

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

14N7

2 SECTIONS

CONSTRUCTION

Voltage - Dual Triode (similar) electronic tube

TRIODE-TRIODE

Twin low-mu triode with a 12.6 V heater, intended for phase-inverter and voltage-amplifier service; its two sections provide the characteristics of the related 7N7 family.

GENERAL CHARACTERISTICS

BASE DESIGNATION	8AC	BASE PINS	8
NOMINAL HEATER	12.6 V / 300 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Triode	
PLATE RESISTANCE	7700 Ω
TRANSCONDUCTANCE	0.0026 S
AMPLIFICATION FACTOR	20
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
Promoted from clearly identified printed ratings/characteristics; additional published operating points and capacitances retained in TUBE_SECTION_PARAMETER.	

SECTION2 Triode	
PLATE RESISTANCE	7700 Ω
TRANSCONDUCTANCE	0.0026 S
AMPLIFICATION FACTOR	20
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
Second identical physical triode section; added to align rows with SectionCount.	

14N7 — Medium-Mu Twin Triode Vacuum Tube

Overview

The **14N7** is a loctal (lock-in) double triode vacuum tube designed for use as a voltage amplifier or phase inverter. It contains two independent triode sections within a single T-9 glass envelope, sharing a common heater but having separate cathode, grid, and plate connections for each section. The tube is characterized by its lock-in construction, which provides robust mechanical support and secure retention in its socket, making it suitable for applications requiring high reliability.

The 14N7 is closely related to the [7N7](#); the two types share identical electrical characteristics, ratings, and physical dimensions, differing only in their heater ratings. While the [7N7](#) operates with a 6.3 V heater, the 14N7 is designed for a nominal **12.6 V** heater supply, making it suitable for series-string heater circuits or equipment with higher-voltage supply rails.

Construction, Heater, and Base Configuration

The 14N7 features an indirectly heated, coated unipotential cathode structure. The two triode units are electrically independent, allowing them to be operated in separate circuits or cascaded stages, provided that the heater-to-cathode voltage limits are not exceeded.

The tube is housed in a T-9 glass bulb with an 8-pin lock-in (loctal) base, designated as the **8AC** basing arrangement. The physical dimensions of the tube are as follows:

- **Maximum overall length:** 3-5/32 inches
- **Maximum seated height:** 2-5/8 inches
- **Maximum bulb diameter:** 1-9/32 inches
- **Maximum base diameter:** 1-3/16 inches

The tube can be mounted and operated in **any position**.

The 8AC base connections, viewed from the bottom of the tube, are assigned as follows:

- **Pin 1:** Heater
- **Pin 2:** Grid (Triode II)

- **Pin 3:** Plate (Triode II)
- **Pin 4:** Cathode (Triode II)
- **Pin 5:** Cathode (Triode I)
- **Pin 6:** Plate (Triode I)
- **Pin 7:** Grid (Triode I)
- **Pin 8:** Heater

Heater Characteristics

The heater is designed for either AC or DC operation. The electrical specifications for the heater of the 14N7, compared with the 7N7, are:

Parameter	14N7 Value	<u>7N7</u> Value
Heater Voltage	12.6 V	6.3 V
Heater Current	0.3 A (300 mA)	0.6 A (600 mA)
Calculated Heater Power	3.78 W	3.78 W

The calculated heater power for both tubes is identical ($12.6 \text{ V} * 0.3 \text{ A} = 3.78 \text{ W}$ and $6.3 \text{ V} * 0.6 \text{ A} = 3.78 \text{ W}$), reflecting their shared internal structure.

Electrical Characteristics and Ratings

The maximum ratings for the 14N7 are interpreted according to the RMA Standard MB-210. These limits represent the absolute boundaries within which the tube must be operated to ensure reliable performance and longevity.

Maximum Ratings (Per Section)

- **Maximum Plate Voltage:** 300 V
- **Maximum Plate Dissipation:** 2.5 W
- **Maximum Heater-Cathode Voltage:** 90 V
- **Minimum Grid Voltage:** 0 V

Typical Class A1 Amplifier Operation

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

Parameter	Operating Point I	Operating Point II
Plate Voltage	90 V	250 V
Grid Voltage	0 V	-8 V
Self-Bias Resistor	0 Ω	900 Ω

Parameter	Operating Point I	Operating Point II
Plate Current	10 mA	9 mA
Plate Resistance (rp)	6,700 Ω	7,700 Ω
Transconductance (gm)	3,000 μmhos	2,600 μmhos
Amplification Factor (mu)	20	20

At these operating points, the relationship between amplification factor, transconductance, and plate resistance is maintained according to the standard triode formula: $\mu = g_m \times r_p$. For Operating Point II, this is illustrated by: $0.0026 \text{ S} \times 7,700 \Omega = 20.02$, which closely matches the nominal amplification factor of 20.

Phase Inverter Operation

The 14N7 is specifically designed to function as a phase inverter, utilizing its two independent triode sections to provide balanced, out-of-phase signals. Typical operating conditions for phase inverter service are documented at two different plate supply voltages:

Parameter	Low-Voltage Option	High-Voltage Option
Plate Supply Voltage	100 V	250 V
Grid Voltage	-2.25 V	-5.5 V
Plate Resistor	30,000 Ω	50,000 Ω
Self-Bias Resistor	750 Ω	1,150 Ω
Maximum Output Voltage (RMS)	20 V	65 V

These operating points demonstrate that with a higher plate supply voltage of 250 V and a larger plate load resistor of 50,000 Ω , the stage can deliver a significantly higher maximum output voltage of 65 V RMS compared to the 20 V RMS achieved with a 100 V supply.

Interelectrode Capacitances

Direct interelectrode capacitances are measured with an RMA standard shield (#308) connected to the cathode. Because the two triode units are housed in close proximity within the same envelope, small capacitances exist between the sections in addition to the internal capacitances of each individual unit.

Individual Section Capacitances

- **Grid to Plate (G to P):**
 - Triode I: 3.0 pF

- Triode II: 3.0 pF
- **Input (Grid to Heater and Cathode):**
 - Triode I: 3.4 pF
 - Triode II: 2.9 pF
- **Output (Plate to Heater and Cathode):**
 - Triode I: 2.0 pF
 - Triode II: 2.4 pF

Inter-Section Capacitances

- **Grid to Grid (1G to 2G):** 0.4 pF
- **Plate to Plate (1P to 2P):** 0.34 pF
- **Grid to Plate (1G to 2P):** 0.08 pF
- **Grid to Plate (2G to 1P):** 0.06 pF

These small but measurable inter-section capacitances indicate that while the triodes are galvanically isolated, high-frequency signals can couple between the two stages. This must be accounted for in high-gain or high-frequency amplifier designs.

Characteristic Curves and Design Interpretation

The electrical behavior of each section of the 14N7 is illustrated by its characteristic curves, which show the relationship between plate voltage, grid voltage, and plate current.

Plate Characteristics

The plate family of curves plots plate current in milliamperes against plate voltage for various negative grid bias voltages.

- At zero grid bias, the plate current rises steeply with plate voltage, reaching approximately 30 mA at a plate voltage of 160 V.
- As the grid bias is made more negative, the curves shift to the right. For example, at a grid bias of -6 V, a plate voltage of approximately 210 V is required to achieve a plate current of 10 mA.
- The curves are relatively linear and parallel over the typical operating region, indicating low distortion when the tube is operated within its rated limits.

Transfer and Parameter Curves

The transfer characteristics show how plate current, plate resistance, and amplification factor vary with grid voltage at fixed plate voltages of 100 V and 250 V.

- **At Plate Voltage = 100 V:**
 - With grid voltage at 0 V, the plate current is approximately 11 mA, and the plate resistance is at its minimum of about 7,000 Ω .
 - As the grid voltage is made negative, the plate current decreases, and the plate resistance increases. At a grid bias of -5 V, the plate current drops below 1 mA, and the plate resistance rises

sharply toward 50,000 Ω .

- The amplification factor remains remarkably stable near 20 across most of the useful operating range, only dropping slightly as the tube approaches cutoff.
- **At Plate Voltage = 250 V:**
 - At the typical operating bias of -8 V, the plate current is 9 mA, and the plate resistance is approximately 7,700 Ω .
 - Cutoff is reached near a grid bias of -16 V, where the plate current approaches zero and the plate resistance increases rapidly.
 - The amplification factor remains highly constant at approximately 20 throughout the active region, ensuring consistent voltage gain.

Technical Summary

The **14N7** is a loctal-base, medium-mu twin triode vacuum tube designed for voltage amplification and phase inverter service. It features two independent triode sections with separate unipotential cathodes, housed in a T-9 glass envelope with an 8-pin lock-in base (8AC). The 14N7 operates with a **12.6 V, 0.3 A** heater, distinguishing it from its 6.3 V counterpart, the [7N7](#).

Each triode section provides an amplification factor of **20**, a transconductance of **2,600 to 3,000 μmhos** , and a plate resistance of **6,700 to 7,700 Ω** under typical Class A1 operating conditions. With a maximum plate voltage rating of **300 V** and a plate dissipation limit of **2.5 W** per section, the 14N7 offers a reliable and mechanically secure solution for general-purpose audio and low-frequency electronic circuits.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X General Electric Essential Characteristics

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

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA;EachSection
Control-grid voltage	-8 V	ClassA;EachSection
Plate current	9 mA	ClassA;EachSection

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	7700 Ω	EachSection
Transconductance	2600 μS	EachSection
Amplification factor	20	EachSection



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 2 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 2 OF 4

Section 1 · Triode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
GRID TO PLATE: (G TO P)	3 pF	Interelectrode capacitances; published column 1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
GRID TO GRID: (	1 pF	Interelectrode capacitances; published column 1
GRID TO GRID: (	2 pF	Interelectrode capacitances; published column 2
GRID TO GRID: (	0.4 pF	Interelectrode capacitances; published column 3
PLATE TO PLATE: (iP TO	2 pF	Interelectrode capacitances; published column 1
PLATE TO PLATE: (iP TO	0.34 pF	Interelectrode capacitances; published column 2
GRID TO PLATE: (	1 pF	Interelectrode capacitances; published column 1
GRID TO PLATE: (	2 pF	Interelectrode capacitances; published column 2
GRID TO PLATE: (	0.08 pF	Interelectrode capacitances; published column 3
GRID TO PLATE: (	0.06 pF	Interelectrode capacitances; published column 2

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HEATER VOLTAGE	6.3 V	Maximum ratings
MAXIMUM HEATER- CATHODE VOLTAGE	90 V	Maximum ratings
MAXIMUM PLATE VOL TAGS	300 V	Maximum ratings
MINIMUM GRID VOLTAGE	0 V	Maximum ratings
MAXIMUM PLATE DISSIPATION (EACH SECTION)	2.5 W	Maximum ratings
HEATER VOLTAGE	6.3 V	Typical operating conditions; published column 1
HEATER CURRENT	600 mA	Typical operating conditions; published column 1
HEATER CURRENT	60 mA	Typical operating conditions; published column 2
PLATE VOLTAGE	9 V	Typical operating conditions; published column 1
PLATE VOLTAGE	0 V	Typical operating conditions; published column 2

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
PLATE VOLTAGE	25 V	Typical operating conditions; published column 3
GRID VOLTAGE	0 V	Typical operating conditions
SELF-BIAS RESISTOR	0 ohm	Typical operating conditions; published column 1
SELF-BIAS RESISTOR	9 ohm	Typical operating conditions; published column 2
PLATE CURRENT	10 mA	Typical operating conditions; published column 1
PLATE CURRENT	9 mA	Typical operating conditions; published column 2
PLATE RESISTANCE	6 ohm	Typical operating conditions; published column 1
PLATE RESISTANCE	700 ohm	Typical operating conditions; published column 2
PLATE RESISTANCE	7 ohm	Typical operating conditions; published column 3
PLATE SUPPLY VOLTAGE	100 V	Typical operating conditions; published column 1
PLATE SUPPLY VOLTAGE	250 V	Typical operating conditions; published column 2
GRID VOLTAGE	-22 V	Typical operating conditions; published column 1
GRID VOLTAGE	-55 V	Typical operating conditions; published column 2
PLATE RESISTOR	30 ohm	Typical operating conditions; published column 1
PLATE RESISTOR	0 ohm	Typical operating conditions; published column 2
PLATE RESISTOR	50 ohm	Typical operating conditions; published column 3
SELF-BIAS RESISTOR	75 ohm	Typical operating conditions; published column 1
SELF-BIAS RESISTOR	1150 ohm	Typical operating conditions; published column 3
MAXIMUM	0 V	Typical operating conditions; published column 1
MAXIMUM	20 V	Typical operating conditions; published column 2

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MAXIMUM	65 V	Typical operating conditions; published column 3
$E_t =$	6.3 V	Typical operating conditions
PLATE VOLTS	2909 V	Typical operating conditions
$E_c =$	6.3 V	Typical operating conditions
$+ \sim E_b =$	100 V	Typical operating conditions
PLATE (	1 mA	Typical operating conditions
$E_b =$	250 V	Typical operating conditions
Maximum plate voltage	300 V	Published datasheet; promoted section value
Maximum plate dissipation	2.5 W	Published datasheet; promoted section value
Maximum output voltage RMS	65 V	PhaseInverter

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	7700 ohm	Published datasheet; promoted section value
Transconductance	0.0026 A/V	Published datasheet; promoted section value
Amplification factor	20	Published datasheet; promoted section value