

## INSTRUMENT CATHODE-RAY TUBE

7 cm diameter flat faced monoaccelerator oscilloscope tube primarily intended for use in inexpensive oscilloscopes and monitoring devices.

QUICK REFERENCE DATA			
Accelerator voltage	$V_{g2,g4,g5,\ell}$	1000	V
Display area		60 x 50	mm <sup>2</sup>
Deflection coefficient, horizontal	$M_x$	29	V/cm
	vertical	$M_y$	11.5 V/cm

### SCREEN

	colour	persistence
D7-190GH	green	medium short
D7-190GM	yellowish green	long

Useful screen diameter min. 64 mm

Useful scan

horizontal min. 60 mm

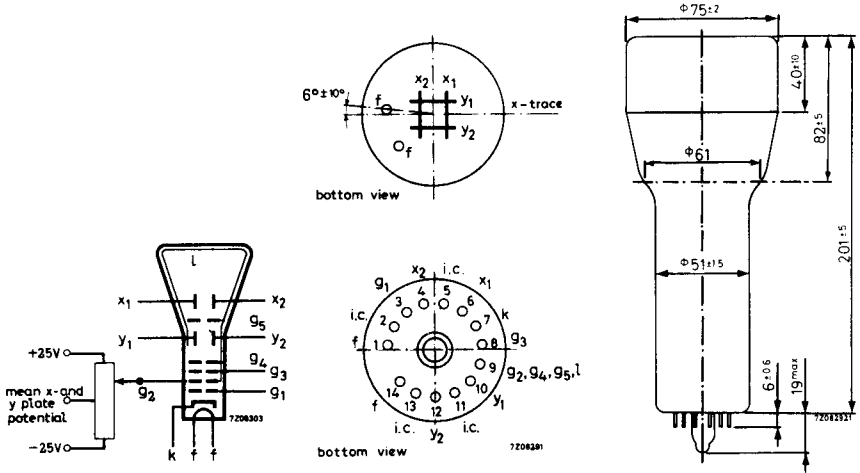
vertical min. 50 mm

The useful scan may be shifted vertically to a maximum of 4mm 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

**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.

Dimensions and connections

See also outline drawing

Overall length max. 225 mm

Face diameter max. 77 mm

Base 14 pin all glass

Net weight approx. 260 g

Accessories

Socket (supplied with tube) type 55566

Mu-metal shield type 55534

**CAPACITANCES**

$x_1$ to all other elements except $x_2$	$C_{x1(x2)}$	4	pF
$x_2$ to all other elements except $x_1$	$C_{x2(x1)}$	4	pF
$y_1$ to all other elements except $y_2$	$C_{y1(y2)}$	3.5	pF
$y_2$ to all other elements except $y_1$	$C_{y2(y1)}$	3	pF
$x_1$ to $x_2$	$C_{x1x2}$	1.6	pF
$y_1$ to $y_2$	$C_{y1y2}$	1.1	pF
Control grid to all other elements	$C_{g1}$	5.5	pF
Cathode to all other elements	$C_k$	4.0	pF

**FOCUSING** electrostatic

**DEFLECTION** 3) 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

$90 \pm 1^\circ$

**LINE WIDTH** 3)

Measured with the shrinking raster method in the centre of the screen under typical operating conditions, adjusted for optimum spot size at a beam current  $I_\ell = 10 \mu\text{A}$ . 1)

Line width l. w. 0.28 mm

1) As the construction of this tube does not permit a direct measurement of the beam current, this current should be determined as follows:

a) under typical operating conditions, apply a small raster display (no overscan), adjust  $V_{g1}$  for a beam current of approx.  $10 \mu\text{A}$  and adjust  $V_{g3}$  and  $V_{g2, g4, g5, \ell}$  for optimum spot quality at the centre of the screen.

b) under these conditions, but no raster, the deflection plate voltages should be changed to

$V_{y1} = V_{y2} = 1000 \text{ V}$ ;  $V_{x1} = 300 \text{ V}$ ;  $V_{x2} = 700 \text{ V}$ , thus directing the total beam current to  $x_2$ .

Measure the current on  $x_2$  and adjust  $V_{g1}$  for  $I_{x2} = 10 \mu\text{A}$  (being the beam current  $I_\ell$ )

c) set again for the conditions under a), without touching the  $V_{g1}$  control. Now a raster display with a true  $10 \mu\text{A}$  screen current is achieved.

d) focus optimally in the centre of the screen (do not adjust the astigmatism control) and measure the line width.

3) See page 4

## TYPICAL OPERATING CONDITIONS 3)

Accelerator voltage	$V_{g2,g4,g5,\ell}$	1000 V
Astigmatism control voltage	$\Delta V_{g2,g4,g5,\ell}$	$\pm 25$ V 1)
Focusing electrode voltage	$V_{g3}$	100 to 180 V
Control grid voltage for visual extinction of focused spot	$V_{g1}$	max. -35 V
Grid drive for 10 $\mu$ A screen current		approx. 10 V
Deflection coefficient, horizontal	$M_x$	29 V/cm
		max. 31 V/cm
vertical	$M_y$	11,5 V/cm
		max. 12,5 V/cm
Deviation of linearity of deflection		max. 1 % 2)
Geometry distortion		see note 4
Useful scan, horizontal		min. 60 mm
		vertical

## LIMITING VALUES (Absolute max. rating system)

Accelerator	$V_{g2,g4,g5,\ell}$	max. 2200 V
		min. 900 V
Focusing electrode voltage	$V_{g3}$	max. 2200 V
		min. 0 V
Control grid voltage, negative	$-V_{g1}$	max. 200 V
		min. 0 V
Cathode to heater voltage	$V_{kf}$	max. 125 V
		$-V_{kf}$
Grid drive, average		max. 20 V
Screen dissipation	$W_\ell$	max. 3 mW/cm <sup>2</sup>
→ Control grid circuit resistance	$R_{g1}$	max. 1 M $\Omega$

- 1) All that will be necessary when putting the tube into operation is to adjust the astigmatism control voltage once for optimum spot shape in the screen centre. The control voltage will always be in the range stated, provided the mean x plate and certainly the mean y plate potential was made equal to  $V_{g2,g4,g5,\ell}$  with zero astigmatism correction.
- 2) 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.
- 3) The mean x and certainly the mean y plate potential should be equal to  $V_{g2,g4,g5,\ell}$  with astigmatism adjustment set to zero.
- 4) A graticule, consisting of concentric rectangles of 40 mm x 50 mm and 39,2 mm x 49 mm is aligned with the electrical x-axis of the tube. The edges of a raster will fall between these rectangles.