

**SQ****PHILIPS****E80CF**

SPECIAL QUALITY, LONG LIFE, RUGGEDISED TRIODE-PENTODE with separate cathode leads; the pentode section for use as mixer, R.F. or A.F. amplifier; the triode section for use as oscillator up to 300 Mc/s, multivibrator or blocking oscillator

TRIODE-PENTODE À HAUTE SÉCURITÉ, DE LONGUE DURÉE ET DE STRUCTURE RENFORCÉE avec des conducteurs de cathode séparés; la partie pentode pour utilisation comme tube mélangeur ou tube amplificateur H.F. ou B.F.; la partie triode comme oscillateur jusqu'à 300 MHz, multivibrateur ou oscillateur de blocage

ZUVERLÄSSIGE, STOSS- UND VIBRATIONSFESTE TRIODE-PENTODE MIT LANGER LEBENSDAUER und getrennten Katodenzuleitungen; der Pentodenteil zur Verwendung als Mischröhre oder HF- oder NF-Verstärkerröhre; der Triodenteil als Oszillator bis zu 300 MHz, Multivibrator oder Sperrschwinger

The E 80 CF will maintain its emission capabilities after long periods of operation under cut-off conditions

Le tube E 80 CF conservera son pouvoir d'émission après de longues périodes de fonctionnement dans la condition de cut-off

Diese Röhre behält ihre Emissionsfähigkeit auch nach langen Betriebsperioden in gesperrtem Zustand bei

Heating : indirect by A.C. or D.C.; parallel supply

Chauffage: indirect par C.A. ou C.C.; alimentation parallèle

Heizung : indirekt durch Wechsel- oder Gleichstrom; Parallelspeisung

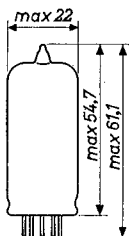
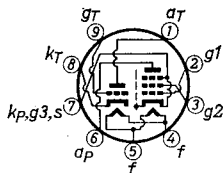
$$V_f = 6,3 \text{ V } ^1)$$

$$I_f = 330 \text{ mA}$$

Dimensions in mm

Dimensions en mm

Abmessungen in mm



Base, culot, Sockel: NOVAL

- <sup>1)</sup> In order to obtain a prolonged tube life, the maximum variation of  $V_f$  should be less than  $\pm 5\%$  (absolute limits) Afin d'obtenir une vie prolongée du tube, la variation maximum de  $V_f$  sera moins de  $\pm 5\%$  (limites absolues) Zur Verlängerung der Lebensdauer der Röhre darf die maximale Heizspannungsschwankung nicht mehr als  $\pm 5\%$  (absolute Werte) betragen

SPECIAL QUALITY, LONG LIFE, RUGGEDISED TRIODE-PENTODE with separate cathode leads; the pentode section is for use as mixer, R.F. or A.F. amplifier, the triode section for use as oscillator up to 300 Mc/s, multivibrator or blocking oscillator.

The E80CF is shock and vibration resistant and will maintain its emission capabilities after long periods of operation under cut-off conditions.

### HEATING

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

Heater voltage  $V_f = 6.3 \text{ V}$

Heater current  $I_f = 330 \text{ mA} \pm 5\%$

Remark. In order to obtain a prolonged tube life, the maximum variation of the heater voltage should be less than  $\pm 5\%$  (absolute limits).

### CAPACITANCES (the numbers denote tube pin numbers)

#### Pentode section

Grid No.1 to all other elements except anode	$C_{g1} =$	$5.6 \pm 0.4 \text{ pF}$ (pin 2 to 3+4+5+7)
Anode to all other elements except grid No.1	$C_a =$	$3.4 \pm 0.4 \text{ pF}$ (pin 6 to 3+4+5+7)
Anode to grid No.1	$C_{ag1}$ (6 to 2)	$< 0.025 \text{ pF}$
Grid No.1 to heater	$C_{g1f}$ (2 to 4+5)	$< 0.16 \text{ pF}$

#### Triode section

Grid to all other elements except anode	$C_g =$	$2.5 \pm 0.3 \text{ pF}$ (pin 9 to 4+5+7+8)
Anode to all other elements except grid	$C_a =$	$1.5 \pm 0.3 \text{ pF}$ (pin 1 to 4+5+7+8)
Anode to grid	$C_{ag}$ (1 to 9)	$= 1.5 \pm 0.3 \text{ pF}$
Grid to heater	$C_{gf}$ (9 to 4+5)	$< 0.22 \text{ pF}$

#### Between pentode and triode sections

Pentode anode to triode anode	$C_{aP-aT}$ (6 to 1)	$< 0.07 \text{ pF}$
Pentode anode to triode grid	$C_{aP-gT}$ (6 to 9)	$< 0.02 \text{ pF}$
Pentode grid No.1 to triode anode	$C_{g1P-aT}$ (2 to 1)	$< 0.16 \text{ pF}$

### REMARK

It is recommended to employ the triode in a Colpitts type of circuit and not in a Hartley type

Capacitances (numbers denote pin numbers)  
 Capacités (les chiffres indiquent les numéros des broches)  
 Kapazitäten (die Ziffern geben die Stiftennummern an)

Pentode section  
 Partie pentode  
 Pentodenteil

Triode section  
 Partie triode  
 Triodenteil

$C_{g1}$ (2-3+4+5+7) = 5,2 pF	$C_g$ (9-4+5+7+8) = 2,5 pF
$C_a$ (6-3+4+5+7) = 3,4 pF	$C_a$ (1-4+5+7+8) = 1,5 pF ←
$C_{ag1}$ (6-2) < 0,025 pF	$C_{ag}$ (1-9) = 1,5 pF
$C_{g1f}$ (2-4+5) < 0,160 pF	$C_{gf}$ (9-4+5) < 0,220 pF

Between pentode and triode sections  
 Entre les parties pentode et triode  
 Zwischen Pentoden- und Triodenteile

$C_{aP-aT}$ (6-1) < 0,07 pF
$C_{aP-gT}$ (6-9) < 0,02 pF
$C_{g1P-aT}$ (2-1) < 0,16 pF

Typical characteristics  
 Caractéristiques types  
 Kenndaten

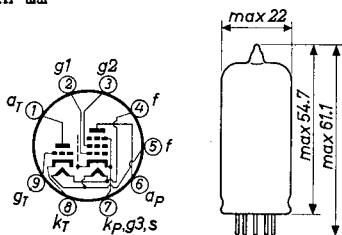
Pentode section  
 Partie pentode  
 Pentodenteil

Triode section  
 Partie triode  
 Triodenteil

$V_{ba}$ = 170 V	$V_{ba}$ = 100 V
$V_{bg2}$ = 170 V	$R_k$ = 120 $\Omega$ ←
$R_k$ = 155 $\Omega$	$I_a$ = 14 mA <sup>1)</sup>
$I_a$ = 10 mA <sup>1)</sup>	$S$ = 5 mA/V <sup>1)</sup>
$I_{g2}$ = 2,8 mA	$-I_g$ ≤ 0,3 $\mu$ A <sup>1)</sup>
$S$ = 6,2 mA/V <sup>1)</sup>	$\mu$ = 18 ←
$\mu_{g2g1}$ = 40	
$R_i$ = 0,4 M $\Omega$	
$-I_{g1}$ ≤ 0,3 $\mu$ A <sup>1)</sup>	←

<sup>1)</sup> See page 6; voir page 6; siehe Seite 6

Dimensions in mm



Base: NOVAL

TYPICAL CHARACTERISTICSPentode section

Anode supply voltage	$V_{ba}$	=	170 V
Grid No.2 supply voltage	$V_{bg2}$	=	170 V
Cathode resistor	$R_k$	=	155 $\Omega$
Anode current	$I_a$	=	$10 \pm 2.5$ mA
Grid No.2 current	$I_{g2}$	=	$2.8 \pm 1.25$ mA
Mutual conductance	$S$	=	$6.2 \pm 1.0$ mA/V
Amplification factor of grid No.2 with respect to grid No.1	$\mu_{g2g1}$	=	40
Internal resistance	$R_i$	=	0.4 M $\Omega$
		>	0.26 M $\Omega$
Negative grid No.1 current	$-I_{g1}$	= max.	0.5 $\mu$ A

Triode section

Anode supply voltage	$V_{ba}$	=	100 V
Cathode resistor	$R_k$	=	120 $\Omega$
Anode current	$I_a$	=	$14 \pm 4.0$ mA
Mutual conductance	$S$	=	$5.0 \pm 1.0$ mA/V
Amplification factor	$\mu$	=	18
Negative grid current	$-I_g$	= max.	0.5 $\mu$ A

MICROPHONY

The pentode section can be used without special precautions against microphonic effect in circuits in which the input voltage  $\geq 50$  mV for an output of 50 mW of the output stage.

Operating characteristics for use as frequency changer  
 Caractéristiques d'utilisation pour utilisation comme  
 changeuse de fréquence

Betriebsdaten zur Verwendung als Mischröhre

V <sub>ba</sub>	= 170 V
V <sub>bg2</sub>	= 170 V
R <sub>g1</sub>	= 0,1 MΩ
R <sub>k</sub>	= 330 Ω
V <sub>osc</sub>	= 3,5 V <sub>eff</sub>
I <sub>a</sub>	= 8 mA
I <sub>g2</sub>	= 2,5 mA
I <sub>g1</sub>	= 12 μA
S <sub>c</sub>	= 2,3 mA/V
R <sub>i</sub>	= 0,5 kΩ

Note : It is recommended to employ the triode in a Colpitts type of circuit and not in a Hartley type

Note : Il est recommandé d'utiliser la triode dans un montage Colpitts et ne pas dans un montage Hartley

Bemerkung: Es wird empfohlen die Triode in einer Colpitts-schaltung und nicht in einer Hartleyschaltung zu verwenden

Operating characteristics of the pentode section for use as R.F. amplifier

Caractéristiques d'utilisation de la partie pentode comme amplificateur H.F.

Betriebsdaten des Pentodenteils als HF-Verstärker

V <sub>ba</sub>	= 170 V
V <sub>bg2</sub>	= 170 V
R <sub>k</sub>	= 155 Ω
I <sub>a</sub>	= 10 mA
I <sub>g2</sub>	= 2,8 mA
S	= 6,2 mA/V
μ <sub>g2g1</sub>	= 40
R <sub>i</sub>	= 0,4 MΩ
r <sub>g1</sub> (f = 50 Mc/s)	= 10 kΩ
Req	= 1,5 kΩ

LIFE EXPECTANCY: 10 000 hours

The end point of life is reached when under the conditions mentioned under "Typical characteristics" one or more of the characteristics have changed to the following values:

Pentode section

Anode current	$I_a$	→	6 mA
Mutual conductance	S	→	4.3 mA/V
Negative grid No.1 current	$-I_{g1}$	→	1 $\mu$ A

Triode section

Anode current	$I_a$	→	8.4 mA
Mutual conductance	S	→	3.5 mA/V
Negative grid current	$-I_g$	→	1 $\mu$ A

OPERATING CHARACTERISTICS of the pentode section as R.F. amplifier

Anode supply voltage	$V_{ba}$	=	170 V
Grid No.2 supply voltage	$V_{bg2}$	=	170 V
Cathode resistor	$R_k$	=	155 $\Omega$
Anode current	$I_a$	=	10 mA
Grid No.2 current	$I_{g2}$	=	2.8 mA
Mutual conductance	S	=	6.2 mA/V
Amplification factor of grid No.2 with respect to grid No.1	$\mu_{g2g1}$	=	40
Internal resistance	$R_i$	=	0.4 M $\Omega$
Input resistance at 50 Mc/s	$r_{g1}$ (f=50 Mc/s)	=	10 k $\Omega$
Equivalent noise resistance	$R_{eq}$	=	1.5 k $\Omega$

OPERATING CHARACTERISTICS of the pentode section as mixer

Anode supply voltage	$V_{ba}$	=	170 V
Grid No.2 supply voltage	$V_{bg2}$	=	170 V
Grid No.1 resistor	$R_{g1}$	=	0.1 M $\Omega$
Cathode resistor	$R_k$	=	330 $\Omega$
Oscillator voltage	$V_{osc}$	=	3.5 V (RMS)
Anode current	$I_a$	=	8 mA
Grid No.2 current	$I_{g2}$	=	2.5 mA
Grid No.1 current	$I_{g1}$	=	12 $\mu$ A
Conversion conductance	$S_c$	=	2.4 mA/V
Internal resistance	$R_i$	=	0.5 M $\Omega$

The pentode section of this tube can be used without special precautions against microphonic effect in A.F. circuits in which the input voltage  $V_i \geq 50$  mV for an output of 50 mW of the output tube

La partie pentode de ce tube peut être utilisé sans précautions spéciales contre l'effet microphonique dans des circuits B.F. dont la tension d'entrée  $V_i \geq 50$  mV pour une puissance de 50 mW du tube de sortie

Der Pentodenteil dieser Röhre darf ohne spezielle Massnahmen gegen Mikrophonie in NF-Schaltungen, die für eine Eingangsspannung  $V_i \geq 50$  mV eine Leistung von 50 mW der Endröhre ergeben, verwendet werden

Shock resistance: about 500 g<sup>2</sup>)

Forces as applied by the NRL impact machine for electronic devices caused by 5 blows of the hammer, lifted over an angle of 30° in each of four different positions of the tube

Vibration resistance: 2.5 g<sup>2</sup>)

Vibrational forces for a period of 32 hours at a frequency of 25 c/s in each of 3 positions of the tube

Résistance aux chocs: environ 500 g<sup>2</sup>)

Des forces telles que celles appliquée par la machine à chocs NRL pour dispositifs électroniques, produites par 5 coups du marteau, soulevé d'un angle de 30° dans chacune de quatre positions différentes

Résistance aux vibrations: 2,5 g<sup>2</sup>)

Des forces de vibration pendant une période de 32 heures à une fréquence de 25 Hz dans chacune de trois positions du tube

Stossfestigkeit: etwa 500 g<sup>2</sup>)

Stossbeschleunigungen gemäss NRL-Stossmaschine für elektronische Geräte, verursacht durch 5 Schläge des Hammers, der in jeder von vier verschiedenen Positionen der Röhre über einen Winkel von 30° gehoben wird

Vibrationsfestigkeit: 2,5 g<sup>2</sup>)

Vibrationskräfte während einer Periode von 32 Stunden bei einer Frequenz von 25 Hz in jeder von 3 Stellungen der Röhre

Limiting values of the triode section (Absolute limits)

Caractéristiques limites de la partie triode (Limites absolues)

Grenzdaten des Triodenteils (Absolute Grenzwerte)

$V_{ao}$ = max. 550 V	$I_k$ = max. 18 mA
$V_a$ = max. 275 V	$I_{kp}$ = max. 100 mA <sup>3)</sup>
$W_a$ = max. 1,75 W	$R_g$ = max. 0,5 MΩ
$V_{gp}$ = max. 30 V <sup>3)</sup>	$V_{kf}$ = max. 100 V
$W_g$ = max. 0,1 W	

<sup>2)</sup><sup>3)</sup> See page 5; voir page 5; siehe Seite 5

SHOCK RESISTANCE: about 500 g<sup>1)</sup>

Forces as applied by the NRL impact machine for electronic devices caused by 5 blows of the hammer lifted over an angle of 30° in each of four different positions of the tube

VIBRATION RESISTANCE: 2.5 g<sup>1)</sup>

Vibrational forces for a period of 32 hours at a frequency of 50 c/s in each of three directions.

LIMITING VALUES (Absolute limits)

Bulb temperature  $t_{bulb} = \text{max. } 170^{\circ}\text{C}$

Triode section

Anode voltage in cold condition	$V_{a0} = \text{max. } 550\text{ V}$
Anode voltage	$V_a = \text{max. } 275\text{ V}$
Anode dissipation	$W_a = \text{max. } 1.75\text{ W}$
Grid dissipation	$W_g = \text{max. } 0.1\text{ W}$
Peak positive grid voltage	$+V_{gp} = \text{max. } 30\text{ V}^2)$
Negative grid voltage	$-V_g = \text{max. } 100\text{ V}$
Grid circuit resistance	$R_g = \text{max. } 0.5\text{ M}\Omega$
Cathode current	$I_k = \text{max. } 18\text{ mA}$
Peak cathode current	$I_{kp} = \text{max. } 100\text{ mA}^2)$
Voltage between cathode and heater	$V_{kf} = \text{max. } 100\text{ V}$

Pentode section

Anode voltage in cold condition	$V_{a0} = \text{max. } 550\text{ V}$
Anode voltage	$V_a = \text{max. } 275\text{ V}$
Anode dissipation	$W_a = \text{max. } 2.15\text{ W}$
Grid No.2 voltage in cold condition	$V_{g20} = \text{max. } 550\text{ V}$
Grid No.2 voltage when cathode current higher than 10 mA	$V_{g2}(I_k > 10\text{ mA}) = \text{max. } 200\text{ V}$
Grid No.2 voltage when cathode current lower than 10 mA	$V_{g2}(I_k < 10\text{ mA}) = \text{max. } 225\text{ V}$

<sup>1)</sup> These test conditions are only given for evaluation of the ruggedness of the tube and should by no means be interpreted as suitable operating conditions.

<sup>2)</sup> Max. pulse duration 4 % of a cycle, with a maximum of 0.8 msec.



Limiting values of the pentode section (Absolute limits)  
 Caractéristiques limites de la partie pentode (Limites  
 absolues)

Grenzdaten des Pentodenteiles (Absolute Grenzwerte)

$V_{a0}$	= max.	550 V
$V_a$	= max.	275 V
$W_a$	= max.	2,15 W
$V_{g20}$	= max.	550 V
$V_{g2}$ ( $I_k > 10$ mA)	= max.	200 V
$V_{g2}$ ( $I_k < 10$ mA)	= max.	225 V
$W_{g2}$ ( $W_a > 1,2$ W)	= max.	0,7 W
$W_{g2}$ ( $W_a < 1,2$ W)	= max.	0,8 W
$I_k$	= max.	18 mA
$R_{g1}$	= max.	1 M $\Omega$ <sup>4)</sup>
$R_{g1}$	= max.	0,5 M $\Omega$ <sup>5)</sup>
$V_{kf}$	= max.	100 V
$t_{bulb}$	= max.	170 °C

- 2) These test conditions are only given for evaluation of the ruggedness of the tube. They are by no means to be interpreted as suitable operating conditions

Ces conditions d'essai sont données seulement pour l'évaluation de la robustesse du tube. En aucune manière elles ne doivent être interprétées comme des conditions de fonctionnement normales

Diese Prüfbedingungen dienen lediglich zur Beurteilung der Robustheit der Röhre und sind keinesfalls als geeignete Betriebsbedingungen aufzufassen

- 3) Max. pulse duration 4 % of a cycle with a maximum of 0,8 msec

Durée max. d'impulsion 4 % d'une période avec un maximum de 0,8 msec

Impulszeit max. 4 % einer Periode mit einem Maximum von 0,8 msec

- 4) With automatic grid bias  
 Avec polarisation négative automatique  
 Mit automatischer Gittervorspannung

- 5) With fixed grid bias  
 Avec polarisation négative fixe  
 Mit fester Gittervorspannung

LIMITING VALUES (Absolute limits; continued)Pentode section (continued)

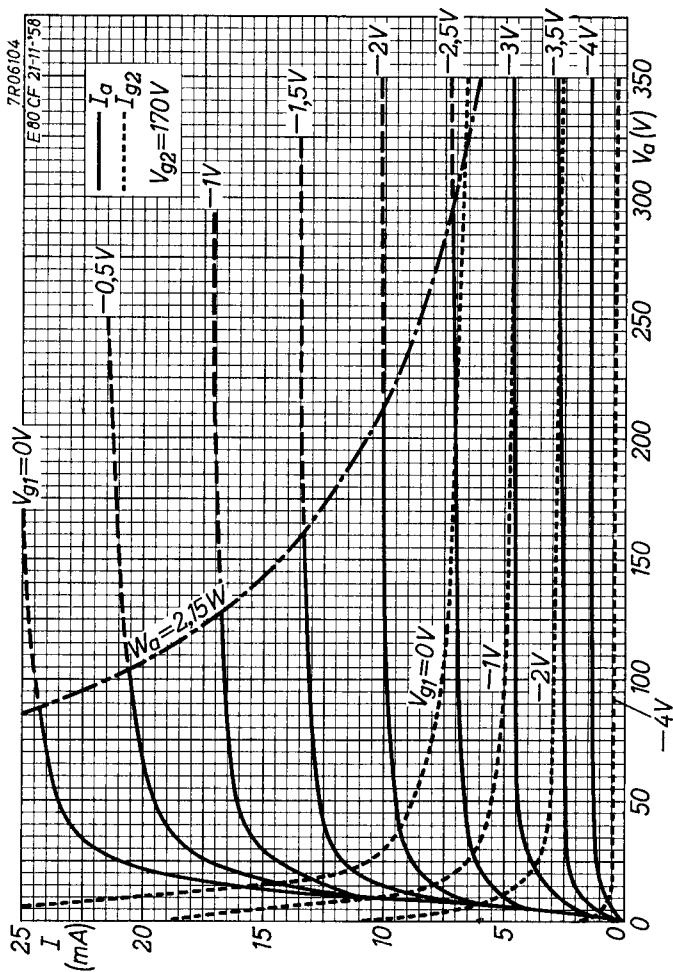
Grid No.2 dissipation when anode dissipation higher than 1.2 W	$W_{G2}(W_a > 1.2 \text{ W})$	= max. 0.7 W
Grid No.2 dissipation when anode dissipation lower than 1.2 W	$W_{G2}(W_a < 1.2 \text{ W})$	= max. 0.8 W
Grid No.1 dissipation	$W_{G1}$	= max. 0.1 W
Negative grid No.1 voltage	$-V_{G1}$	= max. 100 V
Grid No.1 circuit re- sistance with automa- tic bias	$R_{G1}$	= max. 1 M $\Omega$
Grid No.1 circuit re- sistance with fixed bias	$R_{G1}$	= max. 0.5 M $\Omega$
Cathode current	$I_k$	= max. 18 mA
Voltage between cathode and heater	$V_{kf}$	= max. 100 V

1) The end point of life is reached when one or more of these characteristics have changed to the following values:

Le tube est arrivé à la fin de sa durée si une ou quelques-unes de ces caractéristiques sont changées jusqu'aux valeurs suivantes:

Das Ende der Lebensdauer ist erreicht, wenn eine oder mehrere dieser Kennwerte bis folgende Werte geändert sind:

<u>Pentode</u>		<u>Triode</u>	
$I_a$	< 6 mA	$I_a$	< 8,4 mA
S	< 4,3 mA/V	S	< 3,5 mA
$-I_{g1}$	$\geq$ 1 $\mu$ A	$-I_g$	$\geq$ 1 $\mu$ A

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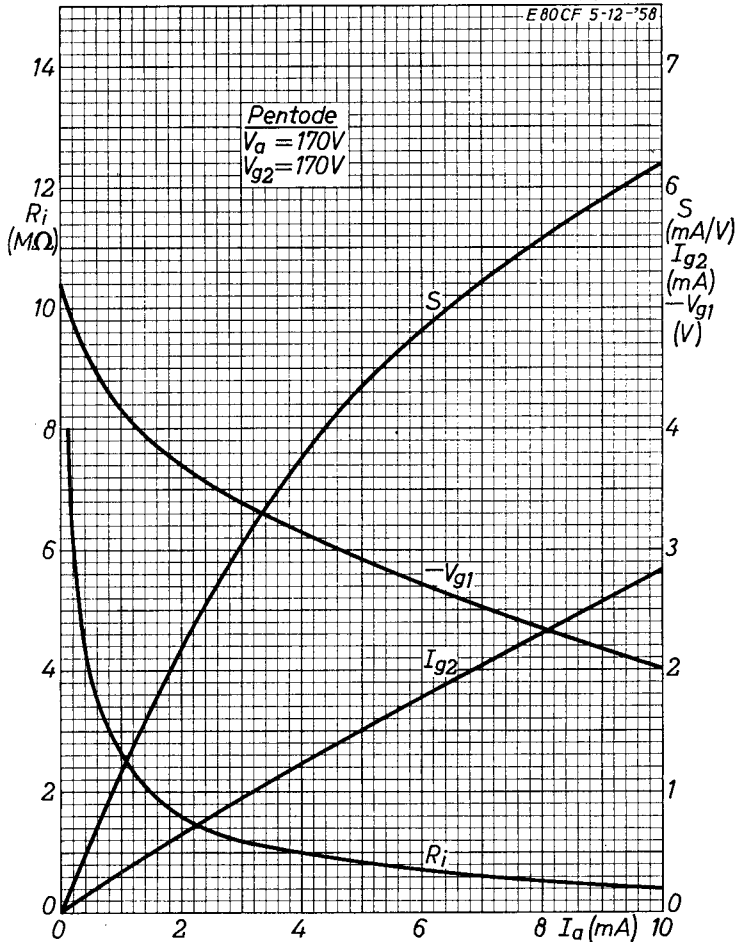
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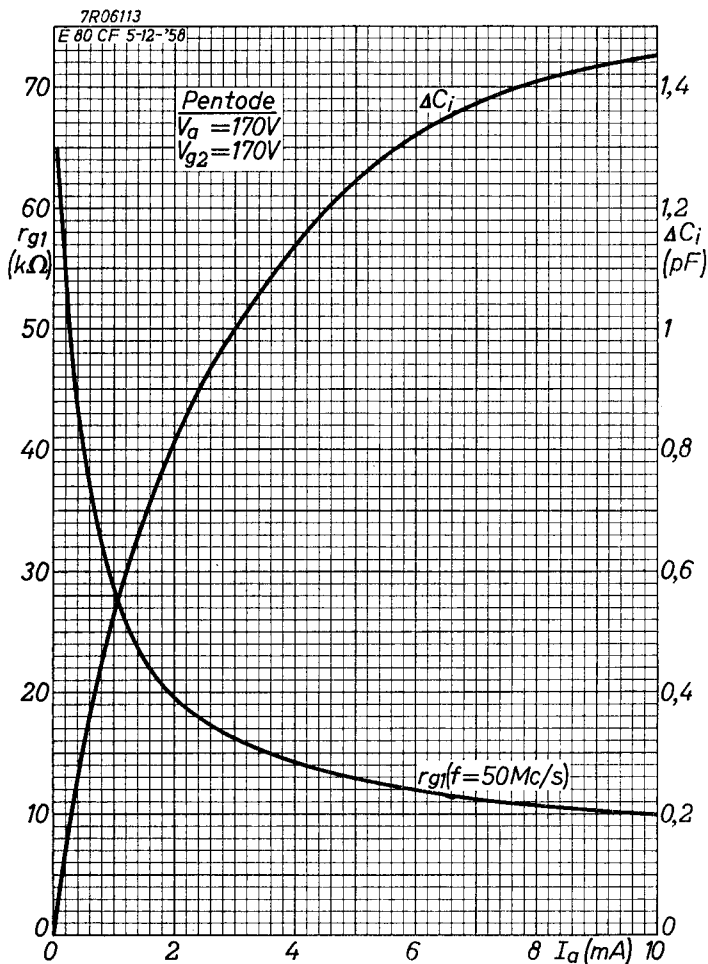
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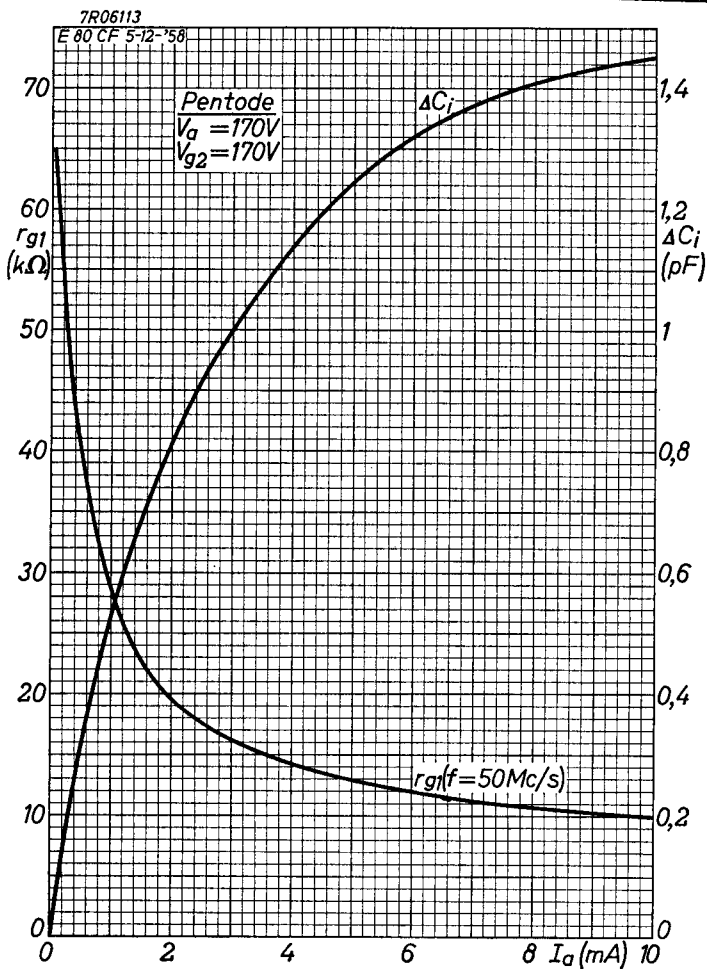


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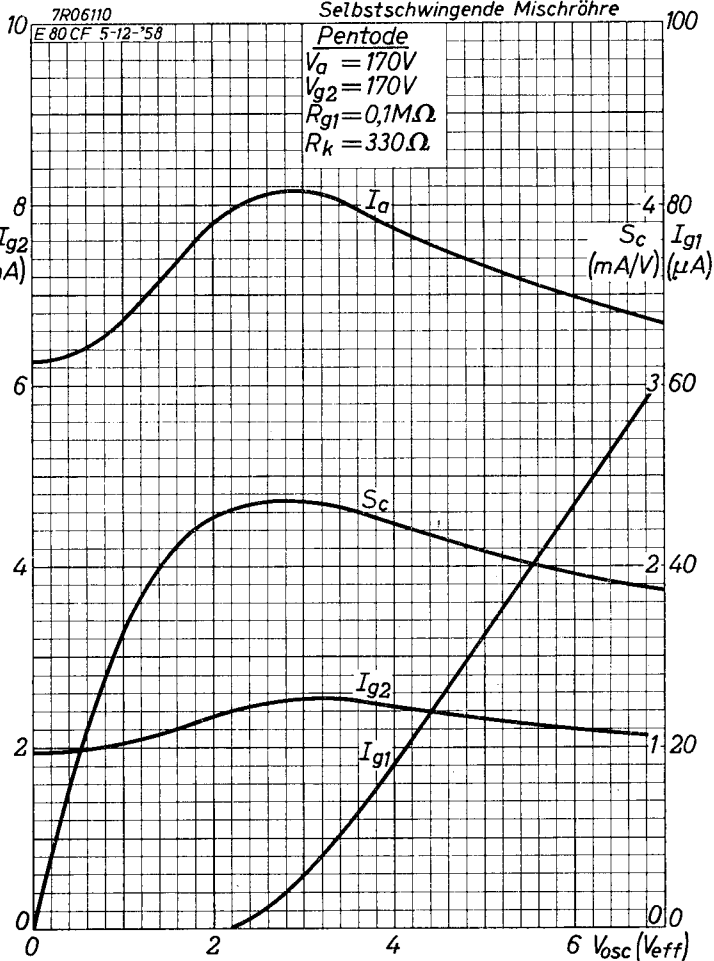
**SQ****PHILIPS****E 80 CF**

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**E80CF****PHILIPS****SQ**

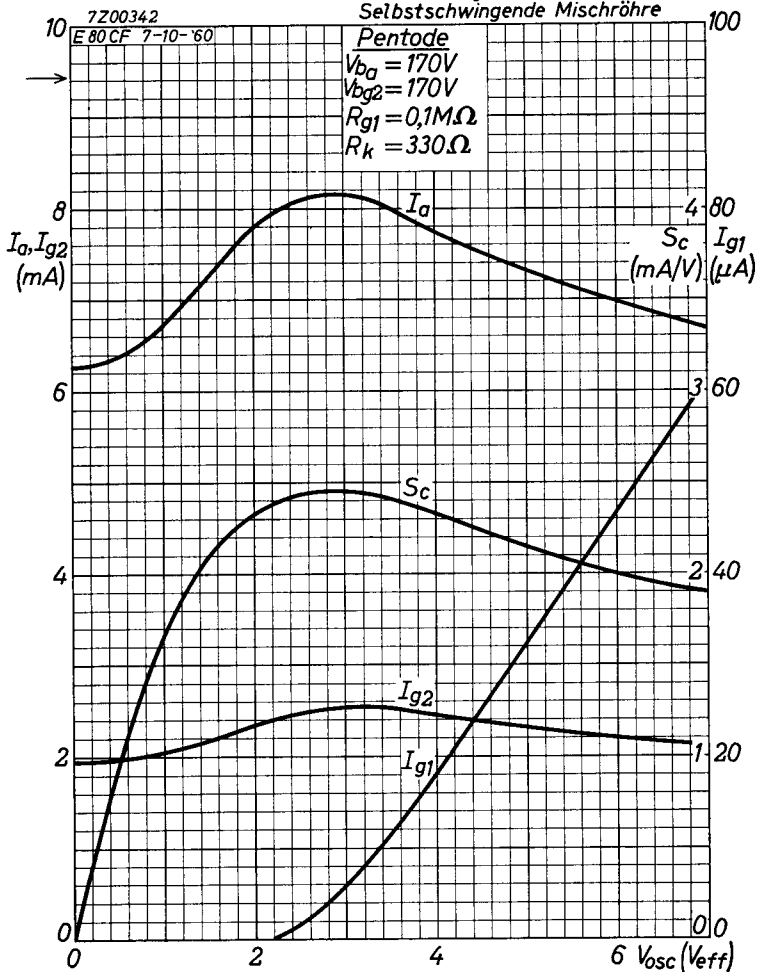
Self-oscillating frequency-changer  
Tube mélangeur auto-oscillateur  
Selbstschwingende Mischröhre





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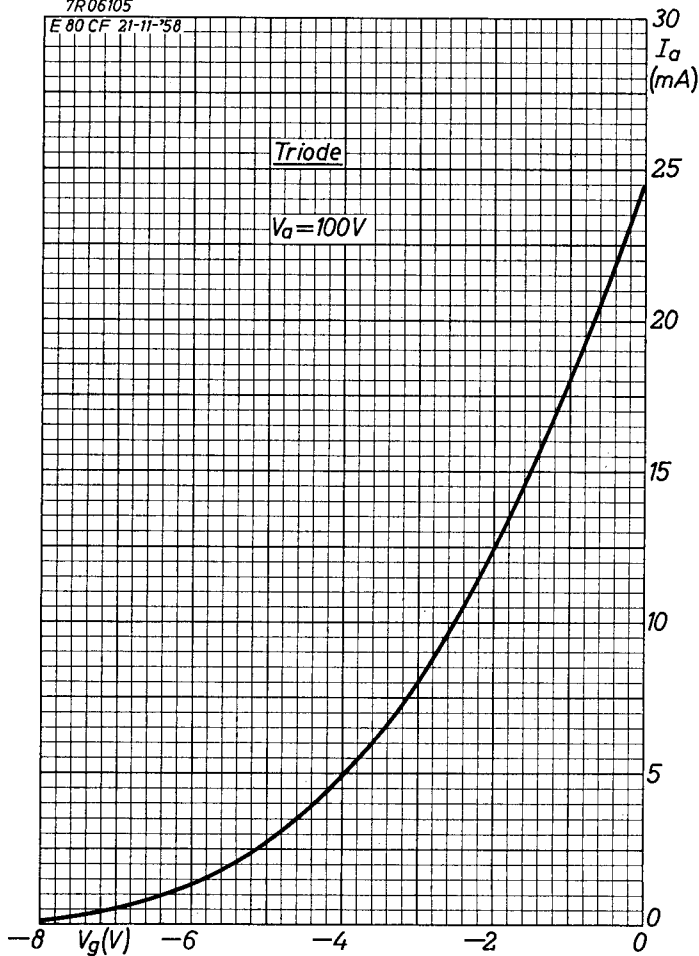
Self-oscillating frequency-changer  
Tube mélangeur auto-oscillateur  
Selbstschwingende Mischröhre



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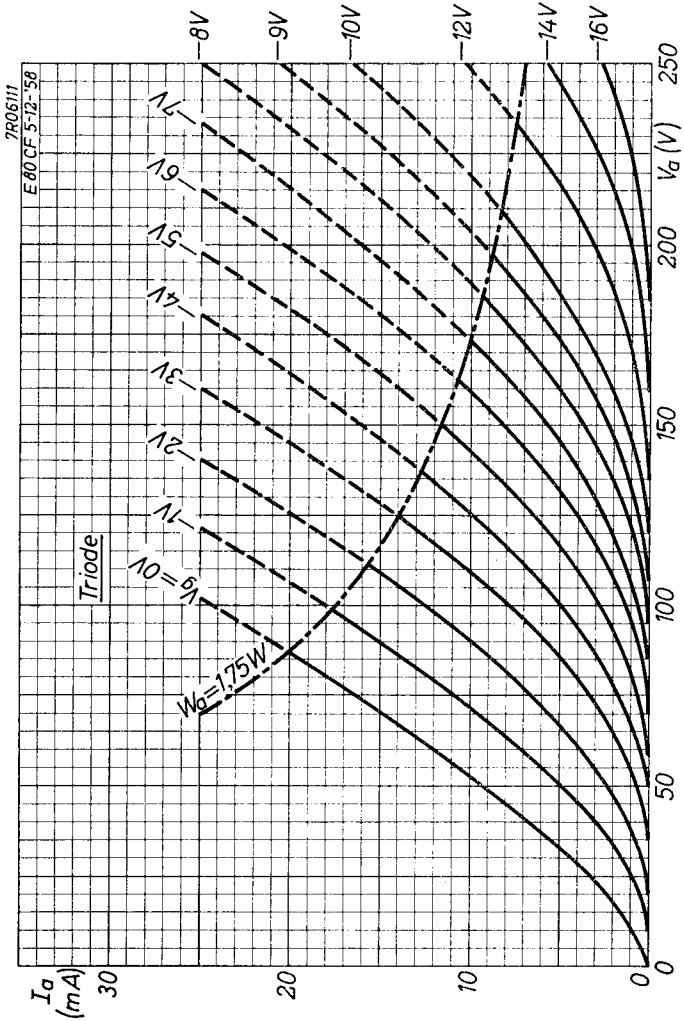
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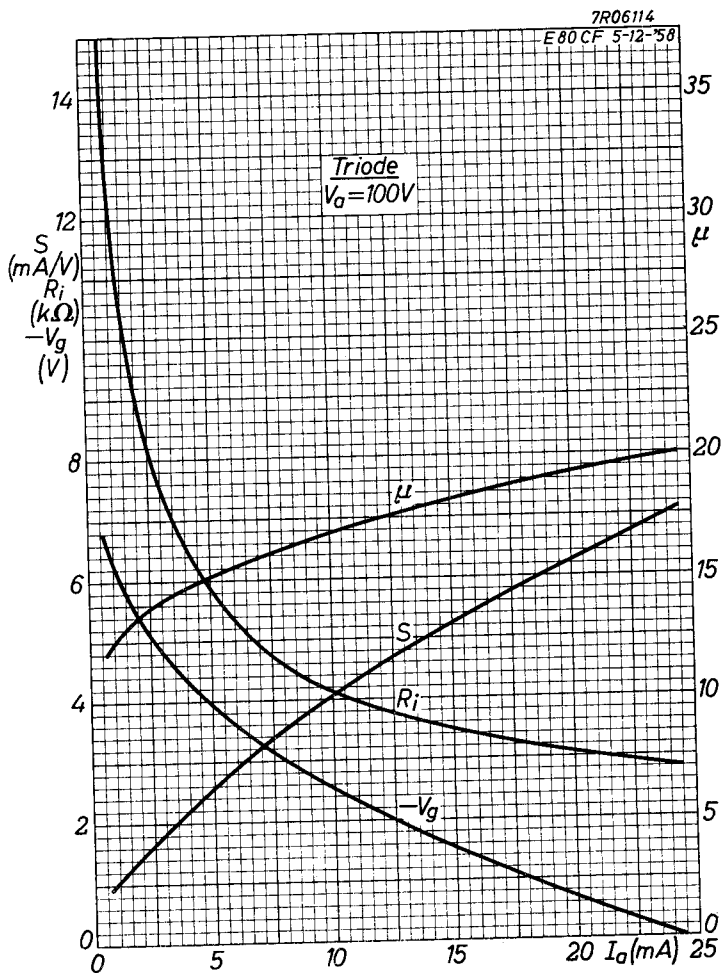
E

# E80CF

# PHILIPS

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12.12.1958

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**PHILIPS**

*Electronic  
Tube*

**HANDBOOK**

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