

OUTPUT PENTODE
PENTHODE DE SORTIE
ENDPENTODE

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

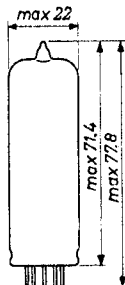
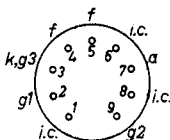
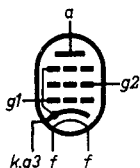
Chauffage: indirect par C.A. ou C.C.
alimentation série

Heizung : indirekt durch Wechsel-
oder Gleichstrom; Serien-
speisung

$V_f = 45 \text{ V}$

$I_f = 100 \text{ mA}$

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: NOVAL

Capacitances
Capacités
Kapazitäten

$C_a = 6.0 \text{ pF}$

$C_{g1} = 12.0 \text{ pF}$

$C_{ag1} < 0.6 \text{ pF}$

$C_{g1, f} < 0.25 \text{ pF}$

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	100	170 V
V_{g2}	=	100	170 V
V_{g1}	=	-6.7	-12.5 V
I_a	=	43	70 mA
I_{g2}	=	3	5 mA
S	=	9	10 mA/V
μ	=	8	8
R_i	=	23	23 k Ω

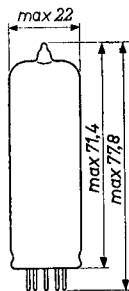
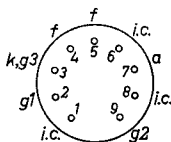
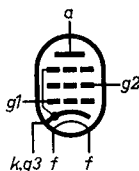
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speisung

$V_f = 45 \text{ V}$

$I_f = 100 \text{ mA}$

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: NOVAL

Capacitances
Capacités
Kapazitäten

$C_a = 6,0 \text{ pF}$

$C_{g1} = 12,0 \text{ pF}$

$C_{ag1} < 0,6 \text{ pF}$

$C_{g1 f} < 0,25 \text{ pF}$

Typical characteristics
Caractéristiques types
Kenndaten

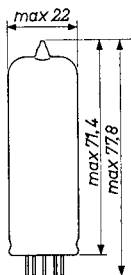
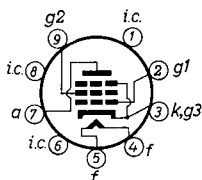
V_a	=	100	170	200 V
V_{g2}	=	100	170	- V
V_{bg2}	=	-	-	200 V
R_{g2}	=	-	-	470 Ω
V_{g1}	=	-6,7	-12,5	-17,3 V
I_a	=	43	70	60 mA
I_{g2}	=	3	5	4,1 mA
S	=	9	10	8,8 mA/V
μ	=	8	8	8 -
R_1	=	23	23	28 k Ω

A.F. OUTPUT PENTODE
 PENTODE DE SORTIE B.F.
 NF-ENDPENTODE

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; Serien-
 speisung

$$\frac{I_f}{V_f} = \frac{100 \text{ mA}}{45 \text{ V}}$$

Dimensions in mm
 Dimensions en mm
 Abmessungen in mm



Base, culot, Sockel: NOVAL

Capacitances
 Capacités
 Kapazitäten

C_a	=	6,8 pF
C_{g1}	=	13 pF
C_{ag1}	<	0,6 pF
C_{g1f}	<	0,25 pF

Typical characteristics
 Caractéristiques types
 Kenndaten

V_a	=	170 V
V_{g2}	=	170 V
V_{g1}	=	-12,5 V
I_a	=	70 mA
I_{g2}	=	3,5 mA
S	=	11 mA/V
μ_{g2g1}	=	8
R_i	=	26 k Ω

Operating characteristics class A
 Caractéristiques d'utilisation classe A
 Betriebsdaten Klasse A

V_a	=	100		170		V		
V_{g2}	=	100		170		V		
V_{g1}	=	-6,7		-12,5		V		
$R_{a\sim}$	=	2,4		2,4		k Ω		
V_i	=	0	0,55	4,3	0	0,5	7,0	V_{eff}
I_a	=	43	-	43	70	-	70	mA
I_{g2}	=	3	-	11	5	-	22	mA
W_o	=	-	0,05	1,9	-	0,05	5,6	W
d_t	=	-	-	10	-	-	10	%

Operating characteristics class B, two tubes
 Caractéristiques d'utilisation classe B, deux tubes
 Betriebsdaten Klasse B, zwei Röhren

V_a	=	100		170		V		
V_{g2}	=	100		170		V		
V_{g1}	=	-11,4		-20,5		V		
$R_{aa\sim}$	=	3,5		3,5		k Ω		
V_i	=	0	0,95	7,9	0	0,92	14,6	V_{eff}
I_a	=	2x10	-	2x30,5	2x15	-	2x57,5	mA
I_{g2}	=	2x0,55	-	2x7,1	2x0,7	-	2x20,5	mA
W_o	=	-	0,05	3,7	-	0,05	13,5	W
d_t	=	-	-	2,8	-	-	4,8	%

Operating characteristics class AB, two tubes
 Caractéristiques d'utilisation classe AB, deux tubes
 Betriebsdaten Klasse AB, zwei Röhren

V_a	=	100		170		V		
V_{g2}	=	100		170		V		
R_k	=	135		120		Ω		
$R_{aa\sim}$	=	3,5		3,5		k Ω		
V_i	=	0	0,54	7,0	0	0,45	13,1	V_{eff}
I_a	=	2x29	-	2x31	2x56,5	-	2x57,5	mA
I_{g2}	=	2x1,6	-	2x7	2x3,0	-	2x20,5	mA
W_o	=	-	0,05	3,6	-	0,05	13,0	W
d_t	=	-	-	3	-	-	4,5	%

Operating characteristics class A
 Caractéristiques d'utilisation classe A
 Betriebsdaten Klasse A

V_a	=	100		170		V		
V_{g2}	=	100		170		V		
V_{g1}	=	-6,7		-12,5		V		
$R_{a\sim}$	=	2,4		2,4		k Ω		
V_i	=	0	0,55	4,3	0	0,5	7,0	V_{eff}
I_a	=	43	-	43	70	-	70	mA
I_{g2}	=	3	-	11	5	-	22	mA
W_o	=	-	0,05	1,9	-	0,05	5,6	W
d_t	=	-	-	10	-	-	10	%

V_a	=	200		V	
V_{g2}	=	200		V	
R_{g2}	=	470		Ω +)	
V_{g1}	=	-17,3		V	
$R_{a\sim}$	=	2,4		k Ω	
V_i	=	0	0,55	7,8	V_{eff}
I_a	=	60	-	62,5	mA
I_{g2}	=	4,1	-	12,5	mA
W_o	=	-	0,05	5,2	W
d_t	=	-	-	10	%

Operating characteristics class B, two tubes
 Caractéristiques d'utilisation classe B, deux tubes
 Betriebsdaten Klasse B, zwei Röhren

V_a	=	100		170		V		
V_{g2}	=	100		170		V		
V_{g1}	=	-11,4		-20,5		V		
$R_{a\sim}$	=	3,5		3,5		k Ω		
V_i	=	0	0,95	7,9	0	0,92	14,6	V_{eff}
I_a	=	2x10	-	2x30,5	2x15	-	2x57,5	mA
I_{g2}	=	2x0,55	-	2x7,1	2x0,7	-	2x20,5	mA
W_o	=	-	0,05	3,7	-	0,05	13,5	W
d_t	=	-	-	2,8	-	-	4,8	%

+) Non by-passed; ne pas shuntée; nicht entkoppelt

→ Operating characteristics, class A, one tube
 Caractéristiques d'utilisation, classe A, un tube
 Betriebsdaten, Klasse A, eine Röhre

V_b	=	100		170	V		
R_k	=	130		130	$\Omega^1)$		
$R_{a\sim}$	=	2,1		2,0	k Ω		
V_i	=	0 0,55 3,8		0 0,47 6,1		V_{eff}	
I_a	=	41	-	42	75	-	76 mA
I_{g2}	=	2,6	-	8,6	4,0	-	16,5 mA
W_o	=	0	0,05	1,55	0	0,05	5,1 W
d_{tot}	=	-	-	10	-	-	10 %

V_b	=			200	V	
R_{g2}	=			470	$\Omega^2)$	
R_k	=			215	$\Omega^1)$	
$R_{a\sim}$	=			2,5	k Ω	
V_i	=	0 0,52 7,0				V_{eff}
I_a	=	65	-			64 mA
I_{g2}	=	3,2	-			11,4 mA
W_o	=	0	0,05			5,3 W
d_{tot}	=	-	-			10 %

1) During measurement V_k is kept constant
 Pendant la mesure V_k est tenue constante
 Während der Messung wird V_k konstant gehalten

2) Not bypassed
 Non découplée
 Nicht entkoppelt

Operating characteristics in triode connection, class A
 (Screen grid connected to anode)
 Caractéristiques d'utilisation en montage triode, classe A
 (Grille-écran reliée à l'anode)
 Betriebsdaten in Triodenschaltung, Klasse A
 (Schirmgitter verbunden mit Anode)

$V_a =$	100		170	V			
$V_{g_1} =$	-8		-15,1	V			
$R_{a\sim} =$	1,2		1,2	k Ω			
$V_i =$	0	1,8	5,7				
			0	1,75	10,8	V_{eff}	
$I_a =$	30	-	36,1	50	-	62	mA
$W_o =$	-	0,05	0,52	-	0,05	2,1	W
$d_t =$	-	-	10	-	-	10	%

Operating characteristics two tubes class AB in triode connection (Screen grid connected to anode)
 Caractéristiques d'utilisation deux tubes en classe AB en montage triode (Grille-écran reliée à l'anode)
 Betriebsdaten zwei Röhren in Klasse AB in Triodenschaltung (Schirmgitter verbunden mit Anode)

$V_a =$	100		170	V			
$R_k =$	270		270	Ω			
$R_{aa\sim} =$	3,5		3,5	k Ω			
$V_i =$	0	1,54	7,3				
			0	1,45	13,4	V_{eff}	
$I_a =$	2x18	-	2x20	2x32,5	-	2x36	mA
$W_o =$	-	0,05	1,0	-	0,05	3,9	W
$d_t =$	-	-	3,2	-	-	3,8	%

Operating characteristics class AB, two tubes
 Caractéristiques d'utilisation classe AB, deux tubes
 Betriebsdaten Klasse AB, zwei Röhren

V_a	=	100		170		V	
V_{g2}	=	100		170		V	
R_k	=	135		120		Ω	
$R_{aa} \sim$	=	3,5		3,5		k Ω	
V_i	=	0 0,54 7,0		0 0,45 13,1		V_{eff}	
I_a	=	2x29	-	2x31	2x56,5	-	2x57,5 mA
I_{g2}	=	2x1,6	-	2x7	2x3,0	-	2x20,5 mA
W_o	=	-	0,05	3,6	-	0,05	13,0 W
d_t	=	-	-	3	-	-	4,5 %

Operating characteristics in triode connection, class A
 (Screen grid connected to anode)
 Caractéristiques d'utilisation en montage triode, classe A
 (Grille-écran reliée à l'anode)
 Betriebsdaten in Triodenschaltung, Klasse A
 (Schirmgitter verbunden mit Anode)

V_a	=	100		170		V	
V_{g1}	=	-8		-15,1		V	
$R_a \sim$	=	1,2		1,2		k Ω	
V_i	=	0 1,8 5,7		0 1,75 10,8		V_{eff}	
I_a	=	30	-	36,1	50	-	62 mA
W_o	=	-	0,05	0,52	-	0,05	2,1 W
d_t	=	-	-	10	-	-	10 %

Operating characteristics two tubes class AB in triode connection, (Screen grid connected to anode)
 Caractéristiques d'utilisation deux tubes en classe AB en montage triode (Grille-écran reliée à l'anode)
 Betriebsdaten zwei Röhren in Klasse AB in Triodenschaltung (Schirmgitter verbunden mit Anode)

V_a	=	100		170		V	
R_k	=	270		270		Ω	
$R_{aa} \sim$	=	3,5		3,5		k Ω	
V_i	=	0 1,54 7,3		0 1,45 13,4		V_{eff}	
I_a	=	2x18	-	2x20	2x32,5	-	2x36 mA
W_o	=	-	0,05	1,0	-	0,05	3,9 W
d_t	=	-	-	3,2	-	-	3,8 %

→ Operating characteristics, class AB, two tubes
 Caractéristiques d'utilisation, classe AB, deux tubes
 Betriebsdaten, Klasse AB, zwei Röhren

V_b	=	200	V
R_k	=	120	$\Omega^1)$
$R_{aa\sim}$	=	3	k Ω
V_1	=	0 0,47 14,3	V_{eff}
I_a	=	2x60 - 2x64,5	mA
I_{g2}	=	2x3,0 - 2x18,5	mA
W_o	=	0 0,05 14,3	W
d_{tot}	=	- -	3,8 %

Limiting values
 Caractéristiques limites
 Grenzdaten

V_{a0}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	12 W
V_{g20}	= max.	550 V
V_{g2}	= max.	200 V
W_{g2}	= max.	1,75 W
W_{g2p}	= max.	6 W
I_k	= max.	100 mA
R_{g1}	= max.	1 M $\Omega^1)$
V_{kf}	= max.	200 V
R_{kf}	= max.	20 k Ω

1) Common cathode resistor
 Résistance cathodique commune
 Gemeinsamer Katodenwiderstand

2) Automatic bias
 Polarisation automatique
 Automatische Gittervorspannung

Limiting values
 Caractéristiques limites
 Grenzdaten

V_{A0}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	12 W
V_{E20}	= max.	550 V
V_{E2}	= max.	200 V
W_{E2}	= max.	1,75 W
W_{E2p}	= max.	6 W
I_k	= max.	100 mA
R_{G1}	= max.	1 M Ω ¹⁾
V_{kf}	= max.	200 V
R_{kf}	= max.	20 k Ω

¹⁾ With automatic grid bias
 Avec polarisation automatique
 Mit automatischer Gittervorspannung

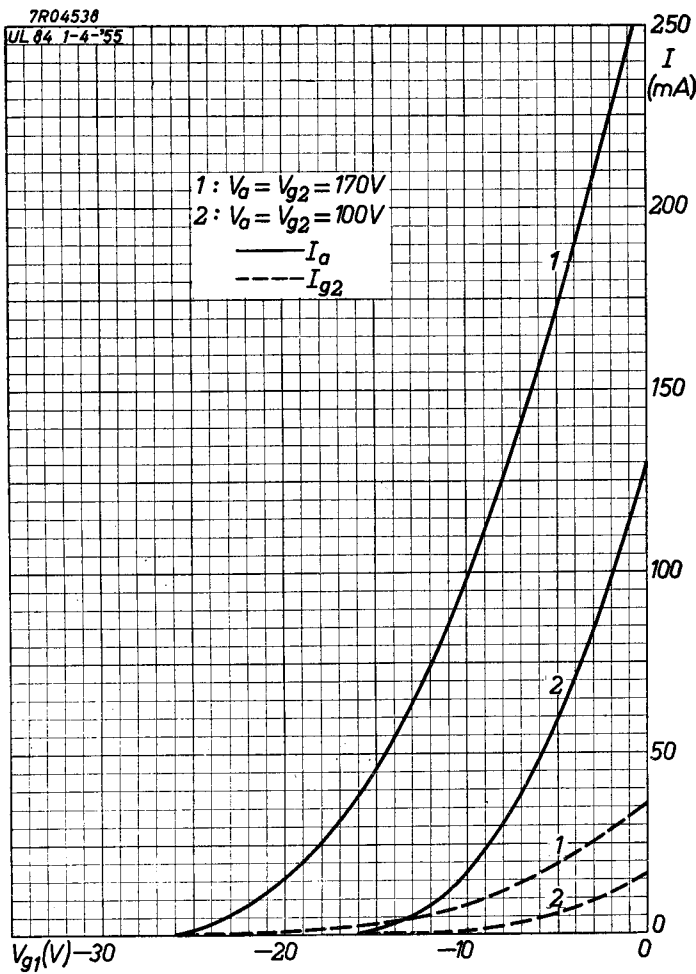
Limiting values
 Caractéristiques limites
 Grenzdaten

V_{a0}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	12 W
V_{g20}	= max.	550 V
V_{g2}	= max.	200 V
W_{g2}	= max.	1,75 W
W_{g2p}	= max.	6 W
I_k	= max.	100 mA
R_{g1}	= max.	1 M Ω ¹⁾
V_{kf}	= max.	200 V
V_{kfp} (k pos; f neg.) ²⁾	= max.	300 V ³⁾
R_{kf}	= max.	20 k Ω

¹⁾ With automatic grid bias
 Avec polarisation automatique
 Mit automatischer Gittervorspannung

²⁾ For single-ended push-pull applications
 Pour des applications push-pull sans transformateur
 Bei Verwendung in transformatorlosen Gegentaktendstufen

³⁾ D.C. component max. 150 V
 La composante continue 150 V au max.
 Gleichspannungskomponente max. 150 V

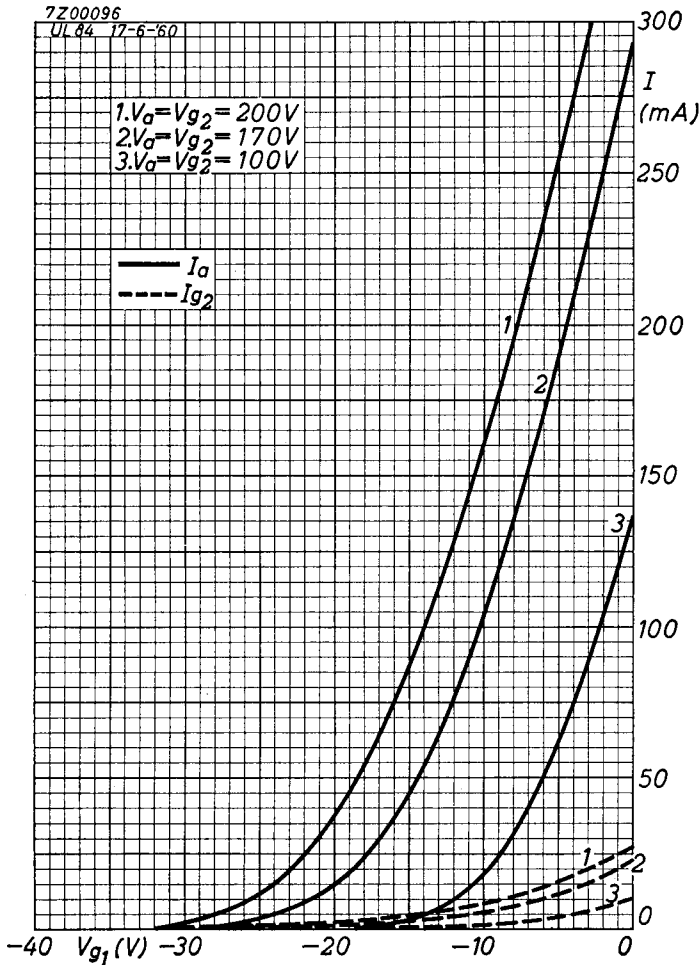


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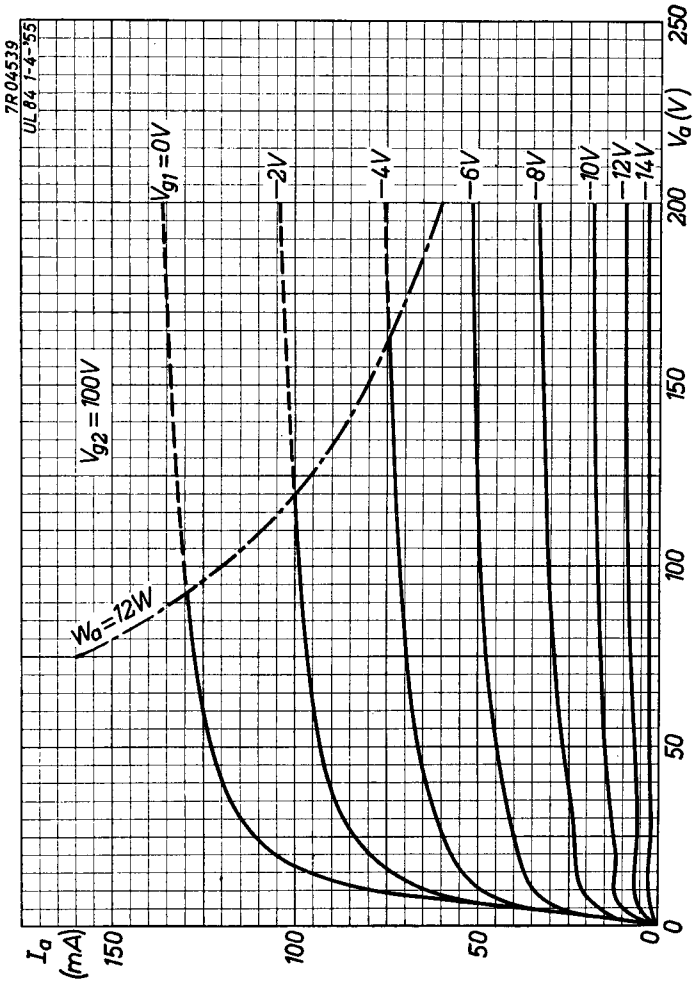
- 1. $V_a = V_{g2} = 200V$
- 2. $V_a = V_{g2} = 170V$
- 3. $V_a = V_{g2} = 100V$

— I_a
 - - - I_{g2}



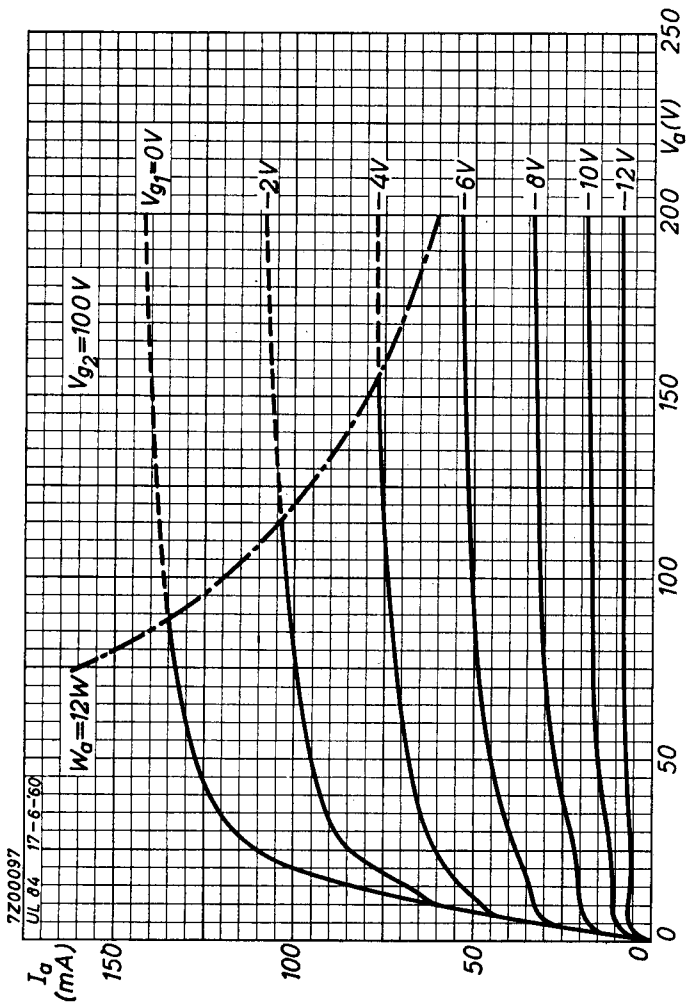
UL 84

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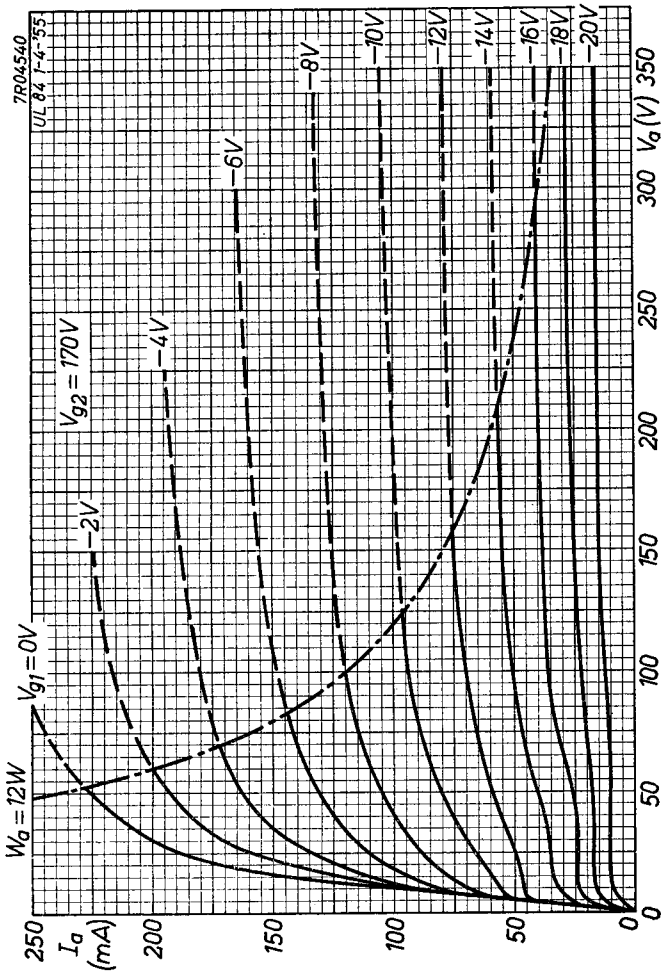
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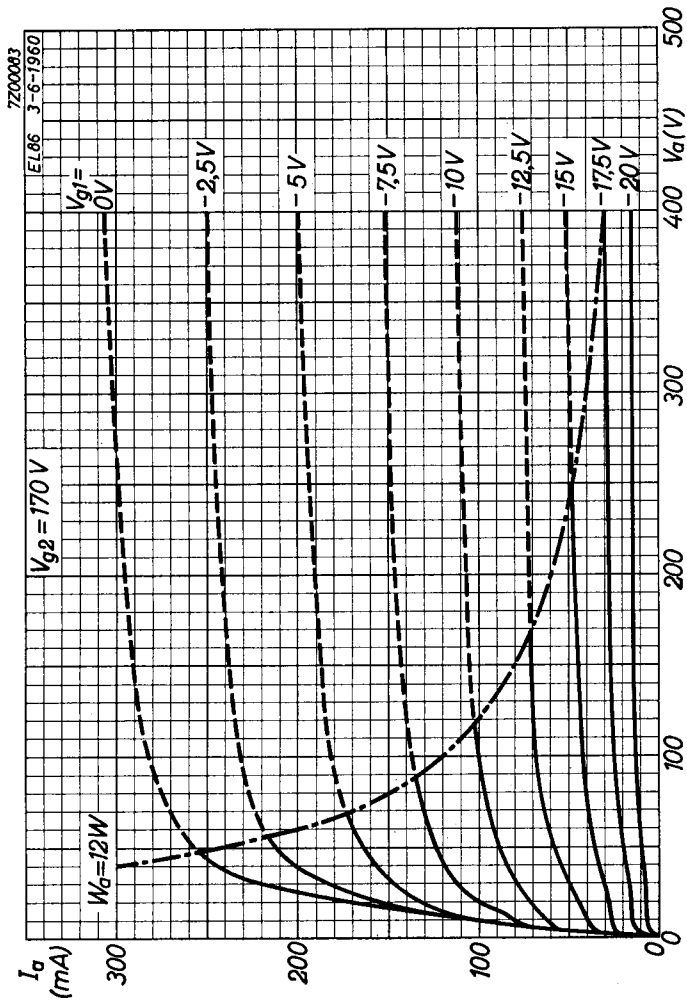
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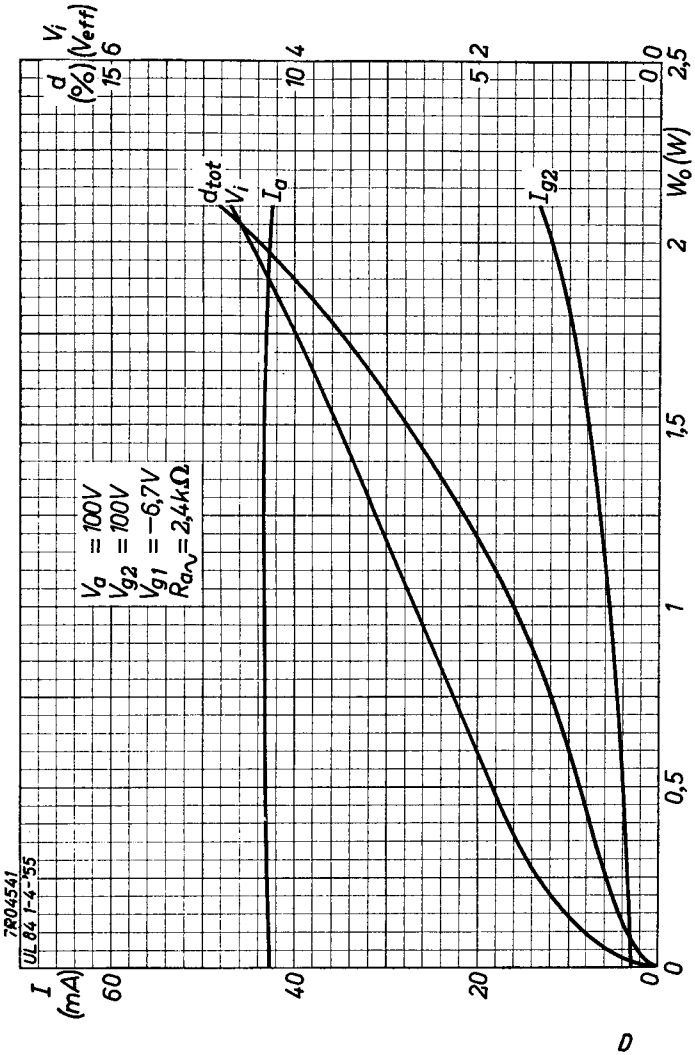
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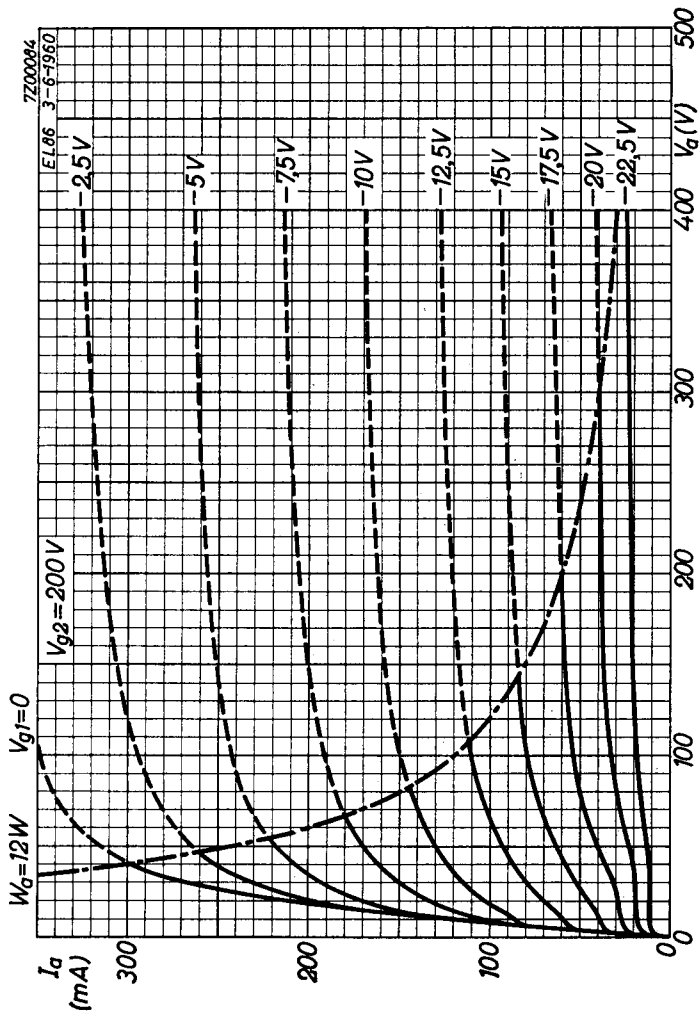
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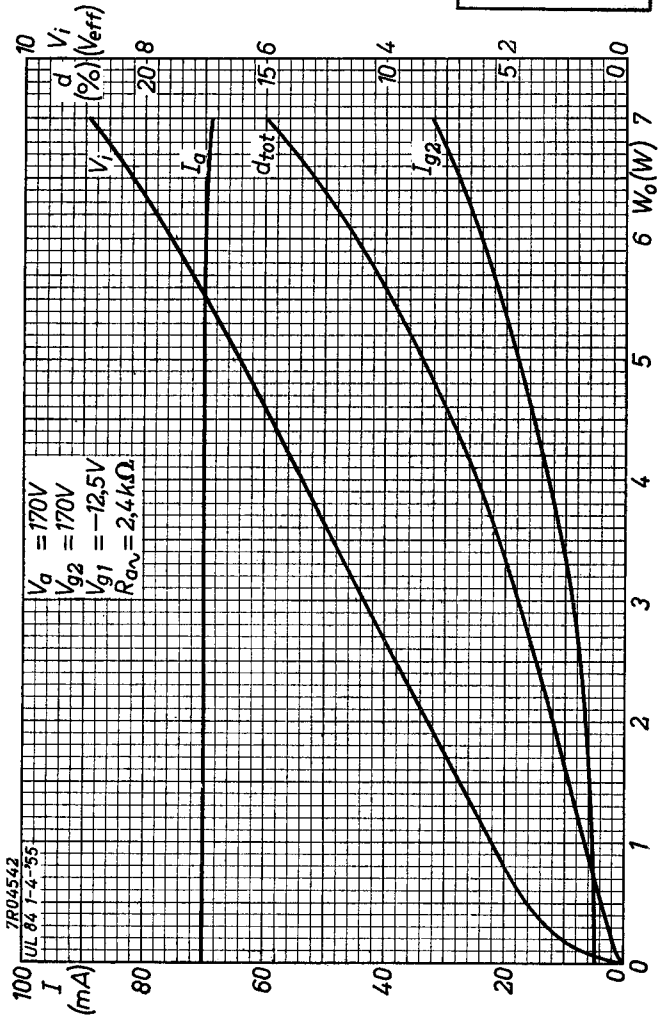


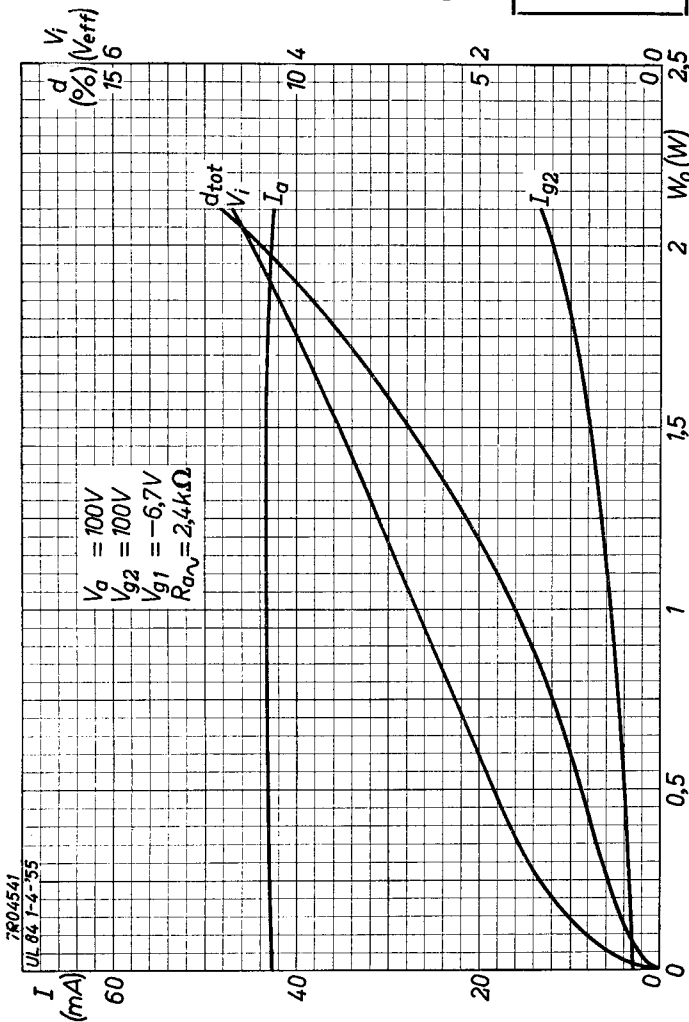
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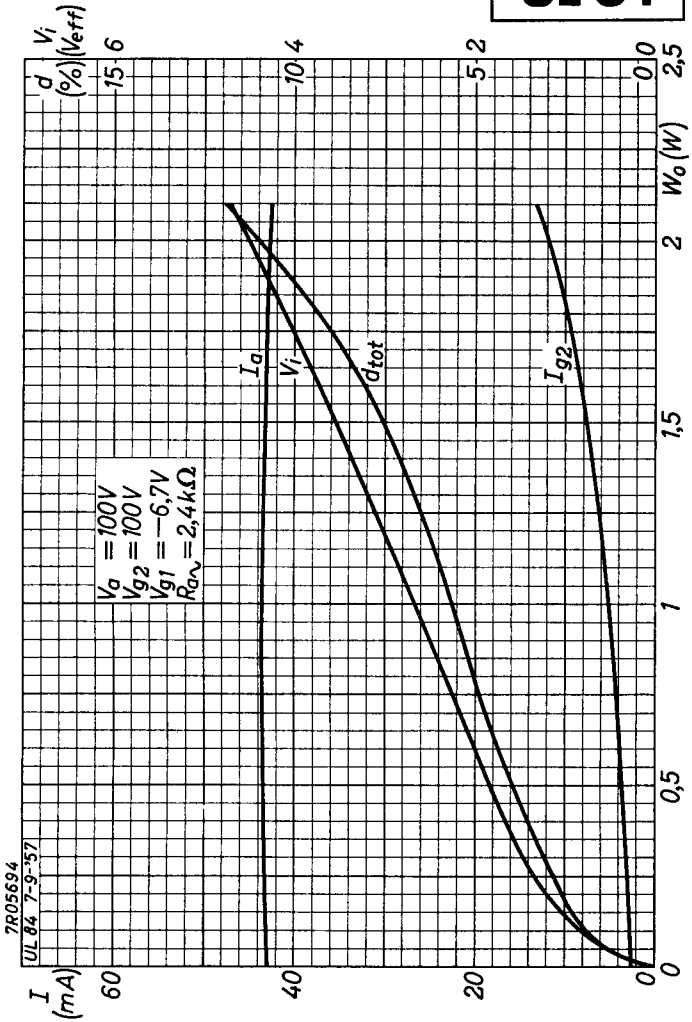
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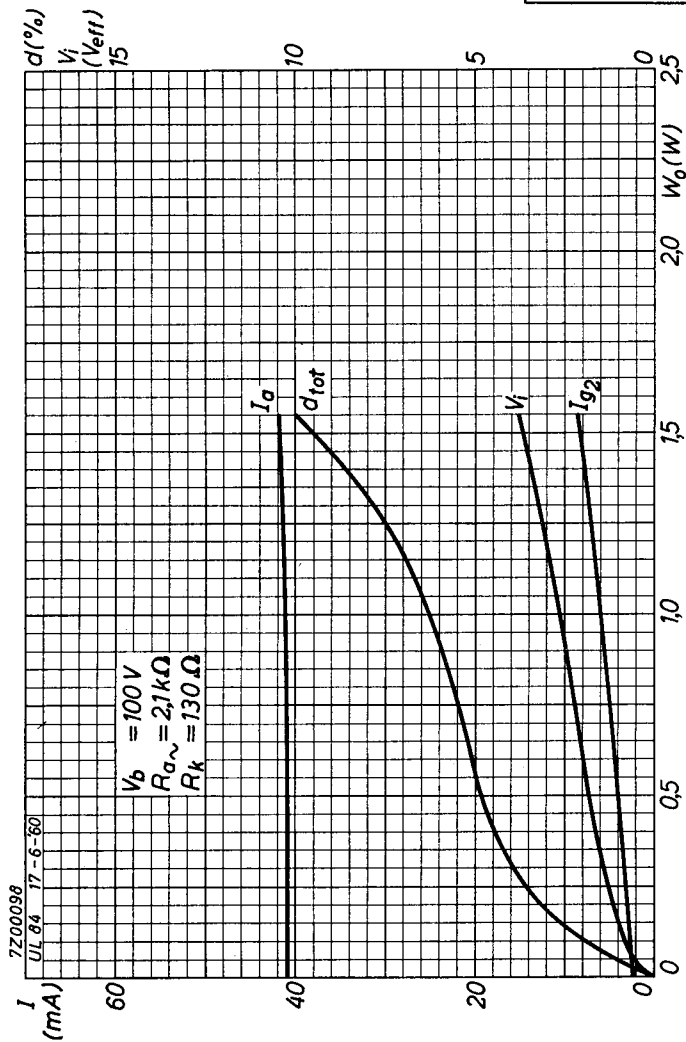
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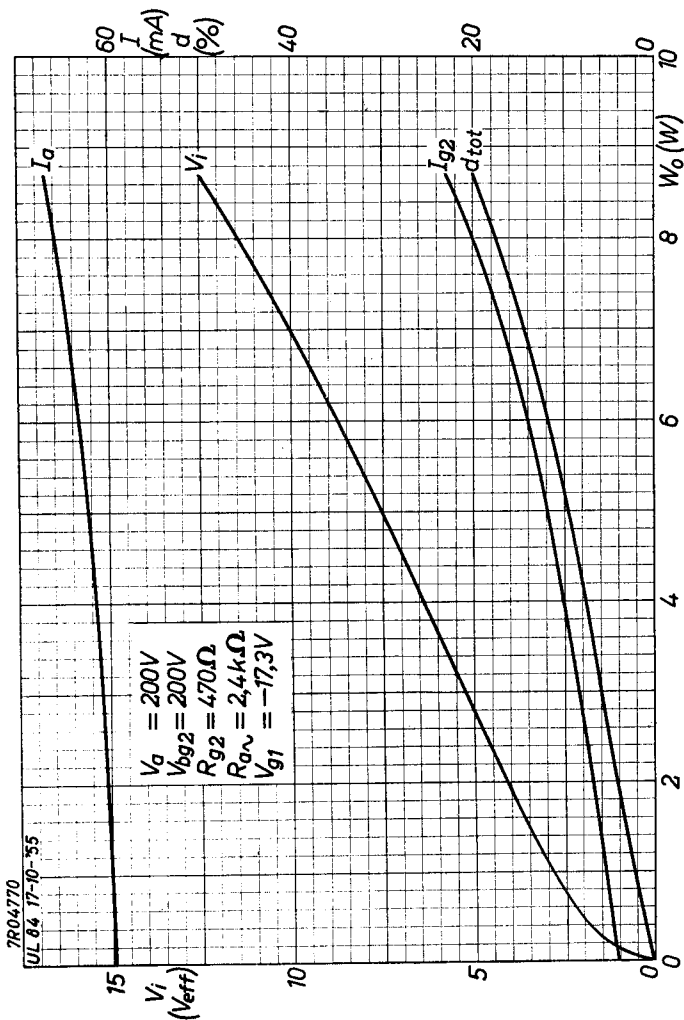
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E



UL 84

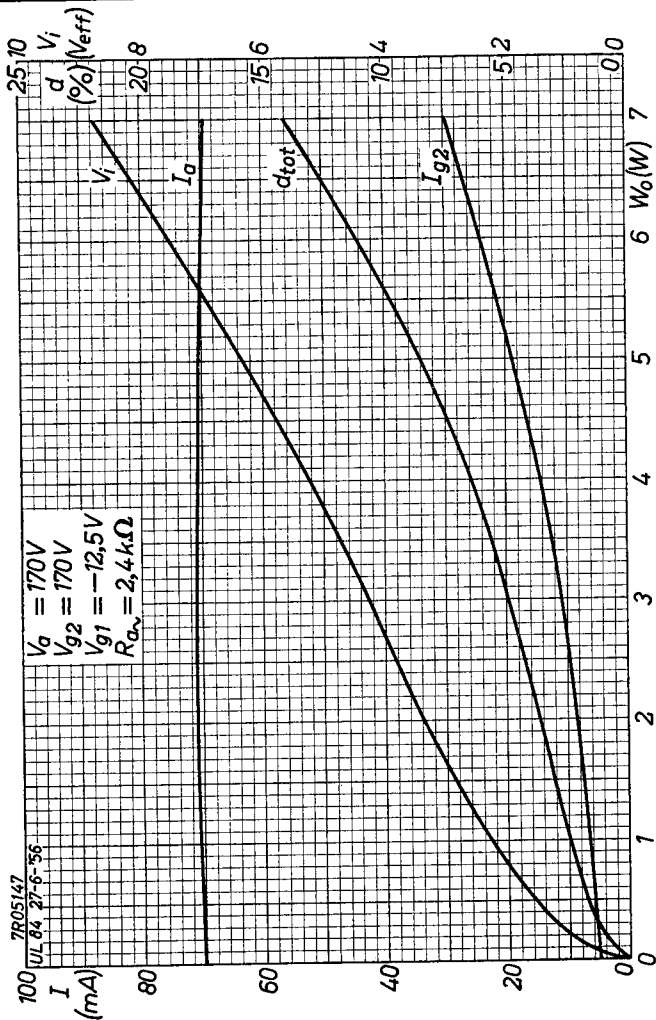
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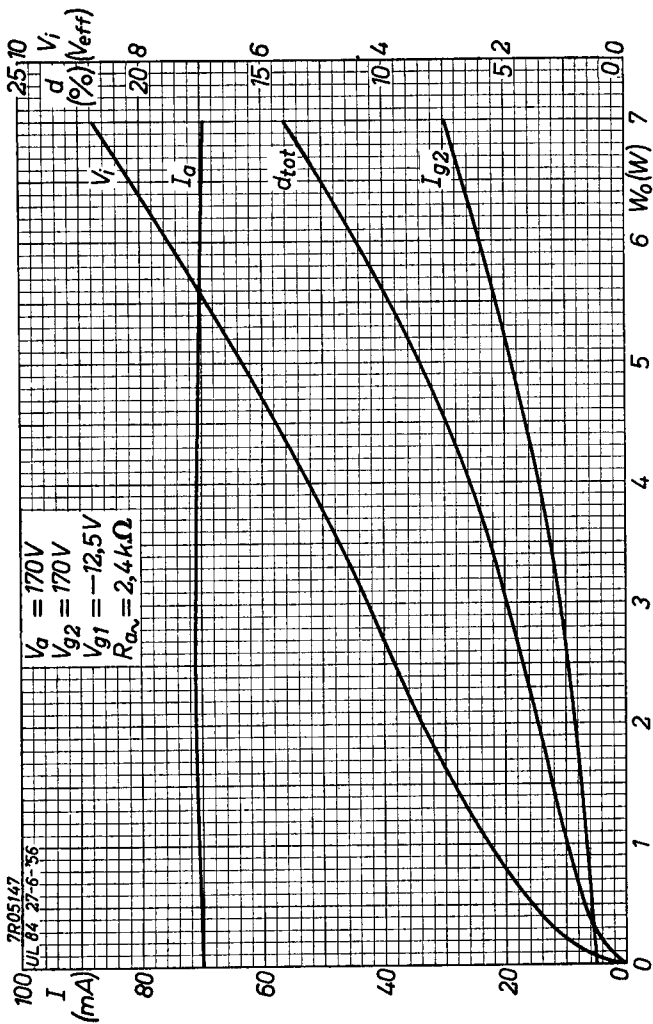


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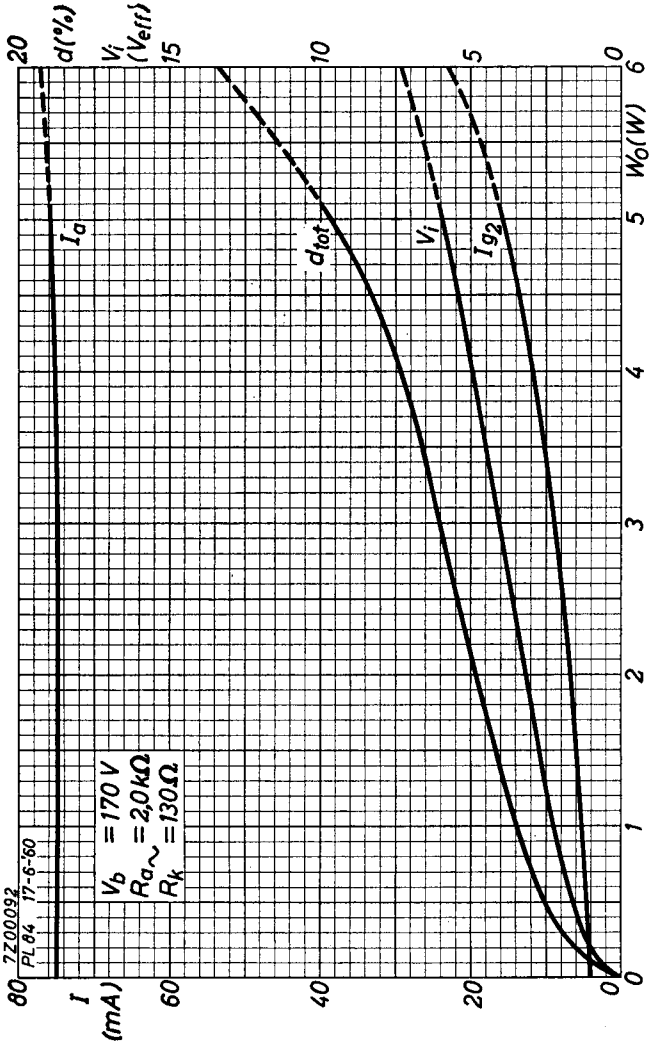
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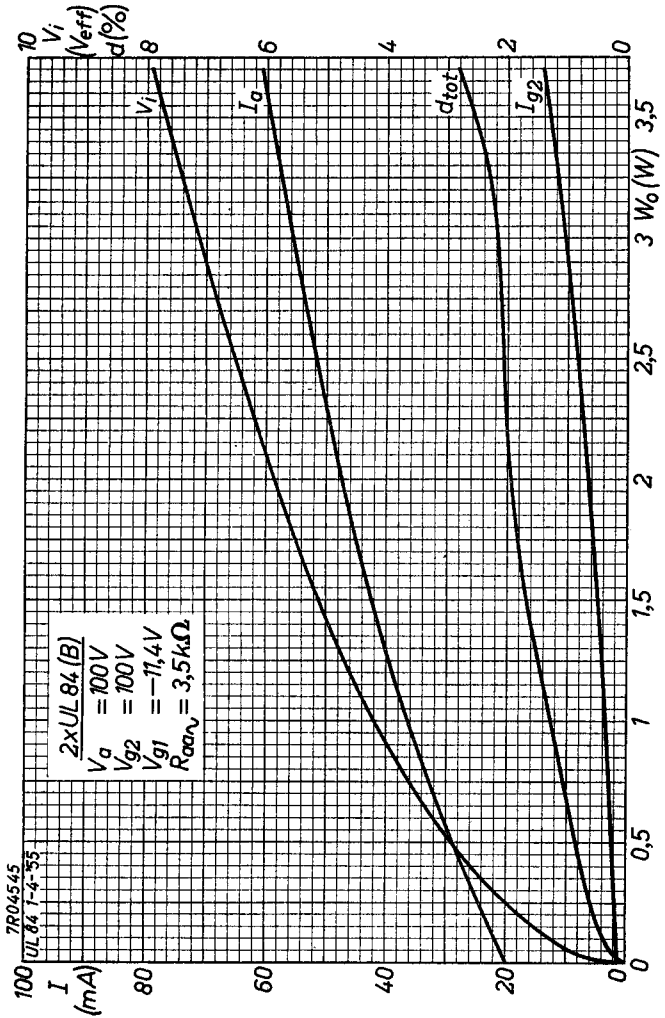
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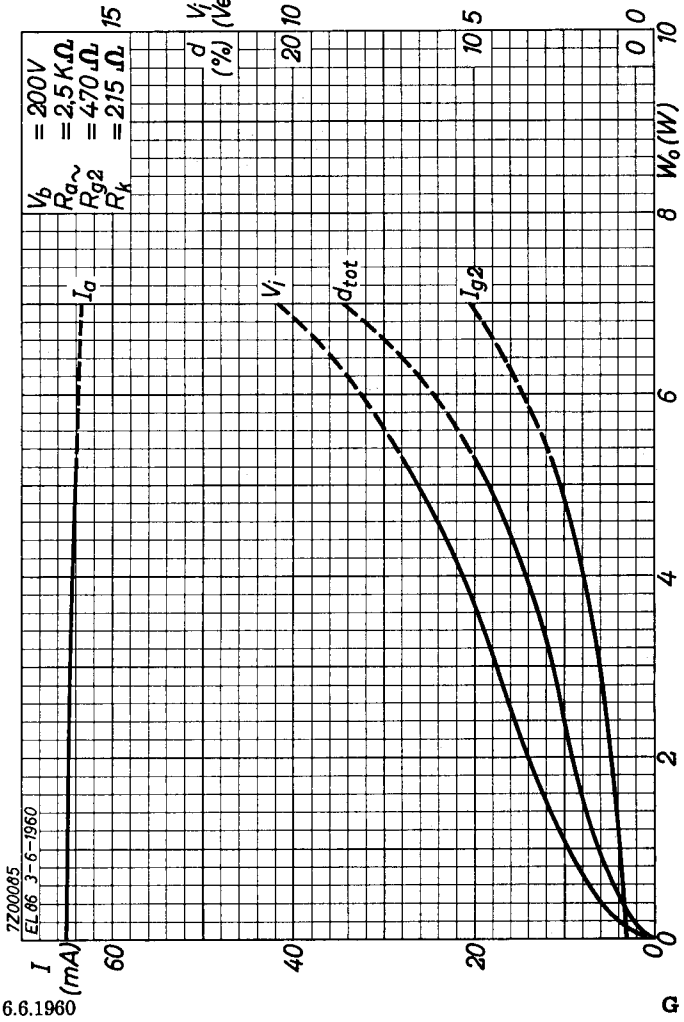
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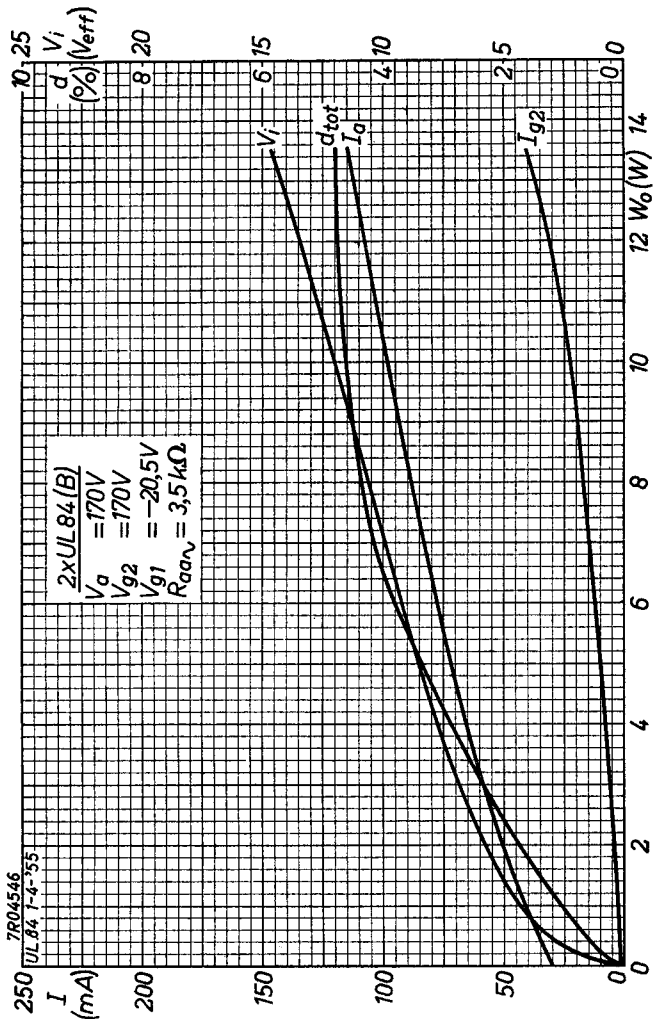
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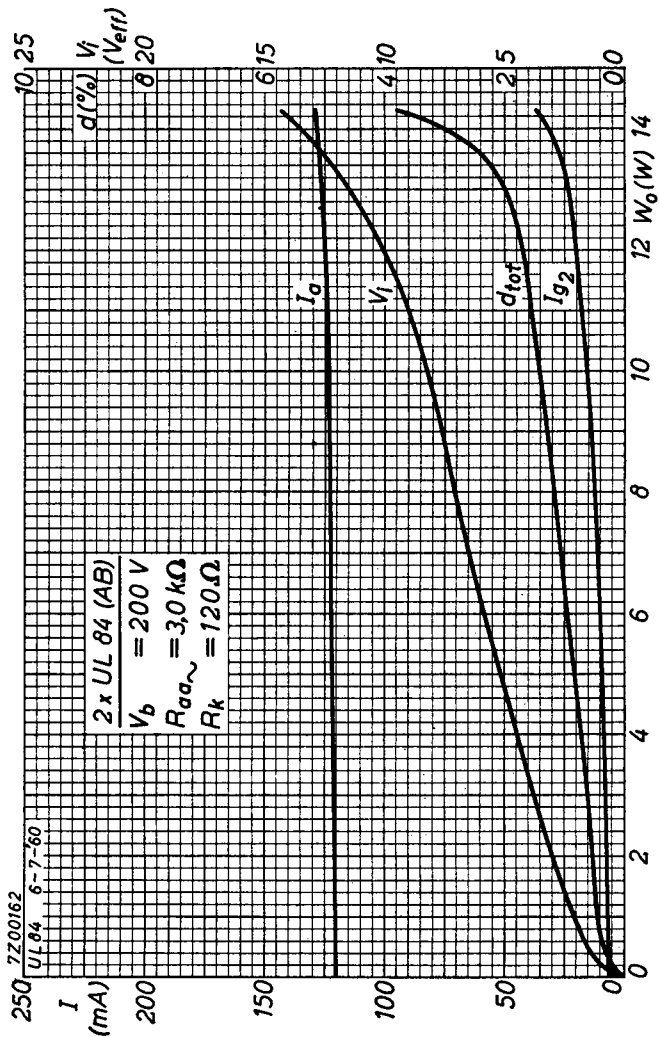
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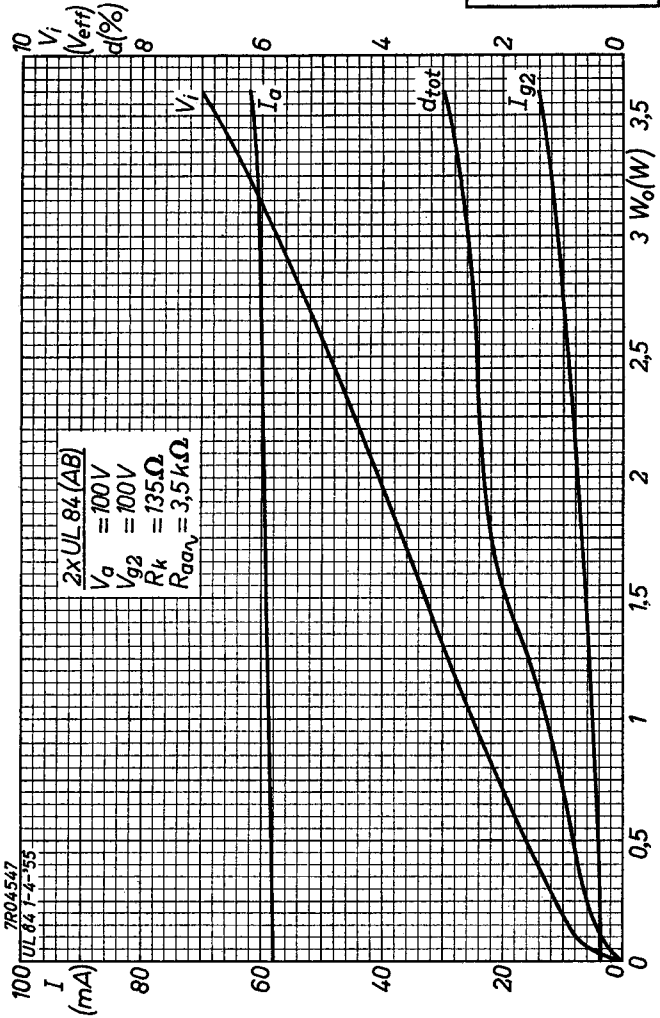
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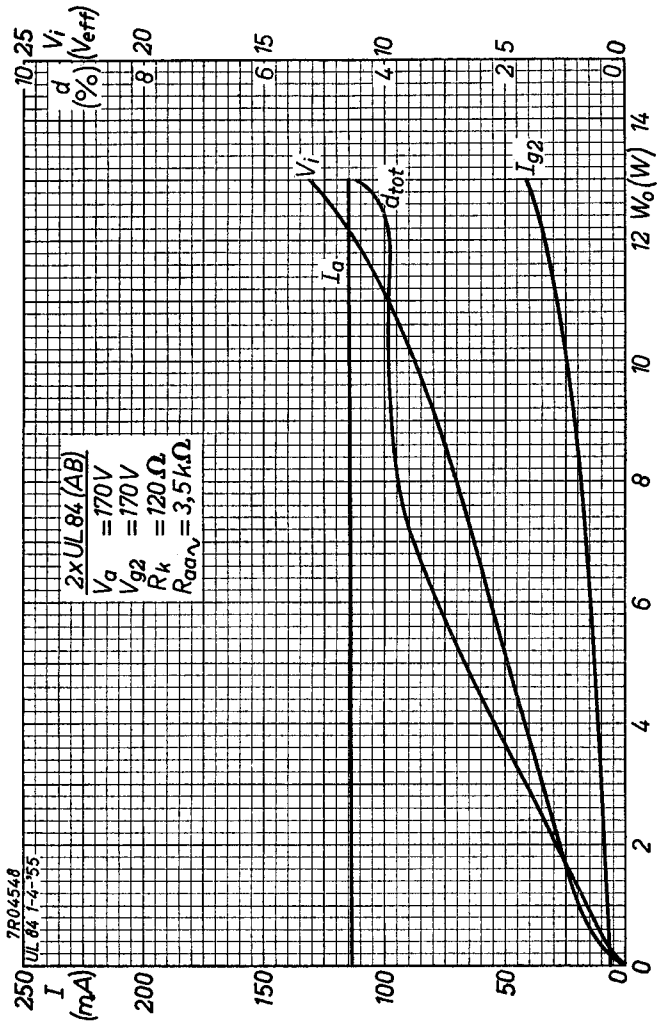


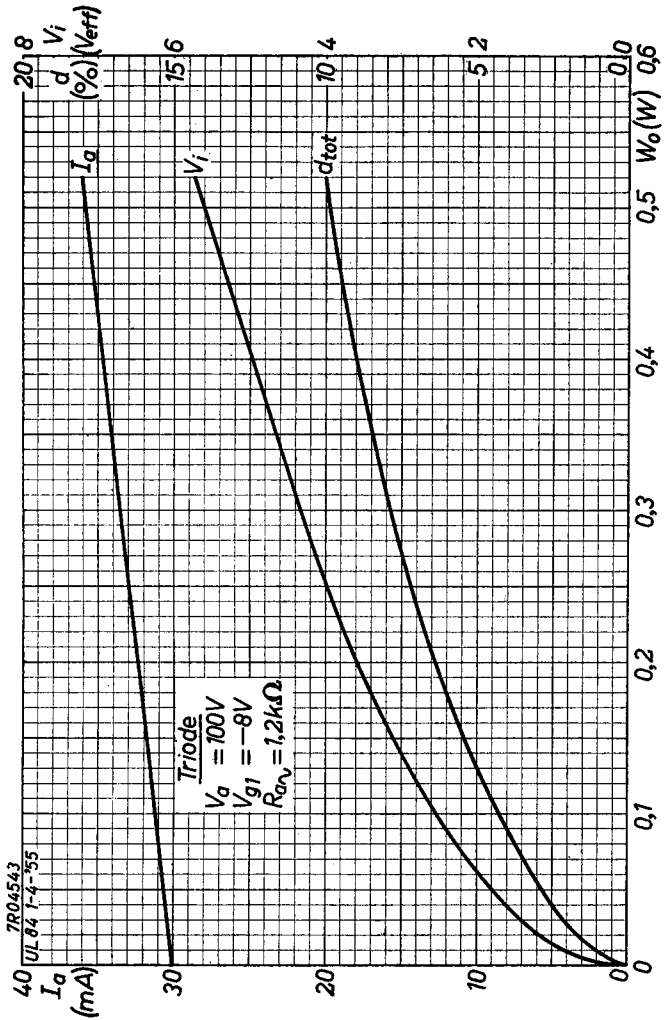
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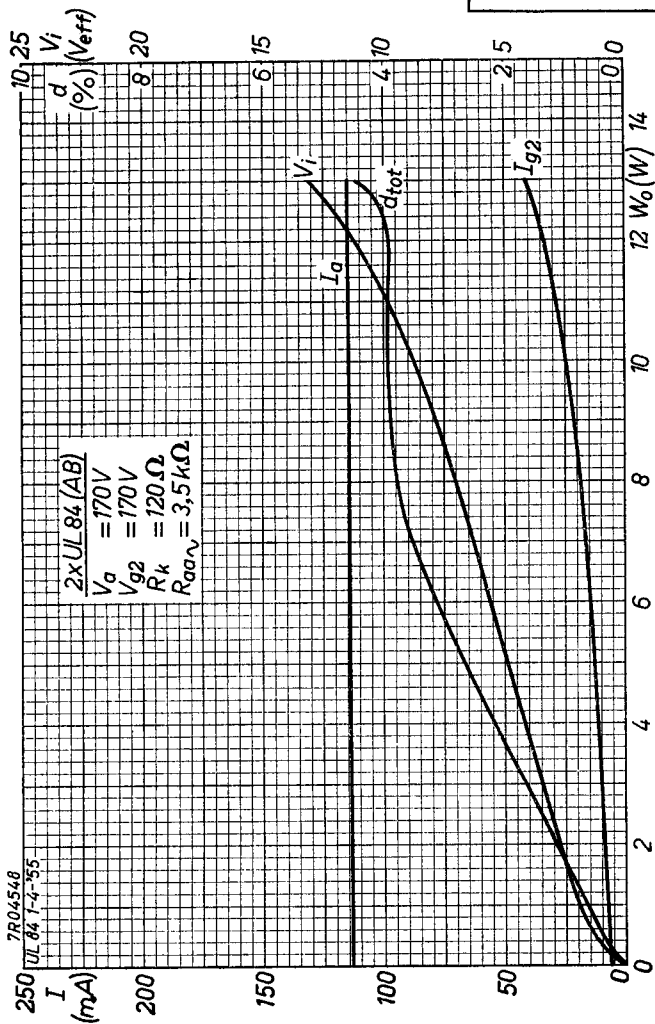


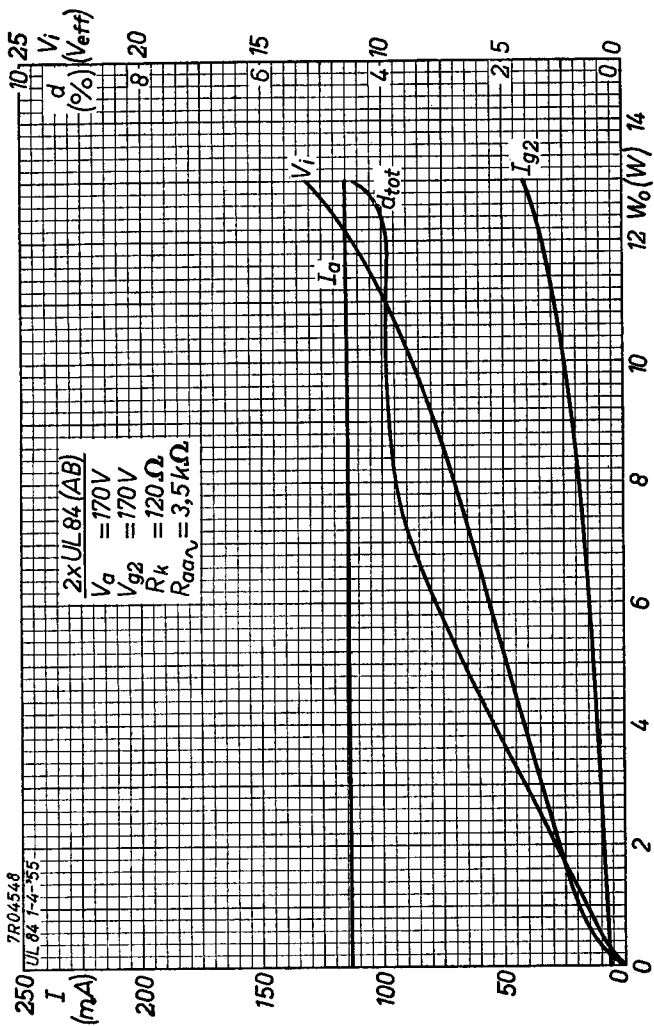
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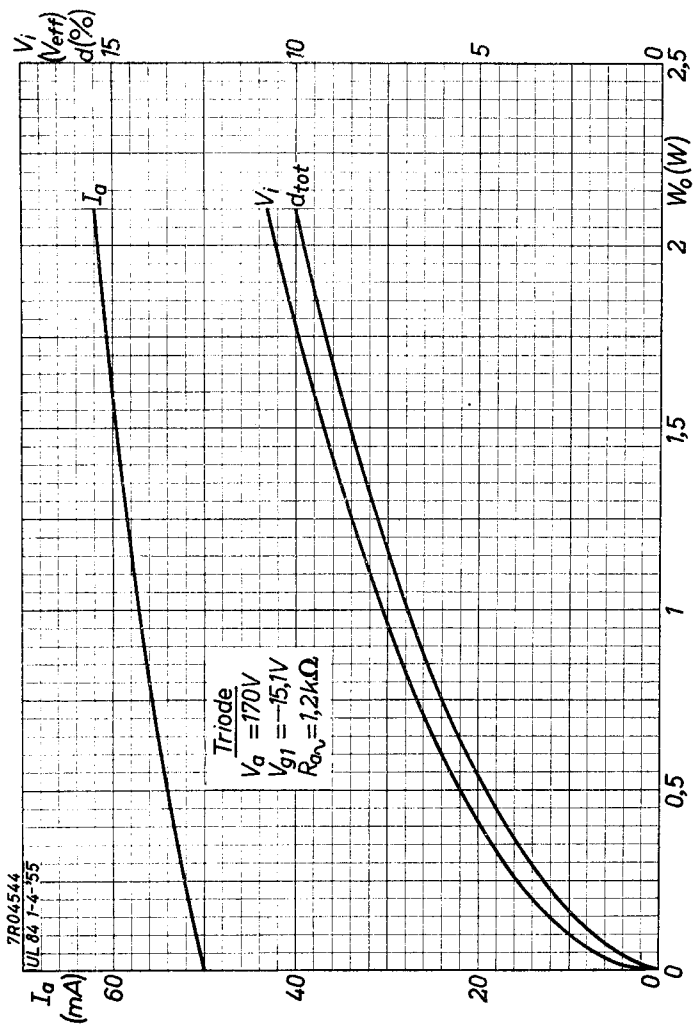
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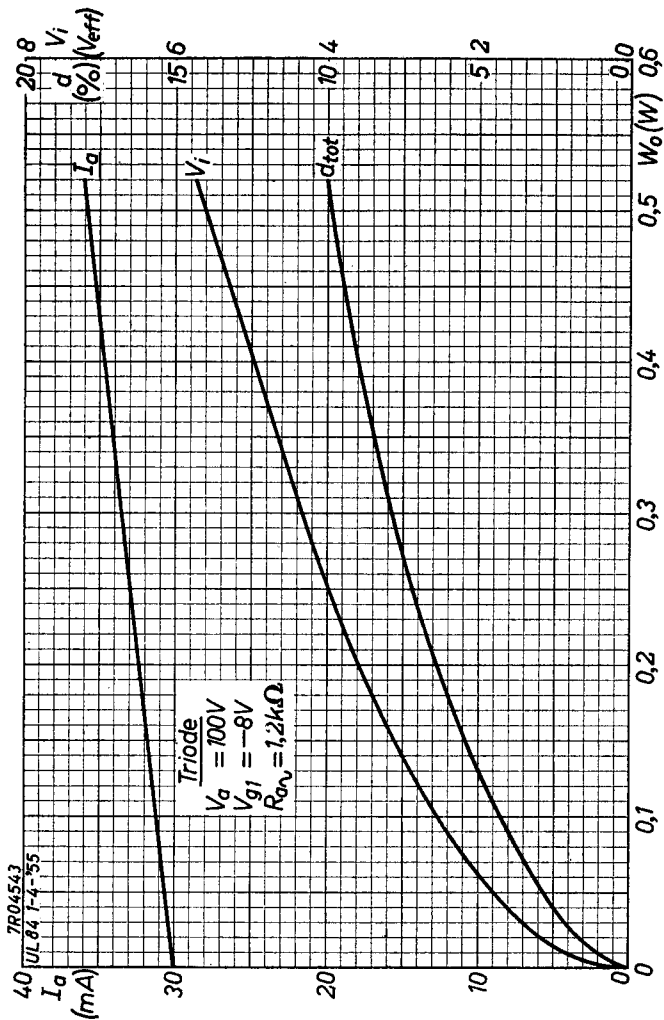


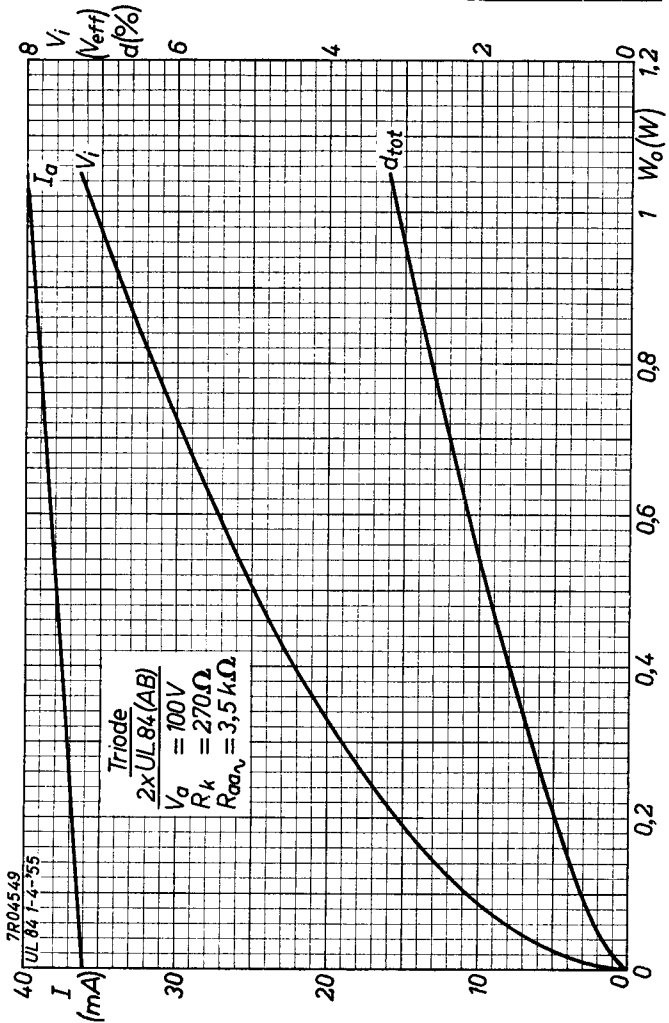


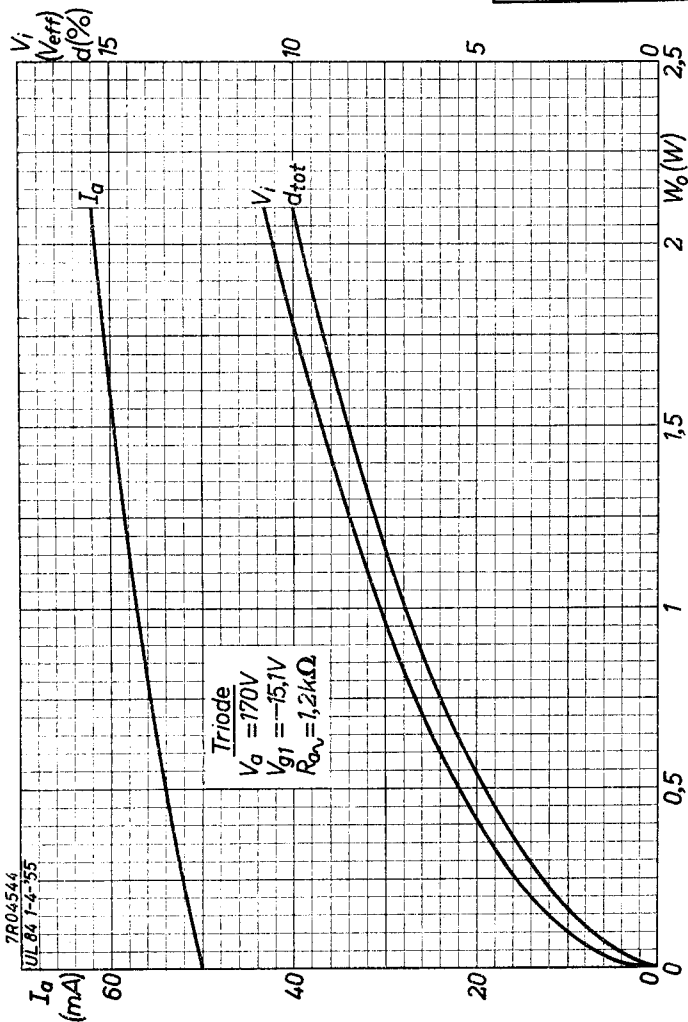




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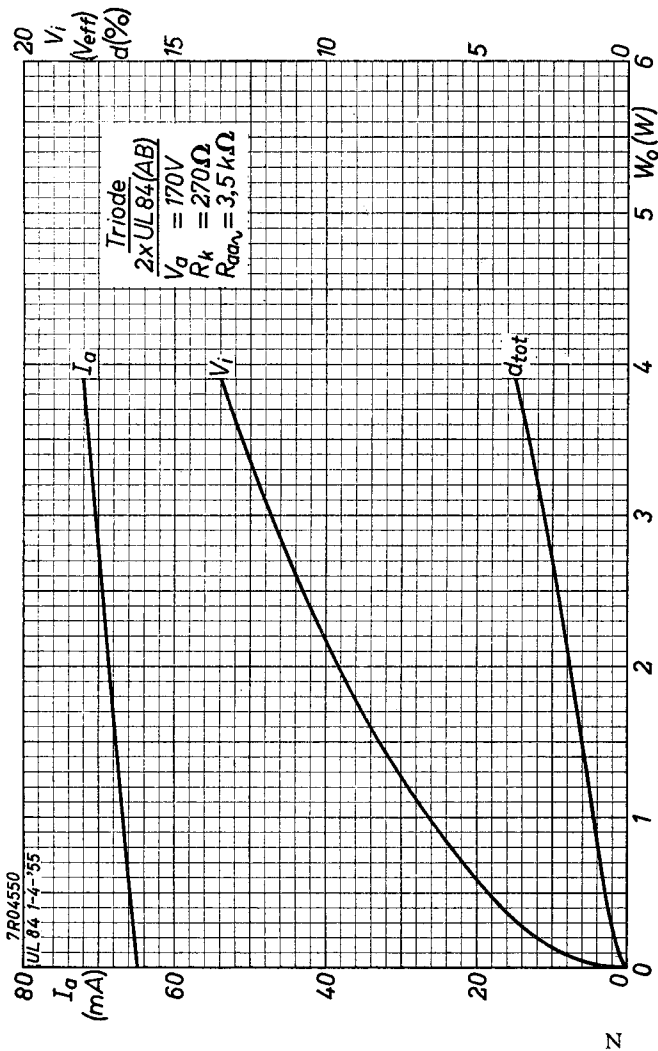
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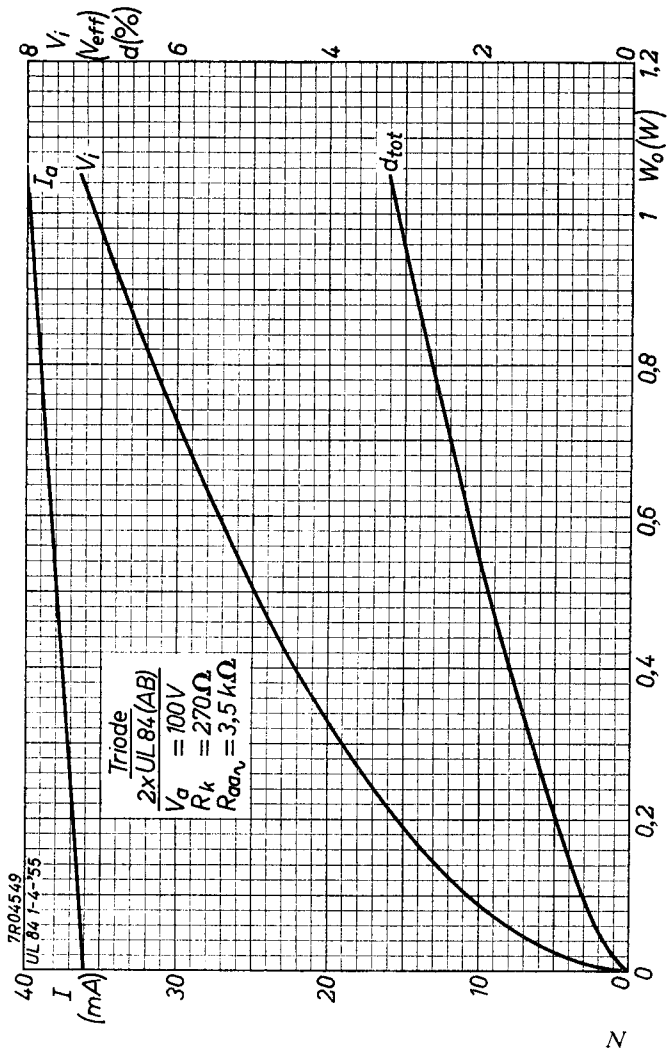




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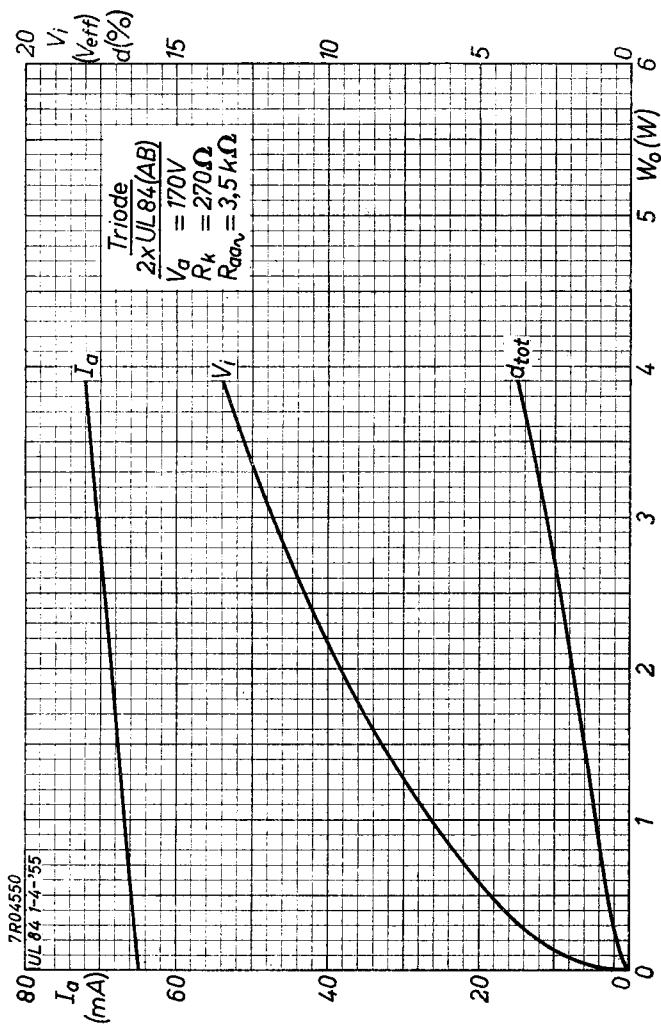
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