



ELECTRONIC TUBE REFERENCE

18MA4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Cathode-ray display tube documented by Mazda for operation around 3.5 kV anode voltage, with a recommended maximum of 4.5 kV and approximately 5 pF grid and cathode capacitances.

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

SECTION 1 Cathode Ray*No fixed ratings recorded.*

18MA4 — Electromagnetic Focus and Deflection Cathode Ray Tube

The **18MA4** (also written as **18 MA 4**) is a triode-structure cathode ray tube designed for electromagnetic focus and deflection. Featuring a white phosphor screen with an 18 cm diameter, the tube is engineered to display images with a useful area of 105 mm by 140 mm. It is characterized by its electromagnetic concentration and deviation systems, requiring external coils for focusing and deflection.

Physical and Mechanical Characteristics

The 18MA4 is a physically substantial cathode ray tube with a glass envelope. Its mechanical dimensions and physical parameters are as follows:

- **Maximum Overall Length:** 373 mm

- **Maximum Bulb Diameter:** 180 mm
- **Neck Diameter:** 34.5 mm
- **Maximum Deflection Cone Length:** 166 mm
- **Neck Length (to deflection reference line):** 190 mm
- **Useful Image Dimensions:** 105 mm x 140 mm
- **Screen Diameter:** 18 cm
- **Phosphor Type:** White (écran blanc)
- **Base Type:** Octal 8-pin

The tube's physical layout features a long neck section to accommodate the external electromagnetic deflection and focusing assemblies, transitioning into a wide deflection cone and a circular faceplate.

Heater and Electrical Connections

The 18MA4 utilizes an indirectly heated cathode. The heater requires a standard low-voltage supply, but because of the high operating potentials of the tube, specific insulation and wiring practices must be followed.

Parameter	Value
Heater Voltage (V_f)	6.3 V
Heater Current (I_f)	0.6 A
Grid 1 Capacitance (g_1)	5 pF
Cathode Capacitance (k)	5 pF

Wiring and Supply Requirements

The heater supply must utilize a separate, well-insulated winding on the power transformer to prevent breakdown. Additionally, one end of the filament must be connected directly to the cathode.

Pinout Configuration

The electrical connections are distributed across an 8-pin octal base and an external bulb contact:

- **Heater (F):** Bottom pins
- **Cathode (k):** Left pin
- **Grid 1 (g_1):** Top-left pin
- **Anode (a / D_a):** Top-right pin and an external bulb contact for the high-voltage connection.

Operating Conditions and Focus Requirements

The 18MA4 operates as a triode gun assembly where the electron beam is controlled by the grid voltage and accelerated by the high-voltage anode.

Anode Voltage and Brightness

The recommended minimum anode voltage (V_a) for achieving sufficient image brightness is **3.5 kV**. Operating the tube at higher anode voltages increases the brightness of the display, but the sweep power required for deflection increases proportionally with the anode voltage.

Grid Control and Drive Voltages

To control the intensity of the electron beam and achieve image extinction (cutoff), a negative bias must be applied to Grid 1. The drive voltage requirements vary depending on the target peak beam current (I_b):

- **Grid Cutoff Voltage (V_{g1}):** -21.5 V to -42 V (required for complete image extinction)
- **Average Peak Drive Voltage (V_{sig}):**
 - For a beam current of 0 to 100 μA : 18 V
 - For a beam current of 0 to 150 μA : 21 V
- **Maximum Peak Drive Voltage (V_{sig}):**
 - For a beam current of 0 to 100 μA : 21 V
 - For a beam current of 0 to 150 μA : 24.5 V

Electromagnetic Focusing

Focusing of the electron beam is accomplished externally using a focusing coil. To achieve proper focus adjustment—defined as the point where individual scan lines become invisible when observed from a distance equal to six times the image height—the focusing coil requires approximately **450 ampere-turns** (ampères-tours).

Maximum Ratings and Circuit Recommendations

To ensure the longevity of the tube and prevent electrical breakdown or damage to the phosphor screen, operating limits and protective measures must be strictly observed.

Absolute Maximum Ratings

- **Maximum Anode Voltage ($V_{a(max)}$):** 4.5 kV. This limit must not be exceeded under any operating condition.

Circuit Protection

Due to the high electrostatic energy stored in the extra-high tension (EHT) power supply, the tube requires anode protection. A protective resistor of approximately **25 k Ω** must be connected in series between the EHT power supply and the tube's anode. This resistor limits surge currents in the event of transient internal arcing, protecting both the tube electrodes and the power supply components.

Technical Summary

The **18MA4** is an 18 cm diameter, triode-structure cathode ray tube designed for electromagnetic focus and deflection in display applications. Operating with a standard **6.3 V, 0.6 A** heater, it requires a dedicated, well-insulated heater winding with one filament leg tied directly to the cathode. The tube features a white phosphor screen providing a **105 mm x 140 mm** useful image area. Under typical operating conditions, it utilizes a minimum anode voltage of **3.5 kV** (up to a maximum of **4.5 kV**), requiring a series **25 kΩ** protective resistor. Beam control is achieved via Grid 1 with a cutoff range of **-21.5 V to -42 V** and peak drive voltages up to **24.5 V**, while sharp focus is established using an external coil operating at approximately **450 ampere-turns**.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1960 Mazda

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

1960 MAZDA

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical anode voltage	3.5 kV	—
Maximum recommended anode voltage	4.5 kV	—
Grid capacitance	5 pF	—
Cathode capacitance	5 pF	—

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