electronic tube

POCKETBOOK

PHILIPS ELECTRONIC TUBE DIVISION

CONTENTS

All type numbers contained in this booklet are arranged in numerical-alphabetical order in the section "Receiving and Amplifying tubes". For types not belonging to this group reference is made to the page where the data are given.

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Note: The fact that a tube is listed in this booklet does not imply that it can always be delivered at short notice.

CALENDAR FOR 1953

	JANUARY	FEBRUARY	MARCH
S	4 11 18 25	1 8 15 22	1 8 15 22 29
M	5 12 19 26	2 9 16 23	2 9 16 23 30
T	6 13 20 27	3 10 17 24	3 10 17 24 31
W	7 14 21 28	4 11 18 25	4 11 18 25
T	1 8 15 22 29	5 12 19 26	5 12 19 26
F	2 9 16 23 30	6 13 20 27	6 13 20 27
S	3 10 17 24 31	7 14 21 28	7 14 21 28

	APRIL	MAY	JUNE
S	5 12 19 26	3 10 17 24 31	7 14 21 28
M	6 13 20 27	4 11 18 25	1 8 15 22 29
T	7 14 21 28	5 12 19 26	2 9 16 23 30
W	1 8 15 22 29	6 13 20 27	3 10 17 24
T	2 9 16 23 30	7 14 21 28	4 11 18 25
F	3 10 17 24	1 8 15 22 29	5 12 19 26
S	4 11 18 25	2 9 16 23 30	6 13 20 27

	JULY	AUGUST	SEPTEMBER
S	5 12 19 26	2 9 16 23 30	6 13 20 27
M	6 13 20 27	3 10 17 24 31	7 14 21 28
T	7 14 21 28	4 11 18 25	1 8 15 22 29
W	1 8 15 22 29	5 12 19 26	2 9 16 23 30
T	2 9 16 23 30	6 13 20 27	3 10 17 24
F	3 10 17 24 31	7 14 21 28	4 11 18 25
S	4 11 18 25	1 8 15 22 29	5 12 19 26

	OCTOBER	NOVEMBER	DECEMBER
S	4 11 18 25	1 8 15 22 29	6 13 20 27
M	5 12 19 26	2 9 16 23 30	7 14 21 28
T	6 13 20 27	3 10 17 24	1 8 15 22 29
W	7 14 21 28	4 11 18 25	2 9 16 23 30
T	1 8 15 22 29	5 12 19 26	3 10 17 24 31
F	2 9 16 23 30	6 13 20 27	4 11 18 25
S	3 10 17 24 31	7 14 21 28	5 12 19 26

CALENDAR FOR 1954

	JANUARY	FEBRUARY	MARCH
S	3 10 17 24 31	7 14 21 28	7 14 21 28
M	4 11 18 25	1 8 15 22	1 8 15 22 29
T	5 12 19 26	2 9 16 23	2 9 16 23 30
W	6 13 20 27	3 10 17 24	3 10 17 24 31
T	7 14 21 28	4 11 18 25	4 11 18 25
F	1 8 15 22 29	5 12 19 26	5 12 19 26
S	2 9 16 23 30	6 13 20 27	6 13 20 27

	APRIL	MAY	JUNE
S	4 11 18 25	2 9 16 23 30	6 13 20 27
M	5 12 19 26	3 10 17 24 31	7 14 21 28
T	6 13 20 27	4 11 18 25	1 8 15 22 29
W	7 14 21 28	5 12 19 26	2 9 16 23 30
T	1 8 15 22 29	6 13 20 27	3 10 17 24
F	2 9 16 23 30	7 14 21 28	4 11 18 25
S	3 10 17 24	1 8 15 22 29	5 12 19 26

	JULY	AUGUST	SEPTEMBER
S	4 11 18 25	1 8 15 22 29	5 12 19 26
M	5 12 19 26	2 9 16 23 30	6 13 20 27
T	6 13 20 27	3 10 17 24 31	7 14 21 28
W	7 14 21 28	4 11 18 25	1 8 15 22 29
T	1 8 15 22 29	5 12 19 26	2 9 16 23 30
F	2 9 16 23 30	6 13 20 27	3 10 17 24
S	3 10 17 24 31	7 14 21 28	4 11 18 25

	OCTOBER	NOVEMBER	DECEMBER
S	3 10 17 24 31	7 14 21 28	5 12 19 26
M	4 11 18 25	1 8 15 22 29	6 13 20 27
T	5 12 19 26	2 9 16 23 30	7 14 21 28
W	6 13 20 27	3 10 17 24	1 8 15 22 29
T	7 14 21 28	4 11 18 25	2 9 16 23 30
F	1 8 15 22 29	5 12 19 26	3 10 17 24 31
S	2 9 16 23 30	6 13 20 27	4 11 18 25

CALENDAR FOR 1952

	JANUARY	FEBRUARY	MARCH
S	6 13 20 27	3 10 17 24	2 9 16 23 30
M	7 14 21 28	4 11 18 25	3 10 17 24 31
T	1 8 15 22 29	5 12 19 26	4 11 18 25
W	2 9 16 23 30	6 13 20 27	5 12 19 26
T	3 10 17 24 31	7 14 21 28	6 13 20 27
F	4 11 18 25	1 8 15 22 29	7 14 21 28
S	5 12 19 26	2 9 16 23	1 8 15 22 29

	APRIL	MAY	JUNE
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M	7 14 21 28	5 12 19 26	2 9 16 23 30
T	1 8 15 22 29	6 13 20 27	3 10 17 24
W	2 9 16 23 30	7 14 21 28	4 11 18 25
T	3 10 17 24	1 8 15 22 29	5 12 19 26
F	4 11 18 25	2 9 16 23 30	6 13 20 27
S	5 12 19 26	3 10 17 24 31	7 14 21 28

	JULY	AUGUST	SEPTEMBER
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T	1 8 15 22 29	5 12 19 26	2 9 16 23 30
W	2 9 16 23 30	6 13 20 27	3 10 17 24
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F	4 11 18 25	1 8 15 22 29	5 12 19 26
S	5 12 19 26	2 9 16 23 30	6 13 20 27

	OCTOBER	NOVEMBER	DECEMBER
S	5 12 19 26	2 9 16 23 30	7 14 21 28
M	6 13 20 27	3 10 17 24	1 8 15 22 29
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T	2 9 16 23 30	6 13 20 27	4 11 18 25
F	3 10 17 24 31	7 14 21 28	5 12 19 26
S	4 11 18 25	1 8 15 22 29	6 13 20 27

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DATA OF ELECTRONIC TUBES

TYPE NUMBER SYSTEM

Below the present type number system is given for tubes having type numbers which provide information concerning electrical data, principal uses, bases etc. of the tube.
It is pointed out, however, that in a few instances it has not been possible to adhere strictly to this system.

RECEIVING AND AMPLIFYING TUBES

The type number consists of a number of capital letters followed by either one or two figures (e.g. EF 6, UCH 81).

First letter: indicates the filament rating.
Second and subsequent letters: indicate the type classification.
Figures: indicate a serial number.

The key to this system is given in the following tables.

First letter

A — 4 V
C — 200 mA
D — 1.4 V battery
E — 6.3 V
G — 5 V
K — 2 V battery
O — no filament
P — 300 mA
U — 100 mA

Second and subsequent letters

A — R.F. single diode
B — R.F. double diode
C — Triode (except output and gasfilled triodes)
D — Output triode
E — Tetrode (except output tetrodes)

F — Pentode (except output pentodes)
H — Hexode or heptode
K — Octode or heptode
L — Output tetrode or pentode
M — Tuning indicator
P — Tube with secondary emission system
Q — Enneode
X — Full-wave gasfilled rectifying tube
Y — Half-wave high-vacuum rectifying tube
Z — Full-wave high-vacuum rectifying tube

Figures

Serial number

SPECIAL TUBES

(reliable, ruggedized, long life tubes, etc.)

The system is similar to that of receiving and amplifying tubes, however, the figures are placed between the letters (e.g. E80F, E90CC).

CATHODE-RAY TUBES

The type number consists of two capital letters followed by two sets of figures (e.g. DG 13-2, MW 31-16).

First letter: indicates the method of focusing and deflection.

Second letter: indicates properties of the screen.

First group of figures: indicates dimensions of the screen.

Second group of figures: indicates a serial number.

The key to this system is given in the following tables.

First letter

D — Electrostatic focusing and electrostatic deflection in two directions.

M — Electromagnetic focusing and electromagnetic deflection.

Second letter

B — Bluish fluorescence, short persistence (1% of max. brightness after 0.01 sec)

F — Orange fluorescence, very long persistence (0.1% of max. brightness after 75 sec).

G — Green fluorescence, medium persistence (1% of max. brightness after 0.05 sec).

N — Green fluorescence, long persistence (0.1% of max. brightness after 6.4 sec)

P — Double layer screen, bluish fluorescence of short persistence followed by greenish-yellow fluorescence of very long persistence (0.1% of max. brightness after 80 sec)

R — Greenish-yellow fluorescence, long persistence (0.1% of max. brightness after 20 sec)

W — White fluorescence, medium persistence
Direct-viewing tubes: colour temp. 8000 °K
Projection tubes : colour temp. 5500 °K

First group of figures

Four round tubes : screen diameter in cm
For rectangular tubes: screen diagonal in cm

Second group of figures

Serial number

TRANSMITTING TUBES

The type number consists of two or three capital letters followed by two sets of figures. For some types a group of letters is added (e.g. TAL 12/10, DCG 4/1000 G).

First letter: indicates the tube classification.
Second letter: indicates type of filament or cathode.
First group of figures: indicates operating voltage.
Second group of figures: indicates power.
Added letters: indicate the tube base.

The key to this system is given in the following tables.

First letter

D — Rectifying tube (included grid-controlled tubes)
M — Triode (A.F. amplifying tube or modulator)
P — Pentode
Q — Tetrode
T — Triode (R.F., A.F. or oscillator tube)

For tubes having dual systems two of the above mentioned letters are used. (e.g. QQC 04/15)

Second letter

(third letter for tubes having dual systems)

A — Directly-heated tungsten filament
B — Directly-heated thoriated tungsten filament
C — Directly-heated oxide-coated filament
E — Indirectly-heated oxide-coated cathode

Third letter

(fourth letter for tubes having dual systems)

G — Mercury-vapour filling
L — Forced air cooling
W — Water cooling
X — Xenon filling

When the type number does not contain a letter indicating the cooling the tube is radiation cooled.

First group of figures

Rectifying tubes: Approx. D.C. output voltage in kilovolts in a three-phase half-wave rectifying circuit.

Transmitting tubes: Approx. max. anode voltage in kilovolts.

Second group of figures

Rectifying tubes:	Approx. D.C. output power in watts or kilowatts per tube in a three-phase half-wave rectifying circuit.
R.F. tubes:	Approx. output power in watts or kilowatts in class C telegraphy.
Modulators:	Approx. anode dissipation in watts or kilowatts.

Added letters

E — Medium 7p.-base
ED — Edison base
EG — Goliath base
G — Medium 4p.-base
GB — Jumbo 4p.-base
N — Medium 5p.-base
P — P-base

PHOTOTUBES

The type number consists of two figures followed by two letters (e.g. 90AV).

First figure : indicates the tube base.
Second figure: indicates a serial number.
First letter : indicates the type of cathode.
Second letter: indicates the class of phototube.

The key for this system is given in the following tables.

First figure

2 — Loctal 8p.-base
3 — Octal 8p.-base
5 — Special base
8 — Noval 9p.-base
9 — Miniature 7p.-base

Second figure

Serial number

First letter

A — Caesium-antimony cathode (blue sensitive)
C — Caesium-on-oxidized-silver cathode (red sensitive)

Second letter

G — Gasfilled
V — High vacuum

VOLTAGE STABILIZERS

The type number consists of a number followed by a capital letter, a figure and in some cases by a second capital letter. (e.g. 85A2, 150C1K)

Number: indicates burning voltage.
First letter: indicates the current range.
Figure: indicates a serial number.
Second letter: indicates the tube base.

The key for this system is given in the following tables.

Number

Average burning voltage in volts

First letter

A — max. 8 mA
B — max. 20 mA
C — max. 40 mA
D — max. 100 mA
E — max. 200 mA

Figure

Serial number

Second letter

K — Octal 8p.-base
P — P-base

SYMBOLS

Electrodes

a	Anode
a_h	Auxiliary anode
a_{ign}	Ignition anode
d	Anode of detection diode
D	Deflection plate or rod
f	Filament or resistance wire
f_c	Filament tap or tap of resistance wire
g	Grid
$i.c$	Internal connection (not to be connected externally)
k	Cathode
$k_{(i)}$	Input cathode lead of U.H.F. tube
$k_{(o)}$	Output cathode lead of U.H.F. tube
l	Fluorescent screen
m	External conducting coating
s	Internal shield
S	Switch

Electrode systems

D	Diode
H	Hexode or Heptode
P	Pentode
T	Triode

Voltages

V_a	Anode voltage
V_{aarc}	Anode voltage of conducting tube
V_{arms}	A.C. anode voltage (r.m.s. value)
V_{ag}	Voltage between anode and grid
V_{ah}	Auxiliary anode voltage
V_{aharc}	Auxiliary anode voltage of conducting tube
V_{ahign}	Ignition voltage of auxiliary anode
V_{ahp}	Peak value of auxiliary anode voltage
V_{ainvp}	Peak value of inverse anode voltage
V_{ap}	Peak value of anode voltage
V_{arc}	Arc voltage

V_b	Supply voltage
V_{ba}	Anode supply voltage
V_{bg_2}	Supply voltage of second grid
V_{burn}	Burning voltage of voltage stabilizer
ΔV_{burn}	Burning voltage variation of voltage stabilizer in stabilizing range
V_{contr}	Voltage range of current regulator
V_d	Anode voltage of detection diode
V_{dinv}	Inverse anode voltage of detection diode
V_{dinvp}	Peak value of inverse anode voltage of detection diode
V_f	Filament voltage
V_g	Grid voltage
V_g (arc)	Grid voltage of conducting tube
V_{ginvp}	Peak value of inverse grid voltage
V_{gp}	Peak value of grid voltage
V_i	A C input voltage per tube
V_{ign}	Ignition voltage
V_{invp}	Peak value of inverse voltage
V_k	Voltage between cathode and chassis
V_{kf}	Voltage between cathode and filament
V_{kfp}	Peak value of voltage between cathode and filament
V_l	Voltage of fluorescent screen
V_o	A.C output voltage. D C. output voltage
V_{osc}	Oscillator voltage
V_{tr}	Secondary transformer voltage (without load)

Currents

I_a	Anode current
I_{ah}	Auxiliary anode current
I_{amax}	Anode current at full drive
I_{amin}	Anode current without drive
I_{ap}	Peak value of anode current
I_b	Supply current
I_{contr}	Current range of voltage stabilizer
I_d	Anode current of detection diode
I_{dp}	Peak value of anode current of detection diode

I_f	Filament current
I_g	Grid current
$I_{g\max}$	Grid current at full drive
$I_{g\min}$	Grid current without drive
I_{gp}	Peak value of grid current
I_k	Cathode current
I_l	Current of fluorescent screen
I_o	D.C. output current per tube
I_{rec}	Recommended current
I_{reg}	Stabilized current of current regulator
I_{surge}	Surge current

Powers

W_a	Max. anode dissipation
W_{ig}	Driving power
W_o	Max. output power

Resistances

R_a	External anode resistor; Matching resistance; Total anode resistance of rectifying tube
R_{aa}	Matching resistance of push-pull amplifier (anode to anode)
$R_{damping}$	Damping resistance
R_{eq}	Equivalent noise resistance
R_E	Resistance of thermo-element
R_f	Resistance of filament
R_g	External resistance between grid and cathode
R_g'	External resistance between grid and cathode of next tube
R_i	Internal resistance
R_{id}	Internal resistance of detection diode
R_k	Resistance between cathode and chassis
R_{kf}	External resistance between cathode and filament
R_t	Total anode resistance of rectifying tube
R_1	External resistance between $+V_b$ and g_2 } potentiometer
R_2	External resistance between g_2 and chassis } potentiometer

R_1	External resistance between $+ V_b$ and g_2	potentiometer
R_2	External resistance between g_2 and k	potentiometer
R_3	External resistance between k and chassis	potentiometer

Capacitances

C_a	Anode to all other elements except control grid
C_{ag}	Anode to grid, all other elements earthed
C_{ak}	Anode to cathode, all other elements earthed
C_{dk}	Anode to cathode of detection diode, all other elements earthed
$C_{DD'}$	Deflection plate D to deflection plate D', all other elements earthed
C_{filt}	Input capacitor of smoothing filter
C_g	Grid to all other elements except anode

Miscellaneous

d_{tot}	Total distortion
freq.	Frequency
g	Voltage gain per stage
m	Number of anodes of rectifying tube
N	Sensitivity
S	Mutual conductance
S_c	Conversion conductance
S_{eff}	Effective slope of oscillator tube
S_0	Mutual conductance of oscillator triode at $V_g = 0$ V and $V_{osc} = 0$ V
t_{amb}	Ambient temperature
t_{Hg}	Temperature of condensed mercury (at the cathode)
t_{rec}	Recommended temperature
T_{av}	Averaging time
T_{dion}	Deionization time
T_h	Heating time of tube
T_{ion}	Ionization time
T_{imp}	Pulse time
α	Shadow angle on fluorescent screen
η	Efficiency
μ	Gain factor
$\mu_{g_2g_1}$	Gain factor of grid No. 2 with respect to grid No. 1

RECEIVING AND AMPLIFYING TUBES

Type of tube		Diode pentode	Double diode	Double diode triode High μ	Triple diode triode High μ	Double diode pentode Var μ	Triode	Double triode
Filament voltage or current	1.4 V	DAF 91						
	4 V							
	5 V							
	6.3 V	EAF 42	EB 91	EBC 41	EABC 80	EBF 80	EC 92	ECC 40 ECC 81
	100 mA	UAF 42	UB 41	UBC 41	UABC 80	UBF 80	UC 92	
	300 mA		EB 91			EBF 80		ECC 81

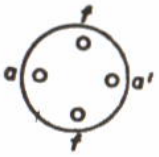
TYPES

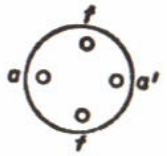
Triode output pentode	Pentode			Mixer	Enneode	Tuning indicator	High-vacuum rectifier
	Var μ	Sharp cut off	Output				
	DF 91	DF 92	DL 92 DL 94	DK 91 DK 92		DM 70	
							AZ 41
							GZ 32
ECL 80	EF 41 EF 85	EF 40 EF 80	EL 34 EL 41 EL 42 EL 81 EL 83	ECH 42 ECH 81	EQ 80	EM 34	EY 51 EY 80 EZ 80
	UF 41 UF 85	UF 80	UL 41	UCH 42 UCH 81		UM 4	UY 41 UY 42
ECL 80	EF 85	EF 80	PL 81 PL 82 PL 83	ECH 81			PY 81 PY 82

RECEIVING AND AMPLIFYING TUBES

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
58 CG 58 CV	Phototubes, see p. 162					
85 A1 85 A2	Voltage reference tubes, see p. 164					
90 AG 90 AV 90 CG 90 CV	Phototubes, see p. 162					
100 E1 150 A1 150 B2 150 C1	Voltage stabilizers, see p. 164					
328	Industrial rectifying tube, see p. 142					
329 340	Current regulators, see p. 170					
354 367 451	Industrial rectifying tubes, see p. 142					

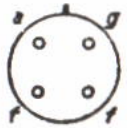
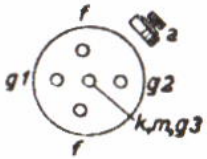
452	Current regulator, see p. 170
1002 **1010**	Industrial rectifying tubes, see p. 142
1012	Current regulator, see p. 170
1037 **1039** **1048** **1049** **1053** **1054** **1059** **1063A** **1069K** **1089** **1110** **1119**	Industrial rectifying tubes, see p. 142
1120	Current regulator, see p. 170
1129 **1138** **1163** **1164** **1173** **1174** **1176** **1177**	Industrial rectifying tubes, see p. 142

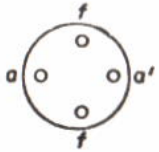
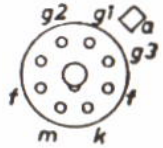
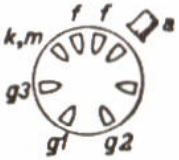
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
1331	Current-regulator, see p. 170					
1533 **1534** **1543** **1544** **1553** **1554**	Industrial rectifying tubes, see p. 142					
1561 Full-wave rectifying tube	V_f = 4 V I_f = 2 A	Rectifier	V_{tr} = 2×500 V = 2×400 V = 2×300 V	I_o = max. 120 = max. 140 = max. 160	C_{filt} > 60 μF R_t = min. 50 Ω C_{filt} > 60 μF R_t = min. 100 Ω	 A [1])
1564 **1701** **1710** **1725A** **1729** **1738** **1749A** **1768** **1788**	Industrial rectifying tubes, see p. 142					

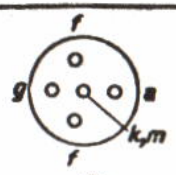
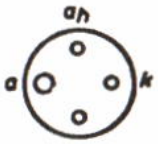
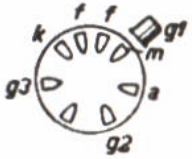
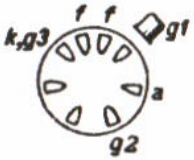
1805 Full-wave rectifying tube	$V_f = 4$ V $I_f = 1$ A	Rectifier	$V_{tr} = 2\times500$ V $= 2\times300$ V	$I_e =$ max. 60 $=$ max. 100		 A
1838 **1849** **1859**	Industrial rectifying tubes, see p. 142					

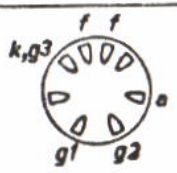
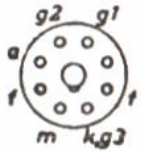
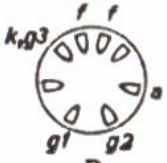
[1]) Tube base, for socket see p. 175

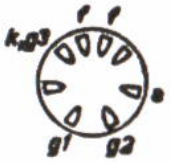
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
1904 1910 1941 1945	Current regulators, see p. 170					
3530 3533 3538 3545 3546 3554	Phototubes, see p. 162					
4060 4065 4066	Electrometer tubes, see p. 168					
4152	Bimetal relay, see p. 169					
4349 4369 4370 4371 4372 4373	Surge arresters, see p. 166					

4378 **4379** **4380** **4383** **4390** **4397**	Surge arresters, see p. 166					
4624 Output triode	$V_f = 7.2$ V $I_f = 1.1$ A	Class A final amplifier	$V_a = 800$ V $V_g = -90$ V	$I_a = 35$	$S = 2.3$ mA/V $R_i = 3$ kΩ $\mu = 7$ $R_a = 11$ kΩ $W_o = 9$ W $W_a = 32$ W	 W
4630 Triode	$V_f = 4.2$ V $I_f = 0.25$ A	Pre-amplifier	$V_a = 130$ V $R_a = 6$ kΩ $V_g = -8.4$ V	$I_a = 8.5$	$S = 1.3$ mA/V $R_i = 5.5$ kΩ $g = 1.3$ N $W_a = 1.1$ W	 Spec. 4 p. (3)
4631 Triode	$V_f = 2$ V $I_f = 0.25$ A	Pre-amplifier	$V_a = 130$ V $R_a = 0.6$ MΩ $V_g = -1.5$ V	$I_a = 0.7$	$S = 0.5$ mA/V $R_i = 55$ kΩ $g = 3.24$ N $W_a = 1.1$ W	
4636 Pentode	$V_f = 4$ V $I_f = 1.1$ A	Typical characteristics	$V_a = 200$ V $V_{g2} = 100$ V $V_{g1} = -2$ V	$I_a = 3$ $I_{g2} = 1.2$	$S = 2.3$ mA/V $R_i = 2.2$ MΩ $C_{ag1} < 6$ mpF	 O

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
4641 Output triode	V_f = 4 V I_f = 2.1 A	Typical characteristics	V_a = 1500 V V_{g1} = —140 V	I_a = 15	S = 2 mA/V R_i = 4.6 kΩ μ = 10 W_a = 25 W	 W
4652 = AX 1 Gasfilled full-wave rectifying tube	V_f = 4 V I_f = 2.4 A	Rectifier	V_{tr} = 2×500 V V_{arc} = max. 15 V	I_o = max. 125	R_t = min. 200 Ω C_{filt} = max. 64 μF R_t = min. 150 Ω C_{filt} = max. 32 μF R_t = min. 100 Ω C_{filt} = max. 16 μF	 A
4654 Output pentode	V_f = 6.3 V I_f = 1.35 A	Class A final amplifier	V_a = 250 V V_{g2} = 275 V R_k = 175 Ω	I_a = 72 I_{g2} = 8	S = 8.5 mA/V R_i = 22 kΩ R_a = 3.5 kΩ W_o = 9.2 W W_a = 18 W	 Octal 4654 K
		Class AB push-pull amplifier	V_b = 375 V R_{g2} = 500 Ω R_k = 195 Ω	$I_{a\,min}$ = 2× 53 $I_{a\,max}$ = 2× 67 I_{g2min} = 2×6.5 I_{g2max} = 2× 16	R_{aa} = 5 kΩ W_o = 26 W	 P 4654 P

4657 Triode	V_f = 4 V I_f = 1.0 A	Typical characteristics	V_a = 200 V V_g = −1.5 V	I_a = 1	S = 2.2 mA/V R_i = 45 kΩ μ = 99 C_{ag} < 3 pF	 O
4662 Neon tuning indicator		Tuning indicator	V_a = 150—170 V V_{ah} = 165—190 V	I_a = 2 I_{ah} = 0.04—0.05		 Spec. 4 p. (1)
4671 **4672**	U.H.F. tubes, see p. 116					
4673 R.F. pentode	V_f = 4 V I_f = 1.35 A	R.F. amplifier	V_a = 250 V V_{g2} = 200 V V_{g1} = −2.5 V	I_a = 8 I_{g2} = 1.5	S = 5 mA/V R_i > 1.5 MΩ C_{ag1} < 12 mpF	 P
4682 Output pentode	V_f = 4 V I_f = 1.0 A	Class AB push-pull amplifier	V_a = 375 V V_{g2} = 250 V R_k = 540 Ω	$I_{a\,min}$ = 2× 24 $I_{a\,max}$ = 2× 29 $I_{g2\,min}$ = 2×3.5 $I_{g2\,max}$ = 2× 4	R_{aa} = 15 kΩ W_o = 14 W	 P
		Class B push-pull amplifier	V_a = 375 V V_{g2} = 250 V V_{g1} = −32 V	$I_{a\,min}$ = 2× 20 $I_{a\,max}$ = 2× 45 $I_{g2\,min}$ = 2× 3 $I_{g2\,max}$ = 2×5.5	R_{aa} = 9 kΩ W_o = 19 W	

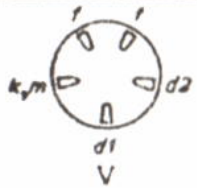
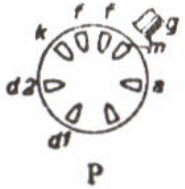
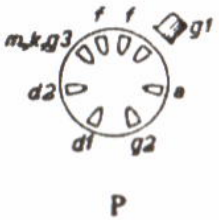
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
4683 Output triode	$V_f = 4$ V $I_f = 0.95$ A	Class AB push-pull amplifier	$V_a = 350$ V $R_k = 850\ \Omega$	I_a min $= 2\times 43$ I_a max $= 2\times 46$	$R_{aa} = 8$ kΩ $W_o = 15.6$ W	P
		Class B push-pull amplifier	$V_a = 350$ V $V_g = -75$ V	I_a min $= 2\times 35$ I_a max $= 2\times 70$	$R_{aa} = 5$ kΩ $W_o = 20$ W	
4687	Voltage stabilizer, see p. 164					
4688 Output pentode	$V_f = 4$ V $I_f = 2$ A	Class AB push-pull amplifier	$V_a = 375$ V $V_{g2} = 275$ V $R_k = 165\ \Omega$	I_a min $= 2\times 48$ I_a max $= 2\times 62$ I_{g2} min $= 2\times 5$ I_{g2} max $= 2\times 9$	$R_{aa} = 6.5$ kΩ $W_o = 28.5$ W	 P
4689 Output pentode	$V_f = 6.3$ V $I_f = 1.35$ A	Class AB push-pull amplifier	$V_a = 375$ V $V_{g2} = 275$ V $R_k = 165\ \Omega$	I_a min $= 2\times 48$ I_a max $= 2\times 62$ I_{g2} min $= 2\times 5$ I_{g2}max $= 2\times 9$	$R_{aa} = 6.5$ kΩ $W_o = 28.5$ W	 Octal  P
4690	Thyratron, see p. 147					

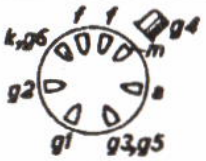
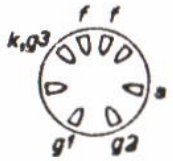
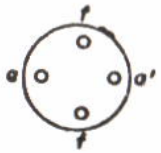
4694 Output pentode	V_f = 6.3 V I_f = 0.9 A	Class AB push-pull amplifier	V_a = 375 V V_{g2} = 250 V R_k = 145 Ω	I_a min = 2× 24 I_a max = 2× 30 I_{g2} min = 2×2.5 I_{g2}max = 2× 5	R_{aa} = 13 kΩ W_o = 12 W	
4699 N Output pentode	V_f = 6.3 V I_f = 1.5 A	Class A final amplifier	V_a = 250 V V_{g2} = 250 V R_k = 90 Ω	I_a = 72 I_{g2} = 8	S = 14.5 mA/V R_i = 20 kΩ R_a = 3.5 kΩ W_o = 8 W W_a = 18 W	 P
		Class AB push-pull amplifier	V_b = 375 V R_{g2}[1]) = 700 Ω R_k = 125 Ω	I_a min = 2× 52 I_a max = 2× 64 I_{g2} min = 2×6.5 I_{g2}max = 2× 17	R_{aa} = 6 kΩ W_o = 27.5 W	
5854	Image iconoscope, see p. 173					
7475 **13201**	Voltage stabilizers, see p. 164					
18004 **18040** **18042** **18045** **18046**	Repeater tubes, see p. 110					
18120 **18121** **18130**	Image converters, see p. 172					

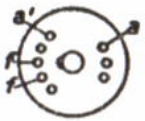
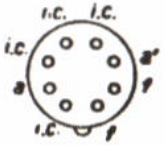
[1]) Common screen-grid resistor.

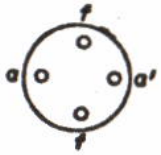
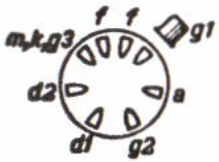
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
18500 18501 18502 18513 18514	Radiation counter tubes, see p. 173					
20610 tot 28216	X-ray tubes, see p. 152					
55030 55032 55035 55040 55085-01 55085-02 55085-03 55085-04 55100-01 55100-02 55100-03 55100-04 55230	Magnetrons, see p. 174					
55390 55395	Klystrons, see p. 174					
56000	High-vacuum diode, see p. 174					

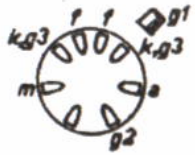
56030 56031 56085 56100	TR and ATR switches, see p. 174

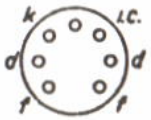
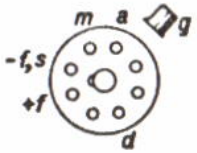
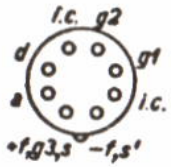
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
AB 2 Double diode	$V_f =$ 4 V $I_f =$ 0.65 A	Detector and A.G.C.	$V_{d\ invp} =$ max. 420 V	I_d = max. 0.8		
ABC 1 Double diode triode	$V_f =$ 4 V $I_f =$ 0.65 A	Typical characteristics	V_a = 250 V V_g = −7 V	I_a = 4	S = 2.0 mA/V R_i = 13.5 kΩ μ = 27	
ABL 1 Double diode output pentode	$V_f =$ 4 V $I_f =$ 2.4 A	Class A final amplifier	V_a = 250 V V_{g2} = 250 V V_{g1} = −6 V R_k = 150 Ω	I_a = 36 I_{g2} = 4	S = 9 mA/V R_i = 50 kΩ R_a = 7 kΩ W_o = 4.5 W W_a = 9 W	
AF 3 Variable mu pentode	$V_f =$ 4 V $I_f =$ 0.65 A	R.F. or I.F. amplifier	V_a = 250 V V_{g2} = 100 V V_{g1} = −3 V	I_a = 8 I_{g2} = 2.6	S = 1.8 mA/V R_i = 1.2 MΩ C_{ag1} < 3 mpF	
AF 7 R.F. pentode	$V_f =$ 4 V $I_f =$ 0.65 A	R.F. amplifier	V_a = 250 V V_{g2} = 100 V V_{g1} = −2 V	I_a = 3 I_{g2} = 1.1	S = 2.1 mA/V R_i = 2 MΩ	

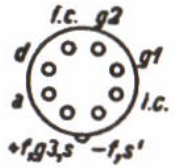
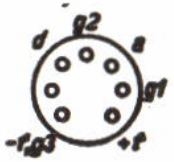
AK 2 Octode	V_f = 4 V I_f = 0.65 A	Frequency changer	V_a = 250 V V_{g3+g5} = 70 V V_{g4} = −1.5 V V_{g2} = 90 V R_{g1} = 50 kΩ	I_a = 1.6 I_{g3+g5} = 3.8 I_{g2} = 2.0 I_{g1} = 0.19	S_c = 0.6 mA/V R_i = 1.6 MΩ	 P
AL 4 Output pentode	V_f = 4 V I_f = 1.75 A	Class A final amplifier	V_a = 250 V V_{g2} = 250 V V_{g1} = −6 V R_k = 150 Ω	I_a = 36 I_{g2} = 4	S = 9 mA/V R_i = 50 kΩ R_a = 7 kΩ W_o = 4.5 W W_a = 9 W	 P
AX 1	= 4652					
AX 50 Gasfilled full-wave rectifying tube	V_f = 4 V I_f = 3.75 A	Rectifier	V_{tr} = 2×500 V V_{arc} = max. 15 V	I_o = max. 275	C_{filt} = max. 64 μF R_t = min. 200 Ω C_{filt} = max. 32 μF R_t = min. 150 Ω C_{filt} = max. 16 μF R_t = min. 100 Ω	 A
AZ 1 Full-wave rectifying tube	V_f = 4 V I_f = 1.1 A	Rectifier	V_{tr} = 2×500 V = 2×400 V = 2×300 V	I_o = max. 60 = max. 75 = max. 100	C_{filt} = max. 60 μF	P

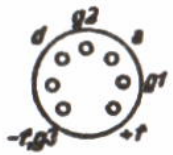
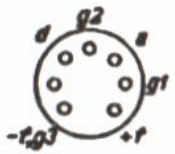
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
AZ 4 Full-wave rectifying tube	$V_f =$ 4 V $I_f =$ 2.3 A	Rectifier	V_{tr} = 2×500 V = 2×400 V = 2×300 V	I_o = max. 120 = max. 150 = max. 200	C_{filt} = max. 60 μF	P
AZ 11 Full-wave rectifying tube	$V_f =$ 4 V $I_f =$ 1.1 A	Rectifier	V_{tr} = 2×500 V = 2×400 V = 2×300 V	I_o = max. 60 = max. 75 = max. 100	C_{filt} = max. 60 μF	 Y
AZ 12 Full-wave rectifying tube	$V_f =$ 4 V $I_f =$ 2.3 A	Rectifier	V_{tr} = 2×500 V = 2×400 V = 2×300 V	I_o = max. 120 = max. 150 = max. 200	C_{filt} = max. 60 μF	
AZ 31 Full-wave rectifying tube	$V_f =$ 4 V $I_f =$ 1.1 A	Rectifier	V_{tr} = 2×500 V = 2×400 V = 2×300 V	I_o = max. 60 = max. 75 = max. 100	C_{filt} = max. 60 μF	Octal
AZ 41 Full-wave rectifying tube	$V_f =$ 4 V $I_f =$ 0.72 A	Rectifier	V_{tr} = 2×500 V = 2×400 V = 2×300 V	I_o = max. 60 = max. 60 = max. 70	C_{filt} = max. 50 μF	 Rimlock

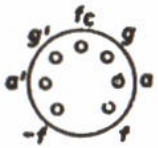
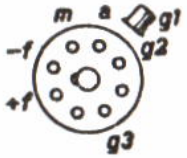
AZ 50 Full-wave rectifying tube	$V_f =$ 4 V $I_f =$ 3 A	Rectifier	V_{tr} = 2×500 V = 2×400 V = 2×300 V	I_o = max. 250 = max. 275 = max. 300	C_{filt} = max. 64 μF R_t = min. 200 Ω C_{filt} = max. 32 μF R_t = min. 150 Ω C_{filt} = max. 16 μF R_t = min. 100 Ω	 A
C 8 **C 10** **C 12**	Current regulators, see p. 170					
CBL 1 Double diode output pentode	$V_f =$ 44 V $I_f =$ 0.2 A	Class A final amplifier	V_a = 200 V V_{g2} = 200 V V_{g1} = −8.5 V R_k = 170 Ω	I_a = 45 I_{g2} = 6	S = 8 mA/V R_i = 40 kΩ R_a = 4.5 kΩ W_o = 4 W W_o = 9 W	 P
			V_a = 100 V V_{g2} = 100 V V_{g1} = −4 V R_k = 170 Ω	I_a = 21 I_g = 3	S = 6.5 mA/V R_i = 48 kΩ R_a = 4.5 kΩ W_o = 0.85 W	

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
CF 50 A.F. pentode	V_f = 30 V I_f = 0.2 A	Typical characteristics	V_a = 250 V V_{g2} = 100 V V_{g1} = −2 V	I_a = 1.5 I_{g2} = 0.3	S = 3.3 mA/V R_i = 2.5 MΩ μ_{g2g1} = 45	 P
		A.F. amplifier	V_b = 250 V R_a = 0.3 MΩ R_{g2} = 0.9 MΩ R_k = 2 kΩ	I_a = 0.7 I_{g2} = 0.18	g = 315	
			V_b = 450 V R_a = 0.3 MΩ R_{g2} = 1 MΩ V_{g1} = −2 V = −10 V = −12 V	I_a = 1.3 = 0.22 = 0.04	g = 395 = 90 = 7	
CY 2 Double half-wave rectifying tube	V_f = 30 V I_f = 0.2 A	Rectifier (cathodes and anodes interconnected)	V_i = 250 V	I_o = max. 120	C_{filt} = 32/16 μF R_t = min. 125/75 Ω	 P
		Voltage doubler	V_i = 127 V	I_o = max. 60	C_{filt} = max. 32 μF R_t = 0 Ω	

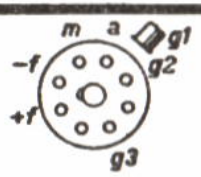
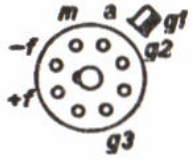
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
DA 90 Single diode	$V_f = 1.4$ V $I_f = 0.15$ A	Detector	$V_{dinvp} =$ max. 330 V	I_d = max. 0.5 I_{dp} = max. 5	V_{kf} = max. 140 V	 Miniature
DAC 21 Diode triode	$V_f = 1.4$ V $I_f = 25$ mA	Typical characteristics	$V_a = 120$ V $V_g = 0$ V	$I_a = 0.75$	$S = 0.4$ mA/V $R_i = 0.1$ MΩ $\mu = 40$	 Octal
			$V_a = 90$ V $V_g = 0$ V	$I_a = 0.45$	$S = 0.3$ mA/V $R_i = 0.13$ MΩ $\mu = 40$	
		A.F. amplifier	$V_b = 120$ V $V_g = 0$ V $R_a = 0.5$ MΩ	$I_a = 0.12$	$g = 25$	
			$V_b = 90$ V $V_g = 0$ V $R_a = 0.5$ MΩ	$I_a = 0.08$	$g = 23$	
DAF 40 Diode pentode	$V_f = 1.4$ V $I_f = 25$ mA	R.F. or I.F. amplifier	$V_a = 120$ V $R_{g2} = 0.27$ MΩ $V_{g1} = 0$ V	$I_a = 0.85$ $I_{g1} = 0.20$	$S = 0.7$ mA/V $R_i = 2.6$ MΩ $C_{ag1} <$ 7 mpF	 Rimlock
			$V_a = 67.5$ V $V_{g2} = 67.5$ V $V_{g1} = 0$ V	$I_a = 0.85$ $I_{g2} = 0.20$	$S = 0.7$ mA/V $R_i = 1.6$ MΩ	

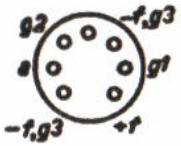
DAF 41 Diode pentode	$V_f = 1.4$ V $I_f = 25$ mA	A.F. amplifier	V_b = 150 V R_a = 0.47 MΩ R_{g2} = 2.2 MΩ V_{g1} = 0 V	I_a = 0.24 I_{g2} = 0.05	g = 112	 Rimlock
			V_b = 90 V R_a = 0.47 MΩ R_{g2} = 2.2 MΩ V_{g1} = 0 V	I_a = 0.13 I_{g2} = 0.03	g = 83	
			V_b = 67.5 V R_a = 0.22 MΩ R_{g2} = 0.82 MΩ V_{g1} = 0 V	I_a = 0.17 I_{g2} = 0.04	g = 60	
DAF 91 Diode pentode	$V_f = 1.4$ V $I_f = 50$ mA	Typical characteristics	V_a = 67.5 V V_{g2} = 67.5 V V_{g1} = 0 V	I_a = 1.6 I_{g2} = 0.4	S = 0.62 mA/V R_i = 0.6 MΩ	 Miniature
		A.F. amplifier	V_b = 90 V R_a = 1 MΩ R_{g2} = 3.9 MΩ V_{g1} = 0 V R_{g1} = 10 MΩ	I_b = 0.09	g = 60	

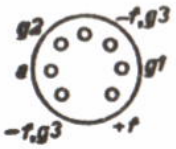
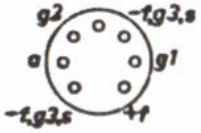
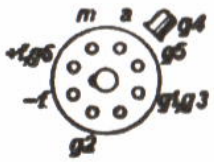
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
DAF 91 (continued)	V_f = 1.4 V I_f = 50 mA	A.F. amplifier	V_b = 67.5 V R_a = 1 MΩ R_{g2} = 3.9 MΩ V_{g1} = 0 V R_{g1} = 10 MΩ	I_b = 0.06	g = 55	 Miniature
			V_b = 45 V R_a = 1 MΩ R_{g2} = 3.9 MΩ V_{g1} = 0 V R_{g1} = 10 MΩ	I_b = 0.04	g = 42	
DAF 96[1]) Diode pentode	V_f = 1.4 V I_f = 25 mA	A.F. amplifier	V_b = 63.5 V R_a = 1 MΩ R_{g2} = 3.3 MΩ R_{g1} = 10 MΩ R_{g1}' = 2 MΩ	I_a = 0.032 I_{g2} = 0.009	g = 52	 Miniature
			V_b = 85 V R_a = 1 MΩ R_{g2} = 3.3 MΩ R_{g1} = 10 MΩ R_{g1}' = 2 MΩ	I_a = 0.05 I_{g2} = 0.015	g = 62	
DB	Instrument tubes, see p. 120					

DC 80	U.H.F tube, see p. 116					
DCC 90 Double triode	$V_f = 1.4$ V $I_f = 0.22$ A	Typical characteristics (per system)	$V_a = 90$ V $V_g = -2.5$ V	$I_a = 3.7$	$S = 1.8$ mA/V $R_i = 8.3$ kΩ $\mu = 15$	 Miniature
	$V_f = 2.8$ V $I_f = 0.11$ A	R.F. push-pull amplifier or oscillator (intermittent operation)	$V_a = 135$ V $V_{g1} = -20$ V $V_{in} = 2 \times 45$ V	$I_a = 2 \times 15$ $I_g = 2 \times 2.5$	freq. = 40 Mc/s $W_o = 2$ W	
DCG DCX	Rectifying tubes for transmitting purposes, see p. 138					
DF 21 Pentode	$V_f = 1.4$ V $I_f = 25$ mA	R.F. or I.F amplifier	$V_a = 120$ V $R_{g2} = 120$ kΩ $V_{g1} = 0$ V	$I_a = 1.2$ $I_{g2} = 0.25$	$S = 0.7$ mA/V $R_i = 2.5$ MΩ $C_{ag1} < 6$ mpF	 Octal
			$V_a = 90$ V $V_{g2} = 90$ V $V_{g1} = 0$ V	$I_a = 1.2$ $I_{g2} = 0.25$	$S = 0.7$ mA/V $R_i = 2$ MΩ	
		A.F. amplifier	$V_b = 120$ V $R_a = 0.5$ MΩ $V_{g2} = 2$ MΩ $R_{g1} = -0.5$ V	$I_a = 0.15$ $I_{g2} = 0.03$	$g = 85$	

) Provisional data.

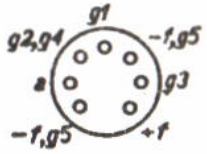
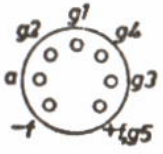
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
DF 21 (continued)	$V_f = 1.4$ V $I_f = 25$ mA	A.F. amplifier	$V_b = 90$ V $R_a = 0.5$ MΩ $R_{g2} = 2$ MΩ $V_{g1} = -0.5$ V	$I_a = 0.10$ $I_{g2} = 0.02$	$g = 69$	 Octal
DF 22 Variable mu pentode	$V_f = 1.4$ V $I_f = 50$ mA	R.F. or I.F. amplifier	$V_a = 120$ V $R_{g2} = 0.1$ MΩ $V_{g1} = -1.5$ V	$I_a = 1.4$ $I_{g2} = 0.3$	$S = 1.1$ mA/V $R_i = 2.5$ MΩ $C_{ag1} < 5$ mpF	 Octal
			$V_a = 90$ V $V_{g2} = 90$ V $V_{g1} = -1.5$ V	$I_a = 1.4$ $I_{g2} = 0.3$	$S = 1.1$ mA/V $R_i = 1.5$ MΩ	
DF 65 **DF 66** **DF 67** **DF 70**	Hearing-aid tubes, see p. 113					

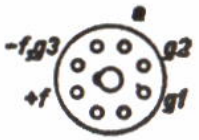
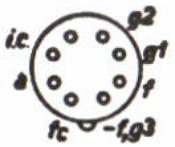
DF 91 Variable mu pentode	$V_f = 1.4$ V $I_f = 50$ mA	R.F. or I.F. amplifier	$V_a = 90$ V $V_{g2} = 45$ V $V_{g1} = 0$ V	$I_a = 1.8$ $I_{g2} = 0.65$	$S = 0.75$ mA/V $R_i = 0.8$ MΩ $C_{ag1} < 0.01$ pF	 Miniature
			$V_a = 67.5$ V $V_{g2} = 45$ V $V_{g1} = 0$ V	$I_a = 1.75$ $I_{g2} = 0.68$	$S = 0.72$ mA/V $R_i = 0.6$ MΩ	
			$V_a = 45$ V $V_{g2} = 45$ V $V_{g1} = 0$ V	$I_a = 1.7$ $I_{g2} = 0.7$	$S = 0.7$ mA/V $R_i = 0.35$ MΩ	

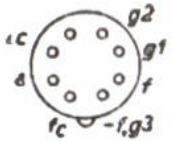
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
DF 92 Pentode	$V_f = 1.4$ V $I_f = 50$ mA	R.F. or I.F. amplifier	$V_a = 90$ V $V_{g2} = 90$ V $V_{g1} = 0$ V	$I_a = 4.5$ $I_{g2} = 2.0$	$S = 1.025$ mA/V $R_i = 0.35$ MΩ $C_{ag1} < 8$ mpF	 Miniature
			$V_a = 90$ V $V_{g2} = 67.5$ V $V_{g1} = 0$ V	$I_a = 2.9$ $I_{g2} = 1.2$	$S = 0.925$ mA/V $R_i = 0.6$ MΩ	
DF 96[1] R.F. pentode	$V_f = 1.4$ V $I_f = 25$ mA	R.F. or I.F. amplifier	$V_a = 63.5$ V $V_{g2} = 63.5$ V $V_{g1} = 0$ V	$I_a = 1.65$ $I_{g2} = 0.55$	$S = 0.75$ mA/V $R_i = 0.8$ MΩ $C_{ag1} < 8$ mpF	 Miniature
			$V_a = 85$ V $V_{g2} = 63.5$ V $V_{g1} = 0$ V	$I_a = 1.65$ $I_{g2} = 0.55$	$S = 0.75$ mA/V $R_i = 1.0$ MΩ	
DG	Instrument tubes, see p. 120					
DK 21 Octode	$V_f = 1.4$ V $I_f = 50$ mA	Frequency changer	$V_a = V_b = 120$ V $R_{g5} = 0.12$ MΩ $V_{g4} = 0$ V $R_{g2} = 25$ kΩ $R_{g1+g3} = 35$ kΩ	$I_a = 1.5$ $I_{g5} = 0.25$ $I_{g2} = 2.4$ $I_{g1+g3} = 0.2$	$S_c = 0.5$ mA/V $R_i = 1.5$ MΩ	 Octal

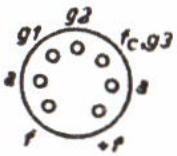
DK 21			$V_a = V_b =$ 90 V V_{g5} = 90 V V_{g4} = 0 V R_{g2} = 12.5 kΩ R_{g1+g3} = 35 kΩ	I_a = 1.5 I_{g5} = 0.25 I_{g2} = 2.4 I_{g1+g3} = 0.2	S_c = 0.5 mA/V R_i = 1.2 MΩ	
DK 40 Octode	V_f = 1.4 V I_f = 50 mA	Frequency changer	$V_a = V_b =$ 135 V R_{g5} = 270 Ω V_{g4} = 0 V R_{g2} = 26 kΩ R_{g1+g3} = 35 kΩ V_{osc} = 8 V	I_a = 1.0 I_{g5} = 0.25 I_{g2} = 2.6	S_c = 0.42 mA/V R_i = 1.0 MΩ	 Rimlock
			$V_a = V_b =$ 90 V R_{g5} = 90 kΩ V_{g4} = 0 V R_{g2} = 8.5 kΩ R_{g1+g3} = 35 kΩ V_{osc} = 8 V	I_a = 1.0 I_{g5} = 0.25 I_{g2} = 2.6	S_c = 0.42 mA/V R_i = 1.0 MΩ	
			$V_a = V_b =$ 67.5 V V_{g5} = 67.5 V V_{g4} = 0 V V_{g2} = 67.5 V R_{g1+g3} = 35 kΩ V_{osc} = 8 V	I_a = 1.0 I_{g5} = 0.25 I_{g2} = 2.6	S_c = 0.42 mA/V R_i = 0.9 MΩ	

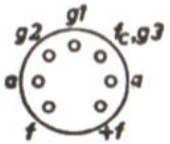
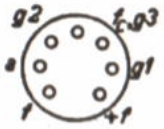
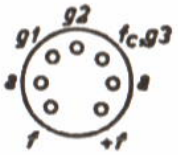
[1]) Provisional data.

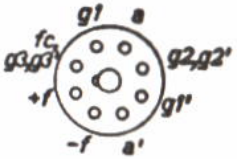
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
DK 91 Heptode	$V_f = 1.4$ V $I_f = 50$ mA	Frequency changer	$V_a = 90$ V $V_{g2+g4} = 67.5$ V $V_{g1} = 0$ V $R_{g3} = 0.1$ MΩ	$I_a = 1.6$ $I_{g2+g4} = 3.2$ $I_{g1} = 0.25$	$S_c = 0.30$ mA/V $R_i = 0.6$ MΩ	 Miniature
			$V_a = 67.5$ V $V_{g2+g4} = 67.5$ V $V_{g3} = 0$ V $R_{g1} = 0.1$ MΩ	$I_a = 1.4$ $I_{g2+g4} = 3.2$ $I_{g1} = 0.25$	$S_c = 0.28$ mA/V $R_i = 0.5$ MΩ	
			$V_a = 45$ V $V_{g2+g4} = 45$ V $V_{g3} = 0$ V $R_{g1} = 0.1$ MΩ	$I_a = 0.7$ $I_{g2+g4} = 1.9$ $I_{g1} = 0.15$	$S_c = 0.23$ mA/V $R_i = 0.6$ MΩ	
DK 92 Heptode	$V_f = 1.4$ V $I_f = 50$ mA	Frequency changer	$V_a = V_b = 85$ V $V_{g3} = 0$ V $V_{osc} = 4$ V $R_{g4} = 0.1$ MΩ $R_{g2} = 33$ kΩ $R_{g1} = 27$ kΩ	$I_a = 0.65$ $I_{g4} = 0.14$ $I_{g2} = 1.65$ $I_{g1} = 0.13$	$S_c = 0.32$ mA/V $S_{eff} = 0.4$ mA/V $R_i = 1$ MΩ $R_{eq} = 100$ kΩ	 Miniature
			$V_a = V_b = 63.5$ V $V_{g4} = 63.5$ V $V_{g3} = 0$ V $V_{osc} = 4$ V $R_{g2} = 22$ kΩ $R_{g1} = 27$ kΩ	$I_a = 0.70$ $I_{g4} = 0.15$ $I_{g2} = 1.55$ $I_{g1} = 0.13$	$S_c = 0.3$ mA/V $S_{eff} = 0.36$ mA/V $R_i = 0.9$ MΩ $R_{eq} = 120$ kΩ	

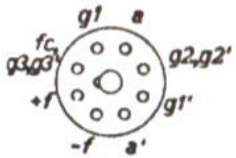
DK 92		Frequency changer	$V_a = V_b =$ 41 V V_{g4} = 41 V V_{g3} = 0 V V_{osc} = 2.5 V R_{g2} = 6.1 kΩ R_{g1} = 27 kΩ	I_a = 0.25 I_{g4} = 0.09 I_{g2} = 1.75 I_{g1} = 0.08	S_c = 0.18 mA/V S_{eff} = 0.7 mA/V R_i = 0.75 MΩ R_{eq} = 115 kΩ	
DL 21 Output pentode	V_f = 1.4 V I_f = 50 mA	Class A final amplifier	V_a = 120 V V_{g2} = 120 V V_{g1} = −4.8 V	I_a = 5 I_{g2} = 0.9	S = 1.4 mA/V R_i = 0.35 MΩ R_a = 24 kΩ W_o = 0.27 W	
			V_a = 90 V V_{g2} = 90 V V_{g1} = −3 V	I_a = 4 I_{g2} = 0.7	S = 1.3 mA/V R_i = 0.3 MΩ R_a = 22.5 kΩ W_o = 0.16 W	Octal
DL 41 Output pentode	V_f = 1.4 V I_f = 50 mA	Class A final amplifier	V_a = 120 V V_{g2} = 120 V V_{g1} = −5.8 V	I_a = 5 I_{g2} = 0.82	S = 1.35 mA/V R_i = 0.16 MΩ R_a = 24 kΩ W_o = 0.3 W W_a = 1.2 W	
			V_a = 90 V V_{g2} = 90 V V_{g1} = −3.6 V	I_a = 4 I_{g2} = 0.65	S = 1.25 mA/V R_i = 0.17 MΩ R_a = 22.5 kΩ W_o = 0.18 W	Rimlock

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
DL 41 Output pentode (continued)	$V_f = 1.4$ V $I_f = 0.1$ A	Class A final amplifier	$V_a = 120$ V $V_{g2} = 120$ V $V_{g1} = -5.7$ V	$I_a = 10$ $I_{g2} = 1.65$	$S = 2.55$ mA/V $R_i = 80$ kΩ $R_a = 12$ kΩ $W_o = 0.6$ W $W_a = 1.2$ W	 Rimlock
			$V_a = 90$ V $V_{g2} = 90$ V $V_{g1} = -3.6$ V	$I_a = 8$ $I_{g2} = 1.3$	$S = 2.45$ mA/V $R_i = 90$ kΩ $R_a = 11$ kΩ $W_o = 0.36$ W	
		Class B final amplifier	$V_a = 150$ V $V_{g2} = 150$ V $V_{g1} = -13.2$ V $V_i = 10.6$ V	$I_{a\,min} = 2\times 1.5$ $I_{a\,max} = 2\times 11.5$ $I_{g2\,min} = 2\times 0.25$ $I_{g2\,max} = 2\times 4$	$R_{aa} = 15$ kΩ $W_o = 2.1$ W	
DL 65 **DL 66** **DL 67** **DL 71** **DL 72**	Hearing-aid tubes, see p. 113					

DL 92 Output pentode	V_f = 1.4 V I_f = 0.1 A	Class A final amplifier	$V_a = V_b$ = 84 V V_{g1} = −6.5 V R_{g2} = 10 kΩ	I_a = 8 I_{g2} = 1.7	S = 1.55 mA/V R_i = 0.1 MΩ R_a = 7 kΩ W_o = 190 mW W_a = 0.7 W	
			$V_a = V_b$ = 61 V V_{g2} = 61 V V_{g1} = −6 V	I_a = 6.6 I_{g2} = 1.4	S = 1.5 mA/V R_i = 0.1 MΩ R_a = 7 kΩ W_o = 125 mW	
	V_f = 2.8 V I_f = 50 mA	Class A final amplifier	$V_a = V_b$ = 84 V V_{g1} = −6 V R_{g2} = 10 kΩ	I_a = 7.6 I_{g2} = 1.6	S = 1.5 mA/V R_i = 0.1 MΩ R_a = 7 kΩ W_o = 180 mW	Miniature
			$V_a = V_b$ = 61 V V_{g2} = 61 V V_{g1} = −5.5 V	I_a = 6.5 I_{g2} = 1.4	S = 1.45 mA/V R_i = 0.1 MΩ R_a = 7 kΩ W_o = 120 mW	

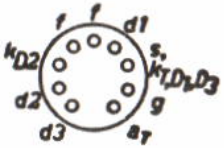
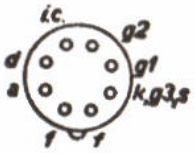
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
DL 93 Output pentode	$V_f = 1.4$ V $I_f = 0.2$ A	Class A A.F. final amplifier	$V_f = 1.4$ V $V_a = 135$ V $V_{g2} = 90$ V $V_{g1} = -7.5$ V	$I_a = 14.8$ $I_{g2} = 2.6$	$S = 1.9$ mA/V $R_i = 90$ kΩ $R_a = 8$ kΩ $W_o = 0.6$ W $W_a = 2$ W	 Miniature
	$V_f = 2.8$ V $I_f = 0.1$ A		$V_f = 1.4$ V $V_a = 150$ V $V_{g2} = 90$ V $V_{g1} = -8.4$ V	$I_a = 13.3$ $I_{g2} = 2.2$	$S = 1.9$ mA/V $R_i = 100$ kΩ $R_a = 8$ kΩ $W_o = 0.7$ W	
		R.F. final amplifier (intermittent operation)	$V_f = 1.4$ V $V_a = 150$ V $V_{g2} = 135$ V $R_{g1} = 0.2$ MΩ	$I_a = 18.3$ $I_{g2} = 6.5$ $I_{g1} = 0.13$	freq. = 50 Mc/s $W_o = 1.2$ W	
DL 94 **DL 95** Output pentodes	$V_f = 1.4$ V $I_f = 0.1$ A	Class A final amplifier	$V_a = 86$ V $V_{g2} = 86$ V $V_{g1} = -4.5$ V	$I_a = 8$ $I_{g2} = 1.8$	$S = 2.0$ mA/V $R_i = 0.11$ MΩ $R_a = 8$ kΩ $W_o = 0.29$ W $W_a = 1.2$ W	 Miniature DL 94
	$V_f = 2.8$ V $I_f = 50$ mA	Class A final amplifier	$V_a = 86$ V $V_{g2} = 86$ V $V_{g1} = -4.3$ V	$I_a = 7.0$ $I_{g2} = 1.5$	$S = 1.9$ mA/V $R_i = 0.12$ MΩ $R_a = 10$ kΩ $W_o = 0.27$ W	 Miniature DL 95

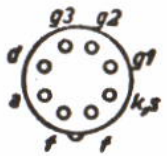
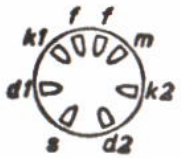
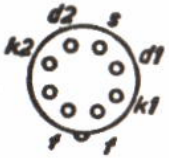
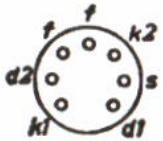
DLL 21 Double output pentode	$V_f = 1.4$ V $I_f = 0.1$ A	Class AB push-pull amplifier	$V_a = 120$ V $V_{g2} = 120$ V $V_{g1} = -8.7$ V	$I_{a\,min} = 2\times 1.0$ $I_{a\,max} = 2\times 4.1$ $I_{g2min} = 2\times 0.16$ $I_{g2max} = 2\times 1.1$	$R_{aa} = 30$ kΩ $W_o = 0.6$ W	
			$V_a = 90$ V $V_{g2} = 90$ V $V_{g1} = -5.7$ V	$I_{a\,min} = 2\times 1.0$ $I_{a\,max} = 2\times 3.0$ $I_{g2min} = 2\times 0.16$ $I_{g2max} = 2\times 0.7$	$R_{aa} = 30$ kΩ $W_o = 0.3$ W	
	$V_f = 1.4$ V $I_f = 0.2$ A	Class AB push-pull amplifier	$V_a = 135$ V $V_{g2} = 135$ V $V_{g1} = -9.4$ V	$I_{a\,min} = 2\times 2.0$ $I_{a\,max} = 2\times 8.8$ $I_{g2min} = 2\times 0.35$ $I_{g2max} = 2\times 2.3$	$R_{aa} = 15$ kΩ $W_o = 1.5$ W	 Octal
			$V_a = 120$ V $V_{g2} = 120$ V $V_{g1} = -8.2$ V	$I_{a\,min} = 2\times 2.0$ $I_{a\,max} = 2\times 7.5$ $I_{g1min} = 2\times 0.35$ $I_{g2max} = 2\times 2.0$	$R_{aa} = 15$ kΩ $W_o = 1.2$ W	
	$V_f = 2.8$ V $I_f = 0.1$ A	Class AB push-pull amplifier	$V_a = 135$ V $V_{g2} = 135$ V $V_{g1} = -9.5$ V	$I_{a\,min} = 2\times 1.5$ $I_{a\,max} = 2\times 8.2$ $I_{g2min} = 2\times 0.25$ $I_{g2max} = 2\times 2.4$	$R_{aa} = 15$ kΩ $W_o = 1.5$ W	

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
DLL 21 Double output pentode (continued)	V_f = 2.8 V I_f = 0.1 mA	Class AB push-pull amplifier	V_a = 120 V V_{g2} = 120 V V_{g1} = −8.1 V	$I_{a\,min}$ = 2 × 1.5 $I_{a\,max}$ = 2 × 7.1 I_{g2min} = 2 × 0.25 I_{g2max} = 2 × 1.9	R_{aa} = 15 kΩ W_o = 1.1 W	 Octal
			V_a = 90 V V_{g2} = 90 V V_{g1} = −5.9 V	$I_{a\,min}$ = 2 × 1.0 $I_{a\,max}$ = 2 × 4.4 I_{g2min} = 2 × 0.2 I_{g2max} = 2 × 1.3	R_{aa} = 20 kΩ W_o = 0.5 W	
DM 70[1] Tuning indicator	V_f = 1.4 V I_f = 25 mA	Tuning indicator	V_f = 1.4 V (Pin 5 positive) V_a = 85 V	I_a = 0.225 (V_g = +1.2 V)	V_g = −11.5 V for complete extinction	 Subminiature
			V_f = 1.4 V (Pin 4 positive) V_a = 60 V	I_a = 0.135 (V_g = +0.9 V)	V_g = −10.3 V for complete extinction	
DN **DP** **DR**	Instrument tubes, see p. 120					

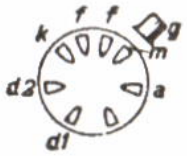
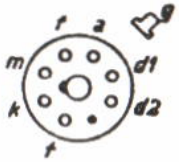
E1C E1F	= 4671 = 4672 U.H.F. tubes, see p. 116
E80CC E80F E80L	Reliable, ruggedized and long life tubes, see p. 112
E81L E83F	Repeater tubes, see p. 110
E90CC	Tube for computers, see p. 113

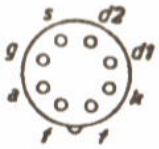
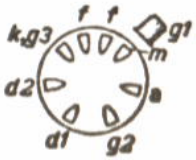
[1]) Provisional data.

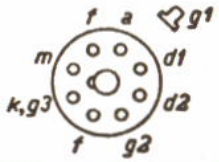
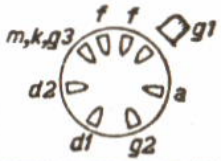
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EA 50 Single diode	V_f = 6.3 V I_f = 0.15 A	Detector	V_d = max. 200 V V_{kf} = max. 100 V R_{kf} = max. 20 kΩ	I_d = max. 5	C_{dk} = 2.1 pF	
EABC 80[1] Triple diode triode	V_f = 6.3 V I_f = 0.45 A	Typical characteristics (diode systems)	$V_{d1\,invp}$ = max. 350 V $V_{d2\,invp}$ = max. 350 V $V_{d3\,invp}$ = max. 350 V	I_{d1} = max. 1 I_{d1p} = max. 6 I_{d2} = max. 10 I_{d2p} = max. 75 I_{d3} = max. 10 I_{d3p} = max. 75	R_{id1} = 6.25 kΩ (V_{d1} = 10 V) R_{id2} = 200 Ω (V_{d2} = 5 V) R_{id3} = 200 Ω (V_{d3} = 5 V)	 Noval
		Typical characteristics (triode systems)	V_a = 250 V V_g = −3 V	I_a = 1.0	S = 1.2 mA/V R_i = 58 kΩ μ = 70	
			V_a = 100 V V_g = −1 V	I_a = 0.8	S = 1.3 mA/V R_i = 54 kΩ μ = 70	
EAC 91	U.H.F. tube, see p. 116					
EAF 41 Diode variable mu pentode	V_f = 6.3 V I_f = 0.2 A	R.F. or I.F. amplifier	V_a = 250 V R_{g2} = 95 kΩ V_{g1} = −2 V	I_a = 5 I_{g2} = 1.6	S = 1.8 mA/V R_i = 1.2 MΩ C_{ag1} < 2 mpF	 Rimlock
		A.F. amplifier	V_b = 250 V R_a = 0.22 MΩ R_{g2} = 0.82 MΩ R_k = 1.6 kΩ	I_a = 0.86 I_{g2} = 0.28	g = 105	

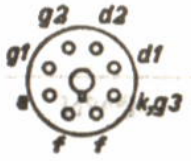
EAF 42 Diode variable mu pentode	V_f = 6.3 V I_f = 0.2 A	R.F. or I.F. amplifier	V_a = 250 V R_{g2} = 110 kΩ V_{g1} = −2 V	I_a = 5 I_{g2} = 1.5	S = 2.0 mA/V R_i = 1.4 MΩ C_{ag1} < 2 mpF	 Rimlock
		A.F. amplifier	V_b = 250 V R_a = 0.22 MΩ R_{g2} = 0.82 MΩ R_k = 1.5 kΩ	I_a = 0.80 I_{g2} = 0.26	g = 120	
EB 4 Double diode	V_f = 6.3 V I_f = 0.2 A	Detector and A.G.C.	$V_{d\,invp}$ = = max. 420 V	I_d = max. 0.8		 P
EB 41 Double diode	V_f = 6.3 V I_f = 0.3 A	Detector and A.G.C.	$V_{d\,invp}$ = = max. 420 V	I_d = max. 9 I_{dp} = max. 54		 Rimlock
EB 91 Double diode	V_f = 6.3 V I_f = 0.3 A	Detector and A.G.C.	$V_{d\,invp}$ = = max. 420 V	I_d = max. 9 I_{dp} = max. 54		 Miniature

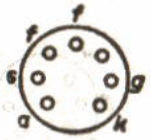
[1]) Provisional data.

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EBC 3 **EBC 33** Double diode triodes	V_f = 6.3 V I_f = 0.2 A	Typical characteristics	V_a = 275 V V_g = −6.25 V	I_a = 5	S = 2.0 mA/V R_i = 15 kΩ μ = 30	 P EBC 3
			V_a = 200 V V_g = −4.3 V	I_a = 4	S = 2.0 mA/V R_i = 15 kΩ μ = 30	
			V_a = 100 V V_g = −2.1 V	I_a = 2	S = 1.6 mA/V R_i = 19 kΩ μ = 30	
		A.F. amplifier	V_b = 250 V R_a = 0.2 MΩ R_k = 4 kΩ	I_a = 0.75	g = 26	 Octal EBC 33
			V_b = 200 V R_a = 0.2 MΩ R_k = 12.5 kΩ	I_a = 0.35	g = 22	
			V_b = 100 V R_a = 0.2 MΩ R_k = 12.5 kΩ	I_a = 0.2	g = 19	

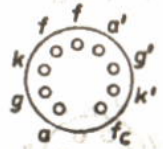
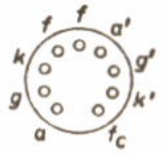
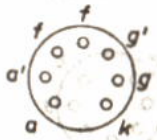
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EBC 41 Double diode triode	$V_f = 6.3$ V $I_f = 0.23$ A	Typical characteristics	$V_a = 250$ V $V_g = -3$ V	$I_a = 1$	$S = 1.2$ mA/V $R_i = 58$ kΩ $\mu = 70$	 Rimlock
		A.F. amplifier	$V_b = 250$ V $R_a = 0.22$ MΩ $R_k = 1.8$ kΩ	$I_a = 0.7$	$g = 51$	
EBF 2 Double diode variable mu pentode	$V_f = 6.3$ V $I_f = 0.2$ A	I.F. amplifier	$V_a = V_b = 250$ V $R_{g2} = 95$ kΩ $V_{g1} = -2$ V	$I_a = 5$ $I_{g2} = 1.6$	$S = 1.8$ mA/V $R_i = 1.3$ MΩ $C_{ag1} < 2$ mpF	 P
			$V_a = V_b = 100$ V $V_{g2} = 100$ V $V_{g1} = -2$ V	$I_a = 5$ $I_{g2} = 1.6$	$S = 1.8$ mA/V $R_i = 0.4$ MΩ	
EBF 11 Double diode variable mu pentode	$V_f = 6.3$ V $I_f = 0.2$ A	I.F. amplifier	$V_a = V_b = 250$ V $R_{g2} = 85$ kΩ $V_{g1} = -2$ V	$I_a = 5$ $I_{g2} = 1.8$	$S = 1.8$ mA/V $R_i = 2.0$ MΩ $C_{ag1} < 2$ mpF	Y
		A.F. amplifier	$V_b = 250$ V $R_a = 0.2$ MΩ $R_{g2} = 0.8$ MΩ $R_k = 2$ kΩ	$I_a = 0.8$ $I_{g2} = 0.24$	$g = 98$	

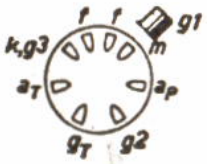
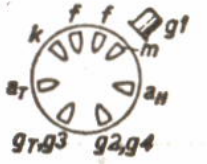
EBF 32 Double diode variable mu pentode	$V_f = 6.3$ V $I_f = 0.2$ A	I.F. amplifier	$V_a = V_b = 250$ V $R_{g2} = 95$ kΩ $V_{g1} = -2$ V	$I_a = 5$ $I_{g2} = 1.6$	$S = 1.8$ mA/V $R_i = 1.3$ MΩ $C_{ag1} < 2$ mpF	 Octal
			$V_a = V_b = 100$ V $V_{g2} = 100$ V $V_{g1} = -2$ V	$I_a = 5$ $I_{g2} = 1.6$	$S = 1.8$ mA/V $R_i = 0.4$ MΩ	
EBF 80 Double diode variable mu pentode	$V_f = 6.3$ V $I_f = 0.3$ A	R.F. or I.F. amplifier	$V_a = V_b = 250$ V $V_{g3} = 0$ V $R_{g2} = 95$ kΩ $R_k = 295$ Ω	$I_a = 5.0$ $I_{g2} = 1.75$	$S = 2.2$ mA/V $R_i = 1.4$ MΩ $C_{ag1} < 2.5$ mpF	 Noval
		A.F. amplifier	$V_b = 250$ V $R_a = 0.22$ MΩ $R_{g2} = 0.82$ MΩ $R_k = 1.8$ kΩ	$I_a = 0.75$ $I_{g2} = 0.30$	$g = 110$	
EBL 1 Double diode output pentode	$V_f = 6.3$ V $I_f = 1.18$ A	Class A final amplifier	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -6$ V $R_k = 150$ Ω	$I_a = 36$ $I_{g2} = 4$	$S = 9$ mA/V $R_i = 50$ kΩ $R_a = 7$ kΩ $W_o = 4.5$ W $W_a = 9$ W	 P
		Class AB push-pull amplifier	$V_a = 250$ V $V_{g2} = 250$ V $R_k = 140$ Ω	$I_{a\,min} = 2\times 24$ $I_{a\,max} = 2\times 28.5$ $I_{g2min} = 2\times 2.8$ $I_{g2max} = 2\times 4.6$	$R_{aa} = 10$ kΩ $W_o = 8.2$ W	

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EBL 21 Double diode output pentode	$V_f = 6.3$ V $I_f = 0.8$ A	Class A final amplifier	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -6$ V $R_k = 150\ \Omega$	$I_a = 36$ $I_{g2} = 4.5$	$S = 9$ mA/V $R_i = 50$ kΩ $R_a = 7$ kΩ $W_o = 4.5$ W $W_a = 11$ W	
			$V_a = 250$ V $V_{g2} = 275$ V $V_{g1} = -6.2$ V $R_k = 125\ \Omega$	$I_a = 44$ $I_{g2} = 5.8$	$S = 9.5$ mA/V $R_i = 50$ kΩ $R_a = 5.7$ kΩ $W_o = 5.5$ W	
		Class AB push-pull amplifier	$V_a = 300$ V $V_{g2} = 300$ V $R_k = 130\ \Omega$	$I_{a\,min} = 2\times30$ $I_{a\,max} = 2\times36$ $I_{g2min} = 2\times3.8$ $I_{g2max} = 2\times6.5$	$R_{aa} = 9$ kΩ $W_o = 13.2$ W	Loctal 8p.
EC 50	Thyratron, see p. 147					
EC 55 **EC 80** **EC 81** **EC 91**	U.H.F. tubes, see p. 116					

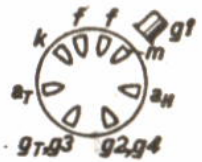
EC 92[1] R.F. triode	$V_f = 6.3$ V $I_f = 0.15$ A	Typical characteristics	$V_a = 250$ V $V_g = -2$ V	$I_a = 10$	$S = 5$ mA/V $R_i = 12$ kΩ $\mu = 60$ freq. = max. 300 Mc/s	 Miniature
			$V_a = 170$ V $V_g = -1$ V	$I_a = 8.5$	$S = 5.5$ mA/V $R_i = 12$ kΩ $\mu = 66$	
ECC 40 Double triode	$V_f = 6.3$ V $I_f = 0.6$ A	Class A final amplifier (per system)	$V_a = 250$ V $R_k = 920$ Ω $V_g = -5.6$ V	$I_a = 6$	$S = 2.9$ mA/V $R_i = 11$ kΩ $\mu = 32$ $R_a = 15$ kΩ $W_o = 0.28$ W $W_a = 1.5$ W	 Rimlock
		A.F. amplifier (per system)	$V_b = 400$ V $R_a = 0.1$ MΩ $R_k = 2.2$ kΩ $R_{g1}' = 0.33$ MΩ	$I_a = 2.2$	$g = 24.5$ V_o = max. 76 V	
			$V_b = 250$ V $R_a = 0.1$ MΩ $R_k = 2.2$ kΩ $R_{g1}' = 0.33$ MΩ	$I_a = 1.4$	$g = 24$ V_o = max. 44 V	
		A.F. amplifier (2 systems in cascade)	$V_b = 250$ V $R_a = 0.22$ MΩ $R_a' = 0.22$ MΩ $R_g' = 1$ MΩ $R_{k.k}' = 1$ kΩ	$I_b = 2.0$	$g = 780$	

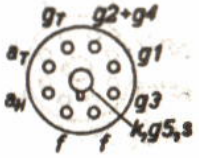
[1]) Provisional data.

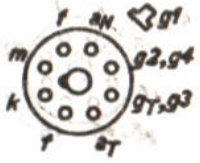
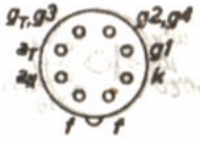
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
ECC 81 Double Triode	V_f = 6.3 V I_f = 0.3 A	Typical characteristics (per system)	V_a = 100 V V_g = −1 V	I_a = 3.0	S = 3.5 mA/V R_i = 16.5 kΩ μ = 58	 Noval
			V_a = 170 V V_g = −1 V	I_a = 8.5	S = 5.5 mA/V R_i = 12 kΩ μ = 66	
	V_f = 12.6 V I_f = 0.15 A		V_a = 250 V V_g = −2 V	I_a = 10	S = 5.0 mA/V R_i = 12 kΩ μ = 60	
ECC 82[1]) Double triode	V_f = 6.3 V I_f = 0.3 A	Typical characteristics (per system)	V_a = 250 V V_g = −8.5 V	I_a = 10.5	S = 2.2 mA/V R_i = 7.7 kΩ μ = 17	 Noval
	V_f = 12.6 V I_f = 0.15 A		V_a = 100 V V_g = 0 V	I_a = 11.8	S = 3.1 mA/V R_i = 6.25 kΩ μ = 19.5	
ECC 91 Double triode	V_f = 6.3 V I_f = 0.45 A	Typical characteristics (per system)	V_a = 100 V R_k = 100 Ω	I_a = 8.5	S = 5.3 mA/V R_i = 7.1 kΩ μ = 38	 Miniature
		R.F. class C telegr. push-pull amplifier and oscillator	V_a = 150 V V_g = −10 V R_g = 625 Ω R_k = 220 Ω	I_a = 2×15 I_g = 2× 8	W_{ig} = 0.35 W W_o = 3.5 W	

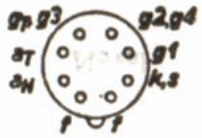
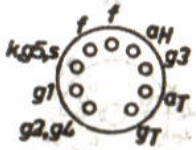
ECF 1 Triode variable mu pentode	$V_f = 6.3$ V $I_f = 0.2$ A	I.F. amplifier (pentode system)	$V_a = V_b =$ 250 V $R_{g2} =$ 75 kΩ $V_{g1} =$ −2 V	$I_a =$ 5 $I_{g2} =$ 2	$S =$ 2.0 mA/V $R_i =$ 1.6 MΩ $C_{ag1} <$ 4 mpF	 P
		Typical characteristics (triode system)	$V_a =$ 150 V $V_g =$ −3 V	$I_a =$ 8	$S =$ 2.2 mA/V $R_i =$ 9 kΩ $\mu =$ 20	
ECH 3 Triode hexode	$V_f = 6.3$ V $I_f = 0.2$ A	Frequency changer (hexode system)	$V_a = V_b =$ 250 V $R_1 =$ 24 kΩ $R_2 =$ 33 kΩ $R_{g3+gT} =$ 50 kΩ $V_{g1} =$ −2 V	$I_a =$ 3 $I_{g2+g4} =$ 3 $I_{g3+gT} =$ 0.2	$S_c =$ 0.65 mA/V $R_i =$ 1.3 MΩ	 P
			$V_a = V_b =$ 200 V $R_1 =$ 19 kΩ $R_2 =$ 54 kΩ $R_{g3+gT} =$ 50 kΩ $V_{g1} =$ −2 V	$I_a =$ 3 $I_{g2+g4} =$ 3 $I_{g3+gT} =$ 0.2	$S_c =$ 0.65 mA/V $R_i =$ 0.9 MΩ	
			$V_a = V_b =$ 100 V $R_1 =$ 19 kΩ $R_2 =$ 54 kΩ $R_{g3+gT} =$ 50 kΩ $V_{g1} =$ −1.25 V	$I_a =$ 1.0 $I_{g2+g4} =$ 1.4 $I_{g3+gT} =$ 0.2	$S_c =$ 0.45 mA/V $R_i =$ 1.3 MΩ	

[1]) Provisional data.

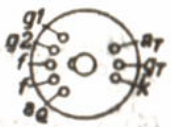
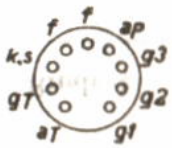
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
ECH 3 Triode hexode (continued)	$V_f = 6.3$ V $I_f = 0.2$ A	Oscillator (triode system)	$V_b = 250$ V $R_a = 45$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 3.3$ $I_{g3+gT} = 0.2$	$S_0 = 2.8$ mA/V $\mu = 24$	
			$V_a = V_b = 100$ V $R_{g3+gT} = 50$ kΩ	$I_a = 3.3$ $I_{g3+gT} = 0.2$	$S_0 = 2.8$ mA/V $\mu = 24$	P
ECH 4 Triode heptode	$V_f = 6.3$ V $I_f = 0.35$ A	Frequency changer (heptode system)	$V_a = 250$ V $R_{g2+g4} = 24$ kΩ $R_{g3+gT} = 50$ kΩ $V_{g1} = -2$ V	$I_a = 3.0$ $I_{g2+g4} = 6.2$ $I_{g3+gT} = 0.19$	$S_c = 0.75$ mA/V $R_i = 1.4$ MΩ	
		Oscillator (triode system)	$V_b = 250$ V $R_a = 20$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 4.5$ $I_{g3+gT} = 0.19$	$S_{eff} = 0.55$ mA/V	
		I.F. amplifier (heptode system)	$V_a = 250$ V $R_{g2+g4} = 45$ kΩ $V_{g3} = 0$ V $V_{g1} = -2$ V	$I_a = 5.3$ $I_{g2+g4} = 3.5$	$S = 2.2$ mA/V $R_i = 0.9$ MΩ $C_{ag1} < 2$ mpF	
		A.F. amplifier (triode system)	$V_b = 250$ V $R_a = 0.2$ MΩ $V_g = -2$ V	$I_a = 1.0$	$g = 13$	P
		Typical characteristics (triode system)	$V_a = 100$ V $V_g = 0$ V	$I_a = 12$	$S = 3.2$ mA/V $\mu = 22$	

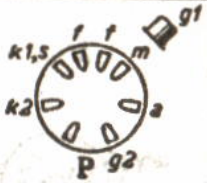
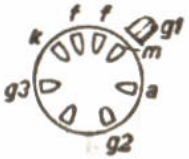
ECH 11 Triode hexode	$V_f = 6.3$ V $I_f = 0.2$ A	Frequency changer (hexode-system)	$V_a = 250$ V $R_{g2+g4} = 50$ kΩ $R_{g3+gT} = 30$ kΩ $V_{g1} = -2$ V	$I_a = 2.3$ $I_{g2+g4} = 3.0$ $I_{g3+gT} = 0.33$	$S_c = 0.65$ mA/V $R_i = 1.2$ MΩ $V_{osc} = 8.5$ V	 Y
		Oscillator (triode system)	$V_b = 250$ V $R_a = 30$ kΩ $R_{g3+gT} = 30$ kΩ	$I_a = 3.4$ $I_{g3+gT} = 0.33$	$S_0 = 2.8$ mA/V $\mu = 17$	
ECH 21 Triode heptode	$V_f = 6.3$ V $I_f = 0.33$ A	Frequency changer (heptode system)	$V_a = V_b = 250$ V $R_{g2+g4} = 24$ kΩ $R_{g3+gT} = 50$ kΩ $V_{g1} = -2$ V	$I_a = 3.0$ $I_{g2+g4} = 6.2$ $I_{g3+gT} = 0.19$	$S_c = 0.75$ mA/V $R_i = 1.4$ MΩ	 Loctal 8p.
		Oscillator (triode system)	$V_b = 250$ V $R_a = 20$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 4.5$ $I_{g3+gT} = 0.19$	$S_{eff} = 0.55$ mA/V	
		I.F. amplifier (heptode system)	$V_a = V_b = 250$ V $R_{g2+g4} = 45$ kΩ $V_{g3} = 0$ V $V_{g1} = -2$ V	$I_a = 5.3$ $I_{g2+g4} = 3.5$	$S = 2.2$ mA/V $R_i = 0.9$ MΩ $C_{ag1} < 2$ mpF	
		A.F. amplifier (triode system)	$V_b = 250$ V $R_a = 0.2$ MΩ $V_g = -2$ V	$I_a = 1.0$	$g = 13$	
		Typical characteristics (triode system)	$V_a = 100$ V $V_g = 0$ V	$I_a = 12$	$S = 3.2$ mA/V $\mu = 22$	

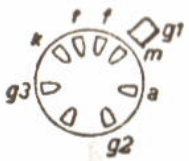
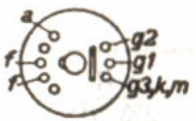
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
ECH 35 Triode hexode	$V_f = 6.3$ V $I_f = 0.2$ A	Frequency changer (hexode system)	$V_a = V_b = 250$ V $R_1 = 24$ kΩ $R_2 = 33$ kΩ $R_{g3+gT} = 50$ kΩ $V_{g1} = -2$ V	$I_a = 3.0$ $I_{g2+g4} = 3.0$ $I_{g3+gT} = 0.2$	$S_c = 0.65$ mA/V $R_i = 1.3$ MΩ	 Octal
		Oscillator (triode system)	$V_b = 250$ V $R_a = 45$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 3.3$ $I_{g3+gT} = 0.2$	$S_0 = 2.8$ mA/V $\mu = 24$	
ECH 41 Triode hexode	$V_f = 6.3$ V $I_f = 0.23$ A	Frequency changer (hexode system)	$V_a = V_b = 250$ V $R_1 = 33$ kΩ $R_2 = 47$ kΩ $R_{g3+gT} = 20$ kΩ $V_{g1} = -2$ V	$I_a = 3.0$ $I_{g2+g4} = 2.2$ $I_{g3+gT} = 0.35$	$S_c = 0.5$ mA/V $R_i = 2$ MΩ $V_{osc} = 8$ V	 Rimlock
		Oscillator (triode system)	$V_b = 250$ V $R_a = 30$ kΩ $R_{g3+gT} = 20$ kΩ	$I_a = 4.9$ $I_{g3+gT} = 0.35$	$S_0 = 1.9$ mA/V $S_{eff} = 0.55$ mA/V $\mu = 19$	

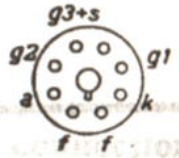
ECH 42 Triode hexode	$V_f = 6.3$ V $I_f = 0.23$ A	Frequency changer (hexode system)	$V_a = V_b = 250$ V $R_1 = 27$ kΩ $R_2 = 27$ kΩ $R_{g3+gT} = 22$ kΩ $V_{g1} = -2$ V	$I_a = 3.0$ $I_{g2+g4} = 3.0$ $I_{g3+gT} = 0.35$	$S_c = 0.75$ mA/V $R_i = 1.7$ MΩ	 Rimlock
		Oscillator (triode system)	$V_b = 250$ V $R_a = 33$ kΩ $R_{g3+gT} = 22$ kΩ $V_{osc} = 8$ V	$I_a = 5.1$ $I_{g3+gT} = 0.35$	$S_0 = 2.8$ mA/V $S_{eff} = 0.6$ mA/V $\mu = 22$	
ECH 81 [1] Triode heptode	$V_f = 6.3$ V $I_f = 0.3$ A	Frequency changer (heptode system)	$V_a = V_b = 250$ V $R_{g2+g4} = 22$ kΩ $R_{g3+gT} = 47$ kΩ $V_{g1} = -2$ V	$I_a = 3.25$ $I_{g2+g4} = 6.7$ $I_{g3+gT} = 0.2$	$S_c = 0.775$ mA/V $R_i = 1$ MΩ $R_{eq} = 70$ kΩ	 Noval
		R.F. or I.F. amplifier (heptode system)	$V_a = V_b = 250$ V $R_{g2+g4} = 39$ kΩ $V_{g1} = -2$ V	$I_a = 6.5$ $I_{g2+g4} = 3.8$	$S = 2.4$ mA/V $R_i = 0.7$ MΩ $\mu_{g2g1} = 20$ $R_{eq} = 8.5$ kΩ	
		Typical characteristics (triode system)	$V_a = 100$ V $V_g = 0$ V	$I_a = 13.5$	$S = 3.7$ mA/V $R_i = 6$ kΩ $\mu = 22$	
		Oscillator (triode system)	$V_b = 250$ V $R_a = 33$ kΩ $R_{g3+gT} = 47$ kΩ	$I_a = 4.5$ $I_{g3+gT} = 0.2$	$S_{eff} = 0.55$ mA/V	

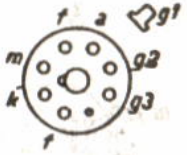
[1]) Provisional data.

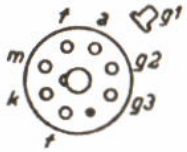
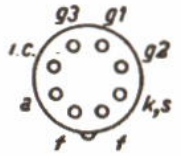
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
ECL 11 Triode output tetrode	$V_f = 6.3$ V $I_f = 1.0$ A	Class A final amplifier (tetrode system)	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -6$ V	$I_a = 36$ $I_{g2} = 4$	$S = 9$ mA/V $R_i = 25$ kΩ $R_a = 7$ kΩ $W_o = 3.8$ W $W_a = 9$ W	 Y
		Typical characteristics (triode system)	$V_a = 250$ V $V_g = -2.5$ V	$I_a = 2$	$S = 2$ mA/V $R_i = 35$ kΩ $\mu = 70$	
ECL 80 Triode output pentode	$V_f = 6.3$ V $I_f = 0.3$ A	Class A final amplifier (pentode system)	$V_a = V_b = 170$ V $V_{g3} = 0$ V $V_{g2} = 170$ V $V_{g1} = -6.7$ V	$I_a = 15$ $I_{g2} = 2.8$	$S = 3.2$ mA/V $R_i = 0.15$ MΩ $R_a = 11$ kΩ $W_o = 1.0$ W $W_a = 3.5$ W	 Noval
		Sync separator (pentode system)	$V_a = 20$ V $V_{g3} = 0$ V $V_{g2} = 12$ V $V_{g1} = 0$ V	$I_a = 2$		
		Typical characteristics (triode system)	$V_a = 100$ V $V_g = 0$ V	$I_a = 8$	$S = 1.9$ mA/V $\mu = 20$	
		A.F. amplifier (triode system)	$V_b = 170$ V $R_a = 0.22$ MΩ $V_{g1} = -3.5$ V $R_{g1}' = 0.68$ MΩ	$I_a = 0.5$	$g = 11$	

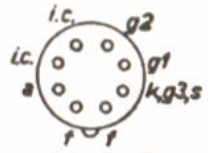
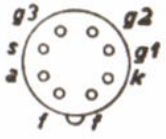
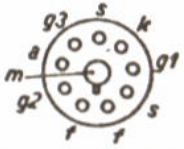
EEP 1 Secondary emission tetrode (phase splitter)	$V_f = 6.3$ V $I_f = 0.6$ A	Typical characteristics	$V_a = 250$ V $V_{g2} = 150$ V $V_{k2} = 150$ V $V_{g1} = -2.5$ V	$I_a = 8$ $I_{g2} = 0.45$ $I_{k2} = -6.5$	$S = 17$ mA/V $R_i = 50$ kΩ	
EF 6 Pentode	$V_f = 6.3$ V $I_f = 0.2$ A	R.F. amplifier	$V_a = 250$ V $V_{g2} = 100$ V $V_{g1} = -2$ V	$I_a = 3.0$ $I_{g2} = 0.8$	$S = 1.8$ mA/V $R_i = 2.5$ MΩ $C_{ag1} < 3$ mpF	 P
			$V_a = 200$ V $V_{g2} = 100$ V $V_{g1} = -2$ V	$I_a = 3.0$ $I_{g2} = 0.8$	$S = 1.8$ mA/V $R_i = 2.0$ MΩ	
			$V_a = 100$ V $V_{g2} = 100$ V $V_{g1} = -2$ V	$I_a = 3.0$ $I_{g2} = 0.8$	$S = 1.8$ mA/V $R_i = 1.0$ MΩ	
		A.F. amplifier	$V_b = 250$ V $R_a = 0.2$ MΩ $R_{g2} = 0.4$ MΩ $R_k = 3$ kΩ	$I_a = 0.9$ $I_{g2} = 0.35$	$g = 140$	
			$V_b = 200$ V $R_a = 0.2$ MΩ $R_{g2} = 0.4$ MΩ $R_k = 5$ kΩ	$I_a = 0.6$ $I_{g2} = 0.23$	$g = 115$	
			$V_b = 100$ V $R_a = 0.2$ MΩ $R_{g2} = 0.4$ MΩ $R_k = 5$ kΩ	$I_a = 0.30$ $I_{g2} = 0.12$	$g = 100$	

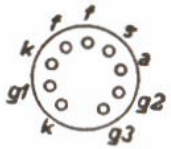
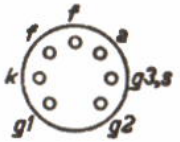
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EF 9 Variable mu pentode	$V_f = 6.3$ V $I_f = 0.2$ A	R.F. or I.F. amplifier	$V_a = V_b = 250$ V $R_{g2} = 90$ kΩ $V_{g1} = -2.5$ V	$I_a = 6$ $I_{g2} = 1.7$	$S = 2.2$ mA/V $R_i = 1.25$ MΩ $C_{ag1} < 2$ mpF	 P
			$V_a = V_b = 200$ V $R_{g2} = 60$ kΩ $V_{g1} = -2.5$ V	$I_a = 6$ $I_{g2} = 1.7$	$S = 2.2$ mA/V $R_i = 0.9$ MΩ	
			$V_a = V_b = 100$ V $V_{g2} = 100$ V $V_{g1} = -2.5$ V	$I_a = 6$ $I_{g2} = 1.7$	$S = 2.2$ mA/V $R_i = 0.4$ MΩ	
		A.F. amplifier	$V_b = 250$ V $R_a = 0.2$ MΩ $R_{g2} = 0.8$ MΩ $R_k = 1.8$ kΩ	$I_a = 0.87$ $I_{g2} = 0.26$	$g = 105$	
EF 11 Variable mu pentode	$V_f = 6.3$ V $I_f = 0.2$ A	R.F. or I.F. amplifier	$V_a = V_b = 250$ V $R_{g2} = 75$ kΩ $V_{g1} = -2$ V	$I_a = 6$ $I_{g2} = 2.0$	$S = 2.2$ mA/V $R_i = 2.0$ MΩ $C_{ag1} < 2$ mpF	 Y
			$V_a = V_b = 200$ V $R_{g2} = 50$ kΩ $V_{g1} = -2$ V	$I_a = 5.7$ $I_{g2} = 2.0$	$S = 2.2$ mA/V $R_i = 1.5$ MΩ	
			$V_a = V_b = 100$ V $V_{g2} = 100$ V $V_{g1} = -2$ V	$I_a = 6$ $I_{g2} = 2.0$	$S = 2.2$ mA/V $R_i = 0.4$ MΩ	

EF 11		A.F. amplifier	V_b = 250 V R_a = 0.2 MΩ R_{g2} = 0.6 MΩ R_k = 1.5 kΩ	I_a = 1.0 I_{g2} = 0.35	g = 98	
EF 12 Pentode	V_f = 6.3 V I_f = 0.2 A	R.F. or I.F amplifier	V_a = 250 V V_{g2} = 100 V V_{g1} = −2 V	I_a = 3.0 I_{g2} = 1.0	S = 2.1 mA/V R_i = 2.0 MΩ C_{ag1} < 2 mpF	 Y
		A.F. amplifier	V_b = 250 V R_a = 0.2 MΩ R_{g2} = 0.5 MΩ R_k = 1.6 kΩ	I_a = 0.90 I_{g2} = 0.37	g = 181	
			V_b = 200 V R_a = 0.2 MΩ R_{g2} = 0.5 MΩ R_k = 2.2 kΩ	I_a = 0.67 I_{g2} = 0.27	g = 166	
			V_b = 100 V R_a = 0.2 MΩ R_{g2} = 0.5 MΩ R_k = 2.2 kΩ	I_a = 0.32 I_{g2} = 0.14	g = 128	
EF 22 Variable mu pentode	V_f = 6.3 V I_f = 0.2 A	R.F. or I.F. amplifier	V_a = 250 V R_{g2} = 90 kΩ V_{g1} = −2.5 V	I_a = 6 I_{g2} = 1.7	S = 2.2 mA/V R_i = 1.2 MΩ C_{ag1} < 2 mpF	 Loctal 8p.
		A.F. amplifier	V_b = 250 V R_a = 0.2 MΩ R_{g2} = 0.8 MΩ R_k = 1.8 kΩ	I_a = 0.87 I_{g2} = 0.26	g = 106	

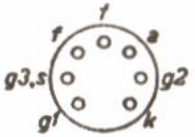
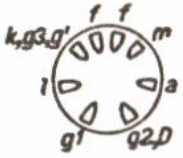
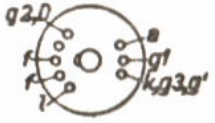
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EF 37A Low microphony pentode	V_f = 6.3 V I_f = 0.2 A	R.F. amplifier	V_a = 250 V V_{g2} = 100 V V_{g1} = −2 V	I_a = 3.0 I_{g2} = 0.8	S = 1.8 mA/V R_i = 2.5 MΩ C_{ag1} < 3 mpF	 Octal
			V_a = 200 V V_{g2} = 100 V V_{g2} = −2 V	I_a = 3.0 I_{g2} = 0.8	S = 1.8 mA/V R_i = 2.0 MΩ	
			V_a = 100 V V_{g2} = 100 V V_{g1} = −2 V	I_a = 3.0 I_{g2} = 0.8	S = 1.8 mA/V R_i = 1.0 MΩ	
		A.F amplifier	V_b = 250 V R_a = 0.3 MΩ R_{g2} = 0.8 MΩ R_k = 4 kΩ	I_a = 0.6 I_{g2} = 0.2	g = 165	
			V_b = 200 V R_a = 0.3 MΩ R_{g2} = 0.6 MΩ R_k = 6.4 kΩ	I_a = 0.45 I_{g2} = 0.17	g = 130	
			V_b = 100 V R_a = 0.3 MΩ R_{g2} = 0.6 MΩ R_k = 6.4 kΩ	I_a = 0.22 I_{g2} = 0.08	g = 105	

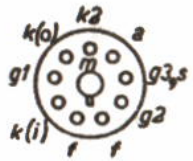
EF 39 Variable mu pentode	V_f = 6.3 V I_f = 0.2 A	R.F. or I.F. amplifier	V_a = 250 V R_{g2} = 90 kΩ V_{g1} = −2.5 V	I_a = 6 I_{g2} = 1.7	S = 2.2 mA/V R_i = 1.2 MΩ C_{ag1} < 3 mpF	 Octal
			V_a = 200 V R_{g2} = 60 kΩ V_{g1} = −2.5 V	I_a = 6 I_{g2} = 1.7	S = 2.2 mA/V R_i = 0.9 MΩ	
			V_a = 100 V V_{g2} = 100 V V_{g1} = −2.5 V	I_a = 6 I_{g2} = 1.7	S = 2.2 mA/V R_i = 0.4 MΩ	
		A.F. amplifier	V_b = 250 V R_a = 0.2 MΩ R_{g2} = 0.8 MΩ R_k = 1.8 kΩ	I_a = 0.87 I_{g2} = 0.26	g = 105	
EF 40 Low noise pre-amplifier pentode	V_f = 6.3 V I_f = 0.2 A	Typical characteristics	V_a = 250 V V_{g2} = 140 V V_{g1} = −2 V	I_a = 3.0 I_{g2} = 0.55	S = 1.85 mA/V R_i = 2.5 MΩ C_{ag1} < 0.04 pF	 Rimlock
		A.F. amplifier	V_b = 250 V R_a = 0.22 MΩ R_{g2} = 1.0 MΩ R_k = 1.5 kΩ	I_a = 0.86 I_{g2} = 0.18	g = 180	
			V_b = 250 V R_a = 0.33 MΩ R_{g2} = 1.5 MΩ R_k = 2.2 kΩ	I_a = 0.58 I_{g2} = 0.12	g = 210	

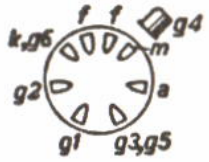
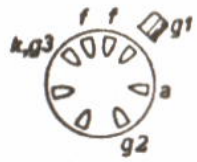
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EF 41 Variable mu pentode	$V_f = 6.3$ V $I_f = 0.2$ A	R.F. or I.F. amplifier	$V_a = V_b = 250$ V $R_{g2} = 90$ kΩ $V_{g1} = -2.5$ V	$I_a = 6$ $I_{g2} = 1.7$	$S = 2.2$ mA/V $R_i = 1.0$ MΩ $C_{ag1} < 2$ mpF	 Rimlock
EF 42 R.F. pentode	$V_f = 6.3$ V $I_f = 0.33$ A	R.F. or I.F. amplifier	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -2$ V	$I_a = 10$ $I_{g2} = 2.4$	$S = 9$ mA/V $R_i = 0.5$ MΩ $\mu_{g2g1} = 83$ $R_{eq} = 840$ Ω $C_{ag1} < 6$ mpF	 Rimlock
EF 43 Variable mu pentode	$V_f = 6.3$ V $I_f = 0.33$ A	Wide-band amplifier	$V_a = V_b = 250$ V $R_{g2} = 33$ kΩ $V_{g3} = 0$ V $V_{g1} = -2$ V	$I_a = 15$ $I_{g2} = 3.5$	$S = 6.4$ mA/V $R_i = 0.5$ MΩ $R_{eq} = 1.7$ kΩ $C_{ag1} < 6$ mpF	
EF 50 R.F. pentode	$V_f = 6.3$ V $I_f = 0.3$ A	Wide-band amplifier	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -2$ V	$I_a = 10$ $I_{g2} = 3$	$S = 6.5$ mA/V $R_i = 1$ MΩ $\mu_{g2g1} = 75$ $R_{eq} = 1.4$ kΩ $C_{ag1} < 7$ mpF	 Loctal 9p. (B9G)
EF 51	U.H.F. tube, see p. 116					

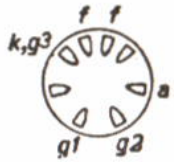
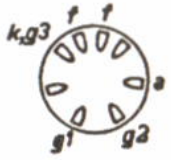
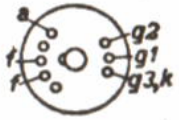
EF 55 R.F. pentode	$V_f = 6.3$ V $I_f = 1.0$ A	Typical characteristics	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -4.5$ V	$I_a = 40$ $I_{g2} = 5.5$	$S = 12$ mA/V $R_i = 55$ kΩ $\mu_{g2g1} = 28$ $C_{ag1} = 0.15$ pF	 Loctal 9p. (B9G)
EF 80 R.F. pentode	$V_f = 6.3$ V $I_f = 0.3$ A	R.F. or I.F. amplifier	$V_a = 170$ V $V_{g3} = 0$ V $V_{g2} = 170$ V $V_{g1} = -2$ V	$I_a = 10$ $I_{g2} = 2.5$	$S = 7.4$ mA/V $R_i = 0.5$ MΩ $C_{ga1} < 7$ mpF	 Noval
EF 85[1] R.F. variable mu pentode	$V_f = 6.3$ V $I_f = 0.3$ A	R.F. or I.F. amplifier	$V_a = V_b = 250$ V $R_{g2} = 60$ kΩ $V_{g1} = -2$ V	$I_a = 10$ $I_{g2} = 2.5$	$S = 6$ mA/V $R_i = 0.5$ MΩ $R_{eq} = 1.5$ kΩ	
EF 91 R.F. pentode	$V_f = 6.3$ V $I_f = 0.3$ A	Wide-band amplifier	$V_a = 250$ V $V_{g3} = 0$ V $V_{g2} = 250$ V $V_{g1} = -2$ V	$I_a = 10$ $I_{g2} = 2.55$	$S = 7.65$ mA/V $R_i = 1$ MΩ $R_{eq} = 1.2$ kΩ $C_{ag1} < 8$ mpF	 Miniature
EF 92 Variable mu pentode	$V_f = 6.3$ V $I_f = 0.2$ A	R.F. or I.F. amplifier	$V_a = 250$ V $V_{g3} = 0$ V $V_{g2} = 150$ V $V_{g1} = -0.65$ V	$I_a = 8.0$ $I_{g2} = 2.0$	$S = 2.5$ mA/V $C_{ag1} < 7$ mpF	
			$V_a = 250$ V $V_{g3} = 0$ V $V_{g2} = 200$ V $V_{g1} = -2.5$ V	$I_a = 8.0$ $I_{g2} = 2.1$	$S = 2.5$ mA/V	

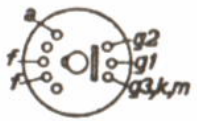
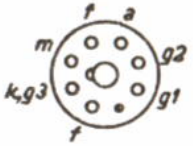
[1]) Provisional data.

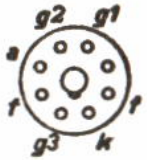
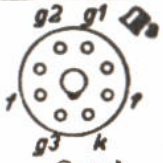
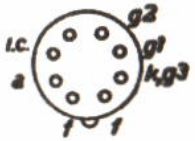
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EF 93 Variable mu pentode	V_f = 6.3 V I_f = 0.3 A	R.F. or I.F. amplifier	$V_a = V_b$ = 250 V R_{g2} = 33 kΩ V_{g1} = −1 V	I_a = 11.6 I_{g2} = 4.5	S = 4.5 mA/V R_i = 1.0 MΩ C_{ag1} < 3.5 mpF	 Miniature
			$V_a = V_b$ = 100 V V_{g2} = 100 V V_{g1} = −1 V	I_a = 10.8 I_{g2} = 4.4	S = 4.3 mA/V R_i = 0.25 MΩ	
EFF 51	U.H.F. tube, see p. 116					
EFM 1 A.F. pentode and tuning indicator	V_f = 6.3 V I_f = 0.2 A	A.F. amplifier and tuning indicator	$V_b = V_l$ = 250 V R_a = 0.13 MΩ R_{g2} = 0.35 MΩ V_{g1} = −2/−20V	I_a = 0.8/0.5 I_{g2} = 0.6/0.2 I_l = 0.65/0.8	g = 60/13 α = 70°/5°	 P
EFM 11 A.F. pentode and tuning indicator	V_f = 6.3 V I_f = 0.2 A	A.F. amplifier and tuning indicator	$V_b = V_l$ = 250 V R_a = 0.13 MΩ R_{g2} = 0.35 MΩ V_{g1} = −1.5/−20V	I_a = 1.0/0.58 I_{g2} = 0.63/0.26 I_l = 0.65/1.0	g = 80/12 α = 70°/3°	 Y

EFP 60 Secondary emission pentode	$V_f = 6.3$ V $I_f = 0.37$ A	R.F. or I.F. amplifier	$V_a = 250$ V $V_{g2} = 250$ V $V_{k2} = 150$ V $V_{g1} = -2$ V $V_{g3} = 0$ V	$I_a = 20$ $I_{g2} = 1.5$ $I_{k2} = -15.6$	$S = 25$ mA/V $R_i = 70$ kΩ $C_{ag1} < 4$ mpF	 Loctal 9p.

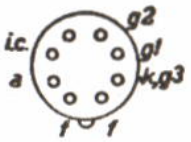
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EK 2 Octode	$V_f = 6.3$ V $I_f = 0.2$ A	Frequency changer	V_a = 200–250 V V_{g3+g5} = 50 V V_{g4} = −2 V V_{g2} = 200 V R_{g1} = 50 kΩ	I_a = 1.0 I_{g3+g5} = 1.1 I_{g2} = 2.5 I_{g1} = 0.3	S_c = 0.55 mA/V R_i = 2.0 MΩ	 P
			V_a = 100 V V_{g3+g5} = 50 V V_{g4} = −2 V V_{g2} = 100 V R_{g1} = 50 kΩ	I_a = 1.0 I_{g3+g5} = 1.0 I_{g2} = 1.5 I_{g1} = 0.2	S_c = 0.55 mA/V R_i = 1.2 MΩ	
EL 2 Output pentode	$V_f = 6.3$ V $I_f = 0.2$ A	Class A final amplifier	V_a = 250 V V_{g2} = 250 V V_{g1} = −18 V R_k = 485 Ω	I_a = 32 I_{g2} = 5	S = 2.8 mA/V R_i = 70 kΩ R_a = 8 kΩ W_o = 3.6 W W_a = 8 W	 P
			V_a = 200 V V_{g2} = 200 V V_{g1} = −14 V R_k = 480 Ω	I_a = 25 I_{g2} = 4	S = 3.0 mA/V R_i = 70 kΩ R_a = 8 kΩ W_o = 2.3 W	
		Class AB push-pull amplifier	V_a = 250 V V_{g2} = 250 V R_k = 305 Ω	I_{amin} = 2×27.5 I_{amax} = 2×32.5 I_{g2min} = 2× 4.5 I_{g2max} = 2× 8	R_{aa} = 8 kΩ W_o = 8 W	

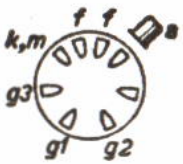
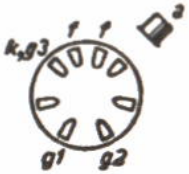
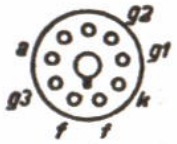
EL 2			V_a = 200 V V_{g2} = 200 V R_k = 320 Ω	I_{amin} = 2× 21 I_{amax} = 2×24.5 I_{g2min} = 2× 3.5 I_{g2max} = 2× 6	R_{aa} = 9 kΩ W_o = 5 W	
EL 3 N Output pentode	V_f = 6.3 V I_f = 0.9 A	Class A final amplifier	V_a = 250 V V_{g2} = 250 V V_{g1} = −6 V R_k = 150 Ω	I_a = 36 I_{g2} = 4	S = 9 mA/V R_i = 50 kΩ R_a = 7 kΩ W_o = 4.5 W W_a = 9 W	 P
		Class AB push-pull amplifier	V_a = 250 V V_{g2} = 250 V R_k = 140 Ω	I_{amin} = 2× 24 I_{amax} = 2×28.5 I_{g2min} = 2× 2.8 I_{g2max} = 2× 4.6	R_{aa} = 10 kΩ W_o = 8.2 W	
EL 6 Output pentode	V_f = 6.3 V I_f = 1.2 A	Class A final amplifier	V_a = 250 V V_{g2} = 250 V V_{g1} = −7 V R_k = 90 Ω	I_a = 72 I_{g2} = 8	S = 14.5 mA/V R_i = 20 kΩ R_a = 3.5 kΩ W_o = 8 W W_a = 18 W	 P
		Class AB push-pull amplifier	V_a = 250 V V_{g2} = 250 V R_k = 90 Ω	I_{amin} = 2× 45 I_{amax} = 2× 53 I_{g2min} = 2× 5.1 I_{g2max} = 2× 8.5	R_{aa} = 5 kΩ W_o = 14.5 W	
EL 11 Output pentode	V_f = 6.3 V I_f = 0.9 A	Class A final amplifier	V_a = 250 V V_{g2} = 250 V V_{g1} = −6 V R_k = 150 Ω	I_a = 36 I_{g2} = 4	S = 9 mA/V R_i = 50 kΩ R_a = 7 kΩ W_o = 4.5 W W_a = 9 W	 Y

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EL 12 Output pentode	$V_f = 6.3$ V $I_f = 1.2$ A	Class A final amplifier	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -7$ V $R_k = 90\ \Omega$	$I_a = 72$ $I_{g2} = 8$	$S = 15$ mA/V $R_i = 25$ kΩ $R_a = 3.5$ kΩ $W_o = 8$ W $W_a = 18$ W	 Y
EL 33 Output pentode	$V_f = 6.3$ V $I_f = 0.9$ A	Class A final amplifier	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -6$ V $R_k = 150\ \Omega$	$I_a = 36$ $I_{g2} = 4$	$S = 9$ mA/V $R_i = 50$ kΩ $R_a = 7$ kΩ $W_o = 4.5$ W $W_a = 9$ W	 Octal
		Class AB push-pull amplifier	$V_a = 250$ V $V_{g2} = 250$ V $R_k = 140\ \Omega$	$I_{amin} = 2\times 24$ $I_{amax} = 2\times 28.5$ $I_{g2min} = 2\times 2.8$ $I_{g2max} = 2\times 4.6$	$R_{aa} = 10$ kΩ $W_o = 8.2$ W	
EL 34		Class A final amplifier	$V_a = 250$ V $V_{g2} = 265$ V $V_{g1} = -13.5$ V	$I_a = 100$ $I_{g2} = 15$	$S = 11$ mA/V $R_i = 15$ kΩ $R_a = 2$ kΩ $W_o = 11$ W $W_a = 25$ W	

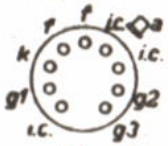
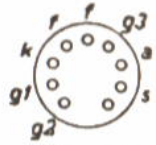
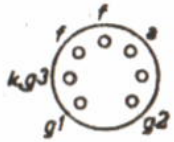
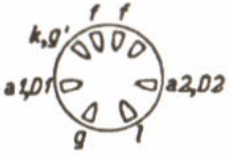
EL 34 Output pentode	$V_f = 6.3$ V $I_f = 1.5$ A	Class AB push-pull amplifier	$V_b = 375$ V R_{g2}[1] $= 470\ \Omega$ $R_k = 130\ \Omega$	$I_{amin} = 2\times 75$ $I_{amax} = 2\times 95$ $I_{g2min} = 2\times 11.5$ $I_{g2max} = 2\times 22.5$	$R_{aa} = 4$ kΩ $W_o = 37$ W	 Octal
		Class B push-pull amplifier	$V_b = 425$ V R_{g2}[1] $= 1$ kΩ $V_{g1} = -38$ V	$I_{amin} = 2\times 30$ $I_{amax} = 2\times 120$ $I_{g2min} = 2\times 4.4$ $I_{g2max} = 2\times 25$	$R_{aa} = 3.4$ kΩ $W_o = 55$ W	
			$V_{ba} = 800$ V $V_{bg2} = 400$ V $V_{g1} = -39$ V $R_{g2} = 750\ \Omega$	$I_{amin} = 2\times 25$ $I_{amax} = 2\times 91$ $I_{g2min} = 2\times 3$ $I_{g2max} = 2\times 19$	$R_{aa} = 11$ kΩ $W_o = 100$ W	
EL 38 Output pentode	$V_f = 6.3$ V $I_f = 1.4$ A	Typical characteristics	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -7$ V	$I_a = 100$ $I_{g2} = 13$	$S = 14.3$ mA/V $R_i = 21$ kΩ $C_{ag1} < 1.2$ pF	 Octal
EL 41 Output pentode	$V_f = 6.3$ V $I_f = 0.71$ A	Class A final amplifier	$V_a = 250$ V $V_{g2} = 250$ V $R_k = 170\ \Omega$	$I_a = 36$ $I_{g2} = 5.2$	$S = 10$ mA/V $R_i = 40$ kΩ $R_a = 7$ kΩ $W_o = 4.8$ W $W_a = 9$ W	 Rimlock
		Class AB push-pull amplifier	$V_a = 250$ V $V_{g2} = 250$ V $R_k = 85\ \Omega$	$I_{amin} = 2\times 36$ $I_{amax} = 2\times 39.5$ $I_{g2min} = 2\times 5.2$ $I_{g2max} = 2\times 8$	$R_{aa} = 7$ kΩ $W_o = 9.4$ W	

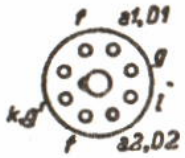
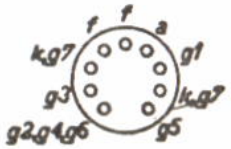
[1]) Common screen-grid resistor.

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EL 42 Output pentode	$V_f = 6.3$ V $I_f = 0.2$ A	Class A final amplifier	$V_a = 225$ V $V_{g2} = 225$ V $R_k = 360\ \Omega$	$I_a = 26$ $I_{g2} = 4.1$	$S = 3.2$ mA/V $R_i = 90$ kΩ $R_a = 9$ kΩ $W_o = 2.8$ W $W_a = 6$ W	 Rimlock
			$V_a = 200$ V $V_{g2} = 200$ V $R_k = 360\ \Omega$	$I_a = 22.5$ $I_{g2} = 3.5$	$S = 3.2$ mA/V $R_i = 90$ kΩ $R_a = 9$ kΩ $W_o = 2.1$ W	
		Class AB push-pull amplifier	$V_a = 250$ V $V_{g2} = 250$ V $R_k = 310\ \Omega$	$I_{amin} = 2\times 20$ $I_{amax} = 2\times 21.5$ $I_{g2min} = 2\times 3.2$ $I_{g2max} = 2\times 6.7$	$R_{aa} = 15$ kΩ $W_o = 7$ W	
			$V_a = 200$ V $V_{g2} = 200$ V $R_k = 310\ \Omega$	$I_{amin} = 2\times 16$ $I_{amax} = 2\times 17$ $I_{g2min} = 2\times 2.6$ $I_{g2max} = 2\times 5.6$	$R_{aa} = 15$ kΩ $W_o = 4.1$ W	
		Class B push-pull amplifier	$V_a = 250$ V $V_{g2} = 250$ V $V_{g1} = -22.5$ V	$I_{amin} = 2\times 5$ $I_{amax} = 2\times 20$ $I_{g2min} = 2\times 0.8$ $I_{g2max} = 2\times 6.5$	$R_{aa} = 16$ kΩ $W_o = 6.5$ W	

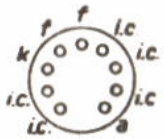
EL 50 Output pentode	$V_f = 6.3$ V $I_f = 1.35$ A	Typical characteristics	$V_a = 800$ V $V_{g2} = 400$ V $V_{g1} = -37$ V	$I_a = 22.5$ $I_{g2} = 2.5$	$S = 4$ mA/V $R_i = 50$ kΩ $W_a = 18$ W	
		Class AB push-pull amplifier	$V_a = 800$ V $V_{g2} = 400$ V $V_{g1} = -37.5$ V	$I_{amin} = 2\times 15$ $I_{amax} = 2\times 70$ $I_{g2min} = 2\times 1.3$ $I_{g2max} = 2\times 20$	$R_{aa} = 16$ kΩ $W_o = 84$ W	
			$V_a = 400$ V $V_{g2} = 425$ V $V_{g1} = -35$ V	$I_{amin} = 2\times 25$ $I_{amax} = 2\times 95$ $I_{g2min} = 2\times 2.5$ $I_{g2max} = 2\times 22$	$R_{aa} = 5$ kΩ $W_o = 50$ W	P
EL 51 Output pentode	$V_f = 6.3$ V $I_f = 1.9$ A	Typical characteristics	$V_a = 750$ V $V_{g2} = 750$ V $V_{g1} = -37.5$ V	$I_a = 60$ $I_{g2} = 10$	$S = 8$ mA/V $R_i = 50$ kΩ $W_a = 45$ W	
		Class AB push-pull amplifier	$V_a = 500$ V $V_{g2} = 500$ V $R_k = 100\ \Omega$	$I_{amin} = 2\times 87$ $I_{amax} = 2\times 110$ $I_{g2min} = 2\times 13$ $I_{g2max} = 2\times 23$	$R_{aa} = 4.8$ kΩ $W_o = 67.5$ W	
		Class B push-pull amplifier	$V_a = 750$ V V_{g2}[1] $= 750$ V $V_{g1} = -40$ V	$I_{amin} = 2\times 40$ $I_{amax} = 2\times 145$ $I_{g2min} = 2\times 7.5$ $I_{g2max} = 2\times 30$	$R_{aa} = 6$ kΩ $W_o = 140$ W	P
EL 60 Output pentode	= EL 34 with different base					 Loctal 9 p.

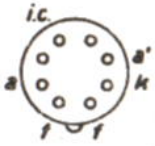
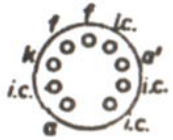
[1]) In the common screen-grid circuit a lamp of 550V/68W must be inserted.

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EL 81 Line output pentode	V_f = 6.3 V I_f = 1.05 A	Typical characteristics	V_a = 250 V V_{g2} = 250 V V_{g3} = 0 V V_{g1} = −38.5 V	I_a = 32 I_{g2} = 2.4	S = 4.6 mA/V W_a = 8 W $V_{a\,p}$ = max. 7 kV[1])	 Noval
EL 83 Video amplifying pentode	V_f = 6.3 V I_f = 0.71 A	Typical characteristics	V_a = 250 V V_{g2} = 250 V V_{g3} = 0 V V_{g1} = −5.5 V	I_a = 36 I_{g2} = 5.0	S = 10 mA/V R_i = 0.13 MΩ W_a = 9 W C_{g1} = 10.4 pF C_a = 6.6 pF	 Noval
EL 91 Output pentode	V_f = 6.3 V I_f = 0.2 A	Class A final amplifier	V_a = 250 V V_g = 250 V R_k = 680 Ω	I_a = 16 I_{g2} = 2.4	S = 2.6 mA/V R_i = 130 kΩ R_a = 16 kΩ W_o = 1.4 W W_a = 4 W	 Miniature
EM 1 Tuning indicator	V_f = 6.3 V I_f = 0.2 A	Tuning indicator	$V_b = V_l$ = 250 V R_a = 2 MΩ V_g = 0/−5 V	I_a = 0.095/0.021 I_l = 0.13/0.14	α = 74°/0°	 P
			$V_b = V_l$ = 200 V R_a = 2 MΩ V_g = 0/−4 V	I_a = 0.075/0.02 I_l = 0.13/0.14	α = 70°/0°	
EM 4 **EM 34** Tuning indicators	V_f = 6.3 V I_f = 0.2 A	Tuning indicator (sensitive system)	$V_b = V_l$ = 250 V R_{a1} = 1 MΩ V_g = 0/−5 V	I_l = 2.0/2.5	α_1 = 90°/5°	 P EM 4
			$V_b = V_l$ = 200 V R_{a1} = 1 MΩ V_g = 0/−4.2 V	I_l = 1.4/1.8	α_1 = 90°/5°	

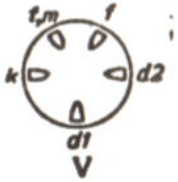
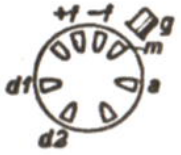
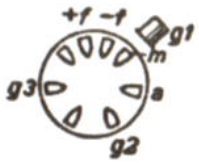
EM 4 **EM 34**		Tuning indicator (insensitive system)	$V_b = V_l =$ 250 V $R_{a2} =$ 1 MΩ $V_o =$ 0/—16 V	$I_l =$ 2.0/2.7	$a_2 =$ 90°/5°	 Octal EM 34
			$V_b = V_l =$ 200 V $R_{a2} =$ 1 MΩ $V_g =$ 0/—12.5 V	$I_l =$ 1.4/2.0	$a_2 =$ 90°/5°	
EQ 80 Enneode	$V_f =$ 6.3 V $I_f =$ 0.2 A	F.M. detector	$V_b =$ 250 V $R_a =$ 0.47 MΩ $R_1 =$ 34 kΩ $R_3 =$ 3.9 kΩ $R_4 =$ 560 Ω	$I_a =$ 0.28 $I_{g2} =$ 1.5 $I_{g3} =$ 0.09 $I_{g5} =$ 0.03	$R_i =$ 5 MΩ	 Noval
		A.F. amplifier	$V_b =$ 250 V $R_a =$ 0.47 MΩ $R_{g2+g3+g5} =$ 0.27 MΩ $R_k =$ 2.2 kΩ	$I_a =$ 0.4 $I_{g2+g3+g5} =$ 0.7	$g =$ 150	
EY 51 E.H.T. rectifying tube	$V_f =$ 6.3 V $I_f =$ 90 mA	Rectifier 50 c/s	$V_{tr} =$ max. 5 kV	$I_o =$ max. 3	$C_{filt} =$ max. 0.1 μF $R_l =$ min. 0.1 MΩ	
		Rectifier 10-500 kc/s	$V_{a\,inv\,p} =$ max. 17 kV	$I_o =$ max. 3	$C_{filt} =$ max. 0.01 μF $R_l =$ min. 0.1 MΩ	
		Pulse rectifier	$V_{a\,inv\,p} =$ max. 17 kV	$I_o =$ max. 0.35 $I_{a\,p} =$ max. 80 [2])	$C_{filt} =$ max. 5000 pF	

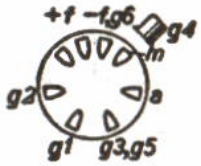
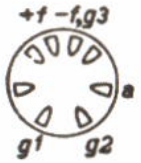
[1]) Max. pulse time 18% of one cycle with a maximum of 18 μsec.
[2]) Max. pulse time ⅓% of one cycle with a maximum of 5 μsec.

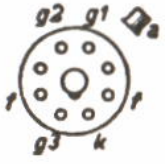
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EY 80[1] Booster diode	V_f = 6.3 V I_f = 0.9 A	Booster	$V_{a\,inv\,p}$[2] = max. 4 kV	I_a = max. 180 $I_{a\,p}$ = max. 400	V_{kfp} = max. 650 V [3] C_{ak} = 5.5 pF C_{filt} = max. 4 μF	 Noval
EY 91 Half-wave rectifying tube	V_f = 6.3 V I_f = 0.42 A	Rectifier	V_i = 250 V V_i = 200 V	I_o = max. 75 I_o = max. 75	C_{filt} = 32 μF R_t = min. 100 Ω R_t = min. 70 Ω V_{kfp} = max. 300 V	 Miniature
EZ 2 Full-wave rectifying tube	V_f = 6.3 V I_f = 0.4 A	Rectifier	V_{tr} = 2×300 V = 2×350 V	I_o = max. 60 = max. 60	C_{filt} = max. 32 μF R_t = min. 500 Ω C_{filt} = max. 16 μF R_t = min. 500 Ω	 P
EZ 35 Full-wave rectifying tube	V_f = 6.3 V I_f = 0.6 A	Rectifier	V_{tr} = 2×325 V	I_o = max. 70	R_t = min. 350 Ω C_{filt} = max. 16 μF V_{kfp} = max. 350 V	 Octal

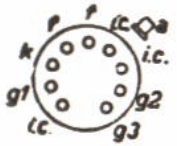
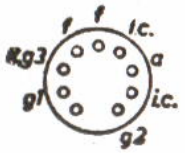
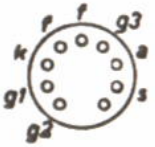
EZ 40 Full-wave rectifying tube	V_f = 6.3 V I_f = 0.6 A	Rectifier	V_{tr} =2×250 V =2×300 V =2×350 V	I_o = max. 90 = max. 90 = max. 90	R_t = min. 125 Ω = min. 215 Ω = min. 300 Ω C_{filt} = max. 50 μF $V_{kf\,p}$ = max. 500 V	 Rimlock
EZ 41 Full-wave rectifying tube	V_f = 6.3 V I_f = 0.4 A	Rectifier	V_{tr} =2×250 V	I_o = max. 60	C_{filt} = max. 32 μF R_t = min. 300 Ω $V_{kf\,p}$ = max. 350 V	 Rimlock
EZ 80 [1] Full-wave rectifying tube	V_f = 6.3 V I_f = 0.6 A	Rectifier	V_{tr} =2×350 V =2×350 V =2×275 V =2×250 V	I_o = max. 90 = max. 90 = max. 90 = max. 90	R_t = min. 300 Ω = min. 215 Ω = min. 175 Ω = min. 125 Ω C_{filt} = max. 50 μF	 Noval
GZ 32 Full-wave rectifying tube	V_f = 5 V I_f = 2 A	Rectifier	V_{tr} =2×500 V =2×300 V =2×300 V	I_o = max. 125 = max. 250 = max. 300	C_{filt} = max. 64 μF R_t = min. 150 Ω C_{filt} = max. 32 μF R_t = min. 100 Ω C_{filt} = max. 16 μF R_t = min. 50 Ω	 Octal

[1]) Provisional data.
[2]) Max. pulse time 18% of one cycle with a maximum of 18 μsec.
[3]) Max. 160 V (r.m.s.) A.C. + 450 V.D.C. Cathode positive with respect to heater.

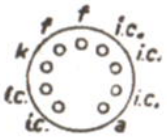
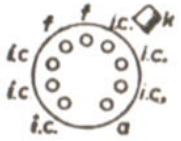
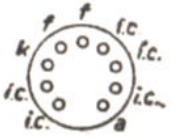
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
KB 2 Double diode	$V_f =$ 2 V $I_f =$ 95 mA	Detector and A.G.C.				
KBC 1 Double diode triode	$V_f =$ 2 V $I_f =$ 0.115 A	Typical characteristics	V_a = 135 V V_g = −4.5 V	I_a = 2.5	S = 1.0 mA/V R_i = 16 kΩ μ = 16	
			V_a = 90 V V_g = −3.4 V	I_a = 1.0	S = 0.7 mA/V R_i = 23 kΩ μ = 16	
		A.F. amplifier	V_b = 135 V R_a = 0.2 MΩ V_g = −2.0 V	I_a = 0.35	g = 12.5	
			V_b = 90 V R_a = 0.2 MΩ V_g = −2.0 V	I_a = 0.19	g = 11	
KF 3 Variable mu pentode	$V_f =$ 2 V $I_f =$ 45 mA	R.F. or I.F. amplifier	V_a = 135 V V_{g2} = 135 V V_{g1} = −0.5 V	I_a = 2.0 I_{g2} = 0.6	S = 0.65 mA/V R_i = 1.3 MΩ C_{ag1} < 6 mpF	
			V_a = 90 V V_{g2} = 90 V V_{g1} = −0.5 V	I_a = 1.0 I_{g2} = 0.2	S = 0.5 mA/V R_i = 2 MΩ	

KK 2 Octode	$V_f = 2$ V $I_f = 0.13$ A	Frequency changer	$V_a = 135$ V $V_{g3+g5} = 45$ V $V_{g4} = -0.5$ V $V_{g2} = 135$ V $R_{g1} = 50$ kΩ $V_{osc} = 8.5$ V	$I_a = 0.7$ $I_{g3+g5} = 1.0$ $I_{g2} = 2.2$ $I_{g1} = 0.16$	$S_c = 0.27$ mA/V $R_i = 2.5$ MΩ	
			$V_a = 90$ V $V_{g3+g5} = 45$ V $V_{g4} = -0.5$ V $V_{g2} = 90$ V $R_{g1} = 50$ kΩ $V_{osc} = 8.5$ V	$I_a = 0.7$ $I_{g3+g5} = 1.0$ $I_{g2} = 1.6$ $I_{g1} = 0.16$	$S_c = 0.27$ mA/V $R_i = 2.0$ MΩ	P
KL 4 Output pentode	$V_f = 2$ V $I_f = 0.15$ A	Class A final amplifier	$V_a = 135$ V $V_{g2} = 135$ V $V_{g1} = -5$ V	$I_a = 7$ $I_{g2} = 1.1$	$S = 2.1$ mA/V $R_i = 130$ kΩ $R_a = 19$ kΩ $W_o = 0.44$ W $W_a = 1$ W	
			$V_a = 90$ V $V_{g2} = 90$ V $V_{g1} = -2.6$ V	$I_a = 4.7$ $I_{g2} = 0.8$	$S = 1.8$ mA/V $R_i = 150$ kΩ $R_a = 19$ kΩ $W_o = 0.16$ W	P

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
MAW	Transmitting tube, see p. 130					
MF	Radar tubes, see p. 123					
MV	X-Ray tubes, see p. 152					
MW	Picture tubes, see p. 123					
OA	Germanium diodes, see p. 171					
PA **PB** **PE**	Transmitting tubes, see p. 130					
PL 5	Senditron, see p. 147					
PL 10 **PL 17** **PL 21**	Thyratrons, see p. 147					
PL 38 Output pentode	V_f = 30 V I_f = 0.3 A	Typical characteristics	V_a = 200 V V_{g2} = 200 V V_{g1} = −5.5 V	I_a = 75 I_{g2} = 9.0	S = 13.5 mA/V R_i = 20 kΩ C_{ag1} > 1.2 pF W_a = 25 W	 Octal
PL 57	Thyratron, see p. 147					

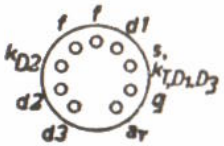
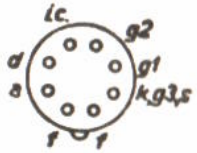
PL 81 Line output pentode	$V_f = 21.5$ V $I_f = 0.3$ A	Typical characteristics	$V_a = 170$ V $V_{g3} = 0$ V $V_{g2} = 170$ V $V_{g1} = -22$ V	$I_a = 45$ $I_{g2} = 3.0$	$S = 6.2$ mA/V $W_a = 8$ W V_{ap} [2] = max. 7 kV	 Noval
PL 82[1] Frame or sound output pentode	$V_f = 16.5$ V $I_f = 0.3$ A	Typical characteristics	$V_a = 170$ V $V_{g2} = 170$ V $V_{g1} = -10.4$ V	$I_a = 53$ $I_{g2} = 10$	$S = 9.0$ mA/V $R_i = 20$ kΩ $W_a = 9$ W V_{ap} [3] = max. 2.5 kV	 Noval
PL 83 Video amplifying pentode	$V_f = 15$ V $I_f = 0.3$ A	Typical characteristics	$V_a = 200$ V $V_{g1} = 0$ V $V_{g2} = 200$ V $V_{g1} = -3.5$ V	$I_a = 36$ $I_{g2} = 5$	$S = 10.5$ mA/V $R_i = 0.1$ MΩ $W_a = 9$ W $C_{g1} = 10.4$ pF $C_a = 6.6$ pF $C_{ag1} < 0.1$ pF	 Noval
PL 105 **PL 150** **PL 435** **PL 522**	Thyratrons, see p. 147					
PL 1267	= Z 300 T, Trigger tube, see p. 169					

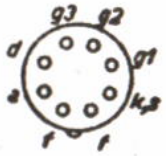
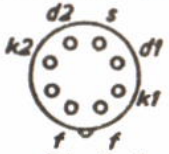
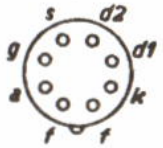
[1]) Provisional data. [2]) Max. pulse time 18% of one cycle with a maximum of 18 μsec.
[3]) Max. pulse time 10% of one cycle with a maximum of 2000 μsec.

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
PL 1607 **PL 5544** **PL 5545**	Thyratrons, see p. 147					
PL 5551 **PL 5552** **PL 5555**	Ignitrons, see p. 150					
PY 80 Booster diode	V_f = 19 V I_f = 0.3 A	Booster	V_{ainvp} [1]) = max. 4 kV	I_a = max. 180 I_{ap} = max. 400	V_{kfp} = max. 650 V [2]) C_a = 5.5 pF C_{filt} = max. 4 μF	 Noval
PY 81 Booster diode	V_f = 17 V I_f = 0.3 A	Booster	V_{ainvp} = max. 4.5 kV	I_a = max. 150 I_{ap} = max. 450		 Noval
PY 82 Half-wave rectifying tube	V_f = 19 V I_f = 0.3 A	Rectifier	V_i = 220 V V_i = 127 V	I_o = max. 180 I_o = max. 180	R_l = min. 40 Ω C_{filt} = max. 60 μF R_l = 0 Ω V_{ainvp} = max. 700 V V_{kfp} = max. 550 V [3])	 Noval

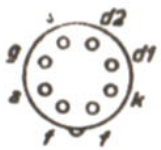
QB **QE** **QQC** **QQE** **TA** **TB**	Transmitting tubes, see p. 130					
TH	Thermocouples, see p. 169					
U 30	Current regulator, see p. 170					

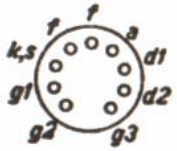
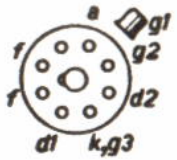
[1]) Max. pulse time 18% of one cycle with a maximum of 18 μsec.
[2]) Max. 160 V (r.m.s.) A.C. + 450 V D.C. Cathode positive with respect to heater.
[3]) Max. 220 V (r.m.s.) A.C. + 250 V D.C. Cathode positive with respect to heater.

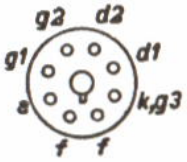
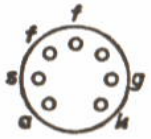
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
UABC 80[1] Triple diode triode	$V_f = 28.5$ V $I_f = 0.1$ A	Typical characteristics (diode systems)	$V_{d1\,inv\,p}$ = max. 350 V $V_{d2\,inv\,p}$ = max. 350 V $V_{d3\,inv\,p}$ = max. 350 V	I_{d1} = max. 1 I_{d1p} = max. 6 I_{d2} = max. 10 I_{d2p} = max. 75 I_{d3} = max. 10 I_{d3p} = max. 75	R_{id1} = 6.25 kΩ (V_{d1} = 10 V) R_{id2} = 200 Ω (V_{d2} = 5 V) R_{id3} = 200 Ω (V_{d3} = 5 V)	 Noval
		Typical characteristics (triode system)	V_a = 170 V V_g = −2 V	I_a = 0.8	S = 1.2 mA/V R_i = 58 kΩ μ = 70	
			V_a = 100 V V_g = −1 V	I_a = 0.8	S = 1.3 mA/V R_i = 54 kΩ μ = 70	
UAF 41 Diode variable mu pentode	$V_f = 12.6$ V $I_f = 0.1$ A	R.F. or I.F. amplifier	$V_a = V_b$ = 170 V R_{g2} = 44 kΩ V_{g1} = −2 V	I_a = 5 I_{g2} = 1.6	S = 1.8 mA/V R_i = 1.2 MΩ C_{ag1} < 2 mpF	 Rimlock
			$V_a = V_b$ = 100 V R_{g2} = 44 kΩ V_{g1} = −1.1 V	I_a = 2.8 I_{g2} = 0.9	S = 1.65 mA/V R_i = 1.0 MΩ	
		A.F. amplifier	V_b = 170 V R_a = 0.2 MΩ R_{g2} = 0.73 MΩ R_k = 2.7 kΩ	I_a = 0.58 I_{g2} = 0.18	g = 78	
			V_b = 100 V R_a = 0.2 MΩ R_{g2} = 0.73 MΩ R_k = 2.7 kΩ	I_a = 0.34 I_{g2} = 0.10	g = 73	

UAF 42 Diode variable mu pentode	$V_f = 12.6$ V $I_f = 0.1$ A	R.F. or I.F. amplifier	$V_a = V_b =$ 170 V $R_{g2} =$ 56 kΩ $V_{g1} =$ −2.0 V	$I_a =$ 5.0 $I_{g2} =$ 1.5	$S =$ 2.0 mA/V $R_i =$ 0.9 MΩ $C_{ag1} <$ 2 mpF	 Rimlock
			$V_a = V_b =$ 100 V $R_{g2} =$ 56 kΩ $V_{g1} =$ −1.2 V	$I_a =$ 2.8 $I_{g2} =$ 0.9	$S =$ 1.7 mA/V $R_i =$ 0.85 MΩ	
		A.F. amplifier	$V_b =$ 170 V $R_a =$ 0.22 MΩ $R_{g2} =$ 0.82 MΩ $R_k =$ 2.7 kΩ	$I_a =$ 0.50 $I_{g2} =$ 0.17	$g =$ 80	
			$V_b =$ 100 V $R_a =$ 0.22 MΩ $R_{g2} =$ 0.82 MΩ $R_k =$ 2.7 kΩ	$I_a =$ 0.29 $I_{g2} =$ 0.09	$g =$ 75	
UB 41 Double diode	$V_f =$ 19 V $I_f =$ 0.1 A	Detector and A.G.C.	$V_{d\,inv\,p} =$ max. 420 V	$I_d =$ max. 9 $I_{dp} =$ max. 54		 Rimlock
UBC 41 Double diode triode	$V_f =$ 14 V $I_f =$ 0.1 A	Typical characteristics	$V_a =$ 170 V $V_g =$ −1.55 V	$I_a =$ 1.5	$S =$ 1.65 mA/V $R_i =$ 42 kΩ $\mu =$ 70	 Rimlock
			$V_a =$ 100 V $V_g =$ −1.0 V	$I_a =$ 0.8	$S =$ 1.4 mA/V $R_i =$ 50 kΩ $\mu =$ 70	

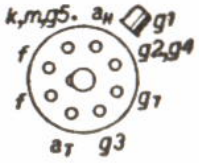
[1]) Provisional data.

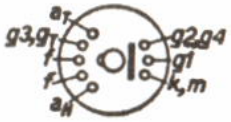
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
UBC 41 Double diode triode (continued)	$V_f = 14$ V $I_f = 0.1$ A	A.F. amplifier	$V_b = 170$ V $R_a = 0.1$ MΩ $R_k = 3.9$ kΩ	$I_a = 0.45$	$g = 37$	 Rimlock
			$V_b = 100$ V $R_a = 0.1$ MΩ $R_k = 3.9$ kΩ	$I_a = 0.28$	$g = 34$	
UBF 11 Double diode variable mu pentode	$V_f = 20$ V $I_f = 0.1$ A	R.F. or I.F. amplifier	$V_a = V_b = 200$ V $R_{g2} = 70$ kΩ $V_{g1} = -2$ V	$I_a = 5$ $I_{g2} = 1.7$	$S = 1.8$ mA/V $R_i = 1.5$ MΩ $C_{ag1} < 2$ mpF	 Y
			$V_a = V_b = 100$ V $R_{g2} = 70$ kΩ $V_{g1} = -1$ V	$I_a = 2.6$ $I_{g2} = 0.85$	$S = 1.3$ mA/V $R_i = 0.9$ MΩ	
		A.F. amplifier	$V_b = 200$ V $R_a = 0.2$ MΩ $R_{g2} = 0.7$ MΩ $R_k = 2.4$ kΩ	$I_a = 0.66$ $I_{g2} = 0.24$	$g = 82$	
			$V_b = 100$ V $R_a = 0.2$ MΩ $R_{g2} = 0.7$ MΩ $R_k = 2.4$ kΩ	$I_a = 0.33$ $I_{g2} = 0.12$	$g = 76$	

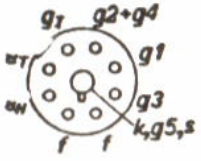
UBF 80 Double diode variable mu pentode	$V_f = 17$ V $I_f = 0.1$ A	R.F. or I.F. amplifier	$V_a = V_b = 170$ V $R_{g2} = 47$ kΩ $R_k = 295$ Ω	$I_a = 5.0$ $I_{g2} = 1.75$	$S = 2.2$ mA/V $R_i = 0.9$ MΩ $C_{ag1} < 2.5$ mpF	 Noval
			$V_a = V_b = 100$ V $R_{g2} = 47$ kΩ $R_k = 295$ Ω	$I_a = 2.8$ $I_{g2} = 1.0$	$S = 1.9$ mA/V $R_i = 0.9$ MΩ	
		A.F. amplifier	$V_b = 170$ V $R_a = 0.22$ MΩ $R_{g2} = 0.68$ MΩ $R_k = 2.7$ kΩ	$I_a = 0.56$ $I_{g2} = 0.20$	$g = 85$	
			$V_b = 100$ V $R_a = 0.22$ MΩ $R_{g2} = 0.68$ MΩ $R_k = 2.7$ kΩ	$I_a = 0.32$ $I_{g2} = 0.12$	$g = 82$	
UBL 1 Double diode output pentode	$V_f = 55$ V $I_f = 0.1$ A	Class A final amplifier	$V_a = 200$ V $V_{g2} = 200$ V $V_{g1} = -11.5$ V $R_k = 175$ Ω	$I_a = 55$ $I_{g2} = 11$	$S = 8.5$ mA/V $R_i = 20$ kΩ $R_a = 3.5$ kΩ $W_o = 5.2$ W $W_a = 11$ W	 Octal
			$V_a = 185$ V $V_{g2} = 185$ V $V_{g1} = -10$ V $R_k = 140$ Ω	$I_a = 59$ $I_{g2} = 11.3$	$S = 8.8$ mA/V $R_i = 23$ kΩ $R_a = 3$ kΩ $W_o = 5$ W	
			$V_a = 100$ V $V_{g2} = 100$ V $V_{g1} = -5$ V $R_k = 145$ Ω	$I_a = 28.5$ $I_{g2} = 5.3$	$S = 7$ mA/V $R_i = 25$ kΩ $R_a = 3$ kΩ $W_o = 1.05$ W	

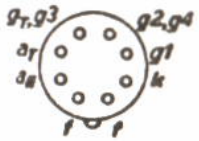
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
UBL 21 Double diode output pentode	V_f = 55 V I_f = 0.1 A	Classe A final amplifier	V_a = 180 V V_{g2} = 180 V V_{g1} = −10 V R_k = 140 Ω	I_a = 61 I_{g2} = 10	S = 9 mA/V R_i = 22 kΩ R_a = 3 kΩ W_o = 4.8 W W_a = 11 W	 Loctal 8p.
			V_a = 100 V V_{g2} = 100 V V_{g1} = −5.3 V R_k = 140 Ω	I_a = 32.5 I_{g2} = 5.5	S = 7.5 mA/V R_i = 25 kΩ R_a = 3 kΩ W_o = 1.35 W	
		Class AB push-pull amplifier	V_a = 200 V V_{g2} = 200 V R_k = 116 Ω	I_{amin} = 2× 50 I_{amax} = 2× 56 I_{g2min} = 2×7.8 I_{g2max} = 2× 14	R_{aa} = 4 kΩ W_o = 12.5 W	
UC 92[1] R.F. triode	V_f = 9.5 V I_f = 0.1 A	Typical characteristics	V_a = 250 V V_g = −2 V	I_a = 10	S = 5 mA/V R_i = 12 kΩ μ = 60 freq. = max. 300 Mc/s	 Miniature
			V_a = 170 V V_g = −1 V	I_a = 8.5	S = 5.5 mA/V R_i = 12 kΩ μ = 66	

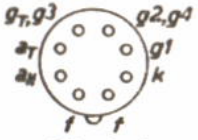
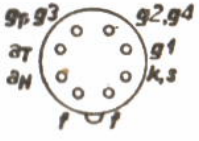
[1]) Provisional data.

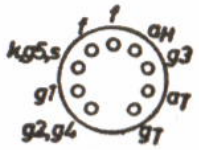
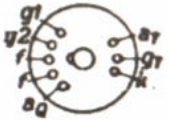
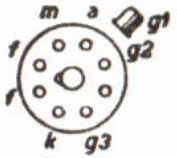
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
UCH 4 Triode heptode	$V_f = 20$ V $I_f = 0.1$ A	Frequency changer (heptode system)	$V_a = V_b = 200$ V $R_{g2+g4} = 15.5$ kΩ $R_{g3+gT} = 50$ kΩ $V_{g1} = -2$ V	$I_a = 3.5$ $I_{g2+g4} = 6.5$ $I_{g3+gT} = 0.19$	$S_c = 0.75$ mA/V $R_i = 1.0$ MΩ	 Octal
			$V_a = V_b = 100$ V $R_{g2+g4} = 15.5$ kΩ $R_{g3+gT} = 50$ kΩ $V_{g1} = -1$ V	$I_a = 1.5$ $I_{g2+g4} = 3.0$ $I_{g3+gT} = 0.095$	$S_c = 0.58$ mA/V $R_i = 1.0$ MΩ	
		Oscillator (triode system)	$V_b = 200$ V $R_a = 20$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 4.1$ $I_{g2+gT} = 0.19$	$S_{eff} = 0.45$ mA/V $V_{osc} = 7.5$ V	
			$V_b = 100$ V $R_a = 20$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 1.9$ $I_{g3+gT} = 0.095$	$S_{eff} = 0.44$ mA/V $V_{osc} = 4$ V	
		R.F. or I.F. amplifier (heptode system)	$V_a = V_b = 200$ V $R_{g2+g4} = 30$ kΩ $V_{g3} = 0$ V $V_{g1} = -2$ V	$I_a = 5.2$ $I_{g2+g4} = 3.5$	$S = 2.2$ mA/V $R_i = 0.7$ MΩ $C_{ag1} < 2$ mpF	
			$V_a = V_b = 100$ V $R_{g2+g4} = 30$ kΩ $V_{g3} = 0$ V $V_{g1} = -1$ V	$I_a = 2.6$ $I_{g2+g4} = 1.9$	$S = 2.0$ mA/V $R_i = 0.7$ MΩ	

UCH 4		A.F amplifier (triode system)	$V_b = 200$ V $R_a = 100$ kΩ $V_g = -2$ V	$I_a = 1.5$	$g = 10.5$	
			$V_b = 100$ V $R_a = 100$ kΩ $V_g = -1$ V	$I_a = 0.68$	$g = 10.5$	
		Typical characteristics (triode system)	$V_a = 100$ V $V_g = 0$ V	$I_a = 12$	$S = 3.2$ mA/V $R_i = 6$ kΩ $\mu = 19$	
UCH 11 Triode hexode	$V_f = 20$ V $I_f = 0.1$ A	Frequency changer (hexode system)	$V_a = V_b = 200$ V $R_{g2+g4} = 40$ kΩ $R_{g3+gT} = 50$ kΩ $V_{g1} = -2$ V	$I_a = 2.5$ $I_{g2+g4} = 3.0$ $I_{g3+gT} = 0.16$	$S_c = 0.75$ mA/V $R_i = 1.0$ MΩ	
			$V_a = V_b = 100$ V $R_{g2+g4} = 40$ kΩ $R_{g3+gT} = 50$ kΩ $V_{g1} = -1$ V	$I_a = 1.2$ $I_{g2+g4} = 1.5$ $I_{g3+gT} = 0.10$	$S_c = 0.45$ mA/V $R_i = 0.6$ MΩ	
		Oscillator (triode system)	$V_b = 200$ V $R_a = 30$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 2.8$ $I_{g3+gT} = 0.16$	$V_{osc} = 7$ V	Y
			$V_b = 100$ V $R_a = 30$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 1.4$ $I_{g3+gT} = 0.10$	$V_{osc} = 4$ V	

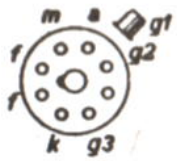
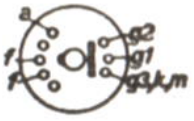
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
UCH 21 Triode heptode	$V_f = 20$ V $I_f = 0.1$ A	Frequency changer (heptode system)	$V_a = 200$ V $R_{g2+g4} = 15.5$ kΩ $R_{g3+gT} = 50$ kΩ $V_{g1} = -2$ V	$I_a = 3.5$ $I_{g2+g4} = 6.5$ $I_{g3+gT} = 0.19$	$S_c = 0.75$ mA/V $R_i = 1.0$ MΩ	 Loctal 8 p.
			$V_a = 100$ V $R_{g2+g4} = 15.5$ kΩ $R_{g3+gT} = 50$ kΩ $V_{g1} = -1$ V	$I_a = 1.5$ $I_{g2+g4} = 3.0$ $I_{g3+gT} = 0.095$	$S_c = 0.58$ mA/V $R_i = 1.0$ MΩ	
		Oscillator (triode system)	$V_b = 200$ V $R_a = 20$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 4.1$ $I_{g3+gT} = 0.19$	$S_{eff} = 0.45$ mA/V $V_{osc} = 7.5$ V	
			$V_b = 100$ V $R_a = 20$ kΩ $R_{g3+gT} = 50$ kΩ	$I_a = 1.9$ $I_{g3+gT} = 0.095$	$S_{eff} = 0.44$ mA/V $V_{osc} = 4$ V	
		R.F. or I.F. amplifier (heptode system)	$V_a = 200$ V $R_{g2+g4} = 30$ kΩ $V_{g3} = 0$ V $V_{g1} = -2$ V	$I_a = 5.2$ $I_{g2+g4} = 3.5$	$S = 2.2$ mA/V $R_i = 0.7$ MΩ $C_{ag1} < 2$ mpF	
			$V_a = 100$ V $R_{g2+g4} = 30$ kΩ $V_{g3} = 0$ V $V_{g1} = -1$ V	$I_a = 2.6$ $I_{g2+g4} = 1.9$	$S = 2.0$ mA/V $R_i = 0.7$ MΩ	

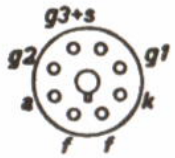
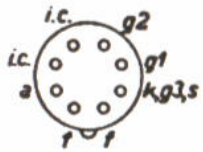
UCH 21		A.F. amplifier (triode system)	V_b = 200 V R_a = 100 kΩ V_g = −2 V	I_a = 1.5	g = 10.5	
			V_b = 100 V R_a = 100 kΩ V_g = −1 V	I_a = 0.68	g = 10.5	
		Typical characteristics (triode system)	V_a = 100 V V_g = 0 V	I_a = 12	S = 3.2 mA/V R_i = 6 kΩ μ = 19	
UCH 41 Triode hexode	V_f = 14 V I_f = 0.1 A	Frequency changer (hexode system)	$V_a = V_b$ = 170 V R_1 = 22 kΩ R_2 = 47 kΩ R_{g3+gT} = 20 kΩ V_{g1} = 1.8 V	I_a = 2.2 I_{g2+g4} = 1.9 I_{g3+gT} = 0.32	S_c = 0.45 mA/V R_i = 1.2 MΩ	 Rimlock
			$V_a = V_b$ = 100 V R_1 = 22 kΩ R_2 = 47 kΩ R_{g3+gT} = 20 kΩ V_{g1} = −1.0 V	I_a = 1.0 I_{g2+g4} = 1.0 I_{g3+gT} = 0.20	S_c = 0.32 mA/V R_i = 1.4 MΩ	
		Oscillator (triode system)	V_b = 170 V R_a = 10 kΩ R_{g3+gT} = 20 kΩ	I_a = 4.9 I_{g3+gT} = 0.32	S_{eff} = 0.6 mA/V V_{osc} = 7 V	

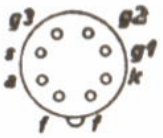
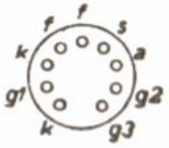
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
UCH 41 (continued)	V_f = 14 V I_f = 0.1 A	Oscillator (triode system)	V_b = 100 V R_a = 10 kΩ R_{g3+gT} = 20 kΩ V_{osc} = 4 V	I_a = 2.8 I_{g3+gT} = 0.20	S_{eff} = 0.56 mA/V S_o = 1.9 mA/V μ = 19	 Rimlock
UCH 42 Triode hexode	V_f = 14 V I_f = 0.1 A	Frequency changer (hexode system)	$V_a = V_b$ = 170 V R_1 = 18 kΩ R_2 = 27 kΩ R_{g3+gT} = 47 kΩ V_{g1} = −1.85 V	I_a = 2.1 I_{g2+g4} = 2.6 I_{g3+gT} = 0.20	S_c = 0.67 mA/V R_i = 1.0 MΩ	 Rimlock
			$V_a = V_b$ = 100 V R_1 = 18 kΩ R_2 = 27 kΩ R_{g2+gT} = 47 kΩ V_{g1} = −1.0 V	I_a = 1.2 I_{g2+g4} = 1.5 I_{g3+gT} = 0.10	S_c = 0.53 mA/V R_i = 1.2 MΩ	
		Oscillator (triode system)	V_b = 170 V R_a = 10 kΩ R_{g3+gT} = 47 kΩ V_{osc} = 8 V	I_a = 5.7 I_{g3+gT} = 0.20	S_{eff} = 0.65 mA/V	
			V_b = 100 V R_a = 10 kΩ R_{g3+gT} = 47 kΩ V_{osc} = 4 V	I_a = 3.1 I_{g3+gT} = 0.10	S_{eff} = 0.6 mA/V S_o = 2.8 mA/V μ = 22	

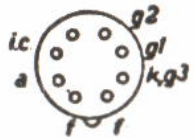
UCH 81[1] Triode heptode	V_f = 19 V I_f = 0.1 A	R.F. or I.F. amplifier (heptode system)	$V_a = V_b$ = 170 V R_{g2+g4} = 10 kΩ R_{g3+gT} = 47 kΩ V_{g1} = −2 V	I_a = 3.25 I_{g2+g4} = 6.7 I_{g3+gT} = 0.2	S_c = 0.775 mA/V R_i = 1 MΩ R_{eq} = 70 kΩ	 Noval
		R.F. or I.F. amplifier (heptode system)	$V_a = V_b$ = 170 V R_{g2+g4} = 18 kΩ V_g = −2 V	I_a = 6.8 I_{g2+g4} = 3.5	S = 2.4 mA/V R_i = 0.7 MΩ	
		Typical characteristics (triode system)	V_a = 100 V V_g = 0 V	I_a = 13.5	S = 3.7 mA/V R_i = 6 kΩ μ = 22	
		Oscillator (triode system)	V_b = 170 V R_a = 22 kΩ R_{g3+gT} = 47 kΩ	I_a = 4.5 I_{g3+gT} = 0.2	S_{eff} = 0.55 mA/V	
UCL 11 Triode output tetrode	V_f = 60 V I_f = 0.1 A	Typical characteristics (triode system)	V_a = 200 V V_g = −2 V	I_a = 2.0	S = 2.1 mA/V R_i = 30 kΩ μ = 65	 Y
		Class A final amplifier (tetrode system)	V_a = 200 V V_{g2} = 200 V V_{g1} = −8.5 V	I_a = 45 I_{g2} = 6	S = 9 mA/V R_i = 18 kΩ R_a = 4.5 kΩ W_o = 4 W	
UF 9 Variable mu pentode	V_f = 12.6 V I_f = 0.1 A	R.F. or I.F. amplifier	$V_a = V_b$ = 200 V R_{g2} = 60 kΩ V_{g1} = −2.5 V	I_a = 6 I_{g2} = 1.7	S = 2.2 mA/V R_i = 1.2 MΩ C_{ag1} < 2 mpF	 Octal
			$V_a = V_b$ = 100 V R_{g2} = 60 kΩ V_{g1} = −1.3 V	I_a = 3.2 I_{g2} = 0.85	S = 2.0 mA/V R_i = 1.0 MΩ	

[1]) Provisional data.

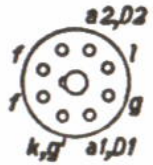
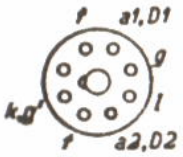
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
UF 9 (continued)	$V_f = 12.6$ V $I_f = 0.1$ A	A.F. amplifier	$V_b = 200$ V $R_a = 0.2$ MΩ $R_{g2} = 0.8$ MΩ $R_k = 2.5$ kΩ	$I_a = 0.65$ $I_{g2} = 0.17$	$g = 88$	 Octal
			$V_b = 100$ V $R_a = 0.2$ MΩ $R_{g2} = 0.8$ MΩ $R_k = 2.5$ kΩ	$I_a = 0.33$ $I_{g2} = 0.08$	$g = 82$	
UF 11 Variable mu pentode	$V_f = 15$ V $I_f = 0.1$ A	R.F. or I.F. amplifier	$V_a = 200$ V $R_{g2} = 70$ kΩ $V_{g1} = -2$ V	$I_a = 6$ $I_{g2} = 1.7$	$S = 2.2$ mA/V $R_i = 1.5$ MΩ $C_{ag1} < 2$ mpF	 Y
			$V_a = V_b = 100$ V $R_{g2} = 70$ kΩ $V_{g1} = -1$ V	$I_a = 2.8$ $I_{g2} = 0.95$	$S = 1.8$ mA/V $R_i = 1.1$ MΩ $C_{ag1} < 2$ mpF	
		A.F. amplifier	$V_b = 200$ V $R_a = 0.2$ MΩ $R_{g2} = 0.6$ MΩ $R_k = 2$ kΩ	$I_a = 0.76$ $I_{g2} = 0.26$	$g = 77$	
			$V_b = 100$ V $R_a = 0.2$ MΩ $R_{g2} = 0.6$ MΩ $R_k = 2$ kΩ	$I_a = 0.37$ $I_{g2} = 0.12$	$g = 66$	

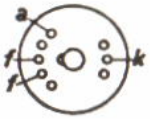
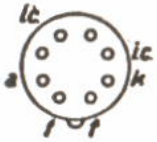
UF 21 Variable mu pentode	$V_f = 12.6$ V $I_f = 0.1$ A	R.F. or I.F. amplifier	$V_a = V_b = 200$ V $R_{g2} = 60$ kΩ $V_{g1} = -2.5$ V	$I_a = 6$ $I_{g2} = 1.7$	$S = 2.2$ mA/V $R_i = 1.0$ MΩ $C_{og1} < 2$ mpF	 Loctal 8p.
			$V_a = V_b = 100$ V $R_{g2} = 60$ kΩ $V_{g1} = -1.3$ V	$I_a = 3.2$ $I_{g2} = 0.85$	$S = 2.0$ mA/V $R_i = 1.0$ MΩ	
		A.F. amplifier	$V_b = 200$ V $R_a = 0.2$ MΩ $R_{g2} = 0.8$ MΩ $R_k = 2.5$ kΩ	$I_a = 0.65$ $I_{g2} = 0.17$	$g = 88$	
			$V_b = 100$ V $R_a = 0.2$ MΩ $R_{g2} = 0.8$ MΩ $R_k = 2.5$ kΩ	$I_a = 0.33$ $I_{g2} = 0.08$	$g = 82$	
UF 41 Variable mu pentode	$V_f = 12.6$ V $I_f = 0.1$ A	R.F. or I.F. amplifier	$V_a = 170$ V $R_{g2} = 40$ kΩ $V_{g1} = -2.5$ V	$I_a = 6$ $I_{g2} = 1.75$	$S = 2.2$ mA/V $R_i = 1.0$ MΩ $C_{ag1} < 2$ mpF	 Rimlock
			$V_a = 100$ V $R_{g2} = 40$ kΩ $V_{g1} = -1.4$ V	$I_a = 3.3$ $I_{g2} = 1.0$	$S = 1.9$ mA/V $R_i = 0.8$ MΩ	

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
UF 42 R.F. pentode	V_f = 21 V I_f = 0.1 A	Typical characteristics	V_a = 170 V V_{g2} = 170 V V_{g1} = -2 V	I_a = 10 I_{g2} = 2.8	S = 8 mA/V R_i = 0.3 MΩ C_{ag1} < 6 mpF R_{eq} = 1060 Ω	 Rimlock
UF 80 R.F. pentode	V_f = 20 V I_f = 0.1 A	R.F. or I.F. amplifier	V_a = 170 V V_{g3} = 0 V V_{g2} = 170 V V_{g1} = —2 V	I_a = 10 I_{g2} = 2.5	S = 7.4 mA/V R_i = 0.5 MΩ C_{ag1} < 7 mpF	 Noval
UF 85[1] R.F. variable mu pentode	V_f = 19 V I_f = 0.1 A	R.F. or I.F. amplifier	$V_a = V_b$ = 170 V R_{g2} = 27 kΩ V_{g1} = —2 V	I_a = 10 I_{g2} = 2.5	S = 6 mA/V R_i = 0.5 MΩ R_{eq} = 1.5 kΩ	

UL 41 Output pentode	$V_f = 45$ V $I_f = 0.1$ A	Class A final amplifier	$V_a = 170$ V $V_{g2} = 170$ V $V_{g1} = -10.4$ V	$I_a = 53$ $I_{g2} = 10$	$S = 9.5$ mA/V $R_i = 20$ kΩ $R_a = 3$ kΩ $W_o = 4.25$ W $W_a = 9$ W	
			$V_a = 110$ V $V_{g2} = 110$ V $V_{g1} = -6.4$ V	$I_a = 32$ $I_{g2} = 6.0$	$S = 8.5$ mA/V $R_i = 18$ kΩ $R_a = 3$ kΩ $W_o = 1.7$ W	
			$R_a = 100$ V $V_{g2} = 100$ V $V_{g1} = -5.7$ V	$I_a = 29$ $I_{g2} = 5.5$	$S = 8.0$ mA/V $R_i = 18$ kΩ $R_a = 3$ kΩ $W_o = 1.35$ W	
		Class AB push-pull amplifier	$V_a = 170$ V $V_{g2} = 170$ V $R_k = 100$ Ω	$I_{amin} = 2\times 44$ $I_{amax} = 2\times 49$ $I_{g2min} = 2\times 8.8$ $I_{g2max} = 2\times 16.5$	$R_{aa} = 4$ kΩ $W_o = 9$ W	Rimlock
			$V_a = 100$ Ω $V_{g2} = 100$ V $R_k = 100$ V	$I_{amin} = 2\times 24$ $I_{amax} = 2\times 27$ $I_{g2min} = 2\times 4.6$ $I_{g2max} = 2\times 6.8$	$R_{aa} = 4$ kΩ $W_o = 2.2$ W	

[1]) Provisional data.

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
UM 4 Tuning indicator	$V_f = 12.6$ V $I_f = 0.1$ A	Tuning indicator (sensitive system)	$V_b = V_l =$ 200 V $R_{a1} =$ 1.0 MΩ $V_g =$ 0/—4.2 V	$I_l =$ 1.4/1.8	$\alpha_1 = 90^0/5^0$	 Octal
			$V_b = V_l =$ 100 V $R_{a1} =$ 1.0 MΩ $V_g =$ 0/—2.5 V	$I_l =$ 0.40/0.52	$\alpha_1 = 90^0/0^0$	
		Tuning indicator (insensitive system)	$V_b = V_l =$ 200 V $R_{a2} =$ 1.0 MΩ $V_g =$ 0/—12.5V	$I_l =$ 1.4/2.0	$\alpha_2 = 90^0/5^0$	
			$V_b = V_l =$ 100 V $R_{a2} =$ 1.0 MΩ $V_g =$ 0/—8 V	$I_l =$ 0.40/0.61	$\alpha_2 = 90^0/0^0$	
UM 34 Tuning indicator	$V_f = 12.6$ V $I_f = 0.1$ A	Tuning indicator (sensitive system)	$V_b = V_l =$ 200 V $R_{a2} =$ 1 MΩ $V_g =$ 0/—4.2 V	$I_l =$ 1.4/1.8	$\alpha_1 = 90^0/5^0$	 Octal
		Tuning indicator (insensitive system)	$V_b = V_l =$ 200 V $R_{a2} =$ 1 MΩ $V_g =$ 0/—12.5 V	$I_l =$ 1.4/2.0	$\alpha_2 = 90^0/5^0$	

UY 1 N Half-wave rectifying tube	$V_f = 50$ V $I_f = 0.1$ A	Rectifier	$V_i = 250$ V $V_i = 127$ V	I_o = max. 140 I_o = max. 140	R_t = min. 175 Ω R_t = 0 Ω C_{filt} = max. 60 μF	Octal
UY 11 Half-wave rectifying tube	$V_f = 50$ V $I_f = 0.1$ A	Rectifier	$V_i = 250$ V	I_o = max. 140	R_t = min. 175 Ω C_{filt} = max. 60 μF	 Y
UY 41 Half-wave rectifying tube	$V_f = 31$ V $I_f = 0.1$ A	Rectifier	$V_i = 220$ V $V_i = 127$ V	I_o = max. 100 I_o = max. 100	R_t = min. 160 Ω R_t = 0 Ω C_{filt} = max. 50 μF	 Rimlock
UY 42 Half-wave rectifying tube	$V_f = 31$ V $I_f = 0.1$ A	Rectifier	V_i = max. 110 V	I_o = max. 100	C_{filt} = max. 50 μF	
Z 300 T	Trigger tube, see p. 169					

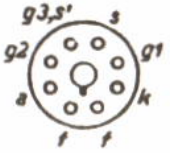
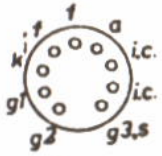
SPECIAL A. F. AND R. F. AMPLIFYING TUBES

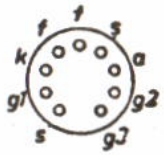
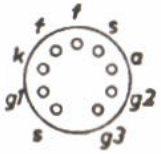
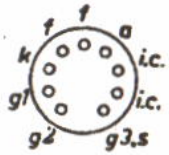
PREFERRED TYPES

Type of tube		Repeater tubes	Reliable ruggedized longlife tubes	Tubes for computers	Hearing-aid tubes	U.H.F. tubes
Filament voltage	0.625 V				DF 66 DF 67	
	1.25 V				DL 66 DL 67	
	6.3 V	E 81 L E 83 F	E 80 CC E 80 F E 80 L	E 90 CC		EC 55 EC 80 EC 81
	18 V	18042 18045				

SPECIAL A.F. AND R.F. AMPLIFYING TUBES

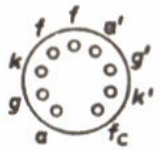
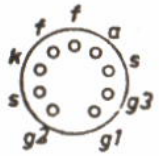
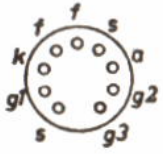
REPEATER TUBES

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
18004 Triode	V_f = 4.4 V I_f = 0.97 A	Final amplifier	V_a = 130 V V_g = −25 V	I_a = 22	S = 1.0 mA/V R_i = 2.3 kΩ R_a = 2.1 kΩ W_o = 0.2 W W_a = 3.5 W d_{tot} < 5 %	Medium 4 p.
18040 Pentode	V_f = 18 V I_f = 0.27 A	Pre-amplifier	V_a = 210 V R_a = 20 kΩ V_{g2} = 210 V R_k = 185 Ω	I_a = 15 I_{g2} = 4	S = 10 mA/V R_i = 0.3 MΩ g = 5.15 N	 Loctal 8 p.
		Final amplifier	V_a = 210 V V_{g2} = 210 V R_k = 120 Ω	I_a = 20 I_{g2} = 5.3	S = 11 mA/V R_i = 0.25 MΩ R_a = 15 kΩ W_o = 2.1 W d_{tot} < 20 % W_a = 4.5 W	
18042 Pentode	V_f = 18 V I_f = 0.1 A	Typical characteristics	V_a = 210 V V_{g2} = 120 V R_k = 165 Ω	I_a = 10 I_{g2} = 2.1	S = 9 mA/V R_i = 0.5 MΩ R_{eq} = 750 Ω	 Noval

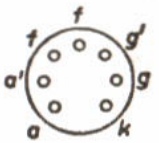
18045 Output pentode	V_f = 18 V I_f = 0.15 A	Class A final amplifier	V_a = 210 V V_{g3} = 0 V V_{g2} = 210 V R_k = 120 Ω	I_a = 20 I_{g2} = 5.3	S = 11 mA/V R_a = 15 kΩ W_o = 0.9 W d_{tot} = 5 % W_a = 6 W	
18046 Output pentode	V_f = 20 V I_f = 0.135 A	Class A final amplifier	V_a = 210 V V_{g3} = 0 V V_{g2} = 210 V R_k = 120 Ω	I_a = 20 I_{g2} = 5.3	S = 11 mA/V R_a = 15 kΩ W_o = 0.9 W d_{tot} = 5 % W_a = 6 W	Noval
E 81 L Output pentode	V_f = 6.3 V I_f = 0.45 A	Class A final amplifier	V_a = 210 V V_{g3} = 0 V V_{g2} = 210 V V_{g1} = —3 V	I_a = 20 I_{g2} = 5.3	R_a = 15 kΩ W_o = 2.1 W W_a = 4.5 W	
E 83 F Pentode	V_f = 6.3 V I_f = 0.3 A	Typical characteristics	V_a = 210 V V_{g2} = 120 V R_k = 165 Ω	I_a = 10 I_{g2} = 2.1	S = 9.0 mA/V R_i = 0.5 MΩ R_{eq} = 750 Ω	Noval
		Class A final amplifier	V_{ba} = 210 V V_{bg2} = 120 V R_{g2} = 5.6 kΩ R_k = 180 Ω	I_a = 8.3 I_{g2} = 1.7	S = 8.2 mA/V R_i = 0.44 MΩ R_a = 20 kΩ W_o = 0.87 W W_a = 2.1 W	

Noval

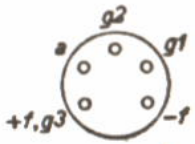
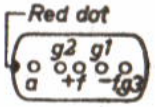
RELIABLE, RUGGEDIZED AND LONG LIFE TUBES

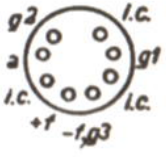
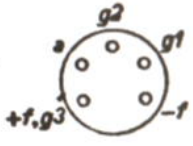
Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
E 80 CC Double triode	V_f = 6.3 V I_f = 0.6 A V_f = 12.6 V I_f = 0.3 A	Typical characteristics (per system)	V_a = 250 V V_g = −5.5 V	I_a = 6	S = 2.7 mA/V R_i = 11 kΩ μ = 30 W_a = 1.5 W	 Noval
E 80 F A. F. pentode	V_f = 6.3 V I_f = 0.3 A	Typical characteristics	V_a = 250 V V_{g2} = 100 V R_k = 560 Ω	I_a = 3 I_{g2} = 0.55	S = 1.85 mA/V R_i = 1.8 MΩ μ_{g2g1} = 25	 Noval
		A.F. amplifier	V_b = 250 V R_a = 0.22 MΩ R_{g2} = 1.2 MΩ R_k = 1.5 kΩ	I_a = 0.80 I_{g2} = 0.17	g = 165	
			V_b = 400 V R_a = 0.22 MΩ R_{g2} = 1.2 MΩ R_k = 1.0 kΩ	I_a = 1.35 I_{g2} = 0.28	g = 185	
E 80 L Output pentode	V_f = 6.3 V I_f = 0.75 A	Class A final amplifier	V_a = 200 V V_{g2} = 200 V R_k = 130 Ω	I_a = 30 I_{g2} = 4.2	S = 9.0 mA/V R_a = 7 kΩ W_o = 2.5 W W_a = 6 W	 Noval

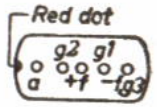
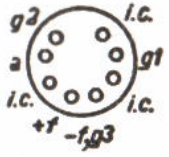
TUBE FOR COMPUTERS

E 90 CC Double triode	V_f = 6.3 V I_f = 0.4 A	Typical characteristics (per system)	V_a = 100 V V_g = −2.1 V	I_a = 8.5	S = 6 mA/V R_i = 4.5 kΩ μ = 27	 Miniature

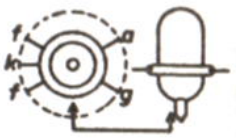
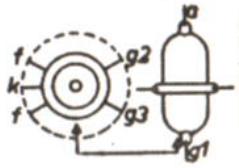
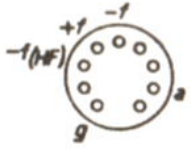
HEARING-AID TUBES

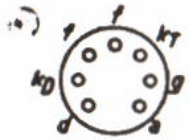
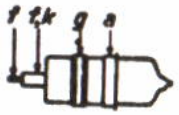
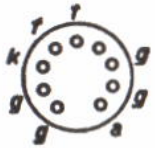
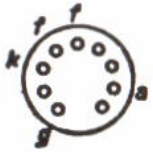
DF 65 Pentode	V_f = 0.625 V I_f = 13.3 mA	Typical characteristics	V_a = 22.5 V V_{g2} = 18 V V_{g1} = −1.15V	I_a = 0.05 I_{g2} = 0.01	S = 0.1 mA/V R_i = 4 MΩ	
		A.F. amplifier	V_b = 22.5 V R_a = 1 MΩ R_{g2} = 3.9 MΩ V_{g1} = 0 V R_{g1} = 10 MΩ R_{g1}' = 5 MΩ	I_a = 0.0117 I_{g2} = 0.0025	g = 31	
DF 66 Pentode	V_f = 0.625 V I_f = 15 mA	Typical characteristics	V_a = 22.5 V V_{g2} = 22.5 V V_{g1} = −1.05V	I_a = 0.05 I_{g2} = 0.015	S = 0.1 mA/V R_i > 2 MΩ	

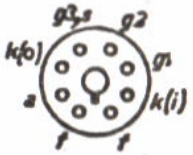
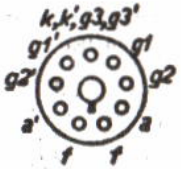
Type	Filament data	Application	Voltages Resistors	Currents	Characteristic data	Base connections
DF 67 Pentode	V_f = 0.625 V I_f = 13.3 mA	Typical characteristics	V_a = 22.5 V V_{g2} = 18 V V_{g1} = −1.15 V	I_a = 0.05 I_{g2} = 0.01	S = 0.1 mA/V R_i = 4 MΩ	
		A.F. amplifier	V_b = 22.5 V R_a = 1 MΩ R_{g2} = 3.9 MΩ V_{g1} = 0 V R_{g1}, = 10 MΩ R_{g1} = 5 MΩ	I_a = 0.0117 I_{g2} = 0.0025	g = 31	
DF 70 Pentode	V_f = 0.625 V I_f = 25 mA	Typical characteristics	V_a = 30 V V_{g2} = 30 V V_{g1} = −1.85 V	I_a = 0.05 I_{g2} = 0.018	S = 0.1 mA/V R_i = 2.5 MΩ μ_{g2g1} = 12.5	 Subminiature
DL 65 Output pentode	V_f = 1.25 V I_f = 13 mA	Class A final amplifier	$V_b = V_{g2}$ = 22.5 V R_{g1} = 10 MΩ R_k = 0 Ω	I_a = 0.34 I_{g2} = 0.09	S = 0.42 mA/V R_i = 0.4 MΩ R_a = 0.1 MΩ W_o = 1.8 mW	
			$V_b = V_{g2}$ = 45 V R_{g1} = 3 MΩ R_k = 4 kΩ	I_a = 0.19 I_{g2} = 0.07	R_a = 0.1 MΩ W_o = 1.6 mW W_a = 25 mW	

DL 66 Output pentode	$V_f = 1.25$ V $I_f = 15$ mA	Class A final amplifier	$V_b = 22.5$ V $V_{g2} = 22.5$ V $V_{g1} = -1.4$ V	$I_a = 0.30$ $I_{g2} = 0.075$	$S = 0.35$ mA/V $R_i = 0.3$ MΩ $R_a = 75$ kΩ $W_o = 2.7$ mW	
			$V_b = 45$ V $V_{g2} = 45$ V $V_{g1} = -3$ V	$I_a = 0.90$ $I_{g2} = 0.02$	$R_a = 50$ kΩ $W_o = 16.5$ mW	
DL 67 Output pentode	$V_f = 1.25$ A $I_f = 13$ mA	Class A final amplifier	$V_b = V_{g2} = 22.5$ V $R_{g1} = 10$ MΩ $R_k = 0$ Ω	$I_a = 0.34$ $I_{g2} = 0.09$	$S = 0.42$ mA/V $R_i = 0.4$ MΩ $R_a = 0.1$ MΩ $W_o = 1.8$ mW	
			$V_b = V_{g2} = 45$ V $R_{g1} = 3$ MΩ $R_k = 4$ kΩ	$I_a = 0.19$ $I_{g2} = 0.07$	$R_a = 0.1$ MΩ $W_o = 1.6$ mW $W_a = 25$ mW	
DL 71 Output pentode	$V_f = 1.25$ V $I_f = 25$ mA	Typical characteristics	$V_a = 45$ V $V_{g2} = 45$ V $V_{g1} = -1.25$ V	$I_a = 0.6$ $I_{g2} = 0.15$	$S = 0.5$ mA/V $R_i = 0.35$ MΩ $R_a = 0.1$ MΩ $W_o = 6$ mW $W_a = 30$ mW	
DL 72 Output pentode	$V_f = 1.25$ V $I_f = 25$ mA	Typical characteristics	$V_a = 45$ V $V_{g2} = 45$ V $V_{g1} = -4.5$ V	$I_a = 1.25$ $I_{g2} = 0.4$	$S = 0.5$ mA/V $R_i = 225$ kΩ $R_a = 30$ kΩ $W_o = 23$ mW $W_a = 60$ mW	Subminiature

U.H.F. TUBES

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
4671 Acorn triode	V_f = 6.3 V I_f = 0.15 A	Typical characteristics	V_a = 180 V V_g = −5 V	I_a = 4.5	S = 2 mA/V R_i = 12.5 kΩ μ = 25 freq. = max. 430 Mc/s	
4672 Acorn pentode	V_f = 6.3 V I_f = 0.15 A	R.F. amplifier	V_a = 250 V V_{g2} = 100 V V_{g1} = −3 V	I_a = 2 I_{g2} = 0.7	S = 1.4 mA/V R_i = 1.5 MΩ C_{ag1} < 7 mpF freq. = max. 430 Mc/s	
DC 80 Triode	V_f = 1.25 V I_f = 0.22 A	Typical characteristics	V_a = 150 V V_g = −3.5 V	I_a = 20	S = 3.5 mA/V μ = 14 W_a = 3 W	 Noval
		Oscillator	V_a = 150 V	I_k = 20 I_s = 1.5	freq. = 470 Mc/s W_o = 0.45 W	
E1C	= 4671					
E1F	= 4672					

EAC 91 Diode triode	V_f = 6.3 V I_f = 0.3 A	Typical characteristics	V_a = 300 V V_g = −2.8 V	I_a = 7.5	S = 2.8 mA/V R_i = 12.8 kΩ μ = 36 freq.=max. 300 Mc/s	 Miniature
EC 55 Disc seal triode	V_f = 6.3 V I_f = 0.4 A	Typical characteristics	V_a = 250 V V_g = −3.5 V	I_a = 20	S = 6 mA/V μ = 30 freq. = max. 3000 Mc/s	
EC 80 Grounded-grid triode	V_f = 6.3 V I_f = 0.48 A	Typical characteristics	V_a = 250 V V_g = −1.5 V	I_a = 15	S = 12 mA/V μ = 80 freq.=max. 750 Mc/s	 Noval
EC 81 Oscillator triode	V_f = 6.3 V I_f = 0.2 A	Typical characteristics	V_a = 150 V V_g = −2 V	I_a = 30	S = 5.5 mA/V μ = 16 freq.=max. 750 Mc/s	 Noval
EC 91 Grounded-grid triode	V_f = 6.3 V I_f = 0.3 A	Typical characteristics	V_a = 250 V V_g = −1.5V R_k = 150Ω	I_a = 10	S = 8.5 mA/V R_i = 12 kΩ μ = 100 W_a = 2.5 W R_{eq} = 400 Ω freq.=max. 250 Mc/s	 Miniature

Type	Filament data	Application	Voltages Resistors	Currents (mA)	Characteristic data	Base connections
EF 51 Variable mu pentode	V_f = 6.3 V I_f = 0.35 A	R.F. or I.F. amplifier	V_a = 250 V V_{g2} = 250 V V_{g1} = −2.25 V	I_a = 14 I_{g2} = 2.8	S = 9.5 mA/V R_i = 0.5 MΩ R_{eq} = 1 kΩ C_{ag1} < 7 mpF freq.=max. 150 Mc/s	 Loctal 8 p.
EFF 51 Double pentode	V_f = 6.3 V I_f = 0.75 A	Typical characteristics (per system)	V_a = 250 V V_{g2} = 200 V V_{g1} = −2 V	I_a = 6 I_{g2} = 1.2	S = 7.5 mA/V R_i = 0.35 MΩ R_{eq} = 800 Ω C_{ag1} <0.04 pF freq.=max. 150 Mc/s	 Loctal 9 p.

CATHODE-RAY TUBES

PREFERRED TYPES

INSTRUMENT AND RADAR TUBES

Screen		Short persistence	Medium persistence	Very long persistence	
Diameter of screen	7 cm (3")	DB 7-5 DB 7-6	DG 7-5 DG 7-6		DP 7-5 DP 7-6
	10 cm (4")	DB 10-2 DB 10-6	DG 10-2 DG 10-6		DP 10-2 DP 10-6
	13 cm (5")	DB 13-2	DG 13-2	MF 13-1	DP 13-2
	31 cm (12")			MF 31-22	

PICTURE TUBES

Type of tube		Projection	Direct view	View finder
Diameter of screen	6 cm (2.5")	MW 6-2		
	13 cm (5")			MW 13-35
	36 cm (14")		MW 36-24	
	43 cm (17")		MW 43-43	

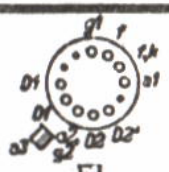
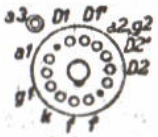
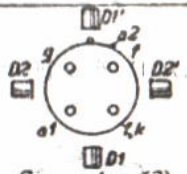
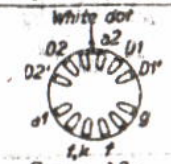
CATHODE-RAY TUBES

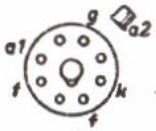
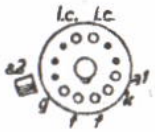
INSTRUMENT TUBES

Type	Screen[1])	Deflection system	Heater		Operating characteristics				Sensitivity		Capacitances			Length (excl. pins)		Base connections
	Max diam. (mm)	Double electrostatic	V_f (V)	I_f (A)	V_{a3} (V)	V_{a2} (V)	V_{a1} (V)	$-V_{g1}$[2]) (V)	N_1 (mm/V)	N_2 (mm/V)	C_{g1} (pF)	$C_{D_1D_1'}$ (pF)	$C_{D_2D_2'}$ (pF)	max. (mm)	min. (mm)	
DB DG 4-1 DP	44	symmetrical	6.3	0.31	—	800	200-300	0-50	0.26	0.16	10	0.6	0.8	145	139	Loctal 9 p. (B9G)
DB DG 4-2 DP	44	D_2D_2' asymmetrical														
DB DG 7-2 DN	71	D_2D_2' asymmetrical	4.0	1.0	—	800	150-350	0-30	0.22	0.14	7	0.65	2.5	163	151	P
DB DG 7-3 DR	71	symmetrical	6.3	0.4	—	800	200-300	0-50	0.26	0.16	9	0.6	0.8	145	139	Loctal 9 p.
DB DG 7-4 DR	71	D_2D_2' asymmetrical										0.5	0.6			

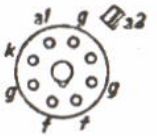
DB DG DP DR 7-5	71	sym-metrical	6.3	0.31	—	800	200-300	0-50	0.26	0.16	10	0.6	0.8	145	139	Loctal 9 p. (B9G)
DB DG DP DR 7-6	71	D_2D_2' asymme-trical														
DB DG DN 9-3	97.5	D_2D_2' asymme-trical	4.0	1.0	—	1000	200-400	0-40	0.40	0.31	8	1.1	1.4	327	312	FJ
DB DG DN 9-4	97.5	sym-metrical											1.3			
DB DG DN 9-5	97.5	D_2D_2' asym-metrical with accel-eration	4.0	1.0	1000 5000	1000 1000	200-400 230-430	0-40 0-40	0.38 0.18	0.32 0.15	8	1.1	1.4	327	312	FJ
DB DG DR DP 10-2	97.5	sym-metrical	6.3	0.3	—	2000	340-640	45-100	0.30	0.23	4.6	1.9	2.5	327	312	Magnal
DB DG DR 10-3	97.5	D_2D_2' asym-metrical	4.0	0.55	—	1000	200-340	18-46	0.65	0.57	5	1.9	2.6	327	312	FJ

[1]) [2]) See p. 125

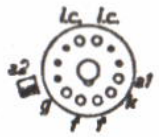
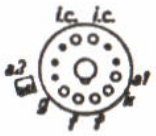
Type	Screen[1])	Deflection system	Heater		Operating characteristics				Sensitivity		Capacitances			Length (excl. pins)		Base connections
	Max. diam. (mm)	Double electro-static	V_f (V)	I_f (A)	V_{a3} (V)	V_{a2} (V)	V_{a1} (V)	$-V_{g1}$ (V)	N_1 (mm/V)	N_2 (mm/V)	C_{g1} (pF)	$C_{D_1D_1'}$ (pF)	$C_{D_2D_2'}$ (pF)	max. (mm)	min. (mm)	
DB DG DR 10-5	97.5	D_2D_2' asymm. with acceler-ation	4.0	0.45	1000 2500	1000 1000	200-340 200-340	18-46 18-46	0.65 0.37	0.55 0.32	5	1.9	2.6	327	312	 FJ
DB DG DP DR 10-6	97.5	symm. with accel-eration	6.3	0.3	2000 4000	2000 2000	340-640 340-640	45-100 45-100	0.30 0.25	0.23 0.19	4.6	1.9	2.5	327	312	Magnal
DB DG DP DR 13-2	136	symm. with accel-eration	6.3	0.3	2000 4000	2000 2000	400-690 400-690	45-100 45-100	0.45 0.35	0.40 0.30	4.6	1.9	2.5	417	406	 Diheptal
DB DG DN 16-1	167	sym-metrical	4.0	1	—	1000	175-250	0-20	0.50	0.35	9.5	1.2	2	440	415	 Spec. 4p. (2)
DB DG DN 16-2	167	sym-metrical				2000	350-500	0-40	0.25	0.17	7.3	2.1	2.7	450	425	 Spec 12p.

Type	Screen [1]) Round: Useful diam. min. (mm)	Screen [1]) Rectangular: Useful diagonal min. (mm)	Screen [1]) Rectangular: Useful width min. (mm)	Deflection system: Double magnetic	Heater: V_f (V)	Heater: I_f (V)	Operating characteristics: V_{a2} (V)	Operating characteristics: V_{a1} (V)	Operating characteristics: $-V_g$ [2]) (V)	Deflection: N [3]) (micron)	Focusing: Magnetic: Number of amp. turns	Capacitances: C_g (pF)	Length (excl. pins): max. (mm)	Length (excl. pins): min. (mm)	Base connections
MF 13-1	108	—	—	—	6.3	0.3	7000	250	28-63	17.9	ca. 800	<10	275	256	 Octal
MF 31-22	287	—	—	—	6.3	0.3	9000	300	32-81	15.8	ca. 750	<10	457	441	 Duodecal 7p.

PICTURE TUBES

MW 6-2 Projection tube	57.5	—	—	—	6.3	0.3	—	25000	40-90	9.5	ca. 920	6.3	286	256	Spark trap V
MW 13-35	Viewfinder; = MF 13-1 with W-screen														
MW 22-7	= MW 22-17 with different base and I_f = 0.6 A														 Loctal 8p.
MW 22-14	= MW 22-17 with different base														

[1]) [2]) [3]) See p. 125

Type	Screen [1]) Round: Useful diam. min.	Screen [1]) Rectangular: Useful diagonal min. (mm)	Screen [1]) Rectangular: Useful width min. (mm)	Deflection system: Double magnetic	Heater: V_f (V)	Heater: I_f (A)	Operating characteristics: V_{a2} (V)	Operating characteristics: V_{a1} (V)	Operating characteristics: $-V_g$ [2]) (V)	Deflection: N [3]) (micron)	Focusing: Magnetic, Number of amp. turns	Capacitances: C_g (pF)	Length (excl. pins): max. (mm)	Length (excl. pins): min. (mm)	Base connections
MW 22-16	214	—	—	with ion trap type 55400	6.3	0.3	7000 7000	160 200	20-50 25-60	17.9	605-745	8	364	353	 Duodecal 7p.
							9000 9000	160 200	20-50 25-60	15.8	665-815				
MW 22-17	214	—	—	—	6.3	0.3	7000	160 200	20-50 25-60	17.9	580-720	6	364	353	
MW 22-18	= MW 22-17 with outer coating														
MW 31-7	= MW 31-47 with different base and $I_f = 0.6$ A														Loctal 8p.
MW 31-14	= MW 31-17 with different base														
MW 31-16	287	—	—	with ion trap type 55400	6.3	0.3	7000 7000	250 350	32-71 44-99	17.9	ca. 660	6	458	441	 Duodecal 7p.
							9000 9000	250 350	32-71 44-99	15.8	ca. 750				
MW 31-17	287	—	—	—	6.3	0.3	7000	160 200	20-50 25-60	17.9	580-720	6	452	441	
MW 31-18	= MW 31-17 with outer coating														
MW 31-74	= MW 31-16 with filter glass														

MW 36-22	—	324	294	with ion trap type 55402	6.3	0.3	10000	250	33-72	15	ca. 1000	6	416	395	Duodecal 5p.
MW 36-24	= MW 36-22 with filter glass														
MW 41-1	365	—	—	with ion trap type 55402	6.3	0.3	12000	250	33-72	13.7	ca. 1000	6	446	418	Duodecal 5p.
MW 43-43	—	388	365	with ion trap type 55402	6.3	0.3	$V_a =$ 14000	$V_{g2} =$ 300	40-86	12.7	1015 [4]) 1065 [5])	7	478	457	Duodecal 7p.

[1]) The second letter of the typenumber indicates the colour of the luminescent screen:
B = blue, short persistence
F = orange, very long persistence
G = green, medium persistence
N = green, long persistence
P = double layer screen. Blue of short persistence followed by greenish-yellow of long persistence
R = greenish-yellow, long persistence
W = white, medium persistence

[2]) Grid voltage for visual cut-off

[3]) $N = \frac{0.3 P.H.c.L}{\sqrt{V_{a2}}}$ cm.

N = deflection on the screen in cm
P = distance between deflection centre and screen in cm
H = max. magnetic field strength in gauss
c = correction factor, in general = 0.5
L = length of coil windings in cm
Va_2 = voltage of second anode in volts

The values of N in the table refer to $P = H = L = 1$ and $c = 0.5$

[4]) $V_{g3} = 0$ V

[5]) $V_{g3} = 250$ V

TRANSMITTING TUBES

TRANSMITTING TUBES

Type of tube		QE 04/10 Tetrode	QQC 04/15 Double tetrode	QQE 04/20 Double tetrode (832 A)	QE 06/50 Tetrode (807)	QQE 06/40 Double tetrode	PE 1/100 Pentode	TB 2.5/300 Triode	QB 3/300 Tetrode (4-125 A)	TB 3/750 Triode
		(W)	(W)	(W)	(W)	(W)	(W)	(W)	(W)	(W)
Tube output in class C telegraphy at:	2 Mc/s	8.0	17.6 23.3■	26	40	86	132	390	375	840
	6 Mc/s	8.0	17.6 23.3■	26	40	86	132	390	375	840
	20 Mc/s	8.0	17.6 23.3■	26	40	86	132	390	375	840
	30 Mc/s	8.0	17.6 23.3■	26	40	86	132	390	375	840
	60 Mc/s	7.8	17.6 23.3■	26	35	86	132	390	375	840
	100 Mc/s	7.4	17.6 23.3■	26	20	86		390	375	840
	120 Mc/s	7.0	17.6 23.3■	26		86		390	375	600
	150 Mc/s	6.3	17.6 23.3■	26		86		390	360	
	200 Mc/s		15.5 19■	26		86		197	225	
	300 Mc/s		6.5 8■	11		70				
	430 Mc/s					34				

■ Intermittent.

● Aircooled (TAL 1210).

□ Watercooled (TAW 12/10)

* Grid controlled.

( ) American type numbers.

TYPES

QB 3.5/750 Tetrode (4-250 A)	TB 4/1250 Triode	QB 5/1750 Tetrode	QBL 5/3500 QBW 5/3500 Tetrode	TBL 6 6000 TBW 6 6000 Triode	TAL 12/10 TAW 12/10 Triode	TAL 12/20 TAW 12/20 Triode	TAL 12/35 TAW 12/35G Triode	TBL 12/100 TBW 12/100 Triode	TA 20/250 Triode
(W)	(W)	(W)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
1000	1750	1760	3.8	6.9	10.5 ● 15 □	22	48.5	108	250
1000	1550	1760	3.8	6.9	10.5 ● 15 □	22	48.5	108	225
1000	1450	1760	3.8	6.9	10.5 ● 12 □	22	48.5	95	125
1000	1450	1760	3.8	6.9	10 ● 11 □	18	39	50	
1000	1450	1760	3.35	6.9	5 ● 5 □				
750	1450		3.1	5.7					
500	950		3.0	5.0					
			2.7	4.1					
			*1.85	2.8					

RECTIFYING TUBES FOR TRANSMITTING PURPOSES

Max. D.C. output current	0.25 A	1.25 A	1.5 A	2.5 A	6 A	10 A
Max. peak inverse voltage						
3 kV	DCG 1 250					
10 kV	DCG 4 1000G (866A) DCX 4 1000 (3B28)	DCX 4 5000 (4B32)				
12 kV			DCG 5/5000GB (872A)			
13 kV					DCG 5/30*	
15 kV						DCG 7/100*
27 kV				DCG 12/30*		

Type	V_f (V)	I_f (A)	V_a max. (V)	V_{g2} max. (V)	W_a max. (W)	Full ratings: Max. freq. (Mc/s)	Full ratings: W_o (W)	Full ratings: η (%)	Operation
MAW 12/15	21.5	79	12000	—	15000	— —	1950 42000	16 66	A mod. B mod. [1]
PAL 12/15	22	80	12000	2000	8000	20 20 20 20	13000 4000 2900 7500	62 33 37 70	C telegr. B teleph. C g_2g_3 mod. C ag_2 mod.
PAW 12/15	22	80	12000	2000	12000	20 20 20 20	15900 3500 2900 7500	61 33 37 70	C telegr. B teleph. C g_2g_3 mod. C ag_2 mod.
PB 1/150	10	3.25	1750	750	70	—	300	69	B mod. [1]
PB 2/200	12	3.35	2000	400	110	20 20 20 20 20 —	270 45 147 124 43 400	71 29 72 69 32 70	C telegr. B teleph. C ag_2 mod. C an. mod. C g_3 mod. B mod. [1]
PB 2/500	12	7.3	2500	500	250	10 20 10 20 —	600 90 325 100 1000	70 26 69 28 70	C telegr. B teleph. C ag_2 mod. C g_3 mod. B mod. [1]
PB 3/800	12	8.5	3000	600	450	10 10 10 10 —	1200 190 580 200 1600	72 30 71 35 69	C telegr. [2] B teleph. C ag_2 mod C g_3 mod. B mod. [1]
PE 04/10E	12	0.65	500	300	10	20 20 20 20	15 4 10 2	60 31 62 33	C telegr. B teleph. C ag_2 mod. C g_3 mod.
PE 05/25	12.6	0.7	500	300	12	100 100 100 55/165	33 6 20 9	73 33 71 43	C telegr. B teleph. C ag_2 mod. C freq. mult.

[1]) Two tubes [2]) $V_{g2} = V_{g3}$.

Reduced ratings			Base Socket	Accessories		Dimensions	
Freq. (Mc/s)	W_o (W)	η (%)		Typenumber	Description	max. diam. (mm)	max. length (mm)
—	2700	22	—	K 707 40614 40632 (2×)	Water jacket Grid bracket Protective cap for grid seal	104	811
—	—	—	—	62 960 53 62 961 23 (2×)	Rubber washer Rubber washer		
50	—	—		K 500	Housing		
50	—	—	—	40602	Supporting ring	234	525
50	—	—	—	40632 (6×)	Protective cap for grid and filament seals		
50	—	—		K 710	Water jacjet		
50	—	—		K 712	Filter		
50	—	—	—	40607	Key	140	541
50	—	—	—	40632 (6×)	Protective cap for grid and filament seals		
50	—	—		Z4 287 46	Rubber washer		
				62 960 81	Rubber washer		
—	—	—	Medium 5p. 40219	28 906 022	Cap	53	157
60	152	58					
60	35	25					
60	77	51	Spec. 7p. 40207	40600 (2×)	Clip	53	167
60	75	50					
60	32	24					
—	—	—					
60	312	55					
60	50	22	Special 40200	40600 (2×)	Clip	82	276
60	175	51					
60	45	22					
60	488	55					
60	67	21	Special 40201	40626 (2×)	Clip	106	293
—	—	—					
—	—	—					
—	—	—					
60	10	50					
60	2	17	Medium 7p. 40220	28 906 022	Cap	51	150
60	6.3	49					
60	1.8	20					
167	15	55					
—	—	—	Spec. 8 p. 40210/02	—		36.2	104.5
—	—	—					
—	—	—					

Type	V_f (V)	I_f (A)	V_a max. (V)	V_{g2} max. (V)	W_a max. (W)	Full ratings Max. freq. (Mc/s)	W_o (W)	η (%)	Operation
PE 06/40 E	12.6	0.65	600	300	25	20	45	69	C telegr.
						20	11	31	B teleph.
PE 06/40 N	6.3	1.3				20	40	70	C ag_2 mod.
						2/4	27	52	C freq. mult.
PE 06/40 P	6.3	1.3				—	100	71	B mod. [1]
PE 1/100	12.6	1.35	1 000	300	45	60	132	74	C telegr.
						60	23	34	B teleph.
						60	75	78	C ag_2 mod.
						60	27	37	C g_3 mod.
						—	194	72	B mod. [1][2]
QB 2/250	10	5	2250	800	100	30	275	76	C telegr.
						30	50	33	B teleph.
						30	180	70	C ag_2 mod.
						—	515	73	B mod. [1]
QB 3/300	5	6.5	3000	600	125	120	375	75	C telegr.
						120	58	32	B teleph.
						120	300	79	C ag_2 mod.
						—	345	64	B mod. [1]
QB 3.5/750	5	14.1	4000	600	250	75	1 000	80	C telegr.
						75	126	33	B teleph.
						75	510	75	C ag_2 mod.
						—	635	68	B mod. [1][2]
QB 5/1750	10	9.7	5000	1000	500	60	2000	80	C telegr.
						60	250	33	B teleph.
						60	1 270	79	C ag_2 mod.
						—	2000	66	B mod. [1]
QBL 5/3500	6.3	33.5	5000	800	2500	75	3900	70	C telegr.
QBW 5/3500						75	2750	72	C ag_2 mod.
QE 04/10	6.3	0.6	300	250	7.5	60	8	62	C telegr.
						75/150	2.3	25	C freq. mult.
						50/150	1.5	19	C freq. mult.
						60	5.8	60	C ag_2 mod.
QE 06/50	6.3	0.9	600	300	25	60	40	67	C telegr.
						60	12.5	33	B teleph.
						60	27.5	70	C ag_2 mod.
						—	80	67	B mod. [1]
QQC 04/15	6.3	0.68	400	250	2×6	186	20.8	65	C telegr. [3]
					2×8[3]	186	7.8	59	C ag_2 mod. [3]
						93/186	8	50	C freq. mult. [3][4]
						62/186	10	38	C freq. mult. [3]
						—	16	74	B mod.
QQE 04/20	6.3	1.8	600	250	2×7.5	200	26	72	C telegr.
	12.6	0.9				200	17	76	C ag_2 mod.
QQE 06/40	6.3	1.8	600	250	2×20	200	90	75	C telegr.
	12.6	0.9				200	50	73	C ag_2 mod.
						50/150	20	33	C freq. mult.
						—	73	72	B mod.

[1]) Two tubes. [2]) $I_{g2} = 0$. [3]) Intermittent operation. [4]) Per system. [5]) In water jacket.

Reduced ratings			Base Socket	Accessories		Dimensions	
Freq. (Mc/s)	W_o (W)	η (%)		Typenumber	Description	max. diam. (mm)	max. length (mm)
60	36	62	Medium 7p. 40220	28 906 022	Cap	51	146
60 60	6.5 20	20 55	Medium 5p. 40219	28 906 022	Cap	51	146
— —	— —	— —	P 5900/02	28 906 022	Cap	51	134
— — — — —	— — — — —	— — — — —	Septar 40202	—		49	110
120 120 120 —	126 34 80 —	70 30 67 —	Giant 7p.	40619	Cap	65	190
200 — — —	225 — — —	65 — — —	Giant 5p. 40211/01	40624	Clip	62	130
120 — — —	500 — — —	67 — — —	Giant 5p. 40211/01	40624	Clip	87	151
120 — —	800 — —	60 — —	Super Giant 40216	40626	Clip	118	213
220	1.85	45	—	40622 40634 (4×) 40635	Grid connector Filament clip Insulating collar	92	196
			—	K 713 40622 40631 40634 (4×)	Water jacket Grid connector Key Filament clip	70	246 [8])
175 — — —	5.4 — — —	42 — — —	Loctal 9p. 40212	—		38	78
125 125 125 —	20 8 14 —	60 30 65 —	Medium 5p. 40219	28 906 022	Cap	51	146
300 — — — —	8 — — — —	34 — — — —	Loctal 8p. 40213	—		32	100
300 —	22 —	61 —	Septar 40202	40615 (2×)	Clip	51	84
500 — 75/225 —	60 — 12 —	60 — 23 —	Septar 40402	40623 (2×)	Clip	49	110

Type	V_f (V)	I_f (A)	V_a max. (V)	W_a max. (W)	Full ratings Max. freq. (Mc/s)	W_o (W)	η (%)	Operation
TA 4/800	23	14.7	4 000	500	2	1 530	76	C telegr
					2	260	34	B teleph.
					2	710	76	C an. mod.
					50	510	72	C osc. [2])
TA 18/100	33	207	20 000	70 000	2	130 000	72	C telegr.
					2	31 000	36	B teleph.
					2	38 000	70	C an. mod.
TA 20/250	35	420	20 000	130 000	2	250 000	76	C telegr.
					2	60 000	32	B teleph.
					2	65 000	64	C an. mod.
TAL 12/10	22	2×39	12 000	4 000	5	10 500	72	C telegr.
					5	2 000	33	B teleph.
					5	7 700	77	C an. mod.
					—	17 000	75	B mod. [1])
TAL 12/20	21.5	78	12 000	18 000	28	22 000	68	C telegr.
					28	5 000	27	B teleph.
					28	9 500	68	C an. mod.
					—	42 000	72	B mod. [1])
TAL 12/35	28.3	3×48.5	15 000	18 000	20	48 500	77	C telegr.
					20	9 000	33	B teleph.
					20	27 000	77	C an. mod.
					20	80 000	74	B mod. [1])
TAW 12/10	22	2×39	12 000	7 500	5	15 000	73	C telegr.
					5	3 700	33	B teleph.
					5	7 700	77	C an. mod.
					—	30 000	73	B mod. [1])
TAW 12/20	21.5	78	12 000	18 000	28	22 000	68	C telegr.
					28	5 000	27	B teleph.
					28	9 500	68	C an. mod.
					—	42 000	72	B mod. [1])
TAW 12/35 G	28.3	3×48.5	15 000	20 000	20	48 500	77	C telegr.
					20	9 000	33	B teleph.
					20	27 000	77	C an. mod.
					—	107 000	74	B mod. [1])
TB 1/60 A TB 1/60 G	7.5	3.25	1 250	50	60	70	58	C telegr.
					60	20	28	B teleph.
					60	58	64	C an. mod.
					—	110	69	B mod. [1])

[1]) Two tubes. [2]) Diathermy operation. [3]) In housing or jacket.

Reduced ratings			Base Socket	Accessories		Dimensions	
Freq. (Mc/s)	W_o (W)	η (%)		Typenumber	Description	max. diam. (mm)	max. length (mm)
—	—	—					
—	—	—	—	—		113	306
—	—	—					
—	—	—					
—	—	—		K 708	Water jacket	330	1333
—	—	—	—	K 709	Water jacket for grid connection (freq. > 3Mc/s)		
—	—	—					
20	125 000	65		40610 (3×)	Protective cap for grid seal		
20	40 000	30	—			330	1393
20	56 000	66		62 960 76	Rubber washer		
				62 961 25 (2×)	Rubber washer		
20	10 500	72		K 501 or 40629	Foot Insulating collar		
20	2 000	33	—	40603	Supporting ring	194	471
20	6 000	75		40604 (2×)	Filament bracket		
—	—	—		40632 (2×)	Protective cap for grid seal		
—	—	—		K 503/01 or	Housing with canalized outlet		
—	—	—	—	K 504/01	Housing with free outlet	104	730
—	—	—		40614	Grid bracket	104	811 [3])
—	—	—		40632 (2×)	Protective cap for grid and filament seals		
37.5	26 000	62		K 505	Housing		
—	—	—	—	40606	Filament bracket	226	618
27	26 000	74		40632 (6×)	Protective cap for grid and filament seals		720 [3])
—	—	—					
				K 700	Water jacket		
75	3 500	51		40604	Filament bracket		
20	3 300	33	—	40632	Protective cap for grid seal	194	495 [3])
20	6 000	75					
—	—	—		R1 366 43	Rubber washer		
				62 960 81 (2×)	Rubber washer		
				K 707	Water jacket		
				40614	Grid bracket		
—	—	—		40632 (2×)	Protective cap for grid seal		
—	—	—				104	730
—	—	—	—	R1 367 50	Contact washer	104	811 [3])
—	—	—		62 960 53	Rubber washer		
				62 960 81 (2×)	Rubber washer		
				62 961 23	Rubber washer		
				K 715	Water jacket ("grip-o-metic")		
37.5	26 000	62					
—	—	—	—	40606	Filament bracket	226	650
27	26 000	74		40632 (6×)	Protective cap for grid and filament seals		720 [3])
—	—	—		89 039 63	Rubber washer		
300	18	27	A 40465	—		72	174
—	—	—					
—	—	—	Medium 4p. 40218,03	—			
—	—	—					

Type	V_f (V)	I_f (A)	V_a max. (V)	W_a max. (W)	Full ratings			Operation
					Max. freq. (Mc/s)	W_a (W)	η (%)	
TB 2/200	12	2.7	2 000	130	46	275	72	C telegr.
					46	60	31	B teleph.
					46	160	74	C an. mod.
					—	540	75	B mod. [1])
TB 2/500	12	7.3	2 000	300	20	635	68	C telegr.
					20	124	29	B teleph.
					20	430	71	C an. mod.
					—	900	71	B mod. [1])
TB 2.5/300	6.3	5.4	2 500	135	150	390	76	C telegr.
					150	65	34	B teleph.
					150	204	80	C an. mod.
					—	700	78	B mod. [1])
TB 3/750	5	14.1	3 000	250	100	840	77	C telegr.
					100	140	36	B teleph.
					100	482	77	C an. mod.
					—	1 280	75	B mod. [1])
TB 3/1000	12	8.5	3 000	500	20	1 200	72	C telegr.
					20	200	30	B teleph.
					20	720	72	C an. mod.
					—	1 750	68	B mod. [1])
TB 3/2000	12	17	3 500	1 100	2	2 900	72	C telegr.
					2	600	35	B teleph.
					2	1 625	75	C an. mod.
					—	3 300	66	B mod. [1])
TB 4/1250	10	9.7	4 000	450	100	1 690	79	C telegr.
					100	1 053	78	C an. mod.
					—	2 210	77	B mod. [1])
TBL 6/6000	12.6	33	6 000	5 000	75	6 900	76	C telegr.
					75	1 900	32	B teleph.
					75	4 700	78	C an. mod.
					—	13 300	74	B mod [1])
TBL 12/100	17.5	196	13 500	45 000	15	108 000	75	C telegr.
					15	65 000	76	C an. mod.
					—	202 000	70	B mod [1])
TBW 6/6000	12.6	33	6 000	6 000	75	6 900	76	C telegr.
					75	1 900	32	B teleph.
					75	4 700	78	C an. mod.
					—	13 300	74	B mod. [1])
TBW 12/100	17.5	196	12 000	50 000 [2])	15	108 000	75	C telegr.
					15	51 500	35	B teleph.
					15	65 000	76	C an. mod.
					—	202 000	70	B mod. [1])

[1]) Two tubes. [2]) For B teleph. 100 kW. [3]) In housing or jacket.

Reduced ratings			Base Socket	Accessories		Dimensions	
Freq. (Mc/s)	W_o (W)	η (%)		Typenumber	Description	max. diam. (mm)	max. length (mm)
100 60 60 —	140 47 85 —	57 30 59 —	Spec. 2p. 40206	40600 (2×) 40608	Clip Key	63	174
150 — — —	250 — — —	46 — — —	Spec. 2p. 40204	40608 40626	Key Clip	86	243
200 — — —	200 — — —	57 — — —	Giant 5p. 40211/01	40624	Clip	62	132
143 — — —	425 — — —	61 — — —	Giant 5p. 40211/01	40624	Clip	87	151
75 — 60 —	450 — 562 —	37 — 72 —	Spec. 2p. 40204	40608 40626 (2×)	Key Clip	106	262
20 20 20 —	2 600 520 1 300 —	70 32 74 —	Spec. 2p. 40205	40608 40626 (2×)	Key Clip	154	334
120 — —	1 125 — —	71 — —	Super Giant 40216	40626	Clip	118	213
220 — — —	2 050 — — —	50 — — —	—	40622 40630 40634 (3×)	Grid connector Insulating collar Clip	122.5	200
30 30 —	50 000 30 000 —	75 71 —	—	K 506 40628 (6×)	Housing Filament clip	286 510 [3])	635 1130 [3])
220 — —	2 050 — —	50 — —	—	K 713 40622 40631 40634 (3×) RI 15 811	Water jacket Grid connector Key Filament clip Rubber washer	70	192 260 [3])
30 — 30 —	50 000 — 30 000 —	75 — 71 —	—	K 714 40628 (6×) 89 039 63	Water jacket Filament clip Rubber washer	240	620 710 [3])

Type	V_f (V)	I_f (A)	$V_{a\ invp}$ (kV)	I_o max. (A)	Circuit: Number of secondary phases	Circuit: Rectification	Number of tubes
DCG 1/250	4	2.5	3	0.25	2 3 3	half wave half wave full wave	2 3 6
DCG 1.5/250	4	2.5	4.25	0.25	2 3 3	half wave half wave full wave	2 3 6
DCG 4/1000 ED **DCG 4/1000 G**	2.5	4.8	10	0.25	2 3 3	half wave half wave full wave	2 3 6
DCG 4/5000	4	7	13	1.25	2 3 3	half wave half wave full wave	2 3 6
DCG 5/30	5	30	13	6	2 3 3	half wave half wave full wave	2 3 6
DCG 5/5000 EG **DCG 5/5000 GB**	5	7	12	1.5	2 3 3	half wave half wave full wave	2 3 6
DCG 6/6000	5	6.5	13	1	2 3 3	half wave half wave full wave	2 3 6
DCG 7/100	5	20	15	15	2 3 3	half wave half wave full wave	2 3 6
DCG 9/20	5	12.5	21	2.5	2 3 3	half wave half wave full wave	2 3 6
DCG 12/30	5	13.5	27	2.5	2 3 3	half wave half wave full wave	2 3 6
DCX 4/1000	2.5	5	10	0.25	2 3 3	half wave half wave full wave	2 3 6
DCX 4/5000	5	7.1	10	1.25	2 3 3	half wave half wave full wave	2 3 6

TRANSMITTING PURPOSES

V_{tr} (kV)	V_o (kV)	I_o (A)	W_o tot. (kW)	Base Socket	Accessories		Dimensions	
					Typenumber	Description	max. diam. (mm)	max. length (mm)
1.1 1.2 2.1	0.96 1.4 2.8	0.48 0.75 0.75	0.5 1.1 2.2	A 40465	—		48	115
1.5 1.7 3.0	1.3 2.0 4.1	0.5 0.75 0.75	0.7 1.5 3.0		—		47	138
3.5 4.1 7.1	3.2 4.8 9.6	0.5 0.75 0.75	1.6 3.6 7.2	Edison E3 000 22	—		47	147
				Medium 4p. 40218/03	40619	Cap	47	157
4.6 5.3 9.2	4.1 6.2 12.4	2.5 3.75 3.75	10.2 23.4 46.5	Goliath 65909BG/01	—		53	225
4.6 5.3 9.2	4.1 6.2 12.4	12 18 18	50 112 224	— —	40612 08 281 72	Anode cap Plug pin for grid connection	225	581
4.2 4.9 8.4	3.8 5.7 11.4	3 4.5 4.5	11.4 25.6 51.3	Goliath 65909BG/01	40619	Cap	52	235
				Jumbo 4p. 40408	40619	Cap	52	213
4.6 5.3 9.2	4.1 6.2 12.4	2 3 3	8.3 18.6 37.2	Jumbo 4p. 40408	40616	Anode cap	120	242
5.3 6.1 10.6	4.8 7.2 14.4	30 45 45	144 324 648	Spec. 4p. 40409	40620	Cap	175	460
7.4 8.6 14.8	6.7 10.0 20.0	5 7.5 7.5	34 75 150	Spec. 3p. 40209	40616 40620	Anode cap Cap	120	375
9.5 11 19.1	8.6 12.9 25.8	5 7.5 7.5	43 97 194	Spec. 3p. 40209	40616 40620	Anode cap Cap	120	384
3.5 4.1 7.1	3.2 4.8 9.6	0.5 0.75 0.75	1.6 3.6 7.2	Medium 4p. 40218/03	40619	Cap	53	156
3.5 4.1 7.1	3.2 4.8 9.6	2.5 3.75 3.75	8 18 36	Jumbo 4p. 40408	40619	Cap	59	216

INDUSTRIAL TUBES

PREFERRED TYPES

INDUSTRIAL RECTIFYING TUBES

Max. D.C. output current per tube		Double-anode types								
		1.3 A	2 A	3 A	4 A	6 A	15 A	25 A	50 A	60 A
Max. A.C. anode voltage	28 V	328								
	45 V			1119		367				
	55 V									1069 K*
	60 V*	1010	1110			1048	1039	1049		
	115 V						1838	1849	1859	
	150 V	1725 A		1710						
	220 V				1173 ◻	1174 ◻	1176 ◻	1177 ◻		

* To be used only for D.C. arc welding apparatus. ◻ Single-anode types.

THYRATRONS

Max. D.C. output current		0.1 A	0.5 A	2.5 A	3.2 A	6.4 A	15 A	90 A*	325 A*
Max. forward peak anode voltage	240 V						PL 150		
	600 V		PL 1607						
	650 V	PL 21							
	1000 V			PL 57					
	1500 V				PL 5544	PL 5545			
	2500 V		PL 17			PL 105			
	8000 V							PL 435 (4C35)	
	16000 V								PL 522 (5C22)

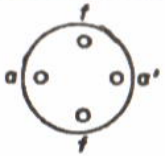
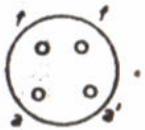
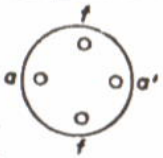
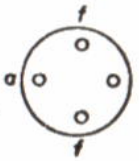
( ) American type numbers. * Max. peak anode current.

IGNITRONS

Type		PL 5551	PL 5552	PL 5555	
Welding	Max. demand power	600 kVA	1200 kVA	2400 kVA	
	Max. r.m.s. line voltage	600 V	600 V	2400 V	
Rectifier service	Max. D.C. anode current	40 A*	100 A*	150 A	200 A
	Peak anode voltage	500 V	500 V	2100 V	900 V

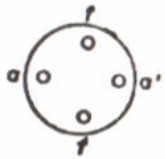
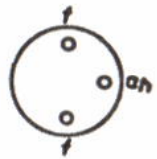
* In intermittent service.

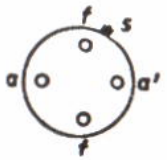
INDUSTRIAL RECTIFYING TUBES

Type	m	Filament data			Voltages			Currents		Typical characteristics			Dimensions		Base connections
		V_f (V)	I_f (A)	T_h (sec)	V_{arms} max. (V)	V_{arms} min. (V)	V_{invp} max. (V)	I_o max. (A)	I_{ap} max. (A)	R_a min. (Ω)	V_{ign} max. (V)	V_{arc} (V)	Diam. max. (mm)	Height max. (mm)	
328	2	1.85	2.8	15	28	16	80	1.3	4	3	16	7	33	112	 A
354	1	1.85	5.5	30	20 130	15 15	60 370	2 0.25	10 1.25	4 50	17 17	8	62	125	Edison
367	2	1.85	8	30	45	16	125	6	18	1	17	8	81	170	 W
451	2	1.85	2.8	15	16	10	45	1.3	4	3	11	6	33	112	 A
1002	1	1.85	2.8	15	160	16	450	0.1	0.6	15	16	7	39	121	 A

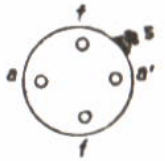
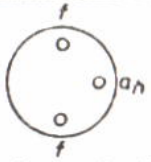
1010	2	1.85	3.5	15	60	16	170	1.3	4	10	14	8	37	120	A
1037	2	1.92	11	120	60	15	170	6	18	1.75	14	12	85	240	Goliath
1039	2	1.92	18	120	60	10	170	15	45	0.75	11	9	94	264	Goliath
1048	2	1.92	7	120	60	10	170	6	18	1.75	14	12	82	171	W
1049	2	1.92	30	120	60	10	170	25	75	0.3	11	9	101	283	straps
1053	2	1.92	45	120	48	10	135	25	75	0.25	15	9	101	287	straps
1054	2	1.92	73	120	48	20	135	40	120	0.18	30	9	111	350	straps
1059	2	1.92	40	120	60	10	170	40	120	0.2	11	9	111	350	straps
1063A	3	1.92	11	30	250	130	700	6	12	0	70 [1]	20	175	255	Edison
1069K [2]	2	3.25	70	120	55	35	155	60 [3]	200	0.12	45	10	114	365	straps

[1]) With auxiliary ignition unit type E3 108 03 (100 V, 25 mA). [2]) For welding equipment. [3]) With fan cooling.

Type	m	Filament data			Voltages			Currents		Typical characteristics			Dimensions		Base connections
		V_f (V)	I_f (A)	T_h (sec)	V_{arms} max. (V)	V_{arms} min. (V)	V_{invp} max. (V)	I_o max. (A)	I_{ap} max. (A)	R_a min. (Ω)	V_{ign} max. (V)	V_{arc} (V)	Diam. max. (mm)	Height max. (mm)	
1089	2	1.92	11	120	60	16	170	10	30	1.2	11	9	94	259	Goliath
1110	2	1.85	3.6	15	60	16	170	2	6	4	16	9	39	131	
1119	2	1.85	5.5	30	45	12	127	3	9	1.8	16	9	71	142	
1129	2	1.85	5.5	30	60	12	170	3	9	2.5	16	9	71	140	A
1138	1	2.5	27	120	85	20	240	15	85	0.3	16	10	115	269	Goliath
1163	1	2.25	17	3	130 90[1])	20	375 250[1])	6	36	0.5	16	11	83	178	Goliath
1164	1	2.5	25	15	80 60[1])	20	225 165[1])	15	90	0.3	16	9	98	220	Goliath
1173	1	1.92	13	60	220	20	625	4	24	0.75	22[2])	12	62	189	317 Spec. 3p.(2)
1174	1	1.92	12	60	220	20	625	6	36	0.5	22[2])	12	77	218	 Spec. 3p.(1)

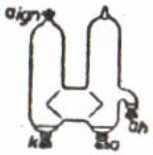
1176	1	1.92	28	120	220	20	625	15	90	0.2	25 [2])	10	92	301	straps
1177	1	1.92	70	300	220	20	625	25	150	0.1	28 [2])	12	128	362	straps
1533	3	1.92	23	120	275	60	775	15	45	0.6	45 [3])	19	192	270	straps
1534	2	1.92	23	120	275	60	775	15	45	0	45 [3])	17	197	270	straps
1543	3	1.92	36	120	275	60	775	25	70	0.4	50 [3])	16	207	265	cables
1544	2	1.92	36	120	275	60	775	25	70	0	50 [3])	15	242	278	cables
1553	3	1.92	70	120	275	60	775	40	135	0.25	50 [3])	15	297	355	cables
1554	2	1.92	70	120	275	60	775	40	135	0	50 [3])	15	317	355	cables
1564	2	1.92	70	120	275	60	775	60	135	0	50 [3])	14	372	390	cables
1701	2	1.8	2.8		340	40	960	0.3	1	450	50	18	58	134	 A
1710	2	1.92	7	30	150	25	425	3	9	2.5	30 [4])	12	69.5	205	W

[1]) In bridge circuits. [2]) With auxiliary ignition unit type 1289 (40 V, 10 mA). [3]) With auxiliary ignition unit type E3 108 03 (100 V, 25 mA). [4]) Screen connected with filament via a resistor of 10000 Ω, 0.5 W.

Type	m	Filament data			Voltages			Currents		Typical characteristics			Dimensions		Base connections
		V_f (V)	I_f (A)	T_h (sec)	V_{arms} max. (V)	V_{arms} min. (V)	V_{invp} max. (V)	I_o max. (A)	I_{ap} max. (A)	R_a min. (Ω)	V_{ign} max. (V)	V_{arc} (V)	Diam. max. (mm)	Height max. (mm)	
1725A	2	1.92	3.5	15	150	22	425	1.3	4	5	30 [1])	12	71	135	 A
1729	2	1.92	8	120	95	20	270	6	18	0.4	30 [1])	15	81	240	Goliath
1738	2	1.92	18	120	95	20	270	15	45	0.2	20 [2])	9	94	284	Goliath
1749A	2	1.92	25	120.	95	30	270	25	75	0.1	30 [2])	10	101	290	straps
1768	2	1.92	11	30	285	130	810	6	10	0	70	20	176	240	straps
1788	2	1.92	11	120	95	20	270	10	30	0.3	25	9	94	284	Goliath
1838	2	1.92	21.5	120	115	20	325	15	45	0.25	22 [3])	10	97	262	 Spec. 3p.(1)
1849	2	1.92	29	120	115	20	325	25	75	0.2	28 [3])	10	105	294	straps
1859	2	1.92	70	300	115	30	325	50	150	0.1	30 [3])	12	143	436	straps

[1]) Screen connected with filament via a resistor of 10000 Ω, 0.5 W. [2]) The screen should not be connected externally. [3]) With auxiliary ignition unit type 1289 (40 V, 10 mA).

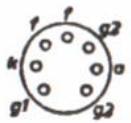
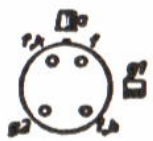
SENDITRON

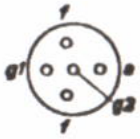
Type	Filament data			Voltages	Currents	Typical characteristics	Dimensions		Base connections
	V_f (V)	I_f (A)	T_h (sec)	max. (V)	max. (A)		Max diam. (mm)	Max. height (mm)	
PL 5 Triode with capacitive ignition	—	—	—	V_{ainvp} = 1500 V_{arms} = 500 = min. 20	I_a = 3.5 [1] I_a = 1 I_{ap} = 3000 [2]	V_{arc} = 20 V T_{av} = max. 1 sec V_{ign} = max. 25 V freq. = max. 300 c/s V_{ignp} = max. 8000 V [3] t_{Hg} = +10-+40 °C	135	179	

THYRATRONS

4690 Triode inert-gas filled	4	1.3	—	V_{ap} = 500	I_a = 0.01 I_{ap} = 0.75 [2]	V_{arc} = 50 V freq. = max. 150 kc/s	43	98	P
EC 50 Triode inert-gas filled	6.3	1.3	10	V_{ap} = 1000 V_{ainvp} = 1000	I_a = 0.01 I_{ap} = 0.75 [2] I_{ap} = 0.10 I_g = 0.0002 I_{gp} = 0.0014	V_{arc} = 33 V freq. = max. 150 kc/s T_{dion} = 1 μsec	43	108	
PL 10 Triode for pulse and relay circuits	1.85	3.4	—	V_{ap} = 400 V_{ainvp} = 400 V_{gp} = +1800 V_{gp} = —1800	I_a = 0.1 I_{ap} = 4	V_{arc} = 20—35 V T_{av} = max. 10 sec freq. = max. 100 c/s t_{amb} = —75-+90 °C	21.5	108	Mignon

[1]) With fan cooling. [2]) Freq. ≥ 25 c/s. [3]) Ignitor voltage.

Type	Filament data			Voltages	Currents	Typical characteristics	Dimensions		Base connections
	V_f (V)	I_f (A)	T_h (sec)	max. (V)	max. (A)		Max. diam. (mm)	Max height (mm)	
PL 17 Triode mercury-vapour filled	2.5	5	5	V_{ap} = 2500 V_{ainvp} = 5000 V_g = −500 $V_{g(arc)}$ = −10	I_a = 0.5 I_{ap} = 2 [1] I_{ap} = 1 I_g = 0.05 I_{gp} = 0.25	V_{arc} = 16 V T_{ion} = 10 μsec T_{dion} = 1000 μsec T_{av} = max. 15 sec t_{Hg} = +40-+80 °C t_{rec} = +40 °C	62	169	 Medium 4p.
PL 21 Tetrode inert-gas filled	6.3	0.6	10	V_{ap} = 650 V_{ainvp} = 1300 V_{g_2p} = −100 $V_{g_2(arc)}$ = −10 V_{g_1p} = −100 $V_{g_1(arc)}$ = −10	I_k = 0.1 I_{kp} = 0.5 [1] I_{g_2} = 0.01 I_{g_1} = 0.01	V_{arc} = 8 V T_{ion} = 0.5 μsec T_{dion} = 35-75 μsec T_{av} = max. 30 sec t_{amb} = −75-+90 °C t_{rec} = +20 °C	19	54	 Miniature
PL 57 Triode mercury-vapour filled	5	4.5	300	V_{ap} = 1000 V_{ainvp} = 1500 V_g = −500 $V_{g(arc)}$ = −10	I_a = 2.5 I_{ap} = 15 [1] I_{ap} = 5 I_g = 0.25 I_{gp} = 1 I_{surge} = 200 [2]	V_{arc} = 16 V T_{ion} = 10 μsec T_{dion} = 1000 μsec T_{av} = max. 15 sec t_{Hg} = +40-+75 °C t_{rec} = +45 °C	62	185	 Medium 4p.
PL 105 Tetrode mercury-vapour filled	5	10	300	V_{ap} = 2500 V_{ainvp} = 2500 V_{g2} = −500 $V_{g2(arc)}$ = −10 V_{g1} = −1000 $V_{g1(arc)}$ = −10	I_a = 6.4 I_{ap} = 40 [1] I_{ap} = 12.8 I_{g2} = 0.5 I_{g2p} = 2 I_{g1} = 0.25 I_{g1p} = 1 I_{surge} = 400 [2]	V_{arc} = 16 V T_{ion} = 10 μsec T_{dion} = 1000 μsec T_{av} = max. 15 sec t_{Hg} = +40-+80 °C t_{rec} = +40 °C	123	289	 Super Jumbo

PL 150 Triode mercury-vapour filled	1.92	26	120	V_{ap} = 240 V_{ainvp} = 500 V_g = —150 [3]) V_g = —50 [4])	I_a = 15 I_{ap} = 90 [1]) I_{gp} = 0.1	V_{arc} = 12 V T_{dion} = 1000 μsec T_{av} = max. 15 sec t_{Hg} = +40-+80 °C t_{rec} = +60 °C	92	293	straps
PL 435 Triode hydrogen filled	6.3	6.1	180	V_{ap} = 8000 V_{ainvp} = 8000 V_{gp} = min. 175 V_{ginvp} = 200	I_a = 0.1 I_{ap} = 90 [1])	T_{imp} = max. 6 μsec [5]) $V_{ap} \times I_{ap} \times$ freq. $< 2 \times 10^9$ [6]) Duty cycle = max. 0.0014	65	178	
PL 522 Triode hydrogen filled	6.3	10.6	300	V_{ap} = 16000 V_{ainvp} = 16000 V_{gp} = min. 200 V_{ginvp} = 200	I_a = 0.2 I_{ap} = 325 [1])	T_{imp} = max. 6 μsec [5]) $V_{ap} \times I_{ap} \times$ freq. $> 3.2 \times 10^9$ [6]) Duty cycle = max. 0.001	65	222	Super Jumbo
PL 1607 Tetrode inert-gas filled	2	2.6	60	V_{ap} = 600 V_{ainvp} = 600 V_{g2} = —100 $V_{g2(arc)}$ = —10 V_{g1} = —100 $V_{g1(arc)}$ = —10	I_a = 0.5 I_{ap} = 2 [1]) I_{ap} = 1 I_{g2} = 0.05 I_{g2p} = 0.25 I_{g1} = 0.05 I_{g1p} = 0.25	V_{arc} = 15 V T_{dion} = 500 μsec T_{av} = max. 15 sec t_{amb} = —75-+90 °C t_{rec} = +20 °C	48	142	 O
PL 5544 Triode inert-gas filled	2.5	12	60	V_{ap} = 1500 V_{ainvp} = 1500 V_g = —250 $V_{g(arc)}$ = —10	I_a = 3.2 I_{ap} = 40 [1]) I_g = 0.2 I_{gp} = 2.5 I_{surge} = 560 [2])	V_{arc} = 16 V T_{ion} = 10 μsec T_{dion} = 40-400 μsec T_{av} = max. 15 sec t_{amb} = —55-+70 °C	67	190	
PL 5545 Triode inert-gas filled	2.5	21	60	V_{ap} = 1500 V_{ainvp} = 1500 V_g = —250 $V_{g(arc)}$ = —10	I_a = 6.4 I_{ap} = 80 [1]) I_g = 0.2 I_{gp} = 2.5 I_{surge} = 1120 [2])	V_{arc} = 16 V T_{ion} = 10 μsec T_{dion} = 50—500 μsec T_{av} = max. 15 sec t_{amb} = —55-+70 °C	67	229	Super Jumbo

[1]) Freq. ≧ 25c/s [2]) Max. duration 0.1 sec. [3]) At negative anode voltage. [4]) At positive anode voltage. [5]) Measured at half amplitude.
[6]) Freq. = pulse repetition frequency.

IGNITRONS

Type	A.C. control (two tubes in inverse parallel connection)							Rectifier (intermittent operation, phase control angle = 0)						
	V_{arms} (V)	Maximum demand (kVA)		I_a (A)	I_a max. (A)	T_{av} max (sec)	I_{surge}[1] max. (A)	V_{ap} max. (V)	V_{ainvp} max. (V)	I_a max. (A)	I_{ap} max. (A)	I_{surge}[1] max. (A)	T_{av} max. (sec)	Freq. (c/s)
PL 5551	220	530	—	30.2	—	18	6720	500	500	40	700	3000	6	25-60
		—	180	—	56									
	250	600	—	30.2	—	18	6720							
		—	200	—	56									
	600	600	—	30.2	—	7.5	2800							
		—	200	—	56									
PL 5552	220	1060	—	75.6	—	14	13450	500	500	100	1600	6000	6	25-60
		—	350	—	140									
	250	1200	—	75.6	—	14	13450							
		—	400	—	140									
	600	1200	—	75.6	—	5.8	5600							
		—	400	—	140									
								Rectifier (continuous operation, phase control angle = 0)						
PL 5555	max 2400	2400	—	max 135	—	1.66	6000	900	900	200	1800	12000	—	25-60
		—	1105	—	207			2100	2100	150	1200	9000	—	

[1]) Design values only. Max. duration 0.15 sec.

X-RAY TUBES

X-RAY TUBES

DIAGNOSTIC RAYPROOF TUBES

Type	Max. peak anode voltage (kV) Circuit [1]) 1	2	3	4	5	6	Focus (mm)	Max. ratings Radiography (kW)	Fluoroscopy HU/sec	Insulation	Cooling	Anode Type	Heat capacity (HU)
20610	100	—	—	—	—	—	1.7	2	450	air	air	stationary	—
20611	—	110	110	110	—	—							
20620	100	—	—	—	—	—	3.1	6	450				
20621	—	110	110	110	—	—							
20630	100	—	—	—	—	—	4.1	10	450				
20631	—	110	110	110	—	—							
20650/01	100	—	—	—	—	—	1.7/3.1	2/6	450				
20650/02	—	110	110	110	—	—							
20651/01	100	—	—	—	—	—	1.7/4.1	2/10	450				
20651/02	—	110	110	110	—	—							

[1]) 1 = self-rectified operation.
2 = one- and two-valve circuit (half-wave)
3 = single-phase full-wave circuit
4 = three-phase full-wave circuit
5 = Villard circuit
6 = Greinacher circuit

DIAGNOSTIC INSERTTUBES

21825	—50	—	—	—	—	—	0.8	0.3	32				11000
21836	—83	—	—	—	—	—	1.0	0.8	240				25000
21837	—90	—	—	—	—	—	1.5	1.0	240			sta-	25000
21838	—95	—	—	—	—	—	1.5	1.0	240	oil	oil	tion-	25000
21839	—85	—	—	—	—	—	1.5	1.0	225			ary	12000
21840	—100	—	—	—	—	—	2.3	2.6	240				60000
21905							1.5	2					
21906							2.3	4					
21907							3.1	6				sta-	
21908	—110	+110	+110	—	—	—	4.1	10	500	oil	oil	tion-	85000
21910							1.5/3.1	2/6				ary	
21911							1.5/4.1	2/10					
21912							2.3/4.1	4/10					
21915							1.5	2					
21916							2.3	4					
21917							3.1	6				sta-	
21918	—110	+125	+125	—	—	—	4.1	10	500	oil	oil	tion-	150 000
21920							1.5/3.1	2/6				ary	
21921							1.5/4.1	2/10					
21922							2.3/4.1	4/10					

Type	Max. peak anode voltage (kV)						Focus	Max. ratings		Insul-ation	Cooling	Anode	
	Circuit							Radio-graphy	Fluo-ros-copy			Type	Heat capacity
	1	2	3	4	5	6	(mm)	(kW)	HU/sec				(HU)
21933 **21934** **21935** **21936** **21937** **21938**	—100	+100	+100	+100	—	—	1/2 0.3/1 0.3/2 1 2 1.5/1.5	21/42 2.2/21 2.2/42 21 42 32/32	500[1])	oil	oil	rot-ating	80 000[2])
21940 21941	—110	+110	+110	+110	—	—	1 1.5	10 17	500	oil	oil	rot-ating	60 000
21943 21944 21945	—110	+125	+125	+125	—	—	1/2 0.3/1 0.3/2	21/42 2/21 2/42	500[1])	oil	oil	rot-ating	80 000[2])

[1]) 425 in circuit 1.
[2]) 50 000 in circuit 1

OIL-INSULATED SHIELDS

Type	Max. peak operating voltage (kV)	Heat capacity (HU)	Cooling capacity (HU/min)		Angle between cables and central beam	Receptacles [2]
			with air circulator	without air circulator		
22116/13 [1] **22116/23** [1] **22116/63** [1] **22116/73** [1]	100	1 500 000	30 000	25 000	90° 90° 135° 135°	tri-polar both sides bi-polar anode side tri-polar both sides bi-polar anode side
22117/33	100	1 000 000	18 000	30 000	90°	tri-polar both sides
22118/03 **22118/53**	125	1 500 000	30 000	25 000	90° 135°	tri-polar both sides bi-polar anode side
22156/13 **22156/23**	100	500 000	12 500	25 000	90°	tri-polar both sides bi-polar anode side
22157/03	125	750 000	15 000	30 000	90°	tri-polar both sides
MV 0276/01	140	2 300 000	70 000	70 000	90° of 135°	tri-polar both sides

[1]) Built-in exposure counter optional.
[2]) The cores of the bi-or tri-polar anode cables are shortcircuited in the receptacles.

INSERTTUBES FOR THERAPY

Type	Max. peak anode voltage (kV) Circuit 1	2	3	4	5	6	Focus (mm)	Max. ratings (mA)	Insulation	Cooling	Anode material
23400	—220	—	—	—	—	—	5×5	10	oil	oil	—
23405	—260	—	—	—	—	—	6×6	18			
23604	—	—	—	—	+220	+220	5 Ø	15	air	water	—
23605	—	—	—	—	+220	+220	7 Ø	30			
24006	—	—	—	—	—	+50	—	2	air	air	—
MV 0675	—	+140	+140	—	—	—	4×4	8	oil	oil	

INSERTTUBES FOR INDUSTRIAL PURPOSES

Macrostructure

25250	—	—	—	—	150	150	8	20	air	water	W
25252	—	—	—	—	150	150	4	12			
25275	—	—	—	—	—	300	8	10			

Diffraction and Spectrography [1]

25293/32	50	50	50	—	—	—	1	850	air	water	Cu
25294/32								850			W
25295/32								850			Mo
25296/32								350			Co
25297/32								350			Fe
25298/32								300			Cr

[1]) All types have 4 windows of Mica-Be.

VALVES

Type	V_f max. (V)	I_f max. (A)	$V_{inv\ p}$ max. (kV)	I_a max. (mA) intermittent	I_a max. (mA) continuous	Total length max. (mm)	Base	Insulation	Vacuum or gas-filled	Filament type
28000	17	8	125	500	200	478	DE	air	vacuum	tungsten
28001	19.5	8.5	125	1 000	200	478	DE	air		
28115	12.5	8	160	300	50	685	DE	air		
28117	12	8	180	300	50	825	DE	air		
28118	12	8	200	300	50	825	DE	air		
28119	12	8	220	300	50	825	DE	air		
28121	12	8	150	300	50	500	DE	oil		
28125	13	8	125	300	50	250	DE	air		
28129	12	12.5	140	750	75	285	E, DE	oil		
28136	6.5	6.0	125	1 400	500	267	D, DE, K	oil	vacuum	thoriated tungsten
28137			150	1 000	400	285	D, DE, K			
28201	2.3	3.5	110	1 000	100	430	DE	air	gas-filled	oxyde coated
28205			160	700		528	DE	air		
28214			110	1 000		230	Philips	oil		
28216			200	700		677	DE	air		

MISCELLANEOUS

VOLTAGE STABILIZERS

Current range		1-8 mA	1-10 mA	10-40 mA	50-200 mA
Burning voltage	83— 87 V		85 A2 ■		
	85—100 V			4687	
	90—105 V				100 E1
	90—110 V	7475			
	146—166 V			150 C1	
	150—170 V	150 A1			

PHOTOTUBES

Colour	Red sensitive	Blue sensitive
High vacuum	58 CV 90 CV 3545	90 AV
Gas-filled	58 CG 90 CG 3546 3554	90 AG

CURRENT REGULATORS

Stabilized current		0.1 A	0.3 A	1.15 A	1.4 A	5.9 A
Voltage range	3— 10 V					340
	5— 15 V				1910	
	10— 30 V			329		
	30— 80 V	1904				
	70—122.5V	U 30				
	80—200 V		1941			

IMAGE ICONOSCOPE

5854

IMAGE CONVERTERS

18120	18121	18130

GERMANIUM DIODES

Minimum forward current at +1 V		2.5 mA	4 mA	5 mA
Max. continuous operating inverse voltage	25 V	OA 60 •		
	50 V			OA 51
	60 V			OA 50
	70 V		OA 56	
	85 V	OA 61		
	100 V		OA 53 OA 55	

SURGE ARRESTERS

Max. temporary load		2.5A/1 sec	5A/1 sec	5A/3 sec	10A/1 sec	10A/3 sec
Starting voltage	80—120 V					4378
	130—180 V			4349		
	150—200 V			4371		4369
	280—350 V	4372				4379
	400—500 V		4397			
	700—850 V				4390	

MAGNETRONS

Peak output		7 kW	40 kW	225 kW	360 kW	400 kW
Wavelength	3 cm	55035 (2J42)	55040 (725A)	55030 (4J50) 55032 (4J78)		
	8.5 cm				55085	
	10 cm					55100

TR AND ATR SWITCHES

Type		TR	ATR	TR/ATR
Frequency	2940—3060 Mc/s			56100
	3450—3614 Mc/s			56085
	8490—9600 Mc/s	56031 (1B24A)		
	9000—9600 Mc/s		56030 (1B35)	

TRIGGER TUBE

Z 300T/PL 1267

RADIATION COUNTER TUBES

18500 18501 18502

18513 18514

HIGH-VACUUM DIODE

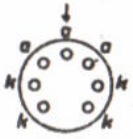
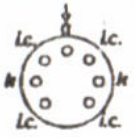
56000 (8020)

■ Voltage reference tube.

*) Video-detector diode; Minimum forward current not indicated.

( ) American type numbers.

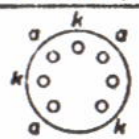
PHOTOTUBES

Type	Vacuum	Gas-filled	Radiation sensitivity	Cathode		Typical characteristics				Max. ratings			C_{ak}	Dimensions		Base connections
				Type	Projected area (cm²)	V_b (V)	Dark current max. (μA)	N[1] (μA/lm)	R_a (MΩ)	V_b (V)	I_k per cm² (μA)	t_{amb} (°C)	(pF)	Tot. height max. (mm)	Diameter max. (mm)	
58 CG	—	G	red	caesium on oxidized silver	1.1	85	0.1	85	1	90	1.5	100	3.0	33	16	
58 CV	V	—				50	0.05	20	1	100	3					
90 AG	—	G	blue	caesium on antimony	4	85	0.1	130	1	90	0.6	70	0.9	54	19	 Miniature[2]
90 AV	V	—				85	0.05	45	1	100	1.25					
90 CG	—	G	red	caesium on oxidized silver	2.4	85	0.1	125	1	90	0.7	100	1.1	0.9	19	 Miniature[2]
90 CV	V	—				50	0.05	20	1	100	3					
3530	—	G	red	caesium on oxidized silver	—	100	—	150	1	100	7.5[3]	50	3.0	76	18	Spec. 2p.

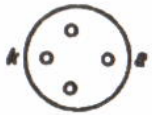
3533	—	G	red	caesium on oxidized silver	—	100	—	150	1	100	7.5[3])	50	3.4	80	28	A
3538	—	G	red	caesium on oxidized silver	—	100	—	150	1	100	7.5[3])	50	2.5	73	23	Spec. 2p.
3545	V	—	red	caesium on oxidized silver	0.8	90	0.15	20	1	250	5	50	2	73 64 (PW)	16.5	Spec. 2p.
3546	—	G	red	caesium on oxidized silver	0.8	90	0.1	150	1	90	7.5	50	2	73 64 (PW)	16.5	Pee-Wee
3554	—	G	red	caesium on oxidized silver	4.5	90	0.1	150	1	90	7.5	50	3.4	103	30	Tapered small 4p.

[1]) Measured with a lamp of colour temperature 2700 °K.
[2]) All cathode connections must be interconnected externally.
[3]) Total cathode current.

VOLTAGE REFERENCE TUBES

Type	V_{burn} (V)	I_{rec} (mA)	V_{ign} max. (V)	R_i max. (Ω)	V_{burn} spread (V)	I_{contr} (mA)	ΔV_{burn} (V)	Dimensions: Total height max. (mm)	Dimensions: Diam. max. (mm)	Base connections
85 A1	85 [1])	4	125	430	83—87 [1])	1—8	2	80	32	Loctal 8p.
85 A2	85 [1])	6	125	400	83—87 [1])	1—10	3	54	19	 Miniature

VOLTAGE STABILIZERS

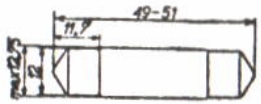
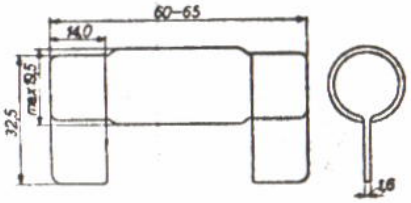
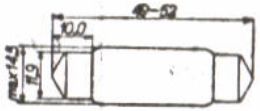
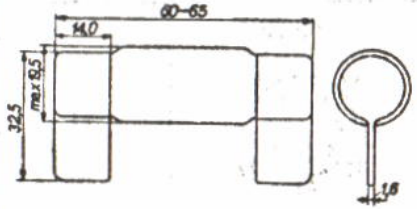
100 E1	95	125	140	30	90—105	50—200	2	168	55.5	 A
150 A1	160	4	205	1140	150—170	1—8	4.5	72	27	F

150 B2	150	10	180	500	143—157	5—15	3	54	19	Miniature
150 C1	155	20	205	200	146—166	5—40	4	99 (P) 114 (K)	44 (P) 43 (K)	P
4687	90	20	125	250	85—100	10—40	3	94 (P) 109 (K)	29 (P) 29 (K)	Octal 150 C1 K Octal 4687 K
7475	95	4	140	700	90—110	1—8	3	84	27	A
13201	100	100	140	90	90—110	15—200	12	154	54	

[1]) Variation ($I_{contr} = I_{rec}$): max. 0.5 % during life
max. 0.2 % after the first 300 operating hours
max. 0.1 % in short term (max. 100 hours) after the first 300 operating hours

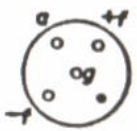
Temperature coëff. of V_{burn}: —3.2 mV/°C and —2.7 mV/°C resp. of the 85 A1 and 85 A2.

SURGE ARRESTERS

Type	Ignition voltage (V)	Extinguishing voltage (V)	Max. ratings: Continuous I (A)	Continuous W (W)	Temporary I (A)	Temporary I (sec)	Fuse in series (A)	Capacitive discharge (repeatedly) (Ws)	Inductive discharge (repeatedly) number	Inductive discharge (repeatedly) (Ws)	Mains voltage: D.C. max. (V)	Mains voltage: A.C. (r.m.s. value) max. (V)	Dimensions
4349	130—180	110	25	3	5	3	6	10	—	—	70	75	
4369	150—200	110	50	6	10	3	10	10	50000	10	70	75	
4370	80—120	60	50	6	10	3	10	10	200000 50000	10 25	36	50	
4371	150—200	110	25	3	5	3	6	10	—	—	70	75	
4372	280—350	250	25	3	2.5	1	10	10	—	—	200	180	

4373	150—200	110	50	6	10	3	10	10	—	—	70	75	
4378	80—120	60	50	6	10	3	10	10	200000 50000	10 25	36	50	
4379	280—350	130	50	6	10	3	10	10	50000	10	50	180	
4380	280—350	250	15	3	2.5	1	6	10	—	—	200	180	
4383	280—350	130	25	3	5	3	6	10	—	—	50	180	
4390	700—850	300	60	20	—	—	—	500	—	—	—	—	
4397	400—500	200	25	6	5	1	10	10	—	—	150	230	

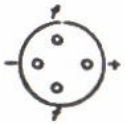
ELECTROMETER TUBES

Type	V_f (V)	I_f (mA)	V_a (V)	V_{g2} (V)	I_a (μA)	V_{g1} (V)	S (μA/V)	μ	I_{g2} (A)	I_{g1} (A)	Base connections
4060 Triode	0.7	600	4	—	100	—2.5	28	0.7	—	10^{-14}	H
4065 Triode	1.25	13	9	—	100	—2.5	80	1.7	—	$<12.5\times10^{-14}$	
4066 Tetrode	1.25	13	4.5	—3	10	>1	10	1	0.5×10^{-14}	25×10^{-5}	

TRIGGER TUBE

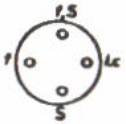
Type	Typical characteristics	Maximum ratings: Voltages	Maximum ratings: Currents	Dimensions: Tot. length max. (mm)	Dimensions: Diam. max. (mm)	Base connections
Z 300T/ PL 1267 Triode	$V_{a\,rms}$ = 105-130 V $V_{ah\,p}$ = 70 V $V_{ah\,p(H.F.)}$ = 55 V $V_{a\,arc}$ = 60 V $V_{ah\,arc}$ = 70 V	$V_{ap}(V_{ah}=0V)$ = max. 225 V $V_{aarc}(V_{ah}=0V)$ = min. 225 V $V_{ah\,ign}$ = max. 90 V = min. 70 V	I_a = max. 25 mA I_{ap} = max. 100 mA $I_{ah}(V_{ah}=140V)$ = max. 100 μA	99	33	 Octal

THERMOCOUPLES

Type	I_f (mA): E.M.F. = approx. 12mV	I_f (mA): Limit of proportionality	I_f (mA): Max. continuous	I_f (mA): Max. during 1 min.	R_f (Ω)	R_E (Ω)	Dimensions: Tot. length max. (mm)	Dimensions: Diam. max. (mm)	Base connections
TH 1	10	5	15	20	75	5.5	63	24	 A
TH 2	20	10	30	40	23	3.0			
TH 3	40	20	75	100	7.3	3.0			
TH 4	100	50	150	200	2.2	3.0			
TH 5	200	100	300	350	1.1	3.0			

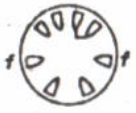
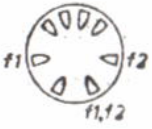
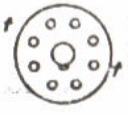
[1]) The E.M.F. is proportional to the square of I_f up to the stated current values (max. deviation ± 2%).

BIMETAL RELAY

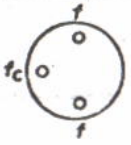
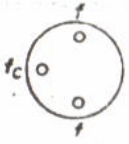
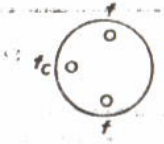
Type	Typical characteristics	Max. current: Mains voltage	Max. current: At switching on	Max. current: At switching off	Base connections
4152	I_f = 92 mA (± 13%) R_f = 340—372 Ω Timing = 80 sec (I_f = 92 mA)	220 V D.C.	1.5 A	0.25 A	 A
		220 V A.C.	1.5 A	0.25 A	
		380 V A.C.	0.7 A	0.075 A	

CURRENT REGULATORS

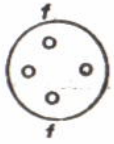
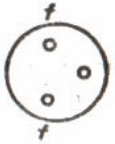
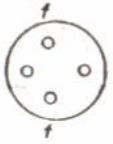
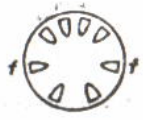
General applications

Type	V_{contr} (V)	I_{reg} (mA)	Base connections
C 8	80—200	200	 P
C 10	35—100	200	P
C 12	f_1—f_2: 80—200 f_1—f_1 f_2: 35—100	200	 P
U 30	70—122	100	 Octal

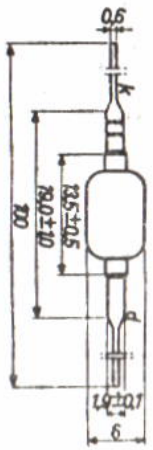
Industrial applications

Type	V_{contr} (V)	I_{reg} (A)	Base connections
329	10-30	1.15	 H
340	3-10	5.9	Edison
452	7-20	1.15	 H
1012	6-18	5.7	Edison
1120	6-18	3.2	Edison
1331	15-40	1.45	 H

Special applications

Type	V_{contr} (V)	I_{reg} (mA)	Base connections
1904	30—80	100	 A
1910	5—15	1400	 H
1941	80—200	300	 A
1945	80—120	275	 P

GERMANIUM DIODES

Type	Description	I_d min. (mA) $V_d = +1V$	$-I_d$ max. (μA) $V_d = -3V$	$V_d = -10V$	$V_d = -50V$	$V_d = -100V$	I_d max. (mA)	I_{dp} max. (mA)	I_{surge} max. (mA)	V_{dinv} max. (V)	V_{dinvp} max. (V)	C_{dk} (pF)	t_{amb} (°C)	Dimensions [4] (mm)
OA 50	General purpose diode	5	—	30	500	—	50	150	500	60 [1]	75	1	−50 to +75	
OA 51	High back resistance diode	5	—	7	100	—	50	150	500	50 [1]	75	1	−50 to +75	
OA 53	100-volt diode	4	—	—	—	600	50	150	500	100 [1]	120	1	−50 to +75	
OA 55	100-volt diode	4	5	—	—	500	50	150	500	100 [1]	120	1	−50 to +75	
OA 56	General purpose diode	4	—	50	800	—	50	150	400	70 [1]	85	1	−50 to +75	
OA 60	Video detector diode	$\eta = 60\%$ and $R_{damping} = 3000\ \Omega$ [3]					5	—	—	25 [2]	30	1	−50 to +60	
OA 61	D.C. restorer diode	2.5	—	—	100	—	5	15	500	85 [2]	100	1	−50 to +60	

[1]) The diode should not be operated at the max. values for voltage, current and temperature simultaneously. [2]) The diode should not be operated at the max. values for voltage and temperature simultaneously. [3]) Diode in series with parallel circuit consisting of $R = 3900\ \Omega$ and $C = 10$ pF. Freq. = 30 Mc/s. Peak input voltage = 5 V. Capacitance of oscillator = 17 pF, temp. = 20 °C. The oscillator must have a negligible internal impedance at its harmonic frequencies. [4]) When soldering, the metal diode extension should be held with a pair of cool pliers in order to avoid damage to the diode through excessive heat.

The typenumbers of the diodes are indicated by a two band colour code.

Colour	silver	gold	black	brown	red	orange	yellow	green	blue	violet	grey	white	none
First band / First colour	—	—	—	1	2	3	4	5	6	7	8	9	—
Second band / Second colour	—	—	0	1	2	3	4	5	6	7	8	9	—

The first band is the one nearest to one end of the diode.

IMAGE CONVERTERS

Type	Execution [1]	Photocathode eff. diam. (mm)	Screen diam. (mm)	N [2] (μA/lm)	Voltages V_a (kV)	V_g (kV)	$-V_g$ [3] (V)	V_a max. (kV)	V_g max. (kV)	V_{ag} max. (kV)	Linear magnification	Picture resolution (lines/cm)	Dimensions Tot. length max. (mm)	Dimensions Diam. max. (mm)
18120 Diode	AA AB AG	30	115	20	6	—	—	6	—	—	3—7	200	240	117
	CA CB CG			15										
18121 Diode	AA AB AG	28	28	20	5	—	—	6	—	—	1	200—500	97	65
	CA CB CG			15										
18130 Triode	AA AB AG	25	115	20	6	3	20	6	6	6.1 [4] 5 [5]	2.5-3.5	200	240	117

[1]) The first letter indicates the type of photocathode:
A = caesium on antimony, blue sensitive.
C = caesium on oxidized silver, red sensitive.
The second letter indicates the colour of the luminescent screen:
A = blue, very short persistence.
B = blue, short persistence.
G = green, medium persistence.

[2]) At a colour temperature of 2700 °K.
[3]) Grid cut-off voltage.
[4]) At picture extinction.
[5]) At exposure.

All types are magnetically focused.

IMAGE ICONOSCOPE

Type	V_f (V)	I_f (A)	Scanning system	Image system	Operating characteristics
5854	6.3	0.63	Focusing: magn. Deflection: magn. Cut-off voltage: —30 to —70 V	Photocath: 12×16 mm Signal electrode: 45×60 mm Focusing: magn.	Voltage of g_2 and collector 930 V Supply voltage of signal electrode 930 V Voltage of photocathode —70 V Beam current 0.1—0.2 μA Current of focusing coil 10 mA Current of image coil 25 mA Signal electrode resistor 0.1 MΩ

RADIATION COUNTER TUBES

Type	Description	Radiation sensitivity	Window thickness (mg/cm²)	Threshold voltage (V)	Operating voltage (V)	Plateau length min. (V)	Plateau slope (% per 100 V)	Dead time (μsec)	Back-ground (counts/min)	Dimensions Tot. length max. (mm)	Dimensions Diam. max. (mm)
18500	Non self quenching	X-ray, γ and neutron	250	900	1100	500	< 2	<100	<20	130	17
18501	Non self quenching	β	75	900	1100	500	< 2	<100	< 20	130	17
18502	Self quenching	γ, β	75	max. 300	350	100	<15	<150	<40	118	19
18513	Self quenching Mica window	α, β	1.6-2.1	575	725	150	<15	<70	<6 [1])	86	12.8
18514	Self quenching Mica window	α, β	3.5-4	650	750	200	<15	<250	<40 [1])	99	33.5

[1]) Shielded.

MAGNETRONS

Type	Interchangeable with type	Wavelength band (cm)	Frequency (Mc/s)	Peak output power min. (kW)
55030	4J50	3	9345-9405	225
55032	4J78		9003-9168	225
55035	2J42		9345-9405	7
55040	725 A		9345-9405	40
55085-01	CV 1483	8.5	3570-3614	360
55085-02	CV 1484		3530-3570	
55085-03	CV 1485		3490-3530	
55085-04	CV 1486		3450-3490	
55100-01	CV 1479	10	3030-3060	400
55100-02	CV 1480		3005-3030	
55100-03	CV 1481		2980-3005	
55100-04	CV 1482		2940-2980	
55230 Tunable	5J26	25	1220-1350	500

HIGH-VACUUM DIODE

Type	Interchangeable with type	V_f (V)	I_f (A)	T_k (sec)	Application	Typical characteristics	
56000	8020	5	6	5	Rectifier	V_{ainvp} = max. 40 kV I_e = max. 100 mA I_{ap} = max. 750 mA	
					Limiter	V_f = 5.5 V V_{ap} = 10 kV I_{ap} = min. 2A	V_f = max. 5.8 V V_{ap} = max. 12.5 kV W_a = max. 75 W

KLYSTRONS

Type	Interchangeable with type	Wavelength band (cm)	Frequency (Mc/s)	Output power (W)
55390 Tunable reflex klystron	2K25 723 A/B	3	8500-9660	0.02
55395 Tunable; double cavity; water cooled	—	3	8575-10000	125

TR AND ATR SWITCHES

Type	Interchangeable with type	Application	Frequency (Mc/s)
56030	1B35	ATR	9000-9600
56031	1B24A	TR	8490-9600
56085	CV 106 [1])	TR/ATR	3450-3614
56100	CV 193 [1])	TR/ATR	2940-3060

[1]) Without external cavity.

TUBE SOCKETS

In the tables the type of tube base has been indicated in the column "Base connections". For these bases the corresponding tube socket may be found from the table below. In some cases more than one type can be used for the same base, and the choice will then depend on the application of the tube.
The base designation according British standards is given between brackets:

Base		Socket			
		Type-number	Number of contacts	Insulating material	Remarks
A		40465	5	Philite/pres.pap.	
Diheptal	(B 14A)	5914/20	14	Philite	
Duodecal	(B 12A)				
5p.		5912/01	5	Pressed pap.	
5p.		5912/23	5	Philite	segment-shape
7p.		5912/22	7	Philite	
12p.		5912/20	12	Philite	
Edison		E3 000 22	—	Philite	with screw cap E 27
FJ		28 226 01	9	Pressed pap.	
Giant	(B 5F)	40211/01	5	Kersima	
Goliath		65909 BG/01	—	Porcelain	with screw cap E 40
H		40465	5	Philite	
Jumbo	(B 4F)	40408	4	Kersima	for bayonet
Loctal 8p.	(B 8G)	40213	8	Kersima	
9p.	(B 9G)	40212	9	Kersima	
9p.		5906/20	9	Philite	
Magnal	(B 11A)	5911/20	11	Philite	
Medium 4p.		40218/03	4	Kersima	
5p.		40219	5	Kersima	
7p.		40220	7	Kersima	
Mignon		88168/01	—	Philite	with screw cap E 14
Miniature	(B 7G)	5909/01	7	Pressed pap.	
		5909/02	7	Philite	
		5909/12	7	R.F. Philite	
		5909/20	7	= 5909/12	with shield base
		5909/35	7	= 5909/36	with shield base
		5909/36	7	Kersima	
Noval	(B 9A)	5908/01	9	Pressed pap.	
		5908/03	9	Kersima	
		5908/30	9	= 5908/03	with shield base
		5908/31	8	Kersima	cup-shaped springs; without 8th contact and inner shield; for high voltage
		5908/34	8	= 5908/31	with fork-shaped springs
		5908/35	9	= 5908/36	with shield base
		5908/36	9	Kersima	
Octal		5903/12	8	Philite	
O		40465	5	Philite/pres.pap.	
P		5900/02	8	Philite	side contacts
Pee-Wee	(B 3A)	40406	3	Philite	
Rimlock	(B 8A)	5904/01	8	Pressed pap.	
		5904/02	8	Philite	
		5904/03	8	Kersima	scraping springs
		5904/36	8	= 5904/03	
Septar	(B 7A)	40202	7	Kersima	
Special 2p.		40407	2	Pressed pap.	
3p. (1)		1285	3	Micalex	
3p. (2)		1287	3	Pressed pap.	
4p. (1)		B1 506 11	4	Pressed pap.	
4p. (2)		40400	4	Pressed pap.	
4p. (3)		40302	4	Kersima	
12p.	(B 12D)	23 661 62	12	Philite	side contacts
Subminiature	(B 8D)	5907/22	8	Philite	
Super Giant		40216	5	Kersima	
Super Jumbo	(B 4D)	40403	4	Kersima	
Tapered small 4p.		40218/03	4	Kersima	
V		40405/00	5	Philite	side contacts
		5900/20	5	= 40405/00	ring shape, without mounting holes
W		40221	4	Pressed pap.	
Y		23 661 92	8	Philite	

EQUIVALENT TUBE TYPES OF AMERICAN RECEIVING, AMPLIFYING AND RECTIFYING TUBES

EXPLANATORY NOTES TO THE TABLES

Type code

First letter	Filament voltage or current
A	4 V
C	200 mA
D	≤1.4 V battery
E	6.3 V
G	5 V
H	150 mA
K	2 V battery
M	2.5 V
O	no filament
P	300 mA
U	100 mA

Second and subsequent letters	Type of tube
A	Diode
B	Double diode
C	Triode
D	Output triode
E	Tetrode
F	Pentode
H	Hexode or Heptode
K	Octode or Heptode
L	Output pentode or output tetrode
M	Tuning indicator
Q	Enneode
X	Gasfilled full-wave rectifying tube
Y	High-vacuum half-wave rectifying tube
Z	High-vacuum full-wave rectifying tube

Application

Indication	Application
1	Frequency changer
2	R.F. and I.F. amplifier
3	Wide-band amplifier
4	A.F. amplifier
5	Output tube
6	Video output tube
7	Frame output tube
8	Line output tube
9	A.M. detector
10	F.M. detector
11	Oscillator
12	Saw-tooth generator
13	Sync. separator
14	Rectifying tube
15	Booster
16	Tuning indicator
17	Current regulator
18	Voltage stabilizer
19	U.H.F. triode
20	D.C. restorer

Equivalent type

The types between brackets are near equivalents. These types have the same base, but may have different base connections or may differ slightly in characteristics.

Recommended type

For the current American tubes a recommended type has been stated. This may be important for new equipment design.

EQUIVALENT TUBE TYPES OF AMERICAN RECEIVING, AMPLIFYING AND RECTIFYING TUBES [1])

American type	Type code	Base	Application	Equivalent type	Recommended type
00	C	4 p. glass	4, 9	—	—
00-A	C	4 p. glass	4, 9	—	—
01	C	4 p. glass	4, 9	—	—
01-A	C	4 p. glass	4, 9	—	—
01-B	AC	4 p. glass	9	—	—
0 38	—	4 p. glass	17	—	—
0A2	—	miniature	18	—	—
0A3	—	octal	18	—	—
0B2	—	miniature	18	—	—
0C3	—	octal	18	(4687K)	4687K
0D3	—	octal	18	(150C1K)	150C1K
0Z3	OX	5 p. glass	14	—	—
0Z4	OX	octal	14	—	—
0Z4A	OX	octal	14	—	—
0Z4G	OX	octal	14	—	—
1	EY	4 p. glass	14	—	—
1-1	—	4 p. glass	17	—	—
1A1	—	4 p. glass	17	—	—
1A2	—	4 p. glass	17	—	—
1A3	DA	miniature	9, 10	DA 90	—
1A4P	KF	4 p. glass	2	—	—
1A4T	KE	4 p. glass	2	—	—
1A5	—	4 p. glass	17	—	—
1A5G/GT	DL	octal	5	(DL 21)	DL 92; DL 94
1A6	KK	6 p. metal	1	—	—
1A7G/GT	DK	octal	1	—	DK 91; DK 92
1AB5	DF	loctal	2	—	—
1AC5	DL	subminiature	5	—	—
1AC6	DK	miniature	1	DK 92	DK 92
1AD4	DF	subminiature	2	—	—
1AD5	DF	subminiature	2	—	—
1AE4	DF	miniature	2	—	—
1AE5	DK	subminiature	1	—	—
1AH5	DAF	miniature	4, 9	DAF 96	DAF 96
1AJ4	DF	miniature	2	DF 96	DF 96
1AX2	DY	noval	14	—	—
1B1	—	4 p. glass	17	—	—
1B2	—	4 p. glass	17	—	—
1B3GT	DY	octal	14	—	—
1B4P	KF	4 p. glass	2	—	—

[1]) See p. 178

American type	Type code	Base	Application	Equivalent type	Recommended type
1B4T	KE	4 p. glass	2	—	—
1B5/25S	KBC	6 p. glass	4, 9	—	—
1B6	DF	miniature	2	(DF 91)	DF 91; DF 96
1B7G/GT	DK	octal	1	—	—
1B8GT	DACL	octal	4, 5, 9	—	—
1C1	—	4 p. glass	17	—	—
1C2	—	4 p. glass	17	—	—
1C3	DC	miniature	4,9	—	—
1C4	KF	octal	2	—	—
1C5G/GT	DL	octal	5	—	—
1C6	KK	6 p. glass	1	—	—
1C7G	KK	octal	1	—	—
1C8	DK	subminiature	1	—	—
1D1	—	4 p. glass	17	—	—
1D2	—	6 p. glass	17	—	—
1D3	DC	subminiature	19	—	—
1D4G/GT	KL	5 p. glass	5	—	—
1D5GP	KF	octal	2	—	—
1D5GT	KE	octal	2	—	—
1D7G	KK	octal	1	—	—
1D8GT	DACL	octal	4, 5, 9	—	—
1E1	—	4 p. glass	17	—	—
1E2	—	6 p. glass	17	—	—
1E3	DC	noval	19	DC 80	DC 80
1E4G	DC	octal	4, 9	—	—
1E5GP	KF	octal	2	—	—
1E7G/GT	KLL	octal	5	—	—
1E8	DK	subminiature	1	—	—
1F4	KL	5 p. glass	5	—	—
1F5G	KL	octal	5	—	—
1F6	KBF	6 p. glass	2, 4, 9	—	—
1F7GV	KBF	octal	2, 4, 9	—	—
1G1	—	4 p. glass	17	—	—
1G4G/GT	DC	octal	4, 9	—	—
1G5G	KL	octal	5	—	—
1G6G/GT	DDD	octal	5	—	—
1H3	DA	miniature	9	—	—
1H4G	KC	octal	4, 9	—	—
1H5G/GT	DAC	octal	4, 9	—	DAF91;DAF96
1H6G	KBC	octal	4, 9	—	—
1J1	—	4 p. glass	17	—	—
1J5G	KL	octal	5	—	—
1J6G/GT	KDD	octal	5	—	—
1K1	—	4 p. glass	17	—	—
1K4	KF	4 p. glass	2	—	—

American type	Type code	Base	Application	Equivalent type	Recommended type
1K5	KF	octal	2	—	—
1K7G	KBF	octal	2, 4, 9	—	—
1L4	DF	miniature	2	DF 92	—
1L5G	KL	octal	5	—	—
1L6	DK	miniature	1	—	DK 91; DK 92
1LA4	DL	loctal	5	—	DL 92; DL 94
1LA6	DK	loctal	1	—	DK 91; DK 92
1LB4	DL	loctal	5	—	DL 92; DL 94
1LC5	DF	loctal	2	—	DF 91; DF 96
1LC6	DK	loctal	1	—	DK 91; DK 92
1LD5	DAF	loctal	4, 9	—	DAF91; DAF96
1LE3	DC	loctal	4, 9	—	—
1LF3	DC	loctal	4, 9	—	—
1LG5	DF	loctal	2	—	DF 91; DF 96
1LH4	DAC	loctal	4, 9	—	DAF91; DAF96
1LN5	DF	loctal	2, 4	—	DF 91; DF 96
1M3	DM	subminiature	16	DM 70	DM 70
1M5G	KF	octal	2	—	—
1N5G GT	DF	octal	2, 4	—	DF 91; DF 96
1N6G	DAL	octal	5, 9	—	—
1N86	OA	—	9,10	OA56	OA56
1N87	OA	—	9,10	OA60	OA60
1N88	OA	—	20	OA61	OA61
1P5G/GT	DF	octal	2, 4	—	DF 91; DF 96
1Q5G/GT	DL	octal	5	—	DL 92; DL 94
1Q6	DAF	subminiature	4, 9	—	—
1R4	DA	loctal	9	—	—
1R5	DK	miniature	1	DK 91	DK 92
1S4	DL	miniature	5	DL 91	DL 92; DL 94
1S5	DAF	miniature	4, 9	DAF 91	DAF91 DAF96
1S6	DAF	subminiature	4, 9	—	—
1SA6GT	DF	octal	2	—	—
1SB6GT	DAF	octal	4, 9	—	—
1T4	DF	miniature	2	DF 91	DF 91, DF 96
1T5GT	DL	octal	5	—	DL 92; DL 94
1T6	DAF	subminiature	4, 9	—	—
1U4	DF	miniature	2, 4	(DF 92)	DF 91; DF 96
1U5	DAF	miniature	4, 9	(DAF 91)	DAF91; DAF96
1V	EY	4 p. glass	14	—	—
1V2	PY	noval	14	—	—
1V5	DL	subminiature	5	(DL 72)	—
1V6	DCF	subminiature	1	—	—
1W4	DL	miniature	5	—	—
1W5	DF	subminiature	2	—	—
1X2; 1X2A	DY	noval	14	—	—

American type	Type code	Base	Application	Equivalent type	Recommended type
1Z2	DY	miniature	14	—	—
2	—	4 p. glass	17	—	—
2A3; 2A3H	MD	4 p. glass	5	—	—
2A5	ML	6 p. glass	5	—	—
2A6	MBC	6 p. glass	4, 9	—	—
2A7; 2A7S	MK	7 p. glass	1	—	—
2B5	MCD	6 p. glass	4, 5	—	—
2B6	MCD	7 p. glass	4, 5	—	—
2B7; 2B7S	MBF	7 p. glass	2, 9	—	—
2B24	DA	subminiature	9	—	—
2B25	DY	miniature	14	—	—
2B35	EA	special	9	EA50	—
2C21	ECC	7 p. metal	4	—	—
2C22	EC	octal	2, 4	—	—
2C50	ECC	octal	4, 12	—	E80CC
2C51	ECC	noval	1	—	—
2C52	PCC	octal	4, 12	—	—
2C53	EC	octal	4	—	—
2E5	MM	6 p. glass	16	—	—
2E30	EL	miniature	5	—	—
2E31	DF	subminiature	2, 4	—	—
2E32	DF	subminiature	2, 4	—	—
2E35	DL	subminiature	5	—	DL 67
2E36	DL	subminiature	5	—	DL 67
2E41	DAF	subminiature	4, 9	—	—
2E42	DAF	subminiature	4, 9	—	—
2F7	MCF	7 p. glass	2, 4	—	—
2G5	MM	6 p. glass	16	—	—
2G21	DCH	subminiature	1	—	—
2G22	DCH	subminiature	1	—	—
2V3G	MY	octal	14	—	—
2W3; 2W3GT	MY	octal	14	—	—
2X2A/879	MY	4 p. glass	14	—	—
2X3G	MY	octal	14	—	—
2Y2	MY	4 p. glass	14	—	—
2Z2/G84	MY	4 p. glass	14	—	—
3-1	—	4 p. glass	17	—	—
3-40	—	4 p. glass	17	—	—
3-150	—	4 p. glass	17	—	—
3-220	—	4 p. glass	17	—	—
3A4	DL	miniature	5	DL 93	—
3A5	DCC	miniature	5	DCC 90	—
3A8GT	DACF	octal	2, 4, 5	—	—
3B4	DL	miniature	5, 11	—	—
3B5GT	DL	octal	5	(DL 92)	DL 94

American type	Type code	Base	Application	Equivalent type	Recommended type
3B7	DCC	loctal	4, 11	—	—
3C5GT	DL	octal	5	—	—
3C6	DCC	loctal	4	—	—
3D6	DL	loctal	5	—	—
3E6	DF	loctal	2, 4	—	—
3E22	ELL	octal	5	—	—
3H1	—	4 p. glass	17	—	—
3H220	—	4 p. glass	17	—	—
3LE4GT	DL	loctal	5	—	—
3LF4	DL	loctal	5	—	DL 94
3Q4	DL	miniature	5	DL 95	DL 94
3Q5G/GT	DL	octal	5	—	DL 94
3S4	DL	miniature	5	DL 92	DL 92; DL 94
3V4	DL	miniature	5	DL 94	DL 94
4-220	—	4 p. glass	17	—	—
4A6G	KDD	octal	5	—	—
4H5	—	4 p. glass	17	—	—
4H220	—	4 p. glass	17	—	—
4S	MZ	5 p. glass	14	—	—
5AX4GT	GZ	octal	14	—	—
5AZ4	GZ	loctal	14	—	—
5R4GY	GZ	octal	14	—	—
5T4	GZ	octal	14	—	—
5U4G	GZ	octal	14	(GZ 32)	GZ 32
5V4G	GZ	octal	14	GZ 32	GZ 32
5W4; 5W4G/GT	GZ	octal	14	(GZ 32)	GZ 32
5X3GT	GZ	4 p. glass	14	—	—
5X4G	GZ	octal	14	—	—
5Y3G/GT	GZ	octal	14	(GZ 32)	GZ 32
5Y4G	GZ	octal	14	(GZ 32)	GZ 32
5Z3	GZ	4 p. glass	14	—	GZ 32
5Z4; 5Z4G/GT	GZ	octal	14	(GZ 32)	GZ 32
6A3	ED	4 p. glass	5	—	—
6A4	EL	5 p. glass	5	—	—
6A4 LA	EL	5 p. glass	5	—	—
6A5G	ED	octal	5	—	—
6A6	EDD	7 p. glass	5	—	—
6A7; 6A7S	EK	7 p. glass	1	—	ECH 81
6A8; 6A8G/GT	EK	octal	1	—	ECH 81
6AB4	EC	miniature	1, 2, 11	(EC 92)	EC 92
6AB5	EM	6 p. glass	16	—	EM 34
6AB6G	ECD	octal	4, 5	—	—
6AB7/1853	EF	octal	3	—	EF 85
6AB8	ECL	noval	4,5,6,7,12	ECL 80	ECL 80
6AC5G/GT	ED	octal	5	—	—

American type	Type code	Base	Application	Equivalent type	Recommended type
6AC6G/GT	ECD	octal	4, 5	—	—
6AC7/1852	EF	octal	3,6	—	EF 80
6AD4	EC	subminiature	4	—	—
6AD5G/GT	EC	octal	4	—	—
6AD6G	EM	octal	16	—	EM 34
6AD7G	ECL	octal	4, 5	—	—
6AE5G/GT	EC	octal	4	—	—
6AE6G	ECC	octal	4	—	—
6AE7GT	ECC	octal	4	—	—
6AF4	EC	miniature	11	—	EC80
6AF5G	EC	octal	4	—	—
6AF6G	EM	octal	16	—	EM 34
6AG5	EF	miniature	1, 2, 3	(EF 91)	EF 80
6AG6G	EL	octal	5	(EL 33)	—
6AG7	EF	octal	3, 6	—	EF 80; EL 83
6AH4GT	EC	octal	7	—	—
6AH5G	EL	octal	5	—	—
AH6	EF	miniature	3	—	EF 80
6AH7GT	ECC	octal	4	—	—
6AJ4	EC	noval	2	—	EC80
6AJ5	EF	miniature	2	—	—
6AJ7	EF	octal	3	—	—
6AJ8	ECH	noval	1	ECH 81	ECH 81
6AK5	EF	miniature	3	—	EF 80
6AK5W	EF	miniature	3	—	—
6AK6	EL	miniature	5	(EL 91)	EL 42
6AK7	EL	octal	5	(EL 33)	EL 41
6AK8	EABC	noval	4, 9, 10	EABC 80	EABC 80
6AL5	EB	miniature	9, 10	EB 91	EB 91
6AL6G	EL	octal	5	(4689 K)	EL 34
6AL7GT	EM	octal	16	—	—
6AM5	EL	miniature	5	EL 91	EL 42
6AM6	EF	miniature	3	EF 91	EF 80
6AN5	EL	miniature	5, 6	—	—
6AN6	EBB	miniature	9	—	—
6AN7	ECH	noval	1	—	—
6AQ5	EL	miniature	5	—	EL 41
6AQ6	EBC	miniature	4, 9	—	EBC 41
6AQ7GT	EBC	octal	4, 9	—	—
6AR5	EL	miniature	5	—	EL 41
6AR6	EL	octal	5	—	—
6AR7GS	EBF	octal	2, 4, 9	—	EBF 80
6AS5	EL	miniature	5	—	—
6AS6	EF	miniature	2	—	—
6AS7G	EDD	octal	15	—	—

American type	Type code	Base	Application	Equivalent type	Recommended type
6AT6	EBC	miniature	4, 9	—	EBC 41
6AU5GT	EL	octal	8	—	EL 81
6AU6	EF	miniature	2, 3, 13	—	EF 80
6AV5GT	EL	octal	8	—	EL 81
6AV6	EBC	miniature	4, 9	—	EBC 41
6AW7GT	EBC	octal	4, 9, 10	—	—
6AX4GT	EY	octal	15	—	PY 81
6AX5GT	EZ	octal	14	—	EZ 80
6AX6G	EZ	octal	14	—	AX 50
6B4G	ED	octal	5	—	—
6B5	ECD	6 p. glass	4, 5	—	—
6B6G	EBC	octal	4, 9	—	EBC 41
6B7; 6B7S	EBF	7 p. glass	2, 4, 9	—	EBF 80
6B8	EBF	octal	2, 4, 9	(EBF 32)	EBF 80
6B8G/GT	EBF	octal	2, 4, 9	EBF 32	EBF 80
6BA5	EF	subminiature	2	—	—
6BA6	EF	miniature	2, 3	EF 93	EF 41; EF 80
6BA7	EK	noval	1	—	EF 80; ECH 81
6BC5	EF	miniature	2, 3	—	EF 80
6BC7	EAB	noval	9, 10	—	—
6BD5GT	EL	octal	8	—	EL 81
6BD6	EF	miniature	2	—	EF 41
6BD7	EBC	noval	4, 9	EBC 80	—
6BE6	EK	miniature	1	—	ECH 81
6BE7	EQ	noval	10	EQ 80	—
6BF5	EL	miniature	7	—	ECL 80
6BF6	EBC	miniature	4, 5, 9	—	—
6BF7	ECC	subminiature	4, 12	—	—
6BG6G	EL	octal	8	(EL38)	EL 81
6BG7	ECC	subminiature	4, 12	—	—
6BH6	EF	miniature	2	—	EF 80
6BJ6	EF	miniature	2	(EF 93)	EF 41; UF 41
6BK5	EL	noval	5, 6	—	EL 83; EL41
6BK6	EBC	miniature	4, 9	—	EBC 41
6BK7	ECC	noval	1, 3	—	ECC 81
6BL7GT	EDD	octal	7	—	—
6BN6	—	miniature	10	—	EQ 80
6BN7	EDD	noval	7	—	ECL 80
6BQ6GT	EL	octal	8	—	EL 81
6BQ7	ECC	noval	1, 11	—	—
6BT6	EBC	miniature	4, 9	—	EBC 41
6BU6	EBC	miniature	4, 5, 9	—	—
6BW6	EL	noval	5	—	EL 41
6BX6	EF	noval	1, 2, 3	EF 80	—
6BX7GT	ECC	octal	7, 11	—	ECL 80

American type	Type code	Base	Application	Equivalent type	Recommended type
6BY5G	EZ	octal	14, 15	—	—
6BY7	EF	noval	3	EF 85	EF 85
6C4	EC	miniature	11	—	EC 81
6C5; 6C5G/GT	EC	octal	4, 9	—	—
6C6	EF	6 p. glass	4	—	EF 40
6C7	EBC	7 p. glass	4, 9	—	EBC 41
6C8G	ECC	octal	4	—	ECC 40
6CA7	EL	octal	5	EL 34	EL 34
6CB6	EF	miniature	3	(EF 91)	EF 80
6CD6G	EL	octal	8	—	EL 81
6CG6	EF	miniature	2	—	EF 41
6CJ6	EL	noval	5, 8	EL 81	EL 81
6CK6	EL	noval	6	EL 83	EL 83
6CQ6	EF	miniature	2	EF 92	EF 41
6D1	EB	5 p. glass	9	—	—
6D5G	ED	octal	5	—	—
6D6	EF	6 p. glass	2	—	EF 41
6D7	EF	7 p. glass	2, 9	—	—
6D8G	EK	octal	1	—	ECH 81
6E5	EM	6 p. glass	16	—	EM 34
6E6	EDD	7 p. glass	5	—	—
6E7	EF	7 p. glass	2	—	—
6E8G	ECH	octal	1	(ECH 35)	ECH 81
6F4	EC	acorn	4, 11	—	—
6F5; 6F5G/GT	EC	octal	4	—	—
6F6; 6F6G/GT	EL	octal	5	(EL 33)	EL 41
6F7S	ECF	7 p. glass	1, 2, 4	—	—
6F8G	ECC	octal	4	—	ECC 40
6G5	EM	6 p. glass	16	—	EM 34
6G6G	EL	octal	5	—	—
6H4GT	EA	octal	9, 14	—	—
6H5	EM	6 p. glass	16	—	—
6H6; 6H6G/GT	EB	octal	9, 10, 14		EB 91
6H8G	EBF	octal	2, 4, 9	(EBF 32)	EBF 80
6J4	EC	miniature	11	(EC 91)	EC 80
6J5; 6J5G/GT	EC	octal	4, 9, 11	—	—
6J6	ECC	miniature	1, 4, 11	ECC 91	ECC 81
6J7; 6J7G/GT	EF	octal	4, 9	(EF 37A)	EF 40
6J8G	ECH	octal	1	(ECH 35)	ECH 81
6K4	EC	subminiature	4, 11	—	—
6K5G/GT	EC	octal	4	—	—
6K6G/GT	EL	octal	5, 7	—	EL 83; EL 42
6K7; 6K7G/GT	EF	octal	2	(EF 39)	EF 41
6K8; 6K8G/GT	ECH	octal	1	(ECH 35)	ECH 81
6L4	EC	acorn	11	—	—

American type	Type code	Base	Application	Equivalent type	Recommended type
6L5G	EC	octal	4, 9, 11	—	—
6L6; 6L6G/GA	EL	octal	5	(4689 K)	EL 34
6L7; 6L7G	EK	octal	1, 2	—	—
6M6G	EL	octal	5	(EL 33)	EL 41
6M7G	EF	octal	2	(EF 39)	—
6M8GT	EACF	octal	2, 4, 9	—	—
6N4	EC	miniature	2, 11	—	EC 81
6N5	EM	6 p. glass	16	—	EM 34
6N6G	ECD	octal	4, 5	—	—
6N7; 6N7G/GT	EDD	octal	5	—	—
6N8	EBF	noval	2, 4, 9	EBF 80	—
6P5G/GT	EC	octal	4, 9	—	—
6P7G	ECF	octal	1, 2, 4	—	—
6P8G	ECH	octal	1	(ECH 35)	ECH 81
6Q4	EC	noval	11	EC 80	—
6Q6-G	EBC	octal	4, 9	—	—
6Q7	EBC	octal	4, 9	—	EBC 41
6Q7G/GT	EBC	octal	4, 9	(EBC 33)	EBC 41
6Q8	EK	octal	1	—	—
6R4	EC	noval	11	EC 81	—
6R6G	EF	octal	2	(EF 39)	—
6R7; 6R7G/GT	EBC	octal	4, 9	(EBC 33)	EBC 41
6R8	EABC	noval	4, 9, 10	—	—
6S4	EC	noval	7	—	—
6S5	EM	6 p. glass	16	—	—
6S6GT	EF	octal	2, 3	—	—
6S7; 6S7G	EF	octal	2	(EF 39)	EF 41
6S8GT	EABC	octal	4, 9, 10	—	—
6SA7	EK	octal	1	—	ECH 81
6SA7G/GT	EK	octal	1	—	ECH 81
6SB7Y	EK	octal	1	—	ECH 81
6SC5	EC	octal	4	—	—
6SC7GT	ECC	octal	4	—	ECC 40
6SD7GT	EF	octal	2	—	—
6SE7GT	EF	octal	4	—	EF 40
6SF5GT	EC	octal	4	—	—
6SF7	EAF	octal	2, 9	—	—
6SG7GT	EF	octal	3	—	EF 85
6SH7GT	EF	octal	3	—	EF 80
6SJ7GT	EF	octal	2, 4	—	EF 40
6SK7; 6SK7G/GT	EF	octal	2	—	EF 41
6SL7GT	ECC	octal	4, 12	—	ECC 40
6SN7GT	ECC	octal	4, 12, 13	—	ECC40; ECL80
6SQ7; 6SQ7G/GT	EBC	octal	4, 9	(EBC 33)	EBC 41

American type	Type code	Base	Application	Equivalent type	Recommended type
6SR7GT	EBC	octal	4, 9	(EBC 33)	EBC 41
6S7	EF	octal	2	—	EF 41
6ST7	EBC	octal	4, 9	—	EBC 41
6SU7GT	ECC	octal	4	—	ECC 40
6SV7	EAF	octal	2, 9	—	EAF 42
6SZ7	EBC	octal	4, 9	—	—
6T5	EM	6 p. glass	16	—	—
6T6	EF	octal	3	—	—
6T7G	EBC	octal	4, 9	(EBC 33)	EBC 41
6T8	EABC	noval	4, 9, 10	(EABC 80)	EABC 80
6U3	EY	noval	14, 15	EY 80	EY 80
6U4GT	EY	octal	14, 15	—	EY 80
6U5/6GS	EM	6 p. glass	16	—	EM 34
6U6GT	EL	octal	5	—	—
6U7G	EF	octal	2	(EF 39)	EF 41
6U8	ECF	noval	1, 11	—	—
6V4	EZ	noval	14	EZ 80	EZ 80
6V5G/GT	EL	octal	5	—	—
6V6	EL	octal	5	(EL 33)	EL 41
6V6G/GT	EL	octal	5	(EL 33)	EL 41
6V7G	EBC	octal	4, 9	—	—
6V8	EABC	noval	4, 9, 10	—	EABC 80
6W4GT	EY	octal	14, 15	—	EY 80
6W5G	EZ	octal	14	(EZ 35)	—
6W6GT	EL	octal	5, 7	—	—
6W7G	EF	octal	2	(EF 39)	EF 41
6X2	EY	—	14, 15	EY 51	—
6X4	EZ	miniature	14	—	EZ 80
6X5	EZ	octal	14	(EZ 35)	EZ 80
6X5G/GT	EZ	octal	14	EZ 35	EZ 80
6X6G	EM	octal	16	—	—
6X8	ECF	noval	1, 11	—	—
6Y3	EY	octal	14	—	—
6Y5	EZ	6 p. glass	14	—	—
6Y6G/GT	EL	octal	5	(EL 35)	—
6Y7G	EDD	octal	5	—	—
6Z3	EY	4 p. glass	14	—	—
6Z4/84	EZ	5 p. glass	14	—	EZ 80
6Z5	EZ	6 p. glass	14	—	—
6Z6G	EZ	octal	14	—	—
6Z7G	EDD	octal	5	—	—
6ZY5G	EZ	octal	14	(EZ 35)	EZ 80
7A4	EC	loctal	4, 9, 11	—	—
7A5	EL	loctal	5, 7	—	—
7A6	EB	loctal	9, 10	—	EB 91

American type	Type code	Base	Application	Equivalent type	Recommended type
7A7-LM	EF	loctal	2	(EF 22)	EF 41
7A8	EK	loctal	1	—	ECH 81
7AD7	EL	loctal	6	—	EL 83
7AF7	ECC	loctal	4	—	—
7AG7	EF	loctal	2, 3	—	EF 80
7AH7	EF	loctal	2, 3	(EF 22)	EF 41
7AJ7	EF	loctal	4	—	EF 40
7AK7	EL	loctal	gating tube	—	—
7B4	EC	loctal	4	—	—
7B5LT	EL	loctal	5	—	EL 42
7B6LM	EBC	loctal	4, 9	—	EBC 41
7B7	EF	loctal	2	(EF 22)	EF 41
7B8LM	EK	loctal	1	—	ECH 81
7C4	EA	loctal	9	—	—
7C5LT	EL	loctal	5	—	EL 41
7C6	EBC	loctal	4, 9	—	EBC 41
7C7	EF	loctal	2	(EF 22)	EF41
7D7	ECH	loctal	1	—	ECH 81
7E5	EC	loctal	11	—	EC 81
7E6	EBC	loctal	4, 9	—	—
7E7	EBF	loctal	2, 9	—	EBF 80
7F7	ECC	loctal	4	—	ECC 40
7F8	ECC	loctal	1, 4, 12	—	ECC 81
7G7	EF	loctal	3	—	EF 80
7G8	EEE	loctal	2	—	—
7H6	EF	loctal	2	(EF 22)	EF 41
7H7	EF	loctal	3	—	EF 80
7J7	ECH	loctal	1	(ECH 21)	ECH 81
7K7	EBC	loctal	4, 9	—	EBC 41
7L7	EF	loctal	2, 3	—	—
7N7	ECC	loctal	4	—	—
7Q7	EK	loctal	1	—	ECH 81
7R7	EBF	loctal	2, 3, 4, 9	—	EBF 80
7S7	ECH	loctal	1	(ECH 21)	ECH 81
7T7	EF	loctal	3	—	—
7V7	EF	loctal	3	—	EF 80
7W7	EF	loctal	3	—	EF 80
7X7	EBC	loctal	4, 9	—	EBC 41
7Y4	EZ	loctal	14	—	EZ 80
7Y7	EZ	loctal	14	—	EZ 80
7Z4	EZ	loctal	14	—	EZ 80
8	—	4 p. glass	17	(U 30)	U 30
10	ED	4 p. glass	5	—	—
11	DC	4 p. glass	4, 9	—	—
12	DC	4 p. glass	4, 9	—	—

American type	Type code	Base	Application	Equivalent type	Recommended type
12A4	PC	noval	7	—	—
12A5	PL	7 p. glass	5	—	—
12A6	HL	octal	5	—	—
12A7	PLY	7 p. glass	5, 14	—	—
12A8G/GT	HK	octal	1	—	UCH 81
12AC8GT	PCC	octal	4, 12	—	—
12AH7GT	HCC	octal	4, 12	—	—
12AL5	HB	miniature	9, 10	—	UB 41
12AT6	HBC	miniature	4, 9	—	UBC 41
12AT7	ECC	noval	1, 3	ECC 81	ECC 81
12AU6	HF	miniature	2	—	UF 41; UF 42
12AU7	ECC	noval	4, 6, 12	ECC 82	ECC 82
12AV6	HBC	miniature	4, 9	—	UBC 41
12AV7	ECC	noval	1, 3	—	ECC 81
12AW6	HF	miniature	3	—	—
12AX7	ECC	noval	4	—	—
12AY7	ECC	noval	4	—	—
12B6	HAC	octal	4, 9	—	—
12B7LM	HF	loctal	2	—	—
12B8GT	PCF	octal	1, 2, 4	—	—
12BA6	HF	miniature	2, 3	—	UF 41
12BA7	HK	noval	1	—	EF 80
12BD6	HF	miniature	2	—	UF 41
12BE6	HK	miniature	1	—	UCH 81
12BF6	HBC	miniature	4, 9	—	—
12BH7	PCC	noval	7, 12	—	ECL 80
12BK6	HBC	miniature	4, 9	—	UBC 41
12BN6	—	miniature	10	—	—
12BT6	HBC	miniature	4, 9	—	UBC 41
12BU6	HBC	miniature	4, 5, 9	—	—
12BY7	PL	noval	6	—	PL 83
12C8	HBF	octal	2, 4, 9	—	UBF 80
12E5G/GT	HC	octal	4	—	—
12F5GT	HC	octal	4	—	—
12G7G/GT	HBC	octal	4, 9	—	—
12H6	HB	octal	9, 10	—	—
12J5GT	HC	octal	4, 9, 11	—	—
12J7GT	HF	octal	4, 9	—	—
12K7GT	HF	octal	2	—	UF 41
12K8; 12K8GT	HCH	octal	1	—	UCH 81
12L8GT	HLL	octal	5	—	—
12Q7GT	HBC	octal	4, 9	—	UBC 41
12S8GT	HABC	octal	4, 9, 10	—	—
12SA7; 12SA7GT	HK	octal	1	—	UCH 81
12SC7	HCC	octal	4	—	—

American type	Type code	Base	Application	Equivalent type	Recommended type
12SF5GT	HC	octal	4	—	—
12SF7	HAF	octal	2, 9	—	UAF 42
12SG7	HF	octal	3	—	—
12SH7GT	HF	octal	3	—	—
12SJ7GT	HF	octal	2, 4	—	—
12SK7GT	HF	octal	2	—	UF 41
12SL7GT	HCC	octal	4	—	—
12SN7GT	HCC	octal	4, 12	—	—
12SQ7; 12SQ7GT	HBC	octal	4, 9	—	UBC 41
12SR7	HBC	octal	4, 9	—	—
12SW7	HBC	octal	4, 9	—	—
12SX7GT	PCC	octal	4	—	—
12SY7GT	HK	octal	1	—	—
12Z3	PY	4 p. glass	14	—	—
12Z5	PZ	7 p. glass	14	—	—
13	GZ	4 p. glass	14	—	—
14	PE	5 p. glass	2	—	—
14A4	HC	loctal	4, 9, 11	—	—
14A5	HL	loctal	5	—	—
14A7	HF	loctal	2	—	UF 41
14AF7	HCC	loctal	4	—	—
14B6	HBC	loctal	4, 9	—	UBC 41
14B8	HK	loctal	1	—	UCH 81
14C5	CL	loctal	5	—	—
14C7	HF	loctal	2, 4	—	—
14E6	HBC	loctal	4, 9	—	—
14E7	HBF	loctal	2, 9	—	UBF 80
14F7	HBC	loctal	4, 9	—	UBC 41
14F8	HCC	loctal	1, 4, 12	—	ECC 81
14H7	HF	loctal	3		EF 80
14J7	HCH	loctal	1	—	UCH 81
14N7	PCC	loctal	4	—	—
14Q7	HK	loctal	1	—	UCH 81
14R7	HBF	loctal	2, 3, 4, 9	—	UBF 80
14S7	CCH	loctal	1	—	UCH 81
14W7	HF	loctal	3	—	EF 80
14X7	HBC	loctal	4, 9	—	UBC 41
14Y4	PZ	loctal	14	—	—
14Z3	PY	4 p glass	14	—	—
15	KF	5 p. glass	2	—	—
15A6	PL	noval	5, 6	PL 83	PL 83
16	EY	4 p. glass	14	—	—
16A5	PL	noval	5,7	PL 82	PL 82
17	PC	5 p. glass	4	—	—
17Z3	PY	noval	15	PY 81	PY 81

American type	Type code	Base	Application	Equivalent type	Recommended type
18	PL	6 p. glass	5	—	—
19	KDD	6 p. glass	5	—	—
19AQ5	HL	miniature	5	—	UL 41
19BG6G	PL	octal	8	(PL 38)	PL 81
19C8	HABC	noval	4, 9, 10	—	—
19J6	HCC	miniature	1	—	—
19T8	HABC	noval	4, 9, 10	(UABC 80)	UABC 80
19V8	HABC	noval	4, 9, 10	—	UABC 80
19X3	PY	noval	15	PY 80	PY 80
19Y3	PY	noval	15	PY 82	PY 82
19X8	HCF	noval	1, 11	—	—
20	KD	4 p. glass	5	—	—
20J8	HCH	octal	1	—	—
21A6	PL	noval	8	PL 81	PL 81
21A7	HCH	octal	1	—	—
22	KE	4 p. glass	2	—	—
24A; 24S	MA	5 p. glass	2	—	—
25; 25S	KBC	6 p. glass	4, 9	—	—
25A6; 25A6G/GT	PL	octal	5	—	—
25A7G/GT	PLY	octal	5, 14	—	—
25A8	PLY	octal	5, 14	—	—
25AC5G/GT	PD	octal	5	—	—
25AV5GT	PL	octal	8	—	PL 81
25B5	PCD	6 p. glass	4, 5	—	—
25B6G	PL	octal	5	—	—
25B8GT	HCF	octal	1, 2, 4	—	—
25BQ6GT	PL	octal	8	—	PL 81
25C6G	PL	octal	5	—	—
25D8GT	HACF	octal	2, 4, 9	—	—
25L6; 25L6G/GT	PL	octal	5	—	—
25N6G	PCD	octal	4, 5	—	—
25SN7GT	HCC	octal	4	—	—
25S	KBC	6 p. glass	4, 9	—	—
25W4GT	PY	octal	14	—	PY 82
			15		PY 80
25X6GT	HZ	octal	14	—	—
25Y4GT	HY	octal	14	—	—
25Y5	PZ	6 p. glass	14	—	—
25Z3	PY	4 p. glass	14	—	—
25Z4GT	PY	octal	14	—	—
25Z5	PZ	6 p. glass	14	—	—
25Z6; 25Z6G/GT	PY	octal	14	—	—
26	MC	4 p. glass	4	—	—
26A6	HF	miniature	2	—	—
26A7GT	PLL	octal	5	—	—

American type	Type code	Base	Application	Equivalent type	Recommended type
26KB6	HBC	miniature	4, 9	—	—
26C6	HBC	miniature	4, 9	—	—
26D6	HK	miniature	1	—	—
27; 27S	MC	5 p. glass	4	—	—
28D7	HLL	loctal	5	—	—
28Z5	HZ	loctal	14	—	—
30	KC	4 p. glass	4, 9	—	—
31	KD	4 p. glass	5	—	—
32	KE	4 p. glass	2	—	—
32L7GT	PLY	octal	5, 14	—	—
33	KL	5 p. glass	5	—	—
34	KF	4 p. glass	2	—	—
35/51	ME	5 p. glass	2	—	—
35A5; 35A5LT	HL	octal	5	—	UL 41
35B5	HL	miniature	5	—	UL 41
35C5	HL	miniature	5	—	UL 41
35L6G/GT	HL	octal	5	—	UL 41
35W4	HY	miniature	14	—	UY 42
35Y4	HY	loctal	14	—	UY 41
35Z3; 35Z3LT	HY	loctal	14	—	UY 41
35Z4GT	HY	octal	14	—	UY 41
35Z5G/GT	HY	octal	14	—	UY 41
35Z6G/GT	PZ	octal	14	—	—
36; 36A	EE	5 p. glass	2	—	—
37; 37A	EC	5 p. glass	4	—	—
38; 38A	EL	5 p. glass	5	—	—
39/44	EF	5 p. glass	2	—	—
40	GC	4 p. glass	4	—	—
40Z5GT	HY	octal	14	—	—
41	EL	6 p. glass	5	—	—
42	EL	6 p. glass	5	—	—
43	PL	6 p. glass	5	—	—
44	EF	5 p. glass	2	—	—
45; 45A	MD	4 p. glass	5	—	—
45Z3	HY	miniature	14	—	—
45Z5GT	HY	octal	14	—	UY 41
46	ME	5 p. glass	2	—	—
47	ML	5 p. glass	5	—	—
48	HL	6 p. glass	5	—	—
49	KE	5 p. glass	4, 5	—	—
50	ED	4 p. glass	5	—	—
50A2	MD	4 p. glass	5	—	—
50A5	HL	loctal	5	—	UL 41
50AX6G	PZ	octal	14	—	—
50B5	HL	miniature	5	—	UL 41

American type	Type code	Base	Application	Equivalent type	Recommended type
50C5	HL	miniature	5	—	UL 41
50C6G	HL	octal	5	—	—
50L6GT	HL	octal	5, 7	—	UL 41
50X6	HY	loctal	14	—	—
50Y6G/GT	HY	octal	14	—	—
50Y7GT	HY	octal	14	—	—
50Z6G	HY	octal	14	—	—
50Z7G/GT	HY	octal	14	—	—
51	ME	5 p, glass	2	—	—
52	EE	5 p. glass	4, 5	—	—
53	MDD	7 p. glass	5	—	—
55; 55S	MBC	6 p. glass	4, 9	—	—
56; 56S	MC	5 p. glass	4	—	—
56A5	EC	5 p. glass	4	—	—
57; 57S	MF	6 p. glass	2	—	—
57AS	EF	6 p. glass	2	—	—
58; 58S	MF	6 p. glass	2	—	—
58AS	EF	6 p. glass	2	—	—
59	ML	7 p. glass	5	—	—
64; 64A	EE	5 p. glass	2	—	—
65; 65A	EF	5 p. glass	2	—	—
67; 67A	EC	5 p. glass	4	—	—
68; 68A	EL	5 p. glass	5	—	—
70A7GT;70L7GT	ELY	octal	5, 14	—	—
71; 71A	GD	4 p. glass	5	—	—
75; 75S	EBC	6 p. glass	4, 9	—	EBC 41
76	EC	5 p. glass	4, 9	—	—
77	EF	6 p. glass	2	—	—
78	EF	6 p. glass	2	—	EF 41
79	EDD	6 p. glass	5	—	—
80	GZ	4 p. glass	14	—	—
81; 81M	EY	4 p. glass	14	—	—
82	MX	4 p. glass	14	—	—
83	GX	4 p. glass	14	—	AX 50
83V	GZ	4 p. glass	14	—	GZ 32
84/6Z4	GZ	5 p. glass	14	—	EZ 80
85; 85AS	EBC	6 p. glass	4, 9	—	—
86A1;86A2;86B2	P	octal	17	—	—
88	GZ	4 p. glass	14	—	—
89	EL	6 p. glass	5	—	—
92A1; 92A2; 92B2	P	octal	17	—	—
95	ML	6 p. glass	5	—	—
V99	KC	4 p. glass	4, 9	—	—
X99	KC	4 p, glass	4, 9	—	—
112A	GC	4 p, glass	4, 9	—	—

American type	Type code	Base	Application	Equivalent type	Recommended type
117L7GT	HLY	octal	5, 14	—	—
117M7GT	HLY	octal	5, 14	—	—
117N7GT	HLY	octal	5, 14	—	—
117P7GT	HLY	octal	5, 14	—	—
117Z3	HY	miniature	14	—	—
117Z4GT	HY	octal	14	—	—
117Z6G/GT	HY	octal	14	—	—

REPLACEMENT GUIDE FOR OBSOLETE TYPES

This list gives the most suitable replacement types for obsolete tubes. In a number of cases the replacements proposed can be carried out without important alterations being required in the equipment. In some cases however, it will be necessary to rewire or change the socket, to use an adapter and/or to modify the circuit. If a triode is replaced by a pentode the latter may be used in triode connection.

Obsolete type	Replacement type	Obsolete type	Replacement type	Obsolete type	Replacement type	Obsolete type	Replacement type
A414K	A415 [1])	DG7-2	DG7-6	EF37	EF37A	1807	1805
AB1	AB2	DG7-3	DG7-5	EFF50	EFF51	1815	AZ50
AC2	ABC1	DG7-4	DG7-6	EH2	ECH3, ECH4	1817	AZ50
ACH1	AK2	DG9-3	DG10-3	EK1	EK2	1821	1805
AD1	4683	DG9-4	DG10-2	EK3	ECH3, EK2	1823	1805
AF2	AF3	DG9-5	DG10-5	EL1	EL2	3541	3533
AH1	AK2	DL25	DL94, DL92	EL5	4689	4610	4636
AK1	AK2	DL91	DL94, DL92	EL6	4699N	4612	4613 [1])
AL2	4682	DN7-1	DR7-5	EL43	EL83	4623	EA50
AL5	4688	DN7-3	DR7-5	EL44	EL81	4635	4614 [1])
AM1	EM4	DN7-4	DR7-6	EM3	EM4	4652	AX50
AX1	AX50	DN9-3	DR10-3	EM11	EM34	4670	DLL21
AZ21	AZ1, AZ41	DN9-4	DR10-2	EZ1	EZ2	4675	4671
	1561	DN9-5	DR10-5	EZ3	EZ80	4676	4672
C1	C8	DN10-3	DR10-3	EZ4	GZ32	4696	EEP1
C2	C10	DN10-5	DR10-5	EZ11	EZ2	18038	1805
C3	C8	E406N	4613 [1])	EZ12	GZ32	18103	18120
C4	C10	E408N	4613 [1])	F410	4641, 4650	18104	18130
C9	C10	E409	4614 [1])	F443N	4650 [1])		
C243N	KL4	E424N	ABC1	F460	4673		
CB1	EB4, UB41	E424R	ABC1	KC1	KBC1		
CB2	EB4, UB41	E428	ABC1	KC3	KBC1 KF3		
CBC1	EBC3	E438	ABC1	KC4	KBC1		
CBL6	CBL1	E442	4636 [1])	KCH1	KK2		
CC2	EBC3	E443N	4688 [1])	KDD1	DLL21		
CF1	CF7 [1]), EF6	E444	ABC1	KF1	KF3		
CF2	CF3 [1]), EF9	E444S	ABC1	KF2	KF3		
CK1	ECH3	E445	AF3	KF4	KF3		
CK3	ECH3	E445S	AF3	KH1	KK2		
CL1	EL2	E446	4636	KL1	KL4		
CL2	CBL1, EL2	E447	AF3	KL5	KL4		
CL4	CBL1	E448	AK2	MW22-7	MW22-16		
CL6	CBL1	E449	AK2	MW22-14	MW22-16		
CY1	CY2	E452T	AF7	MW31-2	MW31-16		
D404	4613 [1])	E453	E443H [1])	MW31-3	MW31-16		
DAC25	DAF91,	E455	AF3	MW31-5	MW31-16		
	DAF96	E462	AF7, 4636	MW31-7	MW31-16		
DB7-1	DB7-5	E463	E443H [1])	MW31-14	MW31-16		
DB7-2	DB7-6	E499	4657	UAF41	UAF42		
DB7-3	DB7-5	F703	E704 [1])	UY21	UY1N, UY41		
DB7-4	DB7-6	E707	4624	373	1805		
DB9-3	DB10-3	EAB1	EBC3, EBC41	505	1805		
DB9-4	DB10-2	EAF41	EAF42	506, 506K	1805		
DB9-5	DB10-5	ECH2	ECH3	1038	328		
DC25	DF91, DF96	EE1	EEP1	1326	1010		
DCH25	DK92, DK40	EF1	EF6	1560	1561 GZ32		
DDD25	DLL21	EF2	EF9	1708	367		
DF26	DAF91,	EF5	EF9, EF41	1801	1805		
	DAF96	EF8	EF9, EF41	1802	1805		
DG7-1	DG7-5	EF13	EF9, EF41	1803	1805		

[1]) Small stock.

TECHNICAL PUBLICATIONS ON ELECTRONIC TUBES

Comprehensive, up to date and reliable tube data, to qualify the electronic tube for any required application, are indispensable tools for the electronic engineer. To supply tube data, that comply with the above mentioned standard is not just a service ANY ONE can give. For the Philips tube information not only contains the know-how and experience of our research laboratories but it also reflects the priceless field experience of our application engineers resulting from their contact with the electronic industry all over the world. Scientists, each of which is a specialist on a particular sector of the vast and dynamic domain of electronics, record their findings which aim to serve in particular as a reliable guidance for the users of Philips electronic tubes and in general as a contribution towards the furtherance of the electronic art. To acquaint everybody concerned better with the extensive information service Philips offer the electronic industry, a complete and descriptive survey is given below.

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Book VII. "Transmitting Valves", by J. P. Heyboer and P. Zijlstra. 300 pages, 256 illustrations, 12 tables. Abridged contents: I. The technology of Transmitting Valves; II. Classification; III. The Triode as R.F. Power Amplifier; IV. The Tetrode and Pentode as R.F. Amplifier; V. Modulation of a R.F. Power Amplifier; VI. The Transmitting Valve as Oscillator; VII. The Transmitting Valve as Frequency Multiplier; VIII. Some Special Items; IX. Transmitting Valves for high Frequencies. Generating very high Frequencies by means of Feed-back Circuits; Appendix, Survey of Principal Technical Data on Philips Transmitting Valves and Rectifying Valves for Transmitters.

Book VIIIA. "Television Receiver Design" 1. A.F. and I.F. Stages, by A. J. W. Uitjens. 200 pages with 150 illustrations. In preparation.

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