



ELECTRONIC TUBE REFERENCE

1B4

Voltage - Pentode High Frequency (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

PENTODE

Directly heated high-frequency amplifier pentode, explicitly co-designated 1B4/951 in RCA documentation. It is intended for RF signal amplification and uses a filamentary cathode suited to low-voltage supply operation.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	5
NOMINAL HEATER	2 V / 60 mA	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Pentode	
PLATE RESISTANCE	1500000 Ω
TRANSCONDUCTANCE	0.00065 S
AMPLIFICATION FACTOR	975
MAXIMUM PLATE VOLTAGE	180 V
MAXIMUM SCREEN VOLTAGE	67.5 V
MAXIMUM CATHODE CURRENT	3 mA
<i>Published maximum ratings and electrical characteristics promoted from the approved source.</i>	

1B4 — Filament-Type R-F Amplifier Pentode

The **1B4** is a filament-type pentode vacuum tube designed primarily for radio-frequency (R-F) amplification and detection in battery-operated receivers. It shares similar application characteristics with the older type 32 pentode but is housed in a more compact glass envelope.

Mechanical Specifications and Pin Connections

The 1B4 is constructed using an **ST-12** glass bulb, featuring a small metal top cap and a small 4-pin base. Its physical dimensions are specified as follows:

- **Maximum Diameter:** 1-3/16 inches
- **Overall Height:** 4-9/32 to 4-17/32 inches
- **Seated Height:** 3-11/16 to 3-31/32 inches

Pinout Configuration

The electrical connections are distributed between the base pins and an unnumbered terminal, alongside the top cap:

- **Pin 1:** Plate (P)
- **Pin 2:** Grid No. 1 / Control Grid (G1)
- **Pin 3:** Grid No. 2 / Screen Grid (G2)
- **Pin 4:** Grid No. 3 / Suppressor Grid (G3) & Filament negative (F-)
- **Unnumbered Pin:** Filament positive (F+)
- **Top Cap:** Small metal cap

Filament Ratings

The 1B4 is designed for low-power battery-operated equipment, utilizing a directly heated filament with the following electrical ratings:

- **Filament Voltage (D.C.):** 2.0 Volts
- **Filament Current:** 0.060 Ampere
- **Calculated Filament Power:** 0.12 Watts (calculated from 2.0 V * 0.060 A)

Electrical Characteristics and Typical Operation

The 1B4 can be operated under different voltage conditions. The table below outlines the typical operating parameters for two distinct configurations, including the maximum rated limits for plate and screen voltages.

Parameter	Typical Operation (90 V)	Maximum Operation (180 V)
Plate Voltage	90 V	180 V (Max)
Screen Voltage (Grid No. 2)	67.5 V (Max)	67.5 V (Max)
Grid Voltage (Grid No. 1)	-3 V	-3 V
Plate Current	1.6 mA	1.7 mA
Screen Current	0.7 mA	0.6 mA

Parameter	Typical Operation (90 V)	Maximum Operation (180 V)
Plate Resistance	1.0 Megohm	1.5 Megohms
Amplification Factor	550	1000
Transconductance	600 μ mhos	650 μ mhos
Grid Voltage for Plate Cut-off (Approx.)	-8 V	-8 V

Interelectrode Capacitances

When measured in conjunction with an external shield-can, the interelectrode capacitances of the 1B4 are:

- **Grid-to-Plate Capacitance:** 0.007 pF (max)
- **Input Capacitance:** 5 pF
- **Output Capacitance:** 11 pF

Application and Installation Guidelines

The primary application of the 1B4 is as an R-F amplifier or detector in battery-powered radio receivers.

- **Installation:** For installation practices and mounting considerations, reference is made to the guidelines established for the type 34 tube.
- **Application:** For detailed circuit application methods, reference is made to the type 32 tube, which shares a similar operational profile but differs in bulb size.

Characteristic Curves and Behavior

The average plate characteristics of the 1B4 are plotted at a constant filament voltage of 2.0 Volts D.C. and a screen grid voltage of 67.5 Volts. The control-grid voltage curves span from 0 to -7 Volts.

The curves reveal the following qualitative behaviors:

- **Low-Voltage Region:** Below 50 plate volts, the plate current exhibits a sharp, rapid rise.
- **Pentode Region:** Above 50 plate volts and extending up to 400 plate volts, the tube displays flat, classic pentode plate current characteristics, indicating high plate resistance.
- **Saturation:** At a control-grid bias of 0 V, the plate current saturates near 4 mA.

Technical Summary

The **1B4** is a compact, filament-type pentode designed for efficient R-F amplification and detection in battery-operated receivers. Operating with a 2.0 V, 0.060 A filament, it provides high plate resistance (up to 1.5 Megohms) and an amplification factor of up to 1000 under maximum operating conditions (180 V plate, 67.5 V screen). Housed in an ST-12 envelope with a small 4-pin base and a top cap, its physical

design is smaller than the functionally similar type [32](#), making it suitable for space-constrained battery receiver designs.

SOURCE OPERATING CONDITIONS

1937 Raytheon Radio Receiving Tubes

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

1937 RAYTHEON RADIO RECEIVING TUBES

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	90 V	ClassA
Screen voltage	67.5 V	ClassA
Grid bias	-3 V	ClassA
Plate current	1.6 mA	PlateVoltage=90V
Screen current	0.7 mA	PlateVoltage=90V
Plate voltage	180 V	ClassA
Plate current	1.7 mA	PlateVoltage=180V
Screen current	0.6 mA	PlateVoltage=180V

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	1 MOhm	PlateVoltage=90V
Transconductance	600 uS	PlateVoltage=90V
Plate resistance	1.8 MOhm	PlateVoltage=180V
Transconductance	650 uS	PlateVoltage=180V
Grid bias for plate-current cutoff	-8 V	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	—0.007 pF	WithTubeShield; Maximum
Input capacitance	5 pF	—
Output capacitance	11 pF	—

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1940 RCA

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

1940 RCA

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HeaterVoltageNominal	2 V	Nominal
HeaterCurrentNominal	60 mA	Nominal
Maximum Plate Voltage	180 V	—
Maximum Screen Voltage	67.5 V	—
Maximum Cathode Current	3 mA	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Transconductance	650 μ S	Typical
Plate Resistance	1500000 ohm	Typical

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