

OSCILLOSCOPE TUBE with flat face, post deflection acceleration by means of a helical electrode, side-contacts, metal-backed screen and high sensitivity for high frequency and high writing-speed applications

## SCREEN

| Type    | Fluorescence    | Phophorescence  | Persistence  |
|---------|-----------------|-----------------|--------------|
| DB13-78 | Blue            | Blue            | Medium short |
| DH13-78 | Green           | Green           | Medium short |
| DN13-78 | Yellowish green | Yellowish green | Medium short |

Useful screen diameter 108 mm

Useful scan at  $V_{g7}/V_{g2}, g_4 = 6$

in the x direction 100 mm

in the y direction 40 mm

The useful scan may vertically be shifted max. 3 mm with respect to the geometric centre of the face plate ←

For further screen properties please refer to front of this section

## HEATING

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

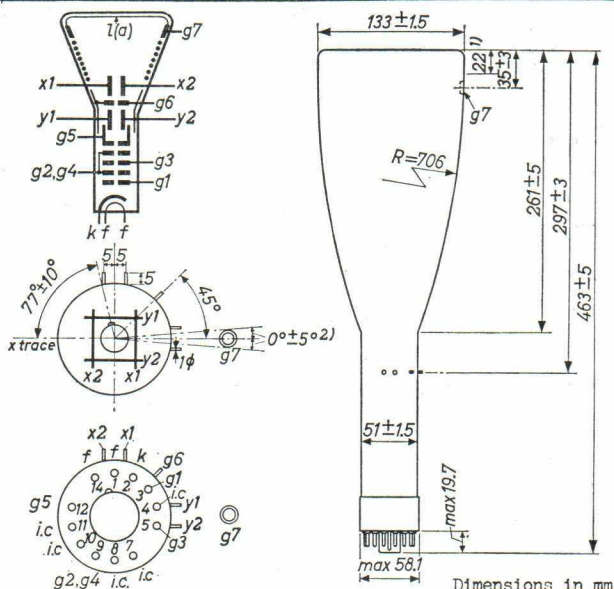
Heater voltage  $V_f = 6.3 \text{ V}$   
Heater current  $I_f = 0.3 \text{ A}$

## CAPACITANCES

|                                                           |             |          |   |
|-----------------------------------------------------------|-------------|----------|---|
| Grid No.1 to all other electrodes                         | $C_{g1}$    | = 6.0 pF | ← |
| Cathode to all other electrodes                           | $C_k$       | = 3.5 pF |   |
| $x_1$ plate to all other electrodes<br>except $x_2$ plate | $C_{x1}$    | = 3.0 pF |   |
| $x_2$ plate to all other electrodes<br>except $x_1$ plate | $C_{x2}$    | = 3.0 pF |   |
| $y_1$ plate to all other electrodes<br>except $y_2$ plate | $C_{y1}$    | = 2.8 pF |   |
| $y_2$ plate to all other electrodes<br>except $y_1$ plate | $C_{y2}$    | = 2.8 pF |   |
| $x_1$ plate to $x_2$ plate                                | $C_{x1-x2}$ | = 2.0 pF |   |
| $y_1$ plate to $y_2$ plate                                | $C_{y1-y2}$ | = 1.5 pF |   |

DB13-78  
DH13-78  
DN13-78

# PHILIPS



Dimensions in mm

$g_5$  = deflection plate shield

Base: DIHEPTAL 12 p

$g_6$  = isolation shield

The post-accelerator helix is connected between  $g_7$  and  $g_6$

The resistance of the helix is min. 200 MΩ

**MOUNTING POSITION:** any

The tube should not be supported by the base alone

## ACCESSORIES

|                                    |         |
|------------------------------------|---------|
| Socket                             | 5914/20 |
| Connector for side contacts        | 55561   |
| Mu-metal shield                    | 55551   |
| Post-accelerator contact connector | 55563   |

**NET WEIGHT** 910 g **Shipping weight** 2300 g

1) Straight part of the bulb

2) Location of the recessed cavity button contact with respect to the x-trace

|                                                         |                      |
|---------------------------------------------------------|----------------------|
| <u>FOCUSING</u>                                         | electrostatic        |
| <u>DEFLECTION</u>                                       | double electrostatic |
| x plates                                                | symmetrical          |
| y plates                                                | symmetrical          |
| Angle between x and y traces $90^{\circ} \pm 1^{\circ}$ |                      |

LINE WIDTH, measured on a circle of 30 mm diameter

|                          |             |   |             |
|--------------------------|-------------|---|-------------|
| Post accelerator voltage | $V_{g7}$    | = | 10 kV       |
| Grids No.2 and 4 voltage | $V_{g2,g4}$ | = | 1670 V      |
| Beam current             | $I_b$       | = | 0.5 $\mu$ A |
| Line width               | l.w.        | = | 0.4 mm      |

## OPERATING CHARACTERISTICS

|                                      |             |        |                                |
|--------------------------------------|-------------|--------|--------------------------------|
| Post accelerator voltage             | $V_{g7}$    | =      | 10 kV                          |
| Isolation shield voltage             | $V_{g6}$    | =      | $1670 \pm 170$ V <sup>1)</sup> |
| Deflection plate shield voltage      | $V_{g5}$    | =      | $1670 \pm 85$ V <sup>1)</sup>  |
| Accelerator voltage                  | $V_{g2,g4}$ | =      | $1670 \pm 85$ V <sup>1)</sup>  |
| Focusing electrode voltage           | $V_{g3}$    | =      | 180 to 590 V                   |
| Grid No.1 voltage                    | $V_{g1}$    | =      | -50 to -80 V <sup>2)</sup>     |
| Deflection factor                    |             |        |                                |
| horizontal                           | $M_x$       | =      | 27 to 33 V/cm                  |
| vertical                             | $M_y$       | =      | 5.6 to 7.6 V/cm                |
| Deviation of linearity of deflection |             | = max. | 2 % <sup>1)3)</sup>            |
| Pattern distortion                   |             | = max. | 1.5 % <sup>1)4)</sup>          |
| Undelected spot position             | R           | =      | 5 mm <sup>5)</sup>             |

<sup>1)2)3)4)5)</sup> See page 4

- 1) In general the voltages on  $g_6$ ,  $g_5$ ,  $g_4$  and the average potential of the deflection plates should be equal  
Variation of the isolation shield voltage  $V_{g_6}$  (max.  $\pm 10\%$  of  $V_{g_2, g_4}$ ) serves to correct pincushion and barrel pattern distortion  
Adjustment of the deflection plate shield voltage  $V_{g_5}$  (max.  $\pm 5\%$  of  $V_{g_2, g_4}$ ) provides improved linearity of vertical deflection  
A small potential difference (max.  $\pm 5\%$  of  $V_{g_2, g_4}$ , obtained by varying  $V_{g_2, g_4}$ ) between the y plates and  $g_4$  may be desirable for obtaining optimum sharpness.
- 2) For visual extinction of the focused spot
- 3) The sensitivity for a deflection of less than 75 % of the useful scan will not differ more than 2% from the sensitivity for a deflection of 25% of the useful scan
- 4) With a raster pattern the size of which is such that the widest points of the pattern just touch the sides of a rectangle of 100x40 mm, no points of the pattern sides will be within a concentric rectangle of 98x38.8 mm
- 5) With the tube shielded the spot will be within a circle of 5 mm radius, the circle being centered with respect to the tube face.
- 6) If use is made of the full deflection capabilities of the tube, the deflection plates will intercept part of the electron beam near the edge of the scan; a low impedance deflection plate drive is therefore desirable.
- 7) Values to be taken into account for the calculation of the  $V_{g_3}$ -potentiometer

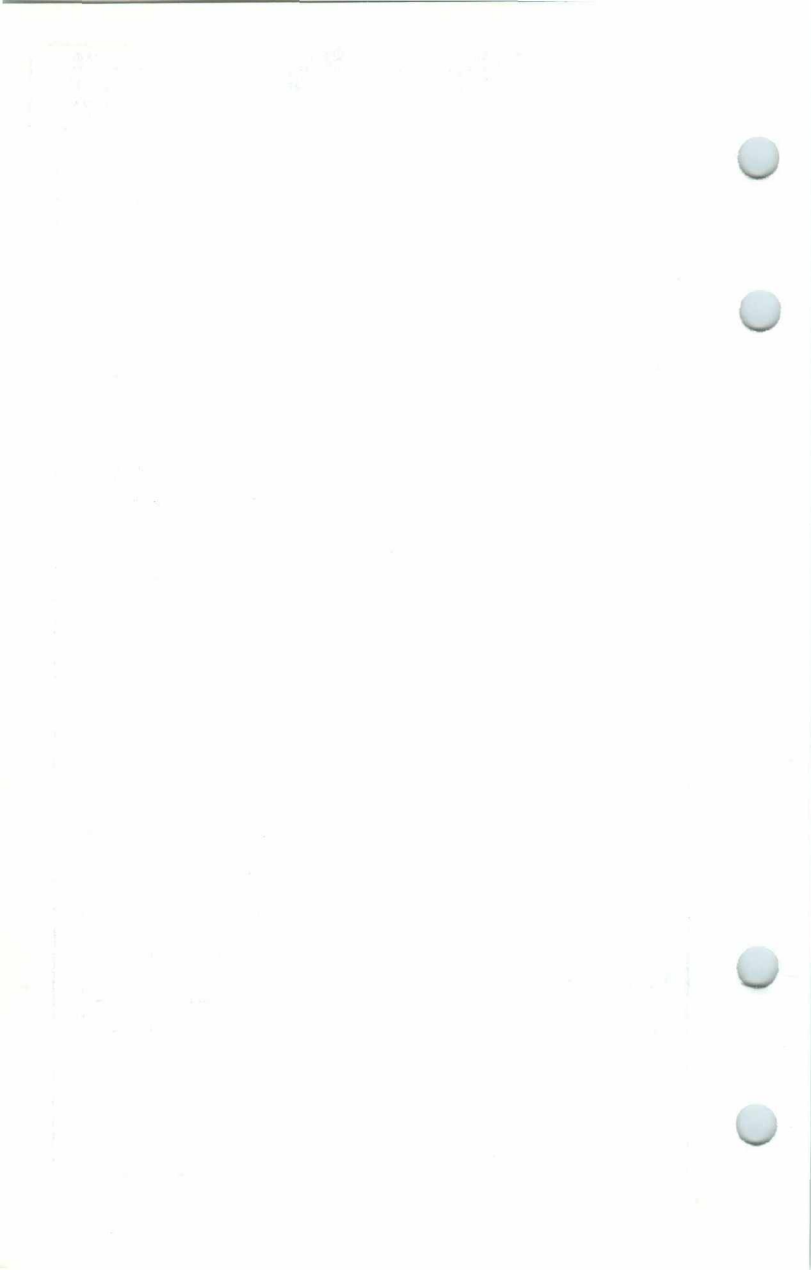
## LIMITING VALUES (Design centre limits)

|                                                            |                     |                                |
|------------------------------------------------------------|---------------------|--------------------------------|
| Post accelerator voltage                                   | $V_{g7}$            | = max. 12 kV<br>= min. 6 kV    |
| Isolation shield voltage                                   | $V_{g6}$            | = max. 2200 V                  |
| Deflection plate shield voltage                            | $V_{g5}$            | = max. 2100 V                  |
| Accelerator voltage                                        | $V_{g2, g4}$        | = max. 2100 V<br>= min. 1000 V |
| Focusing electrode voltage                                 | $V_{g3}$            | = max. 1500 V                  |
| Grid No.1 voltage negative                                 | $-V_{g1}$           | = max. 200 V                   |
| positive                                                   | $+V_{g1}$           | = max. 0 V                     |
| peak positive                                              | $+V_{g1 p}$         | = max. 2 V                     |
| Ratio $V_{g7}/V_{g2, g4}$                                  | $V_{g7}/V_{g2, g4}$ | = max. 6                       |
| Peak voltage between accelerators and any deflection plate | $V_{g2, g4-x p}$    | = max. 500 V                   |
|                                                            | $V_{g2, g4-y p}$    | = max. 500 V                   |
| Voltage between cathode and heater                         |                     |                                |
| cathode positive                                           | $V_{kf(k pos)}$     | = max. 200 V                   |
| cathode negative                                           | $V_{kf(k neg)}$     | = max. 125 V                   |
| Accelerator dissipation                                    | $W_{g2, g4}$        | = max. 6 W                     |
| Screen dissipation                                         | $W_{\phi}$          | = max. 3 mW/cm <sup>2</sup>    |

## CIRCUIT DESIGN VALUES

|                                               |                                     |                        |
|-----------------------------------------------|-------------------------------------|------------------------|
| Focusing voltage                              | $V_{g3} = 110$ to 355 V             | per kV of $V_{g2, g4}$ |
| Grid No.1 voltage 2)                          | $-V_{g1} = 30$ to 48 V              | per kV of $V_{g2, g4}$ |
| Deflection factors at $V_{g7}/V_{g2, g4} = 6$ |                                     |                        |
| horizontal                                    | $M_x = 16$ to 20 V/cm               | per kV of $V_{g2, g4}$ |
| vertical                                      | $M_y = 3.4$ to 4.6 V/cm             | per kV of $V_{g2, g4}$ |
| Grid No.1 circuit resistance                  | $R_{g1} = \text{max.}$              | 1.5 M $\Omega$         |
| Deflection plate resistance                   | $R_x = R_y = \text{max.}$           | 1 M $\Omega$ 6)        |
| Grid No.3 current                             | $I_{g3} = -15$ to +10 $\mu\text{A}$ | 7)                     |

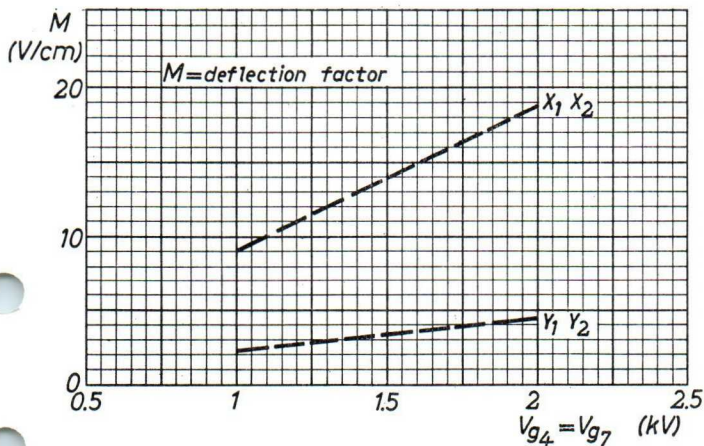
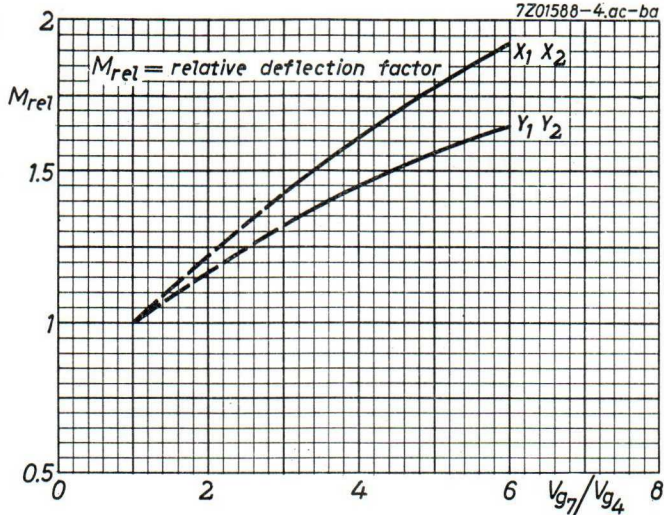
2) 6) 7) See page 4



# PHILIPS

DB13-78  
DH13-78  
DN13-78

7Z01588-4.ac-ba



2.2.1963

A

DB13-78  
DH13-78  
DN13-78

# PHILIPS

7Z01587-4ac-ba

