**COLOUR TELEVISION TUBE**

**TENTATIVE DATA**

**QUICK REFERENCE DATA**

49cm (19in) 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>90 deg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focusing</td>
<td>Electrostatic</td>
</tr>
<tr>
<td>Light transmission (approx.)</td>
<td>54 %</td>
</tr>
<tr>
<td>Maximum overall length</td>
<td>458 mm</td>
</tr>
</tbody>
</table>

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

**HEATER**

\[ V_h \text{ (see note 1)} \quad 6.3 \quad V \]

\[ I_h \quad 900 \quad mA \]

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

**OPERATING CONDITIONS (each gun)**

\[ V_{a3+a4} \quad 25 \quad kV \]

\[ V_{a2} \quad \text{focus electrode control range} \quad 4.2 \text{ to } 5.0 \quad kV \]

\[ V_{a1} \quad \text{(at } V_g = -100V \text{ for visual extinction of focused raster)} \quad 210 \text{ to } 495 \quad V \]

\[ V_{g} \quad \text{(at } V_{a1} = 300V \text{ for visual extinction of focused raster)} \quad -65 \text{ to } -135 \quad V \]

*Light output at screen centre (at \( I_{a3+a4} = 750\mu A \)) \quad 130 \quad cd/m^2 \text{ (nits)}

*To product white of colour co-ordinates \( x = 0.281, y = 0.311 \) with a focused raster size of 39.6 \times 31.0cm
SCREEN

Metal backed

Phosphor types for separate fluorescent colours:

Red
Green
Blue

Europium activated rare earth
Sulphide
Sulphide

Useful screen area (approx.)
1160 cm²

Spacing between centres of adjacent phosphor dot triads (approx.)
0.63 mm

Light transmission (approx.)
54 %

FOCUSBING

Electrostatic

DEFLECTION

Magnetic

Diagonal deflection angle
90 deg

Horizontal deflection angle
79 deg

Vertical deflection angle
62 deg

CONVERGENCE

Magnetic

CAPACITANCES (approx.)

\[ c_{g\text{-all}} \] (each gun) 7.0 pF

\[ c_{(kR+kG+kB)\text{-all}} \] 15 pF

\[ c_{kR\text{-all}} \] 5.0 pF

\[ c_{kG\text{-all}} \] 5.0 pF

\[ c_{kB\text{-all}} \] 5.0 pF

\[ c_{a2\text{-all}} \] 7.0 pF

\[ c_{a3+a4-M} \] 1500 to 2000 pF

\[ c_{a3+a4-B} \] 300 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 52.5mm 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 22cm 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)

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

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

$I_{a2}$  
$I_{a1}$  
$I_g$  

Variation in cut-off voltage between guns

Minimum value is at least $65\%$ of the maximum value.

$I_{a2}$  
$I_{a1}$  
$I_g$ at $V = -150$

To produce white of colour co-ordinates:

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

Red gun  
Green gun  
Blue gun

Ratio of cathode currents

Red gun to green gun

Red gun to blue gun

Maximum electron beam shift required from purity magnets

Maximum required raster shift

Maximum lateral convergence shift of blue beam with respect to the converged red and green beams

Maximum radial convergence shift, excluding effects of dynamic convergence (each beam, see note 8)

WEIGHT

Tube alone (approx.) 11 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, 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 750μA will be met provided a device is incorporated in the circuit to limit the short term average current to 1.1mA.

6. In order to avoid excessive hum the a.c. component of V_{h-k} should be as low as possible (< 20V r.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.
Permissible contact area

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

Recessed cavity connector CT8

* Diagonal opening of metal rimband = 472.5 min.

Eccentricity with respect to centre of screen 1.5 max.

Neck dia 36.5 ± 0.16

All dimensions in mm
COLOUR TELEVISION TUBE

Useful screen area

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

All dimensions in mm
Dimensions of metal band

Opening of rim band

Cement

2 max (meniscus)

Metal rim band

RIM DETAIL

One of the four lugs may deviate 2mm max. from the plane through the three other lugs. This deviation is incorporated in the ±2.5 tolerance.

All dimensions in mm
Minimum space to be reserved for mounting lugs = 37mm.
Mounting lug

Template for mounting bolts

The bolts to be used for mounting the tube must be within the circles of 8.5mm diameter shown in the template drawing.

All dimensions in mm
Reference line gauge

These dimensions define extent of 29:21R

Outline of tube with components

All dimensions in mm
As J.E.D.E.C. B12-244 Base but with shorter spigot.
BRIGHTNESS AT CENTRE OF SCREEN PLOTTED AGAINST TOTAL CURRENT FOR WHITE OF COLOUR COORDINATES $x = 0.281$, $y = 0.311$
COLOUR TELEVISION TUBE

**A49-11X**

**FINAL ANODE CURRENT PLOTTED AGAINST GRID VOLTAGE GRID MODULATION**

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

A49-11X
$V_{a3+a4} = 20 \text{ to } 27.5 \text{ kV}$