

## VERY HIGH RESOLUTION CATHODE-RAY TUBE

The M38-200 is a 38 cm, 70° data graphic display tube with a resolution of more than 6,6 line pairs per mm (corresponding to 3000 TV lines). Used in conjunction with deflection unit AT1991 it is eminently suitable for full page document display.

The resolution easily meets the stringent requirements of the CCITT recommendations for digital group III, high resolution facsimile transmission, and those of graphic displays for computer-aided design.

Tubes with white (WA and WE) or green (GH) screen phosphors are standard; the WE phosphor is recommended for photographic applications. Other phosphors are available to special order. The tubes have a metal-backed screen and rim band for implosion protection.

### QUICK REFERENCE DATA

|                   |                    |   |
|-------------------|--------------------|---|
| Deflection angle  | 70°                |   |
| Face diagonal     | 38 cm              |   |
| Overall length    | 478 mm             |   |
| Neck diameter     | 36,8 mm            |   |
| Screen dimensions | 226 mm x 291 mm    |   |
| Resolution        | 3000 TV lines*     | ← |
|                   | 1800 lines*        | ← |
|                   | (shrinking raster) |   |

\* Landscape format.

**ELECTRICAL DATA**

## Capacitances

cathode to all other electrodes  
 grid 1 to all other electrodes  
 final accelerator to external conductive coating  
 final accelerator to tension band

$C_k$  4 pF  
 $C_{g1}$  12 pF  
 $C_{g3, g5(I)/m}$  1000 pF  
 $C_{g3, g5(I)/m'}$  220 pF

## Focusing method

electrostatic

## Deflection method

magnetic\*

## Deflection angle

approx. 70°

## Heating

heater voltage  
 heater current

indirect by AC or DC

 $V_f$  6,3 V ± 5 % $I_f$  190 mA\*\***OPTICAL DATA**

## Screen

metal-backed phosphor

## Phosphor type

fluorescent colour  
 persistence

| GH     | WA     | WE     |
|--------|--------|--------|
| green  | white  | white  |
| medium | medium | medium |
| short  |        | short  |

## Screen dimensions

226 mm x 291 mm

## Minimum useful screen diagonal

352 mm

## Preferable useful scanning area

200 mm x 270 mm

## Reduction for A4 size (297 mm x 210 mm)

9%

## Reduction for 11" x 8½" size (279 mm x 216 mm)

7,4%

## Light transmission of screen

approx. 50%

\* To obtain the best tube performance, deflection unit AT1991 should be used.

\*\* Liable to be modified into 240 mA.

**MECHANICAL DATA**

|                                     |                                   |
|-------------------------------------|-----------------------------------|
| Overall length                      | 478 ± 6,5 mm                      |
| Neck diameter                       | 36,8 ± 0,8 mm                     |
| Base                                | JEDEC B12-246                     |
| Final accelerator contact           | cavity contact, CT8; IEC 67-III-2 |
| Mounting position                   | any                               |
| Implosion protection                | rim band                          |
| Net mass                            | approx. 6 kg                      |
| Accessories                         |                                   |
| socket                              | type 55589                        |
| final accelerator contact connector | type 55563A                       |
| deflection unit                     | type AT1991                       |

MECHANICAL DATA (continued)

Dimensions in mm

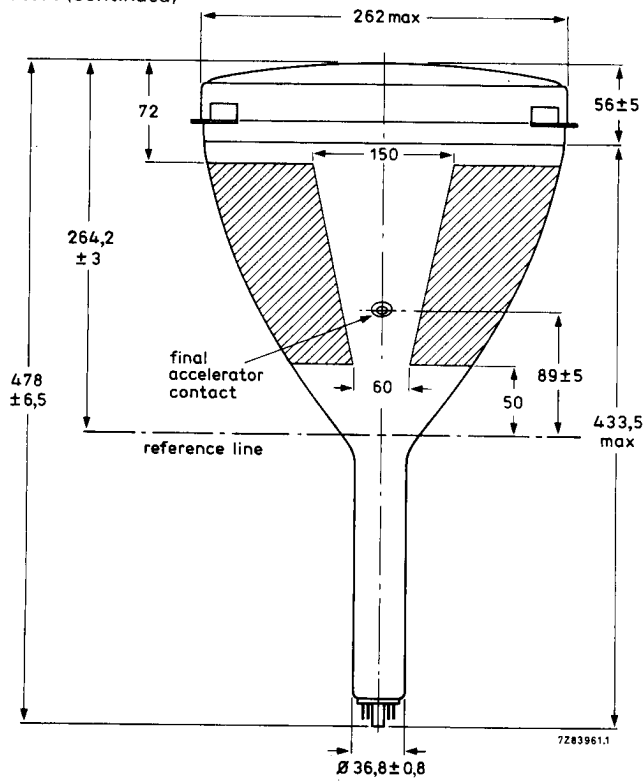


Fig. 1a.

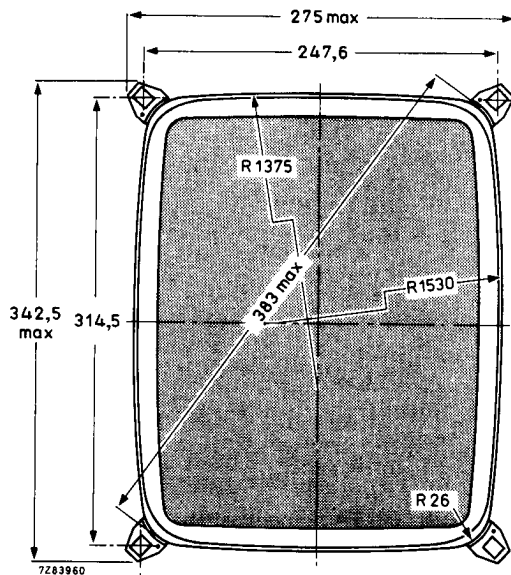


Fig. 1b.

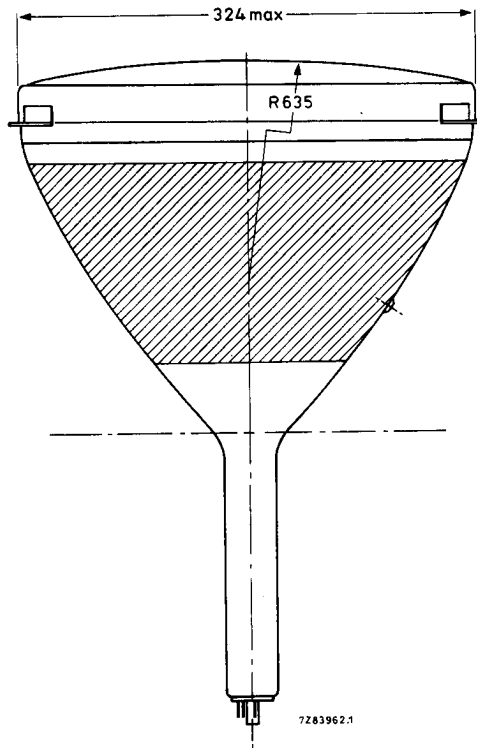


Fig. 1c.

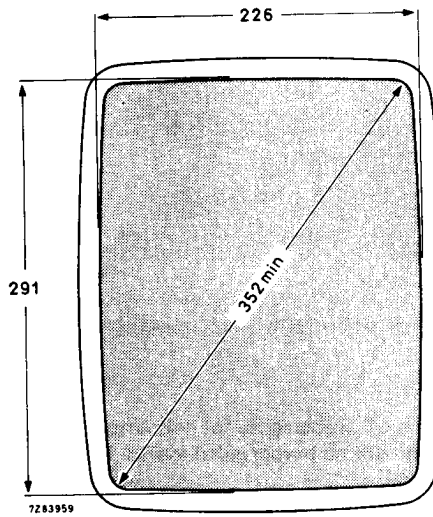


Fig. 2.

MECHANICAL DATA (continued)

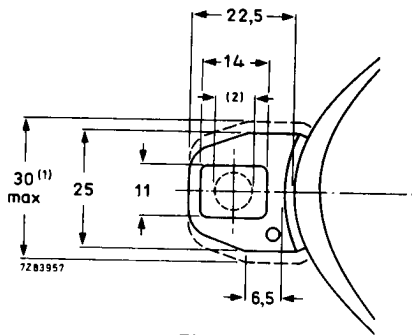


Fig. 3.

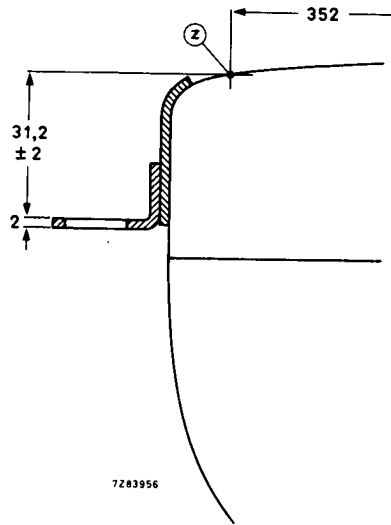


Fig. 4.

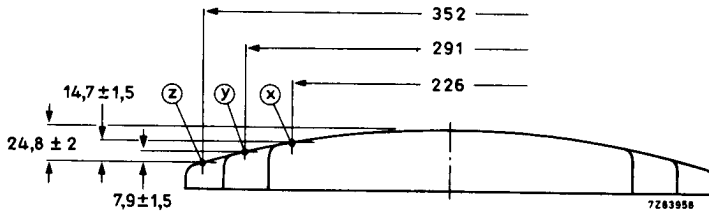


Fig. 5.

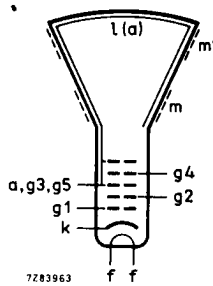


Fig. 6.

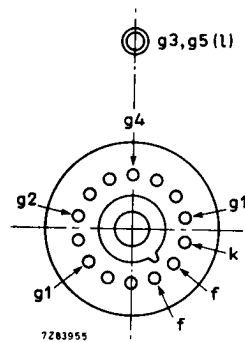


Fig. 7.

Notes

1. Minimum space to be reserved for mounting lugs.
2. The mounting screws in the cabinet must be situated within a circle with a diameter 7,5 mm drawn around the true geometrical positions (corners of a rectangle of 314,5 mm x 247,6 mm).

Reference line gauge, JEDEC 110

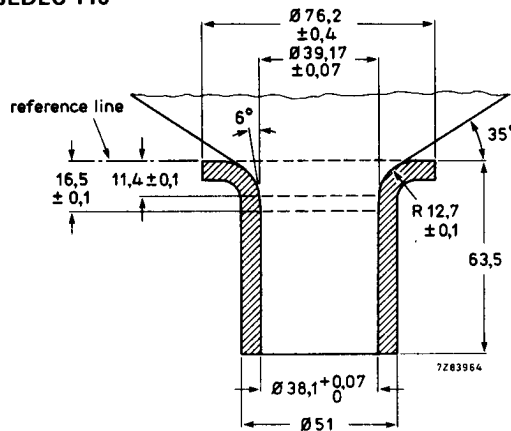


Fig. 8.

RECOMMENDED OPERATING CONDITIONS; voltages with respect to cathode\*

|   |                 |               |   |
|---|-----------------|---------------|---|
| Final accelerator voltage                             | $V_{g3, g5}$    | 18 kV         | ← |
| Focusing electrode voltage                            | $V_{g4}$        | 5 to 7 kV**   |   |
| Dynamic focusing                                      | $\Delta V_{g4}$ | 200 to 300 V▲ |   |
| First accelerator voltage                             | $V_{g2}$        | 800 V         |   |
| Cut-off voltage for visual extinction of focused spot | $-V_{g1}$       | 50 to 110 V   |   |
| Grid drive for 30 $\mu A$ screen current              | $V_d$           | approx. 20 V  |   |

RESOLUTION

With a beam current ( $I_a$ ) of 30  $\mu A$ , the spot diameter at a brightness level of 50% is approx. 120  $\mu m$  (see Fig. 9).

CIRCUIT DESIGN VALUES

|                |           |      |           |   |
|----------------|-----------|------|-----------|---|
| Grid 4 current |           |      |           |   |
| positive       | $I_{g4}$  | max. | 6 $\mu A$ | ← |
| negative       | $-I_{g4}$ | max. | 6 $\mu A$ | ← |
| Grid 2 current |           |      |           |   |
| positive       | $I_{g2}$  | max. | 5 $\mu A$ |   |
| negative       | $-I_{g2}$ | max. | 5 $\mu A$ |   |

\* The tube has internal magnetic correction for astigmatism. To avoid changing this correction, the coil must be at zero potential, before being moved on the tube neck.

\*\* For optimum focus at screen centre.

▲ To obtain optimum focus over the whole useful screen area, dynamic correction voltages should be applied in N-S and E-W directions; these voltages should be adjustable separately within the indicated range.

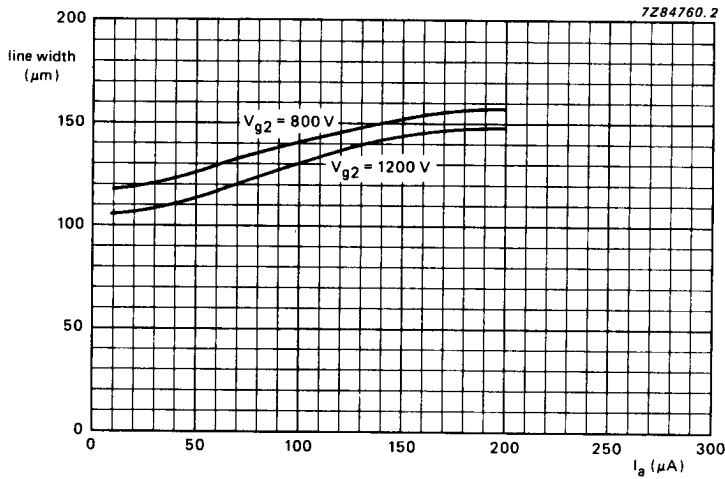
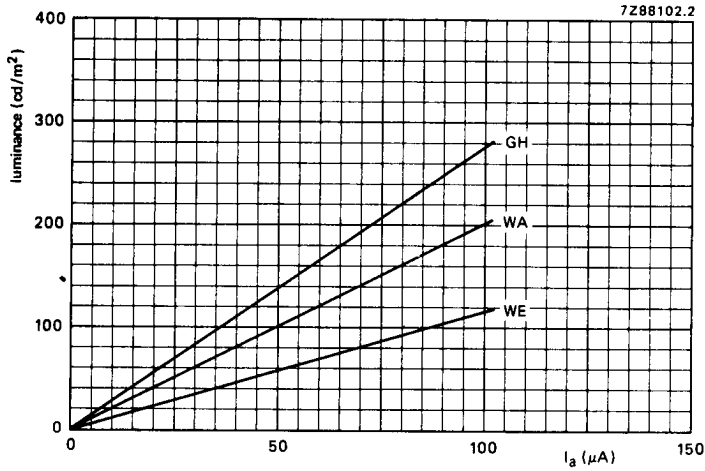


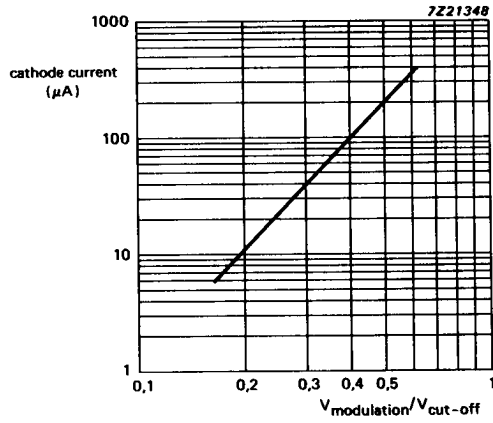
Fig. 9 Resolution.



Luminance is measured with a photo-cell, the spectral response of which is identical to that of the human eye, on a 312 lines non-interlaced raster, screen dimensions 226 mm x 291 mm, frame frequency 50 Hz.

Fig. 10 Luminance.





$V_{\text{co}} = 74,5 \text{ V}$ ,  $V_{\text{g2}} = 800 \text{ V}$ ,  $V_{\text{g3,g5}} = 18 \text{ kV}$ .

Fig. 11 Grid drive.

**LIMITING VALUES** (Absolute maximum rating system)

Voltages are specified with respect to cathode unless otherwise stated.

|                            |                 |              |              |
|----------------------------|-----------------|--------------|--------------|
| Final accelerator voltage  | $V_{g3, g5(l)}$ | max.         | 20 kV        |
| Focusing electrode voltage | $V_{g4}$        | max.<br>min. | 8 kV<br>4 kV |
| First accelerator voltage  | $V_{g2}$        | max.         | 1,2 kV       |
| Control grid voltage       |                 |              |              |
| negative                   | $-V_{g1}$       | max.         | 140 V        |
| positive, non-repetitive   | $V_{g1}$        | max.         | 0 V          |
| Cathode to heater voltage  |                 |              |              |
| positive                   | $V_{kf}$        | max.         | 250 V        |
| positive peak              | $V_{kfp}$       | max.         | 300 V        |
| negative                   | $-V_{kf}$       | max.         | 135 V        |
| negative peak              | $-V_{kfp}$      | max.         | 180 V        |

**LIMITING CIRCUIT VALUES**

|  |          |      |                |
|--|----------|------|----------------|
| Resistance between cathode and heater            | $R_{kf}$ | max. | 1 M $\Omega$   |
| Impedance between cathode and heater (f = 50 Hz) | $Z_{kf}$ | max. | 500 k $\Omega$ |
| Grid 1 circuit resistance                        | $R_{g1}$ | max. | 1,5 M $\Omega$ |
| Impedance between cathode and earth              | $Z_k$    | max. | 100 k $\Omega$ |

**X-RADIATION**

→ See Figs 13 and 14.

**FLASHOVER PROTECTION**

With the high voltage used with this tube internal flashovers may occur. These may destroy the cathode of the tube. Therefore it is necessary to provide protective circuits, using spark gaps. The spark gaps must be connected as follows:

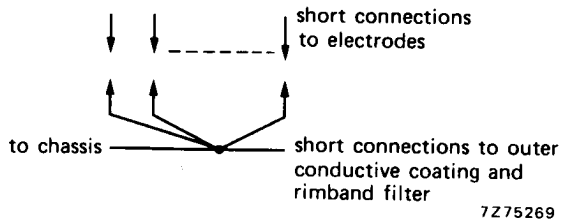
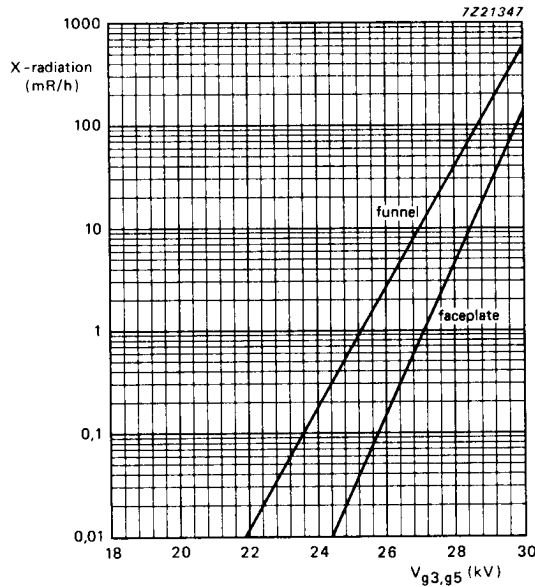


Fig. 12.

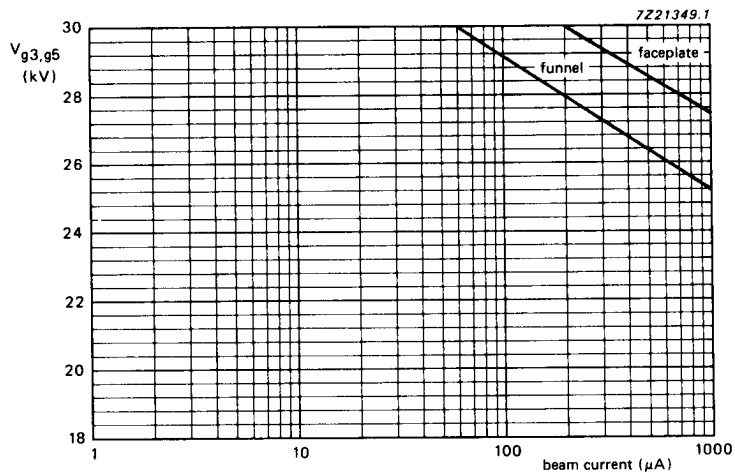
No other connections between the outer conductive coating and the chassis are permissible.

X-RADIATION LIMIT



Anode button has no measureable radiation up to 30 kV.

Fig. 13 X-radiation limit curves, at a constant anode current of 250  $\mu\text{A}$ , measured in accordance with TEPAC164.



Anode button has no measureable radiation up to 30 kV and 1500  $\mu\text{A}$ .

Fig. 14 0,5 mR/h isoexposure-rate limit curves, measured according to TEPAC164.