



ELECTRONIC TUBE REFERENCE

16CRP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Sixteen-inch magnetically deflected cathode-ray display tube documented by Mazda-Belvu; the available source extraction is sparse and does not support a narrower application claim.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 300 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	18000 V
<i>Monochrome cathode-ray picture-tube electron-gun/display system; high-voltage and focusing limits published.</i>	

16CRP4 — Monochrome Cathode Ray Tube

An indirectly heated, unipotential-gun monochrome cathode ray tube featuring a 114-degree deflection angle, electrostatic focusing, magnetic deflection, and a self-protected, tinted aluminized screen for television display applications.

Overview

The **16CRP4** is a specialized monochrome cathode ray tube (cathoscope) designed for television receiver applications. It features a rectangular, tinted, and self-protected faceplate with a nominal diagonal measurement of **40 cm**. The tube incorporates an aluminized screen with a **P4** phosphor, electrostatic

focusing, and a wide-angle **114-degree** magnetic deflection system. Its electron gun is a unipotential design that operates without an ion trap, simplifying mechanical alignment and focusing adjustments.

Electro-Optical and Deflection Characteristics

The electro-optical design of the 16CRP4 is optimized for high-contrast image reproduction under varied ambient lighting conditions.

Screen and Phosphor Specifications

The faceplate is tinted to enhance contrast, providing a light transmission coefficient of **57.5%**. The screen is aluminized to maximize light output and protect the phosphor from ion damage.

- **Luminophore:** P4 (aluminized)
- **Fluorescence:** White
- **Phosphorescence:** White
- **Persistence:** Short
- **Minimum Screen Dimensions:**
 - **Width:** 328 mm
 - **Height:** 260 mm
 - **Diagonal:** 378 mm
 - **Useful Area:** 805 cm²

Deflection and Focusing Systems

Deflection is achieved magnetically, allowing for a short overall tube length. The deflection angles are:

- **Diagonal:** 114°
- **Horizontal:** 103°
- **Vertical:** 87°

Focusing is electrostatic, utilizing Grid No. 4 as the focusing electrode. The unipotential electron gun is designed to operate without an ion trap.

Interelectrode Capacitances

- **Grid No. 1 to all other electrodes ($C_{g1/R}$):** 6 pF
- **Cathode to all other electrodes (C_k/R):** 5 pF
- **External conductive coating and rim to anode ($C_{m/a}$):** 1,300 pF maximum, 800 pF minimum

Mechanical Specifications, Base, and Pinout

The 16CRP4 is designed for mounting in any position. Its physical dimensions and electrical connections are highly standardized.

Physical Dimensions

- **Overall Length:** 266.5 ± 6 mm
- **Overall Width:** 351.5 ± 2.5 mm
- **Overall Height:** 286.5 ± 2.5 mm
- **Total Neck Length:** 109.5 ± 3 mm
- **Approximate Weight:** 4.3 kg

Base and Pin Connections

The tube utilizes an **8C15-B** base. The pin connections, viewed from the bottom of the base, are as follows:

Pin Number	Connection
Pin 1	Filament (Heater)
Pin 2	Grid No. 1
Pin 3	Grid No. 2
Pin 4	Grid No. 4 (Focusing Electrode)
Pin 5	Missing (No connection)
Pin 6	Grid No. 1
Pin 7	Cathode
Pin 8	Filament (Heater)

The high-voltage anode connection is made via a cavity contact (**C8-1**) located on the bulb of the tube. This contact is positioned on the same side as pin 4. The plane passing through the tube axis and the cavity contact may deviate by up to $\pm 30^\circ$ from the plane passing through the axis and pin 4.

Electrical Ratings and Operating Conditions

All voltages are measured with respect to Grid No. 1 unless otherwise specified. The tube is rated under the hybrid limit system and is configured for cathode modulation.

Filament and Heater Ratings

The cathode is indirectly heated. The filament parameters are:

- **Nominal Filament Voltage (V_f):** 6.3 V
- **Nominal Filament Current (I_f):** 0.3 A $\pm$ 5%
- **Filament Heating Time (t_f):** 14 seconds

The filament heating time is defined under specific test conditions: the measurement circuit consists of the filament connected in series with a resistance equal to three times the hot resistance of the filament. The voltage applied to this circuit is equal to four times the nominal filament voltage (25.2 V). The heating time is the duration required for the voltage across the filament terminals to reach 80% of its nominal value (5.04 V).

Maximum Ratings (Hybrid Limit System)

These absolute limits must not be exceeded under any operating conditions:

Parameter	Symbol	Maximum Value	Minimum Value
Anode Voltage	V_a	18,000 V	11,000 V
Grid No. 4 Voltage (Positive)	V_{g4}	1,100 V	—
Grid No. 4 Voltage (Negative)	$-V_{g4}$	550 V	—
Grid No. 2 Voltage	$V_{[g2]}(/tubes/G2)$	700 V	—
Voltage between Grid No. 2 and Cathode	V_{g2k}	550 V	—
Cathode Voltage (Peak Positive)	$V_k \text{ cr}$	220 V	—
Cathode Voltage (Positive Bias)	V_k	154 V	—
Cathode Voltage (Peak Negative)	$-V_k \text{ cr}$	2 V	—
Cathode Voltage (Negative Bias)	$-V_k$	0 V	—
Grid No. 1 Circuit Resistance	R_{g1}	1.5 M Ω	—

Heater-to-Cathode Voltage Limits

- **During a 15-second warm-up period** (filament negative with respect to cathode): 450 V maximum
- **In normal steady-state operation:** 200 V maximum

Normal Operating Conditions

Under typical operating conditions with cathode modulation, the following values apply:

- **Anode Voltage (V_a):** 16,000 V

- **Grid No. 2 Voltage** ($V_{g2}(/tubes/G2)$): 400 V
- **Grid No. 2 Current** ($I_{g2}(/tubes/G2)$): -15 to +15 μ A
- **Grid No. 4 Current** (I_{g4}): -25 to +25 μ A
- **Grid No. 4 Voltage** (V_{g4}): 0 to 400 V

The optimal focusing voltage for Grid No. 4 varies between 0 and 400 V depending on the individual tube. This focusing voltage is independent of the anode current and remains stable even when the anode and Grid No. 2 voltages fluctuate within their specified limits. To achieve optimal focus, the circuit design must include an adjustable multi-tap voltage divider.

- **Cathode Voltage for Image Extinction (Cutoff, V_k bl):**
 - **Average Value:** 60 V
 - **Extreme Limits:** 42 to 78 V

Installation and Handling Guidelines

Proper mechanical and magnetic setup is essential to ensure the longevity of the tube and prevent physical damage.

Mechanical Stress Prevention

To prevent mechanical stress on the glass neck of the tube, the socket (support) must not be rigidly fixed. Instead, it must be allowed to move freely. All electrical connections to the base must possess sufficient flexibility and length to avoid transmitting mechanical tension, which could otherwise cause the neck to crack.

Cabinet Mounting

When mounting the tube within a cabinet, the mounting screw must be positioned within a designated circle of 8.5 mm in diameter. The reference line of the tube is established by the plane of the upper edge of an FNIE 005-4 gauge when it rests on the cone.

Magnetic Centering

Beam centering must be performed using thin magnetic rings. These rings adjust the beam path by adding or subtracting a magnetic field, which must never exceed **8 oersted**. To prevent spot distortion and loss of brightness, these rings must be positioned as close as possible to the rear flanges of the deflection coils. This ensures that the electron beam is deflected immediately upon exiting the terminal electrode.

Technical Summary

The **16CRP4** is an indirectly heated, unipotential-gun monochrome cathode ray tube featuring a 114-degree deflection angle, electrostatic focusing, and magnetic deflection. With its 6.3 V, 0.3 A heater, aluminized P4 white phosphor screen, and self-protected tinted faceplate, it is optimized for high-contrast television display applications. Operating under a hybrid limit system with cathode modulation, it requires

an anode voltage of 16,000 V (typical) and an adjustable Grid No. 4 focusing voltage between 0 and 400 V. Proper installation requires flexible socket connections to prevent neck stress and precise magnetic centering within an 8 oersted limit to maintain spot quality and brightness.



SOURCE OPERATING CONDITIONS

SOURCE PDF

1968 Mazda Belvu

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

1968 MAZDA BELVU
Section 1 · Cathode Ray

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
ScreenDiagonal	16 in	—
Deflection	Magnetic text	—

TUBE TINKER

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and their source documents.

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