

ELECTRONIC TUBE REFERENCE

12AC10A

Voltage - Triple Triode electronic tube

CONSOLIDATED TECHNICAL DATA
3 SECTIONS
CONSTRUCTION
TRIODE-TRIODE-TRIODE

High-mu triple triode for color-difference matrixing circuits in color television receivers.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12FE	BASE PINS	12
NOMINAL HEATER	12.6 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Triode	
PLATE RESISTANCE	10700 Ω
TRANSCONDUCTANCE	0.0058 S
AMPLIFICATION FACTOR	62
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	2 W
Representative row for three electrically identical triodes.	

SECTION2 Triode	
PLATE RESISTANCE	10700 Ω
TRANSCONDUCTANCE	0.0058 S
AMPLIFICATION FACTOR	62
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	2 W
Second identical physical triode section; added to align rows with SectionCount.	

SECTION3 Triode	
PLATE RESISTANCE	10700 Ω
TRANSCONDUCTANCE	0.0058 S
AMPLIFICATION FACTOR	62
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	2 W
Third identical physical triode section; added to align rows with SectionCount.	

12AC10A — High-Mu Triple Triode Compactron

The **12AC10A** (also designated as **12AC10-A**) is a multi-unit vacuum tube of the compactron family containing three high-mu triodes in a single glass envelope. It is designed primarily for use in the matrixing (color-difference) circuits of color television receivers. The three independent triode sections provide high gain and improved linearity, making the device well-suited for voltage amplification and signal processing in television receiver designs.

Construction, Heater, and Base Connections

The 12AC10A is constructed in a T-9 glass envelope with a button 12-pin duodecar base (E12-70 base, EIA 12-56 outline). The tube features three electrically independent triode sections, each utilizing a coated unipotential cathode. The physical design allows the tube to be mounted and operated in any position.

Heater Characteristics

The heater of the 12AC10A is designed for series or parallel operation, with controlled warm-up characteristics to ensure reliable performance in television receiver circuits. The heater specifications are as follows:

Parameter	Value	Unit
Heater Voltage (AC or DC)	12.5 to 12.6	V

Parameter	Value	Unit
Heater Current	0.3 ± 0.02	A
Average Heater Warm-up Time	11	s

The average heater warm-up time is defined under specific test conditions: the time required for the voltage across the heater to reach 80 percent of its nominal value when four times the nominal heater voltage is applied to a circuit consisting of the heater in series with a resistance equal to three times the nominal heater voltage divided by the nominal heater current.

Heater-Cathode Voltage Ratings

To prevent insulation breakdown between the heater and the individual cathodes, the following maximum voltage limits must be observed:

- **Heater Positive with Respect to Cathode:**
 - DC Component: 100 V maximum
 - Total DC and Peak: 200 V maximum
- **Heater Negative with Respect to Cathode:**
 - Total DC and Peak: 200 V maximum

Terminal Connections and Basing

The 12AC10A uses the **12FE** basing diagram. The pin connections, viewed from the bottom of the tube, are assigned as follows:

Pin Number	Connection
Pin 1	Heater
Pin 2	Plate (Section 3)
Pin 3	Cathode (Section 3)
Pin 4	Cathode (Section 1)
Pin 5	Plate (Section 2)
Pin 6	Cathode (Section 2)
Pin 7	Grid (Section 2)
Pin 8	No Connection
Pin 9	Grid (Section 1)
Pin 10	Plate (Section 1)
Pin 11	Grid (Section 3)

Pin Number	Connection
Pin 12	Heater

Physical Dimensions

The physical envelope of the 12AC10A conforms to the T-9 glass bulb specification with the following dimensional limits:

- **Maximum Diameter:** 1.188 inches
- **Minimum Diameter:** 1.062 inches
- **Maximum Over-all Length:** 1.875 inches
- **Maximum Seated Height:** 1.500 inches
- **Minimum Seated Height:** 1.250 inches

Electrical Characteristics and Typical Operation

Each of the three triode sections in the 12AC10A exhibits identical electrical characteristics. Under typical Class A1 amplifier operating conditions, each section operates with the following parameters:

Parameter	Value	Unit
Plate Voltage	200	V
Cathode-Bias Resistor	150	ohms
Amplification Factor	62	
Plate Resistance (approximate)	10,700	ohms
Transconductance	5,800	micromhos
Plate Current	9.0	mA
Grid Voltage (approximate, for plate current of 100 microamperes)	-5	V

Direct Interelectrode Capacitances

The direct interelectrode capacitances vary slightly between the three sections due to internal physical layout. These values are measured without an external shield:

Capacitance Parameter	Section 1	Section 2	Section 3	Unit
Grid to Plate (g to p)	1.3	1.2	1.2	pF
Input: g to (h + k)	2.4	2.6	2.6	pF
Output: p to (h + k)	0.22	0.30	0.44	pF

Maximum Ratings

The maximum ratings of the 12AC10A are established under the Design-Maximum System. These ratings are limiting values of operating and environmental conditions that should not be exceeded under the worst probable conditions in a bogey tube.

Rating (Each Section)	Value	Unit
Plate Voltage	330	V
Plate Dissipation	2.0	W
Grid-Circuit Resistance	0.5	megohms

Characteristic Curves and Interpretation

The performance of each triode section in the 12AC10A can be analyzed through its characteristic curves:

- Average Plate Characteristics:** The plate current versus plate voltage curves demonstrate the behavior of the tube under various grid bias voltages. At zero grid bias, the plate current rises rapidly with plate voltage, reflecting the high transconductance of 5,800 micromhos. As the grid bias becomes more negative (down to -8 V), the curves shift to the right, showing the typical triode cutoff behavior. Positive grid region curves (up to +8 V) show the onset of grid current, which is depicted by dashed lines.
- Average Transfer Characteristics:** The transfer curves plot plate current against grid voltage for various plate voltages (50 V to 300 V). These curves illustrate the high amplification factor of 62 and show that the grid voltage required to cut off plate current to approximately 100 microamperes is around -5 V when the plate voltage is 200 V.
- Dynamic Characteristics:** The curves for amplification factor, plate resistance, and transconductance plotted against plate current show that the amplification factor remains relatively stable between 55 and 65 over a wide range of plate currents (from 5 mA to 20 mA). In contrast, the transconductance increases and the plate resistance decreases as the plate current is increased, which is typical for high-mu triodes.

Related Designations

The 12AC10A is part of a family of high-mu triple triodes that includes the **6AC10** and the **8AC10**. These three types are electrically identical in their triode characteristics, maximum ratings, and physical dimensions, differing only in their heater ratings:

- **6AC10**: Designed for standard parallel heater circuits, requiring a heater voltage of **6.3 V** and a heater current of **0.6 A**.
- **8AC10**: Designed for series-string heater circuits, requiring a heater voltage of **8.4 V** and a heater current of **0.45 A**.
- **12AC10A**: Designed for series-string heater circuits, requiring a heater voltage of **12.5 V** or **12.6 V** and a heater current of **0.3 A**.

All three types share the same average heater warm-up time of 11 seconds, allowing them to be used in television receivers with series-connected heater strings where controlled warm-up is critical to prevent voltage surges across individual heaters.

Technical Summary

The **12AC10A** is a **12-pin duodecar compactron** containing **three high-mu triodes** with independent coated unipotential cathodes. Operating from a **12.5 V / 12.6 V, 0.3 A** heater supply with an average **11-second warm-up time**, it is optimized for series-string television receiver applications. Each triode section provides an amplification factor of **62**, a transconductance of **5,800 micromhos**, and a plate resistance of approximately **10,700 ohms** under typical Class A1 operating conditions. With a maximum plate voltage rating of **330 V** and a plate dissipation limit of **2.0 W** per section, the 12AC10A is a robust and compact solution for color-difference matrixing and general voltage amplification in television circuitry.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	-55611 V	—
Plate Voltage	-55611 V	—
Plate Current	-65611 mA	—
Transconductance	5 uS	—
Transconductance	25000 uS	—
Amplification Factor	62	—
Amplification Factor	62	—
Amplification Factor	20000	—
Plate Resistance	10 ohm	—
Grid Voltage	1 V	—
Grid Voltage	-55611 V	—
Plate Voltage	200 V	EachSection
Cathode Bias Resistance	150 ohm	EachSection

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
GridtoPlateCapacitance	1.2 pF	—
Input Capacitance	2.6 pF	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	9 mA	EachSection



SOURCE OPERATING CONDITIONS

SOURCE PDF

1975 RCA RC30

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

1975 RCA RC30
Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	200 V	ClassA
Cathode-bias resistor	160 ohm	ClassA
Plate current	9 mA	ClassA

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