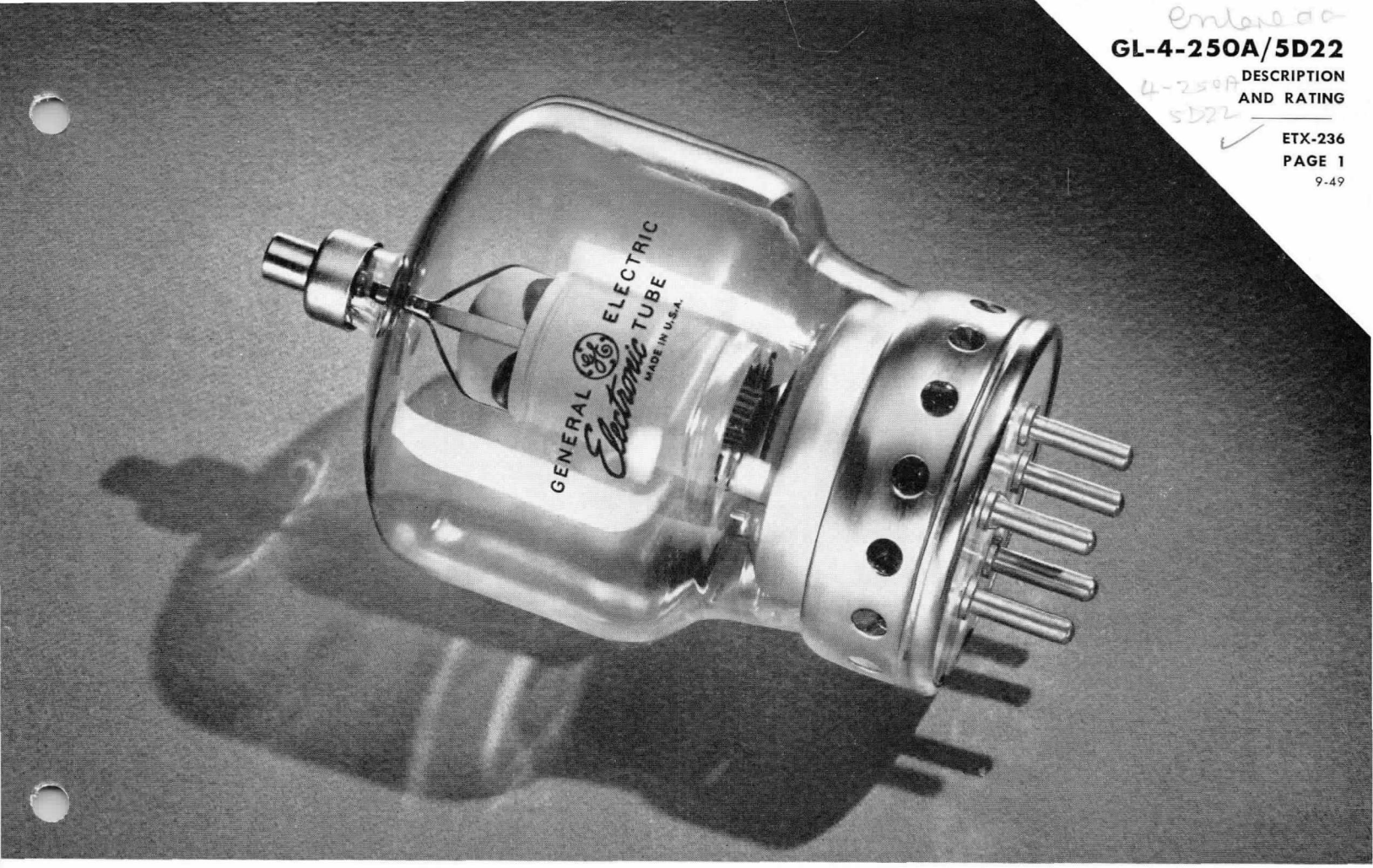


TETRODE

DESCRIPTION

The GL-4-250A/5D22 is a four-electrode tube designed for use as an amplifier, modulator and oscillator and is capable of dissipating 250 watts. The cathode is a thoriated-tungsten filament. Maximum ratings apply up to 75 megacycles.

TECHNICAL INFORMATION

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

GENERAL

Electrical Data

Filament Voltage	5.0	Volts
Filament Current	14.5	Amperes
Amplification Factor, Grid to Screen	5.1	
Transconductance, $I_b = 100$ ma, $E_b = 2500$ v, $E_{c2} = 500$ v	4000	Micromhos
Direct Interelectrode Capacitances*		
Grid-Plate	0.12	uuf
Input	12.7	uuf
Output	4.5	uuf

Electronic TUBE

GENERAL ELECTRIC

TECHNICAL INFORMATION (CONT'D)

Mechanical Data

Mounting position—vertical, base up or down

Forced-air cooling:

Through base toward bulb . . . . . 5 cfm

The specified air flow from a small fan or centrifugal blower should be applied simultaneously with filament power.

Of Bulb and Plate Seal:

Continuous Service—At frequencies below 30 megacycles, relatively slow movement of air past the tube is sufficient to prevent exceeding the specified plate-seal temperature. At frequencies above 30 megacycles, special attention should be given to adequate cooling of bulb and plate seal. A small fan directed toward the upper part of the bulb will generally provide sufficient cooling.

Intermittent Service ("on" period does not exceed 5 minutes and is followed by "off" period of the same or greater duration)—At frequencies below 30 megacycles, forced-air cooling of the bulb and plate seal is not usually required if the ambient temperature is below 30 C, provided a heat-radiating plate connector is used and free circulation of air is provided.

Plate-seal temperature (measured on top of plate cap)

Continuous service . . . . . 170 C

Intermittent service (as defined above) . . . . . 220 C

Net weight . . . . . 8.0 ounces

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

AUDIO-FREQUENCY POWER AMPLIFIER AND MODULATOR—CLASS AB_1

Maximum ratings, absolute values

D-c plate voltage	4000 max	volts
D-c grid No. 2 (screen) voltage	600 max	volts
Maximum signal d-c plate current**	350 max	milliamperes
Plate dissipation**	250 max	watts
Grid No. 2 dissipation**	35 max	watts

Typical Operation

Values are for two tubes

D-c plate voltage	1500	2000	2500	3000	volts
D-c grid No. 2 voltage***	500	500	500	500	volts
D-c grid No. 1 (control-grid) voltage†	−64	−88	−90	−93	volts
Peak a-f grid No. 1 to grid No. 1 voltage	128	176	180	186	volts
Zero-signal d-c plate current	120	110	120	120	milliamperes
Maximum signal d-c plate current	400	405	430	417	milliamperes
Zero-signal d-c grid No. 2 current	−0.4	−0.3	−0.3	−0.2	milliamperes
Maximum signal d-c grid No. 2 current	23	22	13	10.5	milliamperes
Effective load resistance, plate to plate	6250	9170	11,400	15,000	ohms
Maximum signal driving power	0	0	0	0	watts
Maximum signal power output, approximate	310	460	625	750	watts
Total harmonic distortion	4	2.5	2	2.5	per cent

AUDIO-FREQUENCY POWER AMPLIFIER AND MODULATOR—CLASS AB_2

Maximum ratings, absolute values

D-c plate voltage	4000 max	volts
D-c grid No. 2 (screen) voltage	600 max	volts
Maximum signal d-c plate current**	350 max	milliamperes
Plate dissipation**	250 max	watts
Grid No. 2 dissipation**	35 max	watts

TECHNICAL INFORMATION (CONT'D)

Typical operation

Values are for two tubes

D-c plate voltage	1500	2000	2500	3000	volts
D-c grid No. 2 voltage***	300	300	300	300	volts
D-c grid No. 1 (control-grid) voltage‡	−48	−48	−51	−53	volts
Peak a-f grid No. 1 to grid No. 1 voltage	192	198	200	198	volts
Zero-signal d-c plate current	100	120	120	125	milliamperes
Maximum signal d-c plate current	485	510	500	473	milliamperes
Zero-signal d-c grid No. 2 current	0	0	0	0	milliamperes
Maximum signal d-c grid No. 2 current	34	26	23	33	milliamperes
Effective load resistance, plate to plate	5400	8000	10,900	16,000	ohms
Maximum signal average driving power, approximate#	2.1	2.3	2.2	1.9	watts
Maximum signal peak driving power, approximate#	4.7	5.5	4.8	4.6	watts
Maximum signal power output, approximate	428	650	840	1040	watts
Total harmonic distortion	3	4	4	4.5	per cent

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

For operating frequencies up to 75 megacycles

D-c plate voltage	3200 max	volts
D-c grid No. 2 (screen) voltage	600 max	volts
D-c grid No. 1 (control-grid) voltage	−500 max	volts
D-c plate current	275 max	milliamperes
Plate dissipation	165 max	watts
Grid No. 2 dissipation	35 max	watts
Grid No. 1 dissipation	5 max	watts

Typical operation

D-c plate voltage	2500	3000	volts
D-c grid No. 2 voltage△	400	400	volts
D-c grid No. 1 voltage△△	−200	−310	volts
Peak r-f grid No. 1 voltage, approximate	255	365	volts
D-c plate current	200	225	milliamperes
D-c grid No. 2 current	30	30	milliamperes
D-c grid No. 1 current, approximate	9	9	milliamperes
Driving power, approximate	2.2	3.2	watts
Power output, approximate	375	510	watts

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY OR FM TELEPHONY

Key-down conditions per tube without amplitude modulation¶

Maximum Ratings, absolute values

For operating frequencies up to 75 megacycles

D-c plate voltage	4000 max	volts
D-c grid No. 2 (screen) voltage	600 max	volts
D-c grid No. 1 (control-grid) voltage	−500 max	volts
D-c plate current	350 max	milliamperes
Plate dissipation	250 max	watts
Grid No. 2 dissipation	35 max	watts
Grid No. 1 dissipation	5 max	watts

Typical operation

D-c plate voltage	2500	3000	4000	volts
D-c grid No. 2 voltage	500	500	500	volts
D-c grid No. 1 voltage	−150	−180	−225	volts
Peak r-f grid No. 1 voltage, approximate	220	265	303	volts
D-c plate current	300	345	312	milliamperes
D-c grid No. 2 current	60	60	45	milliamperes
D-c grid No. 1 current	9	10	9	milliamperes
Driving power, approximate	1.7	2.6	2.46	watts
Power output, approximate	575	800	1000	watts

TECHNICAL INFORMATION (CONT'D)

Maximum ratings apply up to 75 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	75	100	120	megacycles
Percentage of maximum rated plate voltage and plate input				
Class C Telephony plate modulated	100	75	66	per cent
Class C telegraphy	100	72	62	per cent

*With no external shielding, and base shell grounded.

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

***Obtained from source having good regulation.

†Total effective grid No. 1 circuit resistance should not exceed 0.25 megohm.

‡Obtained from fixed supply having d-c resistance not exceeding 250 ohms.

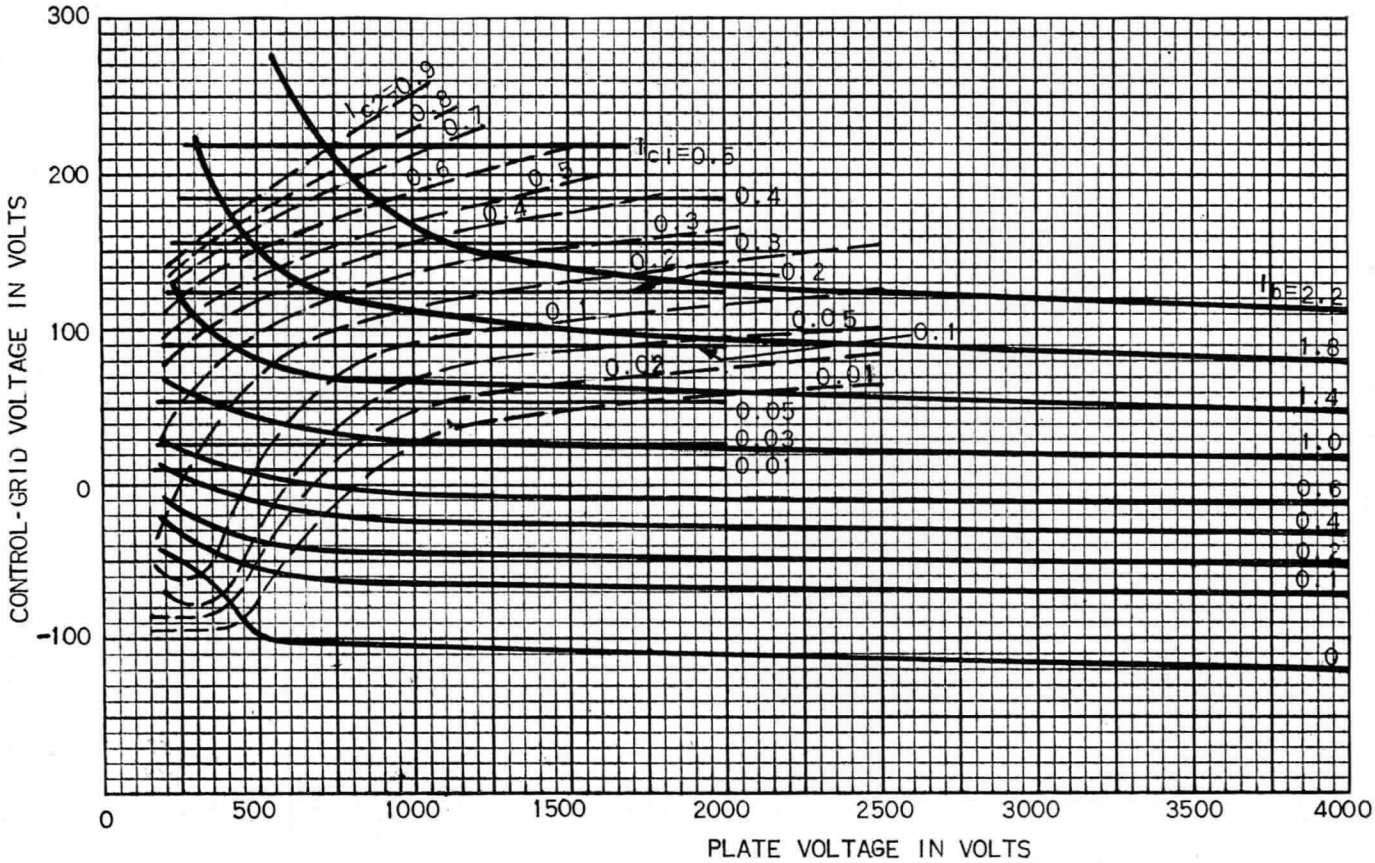
#Driver stage should be capable of supplying the specified driving power at low distortion to the No. 1 grid of the class AB_2 stage. The effective resistance per grid No. 1 circuit of the class AB_2 stage should be held at a low value.

△Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

△△For high-level modulated service, the use of partial grid-resistor bias is recommended. Bypass capacitors across the grid resistor should have a reactance at the highest modulation frequency equal to at least twice the grid-resistor value.

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

GL-4-250A/5D22
CONSTANT-CURRENT CHARACTERISTICS
$E_f = 5$ VOLTS
SCREEN-GRID VOLTAGE = 500 VOLTS



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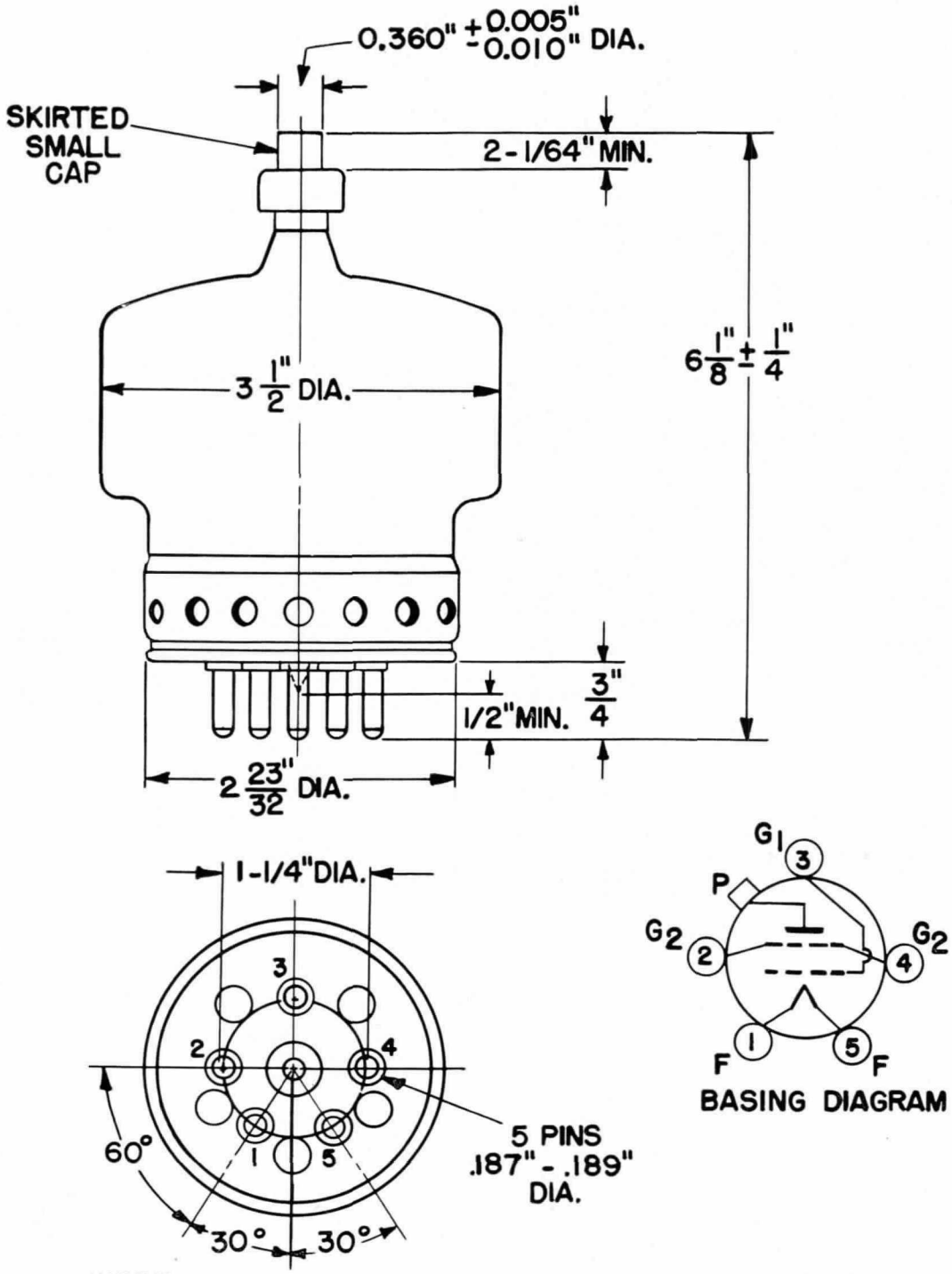
OUTLINE
GL-4-250A/5D22



Tube Divisions, Electronics Department

GENERAL ELECTRIC

Schenectady, N. Y.