

Nineteen-inch black-and-white Pan-O-Ply television picture tube with integral implosion protection, low-voltage electrostatic focus, 114-degree magnetic deflection, and an aluminized screen. Its low grid-2 cathode-drive design supports high-contrast direct-view receiver service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 600 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	20000 V
MAXIMUM SCREEN VOLTAGE	60 V
Low-grid-2 cathode-drive aluminized P4 picture tube.	

19DSP4 — Black-and-White Rectangular Picture Tube

The **19DSP4** is a rectangular glass picture tube designed for black-and-white television receivers. It features Pan-O-Ply integral implosion protection, which utilizes a formed rim band and a welded tension band around the periphery of the tube panel. This design eliminates the need for a separate safety-glass window or an integral protective window. The tube incorporates an aluminized screen with nearly straight sides and slightly rounded corners, a low-voltage electrostatic focus system, and a 114-degree magnetic deflection angle. Its electron gun is designed to operate without an ion-trap magnet and features a low Grid No. 2 voltage configuration optimized for cathode-drive operation.

Mechanical and Optical Characteristics

The 19DSP4 is constructed with a J149 F1 glass bulb and a filterglass faceplate. The faceplate provides a light transmission of approximately 48% to 49% at the center. The screen utilizes a sulfide-type, aluminized P4 phosphor.

Physical Dimensions and Weight

- **Overall Length:** 11.625 ± 0.250 inches
- **Neck Length:** 4.375 ± 0.125 inches
- **Diagonal Dimension:** 18.732 ± 0.100 inches
- **Greatest Width:** 16.514 ± 0.100 inches
- **Greatest Height:** 13.473 ± 0.100 inches
- **Projected Screen Area:** 172 square inches
- **Weight:** Approximately 15 to 15.5 lbs

The tube features a Regular-Band type external conductive coating. The contact area for grounding is located near the Reference Line. Both the external coating and the integral implosion protection hardware must be connected to a common ground.

Electrical Connections and Basing

The 19DSP4 uses a Small-Button Neoeightar 7-Pin base (JEDEC No. B7-208, Arrangement 1) with an 8HR basing designation. High-voltage connection to the anode is made via a Recessed Small Cavity cap (JEDEC No. J1-21).

Pin Configuration (Bottom View)

Pin / Cap	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)
C (Coating)	External Conductive Coating

Direct Interelectrode Capacitances

- **Cathode to all other electrodes:** 5 pF
- **Grid No. 1 to all other electrodes:** 6 pF
- **External conductive coating to anode:** 1000 to 1250 pF minimum; 1500 to 1750 pF maximum

Heater and Filament Ratings

The heater is designed for a typical operating voltage of 6.3 V, with a design-maximum range of 5.7 V to 6.9 V.

Parameter	Value
Nominal Heater Voltage	6.3 V
Heater Current	600 ± 30 mA
Average Warm-Up Time	11 seconds

The average heater warm-up time of 11 seconds is determined using a specific test circuit. In this test, the voltage across the heater terminals increases from zero to 0.8 of the rated voltage, where the supply voltage is four times the rated heater voltage ($4 \times E_f$) and the series resistance is calculated as:

$$\text{Series Resistance } (R) = \frac{3 \times E_f}{I_f}$$

Maximum Ratings and Operating Conditions

The following limits are specified under the Design-Maximum Rating System. Unless otherwise noted, all voltage values are positive with respect to Grid No. 1.

Design-Maximum Ratings

- **Anode Voltage:** 10,000 V minimum to 20,000 V maximum
- **Grid-No. 4 (Focusing) Voltage:**
 - Positive value: 1250 V maximum
 - Negative value: 400 V maximum
- **Grid-No. 2 Voltage:** 40 V minimum to 70 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
- **Peak Heater-Cathode Voltage:**
 - *Heater negative with respect to cathode:* 450 V maximum during equipment warm-up (first 15 seconds or less); 300 V maximum after the warm-up period.

- *Heater positive with respect to cathode:* 200 V maximum (combined AC and DC); 100 V maximum (DC component).
- **Grid-No. 1 Circuit Resistance:** 1.5 MΩ maximum

Typical Cathode-Drive Operating Conditions

Under typical cathode-drive service, the operating parameters are established as follows:

- **Anode Voltage:** 16,000 V
- **Grid-No. 4 Voltage:** 100 V (The optimum focus for individual tubes ranges from -100 V to +300 V, with the combined Grid-No. 1 and video-signal voltage adjusted for a 100 μA anode current on a 10.5-inch by 14-inch pattern)
- **Grid-No. 2 Voltage:** 50 V
- **Cathode Voltage (for visual extinction of focused raster):** 32 V to 50 V
- **Centering Magnet Field Strength:** 0 to 8 gauss

The maximum field strength of the required adjustable centering magnet is calculated using the following relationship: Maximum Field Strength = $8 \times \sqrt{\frac{\text{Anode Volts}}{16000}}$ gauss The permanent magnet (PM)

centering magnet should be positioned such that its distance from the reference line does not exceed 2-1/4 inches.

Raster Cutoff Characteristics

The cathode-to-Grid-No. 1 voltage required for the visual extinction of the focused raster is directly related to the Grid-No. 2-to-Grid-No. 1 voltage. This cutoff voltage increases linearly as the Grid-No. 2 voltage is increased. For example, at a Grid-No. 2 voltage of 50 V, the typical cutoff range is 32 V to 50 V. Additionally, the cutoff voltage varies directly with the anode potential, shifting by approximately 1 volt for every 1000-volt change in the Anode-to-Grid-No. 1 voltage.

Technical Summary

The **19DSP4** is a 114-degree magnetic deflection, black-and-white rectangular glass picture tube featuring Pan-O-Ply integral implosion protection. Operating with a 6.3 V, 600 mA heater, it utilizes low-voltage electrostatic focusing and does not require an external ion-trap magnet. Designed primarily for cathode-drive service, the tube operates typically at an anode voltage of 16,000 V and a Grid-No. 2 voltage of 50 V, with a raster cutoff range of 32 V to 50 V. Its mechanical design incorporates a J149 F1 bulb, a Neoeightar 7-pin base, and a grounded external conductive coating.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1940 RCA

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

1940 RCA

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
® [	14	® [14° Magnetic Deflection
®	600 V	® 6.3 Volt/600 Ma Heater
® Low Grid-No	2	® Low Grid-No.2 Voltage—
®	20	. ® 20 kv Max. Anode Voltage
Cathode to all other electrodes	172 pF	Cathode to all other electrodes . 5 pf Area. 172 sq. in.
GridNo	49 pF	GridNo.1lto all other electrodes. 6 pf Bulb De51gnat10n o .. .49 F1
External conductive coating	1500 pF	External conductive coating 1500 max. pf Cap Designation Hecessed Small Cavit
Heater Current at	3635 mA	Heater Current at 6.3 volves 600230 ma Base Designation. . . 'Ar%::éimgzt?n Tjgl%lli(g:hlt\;'grB?(3635
in the testcircuit shown	1	in the testcircuit shown 1in fig.] for the voltage (E)
0.8 of rated heater voltage. Pin 2: Grid No.1	1	0.8 of rated heater voltage. Pin 2: Grid No.1
Anode Voltage	20000 V	Anode Voltage 20,000 max. volts Measured between the heater terminals.
10,000 min. volts	10000 V	10,000 min. volts
Grid-No	4	Grid-No.4 Voltage: Cathode drive is the operating condition in which
Positive value	1250 V	Positive value. 1250 max. volts respect to grid No.1 and the other electrodes.
Negative value. ,	400 V	Negative value. , . . 400 max. volts
The grid-No	4	The grid-No.4 voltage required for optimum focus

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-No,	70 V	Grid-No, 2 Voltage . 70 m.ax. volts of any individual tube will have a value anywhere
40 min. volts between -100 and +300 volts with the combined grid-Ne.1	1 V	40 min. volts between -100 and +300 volts with the combined grid-Ne.1
an anode current of	-1	an anode current of 200 microamperes on a 113-1/2-1inch
Negative peak value	1 V	Negative peak value 2 max. volts by 18-inch pattern from an RCA-2F21 monoscope, or
Negative bias value	0 V	Negative bias value 0 max. volts equivalent,
Positive bias value	100 V	Positive bias value 100 max. volts Distance from Reference Line for suitable PMcentering
Positive peak value	4 V	Positive peak value 150 max, volts magnet should not exceed 2-1/4 inches. The specified
Heater Voltage®	6.9 V	Heater Voltage® . 6.9 max. volts which mechanical tube tolerances may have on the
Anode volts <	8 V	Anode volts < 8 gauss
period not exceeding V	16000	period not exceeding V 16000 vore * ° ®
15 seconds. . 450 max. volts	450 V	15 seconds. . 450 max. volts
period. R	300 V	period. R 300 max. volts magnetic field and extraneous fields due to choice
Combined AC & DC voltage,	200 V	Combined AC & DC voltage, . . 200 max. volts magnetic field of the deflecting yoke.
DC Component	100 V	DC Component. 100 max. volts
voltages up to	16	voltages up to 16 kilovolts, this picture tube
Anode Voltage ., e	16000 V	Anode Voltage ., e . 16,000 volts
Grid-No	160 V	Grid-No.4 Voltagee. e e e e 160 volts
Grid-No	50 V	Grid-No.2 Voltage 50 volts
at voltages as high as	20	at voltages as high as 20kilovolts (design-maximum
raster {See Fig	50 V	raster {See Fig.2). 32 to 50 volts be needed to protect against possible injury from
adjustable Centering Magnet	8	adjustable Centering Magnet . 0 to 8 gauss operating conditions involve voltages in excess
Maximum Circuit Value: of	16	Maximum Circuit Value: of 16 kilovolts.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-No	1.5	Grid-No.1 Circuit Resistance, 1.5 max. megohms
by	0.8 V	by 1ts published data, and shcould not be exceeded SUPPLY VOLTS E=0.8E ϕ ' (ED OF TuBE
E ϕ =	6.3 V	E ϕ =6.3 VOLTS
ANODE=TO=GRID—No.) VOLTS=	16000 V	ANODE=TO=GRID—No.) VOLTS= 16000
GRID—No	4 V	GRID—No.4-TO-GRID—No., VOLTS ADJUSTED FOR FOCUS.
DIRECTLY	0 V	DIRECTLY 8Y APPROX. IVOLT FOR EVERY 1000-VOLT
GRID-NO	2 V	GRID-NO.2-TQ3-GRID-NO.I VOLTS
INOTE	7	INOTE 7) NOTE 7° BULGE AT SPLICE-LINE SEAL MAY INCREASE THE
DIMENSIONS IN INCHES AND HEIGHT BY NOT MORE THAN	18	DIMENSIONS IN INCHES AND HEIGHT BY NOT MORE THAN 1/18".



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

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	600 mA	—
Heater warm-up time	11 s	—
Maximum anode/ultor voltage	20000 V	—
Minimum anode/ultor voltage	10000 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	-100 V	OptimumFocus

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focus-voltage range maximum	300 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
Peak heater-cathode voltage after warm-up	300 V	HeaterNegative
Peak heater-cathode voltage heater positive	200 V	HeaterPositive
Adjustable centering magnet field strength maximum	8 gauss	Approximate

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

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to all other electrodes capacitance	6 pF	Approximate
External conductive coating to anode capacitance maximum	1750 pF	Approximate

TUBE TINKER

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

[Catalog](#) [Tube types](#) [Full books](#) [Blog](#) [Feedback & corrections](#)

© 2026 Tube Tinker