

Brunel D13-51



**INSTRUMENT
CATHODE RAY TUBE**

10 x 6

BRIEF DATA

A 13cm diagonal (5 $\frac{1}{4}$ ") flat faced rectangular instrument tube with aluminised screen, mesh p.d.a. and deflection blanking. This tube has side connected deflection plates and is intended for use in general purpose oscilloscopes.

HEATER

Heater voltage	6.3	V
Heater current	300	mA

SCREEN

	1374Q	1396Q
Fluorescence	Green	Bluish-White
Phosphorescence	Green	Yellowish-Green
Persistence	1-5ms	10-60s
E.I.A. phosphor code	P31	P7
Pro Electron phosphor code.	GH	GM
GEC phosphor code	74	96

Other screens are available to special order (see data sheet 'CRT Screens').
Preferred Type 1374Q/G8 with special purpose internal graticule.

CAPACITANCES (Typical)

Cathode to all other electrodes	4.4	pF
Control grid to all other electrodes	8.3	pF
Blanking plate to all other electrodes	6.9	pF
Deflector plate y_1 to y_2	1.0	pF
Deflector plate y_1 to all electrodes except y_2	2.8	pF
Deflector plate y_2 to all electrodes except y_1	2.8	pF
Deflector plate x_1 to x_2	1.5	pF
Deflector plate x_1 to all electrodes except x_2	5.3	pF
Deflector plate x_2 to all electrodes except x_1	5.3	pF

RATINGS (Absolute)

		Max	Min	
Fourth anode voltage	V_{a4}	12	5.0	kV
Third anode voltage	V_{a3}	2.0	0.9*	kV
Ratio	V_{a4}/V_{a3}	10	—	
Focus voltage	V_{a2}	1.0	—	kV
First anode voltage	V_{a1}	2.0	0.9*	kV
Control grid voltage	$-V_{g1}$	200	1.0	V
Blanking plate to first anode voltage	V_{g2-a1}	+200	-200	V
Heater to cathode voltage	V_{h-k}	±125	—	V
Y plate to third anode voltage	V_{y-a3}	500	—	V
X plate to third anode voltage	V_{x-a3}	500	—	V
Heater to cathode circuit resistance	R_{h-k}	100	—	kΩ
Grid to cathode circuit resistance	R_{g1-k}	1.0	—	MΩ
Y deflector plate circuit resistance	R_{y-a3}	100	—	kΩ
X deflector plate circuit resistance	R_{x-a3}	250	—	kΩ

*For 1374Q/G8 read 0.65kV minimum.

Voltage ratings are to cathode unless otherwise shown.

EQUIPMENT DESIGN RANGE

		Max	Min	
Focus voltage	V_{a2}	143	28	V/kV $_{a3}$
Control grid voltage for spot cut-off	$-V_{g1}$	93	50	V/kV $_{a1}$
Blanking voltage	V_{g2-a1}	+50	-50†	V/kV $_{a3}$
Y deflection factor	D_y	5.7	4.2	V/cm/kV $_{a3}$
X deflection factor	D_x	14.3	11.4	V/cm/kV $_{a3}$
Astigmatism correction voltage	$V_{a3-y \text{ mean}}$	+30	-60	V/kV $_{a3}$
Pattern correction voltage	$V_{s2-x \text{ mean}}$	+50	-50	V/kV $_{a3}$

†For visual extinction of the trace at a beam current of 5μA. The use of negative blanking is recommended.

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

Fourth anode voltage	V_{a4}	10	kV
Third anode voltage	V_{a3}	1.0	kV
Focus voltage	V_{a2}	28-143	V
First anode voltage	V_{a1}	1.0	kV
Control grid voltage for spot cut-off	$-V_{g1}$	93-50	V
Nominal blanking plate voltage	V_{g2}	1.0	kV
Nominal beam alignment voltage	V_{g3}	1.0	kV

Nominal i.p.s. voltage	V_{s1}	1.0	kV
Nominal mesh voltage	V_{s3}	0.975	kV
Nominal geometry correction			
voltage	V_{s2}	1.0	kV
Maximum y deflection factor	D_y	5.7	V/cm
Maximum x deflection factor	D_x	14.3	V/cm
Line width (typical) 74 screen		0.35	mm

Measured by means of a shrinking raster at $I_b = 5\mu A$

*1374Q/G8 is a special purpose tube operating at 7.0/0.7kV

DISPLAY CHARACTERISTICS (Typical Operation)‡

‡These characteristics apply to 1374Q/G8 when suitably scaled for 7.0/0.7kV operation.

Pattern Distortion

With pattern correction applied to s_2 , the edges of a test raster will lie between two concentric rectangles of 100mm x 60mm and 98mm x 58.5mm. The angle between x and y axis will be $90^\circ \pm \frac{1}{4}^\circ$ measured at face centre.

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 3%.

Spot Position

The focused and undeflected spot will fall within a rectangle 8mm x 20mm centred at the geometric centre of the faceplate, the greater dimension being aligned in the x-axis.

Orientation

Looking at the screen with pins 1 and 12 uppermost a positive voltage applied to x_1 will deflect the beam to the left and a positive voltage applied to y_1 will deflect the beam upwards.

Minimum Scanned Area

x major axis	10.0	cm
y minor axis	6.0	cm

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

ASTIGMATISM CORRECTION

Adjustment of the potential on a_3 relative to the y deflector plate mean potential may be used for astigmatism correction. A range of adjustment from +30 to -60V/kV $_{a_3}$ should be allowed.

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 a close fitting 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 be given by $14\sqrt{kV_{a_4}}$.

BEAM ALIGNMENT

Because of the close spacing of the deflector plates in order to achieve sensitivity, some tubes may exhibit a tendency towards x plate cut off within the specified minimum window size. This may be corrected by centralising the undeflected beam in the x deflector plates by means of a suitable potential applied to the beam aligning electrode g_3 . A range of adjustment of $\pm 50\text{V/kV}_{a_1}$ with respect to a_1 should be allowed for this purpose.

BEAM BLANKING (If g_2 blanking not used join pins 7 & 10 externally)

Under typical operating conditions (i.e. $V_{a_1} = V_{a_3} = 1.0\text{kV}$) and for a beam current (I_b) of $5\mu\text{A}$ a potential of 50V (preferably negative) with respect to a_1 , applied to the blanking electrode g_2 , will completely cut off the beam. This electrode should not be used as a brightness control.

BACKGROUND SUPPRESSION

Background illumination may be reduced and contrast improved by applying a potential of -25V to s_3 with respect to s_2 .

MOUNTING

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

WEIGHT

The weight of the tube alone is 800 gm (approx.).

BASE CONNECTIONS

Base: B12F

Pin 1: g_1

2: k

3: h

4: h

5: a_2 (focus)

6: g_3 (beam alignment)

Pin 7: g_2 (blanking)

8: a_3

9: s_3 (contrast)

10: a_1

11: s_2 (geometry)

12: IC

Side contact (CT8): a_4

ACCESSORIES

CT8 Connector

Pressac Ltd.,
Leopold Street,
Long Eaton,
Nottingham, NG10 4QL

(cover) 12/426

(clip) 10/425

Magnetic Shield

Magnetic Shields Ltd.,
Headcorn Road,
Staplehurst,
Tonbridge, Kent.

Side Pin Connector

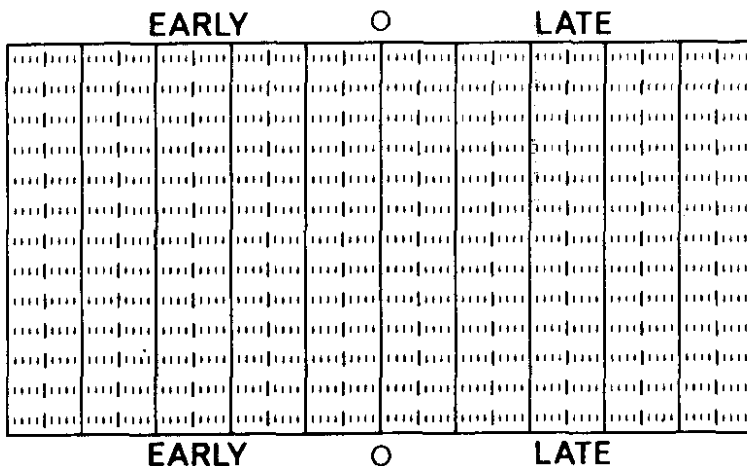
Auto Precision Ltd.,
Glendore Street,
Bristol BS5 9SY

WARNING

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

SPECIAL PURPOSE INTERNAL GRATICULE

The preferred tube, type 1374Q/G8, is supplied with a special internal graticule for use in equipments designed to measure the distortion of pulse trains on telegraph lines.



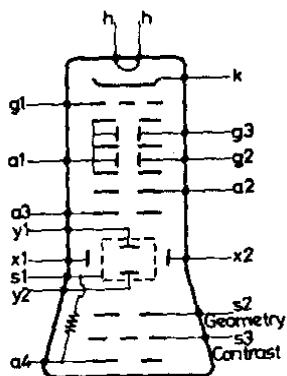
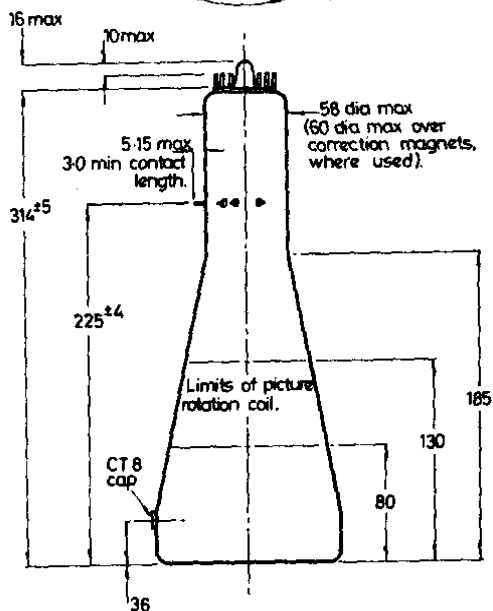
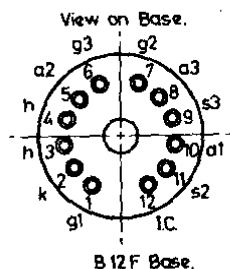
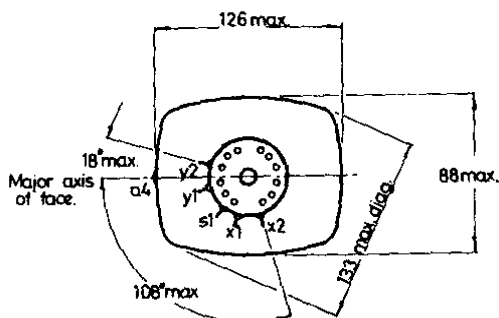
Other graticules are available to special order.

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Centre line of base lies within $90 \pm 5^\circ$ of major axis of face. CTB position lies within ± 5 mm. of major axis of face. Side pins 1 mm. dia. Minimum spacing between adjacent side pins 6 mm.



Dimensions in mm.