

Refer to chart at end of section.

For replacement use type 13Z10/13J10.

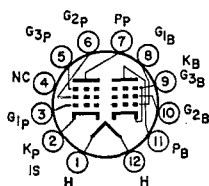
13J10

Refer to type 6JZ8.

13JZ8

BEAM POWER TUBE— SHARP-CUTOFF PENTODE

13V10



12EZ

Duodecar type used as combined FM detector and audio-frequency output amplifier in television receivers. The beam power unit is used in af output stages and the pentode unit as an FM detector. **Outlines section, 8C;** requires duodecar 12-contact socket. **Heater:** volts (ac/dc), 13.2; amperes, 0.45; average warm-up time, 11 seconds; maximum heater-cathode volts, ± 200 peak, 100 average.

Beam Power Unit as Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	165	volts
Grid-No.2 (Screen-Grid) Voltage	150	volts
Cathode Current	65	mA
Plate Dissipation	6.5	watts
Grid-No.2 Input	1.8	watts

TYPICAL OPERATION

Plate Voltage	145	volts
Grid-No.2 Voltage	125	volts
Grid-No.1 (Control-Grid) Voltage	-6	volts
Peak AF Grid-No.1 Voltage	6	volts
Zero-Signal Plate Current	34	mA
Maximum-Signal Plate Current	36	mA
Zero-Signal Grid-No.2 Current	2.2	mA
Maximum-Signal Grid-No.2 Current	5.5	mA
Plate Resistance (Approx.)	0.058	megohm
Transconductance	6400	μ mhos
Load Resistance	3000	ohms
Total Harmonic Distortion (Approx.)	7	per cent
Maximum-Signal Power Output	1.5	watts

MAXIMUM CIRCUIT VALUES

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

Pentode Unit as Class A₁ Amplifier

CHARACTERISTICS

Plate Supply Voltage	150	volts
Grid-No.3 (Suppressor-Grid) Voltage	0	volts
Grid-No.2 (Screen-Grid) Supply Voltage	100	volts
Cathode-Bias Resistor	560	ohms
Plate Resistance (Approx.)	0.15	megohm
Transconductance, Grid No.1 to Plate	1000	μ mhos
Transconductance, Grid No.3 to Plate	400	μ mhos
Plate Current	1.3	mA
Grid-No.2 Current	2	mA
Grid-No.1 Voltage (Approx.) for plate current of 10 μ A	-4.5	volts
Grid-No.3 Voltage (Approx.) for plate current of 10 μ A	-4.5	volts

Pentode Unit as FM Detector

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	330	volts
Grid-No.3 Voltage	28	volts
Grid-No.2 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	1.7	watts
Grid-No.2 Input:		
For grid-No.2 voltages up to 165 volts	1.1	watts
For grid-No.2 voltages between 165 and 330 volts	See curve page 300	

Refer to chart at end of section.

13Z10

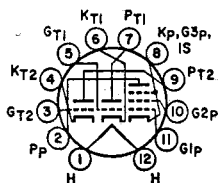
Refer to type 6Z10/6J10.

13Z10/13J10

14A4	Refer to chart at end of section.
14A5	Refer to chart at end of section.
14A7	Refer to chart at end of section.
14AF7	Refer to chart at end of section.
14B6	Refer to chart at end of section.
14B8	Refer to chart at end of section.

14BL11 DUAL TRIODE— SHARP-CUTOFF PENTODE

Duodecar type used in television receiver applications. The pentode unit is used for video amplifier service, and the triode units for general-purpose use. **Outlines section, 8B;** requires duodecar 12-contact socket. **Heater:** volts (ac/dc), 14.2; amperes, 0.45; average warm-up time 11 seconds; maximum heater-cathode volts, ± 200 peak, 100 average.

**12GC**

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

	Triode Unit No.1	Triode Unit No.2	Pentode Unit	
Plate Voltage	330	330	250	volts
Grid-No.2 (Screen-Grid) Voltage	—	—	125	volts
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	0	0	volts
Plate Dissipation	1.5	2	2.5	watts
Grid-No.2 Input	—	—	1.25	watts

CHARACTERISTICS

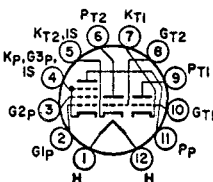
Plate Voltage	200	200	35	200	volts
Grid-No.2 Voltage	—	—	100	100	volts
Grid-No.1 Voltage	—	—	0	—	volts
Cathode-Bias Resistor	470	270	—	82	ohms
Amplification Factor	40	69	—	—	—
Plate Resistance (Approx.)	7600	12500	—	70000	ohms
Transconductance	5300	5500	—	19000	μ mhos
Plate Current	7.2	7.1	40	16	mA
Grid-No.2 Current	—	—	13	3	mA
Grid-No.1 Voltage (Approx.) for plate current of 100 μ A	—8	—5.5	—	—5.5	volts

MAXIMUM CIRCUIT VALUES

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

14BR11 DUAL TRIODE— SHARP-CUTOFF PENTODE

Duodecar type used in television receiver applications. The high-mu triode unit No. 1 is used for general-purpose use, the medium-mu triode unit No. 2 for sync separator service, and the pentode unit for video amplifier service. **Outlines section, 8C;** requires duodecar 12-contact socket. **Heater:** volts (ac/dc), 14.2; amperes, 0.45; warm-up time, 11 seconds; maximum heater-cathode volts, ± 200 peak, 100 average.

**12GL**

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

	Triode Unit No.1	Triode Unit No.2	Pentode Unit	
Plate Voltage	330	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	0	volts
Plate Dissipation	1.5	2	4	watts
Grid-No.2 Input: For grid-No.2 voltages up to 165 volts	—	—	1.1	watts
For grid-No.2 voltages between 165 and 330 volts	—	—	See curve page 300	

CHARACTERISTICS

Plate Voltage	200	200	35	135	volts
Grid-No.2 Voltage	—	—	135	135	volts
Grid-No.1 Voltage	—2	—	0	—	volts
Cathode-Bias Resistor	—	220	—	100	ohms
Amplification Factor	68	41	—	—	
Plate-Resistance (Approx.)	12400	9400	—	45000	ohms
Transconductance	5500	4400	—	10400	μ mhos
Plate Current	7	9.2	34	17	mA
Grid-No.2 Current	—	—	13	4	mA
Grid-No.1 Voltage (Approx.) for plate current of 100 μ A	—5.5	—6.5	—	—6	volts

MAXIMUM CIRCUIT VALUES

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

Refer to chart at end of section.

14C5

Refer to chart at end of section.

14C7

Refer to chart at end of section.

14E6

Refer to chart at end of section.

14E7

Refer to chart at end of section.

14F7

Refer to chart at end of section.

14F8

Refer to chart at end of section.

14GT8

Refer to chart at end of section.

14H7

Refer to chart at end of section.

14J7

Refer to chart at end of section.

14JG8

Refer to chart at end of section.

14N7

Refer to chart at end of section.

14Q7

Refer to chart at end of section.

14R7

Refer to chart at end of section.

15

Refer to type 6AF11.

15AF11

Refer to chart at end of section.

15BD11

Refer to chart at end of section.

15BD11A

Refer to chart at end of section.

15CW5

Refer to type 6CW5/EL86.

15CW5/PL84

Refer to chart at end of section.

15DQ8