Electronic Industries Association

Announcement

of

Electron Device Type Registration

Release No. 7136

July 21, 1989

The Electronics Industries Association announces the registration of the following electron device designation:

A66ADT16X01
A66ADT18X02

according to the ratings and characteristics found on the attached data sheets on the application of:

RCA/Thomson

Lancaster, PA



2001 Eye Street, N.W. · Washington, D.C. 20006 · (202) 457-4900 · TWX: 710-822-0148

RCA

# Color Picture Tube

# A66ADT16X01

## 66 cm (26V) 110° COTY-FS Precision In-Line Color Picture Tube Assembly

- **Factory Adjusted Yoke and Neck Components**
- **COTY-FS – Full Square – Rectilinear Screen – Straight Sides and Square Corners**
- **Saddle/Toroidal Yoke – Lower Deflection Power Fully Pincushion Corrected**
- **XL Bipotential Precision In-Line Gun – Optimized Beam-Forming Region for Excellent Focus Uniformity and Good Resolution**
- **Standard 29 mm Neck Diameter – Proven Reliability**
- **Excellent Convergence and Register Performance**
- **Other Features –**
  - **Low Transmittance Faceplate**
  - **Matrix Line Screen**
  - **Tinted Phosphor**
  - **Internal Magnetic Shield**
  - **Super-Arch Mask**
  - **Soft-Arc Technology**
  - **Integral Mounting Lugs**

RCA A66ADT16X02 is a 66 cm (26V) 110° COTY-FS Precision In-Line Color Picture Tube Assembly . The yoke, which incorporates correction for pincushion distortion, and the other neck components are assembled on the tube and factory adjusted for optimum performance. The COTY-FS features screen edges that are straight and form square corners – a true rectangle.

The bipotential precision in-line electron gun features an XL (expanded diameter lens). In this feature, an expanded lens field encompasses all three beams. This expanded field, when combined with the fields from the individual apertures, produces a superior lens for focus performance with less aberrations than in a standard gun. Only the neck diameter, not the beam spacing, limits the focusing ability. Convergence performance has been improved by reducing the beam spacing.

*Picture Tube Data*

### Electrical Data

| | | |
|---|---|---|
| Heater: | | |
| Voltage | 6.3 | V |
| Current | 700 | mA |
| Focusing Method | Electrostatic | |
| Focus Lens | Bipotential | |
| Convergence Method | Magnetic (Preadjusted) | |
| Deflection Angles (approx.): | | |
| Diagonal | 110 | deg |
| Horizontal | 93 | deg |
| Vertical | 73 | deg |
| Direct Interelectrode Capacitances (approx.): | | |
| Grid no. 1 to all other electrodes | 11 | pF |
| Grid no. 3 to all other electrodes | 5.0 | pF |
| Each cathode to all other electrodes | 6.5 | pF |
| All cathodes to all other electrodes | 14 | pF |
| Capacitance Between Anode and External Conductive Coating (including metal hardware): | | |
| Maximum value | 2700 | pF |
| Minimum value | 2200 | pF |
| Resistance Between Metal Hardware and External Conductive Coating | 50 min. | MΩ |
| Deflection Yoke (factory preset) | RCA No. 2G27001-501 | |
| Magnetic Shield | Internal | |

### Optical Data

| | |
|---|---|
| Faceplate: | |
| Light transmittance at center (approx.) | 49.5% |
| Surface | Polished |
| Screen | Matrix |
| Phosphor, rare-earth (red), sulfide (blue & green) | Type X |
| Persistence | Medium Short |
| Array | Vertical Line Trios |
| Spacing between corresponding points on line trios at center (approx.) | 0.84 mm |

Formerly Developmental Type RCA J20658



Printed in U.S.A./6-89

## Mechanical Data

| | |
|---|---|
| Tube Dimensions: | |
| Overall length | 437.98± 6.35 mm |
| Reference line to center of face | 297.55± 4.78 mm |
| Neck length | 140.43± 4.78 mm |
| O.D. at shrink fit rimband: | |
| Diagonal | 715.87± 2.36 mm |
| Horizontal | 595.02± 2.36 mm |
| Vertical | 465.12± 2.36 mm |
| Minimum screen dimensions (projected): | |
| Diagonal | 659.64 mm |
| Horizontal | 527.71 mm |
| Vertical | 395.78 mm |
| Area | 2089 sq cm |
| Bulb Funnel Designation | EIA No. J704B |
| Bulb Panel Designation | EIA No. F708A |
| Anode Bulb Contact Designation | EIA No. J1-21 |
| Base and Pin Connection Designation[1] | EIA No. B9-297-AH |
| Pin Position Alignment | Space Separating Pins 9 and 10 Aligns Approx. with Anode Bulb Contact |
| Operating Position, Preferred | Anode Bulb Contact on Top |
| Gun Configuration | Horizontal In Line |
| Weight (approx.) | 25.5 kg |

## Implosion Protection

| | |
|---|---|
| Type | Shrink Fit 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: | | |
| Maximum value | 32 | kV |
| Minimum value | 17 | kV |
| Anode Current, Long-Term Average | 2000 max. | μA |
| Grid-No. 3 (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:[2] | | |
| AC (rms) or DC: | | |
| Maximum value | 6.9 | V |
| Minimum value | 5.7 | 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 |

## Typical Design Values (for anode voltage of 25 kV)

Unless otherwise specified, voltage values are positive with respect to grid no. 1.

| | | |
|---|---|---|
| Grid-No. 3 (focusing electrode) Voltage | 23 to 27% of Anode Voltage | |
| Grid-No. 2 Voltage for Visual Extinction of Undeflected Focused Spot | See CUTOFF DESIGN CHART In Figure 3 | |
| At cathode voltage of 100 V | 265 to 535 V | |
| At cathode voltage of 150 V | 420 to 820 V | |
| At cathode voltage of 200 V | 575 to 1105 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) | 1.25 | |
| Heater Voltage[2] | 6.3 V | |
| Grid-No. 3 Current[3] | ± 10 μA | |
| Grid-No. 2 Current | ± 5 μA | |
| Grid-No. 1 Current | ± 5 μA | |
| To Produce White Light Output Having CIE Coordinates of: | | |
| X | 0.313 | 0.303 |
| Y | 0.329 | 0.322 |
| Percentage of total anode current supplied by each beam (average): | | |
| Red | 37 | 33 % |
| Blue | 26 | 29 % |
| Green | 37 | 38 % |
| Ratio of cathode currents: | | |
| Red/blue: | | |
| Minimum | 1.00 | 0.93 |
| Typical | 1.38 | 1.16 |
| Maximum | 1.75 | 1.45 |
| Red/green: | | |
| Minimum | 0.75 | 0.70 |
| Typical | 0.98 | 0.88 |
| Maximum | 1.20 | 1.10 |
| Blue/green: | | |
| Minimum | 0.54 | 0.60 |
| Typical | 0.71 | 0.75 |
| Maximum | 0.88 | 0.94 |
| Raster Centering Displacement Measured at Center of Screen:[4] | | |
| Horizontal | − 1.2± 5.0 mm | |
| Vertical | 0± 3.0 mm | |

*Deflection Yoke Data*

## Maximum Ratings, Absolute-Maximum Values

| | | |
|---|---|---|
| Peak Pulse Voltage Across Horizontal Coils at 15,750 Hz for a Maximum Pulse Duration of 12 μs | 1400 max. | V |
| Peak Pulse Voltage Across Vertical Coils at 60 Hz for a Maximum Pulse Duration of 0.7 ms | 200 max. | V |
| Peak Pulse Voltage Between Horizontal and Vertical Coils at 15,750 Hz for a Maximum Pulse Duration of 12 μs | 1400 max. | V |

Care must be exercised when designing the deflection circuits so that the Absolute-Maximum peak pulse voltage between the horizontal and vertical coils is never exceeded.

## Typical Yoke Design Values

Horizontal Deflection Coils:
- Parallel-Connected:
  - Inductance at 1 V rms and 1 kHz ............. 1.30 ± 5% mH
  - Resistance a 25° C ....................... 1.40 ± 10% Ω
  - Typical operation with edge-to-edge scan at 25 kV:
    - Peak-to-peak deflection current ................. 4.86 A
    - Stored energy ............................... 3.8 mJ

Vertical Deflection Coils:
- Series-Connected:
  - Inductance at 1 V rms and 1 kHz ........... 18.0 ± 10% mH
  - Resistance a 25° C ...................... 5.65 ± 10% Ω
  - Typical operation with edge-to-edge scan at 25 kV:
    - Peak-to-peak deflection current .................. 1.67 A
    - Peak dissipation ............................. 3.9 W

Raster Pincushion Distortion at a Distance 5 Times the Picture Height:[5]
- East/west .............................. −0.40 ± 1.0 %
- North/south .............................. −0.80 ± 1.0 %

## Yoke Connector

This tube is supplied without yoke connectors or lead harness assembly. The following manufacturers are suggested as having the capability of making suitable connector parts. The listing of these manufacturers shall not be construed as giving approval for connectors supplied by these manufacturers. Approval criteria must be established by the individual receiver manufacturer. The set manufacturer may also choose to directly attach a lead harness assembly to the yoke terminals.

AMP, Inc.
Box 3608
Harrisburg, PA 17105
(717) 564-0100

Molex, Inc.
2222 Wellington CT
Lisle, IL 60532
(312) 969-4550

TRW Connector Division
TRW Electronic Component Group
1501 Morse Ave.
Elk Grove Village, IL 60007
(312) 981-6000

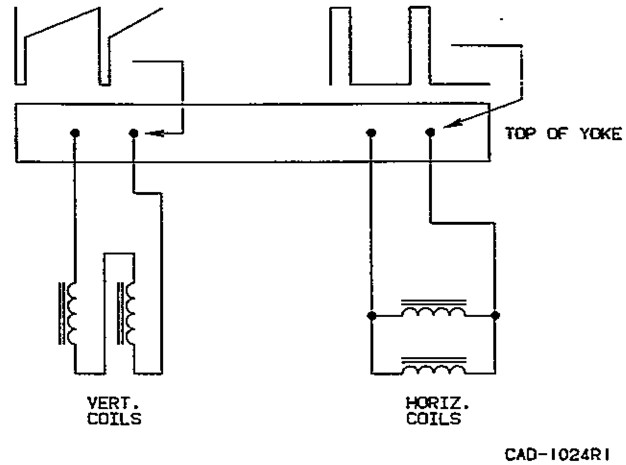


**Figure 1 - Connection Diagram For Yoke (as viewed from top rear of yoke)**

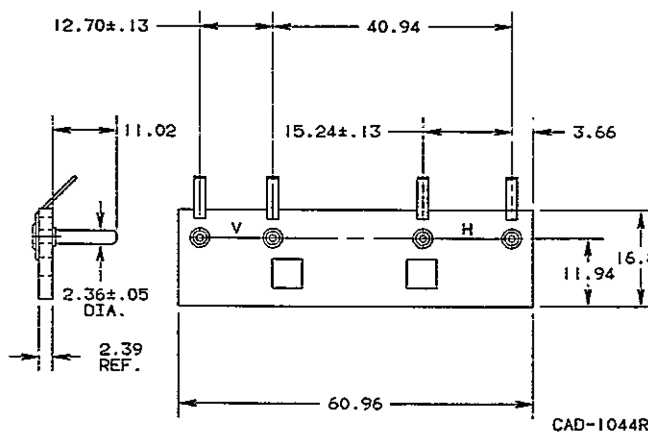


**Figure 2 - Yoke Terminal Board**

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

2 For maximum tube life, the heater supply voltage should be regulated to minimize heater voltage changes due to variations in line voltage, beam current, and other parameters. The heater voltage should be 6.3 V (within a measurement accuracy of ±0.1 V). 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 an unregulated source. If this option is chosen and the unregulated voltage varies with beam current, the circuit parameters should be selected so that the heater voltage is 6.3 V (within a measurement accuracy of ±0.1 V) when the beam current is one-half of the Long-Term Average Anode Current as shown in the tabulated data. The operating conditions should be such that the Absolute-Maximum and Minimum Ratings can never be exceeded when including all variations. Long-term operation at or near the Absolute-Maximum limit will substantially reduce tube life.

For specific considerations, consult your Thomson Consumer Electronics representative.

3 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.

4 Measurements are taken with the tube operating with recommended components and procedures, and in a magnetic field having a 470 mG vertical component and a zero cross-axial horizontal component.

5 Measured in accordance with IEC Recommendation — Publication 107 — 1960 — Recommended Methods of Measurement on Receivers for Television Broadcast Transmission.

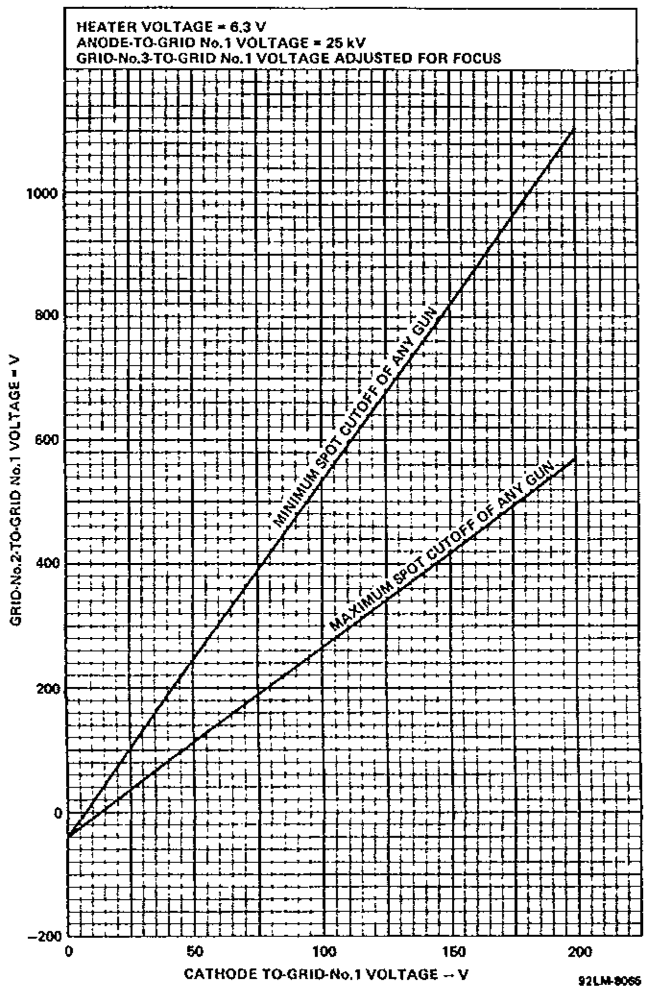


**Figure 3 - Cutoff Design Chart**

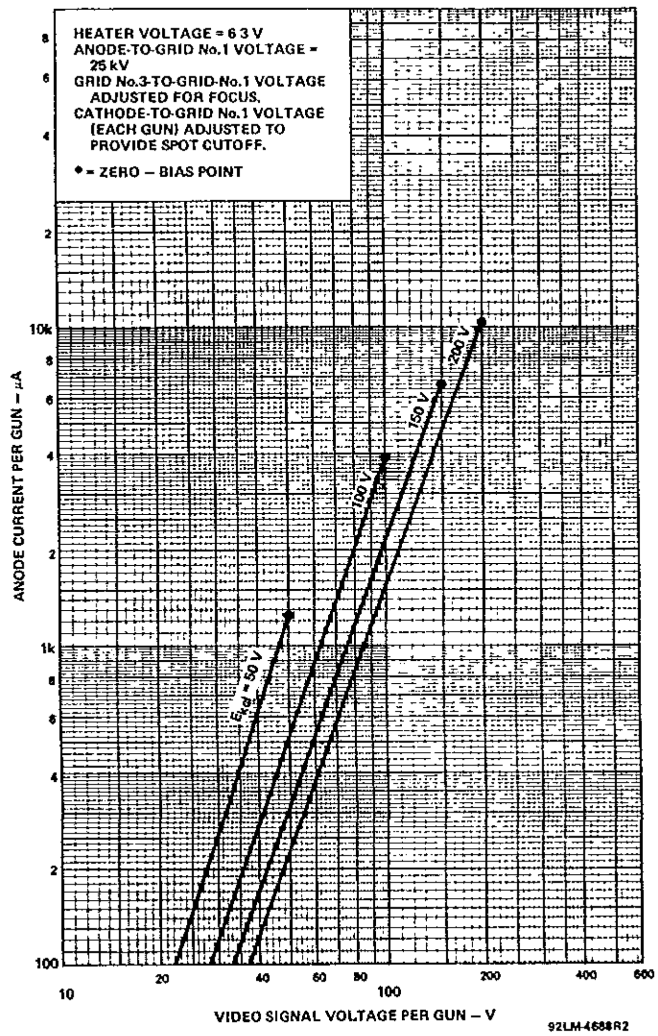


**Figure 4 - Typical Drive Characteristics, Cathode-Drive Service**

*Color Picture Tube Operating Conditions*

## Standard Operating Voltages

Unless otherwise specified, the voltages listed under "Typical Design Values" shall be used for all tests. The following recommended procedure should be used to establish specific operating voltages with deflection applied.

1. After installation of the picture tube into the receiver cabinet, the picture tube must be properly degaussed. For detailed information, see the sections entitled "Magnetic Shield and Degaussing", "Degaussing Coils", and "Degaussing Circuits".

2. Apply 6.3 V (rms) to the heater and allow for a minimum warm-up time of 5 minutes.

3. With 150 V applied to all three cathodes, no video on the tube, and a grid-no. 1 voltage of zero, remove vertical scan and increase the grid-no. 2 voltage until one gun is at cutoff. Then decrease the cathode voltage of the other two guns until they are at cutoff.

4. Restore vertical scan and select a monoscope pattern adjusted to a video drive level which produces an average white anode current of 1200 µA. While observing the monoscope pattern, adjust the focus electrode control to produce the greatest definition in the vertical wedge nearest the tube center.

*Tube Performance Characteristics*

## White Uniformity and Field Purity

With the picture tube set up as specified under "Color Picture Tube Operating Conditions", adjust the video drives applied to the cathodes of the three guns to obtain a white raster having CIE coordinates of x = 0.303, y = 0.322 and allow a 30-minute warm-up time at 25 watts anode power. The screen should be viewed with a blank raster at a distance of 2 meters. Ambient light level at the tube face should be a minimum of 1 lux. In the North American magnetic environment and with the receiver facing in any direction, there should be no readily visible discoloration, or any readily visible impurities on any individual color field.

## Convergence

Using a mutually agreed upon chassis and the tube set up as specified under "Color Picture Tube Operating Conditions", apply a cross hatch pattern at approximately 35 µA total anode current. Convergence errors are measured between the midpoints of the brightest portion of the red, blue, and green beams at the screen locations shown in Figure 5.

Very reliable performance can also be obtained with nonisolated heater circuits. In these cases, only the high side of the heater circuit needs a spark gap. Printed circuit board and socket designs which inherently provide spark gaps for both heater leads are also satisfactory.

### Tube Mounting

Integral mounting lugs are provided to facilitate mounting the picture tube in the receiver. To prevent a possible shock hazard, it is recommended that the integral mounting lugs and other metal hardware of the tube be connected to the receiver chassis through one of the mounting lugs. If the chassis is not at ground potential, the connection should be made through a 1 MΩ current-limiting resistor. The mounting system and other receiver hardware should not place mechanical stress on, or cause abrasion of, the tube; particularly to the panel-to-funnel seal.

The TV receiver mounting system should incorporate sufficient cushioning so that under conditions of shipment or handling the impact force applied to the picture tube does not exceed 35 g's with a pulse duration of 25 ms or less as measured at the tube centerface.

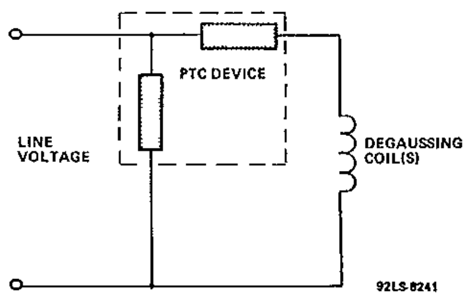


**Figure 14 - Alternate Degaussing Circuit**

One alternative is the dual PTC circuit shown in **Figure 14**. In this arrangement, component parameters and the number of turns in the degaussing coil(s) must be carefully selected to minimize the residual current while still achieving the specified initial value of 1500 AT.

Another alternative is to add a cut-off relay to the single PTC circuit of **Figure 13**. The purpose of this relay is to open the circuit after the degaussing current has decayed to a low level. Such a relay is often already available in remote control receivers. This arrangement forces the residual current to be zero.

In addition to the improvement in degaussing performance that can be achieved as described above, another incremental improvement can be made by eliminating the interactions between the vertical deflection yoke fields and the degaussing field. To achieve this improvement, it is necessary to delay the "turn-on" of the vertical deflection circuit until after the completion of the degaussing cycle.

## High-Voltage Discharge Protection

The high-resistance internal coating incorporated in soft-arc picture-tube designs significantly reduces the peak energy during a high-voltage discharge. In spite of this and other improvements, high-voltage discharges are still capable of initiating ionized paths, both internal and external to the tube, that can couple high-energy low-voltage sources to the picture tube and associated circuit elements. These high-energy sources can cause varying degrees of picture-tube and/or circuit damage.

With any color picture tube, maximum product reliability is obtained through the use of spark gaps with proper grounding, series isolation resistors, and good printed circuit board layouts. Spark gaps to ground should be connected to all socket contacts except as noted below for the heater circuits. The ground points for the focus-electrode spark gap and the low-voltage spark gaps should be connected with a heavy noninductive strap to a good grounding contact on the picture-tube external conductive coating. The focus-electrode spark gap should be designed to break down at a dc value of approximately 1.5 times the maximum design voltage of the focus circuit. The low-voltage spark gaps should be designed for a dc breakdown voltage of 1.5 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 recommended that no other connections be made between the picture-tube external conductive coating and grounds of the main chassis or 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 15**). These resistors should be capable of withstanding an instantaneous application of 12 kV for the low-voltage circuits and 20 kV for the focus circuit without arcing over, arcing through the body, or significantly changing in resistance value during repeated applications of these voltages. Most half-watt carbon composition resistors are suitable for the low-voltage circuits and most one-watt carbon composition resistors are suitable for the focus circuit. Use of these resistors reduces the possibility of circulating currents in the chassis and excessive currents in the picture-tube elements.

For best reliability, the heater circuit should be isolated from chassis ground and/or voltage sources by a minimum resistance of 10 kΩ. 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 another 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. If a capacitance value in excess of 0.01 μF is required, the spark gaps to the heater leads should not be used.

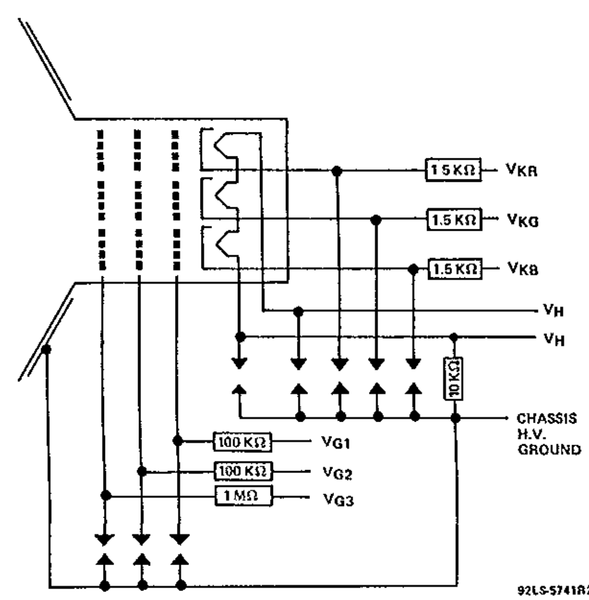


**Figure 15 - Picture-Tube Connections Showing Spark-Gap Recommendations and Typical Isolation-Resistor Values**

**Maximum Allowable Color-to-Color Separation**

| Location | Separation, mm |
|---|---|
| C | 0.4 |
| 3, 9 | 1.8 |
| 6, 12 | 1.2 |
| 2, 4, 8, 10 | 2.0 |

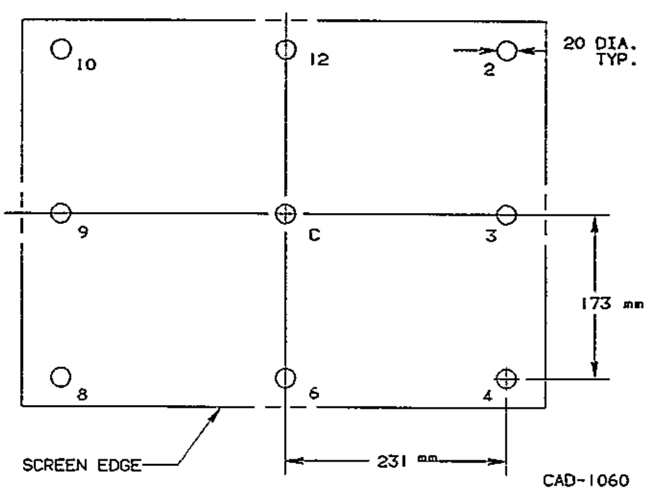


**Figure 5 - Convergence Measurement**

### Raster Rotation

The following procedure is recommended for measuring raster rotation:

1. Set up the tube as specified under " Color Picture Tube Operating Conditions" with the tube facing either magnetic East or West.
2. With a blanked raster video signal applied to the tube, cut off the red and blue guns and remove vertical scan.
3. Measure the vertical distances *(n and t) from the center of the green line to the center of the YAS (Yoke Alignment Slits) marks on both sides of the screen.

*Where: n = vertical error at 9:00
t = vertical error at 3:00
above YAS mark = + error
below YAS mark = − error

Specification Limit:
Raster Rotation (t − n) = ± 4.6 mm max. (± 0.5 °)

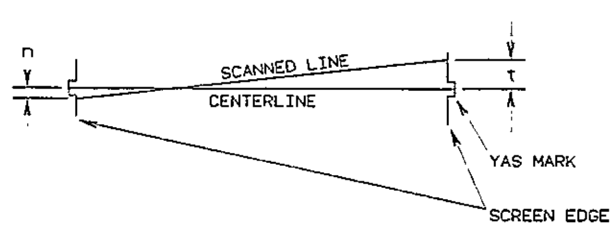


**Figure 6 - Raster Rotation**

**WARNING**

**X-Radiation** – This color picture tube incorporates integral x-radiation shielding and must be replaced with a tube of the same type number or a replacement type recommended by Thomson Consumer Electronics to assure continued safety.

Operation of this color picture tube at abnormal conditions which exceed the 0.5 mR/h isoexposure-rate limit curves shown in **Figure 7** may produce soft X rays and may constitute a health hazard by prolonged exposure at close range unless adequate external x-radiation shielding is provided. Therefore, precautions must be exercised during servicing of TV receivers employing this tube to assure that the anode voltage and other tube voltages are adjusted to the recommended values so that the Absolute-Maximum Ratings will not be exceeded.

**Implosion Protection** – This picture tube employs integral implosion protection and must be replaced with a tube of the same type number or a replacement type recommended by Thomson Consumer Electronics to assure continued safety.

**Shock Hazard** – The high voltage at which the tube is 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 charges from the picture tube, "bleed off" the charge by shorting the anode bulb contact, 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 control brackets may produce a shock hazard. Also see Tube Mounting on page 10.

**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 panel-to-funnel seal.

**It is the sole responsibility of the manufacturer of television receivers and other equipment utilizing this color picture tube to provide appropriate design and circuitry that will limit the possible effects of failure of the color picture tube.**

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

## X-Radiation Characteristics

These measurements are made in accordance with the procedure of EIA Standard RS-503.

A picture tube should never be operated beyond its Absolute-Maximum Ratings (such operation may shorten tube life or have other permanent adverse effects on its performance).

The x-radiation emitted from this picture tube will not exceed 0.5 mR/h for anode voltage and current combinations given by the isoexposure-rate limit curves as shown in Figure 7. Operation above the values shown by the curves may result in failure of the television receiver to comply with the Federal Performance Standard for Television Receivers, Part 1020 of Code of Federal Regulations, Title 21, Chapter I, Subchapter J. Maximum x-radiation as a function of anode voltage at 300 μA anode current is shown by the curves in Figure 8. X-radiation at a constant anode voltage varies linearly with anode current.

From These Curves, Maximum Anode Voltage at Which the X-Radiation Emitted Will Not Exceed 0.5 mR/h at an Anode Current of 300 μA:

For entire tube ................................ * 38.5 kV
For tube face only ................................ 40 kV

WARNING: If the value for the tube face only is used as design criterion, adequate shielding must be provided in the receiver for the anode bulb contact and/or certain portions of the tube funnel and panel skirt to insure that the x-radiation from the receiver is attenuated to a value equal to or lower than that specified for the face of the tube.

Maximum Voltage Difference Between Anode and Focus Electrode at Which the X-Radiation Emitted Will Not Exceed 0.5 mR/h ..................... 30 kV

WARNING: If the voltage value shown above can be exceeded in the receiver, additional attenuation of the x-radiation through the tube neck may be required.

*This rating applies only if the anode connector used by the receiver manufacturer provides the necessary attenuation to reduce the x-radiation from the anode bulb contact by a factor equivalent to the difference between the anode bulb contact isoexposure-rate limit curve (Figure 7) and the isoexposure-rate limit curve for the entire tube.

### Sagittal Heights With Reference to Centerface at the Edge of the Minimum Screen.

| Location | Coordinates X mm | Coordinates Y mm | Sagittal Height mm |
|---|---|---|---|
| Minor Axis | 0.00 | 197.89 | 17.34 |
| | 25.40 | 197.89 | 17.70 |
| | 50.80 | 197.89 | 18.77 |
| | 76.20 | 197.89 | 20.53 |
| | 101.60 | 197.89 | 22.93 |
| | 127.00 | 197.89 | 25.94 |
| | 152.40 | 197.89 | 29.56 |
| | 177.80 | 197.89 | 33.77 |
| | 203.20 | 197.89 | 38.60 |
| | 228.60 | 197.89 | 44.04 |
| | 254.00 | 197.89 | 50.12 |
| Diagonal | 263.86 | 197.89 | 52.66 |
| | 263.86 | 177.80 | 48.90 |
| | 263.86 | 152.40 | 44.71 |
| | 263.86 | 127.00 | 41.16 |
| | 263.86 | 101.60 | 38.24 |
| | 263.86 | 76.20 | 35.97 |
| | 263.86 | 50.80 | 34.34 |
| | 263.86 | 25.40 | 33.37 |
| Major Axis | 263.86 | 0.00 | 33.05 |

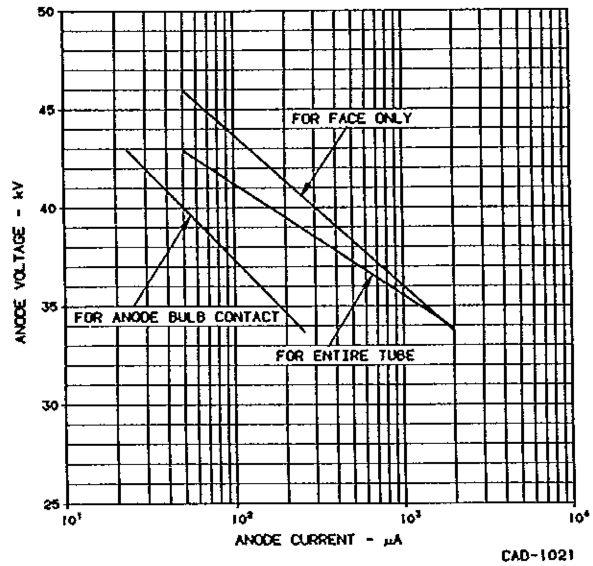


**Figure 7 - 0.5 mR/h Isoexposure-Rate Limit Curves**

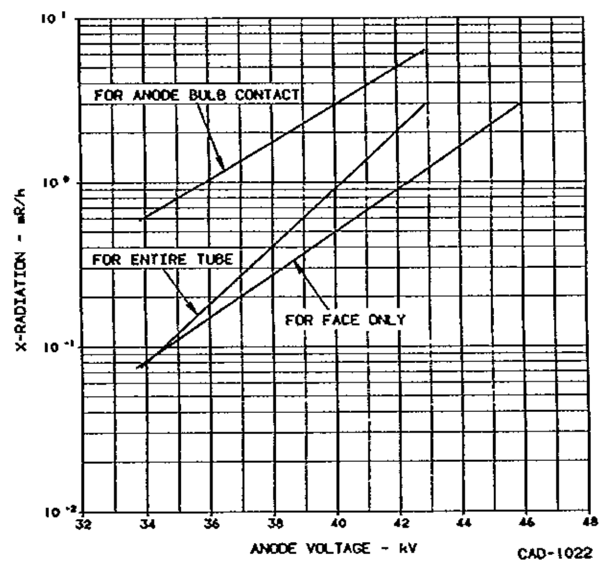


**Figure 8 - X-Radiation Limit Curves at a Constant Anode Current of 300 μA (x-radiation at a constant anode voltage varies linearly with anode current)**

Pin 1: Grid No.3
Pin 4: IC (Do Not Use)
Pin 5: Grid No.1
Pin 6: Cathode for Green Beam
Pin 7: Grid No.2
Pin 8: Cathode for Red Beam
Pin 9: Heater
Pin 10: Heater
Pin 11: Cathode for Blue Beam

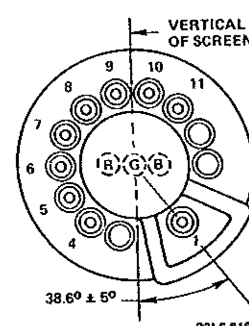


**Figure 9 - Pin Connections and Rear View of Base EIA No. B9-297-AH**

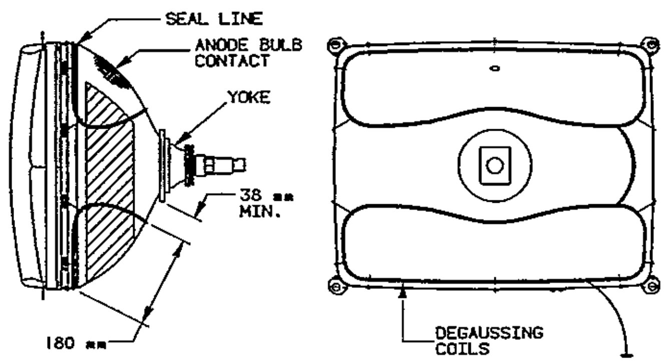


**Figure 11 - Relative Placement of Typical Top and Bottom Degaussing Coils**

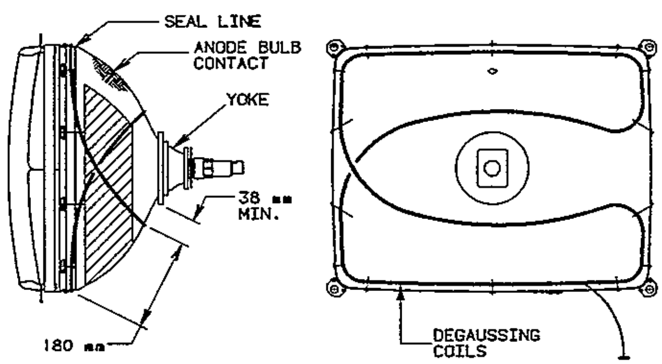


**Figure 12 - Relative Placement of Typical Twisted-Loop Degaussing Coil**

### Magnetic Shield and Degaussing

An internal magnetic shield is provided in this tube. When properly degaussed, this shield in conjunction with the shadow-mask assembly provides compensation for the effects of the earth's magnetic field on the electron beams. After installation of the picture tube into the receiver cabinet, it is recommended that the picture tube be externally degaussed by a minimum degaussing field of 20 gauss measured at the faceplate of the tube. The external degaussing procedure should be followed by the receiver's internal degaussing in the normal manner. It is recommended that this take place in a magnetic field having a 470 mG vertical component and a zero horizontal component. If this field is not available, it is essential that the tube be degaussed in the specific earth's magnetic field (strength and orientation) in which it is to be set up. Both the external degaussing and the receiver's internal degaussing must be performed with the receiver turned "off" or with the vertical scan removed. Proper degaussing will assure satisfactory performance for color field purity.

### Degaussing Coils

For optimum automatic degaussing, either of two different degaussing-coil arrangements should be incorporated in the TV receiver – top and bottom coils or twisted loop. Twelve slots and bosses are provided in the rimband of the tube to facilitate mounting the degaussing coil(s) to the tube funnel.

**Two-Coil, Top and Bottom System** – The two coils should be symmetrically placed on the tube funnel as shown in **Figure 11** and series-connected in such a way that the fields will add to produce the required degaussing field. This configuration offers the advantage of requiring the least amount of wire of the two systems but has the disadvantage of needing two coils with the associated wiring requirements.

**Twisted-Loop System** – The twisted-loop coil should be placed on the tube funnel as shown in **Figure 12**. This single-coil configuration produces a degaussing effect similar to the two-coil system.

### Degaussing Circuit

The degaussing circuit should provide a minimum of 1500 peak-to-peak ampere-turns (AT) in the degaussing coil. This current must decay in a gradual manner such that 50% of the initial amplitude still flows after 5 cycles. In addition, at the completion of the degaussing cycle the residual current in the coil(s) must not exceed 1.0 peak-to-peak AT.

With any degaussing circuit it is necessary to eliminate interactions which occur between the deflection yoke fields and the degaussing coil(s). The induced current can be minimized by careful positioning of the degaussing coil(s). For this reason, and in order to achieve optimal degaussing recovery, coil placement is critical and should follow the recommendations shown in **Figure 11** or **Figure 12**. This will provide a minimum distance of 38 mm measured from the yoke liner.

The typical single PTC circuit shown in **Figure 13** is capable of producing the required current; however, this circuit normally leaves too much residual current flowing after the degaussing cycle is complete. Two alternatives are suggested to reduce this residual current and give a corresponding improvement in purity performance.

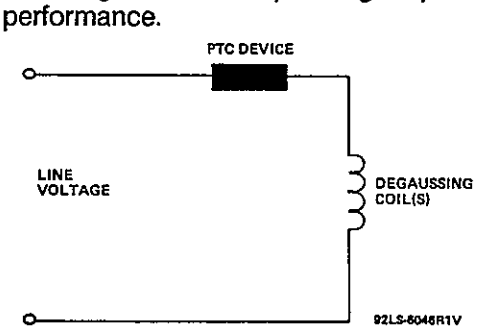


**Figure 13 - Typical Degaussing Circuit**

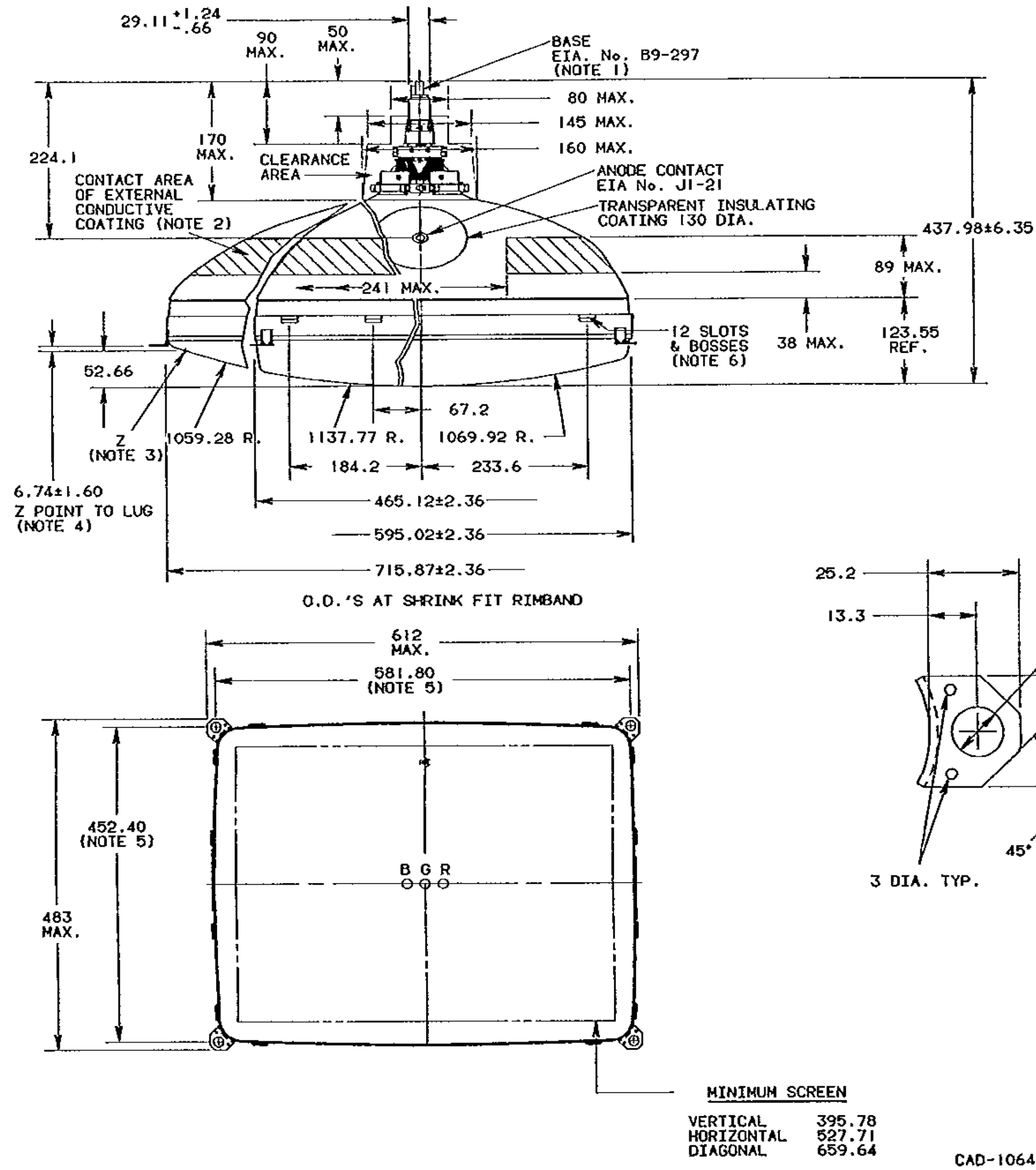


**Figure 10 - Dimensional Outline** (Dimensions in mm unless otherwise noted)

## Notes For Dimensional Outline

Note 1— The mating socket assembly with associated circuit board and mounted components must not weigh more than 0.5 kg. To minimize the torsional forces on the tube base pins, the center of gravity of this assembly should be located on the vertical plane through the picture-tube axis. Caution should also be exercised so that connecting leads to the assembly do not exert excessive torsional forces.

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 in order to provide the required capacitance. The external conductive coating must be connected to the chassis with multiple contacts.

Note 3— "Z" is located on the outside surface of the faceplate on the screen diagonal at the edge of the minimum published screen. This point is used as a reference for the mounting lugs.

Note 4— None of the four mounting lugs will deviate from the plane of the other three by more than 1.6 mm.

Note 5— These dimensions locate the true geometric hole centers for the mounting screws in the receiver. The tolerance of the tube mounting lug holes will accommodate mounting screws up to 9.5 mm in diameter when the screws are positioned at these locations.

Note 6— Clearance dimensions for mounting the degaussing coils: 3.2 mm x 8.0 mm.

RCA

# Color Picture Tube

# A66ADT18X02

## 66 cm (26V) 110° COTY-FS Precision In-Line Color Picture Tube Assembly

- **Factory Adjusted Yoke and Neck Components**
- **COTY-FS – Full Square – Rectilinear Screen – Straight Sides and Square Corners**
- **Saddle/Toroidal Yoke – Lower Deflection Power Fully Pincushion Corrected**
- **XL Bipotential Precision In-Line Gun – Optimized Beam-Forming Region for Excellent Focus Uniformity and Good Resolution**
- **Standard 29 mm Neck Diameter – Proven Reliability**
- **Excellent Convergence and Register Performance**
- **Other Features –**
  - **Low Transmittance Faceplate**
  - **Matrix Line Screen**
  - **Tinted Phosphor**
  - **Internal Magnetic Shield**
  - **Super-Arch Mask**
  - **Soft-Arc Technology**
  - **Integral Mounting Lugs**

RCA A66ADT18X02 is a 66 cm (26V) 110° COTY-FS Precision In-Line Color Picture Tube Assembly . The yoke, which incorporates correction for pincushion distortion, and the other neck components are assembled on the tube and factory adjusted for optimum performance. The COTY-FS features screen edges that are straight and form square corners – a true rectangle.

The bipotential precision in-line electron gun features an XL (expanded diameter lens). In this feature, an expanded lens field encompasses all three beams. This expanded field, when combined with the fields from the individual apertures, produces a superior lens for focus performance with less aberrations than in a standard gun. Only the neck diameter, not the beam spacing, limits the focusing ability. Convergence performance has been improved by reducing the beam spacing.

*Picture Tube Data*

### Electrical Data

Heater:

| | | |
|---|---|---|
| Voltage | 6.3 | V |
| Current | 700 | mA |

Focusing Method ........ Electrostatic

Focus Lens ........ Bipotential

Convergence Method ........ Magnetic (Preadjusted)

Deflection Angles (approx.):

| | | |
|---|---|---|
| Diagonal | 110 | deg |
| Horizontal | 93 | deg |
| Vertical | 73 | deg |

Direct Interelectrode Capacitances (approx.):

| | | |
|---|---|---|
| Grid no. 1 to all other electrodes | 11 | pF |
| Grid no. 3 to all other electrodes | 5.0 | pF |
| Each cathode to all other electrodes | 6.5 | pF |
| All cathodes to all other electrodes | 14 | pF |

Capacitance Between Anode and External Conductive Coating (including metal hardware):

| | | |
|---|---|---|
| Maximum value | 2700 | pF |
| Minimum value | 2200 | pF |

Resistance Between Metal Hardware and External Conductive Coating ........ 50 min. MΩ

Deflection Yoke (factory preset) ........ RCA No. 2G27001-503

Magnetic Shield ........ Internal

### Optical Data

Faceplate:

- Light transmittance at center (approx.) ........ 49.5%
- Surface ........ Polished

Screen ........ Matrix

- Phosphor, rare-earth (red), sulfide (blue & green) ........ Type X
  - Persistence ........ Medium Short
- Array ........ Vertical Line Trios
- Spacing between corresponding points on line trios at center (approx.) ........ 0.84 mm

Formerly Developmental Type RCA J20660



Printed in U.S.A./6-89

## Mechanical Data

| | |
|---|---|
| Tube Dimensions: | |
| Overall length | 437.98± 6.35 mm |
| Reference line to center of face | 297.55± 4.78 mm |
| Neck length | 140.43± 4.78 mm |
| O.D. at tension band: | |
| Diagonal | 715.87± 2.36 mm |
| Horizontal | 595.02± 2.36 mm |
| Vertical | 465.12± 2.36 mm |
| Minimum screen dimensions (projected): | |
| Diagonal | 659.64 mm |
| Horizontal | 527.71 mm |
| Vertical | 395.78 mm |
| Area | 2089 sq cm |
| Bulb Funnel Designation | EIA No. J704B |
| Bulb Panel Designation | EIA No. F708A |
| Anode Bulb Contact Designation | EIA No. J1-21 |
| Base and Pin Connection Designation[1] | EIA No. B9-297-AH |
| Pin Position Alignment | Space Separating Pins 9 and 10 Aligns Approx. with Anode Bulb Contact |
| Operating Position, Preferred | Anode Bulb Contact on Top |
| Gun Configuration | Horizontal In Line |
| Weight (approx.) | 25.5 kg |

## Implosion Protection

| | |
|---|---|
| Type | Shrink Fit 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: | | |
| Maximum value | 32 | kV |
| Minimum value | 17 | kV |
| Anode Current, Long-Term Average | 2000 max. | $\mu$A |
| Grid-No. 3 (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:[2] | | |
| AC (rms) or DC: | | |
| Maximum value | 6.9 | V |
| Minimum value | 5.7 | 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 |

## Typical Design Values (for anode voltage of 25 kV)

Unless otherwise specified, voltage values are positive with respect to grid no. 1.

| | | | |
|---|---|---|---|
| Grid-No. 3 (focusing electrode) Voltage | 23 to 27% of Anode Voltage | | |
| Grid-No. 2 Voltage for Visual Extinction of Undeflected Focused Spot | See CUTOFF DESIGN CHART in Figure 3 | | |
| At cathode voltage of 100 V | 265 to 535 V | | |
| At cathode voltage of 150 V | 420 to 820 V | | |
| At cathode voltage of 200 V | 575 to 1105 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) | 1.25 | | |
| Heater Voltage[2] | 6.3 V | | |
| Grid-No. 3 Current[3] | ± 10 $\mu$A | | |
| Grid-No. 2 Current | ± 5 $\mu$A | | |
| Grid-No. 1 Current | ± 5 $\mu$A | | |
| To Produce White Light Output Having CIE Coordinates of: | | | |
| X | 0.313 | 0.303 | |
| Y | 0.329 | 0.322 | |
| Percentage of total anode current supplied by each beam (average): | | | |
| Red | 37 | 33 | % |
| Blue | 26 | 29 | % |
| Green | 37 | 38 | % |
| Ratio of cathode currents: | | | |
| Red/blue: | | | |
| Minimum | 1.00 | 0.93 | |
| Typical | 1.38 | 1.16 | |
| Maximum | 1.75 | 1.45 | |
| Red/green: | | | |
| Minimum | 0.75 | 0.70 | |
| Typical | 0.98 | 0.88 | |
| Maximum | 1.20 | 1.10 | |
| Blue/green: | | | |
| Minimum | 0.54 | 0.60 | |
| Typical | 0.71 | 0.75 | |
| Maximum | 0.88 | 0.94 | |
| Raster Centering Displacement Measured at Center of Screen:[4] | | | |
| Horizontal | − 1.2± 5.0 mm | | |
| Vertical | 0± 3.0 mm | | |

*Deflection Yoke Data*

## Maximum Ratings, Absolute-Maximum Values

| | | |
|---|---|---|
| Peak Pulse Voltage Across Horizontal Coils at 15,750 Hz for a Maximum Pulse Duration of 12 $\mu$s | 1400 max. | V |
| Peak Pulse Voltage Across Vertical Coils at 60 Hz for a Maximum Pulse Duration of 0.7 ms | 200 max. | V |
| Peak Pulse Voltage Between Horizontal and Vertical Coils at 15,750 Hz for a Maximum Pulse Duration of 12 $\mu$s | 1400 max. | V |

Care must be exercised when designing the deflection circuits so that the Absolute-Maximum peak pulse voltage between the horizontal and vertical coils is never exceeded.

## Typical Yoke Design Values

Horizontal Deflection Coils:
- Parallel-Connected:
  - Inductance at 1 V rms and 1 kHz ............. 0.99 ± 5% mH
  - Resistance a 25° C ........................ 1.17 ± 10% Ω
  - Typical operation with edge-to-edge scan at 25 kV:
    - Peak-to-peak deflection current ................. 5.61 A
    - Stored energy .............................. 3.9 mJ

Vertical Deflection Coils:
- Series-Connected:
  - Inductance at 1 V rms and 1 kHz ........... 18.0 ± 10% mH
  - Resistance a 25° C ...................... 5.65 ± 10% Ω
  - Typical operation with edge-to-edge scan at 25 kV:
    - Peak-to-peak deflection current .................. 1.67 A
    - Peak dissipation .............................. 3.9 W

Raster Pincushion Distortion at a Distance 5 Times the Picture Height:[5]
- East/west ............................... −0.40 ± 1.0 %
- North/south .............................. −0.80 ± 1.0 %

## Yoke Connector

This tube is supplied without yoke connectors or lead harness assembly. The following manufacturers are suggested as having the capability of making suitable connector parts. The listing of these manufacturers shall not be construed as giving approval for connectors supplied by these manufacturers. Approval criteria must be established by the individual receiver manufacturer. The set manufacturer may also choose to directly attach a lead harness assembly to the yoke terminals.

AMP, Inc.
Box 3608
Harrisburg, PA 17105
(717) 564-0100

Molex, Inc.
2222 Wellington CT
Lisle, IL 60532
(312) 969-4550

TRW Connector Division
TRW Electronic Component Group
1501 Morse Ave.
Elk Grove Village, IL 60007
(312) 981-6000

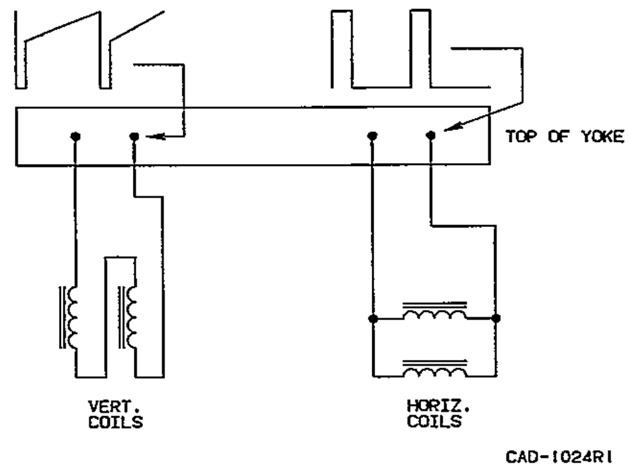


**Figure 1 - Connection Diagram For Yoke (as viewed from top rear of yoke)**

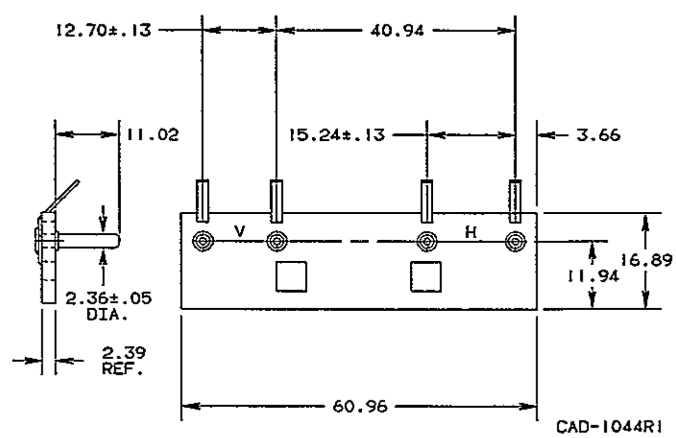


**Figure 2 - Yoke Terminal Board**

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

2 For maximum tube life, the heater supply voltage should be regulated to minimize heater voltage changes due to variations in line voltage, beam current, and other parameters. The heater voltage should be 6.3 V (within a measurement accuracy of ±0.1 V). 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 an unregulated source. If this option is chosen and the unregulated voltage varies with beam current, the circuit parameters should be selected so that the heater voltage is 6.3 V (within a measurement accuracy of ±0.1 V) when the beam current is one-half of the Long-Term Average Anode Current as shown in the tabulated data. The operating conditions should be such that the Absolute-Maximum and Minimum Ratings can never be exceeded when including all variations. Long-term operation at or near the Absolute-Maximum limit will substantially reduce tube life.
For specific considerations, consult your Thomson Consumer Electronics representative.

3 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.

4 Measurements are taken with the tube operating with recommended components and procedures, and in a magnetic field having a 470 mG vertical component and a zero cross-axial horizontal component.

5 Measured in accordance with IEC Recommendation — Publication 107 — 1960 — Recommended Methods of Measurement on Receivers for Television Broadcast Transmission.

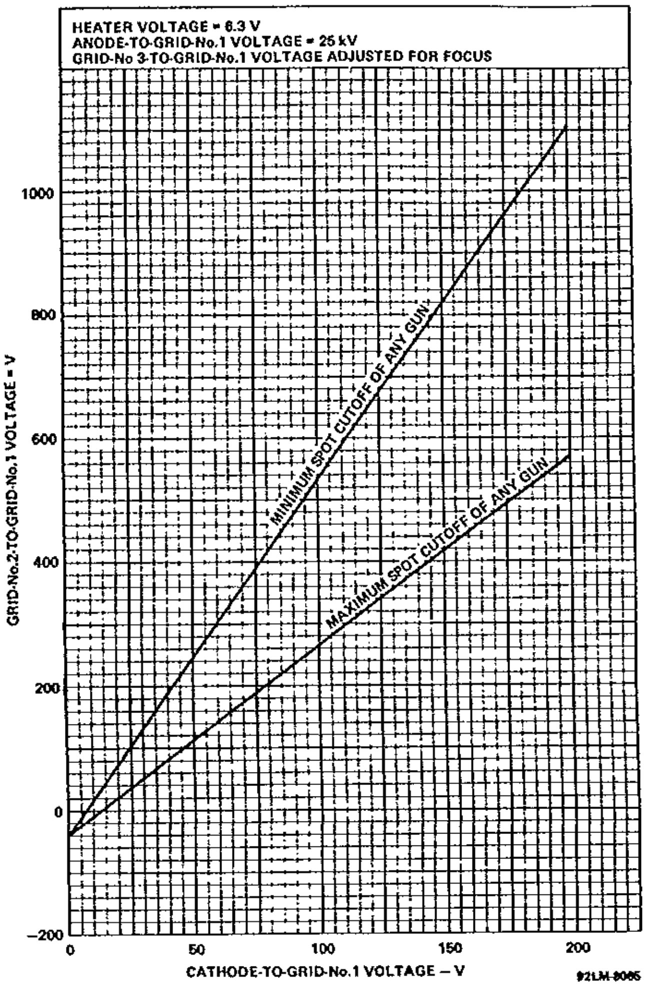


**Figure 3 - Cutoff Design Chart**

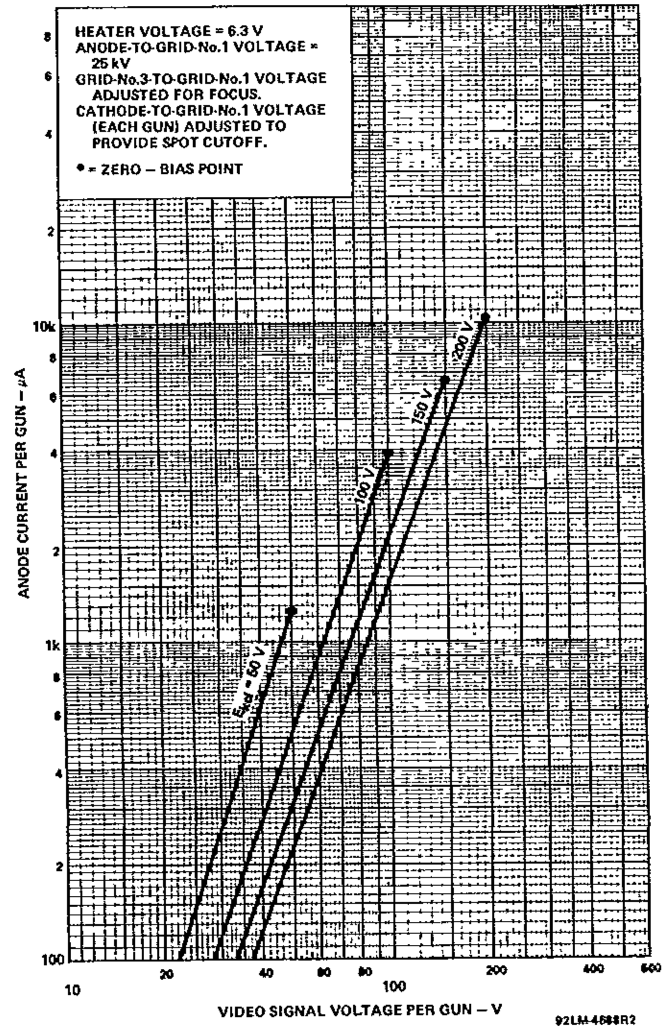


**Figure 4 - Typical Drive Characteristics, Cathode-Drive Service**

*Color Picture Tube Operating Conditions*

## Standard Operating Voltages

Unless otherwise specified, the voltages listed under "Typical Design Values" shall be used for all tests. The following recommended procedure should be used to establish specific operating voltages with deflection applied.

1. After installation of the picture tube into the receiver cabinet, the picture tube must be properly degaussed. For detailed information, see the sections entitled "Magnetic Shield and Degaussing", "Degaussing Coils", and "Degaussing Circuits".
2. Apply 6.3 V (rms) to the heater and allow for a minimum warm-up time of 5 minutes.
3. With 150 V applied to all three cathodes, no video on the tube, and a grid-no. 1 voltage of zero, remove vertical scan and increase the grid-no. 2 voltage until one gun is at cutoff. Then decrease the cathode voltage of the other two guns until they are at cutoff.
4. Restore vertical scan and select a monoscope pattern adjusted to a video drive level which produces an average white anode current of 1200 $\mu$A. While observing the monoscope pattern, adjust the focus electrode control to produce the greatest definition in the vertical wedge nearest the tube center.

*Tube Performance Characteristics*

## White Uniformity and Field Purity

With the picture tube set up as specified under "Color Picture Tube Operating Conditions", adjust the video drives applied to the cathodes of the three guns to obtain a white raster having CIE coordinates of $x = 0.303$, $y = 0.322$ and allow a 30-minute warm-up time at 25 watts anode power. The screen should be viewed with a blank raster at a distance of 2 meters. Ambient light level at the tube face should be a minimum of 1 lux. In the North American magnetic environment and with the receiver facing in any direction, there should be no readily visible discoloration, or any readily visible impurities on any individual color field.

## Convergence

Using a mutually agreed upon chassis and the tube set up as specified under "Color Picture Tube Operating Conditions", apply a cross hatch pattern at approximately 35 $\mu$A total anode current. Convergence errors are measured between the midpoints of the brightest portion of the red, blue, and green beams at the screen locations shown in Figure 5.

Very reliable performance can also be obtained with nonisolated heater circuits. In these cases, only the high side of the heater circuit needs a spark gap. Printed circuit board and socket designs which inherently provide spark gaps for both heater leads are also satisfactory.

**Tube Mounting**

Integral mounting lugs are provided to facilitate mounting the picture tube in the receiver. To prevent a possible shock hazard, it is recommended that the integral mounting lugs and other metal hardware of the tube be connected to the receiver chassis through one of the mounting lugs. If the chassis is not at ground potential, the connection should be made through a 1 MΩ current-limiting resistor. The mounting system and other receiver hardware should not place mechanical stress on, or cause abrasion of, the tube; particularly to the panel-to-funnel seal.

The TV receiver mounting system should incorporate sufficient cushioning so that under conditions of shipment or handling the impact force applied to the picture tube does not exceed 35 g's with a pulse duration of 25 ms or less as measured at the tube centerface.

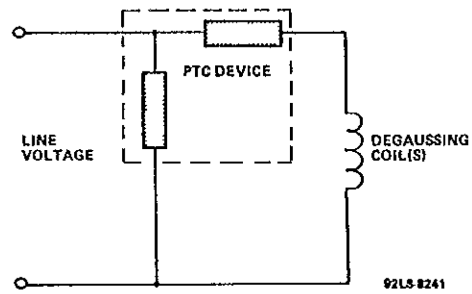


**Figure 14 - Alternate Degaussing Circuit**

One alternative is the dual PTC circuit shown in **Figure 14**. In this arrangement, component parameters and the number of turns in the degaussing coil(s) must be carefully selected to minimize the residual current while still achieving the specified initial value of 1500 AT.

Another alternative is to add a cut-off relay to the single PTC circuit of **Figure 13**. The purpose of this relay is to open the circuit after the degaussing current has decayed to a low level. Such a relay is often already available in remote control receivers. This arrangement forces the residual current to be zero.

In addition to the improvement in degaussing performance that can be achieved as described above, another incremental improvement can be made by eliminating the interactions between the vertical deflection yoke fields and the degaussing field. To achieve this improvement, it is necessary to delay the "turn-on" of the vertical deflection circuit until after the completion of the degaussing cycle.

**High-Voltage Discharge Protection**

The high-resistance internal coating incorporated in soft-arc picture-tube designs significantly reduces the peak energy during a high-voltage discharge. In spite of this and other improvements, high-voltage discharges are still capable of initiating ionized paths, both internal and external to the tube, that can couple high-energy low-voltage sources to the picture tube and associated circuit elements. These high-energy sources can cause varying degrees of picture-tube and/or circuit damage.

With any color picture tube, maximum product reliability is obtained through the use of spark gaps with proper grounding, series isolation resistors, and good printed circuit board layouts. Spark gaps to ground should be connected to all socket contacts except as noted below for the heater circuits. The ground points for the focus-electrode spark gap and the low-voltage spark gaps should be connected with a heavy noninductive strap to a good grounding contact on the picture-tube external conductive coating. The focus-electrode spark gap should be designed to break down at a dc value of approximately 1.5 times the maximum design voltage of the focus circuit. The low-voltage spark gaps should be designed for a dc breakdown voltage of 1.5 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 recommended that no other connections be made between the picture-tube external conductive coating and grounds of the main chassis or 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 15**). These resistors should be capable of withstanding an instantaneous application of 12 kV for the low-voltage circuits and 20 kV for the focus circuit without arcing over, arcing through the body, or significantly changing in resistance value during repeated applications of these voltages. Most half-watt carbon composition resistors are suitable for the low-voltage circuits and most one-watt carbon composition resistors are suitable for the focus circuit. Use of these resistors reduces the possibility of circulating currents in the chassis and excessive currents in the picture-tube elements.

For best reliability, the heater circuit should be isolated from chassis ground and/or voltage sources by a minimum resistance of 10 kΩ. 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 another 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. If a capacitance value in excess of 0.01 μF is required, the spark gaps to the heater leads should not be used.

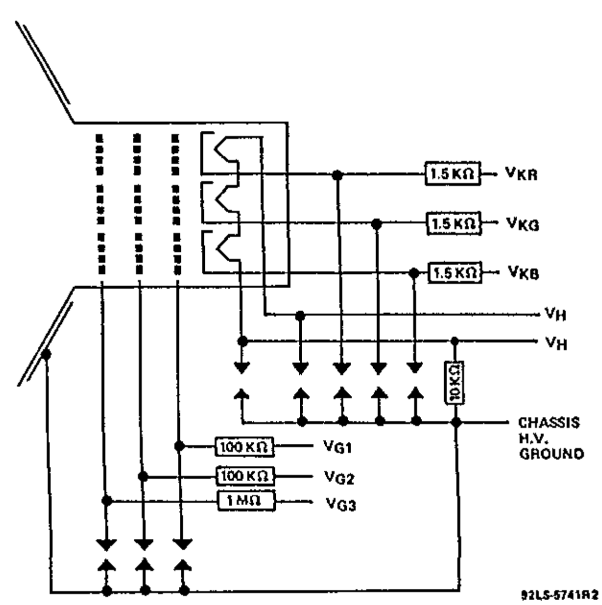


**Figure 15 - Picture-Tube Connections Showing Spark-Gap Recommendations and Typical Isolation-Resistor Values**

**Maximum Allowable Color-to-Color Separation**

| Location | Separation, mm |
|---|---|
| C | 0.4 |
| 3, 9 | 1.8 |
| 6, 12 | 1.2 |
| 2, 4, 8, 10 | 2.0 |

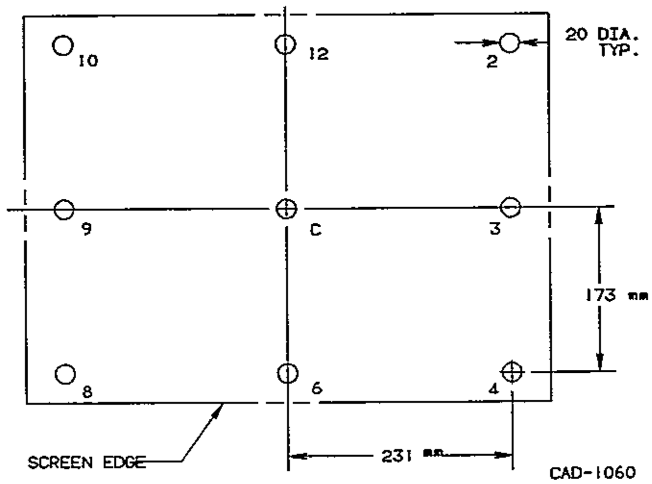


**Figure 5 - Convergence Measurement**

## Raster Rotation

The following procedure is recommended for measuring raster rotation:

1. Set up the tube as specified under " Color Picture Tube Operating Conditions" with the tube facing either magnetic East or West.
2. With a blanked raster video signal applied to the tube, cut off the red and blue guns and remove vertical scan.
3. Measure the vertical distances *(n and t) from the center of the green line to the center of the YAS (Yoke Alignment Slits) marks on both sides of the screen.

*Where: n = vertical error at 9:00
t = vertical error at 3:00
above YAS mark = + error
below YAS mark = − error

Specification Limit:
Raster Rotation (t − n) = ± 4.6 mm max. (± 0.5 °)

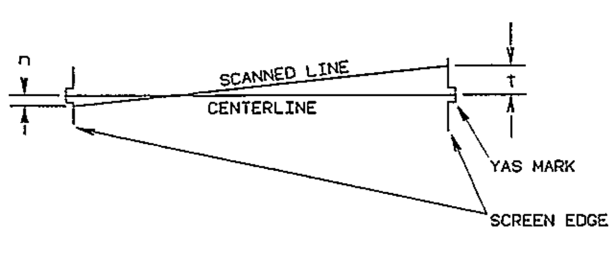


**Figure 6 - Raster Rotation**

**WARNING**

**X-Radiation** – This color picture tube incorporates integral x-radiation shielding and must be replaced with a tube of the same type number or a replacement type recommended by Thomson Consumer Electronics to assure continued safety.

Operation of this color picture tube at abnormal conditions which exceed the 0.5 mR/h isoexposure-rate limit curves shown in **Figure 7** may produce soft X rays and may constitute a health hazard by prolonged exposure at close range unless adequate external x-radiation shielding is provided. Therefore, precautions must be exercised during servicing of TV receivers employing this tube to assure that the anode voltage and other tube voltages are adjusted to the recommended values so that the Absolute-Maximum Ratings will not be exceeded.

**Implosion Protection** – This picture tube employs integral implosion protection and must be replaced with a tube of the same type number or a replacement type recommended by Thomson Consumer Electronics to assure continued safety.

**Shock Hazard** – The high voltage at which the tube is 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 charges from the picture tube, "bleed off" the charge by shorting the anode bulb contact, 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 control brackets may produce a shock hazard. Also see Tube Mounting on page 10.

**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 panel-to-funnel seal.

**It is the sole responsibility of the manufacturer of television receivers and other equipment utilizing this color picture tube to provide appropriate design and circuitry that will limit the possible effects of failure of the color picture tube.**

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

## X-Radiation Characteristics

These measurements are made in accordance with the procedure of EIA Standard RS-503.

A picture tube should never be operated beyond its Absolute-Maximum Ratings (such operation may shorten tube life or have other permanent adverse effects on its performance).

The x-radiation emitted from this picture tube will not exceed 0.5 mR/h for anode voltage and current combinations given by the isoexposure-rate limit curves as shown in Figure 7. Operation above the values shown by the curves may result in failure of the television receiver to comply with the Federal Performance Standard for Television Receivers, Part 1020 of Code of Federal Regulations, Title 21, Chapter I, Subchapter J. Maximum x-radiation as a function of anode voltage at 300 µA anode current is shown by the curves in Figure 8. X-radiation at a constant anode voltage varies linearly with anode current.

From These Curves, Maximum Anode Voltage at Which the X-Radiation Emitted Will Not Exceed 0.5 mR/h at an Anode Current of 300 µA:

For entire tube ................................ *38.5 kV
For tube face only ................................ 40 kV

WARNING: If the value for the tube face only is used as design criterion, adequate shielding must be provided in the receiver for the anode bulb contact and/or certain portions of the tube funnel and panel skirt to insure that the x-radiation from the receiver is attenuated to a value equal to or lower than that specified for the face of the tube.

Maximum Voltage Difference Between Anode and Focus Electrode at Which the X-Radiation Emitted Will Not Exceed 0.5 mR/h ..................... 30 kV

WARNING: If the voltage value shown above can be exceeded in the receiver, additional attenuation of the x-radiation through the tube neck may be required.

*This rating applies only if the anode connector used by the receiver manufacturer provides the necessary attenuation to reduce the x-radiation from the anode bulb contact by a factor equivalent to the difference between the anode bulb contact isoexposure-rate limit curve (Figure 7) and the isoexposure-rate limit curve for the entire tube.

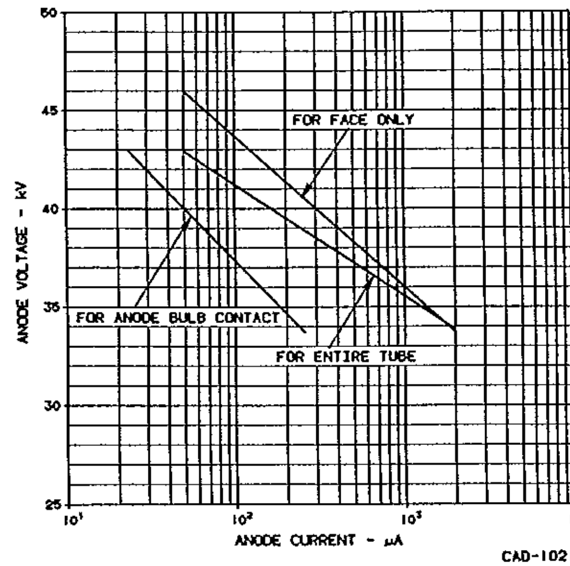


**Figure 7 - 0.5 mR/h Isoexposure-Rate Limit Curves**

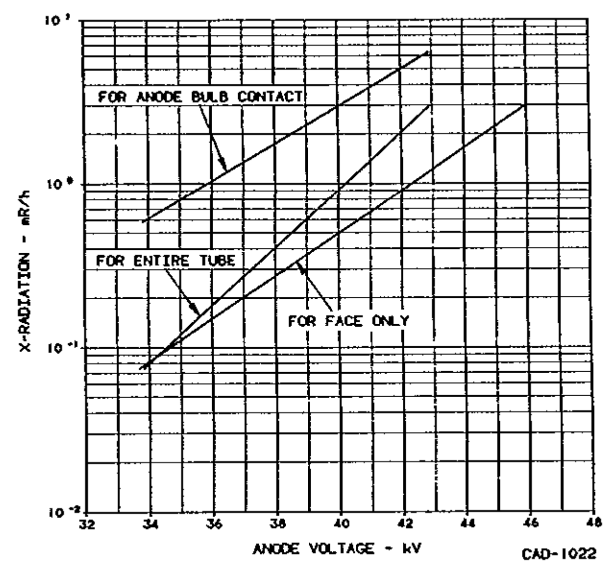


**Figure 8 - X-Radiation Limit Curves at a Constant Anode Current of 300 µA (x-radiation at a constant anode voltage varies linearly with anode current)**

### Sagittal Heights With Reference to Centerface at the Edge of the Minimum Screen.

| Location | Coordinates X mm | Y mm | Sagittal Height mm |
|---|---|---|---|
| Minor Axis | 0.00 | 197.89 | 17.34 |
| | 25.40 | 197.89 | 17.70 |
| | 50.80 | 197.89 | 18.77 |
| | 76.20 | 197.89 | 20.53 |
| | 101.60 | 197.89 | 22.93 |
| | 127.00 | 197.89 | 25.94 |
| | 152.40 | 197.89 | 29.56 |
| | 177.80 | 197.89 | 33.77 |
| | 203.20 | 197.89 | 38.60 |
| | 228.60 | 197.89 | 44.04 |
| | 254.00 | 197.89 | 50.12 |
| Diagonal | 263.86 | 197.89 | 52.66 |
| | 263.86 | 177.80 | 48.90 |
| | 263.86 | 152.40 | 44.71 |
| | 263.86 | 127.00 | 41.16 |
| | 263.86 | 101.60 | 38.24 |
| | 263.86 | 76.20 | 35.97 |
| | 263.86 | 50.80 | 34.34 |
| | 263.86 | 25.40 | 33.37 |
| Major Axis | 263.86 | 0.00 | 33.05 |

Pin 1: Grid No.3
Pin 4: IC (Do Not Use)
Pin 5: Grid No.1
Pin 6: Cathode for Green Beam
Pin 7: Grid No.2
Pin 8: Cathode for Red Beam
Pin 9: Heater
Pin 10: Heater
Pin 11: Cathode for Blue Beam

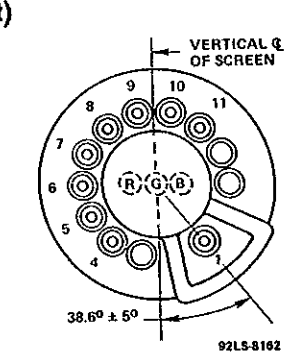


**Figure 9 - Pin Connections and Rear View of Base EIA No. B9-297-AH**

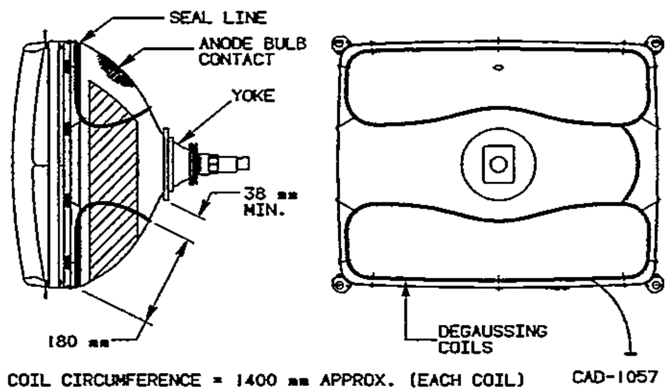


**Figure 11 - Relative Placement of Typical Top and Bottom Degaussing Coils**

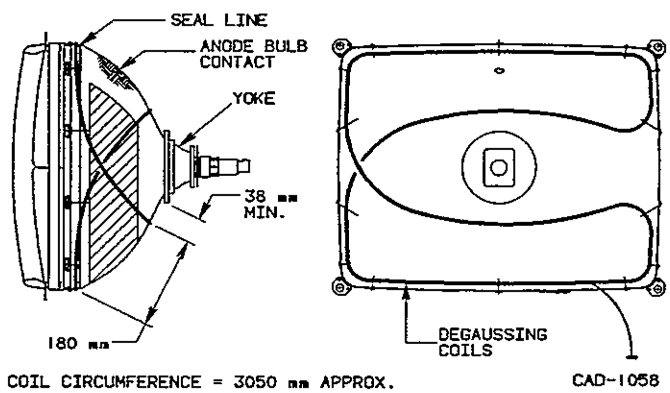


**Figure 12 - Relative Placement of Typical Twisted-Loop Degaussing Coil**

### Magnetic Shield and Degaussing

An internal magnetic shield is provided in this tube. When properly degaussed, this shield in conjunction with the shadow-mask assembly provides compensation for the effects of the earth's magnetic field on the electron beams. After installation of the picture tube into the receiver cabinet, it is recommended that the picture tube be externally degaussed by a minimum degaussing field of 20 gauss measured at the faceplate of the tube. The external degaussing procedure should be followed by the receiver's internal degaussing in the normal manner. It is recommended that this take place in a magnetic field having a 470 mG vertical component and a zero horizontal component. If this field is not available, it is essential that the tube be degaussed in the specific earth's magnetic field (strength and orientation) in which it is to be set up. Both the external degaussing and the receiver's internal degaussing must be performed with the receiver turned "off" or with the vertical scan removed. Proper degaussing will assure satisfactory performance for color field purity.

### Degaussing Coils

For optimum automatic degaussing, either of two different degaussing-coil arrangements should be incorporated in the TV receiver – top and bottom coils or twisted loop. Twelve slots and bosses are provided in the rimband of the tube to facilitate mounting the degaussing coil(s) to the tube funnel.

**Two-Coil, Top and Bottom System** – The two coils should be symmetrically placed on the tube funnel as shown in **Figure 11** and series-connected in such a way that the fields will add to produce the required degaussing field. This configuration offers the advantage of requiring the least amount of wire of the two systems but has the disadvantage of needing two coils with the associated wiring requirements.

**Twisted-Loop System** – The twisted-loop coil should be placed on the tube funnel as shown in **Figure 12**. This single-coil configuration produces a degaussing effect similar to the two-coil system.

### Degaussing Circuit

The degaussing circuit should provide a minimum of 1500 peak-to-peak ampere-turns (AT) in the degaussing coil. This current must decay in a gradual manner such that 50% of the initial amplitude still flows after 5 cycles. In addition, at the completion of the degaussing cycle the residual current in the coil(s) must not exceed 1.0 peak-to-peak AT.

With any degaussing circuit it is necessary to eliminate interactions which occur between the deflection yoke fields and the degaussing coil(s). The induced current can be minimized by careful positioning of the degaussing coil(s). For this reason, and in order to achieve optimal degaussing recovery, coil placement is critical and should follow the recommendations shown in **Figure 11** or **Figure 12**. This will provide a minimum distance of 38 mm measured from the yoke liner.

The typical single PTC circuit shown in **Figure 13** is capable of producing the required current; however, this circuit normally leaves too much residual current flowing after the degaussing cycle is complete. Two alternatives are suggested to reduce this residual current and give a corresponding improvement in purity performance.

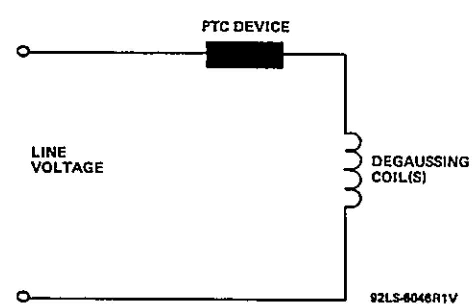


**Figure 13 - Typical Degaussing Circuit**

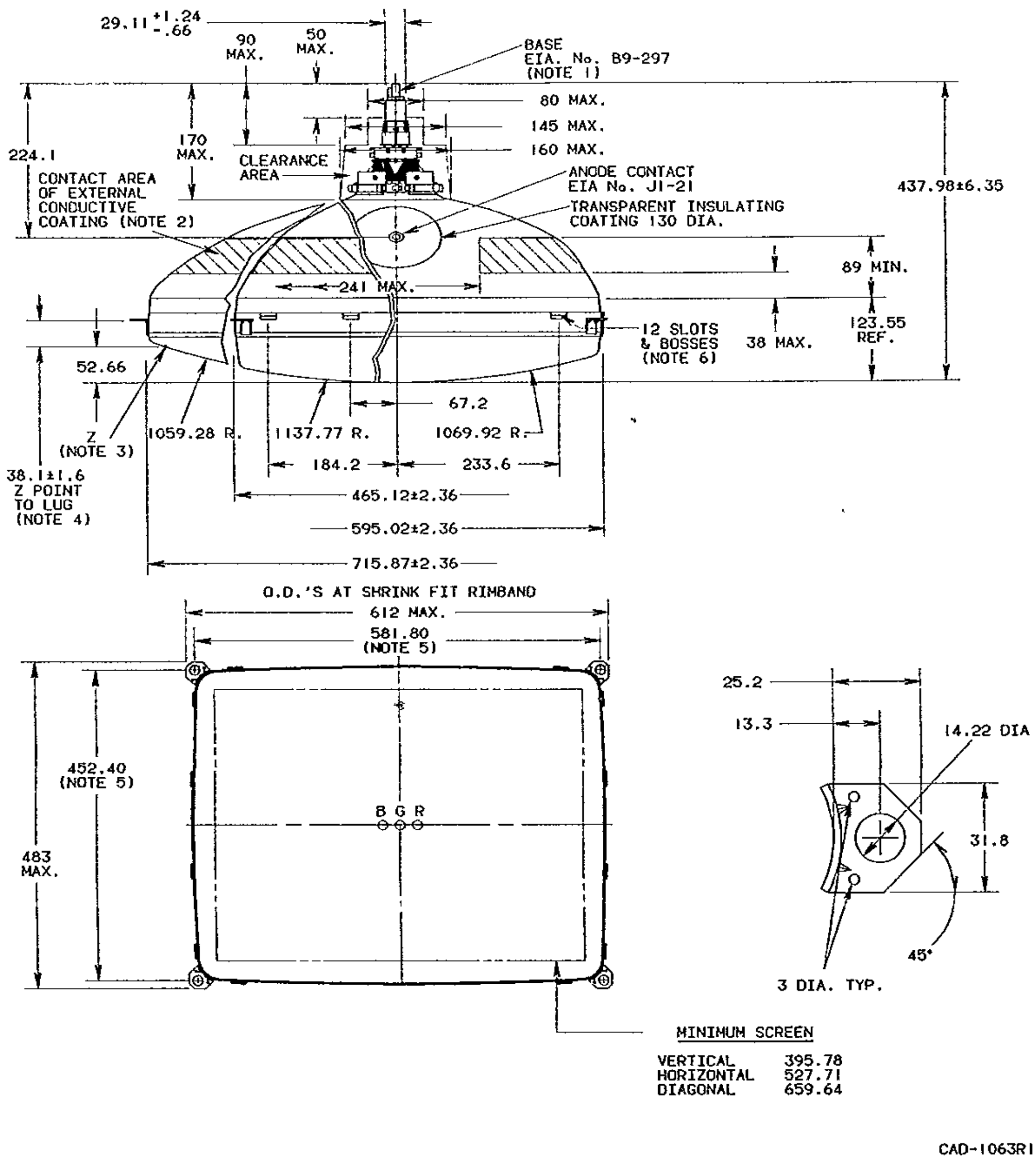


**Figure 10 - Dimensional Outline** (Dimensions in mm unless otherwise noted)

## Notes For Dimensional Outline

Note 1— The mating socket assembly with associated circuit board and mounted components must not weigh more than 0.5 kg. To minimize the torsional forces on the tube base pins, the center of gravity of this assembly should be located on the vertical plane through the picture-tube axis. Caution should also be exercised so that connecting leads to the assembly do not exert excessive torsional forces.

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 in order to provide the required capacitance. The external conductive coating must be connected to the chassis with multiple contacts.

Note 3— "Z" is located on the outside surface of the faceplate on the screen diagonal at the edge of the minimum published screen. This point is used as a reference for the mounting lugs.

Note 4— None of the four mounting lugs will deviate from the plane of the other three by more than 1.6 mm.

*Note 5— These dimensions locate the true geometric hole centers for the mounting screws in the receiver.* The tolerance of the tube mounting lug holes will accommodate mounting screws up to 9.5 mm in diameter when the screws are positioned at these locations.

Note 6— Clearance dimensions for mounting the degaussing coils: 3.2 mm x 8.0 mm.