

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.

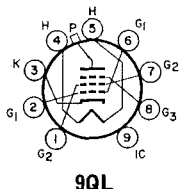
6MHH3

6MJ6/

BEAM POWER TUBE

6LQ6/6JE6C

24LQ6/24JE6C, 31LQ6



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.

Heater Voltage (ac/dc)	6MJ6/	6LQ6/6JE6C	24LQ6/24JE6C	31LQ6	
Heater Current	6.3	24	24	31	volts
Heater Warm-up Time	2.3	0.6	0.45	—	amperes
Heater-Cathode Voltage:	—	11	11	11	seconds
Peak value	± 200 max	± 200 max	± 200 max	± 200 max	volts
Average value	100 max	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	—
Plate Voltage	145	—	60
Grid-No.3 (Suppressor-Grid) Voltage	—	30	30
Grid-No.2 (Screen-Grid) Voltage	145	145	145
Grid-No.1 (Control-Grid) Voltage	—35	—	—35
Plate Resistance (Approx.)	—	—	7000
Transconductance	—	—	7500
Plate Current	—	710 $\pm$	96

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 ^o	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:

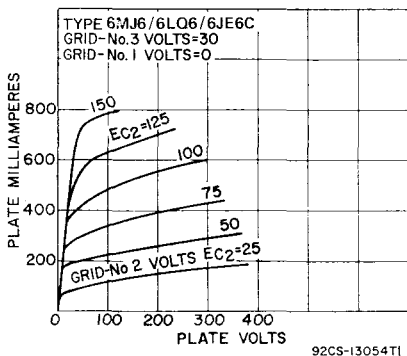
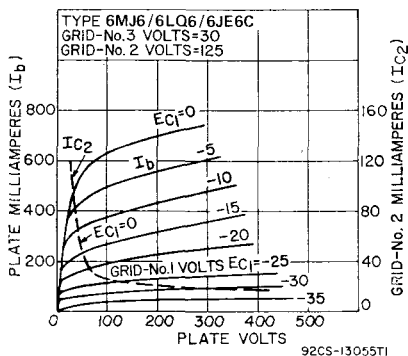
For grid-No.1-resistor-bias operation	0.47	megohm
For plate-pulsed operation (horizontal-deflection circuits only)	10	megohms

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.

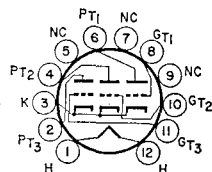
▲ Total continuous or accumulated time not to exceed 40 seconds.



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	
Grid to Cathode and Heater	2.8	2.8	2.8	pF
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)

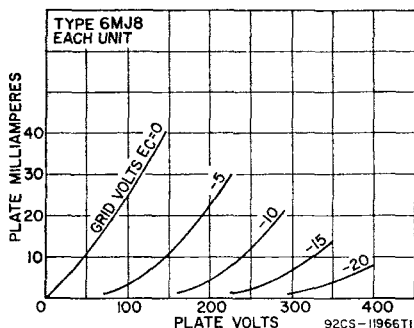
Plate Voltage	330	volts
Grid Voltage, Positive-bias value	0	volts
Plate Dissipation	3	watts

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 mhos
Plate Current for grid voltage of -14 volts	4	mA
Grid Voltage for plate current of 50 μ A	-23	volts

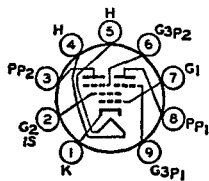
MAXIMUM CIRCUIT VALUE

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

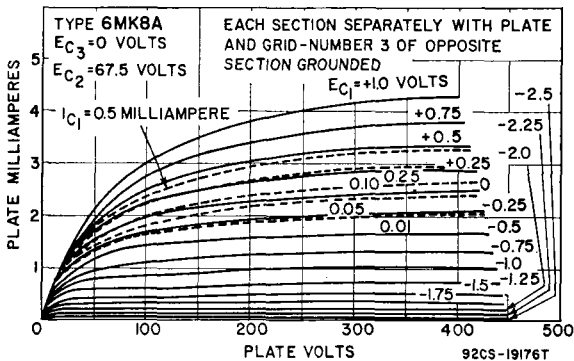
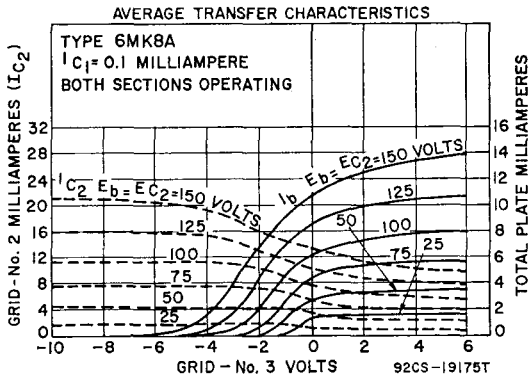
CHARACTERISTICS

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

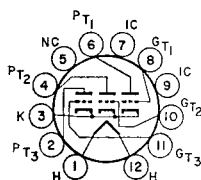


MAXIMUM CIRCUIT VALUES

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.

	6MN8	9MN8	
Heater Voltage	6.3	9.5	volts
Heater Current	0.9	0.6	ampere
	—	11	seconds
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)**

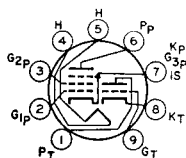
Plate Voltage	330	volts
Grid Voltage, Positive-bias value	0	volt
Plate Dissipation	3	watts

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
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**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.

	5MQ8	6MQ8	
Heater Voltage (ac/dc)	5.6	6.3	volts
Heater Current	0.6	0.535	ampere
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:			
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

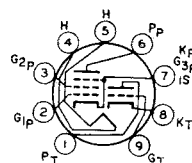
MAXIMUM CIRCUIT VALUES

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)

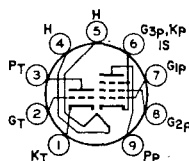
	Triode Unit	Pentode Unit	
Plate Voltage	330	330	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	330	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	0	volts
Grid-No.2 Input	2.5	3.75	watts
Plate Dissipation	—	1.1	watts

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