



## ELECTRONIC TUBE REFERENCE

# 12BNP4A

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

**1 SECTION**  
CONSTRUCTION  
**CATHODERAY**

Cathode-ray display tube documented by manufacturer data for type 12BNP4A; available extracted source information is sparse, so no more specialized application or construction claim is made.

## GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | —                 | BASE PINS            | —             |
| NOMINAL HEATER      | 6.9 V / 20 A      | PARALLEL HEATER      | — / —         |
| HEATING             | Indirect          | SERIES OPERATION     | Not specified |
| CATHODE ARRANGEMENT | Separate cathodes | SECTION CONSTRUCTION | Similar       |

## SECTION RATINGS

**SECTION 1** Cathode Ray

|                        |       |
|------------------------|-------|
| MAXIMUM SCREEN VOLTAGE | 550 V |
|------------------------|-------|

*CRT-specific ratings, operating conditions, capacitances, focus/deflection, cutoff, optical, and screen data are retained in section parameters.*

## 12BNP4A Picture Tube

The **12BNP4A** is a PAN-O-PLY type cathode-ray tube designed for television receiver applications. It features a low-voltage electrostatic focus system and a 110-degree magnetic deflection angle. The tube utilizes an electron gun design that does not require an ion-trap magnet.

## Mechanical Design and Physical Dimensions

The 12BNP4A is constructed using a J99C/E glass bulb envelope. It has a nominal weight of approximately 5 pounds. The physical dimensions of the tube are characterized by the following specifications:

- **Overall Length:** 9.348 ± 0.250 inches

- **Neck Length:** 4.375 ± 0.125 inches
- **Neck Diameter:** 1.125 (+0.043 / -0.025) inches
- **Projected Area of Screen:** 74 square inches
- **Minimum Screen Dimensions:** Diagonal of 11.625 inches, height of 7.625 inches, and width of 10.125 inches.
- **Outer Envelope Dimensions:** Diagonal of 12.429 ± 0.125 inches, height of 8.619 ± 0.125 inches, and width of 10.991 ± 0.125 inches.

The faceplate is made of filterglass with a light transmission at the center of approximately 49%. The screen utilizes an aluminized P4-sulfide type phosphor.

For electrical shielding and mechanical integration, the tube features a Regular-Band type external conductive coating, which includes implosion protection hardware. The contact area for grounding this coating is located near the reference line, which is determined by a JEDEC No. G-126 gauge.

## Electrical Connections and Basing

The 12BNP4A utilizes a Small-Button Neoeightar 7-Pin base (Arrangement 1, JEDEC No. B7-208) and a Recessed Small Cavity anode cap (JEDEC No. J1-21). The basing designation is 8HR, viewed from the bottom of the tube. The pin and cap connections are assigned as follows:

| Pin / Cap | Connection                                        |
|-----------|---------------------------------------------------|
| Pin 1     | Heater                                            |
| Pin 2     | Grid No. 1                                        |
| Pin 3     | Grid No. 2                                        |
| Pin 4     | Grid No. 4                                        |
| Pin 6     | Grid No. 1                                        |
| Pin 7     | Cathode                                           |
| Pin 8     | Heater                                            |
| Cap       | Anode (Grid No. 3, Grid No. 5, Screen, Collector) |
| C         | External Conductive Coating                       |

The direct interelectrode capacitances of the tube are:

- **Cathode to all other electrodes:** 5 pF
- **Grid No. 1 to all other electrodes:** 6 pF
- **External conductive coating to anode:** 550 pF minimum to 850 pF maximum (including the implosion protection hardware).

# Heater Specifications and Design-Maximum Ratings

The heater is designed to operate within a voltage range of 5.7 V minimum to 6.9 V maximum, with a nominal current of  $450 \pm 20$  mA at 6.3 V. The average heater warm-up time is 11 seconds.

The design-maximum ratings for the 12BNP4A, with voltages stated as positive with respect to the cathode, are defined as follows:

- **Anode Voltage:** 9,000 V minimum to 15,000 V maximum
- **Grid-No. 4 Voltage:** Positive value of 1,100 V maximum; negative value of 550 V maximum
- **Grid-No. 2 Voltage:** 125 V minimum to 550 V maximum
- **Grid-No. 1 Voltage:**
  - Negative peak value: 220 V maximum
  - Negative bias value: 155 V maximum
  - Positive bias value: 0 V maximum
  - Positive peak value: 2 V maximum
- **Peak Heater-Cathode Voltage:**
  - *Heater negative with respect to cathode:* 450 V maximum during the equipment warm-up period (less than or equal to 15 seconds); 300 V maximum after the equipment warm-up period.
  - *Heater positive with respect to cathode:* 200 V maximum combined AC & DC voltage; 100 V maximum DC component.

## Typical Operating Conditions for Cathode-Drive Service

Under typical cathode-drive operating conditions, where voltages are positive with respect to Grid No. 1, the operating parameters are:

- **Anode Voltage:** 13,000 V
- **Grid-No. 4 Voltage:** 100 V (The actual voltage required for optimum focus on any individual tube can range from -100 V to +300 V when the combined cathode and video-signal voltage is adjusted to produce an anode current of 75 microamperes on a 6-3/4-inch by 9-inch pattern).
- **Grid-No. 2 Voltage:** 140 V
- **Cathode Voltage:** 22 V to 42 V (for visual extinction of a focused raster)
- **Centering Magnet Field Strength:** 0 to 12 Gauss (using a required adjustable centering magnet)
- **Maximum Grid-No. 1 Circuit Resistance:** 1.5 M $\Omega$

## Technical Summary

The 12BNP4A is an electrostatic-focus, magnetic-deflection picture tube featuring a 110-degree deflection angle, a P4-sulfide aluminized phosphor screen, and a 49% light-transmission filterglass faceplate. Operating with a 6.3 V heater and requiring no ion-trap magnet, it is designed for cathode-drive service with an anode voltage rating up to 15,000 V. Its mechanical integration is supported by a Neoeightar 7-pin

base, a recessed small cavity anode cap, and a regular-band external conductive coating that incorporates implosion protection hardware.

## SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

# 1971 RCA HB3 Binder 1 of 7

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1971 RCA HB3 BINDER 1 OF 7

## Section 1 · Cathode Ray

| CHARACTERISTICS                                    |                 |                                                                                                                          |
|----------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------|
| PARAMETER                                          | PUBLISHED VALUE | CONDITION / NOTE                                                                                                         |
| NO ION-TRAP MAGNET FEQUIRED<br>– published value 1 | 1 mA            | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| NO ION-TRAP MAGNET FEQUIRED<br>– published value 2 | 10 mA           | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Grid No.1 to al l . other electrodes               | 6 pF            | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| External conductive –<br>published value 1         | 550 mA          | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| External conductive –<br>published value 2         | 850 mA          | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Heater Current at 6.3 V –<br>published value 1     | 6.3 mA          | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Heater Current at 6.3 V –<br>published value 2     | 450 mA          | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Heater Current at 6.3 V –<br>published value 3     | 20 mA           | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Light transmission at center<br>(Approx )          | 49              | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Projected Area of Screen                           | 74              | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
|                                                    |                 |                                                                                                                          |

| PARAMETER                          | PUBLISHED VALUE | CONDITION / NOTE                                                                                                         |
|------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------|
| Anode Voltage – published value 1  | <b>9000 V</b>   | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Anode Voltage – published value 2  | <b>-15000 V</b> | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Grid-No.2 – published value 1      | <b>125 V</b>    | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Grid-No.2 – published value 2      | <b>550 V</b>    | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Heater Voltage – published value 1 | <b>5 V</b>      | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Heater Voltage – published value 2 | <b>7 V</b>      | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Heater Voltage – published value 3 | <b>6.9 V</b>    | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Combined AC & DC voltage           | <b>200 V</b>    | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Anode Voltage                      | <b>13000 V</b>  | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Grid-No.4 Voltageb                 | <b>100 V</b>    | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Grid-No.2 Voltage                  | <b>140 V</b>    | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| Grid-No. 1 Circuit Resistance      | <b>1.5 mA</b>   | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |
| SCREEN WIDTH_                      | <b>1.625</b>    | Published CRT datasheet value; multiple numbers on one source row represent its separate limits or operating conditions. |

## TUBE TINKER

An independent reference for electronic tubes, vacuum tubes, and their source documents.

