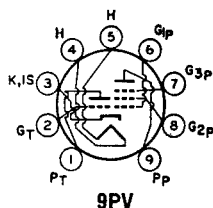


6KA8

8KA8

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

Miniature type used in color and black-and-white television receivers. The triode unit is used in sync-separator circuits; the pentode unit has two independent control grids and is used in gated-agc-amplifier and noise-inverter circuits. Outlines section, 6E; requires miniature 9-contact socket. For curves of average plate characteristics for triode unit, refer to type 6AW8A. Type 8KA8 is identical with type 6KA8 except for heater ratings.



	6KA8	8KA8	
Heater Voltage (ac/dc)	6.3	8.4	volts
Heater Current	0.6	0.45	ampere
Heater Warm-up Time (Average)	11	11	seconds
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		2.2	pF
Grid to Cathode, Heater, and Internal Shield		2.8	pF
Plate to Cathode, Heater, and Internal Shield		2.2	pF
Pentode Unit:			
Grid No.1 to Plate		0.1 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield		9.5	pF
Grid No.1 to Grid No.3		0.5	pF
Grid No.3 to Plate		2.2	pF
Grid No.3 to All Other Electrodes, Heater, and Internal Shield		7	pF

Class A₁ Amplifier**MAXIMUM RATINGS (Design-Maximum Values)**

	Triode Unit	
Plate Voltage	300	volts
Grid Voltage:		
Positive-bias value	0	volts
Negative-bias value	50	volts
Plate Dissipation	1.1	watts

CHARACTERISTICS

	Triode Unit	Pentode Unit	
Plate Supply Voltage	200	150	volts
Grid-No.3 Supply Voltage	—	0	volts
Grid-No.2 Supply Voltage	—	100	volts
Grid-No.1 Supply Voltage	-2	0	volts
Cathode-Bias Resistor	—	180	ohms
Amplification Factor	70	—	
Plate Resistance (Approx.)	17500	100000	ohms
Transconductance, Grid No.1 to Plate	4000	4400	μmhos
Transconductance, Grid No.3 to Plate	—	600	μmhos
Plate Current	4	4	mA
Grid-No.2 Current	—	2.8	mA
Grid-No.1 Supply Voltage (Approx.):			
For plate current of 10 μA	-5	—	volts
For plate current of 20 μA	—	-4	volts
Grid No.3 Supply Voltage (Approx.) for plate current of 20 μA	—	-7	volts

MAXIMUM CIRCUIT VALUES

	Triode Unit	
Grid-Circuit Resistance:		
For fixed-bias operation	0.25	megohm
For cathode-bias operation	1	megohm

Gated AGC Amplifier and Noise Inverter**MAXIMUM RATINGS (Design-Maximum Values)**

	Pentode Unit	
DC Plate Voltage	300	volts
Peak Positive-Pulse Plate Voltage#	600	volts
Grid-No.3 (Control-Grid) Voltage:		
Positive-bias value	0	volts
Negative-bias value	-100	volts
Grid-No.2 (Screen-Grid) Supply Voltage	300	volts
Grid-No.2 Voltage		
Grid-No.1 (Control-Grid) Voltage:		
Positive-bias value	0	volts
Negative-bias value	-50	volts

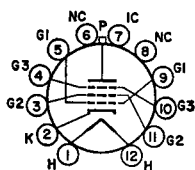
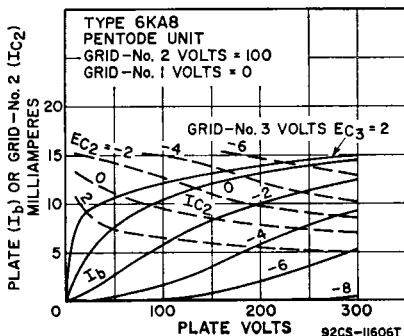
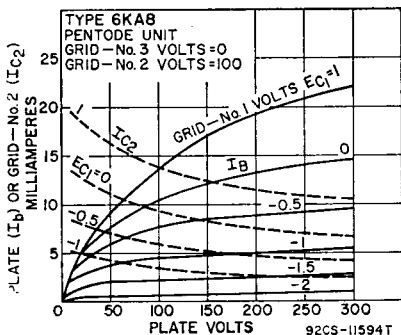
See curve page 300

Plate Dissipation	2	watts
Grid-No.2 Input:		
For grid-No.2 voltages up to 150 volts	1.1	watts
For grid-No.2 voltages between 150 and 300 volts	See curve page 300	

MAXIMUM CIRCUIT VALUES

Grid-No.3-Circuit Resistance	0.68	megohm
Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.5	megohm
For cathode-bias operation	1	megohm

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



12GW

BEAM POWER TUBE

6KD6

30KD6, 36KD6/40KD6

Duodecax type used as horizontal-deflection amplifier in television receivers. Outlines section, 16C; requires duodecax 12-contact socket. Types 30KD6 and 36KD6/40KD6 are identical with type 6KD6 except for heater ratings.

	6KD6	30KD6	36KD6/40KD6	
Heater Voltage	6.3	30	36	volts
Heater Current	2.85	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			0.8	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3			40	pF
Plate to Cathode, Heater, Grid No.2, and Grid No. 3			16	pF

Horizontal-Deflection Amplifier

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

MAXIMUM RATINGS (Design-Maximum Values)

DC Plate Supply Voltage	990	volts
Peak Positive-Pulse Plate Voltage#	7000	volts
Positive DC Grid-No.3 Voltage	20	volts
Grid-No.2 Voltage	200	volts
Peak Negative-Pulse Grid-No.1 Voltage	250	volts
Peak Cathode Current	1400	mA
Average Cathode Current	400	mA
Plate Dissipation*	33	watts
Grid-No.2 Input	5	watts
Bulb Temperature (At hottest point)	225	°C

Class A₁ Amplifier

	Triode† Connection	Pentode Connection	
Plate Voltage	150	60 150	volts
Grid No.3 (Suppressor Grid)		Connected to cathode at socket	

Grid-No.2 (Screen-Grid) Voltage	150	110	110	volts
Grid-No.1 (Control-Grid) Voltage	-22.5	0	-22.5	volts
Amplification Factor	4	—	—	
Plate Resistance (Approx.)	—	—	6000	ohms
Transconductance	—	—	14000	μ mhos
Plate Current	—	750**	120	mA
Grid-No.2 Current	—	42**	1.8	mA
Grid-No.1 Voltage (Approx.) for plate current of 1.0 μ A	—	—	-40	volts

MAXIMUM CIRCUIT VALUE

Grid-No.1-Circuit Resistance	2.2	megohms
Grid-No.3-Circuit Resistance	0.01	megohm

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

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

† Grid-No.2 connected to plate at socket.

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

6KD8

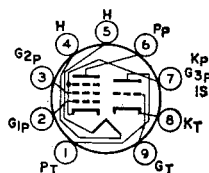
For replacement use type 6U8A/6KD8.

6KE8

4KE8, 5KE8

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

Miniature type with frame-grid pentode unit used as combined oscillator-mixer tube in television receivers using an intermediate frequency in the order of 40 MHz. Outlines section, 6B; requires miniature 9-contact socket. Types 4KE8 and 5KE8 are identical with type 6KE8 except for heater ratings.

**9DC**

Heater Voltage (ac/dc)	4.5	5.6	6.3	volts
Heater Current	0.6	0.45	0.4	ampere
Heater Warm-up Time (Average)	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:†

Triode Unit:

Grid to Plate	1.3	pF
Grid to Cathode, Heater, Pentode Cathode, Pentode Grid No.3, and Internal Shield	2.4	pF
Plate to Cathode, Heater, Pentode Cathode, Pentode Grid No.3, and Internal Shield	2	pF

Pentode Unit:

Grid No.1 to Plate	0.015 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	3.4	pF
Heater to Triode Cathode and Pentode Cathode	5.5*	pF

† With external shield connected to cathode of unit under test, except as noted.

* With external shield connected to ground.

Class A₁ Amplifier**MAXIMUM RATINGS (Design-Maximum Values)**

	Triode Unit	Pentode Unit	
Plate Voltage	280	280	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	280	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	0	volts
Cathode Current	20	20	mA
Plate Dissipation	2	2	watts
Grid-No.2 Input:			
For grid-No.2 voltages up to 140 volts	—	0.5	watt
For grid-No.2 voltages between 140 and 280 volts	—	See curve page 300	

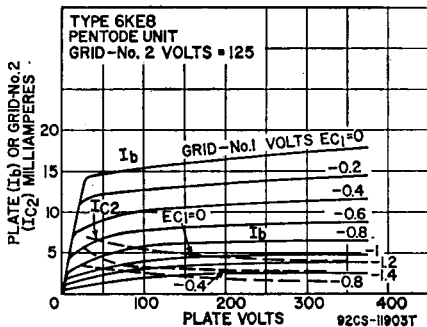
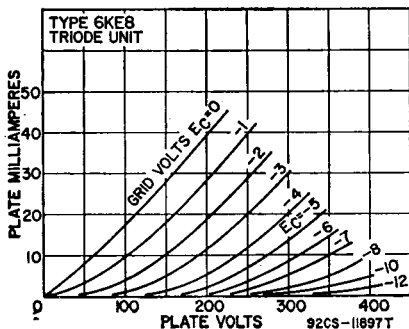
CHARACTERISTICS

Plate Supply Voltage	125	125	volts
Grid-No.2 Supply Voltage	—	125	volts
Grid-No.1 Supply Voltage	0	0	volts
Cathode-Bias Resistor	68	33	ohms
Amplification Factor	40	—	
Plate Resistance (Approx.)	5000	125000	ohms
Transconductance	8000	12000	μ mhos

Plate Current	13	10	mA
Grid-No.2 Current	—	2.8	mA
Grid-No.1 Voltage (Approx.):			
For plate current of 100 μ A	5	—	volts
For plate current of 50 μ A	—	-3	volts

MAXIMUM CIRCUIT VALUES

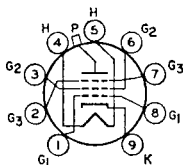
Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.5	0.25	megohm
For cathode-bias operation	1	0.5	megohm



POWER PENTODE

**6KG6A/
EL509**

40KG6A/PL509



Magnoval type used as a horizontal-deflection amplifier in color television receivers. Outlines section, 38A; requires 9-contact magnoval socket. Type 40KG6A/PL509 is identical with type 6KG6A/EL509 except for heater ratings.

Heater Voltage (ac/dc)	6.3	40	volts
Heater Current	2	0.3	amperes
Peak Heater-Cathode Voltage	250		volts
Direct Interelectrode Capacitances:			
Plate to Grid-No.1	2.5		pF
Grid-No.1 to Heater	0.2		pF

Class A₁ Amplifier

CHARACTERISTICS

Plate Voltage	45	160	volts
Grid-No.3 Voltage†	0	0	volts
Grid-No.2 Voltage	160	160	volts
Grid-No.1 Voltage	0	0	volts
Plate Current ^a	1000 (min.)	1400	mA
Grid-No.2 Current ^a	—	45	mA

Horizontal-Deflection Amplifier

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

MAXIMUM RATINGS (Design-Maximum Values)

Plate Supply Voltage	700	volts
Peak Positive-Pulse Plate Voltage*	7000	volts
Grid-No.2 Voltage (zero-current)	700	volts
Grid-No.2 Voltage	250	volts
Plate Dissipation (Absolute-Maximum Value)	34	watts
Grid-No.2 Input	7	watts
Cathode Current	500	mA

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.25	megohm
For cathode-bias operation	2.2	megohms

‡ In horizontal-deflection service, 15 volts may be applied to grid-No.3 to minimize snivets.

* These values can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

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

6KL8

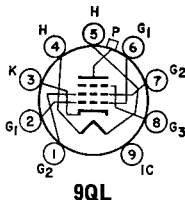
Refer to chart at end of section.

6KM6

22KM6

BEAM POWER TUBE

Novar type used as horizontal-deflection amplifier in color and black-and-white television receivers. Outlines section, 18A; requires novar 9-contact socket. Type 22KM6 is identical with type 6KM6 except for heater ratings.

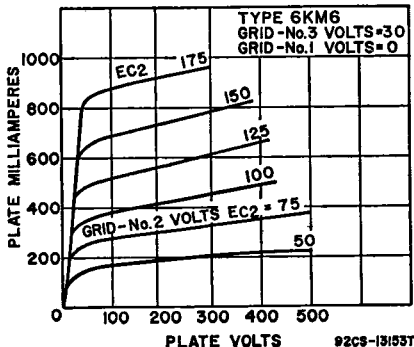
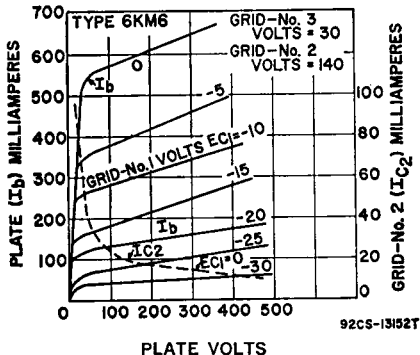


	6KM6	22KM6	
Heater Voltage (ac/dc)	6.3	22	volts
Heater Current	1.6	0.45	amperes
Heater Warm-up Time	—	11	seconds
Heater-Cathode Voltage:			
Peak value	±200 max	±200 max	volts
Average value	100 max	100 max	volts
Direct Interelectrode Capacitances:			
Grid No.1 to Plate		1.2	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3		22	pF
Plate to Cathode, Heater, Grid No.2, and Grid No.3		9	pF

Class A₁ Amplifier

CHARACTERISTICS

	Triode Connection		Pentode Connection		
Plate Voltage	140	—	60	140	volts
Peak Positive-Pulse Plate Voltage**	—	6500	—	—	volts
Grid-No.3 (Suppressed-Grid) Voltage	0	30	30	30	volts
Grid-No.2 (Screen-Grid) Voltage	140	140	140	140	volts
Grid-No.1 (Control-Grid) Voltage	-24.5	—	0	-24.5	volts
Amplification Factor†	4	—	—	—	
Plate Resistance (Approx.)	—	—	—	6000	ohms
Transconductance	—	—	—	9500	μmhos
Plate Current	—	—	560††	80	mA
Grid-No.2 Current	—	—	31††	2.4	mA
Grid-No.1 Voltage for plate current of 1 mA	—	-110	—	-42	volts



92CS-13152T

92CS-13155T

Horizontal-Deflection Amplifier

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

MAXIMUM RATINGS (Design-Maximum Values)

DC Plate Supply Voltage	770	volts
Peak Positive-Pulse Plate Voltage#	6500	volts
Peak Negative-Pulse Plate Voltage	1500	volts
DC Grid-No.3 Voltage*	75	volts
DC Grid-No.2 Voltage	220	volts
Peak Negative-Pulse Grid-No.1 Voltage	330	volts
Peak Cathode Current	950	mA
Average Cathode Current	275	mA
Grid-No.2 Input	3.5	watts
Plate Dissipation**	20	watts
Bulb Temperature (At hottest point)	240	°C

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance:		
For grid-resistor-bias operation	0.47	megohm
For plate-pulsed operation	10	megohms

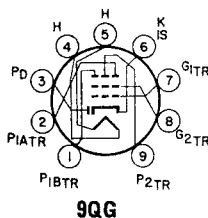
Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).

‡ With grid No.3 and grid No.2 connected, respectively, to cathode and plate at socket.

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

* In this service, a positive value may be applied to grid No.3 to minimize "snivets" interference; a typical value for this voltage is 30 volts.

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



9QG

**DIODE—SHARP-CUTOFF
THREE-PLATE TETRODE**

6KM8

Miniature type used in frequency-divider and complex-wave generator circuits of electronic musical instruments. In such circuits the tetrode unit can provide three independent output-signal voltages; the diode unit can be used as a key in a vibrato circuit. **Outlines** section, 6E; requires miniature 9-contact socket.

Heater Voltage (ac/dc)	6.3	volts
Heater Current	0.3	ampere
Heater-Cathode Voltage:		
Peak value	±200 max	volts
Average value	100 max	volts
Direct Interelectrode Capacitances:		
Tetrode Unit:		
Grid No.1 to Plate No.1A	0.02 max	pF
Grid No.1 to Plate No.1B	0.02 max	pF
Grid No.1 to Plate No.2	0.06 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Internal Shield	5.5	pF
Plate No.1A to Cathode, Heater, Grid No.2, and Internal Shield	1.2	pF
Plate No.1B to Cathode, Heater, Grid No.2, and Internal Shield	1.3	pF
Plate No.2 to Cathode, Heater, Grid No.2, and Internal Shield	1.8	pF
Tetrode Grid No.1 to Diode Plate	0.024 max	pF
Tetrode Plate No.1A to Diode Plate	0.18	pF
Tetrode Plate No.1B to Diode Plate	0.024	pF
Tetrode Plate No.2 to Diode Plate	0.013	pF

Tetrode Unit as Class A₁ Amplifier

Plates No. 1A, 1B, and 2 connected together

CHARACTERISTICS

Plate Voltage	100	volts
Grid-No.2 Voltage	100	volts
Grid-No.1 Supply Voltage	0	volts
Grid-No.1 Resistor (Bypassed)	2.2	megohms
Plate Resistance (Approx.)	30000	ohms
Transconductance	3400	μmhos
Plate Current	4.2	mA
Grid-No.2 Current	1.7	mA
Grid-No.1 Voltage (Approx.) for plate current of 20 μA	-4	volts

Triode Connection—Plates No.1A, 1B, and 2 connected to grid No.2

Plate Voltage	100	volts
Grid-No.1 Supply Voltage	0	volts
Grid-No.1 Resistor (Bypassed)	2.2	megohms
Transconductance	4500	μ mhos
Amplification Factor	45	
Plate Current	5.5	mA

Separate-plate operation; plates not under test grounded

Plate	1A	1B	2	
Plate Voltage	100	100	100	volts
Grid-No.2 Voltage	100	100	100	volts
Grid-No.1 Supply Voltage	0	0	0	volts
Grid-No.1 Resistor (Bypassed)	2.2	2.2	2.2	megohms
Transconductance	2000	2000	1800	μ mhos
Plate Resistance (Approx.)	0.1	0.1	0.12	megohm
Plate Current	2.3	2.3	2.1	mA
Grid-No.2 Current	3.8	3.8	3.3	mA

Tetrode Unit as Frequency Divider and Complex-Wave Generator

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage (Each plate)	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	volts
Negative-bias value	50	volts
Plate Dissipation (Each plate)	1	watt
Grid-No.2 Input:		
For grid-No.2 voltages up to 165 volts	0.65	watt
For grid-No.2 voltages between 165 and 330 volts	See curve page 300	

MAXIMUM CIRCUIT VALUE

Grid-No.1-Circuit Resistance, for grid-No.1-resistor-bias operation	2.2	megohms
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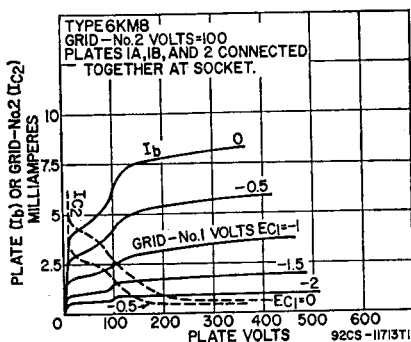
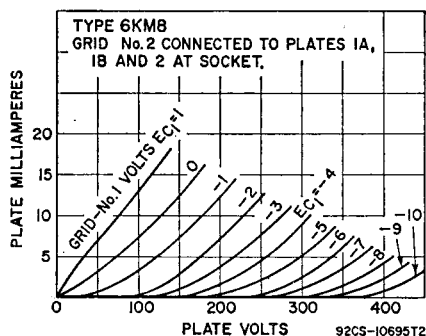
Diode Unit

MAXIMUM RATINGS (Design-Maximum Values)

Plate Current	1	mA
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CHARACTERISTICS, Instantaneous Value

Tube Voltage Drop for plate current of 2 mA	10	volts
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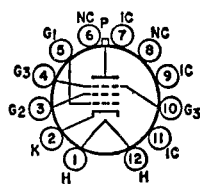


6KN6

42KN6

BEAM PENTODE

Duodecar type used as horizontal-deflection amplifier in color and black-and-white television receivers. Outlines section, 39B; requires duodecar 12-contact socket. Type 42KN6 is identical with type 6KN6 except for heater ratings.



12GU

	6KN6 Parallel	42KN6 Series	
Heater Arrangement	6.3	42	volts
Heater Voltage	3	0.45	ampere
Heater Current	—	11	seconds
Heater Warm-up Time			
Heater-Cathode Voltage:			
Peak value	±200 max	±200 max	volts
Average value	100 max	100 max	volts

Class A₁ Amplifier

CHARACTERISTICS	Triode* Connection		Pentode Connection		
	Plate Voltage	130	5500	60	
Grid-No.2 (Screen-Grid) Voltage ..	130	125	125	130	volts
Grid-No.1 (Control-Grid) Voltage ..	-20	—	0	-20	volts
Plate Resistance	—	—	—	4000	ohms
Transconductance	—	—	—	16000	μmhos
Plate Current	—	—	800 ^A	100	mA
Grid-No.2 Current	—	—	50 ^A	4	mA
Grid-No.1 Voltage (Approx.) for plate current of 1 mA	—	—	—	-33	volts
Grid-No.1 Voltage (Approx.) for plate current of 75 μA	—	100	—	—	volts
Amplification Factor	4.5	—	—	—	

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

* Grid No.2 connected to plate.

Horizontal-Deflection Amplifier

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

MAXIMUM RATINGS (Design-Maximum Values)

DC Plate Supply Voltage	770	volts
Peak Positive-Pulse Plate Voltage#	6500	volts
Peak Negative-Pulse Plate Voltage	1500	volts
Grid-No.2 Voltage	220	volts
Peak Negative-Pulse Grid-No.1 Voltage ..	330	volts
Average Cathode Current	400	mA
Peak Cathode Current	1500	mA
Plate Dissipation*	30	watts
Grid-No.2 Input	5	watts
Bulb Temperature (At hottest point)	260	°C

MAXIMUM CIRCUIT VALUE

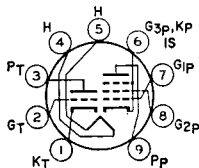
Grid-No.1-Circuit Resistance	1	megohm
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Pulse duration must not exceed 15% of one horizontal scanning cycle (10 microseconds).

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

Refer to chart at end of section.

6KN8/6RHH8



9DX

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

6KR8

10KR8

Miniature type used in television receiver applications. The triode unit is used as a general-purpose amplifier; the pentode unit is used as a video amplifier. Outlines section, 6E; requires miniature 9-contact socket. Type 10KR8 is identical with type 6KR8 except for heater ratings.

	6KR8	10KR8	
Heater Voltage (ac/dc)	6.3	10.5	volts
Heater Current	0.75	0.45	ampere
Heater Warm-up Time (Average)	—	11	seconds
Heater-Cathode Voltage:			
Peak value	±200 max	±200 max	volts
Average value	100 max	100 max	volts

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

	Triode Unit	Pentode Unit	
Plate Voltage	—	330	volts
Grid-No.2 (Screen-Grid) Supply Voltage	330	330	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	0	volts
Plate Dissipation	2	5	watts
Grid-No.2 Input:			
For voltages up to 165 volts	—	1.1	watts
For voltages between 165 and 330 volts	—	See curve page 300	

CHARACTERISTICS

	Triode Unit	Pentode Unit	
Plate Supply Voltage	125	35	200
Grid-No.2 Supply Voltage	—	100	100
Grid-No.1 Voltage	—	0	—
Cathode-Bias Resistor	68	—	82
Amplification Factor	46	—	—
Plate Resistance (Approx.)	4400	—	60000
Transconductance	10400	—	20000
Plate Current	15	54	19.5
Grid-No.2 Current	—	13.5	3
Grid-No.1 Voltage (Approx.) for plate current of 10 μ A	—8	—	—
Grid-No.1 Voltage (Approx.) for plate current of 100 μ A	—	—	-6.3

MAXIMUM CIRCUIT VALUES

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

6KS6

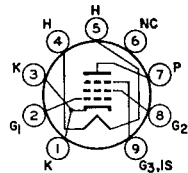
For replacement use type 6BN6/6KS6.

6KT6

3KT6, 4KT6

SEMIREMOTE-CUTOFF
PENTODE

Miniature type with frame grid used as if-amplifier tube in television receivers utilizing an intermediate frequency in the order of 40 MHz. Outlines section, 6B; requires miniature 9-contact socket. Types 3KT6 and 4KT6 are identical with type 6KT6 except for heater ratings.



9PM

	3KT6	4KT6	6KT6	
Heater Voltage (ac/dc)	3.5	4.5	6.3	volts
Heater Current	0.6	0.45	0.3	ampere
Heater Warm-up Time (Average)	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	—	—	0.019 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	—	—	9.5	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	—	—	3	pF

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

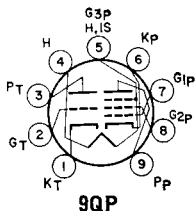
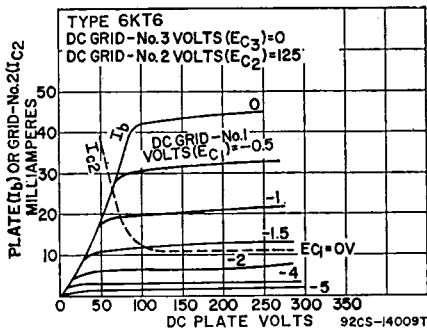
Plate Voltage	330	volts
Grid-No.3 (Suppressor-Grid) Voltage	0	volts
Grid-No.2 (Screen-Grid) Supply Voltage	330	volts
Grid-No.2 Voltage	See curve page 300	
Grid-No.1 (Control-Grid) Voltage	0	volts
Plate Dissipation	3.1	watts
Grid-No.2 Input:		
For grid-No.2 voltages up to 165 volts	0.6	watt
For grid-No.2 voltages between 165 and 330 volts	See curve page 300	

CHARACTERISTICS

Plate Supply Voltage	125	170	volts
Grid-No.3 Voltage	0	0	volts
Grid-No.2 Supply Voltage	125	170	volts
Cathode-Bias Resistor	56	56	ohms
Plate Resistor	160000	—	ohms
Transconductance	18000	—	μ mhos
Plate Current	17	—	mA
Grid-No.2 Current	4.2	—	mA
Grid-No.1 Voltage (Approx.) for transconductance of 10 μ mhos	—	-22	volts

MAXIMUM CIRCUIT VALUES

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



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

6KT8

Miniature type used in color and black-and-white television receiver applications. The pentode unit is used as an if-amplifier tube, and the triode unit as a sync-separator or voltage-amplifier tube. Outlines section, 6B; requires miniature 9-contact socket.

Heater Voltage (ac/dc)	6.3	volts
Heater Current	0.6	ampere
Heater-Cathode Voltage:		
Peak value	± 200 max	volts
Average value	100 max	volts

Direct Interelectrode Capacitances:

Triode Unit:

	Unshielded	Shielded	
Grid to Plate	3	3	pF
Grid to Cathode, Heater, Grid No.3 of Pentode Unit, and Internal Shield	3.2	3.2	pF
Plate to Cathode, Heater, Grid No.3 of Pentode Unit, and Internal Shield	1.6	2.4	pF

Pentode Unit:

Grid No.1 to Plate	0.046 max	0.030 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	7.5	7.5	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	2.2	2.8	pF
Grid of Triode Unit to Plate of Pentode Unit	0.018 max	0.003 max	pF
Grid No.1 of Pentode Unit to Plate of Triode Unit	0.006 max	0.002 max	pF

Class A, 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:			
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	

CHARACTERISTICS

Plate Voltage	250	125	volts
Grid-No.2 Voltage	—	125	volts
Grid-No.1 Voltage	—2	—1	volts
Amplification Factor	100	—	
Plate Resistance (Approx.)	31500	150000	ohms
Transconductance	3200	10000	μ mhos
Plate Current	1.8	12	mA
Grid-No.2 Current	—	4.5	mA
Grid-No.1 Voltage (Approx.) for plate current of 20 μ A	—3.5	—7	volts

MAXIMUM CIRCUIT VALUES

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

6KU8 Refer to chart at end of section.

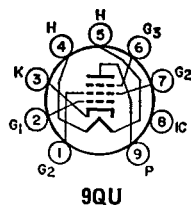
6KV6 Refer to chart at end of section.

6KV6A

17KV6A, 22KV6A

BEAM POWER TUBE

Novar type used for high-voltage pulse- or shunt-regulator applications in color television receivers. Outlines section, 31D; requires novar 9-contact socket. Types 17KV6A and 22KV6A are identical with type 6KV6A except for heater ratings.



	6KV6A	17KV6A	22KV6A	
Heater Voltage (ac/dc)	6.3	16.8	22	volts
Heater Current	1.6	0.6	0.45	amperes
Heater Warm-up Time	—	11	11	seconds
Heater-Cathode Voltage:				
Peak value	+200 max —500 max 100 max	+200 max —500 max 100 max	+200 max —500 max 100 max	volts
Average value				volts
Direct Interelectrode Capacitances (Approx.):				
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		9		pF

Class A₁ Amplifier**CHARACTERISTICS**

Plate Voltage	100	140	volts
Grid-No.3 (Suppressor-Grid) Voltage	0	0	volts
Grid-No.2 (Screen-Grid) Voltage	140	140	volts
Grid-No.1 (Control-Grid) Voltage	0	—24.5	volts
Triode Amplification Factor#	—	4	
Plate Resistance (Approx.)	—	10000	ohms
Transconductance	—	6000	μ mhos
Plate Current	440 \blacksquare	40	mA
Grid-No.2 Current	30 \blacksquare	2.4	mA
Grid-No.1 Voltage for plate current of 1 mA	—	—42	volts

High-Voltage-Pulse Shunt Regulator

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

MAXIMUM RATINGS (Design-Maximum Values)

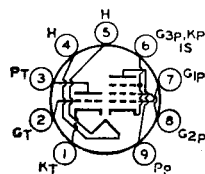
DC Plate Supply Voltage ($I_b = 0$ mA)	900	volts
Peak Positive-Pulse Plate Voltage ^A	6500	volts

Peak Negative-Pulse Plate Voltage	1500	volts
Peak Positive-Pulse Grid-No.2 Voltage	600	volts
DC Grid-No.3 Voltage	75	volts
DC Grid-No.2 Voltage	220	volts
DC Grid-No.1 Voltage, Negative-bias value	250	volts
Peak Negative-Pulse Grid-No.1 Voltage	330	volts
Peak Cathode Current	950	mA
Average Cathode Current	275	mA
Plate Dissipation†	28	watts
Grid-No.2 Input	2	watts
Bulb Temperature (At hottest point)	240	°C

MAXIMUM CIRCUIT VALUE

Grid-No.1-Circuit Resistance:
 For grid-No.1-resistor-bias operation 1 megohm

- # Grid-No.3 and grid-No.2 connected, respectively, to cathode and plate at socket.
- This value can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.
- ▲ Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).
- ‡ Adequate circuit precautions must be taken to protect the tube in the absence of grid-No.1 bias.
- Plate dissipations up to 32 watts maximum are permissible for short periods of time provided the maximum envelope-temperature rating is not exceeded. This condition may exist under high-line voltage, zero picture tube beam current.



9DX

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

**6KV8
11KV8**

Miniature type with frame-grid pentode unit used in black-and-white television receivers. The triode unit is used in general-purpose voltage-amplifier, sync-separator, and sound-if-amplifier applications. The pentode unit is used as a video-output tube. Outlines section, 6E; requires miniature 9-contact socket. For curves of

average plate characteristics for triode unit, refer to type 6AW8A. Type 11KV8 is identical with type 6KV8 except for heater ratings.

	6KV8	11KV8	
Heater Voltage (ac/dc)	6.3	10.9	volts
Heater Current	0.775	0.45	ampere
Heater Warm-up Time (Average)	—	11	seconds
Heater-Cathode Voltage:			
Peak value	±200 max	±200 max	volts
Average value	100 max	100 max	volts

Direct Interelectrode Capacitances (Approx.):

Triode Unit:		
Grid to Plate	3.7	pF
Grid to Cathode, Heater, Pentode Cathode, Pentode Grid No.3, and Internal Shield	2.5	pF
Plate to Cathode, Heater, Pentode Cathode, Pentode Grid No.3, and Internal Shield	2.4	pF
Triode Grid to Pentode Plate	0.015 max	
Pentode Unit:		
Grid No.1 to Plate	0.12 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	13	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	4.8	pF
Pentode Plate to Triode Plate	0.17 max	pF

Class A₁ Amplifier

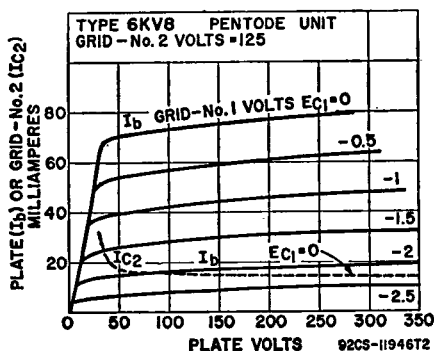
MAXIMUM RATINGS (Design-Maximum Values)	Triode Unit	Pentode Unit	
Plate Voltage	300	300	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	300	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	0	volts
Plate Dissipation	1	5	watts
Grid-No.2 Input:			
For Grid-No.2 voltages up to 150 volts	—	1	watt
For Grid-No.2 voltages between 150 and 300 volts	—	See curve page 300	

CHARACTERISTICS

	Triode Unit	Pentode Unit		
Plate Supply Voltage	200	125	200	volts
Grid-No.2 Supply Voltage	—	125	125	volts
Grid-No.1 Supply Voltage	—2	0	0	volts
Cathode-Bias Resistor	—	82	68	ohms
Amplification Factor	70	—	—	
Plate Resistance (Approx.)	17500	55000	75000	ohms
Transconductance	4000	21000	23000	μmhos
Plate Current	4	16.5	20	mA
Grid-No.2 Current	—	3.1	3.5	mA
Grid-No.1 Voltage (Approx.) for plate current of 100 μA	—4.5	—4.2	—4.2	volts

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance:	Triode Unit	Pentode Unit	
For fixed-bias operation	0.5	0.1	megohm
For cathode-bias operation	1	0.25	megohm

**6KY6**

Refer to chart at end of section.

6KY8

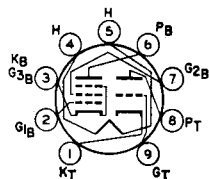
Refer to chart at end of section.

6KY8A

15KY8A

**HIGH-MU TRIODE—
BEAM POWER TUBE**

Novar type used in combined vertical-deflection-oscillator and vertical-deflection-amplifier applications in black-and-white television receivers having low-voltage "B" supplies. Outlines section, 30A; requires novar 9-contact socket. Type 15KY8A is identical with type 6KY8A except for heater ratings.

**9KY8**

Heater Voltage (ac/dc)	6.3	15	volts
Heater Current	1.1	0.45	amperes
Heater Warm-up Time (Average)	—	11	seconds
Heater Cathode Voltage:			
Peak value	±200 max	±200 max	volts
Average value	100 max	100 max	volts
Direct Interelectrode Capacitances (Approx.):			
Triode Unit:			
Grid to Plate		0.44	pF
Grid to Cathode and Heater		15	pF
Plate to Cathode and Heater		7	pF
Pentode Unit:			
Grid No.1 to Plate		0.048	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3		2.6	pF
Plate to Cathode, Heater, Grid No.2, and Grid No.3		0.28	pF

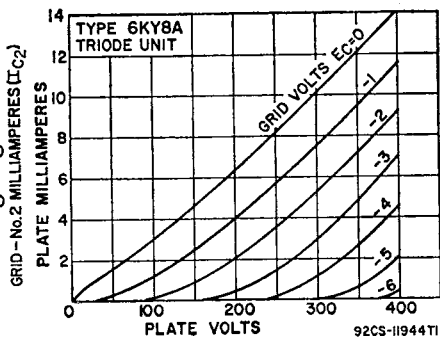
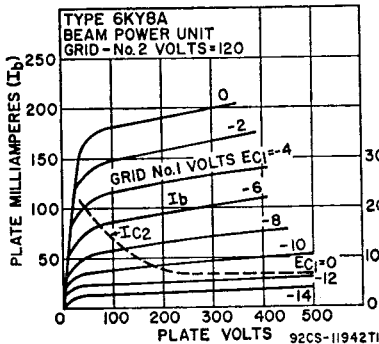
Class A₁ Amplifier

CHARACTERISTICS

	Triode Unit	Beam Power Unit			
Plate Voltage	250	50	135	120	volts
Grid-No.2 (Screen-Grid) Voltage	—	120	120	*	volts
Grid-No.1 (Control-Grid) Voltage	-3	0	-10	-10	volts
Amplification Factor	64	—	—	7	
Plate Resistance (Approx.)	40000	—	18000	—	ohms
Transconductance	1600	—	8400	—	μmhos
Plate Current	1.4	170*	39	—	mA
Grid-No.2 Current	—	20*	3	—	mA
Grid-No.1 Voltage (Approx.) for plate current of 1 mA	—	—	-24	—	volts

* Triode connection, grid No.2 connected to plate at socket.

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



Vertical-Deflection Oscillator and Amplifier

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

MAXIMUM RATINGS (Design-Maximum Values)

DC Plate Voltage	330	300	volts
Peak Positive-Pulse Plate Voltage#	—	2200†	volts
(Absolute Maximum)	—	150	volts
DC Grid-No.2 Voltage	400	250	volts
Peak Negative-Pulse Grid-No.1 Voltage	77	200	mA
Peak Cathode Current	22	60	mA
Average Cathode Current	1.5	12	watts
Plate Dissipation	—	1.9	watts
Grid-No.2 Input	—	—	—

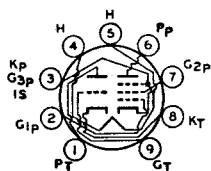
Triode Unit Oscillator	Beam Power Unit Amplifier	
330	300	volts
—	2200†	volts
—	150	volts
400	250	volts
77	200	mA
22	60	mA
1.5	12	watts
—	1.9	watts

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance:			
For grid-resistor-bias operation	2.2	2.2	megohms

Pulse duration must not exceed 15% of a vertical scanning cycle (2.5 milliseconds).

† Under no conditions should this maximum value be exceeded.



9FZ

MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE

6KZ8

5KZ8, 9KZ8

Miniature type used as combined oscillator and mixer in vhf color and black-and-white television receivers. Outlines section, 6B; requires miniature 9-contact socket. Types 5KZ8 and 9KZ8 are identical with type 6KZ8 except for heater ratings.

	5KZ8	6KZ8	9KZ8	
Heater Voltage (ac/dc)	4.7	6.3	9.45	volts
Heater Current	0.6	0.45	0.3	ampere
Heater Warm-up Time (Average)	11	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:^a

Triode Unit:				
Grid to Plate			1.6	pF
Grid to Triode Cathode, Pentode Cathode, Heater, Pentode Grid No.3, and Heater			3.2	pF
Plate to Triode Cathode, Pentode Cathode, Heater, Pentode Grid No.3, and Heater			1.8	pF
Pentode Unit:				
Grid No.1 to Plate			0.01 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield			5.5	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield			3.4	pF
Heater to Cathode (Each Unit)			3.2#	pF

* With external shield connected to cathode.

With external shield connected to ground.

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	2.5	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	

CHARACTERISTICS

Plate Voltage	125	125	volts
Grid-No.2 Voltage	—	125	volts
Grid-No.1 Voltage	—1	—1	volt
Amplification Factor	46	—	
Plate Resistance (Approx.)	5400	20000	ohms
Transconductance	8500	7500	μmhos
Plate Current	13.5	12	mA
Grid-No.2 Current	—	4	mA
Grid-No.1 Voltage (Approx.) for plate current of 10 μA	—8	—8	volts

MAXIMUM CIRCUIT VALUES

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

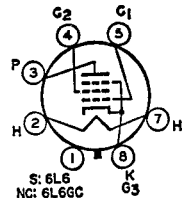
6L5G

Refer to chart at end of section.

6L6
6L6GC

BEAM POWER TUBE

Metal type 6L6 and glass octal type 6L6GC are used in the output stage of audio amplifying equipment, especially units designed to have ample reserve of power-delivering ability. Outlines section, 4 and 19D, respectively; require octal socket. These tubes, like other power-handling tubes, should be adequately ventilated. Type 6L6GC can be used in place of type 6L6 and may be supplied with pin 1 omitted.



7AC

Heater Voltage (ac/dc)		6.3	volts
Heater Current		0.9	ampere
Heater-Cathode Voltage:	6L6	6L6GC	
Peak value	±180 max	±200 max	volts
Average value	—	100 max	volts
Direct Interelectrode Capacitances (Approx.):			
Grid No.1 to Plate	0.4*	0.6	pF
Grid No.1 to Cathode, Heater, Grid No.2, and			
Grid No.3	10*	10	pF
Plate to Cathode, Heater, Grid No.2, and			
Grid No.3	12*	6.5	pF

* With pin 1 connected to pin 8.

Class A₁ Amplifier

MAXIMUM RATINGS	6L6		6L6GC		
	Design- Center Values	Center Values	Design Maximum Values	Maximum Values	
Plate Voltage	360	360	500	500	volts
Grid-No.2 (Screen-Grid) Voltage	270	270	450 [▲]	450	volts
Plate Dissipation	19	19	30	30	watts
Grid-No.2 Input	2.5	2.5	5	5	watts

TYPICAL OPERATION

Plate Voltage	250	300	350	350	volts
Grid-No.2 Voltage	250	200	250	250	volts
Grid-No.1 (Control-Grid) Voltage	-14	-12.5	-18	-18	volts
Peak AF Grid-No.1 Voltage	14	12.5	18	18	volts
Zero-Signal Plate Current	72	48	54	54	mA
Maximum-Signal Plate Current	79	55	66	66	mA
Zero-Signal Grid-No.2 Current	5	2.5	2.5	2.5	mA
Maximum-Signal Grid-No.2 Current	7.3	4.7	7	7	mA
Plate Resistance (Approx.)	22500	35000	33000	33000	ohms
Transconductance	6000	5300	5200	5200	μmhos
Load Resistance	2500	4500	4200	4200	ohms
Total Harmonic Distortion	10	11	15	15	per cent
Maximum-Signal Power Output	6.5	6.5	10.8	10.8	watts

▲ In push-pull circuits where grid No.2 of each tube is connected to a tap on the plate winding of the output transformer, this maximum rating is 500 volts.

Class A₁ Amplifier (Triode Connection)†

MAXIMUM RATINGS	6L6		6L6GC		
	Design- Center Values	Center Values	Design Maximum Values	Maximum Values	
Plate Voltage	275	275	450	450	volts
Plate Dissipation (Total)	19	19	30	30	watts

TYPICAL OPERATION

Plate Voltage	250	250	250	250	volts
Grid-No.1 Voltage	—	—	—	—	volts
Peak AF Grid-No.1 Voltage	20	20	20	20	volts
Zero-Signal Plate Current	40	40	40	40	mA
Maximum-Signal Plate Current	44	44	44	44	mA
Plate Resistance (Approx.)	1700	1700	1700	1700	ohms
Amplification Factor	8	8	8	8	
Transconductance	4700	4700	4700	4700	μmhos
Load Resistance	5000	5000	5000	5000	ohms
Total Harmonic Distortion	5	5	5	5	per cent
Maximum-Signal Power Output	1.4	1.4	1.4	1.4	watts

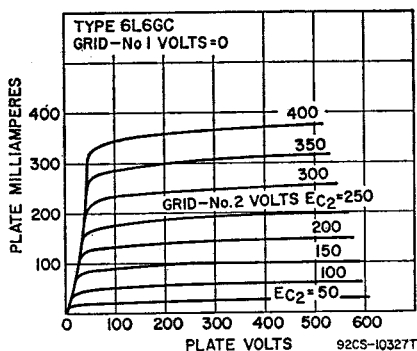
† Grid No.2 connected to plate.

Push-Pull Class A₁ Amplifier

MAXIMUM RATINGS (Same as for Class A₁ Amplifier)

TYPICAL OPERATION (Values are for two tubes)

Plate Voltage	250	270	270	270	volts
Grid-No.2 Voltage	250	270	270	270	volts
Grid-No.1 Voltage	-16	-17.5	-17.5	-17.5	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	32	35	35	35	volts
Zero-Signal Plate Current	120	134	134	134	mA
Maximum-Signal Plate Current	140	155	155	155	mA
Zero-Signal Grid-No.2 Current	10	11	11	11	mA
Maximum-Signal Grid-No.2 Current	16	17	17	17	mA
Effective Load Resistance (Plate-to-plate)	5000	5000	5000	5000	ohms
Total Harmonic Distortion	2	2	2	2	per cent
Maximum-Signal Power Output	14.5	17.5	17.5	17.5	watts



Push-Pull Class AB₁ Amplifier

MAXIMUM RATINGS (Same as for Class A₁ Amplifier)

TYPICAL OPERATION (Values are for two tubes)

	6L6	6L6GC	
Plate Voltage	360	360	450 volts
Grid-No.2 Voltage	270	270	400 volts
Grid-No.1 Voltage	-22.5	-22.5	-37 volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	45	45	70 volts
Zero-Signal Plate Current	88	88	116 mA
Maximum-Signal Plate Current	132	140	210 mA
Zero-Signal Grid-No.2 Current	5	5	5.6 mA
Maximum-Signal Grid-No.2 Current	15	11	22 mA
Effective Load Resistance (Plate-to-plate)	6600	3800	5600 ohms
Total Harmonic Distortion	2	2	1.8 per cent
Maximum-Signal Power Output	26.5	18	55 watts

Push-Pull Class AB₂ Amplifier

MAXIMUM RATINGS (Same as for Class A₁ Amplifier)

TYPICAL OPERATION (Values are for two tubes)

Plate Voltage	360	360	volts
Grid-No.2 Voltage	225	270	volts
Grid-No.1 Voltage	-18	-22.5	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	52	72	volts
Zero-Signal Plate Current	78	88	mA
Maximum-Signal Plate Current	142	205	mA
Zero-Signal Grid-No.2 Current	3.5	5	mA
Maximum-Signal Grid-No.2 Current	11	16	mA
Effective Load Resistance (Plate-to-plate)	6000	3800	ohms
Total Harmonic Distortion	2	2	per cent
Maximum-Signal Power Output	31	47	watts

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.1	megohm
For cathode-bias operation	0.5	megohm

6L6G Refer to chart at end of section.

6L6GB Refer to chart at end of section.

6L7 Refer to chart at end of section.

6L7G Refer to chart at end of section.