



ELECTRONIC TUBE REFERENCE

15D1

Voltage Radio Detector Converter electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

HEPTODE

Heptode frequency changer for superheterodyne receiver service. Its multi-grid structure integrates local oscillation and mixing, converting incoming radio-frequency signals to the receiver intermediate frequency within a single valve.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	8
NOMINAL HEATER	13 V / 200 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Heptode	
PLATE RESISTANCE	360000 Ω
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	100 V
<i>Brimar 15D1 octal heptode frequency changer for receiver oscillator/mixer, heater 13 V 0.20 A. Typical plate 250 V at 3.5 mA, screen (grids 3 and 5) 100 V at 2.7 mA, oscillator anode (grid 2) 200 V at 4.0 mA, mixer control grid 4 bias -3 V, oscillator grid 1 resistor 50 kΩ, grid current 0.4 mA. Approximate anode resistance 360 kΩ. Conversion conductance 0.55 mA/V is not intrinsic static gm. These voltage values are operating conditions, not independently verified absolute maximum limits. Brimar cross-references 6A8G.</i>	

15D1 — Heptode Frequency Changer

An indirectly heated heptode frequency changer designed for superheterodyne radio receivers, featuring a seven-pin English base and a top-cap control grid.

Overview

The **15D1** is a multi-grid vacuum tube designed primarily for frequency changer (mixer-oscillator) service in radio receivers. It belongs to a family of heptode frequency changers that includes the **15A2** and **15D2**. These three types share identical physical dimensions, electrode structures, and base configurations, but are distinguished by their heater ratings.

The 15D1 is classified as a replacement type. Its electrical characteristics and operating parameters correspond to those of the widely used **6A8G** heptode. The multi-grid design allows the tube to simultaneously perform the functions of a local oscillator and a mixer, combining the incoming radio-frequency signal with the locally generated oscillation to produce an intermediate frequency.

Construction, Physical Dimensions, and Heater

The 15D1 is constructed with a glass envelope featuring a top cap for the control grid connection. The physical dimensions of the tube are characterized by a maximum diameter of **1 9/16 inches** and a maximum overall height of **3 7/8 inches**.

The tube utilizes an indirectly heated, unipotential cathode. The heater is designed for series-string or specific voltage supply configurations. The heater characteristics of the 15D1, alongside its family relatives, are detailed below:

Tube Type	Heater Voltage	Heater Current
15A2	4.0 V	0.65 A
15D1	13.0 V	0.2 A
15D2	13.0 V	0.15 A

The 15D1 requires a nominal heater supply of **13.0 V** at a current of **0.2 A**, representing a heater power consumption of **2.6 W** (calculated as 13.0 V multiplied by 0.2 A).

Base Configuration and Pin Connections

The 15D1 utilizes a 7-pin **English Base** (often referred to as a British 7-pin base) with a top cap. The electrode connections are assigned as follows:

- **Pin 1:** Oscillator Anode (*g2*)
- **Pin 2:** Oscillator Grid (*g1*)
- **Pin 3:** Screen Grid (*g3, g5*)
- **Pin 4:** Heater (*h*)
- **Pin 5:** Heater (*h*)
- **Pin 6:** Cathode (*k*)
- **Pin 7:** Anode (*a*)
- **Top Cap (TC):** Control Grid (*g4*)

In this heptode structure, the screen grids (g_3 and g_5) are internally connected to each other and share a single pin connection. The control grid (g_4) is brought out to the top cap to minimize parasitic capacitances and improve isolation between the input signal and the oscillator/anode circuits.

Electrical Characteristics and Operating Points

The typical operating conditions for the 15D1 as a heptode frequency changer are established at an anode voltage of 250 V. Under these conditions, the tube operates with the following parameters:

Parameter	Value
Anode Voltage (V_a)	250 V
Anode Current (I_a)	3.5 mA
Screen Grid (g_3, g_5) Voltage	100 V
Screen Grid Current (I_{g3+g5})	2.7 mA
Oscillator Anode (g_2) Voltage	200 V
Oscillator Anode Current ($I_{[g2]}(/tubes/G2)$)	4.0 mA
Control Grid (g_4) Voltage	-3 V
Oscillator Grid (g_1) Resistor	50,000 Ω
Oscillator Grid Current (I_{g1})	0.4 mA
Anode Impedance (r_p)	0.36 M Ω
Conversion Conductance (g_c)	0.55 mA/V (550 μ mhos)

Circuit Function and Electrode Operation

The heptode structure of the 15D1 operates by modulating the electron stream with two separate signals:

- 1. Local Oscillator Section:** The cathode, the oscillator grid (g_1), and the oscillator anode (g_2) function as the triode elements of a local oscillator. The oscillator grid is operated with a **50,000 Ω** grid leak resistor, producing a typical grid current of **0.4 mA** under oscillation.
- 2. Mixer Section:** The modulated electron stream passes through the screen grid (g_3), which acts as an electrostatic shield. The incoming RF signal is applied to the control grid (g_4) via the top cap, which is biased at **-3 V**. This further modulates the electron stream.
- 3. Output:** The second screen grid (g_5) provides additional shielding before the electrons reach the main plate (anode), which operates at **250 V** with a typical current of **3.5 mA**. The resulting plate current contains the mix products, from which the intermediate frequency is extracted.

The conversion conductance, which measures the efficiency of the frequency translation, is **0.55 mA/V** under these standard operating conditions. The plate impedance of the mixer section is relatively high at

0.36 MΩ, which is typical for heptode structures.

Related Designations and Equivalents

The 15D1 is electrically equivalent to the [6A8G](#) heptode frequency changer. For detailed characteristic curves, multi-band receiver design considerations, and automatic volume control (AVC) bias characteristics, reference is made to the standard documentation for the [6A8G](#).

While the 15D1 shares its electrical characteristics with the [15A2](#) and [15D2](#), they are not direct drop-in replacements for one another due to their different heater voltage and current requirements. Any substitution between these types requires modification of the receiver's heater supply circuit.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1948 Brimar Radio Valve Manual

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

1948 BRIMAR RADIO VALVE MANUAL

Section 1 · Heptode

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Service	Frequency changer	—