

used in EM1/SE SM111



INSTRUMENT
CATHODE RAY TUBE

very similar to D13-47 6x10cm

improved version is 1400J / D14-180 which are 338mm long.

BRIEF DATA

A rectangular, flat faced, single gun oscilloscope tube with spiral p.d.a. and full 8 x 10 cm display.

Final anode voltage (p.d.a.)	4	kV
Display area	8 x 10	cm
Y deflection factor (D_y)	< 9.5	V/cm
X deflection factor (D_x)	< 18	V/cm

Length 368

HEATER

Heater voltage	6.3	V
Heater current	0.3	A

SCREEN

Tube normally supplied with type 24 phosphor as 1424A

Fluorescence	Green
Phosphorescence	Green
Persistence	1 - 5 ms
E.I.A. phosphor code	P31
GEC phosphor code	24
Pro Electron phosphor code	GH

Other screens are available to special order (see data sheet 'CRT Screens')

CAPACITANCES (Typical)

Cathode to all other electrodes	5.5	pF
Control grid to all other electrodes	11.0	pF
Blanking plate to all other electrodes	10.0	pF
Deflector plates y1 to y2	1.8	pF
Deflector plates y1 to all electrodes except y2	6.4	pF
Deflector plates y2 to all electrodes except y1	6.4	pF
Deflector plates x1 to x2	2.0	pF
Deflector plates x1 to all electrodes except x2	6.8	pF
Deflector plates x2 to all electrodes except x1	6.8	pF

RATINGS (Absolute)

		Max	Min	
Fourth anode voltage	V_{a4}	7.0	2.5	kV
Third anode voltage	V_{a3}	1.7	0.6	kV
Ratio	V_{a4}/V_{a3}	4	—	—
Focus voltage	V_{a2}	1.0	0	kV
First anode voltage	V_{a1}	1.75	0.6	kV
Control grid voltage	$-V_{g1}$	200	1.0	V
Blanking plate to first anode voltage	V_{g2-a1}	± 200	—	V
Y plate to third anode voltage	V_{y-a3}	500	—	V
X plate to third anode voltage	V_{x-a3}	500	—	V
Heater-cathode voltage	V_{h-k}	± 150	—	V
Grid to cathode circuit resistance	R_{g1-k}	1.5	—	M Ω
Y deflector plate circuit resistance	R_{y-a3}	100	—	k Ω
X deflector plate circuit resistance	R_{x-a3}	500	—	k Ω

Voltage ratings are to cathode unless otherwise shown.

EQUIPMENT DESIGN RANGE

	Max	Min	
V_{a2} (for focus)	400	175	V/k V_{a3}
$-V_{g1}$ (for cut-off)	65	35	V/k V_{a1}
V_{g2} (for blanking) (w.r.t. $a1$)	60	—	V/k V_{a1}
D_y (at $V_{a4}/V_{a3} = 4$)	9.5	7.8	V/cm/k V_{a3}
D_x (at $V_{a4}/V_{a3} = 4$)	18	14.8	V/cm/k V_{a3}
V_{a3} (astigmatism correction)	+50	-50	V/k V_{a3}
V_s (pattern correction)	+50	-50	V/k V_{a3}

TYPICAL OPERATION (All operating potentials are with respect to cathode)

Fourth anode voltage	V_{a4}	4	kV
Third anode voltage	V_{a3}	1	kV
Focus voltage	V_{a2}	175 — 400	V
First anode voltage	V_{a1}	1	kV
Nominal blanking plate voltage	V_{g2}	1	kV
Nominal geometry correction voltage	V_s	1	kV
Control grid voltage for spot cut-off	$-V_{g1}$	35 — 65	V
Maximum y deflection factor	D_y	9.5	V/cm
Maximum x deflection factor	D_x	18.0	V/cm
* Line width (typical)		0.6	mm
<i>Line width by shrinking raster</i>		0.3	

* For type 24 (P31) phosphor, measured by means of a microscope at the geometric centre of the faceplate, at a beam current of 5 μ A.

Pattern Distortion

The angle between the x and y axes will be $90^\circ \pm 1^\circ$.

Deflection Linearity

The deflection factor for a deflection of less than 75% of the useful scan will not differ from that for a deflection of 25% by more than 2%.

Spot Position

The focused and undeflected spot will fall within a rectangle 8 x 10 mm centred at the geometric centre of the faceplate, the greater dimension being parallel to the x axis.

Orientation

When looking at the screen with pins 6 and 7 of the base uppermost, a positive potential applied to x1 will deflect the beam to the left and a positive potential applied to y1 will deflect the beam upwards.

Minimum Scanned Area

x axis 10 cm
y axis 8 cm

This area will be centred on a point which is within 3 mm of the major and minor axes of the tube face.

Beam Blanking

At a cathode current of $500\text{ }\mu\text{A}$, a potential of $+60\text{V/kV}_{a1}$ with respect to $a1$ applied to the blanking electrode $g2$, will completely cut off the beam. This electrode should not be used as a brightness control.

Astigmatism Correction

Adjustment of the potential on a3 relative to the y plate mean potential may be used for the purpose of astigmatism correction. A range of adjustment of $\pm 50 \text{ V/kV}_{a3}$ should be allowed for this purpose.

Pattern Correction

Barrel or pincushion distortion may be minimised by the application of the appropriate potential to s with respect to the x plate mean potential. A range of adjustment of $\pm 50V/kV_{a3}$ should be allowed for this purpose. Astigmatism and pattern correction potentials are quoted for the condition where the x plate mean potential is equal to the y plate mean potential. If in any application, a difference between x and y plate mean potentials is unavoidable it is recommended that this difference should be kept to a minimum.

Axis Alignment

The electrical x axis of the tube will lie within $\pm 5^\circ$ of the major axis of the faceplate and may be aligned with this axis by means of the field from an axial coil placed about the cone of the tube in the region shown in the outline drawing. The maximum ampere turns required for axis alignment will not exceed $12\sqrt{kV_{a4}}$.

MOUNTING

The tube may be mounted in any position but should not be supported by base alone. It should, preferably, be held in a suitable rubber mask at the screen and by a clamp round the magnetic shield near the base. The socket should have sufficient freedom of movement to accommodate overall length and base orientation tolerances.

WEIGHT

The weight of the tube alone is approximately 1.0 kg.

BASE CONNECTIONS

Base: B12F

Side contact (CT8): a4

Pin 1: g1
2: hk
3: h
4: a2
5: g2
6: a3

Pin 7: y1
8: y2
9: s
10: x1
11: a1
12: x2

MAGNETIC SHIELD

A suitable magnetic shield may be obtained from Magnetic Shields Ltd., Headcorn Road, Staplehurst, Tonbridge, Kent.

WARNING

Care should be taken not to expose the tube to strong magnetic fields either in use or during storage.

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OUTLINE

