

Wide-angle aluminized P4 monochrome television picture tube using electrostatic focusing and magnetic deflection, designed for high-voltage direct-view service with a large approximately 19-inch screen.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 450 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	21000 V
MAXIMUM SCREEN VOLTAGE	60 V
Low-grid-2 aluminized P4 cathode-drive picture tube.	

19ENP4A — Cathode-Drive Picture Tube

The 19ENP4A is a cathode-drive television picture tube designed with integral PAN-O-PLY implosion protection. It features low-voltage electrostatic focusing, 114-degree magnetic deflection, and an electron gun that operates without requiring an external ion-trap magnet.

Optical and Mechanical Design

The 19ENP4A utilizes an aluminized, sulfide-type P4 phosphor screen. The faceplate is constructed of filterglass, providing approximately 48% light transmission at the center to enhance picture contrast.

Mechanically, the tube weighs approximately 15 pounds. Its physical dimensions and envelope features include:

- **Overall Length:** 11.625 ± 0.250 inches
- **Neck Length:** 4.375 ± 0.125 inches
- **Projected Screen Area:** 172 square inches
- **External Conductive Coating:** Modified-Band type, with a grounding contact area located near the Reference Line.
- **Anode Cap:** Recessed Small Cavity (JEDEC No. J1-21)
- **Base:** Small-Button Neoeightar 7-Pin, Arrangement 1 (JEDEC No. B7-208)

To ensure safe and stable operation, both the external conductive coating and the integral implosion protection hardware must be connected to a reliable system ground.

Terminal Connections and Pinout

The 19ENP4A uses a 7-pin Small-Button Neoeightar base (JEDEC No. B7-208) with an 8HR bottom-view pin arrangement. The electrical connections are distributed as follows:

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

Grid No. 1 is internally connected to both Pin 2 and Pin 6. The high-voltage anode connection is made via the recessed small cavity cap, which ties together Grid No. 3, Grid No. 5, the screen, and the collector.

Electrical Characteristics and Heater Ratings

The tube is designed with an indirectly heated cathode. The heater is rated for a nominal operating voltage of 6.3 V, drawing a current of 450 ± 20 mA. Under typical conditions, the average heater warm-up time is 11 seconds.

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:** 1000 pF minimum to 1500 pF maximum

Design-Maximum Ratings

The following design-maximum limits must be observed to prevent damage and ensure reliable operation. Unless otherwise specified, all voltage values are positive with respect to Grid No. 1.

- **Anode Voltage:** 12,000 V minimum to 21,000 V maximum
- **Grid-No. 4 (Focusing) Voltage:** -400 V maximum to +1250 V maximum
- **Grid-No. 2 Voltage:** 25 V minimum to 60 V maximum
- **Cathode Voltage:**
 - Negative peak value: 2 V maximum
 - Negative bias value: 0 V maximum
 - Positive bias value: 100 V maximum
 - Positive peak value: 150 V maximum
- **Heater Voltage:** 5.7 V minimum to 6.9 V maximum
- **Grid-No. 1-Circuit Resistance:** 1.5 MΩ maximum

Peak Heater-Cathode Voltage Limits

The maximum allowable potential difference between the heater and the cathode depends on the polarity and the operating state of the equipment:

- **Heater negative with respect to cathode:**
 - During equipment warm-up (first 15 seconds or less): 450 V maximum
 - After equipment warm-up is complete: 300 V maximum
- **Heater positive with respect to cathode:**
 - Combined AC and DC voltage: 200 V maximum
 - DC component only: 100 V maximum

Typical Operating Conditions

In typical cathode-drive service, the operating voltages are referenced positive with respect to Grid No. 1. Standard operating parameters are established as follows:

- **Anode Voltage:** 16,000 V
- **Grid-No. 2 Voltage:** 50 V
- **Grid-No. 4 Voltage:** 250 V
- **Cathode Voltage:** 32 V to 50 V (for visual extinction of the focused raster)

The optimum focus range for Grid No. 4 is 0 V to +400 V. This range is specified with the combined Grid No. 1 and video-signal voltage adjusted to produce an anode current of 100 μA on a 10-1/2 inch by 14-inch

raster pattern.

Technical Summary

The **19ENP4A** is a 15-pound, 114-degree magnetic deflection cathode-ray tube designed for cathode-drive television applications. It features a P4 aluminized sulfide phosphor screen, a 48% transmission filterglass faceplate, and PAN-O-PLY integral implosion protection. Operating with a nominal 6.3 V heater, the tube utilizes low-voltage electrostatic focusing (Grid No. 4) and does not require an ion-trap magnet. With an anode rating of up to 21,000 V and a typical operating anode voltage of 16,000 V, it provides a reliable, high-contrast display when its external conductive coating and implosion hardware are properly grounded.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

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Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	450 mA	—
Heater warm-up time	11 s	—
Maximum anode/ultor voltage	21000 V	—
Minimum anode/ultor voltage	12000 V	—
Typical anode/ultor voltage	16000 V	PictureTubeService
Maximum grid No.2 voltage	60 V	—
Typical grid No.2 voltage	50 V	PictureTubeService
Focus-voltage range minimum	0 V	OptimumFocus
Focus-voltage range maximum	400 V	OptimumFocus
Visual-extinction voltage range minimum	32 V	FocusedRasterExtinction
Visual-extinction voltage range maximum	50 V	FocusedRasterExtinction
Maximum grid No.1 circuit resistance	1.5 megohm	—
X-ray shielding warning	Present	HighAnodeVoltage
Maximum cathode positive bias voltage	100 V	CathodeDrive
Maximum cathode positive peak voltage	150 V	CathodeDrive
Maximum cathode negative peak voltage	2 V	CathodeDrive
Peak heater-cathode voltage during warm-up	450 V	HeaterNegative;Warmup<=15s

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak heater-cathode voltage after warm-up	300 V	HeaterNegative
Peak heater-cathode voltage heater positive	200 V	HeaterPositive

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing method	LowVoltageElectrostatic	—
Deflection method	Magnetic	—
Phosphor	P4	—
Screen type	Aluminized white	P4

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection angle	114 deg	Approximate

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	5 pF	Approximate
Grid No.1 to all other electrodes capacitance	6 pF	Approximate
External conductive coating to anode capacitance maximum	1500 pF	Approximate

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