

TRIODE-PENTODE for use as frame output tube and frame oscillator or pulse amplifier in television receivers  
 TRIODE-PENTHODE pour utilisation comme tube de sortie pour le balayage image et oscillatrice pour le balayage image ou amplificatrice d'impulsions dans les récepteurs de télévision

TRIODE-PENTODE zur Verwendung als Endröhre für die vertikale Ablenkung und Oszillator für die vertikale Ablenkung oder Impulsverstärker in Fernsehempfängern.

Heating : indirect by A.C. or D.C.  
 Series supply

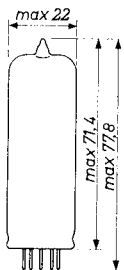
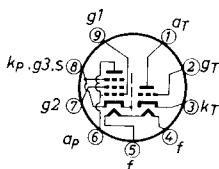
Chauffage: indirect par C.A. ou C.C.  
 Alimentation série

Heizung : indirekt durch Wechsel-  
 oder Gleichstrom  
 Serienspeisung

$V_f = 18 \text{ V}$

$I_f = 300 \text{ mA}$

Dimensions in mm  
 Dimensions en mm  
 Abmessungen in mm



Base, culot, Sockel: NOVAL

Capacitances  
 Capacités  
 Kapazitäten

$C_{g1ap} = 0,45 \text{ pF}$   
 $C_{gT ap} < 0,03 \text{ pF}$   
 $C_{g1 aT} < 0,08 \text{ pF}$

$C_{gT f} < 0,15 \text{ pF}$   
 $C_{g1 f} < 0,20 \text{ pF}$

Typical dynamic characteristics  
 Caractéristiques dynamiques types  
 Dynamische Kenndaten

Pentode section Partie penthode Pentodenteil		Triode section Partie triode Triodenteil
$V_a = 50$	65 V	$V_a = 100 \text{ V}$
$V_{g2} = 170$	210 V	$V_g = 0 \text{ V}$
$V_{g1} = -1$	-1 V	$I_a = 10 \text{ mA}$
$I_{ap} = 200$	285 mA <sup>1)</sup>	$S = 5,5 \text{ mA/V}$
$I_{g2p} = 35$	45 mA	$R_1 = 9 \text{ k}\Omega$
		$\mu = 50$

<sup>1)</sup> See page 4; voir page 4; siehe Seite 4

## TRIODE PENTODE FOR USE IN TELEVISION RECEIVERS

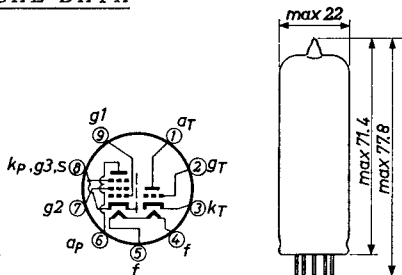
Triode pentode for use as frame output tube and frame oscillator or pulse amplifier in television receivers

HEATING: Indirect by A.C. or D.C.; series supply

Heater voltage  $V_f = 17.5$  V

Heater current  $I_f = 0.3$  A

### MECHANICAL DATA



Base : NOVAL (Dimensions in mm)

### CAPACITANCES

Pentode grid No.1 to pentode anode

$$C_{g_1-a_p} < 0.6 \text{ pF}$$

Triode grid to pentode anode

$$C_{g_T-a_p} < 0.03 \text{ pF}$$

Pentode grid No.1 to triode anode

$$C_{g_1-a_T} < 0.08 \text{ pF}$$

Pentode grid No.1 to heater

$$C_{g_1-f} < 0.20 \text{ pF}$$

Triode grid to heater

$$C_{g_T-f} < 0.15 \text{ pF}$$

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Hum; ronflement; Brumm

The equivalent pentode grid hum voltage without negative feedback is max. 10 mV when  $Z_{g1}$  (at  $f = 50$  c/s)  $\leq 0.5$  M $\Omega$ ,  $C_{g1f} = 0.2$  pF and  $V_{kf} = 150$  V<sub>eff</sub>.

La tension de ronflement équivalente de la grille de la pentode sans contre-réaction est de 10 mV au max., quand  $Z_{g1}$  (à  $f = 50$  Hz)  $\leq 0,5$  M $\Omega$ ,  $C_{g1f} = 0,2$  pF et  $V_{kf} = 150$  V<sub>eff</sub>

Die äquivalente Brummspannung des Pentodengitters ohne Gegenkopplung ist max. 10 mV, wenn  $Z_{g1}$  (bei  $f = 50$  Hz)  $\leq 0,5$  M $\Omega$ ,  $C_{g1f} = 0,2$  pF und  $V_{kf} = 150$  V<sub>eff</sub>

Limiting values  
Caractéristiques limites  
Grenzdaten

Pentode section  
Partie penthode  
Pentodenteil

Triode section  
Partie triode  
Triodenteil

$V_{a0} = \text{max. } 550$  V

$V_a = \text{max. } 250$  V

$W_a = \text{max. } 0,5$  W

$R_{g1} = \text{max. } 1$  M $\Omega$  <sup>4)</sup>

$R_{g1} = \text{max. } 3,3$  M $\Omega$  <sup>5)</sup>

$I_k = \text{max. } 15$  mA

$I_{kp} = \text{max. } 200$  mA <sup>6)</sup>

$I_{kp} = \text{max. } 100$  mA <sup>7)</sup>

$V_{kf} = \text{max. } 200$  V <sup>8)</sup>

$V_{a0} = \text{max. } 550$  V

$V_a = \text{max. } 250$  V

$V_{ap} = \text{max. } 2$  kV <sup>2)</sup>

$W_a = \text{max. } 7$  W

$W_a = \text{max. } 9$  W <sup>3)</sup>

$V_{g20} = \text{max. } 550$  V

$V_{g2} = \text{max. } 250$  V

$W_{g2} = \text{max. } 1,5$  W

$W_{g2} = \text{max. } 2,0$  W <sup>3)</sup>

$R_{g1} = \text{max. } 1$  M $\Omega$  <sup>4)</sup>

$R_{g1} = \text{max. } 2,2$  M $\Omega$  <sup>5)</sup>

$I_k = \text{max. } 75$  mA

$V_{kf} = \text{max. } 200$  V

<sup>2)</sup> Max. pulse duration 5 % of a cycle with a maximum of 1 msec.

Durée de l'impulsion 5 % d'un cycle au max., avec un maximum de 1 msec.

Impulsdauer max. 5 % einer Periode, mit einem Maximum von 1 mSek.

<sup>3)</sup> This value should not be exceeded for a nominal tube at the worst probable operating conditions at normal picture height

Cette valeur ne doit pas être dépassée avec un tube moyen dans les pires conditions de fonctionnement probables avec une hauteur normale de l'image

Dieser Wert soll bei einer durchschnittlichen Röhre unter den ungünstigsten wahrscheinlichen Bedingungen bei normaler Bildhöhe nicht überschritten werden

<sup>4)</sup><sup>5)</sup><sup>6)</sup><sup>7)</sup><sup>8)</sup> See page 3; voir page 3; siehe Seite 3

TYPICAL CHARACTERISTICSPentode section

Anode voltage	$V_a =$	50	65 V
Grid No.2 voltage	$V_{g_2} =$	170	210 V
Grid No.1 voltage	$V_{g_1} =$	-1	-1 V
(Peak) anode current	$I_{ap} =$	200	285 mA
(Peak) grid No.2 current	$I_{g_2p} =$	35	45 mA

Remarks. The minimum  $I_{ap}$  to be expected as a result of spread of the tube characteristics, tube deterioration during life and decrease of the mains voltage to 10% below the nominal value can be derived from the curves on page H by decreasing by 40% the  $I_a$  values situated on curve A-B at  $V_{g_2}$  occurring at the decreased mains voltage.

In order not to exceed the maximum permissible value of  $W_{g_2}$ , the circuit should be designed in such a way that at a mains voltage of 10% below nominal  $V_a$  at the end of scan will not be lower than the value determined by curve A-B at the relevant  $V_{g_2}$  value.

Triode section

Anode voltage	$V_a =$	100	100 V
Grid voltage	$V_g =$	-0.85	0 V
Anode current	$I_a =$	5	10 mA
Mutual conductance	$S =$	5.5	7.0 mA/V
Internal resistance	$R_i =$	11	9 k $\Omega$
Amplification factor	$\mu =$	60	63

HUM

The equivalent pentode grid hum voltage without negative feedback is max. 10 mV when  $Z_{g_1}$  (at  $f = 50$  c/s)  $\leq 0.5$  M $\Omega$ ,  $C_{g_1f} = 0.2$  pF and  $V_{kf} = 150$  V (R.M.S.)

- 4) With fixed grid bias  
En polarisation négative fixe  
Mit fester Gittervorspannung
- 5) With automatic grid bias  
En polarisation négative automatique  
Mit automatischer Gittervorspannung
- 6) Max. pulse duration 2 % of a cycle with a maximum of 400  $\mu$ sec.  
Durée de l'impulsion 2 % d'une cycle au max., avec un maximum de 400  $\mu$ sec.  
Impulsdauer max. 2 % einer Periode, mit einem Maximum von 400  $\mu$ Sek.
- 7) Max. pulse duration 4 % of a cycle with a maximum of 800  $\mu$ sec.  
Durée de l'impulsion 4 % d'une cycle au max., avec un maximum de 800  $\mu$ sec.  
Impulsdauer max. 4 % einer Periode, mit einem Maximum von 800  $\mu$ Sek.
- 8) During warming up and with the cathode positive with respect to the heater the D.C. component of  $V_{kf}$  = max. 315 V (cathode positive)  
Pendant la période d'échauffement avec la cathode positive par rapport au filament, la composante continue de  $V_{kf}$  est de 315 V au max. (k positive)  
Während der Anheizperiode mit der Katode positiv in bezug auf den Heizfaden darf der Gleichspannungsanteil von  $V_{kf}$  max. 315 V sein (Katode positiv)

LIMITING VALUES (Design centre limits, unless otherwise specified)

Pentode section

Anode voltage in cold condition	$V_{a_0}$	= max. 550 V
Anode voltage	$V_a$	= max. 250 V
Peak anode voltage	$V_{ap}$	= max. 2 kV <sup>1)</sup>
Anode dissipation	$W_a$	= max. 7 W
Anode dissipation	$W_a$	= max. 9 W <sup>2)</sup>
Grid No.2 voltage in cold condition	$V_{g_{2_0}}$	= max. 550 V
Grid No.2 voltage	$V_{g_2}$	= max. 250 V
Grid No.2 dissipation	$W_{g_2}$	= max. 1.5 W
Grid No.2 dissipation	$W_{g_2}$	= max. 2.0 W <sup>2)</sup>
Grid No.1 circuit resistance		
with fixed bias	$R_{g_1}$	= max. 1.0 M $\Omega$
with automatic bias	$R_{g_1}$	= max. 2.2 M $\Omega$
Cathode current	$I_k$	= max. 75 mA
Heater to cathode voltage	$V_{kf}$	= max. 200 V

1) Max. pulse duration 5% of a cycle with a maximum of 1 msec

2) This value should not be exceeded for a nominal tube at the worst probable operating conditions at normal picture height

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- <sup>1)</sup> The minimum value of  $I_{ap}$  to be expected as a result of spread of the tube characteristics, tube deterioration during life and a decrease of the mains voltage to 10 % below the nominal value can be derived from the curves on page H by decreasing by 40 % the  $I_a$  values situated on the curve A-B at  $V_{g2}$  occurring at the decreased mains voltage.  
In order not to exceed the max. permissible value of  $W_{g2}$ , the circuit should be designed in such a way that at a mains voltage 10 % below the nominal value  $V_a$  at the end of scan will not be lower than the value determined by curve A-B of page H at the relevant  $V_{g2}$  value

La valeur minimale de  $I_{ap}$ , qui peut se présenter par suite des déviations des caractéristiques du tube, de la dégradation en service du tube et d'une diminution de la tension de secteur de 10 % au-dessous de la valeur nominale, peut être dérivée des courbes page H en diminuant de 40 % les valeurs de  $I_a$  situées à la courbe A-B à une valeur de  $V_{g2}$  qui se présente à la tension de secteur diminuée.  
Pour prévenir le dépassement de la valeur max. admissible de  $W_{g2}$ , le circuit doit être étudié de telle manière qu'à une tension de secteur de 10 % au-dessous de la valeur nominale,  $V_a$  à la fin de l'exploration ne soit pas au-dessous de la valeur déterminée par la courbe A-B page H à la valeur concernante de  $V_{g2}$ .

Der Mindestwert von  $I_{ap}$ , der infolge von Kennlinienabweichungen, Veränderung der Röhre während der Lebensdauer und einer Verringerung der Netzspannung bis 10 % unter den Nennwert auftreten kann, findet man aus den Kurven auf Seite H durch eine 40-prozentige Verringerung des auf der Kurve A-B gelegenen  $I_a$ -wertes bei dem bei der verringerten Netzspannung vorkommenden Wert von  $V_{g2}$ .  
Zur Vermeidung einer Überschreitung des max. zulässigen Wertes von  $W_{g2}$  muss die Schaltung derartig sein, dass bei einer Netzspannung 10 % unter dem Nennwert  $V_a$  am Ende der Ablenkung bei dem bezüglichen Wert von  $V_{g2}$  nicht unter dem von der Kurve A-B Seite H bestimmten Wert liegt.

LIMITING VALUES (Design centre limits, unless otherwise specified) (Continued)

Triode section

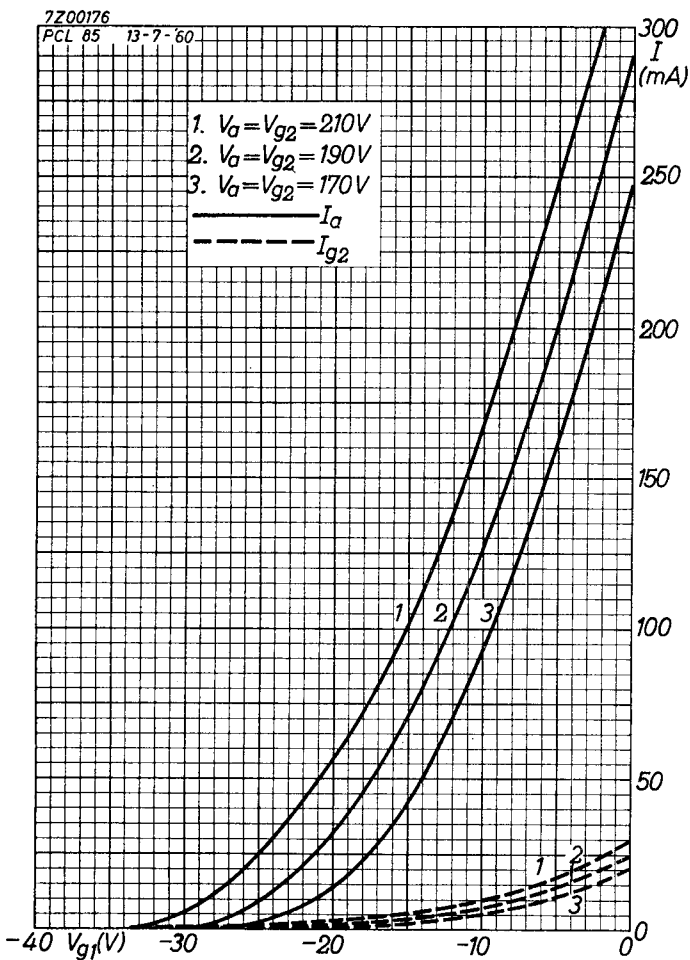
Anode voltage in cold condition	$V_{a0} = \text{max. } 550 \text{ V}$
Anode voltage	$V_a = \text{max. } 250 \text{ V}$
Anode dissipation	$W_a = \text{max. } 0.5 \text{ W}$
Grid circuit resistance	
with fixed bias	$R_g = \text{max. } 1 \text{ M}\Omega$
with automatic bias	$R_g = \text{max. } 3.3 \text{ M}\Omega$
Cathode current	$I_k = \text{max. } 15 \text{ mA}$
Peak cathode current	$I_{kp} = \text{max. } 200 \text{ mA } 1)$
Peak cathode current	$I_{kp} = \text{max. } 100 \text{ mA } 2)$
Heater to cathode voltage	$V_{kf} = \text{max. } 200 \text{ V } 3)$

1) Max. pulse duration 2% of a cycle with a maximum of 400  $\mu\text{sec}$

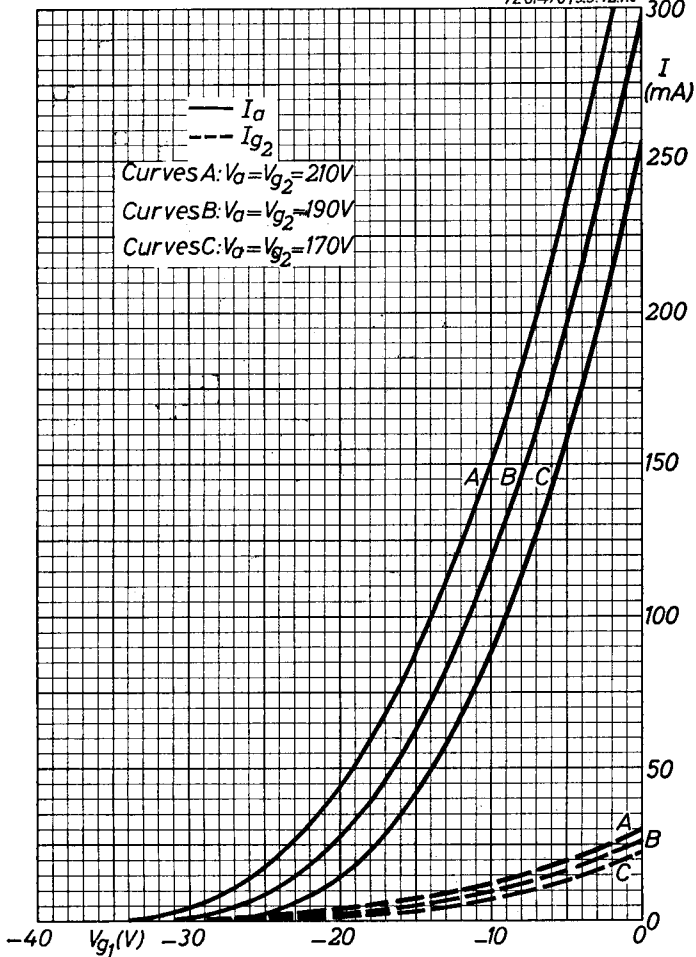
2) Max. pulse duration 4% of a cycle with a maximum of 800  $\mu\text{sec}$

3) During warming up and with the cathode positive with respect to the heater the D.C. component of  $V_{kf} = \text{max. } 315 \text{ V}$



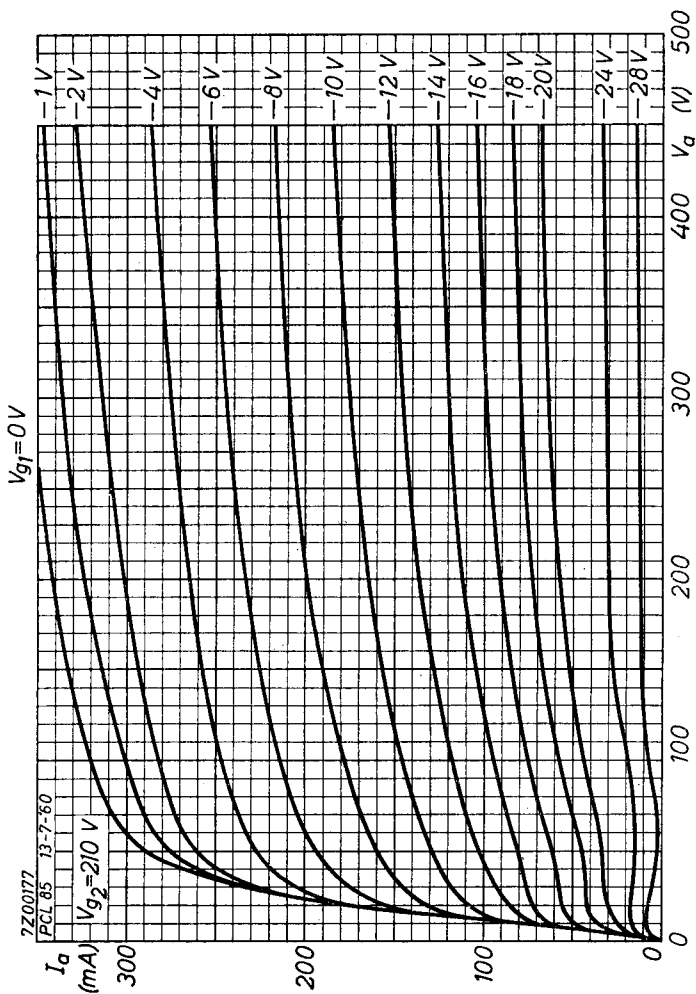


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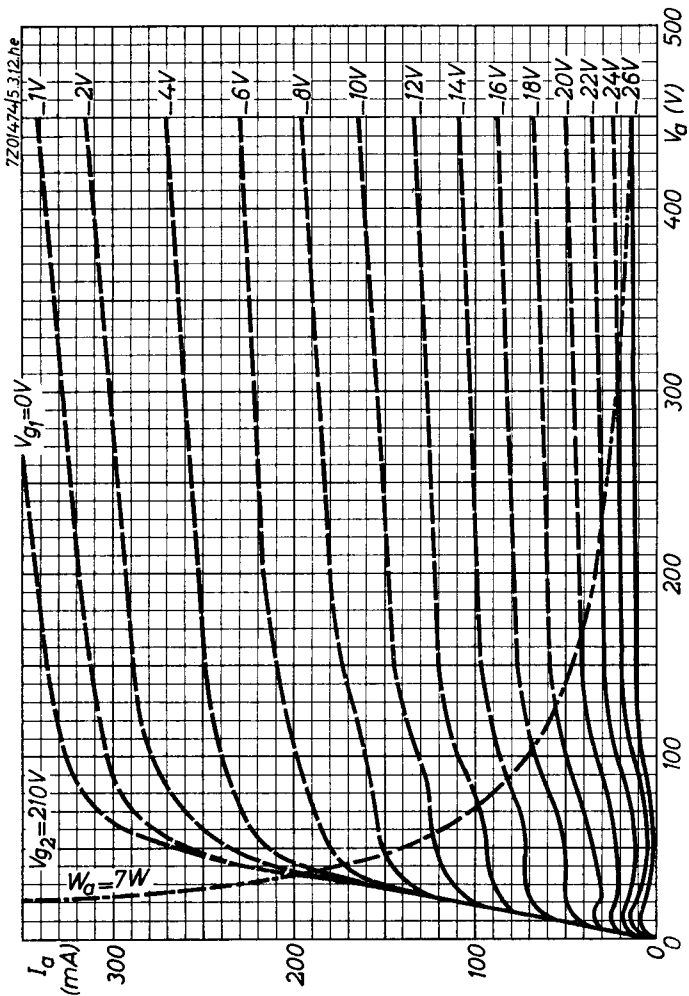


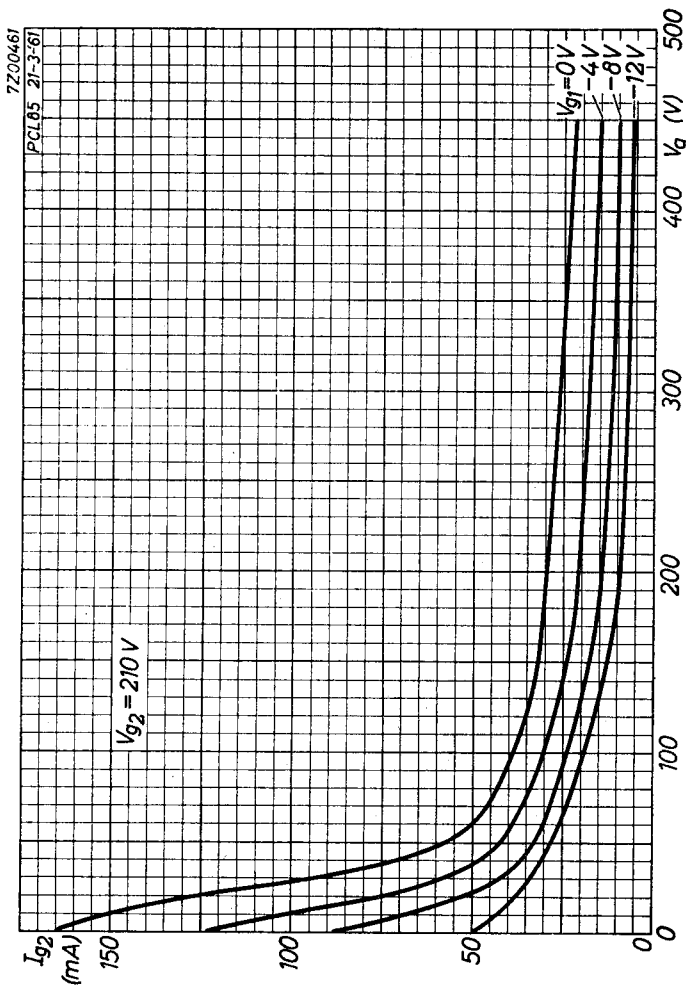
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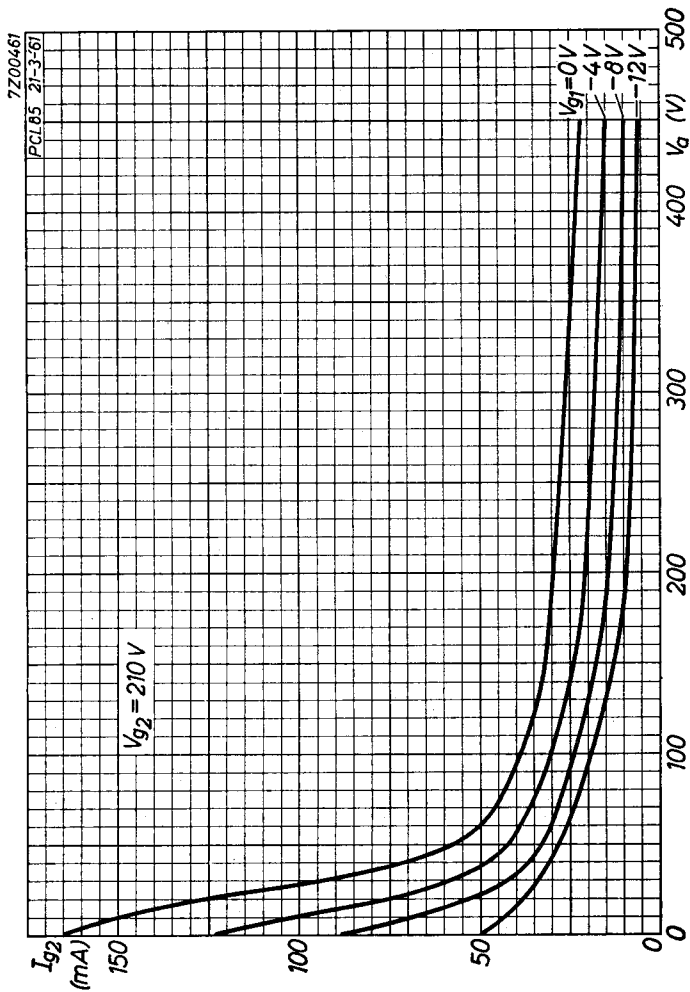
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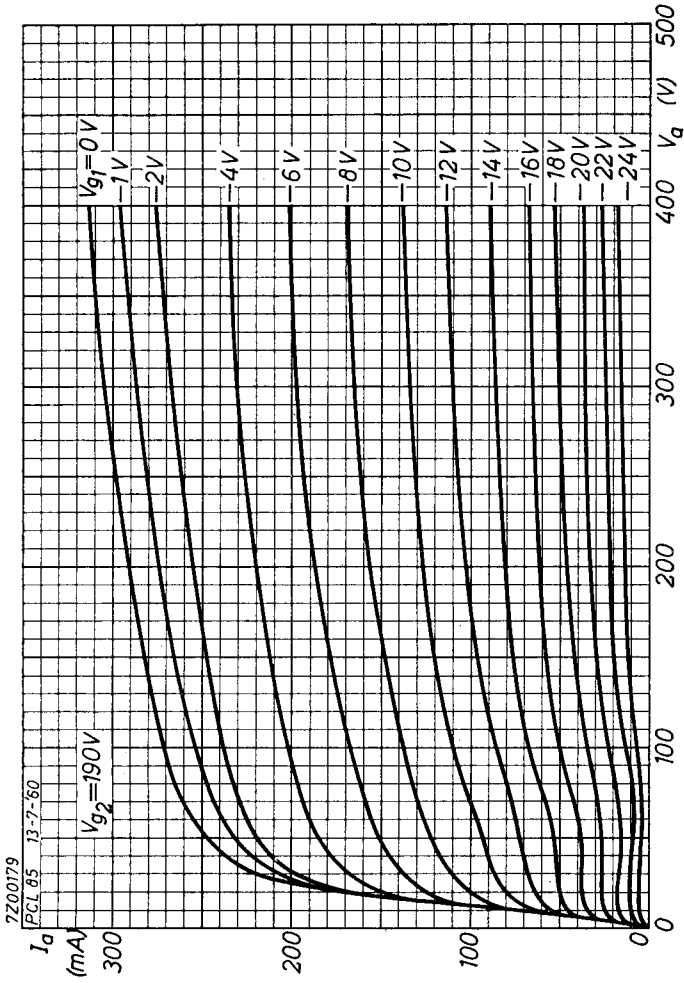


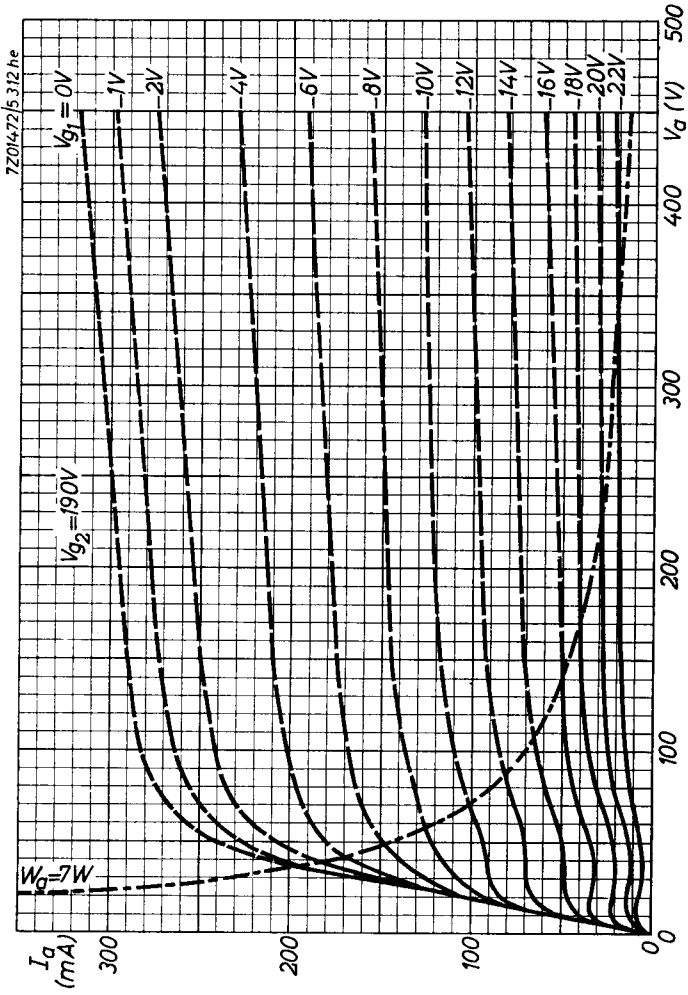




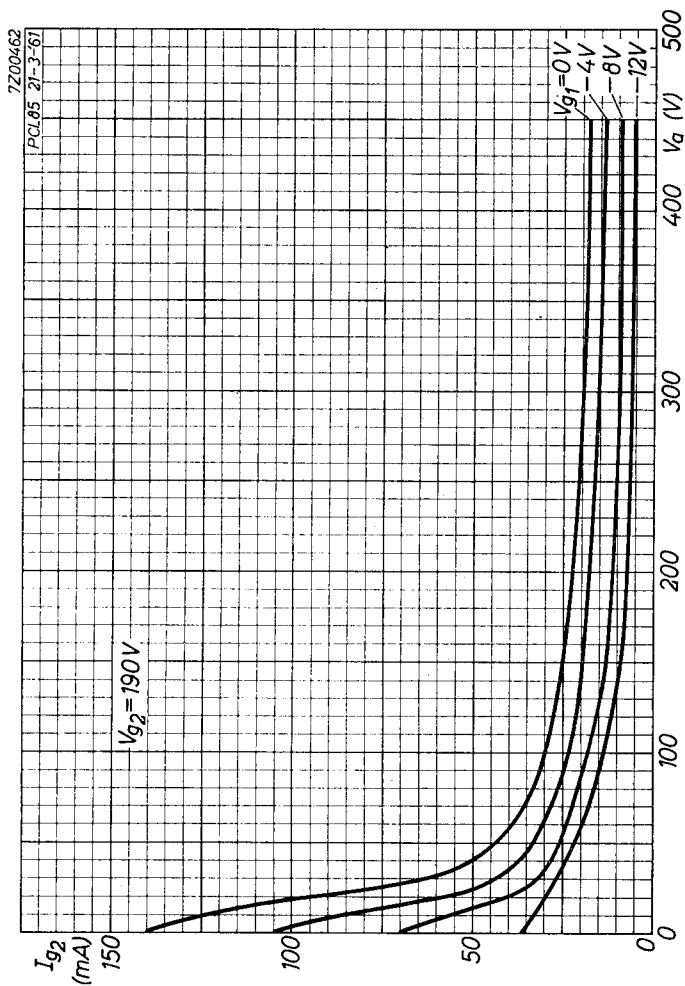
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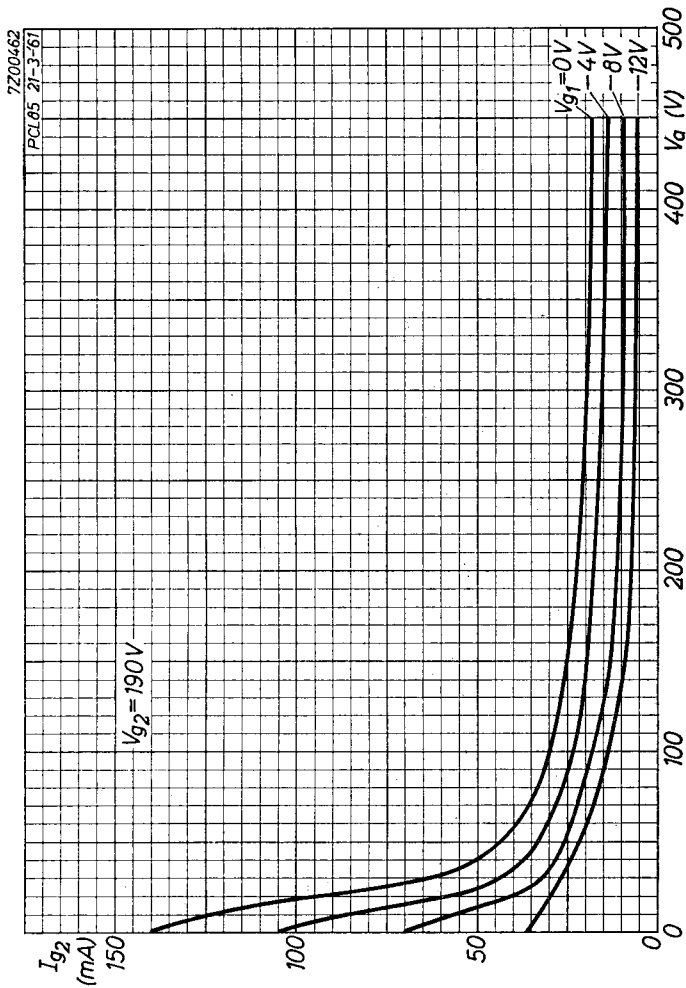
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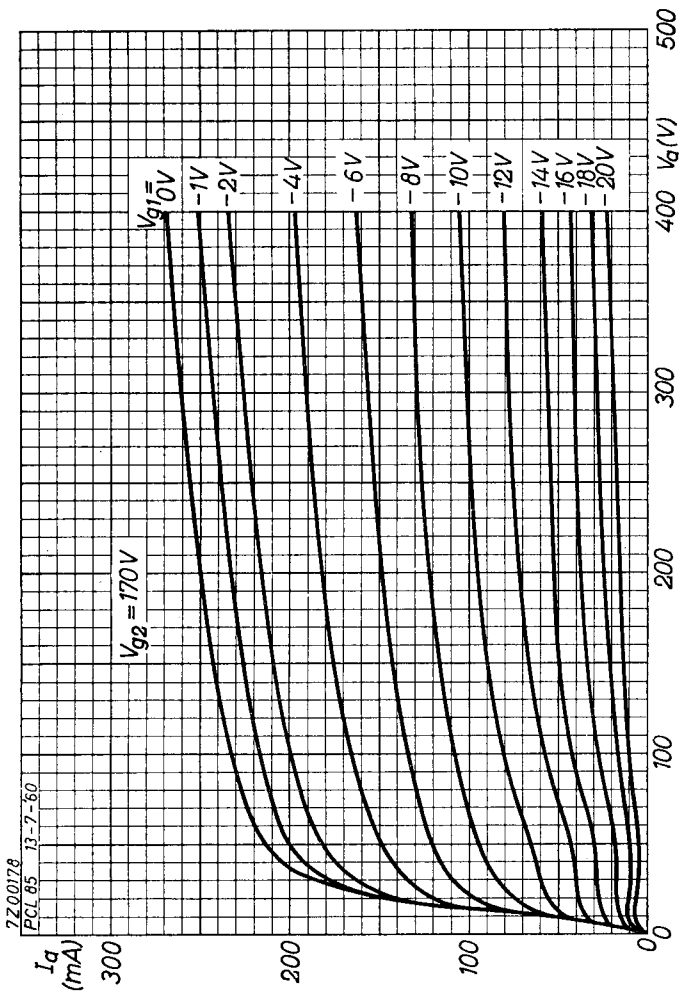




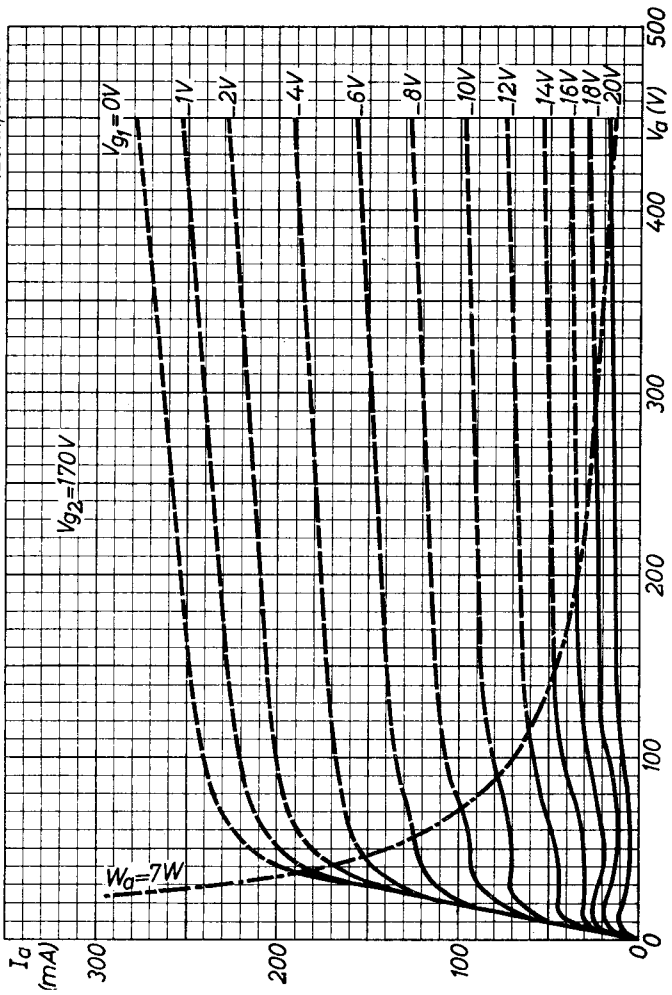


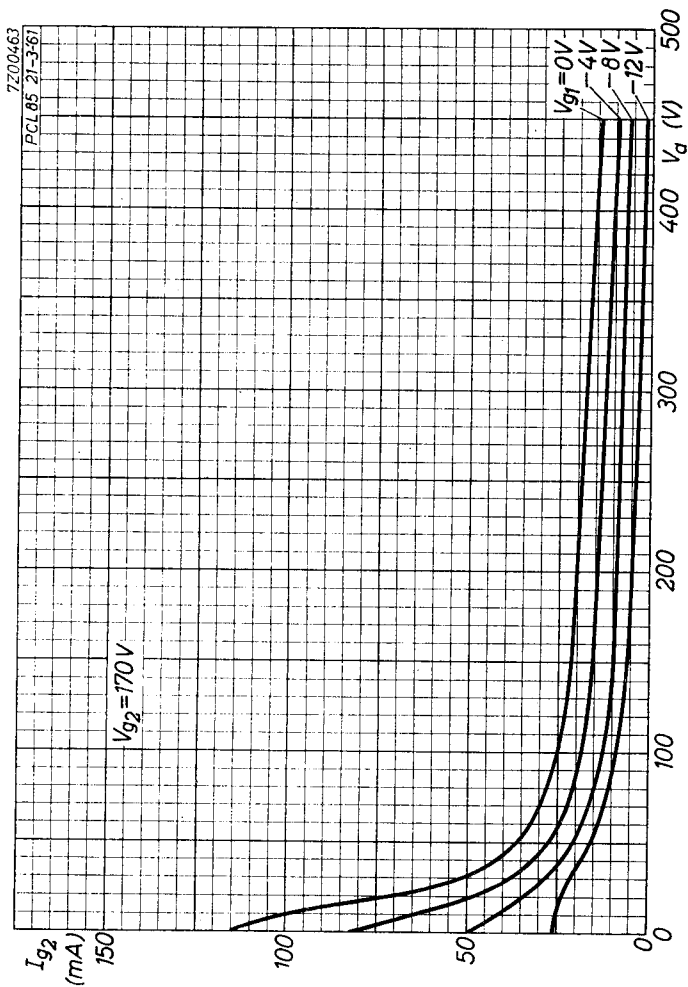
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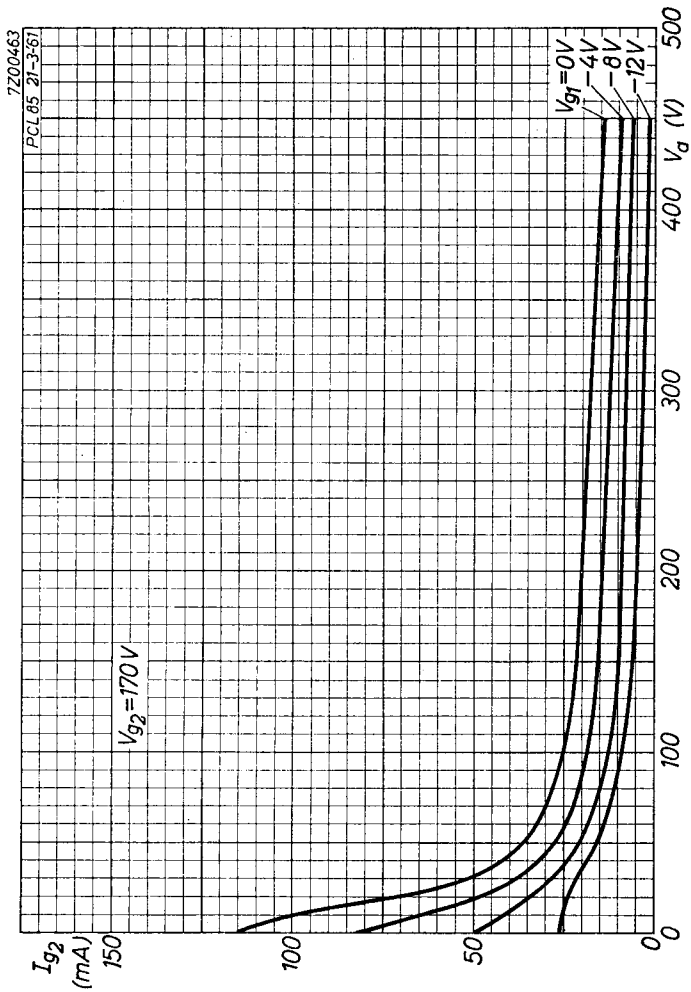
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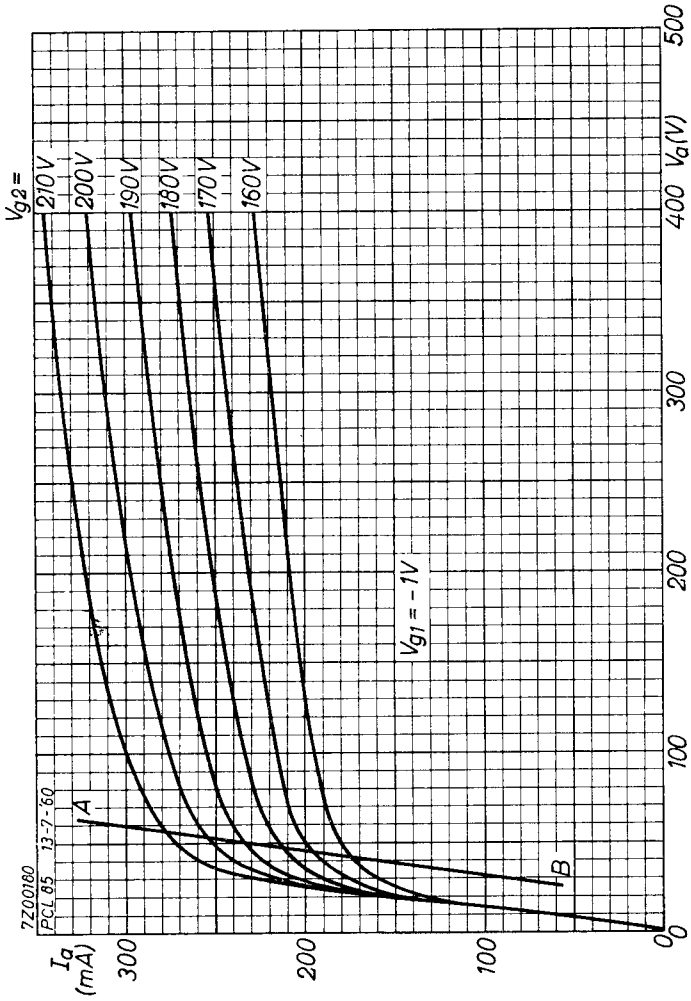


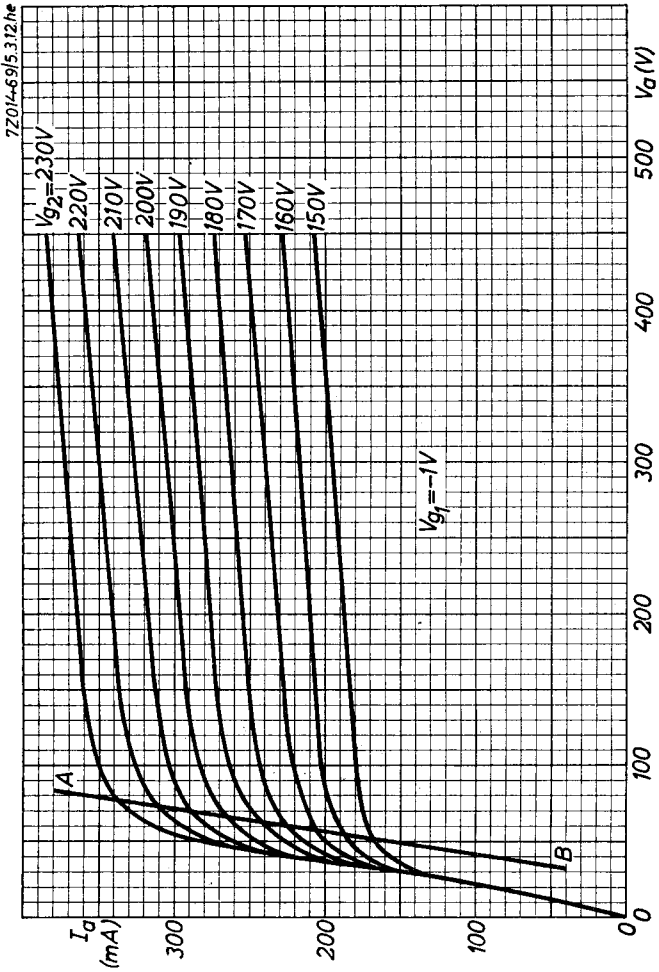




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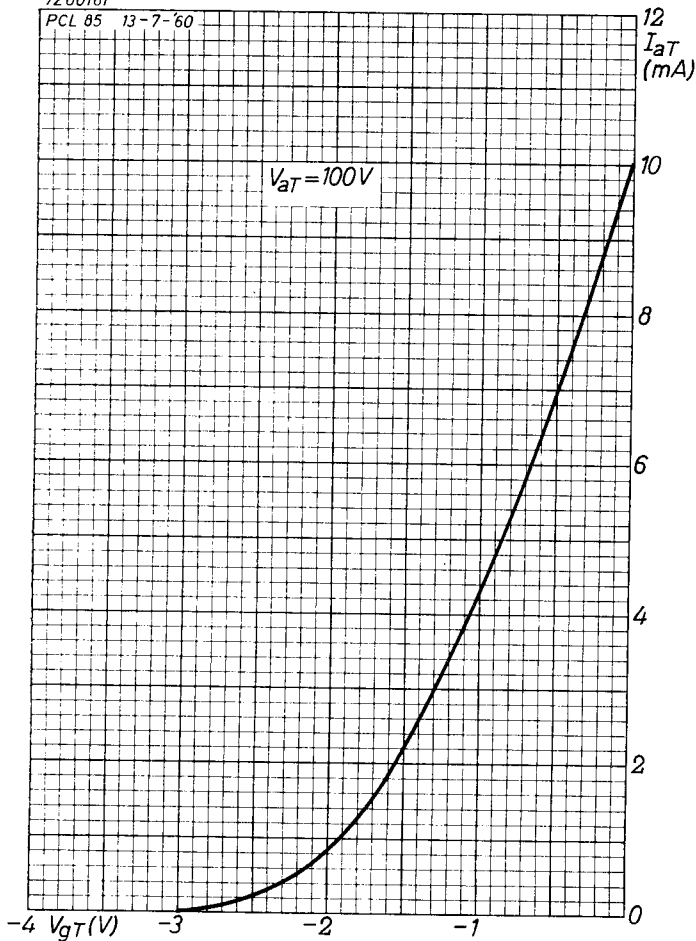






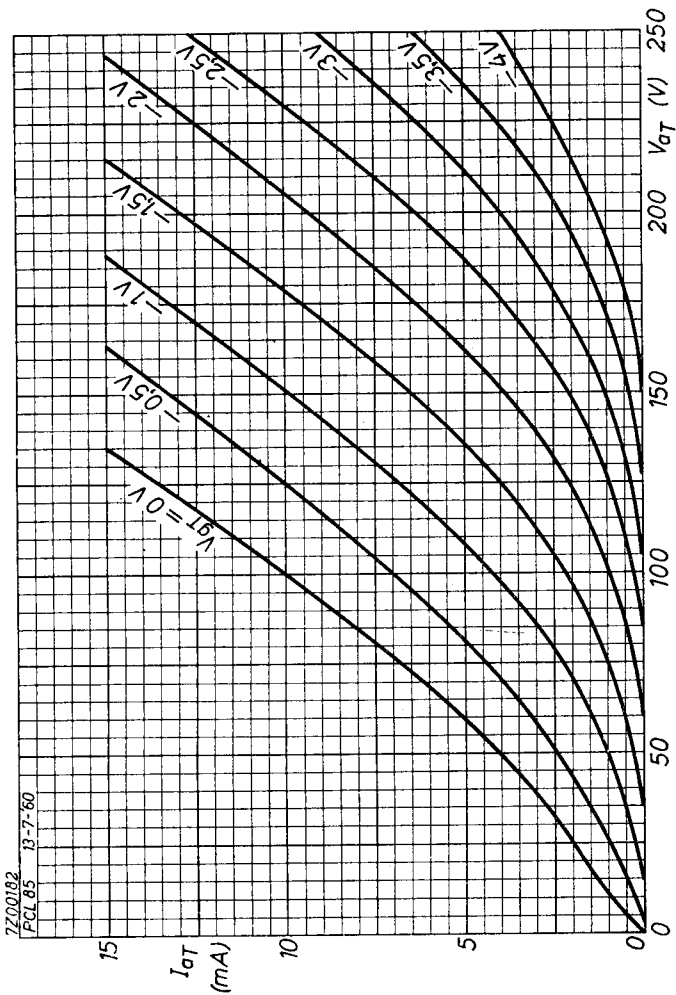
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*Electronic  
Tube*

**HANDBOOK**

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