



**ELECTRONIC  
INNOVATIONS  
IN ACTION**

**TUBES**

**— PRODUCT INFORMATION —**

**Compactron Diode**

**3BN2-A**

**FOR TV HIGH-VOLTAGE  
RECTIFIER APPLICATIONS**

- COLOR TV TYPE
- 27000 VOLTS DC
- 1.7 MILLIAMPERES DC
- DIFFUSION BONDED CATHODE
- FAST WARM-UP
- X-RADIATION RATING

The 3BN2-A is a heater-cathode type diode designed for use in color television receivers as the high-voltage rectifier to supply power to the anode of the picture tube. Features of the tube include fast operational warm-up, a diffusion bonded cathode coating to minimize reverse emission failures, and X-radiation controls.

The diffusion bonded cathode coating practically eliminates one of the major failure mechanisms in high-voltage rectifiers, which is back-emission from the anode due to emissive particles being pulled from the cathode by the very high electrostatic field.

The 3BN2-A features built-in X-radiation shielding and additional design and specification controls for the reduction of X-radiation output.

**GENERAL**

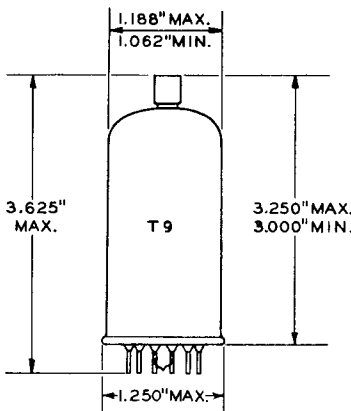
**ELECTRICAL**

|   |                   |
|---|-------------------|
| Cathode - Coated Unipotential                     |                   |
| Heater Characteristics and Ratings                |                   |
| Heater Voltage, AC or DC *                        | 3.15 ± 0.32 Volts |
| Heater Current •                                  | 0.3 Amperes       |
| Operational Warm-up Time ▲                        | 4.0 Seconds       |
| Direct Interelectrode Capacitances, approximate ◆ |                   |
| Plate to Heater, Cathode, and Internal Shield:    |                   |
| p to (h+k+i.s.)                                   | 1.5 pf            |

**MECHANICAL**

|                                 |              |
|---------------------------------|--------------|
| Operating Position - Any        |              |
| Envelope - T-9, Glass           |              |
| Base - E12-70, Button 12-Pin    |              |
| Top Cap - C1-34 or C1-49, Small |              |
| Outline Drawing                 |              |
| Maximum Bulb Diameter           | 1.188 Inches |
| Maximum Seal Diameter           | 1.250 Inches |
| Minimum Diameter                | 1.062 Inches |
| Maximum Over-all Length         | 3.625 Inches |
| Maximum Seated Height           | 3.250 Inches |
| Minimum Seated Height           | 3.000 Inches |

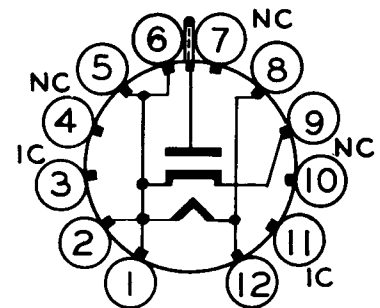
**PHYSICAL DIMENSIONS**



**TERMINAL CONNECTIONS §**

- Pin 1 - Heater, Cathode, and Internal Shield
- Pin 2 - Heater, Cathode, and Internal Shield
- Pin 3 - Internal Connection - Do Not Use
- § Pin 4 - No Connection
- Pin 5 - Heater, Cathode, and Internal Shield
- Pin 6 - Heater, Cathode, and Internal Shield
- § Pin 7 - No Connection
- Pin 8 - Heater
- Pin 9 - Heater, Cathode, and Internal Shield
- § Pin 10 - No Connection
- Pin 11 - Internal Connection - Do Not Use
- Pin 12 - Heater
- Cap - Plate

**BASING DIAGRAM**



EIA 12FV

**MAXIMUM RATINGS**

**FLYBACK RECTIFIER SERVICE® —DESIGN-MAXIMUM VALUES UNLESS OTHERWISE STATED**

|   |       |              |
|---|-------|--------------|
| Peak Inverse Plate Voltage                                |       |              |
| DC Component (Absolute-Maximum Value) .....               | 27000 | Volts        |
| Total DC and Peak (Absolute-Maximum Value) .....          | 30000 | Volts        |
| Steady-State Peak Plate Current .....                     | 88    | Milliamperes |
| DC Output Current .....                                   | 1.7   | Milliamperes |
| Heater Voltage, AC or DC (Absolute-Maximum Value) □ ..... | 3.65  | Volts        |
| Heater Voltage, AC or DC (Absolute-Minimum Value) .....   | 2.65  | Volts        |

Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making allowance for the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration.

The equipment manufacturer should design so that initially and throughout life no design-maximum value for the intended service is exceeded with a bogey tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all other electron devices in the equipment.

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making no allowance for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration and of

all other electron devices in the equipment.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

**AVERAGE CHARACTERISTICS**

|   |     |       |
|---|-----|-------|
| Tube Voltage Drop, approximate          |     |       |
| I <sub>b</sub> = 7.0 Milliamperes ..... | 150 | Volts |

**X-RADIATION RATING®**

|                            |    |       |
|----------------------------|----|-------|
| X-radiation, maximum ..... | 25 | mR/hr |
|----------------------------|----|-------|

Based on accumulated sample test data taken initially and during life test, tubes do not exceed the maximum rating limit of 25 mR/hr at any time throughout their useful life, when operated within the maximum ratings, including heater voltage, specified on this data sheet.

This X-radiation maximum rating is based on the use of the Victoreen 440 RF/C survey meter as the standard instrument for X-radiation measurement. X-radiation is measured with the plastic spacer of the 440 RF/C survey meter at a distance of four (4) inches from the external surface of the tube under test. This rating information is not necessarily applicable when a different radiation measuring instrument is used.

Operation of the 3BN2-A outside of the Absolute-Maximum

Ratings indicated may damage the tube and/or result in either temporary or permanent changes in the X-radiation characteristics of the tube. Equipment design must be such that these Absolute-Maximum Ratings are not exceeded.

The above X-radiation characteristics are measured in accordance with JEDEC Publication No. 67A, "Recommended Practice for Measurement of X-radiation from Receiving Tubes," and controlled in accordance with JEDEC Publication No. 73A, "Recommended Practice for Quality Control of X-radiation from High Voltage Rectifier and Shunt Regulator Receiving Tubes."

The General Electric Company makes no representation concerning the X-radiation output from these tubes when operated beyond the maximum ratings set forth herein.

## WARNING

### X-RADIATION

The high voltages associated with the 3BN2-A result in production of X-radiation which may constitute a health hazard on prolonged exposure at close range unless the tube is adequately shielded. Equipment design must provide for this shielding.

Precautions must be exercised during the servicing of equipment employing the 3BN2-A to assure that the high voltage is adjusted to the recommended value and that any shielding components are replaced to their intended positions before the equipment is operated.

### SHOCK HAZARD

The high voltages at which the 3BN2-A is operated can be extremely dangerous to the user or serviceman. Extreme care should be taken in the use of and for the servicing and adjustment of any high voltage circuit.

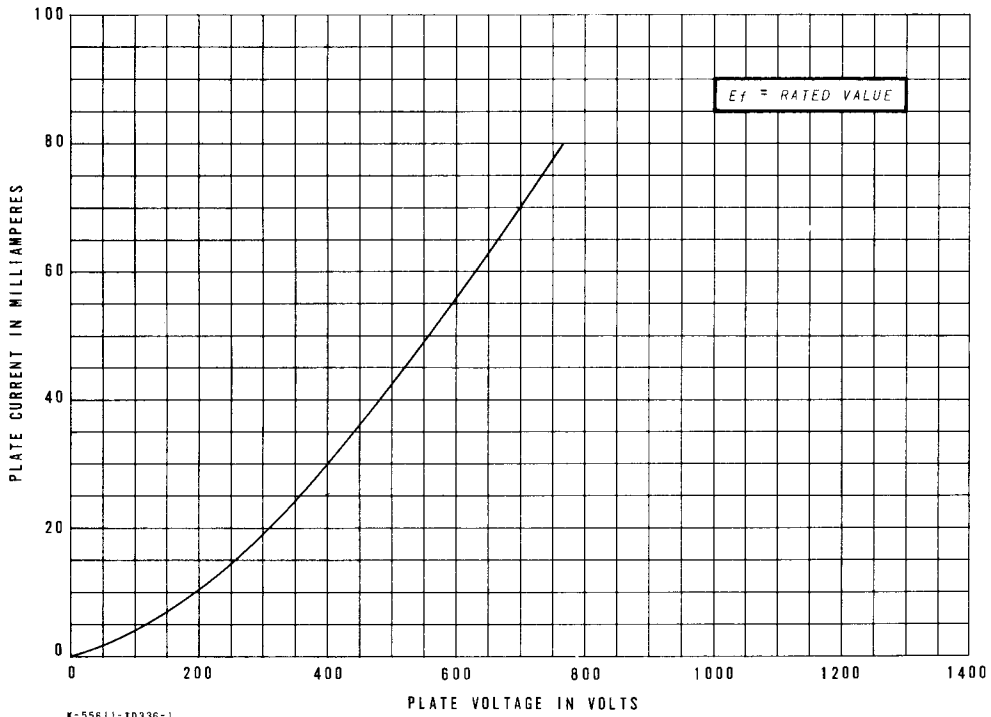
Precautions must be exercised during the replacement or servicing of the 3BN2-A in equipment to assure that the high voltage output terminal is properly grounded while inserting or removing the tube from its socket or while connecting or disconnecting the top cap connector.

**THE EQUIPMENT MANUFACTURER SHOULD PROVIDE A WARNING LABEL IN AN APPROPRIATE POSITION ON THE EQUIPMENT TO ADVISE THE SERVICEMAN OF ALL PRECAUTIONS HEREIN.**

## NOTES

- ★ The equipment designer should design the equipment so that heater voltage is centered at the specified bogey value, with heater supply variations restricted to maintain heater voltage within the specified tolerance.
- Heater current of a bogey tube at  $E_f = 3.15$  volts.
- ▲ The time required to reach 80 percent of rated d-c output voltage when used as a flyback rectifier.
- ◆ Without external shield.
- § Socket terminals 4, 7, and 10 may be used as tie points for components at or near heater potential.
- ⊗ For operation in a 525-line, 30-frame television system as described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission. The duty cycle of the voltage pulse must not exceed 15 percent of one scanning cycle.
- **CAUTION** - Operation of this tube for an extended period of time with the heater voltage above the absolute maximum rated value of 3.65 volts may result in the production of X-radiation in excess of the maximum rated limit of 25 mR/hr.

**AVERAGE PLATE CHARACTERISTICS**



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