COLOUR TELEVISION TUBE

TENTATIVE DATA

QUICK REFERENCE DATA

56cm (22in) rectangular shadow-mask colour television tube incorporating three guns and a metal-backed three-colour phosphor dot screen.
Advanced red phosphor, europium activated.
Increased white brightness.
Unity current ratio for white point x = 0.281, y = 0.311
Temperature compensated shadow-mask maintains purity during warm-up. Shadow-mask optimised for minimum moiré effect on 625 line system.
Reinforced tube envelope-separate safety screen not required.

<table>
<thead>
<tr>
<th>Deflection angle</th>
<th>92 deg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focusing</td>
<td>Electrostatic</td>
</tr>
<tr>
<td>Light transmission (approx.)</td>
<td>53 %</td>
</tr>
<tr>
<td>Maximum overall length</td>
<td>482 mm</td>
</tr>
</tbody>
</table>

This data should be read in conjunction with GENERAL OPERATIONAL RECOMMENDATIONS - TELEVISION PICTURE TUBES

HEATER

\[ V_h = 6.3 \text{ V} \]
\[ I_h = 900 \text{ mA} \]

The limits of heater voltage and current are contained in General Operational Recommendations - Television Picture Tube.

OPERATING CONDITIONS (each gun)

\[ V_{a3+a4} = 25 \text{ kV} \]
\[ V_{a2} (\text{focus electrode control range}) = 4.2 \text{ to } 5.0 \text{ kV} \]
\[ V_{a1} (\text{at } V_g = -100\text{V for visual extinction of focused raster}) = 210 \text{ to } 495 \text{ V} \]
\[ V_g (\text{at } V_{a1} = 300\text{V for visual extinction of focused raster}) = -65 \text{ to } -135 \text{ V} \]

*Light output at screen centre
(at \( I_{a3+a4} = 800\mu\text{A} \))

\[ 120 \text{ cd/m}^2 \text{ (nits)} \]

*To produce white of colour co-ordinates
\( x = 0.281, y = 0.311 \) with a focused raster size of 447 × 337mm.
SCREEN

Metal backed

Phosphor types for separate fluorescent colours:
Red                  Europium activated rare earth
Green                Sulphide
Blue                 Sulphide

Useful screen area
Spacing between centres of adjacent phosphor dot triads (approx.) 0.68 mm
Light transmission (approx.) 53 %

FOCUSING

Electrostatic

DEFLECTION

Magnetic
Diagonal deflection angle 92 deg
Horizontal deflection angle 79 deg
Vertical deflection angle 61 deg

CONVERGENCE

Magnetic

CAPACITANCES (approx.)
\( C_{g-all} \) (each gun) 7.0 pF
\( C_{(kR+kG+kB) - all} \) 15 pF
\( C_{kR - all} \) 5.0 pF
\( C_{kG - all} \) 5.0 pF
\( C_{kB - all} \) 5.0 pF
\( C_{a2-all} \) 7.0 pF
\( C_{a3+a4-M} \) 1700 to 2300 pF
\( C_{a3+a4-B} \) 400 pF

EXTERNAL CONDUCTIVE COATING

This tube has an external conductive coating, M, which must be connected to chassis, and the capacitance of this coating to the final anode is used to provide smoothing for the e.h.t. supply. The electrical connection to this coating must be made within the area specified on the tube outline drawing.

REFERENCE LINE GAUGE

See page 10
MOUNTING POSITION

Any. The tube socket should not be rigidly mounted but should have flexible leads and be allowed to move freely. The bottom circumference of the base shell will fall within a circle of 55mm diameter which is centred upon the perpendicular from the centre of the face.

MAGNETIC SHIELDING

Magnetic shielding must be provided to minimise the effects of extraneous magnetic fields, including the earth's magnetic field. This shielding, in the form of a metal shell extending 250mm over the cone of the tube measured from the centre of the screen, should be constructed of cold-rolled mild steel of 0.5mm minimum thickness. The magnetic shield should be connected to the outer conductive coating. See page 10 for physical dimensions.

RATINGS (DESIGN CENTRE SYSTEM)

\[
\begin{align*}
V_{a3+a4}\text{ max. (absolute rating) (see notes 2 and 3)} & \quad 27.5 \text{ kV} \\
V_{a3+a4}\text{ min. (absolute rating) (see note 4)} & \quad 20 \text{ kV} \\
I_{a3+a4}\text{ (long term average max. for three guns: see note 5)} & \quad 1.0 \text{ mA} \\
V_{a2}\text{ max. (see note 3)} & \quad 6.0 \text{ kV} \\
v_{a1\text{(pk)}}\text{ max.} & \quad 1.0 \text{ kV} \\
-V_g\text{ max.} & \quad 400 \text{ V} \\
V_g\text{ max.} & \quad 0 \text{ V} \\
V_{h-k}\text{ max. (see note 6)} & \\
\text{Cathode positive} & \\
d.c.\text{ max.} & \quad 250 \text{ V} \\
pk\text{ max.} & \quad 300 \text{ V} \\
\text{Cathode negative} & \\
d.c.\text{ max.} & \quad 135 \text{ V} \\
pk\text{ max.} & \quad 180 \text{ V} \\
R_g-k\text{ max.} & \quad 750 \text{ k}\Omega
\end{align*}
\]
EQUIPMENT DESIGN VALUES (each gun if applicable)

Valid for $V_{a3+a4} = 20$ to 27.5kV

- $V_{a2}$
- $V_{a1}$
- $V_g$

Variation in cut-off voltage between guns

| Minimum value is at least 65% of the maximum value. |

| $I_{a2}$ | -15 to +15 $\mu$A |
| $I_{a1}$ | -5 to +5 $\mu$A |
| $I_g$ at $V = -150V$ | -5 to +5 $\mu$A |

To produce white of colour co-ordinates:

| $x$ | 0.310 | 0.265 | 0.281 |
| $y$ | 0.316 | 0.290 | 0.311 |

Percentage of total anode current supplied by each gun (typical)

- Red gun: 43.5 27.9 32.2 %
- Green gun: 30.0 34.9 35.6 %
- Blue gun: 28.5 37.2 32.2 %

Ratio of cathode currents

- Red gun to green gun
  - min. 1.05 0.60 0.65
  - av. 1.45 0.80 0.90
  - max. 2.00 1.10 1.25

- Red gun to blue gun
  - min. 1.20 0.55 0.75
  - av. 1.65 0.75 1.00
  - max. 2.25 1.05 1.35

Maximum electron beam shift required from purity magnets: $\pm 0.115$ mm

Maximum required raster shift: $\pm 13$ mm

Maximum lateral convergence shift of blue beam with respect to the converged red and green beams: $\pm 6$ mm

Maximum radial convergence shift, excluding effects of dynamic convergence (each beam): $\pm 9$ mm

WEIGHT

- Tube alone (approx.): 15 kg
NOTES

1. For maximum cathode life, it is recommended that the heater supply be regulated at 6.3V.

2. The tube does not emit X-radiation above the internationally accepted maximum dosage rate if it is operated from an e.h.t. source supplying an absolute maximum voltage of 27.5kV at zero beam current and with an internal impedance ≅500kΩ.

3. Adequate precautions should be taken to ensure that the receiver is protected from damage which may be caused by a possible high voltage flashover within the cathode ray tube. In view of the high voltage on anode 2, adequate precautions should be taken to ensure freedom from flashover on all connections to this electrode.

4. Operation at lower voltages impairs brightness and resolution and may have a detrimental effect on colour purity.

5. The limiting value "long term average maximum current" of 1.0mA will be met provided a device is incorporated in the circuit to limit the short term average current to 1.5mA.

6. In order to avoid excessive hum the a.c. component of $V_{h-k}$ should be as low as possible (≤20Vr.m.s.)

   During an equipment warm-up period not exceeding 15 seconds $v_{h-k}(pk)$ max. (cathode positive) is allowed to rise to 410V. Between 15 and 45 seconds after switching on a decrease in $v_{h-k}(pk)$ max. (cathode positive) proportional with time from 410 to 250V is permissible.

7. The metal band (B) should be connected directly to the chassis in an a.c. receiver operating from an isolating transformer, or via a suitable leakage path in an a.c./d.c. receiver.

8. The dynamic convergence to be effected by currents of approximately parabolic waveshape synchronised with scanning.
OUTLINE DRAWING

491 max
484.3 ± 2 (bulb)

R1080
R846°

260 max

472.2 ± 9.5

10.3 ± .3

308 ± .8

100 ± .5

Reference line

Recessed cavity connector CTB

Radial convergence

Pole pieces

*496 max

79°

6.5

B-81

a3+a4

386 max

379.8 ± 2 (bulb)

37 max

86 min

*392 max

61°

External conductive coating (M)

Reference line

Determined by the plane of the upper edge of the step on the reference line gauge when the gauge is resting on the cone

Neck dia 36.5 ± 1.6

All dimensions in mm

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Useful screen area within dotted line.

All dimensions in mm

Bulb dimensions

Location of radial convergence pole pieces viewed from screen end of guns.

All dimensions in mm
Dimensions of rimband

Centre of screen

The location of points XYZ are shown on the bulb dimensions drawing.

One of the four lugs may deviate 2mm max from the plane through the other three lugs.

*Refers to straight portion of main tension band

All dimensions in mm
COLOUR TELEVISION TUBE

Hole for earth connection to rimband

*Minimum space to be reserved for mounting lugs = 40mm

Template for mounting bolts

All dimensions in mm

The bolts to be used for mounting the tube must be within the circles of 9.5mm diameter shown in the template drawing.
Reference line gauge

Metal rimband

Magnetic shield

Deflection coil

Radial convergence assembly

Purity magnet

Lateral convergence magnet

Permanent magnet

External magnet

Magnetic flux

Radial pole pieces

Radial convergence system

All dimensions in mm

171.5 ± 0.3 dia

158.75 ± 0.3 dia

150.33 dia

56.54 dia

42.06 dia

25.65

19.36

13.2

67.89

128.32R

29.21R

37.90 dia

47.47

137.16

10max

240

10max

76

89

1...03
COLOUR TELEVISION TUBE

As J.E.D.E.C. B12-244 Base but with shorter spigot

View looking from base
### Dimensions for Maximum Cone Contour Drawing (Page 12)

<table>
<thead>
<tr>
<th>Section Nominal distance from point 'Z'</th>
<th>Long axis</th>
<th>Diagonal</th>
<th>Short axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>10°</td>
<td>0°</td>
<td>10°</td>
</tr>
<tr>
<td>20°</td>
<td>30°</td>
<td>30°</td>
<td>20°</td>
</tr>
<tr>
<td>30°</td>
<td>40°</td>
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<td>40°</td>
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</tr>
<tr>
<td>50°</td>
<td>60°</td>
<td>60°</td>
<td>50°</td>
</tr>
</tbody>
</table>

Dimensions in mm

All dimensions in mm

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BRIGHTNESS AT CENTRE OF SCREEN PLOTTED AGAINST TOTAL CURRENT
FOR WHITE OF COLOUR COORDINATES x = 0.281, y = 0.311
FINAL ANODE CURRENT PLOTTED AGAINST GRID VOLTAGE. GRID MODULATION.

FINAL ANODE CURRENT PLOTTED AGAINST CATHODE-TO-GRID VOLTAGE. CATHODE MODULATION.
CUT-OFF DESIGN CHART

A56-120X

$V_{a3+ a_4} = 20 \text{ to } 27.5 \text{ kV}$

$V_{g \text{ Raster cut-off (V)}}$

$V_{a1} (\text{V})$

Max

Average

Min