

12FK6
12FM6
12FQ7
12FQ8
12FR8
12FV7

Refer to chart at end of section.
Refer to chart at end of section.
Refer to type 6FQ7/6CG7.
Refer to chart at end of section.
Refer to chart at end of section.
Refer to chart at end of section.

12FX5

19FX5, 60FX5

Miniature type used in output stages of audio amplifiers. Outlines section, 5D; requires miniature 7-contact socket. Types 19FX5 and 60FX5 are identical with type 12FX5 except for heater ratings.

	12FX5	19FX5	60FX5	
Heater Voltage (ac/dc)	12.6	18.9	60	volts
Heater Current	0.45	0.3	0.1	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 (Approx.):				
Grid No.1 to Plate			0.65	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3			17	pF
Plate to Cathode, Heater, Grid No.2, and Grid No.3			9	pF

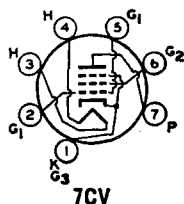
Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

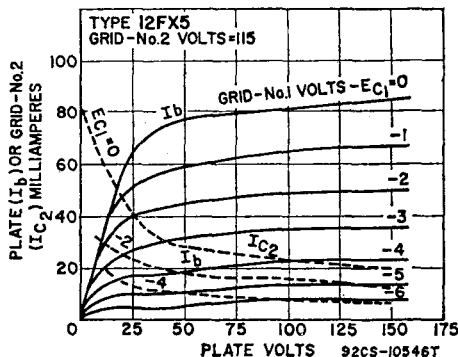
Plate Voltage	150	volts
Grid-No.2 (Screen-Grid) Voltage	130	volts
Plate Dissipation	5.5	watts
Grid-No.2 Input	2	watts
Bulb Temperature (At hottest point)	225	°C

TYPICAL OPERATION

Plate Supply Voltage	110	volts
Grid-No.2 Supply Voltage	115	volts
Cathode-Bias Resistor	62	ohms
Peak AF Grid-No.1 Voltage	3	volts
Zero-Signal Plate Current	36	mA
Maximum-Signal Plate Current	35	mA
Zero-Signal Grid No.2 Current	10	mA
Maximum-Signal Grid No.2 Current	12	mA
Plate Resistance	17500	ohms
Transconductance	13500	μmhos
Load Resistance	3000	ohms

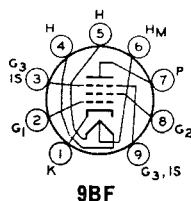


7CV



Total Harmonic Distortion	8	per cent
Maximum-Signal Power Output	1.8	watts
MAXIMUM CIRCUIT VALUES		
Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.1	megohm
For cathode-bias operation	0.5	megohm

Refer to chart at end of section.	12FX8 12FX8A
Refer to chart at end of section.	12GA6
For replacement use type 12BQ6GTB/12CU6.	12GB3
For replacement use type 12GW6/12DQ6B.	12GB6 12GB7
Refer to chart at end of section.	12GC6
Refer to type 6GE5.	12GE5
Refer to chart at end of section.	12GJ5
Refer to type 6GJ5A.	12GJ5A
Refer to chart at end of section.	12GN7
Refer to chart at end of section.	12GN7A
For replacement use type 12HG7/12GN7A.	
Refer to chart at end of section.	12GT5 12GT5A
Refer to type 6GW6/6DQ6B.	12GW6/12DQ6B
Refer to chart at end of section.	12H6
Refer to type 38HE7.	12HE7
For replacement use type 12HG7/12GN7A.	12HG7



9BF

SHARP-CUTOFF PENTODE

**12HG7/
12GN7A**

Miniature types with frame grid used as video amplifier in color and black-and-white television receivers. Outlines section, 6E; require 9-contact miniature socket.

Heater Arrangement:	Series	Parallel	
Heater Voltage (ac/dc)	12.6	6.3	volts
Heater Current	0.26	0.52	ampere

Heater-Cathode Voltage:

Peak value	±200 max	volts
Average value	100 max	volts
Direct Interelectrode Capacitances:		
Grid No.1 to Plate	0.15 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	14 max	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield	4.4 max	pF

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

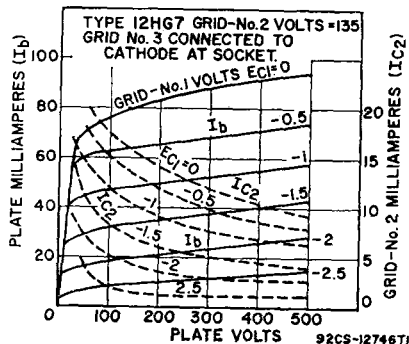
Plate Voltage	400	volts
Grid-No.2 (Screen-Grid) Supply Voltage	330	volts
Grid-No.2 Voltage	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	volts
Plate Dissipation	10	watts
Grid-No.2 Input:		
For Grid-No.2 voltages up to 165 volts	1	watt
For Grid-No.2 voltages between 165 and 330 volts	See curve page 300	

CHARACTERISTICS

Plate Supply Voltage	300	volts
Grid No.3 (Suppressor Grid)	Connected to cathode at socket	
Grid-No.2 Supply Voltage	135	volts
Grid No.1	Connected to negative end of cathode resistor	
Cathode Resistor	47	ohms
Plate Resistance (Approx.)	60000	ohms
Transconductance	32000	μmhos
Plate Current	31	mA
Grid-No.2 Current	4.8	mA
Grid-No.1 Voltage (Approx.) for plate current of 100 μA	—4.5	volts

MAXIMUM CIRCUIT VALUES

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

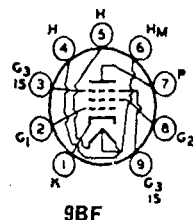


12HL7

SHARP-CUTOFF PENTODE

Miniature type with frame grid used as a video output amplifier in color television receivers. Outlines section, 6E; requires miniature 9-contact socket.

Heater Arrangement	Series
Heater Voltage	12.6
Heater Current	0.3



Parallel	6.3	volts
	0.6	ampere

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		0.15	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield		15	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield		6	pF

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	400	volts
Grid-No.3 (Suppressor-Grid) Voltage, Positive-bias 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	volt
Plate Dissipation	10	watts
Grid-No.2 Input	1	watt

CHARACTERISTICS

Plate Supply Voltage	50	250	volts
Grid-No.3 Voltage, Referred to negative end of cathode	—	0	volts
Grid-No.2 Voltage	125	150	volts
Grid-No.1 Voltage	0	0	volts
Cathode Resistor (Bypassed)	—	122	ohms
Plate Current	76	25	mA
Grid-No.2 Current	32	6	mA
Transconductance, Grid No.1 to Plate	—	21000	μmhos
Plate Resistance (Approx.)	—	55000	ohms
Grid-No.1 Voltage (Approx.) for plate current of 100 μA	—	—7.2	volts

MAXIMUM CIRCUIT VALUES

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

Refer to chart at end of section.	12J5GT
Refer to chart at end of section.	12J7GT
Refer to chart at end of section.	12J8
Refer to chart at end of section.	12JB6
Refer to type 6JB6A.	12JB6A
Refer to chart at end of section.	12JF5
Refer to type 6JN6.	12JN6
Refer to chart at end of section.	12JN8
Refer to type 6JQ6.	12JQ6
Refer to chart at end of section.	12JT6
Refer to type 6JT6A.	12JT6A
Refer to chart at end of section.	12K5
Refer to chart at end of section.	12K7GT
Refer to chart at end of section.	12K8
Refer to chart at end of section.	12KL8
Refer to chart at end of section.	12L6GT
Refer to type 6MD8.	12MD8
Refer to chart at end of section.	12Q7GT
Refer to chart at end of section.	12R5

12RK19	Refer to chart at end of section. For replacement use type 12AF3/12BR3/12RK19.
12S8GT	Refer to chart at end of section.
12SA7	
12SA7GT	Refer to chart at end of section.
12SC7	Refer to chart at end of section.
12SF5	
12SF5GT	Refer to chart at end of section.
12SF7	Refer to chart at end of section.
12SG7	Refer to chart at end of section.
12SH7	Refer to chart at end of section.
12SJ7	
12SJ7GT	Refer to chart at end of section.
12SK7	
12SK7GT	Refer to chart at end of section.
12SL7GT	Refer to type 6SL7GT.
12SN7GT	Refer to chart at end of section.
12SN7GTA	Refer to type 6SN7GTB.
12SQ7	
12SQ7GT	Refer to chart at end of section.
12SR7	
12SR7GT	Refer to chart at end of section.
12SW7	Refer to chart at end of section.
12SY7	Refer to chart at end of section.
12T10	Refer to type 6T10.
12U7	Refer to chart at end of section.
12V6GT	Refer to type 6V6.
12W6GT	Refer to type 6W6GT.
12X4	Refer to type 6X4.
12Z3	Refer to chart at end of section.
13CW4	Refer to type 6CW4.
13DE7	Refer to type 6DE7.
13DR7	Refer to type 6DR7.
13EM7	Refer to chart at end of section. For replacement use type 13EM7/15EA7.
13EM7/15EA7	Refer to type 6EM7/6EA7.
13FD7	Refer to type 6FD7.
13FM7	
13FM7/15FM7	Refer to type 6FM7.
13GB5	Refer to chart at end of section.
13GB5/XL500	Refer to type 6GB5/EL500.
13GF7A	Refer to type 6GF7A.