



ELECTRONIC TUBE REFERENCE

11A2

Voltage - Triode (with diode, heptode or hexode) electronic tube

CONSOLIDATED TECHNICAL
DATA

3 SECTIONS

CONSTRUCTION

DIODE-DIODE-TRIODE

Double-diode triode for combined detector and audio-frequency voltage-amplifier service in radio receivers. Two diodes perform detection and related rectification while the triode provides subsequent signal amplification.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	4 V / 1 A	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Diode

No fixed ratings recorded.

Representative of the two diode sections.

SECTION2 Diode

No fixed ratings recorded.

Physical diode section added in approved section-structure reconciliation.

SECTION3 Triode	
PLATE RESISTANCE	18000 Ω
TRANSCONDUCTANCE	0.0028 S
AMPLIFICATION FACTOR	50
<i>Triode section.</i>	

11A2 — Double Diode Triode Vacuum Tube

An English-base, indirectly heated double diode triode vacuum tube designed for detector, automatic volume control (AVC), and audio voltage amplifier service.

Overview

The **11A2** is a multi-unit vacuum tube containing two diodes and a single triode in a single envelope, sharing a common cathode. Classified as a replacement type and cataloged by Brimar, this tube is designed with a classic English base and an external top cap connection for the triode grid. It is primarily utilized in receiver circuits where demodulation, automatic volume control, and low-frequency voltage amplification are combined in a single stage.

Physical Construction and Base Pinout

The 11A2 features a shouldered glass envelope with a maximum outer diameter of 1 9/16 inches and a maximum overall height of 3 13/16 inches. The tube is fitted with a standard English 7-pin base and a metal top cap at the apex of the bulb.

The top cap provides the electrical connection for the triode's control grid, which helps minimize parasitic capacitance and coupling to other electrodes. The internal structure consists of a single heater and a common cathode sleeve that serves both the triode section and the two independent diode anodes.

The pin connections, viewed from the bottom of the English 7-pin base, are configured as follows:

- **Pin 1:** Diode 1 Anode (D1)
- **Pin 2:** No Connection (NC)
- **Pin 3:** Triode Anode (A)
- **Pin 4:** Common Cathode (C)
- **Pin 5:** Heater (H)
- **Pin 6:** Heater (H)
- **Pin 7:** Diode 2 Anode (D2)
- **Top Cap (CAP):** Triode Grid (G)

Heater and Electrical Characteristics

The 11A2 is designed for operation with a 4.0-volt heater supply, drawing a nominal current of 1.0 ampere. This represents a heater power consumption of 4.0 watts (calculated as 4.0 V multiplied by 1.0 A).

Triode Section Operating Point

Under typical Class A1 amplifier operating conditions, the triode section exhibits the following characteristics:

- **Anode Voltage:** 200 V
- **Grid Voltage:** -2 V
- **Anode Current:** 3.0 mA
- **Cathode Bias Resistor:** 600 ohms
- **Anode Impedance (Plate Resistance):** 18,000 ohms
- **Mutual Conductance (Transconductance):** 2.8 mA/V
- **Amplification Factor (μ):** 50

Technical Analysis of Characteristics

The fundamental triode relationship relates the amplification factor (μ), mutual conductance (g_m), and anode impedance (r_p):

$$\mu \approx g_m \times r_p$$

Using the published typical values for the 11A2 as inputs for this calculation:

$$0.0028 \text{ A/V} \times 18,000 \text{ ohms} = 50.4$$

This calculated value closely aligns with the specified nominal amplification factor of 50.

Additionally, the self-bias configuration can be analyzed. With a specified cathode bias resistor of 600 ohms and a typical anode current of 3.0 mA, the voltage drop across the resistor is calculated as:

$$0.003 \text{ A} \times 600 \text{ ohms} = 1.8 \text{ V}$$

This calculated bias voltage of 1.8 V is highly consistent with the nominal grid operating bias of -2 V, with the small difference attributable to nominal rounding or minor contact potential.

Circuit Applications

The integration of two independent diodes and a high- μ triode sharing a common cathode makes the 11A2 highly suited for the standard detector and first-audio stages of superheterodyne radio receivers:

- **Diode Detection:** One diode anode (D1) is typically configured as a half-wave diode detector to demodulate the incoming intermediate frequency (IF) signal into an audio signal.
- **Automatic Volume Control (AVC):** The second diode anode (D2) can be utilized to derive a negative DC control voltage proportional to the carrier signal strength, which is fed back to the preceding RF

or IF stages to regulate gain.

- **Audio Preamplification:** The triode section, featuring a moderate-to-high amplification factor of 50, serves as the first voltage amplifier stage, boosting the demodulated audio signal before it is sent to the power output stage.

Technical Summary

The Brimar 11A2 is an English-base double diode triode designed for replacement service in legacy receivers. Operating with a 4.0 V, 1.0 A heater, it provides a compact, single-envelope solution for detection, AVC, and voltage amplification. Its triode section offers a high amplification factor of 50 combined with a transconductance of 2.8 mA/V at an anode potential of 200 V, making it an efficient and versatile component in classic receiver architectures.

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 3 · Triode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Anode Voltage	200 V	—
Anode Current	3 mA	—
Grid Voltage	-2 V	—
Cathode Bias Resistor	600 ohm	—