

AMPEREX TUBE TYPE 5923

The 5923 is a water cooled three-electrode tube designed for use as power amplifier, oscillator and modulator in television and AM/FM transmitters and for industrial applications. Maximum ratings apply up to 75 Mc. At reduced ratings it may be operated up to 220 Mc.

GENERAL CHARACTERISTICS

ELECTRICAL DATA

	Min.	Bogey	Max.
Filament Voltage	12.0	12.6	13.2 volts
Filament Current at Bogey Voltage . . .	30	33	36 amps
Amplification Factor (Ib=1 amp, Eb=4000 volts)	26	32	38
Peak Cathode Current ¹			10 amps
Direct Interelectrode Capacitances			
Grid to Plate	9.5	11	12.5 μ f
Grid to Filament	13	16	19 μ f
Plate to Filament	0.2	0.3	0.4 μ f

MECHANICAL DATA

Mounting Position	vertical with plate down
Max. Temperature of Seals	180° C

COOLING : Water and low velocity air flow

COOLING CHARACTERISTICS (See Curves)

Plate Dissipation (kilowatts)	Inlet Water Temperature (° C)	Min. Water Flow (gpm)	Inlet Water Pressure (lbs./sq. inch)
1	20	0.66	1.18
	50	0.79	1.47
2	20	0.66	1.18
	50	1.32	4.41
4	20	1.06	2.65
	50	2.38	13.2
6	20	1.58	5.9
	50	3.70	36.8

Max. Inlet Water Temperature 50° C

ACCESSORIES

Water Jacket	Amperex Type #S3737
Filament Connector	Amperex Type #S3707
Grid Connector	Amperex Type #S3706

WEIGHT

Tube — Net Weight (approx.)	14 ounces
Water Jacket — Net Weight (approx.) . . .	21 ounces

¹Represents max. usable cathode current for any condition of operation.

²At frequencies above 30 Mc it is necessary to direct a low velocity air flow to plate and grid seals.

Radio-Frequency Power Amplifier—Class B

Carrier conditions per tube for use with a maximum modulation factor of 1.0

	Maximum Ratings, Absolute Values	
	CCS	
D.C. Plate Voltage	6000 volts max.	
D.C. Plate Current	1.1 amps max.	
Plate Input	6600 watts max.	
Plate Dissipation	6000 watts max.	

Typical Operation

	CCS	CCS
D.C. Plate Voltage	6	5 kilovolts
D.C. Grid Voltage	—180	—145 volts
Peak R.F. Grid Voltage	250	225 volts
D.C. Plate Current	0.89	0.9 amp
Driving Power, approximate ²	140	130 watts
Power Output, approximate	1.9	1.45 kilowatts

Max. Ratings (per Tube)	Up to 75 Mc	Up to 110 Mc ²	Up to 220 Mc ²
D.C. Plate Voltage	6000	5000	4000 volts
D.C. Plate Current	1.1	1.1	0.9 amps
Plate Input	6600	5500	3600 watts

Grid-Modulated R.F. Power Amplifier Class C—Television Service

Negative Modulation, Positive Synchronization
Maximum Ratings, Absolute Values (per tube)

	CCS
D.C. Plate Voltage	5000 volts max.
D.C. Grid No. 1 Voltage— White Level	—1000 volts max.
Plate Current (at crest of modulation)	1.9 amps max.
Plate Input (sync)	9.5 kilowatts max.
Plate Dissipation (sync)	6 kilowatts max.
Grid No. 1 Dissipation (sync)	120 watts max.

Typical Operation in Television Service at 75 Mc and Bandwidth of 5.25 Mc at 85% Antenna Current and 8 Mc at 70% Antenna Current

	2 tubes—push pull
D.C. Plate Voltage	5000 volts
D.C. Grid No. 1 Voltage Synchronizing Level	—200 volts
Pedestal Level	—300 volts
White Level	—550 volts
R.F. Grid No. 1 Voltage Peak to Peak Synchronizing Level	1000 volts
D.C. Plate Current	3.8 amps
Synchronizing Level	2.6 amps
Pedestal Level	0.5 amp
D.C. Grid Current, approximate Synchronizing Level	0.35 amp
Pedestal Level	5.35 kilowatts
Driving Power at Synchronization Level, approximate	9 kilowatts
Power Output, approximate Synchronization Level	250 watts
Pedestal Level	

Max. Ratings (per Tube)	Up to 75 Mc	Up to 110 Mc ²	Up to 220 Mc ²
Plate Input (Sync.)	6000	5000	4500 volts
D.C. Plate Voltage	1.9	1.9	1.9 amps
Plate Current (Sync.)	11.4	9.5	8.5 kw

Radio-Frequency Amplifier—Class B for Television Service

Negative Modulation and Positive Synchronization

Maximum Ratings, Absolute Values (per tube)

	CCS
D.C. Plate Voltage	5000 volts max.
D.C. Grid Voltage	—1000 volts max.
D.C. Plate Current (at crest of modulation)	1.9 amps max.
Plate Input	9500 watts max.
Plate Dissipation	6000 watts max.
Grid Dissipation	120 watts max.

Typical Operation in Television Service at 75 Mc and Bandwidth of 5.25 Mc at 85% Antenna Current and 8 Mc at 70% Antenna Current

	8 tubes—push pull
D.C. Plate Voltage	5000 volts
D.C. Grid Voltage	—200 volts
R.F. Grid Voltage Peak to Peak Synchronizing Level	1000 volts
Pedestal Level	800 volts
White Level	0 volt
D.C. Plate Current	3.8 amps
Synchronizing Level	3 amps
Pedestal Level	0.2 amp
White Level	0.2 amp
D.C. Grid Current	0.5 amp
Synchronizing Level	0.22 amp
Pedestal Level	0 amp
White Level	250 watts
Driving Power at Synchronization Level, approximate	9 kilowatts
Power Output, approximate Synchronizing Level	5.35 kilowatts
Pedestal Level	

Max. Ratings (per Tube)	Up to 75 Mc	Up to 110 Mc ²	Up to 220 Mc ²
D.C. Plate Voltage	6000	5000	4500 volts
D.C. Plate Current (Sync.)	1.9	1.9	1.9 amps
Plate Input (Sync.)	11.4	9.5	8.5 kw

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TENTATIVE DATA

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Audio-Frequency Power Amplifier and Modulator—Class B

Maximum Ratings, Absolute Values (per tube)

	CCS
D.C. Plate Voltage	6000 volts max.
Maximum Signal D.C. Plate Current ¹	1.5 amps max.
Maximum Signal Plate Input ¹	9000 watts max.
Plate Dissipation ¹	6000 watts max.
Grid Resistor	15,000 ohms max.

Typical Operation

Unless otherwise specified, values are for two tubes

	CCS	CCS	CCS	CCS	CCS	CCS
D.C. Plate Voltage	6000	5000	4500	4000	3500	3000 volts
D.C. Grid Voltage	-165	-138	-125	-112	-100	-80 volts
Peak A-F Grid to Grid Voltage	910	661	655	632	618	570 volts
Zero Signal D.C. Plate Current	250	220	200	200	150	130 milliamperes
Maximum Signal D.C. Plate Current	3000	1820	1840	1880	1900	1800 milliamperes
Effective Load Resistance, Plate to Plate	4800	6400	6100	4900	4200	4400 ohms
Maximum Signal Driving Power, approx.	230	84	54	108	100	104 watts
Maximum Signal Power Output, approx.	13.3	6.6	6.0	5.3	4.6	3.3 kilowatts

Plate-Modulated Radio-Frequency Power Amplifier—Class C—Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum Ratings, Absolute Values (per tube)

	CCS
D.C. Plate Voltage	5000 volts max.
D.C. Grid Voltage	-1000 volts max.
D.C. Plate Current	1.3 amps max.
D.C. Grid Current	0.35 amp max.
Plate Input	6.5 kilowatts max.
Plate Dissipation	4 kilowatts max.

Typical Operation

	CCS	CCS	CCS	CCS	CCS
D.C. Plate Voltage	5	4.5	4	3.5	3 kilovolts
D.C. Grid Voltage ²	-400	-350	-300	-300	-250 volts
Peak R.F. Grid Voltage	690	650	600	500	510 volts
D.C. Plate Current	1.2	1.2	1.2	1.2	1.0 amps
D.C. Grid Current, approx.	0.3	0.3	0.3	0.3	0.3 amp
Driving Power, approx.	190	180	165	165	140 watts
Power Output, approx.	4.7	4.1	3.5	3.0	2.2 kilowatts
Max. Ratings (per Tube)	Up to 75 Mc	Up to 110 Mc ³	Up to 110 Mc ³	Up to 220 Mc ⁴	Up to 220 Mc ⁴
D.C. Plate Voltage	5000	4000	3200	3200	3200 volts
D.C. Plate Current	1.3	1.3	1.1	1.1	1.1 amps
Plate Input	6.5	5.2	3.5	3.5	3.5 kw

Radio-Frequency Power Amplifier and Oscillator—Class C—Telegraphy

Key-down conditions per tube without amplitude modulation⁴

Maximum Ratings, Absolute Values (per tube)

	CCS
D.C. Plate Voltage	6000 volts max.
D.C. Grid Voltage	-1000 volts max.
D.C. Plate Current	1.5 amps max.
D.C. Grid Current	0.35 amp max.
Plate Input	9000 watts max.
Plate Dissipation	6000 watts max.

Typical Operation, Grounded-Filament Circuit¹

	CCS	CCS	CCS
Frequency	75	75	75 megacycles
D.C. Plate Voltage	6	5	4 kilovolts
D.C. Grid Voltage	-400	-300	-200 volts
Peak R.F. Grid Voltage	740	640	500 volts
D.C. Plate Current	1.5	1.5	1.37 amps
D.C. Grid Current, approximate	0.31	0.33	0.35 amps
Driving Power	210	190	160 watts
Power Output, approx.	6.9	5.6	4.0 kilowatts

Typical Operation, Grounded-Grid Circuit, Two Tubes

	CCS	CCS	CCS	CCS
Frequency ²	75	110	110	220 megacycles
D.C. Plate Voltage	6	5	4	4 kilovolts
D.C. Grid Voltage	400	300	200	200 volts
Peak R.F. Grid Voltage	740	640	500	450 volts
D.C. Plate Current	3	3	2.75	2.5 amps
D.C. Grid Current, approx.	0.62	0.66	0.70	0.40 amp
Driving Power	2240	1840	1350	760 watts
Power Output, approx. ³	15.6	12.1	8.8	5.6 kilowatts

	Up to 75 Mc	Up to 110 Mc ³	Up to 110 Mc ³	Up to 220 Mc ⁴
Max. Ratings (per Tube)				
D.C. Plate Voltage	6000	5000	4000	4000 volts
D.C. Plate Current	1.5	1.5	1.25	1.25 amps
Plate Input	9000	7500	5000	5000 watts

Oscillator—Class C

With Rectified, unfiltered, single-phase, full-wave plate supply

Maximum Ratings, Absolute Values (per tube)

	CCS
D.C. Plate Voltage	5400 volts max.
D.C. Grid Voltage	-900 volts max.
D.C. Plate Current	1.35 amps max.
D.C. Grid Current	0.31 amp max.
Plate Input ¹	9000 watts max.
Plate Dissipation	6000 watts max.
Grid Dissipation	120 watts max.

Typical Operation

	6000 ⁴	5100 ⁵ volts rms
Transformer Voltage	5.4	4.6 kilovolts
D.C. Plate Voltage	1.35	1.15 amps
D.C. Plate Current	0.31	0.27 amp
Grid Resistor	1300	1100 ohms
Plate Input	9	6.5 kilowatts
Plate Dissipation	2.3	1.84 kilowatts
Driving Power of Tube, approximate	210	160 watts
Power Output, approximate	6.5	4.5 kilowatts

	Up to 75 Mc	Up to 110 Mc ³	Up to 220 Mc ⁴
Max. Ratings (per Tube)			
D.C. Plate Voltage	5400	4500	3600 volts
D.C. Plate Current	1.35	1.35	1.1 amps
Plate Input ¹	9000	7500	5000 watts

Self-Rectifying Oscillator—Class C

Maximum Ratings, Absolute Values (per tube)

	CCS
A.C. Plate Voltage (RMS)	6800 volts max.
D.C. Grid No. 1 Voltage	-640 volts max.
D.C. Plate Current	0.8 amp max.
D.C. Grid Current	0.19 amp max.
Plate Input ^{1,2}	9000 watts max.
Plate Dissipation	6000 watts max.
Grid Dissipation	120 watts max.

Typical Operation

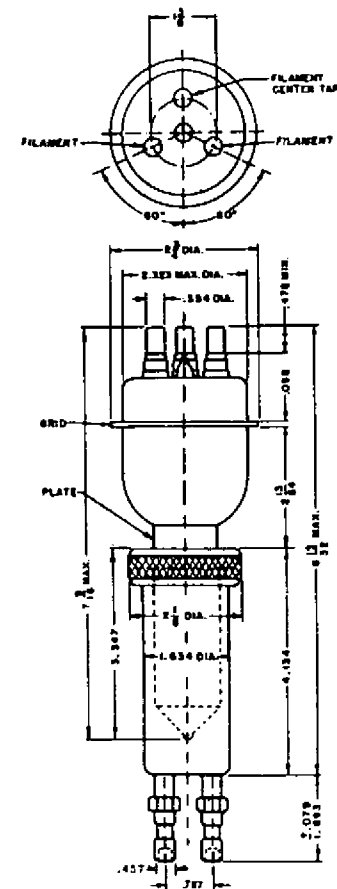
	CCS	CCS	CCS
A.C. Plate Voltage (RMS)	6800 ⁴	5900 ⁵	4500 volts
D.C. Plate Current	0.8	0.7	0.6 amp
D.C. Grid Current	0.19	0.165	0.165 amp
Grid Resistor	1050	1050	1050 ohms
Power Output, approximate	4.55	3.36	3.36 kilowatts
Max. Ratings (per Tube)	Up to 75 Mc	Up to 110 Mc ³	Up to 220 Mc ⁴
A.C. Plate Voltage (RMS)	6800	5700	4500 volts
D.C. Plate Current	0.8	0.8	0.66 amp
Plate Input	9000	7500	5000 watts

Electrical Data and Limits

Characteristic	Conditions	Limits
Grid Voltage ^{1,2}	E _b =1000 volts I _b =8 amps	E _c : — — 420 volts
Grid Current ^{1,2}	E _b =1000 volts I _b =6 amps	I _c : — — 2.5 amps
Plate Current	E _b =6000 volts E _c =-180 volts	I _p : — — 130 milliamperes
Grid Current	E _b =6000 volts I _b =0.85 amp	I _c : — — 40 microamperes
Grid Voltage	E _b =6000 volts I _b =0.85 amp	E _c : 67 94 121 volts
Power Output	E _b =6000 volts I _b =1.5 amps E _c =-400 volts f=75 megacycles	P _o : 5 — — kilowatts

¹Averaged over any audio-frequency cycle of sine-wave form.

²Grid bias partially obtained by the grid resistor.



³When using the tube above 110 megacycles, particular attention must be given to a careful design of the installation, otherwise the tube may be damaged. Therefore, guarantees for tubes operating above 110 mc can only be given after approval of the prototype circuit.

⁴Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115 per cent of the carrier conditions.

⁵Power transferred from driving stage included.

⁶At crest of audio-frequency cycle with modulation factor of 1.0.

⁷Plate input is 1.23 times the product of D.C. Plate Voltage and D.C. Plate Current.

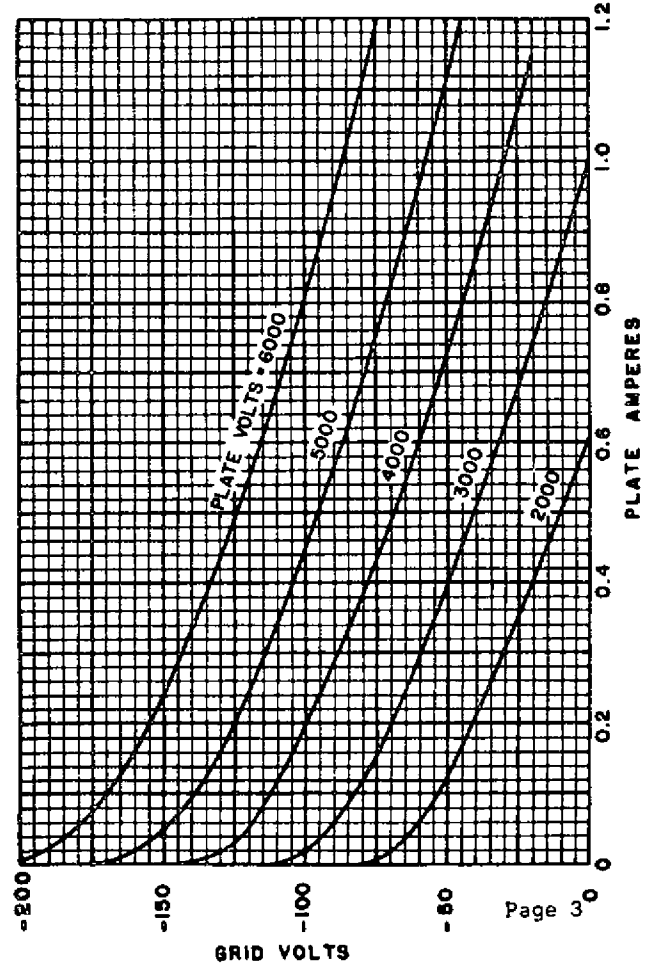
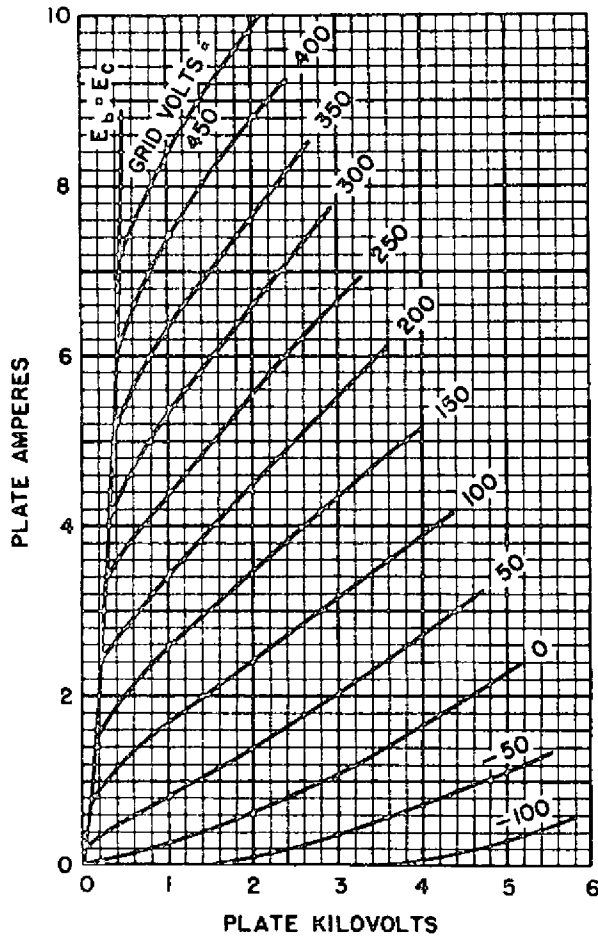
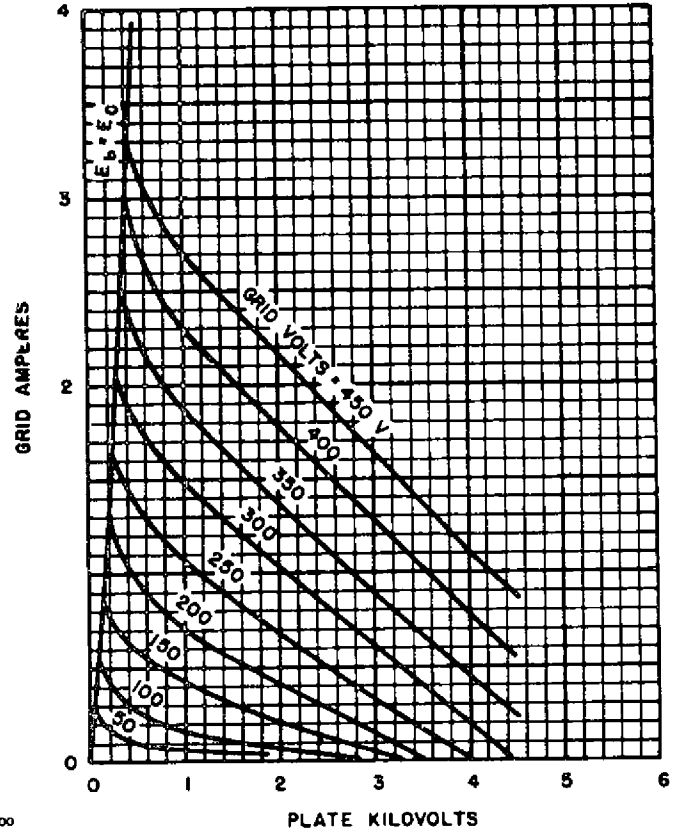
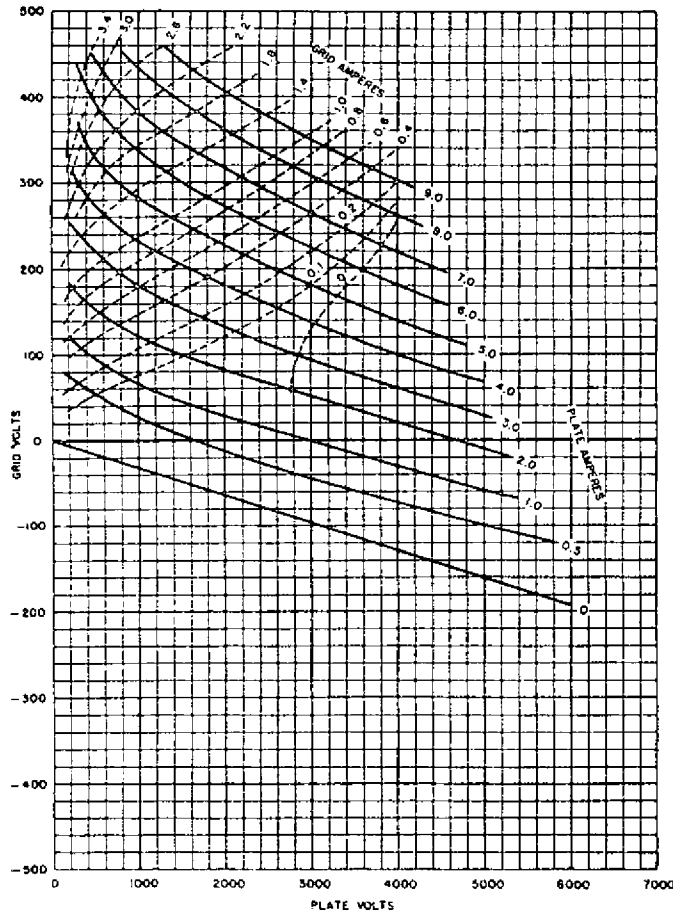
⁸Care must be taken that under these operating conditions the absolute limiting values are not exceeded by variation of the supply voltage or the load or by tolerances in the circuit elements.

⁹Under these conditions normal deviations of voltage and load are permissible. The absolute limiting values of the tube must, however, not be exceeded.

¹⁰Plate input is 1.11 times the product of A.C. Plate Voltage (RMS) and D.C. Plate Current.

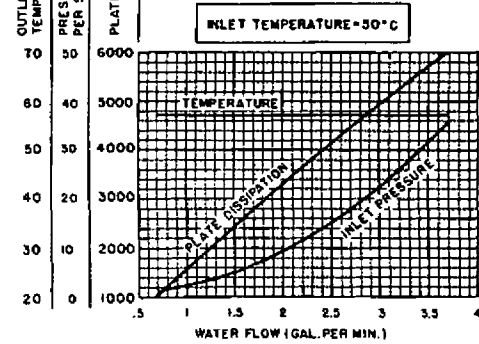
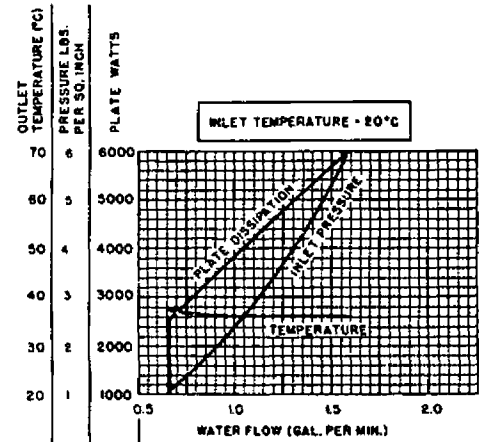
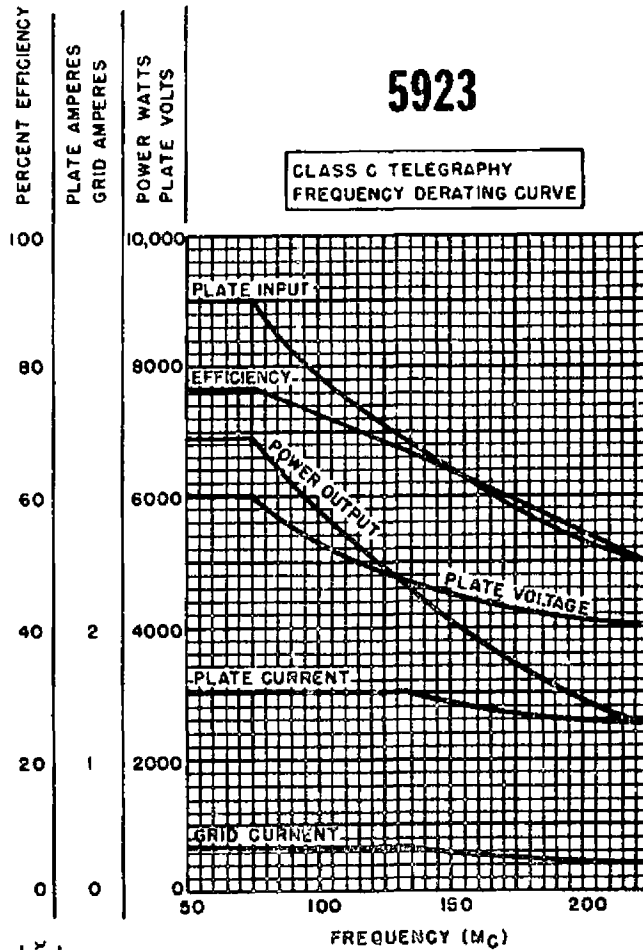
¹¹This data is given only for design purposes; not for measurements.

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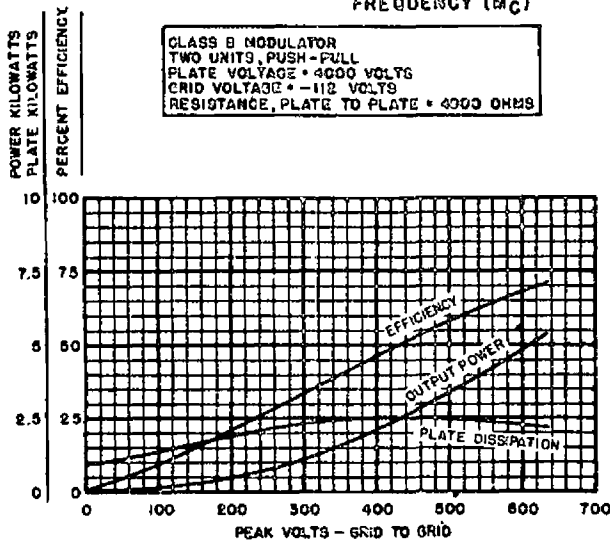


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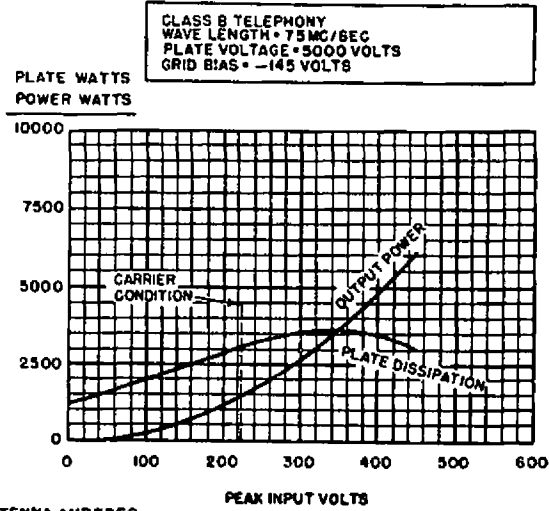
CLASS C TELEGRAPHY FREQUENCY DERATING CURVE



NOTE:
AT INLET TEMPERATURES BETWEEN 20°C
AND 50°C, THE REQUIRED WATER FLOW
CAN BE FOUND BY PROPORTIONAL INTER-
POLATION.



CLASS B MODULATOR
TWO UNITS, PUSH-PULL
PLATE VOLTAGE = 4000 VOLTS
GRID VOLTAGE = -112 VOLTS
RESISTANCE, PLATE TO PLATE = 4000 OHMS



CLASS B TELEPHONY
WAVE LENGTH = 75 MC/SEC
PLATE VOLTAGE = 5000 VOLTS
GRID BIAS = -145 VOLTS

