PHILIPS HANDBOOK

electron tubes

VOLUME I

NATUURKUNDIG LABORATORIUM
AFDELING
TECHNISCHE NATUURKUNDE
RIJKSUNIVERSITEIT GRONINGEN

GENERAL SECTION

PHILIPS

ELECTRONIC

TUBE

DIVISION

GENERAL INDEX; INDEX GENERAL; ALLGEMEINER INDEX;

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The inclusion of a type number in this list does not necessarily imply its availability
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Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
AA119	Sem	Dio	ADZ11	Sem	Tra
AAZ12	Sem	Dio	ADZ12	Sem	Tra
AAZ13	Sem	Dio	AF21-80	II/III	C/M
AAZ15	Sem	Dio	AF36-48	II/III	C/M
AAZ17	Sem	Dio	AF102	Sem	Tra
AAZ18	Sem	Dio	AF114	Sem	Tra
AC107	Sem	Tra	AF115	Sem	Tra
AC125	Sem	Tra	AF116	Sem	Tra
AC126	Sem	Tra	AF117	Sem	Tra
AC128	Sem	Tra	AF118	Sem	Tra

Dio = Semi-conductor diodes; Diodes semi-conductrices; Halbleiterdioden
M = Microwave; Micro-ondes; Mikrowellen
Sem = Volume semiconductors; Tome semi-conducteurs; Halbleiterband
Tra = Transistors; Transistoren

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Type Typ	Volume Tome Band	Section Chapitre Abschnitt
AF124	Sem	Tra
AF125	Sem	Tra
AF126	Sem	Tra
AF127	Sem	Tra
AFZ12	Sem	Tra
AL13-36	II/III	C/M
AL22-10	II/III	C/M
AL31-10	II/III	C/M
ASY26	Sem	Tra
ASY27	Sem	Tra
ASY31	Sem	Tra
ASY32	Sem	Tra
ASZ15	Sem	Tra
ASZ16	Sem	Tra
ASZ17	Sem	Tra
ASZ18	Sem	Tra
ASZ21	Sem	Tra
ASZ23	Sem	Tra
AUY10	Sem	Tra
AW17-20	II	C
AW21-80	II	C
AW36-48	II	C
AW36-80	II	C
AW43-48	II	C
AW43-80	II	C
AW43-88	II	C
AW43-89	II	C
AW47-91	II	C
AW53-80	II	C
AW53-88	II	C
AW53-89	II	C

Type Typ	Volume Tome Band	Section Chapitre Abschnitt
AW59-90	II	C
AW59-91	II	C
AW61-88	II	C
AX50	I	R
AZ1	I	R
AZ4	I	R
AZ41	I	R
AZ50	I	R
BA100	Sem	Dio
BA102	Sem	Dio
BCY10	Sem	Tra
BCY11	Sem	Tra
BCY12	Sem	Tra
BCZ10	Sem	Tra
BCZ11	Sem	Tra
BY100	Sem	Dio
BYY15	Sem	Dio
BYY16	Sem	Dio
BYY22	Sem	Dio
BYY23	Sem	Dio
BYY24	Sem	Dio
BYY25	Sem	Dio
BYZ14	Sem	Dio
BYZ15	Sem	Dio
BZY56	Sem	Dio
BZY57	Sem	Dio
BZY58	Sem	Dio
BZY59	Sem	Dio
BZY60	Sem	Dio
BZY61	Sem	Dio

Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
BZY62	Sem	Dio	DB7-6	II	C
BZY63	Sem	Dio	DB7-11	II	C
BZY64	Sem	Dio	DB7-36	II	C
BZY65	Sem	Dio	DB7-78	II	C
BZY66	Sem	Dio	DB9-3	II	C
BZY67	Sem	Dio	DB9-4	II	C
BZY68	Sem	Dio	DB9-5	II	C
BZY69	Sem	Dio	DB10-2	II	C
BZZ10	Sem	Dio	DB10-3	II	C
BZZ11	Sem	Dio	DB10-5	II	C
BZZ12	Sem	Dio	DB10-6	II	C
BZZ13	Sem	Dio	DB10-78	II	C
C3J	=	PL5632	DB10-94	II	C
C3JA	=	PL5684	DB13-2	II	C
C3m	=	18048	DB13-10	II	C
CF50	I	R	DB13-34	II	C
D10-12BE	II	C	DB13-78	II	C
D10-12GH	II	C	DB16-22	II	C
D10-12GL	II	C	DC70	I	R
D10-12GM	II	C	DC90	I	R
D13-15BE	II	C	DCC90	I	R
D13-15GH	II	C	DCG1/250	IV	T
D13-15GL	II	C	DCG1.5/250	IV	T
D13-15GM	II	C	DCG4/1000	IV	T
D13-19BE	II	C	DCG4/5000	IV	T
D13-19GH	II	C	DCG5/30	IV	T
D13-19GP	II	C	DCG5/5000EG	IV	T
D13-20BE	II	C	DCG5/5000GB	IV	T
D13-21BE	II	C	DCG5/5000GS	IV	T
D13-21GH	II	C	DCG6/18	IV	T
D13-21GL	II	C	DCG6/6000	IV	T
D13-21GM	II	C	DCG7/100	IV	T
DAF40	I	R	DCG7/100B	IV	T
DAF41	I	R	DCG9/20	IV	T
DAF91	I	R	DCG12/30	IV	T
DAF96	I	R	DCX4/1000	IV	T
DB3-91	II	C	DCX4/5000	IV	T
DB4-1	II	C			
DB4-2	II	C			
DB7-1	II	C			
DB7-2	II	C			
DB7-3	II	C			
DB7-4	II	C			
DB7-5	II	C			

C = Cathode Ray Tubes; Tubes à Rayons Cathodiques; Katodenstrahlröhren
Dio = Semi-conductor diodes; Diodes semi-conductrices; Halbleiterdioden
R = Receiving and Amplifying Tubes
Tubes Récepteurs et Tubes Amplificateurs
Empfangs- und Verstärkerröhren
Sem = Volume semiconductors; Tome semi-conducteurs; Halbleiterband
T = Transmitting Tubes; Tubes Emetteurs; Senderröhren

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Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
DF62/1AD4	I	R	DG13-34	II	C
DF64	I	R	DG16-1	II	C
DF65	I	R	DG16-2	II	C
DF66	I	R	DG16-22	II	C
DF67	I	R	DH3-91	II	C
DF91	I	R	DH7-11	II	C
DF92	I	R	DH7-78	II	C
DF96	I	R	DH7-91	II	C
DF97	I	R	DH10-78	II	C
DG4-1	II	C	DH10-94	II	C
DG4-2	II	C	DH13-10	II	C
DG7-1	II	C	DH13-78	II	C
DG7-2	II	C	DH13-97	II	C
DG7-3	II	C	DHM9-11	II	C
DG7-4	II	C	DHM10-93	II	C
DG7-5	II	C	DK40	I	R
DG7-6	II	C	DK91	I	R
DG7-31	II	C	DK92	I	R
DG7-31/01	II	C	DK96	I	R
DG7-32	II	C	DL41	I	R
DG7-32/01	II	C	DL64	I	R
DG7-36	II	C	DL65	I	R
DG9-3	II	C	DL66	I	R
DG9-4	II	C	DL67	I	R
DG9-5	II	C	DL68	I	R
DG10-2	II	C	DL92	I	R
DG10-3	II	C	DL93	I	R
DG10-5	II	C	DL94	I	R
DG10-6	II	C	DL95	I	R
DG10-74	II	C	DL96	I	R
DG13-2	II	C	DM70	I	R
DG13-32	II	C	DM71	I	R
			DM160	I/III	R/SQ
			DN7-2	II	C

Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
DN7-3	II	C	DY87	I	R
DN7-4	II	C	E1T	II/III	D/SQ
DN7-6	II	C	E55L	IA/III	R/SQ
DN7-11	II	C	E80CC	IA/III	R/SQ
DN7-36	II	C	E80CF	IA/III	R/SQ
DN7-78	II	C	E80F	IA/III	R/SQ
DN9-3	II	C	E80L	IA/III	R/SQ
DN9-4	II	C	E80T	II/III	D/SQ
DN9-5	II	C	E81L	IA/III	R/SQ
DN10-78	II	C	E83F	IA/III	R/SQ
DN13-10	II	C	E88C	IA/III	R/SQ
DN13-78	II	C	E88CC	IA/III	R/SQ
DP4-1	II	C	E90CC	IA/III	R/SQ
DP4-2	II	C	E90F	IA/III	R/SQ
DP7-5	II	C	E91H	IA/III	R/SQ
DP7-6	II	C	E92CC	IA/III	R/SQ
DP7-11	II	C	E99F	IA/III	R/SQ
DP7-78	II	C	E130L	IA/III	R/SQ
DP10-2	II	C	E180CC	IA/III	R/SQ
DP10-6	II	C	E180F	IA/III	R/SQ
DP10-78	II	C	E182CC	IA/III	R/SQ
DP10-94	II	C	E186F	IA/III	R/SQ
DP13-2	II	C	E188CC	IA/III	R/SQ
DP13-34	II	C	E283CC	IA/III	R/SQ
DP16-22	II	C	E288CC	IA/III	R/SQ
DR7-3	II	C	E810F	IA/III	R/SQ
DR7-4	II	C	EA50	IA	R
DR7-5	II	C	EA52	IA/III	R/M
DR7-6	II	C	EA53	IA/III	R/M
DR10-2	II	C			
DR10-3	II	C			
DR10-5	II	C			
DR10-6	II	C			
DR13-2	II	C			
DY86	I	R			

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SQ = Special Quality Tubes; Tubes à Haute Sécurité Zuverlässige Röhren

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Type Typ	Volume Tome Band	Section. Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
EAA91	IA	R	ECC88	IA	R
EABC80	IA	R	ECC91	IA	R
EAF41	IA	R	ECC186	IA/III	R/SQ
EAF42	IA	R	ECC189	IA	R
EB41	IA	R	ECC230	IA	R
EB91	IA	R	ECF80	IA	R
EBC41	IA	R	ECF801	IA	R
EBC81	IA	R	ECH41	IA	R
EBF80	IA	R	ECH42	IA	R
EBF83	IA	R	ECH81	IA	R
EBF89	IA	R	ECH83	IA	R
EC50	II	D	ECH84	IA	R
EC55	IA/III	R/M	ECL80	IA	R
EC56	IA/III	R/M	ECL82	IA	R
EC57	IA/III	R/M	ECL84	IA	R
EC80	IA/III	R/M	ECL85	IA	R
EC81	IA/III	R/M	ECL86	IA	R
EC86	IA	R	EF40	IA	R
EC88	IA	R	EF41	IA	R
EC91	IA	R	EF42	IA	R
EC92	IA	R	EF43	IA	R
EC97	IA	R	EF80	IA	R
EC157	IA/III	R/M	EF83	IA	R
EC158	IA/III	R/M	EF85	IA	R
EC1000	IA/III	R/SQ	EF86	IA	R
ECC40	IA	R	EF89	IA	R
ECC81	IA	R	EF91	IA	R
ECC82	IA	R	EF92	IA	R
ECC83	IA	R	EF95	IA	R
ECC84	IA	R	EF97	IA	R
ECC85	IA	R	EF98	IA	R
ECC86	IA	R	EF183	IA	R

Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
EF184	IA	R	EZ81	IA	R
EFP60	IA	R	GZ32	I	R
EH90	IA	R	GZ34	I	R
EL34	IA	R	HCH81	I	R
EL36	IA	R	HL94	I	R
EL41	IA	R	JP9-7A	III	M
EL42	IA	R	JP9-7D	III	M
EL81	IA	R	JP9-15	III	M
EL82	IA	R	JPT9-01	III	M
EL83	IA	R	K50A	III	M
EL84	IA	R	K51A	III	M
EL86	IA	R	K81A	II	D
EL91	IA	R	MA4/500	IV	T
EL95	IA	R	MC1/60	IV	T
EL500	IA	R	MC6-16	II	C
EM34	IA	R	MC13-16	II	C
EM80	IA	R	MF13-1	II/III	C/M
EM81	IA	R	MF31-22	II/III	C/M
EM84	IA	R	MF31-55	II/III	C/M
EM87	IA	R	MF41-10	II/III	C/M
			MF41-15	II/III	C/M
EY51	IA	R	MF53-10	II/III	C/M
EY81	IA	R	MG6-2	II	C
			MK13-16	II	C
EY82	IA	R	ML41-10	II/III	C/M
EY84	IA	R	ML53-10	II/III	C/M
EY86	IA	R	MU6-2	II	C
			MV6-5	II	C
EY87	IA	R	MW6-2	II	C
EY88	IA	R	MW13-35	II	C
			MW22-7	II	C
EZ40	IA	R	MW22-14	II	C
EZ41	IA	R	MW22-16	II	C
EZ80	IA	R	MW22-17	II	C

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Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
MW22-18	II	C	OA85	Sem	Dio
MW31-7	II	C	OA86	Sem	Dio
MW31-14	II	C	OA86C	Sem	Dio
MW31-16	II	C	OA90	Sem	Dio
MW31-17	II	C	OA91	Sem	Dio
MW31-18	II	C	OA92	Sem	Dio
MW31-74	II	C	OA95	Sem	Dio
MW36-24	II	C	OA200	Sem	Dio
MW36-44	II	C	OA201	Sem	Dio
MW36-67	II	C	OA202	Sem	Dio
MW41-1	II	C	OA210	Sem	Dio
MW43-43	II	C	OA211	Sem	Dio
MW43-43/02	II	C	OA214	Sem	Dio
MW43-64	II	C	OAP12	II	P
MW43-69	II	C	OAZ200	Sem	Dio
MW53-10	II	C	OAZ201	Sem	Dio
MW53-20	II	C	OAZ202	Sem	Dio
MW53-80	II	C	OAZ203	Sem	Dio
MW61-80	II	C	OAZ204	Sem	Dio
MY6-2	II	C	OAZ205	Sem	Dio
OA2	II	S	OAZ206	Sem	Dio
OA2WA	II/III	S/SQ	OAZ207	Sem	Dio
OA5	Sem	Dio	OAZ208	Sem	Dio
OA7	Sem	Dio	OAZ209	Sem	Dio
OA9	Sem	Dio	OAZ210	Sem	Dio
OA31	Sem	Dio	OAZ211	Sem	Dio
OA47	Sem	Dio	OAZ212	Sem	Dio
OA70	Sem	Dio	OAZ213	Sem	Dio
OA71	Sem	Dio	OB2	II	S
OA72	Sem	Dio	OB2WA	II/III	S/SQ
OA73	Sem	Dio	OC16	Sem	Tra
OA79	Sem	Dio	OC22	Sem	Tra
OA81	Sem	Dio			

Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Type	Volume Tome Band	Section Chapitre Abschnitt
0C23	Sem	Tra	0C139	Sem	Tra
0C24	Sem	Tra	0C140	Sem	Tra
0C26	Sem	Tra	0C141	Sem	Tra
0C30	Sem	Tra	0C169	Sem	Tra
0C44	Sem	Tra	0C170	Sem	Tra
0C45	Sem	Tra	0C171	Sem	Tra
0C46	Sem	Tra	ORP30	II	P
0C47	Sem	Tra	ORP50	II	P
0C57	Sem	Tra	ORP60	II	P
0C58	Sem	Tra	ORP61	II	P
0C59	Sem	Tra	ORP62	II	P
0C60	Sem	Tra	ORP63	II	P
0C65	Sem	Tra	ORP90	II	P
0C66	Sem	Tra	PABC80	I	R
0C70	Sem	Tra	PB2/200	IV	T
0C71	Sem	Tra	PB2/500	IV	T
0C72	Sem	Tra	PB3/800	IV	T
0C73	Sem	Tra	PB3/1000	IV	T
0C74	Sem	Tra	PC05/15	IV	T
0C75	Sem	Tra	PC86	I	R
0C76	Sem	Tra	PC88	I	R
0C77	Sem	Tra	PC97	I	R
0C79	Sem	Tra	PCC84	I	R
0C80	Sem	Tra	PCC85	I	R
0C122	Sem	Tra	PCC88	I	R
0C123	Sem	Tra	PCC189	I	R

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P = Photo-electric devices; Dispositifs photoélectriques; Photozellen
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S = Cold Cathode Tubes; Tubes à Cathode Froide; Kaltkatodenröhren
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PCF80	I	R	PL522	=	5C22
PCF86	I	R	PL1267	II	S
PCF801	I	R	PL1607	III	Thyr
PCF802	I	R	PL5544	III	Thyr
PCL82	I	R	PL5545	III	Thyr
PCL84	I	R	PL5551	III	Thyr
PCL85	I	R	PL5551A	III	Thyr
PCL86	I	R	PL5552	III	Thyr
PE05/25	IV	T	PL5552A	III	Thyr
PE06/40	IV	T	PL5553B	III	Thyr
PE1/80	IV	T	PL5555	III	Thyr
PE1/100	IV	T	PL5557	III	Thyr
PF86	I	R	PL5559	III	Thyr
PL2D21	III	Thyr	PL5632	III	Thyr
PL3C23	III	Thyr	PL5684	III	Thyr
PL5	III	Thyr	PL5727	III	SQ
PL10	III	Thyr	PL5822	III	Thyr
PL17	III	Thyr	PL5822A	III	Thyr
PL21	=	PL2D21	PL6574	III	Thyr
PL36	I	R	PL6755	III	Thyr
PL57	=	PL5559	PM84	I	R
PL81	I	R	PY81	I	R
PL82	I	R	PY82	I	R
PL83	I	R	PY88	I	R
PL84	I	R	QB2/250	IV	T
PL105	III	Thyr	QB3/200	IV	T
PL106	III	Thyr	QB3/300	IV	T
PL150	III	Thyr	QB3/300GA	IV	T
PL255	III	Thyr	QB3.5/750	IV	T
PL260	III	Thyr	QB3.5/750GA	IV	T
PL435	=	4C35	QB4/1100	IV	T
PL500	I	R	QB4/1100GA	IV	T

Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
QB5/1750	IV	T	TAW12/10	IV	T
QB5/2000	IV	T	TAW12/20	IV	T
QBL3.5/2000	III/IV	M/T	TAW12/35G	IV	T
QBL4/800	IV	T	TB2/200	IV	T
QBL5/3500	IV	T	TB2/500	IV	T
QBW5/3500	IV	T	TB2.5/300	IV	T
QC05/35	IV	T	TB2.5/400	IV	T
QE04/10	IV	T	TB3/350	IV	T
QE05/40	IV	T	TB3/750	IV	T
QE05/40F	IV	T	TB3/1000	IV	T
QE05/40H	IV	T	TB3/2000	IV	T
QE06/50	IV	T	TB4/800	IV	T
QE08/200	IV	T	TB4/1250	IV	T
QE08/200H	IV	T	TB4/1500	IV	T
QEL1/150	IV	T	TB5/2500	IV	T
QEL2/250	IV	T	TBL2/300	IV	T
QQC03/14	IV	T	TBL2/400	IV	T
QQC04/15	IV	T	TBL2/500	IV	T
QQE02/5	IV	T	TBL6/14	IV	T
QQE03/12	IV	T	TBL6/20	IV	T
QQE03/20	IV	T	TBL6/4000	IV	T
QQE04/5	IV	T	TBL6/6000	IV	T
QQE04/20	IV	T	TBL7/8000	IV	T
QQE06/40	IV	T	TBL7/9000	IV	T
RPY13	II	P	TBL12/25	IV	T
RPY14	II	P	TBL12/38	IV	T
TAL12/10	IV	T	TBL12/40	IV	T
TAL12/20	IV	T	TBL12/100	IV	T
TAL12/35	IV	T	TBL15/125	IV	T

M = Microwave; Micro-ondes; Mikrowellen
P = Photo electric devices; Dispositifs photoélectriques; Photozellen
R = Receiving and Amplifying Tubes; Tubes Récepteurs et Tubes Amplificateurs; Empfangs- und Verstärkerröhren
S = Cold cathode Tubes; Tubes à Cathode Froide; Kaltkatodenröhren
SQ = Special Quality Tubes; Tubes à Haute Sécurité; Zuverlässige Röhren
T = Transmitting Tubes; Tubes Emetteurs; Senderöhren
Thyr = Transistors; Transistoren

The inclusion of a type number in this list does not necessarily imply its availability
La figuration d'un numéro de type sur cette liste n'implique pas nécessairement que le tube est livrable
Das Vorkommen einer Typennummer in dieser Liste bedeutet nicht dass die Röhre tatsächlich lieferbar ist

Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
TBW6/14	IV	T	UF41	I	R
TBW6/20	IV	T	UF42	I	R
TBW6/6000	IV	T	UF43	I	R
TBW7/8000	IV	T	UF80	I	R
TBW7/9000	IV	T	UF85	I	R
TBW12/25	IV	T	UF89	I	R
TBW12/38	IV	T	UL41	I	R
TBW12/100	IV	T	UL84	I	R
TBW15/125	IV	T	UM34	I	R
TH1	II	D	UM80	I	R
TH2	II	D	UM84	I	R
TH3	II	D	UY41	I	R
TH4	II	D	UY42	I	R
TH5	II	D	UY82	I	R
TH91	II	D	UY85	I	R
TH92	II	D	UY89	I	R
TH93	II	D	UY92	I	R
TH94	II	D	YJ1000	III	M
TH95	II	D	YL1060	IV	T
UABC80	I	R	Z70U	II	S
UAF41	I	R	Z70W	II	S
UAF42	I	R	Z71U	II	S
UB41	I	R	Z300T	=	PL1267
UBC41	I	R	Z303C	II	S
UBC81	I	R	Z502S	II	S
UBF80	I	R	Z520M	II	S
UBF89	I	R	Z550M	II	S
UC92	I	R	Z803U	II	S
UCC85	I	R	Z804U	II	S
UCH41	I	R	Z805U	II	S
UCH42	I	R	Z900T	=	5823
UCH81	I	R	ZT1000	IV	T
UCL82	I	R	1AD4	=	DF62

Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
2-AC128	Sem	Tra	55AVP	II	P
2J42	III	M	56AVP	II	P
2J51	III	M	58CG	II	P
2J51A	III	M	58CV	II	P
2J55	III	M	75C1	II	S
2J56	III	M	83A1	II	S
2K25	III	M	85A1	II	S
2-OA72	Sem	Dio	85A2	II	S
2-OA79	Sem	Dio	90AG	II	P
2-OC16	Sem	Tra	90AV	II	P
2-OC26	Sem	Tra	90C1	II	S
2-OC30	Sem	Tra	90CG	II	P
2-OC72	Sem	Tra	90CV	II	P
2-OC74	Sem	Tra	92AG	II	P
3C45	III	M	92AV	II	P
4C35	III	M	100E1	II	S
4J50	III	M	150A1	II	S
4J52	III	M	150AVP	II	P
4J52A	III	M	150B2	II	S
4J78	III	M	150C1	II	S
5C22	III	M	150CVP	II	P
5J26	III	M	328	III	Ind
50AVP	II	P	329	II	D
51UVP	II	P	340	II	D
52AVP	II	P	367	III	Ind
53AVP	II	P	451	III	Ind
53UVP	II	P	723A/B	III	M
54AVP	II	P	725A	III	M

D = Miscellaneous types; Types divers; Diverse Typen
Dio = Semi-conductor diodes; Diodes semi-conductrices; Halbleiterdioden
M = Microwave; Micro-ondes; Mikrowellen
P = Photo-electric devices; Dispositifs photoélectriques; Photozellen
R = Receiving and amplifying Tubes; Tubes Récepteurs et Tubes Amplificateurs; Empfangs- und Verstärkerröhren
S = Cold Cathode Tubes; Tubes à Cathode Froide; Kaltkatodenröhren
Sem = Volume Semiconductors; Tome Semi-conducteurs; Halbleiterband
T = Transmitting Tubes; Tubes Emetteurs; Senderöhren
Tra = Transistors; Transistoren

The inclusion of a type number in this list does not necessarily imply its availability
La figuration d'un numéro de type sur cette liste n'implique pas nécessairement que le tube est livrable
Das Vorkommen einer Typennummer in dieser Liste bedeutet nicht dass die Röhre tatsächlich lieferbar ist

Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
1010	III	Ind	1909A	II	D
1037	III	Ind	1910	II	D
1039	III	Ind	1913	II	D
1049	III	Ind	1918-01	II	D
1054	III	Ind	1923	II	D
1069K	III	Ind	1926	II	D
1110	III	Ind	1927	II	D
1119	III	Ind	1928	II	D
1138	III	Ind	1941	II	D
1163	III	Ind	1945	II	D
1164	III	Ind	3533	II	P
1173	III	Ind	3538	II	P
1174	III	Ind	3545	II	P
1176	III	Ind	3546	II	P
1177	III	Ind	3554	II	P
1710	III	Ind	4060	II	D
1725A	III	Ind	4065	II	D
1738	III	Ind	4066	II	D
1749A	III	Ind	4067	II	D
1788	III	Ind	4068	II	D
1805	I	R	4069	II	D
1838	III	Ind	4152/02	II	D
1849	III	Ind	4349	II	D
1859	III	Ind	4369	II	D
1875	I	R	4370	II	D
1876	I	R	4371	II	D
1877	I	R	4372	II	D
1878	I	R	4373	II	D
1904	II	D	4378	II	D
1905	II	D	4379	II	D
1908	II	D	4380	II	D
1909	II	D	4383	II	D

Type Typ	Volume Tome Band	Section Chapitre Abschnitt	Type Typ	Volume Tome Band	Section Chapitre Abschnitt
4390	II	D	6080	I/III	R/SQ
4397	II	D	6201	I/III	R/SQ
4654	I	R	6211	I/III	R/SQ
4654K	I	R	6263	III	M
4662	II	S	6264	III	M
4687	II	S	6463	I/III	R/SQ
4690	II	D	6972	III	M
4699	I	R	6975	III	M
5586	III	M	7028	III	M
5636	I/III	R/SQ	7090	III	M
5639	I/III	R/SQ	7091	III	M
5642	III	SQ	7093	III	M
5644	II	S	7292	III	M
5654	I/III	R/SQ	7475	II	S
			7537	III	M
5672	I	R	7586	III	SQ
5678	I	R	7587	III	SQ
5696	III	Thyr	7895	III	SQ
5718	I/III	R/SQ	8020	III	M
5726	I/III	R/SQ	13201	II	S
5820	II	C	18013	I	R
5823	II	S	18014	I	R
5854	II	C	18015	I	R
5876	III	M	18016	I	R
5893	III	M	18040	I/III	R/SQ
5949	III	M	18042	I/III	R/SQ
6021	I/III	R/SQ	18043	=	E83F

C = Cathode Ray Tubes; Tubes à Rayons Cathodiques; Katodenstrahlröhren
D = Miscellaneous Types; Types Divers; Diverse Typen
Ind = Industrial Rect.Tubes; Tubes Redresseurs Indust; Industrielle Gleichrichterröhren
M = Microwave; Micro-ondes; Mikrowellen
P = Photo-electric Devices; Dispositifs Photoélectriques; Photozellen
R = Receiving and Amplifying Tubes; Tubes Récepteurs et Tubes Amplificateurs; Empfangs- und Verstärkerröhren
S = Cold Cathode Tubes; Tubes à Cathode Froide; Kaltkatodenröhren
SQ = Special Quality Tubes; Tubes à Haute Sécurité; Zuverlässige Röhren
Thyr = Thyratrons, Ignitrons; Stromtorröhren, Ignitrons

The inclusion of a type number in this list does not necessarily imply its availability
La figuration d'un numéro de type sur cette liste n'implique pas nécessairement que le tube est livrable
Das Vorkommen einer Typennummer in dieser Liste bedeutet nicht dass die Röhre tatsächlich lieferbar ist

Type Typ	Volume Tome Band	Section Chapitre Abschnitt
18045	I/III	R/SQ
18048	I/III	R/SQ
18500	II	D
18501	II	D
18502	II	D
18503	II	D
18504	II	D
18505	II	D
18506	II	D
18509/02	II	D
18510	II	D
18511	II	D
18513	II	D
18514	II	D
18515	II	D
18516	II	D
18517	II	D
18518	II	D
18519	II	D
18520	II	D
18523	II	D
18524	II	D
18525	II	D
18526	II	D
18529	II	D
18533	II	D
18536	II	D
18537	II	D
18538	II	D
18545	II	D
18550	II	D
18552	II	D
55008	III	M
55029	III	M
55030	III	M
55031	III	M
55032	III	M
55125	III	M
55334	III	M
55335	III	M
55340	III	M
56001	II	D
95108	II	D

D = Miscellaneous Types; Types Divers; Diverse Typen
M = Microwave; Micro-ondes; Mikrowellen
R = Receiving and Amplifying Tubes;
Tubes Récepteurs et Tubes Amplificateurs;
Empfangs- und Verstärkerröhren
SQ = Special Quality Tubes; Tubes à Haute Sécurité;
Zuverlässige Röhren

RATING SYSTEMS

1. ABSOLUTE MAXIMUM RATING SYSTEM

Absolute maximum ratings are limiting values of operating and environmental conditions applicable to any electron device of a specified type as defined by its published data, which should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the device under consideration and of all other electron devices in the equipment.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any device under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, equipment control adjustment, load variations, signal variation, environmental conditions, and variations in characteristics of the device under consideration and of all other electron devices in the equipment.

2. DESIGN-CENTRE RATING SYSTEM

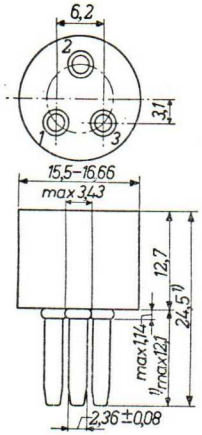
Design-centre ratings are limiting values of operating and environmental conditions applicable to a bogey electron device of a specified type as defined by its published data, and should not be exceeded under normal conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device in average applications, taking responsibility for normal changes in operating conditions due to rated supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all electron devices.

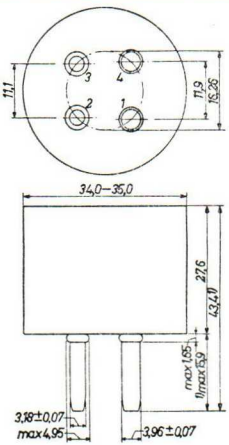
The equipment manufacturer should design so that initially no design-centre value for the intended service is exceeded with a bogey electron device in equipment operating at the stated normal supply-voltage.

PHILIPS

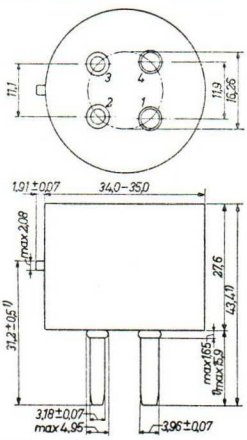
BASES
CULOTS
SOCKEL



Pee Wee 3p



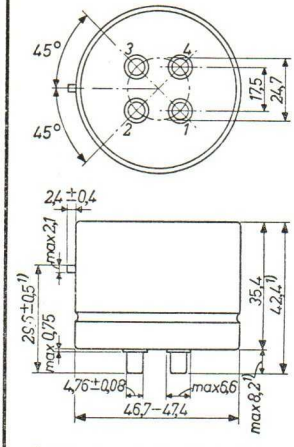
Medium 4p



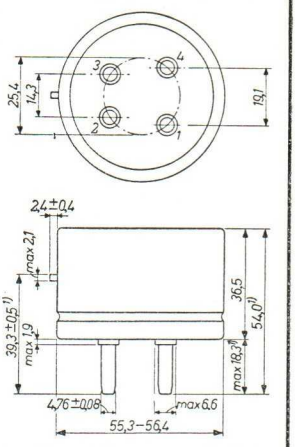
Medium 4p with bayonet
Medium 4p à baïonnette
Medium 4p mit Bajonett

8.8.1952 [1]) Including solder. La soudure y comprise 201
939 3918 Lötzinn einbegriffen.

PHILIPS



Jumbo 4p with bayonet
Jumbo 4p à baïonnette
Jumbo 4p mit Bajonett

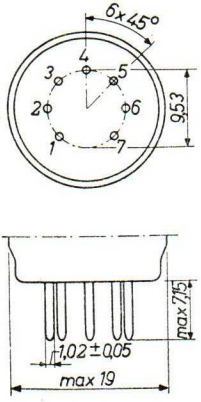


Super Jumbo with bayonet
Super Jumbo à baïonnette
Super Jumbo mit Bajonett

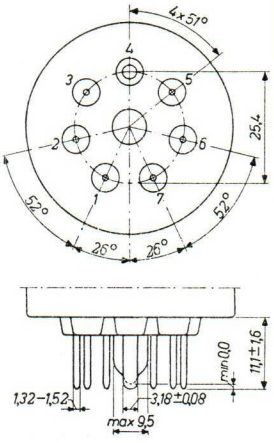
[1]) Including solder. La soudure y comprise
Lötzinn einbegriffen.

PHILIPS

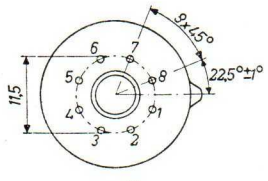
BASES CULOTS SOCKEL

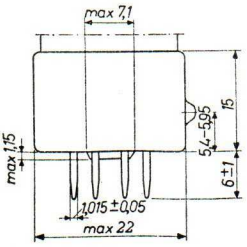


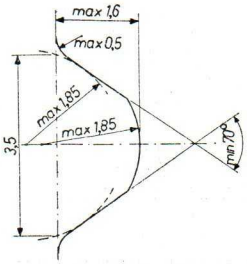
Miniature



Septar

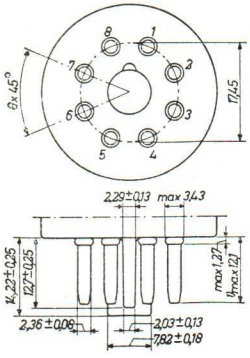






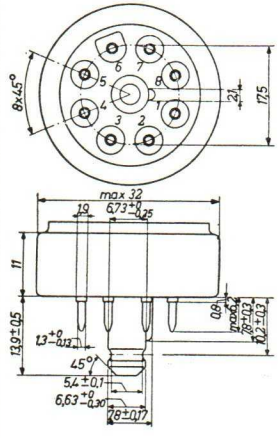
Rimlock

PHILIPS



Octal

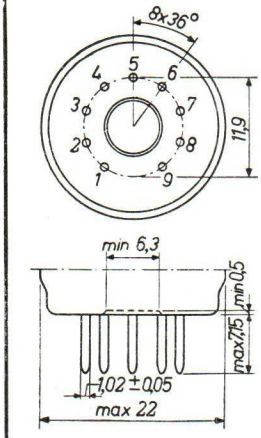
[1]) Including solder. La soudure y comprise.
Lötzinn einbegriffen.



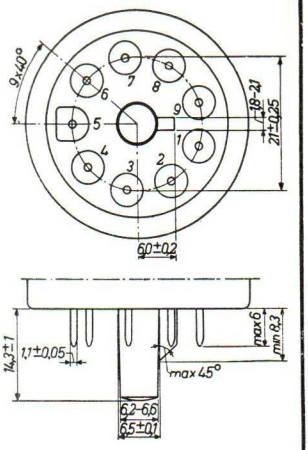
Lock-in

PHILIPS

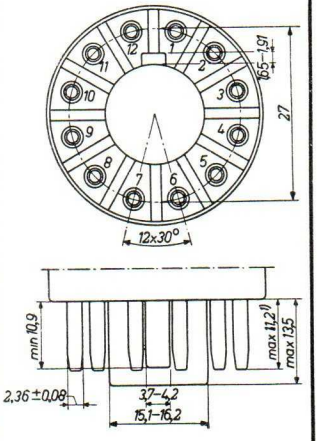
BASES
CULOTS
SOCKEL



Noval



B9G

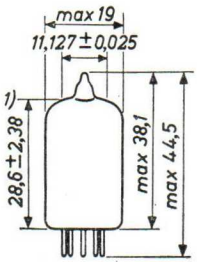


Duodecal

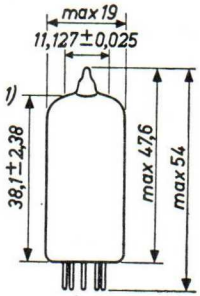
8.8.1952
939 3922

[1]) Including solder. La soudure y comprise Lötzinn einbegriffen.

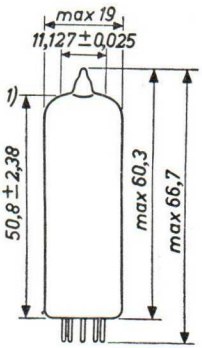
MINIATURE



M1



M2



M3

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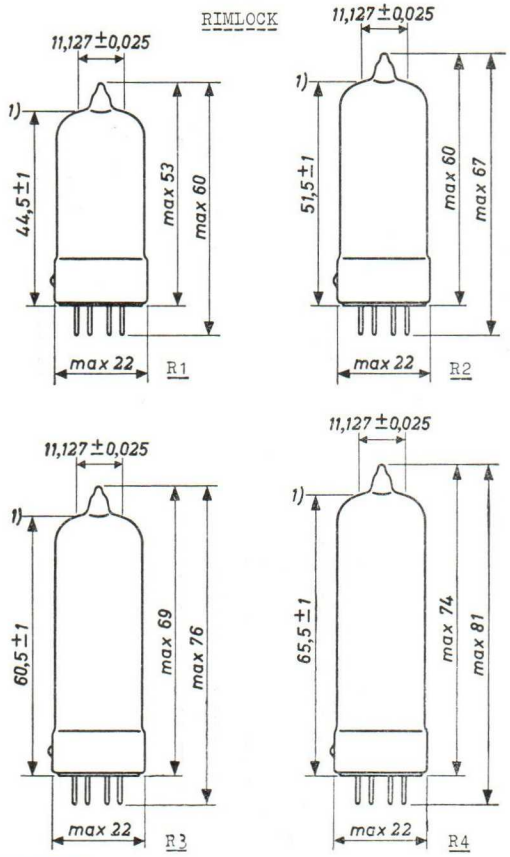
[1])Reference line, determined by a ring gauge of 11.127 ± 0.025 mm internal diameter

Ligne de référence, déterminée par un calibre annulaire avec diamètre interne de 11,127 ± 0,025 mm

Bezugslinie, bestimmt von einer Ringlehre mit einem Durchmesser von 11,127 ± 0,025 mm

PHILIPS

RIMLOCK

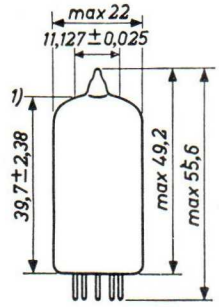


[1])Reference line, determined by a ring gauge of 11.127 ± 0.025 mm internal diameter

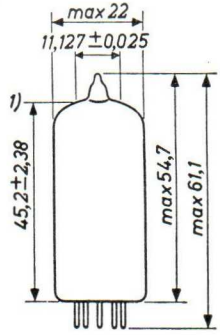
Ligne de référence, déterminée par un calibre annulaire avec diamètre interne de 11,127 ± 0,025 mm

Bezugslinie, bestimmt von einer Ringlehre mit einem Durchmesser von 11,127 ± 0,025 mm

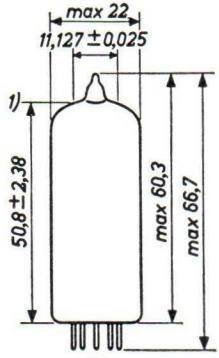
NOVAL



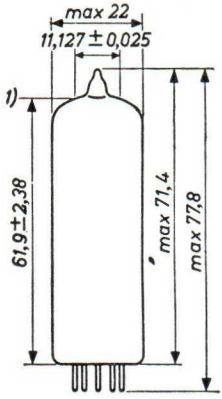
N1



N2



N3



N4

[1])Reference line, determined by a ring gauge of 11.127 ± 0.025 mm internal diameter

Ligne de référence, déterminée par un calibre annulaire avec diamètre interne de 11,127 ± 0,025 mm

Bezugslinie, bestimmt von einer Ringlehre mit einem Durchmesser von 11,127 ± 0,025 mm

SYMBOLS ON ELECTRON TUBES

The symbols used for semi-conductors are inserted under the section "SEMI-CONDUCTOR DEVICES" volume II

The symbols on electron tubes used in this "Handbook" are tabulated below. For the sake of comparison a number of symbols standardized by the American Institute of Radio Engineers (I.R.E.)are given between brackets

1. SYMBOLS DENOTING ELECTRODES AND ELECTRODE CONNECTIONS

Anode . . . . . (p or b^+)	a
Anode of a detection diode . . . . (p or b^+)	d
Electrostatic deflection plate or rod . .(d)	D
Filament or resistance wire . . . (f or h^x)	f
Filament tap or star point of three star connected filaments	f_c
Grid . . . . . (g or c^+)	g
Tube pin which must not be connected externally	i.c.
Ignitor of ignitrons	ign
Cathode . . . . . (k)	k
Input cathode lead of a short-wave tube with two cathode leads	k_i
Output cathode lead of same.	k_o
Fluorescent screen [o]).	*l*
External conductive coating . . . . . (s)	m
Primer (auxiliary electrode of cold cathode tubes to ensure safe triggering)	pr
Internal shield	s
Starter or trigger electrode of cold cathode tubes	st

Remarks

a. Equivalent electrodes of a tube are distinguished by means of accents; e.g. the anodes of a double-anode rectifying tube are indicated by a and a'

[+]) p and g refer to A.C. voltage or A.C. current components; b and c to D.C. voltage or D.C. current values or to instantaneous values

[x]) f refers to directly-heated, h to indirectly-heated tubes

[o]) This electrode often performing the function of an anode is sometimes indicated by *l* (a)

b. Similar electrodes of the same electrode system are distinguished by means of an additional numeral; the electrode nearest to the cathode has the smallest number. Example: with pentodes g1,g2,g3
Two or more diodes in the same bulb are also distinguished by means of an additional numeral; the diode most suitable for signal detection is denoted by the number 2 (d_2).

c. Deflecting plates of one pair are distinguished by an accent, e.g. D_1 - D_1', D_2 - D_2'.

d. The electrodes of different electrode systems inside the same bulb are distinguished by means of the following indices:

diode	D
triode	T
tetrode	Q
pentode	P
hexode or heptode	H

2. SYMBOLS DENOTING VOLTAGES

Remark 1: In the case of indirectly heated tubes the voltages on the various electrodes are with respect to the cathode, in the case of directly heated tubes with respect to the negative side of the filament, unless otherwise stated

Remark 2: The symbols quoted below represent the average values of the concerning voltages, unless otherwise stated

Anode voltage . . . . . (E_p or E_b^+)	V_a
Arc voltage	V_{arc}
Anode voltage in cut-off condition	V_{a_o}
Voltage between anode and starter	V_{a-st}
Supply voltage of tube electrodes . . . . . (E_{bb} or E_{cc}^+)	V_b
Anode voltage of a detection diode.(E_p or E_b^+)	V_d
Voltage between two deflection plates . . .	$V_{DD'}$
R.M.S. value of a voltage . . . (E or E_{rms})	V_{eff}
Filament or heater voltage . . (E_f or E_h^X)	V_f
Heater starting voltage	V_{fo}
Forward voltage	V_{fwd}
Grid voltage . . . . . (E_g or E_c^+)	V_g

+)X)See notes on page 501

Grid voltage in cut-off condition	V_{go}
A.C. input voltage	V_i
Ignition voltage (voltage necessary for breakdown to the concerning electrode) *	V_{ign}
Ignitor voltage	$V_{ignitor}$
Inverse voltage	V_{inv}
Voltage between cathode and filament (E_{kh})	V_{kf}
Voltage on fluorescent screen	V_{ℓ}
Ditto in cut-off condition	$V_{\ell o}$
D.C. voltage supplied by a rectifying tube	V_o
A.C. output voltage	V_o
Oscillator voltage	V_{osc}
Peak value of a voltage	V_p
Primer voltage of a cold cathode tube . . .	V_{pr}
Voltage for gain control	V_R
Starter voltage of cold cathode tubes . . .	V_{st}
Secondary transformer voltage (without load)	V_{tr}

3. SYMBOLS DENOTING CURRENTS

Remark 1: The positive electrical current is directed opposite to the direction of the electron current

Remark 2: The symbols quoted below represent the average values of the concerning currents, unless otherwise stated

Anode current . . . . . (I_p or I_b^+)	I_a
Dark current of photo tubes	I_{a_o}
Current of a detection diode . .(I_p or I_b^+)	I_d
R.M.S. value of a current . . .(I or I_{rms})	Ieff
Filament current . . . . . (I_f or I_h^x)	If
Grid current . . . . . .(I_g or I_c^+)	I_g
Ignitor current	$I_{ignitor}$
Cathode current . . . . . (I_k)	I_k

*) When a lower limit of V_{ign} is published, it means the voltage below which breakdown will not occur in any tube When an upper limit of V_{ign} is published it means the voltage above which breakdown will occur in all tubes (This upper limit of V_{ign} is often mentioned in the data sheets as: V_{ign} = min.....V, where this "min." refers in this case to the external voltage to be applied.)

+)x) See notes on page 501

Current to fluorescent screen	I_l
D.C. current supplied by a rectifying tube .	I_o
Peak value of a current	I_p
Primer current of a cold cathode tube . . .	I_{pr}
Saturation current	I_{sat}
Starter current of a cold cathode tube . .	I_{st}
Starter current required to initiate the main discharge of a cold cathode tube *) . . .	$I_{st\ transf}$
Surge or fault current of rectifying tubes, thyratrons and ignitrons	Isurge

4. SYMBOLS DENOTING POWERS

Anode dissipation	(P_p)	W_a
Grid dissipation	(P_g)	W_g
Input power	(P_i)	W_i
Anode supply D.C. power		W_{ia}
Dissipation of a fluorescent screen		W_l
Modulation power		W_{mod}
Output power	(P_o)	W_o

5. SYMBOLS DENOTING CAPACITANCES (measured on the cold tube)

Capacitances between the anode and all other electrodes and shields except the control grid	C_a
Capacitance between anode and grid (all other electrodes and shields earthed). . . . . (C_{gp})	Cag
Capacitance between anode and cathode (all other electrodes and shields not connected to the cathode being earthed)	C_{ak}
Capacitance between a deflection plate and all other electrodes except the opposite deflection plate	C_D
Capacitance between two deflecting plates	$C_{DD'}$
Capacitance between two pair of deflecting plates	$C_{D1D1'-D2D2'}$
Input capacitor of a smoothing filter . . .	C_{filt}
Capacitance between a grid and all other electrodes and shields except the anode . .	C_g
Capacitance between two grids (all other electrodes and shields earthed) . . (C_{g1g2})	C_{g1g2}

*) When an upper limit of $I_{st\ transf}$ is published it means the starter current to initiate the main discharge in all tubes

Capacitance between a grid and the cathode (all other electrodes and shields not connected to the cathode being earthed)	C_{gk}
Capacitance between the cathode and all other electrodes	C_k
Capacitance between cathode and filament .	C_{kf}

6. SYMBOLS DENOTING RESISTANCES AND IMPEDANCES

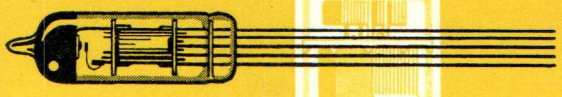
When for one of the following symbols a Z is used instead of a R the word "resistance" should read "impedance"	Z
External D.C. resistance in an anode lead (R_p)	R_a
External A.C. resistance in an anode lead or matching resistance	$R_{a\sim}$
Matching resistance of a push-pull amplifier (anode to anode)	$R_{aa\sim}$
Resistor between anode and starter of a cold cathode tube	$R_{a\text{-}st}$
External resistor in the lead of a deflecting plate	R_D
Equivalent noise resistance	R_{eq}
External resistor in a grid lead . . (R_g)	R_g
Input resistance	r_g
Internal resistance . . . . . (r_p)	R_i
Resistor in a cathode lead . . . . . (R_k)	R_k
External resistor between cathode and filament. . . . . (R_{kh})	R_{kf}
External resistor in the starter lead of a cold cathode tube	R_{st}
External resistor in the primer lead of a cold cathode tube	R_{pr}
Protecting resistance in the anode lead of a rectifying tube	R_t

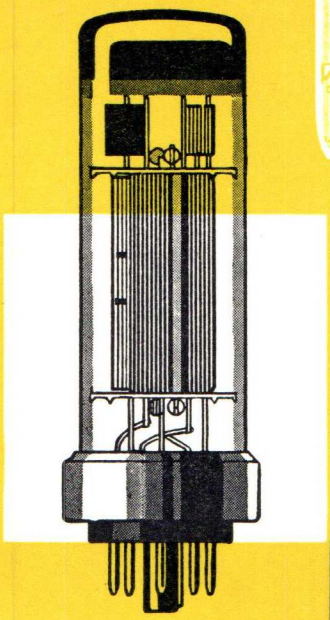
7. SYMBOLS DENOTING VARIOUS QUANTITIES

Brightness . . . . . (B)	B
Bandwidth	B
Distortion factor	d
n-th harmonic distortion	d_n
Noise factor	F
Frequency	f
Temperature coefficient	$\frac{\Delta f}{\Delta t}$

Pulse repetition rate	f_{imp}
Pulling figure	Δf_p
Power gain	G
Voltage gain	$g; V_o/V_i$
Height above sea level	h
Magnetic field strength	H
Cross modulation factor	K
Modulation factor	m
Hum modulation factor	m_b
Sensitivity of cathode ray tubes or photo tubes (s)	N
Transformer ratio	n
Pressure drop of cooling water	pi
Required water flow for water cooling	q
Mutual conductance (g_m)	S
Conversion conductance (g_c)	S_c
Effective slope of an oscillator	S_{eff}
Temperature of anode or anode block	t_a
Ambient temperature	t_{amb}
Averaging time of currents or voltages	T_{av}
Bulb temperature	t_{bulb}
Deionization time	T_{dion}
Cathode heating time	Th
Temperature of condensed mercury (at the cathode (T_{Hg})	t_{Hg}
Inlet temperature of cooling water	ti
Pulse duration (t_p)	T_{imp}
Ionization time	T_{ion}
Outlet temperature of cooling water	t_o
Time of rise of voltage	T_{rv}
Waiting time of a tube = time which has to pass between switching on of the filament (or heater) voltage and switching on of the voltages on the other electrodes	T_w
Rate of rise of voltage	$\frac{\Delta V}{\Delta T_{rv}}$
Voltage gain	$V_o/V_i; g$
Voltage standing wave ratio	V.S.W.R.

Shadow section on a fluorescent screen . . .	α
Light sector on a fluorescent screen . . .	β
Duty cycle	δ
Phase angle . . . . . (ϕ or Θ)	φ
Efficiency . . . . . (η)	η
Wave length . . . . . (λ)	λ
Gain factor . . . . . (μ)	μ
Gain factor of grid No.2 with respect to grid No.1 . . . . . (μ_{g2g1})	μ_{g2g1}





RECEIVING AND AMPLIFYING TUBES

PHILIPS ELECTRONIC TUBE DIVISION

PREFERRED TYPES

RECEIVING AND AMPLIFYING TUBES

F.M./A.M. RADIO AND AUDIO	
F.M. tuner	ECC85 UCC85
A.M. mixer	ECH81 UCH81
(Detection and) I.F. amplification	EBF89 EF89 UBF89 UF89
A.M. detection Audio amplification	EBC81 UBC81
AM/FM detection Audio amplification	EABC80 UABC80
A.F. amplification Phase inverter	ECC82 ECC83 EF86
Audio output	ECL86 EL34 EL84 EL86 UCL82 UL84
Rectification	EZ80 EZ81 GZ34 UY89
Tuning and level indicator	EM87

TELEVISION		
U.H.F. amplification	EC88	PC88
V.H.F. amplification	EC900 ECC189	PC900 PCC189
Mixer	EC86 ECF801	PC86 PCF801
I.F. amplification (and miscellaneous)	ECF200 ECF201 EF183	PCF200 PCF201 EF184
Video output and miscellaneous	EFL200	PFL200
Sound output and amplification	ECL86	PCL86
Vertical output and oscillator	ECL85	PCL85
Horizontal output	EL500	PL500
Booster	EY88	PY88
E.H.T. rectification	DY87	
Pulse circuits	ECC82 ECF80	PCF80
Horizontal oscillator	ECF802	PCF802
Sync separator	ECH200	PCH200

RECEIVING AND AMPLIFYING TUBES, volume I
TUBES RECEPTEURS ET TUBES AMPLIFICATEURS, tome I
EMPFANGS- UND VERSTÄRKERRÖHREN, Band I

The inclusion of a type number in this list does not necessarily imply its availability

La figuration d'un numéro de type sur cette liste n'implique pas nécessairement que le tube est livrable.

Das Vorkommen einer Typennummer in dieser Liste bedeutet nicht dass die Röhre tatsächlich lieferbar ist

Description Umschreibung	Page Seite	Date Datum
Preferred type list Liste de types préférés Vorzugstypenliste	R21,R22	1. 1.1963
Contents	R1,R2	11.11.1962
Index	R3,R4	11.11.1962
Inhalt	R5,R6	11.11.1962
	R101,R102	10.10.1955
	R103,R104	10.10.1959
	R105,R106	10.10.1955
Application directions	R107,R108	10.10.1955
Indications d'application	R109,R110	10.10.1955
Anwendungsrichtlinien	R111,R112	10.10.1959
	R113,R114	10.10.1959
	R115,R116	10.10.1955
	R117,R118	4. 4.1956
	R119,R120	10.10.1955
	R121,R122	10.10.1955
	R123	10.10.1955

Type Typ	Page Seite	Date Datum	Type Typ	Page Seite	Date Datum
AX 50	1,A	4. 4.1953	DAF 96	1,2	11.11.1954
AZ 1	1,A	6. 6.1953		3,4	7. 7.1956
AZ 4	1,A	6. 6.1953		A,B	4. 4.1953
AZ 41	1,A	6. 6.1953	DC 70	1,2	11.11.1960
AZ 50	1,A	6. 6.1953	DC 90	1,2	4. 4.1959
CF 50	1,2	4. 4.1953		A,B	6. 6.1954
DAF 40	1,2	9. 9.1953		C,D	6. 6.1954
DAF 41	1,2	10.10.1953	DCC 90	1,2	10.10.1953
DAF 91	1,2	10.10.1953	DF 62	1,2	5. 5.1961
	3,4	10.10.1953	/1AD4	A,B	1. 1.1960
	A,B	4. 4.1952		C	1. 1.1960
	C,D	10.10.1953			

RECEIVING AND AMPLIFYING TUBES, volume I
TUBES RECEPTEURS ET TUBES AMPLIFICATEURS, tome I
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Type Typ	Page Seite	Date Datum
DF 64	1,2	9. 9.1955
	A,B	11.11.1953
	C	11.11.1953
DF 65 DF 66	1,2	10.10.1953
DF 65 DF 67	1,2	10.10.1953
	A,B	10.10.1953
DF 91	1,2	11.11.1953
	A,B	25. 1.1949
	C,D	11.11.1953
	E,F	25. 1.1949
DF 92	1,2	11.11.1953
DF 96	1,2	12.12.1955
	A,B	10.10.1953
	C,D	1. 1.1956
	E,F	1. 1.1956
DF 97	1,2	1. 1.1958
	3,4	1. 1.1958
	A,B	5. 5.1956
	C,D	5. 5.1956
	E,F	5. 5.1956
	G,H	5. 5.1956
	I,J	5. 5.1956
	K	5. 5.1956
DK 40	1,2	10.10.1953
	3,4	10.10.1953
DK 91	1,2	11.11.1953
	A,B	23.10.1948
	C,D	23.10.1948
	E,F	23.10.1948
	G,H	23.10.1948
	I,J	25. 1.1949
DK 92	1,2	4. 4.1952
	3	11.11.1953
DK 92	A,B	10.10.1951
	C,D	4. 4.1952
	E,F	4. 4.1952
	G,H	4. 4.1952
	I,J	4. 4.1952
	K,L	4. 4.1952
DK 96	1,2	12.12.1955
	3	12.12.1955
	A,B	10.10.1953
	C,D	1. 1.1956
	E,F	1. 1.1956
	G,H	1. 1.1956
DL 41	1,2	10.10.1953
	3,4	10.10.1953
DL 64	1,2	11.11.1954
	A,B	12.12.1953
	C,D	12.12.1953
	E,F	12.12.1953
	G	3. 3.1954
DL 65 DL 66	1,2	11.11.1953
DL 65 DL 67	1,2	11.11.1953
	A,B	11.11.1953
	C,D	11.11.1953
DL 68	1,2	6. 6.1954
	A,B	11.11.1952
	C,D	11.11.1952
	E,F	11.11.1952
DL 92	1,2	11.11.1953
	3,4	6. 6.1954
	A,B	11.11.1953
	C,D	4. 4.1952
	E,F	11.11.1953
	G,H	11.11.1953

Type Typ	Page Seite	Date Datum
DL 92	I,J	4. 4.1952
	K,L	11.11.1953
DL 93	1,2	10.10.1953
	3	10.10.1953
DL 94	1,2	10.10.1960
	3,A	10.10.1960
	B,C	10.10.1960
	D,E	10.10.1960
	F,G	10.10.1960
	H,I	10.10.1960
	J,K	10.10.1960
	L	10.10.1960
DL 95	1	4. 4.1952
DL 96	1,2	11.11.1954
	3,4	11.11.1954
	5,6	11.11.1954
	A,B	10.10.1953
	C,D	10.10.1953
	E,F	10.10.1957
	G,H	10.10.1957
DM 70	1,2	11.11.1954
	3,4	8. 8.1957
	5	11.11.1954
	A,B	9. 9.1952
	C,D	9. 9.1952
	E,F	2. 2.1953
	G,H	12.12.1952
	I	9. 9.1952
DM 71	1	11.11.1953
DM 160	1,2	4. 4.1961
	3,4	2. 2.1959
	A,B	2. 2.1959
DY 86	1	4. 4.1956
DY 87	1,2	5. 5.1960
	3,4	5. 5.1960
	A	8. 8.1956
E-types	1	7. 7.1957
GZ 32	1	10.10.1949
	A,B	9. 9.1949
GZ 34	1,2	6. 6.1958
	A,B	6. 6.1958
	C,D	6. 6.1958

Type Typ	Page Seite	Date Datum
HCH 81	1,2	4. 4.1956
	3,4	4. 4.1956
	5,6	4. 4.1956
HL 94	1,2	9. 9.1957
	A,B	4. 4.1955
	C	4. 4.1955
PABC 80	1	12.12.1953
PC 86	1,2	5. 5.1960
	A,B	5. 5.1960
	C	5. 5.1960
PC 88	1,2	7. 7.1962
	A,B	4. 4.1961
PC 97	1,2	3. 3.1962
	3	3. 3.1962
	A,B	3. 3.1962
	C,D	3. 3.1962
PCC 84	1,2	6. 6.1955
	3	8. 8.1957
	A,B	4. 4.1955
	C,D	8. 8.1955
PCC 85	1,2	3. 3.1957
	3	3. 3.1957
	A,B	11.11.1953
	C,D	11.11.1953
	E,F	11.11.1953
	G,H	11.11.1954
	I,J	11.11.1954
	K,L	11.11.1954
PCC 88	1,2	11.11.1962
	3	1. 1.1958
	A,B	10.10.1957
PCC 189	1,2	11.11.1962
	A,B	1. 1.1960
	C,D	1. 1.1960
PCF 80	1,2	3. 3.1957
	3,4	3. 3.1957
	A,B	9. 9.1954
	C,D	7. 7.1956
	E,F	7. 7.1956
	G,H	9. 9.1954
	I,J	1. 1.1956
	K,L	9. 9.1954
	M,N	9. 9.1954
	O,P	9. 9.1954
	Q	2. 2.1957
PCF 86	1,2	4. 4.1961
	3	4. 4.1961
	A,B	4. 4.1961
	C,D	4. 4.1961
	E,F	4. 4.1961
	G	4. 4.1961
PCF 801	1,2	10.10.1962
	3,4	10.10.1962
PCF 802	1,2	3. 3.1962
	3	3. 3.1962
	A,B	3. 3.1962
	C,D	3. 3.1962
	E,F	3. 3.1962

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Das Vorkommen einer Typennummer in dieser Liste bedeutet nicht dass die Röhre tatsächlich lieferbar ist

Type Typ	Page Seite	Date Datum
PCL 82	1,2	5. 5.1960
	3,4	10.10.1960
	5,6	5. 5.1960
	A,B	5. 5.1960
	C,D	5. 5.1960
	E	10.10.1960
PCL 84	1,2	2. 2.1959
	3	1. 1.1958
	A,B	3. 3.1957
	C,D	3. 3.1957
	E,F	3. 3.1957
	G,H	3. 3.1957
	I	7. 7.1961
PCL 85	1,2	3. 3.1961
	3,4	3. 3.1961
	A,B	3. 3.1961
	C,D	3. 3.1961
	E,F	3. 3.1961
	G,H	3. 3.1961
	I,J	3. 3.1961
PCL 86	1,2	5. 5.1962
	3,4	4. 4.1961
	A,B	4. 4.1961
	C,D	4. 4.1961
	E,F	4. 4.1961
	G	4. 4.1961
PF 86	1,2	1. 1.1960
	A,B	1. 1.1960
PL 36	1,2	9. 9.1958
	3	9. 9.1958
	A,B	9. 9.1958
	C,D	9. 9.1958
	E,F	9. 9.1958
	G,H	9. 9.1958
	I,J	9. 9.1958
	K,L	9. 9.1958
	M,N	9. 9.1958
	O,P	9. 9.1958
	Q	9. 9.1958
PL 81	1,2	11.11.1960
	3	2. 2.1959
	A,B	3. 3.1953
	C,D	3. 3.1957
	E,F	3. 3.1957
	G,H	3. 3.1957
	I,J	3. 3.1957
	K,L	3. 3.1957
	M,N	2. 2.1959
	O	2. 2.1959

Type Typ	Page Seite	Date Datum
PL 82	1,2	5. 5.1962
	3,A	5. 5.1962
PL 83	1,2	4. 4.1957
	A,B	2. 2.1951
	C,D	2. 2.1951
PL 84	1,2	6. 6.1960
	3,4	6. 6.1960
	A,B	6. 6.1960
	C,D	6. 6.1960
	E,F	6. 6.1960
	G,H	6. 6.1960
PL 500	1,2	6. 6.1961
	3,4	6. 6.1961
	A,B	6. 6.1961
	C,D	6. 6.1961
	E,F	6. 6.1961
PM 84	1,2	5. 5.1962
	A	7. 7.1958
PY 81	1,2	11.11.1960
	A	5. 5.1952
PY 82	1,2	4. 4.1955
	A,B	2. 2.1951
PY 88	1,2	6. 6.1960
	A	4. 4.1961
UABC 80	1,2	11.11.1954
	3,4	11.11.1954
	A,B	8. 8.1952
	C,D	12.12.1953
	E,F	12.12.1953
	G	12.12.1953
UAF 41	1,2	12.12.1953
UAF 42	1,2	12.12.1953
	3,4	10.10.1960
UB 41	1	2. 2.1958
UBC 41	1,2	12.12.1953
	3	2. 2.1958
UBC 81	1,2	4. 4.1956
	3	4. 4.1956
	A,B	11.11.1954

Type Typ	Page Seite	Date Datum
UBC 81	C,D	11.11.1954
UBF 80	1,2	12.12.1953
	3,4	12.12.1950
	A,B	11.11.1949
	C,D	2. 2.1951
	E,F	2. 2.1951
	G	2. 2.1951
UBF 89	1,2	1. 1.1958
	3	1. 1.1958
	A,B	4. 4.1956
	C,D	7. 7.1956
	E,F	7. 7.1956
UC 92	1,2	1. 1.1956
	A,B	1. 1.1954
UCC 85	1,2	9. 9.1955
	3	9. 9.1955
UCH 41	1,2	12.12.1953
UCH 42	1,2	12.12.1953
	3	10.10.1960
UCH 81	1,2	5. 5.1955
	3,4	3. 3.1953
	5	3. 3.1953
	A,B	9. 9.1952
	C,D	9. 9.1952
	E,F	9. 9.1952
	G,H	9. 9.1952
	I,J	9. 9.1952
	K,L	9. 9.1952
	M,N	9. 9.1952
	O,P	9. 9.1952
	Q,R	9. 9.1952
	S,T	9. 9.1952
	U,V	9. 9.1952
	W,X	9. 9.1952
	Y,Z	9. 9.1952
	AA,AB	9. 9.1952
	AC,AD	9. 9.1952
	AE,AF	9. 9.1952
	AG,AH	9. 9.1952
	AI	10.10.1957
UCL 82	1,2	5. 5.1960
	3,4	5. 5.1960
	5,6	5. 5.1960
	A,B	5. 5.1960
	C,D	5. 5.1960
	E,F	5. 5.1960
	G,H	5. 5.1960
	I,J	5. 5.1960
UF 41	1,2	12.12.1953
UF 42	1,2	12.12.1950
UF 43	1,2	5. 5.1952
UF 80	1,2	11.11.1953
UF 85	1,2	11.11.1954
	A,B	8. 8.1952
	C,D	12.12.1954
	E,F	8. 8.1952
	G,H	12.12.1954
	I,J	8. 8.1952
	K	8. 8.1952
UF 89	1,2	12.12.1955
	3,4	9. 9.1955
	A,B	3. 3.1955
	C,D	11.11.1954
	E,F	11.11.1954
	G,H	11.11.1954
	I,J	11.11.1954
UL 41	1,2	5. 5.1955
UL 84	1,2	6. 6.1960
	3	6. 6.1960
	A,B	6. 6.1960
	C,D	6. 6.1960
	E,F	6. 6.1960
	G,H	6. 6.1960
UM 34	1,A	11.11.1950
UM 80	1,2	4. 4.1956
	A,B	12.12.1954
UM 84	1,2	5. 5.1962
	A	12.12.1958
UY 41 UY 42	1	2. 2.1954
	A,B	12.12.1953

The inclusion of a type number in this list does not necessarily imply its availability

La figuration d'un numéro de type sur cette liste n'implique pas nécessairement que le tube est livrable

Das Vorkommen einer Typennummer in dieser Liste bedeutet nicht dass die Röhre tatsächlich lieferbar ist

Type Typ	Page Seite	Date Datum	Type Typ	Page Seite	Date Datum
UY 82	1,2	4. 4.1956	6201	5,6	10.10.1957
	A,B	3. 3.1955		A,B	6. 6.1957
UY 85	1	9. 9.1955		C,D	6. 6.1957
	A,B	4. 4.1954		E,F	6. 6.1957
UY 89	1	1. 1.1960	6211	1,2	2. 2.1960
	A,B	1. 1.1960		3,4	2. 2.1960
UY 92	1,2	1. 1.1958		A,B	2. 2.1960
	A,B	5. 5.1955	6463	1,2	7. 7.1959
1805	1,2	24. 9.1948		3,4	7. 7.1959
1875	1,2	26. 8.1948		5,A	4. 4.1959
1876	1,2	15. 9.1948		B,C	12.12.1958
1877	1	20. 9.1948	18013	1,2	18. 9.1948
1878	1,A	5. 5.1950	18014	1,2	18. 9.1948
4654	1,2	12.12.1953	18015	1,2	16. 9.1948
4654K			18016	1,2	18. 9.1948
4699	1,2	12.12.1953	18040	1,2	6. 6.1957
5636	1,2	10.10.1961		3,4	6. 6.1957
	3,4	10.10.1961		A,B	6. 6.1957
	5	10.10.1961		C,D	6. 6.1957
	A,B	10.10.1961		E	6. 6.1957
5639	1,2	10.10.1961	18042	1,2	9. 9.1962
	3,4	10.10.1961		3,4	9. 9.1962
	5	10.10.1961		A,B	6. 6.1957
	A,B	10.10.1961		C,D	6. 6.1957
5654	1,2	10.10.1957		E,F	6. 6.1957
	3,4	10.10.1957		G,H	6. 6.1957
	A	6. 6.1957		I,J	6. 6.1957
5672	1,2	3. 3.1957	18045	1,2	8. 8.1957
5678	1,2	3. 3.1957		3,4	6. 6.1957
5718	1,2	12.12.1957		5,A	6. 6.1957
	3,4	12.12.1957		B,C	6. 6.1957
	5,6	12.12.1957		D,E	6. 6.1957
	A,B	12.12.1957	18048/C3m	1,2	10.10.1962
	C	12.12.1957		3,4	10.10.1962
5726	1,2	10.10.1957		5	10.10.1962
	3	10.10.1957		A,B	10.10.1962
	A,B	6. 6.1957		C,D	10.10.1962
	C	6. 6.1957		E,F	10.10.1962
6021	1,2	10.10.1961		G,H	10.10.1962
	3,4	10.10.1961		I,J	10.10.1962
	5	10.10.1961		K,L	10.10.1962
	A,B	10.10.1961		M,N	10.10.1962
6080	1,2	2. 2.1960		O,P	10.10.1962
	3,4	2. 2.1960		Q,R	10.10.1962
	A	2. 2.1960		S,T	10.10.1962
6201	1,2	10.10.1957		U,V	10.10.1962
	3,4	10.10.1957		W,X	10.10.1962

APPLICATION DIRECTIONS FOR RECEIVING AND AMPLIFYING TUBES

INTRODUCTION

The technical data of the Receiving and Amplifying Tubes are given as typical characteristics, operating characteristics, limiting values and curves. These data and curves are to be regarded as those pertaining to an average tube representative of that particular type.

By typical characteristics are to be understood the specific properties of the tube itself without any circuiting elements taken up in the electrode leads. They include the mutual conductance, the internal resistance, the Ia/Vg and Ia/Va curves, etc.
The capacitance values are measured on the "cold tube" with all outside connections and pins fully screened.

Under operating characteristics are given the characteristic circuits for certain applications with the corresponding data, curves and properties. Although it is as a rule advisable to adhere to these data as far as possible, they may be departed from on the condition that none of the limiting values for the particular type of tube is exceeded. Where a tube is to be used in an application which does not appear to be provided for by the published data, the tube manufacturer should be consulted to ensure that the new needs may be met by suitable tests.

The limiting values represent the tube manufacturer's opinion on the most satisfactory compromise between efficiency and life. Tubes not operated within the stated limiting values may have their life or performance impaired, in some cases seriously. The limiting values are given as absolute maxima or as design centre maxima. When not otherwise stated the limiting values are given as design centre maxima. These two systems of limiting values are defined in section 2.

SECTION 1

General points.

a. The data of a tube for a specific purpose are usually based upon the anode current. The published control-grid voltage will therefore as a rule be only the approximate value required.

b. The voltages on the various electrodes of a tube are given with respect to a certain basic point. In the case of indirectly heated tubes this point is the cathode, whilst for directly heated tubes it is the negative side of the filament.

c. Under all circumstances there must be a direct-current connection between each of the electrodes and the cathode of the tubes.
Resistors in an electrode lead should not as a rule be made higher than is necessary for the proper functioning of the tube.

d. It is not practicable for tubes to be specially selected for individual equipment. It is therefore desirable that initial tests should be made with the largest reasonable number of equipment and tubes.

When equipment is being designed on the basis of new tube types it should be borne in mind that there may be differences in characteristics and dimensions between first samples and subsequent production. Circuit design based on the mean characteristics of a limited number of tubes is liable to serious error and should not be adopted for production.

e. When the use of established types of tubes is being contemplated in the design of new equipment, particular attention should be paid to the published dimensions. It is important that reliance should not be placed upon dimensions taken from individual tubes. This is to ensure that adequate space is allowed and that tube shields, retaining and mounting devices can accommodate all tubes of the type concerned.

f. When tubes are to be operated near or at maximum dissipation the use of automatic bias by means of a cathode resistor is recommended.

g. Ratings in general apply to operation at normal atmospheric pressure at altitudes below 2000 metres and a relative humidity below 80%. In the event of tubes being operated at lower pressures at which the risk of external voltage flash-over increases, the tube manufacturer should be consulted, unless specific ratings are given for the intended use.

h. Where no pulse or peak ratings are specified it must not be assumed that the tubes will function satisfactorily if the average values under pulse operation conditions are within the normal stated values. Under pulse conditions the average values of, for example, current and voltage may be well within the normal ratings but very high values will be required for short periods of time.

If pulse operation is wanted it is recommended to consult the tube manufacturer.

i. The insulation resistance between the heater and the cathode should if possible not be included in RF circuits where frequency stability or preservation of wave form is important, or in AF circuits followed by high gain.

The leakage currents may make themselves apparent as noise or hum, which may assume serious proportions if the tube in which they originate is followed by a large degree of amplification.
Moreover, if the heater-cathode insulation is included in a tuned circuit, any change in the physical or electrical properties of the insulation may alter the frequency to which the circuit is tuned, and if both RF and AF (e.g. mains frequency) voltages exist across the insulation, there is a risk of modulation hum, particularly in cathode-coupled oscillators and the like. There is also some risk of the introduction of hum and noise due to spurious emission from the cathode resulting from the cathode-heater potential difference.

j. The practice of "keying" by opening a cathode circuit may result in a large potential difference between heater and cathode and should be avoided.

Where a tube is operated from a separate transformer heater winding, it is essential that a DC connection should exist between this winding and the cathode to avoid heater-cathode insulation breakdown.

k. The suppressor grid should preferably be maintained at the same potential as the cathode.
In certain applications it is permissible to connect the suppressor grid to the negative end of the cathode biasing resistor or to the A.V.C. line instead of directly to the cathode.
If the suppressor grid voltage is negative, care should be taken not to exceed the maximum permissible screen grid dissipation.

l. Proper functioning of the tubes at supply voltages lower than 50 volts cannot be guaranteed if these values are not quoted under the operating characteristics.

SECTION 2

A. Design Centre Maxima

I. Mains supply

With a set of nominal tubes inserted in an electronic device where all components have their nominal value, and with the device connected to a power supply whose measured voltage is the highest permitted nominal voltage for the mains tap in use:

a. The electrode dissipations and/or cathode current of all tubes should under all circumstances be within the published max. values [1])

[1]) In AF class B application the max. anode dissipation of the output tube will be obtained at about 2/3 of full excitation. If the tube is not operating constantly on this max. dissipation (which will be the case by excitation with music or speech), the published max. value is permitted to be exceeded at this point by not more than 10%

b. The electrode voltages of all tubes not subject to automatic gain control should be within the published max. values.

c. The electrode voltage of tubes which are subject to automatic gain control should be within the published limits when no signal is applied and are permitted to increase with decreasing electrode current, provided the published max. value of electrode voltage is not exceeded by more than 20% when the electrode currents approach zero or are equal to zero (see, however, under D).

d. The open circuit voltage of the supply source should be within the published maximum value of the electrode voltage for zero current.

If these conditions are fulfilled, then:

1. All appropriate tubes supplied by the manufacturer can be used in the device.

2. The device can without harm be connected to the appropriate mains supply whose measured voltage fluctuates by not more than ± 10%.
If mains voltage variations are greater than 10% so that the highest mains voltage may exceed the nominal value by p %, the maximum permissible electrode voltages (not the heater voltage) must be decreased by (p-10)% and the maximum permissible dissipations by 2x (p-10)%.

3. The tolerances of component values may be such that the max. permissible electrode dissipations are exceeded by not more than 10%.

It is good practice to incorporate a cathode bias resistor having a tolerance of maximum 10% in a circuit employing high slope pentodes and power output tubes operating within 20% of the maximum permissible dissipations. If a cathode bias resistor cannot be included in the circuit, it is recommended to incorporate a screen grid dropping resistor (having a tolerance of max. 10%) dropping at least one third of the HT voltage.

II. Battery supply

1. With a set of nominal tubes inserted in a device where all components have their nominal value and the device connected to a battery of nominal voltage, the points a), b), c), 1) and 3) are the same as for mains supply.

2. The device can, without harm, be connected to a battery the voltage of which, when new, is not more than 15% above the nominal value.

III. Accumulator supply through vibrator or rotary converter

The directions given for mains supply also hold for accumulator supply through vibrator or rotary converter The conditions must be satisfied at nominal accumulator voltages of 6.3; 12.6 or 25.2 V. However, if it can be assumed that the accumulator is being charged during the greater part of the time the circuit is switched on, the conditions must be fulfilled at an accumulator voltage of 7; 14 or 28 V.

B. ABSOLUTE MAXIMA

No tube in any equipment under any circumstances should be allowed to exceed the absolute ratings.

C. LIMITING VALUES FOR SCREEN GRID DISSIPATION

For AF output tubes two values of screen grid dissipation are given.

1. A max. value which must not be exceeded during continuous operation (W_{g2})

2. A max. value which must not be exceeded at full excitation (in general up to the start of grid nr. 1 current) with a sustained sine wave (W_{g2p})

The max. value of W_{g2p} is given to avoid the risk of impairing tube life by overheating the screen grid during long periods of full excitation, which sometimes occur with music or speech. In most cases, insertion of a non-decoupled series resistor of 0.5 to 1 kΩ in the screen grid lead will reduce the actual value of W_{g2p} to a large extent and not affect the output power seriously.

During normal excitation with music or speech there will in general be no danger of exceeding the max. value of W_{g2} when the tube is adjusted according to the published operating characteristics.

In applications with a sustained sine wave input voltage the risk of exceeding the max. value of W_{g2} is great, so that in general full excitation is not allowed.

In order to prevent the max. permissible screen grid dissipation from being exceeded it is necessary to ensure

that the anode is always properly loaded. The anode lead must therefore not be interrupted, nor must the loudspeaker be switched off without replacing it by an equivalent resistor.

D. LIMITING VALUES FOR POSITIVE ANODE AND SCREEN GRID VOLTAGES

Two values of max. anode and screen grid voltages are given viz. the max. permissible anode or screen grid voltage for zero current (V_{ao}, V_{g2o}) and the max. permissible voltage during operation (V_a, V_{g2}).

The published max. value of the electrode voltage for zero current should only be applied, as DC voltage to the cold tube (that is without heater or filament voltage).

During operation the DC anode or screen grid voltage should not exceed the max. stated value for V_a or V_{g2}.

If, during operation, both an alternating and a direct voltage are present simultaneously on anode or screen grid, the peak value may approach (but should not exceed) the max. limit for V_{ao} or V_{g2o} on the condition that the instantaneous value of the current at that moment is approximately zero.

Sometimes 2 max. values for V_{g2} are published viz. V_{g2} (I_a < X mA) and V_{g2} (I_a < ½ X mA). The first value is valid when no automatic gain control voltage is present The second one should not be exceeded with automatic gain control (see also under A-Ic).

E. LIMITING VALUES FOR HEATER VOLTAGES AND HEATER CURRENTS

I. Indirectly heated tubes, parallel supply

It is recommended to take measures to ensure that during operation the heater voltage differs as little as possible from the published value.
When a tube, having nominal heater characteristics, is used at the highest or lowest nominal mains voltage of a voltage range as determined by the mains taps, the heater voltage, measured at the tube socket, must be within ±7% of the published value. Part of this deviation may be due to the tolerances of the heater voltage transformer. If this condition is fulfilled, then any tube of the type concerned may be used in the appropriate place, and the circuit may be connected to a mains fluctuating by max. 10%.

When the tubes are fed from an accumulator, the actual accumulator voltage should not exceed 8 V, and the ac-

cumulator may be used until its voltage has decreased to 5.5 V. However, if it can be assumed that the accumulator is being charged during the greater part of the time the circuit is switched on, measures must be taken to ensure that the average heater voltage does not exceed 7 V.

II. Indirectly heated tubes, series supplies

The heater current of tubes with series-connected heaters should be within ± 3.5% of the published value when tubes with nominal heater characteristics are employed and the series circuit is connected to the highest or lowest nominal mains voltage of a voltage range. Part of this deviation may be due to tolerances of the series resistor.

If instead of a series resistor, a current regulator is used, a max. difference of 5% is allowed. In addition care must be taken that during the warming up period, the heater voltage of any tube does not exceed 1.5 times its published value. If necessary, use should be made of a surge current limiting device.

If the above conditions are fulfilled, any tube of the type concerned may be used in this circuit in its appropriate place, and the circuit may be connected to a mains fluctuating by max. 10%

From fig.1 it may be seen which voltage ranges may be accommodated on the mains tapping plate when a fixed series resistor is employed. $\Delta R/R$ represents the tolerance of the resistors involved, V_m is the average mains voltage within a certain range and V_f the total heater voltage at the mains voltage V_m. The limits of the voltage range are determined by $V_m(1 \pm \Delta V_m/V_m)$.

III. Battery tubes, filaments in parallel

a. Tubes with nominal filament voltage of 1.4 volt

These tubes may be fed from a battery, the maximum voltage of which (new battery) amounts to 1.6 volts. After 30 minutes of normal operation this voltage should have decreased to a value lower than 1.5 volts.
The lowest filament voltage at which the tube normally still operates satisfactorily amounts to 1.1 volts.
A recommended voltage curve of the battery is given in fig.2

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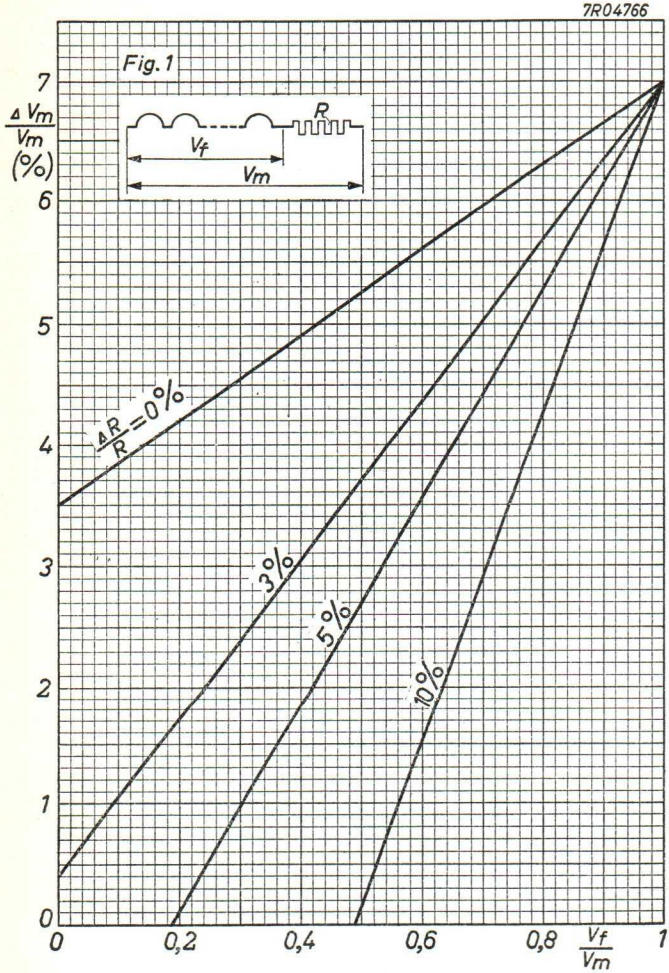


R 108

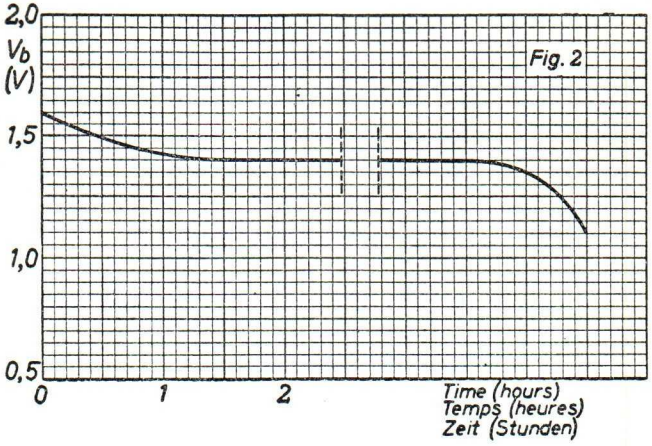

2,0
V_b
(V)
1,5
1,0
0,5
0
1
2
Time (hours)
Temps (heures)
Zeit (Stunden)

Fig. 2

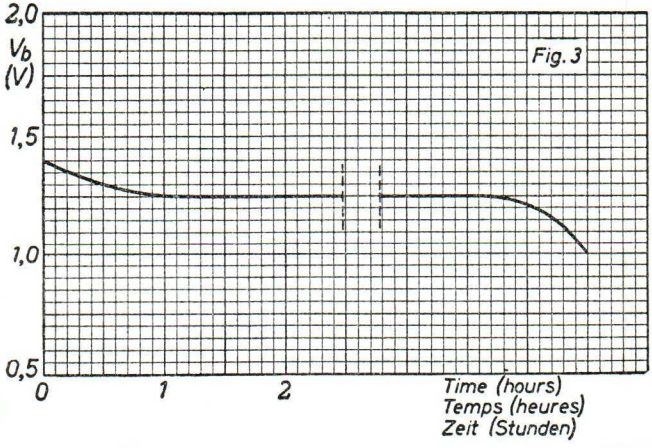

2,0
V_b
(V)
1,5
1,0
0,5
0
1
2
Time (hours)
Temps (heures)
Zeit (Stunden)

Fig. 3

b. Tubes with nominal filament voltage of 1.25 volts

These tubes may be fed from a battery, the maximum voltage of which (new battery) amounts to 1.4 volts. After 30 minutes of normal operation this voltage should have decreased to a value lower than 1.3 volts. The lowest filament voltage at which the tube normally still operates satisfactorily amounts to 1.0 volt. A recommended voltage curve of the battery is given in fig.3.If the tubes are fed from batteries as described under a), a series resistor should be inserted.

IV. Battery tubes; filaments in series

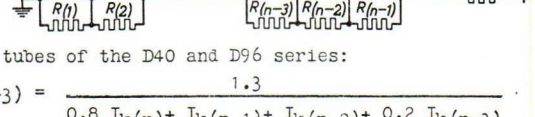
a. If the filaments of 1.4 volts battery tubes are connected in series to the DC mains or to the high-voltage supply via a series resistor the value of the filament current is mainly determined by the series resistor.This will give rise to difficulties when the mains voltage is higher than its nominal voltage. The filament current is then increased about proportional to the mains voltage increase, resulting in an increase of the filament resistance. The filament voltage will therefore be increased at a higher rate than the mains voltage, which may result in a serious overloading of the filament. For this reason the value of the series resistor should be calculated and adjusted in each receiver in such a way that the filament voltage of an average tube, at nominal mains voltage becomes 1.3 volts. To this end the following filament currents can be adhered to:

96 mA for 100 mA tubes
48 mA for 50 mA tubes
24 mA for 25 mA tubes.

Hence the series resistor in each receiver must be adjusted in such a way that the filament current, under normal operating conditions, is equal to the above values. The accuracy of the filament current measurement should be 2% or better.
A series resistor with a positive temperature coefficient is recommended. No resistor with a negative temperature coefficient must be used. The thermal inertia must be such that the operating temperature is reached within a short time.

In order to by-pass the filaments for the cathode currents of tubes nearer the positive end of the chain the filaments should be shunted with resistors(fig.4 or 5).

In the case of tubes with 2 filament sections connected in series, one section of the filament should be shunted to pass the cathode current of the other section. Examples of these tube types are the DL94 and the DL96.
The shunt resistors can be calculated as follows:

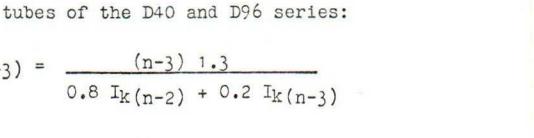


For tubes of the D40 and D96 series:

$$R(n-3) = \frac{1.3}{0.8\ I_{k(n)} + I_{k(n-1)} + I_{k(n-2)} + 0.2\ I_{k(n-3)}}$$

For tubes of other series:

$$R(n-3) = \frac{1.3}{0.67\ I_{k(n)} + I_{(n-1)} + I_{k(n-2)} + 0.33\ I_{k(n-3)}}$$



For tubes of the D40 and D96 series:

$$R(n-3) = \frac{(n-3)\ 1.3}{0.8\ I_{k(n-2)} + 0.2\ I_{k(n-3)}}$$

For tubes of other series:

$$R(n-3) = \frac{(n-3)\ 1.3}{0.67\ I_{k(n-2)} + 0.33\ I_{k(n-3)}}$$

If the resistor values calculated according to figs. 4 or 5 do not coincide with international standard values, the nearest standard value may be taken.
For the resistances calculated according to fig. 4 which are smaller than 330 Ω (25 mA series), resistors with 5%

tolerance should be used. The same holds for the 50 mA series for values lower than 150 Ω. Other resistor values, as well as the resistors calculated according to fig.5, may have a tolerance of ± 10%.

The minimum voltage to which a filament chain including the series resistor as described above may be connected, should amount to at least 7 to 10 times the total filament voltage. When a filament chain has been adapted to a nominal mains voltage V_m, it may be connected without any change to mains voltages whose nominal values do not differ by more than 2.5% from V_m. If a circuit fulfils the above conditions it may be connected to a mains voltage fluctuating not more than ± 10%.

b. A circuit as described under a) without the series resistor may also be connected to a battery consisting of as many 1.4 V cells as there are 1.4 V filament sections

c. If the filaments are to be series-connected to an accumulator, the series resistor, if any, can be determined from the surplus voltage when the accumulator voltage is 2.0 V per cell (V_f = 1.3 V per filament section and I_f = 24 mA for the 25 mA series, 48 mA for the 50 mA series and 96 mA for the 100 mA series). These resistors are as follows:

25 mA series

12 V accumulator	7 filament sections	120 Ω
	6 filament sections	180 Ω
	5 filament sections	240 Ω
6 V accumulator	4 filament sections	33 Ω

50 mA series

12 V accumulator	7 filament sections	62 Ω
	6 filament sections	90 Ω
	5 filament sections	120 Ω
6 V accumulator	4 filament sections	15 Ω

The above only holds if during normal operation the accumulator is not charged. When the accumulator is charged during operation a voltage of 2.3 V per cell should be taken into account. The bypassing of the emission current with accumulator supply can be done in the same way as described under a).

F. LIMITING VALUES FOR THE VOLTAGE BETWEEN HEATER AND CATHODE

The values given for these limits relate to that side of the heater where the voltage between cathode and heater is greatest.

The voltage between cathode and heater may be D.C., A.C., or a combination of both voltages. Unless otherwise stated, the max. values quoted for the voltage between cathode and

heater indicate the maximum permissible mean value (D.C. component).

If A.C. voltage, or a combination of D.C. and A.C. is applied, the peak value may be twice the rated V_{kf}; however, unless otherwise stated, the peak voltage shall never exceed a value of 315 V. The D.C. component is not allowed to exceed the published value.

Unless otherwise stated, the V_{kf} max. holds for both polarities of the voltage between cathode and heater; however, in respect to the heater, the polarity with a positive cathode is usually the most favourable.

Sometimes (e.g. in the case of rectifiers) a peak value is stated which applies to the sum of the D.C. voltage and the peak of the alternating voltage.

G. LIMITING VALUES FOR THE EXTERNAL RESISTANCE BETWEEN CATHODE AND GRID

Control grid leak for output tubes

Unless otherwise stated, the published max. values of R_{g1} apply to operation of the tube with automatic negative control grid bias (obtained with the aid of a cathode resistor.)

The max. value for operation of the tube with fixed bias can be assumed as half the published max. value.

In the case of semi-automatic grid bias (negative grid voltage obtained by means of a resistor in the common negative lead of the tubes) the max. permissible value for the grid-leak resistance lies between the two values mentioned above and can be determined with the aid of the formula:

$$R_{g1} = \frac{1}{2} R_{g1}' + \frac{1}{2} \frac{\text{cathode current of the tube}}{\text{total current through negative lead}} R_{g1}'$$

where in this case R_{g1}' represents the max. permissible grid leak when automatic negative grid bias is applied.

Control grid leak for RF and AF tubes

Unless otherwise stated, the published max. values apply to operation with fixed or automatic bias (obtained with the aid of a cathode resistor.) If grid current biasing is applied (negative bias obtained only by means of the positive grid current through R_{g1}) the max. value is 22 MΩ.

Only in this case is it recommended to take the value of R_{g1} not too low, as with low values of R_{g1} the positive grid current will result in considerable damping of the foregoing stage.

Suppressor grid leak

When no value for the suppressor grid resistance is quoted, resistances in series with this grid should be avoided.

H. LIMITING VALUES FOR THE PROTECTIVE RESISTOR OF RECTIFYING TUBES

In order to avoid sputtering in rectifying tubes (a momentary flash-over from anode to cathode) there must be a certain ohmic resistance in each anode lead; the minimum value of this resistance is always quoted. When there is a transformer between the mains and the rectifying tube this protective resistance will already be provided wholly or in part by the ohmic resistance of the transformer, in which case the following formula applies:

$$R_t = R_s + n^2 R_p + R_1$$

where, in case of half-wave rectification

R_t = the protective resistance required

R_s = the ohmic resistance of the secondary coil

n = the transformer ratio

R_p = the ohmic resistance of the primary coil

R_1 = resistance that must be added

and, in case of full-wave rectification

R_t = protective resistance required per anode

R_s = ohmic resistance of half the secondary coil

n = transformer ratio between primary and half the secondary coil

R_p = ohmic resistance of the primary coil

R_1 = resistance to be added in each anode lead.

If an autotransformer is used, the fact that a part of the transformer winding is short circuited by the mains should be taken into account when calculating R_1

When the rectifying tube is followed by a reservoir capacitor for smoothing the current, allowance must be made for the fact that in addition to the direct current also a ripple current flows through the protective resistor Generally, it will therefore be necessary to use a protective resistance the power of which is about three times as high as what would be needed for the direct current alone.

I. LIMITING VALUES FOR THE EXTERNAL RESISTANCE BETWEEN CATHODE AND HEATER

When high values of cathode resistors are used it is possible that the operating conditions are influenced by the leakage between heater and cathode which may give rise to difficulties when replacing the tubes or by variation of the leakage between heater and cathode during life.

Therefore a max. value of 20 kΩ is recommended for the limiting value of the external resistance between cathode and heater.

However, when the instantaneous voltage between the heater and the cathode is at each moment higher than 3 times the R.M.S. value of the heater voltage the limiting value for R_{kf} may amount up to 1 MΩ. In this respect the hum caused by R_{kf} is not taken into account.

J. CAPACITANCES

Unless otherwise stated, the capacitance quoted in the published data sheets are measured with cathode cold and with no direct voltages present.

Only the values of the interelectrode capacitances are given; every outside contact or pin is fully screened.

When capacitances measured with external screening are stated, the measuring screens used have the following dimensions:

Bulb	Screen		Nr.
	Internal diameter (mm)	Length (mm)	
7 pin miniature	19.2	57.5	A
	19.2	45.0	B
Noval	22.2	33.5	C
	22.2	44.5	D
	22.2	55.5	E
	22.2	66.5	F

K. MOUNTING

I. Unless otherwise stated, an electronic tube may be used in any position subject to the following qualifications:

a. Tubes with a pinch construction must be mounted in such a way that the tube base is not higher than the top of the tube.

b. If directly heated rectifying tubes cannot be mounted vertically, care must be taken that in the horizontal position of the tube the plane of the filaments is vertical.

II. Many small glass-based tubes employ semi rigid pins. It is necessary to straighten the pins in a pin-straightening tool before insertion in the socket.
It is recommended that for holders with floating contacts a wiring jig is used to ensure that the holder contacts are in correct position to receive a tube after the holder has been wired. The connections to these floating contacts should be as flexible as possible. The use of too stiff wiring will destroy the advantages provided by the float of the contacts, and may hold the contacts so far out of position as to result in damage to the tube bases.

III. Tubes having flexible leads do not employ plug-in tube holders and it is usually necessary to secure them in position by the envelope. Any such method will restrict the ventilation of the envelope and care should be taken to see that the safe bulb temperature is not exceeded owing to the method of mounting used.

IV. It is not recommended to use the tags of spare tube-holder contacts as anchoring points in the circuit wiring This practice may adversely affect the characteristics of tubes with glass bases by the application of potentials to pins which are not connected to any tube element but which project into the envelope.

When a pin is marked "internally connected" no connection must be made to the corresponding tube holder tag.

V. It is not allowed to solder connections directly to rigid or semirigid pins in glass bases. The application of heat introduces strain in the glass, the effect of which may not be immediately apparent, but it may subsequently impair the vacuum or crack the seal.

VI. Where tubes are desgined for soldering into the circuit, care must be taken to avoid bending the leads sharply close to the glass. Care must also be taken to avoid overheating the glass-to-metal seal by heat conduction along the lead. This can be avoided by the use of a thermal shunt of adequate heat capacity between the point of soldering and the glass seal. In any case the wire should not be soldered closer than 5 mm from the seals or as

specified in the published data.

VII. The operation of tubes may be seriously affected by magnetic or electrostatic fields; they should therefore be positioned and/or shielded so as to reduce the deleterious effects of such fields to a minimum.

VIII. Steps should be taken where necessary to ensure that the tube does not get shaken out of the holder during transport or while the apparatus is working. If for that purpose a can is mounted around the tube, provision must be made for adequate cooling by free circulation of air around the tube (see under ventilation.)

L. THE MICROPHONIC EFFECT OF AUDIO-FREQUENCY AMPLIFYING TUBES.

In the published data on A.F. amplifying tubes it is stated that if, for a certain output power of the output tube, the input signal applied to the tube concerned is greater than the specified value, no special measures need be taken to avoid microphonic effect. This does not imply, however, that no precautions are needed when assembling and designing the amplifier.

To clarify the precautions called for, three possible causes of microphonic effect are given below, together with directions on assembly and design.

I. Acoustic coupling in air, as a result of which the tube is brought into vibration and whereby, owing to the mutual displacement of electrodes, the anode current is influenced, thus giving rise to troublesome noise. The following are important in this respect:

1. The efficiency of the loudspeaker.
   It is assumed that this will be $\leq$ 5% at the specified gain. At higher values of efficiency, e.g. p%, the specified gain must be reduced by a factor $\sqrt{5/p}$.

2. The distance of the tube from the loudspeaker.

3. The direction in which the loudspeaker is beamed.

II. Mechanical coupling, as a result of which the vibrations from the cone of the loudspeaker are transmitted via the chassis to the electrodes of the tube.

In this case the place where the tube is mounted on the chassis is of importance. As a consequence of the cone-vibrations, the chassis will show nodes and anti-nodes and the vibrations will be transmitted to the tube via the tube socket. The acceleration to which the tube will be subjected as a result of these vibrations varies according

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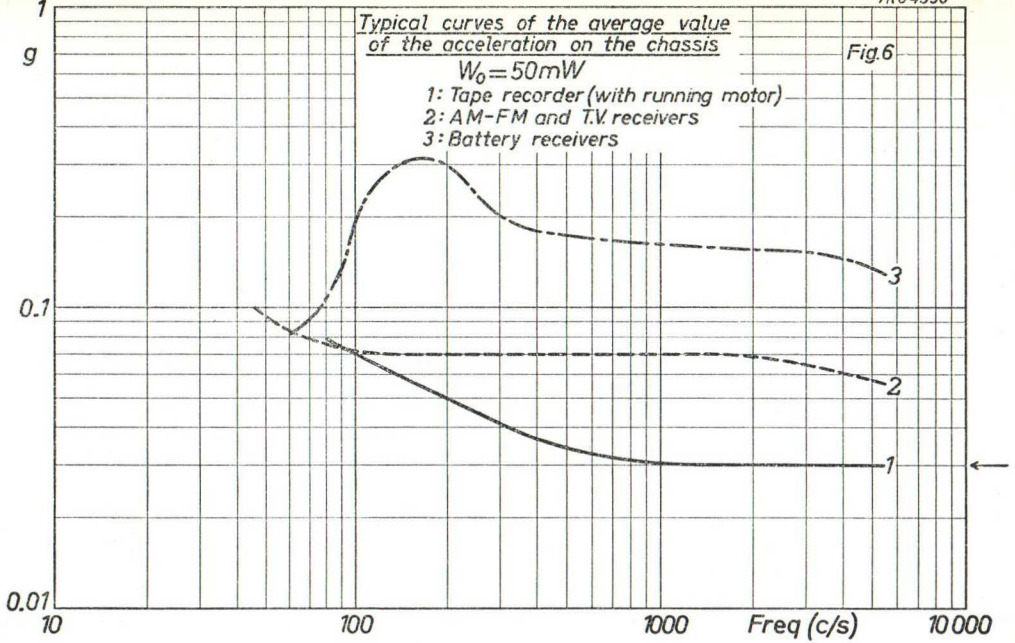
Fig.6



to the characteristic resonance of the chassis with the frequency of the sound.

If this acceleration is great in the region of the characteristic frequency of the tube electrode, the microphonic effect can be very troublesome. By slightly modifying the chassis (i.e. by changing its characteristic frequency) this nuisance can be considerably reduced.

The accompanying figure shows some typical curves of the effective values of the acceleration as a function of the frequency, measured at the position of the tube socket on the chassis.

By effective value is here meant the average value of the acceleration-peaks occurring; the peak values will be approximately three times the effective value.

III. Mechanically transmitted vibrations and shocks, resulting from the turning of switches, the operation of the gramophone motor, etc.

These too will cause troublesome extraneous noise, which will be worse the higher the gain - a fact which must be taken into account in the designing stage.

If it is necessary to have a greater gain than published, spring-mounting and acoustic screening will be even more important, and it must be remembered that it will also increase other forms of interference, such as hum and background noise.

For tubes mainly intended for use in broadcast receivers, the permissible gain is stated in relation to an output of 50 mW of the output tube.

For tubes mainly intended for larger amplifiers, the input voltage is specified for maximum output, whereby it is assumed that, at the most, a monitoring loudspeaker of 5 W is located in the immediate vicinity.

M. BULB TEMPERATURE

As a general rule the maximum design centre bulb temperature of a tube should not exceed by more than 30°C that temperature which would be attained if the tube were operated at its max. ratings in free air at a room temperature of 20°C

If for instance the bulb temperature of a certain type of tube operating in free air at maximum ratings is shown to be 200°C, it is permissible to use this tube in equipment where the bulb attains a temperature of 230°C (thus a temperature increase of 30°C.) In practice this means that the ambient temperature is permitted to increase by about twice 30°C and thus may attain a value of 80°C.

When a tube runs particularly hot at maximum ratings this increase of 30°C is not permissible; the design maximum

should then be 250°C. (Under "bulb temperature" is understood the temperature of the hottest point on the envelope.)

N. VENTILATION

The layout and design of equipment should afford sufficient ventilation to ensure a safe bulb temperature under all conditions.

As the proportion of heat dissipated from a tube by radiation is of the order of 50%, it is necessary to allow adequate conditions for free radiation from the surface of the bulb to cooler surroundings. To improve radiation the surrounding surfaces should not be polished and should be kept as cool as possible.

Surrounding a tube by a plated or tinned screening can or by components at about its own temperature may give rise to a seriously increased temperature. Where this is likely to occur, the screening cans should have matt blackened surfaces, inside and outside, and ventilation holes at the top and bottom will be required.
When tubes designed for free air cooling are used in conditions where free convection cannot be maintained, steps should be taken, either by a derating in dissipation or by forced air cooling, to ensure that the limiting bulb temperature is not exceeded.
Particular care should be taken to maintain adequate ventilation where high voltages are concerned, to avoid insulation breakdown due to ionization or tracking.
Particular attention should also be paid to the high voltage terminals, which should not have sharp or pointed edges.

O. HUM

If tube filaments are fed from the mains, the cathode current may become modulated by the mains frequency as a result of capacitance and/or insulation resistance between the filament and the other electrodes, or owing to the magnetic field of the filament. This can give rise to audible hum. The greatest influence in this connection will be exerted by the cathode and the first grid.

The greater the A.C. component becomes between filament and cathode, or first grid, the stronger will be the hum. (This will be the case, for instance, with series-fed filaments, if the tube concerned is placed "high" in the chain.)

As regards A.F. tubes, the hum will be transmitted directly; I.F. and R.F. tubes will convey it as modulation hum.

Hum can be caused by the magnetic field of the filament. In pentodes with variable mutual conductance used for A.F. purposes the hum thus produced constitutes an important part of the total hum.

Hum can also be caused by the insulation resistance between cathode and filament being included in an A.F. or R.F. chain. If it should be included in a tuned circuit, there is a risk that the frequency to which the circuit is tuned may be altered by changes in the physical or electrical properties of the insulation (e.g. by vibration of the filament in the frequency of the mains) the consequence of which will be modulation hum.

The external magnetic fields of transformers and smoothing chokes in the neighbourhood of a tube are a further cause of hum.

Moreover, the presence of leakage currents may become apparent as hum or background noise.This can be particularly troublesome in A.F. circuits, when the tube in which they originate is followed by high gain. In this context, idle tube-holder contacts in the proximity of the control grid contact should not be used as anchoring points for joints connected to 50 c/s, as in this case hum may be introduced by leakages via the tube base.

The following are some of the measures that can be taken to keep hum to a minimum.

1. Cathode hum

a. Keep the A.C. between cathode and filament as small as possible; thus, in series operation, insert the tube at the earthed side of the heater chain, and, in parallel operation, earth the centre of the filament.

b. Do not include the impedance between cathode and filament in an R.F. or A.F. circuit. If this cannot be avoided, then, for A.F., keep the gain small after the tube concerned.

As regards tuned circuits, choose the highest practicable tuning capacitance in order to reduce the influence of possible variations in circuit capacitance.

This applies especially to oscillator circuits in which the cathode is connected to a tapping in the tuned circuit. Variations in the capacitance between cathode and filament may, in this case, lead to modulation hum.

c. Decouple the cathode resistance as far as possible. Where negative feedback is employed, make the non-decoupled part as small as possible.

2. Control grid hum.

a. As for 1a) above.

b. At the mains frequency keep the impedance in the control-grid lead as small as possible.

In the published data on A.F. amplifying tubes, a minimum permissible input voltage is specified for a given

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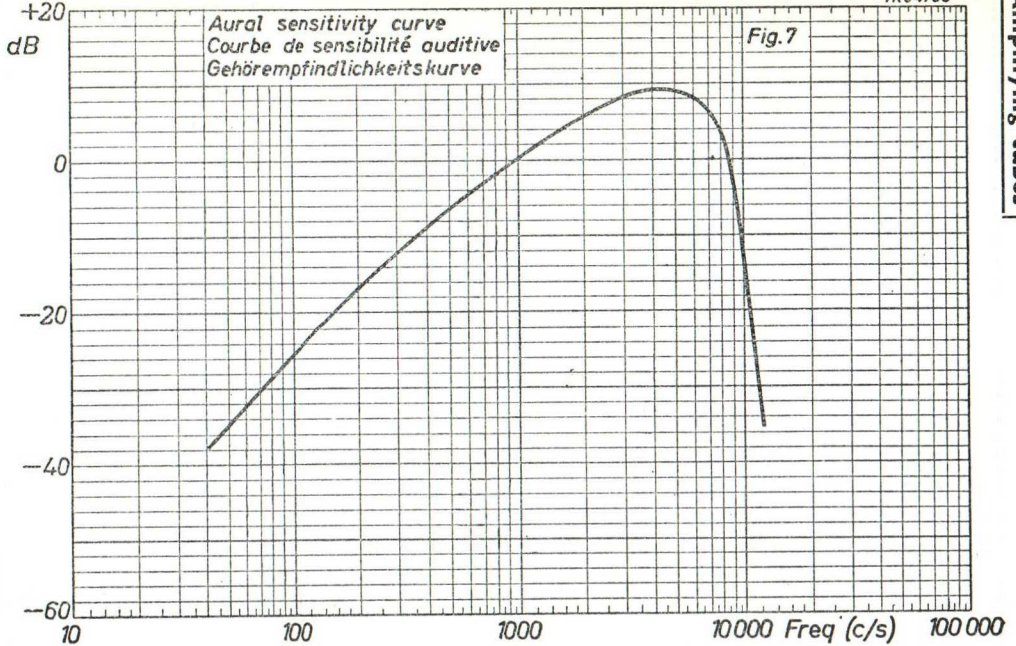


R122

output power, with a view to avoiding microphony. The value of the impedance in the control-grid lead (Z_{g1}), published in this connection, refers to the hum frequency.

For tubes mainly intended for use in broadcasting apparatus, the value of Z_{g1} is chosen such that the level of the hum voltage will lie at -60 dB (design centre value) with respect to the input voltage for 50 mW output power. The hum voltage in this case is measured behind a filter, the characteristic of which agrees with the C.C.I.R. aural sensitivity curve. (see fig.7)

For tubes mainly intended for use in larger amplifiers, the value of Z_{g1} is chosen such that the level of hum voltage, measured with a filter linear up to 500 c/s, will lie at -60 dB (design centre value) with respect to the input voltage for maximum output power.

To determine these figures for both types of amplifier, the stipulation holds that the centre of parallel-fed filaments should be earthed and that in the case of series-fed filaments the V_{kf} - voltage, permitted in connection to hum, should not be exceeded. If a cathode resistor is used, it should be decoupled by at least 100 µF.

The published limiting value of V_{kf} is the maximum permissible value up to which there will be no danger of break-down between cathode and filament and does not give any information about the resulting hum level.

It should be realized, that altough the tubes may answer the requirement of a -60 dB hum level, the total hum level of the apparatus may nevertheless be higher owing to imperfect circuitry (magnetic hum due to unfavourable positioning of transformers and smoothing chokes; unsatisfactory smoothing of the rectified voltage, etc.)

For R.F. and I.F. tubes a curve has been published which shows, as a function of the mutual conductance, the hum voltage (V_i) on the control-grid which causes a modulation hum of 1%.

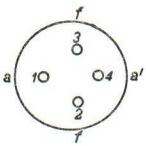
PHILIPS

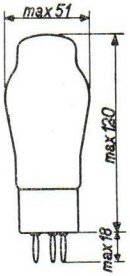
AX50

Gasfilled FULL WAVE RECTIFYING VALVE
TUBE REDRESSEUR BIPLAQUE à remplissage de gaz.
Gasgefüllte VOLLWEGGLEICHRICHTERRÖHRE

Heating : direct by A.C.	V_f =	4 V
Chauffage: direct par C.A.	I_f =	3,75 A
Heizung : direkt durch Wechselstrom		

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Fuss: A

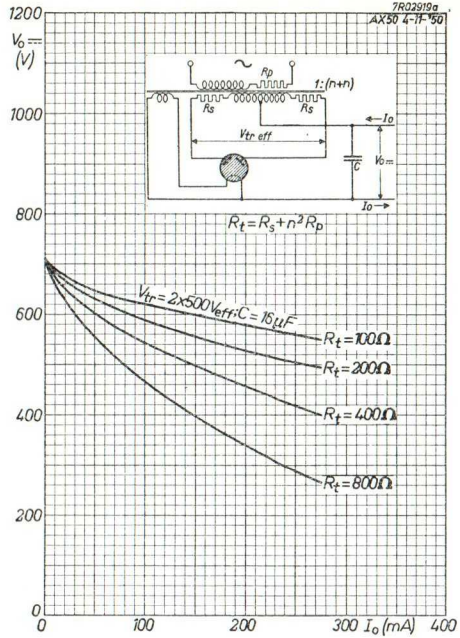
Operating characteristics and limiting values (filter with condenser input)
Caractéristiques d'utilisation et limites (filtre à entrée de condensateur)
Betriebs- und Grenzdaten (Filter mit Kondensatoreingang)

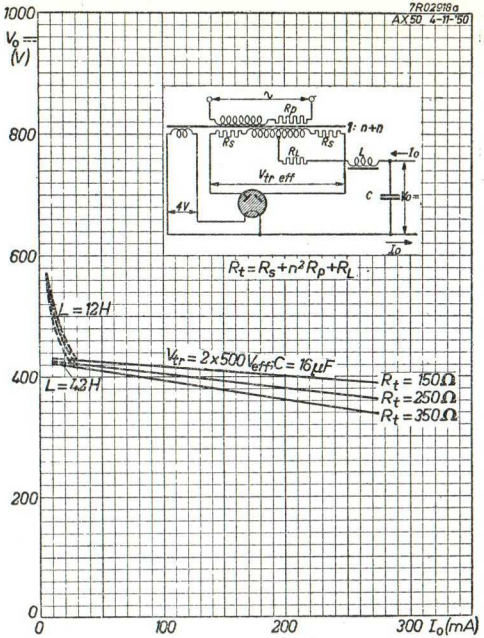
V_{tr}	= max.	2x500 V_{eff}
I_o	= max.	275 mA
I_{ap}	= max.	1000 mA
V_{arc}	= max.	15 V

C_{filt} =	16	32 max.	64 µF
R_t	= min. 2x100	min. 2x150	min. 2x200 Ω

Operating characteristics as double phase rectifier with choke-input filter
Caractéristiques d'utilisation comme redresseur biphasé avec filtre à entrée de choc
Betriebsdaten als Zweiweggleichrichter mit Filter mit Drosselspuleneingang

V_{tr}	= max.	2x500 V_{eff}
I_o	= max.	275 mA
R_t	= min.	2x100 Ω(4W)
L_{filt}	=	6 H
C_{filt}	=	50 µF





AX50

PHILIPS

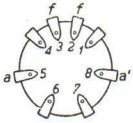
PHILIPS

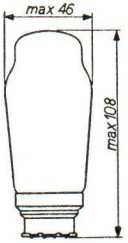
AZ 1

High vacuum FULL-WAVE RECTIFYING VALVE
TUBE REDRESSEUR BIPLAQUE à vide poussé
Hochvakuum VOLLWEGGLEICHRICHTERRÖHRE

Heating:	direct by A.C.	Vf =	4,0 V
Chauffage:	direct par C.A.	If =	1,1 A
Heizung:	direkt durch Wechselstrom		

Dimensions in mm
Dimensions en mm
Abmessungen in mm

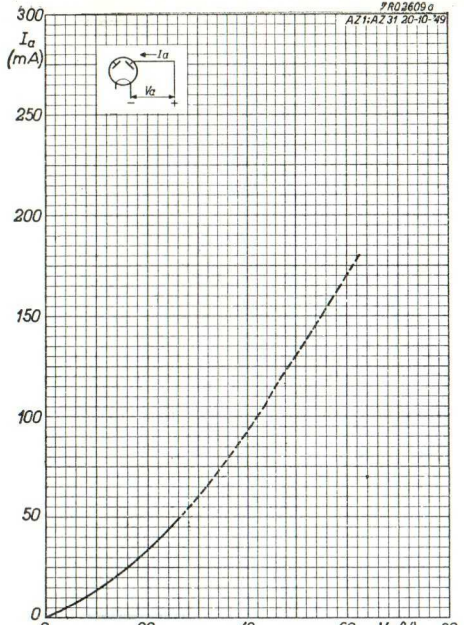


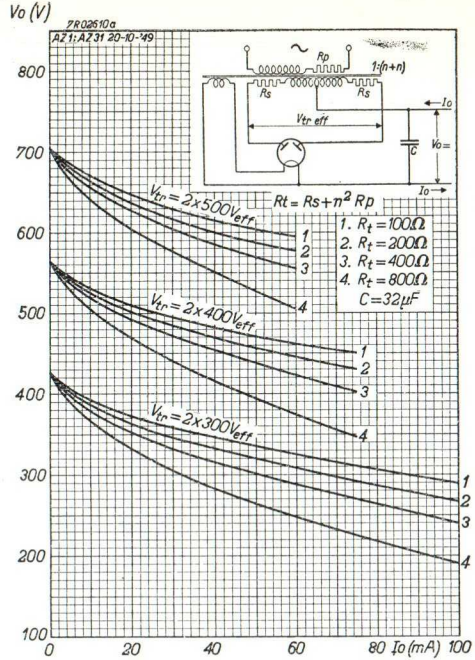


Base, culot, Fuss: P

Operating characteristics and limiting values
Caractéristiques d'utilisation et limites
Betriebs- und Grenzdaten

V_{tr}	=	2x300		2x400		max. 2x500	V_{eff}
Io	=	max. 100		max. 75		max. 60	mA
C_{filt}	=	max. 60		max. 60		max. 60	µF
Rt	=	min. 2x60		min. 2x80		min. 2x100	Ω


7R02609a
AZ1:AZ31 20-10-'49
Ia (mA)
Ia
Va
300
250
200
150
100
50
0
0
20
40
60
Va (V)
80


Vo (V)
7R02610a
AZ1:AZ31 20-10-'49
Rp
1:(n+n)
Rs
Rs
Io
Vtr. eff
C
Vo=
Io
Rt = Rs+n² Rp
1. Rt = 100Ω
2. Rt = 200Ω
3. Rt = 400Ω
4. Rt = 800Ω
C=32µF
Vtr = 2x500Veff
Vtr = 2x400Veff
Vtr = 2x300Veff
800
700
600
500
400
300
200
100
0
20
40
60
80
Io (mA)
100

AZ 1

PHILIPS

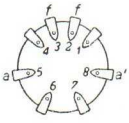
PHILIPS

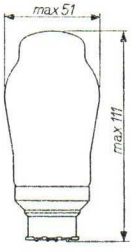
AZ 4

High vacuum FULL-WAVE RECTIFYING VALVE
TUBE REDRESSEUR BIPLAQUE à vide poussé
Hochvakuum VOLLWEGGLEICHRICHTERRÖHRE

Heating: direct by A.C. Vf = 4,0 V
Chauffage: direct par C.A. If = 2,3 A
Heizung: direkt durch Wechselstrom

Dimensions in mm
Dimensions en mm
Abmessungen in mm

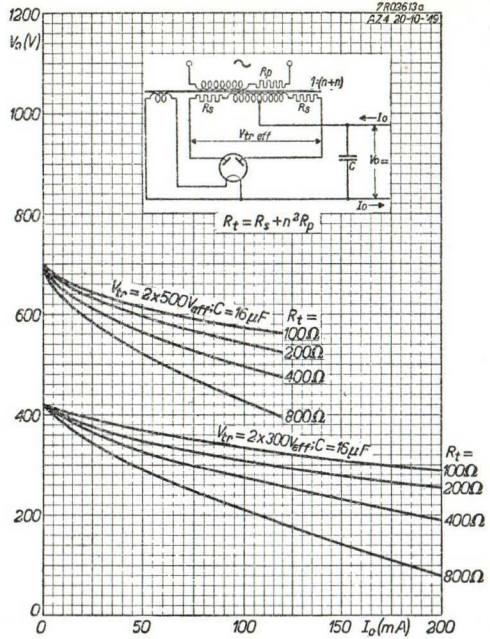


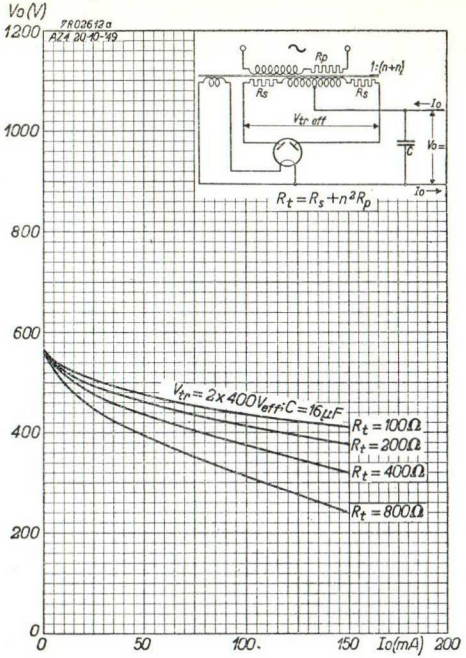


Base, culot, Fuss: P

Operating characteristics and limiting values
Caractéristiques d'utilisation et limites
Betriebs- und Grenzdaten

V_{tr}	=		2x300		2x400	max.	2x500	V_{eff}
Io	=	max.	200	max.	150	max.	120	mA
C_{filt}	=	max.	60	max.	60	max.	60	µF
Rt	=	min.	2x60	min.	2x80	min.	2x100	Ω





AZ 4

PHILIPS

A

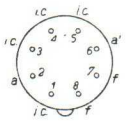
PHILIPS

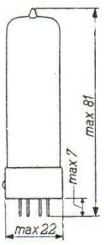
AZ41

High vacuum FULL WAVE RECTIFYING VALVE
TUBE REDRESSEUR BIPLAQUE à vide poussé
Hochvakuum VOLLWEGGLEICHRICHTERRÖHRE

Heating: direct by A.C. Vf = 4,0 V
Chauffage: direct par C.A. If = 0,72 A
Heizung: direkt durch Wechselstrom

Dimensions in mm
Dimensions en mm
Abmessungen in mm

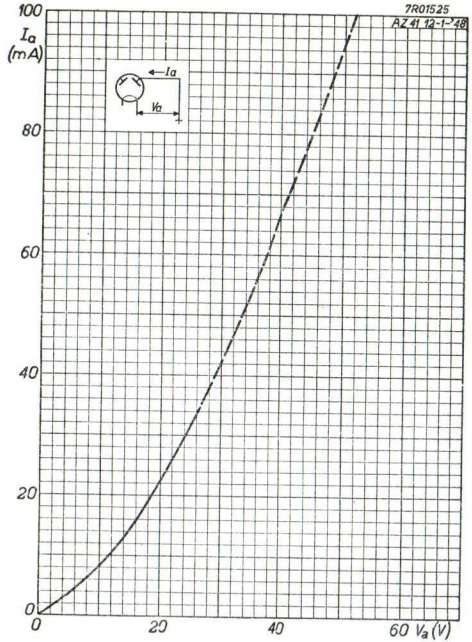


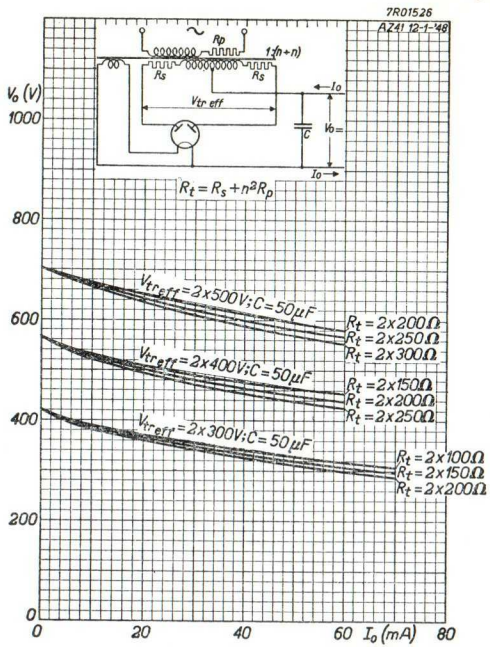


Base, culot, Fuss: Rimlock

Operating characteristics and limiting values
Caractéristiques d'utilisation et caractéristiques limites
Betriebs- und Grenzdaten

Vtr =		2x300	2x400	max. 2x500	V_{eff}
Io =	max.	70	max. 60	max. 60	mA
C_{filt} =	max.	50	max. 50	max. 50	µF
Rt =	min.	2x100	min. 2x150	min. 2x200	Ω


7R01525
AZ41 12-1-48
I_a (mA)
100
80
60
40
20
0
0
20
40
60 V_a (V)
I_a
V_a


7R01526
AZ41 12-1-48
V_o (V)
1000
800
600
400
200
0
0
20
40
60 I_o (mA)
80
Rp
1:(n+n)
Rs
Rs
$V_{tr\ eff}$
C
V_o=
I_o
I_o
$R_t = R_s + n^2 R_p$
$V_{tr\ eff}$ = 2x500V; C = 50µF
R_t = 2x200Ω
R_t = 2x250Ω
R_t = 2x300Ω
$V_{tr\ eff}$ = 2x400V; C = 50µF
R_t = 2x150Ω
R_t = 2x200Ω
R_t = 2x250Ω
$V_{tr\ eff}$ = 2x300V; C = 50µF
R_t = 2x100Ω
R_t = 2x150Ω
R_t = 2x200Ω

PHILIPS

A

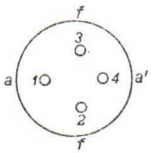
PHILIPS

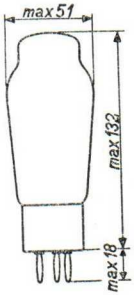
AZ 50

High vacuum FULL WAVE RECTIFIER
REDRESSEUR BIPLAQUE à vide poussé
Hochvakuum VOLLWEGGLEICHRICHTER

Heating	:	direct by A.C.	Vf = 4 V
Chauffage	:	direct par C.A.	If = 3 A
Heizung	:	direkt durch Wechselstrom	

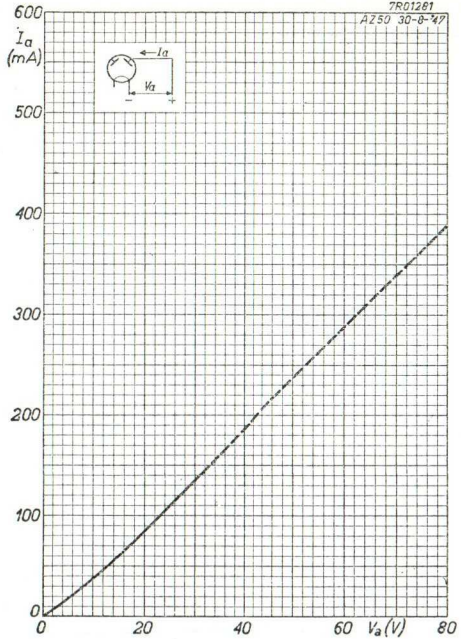
Dimensions in mm
Dimensions en mm
Abmessungen in mm

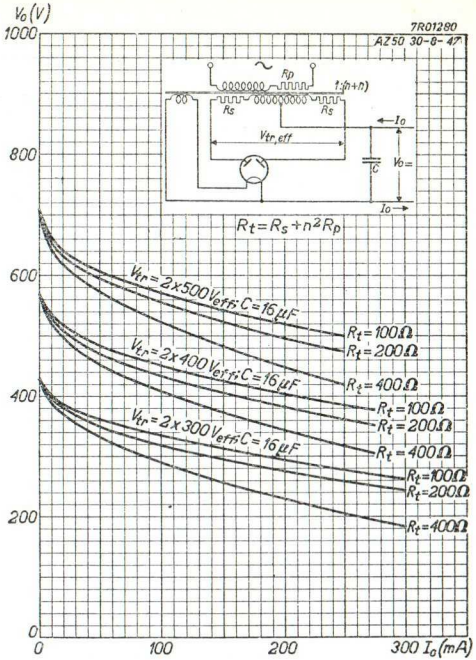




Operating conditions and limiting values
Caractéristiques d'utilisation et limites
Betriebs- und Grenzdaten

Vtr =	2 x 300	2 x 400	max. 2 x 500	V_{eff}
Io =	max. 300	max. 275	max. 250	mA
Rt =	min. 100	min. 150	min. 200	Ω
C =	max. 16	max. 32	max. 64	µF





AZ 50

PHILIPS

A

PHILIPS

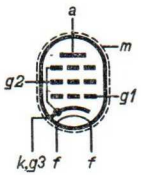
CF 50

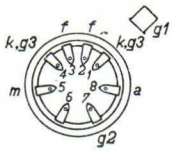
PENTODE for use as microphone pre-amplifier
PENTHODE pour utilisation comme préamplificatrice de microphone
PENTODE zur Verwendung als Mikrophonvorverstärker

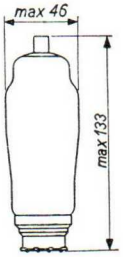
Heating: indirect by A.C. or D.C.; series or parallel supply
Chauffage: indirect par C.A. ou C.C.; alimentation en série ou en parallèle
Heizung: indirekt durch Wechsel- oder Gleichstrom; Serien- oder Parallelspeisung

V_f = 30 V
I_f = 0,2 A

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Capacitances
Capacités
Kapazitäten

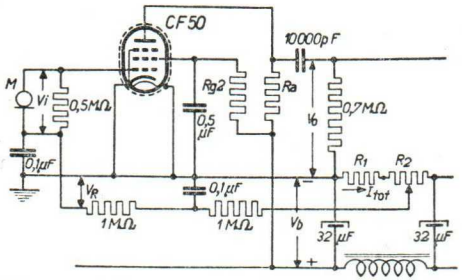
C_a = 13,8 pF
C_{g1} = 12,3 pF
C_{ag1} < 0,03 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	100	250 V
V_{g2}	=	100	100 V
V_{g1}	=	-2	-2 ;
I_a	=	1,5	1,5 mA
I_{g2}	=	0,3	0,3 mA
S	=	3,3	3,3 mA/V
μ_{g2g1}	=	45	45
R_i	=	2	2,5 MΩ
R_{eq}	=		2,5 kΩ

Operating conditions as resistance-coupled L.F.amplifier
Caractéristiques d'utilisation en amplificatrice B.F. à résistances
Betriebsdaten als N.F. Widerstandsverstärker.

V_b (V)	R_a (MΩ)	R_{g2} (MΩ)	$-V_R$ (V)	I_a (mA)	I_{g2} (mA)	$\frac{V_o}{V_i}$	d_{tot} (%) (V_o=0,1V_{eff})
450	0,3	1	2	1,3	0,38	395	<0,2
450	0,3	1	6	0,72	0,18	260	<0,2
450	0,3	1	10	0,22	0,06	90	<0,2
450	0,3	1	11	0,11	0,04	45	0,4
450	0,3	1	12	0,04	0,02	7	3
450	0,1	0,5	2	2,8	0,64	245	<0,2
450	0,1	0,5	6	1,5	0,33	180	<0,2
450	0,1	0,5	10	0,25	0,05	38	0,3
450	0,1	0,5	11	0,09	0,02	15	1,1
450	0,1	0,5	12	0,03	0,01	3	5



Limiting values
Caractéristiques limites
Grenzdaten

V_{ao}	= max. 550 V	V_{g2o}		= max.	550 V
V_a	= max. 250 V	V_{g2} (I_a=1,5 mA)		= max.	125 V
W_a	= max. 1 W	V_{g2}($I_a \leq$0,25 mA)		= max.	450 V
W_{g2}	= max. 0,5 W	V_{g1}(I_{g1}=+0,3µA)		= max.	-1,3 V
I_k	= max. 10 mA	V_{kf}		= max.	100 V
R_{g1}	= max. 3 MΩ	R_{kf}		= max.	20 kΩ

PHILIPS DAF 40

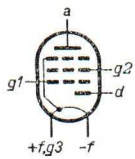
DIODE-PENTODE for use as R.F. or I.F. amplifier in battery receivers
DIODE-PENTHODE pour l'utilisation comme amplificatrice H.F. ou M.F. dans des apareils-batterie
DIODE-PENTODE zur Verwendung als HF- oder ZF- Verstärker in Batteriegeräten

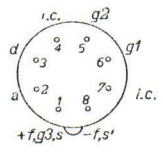
Heating: direct by D.C.;series or parallel supply
Chauffage: direct par C.C.; alimentation en serie ou en parallèle
Heizung: direkt durch Gleichstrom; Serien- oder Parallelspeisung

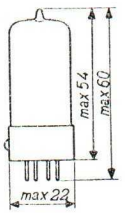
Parallel supply:
Alimentation en parallèle: V_f 1,4 V
Parallelspeisung: I_f = 0,025 A

Series supply:
Alimentation en série: V_f = 1,3 V
Serienspeisung:

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Rimlock

Capacitances
Capacités
Kapazitäten

C_{g1}	=	2,8 pF
C_a	=	3,7 pF
C_{ag1}	<	0,0065 pF
C_d	=	2,1 pF
C_{g1d}	<	0,003 pF
C_{ad}	<	0,1 pF

Operating characteristics of the pentode section as R.F. or I.F. amplifier
Caracteristiques d'utilisation de la partie pentode comme amplificatrice H.F. ou M.F.
Betriebsdaten des Pentodenteiles als HF- oder ZF-Verstärker

$V_a=V_b$	=	67,5		90		V
R_{g2}	=	0		120		kΩ
V_{g1}	=	0	-3,7	0	-5,0	V
V_{g2}	=	67,5	67,5	67,5	90	V
I_a	=	0,85	-	0,85	-	mA
I_{g2}	=	0,20	-	0,20	-	mA
S	=	700	7	700	7	µA/V
R_i	=	1,6	>10	2,2	>10	MΩ
μ_{g2g1}	=	32	-	32	-	
R_{eq}	=	8,7	-	8,7	-	kΩ

$V_a=V_b$	=	120		V
R_{g2}	=	270		kΩ
V_{g1}	=	0	-6,8	V
V_{g2}	=	67,5	120	V
I_a	=	0,85	-	mA
I_{g2}	=	0,20	-	mA
S	=	700	7	µA/V
R_i	=	2,6	>10	MΩ
μ_{g2g1}	=	32	-	

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o} = max. 180 V	W_{g2}		=max.0,02 W
V_a = max. 135 V	V_{g2}	(I_a=0,85mA)	=max. 85 V
W_a = max. 0,2 W	V_{g1}	(I_{g1}=+0,3µA)	=max.-0,2 V
I_k = max. 1,2 mA	$V_{d\ inv_p}$		=max. 100 V
R_{g1} = max. 10 MΩ	I_d		=max. 0,2mA
V_{g2_o}= max. 180 V	I_{d_p}		=max. 1,2mA

PHILIPS DAF 41

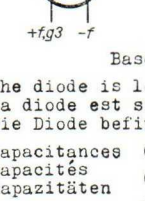
DIODE-PENTODE for use as A.F. amplifier in battery receivers
DIODE-PENTHODE pour utilisation en amplificatrice B.F. dans des appareils-batterie
DIODE-PENTODE zur Verwendung als NF-Verstärker in Batteriegeräten

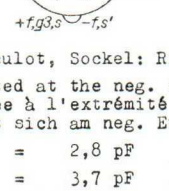
Heating : direct by D.C.
series or parallel supply
Chauffage: direct par C.C.
alimentation en série ou en parallèle
Heizung : direkt durch Gleichstrom
Serien-oder Parallelspeisung

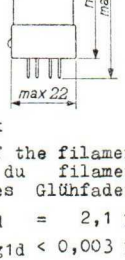
Parallel supply
Alimentation en parallèle
Parallelspeisung
V_f = 1,4 V
I_f = 25 mA

Series supply
Alimentation en série
Serienspeisung
V_f = 1,3 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Rimlock

The diode is located at the neg. end of the filament
La diode est située à l'extrémité nég. du filament
Die Diode befindet sich am neg. Ende des Glühfadens

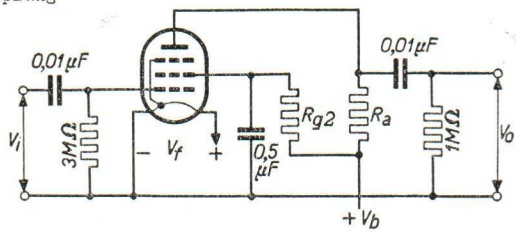
Capacitances Capacités Kapazitäten	C_{g1}	= 2,8 pF	C_d	= 2,1 pF
	C_a	= 3,7 pF	C_{g1d}	< 0,003 pF
	C_{ag1}	< 0,0065 pF	C_{ad}	< 0,1 pF

This tube can be used without special precautions against microphonic effect in circuits in which the input voltage $V_i \geq 18$ mV for an output of 50 mW of the output tube

Ce tube peut être utilisé sans précautions spéciales contre l'effet microphonique dans des circuits dont la tension d'entree $V_i \geq 18$ mV pour une puissance de 50 mW du tube de sortie

Diese Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden in Schaltungen die für eine Eingangsspannung $V_i \geq 18$ mV eine Leistung von 50 mW der Endröhre ergeben

Operating characteristics as resistance coupled A.F. amplifier
Caractéristiques d'utilisation en amplificatrice B.F. avec couplage à résistances
Betriebsdaten als NF- Verstärker mit Widerstandskopplung



Vb (V)	Ra (MΩ)	Rg2 (MΩ)	Ia (mA)	Ig2 (mA)	Vo/Vi	dtot (Vo= 3Veff)	dtot (Vo= 5Veff)	dtot (Vo= 10Veff)
67,5	0,22	0,82	0,17	0,04	60	1,4	1,7	
90	0,22	0,82	0,25	0,06	70	0,8	0,9	
90	0,47	2,2	0,13	0,03	83	1,1	1,4	
120	0,47	2,2	0,18	0,04	100	0,5	1,0	
150	0,47	2,2	0,24	0,05	112	0,4	0,7	1,4

Limiting values
Caractéristiques limites
Grenzdaten

Va_o	= max.	180 V
Va	= max.	135 V
Wa	= max.	0,1 W
$Vg2_o$	= max.	180 V
Vg2	= max.	85 V
Wg2	= max.	0,02 W
Vg1 (Ig1=+0,3µA)	= max.	-0,2 V
Ik	= max.	0,5 mA
Rg1	= max.	10 MΩ
$Vdinv_p$	= max.	50 V
Id	= max.	0,2 mA
Idp	= max.	1,2 mA

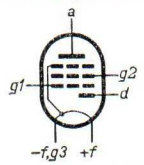
PHILIPS DAF 91

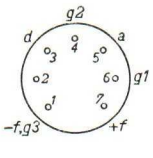
DIODE-PENTODE for use as A.F. amplifier in battery receivers
DIODE-PENTHODE pour utilisation en amplificatrice B.F. dans des appareils-batterie
DIODE-PENTODE zur Verwendung als NF- Verstärker in Batteriegeräten

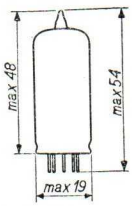
Heating : direct by D.C.
series or parallel supply
Chauffage : direct par C.C.
alimentation en série ou en parallèle
Heizung : direkt durch Gleichstrom
Serien- oder Parallelspeisung

Parallel supply Alimentation en parallèle Parallelspeisung	V_f =	1,4 V
	I_f =	0,05 A
Series supply Alimentation en série Seriensspeisung	V_f =	1,3 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

The diode is located at the negative end of the filament
La diode est située à l'extrémité négative du filament
Die Diode befindet sich am negativen Ende des Glühfadens

Capacitances
Capacités
Kapazitäten

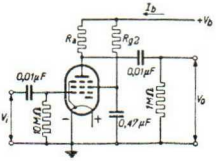
C_a	= 2,8 pF
C_{g1}	= 2,0 pF
C_{ag1}	< 0,4 pF
C_d	= 1,5 pF
C_{g1d}	< 0,1 pF
C_{ad}	< 0,9 pF

Typical characteristics of the pentode section
Caractéristiques types de la partie penthode
Kenndaten des Pentodenteiles

V_a	=	45	67,5	90 V
V_{g2}	=	45	67,5	90 V
V_{g1}	=	0	0	0 V
I_a	=	0,75	1,6	2,7 mA
I_{g2}	=	0,15	0,4	0,6 mA
S	=	420	625	720 µA/V
R_i	=	0,6	0,6	0,5 MΩ
μ_{g2g1}	=	13,5	13,5	13,5

Operating characteristics of the pentode section as A.F. amplifier
Caractéristiques d'utilisation de la partie penthode en amplificatrice B.F.
Betriebsdaten des Pentodenteiles als NF- Verstärker

V_b (V)	R_a (MΩ)	R_{g2} (MΩ)	I_b (µA)	$\frac{V_o}{V_i}$	d_{tot} (%) V_o=5Veff
45	0,47	1,8	70	38	4
45	0,47	2,2	60	37	5
45	1	3,9	40	42	5
45	1	4,7	30	40	8
67,5	0,47	1,8	125	50	1
67,5	0,47	2,2	115	50	1
67,5	1	3,9	60	55	3
67,5	1	4,7	55	55	2,5
90	0,47	1,8	170	56	1
90	0,47	2,2	160	57	1
90	1	3,9	85	60	2
90	1	4,7	80	64	1,7
120	0,47	1,8	260	60	3
120	0,47	2,2	240	66	1
120	1	3,9	115	66	1,8
120	1	4,7	110	70	1,5



This tube can be used without special precautions against microphonic effect in circuits in which the input voltage $V_i \geq 40$ mV for an output of 50 mW of the output tube

Ce tube peut être utilisé sans précautions spéciales contre l'effet microphonique dans des circuits dont la tension d'entrée $V_i \geq 40$ mV pour une puissance de 50 mW du tube de sortie

Die Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden in Schaltungen die für eine Eingangsspannung $V_i \geq 40$ mV eine Leistung von 50 mW der Endröhre ergeben

Operating characteristics of the pentode section in triode connection as A.F. amplifier (screen grid connected to anode)
Caractéristiques d'utilisation de la partie penthode en montage triode en amplificatrice B.F. (grille-écran reliée à l'anode)
Betriebsdaten des Pentodenteiles in Triodenschaltung als NF- Verstärker (Schirmgitter verbunden mit Anode)

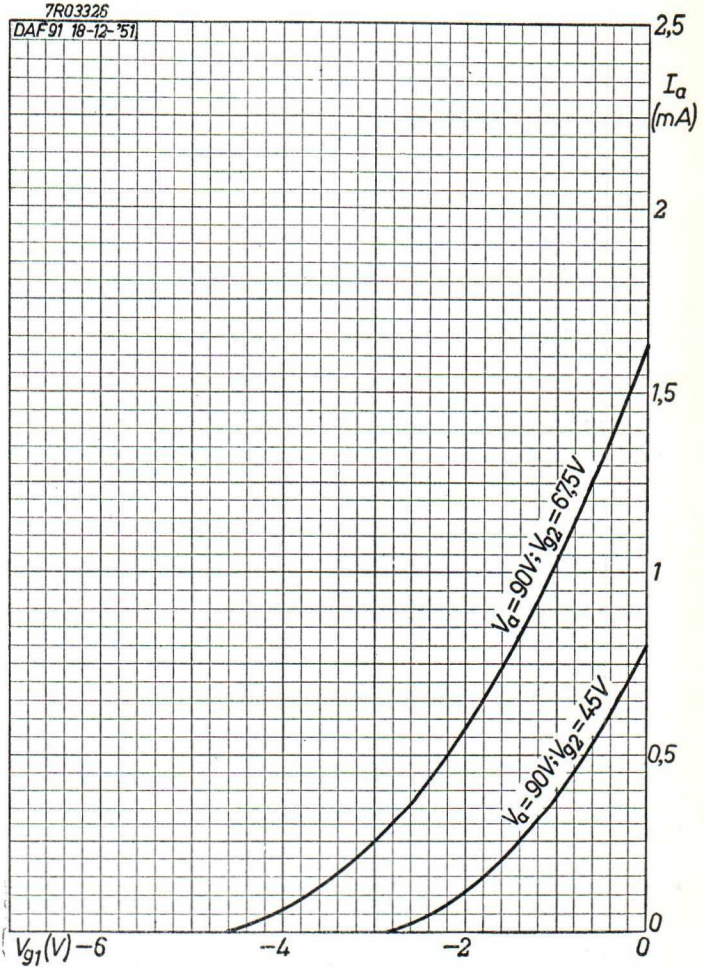
Vb (V)	Ra (MΩ)	Rg1 (MΩ)	Rg1' (MΩ) [1]	Ib (μA)	$\frac{V_o}{V_i}$	dtot (%) (V_o=5Veff)
45	0,22	10	1	85	9,5	2,5
45	0,47	10	1	45	10	3
67,5	0,22	10	1	170	10,5	0,9
67,5	0,47	10	1	85	11	1
90	0,22	10	1	270	11	0,6
90	0,47	10	1	140	11,5	0,7
120	0,22	10	1	380	11,5	1
120	0,47	10	1	200	12	0,5

1) R_{g1}'is the grid resistor of the next tube
R_{g1}'est la résistance de grille du tube suivant
R_{g1}'ist der Gitterwiderstand der nächsten Röhre

Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max. 90 V
W_a	= max. 0,25 W
V_{g2}	= max. 90 V
W_{g2}	= max. 0,06 W
V_{g1} (I_{g1}= + 0,3 µA)	= max. -0,2 V
I_k	= max. 4,5 mA
R_{g1}	= max. 3 MΩ[1])
Vd inv_p	= max. 100 V
I_d	= max. 0,2 mA
Id_p	= max. 1,2 mA

[1]) With grid biasing R_{g1} = max. 22 MΩ
Si V_{g1} est obtenue seulement par moyen de R_{g1}, R_{g1} = 22 MΩ au max.
Wenn V_{g1} nur mittels R_{g1} erhalten wird, ist R_{g1}= max. 22 MΩ


7R03326
DAF 91 18-12-'51
2,5
I_a (mA)
2
1,5
1
0,5
0
V_a=90V; V_{g2}=67,5V
V_a=90V; V_{g2}=45V
V_{g1}(V) −6
−4
−2
0

4.4.1952

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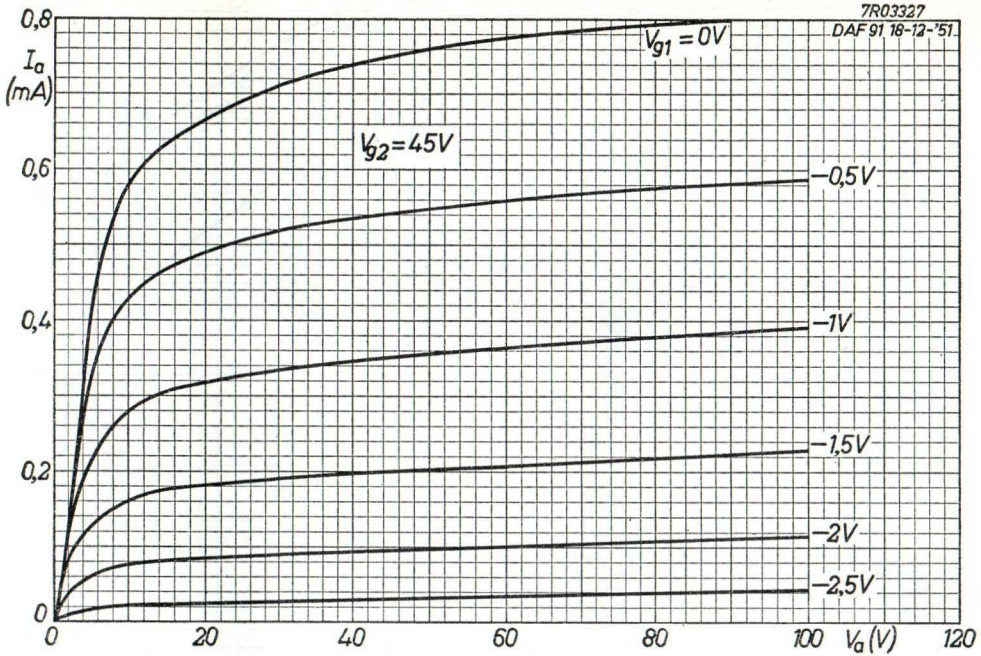

DAF 91

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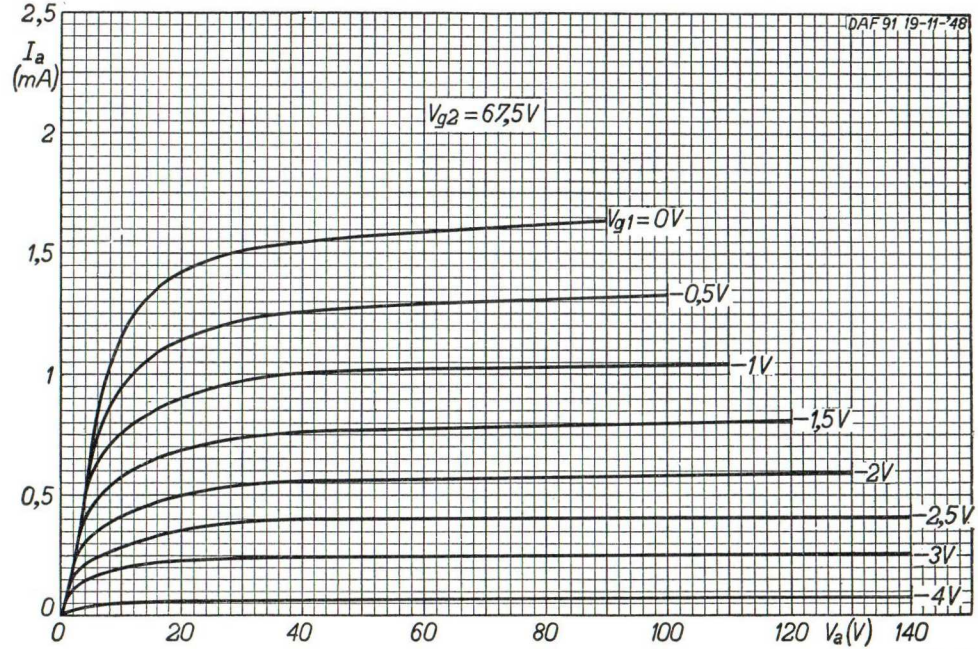
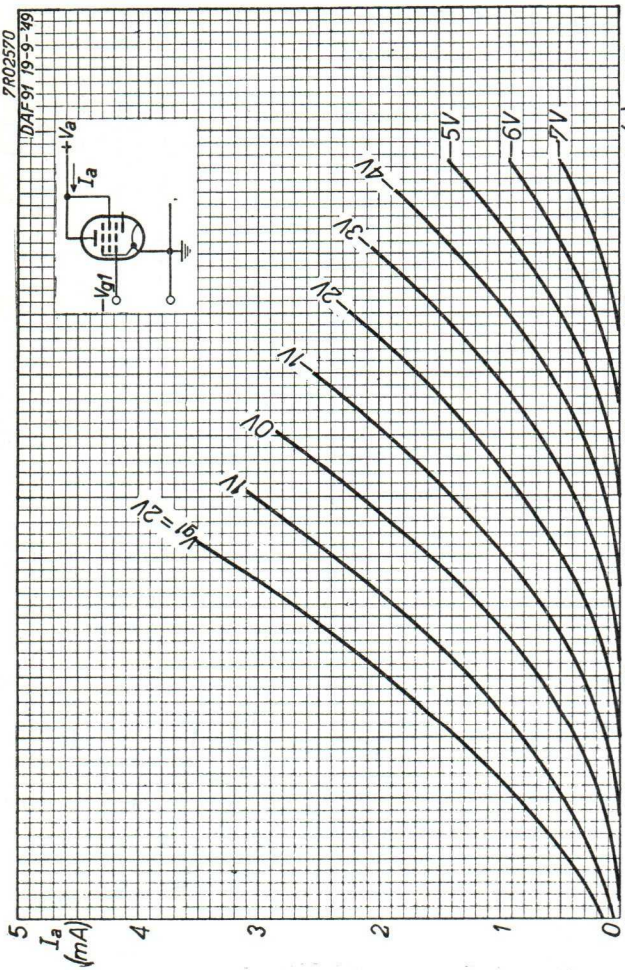
10.10.1953



C

PHILIPS

DAF 91


7R02570
DAF 91 19-9-89
+Va
Ia
-Vg1
Ia (mA)
5
4
3
2
1
0
0
20
40
60
80
100
120
140
Va(V)
-12V = Vg1
-1V
0V
1V
2V
3V
4V
5V
6V
7V

PHILIPS DAF 96

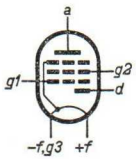
DIODE-PENTODE for use as A.F. amplifier in battery receivers
DIODE-PENTHODE pour utilisation en amplificatrice B.F. dans des appareils-batterie
DIODE-PENTODE zur Verwendung als NF-Verstärker in Batteriegeräten

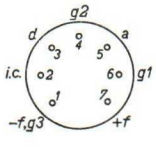
Heating : direct by D.C.; parallel or series supply
Chauffage : direct par C.C.; alimentation parallèle ou série
Heizung : direkt durch Gleichstrom; Parallel- oder Serienspeisung

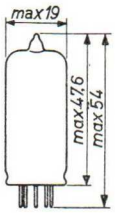
Parallel supply: Vf = 1,4 V
Alimentation parallèle: If = 25 mA
Parallelspeisung:

Series supply:
Alimentation série: Vf = 1,3 V
Serienspeisung:

Dimensions in mm
Dimensions en mm
Abmessungen in mm







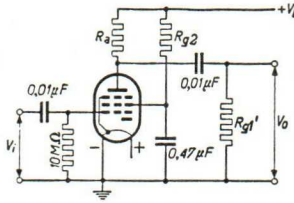
Base, culot, Sockel: Miniature

The diode is located at the negative end of the filament
La diode est située à l'extrémité négative du filament
Die Diode befindet sich am negativen Ende des Glühfadens

Capacitances
Capacités
Kapazitäten

C_a	=	2,7 pF
C_{g1}	=	1,8 pF
C_{ag1}	<	0,3 pF
C_d	=	1,1 pF
C_{ad}	<	0,9 pF
C_{g1d}	<	0,03 pF

Operating characteristics of the pentode section as A.F. amplifier
Caractéristiques d'utilisation de la partie penthode en amplificatrice B.F.
Betriebsdaten des Pentodenteiles als NF-Verstärker



A. In pentode connection
En connexion penthode
In Pentodenschaltung

V_b [1] (V)	R_a (MΩ)	R_{g2} (MΩ)	R_{g1}' (MΩ)	I_a (µA)	I_{g2} (µA)	$\frac{V_o}{V_i}$	d_{tot} (%) (V_o=5 V_{eff})
64	1	2,7	1	42	13	50	3,5
64	1	2,7	2,2	42	13	63	1,8
85	1	2,7	1	64	21	55	1,4
85	1	2,7	2,2	64	21	70	2,4

[1]) Based on a battery voltage of 90 or 67.5 V reduced by the negative bias for the output valve
Se basant sur une tension de batterie de 90 ou 67,5 V diminuée de la polarisation négative du tube de sortie
Basiert auf einer Batteriespannung von 90 oder 67,5 V verringert um die negative Vorsp. der Endröhre

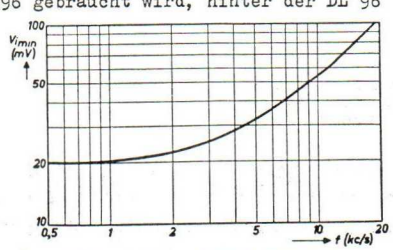
B. In triode connection (screen grid connected to anode)
En connexion triode (grille-écran reliée à l'anode)
In Triodenschaltung (Schirmgitter verbunden mit Anode)

V_b [1] (V)	Ra (MΩ)	Rg1' (MΩ)	Ia (μA)	$\frac{V_o}{V_i}$	d_{tot} (%) (V_o = 5 Veff)
64	0,47	1	70	12	2,0
64	0,47	2,2	70	12,5	1,3
64	1	1	38	12	2,5
64	1	2,2	38	13	1,5
85	0,47	1	110	12,5	1,0
85	0,47	2,2	110	13	1,0
85	1	1	56	12,5	1,2
85	1	2,2	56	13,5	1,2

This tube can be used without special precautions against microphonic effect when the input voltage V_i is higher than 20 mV for an output of 50 mW of the output tube. For the higher frequencies the sensitivity should be decreased according to the figure below. The decrease should be effected after the DAF 96 or, in the case that a DL 96 output tube is used, after the DL 96

Ce tube peut être utilisé sans précautions spéciales contre l'effet microphonique quand la tension d'entrée V_i est plus de 20 mV pour une puissance de 50 mW du tube de sortie. Pour les fréquences plus élevées la sensibilité sera diminuée suivant la figure ci-dessous. La diminuation doit être effectuée après le DAF 96 ou en cas qu'on utilise le tube de sortie DL 96, après le DL 96

Diese Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden wenn die Eingangsspannung höher als 20 mV ist für eine Leistung von 50 mW der Endröhre. Für die höheren Frequenzen ist die Empfindlichkeit nach untenstehender Abbildung zu verringern. Die Verringerung ist hinter der DAF 96 durchzuführen oder, wenn die Endröhre DL 96 gebraucht wird, hinter der DL 96



[1] See page 2 ; voir page 2 ; siehe Seite 2

Limiting values
Caractéristiques limites
Grenzdaten

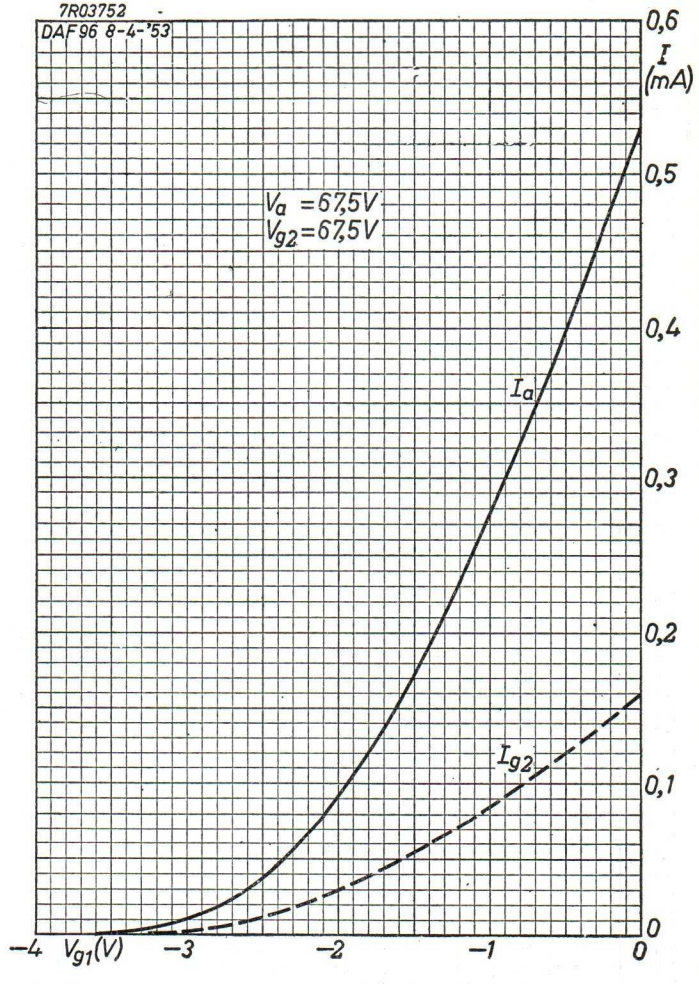
V_b	= max.	120	V
V_b	= max.	150	V [1]
V_a	= max.	120	V
W_a	= max.	0,03	W
V_{g2}	= max.	90	V
W_{g2}	= max.	0,01	W
V_{g1} (I_{g1}=+0,3µA)	= max.	-0,2	V
I_k	= max.	1	mA
R_{g1}	= max.	3	MΩ [2]
$V_{d\ inv_p}$	= max.	100	V
I_d	= max.	0,2	mA
I_{d_p}	= max.	1,2	mA

[1] Absolute maximum value
Valeur max. absolue
Absoluter Grenzwert

[2] With grid current biasing, R_{g1} = max. 22 MΩ
Si V_{g1} est obtenue seulement par moyen de R_{g1}, R_{g1} = 22 MΩ au max.
Wenn V_{g1} nur mittels R_{g1} erhalten wird, ist R_{g1} = max. 22 MΩ

PHILIPS

DAF 96



4.4.1953

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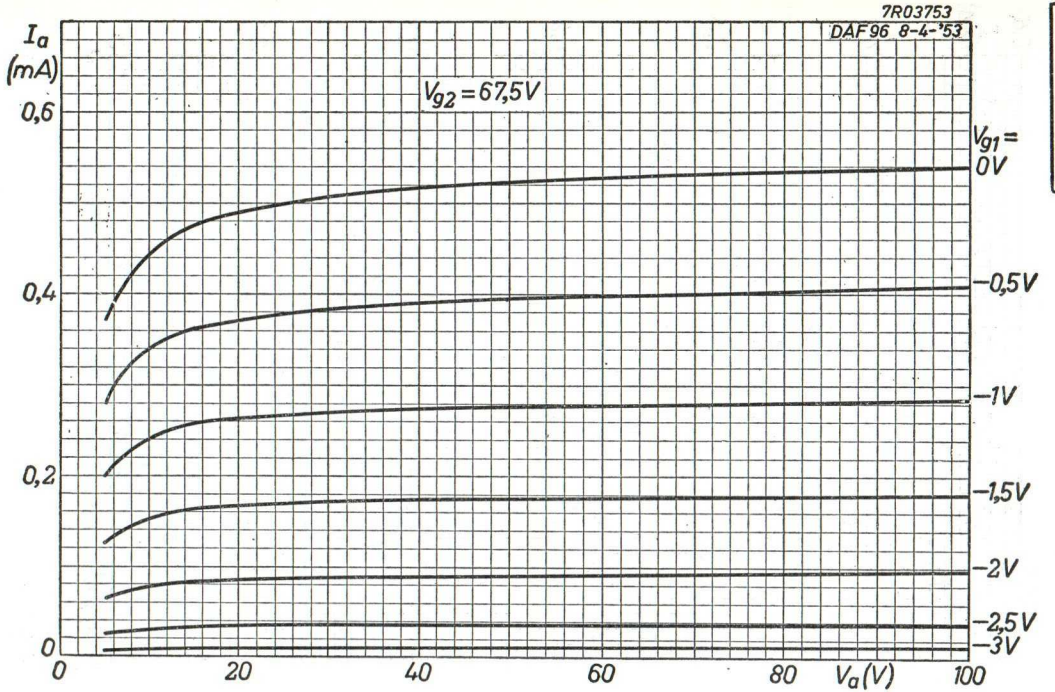


DAF 96

PHILIPS

B

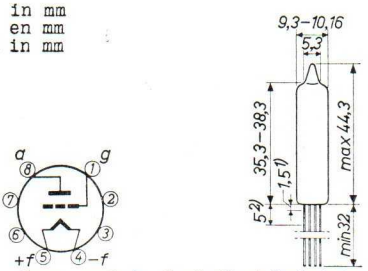
PHILIPS DC 70

U.H.F. TRIODE for use as oscillator in battery-operated equipment at frequencies of the order of 500 Mc/s
TRIODE U.H.F. pour l'utilisation comme oscillatrice dans des équipements à alimentation par batteries aux fréquences de l'ordre de grandeur de 500 MHz
UHF-TRIODE zur Verwendung als Oszillator in batteriegespeisten Anlagen bei Frequenzen in der Grössenordnung von 500 MHz

Heating: direct by D.C.; parallel supply
Chauffage: direct par C.C.; alimentation en parallèle
Heizung: direkt durch Gleichstrom Parallelspeisung

$V_f = 1{,}25$ V
$I_f = 0{,}2$ A

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: Subminiature

Capacitances (with external shield)
Capacités (avec blindage extérieur)
Kapazitäten (mit äusserer Abschirmung)

$C_{ag} = 1{,}4$ pF
$C_{gf} = 1{,}3$ pF
$C_{af} = 1{,}9$ pF

1) This part of the leads should not be bent
Cette partie des fils ne sera pas pliée
Dieser Teil der Drähte soll nicht gebogen werden

2) This part of the leads should not be soldered
Cette partie des fils ne sera pas soudée
Dieser Teil der Drähte soll nicht gelötet werden

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	150 V
I_a	=	12 mA
V_g	=	-4,5 V
S	=	3,4 mA/V
μ	=	14
R_i	=	4 kΩ

Operating characteristics as oscillator at 500 Mc/s
Caractéristiques d'utilisation en oscillatrice à 500 MHz
Betriebsdaten als Oszillator für 500 MHz

V_a	=	150 V
I_k	=	20 mA
W_o	=	450 mW

→ Life; durée de vie; Lebensdauer

The life rating of this tube strongly depends on the filament voltage applied. At intermittent service with the above mentioned operating characteristics an operating life of about 200 hours may be expected
La durée de vie de ce tube dépend sévèrement de la tension de chauffage appliquée. En service intermittent aux caractéristiques susmentionnées on peut s'attendre à une durée de fonctionnement d'environ 200 heures
Die Lebensdauer dieser Röhre ist stark abhängig von der angelegten Heizspannung. Bei aussetzendem Betrieb mit den obengenannten Betriebsdaten kann eine Betriebsdauer von etwa 200 Stunden erwartet werden

Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max.	150 V
W_a	= max.	2,4 W
V_f	= max.	1,35 V [3]
I_k	= max.	20 mA
I_g	= max.	5 mA

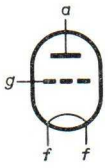
[3]) Absolute value
Valeur absolue
Absoluter Wert

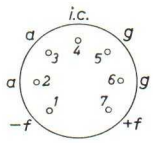
PHILIPS DC 90

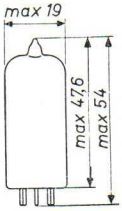
V.H.F.TRIODE for use as self-oscillating frequency changer in F.M. battery receivers
TRIODE V.H.F. pour utilisation comme tube mélangeur auto-oscillateur dans des appareils-batteries F.M.
VHF-TRIODE zur Verwendung als selbstschwingende Mischröhre in FM-Batteriegeräten

Heating	: direct by D.C. series or parallel supply	
Chauffage	: direct par C.C. alimentation série ou parallèle	V_f = 1,4 V I_f = 50 mA
Heizung	: direkt durch Gleichstrom Serien- oder Parallelspeisung	

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances
Capacités
Kapazitäten

C_g	= 0,8 pF
C_a	= 1,3 pF
C_{ag}	= 3,3 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	40	67,5	90 V
V_g	=	0	0	-3 V
Ia	=	1,5	4,2	3 mA
S	=	0,9	1,2	1,1 mA/V
μ	=	11,1	11,6	11,5

939 0058
4.4.1959

Operating characteristics as self-oscillating frequency changer
Caractéristiques d'utilisation comme tube mélangeur auto-oscillateur
Betriebsdaten als selbstschwingende Mischröhre

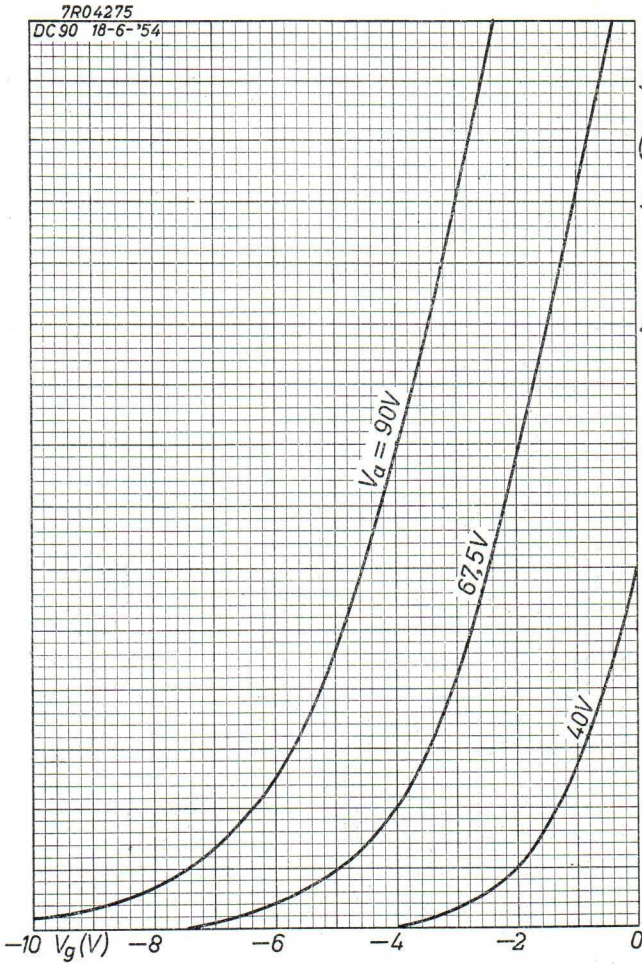
V_a	=	90	V
V_{osc}	=	5,5	Veff
R_g	=	1	MΩ
I_g	=	6	µA
r_g (f=100 Mc/s)	=	12	kΩ

Noise figure
Indice de souffle = 18
Rauschzahl

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max.	140	V
V_a	= max.	90	V
W_a	= max.	0,6	W
I_k	= max.	5,5	mA
R_g	= max.	3	MΩ
R_g (W_a<0,4 W)	= max.	10	MΩ

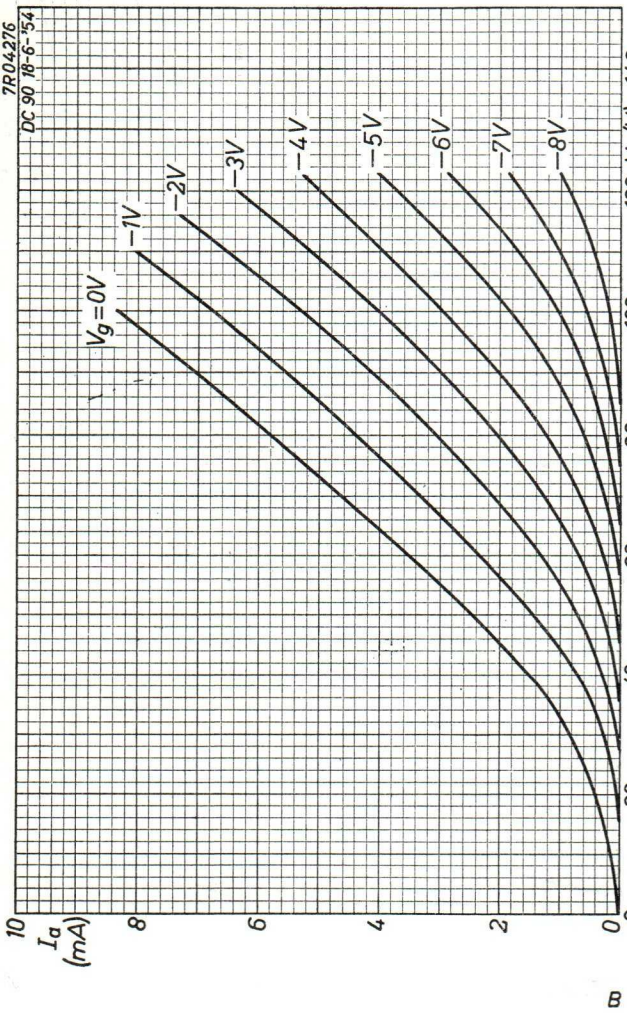
→


7R04275
DC90 18-6-'54
3,5
I_a
(mA)
3
2,5
2
1,5
1
0,5
0
V_a = 90V
67,5V
40V
−10 V_g(V) −8 −6 −4 −2 0

6.6.1954

A

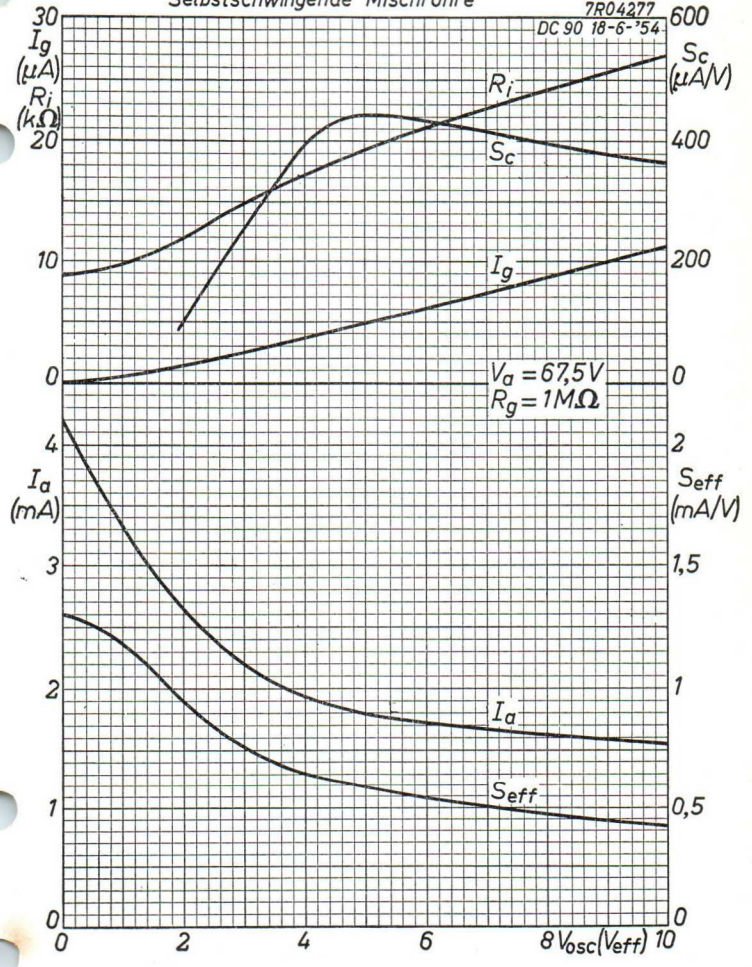
DC90 PHILIPS



PHILIPS

DC 90

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

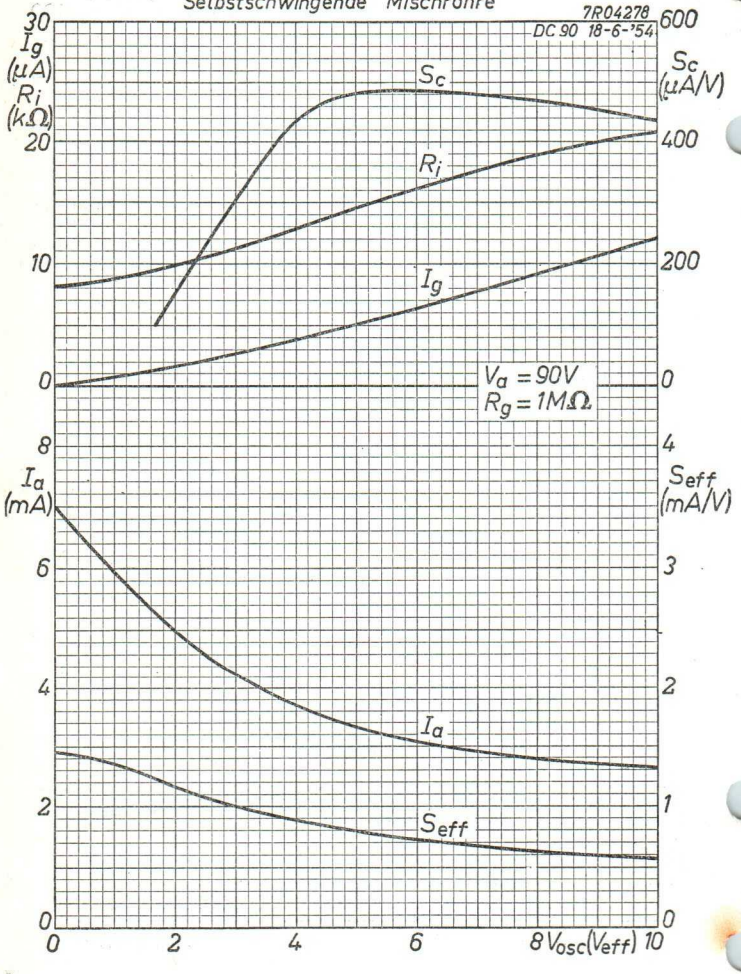


6.6.1954

C

DC90 PHILIPS

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



D

PHILIPS

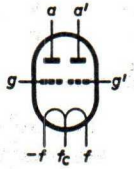
DCC90

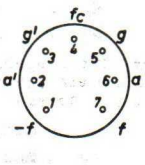
R.F. DOUBLE TRIODE for battery operation
TRIODE H.F. DOUBLE pour opération batterie
HF- DOPPELTRIODE für Batteriebetrieb

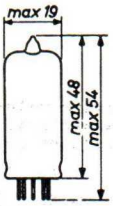
Heating: direct by D.C.
series or parallel supply
Chauffage: direct par C.C.
alimentation en série ou en parallèle
Heizung: direkt durch Gleichstrom
Serien- oder Parallelspeisung

Parallel supply	Vf =	1,4 V[1])	2,8 V[2])
Alimentation en parallèle	If =	220 mA	110 mA
Parallelspeisung	Pins / Broches / Stifte	neg.1+7	1
		pos. 4	7
Series supply	Vf =	1,3 V[1])	2,6 V[2])
Alimentation en série	Pins / Broches / Stifte	neg.1+7	1
Serienspeisung		pos. 4	7

Dimensions in mm Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances	C_g = $C_{g'}$	=	0,9	pF
Capacités	C_a = $C_{a'}$	=	1,0	pF
Kapazitäten	C_{ag} = $C_{a'g'}$	=	3,2	pF
	$C_{aa'}$	=	0,32	pF

1)
Two filament sections in parallel
Les deux parties du filament en parallèle
Die zwei Glühfadenteile parallel

2)
Two filament sections in series
Les deux parties du filament en série
Die zwei Glühfadenteile in Reihe

Typical characteristics (each triode)
Caractéristiques types (par triode)
Kenndaten (je Triode)

V_a	=	90 V
V_g	=	-2,5 V
I_a	=	3,7 mA
S	=	1,8 mA/V
μ	=	15
R_i	=	8,3 kΩ

Operating characteristics as R.F.push-pull amplifier or oscillator at 40 Mc/s (intermittent operation)
Caractéristiques d'utilisation en amplificatrice push-pull H.F. ou oscillatrice à 40 Mc/s(service intermittent)
Betriebsdaten als HF- Gegentaktverstärker oder Oszillator bei 40 MHz (aussetzender Betrieb)

V_a	=	135 V
V_g	=	-20 V[1])
V_{i_p}	=	2x45 V
I_a	=	2x15 mA
I_g	=	approx.2x2,5 mA
W_{g_i}	=	approx. 0,2 W
W_o	=	approx. 2 W

Limiting values (intermittent operation)
Caractéristiques limites (service intermittent)
Grenzdaten (aussetzender Betrieb)

V_a	= max. 135 V	I_a	= max. 2x15 mA[2])
$-V_g$	= max. 30 V	I_g	= max. 2x2,5 mA[2])
		W_a	= max. 2x1 W[2])

[1]) Obtained from fixed supply or by means of a cathode resistor of 570 Ω or a grid resistor of 4 kΩ.
Obtenue d'une tension fixe, par moyen d'une résistance cathodique de 570 Ω ou d'une résistance de grille de 4 kΩ
Erhalten von einer festen Vorspannung oder mittels eines Kathodenwiderstandes von 570 Ω oder eines Gitterwiderstandes von 4 kΩ

[2]) For continuous operation these values must be reduced by 50%
Pour service continu il faut diminuer ces valeurs de 50%
Bei Dauerbetrieb sind diese Werte um 50 % zu verringern

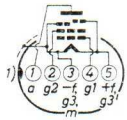
PHILIPS

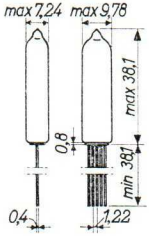
DF 62 /1AD4

Fully shielded sharp cut-off R.F. pentode for use in battery operated equipment.
Penthode H.F. à pente constante, complètement blindée pour utilisation en équipement-batterie
Vollkommen abgeschirmte HF-Pentode mit konstanter Steilheit zur Verwendung in Batteriegeräten.

Heating : direct by D.C.	V_f	=	1,25 V
Chauffage: direct par C.C.	I_f	=	0,1 A
Heizung : direkt durch Gleichstrom			

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: Subminiature

The leads are gold plated. The conductive coating is connected to lead 3. g_3 consists of two plates, one being connected to - f and the other to + f.
Les fils de connexion sont dorés. La couche conductive est reliée au fil de connexion 3. g_3 est composée de deux plaques, l'une étant reliée à - f et l'autre à + f.
Die Anschlussdrähte sind vergoldet. Der leitende Überzug ist mit dem Anschlussdraht 3 verbunden. g_3 besteht aus zwei Platten, die mit je einem Heizfadenende verbunden sind.

Capacitances Capacités Kapazitäten			
	C_{ag_1}	<	0,01 pF
	C_a	=	4,0 pF
	C_{g_1}	=	4,0 pF

1) Dot for indication of the anode connection
Point pour l'indication de la connexion de l'anode
Punkt zur Bezeichnung des Anodenanschlusses

PHILIPS

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	45	90 V
V_{g_2}	=	45	90 V
V_{g_1}	=	0	-1,6 V
R_{g_1}	=	2	- MΩ
I_a	=	3,3	5,7 mA
I_{g_2}	=	0,9	1,5 mA
S	=	2,2	2,6 mA/V
R_i	=	0,4	0,5 MΩ
$\mu_{g_2\ g_1}$	=	17,5	18
V_{g_1} (S = 10 μA/V)	=	-3,8	-7 V

Limiting values (Design centre values)
Caractéristiques limites (Valeurs moyennes)
Grenzdaten (Mittlere Entwicklungsdaten)

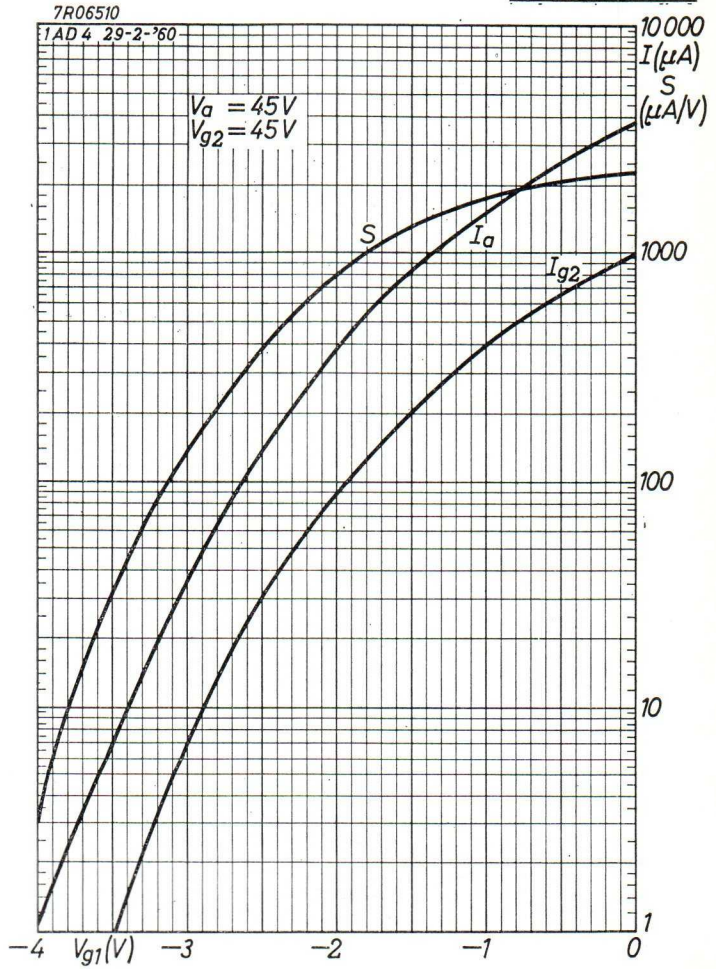
V_a	=	max.	90 V
W_a	=	max.	0,55 W
V_{g_2}	=	max.	90 V
W_{g_2}	=	max.	0,2 W
I_k	=	max.	8,5 mA

Max. circuit values (Design centre values)
Valeurs max. des éléments de montage (Valeurs moyennes)
Max. Werte der Schaltungsteile (Mittlere Entwicklungsdaten)

R_{g_1} = max. 2 MΩ

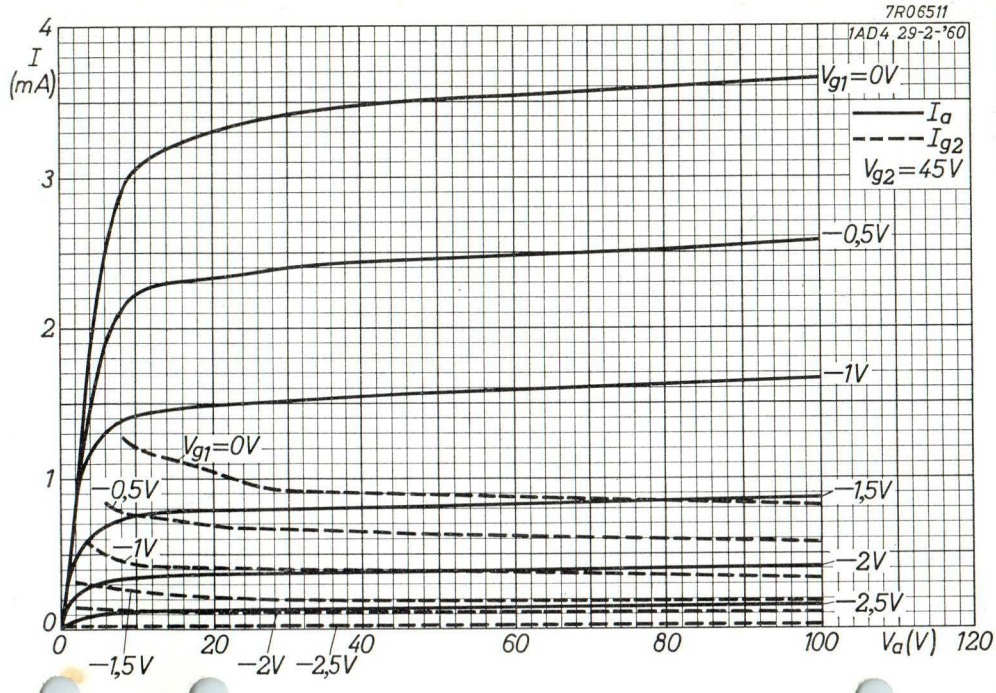
PHILIPS

DF 62 /1AD4



1.1.1960

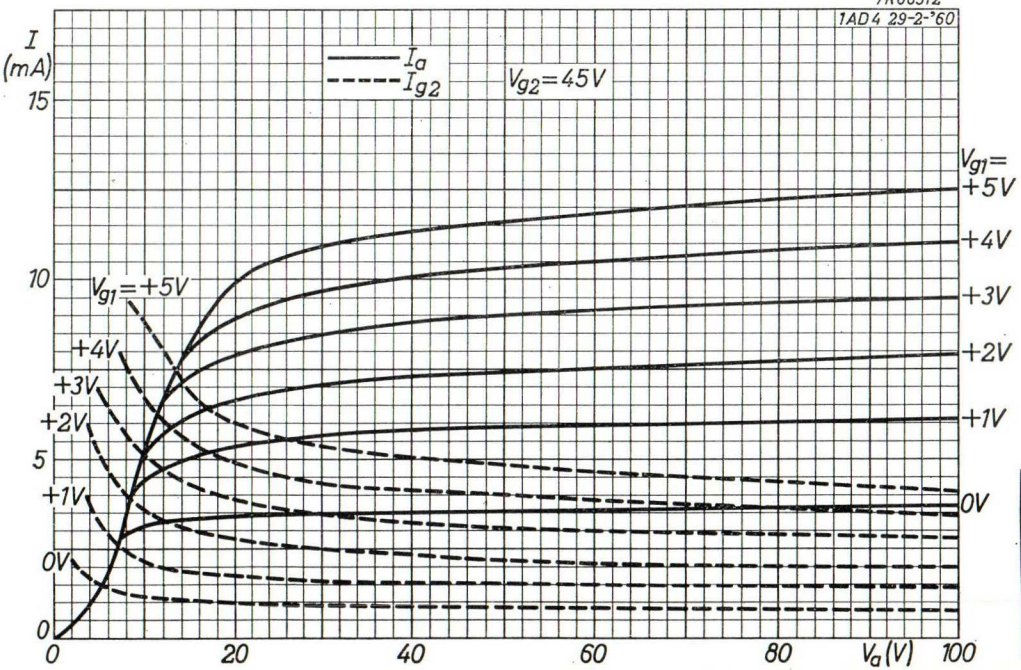
A



DF62
/1AD4

PHILIPS

B



PHILIPS

DF 62
/1AD4

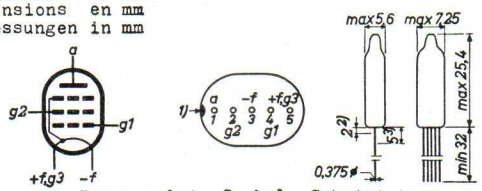
PHILIPS

DF 64

A.F. SUBMINIATURE PENTODE for hearing aids
PENTHODE SUBMINIATURE B.F.pour appareils pour sourds
NF-SUBMINIATURPENTODE für Schwerhörigengeräte

Heating : direct by D.C.;
series or parallel supply
Chauffage: direct par C.C.; V_f = 0,625 V
alimentation en série ou en parallèle I_f = 10 mA
Heizung : direkt durch Gleichstrom;
Serien-oder Parallelspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: Subminiature

Capacitances (measured without external screen)
Capacités (mesurées sans blindage extérieur)
Kapazitäten (gemessen ohne äussere Abschirmung)

C_{g1}	=	1,8 pF
C_a	=	2,0 pF
C_{ag1}	<	0,2 pF

Typical characteristics
Caractéristiques types
Kenndaten

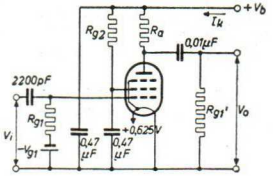
V_a	=	15 V
V_{g2}	=	15 V
I_a	=	60 µA
I_{g2}	=	20 µA
V_{g1}	=	-0,62 V
S	=	100 µA/V
R_i	=	1,0 MΩ
μ_{g2g1}	=	7,5

1) Red spot
Point rouge
Roter Punkt

2) This part of the leads should not be bent
Cette partie des fils ne sera pas pliée
Dieser Teil der Drähte soll nicht gebogen werden

3) This part of the leads should not be soldered
Cette partie des fils ne sera pas soudée
Dieser Teil der Drähte soll nicht gelötet werden

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten



Ra = 2,2 MΩ Rg1' = 5 MΩ

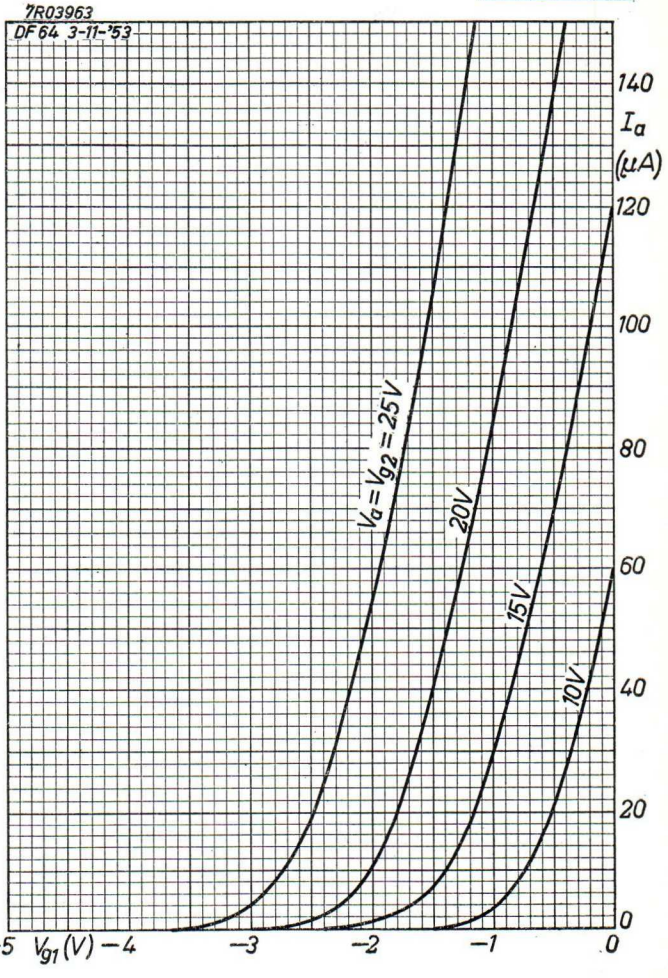
Vb (V)	-Vg1 (V)	Rg1 (MΩ)	Rg2 (MΩ)	Ik (µA)	Vi (mV)	$\frac{Vi}{Vo}$
15	-0,62	5	2,7	6,6	50	23,5
18	-0,62	5	3,3	7,6	50	26,5
15	0	10	4,5	6,4		25
18	0	10	5,0	7,6		29,5

Limiting values
Caractéristiques limites
Grenzdaten

V_a	=	45 V
V_{g2}	=	45 V
W_a	=	1,5 mW
W_{g2}	=	0,5 mW
I_k	=	75 µA

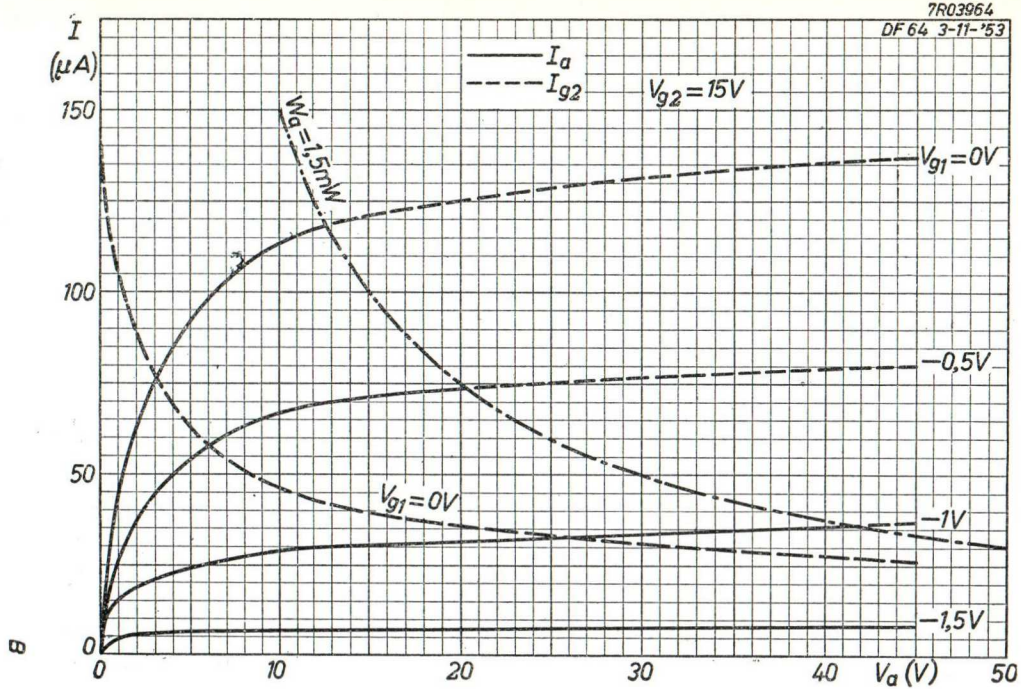
PHILIPS

DF 64



11.11.1953

A



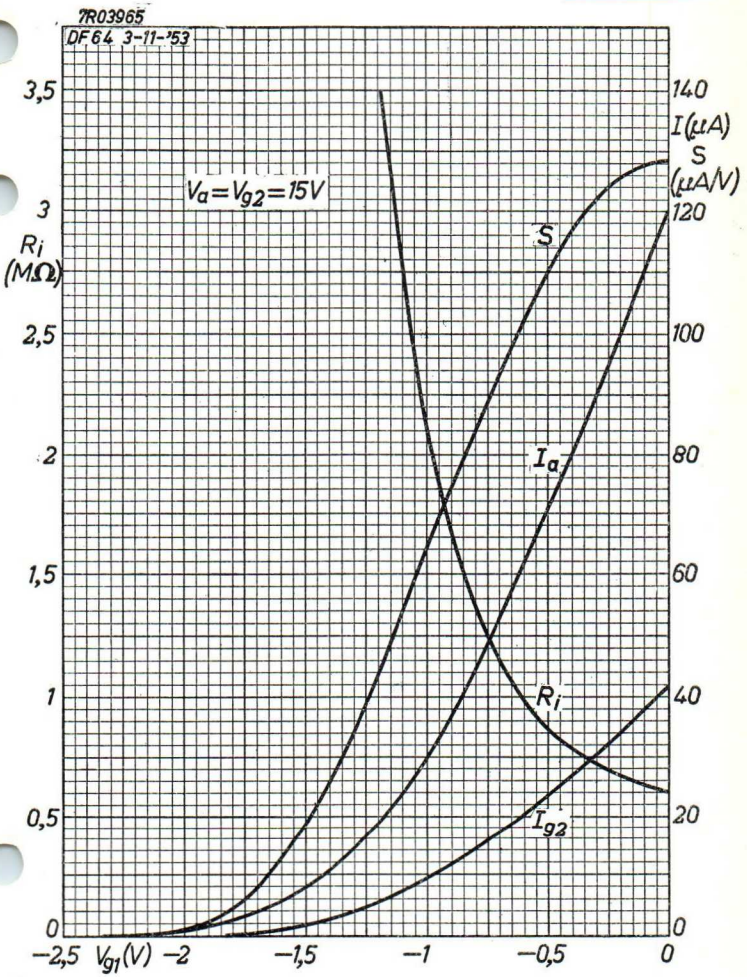
DF 64

PHILIPS

B

PHILIPS

DF 64



11.11.1953

C

PHILIPS

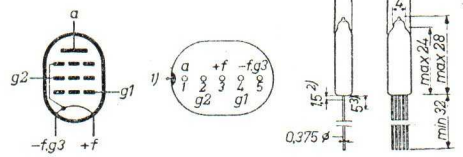
DF 65
DF 66

DF 65 See DF 67
Voir DF 67
Siehe DF 67

A.F. SUBMINIATURE PENTODE for hearing aids
PENTHODE SUBMINIATURE B.F. pour appareils de sourds
NF-SUBMINIATURPENTODE für Schwerhörigengeräte

Heating : direct by D.C.
series or parallel supply
Chauffage : direct par C.C. Vf = 0,625 V
alimentation en parallèle ou en série If = 15 mA
Heizung : direkt durch Gleichstrom
Serien- oder Parallelspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: Subminiature

Capacitances (measured without external screen)
Capacités (mesurées sans blindage extérieur)
Kapazitäten (gemessen ohne äussere Abschirmung)

C_{g1} = 1,6 pF
C_a = 2,2 pF
C_{ag1} = 0,15 pF

1) Red spot
Point rouge
Roter Punkt

2) This part of the leads should not be bent
Cette partie des fils ne sera pas pliée
Dieser Teil der Drähte soll nicht gebogen werden

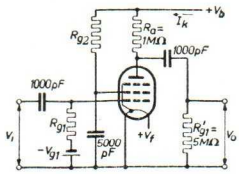
3) This part of the leads should not be soldered
Cette partie des fils ne sera pas soudée
Dieser Teil der Drähte soll nicht gelötet werden

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	22,5 V
V_{g2}	=	22,5 V
I_a	=	50 µA
I_{g2}	=	15 µA
V_{g1}	=	−1,05 V
S	=	100 µA/V
R_i	>	2 MΩ
μ_{g2g1}	=	11,5

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

V_b (V)	$-V_{g1}$ (V)	R_{g1} (MΩ)	R_{g2} (MΩ)	I_k (µA)	$\frac{V_o}{V_i}$
15	0,625	5	1,0	9	20
22,5	0,625	5	2,0	16	33
30	0,625	5	2,7	22	44
45	0,625	5	4,2	32	54
15	0	10	1,8	10	22
22,5	0	10[1])	2,7	16	35
30	0	10	3,3	22	46
45	0	10	4,4	32	58



Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max.	45 V
V_{g2}	= max.	45 V
I_k	= max.	100 µA

---

[1]) The input resistance of tube + grid resistor is about 2.7 MΩ in this case
La résistance d'entrée du tube + résistance de grille est de 2,7 MΩ environ en ce cas
Der Eingangswiderstand der Röhre + Gitterwiderstand beträgt etwa 2,7 MΩ in diesem Fall

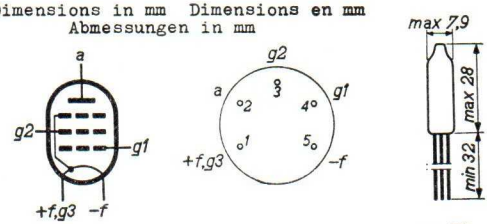
PHILIPS

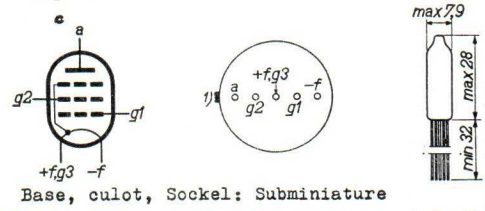
DF 65
DF 67

A.F. SUBMINIATURE PENTODE for hearing aids
PENTHODE SUBMINIATURE B.F.pour appareils de sourds
NF-SUBMINIATURPENTODE für Schwerhörigengeräte

Heating : direct by D.C.
series or parallel supply
Chauffage: direct par C.C.
alimentation en série ou V_f = 0,625 V
en parallèle I_f = 13,3 mA
Heizung : direkt durch Gleichstrom
Serien-oder Parallelspeisung

Dimensions in mm Dimensions en mm
Abmessungen in mm





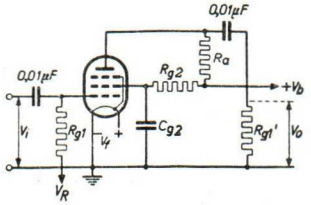
Base, culot, Sockel: Subminiature

Capacitances Capacités Kapazitäten	C_{g1}	=	1,5 pF
	C_a	=	1,5 pF
	C_{ag1}	<	0,2 pF
Typical characteristics Caractéristiques types Kenndaten	V_a	=	22,5 V
	V_{g2}	=	18 V
	V_{g1}	=	-1,15 V
	I_a	=	0,05 mA
	I_{g2}	=	0,01 mA
	S	=	0,1 mA/V
	R_i	=	4 MΩ
	μ_{g2g1}	=	8,7

1)Red spot
Point rouge
Roter Punkt

PHILIPS

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten



V_b	15	15	22,5	22,5	22,5	V
V_R	0	-0,63	0	-0,63	0	V
R_a	1	1	1	1	4,7	MΩ
R_{g2}	3,9	2,7	3,9	2,7	18	MΩ
R_{g1}	10[1])	5	10[1])	5	10	MΩ
R_{g1}'	5	10	5	10	10	MΩ
C_{g2}	0,5	0,5	0,5	0,5	0,002	µF
I_a	-	-	11,7	11,8	-	µA
I_{g2}	-	-	2,5	3,0	-	µA
$\frac{V_o}{V_i}$	19	22	31	30	33	
$d_{tot}(V_o=3V_{eff})$	9	9	5	5	7	%

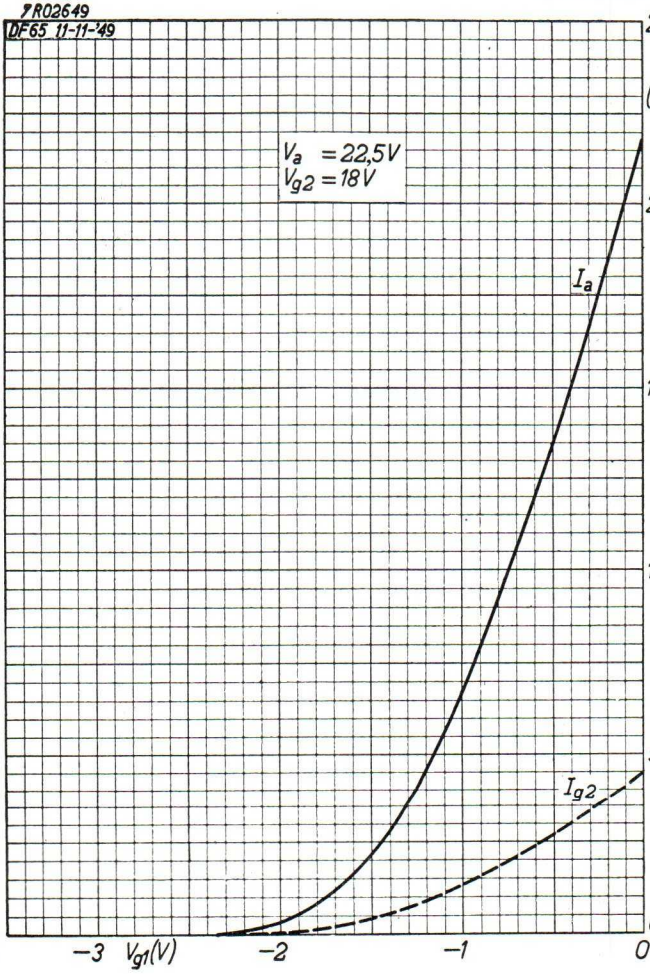
Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max. 45 V	$V_{g1}(I_{g1}=+0,3\mu A)$	= max. -0,2 V
W_a	= max. 1,5 mW	I_k	= max. 75 µA
V_{g2}	= max. 45 V	R_{g1}	= max. 10 MΩ
W_{g2}	= max. 0,5 mW	Vf	= max. 0,78 V
		V_f	= min. 0,45 V

[1]) The input resistance of the tube is about 4 MΩ in this case
La résistance d'entrée du tube est de 4 MΩ environ en ce cas
Die Eingangsdämpfung der Röhre beträgt etwa 4 MΩ in diesem Fall

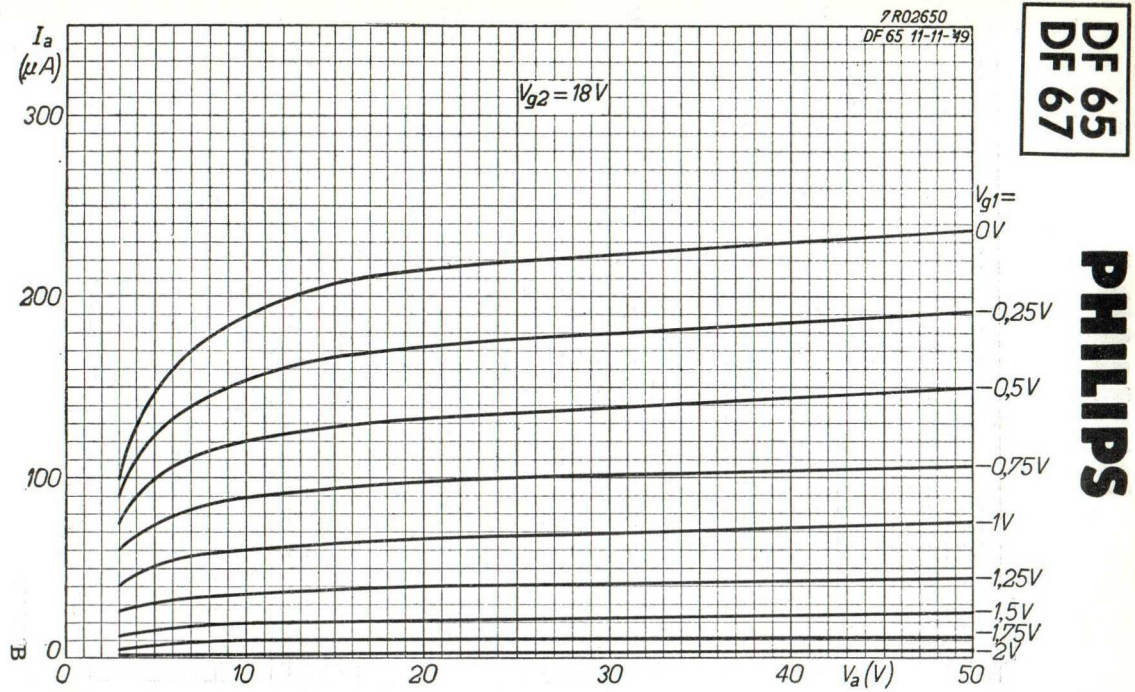
PHILIPS

DF 65
DF 67



10.10.1953

A


7R02650
DF 65 11-11-49
DF 65
DF 67
PHILIPS
I_a (μA)
$V_{g2} = 18\,V$
V_{g1} =
0V
−0,25V
−0,5V
−0,75V
−1V
−1,25V
−1,5V
−1,75V
−2V
300
200
100
0
B
0
10
20
30
40
50
V_a (V)

PHILIPS

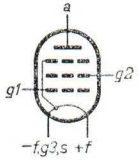
DF 91

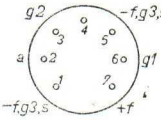
PENTODE for use as R.F. and I.F. amplifier in battery receivers
PENTHODE pour utilisation en amplificatrice H.F. et M.F. dans des appareils-batterie
PENTODE zur Verwendung als HF- und ZF-Verstärker in Batteriegeräten

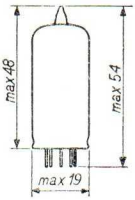
Heating : direct by D.C.
series or parallel supply
Chauffage: direct par C.C.
alimentation en série ou en parallèle
Heizung : direkt durch Gleichstrom
Serien-oder Parallelspeisung

Parallel supply Alimentation en parallèle Parallelspeisung	V_f = 1,4 V I_f = 50 mA
Series supply Alimentation en série Serienspeisung	V_f = 1,3 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances
Capacités
Kapazitäten

C_a	= 7,5 pF
C_{g1}	= 3,6 pF
C_{ag1}	< 0,01 pF[1])

[1]) Measured with external screening
Mesuré avec blindage extérieur
Gemessen mit äusserer Abschirmung

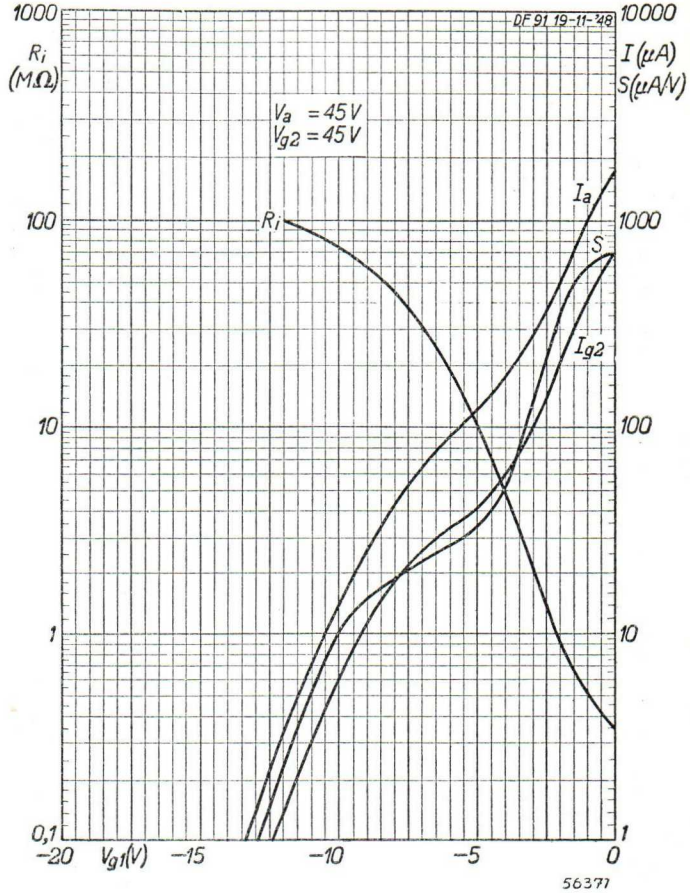
Operating characteristics for use as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F. ou M.F.
Betriebsdaten als HF- oder ZF-Verstärker

V_a	=	45		67,5		90		V
V_{g2}	=	45		45		45		V
V_{g1}	=	0	-10	0	-10	0	-10	V
I_a	=	1,7	-	1,75	-	1,8	-	mA
I_{g2}	=	0,7	-	0,68	-	0,65	-	mA
S	=	700	10	725	10	750	10	µA/V
R_i	=	0,35	>10	0,6	>10	0,8	>10	MΩ
μ_{g2g1}	=	11	-	11	-	11	-	
R_{eq}	=	18	-	17	-	16	-	kΩ

Limiting values
Caractéristiques limites
Grenzdaten

V_b	= max.	120	V
V_b	= max.	140	V [1])
V_a	= max.	90	V
W_a	= max.	0,5	W
V_{g2}	= max.	67,5	V
W_{g2}	= max.	0,2	W
I_k	= max.	5,5	mA
$V_{g1}(I_{g1}=+0,3\mu A)$	= max.	-0,2	V
R_{g1}	= max.	3	MΩ

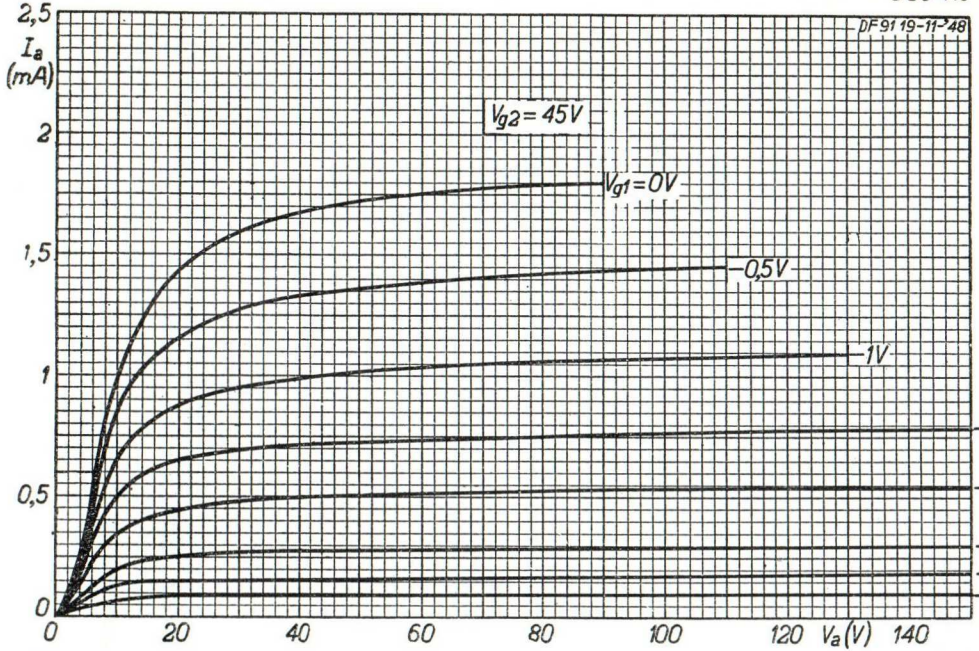
[1]) Absolute value
Valeur absolue
Absolutwert


DF 91 19-11-'48
1000
R_i
(MΩ)
100
10
1
0,1
10000
I (μA)
S(μA/V)
1000
100
10
1
V_a = 45 V
V_{g2} = 45 V
R_i
I_a
S
I_{g2}
−20
V_{g1}(V)
−15
−10
−5
0
56371

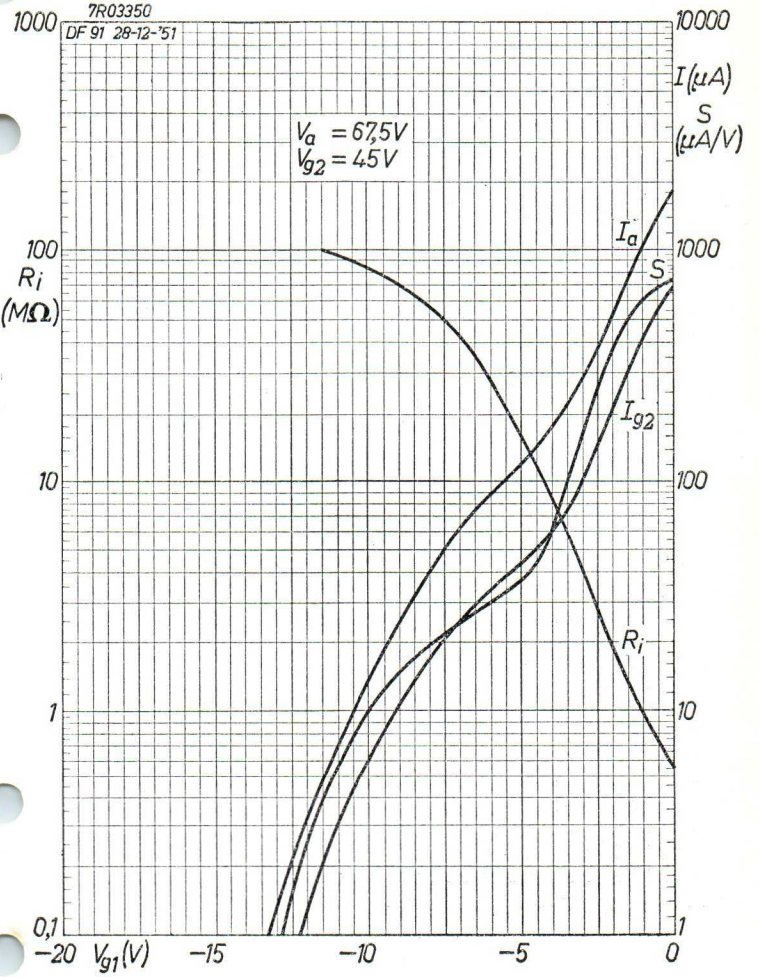
56342

DF 91

PHILIPS



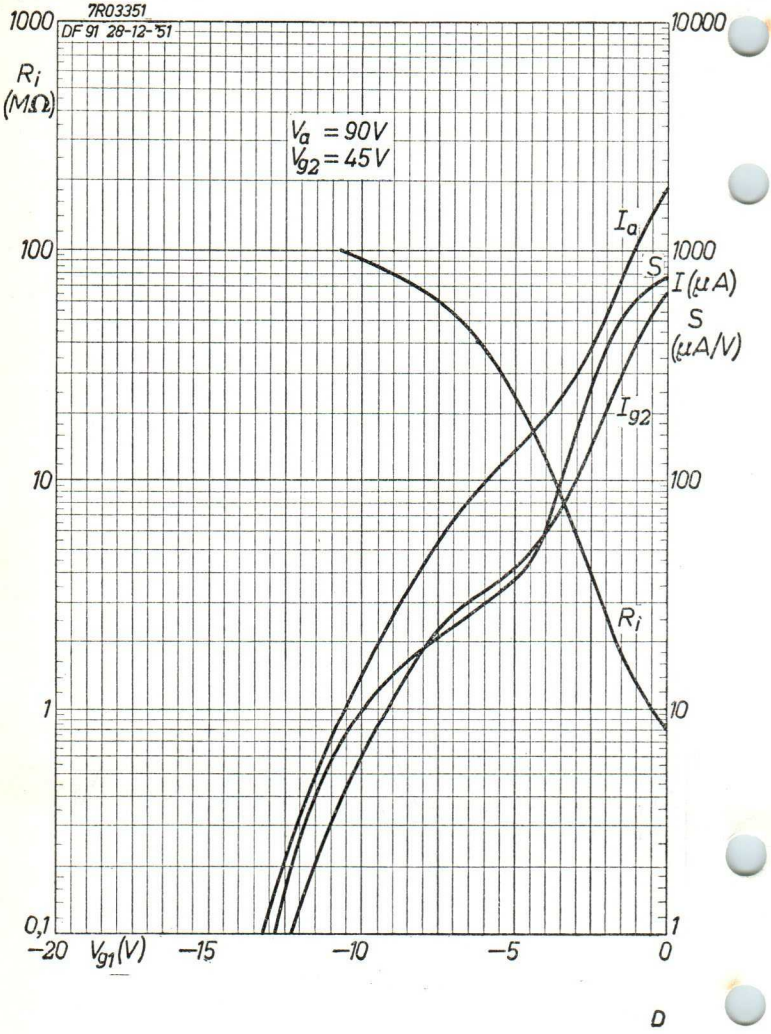
B

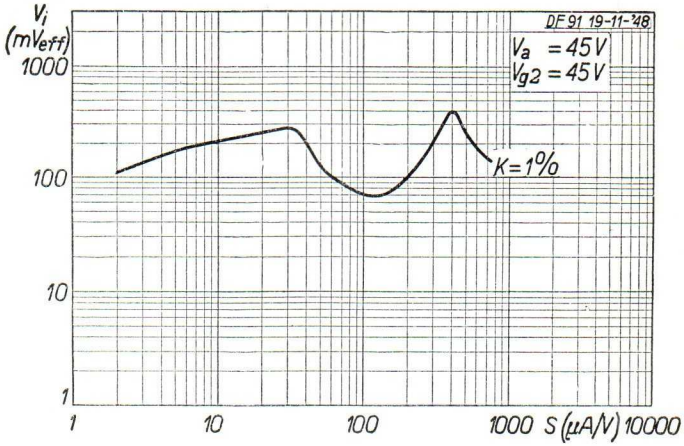

7R03350
DF 91 28-12-'51
$V_a = 67{,}5V$
$V_{g2} = 45V$
I_a
S
I_{g2}
R_i
1000
100
10
1
0,1
R_i (MΩ)
10000
1000
100
10
1
I (μA)
S (μA/V)
−20
V_{g1} (V)
−15
−10
−5
0

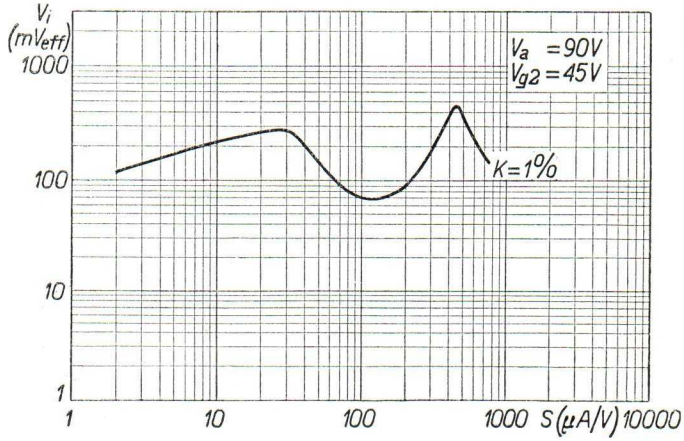
11.11.1953

C

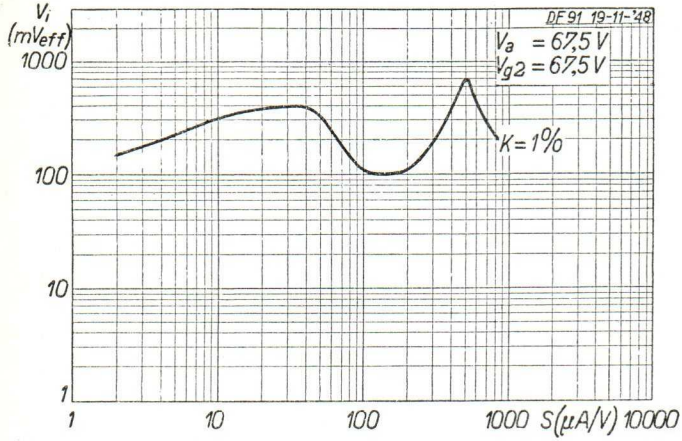
DF 91 PHILIPS

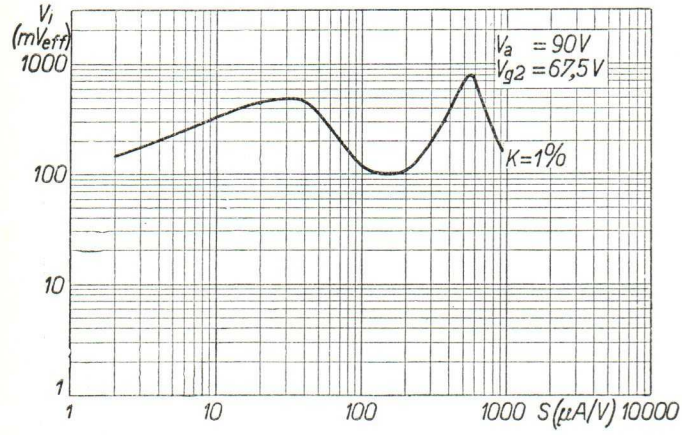



DF 91 19-11-'48
V_a = 45V
V_{g2} = 45V
K=1%
V_i (mV_{eff})
1000
100
10
1
1
10
100
1000 S (µA/V) 10000


V_a = 90V
V_{g2} = 45V
K=1%
V_i (mV_{eff})
1000
100
10
1
1
10
100
1000 S (µA/V) 10000

56372.


DF 91 19-11-'48
V_a = 67,5 V
V_{g2} = 67,5 V
K = 1%
V_i (mV eff)
1000
100
10
1
1
10
100
1000 S(μA/V) 10000


V_a = 90V
V_{g2} = 67,5 V
K = 1%
V_i (mV eff)
1000
100
10
1
1
10
100
1000 S(μA/V) 10000

56373

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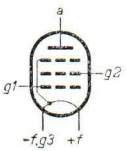
DF92

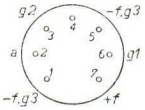
PENTODE for use as R.F. and I.F. amplifier in battery receivers
PENTHODE pour utilisation en amplificatrice H.F. et M.F. dans des appareils-batterie
PENTODE zur Verwendung als HF- und ZF-Verstärker in Batteriegeräten

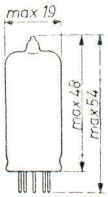
Heating : direct by D.C.
series or parallel supply
Chauffage: direct par C.C.
alimentation en série ou en parallèle
Heizung : direkt durch Gleichstrom
Serien-oder Parallelspeisung

Parallel supply Alimentation en parallèle Parallelspeisung	V_f	= 1,4 V
	I_f	= 50 mA
Series supply Alimentation en série Serienspeisung	V_f	= 1,3 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances
Capacités
Kapazitäten

C_a	=	7,5 pF
C_{g1}	=	3,6 pF
C_{ag1}	<	0,008 pF

Operating characteristics as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F. ou M.F.
Betriebsdaten als HF- oder ZF-Verstärker

V_a	=	90	90 V
V_{g2}	=	67,5	90 V
V_{g1}	=	0	0 V
I_a	=	2,9	4,5 mA
I_{g2}	=	1,2	2,0 mA
S	=	925	1025 µA/V
R_i	=	0,6	0,35 MΩ

Limiting values
Caractéristiques limites
Grenzdaten

V_a	=	max. 110 V
V_{bg2}	=	max. 110 V
V_{g2}	=	max. 90 V
I_k	=	max. 6,5 mA

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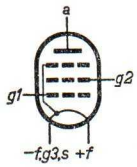
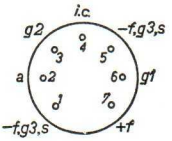
PENTODE for use as R.F. or I.F. amplifier in battery receivers
PENTHODE pour utilisation en amplificatrice H.F. ou M.F. dans des appareils-batterie
PENTODE zur Verwendung als HF- oder ZF-Verstärker in Batteriegeräten

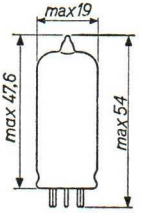
Heating : direct by D.C.;
parallel or series supply
Chauffage: direct par C.C.;
alimentation parallèle ou série
Heizung : direkt durch Gleichstrom;
Parallel- oder Serienspeisung

Parallel supply:	V_f	= 1,4 V
Alimentation parallèle:	I_f	= 25 mA
Parallelspeisung:		
Series supply:		
Alimentation série:	V_f	= 1,3 V
Serienspeisung:		

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances
Capacités
Kapazitäten

C_{ag1}	<	0,01 pF
C_a	=	7,8 pF
C_{g1}	=	3,3 pF

Operating characteristics for use as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F. ou M.F.
Betriebsdaten als HF- oder ZF-Verstärker

V_a	=	85 [1]		64 [1]		V
R_{g2}	=	39		0		kΩ
V_{g1}	=	0	-5,5	0	-4,1	V
V_{g2}	=	64	85	64	64	V
I_a	=	1,65	-	1,65	-	mA
I_{g2}	=	0,55	-	0,55	-	mA
S	=	850	10	850	10	µA/V
R_i	=	1,0	>10	0,7	>10	MΩ
R_{eq}	=	14	-	14	-	kΩ
μ_{g2g1}	=	18	-	18	-	

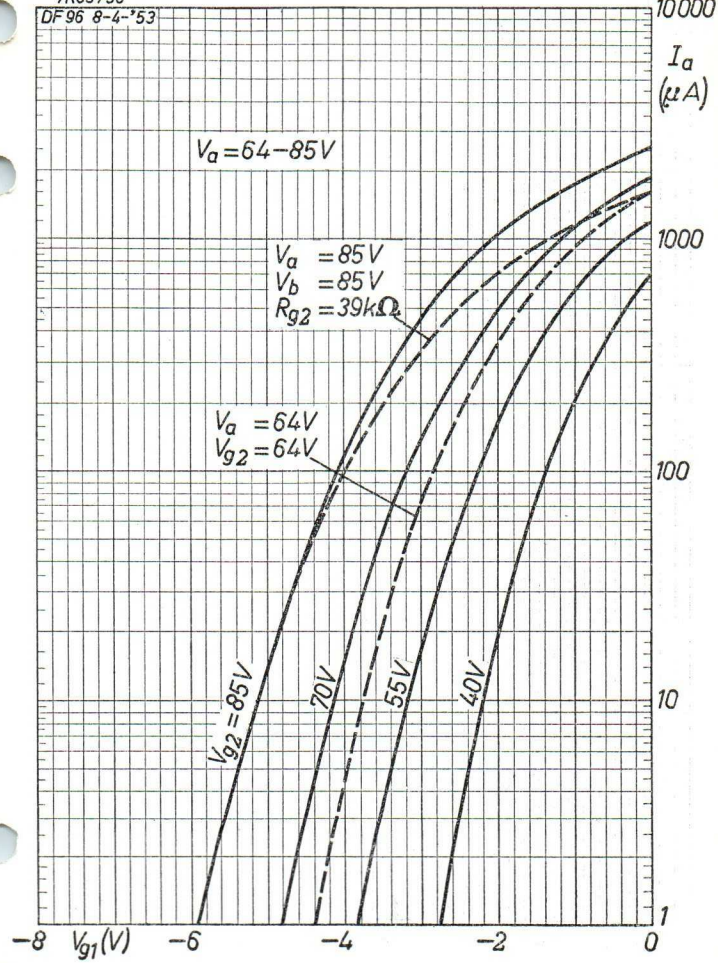
V_a	=	45		V
V_{g2}	=	45		V
V_{g1}	=	0	-2,95	V
I_a	=	0,85	-	mA
I_{g2}	=	0,28	-	mA
S	=	650	10	µA/V
R_i	=	1,0	>10	MΩ
μ_{g2g1}	=	18	-	
R_{eq}	=	12	-	kΩ

Limiting values
Caractéristiques limites
Grenzdaten

V_b	= max. 120 V	V_{g2}	= max. 90 V
V_b	= max. 150 V [2]	W_{g2}	= max. 0,1 W
V_a	= max. 120 V	I_k	= max. 2,2 mA
W_a	= max. 0,25 W	V_{g1} (I_{g1} =+0,3µA)	= max. 0 V
		R_{g1}	= max. 3 MΩ

[1]) Based on a battery voltage of 90 or 67.5 V reduced by the negative bias for the output tube
Se basant sur une tension de batterie de 90 ou 67,5 V diminuée de la polarisation négative du tube de sortie
Basiert auf einer Batteriespannung von 90 oder 67,5 V verringert um die negative Vorspannung der Endröhre

[2]) Absolute max. value
Valeur max. absolue
Absoluter Grenzwert


7R03756
DF 96 8-4-'53
10000
I_a (μA)
1000
100
10
1
V_a = 64–85 V
V_a = 85 V
V_b = 85 V
R_{g2} = 39 kΩ
V_a = 64 V
V_{g2} = 64 V
V_{g2} = 85 V
70 V
55 V
40 V
−8
V_{g1} (V)
−6
−4
−2
0

10.10.1953

A

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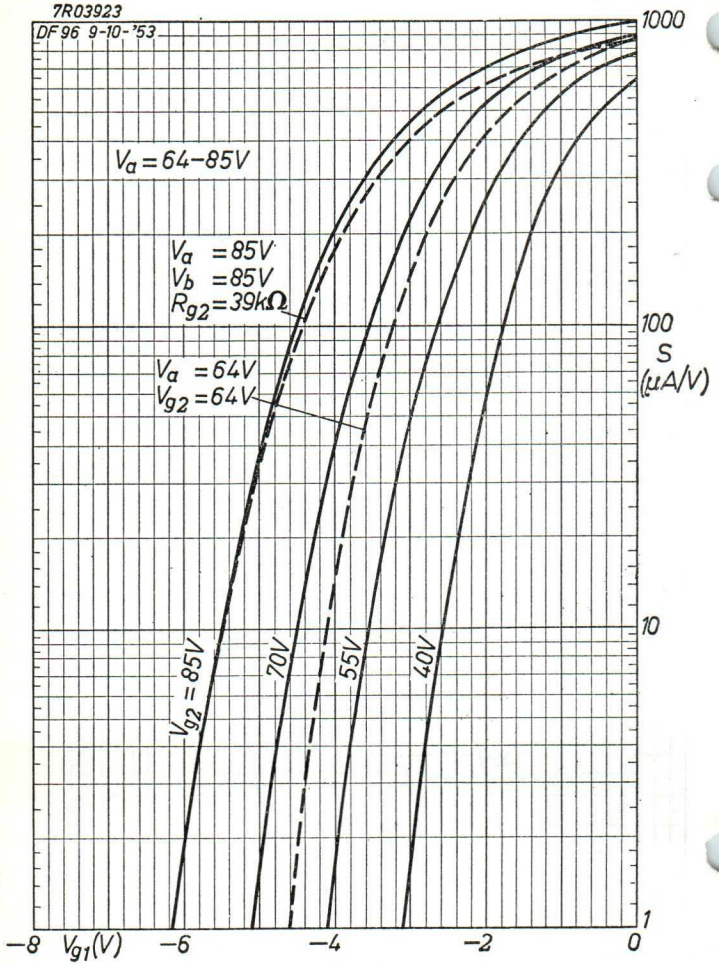

B

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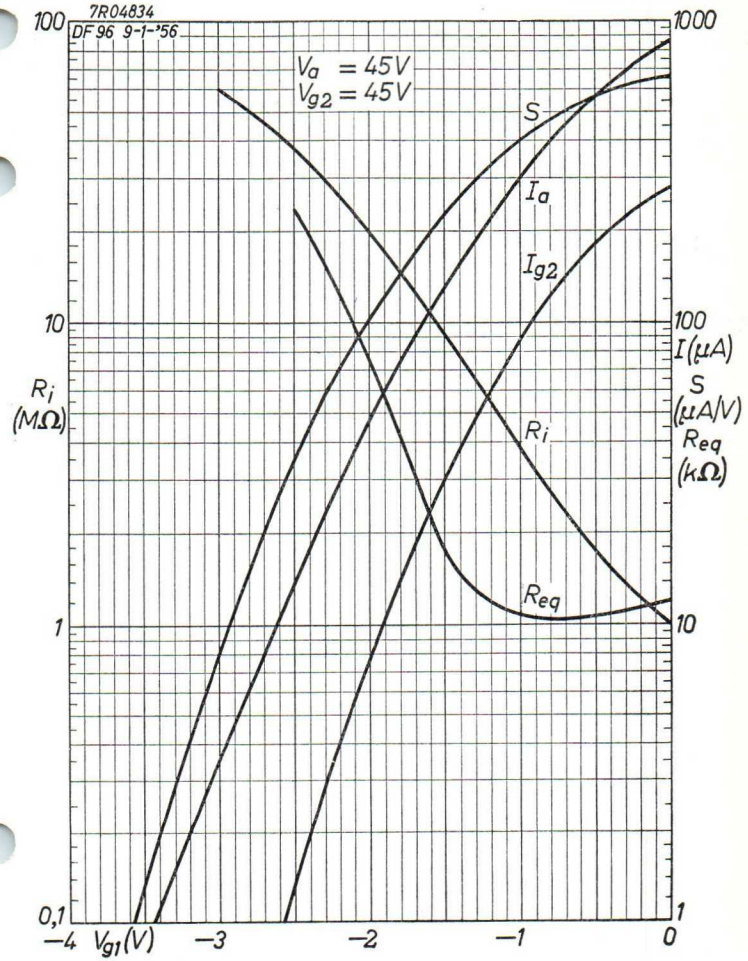
DF 96



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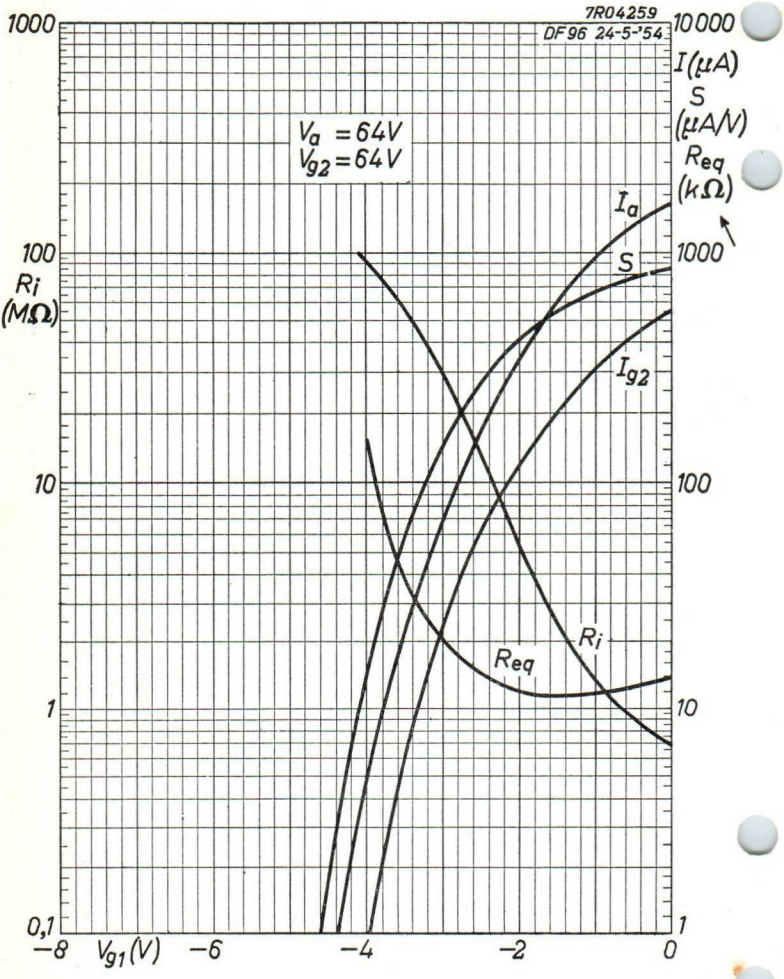
C

DF 96 **PHILIPS**



D

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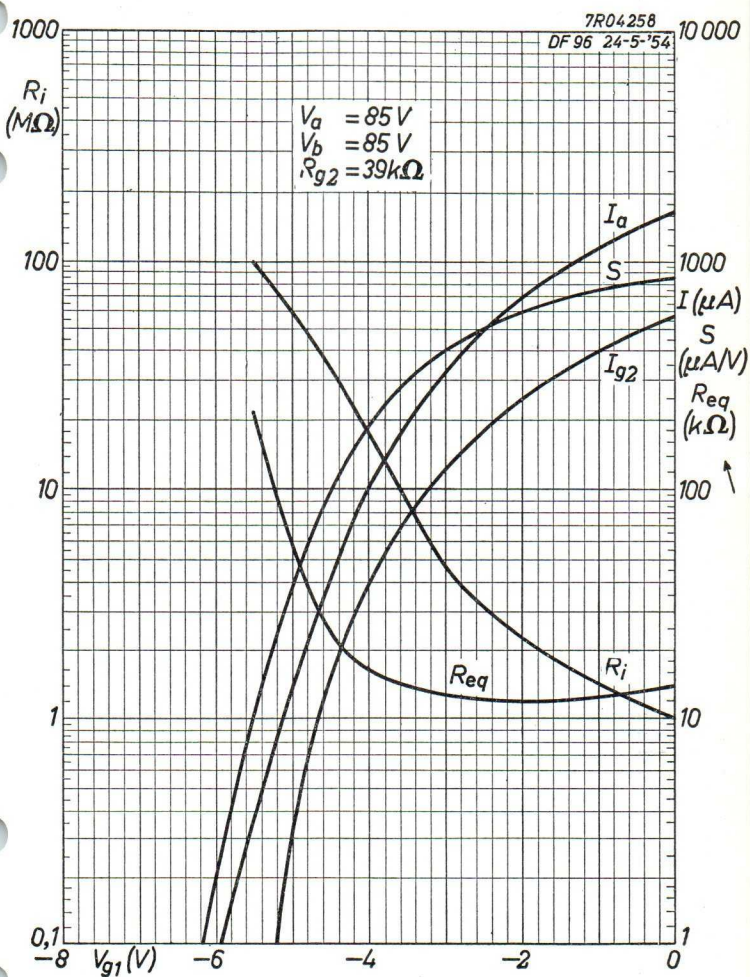
DF 96



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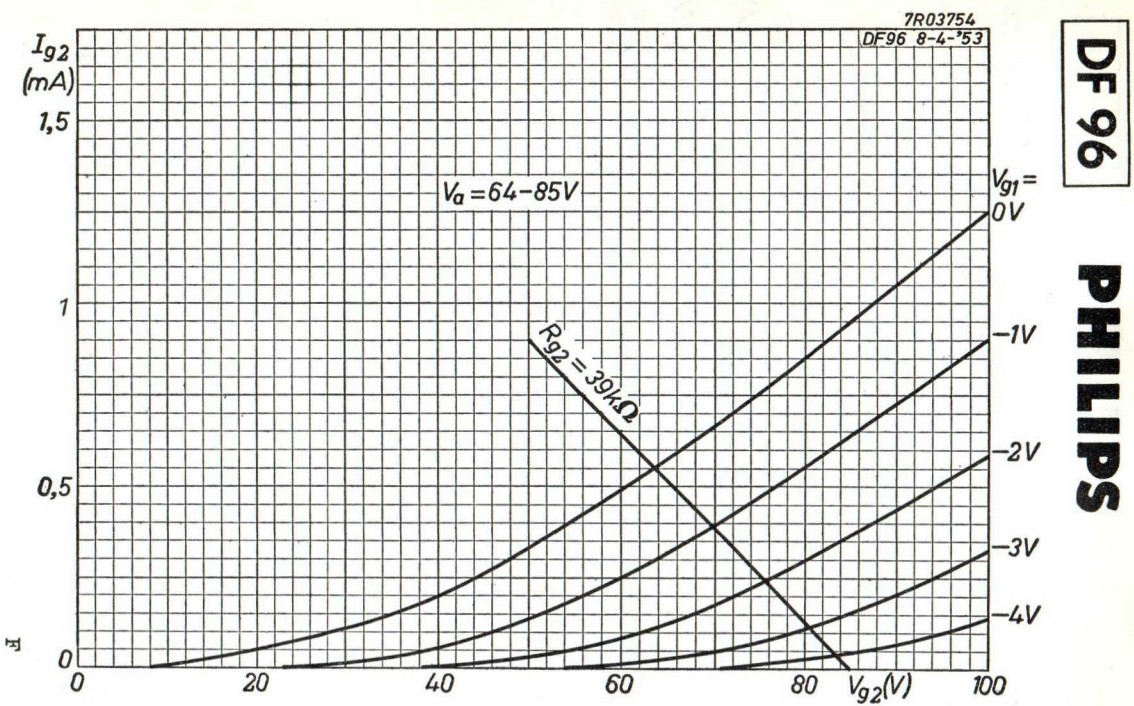
E



DF 96

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DF 97

PENTODE with variable mutual conductance for use as I.F. amplifier and as multiplicative or additive mixing tube in FM/AM battery receivers

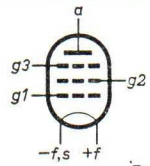
PENTHODE à pente variable pour utilisation comme amplificatrice M.F. et comme convertisseuse de fréquence multiplicative ou additive dans récepteurs à batteries FM/AM

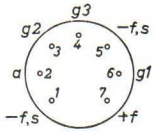
REGELPENTODE zur Verwendung als ZF-Verstärker und als multiplikative- oder additive Mischröhre in FM/AM-Batteriegeräten

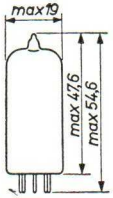
Heating . direct by D.C. series or parallel supply
Chauffage: direct par C.C. alimentation série ou parallèle
Heizung . direkt durch Gleichstrom Serien-oder Parallelspeisung

Parallel supply Alimentation parallèle Parallelspeisung	V_f	= 1,4 V
	I_f	= 25 mA
Series supply Alimentation série Serienspeisung	V_f	= 1,3 V
	I_f	= 24 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: MINIATURE

Capacitances Capacités Kapazitäten	Triode connection[1] Connection triode[1] Triodenschaltung [1]	Pentode connection Connection penthode Pentodenschaltung
	C_a = 8,1 pF	C_a = 7,5 pF
	C_g = 1,1 pF	C_{g_1} = 3,7 pF
	C_{ag} = 2,6 pF	C_{g_3} = 5,2 pF
		C_{ag_1} < 0,01 pF
		$C_{g_1 g_3}$ < 0,1 pF
		$C_{g_1 g_2}$ = 2,5 pF

[1]) g_2 and g_3 connected to anode
g_2 et g_3 connectés à l'anode
g_2 und g_3 verbunden mit der Anode

Operating characteristics as I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F.
Betriebsdaten als ZF-Verstärker

$V_b=V_a$ [1]	=	85		85		64		V
V_{g3}	=	0		0		0		V
R_{g2}	=	33		47		1,5		kΩ
V_{g1}	=	0	-5	0	-5	0	-3,8	V
V_{g2}	=	62	-	57	-	63	-	V
I_a	=	1,7	-	1,5	-	1,7	-	mA
I_{g2}	=	700	-	595	-	780	-	µA
S	=	940	10	900	10	880	10	µA/V
R_i	=	0,45	>10	0,525	>10	0,25	>10	MΩ
μ_{g1g2}	=	20	-	20		20	-	

$V_b=V_a$	=	64 [1]		45	V
V_{g3}	=	0		0	V
R_{g2}	=	4,7		0	kΩ
V_{g1}	=	0	-3,8	0	-2,7 V
V_{g2}	=	61	-	45	- V
I_a	=	1,6	-	0,9	- mA
I_{g2}	=	725	-	445	- µA
S	=	870	10	700	10 µA/V
R_i	=	0,27	>10	0,28	>10 MΩ
μ_{g1g2}	=	20	-	20	-

[1] Based on an H.T. battery voltage of 90 or 67,5 V respectively, minus the bias of the output tube; voltages with respect to -f

Se basant sur une tension de batterie de respectivement 90 ou 67,5 V diminuée de la polarisation négative du tube de sortie. Tensions par rapport à -f

Basiert auf einer Batteriespannung von 90 oder 67,5 V vermindert um die negativen Vorspannung der Endröhre Spannungen in Bezug auf -f

Operating characteristics as multiplicative mixing tube with oscillator voltage on g_3
Caractéristiques d'utilisation comme tube convertisseur de fréquence additive avec tension oscillatrice sur g_3 [2)]
Betriebsdaten als multiplikative Mischröhre mit Oszillatorspannung an g_3

$V_b=V_a$	=	85 [1)]		64 [1)]		45		V
R_{g2}	=	47		4,7		0		kΩ
V_{osc}	=	12		12		12		V_{eff}
R_{g3}	=	300		300		300		kΩ
V_{g1}	=	0	-4,6	0	-3,5	0	-2,4	V
V_{g2}	=	47	-	58	-	45	-	V
I_a	=	540	-	670	-	420	-	µA
I_{g2}	=	800	-	1250	-	795	-	µA
S_c	=	265	10	280	10	250	10	µA/V
R_i	=	0,50	>5	0,30	>5	0,49	>5	MΩ

Operating characteristics as additive mixing tube (triode connection, g_2 and g_3 connected to anode)
Caractéristiques d'utilisation en convertisseuse de fréquence additive (connection triode, g_2 et g_3 à l'anode)
Betriebsdaten als additive Mischröhre (Triodenschaltung, g_2 und g_3 mit der Anode verbunden)

V_b	=	85 [1)]	85 [1)]	64 [1)]	64 [1)]	45	45 V
R [3)]	=	0	4,7	0	3,3	0	1,5 kΩ
R_g	=	1	1	1	1	1	1 MΩ
I_g	=	4,4	3,8	3,1	2,5	2,0	2,0 µA
I_a	=	1,9	1,7	1,3	1,2	0,73	0,7 mA
S_c	=	500	490	465	460	405	400 µA/V
V_{osc}	=	4,0	3,5	3,0	2,5	2,0	2,0 V_{eff}
R_i	=	26	26,5	29	28,5	34	35 kΩ

[1)] See page 2; voir page 2; siehe Seite 2

[2)] See page 4
Voir page 4
Siehe Seite 4

[3)] Bypassed anode resistor
Résistance anodique shuntée
Überbrückter Anodenwiderstand

Limiting values
Caractéristiques limites
Grenzdaten

V_b	= max.	120 V
V_b	= max.	150 V[4])
V_a	= max.	120 V
W_a	= max.	0,25 W
V_{g2}	= max.	90 V
W_{g2}	= max.	0,15 W
I_k	= max.	2,5 mA
R_{g1}	= max.	3 MΩ
R_{g3}	= max.	1,5 MΩ
$+V_{g1}$ (I_{g1} = +0,3 µA)	= min.	0 V

[2]) If in the short wave range A.G.C. is applied to the mixing tube, the current flowing to g_1 due to transit time effect should be taken into account

Quand dans la gamme d'ondes courtes, le C.A.V. est appliqué au convertisseur de fréquence, il faut tenir compte du courant s'écoulant sur g_1 par suite du temps de transit

Wenn im Kurzwellenbereich A.L.R. für die Mischröhre verwendet wird, muss der nach g_1 fliessende Strom, wegen des Laufzeiteffekts, berücksichtigt werden.

[4]) Absolute limit
Limite absolue
Absolutwert

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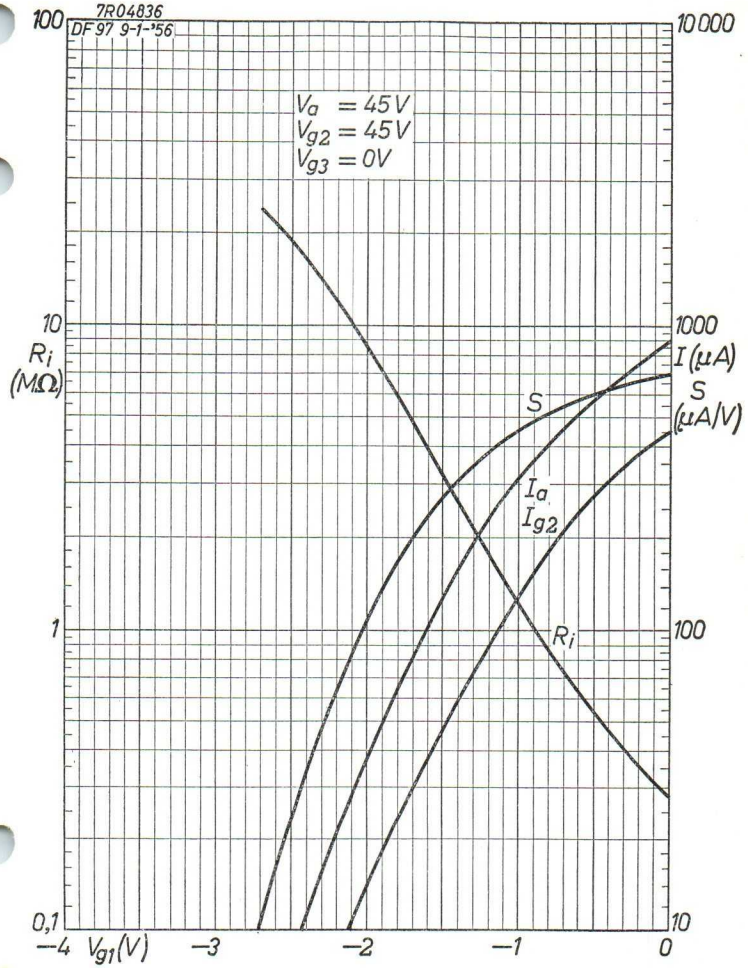

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A

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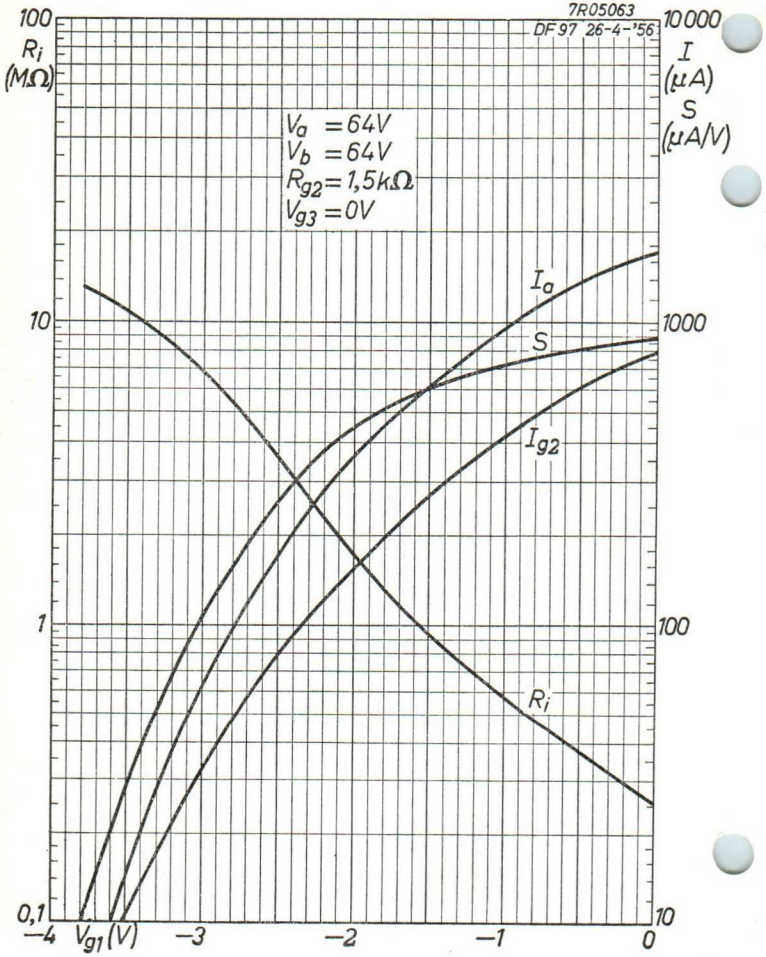

B

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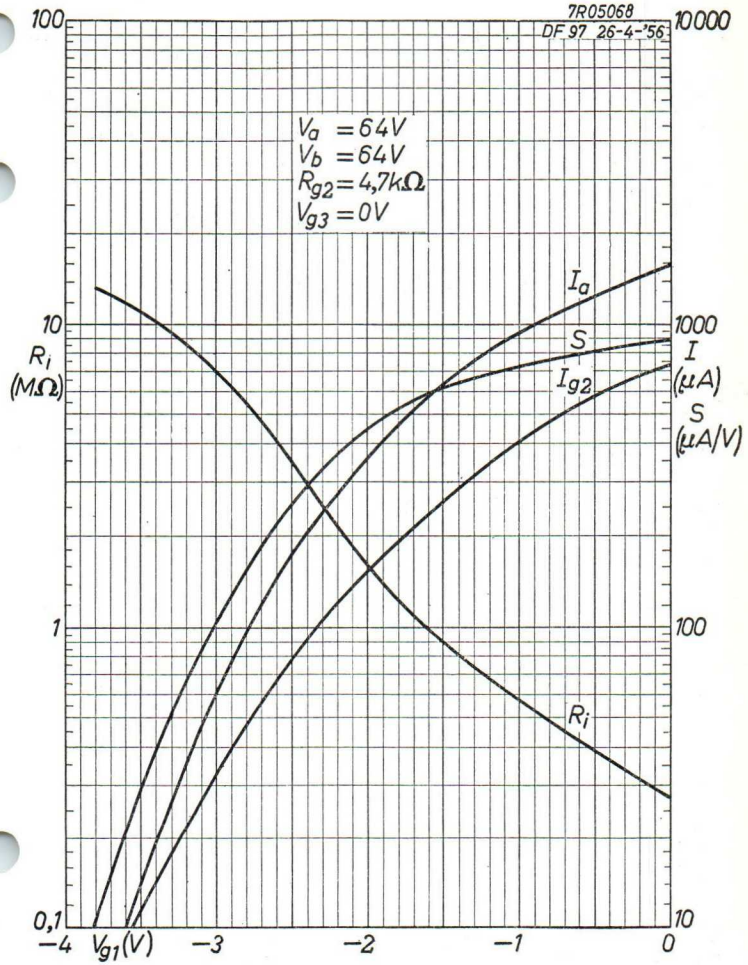
DF 97



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C

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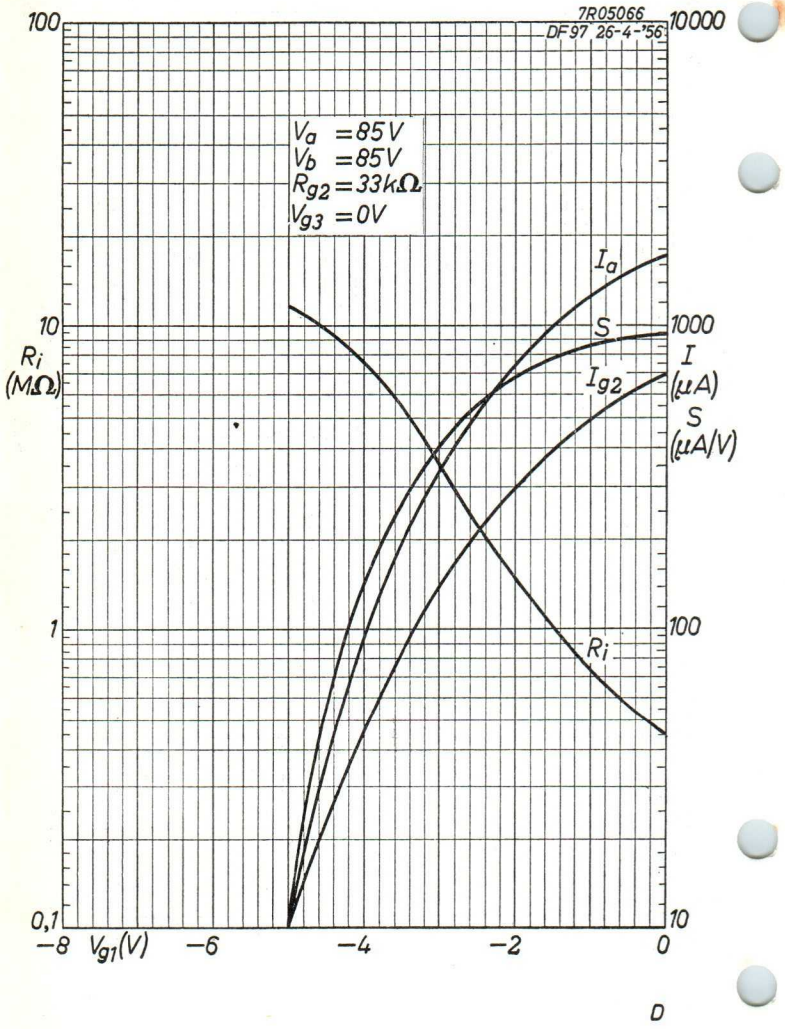

D

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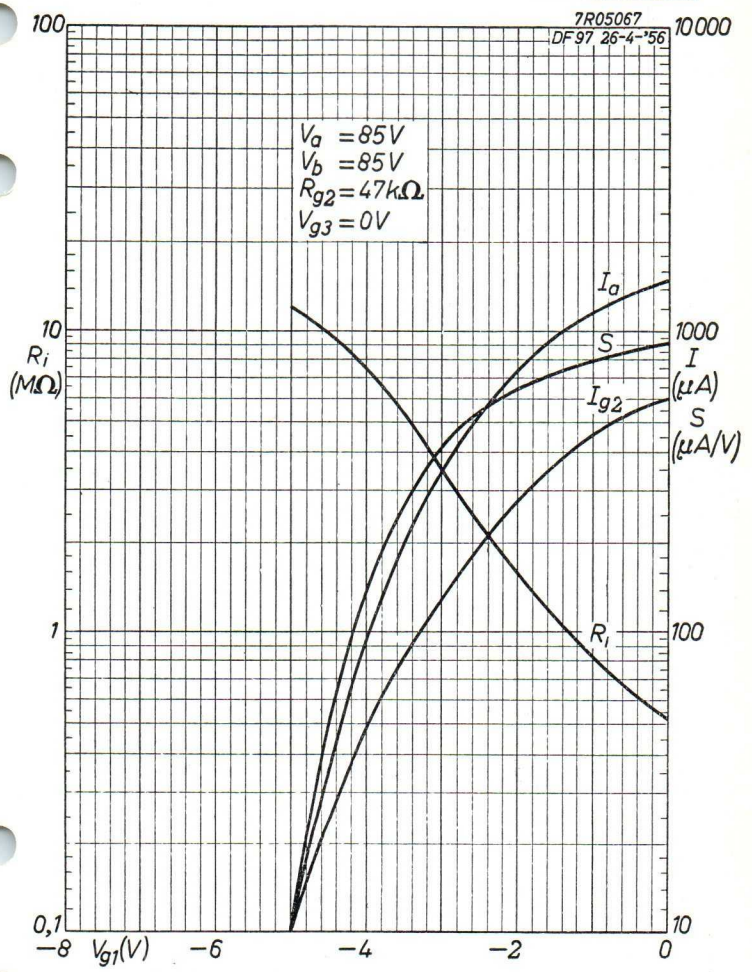
DF 97



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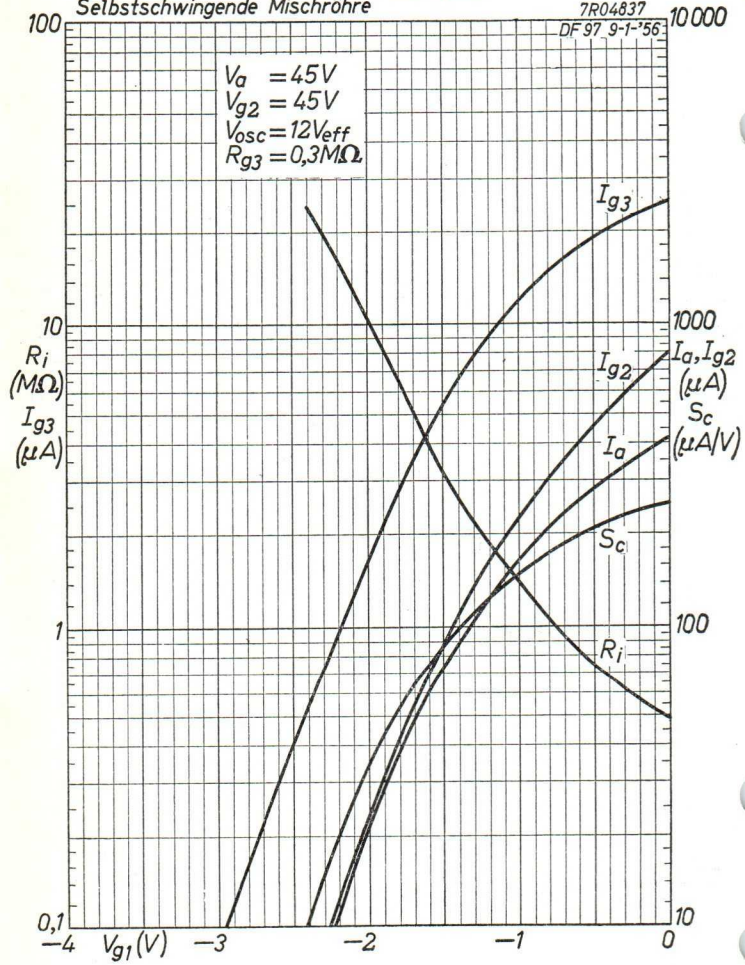
E

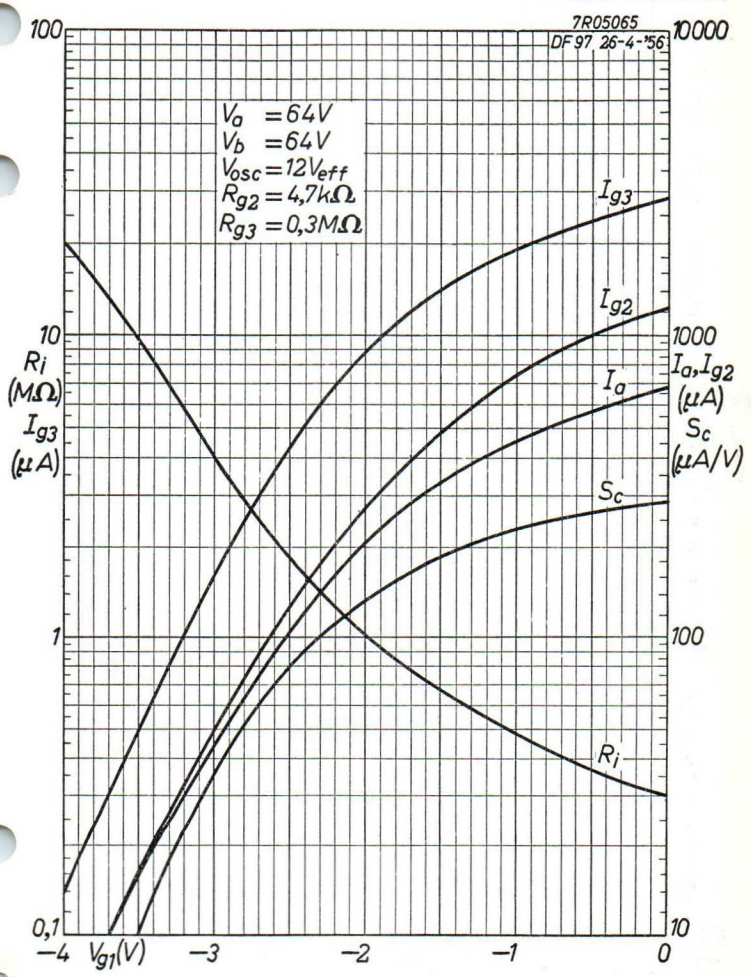
DF 97 PHILIPS

Self-oscillating mixer
Convertisseur de fréquence auto-oscillateur
Selbstschwingende Mischröhre



PHILIPS

DF 97



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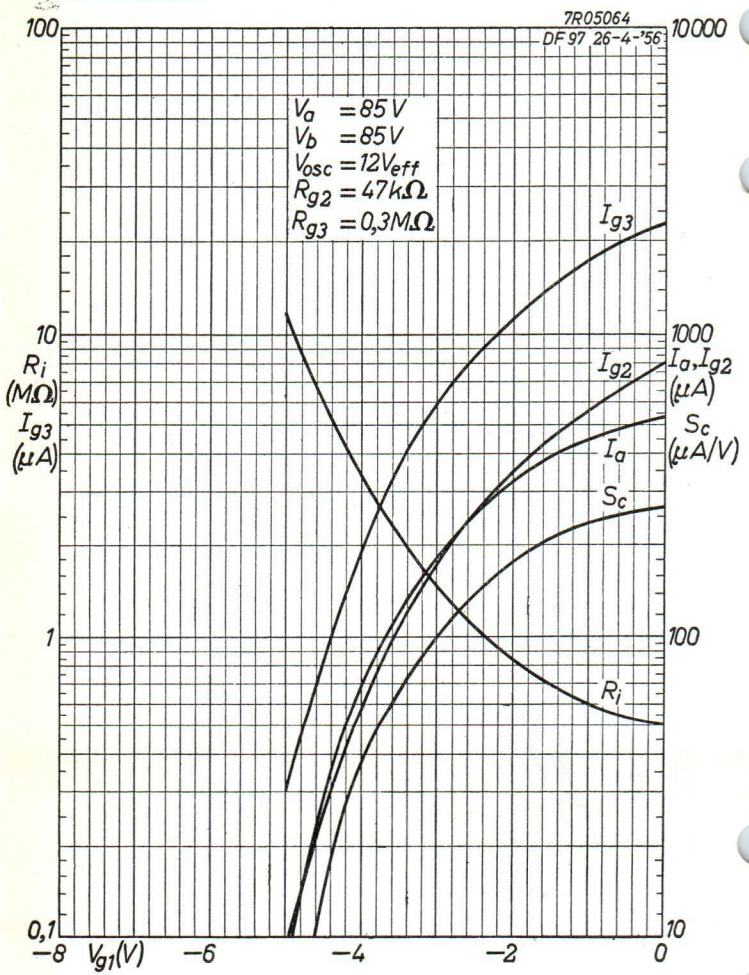
G

DF 97

PHILIPS



H

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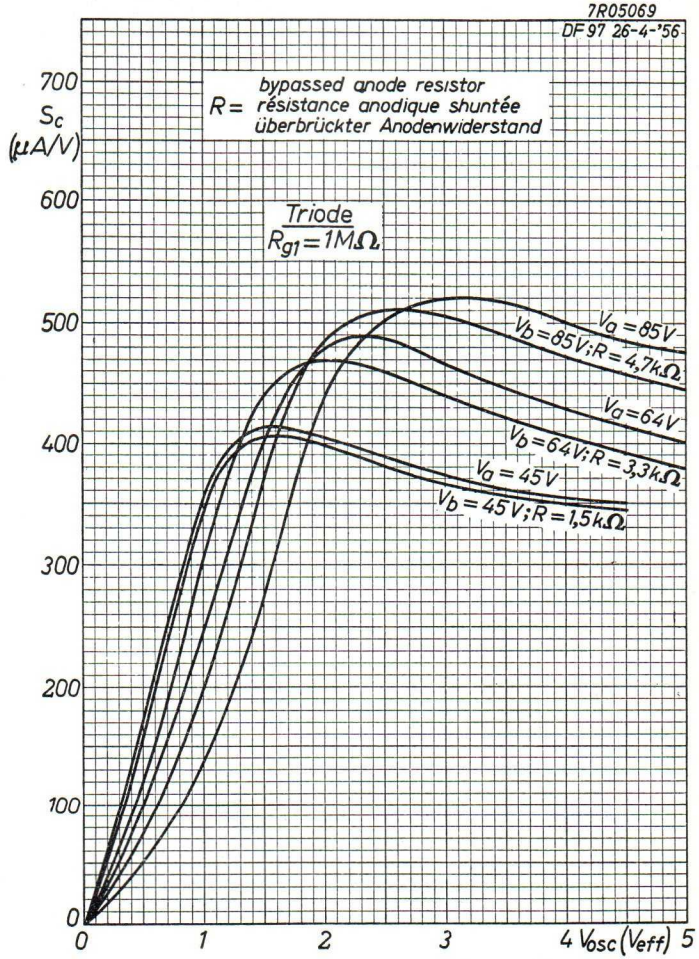
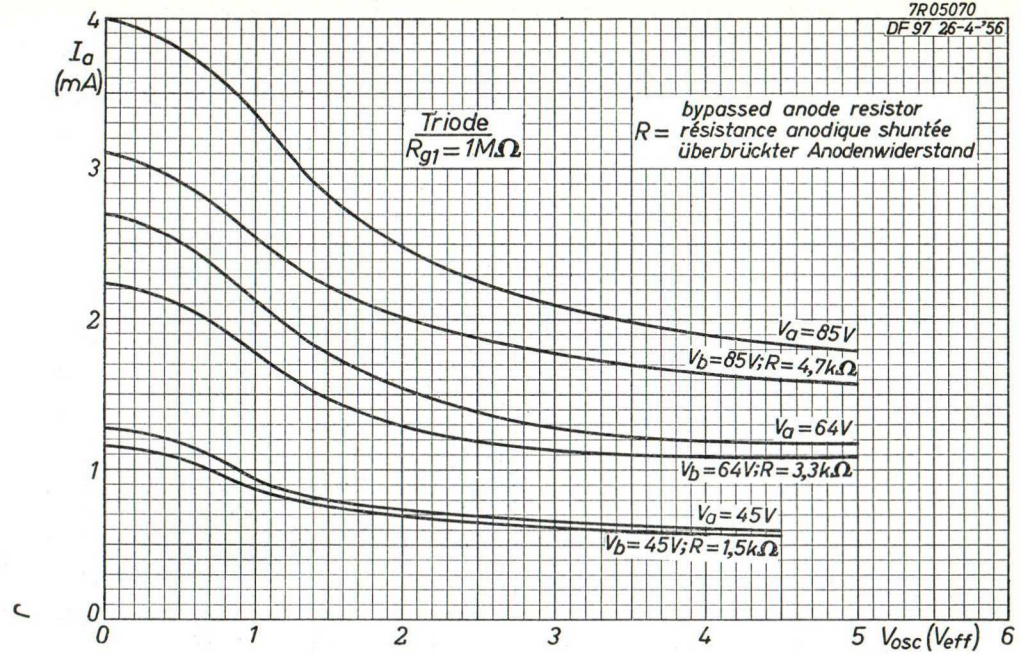
DF 97 26-4-'56

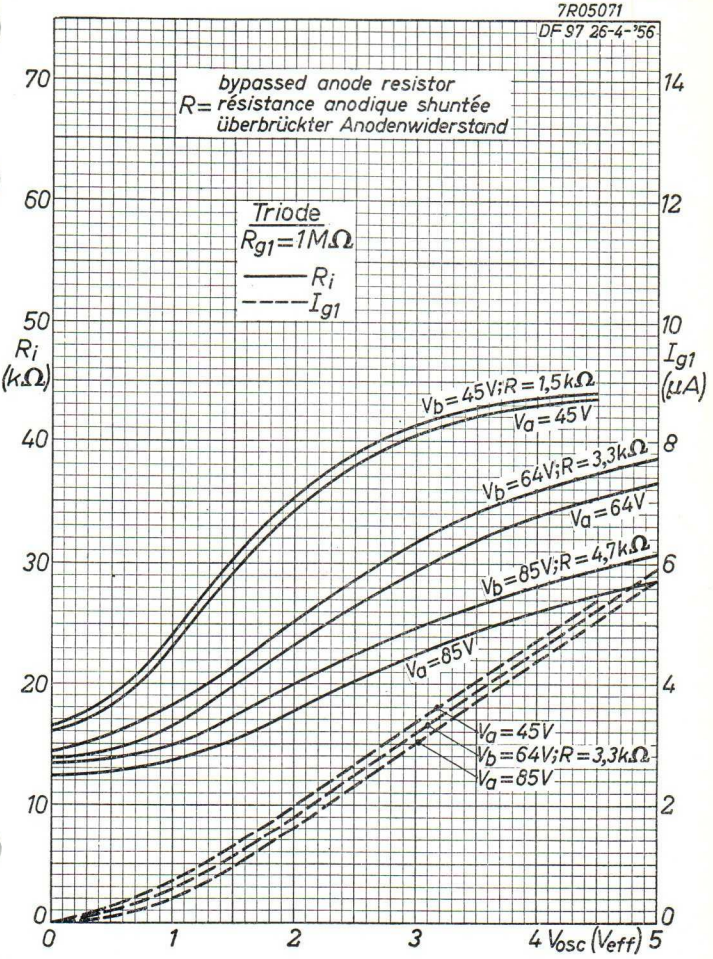



7R05070
DF 97 26-4-'56
I_a (mA)
Triode
$R_{g1} = 1M\Omega$
R = bypassed anode resistor
résistance anodique shuntée
überbrückter Anodenwiderstand
$V_a = 85V$
$V_b = 85V; R = 4{,}7k\Omega$
$V_a = 64V$
$V_b = 64V; R = 3{,}3k\Omega$
$V_a = 45V$
$V_b = 45V; R = 1{,}5k\Omega$
V_{osc} (V_{eff})
0
1
2
3
4
5
6

PHILIPS

DF97

7R05071
DF 97 26-4-'56



5.5.1956

K

PHILIPS

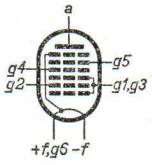
DK 40

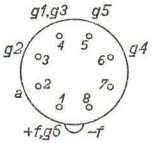
OCTODE for use as frequency changer in battery receivers
OCTODE pour utilisation en changeuse de fréquence dans des appareils-batterie
OKTODE zur Verwendung als Mischröhre in Batteriegeräten

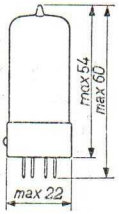
Heating : direct by D.C.
series or parallel supply
Chauffage: direct par C.C.
alimentation en série ou en parallèle
Heizung : direkt durch Gleichstrom
Serien-oder Parallelspeisung

Parallel supply Alimentation en parallèle Parallelspeisung	V_f = 1,4 V I_f = 50 mA
Series supply Alimentation en série Seriespeisung	V_f = 1,3 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Basé, culot, Sockel: Rimlock

Capacitances Capacités Kapazitäten		
	C_a	= 9,6 pF
	C_{g4}	= 6,9 pF
	C_{ag4}	< 0,16 pF
	C_{g1+g3}	= 5,6 pF
	C_{g2}	= 5,0 pF
	C_{g2g4}	= 0,9 pF
	$C_{(g1+g3)g4}$	= 1,1 pF

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

$V_a=V_b$	=	67,5		90		V
R_{g5}	=	0		90		kΩ
R_{g2}	=	0		8,5		kΩ
R_{g1+g3}	=	35		35		kΩ[1])
V_{osc}	=	8		8		V_{eff}
V_{g4}	=	0	-9,5	0	-12,5	V
V_{g5}	=	67,5	67,5	67,5	90	V
V_{g2}	=	67,5	-	67,5	-	V
I_a	=	1,0	-	1,0	-	mA
I_{g5}	=	0,25	-	0,25	-	mA
I_{g2}	=	2,6	-	2,6	-	mA
S_c	=	425	4,2	425	4,3	µA/V
R_i	=	0,9	>10	1,0	>10	MΩ
R_{eq}	=	67	-	67	-	kΩ

$V_a=V_b$	=	120		135		V
R_{g5}	=	210		270		kΩ
R_{g2}	=	20		26		kΩ
R_{g1+g3}	=	35		35		kΩ[1])
V_{osc}	=	8		8		V_{eff}
V_{g4}	=	0	-16,5	0	-18,5	V
V_{g5}	=	67,5	120	67,5	135	V
V_{g2}	=	67,5	-	67,5	-	V
I_a	=	1,0	-	1,0	-	mA
I_{g5}	=	0,25	-	0,25	-	mA
I_{g2}	=	2,6	-	2,6	-	mA
S_c	=	425	4,2	425	4,2	µA/V
R_i	=	1,0	>10	1,0	>10	MΩ

[1]) R_{g1+g3} connected to +f (pin 1)
R_{g1+g3} connectée à +f (broche 1)
R_{g1+g3} verbunden mit +f (Stift 1)

Current saving circuit [2]
Montage économisateur [2]
Stromsparschaltung

$V_a=V_b$	=	67,5		V
R_{g5}	=	0		kΩ
R_{g2}	=	15		kΩ
R_{g1+g3}	=	35		kΩ [1]
V_{osc}	=	8		V_{eff}
V_{g4}	=	0	-9,5	V
V_{g5}	=	67,5	67,5	V
V_{g2}	=	45	-	V
I_a	=	0,85	-	mA
I_{g5}	=	0,19	-	mA
I_{g2}	=	1,5	-	mA
S_c	=	370	3,7	µA/V
R_i	=	1,0	>10	MΩ

Typical characteristics of the oscillator section (filament, g1 and g2) (g1 connected to + f)
Caractéristiques types de la partie oscillatrice (filament, g1 et g2) (g1 connectée à +f)
Kenndaten des Oszillatorteiles (Heizfaden, g1 und g2) (g1 verbunden mit +f)

V_a	=	67,5	67,5	V
V_{g5}	=	67,5	67,5	V
V_{g4}	=	0	0	V
V_{g2}	=	67,5	45	V
I_{g2}	=	2,9	1,3	mA
S_{g2g1}	=	1,2	0,9	mA/V
μ_{g2g1}	=	14	14	

[2]) Not suitable for the short-wave range
Ne convient pas pour ondes courtes
Ungeeignet für Kurzwellen

Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max.	135	V
W_a	= max.	0,2	W
V_{g5}	= max.	135	V
W_{g5}	= max.	0,02	W
V_{g2}	= max.	100	V
W_{g2}	= max.	0,2	W
I_k	= max.	5	mA
V_{g4} (I_{g4}=+0,3 µA)	= max.	+0,75	V
R_{g4}	= max.	3	MΩ
R_{g1+g3}	= max.	35	kΩ

PHILIPS

DK 91

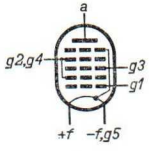
HEPTODE for use as frequency changer in battery receivers
HEPTHODE pour utilisation en changeuse de frequence dans des appareils-batterie
HEPTODE zur Verwendung als Mischröhre in Batteriegeräten

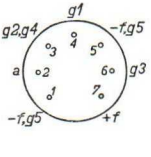
Heating : direct by D.C.
series or parallel supply
Chauffage: direct par C.C.
alimentation en série ou en parallèle
Heizung : direkt durch Gleichstrom
Serien- oder Parallelspeisung

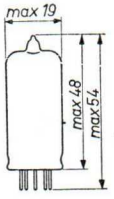
Parallel supply
Alimentation en parallèle
Parallelspeisung
V_f = 1,4 V
I_f = 50 mA

Series supply
Alimentation en série
Serienspeisung
V_f = 1,3 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances
Capacités
Kapazitäten

C_a	=	7,5 pF
C_{g3}	=	7,0 pF
C_{ag3}	<	0,4 pF
C_{g1}	-	3,8 pF
C_{ag1}	<	0,1 pF
C_{g1g3}	<	0,2 pF

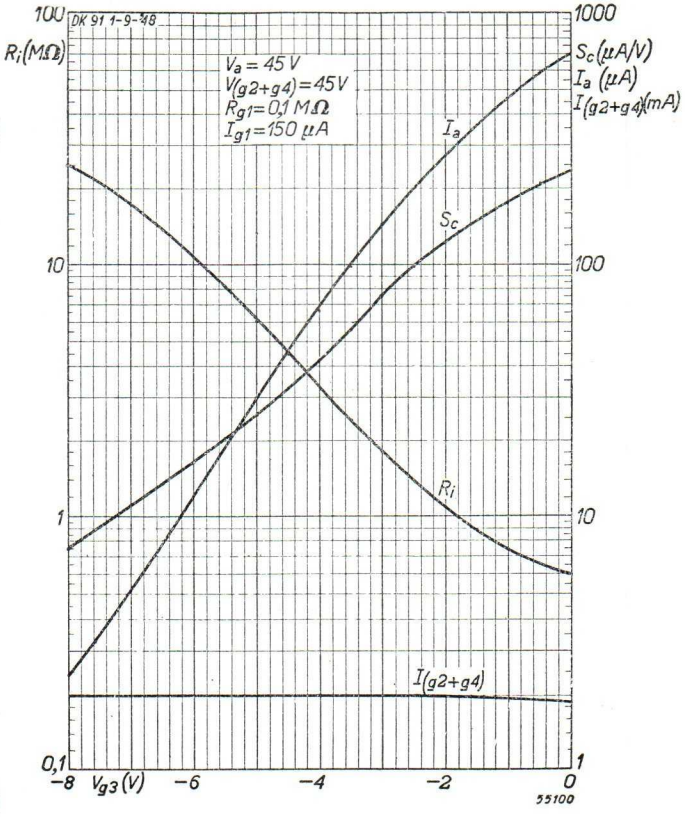
Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

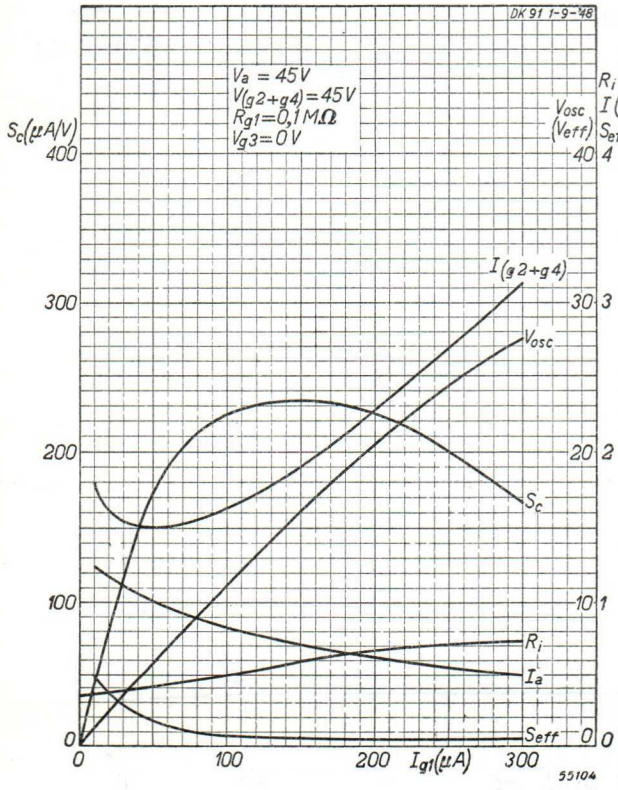
$V_a=V_b$	=	45		90		V
V_{g2+g4}	=	45		45		V
R_{g1}	=	0,1		0,1		MΩ
I_{g1}	=	150		150		µA
V_{g3}	=	0	-9	0	-9	V
I_a	=	0,7	-	0,8	-	mA
I_{g2+g4}	=	1,9	-	1,9	-	mA
S_c	=	235	5	250	5	µA/V
R_i	=	0,6	>10	0,8	>10	MΩ

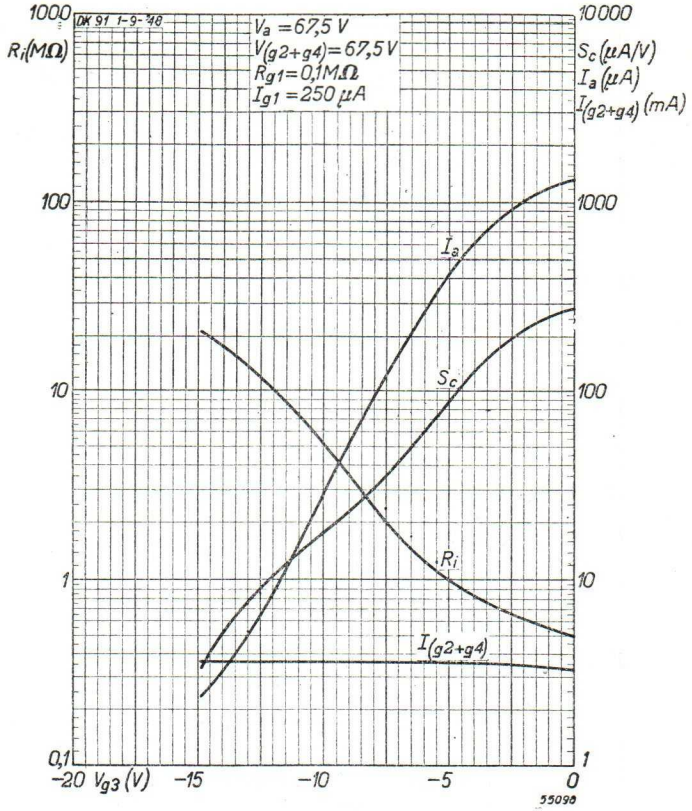
$V_a=V_b$	=	67,5		90		V
V_{g2+g4}	=	67,5		67,5		V
R_{g1}	=	0,1		0,1		MΩ
I_{g1}	=	250		250		µA
V_{g3}	=	0	-14	0	-14	V
I_a	=	1,4	-	1,6	-	mA
I_{g2+g4}	=	3,2	-	3,2	-	mA
S_c	=	280	5	300	5	µA/V
R_i	=	0,5	>10	0,6	>10	MΩ
R_{eq}	=	185	-	195	-	kΩ

Limiting values
Caractéristiques limites
Grenzdaten

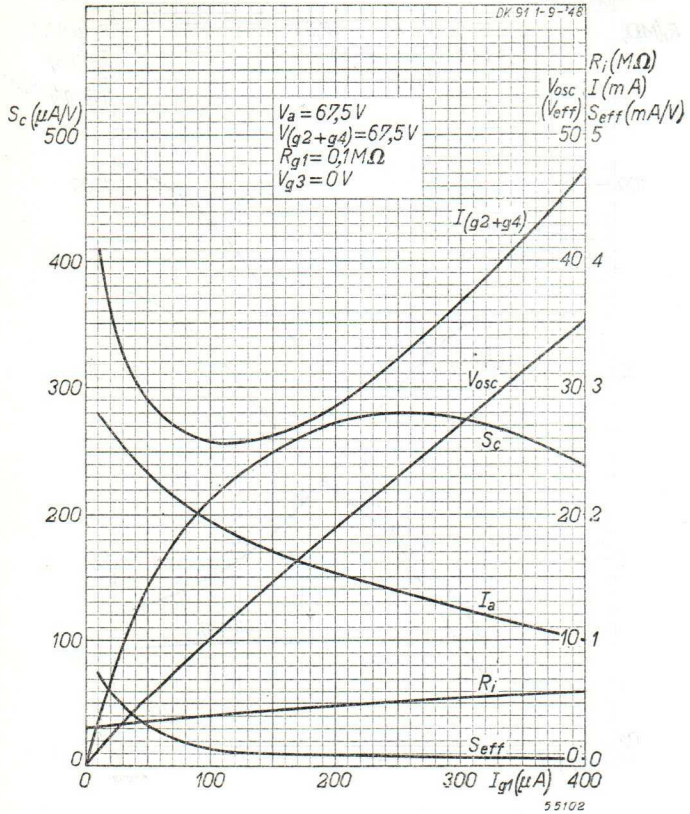
V_a	= max. 90	V
W_a	= max. 0,15	W
V_{g2+g4}	= max. 67,5	V
W_{g2+g4}	= max. 0,25	W
I_k	= max. 5,5	mA
V_{g3} (I_{g3}=+0,3 µA)	= max. 0,75	V
R_{g3}	= max. 3	MΩ
R_{g1}	= max. 0,15	MΩ


DK 91 1-9-48
$V_a = 45\ V$
$V_{(g2+g4)} = 45V$
$R_{g1} = 0{,}1\ M\Omega$
$I_{g1} = 150\ \mu A$
I_a
S_c
R_i
$I_{(g2+g4)}$
100
10
1
0,1
$R_i (M\Omega)$
1000
100
10
1
$S_c (\mu A/V)$
$I_a (\mu A)$
$I_{(g2+g4)} (mA)$
−8
$V_{g3} (V)$
−6
−4
−2
0
55100

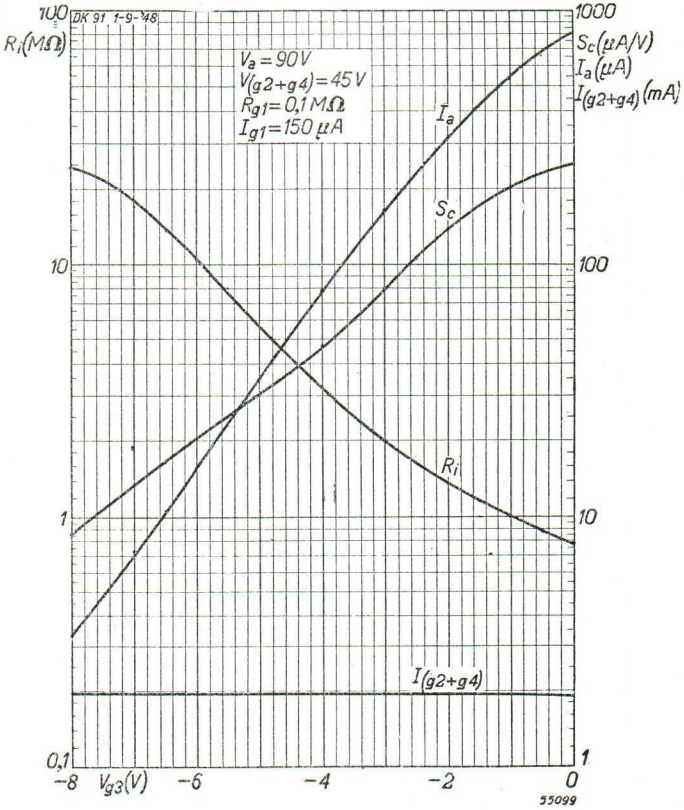

DK 91 1-9-48
V_a = 45V
$V_{(g2+g4)}$ = 45V
R_{g1} = 0,1 MΩ
V_{g3} = 0 V
S_c (µA/V)
400
300
200
100
0
R_i (MΩ)
I (mA)
V_{osc} (Veff)
S_{eff} (mA/V)
40 4
30 3
20 2
10 1
0 0
$I_{(g2+g4)}$
V_{osc}
S_c
R_i
I_a
S_{eff}
0
100
200
300
I_{g1}(µA)
55104


DK 91 1-9-48
V_a = 67,5 V
$V_{(g2+g4)}$ = 67,5 V
R_{g1} = 0,1 MΩ
I_{g1} = 250 µA
R_i(MΩ)
S_c (µA/V)
I_a (µA)
$I_{(g2+g4)}$ (mA)
1000
100
10
1
0,1
10000
1000
100
10
1
I_a
S_c
R_i
$I_{(g2+g4)}$
−20 V_{g3} (V)
−15
−10
−5
0
55098

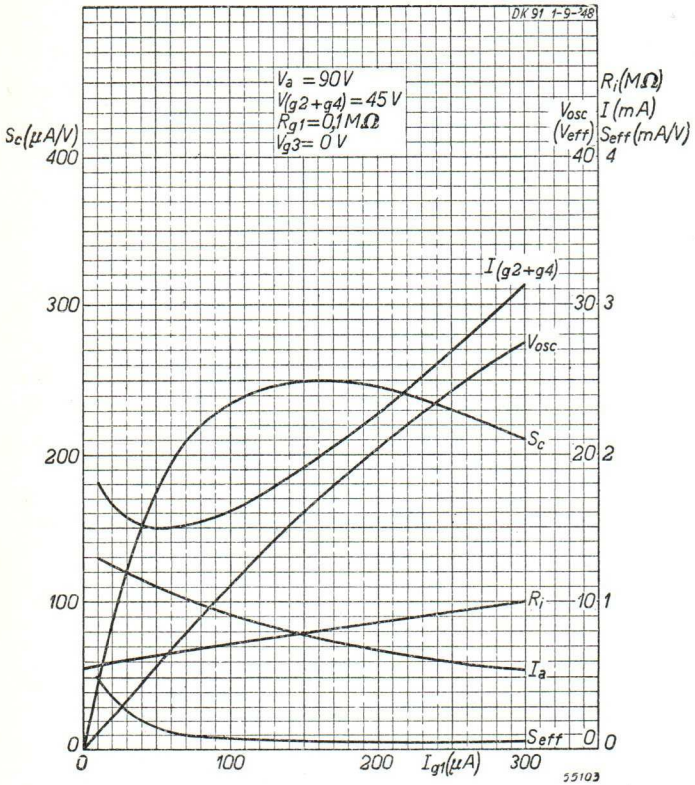
DK 91 **PHILIPS**

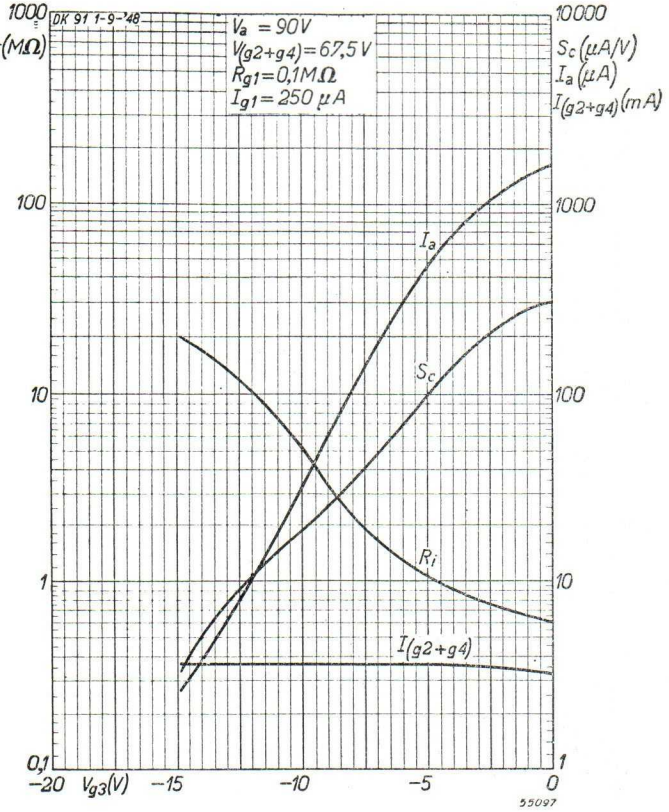


23.10.1948 D

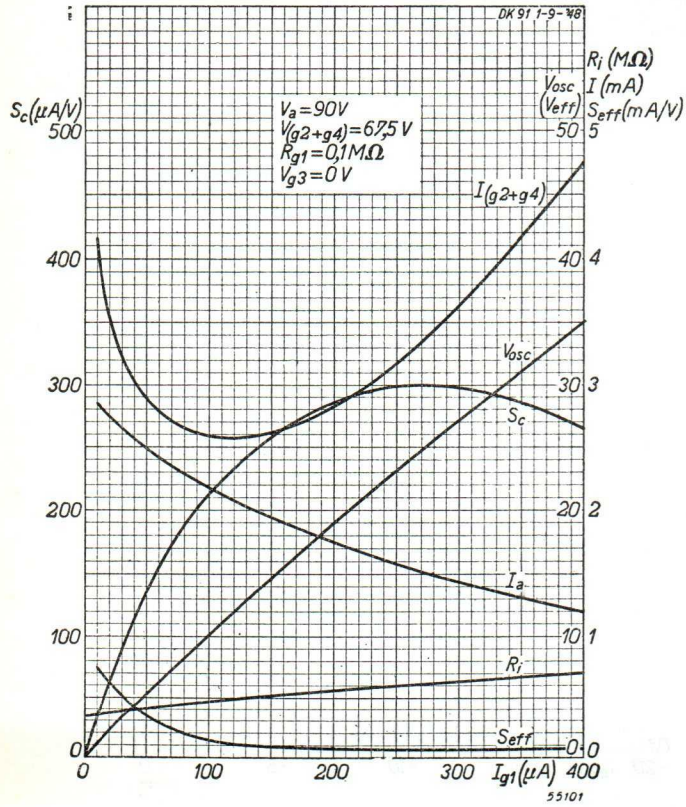

DK 91 1-9-48
$V_a = 90V$
$V_{(g2+g4)} = 45V$
$R_{g1} = 0{,}1 M\Omega$
$I_{g1} = 150 \mu A$
I_a
S_c
R_i
$I_{(g2+g4)}$
100
10
1
0,1
$R_i (M\Omega)$
1000
100
10
1
$S_c (\mu A/V)$
$I_a (\mu A)$
$I_{(g2+g4)} (mA)$
−8
$V_{g3} (V)$
−6
−4
−2
0
55099

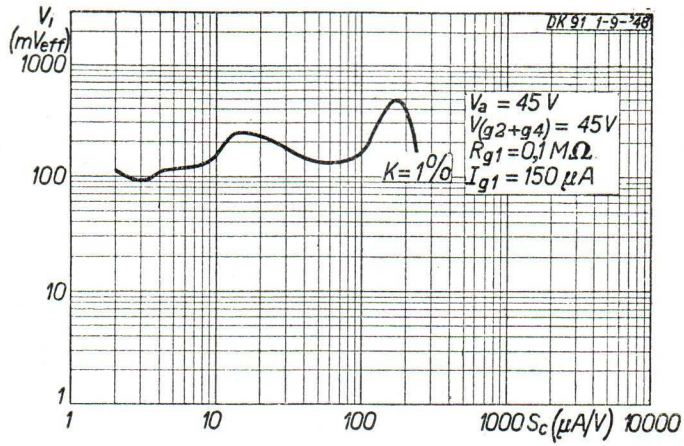
DK 91 **PHILIPS**



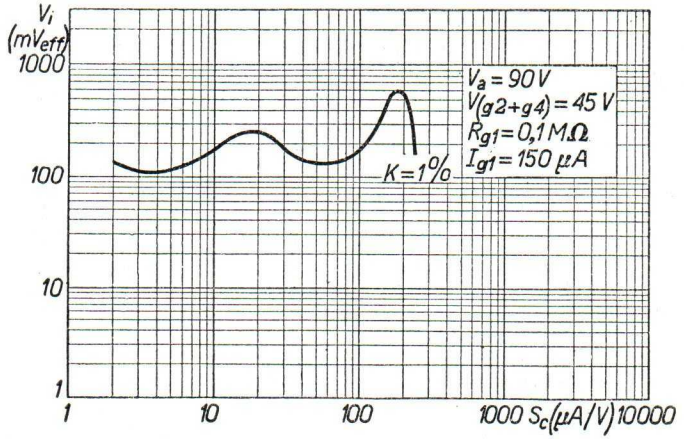

DK 91 1-9-'48
V_a = 90V
$V_{(g2+g4)}$ = 67,5 V
R_{g1} = 0,1 MΩ
I_{g1} = 250 µA
R_i (MΩ)
S_c (µA/V)
I_a (µA)
$I_{(g2+g4)}$ (mA)
1000
100
10
1
0,1
10000
1000
100
10
1
I_a
S_c
R_i
$I_{(g2+g4)}$
−20
V_{g3}(V)
−15
−10
−5
0
55097

23.10.1948 G

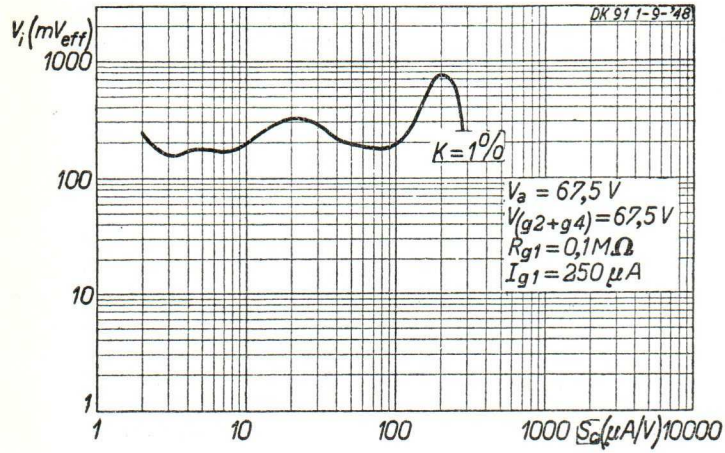

DK 91 1-9-'48
S_c(µA/V)
R_i (MΩ)
V_{osc} (V_{eff})
I (mA)
S_{eff}(mA/V)
V_a = 90V
$V_{(g2+g4)}$ = 67,5 V
R_{g1} = 0,1 MΩ
V_{g3} = 0 V
I(g2+g4)
V_{osc}
S_c
I_a
R_i
S_{eff}
I_{g1}(µA)
0
100
200
300
400
500
50
40
30
20
10
5
4
3
2
1
55101

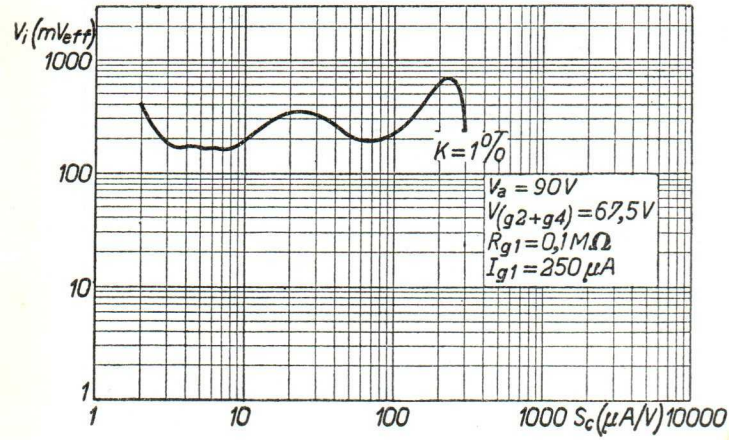

DK 91 1-9-'48
V_i (mV_{eff})
1000
100
10
1
1
10
100
1000 S_c ($\mu A/V$) 10000
V_a = 45 V
$V_{(g2+g4)}$ = 45 V
R_{g1} = 0,1 MΩ
I_{g1} = 150 µA
K = 1%

56375


V_i (mV_{eff})
1000
100
10
1
1
10
100
1000 S_c ($\mu A/V$) 10000
V_a = 90 V
$V_{(g2+g4)}$ = 45 V
R_{g1} = 0,1 MΩ
I_{g1} = 150 µA
K = 1%

DK 91 **PHILIPS**





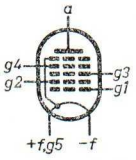
PHILIPS DK92

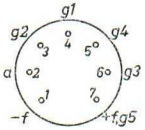
HEPTODE for use as frequency changer in battery sets
HEPTODE pour l'utilisation en changeuse de fréquence dans des appareils batterie
HEPTODE zur Verwendung als Mischröhre in Batteriegeräten

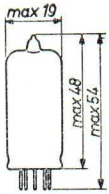
Heating: direct by battery current, rectified A.C. or D.C.; series or parallel supply
Chauffage: direct par courant batterie, C.A. redressé ou C.C.; alimentation en série ou en parallèle
Heizung: direkt durch Batteriestrom, gleichgerichteten Wechselstrom oder Gleichstrom; Serien- oder Parallelspeisung

Parallel supply: Alimentation en parallèle: Parallelspeisung:	V_f = 1,4 V I_f = 0,050 A
Series supply: Alimentation en série: Serienspeisung:	V_f = 1,3 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





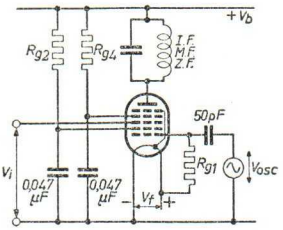


Base, culot, Sockel: MINIATURE

Capacitances
Capacités
Kapazitäten

C_a	= 8,4 pF	C_{ag2}	< 0,3 pF
C_{g3}	= 7,5 pF	C_{ag1}	<0,11 pF
C_{g2}	= 4,8 pF	C_{g1g3}	< 0,2 pF
C_{g1}	= 3,9 pF	C_{g1g2}	= 3,0 pF
C_{ag3}	<0,36 pF	C_{g2g3}	= 1,6 pF

Operating characteristics with separate excitation
Caractèristiques d'utilisation à excitation séparée
Betriebsdaten mit Fremderregnung



V_b [1]	=	41	63,5	85	V
V_a	=	41	63,5	85	V
V_{g4}	=	41	63,5	60	V
V_{g3}	=	0	0	0	V
V_{g2}	=	29	30	30	V
Vosc	=	2,5	4	4	V_{eff}
R_{g4}	=	0	0	180	kΩ
R_{g2}	=	6,8	22	33	kΩ
R_{g1}	=	27	27	27	kΩ
I_a	=	0,25	0,70	0,65	mA
I_{g4}	=	0,09	0,15	0,14	mA
I_{g2}	=	1,75	1,55	1,65	mA
I_{g1}	=	80	130	130	µA
S_c [2]	=	180	300	325	µA/V
$S_c(V_{g3}=-2,9V)$	=	1,8			µA/V
S_c ($V_{g3}=-4V$)	=		3,0		µA/V
S_c ($V_{g3}=-6V$)	=			3,25	µA/V
R_i	=	0,75	0,9	1,0	MΩ
R_{eq}	=	115	120	100	kΩ

[1]) Based on a battery voltage of 45, 67.5 or 90 V reduced by the neg. bias for the output valve.
Se basant sur une tension de batterie de 45, 67,5 ou 90 V, diminuée avec la polarisation négative du tube de sortie.
Basiert auf einer Batteriesp. von 45, 67,5 oder 90V, verringert mit der neg. Vorsp. der Endröhre

[2]) See page 3; voir page 3; siehe Seite 3.

Typical characteristics of the oscillator section (g1 connected to +f)
Caractéristiques types de la partie oscillatrice (g1 connecté à +f)
Kenndaten des Oszillatorteiles (g1 verbunden mit +f)

V_a	=	41	63,5	85 V
V_{g4}	=	41	63,5	60 V
V_{g3}	=	0	0	0 V
V_{g2}	=	29	30	30 V
I_{g2}	=	3	2,2	2,5 mA
S_{g2g1}	=	1,1	0,8	0,9 mA/V
μ_{g2g1}	=	9	7,5	7,5

Limiting values
Caracteristiques limites
Grenzdaten

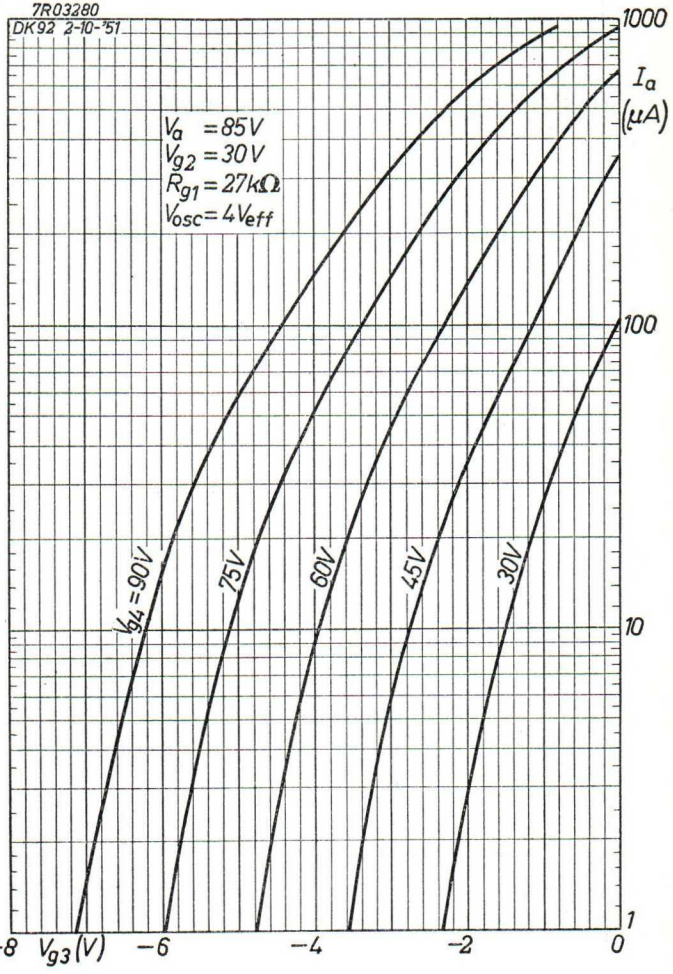
V_b	= max. 120 V
V_b	= max. 140 V [3]
V_a	= max. 90 V
W_a	= max. 0,2 W
V_{g4}	= max. 90 V
W_{g4}	= max. 0,1 W
V_{g2}	= max. 60 V
W_{g2}	= max. 0,2 W
I_k	= max. 4 mA
R_{g3}	= max. 3 MΩ
$V_{g1}(I_{g1}=+0,3\mu A)$	= max. +0,75 V

[2]) With self-excitation S_c will be a few per cent smaller; in general grid-tuning is recommended
Avec auto-excitation S_c sera plus petit de quelques pour cents; en général la syntonisation du circuit de la grille 1 est recommandé
Mit Selbsterregung wird S_c um einige Prozente kleiner sein; im allgemeinen wird Abstimmung des ersten Gitterkreises empfohlen

[3]) Absolute value; valeur absolue; Absolutwert

PHILIPS

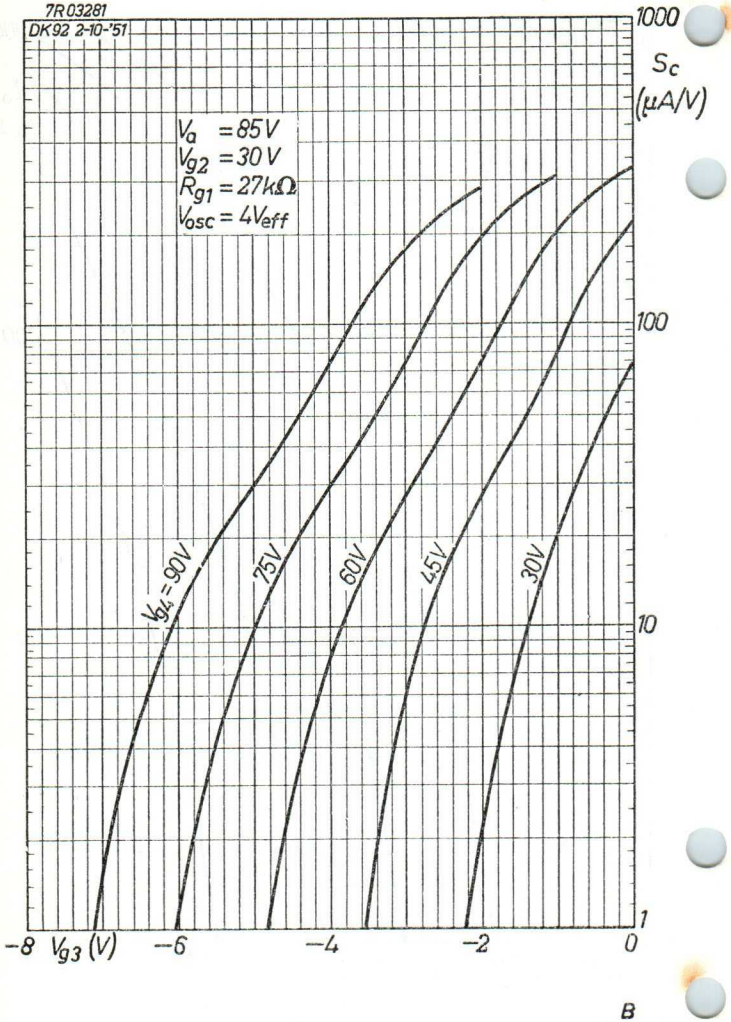
DK92



10.10.1951

A

DK92 **PHILIPS**



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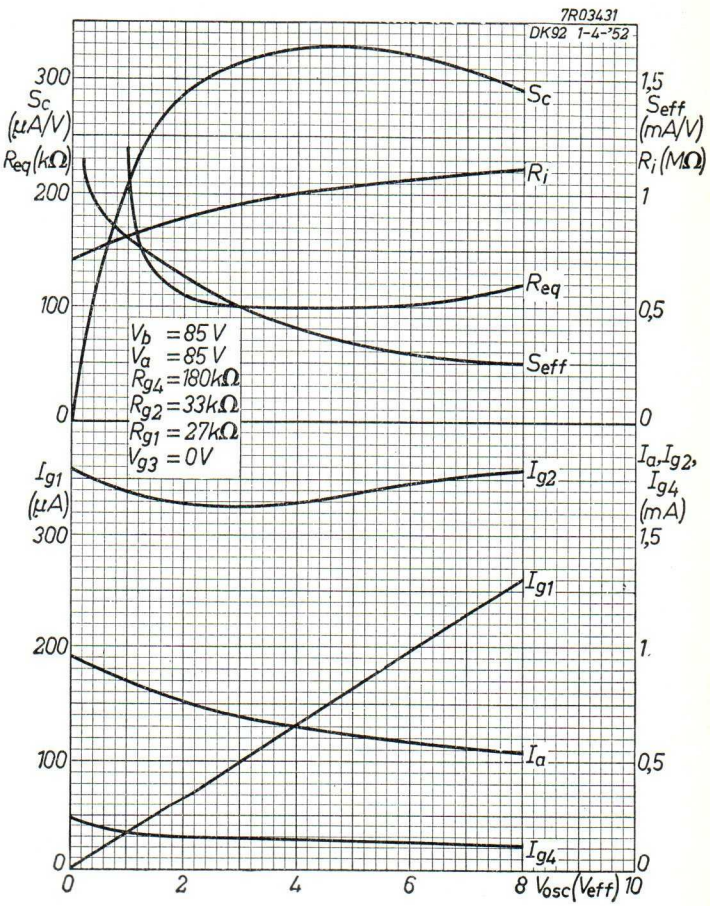
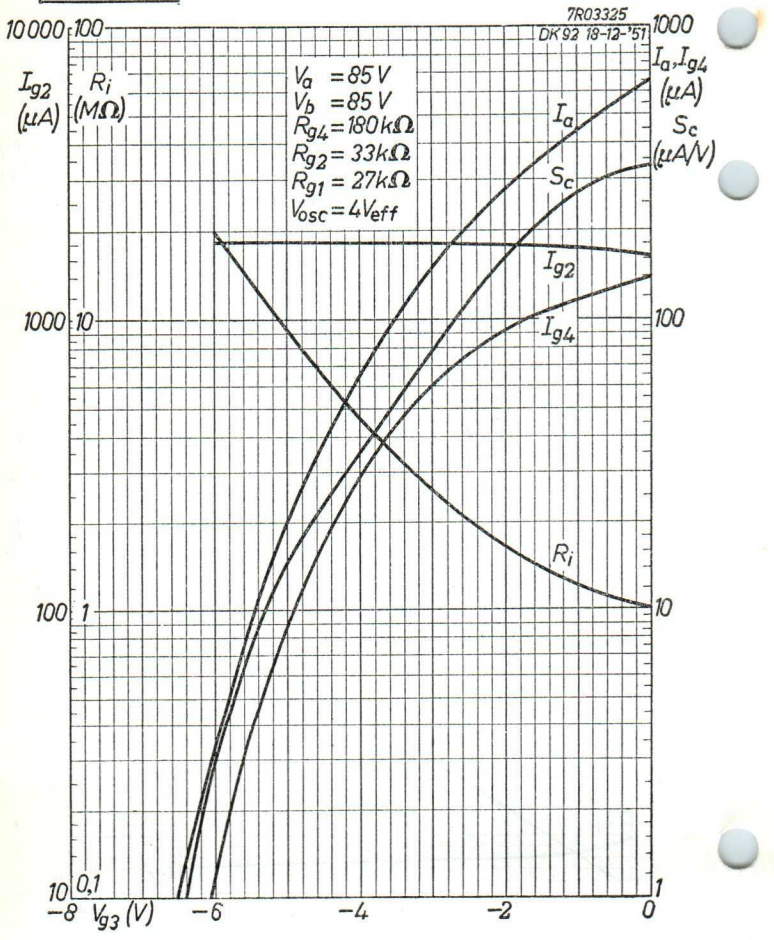


4.4.1952

C

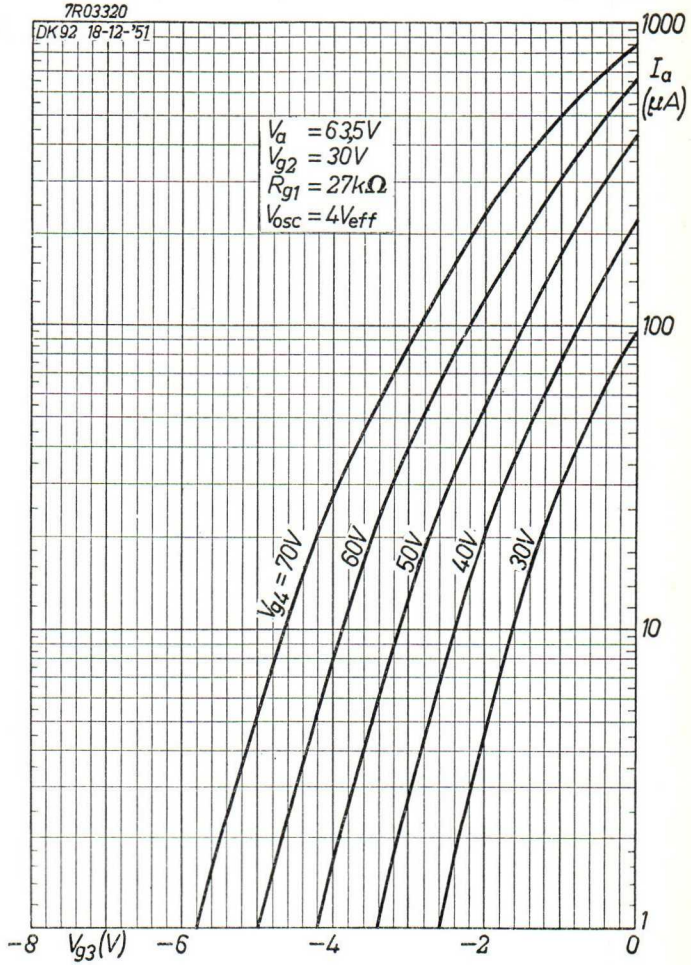
DK92 PHILIPS



D

PHILIPS

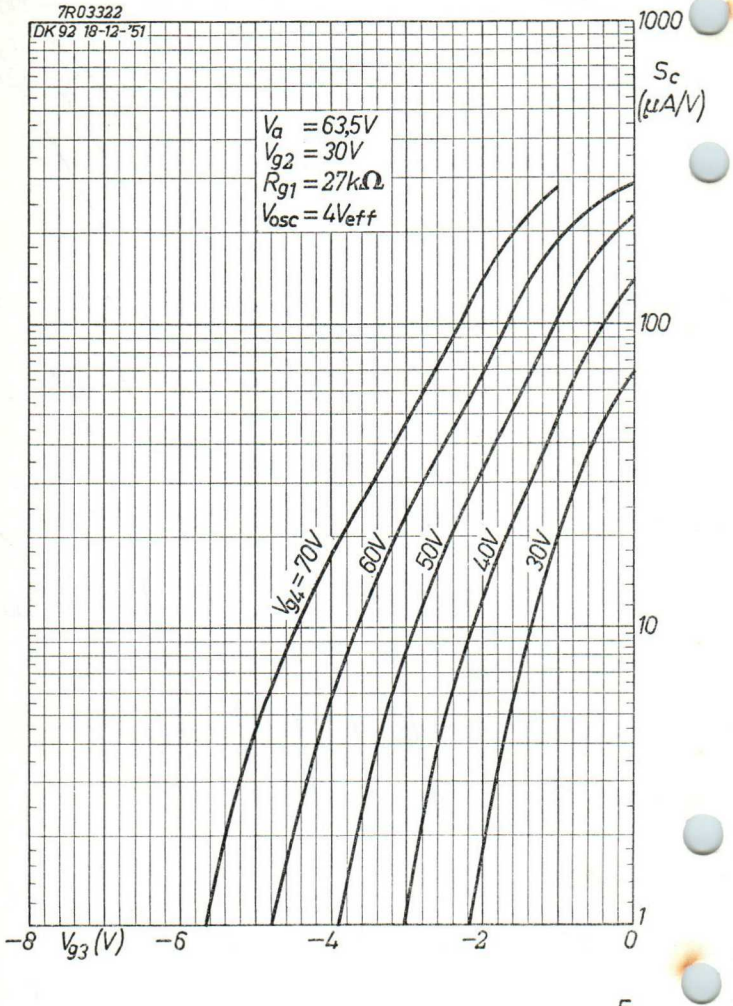
DK92



4.4.1952

E

DK92 **PHILIPS**



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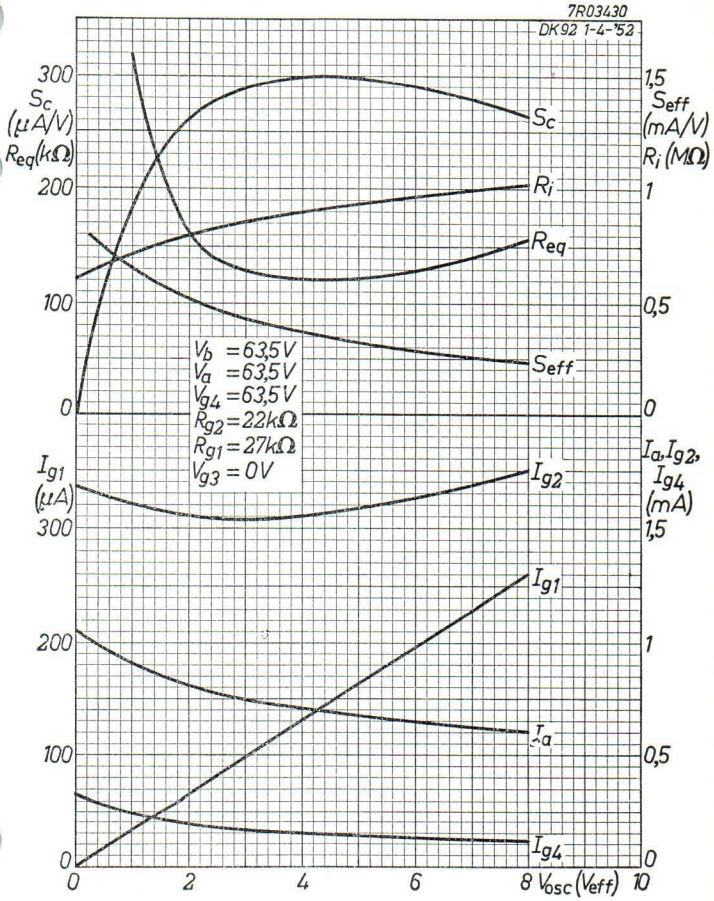
PHILIPS

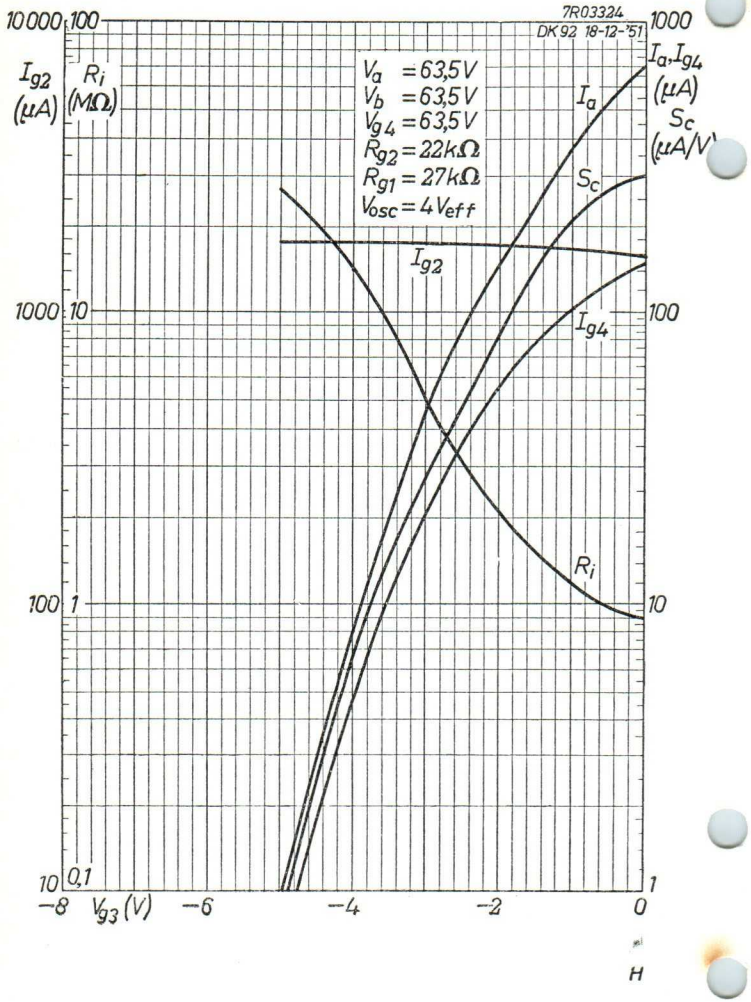
DK 92



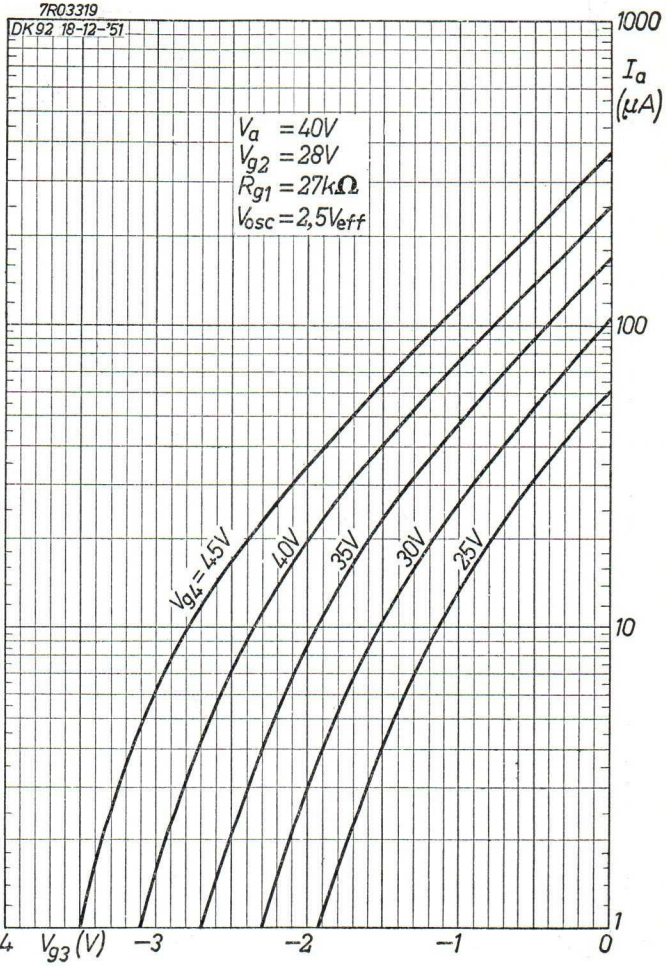
4.4.1952

G

DK92 **PHILIPS**

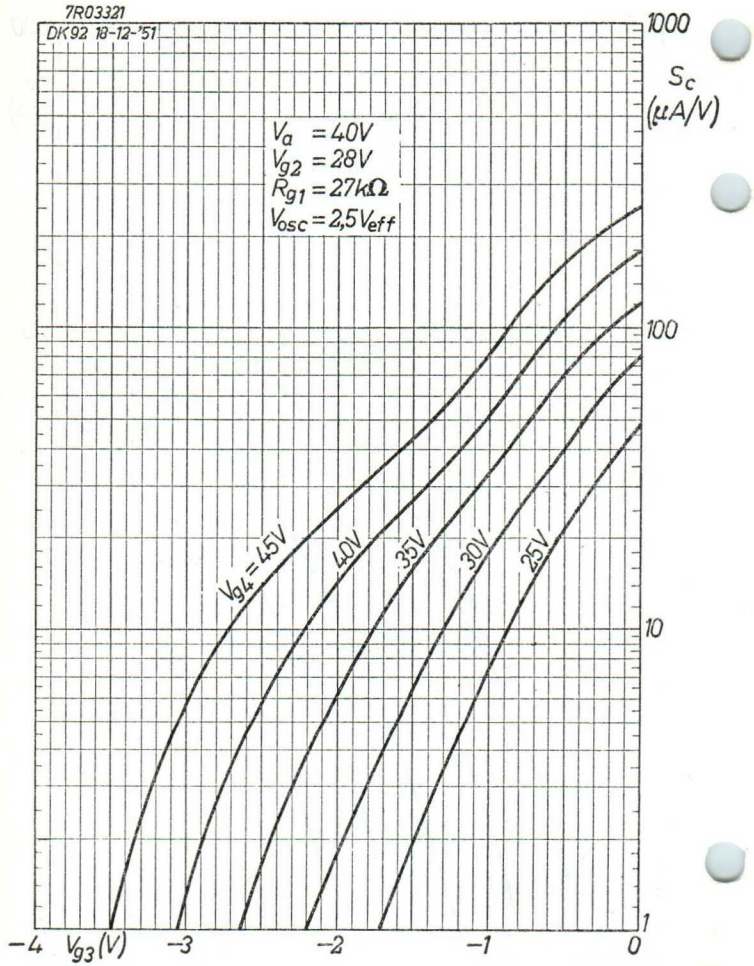


H


7R03319
DK92 18-12-'51
V_a = 40V
V_{g2} = 28V
R_{g1} = 27kΩ
V_{osc} = 2,5V_{eff}
V_{g4} = 45V
40V
35V
30V
25V
1000
I_a
(μA)
100
10
1
−4
V_{g3} (V)
−3
−2
−1
0

4.4.1952

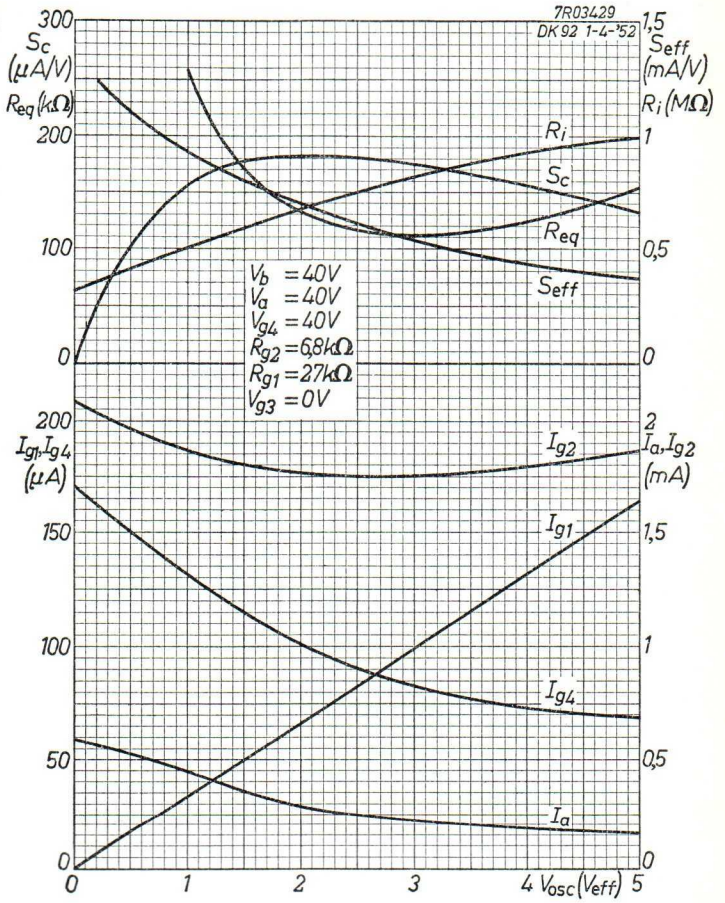
DK92 **PHILIPS**



J

PHILIPS

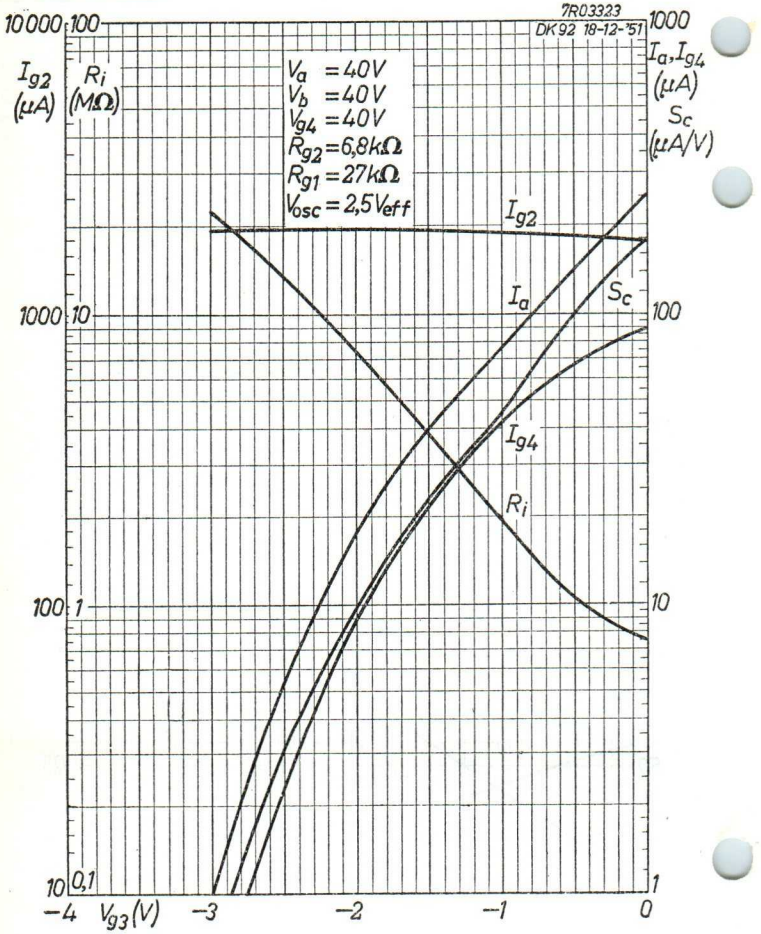
DK 92



4.4.1952

K

DK 92 **PHILIPS**



PHILIPS

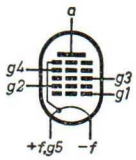
DK 96

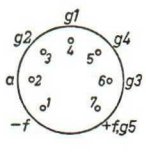
HEPTODE for use as frequency changer in battery sets
HEPTODE pour utilisation en changeuse de fréquence dans des appareils batterie
HEPTODE zur Verwendung als Mischröhre in Batteriegeräten

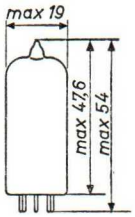
Heating :direct by D.C.;
parallel or series supply
Chauffage:direct par C.C.;
alimentation parallèle ou série
Heizung :direkt durch Gleichstrom;
Parallel- oder Serienspeisung

Parallel supply Alimentation parallèle Parallelspeisung	V_f = 1,4 V I_f = 25 mA
Series supply Alimentation série Serienspeisung	V_f = 1,3 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: MINIATURE

Capacitances
Capacités
Kapazitäten

C_{g1}	= 3,9 pF	C_{ag2}	< 0,3 pF
C_{g2}	= 4,8 pF	C_{ag3}	< 0,36 pF
C_{g3}	= 7,4 pF	C_{g1g2}	= 3 pF
C_a	= 8,1 pF	C_{g1g3}	< 0,2 pF
C_{ag1}	< 0,11 pF	C_{g2g3}	= 1,6 pF

Operating characteristics with separate oscillator
Caractéristiques d'utilisation avec oscillateur séparé
Betriebsdaten mit getrenntem Oszillator

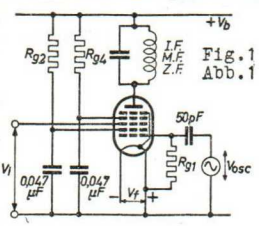


Fig.1
Abb.1

$V_b = V_a$	= 45[1]	64[2]	85[2]	V
R_{g4}	= 0	0	120	kΩ
V_{g4}	= 45	64	68	V
V_{g3}	= 0	0	0	V
R_{g2}	= 12	18	33	kΩ
V_{g2}	= 29,5	35	35	V
R_{g1}	= 27	27	27	kΩ
V_{osc}	= 4	4	4	V_{eff}
I_a	= 0,56	0,55	0,6	mA
I_{g4}	= 0,15	0,12	0,14	mA
I_{g2}	= 1,3	1,6	1,5	mA
I_{g1}	= 85	85	85	µA
I_k	= 2,1	2,36	2,33	mA
S_c (V_{g3} = -4,5 V)	= -	2,75	-	µA/V
S_c (V_{g3} = -6,5 V)	= -	-	3,0	µA/V
S_c	= 325[3][4]	275[3]	300[3]	µA/V
R_i	= 0,55	0,75	0,8	MΩ
R_{eq}	= -	110	100	kΩ

1) Voltages with respect to +f, g5.(see fig.1)
Tension par rapport à +f, g5 (voir la fig.1)
Spannungen in Bezug auf +f, g5 (siehe Abb.1)

2) Based on a battery voltage of 90 or 67.5 V reduced by the negative bias for the output tube
Se basant sur une tension de batterie de 90 ou 67,5 V diminuée de la polarisation négative du tube de sortie
Basiert auf einer Batteriespannung von 90 oder 67,5 V verringert um die negative Vorspannung der Endröhre

3)4) See page 3; voir page 3; siehe Seite 3

Typical characteristics of the oscillator section (g_1 connected to +f)
Caractéristiques types de la partie oscillatrice (g_1 relié à + f)
Kenndaten des Oszillatorteiles (g_1 verbunden mit +f)

V_a	=	64	85 V
V_{g4}	=	64	64 V
V_{g3}	=	0	0 V
V_{g2}	=	35	35 V
I_{g2}	=	1,7	1,7 mA
S_{g2g1}	=	0,6	0,6 mA/V
μ_{g2g1}	=	7,5	7,5

Limiting values
Caractéristiques limites
Grenzdaten

V_b	= max.	90 V	
V_b	= max.	110 V[5])	
V_a	= max.	90 V	
W_a	= max.	0,15 W	
V_{g4}	= max.	90 V	
W_{g4}	= max.	0,03 W	
V_{g2}	= max.	60 V	
W_{g2}	= max.	0,1 W	
I_k	= max.	2,6 mA	
R_{g1}	= max.	100 kΩ	
R_{g3}	= max.	3 MΩ	
V_{g3} (I_{g3} = +0,3 µA)	= min.	+0,75 V	

---

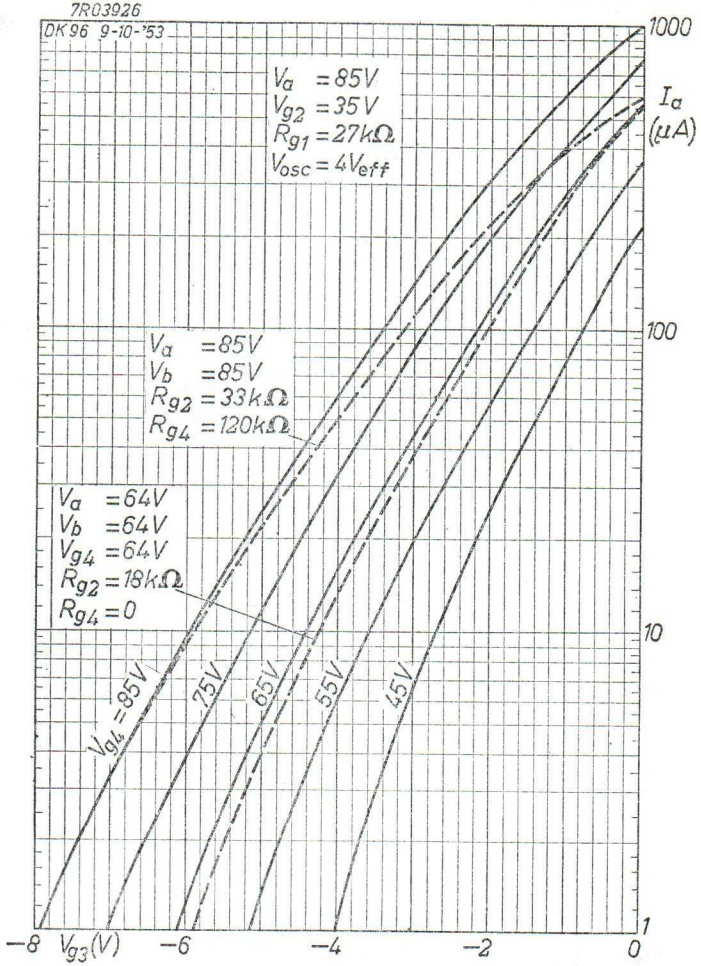
3) With self-oscillation S_c will be a few percent lower
Avec auto-oscillation S_c sera plus petit de quelques pour cents
Bei einer selbstschwingenden Röhre wird S_c um einige Prozente niedriger sein

4) V_{g3} for 1/100 Sc = -4.4 V
V_{g3} pour 1/100 S_c = -4,4 V
V_{g3} für 1/100 S_c = -4,4 V

5) Absolute value
Valeur absolue
Absolutwert

PHILIPS

DK96

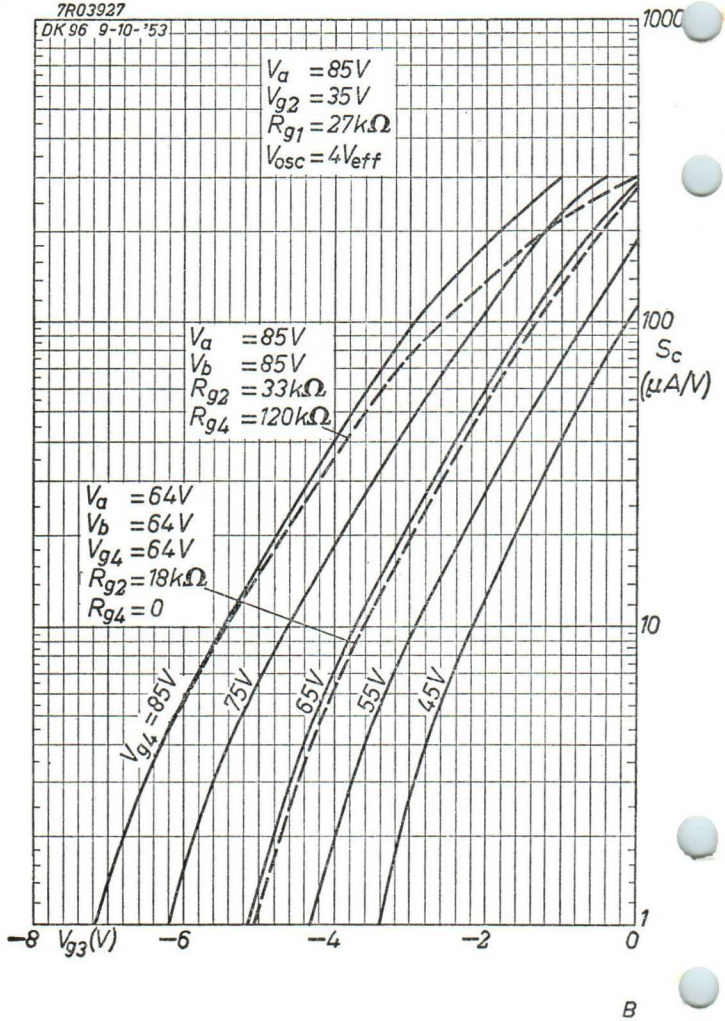


10.10.1953

A

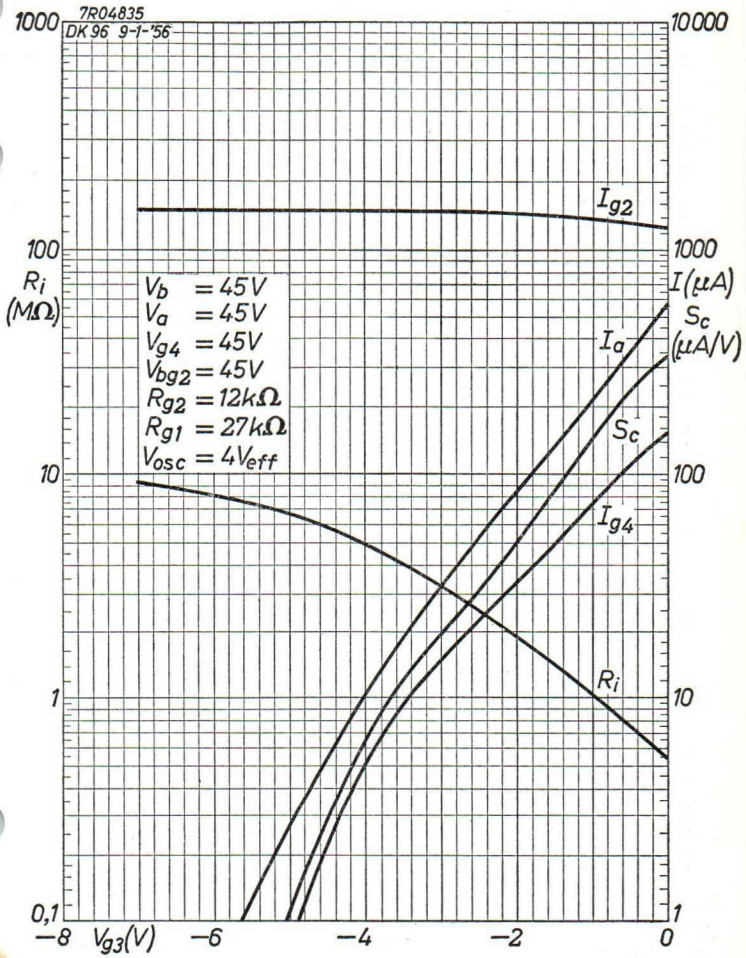
DK96

PHILIPS



PHILIPS

DK96

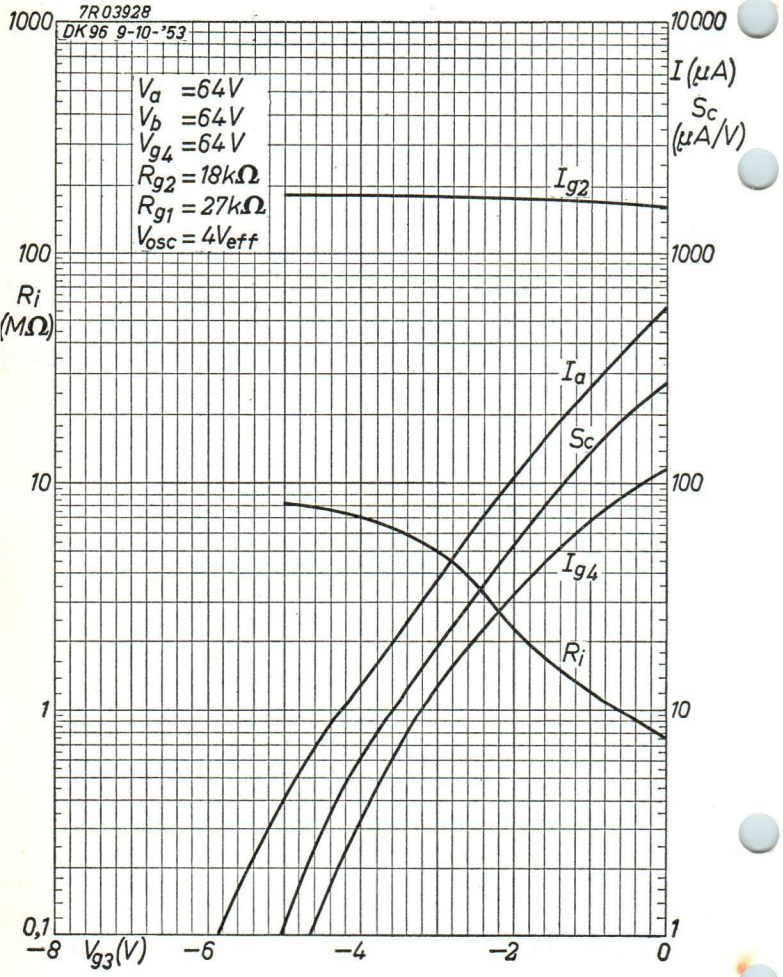


1.1.1956

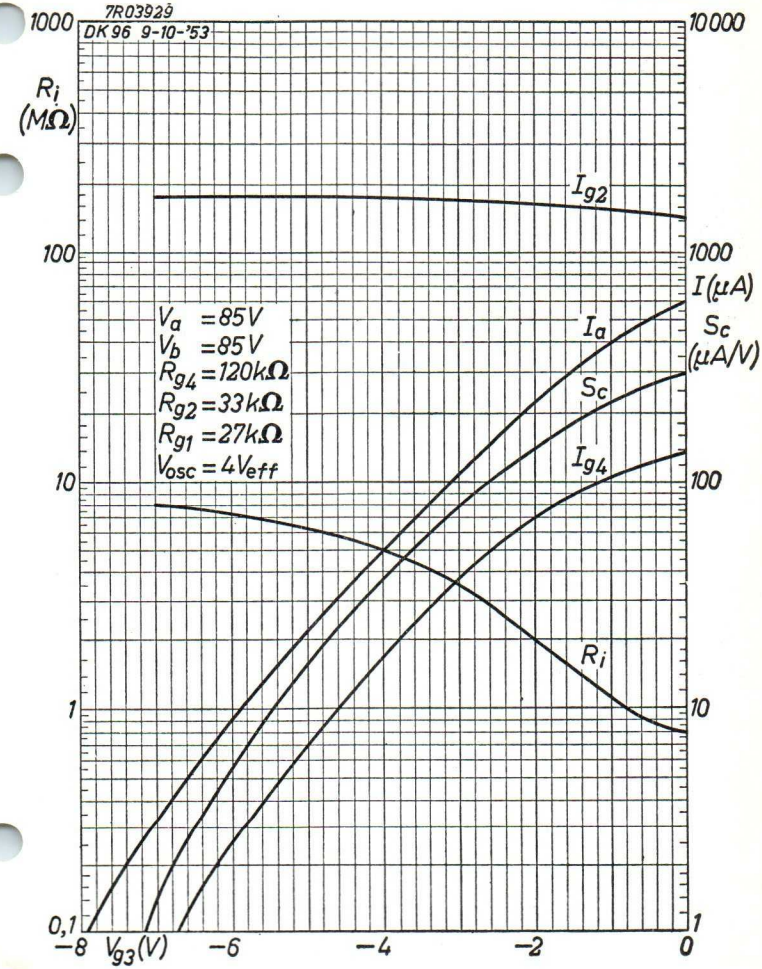
C

DK 96

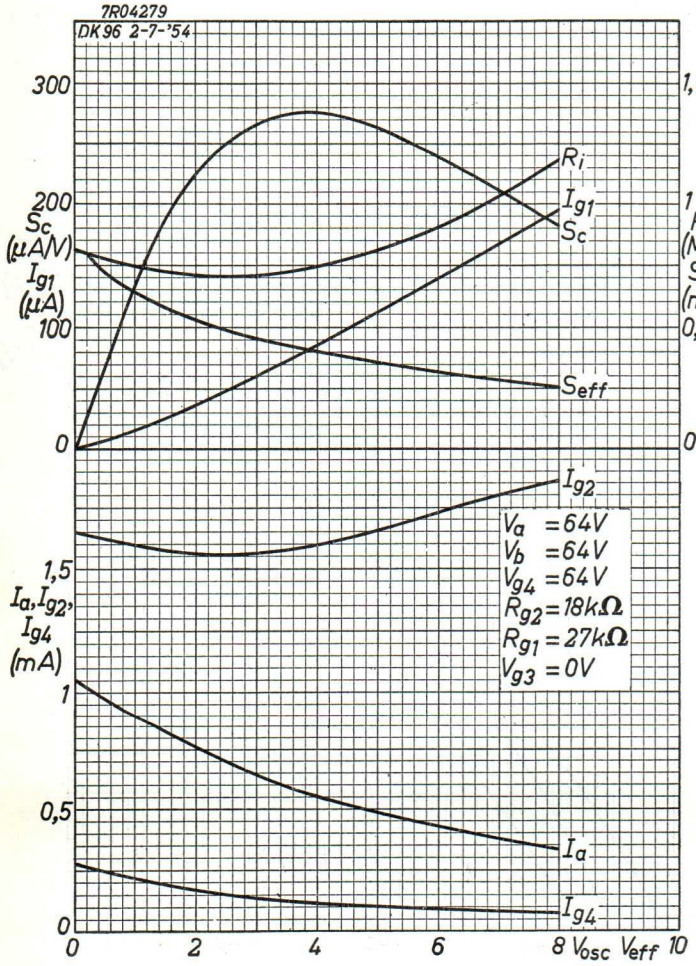
PHILIPS



D


7R03929
DK 96 9-10-'53
1000
100
10
1
0,1
R_i (MΩ)
10000
1000
100
10
1
I(μA)
Sc (μA/V)
V_a = 85V
V_b = 85V
R_{g4} = 120kΩ
R_{g2} = 33kΩ
R_{g1} = 27kΩ
V_{osc} = 4V_{eff}
I_{g2}
I_a
Sc
I_{g4}
R_i
−8
V_{g3}(V)
−6
−4
−2
0

DK 96 **PHILIPS**



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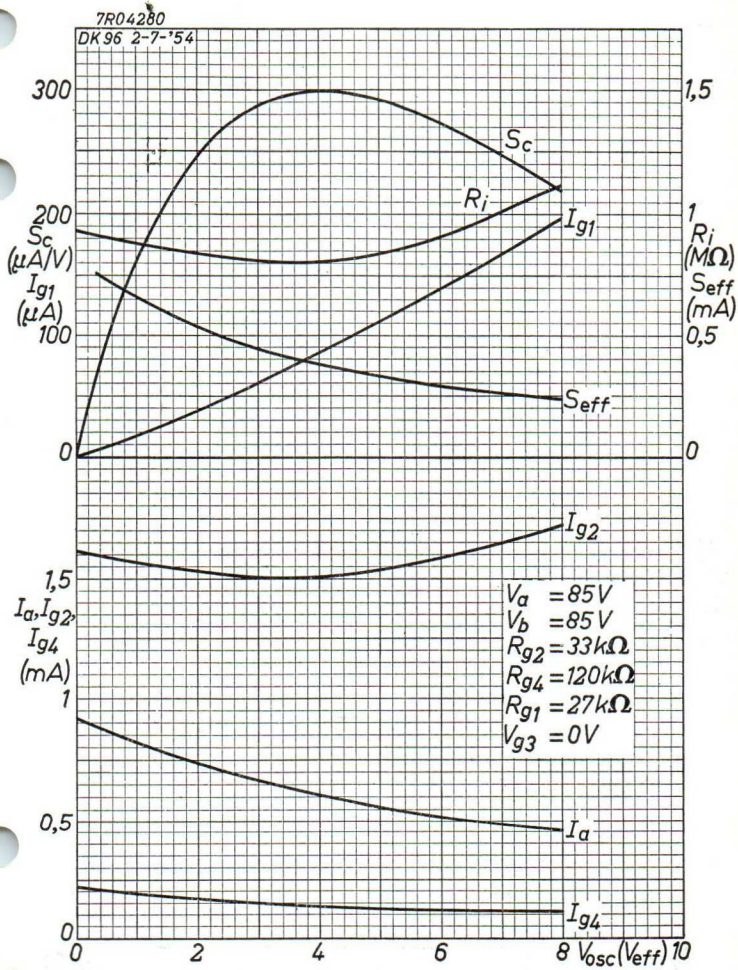
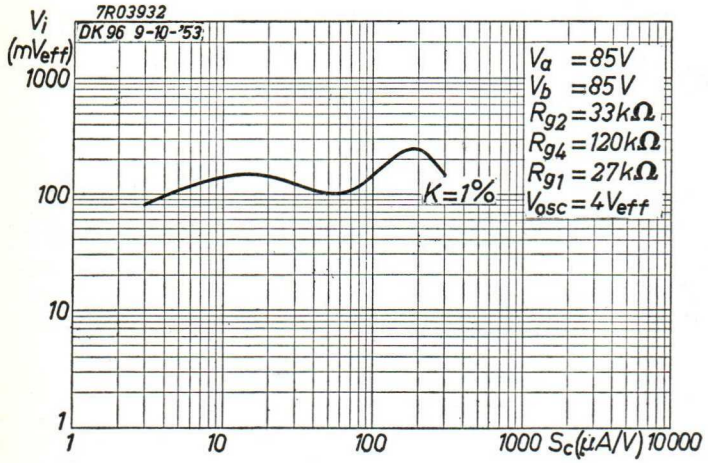
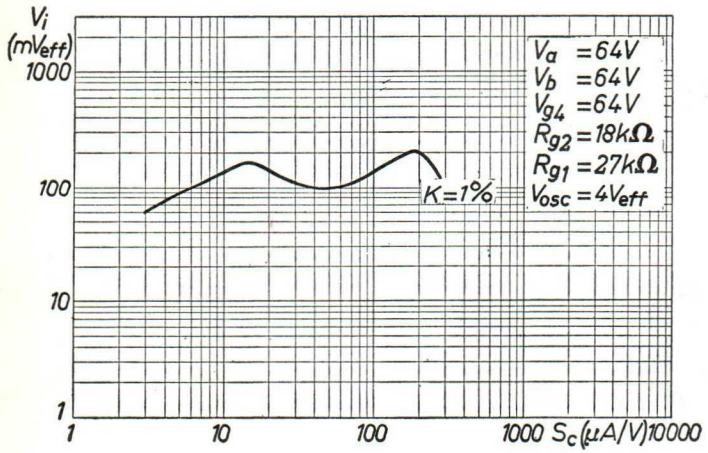

7R04280
DK 96 2-7-'54
300
200
100
0
Sc (μA/V)
Ig1 (μA)
1,5
1
0,5
0
Ri (MΩ)
Seff (mA)
Sc
Ri
Ig1
Seff
Ig2
Va =85V
Vb =85V
Rg2 =33kΩ
Rg4 =120kΩ
Rg1 =27kΩ
Vg3 =0V
1,5
1
0,5
0
Ia, Ig2, Ig4 (mA)
Ia
Ig4
0
2
4
6
8
10
Vosc (Veff)


7R03932
DK 96 9-10-'53
V_i (mV_{eff})
1000
100
10
1
1
10
100
1000 S_c ($\mu A/V$) 10000
V_a = 85V
V_b = 85V
R_{g2} = 33kΩ
R_{g4} = 120kΩ
R_{g1} = 27kΩ
V_{osc} = 4V_{eff}
K=1%


V_i (mV_{eff})
1000
100
10
1
1
10
100
1000 S_c ($\mu A/V$) 10000
V_a = 64V
V_b = 64V
V_{g4} = 64V
R_{g2} = 18kΩ
R_{g1} = 27kΩ
V_{osc} = 4V_{eff}
K=1%

PHILIPS DL 41

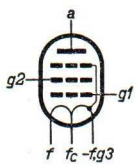
OUTPUT PENTODE for battery receivers
PENTHODE DE SORTIE pour appareils-batterie
ENDPENTODE für Batteriegeräte

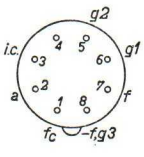
Heating : direct by D.C.
series or parallel supply
Chauffage: direct par C.C.
alimentation en série ou en parallèle
Heizung : direkt durch Gleichstrom
Serien- oder Parallelspeisung

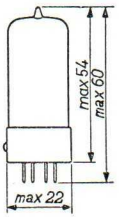
Parallel supply	V_f =	1,4	1,4	2,8	V
Alimentation en parallèle	I_f =	50	100	50	mA
Parallelspeisung	Pins / Broches / Stifte	1-8	1-(7+8)	7-8	

Series supply	V_f =	1,3	2,6	V
Alimentation en série	Pins / Broches / Stifte	1-8	7-8	
Serienspeisung				

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Rimlock

Capacitances
Capacités
Kapazitäten

C_a = 5,3 pF
C_{g1} = 4,7 pF
C_{ag1} < 0,5 pF

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

A. V_f = 1,4 V; I_f = 50 mA; pins, broches, Stifte 1-8

V_a	= 90	120	V
V_{g2}	= 90	120	V
V_{g1}	= -3,6	-5,8	V
I_a	= 4	5	mA
I_{g2}	= 0,65	0,82	mA
S	= 1,25	1,35	mA/V
μ_{g2g1}	= 10	10	
R_i	= 175	165	kΩ
R_a	= 22,5	24	kΩ
W_o (d_{tot}=10%)	= 160	270	mW
V_i (d_{tot}=10%)	= 3	3,5	V_{eff}
W_o (I_{g1}=+0,3μA)	= 180	300	mW
d_{tot} (I_{g1}=+0,3μA)	= 11,8	11,5	%
V_i (W_o = 50 mW)	= 1,4	1,3	V_{eff}

B. V_f = 1,4 V; I_f=100 mA; pins, broches, Stifte 1-(7+8)

V_a	= 90	120	V
V_{g2}	= 90	120	V
V_{g1}	= -3,6	-5,6	V
I_a	= 8	10	mA
I_{g2}	= 1,3	1,65	mA
S	= 2,45	2,55	mA/V
μ_{g2g1}	= 10	10	
R_i	= 90	80	kΩ
R_a	= 11,3	12	kΩ
W_o (d_{tot}=10%)	= 330	550	mW
V_i (d_{tot}=10%)	= 3,1	3,8	V_{eff}
W_o (I_{g1}=+0,3μA)	= 360	600	mW
d_{tot} (I_{g1}=+0,3μA)	= 12	11,7	%
V_i (W_o = 50 mW)	= 1,05	0,9	V_{eff}

C. V_f = 2,8 V; I_f = 50mA; pins, broches, stifte 7-8

V_a	=	90	120 V
V_{g2}	=	90	120 V
V_{g1}	=	-3,6	-5,45 V
I_a	=	6	9 mA
I_{g2}	=	0,95	1,45 mA
S	=	2,2	2,45 mA/V
$\mu g2g1$	=	10	10
R_i	=	100	95 kΩ
R_a	=	15	13,5 kΩ
$W_o(d_{tot}= 10\%)$	=	235	490 mW
$V_i(d_{tot}= 10\%)$	=	2,6	3,5 V_{eff}
$W_o(I_{g1}=+0,3\mu A)$	=	270	540 mW
$d_{tot}(I_{g1}=+0,3\mu A)$	=	13	12,5 %
$V_i(W_o$ = 50 mW)	=	1,0	0,9 V_{eff}

Operating characteristics class B
Caracteristiques d'utilisation classe B
Betriebsdaten Klasse B

A. V_b = 90 V

	V_f = 1,4V; I_f = 100 mA		V_f = 1,4V; I_f = 50 mA		
	Pins, Broches, Stifte	1-(7+8)	Pins, Broches, Stifte	7-8	
V_a =	84		84		V
V_{g2} =	84		84		V
V_{g1} =	-6,4		-5,8		V
R_{aa} =	18		18		kΩ
V_i =	0	5,0	0	4,8	V_{eff}
I_a =	2x1,5	2x5,3	2x1,5	2x4,9	mA
I_{g2} =	2x0,25	2x1,5	2x0,25	2x1,25	mA
W_o =	0	475	0	420	mW
d_{tot} =	-	5	-	3,6	%

B. V_b = 165 V

a. V_f = 1,4V; I_f=100mA; pins, broches, Stifte 1-(7+8)

V_a	=		150[1])	V
V_{g2}	=		150[1])	V
V_{g1}	=		-13,2	V
$R_{aa\sim}$	=		15	kΩ
V_i	=	0	2,0	10,6 Veff
I_a	=	2x1,5	-	2x11,5 mA
I_{g2}	=	2x0,25	-	2x4,0 mA
W_o	=	0	50	2100 mW
d_{tot}	=	-	-	5 %

b. V_f = 2,8V; I_f= 50mA; pins, broches, Stifte 7 - 8

V_a	=		150[1])	V
V_{g2}	=		150[1])	V
V_{g1}	=		-12,6	V
$R_{aa\sim}$	=		15	kΩ
V_i	=	0	2,0	10 Veff
I_a	=	2x1,5	-	2x11 mA
I_{g2}	=	2x0,25	-	2x3,3 mA
W_o	=	0	50	1850 mW
d_{tot}	=	-	-	3,5 %

Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max.	150 V[1])
W_a	= max.	1,2 W
V_{g2}	= max.	150 V
W_{g2}(V_i = 0)	= max.	0,3 W
W_{g2}(W_o = max.)	= max.	0,6 W
V_{g1}(I_{g1} =+0,3 µA)	= max.	0 V
I_k (pins, broches, Stifte 1-8)	= max.	7 mA
I_k(pins,broches,Stifte 1-(7+8)	= max.	12 mA
I_k (pins, broches, Stifte 7-8)	= max.	14 mA
R_{g1}	= max.	2 MΩ

[1])Max. 180 V when V_i= 0; max.180 V si V_i= 0;
Max. 180 V wenn V_i= 0

PHILIPS

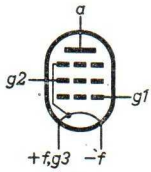
DL 64

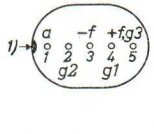
OUTPUT PENTODE for use in hearing aids
PENTHODE DE SORTIE pour appareils pour sourds
ENDPENTODE für Schwerhörigengeräte

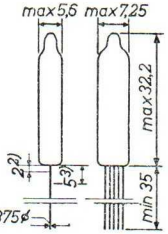
Heating : direct by D.C.; parallel supply
Chauffage: direct par C.C.; alimentation- parallèle
Heizung : direkt durch Gleichstrom; Parallelspeisung

V_f = 1,25 V
I_f = 10 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Subminiature

Capacitances
Capacités
Kapazitäten

C_{g1} = 2,5 pF
C_a = 2,4 pF
C_{ag1} < 0,25 pF

---

1) Red spot
Point rouge
Roter Punkt

2) This part of the leads should not be bent
Cette partie des fils ne sera pas pliée
Dieser Teil der Drähte soll nicht gebogen werden

3) This part of the leads should not be soldered
Cette partie des fils ne sera pas soudée
Dieser Teil der Drähte soll nicht gelötet werden

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11.11.1954

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	15 V
V_{g2}	=	15 V
I_a	=	160 µA
I_{g2}	=	40 µA
V_{g1}	=	-1,5 V
S	=	180 µA/V
R_i	=	0,4 MΩ
μ_{g2g1}	=	4,5

Operating characteristiques as class A output amplifier
Caractéristiques d'utilisation en amplificatrice finale classe A
Betriebsdaten als Klasse A Endverstärker

V_b	=	15 V
V_{g2}	=	15 V
V_{g1}	=	-1,55 V
$R_{a\sim}$	=	100 kΩ
I_a	=	150 µA
I_{g2}	=	34 µA
V_i	=	0,85 V_{eff}
W_o	=	950 µW
d_{tot}	=	10 %

Limiting values.
Caractéristiques limites
Grenzdaten

V_a	= max.	45 V
V_{g2}	= max.	45 V
I_k	= max.	600 µA

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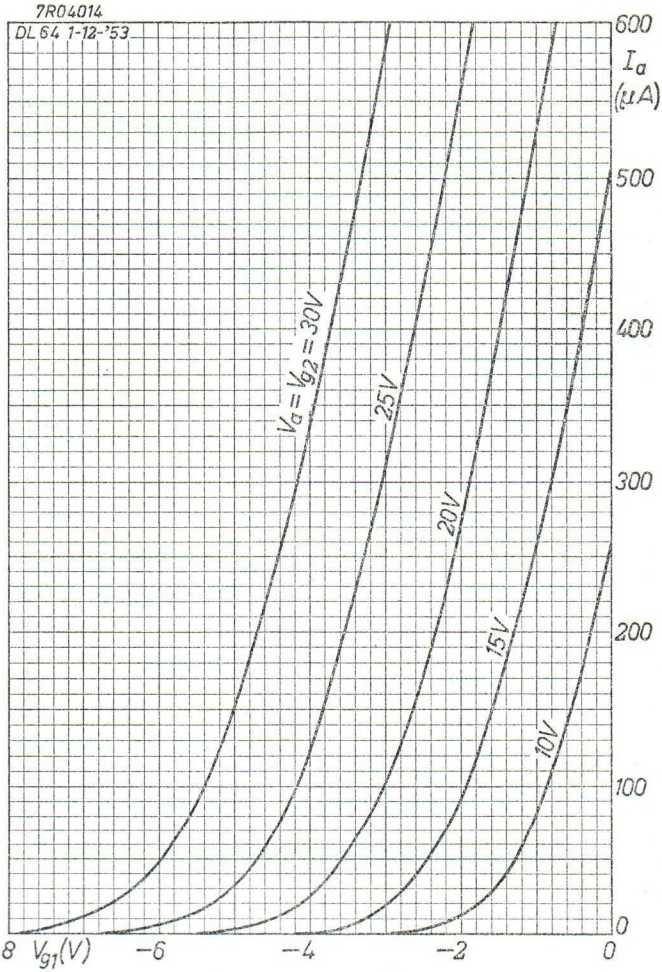
DL 64



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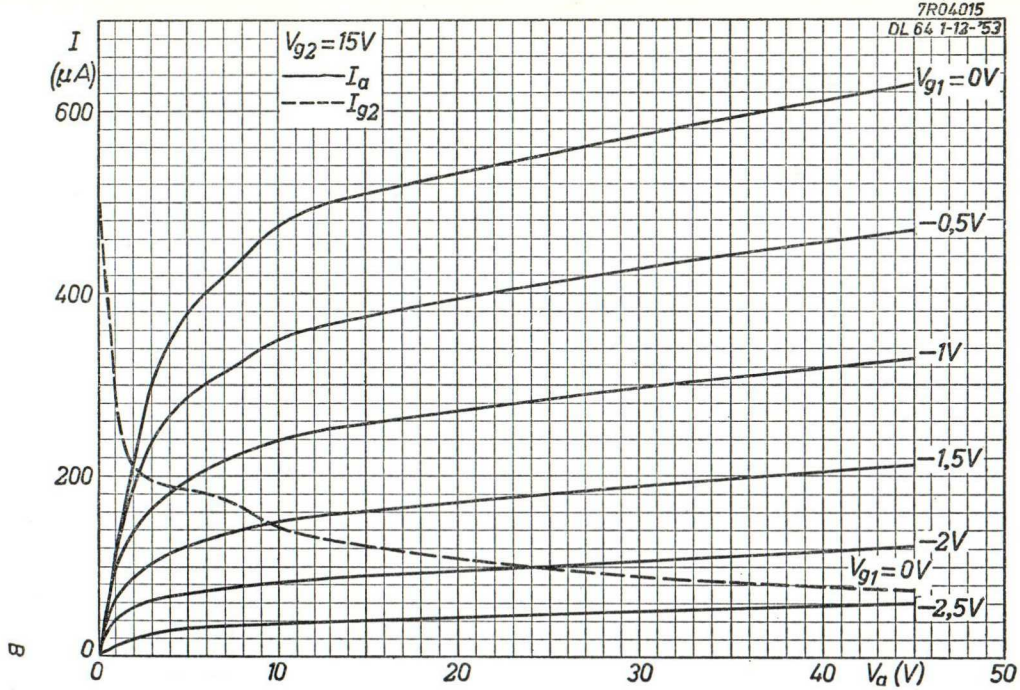
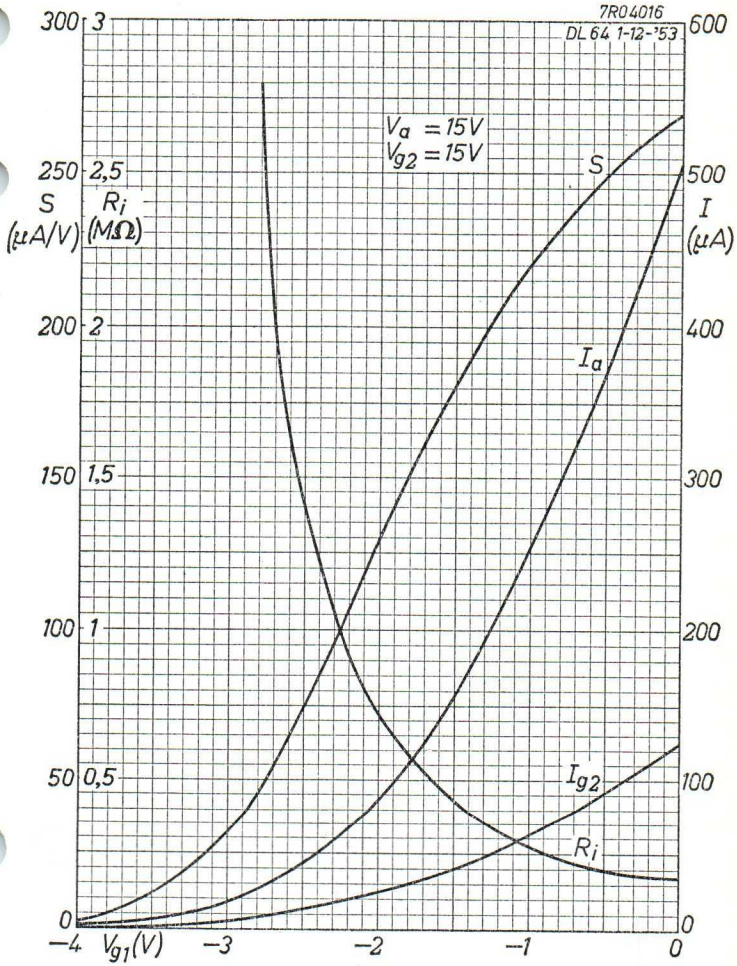
A



DL 64

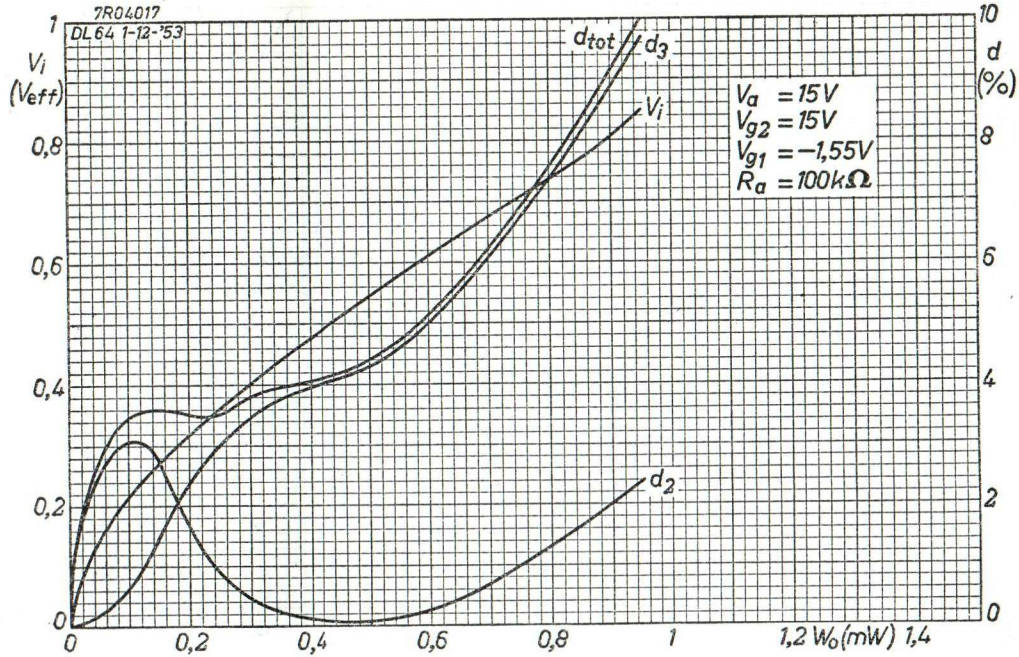
PHILIPS

PHILIPS **DL 64**



12.12.1953

C



DL64

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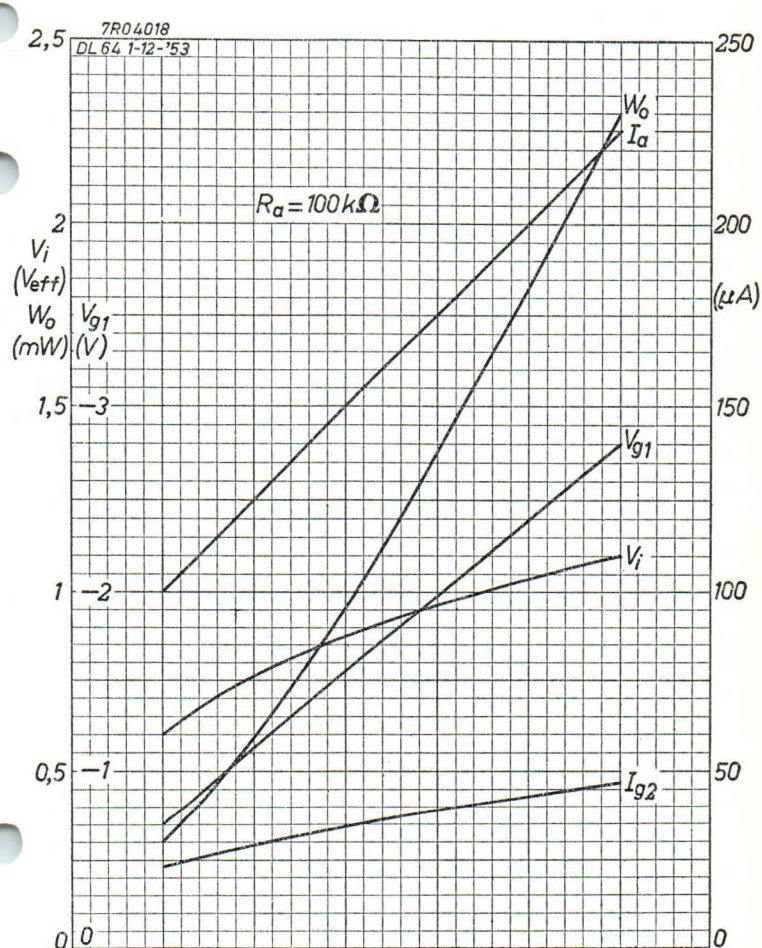
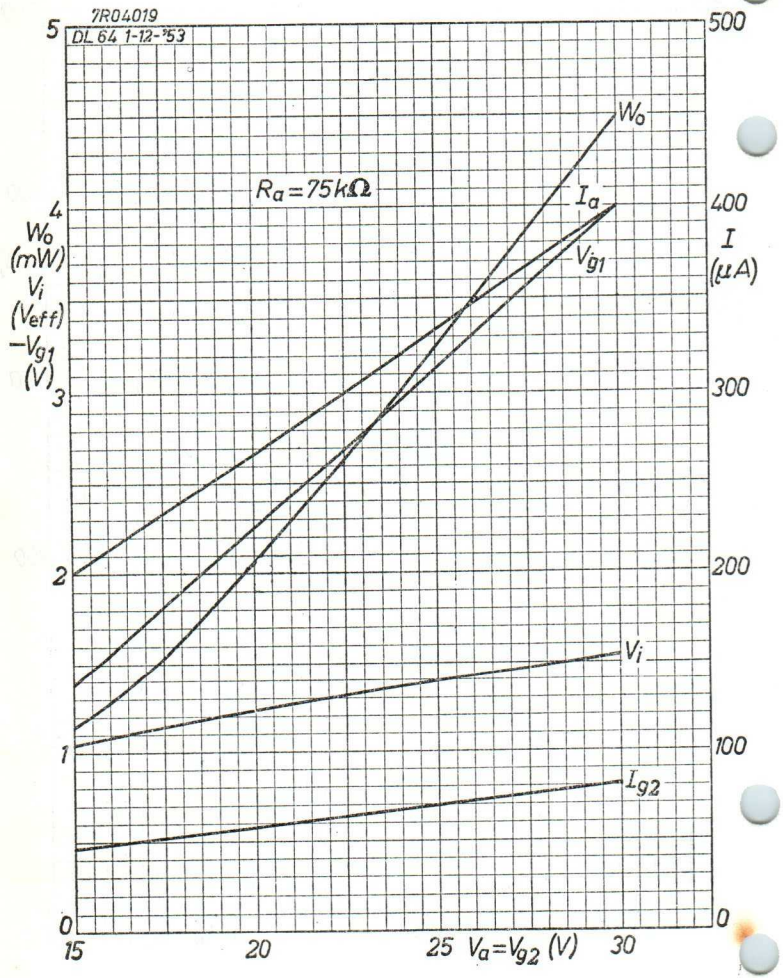

7R04018
DL 64 1-12-'53
$R_a = 100\,k\Omega$
W_o
I_a
V_{g1}
V_i
I_{g2}
V_i (V_{eff})
W_o (mW)
V_{g1} (V)
(μA)
$V_a = V_{g2}$ (V)
2,5
2
1,5
1
0,5
0
−3
−2
−1
250
200
150
100
50
10
15
20
25

12.12.1953

E

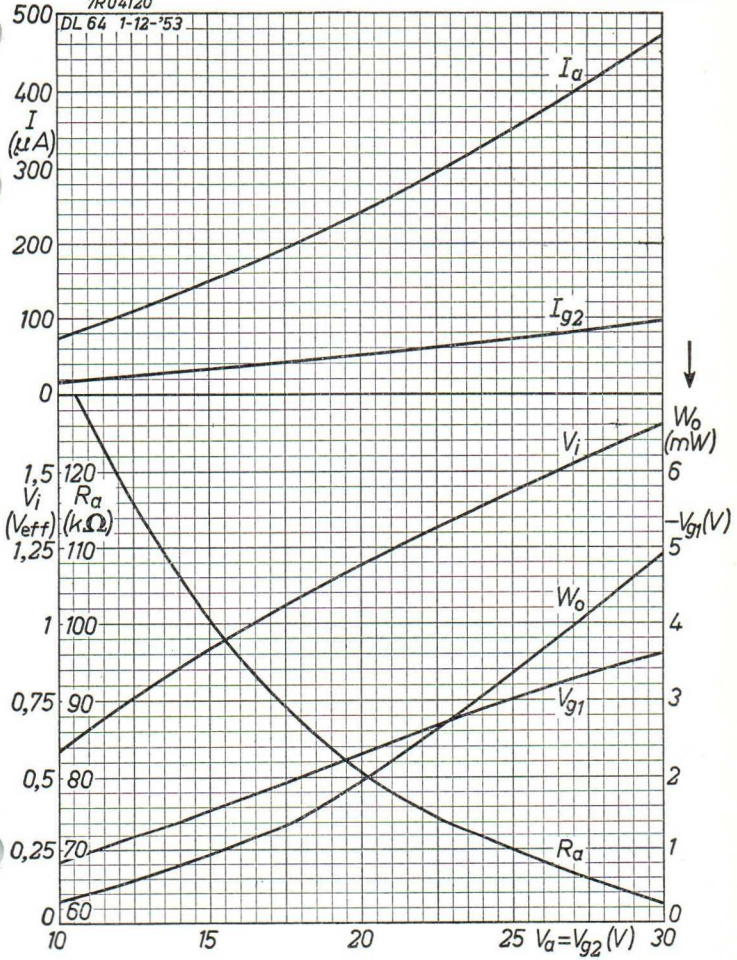
DL 64 PHILIPS



F

PHILIPS

DL 64



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G

PHILIPS

DL 65
DL 66

DL 65 See DL 67 / Voir DL 67 / Siehe DL 67

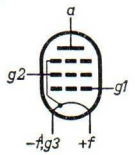
SUBMINIATURE OUTPUT PENTODE for hearing aids.
PENTHODE DE SORTIE SUBMINIATURE pour appareils de sourds
SUBMINIATUR-ENDPENTODE für Schwerhörigengeräten

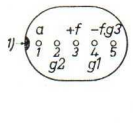
Heating : direct by D.C.
parallel supply
Chauffage: direct par C.C.
alimentation en parallèle
Heizung : direkt durch Gleichstrom
Parallelspeisung

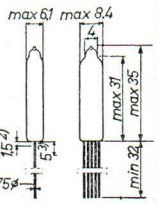
V_f = 1,25 V
I_f = 15 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm

DL 66







Base, culot, Sockel: Subminiature

Capacitances
Capacités
Kapazitäten

C_{g1} = 2,5 pF
C_a = 3,7 pF
C_{ag1} < 0,2 pF

---

1) Red spot
Point rouge
Roter Punkt

2) This part of the leads should not be bent
Cette partie des fils ne sera pas pliée
Dieser Teil der Drähte soll nicht gebogen werden

3) This part of the leads should not be soldered
Cette partie des fils ne sera pas soudée
Dieser Teil der Drähte soll nicht gelötet werden

Typical characteristics
Caracteristiques types
Kenndaten

V_a	=	22,5 V
V_{g2}	=	22,5 V
I_a	=	300 µA
I_{g2}	=	75 µA
V_{g1}	=	-1,4 V
S	=	350 µA/V
R_i	=	0,3 MΩ
μ_{g2g1}	=	8

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

V_b	=	15	22,5	30	45 V
V_{g2}	=	15	22,5	30	45 V
V_{g1}	=	-0,85	-1,4	-1,95	-3,0 V
I_a	=	150	300	470	900 µA
I_{g2}	=	30	75	110	200 µA
R_a	=	100	75	62,5	50 kΩ
W_o	=	0,8	2,7	5,5	16,5 mW
V_i	=	0,48	0,85	1,2	1,65 V_{eff}
d_{tot}	=	10	10	10	10 %

Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max.	45 V
V_{g2}	= max.	45 V
I_k	= max.	1 mA

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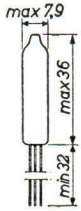
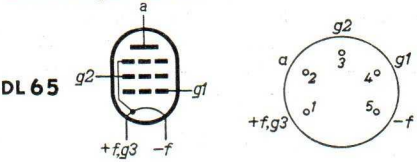
DL 65
DL 67

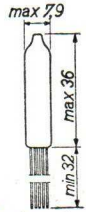
OUTPUT PENTODE for hearing aids
PENTHODE DE SORTIE pour appareils de sourds
ENDPENTODE' für Schwerhörigengeräte

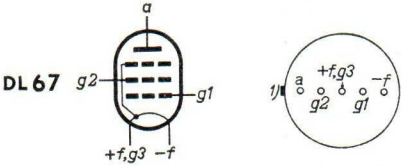
Heating : direct by D.C.
parallel supply
Chauffage: direct par C.C. V_f = 1,25 V
alimentation en parallèle I_f = 13 mA
Heizung : direkt durch Gleichstrom
Parallelspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm









Base, culot, Sockel: Subminiature

Capacitances
Capacités
Kapazitäten

C_{g1} = 2,5 pF
C_a = 2,2 pF
C_{ag1} < 0,2 pF

Typical characteristics
Caracteristiques types
Kenndaten

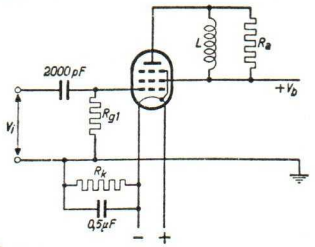
V_a	=	22,5 V
V_{g2}	=	22,5 V
V_{g1}	=	-0,2 V
I_a	=	0,475 mA
I_{g2}	=	0,10 mA
S	=	0,42 mA/V
R_i	=	0,4 MΩ
μ_{g2g1}	=	9

[1]) Red spot.Point rouge. Roter Punkt.

PHILIPS

Operating characteristics
Caracteristiques d'utilisation
Betriebsdaten

V_b	=	22,5		22,5		V
R_a	=	0,1		0,1		MΩ
R_{g1}	=	10[1])		3		MΩ
R_k	=	0		4		kΩ
V_i	=	0	0,45	0	0,67	Veff
I_a	=	0,5	0,34	0,20	0,19	mA
I_{g2}	=	0,095	0,09	0,04	0,07	mA
W_o	=	0	1,8	0	1,6	mW
d_{tot}	=	-	10	-	10	%



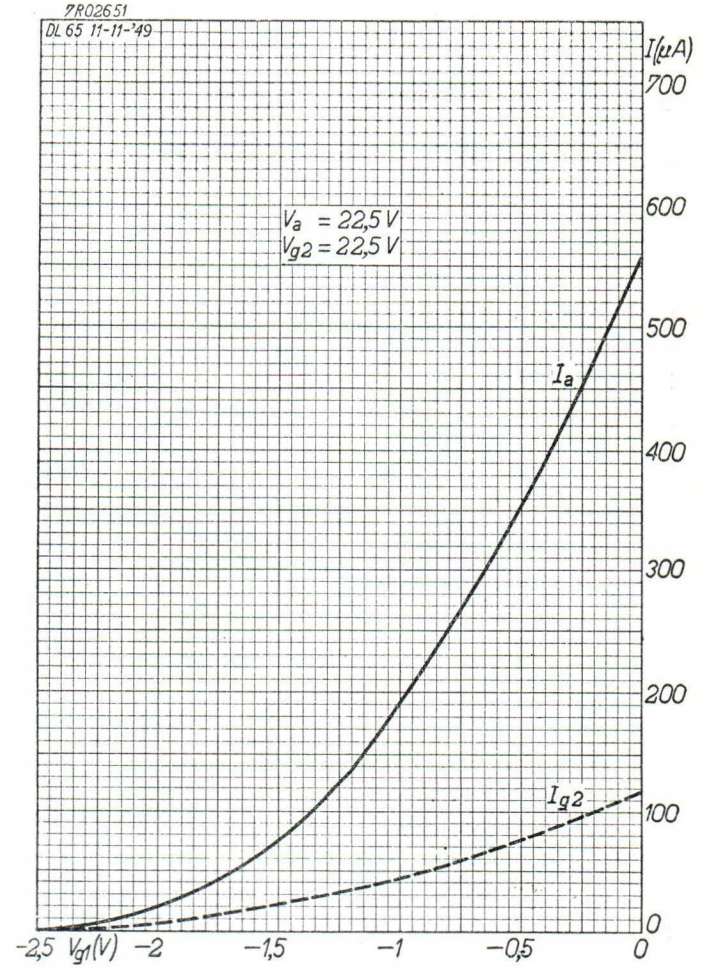
Limiting values
Caracteristiques limites
Grenzdaten

V_a		= max.	45	V
W_a		= max.	25	mW
V_{g2}		= max.	45	V
W_{g2}		= max.	6	mW
I_k		= max.	0,6	mA
V_{g1}	(I_{g1} = +0,3 µA)	= max.	-0,2	V
R_{g1}		= max.	10	MΩ
V_f		= max.	1,55	V
V_f		= min.	0,9	V

[1]) The input resistance of the tube is about 3.5 MΩ in this case
La résistance d'entrée du tube est de 3,5 MΩ environ en ce cas
Die Eingangswiderstand der Röhre beträgt etwa 3,5 MΩ in diesem Fall

PHILIPS

DL 65
DL 67



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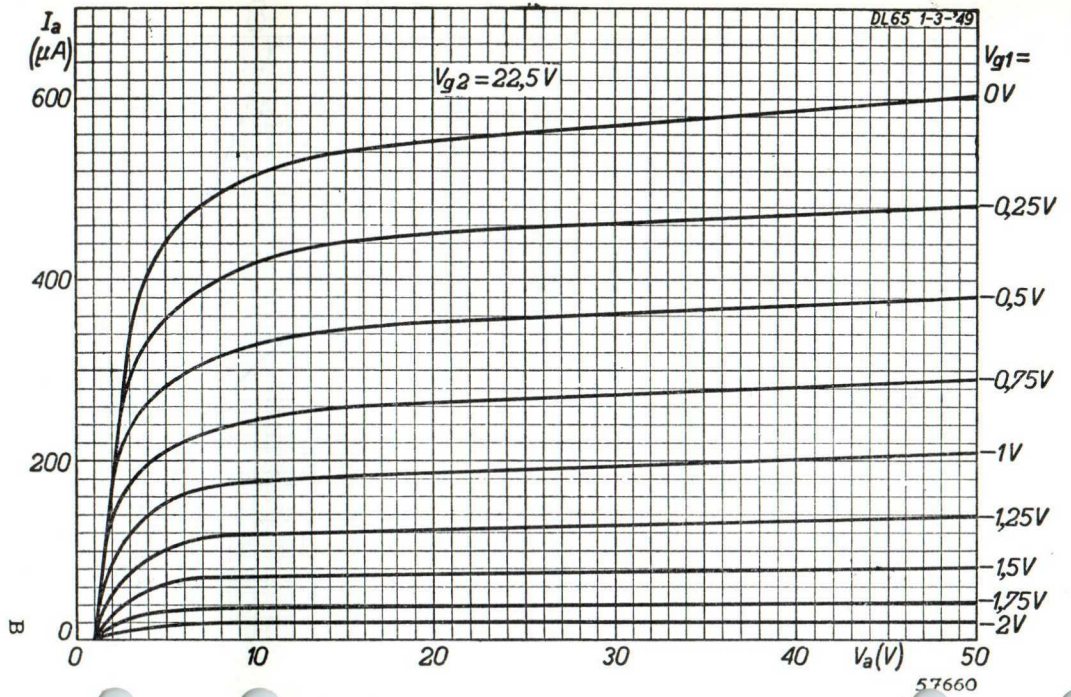

DL 65
DL 67

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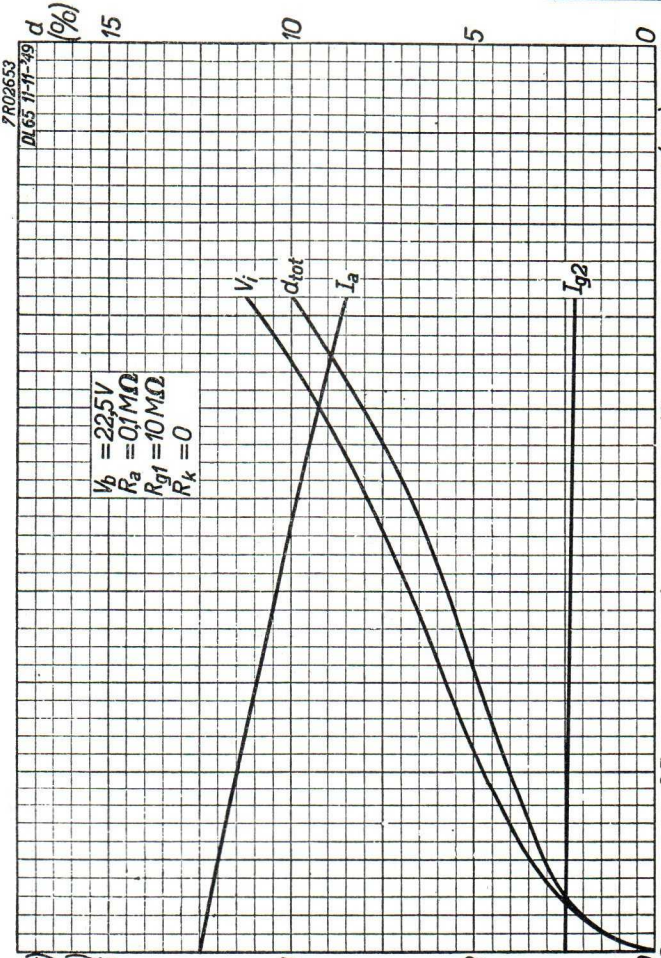
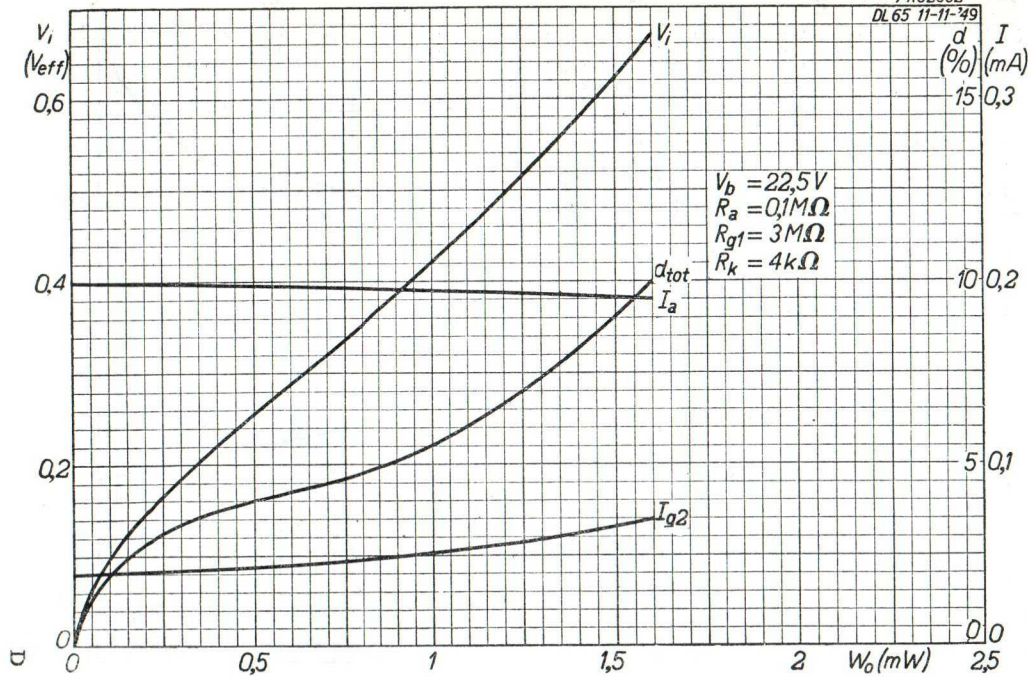
PHILIPS

DL 65
DL 67





DL 65
DL 67

PHILIPS

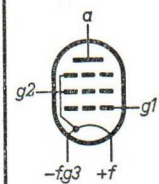
PHILIPS DL 68

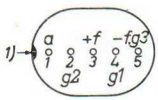
OUTPUT PENTODE for use in hearing aids
PENTHODE DE SORTIE pour appareils de sourds
ENDPENTHODE für Schwerhörigengeräte

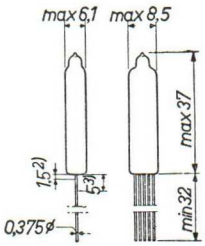
Heating: direkt by D.C.; parallel supply
Chauffage: direct par C.C.; alimentation en parallèle
Heizung: direkt durch Gleichstrom; Parallelspeisung

V_f = 1,25 V
I_f = 25 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Capacitances
Capacités
Kapazitäten

C_{ag1} <0,15 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	22,5 V
V_{g2}	=	22,5 V
V_{g1}	=	-2,2 V
I_a	=	600 µA
I_{g2}	=	150 µA
S	=	430 µA/V
Ri	=	0,1 MΩ
µg2g1	=	5

1) Red spot; point rouge; roter Punkt.
2) This part of the leads should not be bent
Cette partie des fils ne sera pas pliée
Dieser Teil der Drähte soll nicht gebogen werden.
3) This part of the leads should not be soldered.
Cette partie des fils ne sera pas soudée.
Dieser Teil der Drähte soll nicht gelötet werden.

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

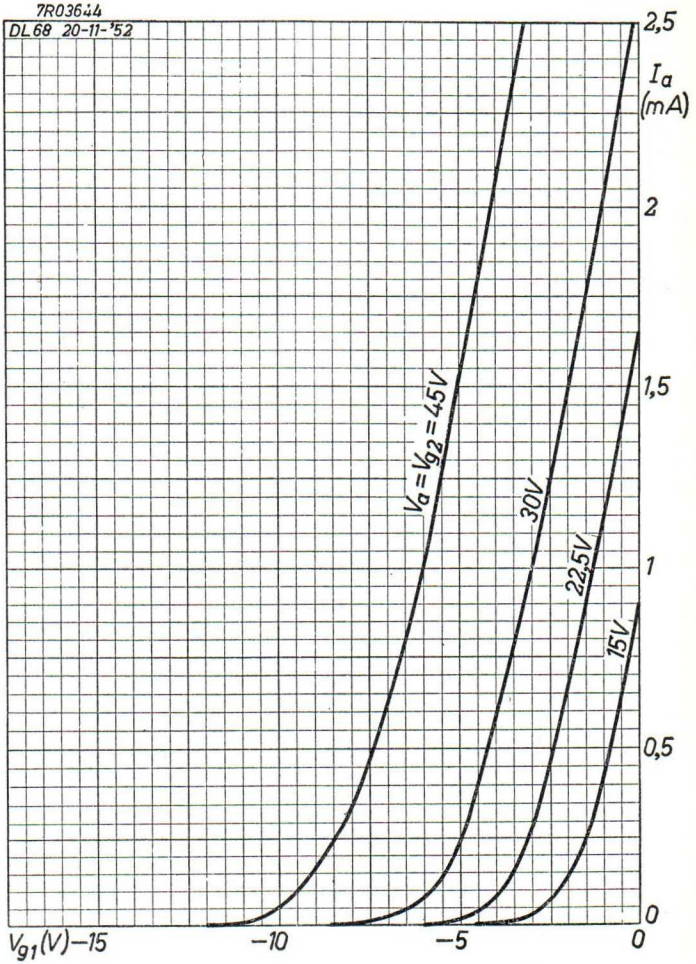
V_b	=	22,5 V
V_{g2}	=	22,5 V
V_{g1}	=	-2,2 V
I_a	=	600 µA
I_{g2}	=	150 µA
R_a	=	37,5 kΩ
W_o	=	5 mW
V_i	=	1,3 V
d_{tot}	=	10 %

Limiting values
Caratéristiques limites
Grenzdaten

V_{a_o}	= max.	45 V
V_a	= max.	45 V
W_a	= max.	100 mW
V_{g2_o}	= max.	45 V
V_{g2}	= max.	45 V
W_{g2}	= max.	25 mW
I_k	= max.	2,3 mA
R_{g1}	= max.	10 MΩ

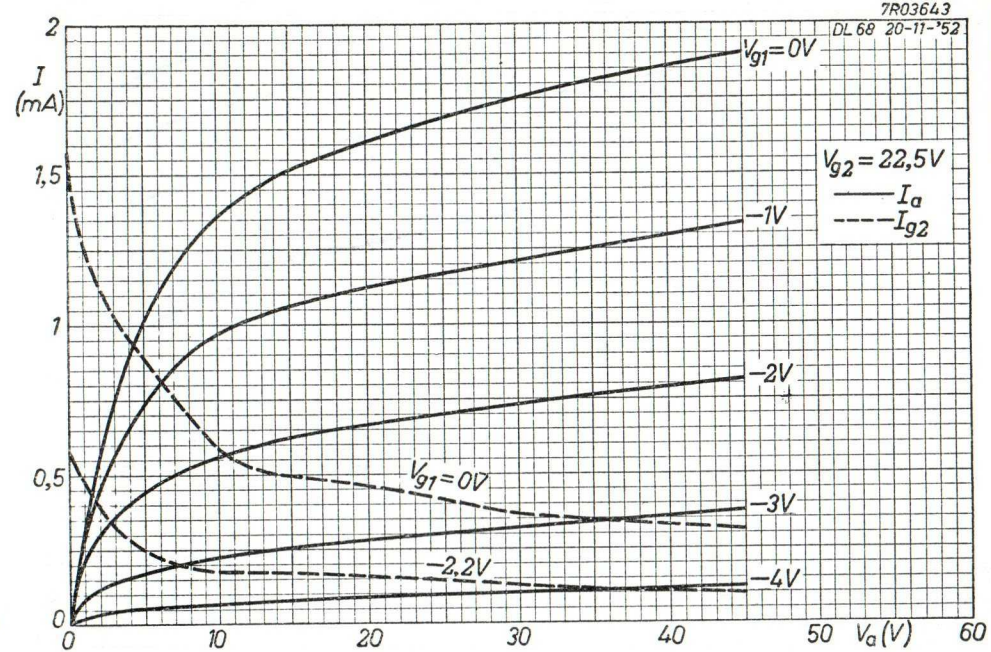
PHILIPS

DL 68



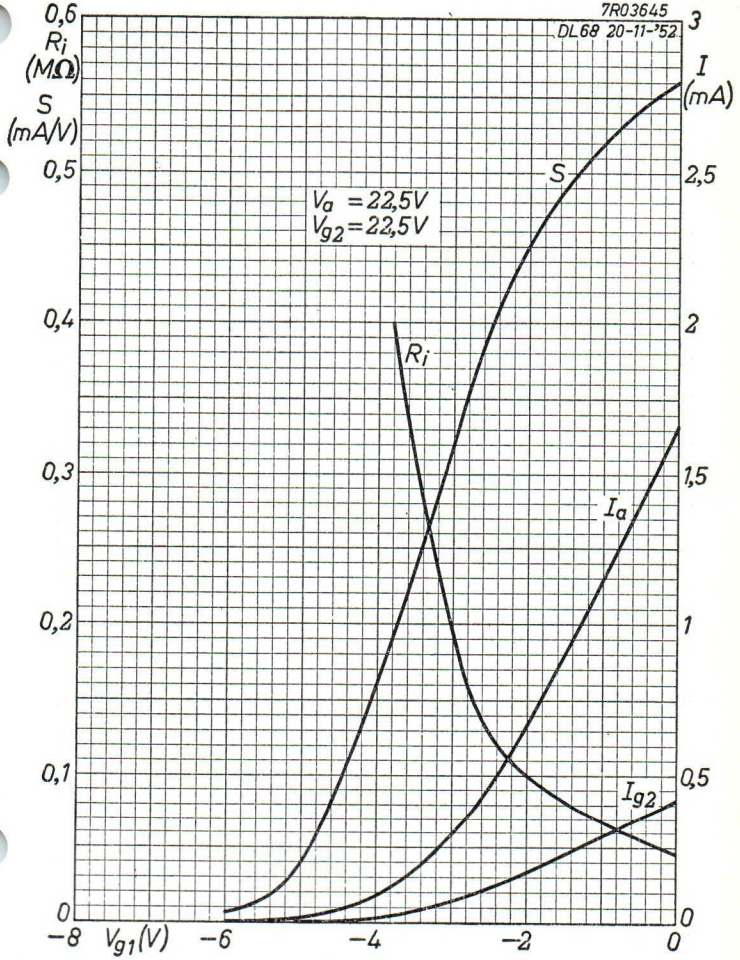
11.11.1952

A


7R03643
DL 68 20-11-'52
I (mA)
2
1,5
1
0,5
0
0
10
20
30
40
50
60
V_a (V)
V_{g1} = 0V
−1V
−2V
−3V
−4V
−2,2V
V_{g2} = 22,5V
I_a
I_{g2}

PHILIPS

DL 68



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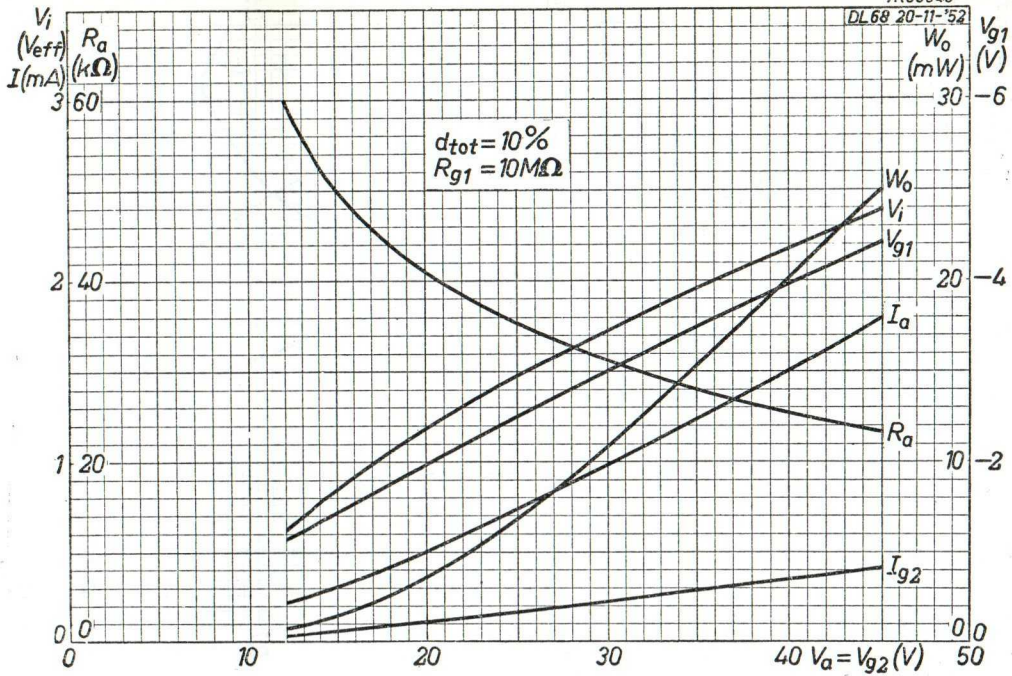
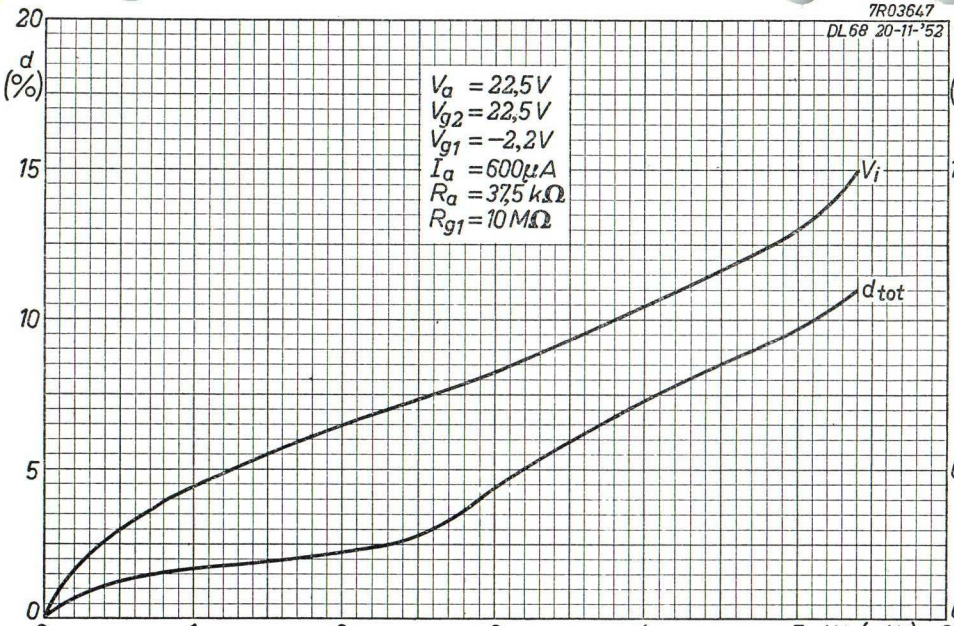
C



DL 68

PHILIPS



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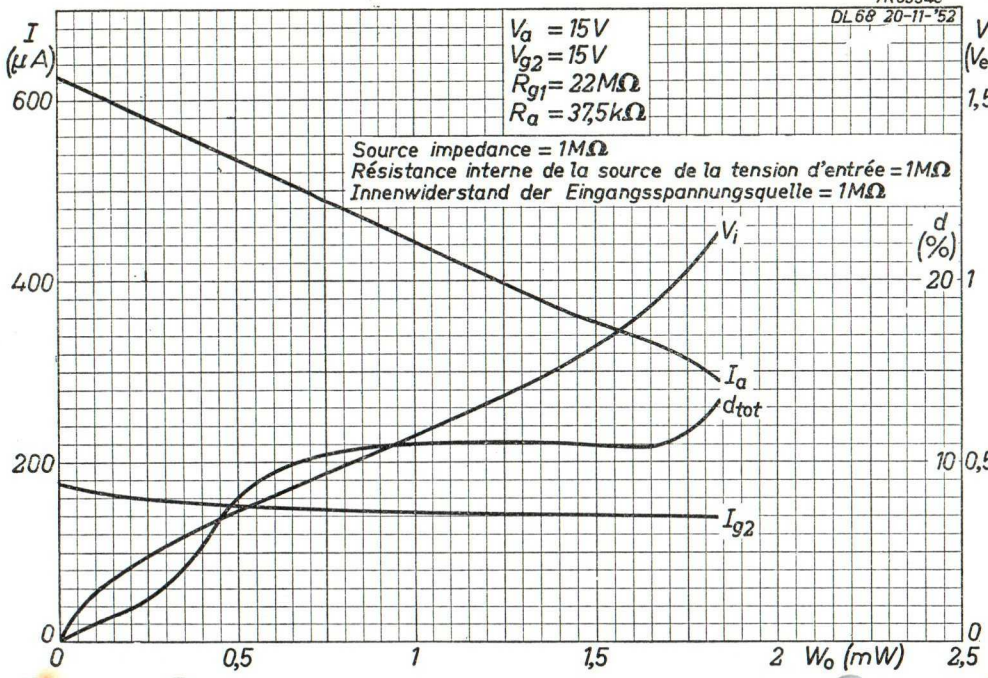
E

PHILIPS

DL 68



DL 68

PHILIPS

PHILIPS

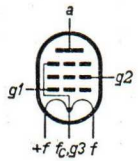
DL 92

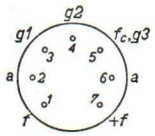
OUTPUT PENTODE for battery receivers
PENTHODE DE SORTIE pour des appareils batterie
ENDPENTODE für Batteriegeräte

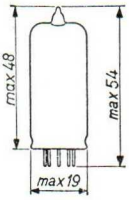
Heating: direct by D.C.; series or parallel supply
Chauffage: direct par C.C.; alimentation en série ou en parallèle
Heizung: direkt durch Gleichstrom; Serien- oder Parallelspeisung

Parallel supply:	Vf =	1,4 V	2,8 V
Alimentation en parallèle:	If =	100 mA	50 mA
Parallelspeisung:	Pins Broches Stifte	5-(1+7)	1-7
Series supply:	Vf =	1,3 V	2,6 V
Alimentation en série:	Pins Broches	5-(1+7)	1-7
Serienspeisung:	Stifte		

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances
Capacités
Kapazitäten

C_{g1} = 4,35 pF
C_a = 6,0 pF
C_{ag1} < 0,4 pF

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

A. V_f = 1,4 V; I_f = 100 mA; pins,broches,Stifte 5-(1+7)

V_a	=	45	41	67,5	V
V_{g2}	=	45	41	67,5	V
V_{g1}	=	-4,5	-3,5	-7	V
I_a	=	3,8	4,0	7,2	mA
I_{g2}	=	0,8	0,8	1,5	mA
S	=	1,25	1,3	1,55	mA/V
μ_{g2g1}	=	5	4,5	5	
R_i	=	100	90	100	kΩ
R_a	=	8	7	5	kΩ
W_o	=	65	45	180	mW
V_i	=	3,5	2,9	5,5	Veff
d_{tot}	=	12	13	10	%
$V_i(W_o$=50 mW)	=	2,8	-	2,5	Veff

V_a	=	61	90	84	V
V_{g2}	=	61	67,5	[1])	V
V_{g1}	=	-6	-7	-6,5	V
I_a	=	6,6	7,4	8,0	mA
I_{g2}	=	1,4	1,4	1,7	mA
S	=	1,5	1,57	1,55	mA/V
μ_{g2g1}	=	4,5	5	4,5	
R_i	=	100	100	100	kΩ
R_a	=	7	8	7	kΩ
W_o	=	125	270	190	mW
V_i	=	4,5	5,1	5,1	Veff
d_{tot}	=	14	12	13	%
V_i	=	2,0	1,95	1,9	Veff

[1]) R_{g2} = 10kΩ, decoupled with 0,47 µF (V_{bg2} = 84 V)
R_{g2} = 10kΩ, découplé par 0,47 µF (V_{bg2} = 84 V)
R_{g2} = 10kΩ, entkoppelt durch 0,47 µF (V_{bg2} = 84 V)

B. V_f = 2,8 V; I_f=50 mA; pins, broches, Stifte 1- 7

V_a	=	45	41	67,5	V
V_{g2}	=	45	41	67,5	V
V_{g1}	=	-4,5	-3,5	-7	V
I_a	=	3,0	3,2	6,0	mA
I_{g2}	=	0,7	0,7	1,2	mA
S	=	1,1	1,15	1,4	mA/V
μ_{g2g1}	=	5	45	5	
R_i	=	100	110	100	kΩ
R_a	=	8	7	5	kΩ
W_o	=	50	38	160	mW
V_i	=	3,5	2,8	5,5	V_{eff}
d_{tot}	=	12,5	13	12	%
$V_i(W_o$ = 50 mW)	=	3,5	-	2,5	V_{eff}

V_a	=	61	90	84	V
V_{g2}	=	61	67,5	[1])	V
V_{g1}	=	-5,5	-7	-6	V
I_a	=	6,5	6,1	7,6	mA
I_{g2}	=	1,4	1,1	1,6	mA
S	=	1,45	1,42	1,5	mA/V
μ_{g2g1}	=	4,5	5	4,5	
R_i	=	100	100	105	kΩ
R_a	=	7	8	7	kΩ
W_o	=	120	235	180	mW
V_i	=	4,4	4,7	4,7	V_{eff}
d_{tot}	=	14	13	13	%
$V_i(W_o$ = 50 mW)	=	2,0	1,95	1,9	V_{eff}

[1]) R_{g2} = 10 kΩ, decoupled with 0,47 μF (V_{bg2}= 84 V)
R_{g2} = 10 kΩ, découplé par 0,47 μF (V_{bg2}= 84 V)
R_{g2} = 10 kΩ, entkoppelt durch 0,47 μF (V_{bg2}= 84 V)

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max.	90	V
V_a	= max.	90	V
W_a	= max.	0,7	W
V_{g2_o}	= max.	90	V
V_{g2}	= max.	67,5	V
W_{g2}	= max.	0,15	W
$V_{g1}(I_{g1}= +0,3\ \mu A)$	= max.	0	V
I_k	= max.	11	mA
R_{g1}	= max.	2	MΩ

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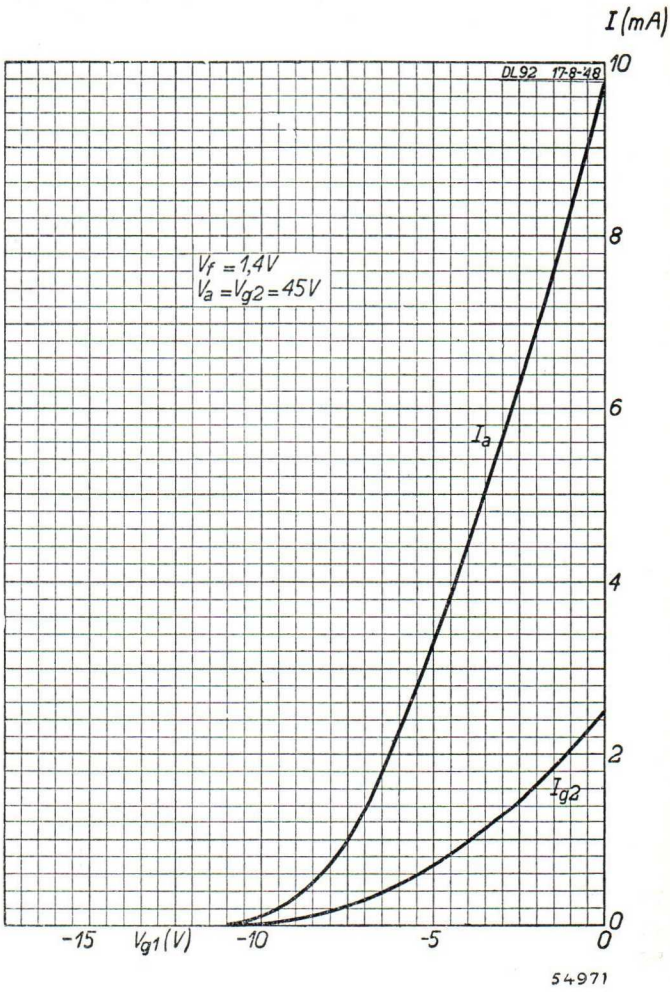
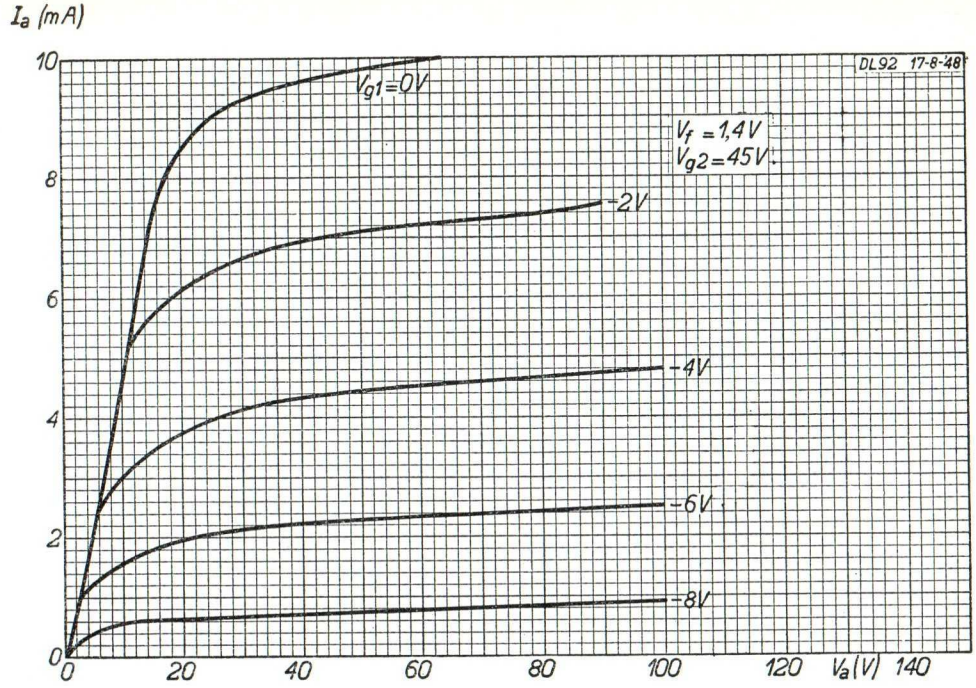
DL 92



54971

11.11.1953

A

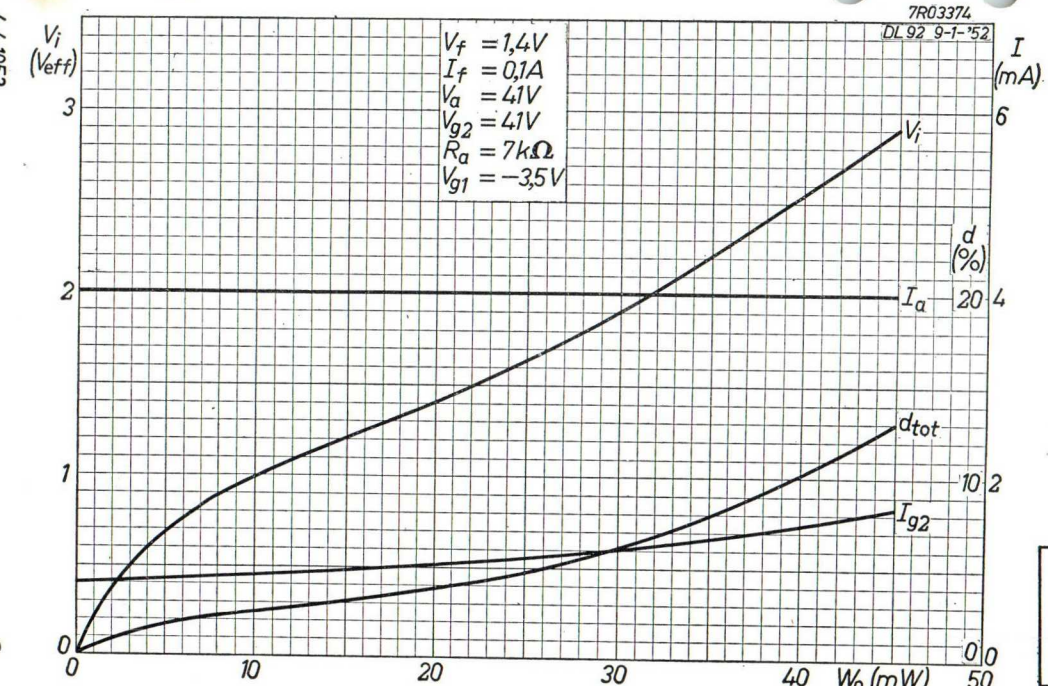


DL92

PHILIPS

B

54977



4.4.1952

C

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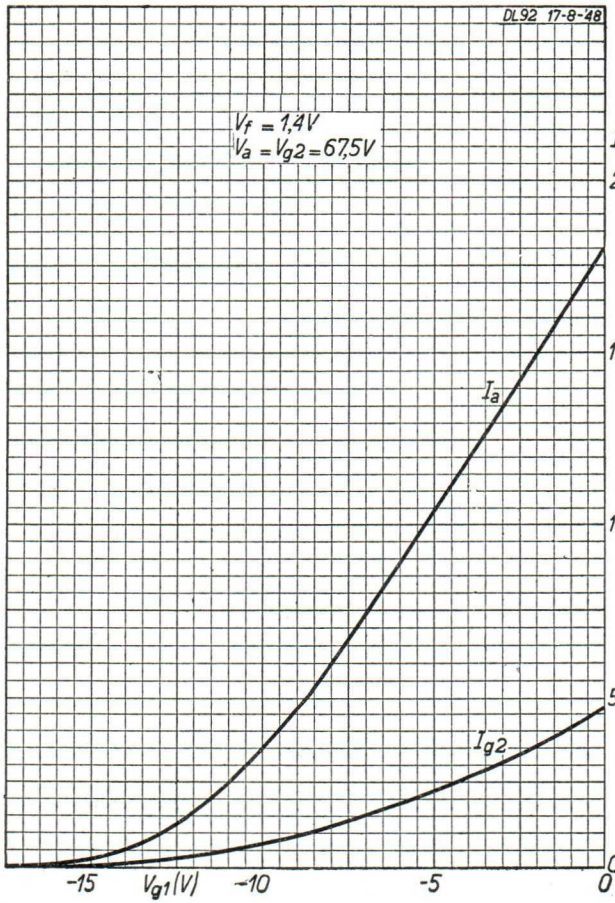
DL92

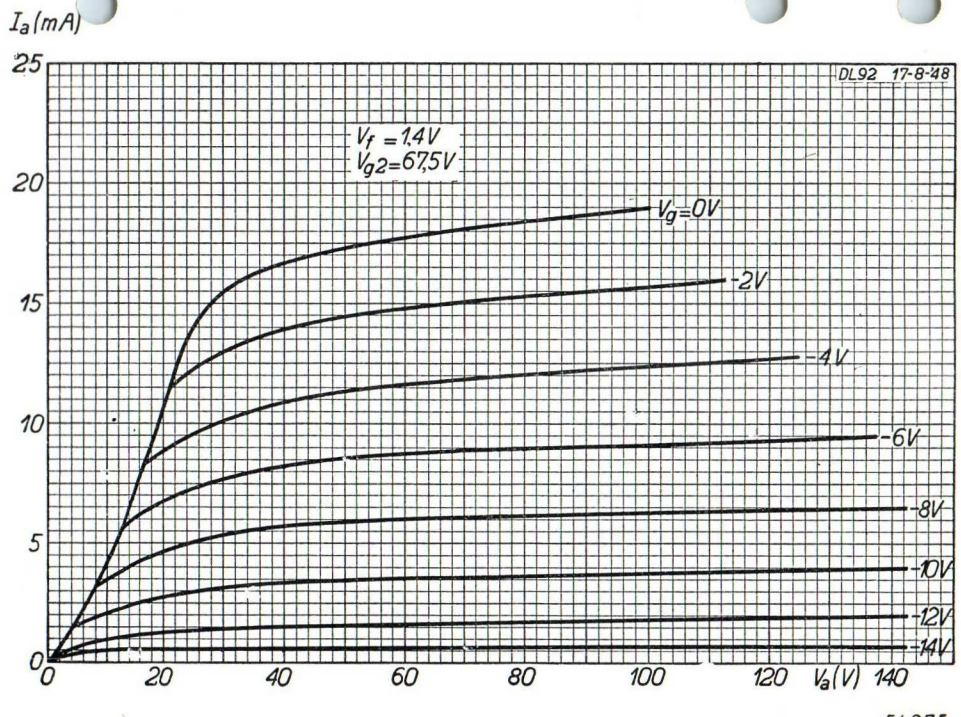
DL 92 **PHILIPS**



54974

D

11.11.1953

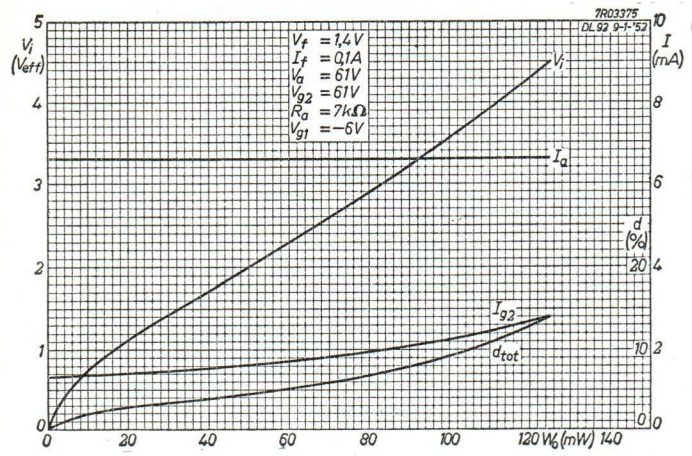


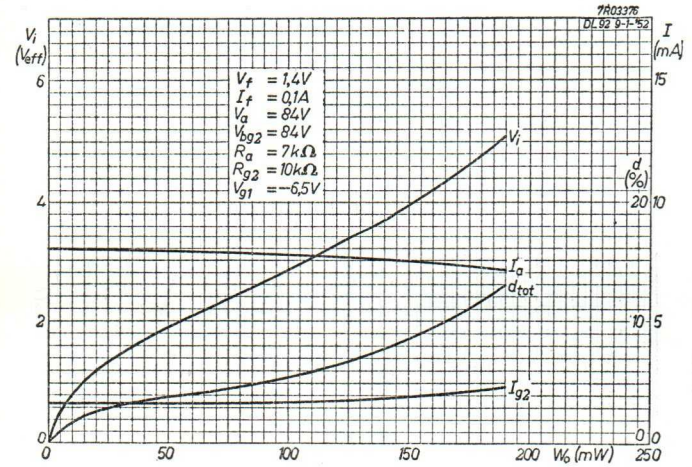
54975

PHILIPS

DL 92

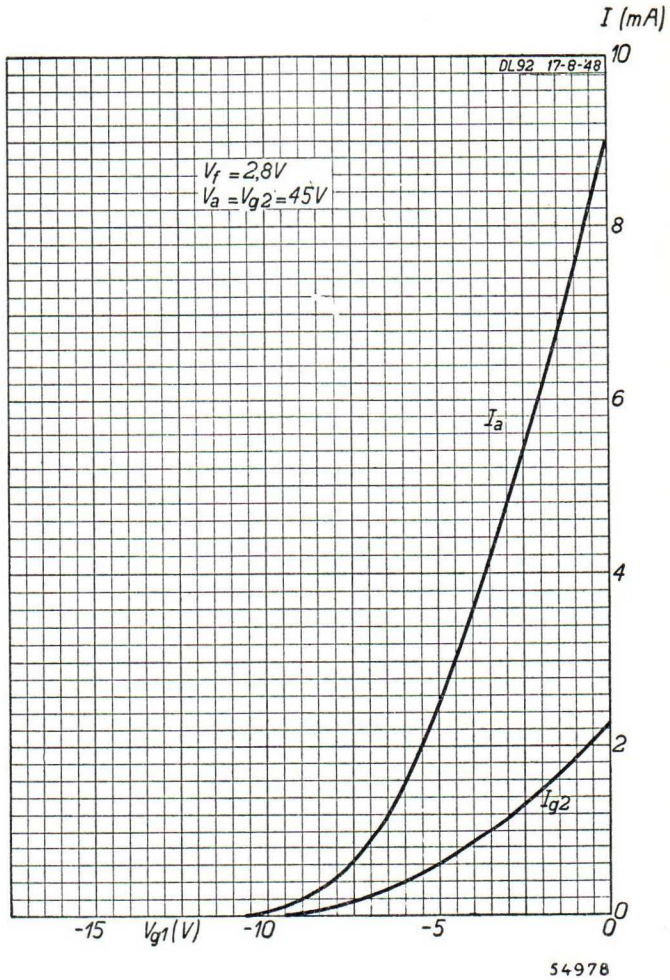
E


7R03375
DL 92 9-1-'52
V_i (V_{eff})
I (mA)
V_f = 1,4 V
I_f = 0,1 A
V_a = 61 V
V_{g2} = 61 V
R_a = 7 kΩ
V_{g1} = −6 V
V_i
I_a
I_{g2}
d_{tot}
d (%)
0 20 40 60 80 100 120 W_a (mW) 140


7R03376
DL 92 9-1-'52
V_i (V_{eff})
I (mA)
V_f = 1,4 V
I_f = 0,1 A
V_a = 84 V
V_{bg2} = 84 V
R_a = 7 kΩ
R_{g2} = 10 kΩ
V_{g1} = −6,5 V
V_i
I_a
d_{tot}
I_{g2}
d (%)
0 50 100 150 200 W_a (mW) 250

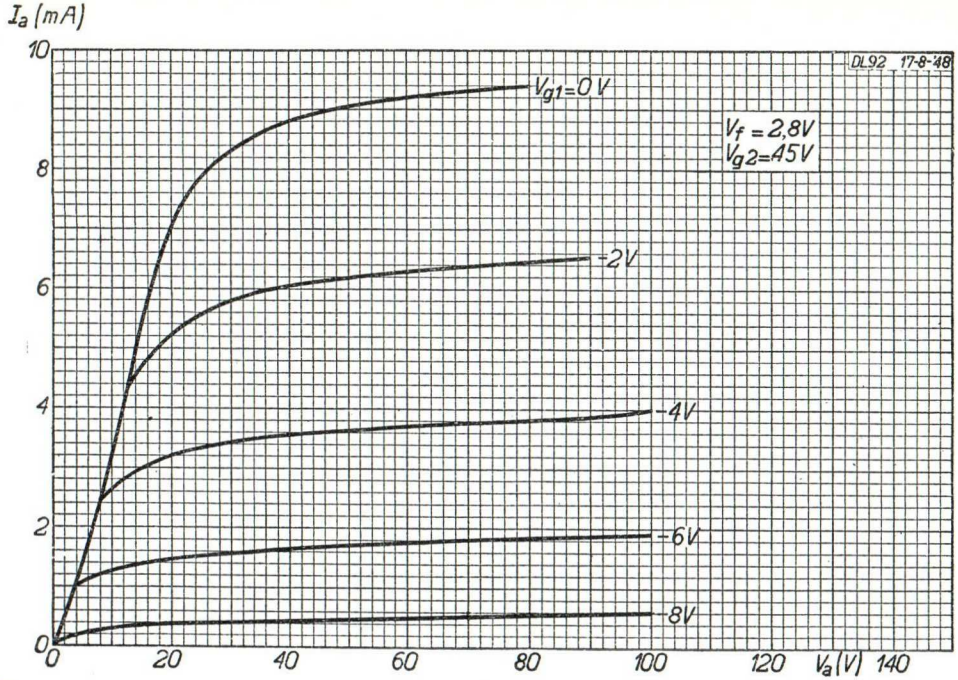
PHILIPS

DL 92



11.11.1953

G



DL92

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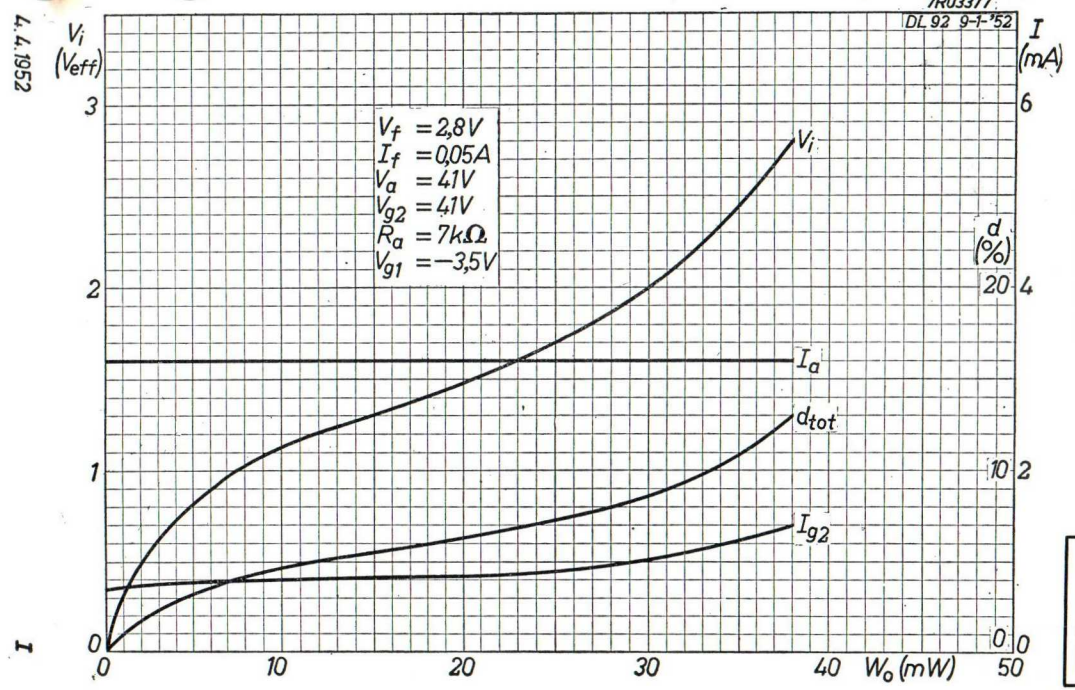
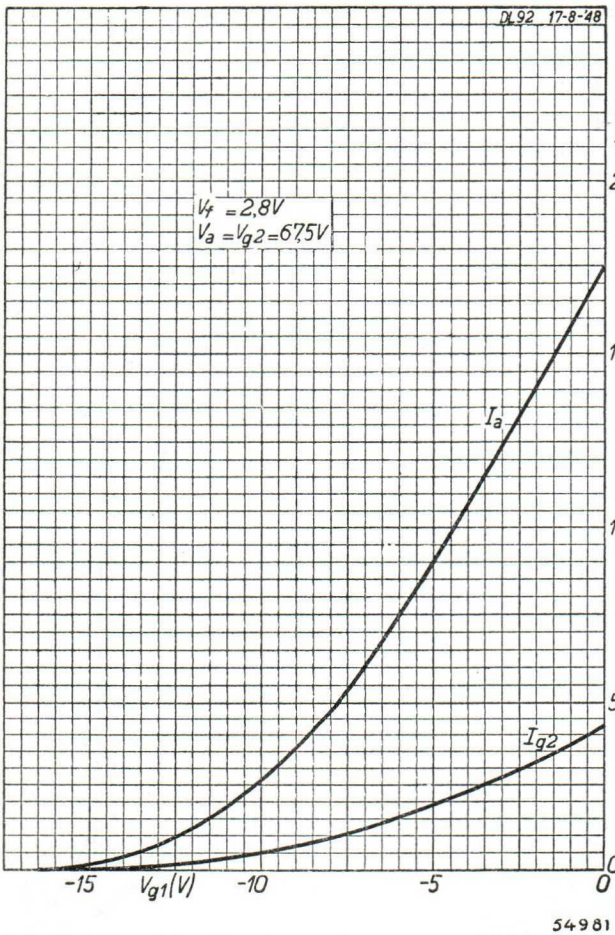
H

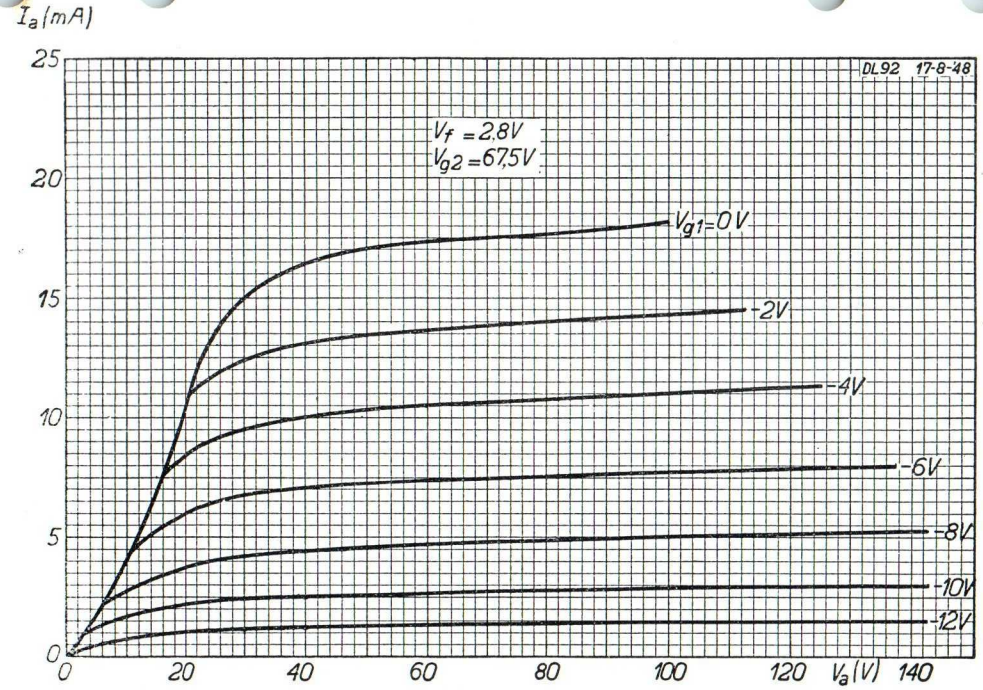

7R03377
DL 92 9-1-'52
4.4.1952
V_i (V_{eff})
I (mA)
V_f = 2,8V
I_f = 0,05A
V_a = 41V
V_{g2} = 41V
R_a = 7kΩ
V_{g1} = −3,5V
V_i
I_a
d_{tot}
I_{g2}
d (%)
W_o (mW)
0
10
20
30
40
50
1
2
3
4
6
I
PHILIPS
DL 92

DL 92 **PHILIPS**



54981

J



54982

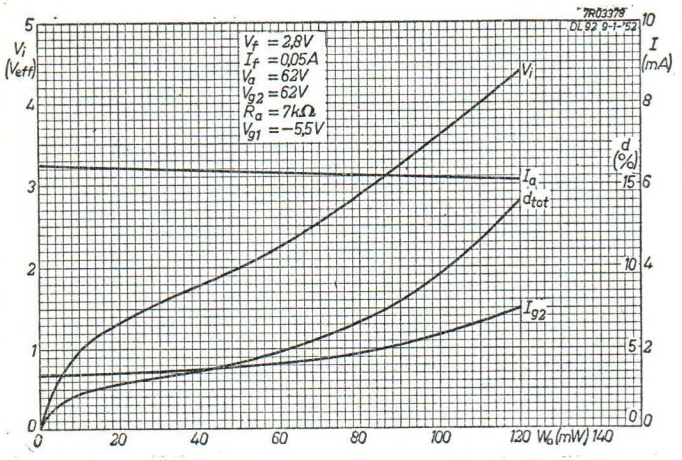
11.11.1953

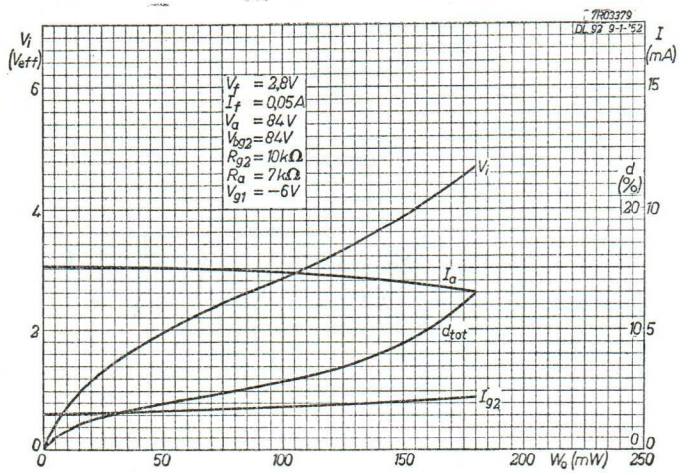
K

PHILIPS

DL 92

DL 92 PHILIPS





PHILIPS

DL 93

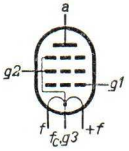
OUTPUT PENTODE for R.F. and A.F. application in battery operation
PENTHODE DE SORTIE pour applications H.F. et B.F.pour opération batterie
ENDPENTODE für HF- und NF-Anwendungen in Batteriebetrieb

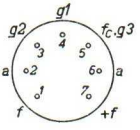
Heating: direct by D.C.; series or parallel supply
Chauffage: direct par C.C.; alimentation en série ou en parallèle
Heizung: direkt durch Gleichstrom; Serien- oder Parallelspeisung

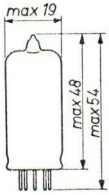
Parallel supply:	Vf =		1,4 V[1])	2,8 V[2])
Alimentation en parallèle:	If =		200 mA	100 mA
Parallelspeisung:	Pins			
	Broches	neg.	5	1
	Stifte	pos.	1+7	7

Series supply:	Vf =		1,3 V[1])	2,6 V[2])
Alimentation en série:	Pins			
	Broches	neg.	5	1
Serienspeisung:	Stifte	pos.	1+7	7

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances (without external shield) C_{g1} = 4,8 pF
Capacités (sans blindage extérieur) C_a = 4,2 pF
Kapazitäten (ohne äussere Abschirmung) C_{ag1} < 0,34 pF

1) Two filament sections in parallel
Deux parties du filament en parallèle
Zwei Glühfadenteile parallel
2) Two filament sections in series
Deux parties du filament en série
Zwei Glühfadenteile in Reihe

Operating characteristics as A.F. output amplifier, class A
Caractéristiques d'utilisation comme amplificatrice de sortie B.F., classe A
Betriebsdaten als NF-Endverstärker, Klasse A

V_f	=	1,4	1,4	V
I_f	=	200	200	mA
V_a	=	135	150	V
V_{g2}	=	90	90	V
V_{g1}	=	-7,5	-8,4	V
I_a (V_i= 0)	=	14,8	13,3	mA
I_a (W_o= max.)	=	14,9	14,1	mA
I_{g2}(V_i= 0)	=	2,6	2,2	mA
I_{g2}(W_o= max.)	=	3,5	3,5	mA
S	=	1,9	1,9	mA/V
R_i	=	90	100	kΩ
R_a	=	8	8	kΩ
W_o	=	600	700	mW
V_i	=	5,3	5,9	V_{eff}
d_{tot}	=	5	6	%

Operating characteristics as R.F. output amplifier at 50 Mc/s (intermittent operation)(V_f=1.4 V; I_f= 200 mA)
Caractéristiques d'utilisation comme amplificatrice de sortie H.F. à 50 Mc/s(service intermittent)(V_f= 1,4 V; I_f= 200 mA)
Betriebsdaten als HF-Endverstärker bei 50MHz(aussetzender Betrieb) (V_f= 1,4 V; I_f= 200 mA)

V_a	=	150 V
V_{g2}	=	135 V
R_{g1}	=	0,2 MΩ
I_a	=	18,3 mA
I_{g2}	=	6,5 mA
I_{g1}	=	0,13 mA
W_o	=	approx. 1,2 W

Limiting values as A.F. output amplifier
Caractéristiques limites comme amplificatrice de sortie B.F.
Grenzdaten als NF-Endverstärker

V_a	= max.	150 V
V_{g2}	= max.	90 V
W_a	= max.	2 W
W_{g2}	= max.	0,4 W
I_k	= max.	18 mA

Limiting values as R.F. output amplifier (intermittent operation)
Caractéristiques limites comme amplificatrice de sortie H.F. (service intermittent)
Grenzdaten als HF-Endverstärker (aussetzender Betrieb)

V_a	= max.	150 V
V_{g2}	= max.	135 V
$-V_{g1}$	= max.	30 V
W_a	= max.	2 W
W_{g2}	= max.	0,9 W
I_{g1}	= max.	0,25 mA
I_k	= max.	25 mA

PHILIPS

DL 94

OUTPUT PENTODE for battery receivers
PENTHODE DE SORTIE pour des appareils batterie
ENDPENTODE für Batteriegeräte

Heating: direct by battery current, rectified A.C. or D.C.; series or parallel supply
Chauffage: direct par courant batterie, C.A. redressé ou C.C.; alimentation en série ou en parallèle
Heizung: direkt durch Batteriestrom, gleichgerichteten Wechselstrom oder Gleichstrom; Serien- oder Parallelspeisung

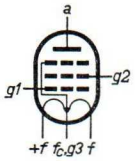
Parallel supply; alimentation en parallèle; Parallelspeisung

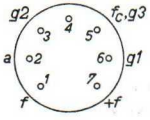
Vf =		1,4 V[1]	1,4 V[2]	2,8 V[3]
If =		50 mA	100 mA	50 mA
Pins Broches Stifte	neg.	5	5	1
	pos.	7	1+7	7

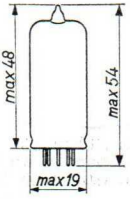
Series supply; alimentation en série; Serienspeisung

Vf =		1,3 V[1]	1,3 V[2]	2,6 V[3]
Pins Broches Stifte	neg.	5	5	1
	pos.	7	1+7	7

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances
Capacités
Kapazitäten

C_{g1} = 5,0 pF
C_a = 3,8 pF
C_{ag1} < 0,40 pF

[1],[2],[3]) see page 2; voir page 2; siehe Seite 2

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

V_f = 1,4 V[2]); If = 100 mA;	pins,	broches,	Stifte	5-(1+7)	
V_a	=	90	86	120	113 V
V_{g2}	=	90	86	120	113 V
V_{g1}	=	-5,1	-4,5	-8,1	-7,1 V
I_a	=	8,0	8,0	10	10 mA
I_{g2}	=	1,8	1,8	2,3	2,3 mA
S	=	2,0	2,0	2,0	2,0 mA/V
μ_{g2g1}	=	7,3	7,3	7,3	7,3
R_i	=	110	110	110	110 kΩ
R_a	=	8	8	8	8 kΩ
W_o (d = 10 %)	=	310	280	550	500 mW
V_i (d = 10 %)	=	4,1	4,0	5,0	4,9 Veff
W_o (I_{g1} = +0,3 µA)	=	340	290	680	570 mW
V_i (I_{g1} = +0,3 µA)	=	4,5	4,1	6,6	5,9 Veff
d (I_{g1} = +0,3 µA)	=	12	11	15	14 %
V_i (W_o = 50 mW)	=	1,35	1,35	1,3	1,3 Veff

[1]) One filament section
Une partie du filament
Ein Glühfadenteil

[2]) Two filament sections in parallel
Deux parties du filament reliées en parallèle
Zwei Glühfadenteile parallelgeschaltet

[3]) Two filament sections in series
Deux parties du filament reliées en série
Zwei Glühfadenteile in Serie

[4]) With cold tube; avec tube froid; bei kalter Röhre

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

V_f = 2,8 V[3]; I_f = 50 mA; pins, broches, Stifte 1-7

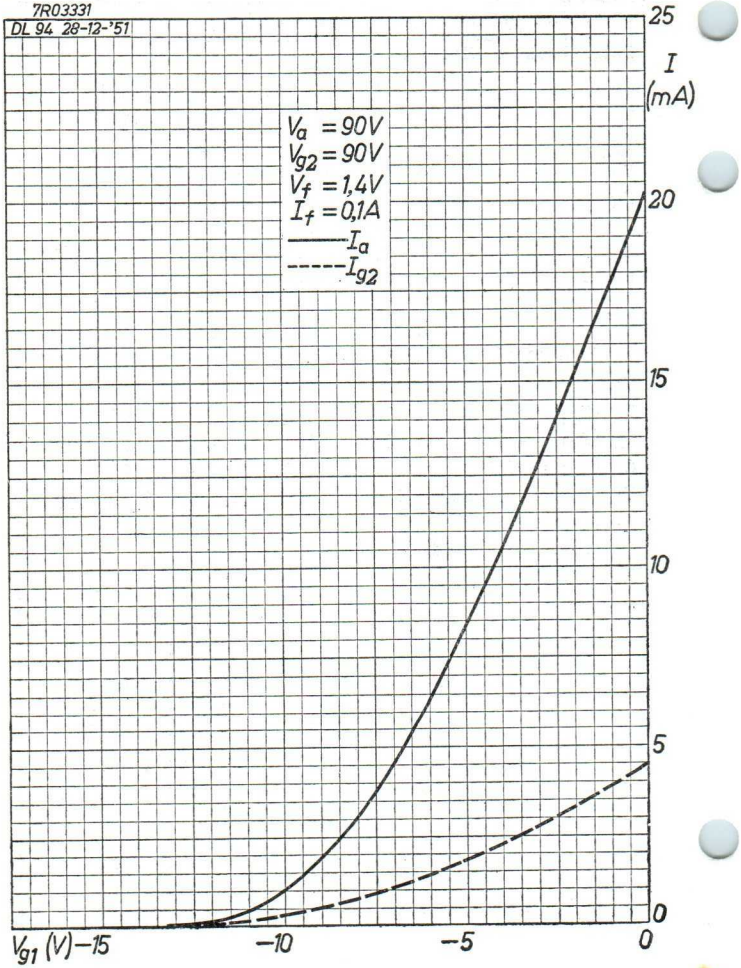
V_a	=	90	86	120	113 V
V_{g2}	=	90	86	120	113 V
V_{g1}	=	-4,2	-4,3	-8,1	-7,2 V
I_a	=	8,0	7,0	9,0	9,0 mA
I_{g2}	=	1,7	1,5	1,8	1,8 mA
S	=	2,0	1,9	2,0	2,0 mA/V
μ_{g2g1}	=	7,3	7,3	7,3	7,3
R_i	=	120	120	120	120 kΩ
R_a	=	10	10	10	10 kΩ
W_o (d = 10 %)	=	280	250	500	420 mW
V_i (d = 10 %)	=	3,8	3,7	4,8	4,4 V_{eff}
W_o (I_{g1} = +0,3 µA)	=	290	270	620	525 mW
V_i (I_{g1} = +0,3 µA)	=	4,0	4,0	6,6	6,1 V_{eff}
d (I_{g1} = +0,3 µA)	=	12	11,5	17	16 %
V_i (W_o = 50 mW)	=	1,35	1,40	1,35	1,35 V_{eff}

Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max.	150 V
V_a (V_i = 0 V)	= max.	180 V
V_a	= max.	200 V [4]
W_a	= max.	1,2 W
V_{g2}	= max.	150 V
V_{g2} (V_i = 0 V)	= max.	180 V
V_{g2}	= max.	200 V [4]
W_{g2}	= max.	0,45 W
I_k	= max.	6 mA [1]
I_k	= max.	12 mA [2]
I_k	= max.	11 mA [3]
R_{g1}	= max.	1 MΩ
V_{g1} (I_{g1} = +0,3 µA)	= max.	0 V

[1)2)3)4)] See page 2; voir page 2; Siehe Seite 2

DL 94 **PHILIPS**



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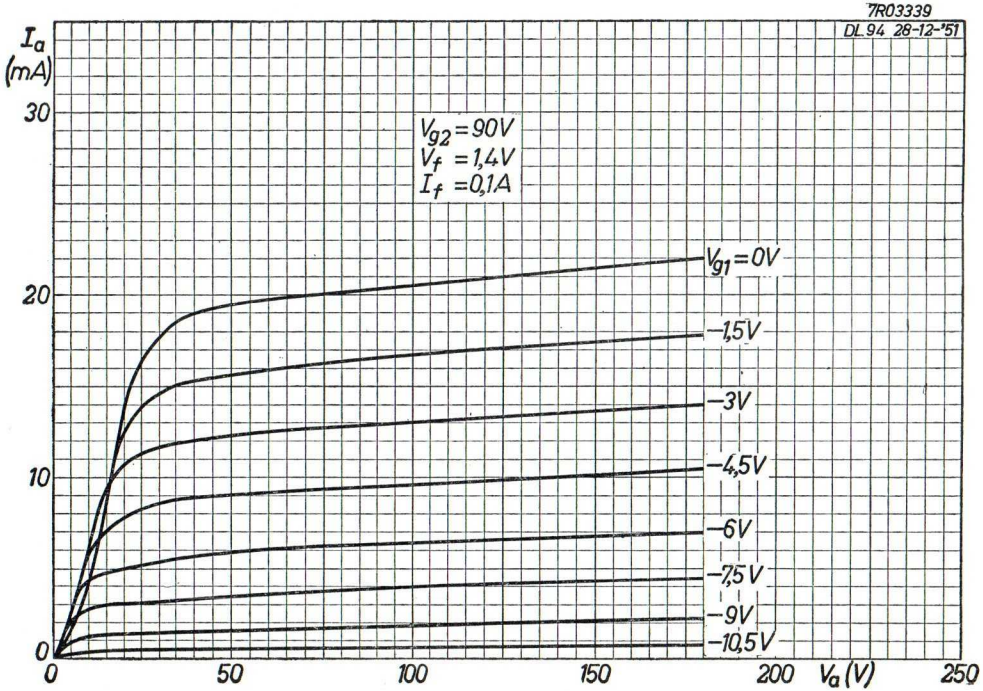
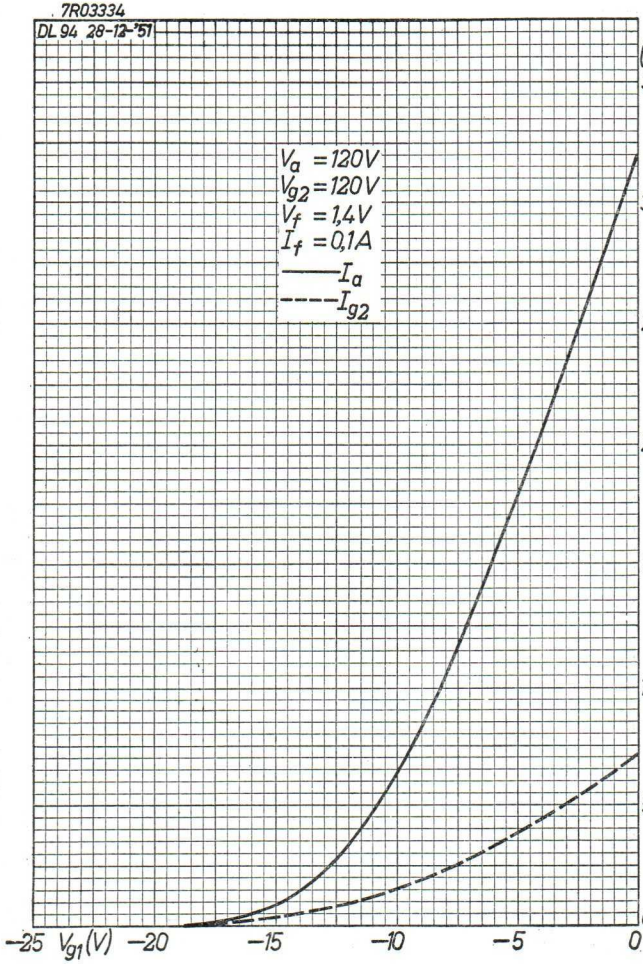
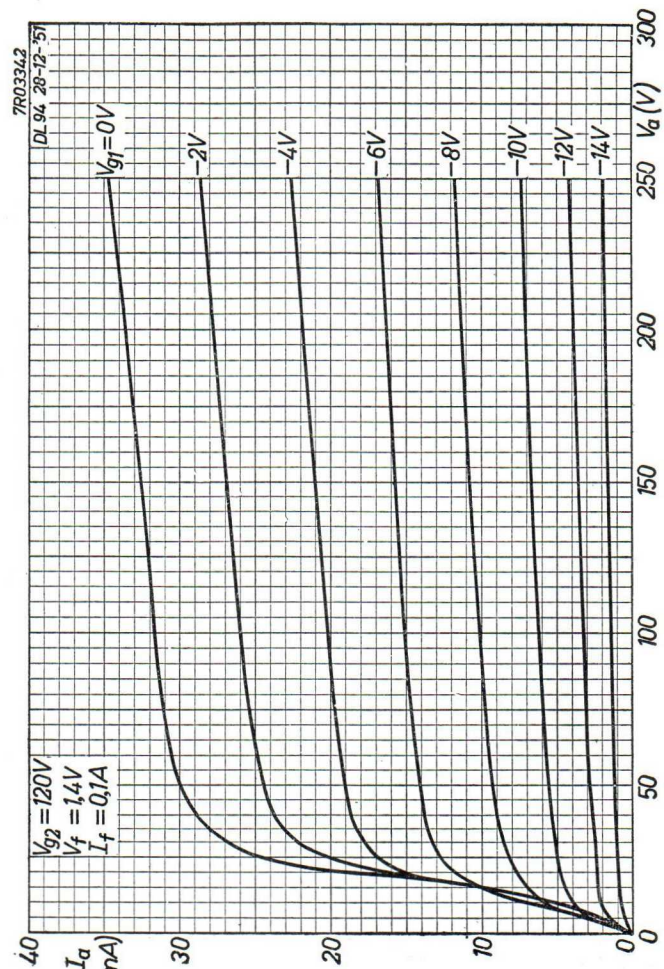
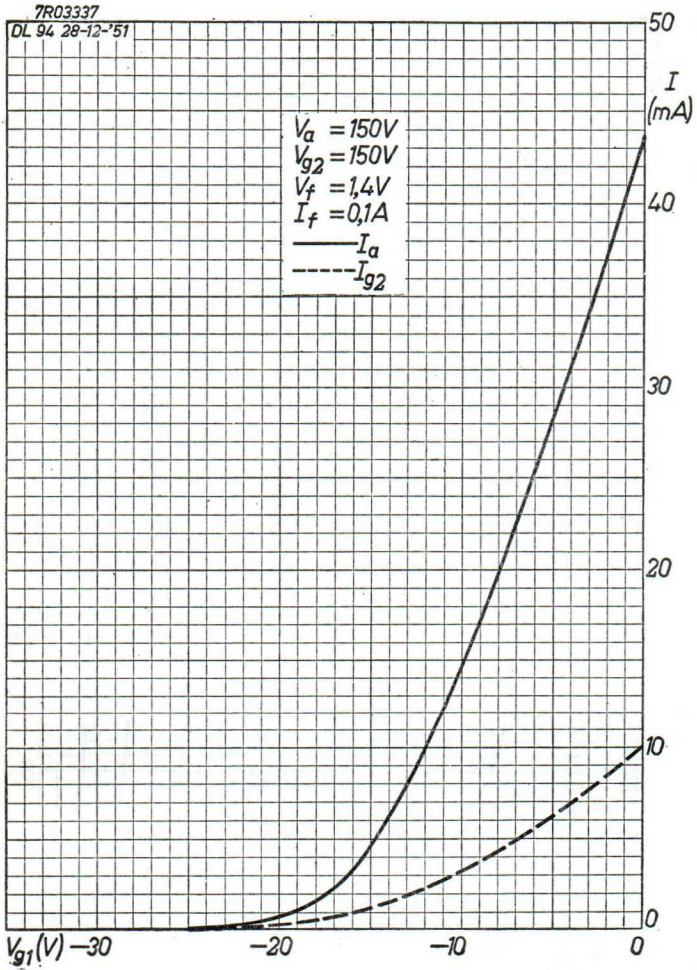


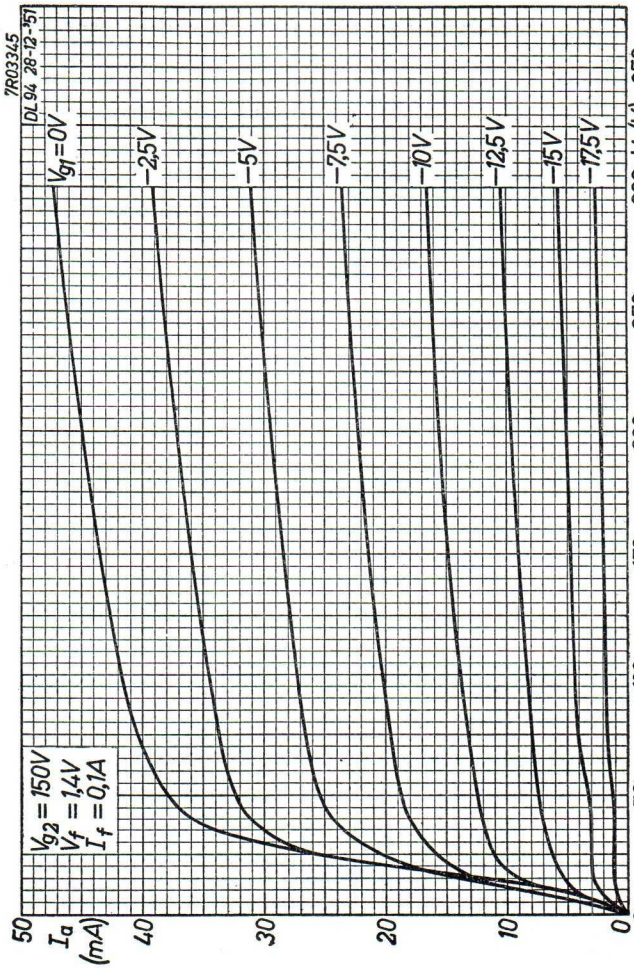
PHILIPS

DL 94

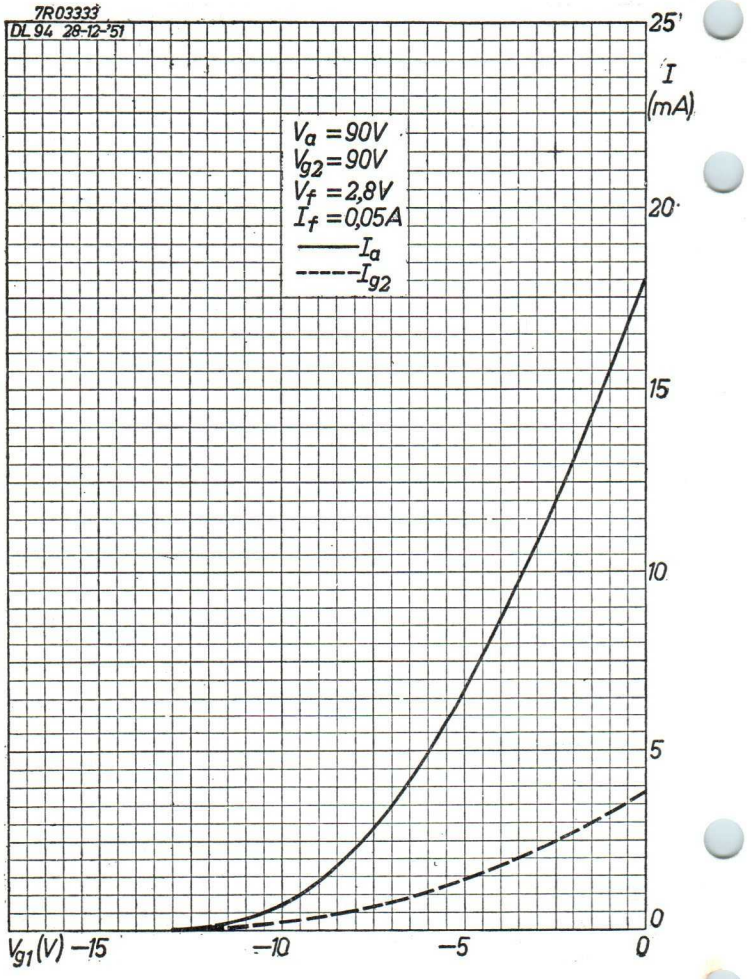

7R03334
DL 94 28-12-'51
V_a = 120V
V_{g2} = 120V
V_f = 1,4V
I_f = 0,1A
——— I_a
---- I_{g2}
I (mA)
35
30
25
20
15
10
5
0
−25 V_{g1}(V) −20 −15 −10 −5 0


7R03342
DL 94 28-12-'51
V_{g1}=0V
-2V
-4V
-6V
-8V
-10V
-12V
-14V
V_{g2} = 120V
V_f = 1,4V
I_f = 0,1A
I_a (mA)
40
30
20
10
0
0
50
100
150
200
250
300
V_a (V)


7R03337
DL 94 28-12-'51
V_a = 150V
V_{g2} = 150V
V_f = 1,4V
I_f = 0,1A
I_a
I_{g2}
I (mA)
50
40
30
20
10
0
V_{g1}(V) −30
−20
−10
0


7R0334.5
DL 94 28-12-'51
V_{g1}=0V
-2,5V
-5V
-7,5V
-10V
-12,5V
-15V
-17,5V
V_{g2} = 150V
V_f = 1,4V
I_f = 0,1A
I_a (mA)
50
40
30
20
10
0
0
50
100
150
200
250
300
350
V_a (V)

DL 94 **PHILIPS**



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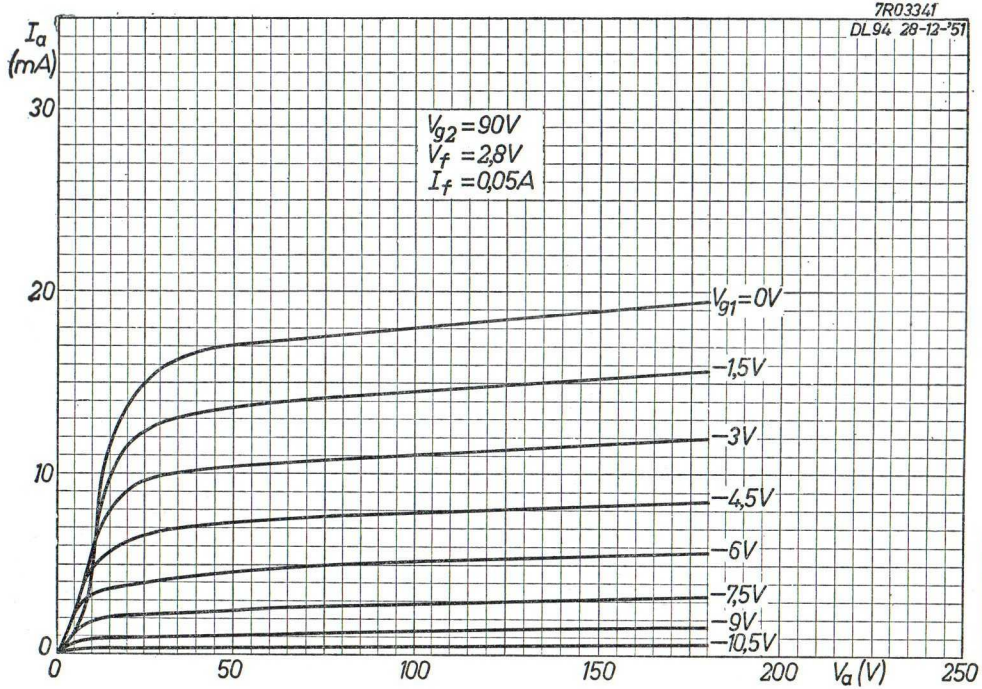

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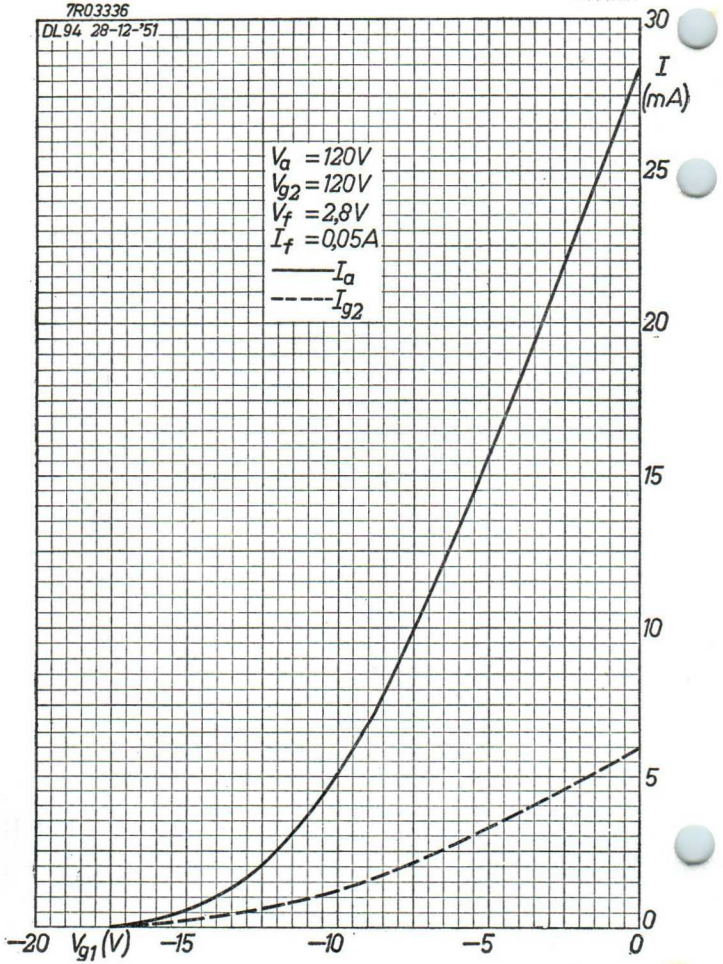
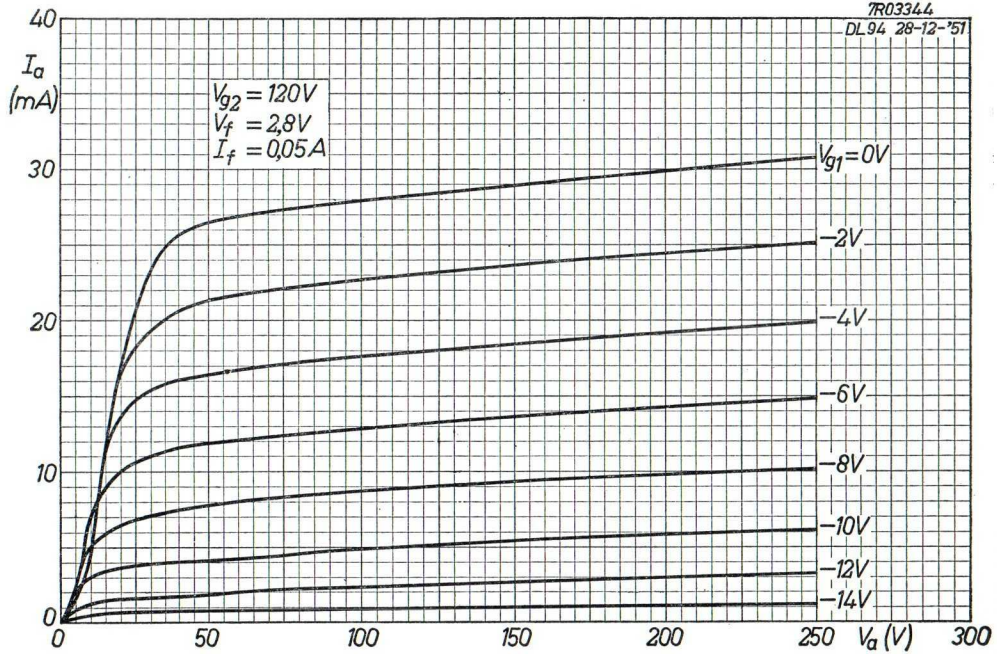
DL94 PHILIPS





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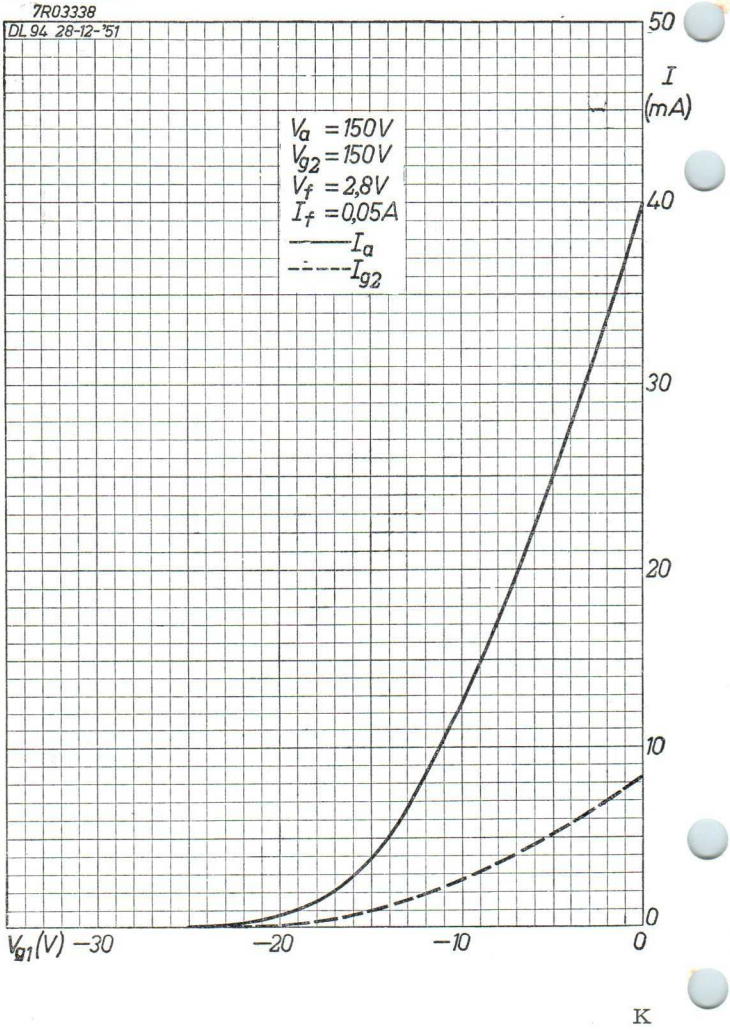

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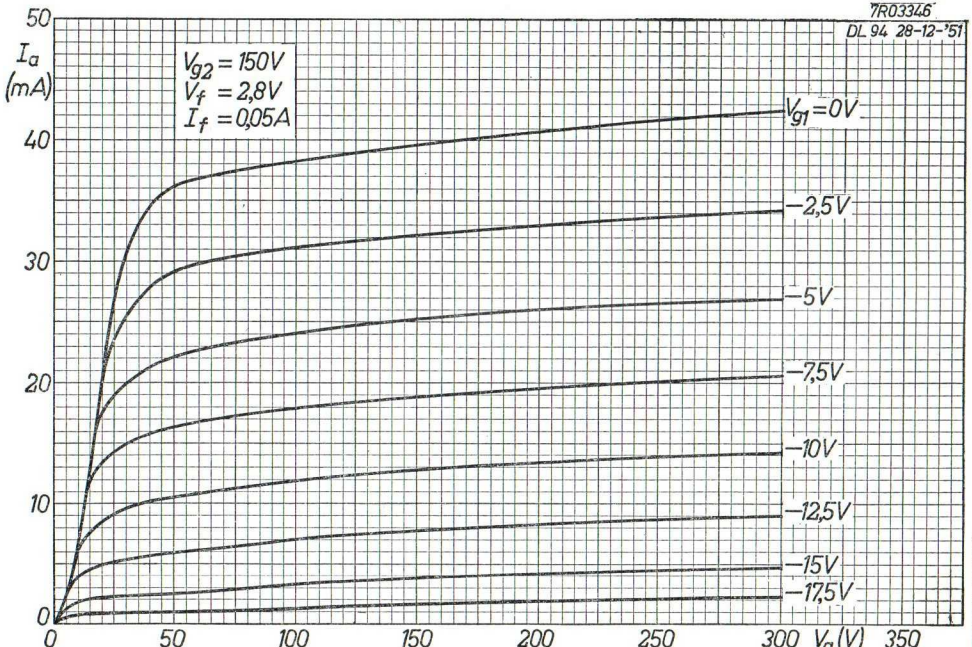


PHILIPS

DL 94

PHILIPS

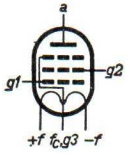
DL 95

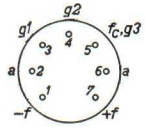
OUTPUT PENTODE for battery receivers
PENTHODE DE SORTIE pour des appareils batterie
ENDPENTODE für Batteriegeräte

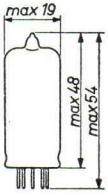
Heating: direct by battery current, rectified A.C. or D.C.; series or parallel supply
Chauffage: direct par courant batterie, C.A.redressé ou C.C.; alimentation en série ou en parallèle
Heizung: direkt durch Batteriestrom, gleichgerichteten Wechselstrom oder Gleichstrom; Serien- oder Parallelspeisung

Parallel supply: Alimentation en parallèle Parallelspeisung:	V_f =		1,4 V[1])	2,8 V[2])
	I_f =		100 mA	50 mA
	Pins Broches Stifte	neg.	5	1
		pos.	1+7	7
Series supply: Alimentation en série: Serienspeisung:	V_f =		1,3 V[1])	2,6 V[2])
	Pins Broches Stifte	neg.	5	1
		pos.	1+7	7

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Fuss: MINIATURE

For further data and curves refer to type DL 94
Pour les autres caractéristiques et courbes voir Type DL 94
Für die übrige Daten und Kurven siehe Type DL 94

[1]) Two filament sections in parallel
Les deux parties du filament en parallèle
Die zwei Glühfadenteile parallel

[2]) Two filament sections in series
Les deux parties du filament en série
Die zwei Glühfadenteile in Reihe

PHILIPS

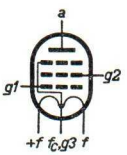
DL96

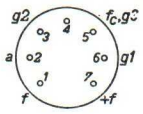
OUTPUT PENTODE for battery receivers
PENTHODE DE SORTIE pour appareils-batterie
ENDPENTODE für Batteriegeräte

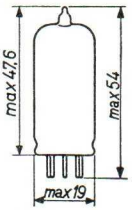
Heating :direct by D.C.;
parallel or series supply
Chauffage :direct par C.C.;
alimentation parallèle ou série
Heizung :direkt durch Gleichstrom;
Parallel- oder Serienspeisung

Parallel supply Alimentation parallèle Parallelspeisung	Vf	=	1,4 V 2,8 V
	If	=	50 mA 25 mA
	Pins Broches Stifte	5-(1+7)	1-7
Series supply Alimentation série Serienspeisung	Vf	=	1,3 V 2,6 V
	Pins Broches Stifte	5-(1+7)	1-7

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: MINIATURE

Capacitances Capacités Kapazitäten	C_{g1}	=	5,0 pF
	C_a	=	4,7 pF
	C_{ag1}	<	0,4 pF

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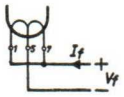
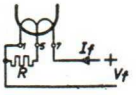
11.11.1954

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



V_f	=	1,4 V
I_f	=	50 mA
pins broches Stifte		5-(1+7)

V_a [1])	=	64	85 V
V_{g2} [1])	=	64	85 V
V_{g1}	=	-3,3	-5,2 V
I_a	=	3,5	5 mA
I_{g2}	=	0,65	0,9 mA
S	=	1,3	1,4 mA/V
μ_{g2g1}	=	7	7
R_i	=	170	150 kΩ
$R_{a\sim}$	=	15	13 kΩ
$W_o(d_{tot}=10\%)$	=	100	200 mW
$V_i(d_{tot}=10\%)$	=	2,6	3,5 Veff
$V_i(W_o=50mW)$	=	1,6	1,5 Veff

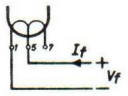


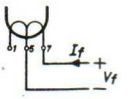
V_f	=	2,8 V
I_f	=	25 mA
R	=	680 Ω
pins broches Stifte		1-7

V_a [1])	=	90 V
V_{g2} [1])	=	90 V
V_{g1}	=	-6,3 V
$R_{a\sim}$	=	20 kΩ
I_a	=	3,7 mA
I_{g2}	=	0,7 mA
$W_o(d_{tot}=10\%)$	=	150 mW
$V_i(d_{tot}=10\%)$	=	2,8 Veff
$V_i(W_o=50mW)$	=	1,2 Veff

[1]) See page 5; voir page 5; siehe Seite 5

Current saving circuit class A
Montage économisateur classe A
Stromsparschaltung Klasse A

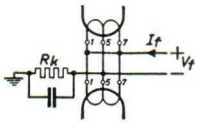




V_f	= 1,4 V	
I_f	= 25 mA	
pins broches Stifte	1-5	or ou oder 5-7

V_a [1])	= 64	85 V
V_{g2} [1])	= 64	85 V
V_{g1}	= -3,3	-5,2 V
I_a	= 1,75	2,5 mA
I_{g2}	= 0,33	0,45 mA
$R_{a\sim}$	= 30	25 kΩ
W_o (d_{tot}=10%)	= 50	100 mW
V_i (d_{tot}=10%)	= 2,6	3,6 Veff
V_i (W_o =50 mW)	= 2,6	2,4 Veff

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



V_f	= 1,4 V	
I_f	= 100 mA	
pins broches Stifte	5-(1+7)	

V_b	=	67,5			90			V
R_k [2])	=	470			560			Ω
$R_{aa\sim}$	=	20			20			kΩ
V_i	=	0	1,7	5,7	0	1,5	7,9	Veff
I_a	=	2x2,3	-	2x3,4	2x3,25	-	2x4,75	mA
I_{g2}	=	2x0,43	-	2x0,95	2x0,60	-	2x1,50	mA
W_o	=	-	50	220	-	50	420	mW
d_{tot}	=	-	-	3	-	-	4	%

[1])[2]) See page 5; voir page 5; siehe Seite 5

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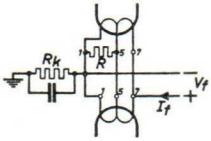
11.11.1954

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

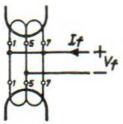
Only for battery use; seulement pour opération batterie; nur für Batteriebetrieb



V_f = 2,8 V
I_f = 50 mA
pins
broches = 1-7
Stifte

V_b	=		67,5			90		V
R_k [2])	=		470			560		Ω
R	=		470			330		Ω
Raa~	=		20			20		kΩ
V_i	=	0	2,0	5,6	0	1,5	7,7	V_{eff}
I_a	=	2x1,95	-	2x3,1	2x2,85	-	2x4,4	mA
I_{g2}	=	2x0,36	-	2x0,8	2x0,52	-	2x1,25	mA
W_o	=	-	50	200	-	50	400	mW
dtot	=	-	-	3,6	-	-	4,0	%

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



V_f = 1,4 V
I_f = 100 mA
pins
broches = 5-(1+7)
Stifte

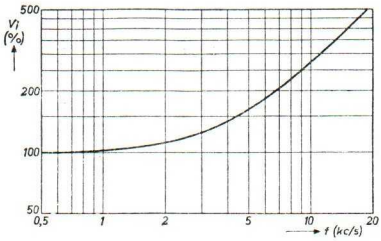
V_a [1])	=		61,5			81,5		V
V_{g2} [1])	=		61,5			81,5		V
V_{g1}	=		-5,8			-8,5		V
Raa~	=		20			16		kΩ
V_i	=	0	2,75	5,7	0	2,8	7,9	V_{eff}
I_a	=	2x0,75	-	2x3,4	2x1,0	-	2x5,0	mA
I_{g2}	=	2x0,14	-	2x0,95	2x0,18	-	2x1,3	mA
W_o	=	-	50	220	-	50	440	mW
dtot	=	-	-	3	-	-	2,6	%

[1])[2]) See page 5; voir page 5; siehe Seite 5

This tube can be used without special precautions against microphonic effect when the sensitivity for the higher frequencies is decreased according to the figure below.

Ce tube peut être utilisé sans précautions spéciales contre l'effet microphonique quand la sensibilité pour les fréquences plus élevées est diminuée suivant la figure ci-dessous

Diese Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden wenn die Empfindlichkeit für die höheren Frequenzen nach untenstehender Abbildung verringert wird.



[1]) Based on a battery voltage of 67.5 or 90 V, reduced by the negative bias

Se basant sur une tension de batterie de 67,5 ou 90 V, diminuée de la polarisation négative

Basiert auf einer Batteriespannung von 67,5 oder 90 V, verringert um die negatieve Vorspannung

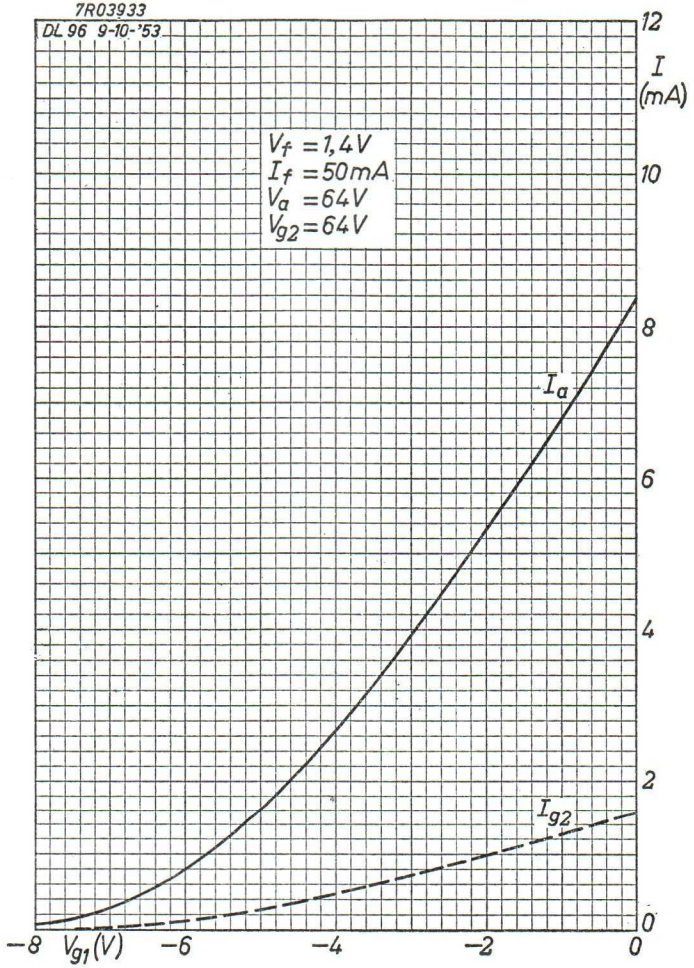
[2]) An additional current of 3,5 mA is fed through R_k, this current being normally drawn by the preceding stages
On a fait circuler un courant supplémentaire de 3,5 mA à travers R_k, ce courant étant normalement consommé par les étages précédents
Ein zusätzlicher Strom von 3,5 mA wird hierbei durch R_k geführt, da dies im allgemeinen mit dem von den vorhergehenden Stufen aufgenommenen Strom übereinstimmt

Limiting values
Caractéristiques limites
Grenzdaten

V_b	= max.	90	V
V_b [2])	= max.	110	V
V_a	= max.	90	V
W_a	= max.	0,6	W
V_{g2}	= max.	90	V
W_{g2}	= max.	0,2	W
V_{g1} (I_{g1}=+0,3µA)	= max.	0	V
I_k(pins,broches,Stifte 5-7)	= max.	3	mA
I_k(pins,broches,Stifte 5-(1+7)	= max.	6	mA
I_k(pins,broches,Stifte 1-7)	= max.	4,5	mA
R_{g1}	= max.	2	MΩ

---

[2]) Absolute value; valeur absolue; Absolutwert


7R03933
DL 96 9-10-'53
$V_f = 1,4V$
$I_f = 50mA$
$V_a = 64V$
$V_{g2} = 64V$
I_a
I_{g2}
12
I (mA)
10
8
6
4
2
0
−8
V_{g1}(V)
−6
−4
−2
0

DL96

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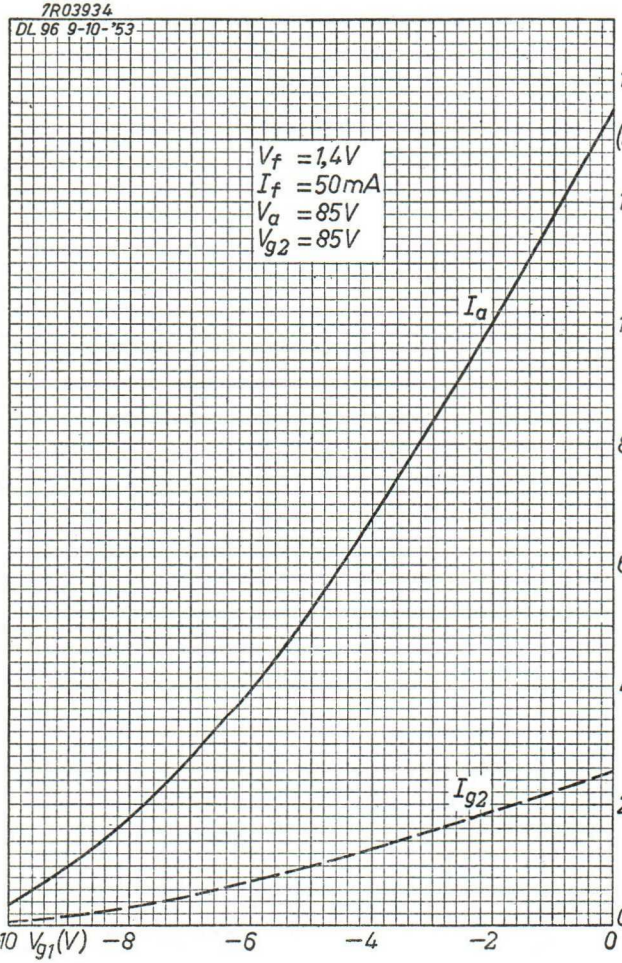
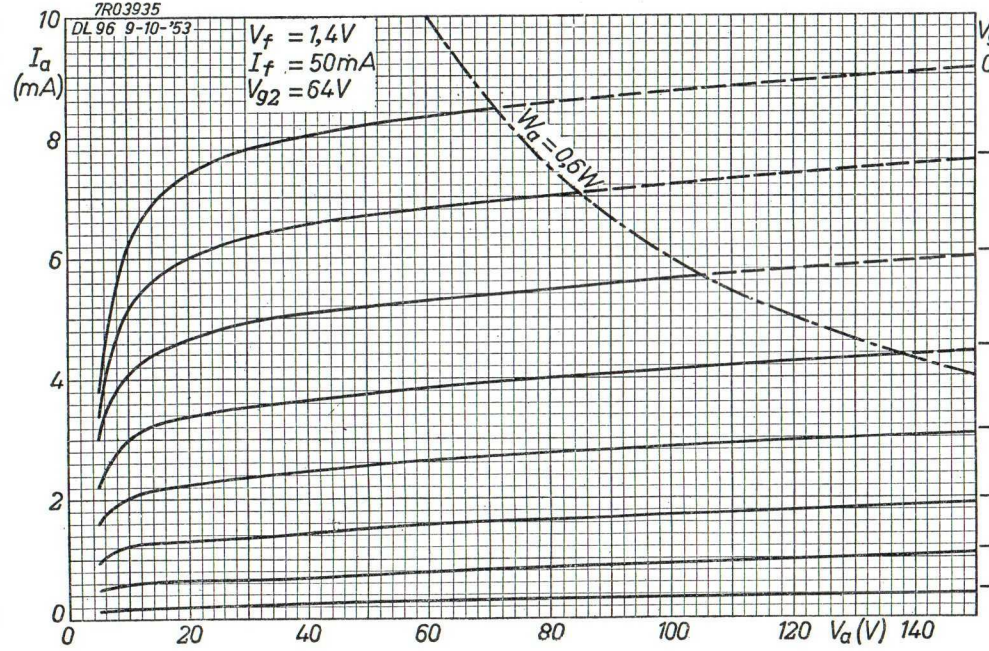


B



10.10.1953

C

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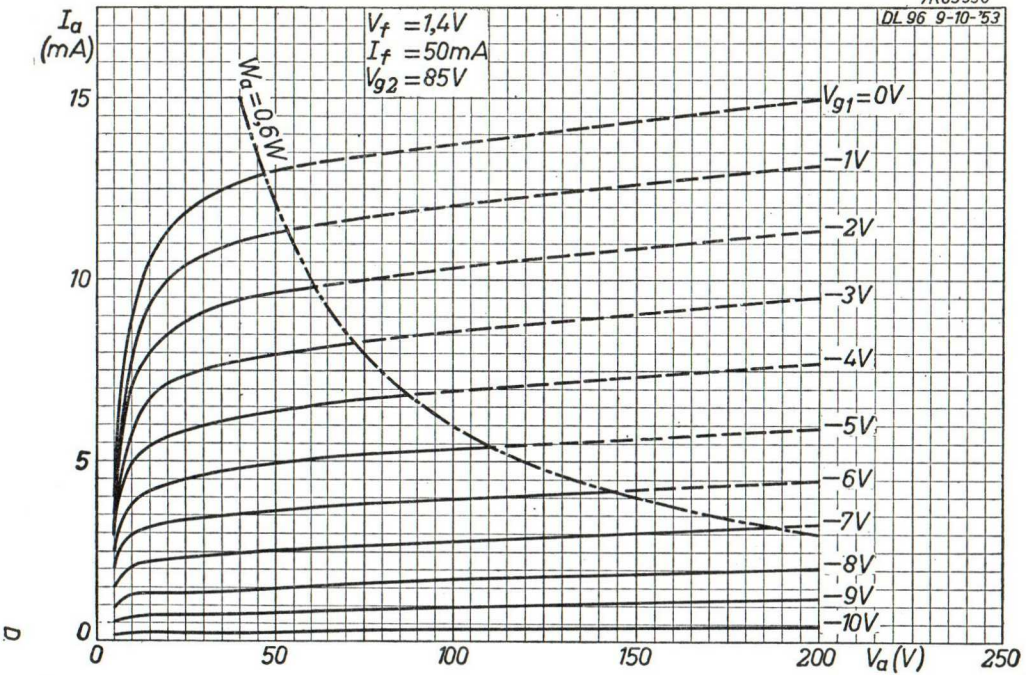
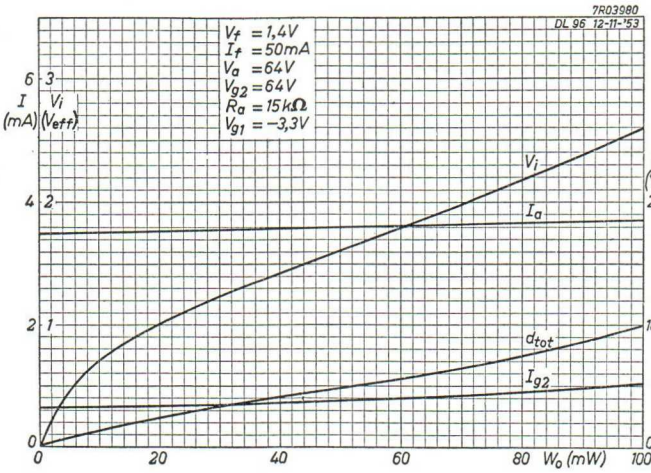
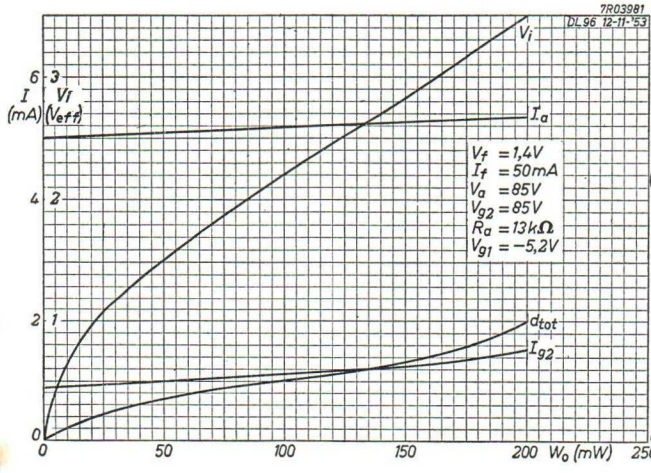
DL96

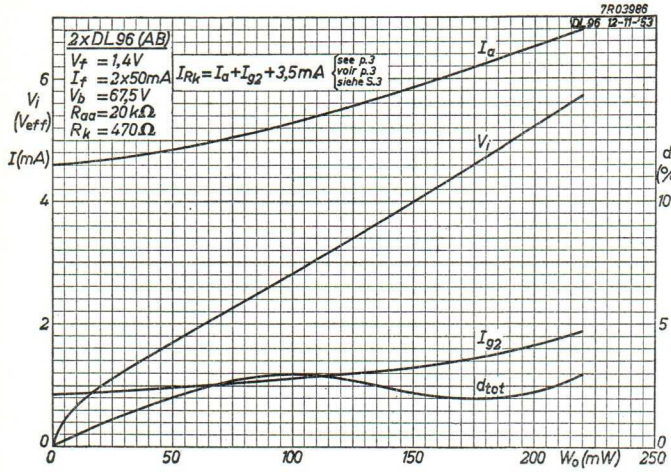


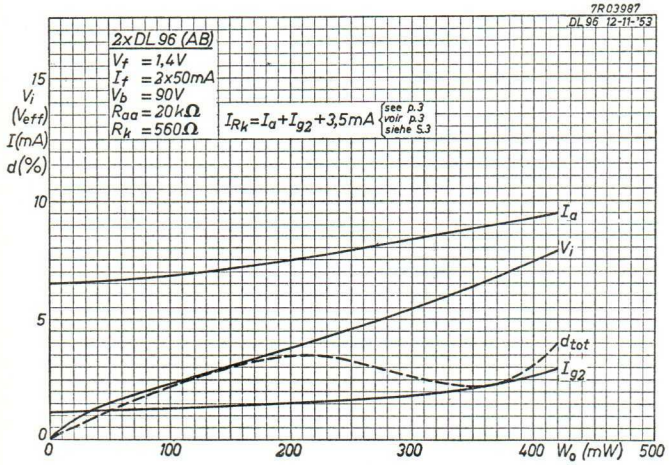
DL96

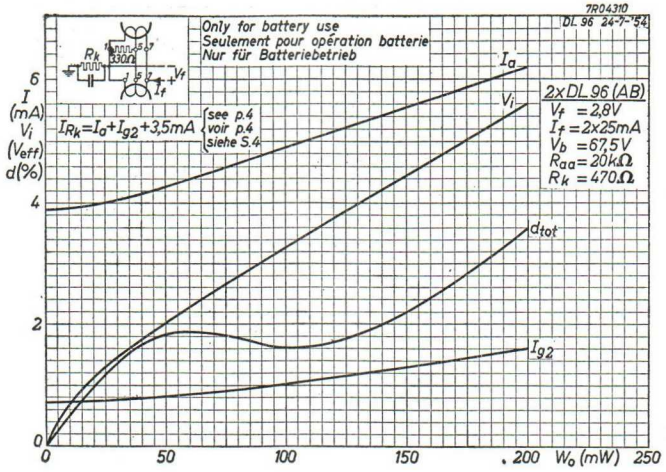
PHILIPS

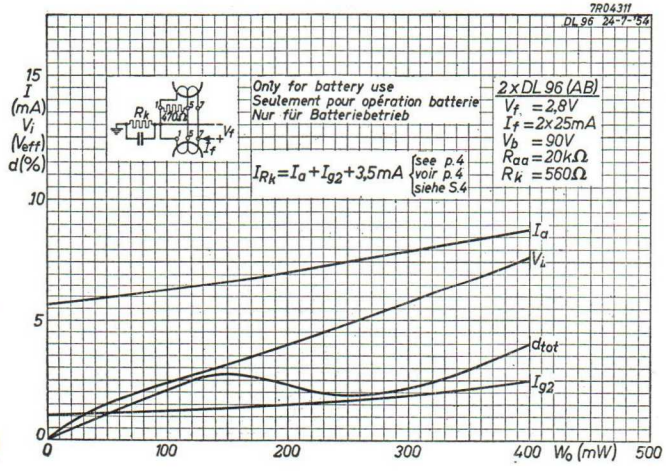

7R03980
DL 96 12-11-'53
V_f = 1,4V
I_f = 50mA
V_a = 64V
V_{g2} = 64V
R_a = 15kΩ
V_{g1} = −3,3V
I (mA)
Vi (Veff)
d (%)
V_i
I_a
d_{tot}
I_{g2}
W_o (mW)


7R03981
DL96 12-11-'53
V_i
I_a
V_f = 1,4V
I_f = 50mA
V_a = 85V
V_{g2} = 85V
R_a = 13kΩ
V_{g1} = −5,2V
I (mA)
Vf (Veff)
d (%)
d_{tot}
I_{g2}
W_o (mW)


7R03986
DL96 12-11-'53
2xDL96 (AB)
V_f = 1,4V
I_f = 2x50mA
V_b = 67,5V
R_{aa} = 20kΩ
R_k = 470Ω
$I_{Rk}=I_a+I_{g2}+3,5mA$
see p.3
voir p.3
siehe S.3
I_a
V_i
I_{g2}
d_{tot}
V_i (V_{eff})
I(mA)
d (%)
0
2
4
6
0
5
10
0
50
100
150
200
250
W_o(mW)

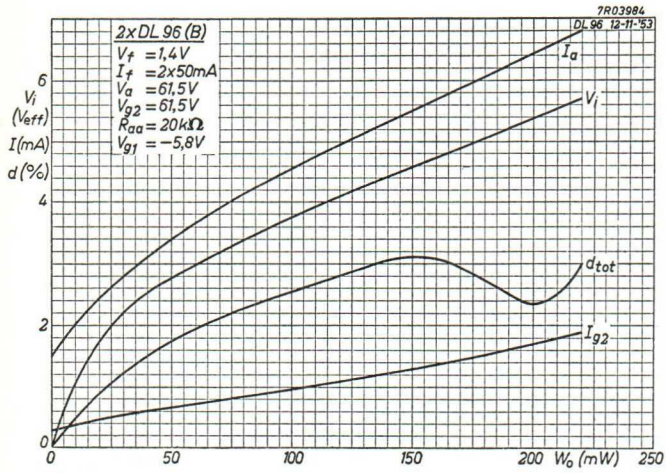

7R03987
DL96 12-11-'53
2xDL96 (AB)
V_f = 1,4V
I_f = 2x50mA
V_b = 90V
R_{aa} = 20kΩ
R_k = 560Ω
$I_{Rk}=I_a+I_{g2}+3,5mA$
see p.3
voir p.3
siehe S.3
I_a
V_i
d_{tot}
I_{g2}
V_i (V_{eff})
I(mA)
d(%)
0
5
10
15
0
100
200
300
400
500
W_o (mW)

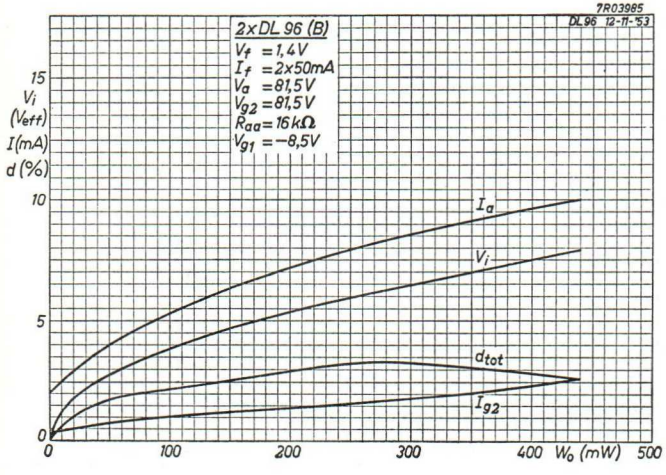

7R04310
DL 96 24-7-'54
Only for battery use
Seulement pour opération batterie
Nur für Batteriebetrieb
Rk 330Ω
Vf
If
I (mA)
Vi (Veff)
d(%)
IRk=Ia+Ig2+3,5mA
see p.4
voir p.4
siehe S.4
Ia
Vi
dtot
Ig2
2 x DL 96 (AB)
Vf = 2,8V
If = 2x25mA
Vb = 67,5V
Raa = 20kΩ
Rk = 470Ω
0
2
4
6
0
50
100
150
200
Wo (mW)
250


7R04311
DL 96 24-7-'54
Only for battery use
Seulement pour opération batterie
Nur für Batteriebetrieb
Rk 470Ω
Vf
If
I (mA)
Vi (Veff)
d(%)
IRk=Ia+Ig2+3,5mA
see p.4
voir p.4
siehe S.4
Ia
Vi
dtot
Ig2
2 x DL 96 (AB)
Vf = 2,8V
If = 2x25mA
Vb = 90V
Raa = 20kΩ
Rk = 560Ω
0
5
10
15
0
100
200
300
400
Wo (mW)
500

DL 96

PHILIPS





TUNING INDICATOR
INDICATEUR D'ACCORD
ABSTIMMANZEIGERÖHRE

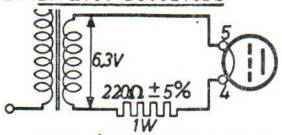
Heating: Direct by battery current, A.C. or D.C.; series or parallel supply.

A. In battery receivers

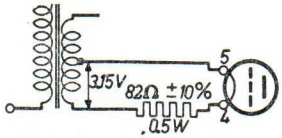
V_f = 1.4 V
I_f = 25 mA

One of the pins 4 and 5 should be connected to the earthed point of the detector circuit.

B. In A.C. receivers



With 6.3 V transformer winding



With 6.3 V winding with mid tap

Pin 5 should be connected to the earthed point of the detector circuit.

C. In A.C./D.C. receivers

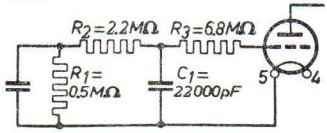
V_f = 1.3 V

The filament of the DM 70 with a suitable shunt resistor can be connected in a normal heater chain, provided an N.T.C. resistor is present.

Pin 5 should be connected to the earthed point of the detector circuit.

Grid circuit in the case of A.C. filament supply

In order to avoid hum a filter is recommended in the grid circuit according to the diagram underneath. R1 is the detector resistor. In the case of non-delayed A.G.C. the resistor R_2 and the capacitor C_1 are already present.



Anode circuit in the case of A.C. filament supply

In order to avoid hum an anode resistor is recommended according to the table below.

V_b = 250 V	R_a = 1.8 MΩ
V_b = 170 V	R_a = 1.0 MΩ
V_b = 110 V	R_a = 0.47 MΩ

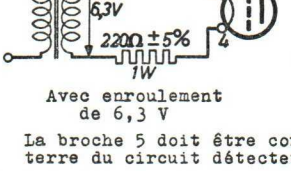
Voir page 2. Siehe Seite 3.

Chauffage: Direct par courant batterie, C.A. ou C.C.; alimentation en série ou en parallèle.

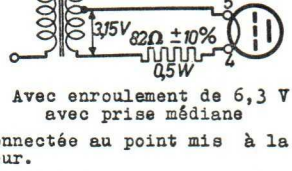
A. Dans des appareils batterie V_f = 1,4 V
I_f = 25 mA

Une des broches 4 et 5 doit être connectée au point mis à la terre du circuit détecteur.

B. Dans des récepteurs sur secteur alternatif



Avec enroulement de 6,3 V



Avec enroulement de 6,3 V avec prise médiane

La broche 5 doit être connectée au point mis à la terre du circuit détecteur.

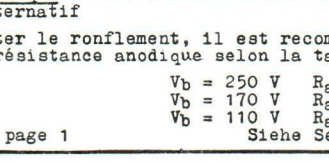
C. Dans des récepteurs tous-courants V_f = 1,3 V

Le filament du DM 70 avec une résistance parallèle propre, peut être connecté dans une chaîne de filaments normale, pourvu qu'une résistance N.T.C. soit présente.

La broche 5 doit être connectée au point mis à la terre du circuit détecteur.

Circuit de grille en cas d'alimentation du filament par courant alternatif.

Afin d'éviter le ronflement, il est recommandé d'utiliser le filtre indiqué ci-dessous.
R_1 est la résistance du circuit détecteur. En cas de C.A.V.non retardé,la résistance R_2 et le condensateur C_1 sont déjà présents.



Circuit anodique en cas d'alimentation du filament par courant alternatif

Afin d'éviter le ronflement, il est recommandé d'utiliser une résistance anodique selon la table suivante.

V_b = 250 V	R_a =	1,8	MΩ
V_b = 170 V	R_a =	1,0	MΩ
V_b = 110 V	R_a =	0,47	MΩ

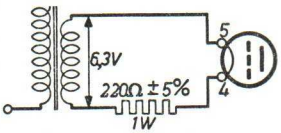
See page 1 Siehe Seite 3.

Heizung: Direkt durch Batteriestrom, Wechsel- oder Gleichstrom; Serien- oder Parallelspeisung.

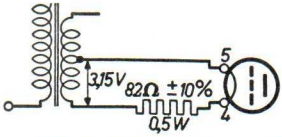
A. In Batteriegeräten V_f = 1,4 V
I_f = 25 mA

Einer der Stifte 4 und 5 soll mit dem Erdpunkt der Detektorschaltung verbunden werden.

B. In Wechselstromempfängern



Mit 6,3 V-Wicklung



Mit 6,3 V-Wicklung mit Mittelanzapfung

Der Stift 5 soll mit dem Erdpunkt der Detektorschaltung verbunden werden.

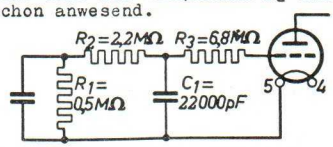
C. In Gleich- Wechselstromempfängern V_f = 1,3 V

Der Heizfaden der DM 70 mit einem geeigneten Nebenwiderstand kann in eine normale Heizkette geschaltet werden unter der Bedingung dass ein NTC-Widerstand anwesend ist.

Der Stift 5 soll mit dem Erdpunkt der Detektorschaltung verbunden werden.

Gitterschaltung falls der Heizfaden von Wechselstrom gespeist wird.

Zur Vermeidung von Brumm wird in der Gitterschaltung ein Filter nach untenstehender Schaltung empfohlen. R_1 ist der Detektorwiderstand. Im Falle nicht-verzögerter A.L.R. sind der Widerstand R_2 und der Kondensator C_1 schon anwesend.



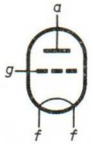
Anodenschaltung falls der Heizfaden von Wechselstrom gespeist wird.

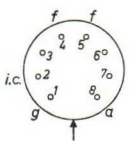
Zur Vermeidung von Brumm wird ein Anodenwiderstand nach untenstehender Tabelle empfohlen.

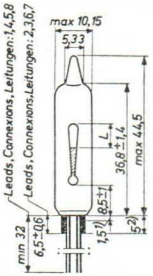
V_b = 250 V	R_a = 1,8 MΩ
V_b = 170 V	R_a = 1,0 MΩ
V_b = 110 V	R_a = 0,47 MΩ

See page 1. Voir page 2.

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Subminar 8p

L = length of the light bar
L = longueur de la barre lumineuse
L = Länge des leuchtenden Striches

L = max. 14 mm

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

A. Battery supply
Alimentation par batterie
Batteriespeisung

V_f	=	1,4 [3])	1,4 [4])	V
V_b	=	67,5	90	V
V_a [5])	=	60	85	V
V_g	=	0	0	V
I_a	=	105	170	µA
L	=	10	11	mm
V_g (L=0)	=	-7	-10	V

B. Mains supply
Alimentation par le secteur
Netzbetrieb

V_f [6])	=	1,4	1,4	1,4	V
V_b	=	110	170	250	V
R_a	=	0,47	1,0	1,8	MΩ
V_g	=	0	0	0	V
I_a	=	105	110	105	µA
L	=	10	10	10	mm
V_g (L=0)	=	-15	-23	-34	V

[1]) ,....,[6]) see page 5., voir page 5., Siehe Seite 5.

Limiting values
Caractéristiques limites
Grenzdaten

V_{bo} = max. 450 V		W_a	= max. 75 mW
V_b = max. 300 V		I_k	= max. 0,6 mA
V_a = max. 150 V[7])		R_g	= max. 10 MΩ
V_a = **min.** 45 V			

---

[1]) This part of the leads should not be bent.
Ne pas plier cette partie des fils
Dieser Teil der Drähte soll nicht gebogen werden

[2]) This part of the leads should not be soldered
Ne pas souder cette partie des fils
Dieser Teil der Drähte soll nicht gelötet werden

[3]) D.C.; pin 5 grounded
C.C.; broche 5 mise à la terre
Gleichspannung; Stift 5 geerdet

[4]) D.C.; pin 4 grounded
C.C.; broche 4 mise à la terre
Gleichspannung; Stift 4 geerdet

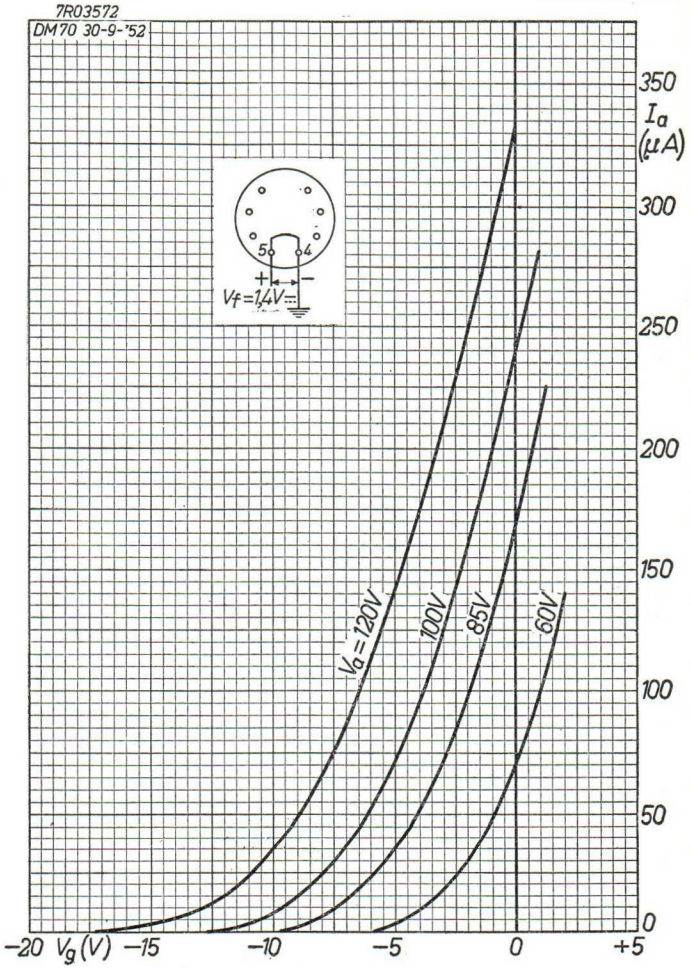
[5]) $V_a = V_b$ reduced by the bias for the output valve
$V_a = V_b$ diminué avec la polarisation négative du tube de sortie
$V_a = V_b$ verringert um die negative Vorspannung der Endröhre.

[6]) A.C.; pin 5 connected to earth. When V_f is adjusted according to page 1, I_a will be 1-2 µA lower. The other data remain unchanged.
C.A.; broche 5 connectée à la terre. Si V_f est ajusté selon page 2, I_a sera plus petit de 1-2 µA. Les autres caractéristiques restent inchangées.
Wechselspannung: Stift 5 geerdet. Wenn V_f eingestellt wird wie auf Seite 3 angegeben, so wird I_a um 1-2 µA niedriger, die anderen Daten bleiben ungeändert.

[7]) In non-controlled condition
En condition non-réglée
In nicht-geregeltem Zustande

PHILIPS

DM 70



9.9.1952

A

DM 70

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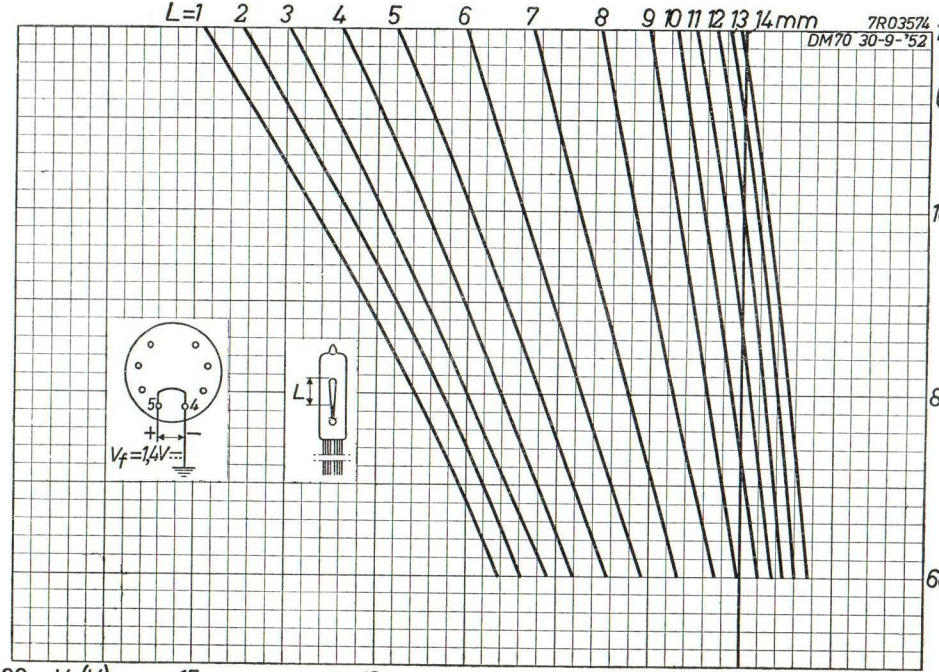
B



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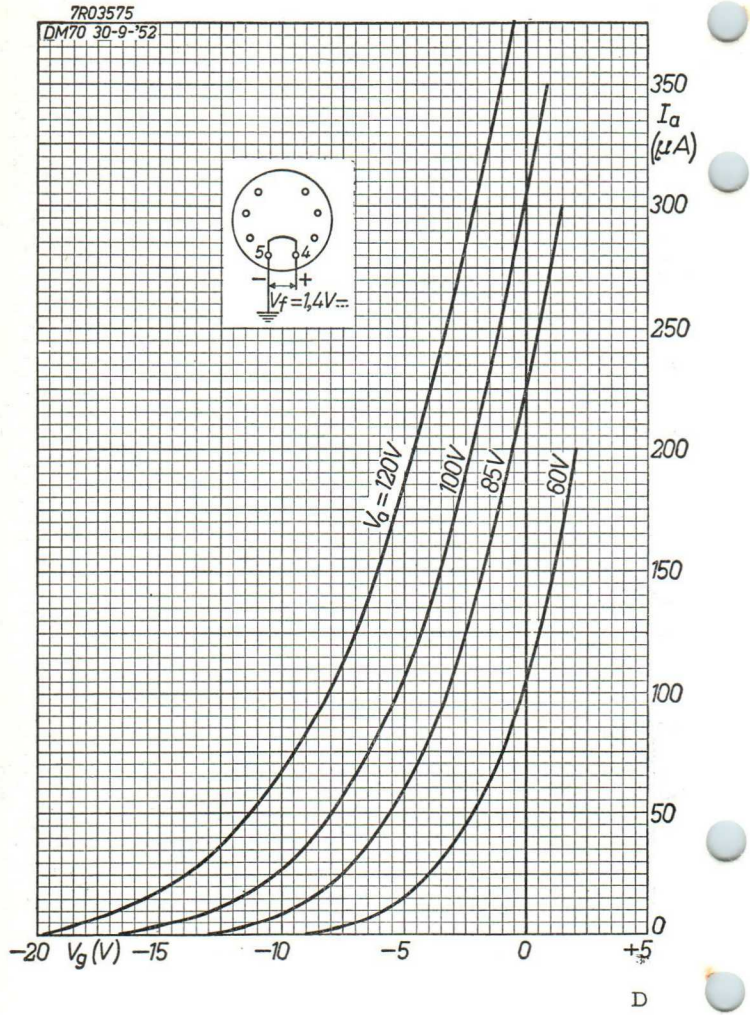
DM70

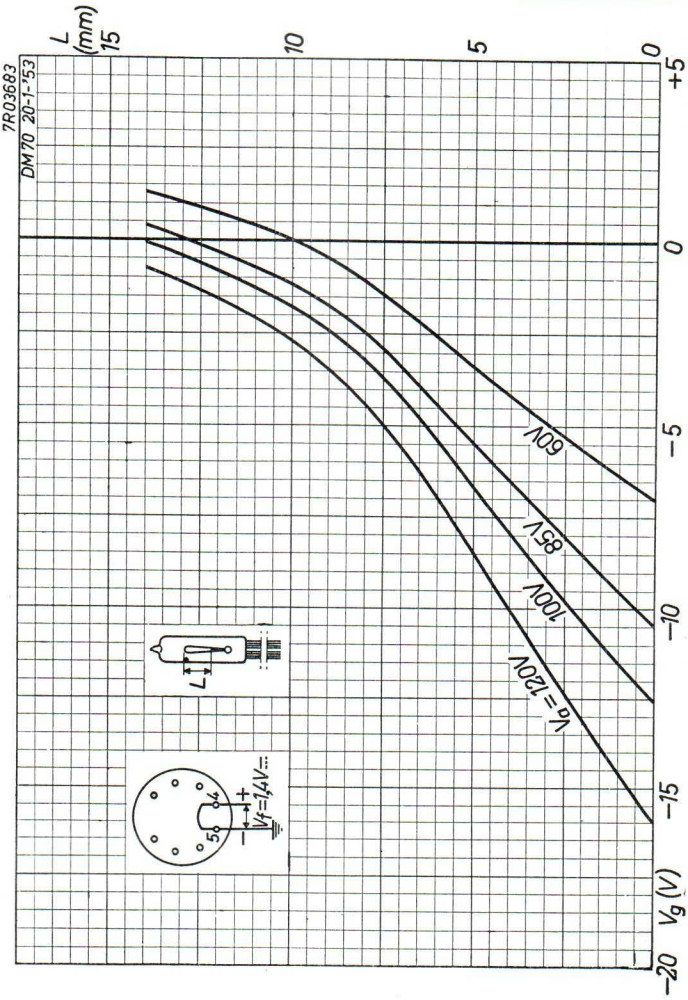
9.9.1952

C

DM 70 PHILIPS

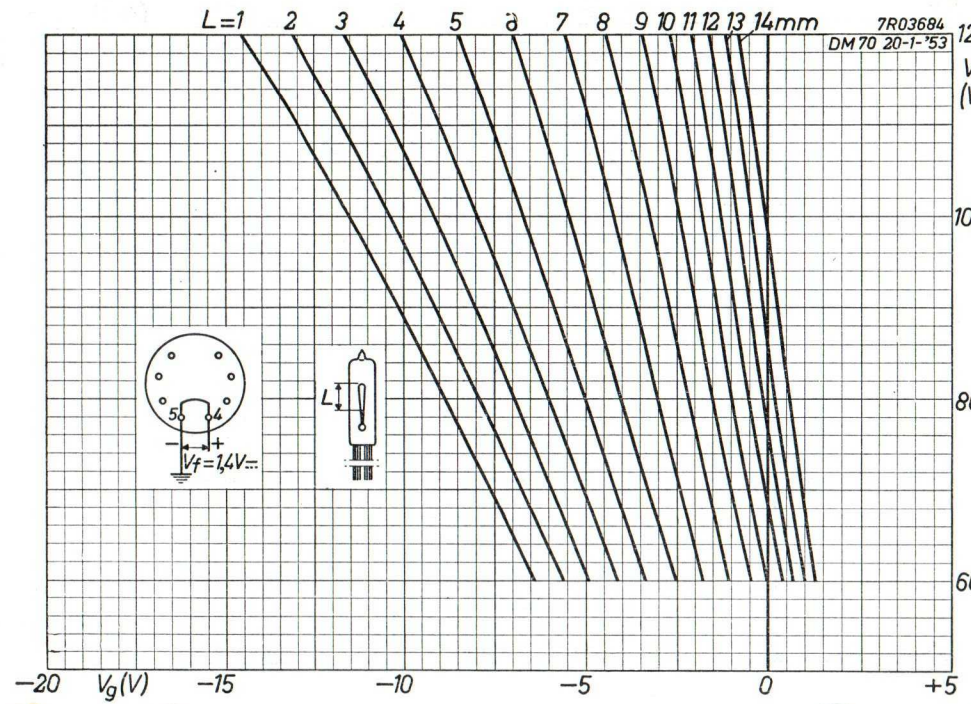


D


7R03683
DM70 20-1-'53
L (mm)
15
10
5
0
+5
0
−5
−10
−15
−20 Vg (V)
60V
85V
100V
Va = 120V
L
Vf=1,4V
5
4

2.2.1953

E



DM70

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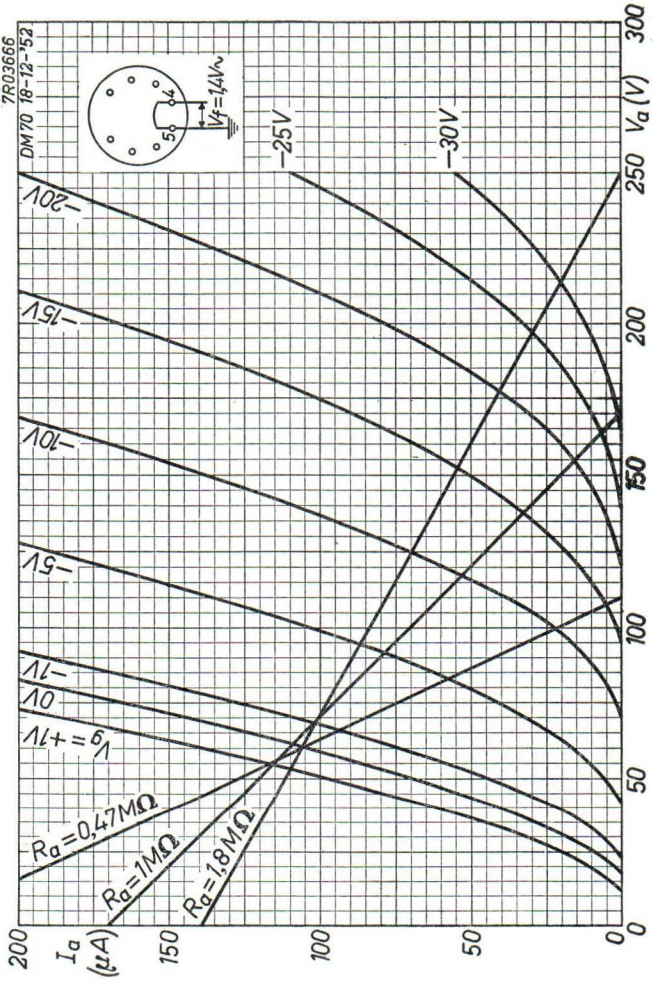
F


7R03666
DM70 18-12-52
Vf=1,4V~
-25V
-30V
-20V
-15V
-10V
-5V
-1V
0V
+1V
Vg =
Ra=0,47MΩ
Ra=1MΩ
Ra=1,8MΩ
Ia (μA)
Va (V)
200
150
100
50
0
300
250
200
150
100
50
0

12.12.1952

DM 70

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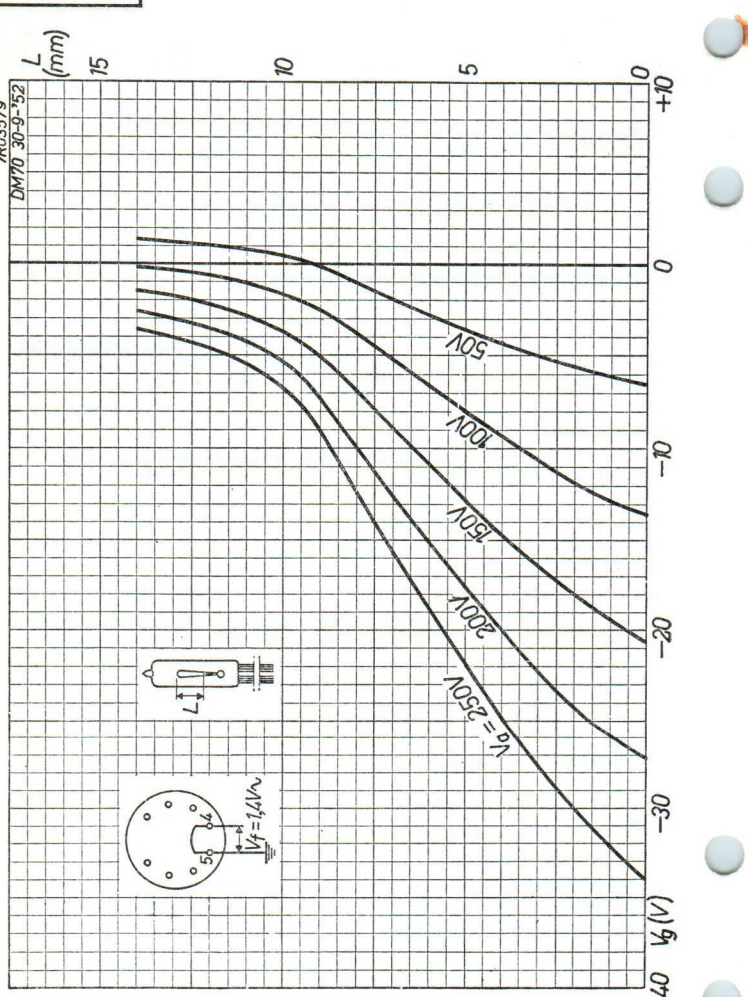
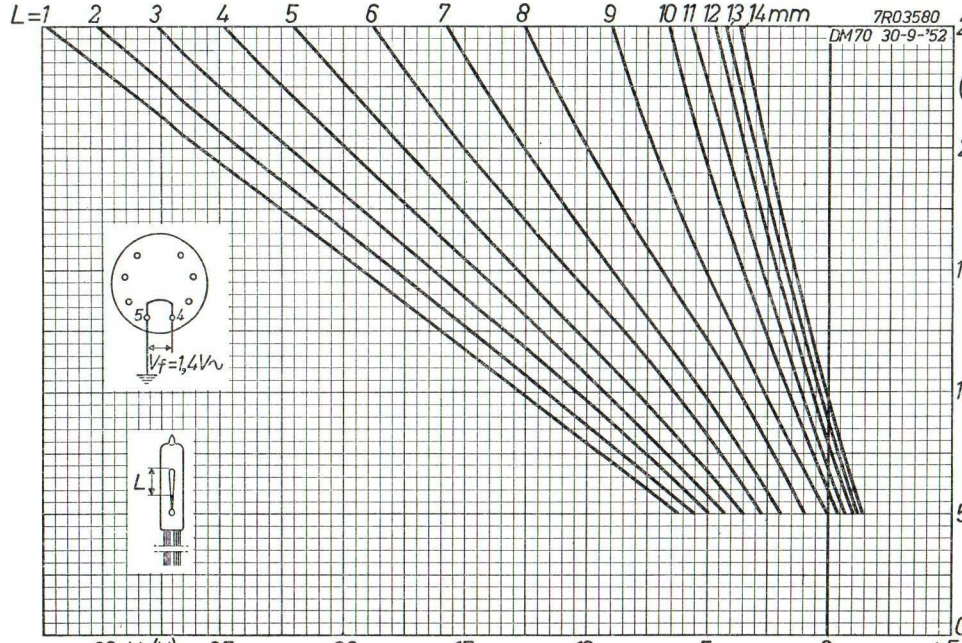




PHILIPS

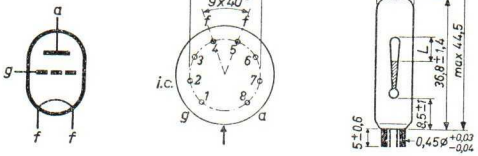
DM70

9.1952

1

TUNING INDICATOR
INDICATEUR D'ACCORD
ABSTIMMANZEIGEROHRE

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: Subminiature

For further data and curves refer to type DM 70
Pour les autres caractéristiques et courbes voir type DM 70
Für die übrigen Daten und Kurven siehe Typ DM 70

SQ PHILIPS DM 160

SPECIAL QUALITY, LONG LIFE AND SHOCK RESISTANT, DIRECTLY HEATED VOLTAGE INDICATOR for use in transistorized computers

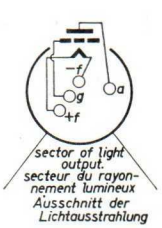
INDICATEUR DE TENSION A CHAUFFAGE DIRECT ET A HAUTE SECURITE DE LONGUE DUREE ET RESISTANT AUX CHOCS, pour utilisation dans des machines à calculer équipées de transistors

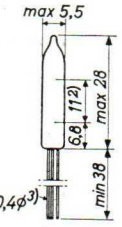
ZUVERLÄSSIGE, STOSSFESTE, DIREKT GEHEIZTE SPANNUNGSANZEIGE-RÖHRE MIT LANGER LEBENSDAUER zur Verwendung in Rechenmaschinen mit Transistorbestückung

Heating : direct by A.C. or D.C.; parallel supply
Chauffage: direct par C.A. ou C.C.; alimentation parallèle
Heizung : direkt durch Wechsel- oder Gleichstrom; Parallelspeisung

$V_f = 1{,}0$ V
$I_f = 30$ mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Remark

Directly soldered connections to the leads of this tube must be at least 5 mm from the seal and any bending of the leads must be at least 1.5 mm from the seal

Observation

Ne pas faire de soudures à moins de 5 mm, et ne pas plier les fils de sortie à moins de 1,5 mm de l'embase

Bemerkung

Lötanschlüsse an den Drahtausführungen müssen mindestens 5 mm, etwaige Biegestellen mindestens 1,5 mm von den Glasdurchführungen entfernt sein

---

2) Length of the light bar
Longueur de la barre lumineuse
Länge des leuchtenden Striches

3) Gold plated leads
Fils dorés
Vergoldete Drähte

Characteristics (Anode and grid voltages measured with respect to the midtap of the filament transformer)
Caractéristiques (Les tensions d'anode et de grille sont mesurées par rapport à la prise médiane du transformateur de chauffage)
Kenndaten (Anoden- und Gitterspannung gemessen in Bezug auf die Mittelanzapfung des Heiztransformators)

Column I: Setting of the triode and typical (average) measuring results of new tubes
II: Characteristic range values for equipment design
III: Data indicating the endpoint of life

Colonne I: Valeurs pour le réglage de la triode et les résultats moyens de mesures de tubes neufs
II: Gamme de valeurs caractéristiques pour l'étude d'équipements
III: Valeurs déterminant la fin de durée de vie

Spalte I: Einstelldaten der Triode und mittlere Messergebnisse neuer Röhren
II: Charakteristischer Wertbereich für Gerätentwurf
III: Werte die das Ende der Lebensdauer bestimmen

		I	II	III	
V_f	=	1.			V
I_f	=	30	24-36		mA
V_a	=	50			V
V_{bg}	=	0			V
R_g	=	0,1			MΩ
I_a	=	585	430-740	250	µA
V_a	=	50			V
V_g	=	-3			V
R_g	=	0,1			MΩ
I_a	=		< 5		µA
V [1]	=	50			V
R_{isol} [1]	=		> 100		MΩ

[1]) Voltage and insulation resistance between two arbitrary electrodes

Tension et résistance d'isolement entre deux électrodes quelconques

Spannung und Isolationswiderstand zwischen zwei willkürlichen Elektroden

Anode and grid voltages measured with respect to the midtap of the filament transformer
Les tensions d'anode et de grille sont mesurées par rapport à la prise médiane du transformateur de chauffage
Anoden- und Gitterspannung gemessen in Bezug auf die Mittelanzapfung des Heiztransformators

Life expectancy: 10 000 hours under the following life test conditions:
Durée prévue : 10 000 heures sous les conditions d'essai de durée suivantes:
Erwartete Lebensdauer: 10 000 Stunden unter folgenden Bedingungen einer Lebensdauerprobe:

V_f = 1,0 V_{eff}
V_a = 50 V
V_{bg} = 0 V
R_g = 100 kΩ

The data indicating the endpoint of life are given in column III under the heading Characteristics
Les valeurs déterminant la fin de la durée sont données dans la colonne III des Caractéristiques
Die Werte die das Ende der Lebensdauer bestimmen sind angegeben worden in Spalte III der Kenndaten

Shock resistance: about 500 g [1])

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

Résistance aux chocs: environ 500 g [1])

Des forces telles que celles appliquées 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 du tube

Stossfestigkeit: etwa 500 g [1])

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

---

[1]) 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

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

	V_f	=	1,0 V_{eff}
	V_a	=	50 V
light output	R_g	=	100 kΩ
B = débit lumineux	V_{bg} (B = max.)	=	0 V
Lichtausbeute	I_a (B = max.)	=	585 µA
	V_{bg} (B = 0)	=	-3 V
	I_a (B = 0)	<	5 µA

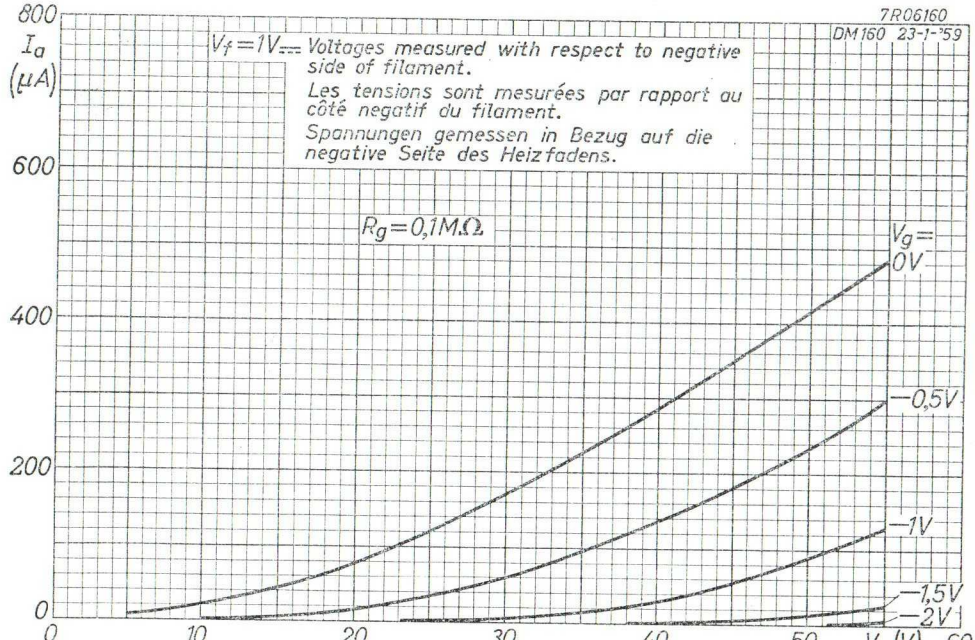
A considerable improvement in contrast can be obtained by using a light filter of cellulose acetate with a thickness of about 0.3 mm shifting the spectral light curve from the green towards the blue region

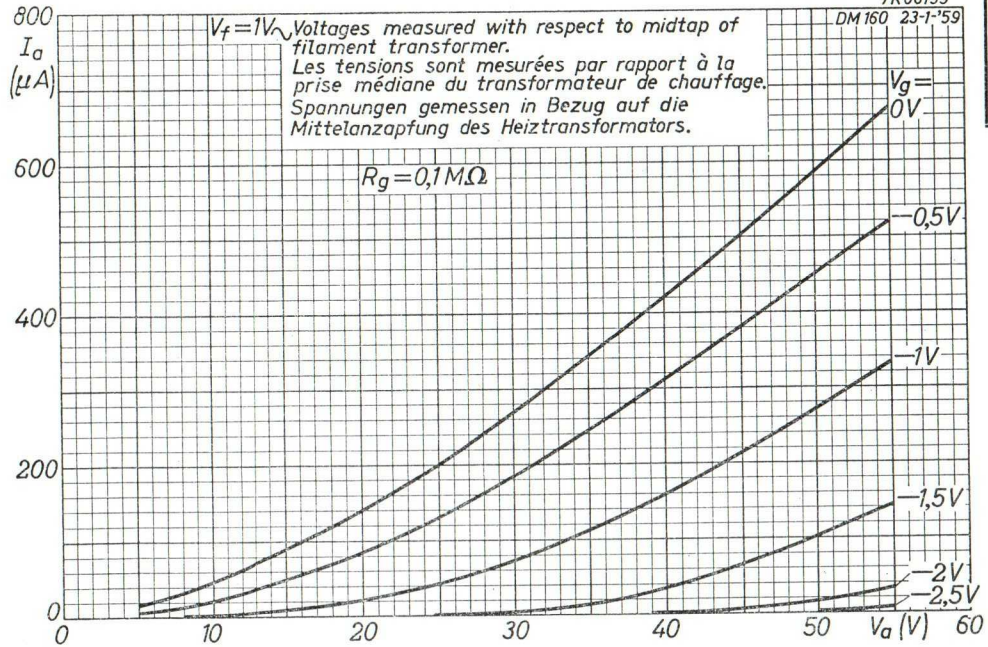
On peut obtenir une amélioration considérable du contraste en utilisant un filtre de lumière d'acétate cellulose avec une épaisseur d'environ 0,3 mm qui déplace la courbe spectrale de lumière de la région verte vers la région bleue

Man kann eine wesentliche Verbesserung des Kontrastes erzielen durch Verwendung eines Lichtfilters aus Cellulose-Acetat mit einer Dicke von etwa 0,3 mm das die spektrale Lichtkennlinie aus dem grünen nach dem blauen Gebiet verschiebt

Limiting values (Absolute limits)
Caractéristiques limites (Limites absolues)
Grenzdaten (Absolute Werte)

V_{ao}	= max. 100 V
V_a	= max. 65 V
V_{bg}	= max. 0 V
$-V_g$	= max. 50 V
I_a	= max. 750 µA
R_g	= min. 0,1 MΩ = max. 1,0 MΩ
V_f	= 1,0 V ± 5 %


7R06160
DM160 23-1-'59
$V_f = 1V_{=}$ Voltages measured with respect to negative side of filament.
Les tensions sont mesurées par rapport au côté negatif du filament.
Spannungen gemessen in Bezug auf die negative Seite des Heizfadens.
$R_g = 0{,}1M\Omega$
I_a (μA)
800
600
400
200
0
0
10
20
30
40
50
60
V_a (V)
V_g = 0V
−0,5V
−1V
−1,5V
−2V


7R06159
DM160 23-1-'59
$V_f = 1V_{\sim}$ Voltages measured with respect to midtap of filament transformer.
Les tensions sont mesurées par rapport à la prise médiane du transformateur de chauffage.
Spannungen gemessen in Bezug auf die Mittelanzapfung des Heiztransformators.
$R_g = 0{,}1\,M\Omega$
I_a (μA)
800
600
400
200
0
V_g =
0V
−0,5V
−1V
−1,5V
−2V
−2,5V
0
10
20
30
40
50
60
V_a (V)

PHILIPS

DY 86

This tube is equivalent to type DY 87, except for the envelope, not being chemically treated

Ce tube est équivalent au type DY 87, à l'exception de l'ampoule, qui n'a pas été traitée chimiquement

Diese Röhre ist äquivalent mit Typ DY 87, mit Ausnahme des Glaskolbens, welche nicht chemisch behandelt worden ist

PHILIPS

DY 87

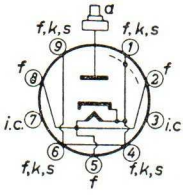
High-vacuum single-anode RECTIFYING TUBE for high tension in television receivers (E.H.T. supply from the line time base)
TUBE REDRESSEUR MONOPLAQUE à vide poussé pour la haute tension de récepteurs de télévision (alimentation très haute tension de la base de temps lignes)
Einanodige hochvakuum GLEICHRICHTERRÖHRE für Hochspannungsbetrieb in Fernsehempfängern (Hochspannungsspeisung von der Zeilenzeitbasis)

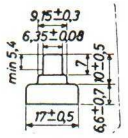
The tube has a chemically treated envelope which avoids flash-over under conditions of high humidity and low atmospheric pressure (45 cm Hg)
L'ampoule du tube est traîtée d'une façon chimique qui empêche une décharge disruptive en cas d'une humidité élevée et d'une pression atmosphérique basse (45 cm Hg)
Die Röhre hat einen chemisch behandelten Glaskolben, wodurch Überschlag bei hoher Feuchtigkeit und niedrigem atmosphärischem Druck (45 cm Hg) vermieden wird

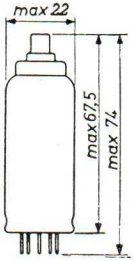
Heating : indirect by A.C. or D.C. parallel supply
Chauffage: indirect par C.A. ou C.C. alimentation parallèle
Heizung : indirekt durch Wechsel- oder Gleichstrom; Parallelspeisung

$V_f = 1{,}4\ V$ [1)] [2)]
$I_f = 550\ mA$

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: NOVAL

Pins 1,4,6,9 can be used for fixing an anti-corona ring
Broches 1,4,6,9 peuvent être utilisées pour le montage d'un anneau anticouronne
Stifte 1,4,6 und 9 können für die Befestigung eines Antikoronaringes gebraucht werden

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

[2)] See page 3; voir page 3; siehe Seite 3

Remarks

a. Circuit elements having the same potential as the heater (e.g. a series resistor) may be connected to pins 3 and 7. These pins must never be earthed

b. If the tube operates at high values of $V_{a\ invp}$ and/or under conditions of high relative humidity or low pressure the metal top-cap should get an insulating cover to avoid corona phenomena

Observations

a. Les éléments du montage, dont le potentiel est le même que celui du filament, peuvent être reliés aux broches 3 et 7. Ces broches ne doivent pas être mises à la terre.

b. Si le tube fonctionne avec des valeurs élevées de $V_{a\ invp}$ et/ou dans des conditions de forte humidité relative ou de basse pression, le capot supérieur métallique devra recevoir une couverture isolante pour éviter les phénomènes coronaires.

Bemerkungen

a. Schaltungsteile mit dem gleichen Potential wie der Glühfaden (z.B. ein Serienwiderstand) können mit den Stiften 3 und 7 verbunden werden. Diese Stifte sollen keinesfalls geerdet werden

b. Wird die Röhre mit hohen $V_{a\ invp}$-Werten und/oder bei hoher Feuchtigkeit bzw. niedrigem Druck betrieben, so ist die Metallkappe zur Vermeidung von Koronaerscheinungen mit einem Isolationsüberzug zu versehen

Capacitance (without external shield)
Capacité (sans blindage extérieur) C_a = 1,55 pF ←
Kapazität (ohne äusserer Abschirmung)

Operating characteristics I_o = 0,15 mA
Caractéristiques d'utilisation V_o = 18 kV
Betriebsdaten

Limiting values (design centre values)
Caractéristiques limites (valeurs moyennes)
Grenzdaten (Normalgrenzdaten)

$V_{a\ invp}$	= max.	22 kV	3)4)
$V_{a\ invp}$ (I_o = 0 mA)	= max.	24 kV	3)4)
$V_{a\ invp}$	= max.	27 kV	4)5)
I_o	= max.	0,5 mA	6) ←
I_{a_p}	= max.	40 mA	7)
C_{filt}	= max.	2000 pF	

3)4)5)6)7) See page 4; voir page 4; siehe Seite 4

[2] Tolerances of Vf; Tolérances de Vf; Heizspannungsschwankungen

a. As E.H.T. rectifier in television receivers

The heater voltage should be adjusted to its nominal value at a D.C. output current of 200 µA. At an increase of the D.C. output current to 400 à 600 µA which can incidentically occur during operation the decrease of the heater voltage may amount to max. 15%. These requirements hold for nominal mains voltage and full horizontal scanning of the picture tube. If the picture width control is such that also the heater voltage of the E.H.T. diode is influenced, the influence of this control must be kept within the 15% limit indicated above

b. For all other applications the limits for the heater voltage are as given in the application directions in front of this section

a. Utilisation comme redresseur T.H.T. dans les récepteurs de télévision

La tension de chauffage devra être réglée à sa valeur nominale pour une intensité continue de sortie de 200 µA. Pour une augmentation de l'intensité continue de sortie allant jusqu'à 400 à 600 µA, accroissement pouvant se produire par instants en cours de fonctionnement, la diminuation de la tension de chauffage peut se monter au maximum à 15%. Ces exigences sont valables pour la tension nominale du secteur et l'exploration totale horizontale du tube image. Si la commande de la largeur d'image est telle que la tension de chauffage de la diode T.H.T. est également influencée, l'influence de cette commande doit être maintenue au-dessous de la limite de 15% indiquée ci-dessus

b. Pour toutes les autres applications, les limites de la tension de chauffage ont été données dans l'indications d'application en tête de ce chapitre

a. Zur Verwendung als Hochspannungsgleichrichter in Fernsehempfängern

Die Einstellung der Heizspannung auf den Nennwert soll bei einem Ausgangsstrom von 200 µA erfolgen. Bei Ansteigen des Ausgangsgleichstroms auf 400 - 600 µA, wie dies im praktischen Betrieb gelegentlich vorkommen kann, darf die Verringerung der Heizspannung maximal 15% betragen. Diese Forderung gilt für nominale Netzspannung und volle Horizontalablenkung. Ist die Bildbreiteregelung derart, dass auch die Heizspannung der Hochspannungsdiode beeinflusst wird, so ist der Einfluss dieser Regelung auf die obenerwähnte 15%-Grenze zu beschränken

b. Für alle sonstigen Anwendungen sind die Grenzwerte der Heizspannung die gleichen wie in den Anwendungsrichtlinien am Anfang dieses Abschnitts angegeben

[1]) When the heater is to be operated on R.F. or flyback pulses, the heater voltage can be adjusted to 1.4 V e.g. by measurement with a thermocouple

Lorsque le filament est alimenté par des impulsions H.F. ou par des impulsions de retour, la tension de chauffage peut être réglée à 1,4 V par example par une mesure avec un couple thermoélectrique

Wenn die Katode mittels Hochfrequenz oder Rücklaufimpulsen geheizt wird, so kann die Heizspannung z.B. mittels Messung mit einem Thermoelement auf 1,4 V eingestellt werden

[3]) The negative peak anode voltage due to ringing in the line-output transformer must be taken into account. The ratio between this negative peak and the positive D.C. voltage can be about 1 to 4.5

La tension anodique négative de crête due aux oscillations transitoires du transformateur de sortie lignes doit être prise en considération. Le rapport entre cette tension de crête négative et la tension positive continue peut être d'environ 1 à 4,5

Die negative Anodenspitzenspannung infolge von Nachschwingen des Horizontalausgangstransformators muss berücksichtigt werden. Das Verhältnis zwischen dieser negativen Spitzenspannung und der positiven Gleichspannung darf etwa 1 zu 4,5 betragen

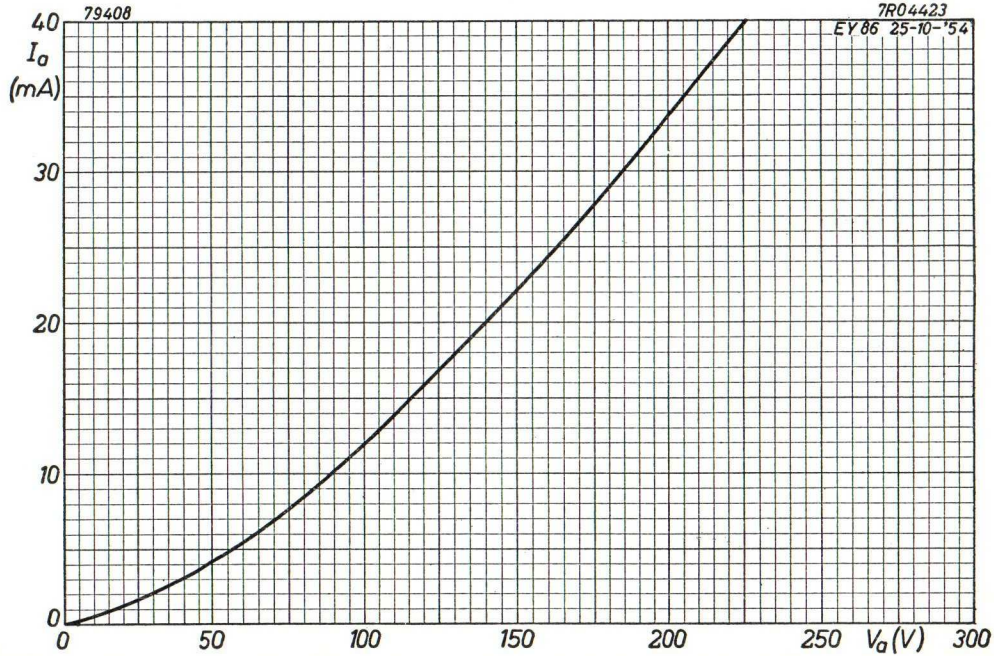
[4]) Maximum pulse duration 22 % of a line scanning cycle with a maximum of 18 µsec
Durée maximum d'une impulsion 22 % d'une période de balayage de ligne avec un maximum de 18 µsec
Max. Impulsdauer 22 % einer Zeilendauer, maximal 18 µSek

[5]) Absolute value
Valeur absolue
Absolutwert

→ [6]) During short periods as in television service I_O = max. 0.8 mA
Pendant des périodes courtes comme en service de télévision I_O = max. 0,8 mA
Während kurzer Perioden wie bei Fernsehbetrieb ist I_O = max. 0,8 mA

[7]) Maximum pulse duration 10 % of a line scanning cycle with a maximum of 10 µsec
Durée maximum d'une impulsion 10 % d'une période de balayage de ligne avec un maximum de 10 µsec
Max. Impulsdauer 10 % einer Zeilendauer, maximal 10 µSek

8.8.1956



PHILIPS

DY87

A

For E-types please refer to volume IA
Pour les types -E- voir le tome IA
-E-Röhren siehe Band IA

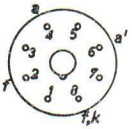
PHILIPS

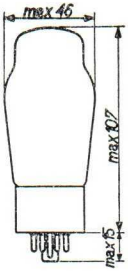
GZ 32

High vacuum FULL WAVE RECTIFIER
REDRESSEUR BIPLAQUE à vide poussé
Hochvakuum VOLLWEGGLEICHRICHTER

Heating:	indirect parallel supply		
Chauffage:	indirect alimentation en parallèle	Vf =	5,0 V If = 2,0 A
Heizung:	indirekt Parallelspeisung		

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Operating conditions and limiting values
Caractéristiques d'utilisation et limites
Betriebs- und Grenzdaten

A. **Condenser input of the filter**
Un condensateur à l'entrée du filtre
Kondensatoreingang des Filters

V_{tr} =	max. 2x300	max. 2x350	max. 2x500 V_{eff}
I_o =	max. 300	max. 250	max. 125 mA

C (µF)	Rt (Ω)
60	min.150
32	min.100
16	min. 50

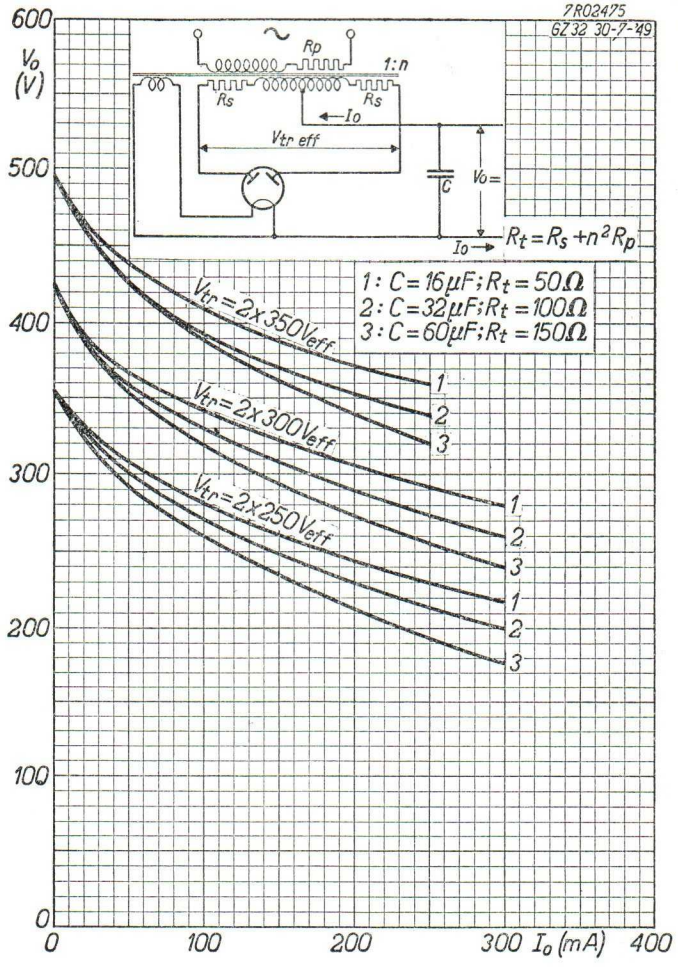
B. Choke input of the filter
Un self à l'entrée du filtre
Drosseleingang des Filters

V_{tr} =	max. 2x400	max. 2x500 V_{eff}
I_o =	max. 300	max. 250 mA

PHILIPS

GZ 32

7R02475
GZ32 30-7-49



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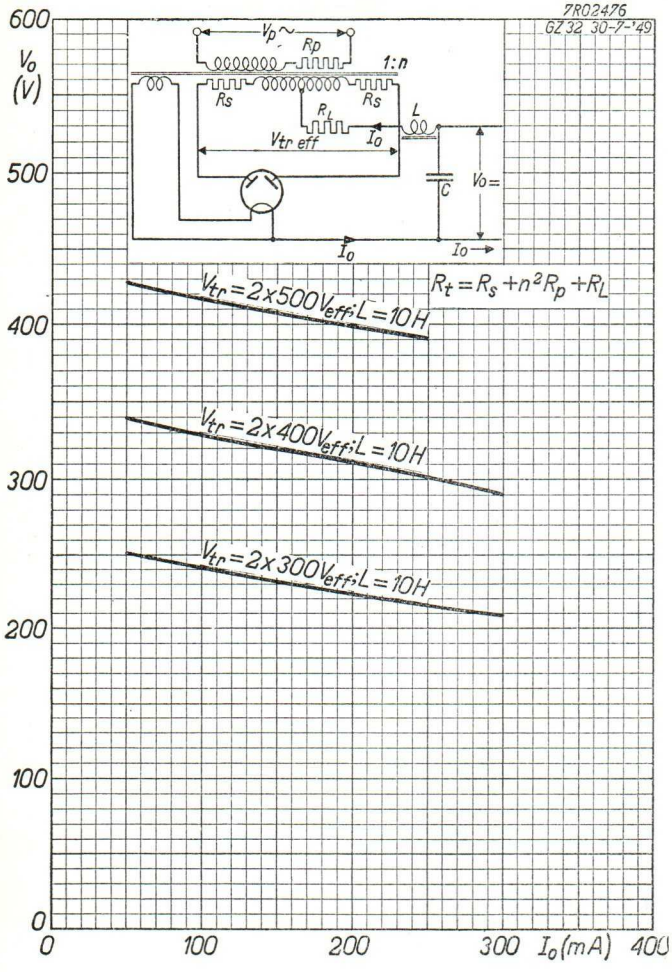
GZ32 PHILIPS



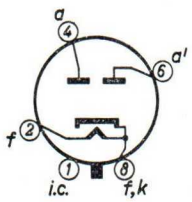
B

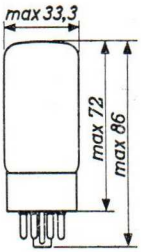
PHILIPS GZ34

High-vacuum FULL-WAVE RECTIFYING TUBE
TUBE REDRESSEUR BIPLAQUE à vide poussé
Hochvakuum VOLLWEGGLEICHRICHTERRÖHRE

Heating : indirect by A.C. V_f = 5 V
Chauffage: indirect par C.A. I_f = 1,9 A
Heizung : indirekt durch Wechselstrom

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: Octal

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

A. Capacitor input
A condensateur d'entrée
Kondensatoreingang

V_{tr}	=	2x300	2x350	2x400	Veff
I_o	=	250	250	250	mA
R_t	=	2x75	2x100	2x125	Ω
C_{filt}	=	60	60	60	µF
V_o	=	330	380	430	V
V_{tr}	=	2x450	2x500	2x550	Veff
I_o	=	250	200	160	mA
R_t	=	2x150	2x175	2x200	Ω
C_{filt}	=	60	60	60	µF
V_o	=	480	560	640	V

B. Choke input
A self d'entrée
Drosseleingang

V_{tr}	=	2x300	2x350	2x400	V_{eff}
I_o	=	250	250	250	mA
L	=	10	10	10	H
R_t	=	0	0	0	Ω
→ V_o	=	250	290	330	V
V_{tr}	=	2x450	2x500	2x550	V_{eff}
I_o	=	250	250	225	mA
L	=	10	10	10	H
R_t	=	0	0	0	Ω
→ V_o	=	375	420	465	V

Limiting values (see also page D)
Caractéristiques limites (voir aussi page D)
Grenzdaten (siehe auch Seite D)

A. Capacitor input
A condensateur d'entrée
Kondensatoreingang

V_{invp}	= max.1500	V			
I_{ap}	= max. 750	mA			
C_{filt}	= max. 60	µF			
V_{tr}	= 2x300		2x350	2x400	V_{eff}
I_o	= max. 250		max. 250	max. 250	mA
R_t	= min.2x50		min.2x75	min 2x100	Ω
V_{tr}	= 2x450		2x500	2x550	V_{eff}
I_o	= max. 250		max. 200	max. 160	mA
R_t	= min.2x125		min.2x150	min.2x175	Ω

B. Choke input
A self d'entrée
Drosseleingang

V_{invp}	= max.1500	V		
I_{ap}	= max. 750	mA		
V_{tr}	≦ 2x500	= 2x550	V_{eff}	
I_o	= max. 250	max.225	mA	

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GZ34

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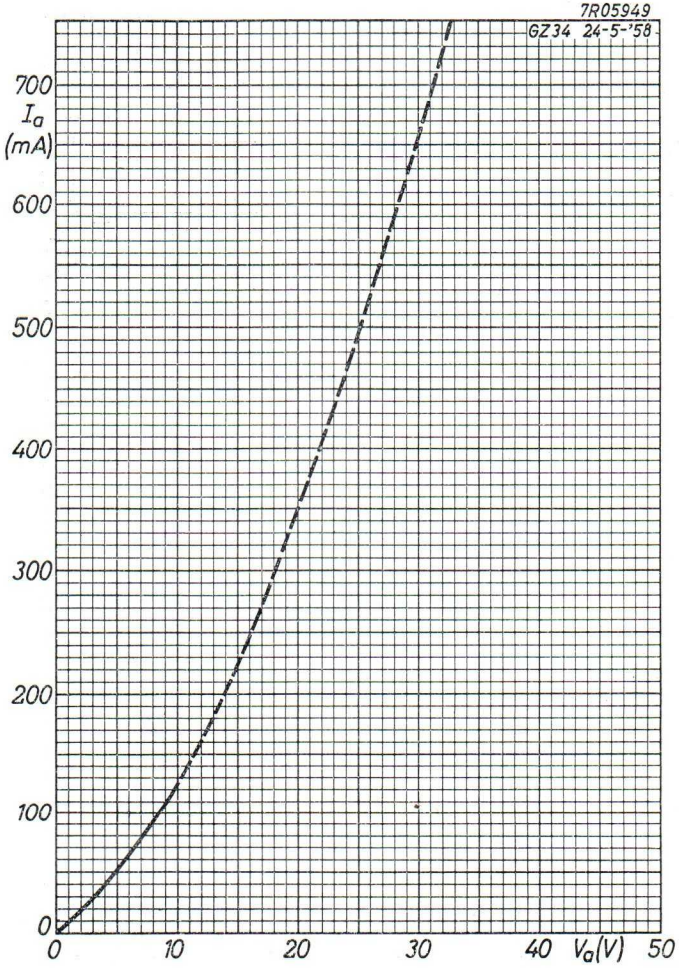
GZ34 24-5-'58



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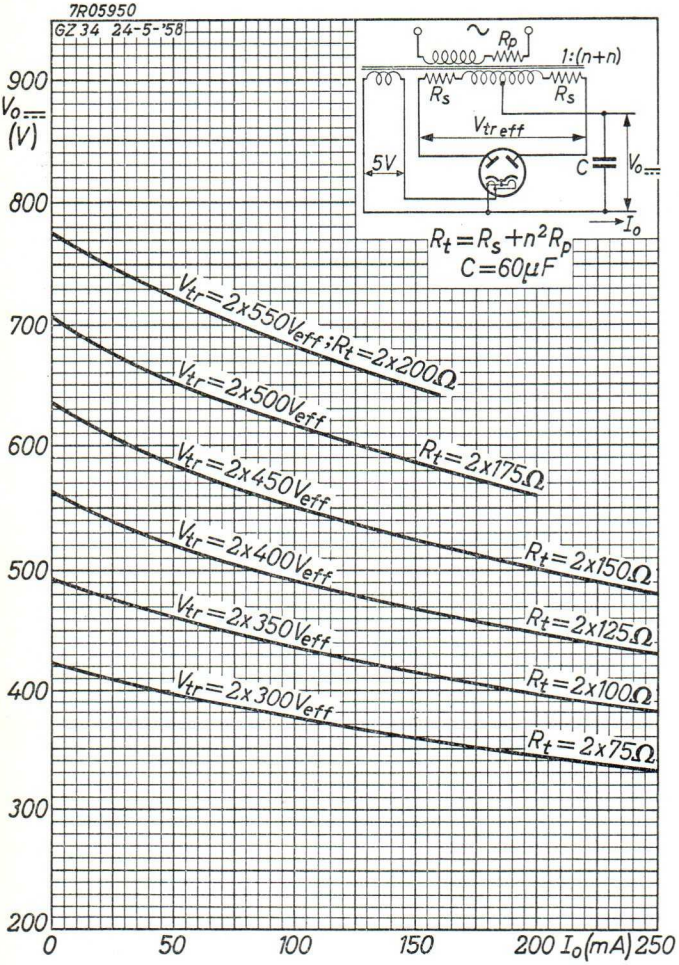
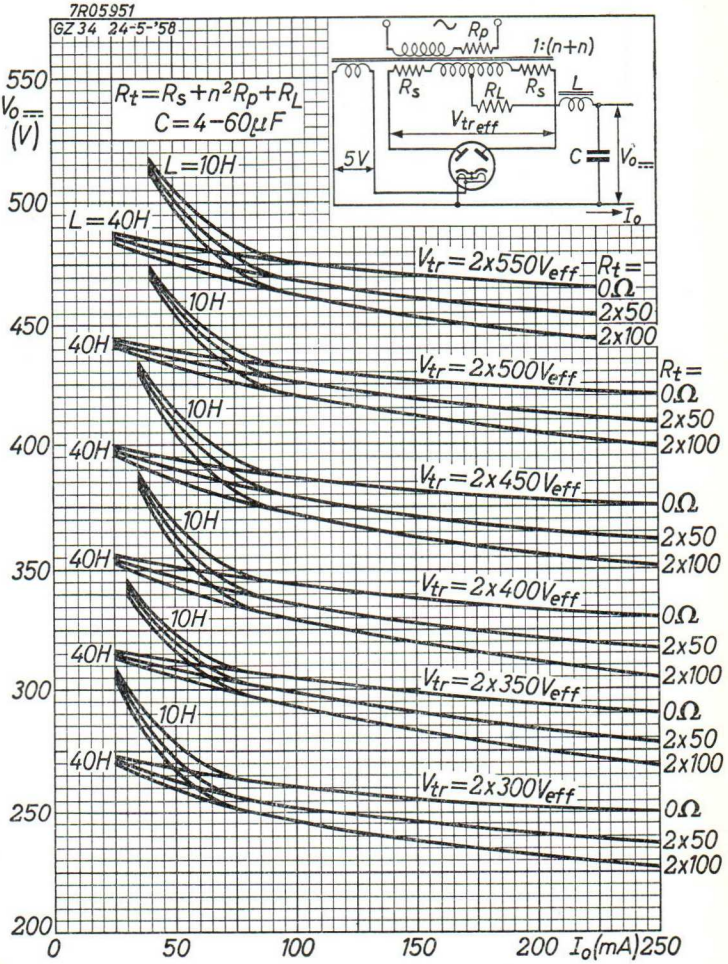
GZ34 PHILIPS

7R05950
GZ 34 24-5-'58



PHILIPS

GZ 34



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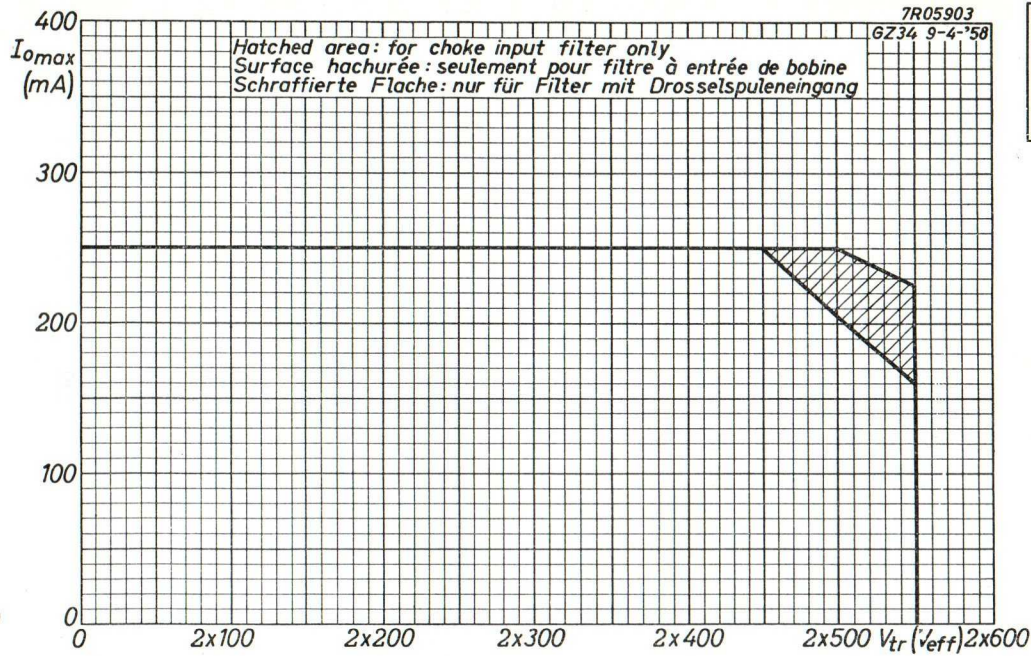


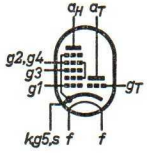
GZ34

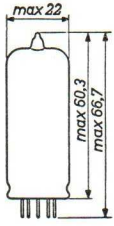
PHILIPS

TRIODE-HEPTODE for use in A.M.,F.M. and AM/FM receivers
TRIODE-HEPTODE pour applications dans des récepteurs A.M., F.M. et AM/FM
TRIODE-HEPTODE zur Verwendung in AM-, FM- und AM/FM Empfängern

Heating : indirect; series or parallel supply — V_f = 12,6 V
Chauffage: indirect; alimentation série ou parallèle — I_f = 150 mA
Heizung : indirekt; Serien- oder Parallelspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances
Capacités
Kapazitäten

Triode section Partie triode Triodenteil		Heptode section Partie heptode Heptodenteil	
C_g = 2,6 pF	C_{g_1} = 4,8 pF	$C_{g_1 g_3}$ < 0,3 pF	
C_a = 2,1 pF	C_a = 7,9 pF	$C_{g_1 f}$ < 0,17 pF	
C_{ag} = 1,0 pF	C_{ag_1} < 0,006 pF	$C_{g_3 f}$ < 0,06 pF	
C_{gf} < 0,02 pF	C_{g_3} = 6,0 pF		

Between triode and heptode sections
Entre les parties triode et heptode
Zwischen Trioden- und Heptodenteil

C_{aH-aT}	= 0.20 pF[1)]	$C_{g_1 H-gT}$	< 0,170 pF
C_{aH-gT}	< 0.090 pF	$C_{g_1 H-(gT+g_3)}$	< 0.450 pF
$C_{g_1 H-aT}$	< 0,060 pF	$C_{aH-(gT+g_3)}$	< 0,350 pF

[1)] See page 6; voir page 6; siehe Seite 6

Operating characteristics of the heptode section for use as mixer
Caractéristiques d'utilisation de la partie heptode comme tube mélangeur
Betriebsdaten des Heptodenteiles als Mischröhre

$V_a = V_b$	=	200		V
$R(g_2+g_4)$	=	10		kΩ
$R(gT+g_3)$	=	47		kΩ
$I(gT+g_3)$	=	230		μA
V_{g_1}	=	-2,3	-28	V
$V(g_2+g_4)$	=	119	-	V
I_a	=	3,7	-	mA
$I(g_2+g_4)$	=	8,1	-	mA
S_c	=	775	7,75	μA/V
R_i	=	1	>3	MΩ
R_{eq}	=	75	-	kΩ

$V_a = V_b$	=	170		100		V
$R(g_2+g_4)$	=	10		10		kΩ
$R(gT+g_3)$	=	47		47		kΩ
$I(gT+g_3)$	=	200		115		μA
V_{g_1}	=	-2,0	-24	-1,1	-14,5	V
$V(g_2+g_4)$	=	103	-	63	-	V
I_a	=	3,2	-	1,7	-	mA
$I(g_2+g_4)$		6,7	-	3,7	-	mA
S_c	=	750	7,5	620	6,2	μA/V
R_i	=	0,9	>3	0,8	>3	MΩ
R_{eq}	=	70	-	62	-	kΩ

Operating characteristics of the heptode section as R.F. or I.F. amplifier
Caractéristiques d'utilisation de la partie heptode en amplificatrice H.F. ou M.F.
Betriebsdaten des Heptodenteiles als HF- oder ZF- Verstärker

$V_a = V_b$	=	200		V
V_{g_3}	=	0		V
$R_{(g_2+g_4)}$	=	18		kΩ
V_{g_1}	=	-2,3	-33	V
$V_{(g_2+g_4)}$	=	117	-	V
I_a	=	7,4	-	mA
$I_{(g_2+g_4)}$	=	4.6	-	mA
S	=	2,4	0,024	mA/V
R_i	=	0,5	>10	MΩ
$\mu_{g_2 g_1}$	=	20	-	
R_{eq}	=	9,7	-	kΩ
r_{g_1} [2]	=	2,1	-	kΩ

$V_a = V_b$	=	170		100		V
V_{g_3}	=	0		0		V
$R_{(g_2+g_4)}$	=	18		18		kΩ
V_{g_1}	=	-2,0	-28	-1,1	-16,5	V
$V_{(g_2+g_4)}$	=	102	-	60	-	V
I_a	=	6,25	-	3,4	-	mA
$I_{(g_2+g_4)}$	=	3,8	-	2,2	-	mA
S	=	2,3	0,023	2,0	0,020	mA/V
R_i	=	0,5	>10	0,45	>10	MΩ
$\mu_{g_2 g_1}$	=	20	-	20	-	
R_{eq}	=	8,8	-	5,8	-	kΩ
r_{g_1} [2]	=	2,0	-	1,4	-	kΩ

[2] Input resistance at 100 Mc/s
Résistance d'entrée à 100 Mc/s
Eingangswiderstand bei 100 MHz

Typical characteristics of the triode section
Caractéristiques types de la partie triode
Kenndaten des Triodenteiles

V_a	=	100 V
V_g	=	0 V
I_a	=	13,5 mA
S	=	3,7 mA/V
μ	=	22

Operating characteristics of the triode section as oscillator
Caractéristiques d'utilisation de la partie triode en oscillatrice
Betriebsdaten des Triodenteiles als Oszillator

V_b	=	200	170	100 V
R_a	=	15	15	15 kΩ
$R(gT+g_3)$	=	47	47	47 kΩ
$I(gT+g_3)$	=	230	200	115 µA
I_a	=	5,4	4,5	2,5 mA
S_{eff}	=	0,65	0,65	0,58 mA/V

Operating characteristics for use as A.F. amplifier
Caractéristiques d'utilisation en amplificatrice B.F.
Betriebsdaten als NF- Verstärker

The heptode section of this tube can be used without special precautions against microphonic effect in circuits in which the input voltage V_i › 50 mV for an output of 50 mW of the output tube. For the triode section the corresponding value is 25 mV.

La partie heptode de ce tube peut être utilisée sans précautions spéciales contre l'effet microphonique dans des circuits dont la tension d'entrée V_i › 50 mV pour une puissance de 50 mW du tube de sortie. La valeur correspondante pour la partie triode est de 25 mV

Der Heptodenteil dieser Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden in Schaltungen die für eine Eingangsspannung V_i › 50 mV eine Leistung von 50 mW ergeben. Der entsprechende Wert für den Triodenteil ist 25 mV

Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteiles

V_{ao}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	0,8	W
I_k	= max.	6,5	mA
R_g	= max.	3	MΩ
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	100	V
$-V_g(I_g = +0,3\ \mu A)$	= max.	1,3	V

Limiting values of the heptode section
Caractéristiques limites de la partie heptode
Grenzdaten des Heptodenteiles

V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	1,7	W
$V_{(g_2+g_4)_o}$	= max.	550	V
$V_{(g_2+g_4)}$	= max.	125	V
$V_{(g_2+g_4)}(I_a < 1\ mA)$	= max.	250	V
$W_{(g_2+g_4)}$	= max.	1	W
I_k	= max.	12,5	mA
R_{g_1}	= max.	3	MΩ
R_{g_3}	= max.	3 MΩ [3)]	
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	100	V
$-V_{g_1}(I_{g_1}=+0,3\ \mu A)$	= max.	1,3	V
$-V_{g_3}(I_{g_3}=+0,3\ \mu A)$	= max.	1,3	V

3) See page 6; voir page 6; siehe Seite 6

For curves of this tube please refer to type UCH 81
Pour les courbes de ce tube voir le type UCH 81
Für die Kennlinien dieser Röhre siehe Type UCH 81

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[1] $\mathcal{G}$ = 0.015 pF, which means
that for 68% of a great number of tubes
0.20 - 0.015 pF < CaH-aT < 0.20 + 0.015 pF
and for 94% of a great number of tubes
0.20 - 0.03 pF < CaH-aT < 0.20 + 0.03 pF

$\mathcal{G}$ = 0,015 pF, cequi signifie que
0,20 - 0,015 pF < CaH-aT < 0,20 + 0,015 pF
pour 68% d'un grand nombre de tubes et
0,20 - 0,03 pF < CaH-aT < 0,20 + 0,03 pF
pour 94% d'un grand nombre de tubes

$\mathcal{G}$ = 0,015 pF, das heisst
dass für 68% einer grossen Anzahl Röhren
0,20 - 0,015 pF < CaH-aT < 0,20 + 0,015 pF
und für 94% einer grossen Anzahl Röhren
0,20 - 0,03 pF < CaH-aT < 0,20 + 0,03 pF

[3] When in AM/FM receivers the connections to the tube are switched over during operation and g_3 and gT have not been connected by ohmic resistance, R_{g_3} = max. 20 kΩ

En cas que dans des appareils AM/FM les connexions au tube soient commutées pendant l'opération et g_3 n'ait pas été connecté à gT par l'intermédiaire d'une résistance ohmique, R_{g_3} = max. 20 kΩ

Wenn in AM/FM-Empfängern die Verbindungen zu der Röhre während des Betriebs umgeschaltet werden und g_3 nicht mittels eines ohmischen Widerstandes mit gT verbunden ist, ist R_{g_3} = max. 20 kΩ

PHILIPS

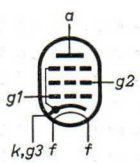
HL 94

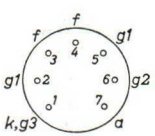
OUTPUT PENTODE for use in receivers for low mains voltages
PENTHODE DE SORTIE pour l'utilisation dans des récepteurs pour tension de secteur basse
ENDPENTODE zur Verwendung in Empfangsgeräten für niedrige Netzspannung

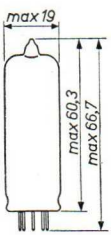
Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

V_f = 30 V
I_f = 150 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: MINIATURE

Capacitances
Capacités
Kapazitäten

C_a	=	5.8 pF
C_{g_1}	=	12 pF
C_{ag_1}	=	0,3 pF
$C_{g_1 f}$	=	0,4 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	100 V
V_{g_2}	=	100 V
V_{g_1}	=	-6,7 V
I_a	=	43 mA
I_{g_2}	=	3 mA
S	=	9,2 mA/V
$\mu_{g_2 g_1}$	=	7,8
Ri	=	22 kΩ

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

V_a	=		100		V
V_{g2}	=		100		V
V_{g1}	=		-6,7		V
$R_{a\sim}$	=		2,4		kΩ
V_i	=	0	0,55	4,3	Veff
I_a	=	43	-	43,0	mA
I_{g2}	=	3	-	11	mA
W_o	=	-	0,05	1,9	W
d_t	=	-	-	10	%

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max.	550	V
V_a	= max.	150	V
W_a	= max.	7,5	W
$V_{g2\,o}$	= max.	550	V
V_{g2}	= max.	150	V
W_{g2}	= max.	1,5	W
$W_{g2\,p}$	= max.	2,5	W
I_k	= max.	100	mA
V_{kf}	= max.	150	V
R_{g_1}	= max.	1	MΩ [1]

[1] With automatic bias
Avec polarisation automatique
Mit automatischer Gittervorspannung

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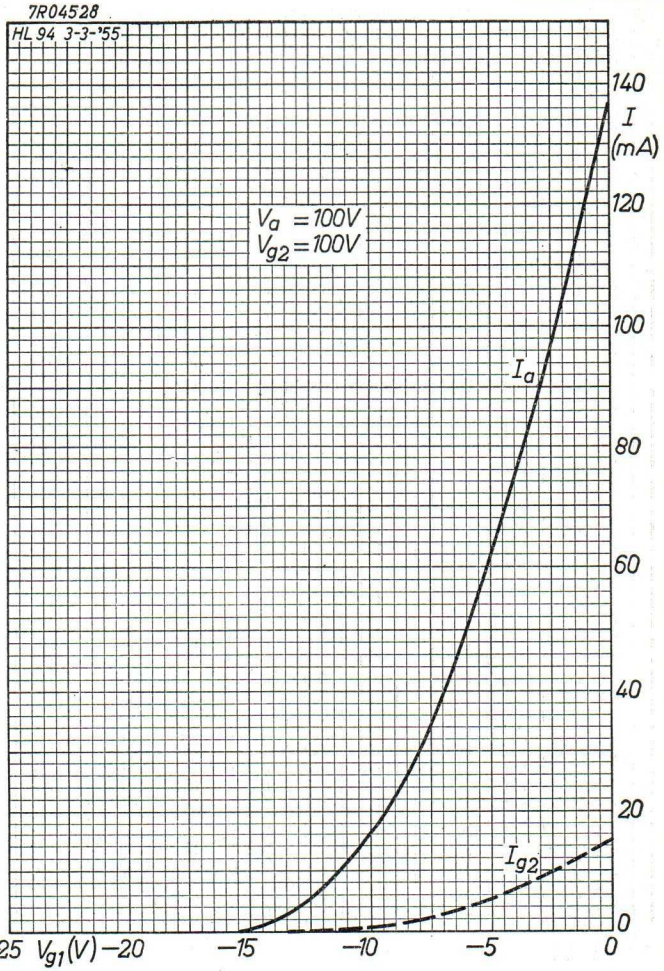
HL 94



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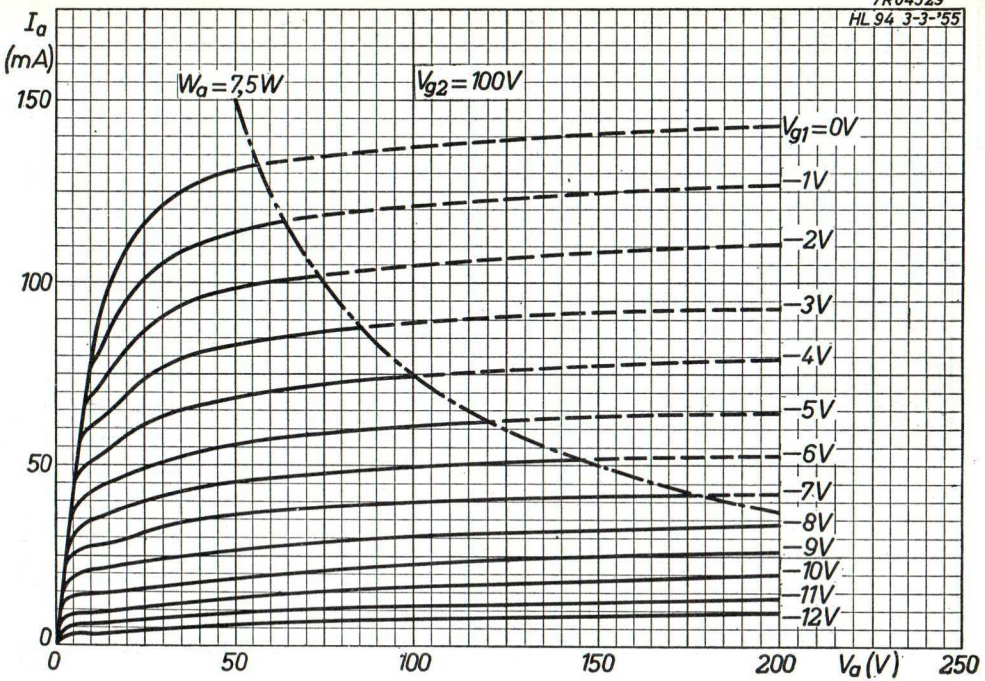

HL 94

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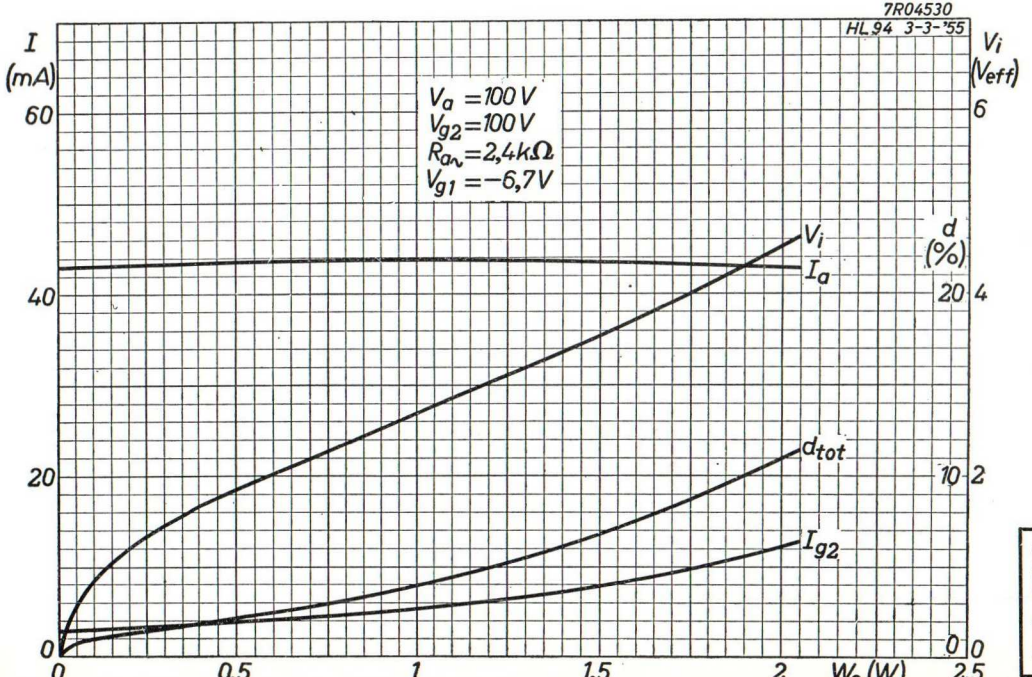


PHILIPS

HL 94

C

PHILIPS PABC80

TRIPLE DIODE TRIODE for video and audio signal detection in television receivers
TRIPLE DIODE TRIODE pour détection des signaux d'images et du son dans des récepteurs de télévision
DREIFACHDIODE TRIODE zur Bild- und Tonsignalgleichrichtung in Fernsehempfängern

Heating :	indirect by A.C. or D.C.; series supply	
Chauffage:	indirect par C.A. ou C.C.; alimentation série	V_f = 9,5 V
Heizung :	indirekt durch Wechsel- oder Gleichstrom; Serienspeisung	I_f = 300 mA

For further data and curves refer to type UABC 80
Pour les autres caractéristiques et courbes voir type UABC 80
Für die übrigen Daten und Kurven siehe Typ UABC 80

PHILIPS

PC 86

TRIODE for use as grounded grid U.H.F. amplifier, oscillator or mixer for bands IV and V
TRIODE pour utilisation comme amplificateur U.H.F. à grille mise à la terre, oscillateur ou mélangeur pour les bandes IV et V
TRIODE zur Verwendung als UHF-Verstärker in Gitterbasisschaltung, Oszillator oder Mischröhre für die Bänder IV und V

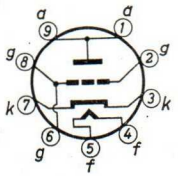
Heating : indirect by A.C. or D.C.; series supply
Chauffage: indirect par C.A. ou C.C.; alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

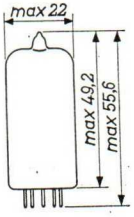
I_f = 300 mA
V_f = 3,8 V

Capacitances
Capacités
Kapazitäten

Without external screening Sans blindage extérieur Ohne äussere Abschirmung	C_{ag}	= 2,0 pF
	C_{ak}	= 0,2 pF
	C_{gk}	= 3,6 pF
	C_{gf}	< 0,3 pF
	$C_{k-(g+f)}$	= 6,6 pF
	$C_{g-(k+f)}$	= 3,9 pF
	$C_{a-(k+f)}$	= 0,3 pF
	$C_{a-(g+f)}$	= 2,1 pF
With external screening Avec blindage extérieur Mit äusserer Abschirmung	$C_{a-(g+s)}$	= 3,1 pF
	$C_{(k+f)-(g+s)}$	= 4,2 pF
	$C_{a-(k+f)}$	=0,25 pF

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	175 V
V_g	=	-1,5 V
I_a	=	12 mA
S	=	14 mA/V
μ	=	68
R_{eq}	=	230 Ω
ΔC_g	=	2 pF [1] ←

Operating characteristics as grounded-grid amplifier
Caractéristiques d'utilisation comme amplificateur à grille mise à la terre
Betriebsdaten in Gitterbasisschaltung

V_a	=	175 V
R_k	=	125 Ω
I_a	=	12 mA
S	=	14 mA/V

Operating characteristics as self-oscillating mixer
Caractéristiques d'utilisation comme tube mélangeur auto-oscillateur
Betriebsdaten als selbstschwingende Mischröhre

V_b	=	220 V
R_a	=	5,6 kΩ
R_g	=	47 kΩ
I_a	=	12 mA
I_g	=	50 µA

Limiting values
Caractéristiques limites
Grenzdaten

V_{ao}	= max.	550 V
V_a	= max.	220 V
W_a	= max.	2,2 W
I_k	= max.	20 mA
$-V_g$	= max.	50 V
R_g	= max.	1 MΩ
V_{kf}	= max.	100 V [2] ←
R_{kf}	= max.	20 kΩ

[1]) Difference between C_g of cold and hot tube
Différence entre C_g du tube froid et chaud
Unterscheid zwischen C_g von kalter und warmer Röhre

[2]) A.C. component = max. 50 Veff
Composante alternative = 50 Veff au max.
Wechselspannungsanteil = max. 50 Veff

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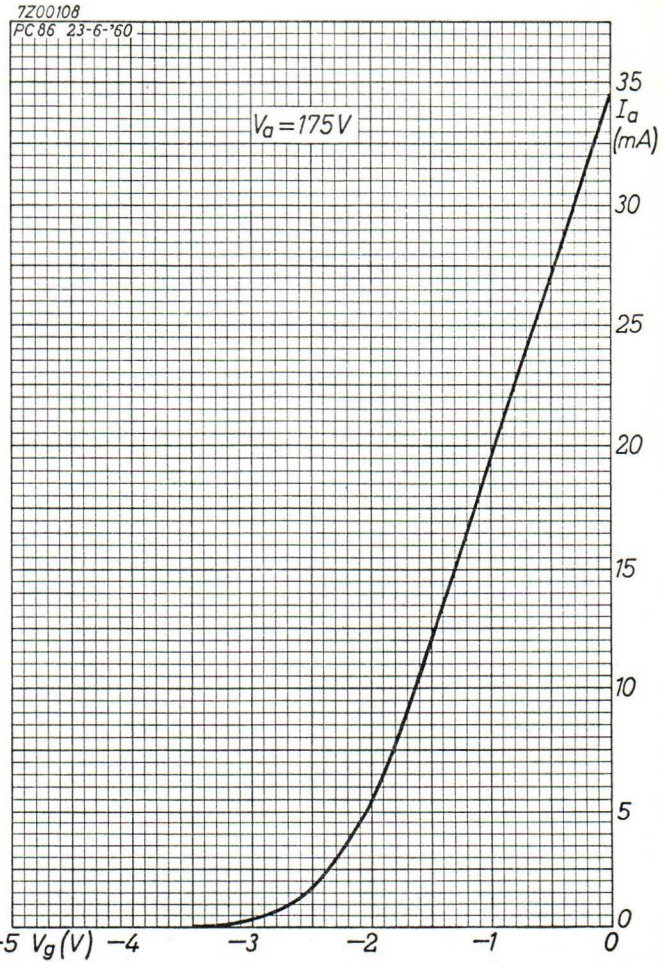
PC 86



5.5.1960

A

PC 86

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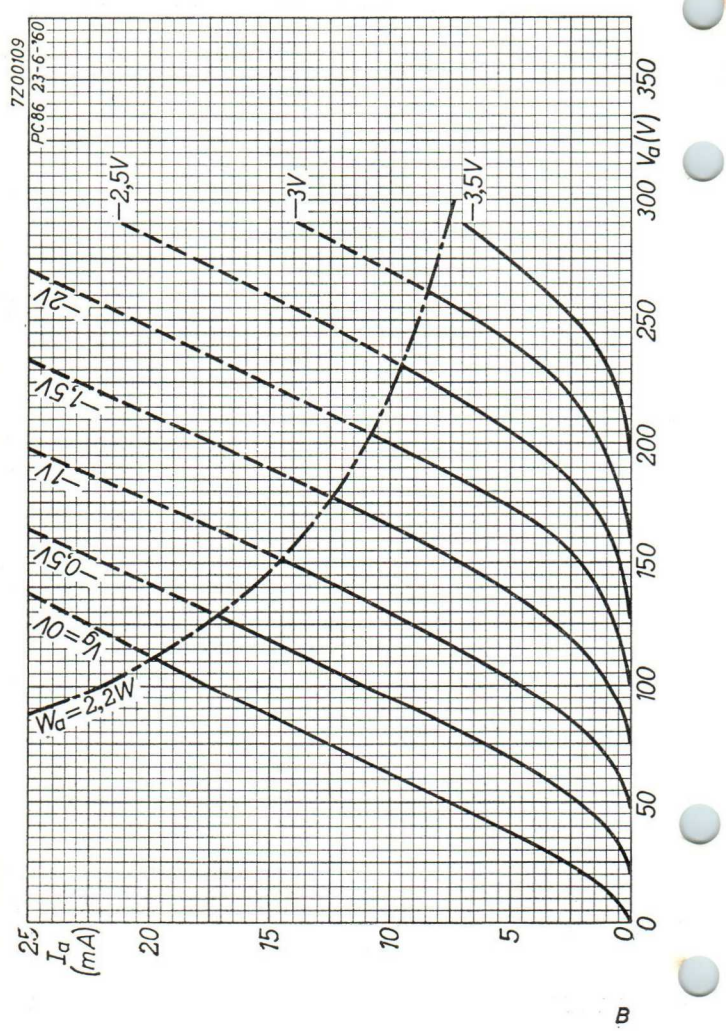

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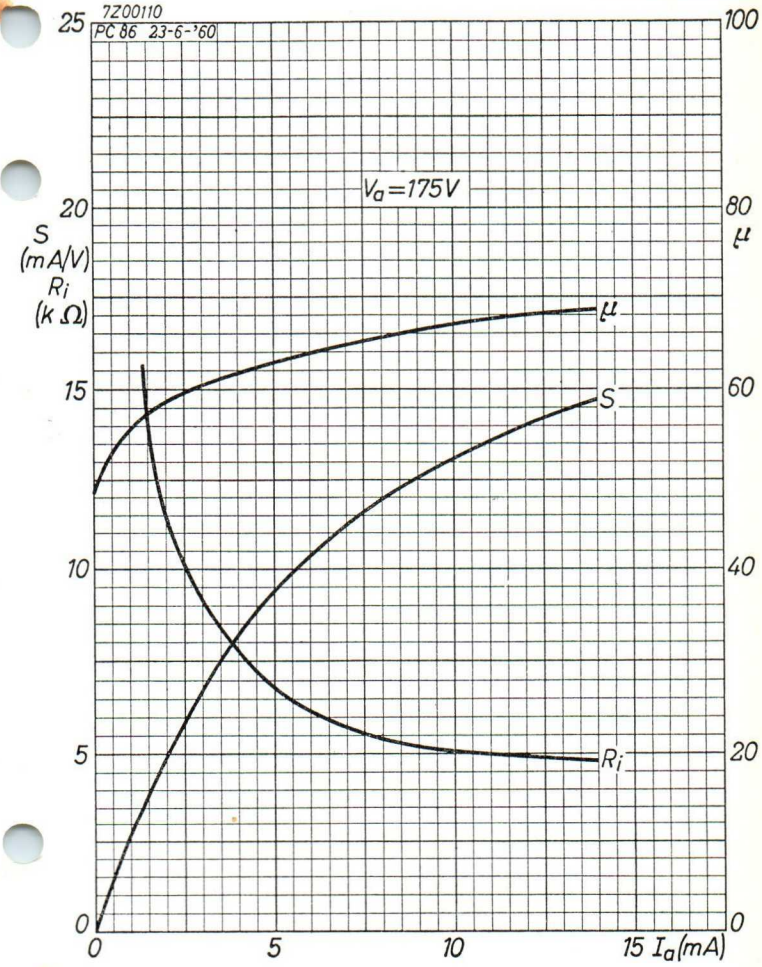
PC 86



5.5.1960

C

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PC88

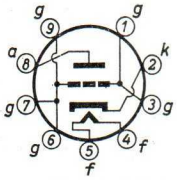
TRIODE for use as grounded grid U.H.F. amplifier in tuners for television bands IV and V

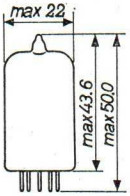
HEATING

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

Heater current	I_f = 300 mA
Heater voltage	V_f = 3.8 V

Dimensions in mm





Base: NOVAL

CAPACITANCES

Without external screening

Anode to grid	C_{ag}	= 1.2 pF

With external screening (inside diameter 22.2 mm)

Anode to grid	C_{ag}	= 1.7 pF
Grid to heater and cathode	$C_{g(k+f)}$	= 3.8 pF
Anode to heater and cathode	$C_{a(k+f)}$	= 0.055 pF

LIMITING VALUES (Design centre limits)

Anode voltage in cold condition	V_{ao}	= max. 550 V
Anode voltage	V_a	= max. 175 V
Anode dissipation	W_a	= max. 2 W
Cathode current	I_k	= max. 13 mA
Negative grid voltage	$-V_g$	= max. 50 V
External grid resistance (at cathode resistor R_k = 100 Ω)	$R_g(R_k=100\ \Omega)$	= max. 1 MΩ
Voltage between heater and cathode	V_{kf}	= max. 100 V[1]

[1]) To fulfil the modulation hum requirements, the A.C. component should not exceed 50 V (R.M.S.)

CHARACTERISTICS

Heater current	I_f	=	300 mA [1]
Anode voltage	V_a	=	160 V [1]
Cathode resistor	R_k	=	100 Ω [1]
Anode current	I_a	=	12.5 mA
Mutual conductance	S	=	13.5 mA/V
Amplification factor	μ	=	65
Equivalent noise resistance	R_{eq}	=	240 Ω
Noise figure	F	=	10 dB
Heater current	I_f	=	300 mA
Anode voltage	V_a	=	0 V
Positive grid current	$+I_g$	=	0.3 μA
Negative grid voltage	$-V_g$	= max.	1.3 V

Series resonance frequencies

Measured between a point on the relevant tube pin close to the tube bottom and a point close to the relevant pin on a metal reference plane, placed against the tube bottom. All the pins, except the relevant one, are connected to the reference plane with a negligible impedance
The tube is screened by a metal cylinder with an inside diameter of 22.2 mm placed upon the metal reference plane

Heater voltage	V_f	=	0 V
Anode voltage	V_a	=	0 V
Anode resonance frequency	f_{o_a}	=	1700 Mc/s
Cathode resonance frequuency	f_{o_k}	=	1000 Mc/s

[1]) Recommended operating conditions

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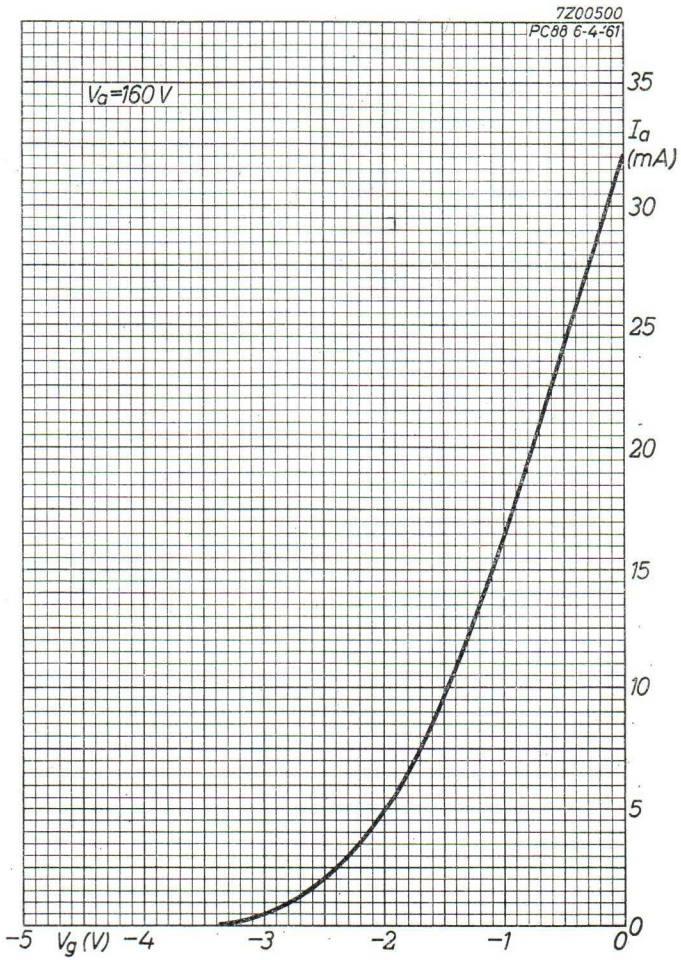
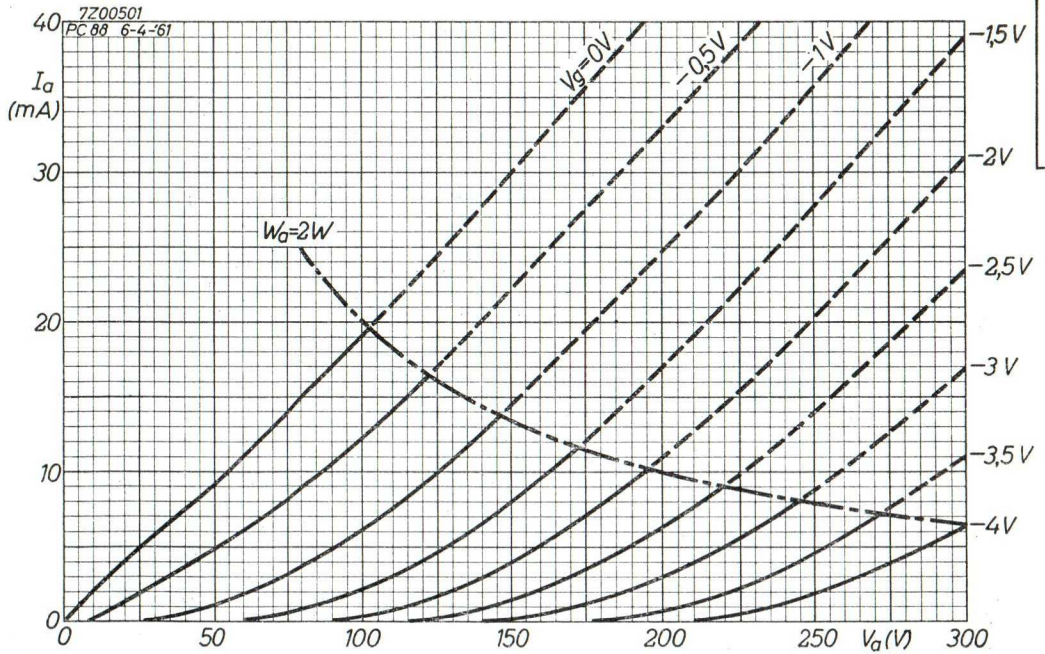
PC 88



4.4.1961

A



PC 88

PHILIPS

B

PHILIPS

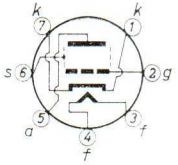
PC97

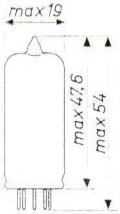
TRIODE for use as R.F. amplifier in V.H.F. television tuners
TRIODE pour utilisation en amplificatrice H.F. dans le pré-amplificateur V.H.F. des récepteurs de télévision
TRIODE zur Verwendung als HF-Verstärkerröhre in der VHF-Vorverstärker von Fernsehempfängern

Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation série
Heizung : indirekt durch Gleich- oder Wechselstrom Serienspeisung

$\frac{If = 300\ mA}{V_f = 4{,}5\ V}$

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: MINIATURE

Capacitances
Capacités
Kapazitäten

with external screening avec blindage extérieur [1] mit äusserer Abschirmung	without external screening sans blindage extérieur ohne äussere Abschirmung
C_a = 4,3 pF	C_a = 3,3 pF
C_g = 5,0 pF	C_g = 5,0 pF
C_{ag} = 0,48 pF	C_{ag} = 0,5 pF
C_{ak} = 0,21 pF	C_{ak} = 0,25 pF
C_{gk} = 3,2 pF	C_{gk} = 3,2 pF
C_{gf} < 0,28 pF	C_{gf} < 0,28 pF
C_{kf} = 2,5 pF	C_{kf} = 2,5 pF

[1]) Inside diameter 19.1 mm
Diamètre intérieur 19,1 mm
Innerer Durchmesser 19,1 mm

Typical characteristics (pin 6 connected to cathode)
Caractéristiques types (broche 6 reliée à la cathode)
Kenndaten (Stift 6 mit der Katode verbunden)

V_a	=	135	V
V_g	=	-1	V
I_a	=	11	mA
S	=	13	mA/V
μ	=	65	
R_i	=	5	kΩ
V_g (S = 0,65 mA/V)	=	-3,1	V
V_g (S = 0,13 mA/V)	=	-5,0	V
V_g (I_a = 0,1 mA)	=	-5,0	V

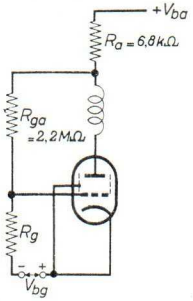
Operating characteristics (pin 6 connected to cathode)
Caractéristiques d'utilisation (broche 6 reliée à la cathode)
Kenndaten (Stift 6 mit der Katode verbunden)

V_{ba}	=	200 [1]			200 [2]			V
R_a	=	5,6			5,6			kΩ
R_k	=	82			0			Ω
R_g	=	0			1,0			MΩ
V_{bg}	=	0	-4,4	-7,5	0	-4,2	-7,3	V
I_a	=	12	-	-	13	-	-	mA
S	=	14	0,7	0,14	15,5	0,78	0,155	mA/V

[1]) See curves 1 pages C and D
Voir les courbes 1 pages C et D
Siehe die Kurven 1 auf Seiten C und D

[2]) See curves 2 pages C and D
Voir les courbes 2 pages C et D
Siehe die Kurven 2 auf Seiten C und D

Operating characteristics (continued)
Caractéristiques d'utilisation (suite)
Betriebsdaten (Fortsetzung)



V_{ba}	=	200 [3]			200 [4]			V
R_g	=	0,22			0,56			MΩ
V_{bg}	=	0	-5,9	-9,0	0	-9,2	-12,5	V
I_a	=	14	-	-	14	-	-	mA
S	=	16	0,80	0,16	16	0,80	0,16	mA/V

Limiting values (Design centre limites)
Caractéristiques limites (Limites moyennes)
Grenzdaten (Normalgrenzdaten)

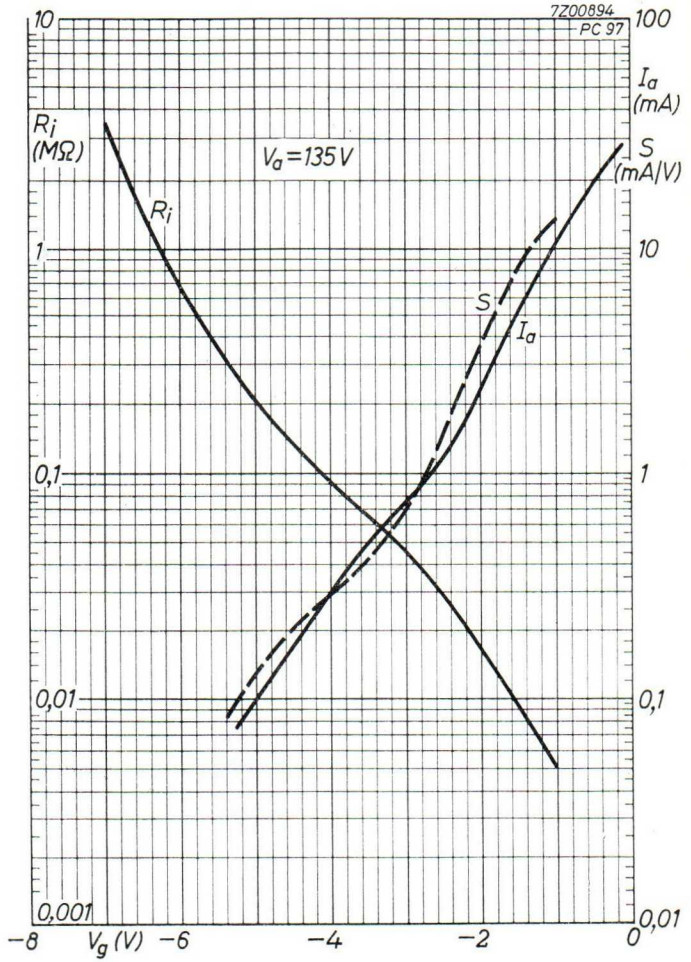
V_{ao}	=	max. 550	V
V_a	=	max. 200	V
W_a	=	max. 2,2	W
I_k	=	max. 20	mA
$-V_g$	=	max. 50	V
R_g	=	max. 1	MΩ
V_{kf}	=	max. 100	V

[3]) See curves 3 pages C and D
Voir courbes 3 pages C et D
Siehe Kurven 3 auf Seiten C und D

[4]) See curves 4 pages C and D
Voir courbes 4 pages C et D
Siehe Kurven 4 auf Seiten C und D

PHILIPS

PC97



3.3.1962

A

PC97

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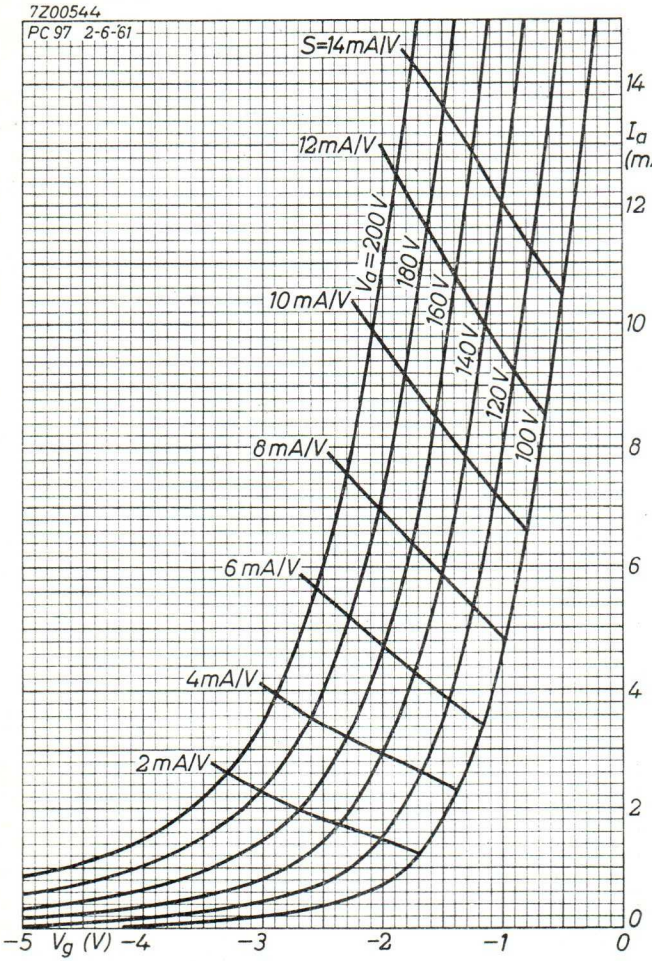

B

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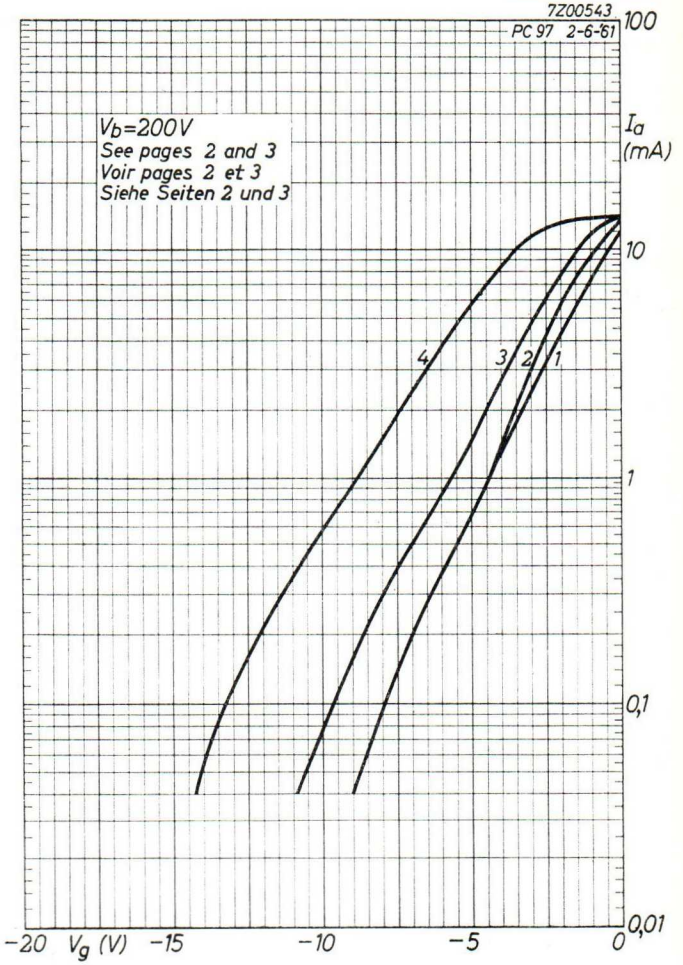
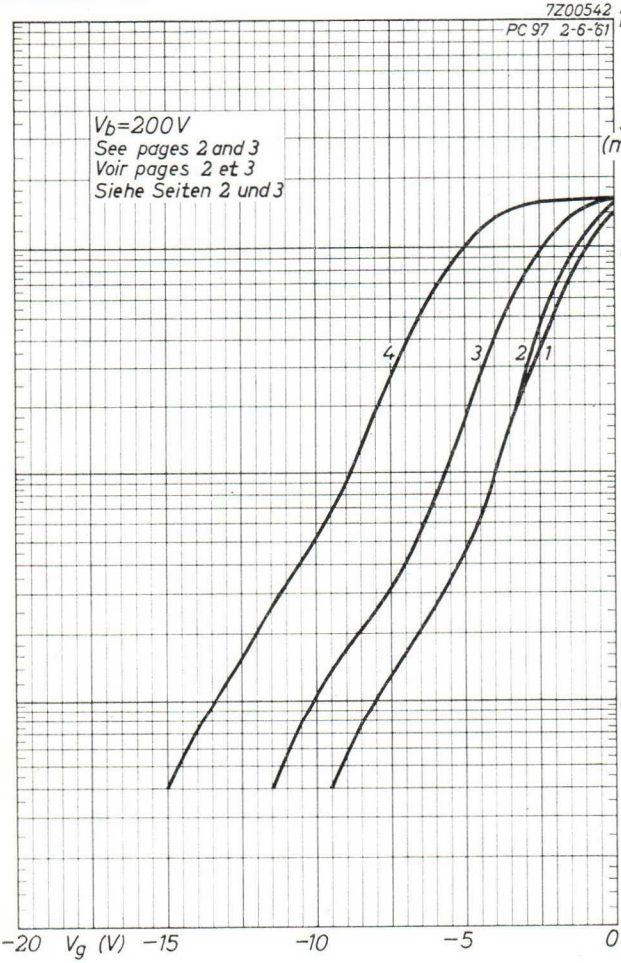
PC97



3.3.1962

C

PHILIPS


7Z00542
PC 97 2-6-61
V_b=200 V
See pages 2 and 3
Voir pages 2 et 3
Siehe Seiten 2 und 3
S
(mA/V)
100
10
1
0,1
0,01
4
3
2
1
−20
V_g (V)
−15
−10
−5
0

D

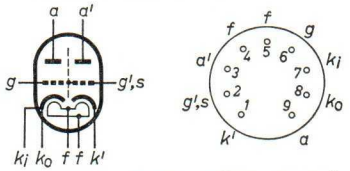
PHILIPS PCC 84

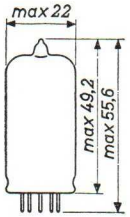
DOUBLE TRIODE particularly designed for use as R.F. cascode amplifier in tuners for television receivers up to 220 Mc/s
DOUBLE TRIODE conçue particulièrement pour être utilisée comme amplificatrice H.F. en montage cascode dans les étages d'entrée des récepteurs de télévision jusqu'à 220 Mc/s
DOPPELTRIODE speziell entworfen zur Verwendung als HF-Verstärker in Kaskodenschaltung in Eingangsstufen von Fernsehempfängern bis zu 220 MHz

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 = 7 V
I_f = 300 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: Noval

Capacitances (without external shield)
Capacités (sans blindage extérieur)
Kapazitäten (ohne äussere Abschirmung)

C_{ag}	=	1,2 pF	$C_{a'k'}$	=	0,16 pF
→ C_g	=	2,1 pF	$C_{k'(g'+f)}$	=	4,7 pF
C_a	=	0,45 pF	$C_{a'(g'+f)}$	=	2,5 pF
C_{gf}	<	0,25 pF	$C_{k'f}$	=	2,7 pF
			$C_{a'g'}$	=	2,3 pF

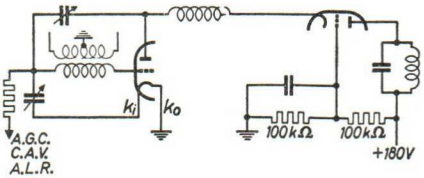
$C_{a-(k+f+g')}$	=	1,2 pF
$C_{aa'}$	<	0,035 pF
$C_{ga'}$	<	0,006 pF

Typical characteristics (each system)
Caractéristiques types (chaque système)
Kenndaten (jedes System)

V_a	=	90 V
V_g	=	-1,5 V
I_a	=	12 mA
S	=	6 mA/V
μ	=	24

Input conductance at 200 Mc/s
Conductance d'entrée à 200 Mc/s
Eingangsleitwert bei 200 MHz — 250 µA/V[1])

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten



Noise figure
(bandwidth of input circuit 7-8 Mc/s) — 6.5[1])
Indice de souffle
(largeur de bande du circuit d'entrée 7-8Mc/s) — 6,5[1])
Rauschzahl
(Bandbreite der Eingangsschaltung 7-8 MHz) — 6,5[1])

[1]) The quoted values of the input conductance and the noise figure are valid in the case that the cathode lead ki is connected to the input circuit and k_o to the chassis. The noise figure will be reduced to about 5 when the cathode leads are connected in parallel; the input conductance will increase, however, in this case to about 700 µA/V
Les valeurs mentionnées de la conductance d'entrée et de l'indice de souffle s'appliquent au cas que la connection cathodique ki soit connectée au circuit d'entrée et k_o au châssis. L'indice de souffle sera diminuée à 5 si les connections cathodiques sont montées en parallèle; pourtant, la conductance d'entrée s'élèvera à 700 µA/V dans ce cas
Die genannten Werte des Eingangsleitwertes und der Rauschzahl gelten im Falle dass die Katodenleitung ki mit dem Eingangskreis verbunden ist und k_o mit dem Chassis. Die Rauschzahl wird bis zu etwa 5 verringert wenn die Katodenleitungen parallel geschaltet sind; der Eingangsleitwert wird in diesem Falle aber bis zu etwa 700 µA/V erhöht werden

Remarks

1. The section a,g,k_i,k_o is the grounded cathode triode of the cascode amplifier and the section a',g',k' the grounded grid triode
2. The grounded cathode section has two cathode leads, of which k_i should be connected to the input circuit and k_o to the chassis

Observations

1. La section a,g,k_i,k_o est la triode à cathode à la terre de l'amplificateur cascode et la section a',g',k' la triode à grille à la terre
2. La triode à cathode à la terre a deux connections de la cathode, l'une (k_i) destinée d'être connectée au circuit d'entrée et l'autre (k_o) au châssis

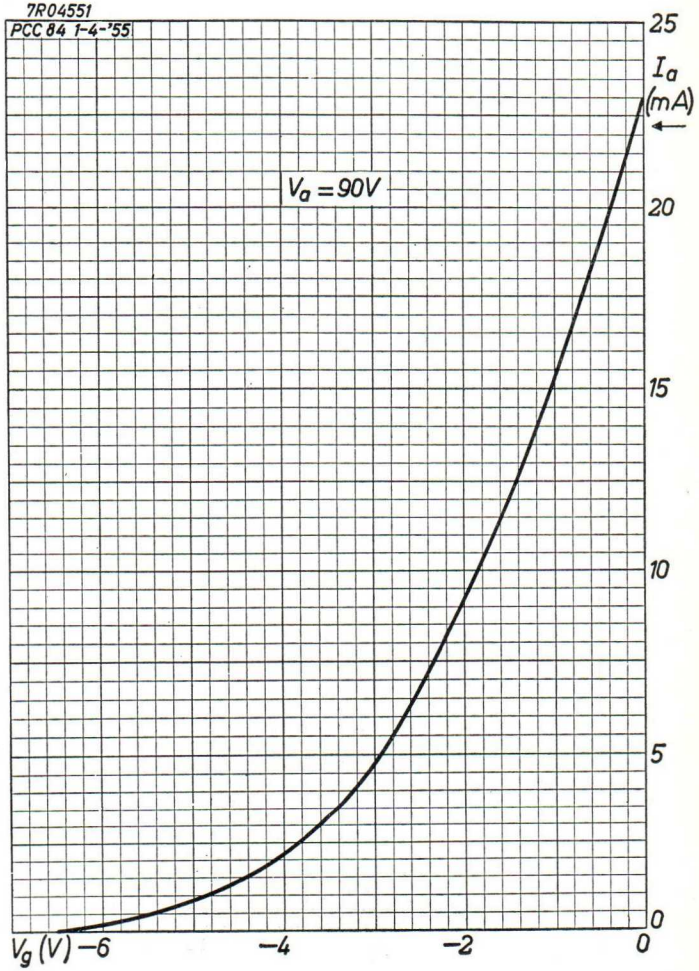
Bemerkungen

1. Das System a,g,k_i,k_o ist die Katodenbasistriode des Kaskodenverstärkers und das System a',g',k' die Gitterbasistriode
2. Die Katodenbasistriode hat zwei Katodenanschlüsse, der eine (k_i) zum Anschluss am Eingangskreis, der andere (k_o) zum Anschluss am Chassis

Limiting values
Caractéristiques limites
Grenzdaten

V_{bo}	= max.	550	V
$V_a = V_{a'}$	= max.	180	V
$W_a = W_{a'}$	= max.	2	W
$I_k = I_{k'}$	= max.	22	mA
$-V_g = -V_{g'}$	= max.	50	V
R_g	= max.	1	MΩ
$R_{g'}$	= max.	0,5	MΩ
$V_{k'f}$ (k' pos., f neg.)	= max.	250	V [1]
$V_{k'f}$ (k' neg., f pos.)	= max.	100	V
V_{kf}	= max.	100	V
R_{kf}	= max.	20	kΩ

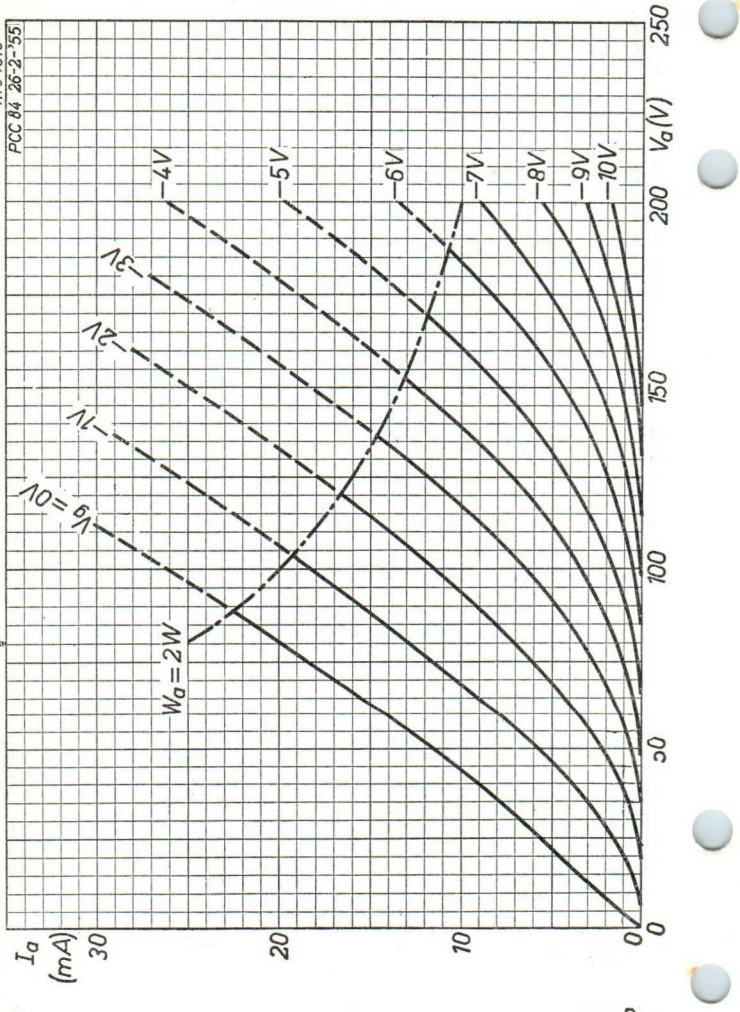
[1]) D.C. component max. 180 V
La composante continue 180 V au max.
Gleichspannungskomponente max. 180 V



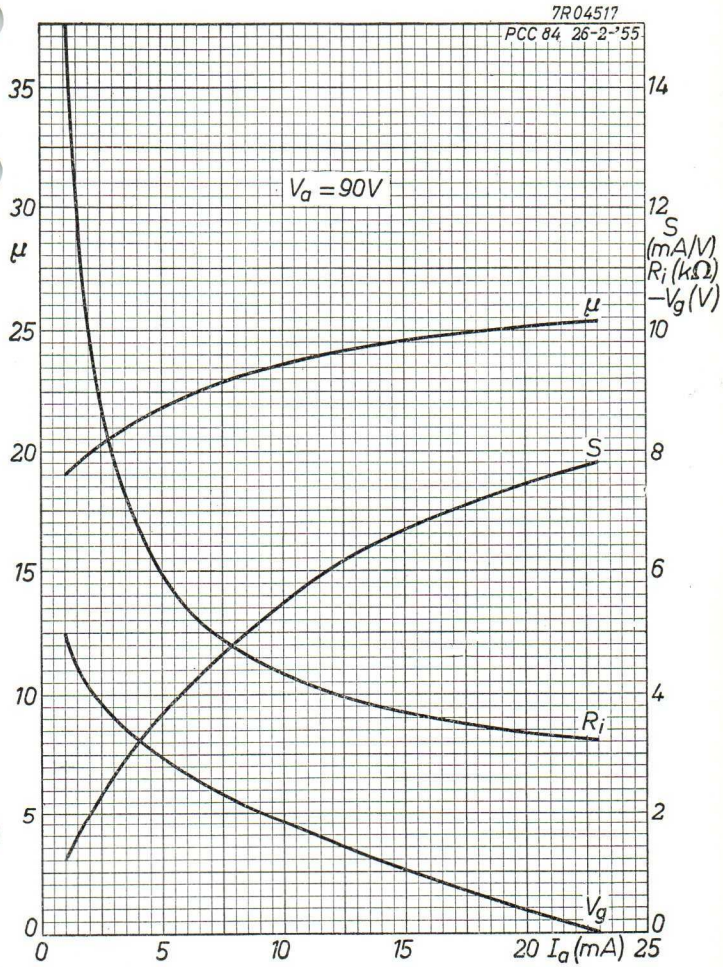
4.4.1955

A

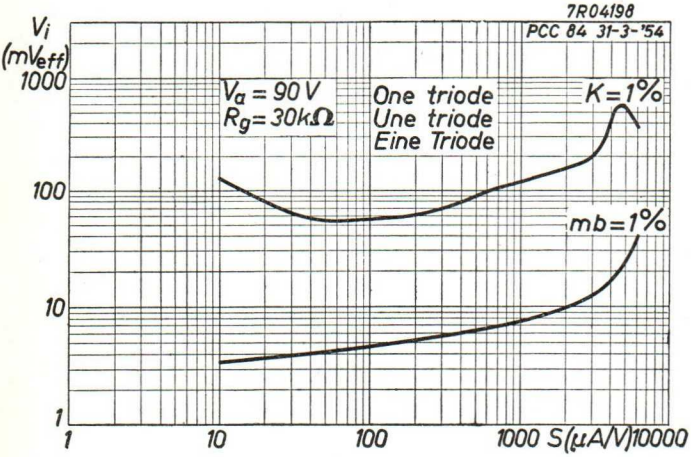
PCC 84 PHILIPS



B


7R04517
PCC 84 26-2-'55
$V_a = 90V$
μ
S
R_i
V_g
μ
S (mA/V)
R_i (kΩ)
$-V_g$ (V)
I_a (mA)
0
5
10
15
20
25
35
30
25
20
15
10
5
0
14
12
10
8
6
4
2
0

PCC 84 PHILIPS



D

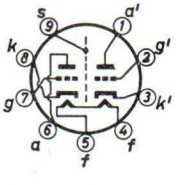
PHILIPS PCC 85

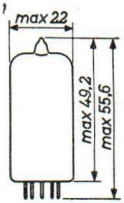
DOUBLE TRIODE for use as oscillator and mixer in television receivers, up to 200 Mc/s (not for split carrier)
DOUBLE TRIODE pour utilisation comme oscillatrice et mélangeuse dans récepteurs de télévision, jusqu'à 200 MHz (ne pas pour le système à porteuses scindées)
DOPPELTRIODE zur Verwendung als Oszillator und Mischröhre in Fernsehempfängern, bis 200 MHz (nicht für Parallelton-verfahren)

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

I_f = 300 mA
V_f = 9,0 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances
Capacités
Kapazitäten

C_{ag}	=	1,5 pF	$C_{a'g'}$	=	1,5 pF
C_{ak}	=	0,18 pF	$C_{a'k'}$	=	0,18 pF
$C_{a(k+f+s)}$	=	1,2 pF	$C_{a'(k'+f+s)}$	=	1,2 pF
$C_{g(k+f+s)}$	=	3 pF	$C_{g'(k'+f+s)}$	=	3 pF
$C_{a(k+f+s)}$	=	1,9 pF[1])	$C_{a'(k'+f+s)}$	=	1,9 pF[1])
$C_{aa'}$	<	0,04 pF	$C_{ak'}$	<	0,008 pF
$C_{aa'}$	<	0,008 pF[1])	$C_{gk'}$	<	0,003 pF
$C_{gg'}$	<	0,003 pF	$C_{a'k}$	<	0,008 pF
$C_{ag'}$	<	0,008 pF	$C_{g'k}$	<	0,003 pF
$C_{a'g}$	<	0,008 pF			

[1])With external shield (22,5 mm diameter)
Avec blindage extérieur (diamètre 22,5 mm)
Mit äusserer Abschirmung (22,5 mm Durchmesser)

Typical characteristics (each system)
Caractéristiques types (chaque système)
Kenndaten (jedes System)

V_a	=	100	170	200 V
V_g	=	-1,1[1])	-1,5	-2,1 V
I_a	=	4,5	10	10 mA
S	=	4,6	6,2	5,8 mA/V
μ	=	50	50	48

Operating characteristics as self-oscillating additive mixer
Caractéristiques d'utilisation comme tube mélangeur additif auto-oscillateur
Betriebsdaten als selbstschwingende additive Mischröhre

V_b	=	100	170	200 V
R_a	=	4,7	4,7	8,2 kΩ
R_g	=	1	1	1 MΩ
V_{osc}	=	1,8	2,8	2,8 Veff
I_a	=	2,2	4,8	5,2 mA
S_c	=	1,7	2,2	2,3 mA/V
R_i	=	20	16	15 kΩ
r_g (f = 100 Mc/s)	=	-	15	- kΩ

Operating characteristics as oscillator in television receivers
Caractéristiques d'utilisation comme oscillatrice dans récepteurs de télévision
Betriebsdaten als Oszillator in Fernsehempfängern

V_b	=	180 V
R_a	=	4,4 kΩ
R_g	=	22 kΩ
V_{osc}	=	9 Veff
I_a	=	8 mA
W_a	=	1,2 W

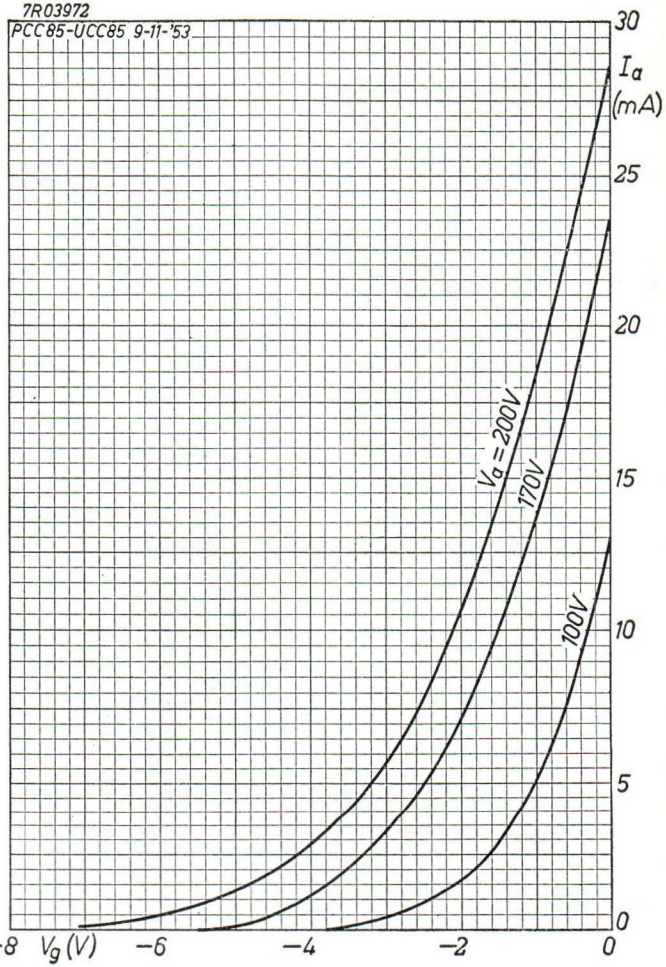
[1]) In this case grid current may occur. If this is not permissible, a condition with a bias of -1.5 V should be chosen

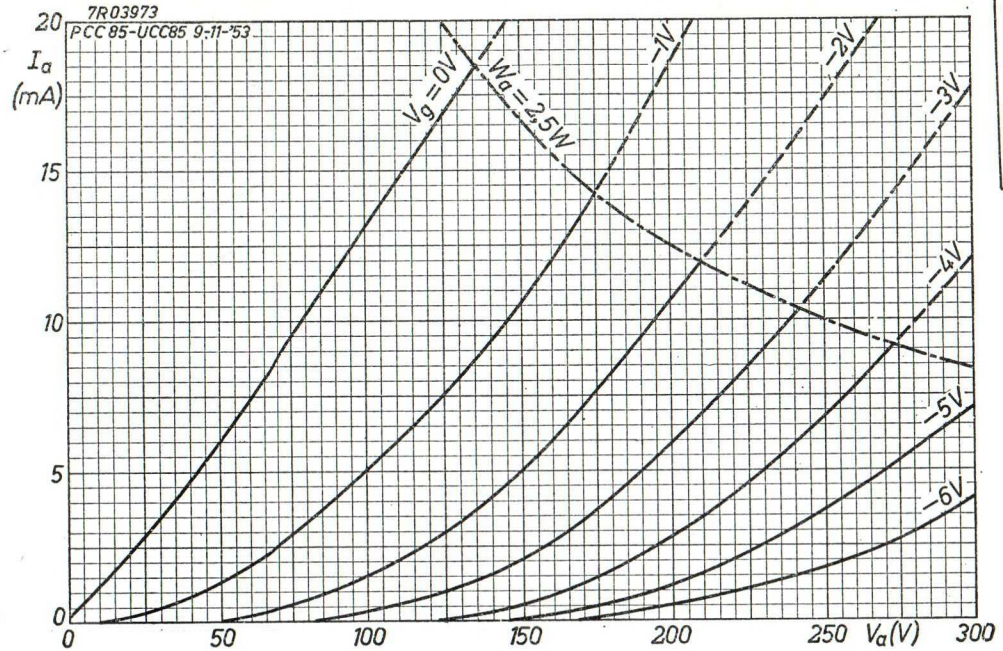
S'il se produit un courant de grille, et qu'il ne puisse être toléré, on augmente la polarisation à -1,5 V au moins

Bei dieser Einstellung kann Gitterstrom fliessen; wenn das unzulässig ist, muss man eine Einstellung mit -1,5 V Gittervorspannung wählen

Limiting values (each system)
Caractéristiques limites (chaque système)
Grenzdaten (jedes System)

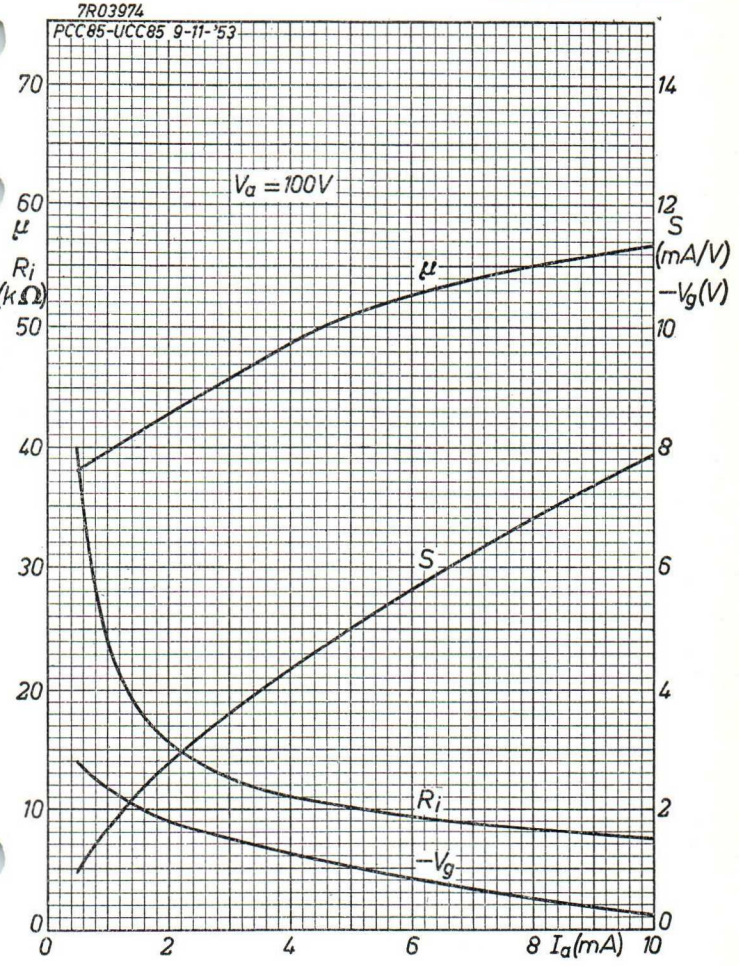
V_{a_o}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	2,5 W
$W_a + W_{a'}$	= max.	4,5 W
I_k	= max.	15 mA
V_{kf}	= max.	90 V
$-V_g$	= max.	100 V
R_g	= max.	1 MΩ
R_{kf}	= max.	20 kΩ


7R03972
PCC85-UCC85 9-11-'53
30
I_a
(mA)
25
20
15
10
5
0
V_a = 200V
170V
100V
−8
V_g (V)
−6
−4
−2
0



B

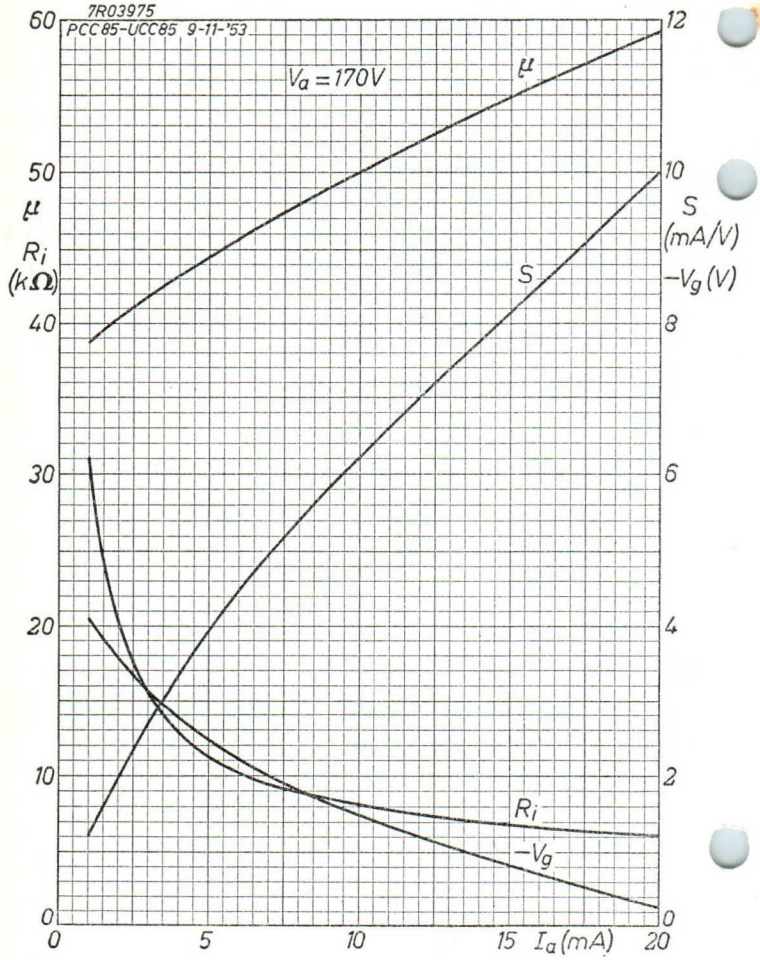
PCC 85 PHILIPS


7R03974
PCC85-UCC85 9-11-'53
$V_a = 100V$
μ
R_i (kΩ)
S (mA/V)
$-V_g$(V)
I_a(mA)
0
2
4
6
8
10
20
30
40
50
60
70
12
14

11.11.1953

C

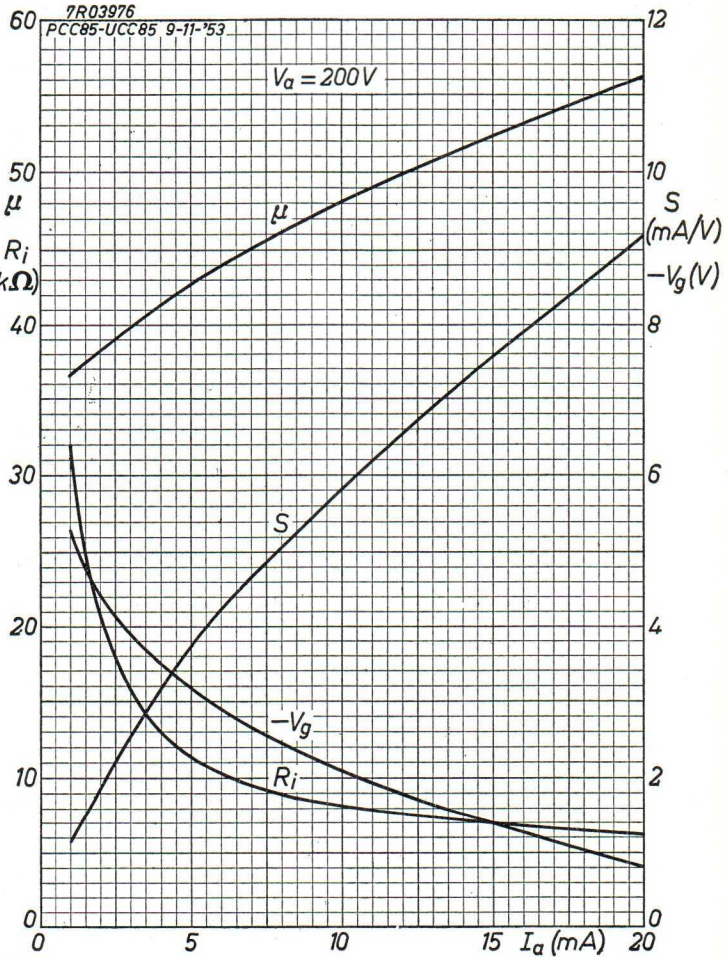
PCC 85 PHILIPS



D

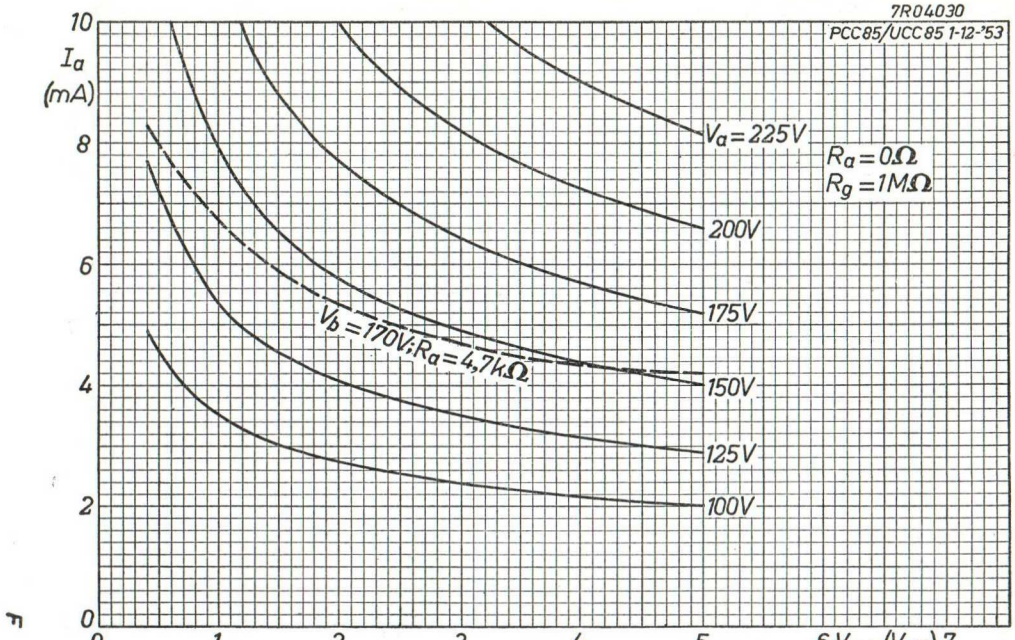
PHILIPS

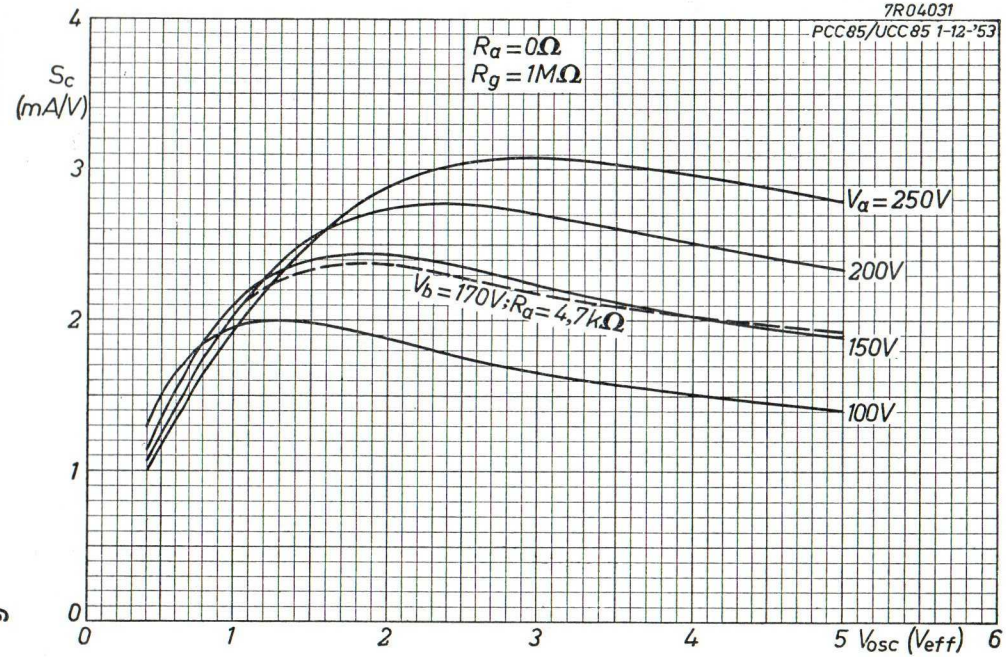
PCC 85



11.11.1953

E


7R04030
PCC85/UCC85 1-12-'53
10
Ia
(mA)
8
6
4
2
0
0
1
2
3
4
5
6 Vosc (Veff) 7
Va = 225V
200V
175V
150V
125V
100V
Ra = 0Ω
Rg = 1MΩ
Vb = 170V; Ra = 4,7kΩ



PHILIPS

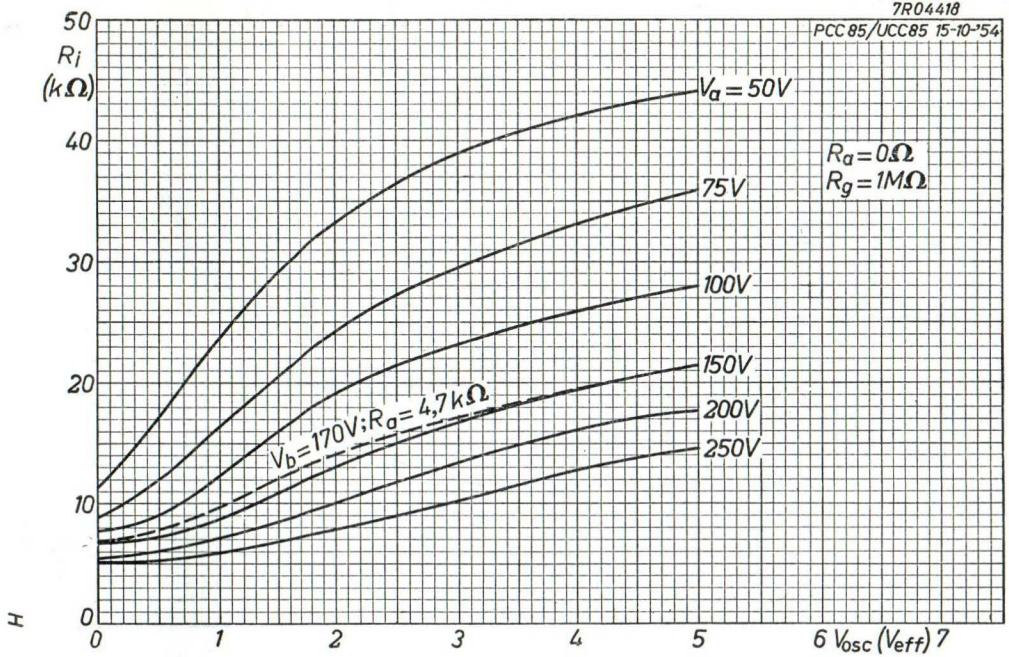
PCC85

PCC 85

PHILIPS

7R04418

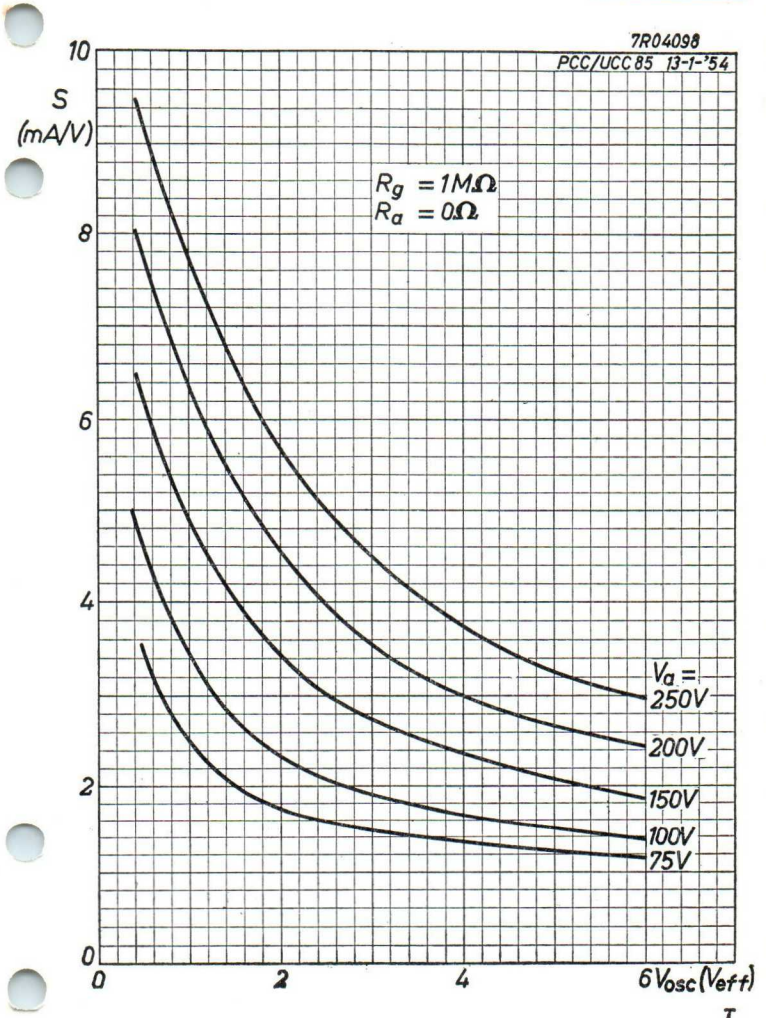
PCC 85/UCC 85 15-10-'54



H

PHILIPS

PCC 85

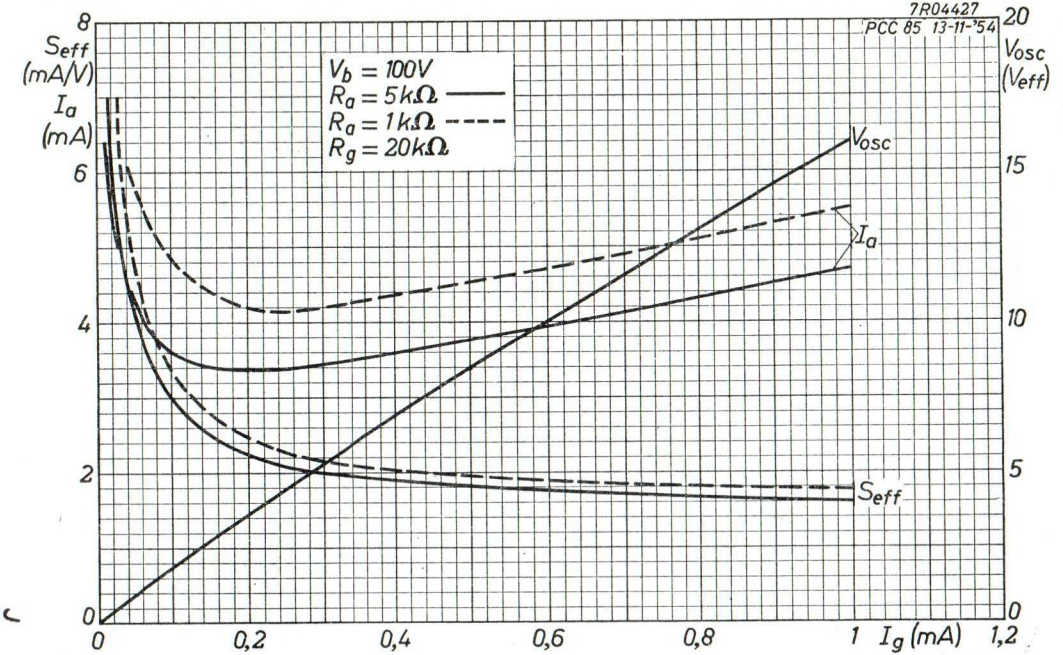


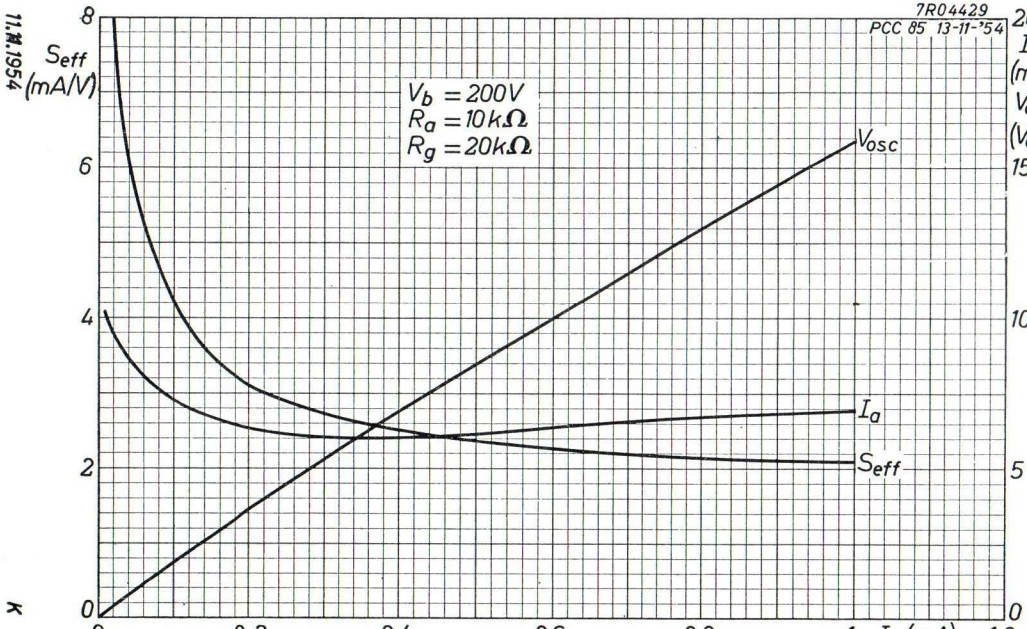
I

11.11.1954

PCC 85

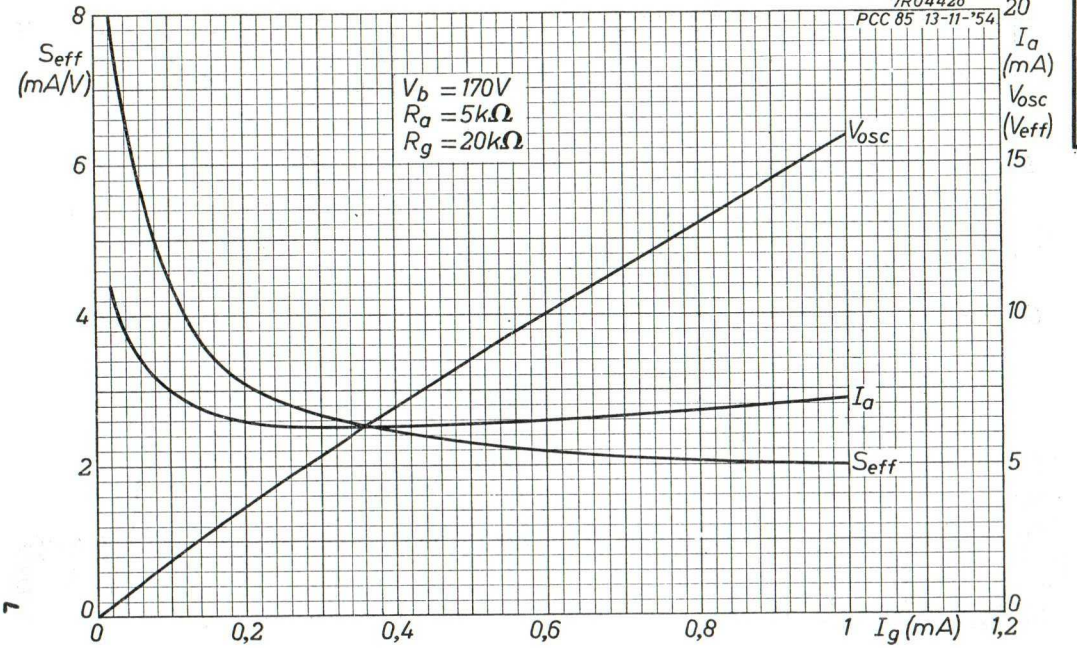
PHILIPS





PHILIPS

PCC 85


7R04428
PCC 85 13-11-'54
S_{eff} (mA/V)
I_a (mA)
V_{osc} (Veff)
$V_b = 170V$
$R_a = 5k\Omega$
$R_g = 20k\Omega$
V_{osc}
I_a
S_{eff}
I_g (mA)
0
0,2
0,4
0,6
0,8
1
1,2
2
4
6
8
5
10
15
20

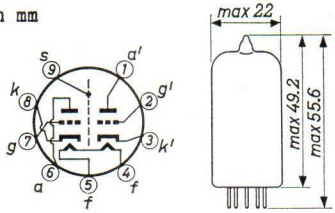
High slope, low noise DOUBLE TRIODE for use as cascode amplifier in tuners for television receivers

HEATING

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

Heater current	I_f = 300 mA
Heater voltage	V_f = 7.6 V

Dimensions in mm



Base: NOVAL

REMARK

The system a, g, k should be used as the grounded cathode input system of the cascode amplifier and the system a', g', k' as the grounded grid output section

CAPACITANCES

			1)	2)	
Triode system a, g, k					
Grid to cathode, heater and screen	$C_{g-(k+f+s)}$	=	3.3	3.3	pF
Anode to cathode, heater and screen	$C_{a-(k+f+s)}$	=	1.8	2.5	pF
Anode to grid	C_{ag}	=	1.4	1.4	pF
Grid to heater	C_{gf}	=	0.13	0.13	pF
Triode system a',g',k'			1)	2)	
Cathode to grid, heater and screen	$C_{k'-(g'+f+s)}$	=	6	6	pF
Anode to grid, heater and screen	$C_{a'-(g'+f+s)}$	=	2.8	3.7	pF
Anode to cathode	$C_{a'k'}$	=	0.18	0.16	pF
Anode to grid	$C_{a'g'}$	=	1.4	1.4	pF
Cathode to heater	$C_{k'f}$	=	2.7	2.7	pF

1) Without external shield
2) With external shield

CAPACITANCES (continued)

Between the two triode systems		1)	2)	
Anode to anode	$C_{aa'}$	< 0.045	0.015	pF
Grid (g) to anode (a')	$C_{ga'}$	< 0.005	0.005	pF

TYPICAL CHARACTERISTICS (each triode)

Anode voltage	V_a	=	90	V
Grid voltage	V_g	=	-1.3	V
Anode current	I_a	=	15	mA
Mutual conductance	S	=	12.5	mA/V
Amplification factor	μ	=	33	
Equivalent noise resistance	R_{eq}	=	300	Ω

LIMITING VALUES (Design centre limits; each triode)

Anode voltage in cold condition	V_{ao}	= max.	550	V
Anode voltage	V_a	= max.	130	V
Anode dissipation	W_a	= max.	1.8	W
Negative grid voltage	$-V_g$	= max.	50	V
Grid circuit resistance	R_g	= max.	1	MΩ
Cathode current	I_k	= max.	25	mA
Circuit resistance between cathode and heater	R_{kf}	= max.	20	kΩ
Voltage between cathode and heater				
triode system a, g, k	V_{kf}	= max.	80	V(RMS)
triode system a',g',k' (cathode positive)	$V_{k'f}$	= max.	180	V [3]

REMARK

In order not to exceed the maximum permissible anode voltage when the cascode amplifier is controlled, it is necessary to use a voltage divider for the grid of the grounded grid section (system a',g',k'). With grid current biasing for the grounded cathode section (system a,g,k) the anode voltage across this section should not be more than 75 V in the not controlled condition

[1]) Without external shield

[2]) With external shield

[3]) D.C. component max. 130 V

Remark

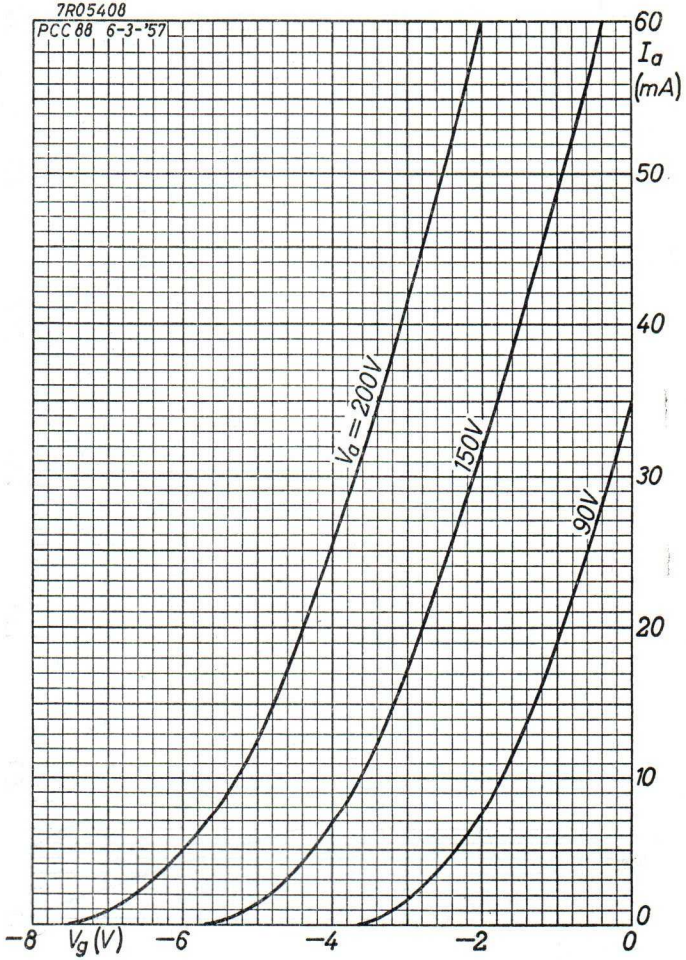
In order not to exceed the maximum permissible anode voltage when the cascode amplifier is controlled, it is necessary to use a voltage divider for the grid of the grounded grid section. With grid current biasing for the grounded cathode section the anode voltage across this section should not be more than 75 V in the not controlled condition

Observation

Afin de ne pas dépasser la valeur maximum admissible de la tension anodique quand l'amplificateur en montage cascode est réglée, il est nécessaire d'utiliser un potentiomètre pour la grille de la section "grille à la masse". Lorsque la polarisation de grille pour la section "cathode à la masse" est obtenue par moyen d'une résistance dans la connection de grille, la tension anodique sur cette section ne doit pas dépasser 75 V à la condition non-réglée

Bemerkung

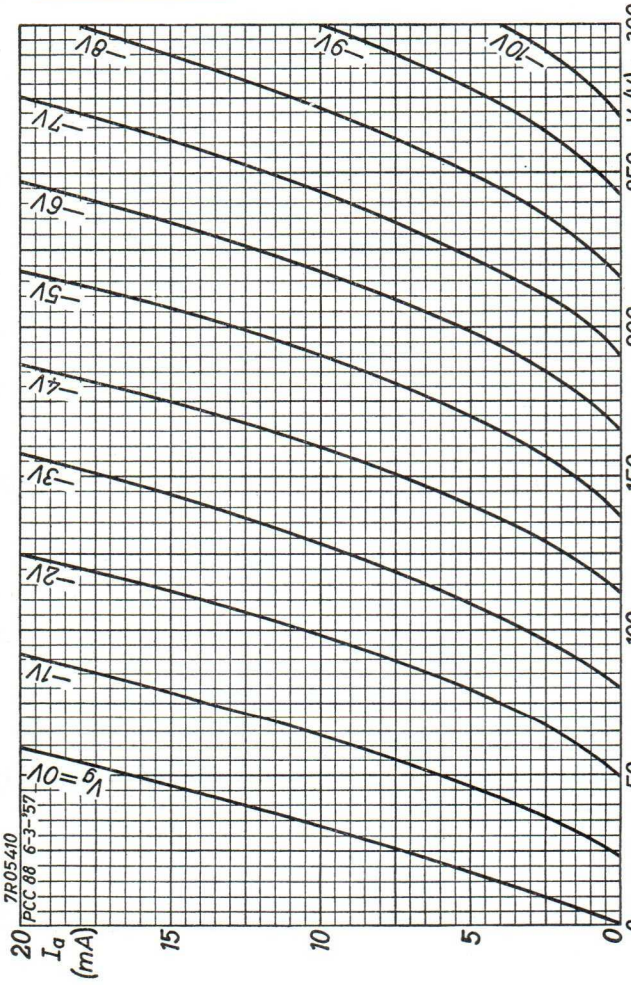
Um bei geregeltem Kaskodenverstärker die maximal zulässige Anodenspannung nicht zu überschreiten braucht man einen Spannungsteiler für das Gitter des Gittersbasisteiles. Wenn für den Katodenbasisteil die Gittervorspannung mittels eines Widerstandes in dem Gitterzuleitung erhalten wird, so darf die Anodenspannung über diesem Teil bei nicht geregeltem Zustand den Wert von 75 V nicht überschreiten


7R05408
PCC 88 6-3-'57
60
Ia
(mA)
50
40
30
20
10
0
Va = 200V
150V
90V
−8
Vg (V)
−6
−4
−2
0

A

10.10.1957

PCC 88 PHILIPS



PHILIPS

PCC189

High slope, low noise DOUBLE TRIODE with variable mutual conductance for use as V.H.F. cascode amplifier in television tuners

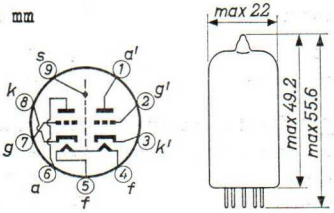
HEATING

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

Heater current I_f = 300 mA

Heater voltage V_f = 7.6 V

Dimensions in mm



Base: NOVAL

REMARK

The system a,g,k should be used as the grounded cathode input section and the system a',g',k' as the grounded grid output section

CAPACITANCES

			1)	2)	
Triode system a,g,k					
Grid to cathode, heater and screen	$C_{g-(k+f+s)}$	=	3.5	3.5	pF
Anode to cathode, heater and screen	$C_{a-(k+f+s)}$	=	1.7	2.3	pF
Anode to grid	C_{ag}	=	1.9	1.9	pF
Grid to heater	C_{gf}	<	0.28	0.28	pF
Triode system a',g',k'					
Cathode to grid, heater and screen	$C_{k'-(g'+f+s)}$	=	6.0	6.0	pF
Anode to grid, heater and screen	$C_{a'-(g'+f+s)}$	=	3.4	4.0	pF
Anode to cathode	$C_{a'k'}$	=	0.18	0.17	pF
Cathode to heater	$C_{k'f}$	=	3.0	3.0	pF
Anode to grid	$C_{a'g'}$	=	1.9	1.9	pF
Between the two triode systems					
Anode to anode	$C_{aa'}$	<	0.045	0.015	pF
Grid (g) to anode (a')	$C_{ga'}$	<	0.004	0.004	pF

1) Without external shield
2) With external shield

TYPICAL CHARACTERISTICS (each system)

Anode voltage	V_a	= 90 V
Grid voltage	V_g	= -1.4 V
Anode current	I_a	= 15 mA
Mutual conductance	S	= 12.5 mA/V
Internal resistance	R_i	= 2.5 kΩ
Grid voltage	V_g	= -5 V
Mutual conductance	S	= 0,625 mA/V
Grid voltage	V_g	= -9 V
Mutual conductance	S	= 0.125 mA/V

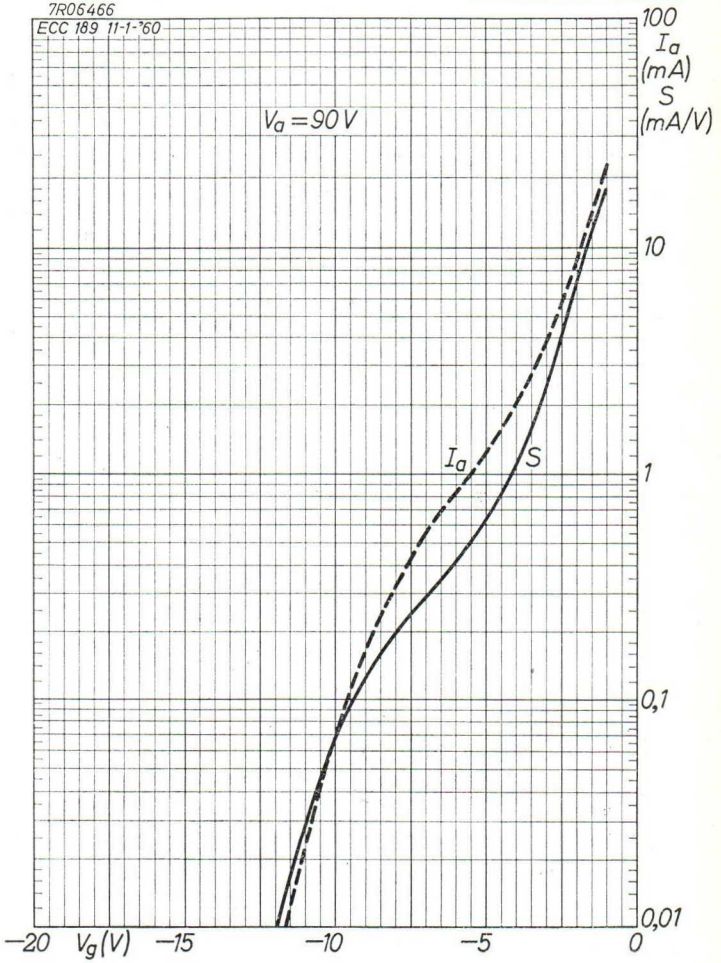
LIMITING VALUES (Design centre limits; each system)

Anode voltage in cold condition	V_{a_o}	= max. 550 V
Anode voltage	V_a	= max. 130 V
Anode dissipation	W_a	= max. 1.8 W
Negative grid voltage	$-V_g$	= max. 50 V
Grid circuit resistance		
system a,g,k	R_g	= max. 1 MΩ
system a',g',k'	R_g	= max. 0.5 MΩ
Cathode current	I_k	= max. 22 mA
Circuit resistance between cathode and heater	R_{kf}	= max. 20 kΩ
Voltage between cathode and heater		
system a,g,k	V_{kf}	= max. 80 V
system a',g',k' (cathode positive)	$V_{k'f}$	= max. 180 V [1]

REMARK

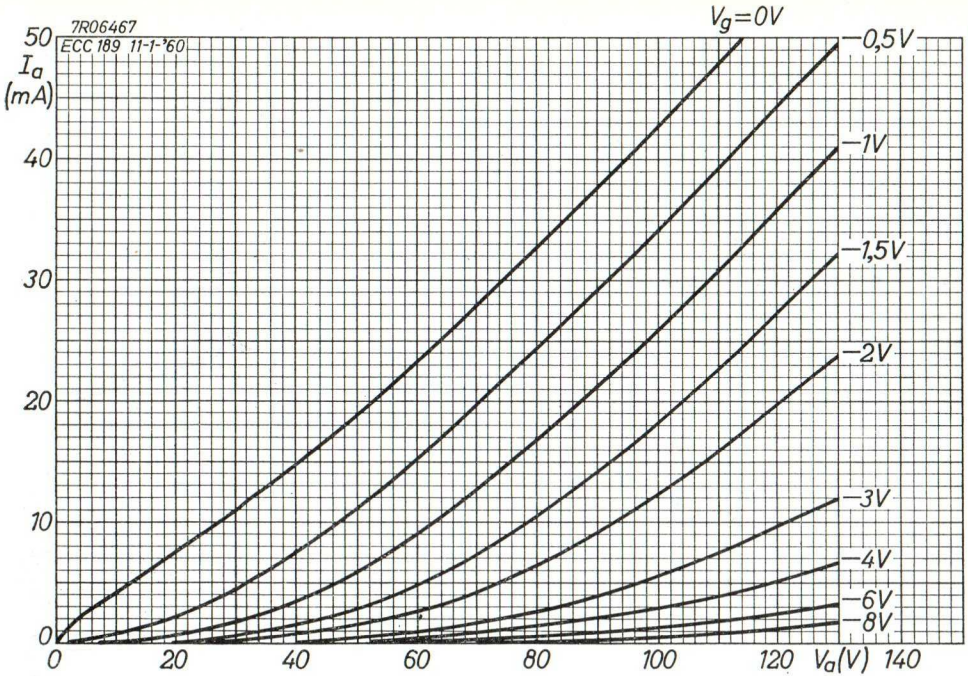
In order not to exceed the maximum permissible anode voltage when the tube is controlled, it is necessary to use a voltage divider for the grid of the grounded grid section

[1]) D.C. component max. 130 V


7R06466
ECC 189 11-1-'60
$V_a = 90\,V$
I_a
S
100
I_a (mA)
S (mA/V)
10
1
0,1
0,01
−20
V_g (V)
−15
−10
−5
0

1.1.1960

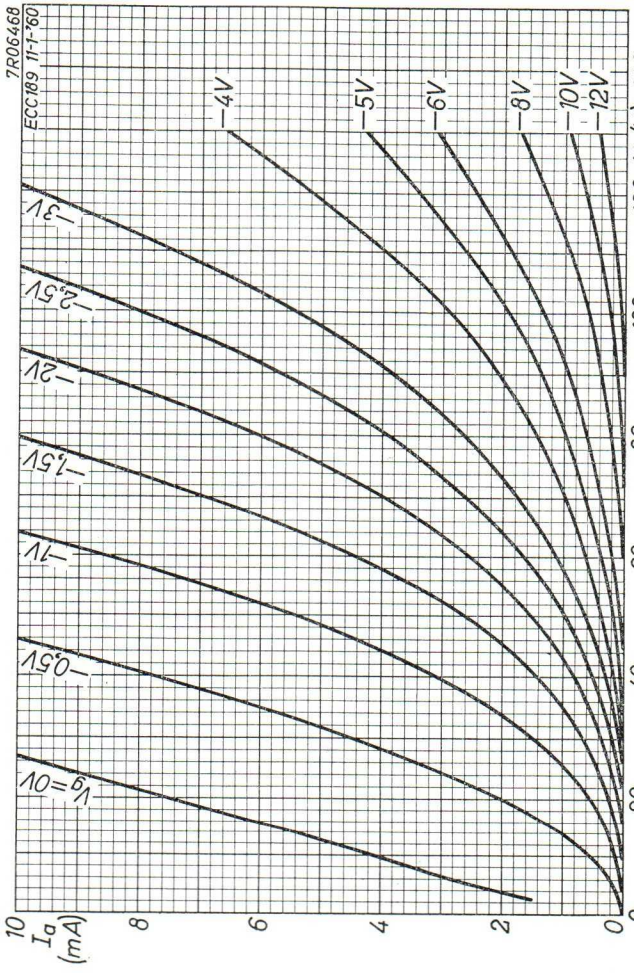
A



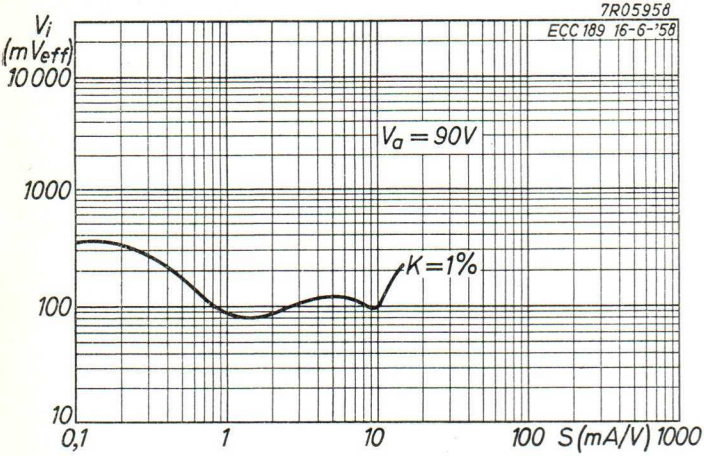
PCC 189

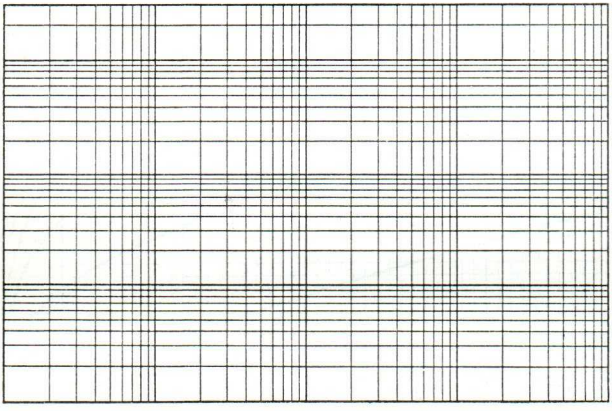
PHILIPS

B


7R06468
ECC189 11-1-'60
−4V
−5V
−6V
−8V
−10V
−12V
−3V
−2,5V
−2V
−1,5V
−1V
−0,5V
V_g=0V
V_a(V) 140
120
100
80
60
40
20
0
I_a (mA)
10
8
6
4
2
0

PCC 189 PHILIPS





D

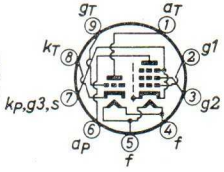
PHILIPS PCF 80

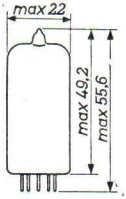
TRIODE-PENTODE with separate cathodes, for use as frequency changer in television receivers and for other purposes
TRIODE-PENTHODE avec cathodes séparées, pour utilisation comme changeuse de fréquence dans récepteurs de télévision et pour d'autres applications
TRIODE-PENTODE mit getrennten Katoden zur Verwendung als Mischröhre in Fernsehempfängern und für andere Zwecke

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

I_f = 300 mA
V_f = 9 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances (numbers denote pin number)
Capacités (les chiffres indiquent le numéro de la broche)
Kapazitäten (die Ziffer geben die Stiftennummer an)

Pentode section Partie penthode 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)	= 1,8 pF
C_{ag1}(6-2)	< 0,025 pF	C_{ag} (1-9)	= 1,5 pF

Between pentode and triode section
Entre la partie penthode et triode
Zwischen Pentoden- und Triodenteil

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

Typical characteristics
Caractéristiques types
Kenndaten

	Pentode section Partie penthode Pentodenteil		Triode section Partie triode Triodenteil	
V_a	= 170 V	V_a	= 100 V	
V_{g2}	= 170 V	V_g	= -2 V	
V_{g1}	= -2 V	I_a	= 14 mA	
I_a	= 10 mA	S	= 5 mA/V	
I_{g2}	= 2,8 mA	μ	= 20	
S	= 6,2 mA/V			
μ_{g2g1}	= 47			
R_i	= 0,4 MΩ			
r_{g1} (f = 50 Mc/s)	= 10 kΩ			
R_{eq}	= 1,5 kΩ			

Operating characteristics for use as frequency changer
Caractéristiques d'utilisation pour utilisation comme changeuse de fréquence
Betriebsdaten zur Verwendung als Mischröhre

V_a	=	170	170 V
V_{g2}	=	170	170 V
R_{g1}	=	0,1	0,1 MΩ
R_k	=	330	820 Ω
V_{osc}	=	3,5	3,5 Veff
I_a	=	6,5	5,2 mA
I_{g2}	=	2,0	1,5 mA
I_{g1}	=	20	0 µA
S_c	=	2,2	2,1 mA/V
R_i	=	800	870 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 Colpittsschaltung und nicht in einer Hartleyschaltung zu verwenden

Limiting values of the pentode section
Caractéristiques limites de la partie penthode
Grenzdaten des Pentodenteils

V_{a_o}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	1,7 W
V_{g2_o}	= max.	550 V
V_{g2} (I_k = 14 mA)	= max.	175 V
V_{g2} ($I_k \leq$ 10 mA)	= max.	200 V
W_{g2} (W_a > 1,2 W)	= max.	0,5 W
W_{g2} (W_a < 1,2 W)	= max.	0,75 W
I_k	= max.	14 mA
R_{g1}	= max.	1 MΩ [1]
R_{g1}	= max.	0,5 MΩ [2]
$-V_{g1}$ (I_{g1} = +0,3 µA)	= max.	1,3 V
V_{kf} (k neg.; f pos.)	= max.	100 V
V_{kf} (k pos.; f neg.)	= max.	200 V [4]

Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteiles

V_{a_o}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	1,5 W
I_k	= max.	14 mA
I_{k_p}	= max.	[3]
R_g	= max.	0,5 MΩ
$-V_g$ (I_g = +0,3 µA)	= max.	1,3 V
V_{kf} (k neg.; f pos.)	= max.	100 V
V_{kf} (k pos.; f neg.)	= max.	200 V [4]

[1] With automatic bias
Avec polarisation automatique
Mit automatischer Gittervorspannung

[2] With fixed bias
Avec polarisation fixe
Mit fester Gittervorspannung

[3] See page 4
Voir page 4
Siehe Seite 4

[4] D.C. component max. 120 V
La composante continue 120 V au max.
Gleichspannungskomponent max. 120 V

[3]) Optimum peak cathode current in frame output application

To allow for tube spread, for deterioration during life and for emission drop at underheating the equipment should be so designed that it still operates satisfactorily with a peak cathode current of 100 mA (max. pulse duration 4% of a cycle, with a maximum of 0.8 msec.). The amplitude of the peak current occuring with new tubes should be limited automatically to this max. value of 100 mA. (e.g. by non-bypassed resistances in the grid lead)

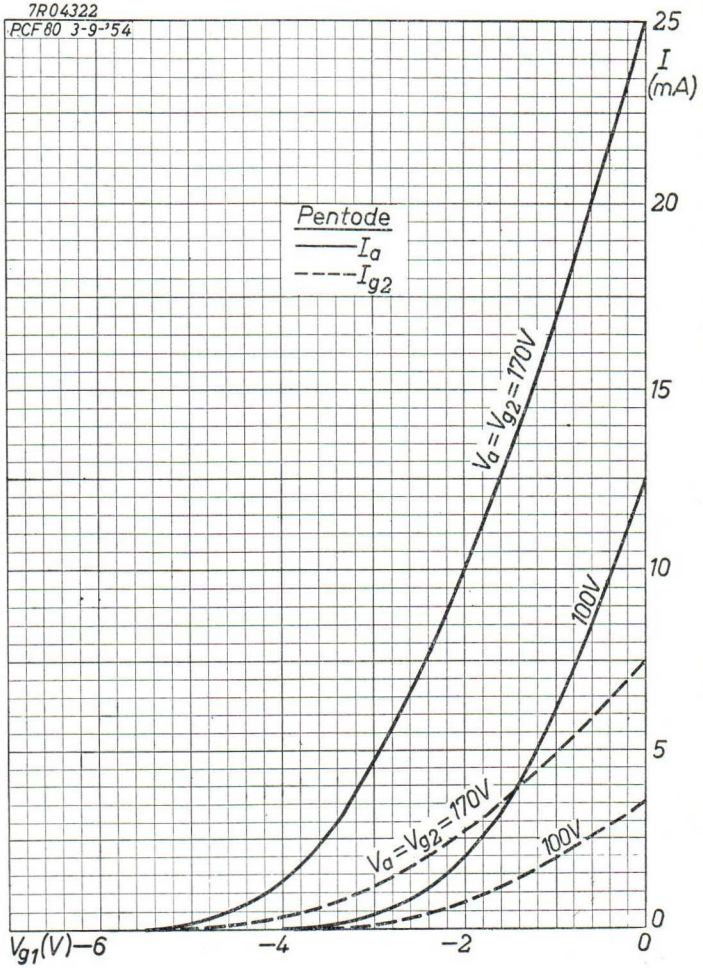
Courant cathodique de crête optimum en application pour la déviation verticale

Pour tenir compte de la dispersion, de la dégradation en service et de la chûte de l'émission lors d'un chauffage insuffisant, l'appareil devra être conçu de telle façon qu'il donne encore toute satisfaction avec un courant cathodique de crête de 100 mA. (Durée maximum de l'impulsion 4% d'une période avec un maximum de 0,8 msec.) Il faut limiter automatiquement l'amplitude du courant de crête à cette valeur maximum de 100 mA se produisant avec des tubes neufs (p.e. par des résistances non-shuntées dans la connection de grille)

Höchstwert des Katodenspitzenstromes beim Gebrauch für die vertikale Ablenkung

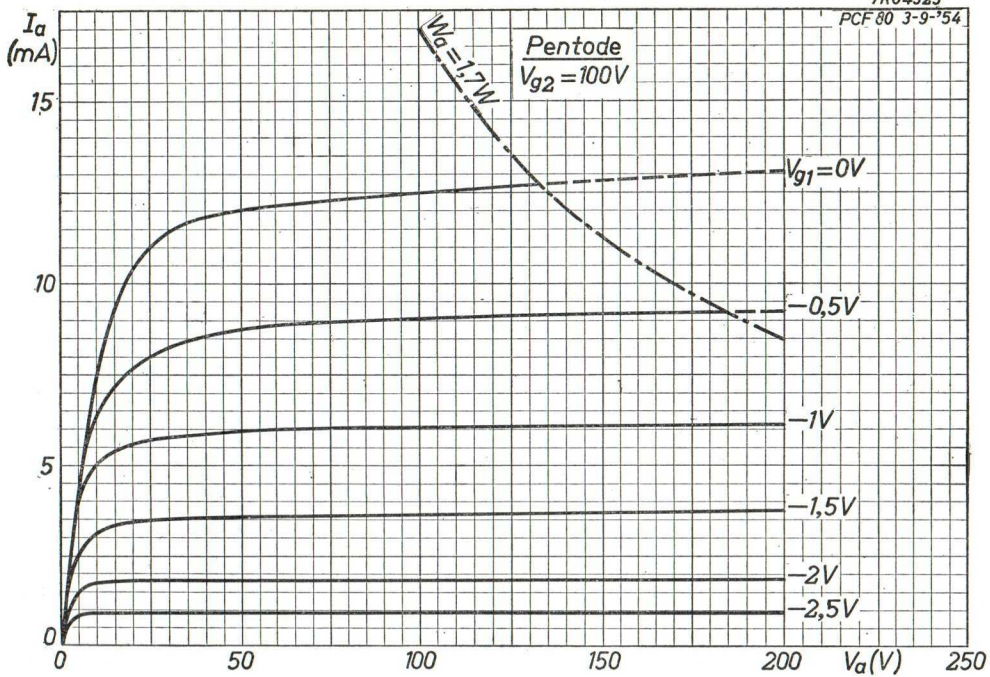
Um den Röhrentoleranzen, dem Absinken der Röhrenkennwerte während der Lebensdauer und der Emissionsabnahme bei Unterheizung Rechnung zu tragen, soll das Gerät so ausgelegt werden, dass es bei einem Katodenspitzenstrom von 100 mA noch einwandfrei arbeitet (Impulzdauer max. 4% einer Periode, aber nicht länger als 0,8 mSek.). Man soll die Amplitude der bei neuen Röhren auftretenden Spitzenstrom automatisch auf diesem maximalen Wert von 100 mA begrenzen (z.B. durch nicht-überbrückte Widerstände in der Gitterleitung

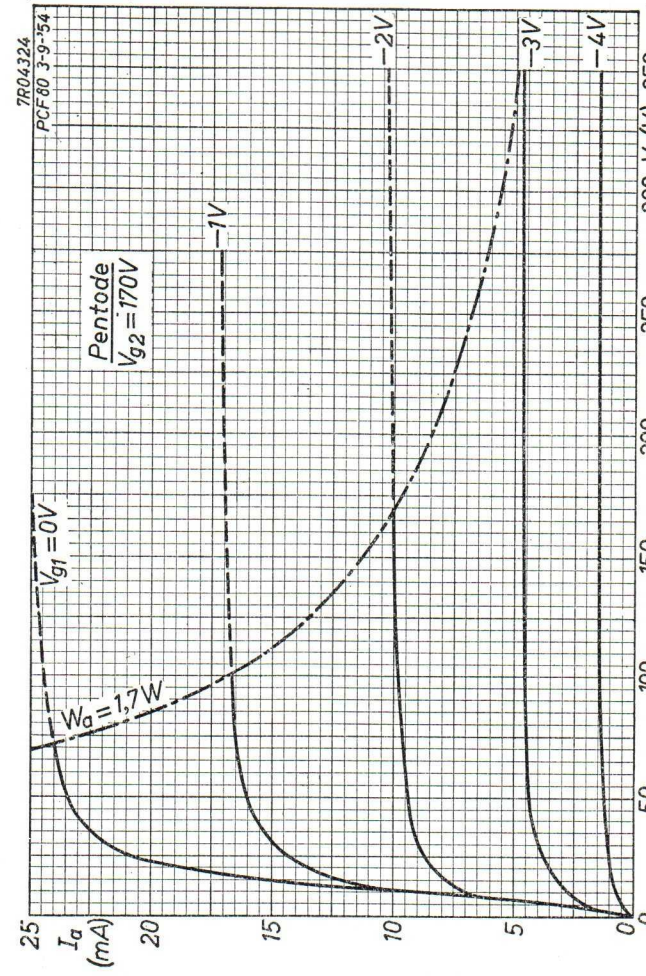
PHILIPS PCF 80



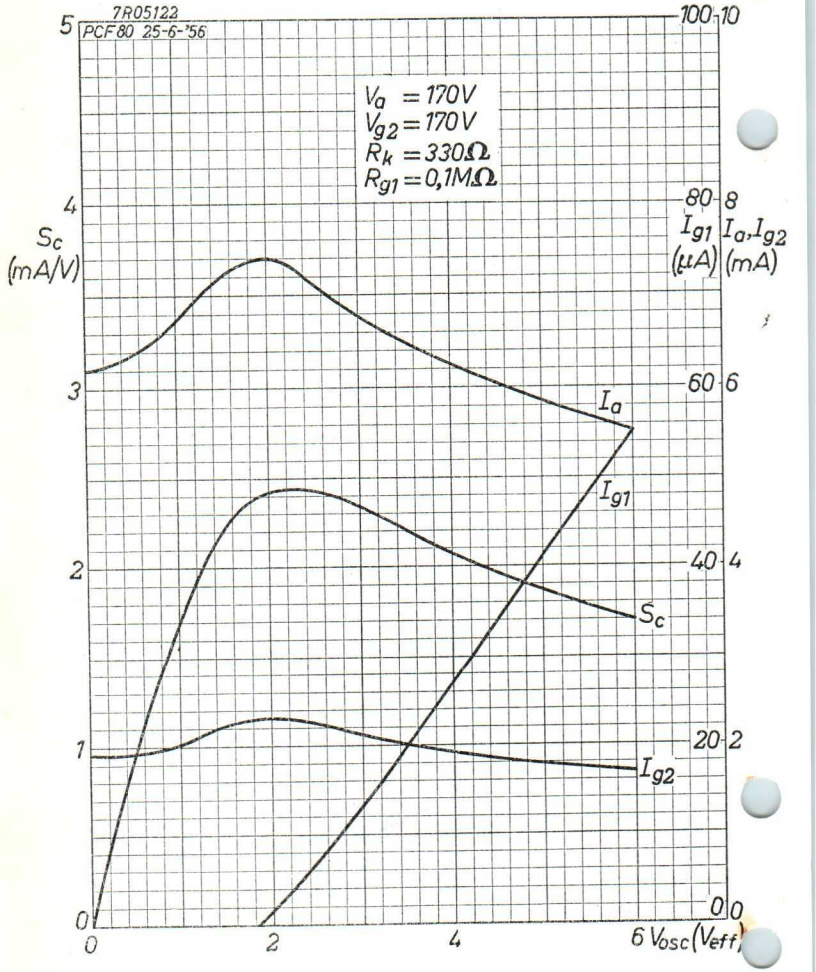
9.9.1954

A


7R04323
PCF 80 3-9-'54
Pentode
V_{g2} = 100V
W_a = 1,7W
V_{g1} = 0V
−0,5V
−1V
−1,5V
−2V
−2,5V
I_a (mA)
15
10
5
0
0
50
100
150
200
V_a (V)
250


7R04324
PCF80 3-9-54
Pentode
V_{g2} = 170V
V_{g1} = 0V
−1V
−2V
−3V
−4V
W_a = 1,7W
I_a (mA)
25
20
15
10
5
0
0
50
100
150
200
250
300
350
V_a(V)

PCF 80 PHILIPS



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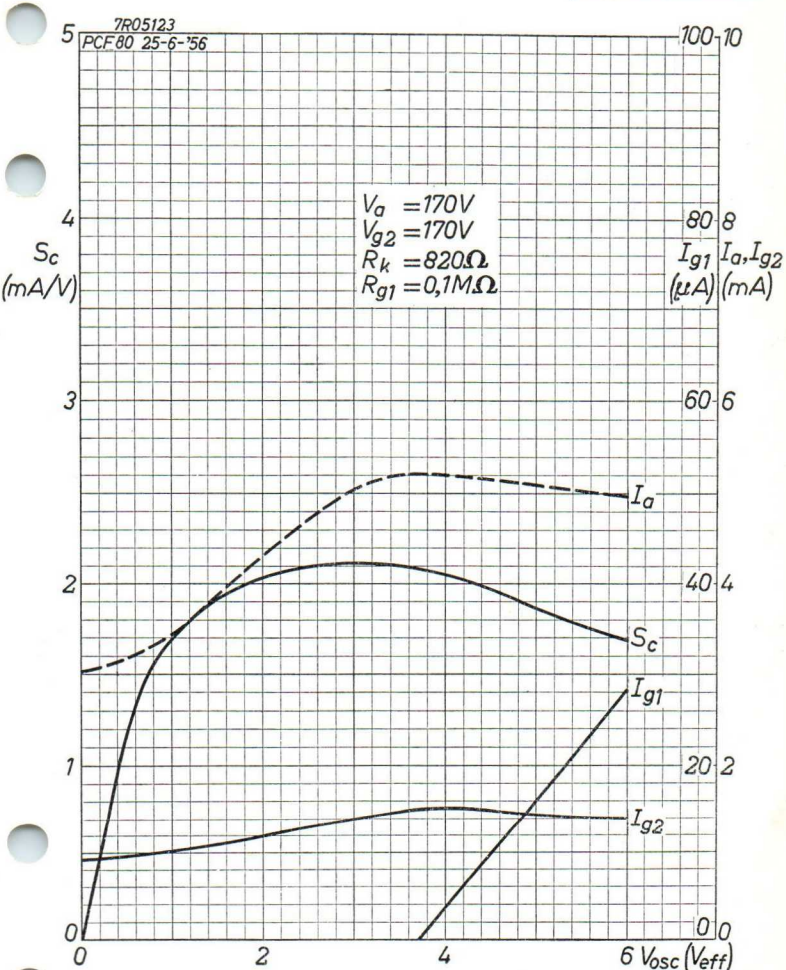

7R05123
PCF 80 25-6-'56
V_a = 170V
V_{g2} = 170V
R_k = 820Ω
R_{g1} = 0,1MΩ
S_c (mA/V)
I_{g1} (μA)
I_a, I_{g2} (mA)
I_a
S_c
I_{g1}
I_{g2}
6 V_{osc} (V_{eff})

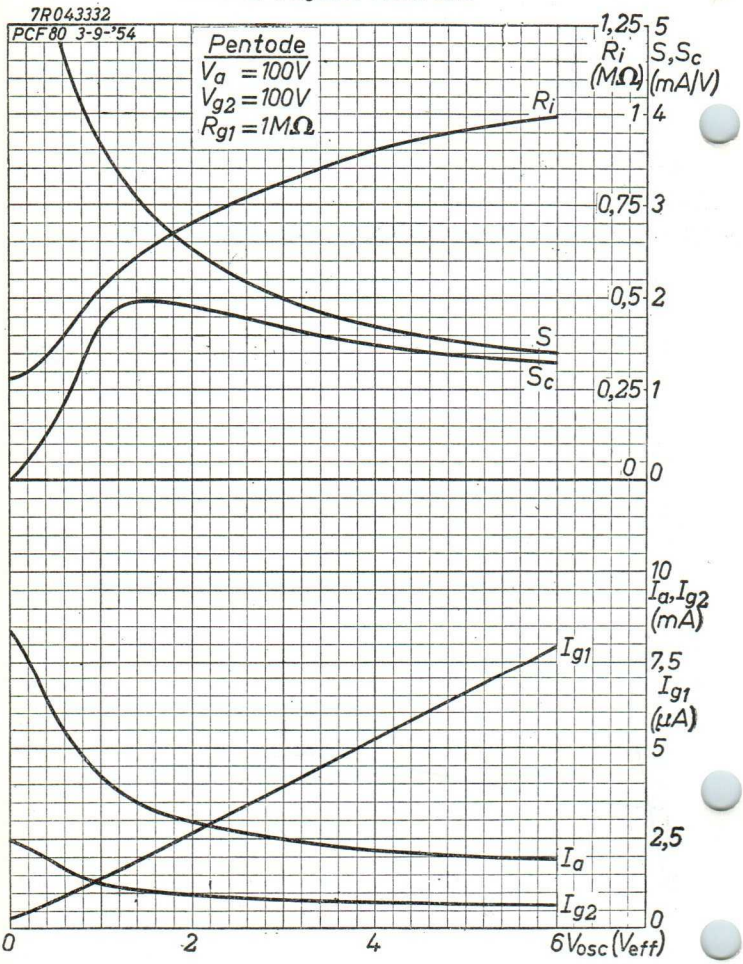
7.7.1956

E

PCF 80

PHILIPS

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

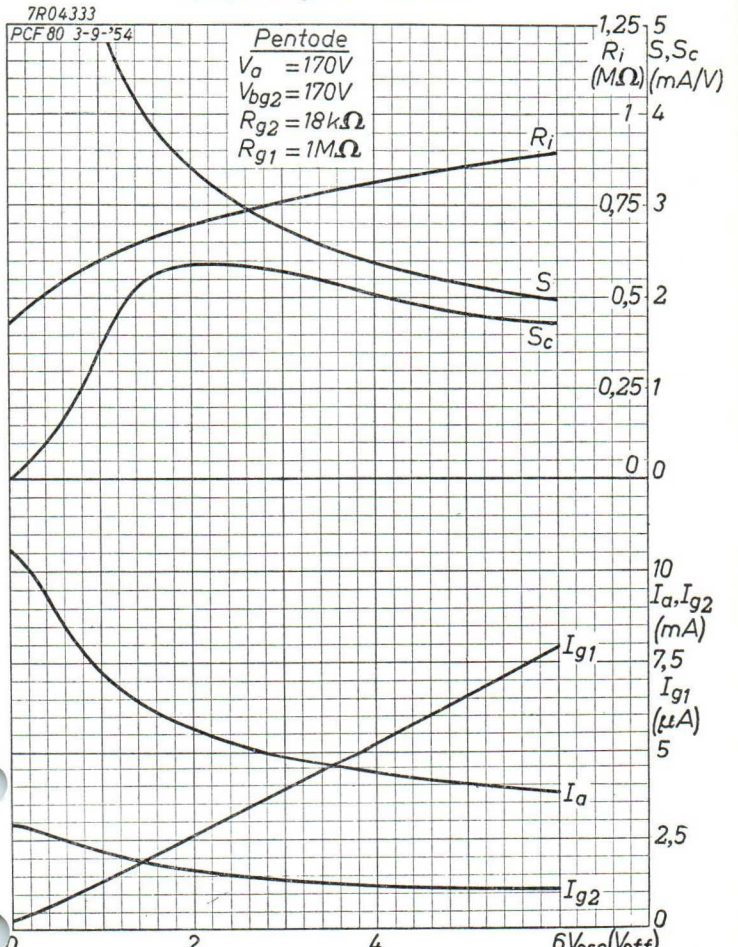


F

PHILIPS

PCF 80

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



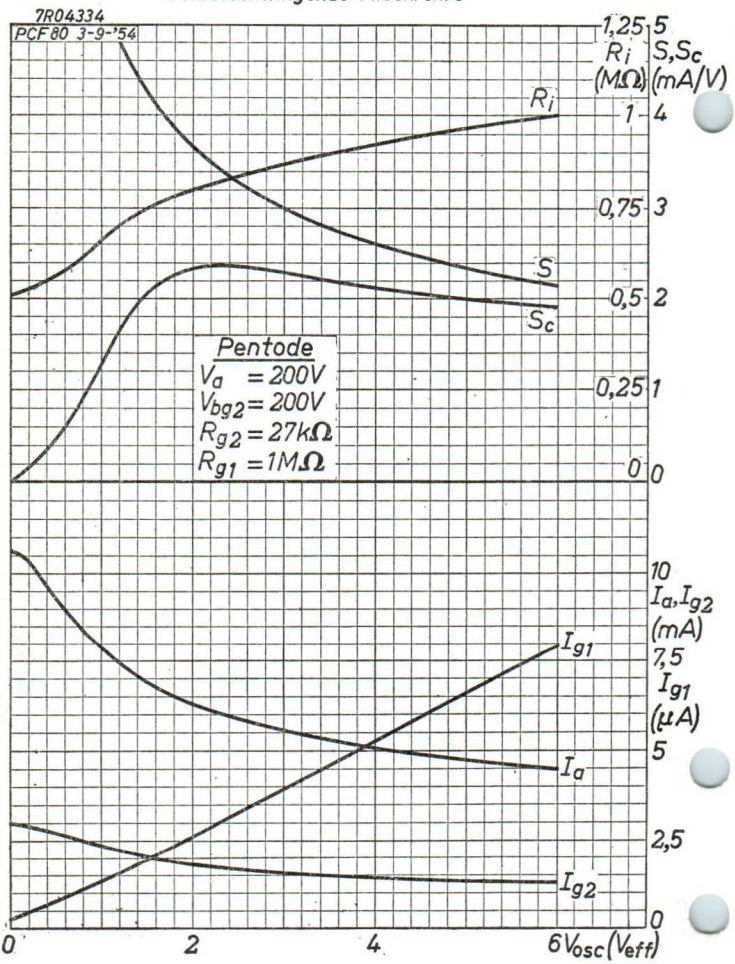
9.9.1954

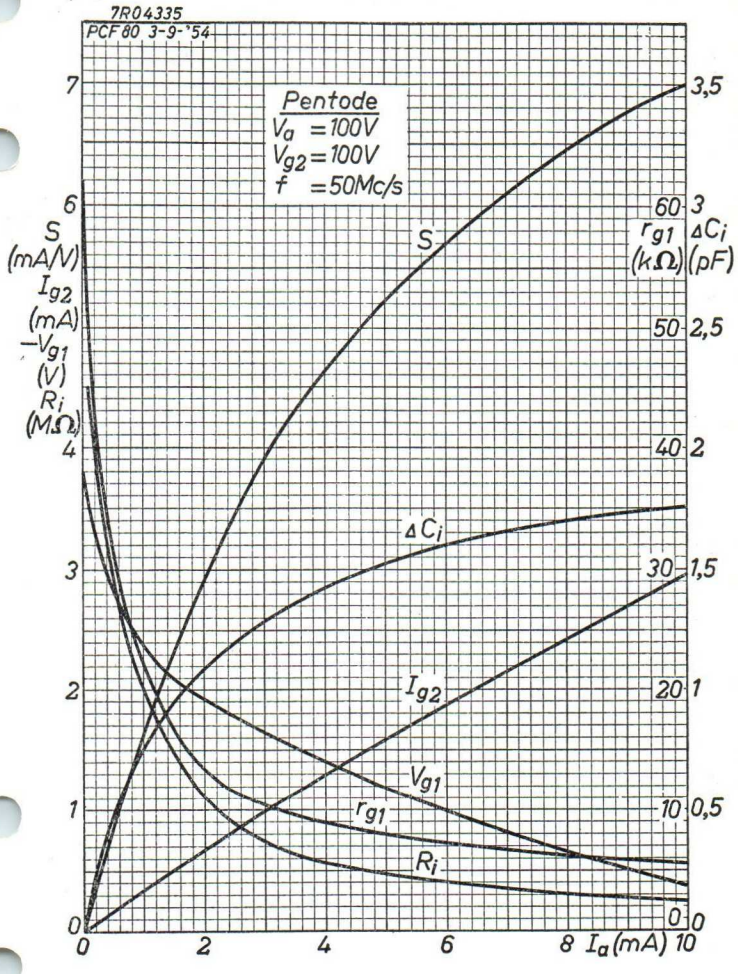
G

PCF 80

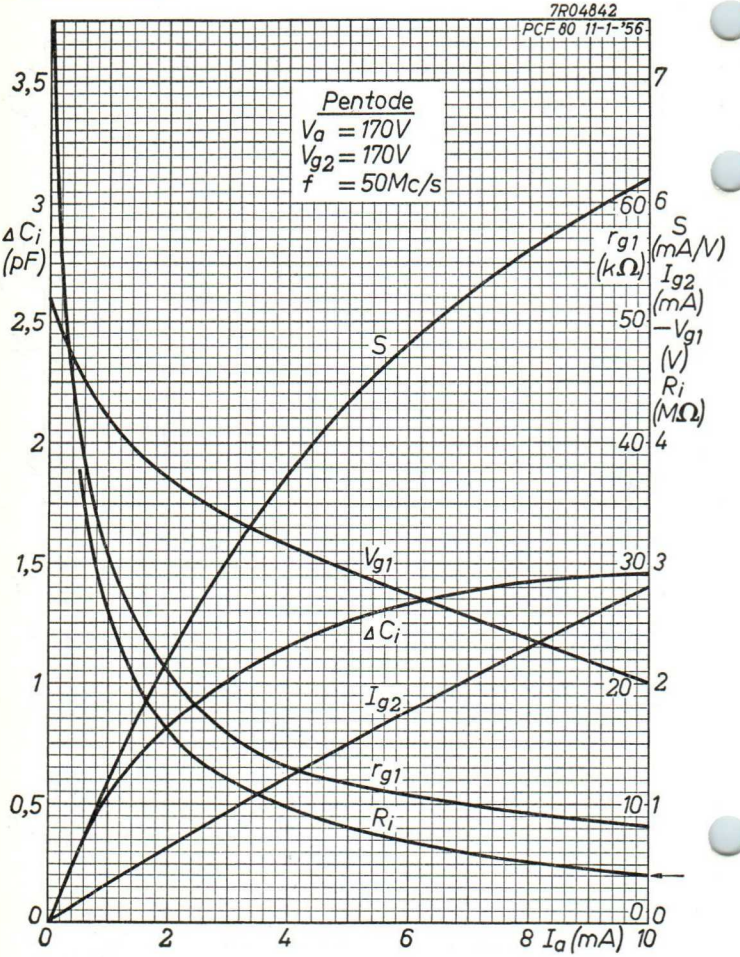
PHILIPS

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

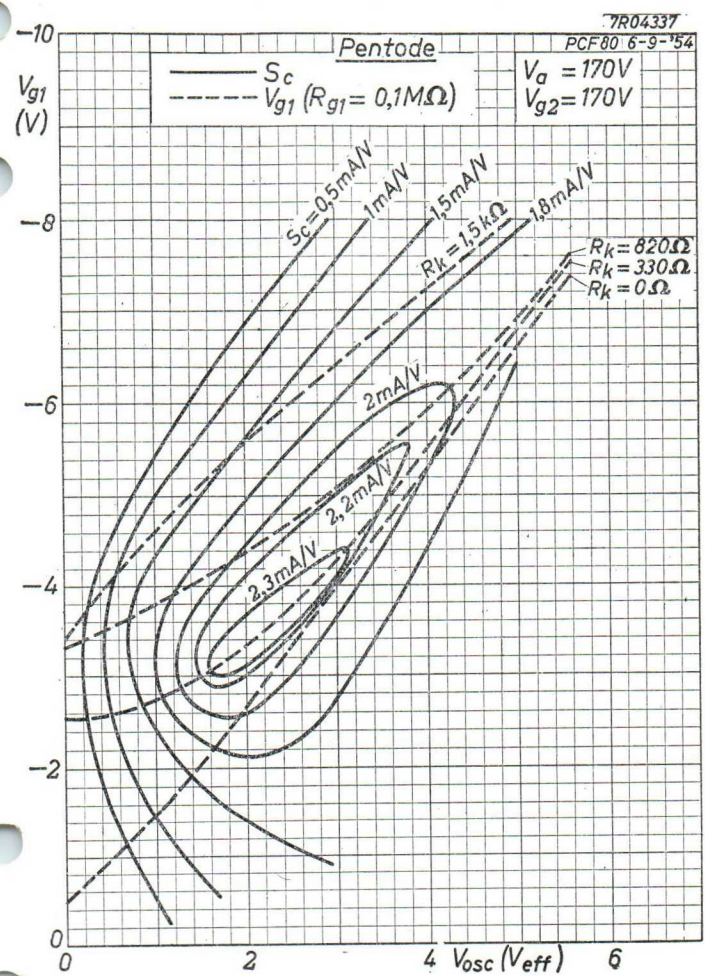



7R04335
PCF80 3-9-'54
Pentode
V_a = 100V
V_{g2} = 100V
f = 50Mc/s
S (mA/V)
I_{g2} (mA)
$-V_{g1}$ (V)
R_i (MΩ)
r_{g1} (kΩ)
ΔC_i (pF)
S
ΔC_i
I_{g2}
V_{g1}
r_{g1}
R_i
I_a (mA)
0
2
4
6
8
10
1
3
5
7
0,5
1,5
2,5
3,5
10
20
30
40
50
60

PCF 80 PHILIPS



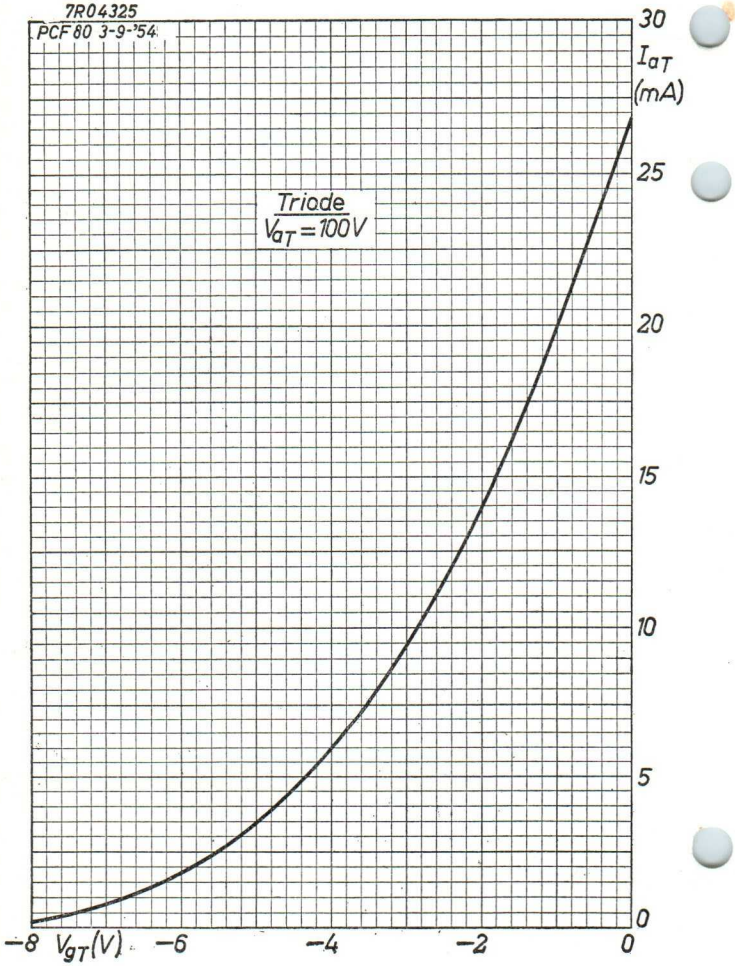
PHILIPS PCF 80



9.9.1954

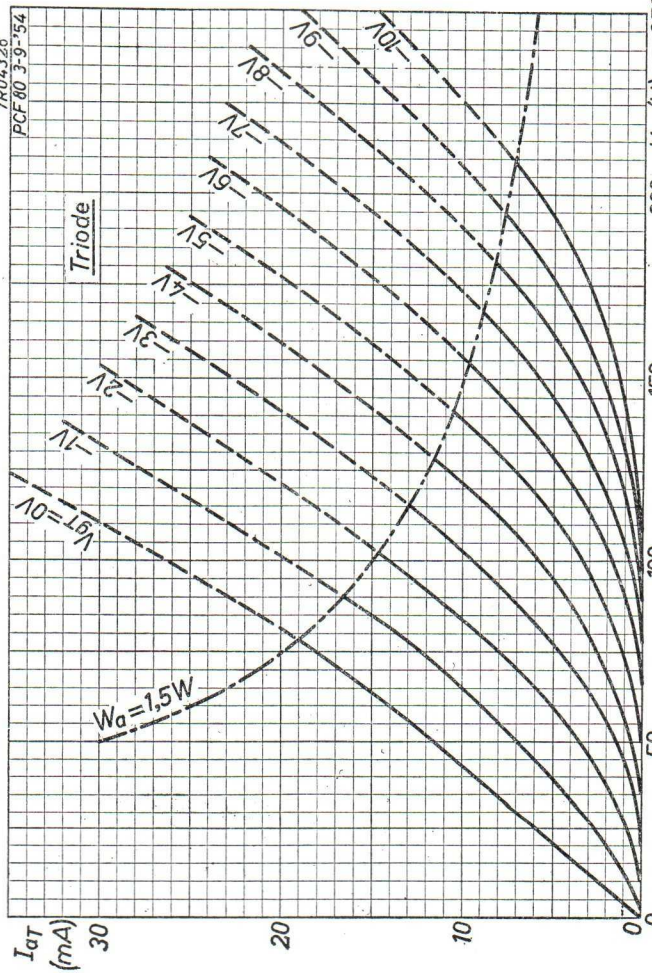
K

PCF 80 PHILIPS



PHILIPS

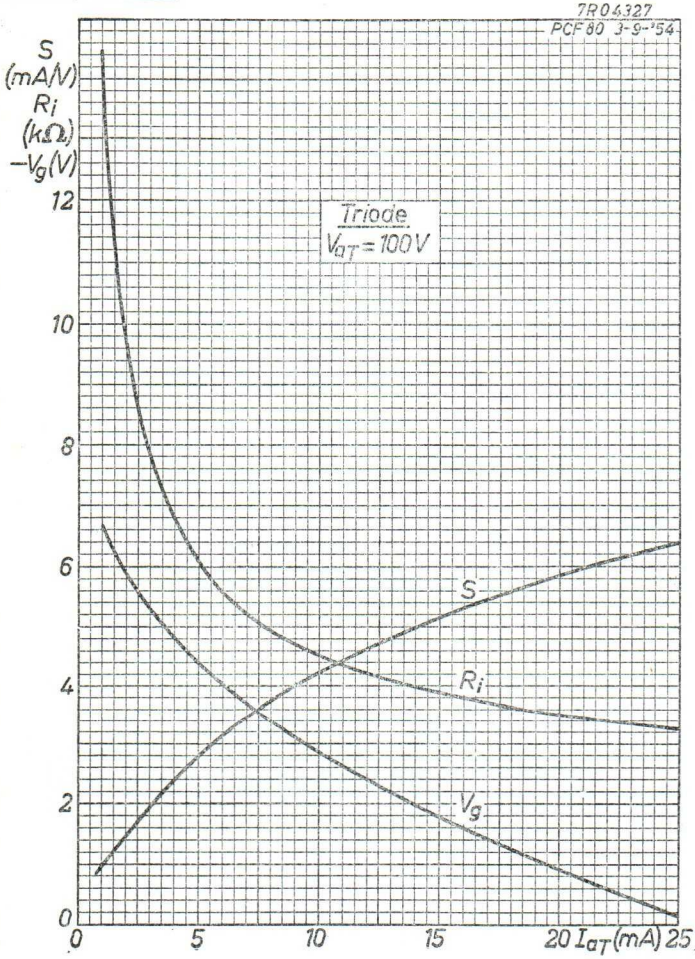
PCF80



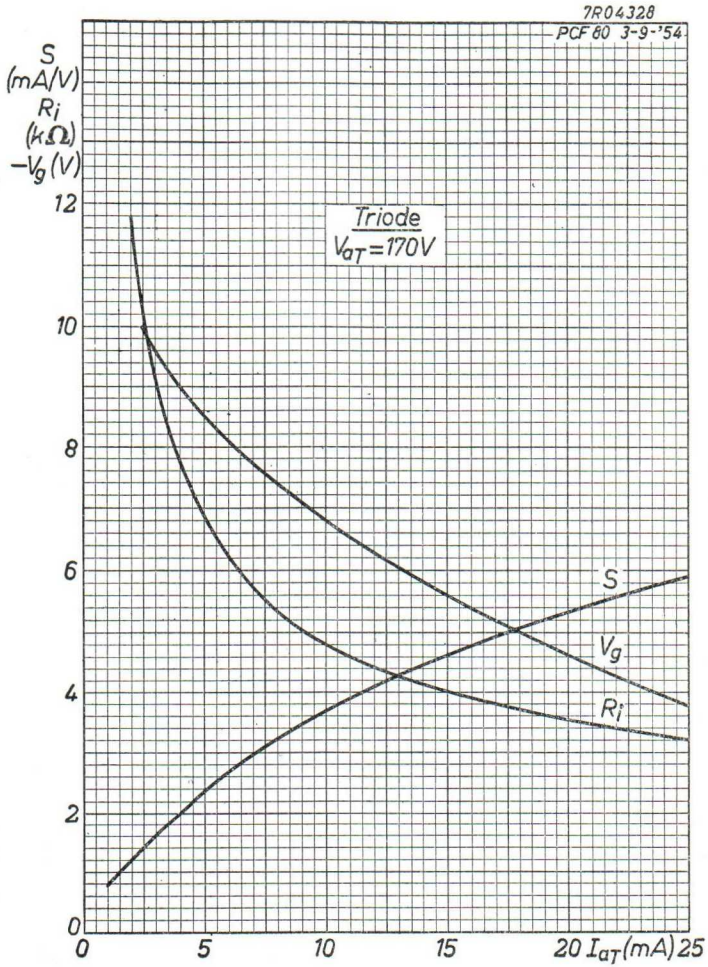
9.9.1954

M

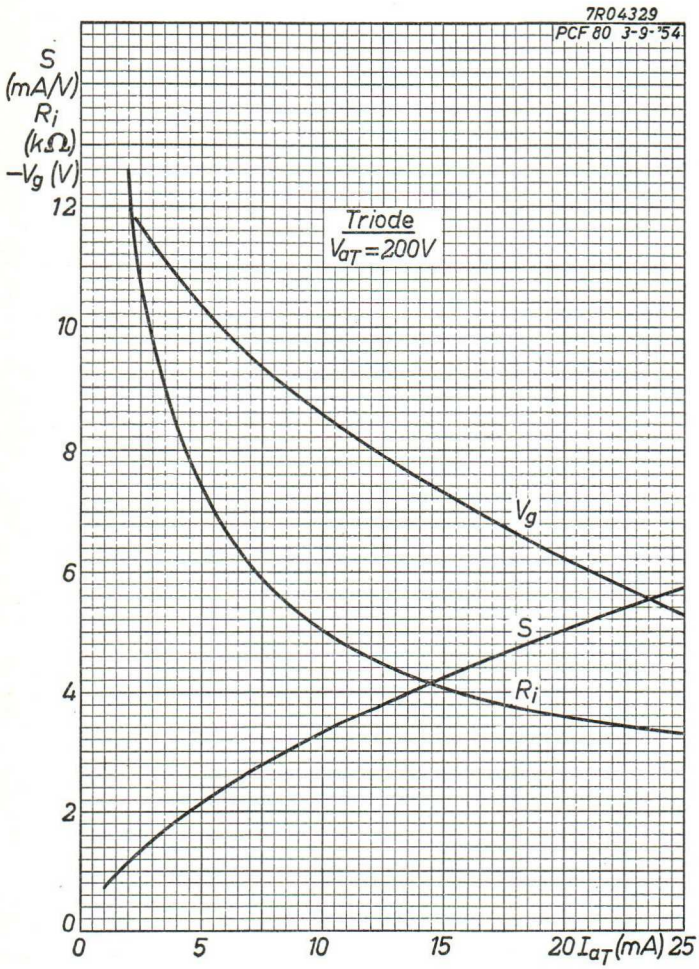
PCF80 **PHILIPS**



N

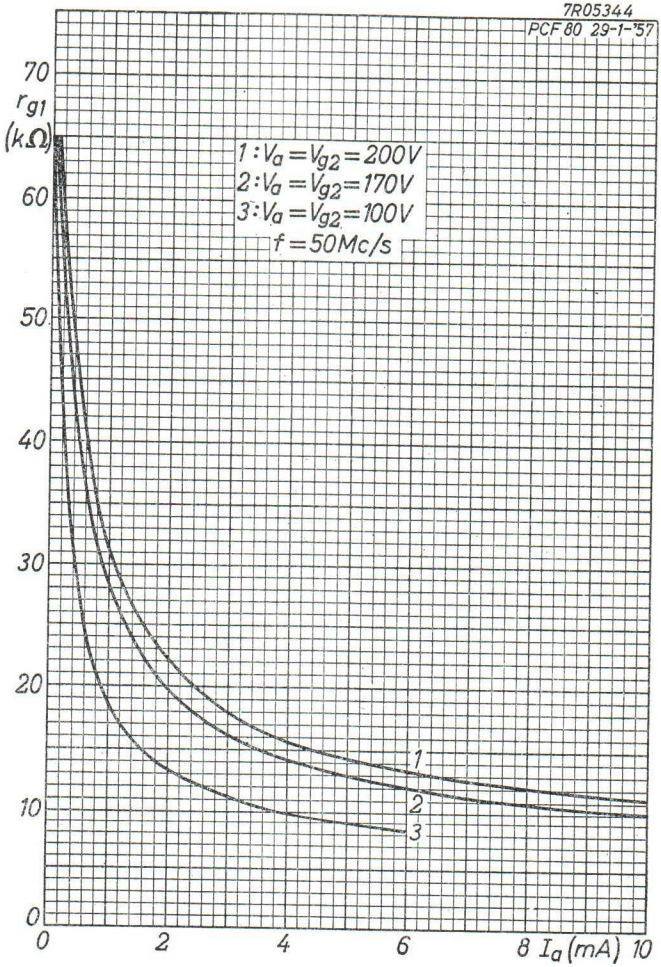

7R04328
PCF 80 3-9-'54
S (mA/V)
Ri (kΩ)
−Vg (V)
Triode
VaT=170V
S
Vg
Ri
0
2
4
6
8
10
12
0
5
10
15
20
IaT(mA)
25

PCF 80 PHILIPS



P

7R05344
PCF 80 29-1-'57



2.2.1957

Q

PHILIPS

PCF 86

Combined TRIODE and high-slope R.F. PENTODE for use as frequency changer in V.H.F. television tuners

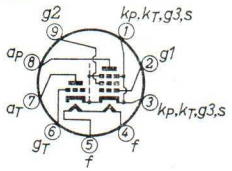
Tube composé d'une TRIODE et d'une PENTODE H.F. à pente élevée pour utilisation comme changeur de fréquence dans les amplificateurs d'entrée des récepteurs de télévision V.H.F.

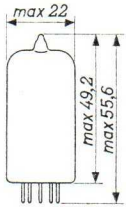
Röhre mit TRIODE und HF-PENTODE mit hoher Steilheit zur Verwendung als Mischröhre in den Eingangsverstärkern von VHF-Fernsehempfängern

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

I_f = 300 mA
V_f = 8 V

Dimensions in mm
Dimensions
Abmessungen





Base, culot, Sockel: NOVAL

Capacitances
Capacités
Kapazitäten

Triode section Partie triode Triodenteil		Pentode section Partie pentode Pentodenteil	
C_g	= 2,4 pF	C_{g_1}	= 6,0 pF
C_a	= 1,1 pF	C_a	= 3,5 pF
C_{ag}	= 2,0 pF	C_{ag_1}	= 0,012 pF
		$C_{g_1g_2}$	= 1,7 pF

Between triode and pentode sections
Entre les parties triode et pentode
Zwischen Trioden- und Pentodenteil

$C_{aP\text{-}aT}$ = 0,14 pF
$C_{aP\text{-}gT}$ = 0,014 pF
$C_{g_1\text{-}aT}$ < 0,010 pF
$C_{g_1\text{-}gT}$ < 0,010 pF

Typical characteristics
Caractéristiques types
Kenndaten

Triode section Partie triode Triodenteil		Pentode section Partie pentode Pentodenteil	
V_a	= 100 V	V_a	= 170 V
V_g	= -3 V	V_{g2}	= 150 V
I_a	= 14 mA	V_{g1}	= -1,2 V
S	= 5,5 mA/V	I_a	= 10 mA
μ	= 17	I_{g2}	= 3,3 mA
		S	= 12 mA/V
		R_i	> 350 kΩ
		μ_{g2g1}	= 70
		R_{eq}	= 1 kΩ

Operating characteristics of the pentode section as frequency changer
Caractéristiques d'utilisation de la partie pentode comme changeuse de fréquence
Betriebsdaten des Pentodenteils als Mischröhre

V_{ba}	= 190 V
V_{bg2}	= 190 V
R_{g2}	= 18 kΩ
R_{g1}	= 100 kΩ
V_{osc}	= 2,3 V_{eff}
I_a	= 8,5 mA
I_{g2}	= 2,7 mA
I_{g1}	= 30 µA
R_1	= 0,6 MΩ
S_c	= 4,5 mA/V
r_{g1} (f = 200 Mc/s)	= 3 kΩ

[2]) Automatic grid bias
En polarisation automatique
Mit automatischer Gittervorspannung

[3]) Fixed grid bias
En polarisation fixe
Mit fester Gittervorspannung

Operating characteristics of the triode section as oscillator
Caractéristiques d'utilisation de la partie triode comme oscillatrice
Betriebsdaten des Triodenteils als Oszillator

V_{ba} = 190 V
R_a = 8,2 kΩ
R_g = 10 kΩ
Vosc = 4,5 V_{eff}
I_a = 12 mA
S_{eff} = 3,5 mA/V

Limiting values
Caractéristiques limites
Grenzdaten

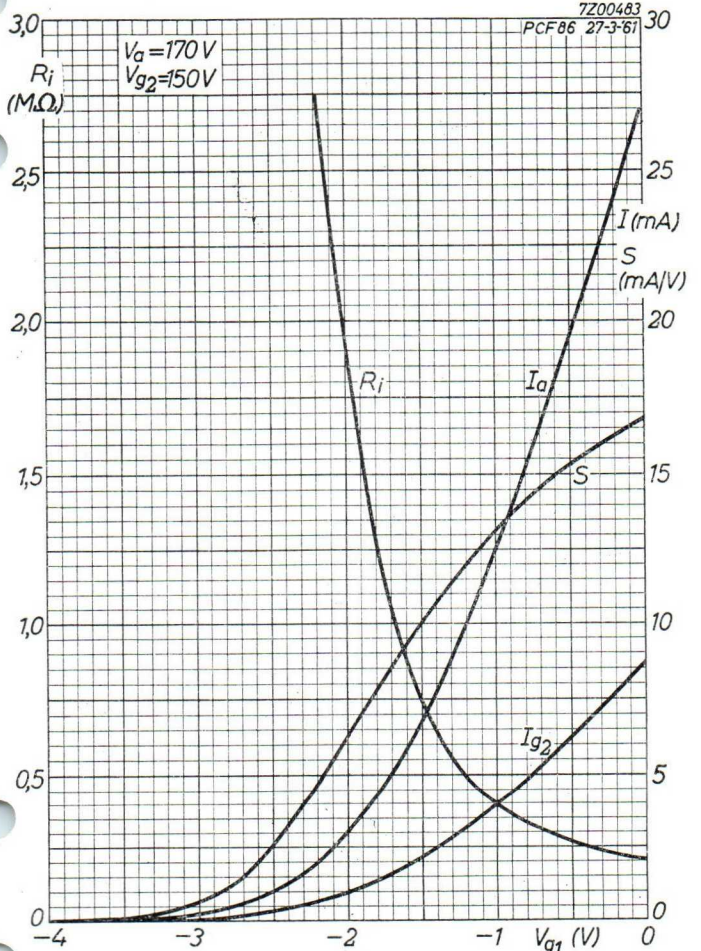
Triode section Partie triode Triodenteil	Pentode section Partie pentode Pentodenteil
V_a = max. 125 V	V_a = max. 250 V
W_a = max. 1,5 W	W_a = max. 2,0 W
R_g = max. 500 kΩ	V_{g_2} = max. 150 V
I_k = max. 15 mA	W_{g_2} = max. 0,5 W
V_{kf} = max. 100 V [1]	R_{g_1} = max. 500 kΩ [2]
	R_{g_1} = max. 250 kΩ [3]
	I_k = max. 18 mA
	V_{kf} = max. 100 V [1]

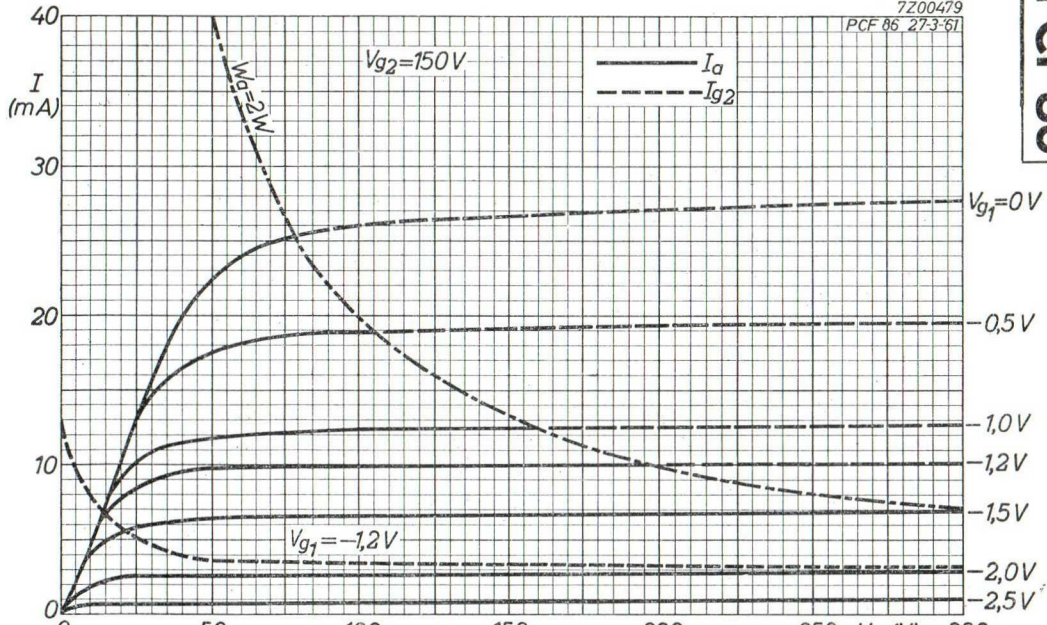
[1] To fulfil the modulation hum requirements in intercarrier receivers, V_{kf} should not exceed 75 V (R.M.S.)
With respect to modulation hum in A.M. sound receivers V_{kf} should not exceed 50 V (R.M.S.)

Pour satisfaire aux exigences de la modulation de ronflement dans les récepteurs pour le système interporteur, V_{kf} ne dépassera pas 75 V_{eff}
Par rapport à la modulation de ronflement de récepteurs de son A.M. V_{kf} ne dépassera pas 50 V_{eff}.

Um die Brummodulationsanforderungen von Empfängern nach dem Differenzträgerverfahren zu genügen soll V_{kf} einen Wert von 75 V_{eff} nicht überschreiten
In Bezug auf die Brummodulation von AM-Radioempfängern soll V_{kf} 50 V_{eff} nicht überschreiten

[2][3] See page 2; voir page 2; Siehe Seite 2

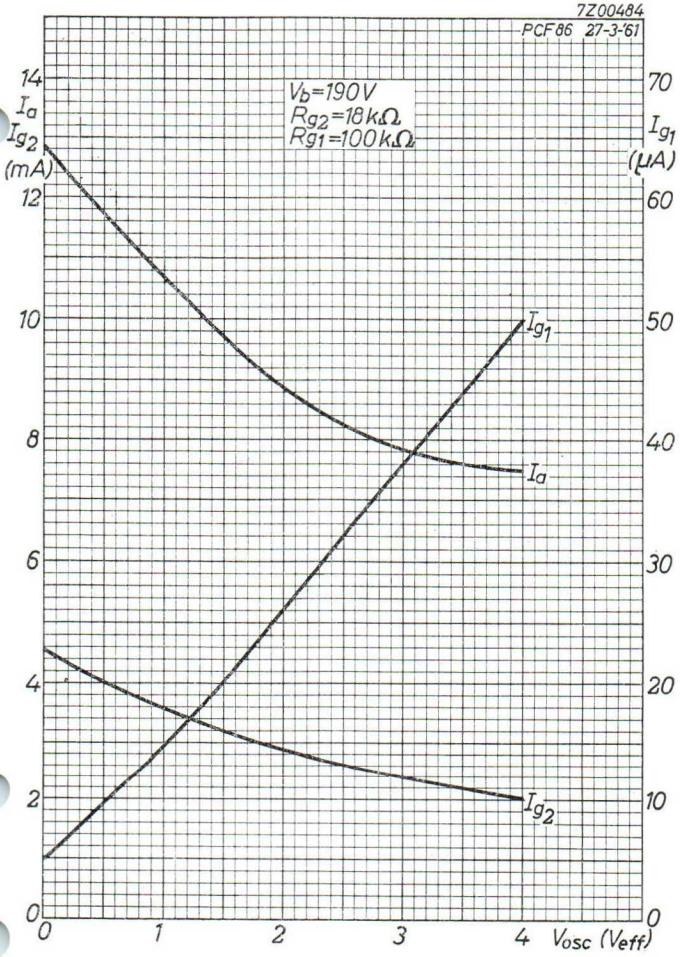

7Z00483
PCF86 27-3-61
V_a = 170 V
V_{g2} = 150 V
R_i (MΩ)
I (mA)
S (mA/V)
R_i
I_a
S
I_{g2}
3,0
2,5
2,0
1,5
1,0
0,5
0
30
25
20
15
10
5
0
−4
−3
−2
−1
0
V_{g1} (V)



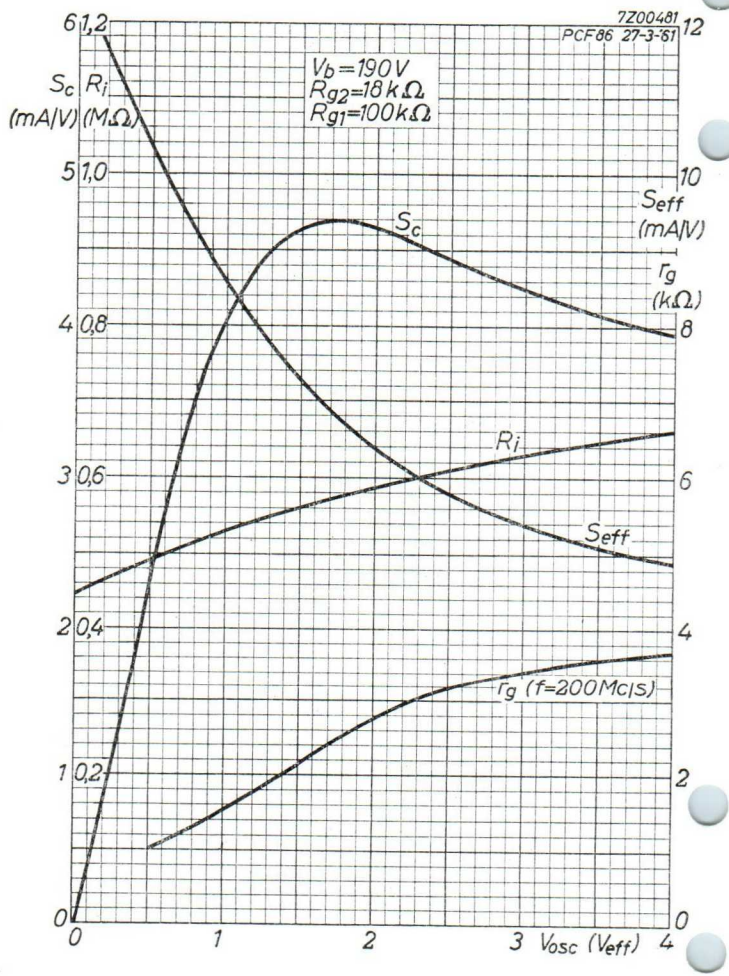
PCF 86

PHILIPS

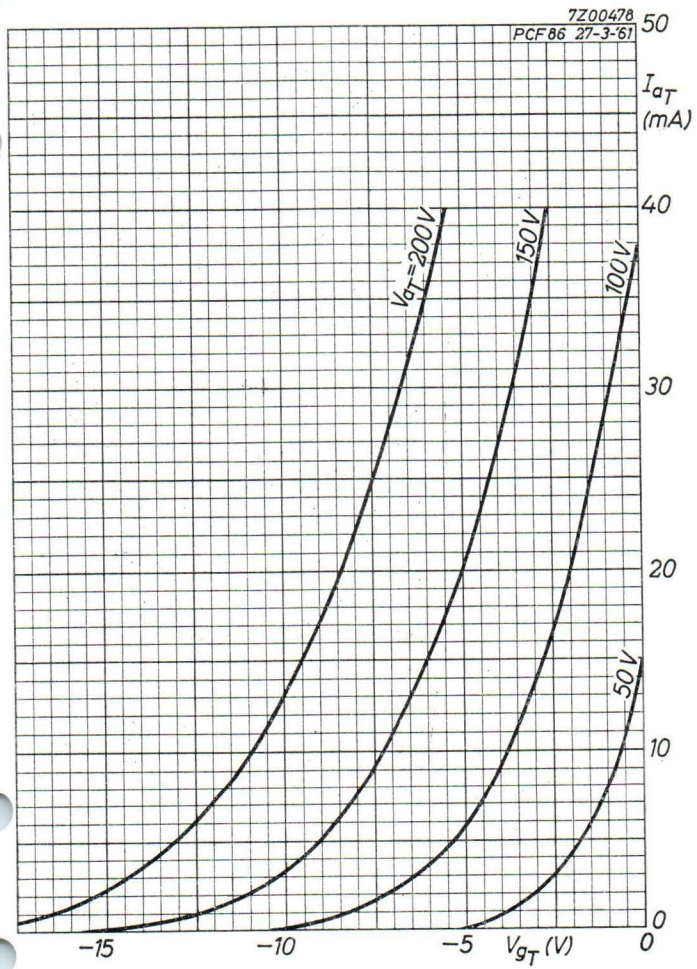
B


7Z00484
PCF86 27-3-'61
V_b=190V
R_{g2}=18kΩ
R_{g1}=100kΩ
I_a
I_{g2} (mA)
I_{g1} (μA)
I_{g1}
I_a
I_{g2}
14
12
10
8
6
4
2
0
70
60
50
40
30
20
10
0
0
1
2
3
4
V_{osc} (V_{eff})

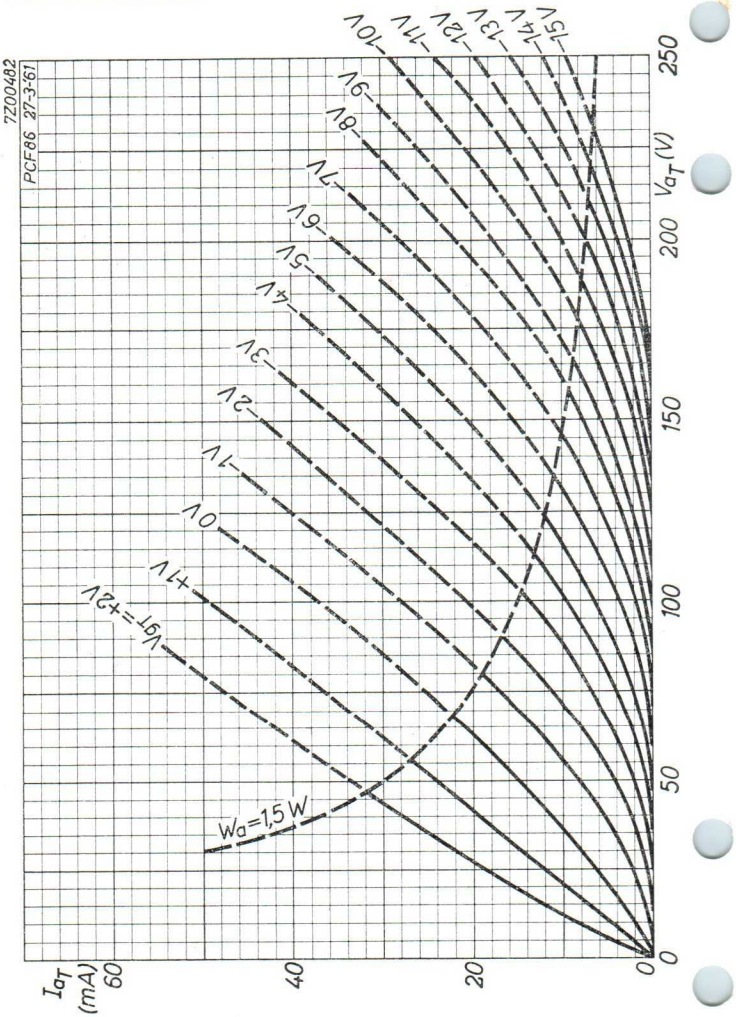
PCF 86 PHILIPS

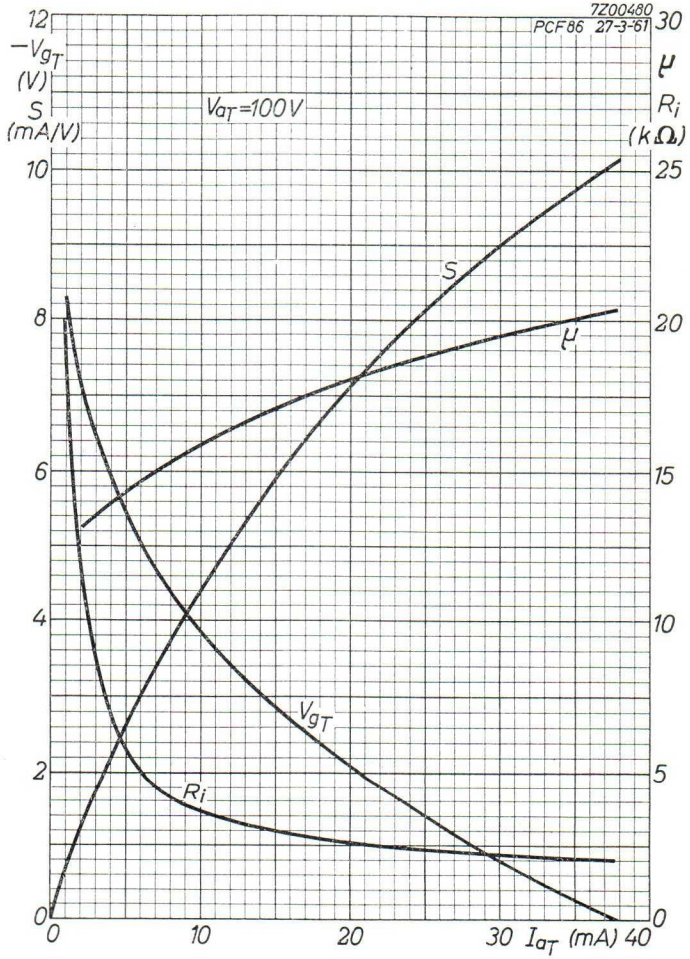


D


7Z00478
PCF 86 27-3-'61
I_{aT} (mA)
50
40
30
20
10
0
V_{aT}=200V
150V
100V
50V
−15
−10
−5
V_{gT} (V)
0

PCF 86 PHILIPS




7Z00480
PCF86 27-3-61
12
−Vg_T (V)
S (mA/V)
10
8
6
4
2
0
Va_T=100V
30
μ
Ri (kΩ)
25
20
15
10
5
0
S
μ
Vg_T
Ri
0
10
20
30 Ia_T (mA) 40

PHILIPS

PCF801

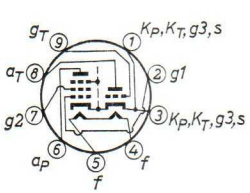
Combined high slope FRAME GRID TRIODE AND R.F. PENTODE for use as frequency changer in V.H.F. television tuners

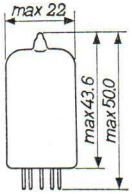
HEATING

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

Heater current $I_f = 0.3$ A

Heater voltage $V_f = 8.5$ V





Base: NOVAL. (Dimensions in mm)

CAPACITANCES

Pentode section (with external shield)

Grid No.1 to all other elements except anode	C_{g1}	= 6.2 pF
Anode to all other elements except grid No.1	C_a	= 3.5 pF
Anode to grid No.1	C_{ag1} C_{ag1}	= 0.009 pF < 0.012 pF
Grid No.1 to grid No.2	C_{g1g2}	= 1.5 pF

Triode section

Grid to all other elements except anode	C_g	= 3.3 pF
Anode to all other elements except grid	C_a	= 1.7 pF
Anode to grid	C_{ag}	= 1.8 pF

Between pentode and triode sections

Pentode anode to triode anode	C_{aP-aT}	< 0.025 pF
Pentode anode to triode grid	C_{aP-gT}	< 0.010 pF
Pentode grid to triode anode	C_{g1P-aT}	< 0.010 pF
Pentode grid to triode grid	C_{g1P-gT}	< 0.010 pF

TYPICAL CHARACTERISTICS

Pentode section

Anode voltage	V_a	= 170	V
Grid No.2 voltage	V_{g2}	= 120	V
Grid No.1 voltage	V_{g1}	= -1.2	V
Anode current	I_a	= 10	mA
Grid No.2 current	I_{g2}	= 3	mA
Mutual conductance	S	= 11	mA/V
Internal resistance	R_i	> 350	kΩ
Amplification factor of grid No.2 with respect to grid No.1	$\mu_{g_2g_1}$	= 55	
Equivalent noise resistance	R_{eq}	= 1.5	kΩ
Grid No.1 current	I_{g_1}	= +0.3	μA
Negative grid No.1 voltage	$-V_{g_1}$	≦ 1.3	V

Triode section

Anode voltage	V_a	= 100	V
Grid voltage	V_g	= -3	V
Anode current	I_a	= 15	mA
Mutual conductance	S	= 9	mA/V
Amplification factor	μ	= 20	
Grid current	I_g	= +0.3	μA
Negative grid voltage	$-V_g$	≦ 1.3	V

OPERATING CHARACTERISTICS of the triode section as oscillator

Anode supply voltage	V_{ba}	= 200		V
Grid resistor	R_g	= 10		kΩ
Anode resistor	R_a	= 8.2	12	kΩ
Oscillator voltage	V_{osc}	= 4.5	3.3	V(RMS)
Anode current	I_a	= 16	12	mA
Effective mutual conductance [1]	S_{eff}	= 3.7	3.7	mA/V

[1]) Without higher harmonics

OPERATING CHARACTERISTICS of the pentode section as mixer				
Anode supply voltage	V_{ba}	=	200	V
Grid No.2 supply voltage	V_{bg_2}	=	200	V
Grid No.2 resistor	R_{g_2}	=	27	kΩ
Anode resistor	R_a	=	2.7 to 4.7	kΩ
Grid No.1 supply voltage	V_{bg_1}	=	-1.2 to 0	V
Grid No.1 resistor	R_{g_1}	=	0.1 to 1	MΩ
Oscillator voltage	V_{osc}	=	1.6 to 1.6	V(RMS)
Anode current	I_a	=	10 to 9	mA
Grid No.2 current	I_{g_2}	=	3.0 to 2.8	mA
Grid No.1 current	I_{g_1}	=	10 to 2.3	μA
Conversion conductance	S_c	=	5 to 4.7	mA/V

OPERATING CHARACTERISTICS of the pentode section as I.F. amplifier				
Anode supply voltage	V_{ba}	=	200	V
Grid No.2 supply voltage	V_{bg_2}	=	200	V
Grid No.2 resistor	R_{g_2}	=	27	kΩ
Anode resistor	R_a	=	2.7 to 4.7	kΩ
Grid No.1 supply voltage	V_{bg_1}	=	-1.2 to 0	V
Grid No.1 resistor	R_{g_1}	=	0.1 to 1	MΩ
Anode current	I_a	=	10 to 12.5	mA
Grid No.2 current	I_{g_2}	=	3.0 to 3.7	mA
Mutual conductance	S	=	11 to 14	mA/V
Input resistance at 50 Mc/s	r_{g_1}	=	10 to 10	kΩ
Grid No.1 voltage	V_{g_1}	=	-12 to -	V
Mutual conductance	S	=	0.11 to -	mA/V

LIMITING VALUES of the pentode section (Design centre limits)

Anode voltage in cold condition	V_{a_o}	= max.	550 V
Anode voltage	V_a	= max.	250 V
Anode dissipation	W_a	= max.	2.0 W
Grid No.2 voltage in cold condition	V_{g2o}	= max.	550 V
Grid No.2 voltage	V_{g2}	= max.	250 V
Grid No.2 dissipation			
at $-V_{g1}$ < 1.5 V	W_{g2}	= max.	0.45 W
at 1.5 V < $-V_{g1}$ < 2 V	W_{g2}	= max.	0.4 W
at $-V_{g1}$ > 2 V	W_{g2}	= max.	0.3 W
Negative grid No.1 voltage	$-V_{g1}$	= max.	50 V
Grid No.1 resistor with fixed bias	R_{g1}	= max.	1 MΩ
Grid No.1 resistor with automatic bias	R_{g1}	= max.	2.2 MΩ
Cathode current	I_k	= max.	18 mA
Voltage between heater and cathode	V_{kf}	= max.	100 V [1]

LIMITING VALUES of the triode section (Design centre limits)

Anode voltage in cold condition	V_{a_o}	= max.	550 V
Anode voltage	V_a	= max.	125 V
Anode dissipation	W_a	= max.	1.5 W
Negative grid voltage	$-V_g$	= max.	50 V
Grid resistor	R_g	= max.	0.5 MΩ
Cathode current	I_k	= max.	20 mA
Voltage between heater and cathode	V_{kf}	= max.	100 V [1]

[1]) To fulfil the modulation hum requirements in intercarrier receivers, the voltage between heater and cathode should not exceed 100 V (RMS)

With respect to modulation hum in A.M. sound receivers the voltage between heater and cathode should not exceed 50 V(RMS)

PHILIPS PCF802

TRIODE-PENTODE for use as sine-oscillator puls-shaper (pentode section) and reactance tube (triode section) in television receivers

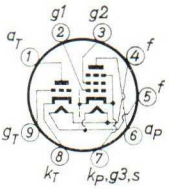
TRIODE-PENTODE pour utilisation en oscillatrice sinusoïdale-conformatrice d'impulsions (partie pentode) et tube de réactance (partie triode) dans les récepteurs de télévision.

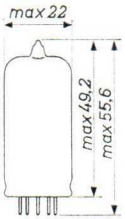
TRIODE-PENTODE zur Verwendung als Sinusoszillator-Impulsformer (Pentodenteil) und als Reaktanzröhre (Triodenteil) in Fernsehempfängern.

Heating : indirect by A.C. or D.C. Series supply
Chauffage: indirect par C.A. ou C.C. Alimentation série
Heizung : indirect durch Gleich- oder Wechselstrom Serienspeisung

I_f = 300 mA
V_f = 9 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances
Capacités
Kapazitäten

Pentode section Partie pentode Pentodenteil	Triode section Partie triode Triodenteil
C_{g_1} = 5,4 pF	C_g = 2,4 pF
C_{ag_1} = 0,06 pF	C_{ag} = 1,5 pF
C_{fg_1} < 0,1 pF	C_{gf} < 0,1 pF

Typical characteristics
Caractéristiques types
Kenndaten

Pentode section
Partie pentode
Pentodenteil

V_a	=	100 V	V_a	=	100 V
V_{g_2}	=	100 V	V_{g_2}	=	100 V
V_{g_1}	=	-1 V	V_{g_1}	=	0 V
I_a	=	6 mA	I_a	=	12,5 mA
I_{g_2}	=	1,7 mA	I_{g_2}	=	3,5 mA
S	=	5,5 mA/V			
R_i	=	0,4 MΩ	V_a	=	200 V
$\mu_{g_2g_1}$	=	47	V_{g_2}	=	200 V
			I_a	=	10 µA
V_a	=	100 V	$-V_{g_1}$	<	16 V
V_{g_2}	=	100 V			
I_{g_1}	=	+0,3 µA			
$-V_{g_1}$	<	1,3 V			

Triode section
Partie triode
Triodenteil

V_a	=	200 V	V_a	=	200 V
V_g	=	-2 V	I_a	=	10 mA
I_a	=	3,5 mA	I_g	=	10 µA
S	=	3,5 mA/V			
R_i	=	20 kΩ	V_a	=	200 V
µ	=	70	I_g	=	+0,3 µA
			$-V_g$	<	1,3 V

Limiting values (Design centre values)
Caractéristiques limites (Limites moyennes)
Grenzdaten (Normalgrenzdaten)

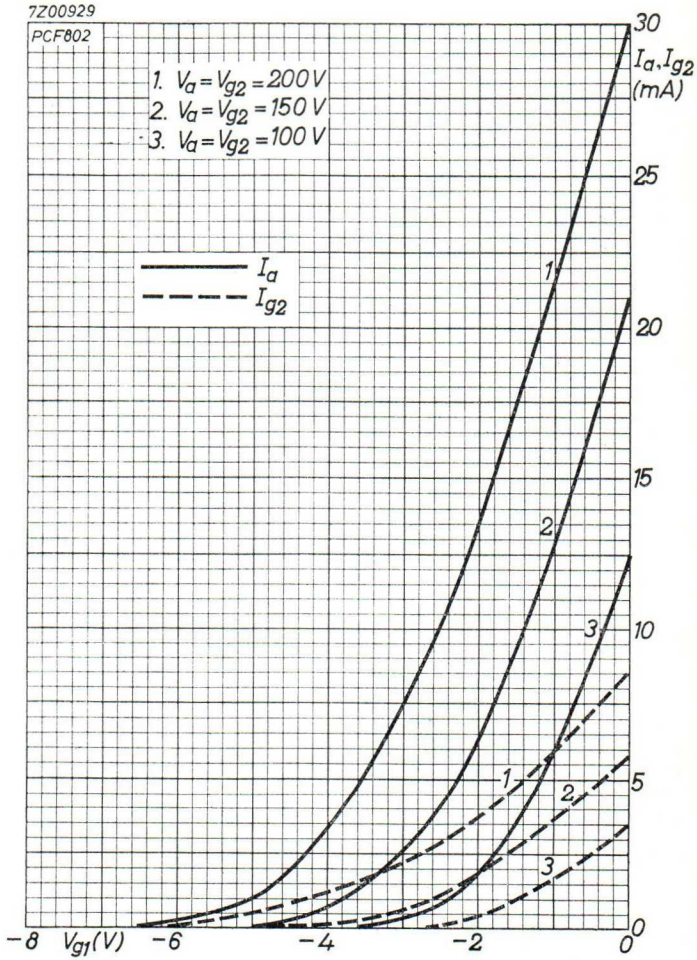
Pentode section Partie pentode Pentodenteil	V_{a_o}	= max.	550 V
	V_a	= max.	250 V
	W_a	= max.	1,2 W
	$V_{g_{2_o}}$	= max.	550 V
	V_{g_2}	= max.	250 V
	W_{g_2}	= max.	0,56 W
	R_{g_1}	= max.	0,56 MΩ [1]
	R_{g_1}	= max.	1 MΩ [2]
	I_k	= max.	15 mA
	I_{kp}	= max.	50 mA [3]
	V_{kf}	= max.	100 V [4]
	Z_{g_1} (f = 50 c/s)	=	300 kΩ [4]
Triode section Partie triode Triodenteil	V_{a_o}	= max.	550 V
	V_a	= max.	250 V
	W_a	= max.	1,4 W
	R_g	= max.	3 MΩ [1]
	I_k	= max.	10 mA
	V_{kf}	= max.	100 V [4]
	Z_g (f = 50 c/s)	=	50 kΩ [4]

[1]) Fixed bias
Polarisation fixe
Feste Gittervorspannung

[2]) Automatic bias
Polarisation automatique
Automatische Gittervorspannung

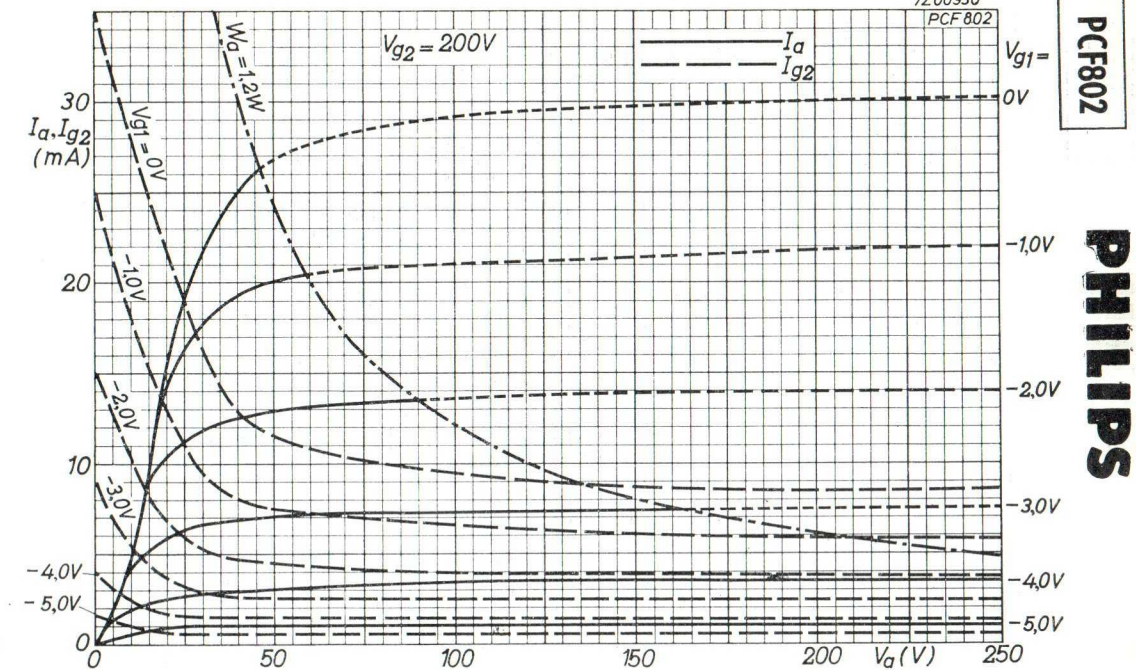
[3]) T_{imp} = max. 30 µsec. δ = max. 30 %

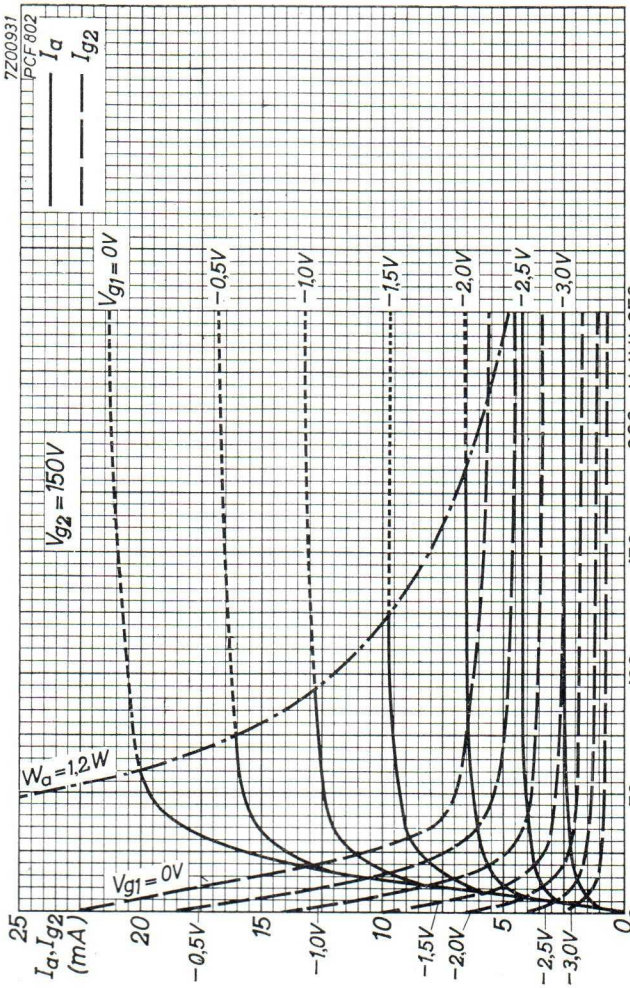
[4]) To avoid hum interference the A.C. component of V_{kf} should not exceed 65 V at the specified value of Z_g
Pour éviter le ronflement la composante alternative de V_{kf} ne doit pas dépasser une valeur de 65 V à la valeur mentionnée de Z_g.
Zur Vermeidung von Brummstörungen muss der Wechselspannungsanteil von V_{kf} bei dem erwähnten Wert von Z_g einen Wert von 65 V nicht überschreiten.

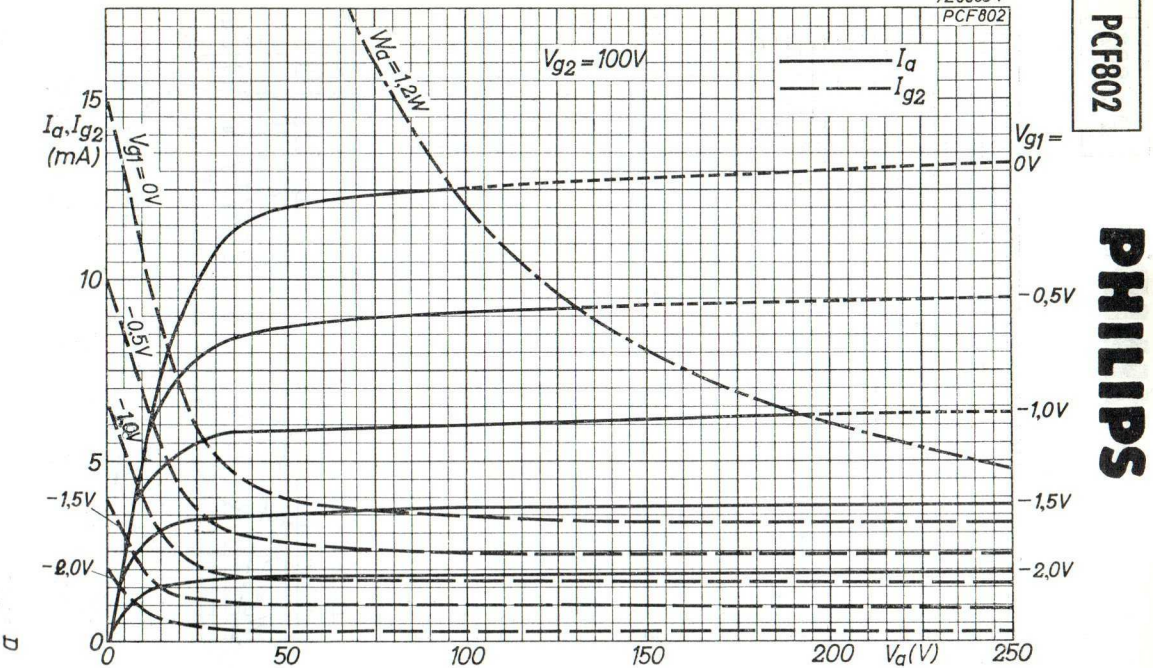

7Z00929
PCF802
1. $V_a = V_{g2} = 200\,V$
2. $V_a = V_{g2} = 150\,V$
3. $V_a = V_{g2} = 100\,V$
I_a
I_{g2}
I_a, I_{g2} (mA)
30
25
20
15
10
5
0
1
2
3
1
2
3
−8
V_{g1} (V)
−6
−4
−2
0

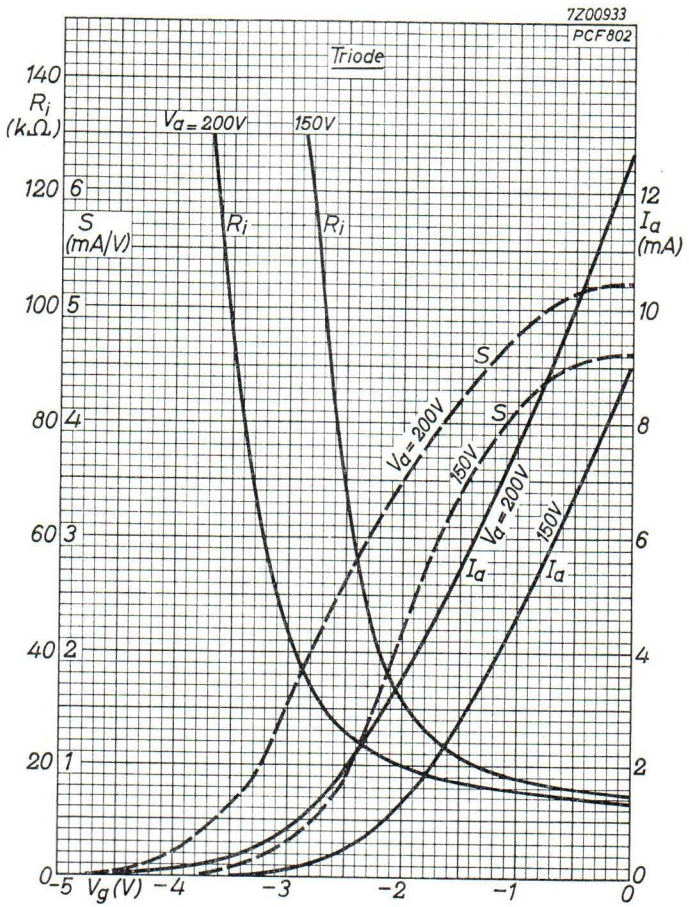
3.3.1962

A


7Z00930
PCF802
PCF802
PHILIPS
$V_{g2} = 200V$
I_a
I_{g2}
V_{g1} =
0V
-1,0V
-2,0V
-3,0V
-4,0V
-5,0V
$W_a = 1,2W$
$V_{g1} = 0V$
-1,0V
-2,0V
-3,0V
-4,0V
-5,0V
I_a, I_{g2} (mA)
30
20
10
0
0
50
100
150
200
250
V_a (V)
B

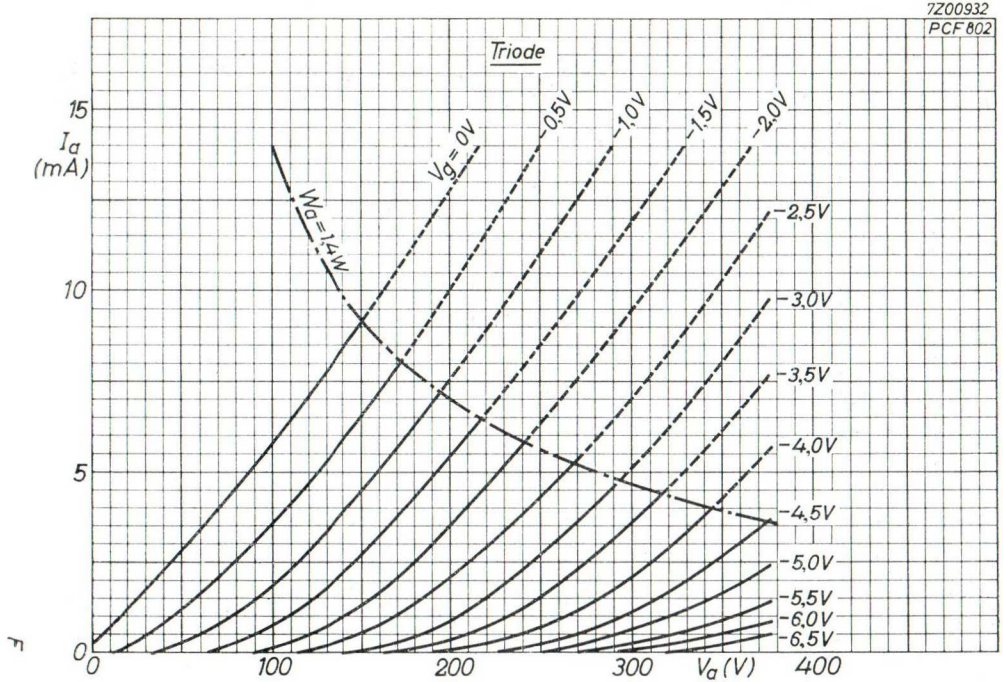

7Z00931
PCF802
Ia
Ig2
Vg2 = 150V
Wa = 1,2W
Vg1 = 0V
−0,5V
−1,0V
−1,5V
−2,0V
−2,5V
−3,0V
Ia, Ig2 (mA)
Va (V)
0
5
10
15
20
25
50
100
150
200
250


7Z00934
PCF802
V_{g2} = 100V
I_a
I_{g2}
W_a = 1,2W
I_a, I_{g2} (mA)
V_{g1} = 0V
−0,5V
−1,0V
−1,5V
−2,0V
V_{g1} = 0V
−0,5V
−1,0V
−1,5V
−2,0V
0
5
10
15
0
50
100
150
200
250
V_a (V)


7Z00933
PCF802
Triode
140
Ri
(kΩ)
120
100
80
60
40
20
0
6
5
4
3
2
1
S
(mA/V)
Va = 200V
150V
Ri
Ri
S
S
Va = 200V
150V
Va = 200V
150V
Ia
Ia
12
Ia
(mA)
10
8
6
4
2
0
−5
Vg (V)
−4
−3
−2
−1
0

3.3.1962

E


7Z00932
PCF802
Triode
15
I_a (mA)
10
5
0
0
100
200
300
V_a (V)
400
W_a = 1,4W
V_g = 0V
-0,5V
-1,0V
-1,5V
-2,0V
-2,5V
-3,0V
-3,5V
-4,0V
-4,5V
-5,0V
-5,5V
-6,0V
-6,5V

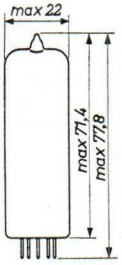
PHILIPS

PCL 82

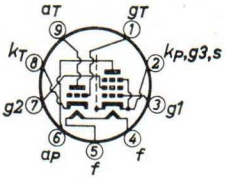
TRIODE PENTODE; triode section for use as frame time base oscillator and A.F. amplifier; pentode section for use as frame output tube and A.F. output tube
TRIODE-PENTHODE; la triode pour utilisation comme oscillatrice pour la déviation verticale et comme amplificatrice B.F.; la penthode pour utilisation comme tube de sortie de déviation verticale et comme tube de sortie B.F.
TRIODE-PENTODE; die Triode zur Verwendung als Oszillator für die vertikale Ablenkung und als NF-Verstärker; die Pentode zur Verwendung als Endröhre für die vertikale Ablenkung und als NF-Endröhre

Heating : indirectby A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

I_f = 300 mA
V_f = 16 V



Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	Triode section Partie triode Triodenteil	Pentode section Partie penthode Pentodenteil
	C_g = 2,7 pF	C_{g1} = 9,3 pF
	C_a = 4,3 pF	C_a = 8,0 pF
	C_{ag} = 4,4 pF	C_{ag1} < 0,3 pF ←
	C_{gf} < 0,02 pF	C_{g1f} < 0,3 pF

Between triode and pentode section
Entre la partie triode et penthode
Zwischen Trioden- und Pentodenteil

C_{aT-g1P} < 0,02 pF
C_{gT-aP} < 0,02 pF
C_{gT-g1P} < 0,025 pF
C_{aT-aP} < 0,25 pF

Typical characteristics
Caractéristiques types
Kenndaten

Triode section Partie triode Triodenteil		Pentode section Partie penthode Pentodenteil	
V_a	= 100 V	V_a	= 170 V
V_g	= 0 V	V_{g_2}	= 170 V
I_a	= 3,5 mA	V_{g_1}	= -11,5 V
S	= 2,2 mA/V	I_a	= 41 mA
μ	= 70	I_{g_2}	= 9 mA
		S	= 7,5 mA/V
		R_i	= 16 kΩ
		$\mu_{g_2g_1}$	= 9,5

Operating characteristics of the pentode section as audio output tube, class A
Caractéristiques d'utilisation de la partie penthode comme tube de sortie B.F., classe A
Betriebsdaten des Pentodenteils als NF-Endröhre, Klasse A

V_{ba}	=	170			200			230		V
V_{bg_2}	=	170			200			230		V
R_{g_2}	=	0			470			1200		Ω [1]
R_k	=	200			330			490		Ω [2]
$R_{a\sim}$	=	3,25			4,5			6		kΩ
V_i	=	0	0,61	5,9	0	0,66	6,7	0	0,75	7,8 Veff
I_a	=	42	-	44	35	-	37	30,0	-	31,0 mA
I_{g_2}	=	9,2	-	15,5	7,8	-	13,3	6,6	-	11,0 mA
W_o	=	0	0,05	3,2	0	0,05	3,3	0	0,05	3,25 W
d_{tot}	=	-	-	10	-	-	10	-	-	10 %

[1]) Not bypassed; non découplée; nicht entkoppelt

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

Operating characteristics of two pentode sections as A.F. class AB push-pull output amplifier
Caractéristiques d'utilisation de deux parties penthodes en amplificatrice de sortie B.F. classe AB
Betriebsdaten von zwei Pentodenteilen als NF Klasse AB Gegentakt-Ausgangsverstärker

V_{ba}	=	200		230		V
V_{bg_2}	=	200		200		V
R_k	=	170		200		Ω [1]
$R_{aa'\sim}$	=	4,5		7		kΩ
V_i	=	0	14,2	0	13,0	V_{eff}
I_a	=	2x35	2x42,5	2x 30	2x34,5	mA
I_{g_2}	=	2x 8	2x16,5	2x6,2	2x13,5	mA
W_o	=	0	9,3	0	10	W
d_{tot}	=	-	6,3	-	5,5	%

Optimum peak anode current of the pentode section in frame output application

The circuit should be designed so that it operates satisfactorily with a peak anode current I_{ap} not exceeding 85 mA at V_a = 50 V, V_{g_2} = 170 V, I_f = 300 mA. The minimum available I_{ap} at end of life with I_f = 280 mA is

70 mA at V_a = 50 V, V_{g_2} = 170 V

80 mA at V_a = 50 V, V_{g_2} = 190 V

Courant anodique de crête optimum de la partie penthode comme tube de sortie pour la déviation verticale

Le circuit doit être conçu de telle manière qu'il fonctionne sataisfaisant avec un courant anodique de crête I_{ap} qui ne surpasse pas 85 mA à V_a = 50 V, V_{g_2} = 170 V, I_f = 300 mA. Le I_{ap} disponible au minimum à la fin de la durée et à I_f = 280 mA est de

70 mA à V_a = 50 V, V_{g_2} = 170 V

80 mA à V_a = 50 V, V_{g_2} = 190 V

Höchstwert des Anodenspitzenstromes des Pentodenteils als Endröhre für die vertikale Ablenkung

Die Schaltung soll derart entworfen werden, dass sie mit einem Anodenspitzenstrom der bei V_a = 50 V, V_{g_2} = 170 V und I_f = 300 mA nicht höher ist, als 85 mA, befriedigend arbeitet. Der mindestens zur Verfügung stehende I_{ap} am Ende der Lebensdauer bei I_f = 280 mA ist

70 mA bei V_a = 50 V, V_{g_2} = 170 V
80 mA bei V_a = 50 V, V_{g_2} = 190 V

[1]) Common cathode resistor
Résistance cathodique commune
Gemeinsamer Katodenwiderstand

Microphony and hum.

The triode section can be used without special precautions against microphony and hum in circuits in which an input voltage $V_i \leq 10$ mV_{eff} gives an output of 50 mW of the output stage. Z_g (50 c/s) = 0.25 MΩ. The A.C. voltage between pin 4 and cathode should not exceed 6.3 V. If the tube is used in television circuits where the frequency of the heater supply is not synchronized with the frame frequency, this may cause interference due to hum. At page E the relation is shown between the permissible value of Z_{g_1} of the pentode section and the A.C. voltage between pin 4 and the cathode. For this curve it has been assumed that C_{g_1f} (inclusive of wiring and tube socket) is 0.8 pF.

Effet microphonique et ronflement.

La partie triode peut être utilisée sans précautions spéciales contre l'effet microphonique et le ronflement dans des circuits où une tension d'entrée $V_i \leq 10$ mV_{eff} résulte en une puissance de sortie de l'étage de sortie de 50 mW. Z_g (50 c/s) = 0,25 MΩ. La tension alternative entre broche 4 et la cathode ne doit pas surpasser 6,3 V. Si le tube est utilisé dans un circuit de télévision dans lequel la fréquence de l'alimentation du filament n'est pas synchronisée avec la fréquence de la déviation verticale, il peut se présenter de l'interférence par le ronflement. La courbe page E montre la relation entre la valeur de Z_{g_1} maximum admissible de la partie penthode et la tension alternative entre la broche 4 et la cathode Pour cette courbe il est admis que C_{g_1f} (y inclus le câblage et le support de tube) est de 0,8 pF.

Mikrophonie und Brumm.

Der Triodenteil darf ohne spezielle Massnahmen gegen Mikrophonie und Brumm verwendet werden in Schaltungen, die für eine Eingangsspannung $V_i \leq 10$ mV_{eff} eine Ausgangsleistung der Endstufe von 50 mW ergeben. Z_g (50 c/s) = 0,25 MΩ. Die Wechselspannung zwischen Stift 4 und Katode soll nicht mehr als 6,3 V betragen.
Wenn die Röhre in einem Fernsehempfänger verwendet wird, in dem die Frequenz der Heizspannung nicht mit der Frequenz der vertikalen Ablenkung synchronisiert ist, so kann Störung durch Brumm entstehen. Auf Seite E wird eine Kurve gegeben, die das Verhältnis zwischen dem max. zulässigen Wert von Z_{g_1} des Pentodenteils und der Wechselspannung zwischen Stift 4 und Katode zeigt. Für diese Kurve ist C_{g_1f} (Bedrahtung und Röhrenfassung einbegriffen) gleich 0,8 pF angenommen.

Operating characteristics of the triode section as A.F. amplifier

→ Caractéristiques d'utilisation de la partie triode en amplificatrice B.F.

Betriebsdaten des Triodenteils als NF-Verstärker

R_s = 0,22 MΩ [1]) R_g = 3 MΩ R_g' = 0,68 MΩ [2])

V_b (V)	R_k (kΩ)	R_a (kΩ)	I_a (mA)	V_o [3]) / V_i	V_o max (V_{eff})	d_{tot} (%)
200	2,2	220	0,52	52	26	1,6 [4])
170	2,7	220	0,43	51	25	2,3 [4])

R_s = 0,22 MΩ [1]) R_g = 22 MΩ R_g' = 0,68 MΩ [2])

V_b (V)	R_k (Ω)	R_a (kΩ)	I_a (mA)	V_o [3]) / V_i	V_o max (V_{eff})	d_{tot} (%)
200	0	100	1,05	50	24	1,5 [5])
170	0	100	0,86	49	19	1,4 [5])
200	0	220	0,61	55	25	1,4 [5])
170	0	220	0,50	53	20	1,4 [5])

[1]) Signal source resistance
Résistance interne de la source de signal
Generator- Innenwiderstand

[2]) Grid leak of the following tube
Résistance de fuite du tube suivant
Gitterableitwiderstand der folgenden Röhre

[3]) Measured at small input voltage
Mesuré à une tension d'entrée faible
Gemessen bei niedriger Eingangsspannung

[4]) At lower output voltages the distortion is proportionnally lower
A des tensions de sortie plus basses la distorsion est proportionnelle à la tension de sortie
Bei niedrigeren Ausgangsspannungen ist der Klirrfaktor der Ausgangsspannung proportional

[5]) At lower output voltages the distortion remains approximately constant down to V_o = 5 V_{eff}. At values < 5 V_{eff} the distortion is approximately proportional to V_o
A des tensions de sortie plus basses la distorsion reste environ constante jusqu'à V_o = 5 V_{eff}. A des valeurs < 5 V_{eff} la distorsion est à peu près proportionnelle à V_o.
Bei kleineren Ausgangsspannungen bleibt der Klirrfaktor annähernd konstant bis V_o = 5 V_{eff}. Unterhalb 5 V_{eff} ist der Klirrfaktor der Ausgangsspannung ungefähr proportional.

Limiting values of the pentode section
Caractéristiques limites de la partie penthode
Grenzdaten des Pentodenteils

V_{a_o}	= max. 550 V	W_{g2}	= max. 1,8 W
V_a	= max. 250 V	W_{g_2}	= max. 2 W [2] [3]
V_{a_p}	= max. 2500 V [1]	W_{g2_p}	= max. 3,2 W
$-V_{a_p}$	= max. 500 V	I_k	= max. 50 mA
W_a	= max. 5 W [2]	R_{g1}	= max. 1 MΩ [5]
W_a	= max. 7 W [4]	R_{g1}	= max. 2 MΩ [6]
V_{g2o}	= max. 550 V	V_{kf}	= max. 200 V
V_{g2}	= max. 250 V	R_{kf}	= max. 20 kΩ

Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteils

V_{a_o}	= max. 550 V	R_g	= max. 1 MΩ [5]
V_a	= max. 250 V	R_g	= max. 3 MΩ [6]
V_{a_p}	= max. 600 V [1]	R_g	= max. 22 MΩ [7]
W_a	= max. 1 W	V_{kf}	= max. 200 V
I_k	= max. 15 mA	R_{kf}	= max. 20 kΩ
I_{kp}	= max. 100 mA [1]	Z_g(50c/s)	= max. 500 kΩ

[1]) Max. pulse duration 4% of a cycle with a maximum of 0,8 msec.
Durée de l'impulsion max. 4% d'un cycle avec un maximum de 0,8 msec.
Impulsdauer max. 4% einer Periode mit einem Maximum von 0,8 mSek.

[2]) For frame output application
En cas d'utilisation comme tube de sortie pour la déviation verticale
Bei Verwendung als Endröhre für die vertikale Ablenkung

[3]) When W_a = max. 4 W; si W_a = 4 W au max.;
wenn W_a = max. 4 W.

[4]) For audio output application
En cas d'utilisation comme tube de sortie B.F.
Bei Verwendung als NF-Endröhre

[5]) With fixed bias
Avec polarisation fixe
Mit fester Gittervorspannung

[6]) With automatic bias
Avec polarisation automatique
Mit automatischer Gittervorspannung

[7]) With grid current biasing
Si la polarisation est obtenue seulement par moyen de R_g
Wenn die Gittervorspannung nur mittels R_g erhalten wird

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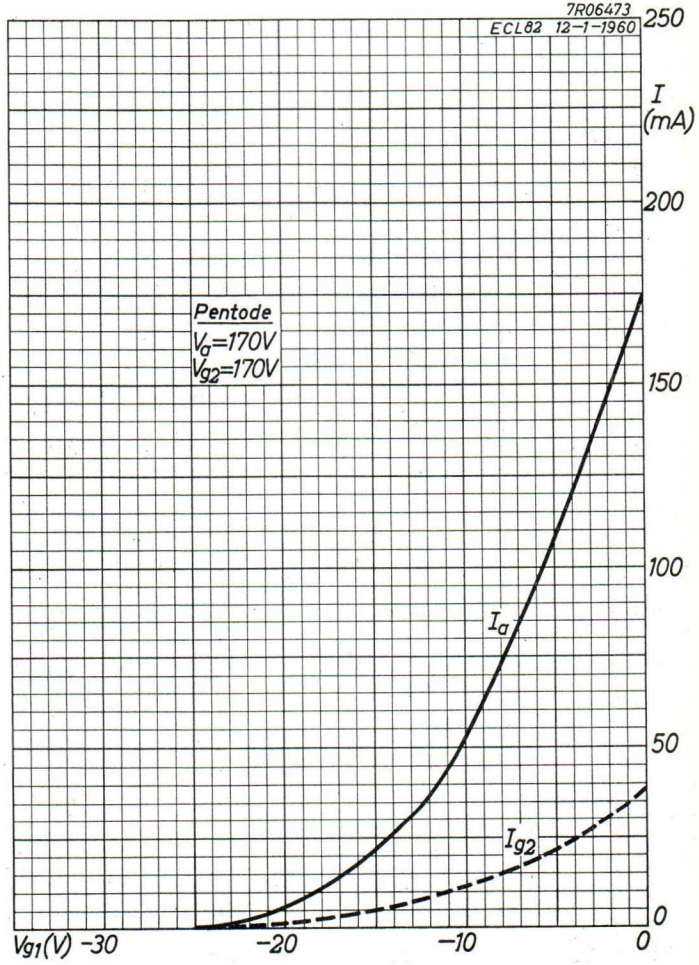

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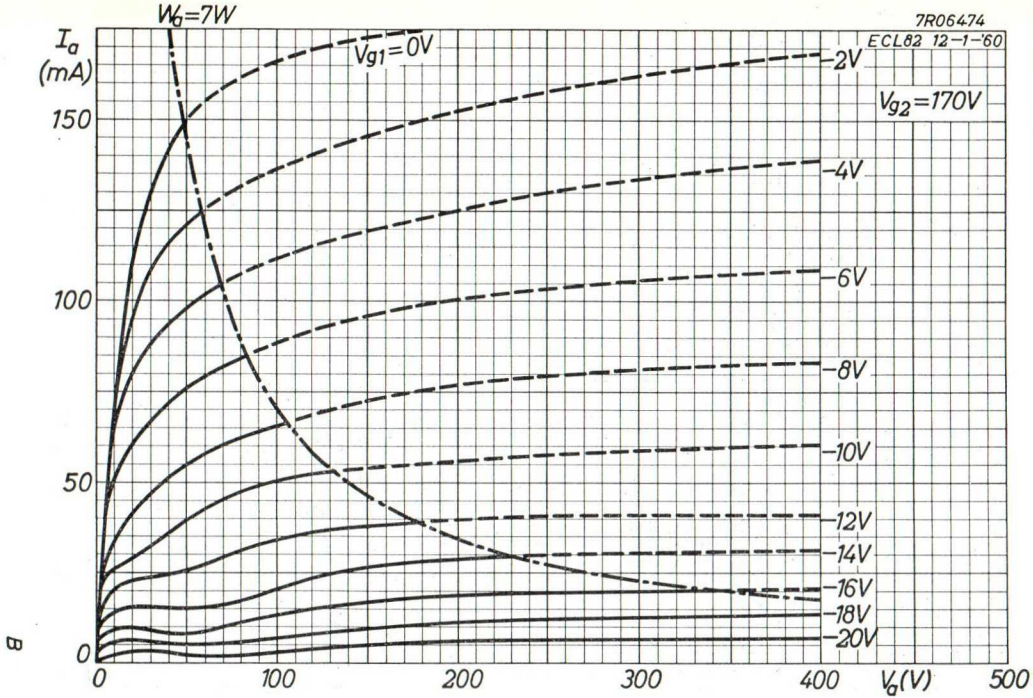
7R06474
ECL82 12-1-'60
W_a=7W
I_a (mA)
V_{g1}=0V
V_{g2}=170V
-2V
-4V
-6V
-8V
-10V
-12V
-14V
-16V
-18V
-20V
150
100
50
0
0
100
200
300
400
500
V_a(V)

B

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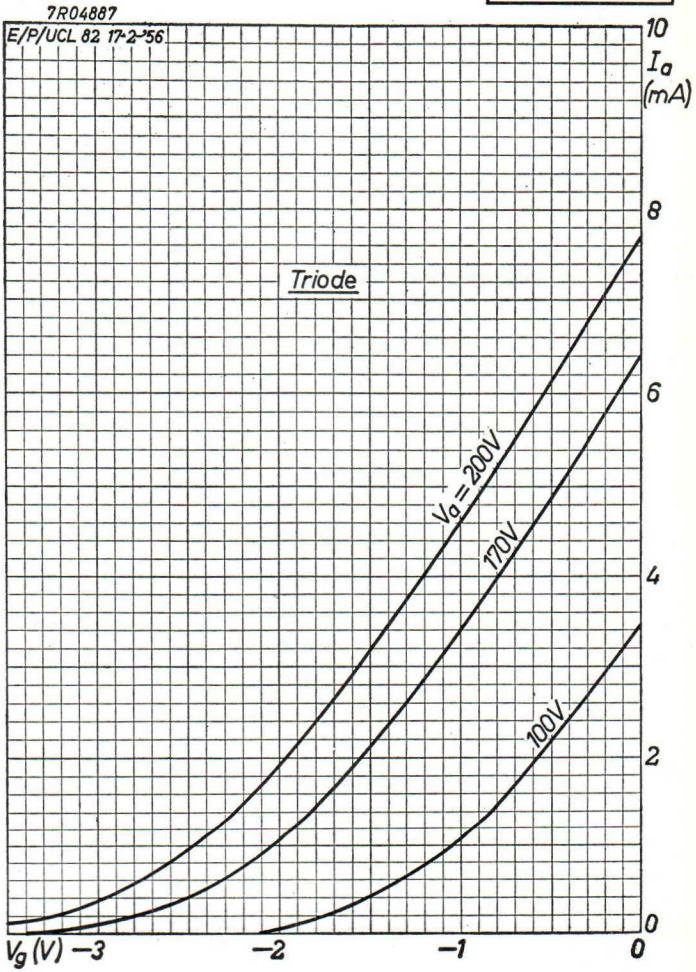
PCL 82



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C

7R04888

E/P/UCL 82 17-2-'56

PCL 82

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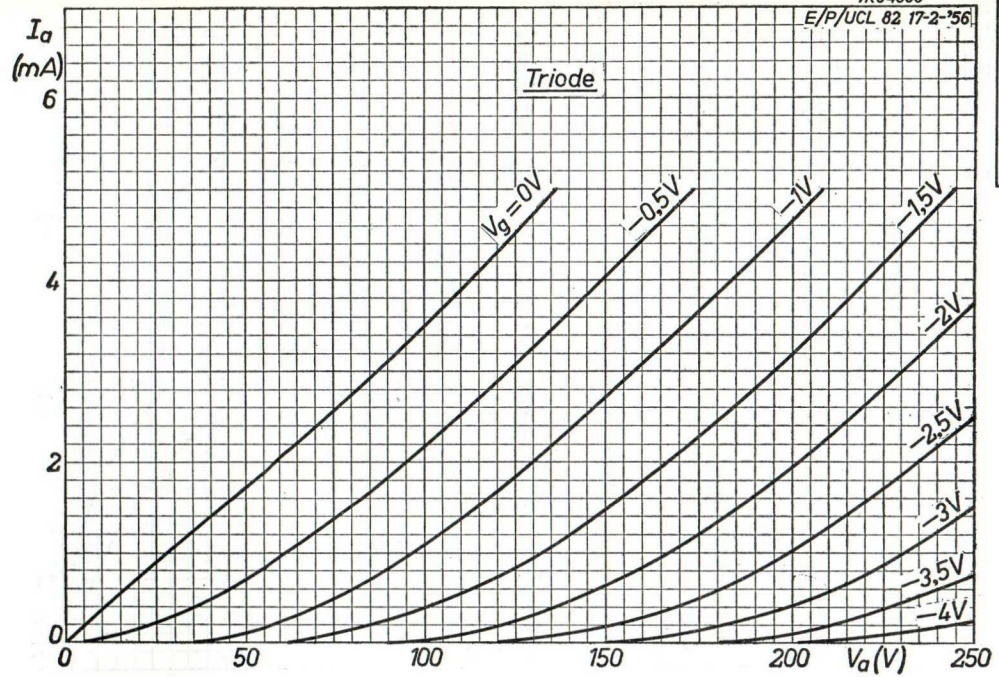

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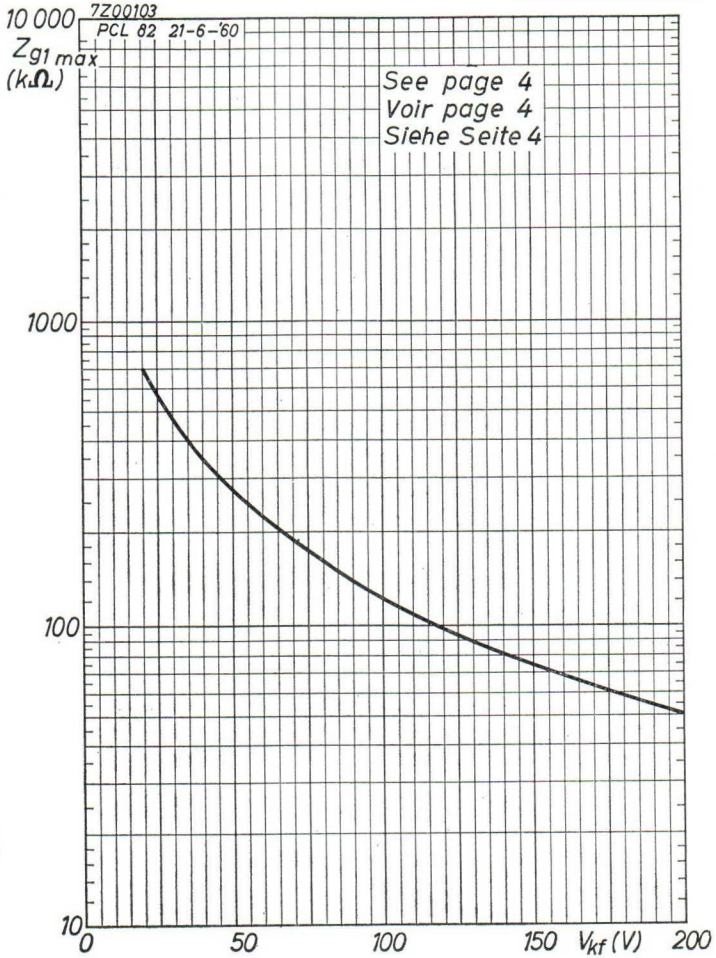

7Z00103
PCL 82 21-6-'60
10 000
$Z_{g1\ max}$
(kΩ)
See page 4
Voir page 4
Siehe Seite 4
1000
100
10
0
50
100
150
V_{kf} (V)
200

10.10.1960

E

PHILIPS PCL 84

TRIODE-PENTODE with separate cathodes. Triode for use in circuits for keyed A.G.C., sync-separation, sync-amplification and noise suppression. Pentode for use as video output tube

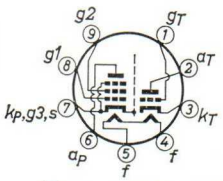
TRIODE PENTHODE avec cathodes séparées. La triode pour utilisation dans circuits pour le C.A.V. verrouillé, pour la séparation de synchronisation, l'amplification de synchronisation et la suppression de bruit. La penthode pour utilisation comme tube de sortie vidéo

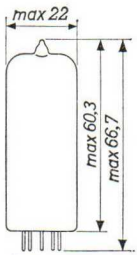
TRIODE PENTODE mit getrennten Katoden. Triode zur Verwendung in Schaltungen für getastete Schwundregelung, Synchronisationsabtrennung, Synchronisationsverstärkung und Störunterdrückung. Pentode zur Verwendung als Video-Endröhre

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

$\frac{I_f = 300\ mA}{V_f = 15\ V}$

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	Triode section Partie triode Triodenteil	Pentode section Partie penthode Pentodenteil
	C_g = 3,8 pF	C_{g1} = 8,7 pF ←
	C_a = 2,3 pF	C_a = 4,2 pF ←
	C_{ag} = 2,7 pF	C_{ag1} < 0,1 pF
	C_{gf} < 0,1 pF	C_{g1f} < 0,1 pF

Between triode and pentode section
Entre la partie triode et penthode
Zwischen Trioden- und Pentodenteil

C_{aTg1P} < 0,01 pF
C_{gTg1P} < 0,01 pF

Typical characteristics of the triode section
Caractéristiques types de la partie triode
Kenndaten des Triodenteils

V_a	=	200 V
V_g	=	-1,7 V
I_a	=	3 mA
S	=	4 mA/V
μ	=	65
$-V_g$ (I_g = +0,3 µA)	=	1,3 V

Typical characteristics of the pentode section
Caractéristiques types de la partie penthode
Kenndaten des Pentodenteils

V_a	=	170	200	220 V
V_{g2}	=	170	200	220 V
V_{g1}	=	-2,1	-2,9	-3,4 V
I_a	=	18	18	18 mA
I_{g2}	=	3,0	3,0	3,0 mA
S	=	11	10,4	10 mA/V
R_1	>	100	130	150 kΩ
μ_{g2g1}	=	36	36	36
$-V_{g1}$ (I_{g1} = +0,3 µA)	<	1,3	1,3	1,3

Operating characteristics of the pentode section as video output tube
Caractéristiques d'utilisation de la partie penthode comme tube de sortie vidéo
Betriebsdaten des Pentodenteils als Video-Endröhre

$V_b = V_{g2}$	=	170	200	220 V
R_a	=	3	3	3 kΩ
V_{g1}	=	-2	-2,8	-3,3 V
I_a	=	18	18	18 mA
I_{g2}	=	3,2	3,1	3,1 mA
S	=	10,4	10,0	9,7 mA/V

Limiting values of the pentode section
Caractéristiques limites de la partie penthode
Grenzdaten des Pentodenteils

V_{a_o}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	4 W
V_{g2_o}	= max.	550 V
V_{g2}	= max.	250 V
W_{g2}	= max.	1,7 W
I_k	= max.	40 mA
R_{g1}	= max.	1 MΩ [1]
R_{g1}	= max.	2 MΩ [2]
V_{kf}	= max.	200 V
R_{kf}	= max.	20 kΩ

Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteils

V_{a_o}	= max.	± 550 V
V_a	= max.	± 250 V
V_{a_p} (I_a < 0,1 mA)	= max.	600 V [3]
W_a	= max.	1 W
I_k	= max.	12 mA
R_g	= max.	1 MΩ [1]
R_g	= max.	3 MΩ [2]
V_{kf} (k neg.; f pos.)	= max.	150 V
V_{kf} (k pos.; f neg.)	= max.	200 $V_=$ + 150 V_{eff}
R_{kf}	= max.	20 kΩ

---

[1] Fixed bias
Polarisation fixe
Feste Vorspannung

[2] Automatic bias
Polarisation automatique
Automatische Vorspannung

[3] Max. pulse duration 18% of a cycle with a maximum of 18 µsec
Durée de l'impulsion max. 18% d'un cycle avec un maximum de 18 µsec
Impulszeit max. 18 % einer Periode mit einem Maximum von 18 µsec

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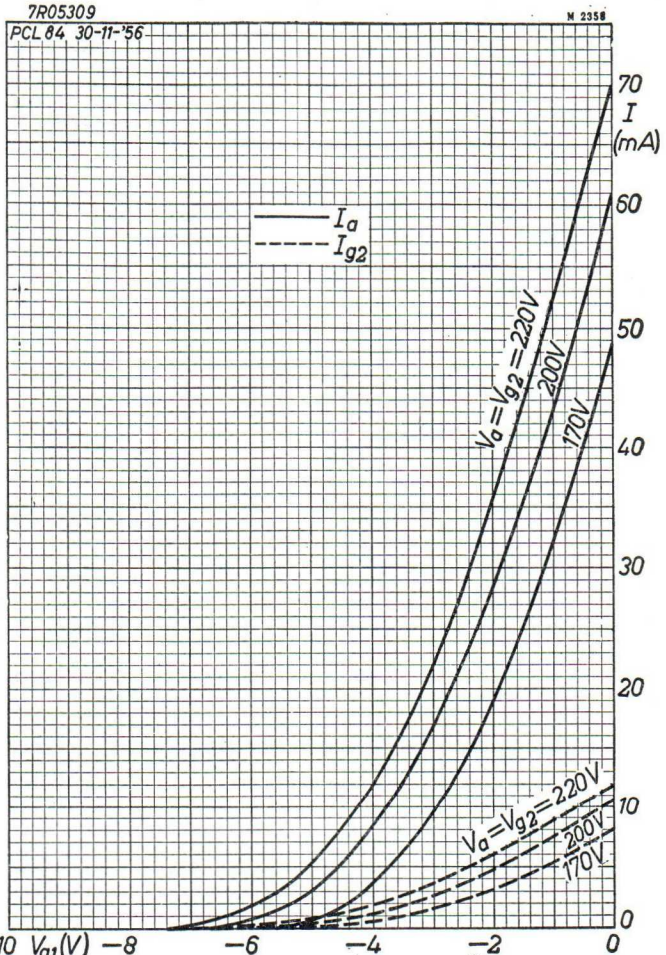

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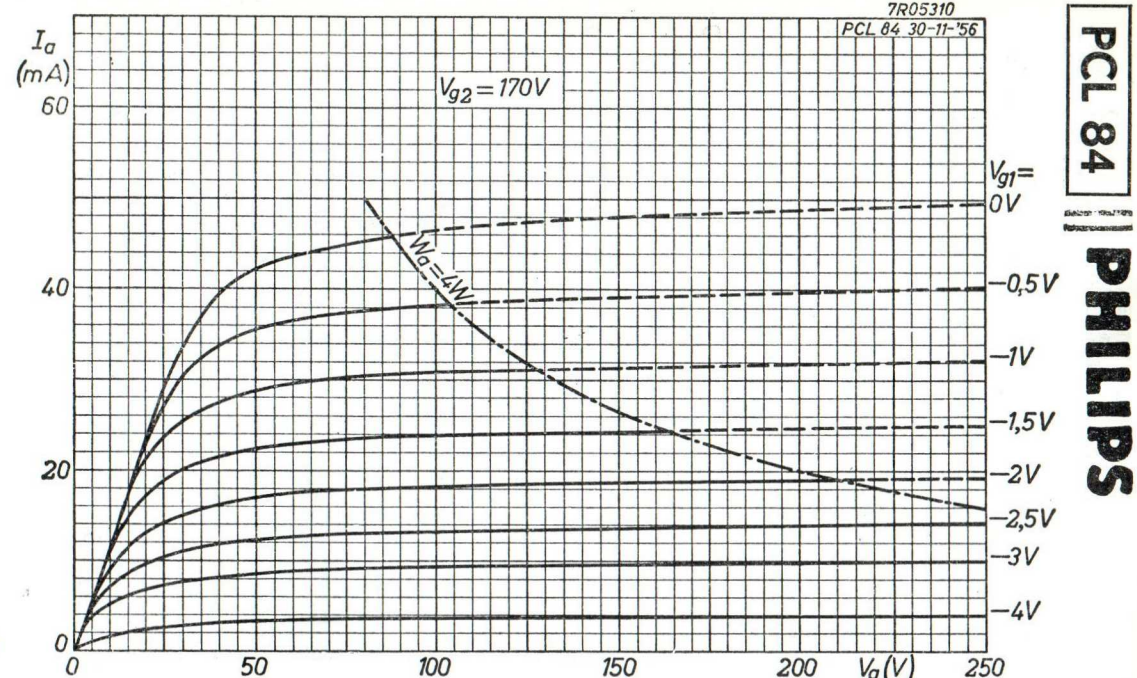

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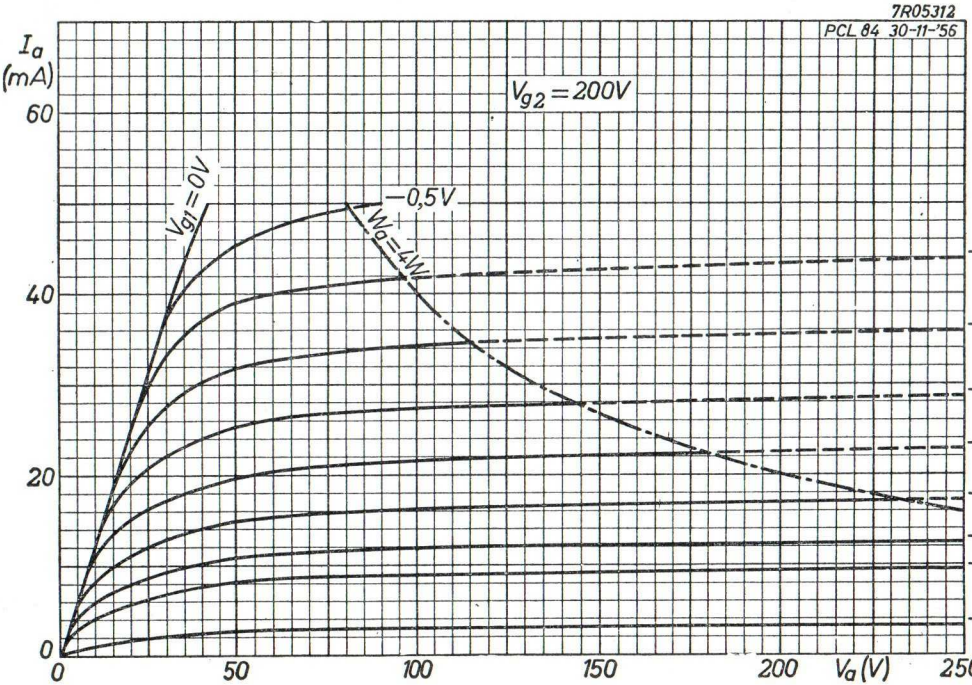

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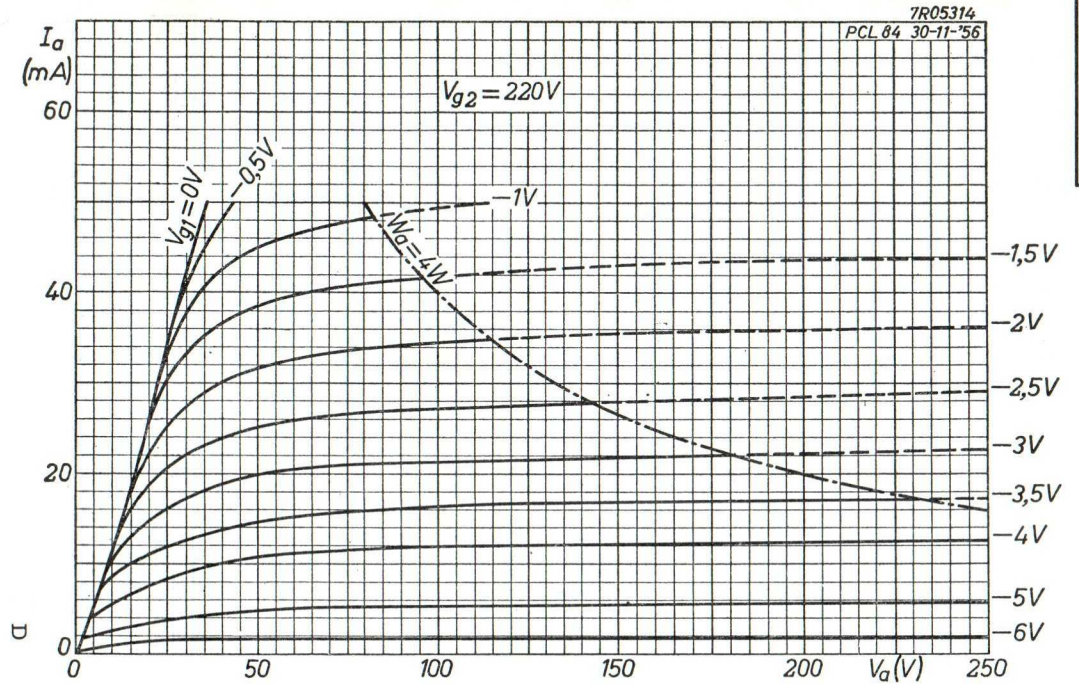

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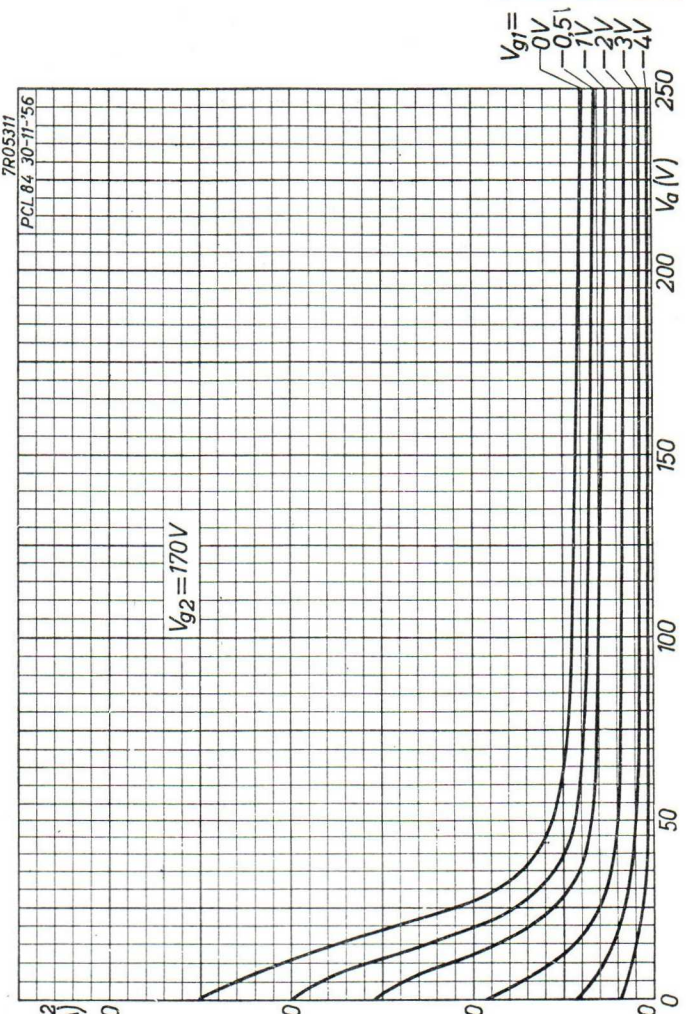

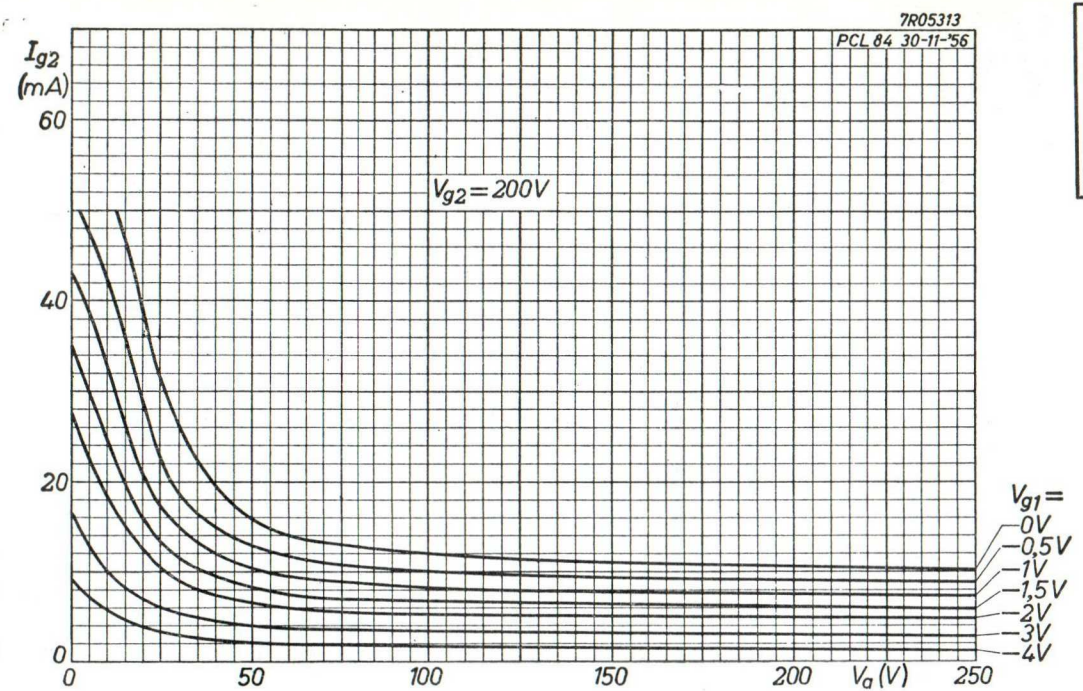

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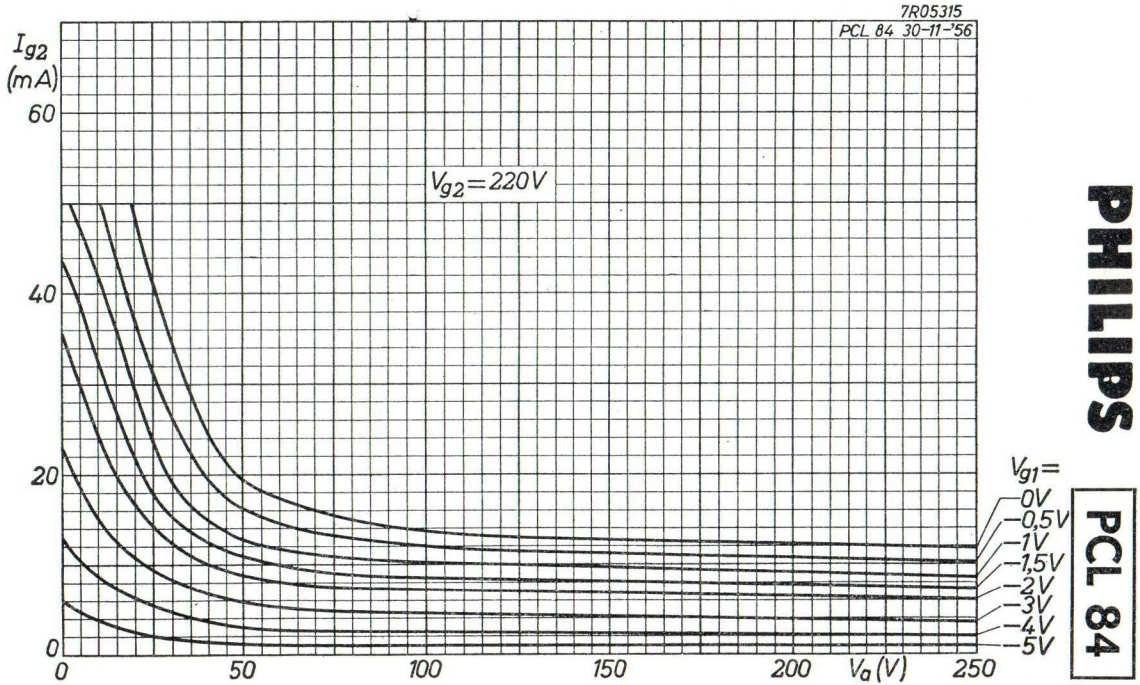

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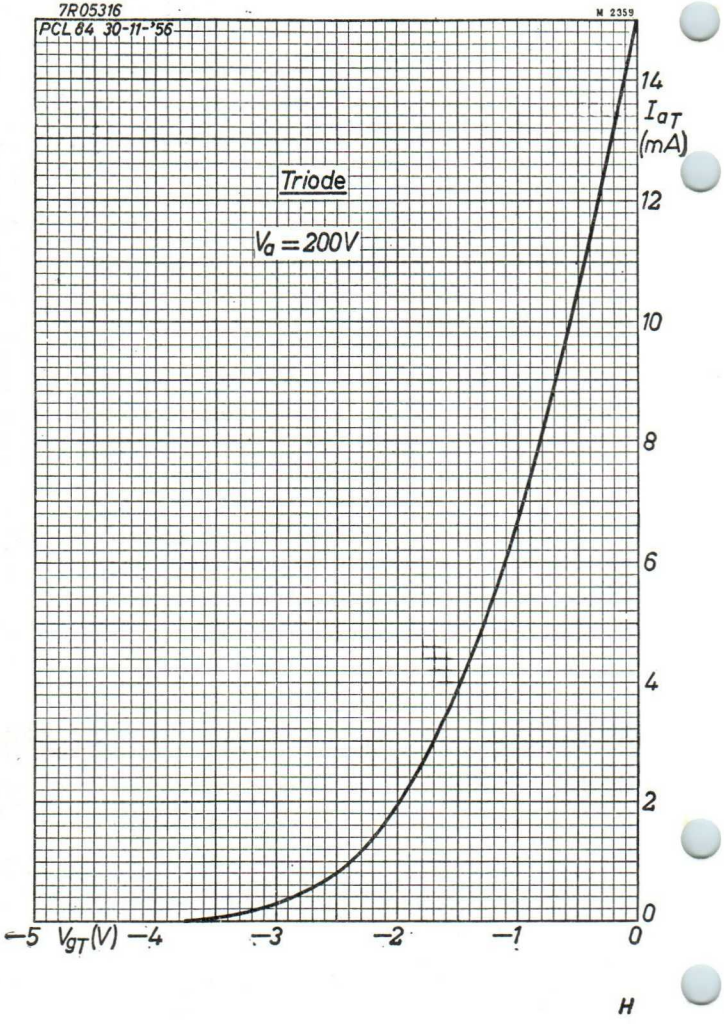
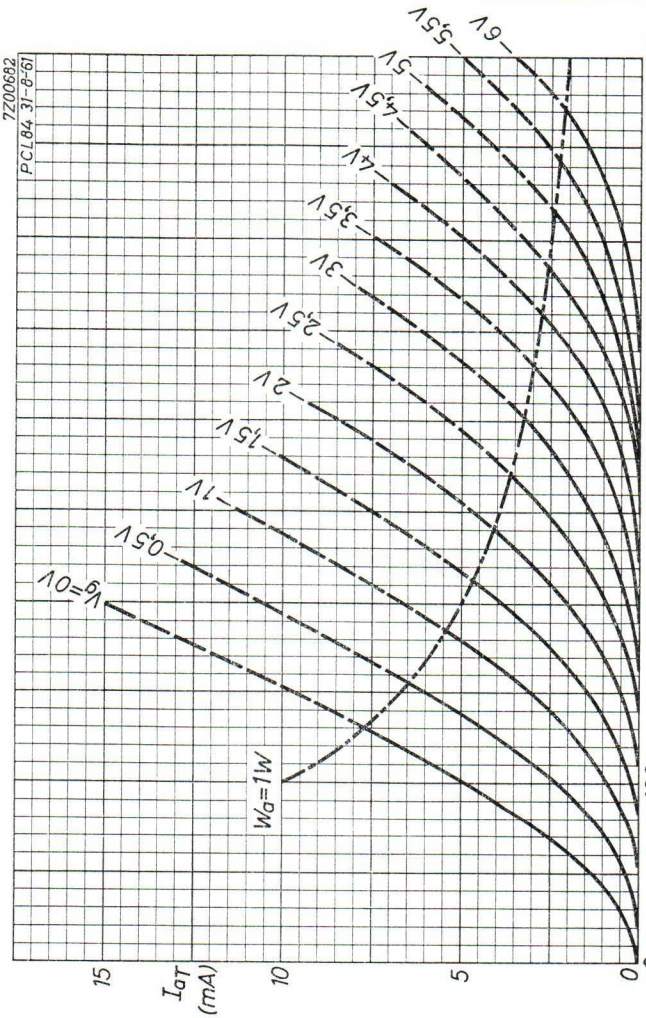


H

PHILIPS PCL84



PHILIPS

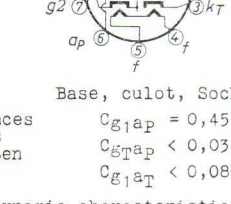
PCL 85

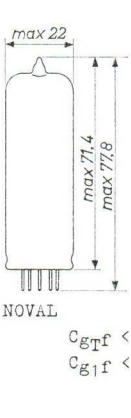
TRIODE-PENTODE for use as frame output tube and frame oscillator or pulse amplifier in television receivers
TRIODE-PENTHODE pour utilisation comme tube de sortie pour le balayage image et oscillatrice pour le balayage image ou amplificatrice d'impulsions dans les récepteurs de télévision
TRIODE-PENTODE 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 V
I_f = 300 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	$C_{g_1a_p}$ = 0,45 pF	C_{g_Tf} < 0,15 pF
	$C_{g_Ta_p}$ < 0,03 pF	C_{g_1f} < 0,20 pF
	$C_{g_1a_T}$ < 0,08 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 V
V_{g_2} =	170	210 V	V_g =	0 V
V_{g_1} =	-1	-1 V	I_a =	10 mA
I_{a_p} =	200	285 mA [1])	S =	5,5 mA/V
$I_{g_{2p}}$ =	35	45 mA	R_i =	9 kΩ
			μ =	50

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

Hum; ronflement; Brumm

The equivalent pentode grid hum voltage without negative feedback is max. 10 mV when Z_{g_1} (at f = 50 c/s) ≦ 0.5 MΩ, C_{g_1f} = 0.2 pF and V_{kf} = 150 V_{eff}.

La tension de ronflement équivalente de la grille de la penthode sans contre-réaction est de 10 mV au max., quand Z_{g_1} (à f = 50 Hz) ≦ 0,5 MΩ, C_{g_1f} = 0,2 pF et V_{kf} = 150 V_{eff}

Die äquivalente Brummspannung des Pentodengitters ohne Gegenkopplung ist max. 10 mV, wenn Z_{g_1} (bei f = 50 Hz) ≦ 0,5 MΩ, C_{g_1f} = 0,2 pF und V_{kf} = 150 V_{eff}

Limiting values
Caractéristiques limites
Grenzdaten

Triode section
Partie triode
Triodenteil

V_{ao} = max. 550 V
V_a = max. 250 V
W_a = max. 0,5 W
R_{g_1} = max. 1 MΩ 4)
R_{g_1} = max. 3,3 MΩ 5)
I_k = max. 15 mA
I_{kp} = max. 200 mA 6)
I_{kp} = max. 100 mA 7)
V_{kf} = max. 200 V 8)

Pentode section
Partie penthode
Pentodenteil

V_{ao} = max. 550 V
V_a = max. 250 V
V_{ap} = max. 2 kV 2)
W_a = max. 7 W
W_a = max. 9 W 3)
$V_{g_{2o}}$ = max. 550 V
V_{g_2} = max. 250 V
W_{g_2} = max. 1,5 W
W_{g_2} = max. 2,0 W 3)
R_{g_1} = max. 1 MΩ 4)
R_{g_1} = max. 2,2 MΩ 5)
I_k = max. 75 mA
V_{kf} = max. 200 V

2) 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.

3) 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 ungünstigst wahrscheinlichen Bedingungen bei normaler Bildhöhe nicht überschritten werden

4)5)6)7)8) See page 3; voir page 3; siehe Seite 3

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 µsec.
Durée de l'impulsion 2 % d'une cycle au max., avec un maximum de 400 µsec.
Impulsdauer max. 2 % einer Periode, mit einem Maximum von 400 µSek.

7) Max. pulse duration 4 % of a cycle with a maximum of 800 µsec.
Durée de l'impulsion 4 % d'une cycle au max., avec un maximum de 800 µsec.
Impulsdauer max. 4 % einer Periode, mit einem Maximum von 800 µSek.

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 periode 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)

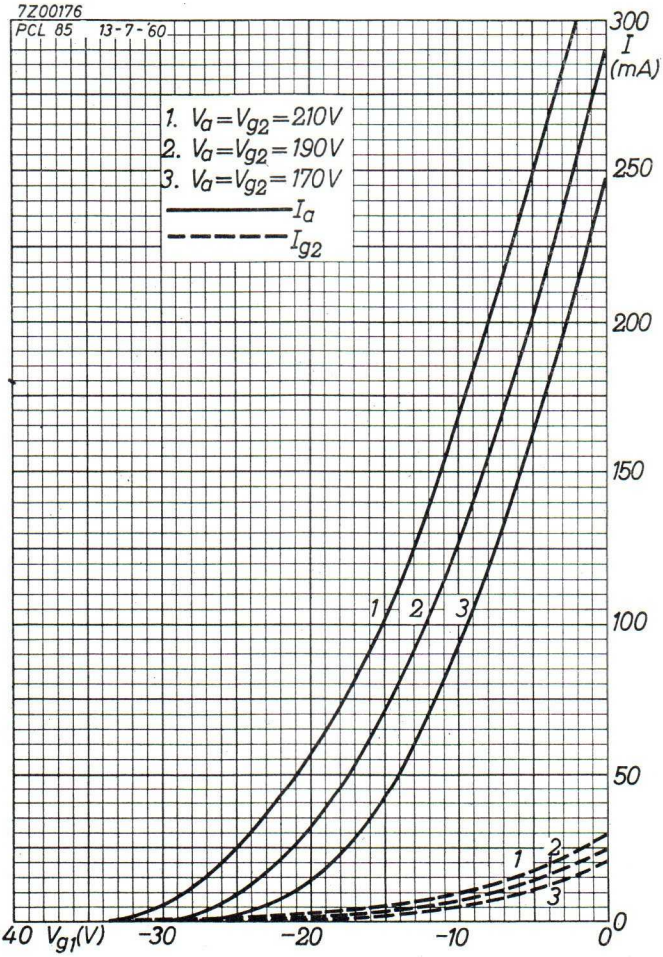
[1]) The minimum value of I_{ap} to be expected as a result of spread of the tube characteristics, tube deterioration during life and a decrease of the mains voltage to 10 % below the nominal value can be derived from the curves on page H by decreasing by 40 % the I_a values situated on the curve A-B at V_{g2} occuring 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.

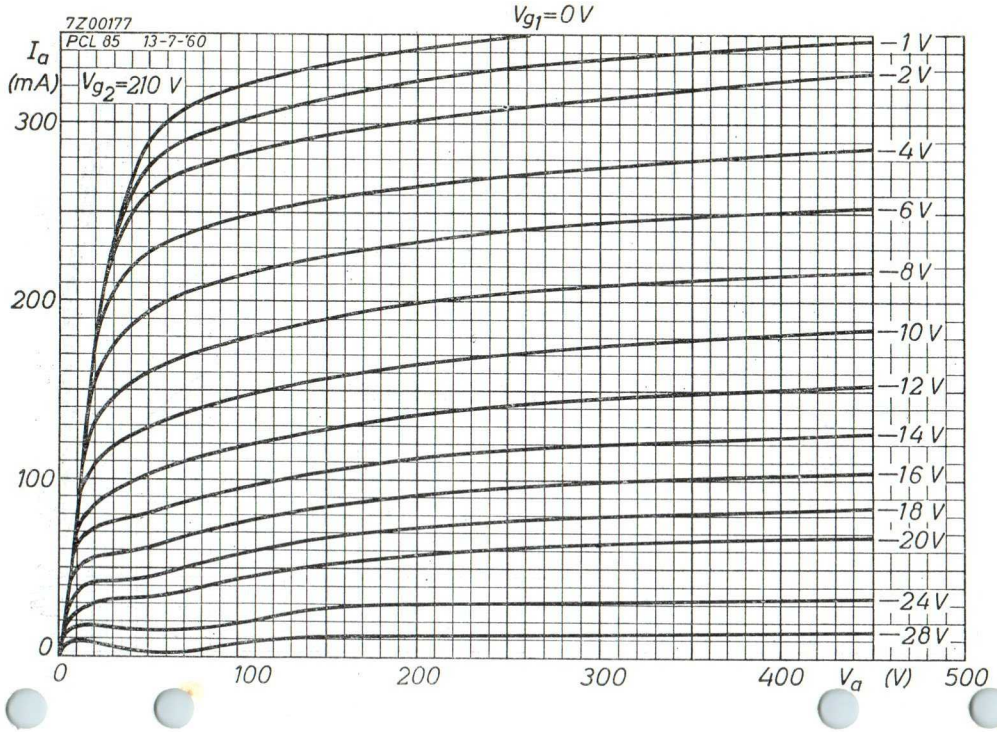
PHILIPS

PCL 85



3.3.1961

A



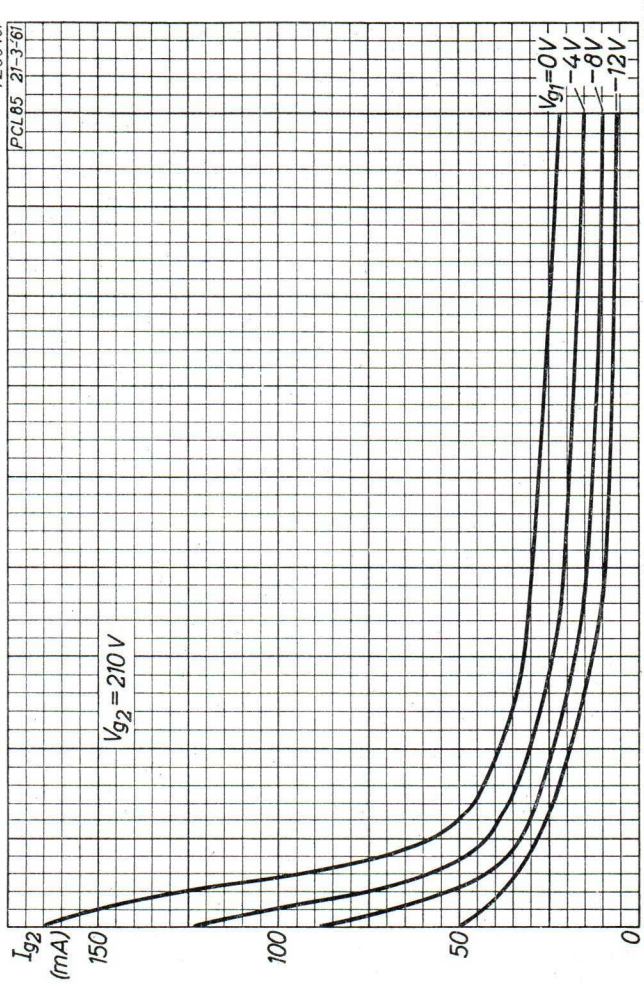
PCL 85

PHILIPS

B

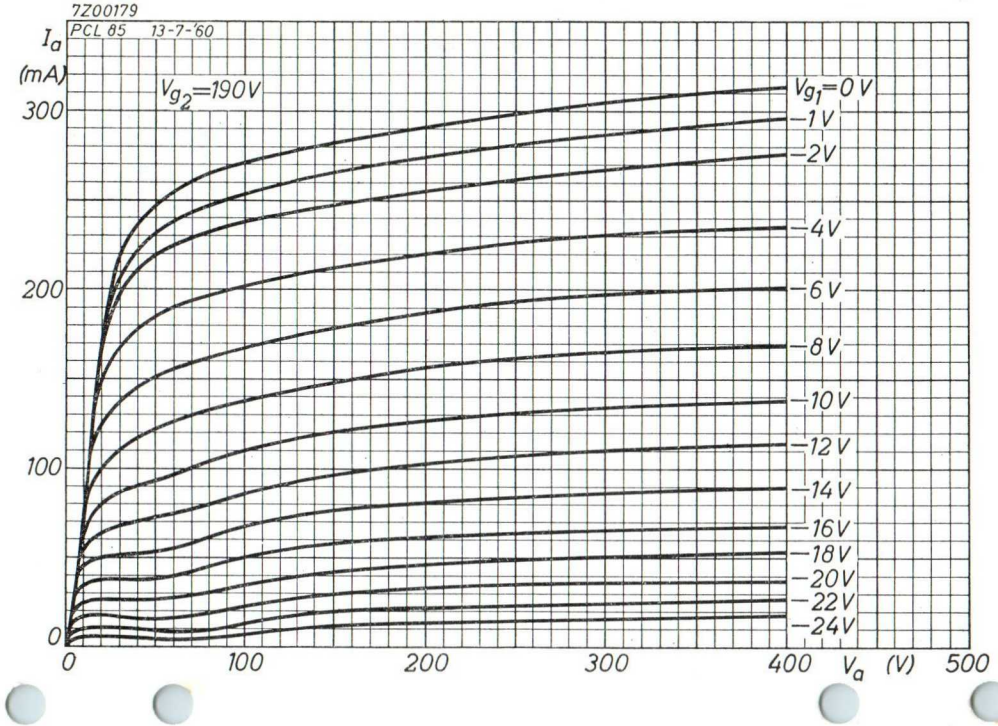
PHILIPS

PCL 85



3.3.1961

C

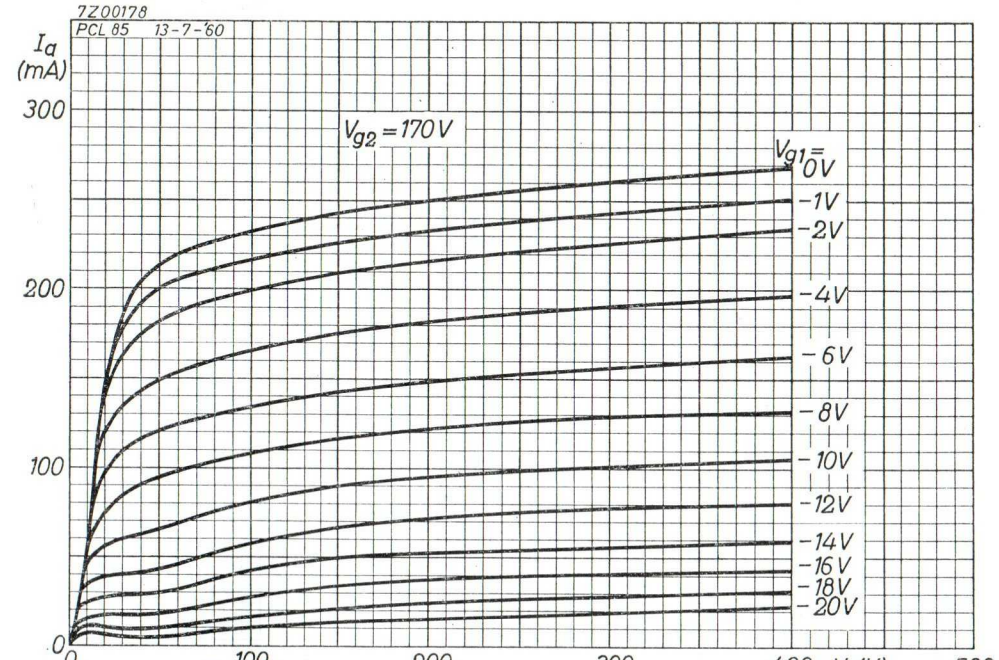


PCL 85

PHILIPS

D

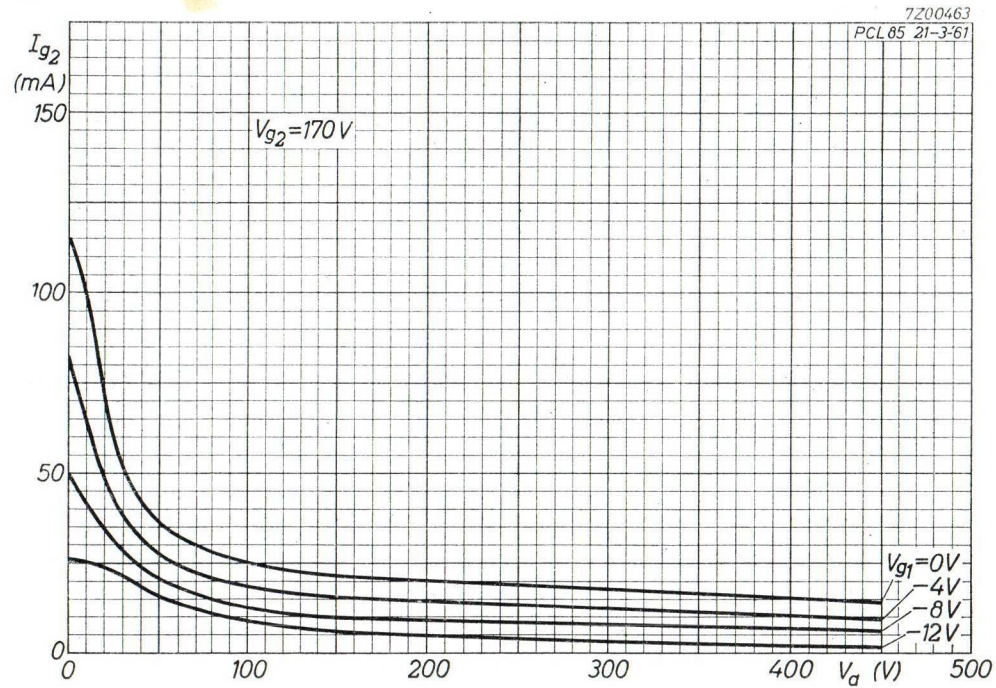
7Z00462
PCL85 21-3-61
V_{g1}=0V
−4V
−8V
−12V
V_{g2}=190V
I_{g_2} (mA)
150
100
50
0
0
100
200
300
400
500
V_a (V)



PCL 85

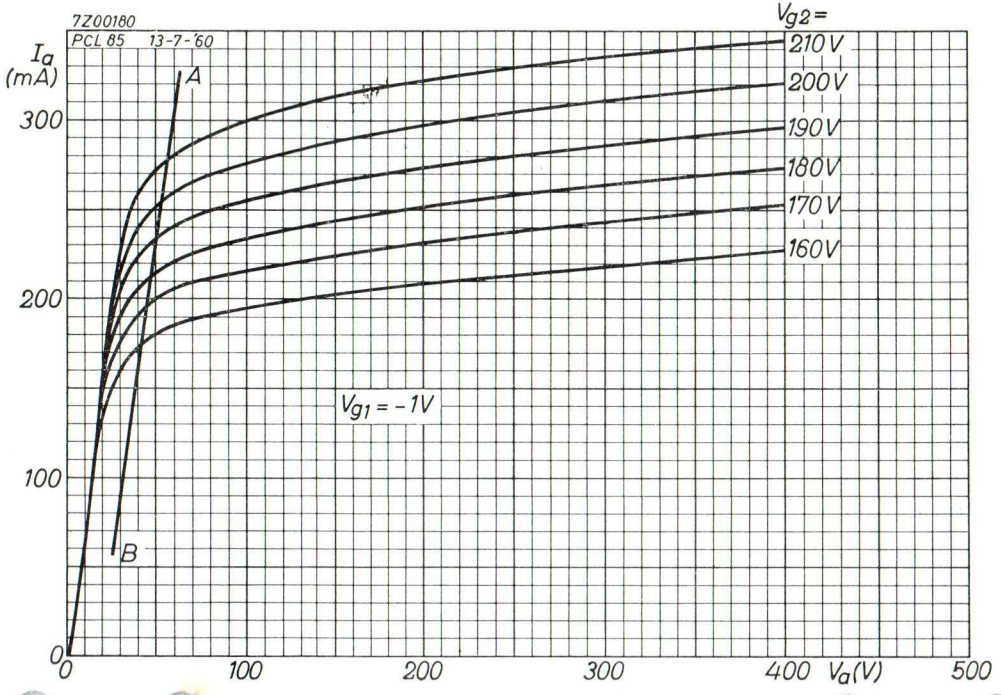
PHILIPS

F



PHILIPS

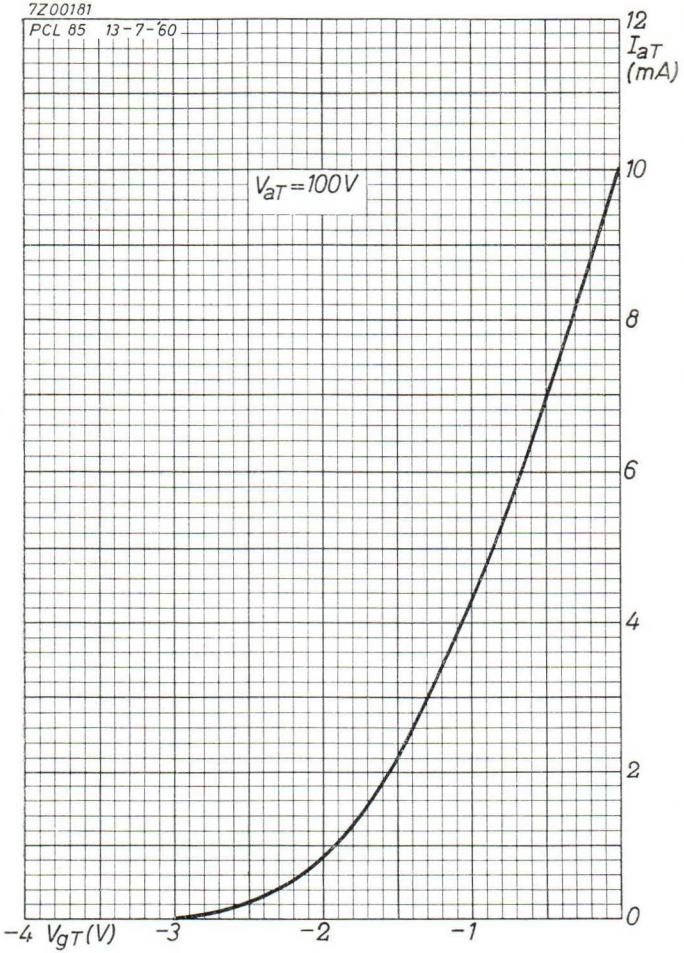
PCL85

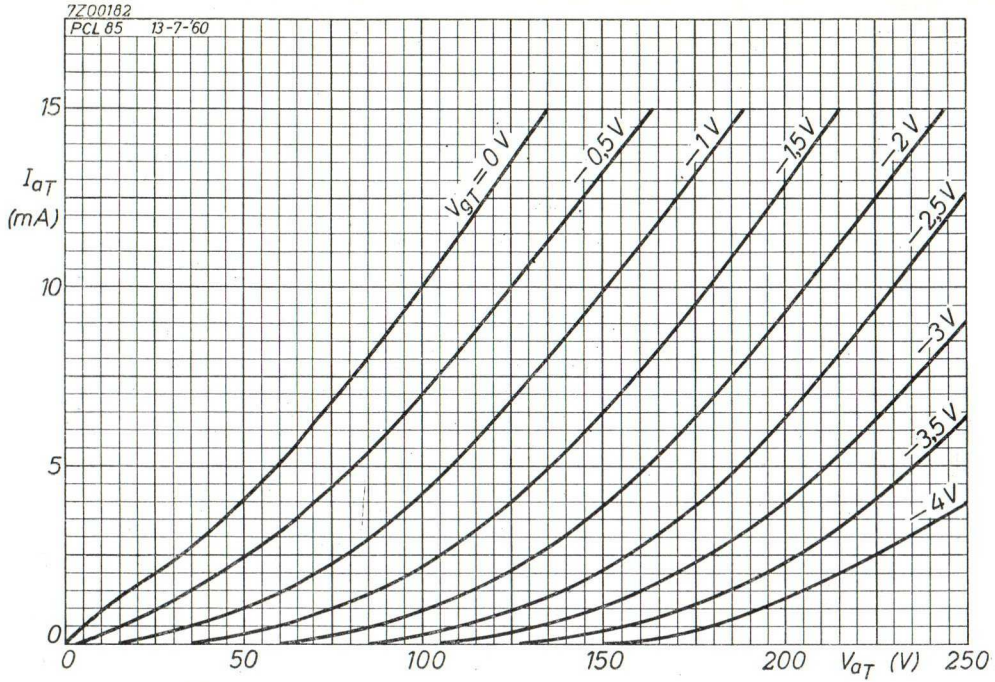


PCL 85

PHILIPS

H


7Z00181
PCL 85 13-7-'60
V_{aT} = 100 V
12
I_{aT} (mA)
10
8
6
4
2
0
−4 V_{gT} (V)
−3
−2
−1



PCL 85

PHILIPS

PHILIPS

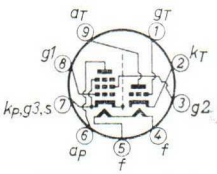
PCL 86

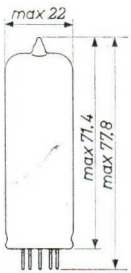
TRIODE-PENTODE for use as A.F. pre-amplifier and A.F. output tube
TRIODE-PENTODE pour utilisation comme pré-amplificatrice B.F. et tube de sortie B.F.
TRIODE-PENTODE zur Verwendung als NF-Vorverstärker und NF-Endröhre

Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation série
Heizung : indirect durch Wechsel- oder Gleichstrom Serienspeisung

I_f = 300 mA
V_f = 13 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	Triode section Partie triode Triodenteil	Pentode section Partie pentode Pentodenteil
	C_g = 2,3 pF	C_{g_1} = 10 pF
	C_a = 2,5 pF	C_{ag_1} = max. 0,4 pF
	C_{ag} = 1,4 pF	C_{g_1f} = max. 0,24 pF
	C_{gf} = max.0,006 pF	

Between triode and pentode sections
Entre les parties triode et pentode
Zwischen Trioden- und Pentodenteil

C_{aT-g_1P} = max. 0,2 pF C_{gT-g_1P} = max. 0,02 pF
C_{aT-aP} = max. 0,15 pF C_{gT-aP} = max. 0,006 pF [1])

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

Typical characteristics
Caractéristiques types
Kenndaten

Triode section Partie triode Triodenteil		Pentode section Partie pentode Pentodenteil	
V_a	= 230 V	V_a	= 230 V
V_g	= -1,7 V	V_{g2}	= 230 V
I_a	= 1,2 mA	V_{g1}	= -5,7 V
S	= 1,6 mA/V	I_a	= 39 mA
μ	= 100	I_{g2}	= 6,5 mA
$-V_g(I_g = 0,3\ \mu A)$	< 1,3 V	S	= 10,5 mA/V
		R_i	= 45 kΩ
		$\mu_{g_2g_1}$	= 21
		$-V_{g_1}(I_{g_1}=0,3\ \mu A)$	< 1,3 V

Operating characteristics of the triode section as A.F. amplifier
Caractéristiques d'utilisation de la partie triode comme amplificatrice B.F.
Betriebsdaten des Triodenteils als NF-Verstärker

R_a = 220 kΩ, R_g' = 680 kΩ [1]), V_o = 3,2 V_{eff}

V_b (V)	R_k (Ω)	R_g (MΩ)	I_a (mA)	V_o/V_i	d_{tot} (%)
200	0	10	0,42	66	0,6 [2])
230	0	10	0,52	68	0,5 [2])
200	2600	-	0,42	66	0,6
230	2100	-	0,52	68	0,5

[1]) Grid resistor of the following tube
Résistance de grille du tube suivant
Gitterwiderstand der folgenden Röhre

[2]) Measured with signal source resistance of 47 kΩ
Mesuré avec une résistance de la source d'entrée de 47 kΩ
Gemessen mit einem Widerstand der Eingangsspannungsquelle von 47 kΩ

Microphony and hum
Effet microphonique et ronflement
Mikrophonie und Brumm

The triode section can be used without special precautions against microphonic effect in circuits in which an output of 50 mW is obtained at an input voltage of at least 10 mV (R.M.S.)
Under this condition and with Z_g (at f = 50 c/s) $\leq$ 500 kΩ, $C_k \geq$ 100 µF and pin 4 earthed the hum level will be $\geq$ 60 dB. The A.C. voltage between pin 4 and cathode should not exceed 30 V.

La partie triode peut être utilisée sans précautions spéciales contre l'effet microphonique dans les circuits dont la puissance de sortie est de 50 mW à une tension d'entrée de 10 mV_{eff} au moins.
Sous cette condition et avec Z_g (à f = 50 Hz) $\leq$ 500 kΩ, $C_k \geq$ 100 µF et la broche 4 mise à la terre le niveau de ronflement sera meilleur à 60 dB. La tension alternative entre broche 4 et la cathode ne dépassera pas une valeur de 30 V.

Der Triodenteil kann ohne spezielle Massnahmen gegen Mikrophonie in Schaltungen verwendet werden bei denen eine Eingangsspannung von mindestens 10 mV_{eff} eine Ausgangsleistung von 50 mW ergibt.
Unter dieser Bedingung und mit Z_g (bei f = 50 Hz) $\leq$ 500 kΩ, $C_k \geq$ 100 µF und Stift 4 geerdet wird der Brummpegel besser als 60 dB sein. Die Wechselspannung zwischen Stift 4 und Erde soll einen Wert von 30 V nicht überschreiten

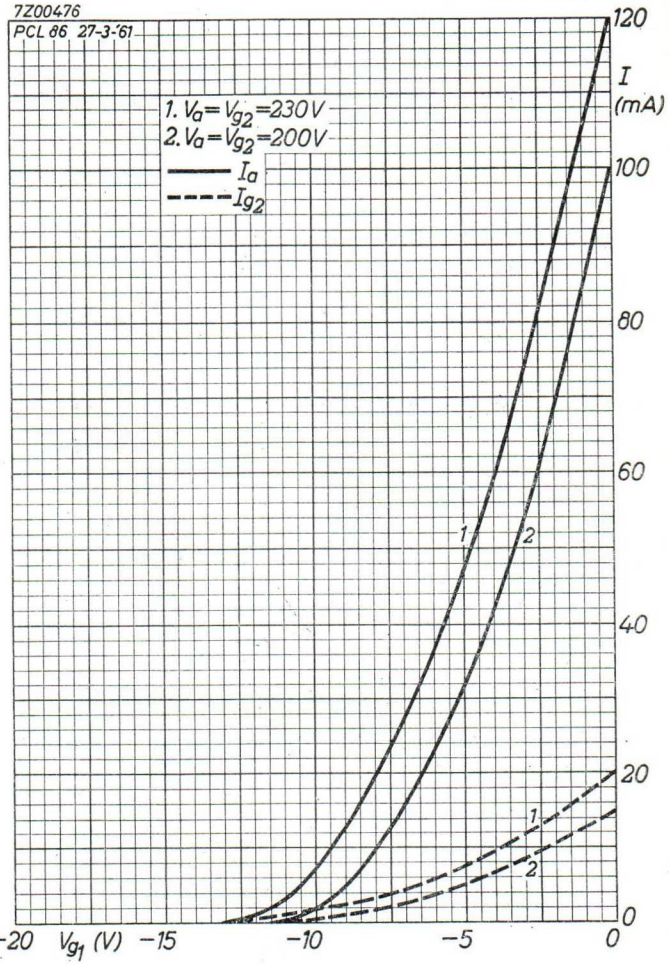
Operating characteristics of the pentode section as class A output tube (Measured with V_k kept constant)
Caractéristiques d'utilisation de la partie pentode comme tube de sortie classe A (Mesurées avec V_k maintenue constante)
Betriebsdaten als Klasse A Endröhre (Mit konstant gehaltener Spannung V_k gemessen)

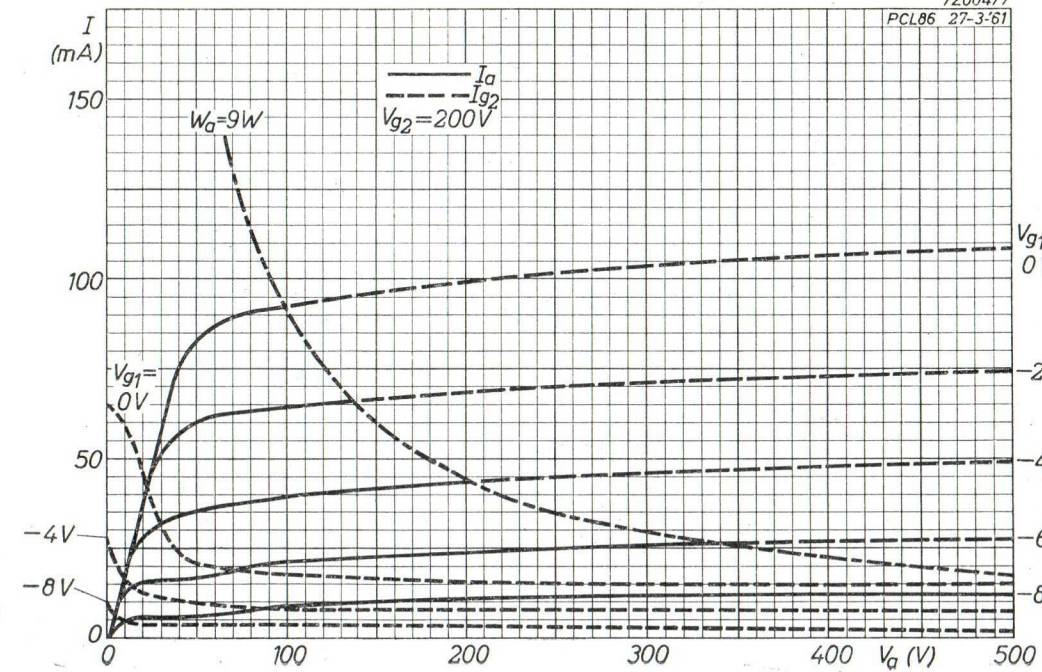
V_b	=		230			200		V
R_k	=		115			65		Ω
$R_{a\sim}$	=		5,1			4,7		kΩ
V_i	=	0	0,3	3,3	0	0,29	1,9	V_{eff}
I_a	=	40	-	42	46	-	46,5	mA
I_{g2}	=	6,7	-	11,4	7,6	-	8,8	mA
W_o	=	0	0,05	4,0	0	0,05	2,0	W
d_{tot}	=	-	0,9	10	-	0,7	4,0	%

Limiting values
Caractéristiques limites
Grenzdaten

Triode section Partie triode Triodenteil		Pentode section Partie pentode Pentodenteil	
V_{ao}	max. 550 V	V_{ao}	max. 550 V
V_a	max. 250 V	V_a	max. 250 V
W_a	max. 0,5 W	V_{g2_o}	max. 550 V
I_k	max. 4 mA	V_{g2}	max. 250 V
R_g	max. 1 MΩ	W_a	max. 9 W
V_{kf}	max. 100 V	W_{g2}	max. 1,8 W
		W_{g2_p}	max. 3,25 W
		I_k	max. 55 mA
		R_{g_1}	max. 1 MΩ [1]
		V_{kf}	max. 100 V

[1]) With automatic grid bias
En polarisation de grille automatique
Mit automatischer Gittervorspannung


7Z00476
PCL 86 27-3-'61
1. $V_a = V_{g2} = 230V$
2. $V_a = V_{g2} = 200V$
I_a
I_{g2}
I (mA)
120
100
80
60
40
20
0
1
2
1
2
−20 V_{g1} (V) −15 −10 −5 0



PCL 86

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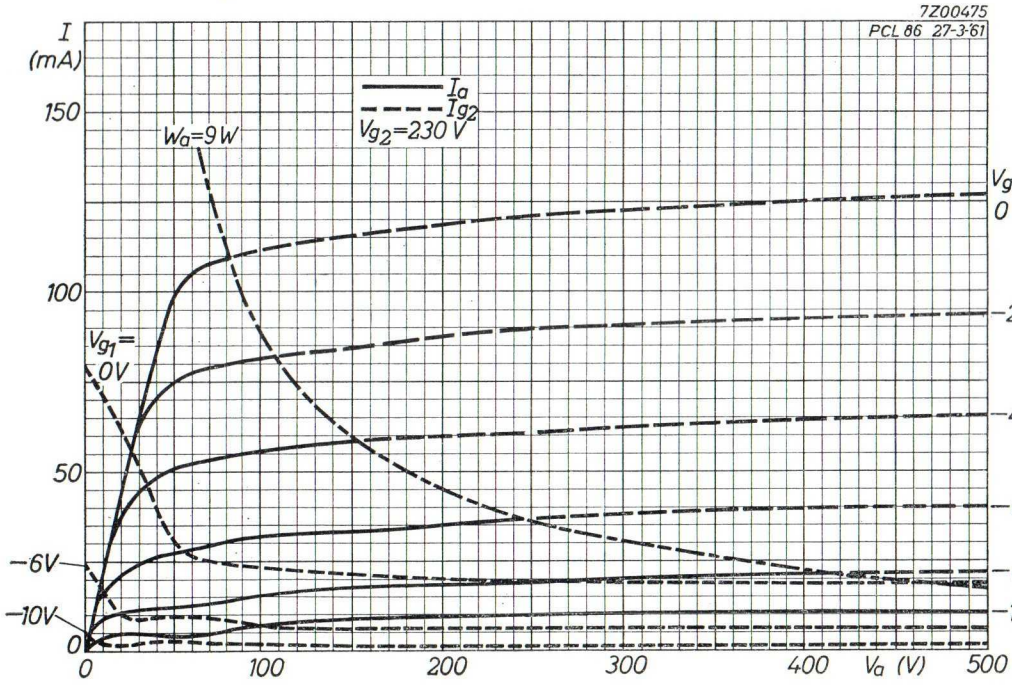
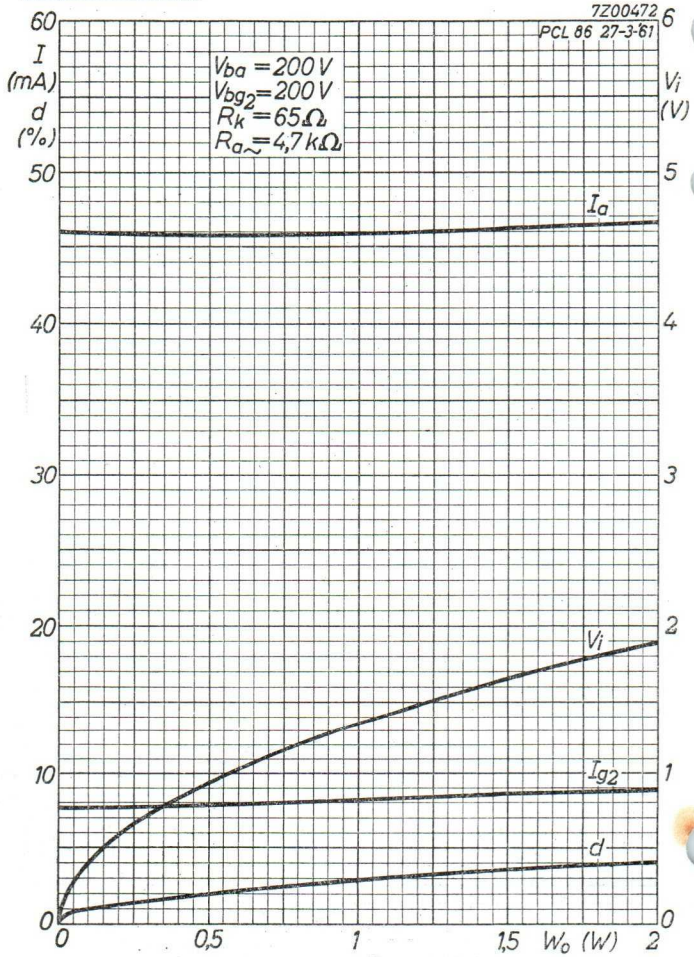
8



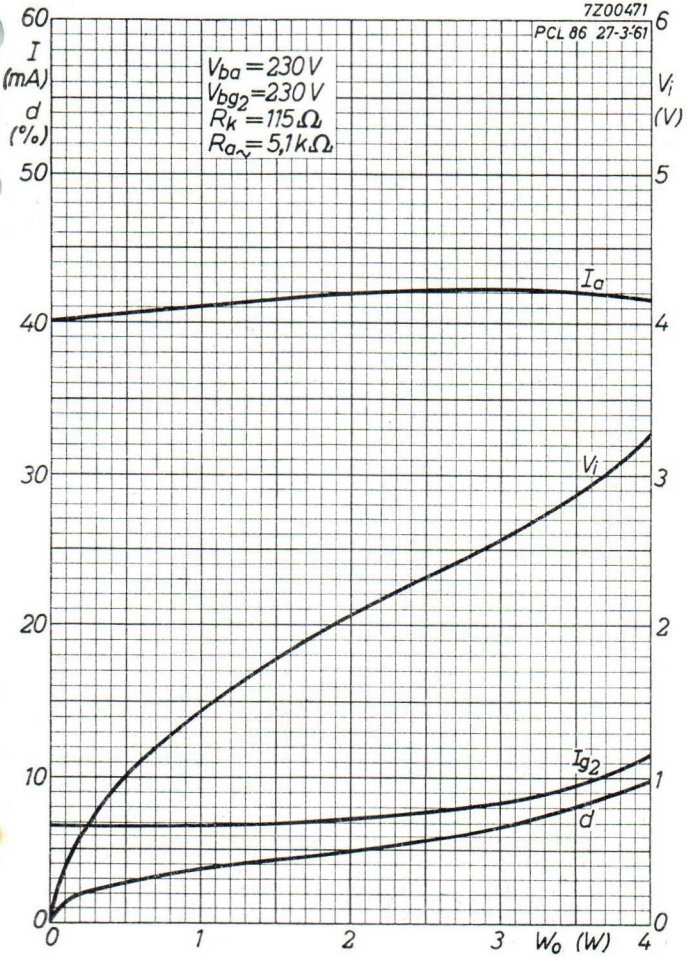
PHILIPS

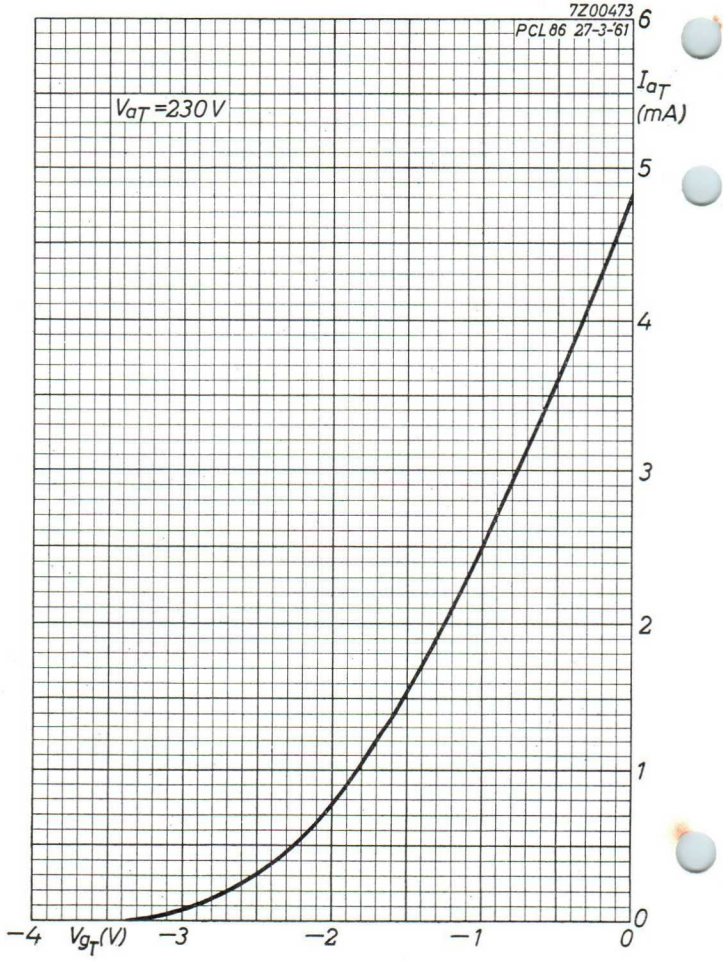
PCL 86

PCL86 **PHILIPS**

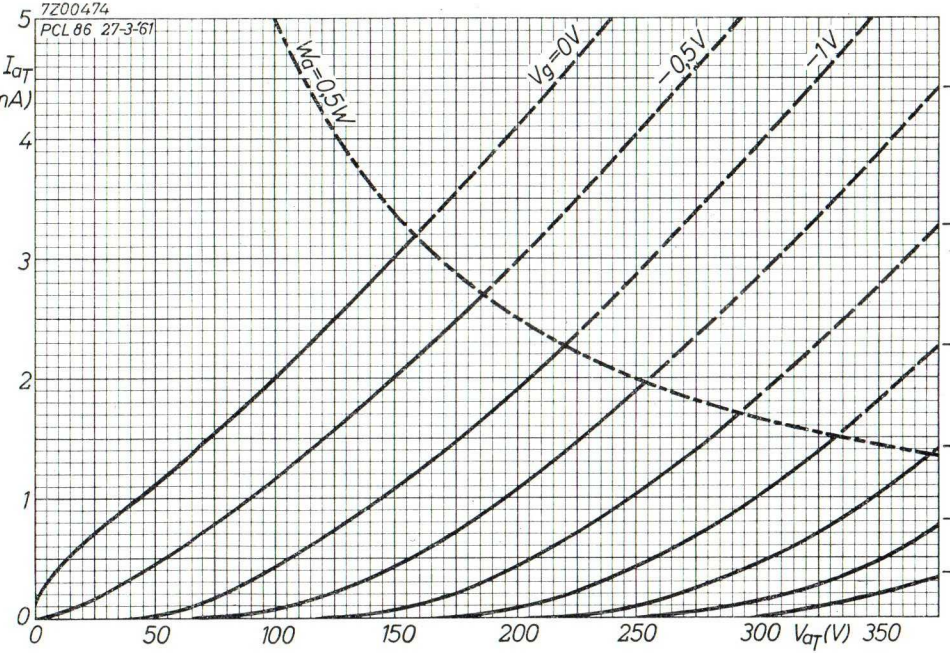


D


7Z00471
PCL 86 27-3-'61
V_{ba} = 230 V
V_{bg_2} = 230 V
R_k = 115 Ω
$R_{a\sim}$ = 5,1 kΩ
I (mA)
d (%)
V_i (V)
I_a
V_i
I_{g_2}
d
W_o (W)
60
50
40
30
20
10
0
6
5
4
3
2
1
0
0
1
2
3
4



F



PHILIPS

PCL86

4.4.1961

G

PHILIPS

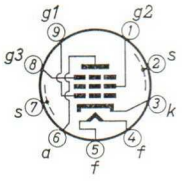
PF86

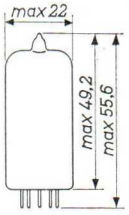
PENTODE FOR USE IN TRANSITRON CIRCUITS in television receivers
PENTHODE POUR UTILISATION DANS DES CIRCUITS TRANSITRONS dans des récepteurs de télévision
PENTODE ZUR VERWENDUNG IN TRANSITRONSCHALTUNGEN in Fernsehempfängern

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

$I_f = 300$ mA
$V_f = 4{,}5$ V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: Noval

Capacitances
Capacités
Kapazitäten

$C_{g_1} = 3{,}5$ pF
$C_a = 5{,}0$ pF
$C_{ag_1} < 0{,}05$ pF
$C_{g_1 f} < 0{,}003$ pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	100	250 V
V_{g_3}	=	-30	0 V
V_{g_2}	=	35	140 V
V_{g_1}	=	0	-2 V
I_a	=	<0,01	3,0 mA
I_{g_2}	=		0,6 mA
S	=		2,0 mA/V
$\mu_{g_2g_1}$	=		38
R_i	=		2,5 MΩ

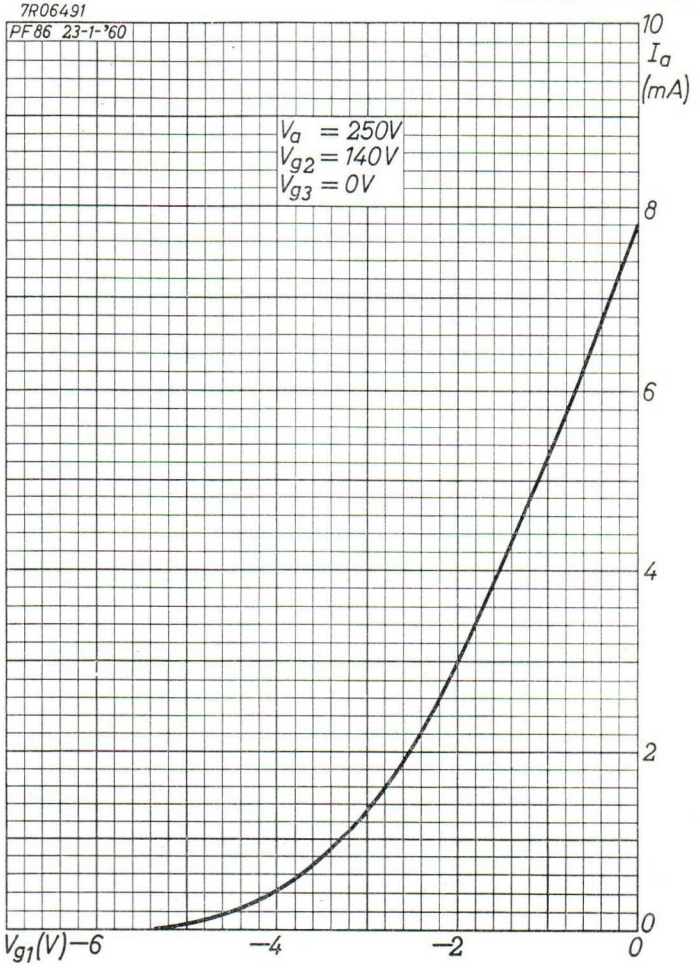
Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}		= max.	550 V
V_a		= max.	300 V
W_a		= max.	1 W
$V_{g_{2_o}}$		= max.	550 V
V_{g_2}		= max.	200 V
W_{g_2}		= max.	0,2 W
I_k		= max.	4 mA
I_{kp}		= max.	25 mA [1]
R_{g_1}	(W_a < 0,2 W)	= max.	10 MΩ
R_{g_1}	(W_a > 0,2 W)	= max.	3 MΩ
R_{g_3}		= max.	0,1 MΩ
V_{kf}		= max.	100 V
R_{kf}		= max.	20 kΩ

[1]) Max. pulse duration 4% of a cycle with a maximum of 0,8 msec
Durée de l'impulsion max. 4% d'un cycle avec un maximum de 0,8 msec
Impulszeit max. 4% einer Periode mit einem Maximum von 0,8 mSek.

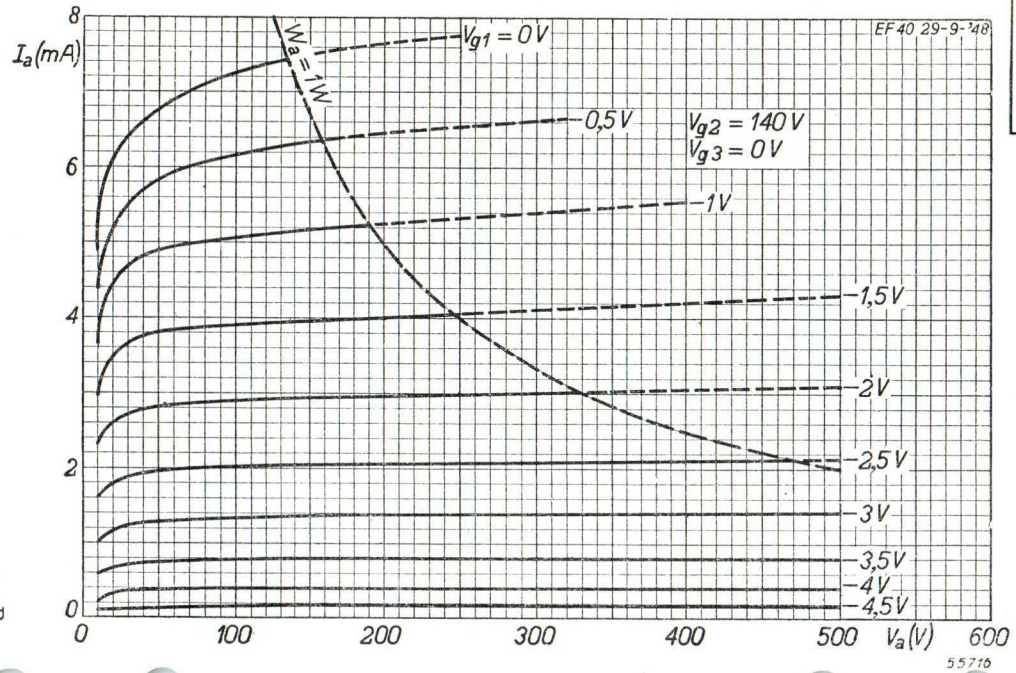
PHILIPS

PF86



1.1.1960

A


EF40 29-9-'48
I_a(mA)
$W_a = 1W$
$V_{g1} = 0V$
0,5V
1V
1,5V
2V
2,5V
3V
3,5V
4V
4,5V
$V_{g2} = 140V$
$V_{g3} = 0V$
0
2
4
6
8
0
100
200
300
400
500
600
V_a(V)
55716

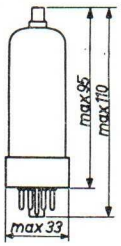
B

PHILIPS PL 36

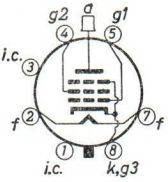
OUTPUT PENTODE for use as line output tube in television receivers
PENTHODE DE SORTIE pour utilisation comme tube de sortie de déviation horizontale dans récepteurs de télévision
ENDPENTODE zur Verwendung als Endröhre für die horizontale Ablenkung in Fernsehempfängern

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

I_f = 300 mA
V_f 25 V



Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: OCTAL

Capacitances
Capacités
Kapazitäten

C_a	=	8 pF
C_{g1}	=	17,5 pF
C_{ag1}	<	1,1 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	100 V
V_{g2}	=	100 V
V_{g1}	=	-8.2 V
I_a	=	100 mA
I_{g2}	=	7 mA
S	=	14 mA/V
R_i	=	5 kΩ
μ_{g2g1}	=	5,6

9.9.1958

Remarks

On pages F to O curves are given for nominal new tubes. On designing a line output circuit it has to be taken into account that due to tube spread and deterioration during life the current may be reduced by 25 %.

When the tube is operated below the knee of its Ia-Va characteristic the screen grid series resistor must have a minimum value of 2.2 kΩ to avoid the occurrence of Barkhausen oscillations.

The min. drive at Vap = 5 kV is 100 V
and at Vap = 7 kV 120 V

Observations

Sur les pages F - O des courbes de tubes moyens neufs sont données. Quand on étudie un circuit de sortie de déviation horizontale, il faut tenir compte du fait que par suite des tolérances du tube et de la dégradation en service, les courant donnés peuvent se diminuer de 25 %.

Quand le tube fonctionne au-dessous du genou de sa caractéristique Ia-Va la résistance série de la grille écran doit avoir une valeur de 2,2 kΩ au minimum pour éviter la formation d'oscillations de Barkhausen.

La tension d'attaque à Vap = 5 kV est de 100 V au min.
et à Vap = 7 kV de 120 V au min.

Bemerkungen

Auf Seite F bis O sind Kurven von durchschnittlichen neuen Röhren gegeben. Wenn man eine Ausgangsschaltung für die horizontale Ablenkung entwirft, muss man damit Rechnung tragen, dass, infolge Röhrentoleranzen und Verschlechterung der Röhren während der Lebensdauer, die angegebenen Stromwerte sich um 25 % verringern können.

Wenn die Röhre unter dem Knie ihrer Ia-Va Kennlinie arbeitet muss der Schirmgitterserienwiderstand einen minimalen Wert von 2,2 kΩ haben um das Auftreten von Barkhausen-Schwingungen zu vermeiden.

Die Eingangsspannung bei Vap = 5 kV ist mindestens 100 V
und bei Vap = 7 kV mindestens 120 V

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max. 550 V
V_a	= max. 250 V
V_{ap}	= max. 7 kV [1]
$-V_{ap}$	= max. 1,5 kV [1]
V_{g2_o}	= max. 550 V
V_{g2}	= max. 250 V
$-V_{g1_p}$	= max. 1 kV [1]
W_a	See pages P and Q
W_{g2}	Voir pages P et Q
$W_{a+}W_{g2}$	Siehe Seiten P und Q
I_k	= max. 200 mA
R_{g1}	= max. 0,5 MΩ
R_{g1}	= max. 2,2 MΩ [2]
$V_{kf\sim}$	= max. 250 V_{eff}
$V_{kf=}$(k pos.)	= max. 250 V
$V_{kf=}$(k neg.)	= max. 200 V
R_{kf}	= max. 20 kΩ

---

[1]) Valid for application in line output circuits where the max. pulse duration is 22 % of a cycle with a max. of 18 µsec

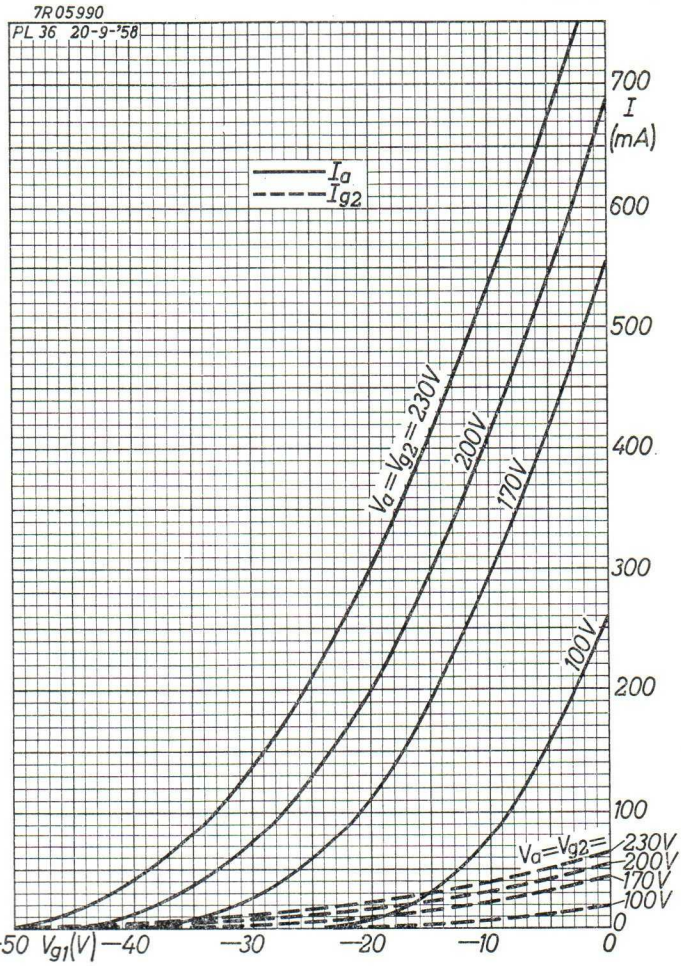
Valable pour l'application dans des circuits de sortie de déviation horizontale où la durée d'impulsion max. est de 22 % d'un cycle avec un max. de 18 µsec

Gültig bei Verwendung in Ausgangskreisen für die horizontale Ablenkung wobei die Impulszeit max. 22 % einer Periode ist, mit einem Maximum von 18 µSek

[2]) For line output tube application only
Seulement pour application comme tube de sortie lignes
Nur für die Verwendung als Ausgangsröhre für die horizontale Ablenkung

PHILIPS

PL 36

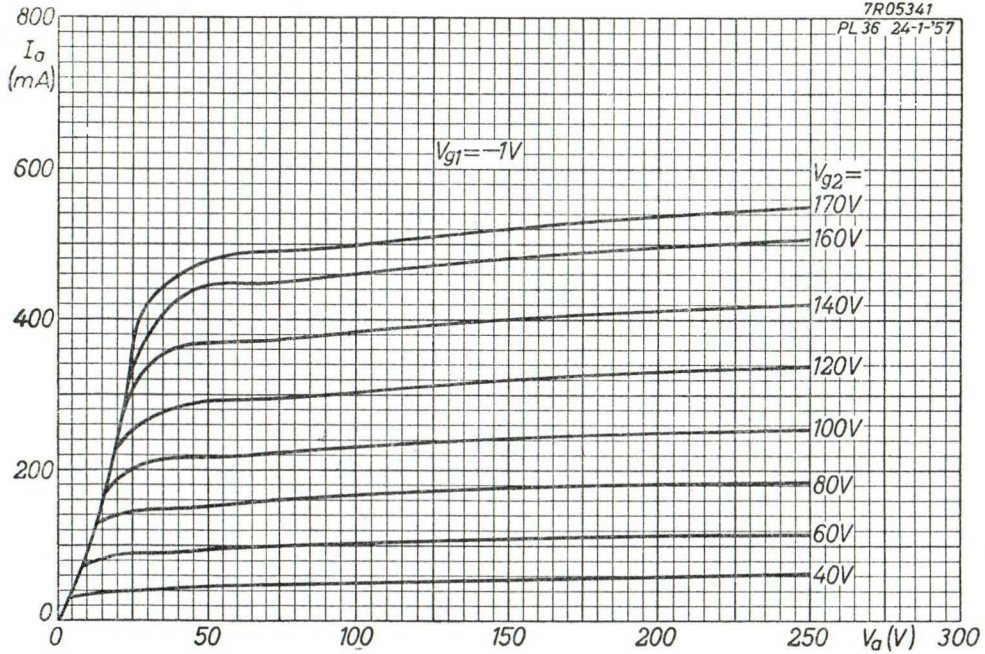


9.9.1958

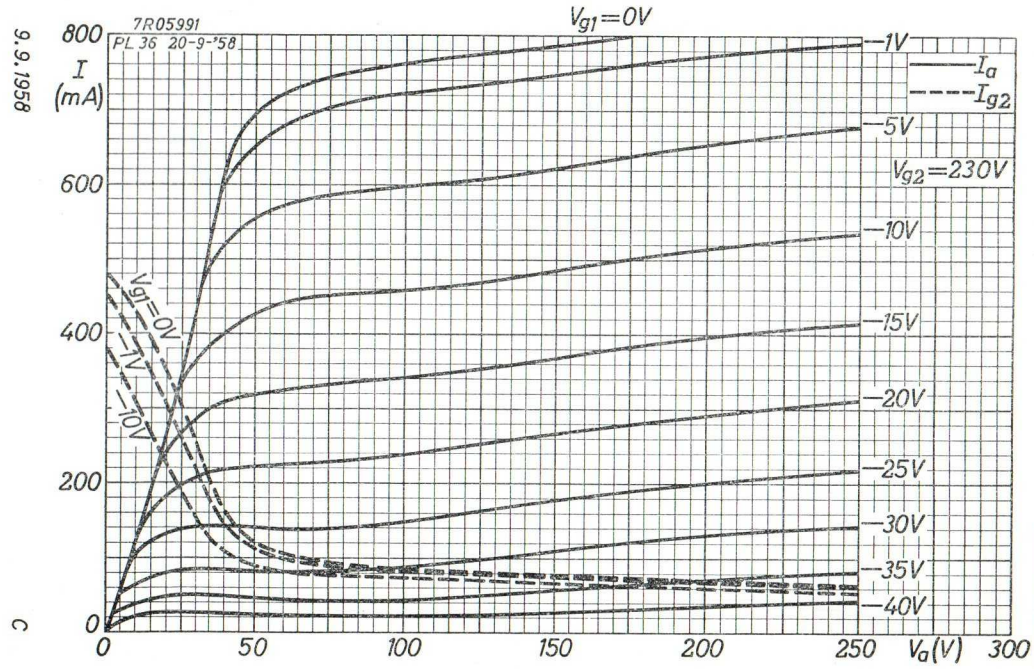
A

PL 36

PHILIPS



8

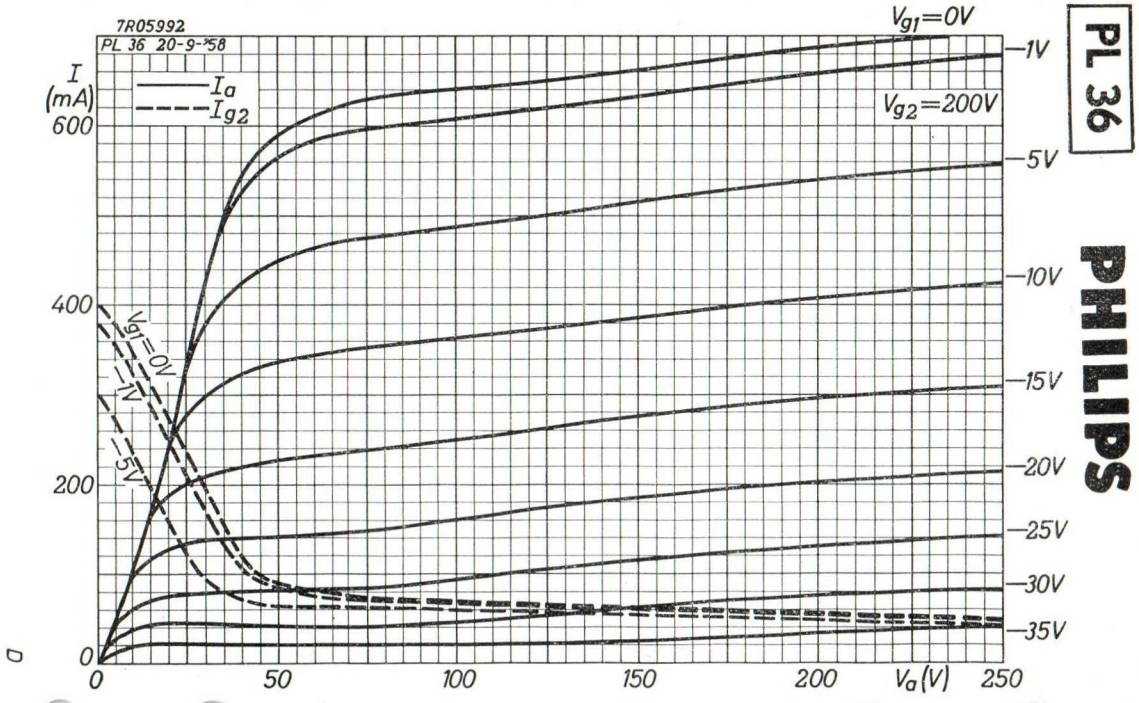


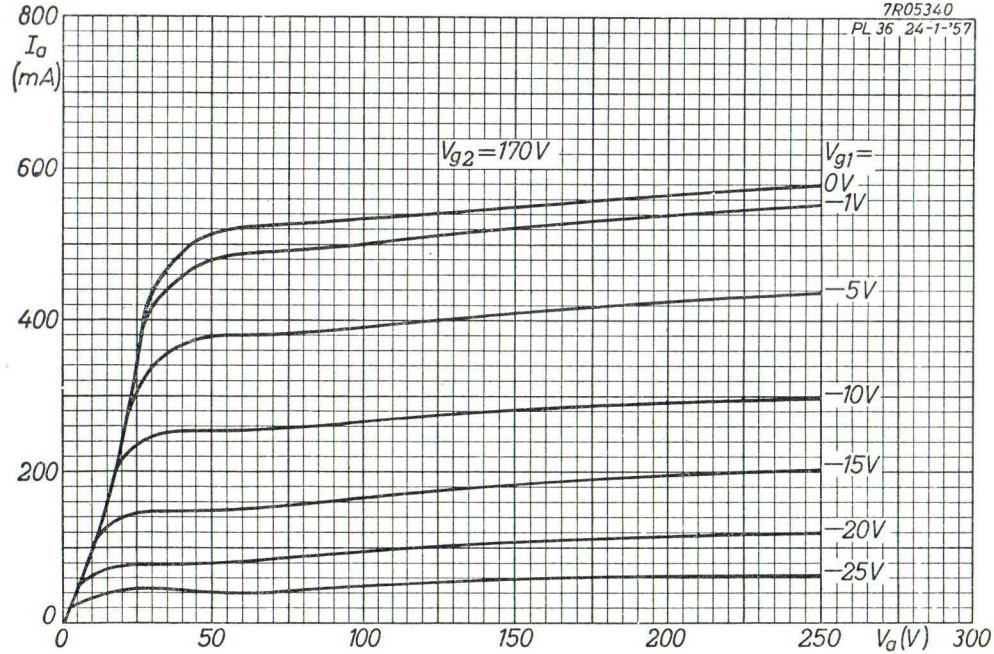
9.9.1958

C

PHILIPS

PL 36

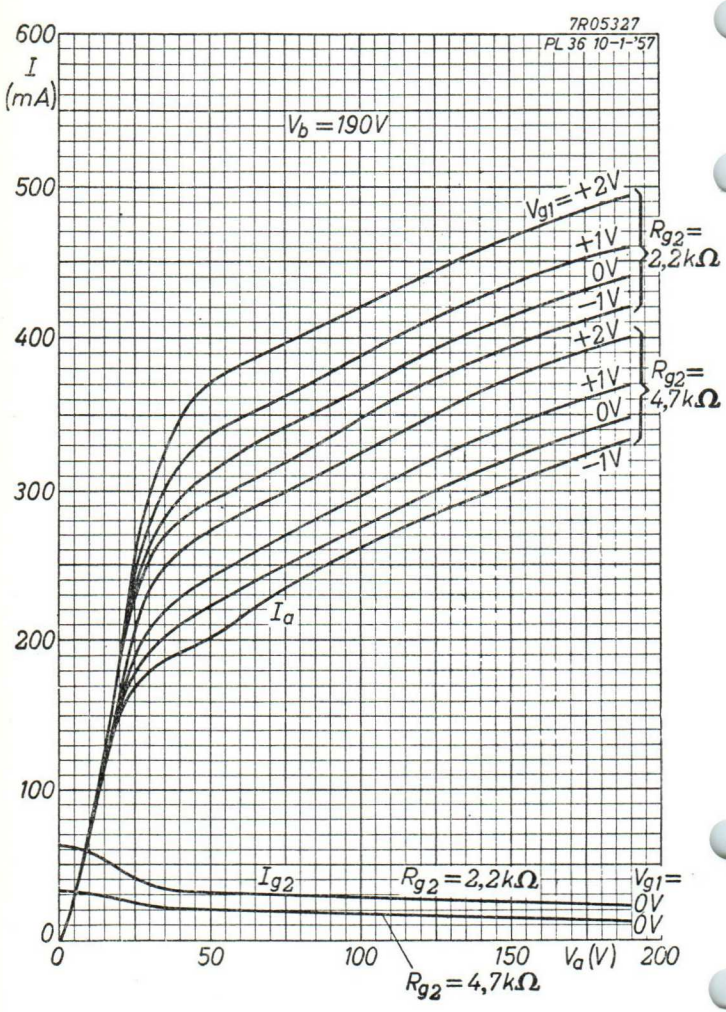

7R05992
PL 36 20-9-'58
PL 36
PHILIPS
I (mA)
I_a
I_{g2}
V_{g1}=0V
V_{g2}=200V
-1V
-5V
-10V
-15V
-20V
-25V
-30V
-35V
600
400
200
0
50
100
150
200
V_a(V)
250

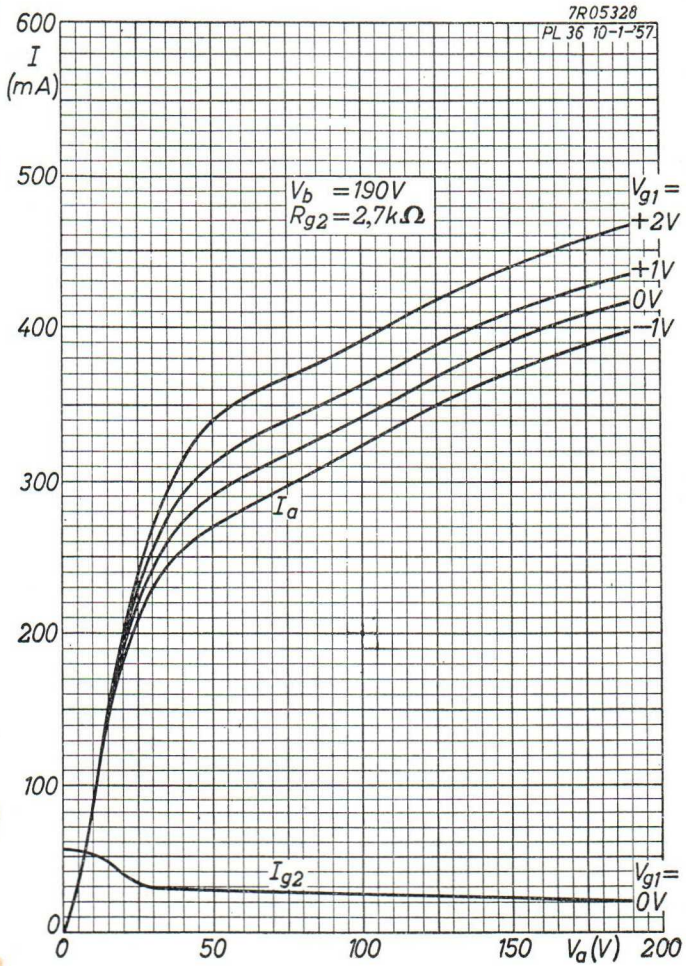


PHILIPS

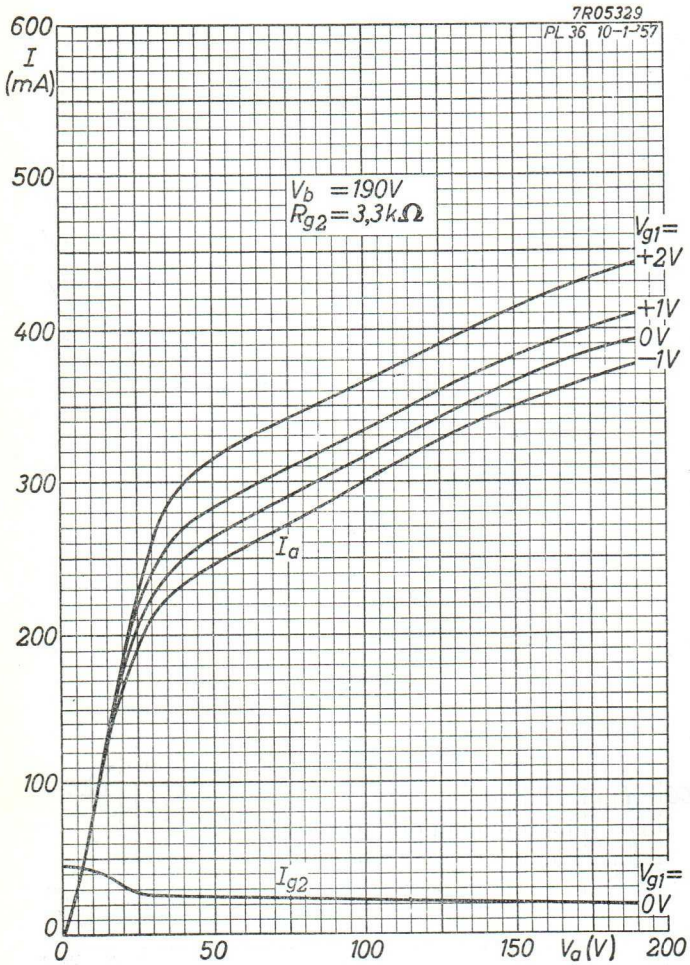
PL 36

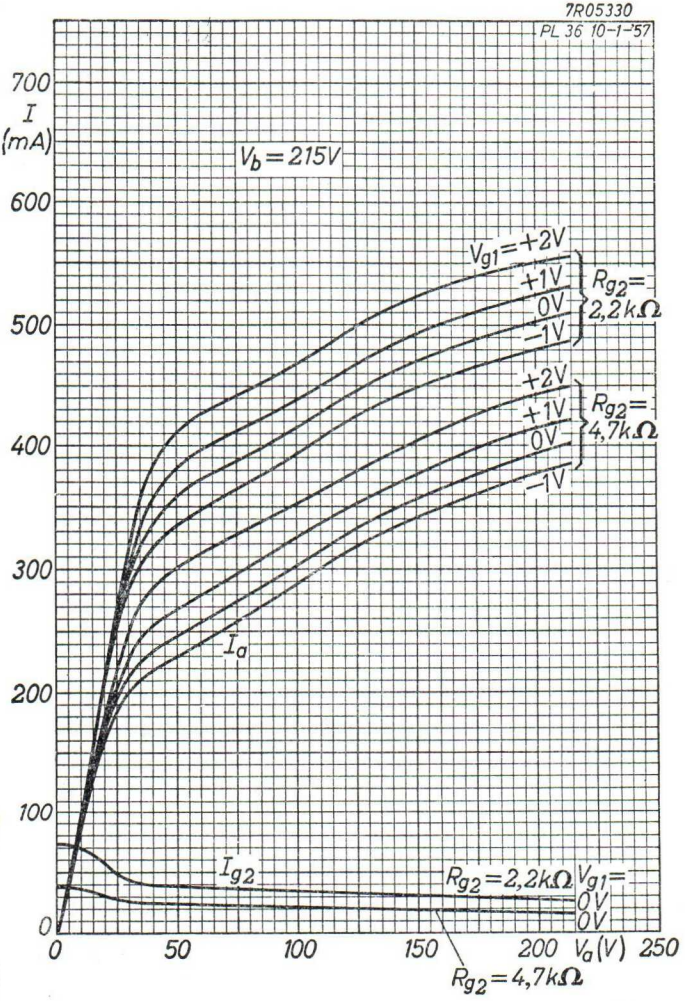
PHILIPS


7R05327
PL 36 10-1-'57
600
I
(mA)
500
400
300
200
100
0
$V_b = 190V$
$V_{g1} = +2V$
+1V
0V
−1V
R_{g2}= 2,2kΩ
+2V
+1V
0V
−1V
R_{g2}= 4,7kΩ
I_a
I_{g2}
$R_{g2} = 2,2k\Omega$
V_{g1}=
0V
0V
0
50
100
150
V_a(V)
200
$R_{g2} = 4,7k\Omega$

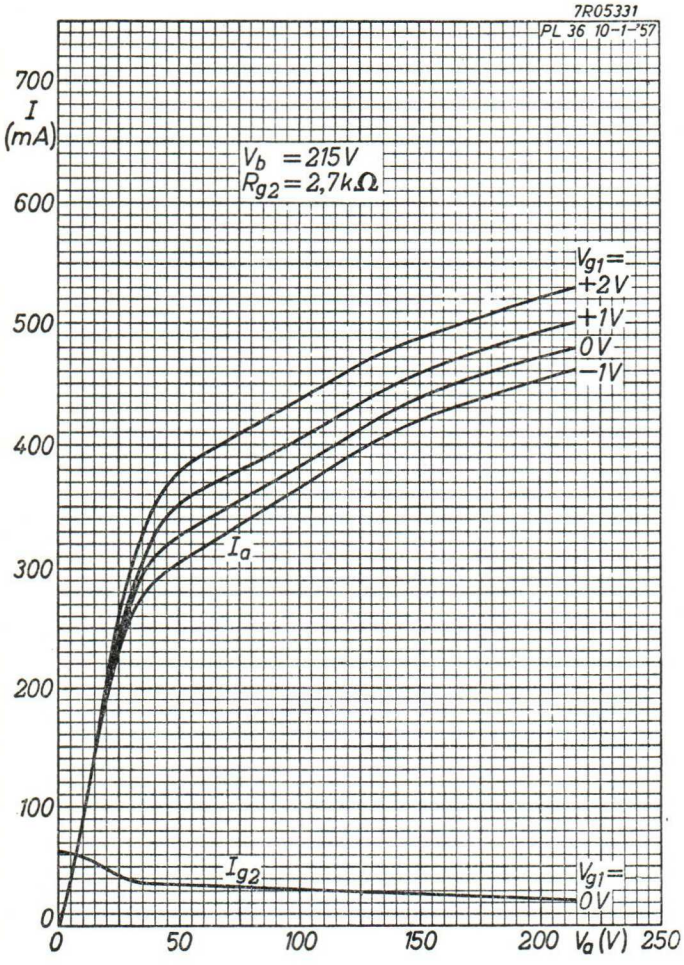

7R05328
PL 36 10-1-57
600
I
(mA)
500
400
300
200
100
0
V_b = 190V
R_{g2} = 2,7kΩ
V_{g1} =
+2V
+1V
0V
−1V
I_a
I_{g2}
V_{g1} =
0V
0
50
100
150
V_a(V)
200

PL36 PHILIPS

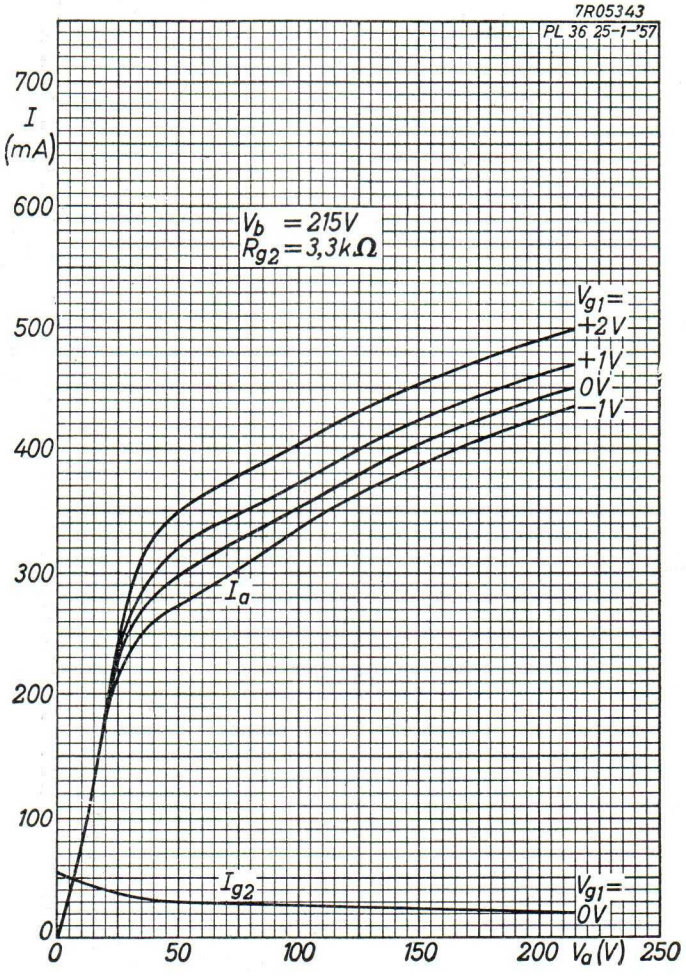



7R05330
PL 36 10-1-57
700
I
(mA)
600
500
400
300
200
100
0
$V_b = 215V$
V_{g1}=+2V
+1V
0V
−1V
R_{g2}= 2,2kΩ
+2V
+1V
0V
−1V
R_{g2}= 4,7kΩ
I_a
I_{g2}
R_{g2}=2,2kΩ V_{g1}=
0V
0V
R_{g2}=4,7kΩ
0
50
100
150
200 V_a(V) 250

PL 36 **PHILIPS**

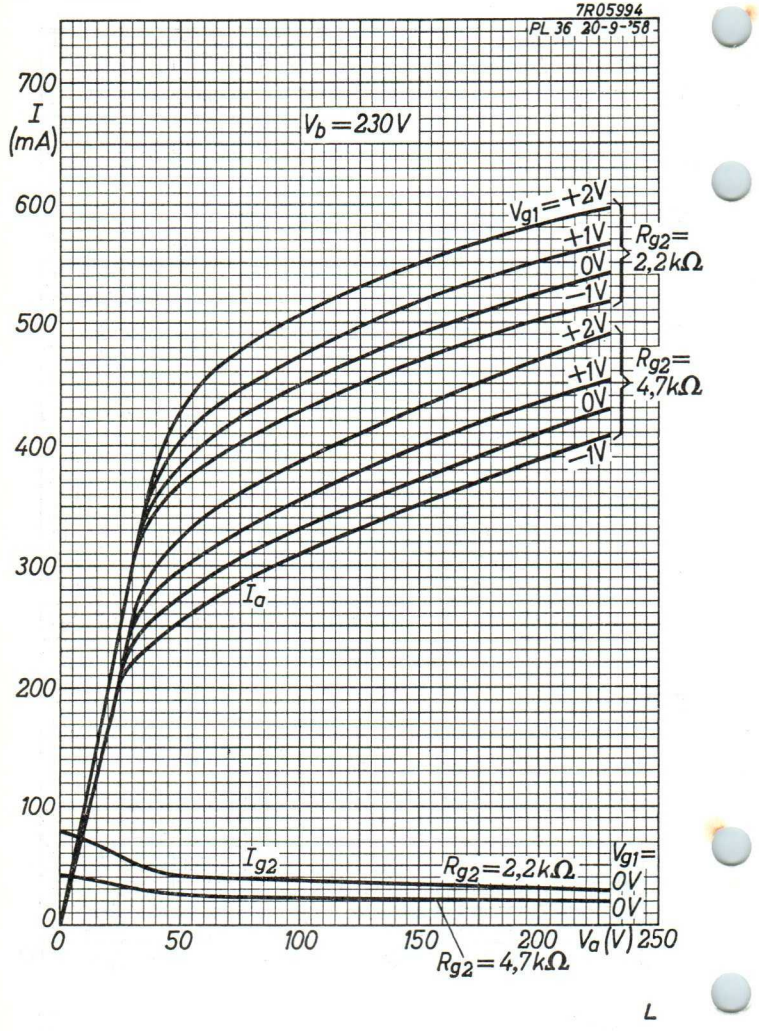


J


7R05343
PL 36 25-1-'57
700
I
(mA)
600
500
400
300
200
100
0
V_b = 215V
R_{g2} = 3,3kΩ
V_{g1} =
+2V
+1V
0V
−1V
I_a
I_{g2}
V_{g1} =
0V
0
50
100
150
200
V_a (V)
250

PL 36

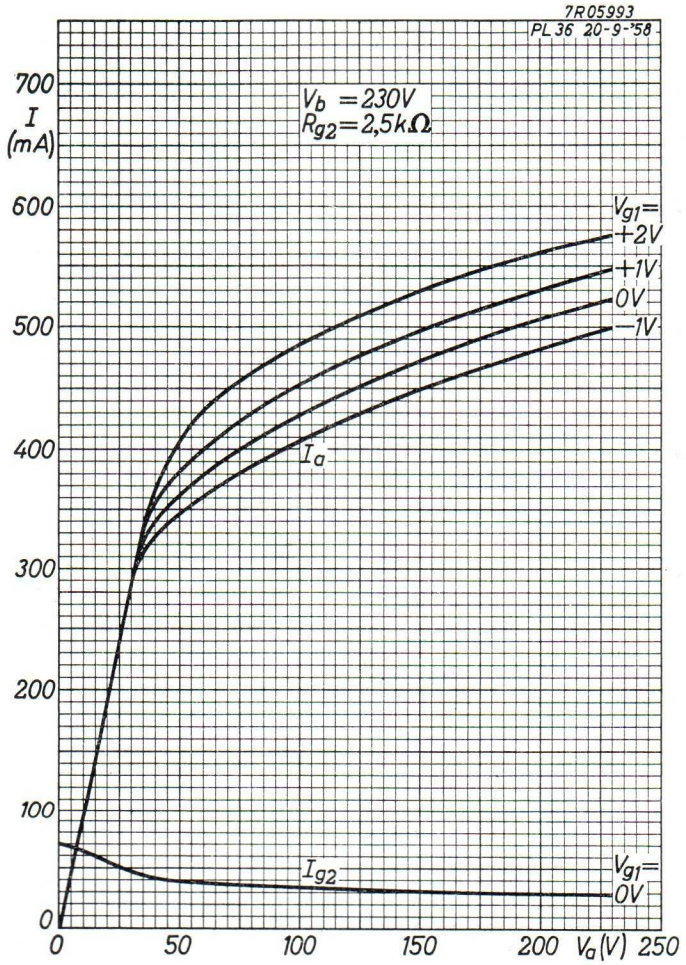
PHILIPS



L

PHILIPS

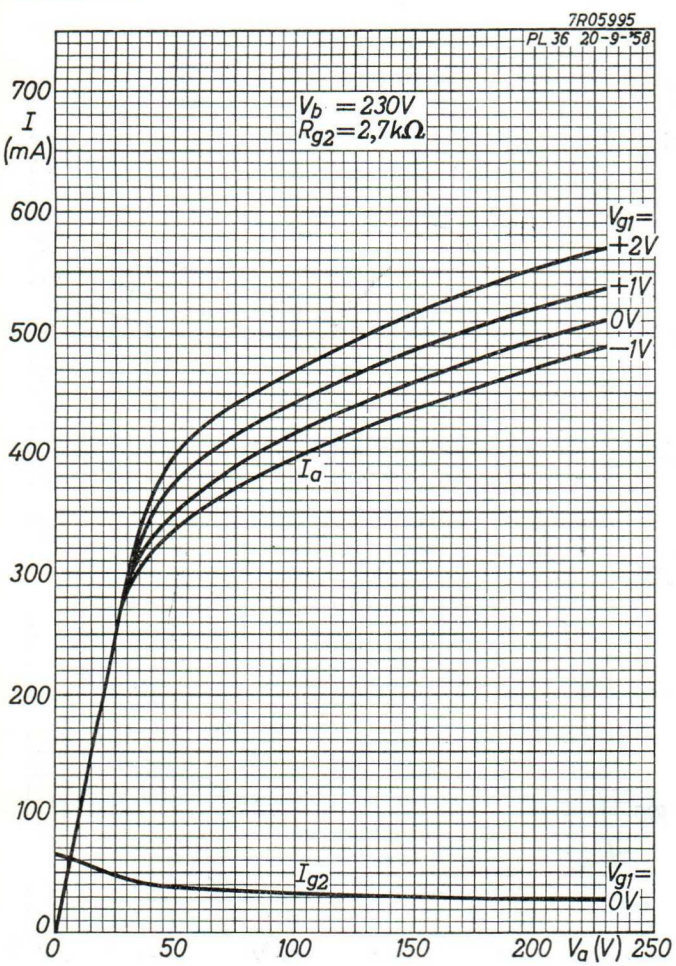
PL 36



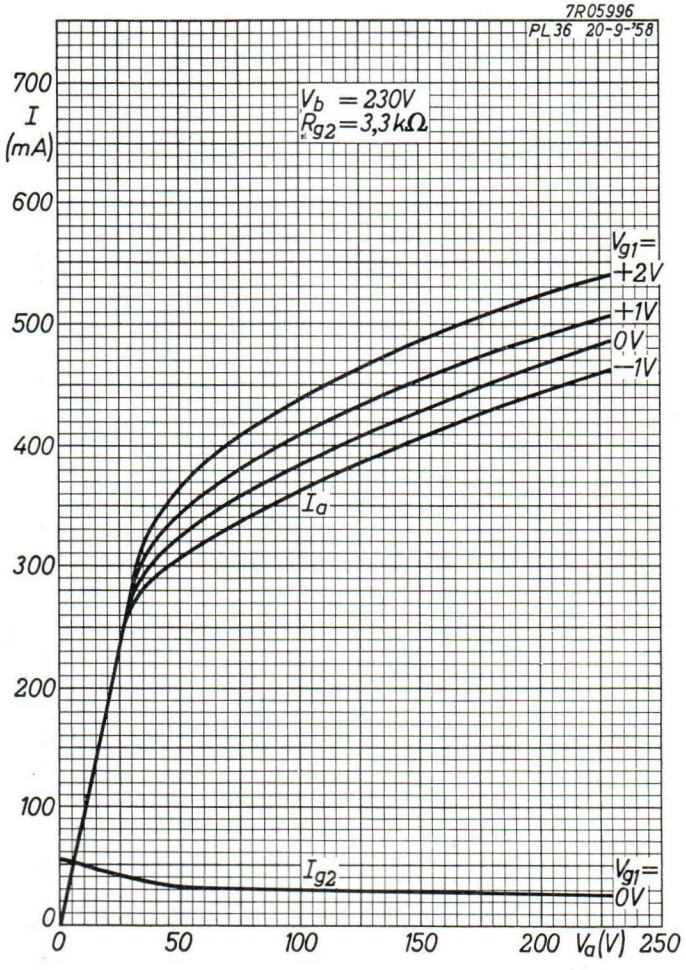
9.9.1958

N

PL 36 **PHILIPS**

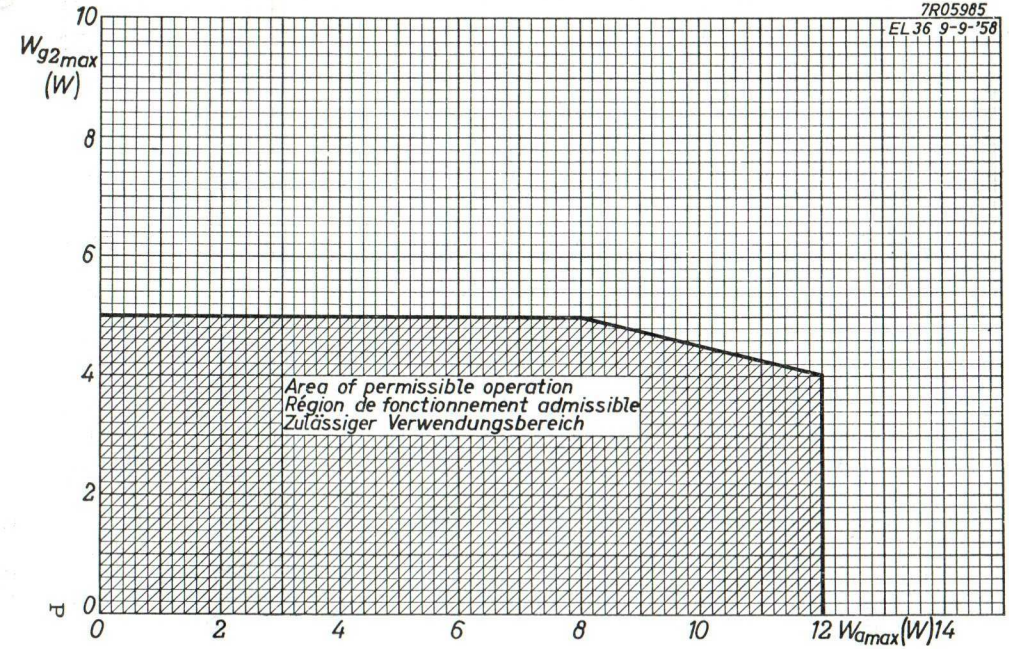


N


7R05996
PL 36 20-9-'58
V_b = 230V
R_{g2} = 3,3 kΩ
V_{g1} =
+2V
+1V
0V
−1V
I_a
I_{g2}
V_{g1} =
0V
I (mA)
700
600
500
400
300
200
100
0
0
50
100
150
200
V_a(V)
250

PL 36

PHILIPS

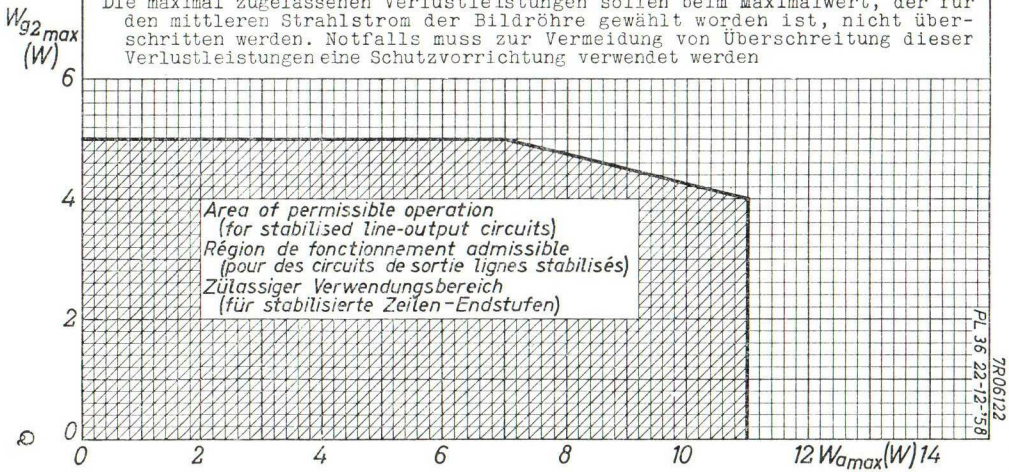


9.9.1958

The max. permissible dissipations should not be exceeded with the chosen max. mean value of the beam current of the picture tube. If necessary a protecting device should be applied in order to avoid exceeding these dissipations

Les dissipations max. admissibles ne seront pas dépassées au maximum choisi pour la valeur moyenne du courant de faisceau du tube-image. En cas de besoin il faut incorporer un dispositif de protection pour prévenir le dépassement de ces dissipations

Die maximal zugelassenen Verlustleistungen sollen beim Maximalwert, der für den mittleren Strahlstrom der Bildröhre gewählt worden ist, nicht überschritten werden. Notfalls muss zur Vermeidung von Überschreitung dieser Verlustleistungen eine Schutzvorrichtung verwendet werden



PHILIPS

PL 36

PHILIPS

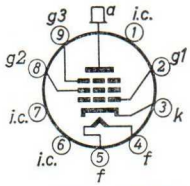
PL 81

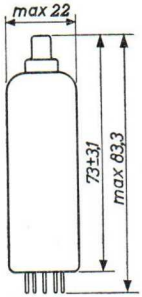
PENTODE for use as line time base output tube
PENTHODE pour utilisation comme tube de sortie de base de temps lignes
PENTODE zur Verwendung als Zeilenzeitbasisendröhre

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

I_f = 300 mA
V_f = 21,5 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances
Capacités
Kapazitäten

C_{g1}	=	14,7 pF
C_a	=	6,4 pF
C_{ag1}	<	0,8 pF
C_{ak}	<	0,1 pF
C_{g1f}	<	0,2 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	170	200 V
V_{g3}	=	0	0 V
V_{g2}	=	170	200 V
V_{g1}	=	-22	-28 V
I_a	=	45	40 mA
I_{g2}	=	3,0	2,8 mA
S	=	6,2	6,0 mA/V
R_i	=	10	11 kΩ
μ_{g2g1}	=	5,3	5,3

Remarks

On pages G to M curves are given for nominal new tubes. On designing a line output circuit it has to be taken into account that due to tube spread and deterioration during life the current may be reduced by 30 %

Observation

Sur les pages G jusqu'à M des courbes de tubes moyens neufs sont données. Quand on étudie un circuit de sortie de déviation horizontale, il faut tenir compte du fait que par suite des tolérances du tube et de la dégradation en service, les courants donnés peuvent se diminuer de 30 %

Bemerkung

Auf Seite G bis M sind Kurven von durchschnittlichen neuen Röhren gegeben. Wenn man eine Ausgangsschaltung für die horizontale Ablenkung entwirft, muss man damit Rechnung tragen dass, infolge Röhrentoleranzen und Verschlechterung der Röhre während der Lebensdauer, die angegebenen Stromwerte sich um 30 % verringern können

Operating characteristics of two tubes as class B push-pull amplifier
Caractéristiques d'utilisation de deux tubes en amplificatrice push-pull classe B
Betriebsdaten für zwei Röhren in Klasse B Gegentaktschaltung

V_a	=	170		200		V
V_{g3}	=	0		0		V
V_{bg2}	=	170		200		V
R_{g2} [1]	=	1		1		kΩ
V_{g1}	=	-27		-31,5		V
$R_{aa\sim}$	=	2,5		2,5		kΩ
V_i	=	0	19	0	22,5	V_{eff}
I_a	=	2x20	2x73	2x25	2x87	mA
I_{g2}	=	2x1,5	2x10	2x2,0	2x12,5	mA
W_o	=	0	13,5	0	20	W
d_{tot}	=	-	5,2	-	5,2	%

Limiting values
Caractéristiques limites
Grenzdaten

V_{ao}	= max. 550 V	V_{g2o}	= max. 550 V
V_{ap}	= max. +7 kV [2]	V_{g2}	= max. 250 V
$-V_{ap}$	= max. 7 kV [2]	I_k	= max. 180 mA
V_a	= max. 250 V	$V_{g1}(I_{g1}=+0,3\mu A)$	= max. -1,3 V
W_a	See pages N and O	R_{g1}	= max. 0,5 MΩ
→ W_{g2} [3]	Voir pages N et O	R_{kf}	= max. 20 kΩ
W_a+W_{g2}	Siehe Seiten N und O	V_{kf}	= max. 200 V

---

[1]) Common screen grid resistor
Résistance de grille écran commune
Gemeinsamer Schirmgitterwiderstand

→ [2]) Maximum pulse duration 22 % of a cycle, with a maximum of 18 µsec
Durée de l'impulsion max. 22 % d'un cycle, avec un maximum de 18 µsec
Impulszeit max. 22 % einer Periode, mit einem Maximum von 18 µsec

[3]) During the heating-up of the cathode
Pendant l'échauffement de la cathode
Während der Anheizzeit der Kathode
} W_{g2} = max. 6 W ←

Operating characteristics of two tubes as class B push-pull amplifier
Caractéristiques d'utilisation de deux tubes en amplificatrice push-pull classe B
Betriebsdaten für zwei Röhren in Klasse B Gegentaktschaltung

V_a	=	170	200	V
V_{g_1}	=	0	0	V
V_{bg_2}	=	170	200	V
R_{g_2} [1]	=	1	1	kΩ
V_{g_1}	=	-27	-31,5	V
R_{aa}	=	2,5	2,5	kΩ
V_i	=	0 19	0 22,5	Veff
I_a	=	2x20 2x25	2x25 2x37	mA
I_{g_2}	=	2x1,5 2x10	2x2,0 2x12,5	mA
W_o	=	0 13,5	0 20	W
d_{tot}	=	- 5,2	- 5,2	%

Limiting values
Caractéristiques limites
Grenzdaten

V_{ao}	= max. 550 V	V_{go}	= max. 550 V
V_{gp}	= max. +7 kV[3])	V_{go}	= max. 250 V
$-V_{gp}$	= max. 7 kV[3])	I_K	= max. 180 mA
V_a	= max. 250 V	$V_{g_1}(I_{g_1}=+0{,}3\mu A)$	= max. -1,3 V
W_a	See page N and O	R_{g_1}	= max. 0,5 MΩ
W_{g_2} [2]	Voir pages N et O	R_{K_1}	= max. 20 kΩ
$W_a+W_{g_2}$	Siehe Seiten N und O	V_{K_1}	= max. 200 V

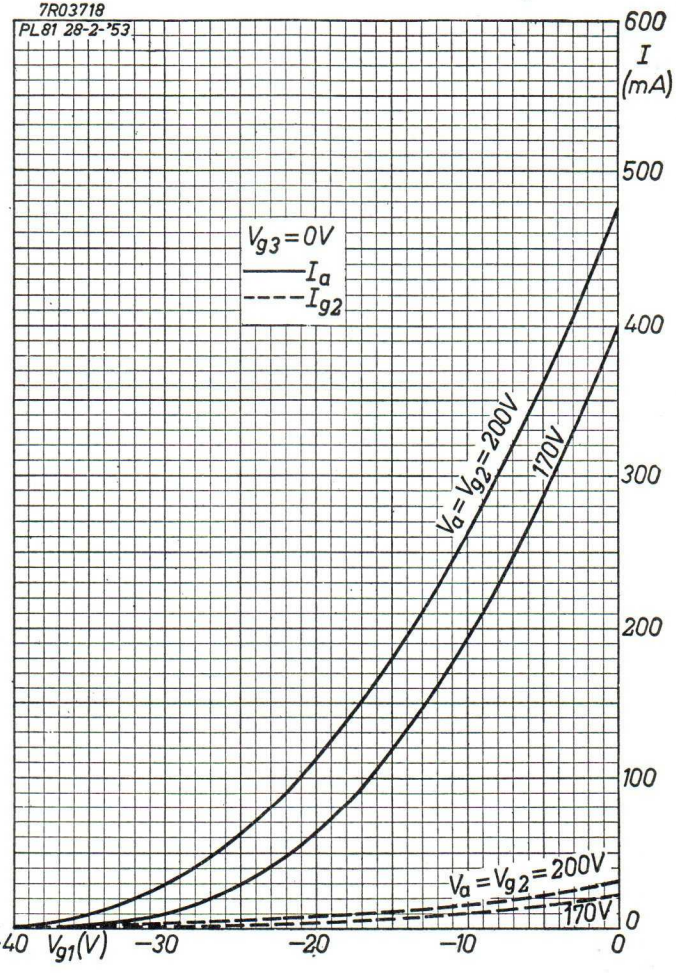
[1]) Common screen grid resistor
Résistance de grille écran commune
Gemeinsamer Schirmgitterwiderstand

[2]) Maximum pulse duration 22 % of a cycle, with a maximum of 18 μsec
Durée de l'impulsion max. 22 % d'un cycle, avec un maximum de 18 μsec
Impulszeit max. 22 % einer Periode, mit einem Maximum von 18 μsec

[3]) During the heating-up of the cathode
Pendant l'échauffement de la cathode
Während der Anheizzeit der Kathode } W_{g_2} = max. 6 W

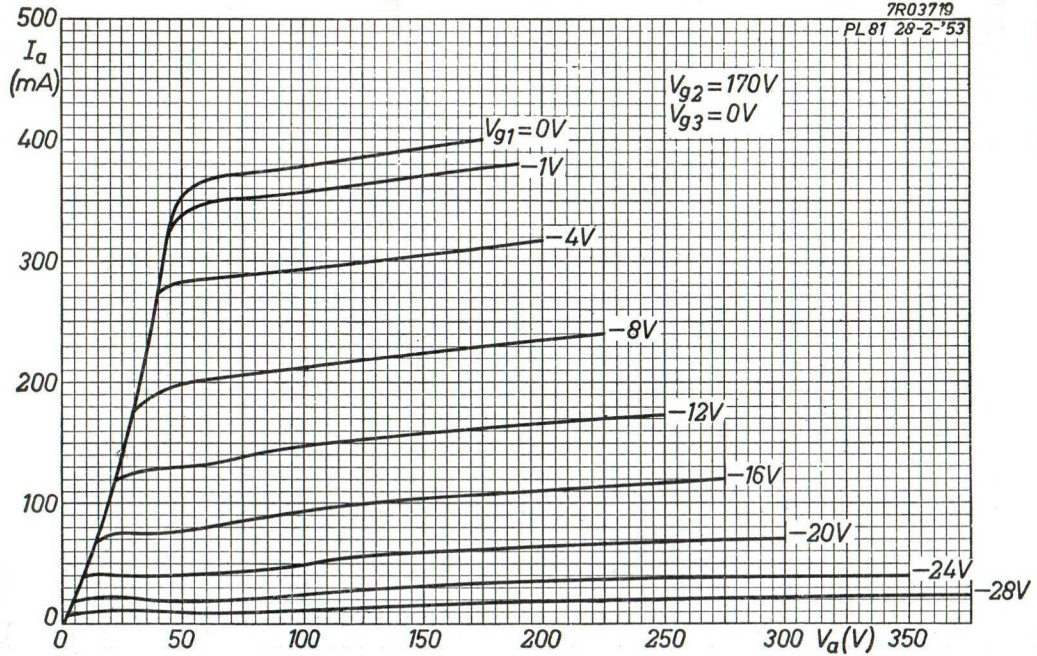
PHILIPS

PL 81



3.3.1953

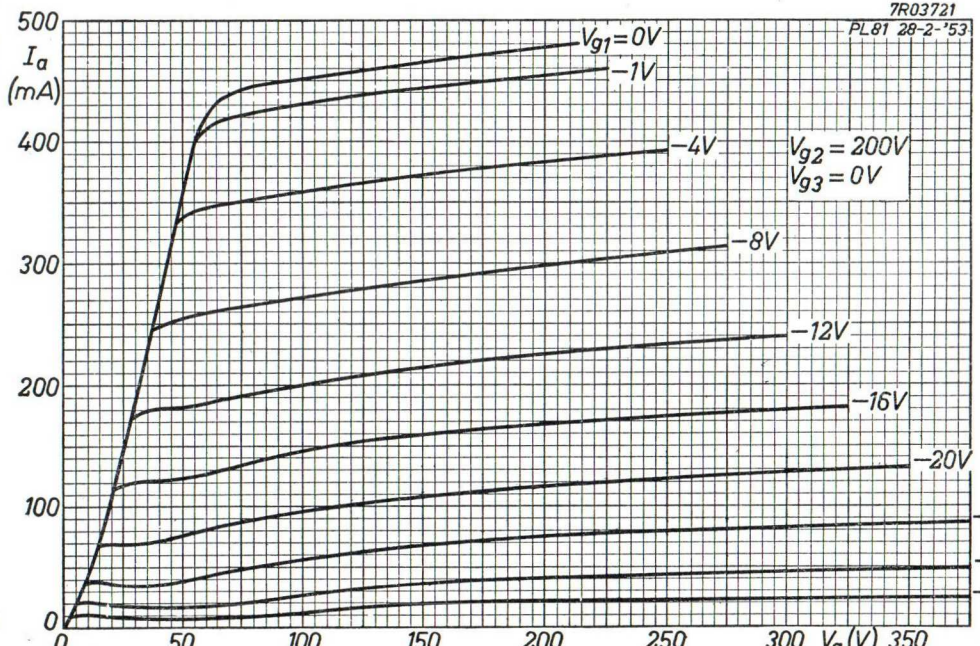
A



B

PL 81

PHILIPS

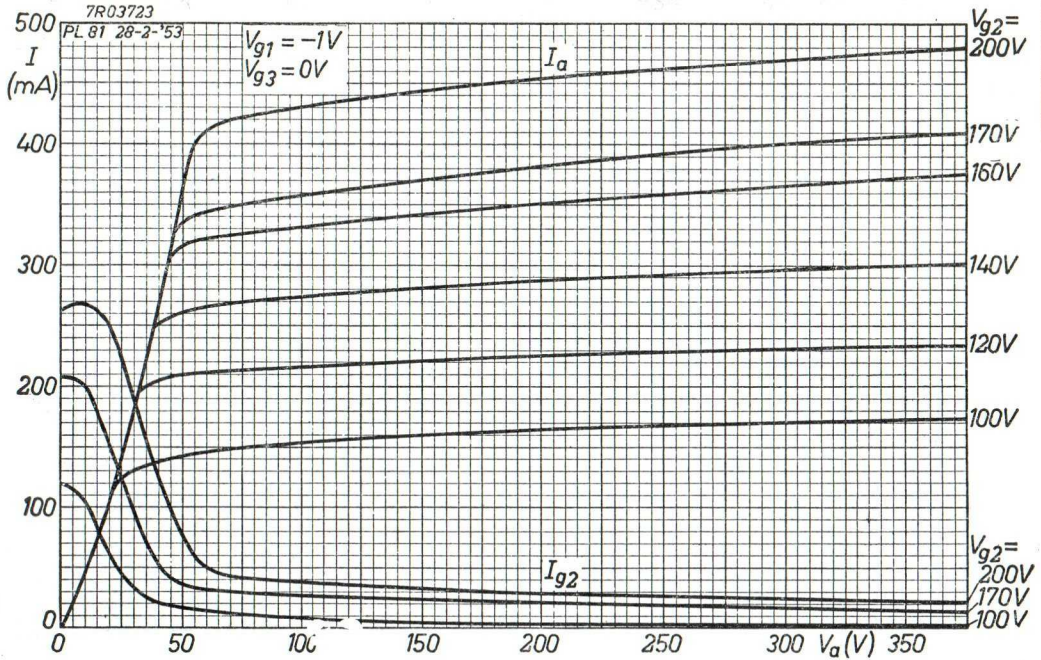


3.3.1957

C

PHILIPS

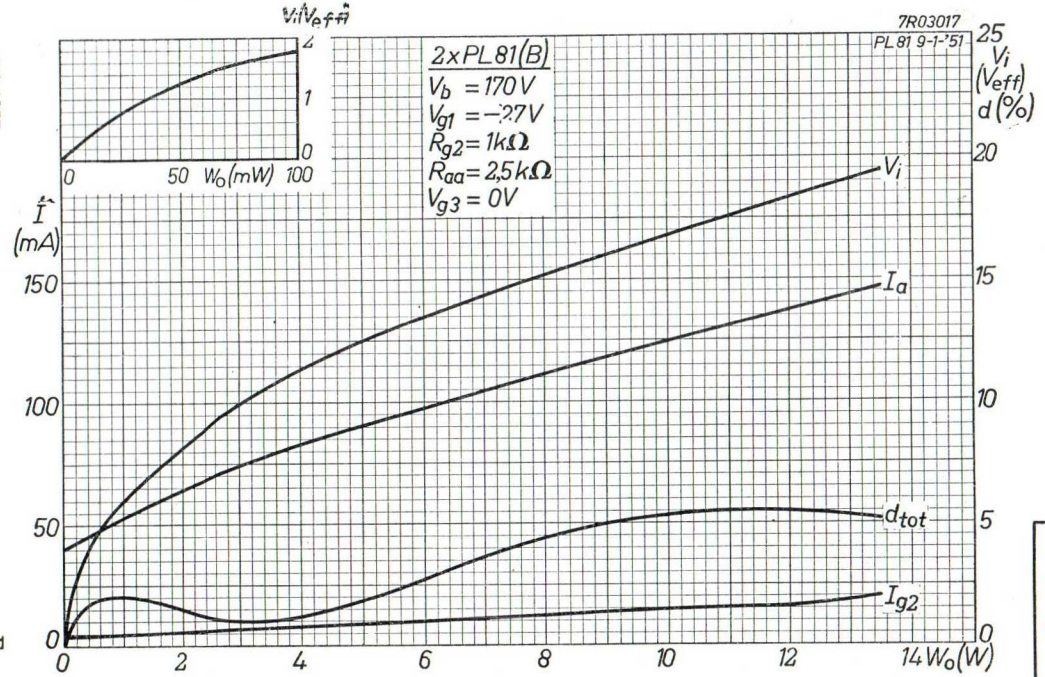
PL 81



PL 81

PHILIPS

D

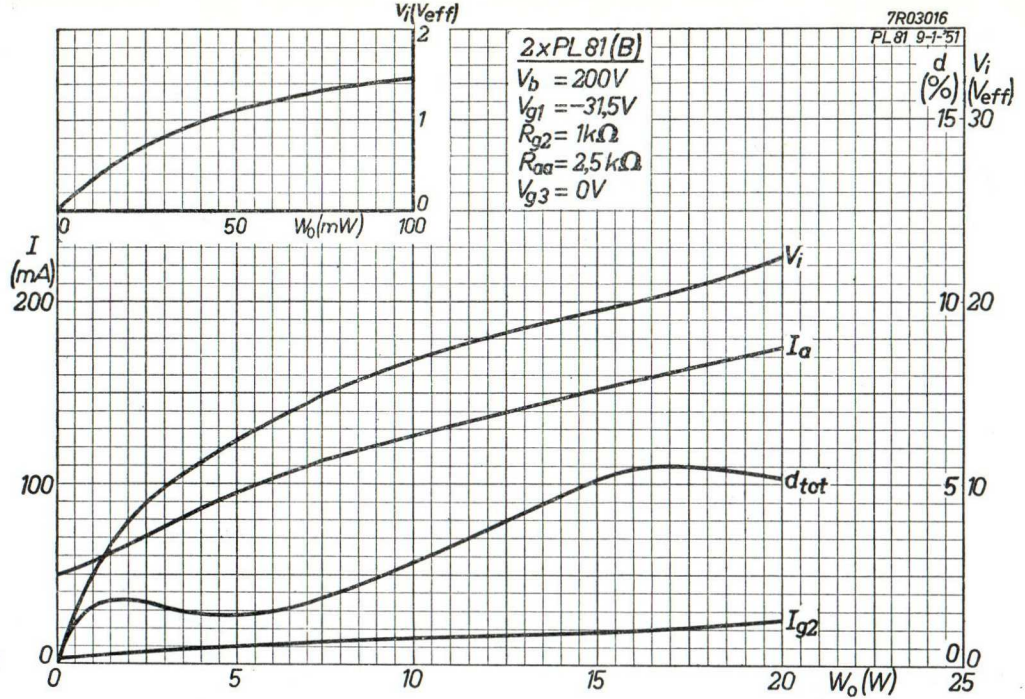


3.3.1957

E

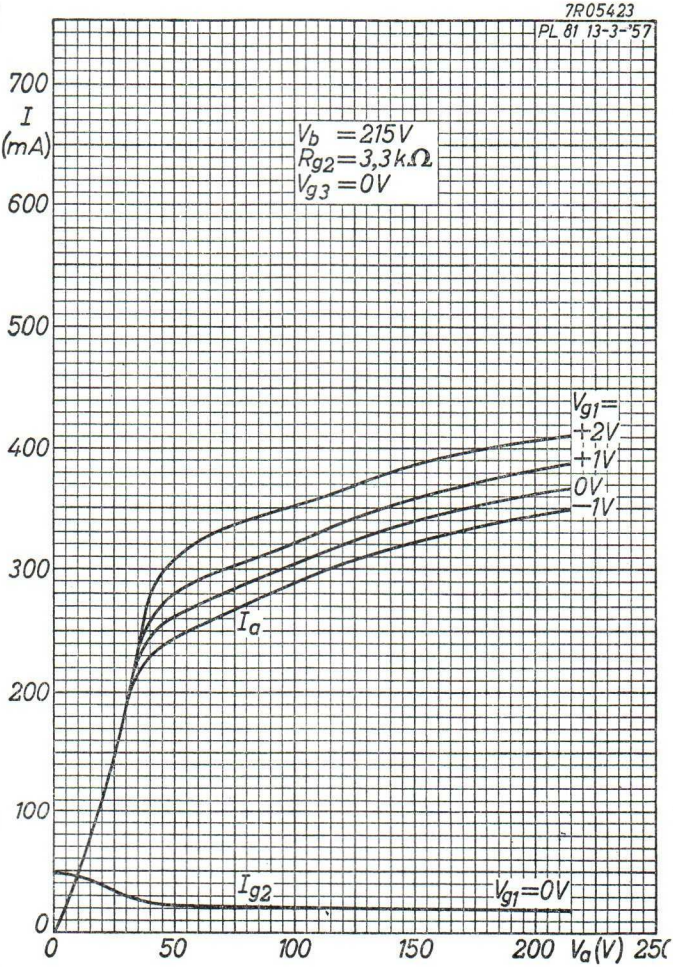
PHILIPS

PL 81



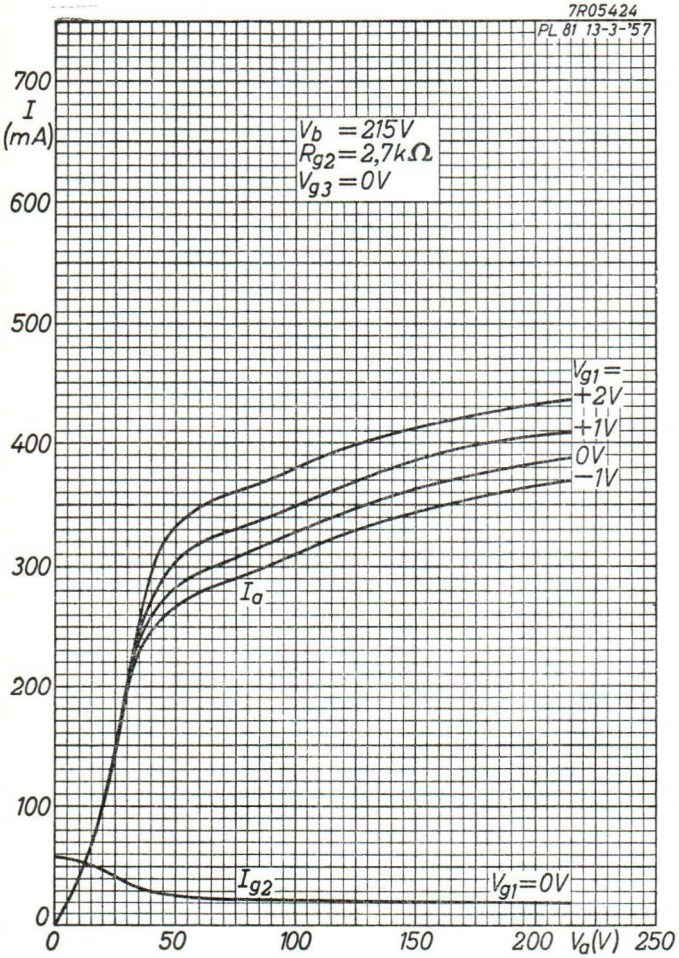
PL 81

PHILIPS


7R05423
PL 81 13-3-'57
700
I
(mA)
600
500
400
300
200
100
0
V_b = 215V
R_{g2} = 3,3 kΩ
V_{g3} = 0V
V_{g1} =
+2V
+1V
0V
−1V
I_a
I_{g2}
V_{g1}=0V
0
50
100
150
200
V_a(V)
250

PL 81

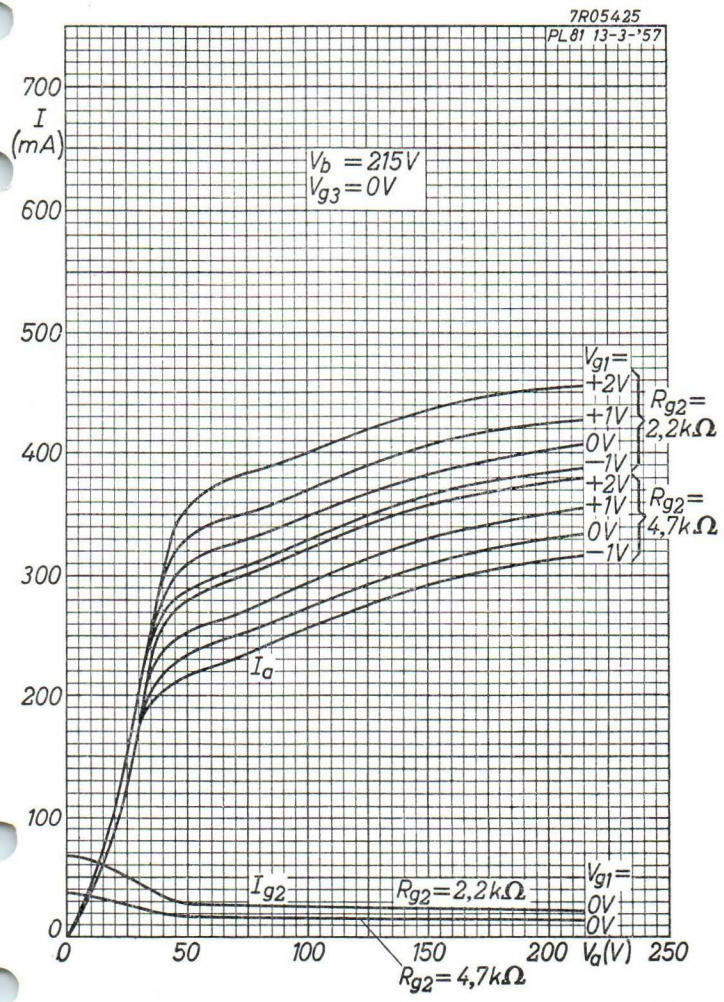
PHILIPS



H

PHILIPS

PL 81

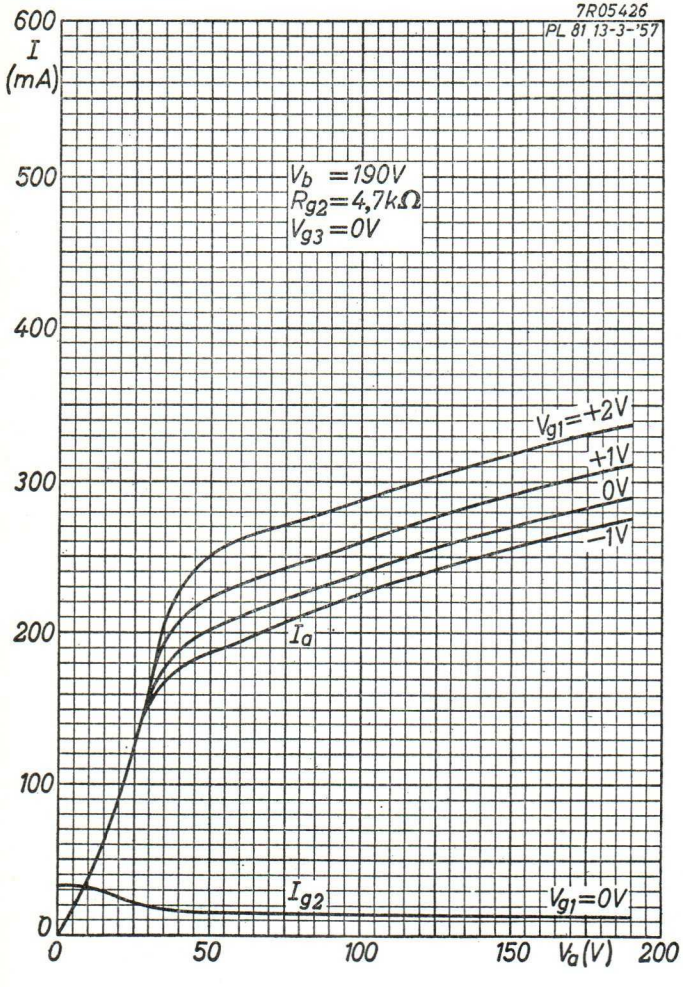


3.3.1957

I

PL 81

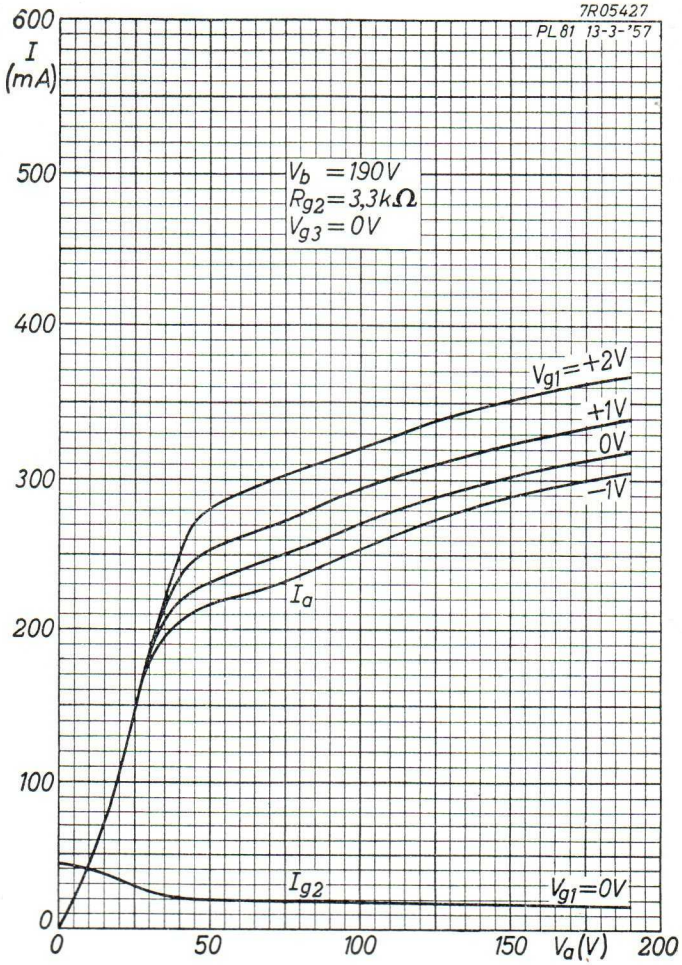
PHILIPS



J

PHILIPS

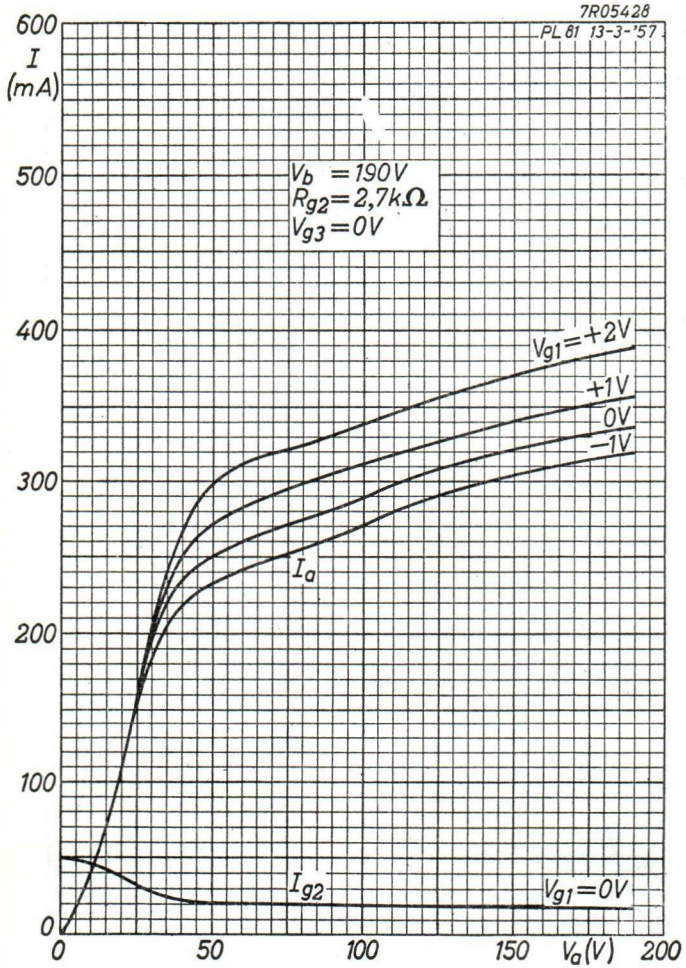
PL 81



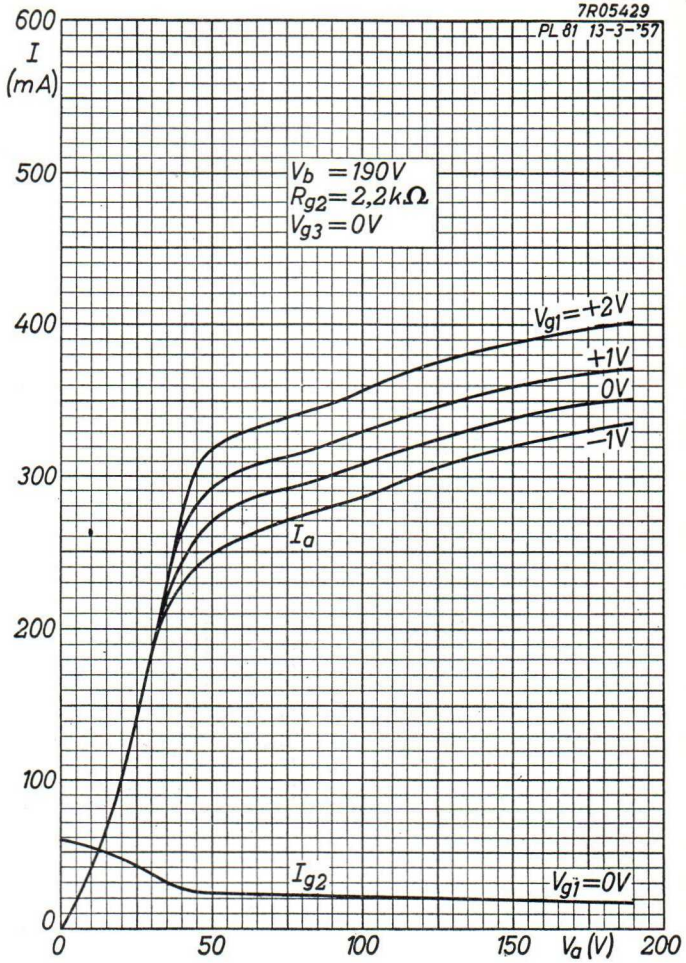
3.3.1957

K

PL 81 **PHILIPS**

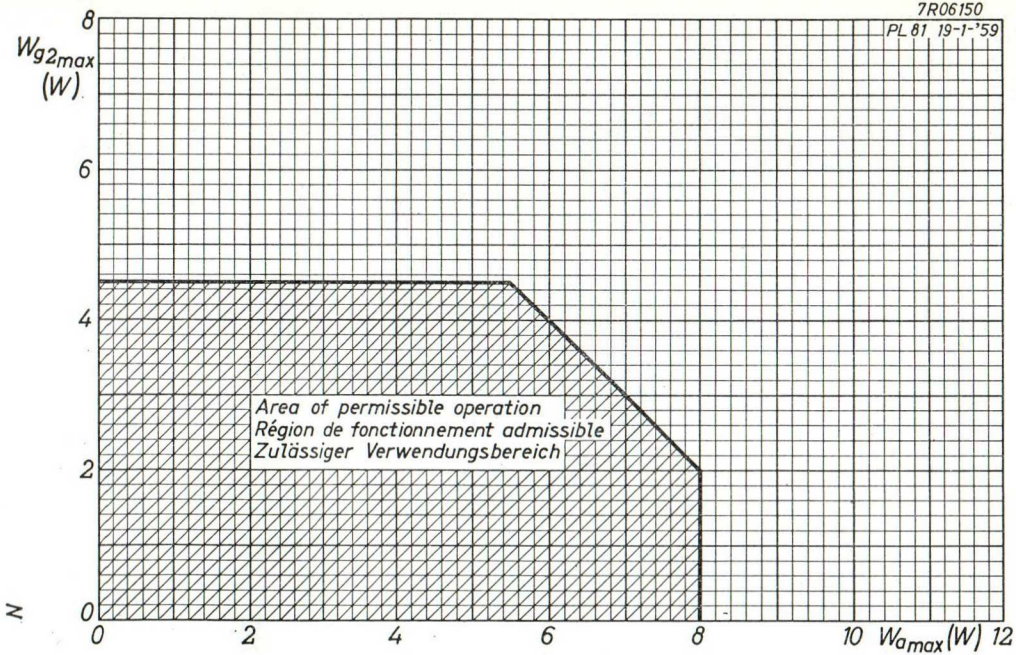


L


7R05429
PL 81 13-3-'57
600
I
(mA)
500
400
300
200
100
0
V_b = 190V
R_{g2} = 2,2kΩ
V_{g3} = 0V
V_{g1} = +2V
+1V
0V
−1V
I_a
I_{g2}
V_{g1} = 0V
0
50
100
150
V_a (V)
200

7R06150

PL 81 19-1-'59



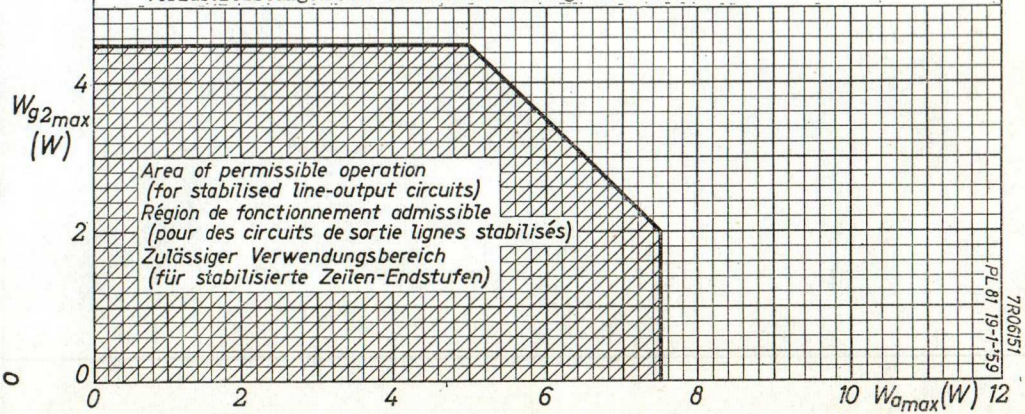
PL 81

PHILIPS

The max. permissible dissipations should not be exceeded with the chosen max. mean value of the beam current of the picture tube. If necessary a protecting device should be applied in order to avoid exceeding these dissipations

Les dissipations max. admissibles ne seront pas dépassées au maximum choisi pour la valeur moyenne du courant de faisceau du tube-image. En cas de besoin il faut incorporer un dispositif de protection pour prévenir le dépassement de ces dissipations.

Die maximal zugelassenen Verlustleistungen sollen beim Maximalwert, der für den mittleren Strahlstrom der Bildröhre gewählt worden ist, nicht überschritten werden. Notfalls muss zur Vermeidung von Überschreitung dieser Verlustleistungen eine Schutzvorrichtung verwendet werden



PHILIPS

PL 81

2.2.1959

0

4

8

12 MWmax (W)

Permissible load curve for pulse operation
(not applicable to continuous operation)

Zulässige Belastungskurve für Impulsbetrieb
(nicht für Dauerbetrieb)

Courbe de charge admissible en régime impulsionnel
(non valable pour fonctionnement continu)

PL 81 15-1-59

The max. permissible load values should not be exceeded with the chosen max. mean value of the beam current of the picture tube. It is necessary to avoid overload in order to avoid exceeding these load values.

Les charges maximales admissibles ne seront pas dépassées au maximum choisi pour la valeur moyenne du courant de faisceau de tube-image. En cas de besoin il faut limiter la puissance du projecteur pour prévenir les dépassements de ces charges.

Die maximal zugelassenen Verlustleistungen sollen beim Maximalwert, der für den mittleren Strahlstrom der Bildröhre gewählt wird, nicht überschritten werden. Mittels max. Strahlstrom von Übersteuerung dieser Belastungswerte zu vermeiden.

Verlustleistungen ohne Sonderkühlung vermindert werden.

PHILIPS

PL 82

PENTODE for use as frame and sound output tube
PENTODE pour utilisation en amplificatrice de sortie de base de temps image et du son
PENTODE zur Verwendung als Endröhre für die vertikale Ablenkung und für die Schallwiedergabe

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

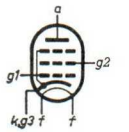
I_f = 300 mA
V_f = 16,5 V

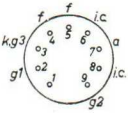
Base, culot, Sockel: NOVAL

Overall length: 78 mm
See pages 205 and 253

Hauteur totale: 78 mm
Voir pages 205 et 253

Gesamthöhe : 78 mm
Siehe S. 205 und 253





Capacitances Capacités Kapazitäten		
	C_{g1} =	11 pF
	C_a =	5,9 pF
	C_{ag1} <	1 pF
	C_{g1f} <	0,15 pF

Optimum peak anode current in frame output operation

To allow for tube spread and for deterioration during life in frame output application the circuit should be designed around a peak anode current not exceeding

90 mA at V_a = 50 V, V_{g2} = 170 V
120 mA at V_a = 60 V, V_{g2} = 200 V

Courant anodique de crête optimum en application comme tube final de base de temps image

A l'application comme tube final de base de temps image il faut tenir compte des tolérances du tube et de la détérioration pendant la durée en dessinant le circuit pour un courant anodique de crête ne dépassant pas

90 mA à V_a = 50 V, V_{g2} = 170 V
120 mA à V_a = 60 V, V_{g2} = 200 V

Höchstwert des Anodenspitzenstromes beim Gebrauch als Endröhre für die vertikale Ablenkung

Beim Gebrauch als Endröhre für die vertikale Ablenkung muss den Röhrentoleranzen und der Verschlechterung der Röhre während der Lebensdauer Rechnung getragen werden indem die Schaltung entworfen wird für einen Anodenspitzenstrom der einen Wert von

90 mA bei V_a = 50 V, V_{g2} = 170 V
120 mA bei V_a = 60 V, V_{g2} = 200 V

nicht überschreitet

Operating characteristics as class A sound output amplifier
Caractéristiques d'utilisation en amplificatrice finale de son classe A
Betriebsdaten als Klasse A Endverstärker für Schallwiedergabe

$V_a=V_b$	=	170	200	V
V_{g2}	=	170	-	V
R_{g2}	=	0	680	Ω
V_{g1}	=	-10,4	-13,9	V
I_a	=	53	45	mA
I_{g2}	=	10	8,5	mA
S	=	10,2	8,6	mA/V
R_i	=	20	24	kΩ
R_a	=	3	4	kΩ
μ_{g2g1}	=	10	10	
W_o (d = 10%)	=	4,0	4,2	W
V_i (d = 10%)	=	6	7	V_{eff}
V_i (W_o = 50 mW)	=	0,5	0,55	V_{eff}

Operating characteristics as class A push-pull sound output amplifier
Caractéristiques d'utilisation en amplificatrice push-pull de son en classe A
Betriebsdaten als Klasse A Gegentaktverstärker für Schallwiedergabe

V_a	=	170		200		V
V_{g2}	=	170		200		V
R_k	=	100		135		Ω
R_{aa}	=	4		4		kΩ
V_i	=	0	2x9,3	0	2x13,5	V_{eff}
I_a	=	2x46	2x50	2x45	2x52	mA
I_{g2}	=	2x8,7	2x17	2x8,5	2x19	mA
W_o	=	0	9	0	12	W
d_{tot}	=	-	5	-	5	%

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max. 550 V	W_{g2}		= max. 2,5 W	
V_{a_p}	= max. 2500 V[1])	I_k		= max. 75 mA	
$-V_{a_p}$	= max. 500 V	V_{g1}	(I_{g1}=+0,3µA)	= max. -1,3 V	
V_a	= max. 250 V[4])	R_{g1}		= max. 1 MΩ[2])	
W_a	= max. 9 W	R_{g1}		= max. 0,4 MΩ[3])	
V_{g2_o}	= max. 550 V	R_{kf}		= max. 20 kΩ	
V_{g2}	= max. 250 V	V_{kf}		= max. 200 V	

1) Max. pulse duration 10% of a cycle, with a maximum of 2 m sec.
Durée de l'impulsion max. 10% d'un cycle, avec un maximum de 2 m sec.
Impulszeit max. 10% einer Periode, mit einem Maximum von 2 Sek.

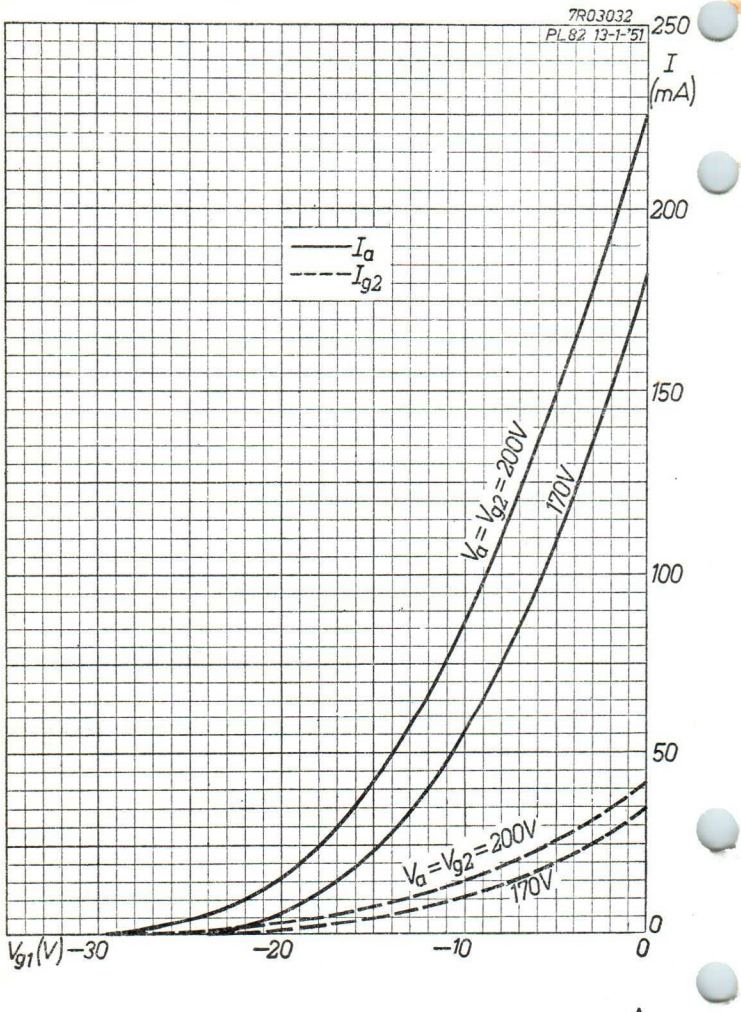
2) With automatic grid bias
Avec polarisation négative automatique
Mit automatischer negativer Gittervorspannung

3) With fixed grid bias
Avec polarisation négative fixe
Mit fester negativer Gittervorspannung

4) When used as frame output tube with $W_a \leq 4.5$ W, V_a = max. 450 V.
En utilisation comme tube de sortie de base de temps image avec $W_a \leq 4,5$ W, V_a = 450 V au max.
Beim Gebrauch als Endröhre für die vertikale Ablenkung mit $W_a \leq 4,5$ W, ist V_a = max. 450 V.

PL 82

PHILIPS



A

PHILIPS

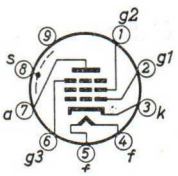
PL83

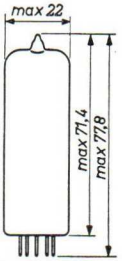
PENTODE for use as video output tube
PENTHODE pour utilisation comme tube de sortie vidéo
PENTODE zur Verwendung als Video-Endröhre

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

$\frac{I_f = 300 \text{ mA}}{V_f = 15 \text{ V}}$

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances
Capacités
Kapazitäten

C_{g1}		10,8 pF
C_a	=	6,6 pF
C_{ag1}	<	0,1 pF
C_{g1f}	<	0,15 pF
C_{g1g2}	=	3,2 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	170	200 V
V_{g3}	=	0	0 V
V_{g2}	=	170	200 V
V_{g1}	=	-2,3	-3,5 V
I_a	=	36	36 mA
I_{g2}	=	5,0	5,0 mA
S	=	10,5	10,5 mA/V
μ_{g2g1}	=	24	24
R_i	=	0,1	0,1 MΩ

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	9	W
V_{g2_o}	= max.	550	V
V_{g2}	= max.	250	V
W_{g2}	= max.	2	W
I_k	= max.	70	mA
V_{g1} ($I_{g1} \triangleq +0{,}3$ µA)	= max.	-1,3	V
R_{g1}	= max.	1	MΩ [1])
R_{g1}	= max.	0,5	MΩ [2])
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	200	V [3])

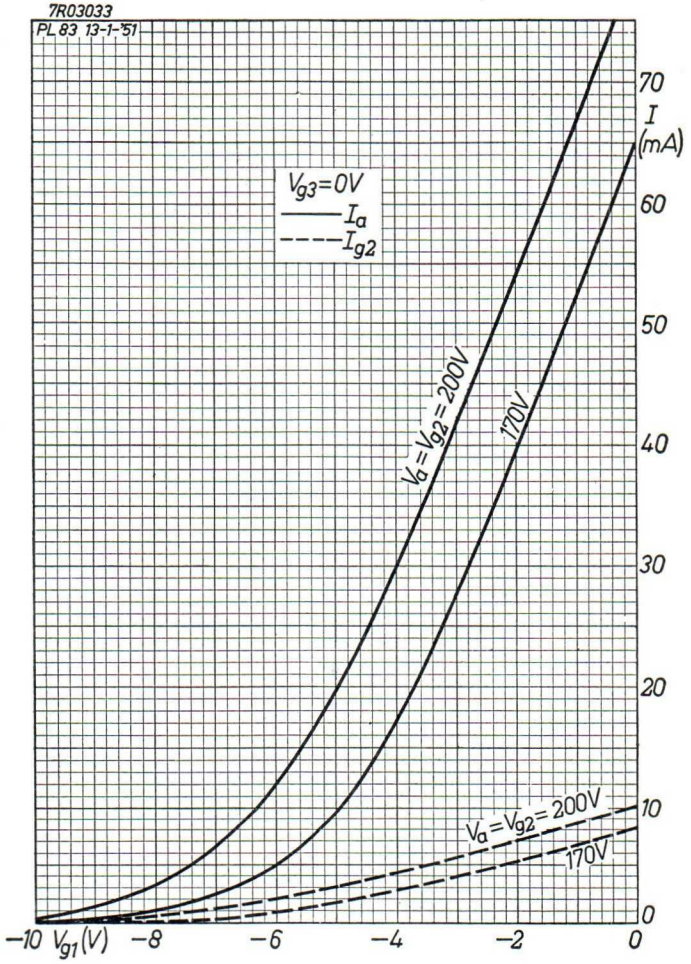
[1]) With automatic bias
Avec polarisation automatique
Mit automatischer Gittervorspannung

[2]) With fixed bias
Avec polarisation fixe
Mit fester Gittervorspannung

[3]) D.C. component max. 150 V
Composante continue 150 V au max.
Gleichspannungsanteil max. 150 V

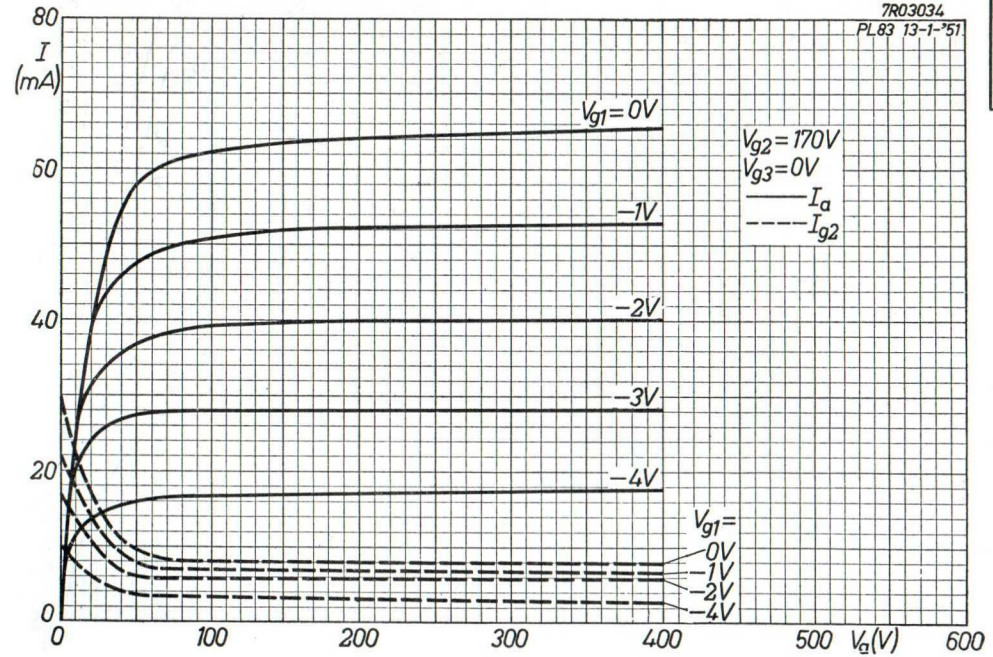
PHILIPS

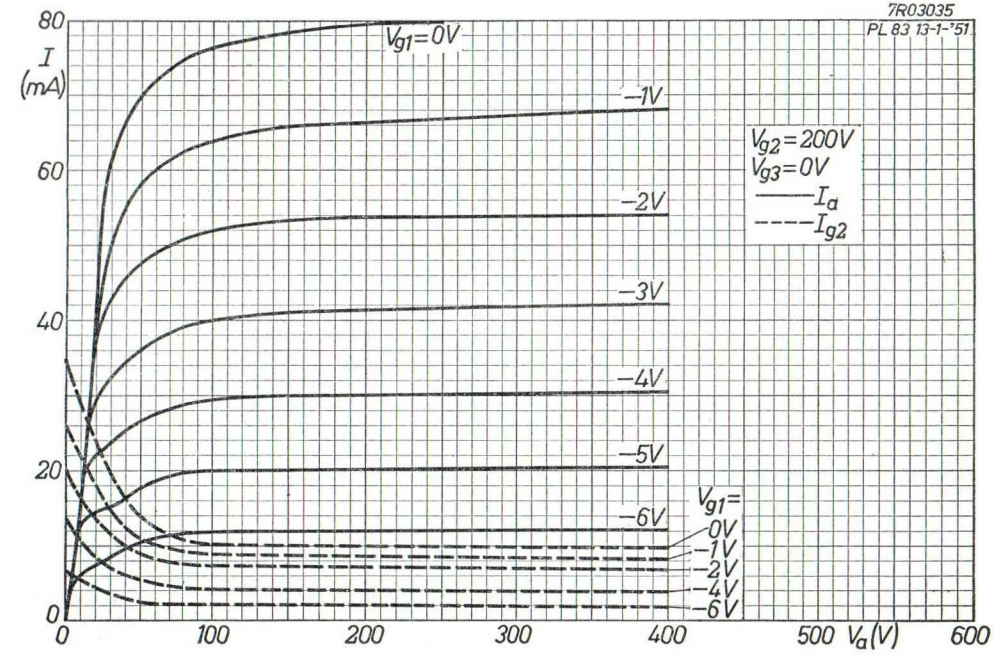
PL83



2.2.1951

A


7R03034
PL83 13-1-'51
80
I
(mA)
60
40
20
0
0
100
200
300
400
500
600
V_a(V)
V_{g1}=0V
−1V
−2V
−3V
−4V
V_{g2}=170V
V_{g3}=0V
I_a
I_{g2}
V_{g1}=
0V
−1V
−2V
−4V

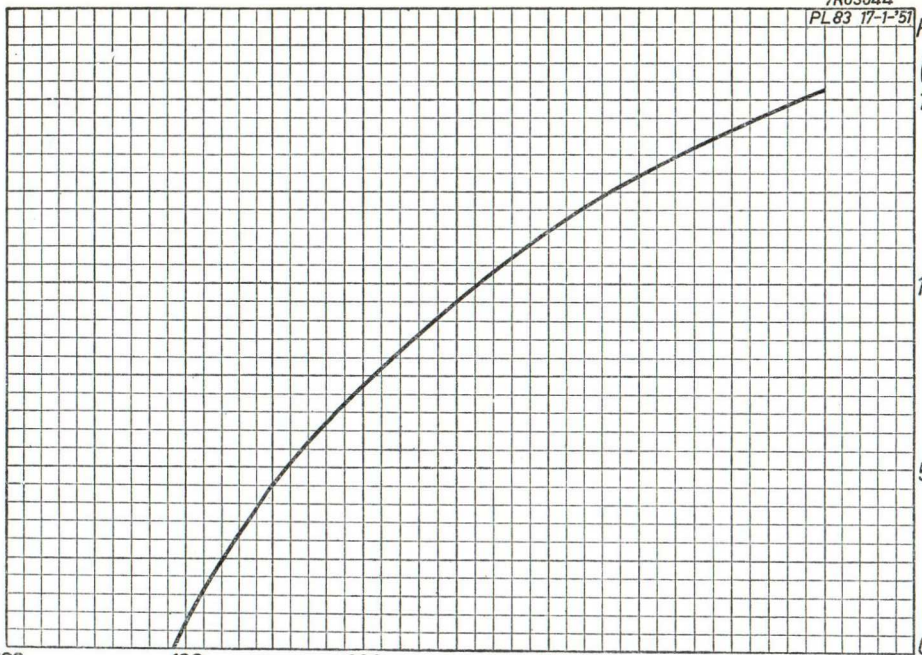


PHILIPS

PL 83

C

7R03044
PL83 17-1-'51



PL83

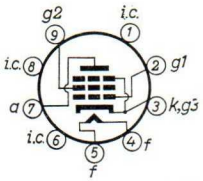
PHILIPS

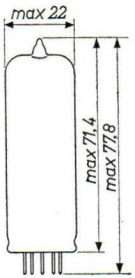
A.F. OUTPUT PENTODE or FRAME OUTPUT PENTODE
PENTHODE DE SORTIE B.F. ou PENTODE DE SORTIE POUR LE BALAYAGE IMAGE
NF-ENDPENTODE **oder** ENDPENTODE FÜR DIE VERTIKALE ABLENKUNG

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

I_f = 300 mA
V_f = 15 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 kΩ

PHILIPS

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

V_b	=		170			200		V
R_{g2}	=		0			470		Ω[1]
R_k	=		130			215		Ω[2]
$R_{a\sim}$	=		2			2,5		kΩ
V_i	=	0	0,47	6,1	0	0,52	7,0	V_{eff}
I_a	=	75	-	76	65	-	64	mA
I_{g2}	=	4,0	-	16,5	3,2	-	11,4	mA
W_o	=	0	0,05	5,1	0	0,05	5,3	W
d_{tot}	=	-	-	10	-	-	10	%

V_{ba}	=		230		V
V_{bg2}	=		200		V
R_{g2}	=		220		Ω[1]
R_k	=		270		Ω[2]
$R_{a\sim}$	=		3,25		kΩ
V_i	=	0	0,42	5,7	V_{eff}
I_a	=	56	-	54	mA
I_{g2}	=	2,2	-	9,7	mA
W_o	=	0	0,05	5,4	W
d_{tot}	=	-	-	10	%

---

1) Not bypassed
Non découplée
Nicht entkoppelt

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

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

V_{ba}	=		200			230		V
V_{bg2}	=		200			200		V
R_k	=		120			130		Ω[1])
$R_{aa\sim}$	=		3			4		kΩ
V_i	=	0	0,47	14,3	0	0,4	14,6	V_{eff}
I_a	=	2x60	-	2x64,5	2x56	-	2x61	mA
I_{g2}	=	2x3,0	-	2x18,5	2x2,3	-	2x17,5	mA
W_o	=	0	0,05	14,3	0	0,05	17,5	W
d_{tot}	=	-	-	3,8	-	-	5,4	%

Optimum peak anode current in frame output application
Courant anodique de crête optimum pour l'application comme tube de sortie pour le balayage image
Höchstwert des Anodenspitzenstromes bei Verwendung als Endröhre für die vertikale Ablenkung

The circuit should be designed so that I_{ap} does not exceed the following values:
Le circuit doit être conçu de telle manière que I_{ap} ne dépasse pas les valeurs suivantes:
Die Schaltung soll so entworfen werden, dass I_{ap} die folgenden Werte nicht überschreitet:

145 mA, 190 mA, 220 mA } at / à / bei { V_a = 60 V, V_{g2} = 170 V, I_f = 300 mA
{ V_a = 70 V, V_{g2} = 200 V, I_f = 300 mA
{ V_a = 80 V, V_{g2} = 220 V, I_f = 300 mA

The minimum available value of I_{ap} at end of life and I_f = 285 mA is:

La valeur minimum disponible de I_{ap} à la fin de la durée et à I_f = 285 mA est de:

Der minimal verfügbare Wert von I_{ap} am Ende der Lebensdauer und bei I_f = 285 mA ist:

125 mA, 160 mA, 185 mA } at / à / bei { V_a = 60 V, V_{g2} = 170 V
{ V_a = 70 V, V_{g2} = 200 V
{ V_a = 80 V, V_{g2} = 220 V

---

[1]) Common cathode resistor
Résistance cathodique commune
Gemeinsamer Katodenwiderstand

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max.	550 V	
V_a	= max.	250 V	
V_{a_p}	= max.	2 kV	[1]
W_a	= max.	12 W	[2]
V_{g2_o}	= max.	550 V	
V_{g2}	= max.	250 V	
W_{g2}	= max.	1,75 W	
W_{g2_p}	= max.	6 W	
I_K	= max.	100 mA	
R_{g1}	= max.	1 MΩ	[3]
R_{g1}	= max.	2 MΩ	[4]
V_{kf}	= max.	200 V	
R_{kf}	= max.	20 kΩ	

[1]) Max. pulse duration 4% of a cycle with a maximum of 0.8 msec

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

Max. Impulsdauer 4% einer Periode, mit einem Maximum von 0,8 mSek

[2]) For frame output applications W_a = max. 10 W

Pour application comme tube de sortie du balayage image W_a = 10 W au max.

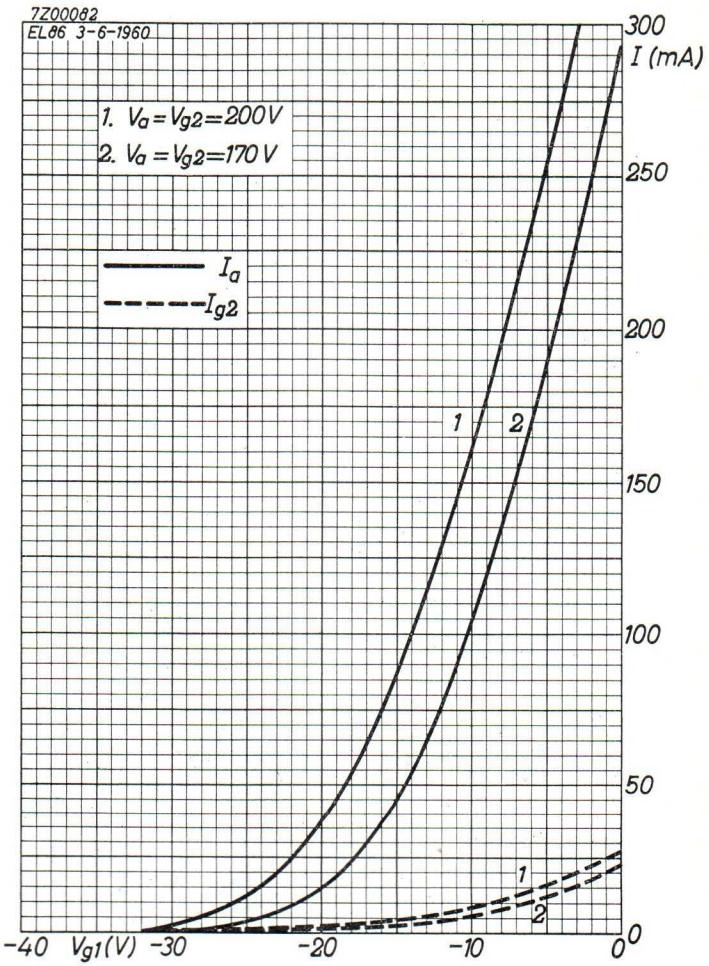
Bei verwendung als Endröhre für die vertikale Ablenkung ist W_a = max. 10 W

[3]) Automatic bias
Polarisation automatique
Automatische Gittervorspannung

[4]) In frame output application only, combined with automatic bias

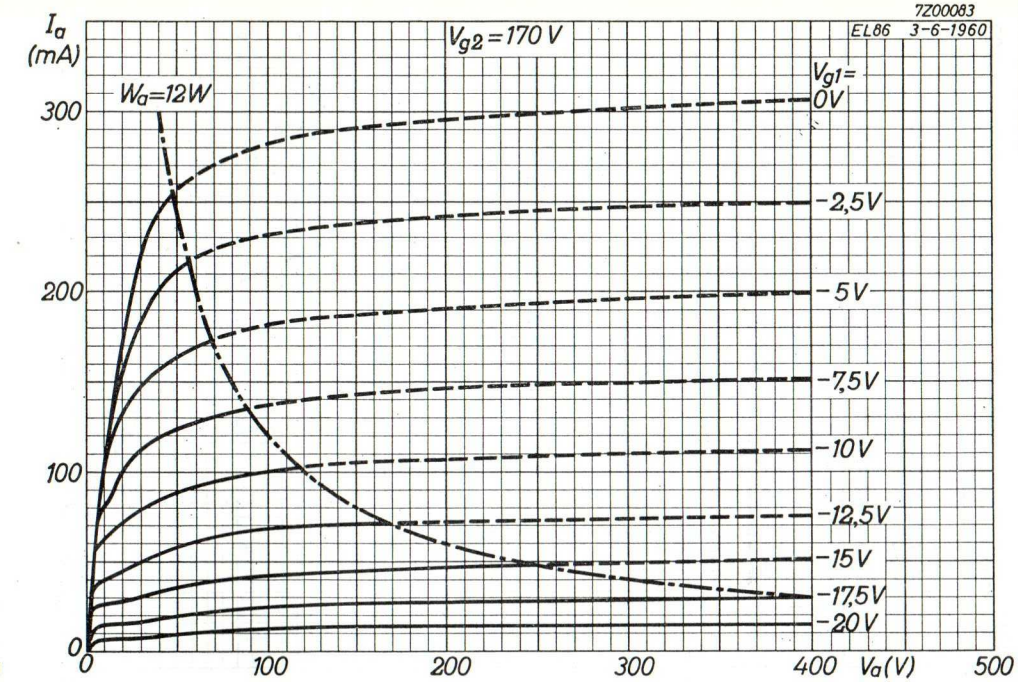
Seulement pour l'application comme tube de sortie pour le balayage image, en combinaison avec polarisation automatique

Nur für die Verwendung als Endröhre für die vertikale Ablenkung, zusammen mit automatischer Gittervorspannung


7Z00082
EL86 3-6-1960
1. $V_a = V_{g2} = 200\,V$
2. $V_a = V_{g2} = 170\,V$
I_a
I_{g2}
1
2
1
2
300
I (mA)
250
200
150
100
50
0
-40
V_{g1}(V)
-30
-20
-10
0

6.6.1960

A



PL 84

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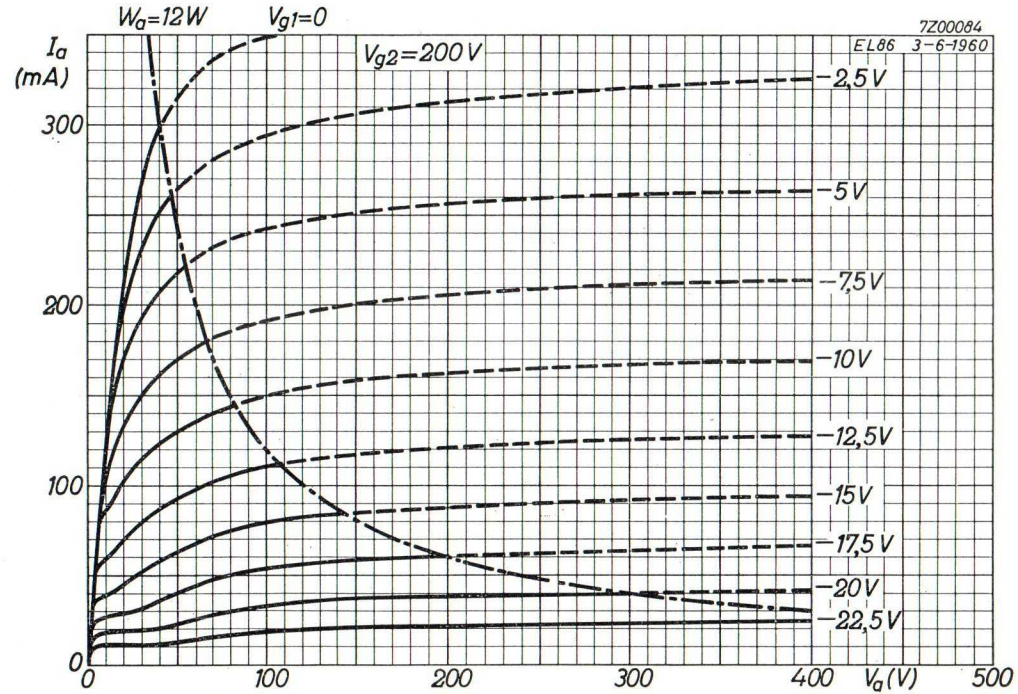
B



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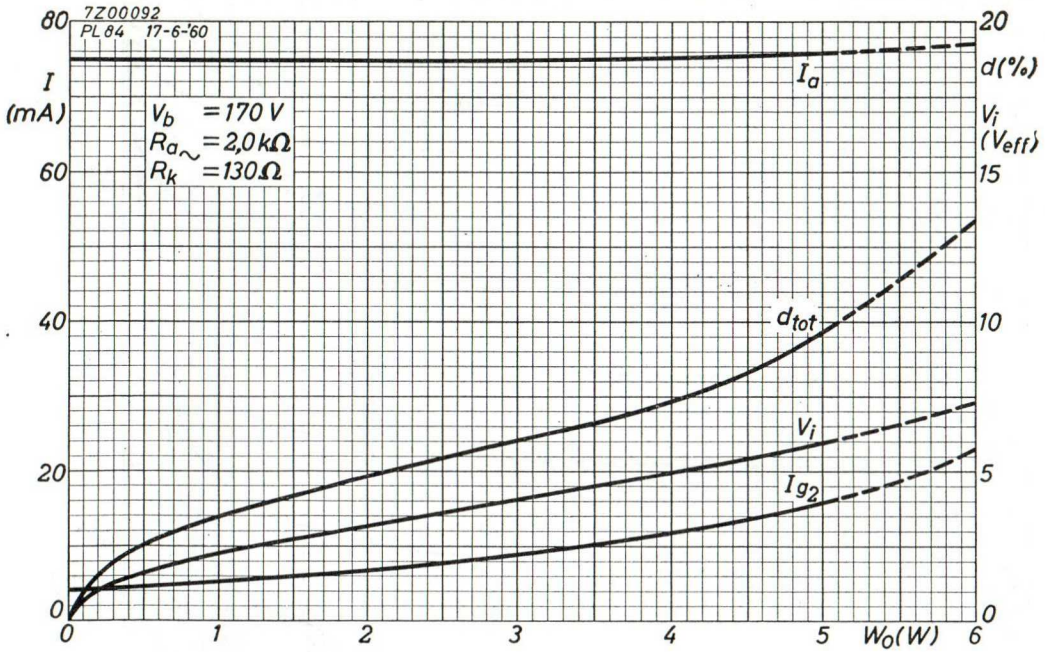
PL 84



PL 84

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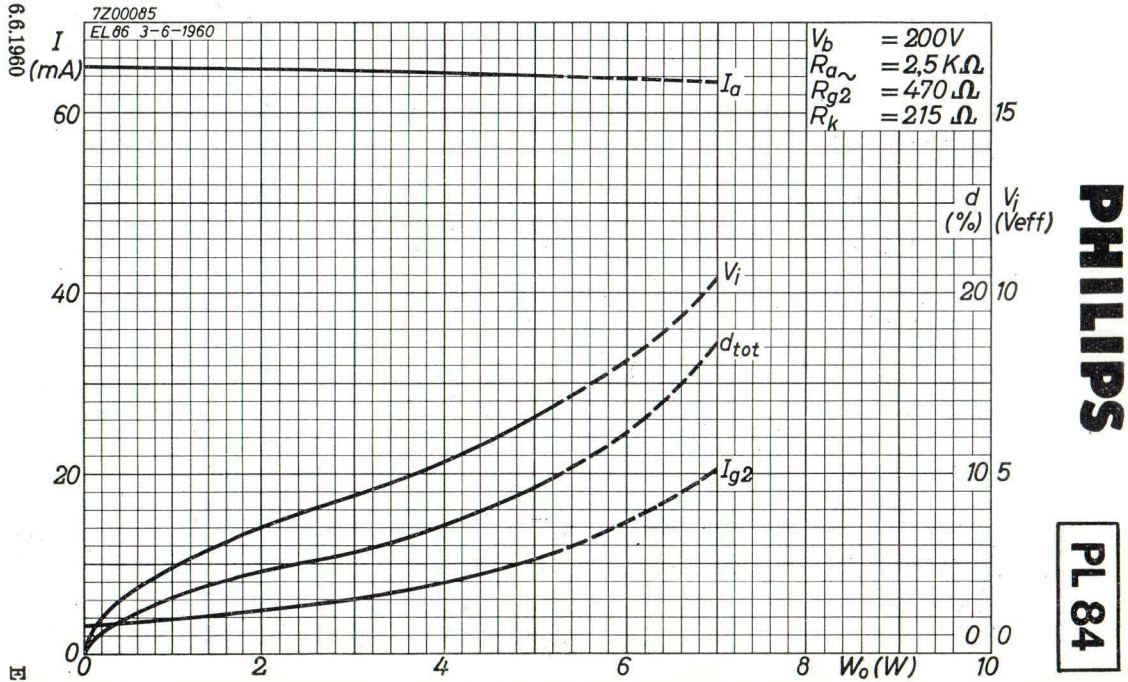
D



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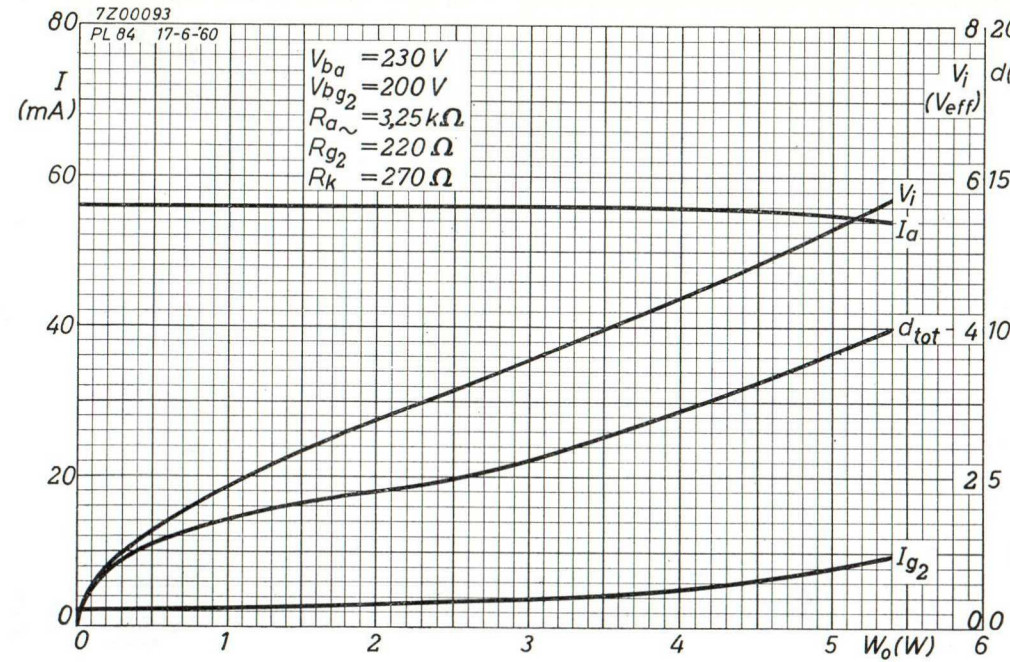
PL 84



PL 84

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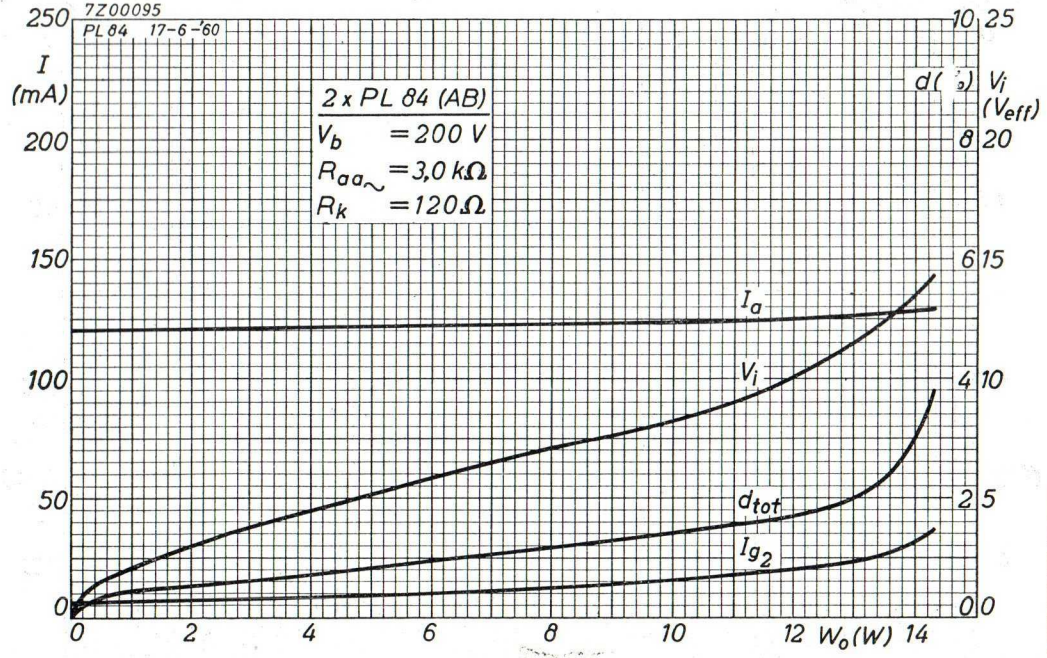
F



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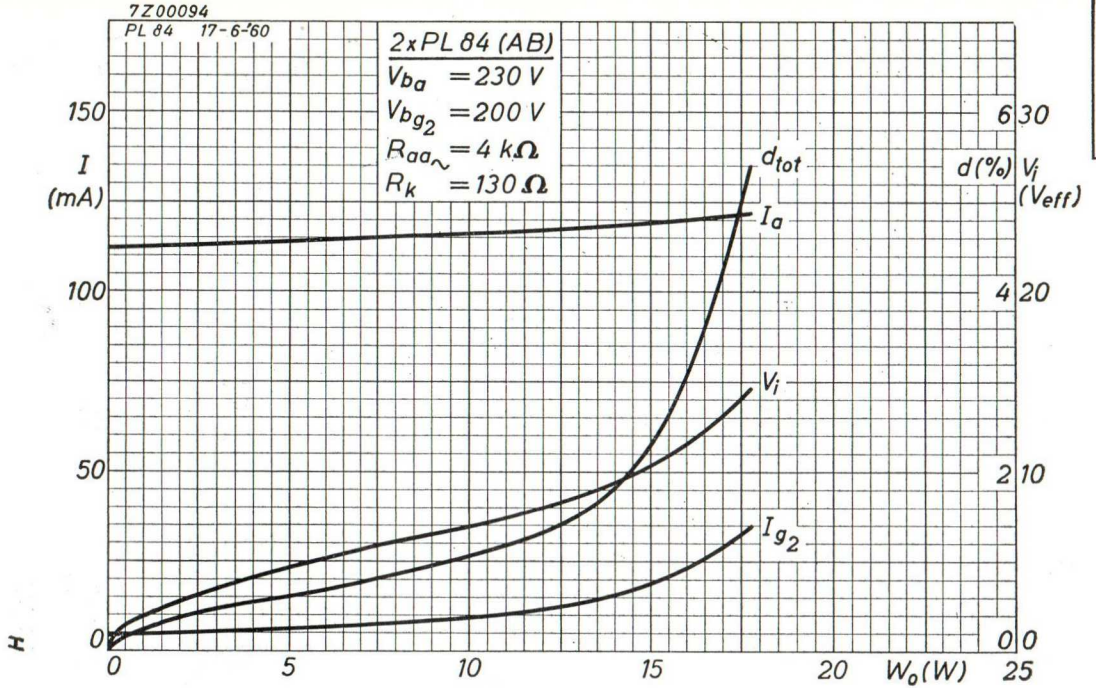
PL 84



PL 84

PHILIPS

PHILIPS PL 500

All-glass BEAM POWER TUBE for use in horizontal deflection output stages of television receivers. The tube features a large anode to screen-grid current ratio and has a magnoval base.

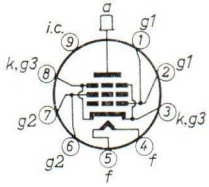
TUBE À FAISCEAUX DE PUISSANCE de construction tout verre pour utilisation dans les étages de sortie de la déviation horizontale des récepteurs de télévision. Le tube a un rapport élevé de courant anodique-courant grille-écran et est muni d'un culot magnoval.

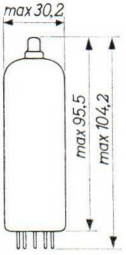
BÜNDELRÖHRE in Allglastechnik zur Verwendung in der Ausgangsstufe für die Horizontal-Ablenkung in Fernsehempfängern. Die Röhre hat ein hohes Verhältnis zwischen Anoden- und Schirmgitterstrom und ist mit einem Magnoval-Sockel ausgestattet.

Heating : indirect
series supply
Chauffage: indirect
alimentation série
Heizung : indirekt
Serienspeisung

I_f = 300 mA
V_f = 27 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: MAGNOVAL

If use is made of a metal retaining ring or screen around the tube base it should be earthed and should make galvanic contact with the silver ring on the bulb. The distance between the upper side of the retaining ring or screen and the bottom of the base should not exceed 18 mm.

Si on fait usage d'un anneau métallique autour du culot pour le blindage ou pour maintenir le tube en place, cet anneau doit être mis à la terre et doit faire contact galvanique avec l'anneau d'argent à l'ampoule. La distance entre le bord supérieur de l'anneau métallique et le fond du culot ne dépassera pas 18 mm.

Wenn man für die Abschirmung oder zur Halterung der Röhre einem Metallring um den Sockel verwendet, so muss dieser Ring geerdet werden und galvanischer Kontakt mit dem Silberring um den Kolben machen. Der Abstand zwischen dem oberen Rande des Metallringes und dem Boden der Röhre soll nicht mehr als 18 mm sein.

Capacitances
Capacités
Kapazitäten

$C_{g1f} < 0{,}2$ pF

Typical dynamic characteristics
Caractéristiques dynamiques types
Dynamische Kenndaten

$V_a = 75$ V
$V_{g_2} = 200$ V
$V_{g_1} = -10$ V
$I_{ap} = 440$ mA
$I_{g2_p} = 30$ mA

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

A. Stabilized circuits (operation above the knee)
Circuits stabilisés (fonctionnement au-dessus du coude)
Stabilisierte Schaltungen (Betrieb oberhalb des Knies)

V_b	170		200			230			V
V_{g_2} =	130	150	130	150	170	150	170	190	V [1]
V_a =	62	66	65	69	73	72	76	80	V [2]
V_{g_1} =	-6	-7	-6	-7	-8	-7	-8	-9	V [3]
I_{ap} =	250	310	250	310	360	310	360	420	mA [4]

B. Non stabilized circuits (operation below the knee)
Circuits non-stabilisés (fonctionnement au-dessous du coude)
Nicht-stabilisierte Schaltungen (Betrieb unterhalb des Knies)

V_b =	190	230	V
R_{g_2} =	2,2	2,2	kΩ
V_{g_1} =	+1	+1	V [3]
I_{ap} =	230	320	mA [4]

[1]) To prevent an excessive value of W_{g_2} during the heating-up period the required minimum values of R_{g_2} are 1.2 kΩ at V_b =170V, 1.5 kΩ at V_b =200V and 2.2 kΩ at V_b =230V.
Pour prévenir une valeur excessive de W_{g_2} pendant la période de chauffage la valeur requise au minimum de R_{g_2} est de 1,2 kΩ à V_b = 170 V, de 1,5 kΩ à V_b = 200 V et de 2,2 kΩ à V_b = 230 V.
Zur Vermeidung einer zu hohen Wert von W_{g_2} während der Anheizperiode, soll der Mindestwert von R_{g_2} 1,2 kΩ bei V_b = 170 V, 1,5 kΩ bei V_b = 200 V und 2,2 kΩ bei V_b = 230 V sein

[2])[3])[4]) See page 3; voir page 3; siehe Seite 3

[2]) These values refer to the end of the scan at nominal operating conditions. At the quoted values a reserve has been taken into account to cover 10% mains voltage fluctuations and a decrease of V_a with 15 V resulting from tube and component spreads.

Ces valeurs se rapportent à la fin du balayage sous conditions de fonctionnement nominales. Aux valeurs mentionnées de V_a on a tenu compte d'une réserve pour couvrir des fluctuations de la tension secteur de 10% et une diminution de V_a de 15 V par suite des tolérances du tube et des pièces.

Diese Werte beziehen sich auf das Ende der Abtastung bei Nennwerten der Betriebsbedingungen. Bei den genannten Werten von V_a ist einer Reserve zur Ausgleichung von Netzspannungsschwankungen von 10% und einer Verringerung von V_a von 15 V wegen Röhren- und Unterteilentoleranzen Rechnung getragen.

[3]) These values refer to the end of the scan. The minimum required control-grid voltage for cut off during the fly-back is -120 V at V_{ap} = 7 kV, V_{g2} = 200 V and Z_{g_1} = 1 kΩ.

Ces valeurs se rapportent à la fin du balayage. La valeur requise au minimum de la tension de la grille de commande pour la coupure pendant le retour du spot est de -120 V à V_{ap} = 7 kV, V_{g2} = 200 V et Z_{g_1} = 1 kΩ.

Diese Werte beziehen sich auf das Ende der Abtastung. Die mindest erforderliche Steuergitterspannung zur Sperrung während des Rücklaufes ist -120 V bei V_{ap} = 7 kV, V_{g2} = 200 V und Z_{g_1} = 1 kΩ

[4]) To allow for tube spread, deterioration during life and a mains voltage 10% below nominal, the specified values for I_{ap} should not be exceeded at nominal mains voltage and at the specified conditions.

Pour tenir compte des tolérances du tube, de la détérioration pendant la durée et d'une tension secteur de 10% au-dessous de la valeur nominale, les valeurs spécifiées de I_{ap} ne doivent pas être dépassées à la valeur nominale de la tension secteur et aux conditions spécifiées.

Um den Röhrentoleranzen, der Verschlechterung der Röhre während der Lebensdauer und einer Netzspannung von 10% unterhalb des Nennwertes Rechnung zu tragen, müssen die angegebenen Werte von I_{ap} bei dem Nennwert der Netzspannung und unter den angegebenen Bedingungen nicht überschritten werden.

Hum
Ronflement
Brumm

At Z_{g_1} = 200 kΩ (f = 50 c/s), V_{kf} = 220 V (R.M.S.) and without wiring and socket capacitances, the equivalent grid hum voltage will be smaller than 5 mV

À Z_{g_1} = 200 kΩ (f = 50 Hz), V_{kf} = 220 V_{eff} et sans capacités de câblage et de support, la tension de ronflement équivalente à la grille sera plus petite que 5 mV.

Mit Z_{g_1} = 200 kΩ (f = 50 Hz), V_{kf} = 220 V_{eff} und ohne Bedrahtungs- und Fassungskapazitäten wird die äquivalente Gitterbrummspannung kleiner als 5 mV sein.

Limiting values (Design centre limits)
Caractéristiques limites (Limites moyennes)
Grenzdaten (Normalgrenzdaten)

V_{ao}	= max.	550 V
V_a	= max.	250 V
V_{ap}	= max.	7000 V
V_{g2_o}	= max.	550 V
V_{g2}	= max.	250 V
W_a	{ See page F / Voir page F / siehe Seite F	
W_{g2}		
I_k	= max.	250 mA
R_{g_1}	= max.	0,5 MΩ
R_{g_1}	= max.	2,2 MΩ [1]
V_{kf}	= max.	220 V

[1]) Only for line output application
Seulement pour application comme tube de sortie lignes
Nur für die Verwendung als Ausgangsröhre für die horizontale Ablenkung

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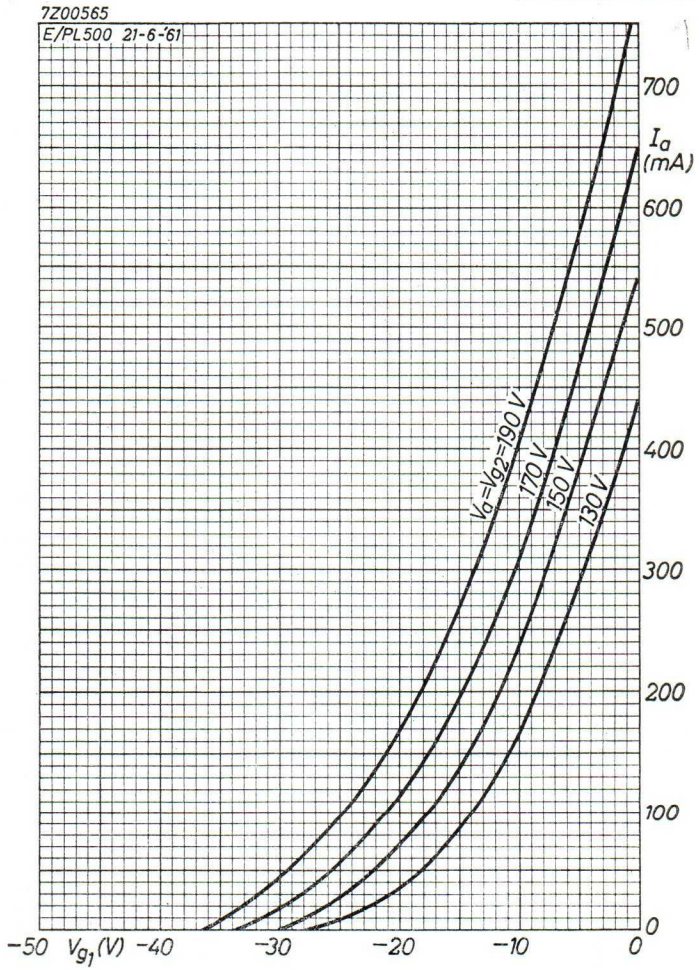
PL500



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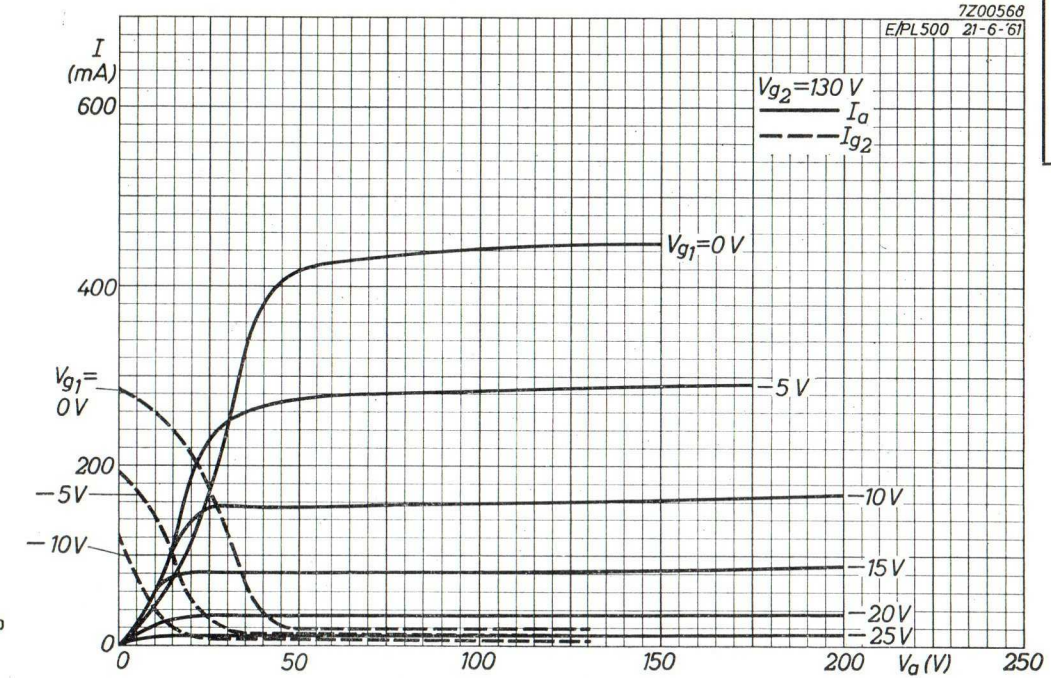
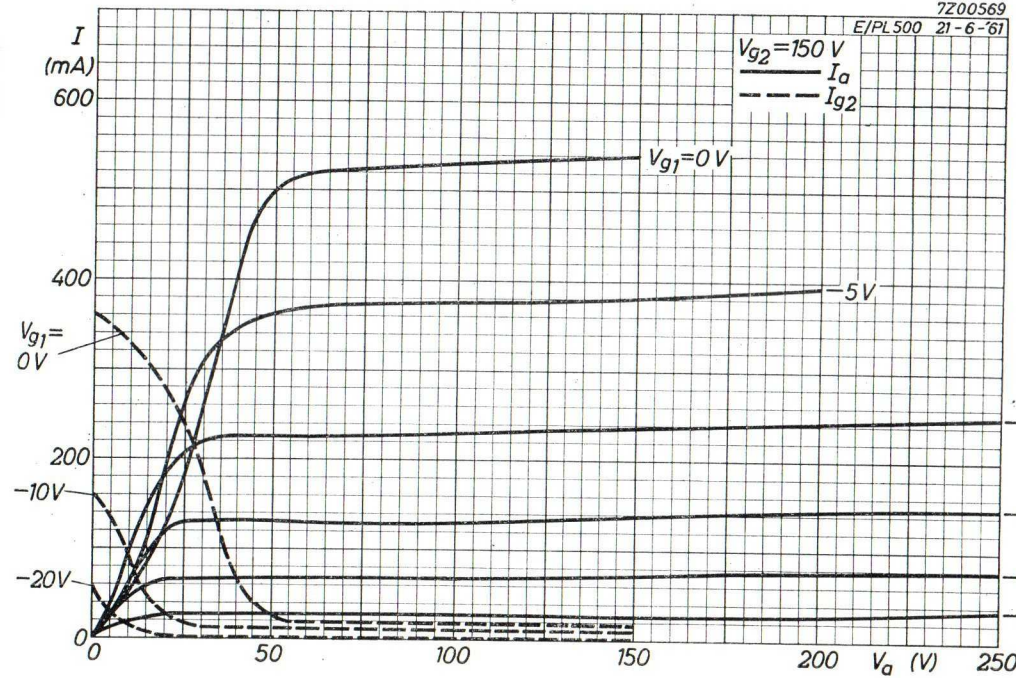
A


7Z00568
E/PL500 21-6-61
I
(mA)
600
400
200
0
V_{g_2}=130 V
I_a
I_{g_2}
V_{g_1}=0 V
−5 V
−10 V
−15 V
−20 V
−25 V
V_{g_1}=
0 V
−5V
−10V
0
50
100
150
200
250
V_a (V)



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PL500

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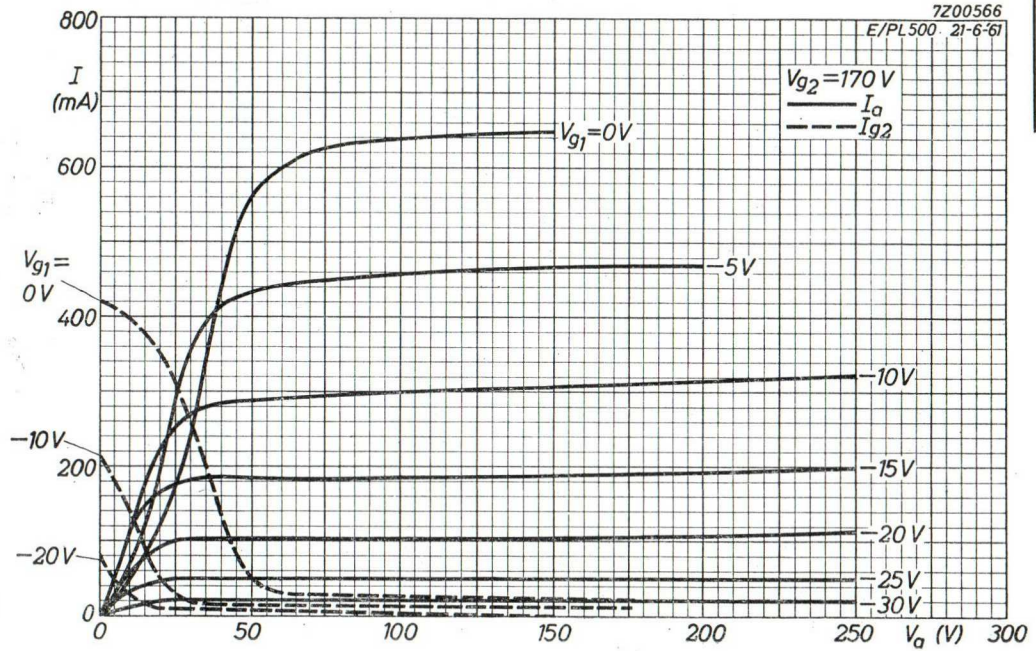
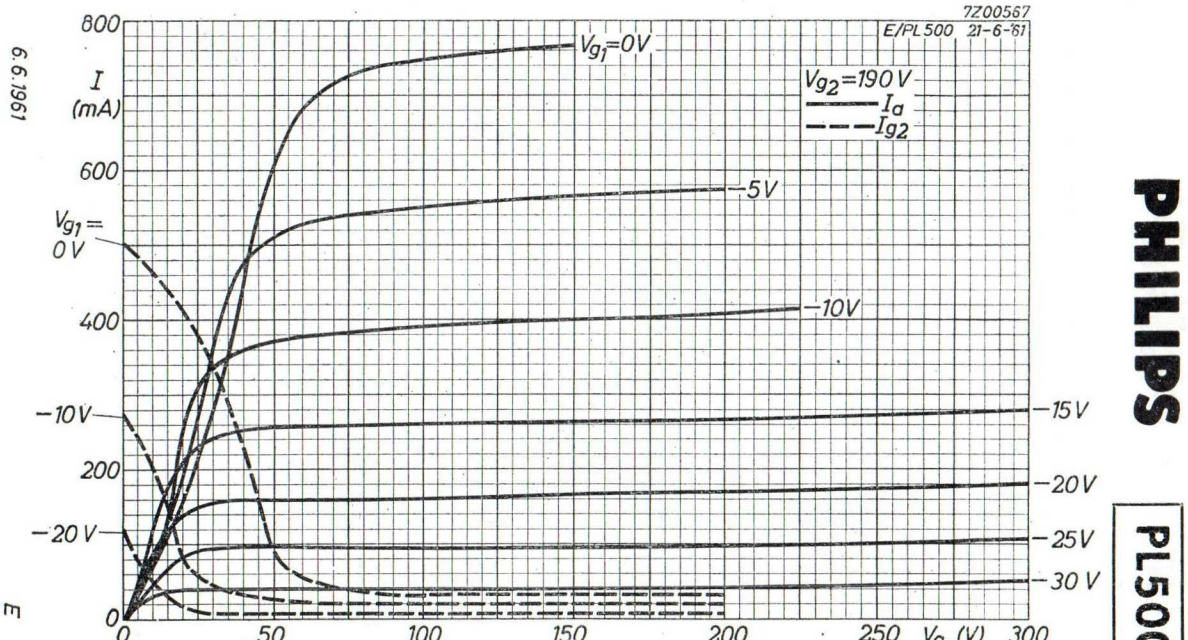
C


7Z00566
E/PL500. 21-6-61
800
I
(mA)
600
400
200
0
0
50
100
150
200
250
300
V_a (V)
V_{g2}=170 V
I_a
I_{g2}
V_{g1}=0V
−5V
−10V
−15V
−20 V
−25V
−30V
V_{g1}=
0 V
−10V
−20V



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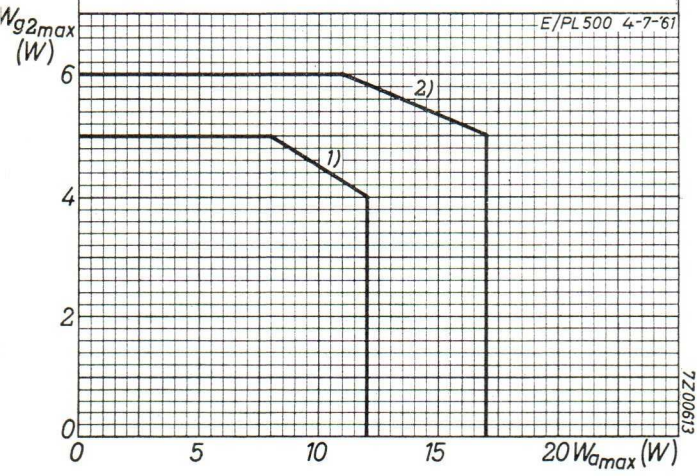
E

6.6.1961

[1]) Design center limits for W_a and W_{g2}
Limites moyennes de W_a et W_{g2}
Normalgrenzdaten von W_a und W_{g2}

[2]) These limits for W_a and W_{g2} should not be exceeded with a nominal tube operating in a normal line deflection circuit under the worst probable conditions
Ces limites de W_a et W_{g2} ne doivent pas être dépassées avec un tube moyen dans un circuit de déviation lignes normal dans les pires conditions probables
Diese Grenzwerte von W_a und W_{g2} müssen mit einer durchschnittlichen Röhre in einer normalen Zeilenablenkschaltung unter den ungünstigst wahrscheinlichen Umständen nicht überschritten werden.

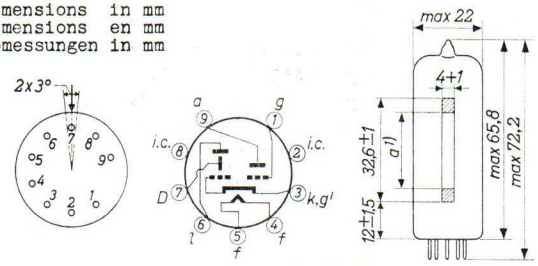


INDICATOR TUBE with amplifying triode for use as tuning indicator
TUBE INDICATEUR avec triode amplificatrice pour utilisation comme indicateur de syntonisation
ANZEIGERÖHRE mit Verstärkertriode zur Verwendung als Abstimmanzeigeröhre

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

I_f = 300 mA
V_f = 4,2 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: NOVAL

The arrow near pin 7 indicates the viewing direction
La flèche près de la broche 7 indique le sens d'observation
Der Pfeil bei Stift 7 bezeichnet die Blickrichtung

Operating characteristics (D connected to a)
Caractéristiques d'utilisation (D relié à l'anode)
Betriebsdaten (D mit a verbunden)

V_b	=	170		220		V
V_l	=	170		220		V
$R_{a,D}$	=	470		470		kΩ
R_g	=	3		3		MΩ
V_{bg}	=	0	-15	0	-19,5	V
I_{a+D}	=	0,3	0,04	0,4	0,055	mA
I_l	=	0,6	1,05	0,85	1,5	mA
a	=	20±5	0	21±5	0	mm

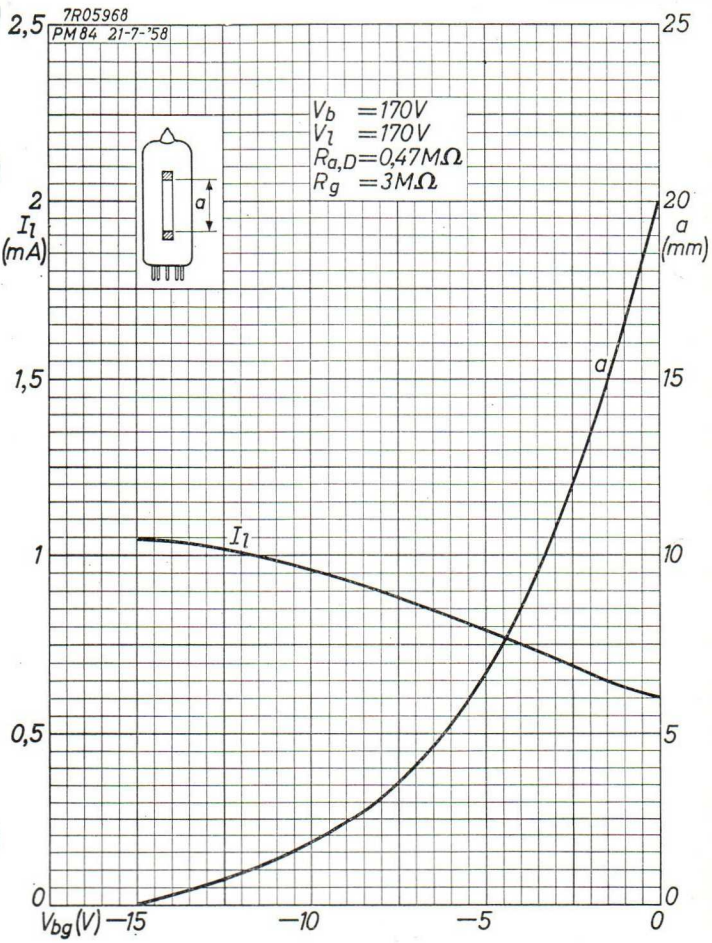
[1]) Shadow length; Longueur d'ombre; Schattenlänge

Limiting values
Caractéristiques limites
Grenzdaten

V_{ao}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	0,5	W
V_{Do}	= max.	550	V
V_D	= max.	250	V
$V_{\ell o}$	= max.	550	V
V_ℓ	= max.	250	V
	min.	170	V
I_k	= max.	3,0	mA
R_g	= max.	3	MΩ
V_{kf} (k pos.)	= max.	250	V
V_{kf} (k neg.)	= max.	50 $V_{=}$ + 200	Veff
R_{kf}	= max.	100	kΩ
t_{bulb}	= max.	120	°C
$-V_g$ (I_g = +0,3 μA)	= max.	1,3	V

PHILIPS

PM84



7.7.1958

A

PHILIPS

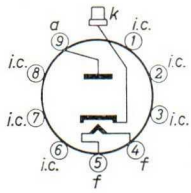
PY 81

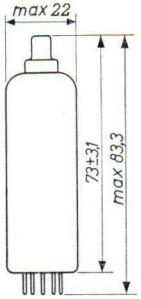
BOOSTER DIODE for use in line time-base circuits of transformerless television receivers
DIODE SURVOLTEUSE pour l'utilisation dans des circuits de base de temps lignes de récepteurs de télévision sans transformateur
SCHALTERDIODE zur Verwendung in Zeilenzeitbasisstufen von transformatorlosen Fernsehempfängern

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

I_f = 300 mA
V_f = 17 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Capacitances
Capacités
Kapazitäten

C_a = 6,4 pF
C_{kf} = 2,8 pF

Limiting values (Design centre values, unless otherwise specified)
Caractéristiques limites (Valeurs moyennes, sauf indication différente)
Grenzdaten (Normalgrenzdaten, wenn nicht anders angegeben)

V_{bo}	= max. 550 V	V_{akp}	= max. 5000 V [1)2)]
V_b	= max. 250 V	V_{akp}	= max. 5600 V [1)2)3)]
W_a	= max. 3,5 W	V_{kfp}	= max. 5000 V [1)]
I_a	= max. 150 mA	R_s	= min. 80 Ω [4)]
I_{ap}	= max. 450 mA		

V { heater to earth / entre filament et terre / zwischen Heizfaden und Erde } = max. 220 V_{eff}

[1),2),3),4)] See page 2; voir page 2; siehe Seite 2

Remark: In general it will be necessary to take measures in order to prevent the maximum permissible screen grid dissipation of the tube that derive their anode voltage from the PY 81, from being exceeded during the heating-up time of the PY 81

Observation: Il faut prendre des mesures de manière que la dissipation grille-écran maximum admissible des tubes, qui dérivent leur tension anodique du PY 81, ne soit pas surpassée pendant le temps de chauffage du PY 81

Bemerkung: Im allgemeinen müssen Massnahmen getroffen werden damit die maximal zulässige Schirmgitterleistung der Röhren die ihre Anodenspannung von der PY 81 erhalten, während der Anheizzeit der PY 81 nicht überschritten wird

---

1) Max. pulse duration 22% of a cycle with a maximum of 18 µsec
Durée de l'impulsion max. 22% d'un cycle avec un maximum de 18 µsec
Impulszeit max. 22% einer Periode mit einem Maximum von 18 µSek

2) Cathode positive with respect to the anode
Cathode positive par rapport à l'anode
Katode positiv in Bezug auf die Anode

3) Absolute maximum value
Valeur maximum absolue
Absoluter Maximalwert

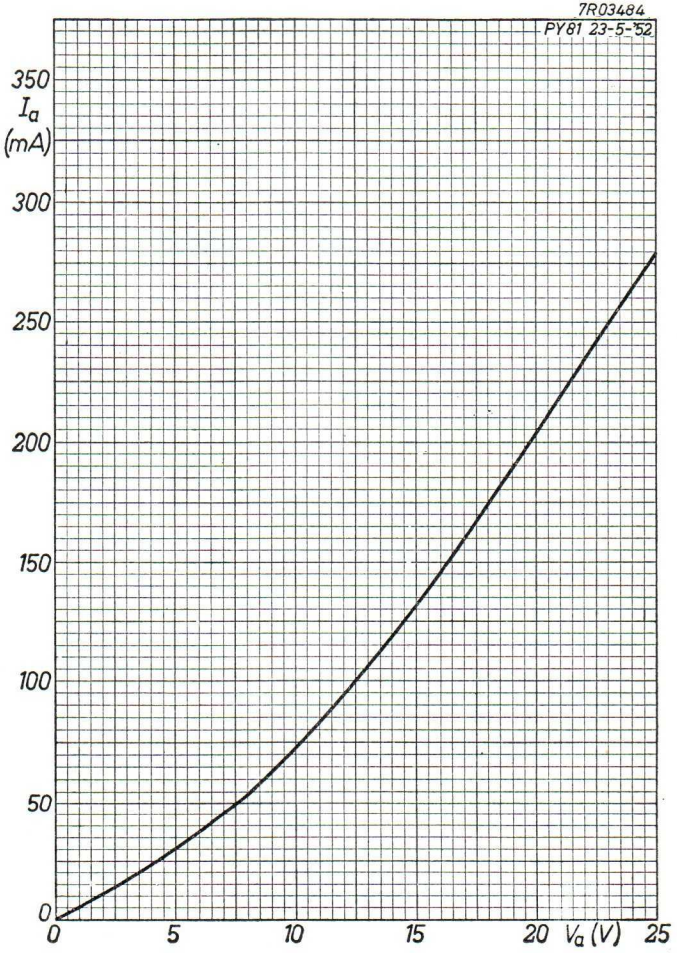
4) R_S = minimum resistance of the heater chain between any heater pin and any mains terminal under working conditions (the heater of another tube can be used for this resistance)

R_S = résistance min. de la chaîne des filaments entre chaque broche du filament et chaque borne du réseau sous les conditions de service (pour cette résistance le filament d'un autre tube peut être utilisé)

R_S = Mindestwiderstand der Heizfadenkette zwischen jedem Heizfadenstift und jeder Anschlussklemme des Netzes unter Betriebsverhältnisse (für diesen Widerstand kann der Heizfaden einer anderen Röhre verwendet werden)

PHILIPS

PY 81



5.5.1952

A

PHILIPS

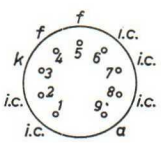
PY 82

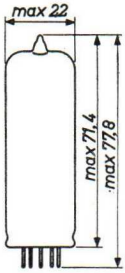
High-vacuum single-anode RECTIFYING TUBE
TUBE REDRESSEUR monoplaque à vide poussée
Einanodige hochvakuum GLEICHRICHTERRÖHRE

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 = 19 V
I_f = 300 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

V_{tr}	=	250	240	220	200	127 V_{eff}
Cfilt	=	60	60	60	60	60 µF
R_t	=	125	105	65	30	0 Ω
I_o	=	180	180	180	180	180 mA
V_o	=	195	195	195	195	127 V

Limiting values
Caractéristiques limites
Grenzdaten

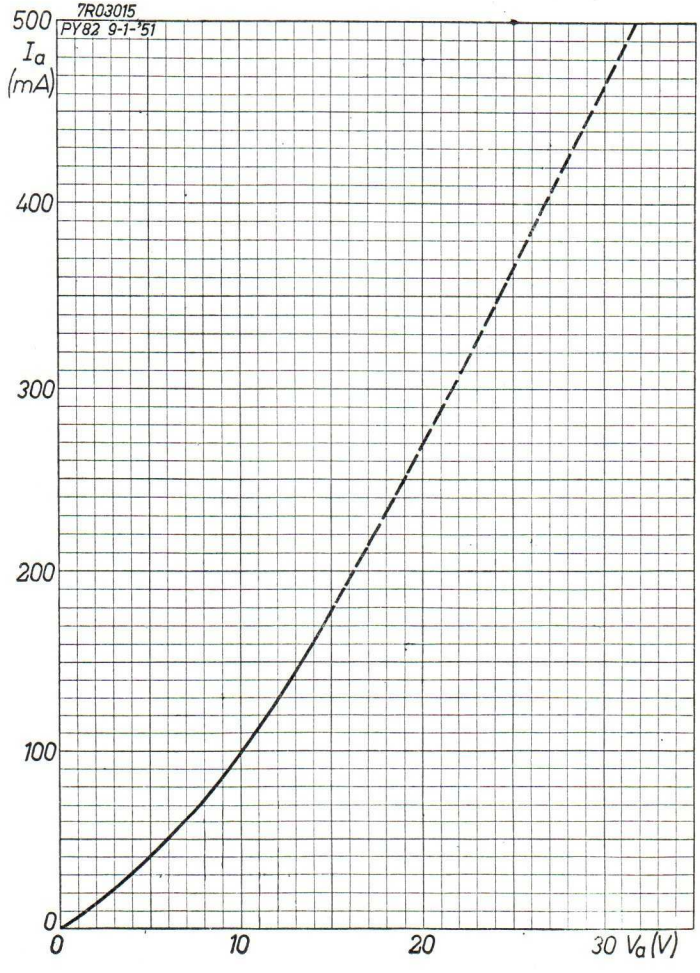
V_{tr}	= max.	250				V_{eff}
$V_{a\ inv_p}$	= max.	700				V
I_o	= max.	180				mA
V_{kf_p}	= max.	550				V [1]
C_{filt}	= max.	60				μF [2]
V_{tr} =	250	240	220	200	127	V_{eff}
R_t = min.	100	80	40	30	0	Ω

[1]) Max. 220 Veff A.C.voltage + max. 250 V D.C.voltage.
Cathode positive with respect to the filament.
220 V_{eff} tension alternative au max. + 250 V tension directe au max.
Cathode positive par rapport au filament.
Max. 220 Veff Wechselspannung + max. 250 V Gleichspannung.
Kathode positiv in bezug auf den Glühfaden.

[2]) When two valves are placed in parallel, C_{filt} = max. 100 μF. The resistor R_t must be inserted in the anode lead of each valve.
Si deux tubes sont connectés en parallèle, C_{filt} = 100 μF au max. Il faut insérer la résistance R_t dans le circuit anodique de chaque tube.
Wenn zwei Röhren parallel geschaltet sind ist C_{filt} = max. 100 μF. Der Widerstand R_t muss in der Anodenleitung jeder Röhre aufgenommen werden.

PHILIPS

PY 82



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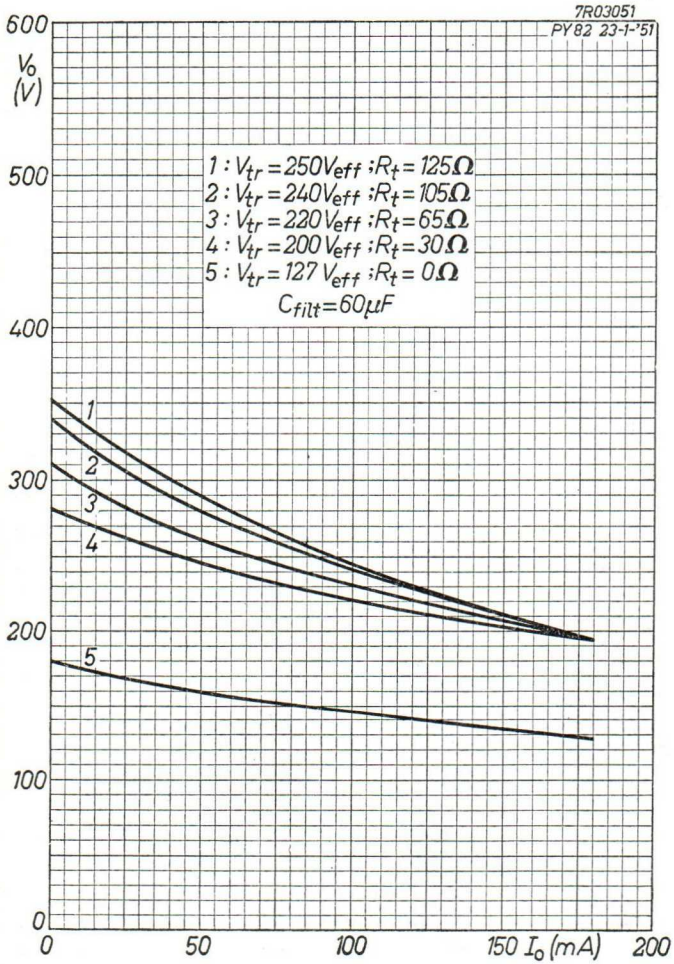
2.2.1951

PHILIPS


7R03051
PY82 23-1-'51
600
V_o (V)
500
400
300
200
100
0
1 : V_{tr} = 250 V_{eff} ; R_t = 125 Ω
2 : V_{tr} = 240 V_{eff} ; R_t = 105 Ω
3 : V_{tr} = 220 V_{eff} ; R_t = 65 Ω
4 : V_{tr} = 200 V_{eff} ; R_t = 30 Ω
5 : V_{tr} = 127 V_{eff} ; R_t = 0 Ω
C_{filt} = 60 μF
1
2
3
4
5
0
50
100
150 I_o (mA)
200

B

PHILIPS

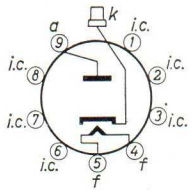
PY 88

BOOSTER DIODE for use in line time-base circuits of transformerless television receivers
DIODE SURVOLTEUSE pour l'utilisation dans des circuits de base de temps lignes de récepteurs de télévision sans transformateur
SCHALTERDIODE zur Verwendung in Zeilenzeitbasisstufen von transformatorlosen 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

I_f = 300 mA
V_f = 30 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	C_a	=	8,6 pF
	C_{kf}	=	2,0 pF

Limiting values (Design centre values, unless otherwise specified)
Caractéristiques limites (Valeurs moyennes, sauf indication différente)
Grenzdaten (Normalgrenzdaten, wenn nicht anders angegeben)

V_{bo}	= max.	550	V
V_b	= max.	250	V
I_a	= max.	220	mA
I_{ap}	= max.	550	mA
W_a	= max.	5	W
V_{akp} (k pos.)	= max.	6	kV [1]
V_{akp} (k pos.)	= max.	7,5	kV [1][2]
V_{fkp}	= max.	6,6	kV [1]
R_s	= min.	80	Ω [3]

Voltage between heater and earth
Tension entre le filament et la masse = max. 220 V_{eff}
Spannung zwischen Heizfaden und Erde

---

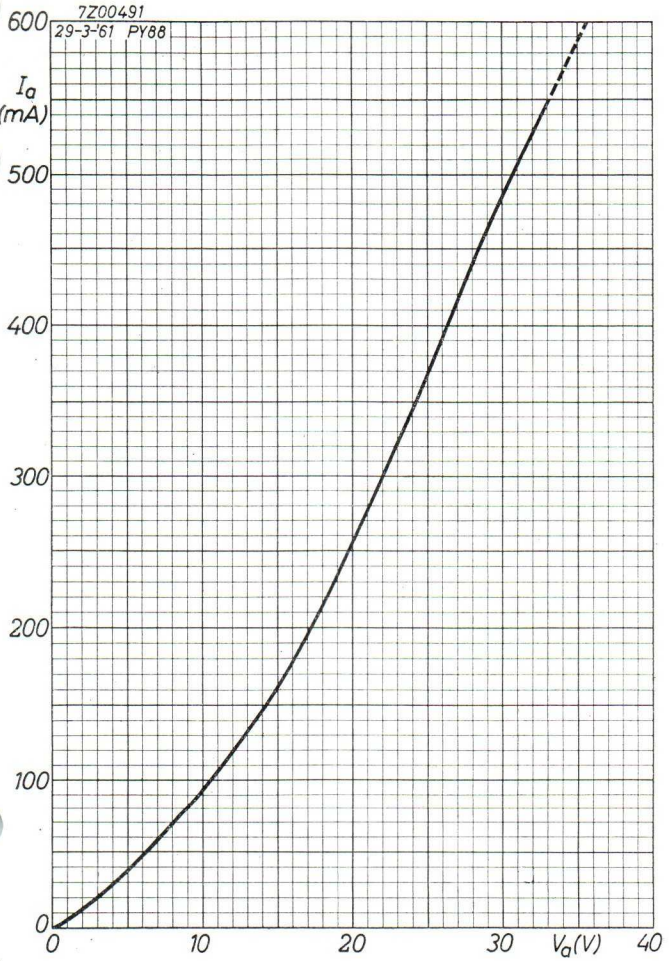
[1]) Max. pulse duration 22% of a cycle with a maximum of 18 µsec
Durée de l'impulsion max. 22% d'un cycle avec un maximum de 18 µsec
Impulszeit max. 22% einer Periode mit einem Maximum von 18 µSek

[2]) Absolute maximum
Valeur absolue
Absolutwert

[3]) R_s = minimum resistance of the heater chain between any heater pin and any mains terminal under working conditions (the heater of another tube can be used for this resistance)

R_s = résistance min. de la chaîne des filaments entre chaque broche du filament et chaque borne du réseau sous les conditions de service (pour cette résistance le filament d'un autre tube peut être utilisé)

R_s = Mindestwiderstand der Heizfadenkette zwischen jedem Heizfadenstift und jeder Anschlussklemme des Netzes unter Betriebsverhältnisse (für diesen Widerstand kann der Heizfaden einer anderen Röhre verwendet werden)


7Z00491
29-3-'61 PY88
600
I_a (mA)
500
400
300
200
100
0
0
10
20
30
V_a(V)
40

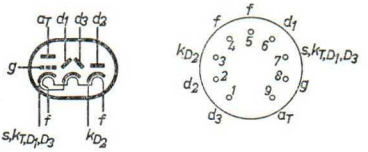
PHILIPS UABC 80

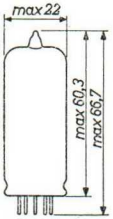
TRIPLE DIODE TRIODE for F.M. or FM/AM broadcast receivers and for video and audio signal detection in television receivers
TRIPLE DIODE TRIODE pour récepteurs F.M. ou FM/AM et pour détection des signaux d'images et du son dans des récepteurs de télévision
DREIFACHDIODE TRIODE für FM- oder FM/AM-Empfänger und zur Bild- und Tonsignalgleichrichtung 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 = 28 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

It is recommended to connect pin 5 to earth
Il est recommandé de mettre broche 5 à la terre
Es wird empfohlen Stift 5 zu erden

Capacitances Capacités Kapazitäten	Triode section Partie triode Triodenteil	Diode sections Parties diode Diodenteile
	C_g = 1,9 pF	C_{d1} = 0,8 pF
	C_a = 1,4 pF	C_{d2} = 4,8 pF
	C_{ag} = 2,0 pF	C_{d3} = 4,8 pF
	C_{gf} < 0,04 pF	C_{kD2} = 5,0 pF
		C_{d1f} < 0,25 pF
		C_{d3f} < 0,2 pF
		C_{kD2-f} = 2,5 pF

Capacitances
Capacités
Kapazitäten

Between triode and diode sections
Entre les parties triode et diode
Zwischen Trioden-und Diodenteilen

C_{ad1}	<	0,12 pF
C_{ad3}	<	0,1 pF
C_{a-kD2}	<	0,01 pF
C_{gd1}	<	0,07 pF
C_{gd3}	<	0,02 pF
C_{g-kD2}	<	0,005 pF

Typical characteristics of the triode section
Caractéristiques types de la partie triode
Kenndaten des Triodenteiles

V_a	=	100	170	200 V
V_g	=	-1	-1,85	-2,3 V
I_a	=	0,8	1,0	1,0 mA
S	=	1,45	1,45	1,40 mA/V
μ	=	70	70	70
R_i	=	48	48	50 kΩ

Operating characteristics as R.C. coupled A.F. amplifier
Caractéristiques d'utilisation en amplificatrice B.F. à couplage par résistances
Betriebsdaten als Widerstandsgekoppelter NF-Verstärker

R_g = 10 MΩ

V_b	R_a	R_{g1}	I_a	$\frac{V_o}{V_i}$	dtot % V_o eff		
V	kΩ	MΩ	mA		3V	5V	8V
200	220	0,68	0,56	53	0,3	0,4	0,9
200	100	0,33	1,00	44	0,4	0,6	1,0
200	47	0,15	1,60	34	0,5	0,9	1,5
170	220	0,68	0,46	51	0,4	0,5	1,1
170	100	0,33	0,82	42	0,5	0,8	1,3
170	47	0,15	1,25	32	0,6	1,1	2,0
100	220	0,68	0,21	44	1,0	1,7	
100	100	0,33	0,35	35	1,3	2,3	
100	47	0,15	0,52	26	2,0	4,3	

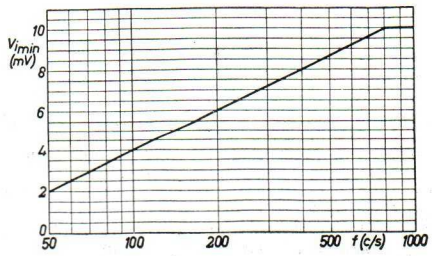
Typical characteristics of the diode sections
Caractéristiques types des parties diode
Kenndaten der Diodenteile

R_{iD1} (V_{d1}=+10V)	=	5 kΩ
R_{iD2} (V_{d2}=+ 5V)	=	200 Ω
R_{iD3} (V_{d3}=+ 5V)	=	200 Ω
R_{iD2}/R_{iD3}	>	2/3
	<	1,5

This tube can be used without special precautions against microphonic effect in circuits in which the input voltage Vi is higher than 10 mV for an output of 50 mW of the output tube at 800 c/s and higher. For frequencies lower than 800 c/s the sensitivity may be increased according to the figure below

Ce tube peut être utilisé sans précautions spéciales contre l'effet microphonique dans des circuits dont la tension d'entrée Vi est plus de 10 mV pour une puissance de 50 mW du tube de sortie à des fréquences de 800 c/s et plus. A des fréquences plus basses que 800 c/s la sensibilité peut être augmentée suivant la figure ci-dessous.

Diese Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden in Schaltungen die bei einer Frequenz von 800 Hz und höher für eine Eingangsspannung von 10 mV oder höher eine Leistung von 50 mW der Endröhre ergeben. Bei Frequenzen niedriger als 800 Hz kann die Empfindlichkeit nach untenstehender Abbildung vergrössert werden.



Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteiles

V_{a_o}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	1 W
I_k	= max.	5 mA
V_g (I_g=+0,3µA)	= max.	-1,3 V
R_g	= max.	3 MΩ[1]
R_{kf}	= max.	20 kΩ
V_{kf}	= max.	150 V[2]

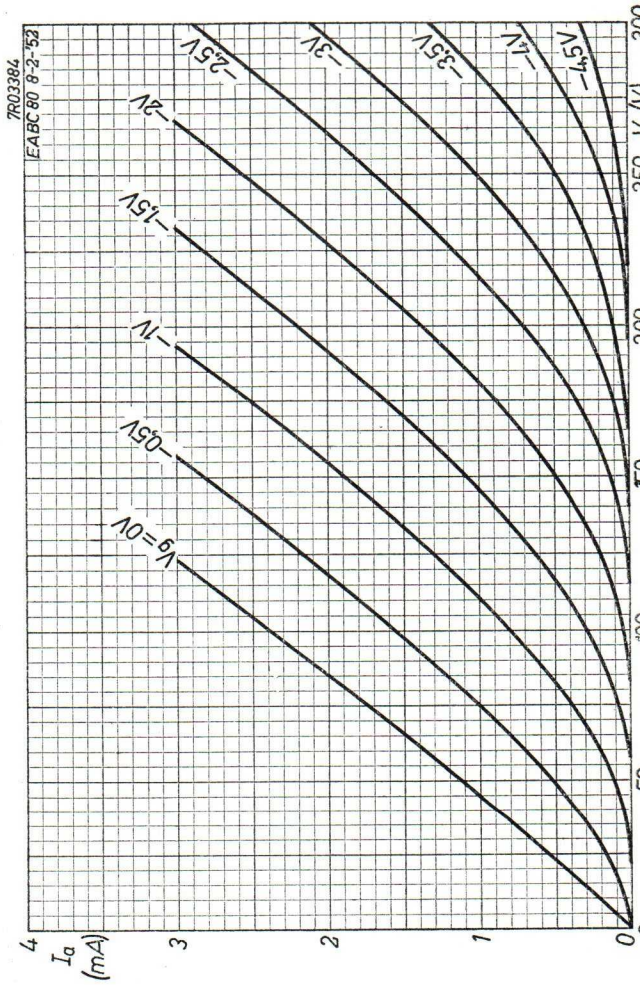
Limiting values of the diode sections
Caractéristiques limites des parties diode
Grenzdaten der Diodenteile

$V_{d1\ inv_p}$	= max.	350 V
$V_{d2\ inv_p}$	= max.	350 V
$V_{d3\ inv_p}$	= max.	350 V
I_{d1}	= max.	1 mA
I_{d2}	= max.	10 mA
I_{d3}	= max.	10 mA
I_{d1_p}	= max.	6 mA
I_{d2_p}	= max.	75 mA
I_{d3p}	= max.	75 mA
$V_{kD2-f.}$	= max.	150 V[2]

---

[1] With grid current biasing R_g = max. 22 MΩ
Si V_g est obtenu seulement par moyen de R_g, R_g=max.22MΩ
Wenn V_g nur mittels R_g erhalten wird, ist R_g =max.22MΩ

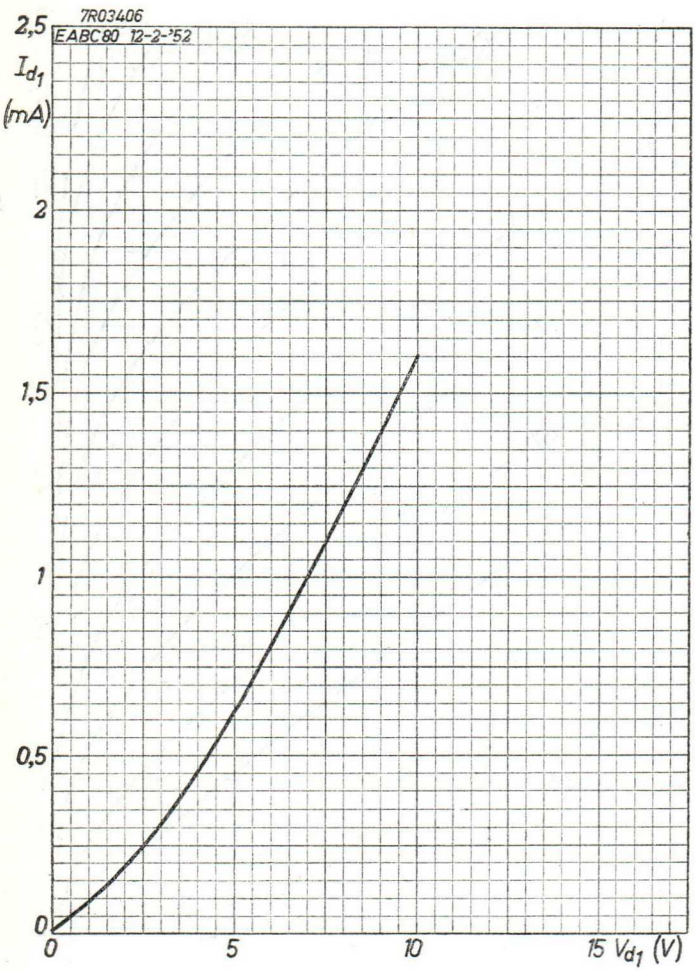
[2] With regard to hum a low A.C. voltage (< 30 V rms) between cathode and heater is recommanded
Au regard du ronflement une tension alternative basse (< 30 V_{eff}) entre k et f est recommandée
In Bezug auf Brumm wird eine niedrige Wechselspannung (< 30 V_{eff}) zwischen k und f empfohlen


7R03384
EABC 80 8-2-'52
-2,5V
-2V
-1,5V
-1V
-0,5V
Vg=0V
-3V
-3,5V
-4V
-4,5V
Va (V)
300
250
200
150
100
50
0
Ia (mA)
4
3
2
1
0

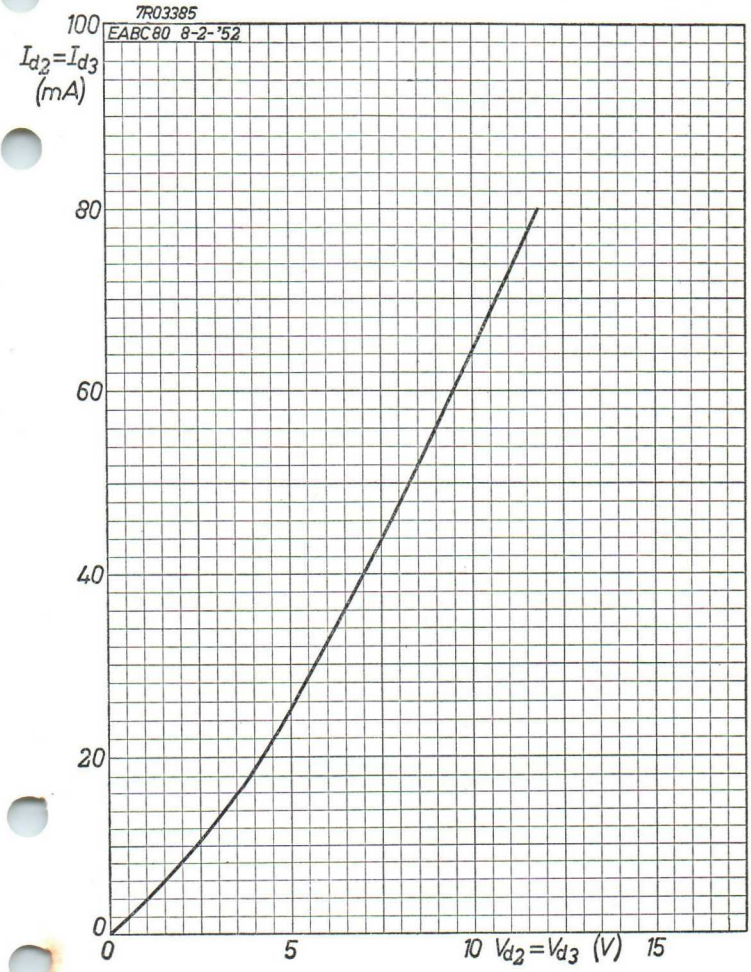
8.8.1952

A

UABC 80 **PHILIPS**



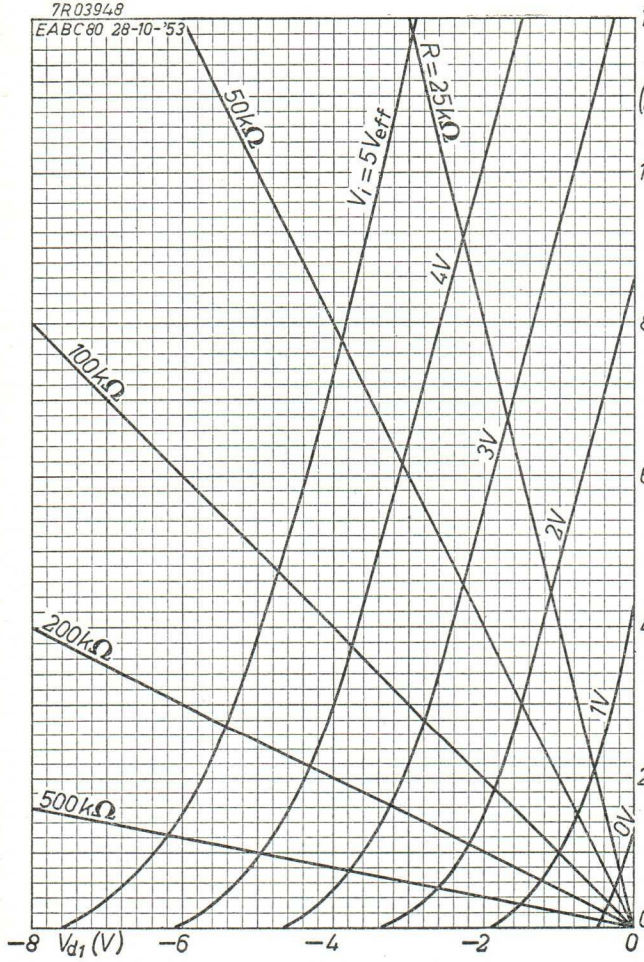
B


7R03385
EABC80 8-2-'52
100
$I_{d2}=I_{d3}$ (mA)
80
60
40
20
0
0
5
10 $V_{d2}=V_{d3}$ (V) 15

12.12.1953

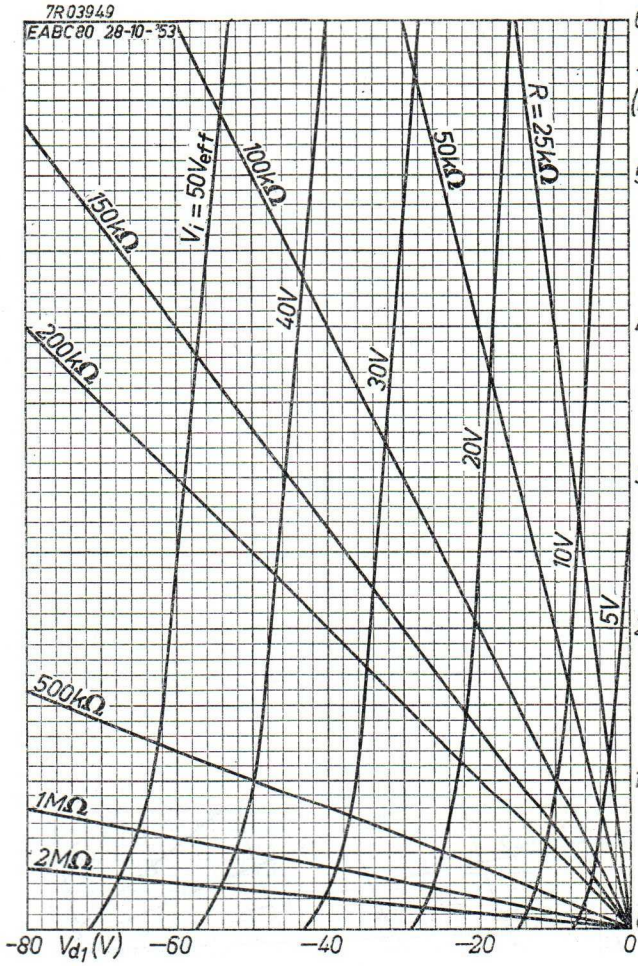
C

UABC 80 PHILIPS



PHILIPS

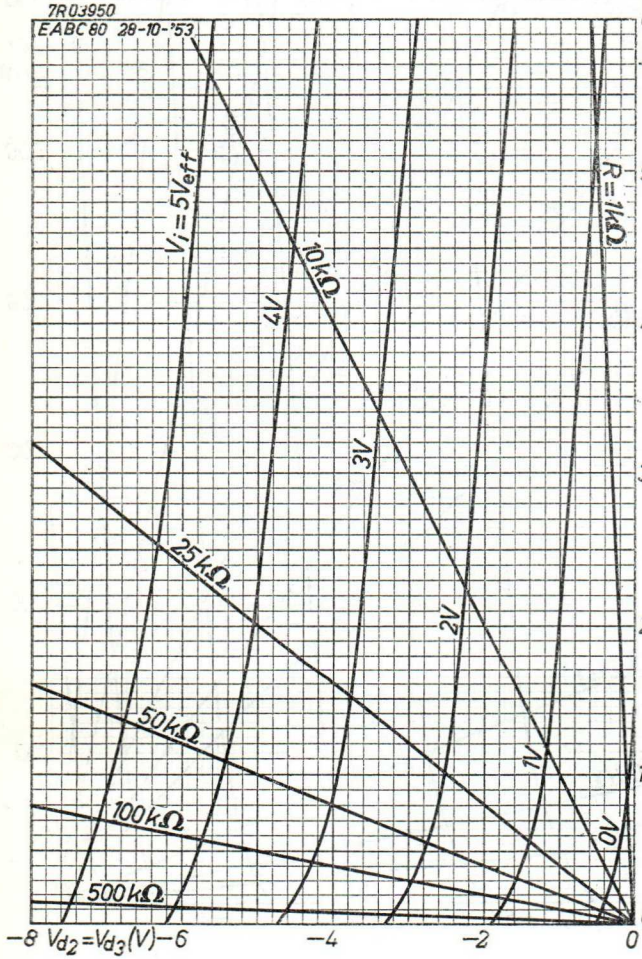
UABC 80



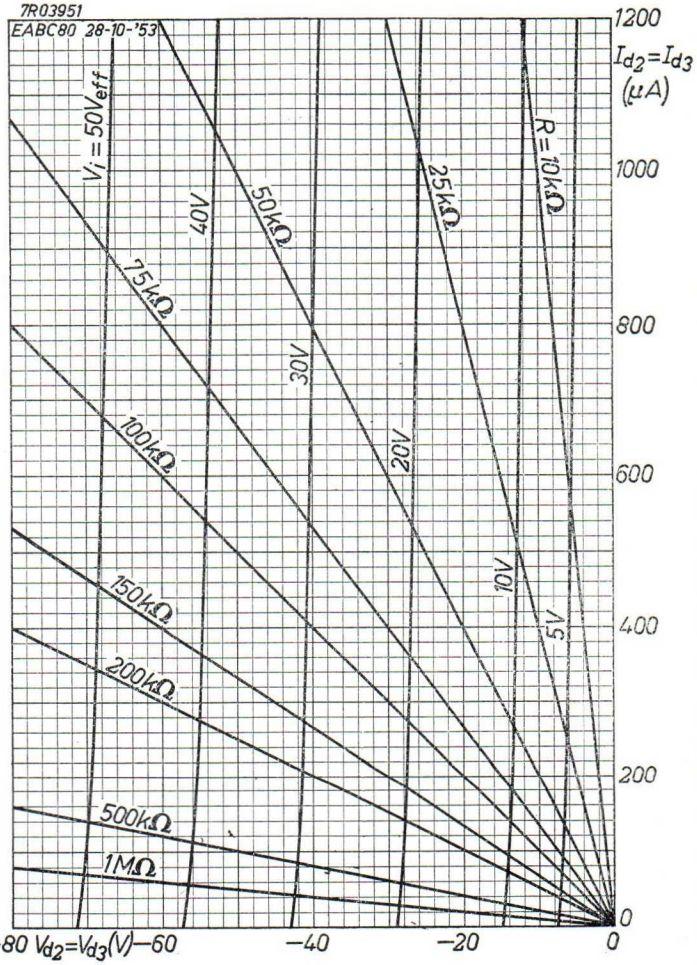
12.12.1953

E

UABC 80 **PHILIPS**



F


7R03951
EABC80 28-10-'53
$V_i = 50V_{eff}$
40V
30V
20V
10V
5V
R=10kΩ
25kΩ
50kΩ
75kΩ
100kΩ
150kΩ
200kΩ
500kΩ
1MΩ
1200
1000
800
600
400
200
0
$I_{d2}=I_{d3}$ (μA)
-80 $V_{d2}=V_{d3}$(V) -60
-40
-20
0

12.12.1953

PHILIPS

UAF 41

DIODE-PENTODE with variable mutual conductance for use as R.F., I.F. or A.F. amplifier
DIODE-PENTHODE à pente variable pour utilisation en amplificatrice H.F., M.F. ou B.F.
DIODE-PENTODE mit veränderlicher Steilheit zur Verwendung als HF-, ZF- oder NF-Verstärker

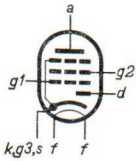
Heating : indirect; series supply — V_f = 12,6 V
Chauffage: indirect; alimentation- série — I_f = 100 mA
Heizung : indirekt; Serienspeisung

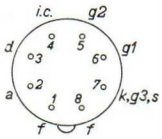
Base, culot, Sockel: RIMLOCK

Overall length: 60 mm
See pages 203 and 252

Hauteur totale: 60 mm
Voir pages 203 et 252

Gesamthöhe : 60 mm
Siehe S. 203 und 252





Capacitances / Capacités / Kapazitäten					
	C_a =	6,5 pF	C_{dk} =	3,8 pF	
	C_{g1} =	4,0 pF	C_{df} <	0,02 pF	
	C_{ag1} <	0,002 pF	C_{dg1} <	0,0015 pF	
	C_{g1f} <	0,05 pF	C_{da} <	0,15 pF	

Operating characteristics as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F. ou M.F.
Betriebsdaten als HF- oder ZF-Verstärker

$V_a=V_b$ =	100		170		200		V
R_{g2} =	44		44		44		kΩ
R_k =	300		300		300		Ω
V_{g1} =	-1,1	-17	-2	-28	-2,4	-34	V
I_a =	2,8	-	5	-	6	-	mA
I_{g2} =	0,9	-	1,6	-	1,9	-	mA
S =	1650	16,5	1800	18	1900	19	µA/V
R_i =	1,0	>10	1,2	>10	1,3	>10	MΩ
μ_{g2g1} =	19	-	19	-	19	-	
R_{eq} =	7	-	9	-	9,6	-	kΩ

Operating characteristics as resistance coupled A.F. amplifier
Caractéristiques d'utilisation en amplificatrice B.F. avec couplage à résistances
Betriebdaten als NF-Verstärker mit Widerstandskopplung

A. V_b = 170 V; R_a =0,2 MΩ; R_{g2} = 0,73 MΩ; R_k = 2,7 kΩ

$-V_R$ (V)	I_a (mA)	I_{g2} (mA)	$\frac{V_o}{V_i}$	d_{tot} (%) (V_o=3Veff)	d_{tot} (%) (V_o=5Veff)	d_{tot} (%) (V_o=8Veff)
0	0,58	0,18	78	0,8	1,1	1,6
5	0,46	0,13	25	1,2	2,1	4,0
10	0,36	0,08	15	2,0	3,2	4,8
15	0,26	0,05	10	2,6	3,7	5,8
20	0,18	0,03	7	3,0	4,4	7,3
25	0,12	0,01	5	5,1	8,0	13,0

B. V_b = 100 V; R_a =0,2 MΩ; R_{g2} = 0,73 MΩ; R_k = 2,7 kΩ

$-V_R$ (V)	I_a (mA)	I_{g2} (mA)	$\frac{V_o}{V_i}$	d_{tot} (%) (V_o=3Veff)	d_{tot} (%) (V_o=5Veff)
0	0,34	0,10	73	0,8	1,0
2,5	0,26	0,07	27	3,0	4,0
5	0,20	0,05	15	3,5	5,0
7,5	0,16	0,04	10	3,8	5,7
10	0,12	0,02	7	4,4	7,5
12,5	0,08	0,01	5,5	5,7	9,0

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max. 550 V	I_k	= max. 10 mA
V_a	= max. 250 V	R_{g1}	= max. 3 MΩ
W_a	= max. 2 W	R_{kf}	= max. 20 kΩ
V_{g2_o}	= max. 550 V	V_{kf}	= max. 150 V
V_{g2} (I_a< 3 mA)	= max. 250 V		
V_{g2} (I_a= 6 mA)	= max. 150 V	V_{dinv_p}	= max. 350 V
W_{g2}	= max. 0,3 W	I_d	= max. 0,8 mA
V_{g1} (I_{g1}=+0,3μA)	= max. -1,3 V	I_{dp}	= max. 5 mA

PHILIPS

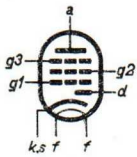
UAF42

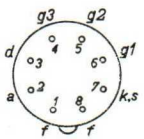
DIODE-PENTODE with variable mutual conductance for use as R.F., I.F. or A.F. amplifier
DIODE-PENTHODE à pente variable pour l'utilisation en amplificatrice H.F., M.F. ou B.F.
DIODE-PENTODE mit veränderlicher Steilheit zur Verwendung als HF-, ZF- oder NF-Verstärker

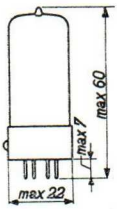
Heating : indirect by A.C. or D.C.; series supply
Chauffage: indirect par C.A. ou C.C.; alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

V_f = 12,6 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Rimlock

Capacitances Capacités Kapazitäten	Pentode section Partie penthode Pentodenteil	Diode section Partie diode Diodenteil
	C_a = 5,2 pF	C_d = 3,3 pF
	C_{g1} = 4,1 pF	C_{df} < 0,02 pF
	C_{ag1} < 0,002 pF	
	C_{g1f} < 0,05 pF	

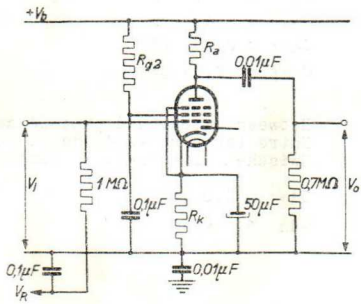
Between diode and pentode sections
Entre les parties diode et penthode
Zwischen Dioden- und Pentodenteil

C_{dg1} < 0,0015 pF
C_{da} < 0,15 pF

Operating characteristics of the pentode section as R.F. or I.F. amplifier
Caractéristiques d'utilisation de la partie penthode en amplificatrice H.F. ou M.F.
Betriebsdaten des Pentodenteiles als HF- oder ZF-Verstärker

$V_a=V_b$ =	100		170		200		V
V_{g3} =	0		0		0		V
R_{g2} =	56		56		76		kΩ
R_k =	310		310		310		Ω
V_{g1} =	-1,2	-16	-2	-28	-2	-34	V
V_{g2} =	50	-	85	-	85	-	V
I_a =	2,8	-	5,0	-	5,0	-	mA
I_{g2} =	0,9	-	1,5	-	1,5	-	mA
S =	1700	17	2000	20	2000	20	µA/V
R_i =	0,85	>10	0,9	>10	1,0	>10	MΩ
μ_{g2g1} =	16	-	16	-	16	-	
R_{eq} =	5,8	-	7,5	-	7,5	-	kΩ

Operating characteristics of the pentode section as resistance coupled A.F. amplifier
Caractéristiques d'utilisation de la partie penthode en amplificatrice B.F. à couplage par résistance
Betriebsdaten des Pentodenteiles als NF-Verstärker mit Widerstandskopplung



This valve can be used without special precautions against microphonic effect in circuits in which the input voltage Vi ≥ 10 mV for an output of 50 mW of the output valve

Ce tube peut etre utilisé sans précautions spéciales contre l'effet microphonique dans des circuits dont la tension d'entrée Vi ≥ 10 mV pour une puissance de 50 mW du tube de sortie

Diese Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden in Schaltungen die für eine Eingangsspannung Vi ≥ 10 mV eine Leistung von 50 mW der Endröhre ergeben

A. Vb = 170 V;Ra =0,22 MΩ; Rg2 = 0,82 MΩ;Rk = 2,7 kΩ

$-V_R$ (V)	Ia (mA)	Ig2 (mA)	$\frac{Vo}{Vi}$	d_{tot} (%) ($Vo=3V_{eff}$)	d_{tot} (%) ($Vo=5V_{eff}$)	d_{tot} (%) ($Vo=8V_{eff}$)
0	0,50	0,17	80	0,8	1,0	1,2
5	0,38	0,12	23	1,5	2,5	4,0
10	0,28	0,09	14	1,9	3,2	5,0
15	0,20	0,06	9	2,6	4,2	6,5
20	0,14	0,04	6	3,6	6,0	9,0

B. Vb = 170 V;Ra = 0,1 MΩ; Rg2 = 0,33 MΩ;Rk = 1,5 kΩ

$-V_R$ (V)	Ia (mA)	Ig2 (mA)	$\frac{Vo}{Vi}$	d_{tot} (%) ($Vo=3V_{eff}$)	d_{tot} (%) ($Vo=5V_{eff}$)	d_{tot} (%) ($Vo=8V_{eff}$)
0	1,05	0,37	68	0,75	0,8	1,1
5	0,71	0,25	20	2,2	3,2	5,0
10	0,48	0,17	10	2,4	3,7	5,5
15	0,30	0,11	6	3,0	4,5	7,0
20	0,16	0,07	3,5	5,2	8,0	12

C. Vb = 100 V;Ra = 0,22MΩ; Rg2 = 0,82 MΩ;Rk = 2,7 kΩ

$-V_R$ (V)	Ia (mA)	Ig2 (mA)	$\frac{Vo}{Vi}$	d_{tot} (%) ($Vo=3V_{eff}$)	d_{tot} (%) ($Vo=5V_{eff}$)
0	0,29	0,09	75	0,9	1,1
2,5	0,22	0,07	27	2,6	4,4
5	0,17	0,05	15	3,2	5,0
7,5	0,13	0,04	10	4,0	6,5
10	0,10	0,03	7	5,2	8,0

D. V_b = 100 V; R_a = 0,1 MΩ; R_{g2} = 0,33 MΩ; R_k = 1,5 kΩ

$-V_R$ (V)	I_a (mA)	I_{g2} (mA)	$\frac{V_o}{V_i}$	d_{tot} (%) (V_o=3Veff)	d_{tot} (%) (V_o=5Veff)
0	0,58	0,21	60	0,9	1,0
2,5	0,43	0,14	25	2,3	4,5
5	0,31	0,10	12	3,5	6,0
7,5	0,21	0,07	7,5	4,7	8,0
10	0,14	0,05	5	7,0	11,0

Limiting values of the pentode section
Caractéristiques limites de la partie penthode
Grenzdaten des Pentodenteiles

V_{a_o}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	2 W
V_{g2_o}	= max.	550 V
V_{g2} (I_a < 2,5 mA)	= max.	250 V
V_{g2} (I_a = 5 mA)	= max.	125 V
W_{g2}	= max.	0,3 W
I_k	= max.	10 mA
V_{g1} (I_{g1} = +0,3 µA)	= max.	-1,3 V
R_{g1}	= max.	3 MΩ
R_{g3}	= max.	3 MΩ
R_{kf}	= max.	20 kΩ
V_{kf}	= max.	150 V

Limiting values of the diode section
Caractéristiques limites de la partie diode
Grenzdaten des Diodenteiles

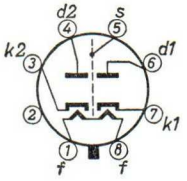
V_{dinv_p}	= max.	350 V
I_d	= max.	0,8 mA
I_{d_p}	= max.	5 mA
R_{kf}	= max.	20 kΩ
V_{kf}	= max.	150 V

DOUBLE DIODE with separate cathodes for signal detection and other purposes
DOUBLE DIODE avec cathodes séparées pour la détection de signaux et d'autres utilisations
DOPPELDIODE mit getrennten Katoden für Empfangsgleichrichtung und andere Zwecke

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 = 19 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Capacitances
Capacités
Kapazitäten

C_{d1} = 3,6 pF
C_{d2} = 3,6 pF
C_{d1d2} < 0,03 pF
C_{k1} = 4,5 pF
C_{k2} = 4,5 pF

Limiting values (each system)
Caractéristiques limites (chaque système)
Grenzdaten (jedes System)

$V_{d\ inv_p}$	= max. 420 V
I_d	= max. 9 mA
I_{d_p}	= max. 54 mA
V_{kf} (k neg., f pos.)	= max. 150 V
V_{kf} (k pos., f neg.)	= max. 330 V [1]
R_{kf}	= max. 20 kΩ

For curves refer to type EAA91
Pour les courbes voir type EAA91
Für die Kennlinien siehe Typ EAA91

[1]) D.C. component max. 165 V, A.C. component max. 165 V_{rms}
Composante continue max. 165 V, composante alternative max. 165 Veff
Gleichspannungsanteil max. 165 V, Wechselspannungsanteil max. 165 Veff

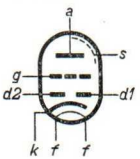
DOUBLE DIODE-TRIODE for use as A.F. amplifier
DOUBLE DIODE-TRIODE pour utilisation en amplificatrice B.F.
DOPPELDIODE-TRIODE zur Verwendung als NF-Verstärker

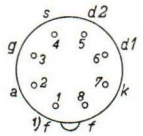
Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation-série
Heizung : indirekt durch Wechsel- oder Gleichstrom Serienspeisung

V_f = 14 V
I_f = 100 mA

Base, culot, Sockel: RIMLOCK

Overall length: 60 mm
See pages 203 and 252
Hauteur totale: 60 mm
Voir pages 203 et 252
Gesamthöhe : 60 mm
Siehe S. 203 und 252





Capacitances Capacités Kapazitäten	Triode section Partie triode Triodenteil	Diode section Partie diode Diodenteil
	C_g = 2,7 pF	C_{d1} = 0,8 pF
	C_a = 1,7 pF	C_{d2} = 0,7 pF
	C_{ag} = 1,5 pF	C_{d1d2} < 0,3 pF
	C_{gf} < 0,05 pF	C_{d1f} < 0,1 pF
		C_{d2f} < 0,05 pF

Between triode and diode sections
Entre les parties triode et diode
Zwischen Trioden- und Diodenteilen

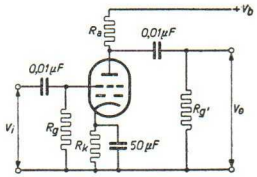
C_{d1g} < 0,007 pF
C_{d2g} < 0,03 pF
C_{d1a} < 0,01 pF
C_{d2a} < 0,01 pF

1) Earthed side of the filament circuit
Côté mise à la terre du circuit de filament
Geerdete Seite der Glühfadenschaltung

Typical characteristics of the triode section
Caractéristiques typiques de la partie triode
Kenndaten des Triodenteiles

Va =	170	100	V
Vg =	-1,55	-1,0	V
Ia =	1,5	0,8	mA
S =	1,65	1,4	mA/V
μ =	70	70	
Ri =	42	50	kΩ

Operating characteristics as L.F. amplifier
Données caractéristiques comme amplificatrice B.F.
Betriebsdaten als N.F. Verstärker



Vb	Ra	Rk	Rg	Rg'	Ia	Vo/Vi	d_{tot} (%) at Vo =		
(V)	(MΩ)	(kΩ)	(MΩ)	(MΩ)	(mA)		$3V_{eff}$	$5V_{eff}$	$8V_{eff}$
170	0,22	5,6	1	0,68	0,28	44	1,1	1,3	1,85
100	0,22	5,6	1	0,68	0,18	41	1,4	1,9	
170	0,1	3,9	1	0,33	0,45	37	1,1	1,7	2,6
100	0,1	3,9	1	0,33	0,28	34	2,0	3,5	
170	0,22	0	22	0,68	0,46	48	0,95	1,1	1,3
100	0,22	0	22	0,68	0,21	41	1,45	2,0	
170	0,1	0	22	0,33	0,82	42	0,75	1,0	1,2
100	0,1	0	22	0,33	0,35	35	1,6	2,8	

This valve can be used without special precautions against microphonic effect in circuits in which the input voltage Vi ≥ 10 mV for an output of 50 mW of the output valve

Ce tube peut être utilisé sans précautions spéciales contre l'effet microphonique dans des circuits dont la tension d'entrée $V_i \geq 10$ mV pour une puissance de sortie de 50 mW du tube de sortie

Diese Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden in Schaltungen die für eine Eingangsspannung $V_i \geq 10$ mV eine Ausgangsleistung von 50 mW der Endröhre ergeben

Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteiles

V_{a_o}	= max. 550 V
V_a	= max. 250 V
W_a	= max. 0,5 W
I_k	= max. 5 mA
$-V_g$ (I_g = +0,3 µA)	= max. 1,3 V
R_g	= max. 3 MΩ [1]
V_{kf}	= max. 150 V
R_{kf}	= max. 20 kΩ

Limiting values of the diode sections (each diode)
Caractéristiques limites des parties diode (par diode)
Grenzdaten der Diodenteile (pro Diode)

$V_{d\ inv_p}$	= max. 350 V
I_d	= max. 0,8 mA
I_{dp}	= max. 5 mA
V_{kf}	= max. 150 V
R_{kf}	= max. 20 kΩ

For curves refer to type UBC81
Pour les courbes voir type UBC81
Für die Kennlinien siehe Typ UBC81

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[1]) If the grid bias is obtained only by connecting a leakage resistor in the grid circuit, the max. value of R_g is 22 MΩ
Si la polarisation négative est obtenue seulement par moyen d'une résistance de fuite dans le circuit de la grille, la valeur maximum de R_g est de 22 MΩ
Wenn die negative Gittervorspannung nur mittels eines Ableitwiderstandes in der Gitterleitung erhalten wird, ist der Maximalwert von R_g 22 MΩ

PHILIPS

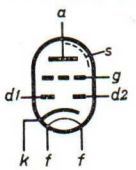
UBC81

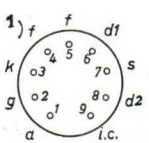
DOUBLE DIODE-TRIODE for A.F. amplification, signal detection and A.V.C.
DOUBLE DIODE-TRIODE pour amplification B.F., la détection de signaux et C.A.V.
DOPPELDIODE-TRIODE für NF-Verstärkung, Empfangsgleichrichtung und A.L.R.

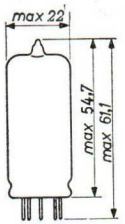
Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

V_f = 14 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	Triode section Partie triode Triodenteil	Diode section Partie diode Diodenteil
	C_g = 2,3 pF	C_{d1} = 0,9 pF
	C_a = 2,3 pF	C_{d2} = 0,9 pF
	C_{ag} = 1,2 pF	C_{d1d2} < 0,2 pF
	C_{gf} < 0,05 pF	C_{d1f} < 0,25 pF
		C_{d2f} < 0,05 pF

Between triode and diode sections
Entre les parties triode et diode
Zwischen Trioden- und Diodenteilen

C_{d1g} < 0,007 pF
C_{d2g} < 0,007 pF
C_{d1a} < 0,005 pF
C_{d2a} < 0,01 pF

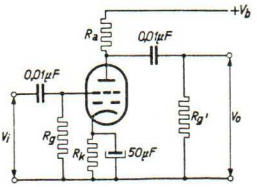
1) Earthed side of the heater circuit
Côté mise à la terre du circuit de filament
Geerdete Seite der Heizfadenschaltung

4.4.1956

Typical characteristics of the triode section
Caractéristiques types de la partie triode
Kenndaten des Triodenteiles

V_a	=	170	100 V
V_g	=	-1,55	-1,0 V
I_a	=	1,5	0,8 mA
S	=	1,65	1,4 mA/V
μ	=	70	70
R_i	=	42	50 kΩ

Operating characteristics as A.F. amplifier
Caractéristiques d'utilisation comme amplificatrice B.F.
Betriebsdaten als NF-Verstärker



V_b (V)	R_a (MΩ)	R_k (kΩ)	R_g (MΩ)	$R_{g'}$ (MΩ)	I_a (mA)	$\frac{V_o}{V_i}$	d_{tot} (%) at V_o = 3Veff	5Veff	8Veff
170	0,22	5,6	1,0	0,68	0,28	44	1,1	1,3	1,85
170	0,1	3,9	1,0	0,33	0,45	37	1,1	1,7	2,6
170	0,22	-	22	0,68	0,46	48	0,95	1,1	1,3
170	0,1	-	22	0,33	0,82	42	0,75	1,0	1,2
100	0,22	5,6	1,0	0,68	0,18	41	1,4	1,9	-
100	0,1	3,9	1,0	0,33	0,28	34	2,0	3,5	-
100	0,22	-	22	0,68	0,21	41	1,45	2,0	-
100	0,1	-	22	0,33	0,35	35	1,6	2,8	-

This tube can be used without special precautions against microphonic effect in circuits in which the input voltage $V_i \geq 10$ mV for an output of 50 mW of the output tube

Ce tube peut être utilisé sans précautions speciales contre l'effet microphonique dans des circuits dont la tension d'entrée $V_i \geq 10$ mV pour une puissance de 50 mW du tube de sortie

Diese Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden in Schaltungen die für eine Eingangsspannung $V_i \geq 10$ mV eine Leistung von 50 mW der Endröhre ergeben

Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteiles

V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	0,5	W
I_k	= max.	5	mA
$-V_g$ (I_g =+0,3µA)	= max.	1,3	V
R_g	= max.	3	MΩ [1]
V_{kf}	= max.	100	V
R_{kf}	= max.	20	kΩ

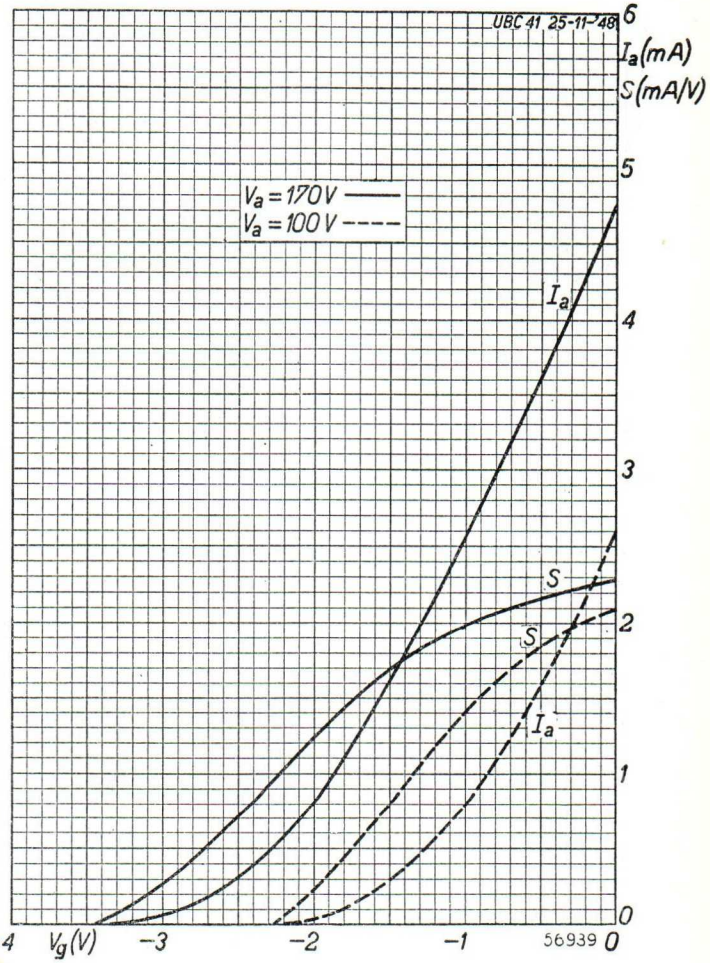
Limiting values of the diode sections
Caractéristiques limites des parties diode
Grenzdaten der Diodenteile

$V_{d\ inv_p}$	= max.	350	V
I_d	= max.	0,8	mA
I_{d_p}	= max.	5	mA
V_{kf}	= max.	100	V
R_{kf}	= max.	20	kΩ

[1]) If the grid bias is obtained only by connecting a leakage resistor in the grid circuit, the max. value of R_g is 22 MΩ.

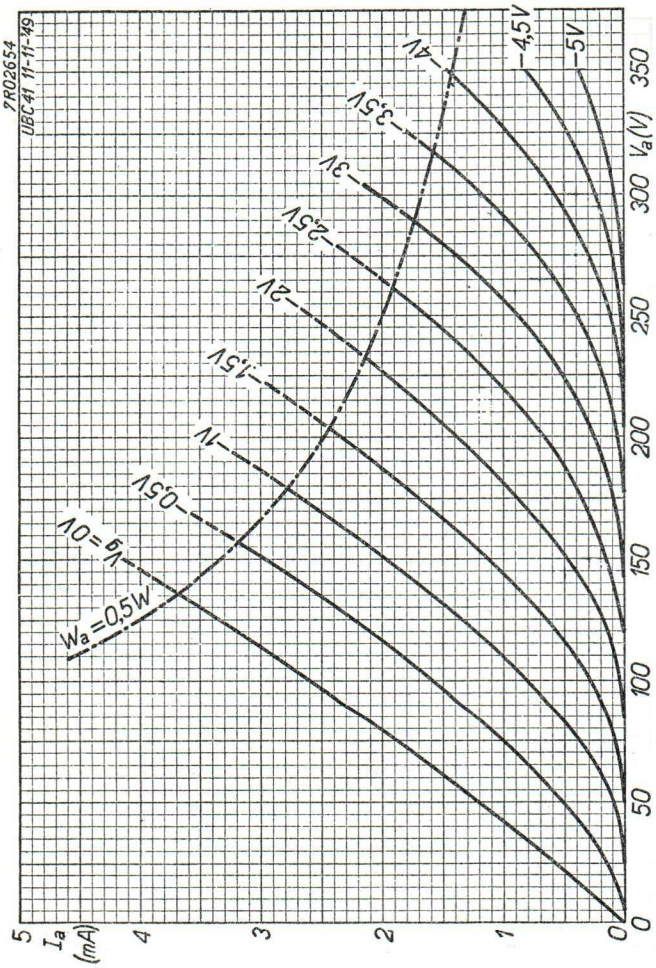
Si la polarisation négative est obtenue seulement par moyen d'une résistance de fuite dans le circuit de la grille, la valeur maximum de R_g est de 22 MΩ

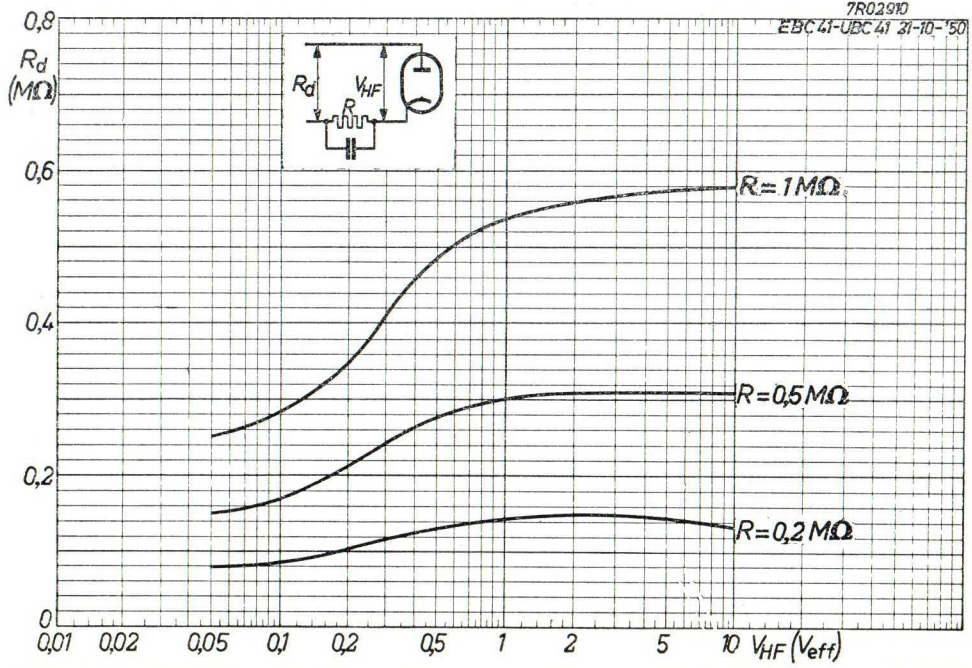
Wenn die negative Gittervorspannung nur von einem Ableitungswiderstand in der Gitterleitung erhalten wird, ist der Maximalwert von R_g 22 MΩ


UBC 41 25-11-48
I_a(mA)
S(mA/V)
V_a = 170 V
V_a = 100 V
I_a
S
S
I_a
6
5
4
3
2
1
0
−4
V_g(V)
−3
−2
−1
0
56939

11.11.1954

A


7R02654
UBC41 11-11-49
-4,5V
-5V
4V
3,5V
3V
2,5V
2V
1,5V
1V
0,5V
Vg=0V
Wa=0,5W
Ia (mA)
Va (V)
0
50
100
150
200
250
300
350
1
2
3
4
5

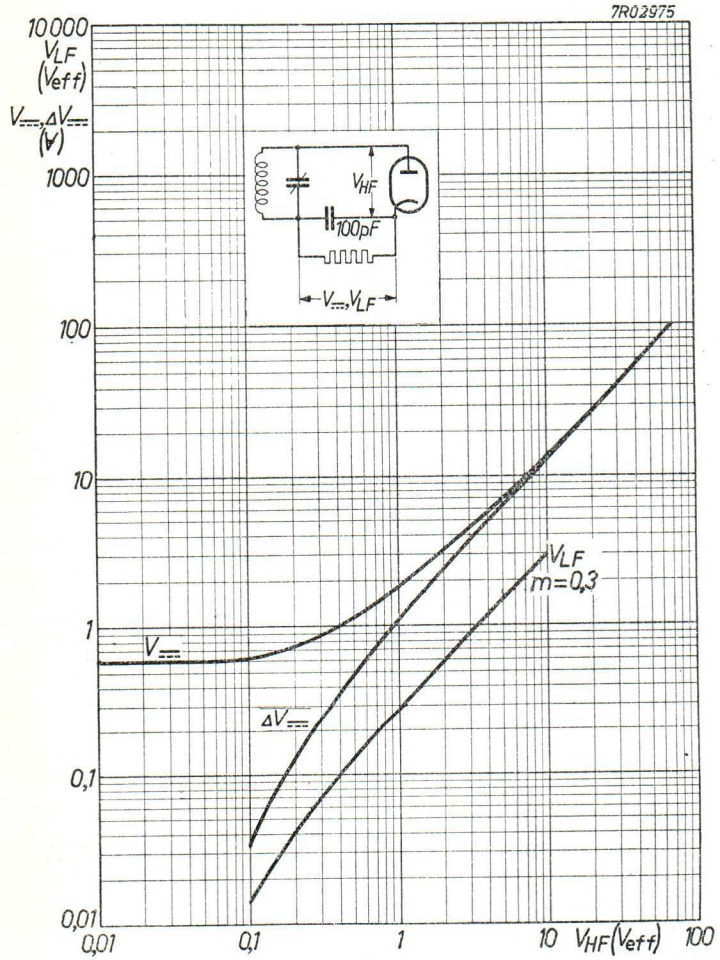


PHILIPS

UBC81

C

UBC 81 **PHILIPS**



D

PHILIPS UBF 80

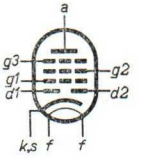
DOUBLE DIODE-PENTODE with variable mutual conductance for use as R.F., I.F. or A.F. amplifier
DOUBLE DIODE-PENTHODE à pente variable pour utilisation en amplificatrice H.F., M.F. ou B.F.
DOPPELDIODE-PENTODE mit veränderlicher Steilheit zur Verwendung als HF-, ZF- oder NF-Verstärker

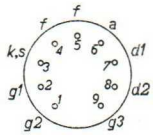
Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation-série
Heizung : indirekt durch Wechsel- oder Gleichstrom Serienspeisung

I_f = 100 mA
V_f = 17 V

Base, culot, Sockel: NOVAL

Overall length: 67 mm
See pages 205 and 253
Hauteur totale: 67 mm
Voir pages 205 et 253
Gesamthöhe : 67 mm
Siehe S. 205 und 253





Capacitances Capacités Kapazitäten	Pentode section Partie penthode Pentodenteil	Diode section Partie diode Diodenteil
	C_a = 4,9 pF	C_{d1} = 2,2 pF
	C_{g1} = 4,2 pF	C_{d2} = 2,35 pF
	C_{ag1} < 0,0025 pF	C_{d1d2} < 0,35 pF
	C_{g1f} < 0,07 pF	C_{d1f} < 0,02 pF
		C_{d2f} < 0,005 pF

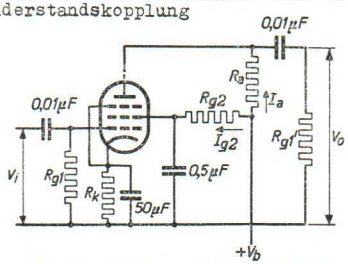
Between pentode and diode sections
Entre les parties penthode et diode
Zwischen Pentoden- und Diodenteilen

C_{d1g1} < 0,0008 pF
C_{d2g1} < 0,001 pF
C_{d1a} < 0,2 pF
C_{d2a} < 0,05 pF

Operating characteristics as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F. ou M.F.
Betriebsdaten als H.F. oder Z.F. Verstärker

$V_a=V_b$	=	100		170		200		V
R_{g2}	=	47		47		68		kΩ
V_{g3}	=	0		0		0		V
R_k	=	295		295		295		Ω
V_{g1}	=	-1,15	-15,5	-2	-26,5	-2	-31,5	V
I_a	=	2,8	-	5,0	-	5,0	-	mA
I_{g2}	=	1,0	-	1,75	-	1,75	-	mA
S	=	1900	19	2200	22	2200	22	µA/V
R_i	=	0,9	>10	0,9	>10	1,0	>10	MΩ
μ_{g2g1}	=	18	-	18	-	18	-	
R_{eq}	=	4,6	-	6,2	-	6,2	-	kΩ

Operating characteristics of the pentode section as resistance coupled A.F. amplifier
Données caractéristiques de la partie penthode en amplificatrice B.F. avec couplage à résistances
Betriebsdaten des Pentodenteiles als N.F. Verstärker mit Widerstandskopplung



This valve can be used without special precautions against microphonic effect in circuits in which the input voltage $V_i \geqq 25$ mV for an output of 50 mW of the output valve.
Ce tube peut être utilisé sans précautions spéciales contre l'effet microphonique dans des circuits dont la tension d'entrée $V_i \geqq 25$ mV pour une puissance de 50 mW du tube de sortie
Diese Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden in Schaltungen die für eine Eingangsspannung $V_i \geqq 25$ mV eine Leistung von 50 mW der Endröhre ergeben.

V_b = 170 V

R_a (MΩ)	R_{g2} (MΩ)	R_{g1} (MΩ)	R_k (Ω)	R_{g1}' (MΩ)	I_a (mA)	I_{g2} (mA)	$\frac{V_o}{V_i}$	d_{tot} (%)		
								V_o= $3V_{eff}$	V_o= $5V_{eff}$	V_o= $8V_{eff}$
0,22	0,68	1	2700	0,68	0,56	0,20	85	1,2	1,5	1,8
0,1	0,27	1	1000	0,33	1,25	0,50	70	1,2	1,6	2,0
0,22	0,82	10	0	0,68	0,56	0,19	140	0,8	1,0	1,4
0,1	0,33	10	0	0,33	1,16	0,46	100	0,8	1,4	2,0

V_b = 100 V

R_a (MΩ)	R_{g2} (MΩ)	R_{g1} (MΩ)	R_k (Ω)	R_{g1}' (MΩ)	I_a (mA)	I_{g2} (mA)	$\frac{V_o}{V_i}$	d_{tot} (%)	
								V_o= $3V_{eff}$	V_o= $5V_{eff}$
0,22	0,68	1	2700	0,68	0,32	0,12	82	1,4	1,9
0,1	0,27	1	1000	0,33	0,73	0,29	67	1,4	1,8
0,22	0,82	10	0	0,68	0,32	0,11	100	2,8	3,0
0,1	0,33	10	0	0,33	0,66	0,25	70	1,7	3,2

Operating characteristics as resistance coupled A.F. amplifier in triode connection (g2 connected to anode)
Données caractéristiques en amplificatrice B.F. avec couplage à résistances montée en triode (g2 relié à l'anode)
Betriebsdaten als N.F.Verstärker mit Widerstandskopplung in Triodenschaltung (g2 verbunden mit Anode)

V_b (V)	R_a (MΩ)	R_{g1} (MΩ)	R_k (Ω)	R_{g1}' (MΩ)	I_a (mA)	$\frac{V_o}{V_i}$	d_{tot} (%)		
							V_o= $3V_{eff}$	V_o= $5V_{eff}$	V_o= $8V_{eff}$
170	0,1	1	1800	0,33	1,25	11	2,1	3,5	4,8
170	0,047	1	1000	0,15	2,4	11	1,8	3,1	4,6
170	0,1	10	0	0,33	1,4	14	2,5	3,8	5,0
170	0,047	10	0	0,15	2,8	14	2,1	3,4	4,7
100	0,1	1	1800	0,33	0,74	11	3,2	4,9	
100	0,047	1	1000	0,15	1,4	11	3,0	4,8	
100	0,1	10	0	0,33	0,8	12	3,0	4,7	
100	0,047	10	0	0,15	1,5	12	3,0	4,8	

Limiting values of the pentode section
Caractéristiques limites de la partie penthode
Grenzdaten des Pentodenteiles

V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	1,5	W
V_{g2_o}	= max.	550	V
V_{g2} (I_a < 2 mA)	= max.	250	V
V_{g2} (I_a = 5 mA)	= max.	125	V
W_{g2}	= max.	0,3	W
I_k	= max.	10	mA
V_{g1} (I_{g1}=+0,3µA)	= max.	-1,3	V
R_{g1} (R_k = 295Ω)[1]	= max.	3	MΩ
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	150	V

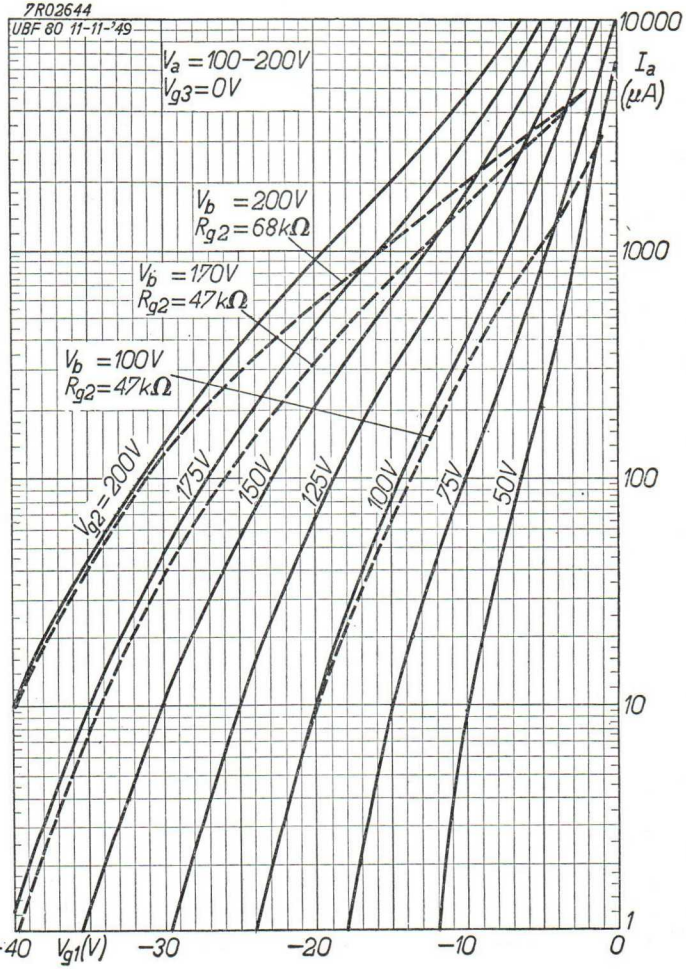
Limiting values of the diode section
Caractéristiques limites de la partie diode
Grenzdaten des Diodenteiles

$V_{d1\ inv_p}$	= max.	350	V
$V_{d2\ inv_p}$	= max.	350	V
I_{d1}	= max.	0,8	mA
I_{d2}	= max.	0,8	mA
I_{d1_p}	= max.	5	mA
I_{d2_p}	= max.	5	mA
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	150	V

[1]) If the grid bias is obtained only by connecting a leakage resistor in the grid circuit, the maximum value of R_{g1} is 22 MΩ.

Si la polarisation négative est obtenue seulement par moyen d'une résistance de fuite dans le circuit de la grille, la valeur maximum de R_{g1} est de 22 MΩ.

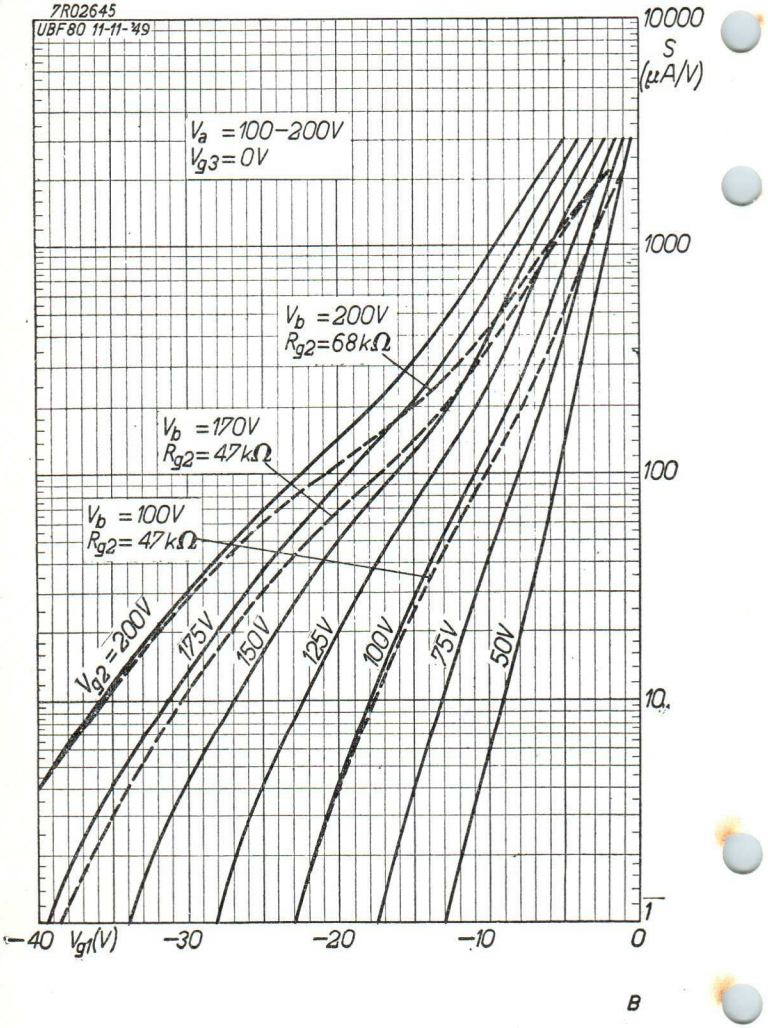
Wenn die negative Gittervorspannung nur von einem Ableitungswiderstand in der Gitterleitung erhalten wird, ist der Maximalwert von R_{g1} 22 MΩ.


7R02644
UBF 80 11-11-'49
V_a = 100–200V
V_{g3} = 0V
V_b = 200V
R_{g2} = 68kΩ
V_b = 170V
R_{g2} = 47kΩ
V_b = 100V
R_{g2} = 47kΩ
V_{g2} = 200V
175V
150V
125V
100V
75V
50V
10000
I_a (μA)
1000
100
10
1
−40
V_{g1}(V)
−30
−20
−10
0

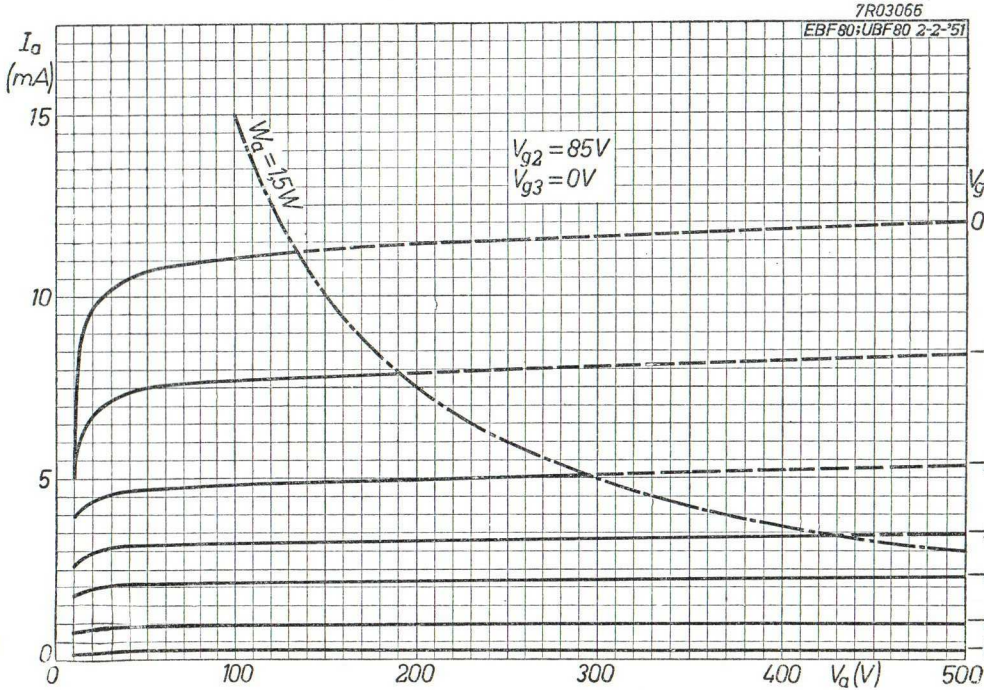
11.11.1949

A

UBF 80 **PHILIPS**



B



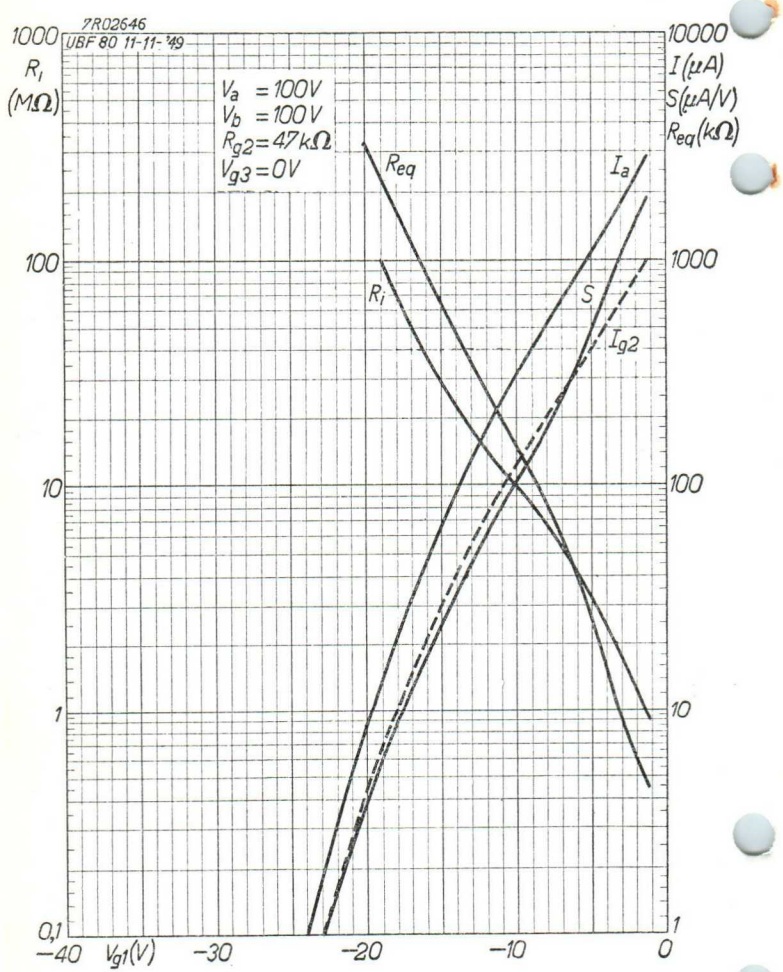
PHILIPS

UBF80

C

UBF80

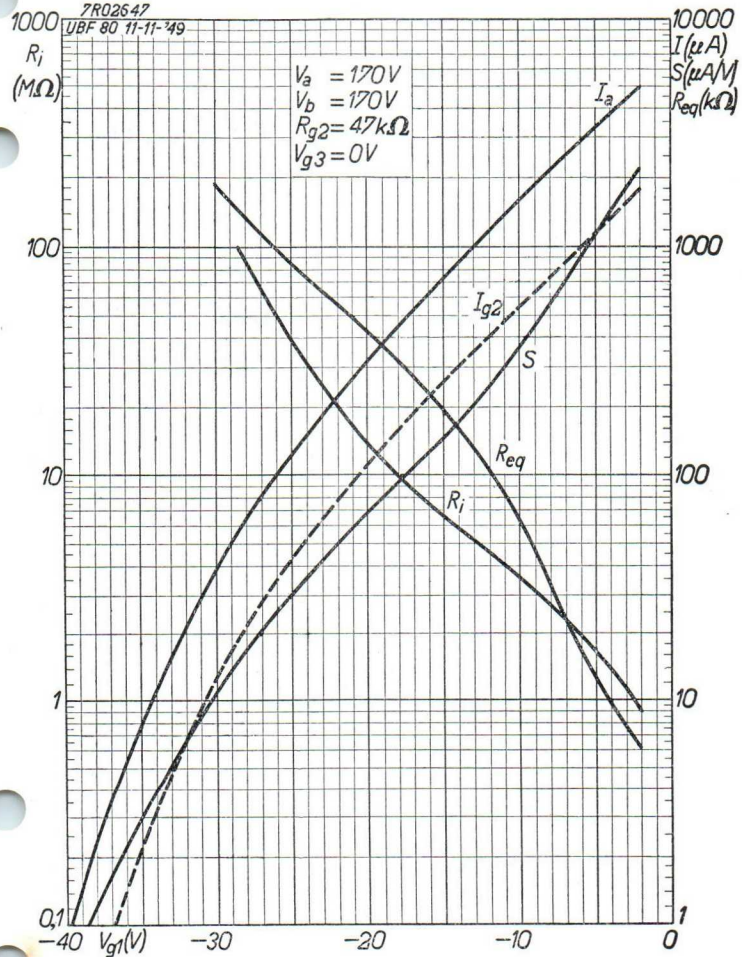
PHILIPS



D

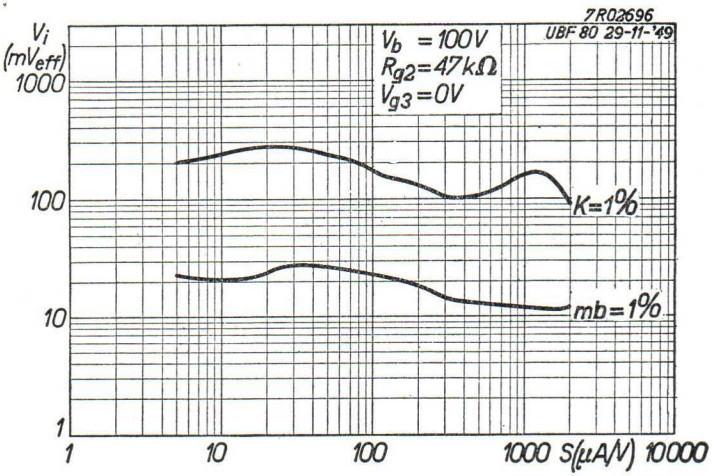
PHILIPS

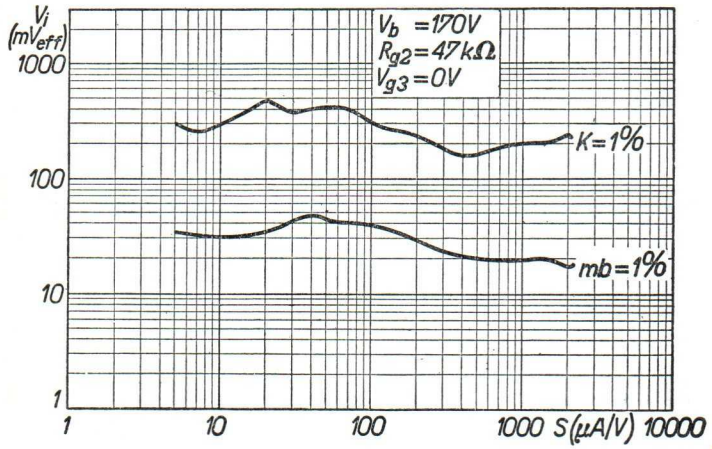
UBF 80

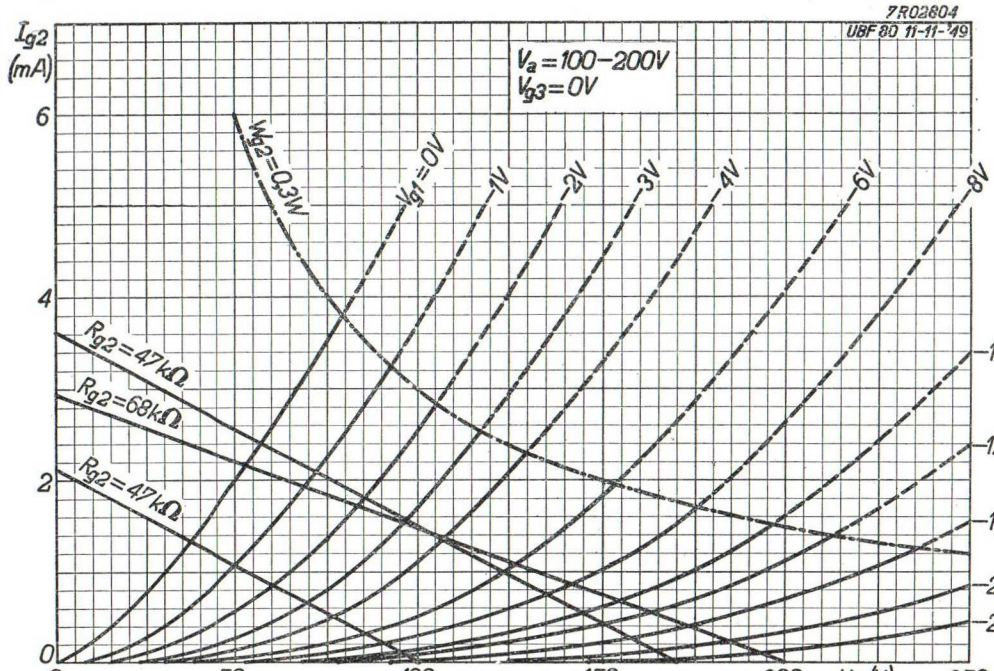


2.2.1951

E


7R02696
UBF 80 29-11-'69
V_i (mV_{eff})
1000
100
10
1
V_b = 100V
R_{g2} = 47kΩ
V_{g3} = 0V
K=1%
mb=1%
1
10
100
1000 S(μA/V) 10000


V_i (mV_{eff})
1000
100
10
1
V_b = 170V
R_{g2} = 47kΩ
V_{g3} = 0V
K=1%
mb=1%
1
10
100
1000 S(μA/V) 10000



PHILIPS

UBF 80

G

PHILIPS

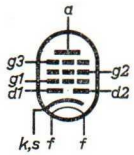
UBF 89

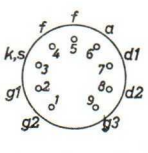
DUODIODE-PENTODE with variable mutual conductance for use as H.F. or I.F. amplifier
DUODIODE-PENTHODE à pente variable pour utilisation comme amplificatrice H.F. ou M.F.
DUODIODE-PENTODE mit veränderlicher Steilheit zur Verwendung als HF- oder ZF-Verstärker

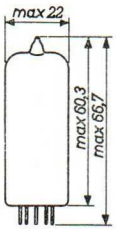
Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

V_f = 19 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	Pentode section Partie penthode Pentodenteil			Diode section Partie diode Diodenteil		
	C_a	=	5,2 pF	C_{d1}	=	2,5 pF
	C_{g1}	=	5,0 pF	C_{d2}	=	2,5 pF
→	C_{ag1}	<	0,0025 pF	C_{d1d2}	<	0,25 pF
	C_{g1f}	<	0,05 pF	C_{d1f}	<	0,015 pF
				C_{d2f}	<	0,003 pF

Between pentode and diode sections
Entre les parties penthode et diode
Zwischen Pentoden- und Diodenteilen

C_{d1g1} < 0,0008 pF
C_{d2g1} < 0,001 pF
C_{d1a} < 0,15 pF
C_{d2a} < 0,025 pF

←

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	200	170	100 V
V_{g2}	=	100	100	100 V
V_{g3}	=	0	0	0 V
V_{g1}	=	-1,5	-1[1])	-2 V
I_a	=	11	12	8,5 mA
I_{g2}	=	3,3	4	2,8 mA
S	=	4,5	5	3,5 mA/V
μ_{g2g1}	=	20	20	-
R_i	=	0,6	0,4	0,3 MΩ

Operating characteristics as H.F. or I.F. amplifier
Caractéristiques d'utilisation comme amplificateur H.F. ou M.F.
Betriebsdaten als HF- oder ZF-Verstärker

$V_b = V_a$	=	200		100		V
V_{g3}	=	0		0		V
R_{g2}	=	30		0		kΩ
V_{g1}	=	-1,5	-20	-2	-10	V
I_a	=	11	-	8,5	-	mA
I_{g2}	=	3,3	-	2,8	-	mA
S	=	4,5	0,12	3,5	0,11	mA/V
R_i	=	0,6	-	0,3	-	MΩ

[1]) In this case control grid current may occur. If this is not permissible, the negative grid bias should be increased to a value of 1.5 V at least

Dans ce cas il peut se présenter de courant de grille. Si celui-ci n'est pas permis, il faut augmenter la polarisation négative jusqu'à une valeur de 1,5 V au moins

Bei dieser Einstellung kann Gitterstrom fliessen; wenn das unzulässig ist, muss man eine Einstellung mit -1,5 V Gittervorspannung wählen.

Limiting values of the pentode section
Caractéristiques limites de la partie penthode
Grenzdaten des Pentodenteils

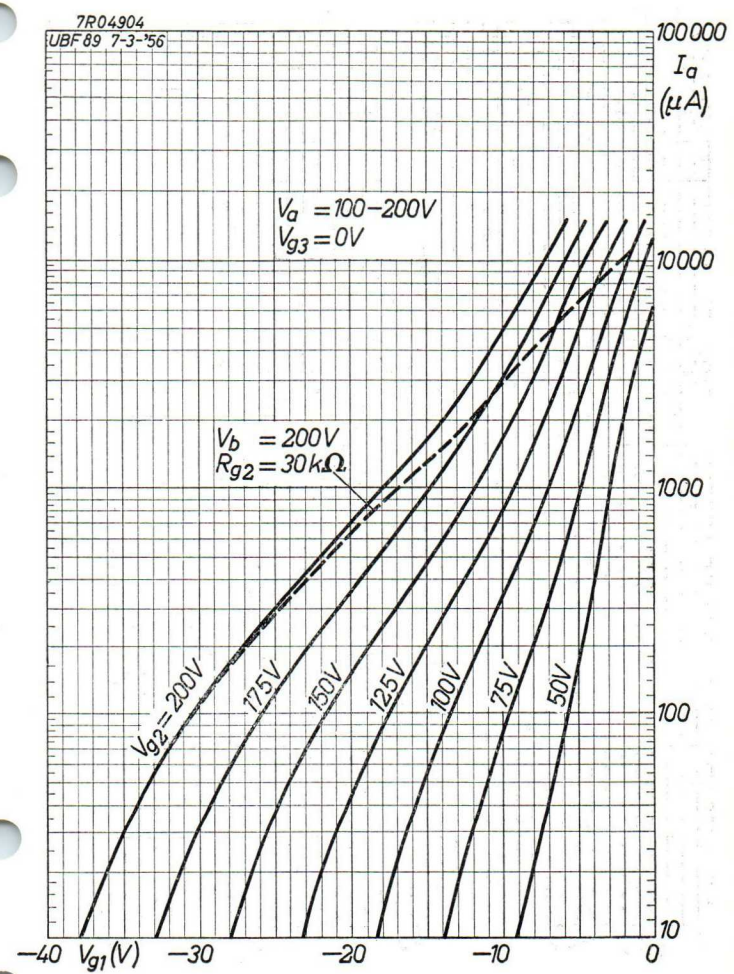
V_{a_o}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	2,25 W
V_{g2_o}	= max.	550 V
V_{g2} (I_a < 4 mA)	= max.	250 V
V_{g2} (I_a > 8 mA)	= max.	125 V
W_{g2}	= max.	0,45 W
I_k	= max.	16,5 mA
R_{g1}	= max.	3 MΩ[2])
R_{g3}	= max.	10 kΩ
R_{kf}	= max.	20 kΩ
V_{kf}	= max.	100 V
$-V_{g1}$ (I_{g1} = +0,3 µA)	= max.	1,3 V

Limiting values of the diode sections
Caractéristiques limites des parties diodes
Grenzdaten der Diodenteile

$V_{d1\ inv_p}$	= max.	200 V
$V_{d2\ inv_p}$	= max.	200 V
I_{d1}	= max.	0,8 mA
I_{d2}	= max.	0,8 mA
I_{d1_p}	= max.	5 mA
I_{d2_p}	= max.	5 mA
$-V_d$ (I_d = +0,3 µA)	= max.	1,3 V

---

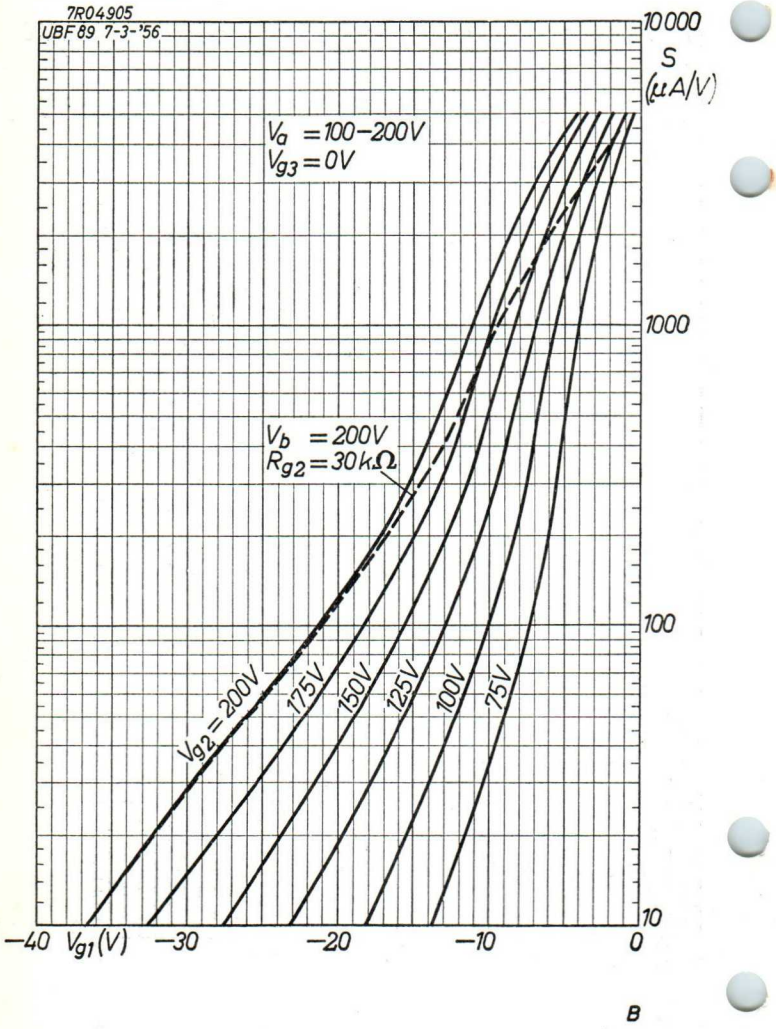
2) With grid current biasing R_{g1} = max. 22 MΩ
Si V_{g1} est obtenue seulement par moyen de R_{g1}, R_{g1} = max. 22 MΩ
Wenn V_{g1} nur mittels R_{g1} erhalten wird, ist R_{g1} = max. 22 MΩ


7R04904
UBF 89 7-3-'56
100000
I_a
(μA)
V_a = 100–200V
V_{g3} = 0V
10000
V_b = 200V
R_{g2} = 30kΩ
1000
V_{g2} = 200V
175V
150V
125V
100V
75V
50V
100
10
−40
V_{g1}(V)
−30
−20
−10
0

4.4.1956

A

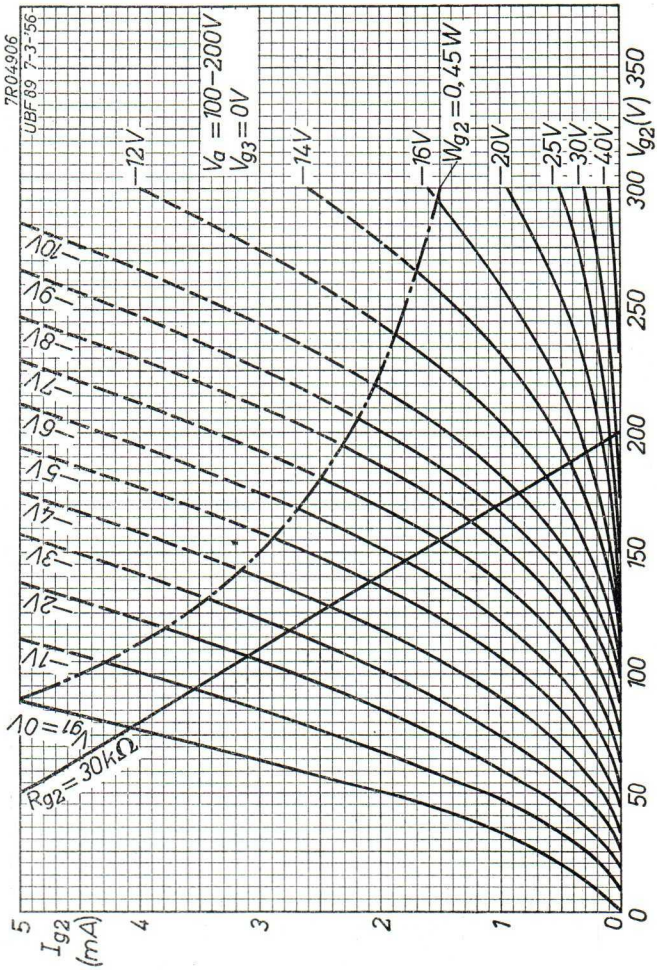
UBF 89 **PHILIPS**



B

PHILIPS

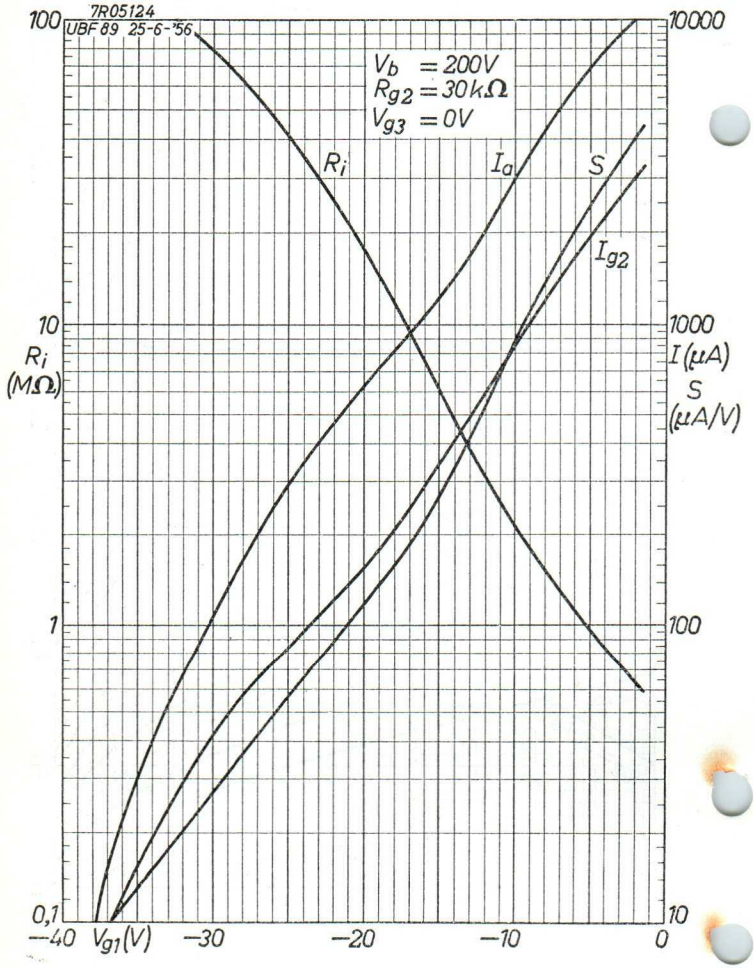
UBF 89



7.7.1956

C

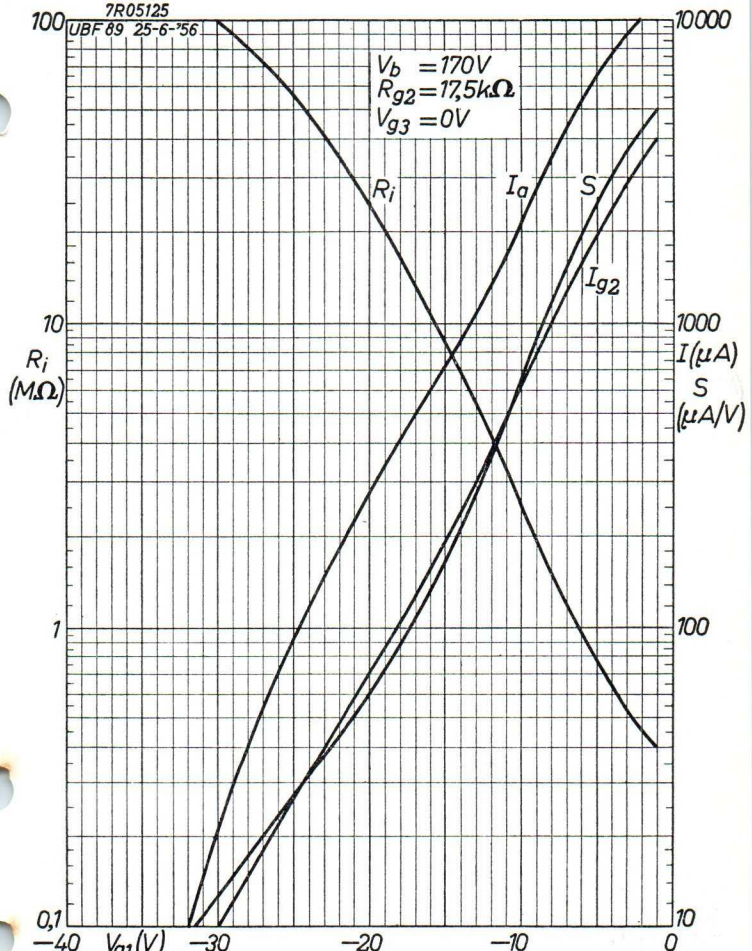
UBF 89 **PHILIPS**



D

PHILIPS

UBF 89



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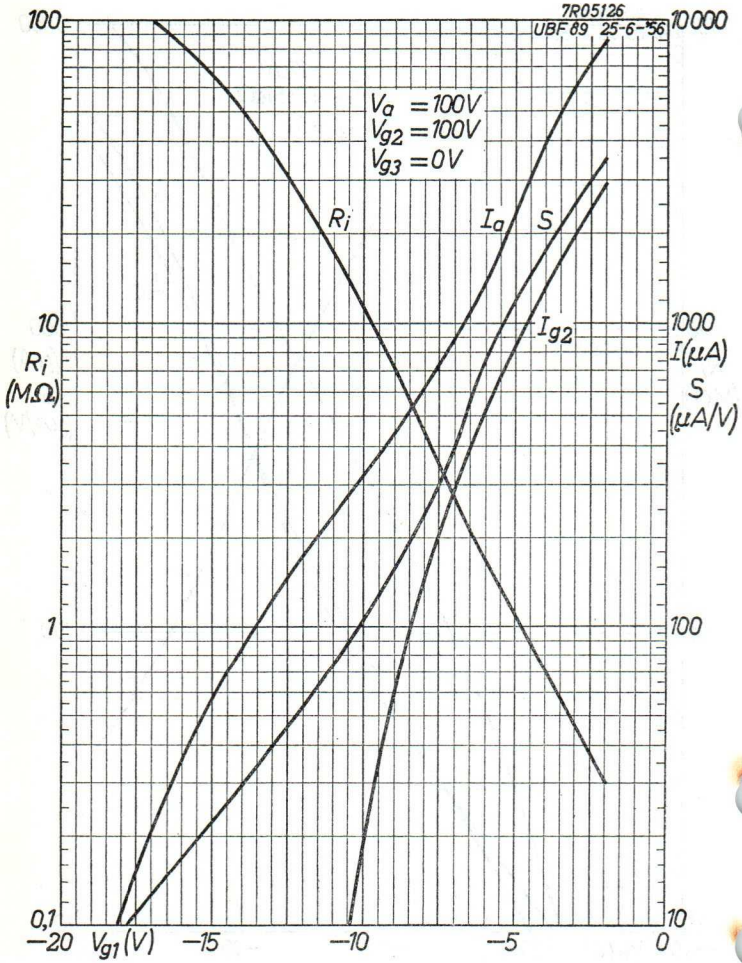
E

UBF 89 **PHILIPS**



F

PHILIPS

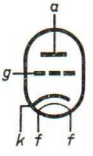
UC 92

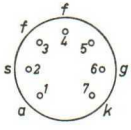
R.F.TRIODE for use as oscillator or mixer in F.M./A.M. receivers
TRIODE H.F.pour utilisation en oscillatrice ou mélangeuse dans des récepteurs F.M./A.M.
HF-TRIODE zur Verwendung als Oszillator oder Mischröhre in FM/AM-Empfängern

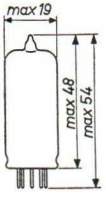
Heating : indirect by A.C. or D.C.; series supply
Chauffage: indirect par C.A. ou C.C.; alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

V_f = 9,5 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Miniature

Capacitances
Capacités
Kapazitäten

C_g	= 2,6 pF	C_k (g+f)	= 4,5 pF
C_a	= 0,55 pF	C_a (g+f)	= 1,8 pF
C_{ag}	= 1,6 pF		
C_{kf}	= 2,2 pF		
C_{gf}	< 0,15 pF		
C_{ak}	= 0,24 pF		

Typical characteristics
Caractéristiques types
Kenndaten

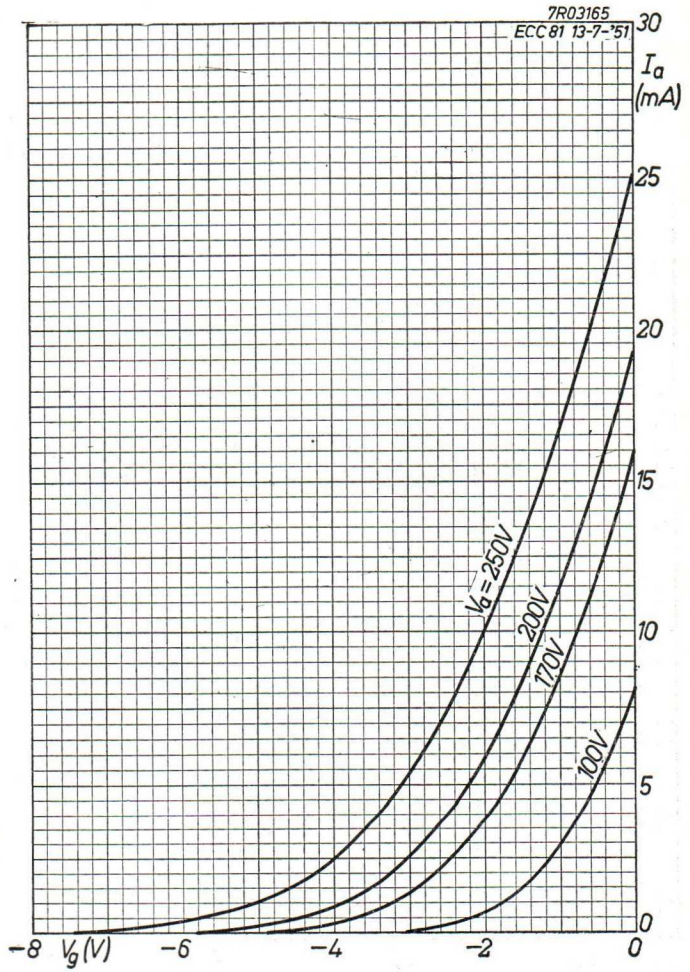
V_a	=	100	170	200 V
V_g	=	-1	-1	-1 V
I_a	=	3	8,5	11,5 mA
S	=	3,75	5,9	6,7 mA/V
μ	=	62	66	70
R_i	=	16,5	11	10,5 kΩ

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max.	550	V
V_a	= max.	300	V
W_a	= max.	2,5	W
I_k	= max.	15	mA
$-V_g$	= max.	50	V
R_g	= max.	1	MΩ
V_{kf}	= max.	90	V
R_{kf}	= max.	20	kΩ
$V_g(I_g=+0,3\mu A)$	= max.	-1,3	V

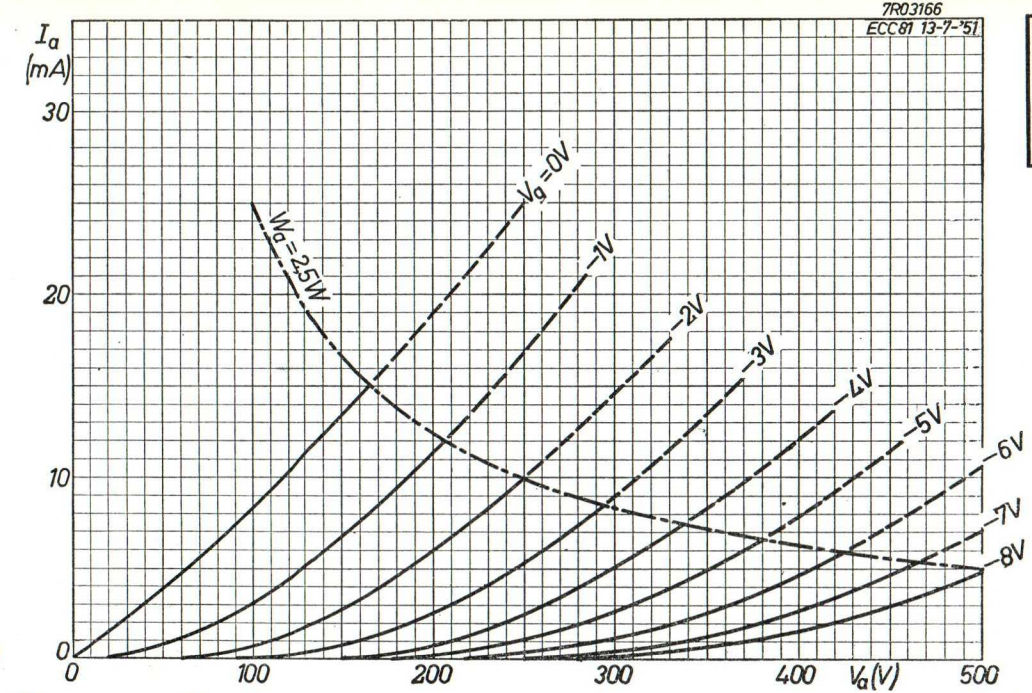
PHILIPS

UC 92



1.1.1954

A



UC 92

PHILIPS

B

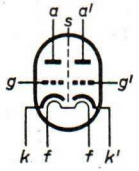
PHILIPS UCC 85

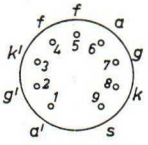
DOUBLE TRIODE for use as R.F. amplifier and self-oscillating mixer
DOUBLE TRIODE pour utilisation comme amplificatrice H.F. et tube mélangeur-auto-oscillateur
DOPPELTRIODE zur Verwendung als HF-Verstärker und selbstschwingende Mischröhre

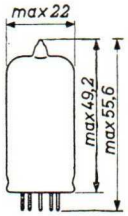
Heating : indirect by A.C. or D.C.; series supply
Chauffage: indirect par C.A. ou C.C.; alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

V_f = 26 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: NOVAL

Capacitances
Capacités
Kapazitäten

C_{ag}	= 1,5 pF	$C_{a'g'}$	= 1,5 pF
C_{ak}	= 0,18 pF	$C_{a'k'}$	= 0,18 pF
$C_{a(k+f+s)}$	= 1,2 pF	$C_{a'(k'+f+s)}$	= 1,2 pF
$C_{g(k+f+s)}$	= 3 pF	$C_{g'(k'+f+s)}$	= 3 pF
$C_{a(k+f+s)}$	= 1,9 pF[1])	$C_{a'(k'+f+s)}$	= 1,9 pF[1])
$C_{aa'}$	< 0,04 pF	$C_{ak'}$	< 0,008 pF
$C_{aa'}$	< 0,008 pF[1])	$C_{gk'}$	< 0,003 pF
$C_{gg'}$	< 0,003 pF	$C_{a'k}$	< 0,008 pF
$C_{ag'}$	< 0,008 pF	$C_{g'k}$	< 0,003 pF
$C_{a'g}$	< 0,008 pF		

1)With external shield (22.5 mm diameter)
Avec blindage extérieur (diamètre 22,5 mm)
Mit äusserer Abschirmung (22,5 mm Durchmesser)

939 0519
9.9.1955

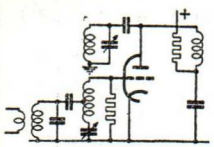
Typical characteristics
Caractéristiques types
Kenndaten

V_a	= 100	170	200	V
V_g	= -1,1[1])	-1,5	-2,1	V
I_a	= 4,5	10	10	mA
S	= 4,6	6,2	5,8	mA/V
μ	= 50	50	48	

Operating characteristics as R.F. amplifier in F.M./A.M. receivers (system a,g,k)
Caractéristiques d'utilisation en amplificatrice H.F. dans des récepteurs F.M./A.M. (système a,g,k)
Betriebsdaten als HF-Verstärker in FM/AM-Empfängern (System a,g,k)

V_b	= 170	170	100	V
R_a	= 1,3	1,5	1,5	kΩ
V_a	= 160	155	92	V
R_k	= 330	160	160	Ω
V_g	= -2	-1,4	-0,85	V
I_a	= 6	8,7	5,2	mA
S	= 4,7	6	5,2	mA/V
R_i	= 10,5	8,4	10	kΩ
r_g(f=100 Mc/s)	= 8	6	7	kΩ
R_{eq}	= 0,65	0,5	0,58	kΩ

Operating characteristics as self-oscillating mixer in F.M./A.M. receivers (system a',g',k')
Caractéristiques d'utilisation comme tube mélangeur auto-oscillateur dans des récepteurs F.M./A.M.(système a',g',k')
Betriebsdaten als selbstschwingende Mischröhre in FM/AM-Empfängern (System a',g',k')



V_b	= 100	170	200	V
R_a	= 4,7	4,7	8,2	kΩ
R_g	= 1	1	1	MΩ[2])
Vosc	= 1,8	2,8	2,8	V_{eff}
I_a	= 2,2	4,8	5,2	mA
S_c	= 1,7	2,2	2,3	mA/V
R_i	= 20	16	15	kΩ
r_g(f=100 Mc/s)	= -	15	-	kΩ

[1])[2])See page 3; voir page 3; siehe Seite 3

Limiting values (per system)
Caractéristiques limites (par système)
Grenzdaten (pro System)

V_{a_o}	= max.	550 V
V_a	= max.	250 V
W_a	= max.	2,5 W[3])
$-V_g$	= max.	100 V
R_g	= max.	1 MΩ
I_k	= max.	15 mA
V_{kf}	= max.	90 V
R_{kf}	= max.	20 kΩ

For curves of the UCC 85 please refer to type PCC 85
Pour les caractéristiques du type UCC 85 voir le type PCC 85
Für die Kurven der Röhre UCC 85 siehe Type PCC 85

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[1])In this case grid current may occur. If this is not permissible, the negative grid bias should be increased to a value of -1.5 V at least

Dans ce cas il peut se présenter de courant de grille. Si ceci n'est pas permis, il faut augmenter la polarisation négative jusqu'à une valeur de -1,5 V au moins

Bei dieser Einstellung kann Gitterstrom fliessen; wenn das unzulässig ist, muss man eine Einstellung mit -1,5 V Gittervorspannung wählen

[2])At this value of R_g squegging is prevented by feedback, which normally is applied in order to compensate for the R_i of the tube

A cette valeur de R_g la sur-oscillation est prévenue par réaction, qui normalement est apliquée afin de compenser la R_i du tube

Bei diesem Wert von R_g werden Überschwingungen vermieden durch Rückkopplung, die gewöhnlich angewandt wird zur Ausgleichung der R_i der Röhre

[3])$W_a + W_a' = \text{max. } 4,5 \text{ W}$

PHILIPS

UCH 41

TRIODE-HEXODE

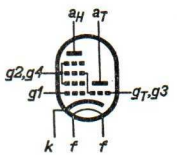
Heating : indirect; series supply — V_f = 14 V
Chauffage : indirect; alimentation- série — I_f = 100 mA
Heizung : indirekt; Serienspeisung

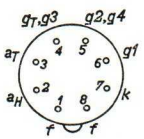
Base, culot, Sockel: RIMLOCK.

Overall length: 60 mm
See pages 203 and 252

Hauteur totale: 60 mm
Voir pages 203 et 252

Gesamthöhe : 60 mm
Siehe S. 203 und 252





Capacitances Capacités Kapazitäten	C_{g1}	= 3,4 pF		$C_{gT,g3}$	= 4,9 pF
	C_{aH}	= 6,0 pF		C_{aT}	= 1,5 pF
	C_{aH-g1}	< 0,1 pF		$C_{aT-gT,g3}$	= 1,2 pF
	C_{g1f}	< 0,15 pF		$C_{g1-gT,g3}$	< 0,35 pF
				$C_{aH-gT,g3}$	< 0,2 pF

Operating characteristics of the triode section as oscillator
Caractéristiques d'utilisation de la partie triode en oscillatrice
Betiebsdaten des Triodenteiles als Oszillator

V_b	= 100	170	200	V
R_a	= 10	10	20	kΩ
I_a	= 2,8	4,9	4,6	mA
$R_{gT,g3}$	= 20	20	20	kΩ
$I_{gT,g3}$	= 200	320	360	µA
V_{osc}	= 4	7	8	Veff
S_{eff}	= 0,56	0,6	0,5	mA/V

Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteiles

V_{a_o}	= max. 550 V	I_k	= max. 5,5 mA
V_a	= max. 175 V	$V_g(I_g=+0,3\mu A)$	= max. -1,3 V
W_a	= max. 0,75 W	R_g	= max. 3 MΩ

Operating characteristics of the hexode section as frequency changer(screen-grid supply through a potentiometer R_1,R_2)
Caractéristiques d'utilisation de la partie hexode en changeuse de fréquence(alimentation de la grille-écran à travers un potentiomètre R_1,R_2)
Betriebsdaten des Hexodenteiles als Mischröhre(Schirmgitterspannung über einen Spannungsteiler R_1,R_2)

$V_a=V_b$ =	100		170		200		V
R_1 =	22		22		22		kΩ
R_2 =	47		47		47		kΩ
R_k =	200		200		225		Ω
$R_{gT,g3}$=	20		20		20		kΩ
$I_{gT,g3}$=	200		320		360		µA
V_{g1} =	-1,0	-14	-1,8	-22	-2,2	-27	V
$V_{g2,g4}$=	53	68	87	116	105	136	V
I_a =	1,0	-	2,2	-	3,0	-	mA
$I_{g2,g4}$=	1,0	-	1,9	-	2,1	-	mA
S_c =	320	3,2	450	4,5	500	5	µA/V
R_i =	1,4	>5	1,2	>5	1,0	>5	MΩ
R_{eq} =	115	-	145	-	220	-	kΩ

Limiting values of the hexode section
Caractéristiques limites de la partie hexode
Grenzdaten des Hexodenteiles

V_{a_o}	= max. 550 V
V_a	= max. 250 V
W_a	= max. 0,8 W
$V_{g2,g4_o}$	= max. 550 V
$V_{g2,g4}$	= max. 125 V
$W_{g2,g4}$	= max. 0,3 W
I_k	= max. 7 mA
$V_{g1}(I_{g1}=+0,3\mu A)$	= max.-1,3 V
R_{g1}	= max. 3 MΩ
R_{g3}	= max. 3 MΩ
R_{kf}	= max. 20 kΩ
V_{kf}	= max. 150 V

PHILIPS UCH 42

TRIODE-HEXODE for use as frequency changer and phase inverter
TRIODE-HEXODE pour utilisation en changeuse de fréquence et comme tube inverseur de phase
TRIODE-HEXODE zur Verwendung als Mischröhre und Phasenumkehrröhre

Heating : indirect; series supply
Chauffage: indirect; alimentation- série
Heizung : indirekt; Serienspeisung

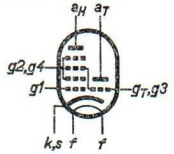
V_f = 14 V
I_f = 100 mA

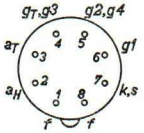
Base, culot, Sockel: RIMLOCK

Overall length: 60 mm
See pages 203 and 252

Hauteur totale: 60 mm
Voir pages 203 et 252

Gesamthöhe : 60 mm
Siehe S.203 und 252





Capacitances Capacités Kapazitäten	C_{g1}	= 4,0 pF	$C_{gT,g3}$	= 5,9 pF
	C_a	= 9,4 pF	C_{aT}	= 2,4 pF
	C_{aH-g1}	< 0,1 pF	$C_{aT-gT,g3}$	= 1,3 pF
	C_{g1f}	<0,15 pF	$C_{g1-gT,g3}$	< 0,35 pF
			$C_{aH-gT,g3}$	< 0,2 pF

Triode section;Partie triode;Triodenteil

Typical characteristics
Caractéristiques types
Kenndaten

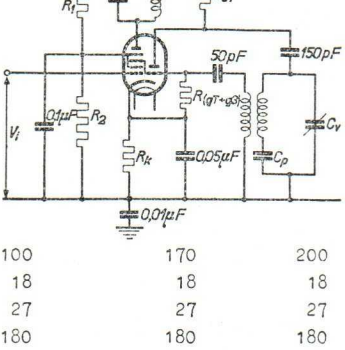
V_a = 100 V
V_g = 0 V
I_a = 10 mA
S = 2,8 mA/V
μ = 16

Operating characteristics as oscillator
Caractéristiques d'utilisation en oscillatrice
Betriebsdaten als Oszillator

V_b	=	100		170		200	V
R_a	=	10		10		22	kΩ
Vosc	=	4		8		8	Veff
$R_{gT,g3}$	=	22	47	22	47	22	47	kΩ
$I_{gT,g3}$	=	175	100	350	200	350	200	µA
I_a	=	3,4	3,1	6,5	5,7	5,5	5,2	mA
Seff	=	0,7	0,6	0,75	0,65	0,65	0,55	mA/V

Hexode section;Partie hexode;Hexodenteil

Operating characteristics as frequency changer(screen-grid supply through a potentiometer R_1,R_2)
Caractéristiques d'utilisation en changeuse de fréquence (alimentation de la grille-écran à travers un potentiomètre R_1,R_2)
Betriebsdaten als Mischröhre(Schirmgitterspannung über einen Spannungsteiler R_1,R_2)



$V_a=V_b$ =	100		170		200		V
R_1 =	18		18		18		kΩ
R_2 =	27		27		27		kΩ
R_k =	180		180		180		Ω
$R_{gT,g3}$=	22		22		22		kΩ
$I_{gT,g3}$=	175[1]		350[1]		350[1]		µA
V_{g1} =	-1,0	-13,5	-1,85	-25	-2	-27,5	V
$V_{g2,g4}$=	43	57	70	100	85	119	V
I_a =	1,2	-	2,1	-	3,0	-	mA
$I_{g2,g4}$=	1,46	-	2,6	-	3,0	-	mA
S_c =	530	5,3	670	6,7	750	7,5	µA/
R_i =	>1	>5	>1	>5	>1	>5	MΩ
R_{eq} =	60	-	65	-	75	-	kΩ

[1]) For $R_{gT,g3}$=47 kΩ, $I_{gT,g3}$ should be adjusted to 200 µA at V_a=200 V or 170 V and to 100 µA at V_a = 100 V
Pour $R_{gT,g3}$=47 kΩ, $I_{gT,g3}$ sera réglé à 200 µA avec V_a=200 V ou 170 V et à 100 µA avec V_a=100 V
Für $R_{gT,g3}$=47 kΩ,ist $I_{gT,g3}$ auf 200µA einzustellen wenn V_a=200V oder 170V und auf 100µA wenn V_a=100 V

Limiting values of the hexode section
Caractéristiques limites de la partie hexode
Grenzdaten des Hexodenteiles

V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	1,5	W
$V_{g2,g4_o}$	= max.	550	V
$V_{g2,g4}$ (I_a = 3 mA)	= max.	125	V
$V_{g2,g4}$ (I_a < 1 mA)	= max.	250	V
$W_{g2,g4}$	= max.	0,3	W
V_{g1} (I_{g1} = +0,3 µA)	= max.	-1,3	V
I_k	= max.	10	mA
R_{g1}	= max.	3	MΩ
R_{g3}	= max.	3	MΩ
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	150	V

Limiting values of the triode section
Caractéristiques limites de la triode
Grenzdaten des Triodenteiles

V_{a_o}	= max.	550	V
V_a	= max.	175	V
W_a	= max.	0,8	W
V_g (I_g = +0,3 µA)	= max.	-1,3	V
I_k	= max.	6	mA
R_g	= max.	3	MΩ

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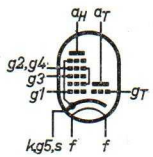
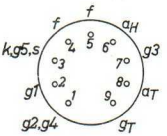
TRIODE-HEPTODE for use in A.M., F.M. and AM/FM receivers
TRIODE-HEPTODE pour applications dans des récepteurs A.M., F.M. et AM/FM
TRIODE-HEPTODE zur Verwendung in AM-, FM- und AM/FM Empfängern

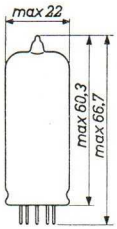
Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

I_f = 100 mA
V_f = 19 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: NOVAL

Capacitances; Capacités; Kapazitäten

Triode section Partie triode Triodenteil		Heptode section Partie heptode Heptodenteil	
C_g = 2,6 pF	C_{g1} = 4,8 pF	C_{g1g3}	< 0,3 pF
C_a = 2,1 pF	C_a = 7,9 pF	C_{g1f}	< 0,17 pF
C_{ag} = 1,0 pF	C_{ag1} < 0,006 pF	C_{g3f}	< 0,06 pF
C_{gf} < 0,02 pF	C_{g3} = 6,0 pF		

Between triode and heptode sections
Entre les parties triode et heptode
Zwischen Trioden- und Heptodenteil

C_{aH-aT}	= 0,20 pF[1])	C_{g1H-gT}	< 0,170 pF
C_{aH-gT}	< 0,090 pF	$C_{g1H-(gT+g3)}$	< 0,450 pF
C_{g1H-aT}	< 0,060 pF	$C_{aH-(gT+g3)}$	< 0,350 pF

[1])See page 5; voir page 5; siehe Seite 5

Operating characteristics of the heptode section for use as mixer
Caractéristiques d'utilisation de la partie heptode comme tube mélangeur
Betriebsdaten des Heptodenteiles als Mischröhre

$V_a=V_b$	=	200		V
R_{g2+g4}	=	10		kΩ
R_{gT+g3}	=	47		kΩ
I_{gT+g3}	=	230		uA
R_k	=	150		Ω
V_{g1}	=	-2,6	-28	V
V_{g2+g4}	=	119	250	V
I_a	=	3,7	-	mA
I_{g2+g4}	=	8,1	-	mA
S_c	=	775	7,75	µA/V
R_i	=	1	> 3	MΩ
R_{eq}	=	75	-	kΩ

$V_a=V_b$	=	170		100		V
R_{g2+g4}	=	10		10		kΩ
R_{gT+g3}	=	47		47		kΩ
I_{gT+g3}	=	200		115		uA
R_k	=	150		150		Ω
V_{g1}	=	-2,2	-24	-1,2	-14,5	V
V_{g2+g4}	=	102	-	63	-	V
I_a	=	3,2	-	1,7	-	mA
I_{g2+g4}	=	6,8	-	3,7	-	mA
S_c	=	750	7,5	620	6,2	µA/V
→ R_i	=	0,9	> 3	0,8	> 3	MΩ
R_{eq}	=	70	-	62	-	kΩ

Operating characteristics of the heptode section as R.F. or I.F. amplifier
Caractéristiques d'utilisation de la partie heptode en amplificatrice H.F. ou M.F.
Betriebsdaten des Heptodenteiles als H.F.-oder Z.F. Verstärker

$V_a=V_b$	=		200		V
V_{g3}	=		0		V
R_{g2+g4}	=		18		kΩ
R_k	=		220		Ω
V_{g1}	=	-2,6		-33	V
V_{g2+g4}	=	123		-	V
I_a	=	7,6		-	mA
I_{g2+g4}	=	4,3		-	mA
S	=	2,4		0,024	mA/V
R_i	=	0,6		> 10	MΩ
μ_{g2g1}	=	20		-	
R_{eq}	=	9,7		-	kΩ

$V_a=V_b$	=	170			100		V
V_{g3}	=	0			0		V
R_{g2+g4}	=	18			18		kΩ
R_k	=	220			220		Ω
V_{g1}	=	-2,2	-28		-1,2	-16,5	V
V_{g2+g4}	=	102	-		60	-	V
I_a	=	6,2	-		3,4	-	mA
I_{g2+g4}	=	3,8	-		2,2	-	mA
S	=	2,3	0,023		2,0	0,020	mA/V
R_i	=	0,6	> 10		0,5	> 10	MΩ
μ_{g2g1}	=	20	-		20	-	-
R_{eq}	=	8,8	-		5,8	-	kΩ

Typical characteristics of the triode section
Caractéristiques limites de la partie triode
Kenndaten des Triodenteiles

V_a	=	100	V
V_g	=	0	V
I_a	=	13,5	mA
S	=	3,7	mA/V
μ	=	22	

Operating characteristics of the triode section as oscillator
Caractéristiques d'utilisation de la partie triode en oscillatrice
Betriebsdaten des Triodenteiles als Oszillator

V_b	=	200	170	100	V
R_a	=	15	15	15	kΩ
R_{gT+g3}	=	47	47	47	kΩ
I_{gT+g3}	=	240	200	120	µA
I_a	=	5,4	4,5	2,5	mA
S_{eff}	=	0,58	0,58	0,53	mA/V

Operating characteristics for use as A.F. amplifier
Caractéristiques d'utilisation en amplificatrice B.F.
Betriebsdaten als N.F. Verstärker

The heptode section of this valve can be used without special precautions against microphonic effect in circuits in which the input voltage $V_i \geq 50mV$ for an output of 50 mW of the output valve. For the triode section the corresponding value is 25 mV.

La partie heptode de ce tube peut être utilisée sans précautions spéciales contre l'effet microphonique dans des circuits dont la tension d'entrée $V_i \geq 50mV$ pour une puissance de 50 mW du tube de sortie. La valeur correspondante pour la partie triode est de 25 mV.

Der Heptodenteil dieser Röhre darf ohne spezielle Massnahmen gegen Mikrophonie verwendet werden in Schaltungen die für eine Eingangsspannung $V_i \geq 50mV$ eine Leistung von 50 mW ergeben. Der entsprechende Wert für den Triodenteil ist 25 mV.

Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteiles

V_{a_c}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	0,8	W
I_k	= max.	6,5	mA
R_g	= max.	3	MΩ
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	100	V
V_g (I_g = +0,3 µA)	= max.	-1,3	V

Limiting values of the heptode section
Caractéristiques limites de la partie heptode
Grenzdaten des Heptodenteiles

V_{ao}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	1,7	W
$V_{(g2+g4)o}$	= max.	550	V
$V_{g2+g4}(I_a = 7,6$ mA)	= max.	125	V
$V_{g2+g4}(I_a < 1$ mA)	= max.	250	V
W_{g2+g4}	= max.	1	W
I_k	= max.	12,5	mA
R_{g1}	= max.	3	MΩ
R_{g3} [2])	= max.	3	MΩ
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	100	V
$V_{g1}(I_{g1} = + 0,3$ µA)	= max.	-1,3	V
$V_{g3}(I_{g3} = + 0,3$ µA)	= max.	-1,3	V

[2]) When in AM/FM receivers the connections to the valve are switched over during operation and g_3 and g_T have not been connected by ohmic resistance, R_{g3} = max. 20 kΩ.
En cas que dans des appareils AM/FM les connexions au tube soient commutées pendant l'opération et g_3 n'ait pas été connecté à g_T par l'intermédiaire d'une résistance ohmique, R_{g3} = max. 20 kΩ.
Wenn in AM/FM-Empfängern die Verbindungen zu der Röhre während des Betriebs umgeschaltet werden und g_3 nicht mittels eines ohmischen Widerstandes mit g_T verbunden ist, ist R_{g3} = max. 20 kΩ.

Page 1, Seite 1.

[1]) σ = 0.015 which means that for 68% of a great number of valves 0.20 - 0.015 pF < C_{aH-aT} < 0.20 + 0.015 pF and for 94% 0.20 - 0.03 pF < C_{aH-aT} < 0.20 + 0.03 pF.

σ = 0,015 cequi signifie que 0,20-0,015 pF< C_{aH-aT} < 0,20 + 0,015 pF pour 68% d'un grand nombre de tubes et 0,20-0,03 pF < C_{aH-aT} < 0,20 + 0,03 pF pour 94%

σ = 0,015 was heisst dass für 68% einer grossen Anzahl Röhren 0,20 - 0,015 pF < C_{aH-aT} < 0,20 + 0,015 pF und für 94% 0,20 - 0,03 pF < C_{aH-aT} < 0,20 + 0,03 pF.

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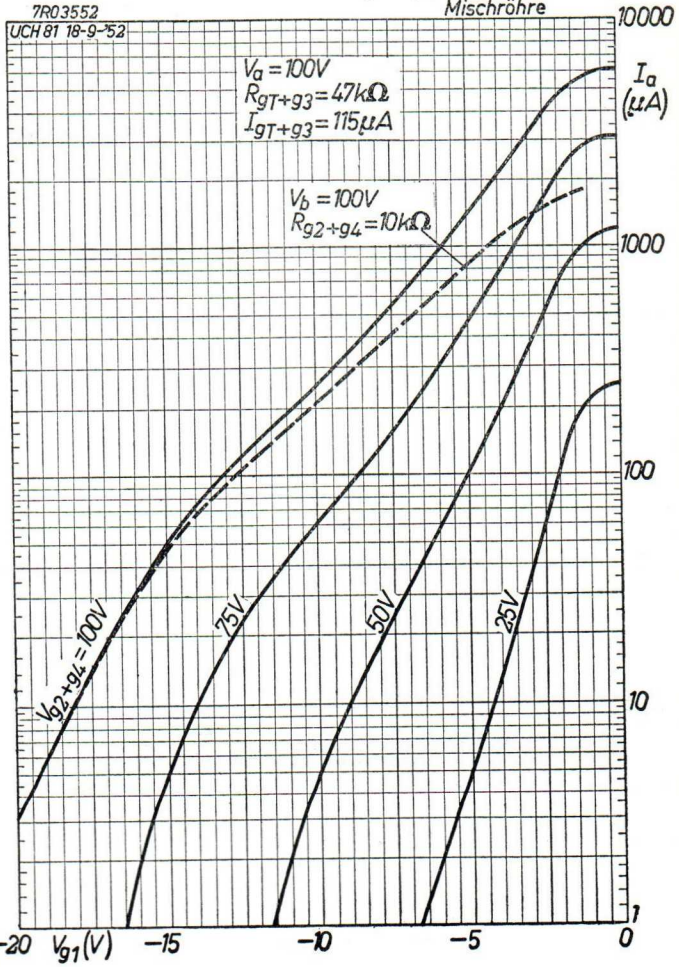
Frequency changer; Tube mélangeur; Mischröhre



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A

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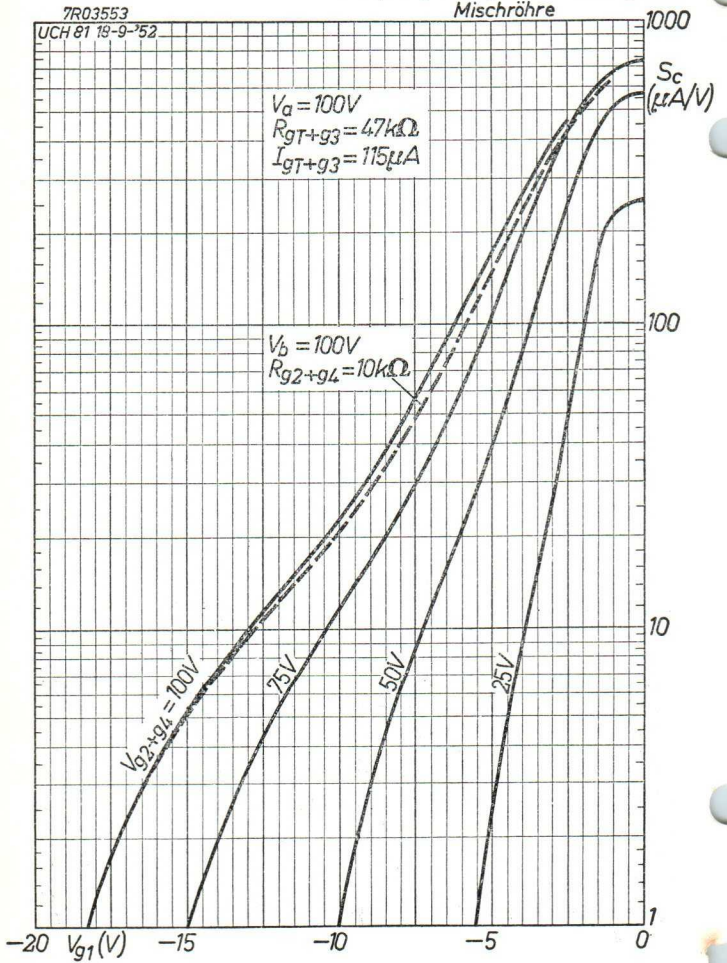
Frequency changer; Tube mélangeur; Mischröhre



B

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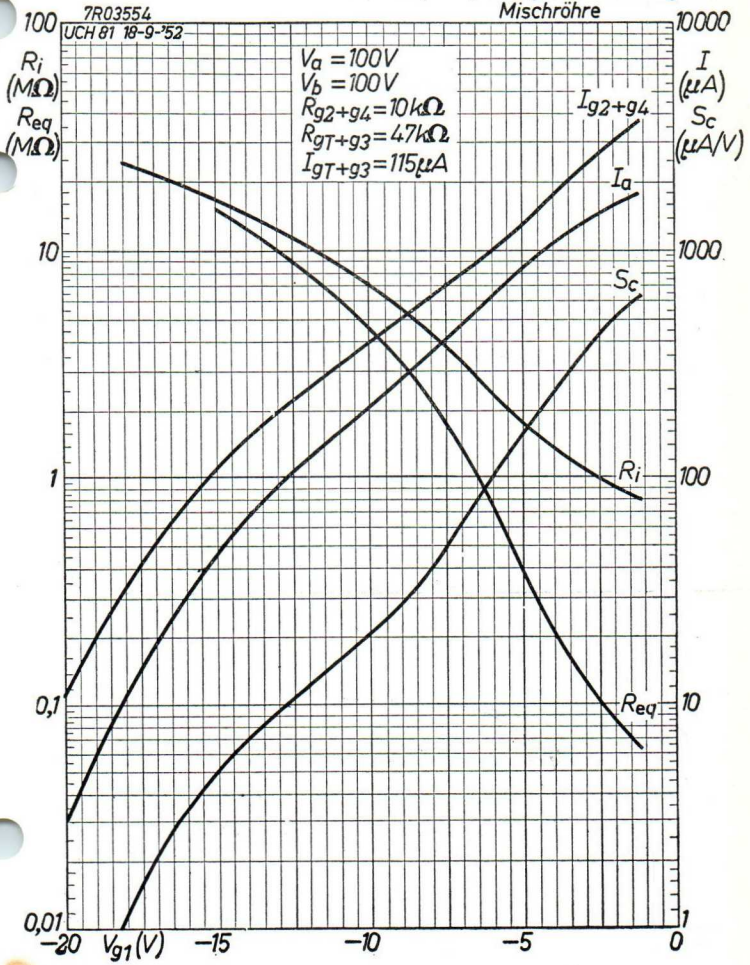
Frequency changer; Tube mélangeur; Mischröhre



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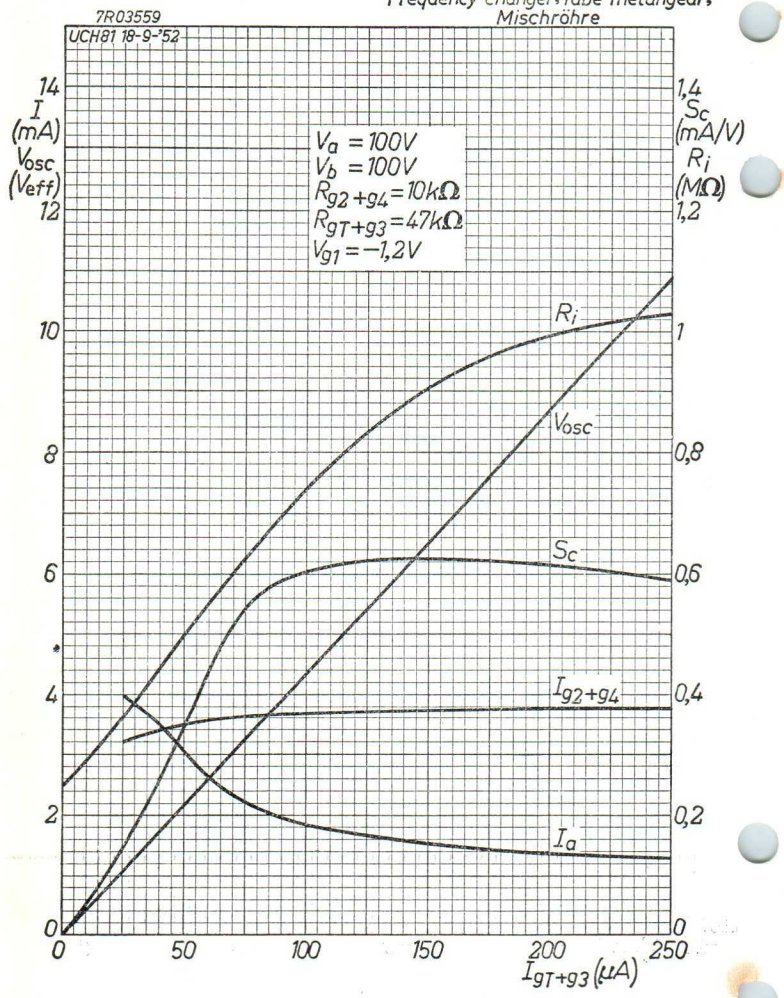
Frequency changer; Tube mélangeur; Mischröhre



D

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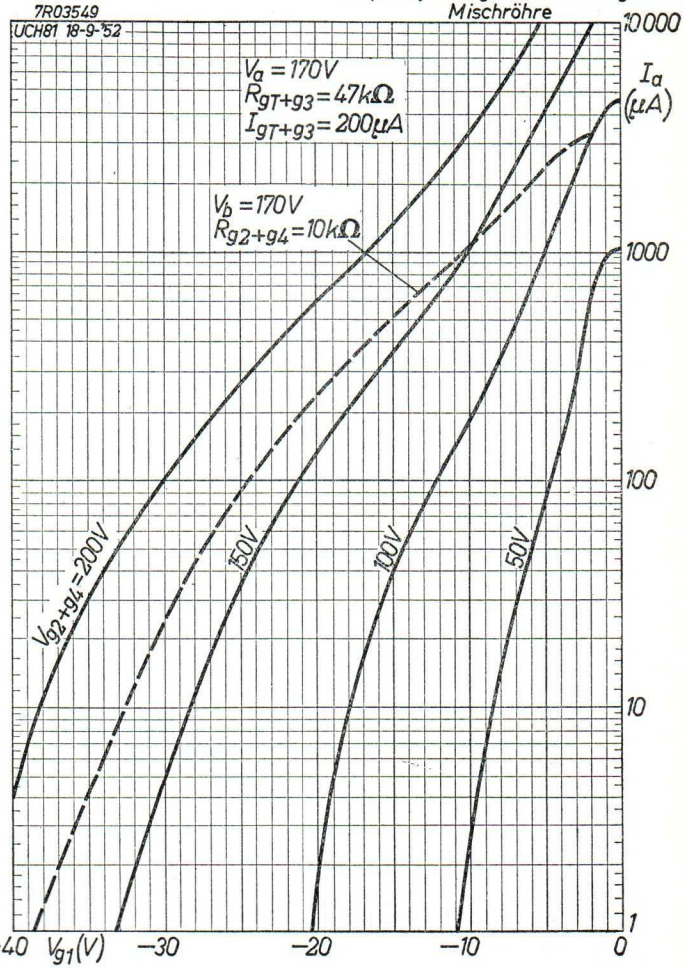
Frequency changer; Tube mélangeur; Mischröhre



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E

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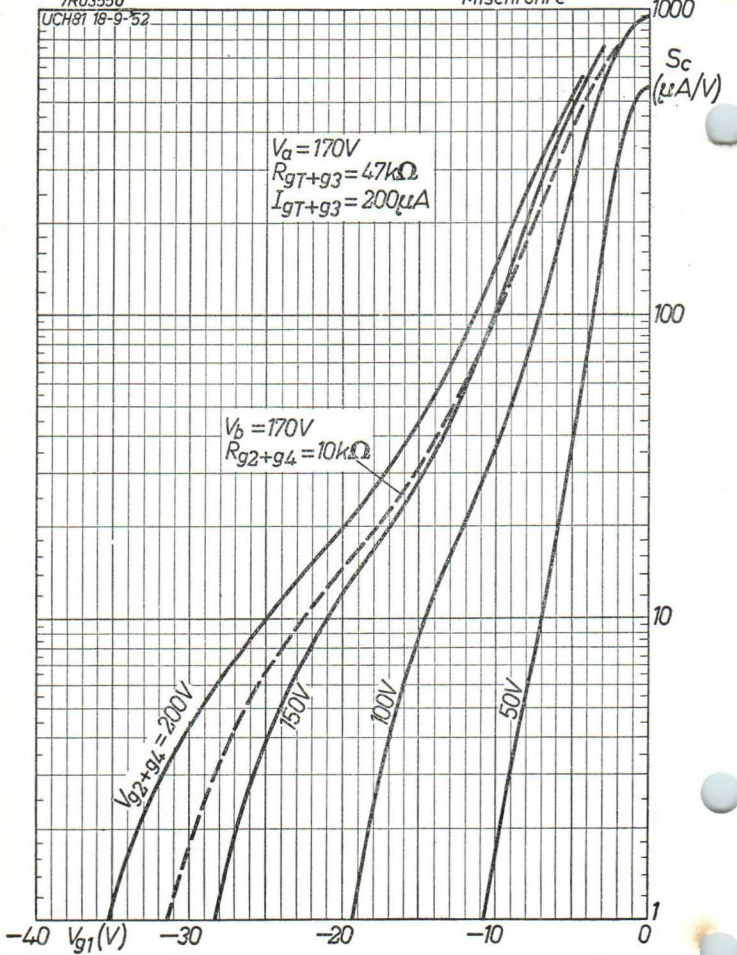
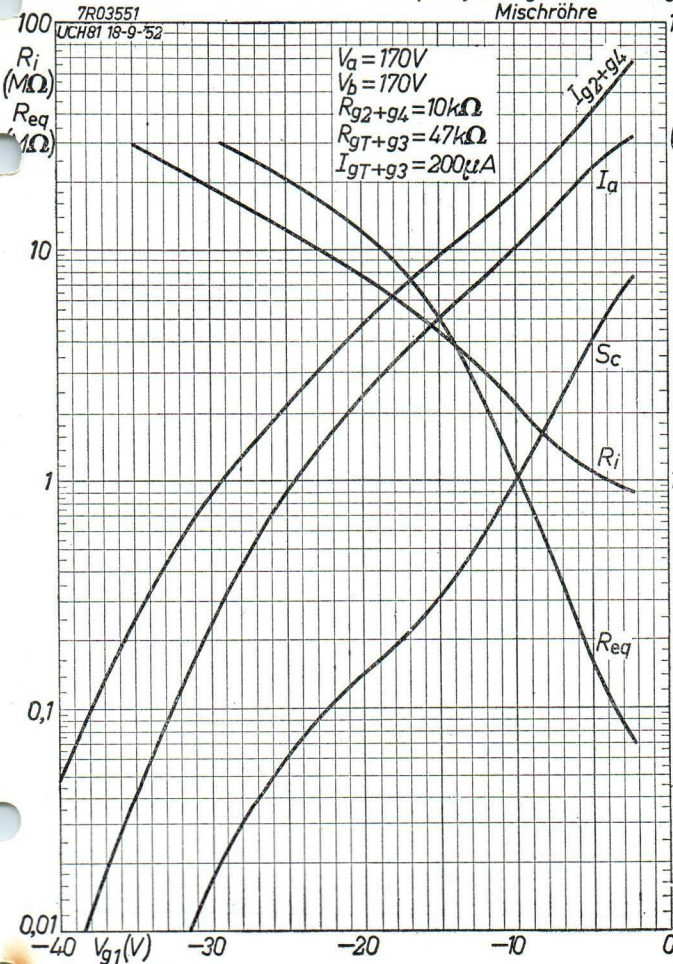
Frequency changer; Tube mélangeur; Mischröhre



F

Frequency changer; Tube mélangeur; Mischröhre



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G

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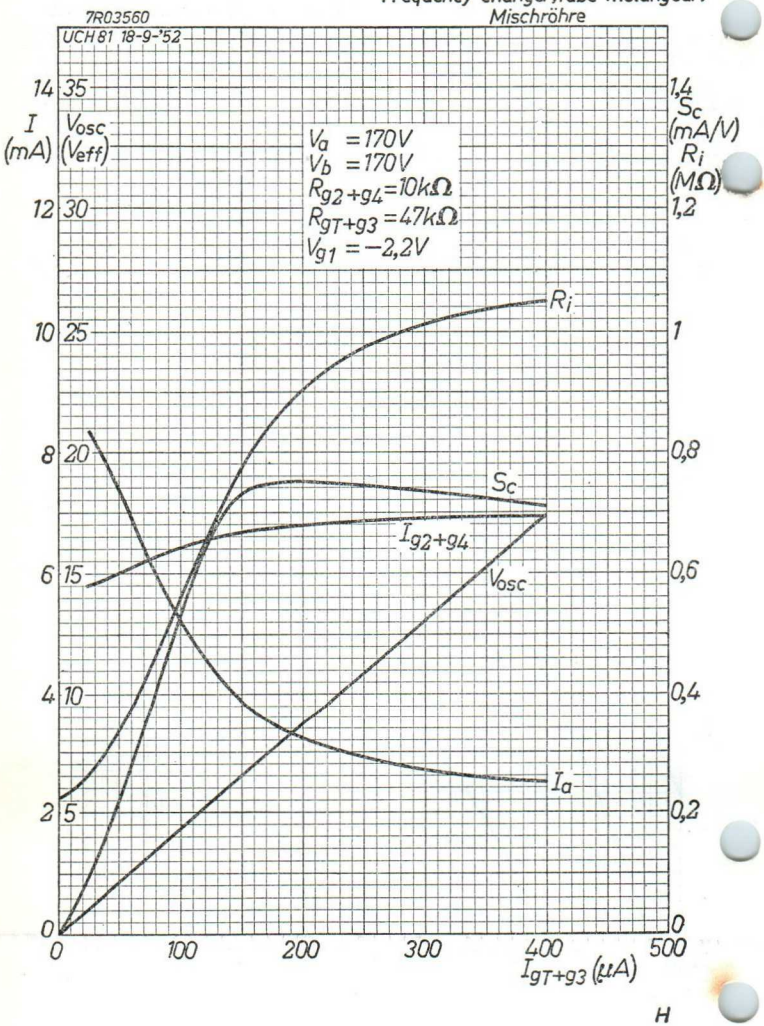
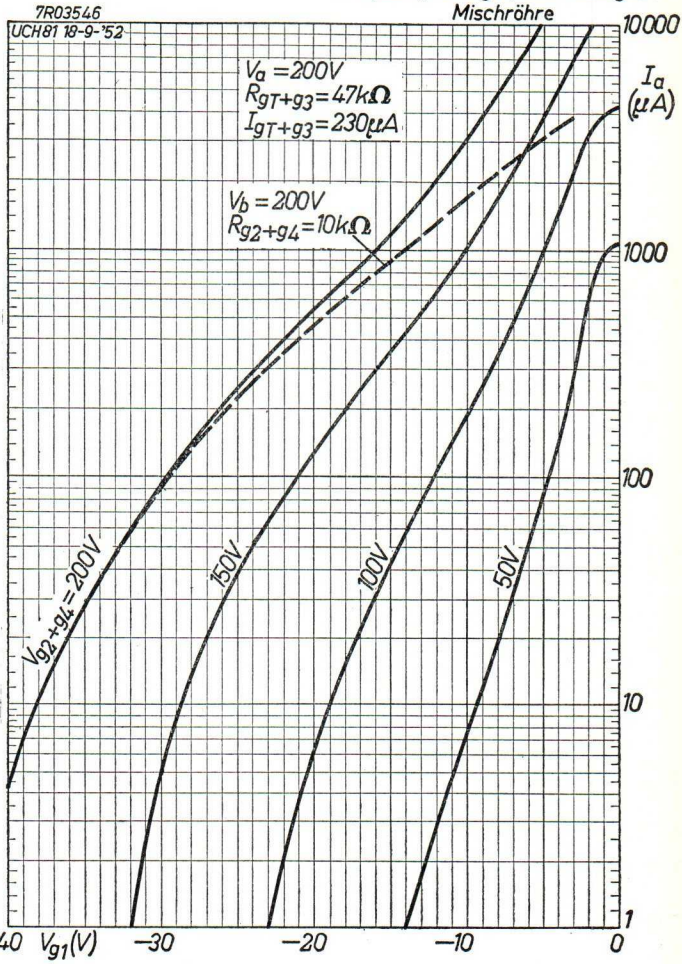
Frequency changer; Tube mélangeur; Mischröhre



H

Frequency changer; Tube mélangeur; Mischröhre



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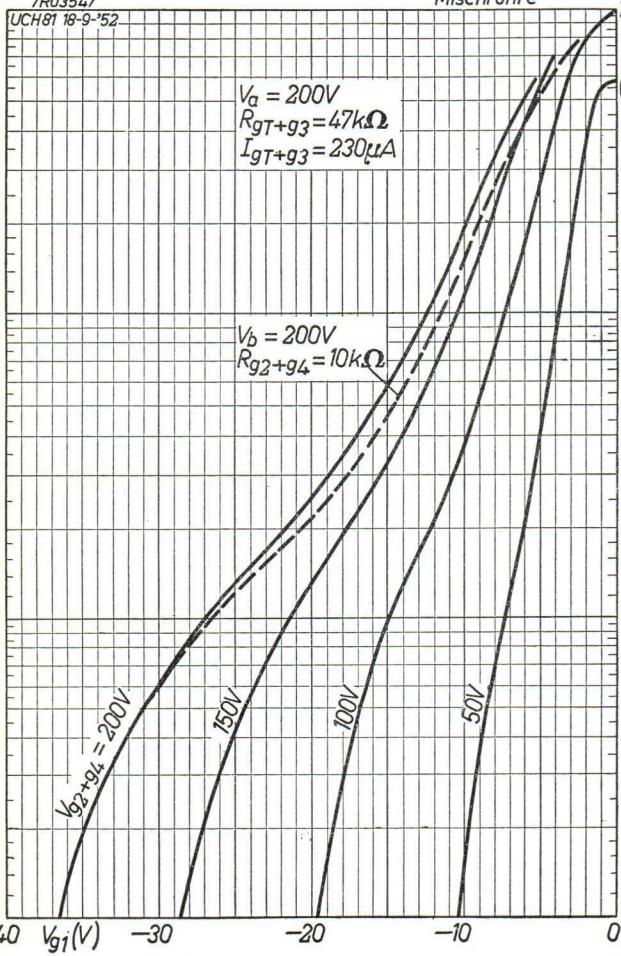
Frequency changer; Tube mélangeur; Mischröhre



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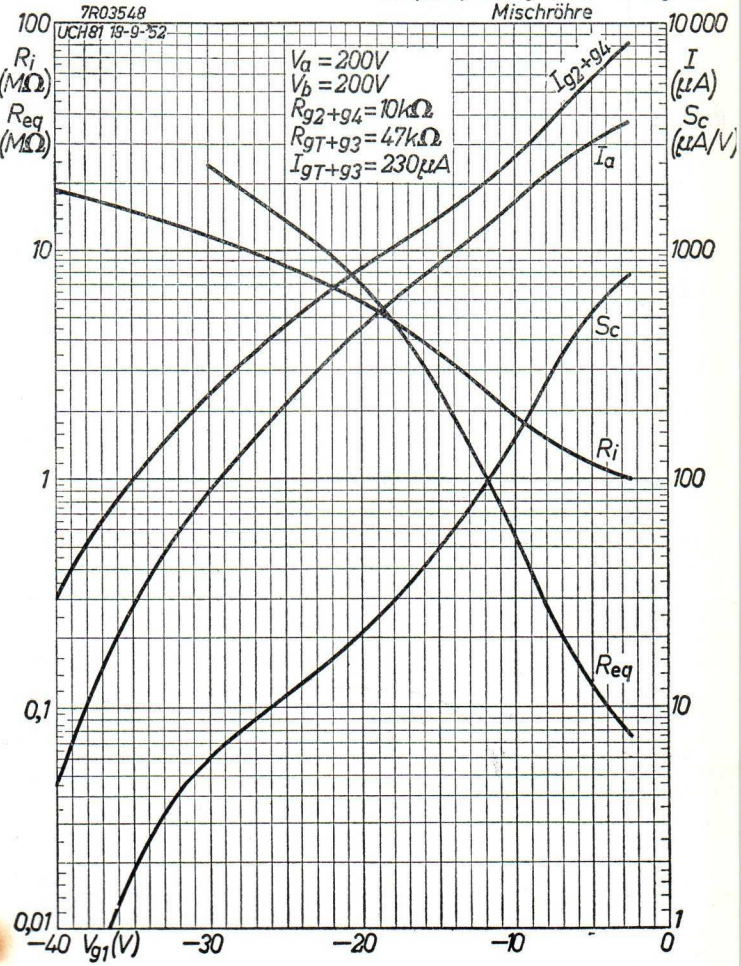
Frequency changer; Tube mélangeur; Mischröhre



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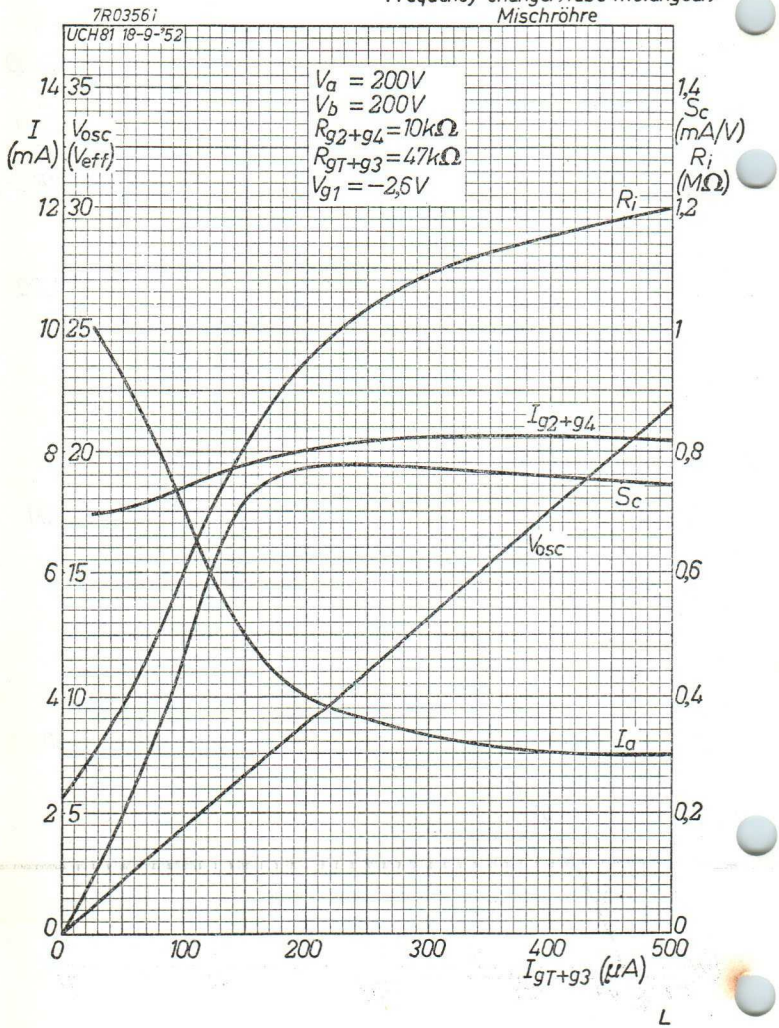
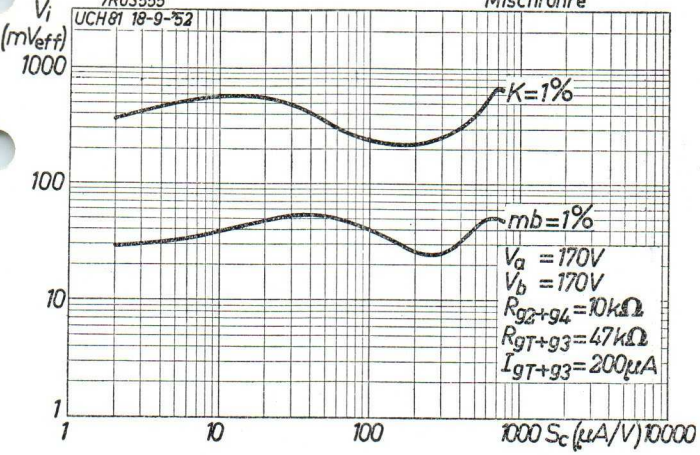
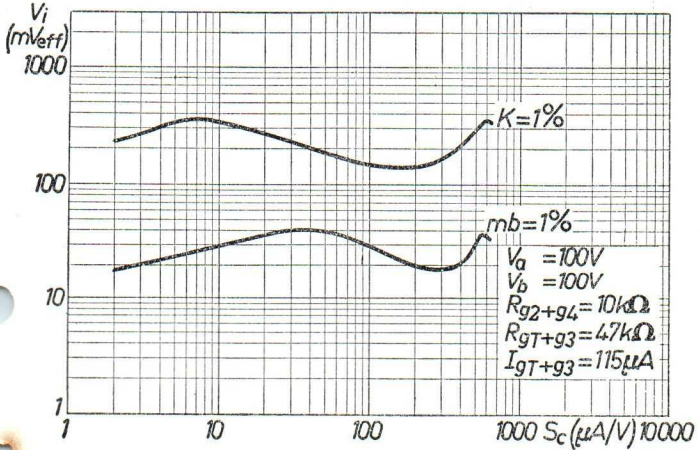
Frequency changer; Tube mélangeur; Mischröhre

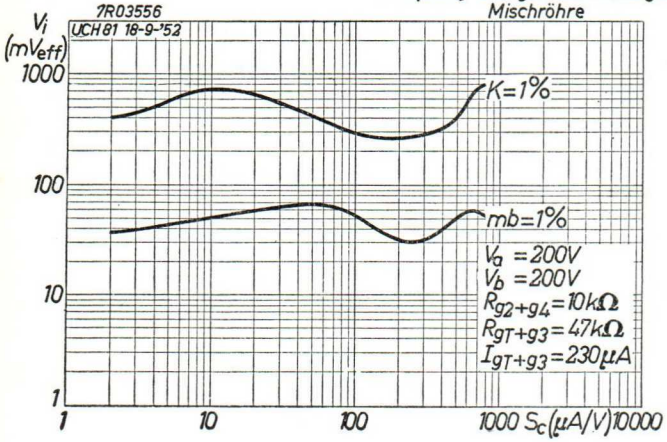


Frequency changer; Tube mélangeur; Mischröhre





Frequency changer; Tube mélangeur; Mischröhre



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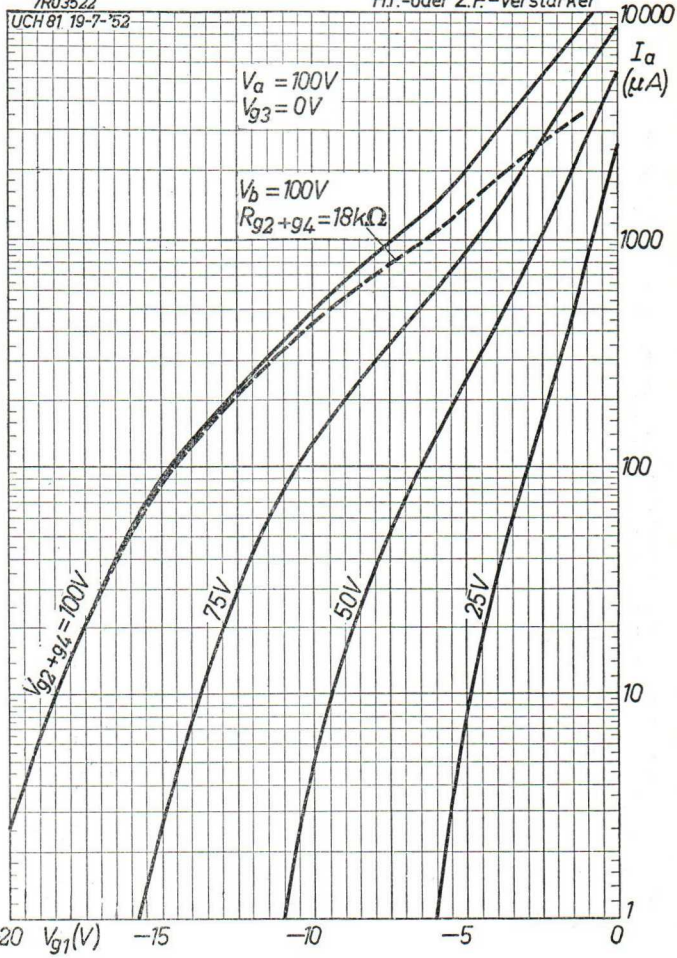
UCH 81

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-Verstärker



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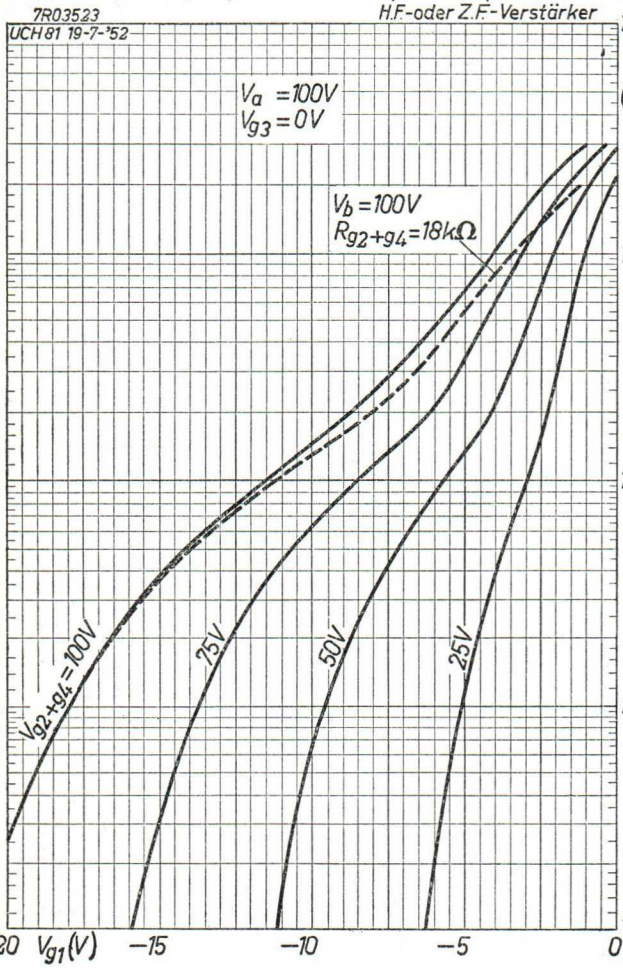
UCH 81 PHILIPS

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-Verstärker

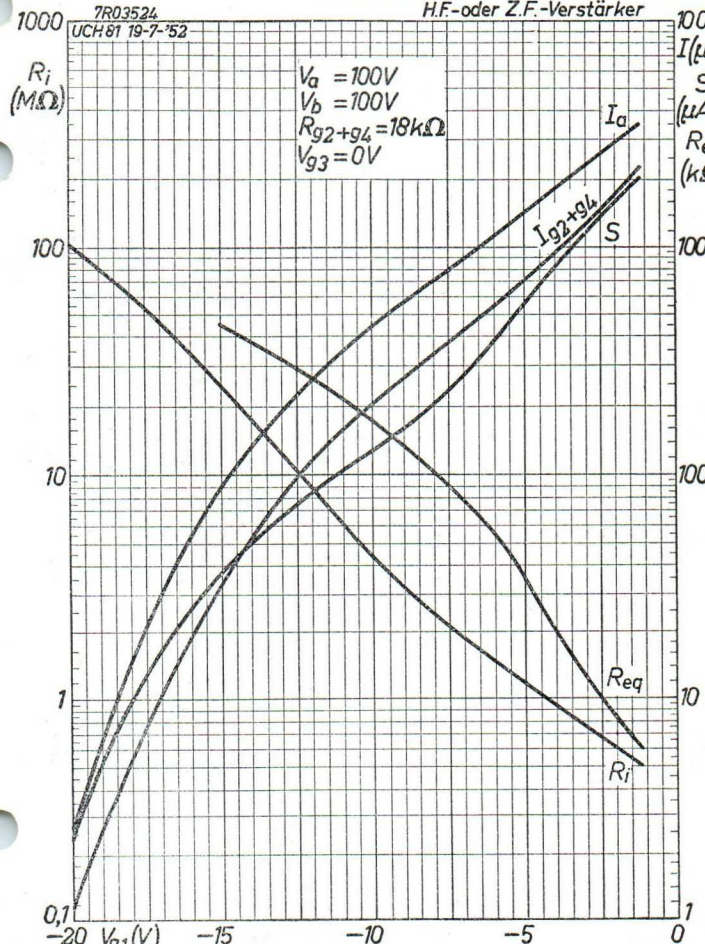


P

PHILIPS

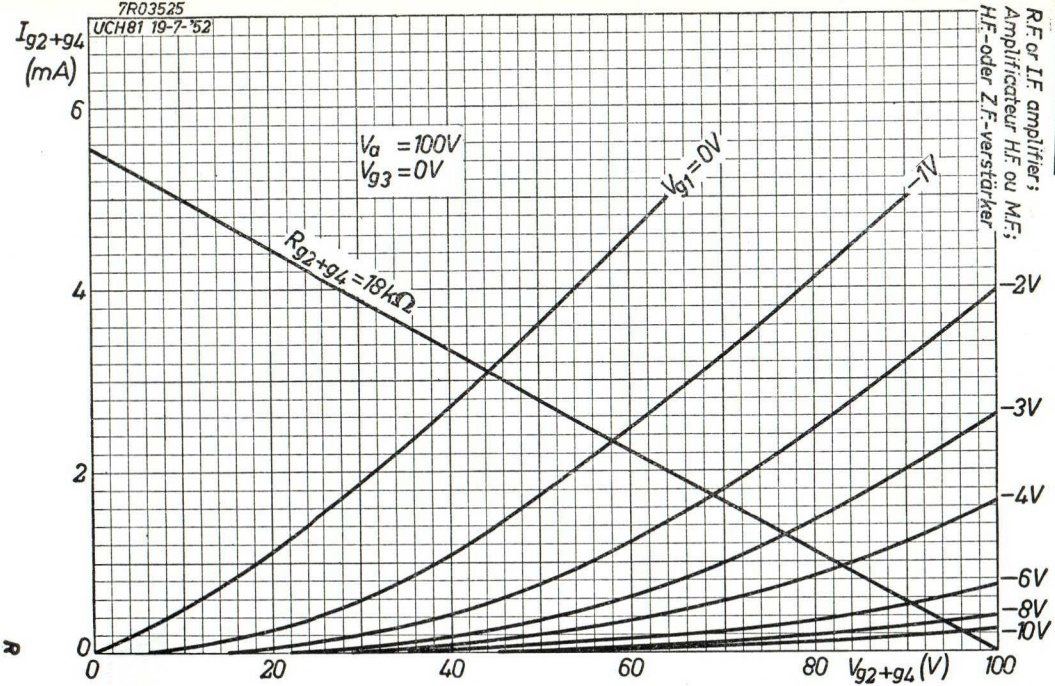
UCH 81

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.- oder Z.F.-Verstärker



9.9.1952

Q



R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-verstärker

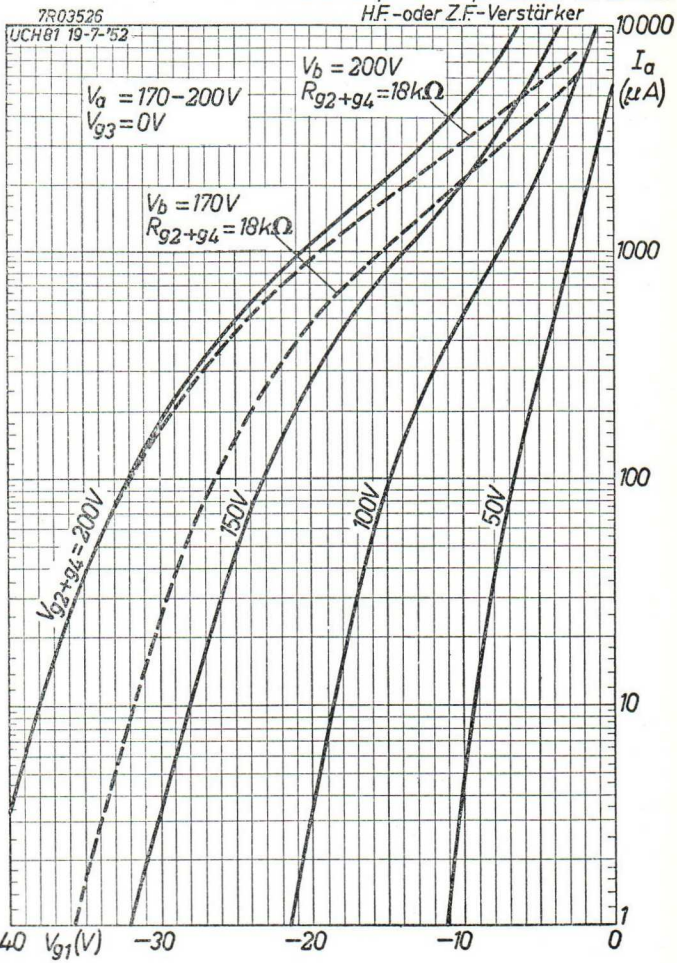
UCH 81

PHILIPS

PHILIPS

UCH 81

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-Verstärker



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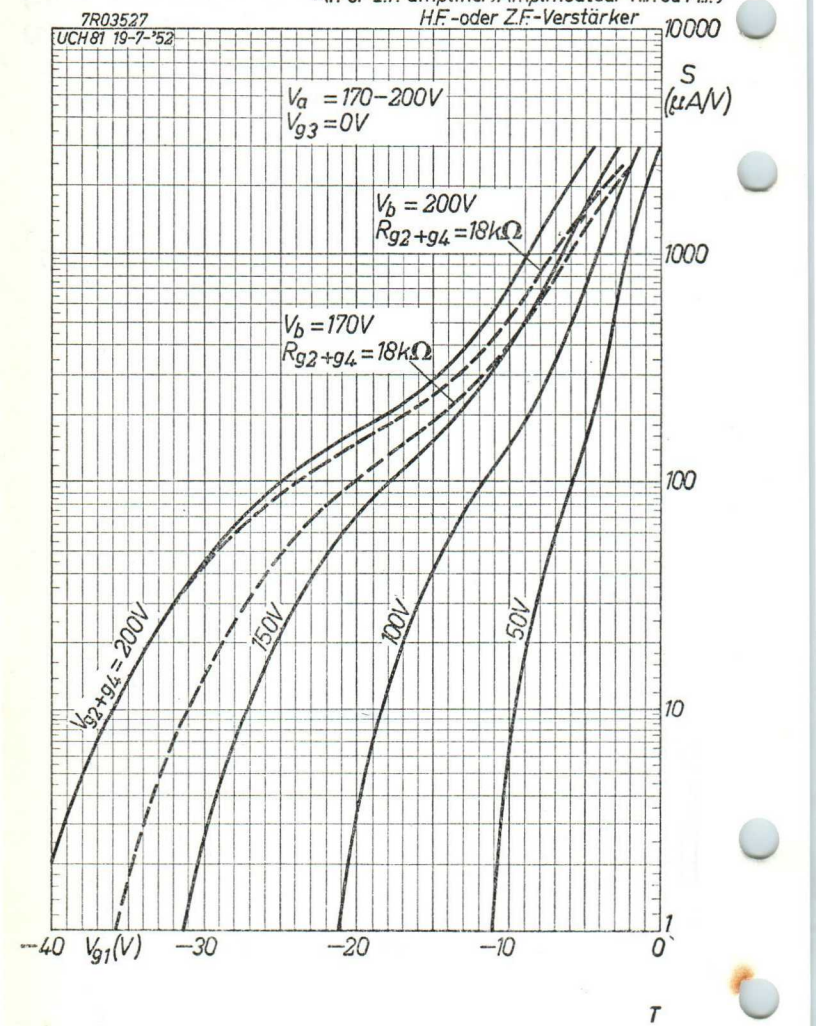
S

UCH 81 PHILIPS

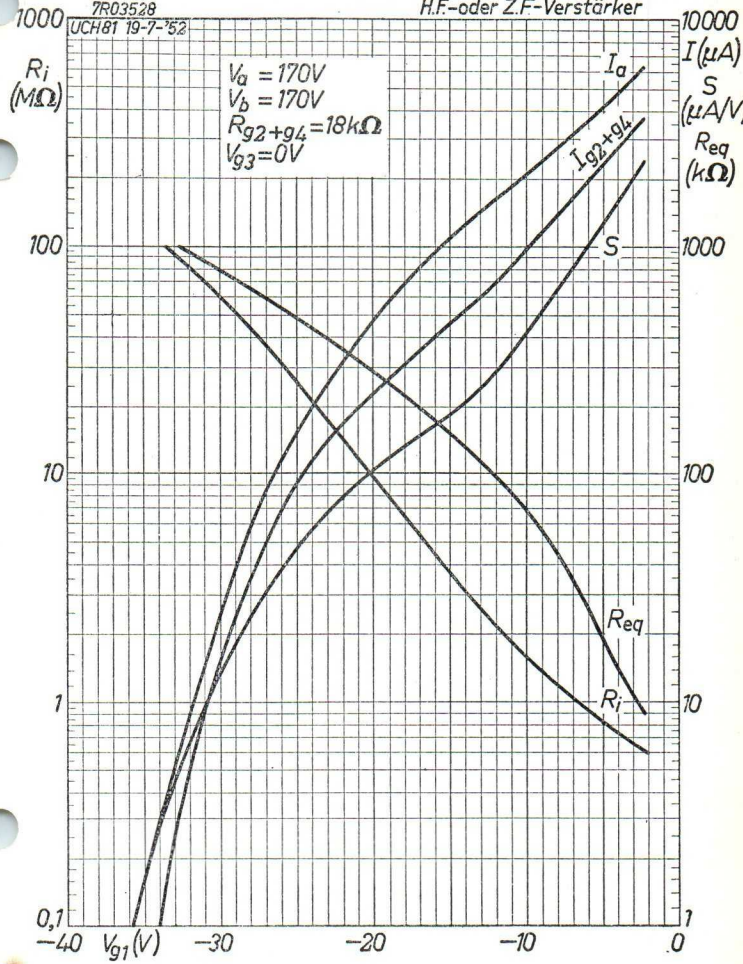
R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-Verstärker



PHILIPS

UCH 81

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.- oder Z.F.-Verstärker



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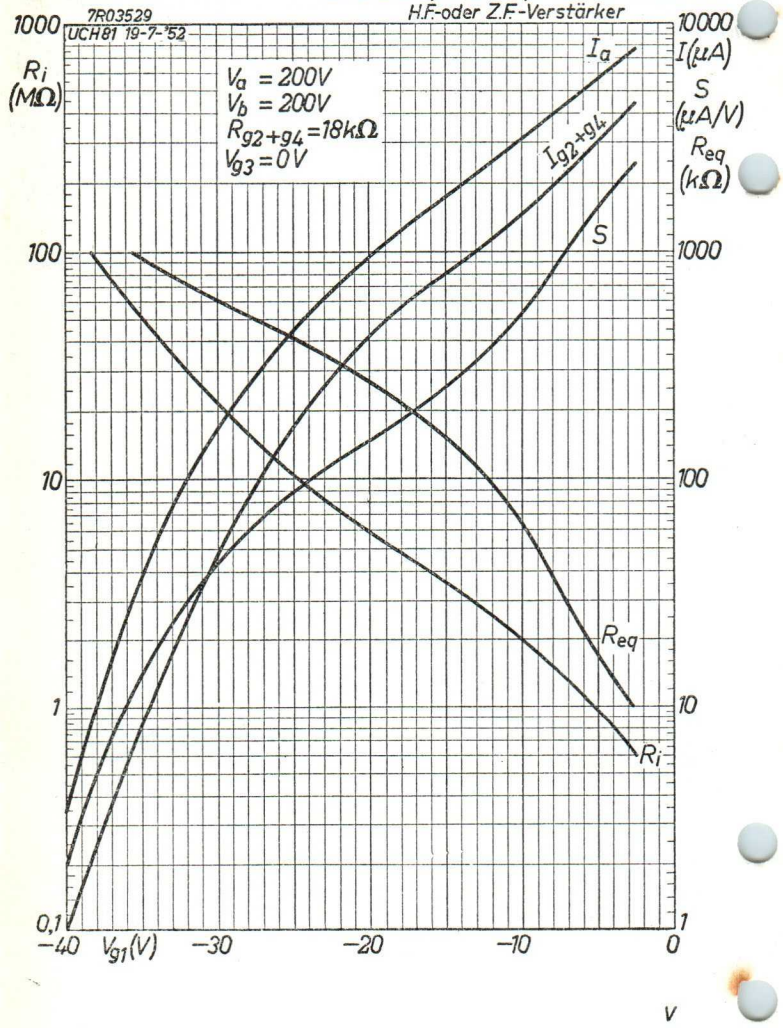
U

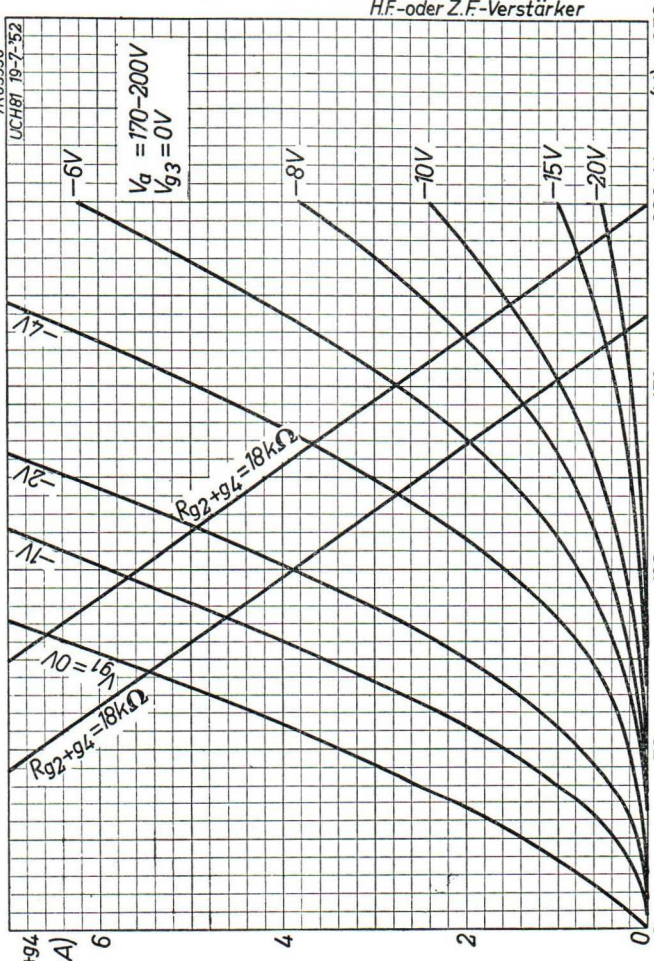
UCH 81 PHILIPS

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-Verstärker



PHILIPS UCH 81

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-Verstärker



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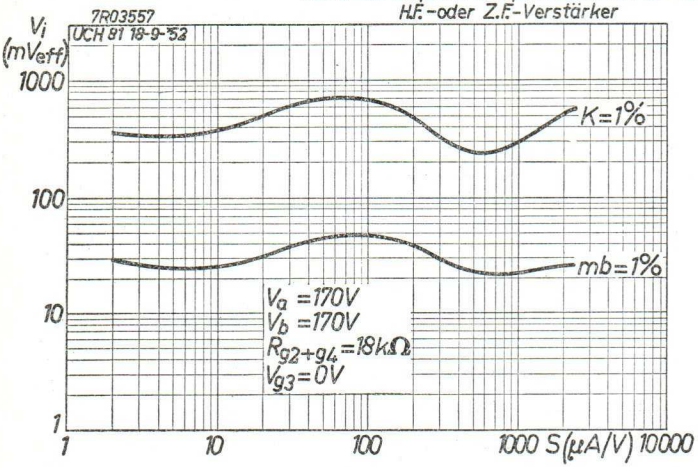
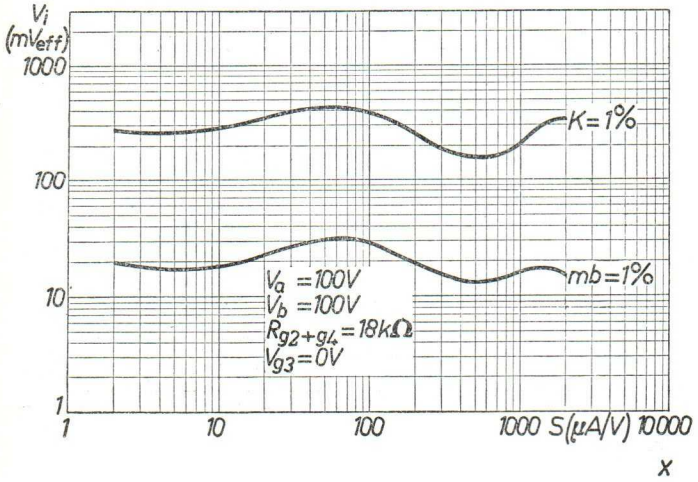
W

UCH 81 PHILIPS

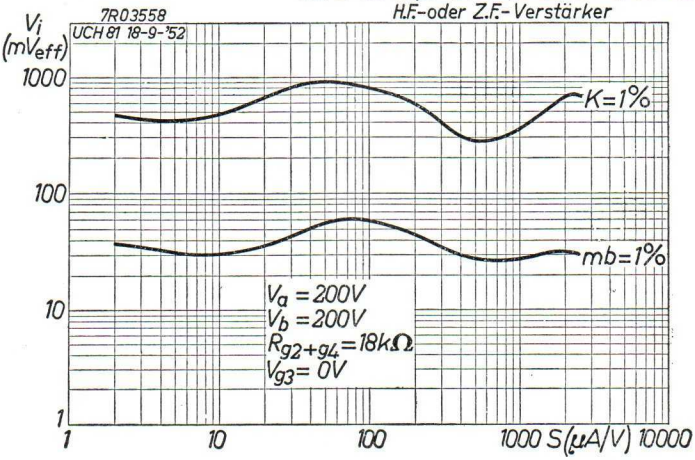
R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-Verstärker





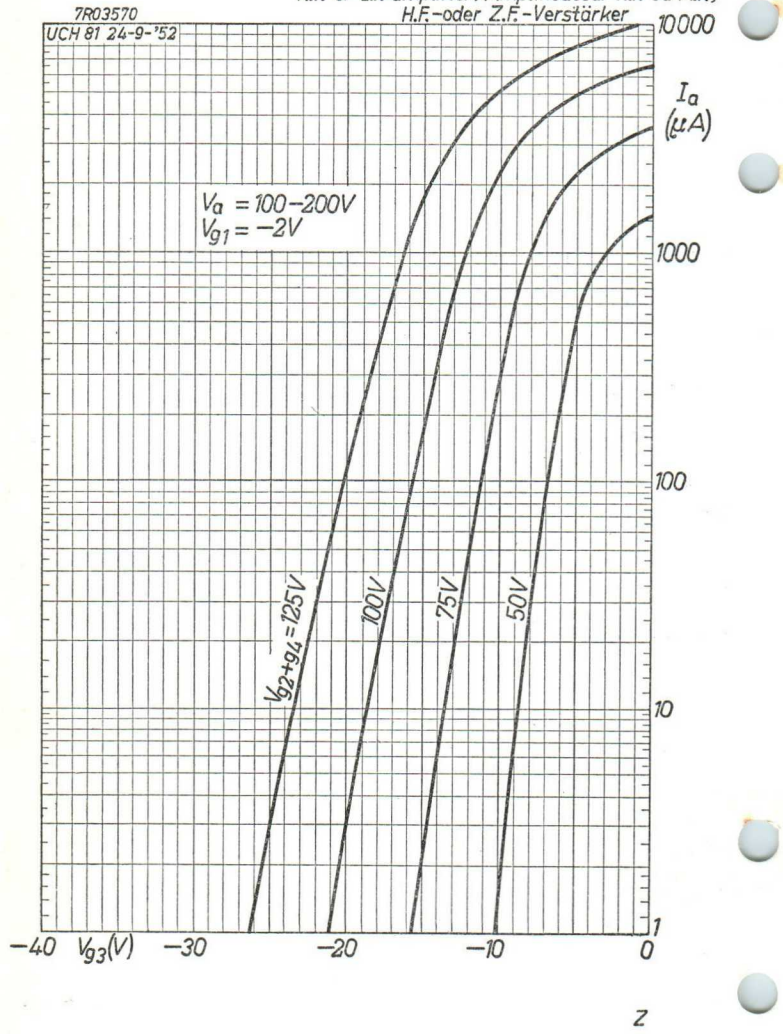
x

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-Verstärker



UCH 81 PHILIPS

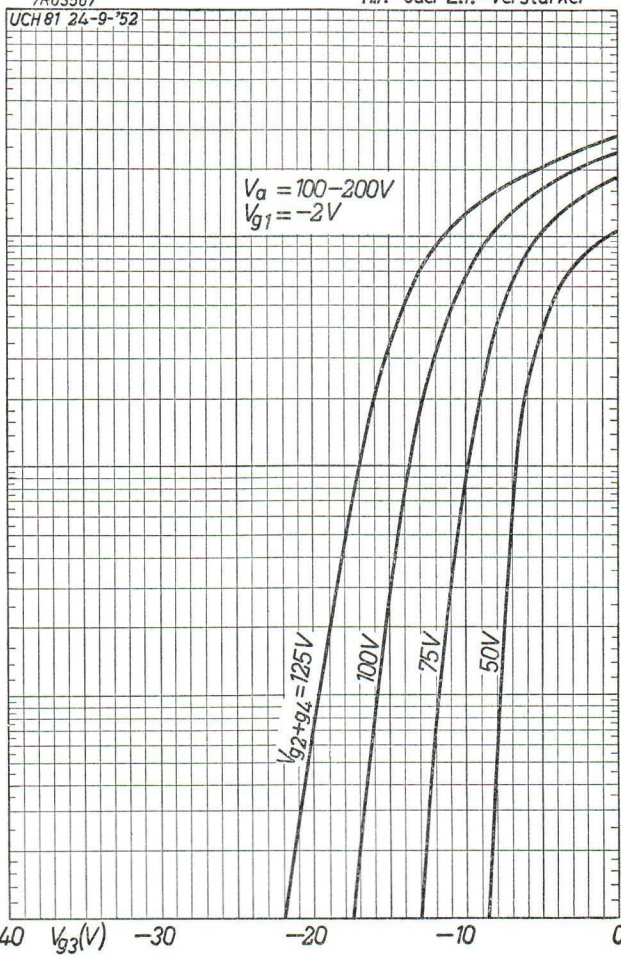
R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.;
H.F.-oder Z.F.-Verstärker



Z

PHILIPS UCH 81

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.- oder Z.F.-Verstärker



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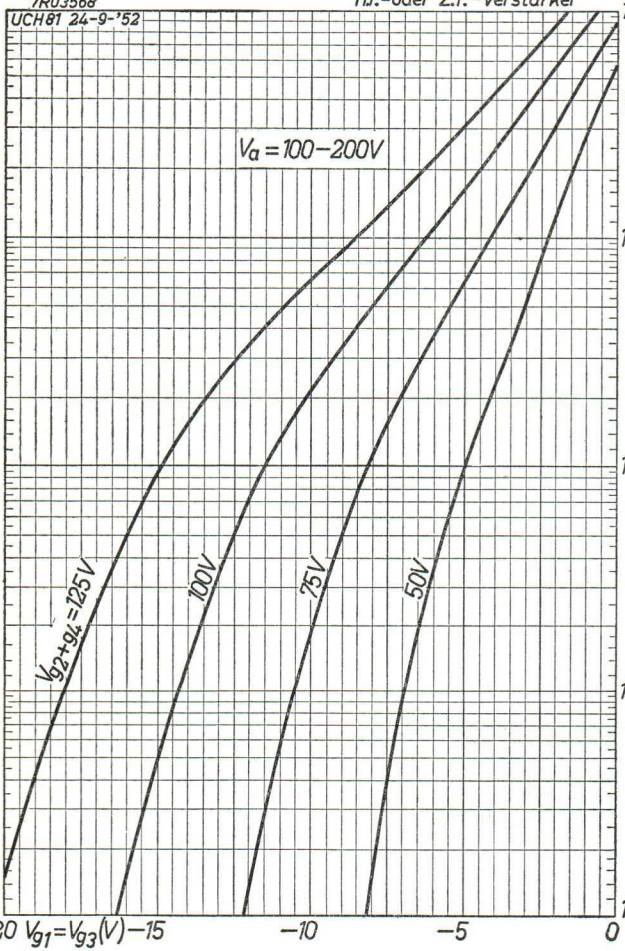
AA

UCH 81 PHILIPS

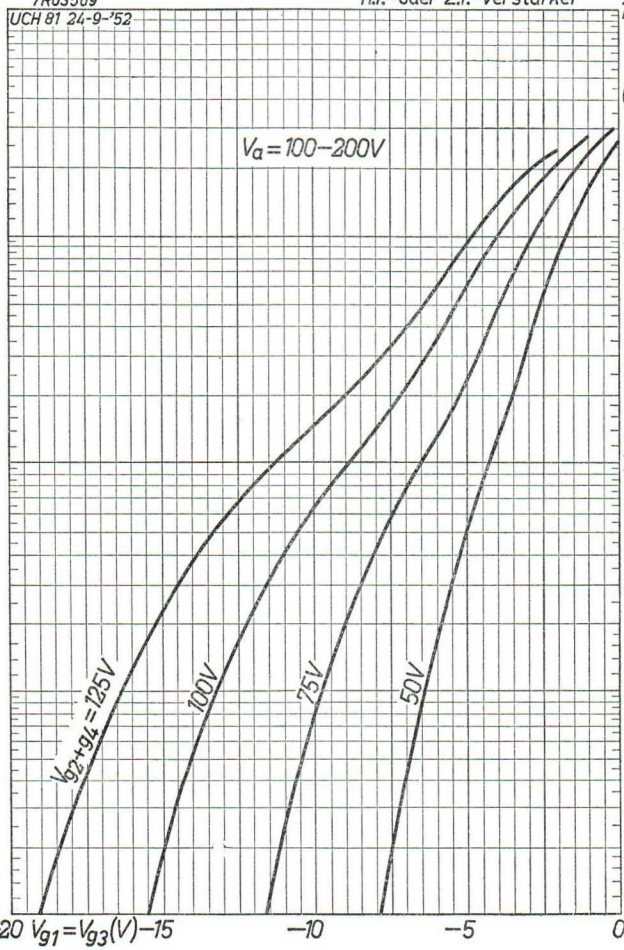
R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.- oder Z.F.-Verstärker



AB

PHILIPS UCH 81

R.F. or I.F. amplifier; Amplificateur H.F. ou M.F.; H.F.-oder Z.F.-Verstärker



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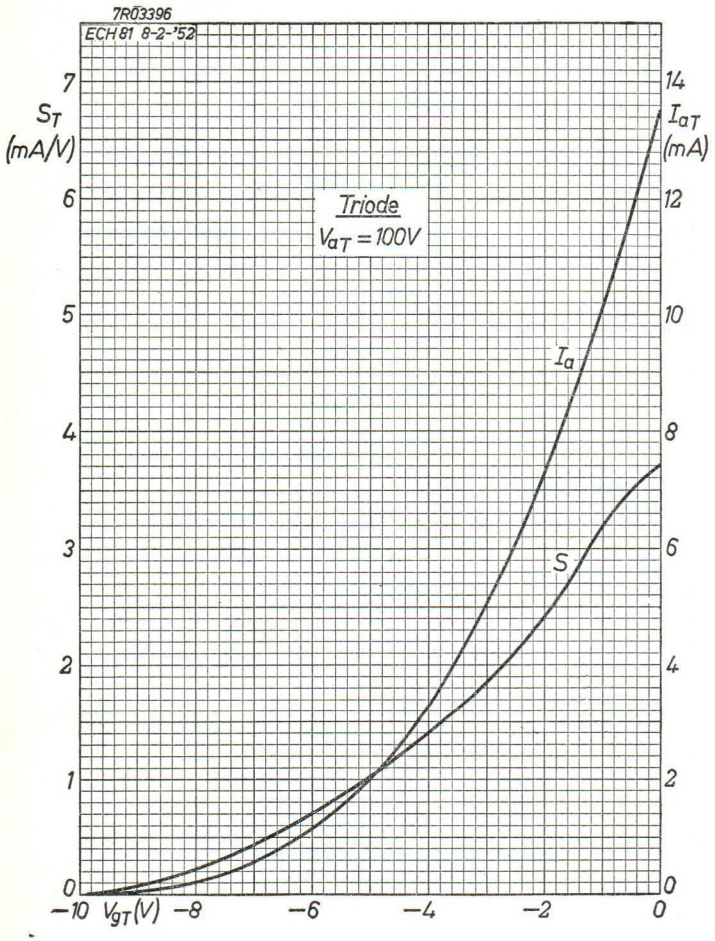
AC

UCH 81 PHILIPS



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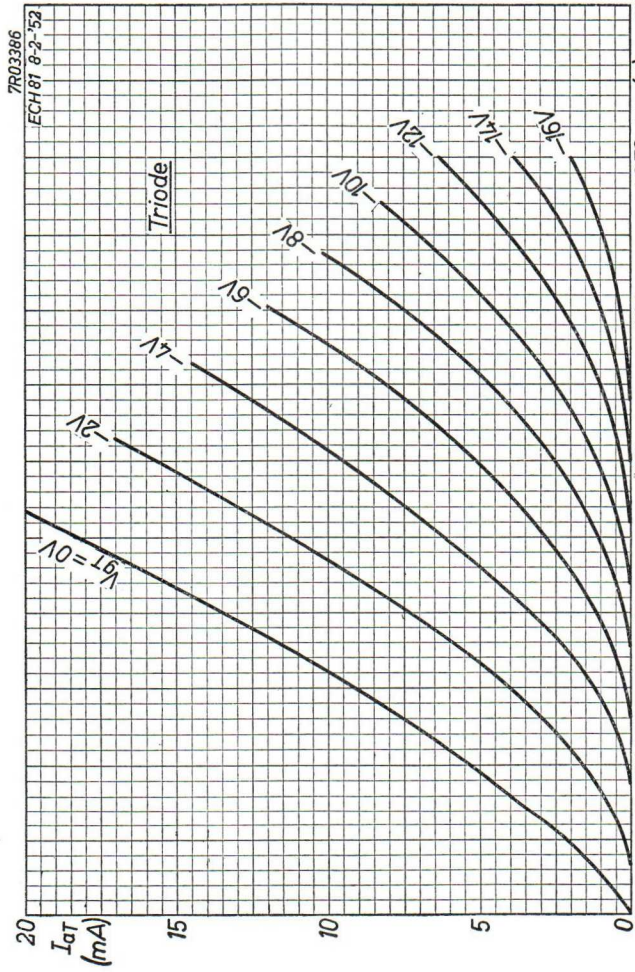
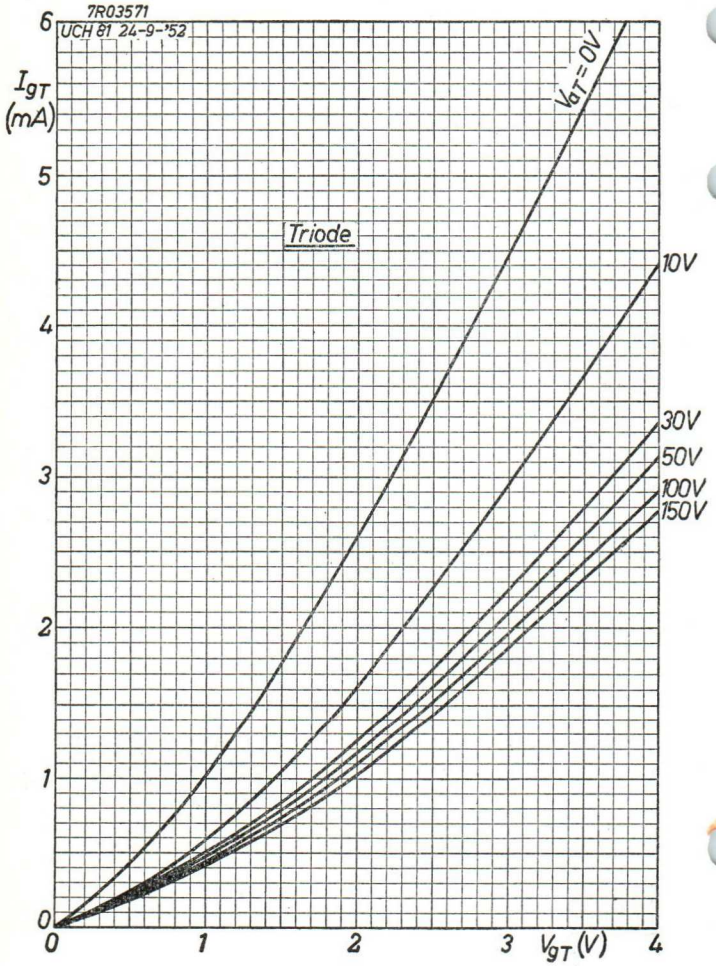

7R03386
ECH 81 8-2-'52
Triode
$V_{g1} = 0V$
-1V
-2V
-4V
-6V
-8V
-10V
-12V
-14V
-16V
I_{aT} (mA)
20
15
10
5
0
V_{aT} (V)
300
250
200
150
100
50
0

9.9.1952

AE

UCH 81 PHILIPS



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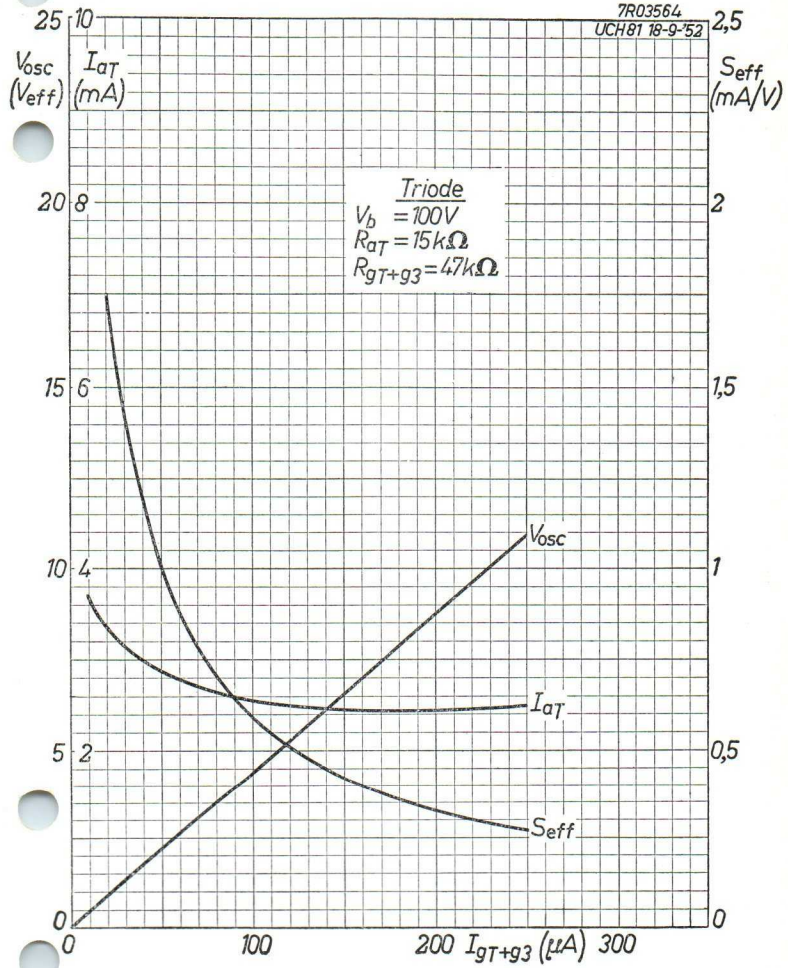
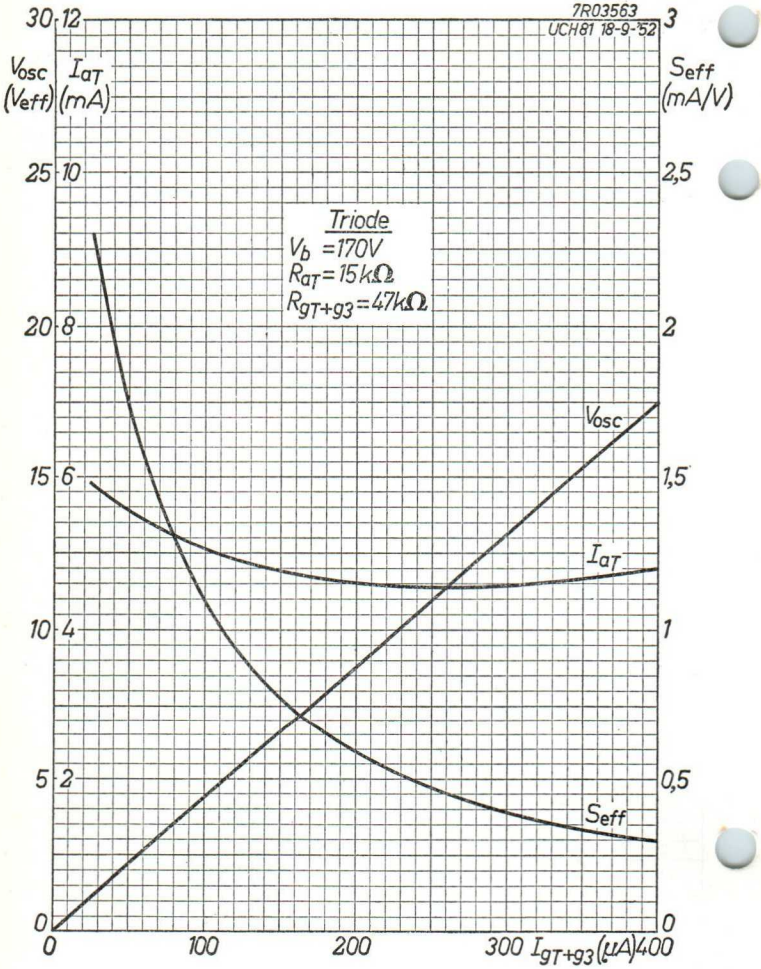

7R03564
UCH81 18-9-52
Vosc (Veff)
IaT (mA)
Seff (mA/V)
Triode
Vb = 100V
RaT = 15kΩ
RgT+g3 = 47kΩ
Vosc
IaT
Seff
25
20
15
10
5
0
10
8
6
4
2
0
2,5
2
1,5
1
0,5
0
0
100
200
300
IgT+g3 (μA)

9.9.1952

AG

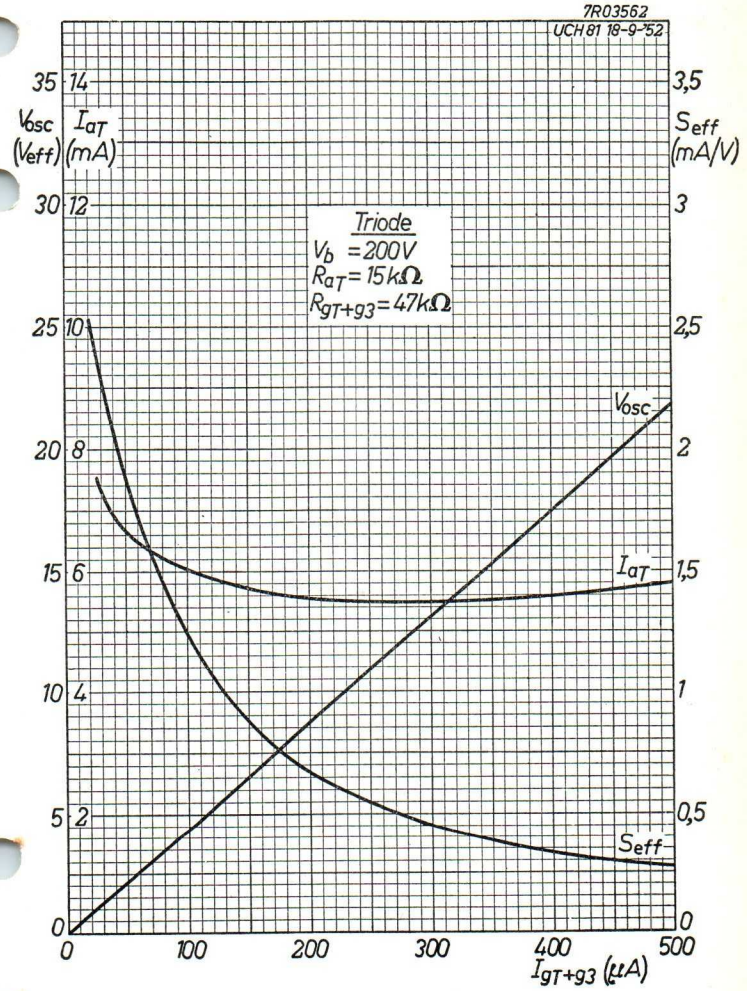
UCH 81 PHILIPS



AH

PHILIPS

UCH 81



AI

10.10.1957

PHILIPS

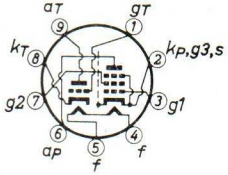
UCL82

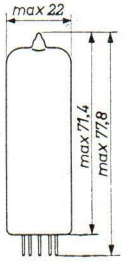
TRIODE PENTODE; triode section for use as A.F. pre-amplifier; pentode section for use as A.F. output tube
TRIODE-PENTHODE; la triode pour utilisation comme préamplificatrice B.F.; la penthode pour utilisation comme tube de sortie B.F.
TRIODE-PENTODE; die Triode zur Verwendung als NF-Vorverstärker; die Pentode zur Verwendung als NF-Endröhre

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

If = 100 mA
Vf = 50 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	Triode section Partie triode Triodenteil	Pentode section Partie penthode Pentodenteil
	C_g = 2,7 pF	C_{g1} = 9,3 pF
	C_a = 4,3 pF	C_a = 8,0 pF
	C_{ag} = 4,4 pF	C_{ag1} < 0,3 pF ←
	C_{gf} < 0,02 pF	C_{g1f} < 0,3 pF

Between triode and pentode section
Entre la partie triode et penthode
Zwischen Trioden- und Pentodenteil

$C_{aT\text{-}g1P}$ < 0,02 pF
$C_{gT\text{-}aP}$ < 0,02 pF
$C_{gT\text{-}g1P}$ < 0,025 pF
$C_{aT\text{-}aP}$ < 0,25 pF

Typical characteristics
Caractéristiques types
Kenndaten

Triode section Partie triode Triodenteil		Pentode section Partie penthode Pentodenteil	
V_a	= 100 V	V_a	= 170 V
V_g	= 0 V	V_{g_2}	= 170 V
I_a	= 3,5 mA	V_{g_1}	= -11,5 V
S	= 2,2 mA/V	I_a	= 41 mA
μ	= 70	I_{g_2}	= 9 mA
		S	= 7,5 mA/V
		R_i	= 16 kΩ
		$\mu_{g_2g_1}$	= 9,5

Operating characteristics of the pentode section as audio output tube, class A.
Caractéristiques d'utilisation de la partie penthode comme tube de sortie B.F., classe A
Betriebsdaten des Pentodenteils als NF-Endröhre, Klasse A

V_{ba}	=	100			170		V
V_{bg_2}	=	100			170		V
R_k	=	170			200		Ω[1])
$R_{a\sim}$	=	3,0			3,25		kΩ
V_i	=	0	0,7	3,75	0	0,61	5,9 V_{eff}
I_a	=	26	-	27	42	-	44 mA
I_{g_2}	=	5,8	-	8,6	9,2	-	15,5 mA
W_o	=	0	0,05	1,0	0	0,05	3,2 W
d_{tot}	=	-	-	10	-	-	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

Operatung characteristics of the pentode section as audio output tube, class A. (Continued)
Caractéristiques d'utilisation de la partie penthode comme tube de sortie B.F., classe A. (Suite)
Betriebsdaten des Pentodenteils als NF-Endröhre, Klasse A. (Fortsetzung)

V_{ba}	=		200		V
V_{bg_2}	=		200		V
R_{g_2}	=		470		Ω [1]
R_k	=		330		Ω [2]
$R_{a\sim}$	=		4,5		kΩ
V_i	=	0	0,66	6,7	V_{eff}
I_a	=	35	-	37	mA
I_{g_2}	=	7,8	-	13,3	mA
W_o	=	0	0,05	3,3	W
d_{tot}	=	-	-	10	%

Operating characteristics of two pentode sections as A.F. class AB push-pull output amplifier
Caractéristiques d'utilisation de deux parties penthodes en amplificatrice de sortie push-pull B.F., classe AB
Betriebsdaten von zwei Pentodenteilen als NF-Klasse AB Gegentakt-Ausgangsverstärker

V_{ba}	=	100		170		V
V_{bg_2}	=	100		170		V
R_k	=	140		125		Ω [3]
$R_{aa'\sim}$	=	4,5		4,5		kΩ
V_i	=	0	5,4	0	9,5	V_{eff}
I_a	=	2x 19	2x 22	2x 35	2x39,5	mA
I_{g_2}	=	2x4,4	2x7,0	2x8,5	2x13	mA
W_o	=	0	2,0	0	7	W
d_{tot}	=	-	3,1	-	3,6	%

1) Not bypassed; non découplée; nicht entkoppelt
2) During measurement V_k is kept constant
Pendant la mesure V_k est tenue constante
Während der Messung wird V_k konstant gehalten
3) Common cathode resistor
Résistance cathodique commune
Gemeinsamer Katodenwiderstand

Operating characteristics of two pentode sections as A.F. class AB push-pull output amplifier (continued)

→ Caractéristiques d'utilisation de deux parties penthodes en amplificatrice de sortie push-pull B.F., classe AB (suite)

Betriebsdaten von zwei Pentodenteilen als NF-Klasse AB Gegentakt-Ausgangsverstärker (Fortsetzung)

V_{ba}		200		V
V_{bg_2}		200		V
R_k		170		Ω [3]
$R_{aa'\sim}$		4,5		kΩ
V_i	=	0	14,2	V_{eff}
I_a	=	2x35	2x42,5	mA
I_{g_2}	=	2x8	2x16,5	mA
W_o	=	0	9,3	W
d_{tot}	=	-	6,3	%

→ Microphony and hum of the triode section

The triode section can be used without special precautions against microphony and hum in circuits in which an input voltage $V_i \geq 10$ mVeff gives an output of 50 mW in the output stage. Z_g (f = 50 c/s) = 0.25 MΩ. This hum requirement can be fulfilled when there is no A.C. voltage between pin 4 and cathode.

→ Effet microphonique et ronflement de la partie triode

La partie triode peut être utilisée sans précautions spéciales contre l'effet microphonique et le ronflement dans des circuits où une tension d'entrée $V_i \geq 10$ mVeff résulte en une puissance de sortie de l'étage de sortie de 50 mW. Z_g (50 c/s) = 0,25 MΩ. Cette exigence de ronflement peut être réalisée, s'il n'y a pas de tension alternative entre broche 4 et la cathode.

→ Mikrophonie und Brumm des Triodenteiles

Der Triodenteil darf ohne spezielle Massnahmen gegen Mikrophonie und Brumm verwendet werden in Schaltungen, die für eine Eingangsspannung $V_i \geq 10$ mVeff eine Ausgangsleistung der Endstufe von 50 mW ergeben. Z_g (50 c/s) = 0,25 MΩ. Dieses Brummerfordernis kann erfüllt werden wenn zwischen Stift 4 und der Katode keine Wechselspannung steht.

[3]) Common cathode resistor
Résistance cathodique commune
Gemeinsamer Katodenwiderstand

Operating characteristics of the triode section as A.F. amplifier

→ Caractéristiques d'utilisation de la partie triode en amplificatrice B.F.

Betriebsdaten des Triodenteils als NF-Verstärker

R_s = 0,22 MΩ [1]) R_g = 3 MΩ R_g' = 0,68 MΩ [2])

V_b (V)	R_k (kΩ)	R_a (kΩ)	I_a (mA)	$\frac{V_o}{V_i}$ [3])	V_o max (V_{eff})	d_{tot} (%)
170	2,7	220	0,43	51	25	2,3 [4])
100	2,7	220	0,23	47	15	4,0 [4])

R_s = 0,22 MΩ [1]) R_g = 22 MΩ R_g' = 0,68 MΩ [2])

V_b (V)	R_k (Ω)	R_a (kΩ)	I_a (mA)	$\frac{V_o}{V_i}$ [3])	V_o max (V_{eff})	d_{tot} (%)
170	0	100	0,86	49	19	1,4 [5])
100	0	100	0,37	42	8	1,3 [4])
170	0	220	0,50	53	20	1,4 [5])
100	0	220	0,22	46	9	1,5 [4])

[1]) Signal source resistance
Résistance interne de la source de signal
Generator-Innenwiderstand

[2]) Grid leak of the following tube
Résistance de fuite du tube suivant
Gitterableitwiderstand der folgenden Röhre

[3]) Measured at small input voltage
Mesuré à une tension d'entrée faible
Gemessen bei niedriger Eingangsspannung

[4]) At lower output voltages the distortion is proportionnally lower
A des tensions de sortie plus basses la distorsion est proportionnelle à la tension de sortie
Bei niedrigeren Ausgangsspannungen ist der Klirrfaktor der Ausgangsspannung proportional

[5]) At lower output voltages the distortion remains approximately constant down to V_o = 5 V_{eff}. At values < 5 V_{eff} the distortion is approximately proportional to V_o
À des tensions de sortie plus basses la distorsion reste environ constante jusqu'à V_o = 5 V_{eff}. À des valeurs < 5 V_{eff} la distorsion est à peu près proportionnelle à V_o.
Bei kleineren Ausgangsspannungen bleibt der Klirrfaktor annähernd konstant bis V_o = 5 V_{eff}. Unterhalb 5 V_{eff} ist der Klirrfaktor der Ausgangsspannung ungefähr proportional

Limiting values of the pentode section
Caractéristiques limites de la partie penthode
Grenzdaten des Pentodenteils

V_{ao}	= max. 550 V	W_{g2p}	= max. 3,2 W
V_a	= max. 250 V	I_k	= max. 50 mA
W_a	= max. 7 W	R_{g1}	= max. 1 MΩ [1]
V_{g2o}	= max. 550 V	R_{g1}	= max. 2 MΩ [2]
V_{g2}	= max. 250 V	V_{kf}	= max. 200 V
→ W_{g2}	= max. 2 W	R_{kf}	= max. 20 kΩ

Limiting values of the triode section
Caractéristiques limites de la partie triode
Grenzdaten des Triodenteils

V_{ao}	= max. 550 V	R_g	= max. 3 MΩ [2]
V_a	= max. 250 V	R_g	= max. 22 MΩ [3]
W_a	= max. 1 W	V_{kf}	= max. 200 V
I_k	= max. 15 mA	R_{kf}	= max. 20 kΩ
R_g	= max. 1 MΩ [1]	Z_g(50 c/s)	= max. 500 kΩ

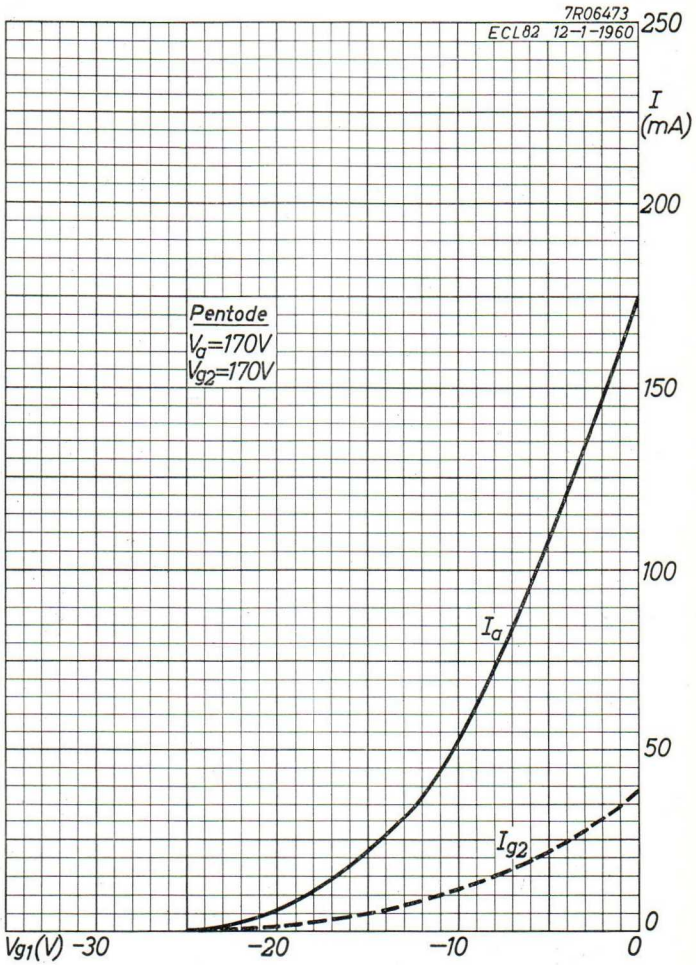
[1]) With fixed bias
Avec polarisation fixe
Mit fester Gittervorspannung

[2]) With automatic bias
Avec polarisation automatique
Mit automatischer Gittervorspannung

[3]) With grid current biasing
Si la polarisation est obtenue seulement par moyen de R_g
Wenn die Gittervorspannung nur mittels R_g erhalten wird

PHILIPS

UCL82



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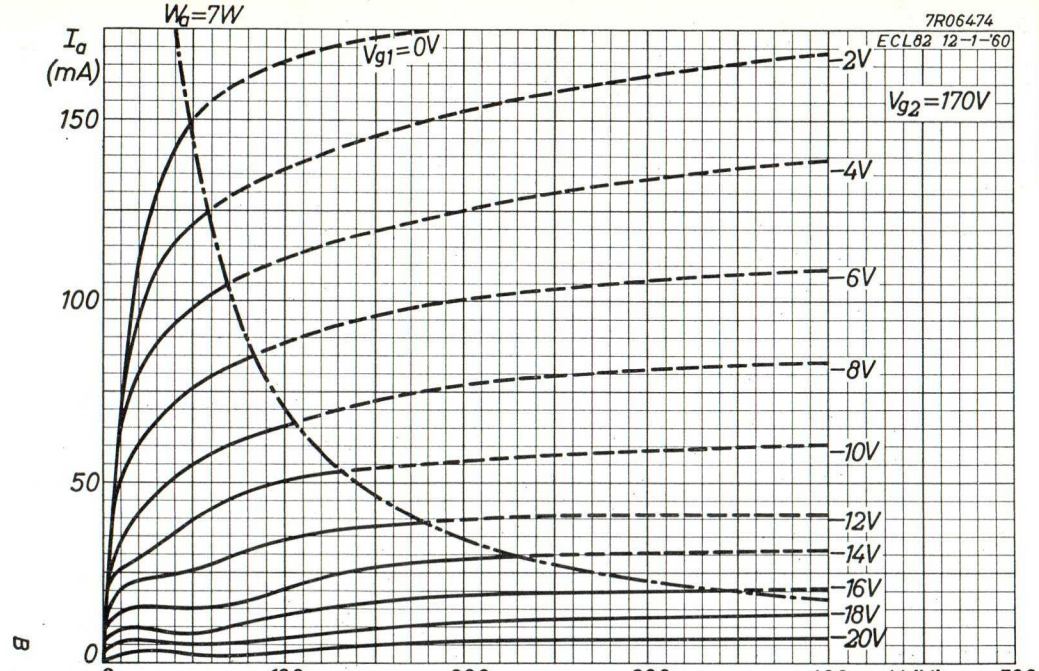

UCL 82

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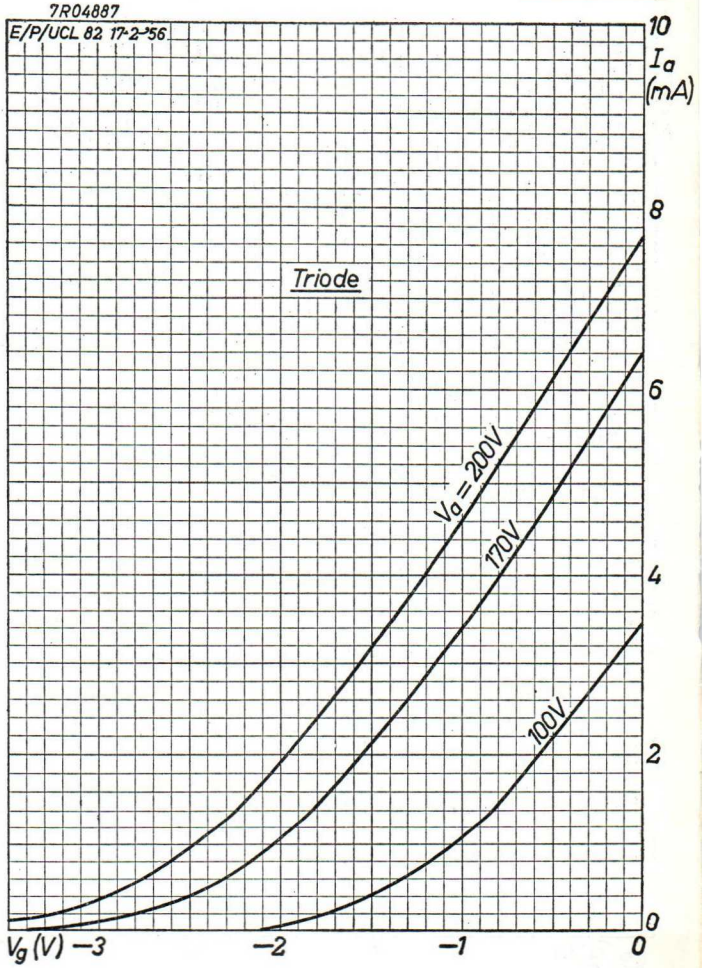

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C

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E/P/UCL 82 17-2-'56

UCL 82

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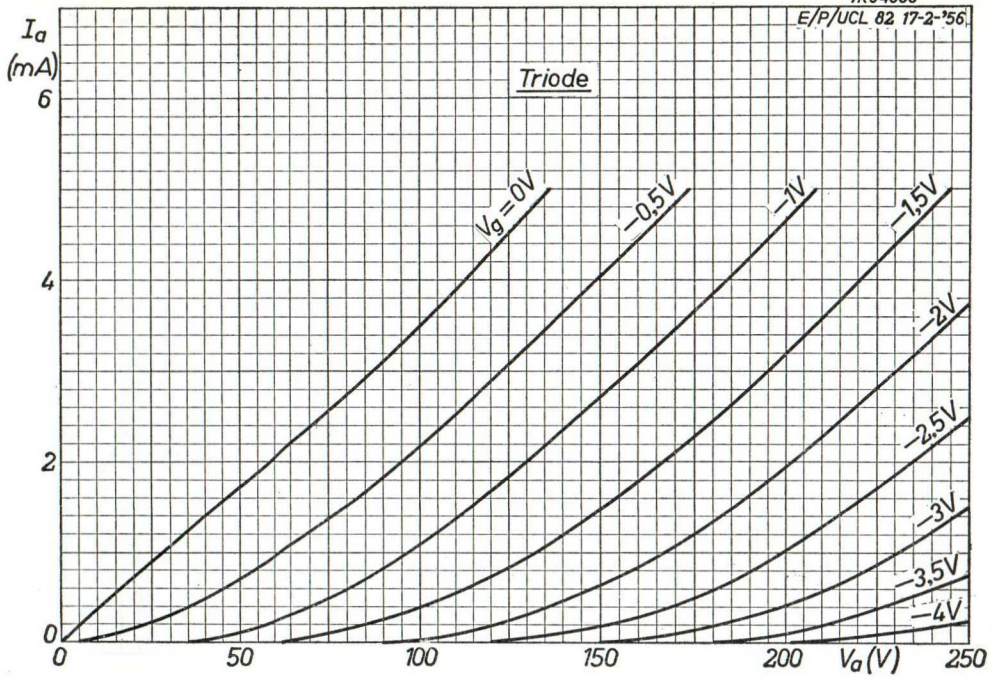

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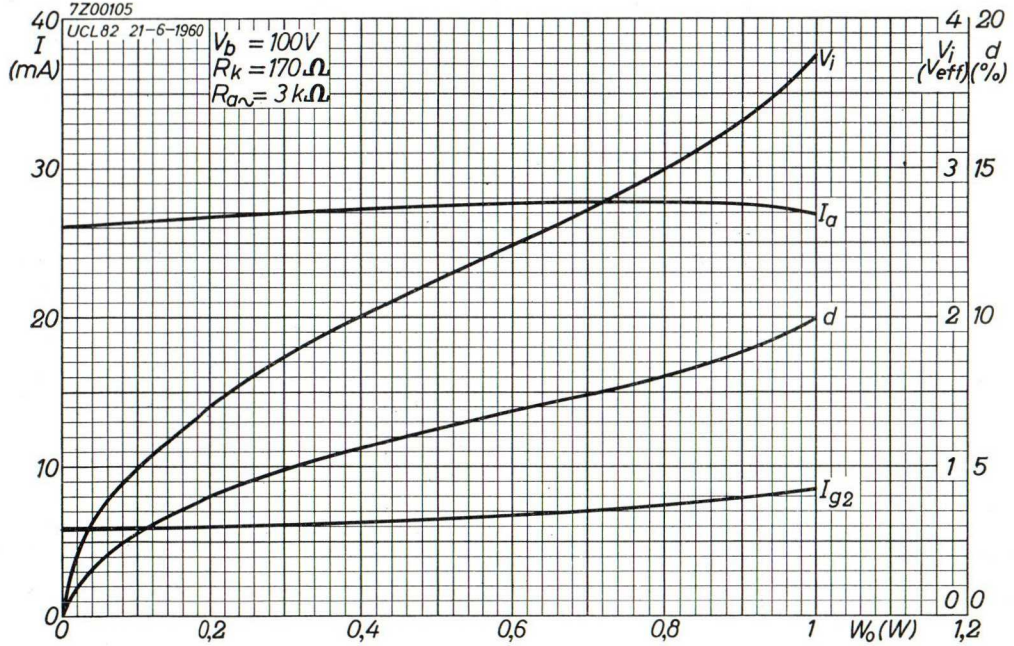

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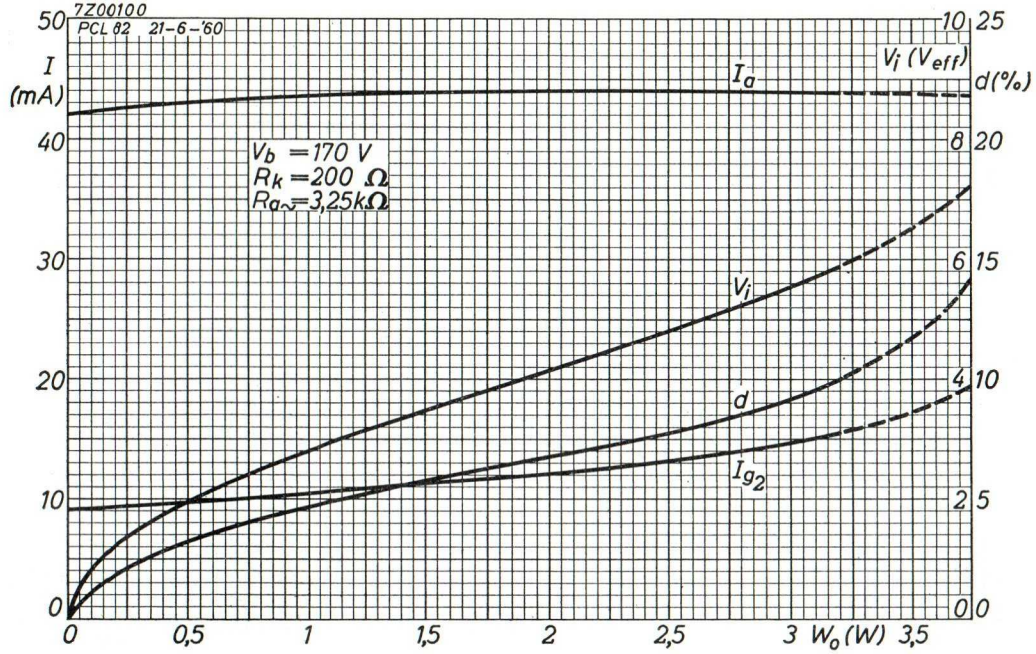
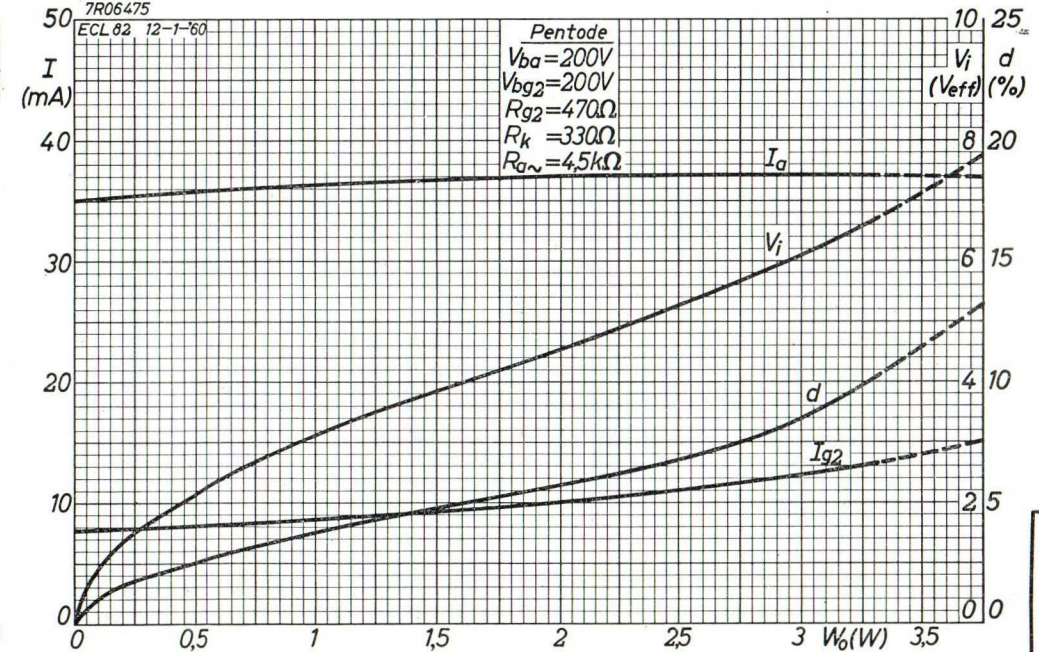

7Z00100
PCL 82 21-6-'60
I (mA)
V_i (V_{eff})
d(%)
I_a
V_b = 170 V
R_k = 200 Ω
$R_{a\sim}$ = 3,25kΩ
V_i
d
I_{g_2}
W_o (W)
50
40
30
20
10
0
10
8
6
4
2
0
25
20
15
10
5
0
0,5
1
1,5
2
2,5
3
3,5



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G

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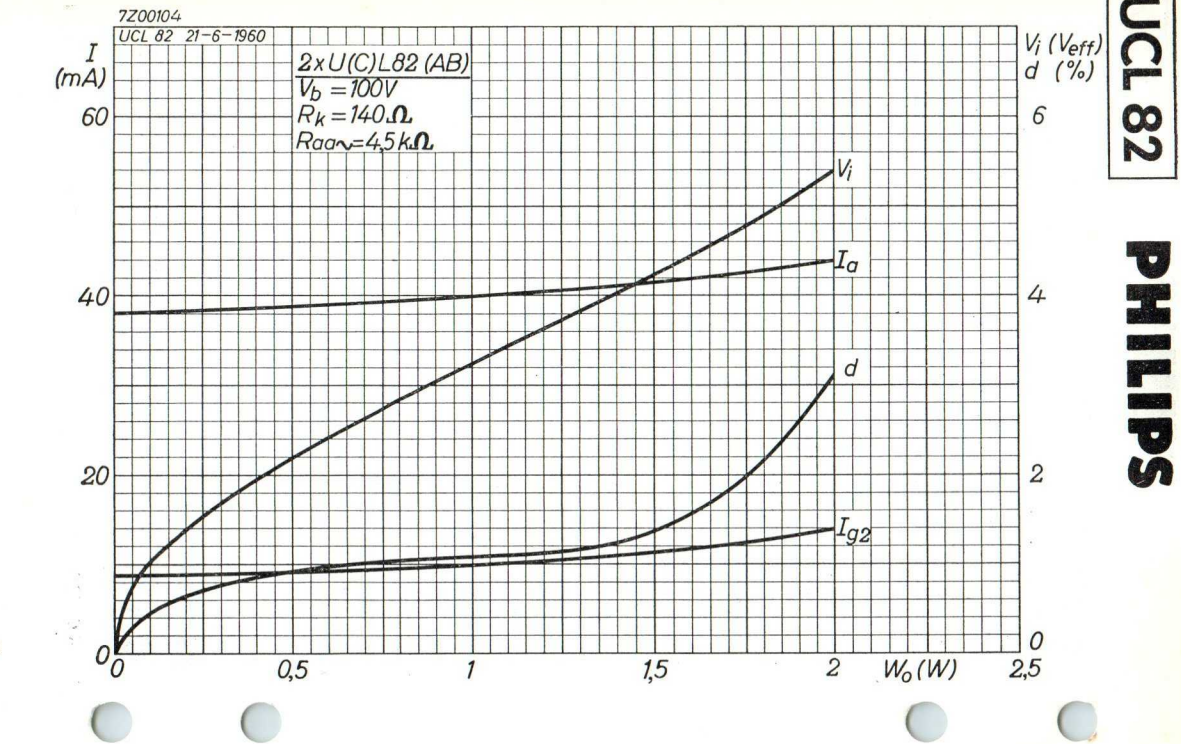

UCL 82

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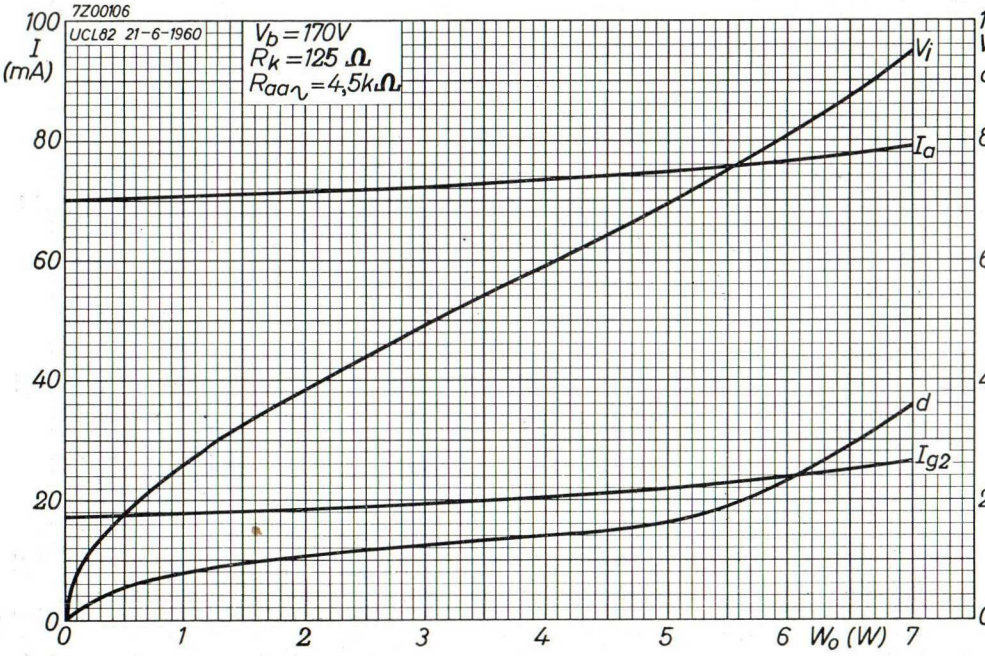
H



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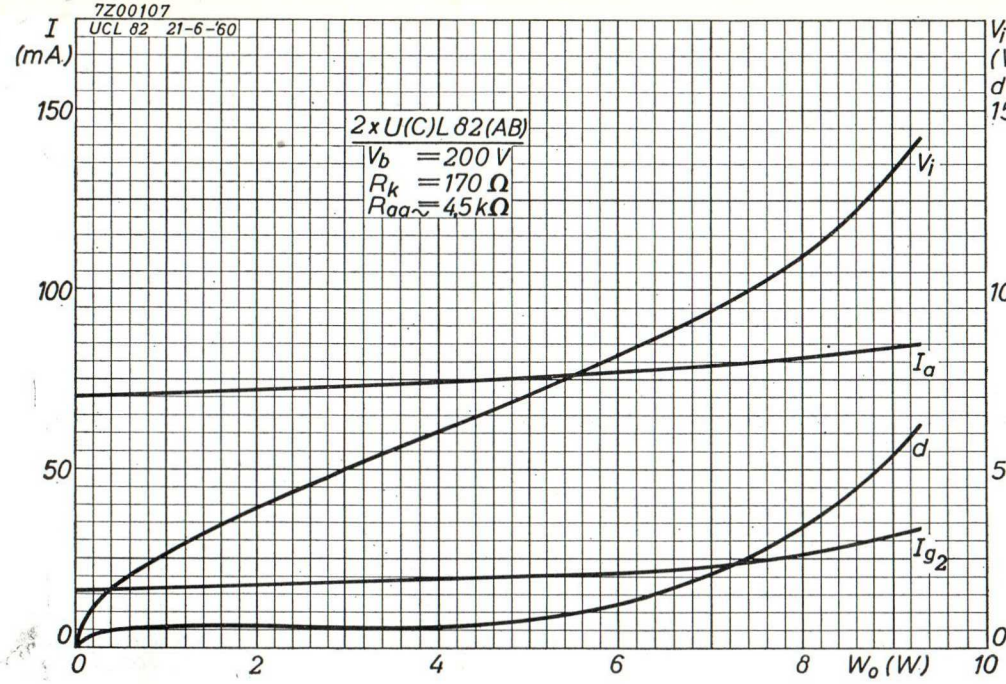


UCL 82

PHILIPS

PHILIPS

UF 41

PENTODE with variable mutual conductance for use as R.F. or I.F. amplifier
PENTHODE à pente variable pour utilisation en amplificatrice H.F. ou M.F.
PENTODE mit veränderlicher Steilheit zur Verwendung als HF- und ZF-Verstärker

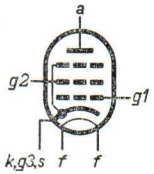
Heating : indirect; series supply — V_f=12,6 V
Chauffage: indirect; alimentation- série — I_f= 100 mA
Heizung : indirekt; Serienspeisung

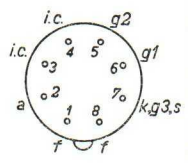
Base, culot, Sockel: RIMLOCK

Overall length: 60 mm
See pages 203 and 252

Hauteur totale: 60 mm
Voir pages 203 et 252

Gesamthöhe : 60 mm
Siehe S. 203 und 252





Capacitances
Capacités
Kapazitäten

C_a	=	5,7 pF
C_{g1}	=	4,9 pF
C_{ag1}	<	0,002 pF
C_{g1f}	<	0,1 pF

Operating characteristics as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F. ou M.F.
Betriebsdaten als HF- oder ZF-Verstärker

A. With sliding V_{g2}
Avec V_{g2} glissante
Mit gleitender V_{g2}

$V_a=V_b$ =	100		170		200		V
R_{g2} =	40		40		40		kΩ
R_k =	325		325		325		Ω
V_{g1} =	-1,4	-17	-2,5	-28	-3	-34	V
I_a =	3,3	-	6,0	-	7,2	-	mA
I_{g2} =	1,0	-	1,75	-	2,1	-	mA
S =	1900	19	2200	22	2300	23	µA/V
R_i =	0,8	>10	1,0	>10	1,0	>10	MΩ
μ_{g2g1}=	18	-	18	-	18	-	
R_{eq} =	5,5	-	6,5	-	7,0	-	kΩ

B. With fixed V_{g2}
Avec V_{g2} fixe
Mit fester V_{g2}

V_a=V_b	=	100	V
V_{g2}	=	100	V
R_k	=	325	Ω
V_{g1}	=	-2,5 -16,5	V
I_a	=	6,0 -	mA
I_{g2}	=	1,75 -	mA
S	=	2200 22	µA/V
R_i	=	0,6 >10	MΩ
μ_{g2g1}	=	18 -	
R_{eq}	=	6,5 -	kΩ

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	2	W
V_{g2_o}	= max.	550	V
V_{g2}(I_a < 4 mA)	= max.	250	V
V_{g2}(I_a =7,2 mA)	= max.	150	V
W_{g2}	= max.	0,3	W
I_k	= max.	10	mA
V_{g1}(I_{g1}=+0,3µA)	= max.	-1,3	V
R_{g1}	= max.	3	MΩ
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	150	V

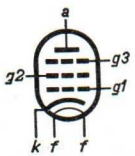
PHILIPS UF 42

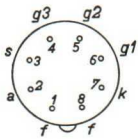
R.F. PENTODE for use as wide-band amplifier
PENTHODE H.F. pour utilisation en amplificatrice à large bande
H.F.PENTODE zur Verwendung als Breitbandverstärker

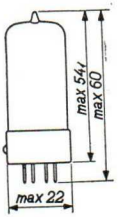
Heating: indirect by A.C. or D.C.; series supply
Chauffage: indirect par C.A. ou C.C.; alimentation en série
Heizung: indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

I_f = 100 mA
V_f = 21 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: RIMLOCK

Capacitances
Capacités
Kapazitäten

C_a	=	4,3 pF
C_{g1}	=	8,6 pF
C_{ag1}	<	0,006 pF
C_{g1f}	<	0,2 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	170 V
V_{g3}	=	0 V
V_{g2}	=	170 V
V_{g1}	=	-2 V
I_a	=	10 mA
I_{g2}	=	2,8 mA
S	=	8 mA/V
μ_{g2g1}	=	52
R_i	=	0,3 MΩ
R_{eq}	=	1060 Ω

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

V_a	=	170	V
V_{g3}	=	0	V
V_{g2}	=	170	V
I_a	=	10	mA
f	=	100	Mc/s
Bandwidth Largeur de bande Bandbreite	=	0,8	Mc/s
G	=	1000	

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}		= max.	550	V
V_a		= max.	250	V
W_a		= max.	2	W
V_{g2_c}		= max.	550	V
V_{g2}		= max.	250	V
W_{g2}		= max.	0,5	W
I_k		= max.	15	mA
$-V_{g1}$		= max.	100	V
V_{g1}	(I_{g1}=+0,3μA)	= max.	-1,3	V
R_{g1}		= max.	1	MΩ[1])
V_{kf}		= max.	150	V
R_{kf}		= max.	20	kΩ

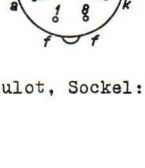
[1]) With automatic grid bias
A polarisation négative automatique
Mit automatischer negativer Gittervorspannung

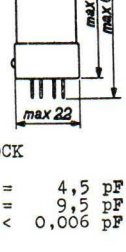
PHILIPS UF 43

R.F. PENTODE with variable mutual conductance for use as wide-band amplifier
PENTHODE H.F. à pente variable pour utilisation en amplificatrice à large bande
H.F. PENTODE mit veränderlicher Steilheit zur Verwendung als Breitbandverstärker

Heating:	indirect by A.C. or D.C.; series supply		
Chauffage:	indirect par C.A. ou C.C.; alimentation en série	V_f =	21 V
Heizung:	indirekt durch Wechsel- oder Gleichstrom; Serienspeisung	I_f =	100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: RIMLOCK

Capacitances	C_a =	4,5 pF
Capacités	C_{g1} =	9,5 pF
Kapazitäten	C_{ag1} <	0,006 pF

Operating characteristics for use as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F. ou M.F.
Betriebsdaten als H.F.- oder Z.F.-Verstärker

$V_a=V_b$	=	100		170		V
V_{g3}	=	0		0		V
R_{g2}	=	10		10		kΩ
R_k	=	105		105		Ω
V_{g1}	=	-1,05	-11	-2,0	-19	V
V_{g2}	=	75	-	135	-	V
I_a	=	7,5	-	15	-	mA
I_{g2}	=	2,5	-	3,5	-	mA
S	=	5,8	0,058	6,3	0,063	mA/V
R_i	=	0,3	>10	0,3	>10	MΩ
R_{eq}	=	1,5	-	1,8	-	kΩ

$V_a=V_b$	=	200		V
V_{g3}	=	0		V
R_{g2}	=	18		kΩ
R_k	=	105		Ω
V_{g1}	=	-2	-22	V
V_{g2}	=	135	-	V
I_a	=	15	-	mA
I_{g2}	=	3,5	-	mA
S	=	6,4	0,064	mA
R_i	=	0,4	>10	MΩ
R_{eq}	=	1,7	-	kΩ

Limiting values
Caractéristiques limites
Grenzdaten

V_{ao}	= max.	550	V
V_a	= max.	300	V
W_a	= max.	3,75	W
V_{g2o}	= max.	550	V
V_{g2}	= max.	250	V
W_{g2}	= max.	0,7	W
I_k	= max.	20	mA
$V_{g1}(I_g = 0,3\mu A)$	= max.	-1,3	V
R_{g1}	= max.	1	MΩ
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	150	V

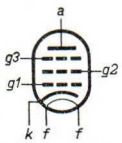
PHILIPS

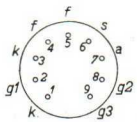
UF 80

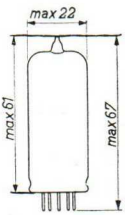
PENTODE for use as R.F. and I.F. amplifier
PENTHODE pour l'utilisation en amplificatrice H.F. et M.F.
PENTODE zur Verwendung als HF- und ZF-Verstärker

Heating:	indirect by A.C. or D.C.; series supply	
Chauffage:	indirect par C.A. ou C.C.; alimentation série	Vf = 19 V If = 100 mA
Heizung:	indirekt durch Wechsel- oder Gleichstrom; Serienspeisung	

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Noval

Capacitances
Capacités
Kapazitäten

C_{g1}	=	7,5 pF
C_a	=	3,3 pF
C_{ag1}	<	0,007 pF
C_{ak}	<	0,012 pF
C_{g2}	=	5,4 pF
C_{g1g2}	=	2,6 pF
C_{g1f}	<	0,15 pF

Operating characteristics as R.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F.
Betriebsdaten als HF-Verstärker

V_a	=	170 V
V_{g3}	=	0 V
V_{g2}	=	170 V
V_{g1}	=	-2,0 V
I_a	=	10 mA
I_{g2}	=	2,5 mA
S	=	7,4 mA/V
R_i	=	0,4 MΩ
μ_{g2g1}	=	50
R_{eq}	=	1000 Ω
r_{g1} [1]	=	10 kΩ

Limiting values
Caractéristiques limites
Grenzdaten

V_{ao}	= max. 550 V	I_k	= max.	15 mA	
V_a	= max. 250 V	V_{g1} (I_{g1} = +0,3 μA)	= max.	-1,3 V	
W_a	= max. 2,5 W	R_{g1}	= max.	1 MΩ	[2]
V_{g2o}	= max. 550 V	R_{g1}	= max.	0,5 MΩ	[3]
V_{g2}	= max. 250 V	R_{kf}	= max.	20 kΩ	
W_{g2}	= max. 0,7 W	V_{kf}	= max.	150 V	

[1] Input resistance at 50 Mc/s; pin 1 connected to pin 3
Résistance d'entrée à 50 Mc/s; broche 1 connectée à broche 3
Eingangswiderstand bei 50 MHz; Stift 1 verbunden mit Stift 3

[2] With automatic grid bias
Avec polarisation négative automatique
Mit automatischer negativer Gittervorspannung

[3] With fixed grid bias
Avec polarisation négative fixe
Mit fester negativer Gittervorspannung

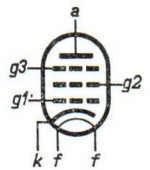
PHILIPS

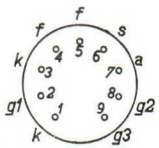
UF85

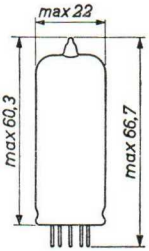
R.F. PENTODE with variable mutual conductance for use as I.F. amplifier in A.M. receivers and as R.F. or I.F. amplifier in F.M. receivers or broadband amplifiers
PENTHODE H.F. à pente variable pour utilisation en amplificatrice M.F. dans des récepteurs A.M. et en amplificatrice H.F. ou M.F. dans des récepteurs F.M. ou des amplificateurs à large bande
H.F.PENTODE mit veränderlicher Steilheit zur Verwendung als ZF-Verstärker in AM-Empfängern und als HF- oder ZF-Verstärker in FM-Empfängern oder Breitbandverstärkern

Heating :	indirect by A.C. or D.C. series supply	
Chauffage:	indirect par C.A. ou C.C. alimentation en série	V_f = 19 V I_f = 100 mA
Heizung :	indirekt durch Wechsel- oder Gleichstrom; Serienspeisung	

Dimensions in mm
Dimensions en mm
Abmessungen in mm.







Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	C_a	=	3,2 pF
	C_{g1}	=	6,9 pF
	C_{ag1}	<	0,007 pF
	C_{g1f}	<	0,15 pF

Operating characteristics for use as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F. ou M.F.
Betriebsdaten als HF- oder ZF-Verstärker

$V_a=V_b$	=	100		170		200	V
V_{g3}	=	0		0		0	V
R_{g2}	=	27		27		27	kΩ
V_{g1}	=	-1,1	-14	-2	-24	-2,3	-28	V
V_{g2}	=	57	-	100	-	116	-	V
I_a	=	5,5	-	9,7	-	11,4	-	mA
I_{g2}	=	1,6	-	2,6	-	3,1	-	mA
S	=	5000	50	5900	59	6100	61	µA/V
R_i	=	0,25	> 5	0,3	> 5	0,35	> 5	MΩ
R_{eq}	=	1,1	-	1,4	-	1,5	-	kΩ
r_{g1} [1]	=	5,6	-	7,6	-	8	-	kΩ

Limiting values
Caractéristiques limites
Grenzdaten

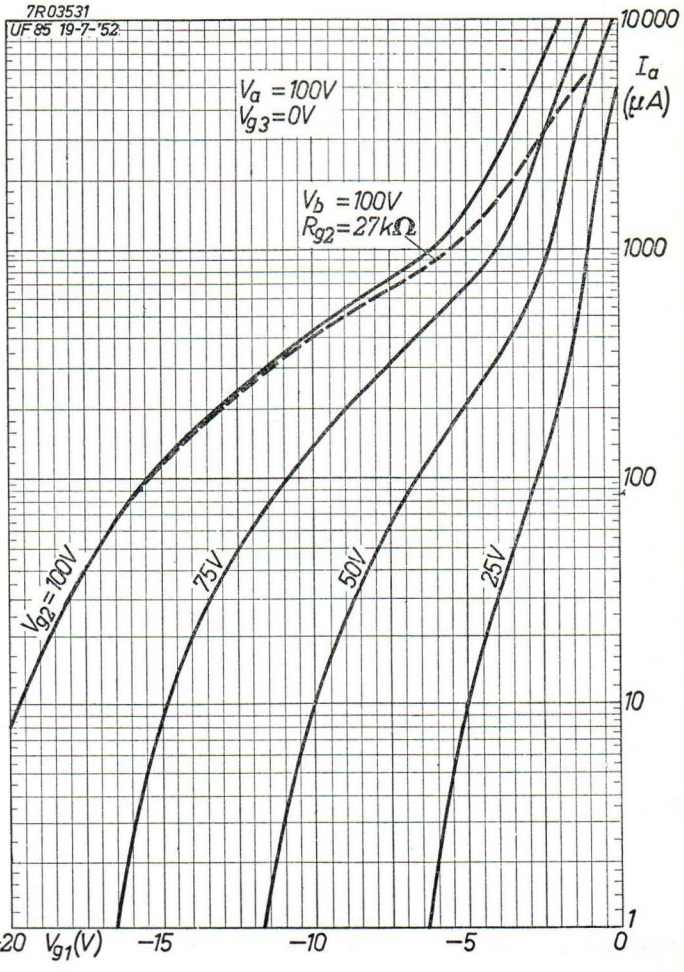
V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	2,5	W
V_{g2_o}	= max.	550	V
V_{g2}	= max.	250	V
W_{g2}	= max.	0,65	W
I_k	= max.	15	mA
$-V_{g1}(I_{g1}=+0,3\mu A)$	= max.	1,3	V
R_{g1}	= max.	3	MΩ [2]
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	150	V

[1] f = 50 Mc/s

[2] When the tube is used at or near maximum ratings it is advisable to take the value of R_{g1} as low as possible.
Si le tube est utilisé aux ou presqu'aux valeurs limites il est recommandé de choisir une valeur de R_{g1} aussi petite que possible.
Wenn die Röhre bei oder fast bei den Grenzdaten verwendet wird, wird es empfohlen einen möglichst niedrigen Wert von R_{g1} zu wählen.

PHILIPS

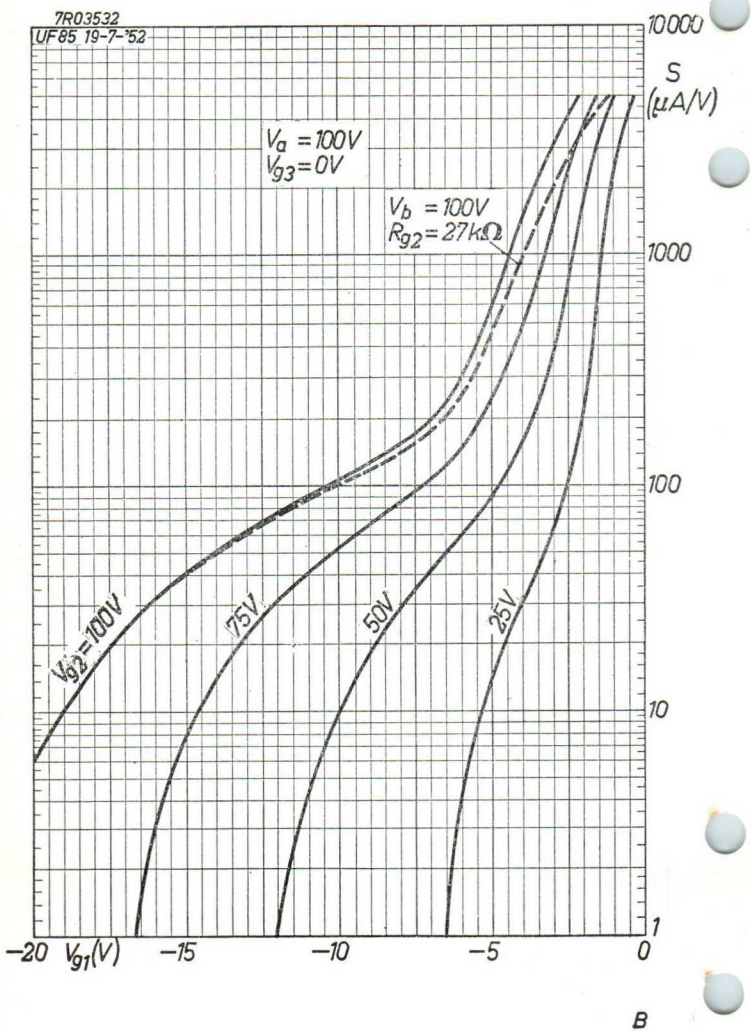
UF 85



8.8.1952

A

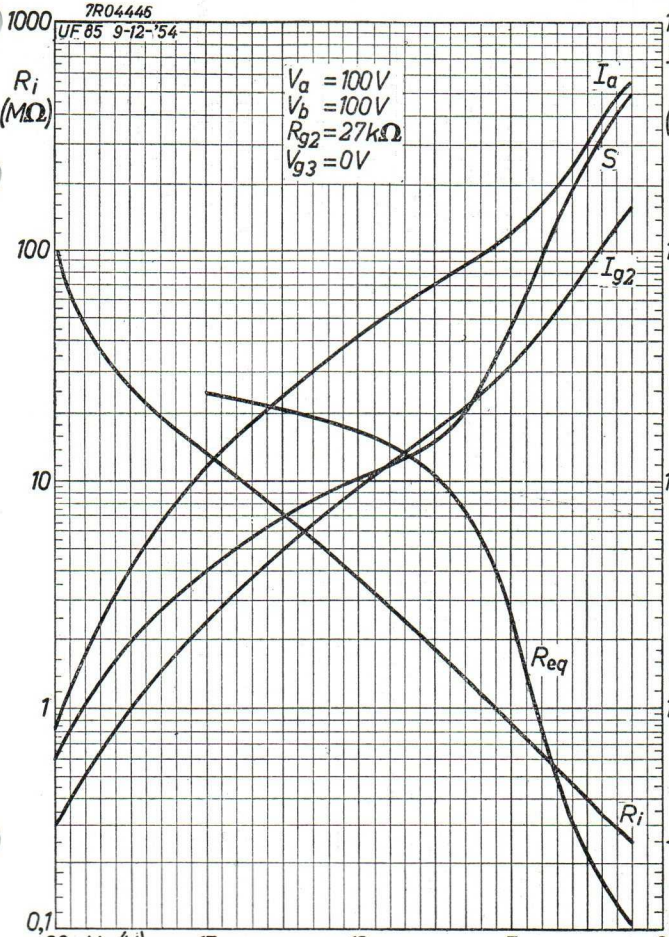
UF 85 **PHILIPS**



B

PHILIPS

UF 85



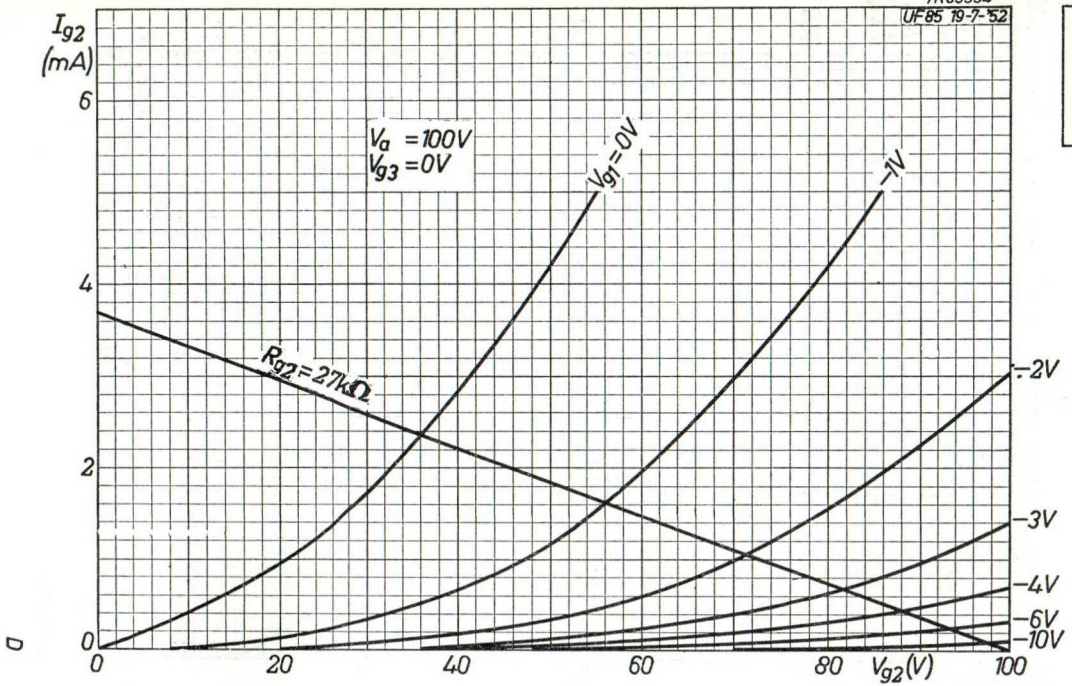
12.12.1954

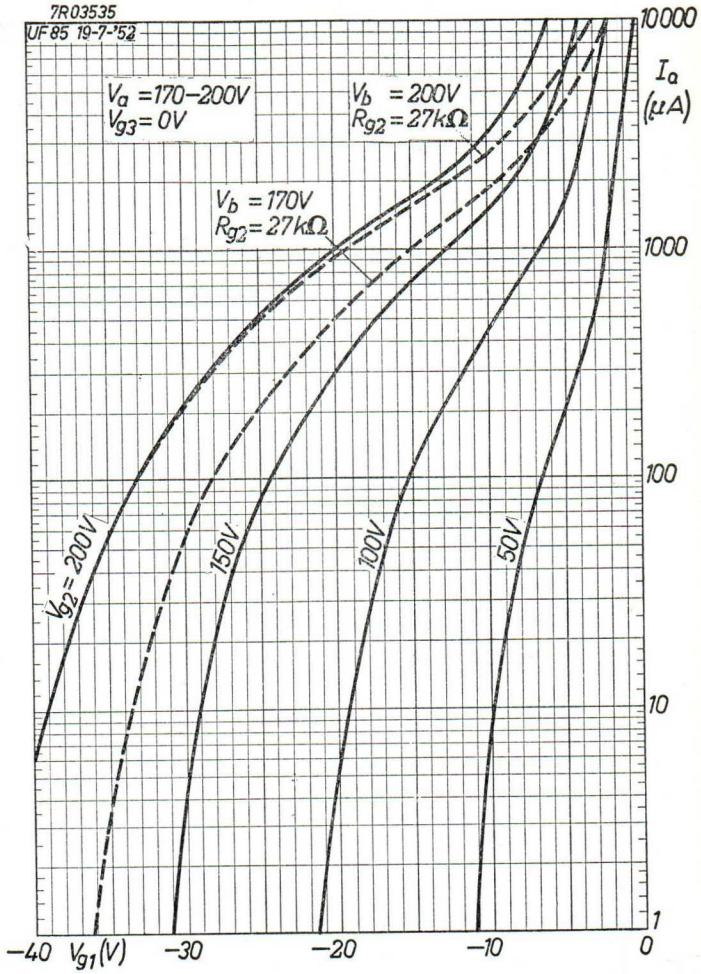
C

7R03534
UF85 19-7-52

UF85

PHILIPS



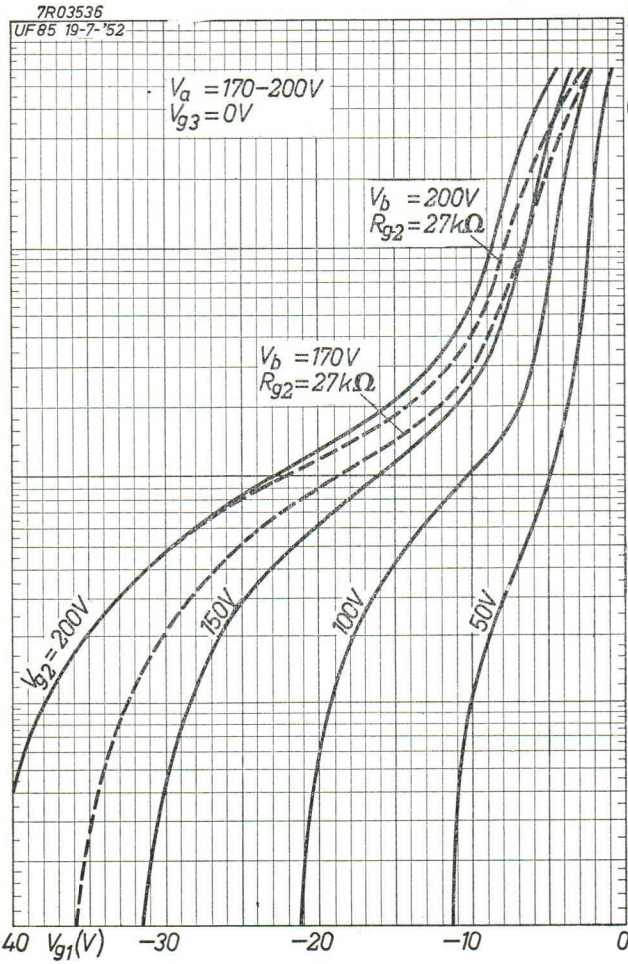

7R03535
UF 85 19-7-'52
V_a = 170–200V
V_{g3} = 0V
V_b = 200V
R_{g2} = 27kΩ
V_b = 170V
R_{g2} = 27kΩ
V_{g2} = 200V
150V
100V
50V
10000
I_a (μA)
1000
100
10
1
−40
V_{g1}(V)
−30
−20
−10
0

8.8.1952

E

UF 85

PHILIPS



F

PHILIPS

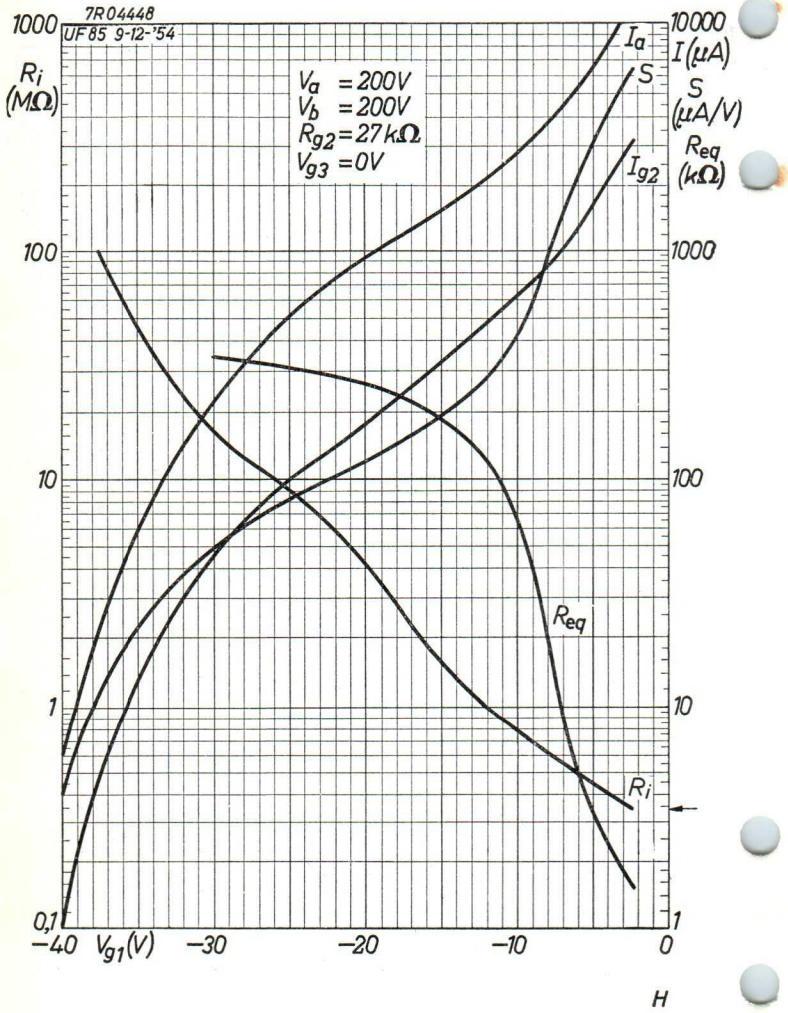
UF85

12.12.1954

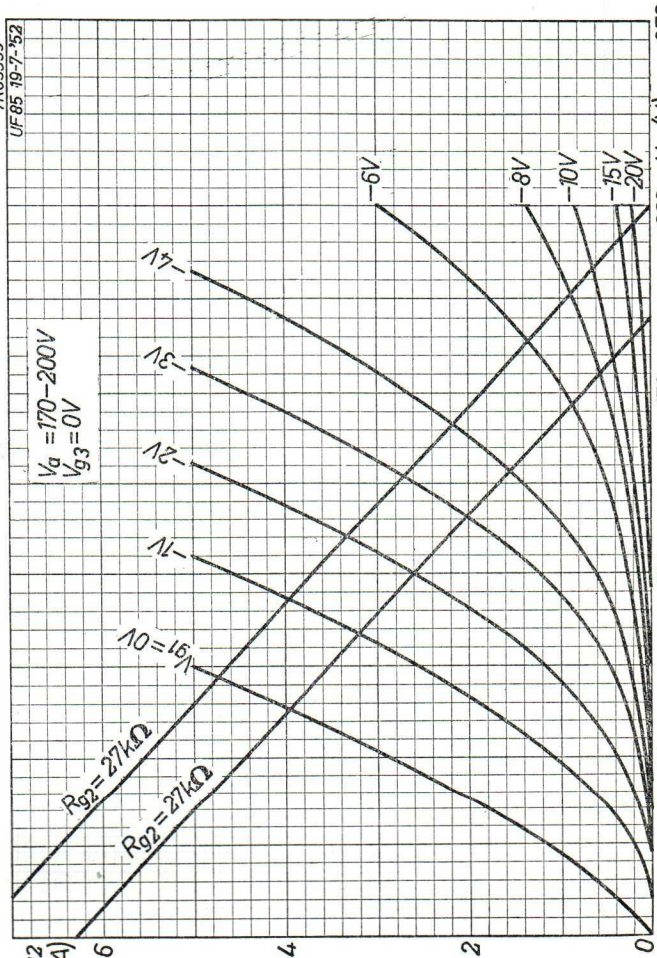
G

UF85

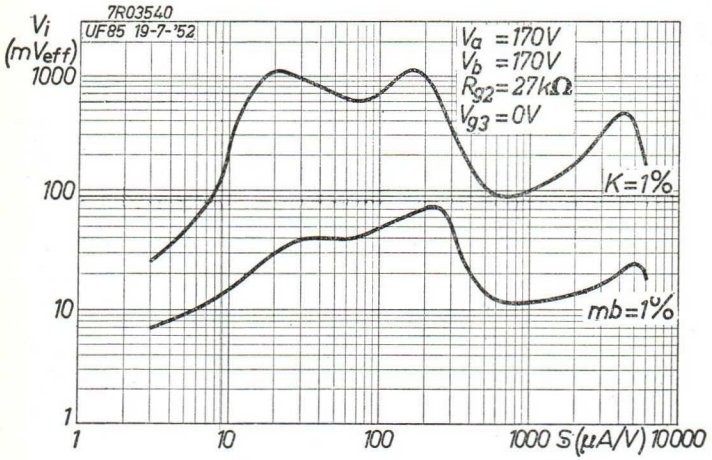
PHILIPS

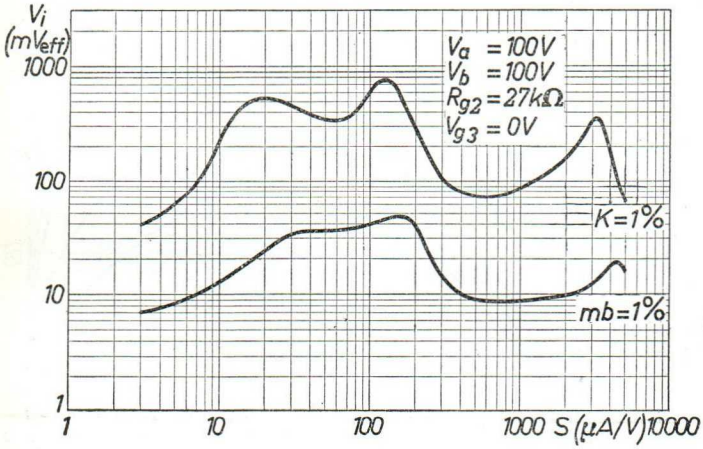


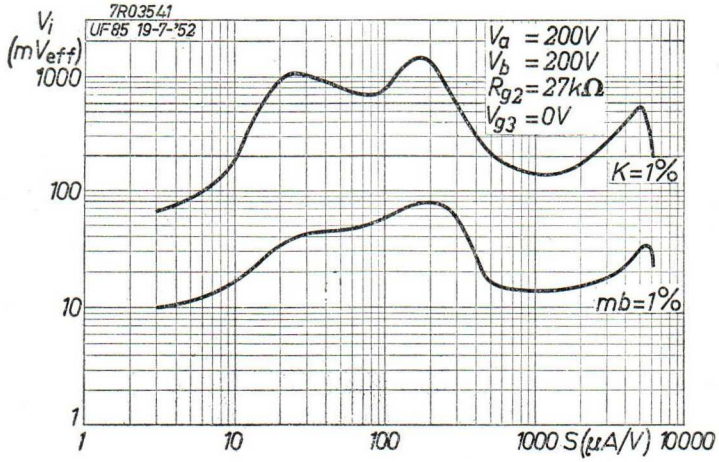
H


7R03539
UF 85 19-7-'52
V_a = 170–200V
V_{g3} = 0V
V_{g1} = 0
-1V
-2V
-3V
-4V
R_{g2} = 27kΩ
R_{g2} = 27kΩ
-6V
-8V
-10V
-15V
-20V
I_{g2} (mA)
V_{g2} (V)
0
2
4
6
50
100
150
200
250

UF 85 PHILIPS






7R03541
UF85 19-7-'52
V_i (mV_{eff})
1000
100
10
1
1
10
100
1000 S($\mu A/V$) 10000
V_a = 200V
V_b = 200V
R_{g2} = 27kΩ
V_{g3} = 0V
K=1%
mb=1%

8.8.1952

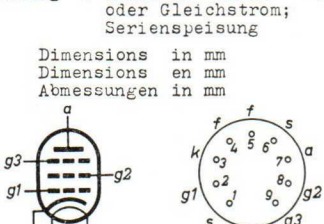
K

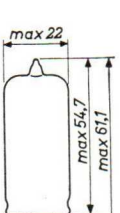
PHILIPS UF 89

PENTODE with variable mutual conductance for use as H.F. or I.F. amplifier
PENTHODE à pente variable pour utilisation comme amplificatrice H.F. ou M.F.
PENTODE mit veränderlicher Steilheit zur Verwendung als HF- oder ZF-Verstärker

Heating : indirect by A.C. or D.C.; series supply
Chauffage: indirect par C.A. ou C.C.; alimentation série — V_f = 12,6 V, I_f = 100 mA
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: Noval

Capacitances Capacités Kapazitäten	C_a = 5,1 pF	C_{ag1} < 0,002 pF
	C_{g1} = 5,5 pF	C_{g1f} = 0,05 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	170 V
V_{g2}	=	100 V
V_{g3}	=	0 V
I_a	=	12 mA
V_{g1}	=	-1,2 V[1])
I_{g2}	=	4,4 mA
S	=	4,4 mA/V
R_i	=	0,4 MΩ
μ_{g2g1}	=	21

[1]) In this case control grid current may occur. If this is not permissible, the negative grid bias should be increased to a value of 1.5 V at least.
Dans ce cas il peut ce présenter de courant de grille Si celui-ci n'est pas permis, il faut augmenter la polarisation négative jusqu'à une valeur de 1,5V au moins.
Bei dieser Einstellung kann Gitterstrom fliessen; wenn das unzulässig ist, muss man eine Einstellung mit -1,5 V Gittervorspannung wählen

Operating characteristics as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F. ou M.F.
Betriebsdaten als HF- oder ZF-Verstärker

$V_a=V_b$	=	200		170		V
V_{g3}	=	0		0		V
R_{g2}	=	24		15		kΩ
R_k	=	130		130		Ω
V_{g1}	=	-1,95	-20	-1,95	-20	V
I_a	=	11,1	-	11,0	-	mA
I_{g2}	=	3,8	-	3,9	-	mA
S	=	3,85	0,16	3,8	0,11	mA/V
R_i	=	550	-	450	-	kΩ
R_{eq}	=	4,2	-	4,5	-	kΩ
g [2]	=	102	-	102	-	μA/V

$V_a=V_b$	=	100		100		V
V_{g3}	=	0		0		V
R_{g2}	=	15		0		kΩ
R_k	=	130		160		Ω
V_{g1}	=	-1,05	-10	-1,9	-10	V
I_a	=	6,0	-	8,6	-	mA
I_{g2}	=	2,1	-	3,1	-	mA
S	=	3,2	0,15	3,3	0,16	mA/V
R_i	=	475	-	300	-	kΩ
R_{eq}	=	3,5	-	4,7	-	kΩ
g [2]	=	120	-	102	-	μA/V

2) Input conductance at f = 50 Mc/s
Conductance d'entrée à f = 50 MHz
Eingangsleitwert bei f = 50 MHz

Operating characteristics as R.F. or I.F. amplifier
Caractéristiques d'utilisation en amplificatrice H.F.
Betriebsdaten als HF- oder ZF-Verstärker

$V_a=V_b$	=	200[1]		170[1]		V
V_{g3}	=	0		0		V
R_{g2}	=	33		22		kΩ
R_k	=	0		0		Ω
R_{g1}	=	10		10		MΩ
$V_{R(g1)}$	=	0	-20	0	-20	V
I_a	=	11,3	-	11,8	-	mA
I_{g2}	=	3,9	-	4,3	-	mA
S	=	5,15	0,15	5,2	0,11	mA/V
R_i	=	475	-	400	-	kΩ
R_{eq}	=	2,5	-	2,6	-	kΩ

$V_a=V_b$	=	100[1]		100[1]		V
V_{g3}	=	0		0		V
R_{g2}	=	22		3,9		kΩ
R_k	=	0		0		Ω
R_{g1}	=	10		10		MΩ
$V_{R(g1)}$	=	0	-10	0	-10	V
I_a	=	6,1	-	12	-	mA
I_{g2}	=	2,3	-	4,5	-	mA
S	=	4,0	0,14	5,0	0,16	mA/V
R_i	=	450	-	200	-	kΩ
R_{eq}	=	2,6	-	3,0	-	kΩ

[1]) In this case control grid current may occur. If this is not permissible, the negative grid bias should be increased to a value of 1.5 V at least.

Dans ce cas il peut ce présenter de courant de grille Si celui-ci n'est pas permis, il faut augmenter la polarisation négative jusqu'à une valeur de 1,5V au moins.

Bei dieser Einstellung kann Gitterstrom fliessen; wenn das unzulässig ist, muss man eine Einstellung mit -1,5 V Gittervorspannung wählen

Limiting values
Caractéristiques limites
Grenzdaten

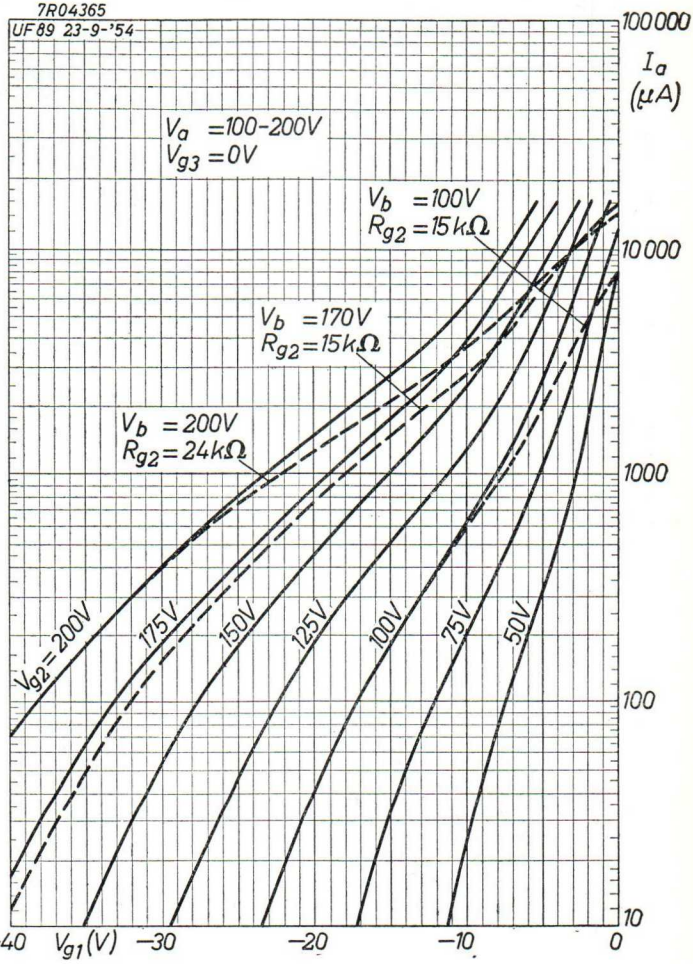
V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	2,25	W
V_{g2_o}	= max.	550	V
V_{g2}	= max.	250	V
W_{g2}	= max.	0,45	W
I_k	= max.	16,5	mA
R_{g1}	= max.	3	MΩ[1])
R_{g3}	= max.	10	kΩ
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	150	V

---

[1])With grid current biasing R_{g1} = max. 22 MΩ
Si V_{g1} est obtenue seulement par moyen de R_{g1}, R_{g1} = max. 22 MΩ
Wenn V_{g1} nur mittels R_{g1} erhalten wird ist R_{g1} = max. 22 MΩ

PHILIPS

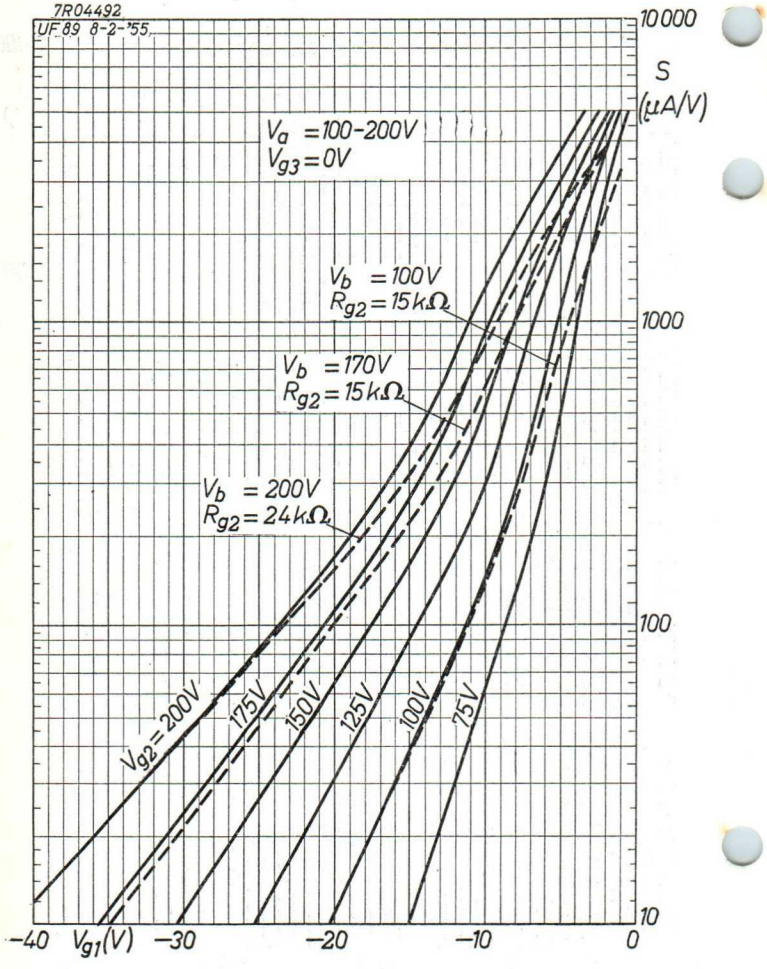
UF 89



3.3.1955

A

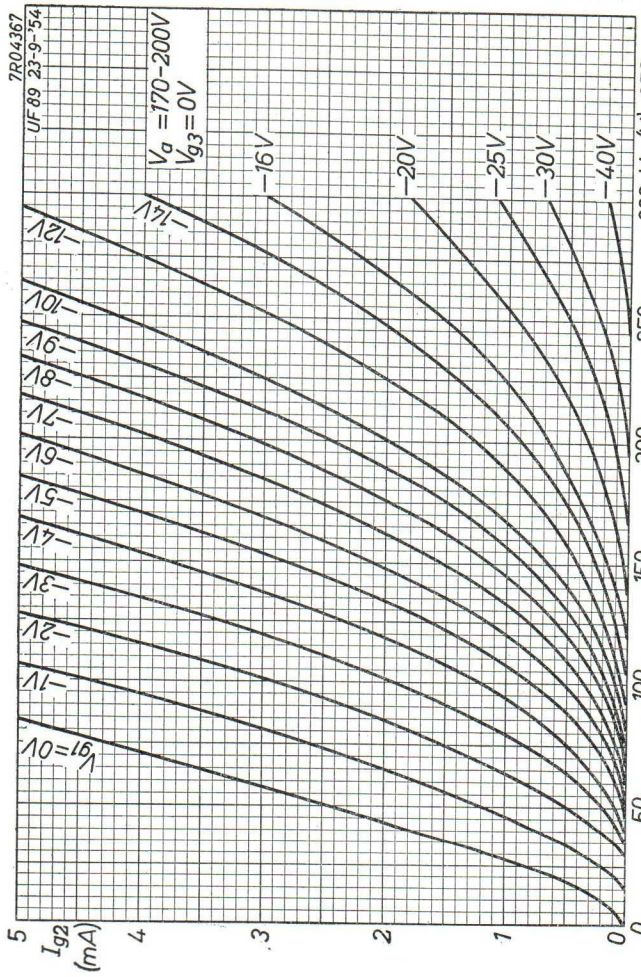
UF 89 **PHILIPS**



B

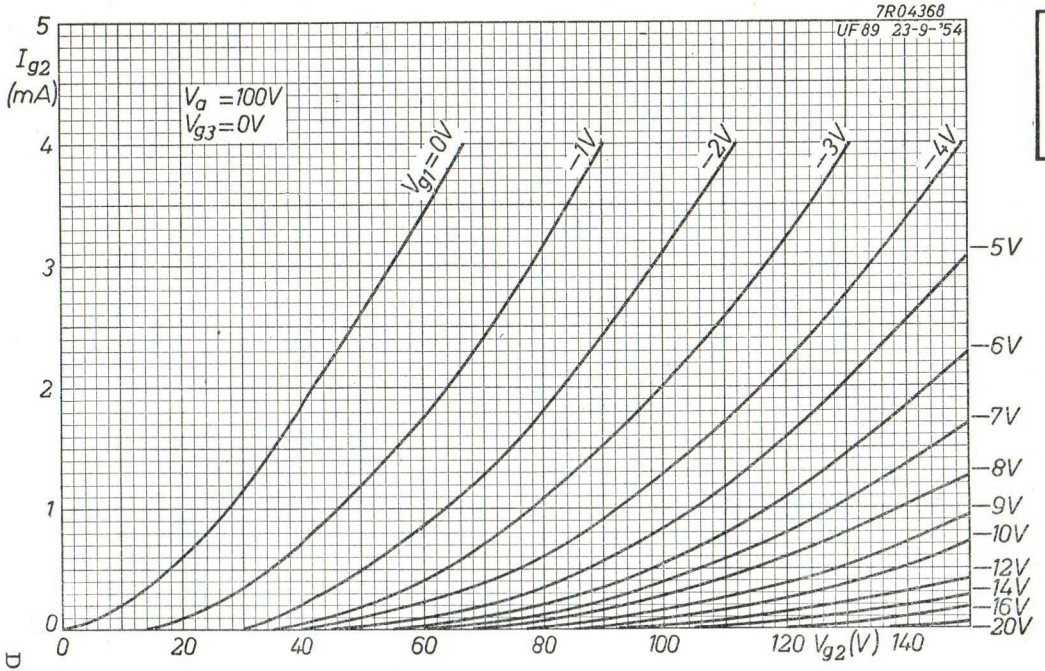
PHILIPS

UF 89



11.11.1954

C

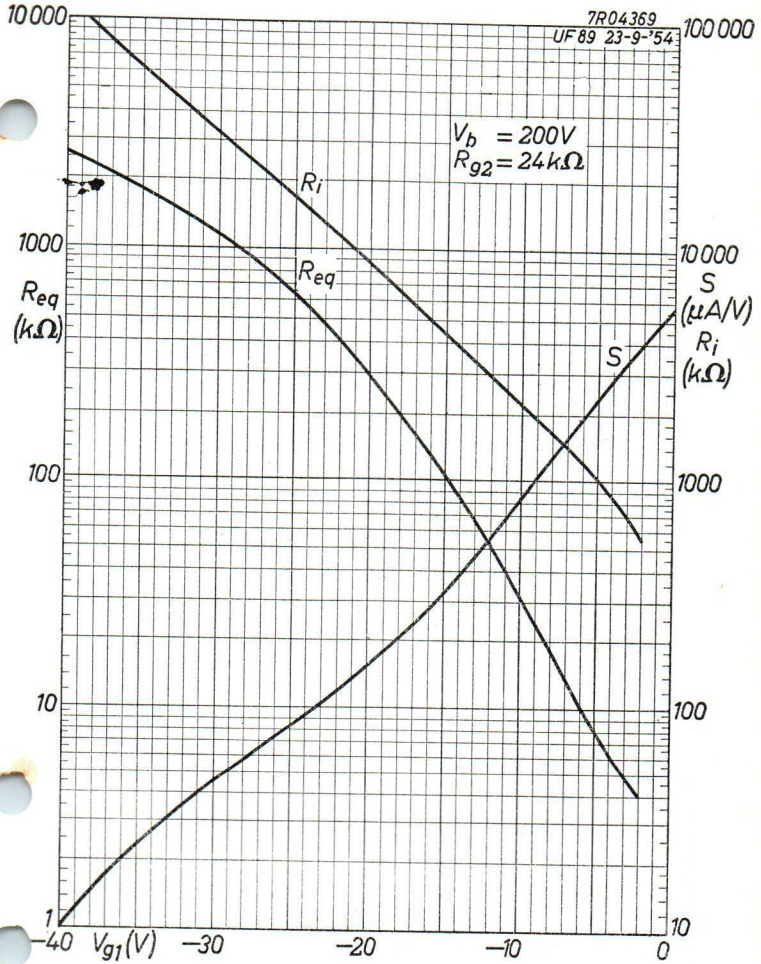


UF 89

PHILIPS

PHILIPS

UF 89

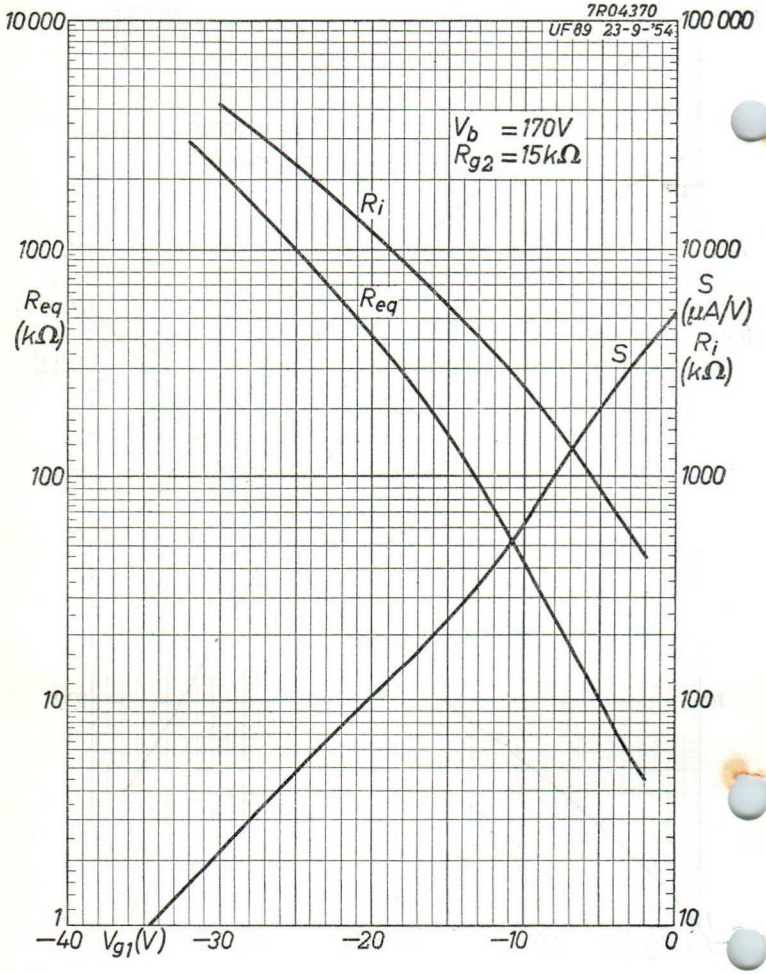


11.11.1954

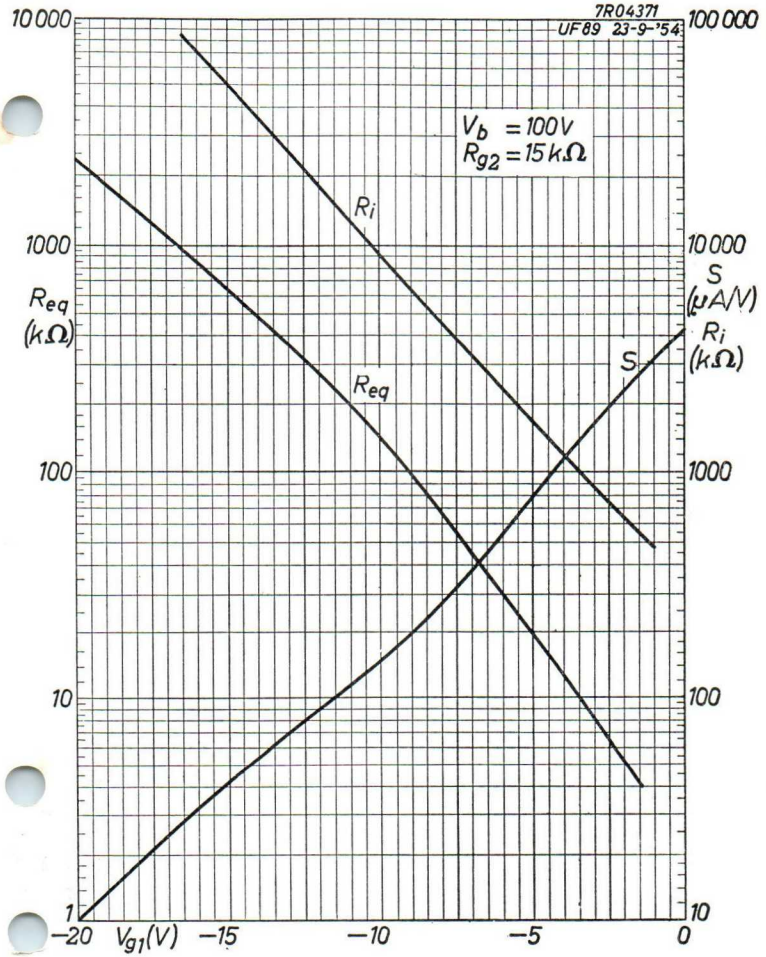
E

UF 89

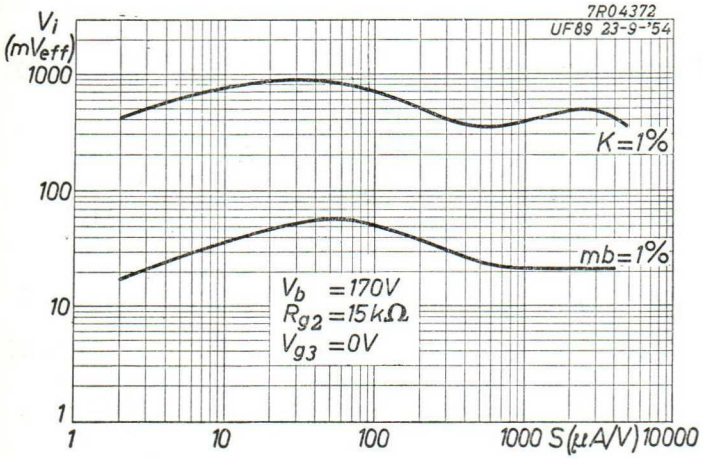
PHILIPS

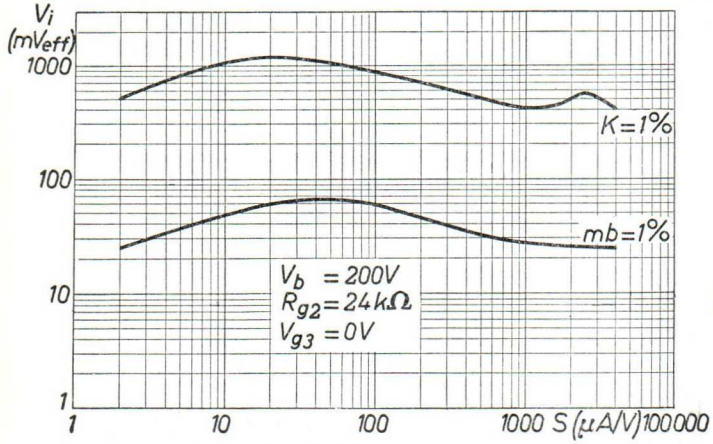


F

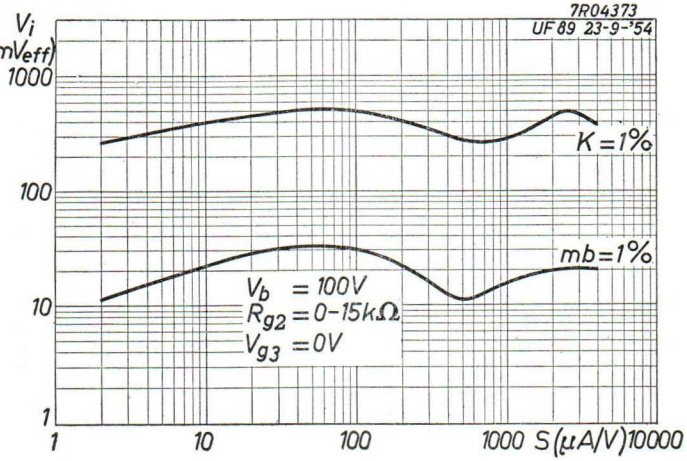

7R04371
UF89 23-9-'54
V_b = 100V
R_{g2} = 15 kΩ
R_i
R_{eq}
S
10 000
1000
100
10
1
100 000
10 000
1000
100
10
R_{eq} (kΩ)
S (μA/V)
R_i (kΩ)
−20 V_{g1}(V) −15 −10 −5 0

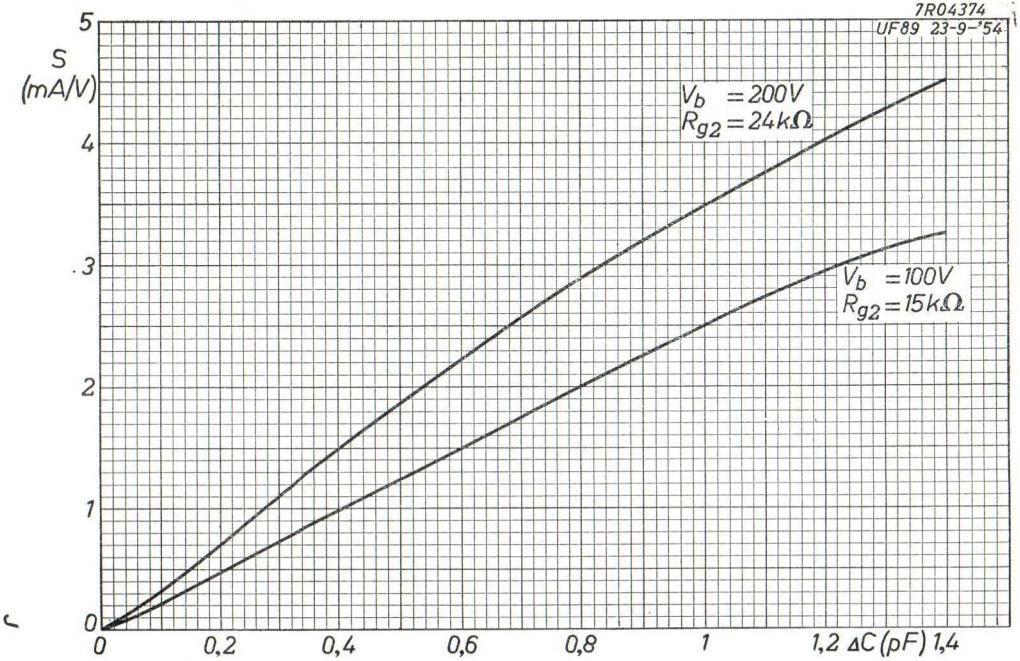
UF 89 **PHILIPS**





H


7R04373
UF 89 23-9-'54
Vi
(mVeff)
1000
100
10
1
1
10
100
1000
S(μA/V)
10000
K=1%
mb=1%
Vb = 100V
Rg2 = 0-15kΩ
Vg3 = 0V


7R04374
UF89 23-9-'54
S
(mA/V)
5
4
3
2
1
0
V_b = 200V
R_{g2} = 24kΩ
V_b = 100V
R_{g2} = 15kΩ
0
0,2
0,4
0,6
0,8
1
1,2 ΔC (pF) 1,4

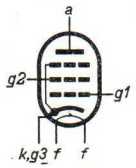
PHILIPS

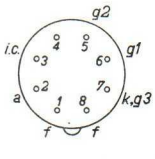
UL 41

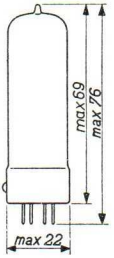
OUTPUT PENTODE
PENTHODE DE SORTIE
ENDPENTODE

Heating : indirect; series supply — V_f = 45 V
Chauffage: indirect; alimentation série — I_f = 100 mA
Heizung : indirekt; Serienspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: RIMLOCK

Capacitances
Capacités
Kapazitäten

C_a	=	8,3 pF
C_{g_1}	=	11 pF
C_{ag_1}	<	1 pF
$C_{g_1 f}$	<	0,1 pF

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

V_a	=	100	170 V
V_{g_2}	=	100	170 V
V_{g_1}	=	-5,7	-10,4 V
I_a	=	29	53 mA
I_{g_2}	=	5,5,	10 mA
S	=	8,0	9,5 mA/V
R_i	=	18	20 kΩ
R_a	=	3	3 kΩ
$\mu_{g_2 g_1}$	=	10	10
W_o (dtot = 10%)	=	1,25	4,0 W
V_i (dtot = 10%)	=	3,8	**6,0 Veff**
V_i (W_o = 50 mW)	=	0,55	0,5 Veff

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

V_a	=	100		170		V
V_{g_2}	=	100		170		V
R_k	=	100		100		Ω
R_{aa}	=	4,0		4,0		kΩ
V_i	=	0	4,6	0	9,3	V_{eff}
I_a	=	2x25	2x27	2x46	2x49	mA
I_{g_2}	=	2x5,0	2x6,8	2x9,0	2x16,5	mA
W_o	=	0	2,2	0	9	W
d_{tot}	=	-	4,0	-	5,0	%

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	9	W
$V_{g_{2o}}$	= max.	550	V
V_{g_2}	= max.	250	V
W_{g_2}	= max.	2,5	W
I_k	= max.	75	mA
V_{g_1} (I_{g_1}=+0,3 μA)	= max.	-1,3	V
R_{g_1}	= max.	1	MΩ [1]
R_{kf}	= max.	20	kΩ
V_{kf}	= max.	150	V

[1] With automatic bias
Avec polarisation automatique
Mit automatischer Gittervorspannung

PHILIPS

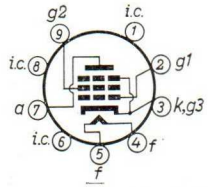
UL 84

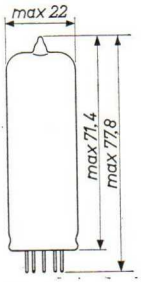
A.F. OUTPUT PENTODE
PENTODE DE SORTIE B.F.
NF-ENDPENTODE

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; Serienspeisung

I_f = 100 mA
V_f = 45 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 kΩ

PHILIPS

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		Ω [1]
$R_{a\sim}$	=		2,1			2,0		kΩ
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		Ω [2]
R_k	=		215		Ω [1]
$R_{a\sim}$	=		2,5		kΩ
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, class AB, two tubes
Caractéristiques d'utilisation, classe AB, deux tubes
Betriebsdaten, Klasse AB, zwei Röhren

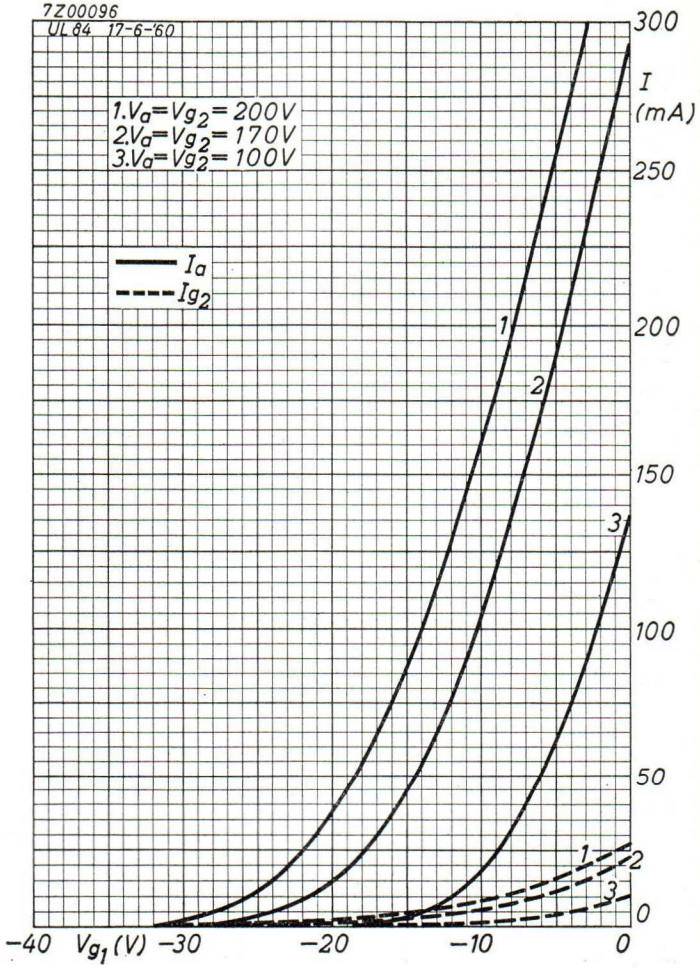
V_b	=		200		V
R_k	=		120		Ω [1]
$R_{aa\sim}$	=		3		kΩ
V_i	=	0	0,47	14,3	V_{eff}
I_a	=	2x60	-	2x64,5	mA
I_{g2}	=	2x3,0	-	2x18,5	mA
W_o	=	0	0,05	14,3	W
d_{tot}	=	-	-	3,8	%

Limiting values
Caractéristiques limites
Grenzdaten

V_{ao}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	12	W
V_{g2_o}	= 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	MΩ [1]
V_{kf}	= max.	200	V
R_{kf}	= max.	20	kΩ

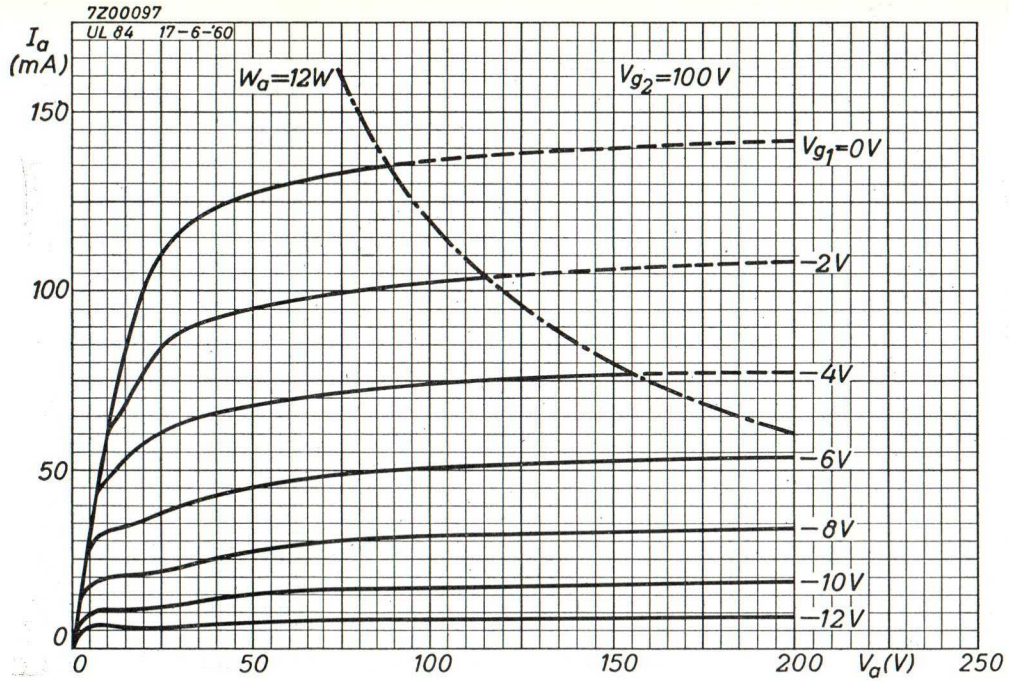
[1]) Common cathode resistor
Résistance cathodique commune
Gemeinsamer Katodenwiderstand

[2]) Automatic bias
Polarisation automatique
Automatische Gittervorspannung


7Z00096
UL84 17-6-60
1. $V_a = Vg_2 = 200V$
2. $V_a = Vg_2 = 170V$
3. $V_a = Vg_2 = 100V$
I_a
Ig_2
I (mA)
300
250
200
150
100
50
0
1
2
3
−40 V_{g_1} (V) −30 −20 −10 0

6.6.1960

A

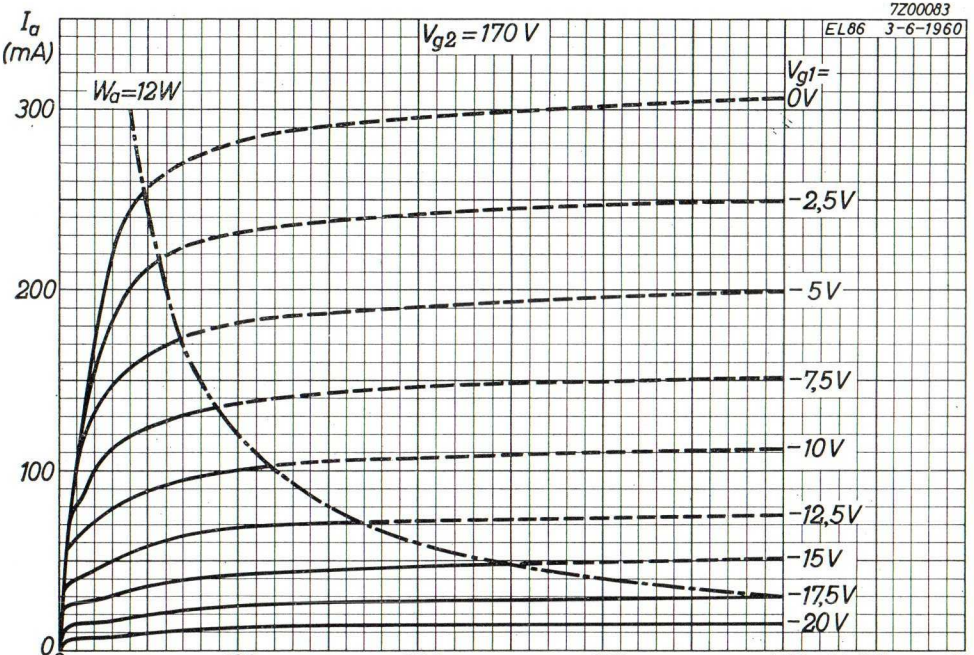


UL84

PHILIPS

B

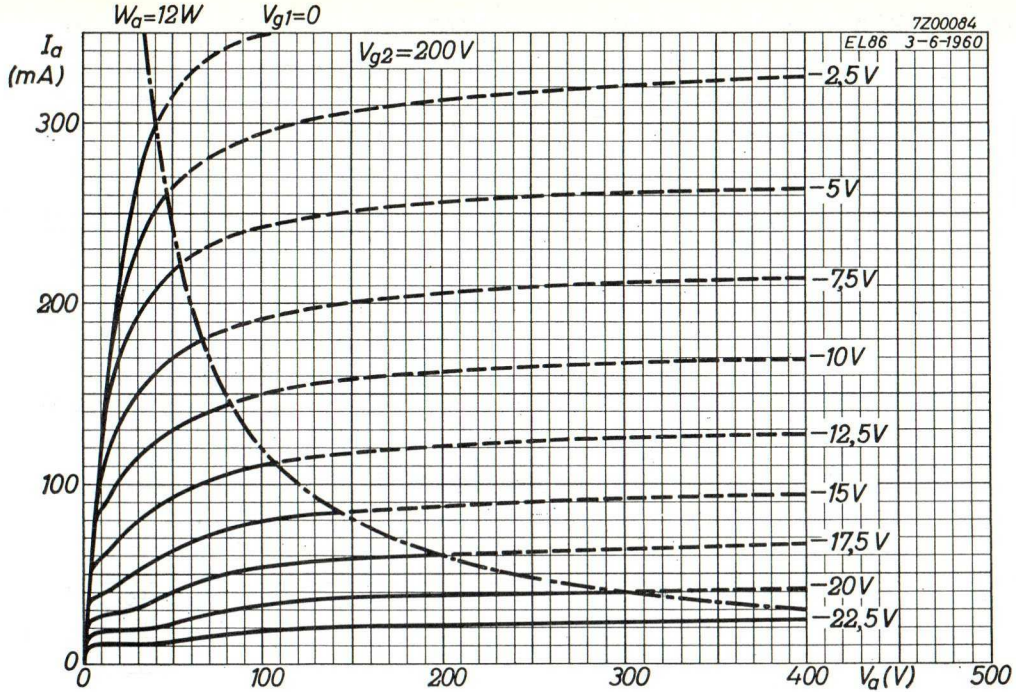
6.6.1960



PHILIPS

UL 84

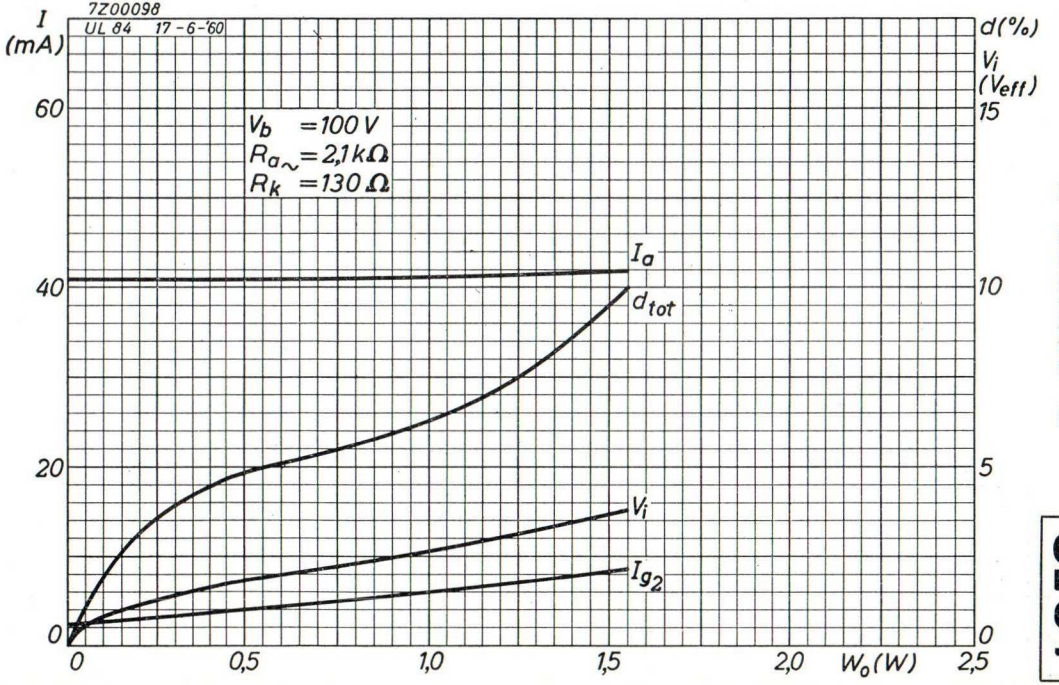
C



UL 84

PHILIPS

D

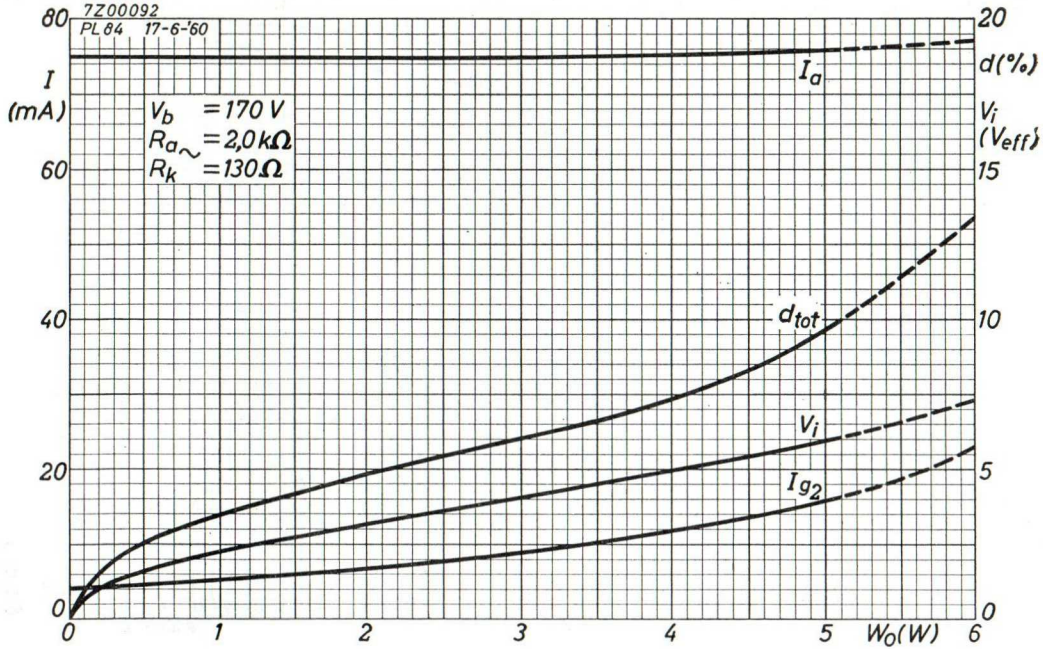


6.6.1960

E

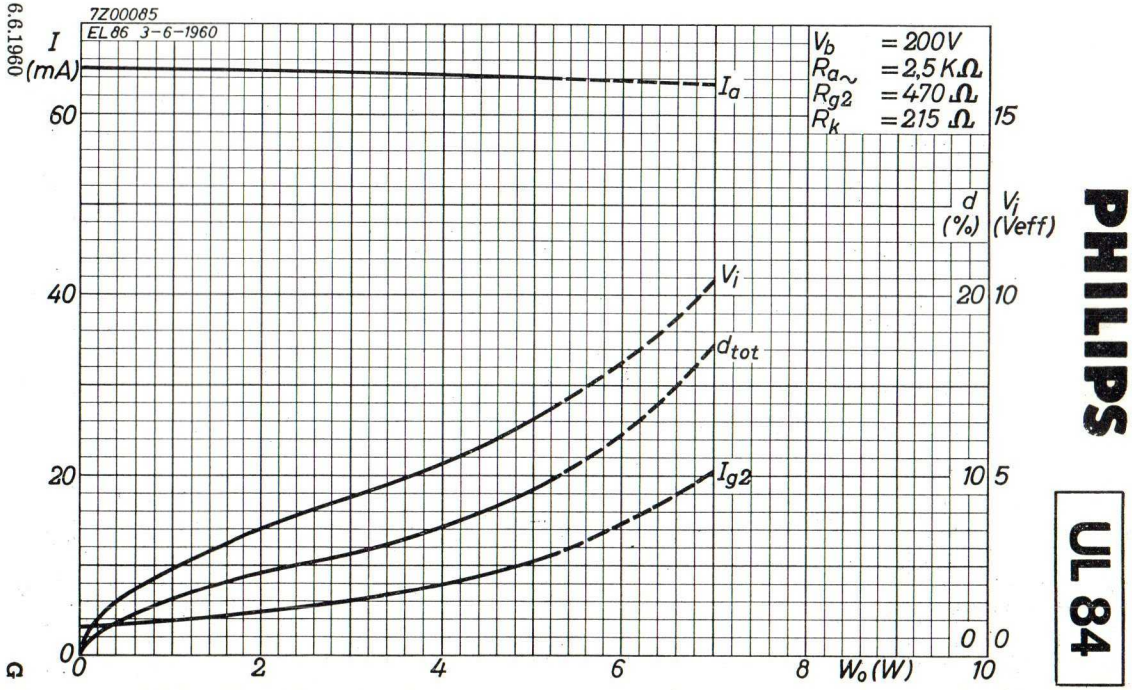
PHILIPS

UL84



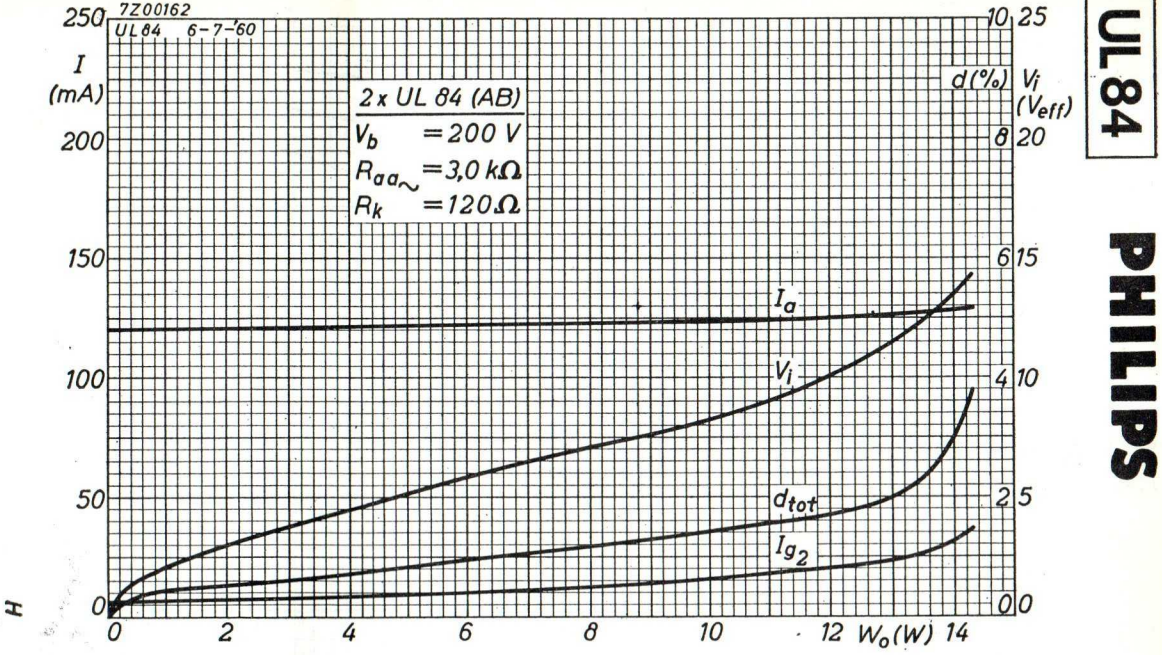
UL 84

PHILIPS



PHILIPS

UL 84



UL84

PHILIPS

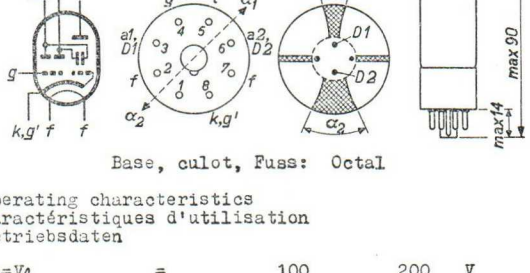
H

TUNING INDICATOR with two systems of different sensitivity
INDICATEUR D'ACCORD avec deux systèmes de sensibilité différente
ABSTIMMANZEIGEROHRE mit zwei Systemen von verschiedener Empfindlichkeit

Heating: indirect by A.C. or D.C.; series supply
Chauffage: indirect par C.A. ou C.C.; alimentation en série
Heizung: indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

V_f = 12,6 V
I_f = 100 mA

Dimensions in mm; Dimensions en mm
Abmessungen in mm



Base, culot, Fuss: Octal

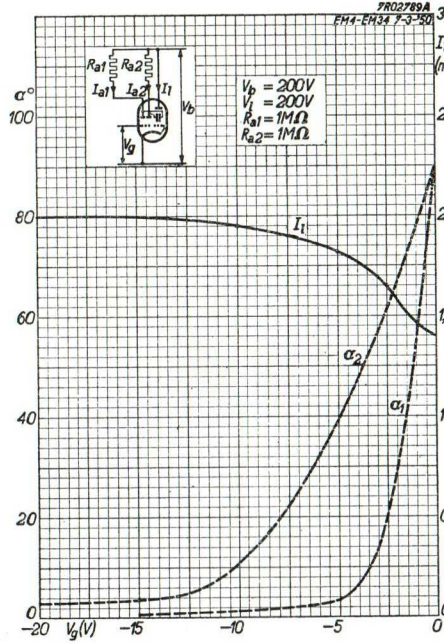
Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

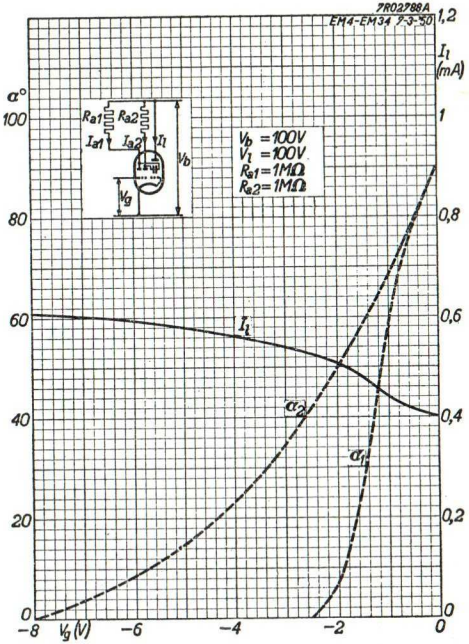
$V_b=V_l$	=	100	200	V
R_{a1} = R_{a2}	=	1,0	1,0	MΩ
I_l (V_g = 0 V)	= approx.	0,4	1,4	mA
V_g ($\alpha_1=\alpha_2=90°$)	=	0	0	V
V_g (α_1 = min.)	=	-2,5	-4,2	V
V_g (α_2 = min.)	=	-8	-12,5	V

Limiting values
Caractéristiques limites
Grenzdaten

V_{a1_o} = max. 550 V	V_l	= max. 250 V	
V_{a1} = max. 250 V	V_g (I_g=+0,3µA)	= max. -1,3 V	
V_{a2_o} = max. 550 V	R_g	= max. 3 MΩ	
V_{a2} = max. 250 V	R_{kf}	= max. 20 kΩ	
V_{l_o} = max. 550 V	V_{kf}	= max. 150 V	

PHILIPS


7R02789A
EM4-EM34 7-3-50
V_b = 200V
V_i = 200V
R_{a1} = 1MΩ
R_{a2} = 1MΩ
I_1 (mA)
α°
I_1
α_2
α_1
V_g(V)


7R02788A
EM4-EM34 7-3-50
V_b = 100V
V_i = 100V
R_{a1} = 1MΩ
R_{a2} = 1MΩ
I_1 (mA)
α°
I_1
α_2
α_1
V_g(V)

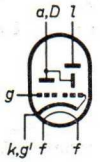
A

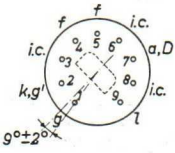
TUNING INDICATOR for A.M. receivers
INDICATEUR D'ACCORD pour des récepteurs A.M.
ABSTIMMANZEIGERÖHRE für AM-Empfänger

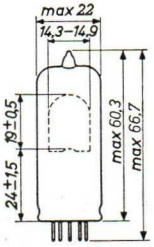
Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serienspeisung

V_f = 19 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

V_b	=	200		170		100		V
V_l	=	200		170		100		V
R_a	=	0,5		0,5		0,5		MΩ
R_g	=	3		3		3		MΩ
V_g	=	-1	-14	-1	-12	-1	-7	V
β	=	4	50	5	50	8	50	°
I_l	=	5,7	7,0	4,5	5,7	2,1	2,5	mA
I_a	=	0,35	0,01	0,3	0,01	0,18	0,01	mA

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	= max.	550	V
V_a	= max.	250	V
W_a	= max.	0,2	W
V_{kf}	= max.	150	V
V_{l_o}	= max.	550	V
V_l	= max.	250	V
V_l	= min.	90	V
I_k	= max.	10	mA
$-V_g(I_g=+0,3\mu A)$	= max.	1,3	V
R_g	= max.	3	MΩ
R_{kf}	= max.	20	kΩ

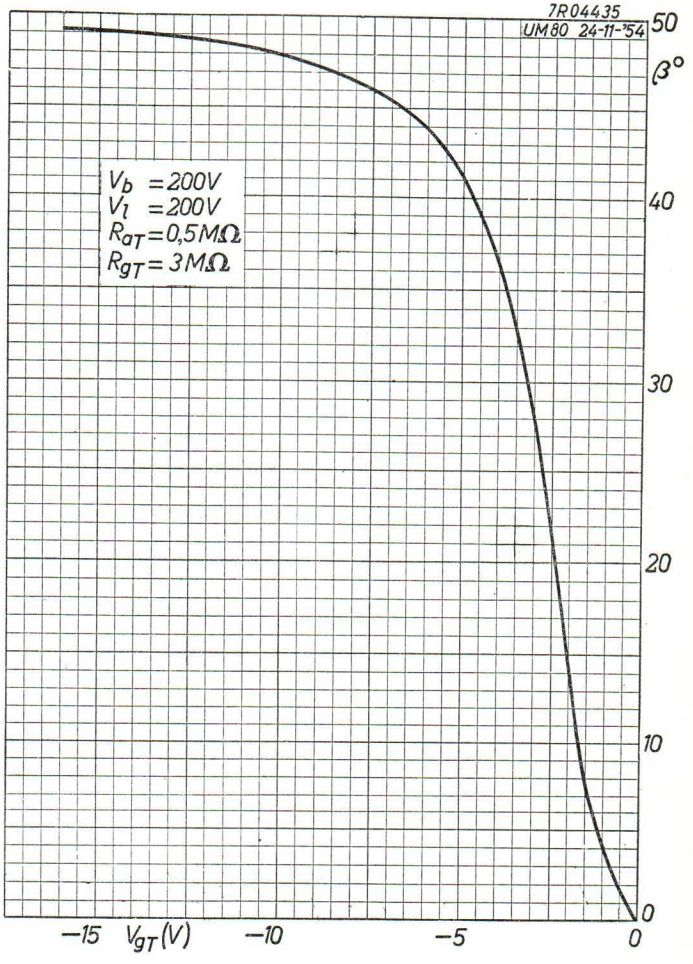
Remark : The tube is to be mounted in such a tube-holder that the frontside of the tube can be placed against the station name dial.

Observation: Le tube sera placé dans tel support que la face du tube peut être montée contre le cadran d'accord

Bemerkung : Die Röhre soll mit einer derartigen Fassung gebraucht werden dass die Vorderseite der Röhre gegen die Abstimmskala montiert werden kann

PHILIPS

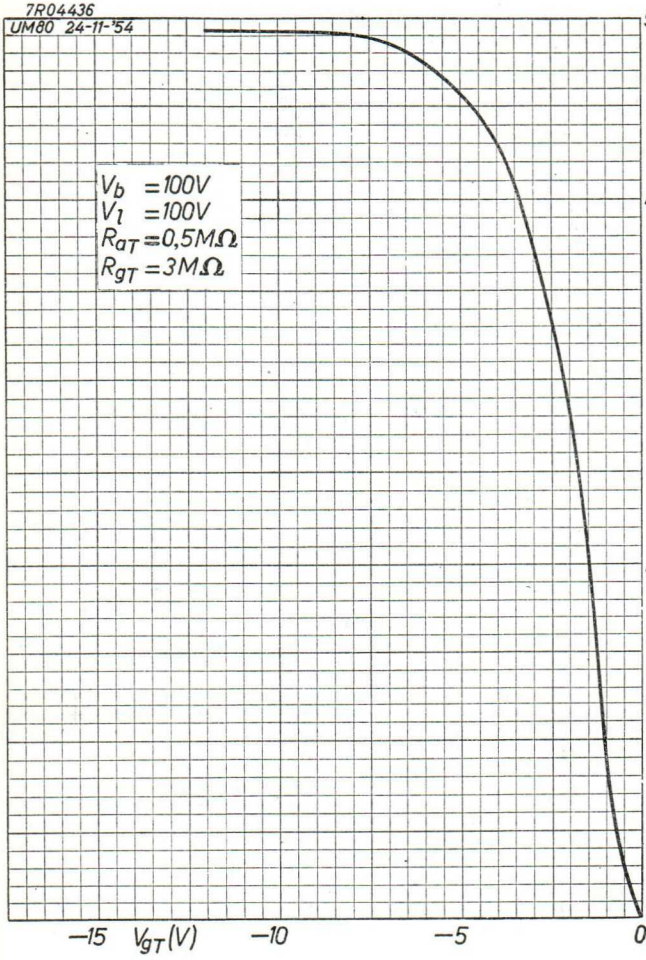
UM 80



12.12.1954

A

UM 80 **PHILIPS**



B

PHILIPS

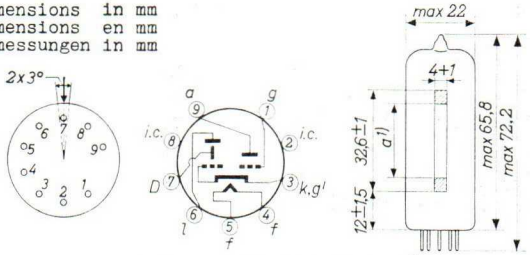
UM 84

INDICATOR TUBE with amplifying triode for use as tuning indicator or for modulation control
TUBE INDICATEUR avec triode amplificatrice pour utilisation comme indicateur de syntonisation ou pour contrôler la modulation
ANZEIGERÖHRE mit Verstärkertriode zur Verwendung als Abstimmanzeigeröhre oder für Aussteuerungskontrolle

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

If = 100 mA
Vf = 12 V

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: NOVAL

The arrow near pin 7 indicates the viewing direction
La flèche près de la broche 7 indique le sens d'observation
Der Pfeil bei Stift 7 bezeichnet die Blickrichtung

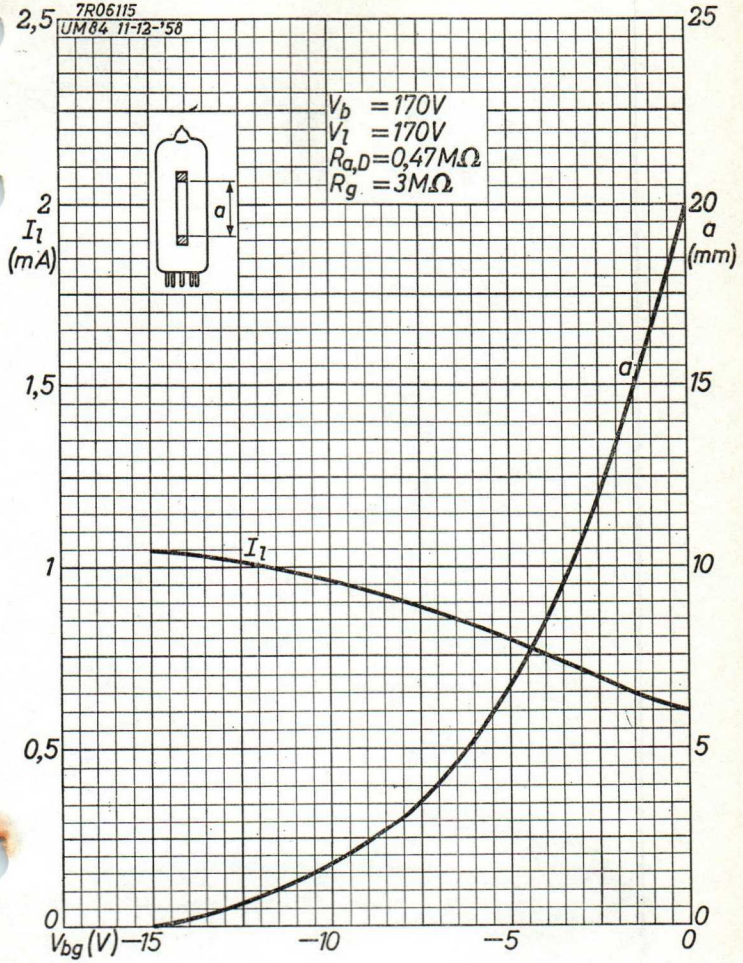
Operating characteristics (D connected to a)
Caractéristiques d'utilisation (D relié à l'anode)
Betriebsdaten (D mit a Verbunden)

V_b	=	170	V
V_l	=	170	V
$R_{a,D}$	=	470	kΩ
R_g	=	3	MΩ
V_{bg}	=	0 -15	V
I_{a+D}	=	0,3 0,04	mA
I_l	=	0,6 1,05	mA
a	=	20±5[1]) 0	mm

[1]) Shadow length; longueur d'ombre; Schattenlänge

Limiting values
Caractéristiques limites
Grenzdaten

V_{a_o}	=	max. 550 V
V_a	=	max. 250 V
W_a	=	max. 0,5 W
V_{D_o}	=	max. 550 V
V_D	=	max. 250 V
V_{ℓ_o}	=	max. 550 V
V_ℓ	=	max. 250 V min. 170 V
I_k	=	max. 3,0 mA
R_g	=	max. 3 MΩ
V_{kf} (k pos.; f neg.)	=	max. 250 V
V_{kf} (k neg.; f pos.)	=	max. 50 $V_{\overline{\sim}}$ + max. 200 $V_\sim$
R_{kf}	=	max. 20 kΩ
t_{bulb}	=	max. 120 °C
$-V_g$ (I_g = + 0,3 µA)	=	max. 1,3 V


7R06115
UM84 11-12-'58
V_b = 170V
V_l = 170V
$R_{a,D}$ = 0,47MΩ
R_g = 3MΩ
a
I_l (mA)
a (mm)
I_l
a
V_{bg} (V)
2,5
2
1,5
1
0,5
0
25
20
15
10
5
0
−15
−10
−5
0

12.12.1958

A

PHILIPS UM 84

12.12.1958

A

PHILIPS

UY 41
UY 42

High-vacuum HALF-WAVE RECTIFIERS
REDRESSEURS MONOPLAQUE à vide poussé
Hochvakuum EINWEGGLEICHRICHTER

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

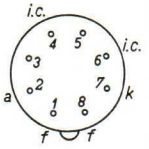
V_f = 31 V
I_f = 100 mA

Base, culot, Sockel: RIMLOCK

Overall length: 67 mm
See pages 203 and 252

Hauteur totale: 67 mm
Voir pages203 et 252

Gesamthöhe : 67 mm
Siehe S. 203 und 252



Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

V_i =	110	127	220	250	V_{eff}
I_o =	100	100	100	100	mA
C_{filt} =	50	50	50	50	µF
R_t =	0	0	160	210	Ω
V_o =	113	135	188	205	V

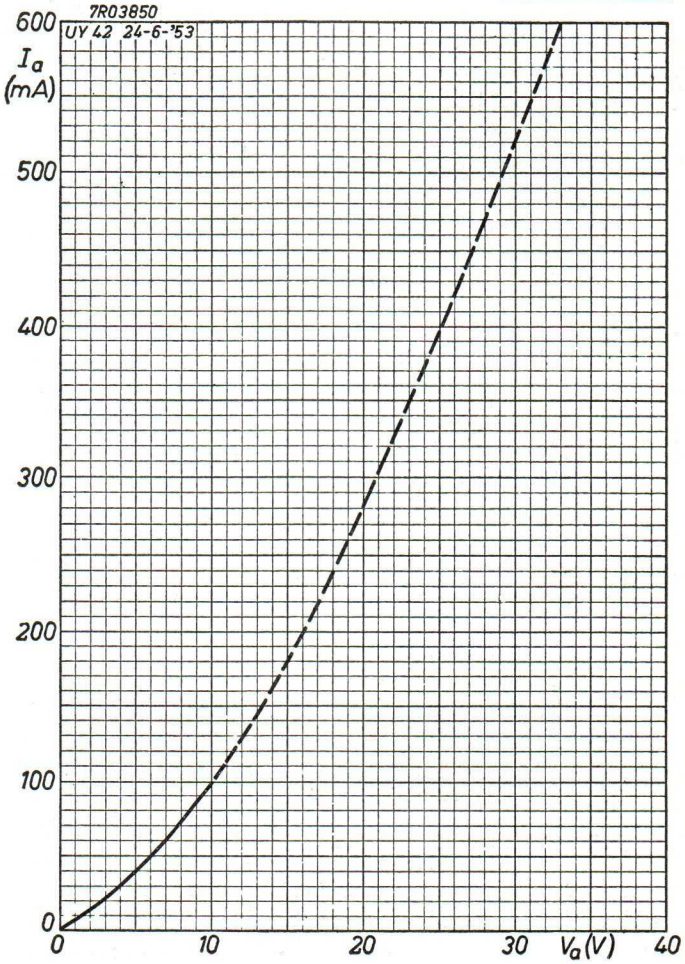
Limiting values
Caractéristiques limites
Grenzdaten

V_{inv_p}	= max.	700 V
I_o	= max.	100 mA
I_{ap}	= max.	600 mA
V_{kf_p} (k pos.,f neg.)	= max.	550 V

V_i =	110	127	220	250	V
R_t =min.	0	0	160	210	Ω

PHILIPS

UY 41
UY 42

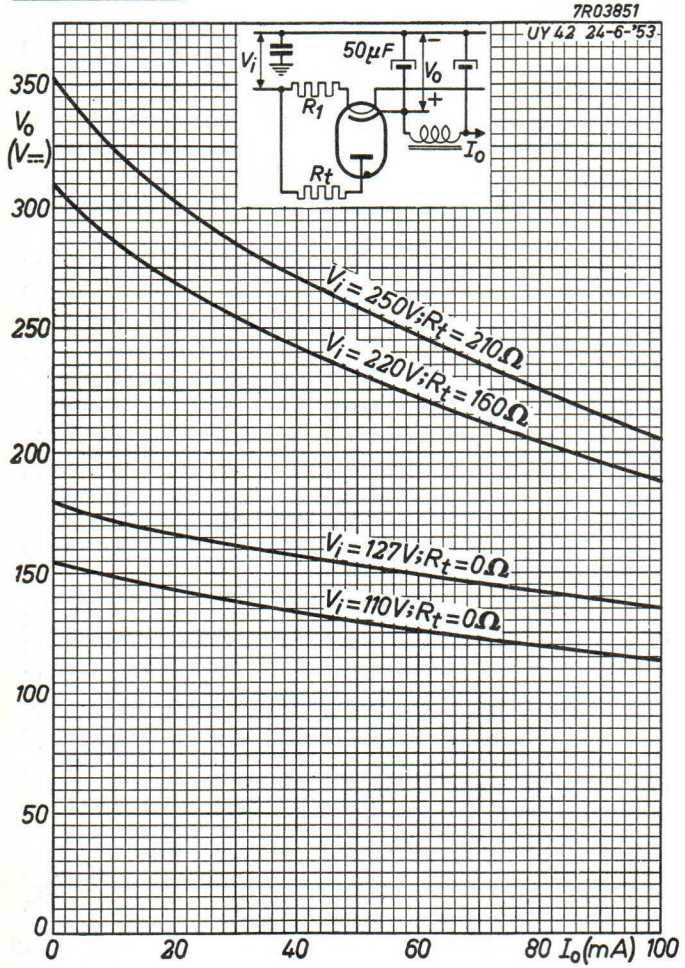


12.12.1953

A

UY 41
UY 42

PHILIPS



B

PHILIPS

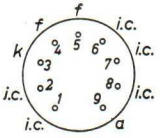
UY 82

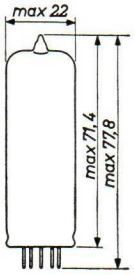
High-vacuum single-anode RECTIFYING TUBE
TUBE REDRESSEUR monoplaque à vide poussée
Einanodige hochvakuum GLEICHRICHTERRÖHRE

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 = 55 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Bàse, culot, Sockel: NOVAL

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

V_{tr}	=	250	240	220	200	127 V_{eff}
C_{filt}	=	60	60	60	60	60 µF
R_t	=	125	105	65	30	0 Ω
I_o	=	180	180	180	180	180 mA
V_o		195	195	195	195	127 V

Limiting values
Caractéristiques limites
Grenzdaten

V_{tr}	= max.	250 V_{eff}
$V_{a\ inv_p}$	= max.	700 V
I_o	= max.	180 mA
V_{kf_p}	= max.	550 V [1]
C_{filt}	= max.	60 µF [2]
I_{k_p}	= max.	1100 mA

V_{tr}	=	250	240	220	200	127 V_{eff}
R_t	= min.	100	80	40	30	0 Ω

1) Max. 220 V_{eff} A.C. voltage + max. 250 V D.C. voltage
Cathode positive with respect to the heater

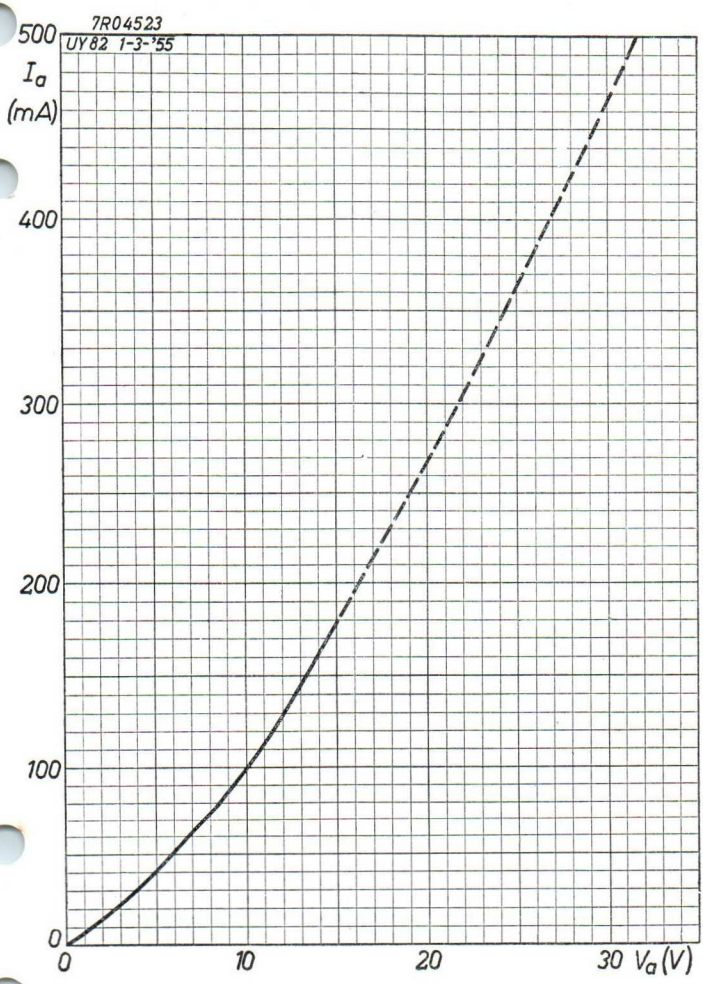
220 V_{eff} tension alternative au maximum + 250 V tension directe au maximum
Cathode positive par rapport au filament

Max. 220 V_{eff} Wechselspannung + max. 250 V Gleichspannung
Katode positiv in Bezug auf den Heizfaden

2) When two tubes are placed in parallel, C_{filt} = max. 100 µF
The resistor R_t must be inserted in the anode lead of each tube

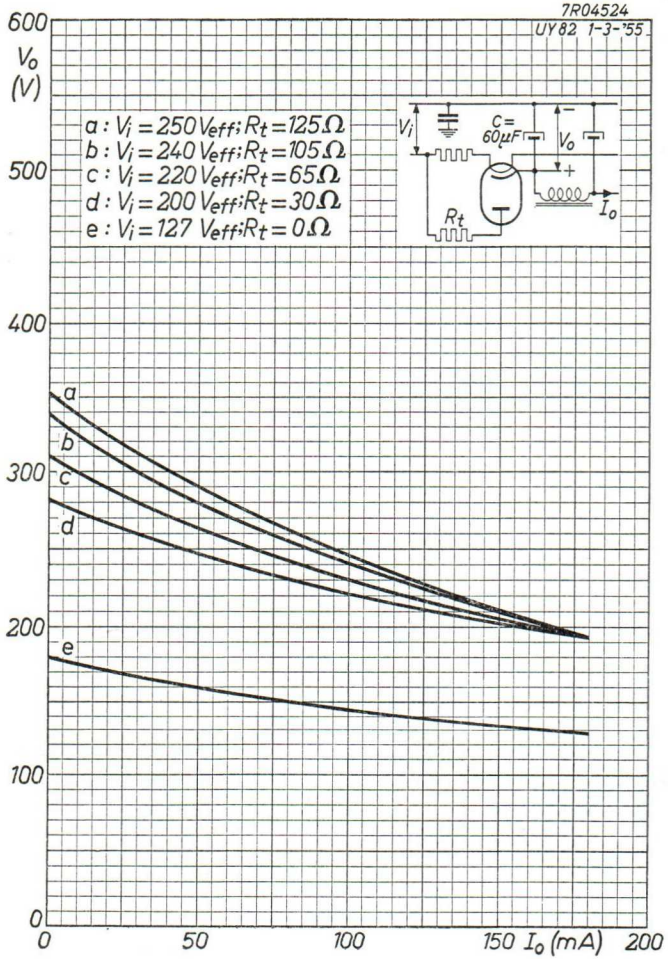
Si deux tubes sont connectés en parallèle, C_{filt} = 100 µF au max. Il faut insérer la résistance R_t dans le circuit anodique de chaque tube

Wenn zwei Röhren parallel geschaltet sind ist C_{filt} = max. 100 µF. Der Widerstand R_t muss in der Anodenleitung jeder Röhre aufgenommen werden



3.3.1955

A


7R04524
UY 82 1-3-'55
600
V_o
(V)
500
400
300
200
100
0
0
50
100
150 I_o (mA)
200
a : V_i = 250 V_{eff}; R_t = 125 Ω
b : V_i = 240 V_{eff}; R_t = 105 Ω
c : V_i = 220 V_{eff}; R_t = 65 Ω
d : V_i = 200 V_{eff}; R_t = 30 Ω
e : V_i = 127 V_{eff}; R_t = 0 Ω
V_i
C = 60 µF
V_o
R_t
I_o
a
b
c
d
e

PHILIPS

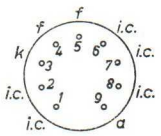
UY 85

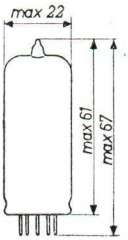
High-vacuum HALF-WAVE RECTIFIER
REDRESSEUR MONOPLAQUE à vide poussé
Hochvakuum EINWEGGLEICHRICHTERRÖHRE

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 = 38 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: Noval

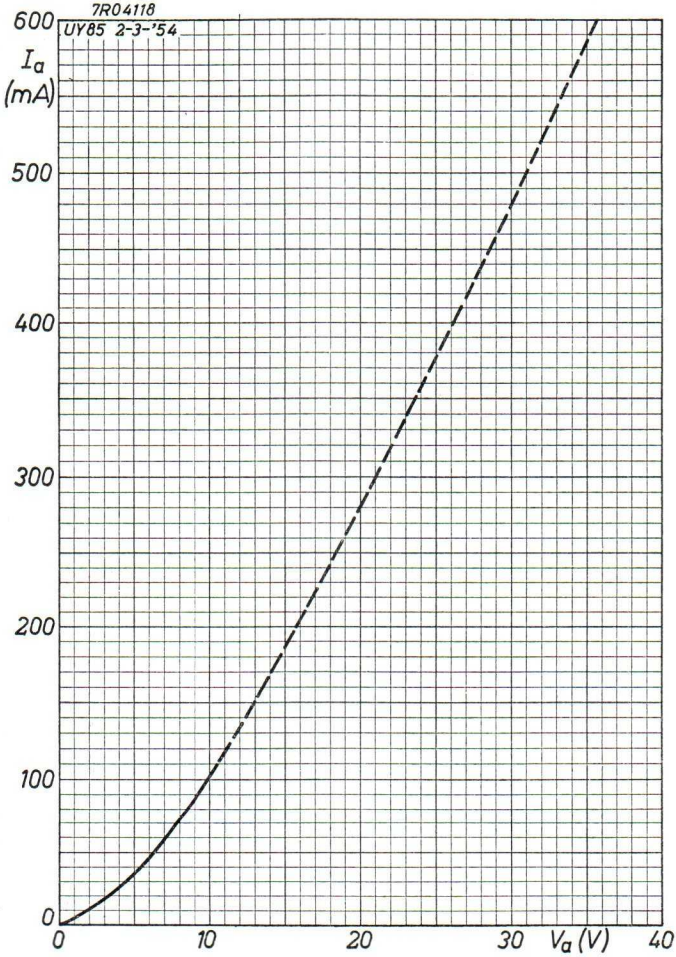
Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

V_i	=	110	127	220	250 V_{eff}
I_o	=	110	110	110	110 mA
Cfilt	=	100	100	100	100 µF
R_t	=	0	0	90	100 Ω
V_o	=	112	135	215	245 V

Limiting values
Caractéristiques limites
Grenzdaten

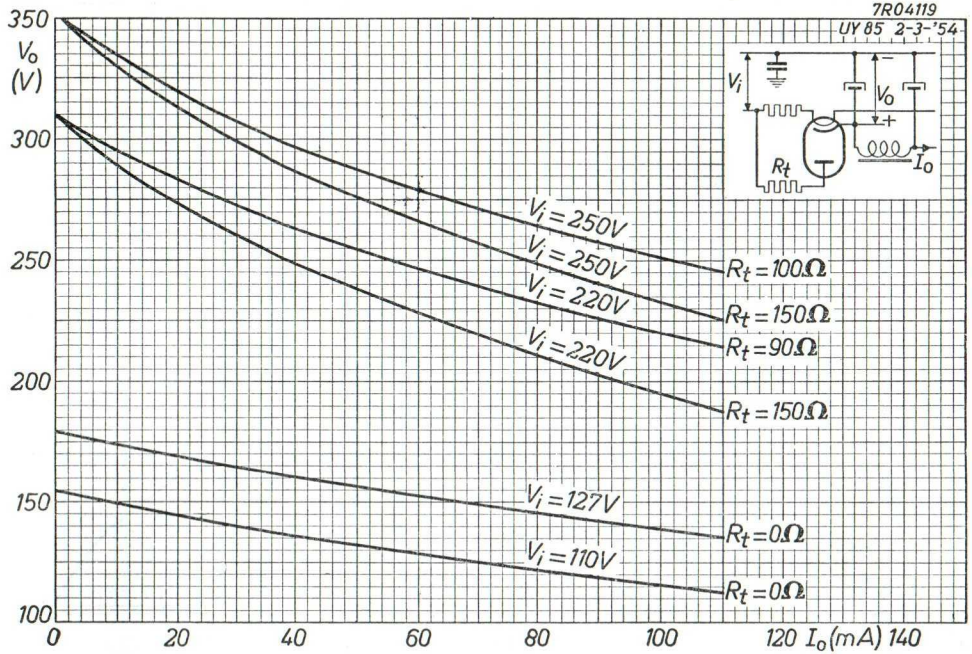
V_{inv_p}				= max.	700 V
I_o				= max.	110 mA
I_{ap}				= max.	660 mA
V_{kf_p} (k pos.,f neg.)				= max.	550 V
V_i	=	110	127	220	250 V_{eff}
R_t	= min.	0	0	90	100 Ω

939 4808
9.9.1955


7R04118
UY85 2-3-'54
600
I_a
(mA)
500
400
300
200
100
0
0
10
20
30
V_a (V)
40

4.4.1954

A


7R04119
UY 85 2-3-'54
350
V_o
(V)
300
250
200
150
100
0
20
40
60
80
100
120 I_o(mA) 140
V_i
V_o
R_t
I_o
$V_i = 250V$
$R_t = 100\Omega$
$V_i = 250V$
$R_t = 150\Omega$
$V_i = 220V$
$R_t = 90\Omega$
$V_i = 220V$
$R_t = 150\Omega$
$V_i = 127V$
$R_t = 0\Omega$
$V_i = 110V$
$R_t = 0\Omega$

PHILIPS

PHILIPS

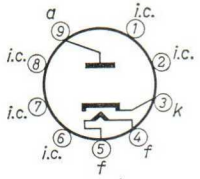
UY89

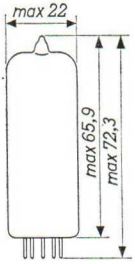
High-vacuum HALF-WAVE RECTIFIER
REDRESSEUR MONOPLAQUE à vide poussé
Hochvakuum EINWEGGLEICHRICHTERRÖHRE

Heating : indirect by A.C. or D.C. series supply
Chauffage: indirect par C.A. ou C.C. alimentation série
Heizung : indirect durch Wechsel- oder Gleichstrom; Serienspeisung

V_f = 31 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





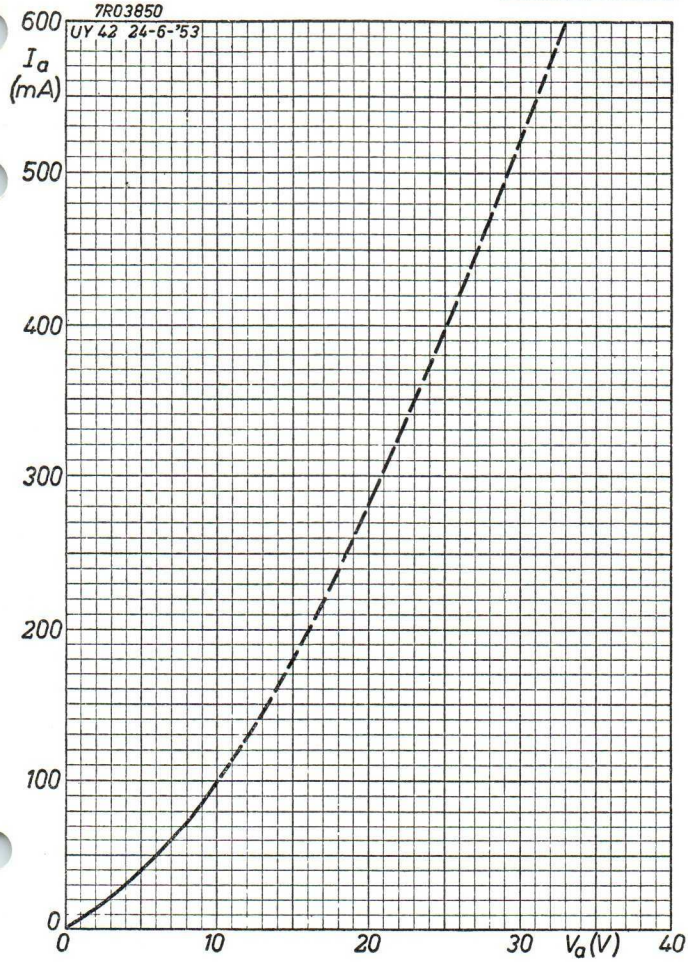
Base, culot, Sockel: Noval

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

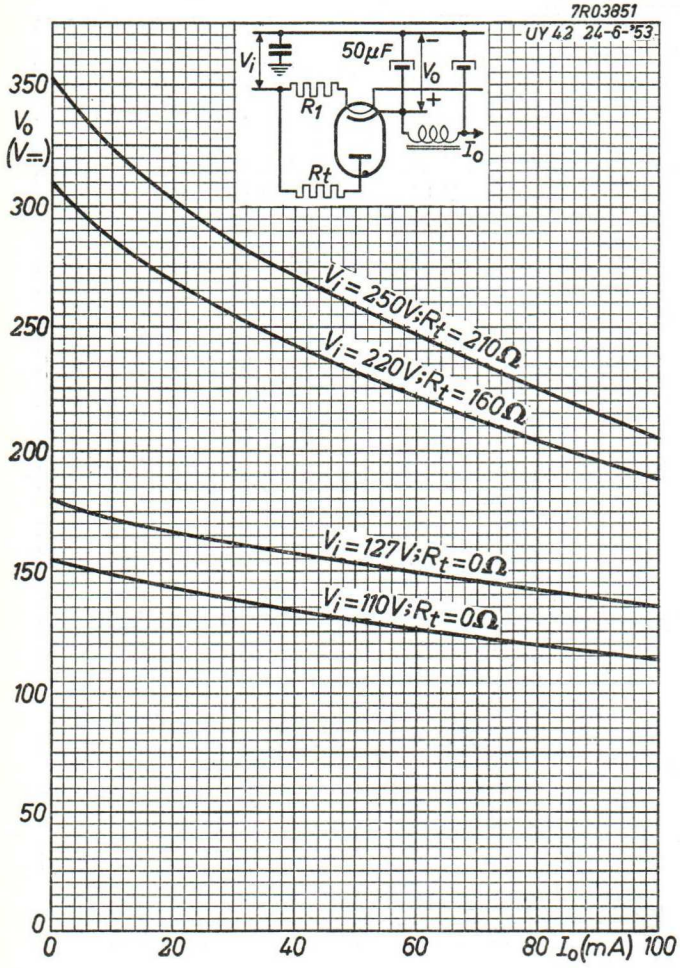
V_i =	110	127	220	250	V_{eff}
I_o =	100	100	100	100	mA
Cfilt =	50	50	50	50	µF
R_t =	0	0	160	210	Ω
V_o =	113	135	188	205	V

Limiting values
Caractéristiques limites
Grenzdaten

V_{inv_p}			= max. 700		V
I_o			= max. 100		mA
I_{ap}			= max. 600		mA
V_{kf_p} (k pos.,f neg.)			= max. 550		V
V_i =	110	127	220	250	V_{eff}
R_t = min.	0	0	160	210	Ω


7R03850
UY 42 24-6-'53
600
I_a
(mA)
500
400
300
200
100
0
0
10
20
30
V_a(V)
40

UY 89 PHILIPS



B

PHILIPS

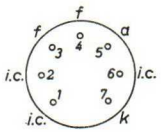
UY 92

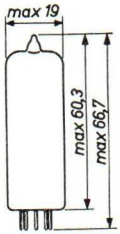
High-vacuum single-anode RECTIFIER
TUBE REDRESSEUR monoplaque à vide poussé
Einanodige hochvakuum GLEICHRICHTERRÖHRE

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 = 26 V
I_f = 100 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: MINIATURE

Operating characteristics
Caractéristiques d'utilisation
Betriebsdaten

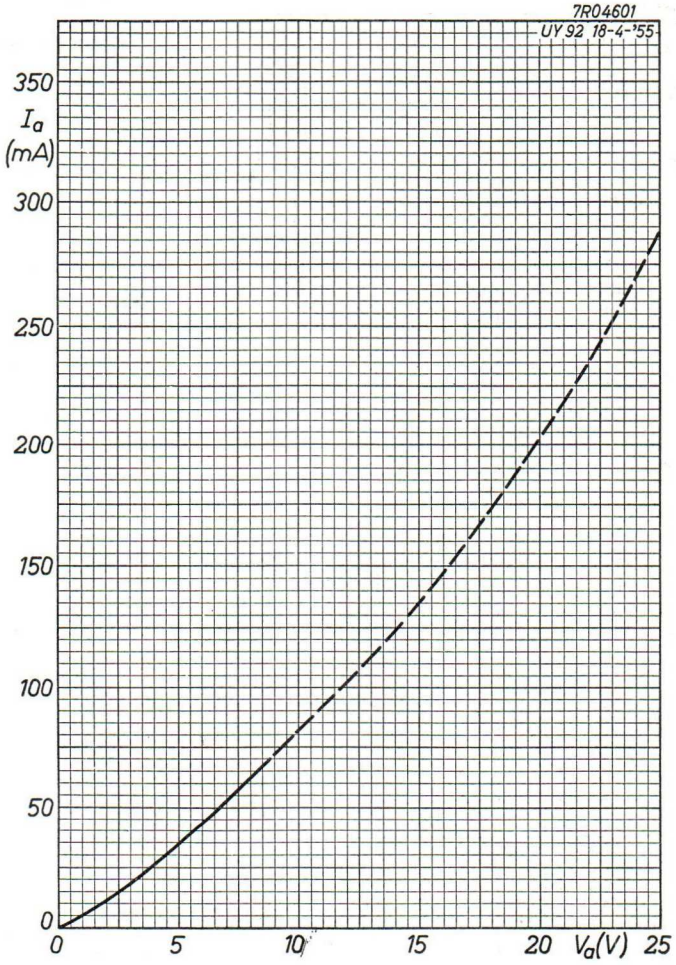
V_i	=	145	127	117	110	Veff
Cfilt	=	100	100	100	100	µF
R_t	=	0	0	0	0	Ω
I_o	=	70	70	70	70	mA
V_o	=	160	137	124	115	V

Limiting values
Caractéristiques limites
Grenzdaten

V_i	=	max.	145 V
V_a inv_p	=	max.	400 V
I_o	=	max.	70 mA
I_{kp}	=	max.	450 mA
V_{kf_p}(k pos.; f neg.)	=	max.	400 V
Cfilt	=	max.	100 µF

PHILIPS

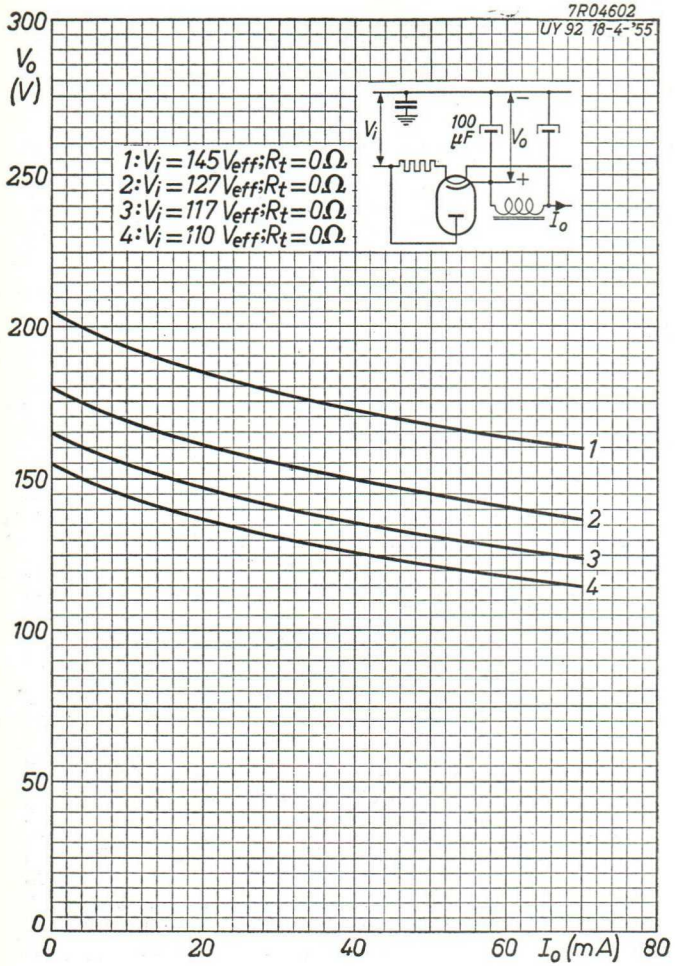
UY 92



5.5.1955

A

UY 92 PHILIPS



B

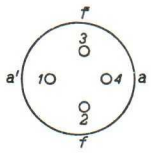
PHILIPS

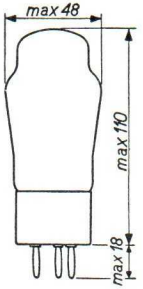
1805

High-vacuum FULL-WAVE RECTIFIER
TUBE REDRESSEUR BIPLAQUE à vide poussé
Hochvakuum DOPPELWEGGLEICHRICHTERROHRE

Heating:	direct by A.C.; parallel supply	
Chauffage:	direct par C.A.; alimentation en parallèle	Vf = 4,0 V If = 1,0 A
Heizung:	direkt durch Wechselstrom; Parallelspeisung	

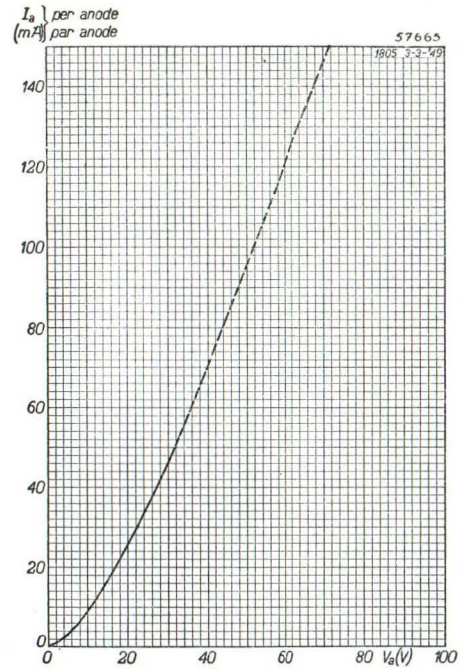
Dimensions in mm
Dimensions en mm
Abmessungen in mm

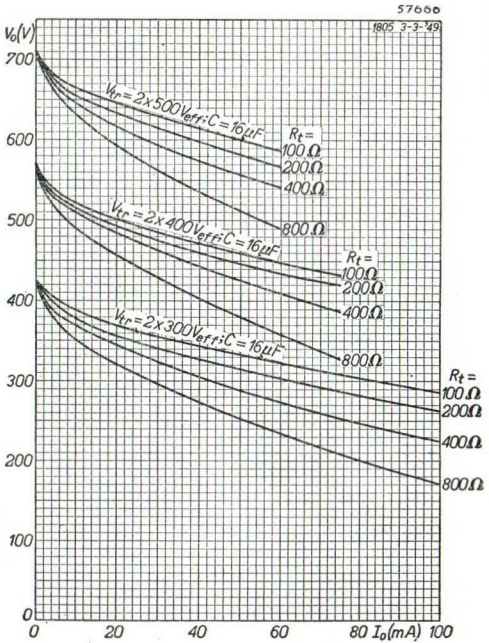




Operating characteristics and limiting values
Caractéristiques d'utilisation et caractéristiques limites
Betriebs- und Grenzdaten

Vtr	2x300	2x400	max.2x500	V_{eff}
Io	max. 100	max. 75	max. 60	mA


I_a } per anode
(mA) } par anode
57665
1805 3-3-'49
140
120
100
80
60
40
20
0
0
20
40
60
80 V_a(V)
100


57666
1805 3-3-'49
V_o(V)
700
600
500
400
300
200
100
0
V_{tr} = 2x500 V_{eff} ; C = 16 µF
V_{tr} = 2x400 V_{eff} ; C = 16 µF
V_{tr} = 2x300 V_{eff} ; C = 16 µF
R_t =
100 Ω
200 Ω
400 Ω
800 Ω
0
20
40
60
80 I_o(mA)
100

PHILIPS

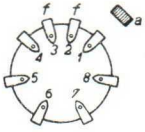
PHILIPS

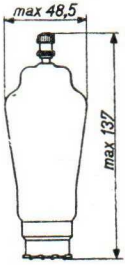
1875

High vacuum HALF WAVE RECTIFIER for high voltage
REDRESSEUR MONOPLAQUE à vide poussé pour haute tension
Hochvakuum EINWEGGLEICHRICHTER für Hochspannung

Heating	:	direct by A.C.	Vf = 4 V
Chauffage	:	direct par C.A.	If = 2,3 A
Heizung	:	direkt durch Wechselstrom	

Dimensions in mm
Dimensions en mm
Abmessungen in mm

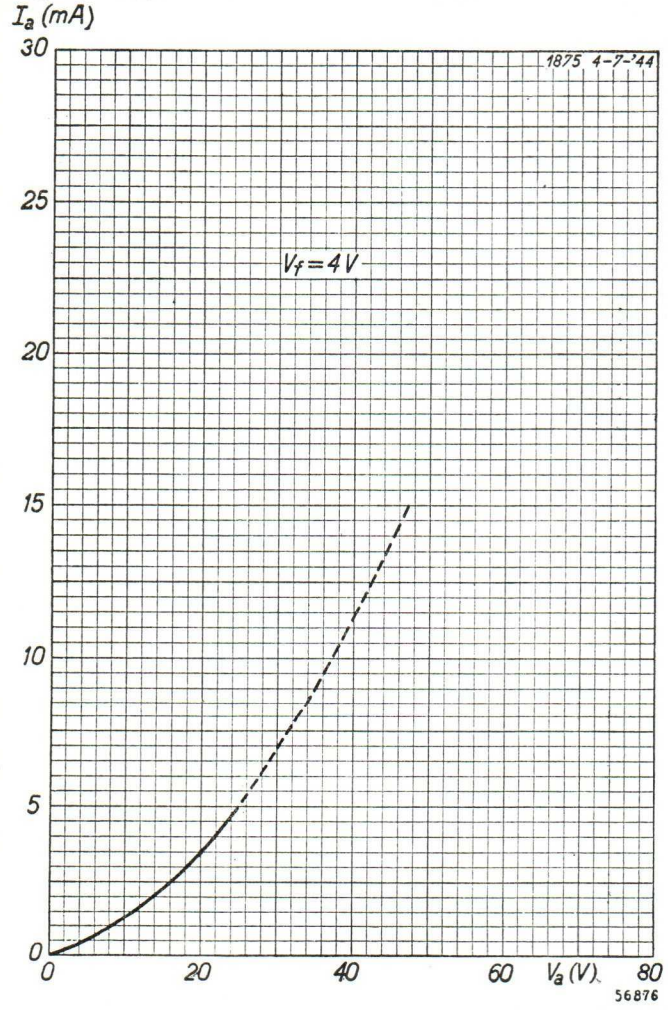




Operating conditions and limiting values
Caractéristiques d'utilisation et limites
Betriebs- und Grenzdaten

Vtr	= max.	5000	V_{eff}
Vo	= max.	7000	V
Io	= max.	5	mA
Vinv	= max.	14000	V
Rt	= min.	10	kΩ
C	= max.	0,5	µF

PHILIPS



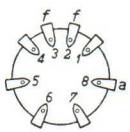
PHILIPS

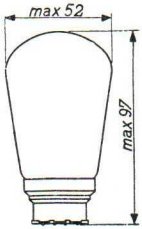
1876

High vacuum HALF-WAVE RECTIFIER
REDRESSEUR MONOPLAQUE à vide poussé
Hochvakuum EINWEGGLEICHRICHTER

Heating: direct by A.C.; parallel supply — Vf = 4 V, If = 0,3 A
Chauffage: direct par C.A.; alimentation en parallèle — Vf = 4 V, If = 0,3 A
Heizung: direkt durch Wechselstrom; Parallelspeisung — Vf = 4 V, If = 0,3 A

Dimensions in mm
Dimensions en mm
Abmessungen in mm



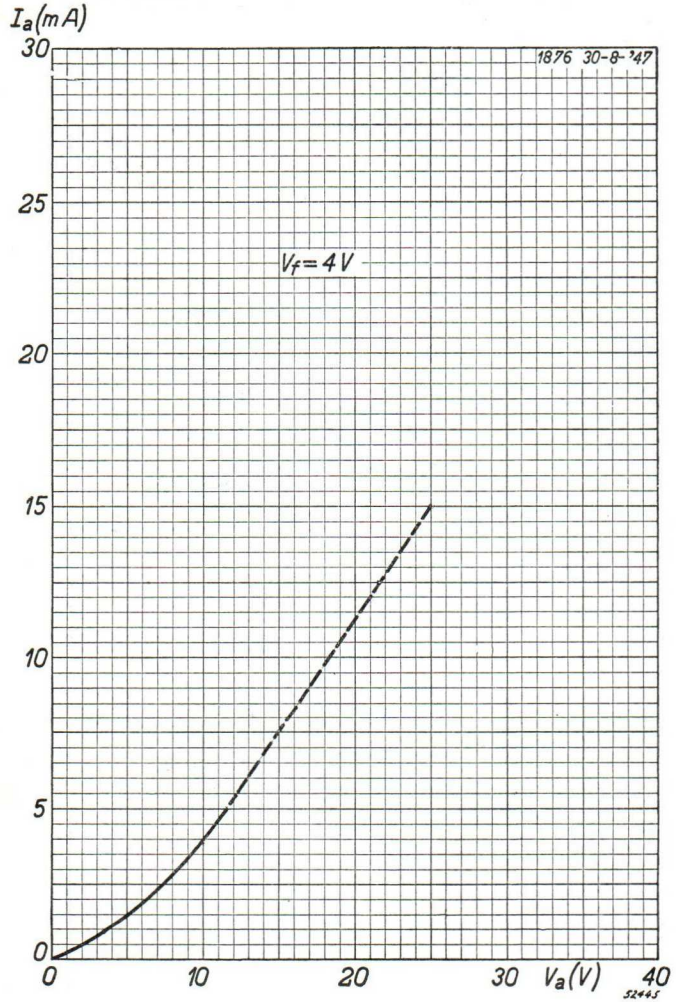


Operating conditions and limiting values
Caractéristiques d'utilisation et limites
Betriebs- und Grenzdaten

V_{tr} = max. 850 V_{eff}
Io = max. 5 mA
V_{inv} = max. 3500 V

Rt = min. 0 Ω
C = max. 0,5 µF

PHILIPS



PHILIPS

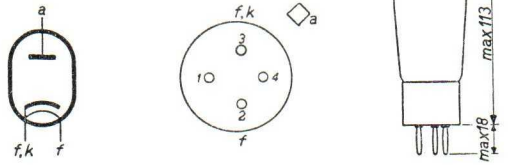
1877

High vacuum HALF-WAVE RECTIFIER for high voltage
REDRESSEUR MONOPLAQUE à vide poussé pour haute tension
Hochvakuum EINWEGGLEICHRICHTER für Hochspannung

Heating: indirect by A.C.; parallel supply
Chauffage: indirect par C.A.; alimentation en parallèle
Heizung: indirekt durch Wechselstrom; Parallelspeisung

Vf = 4 V
If = 0,65 A

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Operating conditions and limiting values
Caractéristiques d'utilisation et limites
Betriebs- und Grenzdaten

Vtr	= max.	5000 V_{eff}
V_{inv}	= max.	15000 V
Io	= max.	3 mA
Rt	= min.	20 kΩ
C	= max.	0,5 µF

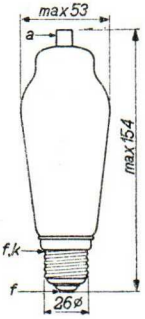
PHILIPS 1878

High vacuum HALF-WAVE RECTIFYING VALVE for high voltage
TUBE REDRESSEUR MONOPLAQUE à vide poussé pour haute tension
Hochvakuum EINWEGGLEICHTERRÖHRE für Hochspannung

Heating: indirect by A.C.
Chauffage: indirect par C.A.
Heizung: indirekt durch Wechselstrom

V_f = 4 V
I_f = 0,7 A

Dimensions in mm
Dimensions en mm
Abmessungen in mm

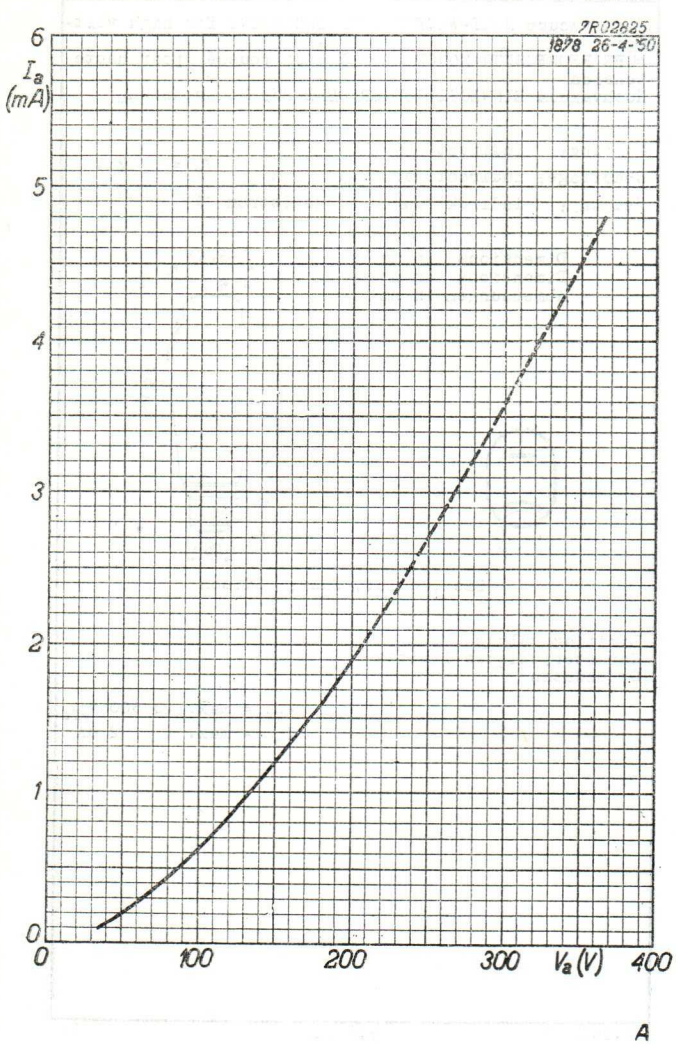


Base, culot, Fuss: Edison

Limiting values
Caractéristiques limites
Grenzdaten

V_{tr} = max. 10 500 V_{eff}
I_o = max. 2 mA

1878 PHILIPS



PHILIPS

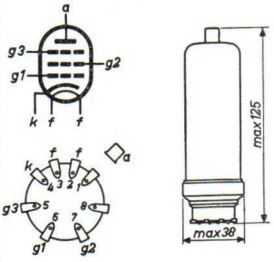
4654
4654K

OUTPUT PENTODE
PENTHODE DE SORTIE
ENDPENTODE

Heating :indirect; parallel supply — V_f= 6,3 V
Chauffage:indirect; alimentation- parallèle — I_f=1,35 A
Heizung :indirekt; Parallelspeisung

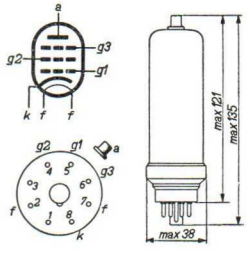
Dimensions in mm
Dimensions en mm
Abmessungen in mm

4654



Base
Culot P
Sockel

4654K



Base
Culot Octal
Sockel

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

V_a	=	250	V
V_{g2}	=	275	V
V_{g3}	=	0	V
R_k	=	175	Ω
I_a	=	72	mA
I_{g2}	=	8	mA
S	=	8,5	mA/V
μ_{g2g1}	=	11	-
R_i	=	22	kΩ
R_a	=	3,5	kΩ
$V_i(I_{g1}=+0,3\mu A)$	=	11,5	Veff
$W_o(I_{g1}=+0,3\mu A)$	=	9,2	W
$d_{tot}(I_{g1}=+0,3\mu A)$	=	11,4	%
$V_i(W_o$ = 50 mW)	=	0,5	Veff

PHILIPS

Operating characteristics class B and AB
Caractéristiques d'utilisation classe B et AB
Betriebsdaten Klasse B und AB

		B		B		AB		
$R_{aa\sim}$	=	5		5		6,5		kΩ
R_{g2}	=	500		500		2000		Ω
V_{g1}	=	-38		-32		-		V
R_k	=	-		-		265		Ω
V_{g3}	=	0		0		0		V
V_i	=	0	26,5	0	22,4	0	27	V_{eff}
V_{b_a}	=	425	425	375	375	425	425	V
V_a	=	420	400	370	350	-	-	V
$V_{a+}V_{Rk}$	=	-	-	-	-	405	400	V
V_{bg2}	=	425	425	375	375	425	425	V
I_a	=	2x20	2x93	2x20	2x79	2x46,5	2x60	mA
I_{g2}	=	2x2,2	2x21	2x2,2	2x17	2x5,4	2x13	mA
W_o	=	0	48	0	35	0	27,5	W
d_{tot}	=	-	2,5	-	2,5	-	5	%

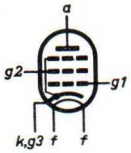
Limiting values
Caractéristiques limites
Grenzdaten

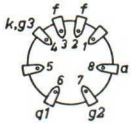
V_{a_o}	= max.	1200	V
V_a	= max.	600	V
W_a	= max.	18	W
V_{g2_o}	= max.	1000	V
V_{g2}	= max.	425	V
$W_{g2}(V_i=0)$	= max.	3	W
$W_{g2}(W_o$ = max.)	= max.	10	W
I_k	= max.	120	mA
$V_{g1}(I_{g1}=+0,3\mu A)$	= max.	-1,3	V
R_{g1}(A, AB)	= max.	0,7	MΩ
R_{g1}(B)	= max.	0,5	MΩ
V_{kf}	= max.	50	V
R_{kf}	= max.	20	kΩ

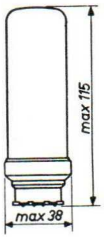
OUTPUT PENTODE
PENTHODE DE SORTIE
ENDPENTODE

Heating : indirect; parallel supply — V_f = 6,3 V
Chauffage: indirect; alimentation- parallèle — I_f = 1,5 A
Heizung : indirect; Parallelspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: P

Capacitances	C_a = 13,5 pF	C_{ag1} <	0,7 pF
Capacités	C_{g1} = 18,5 pF	C_{g1f} =	1,5 pF
Kapazitäten		C_{kf} =	8,5 pF

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

V_a	=	250 V
V_{g2}	=	250 V
R_k	=	90 Ω
I_a	=	72 mA
I_{g2}	=	8 mA
S	=	14,5 mA/V
μ_{g2g1}	=	20 -
R_i	=	20 kΩ
$R_{a\sim}$	=	3,5 kΩ
$V_i(I_{g1}=+0,3\mu A)$	=	5,3 Veff
$W_o(I_{g1}=+0,3\mu A)$	=	8 W
$d_{tot}(I_{g1}=+0,3\mu A)$	=	10 %
V_i (W_o = 50 mW)	=	0,3 Veff

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

$R_{aa\sim}$	=	8		6		kΩ
R_{g2}	=	2,2		0,7		kΩ
R_k	=	170		125		Ω
V_i	=	0	17	0	14	Veff
V_{b_a}	=	425	425	375	375	V
$V_{a+V_{Rk}}$	=	405	400	355	350	V
V_{bg2}	=	425	425	375	375	V
I_a	=	2x46	2x58	2x52	2x64	mA
I_{g2}	=	2x5	2x14,5	2x6,5	2x16,5	mA
W_o	=	0	29	0	27,5	W
d_{tot}	=	-	5	-	4	%

Operating characteristics class AB in triode connection (g2 connected to anode)
Caractéristiques d'utilisation classe AB en connexion triode (g2 reliée à l'anode)
Betriebsdaten Klasse AB in Triodenschaltung (g2 verbunden mit Anode)

V_b	=	400		V
R_k	=	175		Ω
$R_{aa\sim}$	=	5,5		kΩ
V_i	=	0	13,5	Veff
I_a	=	2x48	2x54	mA
W_o	=	0	13	W
d_{tot}	=	-	1,5	%

Limiting values
Caractéristiques limites
Grenzdaten

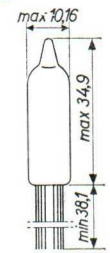
V_{a_o}	= max. 800 V	$W_{g2}(V_i=0)$	= max.	2	W
V_a	= max. 425 V	$W_{g2}(W_o=max.)$	= max.	5	W
W_a	= max. 18 W	$V_{g1}(I_{g1}=+0,3\mu A)$	= max.	-1,3	V
V_{g2_o}	= max. 650 V	R_{g1}(A,AB)	= max.	0,7	MΩ
V_{g2}	= max. 425 V	R_{g1}(B)	= max.	0,5	MΩ
I_k	= max. 90 mA	V_{kf}	= max.	50	V
		R_{kf}	= max.	20	kΩ

SQ PHILIPS 5636

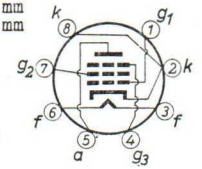
Special quality shock and vibration resistant sharp cut-off DUAL CONTROL PENTODE for use as amplifier and mixer.
PENTODE à haute sécurité, résistante aux chocs et vibrations, à pente constante et À DOUBLE COMMANDE pour utilisation comme amplificatrice et changeuse de fréquence.
Zuverlässige, stoss- und vibrationsfeste, DOPPELGESTEUERTE PENTODE mit konstanter Steilheit zur Verwendung als Verstärker und Mischröhre

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 V
I_f = 150 mA



Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: SUBMINIATURE

Remark : Directly soldered connections to the leads of the tube must be at least 5 mm from the seal and any bending of the leads must be at least 2 mm from the seal
Observation: Ne pas faire de soudures à moins de 5 mm et ne pas plier les fils de sortie à moins de 2 mm de l'embase.
Bemerkung : Lötanschlüsse an den Drahtausführungen müssen mindestens 5 mm, etwaige Biegestellen mindestens 2 mm von den Glasausführungen entfernt sein.

Diameter of the tube leads
Diamètre des fils de sortie = 0,432 mm
Durchmesser der Anschlussdrähte

[1]) Variation of S_{ag_1} during 1000 hours of operation max. 20 %.
Variation de S_{ag_1} pendant 1000 heures de fonctionnement max. 20 %.
Änderung von S_{ag_1} während 1000 Betriebsstunden max. 20 %.

Characteristics
Caractéristiques
Kenndaten

Column I: Setting of the tube and average measuring results of new tubes
II: Initial characteristic range values for equipment design
III: Characteristic range values after 1000 hours of operation
Colonne I: Valeurs pour le réglage du tube et les resultats moyens de mesures de tubes neufs
II: Gammes de valeurs caractéristiques initiales pour l'étude d'équipements
III: Gammes de valeurs caractéristiques pour l'étude d'équipements après un service de 1000 heures
Spalte I: Einstelldaten der Röhre und mittlere Messergebnisse neuer Röhren
II: Anfängliche charakteristische Wertbereiche für Gerätentwurf
III: Charakteristische Wertbereiche für Gerätentwurf nach einem Betrieb von 1000 Stunden

Capacitances with external shield of 10.3 mm diameter
Capacités avec un blindage extérieur d'un diamètre de 10,3 mm
Kapazitäten mit einer äusseren Abschirmung von 10,3 mm Durchmesser

	I	II		I	II
C_{g_1}	= 4,0	3,5-4,5 pF	C_{ag_1} =		< 0,02 pF
C_{g_3}	= 4,0	3,5-4,5 pF	C_{ag_3} =		< 1,1 pF
C_a	= 3,4	2,9-3,9 pF	$C_{g_1g_3}$ =		< 0,15 pF

Typical characteristics
Caractéristiques types
Kenndaten

	I	II		I	II
V_a	= 100	V	V_a = 100		V
V_{g_2}	= 100	V	V_{g_2} = 100		V
V_{g_3}	= 0	V	V_{g_3} = -1		V
R_k	= 150	Ω	R_k = 150		Ω
I_a	= 5,3	3,7-6,9 mA	I_a = 4,0		mA
I_{g_2}	= 4,0	2,8-5,4 mA	I_{g_2} = 5,8		mA
S_{ag_1}	= 3,2	2,7-4,0 mA/V[1]	S_{ag_1} = 1,95		mA/V
S_{ag_3}	= 0,5	mA/V	S_{ag_3} =	0,5-1,8	mA/V
R_i	= 110	kΩ	R_i = 50		KΩ

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

Characteristics (continued)
Caractéristiques (suite)
Kenndaten (Fortsetzung)

Cut-off voltages
Tensions de blocage
Sperrspannungen

	I	II	
V_a =	100		V
V_{g2} =	100		V
V_{g3} =	0		V
V_{g1} =	-7,5		V
I_a =	10	< 100	µA

	I	II	
V_a =	100		V
V_{g2} =	100		V
R_k =	150		Ω
V_{g3} =	-8		V
I_a =	10	< 100	µA

Grid current
Courant de grille
Gitterstrom

	I	II	III	
V_a =	100			V
V_{g2} =	100			V
V_{g3} =	0			V
R_k =	150			Ω
R_{g1} =	1			MΩ
$-I_{g1}$ =		< 0,3	< 1,0	µA

Heater current
Courant de chauffage
Heizstrom

	I	II	III	
V_f =	6,3			V
I_f =	150	140-160	138-164	mA

Heater-to-cathode insulation
Isolement entre cathode et filament
Isolierung zwischen Katode und Heizfaden

	I	II	III	
V_f =	6,3			V
V_{kf} =	100			V
I_{kf} =		< 5	< 10	µA

Insulation between any two electrodes (except heater to cathode)
Isolement entre deux électrodes quelconques (sauf cathode-filament)
Isolierung zwischen zwei willkürlichen Elektroden (ausser Katode-Heizfaden)

	I	II	III	
V_f =	6,3			V
V =	100			V
r_{isol} =		> 100	> 50	MΩ

Vibrational noise ouput
Tension de bruit de sortie due aux vibrations
Vibrations-Störausgangsspannung

		I	II
V_{b_a}	=	100	V
R_a	=	10	kΩ
V_{g_2}	=	100	V
V_{g_3}	=	0	V
R_k	=	150	Ω
C_k	=	1000	µF
Vibration frequency Fréquence de la vibration Vibrationsfrequenz	=	40	c/s
Vibrational acceleration Accélération par la vibration Vibrationsbeschleunigung	=	15 g	
V_o	=		< 40 mV

Shock resistance: about 500 g [1])

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 [1])

Vibrational forces for a period of 32 hours at a frequency of 25 c/s in each of 3 positions of the tube. V_f = 6.3 V.

Résistance aux chocs: environ 500 g [1])

Des forces comme appliquées 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 du tube

Résistance aux vibrations: 2,5 g [1])

Des forces de vibration pendant une période de 32 heures à une fréquence de 25 Hz dans chacune de trois positions du tube. V_f = 6,3 V.

Stossfestigkeit: etwa 500 g [1])

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 [1])

Vibrationskräfte während einer Periode von 32 Stunden bei einer Frequenz von 25 Hz in jeder von 3 Stellungen der Röhre. V_f = 6,3 V.

[1]) See page 5; Voir page 5; Siehe Seite 5

HEATER SWITCHING. The tube can withstand min. 2000 cycles of heater switching under the following conditions:
ESSAI CYCLIQUE DU FILAMENT. Le tube peut résister à 2000 cycles de commutation du filament au min. sous les conditions suivantes:
HEIZFADEN-UMSCHALTUNG. Die Röhre kann mindestens 2000 Schaltzyklen vertragen unter folgenden Bedingungen:

V_f = 7,0 V
V_{kf} = 140 V_{eff}
$V_a = V_{g3} = V_{g2} = V_{g1}$ = 0 V

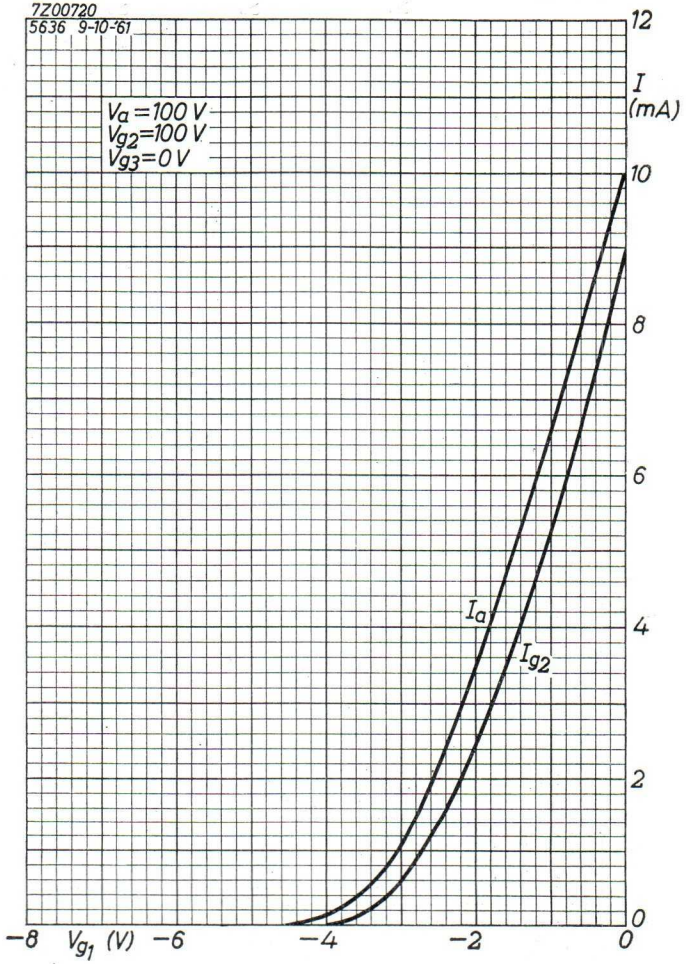
One switching cycle means that the heater voltage is switched on during one minute and switched off during 4 minutes.
Un cycle de commutation veut dire que la tension de chauffage est mise en circuit pendant une minute et mise hors circuit pendant 4 minutes.
Ein Schaltzyklus heisst dass die Heizspannung während einer Minute eingeschaltet und während 4 Minuten ausgeschaltet ist.

Limiting values (Absolute limits)
Caractéristiques limites (Limites absolues)
Grenzdaten (Absolute Grenzwerte)

V_{a_o}	= max. 330 V	V_{g1}	= max. 0 V
V_a	= max. 165 V	$-V_{g1}$	= max. 55 V
W_a	= max. 1,1 W	R_{g1}	= max. 1,2 MΩ
V_{g3}	= max. 30 V	I_k	= max. 16 mA
$-V_{g3}$	= max. 55 V	$V_{kf=}$	= max. 200 V
V_{g2}	= max. 155 V	$V_{kf\ p}$	= max. 200 V
W_{g2}	= max. 0,7 W	V_f	= max. 6,6 V = min. 6,0 V
		t_{bulb}	= max. 220 °C
		Altitude Höhe	= max. 18 km

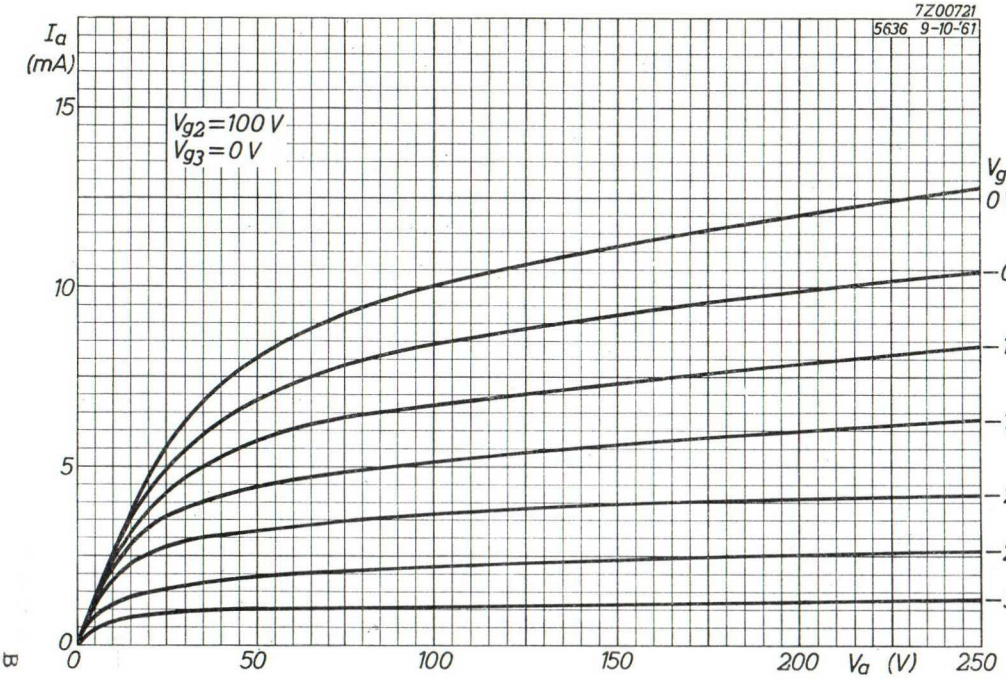
[1]) Page 4; Seite 4

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.


7Z00720
5636 9-10-61
V_a = 100 V
V_{g2} = 100 V
V_{g3} = 0 V
I (mA)
12
10
8
6
4
2
0
I_a
I_{g2}
−8 V_{g1} (V) −6
−4
−2
0

10.10.1961

A


7Z00721
5636 9-10-61
I_a (mA)
15
10
5
0
V_{g2} = 100 V
V_{g3} = 0 V
V_{g1} =
0 V
−0,5 V
−1 V
−1,5 V
−2 V
−2,5 V
−3 V
0
50
100
150
200
V_a (V)
250

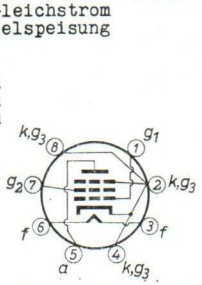
B

Special quality shock and vibration resistant PENTODE for use as output pentode and video amplifier
PENTODE à haute sécurité, résistante aux chocs et vibrations, pour utilisation comme pentode de sortie et amplificatrice vidéo
Zuverlässige, stoss- und vibrationsfeste PENTODE zur Verwendung als Endpentode und als Videoverstärker.

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 V
I_f = 450 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: SUBMINIATURE

Remark : Directly soldered connections to the leads of the tube must be at least 5 mm from the seal and any bending of the leads must be at least 2 mm from the seal
Observation: Ne pas faire de soudures à moins de 5 mm et ne pas plier les fils de sortie à moins de 2 mm de l'embase.
Bemerkung : Lötanschlüsse an den Drahtausführungen müssen mindestens 5 mm, etwaige Biegestellen mindestens 2 mm von den Glasausführungen entfernt sein.

Diameter of the tube leads
Diamètre des fils de sortie 0,432 mm
Durchmesser der Anschlussdrähte

Characteristics
Caractéristiques
Kenndaten

Column I: Setting of the tube and average measuring results of new tubes
II: Initial characteristic range values for equipment design
III: Characteristic range values after 1000 hours of operation
Colonne I: Valeurs pour le réglage du tube et les resultats moyens de mesures de tubes neufs
II: Gammes de valeurs caractéristiques initiales pour l'étude d'équipements
III: Gammes de valeurs caractéristiques pour l'étude d'équipements après un service de 1000 heures
Spalte I: Einstelldaten der Röhre und mittlere Messergebnisse neuer Röhren
II: Anfängliche charakteristische Wertbereiche für Gerätentwurf
III: Charakteristische Wertbereiche für Gerätentwurf nach einem Betrieb von 1000 Stunden

Capacitances with external shield of 10.3 mm diameter
Capacités avec un blindage extérieur d'un diamètre de 10,3 mm
Kapazitäten mit einer äusseren Abschirmung von 10,3 mm Durchmesser

	I	II	
C_{g1}	= 9	8-10	pF
C_a	= 8	7-9	pF
C_{ag1}	=	< 0,13	pF

Typical characteristics
Caractéristiques types
Kenndaten

	I	II	
V_a	= 150		V
V_{g2}	= 100		V
R_k	= 100		Ω
I_a	= 21	14-28	mA
I_{g2}	= 4,0	2-6	mA
S	= 9,0	7,5-10,5	mA/V [1]
R_i	= 50		kΩ

Cut-off voltage
Tension de blocage
Sperrspannung

	I	II	
V_a	= 150		V
V_{g2}	= 100		V
V_{g1}	= -14		V
I_a	=	< 75	µA

[1]) Variation of S during 1000 hours of operation max. 20 %
Variation de S pendant 1000 heures de fonctionnement 20 % au max.
Änderung von S während 1000 Betriebsstunden max. 20 %

Characteristics (continued)
Caractéristiques (suite)
Kenndaten (Fortsetzung)

Grid current
Courant de grille
Gitterstrom

	I	II	III	
V_a	= 150			V
V_{g2}	= 100			V
R_k	= 100			Ω
R_{g1}	= 1			MΩ
$-I_{g1}$	=	< 1	< 2	µA

Heater current
Courant de chauffage
Heizstrom

	I	II	III	
V_f	= 6,3			V
I_f	= 450	420-480	414-492	mA

Heater-to-cathode insulation
Isolement entre cathode et filament
Isolierung zwischen Katode und Heizfaden

	I	II	III	
V_f	= 6,3			V
V_{kf}	= 100			V
I_{kf}	=	< 15	< 60	µA

Insulation between any two electrodes (except heater to cathode)
Isolement entre deux électrodes quelconques (Sauf cathode-filament)
Isolierung zwischen zwei willkürlichen Elektroden (ausser Katode-Heizfaden)

	I	II	III	
V_f	= 6,3			
V	= 100			
r_{isol}	=	> 100	> 50	MΩ

[1]) Page 4, Seite 4.

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.

Vibrational noise output
Tension de bruit de sortie due aux vibrations
Vibrations-Störausgangsspannung

	I	II
V_{b_a} =	150	V
R_a =	2	kΩ
V_{g_2} =	100	V
R_k =	100	Ω
C_k =	1000	µF
R_{g_1} =	0,1	MΩ
Vibration frequency Fréquence de la vibration Vibrationsfrequenz =	40	c/s
Vibrational acceleration Accélération par la vibration Vibrationsbeschleunigung =	15 g	
V_o =		< 100 mV_{eff}

Shock resistance: about 500 g [1])

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 [1])

Vibrational forces for a period of 32 hours at a frequency of 25 c/s in each of 3 positions of the tube. V_f = 6.3 V.

Résistance aux chocs: environ 500 g [1])

Des forces comme appliquées 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 du tube

Résistance aux vibrations: 2,5 g [1])

Des forces de vibration pendant une période de 32 heures à une fréquence de 25 Hz dans chacune de trois positions du tube. V_f = 6,3 V.

Stossfestigkeit: etwa 500 g [1])

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 [1])

Vibrationskräfte während einer Periode von 32 Stunden bei einer Frequenz von 25 Hz in jeder von 3 Stellungen der Röhre. V_f = 6,3 V.

[1]) See page 3; voir page 3; siehe Seite 3

HEATER SWITCHING. The tube can withstand min. 2000 cycles of heater switching under the following conditions:
ESSAI CYCLIQUE DU FILAMENT. Le tube peut résister à 2000 cycles de commutation du filament au min. sous les conditions suivantes:
HEIZFADEN-UMSCHALTUNG. Die Röhre kann mindestens 2000 Schaltzyklen vertragen unter folgenden Bedingungen:

V_f = 7,0 V
V_{kf} = 140 V_{eff}
$V_a = V_{g3} = V_{g2} = V_{g1}$ = 0 V

Operating characteristics as A.F. power amplifier class A
Caractéristiques d'utilisation en amplificatrice de puissance B.F. classe A
Betriebsdaten als Klasse A NF-Endverstärker

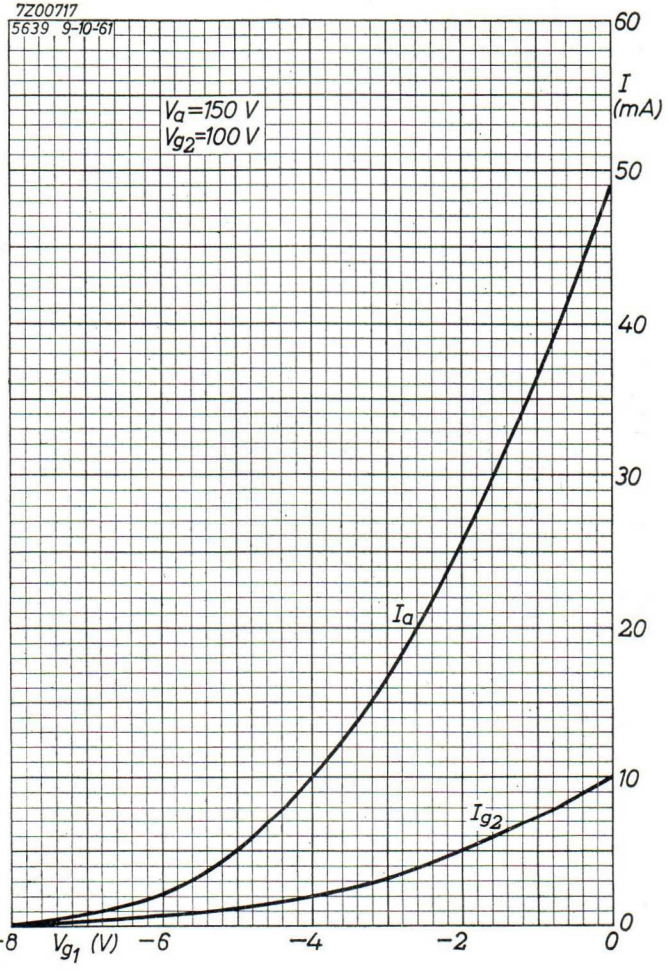
V_a = 150 V
V_{g2} = 100 V
R_k = 100 Ω
$R_{a\sim}$ = 9 kΩ
V_i = 2 V
W_o = 1 W

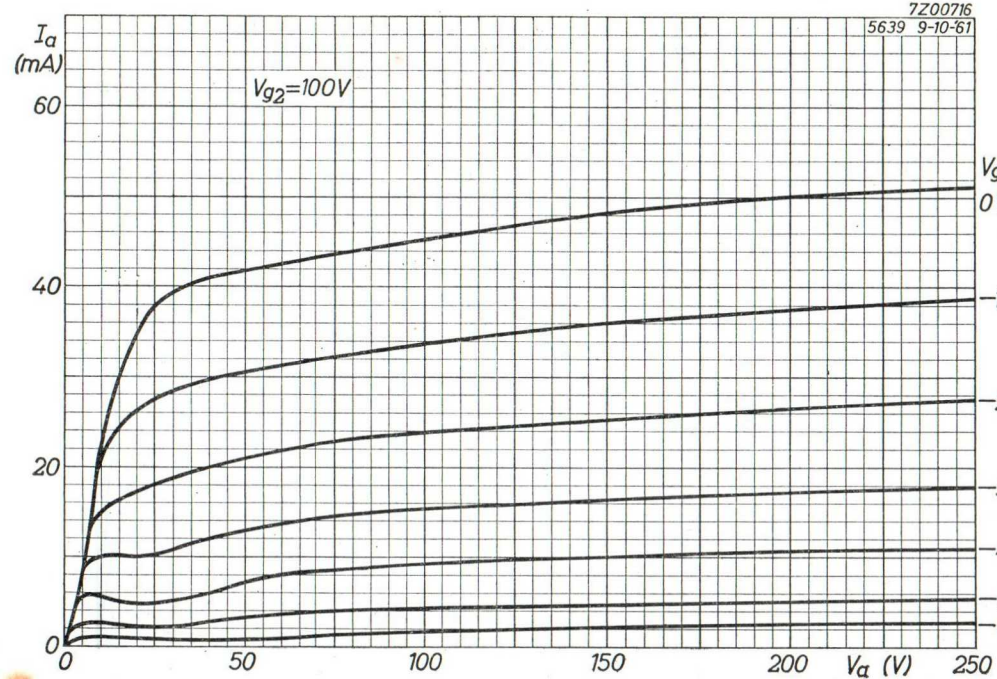
Limiting values (Absolute limits)
Caractéristiques limites (Limites absolues)
Grenzdaten (Absolute Grenzwerte)

V_{ao}	= max. 330 V	R_{g1}	= max. 100 kΩ [1]
V_a	= max. 165 V	R_{g1}	= max. 500 kΩ [2]
W_a	= max. 4 W	I_k	= max. 40 mA
V_{g2}	= max. 155 V	$V_{kf=}$	= max. 200 V
W_{g2}	= max. 1 W	V_{kfp}	= max. 200 V
V_{g1}	= max. 0 V	V_f	= max. 6,6 V
$-V_{g1}$	= max. 55 V		= min. 6,0 V
		t_{bulb}	= max. 220 °C
		Altitude / Höhe	= max. 18 km

[1]) Fixed bias
En polarisation fixe
Mit fester Gittervorspannung

[2]) Automatic grid bias
En polarisation automatique
Mit automatischer Gittervorspannung


7Z00717
5639 9-10-61
V_a=150 V
V_{g_2}=100 V
I_a
I_{g_2}
I (mA)
60
50
40
30
20
10
0
−8
V_{g_1} (V)
−6
−4
−2
0



5639

PHILIPS

SO

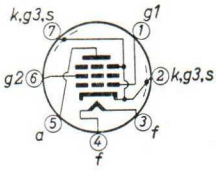
B

SPECIAL QUALITY sharp cut-off PENTODE for use in wide-band amplifiers
PENTHODE A HAUTE SECURITE à pente constante pour utilisation dans amplificateurs à large bande
ZUVERLÄSSIGE PENTODE mit konstanter Steilheit zur Verwendung in Breitbandverstärkern

Heating : indirect by A.C. or D.C. parallel supply
Chauffage: indirect par C.A. or C.C. alimentation parallèle
Heizung : indirekt durch Wechsel- oder Gleichstrom; Parallelspeisung

$V_f = 6{,}3$ V [1)]
$I_f = 175$ mA [1)]

Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: MINIATURE

Capacitances (with external shield)
Capacités (avec blindage extérieur)
Kapazitäten (mit äusserer Abschirmung)

C_{g1}	=	4,0 ±0,6	pF
C_a	=	2,85± 0,4	pF
C_{ag1}	<	0,02	pF
C_{g1g2}	=	1,4	pF

[1)] The maximum deviation of I_f at V_f = 6.3 V ± 15 mA. In order to obtain a better tube life, the maximum variation of V_f should be less than ± 10% (absolute limits)

La déviation de I_f à V_f = 6,3 V est de ± 15 mA au maximum Afin d'obtenir une vie meilleure du tube, la variation maximum de V_f sera moins de ± 10 % (limites absolues)

Die Höchstabweichung von I_f bei V_f = 6,3 V ist ± 15 mA Zur Erhaltung einer besseren Lebensdauer der Röhre soll die maximale Schwankung von V_f weniger als ± 10% betragen (absolute Grenzen)

Typical characteristics
Caractéristiques types
Kenndaten

V_f		=	6,3 V
V_a		=	120 V
V_{g2}		=	120 V
V_{g1}		=	-2 V[2])
I_a		=	$7,5\ ^{+3,5}_{-2,5}$ mA
I_{g2}		=	$2,5\ ^{+1,5}_{-1,7}$ mA
S		=	5 ± 1,2 mA/V
R_1		=	0,34 MΩ
V_{g1}	(I_a = 10 µA)	=	-8,5 V
$-I_{g1}$	(R_{g1} = 0,5 MΩ)	=	max. 0,1 µA
I_a	(R_a = 0,1 MΩ; V_{g1} = -10 V)	=	max. 200 µA

Heater-cathode insulation
Isolement filament-cathode (V_{kf} = 100 V) I_{kf} = max. 10 µA
Katoden-Heizfadenisolation

Insulation between 2 electrodes
Isolement entre 2 électrodes R = min. 100 MΩ
Isolation zwischen 2 Elektroden

---

[2]) Circuit operation with cathode bias is recommended (R_k = 200 Ω)

Un fonctionnement dans un circuit avec polarisation par la cathode est recommandé (R_k = 200 Ω)

Betrieb mit automatischer Gittervorspannung wird empfohlen (R_k = 200 Ω)

Limiting values (ABSOLUTE LIMITS)
Caractéristiques limites (LIMITES ABSOLUES)
Grenzdaten (ABSOLUTE WERTE)

V_{a_o}	= max.	600 V
V_a	= max.	200 V
V_{g2_o}	= max.	600 V
V_{g2}	= max.	155 V
$-V_{g1}$	= max.	50 V
$+V_{g1}$	= max.	0 V
W_a	= max.	1,65 W
W_{g2}	= max.	0,55 W
I_k	= max.	20 mA
I_{g1}	= max.	1 mA
R_{g1}	= max.	0,1 MΩ
V_{kf}	= max.	135 V
tbulb	= max.	165 °C[3])

[3]) Tube life and reliability of performance will be enhanced by operation at lower temperatures

La durée de vie et la sécurité de fonctionnement seront augmentées par opération à des températures plus basses

Lebensdauer und Betriebssicherheit werden durch Betrieb bei niedrigeren Temperaturen verbessert

Shock resistance : about 450 g [4])
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
Vibration resistance: 2.5 g [4])
Vibrational forces for a period of 32 hours at a frequency of 25 c/s in each of the 3 positions

Résistance aux chocs: environ 450 g [4])
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 [4])
Des forces de vibration pendant une période de 32 heures à une fréquence de 25 Hz dans chacune des trois positions

Stossfestigkeit: etwa 450 g [4])
Stossbeschleunigungen gemäss NRL-Stossmaschine für elektronische Geräte, verursacht durch 5 Schläge des Hammers, der in jeder der vier verschiedenen Positionen über einen Winkel von 30° gehoben wird
Vibrationsfestigkeit: 2,5 g [4])
Vibrationskräfte während einer Periode von 32 Stunden bei einer Frequenz von 25 Hz in jeder der 3 Stellungen

Heater switching. The tube can withstand min. 2000 cycles of heater switching under the following conditions:
Commutation du filament. Le tube peut résister à 2000 cycles de commutation du filament au minimum dans les conditions suivantes:
Umschaltung des Heizfadens. Die Röhre kann mindestens 2000 Schaltzyklen aushalten unter folgenden Bedingungen:

	V_f	=	7,5 V
[4])	V_{kf} (f pos.; k neg.)	=	135 V_{rms}
	$V_a = V_{g2} = V_{g1}$	=	0 V

One switching cycle means that the heater is switched on during one minute and switched off during one minute
Un cycle de commutation veut dire que le filament est mis en circuit pendant une minute et mis hors circuit pendant une minute
Ein Schaltzyklus heisst dass der Heizfaden während einer Minute eingeschaltet und während einer Minute ausgeschaltet ist.

4) 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 interprétees comme des conditions de fonctionnement normales

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

6.6.1957

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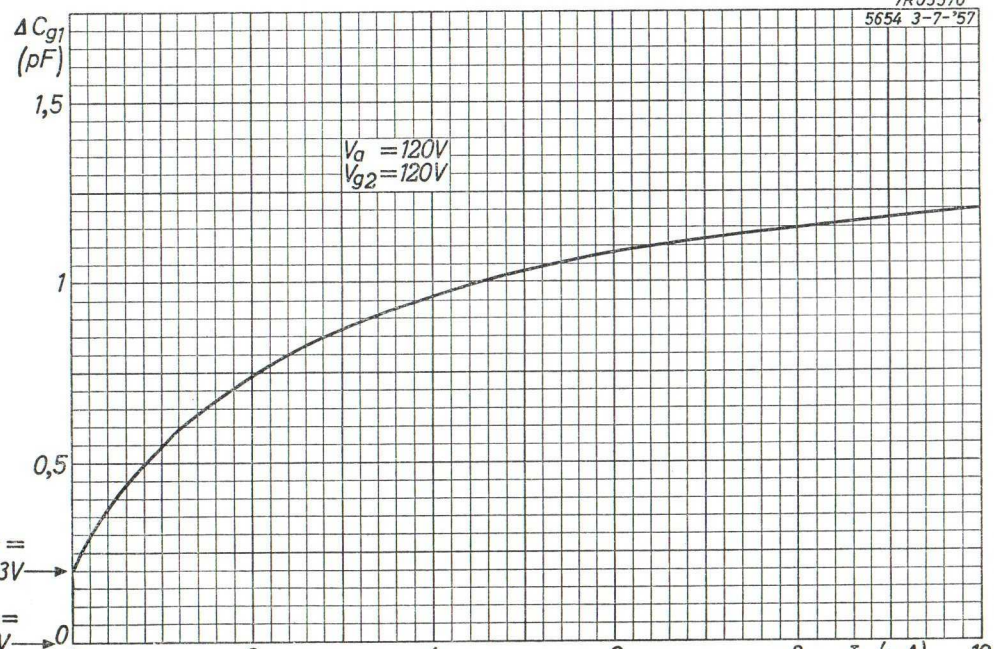


SO PHILIPS

5654

A

PHILIPS

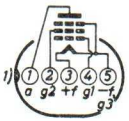
5672

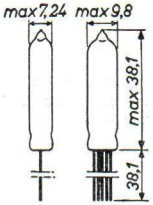
SUBMINIATURE PENTODE for use as A.F. power amplifier in portable equipment
PENTHODE SUBMINIATURE pour utilisation comme amplificatrice de puissance B.F. pour équipements portables
SUBMINIATUR-PENTODE zur Verwendung als NF-Endverstärker für tragbaren Anlagen

Heating : direct by D.C.
parallel supply
Chauffage: direct par C.C.
alimentation parallèle
Heizung : direkt durch Gleichstrom; Parallelspeisung

V_f = 1,25 V
I_f = 50 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: SUBMINIATURE

Remark

Direct soldered connections to the leads of this tube must be at least 5 mm from the seal and any bending of the leads must be at least 1.5 mm from the seal

Observation

Ne pas faire de soudures à moins de 5 mm, et ne pas plier les fils de sortie à moins de 1,5 mm de l'embase

Bemerkung

Lötanschlüsse an den Drahtausführungen müssen min. 5 mm, etwaige Biegestellen min. 1,5 mm von der Glasdurchführung entfernt sein

---

1)Red dot
Point rouge
Roter Punkt

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

V_a	=	67,5 V
V_{g2}	=	67,5 V
V_{g1}	=	-6,5 V
I_a	=	3,1 mA
I_{g2}	=	0,95 mA
S	=	0,65 mA/V
Ra	=	20 kΩ
W_o	=	65 mW
d_{tot}	=	10 %

Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max.	90 V
V_{g2}	= max.	90 V
I_k	= max.	5 mA

PHILIPS

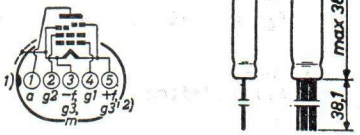
5678

SUBMINIATURE PENTODE for use as R.F., M.F. or A.F. amplifier, oscillator, self-oscillating mixer, A.M.-detector etc.
PENTHODE SUBMINIATURE pour utilisation comme amplificatrice H.F., M.F., ou B.F., oscillatrice, mélangeuse auto-oscillatrice, détectrice A.M. etc.
SUBMINIATUR-PENTODE zur Verwendung als HF-, ZF- oder NF-Verstärker, Oszillator, selbstschwingende Mischröhre, AM-Demodulator usw.

Heating : direct by D.C. parallel supply
Chauffage: direct par C.C. alimentation parallèle
Heizung : direkt durch Gleichstrom, Parallelspeisung

V_f = 1,25 V
I_f = 50 mA

Dimensions in mm
Dimensions en mm
Abmessungen in mm



[1])Red point
Point rouge
Roter Punkt

Base, culot, Sockel: SUBMINIATURE

g3 consists of two parts (g3 and g3'), each of which is connected to a heater terminal
g3 consiste en deux parties (g3 et g3'), chaque de ces parties étant reliées à une broche du filament
g3 besteht aus 2 Teilen (g3 und g3'), die mit je einem Heizfadenende verbunden sind

Direct soldered connections to the leads of this tube must be at least 5 mm from the seal and any bending of the leads must be at least 1.5 mm from the seal

Ne pas faire de soudures à moins de 5 mm, et ne pas plier les fils de sortie à moins de 1,5 mm de l'embase

Lötanschlüsse an den Drahtausführungen müssen min. 5 mm, etwaige Biegestellen min. 1,5 mm von der Glasdurchführung entfernt sein

Capacitances
Capacités
Kapazitäten

C_{g1}	=	3,7 pF
C_a	=	4,6 pF
C_{ag1}	<	0,01 pF

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	45	67,5 V
V_{g2}	=	45	67,5 V
V_{g1}	=	0	0 V
I_a	=	0,8	1,8 mA
I_{g2}	=	0,22	0,48 mA
S	=	0,82	1,10 mA/V
R_i	=	1,2	1 MΩ
V_{g1} (S = 10 µA/V)	=	-3	-4 V

Limiting values
Caractéristiques limites
Grenzdaten

V_a	= max.	90 V
V_{g2}	= max.	67,5 V

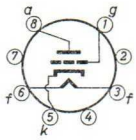
SQ PHILIPS 5718

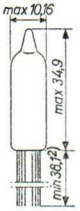
SUBMINIATURE TRIODE for use as R.F. amplifier, as oscillator up to 1000 Mc/s and as RC-coupled A.F. amplifier
TRIODE SUBMINIATURE pour l'utilisation comme amplificateur H.F., comme oscillateur jusqu'à 1000 MHz et comme amplificateur B.F. à couplage par résistance
SUBMINIATUR-TRIODE zur Verwendung als H.F. Verstärker, als Oszillator bis zu 1000 MHz und als widerstandsgekoppelter N.F. Verstärker

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

$$\frac{Vf = 6{,}3\ V\ ^{1})}{If = 150 \pm 12\ mA}$$

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: Subminiature

Mounting position: any
Montage : à volonté
Einbau : beliebig

Socket
Support B1 506 81
Fassung

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1) In order to obtain a prolonged tube life the maximum variation of Vf should be less than ± 5 %
Afin d'obtenir une durée prolongée du tube la variation maximum de Vf sera moins de ± 5 %
Zur Erhaltung einer längeren Lebensdauer der Röhre soll die maximale Schwankung von Vf weniger als ± 5 % betragen

2) Directly soldered connections to the leads of this tube must be at least 5 mm from the seal and any bending of the leads must be at least 1.5 mm from the seal
On request the tube can also be delivered with shortened leads of 4.7 - 5.4 mm

Ne pas faire de soudures à moins de 5 mm et ne pas plier les fils de sortie à moins de 1,5 mm de l'embase
Sur demande le tube peut être livré aussi avec les fils de sortie écourtés jusqu'à 4,7 - 5,4 mm

Lötanschlüsse an den Drahtausführungen müssen mindestens 5 mm, etwaige Biegestellen mindestens 1,5 mm von den Glasdurchführungen entfernt sein
Auf Wunsch kann die Röhre auch geliefert werden mit verkürzten Drahtausführungen von 4,7 - 5,4 mm

Capacitances, capacités, Kapazitäten

With external screening (inside diameter of screening can, connected to cathode, is 10,3 mm)
Avec blindage extérieur (diamètre intérieur de la douille de blindage, reliée à la cathode, est de 10,3 mm)
Mit äusserer Abschirmung (Innendurchmesser der mit der Katode verbundenen Abschirmbuchse ist 10,3 mm)

C_g = 2,4 pF
C_a = 2,4 pF
C_{ag} = 1,3 pF

Without external screening
Sans blindage extérieur
Ohne äussere Abschirmung

C_g = 2,2 ± 0,6 pF
C_a = 0,7 ± 0,2 pF
C_{ag} = 1,45 ± 0,35 pF

Operating characteristics as R.F. amplifier
Caractéristiques d'utilisation comme amplificateur H.F.
Betriebsdaten als H.F. Verstärker

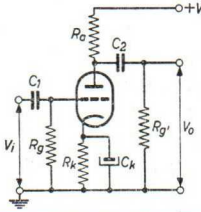
V_a	= 100	150	V
R_k	= 150	180	Ω
I_a	= 8,5 ± 2,5	13	mA
S	= 5,8 ± 1,0	6,5	mA/V
R_i	= 4,65	4,15	kΩ
μ	= 27 ± 4	27	
$-V_g$ (I_a = 10 μA)	= 7	11	V
I_a (V_g = -7 V)	= max. 100	-	μA

Operating characteristics as oscillator
Caractéristiques d'utilisation comme oscillateur
Betriebsdaten als Oszillator

f	=	500 Mc/s
V_a	=	150 V
I_a	=	20 mA
W_o	=	0,9 W [1]

[1] Maximum output power, obtained by suitable choice of Rg and by adjusting the feedback
Puissance de sortie maximum, obtenue par un choix convenable de Rg et par l'ajustage de la réaction
Maximale Ausgangsleistung, erhalten mittels einer geeigneten Wahl von R_g und Einstellung der Rückkopplung

Operating characteristics as R.C-coupled A.F. amplifier
Caractéristiques d'utilisation comme amplificateur B.F. à couplage par résistance
Betriebsdaten als widerstandsgekoppelter N.F. Verstärker



Vb (V)	Ra (kΩ)	Rg (kΩ)	Rg' (kΩ)	Rk (Ω)	Vi eff (V)	Vo/Vi	dtot (%)
100	47	270	100	1000	0,5	16,4	3,9
200	47	270	100	820	1	19	4,0
100	100	270	270	2200	0,5	16,4	3,0
200	100	270	270	1800	1	18,6	3,2
100	270	270	470	8200	0,5	14,8	2,8
200	270	270	470	5600	1	16,2	3,2

Limiting values (absolute limits)
Caractéristiques limites (limites absolues)
Grenzdaten (Absolutwerte)

V_a = max. 165 V	I_g = max. 5,5 mA
$-V_g$ = max. 55 V	R_g = max. 1,2 MΩ
W_a = max. 3,3 W [1]	V_{kf} = max. 200 V
I_a = max. 22 mA	t_{bulb} = max. 250 °C [2]

1) Recommended maximum value
Valeur maximum recommandée 0,9 W
Empfohlener Maximalwert

2) Recommended maximum value
Valeur maximum recommandée 220 °C
Empfohlener Maximalwert

As the tube may become very hot during operation it is recommended to fix it directly to the chassis with a metal clamp (ZE 1100) to provide a better heat sink
Comme le tube peut devenir très chaud pendant l'utilisation il est recommandé de le fixer directement au châssis par une bride de serrage métallique (ZE 1100) afin de obtenir un écoulement de chaleur amélioré
Weil die Röhre während des Betriebs sehr heiss werden kann, wird es zur Erhaltung einer besseren Wärmeableitung empfohlen sie mit einer Metallklammer (ZE 1100) unmittelbar am Chassis zu befestigen

Page 4 in English
Page 5 en Français
Seite 6 auf deutsch

Shock resistance: about 500 g [1])

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 4 different positions. If applied gradually (as for instance in centrifuge) accelerations up to 1000 g can be tolerated

Vibration resistance: 2.5 g [1])

Vibrational forces for a period of 96 hours at a frequency of 25-60 c/s

Vibration-noise level: max. 25 mVeff [1])

Measured at V_{ba} = 100 V, R_a = 10 kΩ, C_{ba} = 40 µF, R_k = 150 Ω, C_k = 1000 µF, and accelerations of 15 g at 40 c/s. This noise level can increase with strong shocks and lasting vibrations up to max. 100 mVeff

Heater switching: min. 2500 cycles [1])

The heater switching cycles consist of 1 minute in, 4 minutes out periods at V_f = 7 V, V_{kf} = 140 Veff and $V_a = V_g$ = 0 V

Life test: 500 hours

During this test the heater voltage is successively switched on for 50 minutes and switched off for 10 minutes at:

V_f = 6.3 V	R_g	= 1 MΩ
V_a = 100 V	V_{kf} (k neg., f pos.)	= 200 V
R_k = 150 Ω	t_{bulb}	= 220 °C

End point of lifetest

The end point of lifetest is reached when one or more of the following characteristics have changed to the indicated values:

$-I_g$	≥	0.6	µA
Decrease of S	≥	20	%
R_{isol} [2])	≤	50	MΩ
I_{kf} (V_{kf} = ± 100 V)	≥	10	µA

[1])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

[2])Between 2 arbitrary electrodes with the exception of k-f

Résistance aux chocs: environ 500 g [1])

Des forces comme fournies par la machine à chocs NRL pour dispositifs électroniques, produites par 5 coups du marteau, soulevé d'un angle de 30° dans chacune de 4 positions différentes. Si appliquées graduellement (comme dans une centrifugeuse par exemple) des accélérations jusqu'à 1000 g sont tolérables

Résistance aux vibrations: 2,5 g [1])

Des forces de vibration pendant une période de 96 heures à une fréquence de 25-60 Hz.

Niveau de bruit de vibration: max. 25 mVeff [1])

Mesuré à V_{ba} = 100 V, R_a = 10 kΩ, C_{ba} = 40 μF, R_k = 150 Ω, C_k = 1000 μF, et des accélérations de 15 g à 40 Hz. Ce niveau de bruit peut s'agrandir jusqu'à max. 100 mV eff sous des chocs forts ou des vibrations continues

Commutations du filament: min. 2500 cycles [1])

Les cycles de commutation du filament consistent en des périodes de 1 minute en circuit et de 4 minutes hors circuit à V_f = 7 V, V_{kf} = 140 Veff et V_a = V_g = 0 V

Epreuve de durée: 500 heures

Pendant cette épreuve la tension de chauffage est successivement mise en circuit pendant 50 min. et mise hors circuit pendant 10 min. à:

V_f = 6,3 V	R_g	=	1 MΩ
V_a = 100 V	V_{kf} (k neg., f pos)	=	200 V
R_k = 150 Ω	t_{bulb}	=	220 °C

Fin de l'épreuve de durée

Le tube est arrivé à la fin de son épreuve de durée quand une ou quelques-unes des caractéristiques suivantes sont changées jusqu' aux valeurs indiquées:

$-I_g$	≥	0,6 μA
Diminution de S	≥	20 %
Risol [2])	≤	50 MΩ
I_{kf} (V_{kf} = ±100 V)	≥	10 μA

---

[1]) 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

[2]) Entre 2 électrodes arbitraires à l'exception de k-f

Stossfestigkeit: etwa 500 g [1])

Stossbeschleunigungen gemäss NRL-Stossmaschine für elektronische Geräte, verursacht durch 5 Schläge des Hammers, der in jeder von 4 verschiedenen Positionen über einen Winkel von 30° gehoben wird. Wenn allmählich angelegt (wie z.B. in einer Zentrifuge) sind Beschleunigungen bis zu 1000 g zulässig

Schwingungsfestigkeit: 2,5 g [1])

Schwingungskräfte während einer Periode von 96 Stunden bei einer Frequenz von 25-60 Hz.

Schwingungs-Räuschpegel: max. 25 mVeff [1])

Gemessen bei V_{ba} = 100 V, R_a = 10 kΩ, C_{ba} = 40 µF, R_k = 150 Ω C_k = 1000 µF und Beschleunigungen von 15 g bei 40 Hz. Dieser Räuschpegel kann bis zu max. 100 mV_{eff} zunehmen bei starken Stössen und dauernden Schwingungen

Heizfadenschaltungen: min. 2500 Perioden [1])

In jeder Schaltperiode wird der Heizfaden 1 Minute ein- und 4 Minuten ausgeschaltet bei Vf = 7 V, V_{kf} = 140 Veff und V_a = V_g = 0 V

Lebensdauerprobe: 500 Stunden

Während dieser Probe wird die Heizspannung jeweils 50 Minuten ein- und 10 Minuten ausgeschaltet unter folgenden Bedingungen

V_f = 6,3 V	R_g	=	1 MΩ
V_a = 100 V	V_{kf} (k neg., f pos.)	=	200 V
R_k = 150 Ω	t_{bulb}	=	220 °C

Ende der Lebensdauerprobe

Das Ende der Lebensdauerprobe ist erreicht wenn einer oder mehrere der untenstehenden Kennwerte bis auf die angegebenen Werte geändert sind:

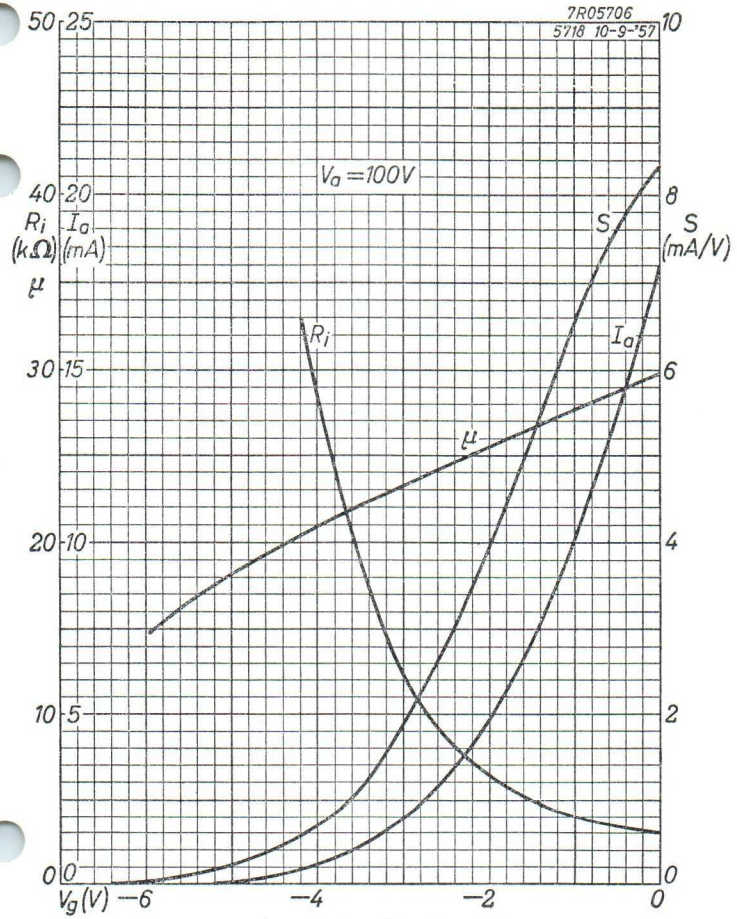
$-I_g$	≥ 0,6 µA
S-Abnahme	≥ 20 %
R_{isol} [2])	≤ 50 MΩ
I_{kf} (V_{kf} = ± 100 V)	≥ 10 µA

---

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

[2]) Zwischen 2 beliebigen Elektroden ausgenommen k-f

SQ **PHILIPS** **5718**



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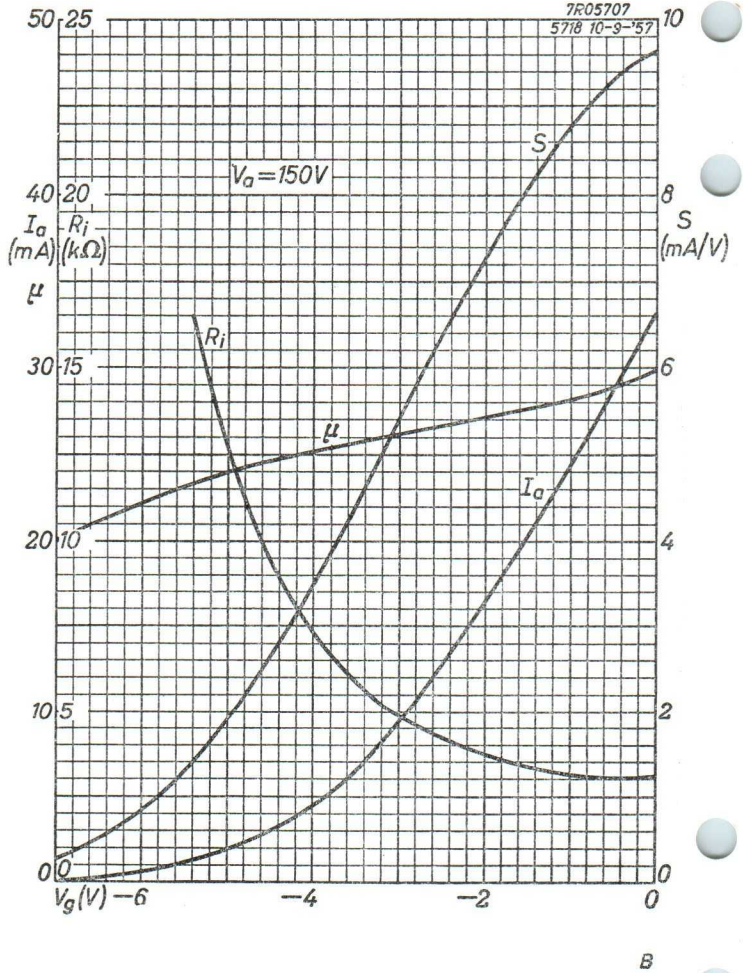
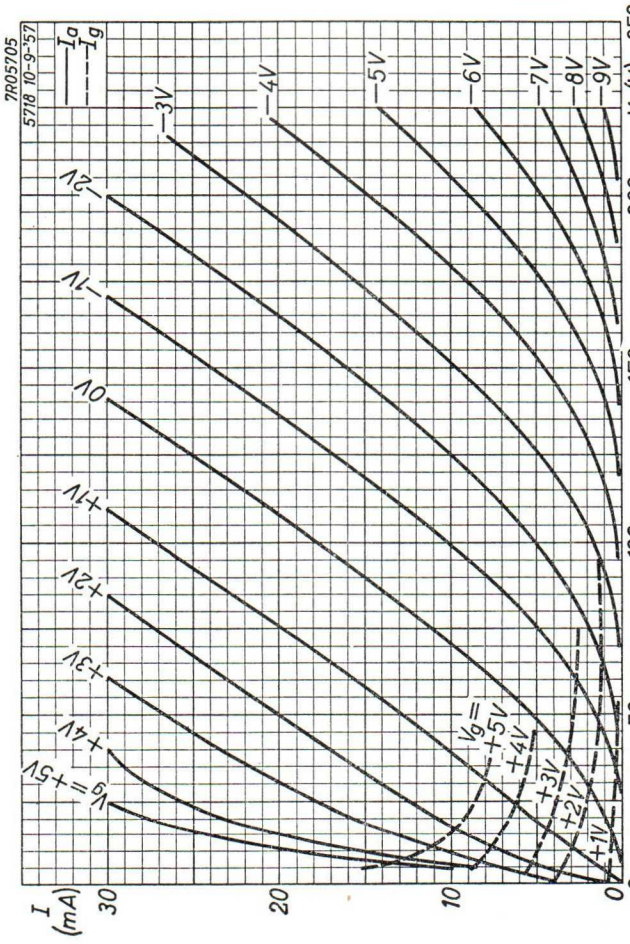

7R05707
5718 10-9-'57
V_a=150V
S
R_i
μ
I_a
I_a (mA)
R_i (kΩ)
μ
S (mA/V)
V_g(V) −6
−4
−2
0
50
25
40
20
30
15
20
10
10
5
0
0
10
8
6
4
2
0

B


7R05705
5718 10-9-'57
Ia
Ig
-3V
-4V
-5V
-6V
-7V
-8V
-9V
Va (V)
250
200
150
100
50
0
12
11
10
+1V
+2V
+3V
+4V
+5V
Vg = +5V
+4V
+3V
+2V
+1V
I (mA)
30
20
10
0

12.12.1957

C

SQ PHILIPS 5726

SPECIAL QUALITY DOUBLE DIODE with separate cathodes for use in professional equipment as detector or low-current power rectifier

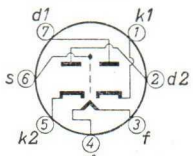
DOUBLE DIODE A HAUTE SÉCURITÉ avec cathodes séparées pour utilisation dans équipements professionnels comme tube détecteur ou redresseur de puissance à courant bas

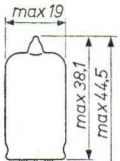
ZUVERLÄSSIGE DOPPELDIODE mit getrennten Katoden zur Verwendung in professionellen Anlagen als Detektor oder Leistungsgleichrichter für niedrige Ströme

Heating : indirect by A.C. or D.C. series or parallel supply
Chauffage: indirect par C.A. ou C.C. alimentation série ou parallèle
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serien- oder Parallelspeisung

V_f = 6,3 V [1]
I_f = 300 mA [1]

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: MINIATURE

Capacitances (with external shield)
Capacités (avec blindage extérieur)
Kapazitäten (mit äusserer Abschirmung)

C_{d1}	=	3,2 ± 0,8 pF
C_{d2}	=	3,2 ± 0,8 pF
C_{d1d2}	<	0,026 pF
C_{k1}	=	3,9 ± 0,8 pF
C_{k2}	=	3,9 ± 0,8 pF

[1] In order to obtain a better tube life, the maximum variation of V_f should be less than ± 10 % (absolute limits)
The maximum deviation of I_f at V_f = 6,3 V is ± 25 mA.

Afin d'obtenir une durée de vie meilleure du tube, la variation maximum de V_f sera moins de ± 10 % (limites absolues)
La déviation maximum de I_f à V_f = 6,3 V est de ± 25 mA

Zur Erhaltung einer besseren Lebensdauer der Röhre soll die maximale Schwankung von V_f weniger als ± 10 % betragen (absolute Werte)
Die Höchstabweichung von I_f bei V_f = 6,3 V ist ± 25 mA

Operating characteristics as half wave rectifier(each system)
Caractéristiques d'utilisation en redresseuse à une alternance (chaque système)
Betriebsdaten als Halbweggleichrichter (jedes System)

V_{tr}	= 117 Veff	C	= 8 µF
R_t	= 300 Ω	I_o	= 9 mA

Characteristic range values for equipment design
Gamme des valeurs caractéristiques pour l'étude d'équipements
Charakteristischer Wertbereich für Gerätentwurf

V_f	= 6,3 V	V_f	= 6,3 V	V_f	= 6,3 V
V_{tr}	= 2x165 V_{eff}	V_d	= 10 V	V_d	= 0 V
C	= 8 µF	I_d	= min. 40 mA	R_a	= 40 kΩ
R_t	= 2x300 Ω			I_{do}	= min. 2 µA = max. 20 µA
R_a	= 11 kΩ				
I_o	= min.16 mA			$\frac{I_d-I_d'}{I_d'-I_d}$	= max. 5 µA

Heater-cathode insulation
Isolement filament-cathode
Katoden-Heizfadenisolation

V_f = 6,3 V
V_{kf} = 100 V (k pos.) I_{kf} = max. 10 µA

V_f = 6,3 V
V_{kf} = 100 V (k neg.) I_{kf} = max. 10 µA

Isulation between two electrodes
Isolement entre deux électrodes
Isolation zwischen zwei Elektroden

(V_f = 6,3 V)
(V = 300 $V_{=}$) R = min.100 MΩ

Resonant frequency : approximately 700 Mc/s (each system)
Fréquence de résonance: environ 700 MHz (chaque système)
Resonanzfrequenz : etwa 700 MHz (jedes System)

Limiting values (ABSOLUTE LIMITS) Each system
Caractéristiques limites (LIMITES ABSOLUES)Chaque système
Grenzdaten (ABSOLUTE WERTE) Jedes System

$V_{inv\ p}$	= max. 360 V	$V_{kf\ p}$	= max. 360 V(k pos.)
I_d	= max. 10 mA	$V_{kf\ p}$	= max. 360 V(k neg.)
I_{dp}	= max. 60 mA	tbulb	= max. 165 °C [2]

---

[2] Tube life and reliability of performance will be enhanced by operation at lower temperatures
La durée de vie et la sécurité de fonctionnement seront augmentées par opération à des températures plus basses
Lebensdauer und Betriebssicherheit werden durch Betrieb bei niedrigeren Temperaturen verbessert

Shock resistance : about 700 g [3])
Forces as applied by the NRL impact machine for electronic devices caused by 5 blows of the hammer, lifted over an angle of 48° in each of four different positions
Vibration resistance: 2.5 g [3])
Vibrational forces for a period of 32 hours at a frequency of 25 c/s in each of the 3 positions

Résistance aux chocs: environ 700 g [3])
Des forces telles que celles appliquée par la machine à chocs NRL pour dispositifs électroniques, produites par 5 coups du marteau, souleyé d'un angle de 48° dans chacune de quatre positions différentes
Résistance aux vibrations: 2,5 [3])
Des forces de vibration pendant une période de 32 heures à une fréquence de 25 Hz dans chacune des trois positions

Stossfestigkeit: etwa 700 g [3])
Stossbeschleunigungen gemäss NRL-Stossmaschine für elektronische Geräte, verursacht durch 5 Schläge des Hammers, der in jeder der vier verschiedenen Positionen über einen Winkel von 48° gehoben wird
Vibrationsfestigkeit: 2,5 [3])
Vibrationskräfte während einer Periode von 32 Stunden bei einer Frequenz von 25 Hz in jeder der 3 Stellungen

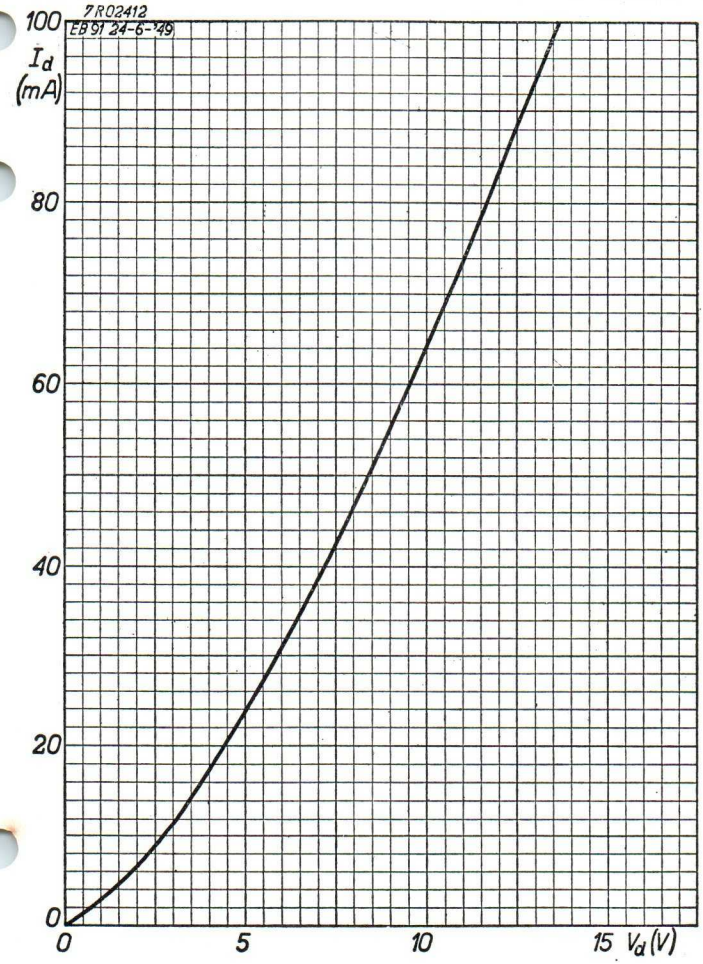
Heater switching. The tube can withstand min. 2000 cycles of heater switching under the following conditions:
Commutation du filament. Le tube peut résister à 2000 cycles de commutation du filament au minimum dans les conditions suivantes:
Umschaltung des Heizfadens. Die Röhre kann mindestens 2000 Schaltzyklen aushalten unter folgenden Bedingungen:

[3])

V_f	= 7,5 V
V_{kf} (f pos.; k neg.)	= 135 V⎓
V_d	= 0 V

One switching cycle means that the heater is switched on during one minute and switched off during one minute
Un cycle de commutation veut dire que le filament est mis en circuit pendant une minute et mis hors circuit pendant une minute
Ein Schaltzyklus heisst dass der Heizfaden während einer Minute eingeschaltet und während einer Minute ausgeschaltet ist.

[3]) 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'evaluation 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



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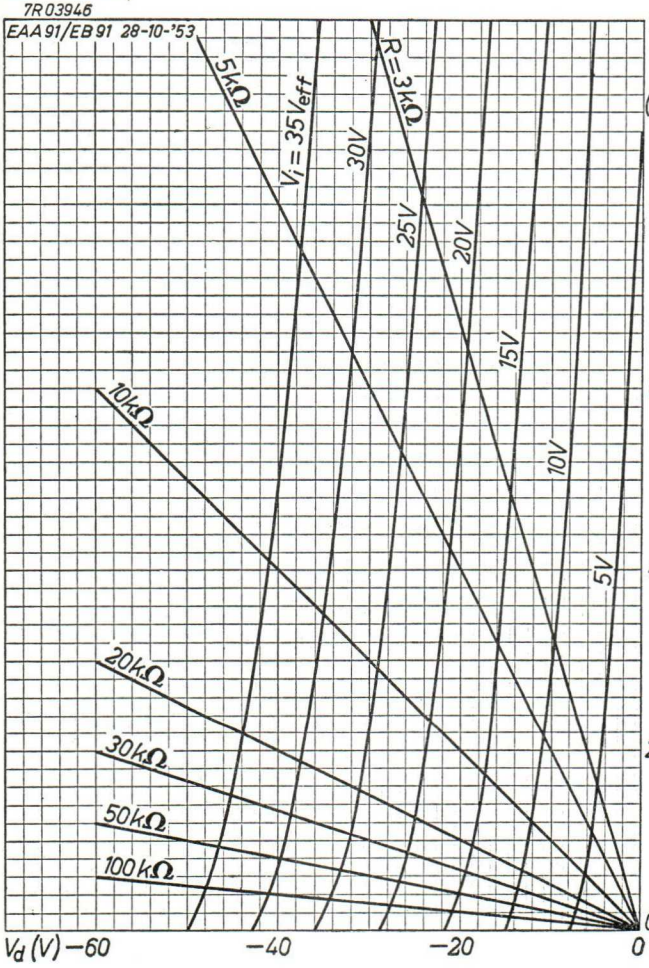
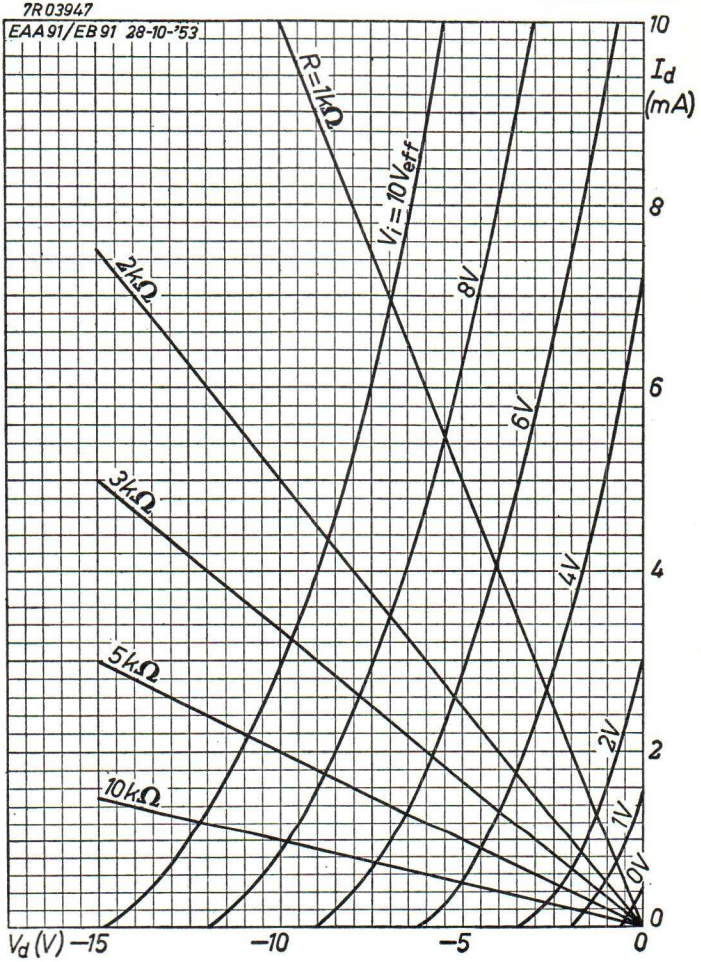

7R03946
EAA91/EB91 28-10-'53
5kΩ
$V_f = 35\ V_{eff}$
30V
R=3kΩ
25V
20V
15V
10V
5V
10kΩ
20kΩ
30kΩ
50kΩ
100kΩ
10
I_d (mA)
8
6
4
2
0
V_d (V) −60
−40
−20
0

B

7R03947

EAA91/EB91 28-10-'53



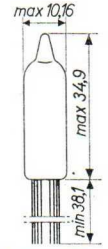
6.6.1957

C

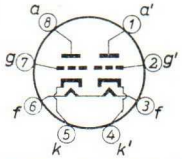
Special quality shock and vibration resistant MEDIUM μ DOUBLE TRIODE for use as R.F. amplifier and oscillator
DOUBLE TRIODE à haute sécurité, résistante aux chocs et vibrations, À COEFFICIENT D'AMPLIFICATION MOYEN pour utilisation comme amplificatrice H.F. et oscillatrice
Zuverlässige, stoss- und vibrationsfeste DOPPELTRIODE MIT MITTLEREM VERSTÄRKUNGSFAKTOR zur Verwendung als HF-Verstärker und Oszillator

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 V
I_f = 300 mA



Dimensions in mm
Dimensions en mm
Abmessungen in mm



Base, culot, Sockel: Subminiature

Remark : Directly soldered connections to the leads of the tube must be at least 5 mm from the seal and any bending of the leads must be at least 2 mm from the seal
Observation: Ne pas faire de soudures à moins de 5 mm et ne pas plier les fils de sortie à moins de 2 mm de l'embase.
Bemerkung : Lötanschlüsse an den Drahtausführungen müssen mindestens 5 mm, etwaige Biegestellen mindestens 2 mm von den Glasausführungen entfernt sein.

Diameter of the tube leads
Diamètre des fils de sortie 0,432 mm
Durchmesser der Anschlussdrähte

Page 2; Seite 2

[1]) Variation of S during 1000 hours of operation max. 25 %
Variation de S pendant 1000 heures de fonctionnement 25 % au max.
Änderung von S während 1000 Betriebsstunden max. 25 %

Characteristics
Caractéristiques
Kenndaten

Column I: Setting of the tube and average measuring results of new tubes
II: Initial characteristic range values for equipment design
III: Characteristic range values after 1000 hours of operation
Colonne I: Valeurs pour le réglage du tube et les resultats moyens de mesures de tubes neufs
II: Gammes de valeurs caractéristiques initiales pour l'étude d'équipements
III: Gammes de valeurs caractéristiques pour l'étude d'équipements après un service de 1000 heures
Spalte I: Einstelldaten der Röhre und mittlere Messergebnisse neuer Röhren
II: Anfängliche charakteristische Wertbereiche für Gerätentwurf
III: Charakteristische Wertbereiche für Gerätentwurf nach einem Betrieb von 1000 Stunden

Capacitances without external shield
Capacités sans blindage extérieur
Kapazitäten ohne äussere Abschirmung

		I	II			I	II
C_g	=	2,4	1,8-3,0 pF	$C_{g'}$	=	2,4	1,8-3,0 pF
C_a	=	0,28	0,20-0,36 pF	$C_{a'}$	=	0,32	0,22-0,42 pF
C_{ag}	=	1,5	1,2-1,8 pF	$C_{a'g'}$	=	1,5	1,2-1,8 pF
$C_{gg'}$	=		< 0,013 pF				
$C_{aa'}$	=		< 0,52 pF				

Typical characteristics
Caractéristiques types
Kenndaten

		I	II	
V_a	=	100		V
R_k	=	150		Ω
I_a	=	6,5	4,5-8,5	mA
$\lvert I_a-I_{a'}\rvert$	=		< 1,6	mA
S	=	5,4	4,45-6,35	mA/V[1])
μ	=	35	30-40	
R_i	=	6,5		kΩ

Cut-off voltage
Tension de blocage
Sperrspannung

		I	II	
V_a	=	100		V
V_g	=	-6,5		V
I_a	=		< 100	μA

[1]) See page 1; voir page 1; siehe Seite 1

Characteristics (continued)
Caractéristiques (suite)
Kenndaten (Fortsetzung)

Grid current
Courant de grille
Gitterstrom

	I	II	III	
V_a	= 150			V
R_k	= 300			Ω
R_g	= 1			MΩ
$-I_g$	=	< 0,3	< 1,0	µA

Heater current
Courant de chauffage
Heizstrom

	I	II	III	
V_f	= 6,3			V
I_f	= 300	280-320	276-328	mA

Heater-to-cathode insulation
Isolement entre cathode et filament
Isolierung zwischen Katode und Heizfaden

	I	II	III	
V_f	= 6,3			V
V_{kf}	= 100			V
I_{kf}	=	< 5	< 10	µA

Insulation between any two electrodes (except heater to cathode.
Isolement entre deux électrodes quelconques (Sauf cathode-filament)
Isolierung zwischen zwei willkürlichen Elektroden (ausser Katode-Heizfaden)

	I	II	III	
V_f	= 6,3			V
V	= 100			V
r_{isol}	=	> 100	> 50	MΩ

Vibrational noise output
Tension de bruit de sortie due aux vibrations
Vibrations-Störausgangsspannung

		I	II	
V_{b_a}	=	100		V
R_a	=	10		kΩ
R_k	=	150		Ω
C_k	=	1000		µF
Vibration frequency Fréquence de la vibration Vibrationsfrequenz	=	40		c/s
Vibrational acceleration Accélération par la vibration Vibrationsbeschleunigung	=	15 g		
V_o	=		< 35 mV_{eff}	

Shock resistance: about 500 g [1])

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 [1])

Vibrational forces for a period of 32 hours at a frequency of 25 c/s in each of 3 positions of the tube. V_f = 6.3 V

Résistance aux chocs: environ 500 g [1])

Des forces comme appliquées 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 du tube

Résistance aux vibrations: 2,5 g [1])

Des forces de vibration pendant une période de 32 heures à une fréquence de 25 Hz dans chacune de trois positions du tube. V_f = 6,3 V

Stossfestigkeit: etwa 500 g [1])

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 [1])

Vibrationskräfte während einer Periode von 32 Stunden bei einer Frequenz von 25 Hz in jeder von 3 Stellungen der Röhre. V_f = 6,3 V

[1]) 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

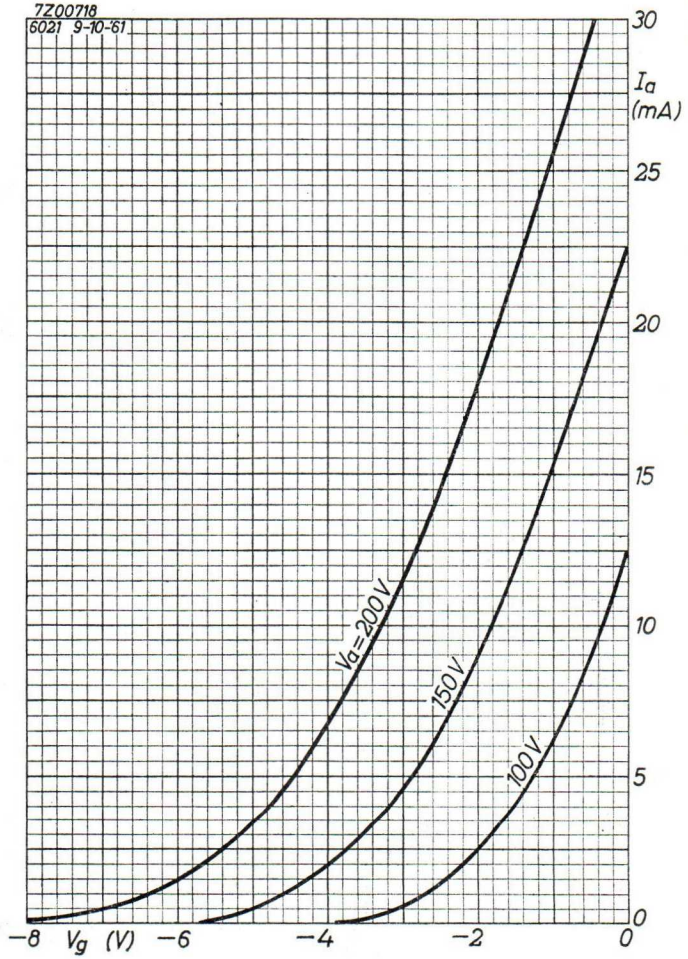
HEATER SWITCHING. The tube can withstand min. 2000 cycles of heater switching under the following conditions:
ESSAI CYCLIQUE DU FILAMENT. Le tube peut résister à 2000 cycles de commutation du filament au min. sous les conditions suivantes:
HEIZFADEN-UMSCHALTUNG. Die Röhre kann mindestens 2000 Schaltzyklen vertragen unter folgenden Bedingungen:

V_f = 7,0 V
V_{kf} = 140 V_{eff}
$V_a = V_g$ = 0 V

Limiting values (each section; absolute limits)
Caractéristiques limites (chaque section; limites absolues)
Grenzdaten (jede Triode; absolute Grenzwerte)

V_{a_o}	= max. 330 V
V_a	= max. 165 V
W_a	= max. 0,7 W
I_a	= max. 22 mA
$-V_g$	= max. 55 V
I_g	= max. 5,5 mA
R_g	= max. 1,1 MΩ
$V_{kf_=}$	= max. 200 V
V_{kf_p}	= max. 200 V
V_f	= max. 6,6 V = min. 6,0 V
t_{bulb}	= max. 220 °C
Altitude Höhe	= max. 18 km

SQ PHILIPS 6021



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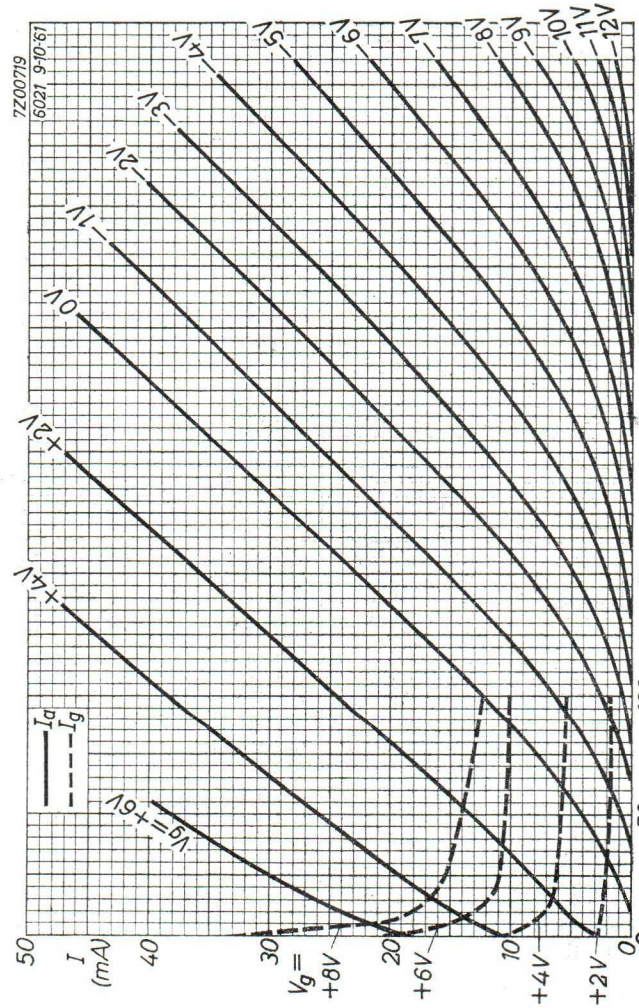

7Z00719
6021 9-10-61
Ia
Ig
Vg=+6V
+14V
+12V
+10V
+8V
+6V
+4V
+2V
0V
-1V
-2V
-3V
-4V
-5V
-6V
-7V
-8V
-9V
-10V
-11V
-12V
I (mA)
50
40
30
20
10
0
Vg = +8V
+6V
+4V
+2V
0
50
100
150
200
250
300
350
Va (V)

B

LOW-MU DOUBLE TRIODE with separate cathodes intended for use as a series regulator tube in D.C. power supplies, for servo applications or as a booster triode

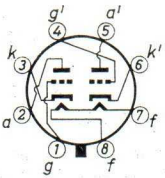
DOUBLE TRIODE à coefficient d'amplification bas avec cathodes séparées, destinée à l'utilisation comme tube régulateur série dans dispositifs d'alimentation C.C., pour applications de servo-réglage ou comme triode survolteuse

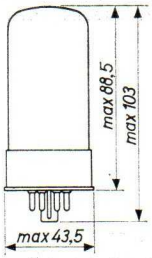
DOPPELTRIODE mit niedrigem Verstärkungsfaktor und getrennten Katoden bestimmt zur Verwendung als Serien-Regelröhre in Gleichstromspeisevorrichtungen, für Servoanwendungen oder als Zeilenschaltertriode

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

$V_f = 6{,}3$ V
$I_f = 2{,}5 \pm 0{,}24$ A

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: Octal 8-p

Capacitances
Capacités
Kapazitäten

C_{ag}	= 8,6 pF	$C_{a'g'}$	= 8,6 pF
C_a	= 2,5 pF	$C_{a'}$	= 2,5 pF
C_g	= 5,5 pF	$C_{g'}$	= 5,5 pF
C_{kf}	= 7 pF	$C_{k'f}$	= 7 pF

$C_{aa'} = 2{,}2$ pF

$C_{gg'} = 0{,}5$ pF

Typical characteristics (each section)
Caractéristiques types (chaque système)
Kenndaten (jedes System) [1]

V_{ba}	=	-	135	V
V_a	=	100	-	V
I_a	=	100	125	mA
R_k	=	300	250	Ω
S	=	6,5	7	mA/V
μ	=	2	2	
R_i	=	300	280	Ω

Characteristic range values for equipment design (For measuring purposes only; measuring time max. 1 sec)
Gamme des valeurs caractéristiques pour l'étude d'équipements (Pour buts de mesure seulement; temps de mesure max. 1 sec)
Charakteristischer Wertbereich für Geräteentwurf (Nur für Messzwecke; Messzeit max. 1 Sek)

V_f	=	6,3 V
V_{ba}	=	135 V
R_k	=	250 Ω
I_a	=	125 ± 25 mA
S	=	7 ±1,2 mA/V
μ	=	2 ±0,6
$-I_g(R_g = 1\ M\Omega)$	=	4 μA [2]

Limiting values (absolute limits, each section)
Caractéristiques limites (limites absolues, chaque système)
Grenzdaten (Absolutwerte, jedes System)

V_{ao}	= max.	550 V
V_a	= max.	250 V
V_a invp	= max.	3 kV [3]
I_k	= max.	125 mA
$-V_{gp}$	= max.	2,3 kV [3]
W_a	= max.	13 W
V_{kfp}	= max.	300 V
R_g	= max.	1,0 MΩ [4][6]
R_g	= max.	0,1 MΩ [5][6]
t_{bulb}	= max.	260 °C

[1] See page 3; voir page 3; siehe Seite 3
[2][3][4][5][6] See page 4; voir page 4; siehe Seite 4

Shock and vibration [7])

The tube can withstand vibrations of 2.5 g and 25 c/s during 32 hours and is proof against impact accelerations of 450 g (measured with the N.R.L. impact machine for electronic devices, lifting the hammer over an angle of 30°)

Output voltage caused by low-frequency vibrations:

V_o = max. 200 mV r.m.s.

Measured with both sections in parallel at V_f = 6.3 V, V_{ba} = 135 V, V_g = -7 V, R_a = 2 kΩ and vibrational accelerations of 2.5 g at 25 c/s

Chocs et vibrations [7])

Le tube peut resister à des vibrations de 2,5 g et de 25 Hz pendant 32 heures et à une accélération par choc de 450 g (Mesurée avec la machine N.R.L.à impact pour des dispositifs électroniques, en soulevant le marteau d'un angle de 30°

Tension de sortie par suite de vibrations à basse fréquence:

V_o = max. 200 mVeff

Mesurée avec les deux systemes en parallele à V_f = 6,3 V, V_{ba} = 135 V, V_g = -7 V, R_a = 2 kΩ et des accélérations de vibration de 2,5 g à 25 Hz

Stösse und Schwingungen [7])

Die Röhre kann Schwingungen von 2,5 g bei 25 Hz während 32 Stunden aushalten und eine Stossbeschleunigung von 450 g vertragen (gemessen mit der N.R.L. Stossmaschine für elektronische Geräte, wobei der Hammer über einen Winkel von 30° gehoben wird)

Ausgangsspannung infolge Schwingungen niedriger Frequenz:

V_o = max. 200 mVeff

Gemessen mit den beiden Systemen parallelgeschaltet bei V_f = 6,3 V, V_{ba} = 135 V, V_g = -7 V, R_a = 2 kΩ und Schwingungsbeschleunigungen von 2,5 g bei 25 Hz

---

[1]) These values represent the setting of an average tube at the absolute limits of I_a and W_a
Ces valeurs représentent l'ajustage d'un tube moyen aux limites absolues de I_a et W_a
Diese Werte stellen die Einstellung einer mittleren Röhre dar bei den absoluten Grenzen von I_a und W_a

[7]) 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

[2]) The grids of both sections connected in parallel
Les grilles des deux systèmes reliées en parallèle
Die Gitter der beiden Systeme parallelgeschaltet

[3]) In booster scanning service; max. pulse duration 15 % of a cycle with a maximum of 10 µsec
En service comme triode survolteuse; durée de l'impulsion max. 15 % d'un cycle avec un maximum de 10 µsec
Bei Verwendung als Zeilenschaltertriode; max. Impulsdauer 15 % einer Periode mit einem Maximum von 10 µSek

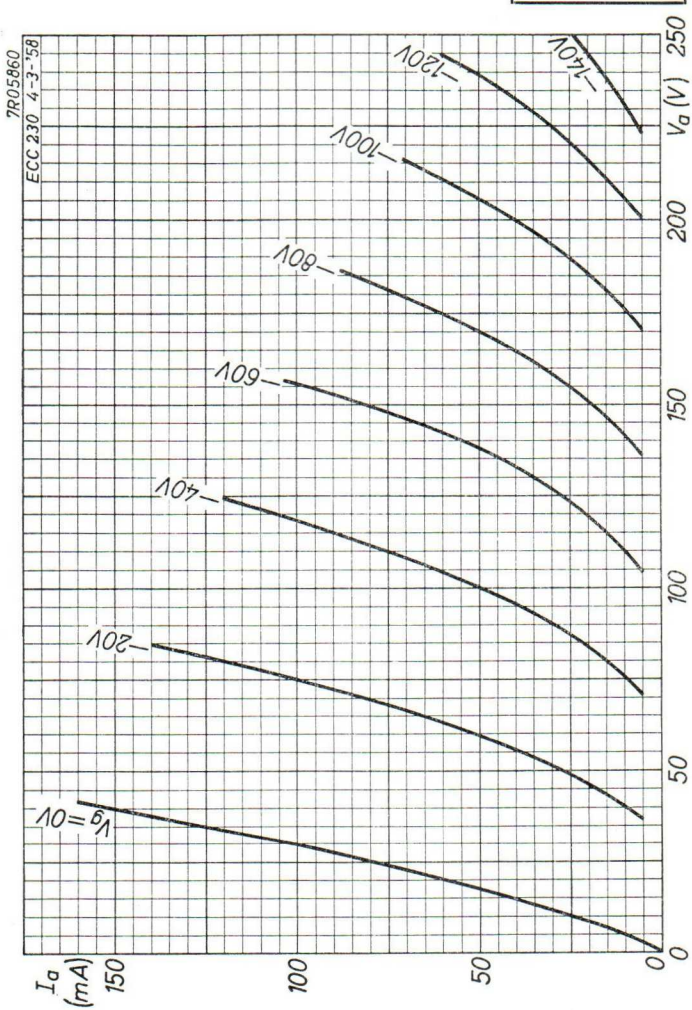
[4]) Automatic bias
Polarisation automatique
Automatische Gittervorspannung

[5]) Fixed bias
Polarisation fixe
Feste Gittervorspannung

[6]) Automatic bias is recommended. With fixed bias the anode circuit should contain a protective resistance to provide a minimum voltage drop of 15 V D.C. at the normal operating conditions. When two or more sections are used in parallel at dissipations approaching the rated maximum, separate anode and cathode resistors must be used to advance load sharing. In the case combined fixed and automatic bias is used, the cathode bias portion should have a minimum value of 7.5 V D.C. at the normal operating conditions
R_g in this case is max. 0.1 MΩ

Polarisation automatique est recommandée. A polarisation fixe le circuit de l'anode doit contenir une résistance de protection pour obtenir une chute de la tension continue de 15 V au moins aux conditions de fonctionnement normales. Quand deux ou plus de systèmes sont utilisés en parallèle à des dissipations s'approchantes du maximum indiqué il faut utiliser des résistances anodiques et cathodiques séparées pour avancer la division de la charge. Dans le cas où une combination de polarisation fixe et polarisation automatique est utilisée la partie de polarisation automatique doit avoir une valeur de 7,5 V de tension continue au moins aux conditions de fonctionnement normales
La valeur de R_g dans ce cas est de 0,1 MΩ au max.

Automatische Gittervorspannung wird empfohlen. Bei fester Gittervorspannung muss in den Anodenkreis ein Schutzwiderstand aufgenommen werden zur Erhaltung eines minimalen Gleichspannungsabfalles von 15 V bei den normalen Betriebsverhältnissen. Wenn 2 oder mehrere Systeme parallel verwendet werden bei etwa der maximal zulässigen Anodenverlustleistung soll man getrennte Anoden- und Katodenwiderstände benützen zur Förderung der Belastungsteilung. Für den Fall eine Kombination von fester und automatischer Gittervorspannung verwendet wird soll die automatische Vorspannung einen Mindestwert von 7,5 V Gleichspannung haben bei den normalen Betriebsverhältnissen
R_g in diesem Fall ist max. 0,1 MΩ


7R05860
ECC 230 4-3-'58
-140V
-120V
-100V
-80V
-60V
-40V
-20V
Vg=0V
Va (V)
250
200
150
100
50
0
Ia (mA)
150
100
50
0

2.2.1960

A

SPECIAL QUALITY DOUBLE TRIODE for use as R.F. amplifier in grounded grid circuits, as frequency changer below approximately 300 Mc/s in mobile and industrial equipment with intermittent operation, or for on-off control applications where operation under cut-off conditions is required
Shock and vibration proof execution

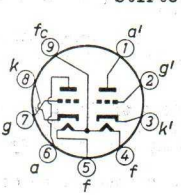
DOUBLE TRIODE A HAUTE SECURITE pour utilisation en amplificatrice H.F. en montages à grille à la masse, en changeuse de fréquence à des fréquences au-dessous d'environ 300 MHz en équipement mobile ou industriel en service intermittent, ou pour des applications de commande marche-arrêt où un fonctionnement dans les conditions de cut-off est requis
Exécution résistante aux chocs et vibrations

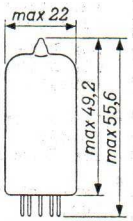
ZUVERLÄSSIGE DOPPELTRIODE zur Verwendung als HF-Verstärker in Gitterbasisschaltungen, als Mischröhre bei Frequenzen unterhalb etwa 300 MHz in mobilen und industriellen Anlagen mit aussetzendem Betrieb, oder für Ein-Aus- Schaltungen wo Betrieb der Röhre in gesperrten Zustand erfordert ist.
Stoss- und Erschütterungsfeste Ausführung

Heating : indirect by A.C. or D.C.; parallel or series supply [1])
Chauffage: indirect par C.A. ou C.C.; alimentation parallèle ou série [1])
Heizung : indirekt durch Wechsel- oder Gleichstrom;Parallel oder Serienspeisung

V_f	= 6,3 V [2])	V_f	= 12,6 V [2])
I_f	= 300 mA	I_f	= 150 mA [3])
Pins Broches Stifte	9-(4+5)	Pins Broches Stifte	4-5

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

[1]) In case of series supply a current-limiting device must be inserted in the heater circuit for limiting the current when switching on
En cas d'alimentation en série il faut utiliser un limiteur de courant dans la chaîne des filaments pour limiter le courant près de la mise en circuit
Bei Serienspeisung muss ein Strombegrenzer im Heizkreis verwendet werden, damit der Heizstrom beim Einschalten begrenzt wird

[2])[3]) See page 2; voir page 2; siehe Seite 2

Capacitances; capacités, Kapazitäten

		Without external shield Sans blindage extérieur Ohne äussere Abschirmung			With external shield Avec blindage extérieur Mit äusserer Abschirmung
Cag	= 1,6 ± 0,3 pF		Cag	= 1,6 pF[4]	
Cg	= 2,5 ± 0,5 pF		Cg	= 2,5 pF[4]	
Ca	=0,45 ±0,25 pF		Ca	= 1,2 pF[4]	
Ckf	= 2,8 ± 0,7 pF		Ckf	= 2,8 pF[4]	
Ca'g'	= 1,6 ± 0,3 pF		Ca'g'	= 1,6 pF[4]	
Cg'	= 2,5 ± 0,5 pF		Cg'	= 2,5 pF[4]	
Ca'	= 0,38±0,22 pF		Ca'	= 1,3 pF[4]	
Ck'f	= 2,8 ± 0,7 pF		Ck'f	= 2,8 pF[4]	
Caa'	= 0,24±0,09 pF				
Ck(g+f)	= 5,0 pF		Ck(g+f)	= 5,0 pF[5]	
Ca(g+f)	= 1,9 pF		Ca(g+f)	= 2,7 pF[5]	
Cak	= 0,2 pF		Cak	= 0,18 pF[5]	
Ck'(g'+f)	= 5,0 pF		Ck'(g'+f)	= 5,0 pF[5]	
Ca'(g'+f)	= 1,8 pF		Ca'(g'+f)	= 2,7 pF[5]	
Ca'k'	= 0,24 pF		Ca'k'	= 0,2 pF[5]	

[2] In order to obtain a better tube life, the maximum variation of Vf should be less than ± 10 % (absolute limits)

Afin d'obtenir une durée de vie meilleure du tube la variation maximum de Vf sera moins de ± 10% (limites absolues)

Zur Erhaltung einer besseren Lebensdauer der Röhre soll die maximale Schwankung von Vf weniger als ± 10 % betragen (absolute Werte)

[3] The maximum deviation of If at Vf = 12,6 V is ± 12 mA
La déviation maximum de If à Vf = 12,6 V est de ± 12 mA
Die Höchstabweichung von If bei Vf = 12,6 V ist ± 12 mA

[4] External screening connected to cathode of section under test
Blindage extérieur connecté à la cathode de la section mesurée
Äussere Abschirmung verbunden mit der Katode der gemessenen Triode

[5] External screening connected to grid of section under test
Blindage extérieur connecté à la grille de la section mesurée
Äussere Abschirmung verbunden mit dem Gitter der gemessenen Triode

Shock resistance : about 600 g +)
Forces as applied by the NRL impact machine for electronic devices caused by 5 blows of the hammer, lifted over an angle of 42° in each of four different positions
Vibration resistance: 2.5 g +)
Vibrational forces for a period of 32 hours at a frequency of 25 c/s in each of the 3 positions

Résistance aux chocs: environ 600 g +)
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 42° dans chacune de quatre positions différentes
Résistance aux vibrations: 2,5 g +)
Des forces de vibration pendant une période de 32 heures à une fréquence de 25 Hz dans chacune des trois positions

Stossfestigkeit: etwa 600 g +)
Stossbeschleunigungen gemäss NRL-Stossmaschine für elektronische Geräte, verursacht durch 5 Schläge des Hammers, der in jeder der vier verschiedenen Positionen über einen Winkel von 42° gehoben wird
Vibrationsfestigkeit: 2,5 g +)
Vibrationskräfte während einer Periode von 32 Stunden bei einer Frequenz von 25 Hz in jeder der 3 Stellungen

Heater switching. The tube can withstand min. 2000 cycles of heater switching under the following conditions:
Commutation du filament. Le tube peut résister à 2000 cycles de commutation du filament au minimum dans les conditions suivantes:
Umschaltung des Heizfadens. Die Röhre kann mindestens 2000 Schaltzyklen aushalten unter folgenden Bedingungen:

+)	V_f	= 7,5 V
	V_{kf} (f pos.; k neg.)	= 135 V⎓
	V_a	= 0 V
	V_g	= 0 V

One switching cycle means that the heater is switched on during one minute and switched off during one minute
Un cycle de commutation veut dire que le filament est mis en circuit pendant une minute et mis hors circuit pendant une minute
Ein Schaltzyklus heisst dass der Heizfaden während einer Minute eingeschaltet und während einer Minute ausgeschaltet ist.

+) 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

Typical characteristics (each triode)
Caractéristiques types (chaque triode)
Kenndaten (jede Triode)

V_a	=	100	250 V
R_k	=	270	200 Ω
I_a	=	3,3	$10\ ^{+4}_{-3}$ mA
S	=	4,0	5,5 ±1 mA/V
R_i	=	14,3	10,9 kΩ
μ	=	57	60±10
$-I_g$	=		max. 0,7 μA
$-V_g$ (I_a = 10 μA)	=	5	12 V
I_a ($-V_g$ = 20 V, R_a = 0,1 MΩ)	=		max. 100 μA
$I_a - I_a'$	=		max. 3,2 mA
$I_a' - I_a$	=		max. 3,2 mA

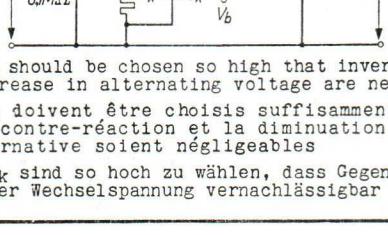
Cathode-heater insulation
Isolement filament-cathode
Katoden-Heizfadenisolation

(V_{kf} = 100 V)
(V_f = 12,6 V)

I_{kf} = max. 10 μA

Insulation / Isolement / Isolation
g-k (k pos.) V = 100 V⎓ R = min. 100 MΩ
a-k (k pos.) V = 300 V⎓ R = min. 100 MΩ

Operating characteristics as A.F. amplifier
Caractéristiques d'utilisation en amplificatrice B.F.
Betriebsdaten als NF-Verstärker



C_1, C_2 and C_k should be chosen so high that inverse feedback and decrease in alternating voltage are negligible

C_1, C_2 et C_k doivent être choisis suffisamment élévés pour que la contre-réaction et la diminuation dans la tension alternative soient négligeables

C_1, C_2 und C_k sind so hoch zu wählen, dass Gegenkopplung und Abfall der Wechselspannung vernachlässigbar sind

A. Voltage source resistance = 200 Ω approx.
Résistance de la source de la tension environ 200 Ω
Widerstand der Spannungsquelle etwa 200 Ω

R_a (MΩ)	R_g [1] (MΩ)	V_b = 90 V			V_b = 180 V			V_b = 300 V		
		R_k(Ω)	V_o [2]	$\frac{V_o}{V_i}$ [3]	R_k(Ω)	V_o [2]	$\frac{V_o}{V_i}$ [3]	R_k(Ω)	V_o [2]	$\frac{V_o}{V_i}$ [3]
0,10	0,10	1600	5,3	26	1100	12	31	1000	22	32
0,10	0,24	1800	7,8	29	1400	17	33	1200	30	33
0,24	0,24	3800	7,2	28	2800	16	32	3300	28	34
0,24	0,51	4200	9,4	30	3300	20	33	2800	35	33
0,51	0,51	8000	8,3	28	5600	18	31	4900	31	33
0,51	1,0	9600	10	29	6700	23	32	6000	38	33

B. Voltage source resistance = 100 kΩ approx.
Résistance de la source de la tension environ 100 kΩ
Widerstand der Spannungsquelle etwa 100 kΩ

R_a (MΩ)	R_g [1] (MΩ)	V_b = 90 V			V_b = 180 V			V_b = 300 V		
		R_k(Ω)	V_o [2]	$\frac{V_o}{V_i}$ [3]	R_k(Ω)	V_o [2]	$\frac{V_o}{V_i}$ [3]	R_k(Ω)	V_o [2]	$\frac{V_o}{V_i}$ [3]
0,10	0,10	2000	9,9	25	1200	17	31	900	35	33
0,10	0,24	2400	13	27	1400	28	33	1200	47	33
0,24	0,24	4700	12	27	2900	25	32	2300	42	34
0,24	0,51	5300	15	28	3600	31	33	2900	52	34
0,51	0,51	9300	13	27	6000	27	31	5000	45	33
0,51	1,0	11000	16	28	7100	33	32	6400	55	34

[1] Grid leak of following tube
Résistance de fuite du tube suivant
Gitterableitwiderstand der folgenden Röhre

[2] Max. V_o at d_{tot} is approx 5%
Valeur maximum de V_o à d_{tot} est environ 5%
Maximalwert von V_o bei d_{tot} ist etwa 5%

[3] V_o = 2 V_{eff}

Limiting values (absolute limits; each triode)
Caractéristiques limites (limites absolues; chaque triode)
Grenzdaten (absolute Werte; jede Triode)

V_{ao}	= max.	600 V
V_a	= max.	330 V
W_a	= max.	2,8 W
$-V_g$	= max.	55 V
I_g	= max.	250 µA
R_g	= max.	1 MΩ[1])
R_g	= max.	0,25 MΩ[2])
I_k	= max.	18 mA
V_{kf}	= max.	100 V
R_{kf}	= max.	20 kΩ
t_{bulb}	= max.	180 °C[3])

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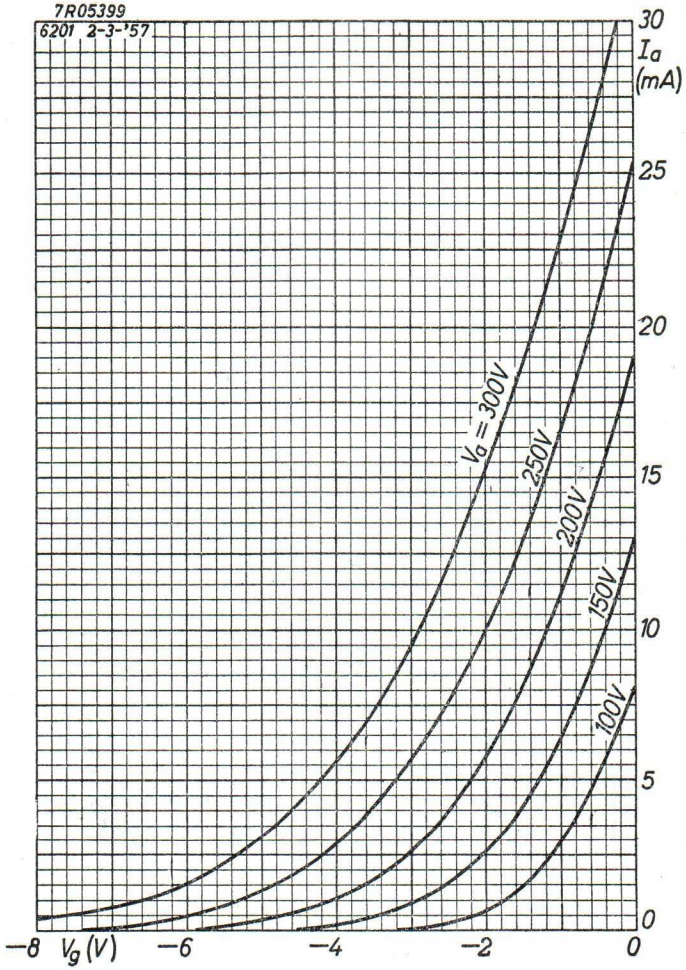
[1]) With automatic grid bias
Avec polarisation automatique
Mit automatischer Gittervorspannung

[2]) With fixed grid bias
Avec polarisation fixe
Mit fester Gittervorspannung

[3]) Tube life and reliability of performance will be enhanced by operation at lower temperatures

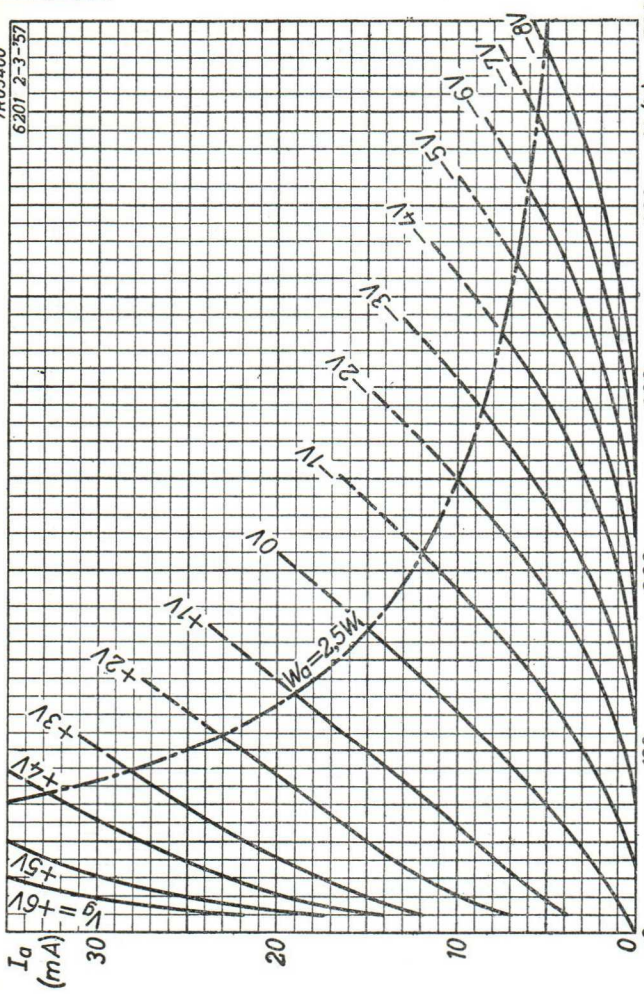
La durée de vie et la sécurité de fonctionnement seront augmentées par opération à des temperatures plus basses

Lebensdauer und Betriebssicherheit werden durch Betrieb bei niedrigeren Temperaturen verbessert

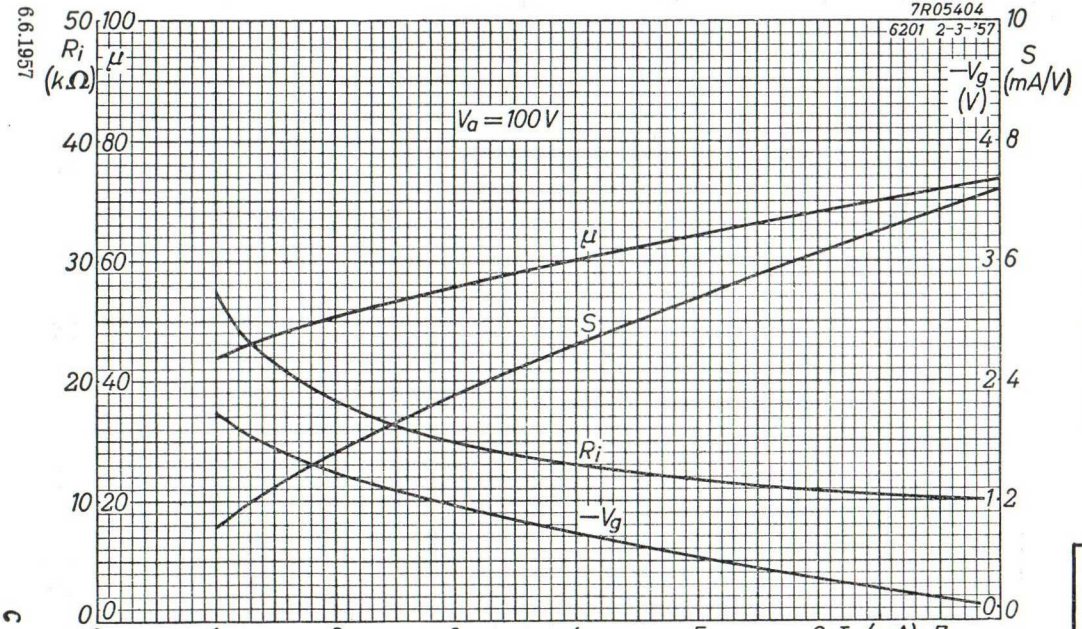

7R05399
6201 2-3-'57
30
Ia
(mA)
25
20
15
10
5
0
Va = 300V
250V
200V
150V
100V
−8 Vg (V)
−6
−4
−2
0

6.6.1957

A

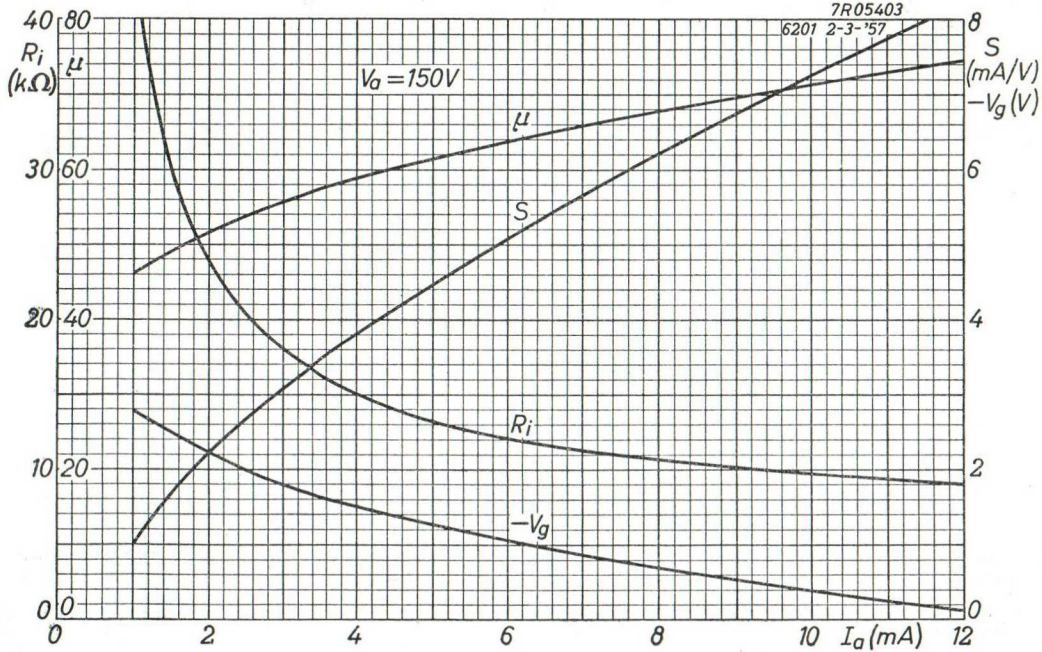

7R05400
6201 2-3-'57
Va (V)
500
400
300
200
100
0
Ia (mA)
30
20
10
0
Wa=2,5W
+8V
+7V
+6V
+5V
+4V
+3V
+2V
+1V
0
-1V
-2V
-3V
-4V
-5V
-6V
Vg = +6V
+5V
+4V
+3V
+2V
+1V
0
-1V
-2V
-3V
-4V
-5V
-6V
-7V
-8V

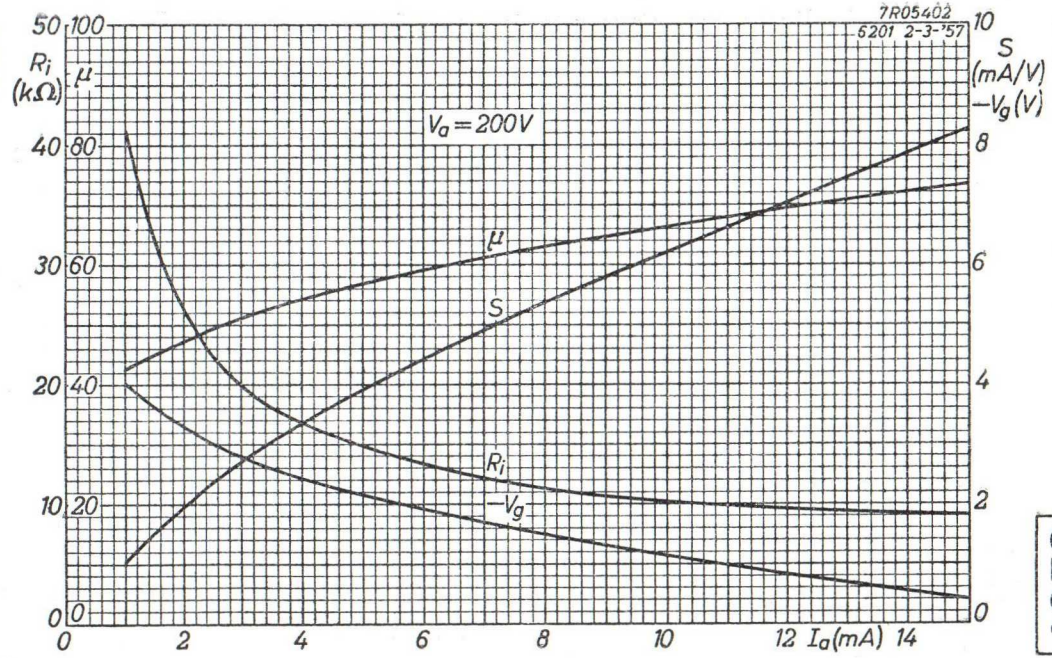
B

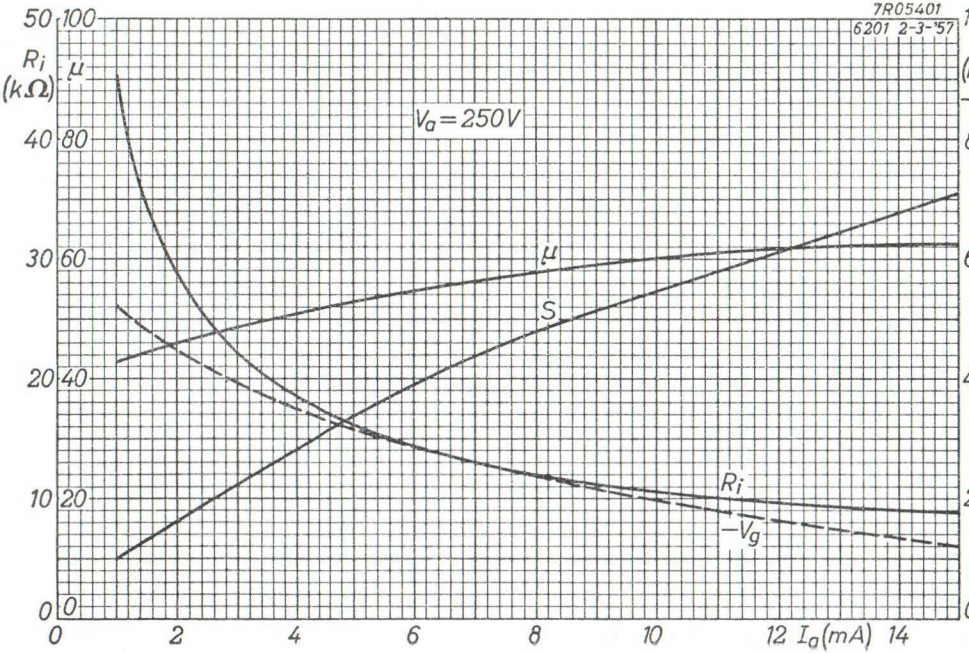


SQ PHILIPS 6201

c


7R05403
6201 2-3-'57
$V_a = 150V$
μ
S
R_i
$-V_g$
R_i (kΩ)
μ
S (mA/V)
$-V_g$ (V)
I_a (mA)
0
2
4
6
8
10
12
20
40
60
80
30


7R05402
6201 2-3-'57
$V_a = 200V$
R_i ($k\Omega$)
μ
S (mA/V)
$-V_g$ (V)
I_a (mA)
0
2
4
6
8
10
12
14
20
40
60
80
100



6201

PHILIPS

SQ

F

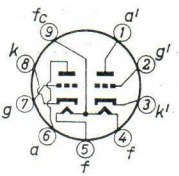
SPECIAL QUALITY DOUBLE TRIODE with separate cathodes for use in computer circuits
DOUBLE TRIODE À HAUTE SÉCURITÉ pour utilisation dans des circuits de comptage
ZUVERLÄSSIGE DOPPELTRIODE zur Verwendung in Rechenmaschinen

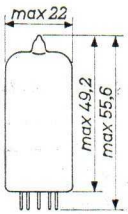
The 6211 will maintain its emission capabilities after long periods of operation under cut-off conditions but is not intended to be used in circuits critical as to hum, microphony or noise
Le tube 6211 conservera son pouvoir d'émission après de longues périodes de fonctionnement dans la condition de cut-off mais il n'est pas étudié pour les circuits critiques quant à l'effet microphonique, le bruit ou le ronflement.
Diese Röhre behält ihre Emissionsfähigkeit auch nach langen Betriebsperioden in gesperrtem Zustand bei; sie ist aber nicht geeignet für Schaltungen die kritisch in Bezug auf Mikrophonie, Rauschen oder Brumm sind.

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 V	12,6 V
I_f	= 300 mA	150 mA
Pins Broches Stifte	9-(4+5)	4-5

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Preferred mounting position: Vertical with base up or down
Horizontal with pins 2 and 8 in a horizontal plane
Montage préféré : Vertical avec le culot en haut ou en bas. Horizontal avec les broches 2 et 8 dans le même plan horizontal
Empfohlener Einbau: Senkrecht mit Sockel oben oder unten
Waagerecht mit den Stiften 2 und 8 in einer waagerechten Ebene.

Characteristics (each triode)
Caractéristiques (chaque triode)
Kenndaten (jede Triode)

Column I: Setting of the triode and typical (average) measuring results of new tubes
II: Characteristic range values for equipment design
III: Data indicating the endpoint of life
Colonne I: Valeurs pour le réglage de la triode et les résultats moyens de mesures de tubes neufs
II: Gamme de valeurs caractéristiques pour l'étude d'équipements
III: Valeurs déterminant la fin de durée de vie
Spalte I: Einstelldaten der Triode und mittlere Messergebnisse neuer Röhren
II: Charakteristischer Wertbereich für Gerätentwurf
III: Werte die das Ende der Lebensdauer bestimmen

Capacitances; capacités; Kapazitäten

	I	II		I	II
C_g =	2,6	2,1- 3,1 pF	$C_{g'}$ =	2,6	2,1- 3,1 pF
C_a =	0,4	0,25-0,55 pF	$C_{a'}$ =	0,35	0,23-0,47 pF
C_{ag} =	2,5	2,0- 3,0 pF	$C_{a'g'}$ =	2,5	2,0- 3,0 pF
C_{kf} =	2,8	pF	$C_{k'f}$ =	2,8	pF
$C_{aa'}$ =	0,9	< 1,1 pF	$C_{gg'}$ =		< 0,06 pF

Heater current; courant de chauffage; Heizstrom

	I	II	III
V_f	6,3		V
I_f =	300	285-315	285-315 mA

Typical characteristics; caractéristiques types; Kenndaten

	I	II	III		I	II	III
V_a =	100		V	V_a =	150		V
R_k =	470		Ω	V_g =	-10		V
I_a =	4,6	3,6-5,6	mA	I_a =		<100	100 µA
S =	3,6	2,7-4,5	1,6 mA/V				
R_i =	7,8		kΩ	V_a =	100		V
µ =	28			V_g =	-2		V
				R_g =	100		kΩ
				$-I_g$ =		<0,2	1 µA

Characteristics (each triode; continued)
Caractéristiques (chaque triode; suite)
Kenndaten (jede Triode; Fortsetzung)

		I	II	III	
V_a	=	85			V
V_{bg}	=	85			V
R_g	=	425			kΩ
I_a	=	16	12-20	7,2	mA
Insulation; isolement; Isolation					
V_{kf} (k pos.)	=	180			V
R [1]	=	1			MΩ
I_{kf}	=		< 15	30	µA
V [2]	=	200			V
R_{isol} [2]	=		> 100	20	MΩ

Life expectancy : 5000 hours under the following life-test conditions:
Durée prévue : 5000 heures sous les conditions d'essai de durée suivantes:
Erwartete Lebensdauer: 5 000 Stunden unter folgenden Bedingungen einer Lebensdauerprobe:

V_f	= 6,3 V	R_a	= 4,3 kΩ
V_{ba}	= 150 V	R_g	= 1,8 MΩ
V_{bg}	= 150 V	V_{kf} (k pos.)	= 180 V

The data indicating the endpoint of life are given in column III under the heading Characteristics
Les valeurs déterminant la fin de la durée sont données dans la colonne III des Caractéristiques
Die Werte die das Ende der Lebensdauer bestimmen sind angegeben worden in Spalte III der Kenndaten

[1]) Series resistance; résistance série; Serienwiderstand

[2]) Voltage and insulation resistance between two arbitrary electrodes. If measured with respect to the cathode, the latter should be positive.
Tension et résistance d'isolement entre deux électrodes quelconques. Si mesuré par rapport à la cathode, celle-ci doit être positive.
Spannung und Isolationswiderstand zwischen zwei willkürlichen Elektroden. Wenn in Bezug auf die Katode gemessen wird, soll diese positiv sein.

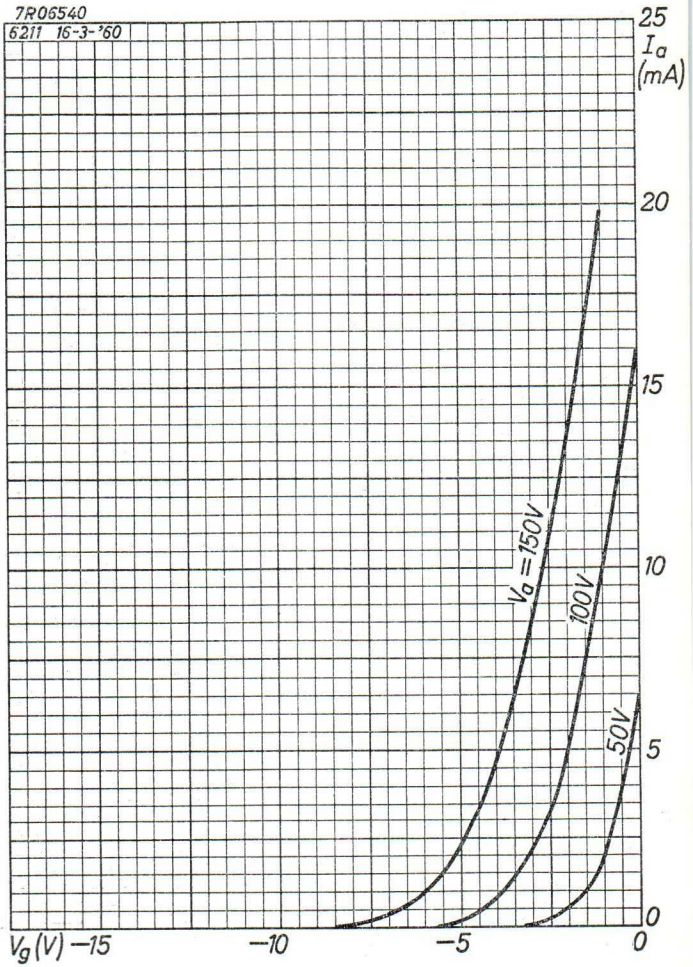
Limiting values (each triode; absolute limits)
Caractéristiques limites (chaque triode; limites absolues)
Grenzdaten (jede Triode; absolute Grenzwerte)

V_f	=	6,3 V ± 5 % = 12,6 V ± 5 %
V_{ao}	= max.	600 V
V_a	= max.	200 V
W_a	= max.	1,5 W
$-V_g$	= max.	100 V
$-V_{gp}$	= max.	200 V [1]
$+V_g$	= max.	1 V
I_g	= max.	2 mA
I_{gp}	= max.	50 mA [1]
I_k	= max.	14 mA
I_{kp}	= max.	75 mA [1]
V_{kf} (k pos.)	= max.	180 V
V_{kf} (k neg.)	= max.	90 V
V_{kfp}(k neg.)	= max.	180 V
t_{bulb}	= max.	120 °C

Max. circuit values
Valeurs max. des éléments de montage
Max. Werte der Schaltungsteile

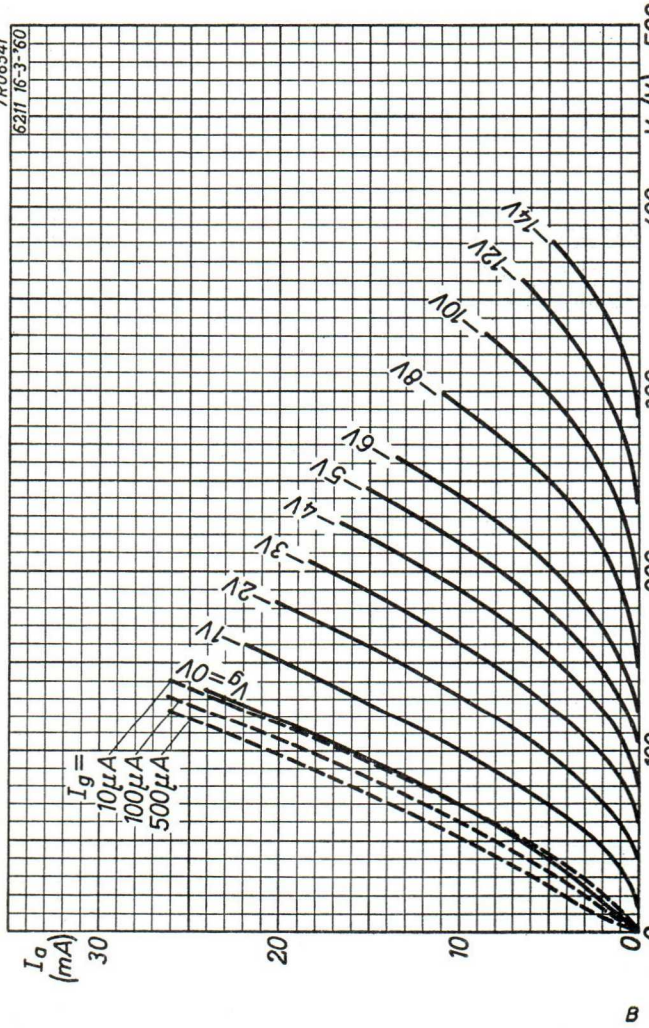
R_g	fixed bias polarisation fixe feste Gittervorspannung	= max. 0,2 MΩ
R_g	automatic bias polarisation automatique automatische Gittervorspannung	= max. 0,5 MΩ

[1]) T_{imp} = max. 10 µsec at δ = 1 %
T_{imp} = max. 10 µsec à δ = 1 %
T_{imp} = max. 10 µsec bei δ = 1 %


7R06540
6211 16-3-'60
25
I_a
(mA)
20
15
10
5
0
V_a = 150V
100V
50V
V_g (V) −15
−10
−5
0

2.2.1960

A


7R06541
6211 16-3-60
V_a (V)
500
400
300
200
100
0
I_a (mA)
30
20
10
0
I_g =
10µA
100µA
500µA
V_g = 0V
1V
2V
3V
4V
5V
6V
8V
10V
12V
14V
B

SQ PHILIPS 6463

SPECIAL QUALITY SHOCK AND VIBRATION RESISTANT, LONG LIFE DOUBLE TRIODE with separate cathodes for use in computer circuits

DOUBLE TRIODE A HAUTE SECURITE, RESISTANTE AUX CHOCS ET VIBRATIONS ET DE LONGUE DUREE, avec cathodes séparées pour utilisation dans circuits de comptage

ZUVERLÄSSIGE STOSS- UND VIBRATIONSFESTE DOPPELTRIODE MIT LANGER LEBENSDAUER und getrennten Katoden zur Verwendung in Rechenmaschinen

The 6463 will maintain its emission capabilities after long periods of operation under cut-off conditions but is not intended to be used in circuits critical as to hum, microphony or noise

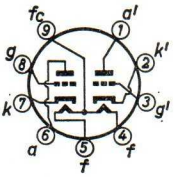
Le tube 6463 conservera son pouvoir d'émission après de longues périodes de fonctionnement dans la condition de cut-off mais il n'est pas destiné aux circuits critiques au regard de l'effet microphonique, de bruit ou de ronflement

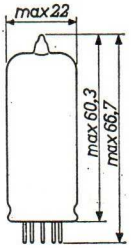
Diese Röhre behält ihre Emissionsfähigkeit auch nach langen Betriebsperioden in gesperrtem Zustand bei; sie ist aber nicht geeignet für Schaltungen die kritisch in Bezug auf Brumm, Mikrophonie oder Rauschen sind

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	12,6	V
I_f	=	600	300	mA
Pins Broches Stifte		9-(4+5)	4-5	

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Characteristics (each triode)
Caractéristiques (chaque triode)
Kenndaten (jede Triode)

Column I: Setting of the triode and typical (average) measuring results of new tubes
II: Characteristic range values for equipment design
III: Data indicating the endpoint of life

Colonne I: Valeurs pour le réglage de la triode et les résultats moyens de mesures de tubes neufs
II: Gamme de valeurs caractéristiques pour l'étude d'équipements
III: Valeurs déterminant la fin de durée de vie

Spalte I: Einstelldaten der Triode und mittlere Messergebnisse
II: Charakteristischer Wertbereich für Gerätentwurf
III: Werte die das Ende der Lebensdauer bestimmen

		I	II				I	II	III	
	V_f	= 6,3		V	V_a	= 100			V	
	I_f	= 600	570-630	mA	I_g	= 200			µA	
					I_a	= 29	> 24		17 mA	
→	C_{ag}	= 5,2	4,6-5,8	pF						
→	C_a	= 0,6	0,4-0,8	pF	V_a	= 120			V	
	C_g	= 3,4	2,9-3,9	pF	V_g	= -2			V	
	C_{kf}	= 3,5		pF	I_a	= 21	14-28		10 mA	←
→	$C_{a'g'}$	= 5,4	4,8-6,0	pF						
→	$C_{a'}$	= 0,5	0,35-0,65	pF	V_a	= 200			V	
	$C_{g'}$	= 3,4	2,9-3,9	pF	V_g	= -15			V	
	$C_{k'f}$	= 3,5		pF	I_a	=	< 1		1 mA	
	$C_{gg'}$		< 0,025	pF						
	$C_{aa'}$	= 0,9	< 1,2	pF	V_a	= 120			V	
					V_g	= -2			V	
	V_{ba}	= 250		V	R_g	= 0,1			MΩ	
	R_k	= 620		Ω	$-I_g$	=	< 0,2		1 µA	←
	I_a	= 14,5		mA						
→	S	= 5,2	3,9-6,5	mA/V	V_{kf} [1]	= 200			V	
	µ	= 20			R [2]	= 1			MΩ	
					I_{kf}	=	< 15		20 µA	
					R_{isol} [3]	=	> 100		20 MΩ	

[1][2][3] See page 5; voir page 5; siehe Seite 5

Life expectancy: 10 000 hours under the following life-test conditions:
Durée prévue : 10 000 heures sous les conditions d'essai de durée suivantes:
Erwartete Lebensdauer: 10 000 Stunden unter folgenden Bedingungen einer Lebensdauerprobe:

V_f	= 6,3 V
V_{ba}	= 150 V
R_k	= 90 Ω
R_a	= 390 Ω
R_g	= 0,1 MΩ
V_{kf} (k neg.)	= 120 V [4]

The data indicating the endpoint of life are given in column III under the heading Characteristics
Les valeurs déterminant la fin de la durée sont données dans la colonne III des Caractéristiques
Die Werte die das Ende der Lebensdauer bestimmen sind angegeben worden in Spalte III der Kenndaten

Shock resistance: about 500 g [5]
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 [5]
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 [5]
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 [5]
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 [5]
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 [5]
Vibrationskräfte während einer Periode von 32 Stunden bei einer Frequenz von 25 Hz in jeder von 3 Stellungen der Röhre

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4) 5) See page 5; voir page 5; siehe Seite 5

Limiting values (each triode; absolute limits)
Caractéristiques limites (chaque triode; limites absolues)
Grenzdaten (jede Triode; absolute Grenzwerte)

V_{a_o}	=	max. 660	V
V_a	=	max. 330	V
V_{a_p}	=	max. 660	V [6]
W_a	=	max. 4,4	W
$W_a+W_{a'}$	=	max. 7,7	W
V_g	=	max. 1,5	V
V_{g_p}	=	max. 25	V [6]
$-V_g$	=	max. 85	V
$-V_{g_p}$	=	max. 350	V [6]
I_g	=	max. 5,5	mA
I_{g_p}	=	max. 110	mA [6]
I_k	=	max. 31	mA
I_{k_p}	=	max. 350	mA [6]
V_{kf} (k pos.)	=	max. 200	V
V_{kf} (k neg.)	=	max. 100	V
V_{kf_p}(k neg.)	=	max. 200	V
V_f	=	6,3 V ± 5 % 12,6 V ± 5 %	
tbulb	=	max. 180	°C [7]

Max. circuit values
Valeurs max. des éléments de montage
Max. Werte der Schaltungsteile

R_g	=	max. 1	MΩ [8]
R_g	=	max. 0,5	MΩ [9]

[6],[7],[8],[9]) See page 5; voir page 5; siehe Seite 5

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[1]) Cathode positive with respect to heater
Cathode positive au regard du filament
Katode positiv in Bezug auf den Heizfaden

[2]) Series resistor
Résistance série
Serienwiderstand

[3]) Insulation resistance between two arbitrary electrodes
Résistance d'isolement entre deux électrodes quelconques
Isolationswiderstand zwischen zwei willkürlichen Elektroden

[4]) This value should not be interpreted as a suitable operating condition
Cette valeur ne doit pas être interprétée comme une condition de fonctionnement convenable
Dieser Wert soll nicht als eine geeignete Betriebsbedingung aufgefasst werden

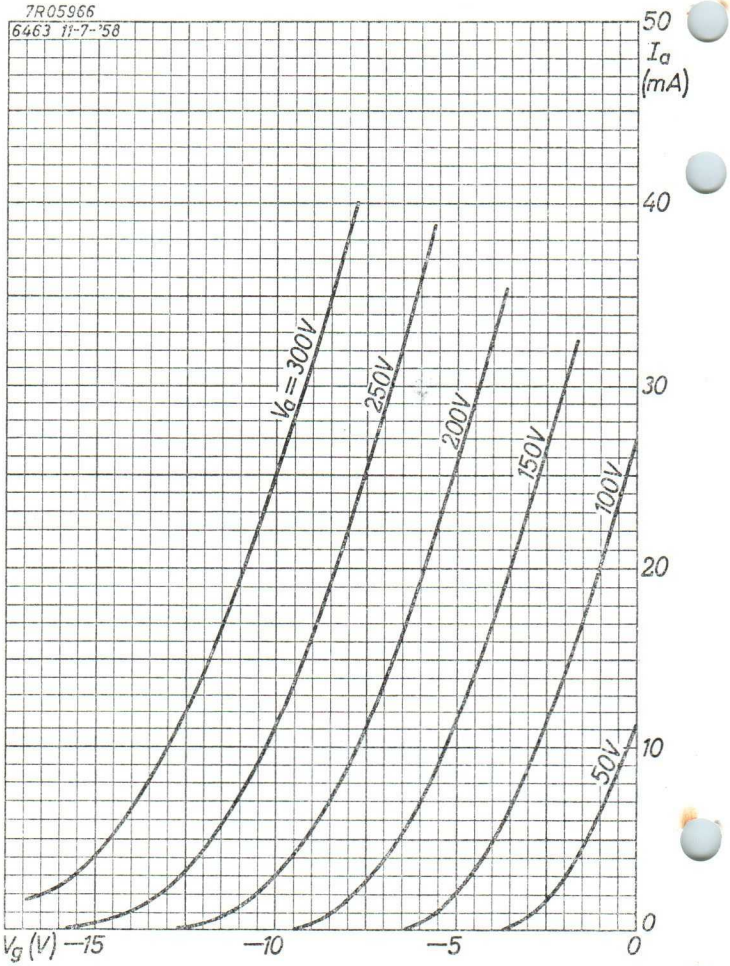
[5]) These test conditions are only given for evaluation of the ruggedness of the tube. They are by no means to be interpreted as suitable operating conditions
Ces conditions d'essai sont données seulement pour l'évaluation de la robustesse du tube. En aucune manière elles ne doivent être interprétées comme des conditions de fonctionnement normales
Diese Prüfbedingungen dienen lediglich zur Beurteilung der Robustheit der Röhre und sind keinesfalls als geeignete Betriebsbedingungen aufzufassen

[6]) With δ = 1 %, Timp = max. 10 µsec
Avec δ = 1 % Timp = max. 10 µsec
Mit δ = 1 % ist Timp = max. 10 µsec

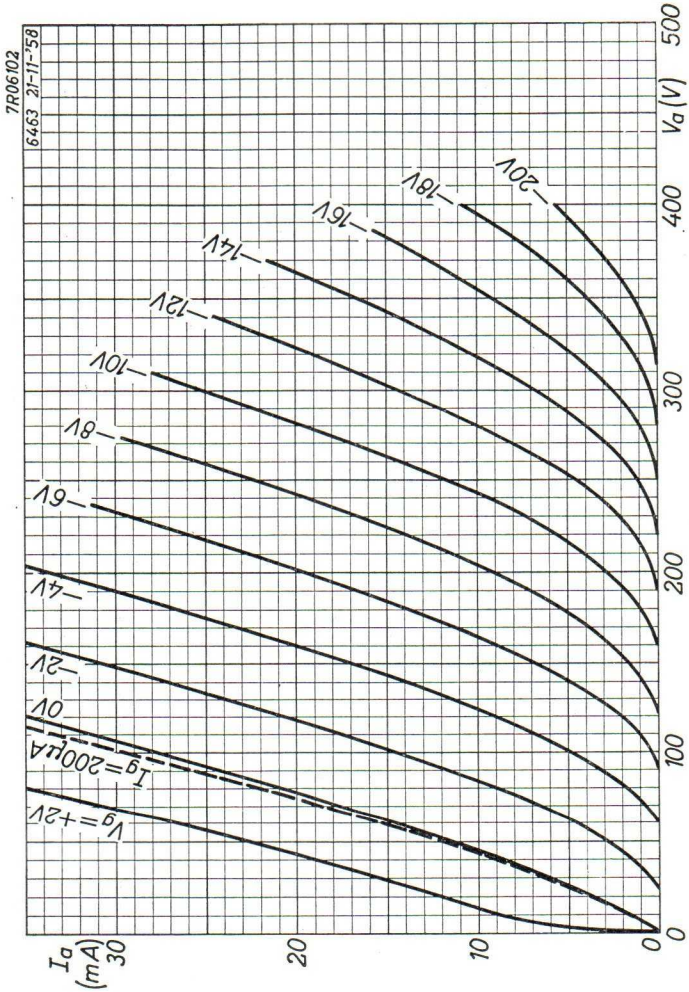
[7]) Tube life and reliability of performance will be enhanced by operation at lower temperatures
La durée de vie et la sécurité de fonctionnement seront augmentées par opération à des températures plus basses
Lebensdauer und Betriebssicherheit werden durch Betrieb bei niedrigeren Temperaturen verbessert

[8]) With automatic grid bias
Avec polarisation automatique
Mit automatischer Gittervorspannung

[9]) With fixed bias
Avec polarisation fixe
Mit fester Gittervorspannung

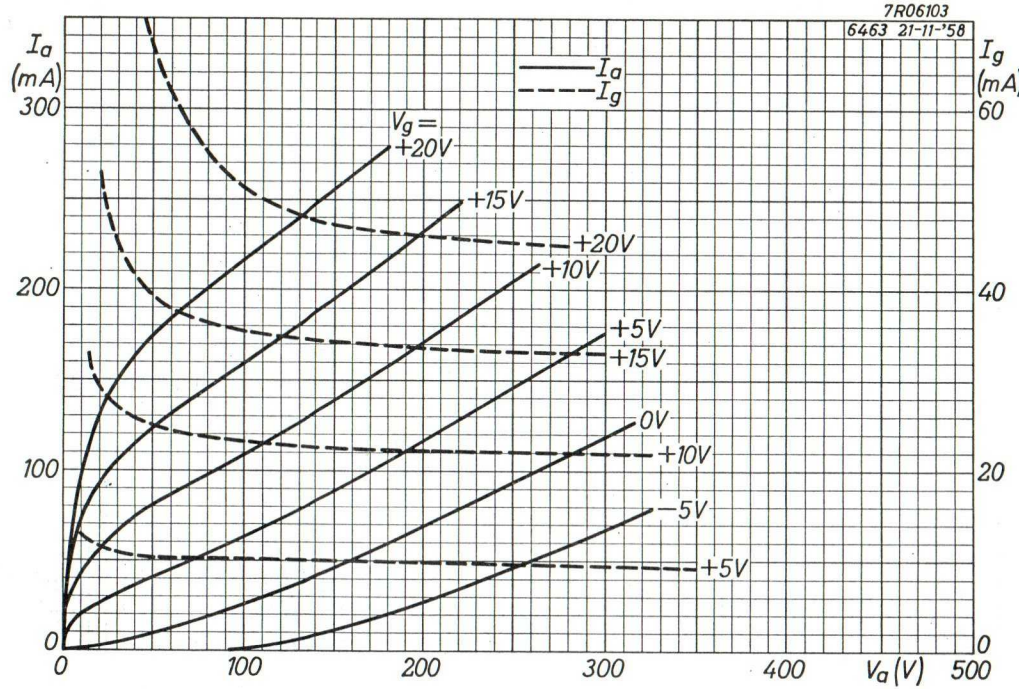

7R05966
6463 11-7-'58
50
I_a
(mA)
40
30
20
10
0
V_a=300V
250V
200V
150V
100V
50V
V_g (V) −15
−10
−5
0

A


7R06102
6463 27-11-58
Va (V)
500
400
300
200
100
0
Ia (mA)
30
20
10
0
20V
18V
16V
14V
12V
10V
8V
6V
4V
2V
0V
Ig=200µA
Vg=+2V

12.12.1958

B



6463

PHILIPS

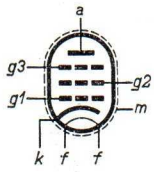
SQ

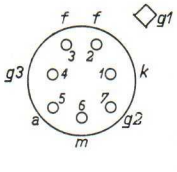
c

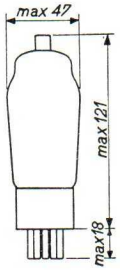
PENTODE for use in telephone equipment
PENTHODE pour utilisation en équipement téléphonique
PENTHODE zur Verwendung in Telephon-Anlagen

Heating : indirect by A.C. or D.C.; parallel supply
Chauffage: indirect par C.A. ou C.C.; Vf = 4 V
alimentation en parallèle If = 1,3 A
Heizung : indirekt durch Wechsel- oder Gleichstrom; Parallelspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Capacities
Capacités
Kapazitäten

Ca	=	7,5 pF
Cgl	=	9,8 pF
Cagl	<	0,012 pF
Cglf	<	0,2 pF

Typical characteristics
Caractéristiques typiques
Kenndaten

Va	=	200 V
Vg3	=	0 V
Vg2	=	200 V
Rk	=	265 Ω
Ia	=	8 mA
Ig2	=	1,5 mA
S	=	5 mA/V
μg2gl	=	48 -
Ri	=	1 MΩ
Req (H.F.)	= max.	2,5 kΩ
Req (L.F.;B.F.;N.F.)	= max.	10 kΩ

Operating conditions for use as pre-amplifier
Caractéristiques d'utilisation comme préamplificatrice
Betriebsdaten zur Verwendung als Vorverstärker

Va	= 200 V	Ig2	= 1,5 mA
Vg3	= 0 V	S	= 5 mA/V
Vg2	= 200 V	Ri	= 1 MΩ
Rk	= 265 Ω	$\frac{Vo}{Vi}$	= 4,5
Ra	= 20 kΩ		
Ia	= 8 mA	Rgl	= max. 1 MΩ

(with fixed grid bias)
Rgl (à polarisation fixe) = max. 0,5 MΩ
(bei fester Gittervorsp.)

Operating conditions for use as output valve
Caractéristiques d'utilisation comme tube de sortie
Betriebsdaten zur Verwendung als Endröhre

Va	= 200 V	Ig2	= 1,5 mA
Vg3	= 0 V	S	= 5 mA/V
Vg2	= 200 V	Ri	= 1 MΩ
Rk	= 265 Ω	Wo	= 0,1 W
Ra	= 30 kΩ	d_{tot}	< 5 %.
Ia	= 8 mA	Rgl	= max. 0,3 MΩ

(with fixed grid bias)
Rgl (à polarisation fixe) = max.0,15 MΩ
(bei fester Gittervorsp.)

Limiting values
Caractéristiques limites
Grenzdaten

Va_o	= max. 450 V
Va	= max. 220 V
Wa	= max. 1,8 W
$Vg2_o$	= max. 450 V
Vg2	= max. 220 V
Wg2	= max. 0,4 W
Ik	= max. 12 mA
Vgl (Igl = +0,3 µA)	= max.-1,3 V
Vfk	= max. 50 V
Rfk	= max. 20 kΩ

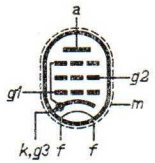
PHILIPS 18014

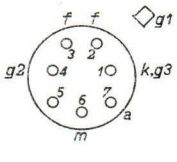
PENTODE for use in telephone equipment
PENTODE pour utilisation en équipement téléphonique
PENTODE zur Verwendung in Telephon-Anlagen

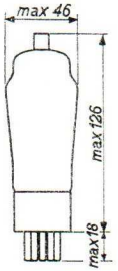
Heating : indirect by A.C. or D.C.; parallel supply
Chauffage: indirect par C.A. ou C.C.; alimentation en parallèle
Heizung : indirekt durch Wechsel- oder Gleichstrom; Parallelspeisung

Vf = 4 V
If = 1,6 A

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Capacities
Capacités
Kapazitäten

Ca	=	13 pF
Cg1	=	15 pF
Cag1	<	0,6 pF
Cg1f	<	2 pF

Typical characteristics
Caractéristiques typiques
Kenndaten

Va	=	200 V
Vg2	=	200 V
Rk	=	125 Ω
Ia	=	35 mA
Ig2	=	4,6 mA
S	=	8 mA/V
μg2g1	=	20 -
Ri	=	50 kΩ

Operating conditions for use as pre-amplifier
Caractéristiques d'utilisation comme préamplificatrice
Betriebsdaten zur Verwendung als Vorverstärker

Va = 200 V		S =	8 mA/V
Vg2 = 200 V		Ri =	50 kΩ
Rk = 125 Ω		$\frac{Vo}{Vi}$ =	4 M
Ra = 8 kΩ			
Ia = 35 mA		Rgl = max.	1 MΩ
Ig2 = 4,6 mA			
Rgl (with fixed grid bias) (à polarisation fixe) (bei fester Gittervorsp.) = max.			0,5 MΩ

Operating conditions for use as output valve
Caractéristiques d'utilisation comme tube de sortie
Betriebsdaten zur Verwendung als Endröhre

Va = 200 V		S =	8 mA/V
Vg2 = 200 V		Ri =	50 kΩ
Rk = 125 Ω		Wo =	0,8 W
Ra = 8 kΩ		d_{tot} <	3 %
Ia = 35 mA		Rgl = max.	0,3 MΩ
Ig2 = 4,6 mA			
Rgl (with fixed grid bias) (à polarisation fixe) (bei fester Gittervorsp.) = max.			0,15 MΩ

Limiting values
Caractéristiques limites
Grenzdaten

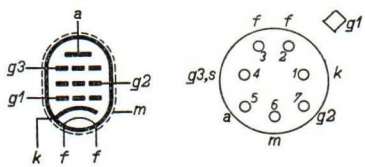
Va_o	= max. 450 V
Va	= max. 220 V
Wa	= max. 7 W
$Vg2_o$	= max. 450 V
Vg2	= max. 220 V
Wg2	= max. 1 W
Ik	= max. 50 mA
Vgl (Igl = +0,3 µA)	= max.-1,3 V
Vfk	= max. 50 V
Rfk	= max. 3 kΩ

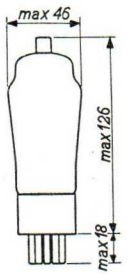
PHILIPS 18015

PENTODE for use in telephone equipment
PENTHODE pour utilisation en équipement téléphonique
PENTHODE zur Verwendung in Telephon-Anlagen

Heating: indirect by A.C. or D.C.; parallel supply
Chauffage: indirect par C.A. ou C.C.; alimentation en parallèle — Vf = 21 V, If = 0,285 A
Heizung: indirekt durch Wechsel- oder Gleichstrom; Parallelspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Capacities
Capacités
Kapazitäten

Ca	=	10,5	pF
Cg1	=	16	pF
Cag1	<	0,02	pF
Cg1f	<	0,1	pF

Typical characteristics
Caractéristiques typiques
Kenndaten

Va	=	125	V
Vg3	=	0	V
Vg2	=	125	V
Rk	=	200	Ω
Ia	=	8	mA
Ig2	=	2,5	mA
S	=	8,3	mA/V
μg2g1	=	42	-
Ri	=	350	kΩ
Req (H.F.)	= max.	1	kΩ
Req (L.F.;B.F.;N.F.)	= max.	10	kΩ

Operating conditions for use as pre-amplifier
Caractéristiques d'utilisation comme préamplificatrice
Betriebsdaten zur Verwendung als Vorverstärker

Va =	125 V	Ig2 =	1,3 mA
Vg3 =	0 V	S =	5,5 mA/V
Vg2 =	125 V	Ri =	550 kΩ
Rk =	440 Ω	$\frac{Vo}{Vi}$ =	4,35 N
Ra =	16 kΩ		
Ia =	4,5 mA	Rg1 =	max. 1 MΩ
Rg1 (with fixed grid bias) (à polarisation fixe) (bei fester Gittervorsp.) =	max. 0,5 MΩ		

Operating conditions for use as output valve
Caractéristiques d'utilisation comme tube de sortie
Betriebsdaten zur Verwendung als Endröhre

Va =	125 V	Ig2 =	2,5 mA
Vg3 =	0 V	S =	8,3 mA/V
Vg2 =	125 V	Ri =	350 kΩ
Rk =	200 Ω	Wo =	0,1 W
Ra =	30 kΩ	d_{tot} <	5 %
Ia =	8 mA	Rg1 =	max. 0,3 MΩ
Rg1 (with fixed grid bias) (à polarisation fixe) (bei fester Gittervorsp.) =	max.0,15 MΩ		

Limiting values
Caractéristiques limites
Grenzdaten

Va_o	= max. 300 V
Va	= max. 150 V
Wa	= max. 1,2 W
$Vg2_o$	= max. 300 V
Vg2	= max. 150 V
Wg2	= max. 0,4 W
Ik	= max. 13 mA
Vg1 (Ig1 = +0,3 µA)	= max.-1,3 V
Vfk	= max. 50 V
Rfk	= max. 20 kΩ

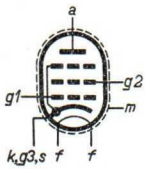
PHILIPS

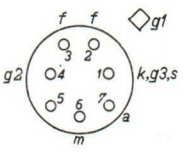
18016

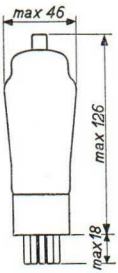
PENTODE for use in telephone equipment
PENTHODE pour utilisation en équipement téléphonique
PENTHODE zur Verwendung in Telephon-Anlagen

Heating : indirect by A.C. or D.C.; parallel supply
Chauffage: indirect par C.A. ou C.C.; alimentation en parallèle — Vf = 21 V, If = 0,335 A
Heizung : indirect durch Wechsel- oder Gleichstrom; Parallelspeisung

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Capacities
Capacités
Kapazitäten

Ca	=	15 pF
Cg1	=	14,5 pF
Cag1	<	0,25 pF
Cg1f	<	0,5 pF

Typical characteristics
Caractéristiques typiques
Kenndaten

Va	=	125 V
Vg2	=	125 V
Rk	=	115 Ω
Ia	=	48 mA
Ig2	=	9,5 mA
S	=	9 mA/V
μg2g1	=	9,5 -
Ri	=	16,5 kΩ

PHILIPS

Operating conditions for use as pre-amplifier
Caractéristiques d'utilisation comme préamplificatrice
Betriebsdaten zur Verwendung als Vorverstärker

Va = 125 V		S =	9 mA/V
Vg2 = 125 V		Ri =	16,5 kΩ
Rk = 115 Ω		$\frac{Vo}{Vi}$ =	3,15 N
Ra = 3,3 kΩ			
Ia = 48 mA		Rgl = max.	1 MΩ
Ig2 = 9,5 mA			
Rgl (with fixed grid bias / à polarisation fixe / bei fester Gittervorsp.) = max. 0,5 MΩ			

Operating conditions for use as output valve
Caractéristiques d'utilisation comme tube de sortie
Betriebsdaten zur Verwendung als Endröhre

Va = 125 V		S =	9 mA/V
Vg2 = 125 V		Ri =	16,5 kΩ
Rk = 115 Ω		Wo =	0,8 W
Ra = 3,3 kΩ		d_{tot} <	3 %
Ia = 48 mA		Rgl = max.	0,3 MΩ
Ig2 = 9,5 mA			
Rgl (with fixed grid bias / à polarisation fixe / bei fester Gittervorsp.) = max. 0,15 MΩ			

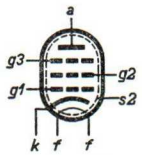
Limiting values
Caractéristiques limites
Grenzdaten

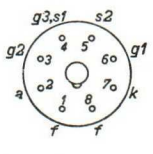
Va_o	= max. 300 V
Va	= max. 150 V
Wa	= max. 5,6 W
$Vg2_o$	= max. 300 V
Vg2	= max. 150 V
Wg2	= max. 1,2 W
Ik	= max. 70 mA
Vgl (Igi = +0,3 µA)	= max. -1,3 V
Vfk	= max. 50 V
Rfk	= max. 3 kΩ

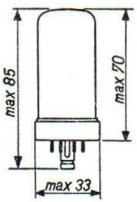
PENTODE for use in telephone equipment
PENTHODE pour utilisation en équipement téléphonique
PENTHODE zur Verwendung in Telephon-Anlagen

Heating:	indirect by A.C. or D.C.; series or parallel supply	
Chauffage:	indirect par C.A. ou C.C.; alimentation en série ou en parallèle	V_f = 18 V[1]) I_f = 0,2 A[1])
Heizung:	indirekt durch Wechsel- oder Gleichstrom; Serien- oder Parallelspeisung	

Dimensions in mm
Dimensions en mm
Abmessungen in mm







Base, culot, Sockel: Loctal

Capacitances
Capacités
Kapazitäten

C_a	=	7,5 ± 1,0	pF
C_{g1}	=	14,5 ± 1,0	pF
C_{ag1}	<	0,02	pF
C_{g1f}	<	0,02	pF
C_{kf}	=	4,5 ± 1,5	pF
C_{g1} (I_k = 25,3 mA)	=	18,5	pF

[1]) See page 2
Voir page 2
Siehe Seite 2

[1]) The maximum deviation of I_f at V_f = 18 V is ± 0.01 A
In case of parallel supply the maximum permissible variation of V_f is ± 5% (absolute limits)
In case of series supply the maximum permissible deviation of the heater current due to voltage fluctuations and tolerances in the parts is ± 1.5% (absolute limits)

La déviation de I_f à V_f = 18 V est de ± 0,01 A au max.
En cas d'alimentation en parallèle la variation maximum admissible de V_f est de ± 5% (limites absolues)
En cas d'alimentation en série la déviation maximum admissible du courant de chauffage par suite de fluctuations de la tension et de tolerances des pièces est de ± 1,5% (limites absolues)

Die Hochstabweichung von I_f bei V_f = 18 V ist ± 0,01 A.
Bei Parallelspeisung ist die erlaubte Schwankung von V_f max. ± 5% (absolute Grenzen)
Bei Serienspeisung ist die höchstzulassige Abweichung des Heizstromes infolge Spannun sschwankungen und Streuungen der Einzelteile ± 1,5% (absolute Grenzen)

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	210 V
V_{g3}	=	0 V
V_{g2}	=	210 V
R_k	=	120 Ω
I_a	=	20 ± 3,5 mA
I_{g2}	=	5,3 ± 1,5 mA
S	=	11 ± 2,0 mA/V
μ_{g2g1}	=	37
R_i	=	0,3 MΩ
R_i	= min.	0,2 MΩ
R_{eq} (H.F.)	= max.	1,2 kΩ
R_{eq} (A.F.;B.F.;N.F.)	= max.	12 kΩ

The end point of life is determined by:
La fin de la durée de vie est determinée par:
Das Ende der Lebensdauer wird bestimmt von:

I_a	= min.	13 mA
I_{g2}	= min.	3 mA
S	= min.	7,5 mA/V

Operating characteristics for use as pre-amplifier
Caractéristiques d'utilisation comme préamplificatrice
Betriebsdaten zur Verwendung als Vorverstärker

V_a	=	210 V
V_{g3}	=	0 V
V_{g2}	=	210 V
R_k	=	185 Ω
R_a	=	20 kΩ
I_a	=	15 mA
I_{g2}	=	4 mA
S	=	10 mA/V
R_1	=	0,4 MΩ
g	=	5,15 N

Operating characteristics for use as output valve
Caractéristiques d'utilisation comme tube de sortie
Betriebsdaten zur Verwendung als Endröhre

V_a	=	210	V
V_{g3}	=	0	V
V_{g2}	=	210	V
R_k	=	120	Ω
R_a	=	15	kΩ
I_a	=	20	mA
I_{g2}	=	5,3	mA
S	=	11	mA/V
R_i	=	0,3	MΩ
W_o	=	1,0	W
d_{tot}	=	5	%

Limiting values
Caractéristiques limites
Grenzdaten

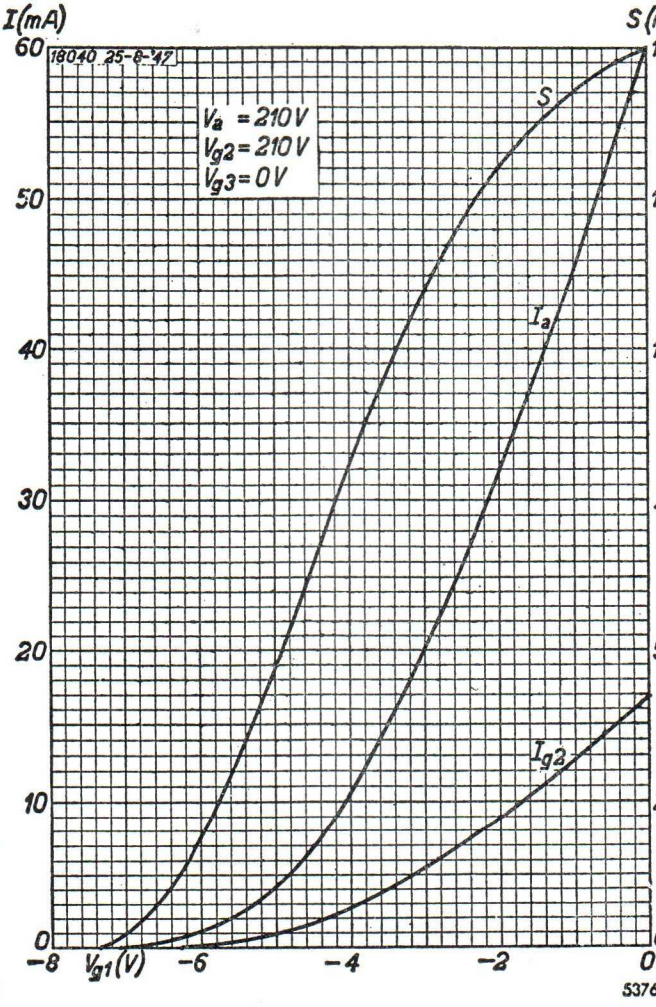
V_{ao}	= max.	500	V
V_a	= max.	250	V
W_a	= max.	4,5	W
V_{g2o}	= max.	400	V
V_{g2}	= max.	250	V
W_{g2}	= max.	1,2	W
I_k	= max.	30	mA
V_{g1} (I_{g1} = +0,3 µA)	= max.	-1,3	V
V_{kf}	= max.	50	V
R_{kf}	= max.	20	kΩ
R_{g1}	= max.	1	MΩ [1] [3]
R_{g1}	= max.	0,5	MΩ [1] [4]
R_{g1}	= max.	0,3	MΩ [2] [3]
R_{g1}	= max.	0,15	MΩ [2] [4]

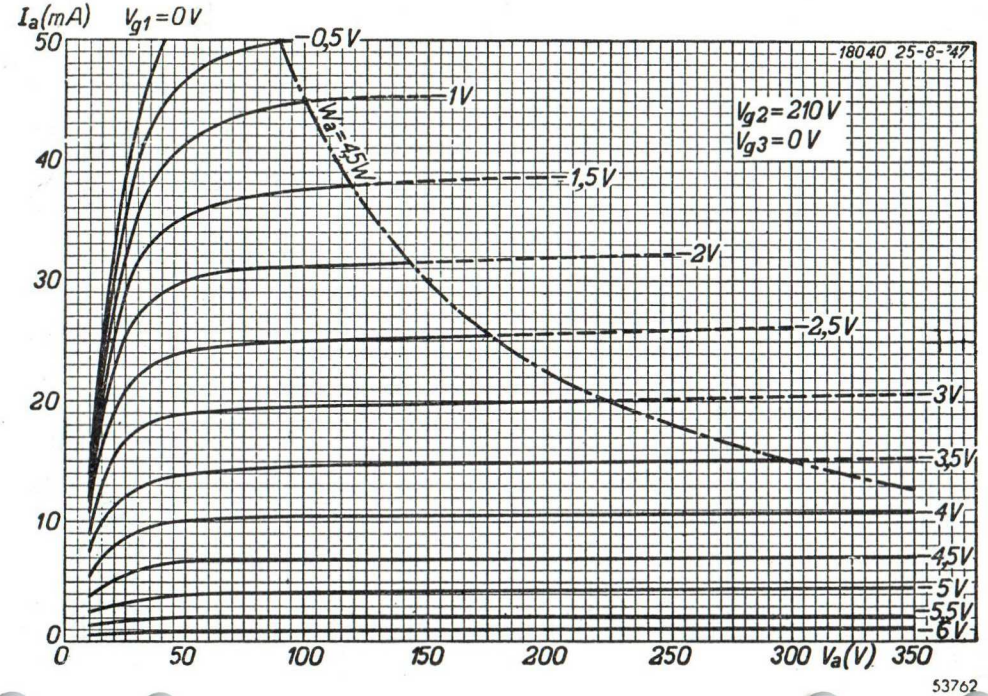
[1] For use as pre-amplifier
Pour utilisation en pré-amplificateur
Zur Verwendung als Vorverstärker

[2] For use as output tube
Pour utilisation comme tube de sortie
Zur Verwendung als Endröhre

[3] Automatic grid bias
Polarisation de grille automatique
Automatische Gittervorspannung

[4] Fixed grid bias
Polarisation de grille fixe
Feste Gittervorspannung.

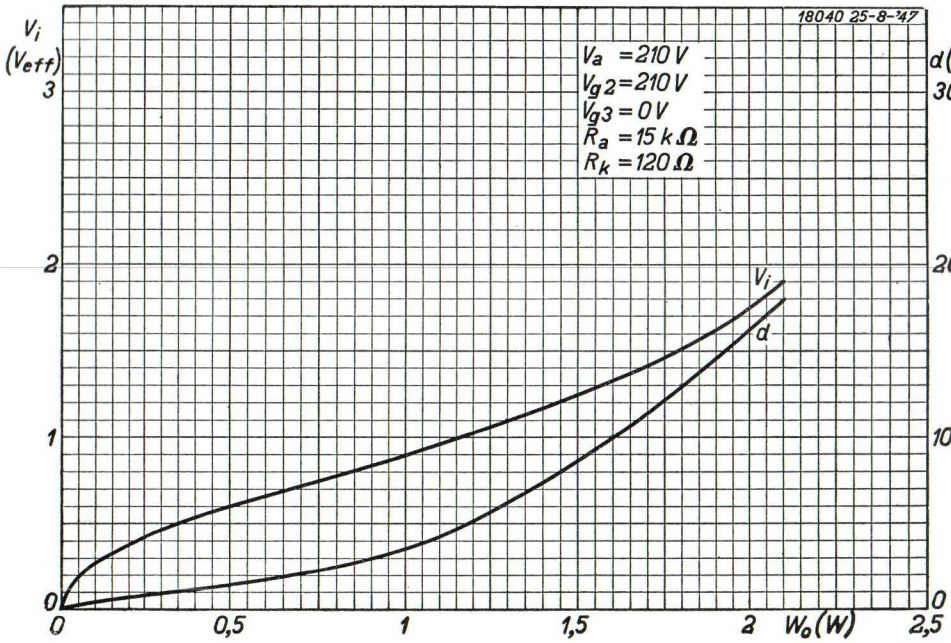

I(mA)
S(mA/V)
18040 25-8-47
V_a = 210V
V_{g2} = 210V
V_{g3} = 0V
S
I_a
I_{g2}
60
50
40
30
20
10
0
15
12,5
10
7,5
5
2,5
0
−8
V_{g1}(V)
−6
−4
−2
0
53763

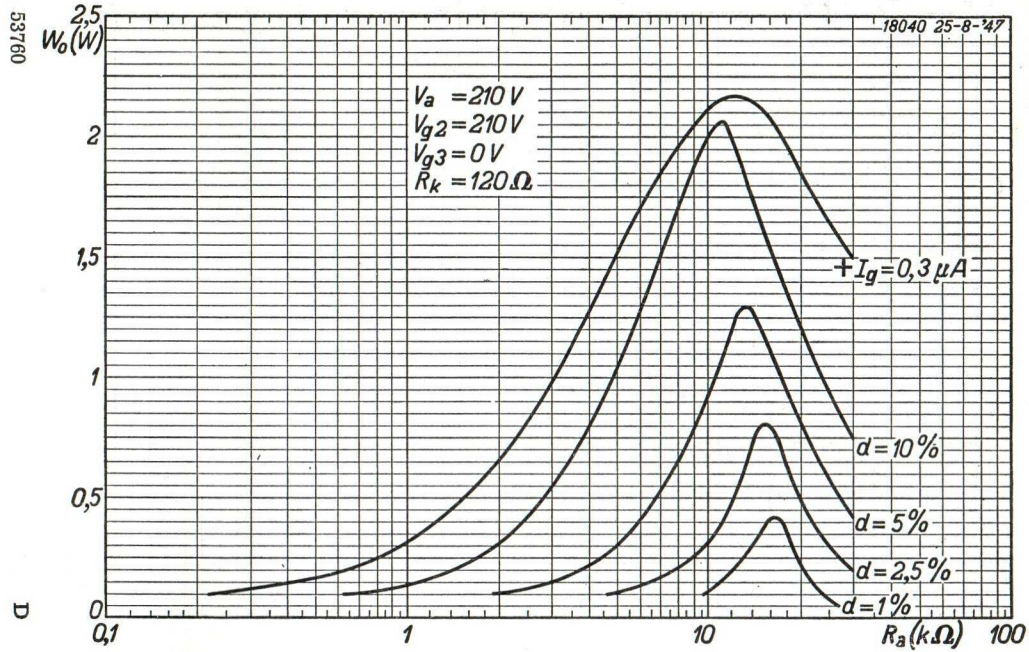


18040

PHILIPS SQ

B

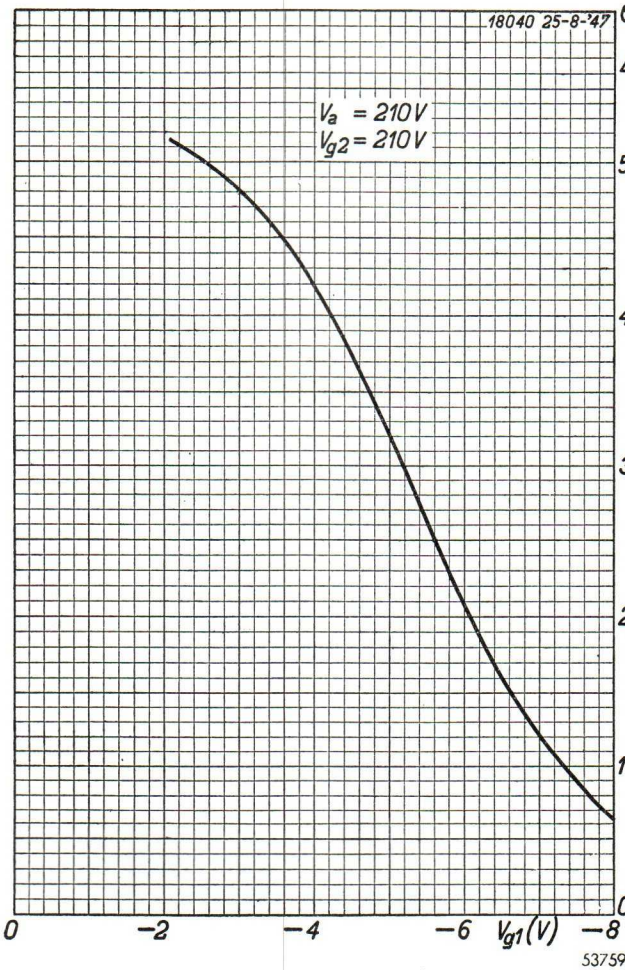

18040 25-8-'47
V_i (V_{eff})
d(%)
V_a = 210 V
V_{g2} = 210 V
V_{g3} = 0 V
R_a = 15 kΩ
R_k = 120 Ω
V_i
d
0
0,5
1
1,5
2
2,5
W_o (W)
53761



53760

D

PHILIPS SQ


18040 25-8-'47
V_a = 210V
V_{g2} = 210V
ΔC_i(pF)
6
5
4
3
2
1
0
0
−2
−4
−6
−8
V_{g1}(V)
53759

6.6.1957

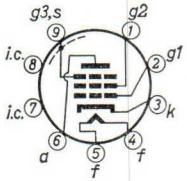
E

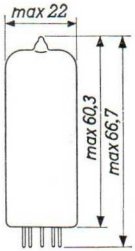
PENTODE for use in telephone equipment (life > 10 000 hours)
PENTHODE pour utilisation dans l'équipment téléphonique (durée > 10 000 heures)
PENTODE zur Verwendung in Telephonanlagen (Lebensdauer > 10 000 Stunden)

Heating : indirect by A.C. or D.C.; series or parallel supply
Chauffage: indirect par C.A. ou C.C.; alimentation-parallèle ou série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serien- oder Parallelspeisung

$\frac{V_f = 18\ V}{I_f = 0{,}1\ A}$ 1)

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: Noval

Capacitances
Capacités
Kapazitäten

C_a	=		3,5 pF
C_a	=	max.	4.1 pF
C_{g_1}	=		8.0 pF
C_{g_1}	=	max.	8.7 pF
C_{ag_1}	<		0,015 pF
C_{g_1f}	<		0,15 pF
C_{kf}	=		4 pF
C_{g_1} (I_k = 12,1 mA)	=		11,3 pF
C_{ra} 2)	<		0,025 pF
C_{rg_1} 2)	<		0,025 pF

1)2) See page 2
Voir page 2
Siehe Seite 2

[1]) The maximum deviation of I_f at V_f = 18 V is ± 0.005 A.
In order to obtain a useful tube life of 10 000 hours in the case of parallel supply, the maximum variation of V_f should be less than ± 5% (absolute limits).
In order to obtain a useful tube life of 10 000 hours in the case of series supply, the maximum variation of I_f due to voltage fluctuations and tolerances in the parts should be less than ± 1.5 % (absolute limits).

La déviation de I_f à V_f = 18 V est de ± 0,005 A aux max.
Afin d'obtenir une durée du tube de 10 000 heures en cas d'alimentation - parallèle la variation max. de V_f sera de moins de ± 5% (limites absolues)
Afin d'obtenir une durée du tube de 10 000 heures en cas d'alimentation- série la variation max. de I_f par suite de fluctuations de la tension et de tolérances des accessoires sera de moins de ± 1,5 % (limites absolues).

Die Höchstabweichung von I_f bei V_f = 18 V ist ± 0,005 A.
Zur Erhaltung einer nützlichen Lebensdauer der Röhre von 10 000 Stunden bei Parallelbetrieb soll die max. Schwankung von V_f weniger als ± 5% betragen (absolute Grenzen).
Zur Erhaltung einer nützlichen Lebensdauer der Röhre von 10 000 Stunden bei Serienbetrieb solldie max. Schwankung von I_f infolge Spannungsschwankungen und Streuungen der Einzelteile weniger als ± 1,5 % betragen (absolute Grenzen).

[2]) Radiation capacitance. Capacitance of the concerning electrode to a surrounding box with an inner diameter of 52 mm and a height of 98 mm, the other electrodes being earthed.

Capacité de rayonnement. Capacité de l'électrode concernante à l'égard d'une boîte entourante avec un diamètre intérieur de 52 mm et une hauteur de 98 mm. Les autres électrodes sont mis à la terre.

Strahlungskapazität. Kapazität zwischen der betreffenden Elektrode und einer Buchse um die Röhre mit einem inneren Durchmesser von 52 mm und einer Höhe von 98 mm. Die übrigen Elektroden der Röhre müssen geerdet sein.

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	210 V
V_{g3}	=	0 V
V_{g2}	=	120 V
R_k	=	165 Ω
I_a	=	10 ± 1,3 mA [1]
I_{g2}	=	2,1 ± 0,4 mA [1]
S	=	9 ± 1,2 mA/V [1]
R_i	=	0,5 MΩ
R_i	= min.	0,3 MΩ
→ μ_{g2g1}	=	38
R_{eq} (R.F.)	=	750 Ω
R_{eq} (R.F.)	= max.	1000 Ω
R_{eq} (f = 0 - 10 kc/s)	= max.	36 kΩ
$-I_{g_1}$ (R_{g_1} = 0,1 MΩ)	= max.	0,5 µA [1]
$-V_{g_1}$ (I_a = 0,5 mA)	= max.	5,25 V

Hum voltage
Tension de ronflement (R_{g_1}=0,5 MΩ) = max. 0,5 mV
Brummspannung

Insulation k-f (V_{kf}=100 V) = min. 5 MΩ
Isolation k-f

[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:

I_a	≦ 7 mA
I_{g_2}	≦ 1,25 mA
S	≦ 6,4 mA/V
$-I_{g_1}$ (R_{g_1} = 0,1 MΩ)	≧ 1,0 µA

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

V_a	=	120	210 V
V_{g3}	=	0	0 V
V_{bg2}	=	120	120 V
R_{g2}	=	5,6	5,6 kΩ
R_k	=	180	180 Ω
I_a	=	8,3	8,3 mA
I_{g2}	=	1,7	1,7 mA
S	=	8,2	8,2 mA/V
R_i	=	0,42	0,44 MΩ
$R_{a\sim}$	=	10	20 kΩ
$W_o(d_{tot} = 10\%)$	=	340	660 mW
$V_i(d_{tot} = 10\%)$	=	1,1	1,1 V_{eff}
$W_o(I_{g1} = +0,3\mu A)$	=	400	870 mW[1])
$V_i(W_o = 50$ mW)	=	0,35	0,25 V_{eff}

Limiting values (design centre values)
Caractéristiques limites (valeurs moyennes de développement)
Grenzdaten (mittlere Entwicklungsdaten)

V_{a_o}	= max. 550 V	I_k	= max. 16 mA
V_a	= max. 210 V	V_{g1} (I_{g1}=+0,3μA)	= max. -1,1 V
W_a	= max. 2,1 W	R_{g1}	= max. 1 MΩ[2])
V_{g2_o}	= max. 550 V	V_{kf}	= max. 100 V
V_{g2}	= max. 210 V	R_{kf}	= max. 20 kΩ
W_{g2}	= max. 0,35 W		

Bulb temperature
Température de l'ampoule = max. 170 °C
Kolbentemperatur

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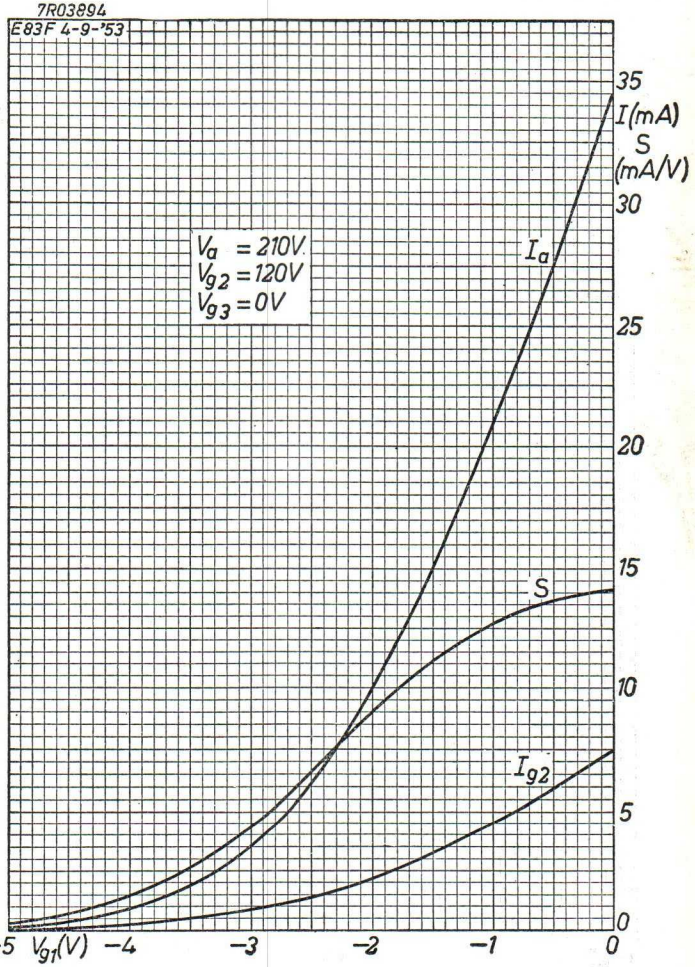
1) Measured with a control-grid series resistor of 0.33 MΩ
Mesuré avec une résistance série dans la grille de commande de 0,33 MΩ
Gemessen mit einem Steuergitterreihenwiderstand von 0,33 MΩ

2) Automatic grid bias
Polarisation de grille automatique
Automatische Gittervorspannung


7R03894
E83F 4-9-'53
V_a = 210V
V_{g2} = 120V
V_{g3} = 0V
I_a
S
I_{g2}
I(mA)
S
(mA/V)
35
30
25
20
15
10
5
0
−5 V_{g1}(V) −4 −3 −2 −1 0

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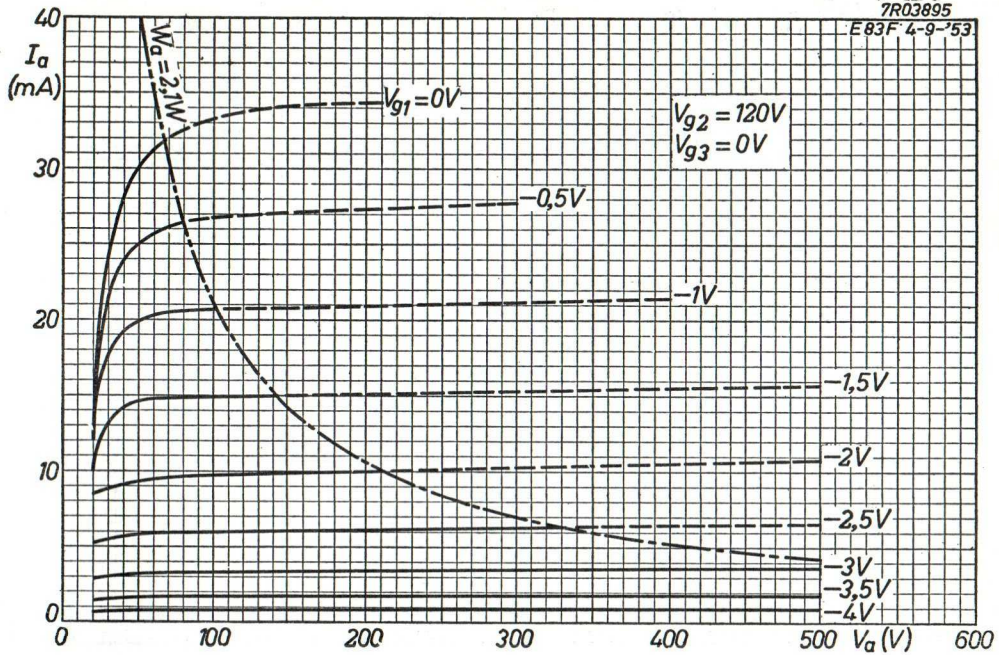
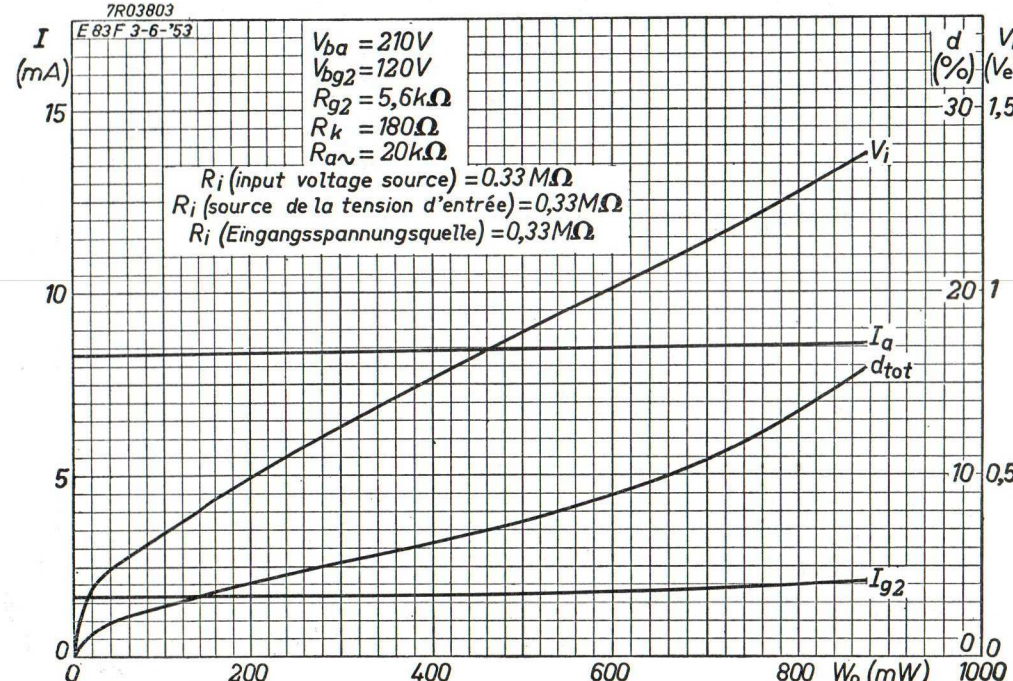
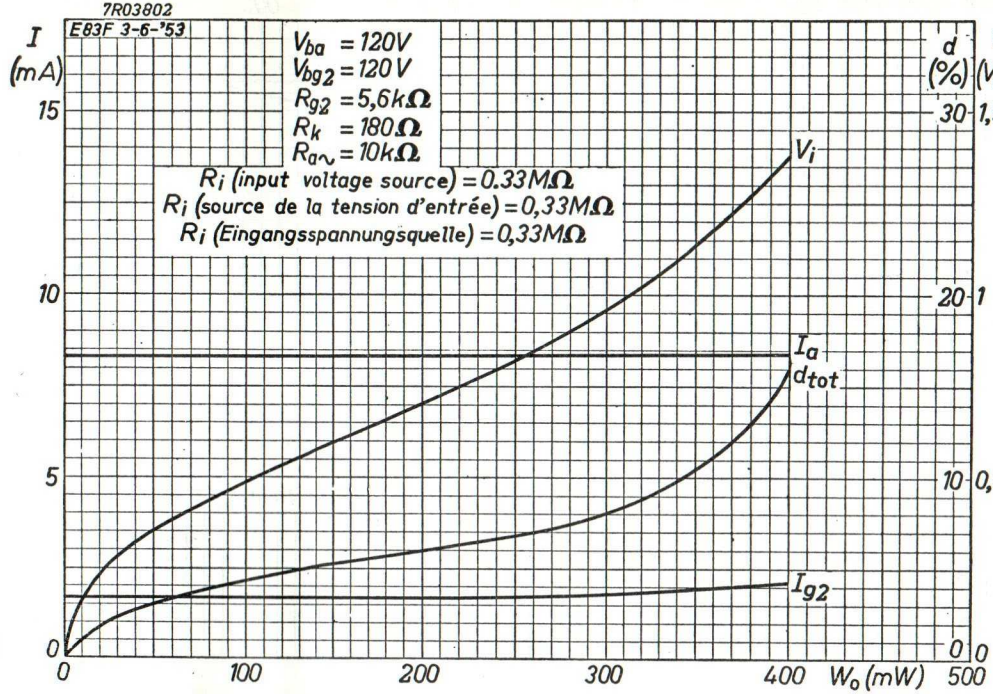
A


7R03895
E83F 4-9-53
I_a (mA)
$W_a = 2{,}1W$
$V_{g1} = 0V$
$V_{g2} = 120V$
$V_{g3} = 0V$
−0,5V
−1V
−1,5V
−2V
−2,5V
−3V
−3,5V
−4V
40
30
20
10
0
0
100
200
300
400
500
600
V_a (V)

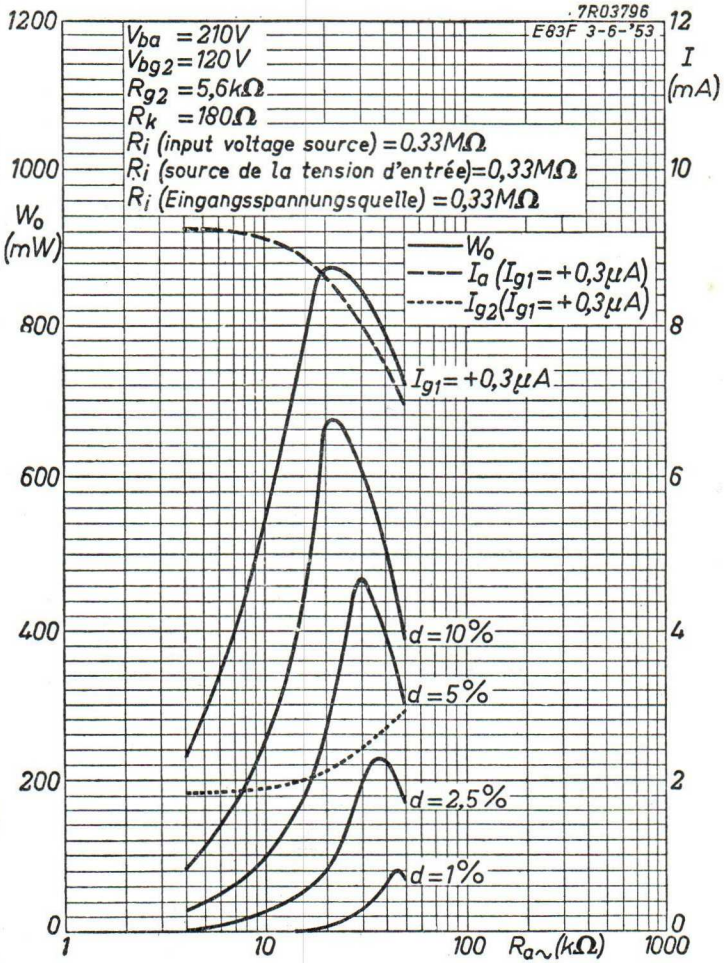
B


7R03803
E 83 F 3-6-'53
I (mA)
d (%)
Vi (Veff)
Vba = 210V
Vbg2 = 120V
Rg2 = 5,6kΩ
Rk = 180Ω
Ra~ = 20kΩ
Ri (input voltage source) = 0.33 MΩ
Ri (source de la tension d'entrée) = 0,33MΩ
Ri (Eingangsspannungsquelle) = 0,33MΩ
Vi
Ia
dtot
Ig2
15
10
5
0
30
20
10
0
1,5
1
0,5
0
200
400
600
800
Wo (mW)
1000



18042

PHILIPS SQ


7R03796
E83F 3-6-'53
V_{ba} = 210V
V_{bg2} = 120V
R_{g2} = 5,6kΩ
R_k = 180Ω
R_i (input voltage source) = 0,33MΩ
R_i (source de la tension d'entrée) = 0,33MΩ
R_i (Eingangsspannungsquelle) = 0,33MΩ
W_o
I_a (I_{g1} = +0,3μA)
I_{g2} (I_{g1} = +0,3μA)
I_{g1} = +0,3μA
d = 10%
d = 5%
d = 2,5%
d = 1%
W_o (mW)
I (mA)
1200
1000
800
600
400
200
0
12
10
8
6
4
2
0
1
10
100
1000
$R_{a\sim}$ (kΩ)

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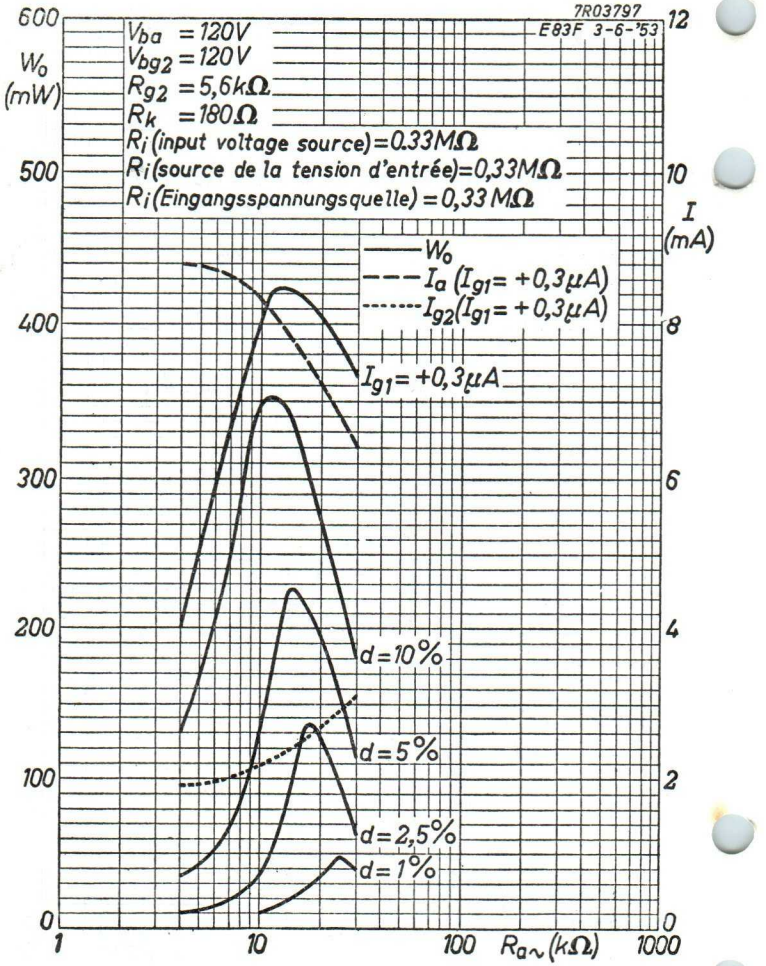
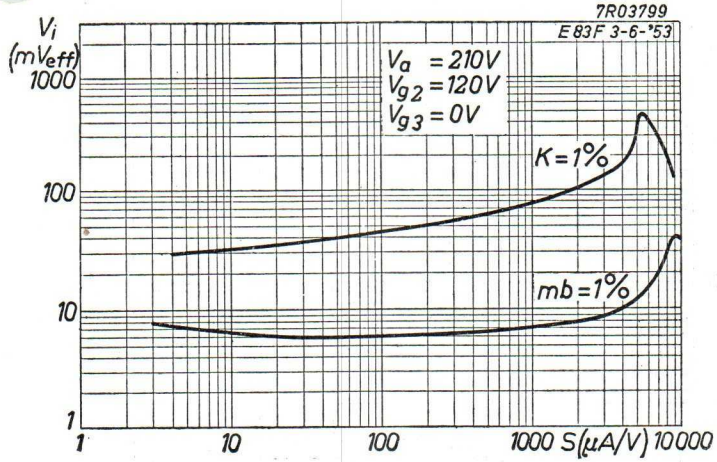
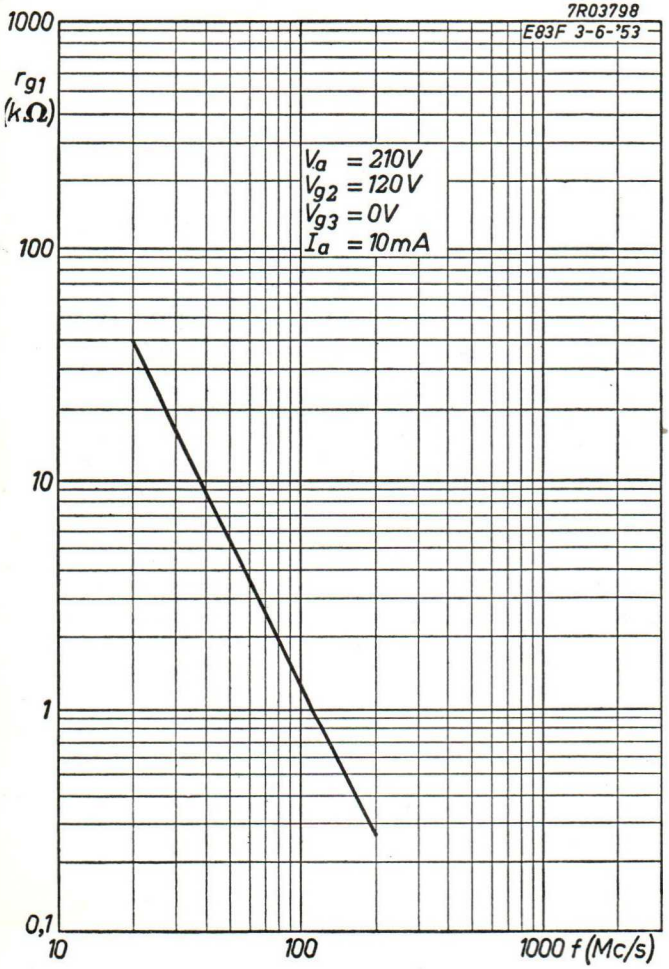
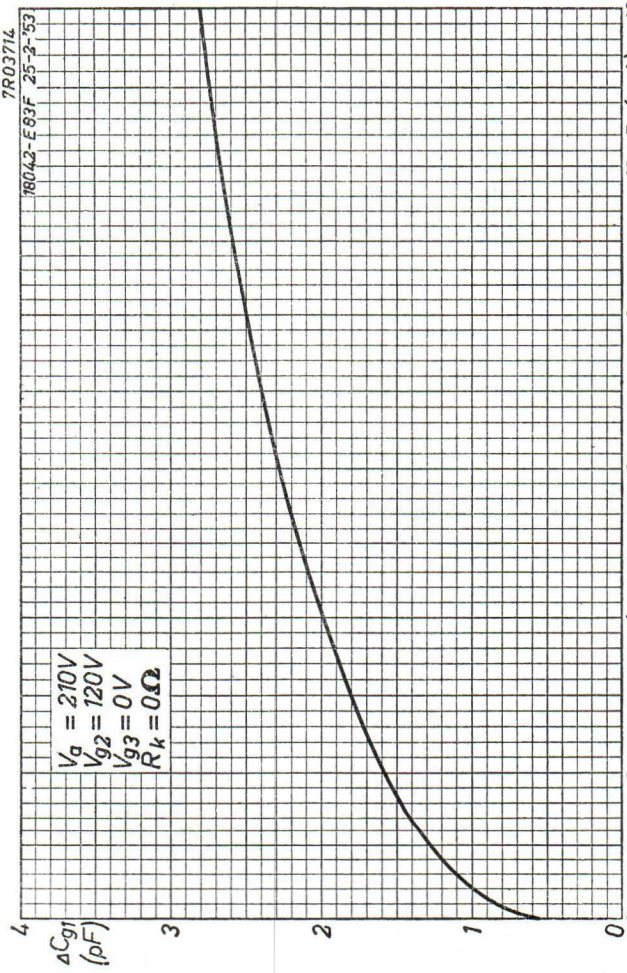
E


7R03797
E83F 3-6-'53
V_{ba} = 120V
V_{bg2} = 120V
R_{g2} = 5,6kΩ
R_k = 180Ω
R_i (input voltage source) = 0.33MΩ
R_i (source de la tension d'entrée) = 0,33MΩ
R_i (Eingangsspannungsquelle) = 0,33 MΩ
W_o
I_a (I_{g1} = +0,3μA)
I_{g2} (I_{g1} = +0,3μA)
I_{g1} = +0,3μA
d = 10%
d = 5%
d = 2,5%
d = 1%
W_o (mW)
I (mA)
$R_{a\sim}$ (kΩ)
600
500
400
300
200
100
0
12
10
8
6
4
2
0
1
10
100
1000


7R03799
E83F 3-6-'53
Vi
(mVeff)
1000
100
10
1
1
10
100
1000 S(μA/V) 10000
Va = 210V
Vg2 = 120V
Vg3 = 0V
K=1%
mb=1%


7R03798
E83F 3-6-'53
1000
r_{g1} (kΩ)
100
10
1
0,1
V_a = 210V
V_{g2} = 120V
V_{g3} = 0V
I_a = 10mA
10
100
1000 f (Mc/s)


7R03714
18042-E83F 25-2-'53
V_a = 210V
V_{g2} = 120V
V_{g3} = 0V
R_k = 0Ω
ΔC_{g1} (pF)
I_k (mA)
0
1
2
3
4
0
2
4
6
8
10
12

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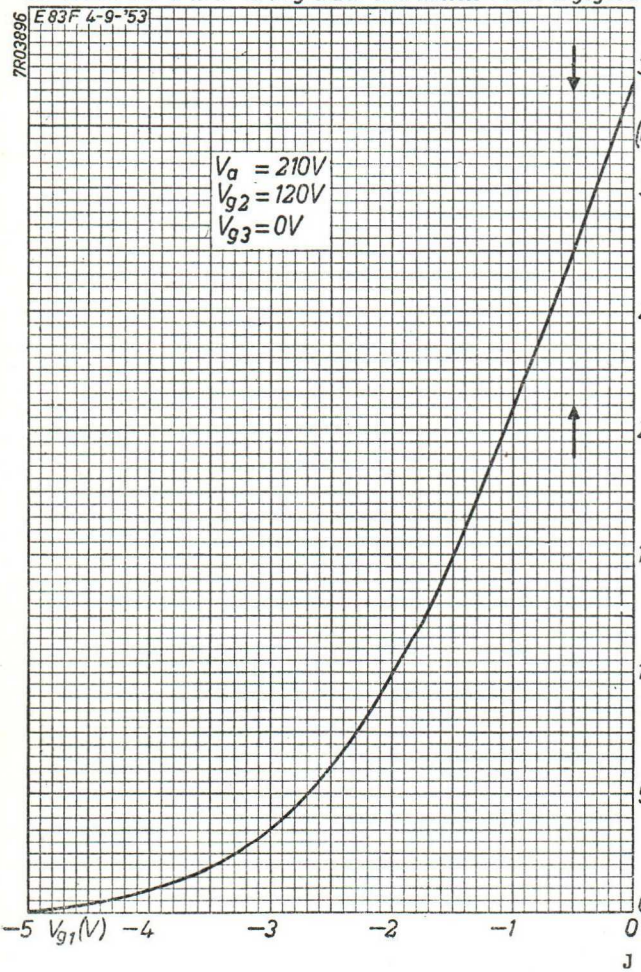
Upper and lower current limits are indicated by arrows
Les limites supérieures et inférieures du courant sont indiquées par des fléches
Die oberen und unteren Stromgrenzen sind mittels Pfeile angegeben

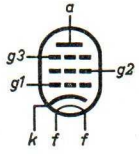


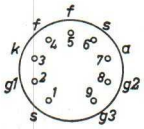
J

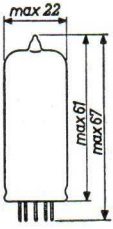
OUTPUT PENTODE for use in telephone equipment (life longer than 10 000 hours)
PENTHODE DE SORTIE pour utilisation dans l'équipement téléphonique (durée plus longue que 10 000 heures)
ENDPENTODE zur Verwendung in Telephonanlagen (Lebensdauer länger als 10 000 Stunden)

Heating : indirect by A.C. or D.C. parallel or series supply
Chauffage: indirect par C.A. ou C.C. alimentation parallèle ou série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Parallel oder Serienspeisung

V_f = 18 V[1])
I_f = 0,130 A[1])







Base, culot, Sockel: Noval

Capacitances Capacités Kapazitäten	C_a	= 6,5±0,7 pF
	C_{g1}	= 11,2±1,2 pF
	C_{g1}(I_k= 25 mA)	= 14,3 pF
	C_{ag1}	< 0,02 pF
	C_{g1f}	< 0,2 pF
	C_{kf}	= 4,2 pF
	C_{ra}[2])	< 0,06 pF
	C_{rg1}[2])	< 0,12 pF

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[1]) [2]) See page 2
Voir page 2
Siehe Seite 2

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[1]) The maximum deviation of I_f at V_f = 18 V is ± 0.007 A In order to obtain a minimum useful tube life of 10 000 hours in the case of parallel supply, the maximum variation of V_f should be less than ± 5 % (absolute limits). In order to obtain a minimum useful tube life of 10 000 hours in the case of series supply, the maximum variation of I_f due to voltage fluctuations and tolerances in the parts should be less than ± 1.5 % (absolute limits).

La déviation de I_f à V_f = 18 V est de ± 0,007 A au max. Afin d'obtenir une durée minimum du tube de 10 000 heures en cas d'alimentation parallèle la variation max. de V_f sera de moins de ± 5 % (limites absolues). Afin d'obtenir une durée minimum du tube de 10 000 heures en cas d'alimentation série la variation max. de I_f par suite de fluctuations de la tension et de tolérances des accessoires sera moins de ± 1,5 % (limites absolues)

Die Höchstabweichung von I_f bei V_f = 18 V ist ± 0,007 A Zur Erhaltung einer minimalen Lebensdauer der Röhre von 10 000 Stunden bei Parallelbetrieb soll die max. Schwankung von V_f weniger als ± 5 % betragen (absolute Grenzen)
Zur Erhaltung einer minimalen Lebensdauer der Röhre von 10 000 Stunden bei Serienbetrieb soll die max. Schwankung von If infolge Spannungsschwankungen und Streuungen der Einzelteile weniger als ± 1,5 % betragen (absolute Grenzen).

[2]) Radiation capacitance. Capacitance of the concerning electrode to a surrounding box with an inner diameter of 52 mm and a height of 98 mm, the other electrodes being earthed

Capacité de rayonnement. Capacité de l'électrode concernante à l'égard d'une boîte entourante avec un diamètre intérieur de 52 mm et une hauteur de 98 mm. Les autres électrodes sont mises à la terre

Strahlungskapazität. Kapazität zwischen der betreffenden Elektrode und einer Buchse um die Röhre mit einem inneren Durchmesser von 52 mm und einer Höhe von 98 mm. Die übrigen Elektroden der Röhre müssen geerdet sein

Typical characteristics
Caractéristiques types
Kenndaten

V_a	=	210	V
V_{g3}	=	0	V
V_{g2}	=	210	V
R_k	=	120	Ω
I_a	=	$20 \pm 3{,}0$	mA [1]
I_{g2}	=	$5{,}3 \pm 1{,}2$	mA [1]
S	=	$11 \pm 1{,}5$	mA/V [1]
ΔS (ΔV_f =-10%)	= max.	10	%
R_i	=	0,3	MΩ
R_i	= min.	0,2	MΩ
W_o ($R_{a\sim}$ = 15kΩ, d_{tot} = 5%)	=	1,0	W
	= min.	0,7	W
d_{tot} ($R_{a\sim}$ = 15kΩ, W_o =0,1W)	=	1,2	%
	= max.	2,0	%
μ_{g2g1}	=	36	
Req (H.F.)	=	1,2	kΩ
$-V_{g1}$(I_a=0,5mA)	= max.	8,5	V
$-I_{g1}$(R_{g1}=0,1MΩ)	= max.	0,5	μA [1]

Hum voltage
Tension de ronflement (R_{g1}=0,5 MΩ) = max. 0,2 mV
Brummspannung

Insulation k-f
Isolation k-f (V_{kf} =120 V) = min. 5 MΩ

Insulation between 2 arbitrary electrodes
Isolation entre 2 électrodes arbitraires R = min. 100 MΩ
Isolation zwischen 2 beliebige Elektroden

Cathode heating time
Durée de chauffage de la cathode = 16 sec
Katodenanheizzeit = max. 22 sec

Cathode cooling time
Durée de refroidissement de la cathode = 15 sec
Katodenkühlungszeit = min. 7 sec

[1])See page 5; voir page 5; siehe Seite 5.

Operating characteristics for use as pre-amplifier
Caractéristiques d'utilisation en pré-amplificatrice
Betriebsdaten als Vorverstärker

V_a	=	210 V
V_{g3}	=	0 V
V_{g2}	=	210 V
R_k	=	180 Ω
$R_{a\sim}$	=	20 kΩ
I_a	=	15 mA
I_{g2}	=	4 mA
S	=	10 mA/V
R_i	=	0,4 MΩ
g	=	5,15 N

Operating characteristics for use as output tube
Caractéristiques d'utilisation comme tube de sortie
Betriebsdaten als Endröhre

V_a	=	210 V
V_{g3}	=	0 V
V_{g2}	=	210 V
R_k	=	120 Ω
I_a	=	20 mA
I_{g2}	=	5,3 mA
S	=	11 mA/V
R_i	=	0,3 MΩ
$R_{a\sim}$	=	15 kΩ
V_i	=	0,95 Veff
W_o	=	1 W
dtot	=	5 %

Limiting values
Caractéristiques limites
Grenzdaten

Va_o	= max. 550 V	Ik	= max. 30 mA
V_a	= max. 210 V	$V_{g1}(I_{g1}=+0,3\mu A)$	= max.-1,1 V
W_a	= max. 4,5 W	R_{g1}	= max. 0,5 MΩ [2]
$Vg2_o$	= max. 550 V	R_{g1}	= max.0,25 MΩ [3]
V_{g2}	= max. 210 V	V_{kf}	= max. 120 V
W_{g2}	= max. 1,2 W	R_{kf}	= max. 20 kΩ [4]

Bulb temperature
Température de l'ampoule
Kolbentemperatur = max. 170 °C

[2] [3] [4] See page 5; voir page 5; siehe Seite 5.

[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:

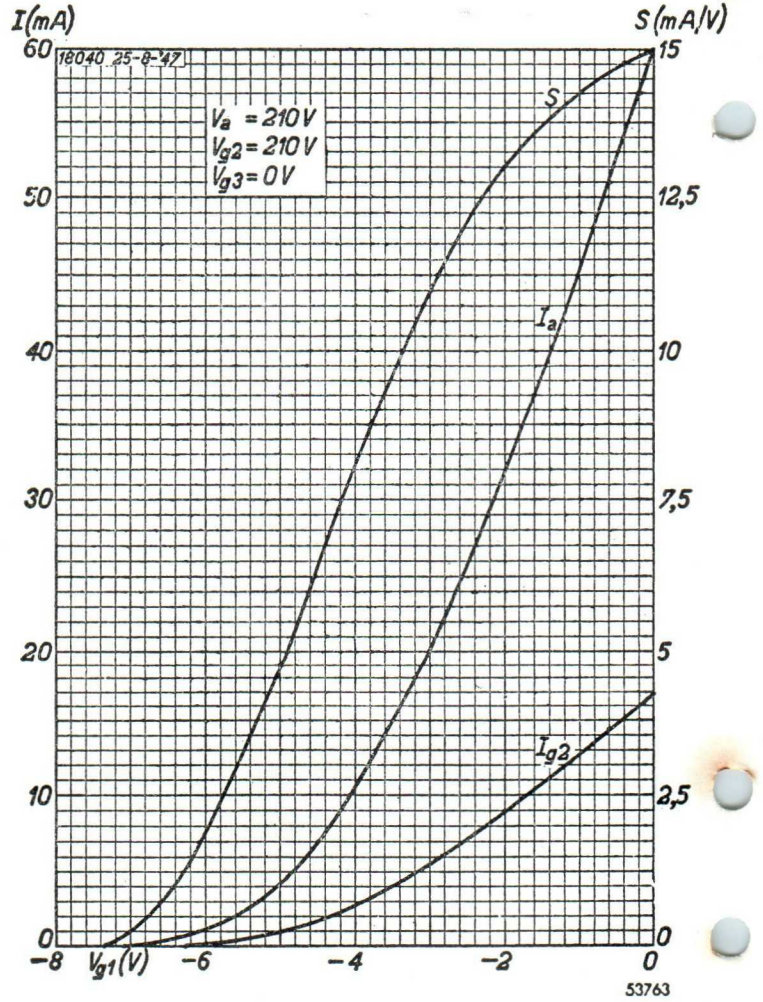
Das Ende der Lebensdauer ist erreicht wenn eine oder mehrere dieser Kennwerte bis folgende Werte geändert sind:

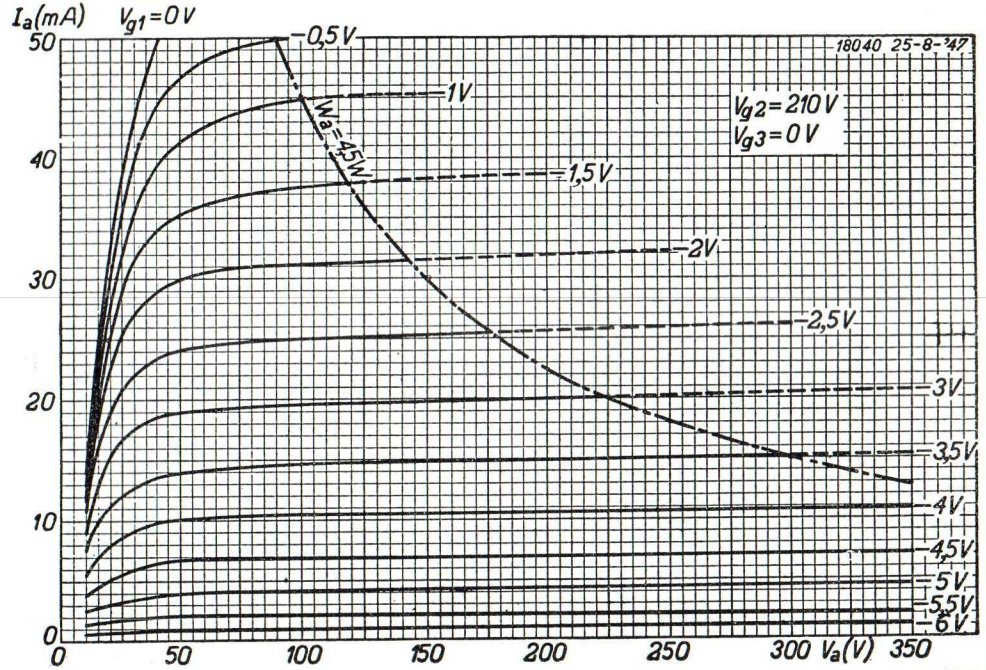
I_a	$\leqq$	13,5 mA
I_{g2}	$\leqq$	3,1 mA
S	$\leqq$	7,8 mA/V
$-I_{g1}(R_{g1}=0,1M\Omega)$	$\geqq$	1,0 µA

[2]) Automatic grid bias
Polarisation automatique
Automatische Gittervorspannung

[3]) Fixed grid bias
Polarisation fixe
Feste Gittervorspannung

[4]) For stable operation it is advisable to restrict Rkf to values < 20 kΩ
Afin d'obtenir une opération stable il est recommendable de limiter Rkf à des valeurs < 20 kΩ
Zur Erhaltung einer stabilen Wirkung ist es empfehlenswert Rkf auf Werte < 20 kΩ zu beschränken

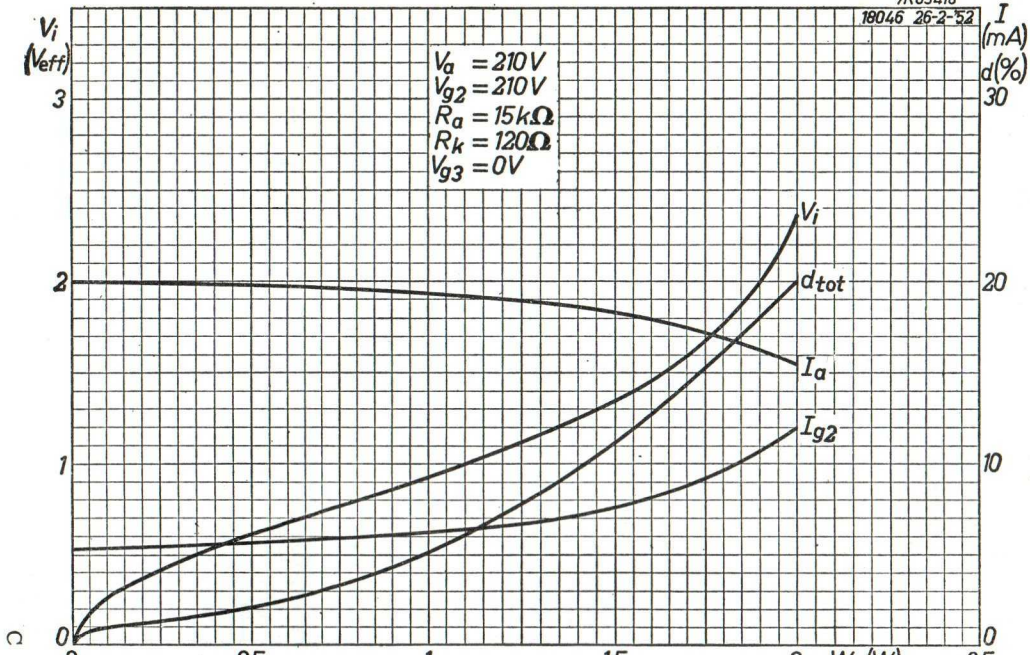

I(mA)
S(mA/V)
18040 25-8-47
V_a = 210 V
V_{g2} = 210 V
V_{g3} = 0 V
S
I_a
I_{g2}
60
50
40
30
20
10
0
15
12,5
10
7,5
5
2,5
0
−8
V_{g1}(V)
−6
−4
−2
0
53763



6.6.1957

B

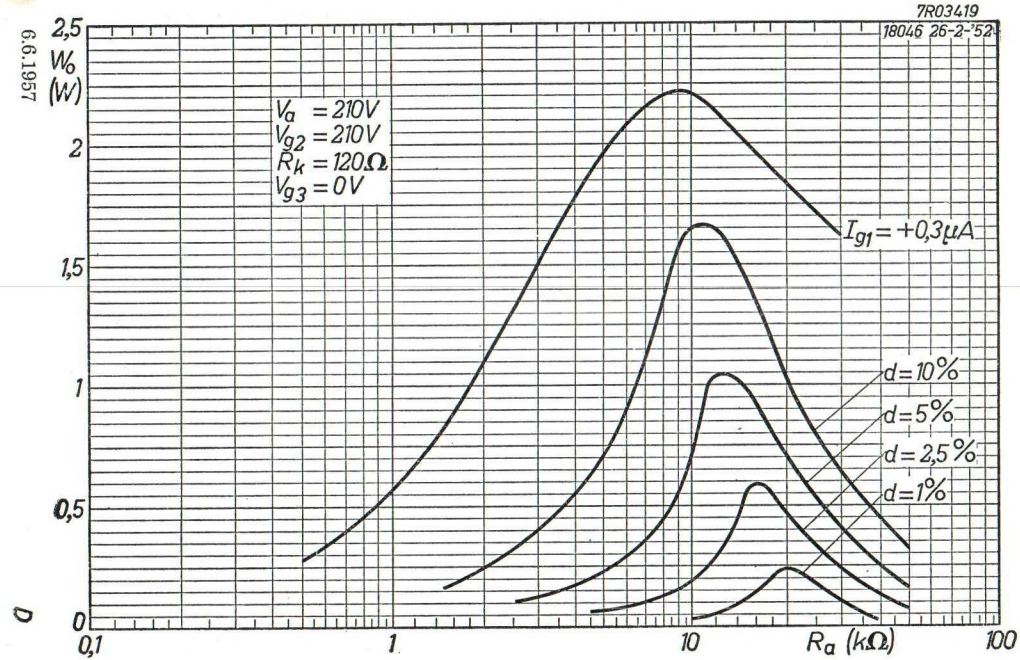
SQ PHILIPS 18045



18045

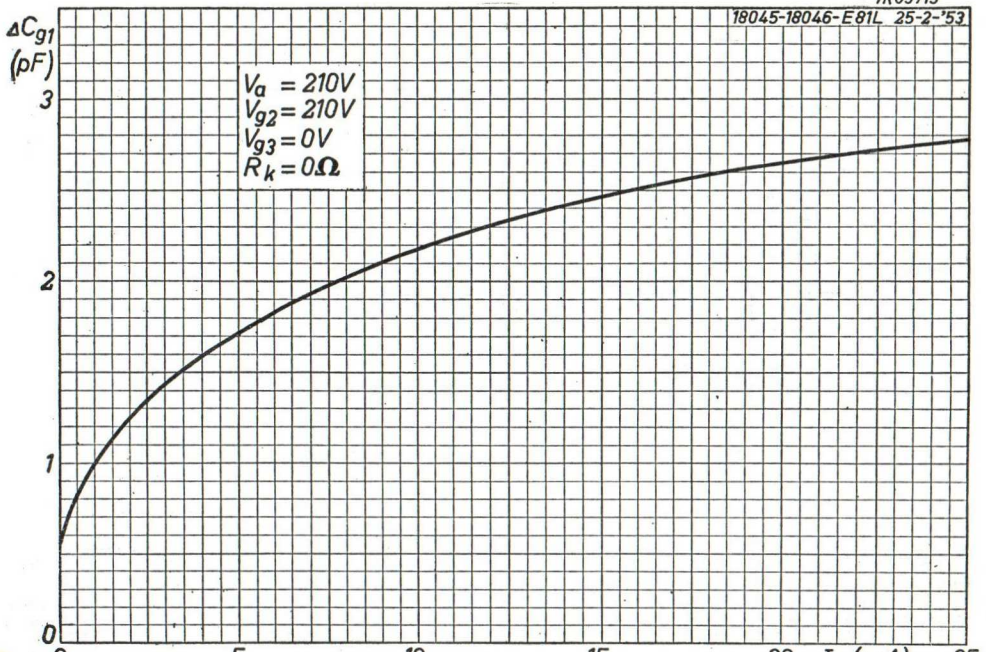
PHILIPS

SQ


7R03419
18046 26-2-'52
6.6.1957
W_o (W)
2,5
2
1,5
1
0,5
0
D
V_a = 210V
V_{g2} = 210V
R_k = 120Ω
V_{g3} = 0V
I_{g1} = +0,3μA
d = 10%
d = 5%
d = 2,5%
d = 1%
0,1
1
10
100
R_a (kΩ)

7RÖ3715

18045-18046-E81L 25-2-'53



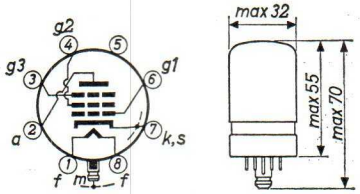
SPECIAL QUALITY, LONG LIFE PENTODE for use as A.F., I.F. or R.F. amplifier, output tube, oscillator, etc.

HEATING

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

Heater voltage V_f = 20 V

Heater current I_f = 125 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_{g_1}	= 8.5	7.5-9.5 pF
The same with I_k = 19 mA	C_{g_1}	= 10.5	pF
Anode to all other elements except grid No.1	C_a	= 6.0	4.5-7.7 pF
Input + output capacitance	$C_{g_1}+C_a$	=	< 16 pF
Anode to grid No.1	C_{ag_1}	= 0.014	< 0.018 pF
Anode to grid No.3	C_{ag_3}	= 1.2	pF
Anode to heater	C_{af}	= 0.12	pF
Grid No.1 to grid No.2	$C_{g_1g_2}$	= 3	pF
Grid No.1 to cathode	C_{g_1k}	= 4.5	pF
Grid No.1 to heater	C_{g_1f}	= 0.02	< 0.04 pF
Grid No.2 to grid No.3	$C_{g_2g_3}$	= 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 ($+g_2+g_3$)	C_{g_1} =	5	< 6	pF
Anode ($+g_2+g_3$) to all other elements except grid No.1	C_a =	7.5	< 9	pF
Anode ($+g_2+g_3$) to grid No.1	C_{ag_1} =	3.2	< 4	pF

Heater current

		I	II	
Heater voltage	V_f =	20		V
Heater current	I_f =	125	120-130	mA

Typical characteristics

		I	II	III	
Anode supply voltage	V_{b_a} =	225			V
Grid No.3 voltage	V_{g_3} =	0			V
Grid No.2 supply voltage	V_{bg_2} =	155			V
Cathode resistor	R_k =	250			Ω
Anode current	I_a =	16	13.5-19	11.5	mA
Grid No.2 current	I_{g_2} =	3	2-4		mA
Mutual conductance	S =	6.5	5.5-7.8	4.5	mA/V
Internal resistance	R_i =	0.25	> 0.2		MΩ
Amplification factor of grid No.2 with respect to grid No.1	$\mu_{g_2g_1}$ =	19			
Aequivalent noise resistance					
R.F.	R_{eq} =	1.2	< 2.0		kΩ
A.F. (f = 500-3000 c/s)	R_{eq} =	5			kΩ
Triode connection, R.F.	R_{eq} =	650			Ω

Negative grid current

		I	II	III	
Anode supply voltage	V_{b_a} =	225			V
Grid No.3 voltage	V_{g_3} =	0			V
Grid No.2 supply voltage	V_{bg_2} =	155			V
Cathode resistor	R_k =	250			Ω
Grid No.1 resistor	R_{g_1} =	0.1			MΩ
Negative grid current	$-I_{g_1}$ =		< 0.5	1.0	μA

CHARACTERISTICS (continued)

Grid current starting point		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			µA
Negative grid No.1 voltage	$-V_{g1}$	=	< 1.3		V

Output power		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			Ω
Load resistance	$Ra_{\sim}$	= 10			kΩ
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			MΩ
Cathode capacitor	C_k	> 100			µF
Hum voltage	V_{g1hum}	=	< 10		µV

Heating time		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			Ω
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	MΩ

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	MΩ

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

Heater voltage	V_f	=	20 V
Anode supply voltage	V_{b_a}	=	225 V
Grid No.3 voltage	V_{g_3}	=	0 V
Grid No.2 supply voltage	V_{bg_2}	=	155 V
Cathode resistor	R_k	=	250 Ω

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

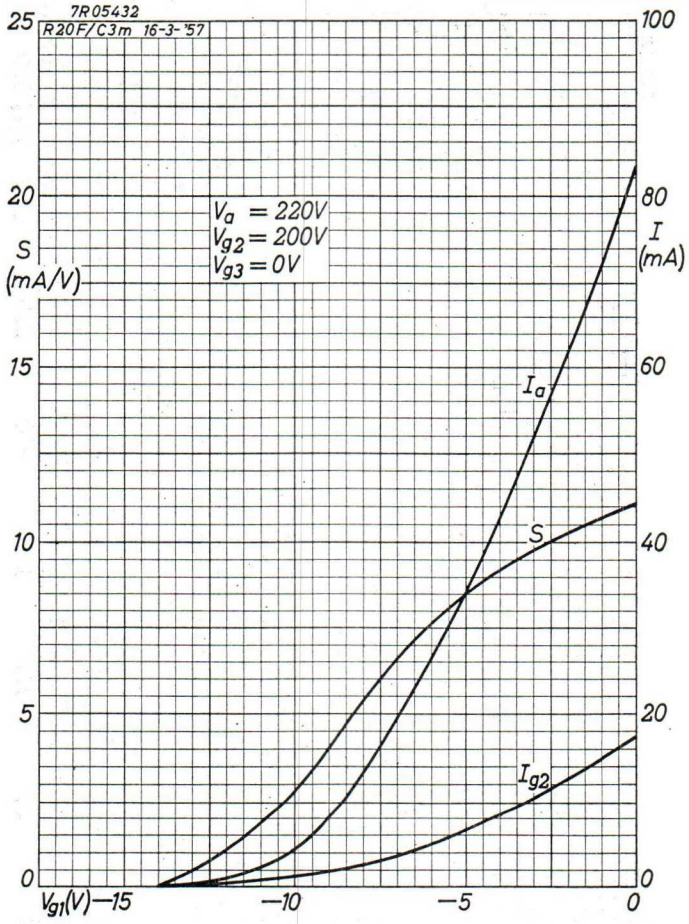
The data indicating the endpoint of life are given in column III under the heading "Characteristics".

LIMITING VALUES (Design centre limits)

Anode voltage in cold condition	V_{a_o}	= max.	550 V
Anode voltage	V_a	= max.	300 V
Anode dissipation	W_a	= max.	4 W [1]
Grid No.3 voltage in cold condition	V_{g3_o}	= 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_{g2_o}	= max.	550 V
Grid No.2 voltage	V_{g_2}	= max.	300 V
Grid No.2 dissipation	W_{g_2}	= max.	1 W
Negative grid No.1 voltage	$-V_{g_1}$	= max.	100 V
Grid No.1 dissipation	W_{g_1}	= max.	50 mW
Grid No.1 circuit resistance			
when $W_a > 1.5$ W	R_{g_1}	= max.	0.5 MΩ
when $W_a < 1.5$ W	R_{g_1}	= max.	3 MΩ
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 kΩ
Heater voltage in case of heater parallel supply	V_f	= 20 V ±	5 % [2]
Heater current in case of heater series supply	I_f	= 125 mA ±	1.5 % [2]
Temperature of metal envelope	t_{bulb}	= max.	120 °C

[1] In case of triode connection $W_a+W_{g_2}+W_{g3}$ = max. 5 W
[2] Absolute limits

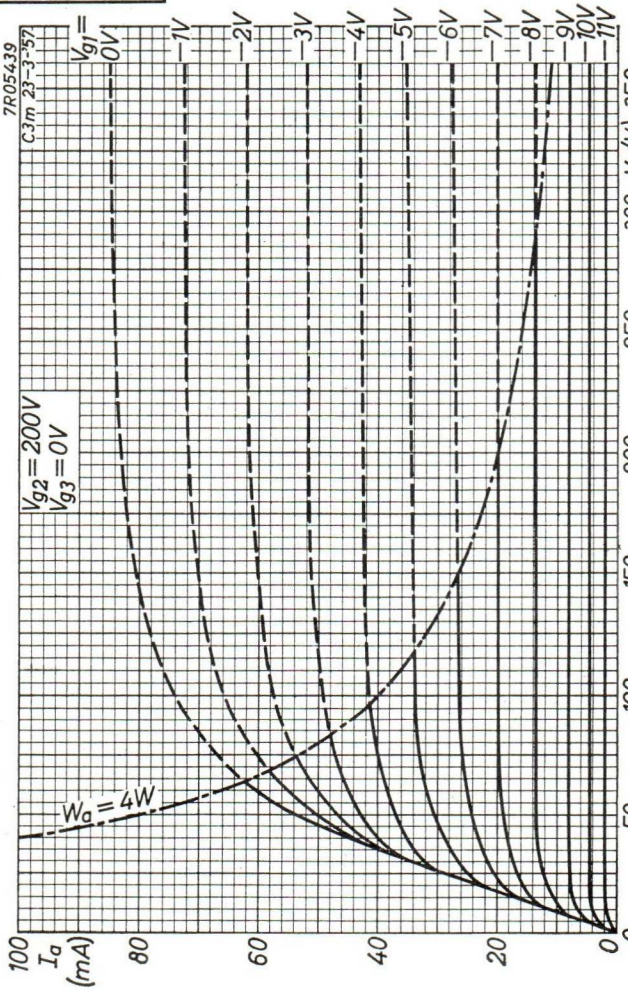
SQ **PHILIPS** **18048/C3m**



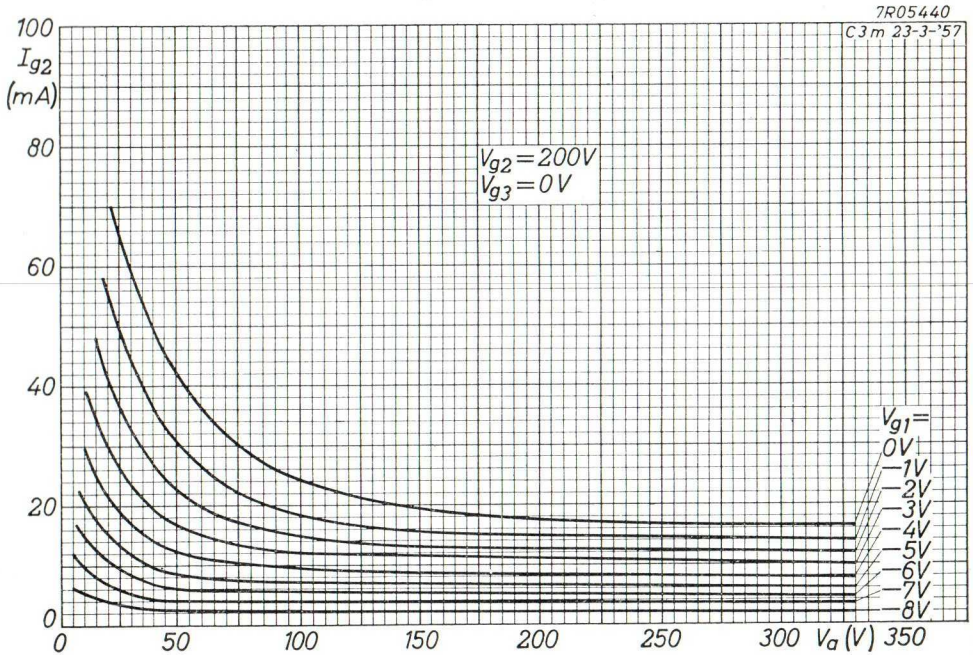
10.10.1962

A

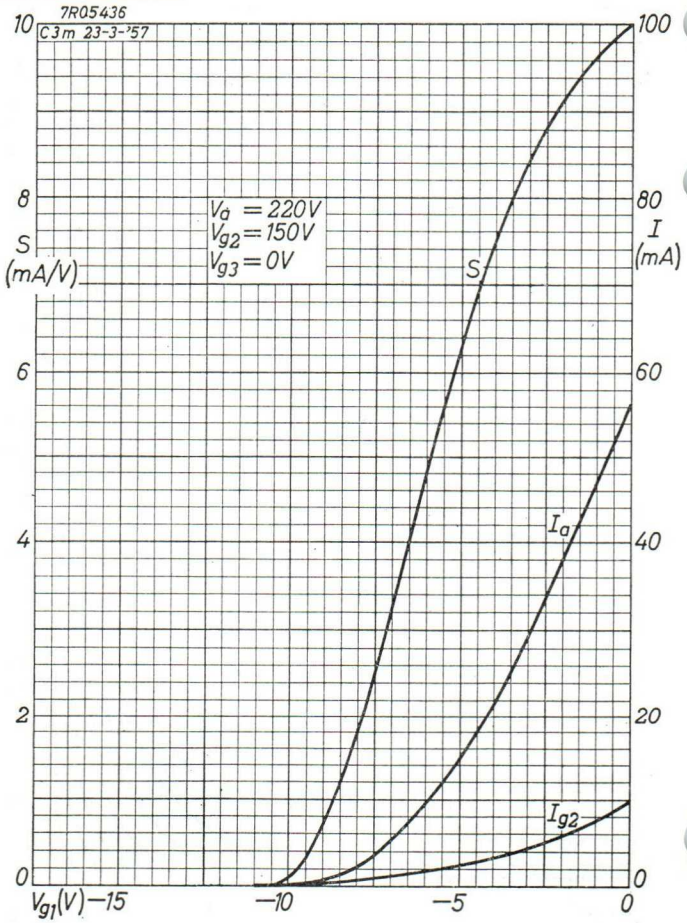
18048/C3m **PHILIPS** **SQ**



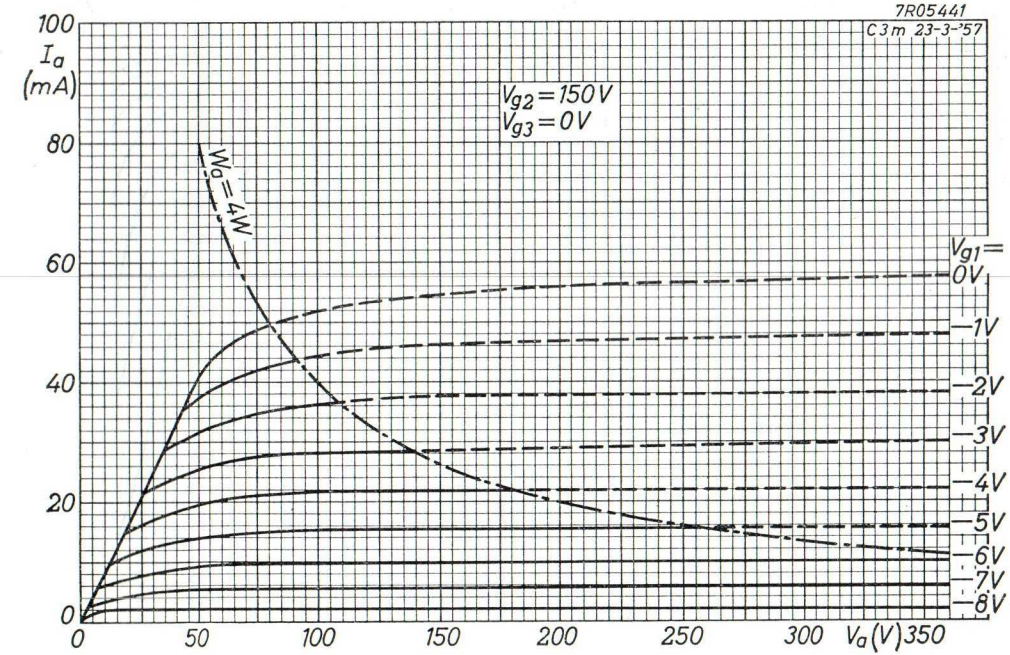
B


7R05440
C3m 23-3-'57
100
I_{g2}
(mA)
80
60
40
20
0
0
50
100
150
200
250
300
V_a (V)
350
$V_{g2}=200V$
$V_{g3}=0V$
$V_{g1}=$
0V
−1V
−2V
−3V
−4V
−5V
−6V
−7V
−8V

18048/C3m **PHILIPS** **SQ**

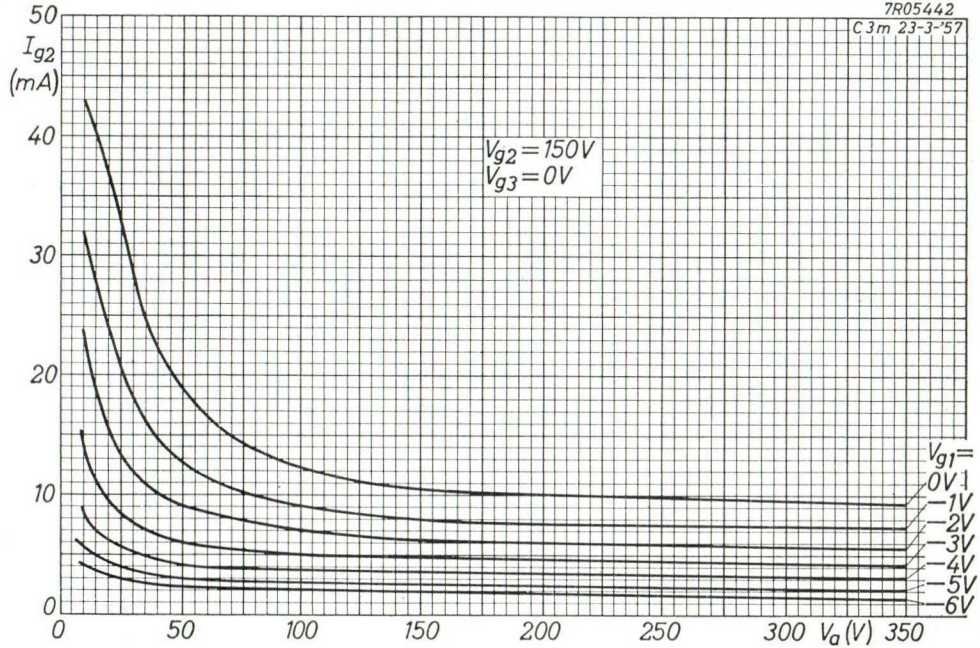


D

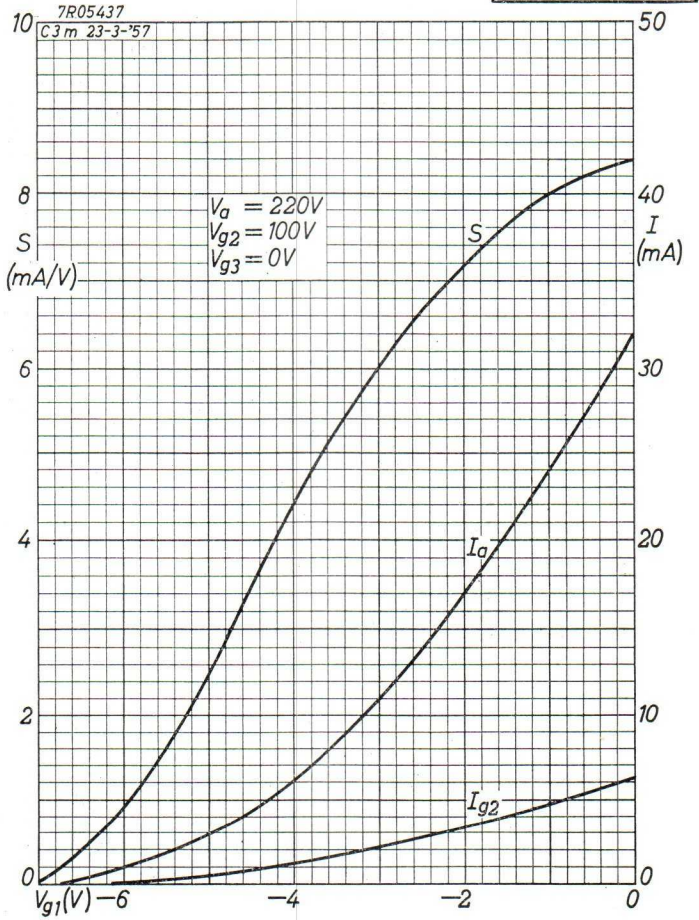


SQ PHILIPS

18048/C3m


7R05442
C3m 23-3-'57
I_{g2} (mA)
50
40
30
20
10
0
$V_{g2} = 150V$
$V_{g3} = 0V$
V_{g1} =
0V
−1V
−2V
−3V
−4V
−5V
−6V
0
50
100
150
200
250
300
V_a (V)
350

SQ **PHILIPS** **18048/C3m**



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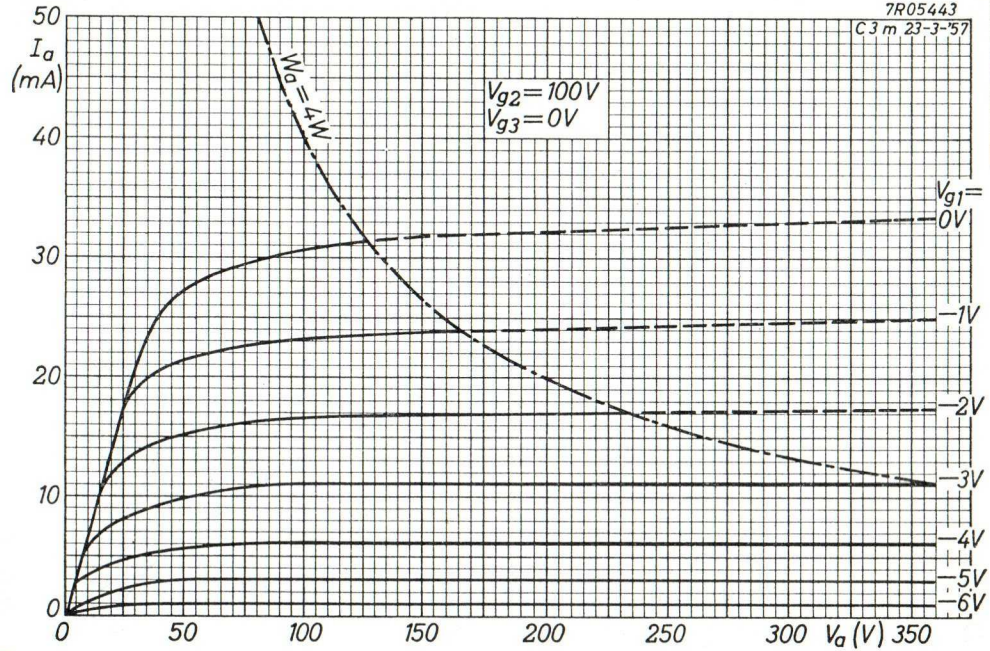
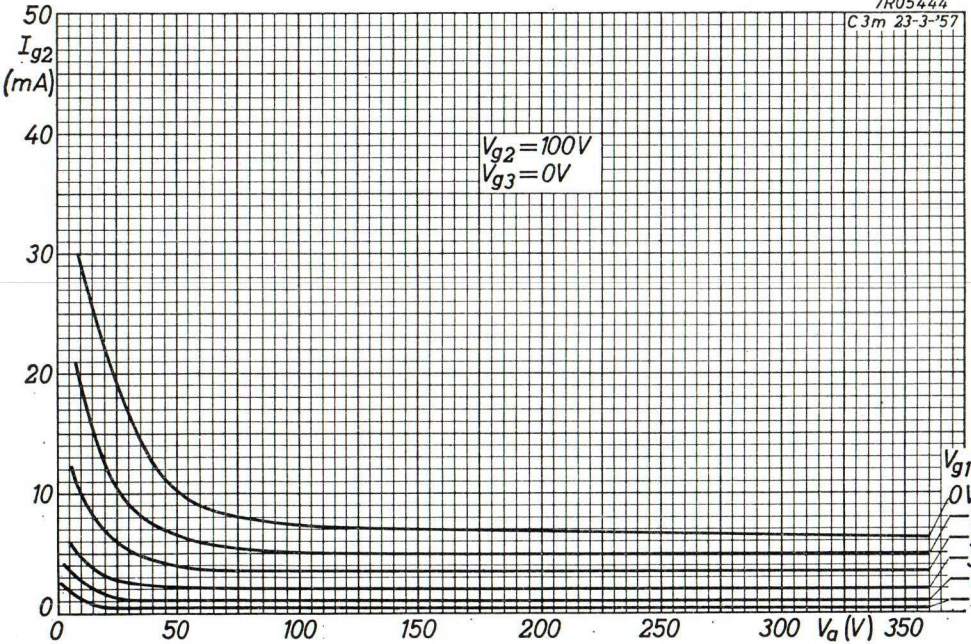
G

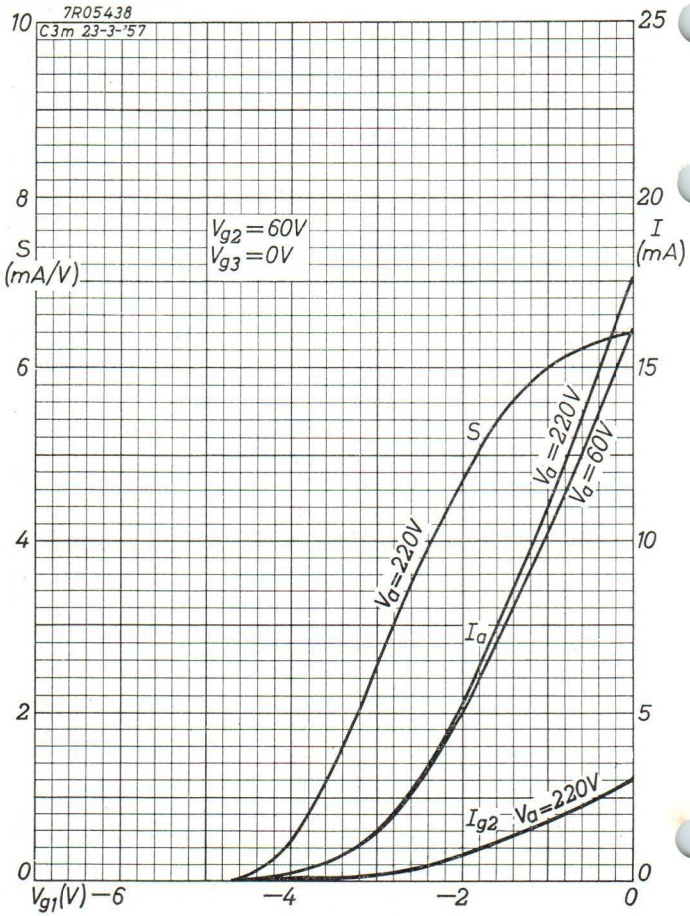

7R05443
C 3 m 23-3-'57
I_a (mA)
$W_a = 4W$
$V_{g2} = 100V$
$V_{g3} = 0V$
V_{g1} =
0V
−1V
−2V
−3V
−4V
−5V
−6V
V_a (V)
0
10
20
30
40
50
0
50
100
150
200
250
300
350

H

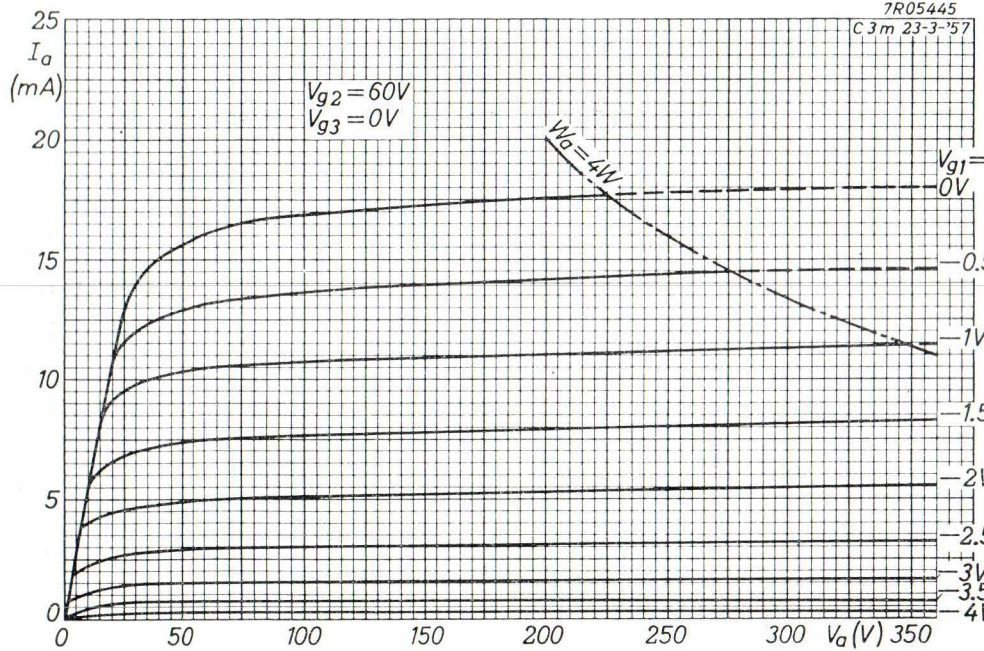

7R05444
C3m 23-3-'57
I_{g2} (mA)
50
40
30
20
10
0
$V_{g2}=100V$
$V_{g3}=0V$
$V_{g1}=$
0V
-1V
-2V
-3V
-4V
-5V
0
50
100
150
200
250
300
V_a (V)
350

18048/C3m

18048/C3m **PHILIPS** **SQ**



J

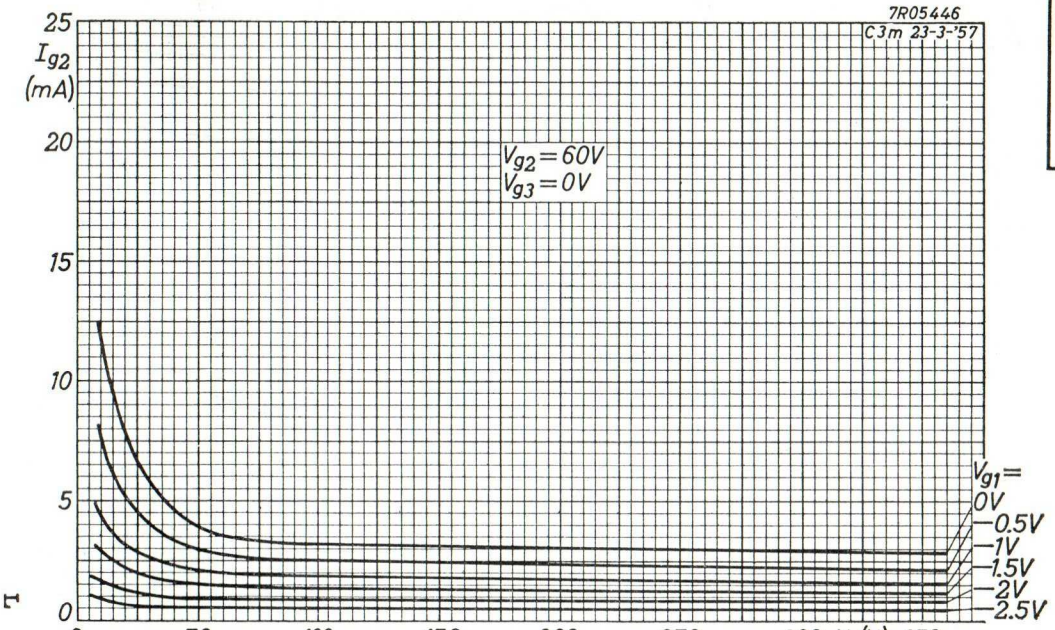


SQ PHILIPS

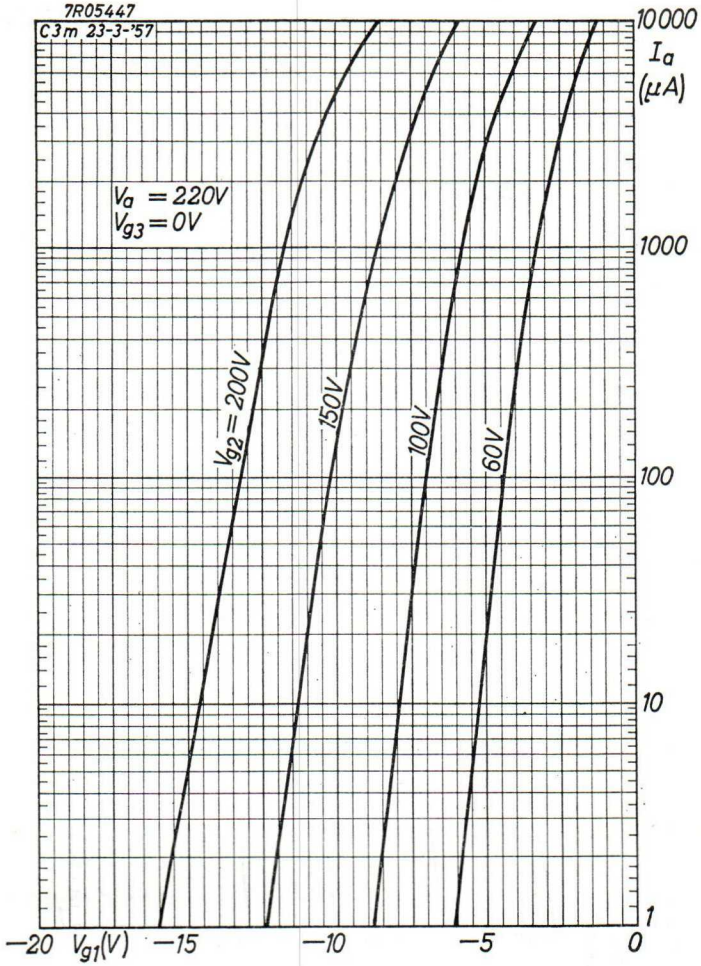
18048/C3m

10.10.1962

K


7R05446
C3m 23-3-'57
I_{g2} (mA)
25
20
15
10
5
0
$V_{g2} = 60V$
$V_{g3} = 0V$
V_{g1} =
0V
−0.5V
−1V
−1.5V
−2V
−2.5V
0
50
100
150
200
250
300
V_a(V)
350

SQ **PHILIPS** **18048/C3m**



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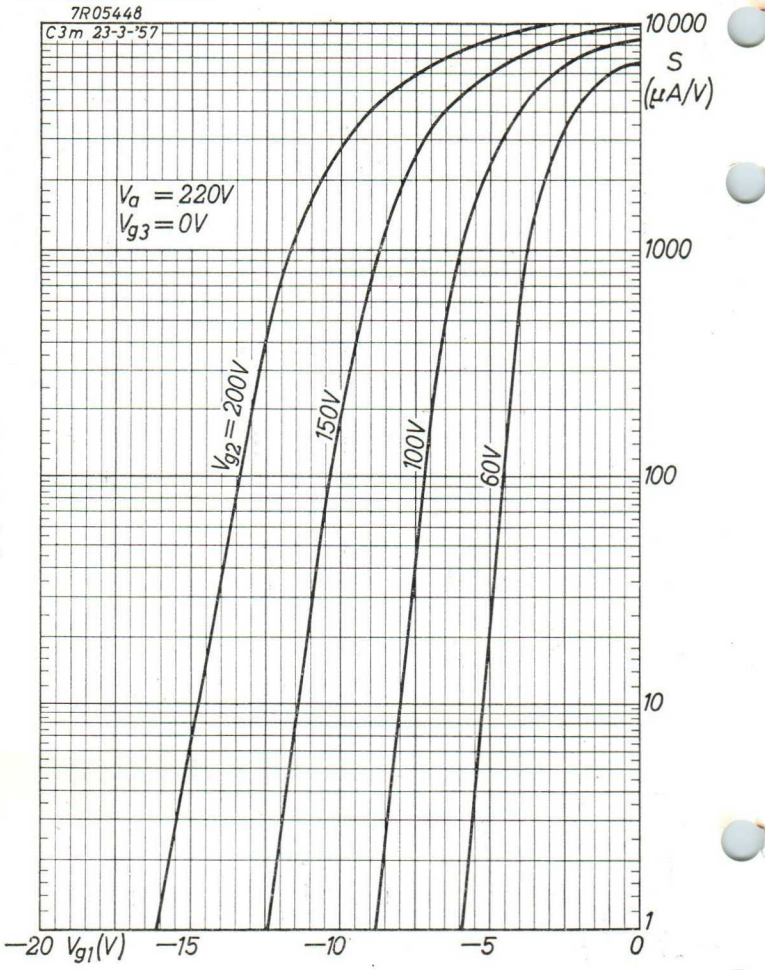
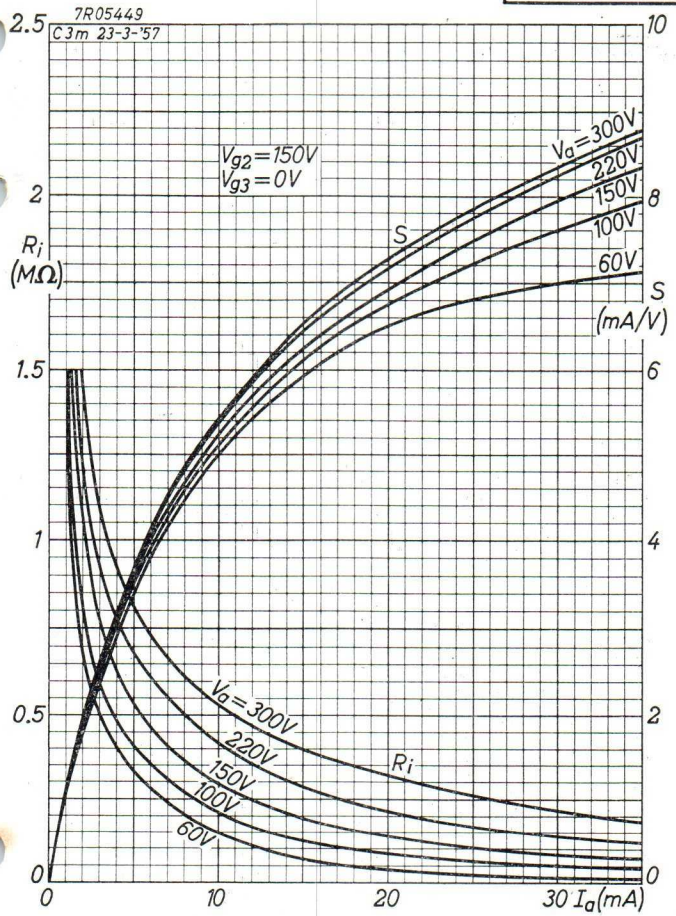
M

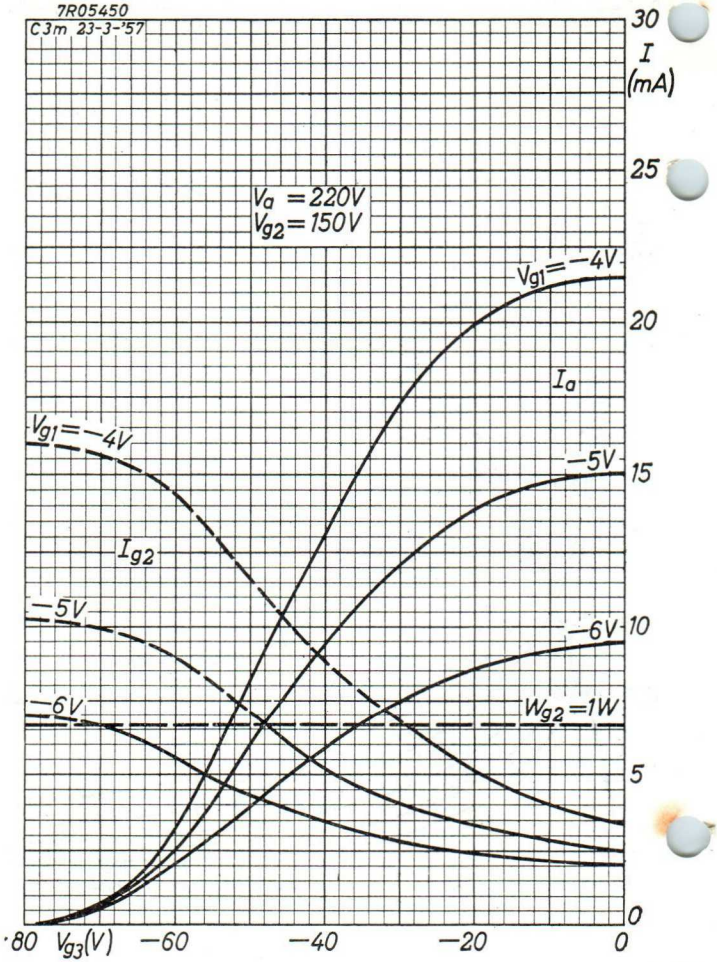
18048/C3m **PHILIPS** **SQ**



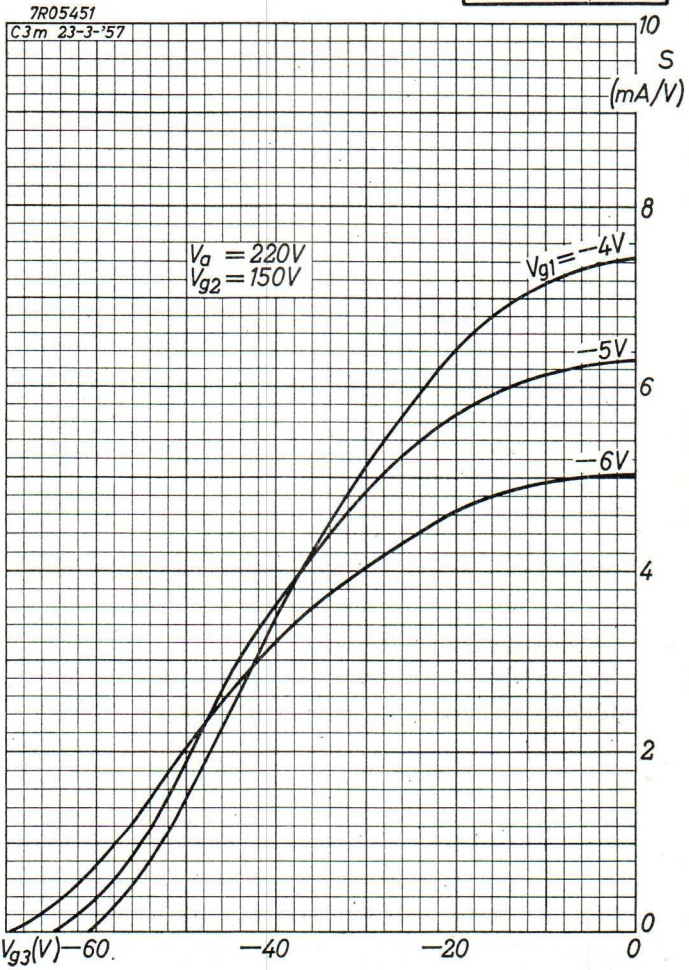
N


7R05449
C3m 23-3-'57
$V_{g2}=150V$
$V_{g3}=0V$
$V_a=300V$
220V
150V
100V
60V
S
(mA/V)
R_i
(MΩ)
I_a(mA)
0
0.5
1
1.5
2
2.5
4
6
8
10
20
30

10.10.1962

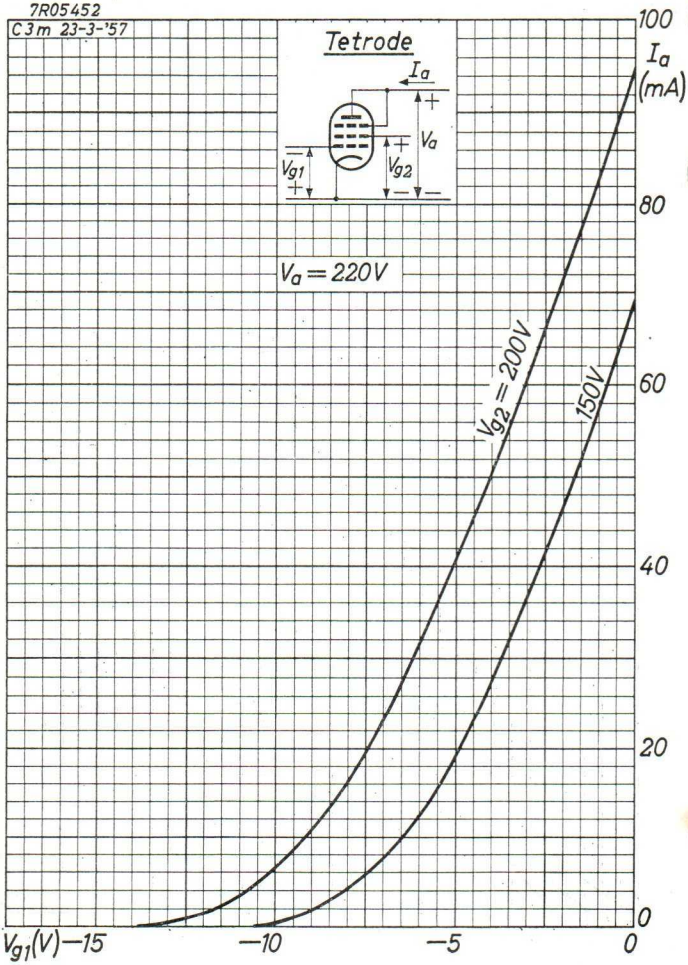

7R05450
C3m 23-3-'57
30
I
(mA)
25
20
15
10
5
0
$V_a = 220V$
$V_{g2} = 150V$
$V_{g1} = -4V$
I_a
$-5V$
$-6V$
$W_{g2} = 1W$
$V_{g1} = -4V$
I_{g2}
$-5V$
$-6V$
·80
$V_{g3}(V)$
-60
-40
-20
0

P

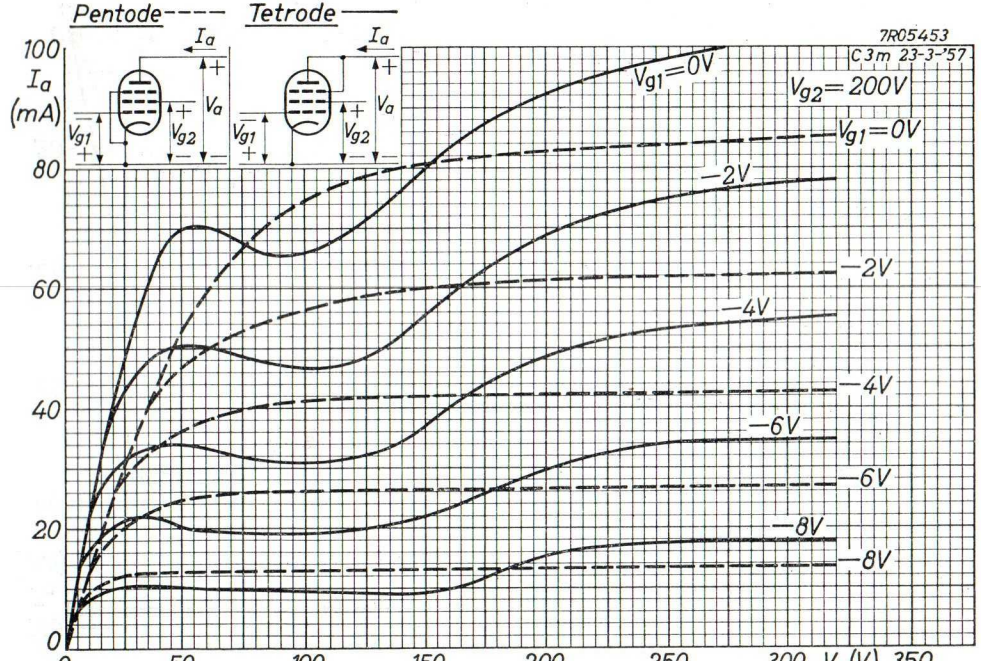

7R05451
C3m 23-3-'57
10
S
(mA/V)
8
6
4
2
0
$V_a = 220V$
$V_{g2} = 150V$
$V_{g1} = -4V$
$-5V$
$-6V$
$V_{g3}(V)$ -60 -40 -20 0

18048/C3m **PHILIPS** **SQ**

7R05452
C3m 23-3-'57

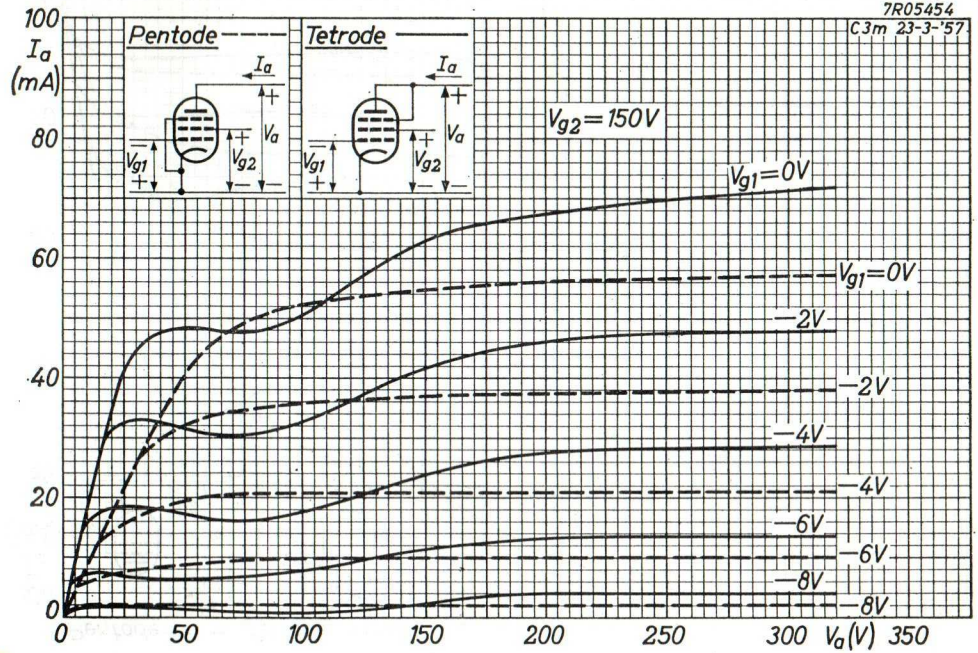


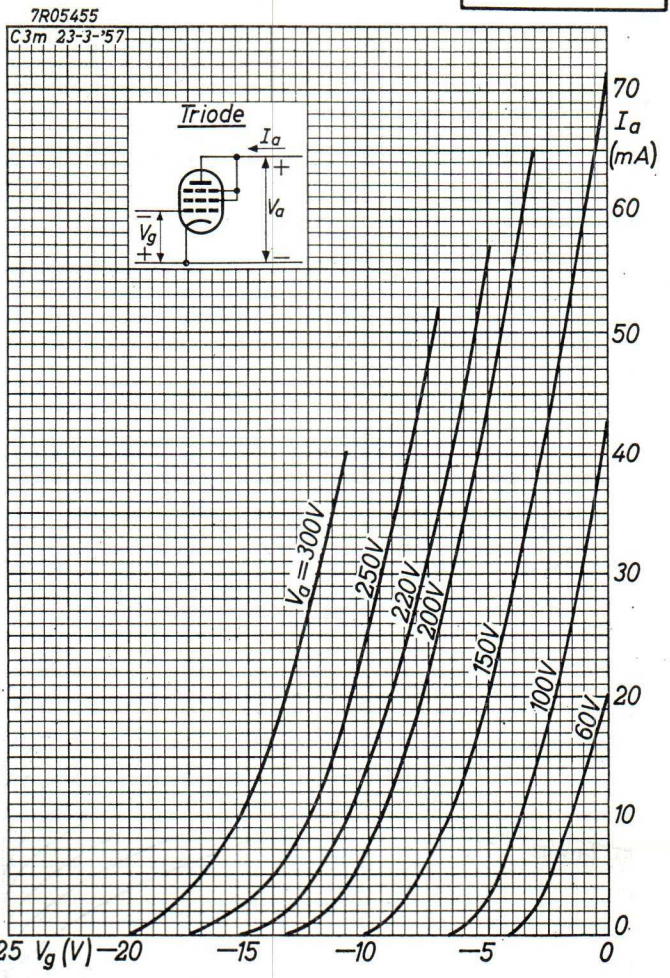
R



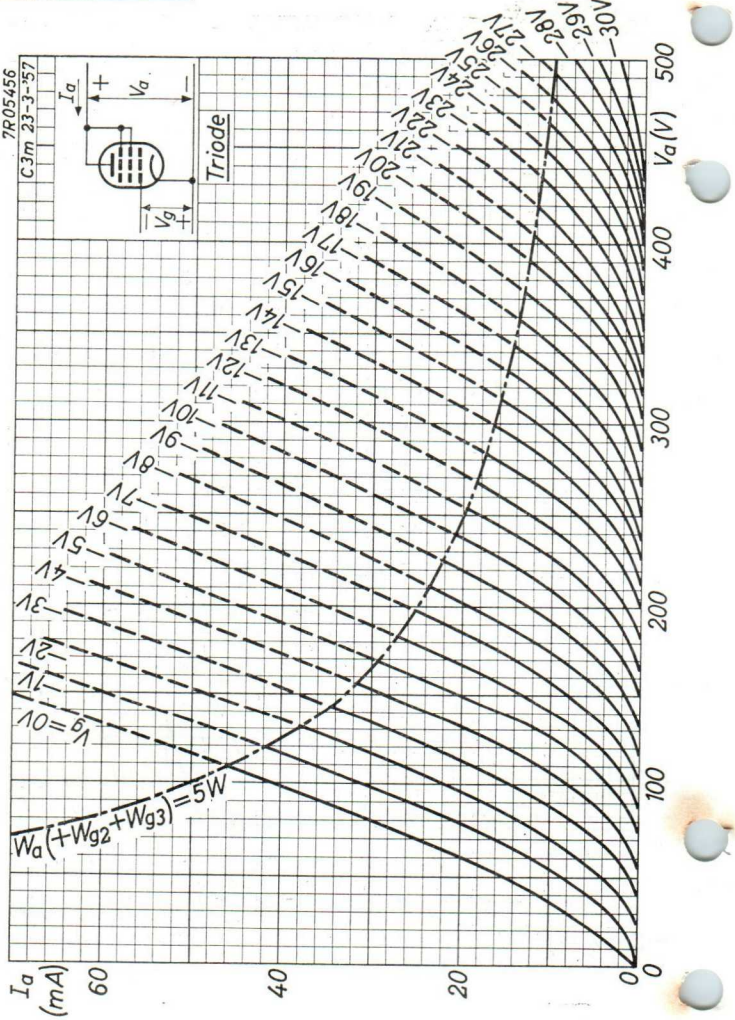
SQ PHILIPS

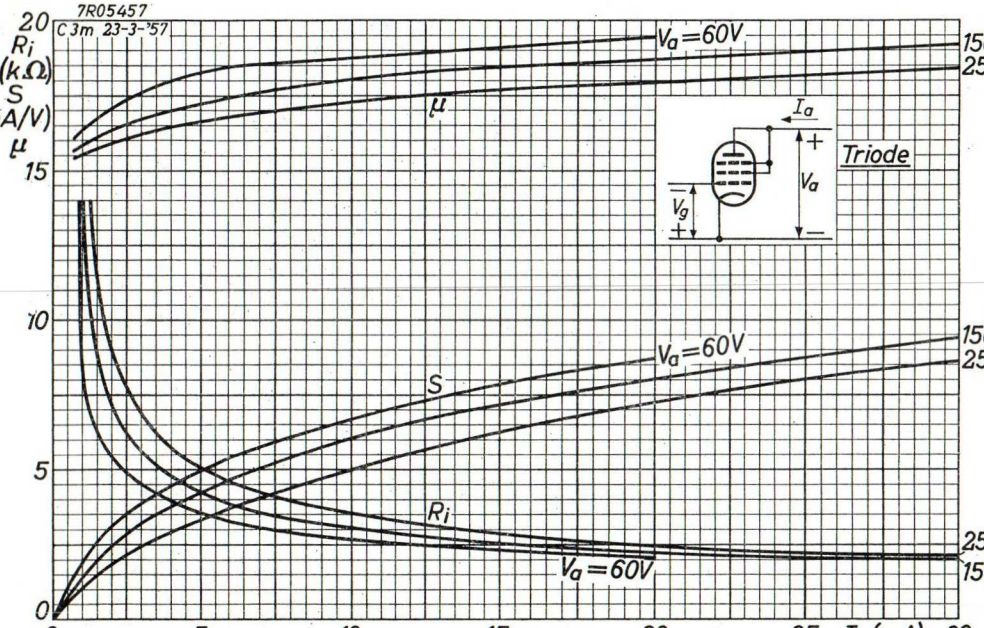
18048/C3m


7R05454
C3m 23-3-'57
Pentode
Tetrode
Ia
Va
Vg1
Vg2
Vg2 = 150V
Vg1 = 0V
Vg1 = 0V
—2V
—2V
—4V
—4V
—6V
—6V
—8V
—8V
Ia (mA)
100
80
60
40
20
0
0
50
100
150
200
250
300
Va (V)
350


7R05455
C3m 23-3-'57
Triode
Ia
Va
Vg
Ia (mA)
70
60
50
40
30
20
10
0
Va = 300V
250V
220V
200V
150V
100V
60V
−25 Vg (V) −20
−15
−10
−5
0

18048/C3m **PHILIPS** **SQ**





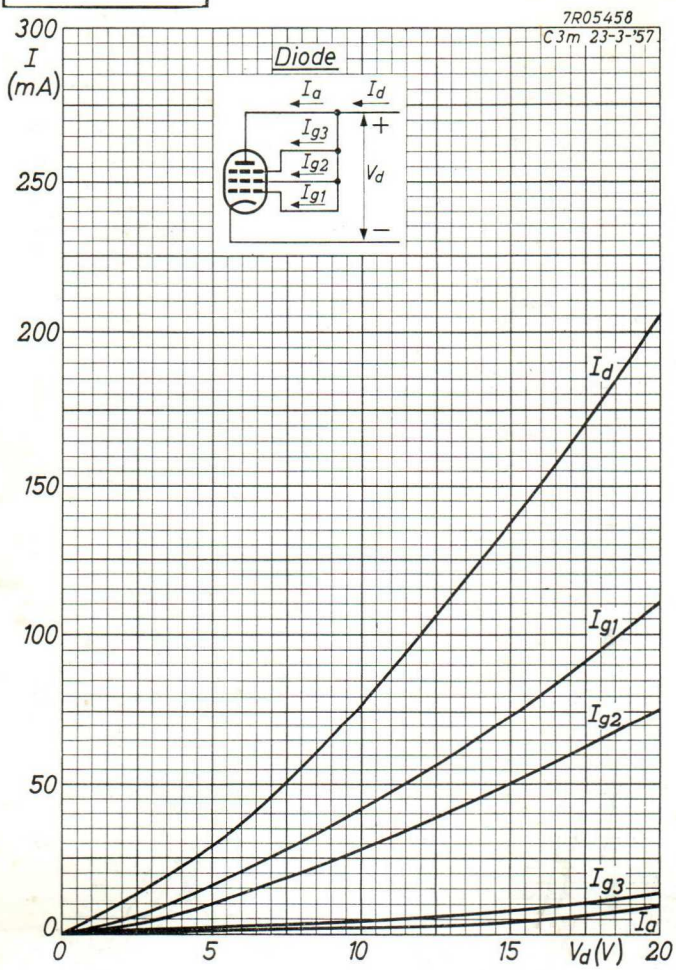
SQ PHILIPS

18048/C3m

10.10.1962

W

18048/C3m **PHILIPS** **SQ**



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