

ELECTRONIC TUBE REFERENCE

16CLP4

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 manufacturer extraction identifies screen size and deflection method but provides limited additional application detail.

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	18000 V
Monochrome cathode-ray picture-tube electron-gun/display system; high-voltage and focusing limits published.	

16CLP4 Monochrome Cathode-Ray Tube

The **16CLP4** is a 40 cm (diagonal) monochrome cathode-ray tube designed for television display applications. Manufactured under the Mazda Belvu brand, it features a 114-degree diagonal deflection angle, a tinted and self-protected screen, electrostatic focusing, and magnetic deflection. The tube incorporates an aluminized P4 phosphor screen with a white fluorescence and phosphorescence characteristic, providing a high-contrast display with a screen transmission coefficient of 57.5%. The electron gun is a unipotential design that operates without an ion trap.

Mechanical Construction and Physical Dimensions

The 16CLP4 is constructed with a rectangular glass envelope and a short neck. The physical dimensions and mechanical specifications are highly detailed to ensure proper mounting and integration:

- **Overall Length:** 266.5 ± 6 mm
- **Overall Width:** 351.5 ± 2.5 mm
- **Overall Height:** 286.5 ± 2.5 mm
- **Overall Diagonal:** 399 ± 2.5 mm
- **Total Neck Length:** 109.5 ± 3 mm
- **Neck Diameter:** 28.6 mm
- **Approximate Weight:** 4.3 kg
- **Mounting Position:** Any (unrestricted)

The screen itself has the following minimum useful dimensions:

- **Minimum Width:** 328 mm
- **Minimum Height:** 260 mm
- **Minimum Diagonal:** 378 mm
- **Minimum Useful Area:** 805 cm²

The external faceplate opening dimensions are specified as:

- **Opening Width:** 337 ± 3 mm
- **Opening Height:** 270 ± 3 mm
- **Opening Diagonal:** 388.5 ± 3 mm

To prevent mechanical stress on the glass neck, the tube socket must not be rigidly fixed; instead, it must be allowed to move freely. The electrical connections to the socket must possess sufficient flexibility and length to prevent any mechanical tension that could lead to neck cracking. The reference line of the tube is determined by the plane of the upper edge of an FNIE 005-4 gauge when it rests on the cone. The anode connection is made via a C8-1 cavity contact located on the side of pin 4, and the plane passing through the tube axis and this contact can deviate by up to ± 30 degrees from the plane passing through the axis and pin 4. A grounding clip (cosse de masse) is located 15 mm wide, positioned 70 ± 10 mm from the front face.

Heater and Electrical Interelectrode Capacitances

The 16CLP4 utilizes an indirectly heated, unipotential coated cathode. The heater (filament) is designed for series or parallel operation with the following nominal characteristics:

- **Heater Voltage (Vf):** 6.3 V
- **Heater Current (If):** $0.3 \text{ A} \pm 5\%$
- **Nominal Heating Time (tf):** 14 seconds

The nominal heater power is calculated as $6.3 \text{ V} \times 0.3 \text{ A} = 1.89 \text{ W}$.

The heating time is defined under specific test conditions: the heater is connected in series with a resistance equal to three times the hot resistance of the filament, and an overall voltage equal to four times the nominal heater voltage is applied to the circuit. The heating time is the duration required for the voltage across the filament terminals to reach 80% of its nominal value.

The interelectrode capacitances of the tube are:

- **Grid 1 to all other electrodes (Cg1/R):** 6 pF
- **Cathode to all other electrodes (Ck/R):** 5 pF
- **External conductive graphite coating and shell to anode (Cm/a):** 1300 pF maximum, 800 pF minimum

Base and Pinout Configuration

The tube utilizes an **8C15-B** base. The electrical connections are distributed across an 8-pin configuration (with pin 5 omitted), viewed from the bottom of the base:

- **Pin 1:** Filament (Heater)
- **Pin 2:** Grid 1
- **Pin 3:** Grid 2
- **Pin 4:** Grid 4 (Focusing electrode / électrode de concentration)
- **Pin 5:** Missing (Manque)
- **Pin 6:** Grid 1
- **Pin 7:** Cathode
- **Pin 8:** Filament (Heater)
- **Anode Contact:** Recessed cavity contact (C8-1) on the bulb envelope.

Grid 1 is internally connected to both Pin 2 and Pin 6.

Operating Conditions and Cathode Modulation

Under normal operating conditions, the 16CLP4 is configured for cathode modulation. All electrode voltages, unless otherwise specified, are measured with respect to Grid 1:

- **Anode Voltage (Va):** 16,000 V
- **Grid 2 Voltage (Vg2):** 400 V
- **Grid 4 Voltage (Vg4):** 0 to 400 V
- **Grid 2 Current (Ig2):** -15 to +15 μ A
- **Grid 4 Current (Ig4):** -25 to +25 μ A
- **Cathode Voltage for Image Cutoff (Vk bl):** 60 V (average), with extreme limits spanning 42 V to 78 V.

The optimal focusing voltage on Grid 4 varies between 0 and 400 V depending on the individual tube. This focusing voltage is independent of the anode current and remains constant when the anode and Grid 2 voltages vary within their specified limits. To achieve optimal focus, a multi-tap voltage divider should be provided to allow adjustment as close as possible to the ideal value.

Beam centering is accomplished magnetically using thin centering magnet rings (aimants de cadrage) that act by subtracting or adding to the magnetic field. The maximum magnetic field must not exceed 8 oersted. These rings must be positioned as close as possible to the rear flanges of the deflection coils to deflect the electron beam near the exit of the final electrode, thereby preventing spot distortion and loss of screen brightness.

Maximum Ratings (Hybrid Limit System)

The maximum ratings for the 16CLP4 are defined under the hybrid limit system (système des limites hybrides) for cathode modulation, with voltages referenced to Grid 1:

- **Anode Voltage (Va):** 18,000 V maximum, 11,000 V minimum
- **Grid 4 Voltage (Vg4):**
 - Positive peak: 1,100 V maximum
 - Negative peak: 550 V maximum
- **Grid 2 Voltage (Vg2):** 700 V maximum
- **Voltage between Grid 2 and Cathode (Vg2 k):** 550 V maximum
- **Cathode Voltage (Vk):**
 - Peak positive value (Vk cr): 220 V maximum
 - Positive bias value (Vk): 154 V maximum
 - Peak negative value (-Vk cr): 2 V maximum
 - Negative bias value (-Vk): 0 V maximum
- **Voltage between Filament and Cathode (Vfk):**
 - During a 15-second warm-up period (filament negative with respect to cathode): 450 V maximum
 - During normal operation: 200 V maximum
- **Grid 1 Circuit Resistance (Rg1):** 1.5 MΩ maximum

Technical Summary

The **16CLP4** is a specialized 114-degree monochrome cathode-ray tube featuring a 40 cm diagonal screen, electrostatic focusing, and magnetic deflection. Operating with a nominal 6.3 V, 0.3 A heater, it is optimized for cathode modulation with an anode voltage of 16,000 V (normal) up to 18,000 V (maximum). Its design incorporates a unipotential electron gun without an ion trap, an aluminized P4 white-emitting phosphor screen, and self-protecting tinted glass. With its standard 8C15-B base and precise mechanical tolerances, the 16CLP4 provides a reliable, high-contrast display solution for monochrome television receivers.



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	—

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