

IMPORTANT

The classification of the phosphor of this tube has been changed to P31, the screen characteristics remaining unaltered to E.T.E.L. tubes previously classified P1.

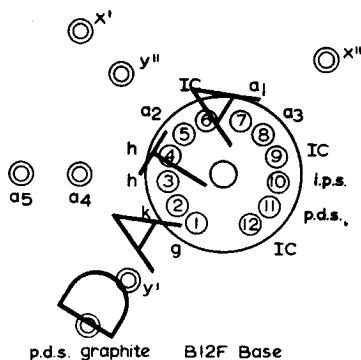
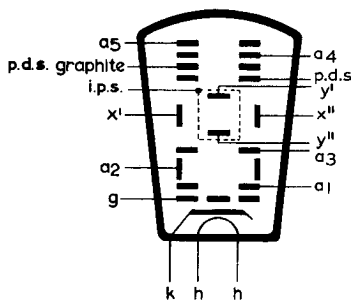
5CLP31

DH 13-60

OSCOPRE TUBE

High sensitivity oscilloscope tube with 5-in. diameter flat screen. This tube is fitted with two stages of distributed post deflection acceleration and the deflection plates are brought out to side connections.

ETL15A



PDS. graphite and i.p.s. must be connected together externally

GENERAL DATA

Screen type	metal-backed P31
Fluorescent colour of screen	green
Persistence	medium
Focus	electrostatic
Deflection	electrostatic
Post deflection acceleration	two stages distributed
Max. faceplate diameter	137.5 mm
Max. overall length	508 mm
Weight	{ 1.3 kg 2 lb 14 oz
Mounting position	any-see section on mounting
Useful screen area at $V_{a5}/V_{a3} = 10, V_{a4}/V_{a3} = 10$	
x direction	100 mm
y direction	60 mm

CATHODE

Indirectly-heated - suitable for parallel operation only.

Heater voltage	V_h	6.3	V
Heater current	I_h	550	mA



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CAPACITANCES

C _g -all	6.0	pF
C _k -all	4.5	pF
C _{x'} -all (x' earthed)	5.5	pF
C _{x''} -all (x'' earthed)	5.5	pF
C _{y'} -all (y' earthed)	4.3	pF
C _{y''} -all (y'' earthed)	4.0	pF
C _{x'-x''}	2.0	pF
C _{y'-y''}	2.0	pF
C _{x'+x''-y'+y''} max.	0.15	pF

LIMITING VALUES (absolute ratings)

Max. first anode voltage	V _{a1} max.	1.7	kV
Min. first anode voltage	V _{a1} min.	500	V
Max. second anode voltage	V _{a2} max.	1.5	kV
Max. third anode voltage	V _{a3} max.	3.3	kV
Min. third anode voltage	V _{a3} min.	800	V
Max. post deflection shield voltage	V _{p.d.s.} max.	4.2	kV
Min. post deflection shield voltage	V _{p.d.s.} min.	500	V
Max. post deflection graphite shield voltage	V _{p.d.s.graphite} max.	4.2	kV
Min. post deflection graphite shield voltage	V _{p.d.s.graphite} min.	500	V
Max. fourth anode voltage	V _{a4} max.	17.3	kV
Max. fifth anode voltage	V _{a5} max.	17.3	kV
Min. fifth anode voltage	V _{a5} min.	6.0	kV
Max. voltage differences	V _{a4-Va3} max.	14	kV
	V _{a5-Va4} max.	14	kV
Max. negative grid voltage	-V _g max.	200	V
Min. negative grid voltage	-V _g min.	1.0	V
Max. inter plate shield voltage	V _{i.p.s.} max.	4.2	kV
Min. inter plate shield voltage	V _{i.p.s.} min.	500	V
Max. grid resistor	R _{g-k} max.	1.0	MΩ
Max. peak heater to cathode voltage	V _{h-k(pk)} max.	250	V
Max. resistor between either deflector plate and a ₃	R _{x-a3} max.	1.0	MΩ
	R _{y-a3} max.	1.0	MΩ
Max. voltage between either deflector plate and a ₃	V _{x-a3} max.	500	V
	V _{y-a3} max.	500	V
Min. insulations	r _{a5-a4} min.	75	MΩ
	r _{a4-a3} min.	75	MΩ

TYPICAL OPERATION (with the i.p.s., p.d.s., p.d.s. graphite connected to a₃)

First anode voltage	V _{a1}	1.0	1.5	kV
Second anode voltage	V _{a2}	130 to 330	200 to 500	V
Third anode voltage	V _{a3}	1.0	1.5	kV
Fourth anode voltage	V _{a4}	10	15	kV
Fifth anode voltage	V _{a5}	10	15	kV
Grid voltage for visual cut-off	V _g	-28 to -60	-42 to -90	V
x plate sensitivity	S _x	7.5	11.2	V/cm
y plate sensitivity	S _y	1.85	2.7	V/cm

ETEL 5CLP31

OSCILLOSCOPE TUBE

DEFLECTION

The tube is designed for symmetrical operation in the x direction, and asymmetrical operation is not recommended.

In the y direction symmetrical or asymmetrical operation is permissible but the vertical deflection defocusing may be worse with asymmetric deflection. The data given for pattern distortion, therefore, do not apply to asymmetric y deflection.

The arrangement of the plates is such that viewing the screen with the x plate connectors symmetrically downwards a positive voltage on the x_1 plate deflects the spot to the left and a positive voltage on the y_1 plate deflects the spot upwards.

The x plates are nearest the screen.

In order to obviate the necessity for pulsing the grid when the tube is used for displaying low occurrence or single stroke phenomena, a beam trap is provided on each x plate. When a positive voltage of suitable magnitude is applied to either plate the beam is contained on that plate and a state of minimum luminance exists.

The following data for deflection sensitivities apply when $V_{a5} = 10\text{kV}$, $V_{a4} = 10\text{kV}$, $V_{a3} = 1\text{kV}$. Provided that the p.d.a. ratios remain constant, the sensitivities vary inversely with the total accelerating voltage (V_{a5}). Due to the presence of the post deflection shield however, variation of the p.d.a. ratio does not affect sensitivity greatly provided $V_{a4} = V_{a5}$. Reducing the a_4 potential below V_{a5} reduces sensitivity and usable screen area.

x plate sensitivity	S_x max.	1.6	mm/V
	S_x min.	1.2	mm/V
y plate sensitivity	S_y max.	6.85	mm/V
	S_y min.	4.73	mm/V

USE OF THE FOURTH ANODE

For the most sensitive condition, coupled with the largest usable screen area, the fourth anode (a_4) is connected to the fifth anode (a_5). Reducing the a_4 voltage below that of a_5 has the effect of reducing the sensitivity and the usable screen area. At the same time, however, the spot size is reduced considerably and single shot photography of high speed transients is eased.

RASTER DISTORTION

The use of the post deflection shield (p.d.s.) allows p.d.a. ratios up to 15 to be used before serious raster distortion is introduced. With $V_{a4} = V_{a5}$, $V_{a5}/V_{a3} = 10$ and the mean potentials of the x and y plates being equal to the potentials of the i.p.s., the p.d.s., and the p.d.s. graphite the following apply:

- (1) A nominal rectangular raster may be inserted into the frame bounded by concentric rectangles $51\text{mm} \times 81.6\text{mm}$ and $49\text{mm} \times 78.4\text{mm}$.
i.e., max. total raster distortion is $\pm 2.0\%$.
- (2) The sensitivity (for both $x'-x''$ and $y'-y''$ plate pairs separately) for a deflection of less than 75% of the useful scan will not differ from the sensitivity for a deflection of 25% of the useful scan by more than 2%.



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ORIENTATION AND RECTANGULARITY

The y axis lies within $\pm 12.5^\circ$ of the line drawn midway between pins 6 and 7, and pins 1 and 12 on the base.

The angle between x and y axes is $90^\circ \pm 1.5^\circ$.

MOUNTING

There is no restriction in the position of mounting.

In mounting the tube the main support should be at the end nearest the screen and so arranged that no stresses are produced in the glass. Adequate precautions should be taken to protect the tube from the effects of shock or sudden acceleration. In particular a resilient pad should be provided between the flat face of the tube and any surrounding metal parts. This tube is not intended to be soldered directly into the wiring. The tube socket and side connections should not be rigidly mounted but should have flexible leads and be allowed to move freely.

SUPPLIES

At average high brightness the first and third anode portion of the tube may require currents up to 1mA. If the tube is used for displaying low occupancy pulses the peak pulse cathode current may reach as much as 2mA, if large 'bright-up' pulses are used and the power supply should be capable of providing this current.

For optimum performance the mean potentials of the x and y plate systems should be the same, and equal to the potentials of the a_3 and the i.p.s. In cases where astigmatic adjustment is required the a_3 should be allowed to swing ± 50 volts with respect to the i.p.s. The p.d.s. should not be allowed to become positive with respect to the mean potential of the x plates.

The positive supply system will need to supply about 200 μ A tube current so that a high frequency generator is quite suitable for this purpose. In view of the small variations in deflection sensitivity with p.d.a. voltage it may be necessary to stabilise this supply in a number of cases.

AUXILIARY COMPONENTS

Sockets

The B12F socket can be supplied by the Carr Fastener Co. of Stapleford, Notts, type VO/842.

Cavity Cap Connectors

Any commercially available CT8 connectors are suitable, but in view of the proximity of the a_5 socket to the front of the tube and consequently to the metal panel, it is recommended that a high insulation type connector be used for this purpose.

Shields

In view of the high sensitivity of the tube it is advisable to mount it as far as possible from the transformers and chokes. If these are in close proximity to the tube thicker shields may be required to avoid saturation and trace modulation.

Magnetic and Electrical Alloys Ltd. of Burnbank, Hamilton, Lanarkshire, manufacture a shield for use with this tube.

ELECTRONIC TUBES LTD.

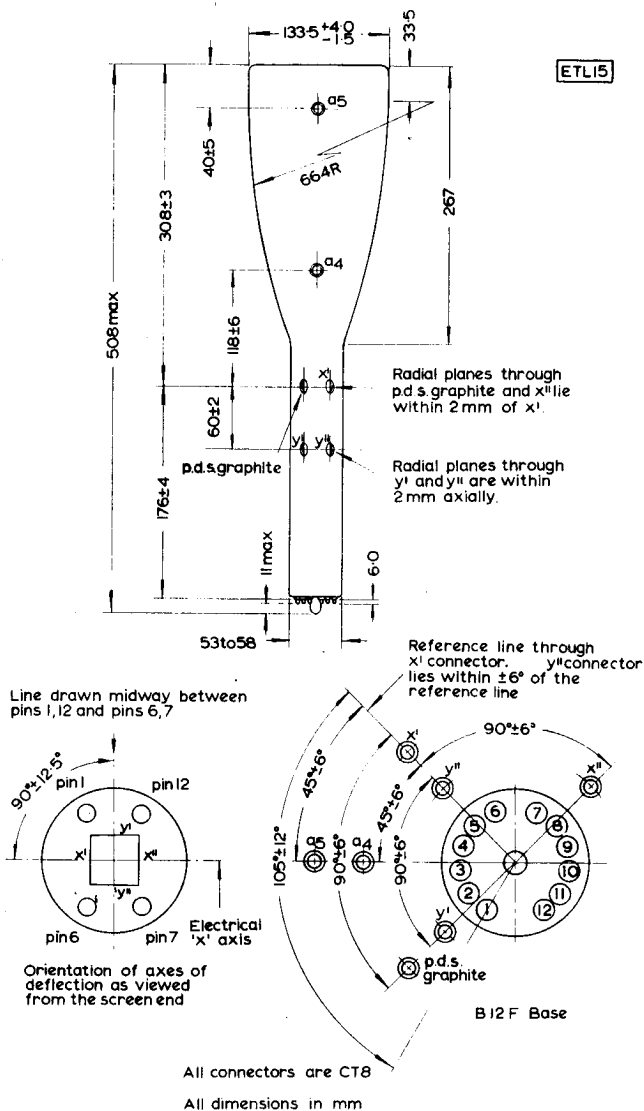
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