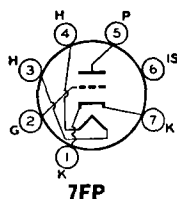


6ER5**3ER5****HIGH-MU TRIODE**

Miniature type with frame grid used in vhf tuners of color and black-and-white television receivers. Outlines section 5C; requires miniature 7-contact socket. Type 3ER5 is identical to type 6ER5 except for heater ratings.

**7FP**

	3ER5	6ER5	
Heater Voltage (ac/dc)	2.8	6.3	volts
Heater Current	0.45	0.18	ampere
Peak Heater-Cathode Voltage	±100 max	±100 max	volts
Direct Interelectrode Capacitances:	Unshielded	Shielded*	
Grid to Plate	0.38	0.36	pF
Grid to Cathode, Heater, and Internal Shield	4.4	4.4	pF
Plate to Cathode, Heater, and Internal Shield	3	4	pF
Grid to Heater	0.28 max	0.28 max	pF
Plate to Cathode	0.24	0.2Δ	pF
Cathode to Grid	3.1	3.1Δ	pF
Heater to Cathode	2.5	2.5Δ	pF

* With external shield connected to cathode except as noted.

Δ With external shield connected to ground.

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

Plate Voltage	250	volts
Grid Voltage, Negative-bias value	50	volts
Cathode Current	20	mA
Plate Dissipation	2.2	watts

CHARACTERISTICS

Plate Voltage	200	volts
Grid Voltage	-1.2	volts
Amplification Factor	80	
Plate Resistance (Approx.)	8000	ohms
Transconductance	10500	μmhos
Plate Current	10	mA
Grid Voltage (Approx.) for transconductance of 500 μmhos	-3.8	volts
Grid Voltage (Approx.) for transconductance of 100 μmhos	-5.6	volts

MAXIMUM CIRCUIT VALUE

Grid-Circuit Resistance	1	megohm
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6ES5

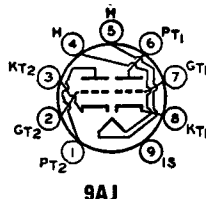
Refer to chart at end of section.

6ES8

Refer to chart at end of section.

**6ES8/
ECC189****VARIABLE-MU TWIN TRIODE**

Miniature type used as cascode-type amplifier in tuners of television receivers. Outlines section, 6B; requires miniature 9-contact socket.

**9AJ**

Heater Voltage (ac/dc)	6.3	volts	
Heater Current	0.365	ampere	
Direct Interelectrode Capacitances:	Unshielded	Shielded*	
Grid to Plate (Each Unit)	1.9	1.9	pF
Plate to Cathode (Each Unit)	0.18	0.17	pF
Heater to Cathode (Each Unit)	3	3 _A	pF
Plate of Unit No.2 to Plate of Unit No.1	0.04 max	0.015 max	pF
Plate of Unit No.2 to Grid of Unit No.1	0.003 max	0.003 max	pF
Grid of Unit No.1 to Cathode of Unit No.2	0.002 max	0.002 max	pF

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

Δ With external shield connected to ground.

Class A₁ Amplifier (Each Unit)

CHARACTERISTICS

Plate Voltage	90	90	90	volts
Grid Voltage	-1.2	-5	-9	volts
Plate Resistance (Approx.)	2500	—	—	ohms
Transconductance	12500	625	125	μ mhos
Plate Current	15	—	—	mA

Cascode-Type Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Supply Voltage with plate current of 0 mA	550	volts
Plate Voltage (Each unit)	130	volts
Grid Voltage, Negative-bias value (Each unit)	50	volts
Cathode Current (Each unit)	22	mA
Plate Dissipation (Each unit)	1.8	watts
Heater-Cathode Voltage:		
Unit No.1:°		
RMS voltage between cathode and heater	50	volts
Unit No.2:■		
RMS voltage between cathode and heater*	50	volts
DC voltage between cathode and heater*	130	volts

TYPICAL OPERATION in a cascode-type circuit

Supply Voltage	180	volts
Plate Current	15	mA
Transconductance	12500	μ mhos
Noise Figure*	6.5	dB
Grid Voltage (Approx.) for transconductance of 125 μ mhos	-9	volts
Input Voltage for cross-modulation factor of 0.01 and transconductance of 125 μ mhos	500	mV

MAXIMUM CIRCUIT VALUE

Grid-Circuit Resistance (Each unit)	1	megohm
-------------------------------------	---	--------

* Grounded-cathode input unit—pins 6, 7, and 8.

■ Grounded-grid output unit—pins 1, 2, and 3.

• Cathode positive with respect to heater.

■ With grid of output unit connected to a voltage divider.

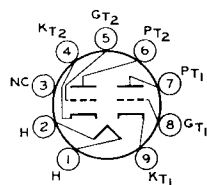
* Measured with tube operating in a television tuner.

Refer to chart at end of section.

6ET7

6EU7

HIGH-MU TWIN TRIODE



9LS

Miniature type used in high-gain, resistance-coupled, low-level audio-amplifier applications where low-hum and non-microphonic characteristics are important, such as microphone amplifiers and pre-amplifiers for phonographs. Outlines section, 6B; requires miniature 9-contact socket. For typical operation as a resistance-coupled amplifier, refer to Resistance-Coupled Amplifier section.

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 (Each Unit, Approx.):		
Grid to Plate	1.5	pF
Grid to Cathode and Heater	1.6	pF
Plate to Cathode and Heater	0.2	pF
Equivalent Noise and Hum Voltage (Referenced to Grid, Each Unit):		
Average Value*	1.8 microvolts rms	

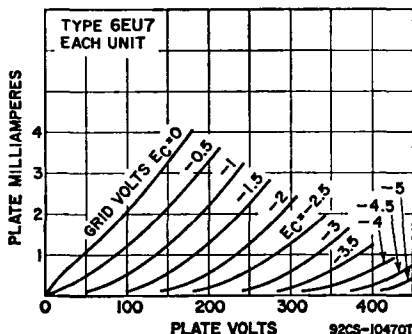
* Measured in "true rms" units under the following conditions: Heater volts (ac), 6.3; center-tap of heater transformer grounded; plate supply volts, 250; plate load resistor, 100000 ohms; cathode resistor, 2700 ohms; cathode bypass capacitor, 100 μ F; grid resistor, 0 ohms; amplifier frequency range, 25 to 10000 Hz.

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

Plate Voltage	330	volts
Grid Voltage:		
Negative-bias value	55	volts
Positive-bias value	0	watts
Plate Dissipation	1.2	watts

CHARACTERISTICS

Plate Voltage	100	250	volts
Grid Voltage	-1	-2	volts
Amplification Factor	100	100	
Plate Resistance (Approx.)	80000	62500	ohms
Transconductance	1250	1600	μ mhos
Plate Current	0.5	1.2	mA

**6EU8**

Refer to chart at end of section.

6EV5**SHARP-CUTOFF TETRODE**

Miniature type used as rf amplifier in vhf tuners of television receivers. Outlines section, 5C; requires miniature 7-contact socket.

Heater Voltage (ac/dc)	6.3	volts
Heater Current	0.2	ampere
Heater-Cathode Voltage:		
Peak value	± 100 max	volts
Average value	50 max	volts
Direct Interelectrode Capacitances: ^a		
Grid No.1 to Plate	0.035 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Internal Shield ..	4.5	pF
Plate to Cathode, Heater, Grid No.2, and Internal Shield ..	2.9	pF

^a With external shield connected to cathode.

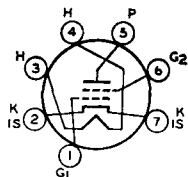
**7EW**

Plate Voltage	275	volts
Grid-No.2 (Screen-Grid) Supply Voltage	180	volts
Grid-No.2 Voltage	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	volts
Cathode Current	20	mA
Plate Dissipation	3.25	watts

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

Plate Voltage	275	volts
Grid-No.2 (Screen-Grid) Supply Voltage	180	volts
Grid-No.2 Voltage	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	volts
Cathode Current	20	mA
Plate Dissipation	3.25	watts
Grid-No.2 Input:		
For grid-No.2 voltages up to 90 volts	0.2	watt
For grid-No.2 voltages between 90 and 180 volts	See curve page 300	

CHARACTERISTICS

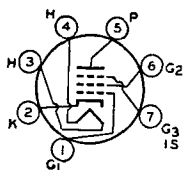
Plate Voltage	250	volts
Grid-No.2 Voltage	80	volts
Grid-No.1 Voltage	—1	volt
Plate Resistance (Approx.)	0.15	megohm
Transconductance	8800	μ mhos
Plate Current	11.5	mA
Grid-No.2 Current	0.9	mA
Grid-No.1 Voltage (Approx.) for transconductance of 100 μ mhos ..	—4.5	volts

MAXIMUM CIRCUIT VALUE

Grid-No.1-Circuit Resistance	0.5	megohm
------------------------------------	-----	--------

Refer to chart at end of section.

6EV7



7CM

SHARP-CUTOFF PENTODE

6EW6

5EW6

Miniature type used in the gain-controlled picture-ify stages of vhf color and black-and-white television receivers operating at an intermediate frequency in the order of 40 MHz. Outlines section, 5C; requires miniature 7-contact socket. Type 5EW6 is identical with type 6EW6 except for heater ratings.

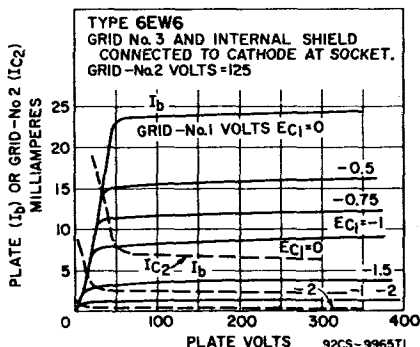
	5EW6	6EW6	
Heater Voltage (ac/dc)	5.6	6.3	volts
Heater Current	0.45	0.4	ampere
Heater Warm-up Time (Average)	11	—	seconds
Heater-Cathode Voltage:			
Peak value	±200 max	±200 max	volts
Average value	100 max	100 max	volts
Direct Interelectrode Capacitances:	Unshielded	Shielded*	
Grid No.1 to Plate	0.04 max	0.03 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	10	10	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	2.4	3.4	pF

* With external shield connected to cathode.

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	330	volts
Grid No.3 (Suppressor-Grid) Voltage, Positive value	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, Positive-bias value	0	volts
Plate Dissipation	3.1	watts
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	



CHARACTERISTICS

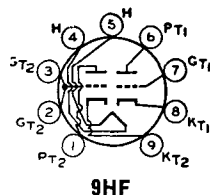
Plate Supply Voltage	125	volts
Grid No.3	Connected to cathode at socket	
Grid-No.2 Supply Voltage	125	volts
Cathode-Bias Resistor	56	ohms
Plate Resistance (Approx.)	0.2	megohm
Transconductance	14000	μ mhos
Plate Current	11	mA
Grid-No.2 Current	3.2	mA
Grid-No.1 Voltage (Approx.) for plate current of 20 μ A	-3.5	volts

6EW7

10EW7, 15EW7

DUAL TRIODE

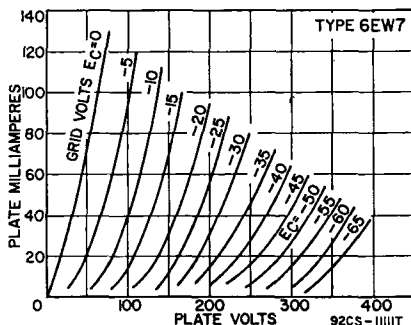
Miniature type used as combined vertical-deflection oscillator and vertical-deflector amplifier in television receivers. Outlines section, 6E, requires miniature 9-contact socket. For curve of average plate characteristics, Unit No.1, refer to type 6DE7 (Unit No.1). Types 10EW7 and 15EW7 are identical with type 6EW7 except for heater ratings.



Heater Voltage (ac/dc)	6EW7	10EW7	15EW7	
Heater Current	6.3	9.7	14.8	volts
Heater Warm-up Time	0.9	0.6	0.45	ampere
Heater-Cathode Voltage:				seconds
Peak value	± 200 max	± 200 max	± 200 max	volts
Average value	100 max	100 max	100 max	volts
Direct Interelectrode Capacitances (Approx.):	Unit No.1	Unit No.2		
Grid to Plate	4.2	9		pF
Grid to Cathode and Heater	2.2	7		pF
Plate to Cathode and Heater	0.4	1.2		pF

Class A₁ Amplifier**CHARACTERISTICS**

	Unit No.1	Unit No.2	
Plate Voltage	250	150	volts
Grid Voltage	-11	-17.5	volts
Amplification Factor	17.5	6	
Plate Resistance (Approx.)	8750	800	ohms
Transconductance	2000	7500	μ mhos
Plate Current	5.5	45	mA
Plate Current for plate voltage of 60 volts and zero grid voltage	—	95	mA
Plate Current for grid voltage of -25 volts	—	8	mA
Grid Voltage (Approx.) for plate current of 10 μ A	-20	—	volts
Grid Voltage (Approx.) for plate current of 100 μ A	—	-40	volts



Vertical-Deflection Oscillator and Amplifier

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

MAXIMUM RATINGS (Design-Maximum Values)	Unit No.1 Oscillator	Unit No.2 Amplifier	
DC Plate Voltage	330	330	volts
Peak Positive-Pulse Plate Voltage#	—	1500	volts
Peak Negative-Pulse Grid Voltage	400	250	volts
Peak Cathode Current	77	175	mA
Average Cathode Current	22	50	mA
Plate Dissipation	1.5	10	watts

MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance:			
For cathode-bias operation	2.2	2.2	megohms
For grid-resistor-bias operation	2.2	2.2	megohms

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

Refer to chart at end of section.

6EX6

Refer to chart at end of section.

6EY6

Refer to chart at end of section.

6EZ5

Refer to chart at end of section.

6EZ8

Refer to chart at end of section.

6F4

Refer to chart at end of section.

6F5

Refer to chart at end of section.

6F5GT

Refer to chart at end of section.

6F6
6F6G
6F6GT

Refer to chart at end of section.

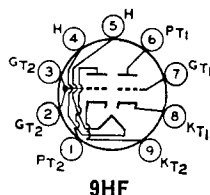
6F7

Refer to chart at end of section.

6F8G

Refer to chart at end of section.

6FA7



9HF

DUAL TRIODE

Miniature type containing high-mu and low-mu triode units used as combined vertical-deflection oscillator and vertical-deflection amplifier in television receivers. **Outlines section, 6E**; requires miniature 9-contact socket. Type 13FD7 is identical with type 6FD7 except for heater ratings.

6FD7

13FD7

Heater Voltage (ac/dc)	6FD7 6.3	13FD7 13	volts
Heater Current	0.925	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.):	Unit No.1	Unit No.2	
Grid to Plate	4.5	10	pF
Grid to Cathode and Heater	2.2	6.5	pF
Plate to Cathode and Heater	0.4	0.2	pF

Class A₁ Amplifier

CHARACTERISTICS

	Unit No.1	Unit No.2	
Plate Voltage	250	60	150 volts
Grid Voltage	-3	0	-17.5 volts
Amplification Factor	64	—	6
Plate Resistance (Approx.)	40000	—	800 ohms
Transconductance	1600	—	7500 μ mhos
Plate Current	1.5	95*	40 mA
Grid Voltage (Approx.):			
For plate current of 10 μ A	-5.5	—	— volts
For plate current of 100 μ A	—	—	-40 volts
Transconductance, For plate current of 1 mA	—	—	500 μ mhos
Plate Current, For grid voltage of -25 volts	—	—	6 mA

* 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)

	Unit No.1 Oscillator	Unit No.2 Amplifier	
DC Plate Voltage	330	330	volts
Peak Positive-Pulse Plate Voltage#	—	1500	volts
Peak Negative-Pulse Grid Voltage	400	250	volts
Peak Cathode Current	70	175	mA
Average Cathode Current	20	50	mA
Plate Dissipation	1.5	10	watts

MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance:			
For grid-resistor-bias or cathode-bias operation	2.2	2.2	megohms

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

6FE5

Refer to chart at end of section.

6FG6/EM84

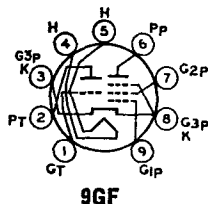
Refer to chart at end of section.

6FG7

5FG7

MEDIUM-MU TRIODE—
SHARP-CUTOFF PENTODE

Miniature type used as combined oscillator and mixer tube in vhf color and black-and-white television receivers. Outlines section, 6B; requires miniature 9-contact socket. Type 5FG7 is identical with type 6FG7 except for heater ratings.



9GF

	5FG7	6FG7	
Heater Voltage (ac/dc)	4.7	6.3	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	1.8	1.8	pF
Grid to Cathode, Pentode Grid No.3, and Heater	3	3	pF
Plate to Cathode, Pentode Grid No.3, and Heater	1.3	1.9	pF
Pentode Unit:			
Grid No.1 to Plate	0.02 max	0.01 max	pF
Grid No.1 to Cathode, Grid No.3, Grid No.2, and Heater	5	5	pF
Plate to Cathode, Grid No.3, Grid No.2, and Heater	2.4	3.4	pF
Heater to Cathode, and Pentode Grid No.3	6	6*	pF

* With external shield connected to cathode except as noted.

* With external shield connected to ground.

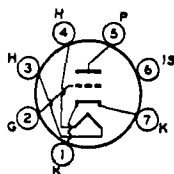
Class A₁ Amplifier

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	3	watts
Grid-No.2 Input:			
For grid-No.2 voltages up to 165 volts	—	See curve page 300	
For grid-No.2 voltages between 165 and 330 volts	—	0.55	watt

CHARACTERISTICS

	Triode Unit	Pentode Unit	
Plate Voltage	125	100 125	volts
Grid-No.2 Voltage	—	100 125	volts
Grid-No.1 Voltage	—1	0 —1	volts
Amplification Factor	43	—	
Plate Resistance (Approx.)	5700	— 180000	ohms
Transconductance	7500	7400 6000	μmhos
Plate Current	13	— 11	mA
Grid-No.2 Current	—	— 4	mA
Grid-No.1 Voltage (Approx.) for plate current of 30 μA	—6.5	— —7.5	volts



7FP

HIGH-MU TRIODE

Miniature type used as an rf amplifier in vhf tuners of color and black-and-white television receivers. Outlines section, 5C; requires 7-contact socket. Type 2FH5 is identical to type 6FH5 except for heater ratings.

6FH5

2FH5

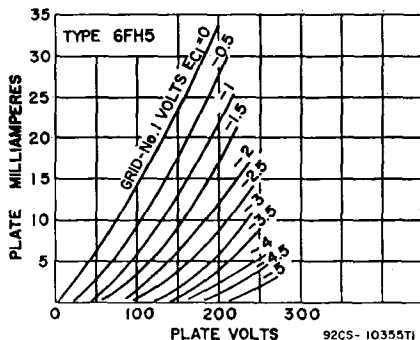
	2FH5	6FH5	
Heater Voltage (ac/dc)	2.35	6.3	volts
Heater Current	0.6	0.2	ampere
Heater Warm-up Time (Average)	11	—	seconds
Peak Heater-Cathode Voltage	±100 max	±100 max	volts
Direct Interelectrode Capacitances (Approx.):	Unshielded	Shielded*	
Grid to Plate	0.52	0.52	pF
Grid to Cathode, Heater, and Internal Shield	3.2	3.2	pF
Plate to Cathode, Heater, and Internal Shield	3.2	4	pF

* With external shield connected to Pin 1.

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	150	volts
Grid Voltage, Positive-bias value	0	volts
Cathode Current	22	mA
Plate Dissipation	2.2	watts



92CS-1035571

CHARACTERISTICS

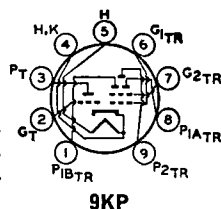
Plate Voltage	135	volts
Grid Voltage	—1	volts
Plate Resistance (Approx.)	5600	ohms
Transconductance	9000	μ mhos
Amplification Factor	50	
Plate Current	11	mA
Grid Voltage (Approx.) for plate current of 100 μ A	—5.5	volts

MAXIMUM CIRCUIT VALUE

Grid-Circuit Resistance, for cathode-bias operation	1	megohm
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6FH8**MEDIUM-MU TRIODE—
THREE-PLATE TETRODE**

Miniature type used in complex-wave generator applications and in television receiver applications. Sharp-cutoff tetrode unit has pair of additional plates. Outlines section, 6B; requires 9-contact socket.

**9KP**

Heater Voltage (ac/dc)	6.3	volts
Heater Current	0.45	ampere

Direct Interelectrode Capacitances:***Triode Unit:**

Grid to Plate	1.4	pF
Grid to Cathode and Heater	2.6	pF
Plate to Cathode and Heater	1	pF

Tetrode Unit:

Grid No.1 to Plate No.2	0.06 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Plate No.1A, and Plate No.1B	4.5	pF

Plate No.2 to Cathode, Heater, Grid No.2, Plate No.1A, and Plate No.1B	1.4	
--	-----	--

Tetrode Grid No.1 to Triode Plate	0.35 max	pF
Tetrode Plate No.2 to Triode Plate	0.008 max	pF

* With external shield connected to cathode.

Class A₁ Amplifier**Triode Unit**

Plate Voltage	100	volts
Grid Voltage	—1	volt
Amplification Factor	40	
Plate Resistance (Approx.)	7400	ohms
Transconductance	5400	μ mhos
Plate Current	7.9	mA
Grid Voltage (Approx.) for plate current of 100 μ A	—7	volts

Tetrode Unit with Plates No.1A and No.1B Connected to Cathode at Socket

MAXIMUM RATINGS (Design-Maximum Values)

Plate-No.2 Voltage	250	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage	—2	volts
Plate-No.2 Resistance (Approx.)	0.75	megohm
Transconductance, Grid No.1 to Plate No.2	4400	μ mhos
Plate-No.2 Current	7.3	mA
Grid-No.2 Current	1.4	mA
Grid-No.1 Voltage (Approx.) for plate-No.2 current of 100 μ A	—7	volts

Complex-Wave Generator**MAXIMUM RATINGS (Design-Maximum Values)**

	Triode Unit	Tetrode Unit	
Plate Voltage	275	—	volts
Plate-No.1A Voltage	—	200	volts
Plate-No.1B Voltage	—	200	volts
Plate-No.2 Voltage	—	275	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	275	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage:			
Negative-bias value	—40	—40	volts
Positive-bias value	0	0	volts
Plate Dissipation	1.7	—	watts
Plate-No.1A Dissipation	—	0.3	watt
Plate-No.1B Dissipation	—	0.3	watt
Plate-No.2 Dissipation	—	2.3	watts

Grid-No.2 Input:

For grid-No.2 voltages up to 137.5 volts	—	0.45	watt
For grid-No.2 voltages between 137.5 and 275 volts	—	See curve page 300	

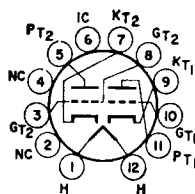
TYPICAL OPERATION WITH SEPARATE PLATE OPERATION

	Tetrode Unit	
Plates-No.1A, No.1B, and No.2 Voltage	100	volts
Grid-No.2 Voltage	50	volts
Grid-No.1 Voltage	—1	volts
Plate-No.1A Current	0.04	mA
Plate-No.1B Current	0.04	mA
Plate-No.2 Current	1.6	mA
Grid-No.2 Current	0.3	mA
Transconductance (Approx.):		
Grid No.1 to Plate No.1A	70	μ mhos
Grid No.1 to Plate No.1B	70	μ mhos
Grid No.1 to Plate No.2	2500	μ mhos

MAXIMUM CIRCUIT VALUES

	Triode Unit	Tetrode Unit	
Grid-No.1-Circuit Resistance, for fixed-bias operation	0.5	0.5	megohm

Refer to chart at end of section.

6FJ7**12EJ****DUAL TRIODE****6FM7****13FM7/15FM7**

Duodecar type used as combined vertical-deflection oscillator and vertical-deflection amplifier in color and black-and-white television receivers. Triode unit No.1 is used as an oscillator, and triode unit No.2 is used as an amplifier. Outlines section, 8C; requires duodecar 12-contact socket. Type 13FM7/15FM7 is identical with type 6FM7 except for heater ratings.

	6FM7	13FM7/15FM7	
Heater Voltage (ac/dc)	6.3	13	volts
Heater Current	1.05	0.45	amperes
Heater Warm-up Time (Average)	—	11	seconds
Heater-Cathode Voltage:			
Average value	± 200 max	± 200 max	volts
Peak value	100 max	100 max	volts

Class A₁ Amplifier**CHARACTERISTICS**

	Unit No.1	Unit No.2	
Plate Voltage	250	175	volts
Grid Voltage	—3	—25	volts
Amplification Factor	66	5.5	
Plate Resistance (Approx.)	30000	920	ohms
Transconductance	2200	6000	μ mhos
Plate Current	2	40	mA
Grid Voltage (Approx.) for plate current of 20 μ A	—5.3	—	volts
Grid Voltage (Approx.) for plate current of 200 μ A	—	—45	volts

Vertical-Deflection Oscillator and Amplifier

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

	Unit No.1 Oscillator	Unit No.2 Amplifier	
MAXIMUM RATINGS (Design-Maximum Values)			
DC Plate Voltage	350	500	volts
Peak Positive-Pulse Plate Voltage#	—	1500	volts
Peak Negative-Pulse Plate Voltage	400	250	volts
Peak Cathode Current	—	175	mA
Average Cathode Current	—	50	mA
Plate Dissipation†	1	10	watts

MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance:			
For fixed-bias operation	1	1	megohm
For cathode-bias operation	2.2	2.2	megohms

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

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