



ELECTRONIC TUBE REFERENCE

1603

Voltage - Pentode Sharp Cutoff (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

PENTODE

Low-noise, low-microphonic heater-cathode pentode designed for preamplifier service. RCA documentation emphasizes sensitive low-level amplification where both electrical noise and vibration-induced microphonics must be minimized.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	6
NOMINAL HEATER	6.3 V / 300 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Pentode	
PLATE RESISTANCE	1500000 Ω
TRANSCONDUCTANCE	0.001225 S
AMPLIFICATION FACTOR	1500
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	100 V
<i>Published maximum ratings and characteristic values promoted from the approved source.</i>	

1603 — Triple-Grid Detector Amplifier

The **1603** is a triple-grid vacuum tube of the heater-cathode type designed specifically for use in pre-amplifier equipment where noise and microphonics are critical design factors. It features a low-microphonic, low-noise construction and incorporates an internal shield connected directly to the cathode within the tube to minimize interference.

Construction, Heater, and Pinout

The 1603 is constructed with an ST12 glass bulb and a small 6-pin base. A top cap with a diameter of 0.346 to 0.369 inches provides the connection for Grid No. 1. The physical dimensions of the device are:

- **Maximum diameter:** 1-9/16 inches
- **Seated height:** 3-29/32 to 4-1/16 inches
- **Overall height:** 4-11/16 to 4-15/16 inches

The tube features an indirectly heated cathode with the following heater specifications:

- **Heater Voltage:** 6.3 V
- **Heater Current:** 0.3 A
- **Calculated Heater Power:** 1.89 W (calculated as 6.3 V multiplied by 0.3 A)

The pin connections, viewed from the top of the socket, are as follows:

Pin / Cap	Connection
Pin 1	Heater
Pin 2	Plate
Pin 3	Grid No. 2 (Screen Grid)
Pin 4	Grid No. 3 (Suppressor Grid)
Pin 5	Cathode
Pin 6	Heater
Cap	Grid No. 1 (Control Grid)

Interelectrode Capacitances

The interelectrode capacitances of the 1603 depend on whether the tube is operated in a pentode or triode configuration. The triode connection is achieved by connecting Grid No. 2 and Grid No. 3 directly to the plate.

Capacitance	Pentode Connection (with shield can)	Triode Connection
Grid-to-Plate	0.007 pF (maximum)	2 pF
Input	5 pF	3 pF
Output	6.5 pF	10.5 pF

Class A Pentode Operation

When operated as a Class A amplifier pentode, Grid No. 3 (suppressor) is connected to the cathode at the socket. The tube exhibits the following characteristics under typical operating conditions:

Parameter	Operating Point 1	Operating Point 2 (Maximum)
D-C Plate Voltage	100 V	250 V max
D-C Screen Voltage (Grid No. 2)	100 V	100 V max
D-C Grid Voltage (Grid No. 1)	-3 V	-3 V
D-C Plate Current	2 mA	2 mA
D-C Screen Current	0.5 mA	0.5 mA
Plate Resistance	1 Megohm	Greater than 1.5 Megohms
Amplification Factor	1185	Greater than 1500
Transconductance	1185 micromhos	1225 micromhos

For cathode current cut-off, the D-C grid voltage (Grid No. 1) is -7 V.

Class A Triode Operation

When configured as a Class A amplifier triode with Grid No. 2 and Grid No. 3 connected directly to the plate, the 1603 operates with the following characteristics:

Parameter	Operating Point 1	Operating Point 2 (Maximum)
D-C Plate Voltage	180 V	250 V max
D-C Grid Voltage (Grid No. 1)	-5.3 V	-8 V
D-C Plate Current	5.3 mA	6.5 mA
Plate Resistance	11,000 Ohms	10,500 Ohms
Amplification Factor (Approx.)	20	20
Transconductance	1800 micromhos	1900 micromhos

Technical Summary

The 1603 is a specialized triple-grid detector amplifier designed for low-noise and low-microphonic pre-amplifier applications. It features an internal shield connected to the cathode, a 6.3 V heater, and an ST12

bulb with a small 6-pin base. The tube offers high flexibility, allowing operation as a high-gain pentode (with amplification factors exceeding 1500 and plate resistance over 1.5 Megohms) or as a medium-mu triode (with an amplification factor of approximately 20 and plate resistance around 10,500 to 11,000 Ohms) when Grids No. 2 and No. 3 are strapped to the plate.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1938 RCA Transmitting Tubes

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

1938 RCA TRANSMITTING TUBES

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HeaterVoltageNominal	6.3 V	Nominal
HeaterCurrentNominal	300 mA	Nominal
Maximum Plate Voltage	250 V	—
Maximum Screen Voltage	100 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Transconductance	1225 μ S	Typical
Amplification Factor	1500	Typical
Plate Resistance	1500000 ohm	Typical

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