

9DC

**MEDIUM-MU TRIODE—
SHARP-CUTOFF PENTODE 6MG8**

Miniature type used in horizontal-deflection circuits and for age-amplifier or sync-separator applications in television receivers. **Outlines section, 6B**; requires miniature 9-contact socket. **Heater:** volts, 6.3; ampere, 0.45; maximum heater-cathode volts, ± 200 peak, 100 average.

Class A₁ Amplifier

| CHARACTERISTICS | Triode Unit | Pentode Unit | |
|---|-------------|--------------|------------|
| Plate Voltage | 150 | 170 | volts |
| Grid-No.2 (Screen-Grid) Voltage | — | 170 | volts |
| Grid-No.1 (Control-Grid) Voltage | — | -2 | volts |
| Cathode-Bias Resistor | 56 | — | ohms |
| Plate Current | 18 | 10 | mA |
| Grid-No.2 Current | — | 2.8 | mA |
| Transconductance | 8500 | 6200 | μ mhos |
| Plate Resistance (Approx.) | 5 | 400 | kohms |
| Amplification Factor | 40 | 47 | |
| Grid-No.1 Voltage for plate current of 10 μ A | -12 | — | volts |

Horizontal-Deflection Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

| | | | |
|---|-----|------|-------|
| Plate Voltage | 330 | 330 | volts |
| Grid-No.2 Supply Voltage | — | 300 | volts |
| Plate Dissipation | 2.5 | 2 | watts |
| Cathode Current | 14 | 14 | mA |
| Grid-No.2 Input: | | | |
| For plate dissipation more than 1.2 watts | — | 0.5 | watt |
| For plate dissipation less than 1.2 watts | — | 0.75 | watt |

MAXIMUM CIRCUIT VALUES

| | | | |
|-------------------------------|-----|-----|--------|
| Grid-No.1 Circuit Resistance: | | | |
| For fixed-bias operation | 0.5 | 0.5 | megohm |
| For cathode-bias operation | 0.5 | 1 | megohm |

For replacement use type 6J6A.

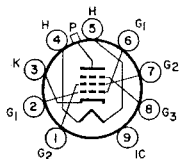
6MHH3

6MJ6/

BEAM POWER TUBE

6LQ6/6JE6C

24LQ6/24JE6C, 31LQ6



9QL

Novar types used as horizontal-deflection amplifier in color and black-and-white television receivers. **Outlines section, 32C**; requires novar 9-contact socket. Types 24LQ6/24JE6C, and 31LQ6 are identical with type 6MJ6/6LQ6/6JE6C except for heater ratings.

| | 6MJ6/ 6LQ6/6JE6C | 24LQ6/24JE6C | 31LQ6 | |
|---|---------------------|---------------|---------------|---------|
| Heater Voltage (ac/dc) | 6.3 | 24 | 31 | volts |
| Heater Current | 2.3 | 0.6 | 0.45 | amperes |
| Heater Warm-up Time | — | 11 | 11 | seconds |
| Heater-Cathode Voltage: | | | | |
| Peak value | ± 200 max | ± 200 max | ± 200 max | volts |
| Average value | 100 max | 100 max | 100 max | volts |
| Direct Interelectrode Capacitances: | | | | |
| Grid No.1 to Plate | — | — | 0.6 | pF |
| Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3 | — | — | 22 | pF |
| Plate to Cathode, Heater, Grid No.2, and Grid No.3 | — | — | 11 | pF |

Class A₁ Amplifier

| CHARACTERISTICS | Triode* Connection | Pentode Connection | | |
|--|-----------------------|--------------------|-------|------------|
| Peak Positive-Pulse Plate Voltage# | 5000 | — | volts | |
| Plate Voltage | 145 | 60 | 175 | volts |
| Grid-No.3 (Suppressor-Grid) Voltage | — | 30 | 30 | volts |
| Grid-No.2 (Screen-Grid) Voltage | 145 | 145 | 145 | volts |
| Grid-No.1 (Control-Grid) Voltage | -35 | 0 | -35 | volts |
| Plate Resistance (Approx.) | — | — | 7000 | ohms |
| Transconductance | — | — | 7500 | μ mhos |
| Plate Current | — | 710 \ddagger | 96 | mA |

| | | | | | |
|---|-----|------|-----|-----|-------|
| Grid-No.2 Current | — | — | 55‡ | 2.4 | mA |
| Grid-No.1 Voltage for plate current of 1 mA | — | —125 | — | —60 | volts |
| Amplification Factor | 2.8 | — | — | — | — |

* Grid No.3 and grid No.2 connected, respectively, to cathode and plate at socket.

‡ This value may be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

Horizontal-Deflection Amplifier

For operation in a 525-line, 30-frame system

MAXIMUM RATINGS (Design-Maximum Values)

| | | |
|--|------|-------|
| Plate Supply Voltage | 990 | volts |
| Peak Positive-Pulse Plate Voltage# | 7500 | volts |
| Peak Negative-Pulse Plate Voltage | 1100 | volts |
| Grid-No.3 Voltage ■ | 75 | volts |
| Grid-No.2 Voltage | 220 | volts |
| Peak Negative-Pulse Grid-No.1 Voltage | 330 | volts |
| Peak Cathode Current | 1200 | mA |
| Average Cathode Current | 350 | mA |
| Plate Dissipation ○ | 30 | watts |
| Plate Dissipation (Temporary overload) ▲ | 200 | watts |
| Grid-No.2 Input | 5 | watts |
| Envelope Temperature (At hottest point) | 250 | °C |

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance:

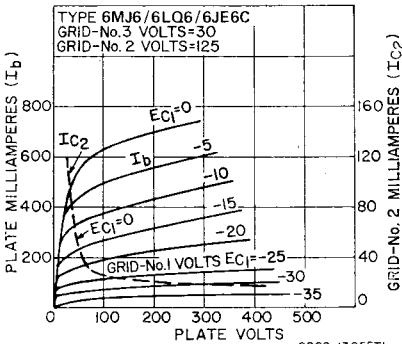
| | | |
|--|------|---------|
| For grid-No.1-resistor-bias operation | 0.47 | megohm |
| For plate-pulsed operation (horizontal-deflection circuits only) | 10 | megohms |

Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).

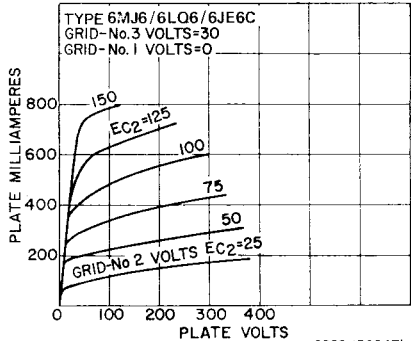
■ For horizontal-deflection service, a positive voltage may be applied to grid-No.3 to minimize "snivets" interference in both vhf and uhf television receivers. A typical value is 30 volts.

○ A bias resistor or other means is required to protect the tube in absence of excitation.

▲ Total continuous or accumulated time not to exceed 40 seconds.



92CS-13055TI

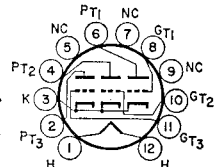


92CS-13054TI

6MJ8

MEDIUM-MU TRIPLE TRIODE

Duodecar type used in matrixing-amplifier circuits of color and black-and-white television receivers. Outlines section, 8D; requires duodecar 12-contact socket.



12HG

| | | | | |
|-------------------------------------|----------|--------|------|----|
| Heater Voltage | 6.3 | volts | | |
| Heater Current | 0.9 | ampere | | |
| Heater-Cathode Voltage: | | | | |
| Peak value | ±200 max | volts | | |
| Average value | 100 max | volts | | |
| Direct Interelectrode Capacitances: | Unit | Unit | Unit | |
| Grid to Plate | No.1 | No.2 | No.3 | pF |
| Grid to Cathode and Heater | 2.8 | 2.8 | 2.8 | |
| Plate to Cathode and Heater | 2.9 | 2.9 | 3 | pF |
| | 0.36 | 0.6 | 0.7 | pF |

Class A₁ Amplifier (Each Unit)

MAXIMUM RATINGS (Design-Maximum Values)

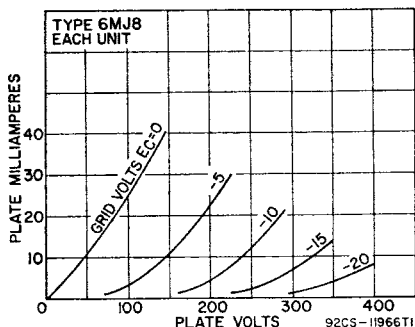
| | | |
|---|-----|-------|
| Plate Voltage | 330 | volts |
| Grid Voltage, Positive-bias value | 0 | volts |
| Plate Dissipation | 3 | watts |

CHARACTERISTICS

| | | |
|--|-------|------------|
| Plate Voltage | 250 | volts |
| Grid Voltage | -10.5 | volts |
| Plate Current | 10 | mA |
| Amplification Factor | 17 | |
| Plate Resistance (Approx.) | 5600 | ohms |
| Transconductance | 3000 | μ mbos |
| Plate Current for grid voltage of -14 volts | 4 | mA |
| Grid Voltage for plate current of 50 μ A | -23 | volts |

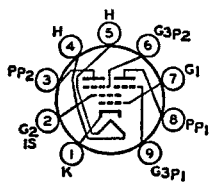
MAXIMUM CIRCUIT VALUE

| | | |
|---|---|--------|
| Grid-Circuit Resistance, for fixed-bias operation | 1 | megohm |
|---|---|--------|



Refer to chart at end of section.
For replacement use type 6MK8A.

6MK8



9FG

**SHARP-CUTOFF
TWIN PENTODE**

Miniature type used in sync-separator, clipper, agc, and low-level color-demodulator circuits in television receivers. Outlines section, 6E; requires miniature 9-contact socket.

6MK8A

4MK8

| | | |
|--|---------------|--------|
| Heater Voltage | 6.3 | volts |
| Heater Current | 0.3 | ampere |
| Heater-Cathode Voltage: | | |
| Peak value | \pm 200 max | volts |
| Average value | 100 max | volts |
| Direct Interelectrode Capacitances: | | |
| Grid No.3 to Plate (Each Section) | 2 | pF |
| Grid No.1 to All Electrodes | 6 | pF |
| Grid No.3 (Each Section) to All Electrodes | 3.6 | pF |
| Plate (Each Section) to All Electrodes | 3 | pF |
| Grid No.3 (Section 1) to Grid No.3 (Section 2) | 0.015 max | pF |

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

| | | |
|---|-----|-------|
| Plate Voltage (Each Unit) | 300 | volts |
| Grid-No.3 (Suppressor-Grid) Voltage (Each Unit) | | |
| Peak positive value | 50 | volts |
| DC negative value | 50 | volts |
| DC positive value | 3 | volts |

| | | |
|---|------|-------|
| Grid-No.2 (Screen-Grid) Voltage | 150 | volts |
| Grid-No.1 (Control-Grid) Voltage, Negative-bias value | 50 | volts |
| Cathode Current | 12 | mA |
| Plate Dissipation (Each Section) | 1.1 | watts |
| Grid-No.2 Input | 0.75 | watt |

MAXIMUM PLATE CURRENT RATIO (Balance): 6MK8A — 1.2 to 1; 4MK8 — 1.3 to 1

| | | |
|----------------------|------|--------|
| Plate Voltage | 100 | volts |
| Grid-No.2 Voltage | 67.5 | volts |
| Grid-No.1 Voltage | 67.5 | volts |
| Grid-No.3 Voltage | 0 | volts |
| Grid-No.1 Resistance | 0.68 | megohm |

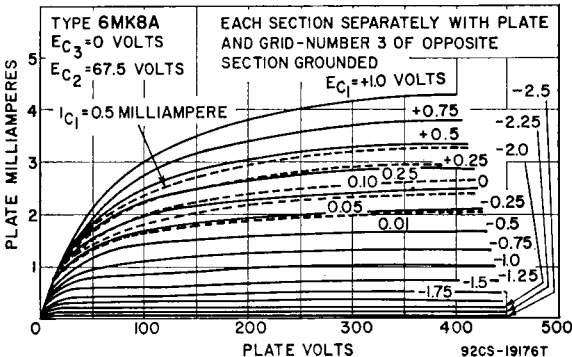
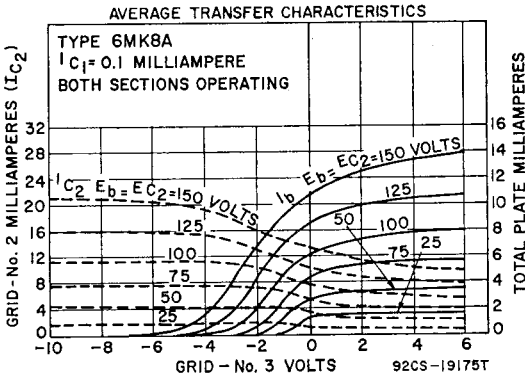
CHARACTERISTICS

With One Unit Operating*

| | | | |
|--|------|------|------------|
| Plate Voltage | 100 | 100 | volts |
| Grid-No.3 Voltage | 0 | 0 | volts |
| Grid-No.2 Voltage | 67.5 | 67.5 | volts |
| Grid-No.1 Voltage | 0 | * | volts |
| Transconductance, Grid No.3 to Plate | — | 450 | μ mhos |
| Transconductance, Grid No.1 to Plate | 1100 | — | μ mhos |
| Plate Current | — | 2 | mA |
| Grid-No.3 Voltage (Approx.) for plate current of 100 μ A | — | -3.5 | volts |
| Grid-No.1 Voltage (Approx.) for plate current of 100 μ A | — | -2.3 | volts |

With Both Units Operating

| | | | |
|-------------------------------|------|------|-------|
| Plate Voltage (Each Unit) | 100 | 100 | volts |
| Grid-No.3 Voltage (Each Unit) | -10 | 0 | volts |
| Grid-No.2 Voltage | 67.5 | 67.5 | volts |
| Grid-No.1 Voltage | * | * | volts |
| Plate Current (Each Section) | — | 2 | mA |
| Cathode Current | 7.1 | 8.5 | mA |
| Grid-No.2 Current | 7 | 4.4 | mA |



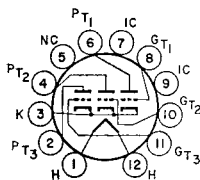
MAXIMUM CIRCUIT VALUES

| | | |
|--|-----|--------|
| Grid-No.3-Circuit Resistance (Each Unit) | 0.5 | megohm |
| Grid-No.1-Circuit Resistance | 0.5 | megohm |

* With plate and grid No.3 of other unit grounded. * Grid current adjusted for 100 μ A dc.

Refer to chart at end of section.

6ML8



12HU

**HIGH-MU
TRIPLE TRIODE**

6MN8

9MN8

Duodecar type used for matrix-amplifier applications in color television receivers. **Outlines** section, 8D; requires duodecar 12-contact socket. Type 9MN8 is identical with type 6MN8 except for heater ratings.

| | | | |
|--|------------------|------------------|------------------|
| Heater Voltage | 6MN8 | 9MN8 | volts |
| Heater Current | 6.3 | 9.5 | ampere |
| | 0.9 | 0.6 | seconds |
| | — | 11 | |
| Heater-Cathode Voltage: | | | |
| Peak value | ± 200 max | ± 200 max | volts |
| Average value | ± 100 max | ± 100 max | volts |
| Direct Interelectrode Capacitances: | | | |
| | Unit No.1 | Unit No.2 | Unit No.3 |
| Grid to Plate | 2.6 | 2.6 | 2.6 |
| Grid to Cathode and Heater | 4.6 | 4.6 | 4.6 |
| Plate to Cathode and Heater | 0.33 | 0.57 | 0.65 |
| | | | pF |

Class A₁ Amplifier (Each Unit)

MAXIMUM RATINGS (Design-Maximum Values)

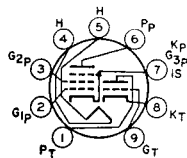
| | | |
|---|-----|-------|
| Plate Voltage | 330 | volts |
| Grid Voltage, Positive-bias value | 0 | volt |
| Plate Dissipation | 3 | watts |

CHARACTERISTICS

| | | | |
|---|------|-------|------------|
| Plate Voltage | 125 | 200 | volts |
| Grid Voltage | -1 | -4 | volts |
| Amplification Factor | 47 | 40 | |
| Plate Resistance (Approx.) | 6250 | 10000 | ohms |
| Transconductance | 7500 | 4000 | μ mhos |
| Plate Current | 11 | 4.8 | mA |
| Grid Voltage (Approx.) for plate current of 50 μ A .. | -5 | -11 | volts |

MAXIMUM CIRCUIT VALUE

| | | |
|---|---|--------|
| Grid-Circuit Resistance, for fixed-bias operation | 1 | megohm |
|---|---|--------|



9AE

**MEDIUM-MU TRIODE—
SHARP-CUTOFF PENTODE**

6MQ8

5MQ8

Miniature type used in color and black-and-white television receiver applications. The pentode unit is used in band-pass-amplifier applications. The triode unit is used in video-amplifier, sync-separator, color-killer-control, matrix-amplifier, and blanker applications. **Outlines** section, 6B; requires miniature 9-contact socket. Type 5MQ8 is identical with type 6MQ8 except for heater ratings.

| | | | |
|---|---------------|---------------|---------|
| Heater Voltage (ac/dc) | 5MQ8 | 6MQ8 | volts |
| Heater Current | 5.6 | 6.3 | ampere |
| Heater Warm-up Time | 0.6 | 0.535 | seconds |
| | 11 | — | |
| Heater Cathode Voltage: | | | |
| Peak value | ± 200 max | ± 200 max | volts |
| Average value | 100 max | 100 max | volts |
| Direct Interelectrode Capacitances: | | | |
| Triode Unit: | | | |
| Grid to Plate | | 1.7 | pF |
| Grid to Triode Cathode, Pentode Cathode, Heater, Pentode Grid No.3, and Internal Shield | | 3 | pF |

| | | |
|---|-------|----|
| Plate to Triode Cathode, Pentode Cathode, Heater, Pentode Grid No.3, and Internal Shield | 1.4 | pF |
| Pentode Unit: Grid No.1 to Plate | 0.045 | pF |
| Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield | 7.5 | pF |
| Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield | 2.2 | pF |

Class A₁ Amplifier

| MAXIMUM RATINGS | Triode Unit | Pentode Unit | |
|---|-------------|--------------------|---------|
| DC Plate Voltage | 330 | 330 | volts |
| DC Grid-No.2 (Screen-Grid) Supply Voltage | — | 330 | volts |
| DC Grid-No.2 Voltage | — | See curve page 300 | |
| DC Grid-No.1 (Control-Grid) Voltage, Positive-bias value | 0 | 0 | volt |
| Plate Dissipation | 2.7 | 2.5 | watts |
| Grid-No.2 Input: For grid-No.2 voltages up to 165 volts | — | 0.55 | watt |
| For grid-No.2 voltages between 165 and 330 volts | — | See curve page 300 | |
| Interelectrode Leakage | 109 | 100 | megohms |

| CHARACTERISTICS | Triode Unit | Pentode Unit | |
|---|-------------|--------------|-------|
| DC Plate Voltage | 150 | 125 | volts |
| DC Grid-No.2 Voltage | — | 125 | volts |
| Cathode Resistance | 56 | 62 | ohms |
| Amplification Factor | 40 | — | |
| Plate Resistance (Approx.) | 5 | 150 | kohms |
| Transconductance | 8500 | 10000 | μmhos |
| DC Plate Current | 18 | 12 | mA |
| DC Grid-No.2 Current | — | 4.5 | mA |
| Grid-No.1 Voltage for plate current of 100 μA | -12 | -7 | volts |

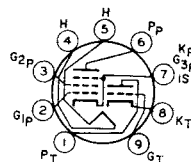
MAXIMUM CIRCUIT VALUES

| | | | |
|---|-----|------|---------|
| Grid-No.1-Circuit Resistance: For fixed-bias operation | 0.5 | 0.25 | megohms |
| For cathode-bias operation | 0.5 | 0.5 | megohms |

6MU8

MEDIUM-MU TRIODE— SEMIREMOTE-CUTOFF PENTODE

Miniature type used in color and black-and-white television receiver applications. The pentode unit is used in burst-amplifier circuits, and the triode unit as a general amplifier tube. Outlines section, 6E; requires miniature 9-contact socket.



9AE

| | | |
|---|----------|---------|
| Heater Voltage | 6.3 | volts |
| Heater Current | 0.6 | ampere |
| Heater Warm-up Time | 11 | seconds |
| Heater-Cathode Voltage: Peak value | ±200 max | volts |
| Average value | 100 max | volts |

| Direct Interelectrode Capacitances: | With Shield | Without Shield | |
|--|-------------|----------------|----|
| Triode Unit: | | | |
| Grid to Plate | 2.2 | 2.2 | pF |
| Grid to Cathode, Heater, Pentode Cathode, Pentode Grid No.3, and Internal Shield | 3.2 | 3 | pF |
| Plate to Cathode, Heater, Pentode Cathode, Pentode Grid No.3, and Internal Shield | 3.4 | 2.2 | pF |
| Pentode Unit: | | | |
| Grid No.1 to Plate | 0.05 | 0.05 | pF |
| Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield | 9 | 9 | pF |
| Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield | 4.4 | 3.6 | pF |
| Heater to Triode Cathode | 4.8 | 4.4 | pF |
| Heater to Pentode Cathode | 7.5 | 5.5 | pF |
| Pentode Grid No.1 to Triode Plate | 0.2 | 0.17 | pF |
| Pentode Plate to Triode Plate | 0.008 | 0.09 | pF |

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

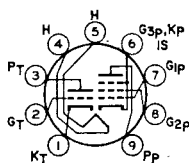
| | Triode Unit | Pentode Unit | |
|---|-------------|--------------------|-------|
| Plate Voltage | 330 | 330 | volts |
| Grid-No.2 (Screen-Grid) Supply Voltage | — | 330 | volts |
| Grid-No.2 Voltage | — | See curve page 300 | |
| Grid-No.1 (Control-Grid) Voltage, Positive-bias value | 0 | 0 | volts |
| Grid-No.2 Input | 2.5 | 3.75 | watts |
| Plate Dissipation | — | 1.1 | watts |

CHARACTERISTICS

| | Triode Unit | Pentode Unit | |
|--|-------------|--------------|-------|
| Plate Voltage | 125 | 150 | volts |
| Grid-No.2 Voltage | — | 150 | volts |
| Grid-No.1 Voltage | —1 | — | volts |
| Cathode Bias Resistor | — | 150 | ohms |
| Plate Current | 11.5 | 19 | mA |
| Grid-No.2 Current | — | 4.2 | mA |
| Transconductance | 6000 | 9000 | μmhos |
| Amplification Factor | 35 | — | |
| Plate Resistance (Approx.) | 5800 | 165000 | ohms |
| Grid-No.1 Voltage (Approx.) for plate current of 10 μA | —5.8 | — | volts |
| Grid-No.1 Voltage (Approx.) for plate current of 20 μA | — | —9.5 | volts |

MAXIMUM CIRCUIT VALUES

| Grid-No.1-Circuit Resistance: | | | |
|-------------------------------|-----|------|--------|
| For fixed-bias operation | 0.5 | 0.25 | megohm |
| For cathode-bias operation | 1 | 1 | megohm |



9DX

**HIGH-MU TRIODE—
SHARP-CUTOFF PENTODE**

6MV8

Miniature type used for general-purpose applications. The pentode unit is used as an if-amplifier, and the triode unit as a sync-separator or voltage amplifier. **Outlines section, 6B;** requires miniature 9-contact socket. **Heater:** volts, 6.3; ampere, 0.6; maximum heater-cathode volts, ±200 peak, 100 average.

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

| | Triode Unit | Pentode Unit | |
|--|-------------|--------------------|-------|
| Plate Voltage | 330 | 330 | volts |
| Grid-No. 2 (Screen-Grid) Supply Voltage | — | 330 | volts |
| Grid-No. 2 Voltage | — | See curve page 300 | |
| Grid-No. 1 (Control-Grid) Voltage, Positive bias value | 0 | 0 | volts |
| Plate Dissipation | 1 | 2.5 | watts |
| Grid-No. 2 Input | — | 0.55 | watts |

CHARACTERISTICS

| | Triode Unit | Pentode Unit | |
|---|-------------|--------------|-------|
| Plate Voltage | 250 | 125 | volts |
| Grid-No. 2 Voltage | — | 125 | volts |
| Grid-No. 1 Voltage | —2 | —1 | volts |
| Plate Current | 2.5 | 13 | mA |
| Grid-No. 2 Current | — | 4 | mA |
| Transconductance | 4000 | 9000 | μmhos |
| Amplification Factor | 100 | — | |
| Plate Resistance (Approx.) | 25000 | 150000 | ohms |
| Grid-No. 1 Voltage (Approx.) for plate current of 20 μA | —4.5 | —6 | volts |

MAXIMUM CIRCUIT VALUES

| Grid-No. 1-Circuit Resistance: | | | |
|--------------------------------|-----|------|---------|
| For fixed-bias operation | 0.5 | 0.25 | megohms |
| For cathode-bias operation | 1 | 1 | megohms |

Refer to chart at end of section.

6N6G