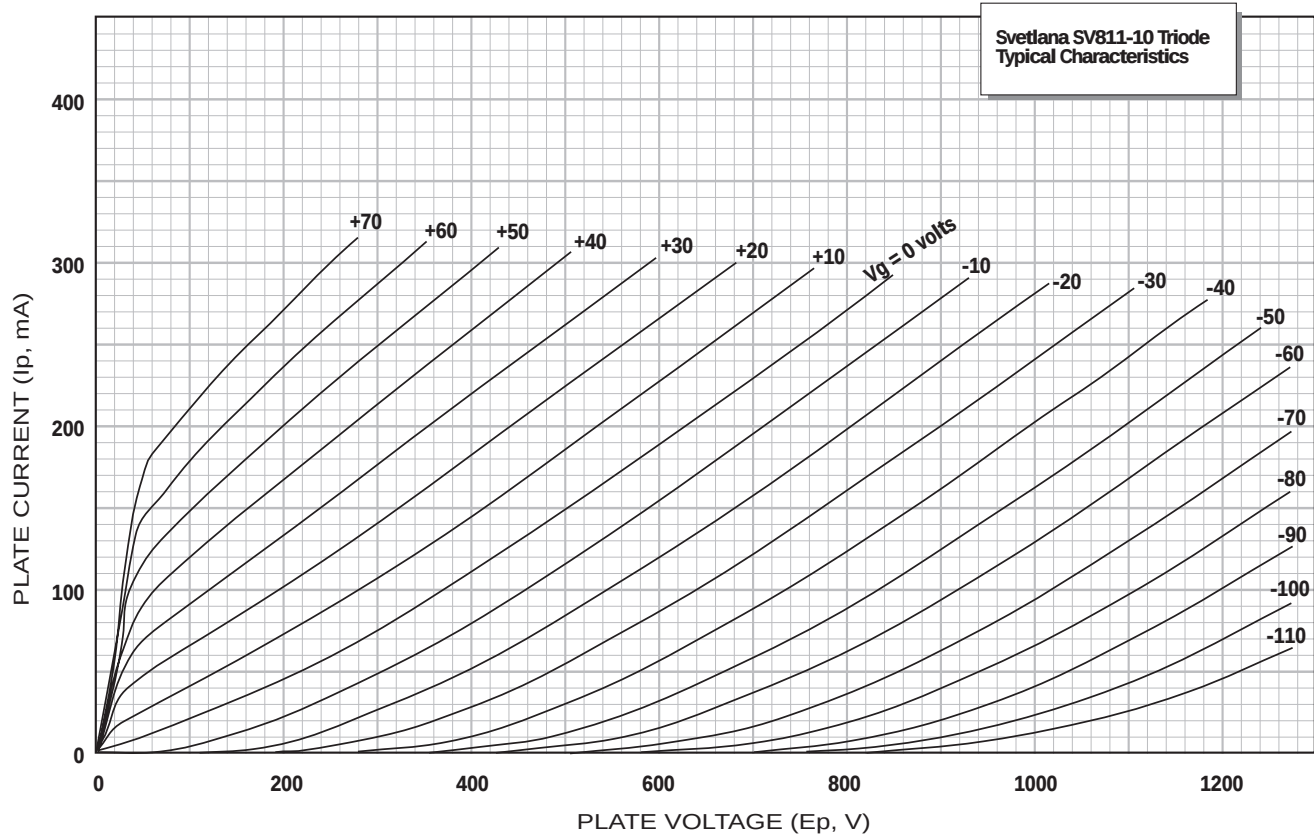
Typical Operation, Class A, Single Tube

DC plate voltage	450	800	V
Grid voltage	-9	-45	V
Peak grid drive	110	127	V P-P
DC Plate current, zero signal	80	80	mA
DC Plate current, max signal	100	91	mA
Plate load resistance	5000	5000	ohms
Distortion at max output	1.0	1.0	%
Power output at distortion above	8.3	13.4	W

Typical Operation, Audio Power Amplifier, Class A₂, Two Tubes

DC plate voltage	450	800	V
Grid voltage	-16.5	-51	V
Peak grid drive, grid-to-grid	360	420	V P-P
DC Plate current, zero signal (per tube)	150	150	mA
DC Plate current, max signal (per tube)	250	260	mA
Plate load resistance	9600	9600	ohms
Distortion at max output	3.0	3.0	%
Power output at distortion above	41	91	W

(Note: allow for contact potential and secondary emission in grid biasing.)



Note: A μ of 3.5 version of this tube is available, the SV811-3

SVETLANA TECHNICAL DATA

SV811-10A

High Performance Audio Power Triode



he Svetlana™ SV811-10A is a power triode intended for use in class A, AB, or B audio amplifiers. It is one of the lowest distortion tubes ever made.

Features:

- Directly heated thoriated tungsten filament for soft glow and warm sound
- Transmitting tube design, hard glass envelope with white ceramic base
- Low microphonic construction with ceramic internal spacers and mica supports
- Excellent gettering system
- Superb aesthetic appearance

Characteristics

Electrical

Filament:	Thoriated-tungsten
Voltage (AC or DC)	6.3 ± 0.3 V
Current	4 A
Amplification factor (nominal)	9.5
Transconductance (nominal)	3800 μ S
Plate resistance (nominal)	2500 ohms
Interelectrode capacitances (typical), with filament grounded:	
Grid to plate	8 pF
Grid to filament	7 pF

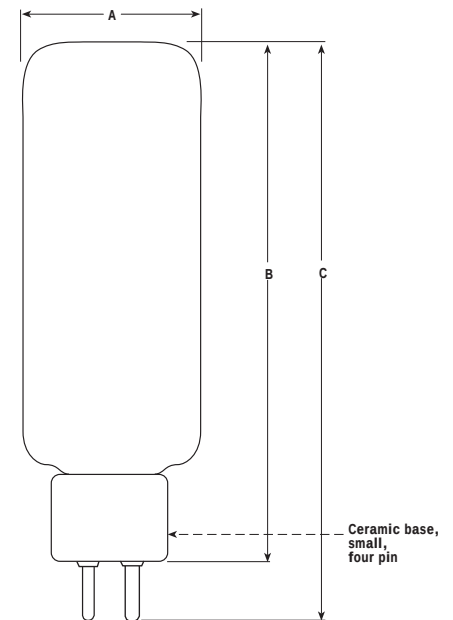
Mechanical

Cooling	Radiation and convection
Base	Ceramic, four pin, small
Basing diagram	JEDEC 4D
Socket	Svetlana SK4A or equivalent
Operating position- Axis vertical, base down or horizontal w/pins 1 and 4 in vertical plane (Adequate surrounding clearance for cooling must be maintained)	
Nominal dimensions:	
Diameter	45.7 mm (1.8 in.)
Base to top	127 mm (5.0 in.)
Overall height	138.2 mm (5.44 in.)
Net weight	100 g

Maximum ratings

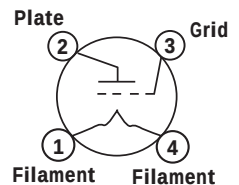
DC plate voltage	800 V
Maximum-signal DC plate current	160 mA
Plate Dissipation	65 W
Grid Current	50 mA

Svetlana Outline drawing



Dimensional Data		
Dim.	Millimeters	Inches
A	45.7	1.80
B	127	5.00
C	138.2	5.44

Base pin connections bottom view



Notes:

The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal mounting.

The anode may be operated while showing small red spots, without decreasing lifetime, as long as dissipation is kept below 65 watts.



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Svetlana SV811-10A

High Performance

Audio Power Triode



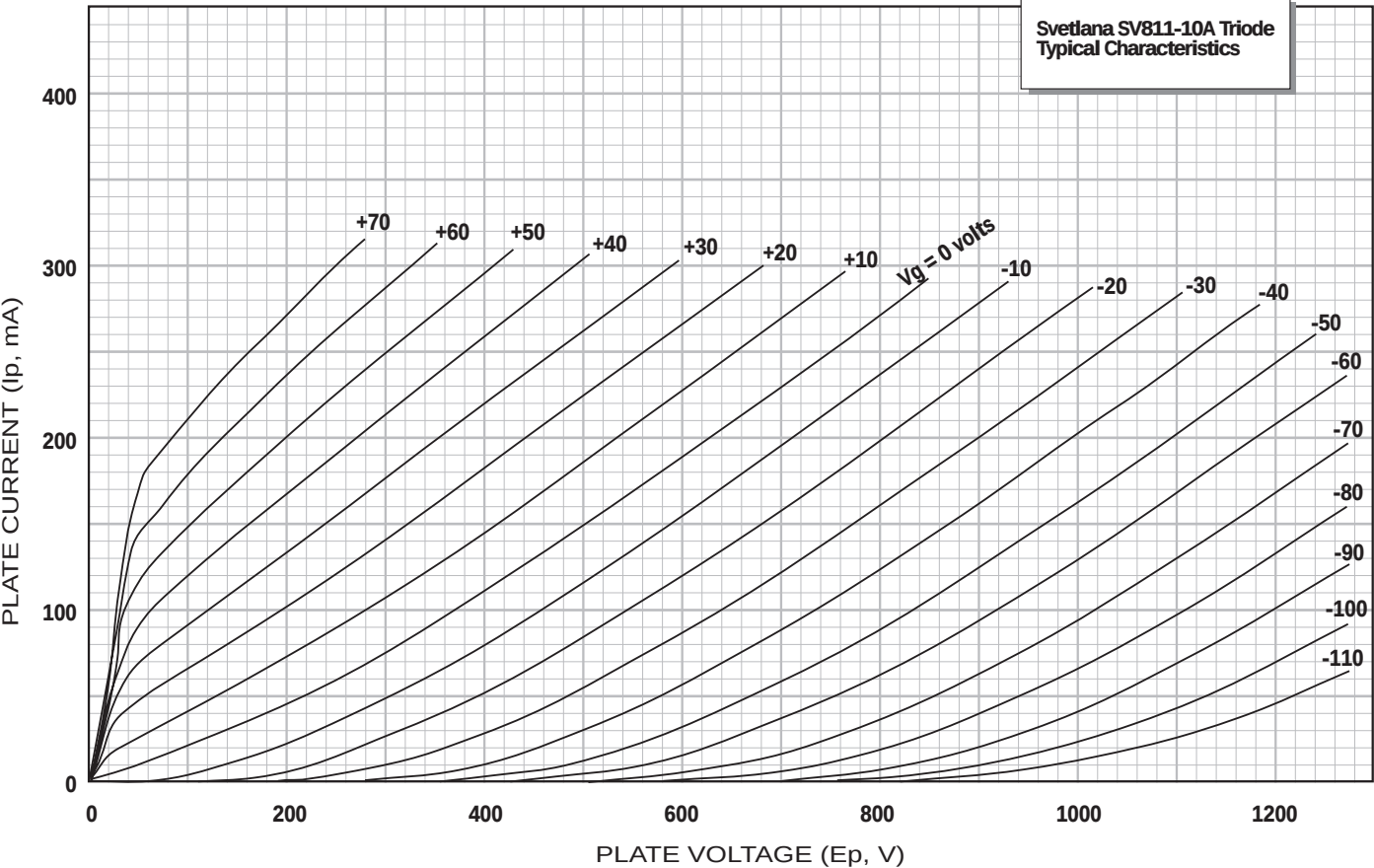
Typical Operation, Single Tube, Class A

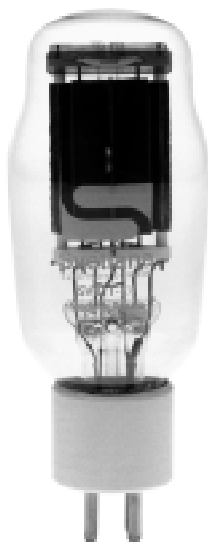
DC plate voltage	450	800	V
Grid voltage	-9	-45	V
Peak grid drive	110	127	V P-P
DC Plate current, zero signal	80	80	mA
DC Plate current, max signal	100	91	mA
Plate load resistance	5000	5000	ohms
Distortion at max output	1.0	1.0	%
Power output at distortion above	8.3	13.4	W

Typical Operation, Push-Pull, Two Tubes, Class AB₂

DC plate voltage	450	800	V
DC grid voltage	-16.5	-51	V
Peak grid-to-grid drive	360	420	V P-P
DC Plate current, zero signal (per tube)	150	150	mA
DC Plate current, max signal (per tube)	250	260	mA
Plate load resistance	9600	9600	ohms
Distortion at max output	3.0	3.0	%
Power output at distortion above	41	91	W

(Note: allow for contact potential and secondary emission in grid biasing.)





SVETLANA TECHNICAL DATA

SV811-3

Low-Mu Power Triode



he Svetlana™ SV811-3 is a power triode intended for use in class A, AB, or B audio amplifiers. This tube features:

- Directly heated thoriated tungsten filament for soft glow and warm sound.
- Hard glass envelope with white ceramic base
- Low microphonic internal construction
- Titanium gettering system
- Tri-plate anode
- Superb aesthetic appearance

Characteristics

Electrical

Filament:	Thoriated-tungsten	
Voltage (AC or DC)	6.3 ± 0.3	V
Current	4	A
Amplification factor	3.5	
Transconductance	1700	μS
Plate resistance	2000	ohms
Interelectrode capacitances (typical), with filament grounded:		
Grid to plate	8	pF
Grid to filament	7	pF

Mechanical

Cooling	Radiation and convection	
Base	Ceramic, four pin, small	
Basing diagram	JEDEC 4D	
Socket	Svetlana SK4 or equivalent	
Operating position-	Axis vertical, base down or horizontal w/ pins 1 and 4 in vertical plane	

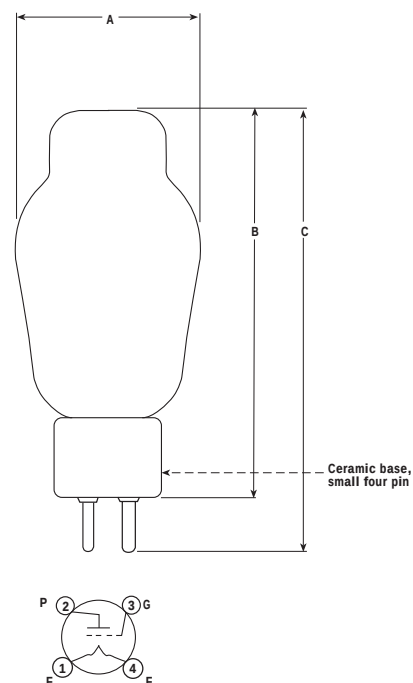
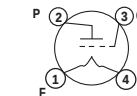
Nominal dimensions:

Diameter	57 mm (2.23 in.)
Base to top	133 mm (5.25 in)
Overall height	150 mm (5.89 in)
Net weight	100 g

Maximum ratings

DC plate voltage	800	V
Maximum-signal DC plate current	160	mA
Plate Dissipation	65	W
Grid Current	50	mA

Svetlana Outline drawing



Notes:

The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal mounting.

- | | |
|------------|------------|
| 1 Filament | 3 Grid |
| 2 Plate | 4 Filament |

Dimensional Data

Dim.	Millimeters	Inches
A	57	2.23
B	133	5.25
C	150	5.89



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Svetlana SV811-3

Low-Mu Power Triode



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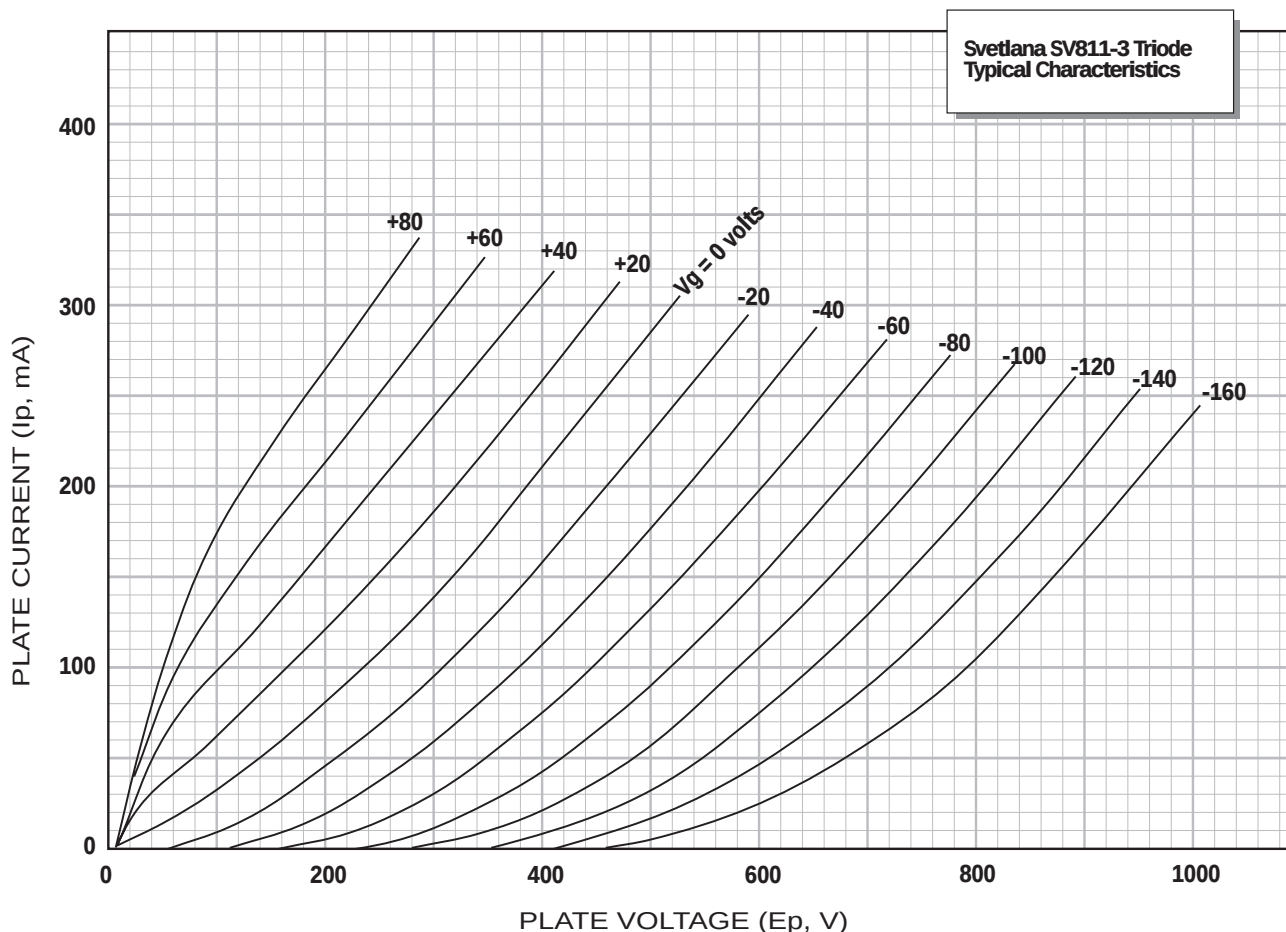
Typical Operation, Single Tube, Class A

Class of Operation	A1	A1	A2	
DC plate voltage	450	800	450	V
Grid voltage	-65	-165	-65	V
Peak grid drive	130	30	280	V P-P
DC plate current, zero signal	80	80	80	mA
DC plate current, max signal	83	90	105	mA
Plate load resistance	5000	5000	5000	Ohms
Distortion at max output	0.2	1.0	1.0	%
Power output at distortion above	3.2	15.4	12.4	W

Typical Operation, Push-Pull, Two Tubes

Class of Operation	AB1	AB1	AB2	
DC plate voltage	450	750	750	V
Grid voltage	-80	-178	-178	V
Peak grid drive, grid to grid	328	720	880	V P-P
DC plate current, zero signal	150	150	150	mA
DC plate current, max signal	155	215	238	mA
Plate load resistance	9600	9600	9600	Ohms
Distortion at max output	0.12	3.0	5.0	%
Power output at distortion above	10	49	66	W

(Note: allow for contact potential and secondary emission in grid biasing.)



Note: A μ of 10 version of this tube type is available, the SV811-10



SVETLANA TECHNICAL DATA

SV811-3A

Low-Mu Audio Power Triode



The Svetlana™ SV811-3A is a power triode intended for use in class A, AB, or B audio amplifiers. It features:

- Directly heated thoriated tungsten filament for soft glow and warm sound
- Hard glass envelope with white ceramic base
- Low microphonic construction with ceramic internal spacers
- Titanium gettering system
- Superb aesthetic appearance

Characteristics

Electrical

Filament:	Thoriated-tungsten	
Voltage (AC or DC)	6.3 ± 0.3	V
Current	4	A
Amplification factor (nominal)	3.5	
Transconductance (nominal)	1700	μS
Plate resistance (nominal)	2000	ohms
Interelectrode capacitances (typical), with filament grounded:		
Grid to plate	8	pF
Grid to filament	7	pF

Mechanical

Cooling	Radiation and convection	
Base	Ceramic, four pin, small	
Basing diagram	JEDEC 4D	
Socket	Svetlana SK4A or equivalent	
Operating position-	Axis vertical, base down or horizontal w/pins 1 and 4 in vertical plane (maintain at least 4 inches clearance from other components)	

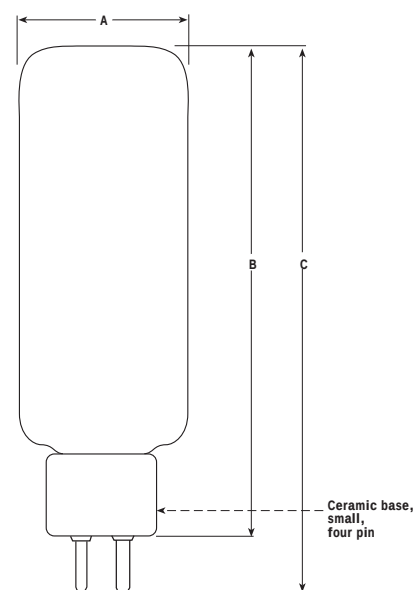
Nominal dimensions:

Diameter	45.7 mm (1.8 in.)
Base to top	127 mm (5.0 in.)
Overall height	138.2 mm (5.44 in.)
Net weight	100 g

Maximum ratings

DC plate voltage	800	V
Maximum-signal DC plate current	160	mA
Plate Dissipation	65	W
Grid Current	50	mA

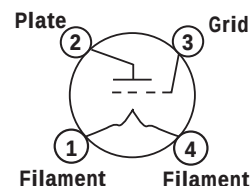
Svetlana Outline drawing



Dimensional Data

Dim.	Millimeters	Inches
A	45.7	1.80
B	127	5.00
C	138.2	5.44

Base pin connections bottom view



Notes:

The internal structure is aligned with respect to the base pins to avoid internal shorting problems in equipment designed for horizontal mounting.

The anode may be operated while showing small red spots, without decreasing lifetime, as long as dissipation is kept below 65 watts.



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Svetlana SV811-3A

Low-Mu Audio Power Triode



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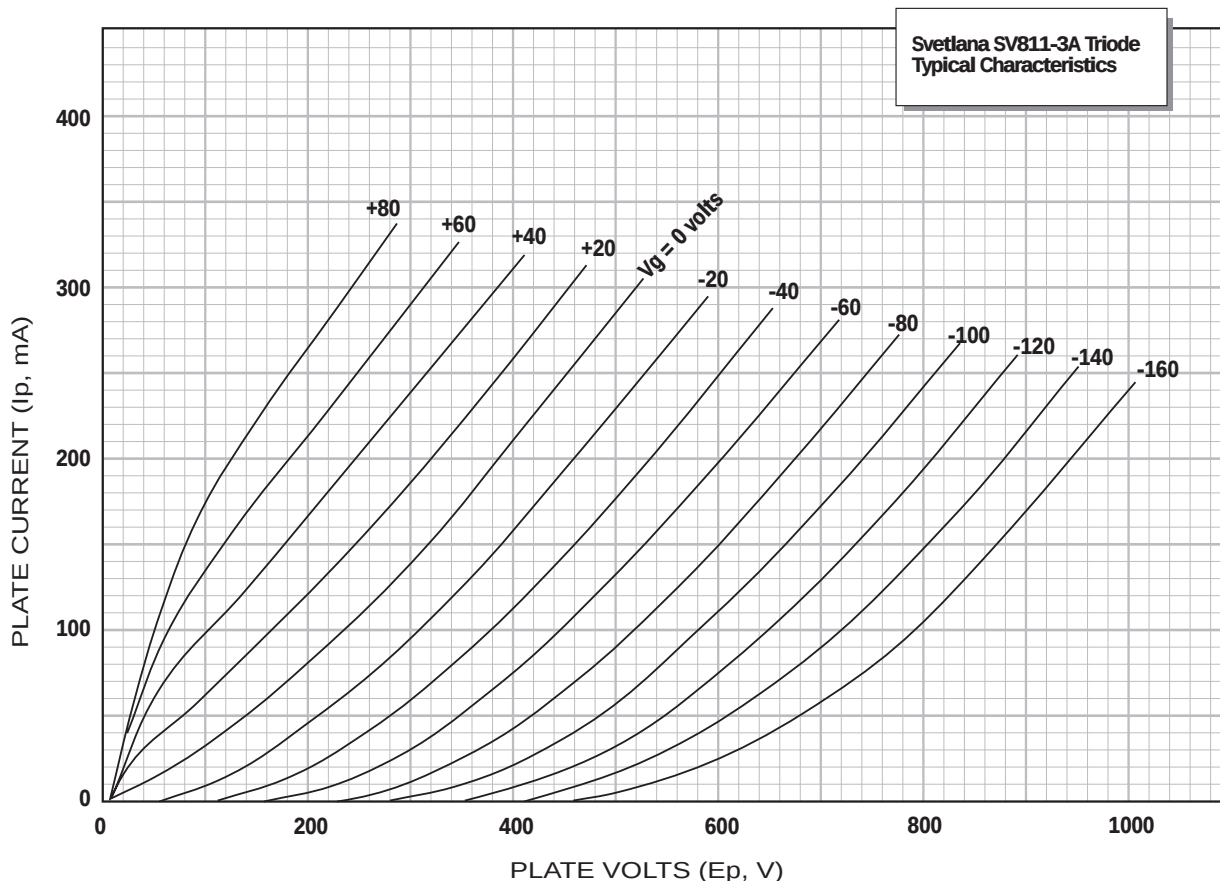
Typical Operation, Single Tube, Class A

Class of Operation	A1	A1	A2	
DC plate voltage	450	800	450	V
Grid voltage	-65	-165	-65	V
Peak grid drive	130	30	280	V P-P
DC plate current, zero signal	80	80	80	mA
DC plate current, max signal	83	90	105	mA
Plate load resistance	5000	5000	5000	Ohms
Distortion at max output	0.2	1.0	1.0	%
Power output at distortion above	3.2	15.4	12.4	W

Typical Operation, Audio Power Amplifier, Push-Pull, Two Tubes

Class of Operation	AB1	AB1	AB2	
DC plate voltage	450	750	750	V
Grid voltage	-80	-178	-178	V
Peak grid drive, grid to grid	328	720	880	V P-P
DC plate current, zero signal	150	150	150	mA
DC plate current, max signal	155	215	238	mA
Plate load resistance	9600	9600	9600	Ohms
Distortion at max output	0.12	3.0	5.0	%
Power output at distortion above	10	49	66	W

(Note: allow for contact potential and secondary emission in grid biasing.)



SVETLANA TECHNICAL DATA

SV83

Audio Power Pentode



The Svetlana™ SV83 is a miniature glass-envelope power pentode intended for use as a driver or output device in high-quality audio amplifiers. Features include plate dissipation 12 watts; low distortion; high transconductance; internally shielded for low hum pickup; and pinout compatibility—EL84 can be used in an SV83 circuit without modification. The highly linear SV83 is similar to the EL84 with the exception of basing connections and screen-grid ratings.

Characteristics

Electrical

Cathode	Oxide-coated, unipotential	
Heater voltage (AC or DC)	6.3 volts AC or DC (± 0.6 volts)	
Heater current	760 mA ± 60 mA	
Heater-cathode voltage	± 100 volts peak	
Amplification factor (nominal)	25	
Transconductance (nominal)	15,000	μS
Interelectrode capacitances (typical), with cathode grounded:		
Grid to cathode	13.5	pF
Anode to cathode	7.0	pF
Grid to anode	0.07	pF

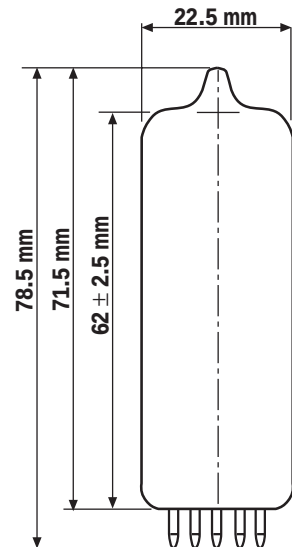
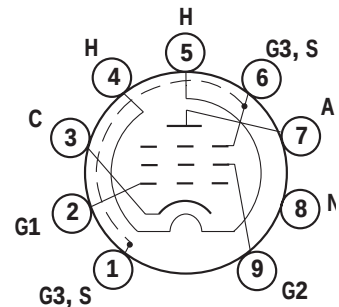
Mechanical

Base	standard 9-pin miniature, glass button	
Basing diagram	see below	
Socket	standard 9-pin miniature	
Operating position	Any (vertical for convection cooling)	
Nominal dimensions:		
Height of glass envelope	71.5 mm (2.81 in.)	
Diameter of glass envelope	22.5 mm (.89 in.)	
Overall height	78.5 mm (3.09 in.)	
Net weight	20 g (.71 oz.)	

Maximum ratings

Anode voltage, DC	300	V
Anode dissipation	12	W
Screen voltage, DC	200	V
Screen dissipation	1.5	W
Cathode current, continuous	90	mA
Grid voltage	-450	V
Maximum grid-circuit resistance (self-bias)	1	megohm
Envelope temperature	200°	C

Svetlana Outline drawing



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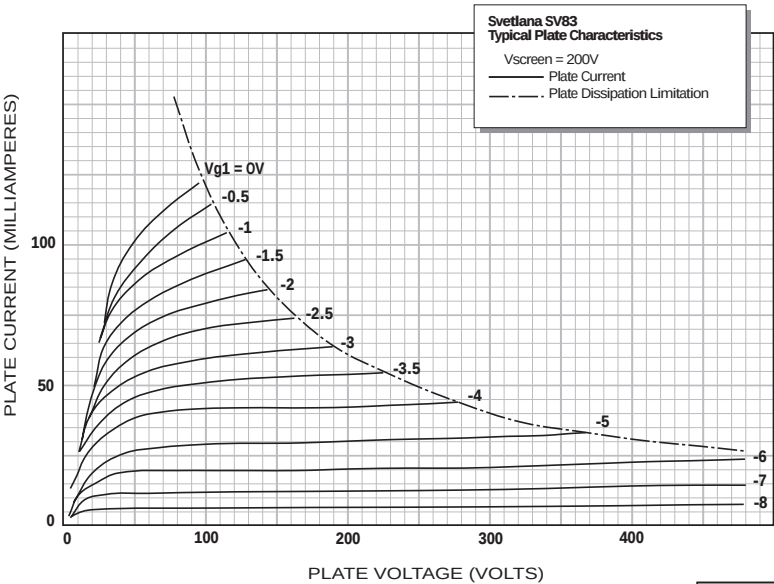
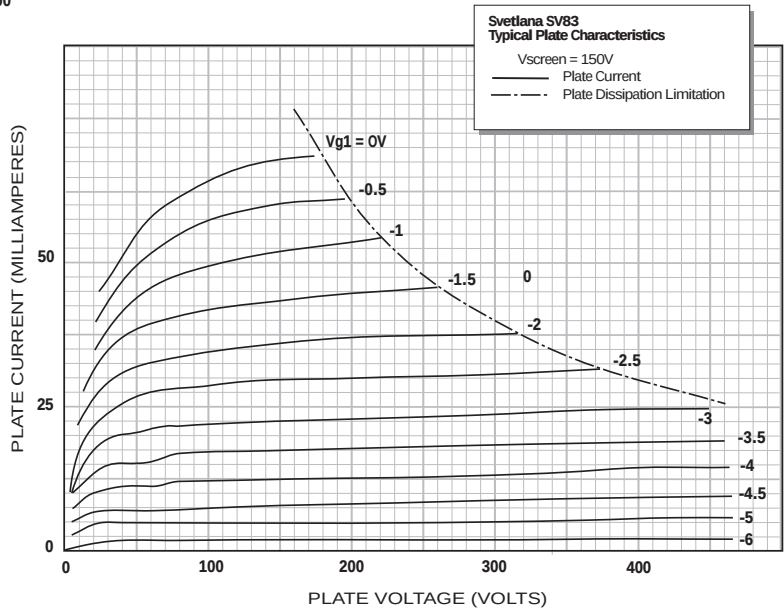
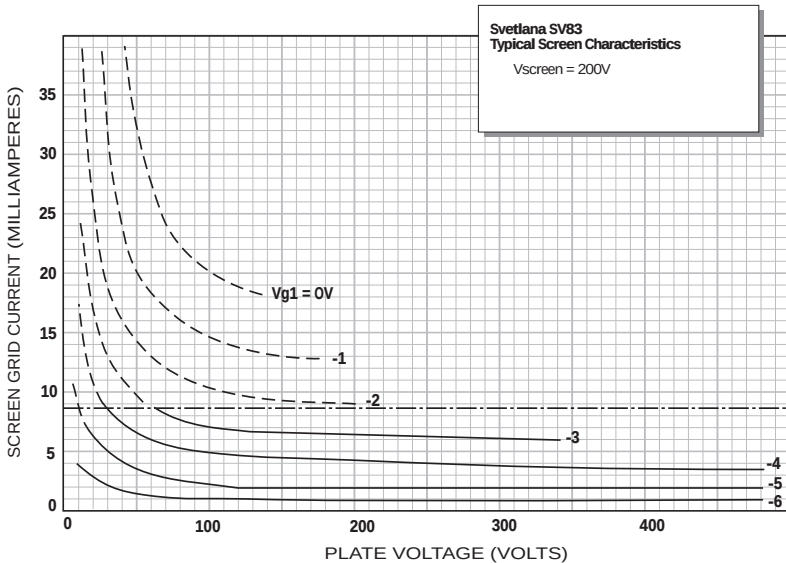
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Svetlana SV83

Audio Power Pentode



Svetlana TH5-4

Industrial Power Triode

The Svetlana™ TH5-4 is a high performance ceramic/metal power triode designed for use in industrial and commercial service. The principal use is as a Class C high power oscillator for dielectric heating equipment. In many applications, the plate power supply may be completely unfiltered.

The Svetlana TH5-6 is identical in electrical characteristics to the TH5-4, except that its fragile hairpin filament is replaced with a rugged, low-inductance, mesh-filament basket.

The Svetlana TH5-4 is a direct replacement for models TH5-4 and TH5-6 manufactured in the United States.

General Characteristics

Electrical

Filament:	Thoriated-tungsten MESH	
Voltage (AC or DC)	7.50 ± 0.37	V
Current	51.5	A
Amplification factor (average)	22	
Maximum frequency	110	MHz
Interelectrode capacitances, with filament grounded:		
Input	35.0	pF
Output	0.9	pF
Feedback	20.0	pF

Mechanical

Cooling	Forced air
Base	Coaxial
Socket	Via Spring Collets
Operating position-	Vertical, base up or down
Nominal dimensions:	
Diameter	106 mm (4.2 in.)
Length	261 mm (10.3 in)
Maximum operating temperature	250° C
Net weight (average)	2.8 kg (6.2 lb.)

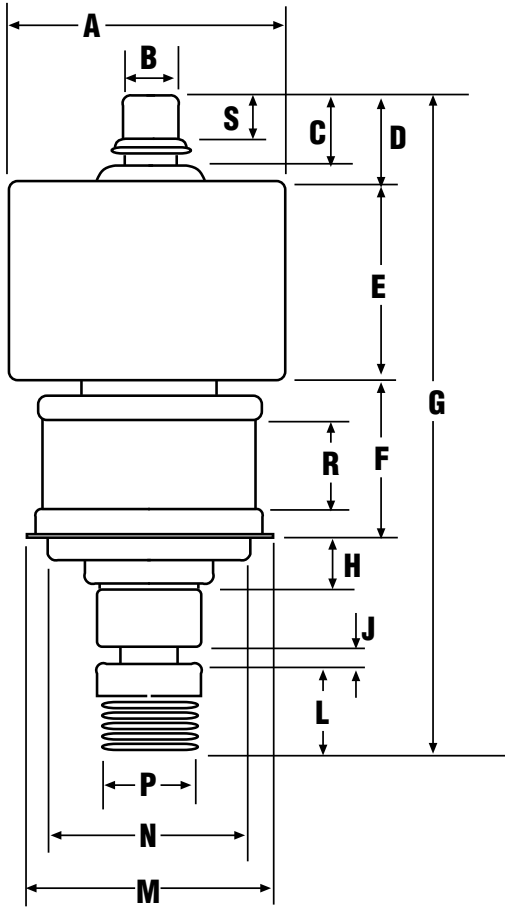
Maximum ratings

DC plate voltage	6000	V
Maximum-signal DC plate current	2500	mA
Plate Dissipation	4000	W
Grid Dissipation	150	W
DC grid voltage	-1000	V

Typical Operation, Class C (Frequencies to 30 MHz)

DC plate voltage	4,000	5,000	6,000	V
DC grid voltage	-300	-450	-500	V
Peak grid voltage	580	750	765	V
Plate current	2,500	2,500	2,080	mA
DC grid current	-245	-265	-80	mA
Grid dissipation	68	78	46	W
Power output	7,500	10,000	10,000	W
Plate dissipation	2,500	2,500	2,500	W

Svetlana TH5-4 Outline drawing



Dimensional Data

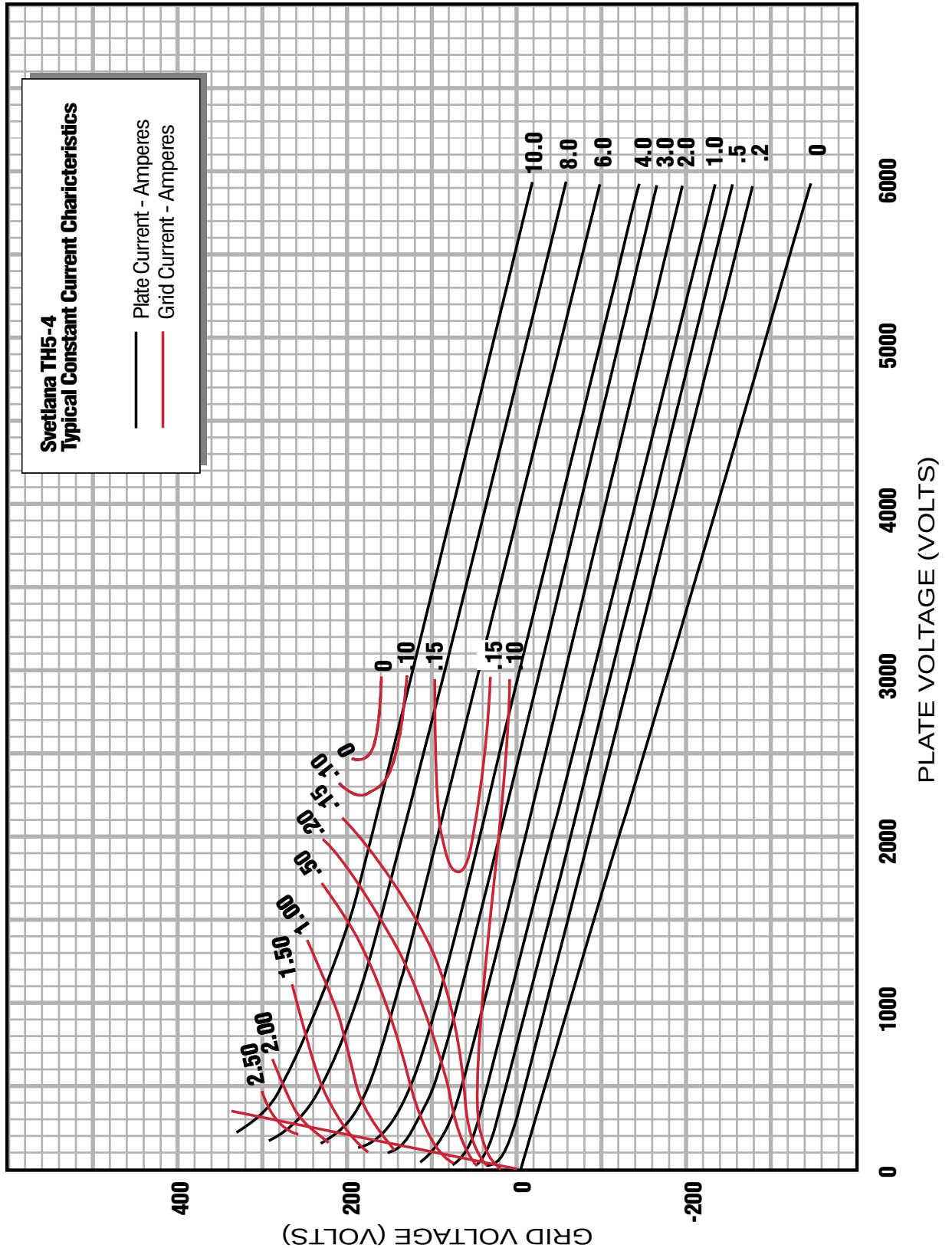
Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	103.99	105.56	4.094	4.156	J	18.42	25.10	0.725	0.988
B	19.84	21.44	0.781	0.844	L	30.86	32.21	1.215	1.268
C	25.40	28.58	1.000	1.125	M	81.28	92.08	3.200	3.625
D	30.18	42.88	1.188	1.688	N	75.95	76.45	2.990	3.010
E	74.60	77.80	2.937	3.063	P	37.85	38.35	1.490	1.510
F	46.99	55.63	1.850	2.190	Q	49.20	54.92	1.937	2.162
G	228.60	261.62	9.000	10.300	R	34.93	42.85	1.375	1.687
H	21.59	26.92	0.850	1.060	S	11.10	—	0.437	—



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Svetlana TH5-6

Industrial Power Triode

The Svetlana™ TH5-6 is a high performance ceramic/metal power triode designed for use in industrial and commercial service. The principal use is as a Class C high power oscillator for dielectric heating equipment. In many applications, the plate power supply may be completely unfiltered.

The Svetlana TH5-6 is identical in electrical characteristics to the TH5-4, except that its fragile hairpin filament is replaced with a rugged, low-inductance, mesh-filament basket.

The Svetlana TH5-6 is a direct replacement for models TH5-4 and TH5-6 manufactured in the United States.

General Characteristics

Electrical

Filament:	Thoriated-tungsten MESH	
Voltage (AC or DC)	7.50 ± 0.37	V
Current	51.5	A
Amplification factor (average)	22	
Maximum frequency	110	MHz
Interelectrode capacitances, with filament grounded:		
Input	35.0	pF
Output	0.9	pF
Feedback	20.0	pF

Mechanical

Cooling	Forced air
Base	Coaxial
Socket	Via Spring Collets
Operating position-	Vertical, base up or down
Nominal dimensions:	
Diameter	106 mm (4.2 in.)
Length	261 mm (10.3 in)
Maximum operating temperature	250° C
Net weight (average)	2.8 kg (6.2 lb.)

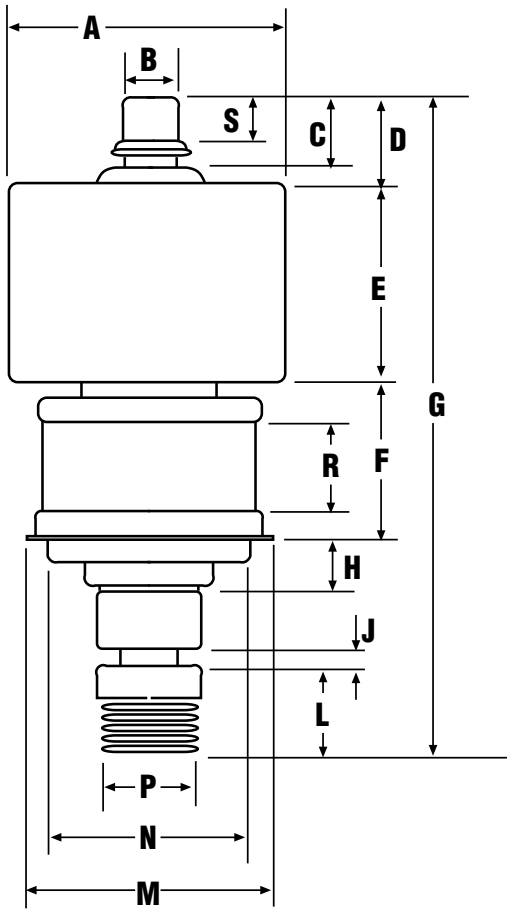
Maximum ratings

DC plate voltage	6000	V
Maximum-signal DC plate current	2500	mA
Plate Dissipation	4000	W
Grid Dissipation	150	W
DC grid voltage	-1000	V

Typical Operation, Class C (Frequencies to 30 MHz)

DC plate voltage	4,000	5,000	6,000	V
DC grid voltage	-300	-450	-500	V
Peak grid voltage	580	750	765	V
Plate current	2,500	2,500	2,080	mA
DC grid current	-245	-265	-80	mA
Grid dissipation	68	78	46	W
Power output	7,500	10,000	10,000	W
Plate dissipation	2,500	2,500	2,500	W

Svetlana TH5-6 Outline drawing



Dimensional Data

Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	103.99	105.56	4.094	4.156	J	18.42	25.10	0.725	0.988
B	19.84	21.44	0.781	0.844	L	30.86	32.21	1.215	1.268
C	25.40	28.58	1.000	1.125	M	81.28	92.08	3.200	3.625
D	30.18	42.88	1.188	1.688	N	75.95	76.45	2.990	3.010
E	74.60	77.80	2.937	3.063	P	37.85	38.35	1.490	1.510
F	46.99	55.63	1.850	2.190	Q	49.20	54.92	1.937	2.162
G	228.60	261.62	9.000	10.300	R	34.93	42.85	1.375	1.687
H	21.59	26.92	0.850	1.060	S	11.10	—	0.437	—

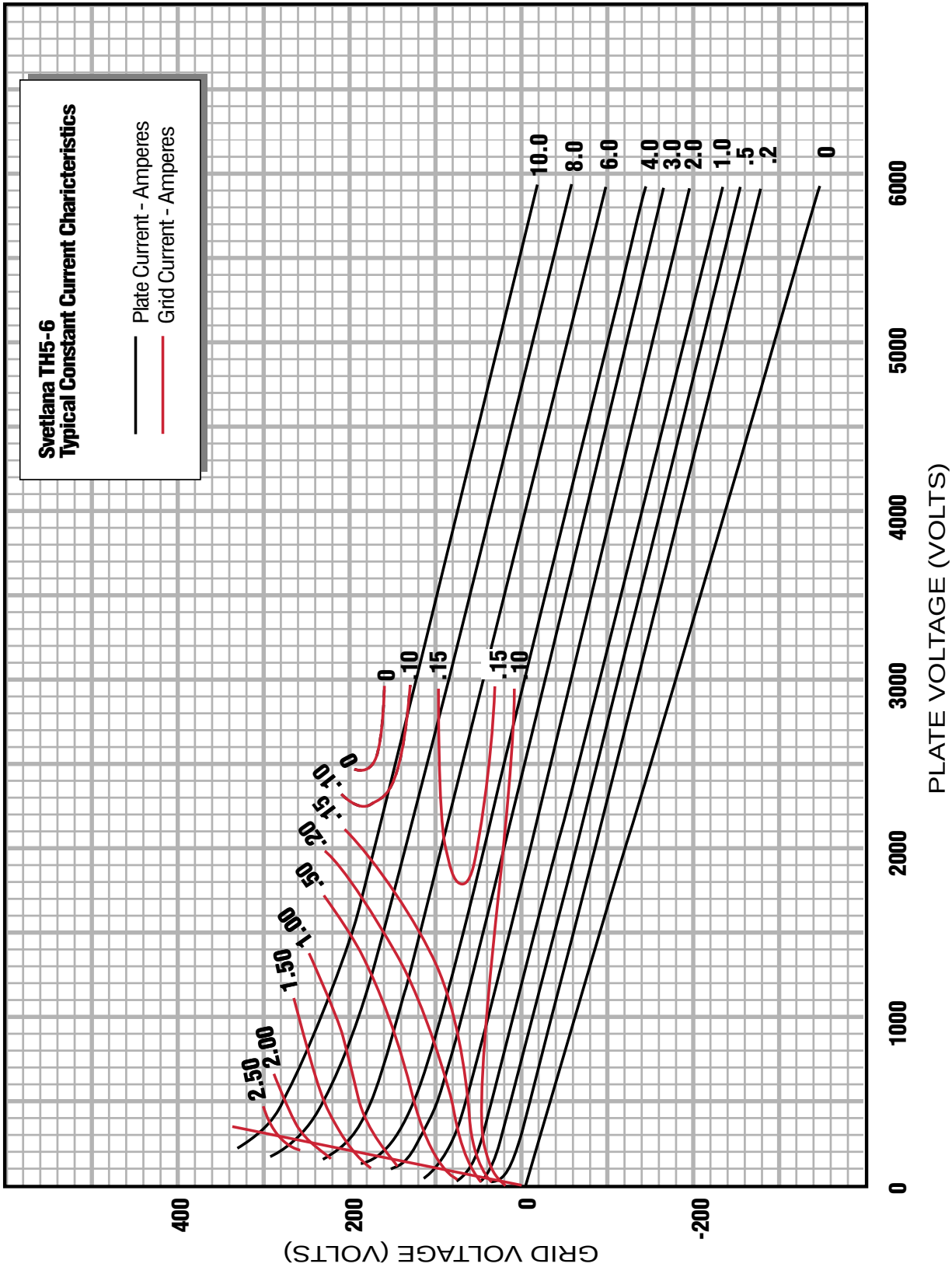


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SVETLANA TECHNICAL DATA

Svetlana TH6-3 and TH6-3A Industrial Power Triodes



The Svetlana™ TH6-3 and TH6-3A are high performance ceramic/metal power triodes designed for use in industrial service. Typical use is as a Class C high power oscillator for dielectric heating equipment.

The TH6-3 and the TH6-3A are identical in electrical characteristics. The difference in the TH6-3 and TH6-3A models is that the TH6-3A has a star flange which is welded to the grid ring for ease of mounting and connection. Reliability of the Svetlana manufactured tube is much higher because of its welded construction and solid copper grid mounting flange. These mechanical advantages provide improved thermal conductivity for optimum grid cooling and a more rugged assembly than the soft soldered bronze grid flange used in U.S. tubes.

The Svetlana TH6-3 and the TH6-3A are direct replacements for United States manufactured triodes of the same type.

Characteristics

Electrical

Filament	Thoriated-tungsten mesh	
Voltage	7.5 ± 0.37	V
Current @ 7.5 V	100	A
Amplification factor (average)	20	
Interelectrode capacitances (typical), with filament grounded:		
Input	53	pF
Output	1.5	pF
Feedback	34	pF

Mechanical

Cooling	Forced air
Base	Coaxial
Operating position	Vertical, base up or down
Maximum dimensions:	
Length	261.88 mm (10.310 in)
Diameter	179.07 mm (7.050 in.)
Maximum operating temperature	250° C

Maximum ratings, CW

DC plate voltage	10,000	V
Maximum-signal DC plate current	4.0	A
Plate Dissipation	10	kW
Grid Dissipation	250	W

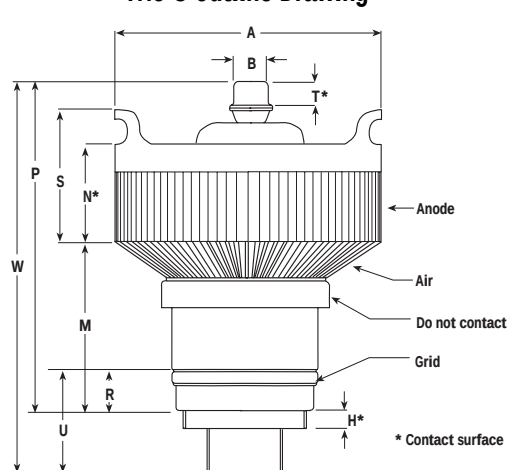
Typical Operation

DC plate voltage	7000	9000	V
Plate current	4.0	4.0	A
DC grid voltage	-620	-930	V
DC grid current*	0.275	0.43	A
Peak cathode RF voltage*	370	390	V
Driving power*	260	570	W
Plate Power output	19	29	kW

*Approximate values

Svetlana Outline drawing

TH6-3 Outline Drawing



Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	175.97	179.07	6.928	7.050
B	21.72	22.73	0.855	0.895
H	11.43	—	0.45	—
M	100.33	109.22	3.950	4.300
N	61.26	70.82	2.412	2.788
P	209.55	222.25	8.250	8.750
R	25.04	26.67	0.986	1.050
S	86.66	96.22	3.412	3.788
T	9.53	—	0.375	—
U	—	66.68	—	2.625
W	259.20	261.88	10.008	10.310

TH6-3A Outline Drawing

See Next Page



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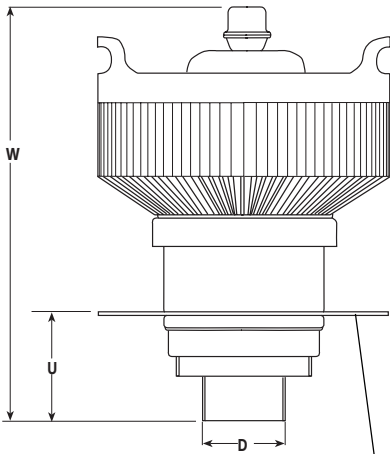
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Svetlana TH6-3 and TH6-3A Industrial Power Triodes



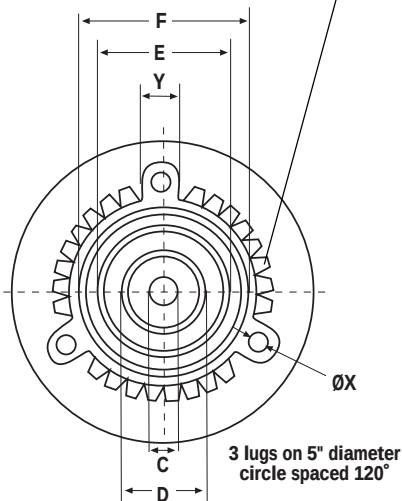
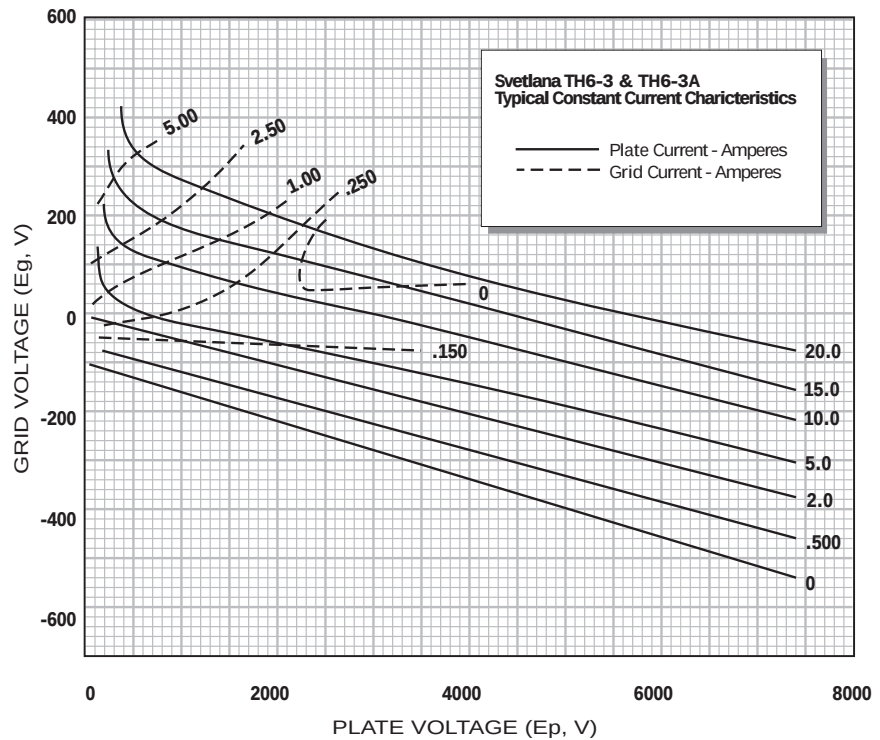
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TH6-3A Outline Drawing



GRID MOUNTING
FLANGE

TH6-3A Bottom View



Minimum Cooling Air Flow Requirements

Anode-to-Base Air Flow

Anode Dissipation, Watts	Sea Level		5000 Feet	
	Air Flow, CFM	Pressure Drop, Inches of Water	Air Flow, CFM	Pressure Drop, Inches of Water
4000	85	0.18	105	0.21
6000	145	0.38	125	0.46
8000	215	0.68	260	0.82
10,000	235	1.08	360	0.32

Because the power dissipated by the filament represents about 250 watts and because grid dissipation can, under some conditions, represent another 250 watts, allowance has been made in preparing this tabulation for an additional 1000 watts.

Dimensional Data

Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
C	18.29	22.50	0.720	0.886
D	48.16	49.17	1.896	1.936
E	82.00	83.00	3.228	3.268
F	96.32	97.33	3.792	3.832
U	—	66.68	—	2.625
W	254.20	261.88	10.008	10.310
ØX	—	9.66	—	0.380
Y	24.00	26.00	0.945	1.024

Except for star flange, dimensions of TH6-3A and TH6-3 are identical.