



## ELECTRONIC TUBE REFERENCE

## 12BC32

Voltage - Dual Triode (similar) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

TRIODE-TRIODE

Indirectly heated triode for general electronic service. Available source material confirms triode construction without establishing a narrower functional application confidently.

## GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | —                 | BASE PINS            | —             |
| NOMINAL HEATER      | 12.6 V / 150 mA   | PARALLEL HEATER      | — / —         |
| HEATING             | Indirect          | SERIES OPERATION     | Not specified |
| CATHODE ARRANGEMENT | Separate cathodes | SECTION CONSTRUCTION | Similar       |

## SECTION RATINGS

|                                                                                                                                      |                |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------|
| SECTION1 Triode                                                                                                                      |                |
| PLATE RESISTANCE                                                                                                                     | 62500 $\Omega$ |
| TRANSCONDUCTANCE                                                                                                                     | 0.00155 S      |
| AMPLIFICATION FACTOR                                                                                                                 | 100            |
| MAXIMUM PLATE VOLTAGE                                                                                                                | 300 V          |
| <i>Published ratings and characteristics promoted where clearly stated; identical repeated sections compressed where applicable.</i> |                |

|                                                                             |                |
|-----------------------------------------------------------------------------|----------------|
| SECTION2 Triode                                                             |                |
| PLATE RESISTANCE                                                            | 62500 $\Omega$ |
| TRANSCONDUCTANCE                                                            | 0.00155 S      |
| AMPLIFICATION FACTOR                                                        | 100            |
| MAXIMUM PLATE VOLTAGE                                                       | 300 V          |
| <i>Second physical triode section; electrically identical twin section.</i> |                |

# 12BC32 — Twin Diode-AF Triode Vacuum Tube

*An indirectly heated multi-unit miniature tube combining a high-mu triode and two independent diodes, designed for RF rectification, audio-frequency voltage amplification, and resistance-coupled amplifier applications.*

## Overview

The **12BC32** is a multi-unit vacuum tube containing a high-gain triode and two diode units within a single compact envelope. The tube is designed for versatile service in radio receivers and audio preamplifiers, where it can simultaneously perform detection, automatic volume control (AVC) or RF rectification, and audio-frequency (AF) voltage amplification.

The physical dimensions of the 12BC32 are highly compact, featuring a maximum diameter of **19 mm** and a maximum overall length of **57 mm**. It utilizes a 7-pin miniature base configuration, allowing for space-saving circuit layouts. The triode and both diode units share a single, common indirectly heated cathode, which simplifies biasing and wiring in typical detector-amplifier configurations.

## Heater and Base Configuration

The 12BC32 features an indirectly heated, coated unipotential cathode. The heater is designed for series or parallel operation with a nominal voltage of **12.6 V** and a current draw of **150 mA**.

## Heater Specifications

- **Nominal Heater Voltage ( $U_f$ ):** 12.6 V
- **Nominal Heater Current ( $I_f$ ):** 150 mA
- **Calculated Heater Power Consumption:** 1.89 W
- **Maximum Heater Voltage ( $U_{f\text{ max}}$ ):** 14 V
- **Minimum Heater Voltage ( $U_{f\text{ min}}$ ):** >11.4 V

## Pin Connection Diagram

The tube utilizes a 7-pin base layout. Viewed from the bottom of the tube, the pin assignments are as follows:

| Pin Number | Electrode Connection                                   |
|------------|--------------------------------------------------------|
| 1          | Grid ( $g_1$ ) — Triode Control Grid                   |
| 2          | Cathode ( $k$ ) — Common Cathode for Triode and Diodes |
| 3          | Heater ( $f$ )                                         |
| 4          | Heater ( $f$ )                                         |

| Pin Number | Electrode Connection                          |
|------------|-----------------------------------------------|
| 5          | Diode II ( $d_{II}$ ) — Anode of Second Diode |
| 6          | Diode I ( $d_I$ ) — Anode of First Diode      |
| 7          | Anode ( $a$ ) — Triode Plate                  |

The common cathode structure means that the triode and both diodes are referenced to the same cathode potential, which must be considered when designing bias networks.

## Electrical Characteristics and Static Operating Points

The 12BC32 combines a high- $\mu$  triode section with two low-current diode sections. The static characteristics of each section under nominal conditions are detailed below.

### Triode Section Static Characteristics

At a typical operating point, the triode exhibits a very high amplification factor ( $\mu = 100$ ), making it highly suitable for high-gain voltage preamplification.

- **Anode Voltage ( $U_a$ ):** 100 V
- **Grid Voltage ( $U_{g1}$ ):** -1 V
- **Anode Current ( $I_a$ ):** 0.5 mA
- **Transconductance ( $S$ ):** 1.25 mA/V (1,250  $\mu$ mhos)
- **Amplification Factor ( $\mu$ ):** 100
- **Internal Plate Resistance ( $R_i$ ):** 80 k $\Omega$

*Calculation Verification:* The fundamental triode relationship  $\mu = S \times R_i$  is confirmed by the static parameters:  $1.25 \text{ mA/V} \times 80 \text{ k}\Omega = 100$  The static plate dissipation at this operating point is calculated as:  $100 \text{ V} \times 0.5 \text{ mA} = 0.05 \text{ W}$  This is well within the maximum plate dissipation rating of 0.5 W.

### Diode Section Static Characteristics

The diode units are designed for low-current signal detection and rectification.

- **Diode Voltage ( $U_d$ ):** 4 V
- **Diode Current ( $I_d$ ):** >0.15 mA

### Interelectrode Capacitances

The internal capacitances of the 12BC32 determine its performance at high frequencies and its susceptibility to crosstalk between the diode and triode sections:

- **Grid 1 Capacitance ( $C_{g1}$ ):** 2 pF
- **Anode Capacitance ( $C_a$ ):** 0.65 pF
- **Anode-to-Grid 1 Capacitance ( $C_{a/g1}$ ):** 2 pF

- **Diode-to-Grid 1 Capacitance ( $C_{d/g1}$ ):** <0.04 pF
- **Diode-to-Cathode Capacitance ( $C_{d/k}$ ):** <1.2 pF

The extremely low diode-to-grid capacitance ( $C_{d/g1} < 0.04$  pF) minimizes unwanted RF signal leakage from the detector circuit into the high-gain audio triode grid.

## AF Resistance-Coupled Amplifier Operation

The 12BC32 is highly optimized for resistance-coupled audio-frequency voltage amplification. The operating characteristics are documented for three distinct circuit configurations, utilizing either a 180 V or 300 V anode supply.

In these configurations, the grid bias ( $U_{g1}$ ) can be produced via a grid leak resistor ( $R'_{g1}$ ) of high value, which utilizes the small grid current to establish a negative bias.

| Parameter                                                  | Case 1          | Case 2          | Case 3          |
|------------------------------------------------------------|-----------------|-----------------|-----------------|
| <b>Anode Supply Voltage (<math>U_b</math>)</b>             | 180 V           | 300 V           | 300 V           |
| <b>Anode Load Resistor (<math>R_a</math>)</b>              | 0.22 M $\Omega$ | 0.22 M $\Omega$ | 0.47 M $\Omega$ |
| <b>Cathode Resistor (<math>R_k</math>)</b>                 | 3.9 k $\Omega$  | 3.1 k $\Omega$  | 5.9 k $\Omega$  |
| <b>Following Stage Grid Resistor (<math>R_{g1}</math>)</b> | 1 M $\Omega$    | 1 M $\Omega$    | 1 M $\Omega$    |
| <b>Grid Leak Resistor (<math>R'_{g1}</math>)</b>           | 1 M $\Omega$    | 1 M $\Omega$    | 2.2 M $\Omega$  |
| <b>Cathode Bypass Capacitor (<math>C_k</math>)</b>         | 1.8 $\mu$ F     | 2.1 $\mu$ F     | 1.1 $\mu$ F     |
| <b>Coupling Capacitor (<math>C_v</math>)</b>               | 3 nF (3 kpF)    | 3 nF (3 kpF)    | 2 nF (2 kpF)    |
| <b>Peak AC Output Voltage (<math>U_{a\sim sp}</math>)</b>  | 39 V            | 79 V            | 92 V            |
| <b>Voltage Gain (<math>V</math>)</b>                       | 63              | 68              | 75              |

These operating points demonstrate that by increasing the anode supply voltage from 180 V to 300 V, the peak AC output voltage capability more than doubles (from 39 V to 79 V) while maintaining a high voltage gain of 68. Increasing the anode load resistor to 0.47 M $\Omega$  in Case 3 further optimizes the stage, yielding a maximum voltage gain of 75 and a peak output voltage of 92 V.

# Maximum Ratings

To ensure reliable operation and prevent premature tube failure, circuit designs must respect the absolute maximum ratings established for both the triode and diode sections of the 12BC32.

## Triode Section Maximum Ratings

- **Maximum Cold Anode Voltage ( $U_{a0}$ ):** 500 V
- **Maximum Anode Voltage ( $U_a$ ):** 330 V
- **Maximum Anode Dissipation ( $W_a$ ):** 0.5 W
- **Maximum Positive Grid Voltage ( $+U_{g1}$ ):** 0 V
- **Maximum Negative Grid Voltage ( $-U_{g1}$ ):** -50 V
- **Maximum Grid Resistor ( $R_{g1}$ ):** 3 M $\Omega$
- **Maximum Grid Leak Resistor ( $R'_{g1}$ ):** 10 M $\Omega$  (when bias is produced by  $R'_{g1}$ )
- **Maximum Cathode-to-Heater Resistance ( $R_{k/f}$ ):** 20 k $\Omega$
- **Maximum Cathode-to-Heater Voltage ( $U_{k/f}$ ):** 150 V
- **Maximum Cathode Current ( $I_k$ ):** 8 mA

## Diode Section Maximum Ratings

- **Maximum Peak Inverse Diode Voltage ( $U_{d\text{ sp}}$ ):** 90 V
- **Maximum Continuous Diode Current ( $I_d$ ):** 1 mA
- **Maximum Peak Diode Current ( $I_{d\text{ sp}}$ ):** 6 mA

## Technical Summary

The **12BC32** is a compact, 7-pin miniature **twin diode-AF triode** vacuum tube designed for multi-functional service in radio receivers and audio preamplifiers. It features a **12.6 V, 150 mA** heater and a shared cathode structure.

The triode section is characterized by a high amplification factor of **100**, a transconductance of **1.25 mA/V**, and an internal plate resistance of **80 k $\Omega$**  under static conditions. In resistance-coupled amplifier circuits, the triode delivers high voltage gains ranging from **63 to 75**, with peak output voltage capabilities up to **92 V**.

The dual diode sections are rated for a maximum continuous current of **1 mA** and a peak current of **6 mA**, with a peak inverse voltage rating of **90 V**. With its low interelectrode capacitances, particularly the minimized diode-to-grid capacitance of less than **0.04 pF**, the 12BC32 provides an efficient, low-noise solution for combined signal detection, AVC generation, and high-gain voltage amplification in a single envelope.

## SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

# 1969 Tesla Manual of Electronic Tubes

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

## 1969 TESLA MANUAL OF ELECTRONIC TUBES

## Section 1 · Triode

| CHARACTERISTICS  |                 |                                    |
|------------------|-----------------|------------------------------------|
| PARAMETER        | PUBLISHED VALUE | CONDITION / NOTE                   |
| Heater voltage   | 12.6 V          | Published nominal value            |
| Heater current   | 150 mA          | Published nominal value            |
| Transconductance | 1550 $\mu$ S    | Published operating characteristic |

## TUBE TINKER

An independent reference for electronic tubes, vacuum tubes,  
and their source documents.

[Catalog](#)   [Tube types](#)   [Full books](#)   [Blog](#)   [Feedback & corrections](#)

© 2026 Tube Tinker