

DOUBLE TETRODE for use as H.F. amplifier or oscillator, frequency multiplier or modulator

DOUBLE TETRODE pour utilisation en amplificateur ou oscillatrice H.F., multiplicatrice de fréquence ou modulatrice

DOPPELTETRODE zur Verwendung als HF-Verstärker oder Oszillator, Frequenzvervielfacher oder Modulator

Filament : oxide-coated

Filament : oxyde

Heizfaden: Oxyd

$V_f = 3-3,15^1) \quad 6-6,3 \text{ V}^1)$

$I_f = 1,36 \quad 0,68 \text{ A}$

Heating : direct

Chauffage: direct

Heizung : direkt

Pins

Broches 3-(1+5) 1-5

Stifte

Capacitances

Capacités

Kapazitäten

per system

par système

pro System

in push-pull

en push-pull

in Gegentakt

$C_a = 3,3 \text{ pF} \quad C_o = 1,7 \text{ pF}$

$C_{g1} = 8,5 \text{ pF} \quad C_i = 5,7 \text{ pF}$

$C_{ag1} = 0,05 \text{ pF}$

Typical characteristics

Caractéristiques types

Kenndaten

$\mu g_{2g1} = 7,5$

$S_3(I_a = 20 \text{ mA}) = 2 \text{ mA/V}$

λ	Freq.	C teleg.				Cag2 mod.				B mod		
m	Mc/s	V_a (V)	W_o 2) (W)		V_a (V)	W_o 2) (W)		V_a (V)	W_o (W)			
			CCS	ICAS		CCS	ICAS			C.C.S		
5	60	600	26,6	35	450	17,5		450	18			
		400	17,6	23,2	400	15,4		400	17			
		250	10,6	14,0	250	6,2	8,2	350	16			
	186	600	25,6	33,6	250	6,0	7,8	250	9			
		400	16,8	22,0								
		250	10,2	13,2								
C fr.mult.												
4,6/1,6	62/186	400	7,2	10	Tripler tripleur Verdreifacher							
		250	4,6	6,2								
3,2/1,6	93/186	400	6,5	8,0	doubler doubleur 3)							
		250	4,0	4,9	Verdoppler							
										600	28,2	

1) Nominal values; valeurs nominales; Nennwerte

2) CCS = continous service; service continu; Dauerbetrieb

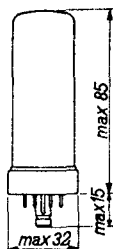
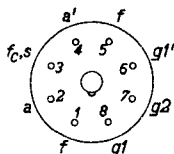
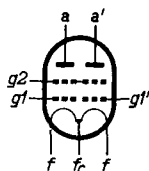
ICAS = intermittent service; service intermittent; aussetzender Betrieb

3) One system; un système; ein System

Pin temperature
Temp. des broches = max. 100 °C
Stiftentemperatur

Bulb temperature
Temp. de l'ampoule = max. 200 °C
Kolbentemperatur

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: Loctal

Socket
Support 40213
Fassung

Mounting position: vertical with base up or down
Horizontal with pins 1 and 5 in one horizontal plane

Montage : vertical avec le culot en haut ou en bas
Horizontal avec les broches 1 et 5 situées dans le même plan horizontal

Einbau : senkrecht mit Sockel oben oder unten
Waagerecht mit den Stiften 1 und 5 in einer waagerechten Ebene

Net weight
Poids net 40 g
Nettogewicht

Shipping weight
Poids brut 55 g
Bruttogewicht

H.F. class C telegraphy, two systems in push-pull
H.F. classe C télégraphie, deux systèmes en push-pull
HF Klasse C Telegraphie, zwei Systeme in Gegentakt

Limiting values, continuous service
C.C.S. Caractéristiques limites, service continu
Grenzdaten, Dauerbetrieb

f	= max. 186 Mc/s	f	= max. 300 Mc/s
V_a	= max. 600 V	V_a	= max. 450 V
W_{ia}	= max. 2x18 W	W_{ia}	= max. 2x9 W
W_a	= max. 2x6 W		
I_a	= max. 2x30 mA		
V_{g2}	= max. 250 V		
W_{g2}	= max. 7 W		
$-V_{g1}$	= max. 200 V		
I_{g1}	= max. 2x5 mA		

Operating conditions; continuous service
C.C.S. Caractéristiques d'utilisation; service continu
Betriebsdaten; Dauerbetrieb

f	= 60	60	60 Mc/s
V_a	= 600	400	250 V
V_{g2}	= 200	200	175 V
V_{g1}	= -80	-80	-70 V
I_a	= 2x30	2x30	2x30 mA
I_{g2}	= 6	6	6,5 mA
I_{g1}	= 2x1,0	2x1,2	2x1,8 mA
$V_{g1g1'p}$	= 210	210	210 V
W_{ig1}	= 2x0,1	2x0,11	2x0,17 W
W_{g2}	= 1,2	1,2	1,1 W
W_{ia}	= 2x18	2x12	2x7,5 W
W_a	= 2x4,7	2x3,2	2x2,2 W
W_o	= 26,6	17,6	10,6 W
η	= 74	73	71 %

H.F. class C telegraphy, two systems in push-pull; continued
H.F. classe C télégraphie, deux systèmes en push-pull; continuation
HF Klasse C Telegraphie, zwei Systeme in Gegentakt; Fortsetzung

C.C.S. Operating conditions; continuous service
Caractéristiques d'utilisation; service continu
Betriebsdaten; Dauerbetrieb

f	=	186	186	186 Mc/s
V_a	=	600	400	250 V
V_{g1}	=	-80	-80	-70 V
V_{g2}	=	200	200	175 V
I_a	=	2x30	2x30	2x30 mA
I_{g1}	=	2x1,0	2x1,0	2x1,5 mA
I_{g2}	=	3,0	3,5	4,5 mA
$V_{g1g1'p}$	=	210	210	220 V
W_{g1}	=	2x0,1	2x0,1	2x0,15 W
W_{g2}	=	0,6	0,7	0,8 W
W_{ia}	=	2x18	2x12	2x7,5 W
W_a	=	2x5,2	2x3,6	2x2,4 W
W_o	=	25,6	16,8	10,2 W
η	=	71 ¹⁾	70	68 %

Limiting values, intermittent service
I.C.A.S. Caractéristiques limites, service intermittent
Grenzdaten, aussetzender Betrieb

f	= max.	186 Mc/s	f	= max.	300 Mc/s
V_a	= max.	600 V	V_a	= max.	450 V
W_{ia}	= max.	2x24 W	W_{ia}	= max.	2x12 W
W_a	= max.	2x8 W			
I_a	= max.	2x40 mA			
V_{g2}	= max.	250 V			
W_{g2}	= max.	7 W			
$-V_{g1}$	= max.	200 V			
I_{g1}	= max.	2x5 mA			

¹⁾In order to prevent overheating a low velocity air flow should be directed on the bulb and the base
Afin de prévenir le surchauffage il faut diriger un léger courant d'air sur l'ampoule et le culot
Zur Vermeidung einer Überhitzung ist ein schwacher Luftstrom auf den Kolben und den Sockel notwendig

H.F. class C telegraphy, two systems in push-pull; continued
H.F. classe C télégraphie, deux systèmes en push-pull; continuation
HF Klasse C Telegraphie, zwei Systeme in Gegentakt; Fortsetzung

Operating conditions; intermittent service
I.C.A.S. Caractéristiques d'utilisation; service intermittent

Betriebsdaten; aussetzender Betrieb

f	=	60	60	60 Mc/s
V _a	=	600	400	250 V
V _{g2}	=	200	200	175 V
V _{g1}	=	-80	-80	-70 V
I _a	=	2x40	2x40	2x40 mA
I _{g2}	=	5,5	6,0	7,5 mA
I _{g1}	=	2x1,2	2x2,0	2x2,5 mA
V _{g1g1'p}	=	220	220	230 V
W _{ig1}	=	2x0,12	2x0,22	2x0,26 W
W _{g2}	=	1,1	1,2	1,3 W
W _{ia}	=	2x24	2x16	2x10 W
W _a	=	2x6,5	2x4,4	2x3,0 W
W _o	=	35	23,2	14,0 W
η	=	73	72,5	70 %
f	=	186	186	186 Mc/s
V _a	=	600	400	250 V
V _{g2}	=	200	200	175 V
V _{g1}	=	-80	-80	-70 V
I _a	=	2x40	2x40	2x40 mA
I _{g2}	=	4,5	5,0	7,5 mA
I _{g1}	=	2x1,3	2x1,5	2x2,0 mA
V _{g1g1'p}	=	220	220	230 V
W _{ig1}	=	2x0,13	2x0,15	2x0,26 W
W _{g2}	=	0,9	1,0	1,3 W
W _{ia}	=	2x24	2x16	2x10 W
W _a	=	2x7,2	2x5	2x3,4 W
W _o	=	33,6	22	13,2 W
η	=	70 ¹⁾	69	66 %

¹⁾See page 4; voir page 4; siehe Seite 4

H.F. class C anode and screen grid modulation, two systems in push-pull

H.F. classe C modulation d'anode et de grille-écran, deux systèmes en push-pull

HF Klasse C Anoden- und Schirmgittermodulation, zwei Systeme in Gegentakt

Limiting values, continuous service

C.C.S. Caractéristiques limites, service continu

Grenzdaten, Dauerbetrieb

f = max. 186 Mc/s

V_a = max. 480 V

W_{ia} = max. 2x11,5 W

W_a = max. 2x4 W

I_a = max. 2x25 mA

V_{g2} = max. 250 V

W_{g2} = max. 4,5 W

$-V_{g1}$ = max. 200 V

I_{g1} = max. 2x5 mA

f = max. 300 Mc/s

V_a = max. 360 V

W_{ia} = max. 2x5,25 W

C.C.S. Operating conditions, continuous service

Caractéristiques d'utilisation, service continu

Betriebsdaten, Dauerbetrieb

f = 60 60 60 186 Mc/s

V_a = 450 400 250 250 V

R_{g2} = 18 18 10 10 k Ω

V_{g1} = -80 -80 -70 -70 V

I_a = 2x25 2x25 2x19,5 2x19,5 mA

I_{g2} = 14 11 11 11 mA

I_{g1} = 2x1,0 2x0,8 2x1,5 2x1,5 mA

V_{g1p} = 83 83 110 110 V

W_{ig1} = 2x0,08 2x0,06 2x0,15 2x0,15 W

W_{g2} = 2,8 2,2 1,6 1,6 W

W_{ia} = 2x11,25 2x10 2x4,9 2x4,9 W

W_a = 2x2,5 2x2,3 2x1,8 2x1,9 W

W_o = 17,5 15,4 6,2 6,0 W

η = 77,5 77 63 61 %

m = 100 100 100 100 %

W_{mod} = 11,5 10 5 5 W

H.F. class C anode and screen grid modulation, two systems in push-pull; continued
H.F. classe C modulation d'anode et de grille-écran, deux systèmes en push-pull; continuation
HF Klasse C Anoden- und Schirmgittermodulation, zwei Systeme in Gegentakt; Fortsetzung

Limiting values, intermittent service
I.C.A.S. Caractéristiques limites, service intermittent
Grenzdaten, aussetzender Betrieb

f	= max.	186 Mc/s	f	= max.	300 Mc/s
V_a	= max.	480 V	V_a	= max.	360 V
W_{ia}	= max.	2x15,5 W	W_{ia}	= max.	2x7 W
W_a	= max.	2x5 W			
I_a	= max.	2x32 mA			
V_{g2}	= max.	250 V			
W_{g2}	= max.	4,5 W			
$-V_{g1}$	= max.	200 V			
I_{g1}	= max.	2x5 mA			

Operating conditions, intermittent service
I.C.A.S. Caractéristiques d'utilisation, service intermittent
Betriebsdaten, aussetzender Betrieb

f	=	60	186 Mc/s
V_a	=	250	250 V
R_{g2}	=	10	10 k Ω
V_{g1}	=	-70	-70 V
I_a	=	2x26,5	2x26,5 mA
I_{g2}	=	9	9 mA
I_{g1}	=	2x1,8	2x1,5 mA
V_{g1p}	=	110	110 V
W_{ig1}	=	2x0,18	2x0,15 W
W_{g2}	=	1,5	1,5 W
W_{ia}	=	2x6,6	2x6,6 W
W_a	=	2x2,5	2x2,7 W
W_o	=	8,2	7,8 W
η	=	62	59 %
m	=	100	100 %
W_{mod}	=	7	7 W

Class C frequency tripler, two systems in push-pull
 Classe C tripleur de fréquence, deux systèmes en push-pull
 Klasse C Frequenzverdreifacher, zwei Systeme in Gegentakt

C.C.S. Limiting values, continuous service
 Caractéristiques limites, service continu
 Grenzdaten, Dauerbetrieb

f	= max. 186 Mc/s	f	= max. 300 Mc/s
V_a	= max. 600 V	V_a	= max. 450 V
W_{ia}	= max. 2x12 W	W_{ia}	= max. 2x9 W
W_a	= max. 2x6 W		
I_a	= max. 2x30 mA		
V_{g2}	= max. 250 V		
W_{g2}	= max. 7 W		
$-V_{g1}$	= max. 200 V		
I_{g1}	= max. 2x5 mA		

C.C.S. Operating conditions, continuous service
 Caractéristiques d'utilisation, service continu
 Betriebsdaten, Dauerbetrieb

f	= 62/186	62/186 Mc/s
V_a	= 400	250 V
V_{g2}	= 200	200 V
V_{g1}	= -175	-175 V
I_a	= 2x24	2x30 mA
I_{g2}	= 3	6 mA
I_{g1}	= 2x0,6	2x1,1 mA
$V_{g1g1'p}$	= 430	430 V
W_{ig1}	= 2x0,12	2x0,22 W
W_{g2}	= 0,6	1,2 W
W_{ia}	= 2x9,6	2x7,5 W
W_a	= 2x6	2x5,2 W
W_o	= 7,2	4,6 W
η	= 37,5	31 %

Class C frequency tripler, two systems in push-pull; continued
 Classe C tripleur de fréquence, deux systèmes en push-pull; continuation
 Klasse C Frequenzverdreifacher, zwei Systeme in Gegentakt; Fortsetzung

Limiting values, intermittent service
 I.C.A.S. Caractéristiques limites, service intermittent
 Grenzdaten, aussetzender Betrieb

f = max. 186 Mc/s	f = max. 300 Mc/s
V_a = max. 600 V	V_a = max. 450 V
W_{ia} = max. 2x16 W	W_{ia} = max. 2x12 W
W_a = max. 2x8 W	
I_a = max. 2x40 mA	
V_{g2} = max. 250 V	
W_{g2} = max. 7 W	
$-V_{g1}$ = max. 200 V	
I_{g1} = max. 2x5 mA	

Operating conditions, intermittent service
 I.C.A.S. Caractéristiques d'utilisation, service intermittent
 Betriebsdaten, aussetzender Betrieb

f	= 62/186	62/186 Mc/s
V_a	= 400	250 V
V_{g2}	= 200	200 V
V_{g1}	= -175	-175 V
I_a	= 2x32,5	2x40 mA
I_{g2}	= 4	6,5 mA
I_{g1}	= 2x1,1	2x1,5 mA
$V_{g1g1'p}$	= 430	430 V
W_{ig1}	= 2x0,22	2x0,3 W
W_{g2}	= 0,8	1,3 W
W_{ia}	= 2x13	2x10 W
W_a	= 2x8	2x6,9 W
W_o	= 10	6,2 W
η	= 38,5	31 %

Class C frequency doubler
 Classe C doubleur de fréquence
 Klasse C Frequenzverdoppler

Limiting values, per tube
 C.C.S. Caractéristiques limites, par tube
 Grenzdaten, pro Röhre

f = max. 186 Mc/s	f = max. 300 Mc/s
V_a = max. 600 V	V_a = max. 450 V
W_{ia} = max. 2x12 W	W_{ia} = max. 2x9 W
W_a = max. 2x6 W	
I_a = max. 2x30 mA	
V_{g2} = max. 250 V	
W_{g2} = max. 7 W	
$-V_{g1}$ = max. 200 V	
I_{g1} = max. 2x5 mA	

Operating conditions, one system, continuous service
 C.C.S. Caractéristiques d'utilisation, un système, service continu
 Betriebsdaten, ein System, Dauerbetrieb

f	= 93/186	93/186 Mc/s
V_a	= 400	250 V
V_{g1}	= -175	-175 V
V_{g2}	= 200	200 V
I_a	= 30	30 mA
I_{g1}	= 1,2	1,5 mA
I_{g2}	= 1,5	2 mA
V_{g1p}	= 210	220 V
W_{ig1}	= 0,23	0,3 W
W_{g2}	= 0,3	0,4 W
W_{ia}	= 12	7,5 W
W_a	= 5,5	3,5 W
W_o	= 6,5	4 W
η	= 54	53 %

Class C frequency doubler
 Classe C doubleur de fréquence
 Klasse C Frequenzverdoppler

I.C.A.S. Limiting values, per tube
 Caractéristiques limites, par tube
 Grenzdaten, pro Röhre

f = max. 186 Mc/s	f = max. 300 Mc/s
V_a = max. 600 V	V_a = max. 450 V
W_{1a} = max. 2x16 W	W_{1a} = max. 2x12 W
W_a = max. 2x8 W	
I_a = max. 2x40 mA	
V_{g2} = max. 250 V	
W_{g2} = max. 7 W	
$-V_{g1}$ = max. 200 V	
I_{g1} = max. 2x5 mA	

Operating conditions, one system, intermittent service
 I.C.A.S. Caractéristiques d'utilisation, un système, service intermittent
 Betriebsdaten, ein System, aussetzender Betrieb

f	= 93/186	93/186 Mc/s
V_a	= 400	250 V
V_{g2}	= 200	200 V
V_{g1}	= -175	-175 V
I_a	= 40	40 mA
I_{g2}	= 2,5	3 mA
I_{g1}	= 1,5	2 mA
V_{g1p}	= 220	230 V
W_{ig1}	= 0,3	0,42 W
W_{g2}	= 0,5	0,6 W
W_{1a}	= 16	10 W
W_a	= 8	5,1 W
W_o	= 8	4,9 W
η	= 50	49 %

L.F. class B amplifier and modulator, two systems in push-pull

Amplificatrice et modulatrice B.F. classe B, deux systèmes en push-pull

NF-Verstärker und Modulator Klasse B, zwei Systeme in Gegentakt

C.C.S. Limiting values, continuous service
Caractéristiques limites, service continu
Grenzdaten, Dauerbetrieb

V_a	= max.	600 V
W_{ia}	= max.	2×18 W
W_a	= max.	2×6 W
I_a	= max.	2×30 mA
V_{g2}	= max.	250 V
W_{g2}	= max.	7 W
$-V_{g1}$	= max.	200 V

C.C.S. Operating conditions, continuous service
Caractéristiques d'utilisation, service continu
Betriebsdaten, Dauerbetrieb

V_f	=	$6,3^1)$	$6,3^1)$	V
V_a	=	450	400	V
V_{g2}	=	200	200	V
V_{g1}	=	-24	-24	V
$R_{aa'}$	=	20	16	k Ω
$V_{g1g1'p}$	=	0 94	0 94	V
I_a	=	$2 \times 2,8$ $2 \times 32,5$	$2 \times 2,7$ 2×35	mA
I_{g2}	=	$2 \times 0,16$ 2×5	$2 \times 0,15$ $2 \times 5,3$	mA
I_{g1}	=	0 $2 \times 1,1$	0 $2 \times 1,3$	mA
W_{ia}	=	$2 \times 1,3$ $2 \times 14,6$	$2 \times 1,1$ 2×14	W
W_a	=	$2 \times 1,3$ $2 \times 5,6$	$2 \times 1,1$ $2 \times 5,5$	W
W_o	=	- 18	- 17	W
dt_{tot}	=	- 5	- 5	%
η	=	- 61,5	- 60,5	%

¹⁾ D.C. voltage
Tension directe
Gleichspannung

L.F. class B amplifier and modulator, two systems in push-pull; continued

Amplificatrice et modulatrice B.F. classe B, deux systèmes en push-pull; continuation

NF-Verstärker und Modulator Klasse B, zwei Systeme in Gegentakt; Fortsetzung

C.C.S. Operating conditions, continuous service
 Caractéristiques d'utilisation, service continu
 Betriebsdaten, Dauerbetrieb

V_f	=	6,3 ¹⁾	6,3 ¹⁾	V
V_a	=	350	250	V
V_{g2}	=	200	175	V
V_{g1}	=	-24	-20	V
R_{aa}	=	12	8	kΩ
$V_{g1g1'p}$	=	0 104	0 100	V
I_a	=	2x2,5 2x37,5	2x2,9 2x36	mA
I_{g2}	=	2x0,14 2x5,5	2x0,2 2x5	mA
I_{g1}	=	0 2x1,4	0 2x1,5	mA
W_{ia}	=	2x0,88 2x13,1	2x0,71 2x9	W
W_a	=	2x0,88 2x5,1	2x0,71 2x4,5	W
W_o	=	- 16	- 9	W
Δt_{tot}	=	- 5	- 5	%
η	=	- 61	- 50	%

¹⁾ Direct voltage
 Tension directe
 Gleichspannung

L.F. class B amplifier and modulator, two systems in push-pull; continued

Amplificatrice et modulatrice B.F. classe B, deux systèmes en push-pull; continuation

NF-Verstärker und Modulator Klasse B, zwei Systeme in Gegentakt; Fortsetzung

Limiting values, intermittent service

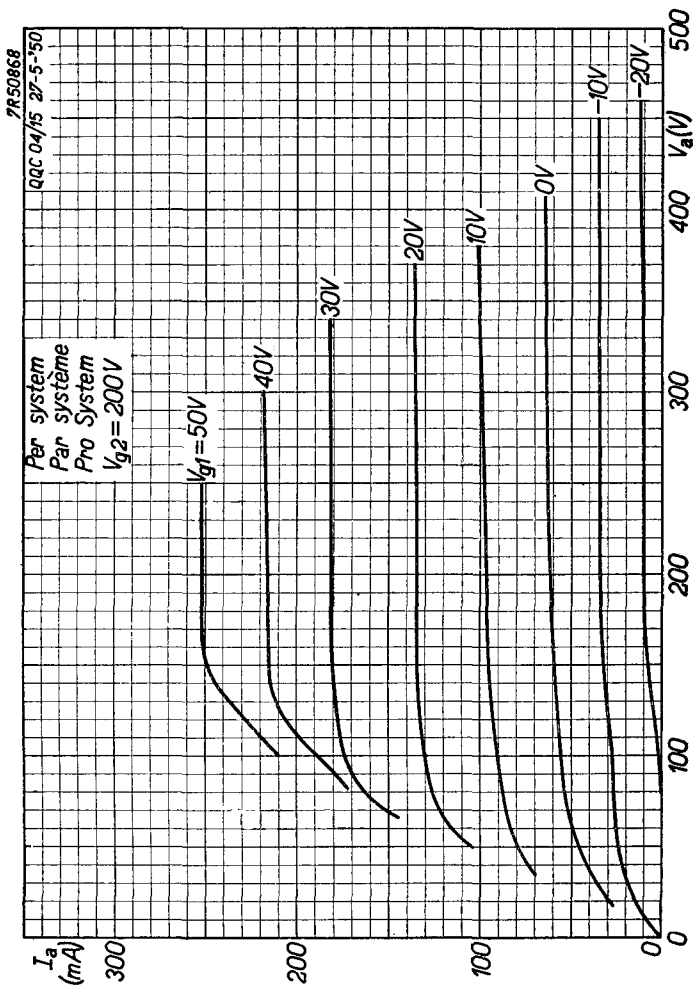
I.C.A.S. Caractéristiques limites, service intermittent
Grenzdaten, aussetzender Betrieb

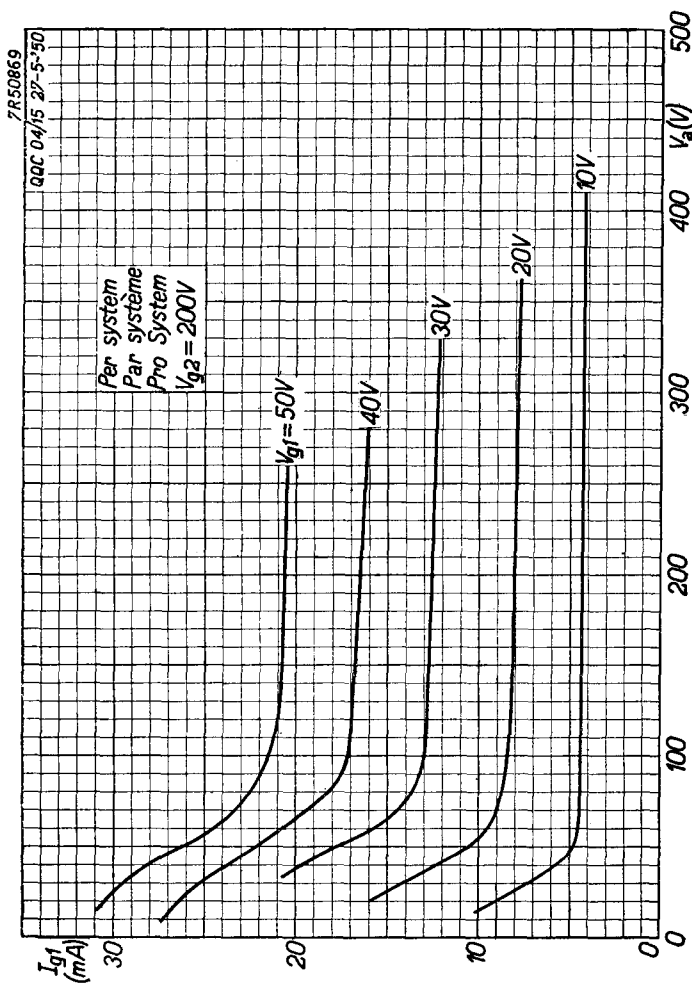
V_a	= max.	600 V
W_{1a}	= max.	2x24 W
W_a	= max.	2x8 W
I_a	= max.	2x40 mA
V_{g2}	= max.	250 V
W_{g2}	= max.	7 W
$-V_{g1}$	= max.	200 V

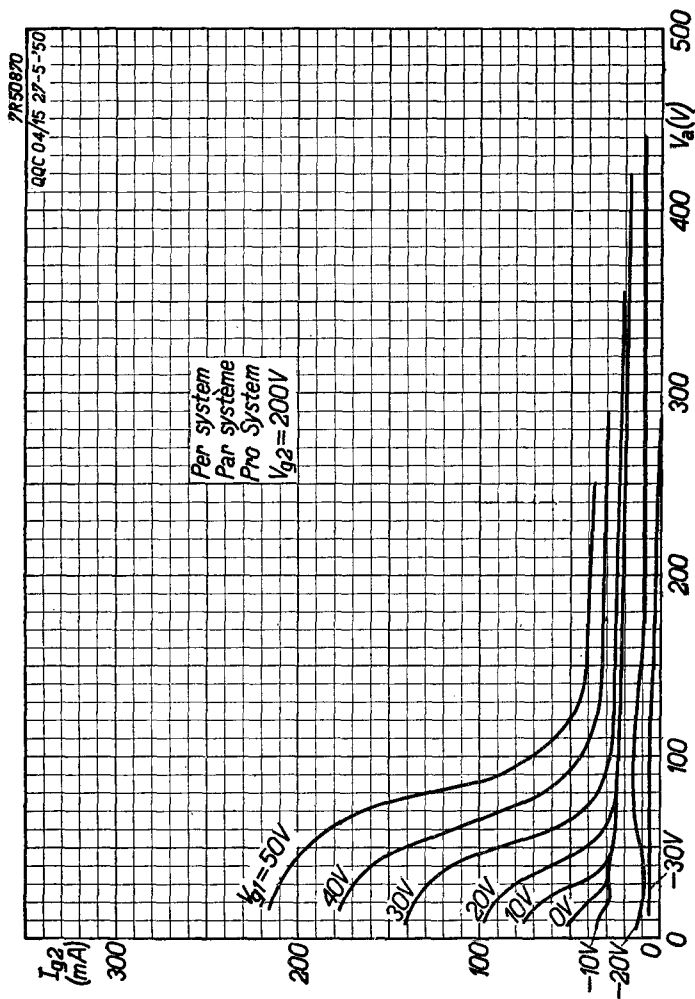
Operating conditions, intermittent service

I.C.A.S. Caractéristiques d'utilisation, service intermittent
Betriebsdaten, aussetzender Betrieb

V_f	=	6,3 ¹⁾	V
V_a	=	600	V
V_{g2}	=	200	V
V_{g1}	=	-24	V
$R_{aa'}$	=	25	k Ω
$V_{g1g1'p}$	=	0 85	V
I_a	=	2x3,0	2x33,5 mA
I_{g2}	=	2x0,18	2x4,5 mA
I_{g1}	=	0	2x1,2 mA
W_{1a}	=	2x1,8	2x20,1 W
W_a	=	2x1,8	2x6 W
W_o	=	0	28,2 W
d_{tot}	=	-	5 %
η	=	0	70 %

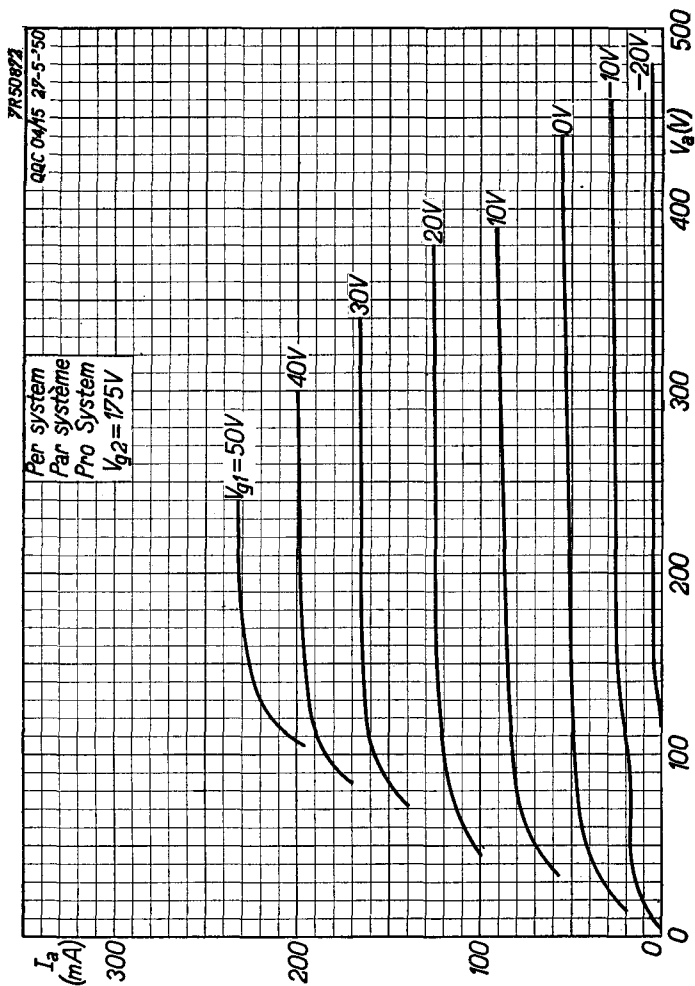


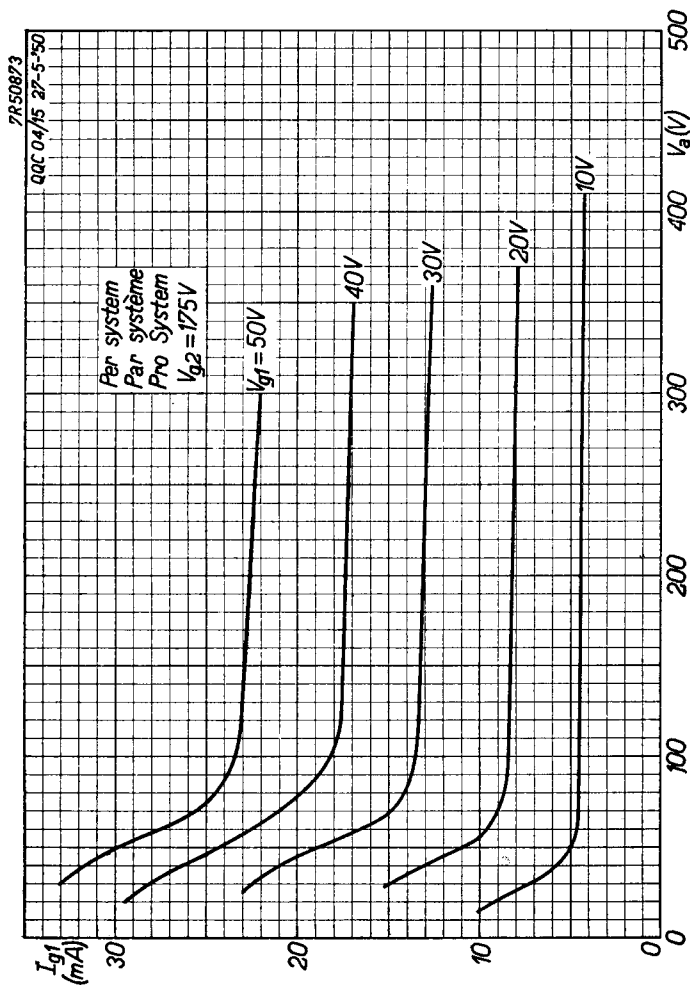


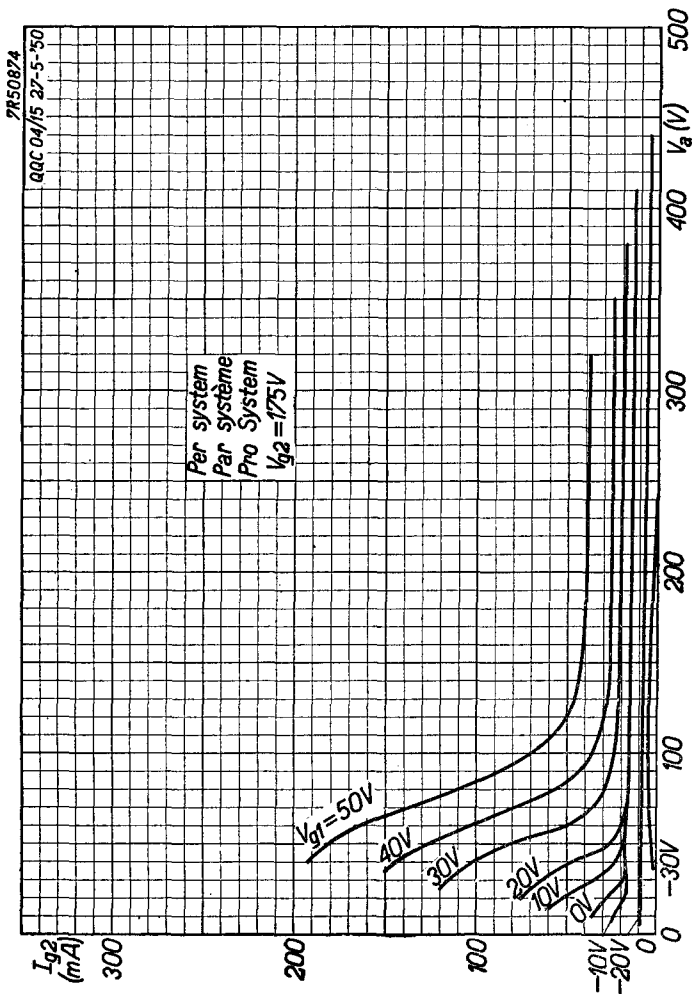


PHILIPS



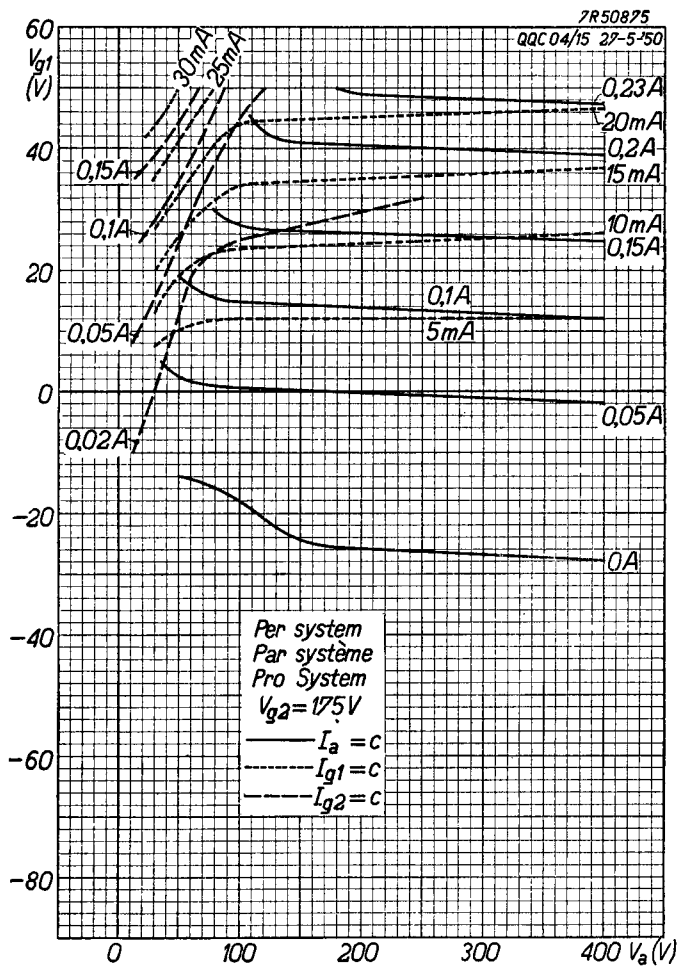


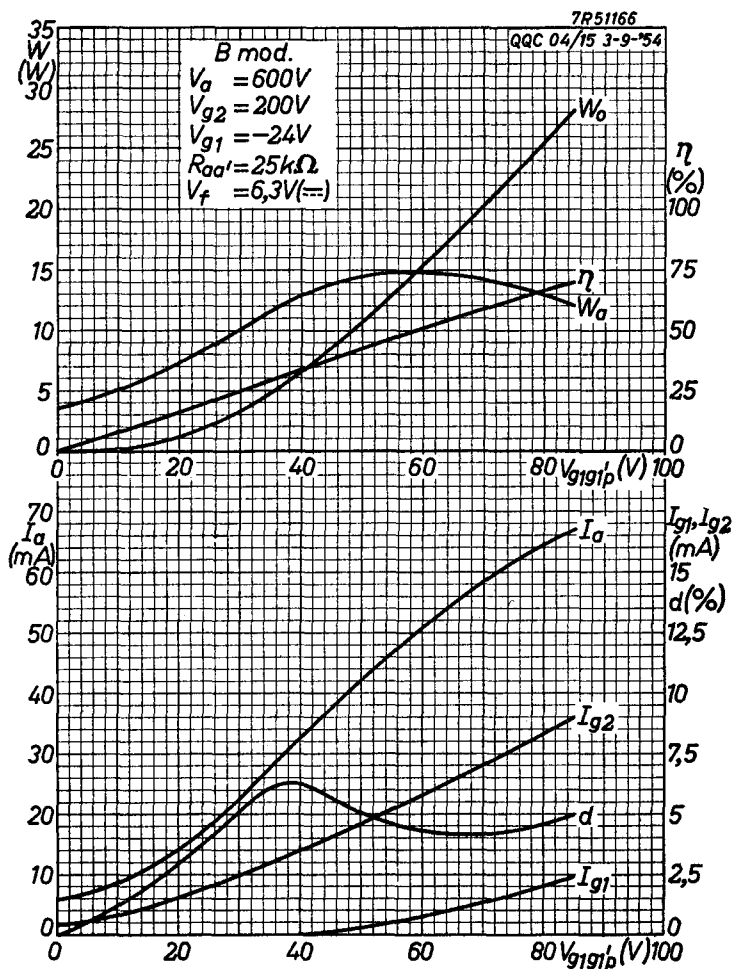


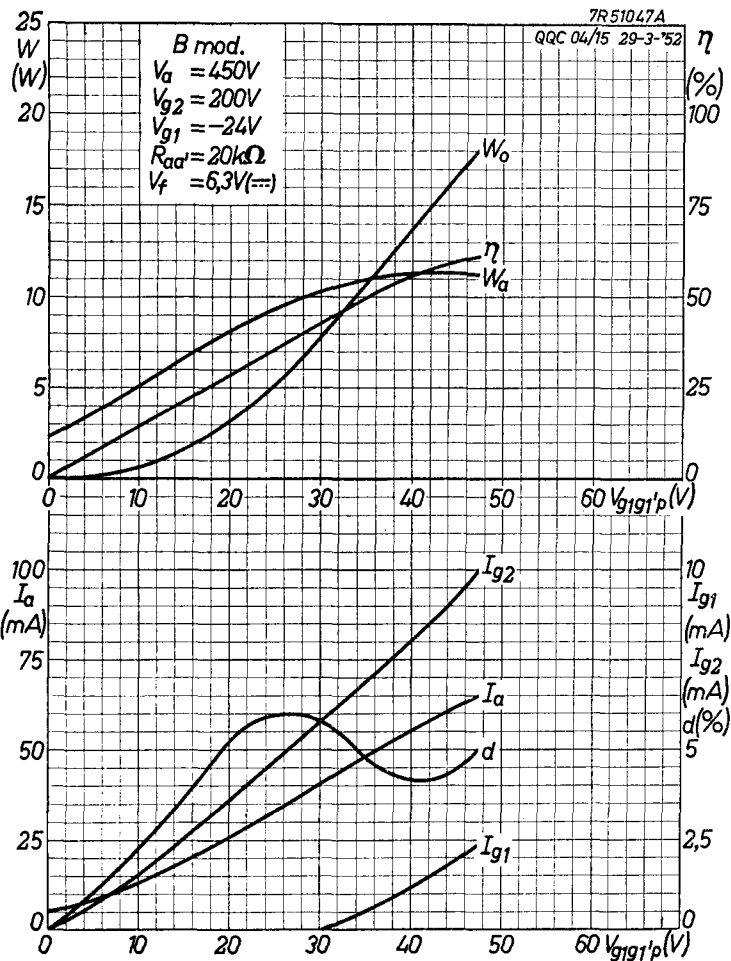


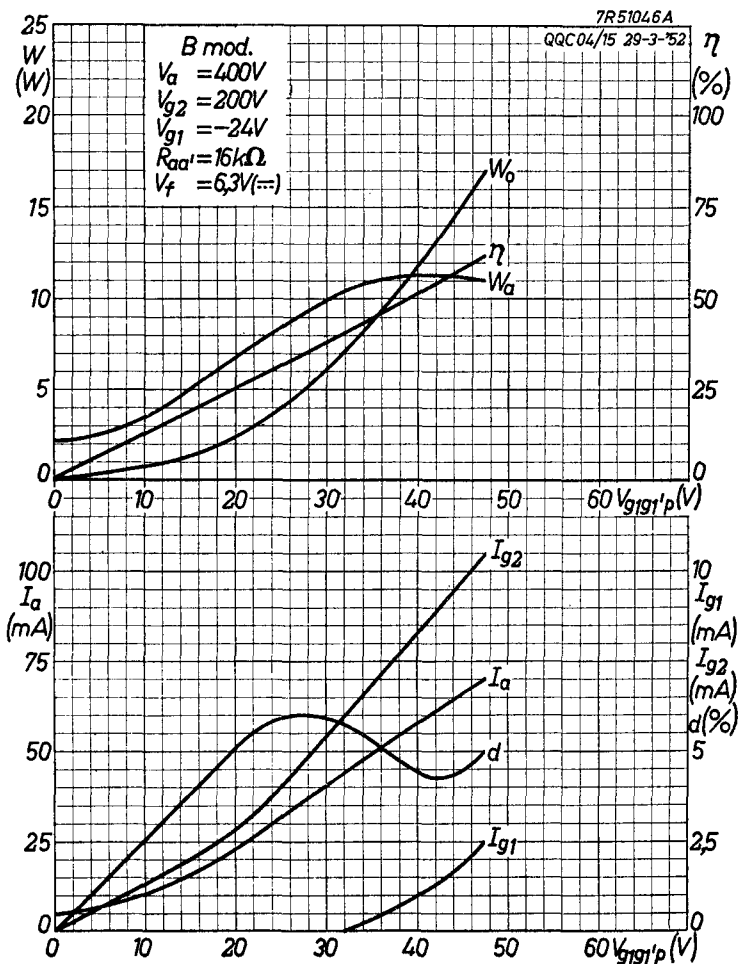
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PHILIPS



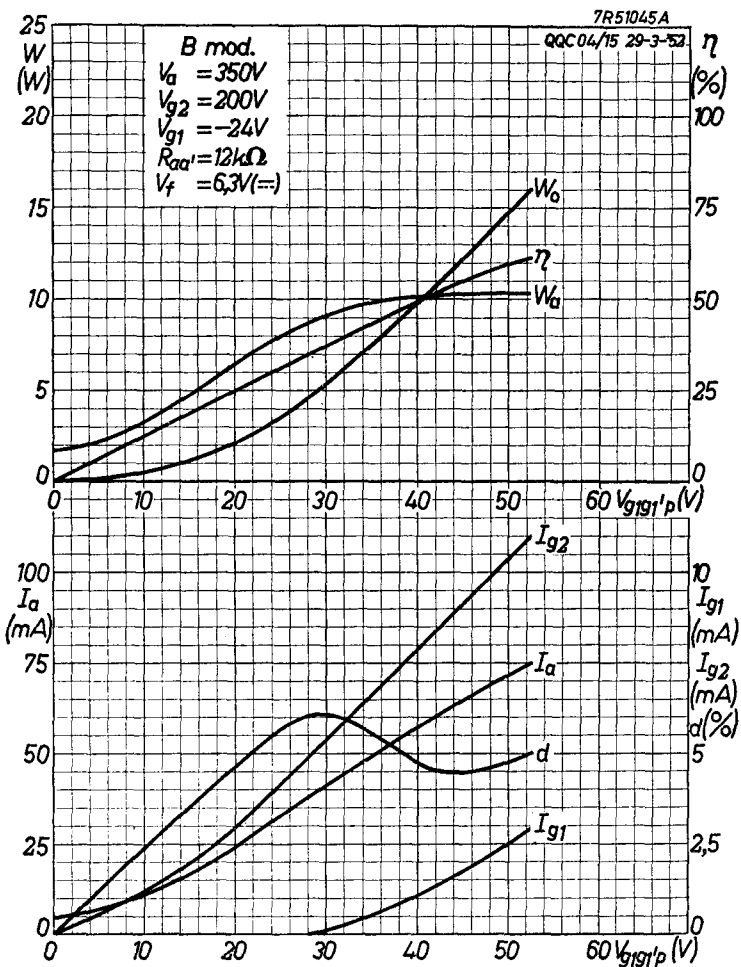


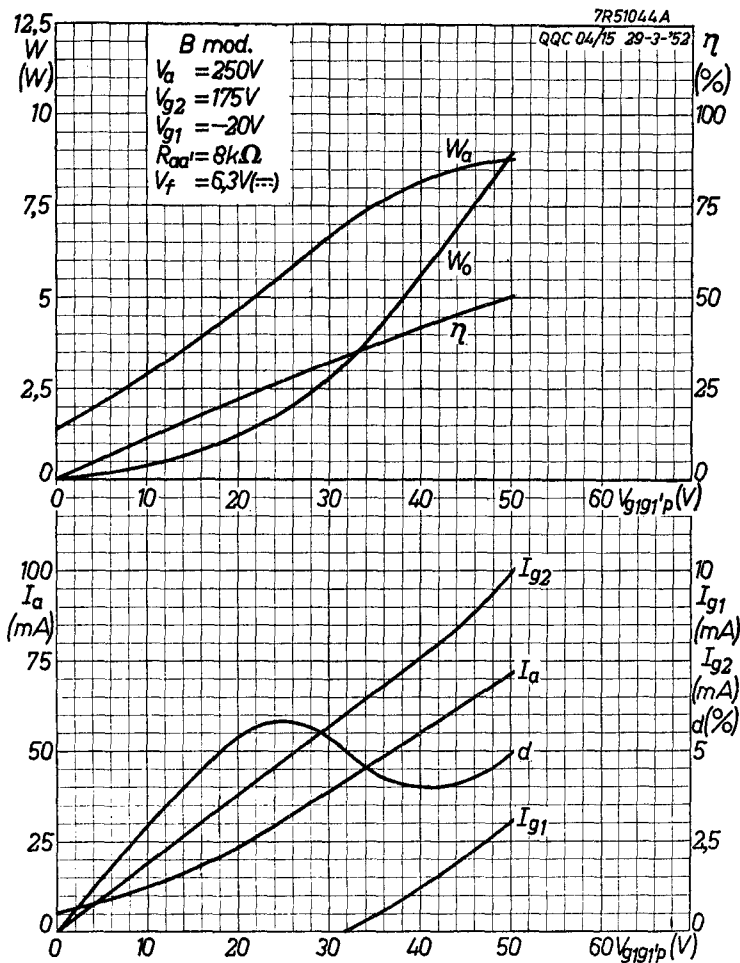


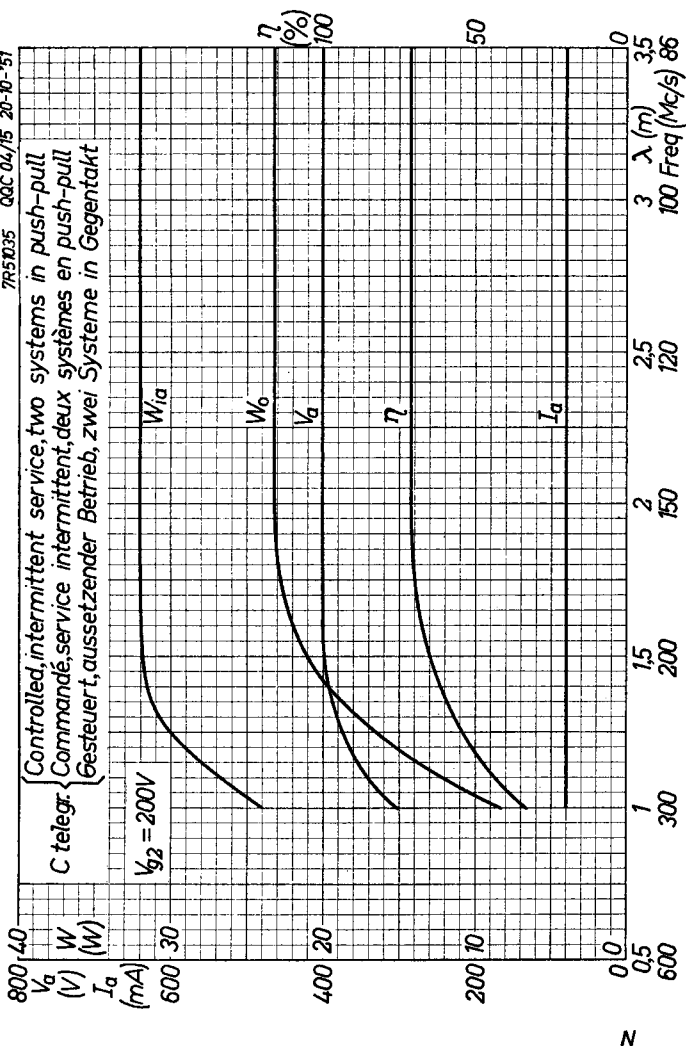


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PHILIPS









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29, 30	FP	1999.10.31