RCA TUBE
HANDBOOK
HB-3

RECEIVING TUBE SECTION — Part 1

This Section contains data for those tubes used primarily in broadcast and home-television receivers.

For further Technical Information, write to Commercial Engineering, Tube Division, Radio Corporation of America, Harrison, N. J.

RCA Electronic Components

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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**

APPLICATION GUIDE FOR RCA RECEIVING TUBES

RCA Electronic Components

APPLICATION GUIDE 1

APPLICATION GUIDE FOR RCA RECEIVING TUBES

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

Twin Diode—High-Mu Triode

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

High-Mu Twin Triode

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

Triple Diode—High-Mu Triode

• 5T8 • 6T8A

High-Mu Triode—Sharp-Cutoff Pentode

• 6KT8

Sharp-Cutoff Pentode

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

Power Amplifiers

Beam Power Tube

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

Beam Power Tube—Sharp-Cutoff Pentode

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

Pentode—Beam Power Tube

‡ 6Z10/6J10 ‡ 13Z10/13J10

Power Pentode

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

2. AUTOMATIC GAIN CONTROL CIRCUITS (AGC & AVC)

Diode—Remote-Cutoff Pentode

• 6EQ7 • 12EQ7

Twin Diode—High-Mu Triode

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

Medium-Mu Triode—Sharp-Cutoff Pentode

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

High-Mu Triode—Sharp-Cutoff Pentode

• 6AW8A • 6JV8 • 8JV8
• 6HF8 • 8AW8A • 10HF8

Sharp-Cutoff Twin Pentode

• 3BU8/3GS8 • 4HS8 • 6HS8
• 6BU8

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

RCA Electronic Components

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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

APPLICATION GUIDE FOR RCA RECEIVING TUBES

RCA Electronic Components

APPLICATION GUIDE 2

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

APPLICATION GUIDE FOR RCA RECEIVING TUBES

Application Guide for RCA Receiving Tubes

In this Application Guide, RCA receiving tubes are classified by function (application), and by structure (diode, triode, etc.).

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 cutoff, as given in the characteristics or typical operation values. These terms are defined as follows: *sharp*, less than 10 per cent; *semi-remote*, 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	• 7AU7	• 17CU5
• 6J6A	• 9AU7	• 19J6
§ 6SN7GTB	§ 12SN7GTA	

High-Mu Triode with Twin Diode

• 3AV6	• 6BN8	• 12AV6
• 4AV6	• 6CN7	§ 12SQ7
• 6AT6	§ 6SQ7	• 14GT8
• 6AV6	• 12AT6	• 18FY6A

High-Mu Triode with Triple Diode

• 5T8	• 6T8A	• 19T8

High-Mu Twin Triode

• 6EU7†	• 12AZ7A	• 20EZ7
§ 6SL7GT	• 12BZ7	• 7025†
• 12AX7A†	§ 12SL7GT	

High-Mu Triode—Sharp-Cutoff Pentode

• 6KT8

Sharp-Cutoff Pentode

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

Remote-Cutoff Pentode with Diode

• 12CR6

Power Amplifiers

Beam Power Tube

• 5AQ5	§ 6L6	§ 12W6GT
• 5CZ5	§ 6L6GC†	• 17CU5
§ 5V6GT	§ 6V6	• 25C5
‡ 6AD10	§ 6V6GTA	• 25F5A
• 6AQ5A	§ 6W6GT	• 34GD5A
• 6AS5	§ 6Y6G	• 35C5
• 6CM6	• 12AB5	§ 35L6GT
• 6CU5	• 12AQ5	• 50B5
• 6CZ5	• 12CA5	• 50C5
§ 6DG6GT	• 12CU5/12C5	§ 50L6GT
• 6DS5		• 6973†
¶ 6GC5	§ 12V6GT	§ 7408†
§ 6HG5		

Beam Power Tube—Sharp-Cutoff Pentode

‡ 6AL11	‡ 10AL11	‡ 12BF11*
‡ 6BF11*	‡ 12AL11	‡ 17BF11*

Power Pentode

• 6BQ5	• 8BQ5	• 50EH5
• 6EH5	• 12EH5	• 60FX5
§ 6F6	• 12FX5	• 7189†
• 6GK6	• 25EH5	¶ 7868†
§ 6K6GT	• 35EH5	

Pentode—Beam Power Tube

‡ 6J10	‡ 6Z10	‡ 13J10

2. AUTOMATIC GAIN CONTROL CIRCUITS (AGC & AVC)

Diode—Sharp-Cutoff Pentode

• 6KL8	• 12KL8

Diode—Remote-Cutoff Pentode

• 6EQ7	• 12EQ7

Twin Diode—High-Mu Triode

• 3AV6	• 6AV6	• 12AV6
• 4AV6	• 6SQ7	§ 12SQ7
• 6AT6	• 12AT6	• 18FY6A

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5AN8	• 6BA8A	• 6GH8A
• 5GH8	• 6BH8	• 8BA8A
• 6AN8A	• 6CU8	• 8BH8
• 6AZ8		

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

High-Mu Triode—Sharp-Cutoff Pentode

• 6AW8A • 6JV8 • 8JV8
• 6HF8 • 8AW8A • 10HF8

Sharp-Cutoff Twin Pentode

• 3BU8 • 4BU8 • 6BU8
• 3GS8 • 4HS8 • 6HS8
• 3HS8

3. BANDPASS AMPLIFIERS (COLOR TV)

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5GH8A • 6HL8 • 6KT8
• 6AW8A • 6LF8 • 8AW8A
• 6GH8A

Medium-Mu Triode—Sharp-Cutoff Pentode

• 6AW8A • 6KV8 • 8AW8A
• 6KT8 • 6LF8

4. BLANKERS

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5GH8A • 6GH8A

Medium-Mu Twin Triode

• 6FQ7 • 6GU7 • 12BH7A

Medium-Mu Triode—Semiremote-Cutoff

• 6LM8

High-Mu Triode—Sharp-Cutoff Pentode

• 6KT8

5. BURST AMPLIFIERS

Beam-Deflection Tube

• 6JH8

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5EA8 • 6EA8 • 6GH8A
• 5GH8A

Medium-Mu Triode—Semi-remote-Cutoff Pentode

• 6LM8

High-Mu Triode with Twin Diodes

• 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
• 4BQ7A • 5BQ7A • 6BS8
• 4BS8 • 6BC8 • 6BZ7
• 4BZ7 • 6BK7A

High-Mu Triode

‖ 2CW4 • 6AB4 ‖ 6DS4
‖ 2DS4 ‖ 6CW4 ‖ 13CW4

High-Mu Twin Triode

• 6DT8 • 12AZ7A • 12DT8
• 12AT7

7. CHROMA AMPLIFIERS

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5GH8A • 6GH8A

Medium-Mu Triple Triode

¶ 6MD8

Medium-Mu Twin Triode

• 6FQ7/6CQ7 • 6GU7 • 12BH7A

8. COLOR KILLERS

Quadruple Diode

• 6JU8 • 6JU8A

• Miniature ¶ Novar ‖ Nuvistor

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Medium-Mu Triode—Sharp-Cutoff Pentode

• 5GH8A • 6GH8A

High-Mu Triode—Sharp-Cutoff Pentode

• 6KT8

9. COLOR MATRIXING CIRCUITS

Medium-Mu Twin Triode

• 6CG7 • 6GU7 • 8FQ7
• 6FQ7 • 8CG7 • 12BH7A

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5GH8A • 6GH8A

Twin Pentode

• 6LE8 • 10LE8 • 15LE8

Quadruple Diode

• 6JU8A

10. COMPLEX-WAVE GENERATORS

High-Mu Twin Double-Plate Triode

• 12FQ8

Sharp-Cutoff Twin-Plate Tetrode—Diode

• 6FA7

Sharp-Cutoff Three-Plate Tetrode—Diode

• 6KM8

Three-Plate Tetrode—Medium-Mu Triode

• 6FH8

11. CONVERTERS

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5EA8 • 5X8 • 6KZ8
• 5GH8 • 6EA8 • 6U8A
• 5KE8 • 6GH8A • 6X8
• 5U8 • 6KE8 • 19X8

High-Mu Twin Triode

• 6DT8 • 12AZ7A • 12DT8
• 12AT7

Sharp-Cutoff Pentode

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

Pentagrid

• 3BE6 § 6SA7 § 12SA7
• 6BA7 • 12BE6 • 18FX6A
• 6BE6

12. DAMPERS

Half-Wave (Diode)

§ 6AU4GTA ¶ 12BS3
§ 6AX4GTB ¶ 12CK3
¶ 6AY3 ¶ 12CL3
¶ 6BA3 § 12D4
¶ 6BH3 § 17AX4GTA
¶ 6BS3 ¶ 17AY3
¶ 6CK3 ¶ 17BH3
¶ 6CL3 ¶ 17BS3
§ 6CQ4 ¶ 17CK3
§ 6DA4 § 17D4
§ 6DE4 § 17DE4
§ 6DM4 § 19AU4
¶ 6CM3 ¶ 22BH3
¶ 6DW4B § 22DE4
§ 6W4GT ¶ 25CM3
§ 12AX4GTA § 25AX4GTA
§ 12AX4GTB ¶ 34CM3
¶ 12AY3

13. DEMODULATORS (COLOR TV)

Medium-Mu Twin Triode

• 12BH7A

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5GH8A • 6GH8A

High-Mu Twin Triode

• 12AZ7A

• Miniature § Octal ¶ Novar ‖ Nuvistor

RADIO CORPORATION OF AMERICA
Electronic Components and Devices Harrison, N. J.

Sharp-Cutoff Pentode

• 3BY6 • 6GY6 • 6HZ6
• 5HZ6

Pentagrid Amplifier

• 6BY6 • 6JH8 • 6ME8

Twin Pentode

• 6LE8 • 10LE8 • 15LE8

Beam Deflection Tube

• 6JH8

14. DETECTORS

Diode—Sharp-Cutoff Pentode

• 5AM8 • 6AM8A
• 5AS8 • 6AS8

Diode—Remote-Cutoff Pentode

• 6CR6 • 12CR6 • 12EQ7
• 6EQ7

Twin Diode

• 3AL5 § 6H6 § 12H6
• 6AL5 • 12AL5

Twin Diode—High-Mu Triode

• 3AV6 • 6CN7 • 12AV6
• 4AV6 § 6SQ7 § 12SQ7
• 6AT6 • 8BN8 • 14GT8
• 6AV6 • 12AT6 • 18FY6A
• 6BN8

Triple Diode

• 6BJ7

Triple Diode—High-Mu Triode

• 5T8 • 6T8A

Quadruple Diode

• 6JU8 • 6JU8A

Sharp-Cutoff Pentode

• 3DT6A* • 5GX6* • 6GX6*
• 4DT6A* • 6DT6A* • 6HZ6*

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 • 19T8

Beam Tube

• 3BN6 • 4BN6 • 6BN6

Beam Power Tube—Sharp-Cutoff Pentode

‡ 6AL11 ‡ 12AL11 ‡ 17BF11
‡ 6BF11 ‡ 12BF11

Pentode—Beam Power Tube

‡ 6J10 ‡ 6Z10 ‡ 13J10

FM Quadrature-Grid

Sharp-Cutoff Pentode

• 3DT6A* • 5GY6* • 6GX6*
• 4DT6A* • 5HZ6* • 6HZ6*
• 5GX6* • 6DT6A*

Beam Tube

• 3BN6 • 4BN6 • 6BN6

Horizontal AFC

Twin Diode—High-Mu Triode

• 6BN8 • 8BN8 • 8CN7
• 6CN7

• Miniature * Dual-control grids ‡ Duodecar § Octal

17. FREQUENCY DIVIDERS

High-Mu Twin Double Plate Triode

• 12FQ8

18. FM DETECTORS

(See 16. Discriminators)

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 • 4BU8 • 6BU8
• 3GS8 • 4HS8 • 6HS8
• 3HS8

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

Oscillators

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5GH8A • 6GH8A

Medium-Mu Twin Triode

• 6FQ7/6CG7 • 9AU7
§ 6SN7GTB • 12AU7A
• 7AU7 • 12BH7A
• 8CG7 § 12SN7GTA

Amplifiers

Beam Power Tube

§ 6AU5GT § 12DQ6B
§ 6AV5GA ¶ 12GT5
§ 6BG6GA § 12GW6
§ 6BQ6GTB/6CU6 ¶ 12JB6
§ 6CB5A ¶ 12JT6
§ 6CD6GA § 17BQ6GTB
§ 6DQ5 § 17DQ6B
§ 6DQ6B ¶ 17GJ5
¶ 6GJ5 ¶ 17GJ5A
¶ 6GT5 ¶ 17GT5
§ 6GW6/6DQ6B § 17GW6/17GW6B
¶ 6JB6 ¶ 17JB6
¶ 6JE6A ¶ 17JG6
¶ 6JF6 ‡ 17JM6A
¶ 6JG6 ¶ 17JT6
¶ 6JG6A ¶ 22JF6
‡ 6JM6A ¶ 22JG6
‡ 6JS6A ¶ 24JE6A
¶ 6JT6 § 25AV5GA
¶ 6JU6 § 25BQ6GTB/25CU6
¶ 6KM6 § 25CD6GB
§ 12AV5GA § 25DN6
§ 12BQ6GTB/12CU6 ‡ 31JS6A

23. INTERMEDIATE-FREQUENCY AMPLIFIERS

Medium-Mu Triode—Sharp-Cutoff Tetrode

• 5CQ8 • 6CQ8 • 6LQ8
• 5GH8A • 6GH8A

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5AN8 • 6AZ8 • 6CU8
• 6AN8A • 6BH8

• Miniature § Octal ‡Duodecar ¶ Novar

High-Mu Triode—Sharp-Cutoff Pentode

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

Sharp-Cutoff Pentode

• 3AU6 • 4JC6A • 6DK6
• 3BC5 • 4JD6• • 6EJ7
• 3CB6 • 5EW6 • 6EW6
• 3CF6 • 6AG5 • 6HS6
• 3DK6 • 6AK5 • 6JC6A
• 3JC6A • 6AU6A • 6JD6•
• 3JD6• • 6BC5 • 12AU6
• 4AU6 • 6CB6 • 12AW6
• 4CB6 • 6CB6A • 12DK6
• 4DE6 • 6CF6 • 18GD6A
• 4DK6 • 6DC6 • 19HS6
• 4EW6 • 6DE6

Sharp-Cutoff Pentode with Diode

• 5AM8 • 6AM8A • 6KL8
• 5AS8 • 6AS8 • 12KL8

Semiremote-Cutoff Pentode

• 3BZ6 • 4KT6 • 6HR6
• 3EH7 • 5GM6 • 6JH6
• 3KT6 • 6BZ6 • 6KT6
• 4BZ6 • 6EH7 • 12BZ6
• 4EH7 • 6GM6 • 19HR6
• 4GM6

Remote-Cutoff Pentode

• 3BA6 • 12BA6 • 18FW6A
• 6BA6 • 18FW6

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

Sharp-Cutoff Pentode

• 3AU6 • 6AU6A • 6HZ6
• 4AU6 • 6GX6 • 12AU6
• 5GX6 • 6HS6 • 19HS6

Sharp-Cutoff Pentode with Diode

• 6KL8 • 12KL8

Power Pentode—Beam Power Tube

‡ 6J10 ‡ 6Z10 ‡ 13J10

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 • 19CL8A
• 5CQ8 • 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode

• 4KE8 • 5U8 • 6KE8
• 5AT8 • 5X8 • 6KZ8
• 5B8 • 6AT8A • 6U8A
• 5BR8 • 6BR8A • 6Z8
• 5CG8 • 6CG8A • 9EA8
• 5EA8 • 6EA8 • 9U8
• 5FG7 • 6FG7 • 19EA8
• 5KE8 • 6HB7 • 19X8

High-Mu Twin Triode

• 6DT8 • 12AT7 • 12DT8

28. MULTIVIBRATORS

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5GH8A • 6GH8A

• Miniature ‖ Nuvistor • Approaches semiremote-cutoff characteristics; used in first-if amplifier applications
‡ Duodecar

RECEIVING-TUBE GUIDE — 2

RECEIVING-TUBE GUIDE — 2

Medium-Mu Twin Triode

• 6CG7 • 8CG7 § 12SN7-GTA
• 6GU7 • 9AU7
§ 6SN7GTB • 12AU7A
• 7AU7 • 12BH7A

High-Mu Twin Triode

• 12AX7A

29. NOISE INVERTERS (NOISE-IMMUNE CIRCUITS)

High-Mu Triode—Sharp-Cutoff Pentode

• 6KA8 • 8KA8 • 8LC8
• 6LC8

Sharp-Cutoff Pentode

• 6GY6*

Quadruple Diode

• 6JU8A

30. OSCILLATORS

Radio Frequency—UHF

Medium-Mu Triode

• 2AF4B • 3AF4A • 6AF4A
‖ 2DV4 • 3DZ4 ‖ 6DV4
• 2DZ4 • 6AF4 • 6DZ4

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 • 6KT8

Low Frequency, Sweep Type

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5AN8 • 6BA8A • 8AU8
• 6AN8A • 6BH8 • 8BA8B
• 6AU8A • 6CH8 • 8BH8
• 6AZ8

High-Mu Triode with Twin Diode

• 6BN8 • 8BN8 • 8CN7
• 6CN7

High-Mu Twin Triode

• 12AX7A

31. PHASE INVERTERS

Medium-Mu Triode—High-Mu Triode

• 12DW7

Medium-Mu Twin Triode

• 6CG7 • 8CG7 • 12BH7A
• 6GU7 • 9AU7 § 12SN7-GTA
§ 6SN7GTB • 12AU7A
• 7AU7

High-Mu Triode—Sharp-Cutoff Pentode

• 6AW8A • 8AW8A • 10GN8
• 6EB8 • 8EB8 • 10HF8
• 6GN8 • 8GN8 • 10JA8
• 6HF8

High-Mu Twin Triode

§ 6SL7GT § 12SL7GT • 7025
• 12AX7A

32. PHASE SPLITTERS

Medium-Mu Triode—Sharp-Cutoff Tetrode

• 5CQ8 • 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5AN8 • 6BA8A • 8BA8A
• 6AN8 • 6CH8 • 7199
• 6AZ8 • 6CU8

• Miniature § Octal * Dual-control grids ‖ Nuvistor

RADIO CORPORATION OF AMERICA
Electronic Components and Devices Harrison, N. J.

RCA Electronic Components

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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

APPLICATION GUIDE FOR RCA RECEIVING TUBES

19. GATED NOISE, AGC, AND SYNC AMPLIFIERS

High-Mu Triode—Sharp-Cutoff Pentode

- • 6KA8
- • 6LC8
- • 8KA8
- • 8LC8

Sharp-Cutoff Pentode

- • 6GY6*

Sharp-Cutoff Twin Pentode

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

Pentagrid Amplifier

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

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

23. INTERMEDIATE-FREQUENCY AMPLIFIERS

Medium-Mu Triode—Sharp-Cutoff Tetrode

- • 5CQ8
- • 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode

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

High-Mu Triode—Sharp-Cutoff Pentode

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

Sharp-Cutoff Pentode

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

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

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 • 6BS8
• 4BQ7A • 5J6 • 6BZ7
• 4BS8 • 6BC8 • 6J6A
• 4BZ7 • 6BK7B • 12AV7
• 5BK7A • 6BQ7A

High-Mu Triode

‖ 2CW4 • 4GK5
‖ 2DS4 • 6AB4
‖ 2EG4 ‖ 6CW4
• 2ER5 ‖ 6DS4
• 2FH5 • 6ER5
• 2FQ5A • 6FH5
• 2GK5 • 6FQ5A
• 3ER5 • 6GK5
• 3FH5 • 6HM5/6HA5
• 3GK5 ‖ 13CW4
• 3HM5/3HA5

High-Mu Twin Triode

• 6DT8 • 12AZ7A • 12DT8

Power Triode

• 6C4 (Class C)

Sharp-Cutoff Tetrode

• 2CY5 • 4CY5 • 6FV6
• 3CY5 • 6CY5

Sharp-Cutoff Pentode

• 3AU6 • 6AK5 • 6DE6
• 3BC5 • 6AU6A § 6SH7
• 3CB6 • 6BC5 § 6SJ7
• 3CF6 • 6BH6 • 12AU6
• 4AU6 • 6CB6 • 12AW6
• 4CB6 • 6CB6A § 12SH7
§ 4DE6 • 6CF6 § 12SJ7
• 6AG5 • 6DC6 • 18GD6A

Sharp-Cutoff Pentode with Diode

• 6KL8 • 12KL8

Remote-Cutoff Pentode

• 3BA6 • 6BJ6 • 12BA6
• 6BA6 § 6SK7GT • 18FW6A

Remote-Cutoff Pentode with Diode

• 6EQ7 • 12EQ7

34. REACTANCE CIRCUITS

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5AN8 • 6BA8A • 6CU8
• 6AN8A • 6CH8 • 8BA8A
• 6AZ8

High-Mu Triode with Twin Diodes

• 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
§ 5AR4/GF34 § 5VG4 • 6X4
§ 5AS4A § 5V4GA § 6X5GT
¶ 5BC3 § 5X4G • 12CA4
§ 5DJ4 § 5Y3GT • 12X4
§ 5U4G § 5Z4 • 25CA4
§ 5U4GB

• Miniature § Octal ¶ Novar ‖ Nuvistor

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

Half-Wave (Diode)

• 1BC2 • 1V2 • 2BJ2
§ 1G3GT/1B3GT • 1X2B • 3A2
§ 1K3/1J3 • 2AV2 § 3A3A

36. REGULATORS (HIGH VOLTAGE)

Sharp-Cutoff Beam Triode

§ 6BK4B ¶ 6KV6 ¶ 17KV6

37. SYNC AMPLIFIERS

Medium-Mu Triode—Sharp-Cutoff Pentode

• 6AU8A • 6CX8 • 8CX8
• 6AZ8 • 8AU8

Medium-Mu Twin Triode

• 6CG7 • 8CG7 • 12AU7A
• 7AU7

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

38. SYNC CLIPPERS

Medium-Mu Triode—Sharp-Cutoff Tetrode

• 5CQ8 • 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5AN8 • 6AZ8 • 6CX8
• 6AN8A • 6CH8 • 8AU8
• 6AU8A • 6CU8 • 8CX8

High-Mu Triode—Sharp-Cutoff Pentode

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

High-Mu Twin Triode

• 12BZ7

Sharp-Cutoff Twin Pentode

• 3BU8 • 4BU8 • 6BU8
• 3GS8 • 4HS8 • 6HS8
• 3HS8

Pentagrid Amplifier

• 3BY6 • 4CS6 • 6CS6
• 3CS6 • 6BY6

39. SYNC SEPARATORS

Medium-Mu Triode—Sharp-Cutoff Tetrode

• 5CQ8 • 6CQ8

Medium-Mu Triode—Sharp-Cutoff Pentode

• 5AN8 • 6CU8 • 6LQ8
• 5GH8A • 6CX8 • 8AU8
• 6AN8A • 6GH8 • 8CX8
• 6AU8A • 6GH8A
• 6AZ8 • 6HL8

Medium-Mu Twin Triode

• 6CG7 • 8CG7 • 12AU7A
• 7AU7

High-Mu Triode with Twin Diode

• 6CN7 • 8CN7

High-Mu Triode—Sharp-Cutoff Pentode

• 6AW8A • 6KV8 • 8KA8
• 6EB8 • 6LC8 • 8LC8
• 6GN8 • 8AW8A • 10GN8
• 6HF8 • 8EB8 • 10HF8
• 6JV8 • 8GN8 • 10JA8
• 6KA8 • 8JV8 • 11KV8
• 6KT8

• Miniature § Octal ¶ Novar

High-Mu Twin Triode

• 12BZ7

Sharp-Cutoff Twin Pentode

• 3BU8 • 4BU8 • 6BU8
• 3GS8 • 4HS8 • 6HS8
• 3HS8

Pentagrid Amplifier

• 3BY6 • 4CS6 • 6CS6
• 3CS6 • 6BY6

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 • 10DE7 • 13DE7
• 6EW7

Medium-Mu Dual Triode

• 6CM7 • 8CM7 • 8CS7
• 6CS7

Medium-Mu Twin Triode

• 6FQ7/6CG7

High-Mu Triode—Low-Mu Triode

• 6CY7 ¶ 6GF7A • 13DR7
• 6DR7 § 6GL7 § 13EM7
• 6EA7 • 10DR7 ¶ 13FD7
§ 6EM7 § 10EM7 ¶ 13GF7
¶ 6FD7 ¶ 10GF7
¶ 6GF7 § 11CY7

High-Mu Triode—Beam Power Tube

¶ 6KY8 ¶ 15KY8 ¶ 15KY8A
¶ 6KY8A

Dual Triode

§ 6EM7 ¶ 6GF7A

Amplifiers

Low-Mu Triode

• 12B4A

Medium-Mu Triode

• 6S4A

Beam Power Tube

• 5AQ5 • 6AQ5A • 6EM5
• 5CZ5 • 6CM6 • 8EM5
§ 5V6GT • 6CZ5 • 12AQ5

Power Pentode

• 6HR5 § 6K6GT

42. VIDEO AMPLIFIERS

Medium-Mu Triode—Sharp-Cutoff Pentode

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

High-Mu Triode—Sharp-Cutoff Pentode

• 6AW8A • 6KV8 • 10GN8
• 6EB8 • 6LF8 • 10HF8
• 6GN8 • 8AW8A • 10JA8
• 6HF8 • 8EB8 • 11KV8
• 6JV8 • 8GN8 • 12KV8
• 6KT8 • 8JV8

Sharp-Cutoff Pentode

• 3JC6A • 6KY6 • 11HM7
• 4JC6A • 7KY6 • 12BY7A
• 6JC6A • 7KZ6 ‡ 12HG7

Sharp-Cutoff Pentode with Diode

• 5AM8 • 6AM8A • 6AS8
• 5AS8

Beam Power Tube

• 6BK5 • 25BK5

Power Pentode

§ 6AG7 • 6GK6 • 16GK6
• 6CL6

• Miniature § Octal ¶ Novar ‡ Duodecar

RECEIVING-TUBE GUIDE—3

RECEIVING-TUBE GUIDE—3

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.

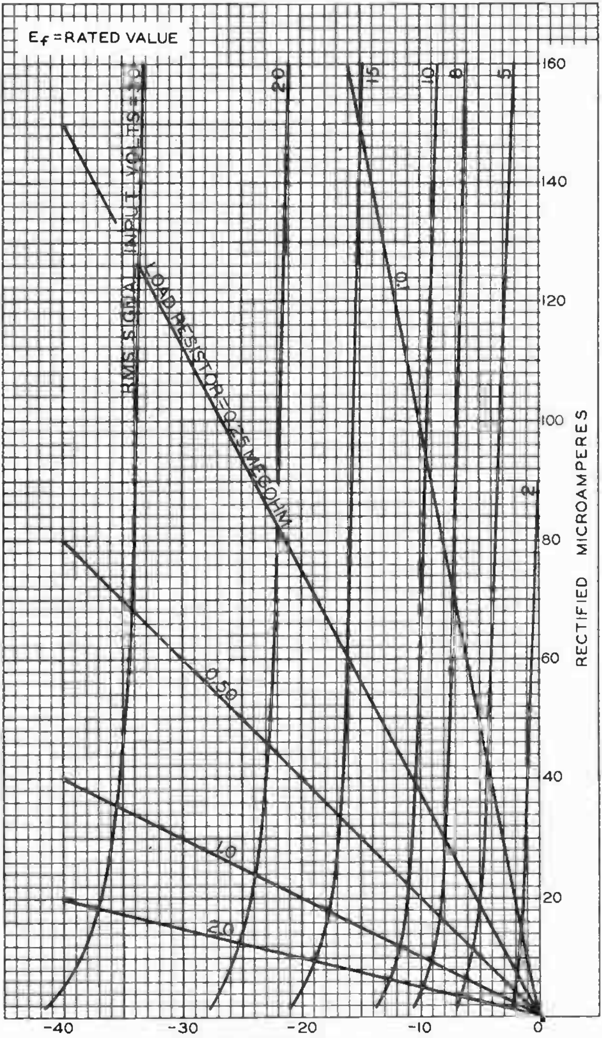
The above functions can be performed simultaneously by using a single diode, two diodes in parallel, or by two diodes operating independently. A number of typical circuit arrangements are shown on the following pages.

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



JULY 15, 1947

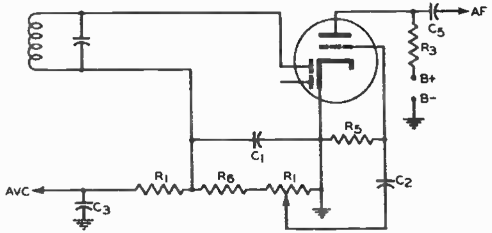
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6875

DIODE CONSIDERATIONS

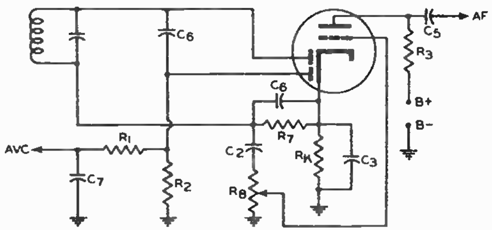
TYPICAL DIODE-TRIODE CIRCUITS

HALF-WAVE DETECTOR, AVC, ZERO-BIAS AMPLIFIER



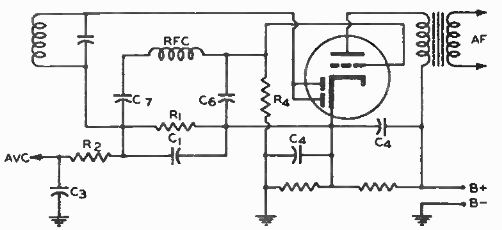
92CS-6677

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



92CS-6679

HALF-WAVE DETECTOR, AVC, FIXED-BIAS AMPLIFIER



92CS-6678R1

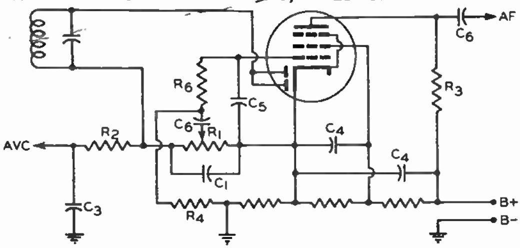
TYPICAL VALUES

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

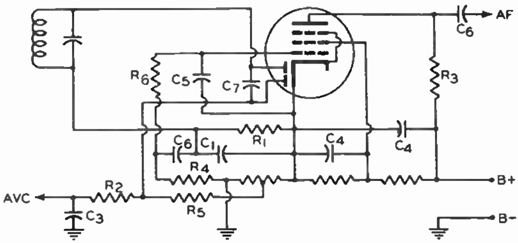
TYPICAL DIODE-PENTODE CIRCUITS

HALF-WAVE DETECTOR AND AVC, FIXED-BIAS AMPLIFIER



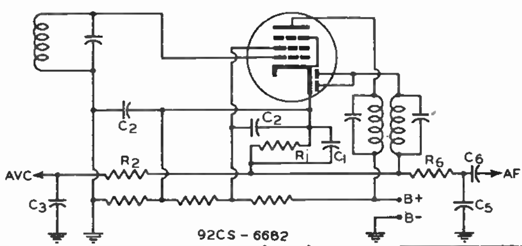
92CS-6681

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



92CS-6680

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



TYPICAL VALUES

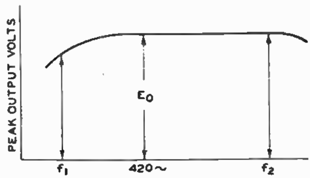
C1: 150 μμf for 450-1600 kc
C2, C3: 0.1 μf
C4: 0.5 μf or larger
C5: 100 μμf or smaller
C6: 0.01 to 0.1 μf
C7: 500 to 1000 μμf

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

RESISTANCE-COUPLED AMPLIFIERS

Symbols used in the following text and charts are explained at the end of the text.

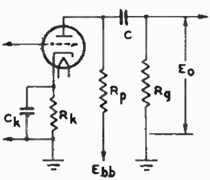
GENERAL CIRCUIT CONSIDERATIONS



92CS-6883

In the discussions which follow, the frequency (f_2) is that value at which the high-frequency response begins to fall off. The freouency (f_1) is that value at which the low-frequency response drops below a satisfactory value, as discussed below. Decoupling filters are not necessary for two stages or less. 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, R_p, 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. Peak Input Voltage is equal to the Peak Output Voltage divided by the Voltage Gain.

Triode (Heater-Cathode Type) Amplifier



92CS-6886

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, of "n" like stage equals $(0.8)^n E_o$ where E_o is the peak output voltage of the 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 (Filament-Type) Amplifier

Capacitors C and C_{g2} have been chosen to give an output voltage equal to $0.8E_o$ for a frequency (f_1) of 100 cycles. For any other value of f_1, multiply values of C and C_{g2} by $100/f_1$. The voltage output at f_1 for "n" like stages equals $(0.8)^n E_o$

RESISTANCE-COUPLED AMPLIFIERS

(continued from preceding page)

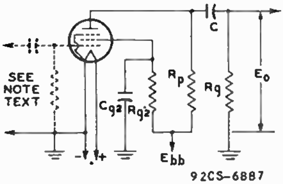


Diagram No.2

where E_o is the peak output voltage of the 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.

Note: The values of input coupling capacitor in microfarads and of grid resistor in megohms should be such that their product lies between 0.02 and 0.1. Values commonly used are 0.005 μf and 10 megohms.

Pentode (Heater-Cathode Type) Amplifier

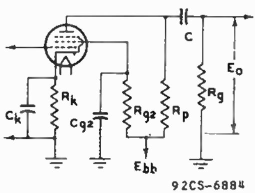


Diagram No.3

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 the 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.

Phase Inverters

Information given for triode amplifiers, in general, applies to this case. Capacitors C have been chosen to give an output voltage equal to 0.9 E_o for a frequency (f_1) of 100 cycles. For any other value of f_1, multiply values of C by $100/f_1$. The signal input is applied to the grid of triode unit A. The grid of triode unit B obtains its signal from a tap (P) on the grid resistor (R_g) in the output circuit of unit A. The tap is chosen so as to make the voltage output of unit B equal to that of unit A. Its location is determined by the voltage gain values given in the charts. For

RESISTANCE-COUPLED AMPLIFIERS

(continued from preceding page)

example, if V.G. is 20 (from the charts), P is chosen so as to supply 1/20 of the voltage across R_g to the grid of unit B. For phase-inverter service, the cathode resistor may be left unbypassed unless a bypass capacitor is necessary to minimize hum; omission of the bypass capacitor assists in balancing the output stages. The value of R_k is specified on the basis that both units are operating simultaneously at the same values of plate load and plate voltage.

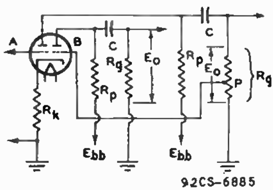


Diagram No.4

SYMBOLS USED IN RESISTANCE-COUPLED AMPLIFIER CHARTS

C = Blocking Capacitor (μf).

C_k = Cathode Bypass Capacitor (μf).

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

E_{bb} = Plate-Supply Voltage (volts). Voltage at plate equals plate-supply voltage minus drop in R_p and R_k. See Note 1, below.

R_k = Cathode Resistor (ohms).

R_{g2} = Screen Resistor (megohms).

R_g = Grid Resistor (megohms). for following stage.

R_p = Plate Resistor (megohms).

V.G. = Voltage Gain. At 5 volts (RMS) output, unless otherwise specified.

E_o = Peak Output Voltage (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 resistance-coupled amplifier tube to the point where its grid starts to draw current.

Note 1: For other supply voltages differing by as much as 50 per cent from those listed, the values of resistors, capacitors, and voltage gain are approximately correct. The value of voltage output, however, for any of these other supply voltages, equals the listed voltage output multiplied by the new plate-supply voltage divided by the plate-supply voltage corresponding to the listed voltage output.

RCA

KEY TO RESISTANCE-COUPLED AMPLIFIER CHARTS

Tube Type	Chart No.
1L4	1
1S5	2
1U4	3
1U5	2
2B7	5
6A6 #	6
6AQ6	7
6AQ7-GT	7
6AT6	7
6AU6	8
6AV6	25
6B7	5
6B8	5
6BF6	9
6C4	10
6C5	11
6C5-GT	11
6C6 { t.	11
6C6 { p.	14
6C8-G ##	12
6F5	18
6F5-GT	18
6F8-G ##	13
6J5	13
6J5-GT	13
6J7, 6J7-G, 6J7-GT { t	11
6J7, 6J7-G, 6J7-GT { p	14
6N7 #	6
6N7-GT #	6
6Q7	7
6Q7-G	7
6Q7-GT	7
6R7	9
6R7-GT	9
6S7	16
6S7-G	16
6S8-GT	4
6SC7 #	17
6SF5	18
6SF5-GT	18
6SF7	19
6SH7	8
6SJ7	20
6SJ7-GT	20
6SL7-GT ##	7
6SN7-GT ##	13
6SN7-GTA ##	29
6SQ7	4
6SQ7-GT	4
6SR7	9
6ST7	9
6SZ7	7
6T8	7
6W7-G { t	11
6W7-G { p	14
12AT6	7
12AU6	8
12AV6	25
12AU7 ##	10
12AX7 ##	25
12AY7 ##	28
12C8	5
12F5-GT	18
12J5-GT	13
12J7-GT { t.	11
12J7-GT { p.	14
12Q7-GT	7
12S8-GT	4
12SC7 #	17
12SF5	18
12SF7	19
12SH7	8
12SJ7	20
12SJ7-GT	20
12SL7-GT ##	7
12SN7-GT ##	13
12SQ7	4
12SQ7-GT	4
12SR7	9
19T8	7
53 #	6
55	22
56	23
57 { t	11
57 { p	14
75	4
76	23
85	22
5879 { t	27
5879 { p	26

The cathodes of the two units have a common terminal.

Chart values are for one triode unit. The cathodes of each unit have separate terminals.

t – Triode Connection

p – Pentode Connection

RESISTANCE-COUPLED AMPLIFIER CHARTS

See Circuit Diagram 2

1

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
45	0.22	0.22	0.24	–	0.071	–	0.011	12	16★
		0.47	0.32	–	0.06	–	0.006	14	23
		1.0	0.39	–	0.056	–	0.0035	18	30
	0.47	0.47	0.57	–	0.049	–	0.0052	14	22
		1.0	0.64	–	0.047	–	0.0035	17	30
		2.2	0.74	–	0.044	–	0.0018	19	33
	1.0	1.0	1.1	–	0.036	–	0.0028	14	28
		2.2	1.25	–	0.035	–	0.0018	16	32
		3.3	1.45	–	0.032	–	0.0015	18	38
90	0.22	0.22	0.4	–	0.089	–	0.011	26	28
		0.47	0.46	–	0.081	–	0.0055	36	36
		1.0	0.47	–	0.08	–	0.0035	42	41
	0.47	0.47	0.84	–	0.07	–	0.0055	30	34
		1.0	0.9	–	0.069	–	0.003	38	42
		2.2	1.0	–	0.062	–	0.0018	40	50
	1.0	1.0	2.0	–	0.045	–	0.0028	30	45
		2.2	2.1	–	0.045	–	0.0018	35	55
		3.3	2.2	–	0.044	–	0.0012	40	61
135	0.22	0.22	0.5	–	0.09	–	0.011	42	34
		0.47	0.63	–	0.074	–	0.0055	54	51
		1.0	0.67	–	0.072	–	0.0035	57	60
	0.47	0.47	1.1	–	0.071	–	0.005	47	49
		1.0	1.4	–	0.06	–	0.0028	54	68
		2.2	1.5	–	0.051	–	0.0018	60	87
	1.0	1.0	2.1	–	0.059	–	0.0025	45	53
		2.2	2.4	–	0.054	–	0.0018	57	88
		3.3	2.7	–	0.049	–	0.0012	61	91

★ At 4 volts (RMS) output.

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

2 See Circuit Diagram 2

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
45	0.22	0.22	0.26	–	0.042	–	0.013	14	17
		0.47	0.36	–	0.035	–	0.006	17	24
		1.0	0.4	–	0.034	–	0.004	18	28
	0.47	0.47	0.82	–	0.025	–	0.0055	14	25
		1.0	1.0	–	0.023	–	0.003	17	33
		2.2	1.1	–	0.022	–	0.002	18	38
	1.0	1.0	1.9	–	0.019	–	0.003	14	31
		2.2	2.0	–	0.019	–	0.002	17	38
		3.3	2.2	–	0.018	–	0.0015	18	43
90	0.22	0.22	0.5	–	0.05	–	0.011	31	25
		0.47	0.59	–	0.05	–	0.006	37	34
		1.0	0.67	–	0.042	–	0.003	40	41
	0.47	0.47	1.2	–	0.035	–	0.005	31	37
		1.0	1.4	–	0.034	–	0.003	36	47
		2.2	1.6	–	0.031	–	0.002	40	57
	1.0	1.0	2.5	–	0.026	–	0.003	31	45
		2.2	2.9	–	0.025	–	0.002	36	58
		3.3	3.1	–	0.024	–	0.0012	38	66
135	0.22	0.22	0.66	–	0.052	–	0.011	45	31
		0.47	0.71	–	0.051	–	0.006	56	41
		1.0	0.86	–	0.039	–	0.003	60	54
	0.47	0.47	1.45	–	0.042	–	0.005	46	44
		1.0	1.8	–	0.034	–	0.003	54	62
		2.2	1.9	–	0.033	–	0.002	60	71
	1.0	1.0	3.1	–	0.03	–	0.003	45	56
		2.2	3.7	–	0.029	–	0.0015	53	76
		3.3	4.3	–	0.026	–	0.0014	56	88

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 2

3

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
45	0.22	0.22	0.06	–	0.046	–	0.011	11	23
		0.47	0.07	–	0.045	–	0.006	15	33
		1.0	0.011	–	0.04	–	0.003	17	39
	0.47	0.47	0.34	–	0.025	–	0.005	13	34
		1.0	0.44	–	0.022	–	0.003	16	46
		2.2	0.5	–	0.022	–	0.002	18	55
	1.0	1.0	1.0	–	0.016	–	0.003	14	43
		2.2	1.0	–	0.016	–	0.002	17	51
		3.3	1.1	–	0.015	–	0.001	17	60
90	0.22	0.22	0.3	–	0.046	–	0.01	27	37
		0.47	0.36	–	0.04	–	0.006	36	54
		1.0	0.4	–	0.038	–	0.003	39	63
	0.47	0.47	0.9	–	0.027	–	0.0045	29	61
		1.0	1.0	–	0.023	–	0.003	35	82
		2.2	1.1	–	0.022	–	0.002	38	96
	1.0	1.0	1.9	–	0.02	–	0.0025	30	77
		2.2	2.0	–	0.02	–	0.002	35	98
		3.3	2.2	–	0.018	–	0.001	37	114
135	0.22	0.22	0.4	–	0.052	–	0.011	44	46
		0.47	0.49	–	0.037	–	0.005	55	71
		1.0	0.52	–	0.034	–	0.003	60	83
	0.47	0.47	1.1	–	0.029	–	0.0045	45	77
		1.0	1.3	–	0.023	–	0.003	53	106
		2.2	1.4	–	0.022	–	0.002	59	123
	1.0	1.0	2.3	–	0.021	–	0.0025	45	104
		2.2	2.5	–	0.019	–	0.0015	53	136
		3.3	2.9	–	0.016	–	0.001	56	163

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

4

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	–	6300	–	2.2	0.02	3	23●
		0.25	–	6600	–	1.7	0.01	5	29■
		0.5	–	6700	–	1.7	0.006	6	31★
	0.25	0.25	–	10000	–	1.24	0.01	5	34■
		0.5	–	11000	–	1.07	0.006	7	40★
		1.0	–	11500	–	0.9	0.003	10	40
	0.5	0.5	–	16200	–	0.75	0.005	7	39
		1.0	–	16600	–	0.7	0.003	10	44
		2.0	–	17400	–	0.65	0.0015	13	48
180	0.1	0.1	–	2600	–	3.3	0.025	16	29
		0.25	–	2900	–	2.9	0.015	22	36
		0.5	–	3000	–	2.7	0.007	23	37
	0.25	0.25	–	4300	–	2.1	0.015	21	43
		0.5	–	4800	–	1.8	0.007	28	50
		1.0	–	5300	–	1.5	0.004	33	53
	0.5	0.5	–	7000	–	1.3	0.007	25	52
		1.0	–	8000	–	1.1	0.004	33	57
		2.0	–	8800	–	0.9	0.002	38	58
300	0.1	0.1	–	1900	–	4.0	0.03	31	31
		0.25	–	2200	–	3.5	0.015	41	39
		0.5	–	2300	–	3.0	0.007	45	42
	0.25	0.25	–	3300	–	2.7	0.015	42	48
		0.5	–	3900	–	2.0	0.007	51	53
		1.0	–	4200	–	1.8	0.004	60	56
	0.5	0.5	–	5300	–	1.6	0.007	47	58
		1.0	–	6100	–	1.3	0.004	62	60
		2.0	–	7000	–	1.2	0.002	67	63

● At 2 volts (RMS) output. ■ At 3 volts (RMS) output. ★ At 4 volts (RMS) output

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 3

5

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1 0.25 0.5	0.37 0.5 0.6	2000 2200 2000	0.07 0.07 0.06	3.0 3.0 2.8	0.02 0.01 0.006	19 28 29	24 33 37
	0.25	0.25 0.5 1.0	1.18 1.1 1.35	3500 3500 3500	0.04 0.04 0.04	1.9 2.1 1.9	0.008 0.007 0.003	26 33 32	43 55 65
	0.5	0.5 1.0 2.0	2.6 2.8 2.9	5000 6000 6200	0.04 0.04 0.04	1.5 1.55 1.5	0.004 0.003 0.003	22 29 27	63 85 100
180	0.1	0.1 0.25 0.5	0.44 0.5 0.6	1000 1200 1200	0.08 0.08 0.07	4.4 4.4 4.0	0.02 0.015 0.008	30 52 53	30 41 46
	0.25	0.25 0.5 1.0	1.18 1.2 1.5	1900 2100 2200	0.05 0.06 0.05	2.7 3.2 3.0	0.01 0.007 0.003	39 55 53	55 69 83
	0.5	0.5 1.0 2.0	2.6 2.8 3.0	3300 3500 3500	0.04 0.04 0.04	2.1 2.0 2.2	0.005 0.003 0.002	47 55 53	81 115 116
300	0.1	0.1 0.25 0.5	0.5 0.55 0.6	950 1100 900	0.09 0.09 0.08	4.6 5.0 4.8	0.025 0.015 0.009	60 89 86	36 47 54
	0.25	0.25 0.5 1.0	1.2 1.2 1.5	1500 1600 1800	0.06 0.06 0.08	3.2 3.5 4.0	0.015 0.008 0.004	70 100 95	64 79 100
	0.5	0.5 1.0 2.0	2.7 2.9 3.4	2400 2500 2800	0.05 0.05 0.05	2.5 2.3 2.8	0.006 0.003 0.0025	80 120 90	96 150 145

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

6 — See Circuit Diagram 4

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1	–	1900*	–	–	0.025	13	16
		0.25	–	2250*	–	–	0.01	19	19
		0.5	–	2500*	–	–	0.006	20	20
	0.25	0.25	–	4050*	–	–	0.01	16	20
		0.5	–	4950*	–	–	0.006	20	22
		1.0	–	5400*	–	–	0.003	24	23
	0.5	0.5	–	7000*	–	–	0.006	18	22
		1.0	–	8500*	–	–	0.003	23	23
		2.0	–	9650*	–	–	0.0015	26	23
180	0.1	0.1	–	1300*	–	–	0.03	35	19
		0.25	–	1700*	–	–	0.015	46	21
		0.5	–	1950*	–	–	0.007	50	22
	0.25	0.25	–	2950*	–	–	0.015	40	23
		0.5	–	3800*	–	–	0.007	50	24
		1.0	–	4300*	–	–	0.0035	57	24
	0.5	0.5	–	5250*	–	–	0.007	44	24
		1.0	–	6600*	–	–	0.0035	54	25
		2.0	–	7650*	–	–	0.002	61	25
300	0.1	0.1	–	1150*	–	–	0.03	60	20
		0.25	–	1500*	–	–	0.015	83	22
		0.5	–	1750*	–	–	0.007	86	23
	0.25	0.25	–	2650*	–	–	0.015	75	23
		0.5	–	3400*	–	–	0.0055	87	24
		1.0	–	4000*	–	–	0.003	100	24
	0.5	0.5	–	4850*	–	–	0.0055	76	23
		1.0	–	6100*	–	–	0.003	94	24
		2.0	–	7150*	–	–	0.0015	104	24

*Values shown are for phase-inverter service.

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 1

7

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●
		0.22	-	4600	-	2.2	0.014	7.5	27●
		0.47	-	4800	-	2.0	0.0065	9.1	30●
	0.22	0.22	-	7000	-	1.5	0.013	7.3	30●
		0.47	-	7800	-	1.3	0.007	10	34■
		1.0	-	8100	-	1.1	0.0035	12	37★
	0.47	0.47	-	12000	-	0.83	0.006	10	36■
		1.0	-	14000	-	0.7	0.0035	14	39★
		2.2	-	15000	-	0.6	0.002	16	41★
180	0.1	0.1	-	1900	-	3.6	0.027	19	30★
		0.22	-	2200	-	3.1	0.014	25	35
		0.47	-	2500	-	2.8	0.0065	32	37
	0.22	0.22	-	3400	-	2.2	0.014	24	38
		0.47	-	4100	-	1.7	0.0065	34	42
		1.0	-	4600	-	1.5	0.0035	38	44
	0.47	0.47	-	6600	-	1.1	0.0065	29	44
		1.0	-	8100	-	0.9	0.0035	38	46
		2.2	-	9100	-	0.8	0.002	43	47
300	0.1	0.1	-	1500	-	4.4	0.027	40	34
		0.22	-	1800	-	3.6	0.014	54	38
		0.47	-	2100	-	3.0	0.0065	63	41
	0.22	0.22	-	2600	-	2.5	0.013	51	42
		0.47	-	3200	-	1.9	0.0065	65	46
		0.1	-	3700	-	1.6	0.0035	77	48
	0.47	0.47	-	5200	-	1.2	0.006	61	48
		1.0	-	6300	-	1.0	0.0035	74	50
		2.2	-	7200	-	0.9	0.002	85	51

● At 2 volts (RMS) output. ■ At 3 volts (RMS) output. ★ At 4 volts (RMS) output

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

8

See Circuit Diagram 3

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1 0.22 0.47	0.07 0.09 0.096	1800 2100 2100	0.11 0.1 0.1	9.0 8.2 8.0	0.021 0.012 0.0065	25 32 37	52 72 88
	0.22	0.22 0.47 1.0	0.25 0.26 0.35	3100 3200 3700	0.08 0.078 0.085	6.2 5.8 5.1	0.009 0.0055 0.003	25 32 34	72 99 125
	0.47	0.47 1.0 2.2	0.75 0.75 0.8	6300 6500 6700	0.042 0.042 0.04	3.4 3.3 3.2	0.0035 0.0027 0.0018	27 32 36	102 126 152
180	0.1	0.1 0.22 0.47	0.12 0.15 0.19	800 900 1000	0.15 0.126 0.1	14.1 14.0 12.5	0.021 0.012 0.006	57 82 81	74 116 141
	0.22	0.22 0.47 1.0	0.38 0.43 0.6	1500 1700 1900	0.09 0.08 0.066	9.6 8.7 8.1	0.009 0.005 0.003	59 67 71	130 171 200
	0.47	0.47 1.0 2.2	0.9 1.0 1.1	3100 3400 3600	0.06 0.05 0.04	5.7 5.4 3.6	0.0045 0.0028 0.0019	54 65 74	172 232 272
300	0.1	0.1 0.22 0.47	0.2 0.24 0.26	500 600 700	0.13 0.11 0.11	18.0 16.4 15.3	0.019 0.011 0.006	76 103 129	109 145 168
	0.22	0.22 0.47 1.0	0.42 0.5 0.55	1000 1000 1100	0.1 0.098 0.09	12.4 12.0 11.0	0.009 0.007 0.003	92 108 122	164 230 262
	0.47	0.47 1.0 2.2	1.0 1.1 1.2	1800 1900 2100	0.075 0.065 0.06	8.0 7.6 7.3	0.0045 0.0028 0.0018	94 105 122	248 318 371

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 1 — 9

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.047	0.047	–	2200	–	2.5	0.063	14	9
		0.1	–	2800	–	2.0	0.033	18	10
		0.22	–	3200	–	1.7	0.015	20	10
	0.1	0.1	–	4100	–	1.4	0.032	13	10
		0.22	–	5400	–	1.0	0.013	20	11
		0.47	–	6400	–	0.9	0.007	24	11
	0.22	0.22	–	8500	–	0.67	0.015	18	11
		0.47	–	12000	–	0.5	0.0065	23	11
		1.0	–	14000	–	0.43	0.0035	27	11
180	0.047	0.047	–	2000	–	2.9	0.062	32	10
		0.1	–	2500	–	2.2	0.033	42	10
		0.22	–	3000	–	1.9	0.016	47	11
	0.1	0.1	–	3800	–	1.5	0.033	36	11
		0.22	–	5100	–	1.1	0.015	47	11
		0.47	–	6200	–	0.9	0.007	55	12
	0.22	0.22	–	8000	–	0.73	0.015	41	12
		0.47	–	11000	–	0.5	0.007	54	12
		1.0	–	13000	–	0.4	0.0035	69	12
300	0.047	0.047	–	1800	–	3.0	0.063	58	10
		0.1	–	2400	–	2.4	0.033	74	11
		0.22	–	2900	–	2.0	0.016	85	11
	0.1	0.1	–	3600	–	1.6	0.033	65	12
		0.22	–	5000	–	1.2	0.015	85	12
		0.47	–	6200	–	0.95	0.007	96	12
	0.22	0.22	–	7800	–	0.73	0.015	74	12
		0.47	–	11000	–	0.5	0.007	95	12
		1.0	–	13000	–	0.43	0.0035	106	12

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

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

■ At 3 volts (RMS) output. ★ At 4 volts (RMS) output.

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 1

11

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.05	0.05	–	2800	–	2.0	0.05	14	9
		0.1	–	3400	–	1.62	0.025	17	9
		0.25	–	3800	–	1.3	0.01	20	10
	0.1	0.1	–	4800	–	1.12	0.025	16	10
		0.25	–	6400	–	0.84	0.01	22	11
		0.5	–	7500	–	0.66	0.005	23	12
	0.25	0.25	–	11400	–	0.52	0.01	18	12
		0.5	–	14500	–	0.4	0.006	23	12
		1.0	–	17300	–	0.33	0.004	26	13
180	0.05	0.05	–	2200	–	2.2	0.055	34	10
		0.1	–	2700	–	2.1	0.03	45	11
		0.25	–	3100	–	1.85	0.015	54	11
	0.1	0.1	–	3900	–	1.7	0.035	41	12
		0.25	–	5300	–	1.25	0.015	54	12
		0.5	–	6200	–	1.2	0.008	55	13
	0.25	0.25	–	9500	–	0.74	0.015	44	13
		0.5	–	12300	–	0.55	0.008	52	13
		1.0	–	14700	–	0.47	0.004	59	13
300	0.05	0.05	–	2100	–	3.16	0.075	57	11
		0.1	–	2600	–	2.3	0.04	70	11
		0.25	–	3100	–	2.2	0.015	83	12
	0.1	0.1	–	3800	–	1.7	0.035	65	12
		0.25	–	5300	–	1.3	0.015	84	13
		0.5	–	6000	–	1.17	0.008	88	13
	0.25	0.25	–	9600	–	0.9	0.015	73	13
		0.5	–	12300	–	0.59	0.008	85	14
		1.0	–	14000	–	0.37	0.003	97	14

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

12

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	–	3040	–	2.34	0.028	13	18
		0.25	–	3700	–	1.48	0.0115	17	20
		0.5	–	4520	–	1.29	0.006	19	21
	0.25	0.25	–	6770	–	0.95	0.011	15	21
		0.5	–	7870	–	0.81	0.0065	19	23
		1.0	–	8830	–	0.69	0.0035	21	23
	0.5	0.5	–	12400	–	0.51	0.006	16	22
		1.0	–	15000	–	0.43	0.0035	20	24
		2.0	–	16500	–	0.38	0.0015	25	24
180	0.1	0.1	–	2420	–	2.34	0.028	30	20
		0.25	–	3080	–	1.84	0.012	40	22
		0.5	–	3560	–	1.6	0.0065	45	23
	0.25	0.25	–	5170	–	1.25	0.012	35	24
		0.5	–	6560	–	0.95	0.007	45	25
		1.0	–	7550	–	0.85	0.0035	50	26
	0.5	0.5	–	9840	–	0.66	0.007	38	25
		1.0	–	12500	–	0.5	0.004	44	26
		2.0	–	15600	–	0.44	0.0015	51	26
300	0.1	0.1	–	2120	–	3.93	0.037	55	22
		0.25	–	2840	–	2.01	0.013	73	23
		0.5	–	3250	–	1.79	0.007	80	25
	0.25	0.25	–	4750	–	1.29	0.013	64	25
		0.5	–	6100	–	0.96	0.0065	80	26
		1.0	–	7100	–	0.77	0.004	90	27
	0.5	0.5	–	9000	–	0.67	0.007	67	27
		1.0	–	11500	–	0.48	0.004	83	27
		2.0	–	14500	–	0.37	0.002	96	28

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 1

13

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.05	0.05 0.1 0.25	– – –	1650 2070 2380	– – –	2.80 2.66 1.95	0.06 0.029 0.012	11 14 17	11 12 13
	0.1	0.1 0.25 0.5	– – –	3470 3940 4420	– – –	1.85 1.29 1.0	0.035 0.012 0.007	12 17 19	13 13 13
	0.25	0.25 0.5 1.0	– – –	7860 9760 10690	– – –	0.73 0.55 0.47	0.0135 0.007 0.004	14 18 20	13 13 13
180	0.05	0.05 0.1 0.25	– – –	1190 1490 1740	– – –	3.27 2.86 2.06	0.06 0.032 0.0115	24 30 36	13 13 13
	0.1	0.1 0.25 0.5	– – –	2330 2830 3230	– – –	2.19 1.35 1.15	0.038 0.012 0.006	26 34 38	14 14 14
	0.25	0.25 0.5 1.0	– – –	5560 7000 8110	– – –	0.81 0.62 0.5	0.013 0.007 0.004	28 36 40	14 14 14
300	0.05	0.05 0.1 0.25	– – –	1020 1270 1500	– – –	3.56 2.96 2.15	0.06 0.034 0.012	41 51 60	13 14 14
	0.1	0.1 0.25 0.5	– – –	1900 2440 2700	– – –	2.31 1.42 1.2	0.035 0.0125 0.0065	43 56 64	14 14 14
	0.25	0.25 0.5 1.0	– – –	4590 5770 6950	– – –	0.87 0.64 0.54	0.013 0.0075 0.004	46 57 64	14 14 14

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

14

See Circuit Diagram 3

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1	0.37	1200	0.05	5.2	0.02	17	41
		0.25	0.44	1100	0.05	5.3	0.01	22	55
		0.5	0.44	1300	0.05	4.8	0.006	33	66
	0.25	0.25	1.1	2400	0.03	3.7	0.008	23	70
		0.5	1.18	2600	0.03	3.2	0.005	32	85
		1.0	1.4	3600	0.025	2.5	0.003	33	92
	0.5	0.5	2.18	4700	0.02	2.3	0.005	28	93
		1.0	2.6	5500	0.05	2.0	0.0025	29	120
		2.0	2.7	5500	0.02	2.0	0.0015	27	140
180	0.1	0.1	0.44	1000	0.05	6.5	0.02	42	51
		0.25	0.5	750	0.05	6.7	0.01	52	69
		0.5	0.5	800	0.05	6.7	0.006	59	83
	0.25	0.25	1.1	1200	0.04	5.2	0.008	41	93
		0.5	1.18	1600	0.04	4.3	0.005	60	118
		1.0	1.4	2000	0.04	3.8	0.0025	60	140
	0.5	0.5	2.45	2600	0.03	3.2	0.005	45	135
		1.0	2.9	3100	0.025	2.5	0.0025	56	165
		2.0	2.7	3500	0.02	2.8	0.0015	60	165
300	0.1	0.1	0.44	500	0.07	8.5	0.02	55	61
		0.25	0.5	450	0.07	8.3	0.01	81	82
		0.5	0.53	600	0.06	8.0	0.006	96	94
	0.25	0.25	1.18	1100	0.04	5.5	0.008	81	104
		0.5	1.18	1200	0.04	5.4	0.005	104	140
		1.0	1.45	1300	0.05	5.8	0.005	110	185
	0.5	0.5	2.45	1700	0.04	4.2	0.005	75	161
		1.0	2.9	2200	0.04	4.1	0.003	97	200
		2.0	2.95	2300	0.04	4.0	0.0025	100	230

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 1

15

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.★
90	0.05	0.05	–	2120	–	2.3	0.05	14	9.3
		0.1	–	2500	–	1.86	0.03	18	10
		0.25	–	2900	–	1.65	0.014	21	11
	0.1	0.1	–	3510	–	1.36	0.03	16	11
		0.25	–	4620	–	1.08	0.015	22	12
		0.5	–	5200	–	1.0	0.0085	23	12
	0.25	0.25	–	8050	–	0.61	0.0125	18	12
		0.5	–	10300	–	0.49	0.0085	22	12
		1.0	–	12100	–	0.42	0.0055	24	12
180	0.05	0.05	–	1810	–	2.9	0.06	32	10
		0.1	–	2240	–	2.2	0.03	41	11
		0.25	–	2660	–	1.8	0.014	46	12
	0.1	0.1	–	3180	–	1.46	0.03	36	12
		0.25	–	4200	–	1.1	0.0145	46	12
		0.5	–	4790	–	1.0	0.009	50	12
	0.25	0.25	–	7100	–	0.7	0.014	38	12
		0.5	–	9290	–	0.54	0.009	46	12
		1.0	–	10950	–	0.46	0.0055	52	13
300	0.05	0.05	–	1740	–	2.91	0.06	56	11
		0.1	–	2160	–	2.18	0.032	68	12
		0.25	–	2600	–	1.82	0.015	79	12
	0.1	0.1	–	3070	–	1.64	0.032	60	12
		0.25	–	4140	–	1.1	0.014	79	13
		0.5	–	4700	–	0.81	0.0075	89	13
	0.25	0.25	–	6900	–	0.57	0.013	64	13
		0.5	–	9100	–	0.46	0.0075	80	13
		1.0	–	10750	–	0.4	0.005	88	13

★ At 4 volts (RMS) output.

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

16

See Circuit Diagram 3

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1	0.59	870	0.065	5.1	0.018	16	33
		0.25	0.65	900	0.061	5.0	0.01	21	47
		0.5	0.7	910	0.057	4.58	0.007	23	54
	0.25	0.25	1.5	1440	0.044	3.38	0.007	14	56
		0.5	1.6	1520	0.044	3.23	0.0055	18	66
		1.0	1.7	1560	0.043	3.22	0.004	19	77
	0.5	0.5	3.2	2620	0.029	2.04	0.004	12	70
		1.0	3.5	2800	0.03	1.95	0.0026	15	84
		2.0	3.7	3000	0.031	1.92	0.0024	16	94
180	0.1	0.1	0.58	530	0.073	7.2	0.017	33	47
		0.25	0.68	540	0.07	6.9	0.01	43	66
		0.5	0.71	540	0.065	6.6	0.0063	48	75
	0.25	0.25	1.6	850	0.05	4.6	0.0071	33	79
		0.5	1.8	890	0.044	4.7	0.005	40	104
		1.0	1.9	950	0.046	4.4	0.0037	44	118
	0.5	0.5	3.3	1410	0.041	3.5	0.0041	30	109
		1.0	3.6	1520	0.037	3.0	0.003	38	134
		2.0	3.8	1600	0.031	2.9	0.0024	42	147
300	0.1	0.1	0.59	430	0.007	8.5	0.0167	57	57
		0.25	0.67	440	0.071	8.0	0.01	75	78
		0.5	0.71	440	0.071	8.0	0.0066	82	89
	0.25	0.25	1.7	620	0.058	6.0	0.0071	54	98
		0.5	1.95	650	0.057	5.8	0.005	66	122
		1.0	2.1	700	0.055	5.2	0.0036	76	136
	0.5	0.5	3.6	1000	0.04	4.1	0.0037	52	136
		1.0	3.9	1080	0.041	3.9	0.0029	66	162
		2.0	4.1	1120	0.043	3.8	0.0023	73	174

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 4

17

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1	–	1850*	–	–	0.028	4.1	13●
		0.25	–	1960*	–	–	0.012	5.9	23■
		0.5	–	2050*	–	–	0.0065	6.9	25★
	0.25	0.25	–	3400*	–	–	0.011	6.2	26★
		0.5	–	3750*	–	–	0.006	8.6	30
		1.0	–	3900*	–	–	0.003	10	33
	0.5	0.5	–	5500*	–	–	0.005	7.4	31
		1.0	–	6300*	–	–	0.003	10	33
		2.0	–	7450*	–	–	0.0015	12	36
180	0.1	0.1	–	960*	–	–	0.031	17	25
		0.25	–	1070*	–	–	0.012	24	29
		0.5	–	1220*	–	–	0.0065	27	33
	0.25	0.25	–	1850*	–	–	0.011	21	35
		0.5	–	2150*	–	–	0.006	28	39
		1.0	–	2400*	–	–	0.003	32	41
	0.5	0.5	–	3050*	–	–	0.006	24	40
		1.0	–	3420*	–	–	0.003	32	43
		2.0	–	3890*	–	–	0.002	36	45
300	0.1	0.1	–	750*	–	–	0.033	35	29
		0.25	–	930*	–	–	0.014	50	34
		0.25	–	1040*	–	–	0.007	54	36
	0.25	0.25	–	1400*	–	–	0.012	45	39
		0.5	–	1680*	–	–	0.006	55	42
		1.0	–	1840*	–	–	0.003	64	45
	0.5	0.5	–	2330*	–	–	0.006	50	45
		1.0	–	2980*	–	–	0.003	62	48
		2.0	–	3280*	–	–	0.002	72	49

● At 2 volts (RMS) output. ■ At 3 volts (RMS) output. ★ At 4 volts (RMS) output.
*Values are for phase-inverter service.

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

18

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	-	4400	-	2.5	0.02	4	28●
		0.25	-	4800	-	2.1	0.01	5	34■
		0.5	-	5000	-	1.8	0.005	6	35★
	0.25	0.25	-	8000	-	1.33	0.01	6	39■
		0.5	-	8800	-	1.18	0.005	7	43★
		1.0	-	9000	-	0.9	0.003	10	44
	0.5	0.5	-	12200	-	0.76	0.005	8	43
		1.0	-	13500	-	0.67	0.003	10	46
		2.0	-	14700	-	0.58	0.0015	12	48
180	0.1	0.1	-	1800	-	4.4	0.025	16	37
		0.25	-	2000	-	3.3	0.015	23	44
		0.5	-	2200	-	2.9	0.006	25	46
	0.25	0.25	-	3500	-	2.3	0.01	21	48
		0.5	-	4100	-	1.8	0.006	26	53
		1.0	-	4500	-	1.7	0.004	32	57
	0.5	0.5	-	6100	-	1.3	0.006	24	53
		1.0	-	6900	-	0.9	0.003	33	63
		2.0	-	7700	-	0.83	0.0015	37	66
300	0.1	0.1	-	1300	-	5.0	0.025	33	42
		0.25	-	1600	-	3.7	0.01	43	49
		0.5	-	1700	-	3.2	0.006	48	52
	0.25	0.25	-	2600	-	2.5	0.01	41	56
		0.5	-	3200	-	2.1	0.007	54	63
		1.0	-	3500	-	2.0	0.004	63	67
	0.5	0.5	-	4500	-	1.5	0.006	50	65
		1.0	-	5400	-	1.2	0.004	62	70
		2.0	-	6100	-	0.93	0.002	70	70

●At 2 volts (RMS) output. ■At 3 volts (RMS) output. ★ At 4 volts (RMS) output

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 3

19

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1	0.26	1500	0.11	4.8	0.02	21	21
		0.22	0.3	1600	0.1	4.4	0.012	26	29
		0.47	0.35	1900	0.09	4.2	0.006	28	37
	0.22	0.22	0.64	2400	0.09	3.4	0.009	21	33
		0.47	0.7	2500	0.09	3.2	0.0055	26	40
		1.0	0.84	2600	0.084	3.0	0.0035	29	52
	0.47	0.47	1.5	4200	0.06	2.1	0.0045	21	50
		1.0	1.6	4400	0.06	1.9	0.003	26	59
		2.2	1.7	4800	0.058	1.6	0.002	29	64
180	0.1	0.1	0.33	1000	0.13	6.7	0.02	32	33
		0.22	0.5	1200	0.12	5.8	0.011	37	45
		0.47	0.6	1300	0.11	5.5	0.006	43	52
	0.22	0.22	0.76	1700	0.11	4.5	0.0095	37	47
		0.47	0.9	1700	0.1	4.5	0.0055	44	68
		1.0	1.0	1800	0.1	4.2	0.003	47	82
	0.47	0.47	1.8	3300	0.09	2.9	0.0045	38	70
		1.0	2.0	3800	0.08	2.4	0.003	50	85
		2.2	2.1	4000	0.07	2.3	0.002	57	98
300	0.1	0.1	0.32	750	0.19	8.0	0.021	62	39
		0.22	0.36	850	0.18	7.7	0.012	80	46
		0.47	0.37	900	0.18	7.7	0.006	93	57
	0.22	0.22	0.8	1150	0.13	6	0.01	63	62
		0.47	0.94	1300	0.12	5.7	0.0055	78	88
		1.0	0.98	1500	0.11	5.0	0.0035	99	97
	0.47	0.47	1.7	2300	0.1	3.5	0.0045	71	82
		1.0	1.9	2500	0.1	3.5	0.003	89	109
		2.2	2.0	2800	0.09	3.1	0.002	105	125

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

20

See Circuit Diagram 3

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1	0.29	820	0.09	8.8	0.02	18	41
		0.25	0.29	880	0.085	7.4	0.016	23	68
		0.5	0.31	1000	0.075	6.6	0.007	28	70
	0.25	0.25	0.69	1680	0.06	5.0	0.012	16	75
		0.5	0.92	1700	0.045	4.5	0.005	18	93
		1.0	0.82	1800	0.04	4.0	0.003	22	104
	0.5	0.5	1.5	3600	0.045	2.4	0.003	18	91
		1.0	1.7	3800	0.03	2.4	0.002	22	119
		2.0	1.9	4050	0.028	2.35	0.0015	24	139
180	0.1	0.1	0.29	760	0.10	9.1	0.019	49	55
		0.25	0.31	800	0.09	8.0	0.015	60	82
		0.5	0.37	860	0.09	7.8	0.007	62	91
	0.25	0.25	0 83	1050	0.06	6.8	0.001	38	109
		0.5	0.94	1060	0.06	6.6	0.004	47	131
		1.0	0.94	1100	0.07	6.1	0.003	54	161
	0.5	0.5	1.85	2000	0.05	4.0	0.003	37	151
		1.0	2.2	2180	0.04	3.8	0.002	44	192
		2.0	2.4	2410	0.035	3.6	0.0015	54	208
300	0.1	0.1	0.35	500	0.10	11.6	0.019	72	67
		0.25	0.37	530	0.09	10.9	0.016	96	98
		0.5	0.47	590	0.09	9.9	0.007	101	104
	0.25	0.25	0.89	850	0.07	8.5	0.011	79	139
		0.5	1.10	860	0.06	7.4	0.004	88	167
		1.0	1.18	910	0.06	6.9	0.003	98	185
	0.5	0.5	2.0	1300	0.06	6.0	0.004	64	200
		1.0	2.2	1410	0.05	5.8	0.002	79	238
		2.0	2.5	1530	0.04	5.2	0.0015	89	263

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 4

21

Ebb	Rp	Rg	Rg2	Rk	Cg2	Ck	C	Eo	V.G.
90	0.1	0.1	–	1480*	–	2.65	0.025	8	21★
		0.25	–	1760*	–	2.02	0.0115	11	25
		0.5	–	1930*	–	1.7	0.0065	14	26
	0.25	0.25	–	3000*	–	1.36	0.01	12	28
		0.5	–	3390*	–	1.1	0.006	15	30
		1.0	–	3670*	–	0.8	0.0035	18	33
	0.5	0.5	–	5300*	–	0.65	0.0055	14	31
		1.0	–	6050*	–	0.61	0.003	18	33
		2.0	–	6700*	–	0.45	0.0015	20	35
180	0.1	0.1	–	930*	–	3.4	0.028	18	26
		0.25	–	1100*	–	2.6	0.0115	28	31
		0.5	–	1210*	–	2.32	0.007	33	32
	0.25	0.25	–	1820*	–	1.71	0.012	28	35
		0.5	–	2110*	–	1.38	0.007	34	38
		1.0	–	2400*	–	1.1	0.0035	41	39
	0.5	0.5	–	3240*	–	0.9	0.006	32	39
		1.0	–	3890*	–	0.703	0.0035	38	40
		2.0	–	4360*	–	0.553	0.002	44	41
300	0.1	0.1	–	670*	–	3.81	0.028	38	31
		0.25	–	950*	–	2.63	0.012	52	34
		0.5	–	1050*	–	2.34	0.007	60	36
	0.25	0.25	–	1430*	–	1.87	0.012	50	38
		0.5	–	1680*	–	1.46	0.006	59	40
		1.0	–	1930*	–	1.19	0.0035	66	43
	0.5	0.5	–	2540*	–	0.97	0.006	55	42
		1.0	–	3110*	–	0.72	0.0035	70	44
		2.0	–	3560*	–	0.56	0.002	75	45

★ At 4 volts (RMS) output. *Values are for phase-inverter service.

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

22

See Circuit Diagram 1

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.05	0.05	–	3800	–	1.4	0.06	16	4.5
		0.1	–	4600	–	1.1	0.03	19	4.9
		0.25	–	5400	–	0.86	0.015	23	5.1
	0.1	0.1	–	6620	–	0.7	0.04	17	5.1
		0.25	–	9000	–	0.55	0.015	22	5.4
		0.5	–	10300	–	0.5	0.007	25	5.5
	0.25	0.25	–	15100	–	0.31	0.015	18	5.3
		0.5	–	20500	–	0.25	0.007	23	5.5
		1.0	–	24400	–	0.2	0.004	26	5.6
180	0.05	0.05	–	3200	–	1.8	0.06	33	4.9
		0.1	–	4100	–	1.6	0.045	44	5.2
		0.25	–	5000	–	1.2	0.02	49	5.3
	0.1	0.1	–	6200	–	0.9	0.04	37	5.3
		0.25	–	8700	–	0.7	0.015	47	5.5
		0.5	–	10000	–	0.57	0.008	50	5.5
	0.25	0.25	–	14500	–	0.43	0.015	40	5.6
		0.5	–	20000	–	0.29	0.008	48	5.7
		0.1	–	24000	–	0.24	0.004	53	5.7
300	0.05	0.05	–	3200	–	1.9	0.08	50	5.2
		0.1	–	4100	–	1.5	0.045	74	5.5
		0.25	–	5100	–	1.2	0.015	85	5.6
	0.1	0.1	–	5900	–	0.8	0.03	64	5.5
		0.25	–	8300	–	0.54	0.015	82	5.7
		0.5	–	9600	–	0.43	0.006	88	5.8
	0.25	0.25	–	14300	–	0.3	0.01	71	5.7
		0.5	–	19400	–	0.22	0.006	84	5.7
		1.0	–	23600	–	0.2	0.003	94	5.8

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 1

23

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.05	0.05	-	2500	-	2.0	0.06	16	7.0
		0.1	-	3200	-	1.6	0.03	21	7.7
		0.25	-	3800	-	1.25	0.015	23	8.1
	0.1	0.1	-	4500	-	1.05	0.03	19	8.1
		0.25	-	6500	-	0.82	0.015	23	8.9
		0.5	-	7500	-	0.68	0.007	25	9.3
	0.25	0.25	-	11100	-	0.48	0.015	21	9.4
		0.5	-	15100	-	0.36	0.007	24	9.7
		1.0	-	18300	-	0.32	0.0035	28	9.8
180	0.05	0.05	-	2400	-	2.5	0.06	36	7.7
		0.1	-	3000	-	1.9	0.035	48	8.2
		0.25	-	3700	-	1.65	0.015	55	9.0
	0.1	0.1	-	4500	-	1.45	0.035	45	9.3
		0.25	-	6500	-	0.97	0.015	55	9.5
		0.5	-	7600	-	0.8	0.008	57	9.8
	0.25	0.25	-	10700	-	0.6	0.015	49	9.7
		0.5	-	14700	-	0.45	0.007	59	10
		1.0	-	17700	-	0.4	0.0045	64	10
300	0.05	0.05	-	2400	-	2.8	0.08	65	8.3
		0.1	-	3100	-	2.2	0.045	80	8.9
		0.25	-	3800	-	1.8	0.02	95	9.4
	0.1	0.1	-	4500	-	1.6	0.04	74	9.5
		0.25	-	6400	-	1.2	0.02	95	10
		0.5	-	7500	-	0.98	0.009	104	10
	0.25	0.25	-	11100	-	0.69	0.02	82	10
		0.5	-	15200	-	0.5	0.009	96	10
		1.0	-	18300	-	0.4	0.005	108	10

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

24 — See Circuit Diagram 4

Ebb	Rp	Rg	Rg2	Rk	Cg2	Ck	C	Eo	V.G.
90	0.1	0.1	–	2050*	–	–	0.04	5.8	23■
		0.25	–	2200*	–	–	0.015	8.4	29★
		0.5	–	2350*	–	–	0.009	9.5	29
	0.25	0.25	–	4000*	–	–	0.015	7.1	31★
		0.5	–	4250*	–	–	0.006	9.7	33
		1.0	–	4650*	–	–	0.004	12	35
	0.5	0.5	–	6150*	–	–	0.006	8.8	34
		1.0	–	6850*	–	–	0.004	12	38
		2.0	–	7500*	–	–	0.002	15	40
180	0.1	0.1	–	1050*	–	–	0.04	21	27
		0.25	–	1250*	–	–	0.02	27	31
		0.5	–	1350*	–	–	0.009	31	34
	0.25	0.25	–	2050*	–	–	0.02	26	37
		0.5	–	2450*	–	–	0.01	34	41
		1.0	–	2750*	–	–	0.005	40	42
	0.5	0.5	–	3450*	–	–	0.009	30	42
		1.0	–	4100*	–	–	0.0035	39	44
		2.0	–	4650*	–	–	0.002	44	45
300	0.1	0.1	–	800*	–	–	0.025	40	29
		0.25	–	1000*	–	–	0.01	57	34
		0.5	–	1100*	–	–	0.006	60	36
	0.25	0.25	–	1650*	–	–	0.01	56	39
		0.5	–	2050*	–	–	0.0055	66	42
		1.0	–	2350*	–	–	0.003	77	43
	0.5	0.5	–	2850*	–	–	0.0055	61	44
		1.0	–	3600*	–	–	0.003	75	46
		2.0	–	4450*	–	–	0.0015	82	46

■ At 3 volts (RMS) output. ★ At 4 volts (RMS) output.
*Values are for phase-inverter service.

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 1

25

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1	-	4400	-	2.7	0.023	5	29●
		0.22	-	4700	-	2.4	0.013	6	35●
		0.47	-	4800	-	2.3	0.007	8	41●
	0.22	0.22	-	7000	-	1.6	0.001	6	39●
		0.47	-	7400	-	1.4	0.006	9	45■
		1.0	-	7600	-	1.3	0.003	11	48★
	0.47	0.47	-	12000	-	0.9	0.006	9	48■
		1.0	-	13000	-	0.8	0.003	11	52★
		2.2	-	14000	-	0.7	0.002	13	55★
180	0.1	0.1	-	1800	-	4.0	0.025	18	40
		0.22	-	2000	-	3.5	0.013	25	47
		0.47	-	2200	-	3.1	0.006	32	52
	0.22	0.22	-	3000	-	2.4	0.012	24	53
		0.47	-	3500	-	2.1	0.006	34	59
		1.0	-	3900	-	1.8	0.003	39	63
	0.47	0.47	-	5800	-	1.3	0.006	30	62
		1.0	-	6700	-	1.1	0.003	39	66
		2.2	-	7400	-	1.0	0.002	45	68
300	0.1	0.1	-	1300	-	4.6	0.027	43	45
		0.22	-	1500	-	4.0	0.013	57	52
		0.47	-	1700	-	3.6	0.006	66	57
	0.22	0.22	-	2200	-	3.0	0.013	54	59
		0.47	-	2800	-	2.3	0.006	69	65
		1.0	-	3100	-	2.1	0.003	79	68
	0.47	0.47	-	4300	-	1.6	0.006	62	69
		1.0	-	5200	-	1.3	0.003	77	73
		2.2	-	5900	-	1.1	0.002	92	75

● At 2 volts (RMS) output. ■ At 3 volts (RMS) output. ★ At 4 volts (RMS) output

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

26

See Circuit Diagram 3

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

* At an output voltage of 1 volt RMS and Grid No. 1 bias of 1 volt.

CHART FOR MAXIMUM VOLTAGE OUTPUT

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
90	0.1	0.1 0.22 0.47	0.12 0.15 0.17	2000 2200 2400	0.09 0.08 0.07	4.8 4.4 4.0	0.027 0.013 0.007	22 28 31	23 32 39
	0.22	0.22 0.47 1.0	0.35 0.40 0.44	3500 3800 4100	0.06 0.065 0.06	3.3 3.2 3.0	0.011 0.006 0.003	24 30 32	33 44 50
	0.47	0.47 1.0 2.2	0.90 1.0 1.1	6800 7400 8000	0.04 0.04 0.04	2.0 2.0 2.0	0.005 0.003 0.002	25 30 32	47 57 64

(Continued on next page)

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 3 — Cont'd — **26**

E_{bb}	R_p	R_g	R_{g2}	R_k	C_{g2}	C_k	C	E_o	V.G.
180	0.1	0.1	0.19	1300	0.08	6.0	0.021	48	33
		0.22	0.20	1400	0.08	5.85	0.013	59	46
		0.47	0.22	1500	0.07	5.45	0.007	68	57
	0.22	0.22	0.44	2000	0.09	4.85	0.011	48	41
		0.47	0.53	2300	0.07	4.45	0.006	62	62
		1.0	0.55	2400	0.065	4.25	0.004	68	72
	0.47	0.47	1.0	3500	0.07	3.5	0.005	51	54
		1.0	1.1	3700	0.07	3.5	0.003	59	66
		2.2	1.2	4000	0.07	3.3	0.002	66	81
300	0.1	0.1	0.18	1000	0.1	7.0	0.022	85	38
		0.22	0.2	1100	0.1	6.8	0.013	110	53
		0.47	0.23	1200	0.075	6.4	0.007	124	66
	0.22	0.22	0.47	1400	0.1	5.75	0.012	88	44
		0.47	0.52	1600	0.1	5.45	0.006	113	64
		1.0	0.58	1700	0.075	5.0	0.004	124	86
	0.47	0.47	1.1	2300	0.1	4.6	0.006	90	58
		1.0	1.2	2500	0.1	4.3	0.004	110	76
		2.2	1.3	2800	0.1	4.2	0.002	121	99

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

27

See Circuit Diagram 1

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

At 2 volts (RMS) output. § At 3 volts (RMS) output.

* At 4 volts (RMS) output.

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

See Circuit Diagram 1							28
E_{bb}	R_p	R_g	R_k	C_k°	C°	E_o	V.G.*
90	0.1 0.24 0.51	0.24 0.51 1.0	1800 3700 7800	— — —	— — —	13 14 16	24 26 27
180	0.1 0.24 0.51	0.24 0.51 1.0	1300 2800 5700	— — —	— — —	31 33 33	27 29 30
300	0.1 0.24 0.51	0.24 0.51 1.0	1200 2300 4800	— — —	— — —	58 30 56	28 30 31

* At 2 volts (RMS) output.

° Coupling capacitors should be selected to give desired frequency response. Cathode resistors should be adequately bypassed.

RCA

RESISTANCE-COUPLED AMPLIFIER CHARTS (Continued)

29 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	–	1870	–	3.1	0.063	14	13
		0.1	–	2230	–	2.5	0.031	18	14
		0.22	–	2500	–	2.1	0.016	20	14
	0.1	0.1	–	3370	–	1.8	0.034	15	14
		0.22	–	4100	–	1.3	0.015	20	14
		0.47	–	4800	–	1.1	0.006	23	15
	0.22	0.22	–	7000	–	0.80	0.013	16	14
		0.47	–	9100	–	0.65	0.007	22	14
		1.00	–	10500	–	0.60	0.004	25	15
180	0.047	0.047	–	1500	–	3.6	0.066	33	14
		0.1	–	1860	–	2.9	0.055	41	14
		0.22	–	2160	–	2.2	0.015	47	15
	0.1	0.1	–	2750	–	1.8	0.028	35	15
		0.22	–	3550	–	1.4	0.015	45	15
		0.47	–	4140	–	1.3	0.007	51	16
	0.22	0.22	–	5150	–	1.0	0.016	36	16
		0.47	–	7000	–	0.71	0.007	45	16
		1.00	–	7800	–	0.61	0.004	51	16
300	0.047	0.047	–	1300	–	3.6	0.061	59	14
		0.1	–	1580	–	3.0	0.032	73	15
		0.22	–	1800	–	2.5	0.015	83	16
	0.1	0.1	–	2500	–	1.9	0.031	68	16
		0.22	–	3130	–	1.4	0.014	82	16
		0.47	–	3900	–	1.2	0.0065	96	16
	0.22	0.22	–	4800	–	0.95	0.015	68	16
		0.47	–	6500	–	0.69	0.0065	85	16
		1.00	–	7800	–	0.58	0.0035	96	16

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

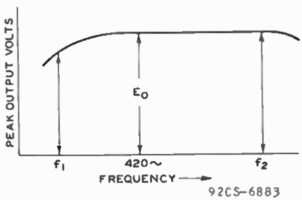
For most of the types shown, the data pertain to operation with cathode bias; for all of the pentodes, the data pertain to operation with series screen-grid resistor. The use of a cathode-bias resistor where feasible and a series screen-grid resistor where applicable offers several advantages over fixed-voltage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

Triode Amplifier *(Heater-Cathode Type)*

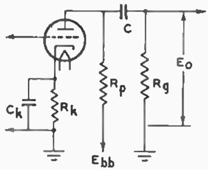


Diagram No.1

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 Ck 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 $(0.8)^nE_o$ 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)*

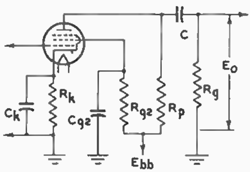


Diagram No.2

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 $(0.7)^nE_o$ 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.
	0.1	0.24	—	1800	—	—	—	13	24
90	0.24	0.51	—	3700	—	—	—	14	26
	0.51	1.0	—	7800	—	—	—	16	27
	0.1	0.24	—	1300	—	—	—	31	27
180	0.24	0.51	—	2800	—	—	—	33	29
	0.51	1.0	—	5700	—	—	—	33	30
	0.1	0.24	—	1200	—	—	—	58	28
300	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.
	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
90	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
	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
180	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
	0.22	0.22	0.530	780	0.077	13.[illegible]	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
300	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.

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.
90	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
	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
180	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
	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
300	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
	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.
90	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
	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
180	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
	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
300	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
	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.
	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
90	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
	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
180	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
	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
300	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.
90	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
	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
180	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
	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
300	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
	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.
90	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
	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
180	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
	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
300	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
	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.
90	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
	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
180	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
	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
300	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
	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.

RADIO CORPORATION OF AMERICA
Electronic Components and Devices Harrison, N. J.

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.
90	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
	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
180	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
	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
300	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
	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:

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

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

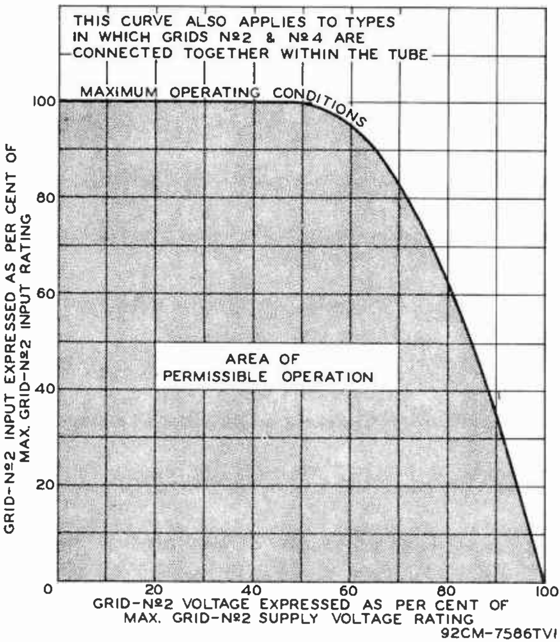
The tube data for a certain tube stipulates a maximum grid-No. 2 supply voltage rating of 300 volts, and a maximum grid-No. 2 input rating of 1 watt. It is desired to operate the tube with a fixed voltage of 200 volts between grid No. 2 and cathode. This value is 66-2/3% of the maximum grid-No. 2 supply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

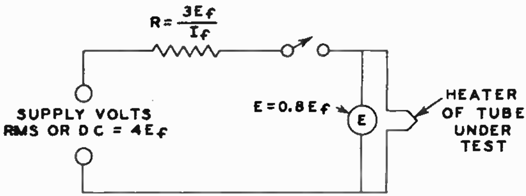
$$R_{g2} = \frac{250\ (300 - 250)}{0.56} = 22{,}320 \text{ ohms}$$



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.

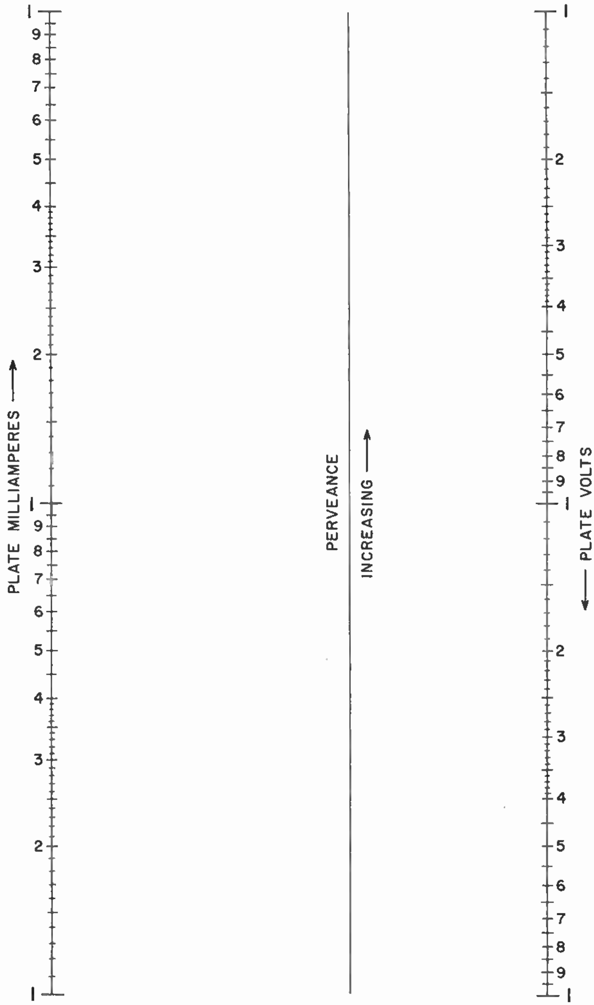
TEST CIRCUIT FOR DETERMINING HEATER WARM-UP TIME



E_f = RATED HEATER VOLTAGE OF TUBE UNDER TEST.
I_f = RATED HEATER CURRENT OF TUBE UNDER TEST.
92CS-8503

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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 ($G = I_b/E_b^{\frac{3}{2}}$) 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.

Half-Wave Vacuum Rectifier

ELECTRICAL

Bogey Values

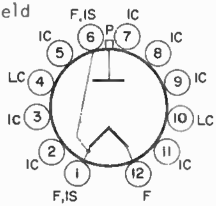
Filament (Coated) Voltage, AC or DC	1.25 V
Filament Current	0.2 A
Direct Interelectrode Capacitance (Approx.)	
Without external shield	
Plate to filament	1.6 pF

MECHANICAL

Operating Position	Any
Type of Cathode	Coated Filament
Maximum Overall Length	3.375 in
Seated Length	2.750 to 3.000 in
Diameter	1.062 to 1.188 in
Envelope	JEDEC T9
Caps (Alternates)	
Small (JEDEC No.C1-1)	
Small with Tubular Support (JEDEC No.C1-34)	
Base	Small-Button Duodecar 12-Pin (JEDEC No.E12-70)

TERMINAL DIAGRAM (Bottom View) ←

Pin 1 – Filament, Internal Shield
Pin 2 – Do Not Use[a]
Pin 3 – Do Not Use[a]
Pin 4 – See Note
Pin 5 – Do Not Use[a]
Pin 6 – Same as Pin 1
Pin 7 – Do Not Use[a]
Pin 8 – Do Not Use[a]
Pin 9 – Do Not Use[a]
Pin 10 – See Note
Pin 11 – Do Not Use[a]
Pin 12 – Filament
Cap – Plate



12GV

Note: *May be used only under conditions specified in Operating Considerations.*

PULSED-RECTIFIER SERVICE

Design-Maximum Ratings

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

Inverse Plate Voltage	
Total dc and peak[b]	26000 V
DC	22000 V
Peak Plate Current	50 mA
Average Plate Current	0.5 mA
Filament Voltage, AC or DC	1.05 to 1.45 V

Characteristics, Instantaneous Value

Tube Voltage Drop for plate mA = 7	225 V

[a] Socket terminals 2, 3, 5, 7, 8, 9, and 11 should not be used as tie points.
[b] This rating is applicable when the duration of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

← Indicates a change.

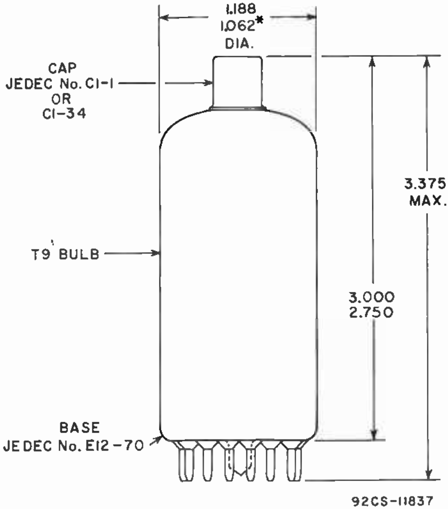
OPERATING CONSIDERATIONS

Socket Connections. Socket terminals 4 and 10 may be used as tie points for components at or near the cathode potential; otherwise, do not use.

The high voltages at which the 1AD2 is operated are very dangerous. Great care should be taken in the design of equipment to prevent the operator from coming in contact with these high voltages. Particular care against fatal shock should be taken in the measurement of filament voltage. Under all circumstances, circuit parts which may be at high potentials should be enclosed or adequately insulated.

X-Radiation. The voltages employed in some television receivers and other high-voltage equipment are sufficiently high that high-voltage rectifier tubes may produce *X-radiation* which can constitute a health hazard unless such tubes are adequately shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equipment design.

DIMENSIONAL OUTLINE



DIMENSIONS IN INCHES

* Applies to minimum diameter except in area of seal.

Full-Wave Gas Rectifier

METAL TYPE HAVING IONICALLY HEATED CATHODE

GENERAL DATA

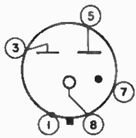
Electrical:

Cathode . . . . Ionically Heated Type

Mechanical:

Operating Position.	Any
Maximum Overall Length.	2-5/8"
Maximum Seated Length	2-1/16"
Maximum Diameter.	1-5/16"
Dimensional Outline	See *General Section*
Envelope.	Metal Shell MT8G
Base. . . . Small-Wafer Octal 5-Pin (JEDEC Group 1, No.B5-215)	
Basing Designation for BOTTOM VIEW.	4R

Pin 1 - Shell
Pin 3 - Plate No.2
Pin 5 - Plate No.1



Pin 7 - No Connection
Pin 8 - Cathode

FULL-WAVE RECTIFIER

Maximum and Minimum Ratings, *Design-Center Values Except as Noted:*

PEAK INVERSE PLATE VOLTAGE PER PLATE. . . .	880	max.	volts
PEAK STARTING-SUPPLY VOLTAGE PER PLATE. . .	300▲	min.	volts
PEAK PLATE CURRENT PER PLATE.	330	max.	ma
DC OUTPUT CURRENT	110	max.	ma
	30▲	min.	ma

Typical Operation:

	With vibrator-type power supply and capacitor input to filter	
Peak Plate Supply Voltage Per Plate●.	440	volts
Filter-Input Capacitor.	8	µf
Total Effective Plate Supply Impedance Per Plate .	600	ohms
DC Output Voltage at input to filter.	310	volts
DC Output Current	100	ma

Characteristics:

Tube Voltage Drop for plate ma. = 110 (Per plate) . 24 volts

Minimum Circuit Value:

Total Effective Plate Supply Impedance Per Plate. . . . . 300 min. ohms

▲ Absolute value. Under no circumstances should the tube be operated with less than this value.

● Open-circuit voltage—flat portion of transformer voltage wave.

RCA

1B3-GT/8016

HALF-WAVE VACUUM RECTIFIER

Supersedes Type 8016

GENERAL DATA

Electrical:

Filament, Coated:

Voltage	1.25*	ac volts
Current	0.2	amp

Direct Interelectrode Capacitance (Approx.):●

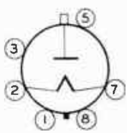
Plate to Filament	1.5	μμf

* The filament voltage must never exceed 1.5 volts, even momentarily.
● With no external shield.

Mechanical:

Mounting Position	Any
Overall Length	3-7/8" ± 3/16"
Seated Length	3-5/16" ± 3/16"
Maximum Diameter	1-9/32" ←
Bulb	T-9
Cap	Small
Base	Intermediate-Shell Octal 6-Pin ←
Basing Designation for BOTTOM VIEW	3C

Pin 1 - See NOTE
Pin 2 - Filament
Pin 3 - Same as Pin 1
Pin 5 - Same as Pin 1



Pin 7 - Filament, Internal Shield
Pin 8 - Same as Pin 1
Cap - Plate

NOTE: May be connected to pin 7; otherwise, do not use.

HALF-WAVE RECTIFIER

Maximum Ratings, *Design-Center Values*:

PEAK INVERSE PLATE VOLTAGE	30000 max.	volts ←
PEAK PLATE CURRENT	17 max.	ma
AVERAGE PLATE CURRENT	2 max.	ma
FREQUENCY OF SUPPLY VOLTAGE	300 max.	kc

OPERATING NOTES

When the *filament* is to be operated on rf, it is recommended that the filament be connected first to a dc or low-frequency ac supply of 1.25 volts. The color temperature of the filament corresponding to this voltage may then be checked visually by observing in a darkened room the reflection of the incandescent filament upon the upper surface of the internal shield. A visual comparison of this color temperature with that obtained with the filament operated from an rf voltage provides a convenient means for adjusting the amount of rf excitation to produce 1.25 volts (RMS) at the filament terminals.

The *voltages* employed in some television receivers and other high-voltage equipment are sufficiently high that high-voltage rectifier tubes may produce soft x-rays which can constitute a health hazard, unless such tubes are adequately shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equipment design.

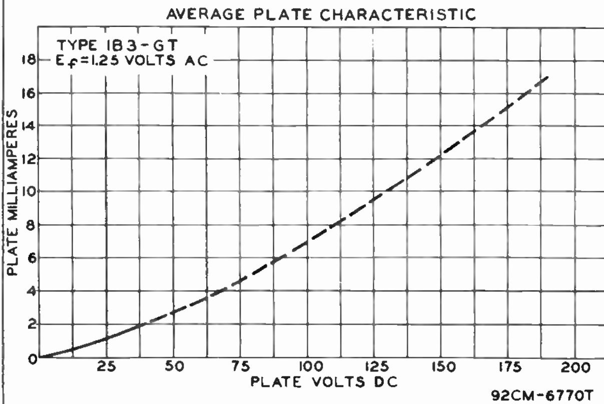
← Indicates a change.

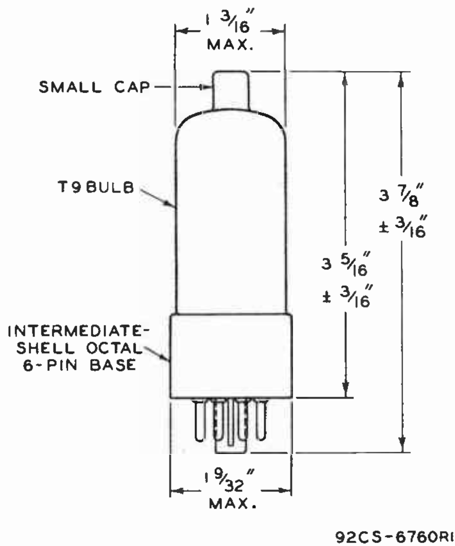
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

1B3-GT

HALF-WAVE VACUUM RECTIFIER





Half-Wave Vacuum Rectifier

ELECTRICAL

Filament, Coated

	Min	Av	Max	
Voltage (AC).	1.05	1.25	1.45	V
Current at 1.25 volts	-	0.2	-	A

Direct Interelectrode Capacitance (Approx.)[a]

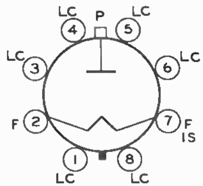
Plate to filament & internal shield	1.3	pF

MECHANICAL

Operating Position. . . . . Any
Maximum Overall Length. . . . . 3-9/16 in
Seated Length . . . . 2-13/16 ± 3/16 in
Maximum Diameter. . . . . 1-9/32 in
Bulb. T9
Cap . . . . Small with Tubular Support (JEDEC No.C1-34)
Bases (Alternates)
- Intermediate-Shell Octal:
  - 8-Pin (JEDEC Group 1, No.B8-6)
  - 7-Pin, Arrangement 2 (JEDEC Group 1, No.B7-166)
  - 6-Pin, Arrangement 1 (JEDEC Group 1, No.B6-8)
  - 5-Pin, Arrangement 2 (JEDEC Group 1, No.B5-82)
- Short Intermediate-Shell Octal:
  - 7-Pin (JEDEC Group 1, No.B7-47)
- Short Intermediate-Shell Octal with External Barriers:
  - 6-Pin, Arrangement 1 (JEDEC Group 1, No.B6-60)
  - 5-Pin, Arrangement 2 (JEDEC Group 1, No.B5-85)

Basing Designation for BOTTOM VIEW. 3C

Pin 1[b] - Limited Connection[c]
Pin 2 - Filament
Pin 3 - Same as Pin 1
Pin 4[d] - Same as Pin 1
Pin 5 - Same as Pin 1
Pin 6[e] - Same as Pin 1
Pin 7 - Filament, Internal Shield
Pin 8 - Same as Pin 1
Cap - Plate



PULSED-RECTIFIER SERVICE

Maximum Ratings, Design-Maximum Values

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

Inverse Plate Voltage

Total dc and peak[f].	26000	V
DC.	22000	V
Peak Plate Current.	50	mA
Average Plate Current	0.5	mA

Characteristics, Instantaneous Value

Tube Voltage Drop for plate mA = 7.	100	V

RADIO-FREQUENCY RECTIFIER SERVICE

Maximum Ratings, Design-Maximum Values

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

Peak Inverse Plate Voltage.	33000	V
Peak Plate Current.	35	mA
Average Plate Current	1.1	mA
Frequency Range of Supply Voltage	1.5 to 100	kc/s

Characteristics, Instantaneous Value

Tube Voltage Drop for plate mA = 7.	100	V

[a] Without external shield.
[b] On the 5-pin bases, pin 1 is omitted.
[c] See *Operating Considerations*.
[d] On the 5-pin bases, the 6-pin bases, and the 7-pin base JEDEC No.B7-166, pin 4 is omitted.
[e] On the 5-pin bases, the 6-pin bases, and the 7-pin base JEDEC No.B7-47, pin 6 is omitted.
[f] This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

OPERATING CONSIDERATIONS

Socket Connections. Socket terminals 1, 3, 4, 5, 6, and 8 may be connected to socket terminal 7 or to a corona shield which is connected to socket terminal 7. Socket terminals 4 and 6 may be used as tie points for components at or near filament potential. Otherwise, do not use.

Measurement of Filament Voltage. To measure the filament voltage when the filament is at a high dc potential with respect to ground, it is recommended that a simple method utilizing visual comparison of the filament temperature be used. The color temperature of the filament, operating from a pulse- or rf-power source, may be checked by observing in a darkened room the reflection of the incandescent filament upon the surface of the internal shield. A visual comparison of this color temperature with that obtained when the filament of another 1G3GT/1B3GT is operated from a dc or low-frequency ac supply of 1.25 volts, provides a convenient means for adjusting the amount of excitation to produce 1.25 volts (rms) at the filament terminals.

The high voltages at which the 1G3GT/1B3GT is operated are very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with these high voltages. Particular care against fatal shock should be taken in the measurement of filament voltage. Under all circumstances, circuit parts which may be at high potentials should be enclosed or adequately insulated.

X-Radiation. The voltages employed in some television receivers and other high-voltage equipment are sufficiently high that high-voltage rectifier tubes may produce *X-radiation* which can constitute a health hazard unless such tubes are adequately shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equipment design.

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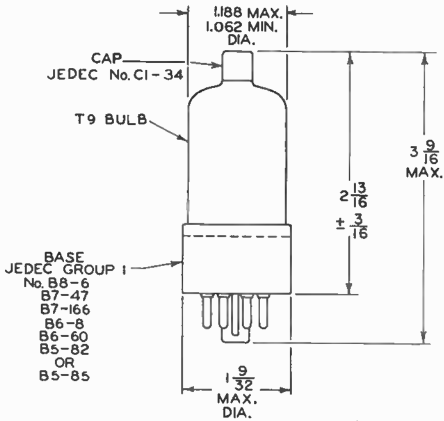
Electronic Components and Devices Harrison, N. J.

DIMENSIONAL OUTLINE

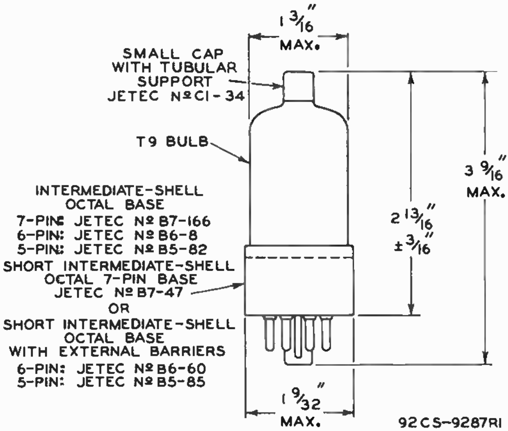


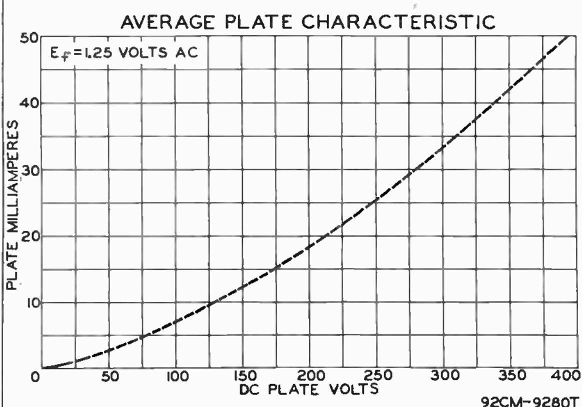
DIMENSIONS IN INCHES

1G3-GT/1B3-GT

HALF-WAVE VACUUM RECTIFIER

shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equipment design.





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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY