Amperex® Electronic Corporation
A NORTH AMERICAN PHILIPS COMPANY
PROFESSIONAL TUBE DIVISION
230 Duffy Avenue
Telephone: 516/931-6200
Hicksville, L.I., N.Y. 11802
TWX: 510/221-1839

TUBE TYPES 4-250A/5D22 6156

TYPE	TETRODE
COOLING	RADIATION & AIR
ENVELOPE	GLASS
MAX. PWR. INPUT	1250 W
MAX PLATE DISS.	250 W
MAX. FREQ.	120 MHz

The Amperex 4–250A/5D22 is a Premium version of the 4–250A, featuring a zirconium-coated heavy graphite anode for high intermittent overload capability and superior gas sorption for long life.

The 6156 is the same tube, but without the metal base. In most cases, the metal base, with its associated additional cost, is unnecessary except in critical neutralization applications. The tubes are intended for use as an RF or audio amplifier.

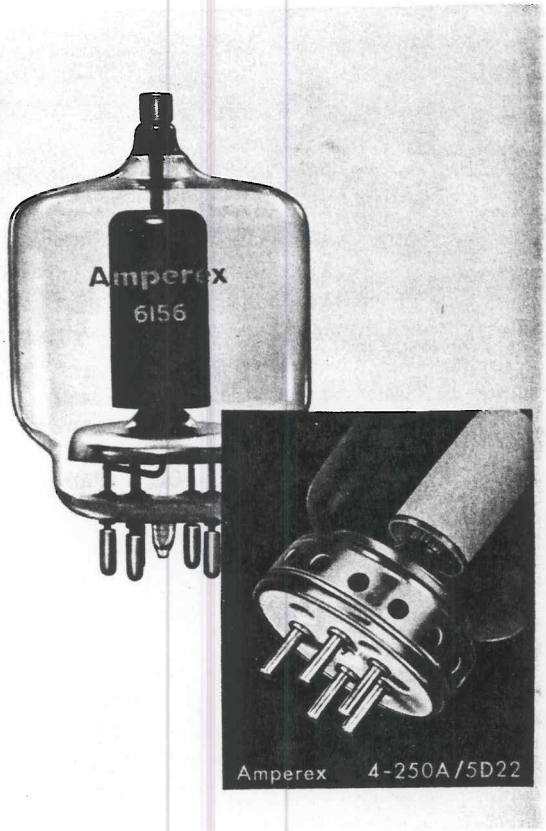
GENERAL CHARACTERISTICS

MECHANICAL

Base	giant 5-pin medium shell
Mounting Position	vertical, base up or down
Maximum Operating Temperatures	
Bulb	350° C
Plate Seal	220° C
Pin Seals	180° C
Cooling[1]	radiation and air
Accessories	
Socket	Johnson No. 122–275 or equiv.
Plate Connector	S–25671

ELECTRICAL

Filament	thoriated tungsten
Voltage	5 volts
Current	14.1 amps
Direct Interelectrode Capacitances	
Input	12.7 pF
Output	4.5 pF
Grid to Plate	0.12 pF
Amplification Factor (G1 to G2)	5.1
Transconductance (I_b = 100 mA)	400 μmhos



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[1] A low velocity air flow must be directed on to the plate seal and the bottom of the envelope to keep temperatures below maximum ratings.

AF Power Amplifier and Modulator — Class AB_1 & Class AB_2

Maximum Ratings, Absolute Values

	CCS
DC Plate Voltage	4000 volts
DC Grid No. 2 Voltage	600 volts
DC Grid No. 1 Voltage	−500 volts
Maximum Signal DC Plate Current [2]	350 mA
Maximum Signal Grid No. 2 Input [2]	35 watts
Plate Dissipation [2]	250 watts

Typical Operation — Class AB_1

Unless Otherwise specified, values are for two tubes

	CCS	CCS	CCS	CCS
DC Plate Voltage	1,500	2,000	2,500	3,000 volts
DC Grid No. 2 Voltage	500	500	500	500 volts
DC Grid No. 1 Voltage	− 85	− 88	− 91	− 94 volts
Peak AF Grid No. 1 to Grid No. 1 Voltage	167	173	178	184 volts
Zero Signal DC Plate Current	100	100	100	100 mA
Maximum Signal DC Plate Current	300	300	310	310 mA
Effective Load Resistance, Plate to Plate	10,000	14,500	18,000	22,000 ohms
Maximum Signal Driving Power [3]	0	0	0	0 watts
Maximum Signal Power Output	268	390	510	635 watts
Maximum Signal DC Grid No. 2 Current	31	29	21	20 mA
Total Harmonic Distortion	3	3.2	2.6	2.8 %

Typical Operation — Class AB_2

Unless otherwise specified, values are for two tubes

	CCS	CCS	CCS	CCS
DC Plate Voltage	1,500	2,000	2,500	3,000 volts
DC Grid No. 2 Voltage	300	300	300	300 volts
DC Grid No. 1 Voltage	− 45	− 49	− 51	− 55 volts
Peak AF Grid No. 1 to Grid No. 1 Voltage	323	328	306	280 volts
Zero Signal DC Plate Current	100	100	100	100 mA
Maximum Signal DC Plate Current	694	694	624	550 mA
Zero Signal DC Grid No. 2 Current	0	0	0	0 mA
Maximum Signal DC Grid No. 2 Current	116	110	88	69 mA
Effective Load Resistance, Plate to Plate	4,550	6,600	9,200	14,000 ohms
Maximum Signal Driving Power [4]	8.0	8.0	5.8	3.8 watts
Maximum Signal Power Output	660	974	1,140	1,240 watts
Maximum Signal D.C. Grid No. 1 Current	56	54	42	30 mA
Total Harmonic Distortion	5	5	5	5 %

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

3 The effective resistance per grid No. 1 circuit of the class AB_1 stage should be kept below 0.25 megohms.

4 Driver stage should be capable of supplying the No. 1 grids of the class AB_2 stage with the specified driving power at low distortion. When a bias supply is used, the DC resistance of the bias source should not exceed 250 ohms.

RF Power Amplifier — Class B
Carrier conditions per tube for use with a maximum modulation factor of 1.0
Maximum Ratings, Absolute Values[7]

	CCS
DC Plate Voltage	4,000 volts
DC Grid No. 2 Voltage	600 volts
DC Plate Current	250 mA
Plate Input	400 watts
Grid No. 2 Input	23 watts
Plate Dissipation	250 watts

Typical Operation

	CCS	CCS	CCS
DC Plate Voltage	2,500	3,000	4,000 volts
DC Grid No. 2 Voltage	500	500	500 volts
DC Grid No. 1 Voltage	−84	−90	−100 volts
Peak RF Grid No. 1 Voltage	66	61	55.5 volts
DC Plate Current	150	125	94 mA
DC Grid No. 2 Current	0	0	0 mA
DC Grid No. 1 Current[5]	5.5	2	0.5 mA
Driving Power, approximate[5]	0.75	0.25	0.06 watts
Power Output	125	125	126 watts
Grid No. 2 Dissipation[5]	6	3.8	4 watts

Plate and Screen Grid Modulated RF Power Amplifier — Class C Telephony
Carrier conditions per tube for use with a maximum modulation factor of 1.0
Maximum Ratings, Absolute Values[7]

	CCS
DC Plate Voltage	3,200 volts
DC Grid No. 2 Voltage	600 volts
DC Grid No. 1 Voltage	−500 volts
DC Plate Current	275 mA
DC Grid No. 1 Current	20 mA
Plate Input	825 watts
Grid No. 2 Input	35 watts
Plate Dissipation	165 watts

Typical Operation

	CCS	CCS
DC Plate Voltage	2500	3000 volts
DC Grid No. 2 Voltage	400	400 volts
DC Grid No. 1 Voltage	− 200	− 310 volts
Peak AF Grid No. 2 Voltage[5]	350	350 volts
Peak RF Grid No. 1 Voltage	280	400 volts
DC Plate Current	200	225 mA
DC Grid No. 2 Current	30	30 mA
DC Grid No. 1 Current	9	9 mA
Driving Power, approximate	2.3	3.3 watts
Power Output	375	510 watts
Modulation Power	256	344 watts

RF Power Amplifier and Oscillator — Class C Telegraphy
Key-down conditions per tube without amplitude modulation[6]
Maximum Ratings, Absolute Values[7]

	CCS	
DC Plate Voltage	4,000	volts
DC Grid No. 2 Voltage	600	volts
DC Grid No. 1 Voltage	−500	volts
DC Plate Current	350	mA
DC Grid No. 1 Current	20	mA
Plate Input	1,250	watts
Grid No. 2 Input	35	watts
Plate Dissipation	250	watts

Typical Operation

	CCS	CCS	CCS	
DC Plate Voltage	2,500	3,000	4,000	volts
DC Grid No. 2 Voltage	500	500	500	volts
DC Grid No. 1 Voltage	−150	−180	−225	volts
Peak RF Grid No. 1 Voltage	220	265	303	volts
DC Plate Current	300	345	312	mA
DC Grid No. 2 Current	60	60	45	mA
DC Grid No. 1 Current	9	10	9	mA
Driving Power, approximate	1.8	2.4	2.5	watts
Power Output	575	800	1,000	watts

Class AB_1 Linear RF Amplifier
Single Sideband Suppressed Carrier Operation
Maximum Ratings, Absolute Values

	CCS	
Frequency	30	MHz
DC Plate Voltage	4,000	volts
DC Grid No. 2 Voltage	600	volts
DC Grid No. 1 Voltage	−500	volts
DC Plate Current	350	mA
Plate Input	1,250	watts
Plate Dissipation	250	watts
Grid No. 2 Input	35	watts
DC Grid No. 1 Current	20	mA

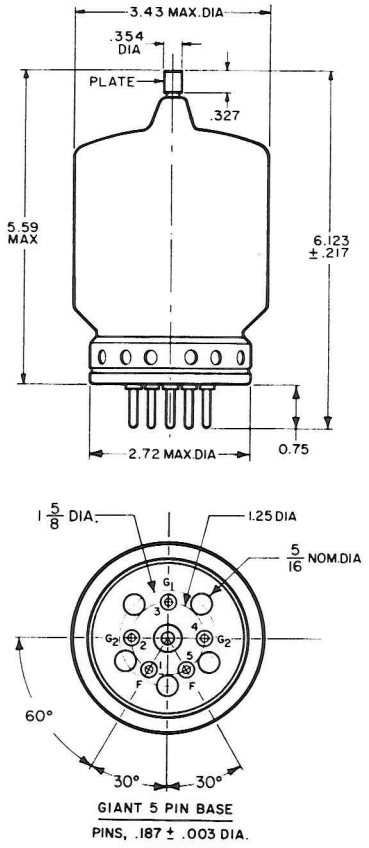
6 Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115 per cent of the carrier conditions.

7 Maximum ratings apply up to 75 MHz. The tube may be operated at higher frequencies provided the maximum values of plate voltage and power input are reduced according to the tabulation below. Special attention should be given to adequate ventilation of the bulb at these frequencies.

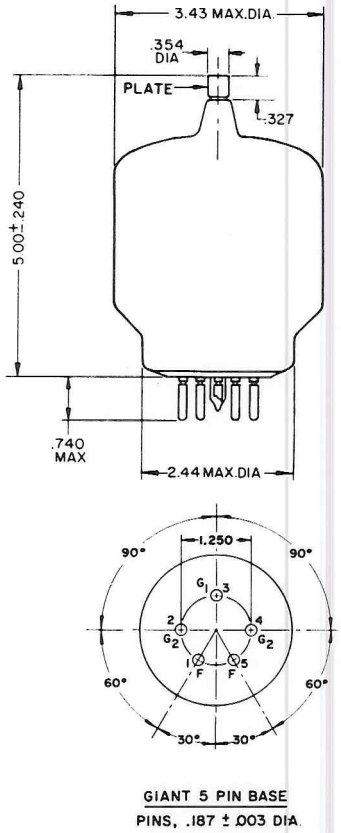
FREQUENCY	75	100	120 MHz
Class B			
Plate Voltage	4000	3300	2500 volts
Plate Input Power	400	320	240 watts
Class C Telephony			
Plate Voltage	3200	2600	2000 volts
Plate Input Power	825	660	500 watts
Class C Telegraphy			
Plate Voltage	4000	3300	2500 volts
Plate Input Power	1250	1000	750 watts

Typical Operation
Single Tone and/or Two Tone Operation

	CCS	CCS	CCS	CCS	CCS	
DC Plate Voltage	4,000	3,500	3,000	2,500	2,000	volts
DC Grid No. 2 Voltage	600	600	600	600	600	volts
DC Grid No. 1 Voltage	−120	−110	−100	−100	−100	volts
Zero Signal DC Plate Current	33	50	60	65	60	mA
Zero Signal DC Grid No. 2 Current	0	0	2	2	2	mA
Effective RF Load Resistance	14,750	11,500	9,500	7,500	6,900	ohms
Single Tone Modulation						
Maximum Signal DC Plate Current	155	174	181	192	165	mA
Maximum Signal DC Grid No. 2 Current	23	16	19	18	16	mA
Maximum Signal DC Grid No. 1 Current	0	0	0	0	0	mA
Maximum Signal Peak RF Grid Voltage	120	110	100	100	100	volts
Maximum Signal Driving Power	0	0	0	0	0	watts
Maximum Signal Plate Power Output	421	421	378	300	228	watts
Two Tone Modulation						
Average DC Plate Current	102	120	130	138	127	mA
Average DC Grid No. 2 Current	8	7	9	7	11	mA
Average DC Grid No. 1 Current	0	0	0	0	0	mA
Maximum Resultant Peak RF Grid Voltage	120	110	100	100	100	volts
Average Plate Power Output	211	211	189	150	114	watts
Peak Envelope Plate Power Output	421	421	378	300	228	watts
3rd Order Intermodulation Distortion	30	30	35	35	40	dB



4–250A/5D22



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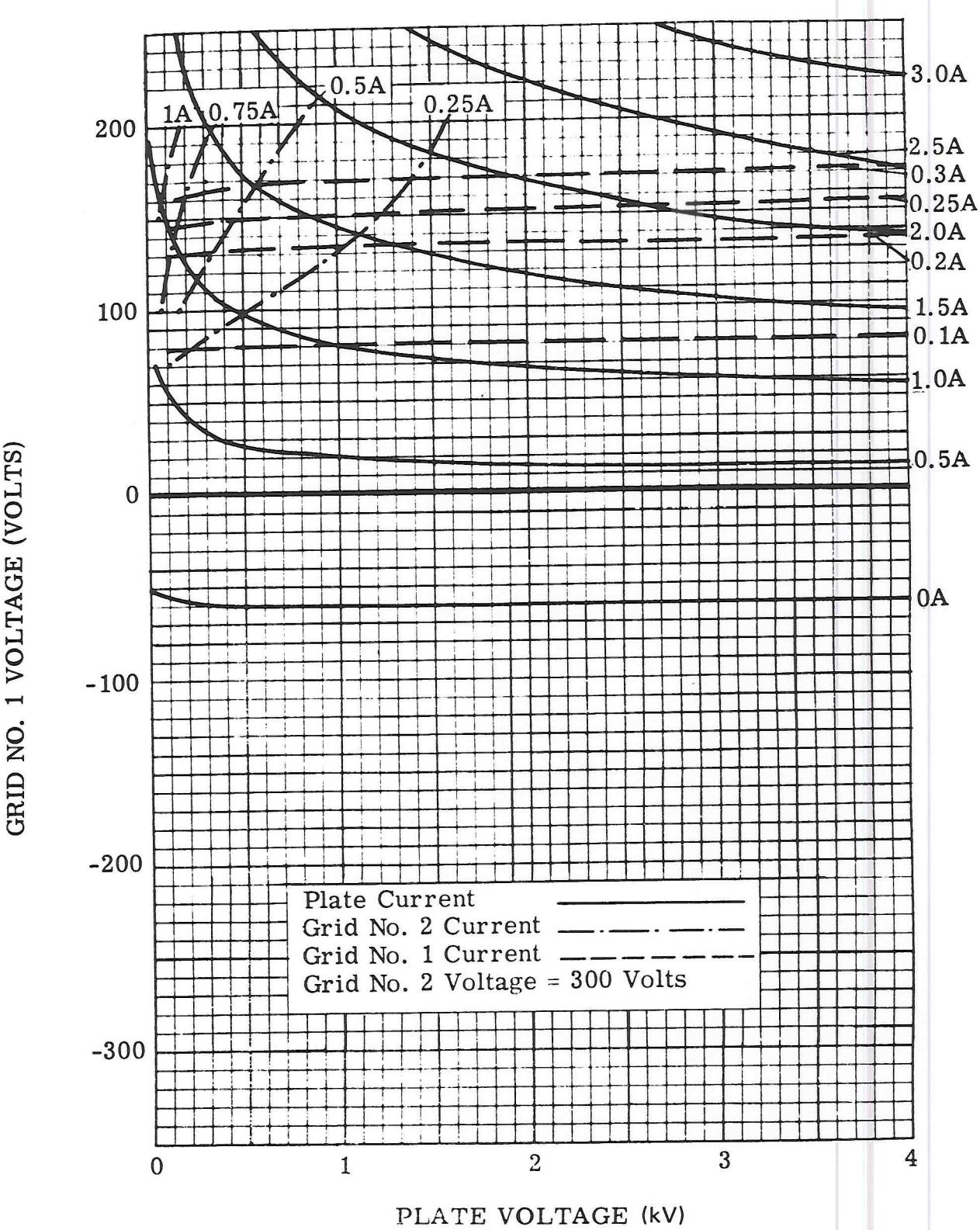
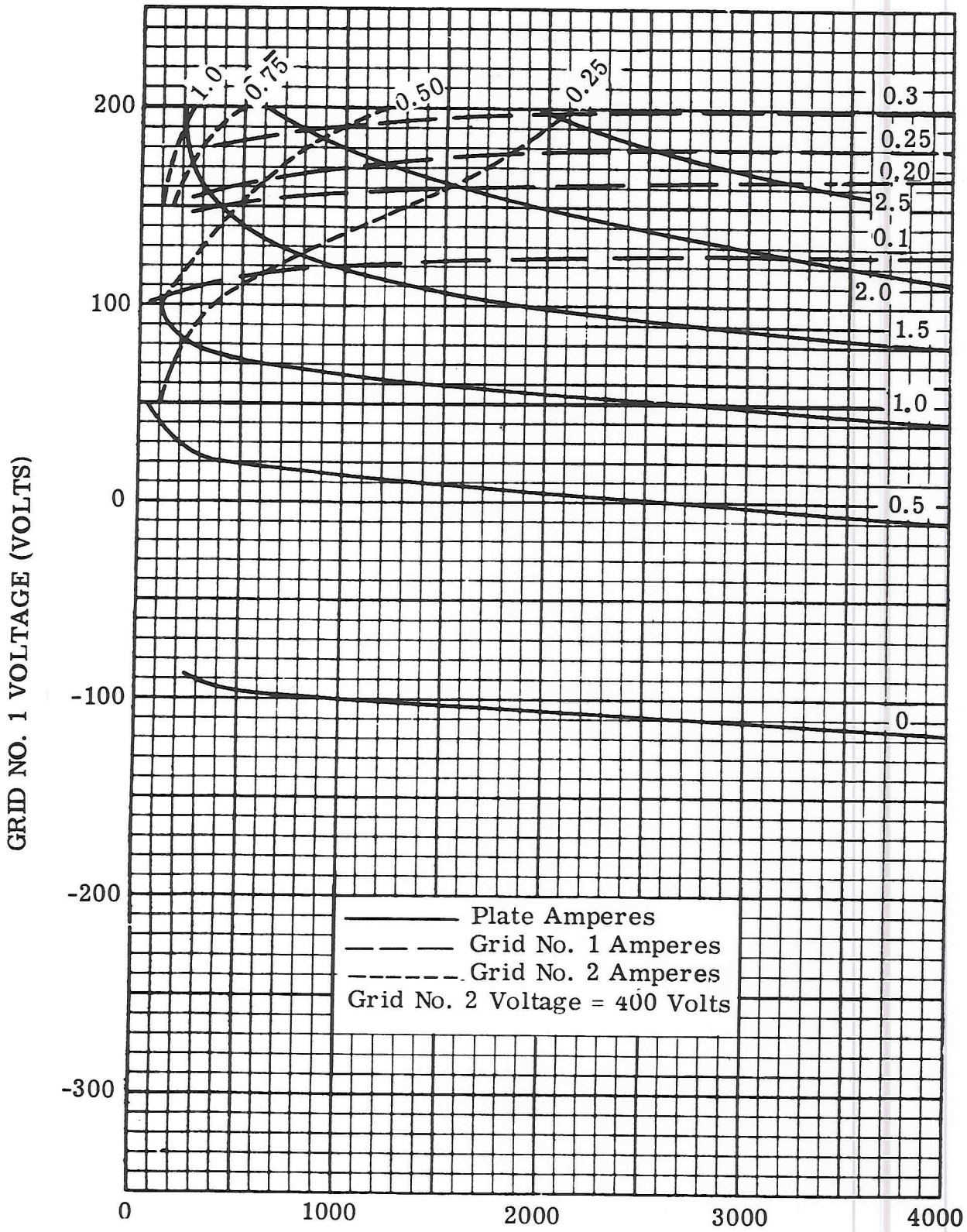
NOTE: To prevent overheating of the screen grid pins, both pins should be connected to the circuit.



CONSTANT CURRENT CHARACTERISTICS



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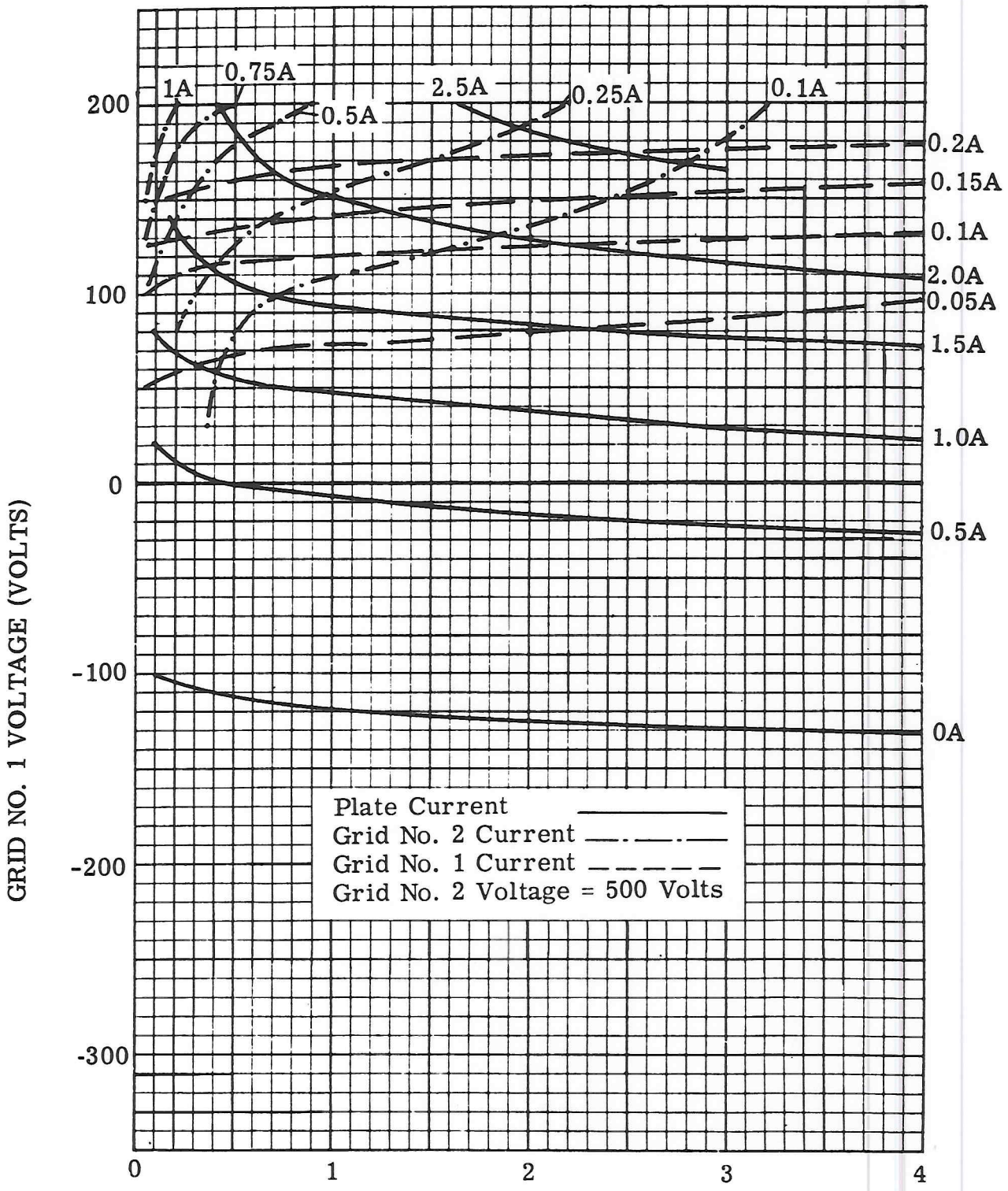

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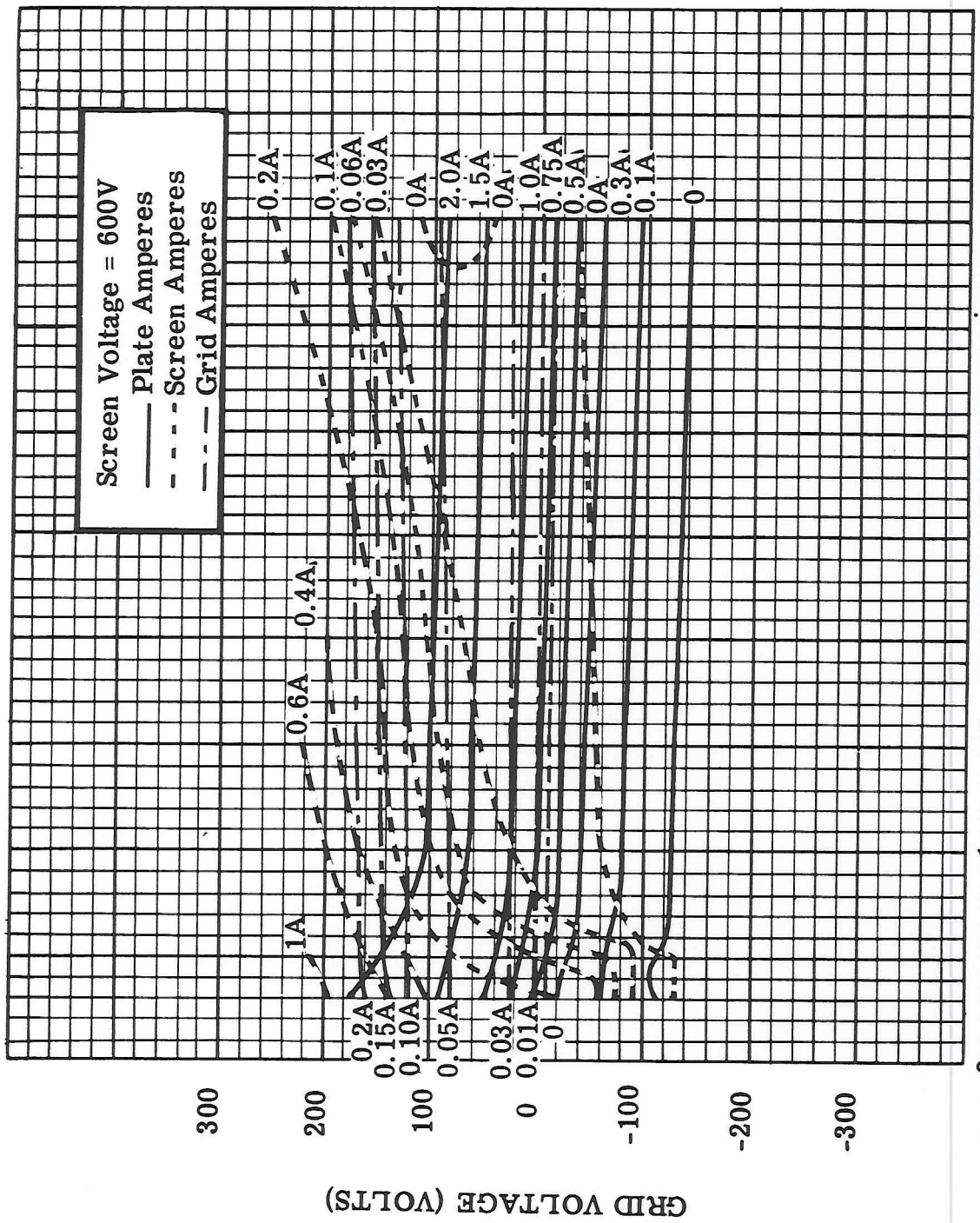

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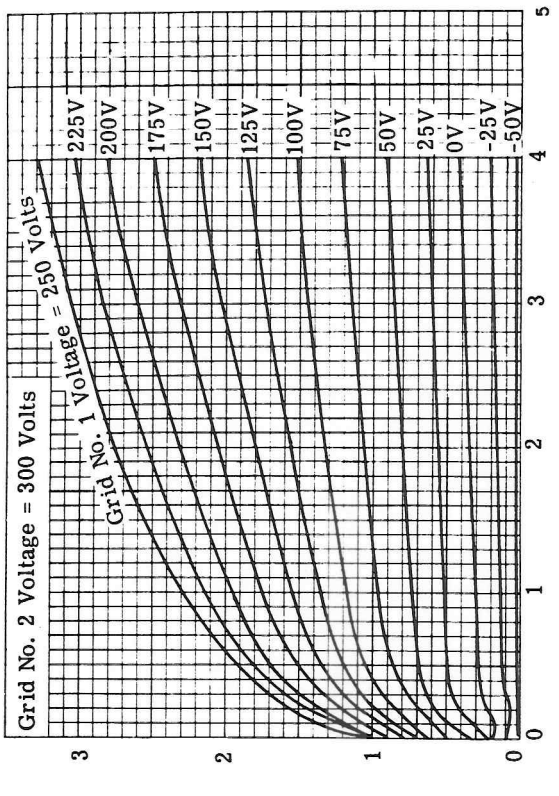
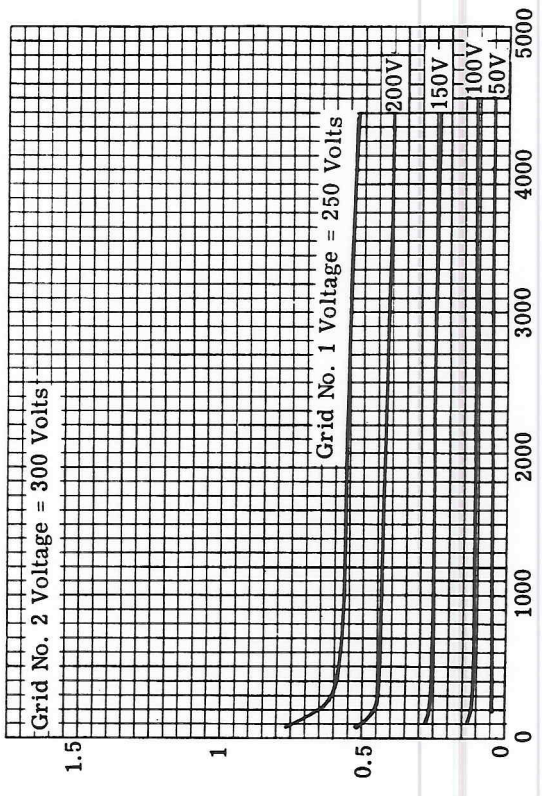


PLATE CHARACTERISTICS



CONTROL GRID CHARACTERISTICS

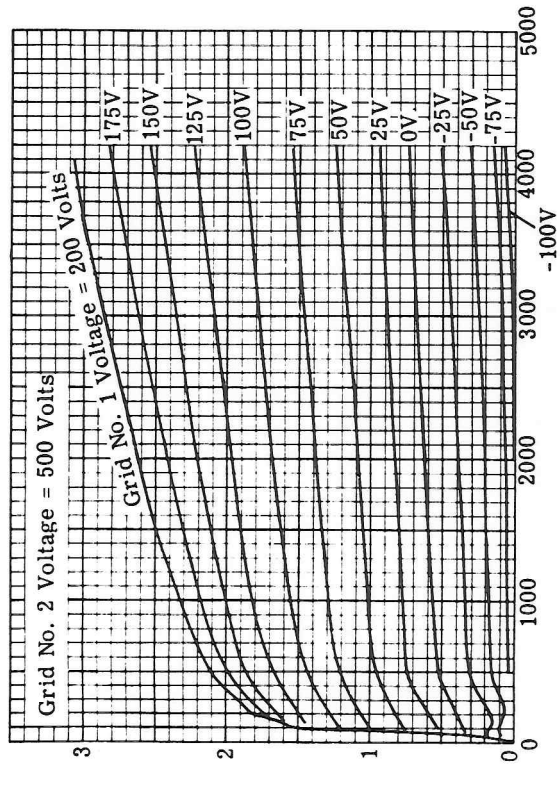
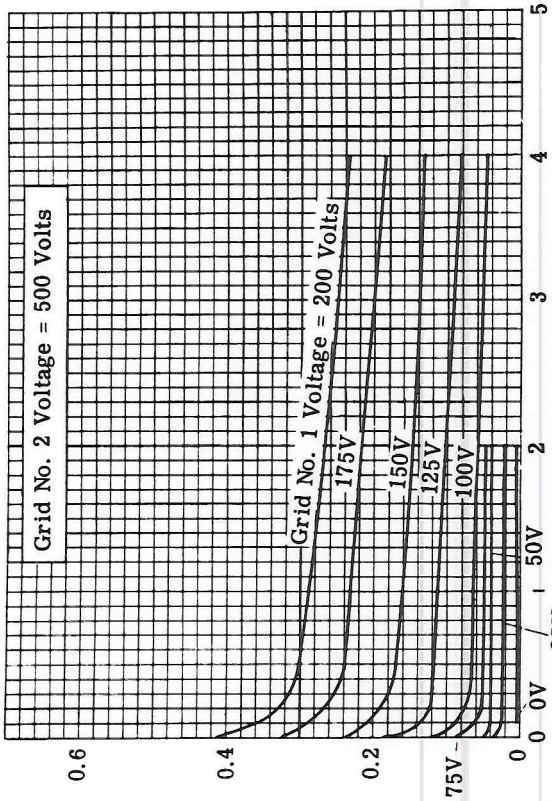


PLATE CHARACTERISTICS



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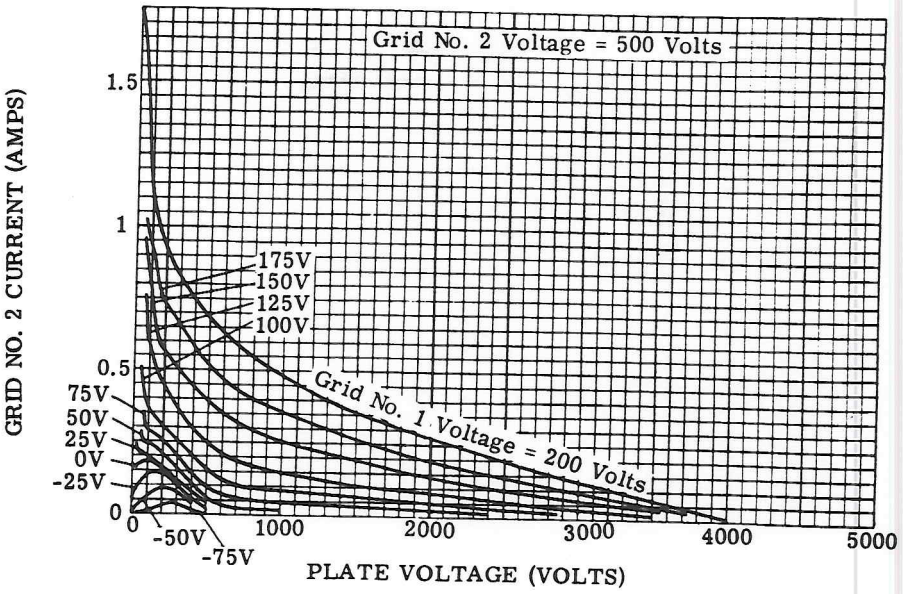
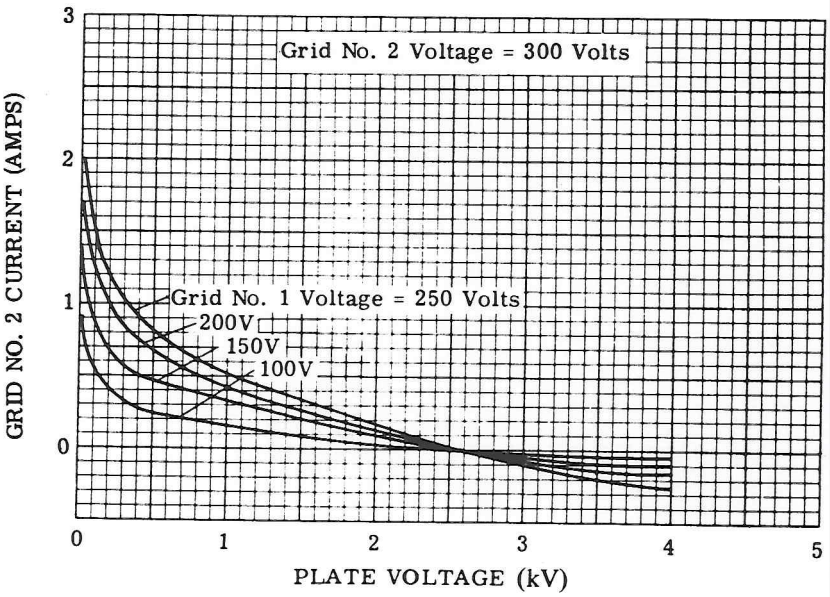


SCREEN GRID CHARACTERISTICS



SCREEN GRID CHARACTERISTICS