videocolor

ORLDIDE

Color Picture Tube Assembly W76EGX023X878

104° Deflection – 76 cm (30 V) 16:9 Super Flat Color Picture Tube

- **Yoke and neck components preset for World Wide**
- **A New Screen Ratio 16:9**
- **Super Flat – Square & Planar – Much Flatter than MP**
  – Screen edge Nearly Planar – Rectilinear Screen
- **Invar mask – Very High Stability Shadow Mask**
- **Saddle – Saddle Yoke – High Deflection Sensitivity**
- **COTY – MDF Gun – Precision In Line Gun – Dynamic Focus**
  for Improved Focus Uniformity and Resolution
- **32.8 mm Neck Diameter – Proven Reliability**
- **Improved Convergence Performance**
- **Integral Scan Modulation Coils**
- **Internal Magnetic Shield**
- **Other Features:**
  Matrix Contoured – Line Screen
  Tinted Phosphor
  Super Arch Mask
  Soft Arc Technology
  Integral Mounting Lugs
- **Integral Tube Components**

The VDC W76EGX023X878 76 cm (30V) 104° Precision In–Line Color Picture Tube is one of new generation of color picture tubes. The faceplate shape is much flatter than Medium Planar tubes.
The COTY–MDF multi–element focus precision in–line electron gun features an XL (expanded diameter lens) for improved focus performance and increased beam spacing . The expanded lens field encompasses all three beams.The expanded fields, when combined with the fields from the individual apertures and the increased beam spacing, produce a superior lens for focus performance with less aberrations than in a standard gun.
The dynamic focus feature permits the design of an electron beam that is essentially round in the center while corner focus may be optimized by adjustment. The W76EG023X878 tube characteristics are the same as the W76EGX023X122 tube. The difference is in the set–up conditions for specific applications. This tube is prepared for World Wide usage.

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For picture tube and deflection yoke data, refer to the W76EGX023X122 data bulletin, except for the following:

Vertical Raster Shift 0.0 ± 5.0 mm max
Horizontal Raster Sift 0.0 ± 5.0 mm max(1)

(1) The design center values are the values obtained when the tube is operated in an earth's magnetic field having a 380 mG vertical component and 240 mG horizontal component. When moving the CRT from the Northern Hemisphere to the Southern Hemisphere the design center value changes by approx 0.3 mm per every 100 mG vertical field variation.

Created in Italy **08/97**

Capacitance Between Anode and External Conductive Coating (including metal hardware) ..... 2600 min pF
Resistance Between Metal Hardware and External Conductive Coating .....50 min MΩ
Magnetic Shield.....Internal

Optical Data
Faceplate:
Light transmittance at center (approx.).....44.5 %

Screen:
Matrix.....Black Opaque Material
Type.....Negative Guard Band
Phosphor, rare – earth(red), sulfide(blue & green).....Type X[1]
Type.....Selectively Absorbent
Persistence ..... .Medium Short
Array..... Vertical Line Trios
Spacing between corresponding points on line trios at center (approx.).....0.78 mm

Mechanical Data
Tube dimensions:
Overall length.....511.84 ± 6.4 mm
Reference Line to center of face.....344.05 ± 4.8 mm
Neck length ..... 167.79 mm
O.D. at tension band:
Diagonal..... 824.20 max mm
Horizontal..... 730.90 max mm
Vertical..... 456.80 max mm
Minimum screen dimensions(projected):
Diagonal.....760.00 mm
Horizontal.....662.40 mm
Vertical.....372.60 mm
Area.....2468 sq.cm
Bulb Funnel Designation.....EIA No. J
Bulb Panel Designation.....EIA No. F
Anode Bulb Contact Designation.....EIA No.J1 21
Base and Pin Connection Designation.(2)..... EIA No. B10–301
Pin Position Alignment.....Space Separating Pins 9 and 10 Aligns Approx. with Anode Bulb Contact
Operating Position, Preferred.....Anode Bulb Contact on Top
Weight (approx.)..... 37 kg

Implosion Protection
Type.....Shrink–fit metal rimband

Maximum and Minimum Ratings, Absolute – Maximum Values
ABSOLUTE – MAXIMUM RATINGS ARE SPECIFIED FOR RELIABILITY AND PERFORMANCE PURPOSES.X–RADIATION CHARACTERISTICS SHOULD ALSO BE TAKEN INTO CONSIDERATION IN THE APPLICATION OF THIS TUBE TYPE.

Unless otherwise specified, voltage values are positive with respect to grid no. 1
Anode Voltage .....32 max kV
Anode Current Long – Term Average.....1500 max µA
Grid no. 3&5 (focusing electrode) Voltage.....12 max kV
Peak Grid no. 2 Voltage.....1850 max V
Cathode Voltage:
Positive bias value.....400 max V
Positive operating cutoff value.....200 max V
Negative bias value.....0 max V
Negative peak value.....2 max V
Heater Voltage:(3)
AC (rms) or DC value.....6.9 max V / 5.7 min V
Peak pulse value.....50 max V
Surge value , during 15 – second warm – up period (rms).....9.5 max V
Heater Cathode Voltage:
Heater negative with respect to cathode:
During equipment warm – up period not exceeding 15 seconds.....450 max V
After equipment warm – up period:
DC component value.....200 max V
Peak value.....300 max V
Heater positive with respect to cathode:
DC component value.....100 max V
Peak value.....200 max V
Limiting Circuit Values:
Grid no. 3 circuit resistance.....70 MΩ max
Grid no. 2 circuit resistance.....5 MΩ max

Typical Design Values [4] (for Anode Voltage of 30.0 KV)
Unless otherwise specified, voltage values are positive with respect to grid no. 1.
Grid no. 3&5 (focusing electrode) voltage.....28 to 32 %of Anode Voltage
Grid no. 5–top (dynamic focus electrode) Voltage.[5].....28 to 32%of Anode Voltage
Horiz. parabola voltage (usefull screen).....800 V
Vert parabola voltage (usefull screen).....150 V
Grid no. 2 & 4 Voltage for Visual Extintion of Undeflected Focused Spot.....See CUT OFF DESIGN CHART in **Figure 4**
At cathode voltage of 150 V.....250 to 550 V
Maximum Ratio of Cathode Cutoff Voltages, Highest Gun to Lowest Gun (with grid no. 2 of gun having highest cathode voltage adjusted to give 150 V spot cutoff)..... 1.15
Heater Voltage[3]..... 6.3 V
Grid no. 3&Grid no. 5 Current[5]..... ± 2 µA
Grid no. 2&4 Current..... ± 2 µA
Grid no. 1 Current..... ± 2 µA
To Produce White Light of ..... 9300 K +. 27 M.P.C.D.
CIE coordinates:
X.....0.281
Y.....0.311
Percentage of total anode current supplied by each beam (average):
Red.....36 %
Blue.....30 %
Green.....34 %
Ratio of cathode currents:
Red/Blue:
Minimum.....0.95
Typical.....1.20
Maximum.....1.45
Red/Green:
Minimum.....0.81
Typical.....1.06
Maximum.....1.31
Blue/Green:
Minimum.....0.68
Typical.....0.88
Maximum.....1.08
Raster Centering Displacement Measured at Center of Screen[6]
Horizontal.....0.0 ± 5.0 mm
Vertical.....0.0 ± 5.0 mm

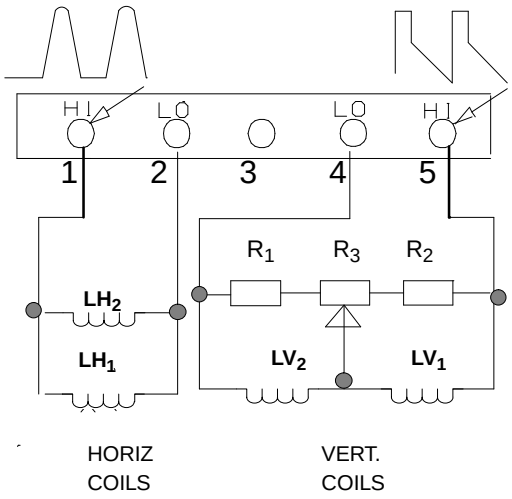
Deflection Yoke Data (At 30.0 KV)

L_H.....0.285 ± 5% mH
R_H..... 0.34 ± 10 % Ω
$I_{H\ p-p}$..... 11.96 A

L_V..... 12.9 ± 10% mH
R_V..... 8.20 ± 10% Ω
$I_{V\ p-p}$..... 1.23 A

Pincushion [7] E/W.....10.0 max %
N/S.....–0.8± 1.5 %
BSVM (Type F32T4) L.....4.6 ± 10 % µH

Deflection Yoke Data



$R_1 = R_2 = 47\ \Omega$
$R_3 = 100\ \Omega$

Fig. 1 – Connection Diagram for Yoke (As viewed from rear of yoke)

1 The X phosphor designation in the WTDS is equivalent to P22 in EIA type designation system.

2 For mating socket considerations, see Note 1 under **Notes** for **Dimensional Outline.**

3 For maximum tube life, the heater supply voltage should be regulated to minimize heater voltage changes due the variations in line voltage, beam current, and other parameters. The design center value of the heater voltage should be the **Typical Design Value:** however, in some applications it may be desirable to operate at a voltage slightly below this value. Cost considerations may suggest that the heater voltage be obtained from unregulated voltage varies with beam current, the circuit parameters should be selected so that the design center value of the heater voltage is equal to the **Typical Design Value** when the beam current is one–half of the **Long Term Average Anode Current** as shown in the tabulated data.The **Absolute Maximum and Minimum Ratings** should not be exceeded when including all variations.

4 The best tube performances are obtained under suggested operational condition.

5 A high source impedance in the focus circuit can result in a change in the focus voltage with a change in the grid no. 3 leakage current.

6 The design–center values are the values obtained when the tube is operated in an earth's magnetic field having a 380 mG vertical component and 240 mG horizontal component.

7 Typical values measured at a distance of 6 times picture height.

8 Measurements at 10 cm from the glass.

X – Radiation Characteristics [8]

Operating within the absolute maximum rating,these color picture tubes do not emit X–Radiation above 0.1 mR/h, satisfying the international accepted dosage rate of 0.5 mR/h (at 5 cm from the cabinet) and the new German regulation.(1 μSv/h at 10 cm from the glass)

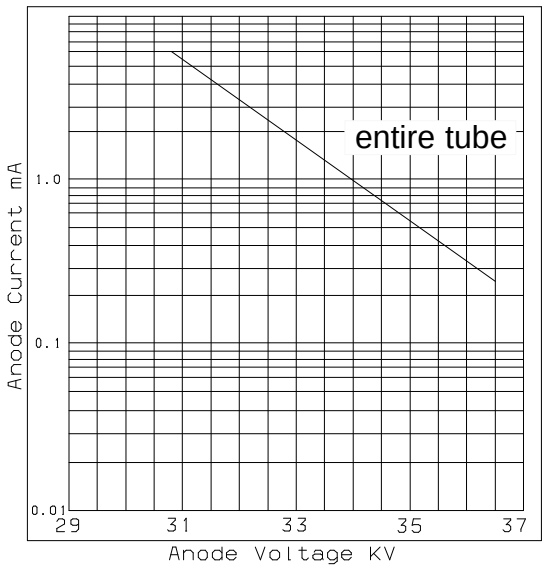


Fig. 2 – 0.1 mR/h Isoexposure–Rate Limit Curves

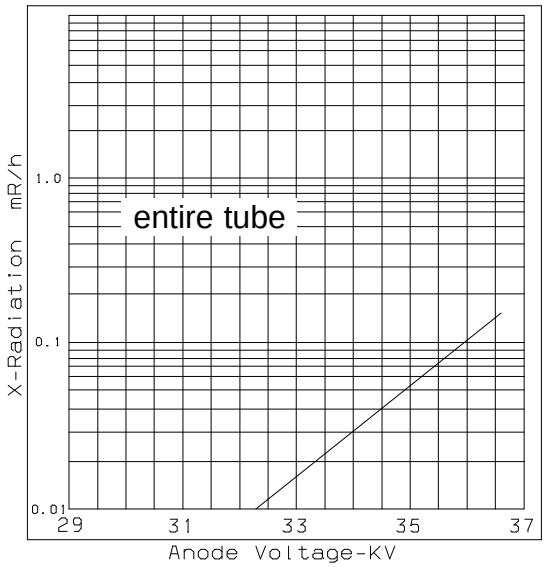


Fig. 3 –X–Radiation Limit Curves at a Constant Anode Current of 300 μA (X–radiation at a constant Anode voltage varies linearly with anode current)

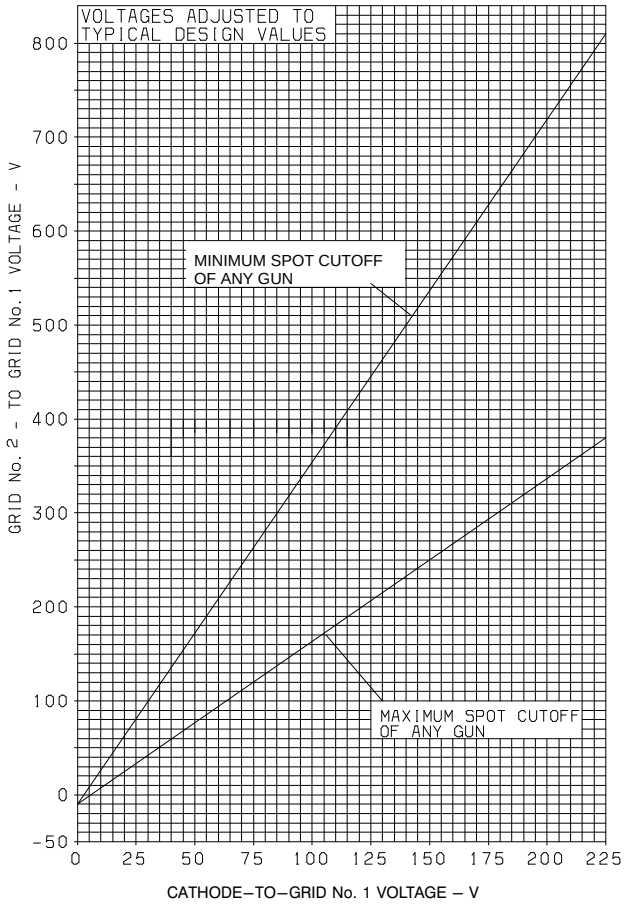
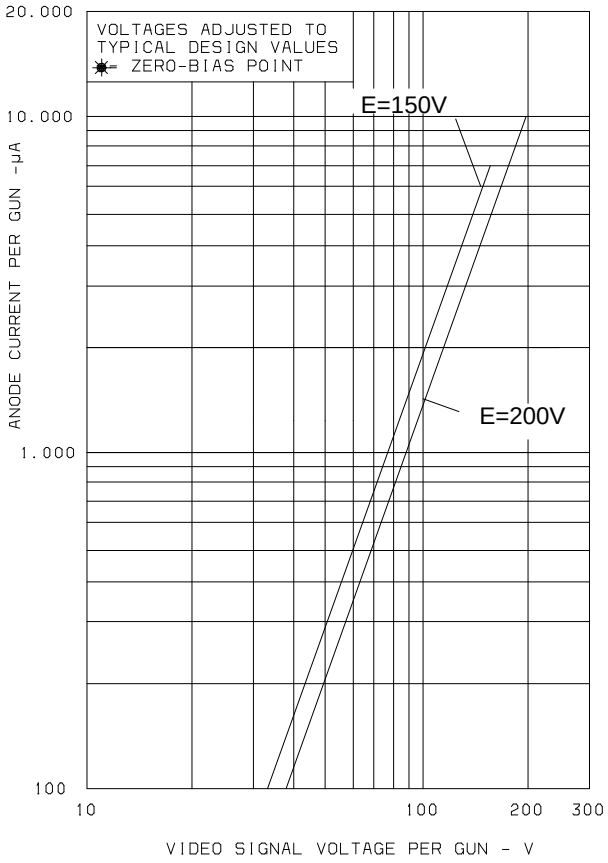


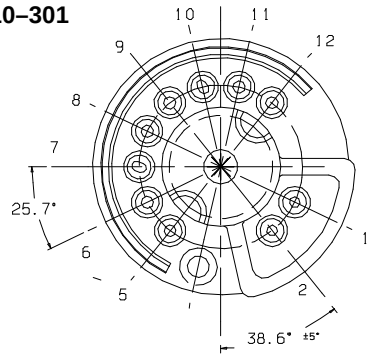
Fig. 4 –Cutoff Design Chart



* Under normal operating conditions, the cathode voltages should not go within 10 volts relative to the grid-no. 1.

Fig. 5 – Typical Drive Characteristics, Cathode–Drive Service

B10–301



Basing Specifications EIA no. 13N

Pin	1 Grid N°3 / N°5 bottom
Pin	2 Grid N°5 top
Pin	5 IC (Do not use)
Pin	6 Grid No. 1
Pin	7 Cathode of Green Beam
Pin	8 Grid N°2 / N°4
Pin	9 Cathode of Red Beam
Pin	10 Heater
Pin	11 Heater
Pin	12 Cathode of Blue Beam

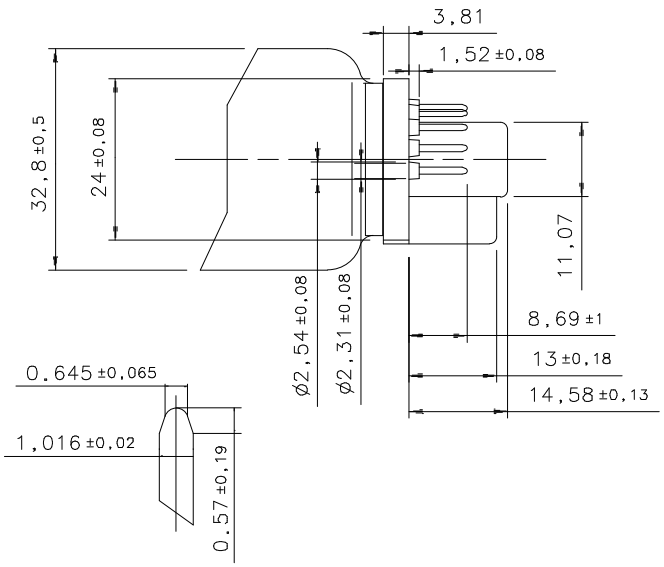
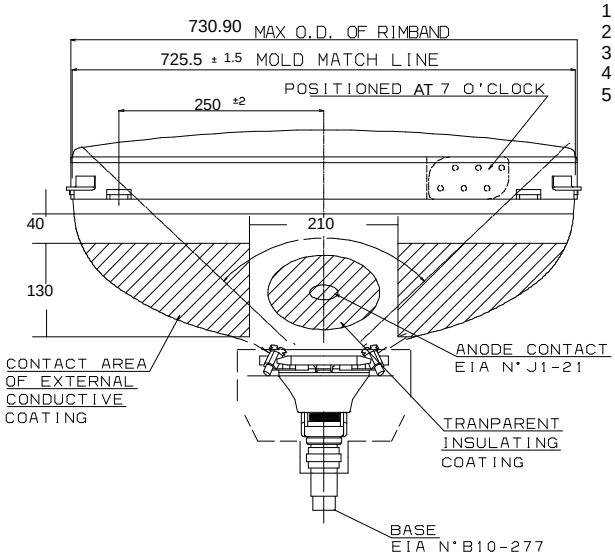


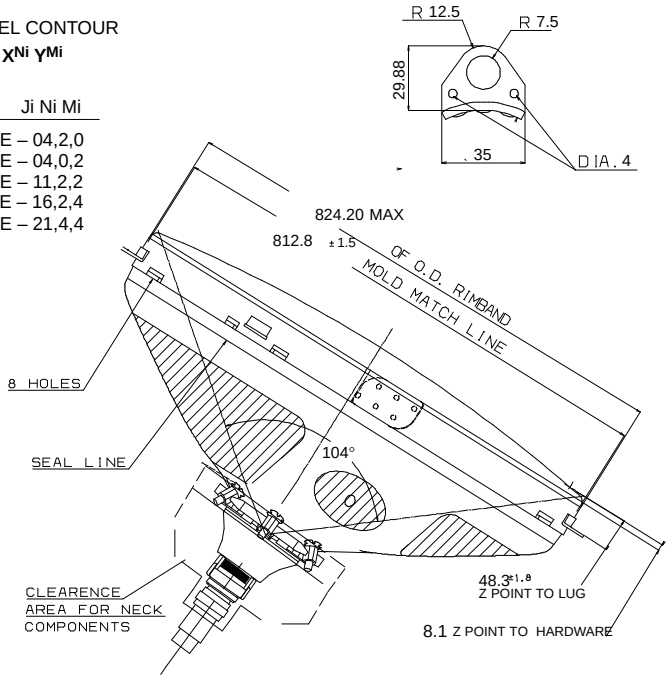
Fig. 6 – Pin Connections and Rear view of Base

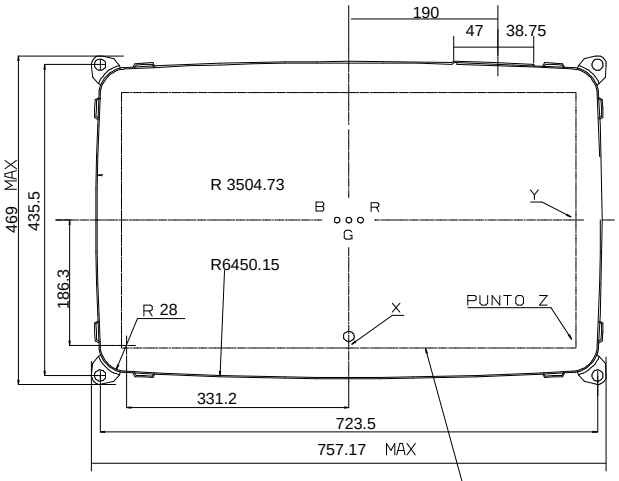
OUTSIDE PANEL CONTOUR

$$Z = \Sigma_i A_i 10^{Ji} X^{Ni} Y^{Mi}$$

I	AI	Ji Ni Mi
1	+ 2.008872E – 04	2,0
2	+ 2.002726E – 04	0,2
3	+ 1.314517E – 11	2,2
4	– 6.563159E – 16	2,4
5	+ 6.807958E – 21	4,4





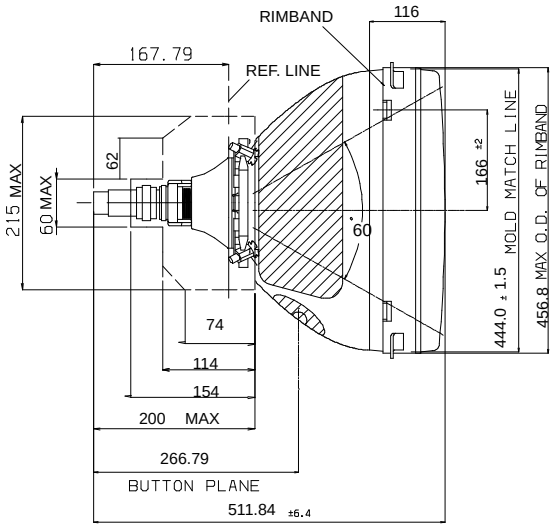


SAGITAL HEIGTH AT EDGE OF MIN. SCREEN:

DIAGONAL	29.05
HORIZONTAL	22.03
VERTICAL	6.95

MINIMUM SCREEN:

DIAGONAL	760.0
HORIZONTAL	662.4
VERTICAL	372.6



Dimensions in mm unless otherwise noted.

Notes for dimensional outline

Note 1– Socket for the base should not be rigidly mounted: it should have flexible leads and be allowed to move freely.

Note 2 – The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be connected to chassis with multiple contacts.

Note 3 – To clean the surface, wipe only with soft, dry, lintless cloth.

Note 4 – ”X”,”Y”,”Z” reference points are located on the outside surface of the faceplate at the intersection of the mini mum published screen with the minor , major, and dia gonal axes, respectively.

Note 5 – The tolerance of the mounting lug holes will accommodate mounting screws up to 8.5 mm in diameter when the screws are positioned on the hole centers.

Note 6 – One of four brackets may deviate 1.5 mm max. from the plane of the other three.

Note 7 – The radius is to the outside of the glass at the mold–match –line and is intended to define the shape of the required cutout for ”push–through” cabinet designs.

Note 8 – To facilitate cabinet design full size drawings and mecha–nical sample tubes are available on request.

Convergence and purity

The yoke and other neck components are preassembled on the tube and factory preset for optimum performance.

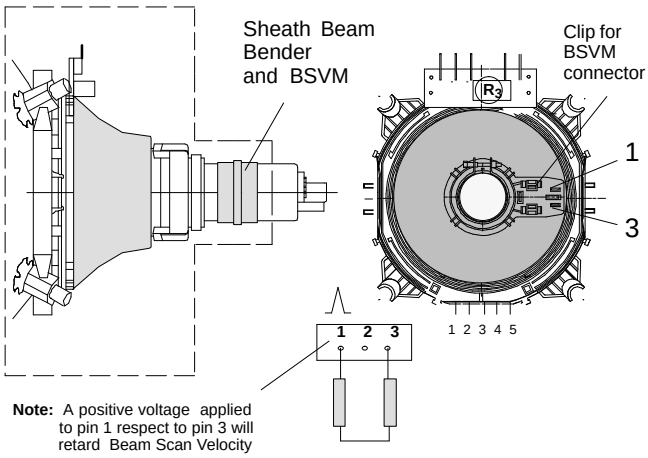
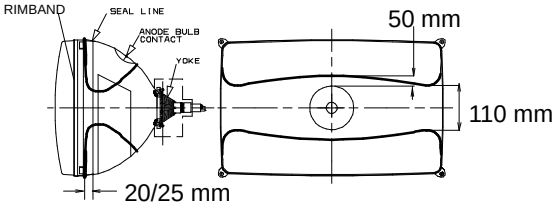


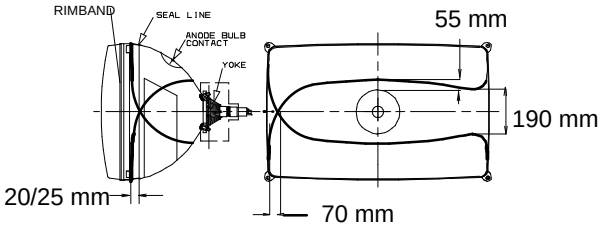
Fig. 7 – Neck Component Detail

Degaussing Coils

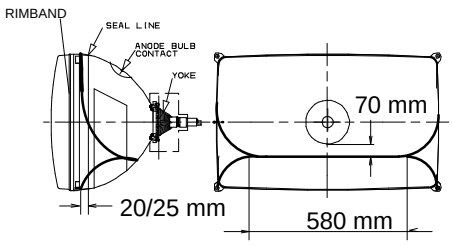
The recommended degaussing system utilizes three configuration coils placed on the TV receiver as shown in **Figures 8a. 8b, 8c.** Small holes are provided in the four mounting lugs to facilitate mounting the degaussing coil to the tube funnel.



Coil circumference = 1860 mm approx. (each coil)
Figure 8a– Top Bottom



Coil circumference = 3740 mm approx.
Fig. 8b – Twisted Loop



Coil circumference = 3740 mm approx.
Fig. 8c – " Figure 8 "

Fig. 8a,8b,8c– Relative Placement of Typical Degaussing Coils

Degaussing Circuit

A recommended degaussing circuit as shown in **figure 9** uses a conventional dual PTC device.For proper degaussing, a minimum value of 2000 peak to peak ampere turns is required. It is essential that the degaussing current reduces in a gradual manner to a quiescent level not exceeding 1.0 peak to peak ampere turns. For optimum performance the degaussing coils should always be connected to a very low source impedance at the horizontal frequency. If the circuit used does not have an inherent low impedance at the horizontal frequency, the degaussing coils should be shunted with a suitable capacitor. If the addition of a short across the coils increases the horizontal frequency current in the degaussing coils by more 20%, the inherent source impedance offered by the PTC and associated circuitry is indicated to be too high to provide satisfactory performance. Therefore a capacitor should be added across the degaussing coil to satisfy this requirement.

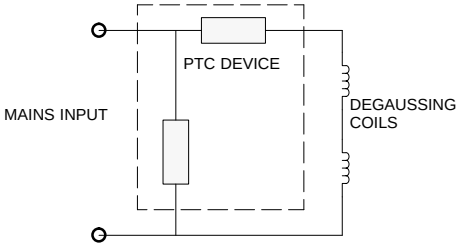


Fig. 9 – Typical Degaussing Circuit

Degaussing Procedures

After installation of the picture tube into the receiver cabinet on the production line, the complete receiver should be externally degaussed by a minimum degaussing field of 20 gauss at the center of the coil. During the external degaussing, the receiver should be in an "off" condition or in an "on" condition with the vertical scan removed and the mains input to the internal degaussing circuit disconnected. In this latter case,the internal degaussing circuit must be reconnected after the external degaussing process is completed. The external degaussing procedure should be followed by the receiver's internal degaussing in the normal manner.

High Voltage Discharge Protection

High internal resistance in the picture tube has significantly reduced the peak energy during a high–voltage discharge. In spite of these significant gains,high–voltage discharge is still capable of initiating ionized paths both internal and external to the tube that can couple high–energy lower–voltage sources to the picture tube and associated circuit elements. These high–energy sources can cause varying degrees of picture tube and circuit damage. With any color picture tube, product reliability is obtained by the use of spark gaps with proper grounding, series isolation resistors, and good printed circuit board layouts. Spark gaps to ground shall be connected to all socket contacts. The ground points for the G3 focus electrode spark gap and the low–voltage spark gaps should be connected with a heavy non–inductive strap to a good grounding contact on the picture tube external coating. The focus electrode spark gap should be designed to breakdown at a minimum DC value of 1.5 times the maximum design voltage of G3 control.

The low–voltage spark gaps should be designed for a DC breakdown voltage of 1.5 KV to 3.0 KV. The high–voltage circuit chassis ground point should be connected to the low–voltage spark gap ground at the picture tube socket. It is not recommended that any other connections be made between the picture tube external coating and the grounds of the main chassis or the spark gaps. This will minimize circulating currents in the chassis during high–voltage discharge. Isolation resistors should be used in series with each grid and cathode lead. The resistance values should be as high as possible without degrading circuit performance (see **figure 10**). These resistors should be capable of withstanding an application of 12 KV for the low–voltage circuits and 20 KV for the focus circuit

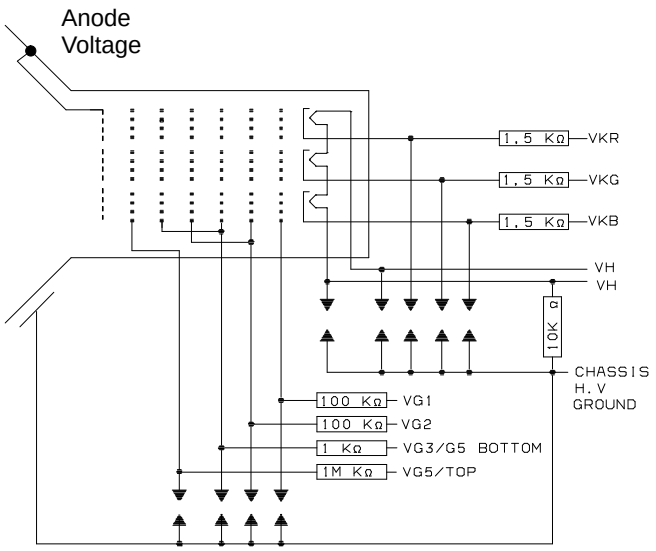


Fig. 10 – Picture Tube Connections Showing Spark–Gaps Recommendations and Typical Isolation–Resistor Values .

without arcing over, arcing through the body, or changing in resistance significantly during repeated applications of these voltages. Most half–watt carbon composition resistors are suitable for the low–voltage circuits and most 1–watt carbon composition resistors are suitable for the focus circuit. The use of these resistors reduces the possibility of circulating currents in the chassis and excessive current in the picture tube elements.

Spark gaps should be connected to both heater socket contacts. These spark gaps should have the same characteristics as the other low–voltage spark gaps. When the heater voltage is supplied from an isolated source, such as the horizontal deflection circuit or some other high–frequency pulse source, a capacitor may be required between one side of the heater and ground to eliminate undesirable interference on the picture tube screen. The capacitance value should be kept as small as possible. The resistance between the heater circuit and any power source should be a minimum of 10 kilohoms.

WARNING

X – Radiation

These color picture tubes do not emit x–radiation above the dosage rate of 0.1 mR/h if it is operated within the Absolute Maximum Ratings.

Implosion Protection

These picture tubes employ integral implosion protection and must be replaced with tubes of the same type number or a recommended replacement to assure continued safety.

Shock Hazard

The high voltage at which the tubes are operated may be very dangerous. Design of the TV receiver should include safeguards to prevent the user from coming in contact with the high voltage. Extreme care should be taken in the servicing or adjustment of any high voltage circuit.

Caution must be exercised during the replacement or servicing of the picture tube since a residual electrical charge may be contained on the high voltage capacitor formed by the external and internal conductive coatings of the picture tube funnel. To remove any undesirable residual high–voltage charge from the picture tube,"bleed–off" the charge by shorting the anode contact button, located in the funnel of the picture tube, to the external conductive coating before handling the tube. Discharging the high voltage to isolated metal parts such as cabinets and the control brackets may produce a shock hazard. Contact to the external conductive coating should be made by multiple fingers to prevent possible damageto the tube from localized overheating due to poor contact.

Mounting

Integral mounting lugs are provided to facilitate mounting the W76EGX023X878 in the receiver. If the integral mounting system is accessible in the receiver it is recommended that it be connected to the receiver chassis through one of the mounting lugs. If the chassis is not at earth potential the connection should be made through a current limiting resistor (1M Ω).

The color receiver mounting system should incorporate sufficient cushioning so that under normal conditions of shipment or handling an impact force of more than 35 g is never applied to the picture tube.

Tube Handling

Picture tubes should be kept in the shipping box or similar protective container until just prior to installation. Wear heavy protective clothing,including gloves and safety goggles with side shields, in areas containing unpacked and unprotected tubes to prevent possible injury from flying glass in the event a tube breaks. Handle the picture tube with extreme care . Do not strike, scratch or subject the tube to more than moderate pressure. Particular care should be taken to prevent damage to the seal area. The picture tube assembly should never be handled by the neck, yoke or other components.

General

It is the sole responsibility of the manufacturer of television receivers and other equipment utilizing this color picture tube assembly to provide protective circuitry and design in the event of failure or this color picture tube assembly.

The equipment manufacturer should provide a warning label in an appropriate position on the equipment to advise the serviceman of all safety precautions.

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