



ELECTRONIC TUBE REFERENCE

10P18

Power - Pentode (NOT beam) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

PENTODE

Output pentode designed for audio power stages in AC/DC mains-powered equipment. Its heater and output characteristics suit transformerless receivers requiring a dedicated low-frequency power amplifier.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	9
NOMINAL HEATER	45 V / 100 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Pentode	
PLATE RESISTANCE	23000 Ω
TRANSCONDUCTANCE	0.01 S
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	200 V
MAXIMUM PLATE DISSIPATION	12 W
MAXIMUM SCREEN DISSIPATION	1.75 W
MAXIMUM CATHODE CURRENT	100 mA
<i>Published ratings and characteristics promoted where clearly stated; identical repeated sections compressed when applicable.</i>	

10P18 — Output Pentode Vacuum Tube

An indirectly heated miniature output pentode designed for series heater operation in AC/DC mains-powered audio output stages.

Overview

The **10P18** (also designated as **10P18/UL84**) is a miniature-based power output pentode designed by Mazda. It is engineered specifically for use in the audio output stages of AC/DC mains-powered equipment utilizing series-connected heater chains. The tube features a high maximum anode dissipation rating of **12 W** and is capable of delivering substantial audio power output at moderate operating voltages.

Constructed with a clear glass envelope and a standard **Noval (B9A)** nine-pin base, the 10P18 is designed for unrestricted mounting positions. Its electrical characteristics make it highly suitable for single-valve Class A audio amplifier applications, where it can provide efficient power amplification with low distortion.

Physical Dimensions and Mounting

The 10P18 is a compact, miniature-type tube. Its physical specifications are as follows:

Dimension / Weight	Value
Maximum Overall Length	78.5 mm
Maximum Seated Height	71.5 mm
Maximum Diameter	22.2 mm
Approximate Nett Weight	0.5 oz (1/2 oz)
Approximate Packed Weight	0.75 oz (3/4 oz)

The tube can be mounted in **any position** (unrestricted mounting). The manufacturer specifies the use of **Ediswan Clix VH599/9, VH499/9, or VH19/9 series** valve holders.

Heater and Base Connections

The 10P18 features an indirectly heated cathode designed for series-string heater chains. The heater parameters are:

- **Heater Current (I_h):** 0.1 A
- **Heater Voltage (V_h):** 45.0 V
- **Heating Method:** Indirectly heated, series operation

Pinout Configuration

The tube utilizes a **Noval (B9A)** base. The pin connections, viewed from the free end of the pins, are assigned as follows:

Pin	Connection	Description
1	IC	Internal Connection

Pin	Connection	Description
2	g1	Grid 1 (Control Grid)
3	k, g3	Cathode, Grid 3 (Suppressor Grid)
4	h	Heater
5	h	Heater
6	IC	Internal Connection
7	a	Anode
8	IC	Internal Connection
9	g2	Grid 2 (Screen Grid)

Note on Internal Connections (IC): Pins 1, 6, and 8 are connected internally to electrodes solely to improve mechanical rigidity. These connections may vary between individual valves of this type. It is essential that the corresponding sockets on the valve holder are left entirely unconnected in the circuit.

Electrical Ratings and Characteristics

The maximum ratings and typical electrical characteristics of the 10P18 are defined below.

Absolute Maximum Ratings

These ratings represent the limiting values that must not be exceeded under any operating conditions:

- **Maximum Anode Voltage ($V_a(max)$):** 250 V
- **Maximum Screen Voltage ($V_{[g2] (/tubes/G2)(max)}$):** 200 V
- **Maximum Anode Dissipation ($P_a(max)$):** 12 W
- **Maximum Screen Dissipation (continuous) ($P_{[g2] (/tubes/G2)(max)}$):** 1.75 W
- **Maximum Screen Dissipation (speech and music peak):** 6.0 W
- **Maximum Mean Cathode Current ($I_{k(mean)max}$):** 100 mA
- **Maximum Heater-to-Cathode Voltage ($V_{h-k(max)}$):** 200 V

Typical Characteristics

Measured under the specific operating conditions of $V_a = V_{[g2] (/tubes/G2)} = 170$ V, $I_a = 70$ mA, and $V_{g1} = -12.5$ V:

- **Mutual Conductance (g_m):** 10.0 mA/V
- **Anode Impedance (r_a):** 23 k Ω
- **Inner Amplification Factor (μ_{g1-g2}):** 8

Inter-Electrode Capacitances

The capacitances of the tube's internal structure, measured with remaining earthy potential electrodes, heater, and shields connected to the cathode, are:

- **Grid 1 to Earth (c_{in}):** 12.0 pF
- **Anode to Earth (c_{out}):** 6.0 pF
- **Anode to Grid 1 (c_{a-g1}):** 0.5 pF
- **Grid 1 to Heater (c_{g1-h}):** 0.25 pF

Class A Audio Amplifier Operation

The 10P18 is optimized for single-valve Class A audio amplification. The typical operating conditions, established using fixed D.C. potentials, are detailed below:

Parameter	Value
Anode Voltage (V_a)	160 V
Screen Voltage ($V_{[g2]}(/tubes/G2)$)	170 V
Quiescent Anode Current (I_a)	70 mA
Quiescent Screen Current ($I_{[g2]}(/tubes/G2)$)	5 mA
Grid Bias (V_{g1})	-12.5 V
Anode Load Resistance (R_a)	2,200 Ω
Input Swing ($V_{in}(rms)$)	7 V
Power Output (P_{out}) for 10% THD	5.2 W

Under these conditions, the tube delivers a robust **5.2 W** of audio power into a **2,200 Ω** load, requiring an input signal swing of only **7 V r.m.s.** to reach full output at 10% total harmonic distortion.

Characteristic Curves and Design Interpretation

The published characteristic curves for the 10P18 provide critical design insights for circuit configuration:

- **Transfer Characteristics ($I_a, I_{[g2]}(/tubes/G2)$ vs. V_{g1}):** These curves, plotted for screen and anode voltages of 100 V, 170 V, and 200 V, demonstrate the high mutual conductance of the tube. The steep slope of the anode current curve relative to grid voltage highlights the tube's high sensitivity, requiring relatively small input signal voltages to achieve full modulation.
- **Anode Characteristics (I_a vs. V_a):**
 - At a screen voltage ($V_{[g2]}(/tubes/G2)$) of 100 V, the curves show the typical pentode knee, with stable plate current across a wide range of anode voltages. The $P_a = 12$ W boundary line is clearly

marked to prevent operation in regions that exceed the maximum thermal dissipation limit of the anode.

- At a screen voltage (V_{g2}) of 170 V, the curves extend to higher current levels, illustrating the tube's capability to handle large current swings. The load line for typical Class A operation (such as the 2,200 Ω load) can be plotted across these curves, ensuring that the instantaneous operating point remains safely below the 12 W anode dissipation curve.

Related Designations

The 10P18 is closely related to, and frequently co-designated with, the [UL84](#) output pentode. The two designations share identical physical dimensions, base connections, and electrical characteristics, making them directly equivalent in series-heated AC/DC mains applications.

Technical Summary

The **10P18** is a high-sensitivity **Noval-based miniature output pentode** designed for series-string heater operation (**45.0 V, 0.1 A**). It features a maximum anode dissipation of **12 W** and a maximum screen dissipation of **1.75 W** (continuous) or **6.0 W** (speech and music peak). In typical Class A audio amplifier service, operating with an anode voltage of **160 V** and a screen voltage of **170 V**, it delivers **5.2 W** of output power into a **2,200 Ω** load with an input drive of **7 V r.m.s.** Its high mutual conductance of **10.0 mA/V** and robust power capability make it an efficient and reliable choice for mains-powered audio output stages.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1973 Mazda Valves Binder 2

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

1973 MAZDA VALVES BINDER 2

Section 1 · Pentode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater or filament voltage	45 V	Published nominal value
Heater or filament current	100 mA	Published nominal value
Transconductance	10000 μ S	Published operating characteristic

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum plate dissipation	12 W	Published maximum rating
Application	Single-ended Class A audio output	Published intended use

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