

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

10M2

2 SECTIONS

CONSTRUCTION

Tuning Indicator electronic tube

TRIODE-TUNING INDICATOR

Ediswan/Mazda electronic tuning indicator for visual receiver tuning or signal-level indication.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	12.6 V / 100 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Triode	
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	0.5 W
MAXIMUM CATHODE CURRENT	5 mA

SECTION2 Tuning Indicator	
No fixed ratings recorded.	

10M2 — Dual Sensitivity Tuning Indicator

The **10M2**, also designated as the **UM35**, is an indirectly heated cathode ray tuning indicator designed for series heater chain operation. It provides a visual tuning aid in the form of a fluorescent Maltese Cross image. The indicator features a dual-sensitivity design where one pair of display angles operates with high sensitivity for weak signals, while the other pair operates with low sensitivity for strong signals. This dual-range response allows for precise tuning across a wide range of signal strengths without requiring manual range switching.

Heater, Base, and Mechanical Specifications

The 10M2/UM35 is designed for series-string heater applications, requiring a constant current supply. The heater and physical characteristics are detailed below:

- **Heater Current:** 0.1 A
- **Heater Voltage:** 12.6 V
- **Heating Method:** Indirectly heated
- **Mounting Position:** Unrestricted
- **Base Type:** International Octal (IO8)

Physical Dimensions and Weight

- **Maximum Overall Length:** 90 mm
- **Maximum Seated Height:** 76 mm
- **Maximum Diameter:** 28 mm
- **Approximate Net Weight:** 1 oz
- **Approximate Packed Weight:** 1.25 oz (1-1/4 oz)

Pin Connections

The tube utilizes an 8-pin International Octal base with the following pinout configuration, viewed from the free end of the pins:

Pin Number	Connection	Symbol
Pin 1	Heater	h
Pin 2	Internal Connection	IC
Pin 3	Anode 2 (Strong Signals)	a''
Pin 4	Target	t
Pin 5	Grid	g
Pin 6	Anode 1 (Weak Signals)	a'
Pin 7	Cathode	k
Pin 8	Heater	h

Display Structure and Shadow Alignment

The fluorescent target of the 10M2/UM35 displays a Maltese Cross pattern. The display is divided into two distinct pairs of angles controlled by separate internal triode anode sections:

- **First Section (a'):** Optimized for weak signals (high sensitivity). The center line of this shadow is designated as A'-A'.
- **Second Section (a''):** Optimized for strong signals (low sensitivity). The center line of this shadow is designated as A''-A''.

The physical orientation of the shadow center lines is aligned at an angle of $45^\circ \pm 15^\circ$ relative to the base alignment.

Electrical Ratings

The maximum and minimum limiting values for the 10M2/UM35 must be strictly observed to prevent damage and ensure reliable operation:

Parameter	Symbol	Rating
Maximum Anode Voltage	Va(max)	300 V
Maximum Anode Dissipation (either section)	Pa(max)	0.5 W
Maximum Target Voltage	Vt(max)	250 V
Minimum Target Voltage	Vt(min)	90 V
Maximum Cathode Current	Ik(max)	5 mA
Maximum Heater-to-Cathode Voltage (R.M.S.)	Vh-k(max)	200 V
Maximum Grid-to-Cathode Resistance	Rg-k(max)	3 MΩ

Typical Operating Characteristics

The device can be operated at different high-tension (H.T.) supply levels. The response of the two independent sections varies depending on the grid control voltage (Vg) applied from the receiver's detector stage.

Operation at 100 V Supply

- **H.T. Supply Voltage:** 100 V
- **Target Voltage:** 100 V
- **Target Current (Vg = 0):** 0.1 mA
- **First Section (a' - Weak Signals) with 2 MΩ Anode Load:**
 - At Vg = 0 V: Anode Current is 0.05 mA; Shadow Angle is 77°.
 - At Vg = -2 V: Anode Current is 0.03 mA; Shadow Angle is 15°.
- **Second Section (a'' - Strong Signals) with 1 MΩ Anode Load:**

- At $V_g = 0$ V: Anode Current is 0.1 mA; Shadow Angle is 77° .
- At $V_g = -10$ V: Anode Current is 0.04 mA; Shadow Angle is 5° .

Operation at 200 V Supply

- **H.T. Supply Voltage:** 200 V
- **Target Voltage:** 200 V
- **Target Current ($V_g = 0$):** 0.4 mA
- **First Section (a' - Weak Signals) with 2 M Ω Anode Load:**
 - At $V_g = 0$ V: Anode Current is 0.1 mA; Shadow Angle is 78° .
 - At $V_g = -3$ V (Cut-off): Anode Current is 0.06 mA; Shadow Angle is 25° .
- **Second Section (a'' - Strong Signals) with 1 M Ω Anode Load:**
 - At $V_g = 0$ V: Anode Current is 0.19 mA; Shadow Angle is 75° .
 - At $V_g = -20$ V (Cut-off): Anode Current is 0.08 mA; Shadow Angle is 10° .

Typical Application Circuit

In a typical receiver configuration, the 10M2/UM35 is connected directly to the high-tension supply and the detector stage.

The target (Pin 4) is tied directly to the positive H.T. line. The two triode anodes are connected to the H.T. line through separate load resistors:

- Anode 1 (a', Pin 6) uses a **2 M Ω** resistor.
- Anode 2 (a'', Pin 3) uses a **1 M Ω** resistor.

The control grid (Pin 5) receives the negative control voltage from the detector load. To prevent high-frequency fluctuations from destabilizing the display, an RC filter is placed in the grid path, consisting of a series **1 M Ω** resistor and a **0.1 μ F** capacitor connected to ground. The cathode (Pin 7) is connected directly to ground.

This configuration ensures that as the negative AGC or detector voltage increases, the triode sections draw less current, causing the voltage at the anodes to rise toward the target potential, which in turn narrows the shadow angles on the fluorescent screen. The high-sensitivity section (a') reaches its minimum shadow angle at a low negative grid voltage (e.g., -3 V at 200 V supply), while the low-sensitivity section (a'') continues to narrow its shadow up to a much higher negative grid voltage (e.g., -20 V at 200 V supply).

Technical Summary

The **10M2/UM35** is a specialized **International Octal-based dual-sensitivity cathode ray tuning indicator** designed for series-connected heater chains (**12.6 V, 0.1 A**). It features a unique Maltese Cross fluorescent display driven by two independent internal triode sections with separate anode connections. By utilizing a **2 M Ω** load resistor on the weak-signal anode (a') and a **1 M Ω** load resistor on the strong-signal anode (a''), the tube provides overlapping sensitivity ranges. This configuration yields a highly

responsive tuning display with cut-off voltages of **-3 V** and **-20 V** respectively under a **200 V** anode supply, ensuring clear and accurate visual tuning across both weak and strong radio signals.

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 · Triode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum target voltage	250 V	—
Minimum target voltage	90 V	—