ELECTRONIC TUBE REFERENCE

16CAP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
CATHODERAY

Sixteen-inch P4 high-voltage picture tube documented by RMA/EIA for direct-view display. Typical anode operation is approximately 15 kV, with published focusing-electrode adjustment for obtaining a sharp television raster.

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

No fixed ratings recorded.

CRT anode/ultor voltage is represented in MaxPlateVoltage; additional electrode, drive, optical, and capacitance data retained as parameters.

16CAP4 — Electrostatic-Focus Magnetic-Deflection Cathode Ray Tube

The **16CAP4** is a 16-inch, 114-degree banded cathode ray tube designed for television display applications. Produced by National Video Corporation, the tube features a short 4 3/8-inch neck length and utilizes a straight electron gun design that requires no external ion trap magnet. It incorporates electrostatic focusing and magnetic deflection, operating with a nominal 6.3 V, 450 mA heater. The tube features a P4 aluminized phosphor screen with a banded implosion protection system.

Mechanical Specifications and Physical Dimensions

The 16CAP4 is constructed with a JEDEC designation J-125-B1 glass bulb and features a banded implosion protection system. The physical dimensions of the tube are highly compact, characterized by a short neck length of 4 3/8 ± 1/8 inches and an overall length of 10 17/32 +5/16 inches.

The greatest external dimensions of the tube, which include the rimband and tension strap, are:

- **Diagonal:** 15 23/32 +1/8 inches
- **Width:** 13 15/16 maximum inches
- **Height:** 11 11/32 maximum inches

The minimum useful projected screen dimensions are:

- **Diagonal:** 14 7/8 inches
- **Horizontal Axis:** 12 15/16 inches
- **Vertical Axis:** 10 1/4 inches
- **Total Area:** 125 square inches

The bulb contact is a JEDEC designation J1-21 recessed small cavity (ultor terminal) located on the funnel. The base is a JEDEC designation B7-208 Small Button Neoeightar 7-pin base arrangement, which corresponds to the JEDEC 8HR basing configuration. The J1-21 bulb contact is aligned with Pin Position No. 4 with an angular tolerance of ±30 degrees, and the ultor terminal is positioned on the same side of the tube as Pin No. 4.

The reference line of the tube is determined by the intersection of the plane CC' of a JEDEC No. G-126 reference-line gauge with the glass funnel when the tube neck is inserted through the flared end of the gauge and the tube is seated.

Electrical Characteristics and Interelectrode Capacitances

The 16CAP4 operates with a 6.3 V heater that draws a nominal current of 450 mA (with a tolerance of ±20 mA) and has a heater warm-up time of 11 seconds. The direct interelectrode capacitances of the tube are:

Parameter	Value
Cathode to all other electrodes (approximate)	5 pF
Grid No. 1 to all other electrodes (approximate)	6 pF
External conductive coating to anode (maximum)	1,500 pF
External conductive coating to anode (minimum)	1,000 pF

The resistance between the external conductive coating and the implosion protection hardware is specified at a minimum of 50 megohms. The external conductive coating must be grounded during

operation, and the capacitance measurement is taken with the implosion protection hardware connected to this external coating.

Optical Characteristics

The screen of the 16CAP4 utilizes a P4 aluminized phosphor, which is standard for black-and-white television displays. The light transmittance at the center of the faceplate is approximately 53 percent. The tube does not feature any antireflection treatment on its faceplate.

Base Connections and Socketing

The 16CAP4 uses the JEDEC 8HR basing diagram, which is a 7-pin arrangement on an 8-pin base (Neoeightar). The socket connections, viewed from the bottom of the base, are assigned as follows:

Pin	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

Note: Grid No. 1 is internally connected to both Pin 2 and Pin 6. Pin 5 is omitted from the active pin connections.

To prevent mechanical stress on the glass-to-metal seals of the base pins, the socket for this base must not be rigidly mounted. It should have flexible leads and be allowed to move freely. The design of the socket must ensure that the circuit wiring cannot impress lateral strains through the socket contacts onto the base pins. The bottom circumference of the base wafer is designed to fall within a 1 3/4-inch diameter circle concentric with the bulb axis.

Design-Maximum Ratings

The ratings for the 16CAP4 are defined under the Design Maximum System. Unless otherwise specified, all voltage values are positive and measured with respect to the cathode.

Parameter	Minimum Value	Maximum Value
Anode Voltage	10,000 V	18,000 V

Parameter	Minimum Value	Maximum Value
Grid No. 4 (Focusing Electrode) Voltage	-500 V	+1,100 V
Grid No. 2 Voltage	200 V	550 V
Grid No. 1 DC Voltage (Negative value)	—	155 V
Grid No. 1 Peak Voltage (Negative value)	—	220 V
Grid No. 1 DC Voltage (Positive value)	—	0 V
Grid No. 1 Peak Voltage (Positive value)	—	2 V
Heater Voltage	5.8 V	6.9 V

Heater-Cathode Voltage Limits

The maximum heater-to-cathode voltage ratings depend on the polarity and the operating state of the equipment:

- **Heater negative with respect to cathode:**
  - During the warm-up period (not to exceed 15 seconds): **450 volts**
  - After the equipment warm-up period: **200 volts**
- **Heater positive with respect to cathode: 200 volts**

Typical Operating Conditions (Grid Drive Service)

Under typical operating conditions in grid drive service, the voltages are positive with respect to the cathode and are configured as follows:

- **Anode Voltage:** 15,000 V DC
- **Grid No. 4 (Focusing Electrode) Voltage:** 250 V DC
- **Grid No. 2 Voltage:** 400 V DC
- **Grid No. 1 Voltage (for visual extinction of focused raster):** 46 to 94 V DC

Individual tubes will achieve satisfactory focus at some value between 0 and +400 volts. The typical focusing electrode voltage of 250 V DC is specified with the combined Grid No. 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 12 5/16" by 10 1/4" pattern (such as that from an RCA 2F21 monoscope or equivalent).

Maximum Circuit Values

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 megohms

Handling and Maintenance

When handling or servicing the 16CAP4, specific precautions must be observed:

1. The external conductive coating must be properly grounded to the chassis.
2. To clean the transparent insulating coating area on the funnel, it should be wiped only with a soft, dry, lint-less cloth.

Technical Summary

The **16CAP4** is a 16-inch, 114-degree cathode ray tube featuring electrostatic focusing and magnetic deflection. It is characterized by its short 4 3/8-inch neck, straight electron gun requiring no ion trap, and a banded implosion protection system. Operating with a 6.3 V, 450 mA heater, the tube is rated for a maximum anode voltage of 18,000 V and typical grid drive operation at 15,000 V. Its physical design utilizes a J-125-B1 bulb, a J1-21 ultor contact, and a B7-208 Neoeightar base, making it a highly integrated display component for television receivers.

SOURCE OPERATING CONDITIONS

1964 RMA EIA

SOURCE PDF

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

1964 RMA EIA

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OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Minimum anode voltage	**10000 V**	—
Minimum anode voltage	**10000 V**	—
Typical anode voltage	**15000 V**	—
Typical grid No. 2 voltage	**400 V**	—
Grid No. 4 focusing voltage range	**1100–500 V**	—

CHARACTERISTICS		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Heater warm-up time	**11 s**	—

CAPACITANCE		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Cathode to other electrodes capacitance	**5 pF**	—