



BEAM POWER TUBE

◆ DESCRIPTION

The GL-813 is a radiation-cooled five-electrode, beam power transmitting tube with extremely high power sensitivity designed for use as a modulator, amplifier, and oscillator. The cathode is a thoriated-tungsten filament. The anode is capable of dissipating 125 watts and the typical power output for class C telegraph service is 275 watts. Maximum ratings apply up to a frequency of 30 megacycles.

Full power output can be obtained with very little driving power and with a reduced number of

driver stages. Neutralization is unnecessary in adequately shielded circuits. The GL-813 makes an excellent power amplifier for the final stage of high-power amateur transmitters where quick band change without neutralizing adjustments is desirable. It is also an excellent high-power frequency multiplier and is capable of giving high harmonic output with unusually high efficiency. The reduced over-all length of the tube provides for short internal leads and minimizes lead inductance.

TECHNICAL INFORMATION

These data are for reference only. For design information refer to specifications.

GENERAL

Electrical Data	Minimum	Bogey	Maximum
Filament Voltage	9.5	10	10.5 Volts
Filament Current at Bogey Voltage	4.7	5	5.3 Amperes
Amplification Factor, Grid No. 1 to Grid No. 2 $E_b = 2000$ v d-c, $I_b = 50$ ma.		8.5	..
Interelectrode Capacitances			
Grid-Plate	..	..	0.25 uuf
Input	13	16.3	19.6 uuf
Output	10.5	14.0	17.5 uuf

◆ Description completely revised.

Supersedes ETX-153B dated 7-48

GENERAL  ELECTRIC


Electronic
TUBE

TECHNICAL INFORMATION (CONT'D)

Mechanical Data

Mounting position—Vertical, base up or down; horizontal—plate in vertical plane

Net weight, approximate..... 8 ounces

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

AUDIO-FREQUENCY POWER AMPLIFIER AND MODULATOR—CLASS AB2

Maximum ratings, absolute values.....	CCS*	ICAS*
D-c plate voltage.....	2250 max	2500 max volts
D-c grid No. 2 voltage.....	800 max	800 max volts
Maximum signal d-c plate current**.....	180 max	225 max milliamperes
Maximum signal plate input**.....	360 max	450 max watts
Maximum signal grid No. 2 input**.....	22 max	22 max watts
Plate dissipation**.....	100 max	125 max watts
Typical operation.....	CCS*	ICAS*
Unless otherwise specified, values are for two tubes		
D-c plate voltage.....	2000	2250
D-c grid No. 3 voltage.....	0	0
D-c grid No. 2 voltage.....	750	750
D-c grid No. 1 voltage.....	-90	-95
Peak a-f grid No. 1 to grid No. 1 voltage.....	230	235
Zero-signal d-c plate current.....	40	45
Maximum signal d-c plate current.....	315	360
Zero-signal d-c grid No. 2 current.....	1.5	1.2
Maximum signal d-c grid No. 2 current.....	58	55
Effective load resistance, plate to plate.....	16000	17000
Maximum signal driving power, approximate***.....	0.10	0.35
Maximum signal power output, approximate.....	455	515

RADIO-FREQUENCY POWER AMPLIFIER—CLASS B TELEPHONY

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

Maximum ratings, absolute values.....	CCS*	ICAS*
D-c plate voltage.....	2000 max	2250 max volts
D-c grid No. 2 voltage.....	400 max	400 max volts
D-c plate current.....	100 max	125 max milliamperes
Plate input.....	150 max	200 max watts
Grid No. 2 input.....	15 max	20 max watts
Plate dissipation.....	100 max	125 max watts
Typical operation.....	CCS*	ICAS*
D-c plate voltage.....	1500	2000
D-c grid No. 3 voltage.....	0	0
D-c grid No. 2 voltage.....	400	400
D-c grid No. 1 voltage.....	-60	-75
Peak r-f grid No. 1 voltage.....	70	80
D-c plate current.....	100	75
D-c grid No. 2 current.....	4	3
D-c grid No. 1 current, approximate***.....	..	..
Driving power, approximate†.....	..	..
Power output.....	50	50

GRID-MODULATED RADIO-FREQUENCY POWER AMPLIFIER—CLASS B TELEPHONY

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

Maximum ratings, absolute values.....	CCS*	ICAS*
D-c plate voltage.....	2000 max	2250 max volts
D-c grid No. 2 voltage.....	400 max	400 max volts
D-c grid No. 1 voltage.....	-200 max	-200 max volts
D-c plate current.....	100 max	125 max milliamperes
Plate input.....	150 max	200 max watts
Grid No. 2 input.....	15 max	20 max watts
Plate dissipation.....	100 max	125 max watts

TECHNICAL INFORMATION (CONT'D)

Typical operation	CCS*		ICAS*
D-c plate voltage.....	1500	2000	2250 volts
D-c grid No. 3 voltage†.....	0	0	0 volts
D-c grid No. 2 voltage.....	400	400	400 volts
D-c grid No. 1 voltage.....	-140	-120	-110 volts
Peak r-f grid No. 1 voltage.....	145	120	135 volts
Peak a-f grid No. 1 voltage.....	60	60	55 volts
D-c plate current.....	70	75	85 milliamperes
D-c grid No. 2 current.....	3	3	2.5 milliamperes
D-c grid No. 1 current, approximate#.....	—	—	— milliamperes
Driving power, approximate##.....	—	—	— milliamperes
Power output, approximate.....	40	50	75 watts

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	CCS*		ICAS*
D-c plate voltage.....	1600 max		2000 max volts
D-c grid No. 2 voltage.....	400 max		400 max volts
D-c grid No. 1 voltage.....	-300 max		-300 max volts
D-c plate current.....	150 max		200 max milliamperes
D-c grid No. 1 current.....	25 max		30 max milliamperes
Plate input.....	240 max		400 max watts
Grid No. 2 input.....	15 max		20 max watts
Plate dissipation.....	67 max		100 max watts
Typical operation	CCS*		ICAS*
D-c plate voltage.....	1250	1600	2000 volts
D-c grid No. 3 voltage†.....	0	0	0 volts
D-c grid No. 2 voltage.....	300	300	350 volts
D-c grid No. 1 voltage.....	-160	-160	-175 volts
Peak r-f grid No. 1 voltage.....	250	250	300 volts
D-c plate current.....	150	150	200 milliamperes
D-c grid No. 2 current.....	35	30	40 milliamperes
D-c grid No. 1 current, approximate.....	13	12	16 milliamperes
Driving power, approximate.....	2.9	2.7	4.3 watts
Power output, approximate.....	140	180	300 watts

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

Key-down conditions per tube without amplitude modulation¶

Maximum ratings, absolute values	CCS*		ICAS*
D-c plate voltage.....	2000 max		2250 max volts
D-c grid No. 2 voltage.....	400 max		400 max volts
D-c grid No. 1 voltage.....	-300 max		-300 max volts
D-c plate current.....	180 max		225 max milliamperes
D-c grid No. 1 current.....	25 max		30 max milliamperes
Plate input.....	360 max		500 max watts
Grid No. 2 input.....	22 max		22 max watts
Plate dissipation.....	100 max		125 max watts
Typical operation	CCS*		ICAS*
D-c plate voltage.....	1250	1500	2250 volts
D-c grid No. 3 voltage†.....	0	0	0 volts
D-c grid No. 2 voltage.....	300	300	400 volts
D-c grid No. 1 voltage.....	-75	-90	-120
Peak r-f grid No. 1 voltage.....	160	175	205
D-c plate current.....	180	180	220 milliamperes
D-c grid No. 2 current.....	35	30	40 milliamperes
D-c grid No. 1 current approximate.....	12	12	15 milliamperes
Driving power, approximate.....	1.7	1.9	4.0 watts
Power output, approximate.....	170	210	375 watts

TECHNICAL INFORMATION (CONT'D)

SELF-RECTIFYING OSCILLATOR OR AMPLIFIER—CLASS C

Maximum ratings, absolute values	CCS*
A-c plate voltage (rms).....	2800 max volts
A-c grid No. 2 voltage (rms).....	550 max volts
D-c grid No. 1 voltage.....	-100 max volts
D-c plate current.....	95 max milliamperes
D-c grid No. 1 current.....	10 max milliamperes
Plate input.....	295 max watts
Grid No. 2 input.....	22 max watts
Plate dissipation.....	100 max watts
Typical operation	CCS*
A-c plate voltage (rms).....	2800 volts
D-c grid No. 3 voltage.....	0 volts
A-c grid No. 2 voltage (rms).....	530 volts
D-c grid No. 1 voltage.....	-37 volts
From a grid resistor of.....	37000 ohms
D-c plate current.....	95 milliamperes
D-c grid No. 2 current.....	12 milliamperes
D-c grid No. 1 current, approximate.....	1 milliampere
Driving power, approximate Δ	1 watt
Power output, approximate.....	230 watts
Useful power output, approximate	
75% circuit efficiency.....	170 watts

AMPLIFIER OR OSCILLATOR—CLASS C

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

Maximum ratings, absolute values	CCS*
D-c plate voltage.....	1800 max volts
D-c grid No. 2 voltage.....	360 max volts
D-c grid No. 1 voltage.....	-200 max volts
D-c plate current.....	190 max milliamperes
D-c grid No. 1 current.....	22 max milliamperes
Plate input $\Delta \Delta$	360 max watts
Grid No. 2 input.....	22 max watts
Plate dissipation.....	100 max watts
Typical operation	CCS*
D-c plate voltage.....	1800 volts
D-c grid No. 3 voltage.....	0 volts
D-c grid No. 2 voltage.....	250 volts
D-c grid No. 1 voltage.....	-120 volts
From a grid resistor of.....	10000 ohms
D-c plate current.....	160 milliamperes
D-c grid No. 2 current.....	37 milliamperes
D-c grid No. 1 current, approximate.....	12 milliamperes
Driving power, approximate $\Delta \Delta \Delta$	2 watts
Power output, approximate.....	280 watts
Useful power output, approximate	
75% circuit efficiency.....	210 watts

Maximum ratings apply up to 30 megacycles. 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 (other maximum ratings are the same as shown above). Special attention should be given to adequate ventilation of the bulb at these frequencies.

Frequency.....	30	60	120 megacycles
Maximum permissible percentage of maximum rated plate voltage and plate input			
Class B.....	100	88	76 per cent
Class C plate-modulated.....	100	75	50 per cent
Class C unmodulated.....	100	75	50 per cent

*Continuous Commercial Service.

Intermittent Commercial and Amateur Service.

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

TECHNICAL INFORMATION (CONT'D)

***Driver stage should be capable of supplying the No. 1 grids of the class AB₂ stage with the specified driving power at low distortion.

****Usually negligible. Fixed supply or by-passed cathode resistor bias recommended.

†Usually negligible. Never more than 2 watts. At crest of audio-frequency cycle with a modulation factor of 1.0.

‡Suppressor should be connected to the mid-point of the filament circuit operated on a-c or to the negative end operated on d-c.

#Usually negligible. Fixed supply or unby-passed cathode resistor bias recommended.

##Usually negligible. R-f driving power is never more than 2 watts; A-f power is usually not more than 1.0 watt. At crest of audio-frequency cycle with a modulation factor of 1.0.

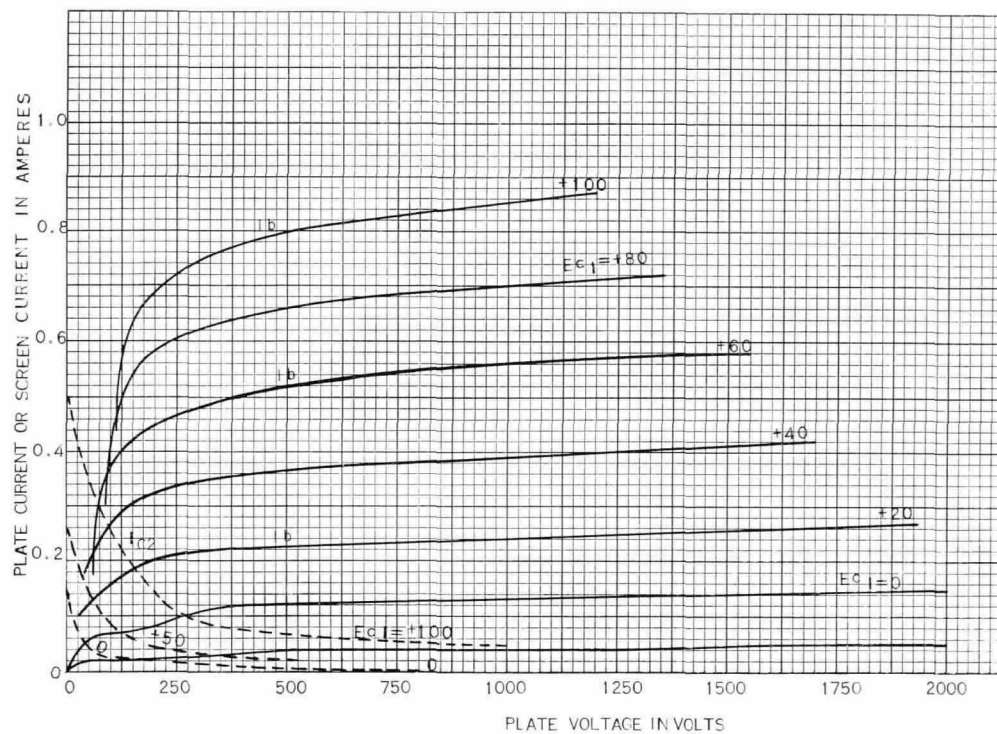
¶Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115 per cent of the carrier conditions.

△From a self-rectified driver.

△△Power input is 1.23 times the product of D-c plate voltage and d-c plate current.

△△△From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

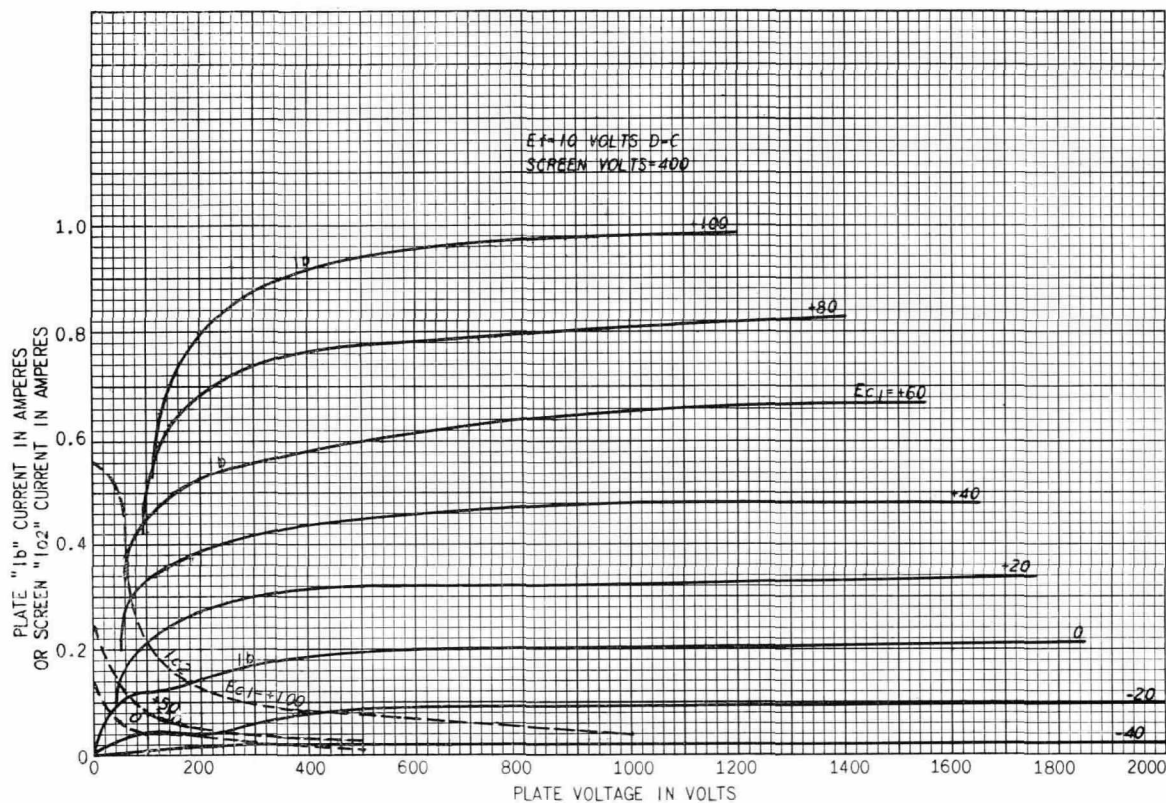
GL-813 AVERAGE PLATE CHARACTERISTICS
 $E_f = 10$ VOLTS D-C, SCREEN VOLTAGE = 300



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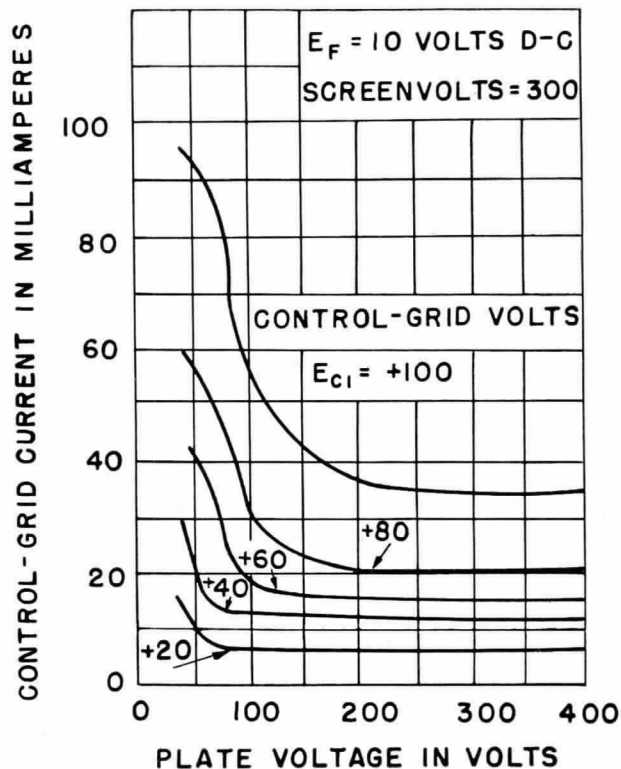
GL-813 AVERAGE PLATE CHARACTERISTICS



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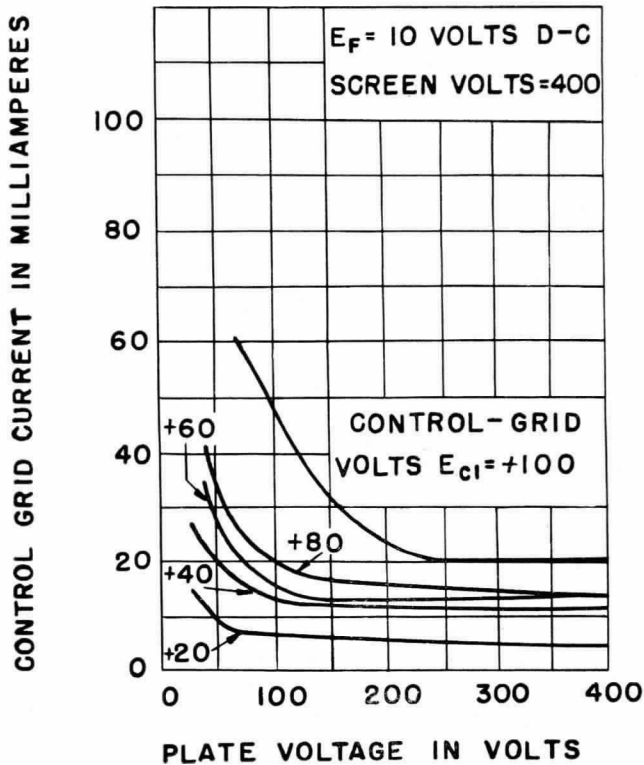
GL-813 AVERAGE PLATE CHARACTERISTICS



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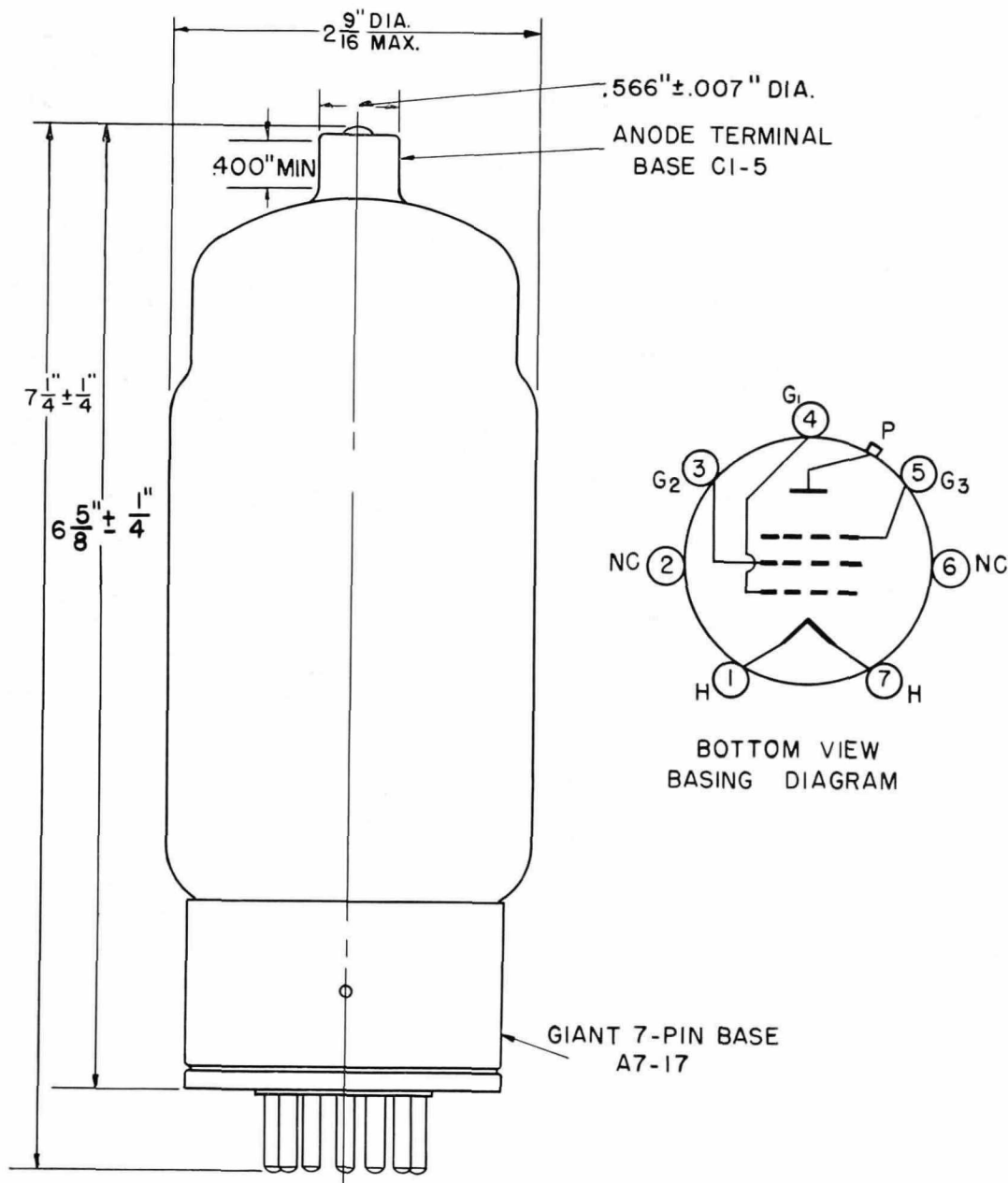
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GL-813 AVERAGE CHARACTERISTICS



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OUTLINE
GL-813 PLIOTRON

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Electronics Department
GENERAL ELECTRIC
Schenectady, N. Y.