

MANUAL

of
electronic
tubes

RECEIVING TUBES
PICTURE TUBES
CATHODE-RAY TUBES
RECTIFIER TUBES
TRANSMITTING TUBES
MODULATING TUBES
IMPULSE TUBES
KLYSTRONS
MAGNETRONS
TRAVELLING WAVE TUBES
CARCINOTRONS
TR AND ATR SWITCH TUBES
VACUUM CONDENSERS
SPECIAL TUBES
CAMERA TUBES
SEMICONDUCTOR DIODES
SEMICONDUCTOR RECTIFIERS
SEMICONDUCTOR PHOTODIODES
A. F. TRANSISTORS
H. F. TRANSISTORS
POWER TRANSISTORS
INTEGRATED CIRCUITS

**MANUAL
OF ELECTRONIC TUBES**

TESLA

1969

TESLA ROŽNOV

Editor:

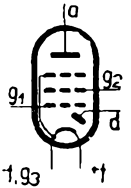
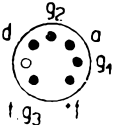
TESLA ROŽNOV, národní podnik
dokumentace a propagace
ROŽNOV POD RADHOŠTĚM

Printed in Czechoslovakia
MTZ, Ostrava 1

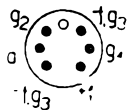
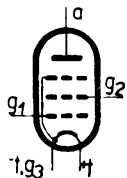
This manual of TESLA electronic tubes and semi-conductor devices contains all basic technical data required for general information. It does not list detailed data required for the development and design of new electronic instruments. A concise catalogue of tubes compiled specially for the use of designers contains, in addition to all data, also the characteristics.

This catalogue is printed on loose leaves and is kept up-to-date by additions. Receiving tubes intended for use in newly designed receivers, instruments, etc., are listed in a table of preferred types.

KOVO, Foreign Trade Co.,
Dept. 8, Prague 7
Czechoslovakia

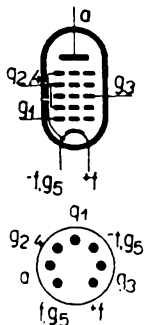
Type Application	Dimensions Base	Heating		Operational Data				Maximum Ratings	
		Static data							
1AF33 1AF34	Size max $\varnothing 19 \times 49$ mm	1AF33		AF resistance-coupled amplifier				Pentode	
		U_f 1,4 V I_f 25 mA Direct heating	U_b 45 67,5 90 V R_a 1 1 1 M Ω R_{g2} 3,3 3,3 3,3 M Ω R_{g1} 10 10 10 M Ω R_{g1}' 2,2 2,2 2,2 M Ω I_b 0,05 0,075 0,1 mA U_o/U_i 45 60 67 k 2 3 5 % $U_o e_f$ 5 5 5 V	U_a 67,5 V U_{g2} 67,5 V U_{g1} -1 V I_a 1,4 mA I_{g2} <0,4 mA $S^{1)}$ >0,3 mA/V R_i 0,6 M Ω μ 300 I_d >0,1 mA U_d 3 V $1) U_{g1} = -0,5$ V Capacitances C_{g1} 2,4 pF C_a 4,6 pF $C_{a/g1}$ <0,3 pF $C_{d/f}$ 1,5 pF	U_{a0} 250 V U_a 90 V U_{g20} 250 V U_{g2} 67,5 V U_{g1} 0 V I_k 4,5 mA R_{g1} 3 M Ω $R_{g1}^{1)}$ 22 M Ω U_f 1,6 V U_i >1,1 V				
 		1AF34		AF resistance-coupled amplifier triode connection				Diode	
		U_f 1,2 V I_f 30 mA Direct heating	U_b 90 90 V R_a 0,22 0,47 M Ω R_{g1} 10 10 M Ω R_{g1}' 0,68 1,5 M Ω U_b 0,25 0,13 mA U_o/U_i 11 11,6 k 1 0,8 % $U_o e_f$ 5 5 V	U_d sp 50 V I_d 0,2 mA I_d sp 1,2 mA $1) U_{g1}$ produced by R_{g1}	1AF34 U_f 1,4 V U_i >0,9 V				
Diode - AF pentode, AF amplifier, AM demodulator									

Type Application	Dimensions Base	Heating		Operational Data				Maximum Ratings		
		Static data								
1F33 1F34	Size max Ø 19×49 mm	1F33		RF and IF amplifier				U_{a0}	150 V	
		U_f	1,4 V	U_a	45	67,5	V	U_a	90 V	
		I_f	25 mA	U_{g2}	45	67,5	V	U_{g20}	150 V	
		Direct heating		U_{g1}	0 -10	0 -16	V	U_{g2}	67,5 V	
		⊙		I_a	1,7	—	3,4	—	I_k	5,5 mA
		U_a	67,5 V	I_{g2}	0,7	—	1,5	—	U_{g1}	0 V
		U_{g2}	67,5 V	S	0,65	0,01	0,75	0,01	W_a	0,3 W
		U_{g1}	-1 V	R_i	0,35	> 10	0,25	> 10	W_{g2}	0,1 W
		I_a	2,5 mA	$\mu_{g2/g1}$	22	—	22	—	R_{g1}	3 MΩ
		I_{g2}	<1,3 mA	U_a	90	90	V	U_f	1,6 V	
		S ¹⁾	>0,6 mA/V	U_{g2}	45	67,5	V	U_f	>1,1 V	
		R_i	>250 kΩ	U_{g1}	0 -10	0 -16	V	Capacitances		
		μ	400	I_a	1,8	—	3,5	—	C_{g1}	4,2 pF
		1) $U_{g1} = -0,5$ V		I_{g2}	0,65	—	1,4	—	C_a	7,5 pF
				S	0,7	0,01	0,75	0,01	C_c/g_1	<0,012 pF
				R_i	0,8	> 10	0,5	> 10	1F34	
				$\mu_{g2/g1}$	22	—	22	—	U_f	1,4 V
				1F34					U_f	>0,9 V
				U_f	1,2 V					
				I_f	30 mA					
			Direct heating							



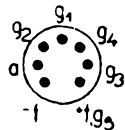
Variable- μ
pentode
RF, IF amplifier

Type Application	Dimensions Base	Heating		Operational Data				Maximum Ratings	
		Static data							
1H33 1H34	Size max Ø 19×49 mm	1H33		Mixer				U_{a0}	250 V
		U_f 1,4 V		U_a 45		67,5	V	U_a	90 V
		I_f 25 mA		U_{g2+4} 45		67,5	V	$U_{g2+4(0)}$	90 V
		Direct heating		R_{g1} 100		100	kΩ	U_{g2+4}	67,5 V
		●		I_{g1} 150		250	μA	U_{g3}	0 V
				U_{g3} 0 -9		0 -14	V	I_k	5,5 mA
		U_a 90 V		I_a 0,57 -		1,4 -	mA	R_{g3}	3 MΩ
		U_{g3} -0,5 V		I_{g2+4} 1,8 -		3,2 -	mA	U_f	1,6 V
		U_{g2+4} 67,5 V		S_c 235 5		280 5	μA/V	U_f	>1,1 V
		U_{g1} -0,5 V		R_i 0,6 >10		0,5 >10	MΩ	Capacitances	
		I_a 3,2 mA		I_k 2,5 -		5 -	mA	C_{g1}	3,8 pF
		I_{g2+4} 4,0 mA		U_a 90		90	V	C_{g3}	6,2 pF
		$S_{g1/g2+g4}$ >0,45 mA/V		U_{g2+4} 45		67,5	V	C_a	9 pF
		R_i >250 kΩ		R_{g1} 100		100	kΩ	C_{g2+4}	12,5 pF
				I_{g1} 150		250	μA	$C_{a/g1}$	<0,1 pF
				U_{g3} 0 -9		0 -14	V	$C_{a/g3}$	<0,4 pF
				I_a 0,8 -		1,6 -	mA	$C_{g1/g2}$	<0,2 pF
				I_{g2+4} 1,9 -		3,2 -	mA	1H34	
				S_c 250 5		300 5	μA/V	U_f	1,4 V
				R_i 0,8 >10		0,6 >10	MΩ	U_f	>0,9 V
				I_k 2,75 -		5 -	mA		
		1H34							
		U_f 1,2 V							
		I_f 30 mA							
		Direct heating							



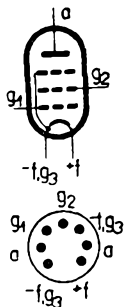
Variable- μ
heptode
Mixer

Type Application	Dimensions Base	Heating		Operational Data		Maximum Ratings	
		Static data					
1H35	Size max Ø 19×49 mm	U_f	1,4 V	Mixer		U_f	1,6 V
		I_f	25 mA	U_a	64 85 V	U_f min	1,1 V
		Direct heating		U_{g3}	0 0 V	U_a	90 V
			●	R_{g2}	18 33 kΩ	W_a	0,15 W
		U_a	67,5 V	R_{g4}	0 120 kΩ	U_{g4}	67,5 V
		U_{g4}	45 V	$R_{g1/f}$	27 27 kΩ	W_{g4}	0,03 W
		U_{g3}	-0,5 V	U_{g2}	35 35 V	U_{g3}	0 V
		U_{g2}	45 V	U_{g4}	64 68 V	U_{g2}	67,5 V
		U_{g1}	-0,5 V	$U_{g1\ ef}$	4 4 V	W_{g2}	0,1 W
		I_a	1,9 mA	I_a	0,55 0,6 mA	U_{g1}	0 V
		I_{g4}	<1 mA	I_{g2}	1,6 1,5 mA	I_k	3 mA
		I_{g2}	1,85 mA	I_{g4}	0,12 0,14 mA	$R_{g3/f}$	3 MΩ
		$S_{g1/g2}$	0,4 mA/V	I_k	2,45 2,4 mA	$R_{g1/f}$	0,1 MΩ
				I_{g1}	85 85 μA	Capacitances	
				S_c	130 160 μA/V	C_{g3}	6,5 pF
				R_i	0,9 1 MΩ	C_a	12 pF
				$U_{g3} (S_c - 2 \mu A/V)$	-4,5 -6,5 V	$C_{a/g3}$	<0,4 pF


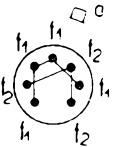


Variable- μ
heptode
Mixer

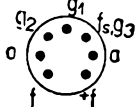
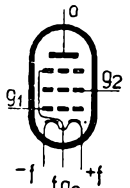
Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings		
		Static data							
1L33 1L34	Size max Ø 19×49 mm	1L33		AF power amplifier class A			U_{a0}	250 V	
		U_f	1,4 V	U_a	45	67,5	90 V	U_a	90 V
		I_f	50 mA	U_{g2}	45	67,5	67,5 V	U_{g20}	250 V
		Direct heating		U_{g1}	-4,5	-7	-7 V	U_{g2}	67,5 V
				I_a	3,8	7,2	7,4 mA	W_a	0,7 W
		U_a	90 V	I_{g2}	0,8	1,5	1,4 mA	$W_{g2} (U_{g1} \sim -0 V)$	0,12 W
		U_{g2}	67,5 V	S	1,25	1,3	1,4 mA/V	$W_{g2} (U_{g1} = \text{max})$	0,2 W
		U_{g1}	-7 V	R_a	8	5	8 kΩ	$I_k (U_{g1} \sim -0 V)$	9 mA
		I_a	7,5 mA	$U_{g1 \text{ ef}}$	3,2	5	5 V	$I_k (U_{g1} \sim \text{max})$	12 mA
		I_{g2}	1,5 mA	P_o	65	160	230 mW	R_{g1}	2 MΩ
		S	1,4 mA/V	k	12	10	12 %	U_f	1,6 V
		R_i	100 kΩ	AF push-pull power amplifier, class B			U_b	90	V
		μ	140	U_a			80	V	
		$I_{ax} (U_{g1} = -15 V)$	<0,6 mA	U_{g2}			57,5	V	
				U_{g1}			-9,9	V	
				$R_{a-a'}$			16	kΩ	
				$U_{g1 \text{ ef}}$	0		7,3	V	
				I_a	2×1,5		2×4,4	mA	
				I_{g2}	2×0,3		2×1,35	mA	
				P_o	0		325	mW	
				k	-		5	%	
		1L34					Capacitances		
		U_f	1,2 V				C_{g1}	5 pF	
		I_f	60 mA				C_a	6 pF	
		Direct heating					$C_{a/g1}$	<0,45 pF	
							1L34		
							U_f	1,4 V	
							U_f	>0,9 V	



Output pentode
Power amplifier

Type Application	Dimensions Base	Heating		Operational Data	Maximum Ratings	
		Static data				
1Y32 1Y32T	Size M 4	1Y32 U_f 1,4 V I_f 265 mA Direct heating Thoriated tungsten cathode		Half-wave HT rectifier U_{SS} max 8 kV ($I_{SS}=2$ mA) U_{SS} max 10 kV Z_{trafo} 500 k Ω C_N ($f = 50$ c/s) 50 kpF C_N (vF) 500 pF	U_{inv} 20 kV I_{sp} 10 mA I_{SS} 2 mA f 300 kc/s	
		I_a 4 mA U_a 45 V				Capacitances $C_{a/k}$ 0,6 pF
		1Y32T U_f 1,4 V I_f 265 mA Direct heating Oxide-coated filament		To be replace by 1Y32T	U_f 1,7 V U_f min 1,1 V U_{inv} 20 kV U_{SS} 15 kV I_{SS} 0,2 mA C_N 2500 pF	
		I_a >5 mA U_a 150 V				Capacitances $C_{a/k}$ 1,5 pF
HT diode Half-wave rectifier for TV receiver HT sources						

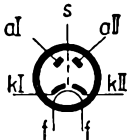
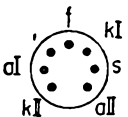
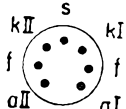
Type Application	Dimensions Base	Heating		Operational Data				Maximum Ratings		
		Static data								
3L31	Size max $\varnothing 19,49$ mm	U_f	2,8 V	AF power amplifier, class A				AF amplifier		
		I_f	50 mA	U_f	1,4	1,4	V		U_a	150 V
		U_f	1,4 V	U_a	135	150	V		U_{g2}	90 V
		I_f	100 mA	U_{g2}	90	90	V		W_a	2 W
		Indirect heating		U_{g1}	-8	-8,8	V		W_{g2}	0,4 W
		U_a	150 V	$U_{g1\ ef}$	0	5,5	0	6	I_k	18 mA
		U_{g3}	0 V	I_{g2}	2,8	3,5	2,2	3,5	$R_{g1\ 1)}$	0,7 M Ω
		U_{g2}	90 V	I_a	14,8	15	14,2	14,2	$R_{g1\ 2)}$	0,5 M Ω
		U_{g1}	-8,5 V	S	2,1		2,1	mA/V		
		I_a	14 mA	R_i	44		50	k Ω		
		I_{g2}	2,2 mA	R_a	8		8	k Ω		
		S	1,9 mA/V	P_o	0,6		0,7	W		
		R_i	100 k Ω	k	10		10	%		
		μ	190	RF power amplifier - $f = 10$ Mc/s						
		Capacitances		U_f	1,4	V		RF amplifier		
		C_{g1}	4,2 pF	U_a	150	V		U_a	150 V	
		C_a	4,9 pF	U_{g2}	135	V		U_{g2}	135 V	
		$C_{a/g1}$	<0,38 pF	R_{g1}	0,2	M Ω		U_{g1}	-30 V	
				I_a	18,5	mA		I_a	20 mA	
				I_{g2}	6,5	mA		I_{g1}	0,25 mA	
				I_{g1}	0,13	mA		I_k	25 mA	
				P_o	1	W		W_{g2}	0,9 W	
								W_a	2 W	



Pentode
AF, RF power
amplifier

1) U_{g1} automatic

2) U_{g1} fixed

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
6B31 6B32  	Size M 1	U_f 6,3 V I_f 0,3 A <hr/> I_f 0,3 A U_f 6,3 V Indirect heating ● U_a 4 V I_a >10 mA	6B31 	Half-wave rectifier $U_{a\ ef}$ 150 V R_o 300 Ω I_{ss} 9 mA I_{sp} 54 mA Full-wave rectifier $U_{a\ ef}$ 2×150 V R_o 2×300 Ω C_N 8 μF R_z 10 k Ω I_{ss} >17 mA Capacitances $C_{aI/kI+s+f}$ 3,2 pF $C_{aII/kII+s+f}$ 3,2 pF $C_{kI/aI+s+f}$ 3,6 pF $C_{kII/aII+s+f}$ 3,6 pF $C_{aI/aII}$ <0,05 pF	Each section U_{inv} 420 V I_{sp} 54 mA I_{ss} 9 mA W_a 0,5 W $U_{k/f}$ 300 V $R_{k/f}$ 20 k Ω C_N 8 μF R_o >300 Ω			
Twir. diode with separate cathodes AM, FM demodulator, ratio detector, full-wave rectifier								

Type Application	Dimensions Base	Heating		Operational Data				Maximum Ratings		
		Static data								
6BC32 EBC91	Size M 3	U_f	6,3 V	AF resistance-coupled amplifier				Triode		
		I_f	0,3 A							
		I_f	0,3 A	U_b	180	300	300	V	U_{a0}	500 V
		U_f	6,3 V	R_a	0,22	0,22	0,47	$M\Omega$	U_a	330 V
		indirect heating		R_k	3,9	3,1	5,9	$k\Omega$	W_a	0,5 W
			●	R_{g1}	1	1	1	$M\Omega$	$+U_{g1}$	0 V
		U_a	250 V	R_{g1}'	1	1	2,2	$M\Omega$	$-U_{g1}$	-50 V
		U_{g1}	-2 V	C_k	1,8	2,1	1,1	μF	$R_{g1}(\rho)$	1 $M\Omega$
		I_a	1 mA	C_v 1)	3	3	2	kpF	R_{g1}^1	3 $M\Omega$
		S	1,55 mA/V	$U_a sp$	39	79	92	V	R_{g1}^2	10 $M\Omega$
		μ	100	V	63	68	75		R_k/f	20 $k\Omega$
		R_i	62,5 $k\Omega$	1) Coupling capacitor				Diodes		
		I_{az} ($U_{g1} = -4,5$ V)	<0,15 mA	Capacitances				$U_d sp$	90 V	
		U_d	4 V	C_{g1}		2	pF	I_d	1 mA	
		I_d	>0,15 mA	C_a		0,65	pF	$I_d sp$	6 mA	
				$C_{a/g1}$		2	pF	1) U_{g1} produced by R_{g1}		
				$C_{d/g1}$		<0,04	pF			
				$C_{d/k}$		<1,2	pF			
AF triode-twin diode AF resistance-coupled amplifier and RF rectifier										

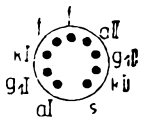
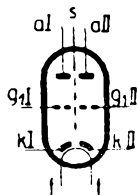


Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings		
		Static data							
6CC10	Size O 1	U_f	6,3 V	AF resistance - coupled amplifier			U_{ao}	330 V	
		I_f	0,6 A	U_b	180	300	V	U_a	275 V
		Indirect heating		R_a	0,1	0,1	$M\Omega$	W_a	2,75 W
			⊕	R_k	3,23	2,44	$k\Omega$	$U_{g1 \text{ min}}$	-0,5 V
		U_a	250 V	R_{g1}	1	1	$M\Omega$	U_{g1}	-100 V
		U_{g1}	-8 V	$R_{g1'}$	0,5	0,25	$M\Omega$	R_{g1}	2 $M\Omega$
		I_a	9,5 mA	C_k	1,15	1,42	μF	I_k	10 mA
		S	2,6 mA/V	C_v	6	12,5	kpF	$U_{k/f}$	100 V
		μ	20	$U_{a \text{ sp}}$	38	56	V	$R_{k/f}$	20 $k\Omega$
		R_i	7,7 $k\Omega$	V	14	14		I_{g1}	2 mA
		I_{az} ($U_{g1} = -24$ V)	<0,005 mA	Capacitances					
				Triode	I	II			
				C_{g1}	2,1	1,85	pF		
				C_a	2,5	2,4	pF		
				$C_{a/g1}$	3,6	3,6	pF		

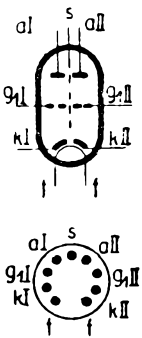
Twin triode with separate cathodes
AF amplifier

Only for information. - No on stock!

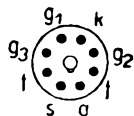
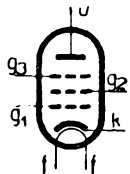
Type Application	Dimensions Base	Heating		Operational Data				Maximum Ratings		
		Static data								
6CC41	Size N 1	U_f	6,3 V	AF resistance-coupled amplifier				U_{a0}	500 V	
		I_f	0,3 A	U_b	180	300	300	V	U_a	300 V
		Indirect heating		R_a	0,22	0,22	0,47	$M\Omega$	W_a	1 W
		U_a	250 V	R_k	3,5	2,8	5,2	$k\Omega$	$R_{g1} (k)$	2 $M\Omega$
		I_a	2,3 mA	R_{g1}	1	1	1	$M\Omega$	$R_{g1}^{1)}$	10 $M\Omega$
		S	2 mA/V	R_{g1}'	0,47	0,47	1	$M\Omega$	I_k	10 mA
		μ	100	C_k	2,1	2,3	1,3	μF	$R_{g1} (\rho)$	0,5 $M\Omega$
		R_i	50 $k\Omega$	$C_{\nu}^{1)}$	6	6	3	kpF	$U_{k/f}$	± 100 V
		U_{g1}	-1,5 V	$U_{a \sim sp}$	34	69	77	V		
		$I_{az} (U_{g1} = -5,5)$	<0,02 mA	V	59	65	73			
				1) Coupling capacitor				1) U_{g1} produced by I_{g1}		
								Capacitances		
								C_{g1}	1,75 pF	
								C_a	1,0 pF	
								$C_{a/g1}$	2,2 pF	
								$C_{a1/a11}$	<0,05 pF	
								$C_{a1/g111}$	<0,01 pF	
								$C_{a11/g11}$	<0,01 pF	



Twin triode with separate cathodes
AF amplifier,
phase inverter

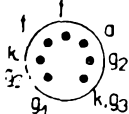
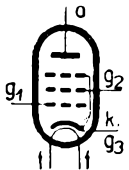
Type Application	Dimensions Base	Heating		Operational Data	Maximum Ratings		
		Static data					
6CC42	Size max ∅ 22,2 × 55 mm	U_f	6,3 V	HF and VHF amplifier	U_{a0}	550 V	
		I_f	0,35 A		U_b	250 V	U_a
		Indirect heating		$R_{a1)}$	12,5 kΩ	W_a	1,5 W
		U_a	150 V	U_a	150 V	I_k	18 mA
		R_k	240 Ω	R_k	240 Ω	R_{g1}	1 MΩ
		I_a	8 mA	I_a	8 mA	$U_{k/1}$	100 V
		S	5,5 mA/V	S	5,5 mA/V	Capacitances 1)	
		μ	35	R_i	6,7 kΩ	C_{g1}	2,2 pF
		R_i	6,7 kΩ	1) R_a shunted by $C_a = 1$ kpF			
		I_{az} ($U_{g1} = -10$ V)	<80 μA			C_a	0,4 pF
						$C_{a/g1}$	<1,6 pF
						$C_{a1/aII}$	<0,3 pF
						7) Without screening	
							
Twin triode with separate cathodes HF, VHF amplifier, mixer, oscillator							

Type Application	Dimensions Base	Heating		Operational Data		Maximum Ratings			
		Static data							
6F10	Size O 2	U_f	6,3 V	RF amplifier		U_{an}	550 V		
		I_f	0,45 A	U_b	300 V	U_a	310 V		
		Indirect heating		U_a	300	300 V	W_a	3,3 W	
		U_a	300 V	U_{g3}	0	0 V	U_{g20}	550 V	
		U_{g3}	0 V	U_{g2}	150	V	U_{g2}	165 V	
		U_{g2}	150 V	R_{g2}	0	60 k Ω	W_{g2} ($U_{g1} \sim -0$ V)		
		R_k	160 Ω	R_k	160	160 Ω		0,45 W	
		I_a	10,25 mA	I_a	10,25	10,25 mA	W_{g2} ($U_{g1} \sim \text{max}$)		
		I_{g2}	2,2 mA	I_{g2}	2,5	2,5 mA		0,8 W	
		S	9 mA/V	S	9	9 mA/V	I_k	25 mA	
		$\mu_{g2/g1}$	50	R_i	300	300 k Ω	$-U_{g1}$	-30 mA	
		R_i	300 k Ω	Z_{g1} (f=100 Mc/s)	540	Ω	R_{g1}	0,5 M Ω	
				R_{ekv}	650	Ω	$R_{g1}^{1)}$	0,25 M Ω	
				RF amplifier, g2 and g3 connected to a		$U_{k/l}$	100 V		
				U_a	150 V	μ	40	Triode connection	
				R_k	160 Ω	R_i	3,6 k Ω	U_a	165 V
				I_a	12,5 mA				
				S	11 mA/V				
				Only for information. - No on stock!					
								1) U_{g1} fixed	
								Capacitances	
								C_{g1}	11 pF
								C_a	5 pF
								C_a/g_1	<0,015 pF



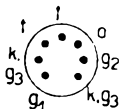
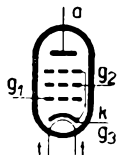
RF pentode
RF, IF, wideband
amplifier

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
6F32 EF95	Size max ∅ 19×45,2 mm	U_f	6,3 V	RF amplifier, class A			U_{i0}	320 V
		I_f	0,175 A	U_a	120	180 V	U_a	200 V
		Indirect heating		U_{g2}	120	120 V	W_1	1,7 W
			●	R_k	200	200 Ω	U_{g20}	320 V
		U_a	120 V	I_a	7,5	7,7 mA	U_{g2}	150 V
		U_{g2}	120 V	I_{g2}	2,5	2,4 mA	W_{g2}	0,5 W
		R_k	200 Ω	S	5	5,1 mA/V	I_k	18 mA
		I_a	7,5 mA	R_i	0,34	0,69 MΩ	R_{g1}	1 MΩ
		I_{g2}	<3,5 mA	Z_{g1} (f=50 Mc/s)	25	25 kΩ	$U_{k/f}$	100 V
		S	5,2 mA/V	R_{ekv}	2	2 kΩ	$R_{k/f}$	20 kΩ
		$\mu_{g2/g1}$	25	RF amplifier, class A -			Capacitances	
		R_i	>0,25 MΩ	Triode connection			C_{g1}	4,5 pF
				U_a	120	180 V	C_a	2,8 pF
				U_{g1}	-2,65	-6 V	$C_{a/g1}$	<0,025 pF
				R_k	265	925 Ω		
				I_a	10	6,5 mA		
				S	6	3,5 mA/V		
				R_i	5	6,66 kΩ		
				μ	30	23,3		
				Z_{g1} (f=100 Mc/s)	9,5	kΩ		
				R_{ekv}	700	Ω		

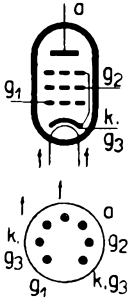


RF high-slope pentode
RF, IF, wideband
amplifier

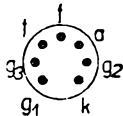
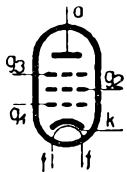
Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
6F32V	Size M 1	U_f	6,3 V	RF amplifier, class A			U_a	200 V
		I_f	0,175 A	U_a	120	180 V	W_a	1,8 W
		Indirect heating		U_{g2}	120	120 V	U_{g2}	150 V
			●	R_k	200	200 Ω	W_{g2}	0,55 W
		U_a	120 V	I_a	7,5	7,7 mA	I_k	20 mA
		U_{g2}	120 V	I_{g2}	2,5	2,4 mA	R_{g1}	1 M Ω
		R_k	200 Ω	S	5,2	5,1 mA/V	$U_{k/f}$	± 120 V
		I_a	$7,5 \pm 2,5$ mA	R_i	300	500 k Ω	$R_{k/f}$	20 k Ω
		I_{g2}	<3,5 mA	Z_{g1} (f=50 Mc/s)	25	k Ω	U_f	7 V
		S	$5,2 \pm 1,4$ mA/V	R_{ekv}	1	k Ω	U_f	>5,7 V
		R_i	>250 k Ω	High-reliability tube			Capacitances	
		I_{az} ($R_a=100$ k Ω)	$U_{g1} = -10$ V	Vibration and shock proofed			C_{g1}	$4,3 \pm 0,5$ pF
			<200 μ A	Exacting tolerances			C_a	$3,4 \pm 0,6$ pF
				Stabilized			$C_{a/g1}$	<0,02 pF



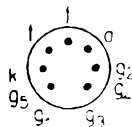
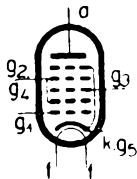
RF high-slope pentode
RF, IF, wideband
amplifier

Type Application	Dimensions Base	Heating		Operational Data	Maximum Ratings
		Static data			
6F35 6AJ5	Size max ∅ 19×45,2 mm	U_f 6,3 V I_f 0,175 A Indirect heating ⊕ U_a 28 V U_{g2} 28 V U_{g1} -0,8 V I_a 3 mA I_{g2} 1,3 mA S 2,8 mA/V I_{az} ($U_{g1} = -3$ V) <0,5 mA		RF and IF amplifier, class A U_a 28 V U_{g2} 28 V R_k 270 Ω I_a 2,7 mA I_{g2} 1 mA S 2,7 mA/V R_i 100 kΩ	U_{a0} 250 V U_a 180 V W_a 1,7 W U_{g20} 250 V U_{g2} 75 V W_{g2} 0,5 W U_{g1} 0 V I_k 18 mA $U_{k/f}$ 90 V Capacitances C_{g1} 5,5 pF C_a 2,8 pF $C_{a/g1}$ <0,03 pF
		<p>RF high-slope pentode RF, IF amplifier</p>			

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
6F36 6AH6	Size M 3	U_f	6,3 V	RF amplifier			U_{a0}	550 V
		I_f	0,45 A	U_b	300	V	U_a	300 V
		Indirect heating		U_a	300	V	W_a	3,3 W
		U_a	300 V	U_{g3}	0	V	U_{g20}	550 V
		U_{g3}	0 V	U_{g2}	150	V	U_{g2}	165 V
		U_{g2}	150 V	R_{g2}	0	60 $k\Omega$	$W_{g2} (U_{g1} \sim -0 V)$	
		R_k	160 Ω	R_k	160	Ω	0,45 W	
		I_a	10,25 mA	I_a	10,25	10,25 mA	$W_{g2} (U_{g1} \sim \text{max})$	
		I_{g2}	2,2 mA	I_{g2}	2,2	2,2 mA	0,8 W	
		S	9 mA/V	S	9	9 mA/V	I_k	25 mA
		R_i	1 M Ω	R_i	0,5	0,5 M Ω	$-U_{g1}$	-30 V
		$I_{az} (U_{g1} = -6 V)$	<0,6 mA	RF amplifier, g2 and g3 connected to a			R_{g1}	0,5 M Ω
		Capacitances		U_a	150	V	$R_{g1} 1)$	0,25 M Ω
		C_{g1}	13,2 pF	R_k	160	Ω	$U_{k/f}$	100 V
		C_a	6,5 pF	I_a	12,5	12,5 mA	$R_{k/f}$	20 $k\Omega$
		$C_{a/g1} 1)$	<0,015 pF	S	11	11 mA/V	Triode connection	
		1) With screening		μ	40		U_a	165 V
				R_i	3,6	$k\Omega$	1) U_{g1} fixed	
				$U_{g1} (I_a = 10 \mu A)$	-7	V		
RF high-slope pentode RF, IF, wideband amplifier								

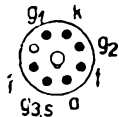
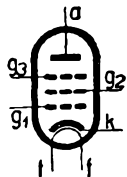


Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
6H31 6BE6	Size M 2	U_f	6,3 V	U_a	100	250 V	U_{a0}	550 V
		I_f	0,3 A	U_{g2+g4}	100	100 V	U_a	300 V
		Indirect heating		U_{g3}	-1,5	-1,5 V	W_a	1 W
		U_a	250 V	$U_{g1\text{ ef}}$	10	10 V	U_{g2+g40}	300 V
		U_{g2+g4}	100 V	I_a	2,8	3 mA	U_{g2+g4}	100 V
		U_{g3}	-1,5 V	I_{g2+g4}	7,3	7,1 mA	W_{g2+g4}	1 W
		I_{g1}	0,5 mA	I_{g1}	0,5	0,5 mA	U_{g1}	0 V
		I_a	3 mA	I_k	10,6	10,6 mA	U_{g1}	-50 V
		I_{g2+g4}	<9,5 mA	R_{g1}	20	20 k Ω	U_{g3}	0 V
		R_{g1}	20 k Ω	R_i	0,5	1 M Ω	$-U_{g3}$	-50 V
		C_{g1}	4 μ F	S_c	0,455	0,475 mA	I_k	14 mA
		$U_{g1\text{ ef}}$	10 V	$U_{g3} (S_c=10 \mu\text{A/V})$	-30	-30 V	$U_{k/f}$	90 V
		f	50 Hz	Capacitances			R_{g3}	20 k Ω
		S_c	>0,3 mA/V	C_{g3}	7,15	pF		
		$U_{g3\text{ ef}}$	0,354 V	C_a	8,6	pF		
				C_{g1}	5,5	pF		
				$C_{a/g3}$	<0,35	pF		
				$C_{g1/g3}$	<0,15	pF		
				$C_{a/g1}$	<0,06	pF		



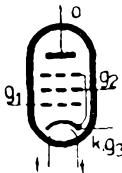
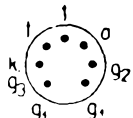
Variable-mu heptode
Mixer

Type Application	Dimensions Base	Static data		Operational Data				Maximum Ratings			
		Heating									
6L10	Size O 2	U_f	6,3 V	Wideband amplifier output stage:				U_{g20}	550 V		
		I_f	0,65 A	U_a	300 V	S	11 mA/V	U_a	330 V		
		Indirect heating		U_{g3}	0 V	R_i	90 k Ω	W_a	9 W		
		U_a	300 V	U_{g2}	150 V	R_a	7 k Ω	U_{g20}	550 V		
		U_{g3}	0 V	R_k	80 Ω	P_o	3,5 W	U_{g2}	330 V		
		U_{g2}	150 V	I_{a0}	30 mA	k	10 %	$W_{g2} (U_{g1} \sim -0 V)$			
		U_{g1}	-3 V	I_a	30,5 mA	$U_{g1\ ef}$	2 V	1,5 W			
		I_a	30 mA	I_{g20}	7 mA			$W_{g2} (U_{g1} \sim \max)$			
		I_{g2}	7 mA	I_{g2}	9 mA			3 W			
		S	11 mA/V	Video amplifier output stage:				I_k	50 mA		
		$\mu_{g2/g1}$	20	U_b	300	300	V	R_{g1}	0,1 M Ω		
		R_i	90 k Ω	U_a	145	200	V	U_k/f	100 V		
				U_{g3}	0	0	V	R_k/f	20 k Ω		
				R_{g2}	0	25	k Ω	Capacitances			
				U_{g2}	115	(125)	V	C_{g1}	13 pF		
				R_k	0	57	Ω	C_a	6,5 pF		
				R_{g1}	0,1	-	M Ω	$C_{a/g1}$	<0,06 pF		
				U_{g1}	0	(-2)	V				
				I_a	45	28	mA				
				I_{g2}	13	7	mA				
				R_a	3,5	3,5	k Ω				
				$U_{a\sim sp/sp}$	135	140	V				
				$U_{g1\sim sp/sp}$	4	4	V				
				Only for information. - No on stock!							



Power pentode for
wideband amplifiers

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings		
		Static data							
6L31 6AQ5	Size M 2	U_f	6,3 V	AF power amplifier, class A			U_{a0}	500 V	
		I_f	0,45 A	U_a	180	250	V	U_a	315 V
		Indirect heating		U_{g2}	180	250	V	W_a	12 W
		U_a	250 V	U_{g1}	-8,5	-12,5	V	U_{g20}	500 V
		U_{g2}	250 V	I_{a0}	29	45	mA	U_{g2}	285 V
		U_{g1}	-12,5 V	I_a	30	47	mA	W_{g20}	2,5 W
		I_a	45 mA	I_{g20}	3	4,5	mA	W_{g2}	3 W
		I_{g2}	<8,5 mA	R_{g2}	4	7	mA	I_k	60 mA
		S	4,1 mA/V	R_i	58	52	k Ω	R_{g1}	0,5 M Ω
		R_i	52 k Ω	S	3,7	4,1	mA/V	$R_{g1}^{1)}$	0,1 M Ω
		I_{az} ($U_{g1} = -30$ V)	<8 mA	R_a	5,5	5	k Ω	$U_{k/f}$	100 V
				P_o	2	4,5	W		
				k	8	8	%		
				AF push-pull amplifier, class AB					
				U_a	250	V			
				U_{g2}	250	V			
				U_{g1}	-15	V			
				I_{a0}	2 \times 35	mA			
				I_a	2 \times 39,5	mA			
				I_{g20}	2 \times 2,5	mA			
				I_{g2}	2 \times 6,5	mA			
				$R_{c-a'}$	10	k Ω			
				$U_{g1\ ef}$	10,5	V			
				P_o	10	W			
				k	5	%			

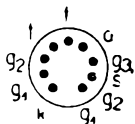
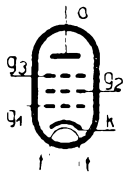



1) U_{g1} fixed

Capacitances
 $C_{a/g1}$ <0,6 pF

Output beam tetrode
AF power amplifier


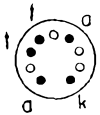
Type Application	Dimensions Base	Heating		Operational Data		Maximum Ratings				
		Static data								
6L43	Size N 4	U_f	6,3 V	Wideband amplifier output stage		U_{a0}	550 V			
		I_f	0,65 A			U_a	300 V	S	11 mA/V	U_{-1}
		Indirect heating		U_{g3}	0 V	R_i	90 k Ω	W_a	9 W	
		U_a	300 V	U_{g2}	150 V	R_a	7 k Ω	U_{g20}	550 V	
		U_{g3}	0 V	R_k	80 Ω	P_o	3,5 W	U_{g2}	330 V	
		U_{g2}	150 V	I_{a0}	30 mA	k	10 %	$W_{g2} (U_{g1\text{ ef}} = 0\text{ V})$	1,5 W	
		U_{g1}	-3 V	I_a	30,5 mA	$U_{g1\text{ ef}}$	2 V	$W_{g2} (U_{g1\text{ ef}} \text{ max})$	3 W	
		I_a	30 mA	I_{g20}	7 mA			I_k	50 mA	
		I_{g2}	7 mA	I_{g2}	9 mA			R_{g1}	0,1 M Ω	
		S	11 mA/V	Video amplifier output stage		U_b	300	300 V	$U_{k/f}$	100 V
		$\mu_{g2/g1}$	20	U_b	300	300 V			$R_{k/f}$	20 k Ω
		R_i	90 k Ω	U_a	145	200 V			Capacitances	
		$I_{az} (U_{g1} = -20\text{ V})$	<0,1 mA	U_{g3}	0	0 V			C_{g1}	11 pF
				U_{g2}	0	25 k Ω			C_a	5,5 pF
				R_{g2}	0				$C_{u/g1}$	<0,1 pF
				U_{g2}	115	(125) V				
				R_k	0	57 Ω				
				R_{g1}	0,1	- M Ω				
				I_a	45	28 mA				
				I_{g2}	13	7 mA				
				R_a	3,5	3,5 k Ω				
				$U_a\text{ sp/sp}$	135	140 V				
				$U_{g1\text{ sp/sp}}$	4	4 V				

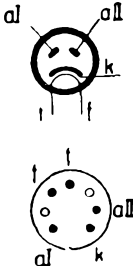


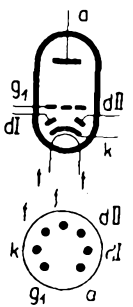
Power pentode for
video and wideband
amplifiers

Type Application	Dimensions Base	Heating		Operational Data				Maximum Ratings		
		Static data								
6L50	Size R 2	U_f	6,3 V	AF and RF amplifier, class A				U_a	1000 V	
		I_f	1,0 A	U_a	250	300	325	350 V	U_{g2}	400 V
		t_f	25 s	U_{g2}	250	200	250	250 V	W_a	25 W
		Indirect heating		R_k	180	250	165	320 Ω	W_{g2}	3,5 W
		U_a	400 V	I_{a0}	72	48	80	54 mA	I_k	125 mA
		U_{g3}	0 V	I_a	79	55	88	66 mA	$I_{k\ sp}$	300 mA
		U_{g2}	250 V	I_{g20}	5	2,5	5	2,5 mA	$I_{k-\pi\ 1)}$	1,5 A
		U_{g1}	-25 V	I_{g2}	7,3	4,7	7,5	7 mA	$R_{g1\ 2)}$	0,1 M Ω
		I_a	30 mA	S	6	5,3	5,5	5,2 mA/V	R_{g1}	0,25 M Ω
		I_{g2}	2 mA	R_i	22,5	35	25	33 k Ω	$U_{k/f}$	80 V
		S	3,5 mA/V	R_a	2,5	4,5	3	4,2 k Ω	$R_{k/f}$	20 k Ω
		R_i	75 k Ω	P_o	6,5	6,5	7	10,8 W		
				$U_{g1\ sp}$	14	12,5	14	18 V		
				k	10	11	8,5	15 %		
				AF push-pull amplifier, class AB2				Capacitances		
				U_a	360 V	I_{g2}	16 mA	C_{g1}	9,7 pF	
				U_{g2}	270 V	$R_{a-a'}$	3,8 k Ω	C_a	7,3 pF	
				U_{g1}	-22,5 V	P_o	47 W	$C_{a/g1}$	<0,35 pF	
				I_{a0}	88 mA	$U_{g1\ sp}$	72 V			
				I_a	205 mA	k	2 %			
				I_{g20}	5 mA					

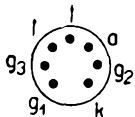
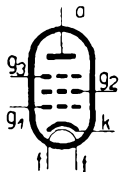
Beam tetrode
AF, RF power amplifier

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings		
		Static data							
6Y50	Size R 1	U_f	6,3 V	Half-wave rectifier			U_{inv}	3500 V	
		I_f	1,65 A	$U_a \sim e_f$ 1)	1200	V	W_a	10 W	
		t_f	1 min	I_{ss}	220	mA	I_{ss}	220 mA	
		Indirect heating		U_{ss}	1350	V	I_{sp}	700 mA	
			●	R_t	150	Ω	R_t	>150 Ω	
		U_a	30 V	CN	4	μF	$U_{k/f}$	50 V	
		I_a	>200 mA	Full-wave rectifier			Capacitances		
				$U_a \sim e_f$ 1)	2×850	V	$C_{a/k}$	5 pF	
				I_{ss}	400	mA			
				U_{ss}	800	V			
				R_t	2×150	Ω			
				CN	4	μF			
				1) U_a must be connected after heating the cathode, otherwise U_{inv} must be reduced to 2000 V.					
		 							
		HT diode							
		Half-wave rectifier							
		full-wave rectifier							
		(two tubes)							

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
6Z31	Size M 3	U_f	6,3 V	Filter input:	Capacitive	Inductive	U_{inu}	1000 V
		I_f	0,6 A	$U_{a \sim ef}$	2×325	2×450 V	I_{sp}	300 mA
		Indirect heating		C_N	max 4	— μF	I_{ss}	70 mA
			●	R_i	150	— Ω	$U_{k/f}$	450 V
		I_d	50 mA	L	—	min 8 H	C_N	16 μF
		R_i	250 Ω	I_{ss}	70	70 mA		
				U_{sb}	355	375 V		
								
Twin diode Full-wave rectifier								

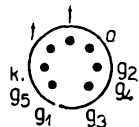
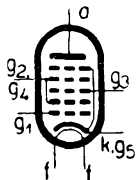
Type Application	Dimensions Base	Heating		Operational Data				Maximum Ratings		
		Static data								
12BC32	Size max Ø 19×57 mm	I_f	150 mA	AF resistance-coupled amplifier				Triode		
		U_f	12,6 V	U_b	180	300	300	V	U_f	14 V
		Indirect heating		R_a	0,22	0,22	0,47	$M\Omega$	U_f	>11,4 V
		U_a	100 V	R_k	3,9	3,1	5,9	$k\Omega$	U_{a0}	500 V
		U_{g1}	-1 V	R_{g1}	1	1	1	$M\Omega$	U_a	330 V
		I_a	0,5 mA	$R_{g1'}$	1	1	2,2	$M\Omega$	W_a	0,5 W
		S	1,25 mA/V	C_k	1,8	2,1	1,1	μF	$+U_{g1}$	0 V
		μ	100	$C_v^{1)}$	3	3	2	kpF	$-U_{g1}$	-50 V
		R_i	80 $k\Omega$	$U_{a \sim sp}$	39	79	92	V	R_{g1}	3 $M\Omega$
		U_d	4 V	V	63	68	75		$R_{g1}^{1)}$	10 $M\Omega$
		I_d	>0,15 mA	1) Coupling capacitor				R_k/f	20 $k\Omega$	
				Capacitances				U_k/f	150 V	
				C_{g1}		2	pF	I_k	8 mA	
				C_a		0,65	pF	Diode		
				$C_{a/g1}$		2	pF	$U_d sp$	90 V	
				$C_{d/g1}$		<0,04	pF	I_d	1 mA	
				$C_{d/k}$		<1,2	pF	$I_d sp$	6 mA	
								1) U_{g1} produced by R_{g1}		
 <p>The diagram shows the internal structure of the 12BC32 tube. The top view shows a central anode (a) and a surrounding cathode (k). The cathode is divided into two sections, each with a grid (g1) and a control grid (g1'). The bottom view shows the base pins: f (filament), d (diode), k (cathode), g1 (grid), and a (anode).</p>		Twin diode-AF triode RF rectifier AF resistance-coupled amplifier								

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
12F31	Size M 3	I_f	150 mA	RF and IF amplifier			U_{a0}	500 V
		U_f	12,6 V				U_a	100
		Indirect heating		U_{g3}	0	0 V	W_a	3 W
		U_a	250 V	U_{g2}	100	100 V	U_{g20}	300 V
		U_{g3}	0 V	R_k	68	68 Ω	U_{g2}	125 V
		U_{g2}	100 V	I_a	10,8	11 mA	W_{g2}	0,6 W
		R_k	68 Ω	I_{g2}	4,4	4,2 mA	U_{g1}	0 V
		I_a	11 mA	S	4,3	4,4 mA/V	$-U_{g1}$	-50 V
		I_{g2}	4,2 mA	R_i	0,25	1,5 $M\Omega$	R_{g1}	3 $M\Omega$
		R_i	1,5 $M\Omega$				$U_{k/f}$	150 V
		S	4,4 mA/V				T_b	150 $^{\circ}C$
		I_{az} ($U_{g1} = -20$ V)	<0,4 mA				Capacitances	
							C_{g1}	5,5 pF
							C_a	5 pF
							$C_{a/g1}$	<0,005 pF



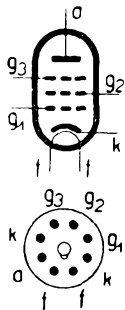
Variable- μ pentode
RF, IF amplifier

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings		
		Static data							
12H31	Size max Ø 19×57 mm	I_f	150 mA	Mixer			U_{a0}	500 V	
		U_f	12,6 V	U_a	100	250	V	U_a	300 V
		Indirect heating		U_{g2+g4}	100	100	V	W_a	1 W
		U_a	250 V	U_{g3}	-1,5	-1,5	V	U_{g2+g40}	300 V
		U_{g2+g4}	100 V	$U_{g1 ef}$	10	10	V	U_{g2+g4}	100 V
		U_{g3}	-1,5 V	I_a	2,8	3	mA	W_{g2+g4}	1 W
		R_{g1}	20 kΩ	I_{g2+g4}	7,3	7,1	mA	U_{g1}	0 V
		I_{g1}	0,5 mA	I_{g1}	0,5	0,5	mA	$-U_{g1}$	-50 V
		I_a	3 mA	I_k	10,6	10,6	mA	U_{g3}	0 V
		I_{g2+g4}	<9,5 mA	R_{g1}	20	20	kΩ	$-U_{g3}$	-50 V
		R_{g1}	20 kΩ	R_i	0,5	1	MΩ	R_{g1}	1 MΩ
		C_{g1}	4 μF	S_c	0,455	0,475	mA/V	R_{g3}	1 MΩ
		$U_{g1 ef}$	10 V	$U_{g3} (S_c = 4 \mu A/V)$	-30	-30	V	I_k	14 mA
		f	50 Hz	Capacitances			$U_{k/f}$	150 V	
				C_{g3}	7,15	pF	U_f	14 V	
				C_a	8,6	pF	U_f	>11,4 V	
				C_{g1}	5,5	pF			
				$C_{a/g3}$	<0,35	pF			
				$C_{g1/g3}$	<0,15	pF			
				$C_{a/g1}$	<0,05	pF			
				$C_{g1/k}$	2,75	pF			
				C_k	13,5	pF			
		$I_{az} (U_{g3} = -30 V)$	<0,4 mA						



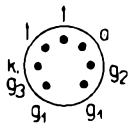
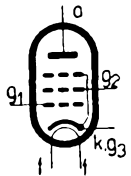
Variable- μ heptode Mixer

Type Application	Dimensions Base	Heating		Operational Data	Maximum Ratings		
		Static data					
18F24	Size L 3	U_f	18 V	RF amplifier, class A		U_{a0}	400 V
		I_f	0,165 A			U_a	250 V
		Indirect heating		U_{g3}	0 V	W_a	4 W
		U_a	250 V	U_{g2}	200 V	U_{g2}	250 V
		U_{g3}	0 V	R_k	120 Ω	W_{g2}	0,45 W
		U_{g2}	200 V	I_a	15 mA	I_k	20 mA
		U_{g1}	-2 V	I_{g2}	2,1 mA	R_{g1}	0,5 M Ω
		I_a	15 mA	S	10 mA/V	$U_{k/f}$	50 V
		I_{g2}	2,1 mA	R_i	0,3 M Ω	Capacitances	
		S	10 mA/V			C_{g1}	10,5 pF
		R_i	0,3 M Ω			C_a	5,9 pF
		$I_{az} (U_{g1} = -7 V)$	<0,5 mA			$C_{a/g1}$	<0,035 pF





RF high-slope pentode
RF, IF, wideband
amplifier

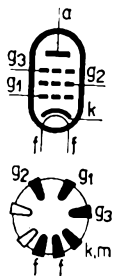
Type Application	Base Dimensions	Heating		Operational Data					Maximum Ratings	
		Static data								
35L31	Size M 4	I_f	150 mA	AF power amplifier, class A					U_{a0}	550 V
		U_f	35 V						U_a	100
		Indirect heating		U_{g2}	100	180	200	V	W_a	11 W
		U_a	200 V	R_k	140	140	200	Ω	U_{g20}	550 V
		U_{g2}	200 V	I_a	32,5	61	55	mA	U_{g2}	250 V
		U_{g1}	-13 V	I_{g2}	5,5	10	9,5	mA	$W_{g2} (U_{g1} \sim 0 V)$	1,9 W
		I_a	55 mA	S	7,5	9	8	mA/V	$W_{g2} (U_{g1} \sim \max)$	3,5 W
		I_{g2}	9,5 mA	R_i	25	22	25	$k\Omega$	R_{g1}	1 $M\Omega$
		S	8 mA/V	R_a	3	3	3,5	$k\Omega$	$U_{k/f}$	150 V
		R_i	25 $k\Omega$	P_o	1,35	4,8	4,8	W	$R_{k/f}$	20 $k\Omega$
		$I_a (U_{g1} = -28 V)$	<10 mA	k	10	10	10	%	U_f	38,5 V
				$U_{g1 ef}$	3,8	6,2	6,2	V	U_f	>31,5 V
				$U_{g1 ef} (P_o = 50 mW)$						
				0,55	0,5	0,5	V			
								Capacitances		
								C_a/g_1	<1,2	pF



Output pentode
AF power amplifier

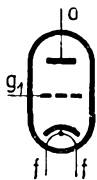
Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
35Y31	Size M 4	I_f	150 mA	$U_{a\ ef}$	127-170	170-250 V	U_{inv}	700 V
		U_f	35 V	R_o	($C_N=60\ \mu F$) 100	175 Ω	$U_{a\ ef}$	250 V
		Indirect heating		($C_N=32\ \mu F$)	75	125 Ω	I_{ss}	140 mA
				($C_N=16\ \mu F$)	30	75 Ω	I_{sp}	850 mA
				($C_N=8\ \mu F$)	0	0 Ω	W_a	2,5 W
				C_N	32	32 μF	$U_{k/f}$	550 V
				I_{ss}	140	140 mA	U_f	38,5 V
				U_{ss}	103	165 V	U_f	>31,5 V
 								
Diode Half-wave rectifier								

Type Application	Dimensions Base	Heating		Operational Data				Maximum Ratings		
		Static data								
4654	Size P 4	U_f	6,3 V	AF push-pull power amplifier, class AB				U_{a0}	1200 V	
		I_f	1,35 A					U_{a1}	400 V	
		Indirect heating		U_{g3}	0 V					
		U_a	400 V	U_{g2}	425 V	425 V	400 V	W_a	18 W	
		U_{g3}	0 V	U_{g1}	—	—30	—33 V	U_{g20}	1000 V	
		U_{g2}	425 V	R_k	315	—	— Ω	U_{g2}	425 V	
		U_{g1}	—33 V	I_{j0}	2×45	2×27,5	2×26 mA	U_{g20}	3 W	
		I_{j1}	45 mA	I_{j1}	2×50	2×97	2×80 mA	W_{g2}	10 W	
		I_{g2}	5 mA	I_{g20}	2×5	2×3	2×2,5 mA	I_k	120 mA	
		S	6 mA/V	I_{g2}	2×13	2×23	2×20 mA	$U_{k'f}$	50 V	
		R_i	30 k Ω	R_{1-a}	10	5	10 k Ω	$R_{g1}(k)$	0,7 M Ω	
		I_{az}	($U_{g1} = -45$) <15 mA	P_o	25	52,5	69 W	$R_{j1}(p)$	0,5 M Ω	
				k	4	3,5	5 %	$R_{k/f}$	10 k Ω	
				$U_{g1 ef}$	18,5	22	22 V	Capacitances		
								C_{g1}	15,5 pF	
								C_a	10 pF	
								$C_{g1/a}$	<0,9 pF	



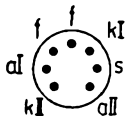
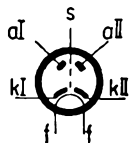
Power pentode
AF power amplifier

Type Application	Dimensions Base	Heating		Operational Data	Maximum Ratings		
		Static data					
AD1N	Size P 1	U_f	4 V	AF power amplifier, class A	U_{ao}	550 V	
		I_f	2 A		U_b	295 V	U_a
		t_f	16 s	U_{g1}	-45 V	W_a	15 W
		Indirect heating		I_a	60 mA	I_k	90 mA
		U_a	250 V	R_a	2300 Ω	$R_{g1}^{1)}$	0,3 M Ω
		U_{g1}	-45 V	R_k	750 Ω	$R_{g1}^{2)}$	0,7 M Ω
		I_a	60 mA	P_o	4,2 W		
		S	4,3 mA/V	$U_{g1\ ef}$	30 V	1) U_{g1} fixed	
		R_i	1035 Ω	k	5 %	2) U_{g1} automatic	
		μ	4,4	AF push-pull power amplifier		Capacitances	
		I_{az} ($U_{g1} = -70$ V)	10 mA	U_b	295 V	C_{g1}	14,4 pF
				R_k	375 Ω	C_a	10 pF
				$R_{a-a'}$	4 k Ω	$C_{a/g1}$	6,9 pF
				I_{ao}	2×60 mA		
				I_a	2×64 mA		
				P_o	9,5 W		
				$U_{g1\ ef}$	30 V		
				k	1,5 %		



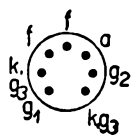
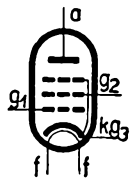
Power triode
AF power amplifier

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
EAA91 6B32	Size max Ø 19×48 mm	U_f	6,3 V	Half-wave rectifier			Each section	
		I_f	0,3 A					$U_{a\ ef}$
		I_f	0,3 A	R_o	300 Ω	I_{ss}	9 mA	
		U_f	6,3 V	I_{ss}	9 mA	$I_{sp} 1)$	90 mA	
		Indirect heating		I_{sp}	54 mA	W_a	0,5 W	
		U_a	4 V	Full-wave rectifier			$U_{+k/f-}$	330 V
		I_a	>10 mA	$U_{a\ ef}$	2×150 V	$U_{-k/f+}$	150 V	
				R_o	2×300 Ω	$R_{k/f}$	20 kΩ	
				C_N	1 μF	$U_{di} (I_d \leq 0,3 \mu A)$	-1,3 V	
				R_z	15 kΩ	C_N	8 μF	
				U_{ss}	130 V	R_o	>200 Ω	
				Capacitances			1) Max, 18 μs, max 18% of a cycle	
				$C_{aI/kI+s+f}$	2,2 pF			
				$C_{aII/kII+s+f}$	2,2 pF			
				$C_{kI/aI+s+f}$	3,3 pF			
				$C_{kII/aII+s+f}$	3,3 pF			
				$C_{aI/aII}$	<0,05 pF			



Twin diode with separate cathodes, AM, FM, demodulator, ratio detector, full-wave rectifier

Type Application	Dimensions Base	Heating		Operational Data			Maximum Ratings	
		Static data						
EF95 6F32	Size max Ø 19×45,2 mm	U_f	6,3 V	RF amplifier, class A			U_{a0}	320 V
		I_f	0,175 A	U_a	120	180 V	U_a	200 V
		Indirect heating		U_{g2}	120	120 V	W_a	1,7 W
			●	R_k	200	200 Ω	U_{g20}	320 V
		U_a	120 V	I_a	7,5	7,7 mA	U_{g2}	150 V
		U_{g2}	120 V	I_{g2}	2,5	2,5 mA	W_{g2}	0,5 W
		R_k	200 Ω	S	5	5,1 mA/V	I_k	18 mA
		I_a	7,5 mA	R_i	0,34	0,69 MΩ	R_{g1}	1 MΩ
		I_{g2}	<3,5 mA	Z_{g1} (f=50 Mc/s)	25	25 kΩ	$U_{k/f}$	100 V
		S	5,2 mA/V	R_{ekv}	2	2 kΩ	$R_{k/f}$	20 kΩ
		$\mu_{g2/g1}$	25	RF amplifier, class A - triode connection			Capacitances	
		R_i	>0,25 MΩ	U_a	120	180 V	C_{g1}	4,5 pF
				U_{g1}	-2,65	-6 V	C_a	2,8 pF
				R_k	265	925 Ω	$C_{a/g1}$	<0,025 pF
				I_a	10	6,5 mA		
				S	6	3,5 mA/V		
				R_i	5	6,66 kΩ		
				μ	30	23,3		
				Z_{g1} (f=100 Mc/s)	9,5	kΩ		
				R_{ekv}	700	Ω		



RF high-slope pentode
PF, IF, wideband
amplifier

Table of receiving tube equivalents

TESLA	European designation	Marconi	CV number	Other makers
1AF33	DAF96	ZD17 ¹⁾	CV784 ¹⁾	1FD1, 1FD9 ¹⁾ , 1S5T
1AF34				1B2Π, 1B1Π ^{1), 3)}
1F33	DF96	W17 ¹⁾	CV785 ¹⁾	1F3 ¹⁾ , 1T4T
1F34				1K2Π, 1K1Π ^{1), 3)}
1H33		X17 ¹⁾	CV782 ¹⁾	1C1 ¹⁾ , 1R5T
1H34				1A2Π, 1A1Π ^{1), 3)}
1H35	DK96			1AB6
1L33	DL91 ¹⁾		CV783 ¹⁾	1S4T
1NN41	OA160			
1Y32				1Z2
1Y32T				~1Z2
2NN41				1N51
3L31				3A4 ¹⁾
3NN41	OA50			1N34
4NN41				1N48
5NN41	OA55			1N38
6B32	EAA91, EB91	D77/D152	CV140, CV283	6D2, 6X2Π
6BC32	EBC91			6AV6
6CC10	ECC33	B65	CV1988	6SN7, 6H8C
6CC31	ECC91		CV858	6H15Π, 6J6
6CC41				6H2Π, 12AX7 ²⁾
6CC42				6385, 2C51, 5760, 6H3Π
6F10			CV660	6AC7, 6Ж4
6F31	EF93	W727	CV454	6BA6, 6K4Π
6F32	EF95		CV850	6AK5, 6Ж1Π
6F32V				5654, 6AK5W, 6AK5WA
6F35				6AJ5
6F36				6AH6, 6Ж5Π
6H31	EK90	X727	CV453	6A2Π, 6BE6
6L10			CV1882	6AG7, 6Π9
6L31	EL90	N727	CV1862	6005, 6AQ5, 6Π1Π ⁴⁾
6L41			CV2129	5763
6L43				6CL6
6NN41				1N64
6Z31				6X4, 6Ц4Π

TESLA	European designation	Marconi	CV number	Other makers
7QR20	~DG7-6 4)			~3BP1, ~3QP1 4)
12BC32	HBC91			12AV6
12F31	HF93		CV1928	12BA6
12H31	HK90			12BE6
12QR50			CV1069 4)	5JP1 4)
12QR51				~OE411PAV 4)
25QP20				10BP4
25QP21				10BP7
251QQ44	A25-10W			
280QQ44	A28-13W			
470QQ44	AW47-91			19ALP4, 19AQP4, 19BEP4
472QQ44	A47-11W			
502QQ44	A50-12W			
590QQ44	AW59-90			23AJP4, 23AMP4, 23AQP4, 23BCP4
592QQ44	A59-12W/2, A59-11W			23DEP4, 23DRP4, 23FQP4 23HBP4
AZ1			CV2860	
DY86				1S2
E88CC				6922, CC α
E180F				6608, 5A/170K, EF861
EAA91				6AL5
EABC80		DH719		6LD12, 6T8, 6AK8
EBF89				7125, 6DC8
EC86				6CM4
EC88				6DL4, 6LD4
ECC82		B329	CV491	12AU7
ECC83		B339	CV492	12AX7, 6L13
ECC84				6CW7, 6H14II
ECC85		B719		6L12, 6AQ8
ECC88				6DJ8, 6H23II
ECC91				6J6, 6H15II
ECC189				6ES8
ECC802S				12AU7WA, 6067
ECC803S				12AX7WA, 6057

TESLA	European designation	Marconi	CV number	Other makers
ECH81		X719	CV2128	6C12, 6AJ8, 6I1Π
ECH84				6JX8
ECF82				6U8
ECL82				6BM8
ECL84				6DX8
ECL86				6GW8
EF80		Z719, Z152		64SPT, 6BX6
EF86		Z729		6267, 6Ж32Π
EF89			CV2901	6DA6
EF183				6EH7, 6F29
EF184				6EJ7, 6F30
EF800				EF860
EF806S				6267
EL34				6CA7
EL36				6CM5
EL81			CV2721	6CJ6
EL82				6DY5
EL83			CV2726	6CK6, 6CN6
EL84		N709	CV2975	6P15, 6BQ5, 6Π14Π, 6L40
EL86				6CW5
EL500				6GB5A
EM4n			~CV1434	
EM80			CV1352	65ME, 6BR5, 6E1Π
EM81				6DA5
EM84				6FG6
EY82				6H3
EY83				6Ц10Π ³⁾
EY88				6AL3
EY86				6S2
EZ80				6V4
EZ81		U709		UU12, 6CA4
PABC80				9AK8
PCC84				30L1, 7AN7
PC86				4CM4
PC88				4DL4
PCC85				9AQ8

TESLA	European designation	Marconi	CV number	Other makers
PCC88				7DJ8
PCC189				7ES8
PCF82				9U8
PCF200				8X9
PCF801				8GJ7
PCF802				8JW8
PCL82		~LN309		16A8, 30P12
PCH200				9V9
PCL85				18GV8
PCL86				14GW8
PL36				25E5, 30P4
PL81		N152, N359		213Pen, 21A6
PL82		N154, N329		30P16, 16A5
PL83		N153		15A6
PL84				30P18
PL508				28GB5
PY82		U152		19SU, 19Y3
PY83				17Z3
PY88				30AE3
UABC80				10LD12
UBF89				10FD12, 19DC8, 19FL8
UCC85				10L14
UCH81				10C14, 19D8, 19AJ8
UCL82				10PL12, 50BM8
UL84				10P18, 45B5
UY85				38A3
UM80				19BR5
UY82				55N3

1. Double heating current, TESLA type more economical
2. Different socket
3. Different heating voltage
4. Different external design