INSTRUMENT CATHODE-RAY TUBE

13 cm diameter flat faced oscilloscope tube with metalbacked screen, distributed p.d.a. and side connections to the deflection plates.

QUICK REFERENCE DATA				
Final accelerator voltage	$V_{g9(\ell)}$		15	kV
Display area			6 x 10	cm
Deflection factor, horizontal	M_x	max.	12.5	V/cm
vertical	M_y	max.	3.5	V/cm

SCREEN

	colour	persistence
D13-22BE	blue	medium short
D13-22GH	green	medium short
D13-22GP	bluish green	medium short
D13-22GM	yellowish green	long

Useful screen diameter	min.	114	mm
Useful scan at $V_{g9(\ell)}/V_{g4}$ = 10			
horizontal	min.	100	mm
vertical	min.	60	mm

The useful scan may be shifted vertically to a max. of 3 mm with respect to the geometric centre of the faceplate.

HEATING

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

Heater voltage	V_f	6.3	V
Heater current	I_f	300	mA

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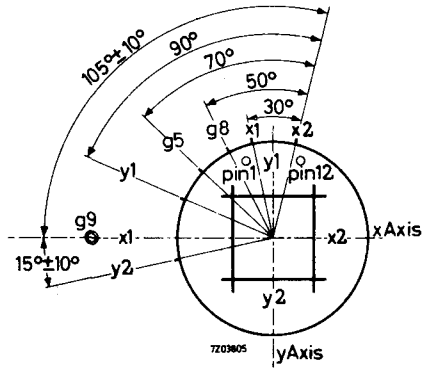
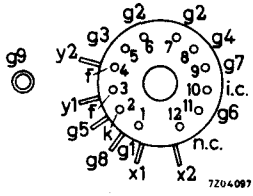
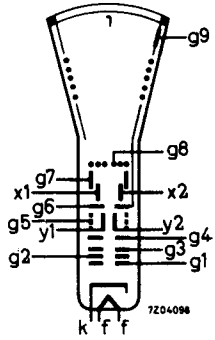
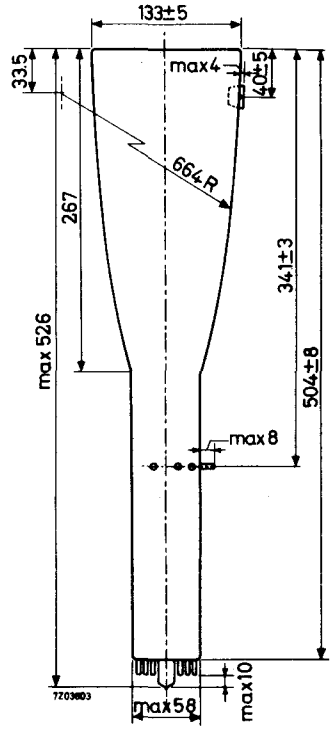
MECHANICAL DATA

Dimensions in mm









Mounting position: any

The tube should not be supported by the base alone and under no circumstances should the socket be allowed to support the tube.

Base	B12F		
Dimensions and connections			
Overall length	max.	526	mm
Face diameter	max.	138	mm
Net weight	approx.	1300	g
Accessories			
Socket	type	55562	
Final accelerator contact connector	type	55563	
Side contact connector	type	55561	

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CAPACITANCES

x_1 to all other elements except x_2	$C_{x_1(x_2)}$	max.	6.1	pF
x_2 to all other elements except x_1	$C_{x_2(x_1)}$	max.	6.4	pF
y_1 to all other elements except y_2	$C_{y_1(y_2)}$	max.	3.9	pF
y_2 to all other elements except y_1	$C_{y_2(y_1)}$	max.	3.9	pF
x_1 to x_2	$C_{x_1x_2}$	max.	2.1	pF
y_1 to y_2	$C_{y_1y_2}$	max.	2.1	pF
Control grid to all other elements	C_{g_1}	max.	6.2	pF
Cathode to all other elements	C_k	max.	4.1	pF

FOCUSING electrostatic

DEFLECTION double electrostatic

x plates symmetrical

y plates symmetrical

If use is made of the full deflection capabilities of the tube the deflection plates will intercept part of the electron beam; hence a low impedance deflection plate drive is desirable.

Angle between x and y traces 90 ± 1°

LINE WIDTH

Measured with the shrinking raster method in the centre of the screen.

Final accelerator voltage	$V_{g_9(\ell)}$	15000	V
Astigmatism control electrode voltage	V_{g_4}	1500	V
First accelerator voltage	V_{g_2}	1500	V
Beam current	$I(\ell)$	25	μA
Line width	l.w.	0.6	mm

HELIX

Post deflection accelerator helix resistance	min.	175	MΩ

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TYPICAL OPERATING CONDITIONS

Final accelerator voltage	$V_{g9}(\ell)$	15000	V
Post deflection shield voltage (w.r.t. V_{g7})	V_{g8}	−12 to −18	V
Geometry control electrode voltage	V_{g7}	1500 ± 50	V [1]
Helix voltage lower end	V_{g6}	1500	V
Deflection plate shield voltage	V_{g5}	1500	V [2]
Astigmatism control electrode voltage	V_{g4}	1500 ± 50	V [3]
Focusing electrode voltage	V_{g3}	250 to 500	V
First accelerator voltage	V_{g2}	1500	V
Control grid voltage for visual extinction of focused spot	$-V_{g1}$	45 to 85	V
Deflection factor, horizontal	M_x	9.4 to 12.5	V/cm
vertical	M_y	2.3 to 3.5	V/cm
Deviation of linearity of deflection	max.	2	% [4]
Geometry distortion		see note 5	
Useful scan, horizontal	min.	100	mm
vertical	min.	60	mm

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1) This tube is designed for optimum performance when operating at the ratio $V_{g9}(\ell)/V_{g4} = 10$. Operation at other ratio may result in changes in deflection uniformity and geometry distortion. The geometry control electrode voltage should be adjusted for optimum performance. For any necessary adjustment its potential will be within the stated range.

2) This voltage should be equal to the mean x- and y plates potential.

3) The astigmatism control electrode voltage should be adjusted for optimum spot shape. For any necessary adjustment its potential will be within the stated range.

4) The sensitivity at a deflection of less than 75% of the useful scan will not differ from the sensitivity at a deflection of 25% of the useful scan by more than the indicated value.

5) A graticule, consisting of concentric rectangles of 100 mm x 60 mm and 98 mm x 58 mm is aligned with the electrical x axis of the tube. The edges of a raster will fall between these rectangles with optimum correction potentials applied.

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LIMITING VALUES (Absolute max. rating system)

Final accelerator voltage	$V_{g9(\ell)}$	max.	17300	V
		min.	6000	V
Post deflection shield voltage	V_{g8}	max.	3300	V
		min.	1000	V
Geometry control electrode voltage	V_{g7}	max.	3300	V
		min.	900	V
Helix voltage, lower end	V_{g6}	max.	3300	V
		min.	1000	V
Deflection plate shield voltage	V_{g5}	max.	3300	V
		min.	1000	V
Astigmatism control electrode voltage	V_{g4}	max.	3300	V
		min.	1000	V
Focusing electrode voltage	V_{g3}	max.	1500	V
First accelerator voltage	V_{g2}	max.	1700	V
		min.	800	V
Control grid voltage,				
negative	$-V_{g1}$	max.	200	V
positive	V_{g1}	max.	0	V
Voltage between astigmatism electrode and any deflection plate	$V_{g4/x}$	max.	500	V
	$V_{g4/y}$	max.	500	V
Cathode to heater voltage,				
cathode positive	$V_{+k/f-}$	max.	200	V
cathode negative	$V_{-k/f+}$	max.	125	V
Screen dissipation	W_{ℓ}	max.	3	mW/cm^2
Ratio $V_{g9(\ell)}/V_{g4}$	$V_{g9(\ell)}/V_{g4}$	max.	10	

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CIRCUIT DESIGN VALUES

Focusing voltage	V_{g3}	167 to	333	V per kV of V_{g4}
Control grid voltage for visual extinction of focused spot	$-V_{g1}$	30 to	56.7	V per kV of V_{g2}
Deflection factor at $V_{g9}(\ell)/V_{g4} = 10$				
horizontal	M_x	6.3 to	8.4	V/cm per kV of V_{g4}
vertical	M_y	1.53 to	2.33	V/cm per kV of V_{g4}
Control grid circuit resistance	R_{g1}	max.	1	MΩ
Deflection plate circuit resistance	R_x, R_y	max.	50	kΩ
Focusing electrode current at a beam current of max. 25 μA	I_{g3}	−25 to	+25	μA [1])

[1]) Values to be taken into account for the calculation of the focus potentiometer.

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