In the Application Guide on the following pages, RCA receiving tubes are classified in two ways: (a) by function, and (b) by structure (diode, triode, etc.). The functional classification covers 42 principal types of application.

Tube types are grouped by structure under each classification; they are also keyed to indicate miniature, octal, nuvistor, duodecar, and novar types.

Triodes are designated as *low, medium-*, or *high-mu* types on the following basis: *low*, less than 10; *medium*, 10 or more, but less than 50; *high*, 50 or more. Where applicable, tubes are designated as *sharp-*, *semiremote*, or *remote-cutoff* on the basis of the ratio, in per cent, of the negative control-grid voltage to the screen-grid voltage (or, for triodes, the plate voltage) for cut-off, as given in the characteristics or typical operation values. These terms are defined as follows: *sharp*, less than 10 per cent; *semiremote*, 10 or more, but less than 20 per cent, *remote*, 20 per cent or more.

APPLICATIONS

1. **Audio-Frequency Amplifiers**
2. **Automatic Gain Control Circuits (AGC and AVC)**
3. **Bandpass Amplifiers (Color TV)**
4. **Blankers**
5. **Burst Amplifiers**
6. **Cathode-Drive RF Amplifiers (Grounded-Grid)**
7. **Chroma Amplifiers**
8. **Color Killers**
9. **Color Matrixing Circuits**
10. **Complex-Wave Generators**
11. **Converters**
12. **Dampers**
13. **Demodulators (Color TV)**
14. **Detectors**
15. **DC Restorers**
16. **Discriminators**
17. **Frequency Dividers**
18. **FM Detectors**
19. **Gated Noise, AGC, and Sync Amplifiers**
20. **Grounded-Grid RF Amplifiers**
21. **Harmonic Generators**
22. **Horizontal-Deflection Circuits**
23. **Intermediate-Frequency Amplifiers**
24. **Keyed AGC Amplifiers**
25. **Limiters**
26. **Mixers—RF**
27. **Mixer-Oscillators—RF**
28. **Multivibrators**
29. **Noise Inverters (Noise Immune Circuits)**
30. **Oscillators**
31. **Phase Inverters**
32. **Phase Splitters**
33. **Radio-Frequency Amplifiers**
34. **Reactance Circuits**
35. **Rectifiers**
36. **Regulators (High Voltage)**
37. **Sync Amplifiers**
38. **Sync Clippers**
39. **Sync Separators**
40. **Tuning Indicators**
41. **Vertical-Deflection Circuits (Oscillator and Amplifier)**
42. **Video Amplifiers**

1. AUDIO-FREQUENCY AMPLIFIERS

Voltage Amplifiers

Medium-Mu Triode with Twin Diode

- 6BF6

Medium-Mu Triode—Sharp-Cutoff Pentode

- 6LQ8
- 11LQ8
- 7199†

Medium-Mu Twin Triode

- 5J6
- 6J6A
- ⊙ 6SN7GTB
- 7AU7
- 9AU7
- 12AU7A/ECC82
- ⊙ 12SN7GTA
- 19J6

Twin Diode—High-Mu Triode

- 3AV6
- 4AV6
- 6AT6
- 6AV6
- 6BN8
- 6CN7
- 8BN8
- 12AT6
- 12AV6
- 14GT8
- 18FY6A

High-Mu Twin Triode

- 6EU7†
- ⊙ 6SL7GT
- 12AX7A/ECC83†
- 12AZ7A
- 12BZ7
- ⊙ 12SL7GT
- 20EZ7
- 7025†

Triple Diode—High-Mu Triode

- 5T8
- 6T8A

High-Mu Triode—Sharp-Cutoff Pentode

- 6KT8

Sharp-Cutoff Pentode

- 3DT6A*
- 4DT6A*
- 5HZ6*
- 6DT6A*
- 6GX6*
- 6HZ6*
- 5879†
- 7543†

Power Amplifiers

Beam Power Tube

- 5AQ5
- 5CZ5
- ⊙ 5V6GT
- 6AQ5A
- 6AS5
- 6CM6
- 6CU5
- 6CZ5
- ⊙ 6DG6GT
- 6DS5
- § 6GC5
- ⊙ 6HG5
- ⊙ 6L6
- ⊙ 6L6GC†
- ⊙ 6V6
- ⊙ 6V6GTA
- ⊙ 6W6GT
- ⊙ 6Y6GA/6Y6G
- 11DS5
- 12AB5
- 12AQ5
- 12CA5
- 12CU5/12C5
- ⊙ 12V6GT
- ⊙ 12W6GT
- 17CU5/17C5
- 25C5
- 25F5A
- 34GD5A
- 35C5
- ⊙ 35L6GT
- 50B5
- 50C5
- ⊙ 50L6GT
- 6973†
- ⊙ 7408†

Beam Power Tube—Sharp-Cutoff Pentode

- ‡ 6AD10
- ‡ 6BF11*
- ‡ 6AL11
- ‡ 12AL11
- ‡ 12BF11*
- ‡ 17BF11*

Pentode—Beam Power Tube

- ‡ 6Z10/6J10
- ‡ 13Z10/13J10

Power Pentode

- 6BQ5/EL84
- 6EH5
- ⊙ 6F6
- 6GK6
- ⊙ 6K6GT
- 8BQ5
- 10BQ5
- 12FX5
- 25EH5
- 35EH5
- 50EH5
- 60FX5
- 7189†
- ▲ 7868†

2. AUTOMATIC GAIN CONTROL CIRCUITS (AGC & AVC)

Diode—Remote-Cutoff Pentode

- 6EQ7
- 12EQ7

Twin Diode—High-Mu Triode

- 3AV6
- 4AV6
- 6AT6
- 6AV6
- 12AT6
- 12AV6
- 18FY6A

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5AN8
- 5GH8A
- 6AN8A
- 6AZ8
- 6BA8A
- 6BH8
- 6CU8
- 6GH8A
- 8BA8A
- 8BH8

High-Mu Triode—Sharp-Cutoff Pentode

- 6AW8A
- 6HF8
- 6JV8
- 8AW8A
- 8JV8
- 10HF8

Sharp-Cutoff Twin Pentode

- 3BU8/3GS8
- 4HS8
- 6BU8
- 6HS8

• Miniature ‡ Duodecar ⊙ Octal ▲ Novar * Dual-control grids † For high-fidelity equipment § Neonoval

3. BANDPASS AMPLIFIER (COLOR TV)

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5GH8A
- 6HL8
- 6MQ8
- 6GH8A

High-Mu Triode—Sharp-Cutoff Pentode

- 6AW8A
- 6KV8
- 8AW8A
- 6KT8
- 6LF8
- 11KV8

4. BLANKERS

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5GH8A
- 6GH8A
- 6MQ8

Medium-Mu Twin Triode

- 6FQ7/6CG7
- 8FQ7/8CG7
- 12BH7A
- 6GU7
- 8GU7

Medium-Mu Triode—Semiremote-Cutoff Pentode

- 6LM8

High-Mu Triode—Sharp-Cutoff Pentode

- 6KT8

5. BURST AMPLIFIERS

Beam-Deflection Tube

- 6JH8

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5EA8
- 6EA8
- 19EA8
- 5GH8A
- 6GH8A

Medium-Mu Triode—Semiremote-Cutoff Pentode

- 6LM8
- 6MU8

Twin Diode–High-Mu Triode

- 6BN8
- 8BN8

Sharp-Cutoff Pentode

- 3JC6A
- 4JC6A
- 6EW6
- 4EW6
- 5EW6
- 6JC6A

6. CATHODE-DRIVE RF AMPLIFIERS (GROUNDED-GRID)

Medium-Mu Triode

- 6BC4

Medium-Mu Twin Triode

- 4BC8
- 5BK7A
- 6BQ7A/6BZ7/6BS8
- 4BQ7A
- 5BQ7A
- 4BS8
- 6BC8/6BZ8
- 4BZ7
- 6BK7B

High-Mu Triode

- ▵ 2CW4
- 4HQ5
- ▵ 6DS4
- ▵ 2DS4
- 6AB4
- 6HQ5
- 2HQ5
- ▵ 6CW4
- ▵ 13CW4
- 3HQ5

High-Mu Twin Triode

- 6DT8
- 12AZ7A
- 12DT8
- 12AT7/ECC81

7. CHROMA AMPLIFIERS

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5GH8A
- 6GH8A

Medium-Mu Triple Triode

- ▲ 6MD8
- ▲ 12MD8

Medium-Mu Twin Triode

- 6FQ7/6CG7
- 8FQ7/8CG7
- 12BH7A
- 6GU7
- 8GU7

8. COLOR KILLERS

Quadruple Diode

- 6JU8A
- 8JU8A

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5GH8A
- 6GH8A
- 6MQ8

High-Mu Triode—Sharp-Cutoff Pentode

- 6KT8

• Miniature ▵ Nuvistor ▲ Novar

9. COLOR MATRIXING CIRCUITS

Medium-Mu Twin Triode

- 6FQ7/6CG7
- 8FQ7/8CG7
- 12BH7A
- 6GU7
- 8GU7

Medium-Mu Triode—Sharp Cutoff Pentode

- 5GH8A
- 6GH8A

Medium-Mu Triple Triode

- ▲ 6MD8
- ‡ 6MJ8
- ▲ 12MD8

High-Mu Triple Triode

- ‡ 6MN8

Twin Pentode

- 6LE8
- 10LE8
- 15LE8

Quadruple Diode

- 6JU8A
- 8JU8A

10. COMPLEX-WAVE GENERATORS

High-Mu Twin Double-Plate Triode

- 12FQ8

Diode—Sharp-Cutoff, Twin-Plate Tetrode

- 6FA7

Diode—Sharp-Cutoff, Three-Plate Tetrode

- 6KM8

Medium-Mu Triode—Three-Plate Tetrode

- 6FH8

11. CONVERTERS

Medium-Mu Triode—Sharp-Cutoff Pentode

- 4KE8
- 5X8
- 6U8A/6KD8
- 5EA8
- 6EA8
- 9KZ8
- 5GH8A
- 6GH8A
- 19EA8
- 5KE8
- 6KE8
- 19X8
- 5U8
- 6KZ8

High-Mu Twin Triode

- 6DT8
- 12AZ7A
- 12DT8
- 12AT7/ECC81

Sharp-Cutoff Pentode

- 3AU6
- 6AU6A
- 18GD6A
- 4AU6
- 12AU6

Pentagrid

- 6BA7
- 12BE6
- 18FX6A
- 6BE6

12. DAMPERS

Half-Wave (Diode)

- ⊙ 6AU4GTA
- ⊙ 6AX4GTB
- ▲ 6AY3B
- ▲ 6BA3
- ‡ 6BE3/6BZ3
- ▲ 6BH3A
- ▲ 6BS3A
- ‡ 6CG3/6CE3/6CD3/6BW3
- ▲ 6CJ3/6CH3
- ▲ 6CK3
- ▲ 6CL3
- ▲ 6CM3
- ⊙ 6DE4/6CQ4
- ⊙ 6DM4A/6DA4
- ▲ 6DW4B
- ⊙ 6W4GT
- ⊙ 12AX4GTB
- ▲ 12AY3A
- ‡ 12BE3
- ▲ 12BS3A/12DW4A
- ▲ 12CL3
- ⊙ 12D4
- ⊙ 17AX4GTA
- ▲ 17AY3A
- ‡ 17BE3/17BZ3
- ▲ 17BH3A
- • 17BR3/17RK19
- ▲ 17BS3A/17DW4A
- ‡ 17BW3
- ▲ 17CK3
- • 17CT3
- ⊙ 17D4
- ⊙ 17DE4
- ⊙ 17DM4A
- ▲ 22BH3A
- ‡ 22BW3
- ⊙ 22DE4
- ⊙ 25AX4GT

13. DEMODULATORS (COLOR TV)

Medium-Mu Twin Triode

- 12BH7A

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5GH8A
- 6GH8A

High-Mu Twin Triode

- 12AZ7A

• Miniature ⊙ Octal ▵ Nuvistor ▲ Novar ‡ Duodecar

Sharp-Cutoff Pentode
• 5HZ6 • 6GY6 ‡ 12BV11
‡ 6BV11 • 6HZ6

Pentagrid Amplifier
• 3BY6 • 6BY6

Twin Pentode
• 6LE8 • 10LE8 • 15LE8

Beam Deflection Tube
• 6JH8 • 6ME8

Sharp-Cutoff Twin Pentode
• 6MK8

14. DETECTORS

Diode—Sharp-Cutoff Pentode
• 5AM8 • 6AM8A
• 5AS8 • 6AS8

Diode—Remote-Cutoff Pentode
• 6CR6 • 12CR6 • 12EQ7
• 6EQ7

Twin Diode
• 3AL5 • 6AL5 • 12AL5

Twin Diode—High-Mu Triode
• 3AV6 • 6BN8 • 12AV6
• 4AV6 • 6CN7 • 14GT8
• 6AT6 • 8BN8 • 18FY6A
• 6AV6 • 12AT6

Triple Diode
• 6BJ7

Triple Diode—High-Mu Triode
•5T8 • 6T8A

Quadruple Diode
• 6JU8A • 8JU8A

Sharp-Cutoff Pentode
• 3DT6A* • 5HZ6* • 6GX6*
• 4DT6A* • 6DT6A* • 6HZ6*
• 5GX6*

15. DC RESTORERS

Diode—Sharp-Cutoff Pentode
• 5AM8 • 6AM8A • 6AS8
• 5AS8

Triple Diode
• 6BJ7

16. DISCRIMINATORS

FM

Twin Diode
• 3AL5 • 6AL5 • 12AL5

Twin Diode—High-Mu Triode
• 6BN8 • 14GT8

Triple Diode—High-Mu Triode
• 5T8 • 6T8A

Beam Tube
• 3BN6 • 4BN6 • 6BN6/6KS6

Beam Power Tube—Sharp-Cutoff Pentode
‡ 6AL11 ‡ 12AL11 ‡ 17BF11
‡ 6BF11 ‡ 12BF11

Pentode—Beam Power Tube
‡ 6Z10/6J10 ‡ 13Z10/13J10 ‡ 17AB10/17X10

FM Quadrature-Grid

Sharp-Cutoff Pentode
• 3DT6A* • 6DT6A* • 6GY6*
• 4DT6A* • 6GX6* • 6HZ6*
• 5HZ6*

Beam Tube
• 3BN6 • 4BN6 • 6BN6/6KS6

Horizontal AFC

Twin Diode—High-Mu Triode
• 6BN8 • 8BN8 • 8CN7
• 6CN7

Twin Diode—Sharp Cutoff Pentode
• 6LT8 • 8LT8 • 11LT8

17. FREQUENCY DIVIDERS

High-Mu Twin Double-Plate Triode
• 12FQ8

18. FM DETECTORS

(See 16. Discriminators)

• Miniature ⊙ Octal * Dual-control grids ‡ Duodecar

19. GATED NOISE, AGC, AND SYNC AMPLIFIERS

High-Mu Triode—Sharp-Cutoff Pentode

- • 6KA8 • 8KA8 • 8LC8
- • 6LC8

Sharp-Cutoff Pentode

- • 6GY6*

Sharp-Cutoff Twin Pentode

- • 3BU8/3GS8 • 4HS8 • 6HS8
- • 6BU8

Pentagrid Amplifier

- • 3BY6 • 4CS6 • 6CS6
- • 3CS6 • 6BY6

20. GROUNDED-GRID RF AMPLIFIERS

(See 6. Cathode-Drive RF Amplifiers)

21. HARMONIC GENERATORS

(See 10. Complex-Wave Generators)

22. HORIZONTAL-DEFLECTION CIRCUITS

Amplifiers

Beam Power Tube

- ⊙ 6AU5GT
- ⊙ 6AV5GA
- ⊙ 6BQ6GTB/6CU6
- ⊙ 6CB5A
- ⊙ 6CD6GA
- ⊙ 6DQ5
- ▲ 6GJ5A
- ▲ 6GT5A
- ⊙ 6GW6/6DQ6B
- ▲ 6JB6A
- ▲ 6JF6
- ▲ 6JG6A
- ‡ 6JM6A
- ▲ 6JR6
- ‡ 6JS6C
- ▲ 6JT6A
- ▲ 6JU6
- ▲ 6KM6
- ▲ 6LQ6/6JE6C
- ⊙ 12AV5GA
- ⊙ 12BQ6GTB/12CU6
- ▲ 12JB6A
- ▲ 12JT6A
- ⊙ 17BQ6GTB
- ▲ 17GJ5A
- ▲ 17GT5A
- ⊙ 17GW6/17DQ6B
- ▲ 17JB6A
- ▲ 17JG6A
- ‡ 17JM6A
- ▲ 17JT6A
- ▲ 22JF6
- ▲ 22JG6A
- ▲ 22JR6
- ▲ 22KM6
- ▲ 24LQ6/24JE6C
- ⊙ 25AV5GA
- ⊙ 25BQ6GTB/25CU6
- ⊙ 25CD6GB
- ⊙ 25DN6
- ‡ 31JS6C
- ▲ 31LQ6

Oscillators

Medium-Mu Triode—Sharp-Cutoff Pentode

- • 5GH8A • 6GH8A

Medium-Mu Twin Triode

- • 6FQ7/6CG7 • 8FQ7/8CG7 • 12BH7A
- ⊙ 6SN7GTB • 9AU7 ⊙ 12SN7GTA
- • 7AU7 • 12AU7A/ECC82

23. INTERMEDIATE-FREQUENCY AMPLIFIERS

Medium-Mu Triode—Sharp-Cutoff Tetrode

- • 5CQ8 • 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode

- • 5AN8 • 6AZ8 • 6GH8A
- • 5GH8A • 6BH8 • 11LQ8
- • 6AN8A • 6CU8

High-Mu Triode—Sharp-Cutoff Pentode

- • 6AW8A • 6KV8 • 10GN8
- • 6GN8 • 8AW8A • 10HF8
- • 6HF8 • 8GN8/8EB8 • 10JA8/10LZ8
- • 6JV8 • 8JV8 • 11KV8
- • 6KT8

Sharp-Cutoff Pentode

- • 3AU6 • 4JD6* • 6DK6
- • 3BC5/3CE5 • 5EW6 • 6EJ7/EF184
- • 3CB6/3CF6 • 6AG5
- • 3DK6 • 6AK5/EF95 • 6EW6
- • 3JC6A • 6HS6
- • 4AU6 • 6AU6A • 6JC6A
- • 4CB6 • 6BC5/6CE5 • 6JD6*
- • 4DE6 • 6CB6A/6CF6 • 12AU6
- • 4DK6 • 12AW6
- • 4EW6 • 6DC6 • 12DK6
- • 4JC6A • 6DE6 • 18GD6A

• Miniature ⊙ Octal * Dual-control grids ‡ Duodecar ▲ Nuvistor ▲ Novar

Diode—Sharp-Cutoff Pentode

- 5AM8
- 6AM8A
- 6AS8
- 5AS8

Semiremote-Cutoff Pentode

- 3BZ6
- 4KT6
- 6HR6
- 3KT6
- 5GM6
- 6JH6
- 4BZ6
- 6BZ6
- 6KT6
- 4EH7/LF183
- 6EH7/EF183
- 12BZ6
- 4GM6
- 6GM6
- 19HR6
- 4JH6

Remote-Cutoff Pentode

- 6BA6/EF93
- 12BA6
- 18FW6A

Remote-Cutoff Pentode with Diode

- 6EQ7
- 12EQ7

24. KEYED AGC AMPLIFIERS

(See 19. Gated Noise, AGC, and Sync Amplifiers)

25. LIMITERS

Beam Tube

- 3BN6
- 4BN6
- 6BN6/6KS6

Sharp-Cutoff Pentode

- 3AU6
- 6GX6
- 6HZ6
- 4AU6
- 6HS6
- 12AU6
- 6AU6A

Power Pentode—Beam Power Tube

‡ 6Z10/6J10 ‡ 13Z10/13J10 ‡ 17AB10/17X10

26. MIXERS—RF

Medium-Mu Twin Triode

- 5J6
- 6J6A

High-Mu Triode

- △ 2CW4
- △ 6CW4
- △ 13CW4
- 6AB4

27. MIXER-OSCILLATORS—RF

Medium-Mu Triode—Sharp-Cutoff Tetrode

- 5CL8A
- 6CL8A
- 19JN8/19CL8A
- 5CQ8
- 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode

- 4KE8
- 5U8
- 6KE8
- 5AT8
- 5X8
- 6KZ8
- 5B8
- 6AT8A
- 6U8A/6KD8
- 5BR8/5FV8
- 6BR8A/6FV8A
- 6X8A
- 5CG8
- 6CG8A
- 9KZ8
- 5EA8
- 6EA8
- 9U8A
- 5FG7
- 6FG7
- 19EA8
- 5KE8
- 6HB7
- 19X8

High-Mu Twin Triode

- 6DT8
- 12AT7/ECC81
- 12DT8

28. MULTIVIBRATORS

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5GH8A
- 6GH8A

Medium-Mu Twin Triode

- 6FQ7/6CG7
- 8FQ7/8CG7
- 12BH7A
- 6GU7
- 8GU7
- ⊙ 12SN7-GTA
- ⊙ 6SN7GTB
- 9AU7
- 7AU7
- 12AU7A/ECC82

High-Mu Twin Triode

- 12AX7A/ECC83

29. NOISE INVERTERS (NOISE IMMUNE CIRCUITS)

High-Mu Triode—Sharp-Cutoff Pentode

- 6KA8
- 8KA8
- 8LC8
- 6LC8

Sharp-Cutoff Pentode

- 6GY6*

Quadruple Diode

- 6JU8A
- 8JU8A

30. OSCILLATORS

Radio Frequency—UHF

Medium-Mu Triode

- 2AF4B/2DZ4
- 3AF4A/3DZ4
- △ 6DV4
- 6DZ4
- △ 2DV4
- 6AF4A

• Miniature ⊙ Octal * Dual-control grids △ Nuvistor ‡ Duodecar

• Approaches semiremote-cutoff characteristics; used in first-if amplifier applications

Radio Frequency—VHF

Medium-Mu Twin Triode
• 5J6 • 6J6A

High-Mu Triode
• 6AB4

Power Triode
• 6C4 (Class C)

3.58-MHz (Color TV)

Medium-Mu Triode—Sharp-Cutoff Pentode
• 5GH8A • 6GH8A

High-Mu Triode—Sharp-Cutoff Pentode
• 6KT8

Low Frequency, Sweep Type

Medium-Mu Triode—Sharp-Cutoff Pentode
• 5AN8 • 6BA8A • 8AU8
• 6AN8A • 6BH8 • 8BA8A
• 6AU8A • 6CH8 • 8BH8
• 6AZ8

Twin Diode—High-Mu Triode
• 6BN8 • 8BN8 • 8CN7
• 6CN7

High-Mu Twin Triode
• 12AX7A/ECC83

31. PHASE INVERTERS

Medium-Mu Twin Triode
• 6FQ7/6CG7 • 8GU7 • 12BH7A
• 6GU7 • 8FQ7/8CG7 ⊙ 12SN7-GTA
⊙ 6SN7GTB • 9AU7
• 7AU7 • 12AU7A/ECC82

High-Mu Triode—Sharp-Cutoff Pentode
• 6AW8A • 8AW8A • 10GN8
• 6EB8 • 8GN8/8EB8 • 10HF8
• 6GN8 • 10JA8/10LZ8
• 6HF8

High-Mu Twin Triode
⊙ 6SL7GT ⊙ 12SL7GT • 7025
• 12AX7A/ECC83

Medium-Mu Triple Triode
‡ 6AV11

32. PHASE SPLITTERS

Medium-Mu Triode—Sharp-Cutoff Tetrode
• 5CQ8 • 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode
• 5AN8 • 6BA8A • 8BA8A
• 6AN8A • 6CU8 • 7199
• 6AZ8

High-Mu Triode—Sharp-Cutoff Pentode
• 6AW8A • 8AW8A

33. RADIO-FREQUENCY AMPLIFIERS

Medium-Mu Triode
• 2BN4A • 6BC4 • 6BN4A
• 3BN4A

Medium-Mu Triode—Sharp-Cutoff Tetrode
• 5CQ8 • 6CQ8

Medium-Mu Twin Triode
• 4BC8 • 5BQ7A • 6BQ7A/6BZ7/6BS8
• 4BQ7A • 5J6
• 4BS8 • 6BC8/6BZ8
• 5BK7A • 6BK7B • 6J6A

High-Mu Triode
▵ 2CW4 • 3ER5 ▵ 6DS4
▵ 2DS4 • 3FH5 • 6ER5
▵ 2EG4 • 3GK5 • 6FH5
• 2ER5 • 3HM5/3HA5 • 6GK5/6FQ5A
• 2FH5 • 4GK5
• 2GK5/2FQ5A • 6AB4 • 6HM5/6HA5
▵ 6CW4 ▵ 13CW4

• Miniature ⊙ Octal ▵ Nuvistor * Dual-control grids ‡ Duodecar

High-Mu Twin Triode
• 6DT8 • 12AZ7A • 12DT8

Power Triode
• 6C4 (Class C)

Sharp-Cutoff Tetrode
• 2CY5 • 6CY5 • 6FV6
• 3CY5

Sharp-Cutoff Pentode
• 3AU6 ⊙ 4DE6 • 6CB6A/6CF6
• 3BC5/3CE5 • 6AG5 • 6DC6
• 3CB6/3CF6 • 6AK5/EF95 • 6DE6
• 4AU6 • 6AU6A • 12AU6
• 4CB6 • 6BC5/6CE5 • 12AW6
• 6BH6 • 18GD6A

Remote-Cutoff Pentode
• 6BA6/EF93 • 12BA6 • 18FW6A
• 6BJ6

Remote-Cutoff Pentode with Diode
• 6EQ7 • 12EQ7

34. REACTANCE CIRCUITS

Medium-Mu Triode—Sharp-Cutoff Pentode
• 5AN8 • 6AZ8 • 6CU8
• 6AN8A • 6BA8A • 8BA8A

Twin Diodes—High-Mu Triode
• 6CN7 • 8CN7

High-Mu Triode—Sharp-Cutoff Pentode
• 6AW8A • 8AW8A

35. RECTIFIERS

Power-Supply Types—Vacuum

Half-Wave (Diode)
• 35W4 • 36AM3B • 50DC4
⊙ 35Z5GT

Full-Wave (Twin Diode)
⊙ 3DG4 ⊙ 5V3A • 6CA4
⊙ 5AS4A 5AU4 • 6X4
▲ 5BC3A ⊙ 5V4GA ⊙ 6X5GT
⊙ 5DJ4 ⊙ 5Y3GT • 12X4
⊙ 5U4GB

High-Voltage Types (For rf-rectifier or pulsed low-current applications)—Vacuum

Half-Wave (Diode)
• 1BC2 • 2BJ2 ⊙ 3CN3A
⊙ 1G3GT/1B3GT ⊙ 2CN3A ⊙ 3CU3A
⊙ 1K3/1J3 ⊙ 3A3B ⊙ 3CX3
• 1V2 ‡ 3BW2/3BS2A/3BT2 ⊙ 3CZ3
• 1X2B/1X2A ⊙ 3CA3 ⊙ 3DB3/3CY3
• 2AV2

36. REGULATORS (HIGH VOLTAGE)

Beam Triode
⊙ 6BK4C/6EL4A ⊙ 6LJ6A/6LH6A

Beam Power Tube
▲ 17KV6A ▲ 22KV6A

37. SYNC AMPLIFIERS

Medium-Mu Triode—Sharp-Cutoff Pentode
• 6AU8A • 6CX8 • 8CX8
• 6AZ8 • 8AU8

Medium-Mu Twin Triode
• 6FQ7/6CG7 • 8FQ7/8CG7
• 7AU7 • 9AU7
• 12AU7A/ECC82

High-Mu Triode with Twin Diode
• 6CN7 • 8CN7

High-Mu Triode—Sharp-Cutoff Pentode
• 6AW8A • 6JV8 • 8JV8
• 6HF8 • 8AW8A • 10HF8

High-Mu Twin Triode
• 12BZ7

• Miniature ⊙ Octal ▲ Novar ‡ Duodecar

38. SYNC CLIPPERS

Medium-Mu Triode—Sharp-Cutoff Tetrode

- 5CQ8
- 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5AN8
- 6AN8A
- 6AU8A
- 6AZ8
- 6CU8
- 6CX8
- 8AU8
- 8CX8

High-Mu Triode—Sharp-Cutoff Pentode

- 6AW8A
- 6EB8
- 6GN8
- 6GW8/ ECL86
- 6HF8
- 6JV8
- 8AW8A
- 8GN8/ 8EB8
- 8JV8
- 10GN8
- 10HF8
- 10JA8/ 10LZ8

High-Mu Twin Triode

- 12BZ7

Sharp-Cutoff Twin Pentode

- 3BU8/ 3GS8
- 4HS8
- 6BU8
- 6HS8

Pentagrid Amplifier

- 3BY6
- 3CS6
- 4CS6
- 6BY6
- 6CS6

39. SYNC SEPARATORS

Medium-Mu Triode—Sharp-Cutoff Tetrode

- 5CQ8
- 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode

- 5AN8
- 5GH8A
- 6AN8A
- 6AU8A
- 6AZ8
- 6CU8
- 6CX8
- 6GH8A
- 6HL8
- 6LQ8
- 6MQ8
- 8AU8
- 8CX8
- 11LQ8

Medium-Mu Twin Triode

- 6FQ7/6CG7
- 7AU7
- 8FQ7/8CG7
- 9AU7
- 12AU7A/ ECC82

Twin Diode—High-Mu Triode

- 6CN7
- 8CN7

High-Mu Triode—Sharp-Cutoff Pentode

- 6AW8A
- 6EB8
- 6GN8
- 6HF8
- 6JV8
- 6KA8
- 6KT8
- 6KV8
- 6LC8
- 8AW8A
- 8GN8/ 8EB8
- 8JV8
- 8KA8
- 8LC8
- 10GN8
- 10HF8
- 10JA8/ 10LZ8
- 11KV8

High-Mu Twin Triode

- 12BZ7

Sharp-Cutoff Twin Pentode

- 3BU8/ 3GS8
- 4HS8
- 6BU8
- 6HS8
- 6MK8

Pentagrid Amplifier

- 3BY6
- 3CS6
- 4CS6
- 6BY6
- 6CS6

40. TUNING INDICATORS

Indicator with Triode Unit

6E5

Twin Indicator Units

⊙ 6AF6G

41. VERTICAL-DEFLECTION CIRCUITS

Oscillators and Amplifiers (Combined)

Medium-Mu Triode—Low-Mu Triode

- 6DE7
- § 6EW7
- 10DE7
- § 10EW7
- 13DE7

Medium-Mu Dual Triode

- 6CM7
- 6CS7
- 8CM7
- 8CS7

Medium-Mu Twin Triode

- 6FQ7/6CG7
- 8FQ7/8CG7

• Miniature ⊙ Octal § Neonoval

High-Mu Triode—Low-Mu Triode

• 6CY7	⊙ 6GL7	• 13DR7
• 6DR7	• 10DR7	⊙ 13EM7/ 15EA7
⊙ 6EM7/6EA7	⊙ 10EM7	▲ 13FD7
▲ 6FD7	▲ 10GF7A	▲ 13GF7A
▲ 6GF7A	• 11CY7	

High-Mu Triode—Beam Power Tube

▲ 6KY8A ▲ 15KY8A

Dual Triode

⊙ 6EM7/6EA7 ▲ 6GF7A ⊙ 13EM7/ 15EA7

Amplifiers

Low-Mu Triode

• 12B4A

Medium-Mu Triode

• 6S4A

Beam Power Tube

• 5AQ5	• 6EM5	• 12AQ5
• 5CZ5	• 6HR5	• 12JQ6#
⊙ 5V6GT	• 6JQ6#	⊙ 12V6GT
• 6AQ5A	⊙ 6V6	• 17JQ6#
• 6CM6	⊙ 6V6GTA	
• 6CZ5	• 8EM5	

Power Pentode

⊙ 6K6GT

42. VIDEO AMPLIFIERS

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5AN8	• 6BH8	• 6MQ8
• 5GH8A	• 6CU8	• 8AU8
• 6AN8A	• 6CX8	• 8BA8A
• 6AU8A	• 6GH8A	• 8BH8
• 6AZ8	• 6HL8	• 8CX8
• 6BA8A	• 6LQ8	• 11LQ8

High-Mu Triode—Sharp-Cutoff Pentode

• 6AW8A	• 6KV8	• 8JV8
• 6EB8	• 6LF8	• 10GN8
• 6GN8	• 8AW8A	• 10HF8
• 6HF8	• 8GN8 / 8EB8	• 10JA8
• 6JV8		• 11KV8
• 6KT8		

Sharp-Cutoff Pentode

• 3JC6A	• 7KY6	• 12BY7A / 12BV7/ 12DQ7
• 4JC6A	• 11HM7	
• 6JC6A	§ 12HG7	

Sharp-Cutoff Pentode

• 5AM8	• 6AM8A	• 12HL7
• 5AS8	• 6AS8	

Power Pentode

⊙ 6AG7 • 6CL6 • 6GK6

• Miniature ⊙ Octal ▲ Novar § Neomoval # With an integral diode

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM DIM.	T.D.	HEATER E_f V	I_f A	UNIT	MAXIMUM RATINGS P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	CHARACTERISTICS P_o W	μ	g_m g_1 - p μmho	g_m g_3 - p μmho	Cutoff E_{c1} V	Cutoff E_{c3} V
□*1AY2 [b]	K8	2-terminal base	1.25F	0.2	D	–	26000	50	–	0.5	–	–	–	–	–	–
■ 1AY2A [b]	K8	2-terminal base	1.25F 1.45F●	0.2	D	–	26000●	50	–	0.5	X-Radiation, Maximum = 0.5 mR/hr.♦					
□*1BC2 [b]	B15	9RG	1.25F	0.2	D	–	18000	45	–	0.5	–	–	–	–	–	–
■ 1BC2A [b]	B15	9RG	1.25F 1.45F●	0.2	D	–	18000●	45	–	0.5	X-Radiation, Maximum = 0.5 mR/hr.♦					
□*1BH2 [b]	B17	9RG**	1.25F	0.2	D	–	18000●	45	–	0.5	–	–	–	–	–	–
■ 1BY2A [b]	L14	12HZ	1.25F 1.45F●	0.2	D	–	26000●	50	–	0.5	X-Radiation, Maximum = 0.5 mR/hr.♦					
■ 1DG3 [b]	F50	8ND	1.25F 1.45F●	0.2	D	–	26000●	50	–	0.5	X-Radiation, Maximum = 0.5 mR/hr.♦					
■ 1G3GTA [b]	F45	3C	1.25F 1.45F●	0.2	D	–	26000●	50	–	0.5	X-Radiation, Maximum = 0.5 mR/hr.♦					
■ 1G3GTA/ 1B3GT [b]	F45	3C	1.25F 1.45F●	0.2	D	–	26000●	50	–	0.5	X-Radiation, Maximum = 0.5 mR/hr.♦					

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM DIM.	T.D.	HEATER E_f V	I_f A	UNIT	MAXIMUM RATINGS P_b W	e_{bm} V	i_{om} mA	I_b mA	$I_{b(av)}$ mA	CHARACTERISTICS P_o W	μ	g_m g_{1-p} μmho	g_m g_{3-p} μmho	Cutoff E_{c1} V	Cutoff E_{c3} V
■ 1K3A [b]	F45	3C	1.25F 1.45F●	0.2	D	–	26000●	50	–	0.5	X-Radiation, Maximum = 0.5 mR/hr.♦					
■ 1K3A/1J3 [b]	F45	3C	1.25F 1.45●	0.2	D	–	26000●	50	–	0.5	X-Radiation, Maximum = 0.5 mR/hr.♦					
□*1S2A/DY87 [b]	B16	9DT	1.4 1.5●	0.55	D	–	27000●	40	–	0.8	–	–	–	–	–	–
■ 1X2C [b]	B8	9Y	1.25F 1.45F●	0.2	D	–	22000●	45	–	0.5	X-Radiation, Maximum = 0.5 mR/hr.♦					
2AF4B/2DZ4 [d]	A1	7DK	2.35▲	0.6	T	25	–	–	–	-24	–	13.5	6500	–	–	–
■ 2AS2A [b]	L6	12EW	2.5 2.9●	0.33	D	–	30000●	90	–	1.7	X-Radiation, Maximum = 25 mR/hr.♦					
2BN4A [d]	A2	7EG	2.35▲	0.6	T	2.2	–	–	-22	–	–	43	7700	–	-6	–
■ 2BU2/2AH2 [b]	L6	12JB	2.5 2.9●	0.33	D	–	30000●	80	–	1.5	X-Radiation, Maximum = 0.5 mR/hr.♦					

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM		HEATER		UNIT	MAXIMUM RATINGS					CHARACTERISTICS					
	DIM.	T.D.	E_f V	I_f A		P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	P_o W	μ	g_m g_1-p μmho	g_m g_3-p μmho	Cutoff E_{c1} V	Cutoff E_{c3} V
2EG4 e	D1	12AQ	1.7▲	0.6	T	1.5	–	–	–	-15	–	68	12500	–	-6.8	–
2HQ5 e	A2	7GM	2.4▲	0.6	T	2.5	–	–	-22	–	–	78	15000	–	–	–
■ 3A3B b	F49	8EZ	3.15 3.65●	0.22	D	–	30000●	100	–	2.0	X-Radiation, Maximum = 25 mR/hr.♦					
■ 3A3C b	F46	8EZ	3.15 3.65●	0.22	D	–	38000●	100	–	2.0	X-Radiation, Maximum = 25 mR/hr.♦					
■ 3AT2B b	L20	12FV	3.15 3.65●	0.22	D	–	38000●	88	–	1.7	X-Radiation, Maximum = 25 mR/hr.♦					
■ 3AW2A b	L6	12HA	3.15 3.65●	0.35	D	–	38000●	110	–	2.2	X-Radiation, Maximum = 25 mR/hr.♦					
3BC5/ 3CE5 k	A2	7BD	3.15▲	0.6	P	2	–	–	–	–	–	–	6100	–	-6	–
■ 3BN2A b	L6	12FV	3.15 3.47●	0.3	D	–	30000●	88	–	1.7	X-Radiation, Maximum = 25 mR/hr.♦					

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM DIM.	T.D.	HEATER E_f V	I_f A	UNIT	MAXIMUM RATINGS P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	CHARACTERISTICS P_o W	μ	g_m g_1-p μmho	g_3-p μmho	Cutoff E_{c1} V	E_{c3} V
■ 3BW2/ 3BS2A/ 3BT2 b	L6	12HY	3.15 3.65●	0.48	D	–	38000●	110	–	2.2	X-Radiation, Maximum = 25 mR/hr.♦					
3BY6 u	A2	7CH♦	3.15▲	0.6	–	2.3	–	–	–	–	–	–	1900	500	-12	-15
3BZ6 j	A2	7CM	3.15▲	0.6	P	2.3	–	–	–	–	–	–	8000	–	-19	–
□ *3CA3 b	F21	8MH	3.6	0.225	D	–	30000	100	–	2.0	–	–	–	–	–	–
■ 3CN3B b	F47	8MU	3.15 3.65●·	0.48	D	–	38000●	110	–	2.2	X-Radiation, Maximum = 25 mR/hr.♦					
3CB6/ 3CF6 k	A2	7CM	3.15▲	0.6	P	2.3	–	–	–	–	–	–	8000	–	-6.5	–
□ *3CX3 b	F16	8MT	3.15▲	0.48	D	–	38000●	110	–	2.2	–	–	–	–	–	–
■ 3DB3/ 3CY3 b	F48	8MX	3.15 3.65●	0.245	D	–	38000●	100	–	2.0	X-Radiation, Maximum = 25 mR/hr.♦					
■ 3DC3 b	F49	8MZ	3.15 3.65●	0.28	D	–	38000●	110	–	2.2	X-Radiation, Maximum = 25 mR/hr.♦					
3HQ5 e	A2	7GM	3.0▲	0.45	T	2.5		–	22	–	–	78	15000	–	-2	–

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM		HEATER		UNIT	MAXIMUM RATINGS					CHARACTERISTICS					
													g_m		Cutoff	
	DIM.	T.D.	E_f V	I_f A		P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	P_o W	μ	$g_1 \cdot p$ μmho	$g_3 \cdot p$ μmho	E_{c1} V	E_{c3} V
4GJ7/ XCF801[t]	B14	9QA	4.1	0.6	T	1.8	–	–	–	–	–	20	9000	–	-1.3 max.	–
					P	2.4	–	–	–	–	–	55 approx.	11000	–	-1.3 max.	–
4GK5 [e]	A2	7FP	4▲	0.3	T	2.5	–	–	–	-22	–	78	15000	–	-4.2	–
4HQ5 [e]	A2	7GM	4.2▲	0.3	T	2.5	–	–	2.2	–	–	78	15000	–	-4.2	–
4JH6 [j]	A2	7CM	4.2▲	0.45	P	2.3	–	–	–	–	–	–	8000	–	-19	–
6AD10 [r]	L3	12EZ	6.3	1.05	P	1.7	–	–	–	–	–	–	3400	600	-4.5	-7
					B	10	–	–	–	–	4.2	–	6500	–	–	–
6AV11 [g]	L1	12BY	6.3▲	0.6	T_1	2.75	–	–	–	-20	–	17	2200	–	-24	–
					T_2	2.75	–	–	–	-20	–	17	2200	–	-24	–
					T_3	2.75	–	–	–	-20	–	17	2200	–	-24	–

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM		HEATER		UNIT	MAXIMUM RATINGS					CHARACTERISTICS					
													g_m		Cutoff	
	DIM.	T.D.	E_f V	I_f A		P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	P_o W	μ	g_1 - p μmho	g_3 - p μmho	E_{c1} V	E_{c3} V
■ 6BK4C/ 6EL4A[c]	F35	8GC	6.3	0.2	T	40[●]	DC Plate Voltage, 27000 V[●] X-Radiation, Maximum = 0.5 mR/hr.[♦]									
6BV11[m]	L3	12HB	6.3 6.9[●]	0.9	P	1.7	–	–	–	–	–	3700	400	3	–	-5.5
6DM4A/ 6DA4[a]	F16	4CG	6.3	1.2	D	6.5	5000	1100	175	–	–	–	–	–	–	
■ 6EH4A[c]	L21	12FA	6.3	0.2	T	40[●]	DC Plate Voltage, 27000 V[●] X-Radiation, Maximum = 0.5 mR/hr.[♦]									
■ 6EJ4A[c]	L21	12HC	6.3	0.2	T	40[●]	DC Plate Voltage, 27000 V[●] X-Radiation, Maximum = 0.5 mR/hr.[♦]									
■ 6EL4A[c]	F34	8MW	6.3	0.2	T	40[●]	DC Plate Voltage, 27000 V[●] X-Radiation, Maximum = 0.5 mR/hr.[♦]									
6HQ5[e]	A2	7GM		0.2	T	2.5	–	–	-22	–	–	78	15000	–	–	–
6HR5[h]	A3	7BZ	6.3[▲]	0.45	B	8	1300	-125	–	-35	–	–	3600	–	-43	–

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM DIM.	T.D.	HEATER E_f V	I_f A	UNIT	MAXIMUM RATINGS P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	CHARACTERISTICS P_o W	μ	gm g_1 - p μmho	gm g_3 - p μmho	Cutoff E_{c1} V	Cutoff E_{c3} V
6JM6A s	L9	12FJ	6.3	1.2	B	17.5	6500 -1500	-550	–	-175	–	4.4	7300	–	-42	–
6JS6C s	L10	12FY	6.3	2.25	B	30	7500 -1200	-1200	–	-350	–	3	11500	–	-54	–
■6LH6A c	F35	8ML	6.3 6.9●	0.2	T	40	DC Plate Voltage, 27000 V.●				X-Radiation, Maximum=0.5mR/hr.♦					
■6LJ6A/ 6LH6A c	F35	8MQ	6.3 6.9●	0.2	T	40	DC Plate Voltage, 27000 V.●				X-Radiation, Maximum=0.5mR/hr.♦					
6LT8 n	B2	9RL	6.3▲	0.6	D	–	–	20	5	–	–	–	–	–	–	–
					D	–	–	20	5	–	–	–	–	–	–	–
					P	3.1	–	–	–	–	–	–	13000	–	-3.5	–
6MK8 m	B4	9FG	6.3	0.3	P	1.1	–	–	-12	–	–	–	1100	450	-2.3	-3.5
8LT8 n	B2	9RL	8.1▲	0.45	D	–	–	20	5	–	–	–	–	–	–	–
					D	–	–	20	5	–	–	–	–	–	–	–
					P	3.1	–	–	–	–	–	–	13000	–	-3.5	–

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM		HEATER		UNIT	MAXIMUM RATINGS					CHARACTERISTICS					
													g_m		Cutoff	
	DIM.	T.D.	E_f V	I_f A		P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	P_o W	μ	g_1 -p μmho	g_3 - p μmho	E_{c1} V	E_{c3} V
9KZ8 [t]	B2	9FZ	9.45▲	0.3	T	2.5	–	–	–	–	–	46	8500	–	-8	–
					P	2.5	–	–	–	–	–	–	7500	–	-8	–
10BQ5 [l]	B10	9CV	10.6▲	0.45	P	12	–	–	-65	–	5.7	–	11300	–	–	–
10EW7 [f]	H1	9HF	9.7▲	0.6	T_1	1.5	–	-77	0	-22	–	17.5	2000	–	-20	–
					T_2	10	1500	-175	0	-50	–	6	7500	–	-40	–
11LT8 [n]	B2	9RL	11.4	0.315	D	–	–	20	5	–	–	–	–	–	–	–
					D	–	–	20	5	–	–	–	–	–	–	–
					P	3.1	–	–	–	–	–	–	13000	–	-3.5	–
12BV11 [m]	L3	12HB	12.6▲	0.45	P	1.7	–	–	–	–	–	67	3700	400	-3	-5.5
12DK6 [k]	A2	7CM	12.6	0.15	P	2.3	–	–	–	–	–	–	9800	–	-6.5	–
12HL7 [k]	B18	9BF	12.6	0.3	P	10	–	–	–	–	–	–	21000	–	-7.2	–
12MD8 [g]	C18	9RQ	12.6▲	0.45	T_1	3	–	–	–	–	–	17	3100	–	-23	–
					T_2	3	–	–	–	–	–	17	3100	–	-23	–
					T_3	3	–	–	–	–	–	17	3100	–	-23	–

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM DIM.	T.D.	HEATER E_f V	I_f A	UNIT	MAXIMUM RATINGS P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	CHARACTERISTICS P_o W	μ	g_m g_1 - p μmho	g_3 - p μmho	Cutoff E_{c1} V	E_{c3} V
12T10 r	L3	12EZ	12.6▲	0.45	P	1.7	–	–	–	–	–	–	1000	400	-4.5	-4.5
					B	10	–	–	–	–	4.2	–	6500	–	–	–
15LE8 m	B10	9QZ	15▲	0.3	P	2	–	–	–	–	–	–	5800	350	-7.2	-17.4
16LU8A h	L7	12DZ	16▲	0.6	T	2.5	400	-105	–	-30	–	58	3600	–	-6.6	–
					B	14	250	-260	–	-75	–	–	9300	–	-30	–
17AB10/ 17AX10 r	L2	12BT	16.8▲	0.45	P	–	–	–	–	-13	–	–	360	700	-4	-4
					B	6.5	–	–	65	–	2.4	–	8600	–	–	–
17BR3/ 17RK19 a	B20	9CB	16.8▲	0.45	D	6.5	5500	1200	200	–	–	–	–	–	–	–
17BW3 a	L4	12FX	16.8▲	0.6	D	6.5	5000	1100	175	–	–	–	–	–	–	–
17JM6A s	L9	12FJ	16.8▲	0.45	B	17.5	6500	-550	–	-175	–	4.4	7300	–	-42	–
							-1500									
18AJ10 r	L3	12EZ	18▲	0.315	P	1.7	–	–	–	-60	–	–	2400	750	-4	-3.5
					B	6	–	–	–	–	1.45	–	5600	–	–	–

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM DIM.	T.D.	HEATER E_f V	I_f A	UNIT	MAXIMUM RATINGS P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	CHARACTERISTICS P_o W	μ	g_m g_{1-p} μmho	g_{3-p} μmho	Cutoff E_{c1} V	E_{c3} V
19JN8/	B2	9FA	18.9	0.15	T	2.5	–	–	–	–	–	46	8500	–	-8	–
19CL8A [t]					P	2.5	–	–	–	–	–	–	7500	–	-8	–
20AQ3/																
LY88 [a]	B12	9CB	20.2	0.45	D	5.0	7500	550	220	–	–	–	–	–	–	–
22BW3 [a]	L4	12FX	22.4▲	0.45	D	6.5	5000	1100	175	–	–	–	–	–	–	–
24BF11 [r]	L3	12EZ	24.2▲	0.315	P	1.7	–	–	–	–	–	–	1000	400	-4.5	-4.5
					B	6.5	–	–	–	–	2.4	–	8600	–	–	–
25JZ8 [h]	L2	12DZ	25.2▲	0.3	T	1	–	-70	–	-20	–	20	2350	–	-11	–
					P	7	2000	-245	–	-70	–	–	7100	–	-25	–
26LX6 [s]	L21	12JA	26▲	0.6	B	33●	7000	-1400	-400	–	–	4	14000	–	–	–
30KD6 [s]	L21	12GW	30▲	0.6	B	33●	7000	-1400	-400	–	–	4	14000	–	–	–
31LR8 [h]	C21	9QT	31.5▲	0.3	T	2.5	–	-105	–	-30	2.5	58	4100	–	-6.6	–
					P	14	2500	-260	–	-75	–	6.5	9200	–	-28	–

NOTE: *For key to symbols, footnotes & abbreviations see end of this section.*

RCA TYPE	DIMENSIONS AND TERMINAL DIAGRAM		HEATER		UNIT	MAXIMUM RATINGS					CHARACTERISTICS					
													g_m		Cutoff	
	DIM.	T.D.	E_f V	I_f A		P_b W	e_{bm} V	i_{bm} mA	I_b mA	$I_{b(av)}$ mA	P_o W	μ	g_1 · p μmho	g_3 · p μmho	E_{c1} V	E_{c3} V
34R3 [a]	B11	9CB	34	0.15	D	–	4500	450	150	–	–	–	–	–	–	–
36KD6/ 40KD6 [s]	L21	12GW	36▲	0.45	B	33●	7000	-1400	-400	–	–	4	14000	–	–	–

FOOTNOTES

- a Damper Diode
- b High-Voltage Diode
- c High-Voltage Regulator Beam Triode
- d Medium-Mu Triode
- e High-Mu Triode
- f Dual-Unit Triode
- g Triple-Unit Triode
- h Vertical Deflection-Amplifier Type
- j Semiremote-Cutoff Pentode
- k Sharp-Cutoff Pentode
- l Power Pentode
- m Twin Sharp-Cutoff Pentode
- n Twin Diode-Sharp-Cutoff Pentode
- r Sharp-Cutoff Pentode-Beam Power Tube
- s Horizontal Deflection-Amplifier Type
- t Medium-Mu Triode-Sharp-Cutoff Pentode
- u Pentagrid amplifier

● Absolute-Maximum Value.

▲ Heater with controlled warm-up time.

** Pins 1 and 5 have solder lugs.

◆ Refer type 6BY6 data for terminal diagram.

□ Refer to sheet *Safety Precautions (1) for Receiving Tubes* following this listing.

* This type does not have an EIA published value for X-Radiation.

■ Refer to sheet *Safety Precautions (11) for Receiving Tubes* following this listing.

♦ Statistical Value Controlled On a Lot Sampling Basis.

SYMBOL	DEFINITION	SYMBOL	DEFINITION
e_{bm}	Peak-Pulse Plate Voltage (Beam Tubes) Peak Inverse Plate Voltage (Diodes)	$I_{b(av)}$	Average Plate (+) or Cathode (-) Current
		i_{bm}	Peak Plate (+) or Cathode (-) Current
E_{c1}	DC Grid No. 1 Cutoff Voltage	I_f	DC or RMS AC Heater or Filament Current (Bogey Value)
E_{c3}	DC Grid No. 3 Cutoff Voltage		
E_f	DC or RMS AC Heater or Filament Voltage (Bogey Value)	P_b	Plate Dissipation
		P_o	Maximum-Signal Power Output
g_m	Transconductance (Mutual Conductance)	μ	Amplification Factor (Mu)
I_b	DC Plate Current (Positive Values) DC Cathode Current (Negative Values)		

ABBREVIATIONS

A Ampere	**B** Beam Unit	**D** Diode Unit	**F** Filament	**g_1** Grid No. 1	**g_3** Grid No. 3
mA Milliampere	**mR/hr** Milliroentgens per hour	**P** Pentode Unit	**p** Plate	**T** Triode Unit	**V** Volt
W Watt	**μmho** Micromho				

For *Key to Tube Dimensions* and *Terminal Diagrams*, see following pages.

KEY TO TUBE DIMENSIONS

Symbol	Maximum Overall Length x Diameter Inches	
7-Pin Miniature Types		
A1	1-3/4	x 3/4
A2	2-1/8	x 3/4
A3	2–5/8	x 3/4
9-Pin Miniature Types		
B2	2-3/16	x 7/8
B4	2-5/8	x 7/8
B8	2-27/32	x 7/8
B10	3-1/16	x 7/8
B11	3-9/32	x 7/8
B12	3-1/2	x 7/8
B14	2	x 7/8
B15	2.531	x .875
B16	2.913	x .875
B17	2.716	x .875
B18	2-3/8	x 7/8
B20	3.5	x .875

Symbol	Maximum Overall Length x Diameter Inches	
Novar Type		
C18	2.960	x 1.188
C21	3.710	x 1.562
Nuvistor Type		
D1	0.800	0.440
Octal-Glass Types		
F16	3-13/16	x 1-9/32
F21	4-1/16	x 1-9/32
F34	5	x 1-9/16
F35	5	x 1-23/32
F45	3.563	x 1.377
F46	3-13/16	x 1-1/4
F47	3.812	x 1.377
F48	3.812	x 1.188
F49	3.812	x 1.281
F50	3.563	x 1.188

Symbol	Maximum Overall Length x Diameter Inches	
9-Pin T-9 Bulb Type		
H1	2.90	x 1.188
Other Type		
K8	3.08	x 1.188
12-Pin Types		
L1	1.875	x 1.188
L2	2.375	x 1.188
L3	2.625	x 1.188
L4	2.875	x 1.188
L6	3.625	x 1.188
L7	2.875	x 1.563
L9	3.625	x 1.563
L10	4.125	x 1.563
L14	3.125	x 1.188
L18	4.000	x 1.563
L20	3.625	x 1.250
L21	4.625	x 1.563

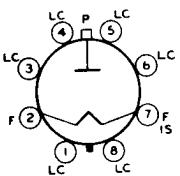
KEY: TERMINAL DIAGRAMS (*Bottom Views*)

LETTER COMBINATIONS

F = Filament End(Unpolarized)
G = Grid (Triode)
G_1 = Grid No. 1
G_2 = Grid No. 2
G_3 = Grid No. 3
H = Heater End (Unpolarized)
H_M = Heater Tap
IC = Do Not Use
IS = Internal Shield
K = Cathode
LC = May be used only under Limited Conditions
NC = No Internal Connection
P = Plate (Vacuum tubes) Anode (Gas-Filled tubes)

SUBSCRIPTS FOR MULTIUNIT TYPES

B = Beam Power Unit
D = Diode Unit
P = Pentode Unit
T = Triode Unit
1, 2, 3, = No. 1, No. 2, No. 3.



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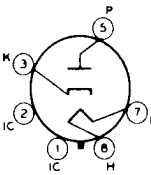

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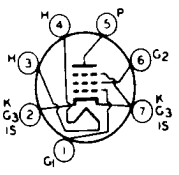

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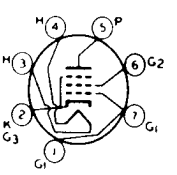

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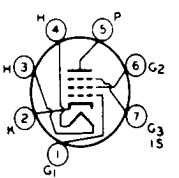

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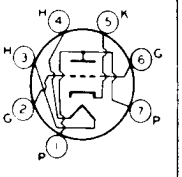

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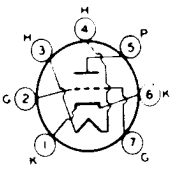

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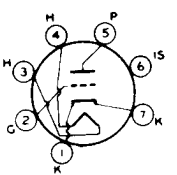

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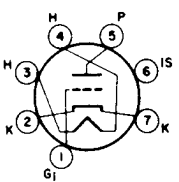

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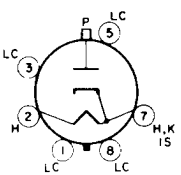

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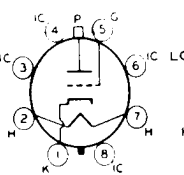

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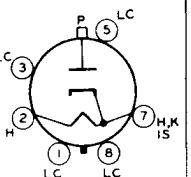

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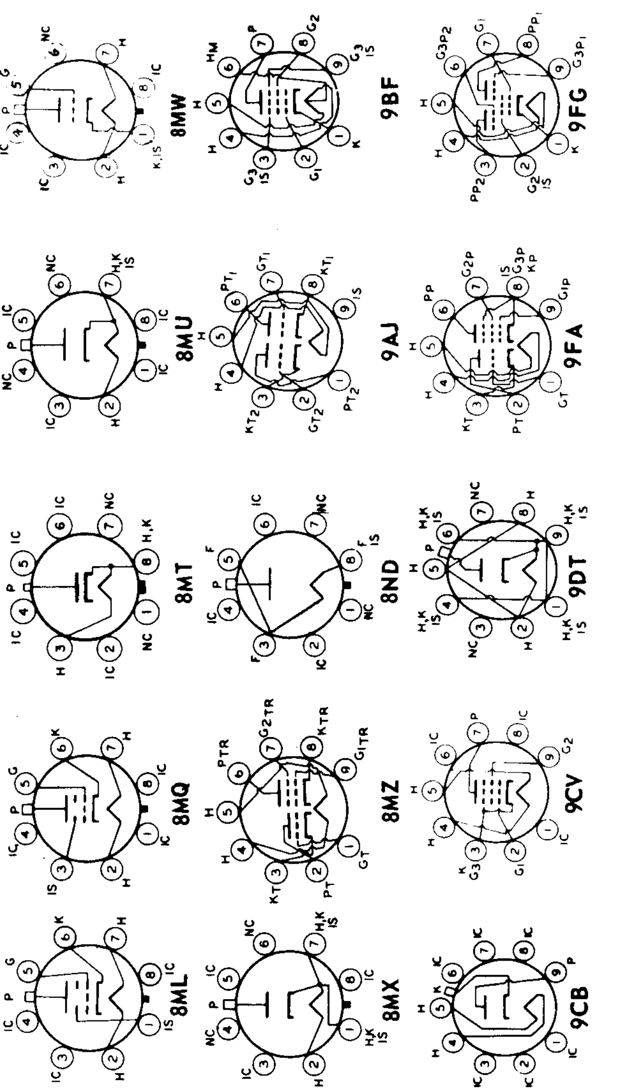
TERMINAL DIAGRAMS (Cont'd)



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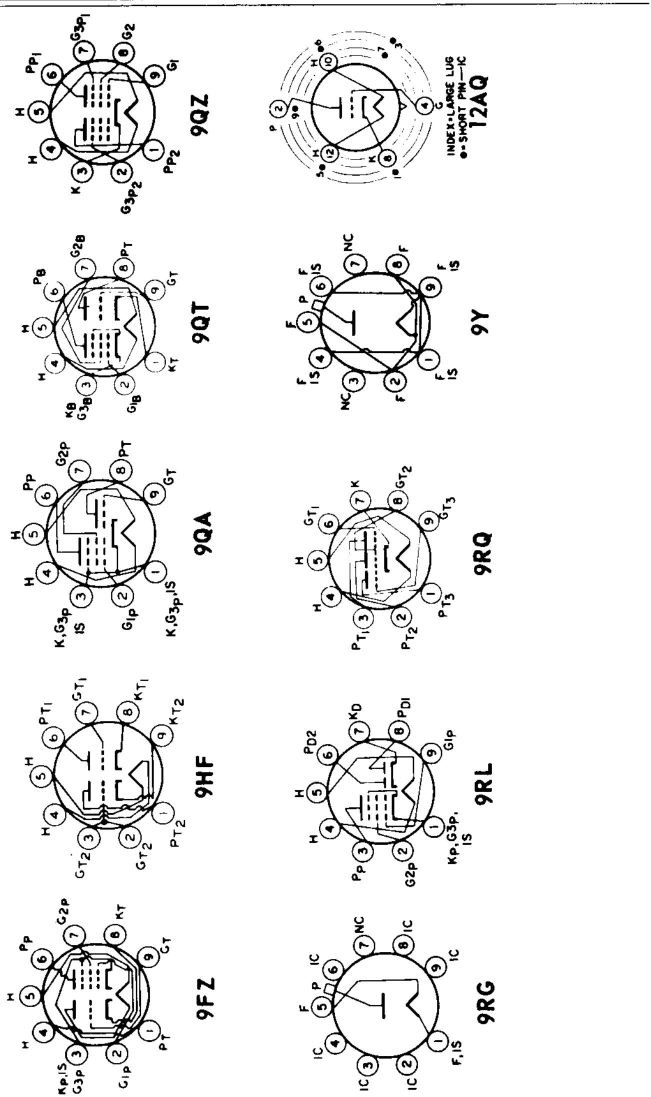

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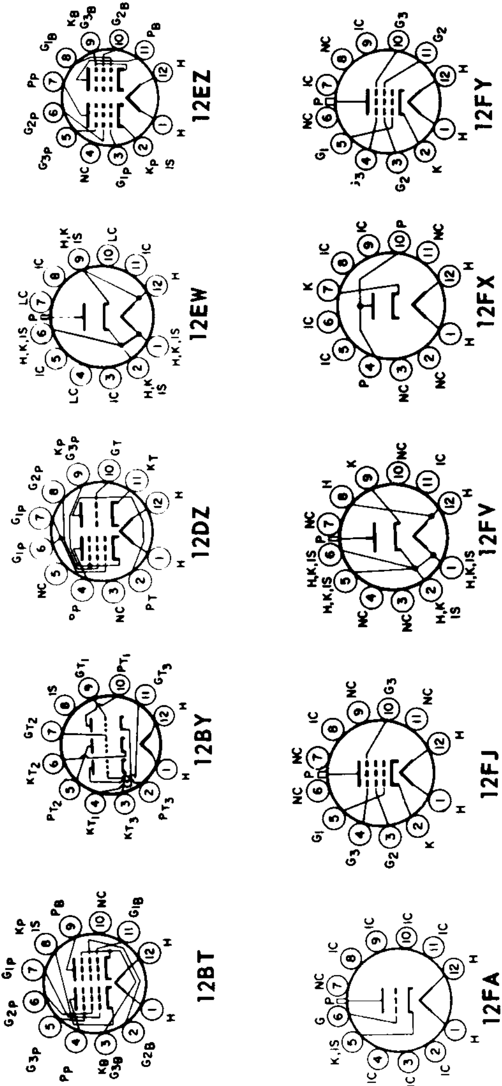

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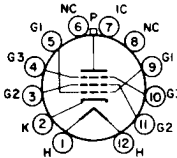

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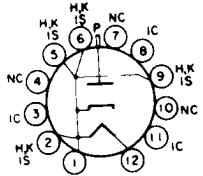

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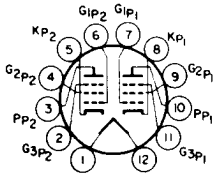

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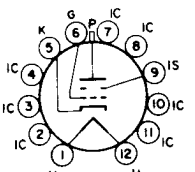

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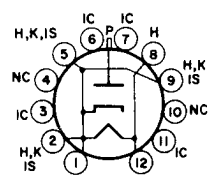

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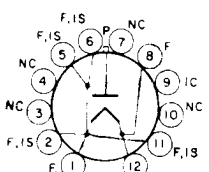

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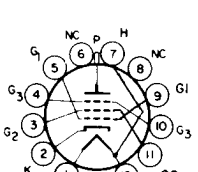

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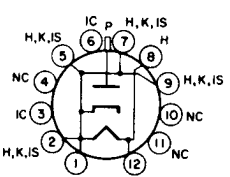


12JB

Type	Name	Tube Dimensions and Basing Diagram△		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply	Grid Bias Volts (v) or Cathode Resistor	Screen Supply	Screen Current	Plate Current	AC Plate Resistance	Transconductance	Load for Stated Power Output	Power Output
		Dim.	B. D.	Volts	Amps.		Volts	Ohms (Ω)	Volts	mA	mA	Ohms	Micromhos	Ohms	Watts
0Z4	Full-Wave Gas Rectifier	E2 F2	4R	—	—	Rectifier	Starting-Supply Voltage per Plate, 300 min. peak volts. DC Output Current, 75 max., 30 min. mA. Peak Plate Current, 200 max. mA. DC Output Voltage, 300 max. volts.								
1A3	Diode	A2	5AP	1.4	0.15	Rectifier	Max. Peak Plate Inverse Volts, 330 Max. Peak Plate mA , 5					Max. DC Output mA , 0.5 Max. Peak Heater-Cathode Volts, 140			
1A5-GT	Pwr Pentode	F6	6X	1.4F	0.05	Class A Amp	85 90	− 4.5v − 4.5v	85 90	0.7 1.1	3.5 4.0	300000 300000	800 850	25000 25000	0.100 0.115
1L6	Pentagrid Converter a	A2	7DC	1.4F	0.05	Converter	90	0v	45	0.6	0.5	650000	Anode-Grid (#2): 90 max. volts, 1.2 mA. Conversion Transcond., 300 micromhos.		
							Oscillator Grid (#1) Resistor, 0.2 meg.								
1N5-GT	Sharp-Cutoff Pentode	F7	5Y#	1.4F	0.05	Class A Amp	90	0v	90	0.3	1.2	1.5§	750	—	—
1R5	Pentagrid Converter▲	A2	7AT	1.4F	0.05	Converter	45 90	0v 0v	45 67.5	2.1 3.5	0.7 1.5	500000 400000	Convers.Transcond.,210 μmho Convers.Transcond.,280 μmho		
1S4	Pwr Pentode	A2	7AV	1.4F	0.1	Class A Amp	45 90	− 4.5v − 7v	45 67.5	0.8 1.4	3.8 7.4	100000 100000	1250 1575	8000 8000	0.065 0.27
1S5	Diode—Sharp-Cutoff Pentode	A2	6AU	1.4F	0.05	Pentode Unit as AF Amp	Plate Supply, 90 v applied through 1 meg. resistor. Screen Supply, 90 v applied through 3.1 meg. resistor. Grid Bias, 0 volts. Grid Resistor, 10 megohms. Voltage Gain, 66 approx.								
1T4	Remote-Cutoff Pentode	A2	6AR	1.4F	0.05	Class A Amp	45 90	0v 0v	45 67.5	0.7 1.4	1.7 3.5	350000 500000	700 900	—	—
1U4	Sharp-Cutoff Pentode	A2	6AR	1.4F	0.05	Class A Amp	90	0v	90	0.50	1.1	1.0§	900	—	—
1U5	Diode—Sharp-Cutoff Pentode	A2	6BW	1.4F	0.05	Pentode Unit as Class A Amp	67.5	0v	67.5	0.4	1.6	600000	625	—	—

Note: For footnotes, see end of this section. △ For key to tube dimensions, description, and basing diagram, see end of this section.

Type	Name	Tube Dimensions and Basing Diagram△ Dim.	B. D.	Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time. Volts	Amps.	Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Load for Stated Power Output Ohms	Power Output Watts
2A3	Power Triode	K11	4D	2.5F	2.5	Class A Amp	250	−45v	Mu = 4.2		60.0	800	5250	2500	3.5
						Push-Pull Class AB$_1$ Amp	300	780Ω♠	—	—	80.0♠	—	—	5000	10.0†
							300	−62v			80.0♠			3000	15.0†
2EN5	Twin Diode	A2	7FL	2.1⊕	0.45	Horizontal Phase Detector	Max. Peak Heater-Cathode Volts, ±200 DC Volts Not to Exceed +100 Max. DC Plate mA, 5								
3A2	Half-Wave Rectifier	B5	9DT	3.15	0.22	Pulsed Rectifier in TV Receivers	Max. Peak Inverse Plate Volts, 18000 Max. Peak Plate mA, 80 Max. Average Plate mA, 1.5								
3B2	Half-Wave Rectifier	F38	8GH	3.15	0.22	Pulsed Rectifier in TV Service	Max. Peak Plate mA, 80 Max. DC Inverse Plate Volts, 25000 Max. Total DC & Pk Inv Plate Volts, 35000 (Abs.) Max. Av Plate mA, 1.1								
3Q4	Power Pentode	A2	7BA	1.4F 2.8F	0.1 0.05	Class A Amp	For other characteristics, refer to Type 3V4								
3Q5-GT	Beam Power Tube	F6	7AP	1.4F 2.8F	0.1 0.05	Class A Amp	110 110	− 6.6v − 6.6v	110 110	1.4 1.1	10.0 8.5	100000 110000	2200 2000	8000 8000	0.40 0.33
3S4	Power Pentode	A2	7BA	1.4F 2.8F	0.1 0.05	Class A Amp	90 90	− 7v − 7v	67.5 67.5	1.4 1.1	7.4 6.1	100000 100000	1575 1425	8000 8000	0.27 0.235
3V4	Power Pentode	A2	6BX	1.4F 2.8F	0.1 0.05	Class A Amp	90 90	− 4.5v − 4.5v	90 90	2.1 1.7	9.5 7.7	100000 120000	2150 2000	10000 10000	0.27 0.24
5AZ4	Full-Wave Rectifier	J3	5T	5.0F	2.0	With Capacitive Input Filter	Max. AC Volts per Plate (RMS), 350 Max. DC Output mA, 125 Max. Peak Inverse Volts, 1400 Max. Peak Plate mA, 440 Min. Total Effect. Supply Imped. per Plate, 50 ohms								
5BE8	Medium-Mu Triode—Sharp-Cutoff Pentode	B2	9EG	4.7⊕	0.6	Triode Unit as Class A Amp	150	56Ω	Mu = 40		18	5000	8500	—	—
						Pentode Unit as Class A Amp	250	68Ω	110	3.5	10	400000	5200	—	—
5BT8	Twin-Diode—Sharp-Cutoff Pentode	B2	9FE	4.7⊕	0.6	Class A Amp	200	180Ω	150	2.8	9.5	300000	6200	—	—

Type	Name	Tube Dimensions and Basing Diagram △		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply	Grid Bias Volts (v) or Cathode Resistor	Screen Supply	Screen Current	Plate Current	AC Plate Resistance	Transconductance
		Dim.	B. D.	Volts	Amps.		Volts	Ohms (Ω)	Volts	mA	mA	Ohms	Micromhos
5DJ4	Full-Wave Rectifier	F25	8KS	5.0F	3.0	With Capacitive-Input Filter	Max. DC Output mA, 300 for AC Volts per Plate, 500 and Min. Total Effect. Supply Imped. per Plate, 83 ohms Max. Peak Inverse Volts, 1700 Max. Peak Plate mA per Plate, 1000						
						With Inductive-Input Filter	Max. DC Output mA, 300 for AC Volts per Plate, 600 Max. Peak Inverse Volts, 1700 Max. Peak Plate mA per Plate, 1000						
5U4-G	Full-Wave Rectifier	F39	5T‡	5.0F	3.0	With Capacitive-Input Filter	Max. AC Volts per Plate (RMS), 450 Max. DC Output mA, 225 Max. Peak Inverse Volts, 1550 Max. Peak Plate mA, 675 Min. Total Effect. Supply Imped. per Plate, 170 ohms						
5Y4-GA **5Y4-GT**	Full-Wave Rectifier	F25 F8	5Q	5.0F	2.0		Max. Peak Plate mA, 400 For other ratings, refer to Type 5AZ4.						
5Z3	Full-Wave Rectifier	K11	4C	5.0F	3.0		For other ratings, refer to Type 5U4-G.						
5Z4	Full-Wave Rectifier	E4	8L	5.0	2.0	With Capacitive-Input Filter	Max. AC Volts per Plate (RMS), 350 Max. DC Output mA, 125 Max. Peak Inverse Volts, 1400 Max. Peak Plate mA, 375						Min. Total Effect. Supply Imped. per Plate, 50 Ω
						With Inductive-Input Filter	Max. AC Volts per Plate (RMS), 500 Max. DC Output mA, 125 Max. Peak Inverse Volts, 1400 Max. Peak Plate mA, 375 Min. Value of Input Choke, 5 henries						
6A7	Pentagrid Converter ⊕	K5	7C	6.3	0.3	Converter	For other characteristics, refer to Type 6A8.						
6A8	Pentagrid Converter ⊕	E3	8A	6.3	0.3	Converter	250	— 3v	100	2.7	3.5	360000	
							Anode-Grid (#2): 250 max. v, 4.0 mA Oscillator-Grid (#1) Res. , Conversion Transcond., 550 μmho						
6AC7	Sharp-Cutoff Pentode	E2	8N	6.3	0.45	Class A Amp	300	160Ω	150	2.5	10.0	1.0§	9000

Note: For footnotes, see end of this section. △ For key to tube dimensions, description, and basing diagram, see end of this section.

Type	Name	Tube Dimensions and Basing Diagram△		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply	Grid Bias Volts (v) or Cathode Resistor	Screen Supply	Screen Current	Plate Current	AC Plate Resistance	Transconductance	Load for Stated Power Output	Power Output
		Dim.	B. D.	Volts	Amps.		Volts	Ohms (Ω)	Volts	mA	mA	Ohms	Micromhos	Ohms	Watts
6AH4-GT	Low-Mu Triode	F6	8EL	6.3	0.75	Vertical Deflection Amp	Max. DC Plate Volts, 500 Max. DC Cathode mA, 60				Max. Peak Positive-Pulse Plate Volts, 2000 Max. Plate Dissipation, 7.5 watts				
6AH6	Sharp-Cutoff Pentode	A2	7BK	6.3	0.45	Class A Amp	300	160Ω	150	2.5	10.0	500000	9000	—	—
6AL7-GT	Electron-Ray Tube	F6	8CH	6.3	0.15	Visual Indicator	Target Voltage, 315 volts Grid Voltage = 0 volts Deflecting-Electrodes—No. 1, No. 2 and No. 3 Voltage = 0				Grid Voltage for Pattern Cutoff, −7 volts approx. Cathode Bias Res., 3300 ohms approx.				
6AM4	High-Mu Triode	B1	9BX	6.3	0.225	Class A Amp	200	100Ω	Mu = 85		10	8700	9800	—	—
6AQ6	Twin-Diode—High-Mu Triode	A2	7BT	6.3	0.15	Triode Unit as Class A Amp	100 250	− 1v − 3v	Mu = 70		0.8 1.0	61000 58000	1150 1200	—	—
6AQ7-GT	Twin-Diode—High-Mu Triode	F6	8CK	6.3	0.3	Triode Unit as Class A Amp	250	− 2v	Mu = 70		2.3	44000	1600	—	—
6AR5	Power Pentode	A3	6CC	6.3	0.4	Class A Amp	250	−18v	250	5.5	32.0	90000	2300	7600	3.4
6AS5	Beam Power Tube	A3	7CV	6.3	0.8	Class A Amp	150	− 8.5v	110	2.0	35	—	5600	4500	2.2
6AV5-GA	Beam Power Tube	F19	6CK	6.3	1.2	Horizontal Deflection Amp	Max. DC Plate Volts, 550 Max. DC Cathode mA, 110				Max. Peak Positive-Pulse Plate Volts, 5500 (Abs.) Max. Plate Dissipation, 11 watts				
6AX8	Medium-Mu Triode—Semiremote Cutoff Pentode	B2	9AE	6.3	0.45	Triode Unit as Class A Amp	150	560Ω	Mu = 40		18	5000	8500	—	—
						Pentode Unit as Class A Amp	250	120Ω	110	3.5	10	400000	4800	—	—
6B8	Twin-Diode—Semiremote-Cutoff Pentode	E3	8E	6.3	0.3	Pentode Unit as Amp	250	− 3v	125	2.3	10	600000	1325	—	—
6BD6	Remote-Cutoff Pentode	A2	7BK	6.3	0.3	Class A Amp	250	− 3v	100	3.0	9.0	800000	2000	—	—

Type	Name	Tube Dimensions and Basing Diagram△		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply	Grid Bias Volts (v) or Cathode Resistor	Screen Supply	Screen Current	Plate Current	AC Plate Resistance	Transconductance	Load for Stated Power Output	Power Output
		Dim.	B. D.	Volts	Amps.		Volts	Ohms (Ω)	Volts	mA	mA	Ohms	Micromhos	Ohms	Watts
6BF5	Beam Power Tube	A3	7BZ	6.3	1.2	Class A Amp	110	− 7.5v	110	4.0	36.0	12000	7500	2500	1.9
6BF6	Twin-Diode—Medium-Mu Triode	A2	7BT	6.3	0.3	Triode Unit as Class A Amp	250	− 9v	Mu = 16		9.5	8500	1900	Power Output, 300 milliwatts	
6BG6-G 6BG6-GA	Beam Power Tube	F40 F33	5BT	6.3	0.9	Horizontal Deflection Amp	Max. DC Plate Volts, 700 Max. Peak Positive-Pulse Plate Volts, 6600 (Abs.) Max. DC Cathode mA, 110 Max. Plate Dissipation, 20 watts								
6BH8	Medium-Mu Triode—Sharp-Cutoff Pentode	B4	9DX	6.3⊕	0.6	Triode Unit as Class A Amp	150	− 5v	Mu = 17		9.5	5150	3300	—	—
						Pentode Unit as Class A Amp	200	82Ω	125	3.4	15	150000	7000	—	—
6BK5	Beam Power Tube	B4	9BQ	6.3	1.2	Class A Amp	250	− 5v	250	3.5	35	100000	8500	6500	3.5
6BS8	Medium-Mu Twin Triode	B2	9AJ	6.3	0.4	Each Unit as Class A Amp	150	220Ω	Mu = 36		10	5000	7200	—	—
6BV8	Twin Diode—Medium-Mu Triode	B2	9FJ	6.3⊕	0.6	Triode Unit as Class A Amp	200	330Ω	Mu = 33		11	5900	5600	—	—
6BW4	Full-Wave Rectifier	B4	9DJ	6.3	0.9	With Capacitive Input Filter	Max. AC Volts per Plate (RMS), 325 Max. Peak Inverse Volts, 1275 Max. DC Output mA, 62.5 Max. Peak Plate mA per Plate, 350 Total Effect. Supply Imped. per Plate, 82 ohms								
						With Inductive Input Filter	Max. AC Volts per Plate (RMS), 450 Max. Peak Inverse Volts, 1275 Min. Value of Input Choke, 10 henries Max. DC Output mA, 62.5 Max. Peak Plate mA per Plate, 350								

Note: For footnotes, see end of this section. △ For key to tube dimensions, description, and basing diagram, see end of this section.

Type	Name	Tube Dimensions and Basing Diagram△ Dim.	B. D.	Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time. Volts	Amps.	Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Amplification Factor
6BX7-GT	Medium-Mu Twin Triode	F6	8BD	6.3	1.5	Vertical Deflection Oscillator	Max. DC Plate Volts, 500						Max. DC Cathode mA, 180	
							Max. Plate Dissipation: 10 watts either plate; 12 watts both plates							
						Vertical Deflection Amplifier	Max. DC Plate Volts, 500				Max. Pk Positive-Pulse Plate Volts, 2000 (Abs.)			
							Max. DC Cath. mA, 180							
							Max. Plate Dissipation: 10 watts either plate; 12 watts both plates.							
6BY5-GA	Full-Wave Rectifier	F17	6CN	6.3	1.6	Television Damper Service	Max. Peak Inverse Plate Volts, 3000 (Abs.)				Max. DC Plate mA, 175			
							Max. Peak Plate mA, 525				Max. Peak Heater-Cathode Volts: −450, +100			
6C5	Medium-Mu Triode	E2	8Q	6.3	0.3	Class A Amp	250	− 8v	—	—	8.0	10000	2000	20
6C6	Sharp-Cutoff Pentode	K9	8F	6.3	0.3	Amplifier Detector	For other characteristics, refer to Type 6J7.							
6C9	Sharp-Cutoff Dual Tetrode	G1	10F	6.3	0.4	Each Unit as Class A Amp	125	− 1V	80	1.5	10	100000	8000	—
6CH8	Medium-Mu Triode—Sharp-Cutoff Pentode	B2	9FT	6.3	0.45	Triode Unit as Class A Amp	200	− 6v	—	—	13	5750	3300	19
						Pentode Unit as Class A Amp	200	180Ω	150	2.8	9.5	300000	6200	—
6CK4	Low-Mu Triode	F9	8JB	6.3	1.25	Vertical Deflection Amp	Max. DC Plate Volts, 550				Max. Pk Positive-Pulse Plate Volts, 2000 (Abs.)			
							Max. Peak Cathode mA, 350				Max. Plate Dissipation, 12 watts			
6CM8	High-Mu Triode—Sharp-Cutoff Pentode	B2	9FZ	6.3⊕	0.45	Triode Unit as Class A Amp	250	− 2v	—	—	1.8	50000	2000	100
						Pentode Unit as Class A Amp	250	180Ω	150	2.8	9.5	600000	6200	—
6CR6	Diode—Remote-Cutoff Pentode	A2	7EA	6.3	0.3	Pentode Unit as Class A Amplifier	250	− 2v	100	2.6	6	800000	2200	—
							Grid (#1) Volts for transcond. of 10 micromhos, −32							

Type	Name	Tube Dimensions and Basing Diagram△		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply	Grid Bias Volts (v) or Cathode Resistor	Screen Supply	Screen Current	Plate Current	AC Plate Resistance	Transconductance	Load for Stated Power Output	Power Output
		Dim.	B. D.	Volts	Amps.		Volts	Ohms (Ω)	Volts	mA	mA	Ohms	Micromhos	Ohms	Watts
6DN6	Beam Power Tube	F33	5BT	6.3	2.5	Horizontal Deflection Amp	Max. DC Plate Volts, 700 Max. DC Cathode mA, 200					Max. Peak Positive-Pulse Plate Volts, 6600 (Abs.) Max. Plate Dissipation, 15 watts			
6EH5	Power Pentode	A3	7CV	6.3	1.2	Class A Amp	110	62Ω	115	11.5	42	11000	14600	8000	1.4
6EV7	High-Mu Twin Triode	B4	9LP	6.3	0.6	Relay Control	250 150	0v 0v	2500-ohm relay		18.5 10.0	Grid Volts for Plate μA, 100 = −9 Grid Volts for Plate μA, 100 = −5			
6EZ5	Beam Power Tube	F9	7AC	6.3	0.8	Vertical Deflection Amp	250	−20v	250	3.5	43	50000	4100	—	—
6F5	High-Mu Triode	E3	5M	6.3	0.3	Class A Amplifier	100 250	−1v −2v	Mu = 100		0.4 0.9	85000 66000	1150 1500	—	—
6F6 6F6-GT	Power Pentode	E4 F9	7S 7S‡	6.3	0.7	Pentode Class A Amp	250 285	−16.5v −20v	250 285	6.5 7.0	34.0 38.0	80000 78000	2500 2550	7000 7000	3.2 4.8
						Pentode Push-Pull Class A Amp	315	−24v	285	12.0♦	62.0♦	—	—	10000	11.0†
6F8-G	Medium-Mu Twin Triode	F24	8G	6.3	0.6	Each Unit as Class A Amp	For other characteristics, refer to Type 6J5.								
6FE5	Beam Power Tube	F15	8KB	6.3	1.2	Class A Amp	145	−16v	145	18	100	8000	9500	1000	5.6
6GY8	Triple High-Mu Triode	B2	9MB	6.3	0.45	Each Unit as Class A Amp	125	−1v	Mu = 63		4.5	14000	4500	—	—
6J5 6J5-GT	Medium-Mu Triode	E2 F7	6Q 6Q‡	6.3	0.3	Class A Amp	90 250	0v −8v	Mu = 20		10 9	6700 7700	3000 2600	—	—
6J7	Sharp-Cutoff Pentode	E3	7R	6.3	0.3	Pentode Class A RF Amp	100 250	−3v −3v	100 100	0.5 0.5	2.0 2.0	1.0§ 1.0§	1185 1225	—	—

Note: For footnotes, see end of this section. △ For key to tube dimensions, description, and basing diagram, see end of this section.

Type	Name	Tube Dimensions and Basing Diagram△		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Load for Stated Power Output Ohms	Power Output Watts
		Dim.	B. D.	Volts	Amps.										
6K7	Remote-Cutoff Pentode	E3	7R	6.3	0.3	Class A Amp	250	− 3v	125	2.6	10.5	600000	1650	—	—
6K8	Triode-Hexode Converter	E3	8K	6.3	0.3	Triode Unit as Oscillator	100	Grid Res., 50000 ohms			3.8	Triode-Grid & Hexode-Grid Current, 0.15 mA			
						Hexode Unit as Mixer	100 250	− 3v − 3v	100 100	6.2 6.0	2.3 2.5	400000 600000	Conv Transcond., 325 μmho Conv Transcond., 350 μmho		
6KL8	Diode—Sharp-Cutoff Pentode	B4	9LQ	6.3	0.3	Pentode Unit as Class A Amp	100	2.2 MΩ Grid Res	100	2.2	5.5	550000	4300	—	—
6L7	Pentagrid Mixer▲	E3	7T	6.3	0.3	Mixer Service	250	− 6v	150	9.2	2.3	Osc Grid (No. 3) Bias, −15 volts Grid-No. 3 Peak Swing, 16 volts min Conv Transcond., 350 micromhos.			
6N7	Medium-Mu Twin Power Triode	E4	8B	6.3	0.8	Class A Amp (as Driver)◇	250 300	− 5v − 6v	Mu = 35		6.0 7.0	11300 11000	3100 3200	20000 or more	exceeds 0.4
6N7-GT		F6	8B‡			Class B Amp	300	0v	Pwr Output for 1 tube at stated plate-to-plate load					8000	10.0
6Q7	Twin Diode High-Mu Triode	E3	7V	6.3	0.3	Triode Unit as Class A Amp	100 250	− 1v − 3v	Mu = 70		0.8 1.1	58000 58000	1200 1200	—	—
6S8-GT	Triple Diode—Hi-Mu Triode	F6	8CB	6.3	0.3	Triode Unit as Class A Amp	250	− 2v	Mu = 100		0.9	91000	1100	—	—
6SB7-Y	Pentagrid Converter▲	E2	8R	6.3	0.3	Mixer	100	− 1v	100	10.2	3.6	500000	Grid-No. 1 Res., 20000 Ω Conversion Transcond., 950 micromhos		
6SC7	High-Mu Twin Triode	E2	8S	6.3	0.3	Each Unit as Amplifier	250	− 2v	Mu = 70		2.0	53000	1325	—	—
6SF5	High-Mu Triode	E2	6AB	6.3	0.3	Class A Amp	250	− 2v	Mu = 100		0.9	66000	1500	—	—

Type	Name	Tube Dimensions and Basing Diagram △ Dim.	B. D.	Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time. Volts	Amps.	Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Load for Stated Power Output Ohms	Power Output Watts
6SF7	Diode—Remote-Cutoff Pentode	E2	7AZ	6.3	0.3	Pentode Unit as Class A Amp	100 250	− 1v − 1v	100 100	3.4 3.3	12.0 12.4	200000 700000	1975 2050	—	—
6SG7	Semiremote-Cutoff Pentode	E2	8BK	6.3	0.3	Class A Amp	100 250	− 1v − 2.5v	100 150	3.2 3.4	8.2 9.2	250000 1.0§	4100 4000	— —	— —
6SH7	Sharp-Cutoff Pentode	E2	8BK	6.3	0.3	Class A Amp	100 250	− 1v − 1v	100 150	2.1 4.1	5.3 10.8	350000 900000	4000 4900	—	—
6SK7 **6SK7-GT**	Remote-Cutoff Pentode	E2 F7	8N 8NX	6.3	0.3	Class A Amp	100 250	− 1v − 3v	100 100	4.0 2.6	13.0 9.2	120000 800000	2350 2000	—	—
6SR7	Twin Diode—Medium-Mu Triode	E2	8Q	6.3	0.3	Triode Unit as Class A Amp	250	− 9v		Mu = 16	9.5	8500	1900	—	—
6T4	Medium-Mu Triode	A1	7DK	6.3	0.225	Osc in UHF TV Receivers Class A Amp	Max. DC Plate Volts, 200 80	Max. DC Cathode mA, 30 150Ω		Mu = 13	Max. Plate Dissipation, 3.5 watts 18	—	7000	Max. Grid mA, 8 —	—
6U5	Electron-Ray Tube	K3	6R	6.3	0.3	Visual Indicator	Plate & Target Supply = 250 volts. Triode Plate Resistor = 1.0 meg. Grid Bias, −22 volts; Shadow Angle, 0°. Bias, 0 volts; Angle, 90°: Target Current = 4.0 m A Plate Current, 0.24 mA								
6V6	Beam Power Tube	E4	7AC	6.3	0.45	Single-Tube Class A Amp	250 315	−12.5v −13v	250 225	4.5 2.2	45.0 34.0	50000 80000	4100 3750	5000 8500	4.5 5.5
						Push-Pull Class AB1 Amp	250 285	−15v −19v	250 285	5.0♠ 4.0♠	70.0♠ 70.0♠	— —	— —	10000 8000	10.0† 14.0†
7A7	Remote-Cutoff Pentode	J2	8V	6.3	0.3	Class A Amp	For other characteristics, refer to Type 6SK7.								
7C5	Beam Power Tube	J3	6AA	6.3	0.45	Class A Amp	For other characteristics, refer to Type 6V6.								

Note: For footnotes, see end of this section. △ For key to tube dimensions, description, and basing diagram, see end of this section.

Type	Name	Tube Dimensions and Basing Diagram △ Dim.	B. D.	Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time. Volts	Amps.	Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Amplification Factor
7C7	Sharp-Cutoff Pentode	J2	8V	6.3	0.15	Class A Amplifier	250	− 3v	100	0.5	2.0	2.0§	1300	—
7F7	High-Mu Twin Triode	J2	8AC	6.3	0.3	Each Unit as Class A Amplifier	250	− 2v	—	—	2.3	44000	1600	70
7F8	Medium-Mu Twin Triode	J2	8BW	6.3	0.3	Each Unit as Class A Amplifier	250	500Ω	—	—	6.0	—	3300	48
7N7	Medium-Mu Twin-Triode	J3	8AC	6.3	0.6	Each Unit as Class A Amplifier	90 250	0v − 8v	— —	— —	10.0 9.0	6700 7700	3000 2600	20 20
9BR7	Twin Diode—High-Mu Triode	B2	9CF	4.7⊕ 9.4	0.6 0.3	Triode Unit as Class A Amplifier	250	200Ω	—	—	10	10900	4000	60
9U8-A	Medium-Mu Triode—Sharp-Cutoff Pentode	B2	9AE	9.45⊕	0.3	Triode Unit as Class A Amplifier	125	− 1v	—	—	13.5	5000	7500	40
						Pentode Unit	125	− 1v	110	3.5	9.5	200000	5000	—
10C8	High-Mu Triode—Sharp-Cutoff Pentode	B2	9DA	10.5⊕	0.3	Triode Unit as Class A Amplifier	250	390Ω	—	—	7.3	12000	4400	53
						Pentode Unit as Class A Amplifier	135	100Ω	135	3.2	11.5	190000	8000	—
12AC6	Remote-Cutoff Pentode⊙	A2	7BK	10.0 to 15.9	0.15 approx. at 12.6 v	Class A Amplifier	12.6	—	12.6	.2	.55	500000	730	G_1 Supp V, 0 G_1 Res., 2.2 megohms
12AD6	Pentagrid Converter⊙	A2	7CH	10.0 to 15.9	0.15 approx. at 12.6 v	Converter	12.6	Self-excited	12.6	1.5	0.45	1§	G_1 Res. 33000 Ω Conv Transcond., 260 micromhos	
12AE6-A	Twin Diode—Medium-Mu Triode⊙	A2	7BT	10.0 to 15.9	0.15 approx. at 12.6 v	Triode Unit as Class A Amplifier	12.6	0v	—	—	1	13000	1300	16.7

Type	Name	Tube Dimensions and Basing Diagram △ Dim.	B. D.	Heater or Filament (F) Unless specified all types have heaters. ⊖ Heater with controlled warmup time. Volts	Amps.	Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Amplification Factor	Load for Stated Power Output Ohms	Power Output Watts
12AF6	Remote-Cutoff Pentode⊙	A2	7BK	10.0 to 15.9	0.15 approx. at 12.6 v	Class A Amp	12.6	—	12.6	0.45	1.1	350000	1500	G_1 Supply Volts, 0 G_1 Res., 2.2 megohms		
12AL8	Medium-Mu Triode—Power Tetrode⊙	B4	9GS	10.0 to 15.9	0.55 approx. at 12.6 v	Triode Unit as Class A Amp	12.6	— 0.9v (across 2.2 megohm res.)			.5	13000	1000	13	—	—
						Tetrode Unit as Class A Amp	Grid-No. 2 (Control Grid) Volts, −.5 (across 2.2 megohm res.) Ampl. Factor (Grid-No. 2 to Plate), 7.2 Grid-No. 1 (Space-Charge Grid) Volts, 12.6 Grid-No. 1 mA, 75 Plate mA, 40 Transcond. (Grid-No. 2 to Plate), 15000 μmho Plate Resistance, 480 ohms					
12AV7	Medium-Mu Twin-Triode	B2	9A	6.3 12.6	0.45 0.225	Each Unit as Class A Amp	150	56Ω	—	—	18	48000	8500	41	Cutoff Volts, −12	
12AW6	Sharp-Cutoff Pentode	A2	7CM	12.6	0.15	Class A Amp	100 250	180Ω 180Ω	100 150	1.4 2.0	4.5 6.5	600000 800000	4500 5000	—	—	—
12BK5	Beam Power Tube	B4	9BQ	12.6⊖	0.6	Class A Amp	250	— 5v	250	3.5	35	100000	8500	—	6500	3.5
12BL6	Remote-Cutoff Pentode⊙	A2	7BK	10.0 to 15.9	0.15 approx. at 12.6 v	Class A Amp	12.6	Grid-No. 1 Supply Volts, 0	12.6	0.5	1.35	500000	1350	C_1 and G_3 Volts for transcond. of 10 micromhos, −5		
12BR7	Twin Diode—Hi-Mu Triode	B2	9CF	6.3 12.6	0.45 0.225	Triode Unit as Class A Amp	100 250	270Ω 200Ω	—	—	3.7 10	15000 10900	4000 5500	60 60	—	—
12BV7	Sharp-Cutoff Pentode	B4	9BF	6.3 12.6	0.6 0.3	Class A Amp	250 250	68Ω — 8v	150 180	6 —	27 0.5 ■	85000 —	13000 —	—	—	—
12BW4	Full-Wave Rectifier	B4	9DJ	12.6	0.45	With Capacitive Input Filter	Max. AC Volts per Plate (RMS) 450 Max. DC Output mA, 62.5 Max. Peak Inverse Volts, 1275 Max. Peak Plate mA, 350 Total Effect. Supply Imped. per Plate, 82 ohms									
12BZ7	High-Mu Twin Triode	B4	9A	6.3 12.6	0.6 0.3	Each Unit as Class A Amp	250	— 2v	—	—	2.5	31800	3200	100	—	—

Note: For footnotes, see end of this section. △ For key to tube dimensions, description, and basing diagram, see end of this section.

Type	Name	Tube Dimensions and Basing Diagram △		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply	Grid Bias Volts (v) or Cathode Resistor	Screen Supply	Screen Current	Plate Current	AC Plate Resistance	Transconductance	Amplification Factor	Load for Stated Power Output	Power Output
		Dim.	B. D.	Volts	Amps.		Volts	Ohms (Ω)	Volts	mA	mA	Ohms	Micromhos		Ohms	Watts
12CN5	Remote-Cutoff Pentode ⊙	A3	7CV	10.0 to 15.9	0.45 approx. at 12.6 v	Class A Amp	12.6	—	12.6	3.5	4.5	40000	3800	{Grid-No. 1 Supply Volts, 0 Grid-No. 1 Res, 2.2 meg		
12CX6	Remote-Cutoff Pentode ⊙	A2	7BK	10.0 to 15.9	0.15 approx. at 12.6 v	Class A Amp	12.6	Grid-No. 1 Supply Volts, 0	12.6	1.4	3	40000	3100	G_1 Volts for Plate Current of 10 μA, −4.5		
12DQ7	Power Pentode	B4	9BF	6.3⊕ 12.6	0.6 0.3	Class A Amp	200	68Ω	125	5.6	26	53000	10500	—	—	—
12DS7	Twin Diode—Power Tetrode ⊙	B4	9JU	10.0 to 15.9	0.4 approx. at 12.6 v	Tetrode Unit as Class A Amplifier	12.6	12.6v	−0.5 (across 2.2 megohm resistor)	75 (Grid-No. 1)	35	500	19000 (Grid-No. 2 to Plate)	9.1 (Grid-No. 2 to Plate)	—	—
						Diode Units	Diode Plate mA, with 10 Volts Applied, 3 mA								
12DW7	Dual Triode	B2	9A	12.6 6.3	0.15 0.3	Unit No. 1 as Class A Amp	250	− 2v	—	—	1.2	62500	—	100	—	—
						Unit No. 2 as Class A Amp	250	−8.5v	—	—	10.5	7700	2200	17	—	—
12DY8	Medium-Mu Triode—Remote-Cutoff Tetrode ⊙	B2	9JD	10.0 to 15.9	0.35 approx. at 12.6V	Triode Unit as Class A Amp	12.6	—	—	—	1.2	10000	2000	20	—	—
						Tetrode Unit as Signal Seeker Relay	10	—	10	—	5 min.	Grid No. 1 res, 10 meg.		Plate Load, 700 ohms		
							15	− 6v	15	—	3 max.	—	—	Plate Load, 700 ohms		
12ED5	Beam Power Tube	A3	7CV	12.6⊕	0.45	Class A Amp	1.25	− 4.5v	125	7	37	14000	8500	—	4500	1.5
12EK6	Remote-Cutoff Pentode ⊙	A2	7BK	10.0 to 15.9	0.19 approx. at 12.6 v	Class A Amp	12.6	—	12.6	1.7	4	50000	4200	G_1 Supply Volts, 0 G_1 Res (Bypassed), 2.2 megohms		

Type	Name	Tube Dimensions and Basing Diagram△		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Amplification Factor	Load for Stated Power Output Ohms
		Dim.	B. D.	Volts	Amps.										
12EQ7	Diode—Remote-Cutoff Pentode	B4	9LQ	12.6	0.15	Pentode Unit as Class A Amplifier	100	0v	100	3.5	9	250000	3800	Grid-No. 1 Res., 2.2 megohms	
12F8	Twin Diode—Remote-Cutoff Pentode⊙	B2	8FH	10.0 to 15.9	0.15 approx. at 12.6 v	Pentode Unit as Class A Amplifier	12.6	0v	12.6	0.38	1	330000	1000		
							Grid-No. 1 Volts for transcond. of 10 micromhos, −5								
12FK6	Twin Diode—Low-Mu Triode⊙	A2	7BT	10.0 to 15.9	0.15 approx. at 12.6 v	Triode Unit as Class A Amplifier	12.6	Grid Supply Volts, 0 Grid Res. (Bypassed), 2.2 megohms			1.3	6200	1200	7.4	—
12FM6	Twin Diode—Medium-Mu Triode⊙	A2	7BT	10.0 to 15.9	0.15 approx. at 12.6 v	Triode Unit as Class A Amplifier	12.6	0v	—	—	1	7700	1300	10	—
12FV7	Medium-Mu Twin Triode	B4	9A	6.3 12.6	0.9 0.45	Each Unit as Class A Amplifier	100	− 2v	—	—	16	2250	9600	21.5	—
12J5-GT	Medium-Mu Triode	F7	6Q‡	12.6	0.15	Amplifier	For other characteristics, refer to Type 6J5-GT.								
12J8	Twin Diode—Power Tetrode⊙	B2	9GC	10.0 to 15.9	0.325 approx. at 12.6 v	Tetrode Unit as Class A Amplifier	12.6	− 0v	12.6	1.5	12	6000	5500	—	2700
							Power Output, 0.02 Watts								
12K5	Power Tetrode⊙	A3	7EK	10.0 to 15.9	0.4 approx. at 12.6 v	Class A Amplifier	DC Plate Volts, 12.6 Grid-No. 2 (Control Grid) Volts, −.5 Grid-No. 1 (Space-Charge Grid) Volts, 12.6 Amplification Factor, DC Plate mA, 40 Grid-No. 1 mA, 75 Grid-No. 2 to Plate, 7.2 Plate Resistance, 480 ohms Transcond., Grid-No. 2 to Plate, 15000 μmho								
12K7-GT	Remote-Cutoff Pentode	F7	7R	12.6	0.15	Amplifier	For other characteristics, refer to Type 6K7-GT.								

Note: For footnotes, see end of this section. △ For key to tube dimensions, description, and basing diagram, see end of this section.

Type	Name	Tube Dimensions and Basing Diagram△		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Load for Stated Power Output Ohms	Power-Output Watts
		Dim.	B. D.	Volts	Amps.										
12KL8	Diode—Sharp-Cutoff Pentode	B4	9LQ	12.6	0.15	Pentode Unit as Class A Amplifier	For other characteristics, refer to Type 6KL8.								
12L6-GT	Beam Power Tube	F6	7AC‡	12.6⊕	0.6	Class A Amplifier	110 200	— 7.5v 180Ω	110 125	4.0 2.2	49 46	13000 28000	8000 8000	2000 4000	2.1 3.8
12R5	Beam Power Tube	A3	7CV	12.6⊕	0.6	Vertical Deflection Amplifier	Max. DC Plate Volts, 150 Max. Peak Neg.-Pulse Grid-No. 1 Volts, 150 Max. Peak Cathode mA, 155 Max. Grid-No. 2 Volts, 150 Max. Plate Dissipation, 4.5 watts Max. Peak Positive-Pulse Plate Volts, 1500 (Abs.)								
12SC7	High-Mu Twin Triode	E2	8S	12.6	0.15	Each Unit as Class A Amplifier	For other characteristics, refer to Type 6SC7.								
12SF5	Hi-Mu Triode	E2	6AB	12.6	0.15	Class A Amplifier	For other characteristics, refer to Type 6SF5.								
12SF7	Diode—Remote-Cutoff Pentode	E2	7AZ	12.6	0.15	Pentode Unit as Amplifier	For other characteristics, refer to Type 6SF7.								
12SG7	Semiremote-Cutoff Pentode	E2	8BK	12.6	0.15	Class A Amplifier	For other characteristics, refer to Type 6SG7.								
12SH7	Remote-Cutoff Pentode	E2	8BK	12.6	0.15	Class A Amplifier	For other characteristics, refer to Type 6SH7.								
12SK7 **12SK7-GT**	Remote-Cutoff Pentode	E2 F7	8N 8N‡	12.6	0.15	Class A Amplifier	For other characteristics, refer to Type 6SK7.								
17BH3	Novar Half-Wave Rectifier	C1	9HP	17.0⊕	0.6	Television Damper Service	Max. Peak Inverse Plate Volts, 5500 Max. Peak Plate mA, 1100								
17BQ6-GTB	Beam Power Tube	F16	6AM	16.8⊕	0.45	Horizontal Deflection Amplifier	Max. DC Plate Volts, 600 Max. Pk.Positive-Pulse Plate Volts, 6000 (Abs.) Max. DC Cathode mA, 112.5 Max. Plate Dissipation, 11 watts								

Type	Name	Tube Dimensions and Basing Diagram△ Dim.	Tube Dimensions and Basing Diagram△ B. D.	Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time. Volts	Heater or Filament (F) Amps.	Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Amplification Factor	Load for Stated Power Output Ohms	Power Output Watts
17C9	Sharp-Cutoff Twin Tetrode	G1	10F	16.8	0.15	Each Unit as Class A Amp	125	— 1v	80	1.5	10	100000	8000	—	—	—
17GE5	Beam Power Tube	L2	12BJ	16.8	0.45	Horizontal Deflection Amp	Max. DC Plate Volts, 770 Max. Peak Positive-Pulse Plate Volts, 6500 (Abs.) Max. DC Cathode mA, 175 Max. Plate Dissipation, 17.5 watts									
17GV5	Beam Power Tube	L3	12DR	16.8	0.45	Horizontal Deflection Amp	For other characteristics, refer to Type 17GE5									
19AU4-GTA	Half-Wave Rectifier	F15	4CG	18.9⊕	0.6	Television Damper Service	Max. Peak Inverse Plate Volts, 4500 Max. Average Plate mA, 210 Max. Peak Plate mA, 1300 Max. Plate Dissipation, 6.5 Watts									
19BG6-GA	Beam Power Tube	F33	5BT	18.9	0.3	Horizontal Deflection Amp	Max. DC Plate Volts, 700 Max. Peak Positive-Pulse Plate Volts, 6600 (Abs.) Max. DC Plate Current, 110 mA Max. Plate Dissipation, 20 watts									
19J6	Medium-Mu Twin Triode	A2	7BF	18.9	0.15	Each Unit as Class A Amp	100	50Ω (For both units at the specified conditions)			8.5	7100	5300	38	—	—
19T8	Triple Diode—Hi-Mu Triode	B2	9E	18.9	0.15	Triode Unit as Class A Amp	100	— 1v	—	—	0.8	54000	1300	70	—	—
							250	— 3v	—	—	1.0	58000	1200	70	—	—
19X8	Medium-Mu Triode—Sharp-Cutoff Pentode	B2	9AK	18.9	0.15	Triode Unit as Class A Amp	125	— 1v	—	—	12	6000	6500	40	—	—
						Pentode Unit as Class A Amp	125	— 1v	125	2.2	9	300000	5500	—	—	—
25CA5	Beam Power Tube	A3	7CV	25.0	0.3	Class A Amp	110	— 4v	110	3.5	32	16000	8100	—	3500	1.1
							125	— 4.5v	125	4	37	15000	9200	—	4500	1.5
25EC6	Beam Power Tube	F29	5BT	25.0⊕	0.6	Horizontal Deflection Amp	Max. DC Plate Volts, 700 Max. Peak Positive-Pulse Plate Volts, 7000 (Abs.) Max. DC Cathode mA, 200 Max. Plate Dissipation, 10 Watts									
25L6-GT	Beam Power Tube	F6	7AC‡	25.0	0.3	Amplifier	100	— 7.5v	110	4	49	13000	8000	—	2000	2.1
							200	180Ω	125	2.2	46	28000	8000		4000	3.8

Note: For footnotes, see end of this section. △ For key to tube dimensions, description, and basing diagram, see end of this section.

Type	Name	Tube Dimensions and Basing Diagram△ Dim.	B. D.	Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time. Volts	Amps.	Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Load for Stated Power Output Ohms	Power Output Watts
25W4-GT	Half-Wave Rectifier	F6	4CG	25.0	0.3	Television Damper Service	Max. Peak Inverse Plate Volts, 3850 (Abs.) Max. Peak Plate mA, 750 Max. DC Plate mA, 125			Max. Peak Heater-Cathode Volts: {−500 (Abs.) {+200 DC Component must not exceed 100 volts.					
25Z5	Rectifier-Doubler	K4	6E	25.0	0.3	Rectifier-Doubler	For other ratings, refer to Type 25Z6-GT.								
25Z6-GT	Rectifier-Doubler	F6	7Q‡	25.0	0.3	Voltage Doubler	Max. AC Volts per Plate (RMS), 117 Min. Total Effective Plate-Supply Max. DC Output mA, 75 Imped: Half-Wave, 30 ohms; Full-Wave, 15 ohms								
						Half-Wave Rectifier	Max. AC Volts per Plate (RMS), 235 Min. Total Effect. Supply Imped. per Max. DC Output mA per Plate, 75 Plate: at 117 volts, 15 ohms; at 150 volts, 40 ohms; at 235 volts, 100 ohms								
35B5	Beam Power Tube	A3	7BZ	35.0	0.15	Class A Amp	110	− 7.5v	110	3.0	40.0	13000	5800	2500	1.5
35GL6	Beam Power Tube	A3	7FZ	35.0	0.15	Class A Amp	110	− 7.5v	110	3	45	12000	7500	2500	1.8
35Y4	Half-Wave Rectifier Heater Tap for Pilot	J3	5AL	35.0	0.15	With Capacitive-Input Filter	Max. AC Plate Volts (RMS), 117. Min. Total Effect. Plate-Supply Max. DC Output mA: With Pilot and No Shunt Res, 60; Impedance, 15Ω With Pilot and Shunt Res., 90; Without Pilot, 100.								
		Pilot Between Pins 1 and 4													
35Z4GT	Half-Wave Rectifier	F6	5AA	35.0	0.15	With Capacitive-Input Filter	Min. Total Effective Plate-Supply Impedance: Up to 117 volts, 15 ohms; Max. DC Output mA, 100 at 235 volts, 100 ohms.								
35Z5-GT	Half-Wave Rectifier Heater Tap for Pilot	F6	6AD	35.0	0.15	With Capacitive-Input Filter	Min. Total Effect. Plate-Supply Imped.: Up to 117 volts, 15 ohms; at 235 volts, 100 ohms. Max. DC Output mA: With Pilot and No Shunt Res, 60; With Pilot and Shunt Res, 90; Without Pilot, 100.								
		Pilot Between Pins 2 and 3													
42	Power Pentode	K8	6B	6.3	0.7	Amplifier	For other characteristics, refer to Type 6F6-G.								
43	Power Pentode	K8	6B	25.0	0.3	Class A Amp	95	−15v	95	4	20	45000	2000	4500	0.9
50A5	Beam Power Tube	J3	6AA	50.0	0.15	Single-Tube Class A Amp	100 200	− 7.5v 180Ω	110 125	4 2.2	49 46	13000 28000	8000 8000	2000 4000	2.1 3.8

Type	Name	Tube Dimensions and Basing Diagram △		Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time.		Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply	Grid Bias Volts (v) or Cathode Resistor	Screen Supply	Screen Current	Plate Current	AC Plate Resistance	Transconductance	Load for Stated Power Output	Power Output
		Dim.	B. D.	Volts	Amps.		Volts	Ohms (Ω)	Volts	mA	mA	Ohms	Micromhos	Ohms	Watts
50FK5	Power Pentode	A3	7CV	50.0	0.1	Class A Amp	110	62Ω	115	8.5	32	14000	12800	3000	1.2
50X6	Rectifier-Doubler	J3	7DX	50.0	0.15	Rectifier-Doubler	For other ratings, refer to Type 25Z6-GT.								
50Y6-GT	Rectifier-Doubler	F6	7Q‡	50.0	0.15	Rectifier-Doubler	For other ratings, refer to Type 25Z6-GT.								
80	Full-Wave Rectifier	K8	4C	5.0F	2.0	With Capacitive-Input Filter	AC Volts per Plate (RMS), 350 Max. Peak Inverse Volts, 1400 Min. Total Effect. Supply Imped. per Plate, 50 ohms					DC Output mA, 125 Max. Peak Plate mA, 440			
						With Inductive-Input Filter	AC Volts per Plate (RMS), 500 Max. Peak Inverse Volts, 1400 Min. Value of Input Choke, 10 henries					Max. DC Output mA, 125 Max. Peak Plate mA, 440			
84/6Z4	Full-Wave Rectifier	K4	5D	6.3	0.5	With Capacitive-Input Filter	AC Volts per Plate (RMS), 325 Max. Peak Inverse Volts, 1250 Total Effect. Supply Imped. per Plate, 150 ohms.					DC Output mA, 60 Max. Peak Plate mA, 180			
						With Inductive-Input Filter	AC Volts per Plate (RMS), 450 Max. Peak Inverse Volts, 1250 Value of Input Choke, 10 henries					Max. DC Output mA, 60 Max. Peak Plate mA, 180			
117L7-GT/ 117M7-GT	Rectifier-Beam Power Tube	F9	8AO	117	0.09	Amplifier Unit as Class A Amp	105	− 5.2v	105	4	43	17000	5300	4000	0.85
						Half-Wave Rectifier	Max. AC Plate Volts (RMS), 117 Max. Peak Inverse Volts, 350 Min. Total Effect. Plate-Supply Imped., 15 ohms					Max. DC Output mA, 75 Max. Peak Plate mA, 450			

Note: For footnotes, see end of this section. △ For key to tube dimensions, description, and basing diagram, see end of this section.

Type	Name	Tube Dimensions and Basing Diagram △ Dim.	B. D.	Heater or Filament (F) Unless specified all types have heaters. ⊕ Heater with controlled warmup time. Volts	Amps.	Use Values to right give operating conditions and characteristics for indicated typical use	Plate Supply Volts	Grid Bias Volts (v) or Cathode Resistor Ohms (Ω)	Screen Supply Volts	Screen Current mA	Plate Current mA	AC Plate Resistance Ohms	Transconductance Micromhos	Load for Stated Power Output Ohms	Power Output Watts
117N7-GT	Rectifier-Beam Power Tube	F9	8AV	117	0.09	Amplifier Unit as Class A Amp	100	− 6v	100	5	51	16000	7000	3000	1.2
						Half-Wave Rectifier	Max. AC Plate Volts (RMS), 117		Max. DC Output mA, 75						
							Max. Peak Inverse Volts, 350		Max. Peak Plate mA, 450						
							Min. Total Effect. Plate-Supply Impedance, 15 ohms.								
117Z3	Half-Wave Rectifier	A3	4CB	117	0.04	With Capacitive-Input Filter	Max. Peak Inverse Volts, 330		Max. DC Output mA, 90						
							Min. Total Effect. Plate-Supply Imped., 20 ohms		Max. Peak Plate mA, 540						
5881	Beam Power Tube	F10	7AC	6.3	0.9	Single Tube Class A Amp	250	−14v	250	4.3	75	30000	6100	2500	6.7
							350	−18v	250	2.5	53	48000	5200	4200	11.3
						Push-Pull Class A Amp	250	−16v	250	10♠	120♠	—	—	5000	14.5†
							270	−17.5v	270	11♠	134♠	—	—	5000	17.5†
						Push-Pull Class AB$_1$ Amp	360	−22.5v	270	5♠	88♠	—	—	6600	26.5†
							360	−22.5v	270	5♠	88♠	—	—	3800	18 †
7247	Dual Triode	B2	9A	12.6	0.15	Unit No. 1 as Class A Amp	250	− 2v	Mu = 100		1.2	62500	1600	—	—
				6.3	0.3	Unit No. 2 as Class A Amp	250	− 8.5v	Mu = 17		10.5	7700	2200	—	—
7695	Beam Power Tube	H2	9PX	50	0.15	Class A Amp	130	−11v	130	5	100	7000	11000	1100	4.5
						Push-Pull Class AB$_1$ Amp	140	500	140	9♠	210♠	—	—	1500	10†
EM84/6FG6	Electron-Ray Tube	B8	9GA	6.3	0.27	Visual Indicator	Triode Plate Supply Volts, 250		Fluorescent-Target Volts, 250						
							Triode-Plate Resistance, 1 meg.		Triode-Grid Resistance, 0.47 meg.						
							Triode Grid-Supply Volts, −22		Triode Plate mA, 0.06						
							Max. Length of Dark Part of Target, when triode grid resistor = 0, 1.14 inch		Fluorescent Target mA, 1.6						

FOOTNOTES

Note 1: Subscript 1 on class of amplifier service (as AB_1) indicates that grid current does not flow during any part of input cycle.

■ With tube mounted horizontally and pins No. 4 and No. 8 in a vertical plane (pin No. 4 on top), deflecting electrode No. 1 controls left-hand section of pattern, deflecting electrode No. 2 controls top right-hand section of pattern, deflecting electrode No. 3 controls bottom section of pattern.

◥ Supply voltage applied through 20000-ohm voltage-dropping resistor.

° Both grids connected together; likewise, both plates.

▲ Grids # 2 and # 4 are screen. Grid # 3 is signal-input control grid.

● Grids # 3 and # 5 are screen. Grid # 4 is signal-input control grid.

† Power output is for two tubes at stated plate-to-plate load.

✖ Applied through plate resistor of 250000 ohms.

▲ Grids # 2 and # 4 are screen. Grid # 1 is signal-input control grid.

‡ This diagram is like the one having the same designation except that Pin No. 1 has no connection.

✱ This diagram is like the one having the same designation except that base sleeve is connected to Pin No. 1.

○ For use in automobile receivers which operate directly from 12-volt storage batteries.

§ Megohms. ♠ For two tubes. ◥ 50000 ohms.

KEY TO TUBE DIMENSIONS

Symbol	Maximum Overall Length	x	Diameter	Description
A1	1-3/4″	x	3/4″	7-Pin Miniature Types
A2	2-1/8″	x	3/4″	
A3	2-5/8″	x	3/4″	
B1	1-3/4″	x	7/8″	9-Pin Miniature Types
B2	2-3/16″	x	7/8″	
B4	2-5/8″	x	7/8″	
B5	2-11/16″	x	7/8″	
B8	2-27/32″	x	7/8″	
C1	3.410″	x	1.188″	Novar Type
E2	2-5/8″	x	1-5/16″	Octal-Metal Types
E3	3-1/8″	x	1-5/16″	
E4	3-1/4″	x	1-5/16″	

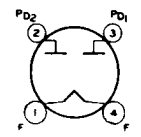
Symbol	Maximum Overall Length	x	Diameter	Description
F1	2-5/16″	x	1-5/16″	Octal-Glass Types
F6	3-5/16″	x	1-9/32″	
F7	3-5/16″	x	1-5/16″	
F8	3-3/8″	x	1-9/32″	
F9	3-7/16″	x	1-9/32″	
F10	3-15/32″	x	1-7/16″	
F15	3-13/16″	x	1-9/32″	
F16	3-7/8″	x	1-9/32″	
F17	3-7/8″	x	1-9/16″	
F19	4″	x	1-9/16″	
F24	4-15/32″	x	1-9/16″	
F25	4-5/8″	x	1-9/16″	
F29	4-3/4″	x	1-9/16″	
F33	5″	x	1-9/16″	
F38	5-7/32″	x	1-23/32″	
F39	5-5/16″	x	2-1/16″	
F40	5-11/16″	x	2-1/16″	

Symbol	Maximum Overall Length	x	Diameter	Description
G1	2.190″	x	0.875″	10-Pin Miniature Type
H2	3.23″	x	1.188″	9-Pin T9-Bulb Type
J2	2-25/32″	x	1-3/16″	Lock-In Types
J3	3-5/32″	x	1-3/16″	
K3	4-3/16″	x	1-3/16″	Other Types
K4	4-3/16″	x	1-9/16″	
K5	4-17/32″	x	1-9/16″	
K8	4-11/16″	x	1-13/16″	
K9	4-15/16″	x	1-9/16″	
K11	5-3/8″	x	2-1/16″	
L2	2.875″	x	1.563″	12-Pin T9-Bulb Types
L3	3.625″	x	1.563″	

KEY: BASING DIAGRAMS *(Bottom Views)*

- ● = Gas-Type Tube
- BC = Base Sleeve
- BS = Base Shell
- C = External Conductive Coating
- CL = Collector
- DJ = Deflecting Electrode
- ES = External Shield
- F = Filament
- F+ = Filament (positive only)
- F− = Filament (negative only)
- FM = Filament Tap
- G = Grid
- H = Heater
- HL = Heater Tap for Panel Lamp
- HM = Heater Tap
- IC = Internal Connection—Do Not Use
- IS = Internal Shield
- K = Cathode
- LC = Limited Connection—Do Not Use, Except As Specified in Data
- NC = No Internal Connection
- P = Plate (Anode)
- RC = Ray-Control Electrode
- S = Shell
- TA = Target

Subscripts for multi-unit types: B, beam unit; D, diode unit; HP, heptode unit; HX, hexode unit; P, pentode unit; T, triode unit; TR, tetrode unit.



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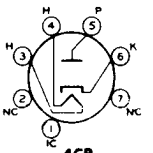

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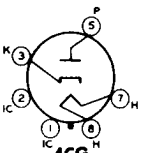

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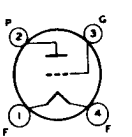

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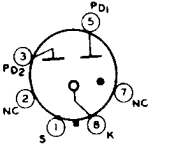

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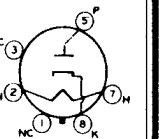

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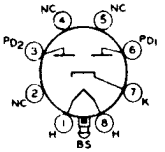

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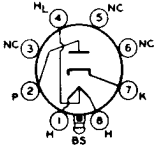

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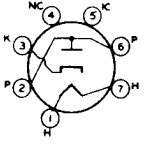

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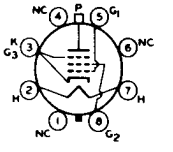

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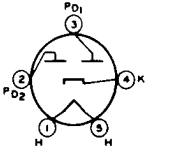

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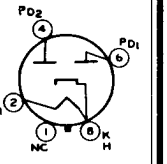

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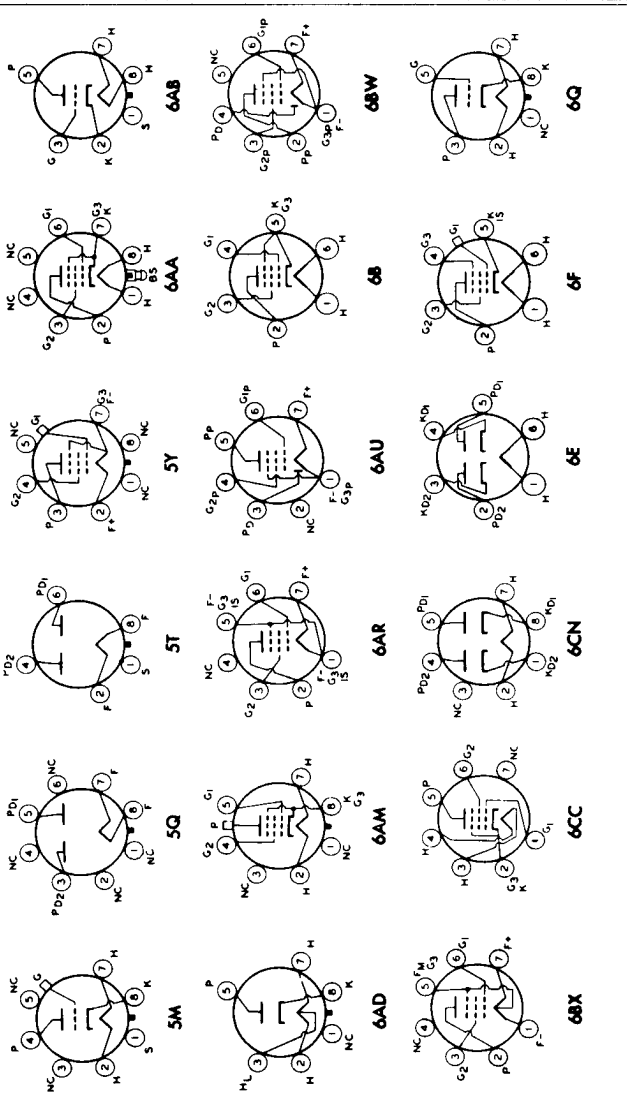
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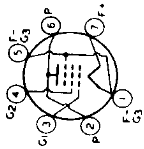
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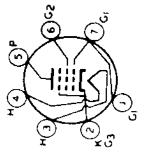
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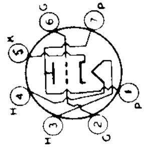
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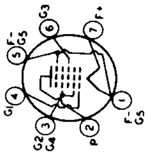
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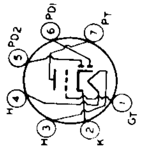
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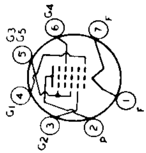
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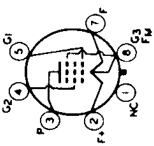
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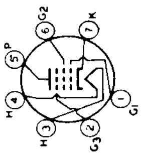
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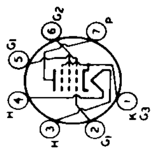
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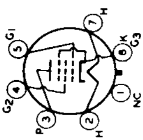
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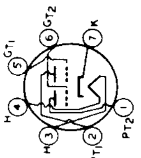
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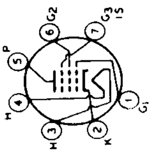
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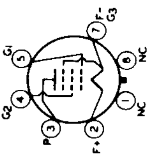
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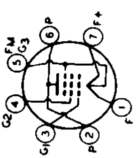
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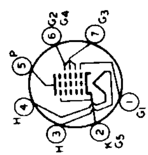
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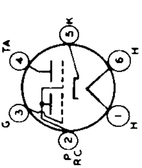
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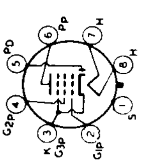
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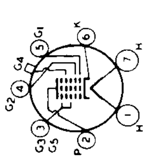
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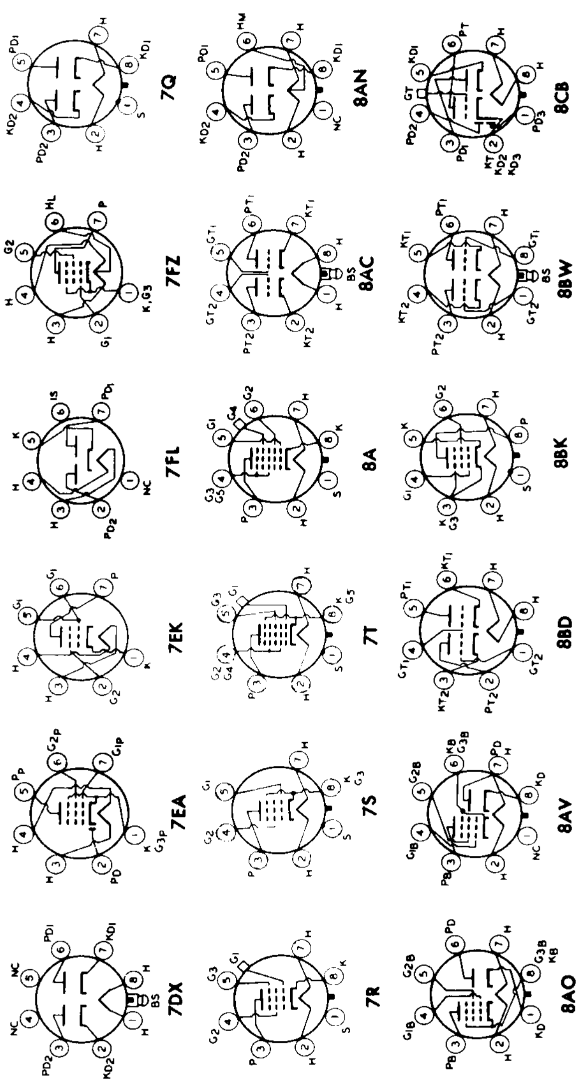

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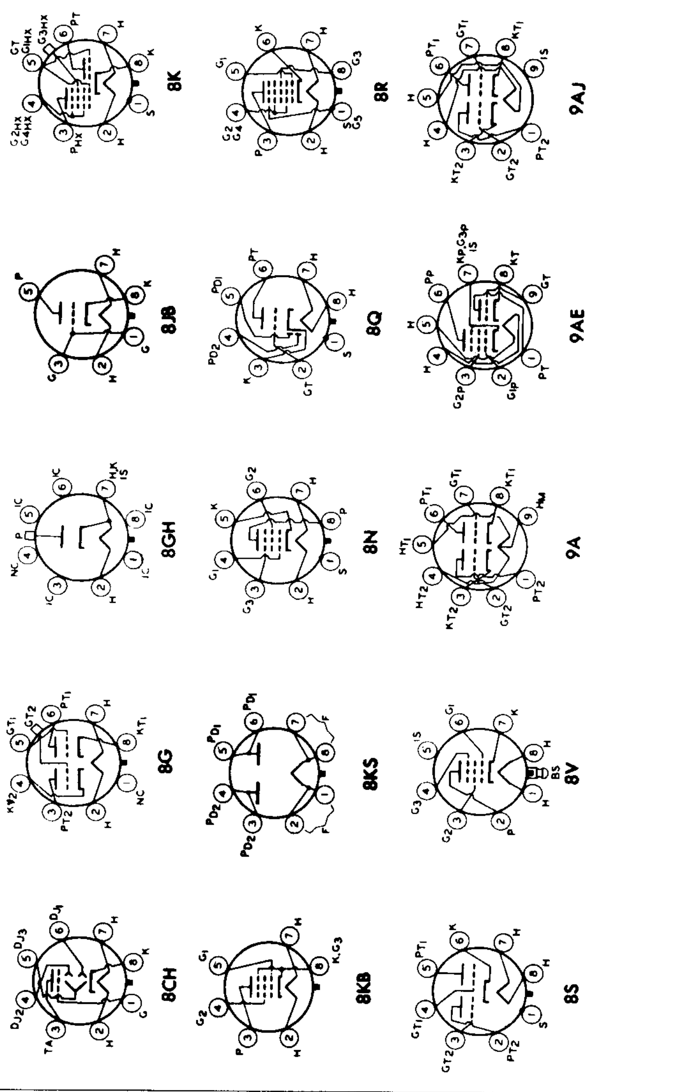

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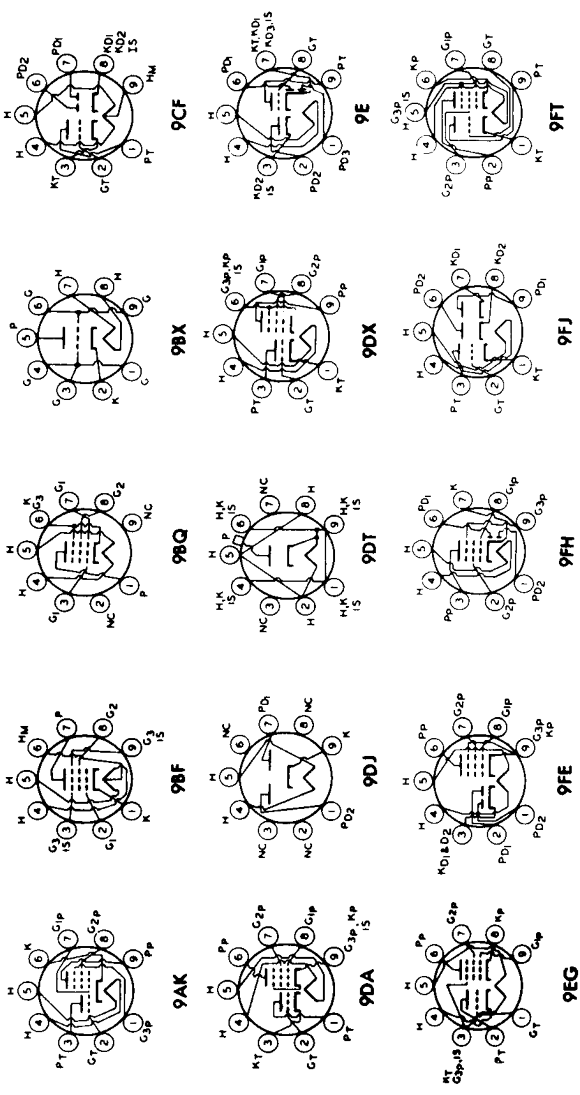

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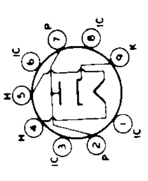
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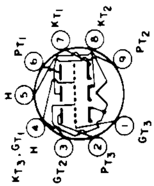
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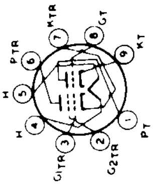
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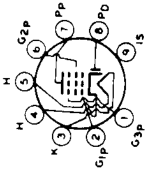
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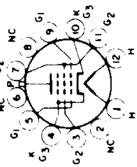
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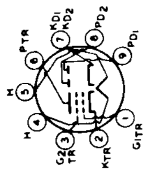
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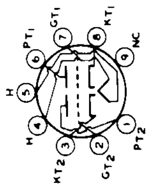
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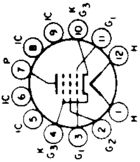
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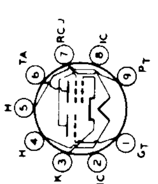
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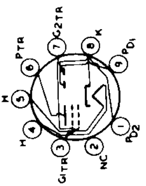
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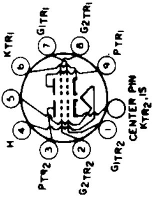
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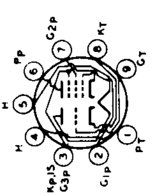
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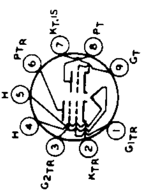
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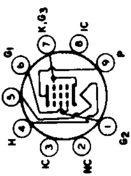
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Safety Precautions (I) For Receiving Tubes

High voltage rectifier and shunt regulator receiving tubes operate at potentials which may result in the production of X-Radiation.

Precautions must be exercised during the servicing of equipment employing these devices to assure that the high voltage is adjusted to the recommended value and that any shielding components are replaced to their intended positions before the equipment is operated.

NOTE: For additional Safety Precautions, refer to sheet *Safety Precautions (II) For Receiving Tubes* which follows.

Safety Precautions (II) For Receiving Tubes

SHOCK HAZARD WARNING

Most electron tubes present a shock hazard in use because of the voltages at which they operate. This hazard applies to all applications and is not restricted to high-voltage circuits. Therefore, precautions should be taken when servicing equipment in which electron tubes are used.

Some electron tubes such as high-voltage rectifiers and shunt regulators operate with very high electrode voltages. Extreme care should be taken during testing or adjustment of circuits in which such tubes are employed. Precautions must be exercised during the replacement or servicing of these tubes in equipment to assure that the high-voltage output terminal is properly grounded while inserting or removing the tube from its socket or while connecting or disconnecting the top cap connector. The tube and its associated apparatus, especially all parts which may be at high-potential with respect to ground,should be housed in a protective enclosure. The protective housing should be designed with interlocks so that personnel cannot possibly come in contact with any high-potential point in the electrical system.

It should be noted that high voltages may appear at normally low-potentials points in the circuit as a result of capacitor breakdown or incorrect circuit connections. Therefore, before any part of the circuit is touched, the power supply switch should be turned off and both terminals of any capacitor should be grounded.

X-RADIATION WARNING

High-voltage rectifier and shunt regulator receiving tubes operate at potentials which may result in the production of X-Radiation. Types covered in the HB-3 Handbook which fall into these categories and which have EIA published values for X-Radiation are tested for an X-Radiation characteristic es specified in their published data.

X-Radiation is measured in accordance with JEDEC Publication No. 67 A, "Recommended Practice for Measurement of X-Radiation from Receiving Tubes", and controlled in accordance with JEDEC Publications No. 73 A, "Recommended Practice for Quality Control of X-Radiation from High Voltage Rectifier and Shunt Regulator Receiving Tubes". These publications are available from the Electronic Industries Association, 2001 Eye St. N. W., Washington, D. C. 20006.

Safety Precautions (II) For Receiving Tubes

Operation of these devices above the design-maximum values indicated in their Maximum Ratings may result in either temporary or permanent changes in the X-Radiation characteristic of the tube. Equipment design must be such that these absolute values are not exceeded.

The high voltages associated with these devices result in production of X-Radiation which may constitute a health hazard on prolonged exposure at close range unless the tube is adequately shielded. Equipment design must provide for this shielding.

Precautions must be exercised during the servicing of equipment employing these devices to assure that the high-voltage is adjusted to the recommended value and that any shielding components are replaced to their intended positions before the equipment is operated.

THE EQUIPMENT MANUFACTURER SHOULD PROVIDE A WARNING LABEL IN AN APPROPRIATE POSITION ON THE EQUIPMENT TO ADVISE THE SERVICEMAN OF ALL PRECAUTIONS HEREIN.

DIODE CONSIDERATIONS
DIODE-TRIODE AND DIODE-PENTODE TUBES

Certain multi-unit tubes contain one or more diode plates, each having its own base pin, in addition to a triode or pentode unit. Such types may employ either a unipotential cathode or a filamentary cathode.

In unipotential-cathode tubes the cathode is common to the triode or pentode unit and the diode(s). In filamentary-cathode tubes the filament is likewise common to the triode or pentode unit and the diode(s). However, in filament types, diode operation is affected by the position of the diode plate(s) with respect to the filament, and, therefore, the position of the diode plate(s) is specified on the individual tube data sheets.

The rectifying action of the diode is commonly used for the following purposes:

Detection: Detection may be accomplished by using either a half-wave or full-wave circuit arrangement to supply signal voltage to the triode or pentode unit of the tube or to another amplifier tube. The half-wave circuit will provide approximately twice the rectified voltage obtainable from a full-wave circuit for the same applied signal voltage. Since the amplitude variation of the envelope of the rectified voltage is usually of greater importance than rectifier power, the half-wave circuit is more commonly used in practice.

AVC: Regulation of amplifier gain, generally called Automatic Volume Control, may be accomplished by using the output of a diode rectifier in a number of ways. The diode output may be applied to the control grids of the preceding amplifier tubes, or it may be applied, in the case of rf pentodes, to their suppressors, plates and/or screens.

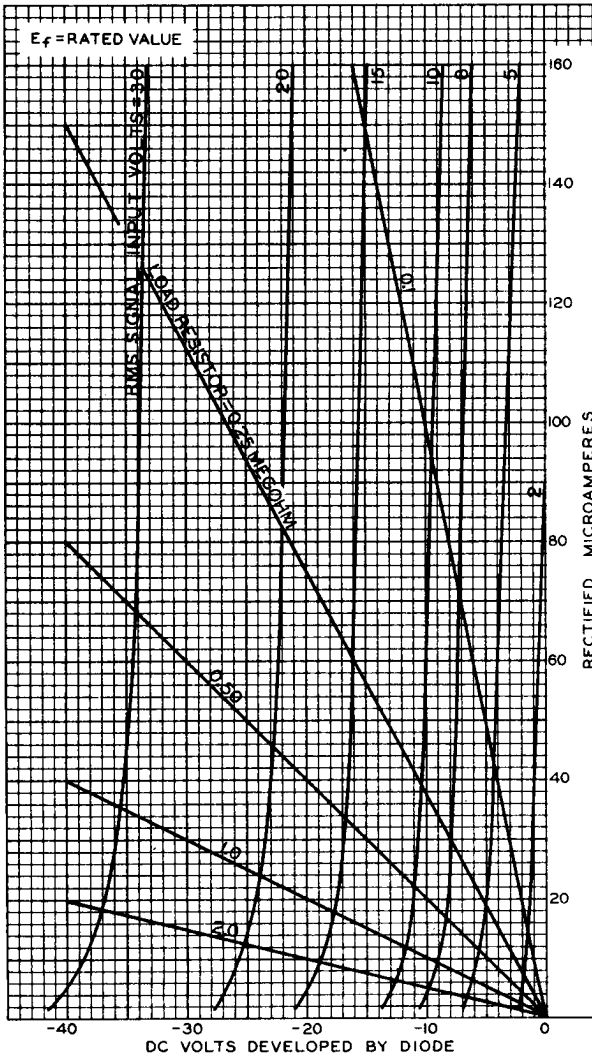
The above functions can be performed simultaneously by using a single diode, two diodes in parallel, or by two diodes operating independently. A number of typical circuit arrangements are shown on the following pages.

Average Characteristic Curves for diodes in diode-triode and diode-pentode tubes are shown on the next page.

AVERAGE DIODE CHARACTERISTICS

HALF-WAVE RECTIFICATION-SINGLE DIODE UNIT

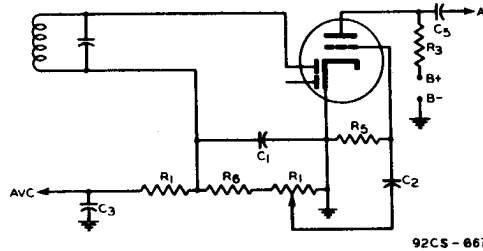
SEE PRECEDING PAGE



DIODE CONSIDERATIONS

TYPICAL DIODE-TRIODE CIRCUITS

HALF-WAVE DETECTOR, AVC, ZERO-BIAS AMPLIFIER



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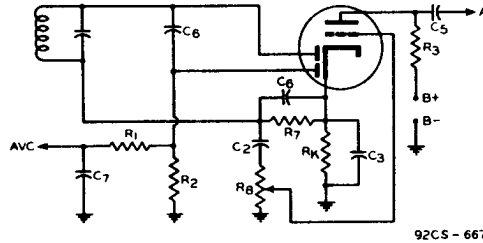
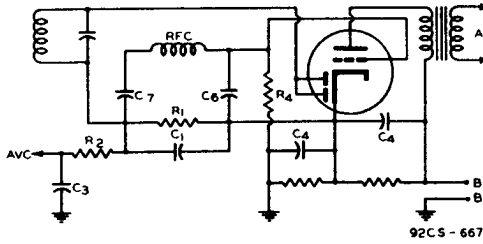
HALF-WAVE DETECTOR AND DELAYED AVC, CATHODE-BIAS AMPLIFIER



92CS-6679

HALF-WAVE DETECTOR, AVC, FIXED-BIAS AMPLIFIER



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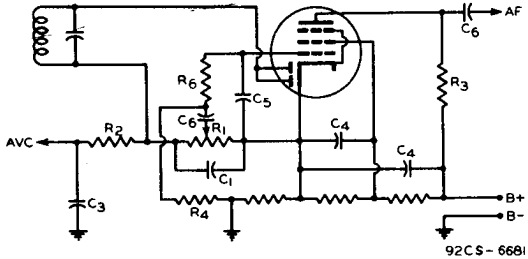
TYPICAL VALUES

C1: 150 μμf for 450-1600 kc
C2: 0.01 μf
C3: 0.1 μf
C4: 0.5 μf or larger
C5: 0.01 to 0.1 μf or larger
C6: 100 μμf
C7: 0.01 to 0.05 μf
R1: 0.5 Megohm
R2: 1.0 Megohm
R3: 0.1 Megohm
R4: 0.05 to 1.0 Megohm
R5: 10 Megohms
R6: 22000 Ohms
R7: 0.25 Megohm
R8: 1 to 2 Megohm

DIODE CONSIDERATIONS

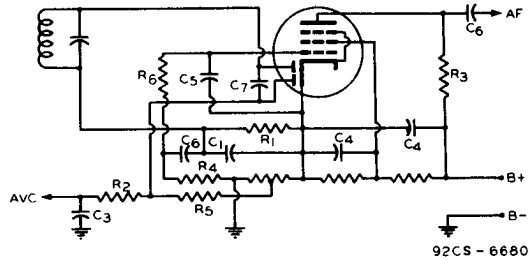
TYPICAL DIODE-PENTODE CIRCUITS

HALF-WAVE DETECTOR AND AVC, FIXED-BIAS AMPLIFIER



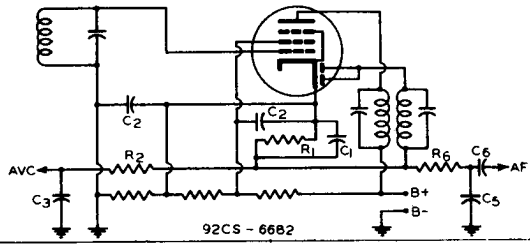
92CS-6681

HALF-WAVE DETECTOR, SEPARATE AVC, FIXED-BIAS AMPLIFIER



92CS-6680

HALF-WAVE DETECTOR, AVC, FIXED-BIAS H-F AMPLIFIER



92CS-6682

TYPICAL VALUES

C1: 150 μμf for 450-1600 kc
C2, C3: 0.1 μf
C4: 0.5 μf or larger
C5: 100 μμf or smaller
C6: 0.01 to 0.1 μf
C7: 500 to 1000 μμf

R1: 0.5 to 1.0 Megohm
R2: 1.0 to 1.5 Megohms
R3: 0.1 to 0.2 Megohm
R4: 0.5 to 1.0 Megohm
R5: 1.0 Megohm
R6: 0.1 to 0.2 Megohm

KEY TO RESISTANCE-COUPLED AMPLIFIER CHARTS

Note: Chart number references, listed below, supersede those which may appear on individual tube data sheets for these types.

Tube Type	Chart No.	Tube Type	Chart No.	Tube Type	Chart No.	Tube Type	Chart No.	Tube Type	Chart No.
3AU6....	2	5BK7A...	10	6BZ7.....	10	6T8A.....	5	12AX7A.....	9
3AV6....	9	5BQ7A...	10	6C4.....	3	7AU7.....	3	12AY7.....	1
3BC5....	11	5T8.....	5	6CB6.....	11	8CG7.....	8	12SL7GT....	5
3CB6....	11	6AB4....	4	6CB6A.....	11	8CN7.....	5	12SN7GTA...	8
3CF6....	11	6AG5....	11	6CF6.....	11	8FQ7.....	8	19T8.....	5
4AU6....	2	6AT6....	5	6CG7.....	8	9AU7.....	3	20EZ7.....	9
4AV6....	9	6AU6A...	2	6CN7.....	5	12AT6....	5	5879▲.....	6
4BC5....	11	6AV6....	9	6EU7.....	9	12AT7....	4	5879*.....	7
4BQ7A...	10	6BC5....	11	6FQ7.....	8	12AU6....	2	7025.....	9
4BZ7....	10	6BK7B...	10	6SL7GT....	5	12AU7A...	3	7199▲.....	12
4CB6....	11	6BQ7A...	10	6SN7GTB...	8	12AV6....	9	7199*.....	13

▲ Pentode Unit

* Triode Unit or Triode Connection

SYMBOLS USED IN RESISTANCE-COUPLED AMPLIFIER CHARTS

C = Blocking Capacitor (μf).

C_k = Cathode Bypass Capacitor (μf).

C_{g2} = Screen-Grid Bypass Capacitor (μf).

E_{bb} = Plate-Supply Voltage. Voltage at plate equals plate-supply voltage minus drop in R_p and R_k.

R_k = Cathode Resistor (ohms).

R_{g2} = Screen-Grid Resistor (megohms).

R_g = Grid Resistor (megohms) for following stage.

R_p = Plate Resistor (megohms).

V.G. = Voltage Gain.

E_o = Output Voltage (peak volts). This voltage is obtained across R_g (for following stage) at any frequency within the flat region of the output vs. frequency curve, and is for the condition where the signal level is adequate to swing the grid of the resistance-coupled amplifier tube to the point where its grid starts to draw current.

Note: The listed values for E_o are the peak output voltages available when the grid is driven from a low-impedance source. The listed values for the cathode resistors are optimum for any signal source. With a high-impedance source, protection against severe distortion and loss of gain due to input loading may be obtained by the use of a coupling capacitor connected directly to the input grid and a high-value resistor connected between the grid and ground.

Resistance-Coupled Amplifiers

CIRCUIT ADVANTAGES

For most of the types shown, the data pertain to operation with cathode bias; for all of the pentodes, the data pertain to operation with series screen-grid resistor. The use of a cathode-bias resistor where feasible and a series screen-grid resistor where applicable offers several advantages over fixed-voltage operation.

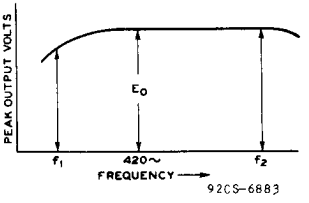
The advantages are: (1) effects of possible tube differences are minimized; (2) operation over a wide range of plate-supply voltages without appreciable change in gain is feasible; (3) the low frequency at which the amplifier cuts off is easily changed; and (4) tendency toward motorboating is minimized.

NUMBER OF STAGES

These advantages can be enhanced by the addition of suitable decoupling filters in the plate supply of each stage of a multi-stage amplifier. With proper filters, three or more amplifier stages can be operated from a single power-supply unit of conventional design without encountering any difficulties due to coupling through the power unit. When decoupling filters are not used, not more than two stages should be operated from a single power-supply unit.

GENERAL CIRCUIT CONSIDERATIONS

In the discussions which follow, the frequency (f_2) is that value at which the high-frequency response begins to fall off. The frequency (f_1) is that value at which the low-frequency response drops below a satisfactory value, as discussed below. A variation of 10 per cent in values of resistors and capacitors has only slight effect on performance. One-half-watt resistors are usually suitable for R_{g2}, R_g, and R_k resistors. Capacitors C and C_{g2} should have a working voltage equal to or greater than E_{bb}. Capacitor C_k may have a low working voltage in the order of 10 to 25 volts.



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Triode Amplifier *(Heater-Cathode Type)*

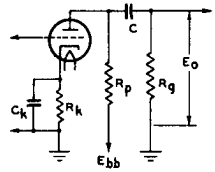

Diagram No.1

Capacitors C and C_k have been chosen to give an output voltage equal to 0.8 E_o for a frequency (f_1) of 100 cycles. For any other values of (f_1), multiply values of C and C_k by $100/f_1$. In the case of capacitor C_k, the values shown in the charts are for an amplifier with dc heater excitation; when ac is used, depending on the character of the associated circuit, the gain, and the value of f_1, it may be necessary to increase the value of C_k to minimize hum disturbances. It may be desirable to operate the heater at a positive voltage of from 15 to 40 volts with respect to the cathode. The voltage output at f_1, or "n" like stage equals $(0.8)^n E_o$ where E_o is peak output voltage of final stage. For an amplifier of typical construction, the value of f_2 is well above the audio-frequency range for any value of R_p.

Pentode Amplifier *(Heater-Cathode Type)*

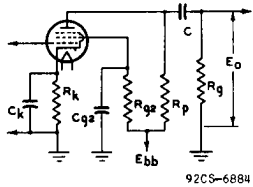

Diagram No.2

Capacitors C, C_k, and C_{g2} have been chosen to give an output voltage equal to 0.7 E_o for a frequency (f_1) of 100 cycles. For any other value of f_1, multiply values of C, C_k, and C_{g2} by $100/f_1$. In the case of capacitor C_k, the values shown in the charts are for an amplifier with dc heater excitation; when ac is used, depending on the character of the associated circuits, the voltage gain, and the value of f_1, it may be necessary to increase the value of C_k to minimize hum disturbances. It may be desirable to operate the heater at a positive voltage of from 15 to 40 volts with respect to the cathode. The voltage output at f_1 for "n" like stages equals $(0.7)^n E_o$ where E_o is the peak output voltage of final stage. For an amplifier of typical construction, and for R_p values of 0.1, 0.25, and 0.5 megohm, approximate values of f_2 are 20000, 10000, and 5000 cps, respectively.

RESISTANCE-COUPLED AMPLIFIER CHARTS

① 12AY7 •

See *Circuit Diagram 1*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
90	0.1	0.24	—	1800	—	—	—	13	24
	0.24	0.51	—	3700	—	—	—	14	26
	0.51	1.0	—	7800	—	—	—	16	27
180	0.1	0.24	—	1300	—	—	—	31	27
	0.24	0.51	—	2800	—	—	—	33	29
	0.51	1.0	—	5700	—	—	—	33	30
300	0.1	0.24	—	1200	—	—	—	58	28
	0.24	0.51	—	2300	—	—	—	30	30
	0.51	1.0	—	4800	—	—	—	56	31

② 3AU6, 4AU6, 6AU6A, 12AU6

See *Circuit Diagram 2*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
90	0.22	0.22	0.340	2700	0.057	5.8	0.0081	16	79
	0.22	0.47	0.370	2900	0.050	5.4	0.0055	22	104
	0.22	1.0	0.380	3100	0.050	5.3	0.0034	25	125
	0.47	0.47	1.00	6000	0.027	2.8	0.0042	13	105
	0.47	1.0	1.00	6200	0.023	2.7	0.0027	17	137
	0.47	2.2	1.00	6300	0.027	2.8	0.0019	25	161
	1.0	1.0	1.90	10800	0.017	1.7	0.0025	10	139
	1.0	2.2	2.40	13100	0.017	1.7	0.0017	19	184
180	0.22	0.22	0.520	1340	0.059	8.8	0.0081	31	143
	0.22	0.47	0.520	1390	0.059	8.7	0.0053	43	192
	0.22	1.0	0.520	1420	0.059	8.6	0.0032	48	223
	0.47	0.47	1.05	2700	0.039	5.5	0.0041	34	189
	0.47	1.0	1.15	2880	0.037	5.4	0.0027	43	249
	0.47	2.2	1.20	2960	0.036	5.4	0.0019	50	294
	1.0	1.0	2.40	5500	0.028	3.2	0.0023	33	230
	1.0	2.2	2.70	6000	0.022	2.8	0.0015	40	323
300	0.22	0.22	0.530	780	0.077	13.2	0.0082	53	200
	0.22	0.47	0.540	783	0.077	13.2	0.0053	65	270
	0.22	1.0	0.540	800	0.077	13.1	0.0033	74	316
	0.47	0.47	1.15	1590	0.057	8.4	0.0045	56	275
	0.47	1.0	1.22	1650	0.049	7.4	0.0027	72	357
	0.47	2.2	1.31	1720	0.045	7.2	0.0017	82	418
	1.0	1.0	2.50	3300	0.036	5.3	0.0022	57	352
	1.0	2.2	2.80	3500	0.031	4.2	0.0015	72	466

• One triode unit. * Peak volts.
▲ Coupling capacitors should be selected to give desired frequency response. Cathode resistors should be adequately bypassed.

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RESISTANCE-COUPLED AMPLIFIER CHARTS

(3)

6C4, 7AU7,• 9AU7,• 12AU7A•

See *Circuit Diagram 1*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
	0.047	0.047	—	1600	—	3.2	0.061	9	10
	0.047	0.1	—	1800	—	2.5	0.033	11	11
	0.047	0.22	—	2000	—	2.0	0.015	14	11
	0.1	0.1	—	3000	—	1.6	0.032	10	11
90	0.1	0.22	—	3800	—	1.1	0.015	15	11
	0.1	0.47	—	4500	—	1.0	0.007	18	11
	0.22	0.22	—	6800	—	0.7	0.015	14	11
	0.22	0.47	—	9500	—	0.5	0.0065	20	11
	0.22	1.0	—	11500	—	0.43	0.0035	24	11
	0.047	0.047	—	920	—	3.9	0.062	20	11
	0.047	0.1	—	1200	—	2.9	0.037	26	12
	0.047	0.22	—	1400	—	2.5	0.016	29	12
	0.1	0.1	—	2000	—	1.9	0.032	24	12
180	0.1	0.22	—	2800	—	1.4	0.016	33	12
	0.1	0.47	—	3600	—	1.1	0.007	40	12
	0.22	0.22	—	5300	—	0.8	0.015	31	12
	0.22	0.47	—	8300	—	0.56	0.007	44	12
	0.22	1.0	—	10000	—	0.48	0.0035	54	12
	0.047	0.047	—	870	—	4.1	0.065	38	12
	0.047	0.1	—	1200	—	3.0	0.034	52	12
	0.047	0.22	—	1500	—	2.4	0.016	68	12
	0.1	0.1	—	1900	—	1.9	0.032	44	12
300	0.1	0.22	—	3000	—	1.3	0.016	68	12
	0.1	0.47	—	4000	—	1.1	0.007	80	12
	0.22	0.22	—	5300	—	0.9	0.015	57	12
	0.22	0.47	—	8800	—	0.52	0.007	82	12
	0.22	1.0	—	11000	—	0.46	0.0035	92	12

• One triode unit. * Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

(4)

6AB4, 12AT7•

See *Circuit Diagram 1*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
	0.1	0.1	—	2680	—	2.4	0.026	8	24
	0.1	0.22	—	3060	—	2.00	0.014	11	25
	0.1	0.47	—	3390	—	1.84	0.0074	13	28
	0.22	0.22	—	5500	—	1.33	0.0136	10	25
90	0.22	0.47	—	6300	—	1.01	0.0067	14	28
	0.22	1.0	—	6930	—	0.92	0.0038	15	28
	0.47	0.47	—	10900	—	0.63	0.007	13	26
	0.47	1.0	—	12500	—	0.52	0.0043	14	28
	0.47	2.2	—	13500	—	0.47	0.0031	18	28
	0.1	0.1	—	1407	—	3.6	0.029	20	31
	0.1	0.22	—	1674	—	3.0	0.016	28	33
	0.1	0.47	—	1786	—	2.6	0.0083	31	34
	0.22	0.22	—	2890	—	1.75	0.0140	24	33
180	0.22	0.47	—	3860	—	1.34	0.0077	35	33
	0.22	1.0	—	4660	—	1.14	0.0047	42	33
	0.47	0.47	—	6960	—	0.83	0.0075	31	31
	0.47	1.0	—	8450	—	0.67	0.0046	39	32
	0.47	2.2	—	9600	—	0.55	0.0032	45	32
	0.1	0.1	—	974	—	4.0	0.028	37	34
	0.1	0.22	—	1404	—	3.1	0.015	57	34
	0.1	0.47	—	2169	—	2.5	0.0083	78	33
	0.22	0.22	—	2510	—	1.9	0.015	50	33
300	0.22	0.47	—	4200	—	1.3	0.0074	78	33
	0.22	1.0	—	4950	—	1.1	0.0046	85	32
	0.47	0.47	—	5700	—	0.90	0.0076	57	33
	0.47	1.0	—	8720	—	0.62	0.0041	81	32
	0.47	2.2	—	9700	—	0.57	0.0030	88	32

• One triode unit. * Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

(5)

5T8, 6AT6, 6CN7, 6SL7GT,• 6T8A, 8CN7, 12AT6, 12SL7GT,• 19T8

See *Circuit Diagram 1*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
90	0.1	0.1	—	4200	—	2.5	0.025	5.4	22
	0.1	0.22	—	4600	—	2.2	0.014	7.5	27
	0.1	0.47	—	4800	—	2.0	0.0065	9.1	30
	0.22	0.22	—	7000	—	1.5	0.013	7.3	30
	0.22	0.47	—	7800	—	1.3	0.007	10	34
	0.22	1.0	—	8100	—	1.1	0.0035	12	37
	0.47	0.47	—	12000	—	0.83	0.006	10	36
	0.47	1.0	—	14000	—	0.7	0.0035	14	39
	0.47	2.2	—	15000	—	0.6	0.002	16	41
180	0.1	0.1	—	1900	—	3.6	0.027	19	30
	0.1	0.22	—	2200	—	3.1	0.014	25	35
	0.1	0.47	—	2500	—	2.8	0.0065	32	37
	0.22	0.22	—	3400	—	2.2	0.014	24	38
	0.22	0.47	—	4100	—	1.7	0.0065	34	42
	0.22	1.0	—	4600	—	1.5	0.0035	38	44
	0.47	0.47	—	6600	—	1.1	0.0065	29	44
	0.47	1.0	—	8100	—	0.9	0.0035	38	46
	0.47	2.2	—	9100	—	0.8	0.002	43	47
300	0.1	0.1	—	1500	—	4.4	0.027	40	34
	0.1	0.22	—	1800	—	3.6	0.014	54	38
	0.1	0.47	—	2100	—	3.0	0.0065	63	41
	0.22	0.22	—	2600	—	2.5	0.013	51	42
	0.22	0.47	—	3200	—	1.9	0.0065	65	46
	0.22	0.1	—	3700	—	1.6	0.0035	77	48
	0.47	0.47	—	5200	—	1.2	0.006	61	48
	0.47	1.0	—	6300	—	1.0	0.0035	74	50
	0.47	2.2	—	7200	—	0.9	0.002	85	51

• One triode unit. * Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

(6)

As Pentode: 5879

See *Circuit Diagram 2*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
90	0.1	0.1	0.35	1700	0.044	4.6	0.020	13	29
	0.1	0.22	0.35	1700	0.046	4.5	0.012	17	39
	0.1	0.47	0.35	1700	0.047	4.4	0.006	20	47
	0.22	0.22	0.80	3000	0.034	3.2	0.010	15	43
	0.22	0.47	0.80	3000	0.035	3.1	0.005	21	59
	0.22	1.0	0.80	3000	0.036	3.0	0.003	24	67
	0.47	0.47	1.9	7000	0.021	1.8	0.005	21	59
	0.47	1.0	1.9	7000	0.022	1.7	0.003	25	75
	0.47	2.2	1.9	7000	0.023	1.7	0.002	28	87
180	0.1	0.1	0.35	700	0.060	7.4	0.020	24	39
	0.1	0.22	0.35	700	0.062	7.3	0.012	28	56
	0.1	0.47	0.35	700	0.064	7.2	0.006	33	65
	0.22	0.22	0.80	1200	0.045	5.5	0.010	24	65
	0.22	0.47	0.80	1200	0.046	5.3	0.005	31	87
	0.22	1.0	0.80	1200	0.048	5.2	0.003	34	101
	0.47	0.47	1.9	2500	0.033	3.5	0.005	27	98
	0.47	1.0	1.9	2500	0.034	3.4	0.003	32	122
	0.47	2.2	1.9	2500	0.035	3.3	0.002	37	140
300	0.1	0.1	0.35	300	0.075	10.8	0.020	25	51
	0.1	0.22	0.35	300	0.077	10.6	0.012	32	68
	0.1	0.47	0.35	300	0.080	10.5	0.006	35	83
	0.22	0.22	0.80	600	0.056	7.9	0.010	28	81
	0.22	0.47	0.80	600	0.057	7.5	0.005	37	109
	0.22	1.0	0.80	600	0.058	7.4	0.003	41	123
	0.47	0.47	1.3	1200	0.044	5.3	0.005	34	125
	0.47	1.0	1.3	1200	0.046	5.2	0.003	42	152
	0.47	2.2	1.3	1200	0.047	5.1	0.002	48	174

* Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

(7)

As Triode: 5879

See *Circuit Diagram 1*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
	0.047	0.047	—	1800	—	2.9	0.060	9	10
	0.047	0.1	—	2100	—	2.4	0.033	12	11
	0.047	0.22	—	2200	—	2.3	0.016	14	21
	0.1	0.1	—	3200	—	1.8	0.027	10	12
90	0.1	0.22	—	3900	—	1.3	0.015	13	13
	0.1	0.47	—	4300	—	1.0	0.007	16	13
	0.22	0.22	—	6200	—	0.87	0.015	12	13
	0.22	0.47	—	8100	—	0.53	0.006	16	13
	0.22	1.00	—	9000	—	0.49	0.003	19	14
	0.047	0.047	—	1200	—	3.5	0.063	21	12
	0.047	0.1	—	1600	—	2.6	0.033	29	13
	0.047	0.22	—	1800	—	2.4	0.016	35	13
	0.1	0.1	—	2200	—	1.9	0.031	26	13
180	0.1	0.22	—	2900	—	1.35	0.015	33	14
	0.1	0.47	—	3400	—	1.1	0.007	40	14
	0.22	0.22	—	4500	—	0.92	0.015	28	14
	0.22	0.47	—	6400	—	0.61	0.006	39	14
	0.22	1.00	—	8200	—	0.52	0.003	47	14
	0.047	0.047	—	1100	—	3.9	0.063	42	13
	0.047	0.1	—	1500	—	2.8	0.033	65	13
	0.047	0.22	—	1700	—	2.5	0.016	71	14
	0.1	0.1	—	2000	—	2.1	0.032	45	15
300	0.1	0.22	—	3400	—	1.4	0.015	74	15
	0.1	0.47	—	3700	—	1.1	0.007	83	15
	0.1	0.22	—	4300	—	0.97	0.015	50	15
	0.22	0.47	—	7200	—	0.63	0.007	88	15
	0.22	1.00	—	7400	—	0.63	0.003	94	15

* Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

(8)

6CG7,• 6FQ7,• 6SN7GTB,• 8CG7,• 8FQ7,• 12SN7GTA•

See *Circuit Diagram 1*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
	0.047	0.047	—	1870	—	3.1	0.063	14	13
	0.047	0.1	—	2230	—	2.5	0.031	18	14
	0.047	0.22	—	2500	—	2.1	0.016	20	14
	0.1	0.1	—	3370	—	1.8	0.034	15	14
90	0.1	0.22	—	4100	—	1.3	0.015	20	14
	0.1	0.47	—	4800	—	1.1	0.006	23	15
	0.22	0.22	—	7000	—	0.80	0.013	16	14
	0.22	0.47	—	9100	—	0.65	0.007	22	14
	0.22	1.00	—	10500	—	0.60	0.004	25	15
	0.047	0.047	—	1500	—	3.6	0.066	33	14
	0.047	0.1	—	1860	—	2.9	0.055	41	14
	0.047	0.22	—	2160	—	2.2	0.015	47	15
	0.1	0.1	—	2750	—	1.8	0.028	35	15
180	0.1	0.22	—	3550	—	1.4	0.015	45	15
	0.1	0.47	—	4140	—	1.3	0.007	51	16
	0.22	0.22	—	5150	—	1.0	0.016	36	16
	0.22	0.47	—	7000	—	0.71	0.007	45	16
	0.22	1.00	—	7800	—	0.61	0.004	51	16
	0.047	0.047	—	1300	—	3.6	0.061	59	14
	0.047	0.1	—	1580	—	3.0	0.032	73	15
	0.047	0.22	—	1800	—	2.5	0.015	83	16
	0.1	0.1	—	2500	—	1.9	0.031	68	16
300	0.1	0.22	—	3130	—	1.4	0.014	82	16
	0.1	0.47	—	3900	—	1.2	0.0065	96	16
	0.22	0.22	—	4800	—	0.95	0.015	68	16
	0.22	0.47	—	6500	—	0.69	0.0065	85	16
	0.22	1.00	—	7800	—	0.58	0.0035	96	16

• One triode unit. * Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

(9)

3AV6, 4AV6, 6AV6, 6EU7,• 12AV6, 12AX7A,• 20EZ7,• 7025•

See *Circuit Diagram 1*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
	0.1	0.1	—	4400	—	2.7	0.023	5	29
	0.1	0.22	—	4700	—	2.4	0.013	6	35
	0.1	0.47	—	4800	—	2.3	0.007	8	41
	0.22	0.22	—	7000	—	1.6	0.012	6	39
90	0.22	0.47	—	7400	—	1.4	0.006	9	45
	0.22	1.0	—	7600	—	1.3	0.003	11	48
	0.47	0.47	—	12000	—	0.9	0.006	9	48
	0.47	1.0	—	13000	—	0.8	0.003	11	52
	0.47	2.2	—	14000	—	0.7	0.002	13	55
	0.1	0.1	—	1800	—	4.0	0.025	18	40
	0.1	0.22	—	2000	—	3.5	0.013	25	47
	0.1	0.47	—	2200	—	3.1	0.006	32	52
	0.22	0.22	—	3000	—	2.4	0.012	24	53
180	0.22	0.47	—	3500	—	2.1	0.006	34	59
	0.22	1.0	—	3900	—	1.8	0.003	39	63
	0.47	0.47	—	5800	—	1.3	0.006	30	62
	0.47	1.0	—	6700	—	1.1	0.003	39	66
	0.47	2.2	—	7400	—	1.0	0.002	45	68
	0.1	0.1	—	1300	—	4.6	0.027	43	45
	0.1	0.22	—	1500	—	4.0	0.013	57	52
	0.1	0.47	—	1700	—	3.6	0.006	66	57
	0.22	0.22	—	2200	—	3.0	0.013	54	59
300	0.22	0.47	—	2800	—	2.3	0.006	69	65
	0.22	1.0	—	3100	—	2.1	0.003	79	68
	0.47	0.47	—	4300	—	1.6	0.006	62	69
	0.47	1.0	—	5200	—	1.3	0.003	77	73
	0.47	2.2	—	5900	—	1.1	0.002	92	75

• One triode unit. * Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

(10)

4BQ7A,• 4BZ7,• 5BK7A,• 5BQ7A,• 6BK7B,• 6BQ7A,• 6BZ7•

See *Circuit Diagram 1*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
	0.047	0.047	—	1580	—	4.0	0.058	9	18
	0.047	0.10	—	1760	—	3.5	0.032	13	19
	0.047	0.22	—	1820	—	3.0	0.015	16	20
	0.1	0.1	—	2920	—	2.1	0.029	12	19
90	0.1	0.22	—	3570	—	1.7	0.015	17	20
	0.1	0.47	—	4020	—	1.4	0.0075	20	20
	0.22	0.22	—	6040	—	0.98	0.0135	16	19
	0.22	0.47	—	7500	—	0.78	0.0075	21	20
	0.22	1.0	—	8800	—	0.63	0.0036	25	20
	0.047	0.047	—	694	—	6.0	0.062	25	23
	0.047	0.1	—	817	—	4.4	0.032	32	24
	0.047	0.22	—	905	—	4.0	0.0155	35	25
	0.10	0.1	—	1596	—	2.80	0.030	30	23
180	0.10	0.22	—	1630	—	2.30	0.0152	32	24
	0.10	0.47	—	1860	—	2.00	0.0073	38	24
	0.22	0.22	—	3950	—	1.24	0.0150	35	22
	0.22	0.47	—	4500	—	0.96	0.0072	41	23
	0.22	1.0	—	5530	—	0.79	0.0038	49	23
	0.047	0.047	—	438	—	6.70	0.062	38	26
	0.047	0.1	—	542	—	5.50	0.032	48	27
	0.047	0.22	—	644	—	4.30	0.016	57	27
	0.10	0.10	—	1009	—	3.5	0.031	42	25
300	0.10	0.22	—	1332	—	2.5	0.015	56	26
	0.10	0.47	—	1609	—	2.1	0.0074	64	25
	0.22	0.22	—	2623	—	1.5	0.015	50	24
	0.22	0.47	—	3900	—	1.1	0.0073	70	24
	0.22	1.0	—	4920	—	0.88	0.0039	84	24

• One triode unit. * Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

(11)

3BC5, 3CB6, 3CF6, 4BC5, 4CB6, 6AG5, 6BC5, 6CB6, 6CB6A, 6CF6

See *Circuit Diagram 2*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
	0.22	0.22	0.480	3800	0.046	5.5	0.0084	10	89
	0.22	0.47	0.480	3800	0.049	5.5	0.0054	16	114
	0.22	1.0	0.500	4400	0.045	5.3	0.0034	23	128
	0.47	0.47	1.04	7200	0.033	2.9	0.0044	10	111
90	0.47	1.0	1.04	7700	0.033	2.8	0.0029	15	133
	0.47	2.2	1.10	8400	0.031	2.6	0.0020	18	152
	1.0	1.0	2.50	16000	0.018	1.4	0.0023	10	118
	1.0	2.2	2.50	18600	0.016	1.2	0.0017	11	139
	0.22	0.22	0.550	1600	0.072	9.5	0.0090	30	161
	0.22	0.47	0.620	1800	0.062	8.5	0.0053	36	208
	0.22	1.0	0.650	1900	0.062	8.5	0.0034	43	239
	0.47	0.47	1.00	3400	0.059	6.0	0.0048	34	183
180	0.47	1.0	1.00	3500	0.059	6.0	0.0031	41	229
	0.47	2.2	1.00	3800	0.059	5.8	0.0020	46	262
	1.0	1.0	2.60	7300	0.029	2.7	0.0022	33	227
	1.0	2.2	2.60	7400	0.029	2.7	0.0016	38	281
	0.22	0.22	0.600	980	0.085	13.0	0.0085	51	223
	0.22	0.47	0.680	1090	0.084	12.0	0.0055	64	288
	0.22	1.0	0.700	1150	0.081	11.0	0.0033	74	334
	0.47	0.47	1.25	2000	0.064	7.9	0.0045	52	285
300	0.47	1.0	1.34	2150	0.061	7.6	0.0029	67	363
	0.47	2.2	1.53	2350	0.057	7.1	0.0019	79	416
	1.0	1.0	2.60	4000	0.044	5.2	0.0023	51	334
	1.0	2.2	3.00	4700	0.038	4.3	0.0015	69	427

• One triode unit. * Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

(12)

7199 (Pentode Unit)

See *Circuit Diagram 2*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
	0.22	0.22	0.560	3700	0.046	4.50	0.0090	12	73
	0.22	0.47	0.600	3900	0.043	4.30	0.0055	17	95
	0.22	1.0	0.640	4200	0.039	4.00	0.0033	19	109
	0.47	0.47	0.870	6000	0.036	2.70	0.0046	16	95
90	0.47	1.0	0.980	6700	0.044	3.00	0.0030	22	113
	0.47	2.2	1.00	6700	0.043	2.80	0.0020	25	131
	1.0	1.0	2.00	12200	0.021	1.44	0.0028	15	119
	1.0	2.2	2.20	12800	0.024	1.74	0.0016	21	167
	0.22	0.22	0.530	1570	0.069	7.50	0.0088	32	82
	0.22	0.47	0.600	1730	0.064	7.40	0.0064	38	164
	0.22	1.0	0.650	1820	0.061	7.30	0.0034	45	190
	0.47	0.47	1.12	3200	0.053	5.30	0.0046	35	147
180	0.47	1.0	1.40	3500	0.042	5.10	0.0028	40	209
	0.47	2.2	1.57	3740	0.040	5.40	0.0019	45	250
	1.0	1.0	2.50	6500	0.039	2.80	0.0024	34	179
	1.0	2.2	3.40	7500	0.026	2.30	0.0015	39	277
	0.22	0.22	0.600	9200	0.086	11.2	0.0085	52	182
	0.22	0.47	0.670	1010	0.076	10.5	0.0052	66	236
	0.22	1.0	0.720	1100	0.076	10.0	0.0033	77	257
	0.47	0.47	1.25	1950	0.060	7.0	0.0044	41	221
300	0.47	1.0	1.43	3210	0.053	6.4	0.0027	72	296
	0.47	2.2	1.45	2200	0.055	6.3	0.0019	82	345
	1.0	1.0	3.00	4100	0.040	4.2	0.0022	57	295
	1.0	2.2	3.30	4340	0.037	3.6	0.0016	74	378

* Peak volts.

RESISTANCE-COUPLED AMPLIFIER CHARTS

13

7199 (Triode Unit)

See *Circuit Diagram 1*

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o*	V.G.
90	0.047	0.047	—	1292	—	3.3	0.060	8	12
	0.047	0.1	—	1401	—	2.8	0.032	10	13
	0.047	0.22	—	1470	—	2.4	0.016	11	13
	0.10	0.1	—	2630	—	1.60	0.029	9	13
	0.10	0.22	—	3090	—	1.24	0.015	12	13
	0.10	0.47	—	3440	—	1.10	0.008	14	14
	0.22	0.22	—	6550	—	0.70	0.015	12	12
	0.22	0.47	—	8270	—	0.51	0.0077	16	12
	0.22	1.0	—	9130	—	0.44	0.0045	18	12
180	0.047	0.047	—	723	—	4.0	0.061	16	14
	0.047	0.1	—	836	—	3.5	0.032	20	14
	0.047	0.22	—	948	—	2.9	0.016	24	15
	0.10	0.1	—	1543	—	2.0	0.031	17	14
	0.10	0.22	—	2002	—	1.6	0.016	24	14
	0.10	0.47	—	2522	—	1.2	0.0082	30	13
	0.22	0.22	—	4390	—	0.79	0.015	24	13
	0.22	0.47	—	6122	—	0.57	0.0078	33	12
	0.22	1.0	—	8060	—	0.47	0.0046	41	12
300	0.047	0.047	—	534	—	4.0	0.061	27	15
	0.047	0.1	—	726	—	3.6	0.031	38	15
	0.047	0.22	—	840	—	3.0	0.015	44	15
	0.10	0.1	—	1117	—	2.3	0.031	26	15
	0.10	0.22	—	1613	—	1.7	0.0155	41	14
	0.10	0.47	—	2043	—	1.31	0.0078	51	14
	0.22	0.22	—	3133	—	0.93	0.015	36	13
	0.22	0.47	—	4480	—	0.69	0.0079	51	13
	0.22	1.0	—	4930	—	0.56	0.0045	55	13

* Peak volts.

GRID-No. 2 INPUT RATING CHART

The Grid-No.2 Input Rating Chart shown on the back of this page presents graphically the relationship between the grid-No.2 voltage and the maximum grid-No.2 input for certain multi-electrode tube types.

The chart shows that full rated grid-No.2 input is permissible at grid-No.2 voltages up to 50 per cent of the maximum rated grid-No.2 supply voltage. From the 50 per cent point to the full rated value of supply voltage, the grid-No.2 input must be decreased. The decrease in allowable grid-No.2 input follows a curve of the parabolic form.

This chart is useful for applications utilizing either a fixed grid-No.2 voltage, or a series grid-No.2 voltage-dropping resistor.

Where a fixed grid-No.2 voltage is used, it is necessary only to determine that the grid-No.2 input is within the boundary of the operating area on the chart at the selected value of grid-No.2 voltage to be used.

Where a grid-No.2 voltage-dropping resistor is used, the minimum value of resistor that will assure tube operation within the boundary of the curve can be determined from the following relation:

$$R_{g2} \geq \frac{E_{c2}\ (E_{cc2} - E_{c2})}{P_{c2}}$$

where:

R_{g2} = minimum value for grid-No.2 voltage-dropping resistor in ohms.

E_{c2} = selected value of grid-No.2 voltage in volts.

E_{cc2} = grid-No.2 supply voltage in volts.

P_{c2} = grid-No.2 input in watts corresponding to E_{c2}.

EXAMPLES

Example I - *Use of a Fixed Grid-No.2 Supply Voltage:*

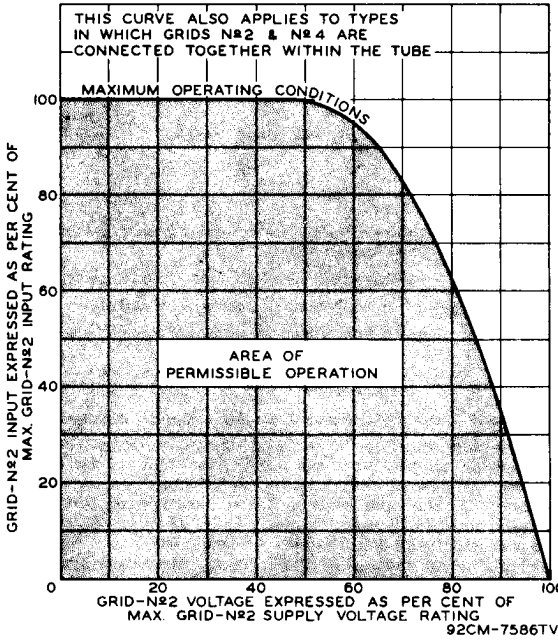
The tube data for a certain tube stipulates a maximum grid-No.2 supply voltage rating of 300 volts, and a maximum grid-No.2 input rating of 1 watt. It is desired to operate the tube with a fixed voltage of 200 volts between grid No.2 and cathode. This value is 66-2/3% of the maximum grid-No.2 supply voltage rating. From the chart, the maximum grid-No.2 input, therefore, must be limited to 88% of the maximum grid-No.2 input rating or 0.88 watt.

GRID-No. 2 INPUT RATING CHART

Example 2 - *Use of a Grid-No.2 Voltage-Dropping Resistor:*

The tube data for a certain tube stipulates a maximum grid-No.2 supply voltage rating of 300 volts, and a maximum grid-No.2 input rating of 1 watt. It is desired to operate the tube with a grid-No.2-to-cathode voltage of 250 volts, obtained through a dropping resistor from a 300-volt power supply. Because 250 volts is 83% of 300 volts, the maximum grid-No.2 input must be limited, as shown on the chart, to 56% of the maximum grid-No.2 input rating, or 0.56 watt. Then, the minimum value required for the grid-No.2 voltage-dropping resistor will be:

$$R_{g2} = \frac{250\ (300 - 250)}{0.56} = 22{,}320 \text{ ohms}$$

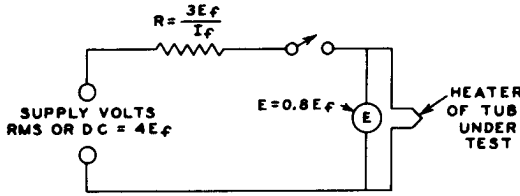


TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

HEATER WARM-UP TIME MEASUREMENT
FOR TUBE TYPES INTENDED FOR USE IN SERIES HEATER-STRING ARRANGEMENT

Heater warm-up time is measured in the circuit shown below as follows: The heater is placed in series with a resistance having a value 3 times the heater operating resistance. A voltage having a value 4 times the rated heater voltage is then applied. Heater warm-up time is then defined as the time required for the voltage across the heater to reach 80 per cent of its rated value.

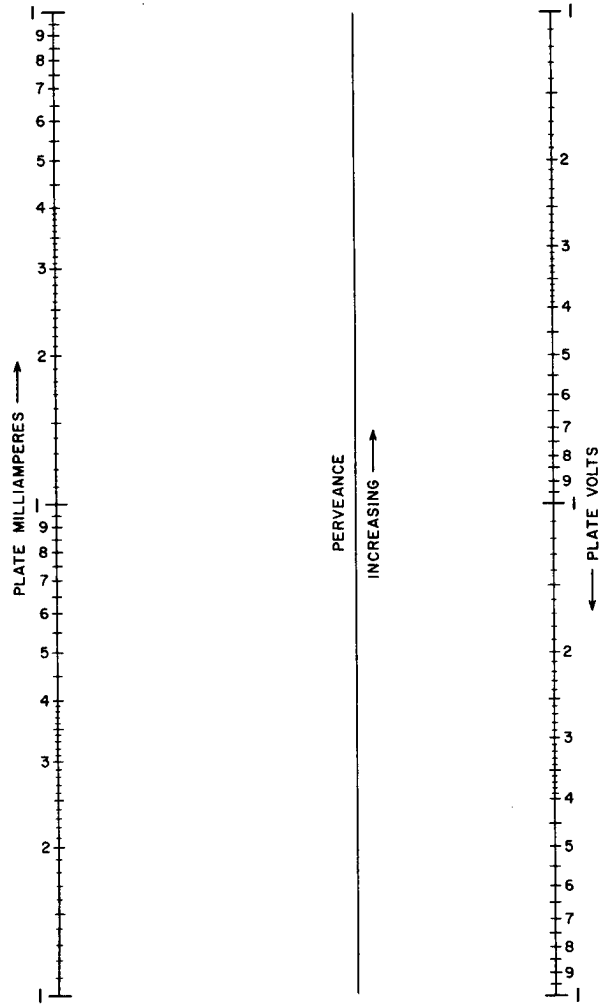
TEST CIRCUIT FOR DETERMINING HEATER WARM-UP TIME



Ef = RATED HEATER VOLTAGE OF TUBE UNDER TEST.
If = RATED HEATER CURRENT OF TUBE UNDER TEST.

92CS-8503

AVERAGE PLATE-CHARACTERISTIC NOMOGRAPH
For Diodes and Rectifiers



92CM-11244

Diode Nomograph

The Diode Nomograph on the preceding page may be used to determine for a diode unit (1) tube voltage drop for any plate current, or (2) plate current for any plate voltage when values for a single plate-voltage, plate-current condition are available from the published data. The nomograph may also be used to compare the perveance ($G = I_b/E_{b2}^{\frac{3}{2}}$) of several diodes.

For convenience, PLATE VOLTS and PLATE MILLIAMPERES are plotted on two-decade logarithmic scales with the PERVEANCE line located between them.

To determine for a specific diode unit the desired tube voltage drop or plate current:

1. Obtain the plate-voltage, plate-current condition from the published data for the type.
2. Select convenient values for the decade scales for PLATE VOLTS and PLATE MILLIAMPERES.
3. Locate and connect with a straightedge the points for PLATE VOLTS and PLATE MILLIAMPERES obtained from the data.
4. Mark the intersection of the straightedge and the PERVEANCE line.
5. With this intersection as a pivot point, line up the straightedge with the desired value of PLATE VOLTS or PLATE MILLIAMPERES, and read the corresponding value of tube voltage drop or plate current on the appropriate scale.

Because the pivot point for a specific diode unit represents its perveance, the pivot points for several units (plotted to the same scales) indicate their relative perveance.

EXAMPLE

The published data for type 5U4GB gives a tube voltage drop (Per plate) of 44 volts at plate ma. = 225.

1. To determine the tube voltage drop at plate ma. = 100:
   a. On the nomograph, establish the decade scale for PLATE VOLTS as 1, 10, 100 (reading down) and the scale for PLATE MILLIAMPERES as 10, 100, 1000 (reading up).
   b. Locate and connect the points "PLATE VOLTS = 44" and "PLATE MILLIAMPERES = 225" with a straightedge.
   c. Mark the intersection of the straightedge and the PERVEANCE line.
   d. Pivot the straightedge about this intersection, line it up with the point "PLATE MILLIAMPERES = 100", and read "PLATE VOLTS = 25"—the tube voltage drop (Per plate).
2. To determine the plate current at plate volts = 33:
   a. Use the same pivot point on the PERVEANCE line as in "1d" above, line up the straightedge with the point "PLATE VOLTS = 33", and read "PLATE MILLIAMPERES = 150".

LIMITATIONS

For readings in the order of 1 volt and/or 1 milliampere or less, the nomograph is not accurate because of the effects of contact potential and initial electron velocity.

RADIO CORPORATION OF AMERICA
Electron Tube Division Harrison, N. J.