



7199

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# MEDIUM-MU TRIODE— SHARP-CUTOFF PENTODE

9-PIN MINIATURE TYPE

*For high-fidelity audio-amplifier applications critical as to noise and hum*

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathodes:

Voltage . . . . .  $6.3 \pm 10\%$  . . . ac or dc volts

Current . . . . . 0.45 . . . . . amp

Direct Interelectrode Capacitances:<sup>0</sup>

#### Triode Unit:

Grid to plate . . . . . 2  $\mu\text{f}$ Grid to cathode and heater . . . . . 2.3  $\mu\text{f}$ Plate to cathode and heater . . . . . 0.3  $\mu\text{f}$ 

#### Pentode Unit:

Grid No.1 to plate . . . . . 0.06 max.  $\mu\text{f}$ Grid No.1 to cathode & internal shield & grid No.3, grid No.2, and heater . . . . . 5  $\mu\text{f}$ Plate to cathode & internal shield & grid No.3, grid No.2, and heater . . . . . 2  $\mu\text{f}$ 

### Equivalent-Hum and Noise Voltage (Referenced to Grid):

#### Triode Unit

Median Value (RMS) . . . . . 10 microvolts

Maximum Value (RMS) . . . . . 150 microvolts

Measured in "true rms" units under the following conditions:  
heater volts = 6.3 ac, center-tap of heater transformer connected to ground, plate-supply volts = 250, plate load resistor (megohms) = 0.1, cathode resistor (ohms) = 1500, grid resistor (megohms) = 0.05, and amplifier covering frequency range between 25 and 10,000 cps.

#### Pentode Unit

Median Value (RMS) . . . . . 35 microvolts

Maximum Value (RMS) . . . . . 100 microvolts

Measured in "true rms" units under the following conditions:  
heater volts = 6.3 ac, center-tap of heater transformer connected to ground, plate-supply volts = 250, plate-load resistor (megohms) = 0.1, grid-No.2 supply volts = 250, grid-No.2 resistor (megohms) = 0.33, grid-No.2-bypass capacitor ( $\mu\text{f}$ ) = 0.22, cathode resistor (ohms) = 1200, grid-No.1 resistor (megohms) = 0.05, and amplifier covering frequency range between 25 and 10,000 cps.

### Characteristics, Class A<sub>1</sub> Amplifier:

|                                | Triode Unit | Pentode Unit |       |
|--------------------------------|-------------|--------------|-------|
| Plate-Supply Voltage . . . . . | 215         | 100 220      | volts |

<sup>0</sup>: See next page.



7199

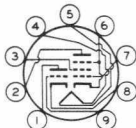
# MEDIUM-MU TRIODE— SHARP-CUTOFF PENTODE

|                                                                | Triode<br>Unit | Pentode<br>Unit |           |
|----------------------------------------------------------------|----------------|-----------------|-----------|
| Grid-No.2 Supply voltage . . . . .                             | —              | 50 130          | volts     |
| Grid-No.1 Voltage. . . . .                                     | -8.5           | —               | volts     |
| Cathode Resistor . . . . .                                     | —              | 1000 62         | ohms      |
| Amplification Factor . . . . .                                 | 17             | —               |           |
| Plate Resistance (Approx.) . . . . .                           | 0.0081         | 1 0.4           | megohm    |
| Transconductance . . . . .                                     | 2100           | 1500 7000       | $\mu$ hos |
| Plate Current. . . . .                                         | 9              | 1.1 12.5        | ma        |
| Grid-No.2 Current. . . . .                                     | —              | 0.35 3.5        | ma        |
| Grid-No.1 Voltage (Approx.)<br>for plate $\mu$ a = 10. . . . . | -40            | -4 —            | volts     |

## Mechanical:

|                                                        |                                          |
|--------------------------------------------------------|------------------------------------------|
| Operating Position . . . . .                           | Any                                      |
| Maximum Overall Length . . . . .                       | 2-3/16"                                  |
| Maximum Seated Length. . . . .                         | 1-15/16"                                 |
| Length, Base Seat to Bulb Top (Excluding tip). . . . . | 1-9/16" $\pm$ 3/32"                      |
| Diameter . . . . .                                     | 0.750" to 0.875"                         |
| Dimensional Outline. . . . .                           | See General Section                      |
| Bulb . . . . .                                         | T6-1/2                                   |
| Base . . . . .                                         | Small-Button Noval 9-Pin (JEDEC No.E9-1) |
| Basing Designation for BOTTOM VIEW . . . . .           | .9JT                                     |

Pin 1—Triode  
Plate  
Pin 2—Pentode  
Plate  
Pin 3—Pentode  
Grid No.2  
Pin 4—Heater  
Pin 5—Heater



Pin 6—Pentode  
Cathode,  
Grid No.3,  
Internal  
Shield  
Pin 7—Pentode  
Grid No.1  
Pin 8—Triode  
Cathode  
Pin 9—Triode  
Grid

## AMPLIFIER — Class A<sub>1</sub>

### Maximum Ratings, Design-Maximum Values:

|                                                     | Triode<br>Unit | Pentode<br>Unit     |       |
|-----------------------------------------------------|----------------|---------------------|-------|
| PLATE VOLTAGE. . . . .                              | 330 max.       | 330 max.            | volts |
| GRID-No.2 (SCREEN-GRID)<br>SUPPLY VOLTAGE . . . . . | —              | 330 max.            | volts |
| GRID-No.2 VOLTAGE. . . . .                          | —              | See Grid-No.2 Input |       |
| Rating Chart at front of Receiving Tube Section     |                |                     |       |
| GRID-No.1 (CONTROL-GRID)<br>VOLTAGE:                |                |                     |       |
| Positive-bias value. . . . .                        | 0 max.         | 0 max.              | volts |

0: See next page.

# Medium-Mu Triode— Sharp-Cutoff Pentode

## 9-PIN MINIATURE TYPE

For High-Fidelity Audio-Amplifier Ap-  
plications Critical as to Noise and Hum

### GENERAL DATA

#### Electrical:

##### Heater Characteristics and Ratings:

|                                                   |                       |       |
|---------------------------------------------------|-----------------------|-------|
| Voltage (AC or DC) . . . . .                      | 6.3 ± 0.6             | volts |
| Current at heater volts = 6.3 . . . . .           | 0.450                 | amp   |
| Peak heater-cathode voltage (Each Unit):          |                       |       |
| Heater negative with respect to cathode . . . . . | 200 max.              | volts |
| Heater positive with respect to cathode . . . . . | 200 <sup>a</sup> max. | volts |

##### Direct Interelectrode Capacitances:<sup>b</sup>

##### 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 & internal shield & grid No.3, grid No.2, and heater . . . . . | 5         | pf |
| Plate to cathode & internal shield & grid No.3, grid No.2, and heater . . . . .     | 2         | pf |

##### Equivalent-Hum and Noise Voltage (Referenced to Grid):

##### Triode Unit

|                                                                                                                                                                                                                                                                                                                                                       |    |            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------------|
| Average Value (RMS) . . . . .                                                                                                                                                                                                                                                                                                                         | 10 | microvolts |
| Maximum Value (RMS) . . . . .                                                                                                                                                                                                                                                                                                                         | 50 | microvolts |
| Measured in "true rms" units under the following conditions: heater volts = 6.3 ac, center-tap of heater transformer connected to ground, plate-supply volts = 250, plate load resistor (megohms) = 0.1, cathode resistor (ohms) unbypassed = 1500, grid resistor (megohms) = 0.05, and amplifier covering frequency range between 25 and 10,000 cps. |    |            |

##### Pentode Unit

|                                                                                                                                                                                                                                                                                                                                                                                 |    |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------------|
| Average Value (RMS) . . . . .                                                                                                                                                                                                                                                                                                                                                   | 15 | microvolts |
| Maximum Value (RMS) . . . . .                                                                                                                                                                                                                                                                                                                                                   | 35 | microvolts |
| Measured in "true rms" units under the following conditions: heater volts = 6.3 ac, center-tap of heater transformer connected to ground, plate-supply volts = 250, plate-load resistor (megohms) = 0.22, grid-No.2 supply volts = 250; grid No.2 voltage divider: resistor (megohm) from grid No.2 to B+ = 0.68, resistor (megohm) from grid-No.2 to ground = 0.33; bypass ca- |    |            |

← Indicates a change.



pacitor ( $\mu\text{f}$ ) from grid No.2 to cathode = 0.1; cathode resistor (ohms unbypassed) = 680; grid No.1 resistor (megohm) = 0.27; and amplifier covering frequency range between 25 and 10,000 cps.

## Characteristics, Class A<sub>1</sub> Amplifier:

|                                                                       | Triode<br>Unit | Pentode<br>Unit |                  |
|-----------------------------------------------------------------------|----------------|-----------------|------------------|
| Plate-Supply Voltage. . . . .                                         | 215            | 100 220         | volts            |
| Grid-No.2 Supply Voltage. . . .                                       | -              | 50 130          | volts            |
| Grid-No.1 Voltage. . . . .                                            | -8.5           | -               | volts            |
| Cathode Resistor. . . . .                                             | -              | 1000 62         | ohms             |
| Amplification Factor. . . . .                                         | 17             | -               |                  |
| Plate Resistance (Approx.). . .                                       | 0.0081         | 1 0.4           | megohm           |
| Transconductance. . . . .                                             | 2100           | 1500 7000       | $\mu\text{mhos}$ |
| Plate Current. . . . .                                                | 9              | 1.1 12.5        | ma               |
| Grid-No.2 Current. . . . .                                            | -              | 0.35 3.5        | ma               |
| Grid-No.1 Voltage (Approx.) for<br>plate $\mu\text{a} = 10$ . . . . . | -40            | -4 -            | volts            |

## Mechanical:

|                                                        |                                          |
|--------------------------------------------------------|------------------------------------------|
| Operating Position. . . . .                            | Any                                      |
| Type of Cathodes. . . . .                              | Coated Unipotential                      |
| Maximum Overall Length. . . . .                        | 2-3/16"                                  |
| Maximum Seated Length. . . . .                         | 1-15/16"                                 |
| Length, Base Seat to Bulb Top (Excluding tip). . . . . | 1-9/16" $\pm$ 3/32"                      |
| Diameter. . . . .                                      | 0.750" to 0.875"                         |
| Dimensional Outline. . . . .                           | See General Section                      |
| Bulb. . . . .                                          | T6-1/2                                   |
| Base. . . . .                                          | Small-Button Noval 9-Pin (JEDEC No.E9-1) |
| Basing Designation for BOTTOM VIEW. . . . .            | 9JT                                      |

Pin 1-Triode

Plate

Pin 2-Pentode

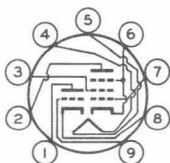
Plate

Pin 3-Pentode

Grid No.2

Pin 4-Heater

Pin 5-Heater



Pin 6-Pentode

Cathode,  
Grid No.3,  
Internal  
Shield

Pin 7-Pentode

Grid No.1

Pin 8-Triode

Cathode

Pin 9-Triode

Grid

## AMPLIFIER — Class A<sub>1</sub>

### Maximum Ratings, Design-Maximum Values:

|                                                    | Triode<br>Unit | Pentode<br>Unit     |       |
|----------------------------------------------------|----------------|---------------------|-------|
| PLATE VOLTAGE. . . . .                             | 330 max.       | 330 max.            | volts |
| GRID-No.2 (SCREEN-GRID)<br>SUPPLY VOLTAGE. . . . . | -              | 330 max.            | volts |
| GRID-No.2 VOLTAGE. . . . .                         | -              | See Grid-No.2 Input |       |
| Rating Chart at front of Receiving Tube Section    |                |                     |       |
| GRID-No.1 (CONTROL-GRID) VOLTAGE:                  |                |                     |       |
| Positive-bias value. . . . .                       | 0 max.         | 0 max.              | volts |

## GRID-No.2 INPUT:

For grid-No.2 voltages

up to 165 volts . . . .

Triode  
Unit

-

Pentode  
Unit

0.6 max.

watt

For grid-No.2 voltages

between 165 and 330

volts . . . . .

-

See Grid-No.2 Input

Rating Chart at front of Receiving Tube Section

PLATE DISSIPATION . . . . .

2.4 max.

3 max.

watts

**Maximum Circuit Values:**Triode  
UnitPentode  
Unit

Grid-No.1-Circuit

Resistance:<sup>c</sup>

For fixed-bias

operation . . . . .

0.5 max.

0.25 max.

megohm

For cathode-bias

operation . . . . .

1 max.

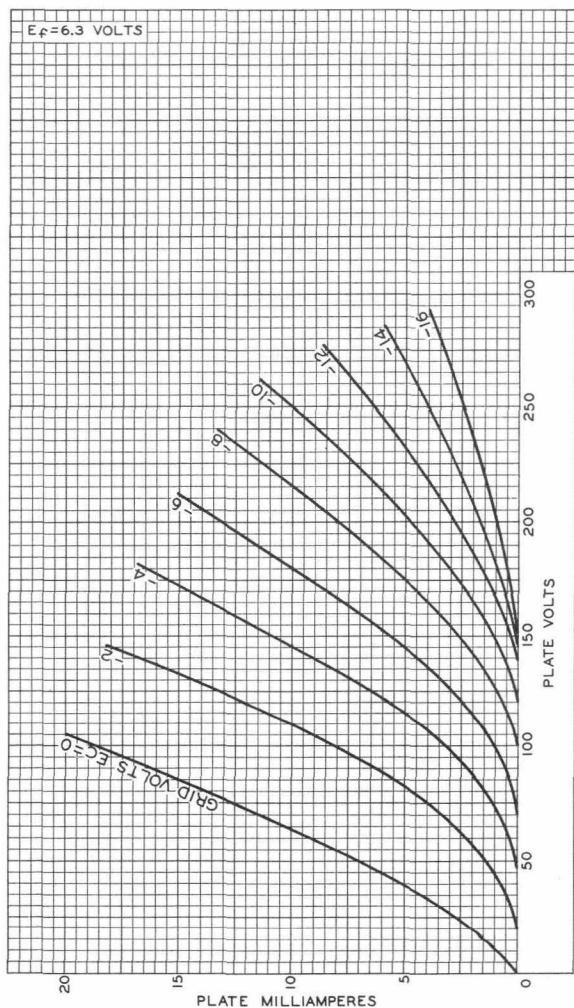
1 max.

megohm

<sup>a</sup> The dc component must not exceed 100 volts.<sup>b</sup> Without external shield.<sup>c</sup> If either unit is operated at maximum rated conditions, grid-No.1-circuit resistances for both units should not exceed the stated values.

# AVERAGE PLATE CHARACTERISTICS

## Triode Unit



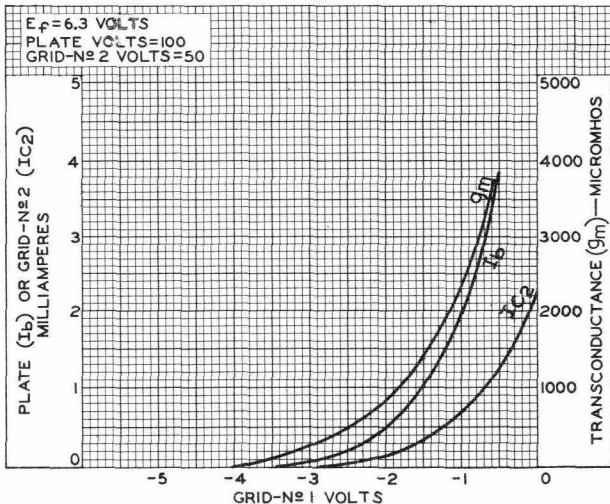
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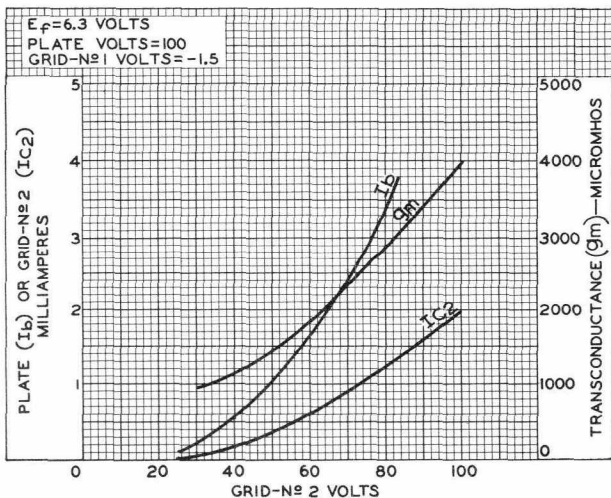


7199

7199

AVERAGE CHARACTERISTICS  
PENTODE UNIT

92CS-9702



92CS-9703

