



ELECTRONIC TUBE REFERENCE

1613

Power - Pentode (NOT beam) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

PENTODE

RCA heater-cathode RF power pentode designed for transmitting service. Its manufacturer ratings are intended for radio-frequency power generation or amplification rather than ordinary receiving or audio-output use.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	7
NOMINAL HEATER	6.3 V / 700 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Pentode	
TRANSCONDUCTANCE	0.0025 S
MAXIMUM PLATE VOLTAGE	350 V
MAXIMUM SCREEN VOLTAGE	275 V
MAXIMUM PLATE DISSIPATION	10 W
MAXIMUM SCREEN DISSIPATION	2.5 W
<i>Representative electrical section; promoted values mapped from published ratings and characteristics where applicable.</i>	

1613 — RF Power Pentode

The **1613** (also designated as the **GL-1613**) is a heater-cathode type power pentode featuring a metal shell. It is designed primarily for use as a Class C radio-frequency power amplifier and oscillator, and it is also highly suitable for use as a crystal oscillator. The tube is rated for operation at full input at

frequencies up to 45 megacycles, and can be operated at frequencies up to 90 megacycles with appropriately reduced ratings.

Construction, Heater, and Physical Characteristics

The 1613 is constructed with a robust metal envelope (shell) and contains five electrodes, making it a true pentode. It utilizes an indirectly heated, coated cathode. The heater is designed to operate from either an AC or DC supply.

Heater Parameter	Value
Heater Voltage (AC/DC)	6.3 V
Heater Current	0.7 A

Mechanical Specifications and Mounting

The tube is built with a small wafer octal 7-pin base. It is designed to be highly versatile in physical installation and can be mounted in either a vertical or horizontal position (any position).

- **Maximum Overall Length:** 3-1/4 inches
- **Maximum Diameter:** 1-11/32 inches (also listed as 1-5/16 inches)
- **Maximum Seated Height:** 2-11/16 inches
- **Approximate Net Weight:** 3 ounces
- **Approximate Shipping Weight:** 1 pound

Pinout and Electrode Connections

The 1613 utilizes a 7-pin octal base configuration. When viewed from the bottom of the tube, the pin connections are assigned as follows:

- **Pin 1:** Metal Shell (S)
- **Pin 2:** Heater (F)
- **Pin 3:** Plate (P)
- **Pin 4:** Grid No. 2 (G2 — Screen Grid)
- **Pin 5:** Grid No. 1 (G1 — Control Grid)
- **Pin 7:** Heater (F)
- **Pin 8:** Cathode (K) and Grid No. 3 (G3 — Suppressor Grid)
- *Note: Pin 6 is omitted from this base configuration.*

Electrical Characteristics and Capacitances

At its standard operating point, the 1613 exhibits a grid-plate transconductance of **2500 micromhos** (measured at a plate current of 31 milliamperes).

The direct interelectrode capacitances of the tube, measured with the metal shell connected directly to the cathode, are as follows:

- **Grid No. 1 to Plate (Grid-Plate):** 0.26 μF (micromicrofarads)
- **Input (Grid No. 1 to Cathode, Grid No. 3, Grid No. 2, Shell, and Heater):** 6.5 μF
- **Output (Plate to Cathode, Grid No. 3, Grid No. 2, Shell, and Heater):** 13.5 μF

These low capacitances, particularly the very low grid-to-plate feedback capacitance of 0.26 μF , are highly beneficial for maintaining stability in high-frequency amplifier and oscillator circuits.

Class C Operating Conditions and Ratings

The 1613 can be operated under two distinct Class C service conditions: plate-modulated (Class C Telephony) and unmodulated (Class C Telegraphy or FM Telephony).

Class C Plate-Modulated RF Power Amplifier and Oscillator

This service is rated for carrier conditions per tube with a maximum modulation factor of 1.0.

Parameter	Typical Operation	Maximum CCS Ratings
DC Plate Voltage	275 V	275 V
DC Grid No. 2 (Screen Grid) Voltage	200 V	275 V
DC Grid No. 1 (Control Grid) Voltage	-35 V	-100 V
DC Plate Current	42 mA	50 mA
DC Grid No. 1 Current	~2.8 mA	5 mA
DC Screen Current	10 mA	—
Plate Input	—	11.5 W
Screen Input	—	2.0 W
Plate Dissipation	—	7.0 W
Peak RF Grid Input Voltage	65 V	—
Driving Power	0.16 W	—
Plate Power Output	6.0 W	—
DC Heater-Cathode Potential	—	100 V

Note on biasing: The typical DC grid No. 1 voltage of -35 V can be obtained by a grid leak, by partial self-bias methods, or through a 12,500-ohm resistor. The typical DC grid No. 2 voltage of 200 V is supplied

from a modulated fixed supply or a modulated plate-voltage supply through a 7,500-ohm resistor.

Class C Unmodulated RF Power Amplifier and Oscillator

This service is rated for key-down conditions per tube without modulation. (Modulation, essentially negative, may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions).

Parameter	Typical Operation	Maximum CCS Ratings
DC Plate Voltage	350 V	350 V
DC Grid No. 2 (Screen Grid) Voltage	200 V	275 V
DC Grid No. 1 (Control Grid) Voltage	-35 V	-100 V
DC Plate Current	50 mA	50 mA
DC Grid No. 1 Current	~3.5 mA	5 mA
DC Screen Current	10 mA	—
Plate Input	—	17.5 W
Screen Input	—	2.5 W
Plate Dissipation	—	10.0 W
Peak RF Grid Input Voltage	70 V	—
Driving Power	0.22 W	—
Plate Power Output	9.0 W	—
DC Heater-Cathode Potential	—	100 V

Note on biasing: The typical DC grid No. 1 voltage of -35 V can be obtained by a grid resistor, other self-bias, fixed-bias, or through a 10,000-ohm resistor. The typical DC grid No. 2 voltage of 200 V can be obtained from a separate source, from the plate-voltage supply with a voltage divider, or through a 15,000-ohm series resistor.

In some compiled tables, the maximum ratings for plate-modulated service (such as a maximum plate voltage of 275 V, plate dissipation of 7.0 W, and screen input of 2.0 W) are listed alongside typical operating conditions for unmodulated Class C telegraphy (such as a plate supply of 350 V, plate current of 50 mA, and power output of 9.0 W).

High-Frequency Operation and Derating

When operating the 1613 at high frequencies, the maximum ratings for plate voltage and plate input must be reduced to prevent overheating and damage. The following table outlines the required percentage of maximum rated plate voltage and plate input for different frequencies:

Frequency	Plate-Modulated Class C	Unmodulated Class C
Up to 45 Mc	100%	100%
At 60 Mc	90%	90%
At 90 Mc	85%	85%

At these elevated frequencies, special attention must be given to providing adequate ventilation of the tube's bulb to ensure reliable operation and maintain the longevity of the device.

Technical Summary

The **1613** is a versatile, metal-shell, heater-cathode type power pentode designed for Class C RF power amplification, oscillation, and crystal oscillator service. Operating with a 6.3 V, 0.7 A heater, it features a transconductance of 2500 micromhos and very low grid-to-plate capacitance (0.26 μF). It is capable of delivering approximately 6 watts of RF power output in plate-modulated Class C service (at 275 V plate voltage) and up to 9 watts in unmodulated Class C telegraphy (at 350 V plate voltage). The tube is fully rated up to 45 megacycles and can be operated up to 90 megacycles with appropriate derating of plate voltage and input power.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1950 General Electric Transmitting Types

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

1950 GENERAL ELECTRIC TRANSMITTING TYPES

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum plate current	50 mA	ClassC
Maximum grid current	5 mA	ClassC
Maximum operating frequency	45 MHz	Published datasheet value



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1956 RCA Transmitting Tubes

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

1956 RCA TRANSMITTING TUBES

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate/Inverse Voltage	400 V	Source rating
Maximum Plate Dissipation	10 W	—



1960 RCA Industrial and Communications Types

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

1960 RCA INDUSTRIAL AND COMMUNICATIONS TYPES

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	275 V	ClassC;Telegraphy
Screen supply	200 V	ClassC;Telegraphy
Grid bias	-35 V	ClassC;Telegraphy
Screen current	10 mA	ClassC;Telegraphy
Plate current	50 mA	ClassC;Telegraphy
Power output	9 W	ClassC;Telegraphy
Plate voltage	375 V	ClassC;Telephony
Grid bias	-50 V	ClassC;Telephony
Plate current	93 mA	ClassC;Telephony
Power output	24.5 W	ClassC;Telephony

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