PREFERRED TYPES OF

ELECTRON TUBES 1967

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* If different from Philips number.

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SURVEYS OF

RECEIVING AND AMPLIFYING TUBES

AM/FM Radio and Audio	parallel supply	series supply
FM input ampl. and mixer/osc.	ECC85	UCC85
AM mixer/osc.	ECH81	UCH81
IF ampl. (and AM det.)	EBF89	UBF89
	EF89	UF89
AM det. and audio pre-ampl.	EBC81	UBC81
AM/FM det. and audio pre-ampl.	EABC80	UABC80
Audio pre-ampl. — μ = 20	ECC82	
Audio pre-ampl. — μ = 100	ECC83	
Audio pre-ampl. — input pentode (low micr.)	EF86	
Audio output ampl. (and pre-ampl.) — W_o = 1-14 W	ECL86	UCL82
Audio output ampl. (and pre-ampl.) — W_o = 4-17 W	EL84	
Audio output ampl. (and pre-ampl.) — W_o = 40 W	EL503	
Audio output ampl. (and pre-ampl.) — transformerless push-pull stage, W_o = 4-10 W	EL86	
Mains rectifier — double diode — I_o = 90 mA	EZ80	
Mains rectifier — double diode — I_o = 160 mA	EZ81	
Mains rectifier — single diode — I_o = 100 mA		UY89
Tuning / Level indicator — V_i = 20 V_{pp}	EM84	
Tuning / Level indicator — V_i = 10 V_{pp}	EM87	

Television	parallel supply	series supply
VHF input ampl. S = 20 mA/V	EC900	PC900
VHF mixer and osc. S = 10 mA/V	ECF801	PCF801
IF ampl. and multi-purpose triode, cut-off sharp	ECF200	PCF200
IF ampl. and multi-purpose triode, cut-off remote	ECF201	PCF201
IF ampl. and multi-purpose triode, cut-off remote	EF183	EF183
IF ampl. and multi-purpose triode, cut-off sharp	EF184	EF184
Multi-purpose pentode and radio output ampl.	EFL200	PFL200
Video output ampl.	EL802[2]	PL802[2]
Colour difference ampl.	ECF200	PCF200
Colour difference ampl.	EF184	EF184
Colour difference ampl.	ECL84	PCL84
AF pre-ampl. and output ampl. W_o = 4 W	ECL86	PCL86
Sync. separator	ECH200	PCH200
Pulse circuits and miscellaneous	ECC82	ECC82
Pulse circuits and miscellaneous	ECF80	PCF80
Hor. defl. osc. and reactance	ECF802	PCF802
Hor. defl. output ampl. W_a = 8 W	EL81[1]	PL81[1]
Hor. defl. output ampl. W_a = 16 W	EL504	PL504
Hor. defl. output ampl. W_a = 25 W	EL505[2]	PL505[2]
Hor. defl. output ampl. W_a = 30 W	EL509[2]	PL509[2]
Booster diode Id_{av} = 150 mA	EY81[1]	PY81[1]
Booster diode Id_{av} = 220 mA	EY88	PY88
Booster diode Id_{av} = 440 mA	EY500[2]	PY500[2]
Vertical defl. output ampl. (and osc.) W_a = 9 W	ECL85	PCL85
Vertical defl. output ampl. (and osc.) W_a = 12 W	EL508[2]	PL508[2]
Shunt stabilizer triode	ED500[2]	PD500[2]
EHT rect. output voltage 12 kV	DY51[1]	
EHT rect. output voltage 20 kV	DY802	
EHT rect. output voltage 25 kV	GY501[2]	

[1]) for small-screen T.V. only

[2]) colour T.V.

CATHODE-RAY TUBES

TELEVISION PICTURE TUBE

	Screen diameter	Focussing	type number
black and white	28 cm (11")	electrostatic	A28-14W
	47 cm (19")		A47-11W
	59 cm (23")		A59-11W
	65 cm (25")		A65-11W
colour	63 cm (25")		A63-11X

TELEVISION STUDIO TUBES

Flying spot scanners

screen diameter (cm)	deflection angle (°)	resolution (lines) min.	accelerator voltage (kV)	screen versions	type number
13 (5")	40	1000	25	C, K	MC13-16 MK13-16

Monitor tubes

screen diagonal (cm)	deflection angle (°)	resolution (lines) min.	final acc. voltage (kV)	heater		type number
				voltage (V)	current (mA)	
21 (8.5".)	90	650	12.-	11.-	70	M21-11W
	110	625	16.-	6.3	300	M21-12W
36 (14".)	90	650	16.-	11.-	70	M36-11W
	110	625	16.-	6.3	300	M36-13W

CATHODE-RAY TUBES

TELEVISION STUDIO TUBES (continued)

CAMERA TUBES		use	type number
VIDICONS-ϕ 1"		differences-degree of uniformity; freedom of blemishes	
magnetic focussing and deflection	resolution 600-900 TV-lines	normal industrial application	55850N
		for industrial and broadcast applications (black and white) or colour TV cameras (high picture quality)	55850S
		X-ray medical eq.	55850SR
		film scanners	55850F
		low-cost industrial eq.; amateur use	55850AM
	separate grid 4 connection resolution up to 1000 TV lines[1])	heater consumption 0.6 W (transistorized eq.)	
		application see 55850	55851N 55851S 55851SR 55851F 55851AM
		heater consumption 2 W	
		applications see 55850	55852N 55852S 55852SR 55852F 55852AM
PLUMBICONS-ϕ 30 mm		differences-sensitivity[2])	
magnetic focussing and deflection		(μA/lumen)	
		black & white studio cameras: > 275	55875
		colour studio cameras: > 60[3])	55875R
		colour studio cameras: > 125[3])	55875G
		colour studio cameras: > 32[3])	55875B
		medical eq. using X-ray image intensifier: > 175	55876

[1]) higher amplitude response at 400 TV lines; max. uniform resolution over whole picture area; stabilisation for packed highlights possible without appreciable loss in resolution.

[2]) colour temperature of illumination 2850 °K

[3]) appropriate filter inserted, see data sheets.

CATHODE-RAY TUBES

INSTRUMENT TUBES

screen diameter or diagonal	typical accel. voltage (kV)	typical p.d.a. voltage (kV)	defl. factors My (V/cm)	defl. factors Mx (V/cm)	overall max. length (mm)	screen versions	type number
ϕ3 cm (1")	1.-		45	53	105	H	D.3-91
ϕ7 cm (3")	1.2	1.2	3.65	10.7	296	B, H, N. P	D.7-11
	0.5		21	37	172	G	D.7-31
	0.5		21	37	172	G	D.7-32
ϕ10 cm (4")	2.-		19	45	260	GH	D10-16 ..
	1.-	6.-	3.5	13.5	340	GH	D10-17 ..
	1.-	3.-	7	15	410	BE, GH, GM, GP	E10-12 ..
ϕ13 cm (5")	3.-	24.-	8	32	642	BE	D13-24 ..
	1.5	3.-	11.3	24	350	GH	D13-27 ..
	1.5	15.-	3	11	459	GH/01	D13-45 ..
	2.-		15	30	310	GH	D13-48 ..
ϕ14 cm (5½")	1.5	10.-	4	16	390	GH	D14-12 ..

PROJECTION TUBES

screen diameter (cm)	deflection angle (°)	brightness* (med/cm^2)	final acc. voltage (kV)	useful screen area (mm^2)	colour	type number
13 (5")	47	2000	50	69 x 92	green	MG13-38
		290			blue	MU13-38
		600			red	MY13-38
		min. 870			white	MW13-38

* measured at V_{g_2} = 50 kV, $s_{(1)}$ = 500 μA, raster size 69 x 92 mm^2.

PHOTOELECTRIC DEVICES

type	use sensitive to:	luminous sensitivity (μA/lum)	spectral response max. at A			sensitive area at:	type number
			2000 -2900	4000	8000		
Phototubes							
high-vacuum	incandescent light sources and to near infra-red radiation	20			red	side	90CV
	daylight and to radiation having a blue pre-dominance	45		blue		side	92AV
	high stability and linearity, for use in high precision photometry (intensity max. 1 lux) and for measurements of quickly changing light phenomena	60		blue			150AV
		20			red	top	150CV
		35	ultra violet	blue			150UV
gas-filled	Incandescent light sources and to near infra red radiation	125			red	side	90CG
	daylight and to radiation having a blue pre-dominance	130		blue		side	92AG
	flame control	–	ultra violet			top	155UG

Electrometer tubes	grid current ($-I_{g1}$) (A)	type number
triode	$< 12.5 \times 10^{-14}$	4065
	$< 1 \times 10^{-12}$	4069
tetrode	$< 6 \times 10^{-15}$	4066
pentode	$< 2.5 \times 10^{-11}$	4067
	$< 8 \times 10^{-15}$	4068
Vibrating capacitor	electrically driven, short time drift of contact potential < 100 μV	XL7900/00

PHOTOELECTRIC DEVICES

type	use	spectral response curve: peak at $\times 10^4$ A	visible to ... $\times 10^4$ Å	type number
Photoconductive cells				
indium antimon infra-red cells				
	intended for use with modulated or pulsed radiation	6-6.3	7.5	ORP10
	operating temperature 77 °C	5.6	5.6	ORP13
		–	–	RPY37
		–	–	RPY40
lead sulphide		condition		
	with chopped or pulsatory radiation (high infra-red sensitivity at room temperature)	250 V, 0.5 mA, 60 °C; 0.3-3.5 (2.5 peak)	0.3–3.5	61SV

cadmium sulphide	typical resistance at 50 lux (kΩ)	max. peak voltage d.c. and a.c.(V)	max. diss. at 25 °C (W)	spectral response curve (Å)	sensitive area at:	type number
industrial applications flame control etc. and automatic brightness and contrast control	2.7	350	0.4		top/side	ORP50
	60	350	0.07		top	ORP60
					side	ORP61
flame control and other industrial on-off applications	46	350	0.1		side	ORP62
flame control, smoke det. or industrial on-off switching applications	1.-	350	1.-	max. at 0.5-0.65 $\times 10^4$	side	ORP90
general control circuits	0.025	100	0.25		side	RPY18
	3.-	400	0.5		side	RPY19
general control circuits such as twilight switches and flame failure eq.	1.5	400	1.-		side	RPY20
	0.650	400	1.-		top	RPY27
general control eq.	1.600	100	0.225		side	RPY41

COLD-CATHODE TUBES

VOLTAGE REFERENCE/VOLTAGE STABILISING TUBES

voltage	voltage reference				voltage stabilising				
	2-4	3.5-6	1-10	mA	5-15	5-30	1-40	2-60	mA
75								75C1	
81	ZZ1000								
83		83A1							
85			85A2						
90							90C1		
108						OB2 OB2WA			
150					150B2	OA2 OA2WA			

TRIGGER TUBES

use	cathode current (mA)	anode voltage (V)			
		125-165	170-290	180-275	230-310
Selecting Counting Automation	2-4				Z70U/7710[2]) Z70W/7709[1])[2])
Telephone exchanges	3-7	Z71U/7711[1])[2])			
Flame control 117 V_{ac} timers	< 25		Z803U[2])	5823/Z900T	

[1]) 2 starters [2]) with primer

COLD-CATHODE TUBES

DIODES

use		difference V_{ign}-$V_{maint.}$ (V)	V_{ign} (V)	type number
low speed switching	relaxation osc. e.g. in musical instruments (constant difference between ignition and maintaining voltage-sawtooth voltage is possible)	35	128	ZA1001
	switching and counting e.g. with CdS cells	61	170	ZA1002
	firing of SCR's I_p = 170 mA	–	125	ZA1005
indicator	read-out purposes visible glow-discharge	$V_{ext.}$ (V) >83.5	90	ZA1004

COUNTER AND INDICATOR TUBES

figures or signs	figure size (mm)	viewing		type number	
		top	side	char. ind.	decimal counter
0 – 9	15	X		ZM1020 ZM1022*	
V, A, Ω, %, +, –, ~	15	X		ZM1021 ZM1023*	
Mc/s, kc/s, c/s, s, ms, μs, ns	15	X		ZM1024 ZM1025*	
0 – 9	15		X	ZM1030 ZM1032*	
+, –	13		X	ZM1031 ZM1033*	
0 – 9	30		X	ZM1040 ZM1042*	
+, –	20		X	ZM1041 ZM1043	
0 – 9	3	X		ZM1050*	
0 – 9	13		X	ZM1080 ZM1000**)	
+, –, ~	8		X	ZM1081	
0 – 9	–	X X			Z504S/ZM1070 Z505S/ZM1060

*) A circular polarised filter (neutral or orange) is recommended instead of the red contrast filter of the unmarked types.**) for p.w. pitch 0.1".

SPECIAL QUALITY TUBES

main use			diode
high voltage rectifier	10 kV	0.25 mA	5642
			double diode
detector	360 V	9 mA	5726
	I_a (mA)	S (mA/v)	triode
U.H.F. amplifier	12.5	13.5	E88C*
Subminiature high impedance input tube	1.4	14.5	EC1000
UHF amplifier	26	24	5842
			double triode
AF and d.c. amplifier	6	2.7	E80CC*
Switching type	5.6	–	E90CC*
Computer applications	8.5	6.4	E180CC*
	50	15	E182CC*
Low microphony	15	12.5	E188CC*
Cascade VHF aerial ampl.	27	–	ECC2000*
	1.2	1.6	12AX7S
AF amplifier (12AU7WA)	10.5	2.2	6189
HF amplifier (12AT7WA)	10	5.5	6201
			low power pentode
AF ampl. electrometer type	3	1.85	E80F*
Telephone circuits	10	9	E83F*
HF amplifier	13	16.5	E180F*
HF ampl., low microphony	13	16.5	E186F*
HF amplifier, low noise	35	50	E810F*
Wide band amplifier	7.5	5	5654
HF amplifier (gate tube)	5.2	3.2	5725

* 10000 hours of factory life test

SPECIAL QUALITY TUBES

main use	I_a (mA)	S (mA/V)	W_a (W)	power pentode
AF output amplifier	50	45	10	E55L*
	30	9	8	E80L*
	20	11	4.5	E81L*
	100	27.5	27.5	E130L*
				triode pentode
Mixer	14	5		E80CF*
	10	6.2		
				indicator
Green fluorescence, diam. 5.5 mm, position indication flip flop circuits	drive < 3 V/30 μA			DM160*

*) 10.000 hours of factory life test.

THYRATRONS

Max. forward peak anode voltage	Mercury vapour- and/or rare gas filling				
	Max. D.C. output current				
	25 mA	0.1 A	0.3 A	0.5 A	1.6 A
500 V	5696[1])				
650 V		PL2D21[1]) PL5727[1])	PL6574[1])		
1000 V					
1500 V					PL3C23A[3])
2000 V					
2500 V				PL5557[2])	

Max. forward peak anode voltage	Mercury vapour- and/or rare gas filling				
	Max. D.C. output current				
	2.5 A	3.2 A	6.4 A	12.A	25 A
500 V					
650 V					
1000 V	PL5559[2]) PL5684[1])				
1500 V		PL5544[1]) PL6755A	PL5545[1])	PL255[2])	
2000 V			PL106[3])		PL260[2])
2500 V					

[1]) xenon filled type; features: low ambient temperature, higher frequency.

[2]) mercury vapour filled type; features: high voltage, long life.

[3]) mercury vapour + xenon filled type; features: low ambient temperature, long life

THYRATRONS

FOR MICROWAVE EQUIPMENT

Max. forward peak anode voltage	Hydrogen filling			
	Max. peak anode current			
	35 A	90 A	325 A	500 A
3 kV	3C45			
8 kV		4C35A		
16 kV			5C22	
25 kV				5949

A.C. welding control service-one phase
(2 tubes connected in inverse-parallel)

Mains voltage[1] (V_{rms})	Max. power demand (kVA)	Max. average current (A)	Type number
250-600	600	30.2	PL5551A
	200	56	ZX1051*
	1200	75.6	PL5552A
	400	140	ZX1052*
	2280	110	ZX1062*
	760	180	
	2400	192	PL5553B
	800	355	

*) short type

Frequency changer, resistance welding service, intermittent reverser service
(3 tubes in three phase connection)

Max. peak voltage (V)	Max. peak current (A)	[3]	[4]	Max. average current (A)	Type number
1200	600	5	135	22.5	PL5551A
1500	480	4	108	18	ZX1051
1200	1500	20	420	70	PL5822A
1500	1200	16	336	56	
600	4000	54	1140	190	PL5553B
1200	3000	40	840	140	
1500	2400	32	672	112	
900	1800	200	400	300	PL5555
2100	1200	150	300	225	

[1]) at 220 V reduced ratings; [2]) water or air cooling; [3]) max. average current at max. peak current; [4]) max. peak current at max. average current.

TRANSMITTING TUBES

HIGH TENSION RECTIFYING TUBES

Max. peak inverse voltage	Max. D.C. output current					
	0.25 A	1.25 A	1.5 A	2.5 A	3 A	15 A
10 kV	DCG4/1000G (866A) DCX4/1000 (3B28	DCX4/5000 (4B32)	–	–	–	–
13 kV	–	–	DCG5/5000GB (872A) DCG5/5000GS (8008) ZY1000 ZY1001 ZY1002	–	–	–
15 kV	–	–	–	–	DCG6/18 (6693)	DCG7/100[1]) DCG7/100B[1]) (6786)
21 kV	–	–	–	DCG9/20 (6508) ZT1000[1]) (8270) ZT1001	–	–
27 kV	–	–	–	DCG12/30[1]) (5870)	–	–

[1]) Grid controlled

TRANSMITTING TUBES

Communcations – C.C.S. class C telegraphy frequency – HF ≤ 30 MHz

use	frequency (MHz)	output (W/kW) (W)	type number: triode	type number: tetrode single
SSB	30	110		YL1150/8579
SSB	30	141		YL1070/8117 YL1071/8116
	30	200		QE08/200/7378 QE08/200H/7836 YL1290
		(kW)		
SSB	30	1.-		YL1230[2])/8560
	30	2.4		QB5/2000
SSB	1	5.7		YL1121[2])
	30	5.-		YL1122[1])
	30	9.5	TBH7/8000[1])/8592 TBL7/8000[2])/6961 TBW7/8000[3])/6960	
SSB	30	12.-		YL1330[2])
SSB AM	30 30	33.- 55.-		YL1010[3]) YL1011[2]) YL1012[1])
	30	41.-	TBL12/40[2])/7800	
	15 30	108.- 50	TBH12/100[1]) TBL12/100[2])/6078 TBW12/100[3])/6077	
	30	108.-	YD1140[3]) YD1141[2]) YD1142[1])	
SSB AM	30	120.- 220.-		YL1090[3]) YL1091[4])
	10	360,-	YD1010[3])	
	30	285.-	YD1012[4])[5])	

[1]) with integral helical cooler; [2]) air cooled; [3]) water cooled; [4]) vapour cooled; [5]) additional type.
Cooling not indicated = radiation and convection cooled.

TRANSMITTING TUBES

Communications C.C.S. class C telegraphy frequency – VHF 50–250 MHz

use	MHz	output (W)	type number		
			tetrode		pentode
			single	double	
quick heating FM,	50	8.-			YL1000/8463
	175	3.6		QQE02/5/6939	
	180	8.-		YL1220/8560	
quick heating	200	11.-		QQC03/14/7983	
quick heating	200	12.-		YL1080/8348	
	200	12.-		QQE03/12/6360 YL1210/8457	
quick heating	200	12.5		YL1130/8408	
quick heating ICAS	200	26.-		YL1190/8580	
ICAS	175	30.-		YL1240	
quick heating FM	200	35.-		YL1020/8118	
quick heating FM	175	40.-		YL1310/8647[1]	
	60	52.-	QE05/40/6146 QE05/40F/6883 QE05/40H/6151 QE05/40K/8032		
	175	25.-			
	200	48.-		QQE03/20/6252	
	75	52.-		YL1250/8505	
	175	38.-			
	60	65.-	QC05/35/8042		
quick heating FM	175	35.-			
quick heating ICAS	180	85.-		YL1030	
	180	45.-			
	200	90.-		QQE06/40/5894	
	250	85.-			
	60	100.-	YL1150/8579		
	60	132.-			PE1/100/6083
	175	132.-		YL1060/7854	
	50	280.-	QB3/200/4-65A		
	220	110.-			
	120	375.-	QB3/300/6155		
	150	360.-			
	200	225.-			

[1]) additional type

Cooling = radiation and connection cooled.

TRANSMITTING TUBES

Communications C.C.S. class C telegraphy frequency VHF 50–250 MHz (continuation)

use	MHz	output (W/kW) (W)	type number: triode	type number: tetrode single
	150	390.-	TB2.5/400/7986	
	175	390.-		QEL2/275[2])/4CX250B QEL2/275H[2])/4CX250F
	110	930.-		QBL4/800[2])/4X500A
	75	1000.-		QB3.5/750/6156
	120	500.-		
	220	1000.-		YL1230[2])/8560
	75	1180.-		QB4/1100/7527
	100	650.-		
	100	1200.-	TB3/750/5867	
	60	1760.-		QB5/1750/6079
		(kW)		
	75	4.1		QBL5/3500/6076[2]) QBW5/3500/6075[3])
	110	3.9		
	220	2.9		
	75	6.9	TBL6/6000[2])/5924 TBW6/6000[2])/5923	
	110	5.3		
	220	2.5		
	75	6.9	TBL6/4000[2])/7753	
FM	220	12.-		YL1330[2])
grounded grid	110	15 + 12	TBL6/20[2])	
TV	220	12.-	TBW6/20[3])	
	220	25.-		YL1010[3]) YL1011[2]) YL1012[4])
Special type s = 6 mA/V anode dissipation 45 W				YL1200

[1]) with integral helical cooler; [2]) air cooled; [3]) water cooled; [4]) vapour cooled

Cooling not indicated = radiation and convection cooled.

Communication C.C.S. frequency UHF 400–1200 MHz

use	MHz	output (W)	type number		
			pentode	single	double
	500	5.8			QQE02/5/6939 YL1220/8577
quick heating SSB	500	6.-			YL1130/8408
quick heating	500	14.5			YL1190/8580
quick heating FM	460	17.-			YL1020/8118
	400	24.-			QQE03/20/6252
	600	20.-			
quick heating FM	475	32.-			YL1030
	500	50.-			
	500	80.-		YL1100[2])/6884 YL1101[2])/6816 YL1102[5])/7843 YL1103[5])/7844	
	430	66.-			QQE06/40/5894
	500	60.-			
	500	210.-		QEL2/200[2])/7580	
	500	250.-		QEL2/275[2])/4CX250B QEL2/275H[2])/4CX250F	
grounded grid	400	620+50	TBL2/500[2])/8120		
	470	730.-	YL1110[2])/7650*		
			UHF ≥ 600 MHz		
	960	7.-			QQE04/5/7377 YL1360
	600	20.-			QQE03/20/6252
	1200	40.-		YL1100[2])/6884 YL1101[2])/6816 YL1102[5])/7843 YL1103[5])/7844	
grounded grid	625	533+47	TBL2/500[2])/8120		
	790	596.-		YL1110[2])/7650	
	600	1600.-		YL1280[2])/7213	
	800	2100.-		QBL3.5/2000/7188[2])	

[2]) air cooled; [5]) conduction cooled Cooling not indicated = radiation and convection cooled

TRANSMITTING TUBES

RF heating class C osc. frequency ≤470 MHz

use	MHz	output (kW)	type number triode/tetrode	use	MHz	output (kW)	type number triode/tetrode
	40	0.170	TB2.5/300/5866		50	13.-	YD1173[2])[6])
	50	0.290	TB2.5/400/7986				YD1170[2])
	470	0.385	TBL2/300[2])/7004		120	15.-	YD1171[3])
	470	0.480	TBL2/400[2])/8119				YD1172[1])
	60	0.750	QB5/1750[5])/6079				TBH6/14[1])/8591
	85	1.-	YD1220/TY4-400C		30	16.9	TBL6/14[2])/7804
	50	1.1	TB3/750/5867				TBW6/14[3])/7805
	100	1.630	TB4/1250/5868				TBH12/25[1])
	50	1.635	TB4/1500		30	29.-	TBL12/25/6618[2])
	100	2.75	TB5/2500/7092				TBW12/25[3])/6617
			YD1150[2])		80	31.49	YD1182[1])
	160	3.3	YD1151[3])				TBH12/38[1])
			YD1152[1])		30	39.-	TBL12/38[2])
	50	4.85	TBL6/4000[2])/7753				TBW12/38[3])
			TBH7/8000[1])/8592		30	60.-	YD1192[1])
	50	6.-	TBL7/8000[2])/6961		15	100.-	TBH12/100[1])
			TBW7/8000[2])/6960		30	60.-	TBL12/100[2])/6078
			TBH6/6000[1])/8610				TBW12/100[5])/6077
	75	6.5	TBL6/6000[2])/5924		30	108.-	YD1140[3])
			TBW6/6000[3])/5923				YD1141[2])
			TBH7/9000[1])/8593				YD1142[1])
	50	6.9	TBL7/9000[2])				YD1202/8752[1])[5])
			TBW7/9000[3])		30	240.-	YD1212[1])
			YD1160[2])		30	250.-	YD1010[3])
	85	8.8	YD1161[3])				YD1012[4])[6])
	150	7.15	YD1162[1])				

[1]) with integral helical cooler (H); [2]) air cooled (L); [3]) water cooled (W); [4]) vapour cooled;

[5]) data not yet released; [6]) additional type

Cooling not indicated = radiation and convection cooled.

DEVICES FOR NUCLEAR EQUIPMENT

Radiation counter tubes	
End-window types:	
18504	18526
18505	18536
18506	18546
18515	
Cylinder types:	
18503	18545
18509	18550
18520	18552
18529	18553
Liquid counters:	
ZP1080	ZP1082
ZP1081	ZP1083
Anti-coincidence guard counter:	
18518[1])	
X-ray counters:	
18507	
18511	

Neutron generator tube
18601

[1]) type 18517 no more preferred

Windowless photomultipliers

application	cathode	vacuum during operation (mm Hg)	mounting	envelope	screen	type n
X-rays ($\lambda > 2$ Å) uv photons ($\lambda < 1500$ Å)	Ni	10^{-5}–10^{-6}	flange O-ring	glass	nickel plated iron	XP1120
ions (> 10 keV) electrons (0.1–10 keV)	Cu Be	10^{-5}–10^{-6}	flange O-ring	glass	nickel plated iron	XP1121
X-rays ($\lambda > 2$ Å) uv photons ($\lambda < 1500$ Å)	Ni	10^{-5}–10^{-6}	cap nut O-ring	glass	nickel plated iron	XP1122
ions (> 10 keV) electrons (0.1–10 keV)	Cu Be	10^{-5}–10^{-6}	cap nut O-ring	glass	nickel plated iron	XP1123
uh vac. X-rays ($\lambda > 2$ Å) uv photons ($\lambda < 1500$ Å)	Ni	10^{-5}–10^{-10}	heavy flange gold foil	stainless steel		XP1130
uh vac. ions (> 10 keV) electrons (0.1–10 keV)	Cu Be	10^{-5}–10^{-10}	heavy flange gold foil	stainless steel		XP1131

Photomultipliers

Spectral response	Number of stages	Cathode diameter (mm)							
		14	20	32	42	44	63.5	110	200
C(S1)	10	XP1116		150CVP	56CVP	XP1005			
S4	6				XP1140 (6 x 25 mm)				
A(S11)	4	XP1114							
	6	XP1113							
	7				XP1141				
	10	XP1110	XP1180	150AVP		XP1000	XP1030		
		XP1111		XP1010		XP1001	XP1031		
		XP1115		XP1011					
				XP1015					
	11							54AVP	57AVP
	12				XP1021				60AVP
	14				56AVP			58AVP	
					56AVP/03			XP1040	
					56AVP/05				
U(S13)	10	XP1118		150UVP		XP1004	XP1032		
							XP1033		
	11							54UVP	
	12				XP1023				
	14				56UVP			58UVP	
T(S20)	9	XP1117							
	10					XP1002			
	14				56TVP				
TU	10					XP1003			
	14				56TUVP				

TUBES FOR MICROWAVE EQUIPMENT

use	description	output	frequency (GHz)	type number
Link equipment	Disc-seal triodes		up to 4.2	EC157
			up to 4.2	EC158
	Travelling-wave tubes		5.9 – 6.4	LB6-10
			4.4 – 5	7537
			3.8 – 4.2	55340
TV transmitters		output power (kW)	frequency	
	Klystrons	10	band IV, V	YK1001
		20		YK1061
Measuring equipment			frequency (GHz)	
	Diodes		up to 1	EA52
			up to 1	EA53
	Reflex klystrons		Ka-band	55335
			E-band	YK1010
Microwave heating		C.W. output power (kW)	frequency (GHz)	
	C.W. magnetrons	0.2		7090
		1.2		DX206
		2.5	2.45	YJ1160
		2.5		YJ1162
		5		YJ1190

TUBES FOR MICROWAVE EQUIPMENT

Radar equipment		peak power (kW)	frequency band	type number
Pulsed magnetrons	fixed frequency	3	X-band	YJ1000
		3		JP9–2.5D
		3		JP9–2.5E
		10		JP9–7D
		22		JP9–15
		22		JP9–15B
		22		JP9–15D
		25	Ka-band	YJ1020
		30		YJ1021
	tunable frequency	450	L-band	5J26
		60	X-band	2J51A
		205		YJ1180*)
		225		YJ1010
Reflex klystrons		C.W. output power (mW)		
		50	X-band	2K25
		40		KS9–20B
		40		KS9–20D
		40		KS9–40
		35		K59–40D
		40		6975
		150	Ka-band	55335

*) Spin-tuned magnetron for frequency agility radar

TYPE DESIGNATION CODE

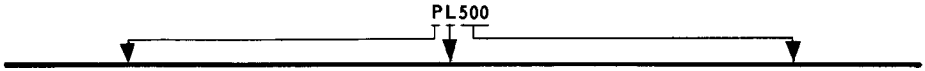
TYPE DESIGNATION CODE FOR RADIO AND TELEVISION RECEIVING TUBES

This type designation code relates to tubes designed for use primarily in reproducing and recording equipment for domestic applications such as: radio and television receivers, record players, tape recorders and audio amplifiers, home cinema projectors, hearing aids, and similar equipment.

The type designation consists of:

TWO OR MORE LETTERS FOLLOWED BY A SERIAL NUMBER

Example and explanation:



First letter indicates the heater voltage or current	Second and subsequent letters indicate the construction and/or application of the tube. (If there is more than one electrode system these letters are placed in alphabetical order.)	Serial number
D ≤ 1.4 V; series or parallel supply **E** 6.3 V; series or parallel supply **G** miscellaneous; parallel supply **H** 150 mA; series supply **L** 450 mA; series supply **P** 300 mA; series supply **U** 100 mA; series supply **X** 600 mA; series supply The use of letters A (4 V), B(180 mA), C (200 mA), F (12.6 V), K (2 V), V (50 mA) and Y (450 mA) has been discontinued.	**A** diode (excluding rectifiers) **B** double diode with common cathode (excluding rectifiers) **C** triode (excluding power output triodes) **D** power output triode **E** tetrode (excluding power output tetrodes) **F** pentode (excluding power output pentodes) **L** power output tetrode or power output pentode **H** hexode or heptode (of the hexode type) **K** octode or heptode (of the octode type) **M** tuning indicator **Y** half-wave rectifier **Z** full-wave rectifier	The serial number consists of three figures the first figure indicating the type of base[1]): **1** miscellaneous base types **2** miniature 10-pin base **3** octal base **5** magnoval base **8** noval base **9** miniature 7-pin base The last figure of tetrodes and pentodes (excluding power output tubes) indicates the type of characteristic, as follows: even figure: sharp cutoff characteristic odd figure: variable-mu characteristic

[1]) The use of remaining figures for other base types and the use of serial numbers of one and two figures has been discontinued.

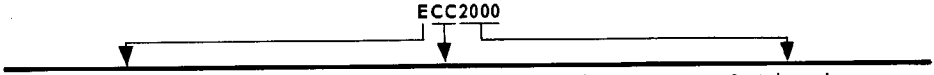
TYPE DESIGNATION CODE FOR PROFESSIONAL RECEIVING-TYPE TUBES

This type designation code relates to professional receiving-type vacuum tubes designed for use primarily in communication equipment, data processing equipment or in other industrial applications.

The type designation consists of:

TWO OR MORE LETTERS FOLLOWED BY A SERIAL NUMBER

Example and explanation:



First letter indicates the heater voltage	Second and subsequent letters indicate the construction and/or application of the tube. (If there is more than one electrode system these letters are placed in alphabetical order.)	Serial number
E 6.3 V; parallel or series supply	**A** diode **C** triode (excluding power output triodes) **D** power output triode **E** tetrodes (excluding power output tetrodes) **F** pentode (excluding power output pentodes) **L** power output tetrode or power output pentode **H** heptode **M** tuning indicator	The serial number consists of four figures, the first figure indicating the type of base[1]): **1** miscellaneous **2** miniature 10-pin base **3** octal base **5** magnoval base **8** noval base **9** miniature 7-pin base

[1]) Serial numbers for prototypes always end in zero, those for variants in one of the figures 1 to 9. The other first figures will be used for new base types as required.

TYPE DESIGNATION CODE FOR CATHODE-RAY TUBES

This type designation code relates to cathode-ray tubes for all applications such as: television and radar display tubes, oscilloscope tubes, monitor tubes and view finders.

The type designation consists of:

ONE LETTER FOLLOWED BY TWO GROUPS OF FIGURES JOINED BY A HYPHEN, AND ONE OR TWO LETTERS

Example and explanation:

D10-11GH
A59-11W

First letter indicates the application and or construction of tube.	First figure or group of figures indicates the screen dimensions.	Second figure or group of figures.	Final letters indicate the screen properties.
A TV display tube for domestic applications **D** Oscilloscope tube, siggle trace **E** Oscilloscope tube, multiple trace **F** Radar display tube, direct view **L** Display storage tube **M** TV display tube for professional applications, direct view **P** Display tube for professional applications, projection **Q** Flying spot scanner	For rectangular screen the screen diagonal in cm. For circular screens the screen diame- in cm.	Serial number	The first letter denotes the colour of the flu rescence (or phosphorescence in the case long or very long persistence screens) accoi ing to the regions of the Kelly Chart of colc designations for lights, where applicable: **A** Reddish-purple, purple, bluish-purple **B** Purplish-blue, blue, greenish-blue **D** Blue-green **G** Bluish-green, yellowish-green **K** Yellow-green **L** Orange, orange-pink **R** Reddish-orange, red, pink, purplish-pink, purplish-red, red-purple **Y** Greenish-yellow, yellowish-orange **W** indicates the "standard white" television display tube phosphor **X** indicates tri-colour screens. The second letter is a serial letter to den other specific differences in screen properti Word description of persistence. (Time to decay to 10 % of initial light outpu less than 1 u sec. very short 1 m sec. to medium 1 u sec to short 100 m sec. 10 u sec. 100 m sec. long 10 u sec. to medium to 1 sec. 1000 u sec. short more than very lor 1 sec.

GROUPS OF LETTERS ALLOCATED TO EXISTING PHOSPHORS

Designation		EIA number	Colour		Persistence (10 %)
New	Old		Fluorescence	Phosphorescence	
BA	C		purplish blue		very short
BC	V		purplish blue		
BD	A		blue		very short
BE	B	P11	blue	blue	medium short
BF	U		blue		medium short
GB	M	P32	purplish blue	yellowish green	long
GE	K	P24	green	green	short
GH	H	P31	green	green	medium short
GJ	G	P1	yellowish green	yellowish green	medium
GK	G[1])		yellowish green	yellowish green	medium
GL	N	P2	yellowish green	yellowish green	medium short
GM	P	P7	purplish blue	yellowish green	long
GN	J		blue	green	[2])
GP			bluish green/green	green	medium short
LA	D		orange	orange	medium
LB	E		orange	orange	long
LC	F		orange	orange	very long
LD	L	P33	orange	orange	very long
RA			reddish orange		medium
YA	Y		yellowish orange	yellowish orange	medium
W	W		white for TV display tubes		
X	X		three-colour for TV display tubes		

[1]) Used for colour TV.
[2]) Depends on external stimulation.

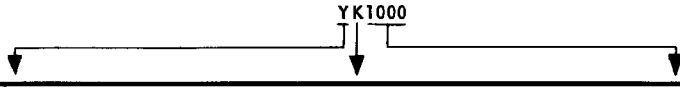
TYPE DESIGNATION CODE FOR PROFESSIONAL TUBES

This type designation code relates to tubes designed for use primarily in radio or television transmitting equipment, in navigation or communication equipment or in other industrial applications.

The type designation consists of:

TWO LETTERS FOLLOWED BY A SERIAL NUMBER

Example and explanation:



First letter indicates the category	Second letter indicates the construction and/or application	Serial number
X Tubes employing photosensitive materials **Y** Vacuum tubes for **Z** Gasfilled tubes (except tubes employing photosensitive material).	**A** diode **C** trigger tube **D** triode (including double triodes) **H** travelling wave tube **J** magnetrons **K** klystron **L** tetrode or pentode (including double tetrodes or double pentodes) **M** cold cathode indicator or counter tube **P** photomultiplier tube, radiation counter tube **Q** camera tube **T** thyratron **X** ignitron, image intensifier or image converter **Y** rectifier **Z** voltage stabiliser **G** miscellaneous	The serial number consists of four figures. Serial numbers for prototypes always end in zero, those for variants in one of the figures 1 to 9.

The type number consists of two capital letters followed by two sets of figures (e.g. DG13-2, MW31-16).

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

A - Electrostatic focusing and electromagnetic deflection.
D - Electrostatic focusing and electrostatic deflection in two directions.
M - Electromagnetic focusing and electromagnetic deflection.

Second letter

Indicates the phosphor screen properties.

First group of figures

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

Second group in figures

Serial number

TRANSMITTING TUBES (Old system)

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. TAL12/10, DCG4/1000G).

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. QQC04/15).

Second letter (third letter fot 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
- H - Helix or other integral cooler
- 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

- B - Cables
- E - Medium 7p-base
- ED - Edison base
- EG - Goliath base
- G - Medium 4p-base
- GB - Jumbo 4p-base
- GS - Super jumbo 4p-base
- N - Medium 5p-base
- P - P-base

PHOTOTUBES AND PHOTOMULTIPLIERS (old system)

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
Third letter: letter P only for photomulitpliers.

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)
U - Caesium-antimony cathode with quartz window
T - Tialkali cathode.

Second letter

G - Gasfilled
V - High vacuum

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. 10 mA
B - max. 22 mA
C - max. 40 mA
D - max. 100 mA
E - max. 200 mA

Figure

Serial number

Second letter

E - Edison
K - Octal 8p-base
P - P-base