

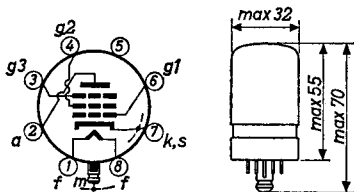
SPECIAL QUALITY, LONG LIFE PENTODE for use as A.F., I.F. or R.F. amplifier, output tube, oscillator, etc.

### HEATING

Indirect by A.C. or D.C.; series or parallel supply

Heater voltage  $V_f = 20\text{ V}$

Heater current  $I_f = 125\text{ mA}$



Base: LOCTAL (Dimensions in mm)

### CHARACTERISTICS

Column I: Setting of the tube and average measuring results of new tubes

II: Characteristics range values for equipment design

III: Data indicating the endpoint of life

### Capacitances

		I	II
Grid No.1 to all other elements except anode	$C_{g1}$	= 8.5	7.5-9.5 pF
The same with $I_k = 19\text{ mA}$	$C_{g1}$	= 10.5	pF
Anode to all other elements except grid No.1	$C_a$	= 6.0	4.5-7.7 pF
Input + output capacitance	$C_{g1+C_a}$	=	< 16 pF
Anode to grid No.1	$C_{ag1}$	= 0.014	< 0.018 pF
Anode to grid No.3	$C_{ag3}$	= 1.2	pF
Anode to heater	$C_{af}$	= 0.12	pF
Grid No.1 to grid No.2	$C_{g1g2}$	= 3	pF
Grid No.1 to cathode	$C_{g1k}$	= 4.5	pF
Grid No.1 to heater	$C_{g1f}$	= 0.02	< 0.04 pF
Grid No.2 to grid No.3	$C_{g2g3}$	= 2.2	pF
Cathode to heater	$C_{kf}$	= 7	pF

## CHARACTERISTICS (continued)

Capacitances in triode connection  
(Grids No.2 and 3 connected to anode)

		I	II	
Grid No.1 to all other elements except anode (+g <sub>2</sub> +g <sub>3</sub> )	C <sub>g1</sub> =	5	< 6	PF
Anode (+g <sub>2</sub> +g <sub>3</sub> ) to all other elements except grid No.1	C <sub>a</sub> =	7.5	< 9	PF
Anode (+g <sub>2</sub> +g <sub>3</sub> ) to grid No.1	C <sub>ag1</sub> =	3.2	< 4	PF

## Heater current

		I	II	
Heater voltage	V <sub>f</sub> =	20		V
Heater current	I <sub>f</sub> =	125	120-130	mA

## Typical characteristics

		I	II	III	
Anode supply voltage	V <sub>ba</sub> =	225			V
Grid No.3 voltage	V <sub>g3</sub> =	0			V
Grid No.2 supply voltage	V <sub>bg2</sub> =	155			V
Cathode resistor	R <sub>k</sub> =	250			Ω
Anode current	I <sub>a</sub> =	16	13.5-19	11.5	mA
Grid No.2 current	I <sub>g2</sub> =	3	2-4		mA
Mutual conductance	S =	6.5	5.5-7.8	4.5	mA/V
Internal resistance	R <sub>i</sub> =	0.25	> 0.2		MΩ
Amplification factor of grid No.2 with respect to grid No.1	μ <sub>g2g1</sub> =	19			
Aequivalent noise resistance					
R.F.	R <sub>eq</sub> =	1.2	< 2.0		kΩ
A.F. (f = 500-3000 c/s)	R <sub>eq</sub> =	5			kΩ
Triode connection, R.F.	R <sub>eq</sub> =	650			Ω

## Negative grid current

		I	II	III	
Anode supply voltage	V <sub>ba</sub> =	225			V
Grid No.3 voltage	V <sub>g3</sub> =	0			V
Grid No.2 supply voltage	V <sub>bg2</sub> =	155			V
Cathode resistor	R <sub>k</sub> =	250			Ω
Grid No.1 resistor	R <sub>g1</sub> =	0.1			MΩ
Negative grid current	-I <sub>g1</sub> =		< 0.5	1.0	μA

CHARACTERISTICS (continued)

<u>Grid current starting point</u>		I	II	III
Anode supply voltage	$V_{ba}$	= 225		V
Grid No.3 voltage	$V_{g3}$	= 0		V
Grid No.2 supply voltage	$V_{bg2}$	= 155		V
Positive grid No.1 current	$+I_{g1}$	= 0.3		$\mu A$
Negative grid No.1 voltage	$-V_{g1}$	=	< 1.3	V

<u>Output power</u>		I	II	III
Anode supply voltage	$V_{ba}$	= 225		V
Grid No.3 voltage	$V_{g3}$	= 0		V
Grid No.2 supply voltage	$V_{bg2}$	= 155		V
Cathode resistor	$R_k$	= 250		$\Omega$
Load resistance	$R_{a\sim}$	= 10		k $\Omega$
Total distortion	$d_{tot}$	= 10		%
Output power	$W_o$	= 1.5		W

Hum voltage (referred to grid No.1)

Measured with straight response filter. Heater supply frequency 50 c/s. Centre of heater connected to earth.

		I	II	III
Heater voltage	$V_f$	= 20		V
Grid No.1 resistor	$R_{g1}$	= 0.5		M $\Omega$
Cathode capacitor	$C_k$	> 100		$\mu F$
Hum voltage	$V_{g1hum}$	=	< 10	$\mu V$

<u>Heating time</u>		I	II	III
Anode supply voltage	$V_{ba}$	= 225		V
Grid No.3 voltage	$V_{g3}$	= 0		V
Grid No.2 supply voltage	$V_{bg2}$	= 155		V
Cathode resistor	$R_k$	= 250		$\Omega$
Heating time for anode current rise from 0 to 4 mA	$T_h$	= 26	19-33	sec

CHARACTERISTICS (continued)Insulation between heater and cathode

		I	II	III
Heater voltage	$V_f = 20$			V
Heater to cathode voltage cathode positive	$V_{kf} = 50$			V
Heater to cathode insulation resistance	$R_{isol} =$		> 100	50 M $\Omega$

Insulation between two arbitrary electrodes

		I	II	III
Heater voltage	$V_f = 20$			V
Voltage between two electrodes	$V = 50$			V
Insulation resistance	$R_{isol} =$		>1000	300 M $\Omega$

LIFE EXPECTANCY: 10 000 hours under the following life test conditions:

Heater voltage	$V_f = 20$ V
Anode supply voltage	$V_{ba} = 225$ V
Grid No.3 voltage	$V_{g3} = 0$ V
Grid No.2 supply voltage	$V_{bg2} = 155$ V
Cathode resistor	$R_k = 250$ $\Omega$

In case of heater parallel supply the heater voltage should be within  $\pm 5\%$  of its nominal value (absolute limits). In case of heater series supply the heater current should be within  $\pm 1.5\%$  of its nominal value (absolute limits).

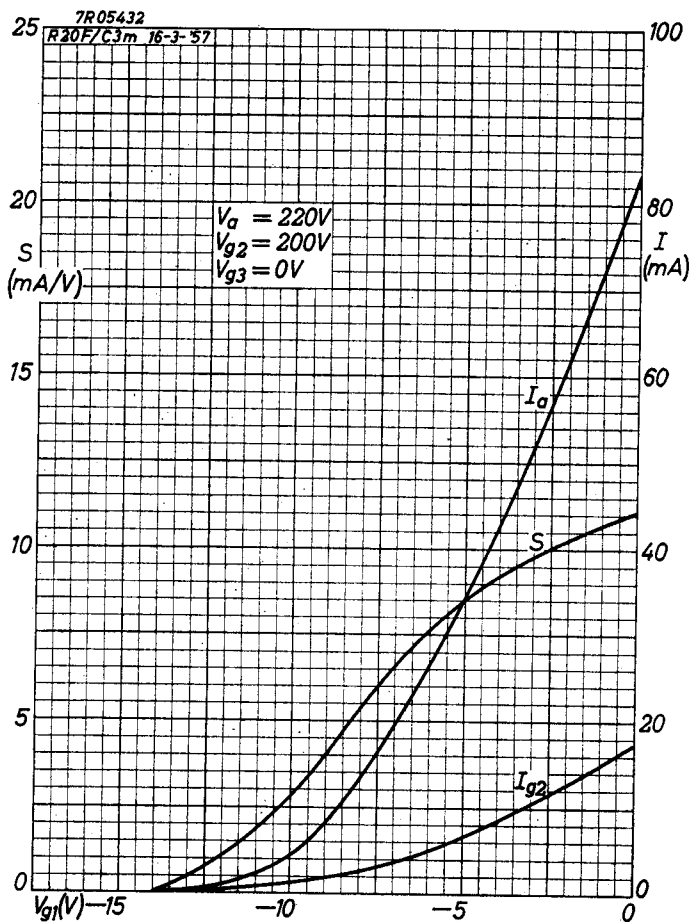
The data indicating the endpoint of life are given in column III under the heading "Characteristics".

LIMITING VALUES (Design centre limits)

Anode voltage in cold condition	$V_{a0}$	= max.	550 V
Anode voltage	$V_a$	= max.	300 V
Anode dissipation	$W_a$	= max.	4 W <sup>1)</sup>
Grid No.3 voltage in cold condition	$V_{g30}$	= max.	550 V
Grid No.3 voltage	$V_{g3}$	= max.	300 V
Grid No.3 dissipation	$W_{g3}$	= max.	1 W
Grid No.2 voltage in cold condition	$V_{g20}$	= max.	550 V
Grid No.2 voltage	$V_{g2}$	= max.	300 V
Grid No.2 dissipation	$W_{g2}$	= max.	1 W
Negative grid No.1 voltage	$-V_{g1}$	= max.	100 V
Grid No.1 dissipation	$W_{g1}$	= max.	50 mW
Grid No.1 circuit resistance			
when $W_a > 1.5$ W	$R_{g1}$	= max.	0.5 M $\Omega$
when $W_a < 1.5$ W	$R_{g1}$	= max.	3 M $\Omega$
Cathode current	$I_k$	= max.	30 mA
Voltage between heater and cathode	$V_{kf}$	= max.	120 V
Circuit resistance between heater and cathode	$R_{kf}$	= max.	20 k $\Omega$
Heater voltage in case of heater parallel supply	$V_f$	= 20 V $\pm$ 5 % <sup>2)</sup>	
Heater current in case of heater series supply	$I_f$	= 125 mA $\pm$ 1.5 % <sup>2)</sup>	
Temperature of metal envelope	$t_{bulb}$	= max.	120 °C

<sup>1)</sup> In case of triode connection  $W_a + W_{g2} + W_{g3} = \text{max. } 5 \text{ W}$

<sup>2)</sup> Absolute limits

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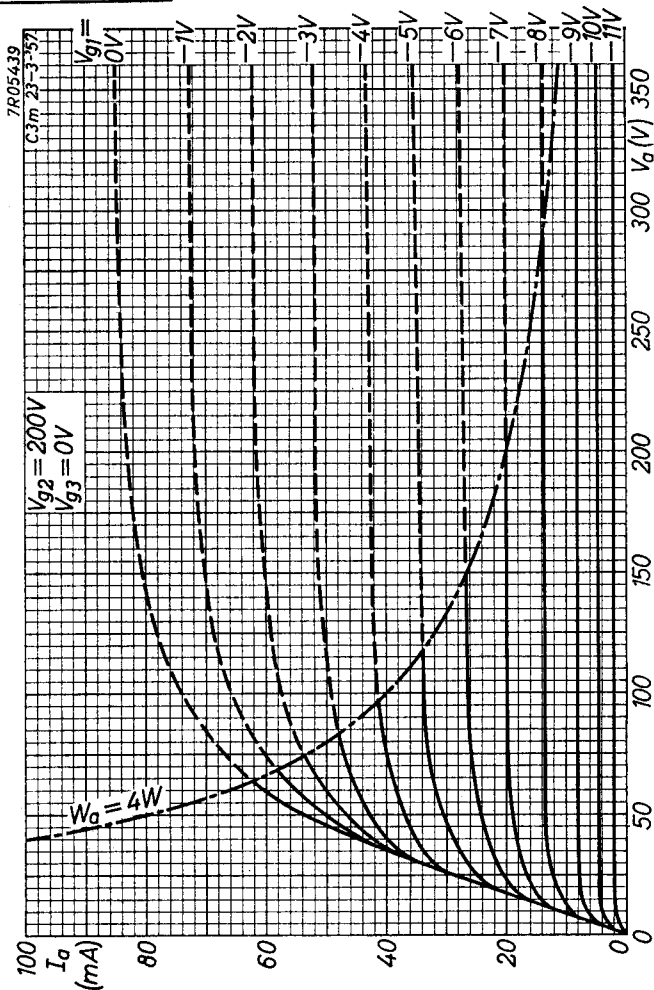
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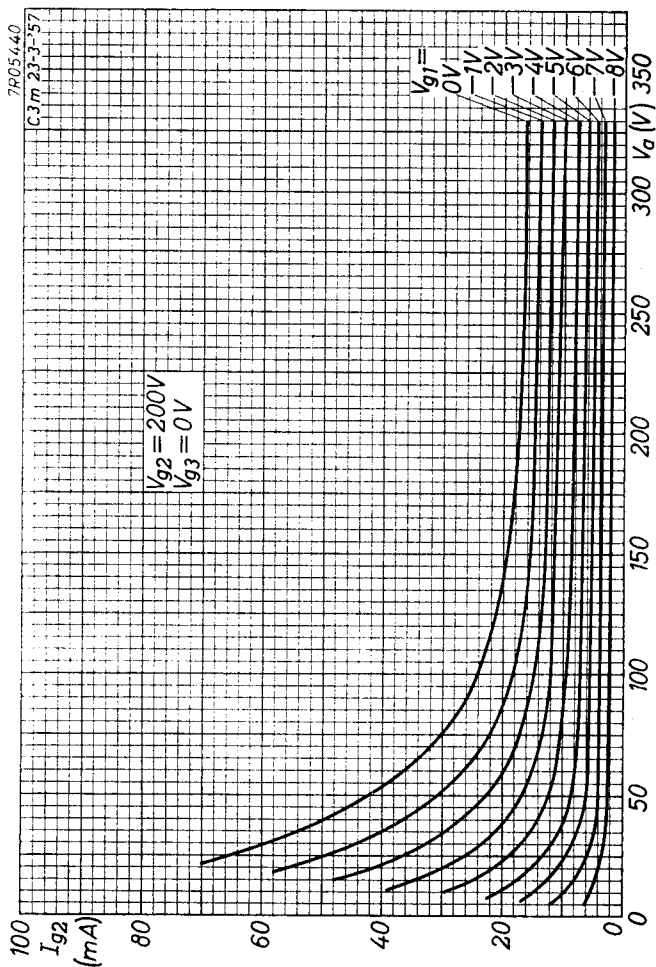
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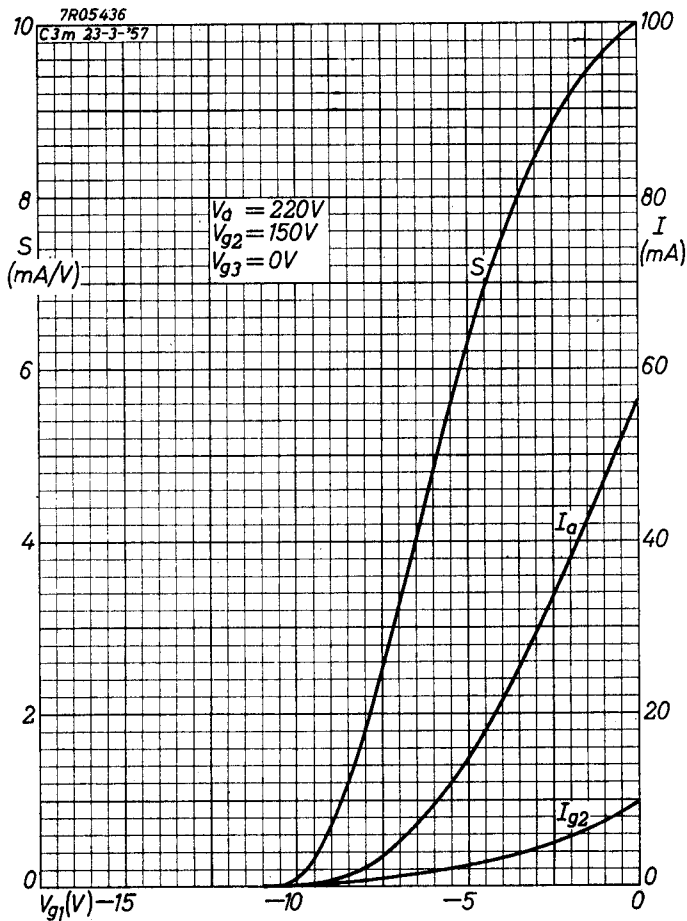
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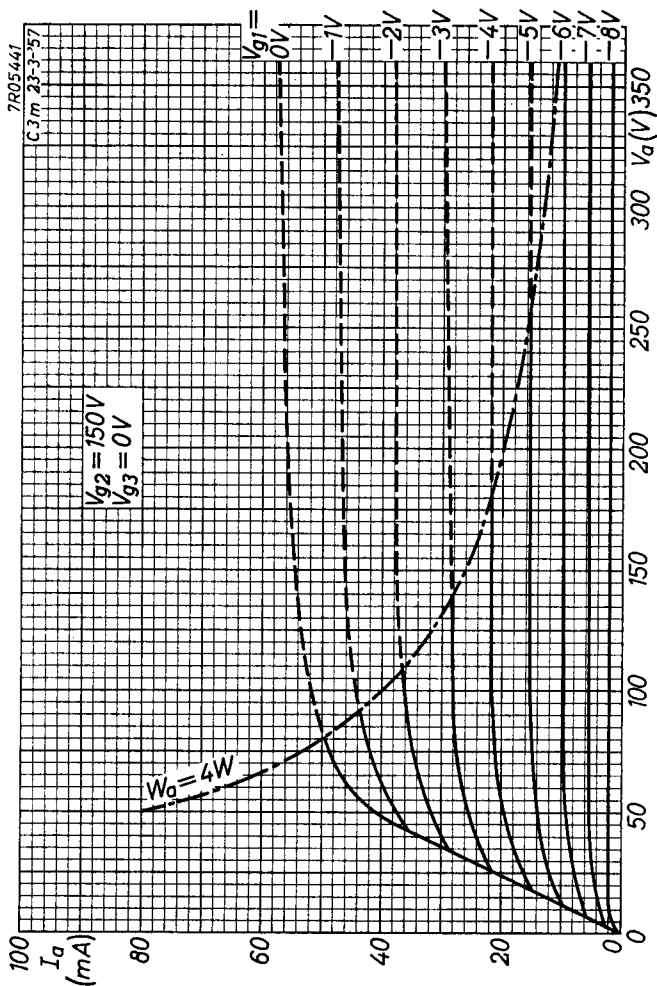


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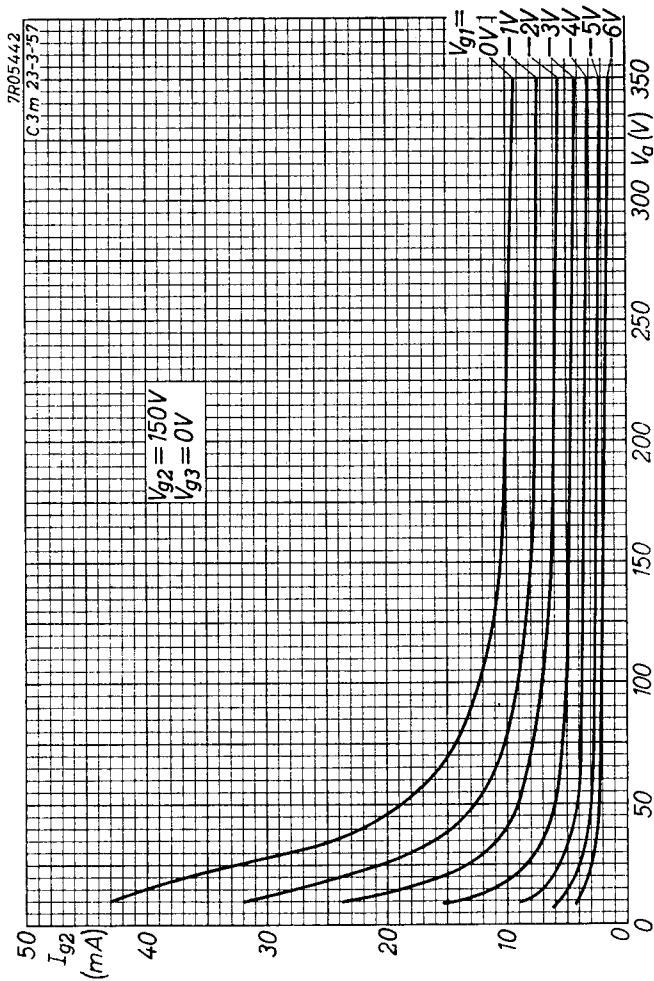
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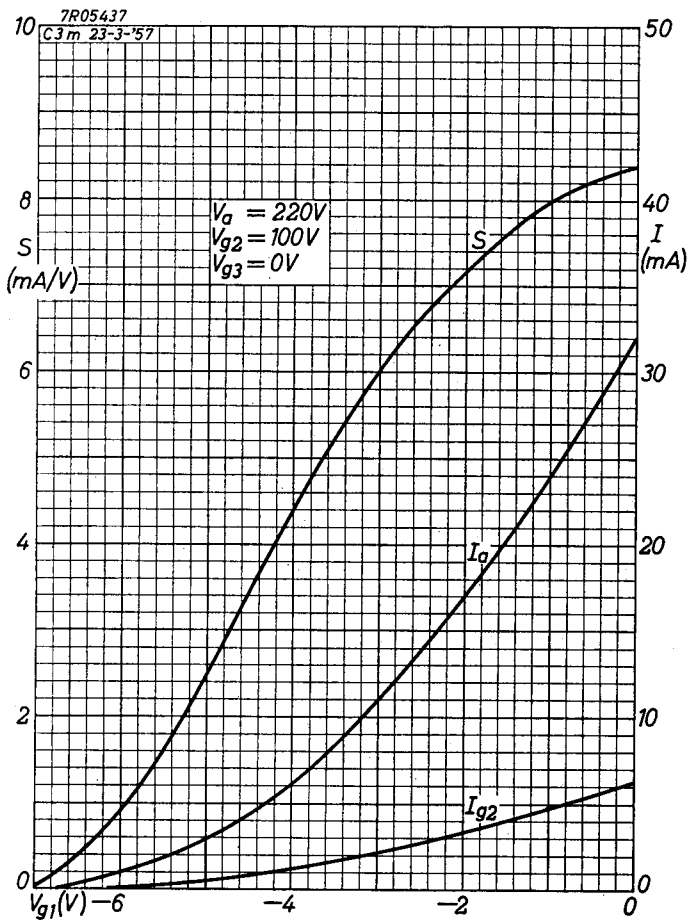
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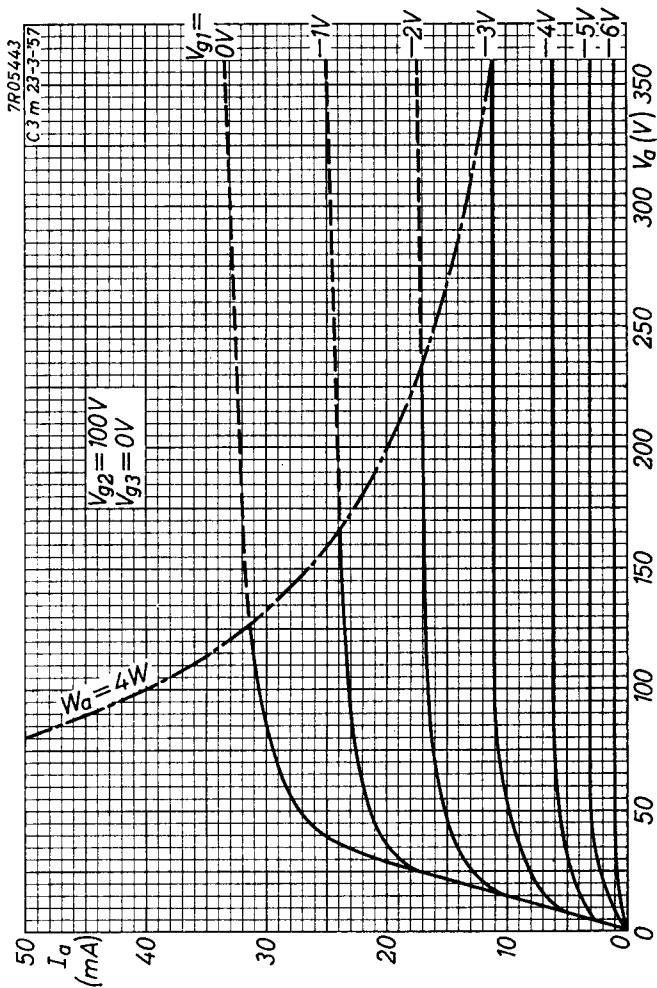
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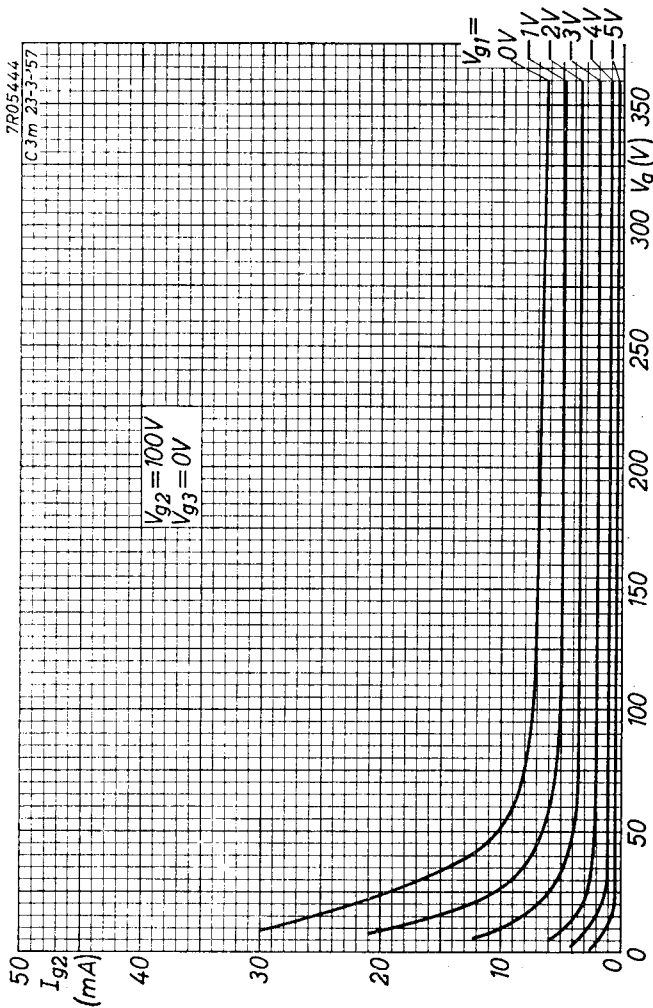
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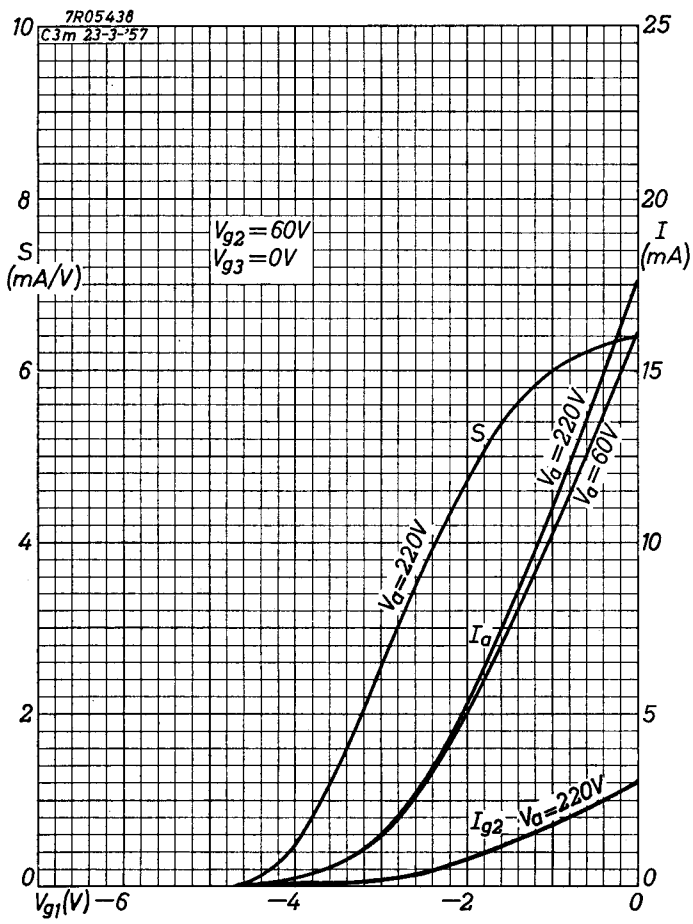
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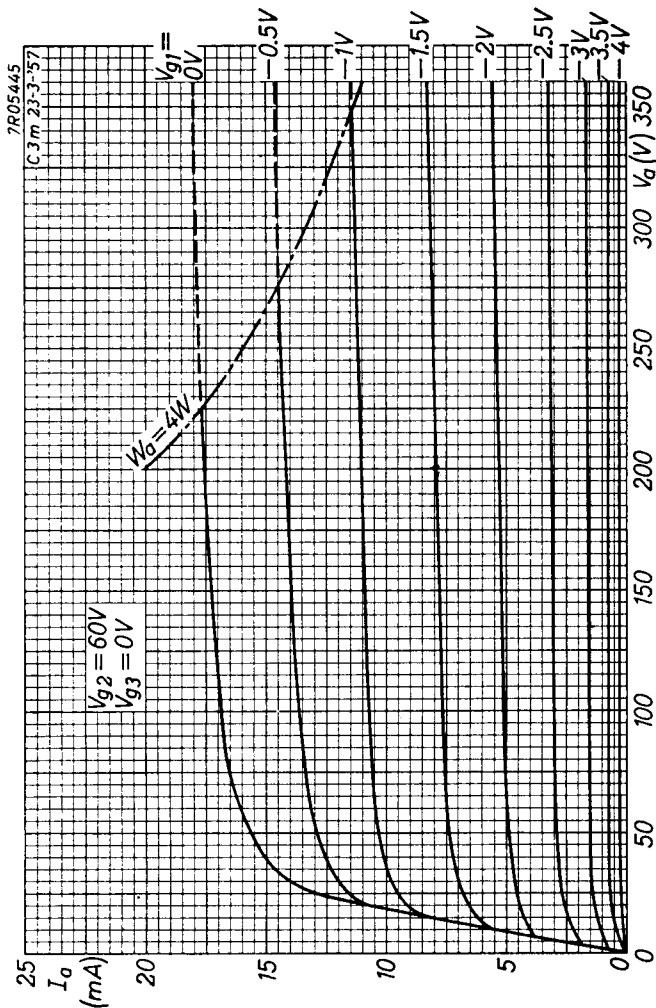
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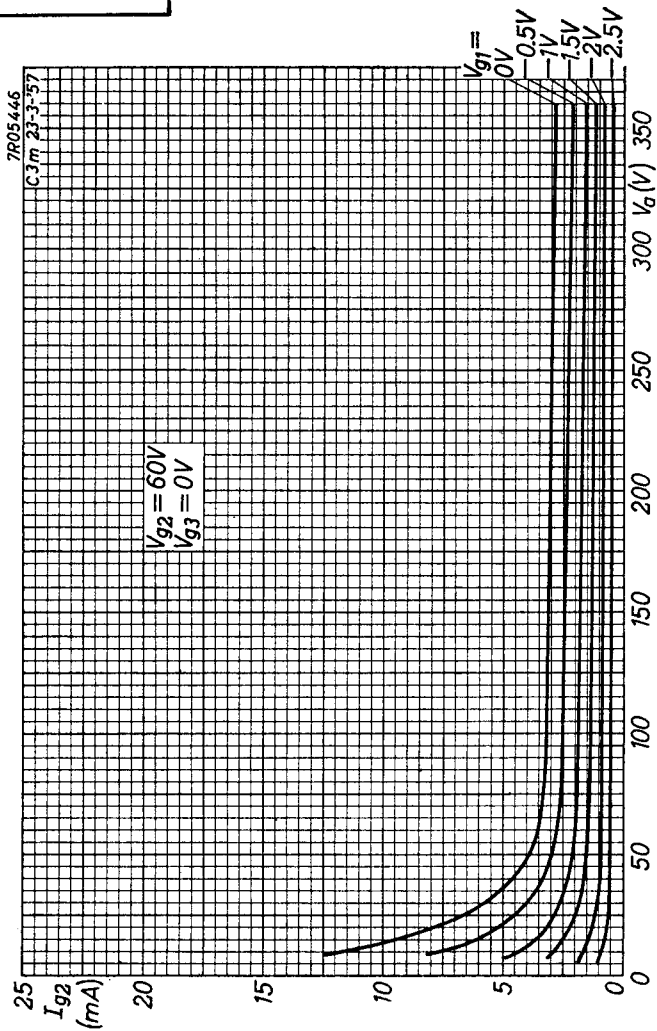
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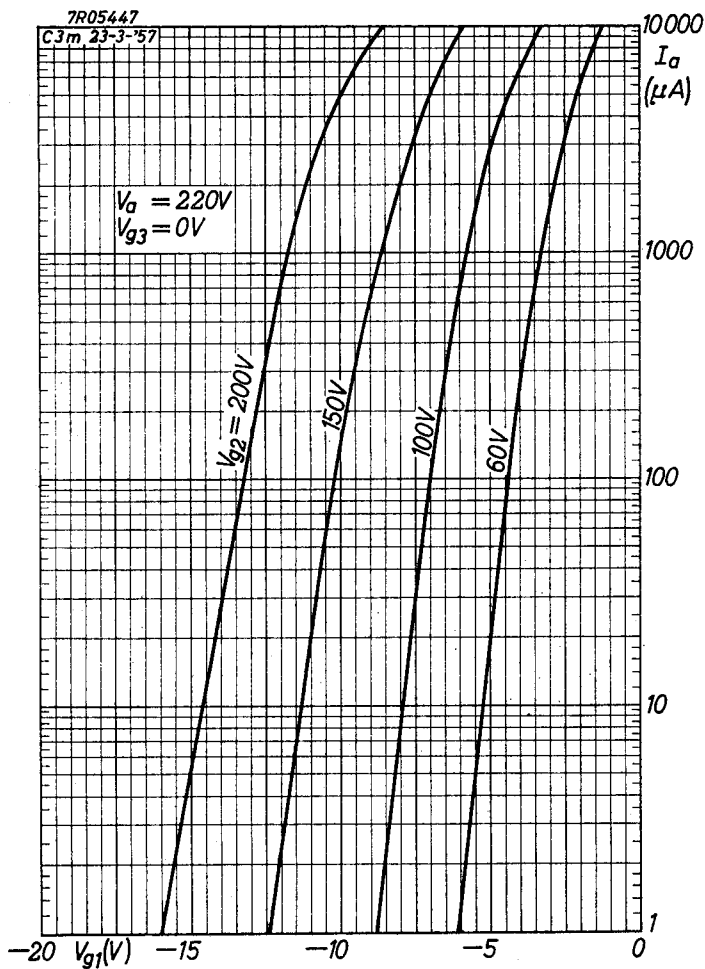


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$V_a = 220V$   
 $V_{g3} = 0V$

$V_{g2} = 200V$

150V

100V

60V

10000  
S  
( $\mu A/V$ )

1000

100

10

1

-20  $V_{g1}(V)$

-15

-10

-5

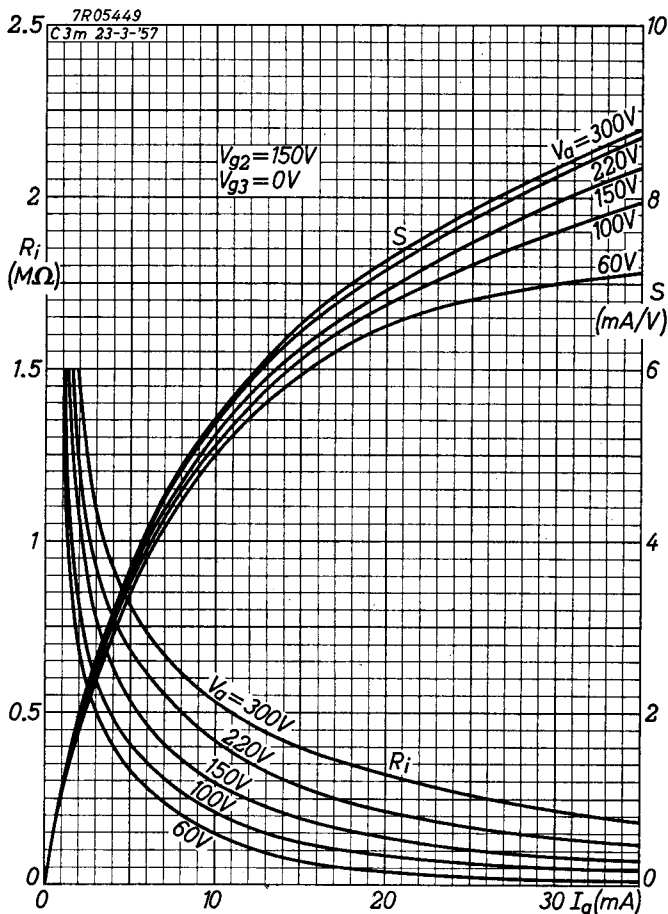
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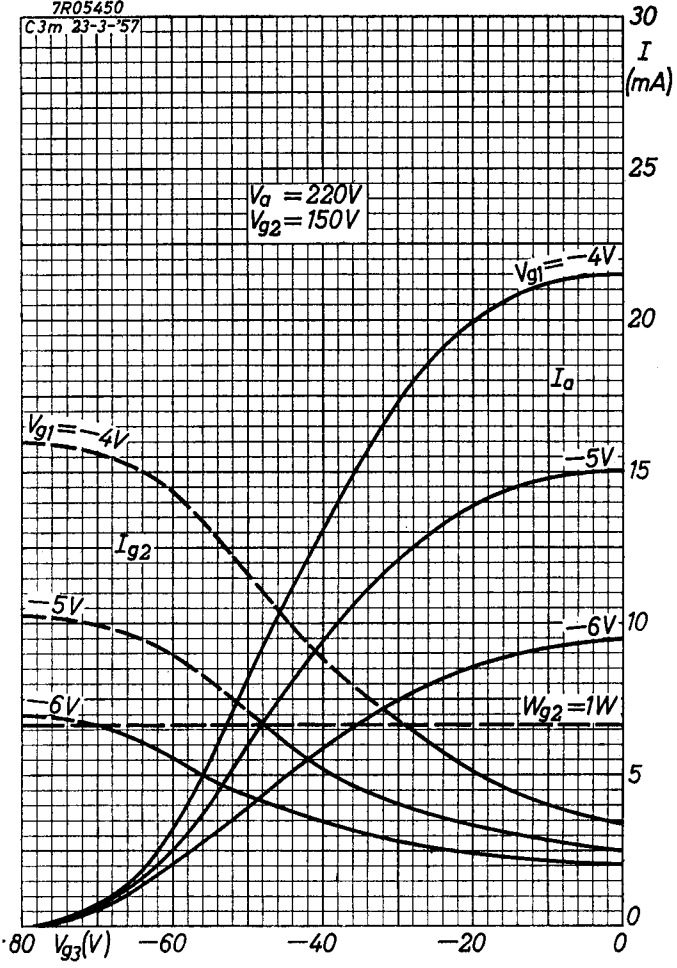
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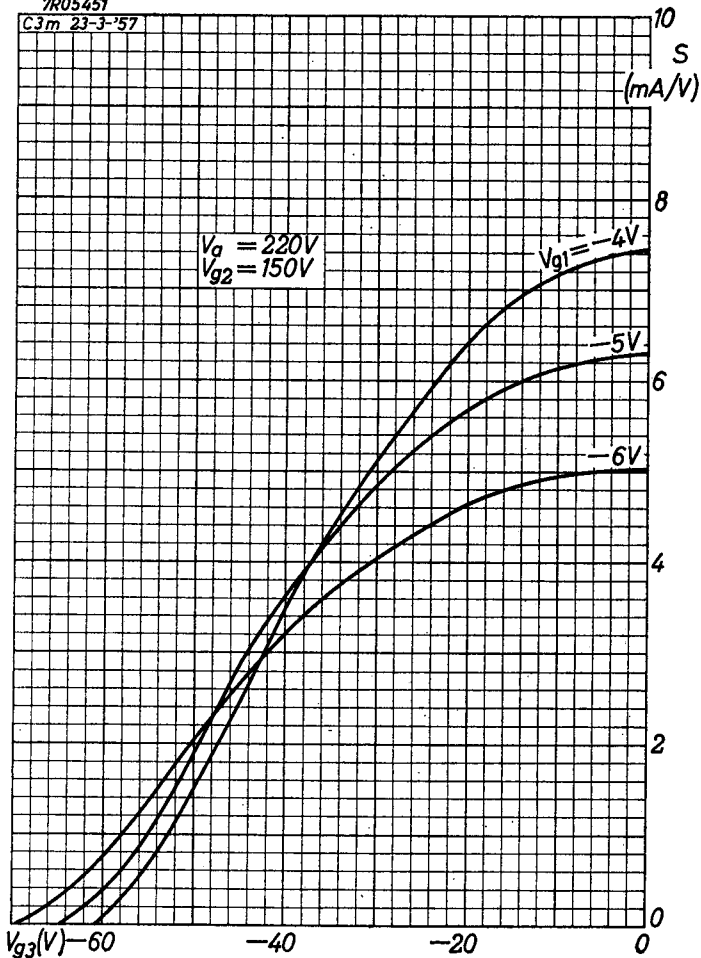
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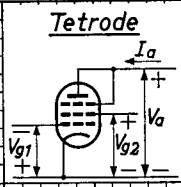
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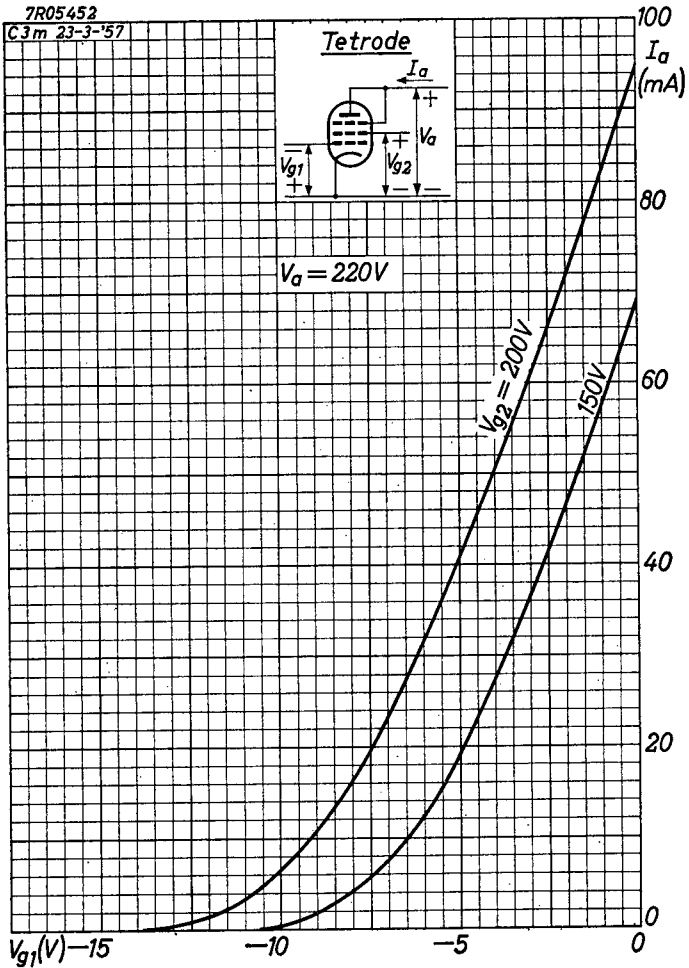
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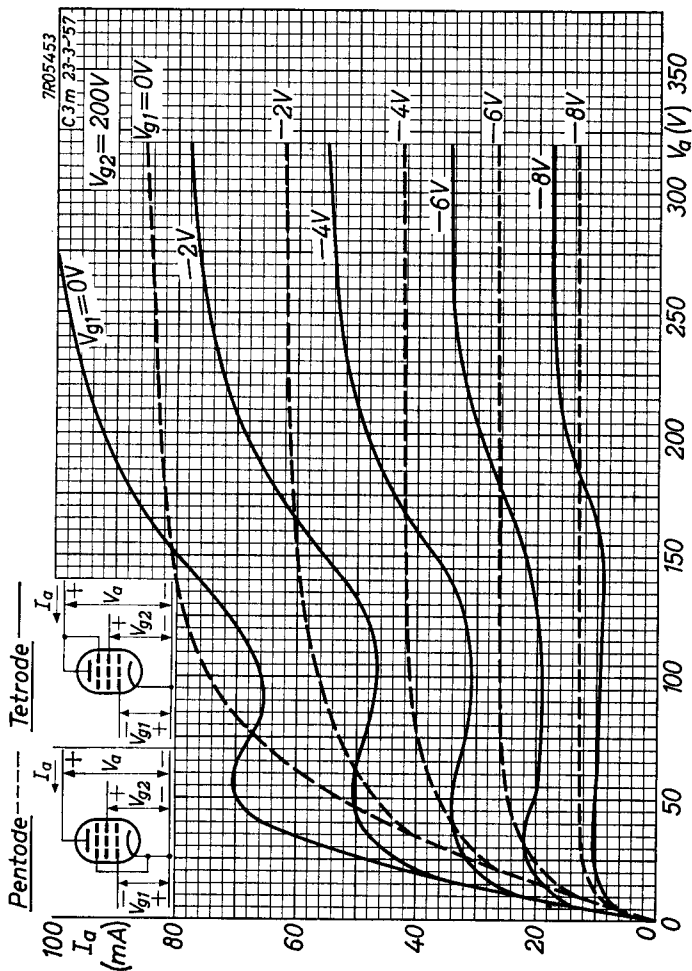
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$V_a = 220V$



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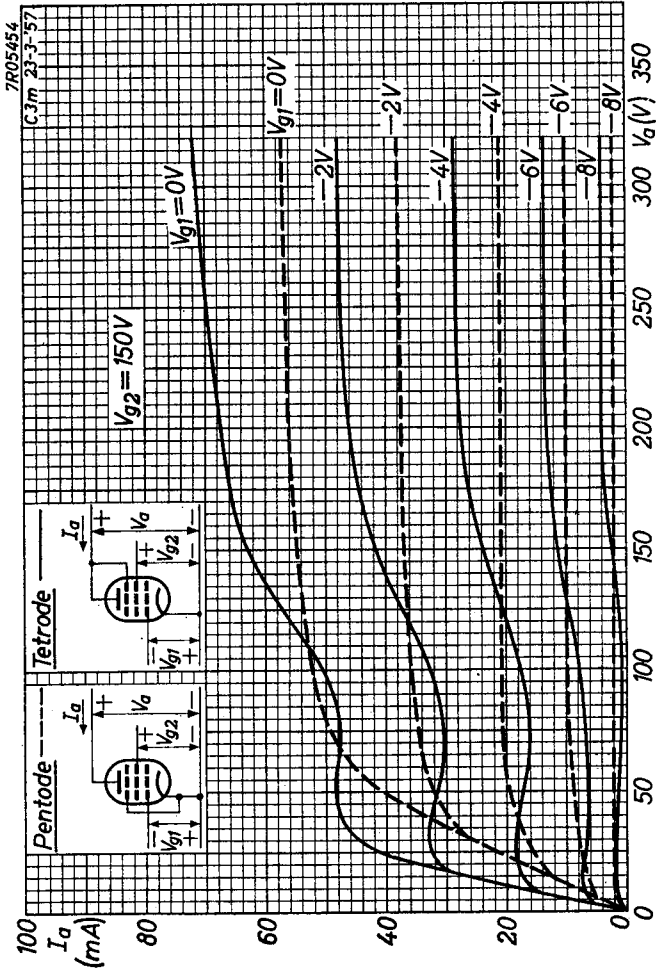
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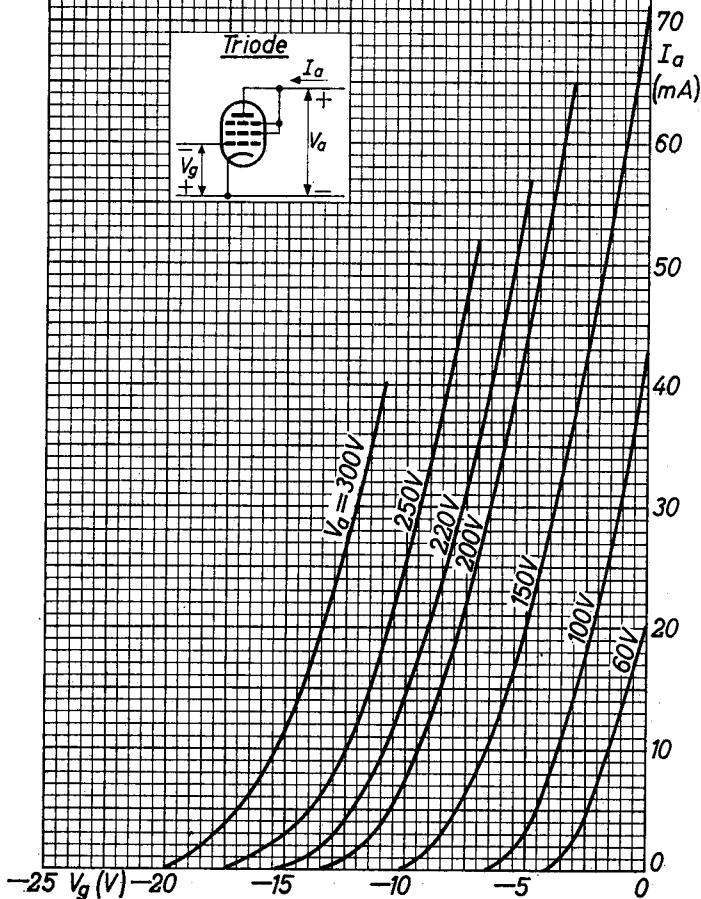
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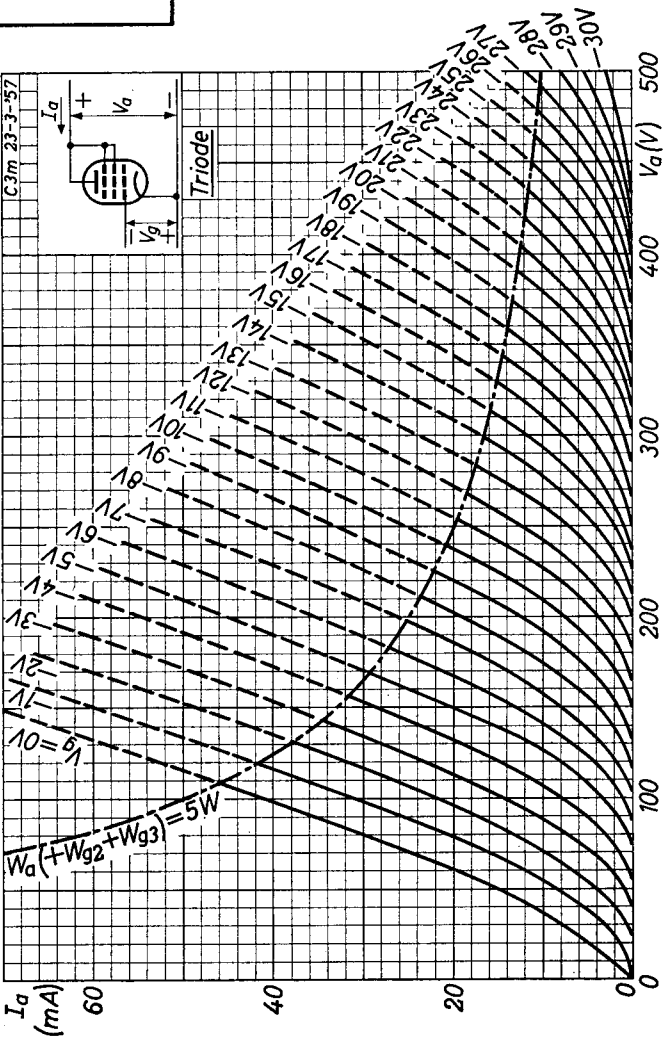
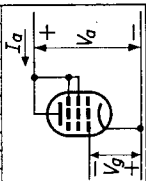
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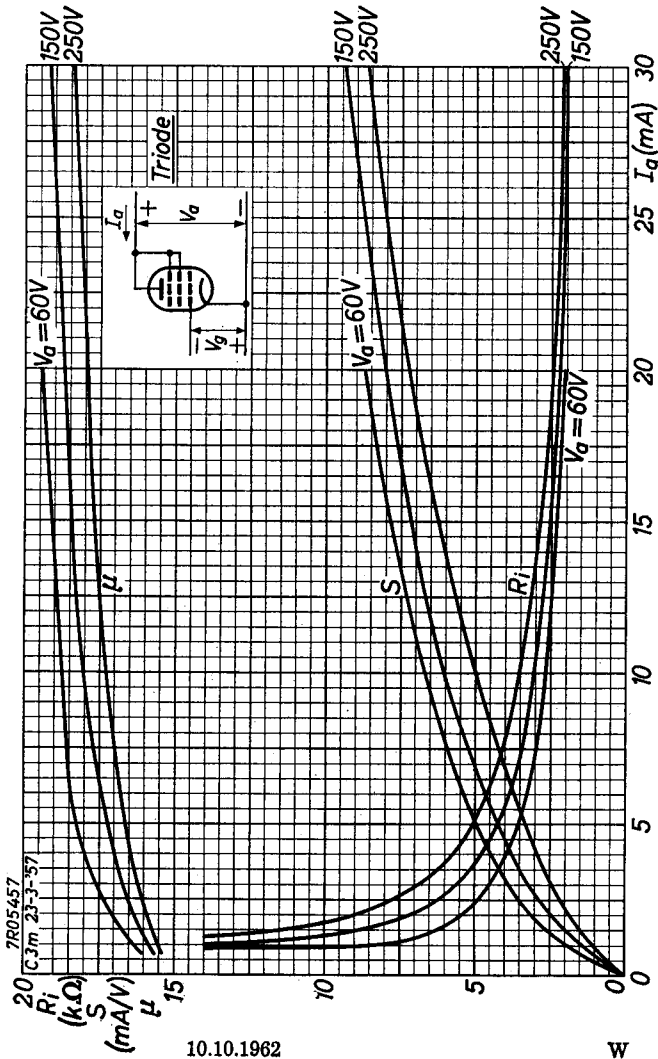
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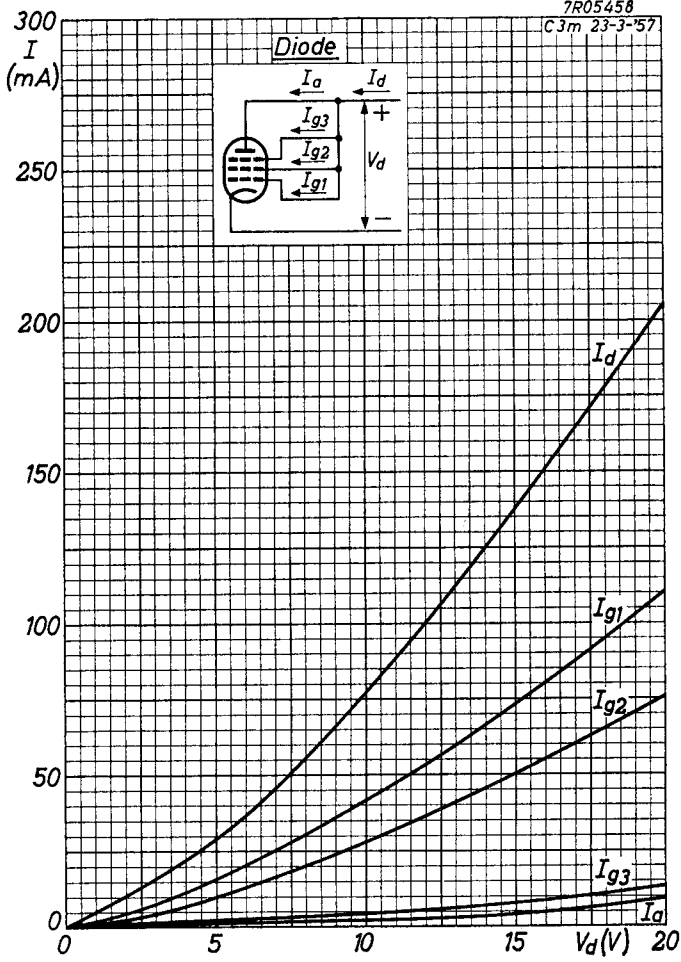


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*Electronic  
Tube*

**HANDBOOK**

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