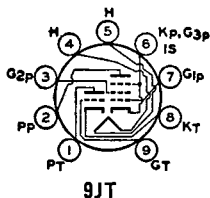


## MEDIUM-MU TRIODE— SHARP-CUTOFF PENTODE 7199



Miniature type used in high-quality, high-fidelity audio equipment, particularly in phase splitters, tone-control amplifiers, and high-gain voltage amplifiers. **Outlines section, 6B**; requires miniature 9-contact socket. For operation as resistance-coupled amplifier, refer to **Resistance-Coupled Amplifier section**. In direct-coupled voltage-amplifier phase-splitter circuits, the pentode unit should drive the triode unit.

Heater Voltage (ac/dc) .....	6.3	volts
Heater Current .....	0.45	ampere
Heater-Cathode Voltage:		
Peak value .....	±200 max	volts
Average value .....	100 max	volts
Direct Interelectrode Capacitances:		
Triode Unit:		
Grid to Plate .....	2	pF
Grid to Cathode and Heater .....	2.3	pF
Plate to Cathode and Heater .....	0.3	pF
Pentode Unit:		
Grid No.1 to Plate .....	0.06 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield .....	5	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield .....	2	pF

### EQUIVALENT-NOISE AND HUM VOLTAGE REFERENCED TO GRID

	<b>Triode Unit</b>	<b>Pentode Unit</b>	
Median Value (rms) .....	10 <sup>†</sup>	35*	μV
Maximum Value (rms) .....	150 <sup>†</sup>	100*	μV

<sup>†</sup> Measured in "true rms" units under the following conditions: heater volts (ac), 6.3; center tap of heater transformer connected to ground; plate-supply volts, 250; plate load resistor, 0.1 megohm; cathode resistor, 1500 ohms; grid resistor, 0.05 megohm; and amplifier covering frequency range between 25 and 10000 cycles per second.

\* Same conditions as for triode unit except: grid-No.2 supply volts, 250; grid-No.2 resistor, 0.33 megohm; grid-No.2-bypass capacitor, 0.22 μF; cathode resistor, 1200 ohms; and grid-No.1 resistor, 0.05 megohm.

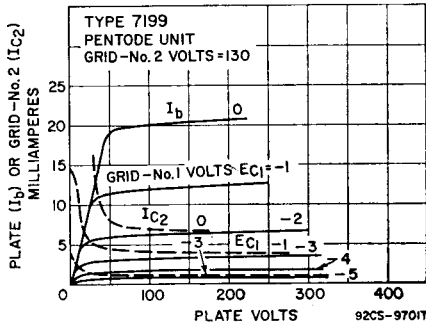
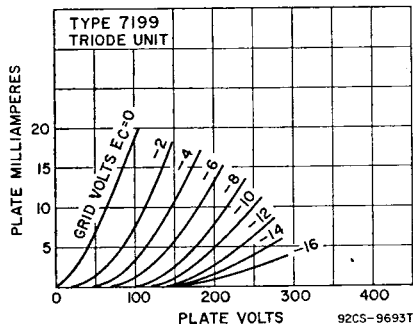
### Class A<sub>1</sub> Amplifier

#### MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage .....	330	
Grid-No.2 (Screen-Grid) Voltage .....	—	See curve page 300
Grid-No.2 Supply Voltage .....	—	330
Grid-No.1 (Control-Grid) Voltage, Positive-bias value .....	0	0
Plate Dissipation .....	2.4	3
Grid-No.2 Input:		
For grid-No.2 voltages up to 165 volts .....	—	0.6
For grid-No.2 voltages between 165 and 330 volts .....	—	See curve page 300

#### Triode Unit Pentode Unit

	330	330	
	—	See curve page 300	volts
	—	330	volts
	0	0	volts
	2.4	3	watts
	—	0.6	watt
	—	See curve page 300	



**CHARACTERISTICS**

	Triode Unit	Pentode Unit		
Plate Supply Voltage	215	100	220	volts
Grid-No.2 Supply Voltage	—	50	130	volts
Grid-No.1 Voltage	-8.5	—	—	volts
Cathode-Bias Resistor	—	1000	62	ohms
Amplification Factor	17	—	—	
Plate Resistance (Approx.)	0.0081	1	0.4	megohm
Transconductance	2100	1500	7000	$\mu$ mhos
Plate Current	9	1.1	12.5	mA
Grid-No.2 Current	—	0.35	3.5	mA
Grid-No.1 Voltage (Approx.) for plate current of 10 $\mu$ A	-40	-4	—	volts

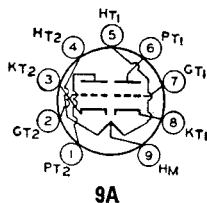
**MAXIMUM CIRCUIT VALUES**

	Triode Unit	Pentode Unit	
Grid-No.1-Circuit Resistance:* For fixed-bias operation	0.5	0.25	megohm
For cathode-bias operation	1	1	megohm

\* If either unit is operated at maximum rated conditions, grid-No.1-circuit resistance for both units should not exceed the stated value.

**7247****DUAL TRIODE**

Miniature type used for combined first- and second-stage audio preamplification in high-fidelity phonograph or tape equipment. Tube has high-mu unit and medium-mu unit. Outline 8B, Outlines section. Tube requires miniature nine-contact socket and may be operated in any position. **Heater:** volts (ac/dc), 12.6 (series), 6.3 (parallel); amperes, 0.15 (series), 0.3 (parallel).

**9A****Class A<sub>1</sub> Amplifier****MAXIMUM RATINGS (Design-Maximum Values)**

	Unit No.1	Unit No.2	
Plate Voltage	330	330	volts
Grid Voltage:			
Negative-bias value	55	55	volts
Positive-bias value	0	0	volts
Cathode Current	—	22	mA
Plate Dissipation	1.2	3	watts
Heater-Cathode-Voltage:			
Peak value		$\pm$ 200 max	volts
Average value		100 max	volts

**CHARACTERISTICS**

	Unit No.1		Unit No.2		
Plate Voltage	100	250	100	250	volts
Grid Voltage	-1	-2	0	-8.5	volts
Amplification Factor	100	100	20	17	
Plate Resistance (Approx.)	80000	62500	6500	7700	ohms
Transconductance	1250	1600	3100	2200	$\mu$ mhos
Plate Current	0.5	1.2	11.8	10.5	mA
Grid Voltage (Approx.) for plate current of 10 $\mu$ A	—	—	—	-24	volts

**MAXIMUM CIRCUIT VALUES**

	Unit No.1	Unit No.2	
Grid-Circuit Resistance:			
For fixed-bias operation	15 max	0.5 max	megohms
For cathode-bias operation	—	1 max	megohm

**HUM OUTPUT VOLTAGE**

Average Value (rms, cathode bypassed)■	1.8	$\mu$ volts
Maximum Value (rms, cathode unbypassed)*	7	$\mu$ volts

° The dc component must not exceed 100 volts.

■ Measured in "true rms" units under the following conditions: heater volts (ac), 6.3 (parallel connection); center tap of heater transformer connected to ground; dc plate supply volts, 250; plate load resistor, 0.1 megohm; cathode resistor, 2700 ohms; cathode-bypass capacitor, 100  $\mu$ f; grid resistor, 0 ohms; amplifier covering frequency range of 25 to 10000 cps.

\* Same conditions as above, except that cathode resistor is unbypassed and grid resistor is 0.05 megohm.