



PENTODE

DESCRIPTION

The GL-802 is a pentode transmitting tube of the heater-cathode type having a maximum plate-dissipation rating of 13 watts (ICAS). The tube requires a driving power of only 1 watt or less, depending on the service in which it is used. The versatility of this pentode makes it well-suited for use as a radio-frequency amplifier, frequency multiplier, oscillator, and suppressor-, grid-, or plate-modulated amplifier. It may also be used as a

Class A pentode amplifier or modulator. The plate connection is brought out of the tube through a separate seal at the top of the bulb to maintain low grid-plate capacitance. The suppressor and the special internal shield of this tube are connected to individual base pins. Neutralization is unnecessary in adequately shielded circuits. In radio-frequency service, the 802 may be operated at maximum ratings at frequencies as high as 30 megacycles.

TECHNICAL INFORMATION

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

GENERAL CHARACTERISTICS

Number of electrodes 5

Electrical

Heater ϕ —Coated unipotential cathode

Voltage, a-c or d-c. 6.3 volts

Current 0.9 amperes

Transconductance for plate current of 20 ma 2250 micromhos

Direct interelectrode capacitances

Grid to plate, with external shielding 0.15 max micromicrofarad

Input 12 micromicrofarads

Output 8.5 micromicrofarads

ϕ In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts.

GENERAL  ELECTRIC


Electronic
TUBE

TECHNICAL INFORMATION (CONT'D)

Mechanical

Cap.	small metal
Base.	medium 7-pin bayonet
Net weight, approximate.	5 ounces
Shipping weight, approximate.	3 pounds
Mounting position.	vertical or horizontal

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

AUDIO-FREQUENCY POWER AMPLIFIER AND MODULATOR—CLASS A

	Typical Operation				Maximum Ratings		
	CCS	ICAS	CCS	ICAS	CCS	ICAS	
D-c plate voltage.	400	500	500	600	500	600	volts
D-c screen voltage (Grid No. 2).					250	250	volts
Suppressor (Grid No. 3).	0*	0*	0*	40			volts
D-c screen voltage.	250	175	225	250			volts
D-c grid voltage (Grid No. 1) ♦.	-18	-10	-17	-18.5			volts
From a grid resistor of.	450	325	530	490			ohms
Peak a-f grid voltage.	18	10	17	-18.5			volts
Internal shield*.	—	—	—	—			
D-c plate current.	30	25	25	30			milliamperes
Plate input.					15	18	watts
D-c screen current.	10	6	7	8			milliamperes
Screen input.					3	3	watts
Load resistance.	10000	18000	16000	13200			ohms
Total harmonic distortion.	8	4	10	9			per cent
Power output.	5.5	4	6.5	7.6			watts

RADIO-FREQUENCY POWER AMPLIFIER—CLASS B TELEPHONY

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

	CCS	ICAS	CCS	ICAS		
D-c plate voltage.	400	500	600	500	600	volts
D-c suppressor voltage (Grid No. 3)*†.				200	200	volts
D-c screen voltage (Grid No. 2).	150	200	225	250	250	volts
D-c plate current.	25	25	30	30	30	milliamperes
Plate input.				15	18	watts
Suppressor input.				2	2	watts
Screen input.				4	4	watts
Plate dissipation.				10	13	watts
D-c grid voltage (Grid No. 1).	-22	-28	-30			volts
Peak r-f grid voltage.	35	32	35			volts
Internal shield*.	—	—	—			
D-c screen current.	6.5	7	8			milliamperes
D-c grid current, approximate.	1	0	0.5			milliamperes
Driving power, approximate°.	0.5	0.18	0.18			watts
Power output, approximate.	2.75	3.5	5.3			watts

SUPPRESSOR-MODULATED RADIO-FREQUENCY POWER AMPLIFIER—CLASS C TELEPHONY

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

	CCS	ICAS	CCS	ICAS		
D-c plate voltage.	400	500	500	600	500	600 volts
D-c screen voltage (Grid No. 2) Δ.					200	250 volts
From a resistor of.	8900	10700	10700	14500		ohms
D-c grid voltage (Grid No. 1).	-85	-90	-90	-100	-200	-200 volts
On grid resistor of†.	11000	18000	20000	20000		ohms
D-c plate current.	18	20	22	30	30	30 milliamperes
D-c grid current.	7.5	5	4.5	5	7.5	7.5 milliamperes
Plate input.					15	18 watts
Screen input.					6	6 watts
Plate dissipation.					10	13 watts
D-c suppressor voltage (Grid No. 3).	-40	-53	-45	-45		volts
Peak a-f suppressor voltage.	40	53	65	65		volts
Peak r-f grid voltage.	125	125	125	125		volts
Internal shield*.	—	—	—	—		
D-c screen current.	28	28	28	24		milliamperes
Driving power, approximate.	0.9	0.6	0.5	0.6		watts
Power output, approximate.	2	3	3.5	6.3		watts

♦ Obtained from fixed supply or by cathode resistor of value shown. The d-c resistance in the grid circuit should not exceed 10,000 ohms with fixed bias, or 50,000 ohms with cathode bias.

(See page 4 for other references)

TECHNICAL INFORMATION (CONT'D)

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

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

		Typical Operation		Maximum Ratings		
		CCS	ICAS	CCS	ICAS	
D-c plate voltage.....	400	500	600	500	600	volts
D-c suppressor voltage (Grid No. 3)*†.....				200	200	volts
D-c screen voltage (Grid No. 2).....	150	200	250	250	250	volts
D-c grid voltage (Grid No. 1).....	-105	-130	-130	-200	-200	volts
D-c plate current.....	25	25	25	30	30	milliamperes
Plate input.....				15	18	watts
Suppressor input.....				2	2	watts
Screen input.....				4	4	watts
Plate dissipation.....				10	13	watts
Peak a-f grid voltage.....	40	50	50			volts
Peak r-f grid voltage.....	125	145	145			volts
Internal shield*.....	—	—	—			
D-c screen current.....	7.5	8	8			milliamperes
D-c grid current, approximate.....	2	1	1			milliamperes
Driving power, approximate°.....	1	0.8	0.8			watts
Power output, approximate.....	3	4	6			watts

PLATE-MODULATED RADIO-FREQUENCY POWER AMPLIFIER—CLASS C TELEPHONY

Pentode Connection

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

	CCS	ICAS	CCS	ICAS	
D-c plate voltage.....	400	500	400	500	volts
D-c suppressor voltage (Grid No. 3).....	40	40	200	200	volts
D-c screen voltage.....	195	245			volts
Or from resistor of.....	11500	16300			ohms
D-c grid voltage†.....	-40	-40			volts
Or grid resistor of.....	27000	27000			ohms
D-c plate current.....	35	40	40	40	milliamperes
D-c grid current.....	1.5	1.5	7.5	7.5	milliamperes
Plate input.....			16	20	watts
Suppressor input.....			2	2	watts
Screen input.....			4	4	watts
Plate dissipation.....			6.7	8	watts
Peak r-f grid voltage.....	55	55			volts
Internal shield*.....	—	—			
D-c screen current.....	17	15			milliamperes
Driving power, approximate.....	0.1	0.1			watt
Power output, approximate.....	8	12			watts

PLATE-MODULATED RADIO-FREQUENCY POWER AMPLIFIER—CLASS C TELEPHONY

Tetrode Connection—Grids #2 and #3 tied together

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

	CCS	ICAS	CCS	ICAS	
D-c plate voltage.....	400	500	400	500	volts
D-c screen voltageφ.....	85	195			volts
From a resistor of.....	15000	18000			ohms
D-c grid voltage†.....	-120	-120			volts
Or from grid resistor of.....	20000	20000			ohms
D-c plate current.....	35	40	40	40	milliamperes
D-c grid current.....	6	6	7.5	7.5	milliamperes
Plate input.....			16	20	watts
Screen input.....			6	6	watts
Plate dissipation.....			6.7	8	watts
Peak r-f grid voltage.....	160	160			volts
Internal shield*.....	—	—			
D-c screen current.....	21	17			milliamperes
Driving power, approximate.....	0.9	0.9			watt
Power output, approximate.....	8	12			watts

(See page 4 for other references)

TECHNICAL INFORMATION (CONT'D)

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

Pentode Connection

Key-down conditions per tube without modulation †

	Typical Operation				Maximum Ratings	
	CCS	ICAS	CCS	ICAS	ICAS	
D-c plate voltage.....	400	500	500	600	500	600 volts
D-c suppressor voltage (Grid No. 3).....	0	0	40	40	200	200 volts
D-c screen voltage (Grid No. 2) ♦♦.....	200	200	250	250		volts
From a resistor of.....	8000	13600	20800	22000		ohms
D-c grid voltage (Grid No. 1) △△.....					-200	-200 volts
From grid resistor of.....	14000	17000	50000	42000		ohms
From cathode resistor of.....	1300	1370	1700	1620		ohms
D-c plate current.....	45	45	45	55	60	60 milliamperes
D-c grid current.....	7	6	2	2.4	7.5	7.5 milliamperes
Plate input.....					25	33 milliamperes
Suppressor input.....					2	2 watts
Screen input.....					6	6 watts
Plate dissipation.....					10	13 watts
Peak r-f grid voltage.....	155	155	155	165		volts
Internal shield*.....	—	—	—	—		
D-c screen current.....	25	22	12	16		milliamperes
Driving power, approximate.....	1.1	0.9	0.25	0.3		watts
Power output, approximate.....	10	14	16	23		watts

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

Tetode Connection—Grids #2 and #3 tied together

Key-down conditions per tube without modulation

	CCS		ICAS		Maximum Ratings	
	CCS	ICAS	CCS	ICAS	ICAS	
D-c plate voltage.....	400	500	600	500	600	volts
D-c screen voltage (Grid No. 2) ♦♦.....	200	100	150	250	200	volts
From a resistor of.....	27000	27000	30000			ohms
D-c grid voltage (Grid No. 1) △△.....				-200	-200	volts
From a grid resistor of.....	8600	10000	10000			ohms
From a cathode resistor of.....	1000	1000	860			ohms
D-c plate current.....	45	45	55	60	60	milliamperes
D-c grid current.....	7	6	6	7.5	7.5	milliamperes
Plate input.....				25	33	watts
Screen input.....				6	6	watts
Plate dissipation.....				10	13	watts
Peak r-f grid voltage.....	90	90	90			volts
Internal shield*.....	—	—	—			
D-c screen current.....	15	15	15			milliamperes
Driving power, approximate.....	0.7	0.5	0.5			watt
Power output, approximate.....	10	12	23			watts

APPLICATION NOTES

The GL-802 can be operated at frequencies as high as 30 megacycles. The tube may be operated at higher frequencies provided the maximum values of plate voltage and power input are reduced as the frequency is raised (other maximum ratings are the same as shown above).

The tabulation below shows the highest percentage of maximum plate voltage and power input that can be used up to 100 megacycles for the various classes of service. Special attention should be given to adequate ventilation of the bulb at these frequencies.

Frequency.....	30	55	100 megacycles
Maximum permissible percentage of maximum rated plate voltage and plate input			
Telephony, Class B.....	100	88	76 per cent
Telephony, Class C, grid-modulated.....	100	88	76 per cent
Telephony, Class C, suppressor-modulated.....	100	88	76 per cent
Telephony C, plate-modulated.....	100	77	55 per cent
Telegraphy, Class C.....	100	77	55 per cent

*Connected to cathode at socket.

†Applying a positive voltage of not over 40 volts to suppressor gives slightly increased output.

‡Obtained by grid resistor shown or by partial self-bias methods.

§At crest of a-f cycle with modulation factor of 1.0.

△ Voltage taken from unmodulated plate-voltage supply through resistor of value shown.

+From a fixed supply or grid resistor of value shown.

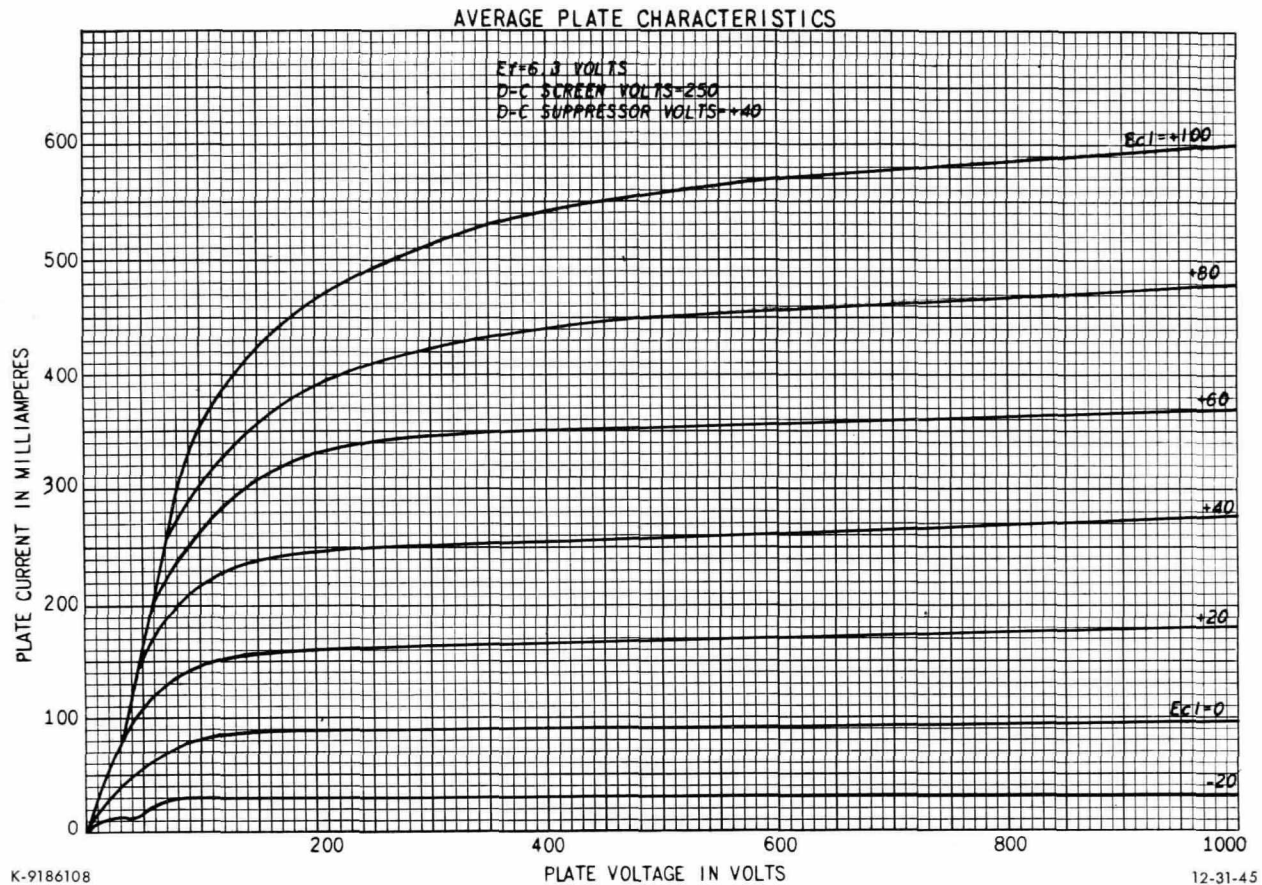
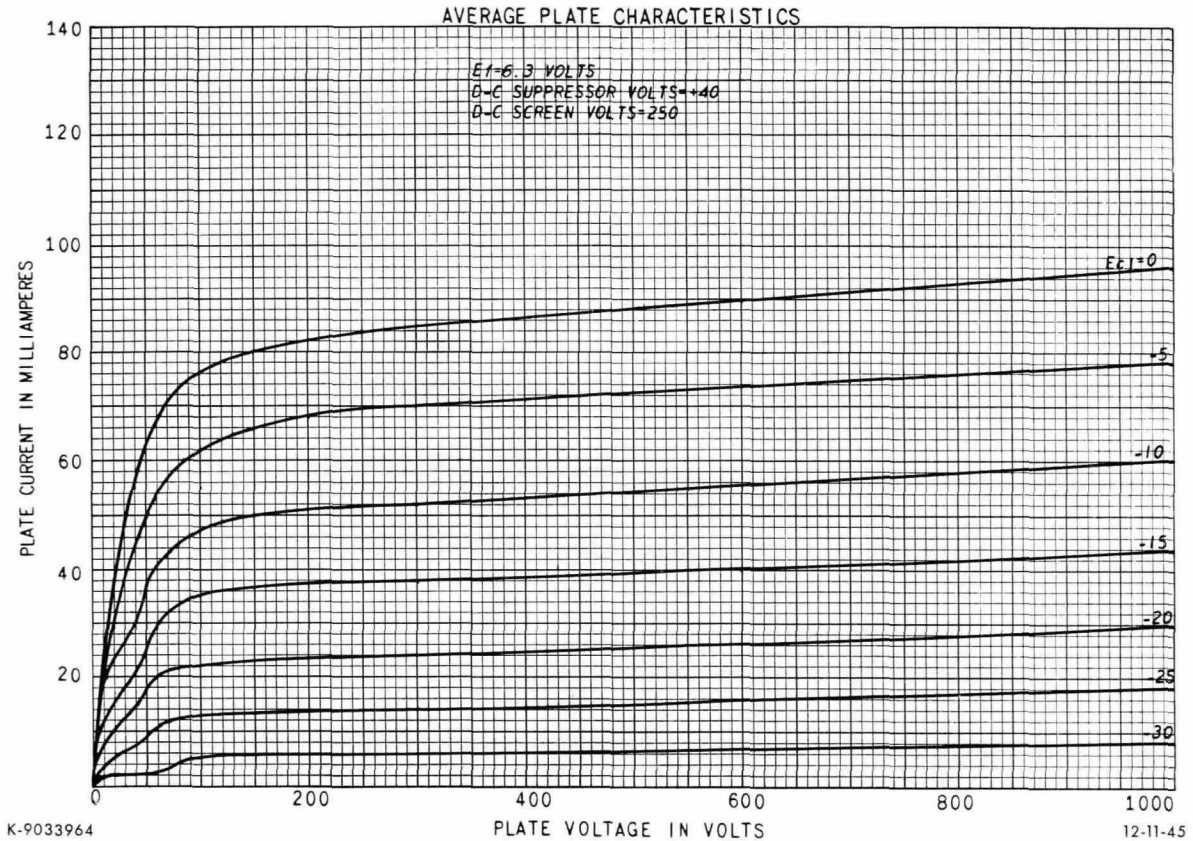
π From modulated fixed supply or modulated plate-voltage supply through resistor of value shown.

φ Preferably from unmodulated plate-voltage supply through resistor of value shown.

△△ Obtained from grid resistor shown, cathode resistor shown or from fixed supply.

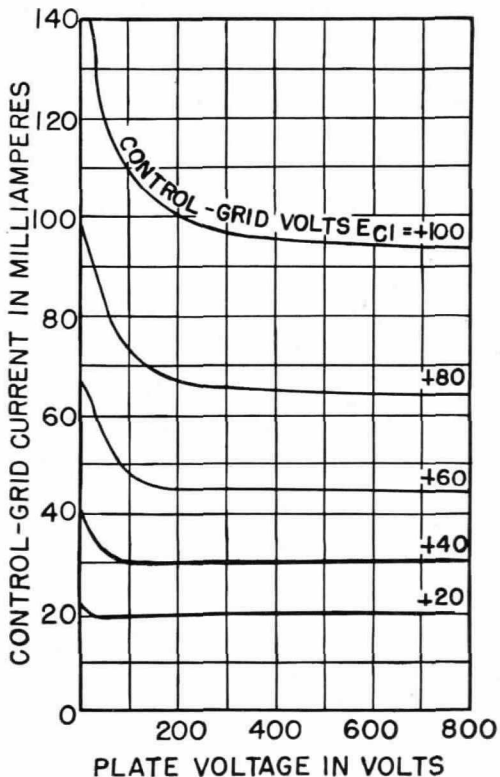
¶ Modulation, essentially negative, may be used if the positive peak of the a-f envelope does not exceed 115 per cent of the carrier conditions.

♦♦ From fixed supply or plate-voltage supply through resistor of value shown. Under key-up conditions, maximum screen voltage should not exceed 500 volts. Series screen resistor of value shown should not be used except where GL-802 is employed as a buffer amplifier and is not keyed.



GL-802 AVERAGE CHARACTERISTICS

($E_f = 6.3$ VOLTS, D-C SCREEN VOLTS = 250, D-C SUPPRESSOR VOLTS = +40)

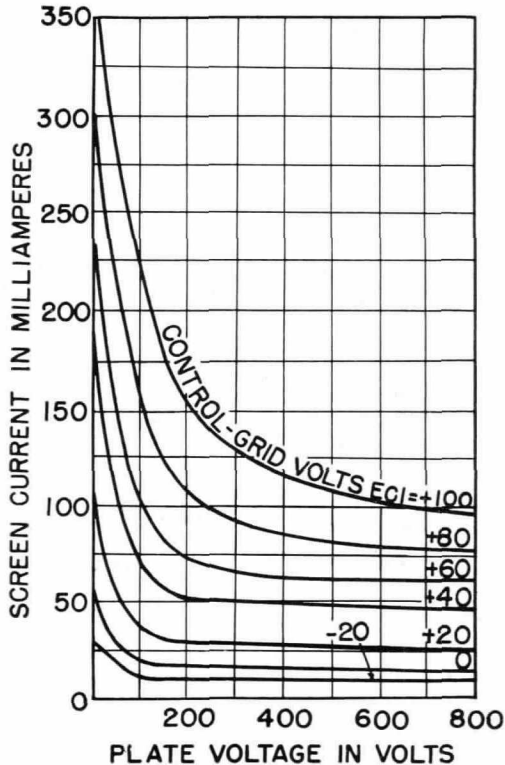


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8-18-45

GL-802 AVERAGE CHARACTERISTICS

($E_f = 6.3$ VOLTS, D-C SCREEN VOLTS = 250, D-C SUPPRESSOR VOLTS = +40)



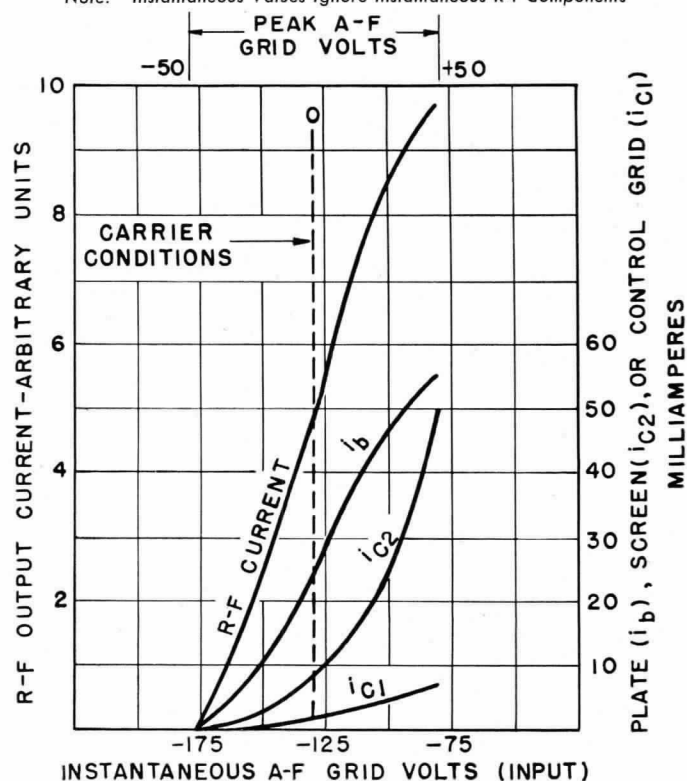
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GL-802 CONTROL-GRID MODULATION CHARACTERISTICS

($E_c = 6.3$ VOLTS, D-C PLATE VOLTS = 500, D-C SCREEN VOLTS = 200, D-C SUPPRESSOR VOLTS = 0)
 (D-C GRID BIAS VOLTS = -130, PEAK R-F GRID VOLTS = 145, INTERNAL SHIELD CONNECTED TO CATHODE)

Note: Instantaneous Values Ignore Instantaneous R-f Components



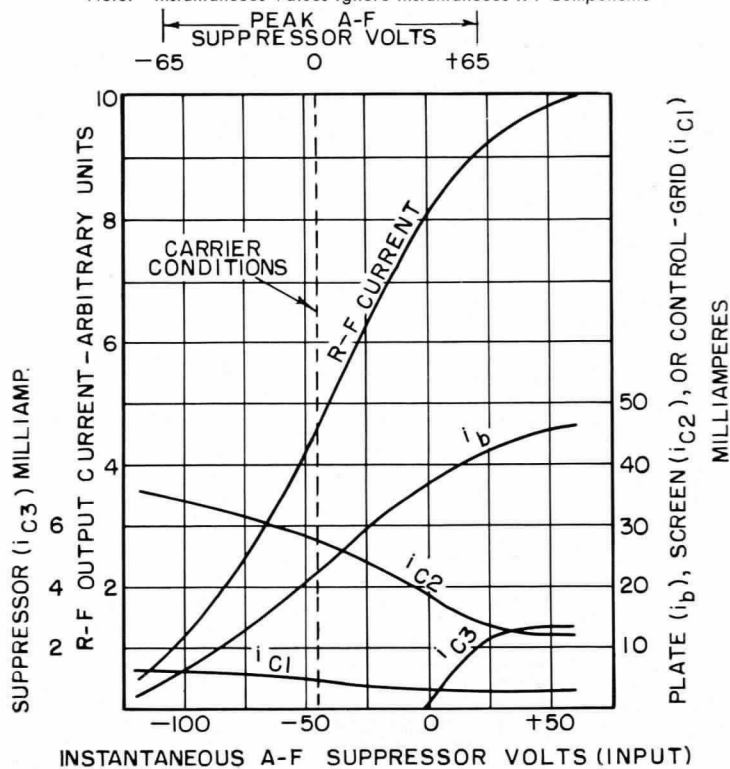
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GL-802 SUPPRESSOR MODULATION CHARACTERISTICS

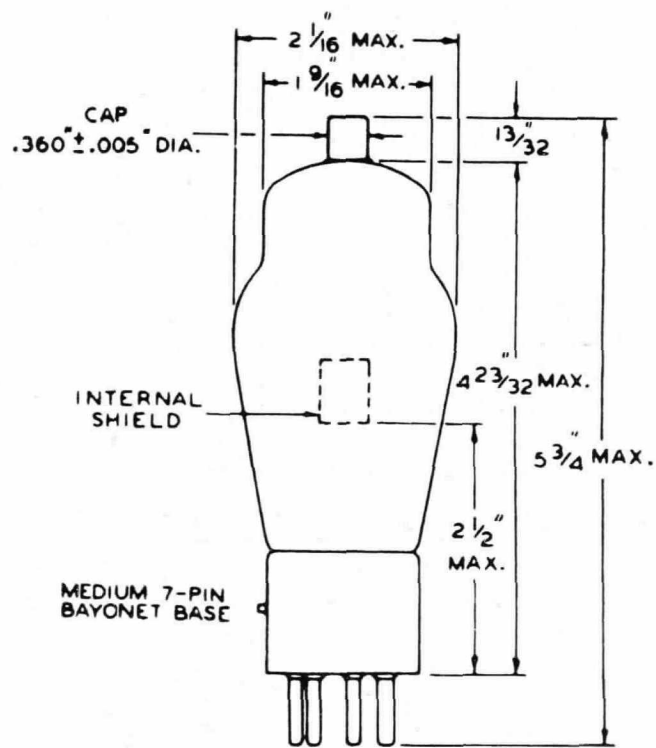
($E_c = 6.3$ VOLTS, D-C PLATE VOLTS = 500, D-C SCREEN VOLTS = 200, D-C SUPPRESSOR VOLTS = -45)
 (D-C GRID BIAS VOLTS = -90, PEAK R-F GRID VOLTS = 125, INTERNAL SHIELD CONNECTED TO CATHODE)

Note: Instantaneous Values Ignore Instantaneous R-f Components

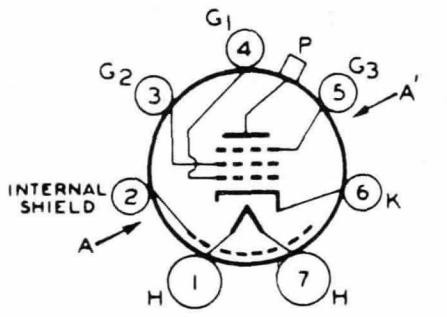


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Bottom View of
Socket Connections



AA=PLANE OF ELECTRODES

GL-802 OUTLINE

K-9033891

7-26-45