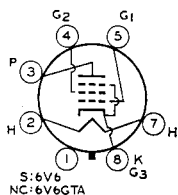


6V6
6V6GTA
12V6GT

BEAM POWER TUBE



Metal type 6V6 and glass octal type 6V6GTA are used as output amplifiers in automobile, battery-operated, and other receivers in which reduced plate-current drain is desirable. Outlines section, 2B and 13D, respectively; require octal socket. These tubes are equivalent in performance to type 6AQ5A. Refer to type 6AQ5A for average plate characteristic curves. Type 12V6GT is identical with type 6V6GTA except for heater ratings.

7AC

7AC
S: 6V6
NC: 6V6GTA

	6V6	6V6GTA	12V6GT	
Heater Voltage (ac/dc)	6.3	6.3	12.6	volts
Heater Current	0.45	0.45	0.225	ampere
Heater Warm-up Time (Average)	—	11	—	seconds
Heater-Cathode Voltage:				
Peak value	±200 max	±200 max	±200 max	volts
Average value	100 max	100 max	100 max	volts
		6V6°	6V6GTA	
Direct Interelectrode Capacitances (Approx.):				
Grid No.1 to Plate		0.3	0.7	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3		10	9	pF
Plate to Cathode, Heater, Grid No.2, and Grid No.3		11	7.5	pF

° With shell connected to cathode.

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	350	volts
Grid-No.2 (Screen-Grid) Voltage	315	volts
Plate Dissipation	14	watts
Grid-No.2 Input	2.2	watts

TYPICAL OPERATION

Plate Voltage	180	250	315	volts
Grid-No.2 Voltage	180	250	225	volts
Grid-No.1 (Control-Grid) Voltage	-8.5	-12.5	-13	volts
Peak AF Grid-No.1 Voltage	8.5	12.5	13	volts
Zero-Signal Plate Current	29	45	34	mA
Maximum-Signal Plate Current	30	47	35	mA
Zero-Signal Grid-No.2 Current	3	4.5	2.2	mA
Maximum-Signal Grid-No.2 Current	4	7	6	mA
Plate Resistance (Approx.)	50000	50000	80000	ohms
Transconductance	3700	4100	3750	μmhos
Load Resistance	5500	5000	8500	ohms
Total Harmonic Distortion	8	8	12	per cent
Maximum-Signal Power Output	2	4.5	5.5	watts

CHARACTERISTICS (Triode Connection)▲

Plate Voltage	250	volts
Grid-No.1 (Control-Grid) Voltage	-12.5	volts
Amplification Factor	9.8	
Plate Resistance (Approx.)	1960	ohms
Transconductance	5000	μmhos
Plate Current	49.5	mA
Grid-No.1 Voltage (Approx.) for plate current of 0.5 mA	-36	volts

▲ 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	285	volts
Grid-No.2 Voltage	250	285	volts
Grid-No.1 (Control-Grid) Voltage	-15	-19	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	30	38	volts
Zero-Signal Plate Current	70	70	mA
Maximum-Signal Plate Current	79	92	mA
Zero-Signal Grid-No.2 Current	5	4	mA
Maximum-Signal Grid-No.2 Current	13	13.5	mA

Effective Load Resistance (Plate-to-Plate)	10000	8000	ohms
Total Harmonic Distortion	5	3.5	per cent
Maximum-Signal Power Output	10	14	watts

MAXIMUM CIRCUIT VALUES

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

Vertical-Deflection Amplifier (Triode Connection)[▲]

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

MAXIMUM RATINGS (Design-Maximum Values)

DC Plate Voltage		350	volts
Peak Positive-Pulse Plate Voltage#		1200	volts
Peak Negative-Pulse Grid-No.1 (Control-Grid) Voltage		275	volts
Peak Cathode Current		115	mA
Average Cathode Current		40	mA
Plate Dissipation		10	watts

MAXIMUM CIRCUIT VALUE

Grid-No.1-Circuit Resistance, for cathode-bias operation	2.2	megohms
--	-----	---------

[▲] Grid No.2 connected to plate.

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

6V6GT Refer to chart at end of section.

6V6GTY Refer to chart at end of section.

6V7G Refer to chart at end of section.

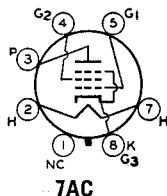
6W4GT Refer to chart at end of section.

6W6GT

12W6GT

BEAM POWER TUBE

Glass octal type used in the audio output stage of radio and color and black-and-white television receivers. Triode-connected, it is used as a vertical-deflection amplifier in television receivers. Outlines section, 13D; requires octal socket. This type may be supplied with pin No.1 omitted. Type 12W6GT is identical with type 6W6GT except for heater ratings.



7AC

Heater Voltage (ac/dc)	6W6GT	12W6GT	volts
Heater Current	1.2	0.6	ampere
Heater Warm-up Time (Average)	—	11	seconds
Heater-Cathode Voltage:			

Peak value	±200 max	{ +200 max —300 max +100 max —200 max	volts
Average value	100 max		volts

Direct Interelectrode Capacitances (Approx.):

Grid No.1 to Plate	0.8	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3	15	pF
Plate to Cathode, Heater, Grid No.2, and Grid No.3	9	pF

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	330	volts
Grid-No.2 (Screen-Grid) Voltage	165	volts
Plate Dissipation	12	watts
Grid-No.2 Input	1.35	watts

TYPICAL OPERATION

Plate Supply Voltage	110	200	volts
Grid-No.2 Supply Voltage	110	125	volts
Grid-No.1 (Control-Grid) Voltage	—7.5	—	volts
Cathode-Bias Resistor	—	180	ohms
Peak AF Grid-No.1 Voltage	7.5	8.5	volts
Zero-Signal Plate Current	49	46	mA
Maximum-Signal Plate Current	50	47	mA
Zero-Signal Grid-No.2 Current	4	2.2	mA
Maximum-Signal Grid-No.2 Current	10	8.5	mA
Plate Resistance (Approx.)	13000	28000	ohms

Transconductance	8000	8000	μ mhos
Load Resistance	2000	4000	ohms
Total Harmonic Distortion (Approx.)	10	10	per cent
Maximum-Signal Power Output	2.1	3.8	watts

CHARACTERISTICS (Triode Connection)*

Plate Voltage	225	volts
Grid-No.1 Voltage	-30	volts
Amplification Factor	6.2	
Plate Resistance (Approx.)	1600	ohms
Transconductance	3800	μ mhos
Plate Current	22	mA
Grid No.1 Voltage (Approx.) for plate current of 0.5 mA	-42	volts

MAXIMUM CIRCUIT VALUES:

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

* Grid No.2 connected to plate.

Vertical-Deflection Amplifier

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

MAXIMUM RATINGS (Design-Maximum Values)

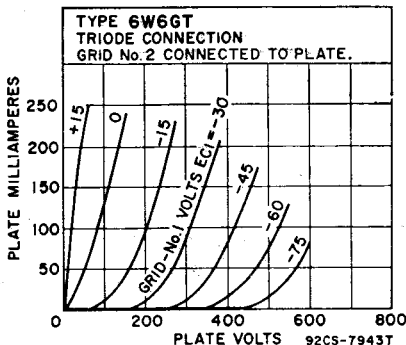
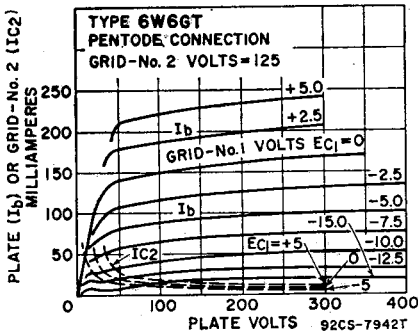
	Triode Connection*	Pentode Connection	
DC Plate Voltage	330	330	volts
Peak Positive-Pulse Plate Voltage#	1200	1500	volts
DC Grid No.2 (Screen-Grid) Voltage	—	165	volts
Peak Negative-Pulse Grid-No.1 Voltage	275	275	volts
Peak Cathode Current	195	195	mA
Average Cathode Current	65	65	mA
Plate Dissipation	8.5	8	watts
Grid-No.2 Input	—	1.2	watts

MAXIMUM CIRCUIT VALUE

Grid-No.1-Circuit Resistance, for cathode-bias operation	2.2	2.2	megohms
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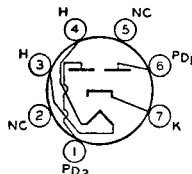
* Grid No.2 connected to plate.

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



Refer to chart at end of section.

6W7G



5B5

FULL-WAVE VACUUM RECTIFIER

6X4

12X4

Miniature type used in power supply of automobile and ac-operated radio receivers. Equivalent in performance to larger type 6X5GT. Outlines section, 5D; requires miniature 7-contact socket. This tube, like other power-handling tubes, should be adequately ventilated. For discussion of Rating Chart and Operation

Characteristics, refer to Interpretation of Tube Data. Type 12X4 is identical with type 6X4 except for heater ratings.

	6X4	12X4	
Heater Voltage (ac/dc)	6.3 ^A	12.5	volts
Heater Current	0.6	0.3	ampere
Heater-Cathode Voltage:			
Peak value	+200, -450 max		volts
Average value	100 max		volts

^A When the heater is operated from a 3-cell (nominal-6-volt) storage-battery source, the permissible heater-voltage range is from 5 to 8 volts.

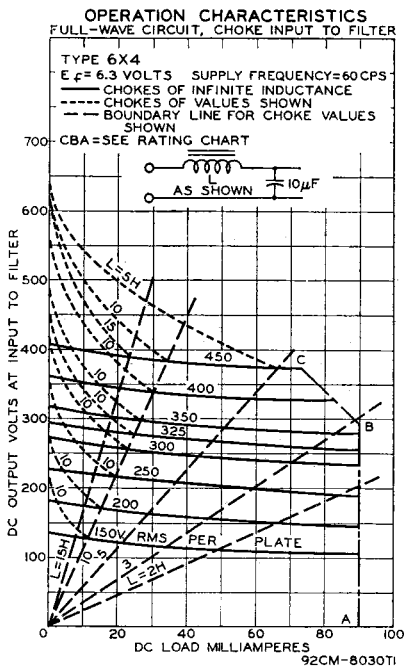
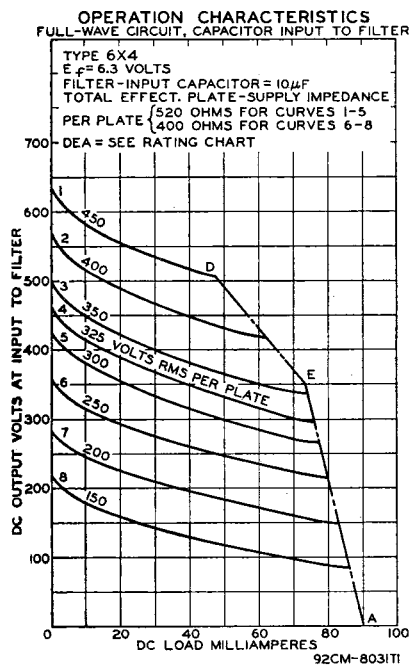
Full-Wave Rectifier

MAXIMUM RATINGS (Design-Maximum Values)

Peak Inverse Plate Voltage	1250	volts
Steady-State Peak Plate Current (Per Plate)	245	mA
AC Plate Supply Voltage (Per Plate, rms)	See Rating Chart	
DC Output Voltage (At filter input)†	350	volts
Average Output Current (Each plate)†	45	mA
Hot-Switching Transient Plate Current	#	

† This rating applies when the 6X4 is used in vibrator operation with a minimum duty cycle of 75 per cent.

If hot-switching is regularly required in operation, the use of choke-input circuits is recommended. Such circuits limit the hot-switching current to a value no higher than that of the peak plate current. When capacitor-input circuits are used, a maximum peak current value per plate of 1.1 amperes during the initial cycles of the hot-switching transient should not be exceeded.



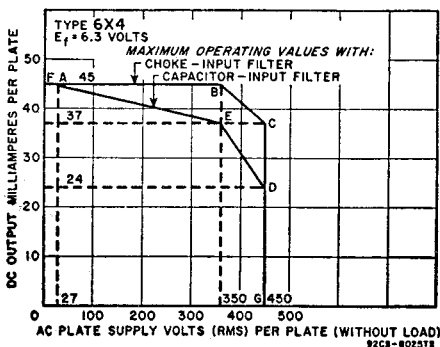
TYPICAL OPERATION

Filter Input

AC Plate Supply Voltage (Each plate, rms) * ..	325	400	—	volts
Filter Input Capacitor	10	—	10	μF
Effective Plate Supply Impedance (Each plate) ..	525	—	—	ohms
Filter Input Choke	—	10	—	henries
Average Output Current	70	70	70	mA
DC Output Voltage at Input to Filter (Approx.)	310	340	240	volts

* AC plate supply voltage is measured without load.

RATING CHART

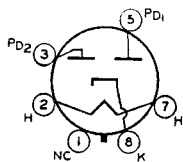


Refer to chart at end of section.

6X4W

Refer to chart at end of section.

6X5



6S

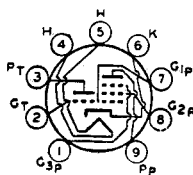
**FULL-WAVE
VACUUM RECTIFIER**

6X5GT

Glass octal type used in power supply of automobile and ac-operated receivers. Outlines section, 13D; requires octal socket. This type may be supplied with pin No.1 omitted. For maximum ratings, and typical operation, refer to type 6X4.

Refer to chart at end of section.

6X8



9AK

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

6X8A

5X8, 19X8

Miniature type used as combined oscillator and mixer tube in television receivers utilizing an intermediate frequency in the order of 40 MHz and in AM/FM receivers. Outlines section, 6B; requires miniature 9-contact socket. Types 5X8 and 19X8 are identical with type 6X8A except for heater ratings.

Heater Voltage (ac/dc)	5X8	6X8A	19X8	
Heater Current	4.7	6.3	18.4	volts
Heater Warm-up Time (Average)	0.6	0.45	0.15	ampere
Heater-Cathode Voltage:	11	11	—	seconds
Peak value	±200 max	±200 max	±200 max	volts
Average value	100 max	100 max	100 max	volts
Direct Interelectrode Capacitances:	Unshielded Shielded^A			
Triode Unit:				
Grid to Plate	1.5	1.5		pF
Grid to Cathode and Heater	2	2.4		pF
Plate to Cathode and Heater	0.5	1		pF
Pentode Unit:				
Grid No.1 to Plate	0.09 max	0.06 max		pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3	4.6	4.8		pF
Plate to Cathode, Heater, Grid No.2, and Grid No.3	0.9	1.6		pF
Pentode Grid No.1 to Triode Plate	0.05 max	0.04 max		pF
Pentode Plate to Triode Plate	0.05 max	0.008 max		pF
Heater to Cathode	6.5	6.5*		pF

- * With external shield connected to cathode except as noted.
- With external shield connected to pentode plate.

Class A₁ Amplifier

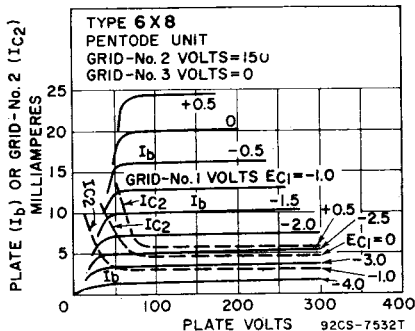
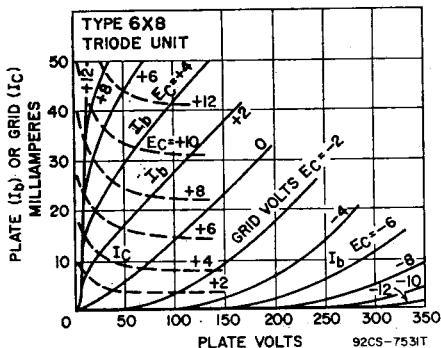
MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	275
Grid No.2 (Screen-Grid) Supply Voltage	—
Grid-No.2 Voltage	— See curve page 300
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0
Plate Dissipation	1.7
Grid-No.2 Input:	
For grid-No.2 voltages up to 137.5 volts	—
For grid-No.2 voltages between 137.5 and 275 volts	— See curve page 300

Triode Unit	Pentode Unit	
275	275	volts
—	275	volts
—	See curve page 300	
0	0	volts
1.7	2.3	watts
—	0.45	watt
—	See curve page 300	

CHARACTERISTICS

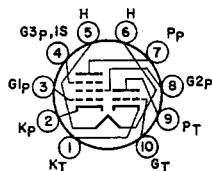
Plate Voltage	125	125	volts
Grid No.3	—	Connected to cathode at socket	
Grid-No.2 Voltage	—	125	volts
Grid-No.1 Voltage	-1	-1	volt
Amplification Factor	40	—	
Plate Resistance (Approx.)	6000	30000	ohms
Transconductance	6500	5500	μ mhos
Plate Current	12	9	mA
Grid-No.2 Current	—	2.2	mA
Grid-No.1 Voltage (Approx.) for plate current of 20 μ A	-7	-6.5	volts



6X9/ ECF200

HIGH-MU TRIODE— SHARP-CUTOFF PENTODE

Miniature type used as if-amplifier tube in television receivers. Outlines section 6B, except has 10-pin base; requires miniature 10-contact socket.



10K

Heater Voltage	6.3	volts
Heater Current	0.41	ampere
Peak Heater-Cathode Voltage	± 150 max	volts
Direct Interelectrode Capacitances:		
Triode Unit:		
Plate to All Other Elements (except grid)	3	pF
Grid to All Other Elements (except plate)	2.5	pF
Plate to Grid	2	pF
Pentode Unit:		
Plate to All Other Elements (except grid No.1)	3.5	pF
Grid No.1 to All Other Elements (except plate)	6.5	pF
Grid No.1 to Cathode	4	pF
Plate to Grid No.1	<6.5	pF
Grid No.1 to Grid No.2	1.8	pF

Pentode Grid No.1 to Triode Plate	15	pF
Pentode Grid No.1 to Triode Grid	<1.2	pF
Pentode Plate to Triode Plate	<1.5	pF

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)	Triode Unit	Pentode Unit	
Plate Supply Voltage	550	550	volts
Plate Voltage	250	250	volts
Peak Plate Voltage*	600	—	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	550	volts
Grid-No.2 Voltage	—	250	volts
Cathode Current	18	18	mA
Plate Dissipation	1.5	2.1	watts
Grid-No.2 Input	—	0.7	watt

CHARACTERISTICS

Plate Voltage	170	160	volts
Grid-No.3 (Suppressor-Grid) Voltage	—	0	volts
Grid-No.2 Voltage	—	135	volts
Grid-No.1 (Control-Grid) Voltage	-1	-1.7	volts
Mu Factor, Grid-No.1 to Grid-No.2	—	55	
Amplification Factor	55	—	
Transconductance	4800	14000	μmhos
Plate Current	8.5	13	mA
Grid-No.2 Current	—	5	mA

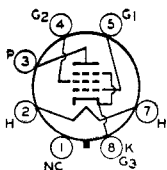
MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance	1	1	megohm
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* With a maximum duty factor of 0.18 and maximum pulse duration of 18 microseconds.

Refer to chart at end of section.

6Y5



7AC

BEAM POWER TUBE

**6Y6GA/
6Y6G**

Glass octal type used as output amplifier in radio receivers and in rf-operated, high-voltage power supplies in television equipment. Outlines section, 19B; requires octal socket.

Heater Voltage (ac/dc)	6.3	volts
Heater Current	1.25	amperes
Peak Heater-Cathode Voltage	±180 max	volts
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to Plate	0.7	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3	12	pF
Plate to Cathode, Heater, Grid No.2, and Grid No.3	7.5	pF

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Center Values)		
Plate Voltage	200	volts
Grid-No.2 (Screen-Grid) Supply Voltage	200	volts
Grid-No.2 Voltage	See curve page 300	
Plate Dissipation	12.5	watts
Grid-No.2 Input:		
For grid-No.2 voltages up to 100 volts	1.75	watts
For grid-No.2 voltages between 100 and 200 volts	See curve page 300	

TYPICAL OPERATION

Plate Voltage	135	200	volts
Grid-No.2 Voltage	135	135	volts
Grid-No.1 (Control-Grid) Voltage	-13.5	-14	volts
Peak AF Grid-No.1 Voltage	13.5	14	volts
Zero-Signal Plate Current	58	61	mA
Maximum-Signal Plate Current	60	66	mA
Zero-Signal Grid-No.2 Current	3.5	2.2	mA
Maximum-Signal Grid-No.2 Current	11.5	9	mA
Plate Resistance (Approx.)	9300	18300	ohms
Transconductance	7000	7100	μmhos
Load Resistance	2000	2600	ohms
Total Harmonic Distortion	10	10	per cent
Maximum-Signal Power Output	3.6	6	watts

MAXIMUM CIRCUIT VALUES

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

6Y6GT

For replacement use type 6Y6GA/6Y6G.

6Y7G

Refer to chart at end of section.

6Y9

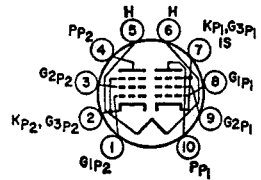
Refer to chart at end of section.
For replacement use type 6Y9/EFL200.

6Y9/EFL200

17Y9

DUAL PENTODE

Miniature type for use in color and black-and-white television receiver applications. Unit No. 1 is used as a video output pentode, and unit No. 2 as a sound if amplifier, agc amplifier, or sync separator. Outlines section, 6L, except has 10-pin base; requires miniature 10-contact socket. Type 17Y9 is identical with type 6Y9/EFL200 except for heater ratings.



10L

	6Y9/ EFL200	17Y9	
Heater Voltage	6.3	16.5	volts
Heater Current	0.8	0.3	ampere
Peak Heater-Cathode Voltage	±200	±200	volts
Direct Interelectrode Capacitances:			
Unit No.1:			
Plate to All Other Elements (except grid No.1)		7	pF
Grid No.1 to All Other Elements (except plate)		12	pF
Plate to Grid No.1		95	pF
Unit No.2:			
Plate to All Other Elements (except grid No.1)		11	pF
Grid No.1 to All Other Elements (except plate)		10	pF
Plate to Grid No.1		140	pF
Grid No.1 to Heater		<100	pF
Plate to Plate		<150	pF
Grid to Grid		<10	pF
Plate (Unit No.1) to Grid No.1 (Unit No.2)		<100	pF
Plate (Unit No.2) to Grid No.1 (Unit No.2)		<5	pF

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)	Unit No.1	Unit No.2	
Plate Supply Voltage	550	550	volts
Plate Voltage	250	250	volts
Grid-No.2 (Screen-Grid) Supply Voltage	550	550	volts
Grid-No.2 Voltage	250	250	volts
Cathode Current	60	15	mA
Plate Dissipation	5	1.5	watts
Grid-No.2 Input	2.5	0.5	watts

CHARACTERISTICS

Plate Voltage	170	150	volts
Grid-No.2 Voltage	170	150	volts
Grid-No.1 (Control-Grid) Voltage	-2.6	-2.3	volts
Mu Factor, Grid-No.1 to Grid-No.2	38	35	
Internal Resistance	40	160	kohms
Transconductance	21000	8500	μmhos
Plate Current	30	10	mA
Grid-No.2 Current	6.5	3	mA

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance	1	1	megohm
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6Z4

Refer to chart at end of section.
For replacement use type 84/6Z4.

6Z5

Refer to chart at end of section.

6Z7G

Refer to chart at end of section.

6Z10

Refer to chart at end of section.