



ELECTRONIC TUBE REFERENCE

12P17L

Power - Pentode Single (NOT beam) (under 10W) electronic tube

CONSOLIDATED TECHNICAL
DATA

1 SECTION
CONSTRUCTION
PENTODE

Russian oscillator pentode designed for high-frequency generation and RF power amplification to approximately 120 MHz. Its defining function is RF generation/output rather than low-frequency audio power service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	8
NOMINAL HEATER	12.6 V / 325 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Pentode	
TRANSCONDUCTANCE	0.007977 S
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	250 V
MAXIMUM PLATE DISSIPATION	7.5 W
MAXIMUM SCREEN DISSIPATION	2 W
MAXIMUM GRID DISSIPATION	0.1 W
MAXIMUM CATHODE CURRENT	60 mA
Published ratings/characteristics promoted where clearly identified; additional bilingual values retained as parameters.	

12P17L — High-Frequency Oscillator Pentode

The **12P17L** (Russian: **12П17Л**) is an indirectly heated glass-envelope oscillator pentode designed for the generation of high-frequency (HF) oscillations and the amplification of high-frequency voltage at frequencies up to 120 MHz. Featuring a robust mechanical design, this pentode is engineered to maintain stable operation under demanding environmental and mechanical conditions, making it suitable for specialized communications and transmitter applications.

Overview

The 12P17L is characterized by its high transconductance, low control-grid-to-plate capacitance, and a dedicated internal shield. The tube is constructed with an indirectly heated, oxide-coated cathode and is housed in a glass envelope featuring eight rigid base pins.

Designed for reliable service in harsh environments, the 12P17L is rated to operate across a wide ambient temperature range from -60 °C to +70 °C and can withstand relative humidity levels of 95% to 98% at an ambient temperature of +40 °C. Mechanically, the device is highly ruggedized, capable of enduring continuous vibration loads of up to 2.5 g and multiple impact/shock loads of up to 12 g. The manufacturer guarantees a minimum service life of 2000 hours under rated operating conditions, with a maximum device weight of 50 grams.

Mechanical Construction and Physical Dimensions

The 12P17L features a compact, cylindrical glass envelope with a specialized base structure. The physical dimensions of the tube are defined by the following maximum limits:

- **Maximum Overall Height:** 85 mm (including the base pins and the top glass tip)
- **Maximum Seated Height:** 76 mm (excluding the base pins)
- **Maximum Bulb Body Height:** 61 mm
- **Top Structure:** The top of the glass envelope features a protective cap structure measuring 10 mm in diameter and 4 mm in height, surrounding the exhaust tip.

The base of the tube consists of eight rigid metal pins arranged in a circular pattern around a central metal locating and locking key (often associated with loctal-type bases). This design ensures secure mechanical retention and reliable electrical contact under severe vibration and shock.

Heater and Pinout Configuration

The 12P17L utilizes an indirectly heated cathode. The heater is designed for nominal 12.6 V operation and is compatible with both AC and DC supplies.

Heater Specifications

- **Nominal Heater Voltage (U_h):** 12.6 V
- **Nominal Heater Current (I_h):** 325 ± 25 mA

- **Calculated Nominal Heater Power:** 4.10 W (derived from $12.6\text{ V} \times 0.325\text{ A}$)

Pin Connection Diagram

The eight rigid pins are numbered sequentially and correspond to the following electrode connections, viewed from the underside of the base:

Pin Number	Electrode Connection	Description
1	h	Heater
2	a	Anode (Plate)
3	g_2	Grid 2 (Screen Grid)
4	g_3	Grid 3 (Suppressor Grid)
5	s	Internal Shield
6	g_1	Grid 1 (Control Grid)
7	h	Heater
8	k	Cathode

The separate pin connection for the internal shield (Pin 5) allows for direct RF grounding, which is critical for minimizing parasitic feedback and maintaining stability at high frequencies.

Electrical Characteristics and Typical Operating Points

Under standard static testing conditions, the 12P17L exhibits high transconductance and a robust plate current capability. The typical electrical characteristics are measured at the following operating point:

- **Plate Voltage (U_a):** 150 V
- **Grid 2 Voltage ($U_{[g2] (/tubes/G2)}$):** 150 V
- **Grid 3 Voltage (U_{g3}):** 0 V
- **Grid 1 Voltage (U_{g1}):** -7 V

Typical Parameters

- **Plate Current (I_a):** 38^{+12}_{-13} mA
- **Grid 2 Current ($I_{[g2] (/tubes/G2)}$):** ≤ 10 mA
- **Transconductance (S):** $7.9^{+2.1}_{-1.9}$ mA/V
- **Plate Cutoff Current (I_{az}):** 3 mA (measured at $U_{g1} = -18$ V)
- **Suppressor Grid Control Action:** When a negative bias of -40 V is applied to Grid 3 ($U_{g3} = -40$ V), the plate current is reduced to 11.0 ± 5 mA.

High-Frequency Power Output

The 12P17L is specifically rated for high-frequency power generation. Under a designated RF test operating point, the tube delivers a high-frequency power output (P_k) of $\geq 4.4\text{ W}$. This performance is verified under the following dynamic conditions:

- **Plate Voltage (U_a):** 200 V
- **Grid 1 Bias (U_{g1}):** -20 V
- **Grid 3 Bias (U_{g3}):** -15 V
- **Effective RF Grid Drive Voltage ($U_{g1\sim eff}$):** 19 V
- **Operating Frequency (f):** 70 MHz

Interelectrode Capacitances

To facilitate stable high-frequency operation up to 120 MHz, the 12P17L is designed with extremely low feedback capacitance. The nominal interelectrode capacitances are:

- **Input Capacitance (C_{g1k}):** $9.3 \pm 1.1\text{ pF}$
- **Output Capacitance (C_{ak}):** $8.5 \pm 1.5\text{ pF}$
- **Feedback Capacitance (C_{g1a}):** $\leq 0.04\text{ pF}$

The exceptionally low control-grid-to-plate capacitance ($C_{g1a} \leq 0.04\text{ pF}$) is achieved through internal shielding, which minimizes the Miller effect and prevents unwanted self-oscillation in high-frequency amplifier stages.

Maximum and Minimum Permissible Ratings

To ensure the reliability and longevity of the 12P17L, circuit designs must strictly adhere to the maximum and minimum permissible operating limits. Operating outside these boundaries can cause immediate failure or severely degrade the 2000-hour guaranteed service life.

Parameter	Minimum Limit	Maximum Limit	Conditions / Notes
Heater Voltage (U_h)	11.4 V	14.0 V	Required for cathode emission stability
Plate Voltage (U_a)	—	250 V	Continuous operation
Plate Voltage (U_a) (Cold Start)	—	300 V	Allowed momentarily when switching in with a cold tube
Grid 2 Voltage ($U_{[g2]}$) (/tubes/G2))	—	250 V	Continuous operation

Parameter	Minimum Limit	Maximum Limit	Conditions / Notes
Grid 2 Voltage (U_{g2})(/tubes/G2)) (Cold Start)	—	300 V	Allowed momentarily when switching in with a cold tube
Plate Dissipation (P_a)	—	7.5 W	Maximum continuous thermal limit
Grid 2 Dissipation (P_{g2})(/tubes/G2))	—	2.0 W	Screen grid thermal limit
Grid 1 Dissipation (P_{g1})	—	0.1 W	Control grid thermal limit
Cathode Current (I_k) (Average)	—	60 mA	Continuous average DC current (Average value)
Cathode Current (I_k) (Peak)	—	250 mA	Peak pulse or peak RF current (Peak value)
Grid 1 Circuit Resistance (R_{g1})	—	0.5 MΩ	To prevent thermal runaway
Grid 3 Circuit Resistance (R_{g3})	—	0.1 MΩ	Suppressor grid circuit limit
Operating Frequency (f)	—	120 MHz	Maximum rated frequency for full RF operation

Analysis of Characteristic Curves

The graphical operating curves of the 12P17L illustrate its behavior under varying voltage and bias conditions, providing key insights for amplifier and oscillator design.

Plate Characteristics (I_a, I_{g2} vs. U_a)

The plate characteristic curves, plotted at a nominal heater voltage of 12.6 V, a screen grid voltage (U_{g2})(/tubes/G2)) of 150 V, and suppressor grid voltage (U_{g3}) of 0 V, demonstrate classic pentode behavior:

- **Knee Region:** The plate current rises sharply below $U_a = 50$ V, transitioning into a flat, high-impedance plateau above 50 V. This sharp knee minimizes distortion and maximizes efficiency in power amplification.

- **Control Grid Bias Steps:** Curves are provided for U_{g1} values from 0 V down to -10 V in 2 V steps. At $U_{g1} = 0$ V, the plate current reaches approximately 90 to 100 mA at $U_a = 100$ V, while the screen grid current ($I_{[g2]}(/tubes/G2)$) remains low.
- **Dissipation Boundary:** The maximum plate dissipation boundary ($P_a \text{ max} = 7.5$ W) is superimposed on the curves, defining the safe operating area. For instance, at $U_{g1} = 0$ V, the operating point must be restricted to lower plate voltages to avoid exceeding the 7.5 W limit, whereas at $U_{g1} = -4$ V (where $I_a \approx 50$ mA), the plate voltage can safely extend across the full rated range.

Transfer Characteristics (I_a, I_{g2} vs. U_{g1})

The transfer curves, plotted at $U_h = 12.6$ V, $U_a = 250$ V, and $U_{g3} = 0$ V, show the control grid's influence on plate and screen currents at different screen voltages ($U_{[g2]}(/tubes/G2) = 100$ V, 150 V, and 200 V):

- **High Screen Voltage** ($U_{[g2]}(/tubes/G2) = 200$ V): The transconductance is highest, with the plate current reaching approximately 140 mA at $U_{g1} = 0$ V. The cutoff voltage is around -16 V.
- **Nominal Screen Voltage** ($U_{[g2]}(/tubes/G2) = 150$ V): The plate current reaches approximately 90 mA at $U_{g1} = 0$ V, with a cutoff voltage of approximately -12 V.
- **Low Screen Voltage** ($U_{[g2]}(/tubes/G2) = 100$ V): The plate current is limited to approximately 45 mA at $U_{g1} = 0$ V, with a cutoff voltage of approximately -8 V.

These curves show that the screen grid voltage can be used to shift the operating region and adjust the overall gain and power handling of the stage.

Technical Summary

The **12P17L** is a highly ruggedized, glass-envelope oscillator pentode designed for high-frequency generation and amplification up to 120 MHz. Operating with a 12.6 V, 325 mA heater, the tube features an eight-pin base with rigid leads and an internal shield connected to Pin 5. At its typical operating point ($U_a = 150$ V, $U_{[g2]}(/tubes/G2) = 150$ V, $U_{g1} = -7$ V), it exhibits a transconductance of approximately 7.9 mA/V and a plate current of 38 mA.

With a maximum plate dissipation of 7.5 W, a peak cathode current rating of 250 mA, and an exceptionally low feedback capacitance of ≤ 0.04 pF, the 12P17L is capable of delivering ≥ 4.4 W of RF power at 70 MHz. Its robust mechanical construction ensures stable performance under extreme temperatures (-60 °C to +70 °C), high humidity, and severe mechanical shock (up to 12 g) and vibration (up to 2.5 g), backed by a 2000-hour service life guarantee.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X Russian

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

195X RUSSIAN

Section 1 · Pentode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Source symbol mo	120 MHz	HOCTH BBICOKOH uactoTel (mo 120 MHz). hf voltage (up to 120 MHz).
Source symbol to	120 MHz	HOCTH BBICOKOH uactoTel (mo 120 MHz). hf voltage (up to 120 MHz).
Source symbol B0	3 h	BO3HEUCTBUIO OKpyXKallollell temmeparypel ot —60
Source symbol to	989 A	relative humidity of 95 to 989 at +40° C, as well
Source symbol aroseunoctb	2000 µA	FapantupoBannas poaroseunoctb 2000 uacos. Service life guarantee: 2000 hr.
Service life	2000 h	FapantupoBannas poaroseunoctb 2000 uacos. Service life guarantee: 2000 hr.
Source symbol U,	128 V	U, 128V Uy 0 I,?) 11,05 mA
Published electrical parameter	11.05 mA	U, 128V Uy 0 I,?) 11,05 mA
Source symbol I,	325+25 mA	I, 325+25 mA U, =7V I, <10mA
Published electrical parameter	7 V	I, 325+25 mA U, =7V I, <10mA
Source symbol I,	<10 mA	I, 325+25 mA U, =7V I, <10mA
Source symbol U,	150 V	U, 150V I, 38fZmA P, %) =>44W
Published electrical parameter	>44 W	U, 150V I, 38fZmA P, %) =>44W
Source symbol Uy,	150 V	Uy, 150V I,,)) 3mA S 7,977 mA/V
Published electrical parameter	3 mA	Uy, 150V I,,)) 3mA S 7,977 mA/V
Source symbol S	7.977 mA/V	Uy, 150V I,,)) 3mA S 7,977 mA/V
Published electrical parameter	200 V	11 U =200 V. Uy =—20V, Uy=15V, Ug =19V, f=70 MHz.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Published electrical parameter	20 V	11 U =200 V. Uy =—20V, Uy=15V, Ug =19V, f=70 MHz.
Published electrical parameter	15 V	11 U =200 V. Uy =—20V, Uy=15V, Ug =19V, f=70 MHz.
Published electrical parameter	19 V	11 U =200 V. Uy =—20V, Uy=15V, Ug =19V, f=70 MHz.
Published electrical parameter	70 MHz	11 U =200 V. Uy =—20V, Uy=15V, Ug =19V, f=70 MHz.
Source symbol Cox	93±1.1 pF	Cox 93=1,1 pF
Published electrical parameter	15 pF	C, 85:±15 pF
Source symbol Cgra	<0.04 pF	Cgra < 0,04 pF
Source symbol Uy	14 V	Uy 14V 114V Pgl 0,1 W
Source symbol V	114 V	Uy 14V 114V Pgl 0,1 W
Source symbol Pgl	0.1 W	Uy 14V 114V Pgl 0,1 W
Source symbol U,	250 V	U, 250 V I,%) 60 mA
Published electrical parameter	60 mA	U, 250 V I,%) 60 mA
Source symbol U,	300 V	U, 300V I, %) 250 mA
Published electrical parameter	250 mA	U, 300V I, %) 250 mA
Source symbol Ug2	250 V	Ug2 250 V Rgl 0,6 MQ
Source symbol Rgl	0.6 MΩ	Ug2 250 V Rgl 0,6 MQ
Published electrical parameter	300 V	Ug2 1) 300V Rg3 0,1 MQ
Source symbol Rg3	0.1 MΩ	Ug2 1) 300V Rg3 0,1 MQ
Source symbol P,	75 W	P, 75 W f 120 MHz
Source symbol f	120 MHz	P, 75 W f 120 MHz
Source symbol g2	2 W	p g2 2w
Source symbol Cpennee	3 h	2) Cpennee 3HaAYeHHE.
Source symbol IMuxoBoe	3 h	3) IMuxoBoe 3HauenHe.
Published electrical parameter	0 V	Upt=0V—
Published electrical parameter	-2 V	-2v 80 & ,

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Published electrical parameter	-6 V	-6V 1+
Published electrical parameter	126 V	I _y U _y =126V —, U _g =126V
Published electrical parameter	150 V	— — =1 U _{gy} = 150 V — — =1y U _g =250V
Published electrical parameter	250 V	— — =1 U _{gy} = 150 V — — =1y U _g =250V

TUBE TINKER
ELECTRON TUBE DATABASE

SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

SOURCE PDF

1970 Russian Tubes Mashpriborintorg

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

1970 RUSSIAN TUBES MASHPRIBORINTORG

Section 1 · Pentode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Guaranteed service life	2000 h	PublishedGuarantee
Transconductance	7.977 mA/V	PublishedElectricalCharacteristics

TUBE TINKER

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and their source documents.

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