

ELECTRONIC TUBE REFERENCE

19JN8

Voltage - Radio Detector Converter electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

PENTODE-TRIODE

Medium-mu triode and sharp-cutoff pentode used as an FM converter and RF amplifier in radio receivers.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9FA	BASE PINS	9
NOMINAL HEATER	18.9 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

9FA - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	B	G1 – Control Grid	CONNECTED
PIN2	B	P – Plate (Anode)	CONNECTED
PIN3	B	K – Cathode	CONNECTED
PIN4	–	H – Heater	CONNECTED
PIN5	–	H – Heater	CONNECTED
PIN6	A	P – Plate (Anode)	CONNECTED
PIN7	A	G2 – Screen Grid	CONNECTED
PIN8	A	G3 – Suppressor Grid	CONNECTED
PIN8	A	K – Cathode	CONNECTED
PIN8	–	IS – Internal Screen	CONNECTED

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	200000 Ω
TRANSCONDUCTANCE	0.0075 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
MAXIMUM SCREEN DISSIPATION	0.55 W
<i>Sharp-cutoff horizontal-deflection oscillator pentode; 300 V maximum screen supply, screen voltage governed by rating chart.</i>	

SECTION2 Triode	
PLATE RESISTANCE	5400 Ω
TRANSCONDUCTANCE	0.0085 S
AMPLIFICATION FACTOR	46
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	2.5 W
<i>Medium-mu triode section.</i>	

19JN8 — Medium-Mu Triode and Sharp-Cutoff Pentode

A miniature multi-unit vacuum tube containing a medium-mu triode and a sharp-cutoff pentode in a single envelope, designed for FM and television receiver applications.

Overview

The **19JN8** is a miniature triode-pentode vacuum tube designed for use in frequency modulation (FM) and television receivers. It combines a medium-mu triode and a sharp-cutoff pentode within a single glass envelope, utilizing a common heater but independent electrode structures. The tube is particularly suited for service as an FM converter, radio-frequency (RF) amplifier, and as a horizontal deflection oscillator.

The 19JN8 belongs to a design family that includes the [6JN8](#) and [12JN8](#) tubes. It is electrically identical to the [6JN8](#) except for its heater characteristics and ratings. Additionally, the designation **19JN8/19CL8A** is noted as an equivalent type, sharing identical characteristics with the exception of heater specifications.

Mechanical Design and Physical Dimensions

The 19JN8 is constructed in a miniature T-6 1/2 glass envelope (JEDEC 6-2 outline) and utilizes a small button 9-pin base (JEDEC E9-1). The tube is designed to operate in any mounting position and requires a standard miniature 9-contact socket.

The physical dimensions of the tube are as follows:

- **Maximum Overall Length:** 2.188 inches (or 2 3/16 inches)
- **Maximum Seated Height:** 1.938 inches (or 1 15/16 inches)
- **Maximum Diameter:** 0.875 inches (or 7/8 inches)
- **Body Height:** 1.938 inches

Heater Characteristics and Ratings

The heater of the 19JN8 is designed for series or parallel AC/DC operation. It features a controlled warm-up time to ensure reliable operation in series-string receiver designs.

- **Heater Voltage (AC or DC):** 18.9 V
- **Heater Current:** 0.15 A (150 mA)
- **Heater Current Limits:** 150 ± 10 mA (0.15 ± 0.01 A)
- **Average Heater Warm-up Time:** 11 seconds
- **Heater-Cathode Voltage Limits (Each Section):**
 - **Heater Positive with Respect to Cathode:** DC component of 100 V maximum; total DC and peak of 200 V maximum.
 - **Heater Negative with Respect to Cathode:** Total DC and peak of 200 V maximum.

Pinout Configurations

The 19JN8 is associated with the JEDEC 9FA basing diagram. However, the technical documentation contains two distinct pinout configurations for this basing designation. Designers must verify the specific pinout of the physical device being implemented.

Standard 9FA Configuration

In the primary configuration, the terminal connections are assigned as follows:

- **Pin 1:** Triode Grid (GT)
- **Pin 2:** Triode Plate (PT)
- **Pin 3:** Triode Cathode (KT)
- **Pin 4:** Heater (H)
- **Pin 5:** Heater (H)
- **Pin 6:** Pentode Plate (PP)
- **Pin 7:** Pentode Grid No. 2 / Screen Grid (G2P)
- **Pin 8:** Pentode Cathode, Grid No. 3, and Internal Shield (KP, G3P, IS)

- **Pin 9:** Pentode Grid No. 1 / Control Grid (G1P)

Alternative Configuration

An alternative documentation of the 9FA basing diagram lists the following pin assignments:

- **Pin 1:** Triode Plate
- **Pin 2:** Triode Grid
- **Pin 3:** Triode Cathode
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Pentode Plate
- **Pin 7:** Pentode Grid No. 1
- **Pin 8:** Pentode Grid No. 2
- **Pin 9:** Pentode Cathode, Grid No. 3, and Internal Shield

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 19JN8 are measured using an external shield (EIA 315) connected to the cathode of the section under test.

Pentode Section

- **Grid No. 1 to Plate (g1 to p):** 0.01 pF (maximum)
- **Input (g1 to h + K + g2 + g3 + IS):** 5.5 pF
- **Output (p to h + K + g2 + g3 + IS):** 3.4 pF

Triode Section

- **Grid to Plate (g to p):** 1.7 pF
- **Input (g to h + TK + PK + PG3 + IS):** 3.2 pF
- **Output (p to h + TK + PK + PG3 + IS):** 2.2 pF

Maximum Ratings

The maximum ratings of the 19JN8 are established under the Design-Maximum System (EIA Standard RS-239). These values represent the limits within which the tube can be operated safely and reliably.

Rating Parameter	Triode Section	Pentode Section
Plate Voltage	300 V	300 V
Grid No. 2 (Screen Grid) Supply Voltage	—	300 V

Rating Parameter	Triode Section	Pentode Section
Grid No. 2 Voltage	—	See Rating Chart
Positive DC Grid No. 1 Voltage	0 V	0 V
Plate Dissipation	2.5 W	2.5 W
Grid No. 2 Input (up to 150 V)	—	0.55 W
Grid No. 2 Input (150 V to 300 V)	—	See Rating Chart
Grid No. 1 Circuit Resistance (Fixed Bias)	2.2 M Ω	2.2 M Ω
Grid No. 1 Circuit Resistance (Cathode Bias)	2.2 M Ω	2.2 M Ω

Typical Characteristics and Class A1 Operation

The typical operating characteristics of the 19JN8 as a Class A1 amplifier are measured with both sections operating at a plate potential of 125 V.

Parameter	Triode Section	Pentode Section
Plate Voltage	125 V	125 V
Grid No. 2 Voltage	—	125 V
Grid No. 1 Voltage	-1.0 V	-1.0 V
Amplification Factor (μ)	46	—
Plate Resistance (r_p , approx.)	5,400 Ω	200,000 Ω
Transconductance (g_m)	8,500 μ mhos	7,500 μ mhos
Plate Current (I_b)	13.5 mA	12.0 mA
Grid No. 2 Current (I_{c2})	—	4.0 mA
Grid No. 1 Voltage for $I_b = 10 \mu$ A (approx.)	-8.0 V	-8.0 V

Qualitative Curve Analysis and Operating Areas

The performance of the 19JN8 is further defined by its characteristic curves, which outline the permissible operating regions and transfer behaviors of both sections.

Grid No. 2 Rating Chart

The Grid No. 2 (screen grid) rating chart defines the "Area of Permissible Operation" for the pentode section. The maximum screen dissipation is flat at 0.55 W for screen voltages from 0 V up to approximately 150 V. Beyond 150 V, the permissible dissipation decreases non-linearly (curving downward) to 0 W at 300 V. This boundary must be respected to prevent thermal damage to the screen grid.

Triode Section Curves

- **Average Plate Characteristics:** The plate current versus plate voltage curves are plotted up to 500 V. The grid voltage curves span from 0 V to -18 V. At a grid bias of 0 V, the plate current rises rapidly, reaching 35 mA at approximately 210 V.
- **Average Transfer Characteristics:** These curves plot plate current against grid voltage for plate voltages of 100 V, 125 V, 150 V, 200 V, 250 V, and 300 V, showing a smooth, predictable control characteristic.
- **Average Characteristics:** Curves of amplification factor, plate resistance, and transconductance are plotted against plate current (from 0 to 40 mA) at plate voltages of 125 V, 200 V, and 300 V. These curves illustrate how the triode's dynamic parameters shift with operating current.

Pentode Section Curves

- **Average Plate Characteristics:** These are plotted for screen grid voltages (E_{c2}) of 125 V and 150 V. The curves show plate current (I_b) and screen current (I_{c2}) for various control grid voltages (E_{c1}) ranging from 0 V down to -6.0 V.
- **Average Transfer Characteristics:** These curves plot plate current, screen current, and transconductance against control grid voltage for screen voltages of 50 V, 75 V, 100 V, 125 V, and 150 V (at a constant plate voltage of 125 V). The transconductance curves clearly demonstrate the sharp-cutoff behavior of the pentode, with transconductance dropping to near zero between -6 V and -8 V depending on the screen voltage.

Technical Summary

The **19JN8** is a versatile miniature triode-pentode vacuum tube designed for television and FM radio receiver applications. Combining a medium- μ triode ($\mu = 46$) and a sharp-cutoff pentode in a single T-6 1/2 envelope, it provides space-saving efficiency for RF amplification, FM conversion, and horizontal deflection oscillator service. With its 18.9 V, 150 mA heater, the 19JN8 is optimized for series-string heater circuits, offering controlled warm-up characteristics and robust heater-cathode insulation.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

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

1961 TUNG SOL

Section 2 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	125 V	Typical
Grid 2 voltage	125 V	Pentode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Triode grid to plate	1.7 pF	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 3 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum plate voltage	300 V	WholeTube
Maximum screen supply voltage	300 V	WholeTube
Maximum plate dissipation	2.5 W	WholeTube
Maximum screen dissipation	0.55 W	WholeTube
Plate voltage	125 V	TypicalOperation
Screen voltage	125 V	TypicalOperation

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate current	12 mA	TypicalOperation
Screen current	4 mA	TypicalOperation
Transconductance	7500 μ S	TypicalOperation
Plate resistance	200000 ohm	TypicalOperation

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Output capacitance	3.4 pF	WholeTube

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 2 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum plate voltage	300 V	WholeTube
Maximum plate dissipation	2.5 W	WholeTube
Plate voltage	125 V	TypicalOperation
Plate current	13.5 mA	TypicalOperation
Transconductance	8500 μ S	TypicalOperation
Amplification factor	46	TypicalOperation
Plate resistance	5400 ohm	TypicalOperation



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

SOURCE PDF

1968 General Electric Co

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1968 GENERAL ELECTRIC CO

Section 1 · Pentode

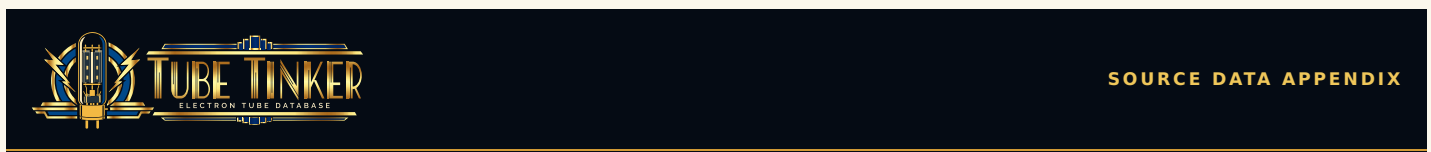
CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical Plate Voltage	125 V	—
Typical Screen Voltage	125 V	—
Typical Grid1 Voltage	-1 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical Plate Current	12 mA	—
Typical Screen Current	4 mA	—

1968 GENERAL ELECTRIC CO

Section 2 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical Plate Voltage	125 V	—
Typical Grid1 Voltage	-1 V	—
Typical Plate Current	13.5 mA	—



SOURCE OPERATING CONDITIONS

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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 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Screen Supply Voltage	300 V	ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	125 V	ClassA
Screen Voltage	125 V	ClassA
Plate Current	12 mA	ClassA
Screen Current	4 mA	ClassA
Transconductance	7500 uS	ClassA

1975 RCA RC30

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	125 V	ClassA
Grid Voltage	-1 V	ClassA
Plate Current	13.5 mA	ClassA
Transconductance	8500 uS	ClassA

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