RCA TUBE
HANDBOOK
HB-3

VOL. 7-8

RECEIVING-TYPE INDUSTRIAL TUBE SECTION

This Section contains data on "special red" tubes; premium tubes; tubes for computer and "on-off" control applications; low-microphonic amplifier tubes; and similar special types.

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

World Radio History

World Radio History

Application Guide for RCA Receiving-Type Industrial Tubes

APPLICATIONS

1. Audio Amplifier
2. Automatic Gain Control
3. Balanced Modulator/ Balanced Mixer
4. Cathode-Coupled, Direct-Drive (RF)
5. Cathode Drive, Grounded-Grid (RF)
6. Cathode Follower
7. Clipper
8. Converter
9. DC Amplifier
10. Delay Circuit
11. Demodulator
12. Detector
13. Driver
14. Frequency Converter
15. Frequency Divider
16. Frequency Multiplier
17. Gated Amplifier
18. Indicator, Tuning
19. IF Amplifier
20. Inverter
21. Limiter
22. Mixer
23. Modulator
24. Multivibrator
25. Oscillator, RF
26. Phase Inverter
27. Pulse Amplifier
28. Pulse Modulator
29. RF Power Amplifier
30. RF Voltage Amplifier
31. Rectifier, Power
32. Switching
33. Transducer
34. Video Amplifier
35. Voltage Regulator (Series)
36. Volume-Expander-Compressor
37. Types Designed to Meet Military Specifications

□ Miniature
● Octal
* Subminiature
◇ Nuvistor
▲ Pencil Tube

Type numbers in *Italics* indicate tubes which are either (1) designed to meet military specifications and critical industrial applications (Premium tubes, Nuvistor tubes, and Special-Red tubes) or (2) subjected to special tests and controls (mobile and communications tubes).

1. AUDIO AMPLIFIER

High-Mu Triode
* *5719*

Medium-Mu Triode—Twin Diodes
● 12SW7 □ 26C6

Medium-Mu Twin Triodes
● 12SX7GT □ 5687 ● *5692*[a] □ 6072
□ *5670*[c] □ 7044[b]

High-Mu Triodes
● 1635 □ 6681/12AX7[f]

High-Mu Triode—Twin Diodes
□ *7724/14GT8*[d]

Sharp-Cutoff Pentode
● 1620[e]

Beam Power Tubes
● 12A6 □ 5686 □ 6669/ 6AQ5A[f] □ *7551*[d]
● 1622 □ *6005M/ 6AQ5W*[k] □ 7558
● 1631 □ *7061*[d]

Twin Beam Power Tube
● 26A7GT[g]

Power Pentodes
● 6AG7Y[h] □ 1621 □ 6677/6CL6[f] □ *8077/ 7054*[d]
□ 6AK6 □ 6550 □ *7054*[d]

Pentagrid Amplifier
● 1612[e]

Beam-Deflection Tube
□ 7360

2. AUTOMATIC GAIN CONTROL

Remote-Cutoff Pentodes
□ *5749M/6BA6W*

For lettered footnotes, see *reverse side*.

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

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3. BALANCED MODULATOR/BALANCED MIXER

Beam-Deflection Tube

□ 7360

4. CATHODE-COUPLED, DIRECT-DRIVE (RF)

Medium-Mu Twin Triode

□ *6922*[b]

5. CATHODE DRIVE, GROUNDED-GRID (RF)

High-Mu Triodes

□ 6J4 □ 6J4WA[k] ◇ 8058

6. CATHODE FOLLOWER

Medium-Mu Triodes

* 6814[b] ◇ *8056*

Medium-Mu Twin Triodes

□ *5670*[c,k] □ 5965[b] □ 6350[b] □ *6922*[b]
□ 5687 □ 7044[b]

7. CLIPPER

Twin Diodes

□ *5726* □ *5726/6AL5W*[k] □ *5726/6AL5W/6097* □ *7055*[d]

8. CONVERTER

Pentagrid Converters

● 12SY7 □ 26D6[g] □ 5750

9. DC AMPLIFIER

High-Mu Twin Triode

□ *7898*[d]

10. DELAY CIRCUIT

Sharp-Cutoff Pentodes

□ 6AS6[b] * *5636* □ *5725*

11. DEMODULATOR

Beam-Deflection Tube

□ 7360

12. DETECTOR

AUDIO

Twin Diode—Medium-Mu Triodes

● 12SW7 □ 26C6[g]

Twin Diode—High-Mu Triode

□ *7724/14GT8*[d]

VHF

Twin Diodes

□ *5726* □ *5726/6AL5W/6097* □ 6663/6AL5[e] □ 6887[b]
□ *5726/6AL5W*[k] □ *7055*[d]

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a "Special Red" tube, where 10,000-hour life, extreme dependability, and exceptional stability are paramount.

b For electronic computers and other "on-off" control applications involving long periods of operation under cutoff conditions.

c *"Command"* type.

d For mobile communications equipment operating from a 6-cell storage-battery system.

e Low-microphonic type.

f For mobile communications equipment operating from a 3-cell storage-battery system.

g 26.5-volt heater type of special use in aircraft receivers.

h Phenolic base, low-loss type.

j Filamentary, dry-cell type.

k A copy of these specifications may be obtained from the *Specifications Division*, Naval Supply Depot, 5801 Tabor Ave., Philadelphia 20, Pa.

m For data refer to type 6AG7 in *Receiving-Tube Section*.

n Gas type with ionically heated cathode.

p Gas (Mercury-vapor) type.

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12. DETECTOR (Cont'd)

UHF

Diodes

6173 9005 □ 9006

13. DRIVER

Beam Power Tubes

□ *7551*[d] □ 7558 □ 7905[j]

14. FREQUENCY CONVERTER

High-Mu Twin Triode

□ 6679/12AT7[f]

Beam-Deflection Tube

□ 7360

15. FREQUENCY DIVIDER

Medium-Mu Twin Triodes

□ *5670*[c,k] □ 5963[b] □ 6197[b] □ 6350[b]
□ 5687 □ 5964[b] □ 6211[b] □ 7044[b]

Power Pentode

□ 6197[b]

16. FREQUENCY MULTIPLIER

Medium-Mu Triode—Power Pentode

□ *7060*[d]

Beam Power Tubes

□ *7551*[d] □ 7558 □ 7905[j]

Power Pentodes

□ *7054*[d] □ *7551*[d] □ *8077/7054*[d]

Twin Power Pentode

□ 6939

17. GATED AMPLIFIER

Sharp-Cutoff Pentodes

□ 6AS6[b] * *5636* □ *5725*

17. GATED AMPLIFIER (Cont'd)

Pentagrid Amplifier

□ 5915[b]

18. INDICATOR, TUNING

Electron-Ray Tube

● 1629

19. IF AMPLIFIER

VHF

Medium-Mu Triode

◇ *7586* ◇ *8056*

Medium-Mu Twin Triodes

□ 5687 □ *6922*[b]

Sharp-Cutoff Pentodes

□ *5654*[c] □ *5654/* □ *6136*[c] □ *7056*[d]
□ *5654M/* *6AK5W/* □ 6676/
6AK5W[k] *6096* 6CB6A[f]

Remote-Cutoff Pentodes

□ 5749M/6BA6W[k] □ 6660/6BA6[f]

Sharp-Cutoff Tetrode

◇ *7587*

High-Mu Triode

◇ *7895*

UHF

High-Mu Triode

956

Sharp-Cutoff Pentodes

* *5840* □ *6186* □ *6186/6AG5WA*[k]

Remote-Cutoff Pentodes

956 □ 9003

For lettered footnotes, see *reverse side*.

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20. INVERTER

Medium-Mu Triode
* 6814[b]

Medium-Mu Twin Triodes
□ 6350[b] □ 7044[b]

21. LIMITER

High-Mu Twin Triode
□ *7898*[d]

22. MIXER

VHF

High-Mu Triode
□ 6664/6AB4[f]

Medium-Mu Twin Triodes
□ *407A* □ *5814A* □ *5814WA* □ *6922*[b]
□ *5670*[c,k]

High-Mu Twin Triodes
□ *6201* □ *7898*[d]

Medium-Mu Triode—Sharp-Cutoff Pentodes
□ 6678/6U8A[f] □ *7059*[d]

Sharp-Cutoff Tetrode
◇ *7587*

Sharp-Cutoff Pentodes
□ 6AS6[b] □ *5725*

Pentagrid Converters
● 12SY7 □ 26D6[g] □ *5750*

UHF

Diode
9005

Medium-Mu Twin Triode
□ 6101

Sharp-Cutoff Pentodes
* *5636* □ 9001

22. MIXER (Cont'd)

UHF

Remote-Cutoff Pentodes
956 □ 9003

23. MODULATOR

Beam Power Tubes
□ *7551*[d] □ 7558

Power Pentode
□ *7054*[d]

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a "Special Red" tube, where 10,000-hour life, extreme dependability, and exceptional stability are paramount.

b For electronic computers and other "on-off" control applications involving long periods of operation under cutoff conditions.

c *"Command"* type.

d For mobile communications equipment operating from a 6-cell storage-battery system.

e Low-microphonic type.

f For mobile communications equipment operating from a 3-cell storage-battery system.

g 26.5-volt heater type of special use in aircraft receivers.

h Phenolic base, low-loss type.

j Filamentary, dry-cell type.

k A copy of these specifications may be obtained from the *Specifications Division*, Naval Supply Depot, 5801 Tabor Ave., Philadelphia 20, Pa.

m For data refer to type 6AG7 in *Receiving-Tube Section*.

n Gas type with ionically heated cathode.

p Gas (Mercury-vapor) type.

World Radio History

24. MULTIVIBRATOR

Medium-Mu Twin Triodes

● 12SX7GT ● *5692*[a] □ 6350[b] □ *6922*[b]
□ *407A* □ *5814A*[c,k] □ 6680/12AU7A[f] □ 7044[b]
□ *5670*[c,k] □ *5814WA*
□ 5687

High-Mu Twin Triodes

□ *5751*[c,k] □ 5751WA □ *6201*

25. OSCILLATOR, RF

VHF

Medium-Mu Triode

◇ *7586*

High-Mu Triode

□ 6664/6AB4[f] ◇ *7895*

Medium-Mu Twin Triodes

□ *407A* □ *5814A*[c,k] * *6111* □ 6680/12AU7A[f]
□ *5670*[c,k] □ *5814WA*

High-Mu Twin Triodes

□ *6201* □ *7898*[d]

Medium-Mu Triode—Sharp-Cutoff Pentodes

□ 6678/6U8A[f] □ *7059*[d]

Sharp-Cutoff Tetrode

◇ 7587

Beam Power Tubes

□ *7551*[d] □ 7558 □ 7905[j]

Power Pentodes

□ *7054*[d] □ *8077/7054*[d]

Pentagrid Converters

● 12SY7 □ 26D6[g] □ 5750

UHF

Medium-Mu Triodes

6F4 955 958A □ 9002
6L4 957 * *5718*

25. OSCILLATOR, RF (Cont'd)

UHF

High-Mu Triodes

956 ◇ *8058*

Medium-Mu Twin Triodes

* 6021 □ 6101 □ 6101/6J6WA

26. PHASE INVERTER

Medium-Mu Twin Triodes

□ *5670*[c,k] □ 5687 □ *6922*[b] □ 7044[b]

High-Mu Twin Triodes

● *5691*[a] □ *5751*[c] □ *7058*[d]

27. PULSE AMPLIFIER

Medium-Mu Twin Triodes

□ *5670*[c,k] □ *5814A*[c,k] □ 6350[b] □ 7044[b]
□ 5687 □ *5814WA* * 6814[b]

Power Pentode

□ 6197[b]

28. PULSE MODULATOR

Twin Diode

□ *5726*

29. RF POWER AMPLIFIER

VHF

Beam Power Tubes

□ 5686 □ *7551*[d] □ 7558 □ 7905[j]

Power Pentodes

□ 3A4[j] ● 6AG7Y[h,m] □ *7054*[d] □ *8077/7054*[d]

UHF

Twin Power Pentode

□ 6939

For lettered footnotes, see *reverse side*.

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30. RF VOLTAGE AMPLIFIER

VHF

Medium-Mu Triodes

□ *5842/417A* ◇ *7586*

High-Mu Triode

□ 6664/6AB4[f]

Medium-Mu Twin Triodes

□ 3A5[j] * *6111* □ *6922*[b] □ *7057*[d]
□ *407A*

High-Mu Twin Triode

□ 6679/12AT7[d]

Sharp-Cutoff Tetrode

◇ *7587* □ 7717/6CY5[f]

Sharp-Cutoff Pentodes

□ 1L4[j] □ *5654M/ 6AK5W*[k] ● *5693*[a] □ 6676/ 6CB6A[f]
● 6SJ7Y[h,m] □ *6136*[c]
408A ● 5654/ 6AK5W/ 6096 □ 6661/ 6BH6[f] □ 7056[d]
□ *5654*[c]

Remote-Cutoff Pentodes

□ 26A6[g] □ *5749M/ 6BA6W*[k] □ 6660/ 6BA6[f] □ 6662/ 6BJ6[f]

Medium-Mu Triode—Power Pentode

□ *7060*[d]

UHF

Medium-Mu Triodes

955 958A * *5718* ◇ *8056*

High-Mu Triodes

□ 6J4 ▲ 7552 ▲ 7553 ◇ *8058*
956

Medium-Mu Twin Triodes

* *6021* □ *6101*

30. RF VOLTAGE AMPLIFIER (Cont'd)

Sharp-Cutoff Pentodes

954 □ *5847/ 404A* □ *6186/ 6AG5WA*[k] □ 9001
959
* *5840*

Remote-Cutoff Pentodes

956 □ 9003

31. RECTIFIER, POWER

Half-Wave Vacuum Types

* 5642[j] 9005 9006

Full-Wave Vacuum Types

● 0Z4A[n] ● 5R4GYB 83[p] ● *5690*[a]
● 5R4GY □ *7055*[d]

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m For data refer to type 6AG7 in *Receiving-Tube Section.*

n Gas type with ionically heated cathode.

p Gas (Mercury-vapor) type.

World Radio History

32. SWITCHING

Twin Diode

□ 6887[b]

Beam Deflection Tube

□ 7360

33. TRANSDUCER

Mechano-Electronic Transducer

5734

34. VIDEO AMPLIFIER

Sharp-Cutoff Tetrode

◇ *7587*

Power Pentodes

● 6AG7Y[h,m] □ 6677/6CL6[f]

35. VOLTAGE REGULATOR (SERIES)

Low-Mu Twin Triodes

● 6AS7G ● *6080WA*[k] ● 6082 ● 6336A
● 6080

36. VOLUME-EXPANDER-COMPRESSOR

Pentagrid Mixer

● 1612[h]

37. TYPES DESIGNED TO MEET MILITARY SPECIFICATIONS[k]

□ 1L4
□ 3A4
□ 3A5
□ 3B4WA
● 5R4GY
● 6AC7WA
□ 6AK6
● 6AS7G
□ 6AU6WB
6F4
□ 6J4WA
□ 6X4W
● 12A6
□ 12AT7WA
□ 12AT7WB
● 12SW7
● 12SX7GT
● 12SY7
□ 26A6
● 26A7GT
□ 26C6
□ 26D6
955
● 1631
● 1635
□ 5654M/
6AK5W
□ 5670
● 5691
● 5692
● 5693
□ 5726/
6AL5W
□ 5749M/
6BA6W
□ 5751
□ 5814A
* 5896
□ 5915
□ 5963
□ 5964
□ 6005M/
6AQ5W
● 6080
● 6080WA
* 6112
□ 6186/
6AG5WA
□ 6189M/
12AU7WA
□ 6197
□ 6211
◇ USA 7586
◇ USA 7587
◇ USA 7895
□ 9001
□ 9002
□ 9003
9005
□ 9006

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[b] For electronic computers and other "on-off" control applications involving long periods of operation under cutoff conditions.

[f] For mobile communications equipment operating from a 3-cell storage-battery system.

[h] Phenolic base, low-loss type.

[k] A copy of these specifications may be obtained from the *Specifications Division*, Naval Supply Depot, 5801 Tabor Ave., Philadelphia 20, Pa.

[m] For data refer to type 6AG7 in *Receiving-Tube Section*.

World Radio History

Prototypes vs RCA "Premium" or Special Types

Prototype	RCA "Premium" Type or Special Type★
2C51	407A
2C51	5670 *"Command"* Type
2C51	5670WA
2C51	6386
3B4	3B4WA
6AB4	6664/6AB4
6AC7	6AC7W
6AG5	6186
6AG5	6186/6AG5WA
6AK5	408A
6AK5	5654 *"Command"* Type
6AK5	5654M/6AK5W
6AK5	5654/6AK5W/6096
6AL5	5726
6AL5	5726/6AL5W
6AL5	5726/6AL5W/6097
6AL5	6663/6AL5
6AL5	6887
6AL5	7055
6AQ5	6005
6AQ5	6005M/6AQ5W
6AQ5	6005/6AQ5W/6095
6AQ5A	6669/6AQ5A
6AS6	5725
6AS7G	6080
6AS7G	6080WA
6AS7G	6082
6AU6	6AU6WA
6AU6	6AU6WB
6AU6	6136 *"Command"* Type
6AU8	7060
6BA6	5749
6BA6	5749/6BA6
6BA6	6660/6BA6
6BE6	5750
6BE6	5915
6BH6	6661/6BH6
6BJ6	6662/6BJ6
6BZ7	7057
6CB6	6676/6CB6A
6CB6	7056
6CL6	6197
6CL6	6677/6CL6

★ These types may differ from their prototypes in electrical and/or mechanical characteristics, physical structure, or types of tests to which they are subjected. Tube data, therefore, should be checked before replacing a type in the prototype column with its corresponding type.

Prototypes vs RCA "Premium" or Special Types

Prototype	RCA "Premium" Type or Special Type★
6DT8	6922
6E5	1629
6F6	1613
6F6	1621
6J4	6J4WA
6J6	6J6WA
6J6	5964
6J6	6099
6J6	6101/6J6WA
6J6	6211
6J7	1620
6L6	1622
6L6	1631
6L7	1612
6N5GT	1635
6SJ7	5693
6SL7GT	5691
6SN7GT	5692
6U8A	6678/6U8A
6U8A	7059
6X4	6X4W
12AB5	7061
12AT7	12AT7WA *"Command"* Type
12AT7	6201
12AT7	6679/12AT7
12AT7	7898
12AU7	5814A *"Command"* Type
12AU7	5814WA
12AU7	5963
12AU7	6189/12AU7A
12AU7	6680/12AU7A
12AX7	5751 *"Command"* Type
12AX7	5751WA
12AX7	6681/12AX7
12AX7	7058
12AY7	6072
12BY7A	7054
12BY7A	8077/7054
404A	5847/404A
417A	5842/417A
5840	6205
5899	6206

★ These types may differ from their prototypes in electrical and/or mechanical characteristics, physical structure, or types of tests to which they are subjected. Tube data, therefore, should be checked before replacing a type in the prototype column with its corresponding type.

World Radio History

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

Socket & Connector Information for RCA Nuvistor Tubes

The sockets listed below by manufacturer's or distributor's part number have contacts and an annular groove designed to mate, respectively, with the base pins and the 2 indexing lugs of the bases utilized on RCA nuvistor tubes. Information on sockets having different casting materials, contact materials, or finishes may be obtained from the manufacturers.

Sockets having mechanical and electrical characteristics comparable to those listed may be available from other component manufacturers.

Socket Description			Manufacturer or Distributor and Part No.		
Application	Mounting	For Types Having JEDEC Base No.	Cinch Mfg. Co.[a]	Cinch-Jones Sales Division[b] Distributors	Industrial Electronic Hardware Corp.[c]
General Purpose	Crimp	E5-65 E5-79	133 65 10 001	5NS	MSN 0905-1 MSN 0905-2 MSN 0905-3
	Flange	E5-65 E5-79	133 65 10 003	5NS-1	-
	Printed board ("Stand-off")	E5-65 E5-79	133 65 10 009	5NS-2	-
UHF (Heat-Dissipating)	Crimp	E5-65 E5-79	133 65 10 041	5NS-3	-
UHF	Crimp	E7-77	133 67 90 040	5NS-4	-
	Crimp	E7-83	-	-	MSN 0907-1 MSN 0707-1

Connector (Top Caps)

RCA Double-Ended Nuvistor Tubes: These types utilize a JEDEC No. C1-44 top cap. Cinch Mfg. Co. Part Nos. 6005 or 422 03 22 017, 6014 or 422 03 22 024, or equivalent "1/4-inch" connectors, may be used.

[a] 1026 South Homan Avenue, Chicago 24, Illinois.
[b] Cinch-Jones Sales Division of Cinch Mfg. Co.
[c] 109 Prince Street, New York 12, N.Y.

World Radio History

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Full-Wave Gas Rectifier

METAL TYPE HAVING IONICALLY HEATED CATHODE

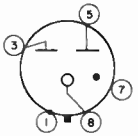
GENERAL DATA

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.	270	max.	ma
DC OUTPUT CURRENT	90	max.	ma
	30▲	min.	ma

Typical Operation:

With vibrator-type power supply and capacitor input to filter

Peak Plate Supply Voltage Per Plate●	380	volts
Filter-Input Capacitor.	8	μf
Total Effective Plate Supply Impedance Per Plate.	800	ohms
DC Output Voltage at input to filter.	275	volts
DC Output Current	65	ma

Characteristics:

Tube Voltage Drop for plate ma. = 90 (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.

← Indicates a change

World Radio History

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Full-Wave Gas Rectifier

METAL TYPE HAVING IONICALLY HEATED CATHODE

GENERAL DATA

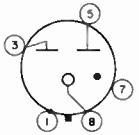
Electrical:

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.

World Radio History

World Radio History

Full-Wave Gas Rectifier

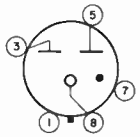
IONICALLY HEATED CATHODE TYPE

The OZ_4-G is the same as the OZ_4 except for the following items:

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-1/16"
Maximum Diameter	1-1/16"
Bulb	T7
Base	Dwarf-Shell Octal 5-Pin (JEDEC Group 1, No. B5-45)
Basing Designation for BOTTOM VIEW	4R

Pin 1 – No Connection
Pin 3 – Plate No.2
Pin 5 – Plate No.1



Pin 7 – No Connection
Pin 8 – Cathode

World Radio History

World Radio History

Half-Wave Vacuum Rectifier

GENERAL DATA

Electrical:

Filament, Coated:

	Min.	Av.	Max.	
Voltage (AC)	1.05	1.25	1.45	volts
Current at 1.25 volts	–	0.2	–	amp

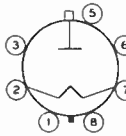
Direct Interelectrode Capacitance (Approx.):▲

Plate to filament & internal shield . . . . . 1.4 μμf

Mechanical:

Operating Position. . . . . Any
Maximum Overall Length. . . . . 3.562"
Seated Length . . . . . 2.624" to 3.000"
Diameter. . . . . 1.438" to 1.562"
Bulb. T12
Cap . . . . . Small with Tubular Support (JEDEC No.C1-34)
Base. . . . . Short Medium-Shell Octal 7-Pin with External Barriers, Style B (JEDEC Group 1, No.B7-227)
Basing Designation for BOTTOM VIEW. 3C

Pin 1 – Limited Connection●
Pin 2 – Filament
Pin 3 – Same as Pin 1
Pin 5 – Same as Pin 1



Pin 6 – No Connection
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♦	28000	max.	volts
DC	24000	max.	volts
PEAK PLATE CURRENT	50	max.	ma
AVERAGE PLATE CURRENT	0.5	max.	ma

Characteristics:

Plate Current for plate volts = 100 . . . 7♦ ma

▲ Without external shield.

● See *Operating Considerations*.

★ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

♦ The duration of the voltage pulse must 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.

♦ Instantaneous test value.

World Radio History

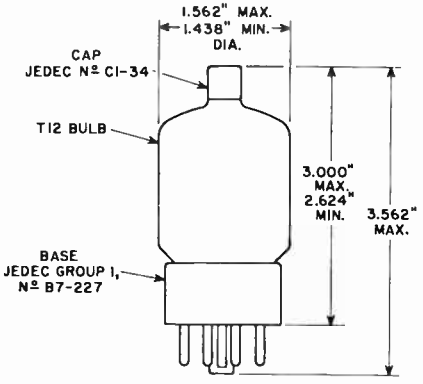
OPERATING CONSIDERATIONS

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.

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 1N2-A 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 1N2-A 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-rays. The voltages employed in some television receivers and other high-voltage equipment are sufficiently high that high-voltage rectifier tubes may produce *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.



92CS-10925

World Radio History

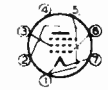
IL4

R-F AMPLIFIER PENTODE

MINIATURE TYPE

Filament	Coated	
Voltage	1.4	d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances:°		
Grid to Plate	0.008 max.	μμf
Input	3.6	μμf
Output	7.5	μμf
Maximum Overall Length		2-1/8"
Maximum Seated Height		1-7/8"
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base ▲		Miniature Button 7-Pin

Pin 1 {Filament -, Internal Shield
Pin 2 - Plate
Pin 3 - Screen
Pin 4 - No Connection
Pin 5 {Filament -, Internal Shield
Pin 6 - Grid
Pin 7 - Filament +



BOTTOM VIEW (6AR)

RCA Socket — Stock No. 9914
Mounting Position — Any

Maximum And Minimum Ratings Are Design-Center Values

AMPLIFIER

Plate Voltage	110 max.	volts
Screen Voltage	90 max.	volts
Screen Supply Voltage	110 max.	volts
Grid Voltage	0 min.	volts
Total Cathode Current	6.5 max.	ma.

Typical Operation and Characteristics - Class A_1 Amplifier

Plate Voltage	90	90	volts
Screen Voltage	67.5	90	volts
Grid Voltage	0	0	volts
Plate Resistance	0.6	0.35	megohm
Transconductance	925	1025	μmhos
Grid Bias for Plate Current = 10 μ amp.	-6	-8	volts
Plate Current	2.9	4.5	ma.
Screen Current	1.2	2.0	ma.

° With no external shield.

▲ *The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.*

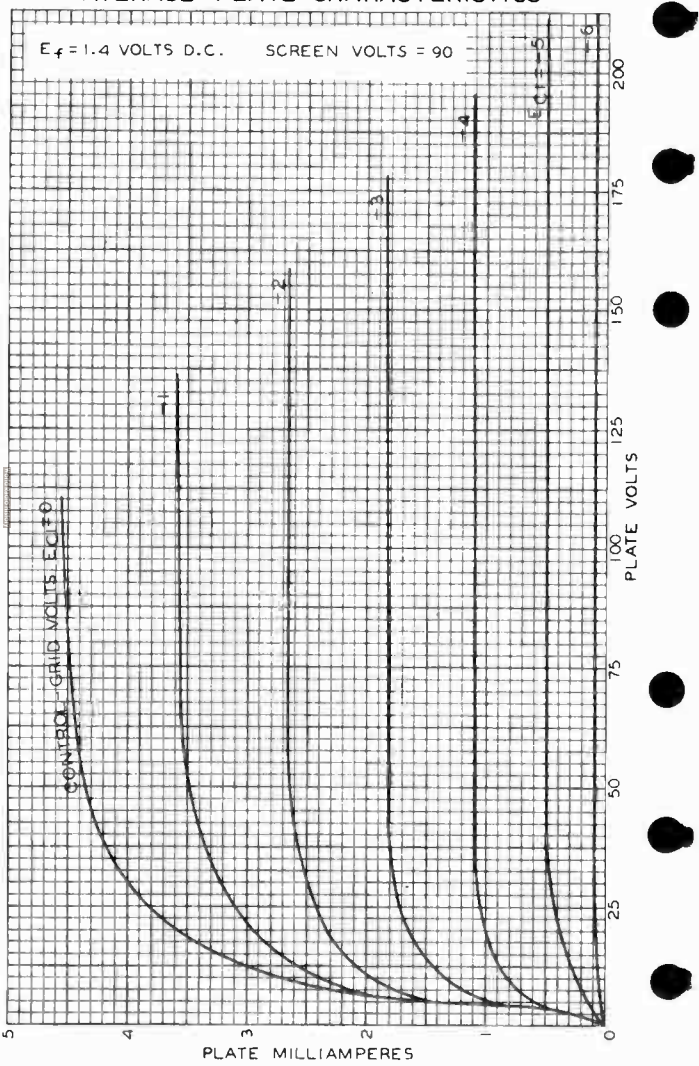
RCA MANUFACTURING COMPANY, INC.

1L4

RCA

1L4

AVERAGE PLATE CHARACTERISTICS



MARCH 18, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

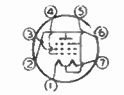
92C-6382

3A4

POWER AMPLIFIER PENTODE

MINIATURE TYPE

Filament	Coated		
Filament Arrangement	*Series* *	*Parallel* **	
Voltage	2.8	1.4	d-c volts
Current	0.1	0.2	amp.
Direct Interelectrode Capacitances:°			
Grid to Plate	0.34 max.		μμf
Input	4.8		μμf
Output	4.2		μμf
Maximum Overall Length			2-1/8"
Maximum Seated Height			1-7/8"
Maximum Diameter			3/4"
Bulb			T-5-1/2
Base▲			Miniature Button 7-Pin
Pin 1 - Fil. (- series)			Pin 5 { Fil. Mid-Tap (- parallel)
Pin 2 - Plate			
Pin 3 - Screen			Pin 6 - Plate
Pin 4 - Grid			Pin 7 - Filament +
RCA Socket			Stock No. 9914
Mounting Position	BOTTOM VIEW (7BB)		Any



Maximum Ratings Are Design-Center Values

A-F POWER AMPLIFIER

Plate Voltage	150 max. volts
Screen Voltage	90 max. volts
Plate Dissipation	2.0 max. watts
Screen Dissipation	0.4 max. watt
Total Zero-Sig. Cathode Current■	18 max. ma.

Typical Operation and Characteristics-Class A1 Amplifier:●

Filament Arrangement	*Parallel* **		
Plate Voltage	135	150	volts
Screen Voltage	90	90	volts
Grid Voltage	-7.5	-8.4	volts
Peak A-F Grid Voltage	7.5	8.4	volts
Zero-Sig. Plate Current	14.8	13.3	ma.
Max.-Sig. Plate Current	14.9	14.1	ma.
Zero-Sig. Screen Current	2.6	2.2	ma.
Max.-Sig. Screen Current	3.5	3.5	ma.
Plate Resistance	90000	100000	ohms
Transconductance	1900	1900	μmhos
Load Resistance	8000	8000	ohms
Total Harmonic Distortion	5	6	%
Max.-Sig. Power Output	600	700	mw

R-F POWER AMPLIFIER

D-C Plate Voltage	150 max. volts
D-C Screen Voltage	135 max. volts
D-C Grid Voltage	-30 max. volts
D-C Plate Current	20 max. ma.
D-C Grid Current	0.25 max. ma.
Total D-C Cathode Current ■	25 max. ma.
Plate Input	3 max. watts
Screen Input	0.9 max. watt
Plate Dissipation	2 max. watts

*, **, °, ▲, ■, ●: See next page.

← Indicates a change.

World Radio History

3A4

POWER AMPLIFIER PENTODE

(continued from preceding page)

→ *Typical Operation at 10 Mc with Parallel Filament Arrangement:***

D-C Plate Voltage	150	volts
D-C Screen Voltage	135	volts
Grid Resistor	0.2	megohm
D-C Plate Current	18.3	ma.
D-C Screen Current	6.5	ma.
D-C Grid Current	0.13	ma.
Power Output (approx.)	1.2	watts

* Filament voltage applied across the two sections in series between pins No.1 and No.7. Grid voltage is referred to pin No.1.

** Filament voltage applied across the two sections in parallel between pin No.5 and pins No.1 and No.7 connected together. Grid voltage is referred to pin No.5.

° With no external shield.

■ For series-filament operation. A shunting resistor must be connected across the section between pins No.1 and No.5 to by-pass excess cathode current in this section. The value of the shunting resistor should be adjusted to make the voltage across the shunted section equal to the voltage across the section between pins No.5 and No.7. When other tubes in series-filament arrangement contribute to the filament current of the 3A4, an additional shunting resistor may be required between pins No.1 and No.7.

● Typical operating values for the 3A4 with filament sections in series will be approximately the same as those shown for parallel-filament operation.

▲ *The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.*

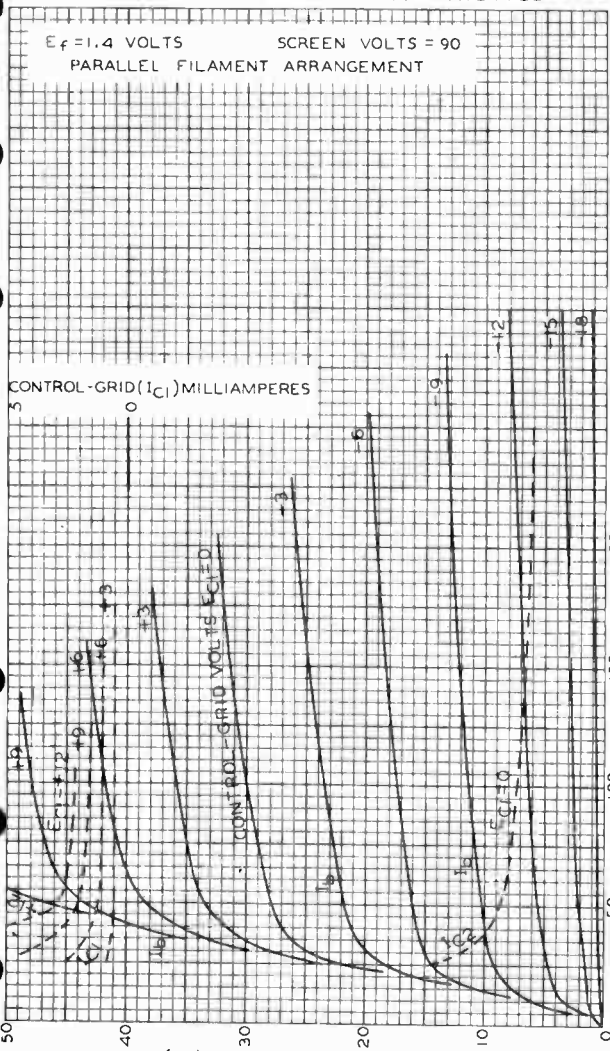
→ Indicates a change.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

3A4

AVERAGE PLATE CHARACTERISTICS



FEB. 19 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6370

World Radio History

3A5

H-F TWIN TRIODE

MINIATURE TYPE

Filament	Coated		
Filament Arrangement	*Series**	*Parallel***	
Voltage	2.8	1.4	d-c volts
Current	0.11	0.22	amp.

Direct Interelectrode Capacitances:°

	Triode Unit T_1	*Triode Unit T_2*	
Grid to Plate	3.2	3.2	μμf
Grid to Filament	0.9	0.9	μμf
Plate to Filament	1.0	1.0	μμf
Plate to Plate	0.32		μμf

Maximum Overall Length	2-1/8"
Maximum Seated Height	1-7/8"
Maximum Diameter	3/4"
Bulb	T-5-1/2"

Base▲ — Miniature Button 7-Pin

Pin 1 - Filament -
Pin 2 - Plate T_2
Pin 3 - Grid T_2
Pin 4 - {Fil. Mid-Tap ((+ parallel)}
Pin 5 - Grid T_1
Pin 6 - Plate T_1
Pin 7 - Fil.{ + Series}

BOTTOM VIEW (7BC)

RCA Socket — Stock No.9914

Mounting Position — Any

For convenience, one triode unit is identified as T_1; the other as T_2.

Maximum Ratings Are Design-Center Values

A-F POWER AMPLIFIER

Plate Voltage	135 max.	volts
Plate Current	5 max.	ma.
Plate Dissipation	0.5 max.	watt

Characteristics - Class A, Amplifier:

Plate Voltage	90	volts
Grid Voltage	-2.5	volts
Amplification Factor	15	
Plate Resistance	8300	ohms
Transconductance	1800	μmhos
Plate Current	3.7	ma.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation

D-C Plate Voltage	135 max.	volts
D-C Grid Voltage	-30 max.	volts
D-C Plate Current (per unit)	15 max.	ma.
D-C Grid Current (per unit)	2.5 max.	ma.
Plate Input (per unit)	2.0 max.	watts
Plate Dissipation (per unit)	1.0 max.	watt

Typical Operation At 40 Mc With Both Units In Push-Pull:

D-C Plate Voltage	135	volts
D-C Grid Voltage •	-20	volts
	4000	ohms
	570	ohms
Peak R-F Grid-to-Grid Voltage	90	volts
D-C Plate Current	30	ma.
D-C Grid Current (approx.)	5	ma.
Driving Power (approx.)	0.2	watt
Power Output (approx.)	2	watts

*, **, °, •, ▲, : see next page

World Radio History

3A5

H-F TWIN TRIODE

(continued from preceding page)

* Filament voltage applied across the two sections in series between pins No.1 and No.7. Grid voltage is referred to Pin No.1. For series filament operation, a shunting resistor must be connected across the section between pins No.1 and No.4. to by-pass excess cathode current in this section. The value of the shunting resistor should be adjusted to make the voltage across the shunted section equal to the voltage across the section between pins No.4 and No.7. When other tubes in series-filament arrangement contribute to the filament current of the 3A5, an additional shunting resistor may be required between pins No.1 and No.7.

** Filament voltage applied across the two sections in parallel between pin No.4 and pins No.1 and No.7 connected together. Grid voltage is referred to pins No.1 and No.7 tied together.

o With no external shield

● Obtained by grid resistor (4000), cathode resistor (570), or fixed supply.

▲ *The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.*

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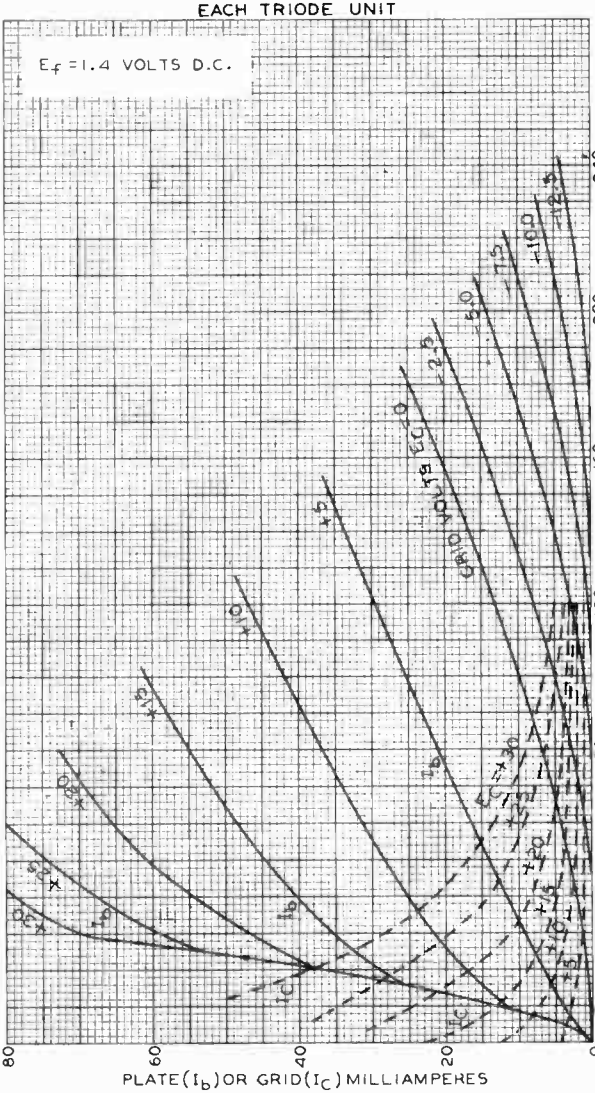
RCA MANUFACTURING COMPANY, INC

World Radio History

3A5.

AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



MARCH 14, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

5GH8

Medium-Mu Triode—Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 5GH8 is the same as the 6GH8 except for the following items:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	4.7	volts
Current	0.6 ± 6%	amp

5GM6

Semiremote-Cutoff Pentode

7-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 5GM6 is the same as the 6GM6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	5.6	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

5J6

Medium-Mu Twin Triode

7-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 5J6 is the same as the 6J6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	4.7	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

Full-Wave Vacuum Rectifier

For Industrial & Military Applications

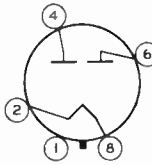
GENERAL DATA

Electrical:

Filament, Coated:[a]
- Voltage (AC or DC) . . . . . 5 volts
- Current . . . . . 2 amp

Mechanical:

Operating Position. . . . . Vertical, base down or up, or Horizontal with pins 2 and 4 in vertical plane
Maximum Overall Length. . . . . 4-1/4"
Maximum Seated Length . . . . . 3-11/16"
Diameter. . . . . 1.438" to 1.562"
Bulb. T12
Base. . . . . Short Medium-Shell Octal 5-Pin Micanol with External Barriers, Style B, Arrangement 1 (JEDEC Group 1, No.B5-121)
Basing Designation for BOTTOM VIEW. 5T



Pin 1 - No Connection
Pin 2 - Filament
Pin 4 - Plate No.2
Pin 6 - Plate No.1
Pin 8 - Filament

FULL-WAVE RECTIFIER

Maximum Ratings, *Absolute-Maximum Values:*

For altitudes up to	*40000*	*20000*	*feet*
PEAK INVERSE PLATE VOLTAGE. . .	2650 max.	3100 max.	volts
AC PLATE SUPPLY VOLTAGE PER PLATE (RMS, without load) . .	See *Rating Chart I*		
PEAK PLATE CURRENT PER PLATE. .	715 max.	715 max.	ma
DC OUTPUT CURRENT, PER PLATE . .	See *Rating Chart I*		
HOT-SWITCHING TRANSIENT PLATE CURRENT PER PLATE	[b]	[b]	
BULB TEMPERATURE (At hottest point on bulb surface). . . .	230 max.	230 max.	°C

Typical Operation:

With capacitor-input filter

For altitudes up to	*40000*		*20000*	*feet*
AC-Plate-to-Plate Supply Voltage (RMS, without load) .	1400	1500	2000	volts
Filter-Input Capacitor.	20	20	20	μf
Total Effective Plate Supply Impedance Per Plate[c].	225	250	375	ohms

World Radio History

5R4GYB

DC Output Voltage (Approx.) at Input to Filter:				
At half-load ma. =				
75.	–	910	1210	volts
125	750	–	–	volts
At full-load ma. =				
150	–	800	1040	volts
250	605	–	–	volts
Voltage Regulation (Approx.): Half-load to full-load current	145	110	170	volts
DC Output Current	250	150	150	ma

With choke-input filter

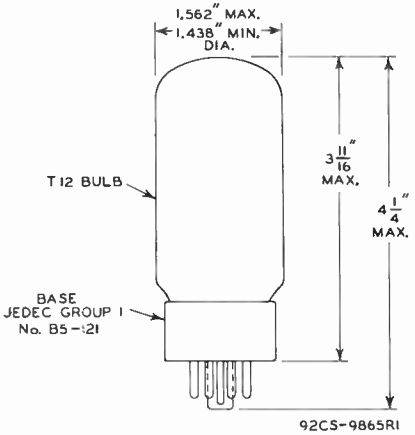
For altitudes up to	*40000*	*20000*	*feet*
AC Plate-to-Plate Supply Voltage (RMS, without load)	1500	1900	volts
Filter-Input Choke	5	10	henrys
DC Output Voltage (Approx.) at Input to Filter for dc output ma. =			
87.5	–	800	volts
125	600	–	volts
175	–	760	volts
250	560	–	volts
Voltage Regulation (Approx.): Half-load to full-load current	40	40	volts
DC Output Current	250	175	ma

[a] See accompanying chart *Operating Areas for Simultaneous and Delayed Application of Plate Voltage* for conditions necessitating delay in application of plate voltage until filament has reached operating temperature.

[b] If hot-switching is required in operation, choke-input circuits are recommended. Such circuits limit the hot-switching current to a value no higher than that of the peak plate current. When capacitor-input circuits are used, a maximum value of 3 amperes should not be exceeded.

[c] Indicated values for conditions shown will limit peak plate current to the maximum-rated value. When a filter-input capacitor larger than 20 μf is used, it may be necessary to increase plate-supply impedance to a higher value than that shown in the data to limit the peak plate current to the maximum-rated value.

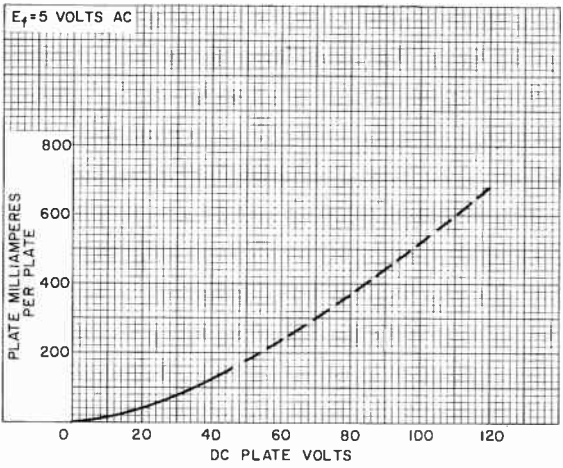
World Radio History



World Radio History

5R4GYB

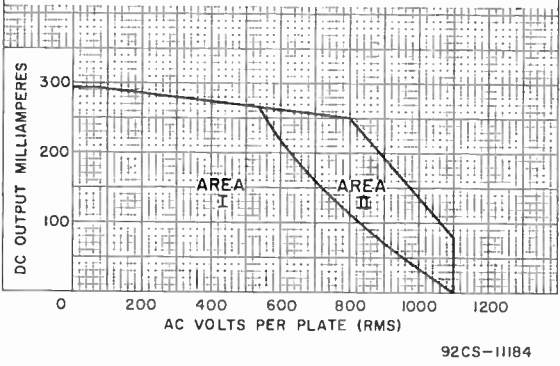
AVERAGE PLATE CHARACTERISTIC



92CS-11183

OPERATING AREAS FOR SIMULTANEOUS AND DELAYED APPLICATION OF PLATE VOLTAGE

FULL-WAVE RECTIFIER SERVICE WITH CAPACITOR-INPUT FILTER.
AREA I — FILAMENT AND PLATE VOLTAGE MAY BE APPLIED SIMULTANEOUSLY.
AREA II — FILAMENT SHOULD BE ALLOWED TO REACH OPERATING TEMPERATURE BEFORE PLATE VOLTAGE IS APPLIED. FOR AVERAGE CONDITIONS, THE DELAY IS APPROXIMATELY 10 SECONDS.

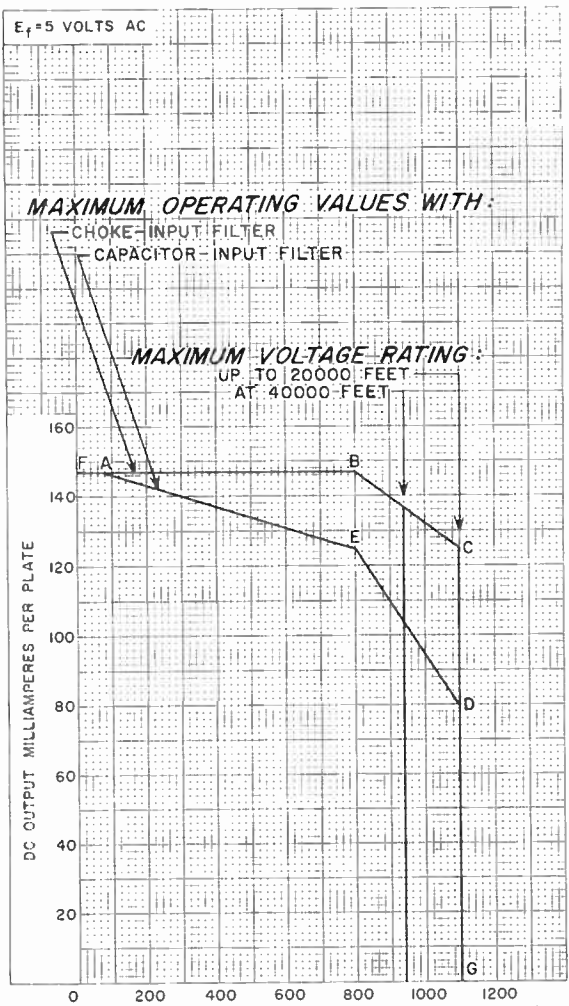


92CS-11184

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

World Radio History

RATING CHART I

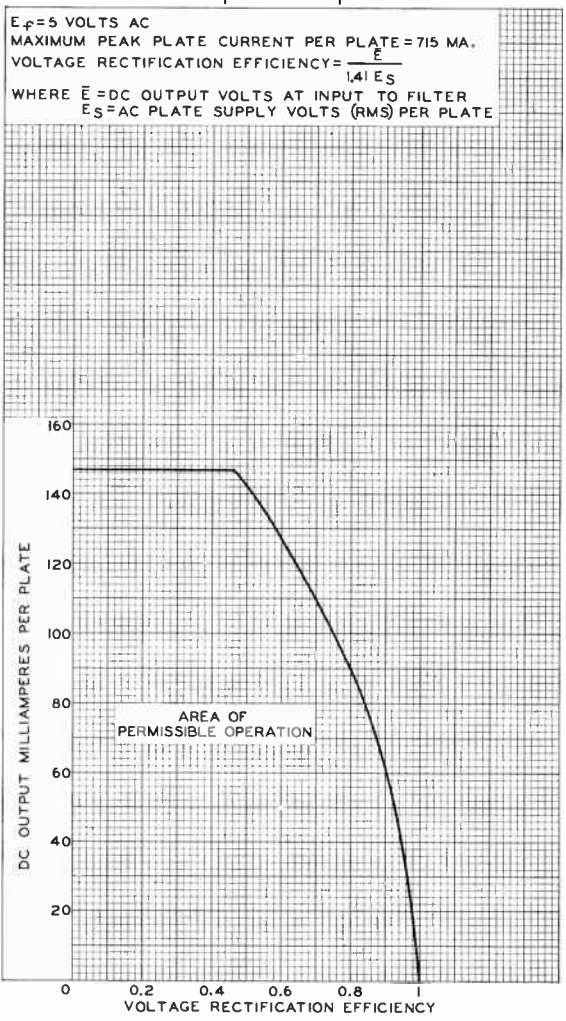


92CM-9943RI

World Radio History

5R4GYB

RATING CHART II
With Capacitor-Input Filter



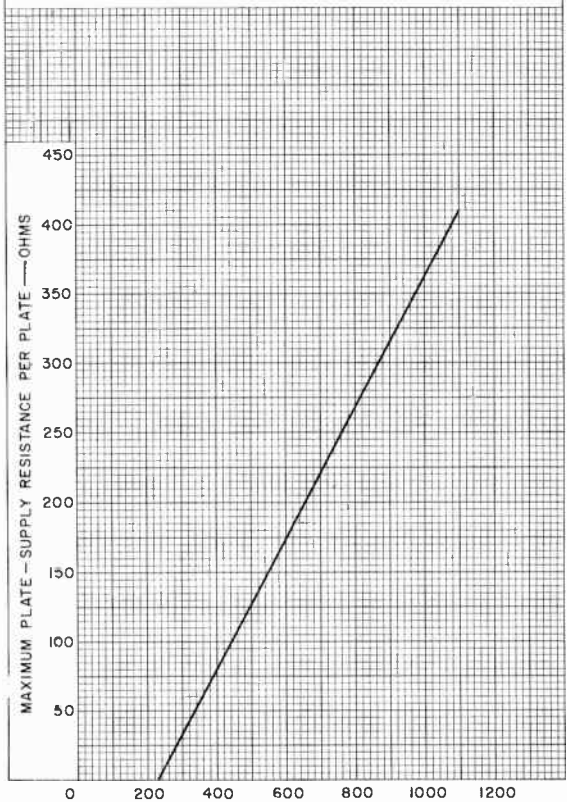
92CM-9953RI

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

World Radio History

RATING CHART III
With Capacitor-Input Filter

E_f = 5 VOLTS AC
MAXIMUM HOT-SWITCHING AMPERES = 3
PLATE-SUPPLY RESISTANCE PER PLATE = $R_{SEC.} + N^2R_{PRI.} + R_A$
WHERE $R_{SEC.}$ = DC RESISTANCE OF TRANSFORMER SECONDARY PER SECTION
$R_{PRI.}$ = DC RESISTANCE OF TRANSFORMER PRIMARY
R_A = DC RESISTANCE OF ADDED SERIES RESISTANCE PER PLATE
N = TRANSFORMER-VOLTAGE STEP-UP RATIO PER SECTION



92CM-6416R4

World Radio History

World Radio History

6AX4-GT

Half-Wave Vacuum Rectifier

For Television Damper Service

GENERAL DATA

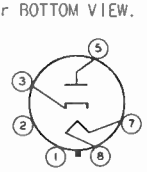
Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	1.2	amp
Direct Interelectrode Capacitances (Approx.):[a]		
Plate to cathode and heater	5	μμf
Cathode to plate and heater	8.5	μμf
Heater to cathode	4	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	3-5/16"
Maximum Seated Length	2-3/4"
Maximum Diameter	1-9/32"
Dimensional Outline	See *General Section*
Bulb	T9
Base	Intermediate-Shell Octal 5-Pin, Arrangement 2 (JEDEC Group 1, No.B5-82), Intermediate-Shell Octal 5-Pin with External Barriers, Arrangement 2 (JEDEC Group 1, No.B5-147), Short Intermediate-Shell Octal 5-Pin with External Barriers, Arrangement 2 (JEDEC Group 1, No.B5-85), or Short Intermediate-Shell Octal 6-Pin with External Barriers, Arrangement 1 (JEDEC Group 1, No.B6-60)
Basing Designation for BOTTOM VIEW	4CG

Pin 1[b] – Same as Pin 2
Pin 2 – Internal Connection—Do Not Use[c]



Pin 3 – Cathode
Pin 5 – Plate
Pin 7 – Heater
Pin 8 – Heater

DAMPER SERVICE

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[d]

PEAK INVERSE PLATE VOLTAGE[e]	4400	max.	volts
PEAK PLATE CURRENT	825	max.	ma
DC PLATE CURRENT	137	max.	ma
PLATE DISSIPATION	5	max.	watts

← Indicates a change.

World Radio History

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode.	4400[f] max.	volts
Heater positive with respect to cathode.	300[g] max.	volts

→Characteristics, Instantaneous Test Condition:

Tube Voltage Drop for plate ma. = 250. . .	32	volts

[a] Without external shield.

[b] On the 5-pin bases, pin 1 as well as pins 4 and 6 is omitted.

[c] Socket terminals 1,2,4 and 6 should not be used as tie points.

[d] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

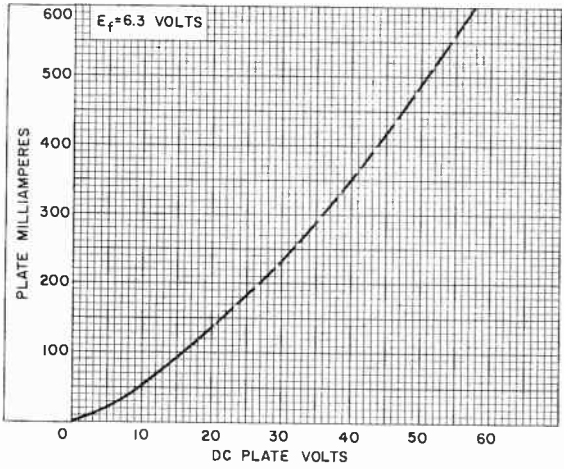
[e] This rating is applicable when the duty cycle of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

[f] The dc component must not exceed 900 volts.

[g] The dc component must not exceed 100 volts.

→Indicates a change.

AVERAGE PLATE CHARACTERISTIC



92CS-7829

World Radio History

6AX4-GTB

Half-Wave Vacuum Rectifier

For Television Damper Service

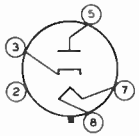
GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	1.2	amp
Direct Interelectrode Capacitances (Approx.):[a]		
Plate to cathode and heater	5	μμf
Cathode to plate and heater	8.5	μμf
Heater to cathode	4	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	3-5/16"
Maximum Seated Length	2-3/4"
Maximum Diameter	1-9/32"
Dimensional Outline	See *General Section*
Bulb	T9
Base	Intermediate-Shell Octal 5-Pin, Arrangement 2 (JEDEC Group 1, No. B5-82)
Basing Designation for BOTTOM VIEW	4CG



Pin 2 – Internal Connection—Do Not Use[b]
Pin 3 – Cathode
Pin 5 – Plate
Pin 7 – Heater
Pin 8 – Heater

DAMPER SERVICE

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[c]

PEAK INVERSE PLATE VOLTAGE[d]	5000	max.	volts
PEAK PLATE CURRENT	1000	max.	ma
DC PLATE CURRENT	165	max.	ma
PLATE DISSIPATION	5.3	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	5000[e]	max.	volts
Heater positive with respect to cathode	300[f]	max.	volts

Characteristics, Instantaneous Test Condition:

Tube Voltage Drop for plate ma. = 250	32	volts

[a] Without external shield.
[b] Socket terminals 1, 2, 4 and 6 should not be used as tie points.
[c] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

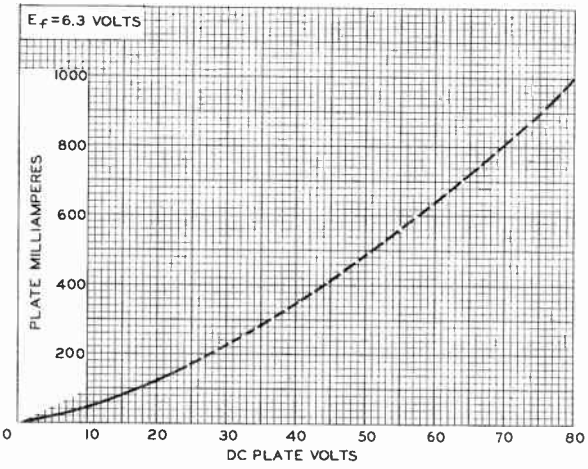
World Radio History

[d] This rating is applicable when the duty cycle 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.

[e] The dc component must not exceed 900 volts.

[f] The dc component must not exceed 100 volts.

AVERAGE PLATE CHARACTERISTIC



92CS-10850

World Radio History

6AK6

POWER AMPLIFIER PENTODE

MINIATURE TYPE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances (Approx.) ♦		
Grid to Plate	0.12	μμf
Input	3.6	μμf
Output	4.2	μμf
Maximum Overall Length		2-1/8"
Maximum Seated Height		1-7/8"
Length from Base Seat to Bulb Top (excluding tip)		1-1/2" ± 3/32"
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base ▲		Miniature Button 7-Pin
Pin 1 - Grid No. 1		Pin 5 - Plate
Pin 2 - Grid No. 3		Pin 6 - Grid No. 2
Pin 3 - Heater		Pin 7 - Cathode
Pin 4 - Heater		
RCA Socket		Stock No. 9914
Mounting Position		Any

BOTTOM VIEW (7BK)

Maximum Ratings Are Design-Center Values

A-F AMPLIFIER

Plate Voltage	300 max.	volts
Screen Voltage (Grid No. 2)	250 max.	volts
Plate Dissipation	2.75 max.	watts
Screen Dissipation	0.75 max.	watt
D-C Heater-Cathode Potential	100 max.	volts
Typical Operation and Characteristics - Class A₁ Amplifier:		
Plate Voltage	180	volts
Suppressor (Grid No. 3)	Connected to cathode at socket	
Screen Voltage	180	volts
Grid Voltage (Grid No. 1) ♦	-9	volts
Peak A-F Grid Voltage	9	volts
Zero-Signal Plate Current	15	ma.
Zero-Signal Screen Current	2.5	ma.
Plate Resistance	0.2	megohm
Transconductance	2300	μmhos
Load Resistance	10000	ohms
Total Harmonic Distortion	10	%
Max.-Sig. Power Output	1.1	watts

♦ With no external shield.

♦ The d-c resistance in the grid circuit under maximum rated conditions should not exceed 0.5 megohm for cathode-bias operation and 0.1 megohm for fixed-bias operation.

▲ *The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.*

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6AK6

6AK6

AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION

E_f = 6.3 VOLTS SCREEN VOLTS = 180

CONTROL-GRID VOLTS E_{c1} =

0
-3
-6
-8
-12
-15
-18

PLATE MILLIAMPERES

0 10 20 30 40 50

PLATE VOLTS

50 100 150 200 250 300 350 400

AUG. 11, 1943

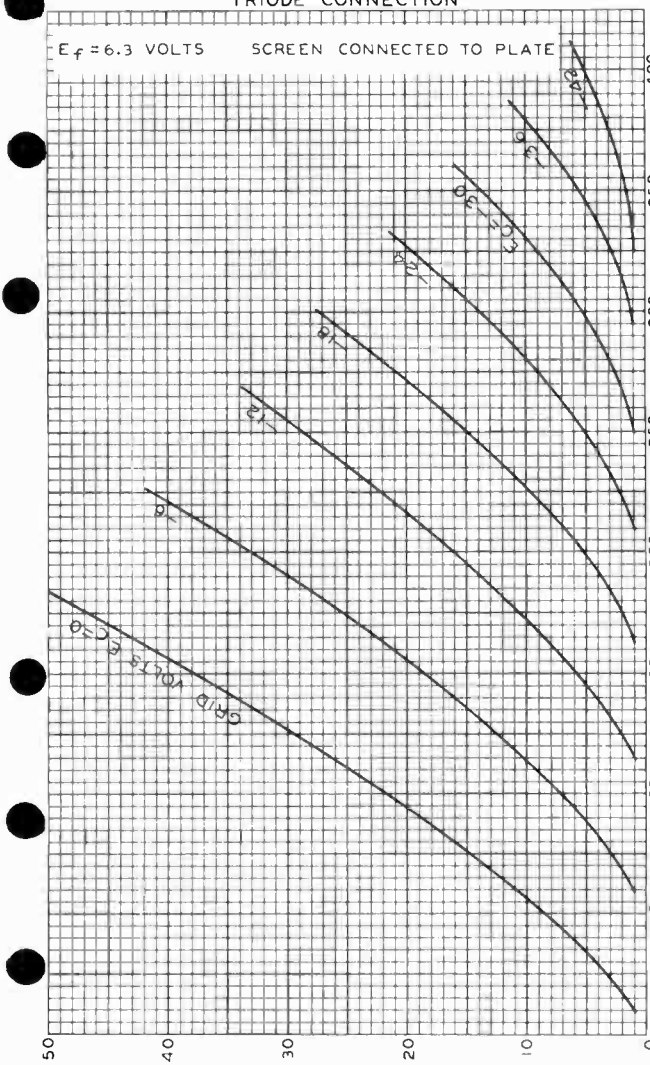
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6450

World Radio History

6AK6

AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION

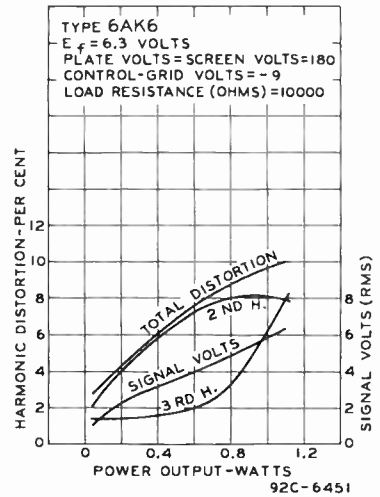


AUG. 11, 1943
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
92C-6449

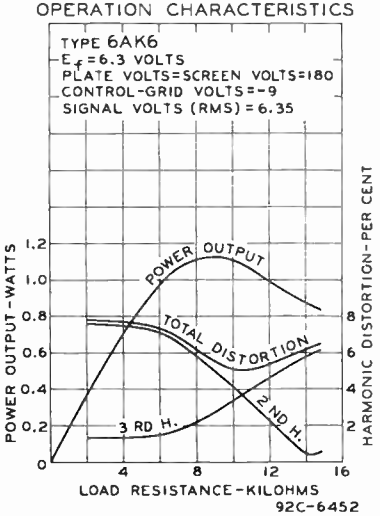
6AK6

POWER AMPLIFIER PENTODE

OPERATION CHARACTERISTICS



OPERATION CHARACTERISTICS



6AS6

SHARP-CUTOFF PENTODE

MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	6.3	ac or dc volts
Current	0.175	amp

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield No.316*	
Grid No.1 to Plate	0.025 max.	0.02 max.	μμf
Input	3.9	4.0	μμf
Output	2.2	3.0	μμf
Grid No.1 to Grid No.3	0.15 max.	0.15 max.	μμf
Grid No.3 to Plate	0.7 max.	0.7 max.	μμf
Grid No.3 to All Other Electrodes	3.3	3.4	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin
Basing Designation for BOTTOM VIEW	$7CM_1$

Pin 1 - Grid No.1
Pin 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Grid No.3

AMPLIFIER - Class A_1

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	180 max.	volts
GRID-No.3 VOLTAGE	27 max.	volts
GRID-No.2 VOLTAGE	140 max.	volts
CATHODE CURRENT	18 max.	ma
PLATE DISSIPATION	1.7 max.	watts
GRID-No.2 INPUT	0.75 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	120 max.	°C

Characteristics:

Plate Voltage	120	120	volts

6AS6

SHARP-CUTOFF PENTODE

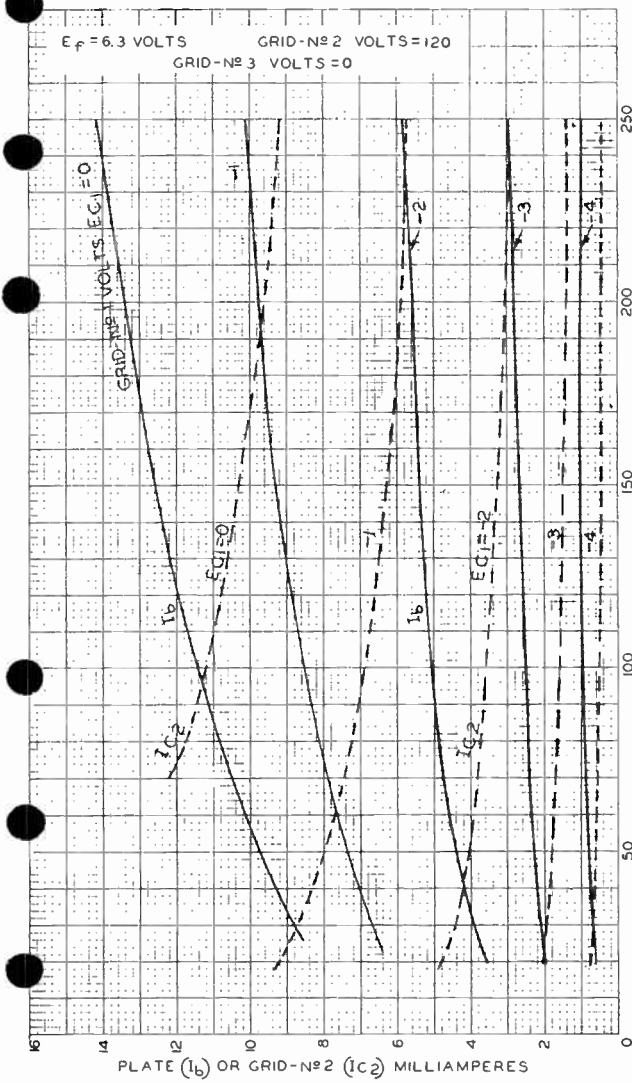
Grid-No.3 Voltage.	-3	0	volts
Grid-No.2 Voltage.	120	120	volts
Grid-No.1 Voltage.	-2	-2	volts
Plate Resistance (Approx.)	-	0.15	megohm
Transconductance, Grid No.1 to Plate. . . .	1850	3200	μmhos
Transconductance, Grid No.3 to Plate. . . .	810	470	μmhos
Plate Current.	3.6	5.2	ma
Max. Plate Current for Grid-No.1 Volts = -10. . . .	-	100	μamp
Max. Plate Current for Grid-No.3 Volts = -15. . . .	-	20	μamp
Grid-No.2 Current.	4.8	3.5	ma

World Radio History

RCA

6AS6

AVERAGE PLATE CHARACTERISTICS



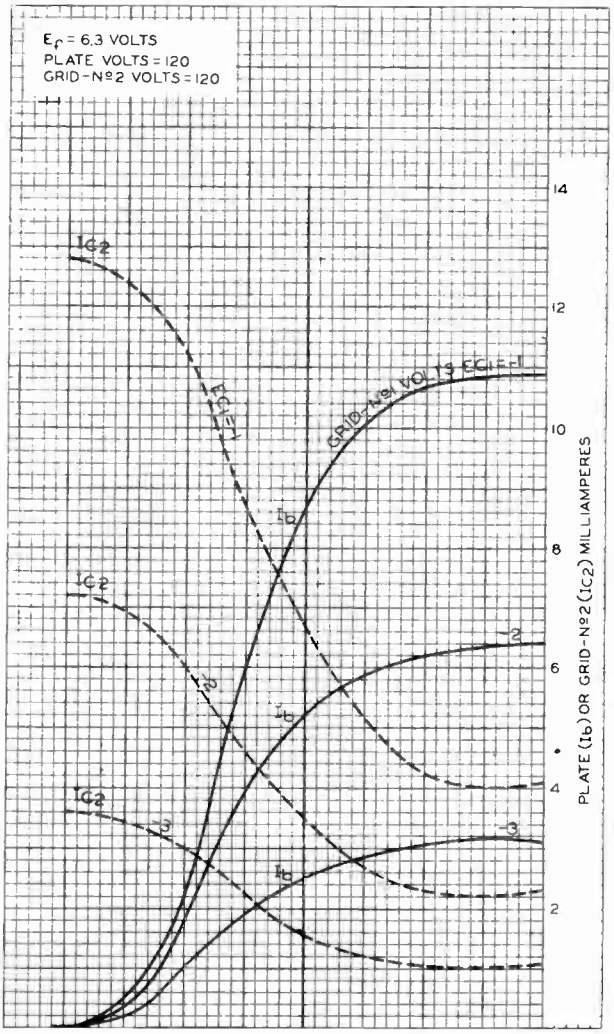
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

6AS6

RCA

6AS6

AVERAGE CHARACTERISTICS



NOV. 9, 1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7403

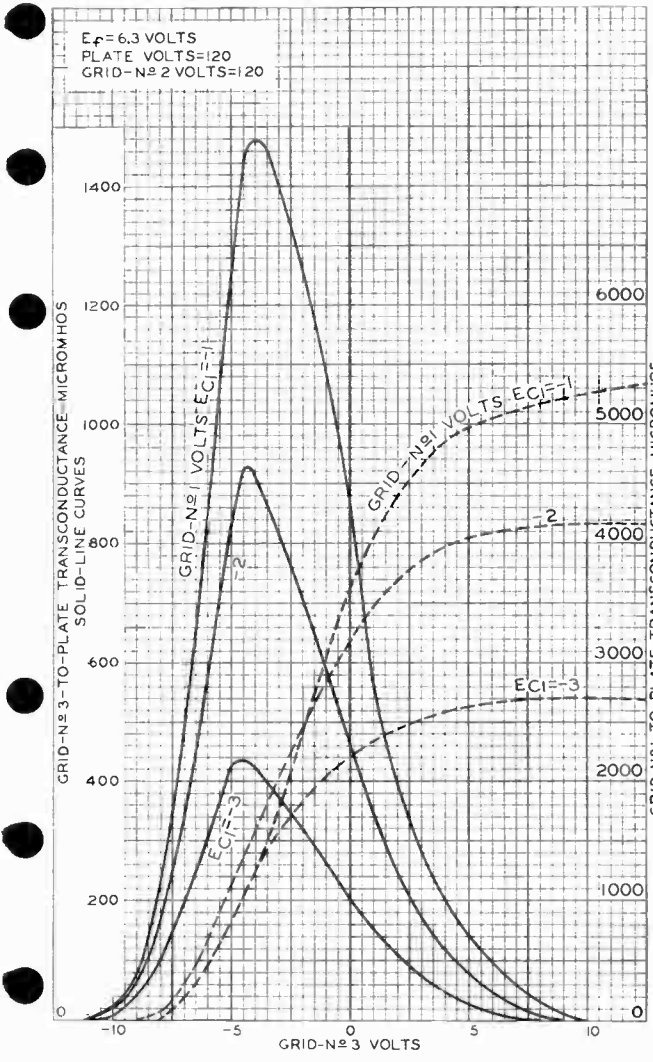
World Radio History

World Radio History

RCA

6AS6

AVERAGE CHARACTERISTICS



World Radio History

6AS7-G

LOW-MU TWIN POWER TRIODE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage	6.3	ac or dc volts
Current	2.5	amp
Direct Interelectrode Capacitances (Approx., each unit):[o]		
Grid to plate	10.5	μμf
Grid to heater and cathode	6.8	μμf
Plate to heater and cathode	2.3	μμf
Heater to cathode	11.0	μμf
Grid of unit No.1 to grid of unit No.2	0.70	μμf
Plate of unit No.1 to plate of unit No.2	1.65	μμf

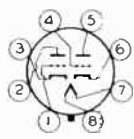
Characteristics, Class A_1 Amplifier (Each unit):

Plate-Supply Voltage	135	volts
Cathode-Bias Resistor[■]	250	ohms
Amplification Factor	2	
Plate Resistance (Approx.)	280	ohms
Transconductance	7000	μmhos
Plate Current	125	ma

Mechanical:

Mounting Position	Any
Maximum Overall Length	5-5/16"
Maximum Seated Length	4-3/4"
Maximum Diameter	2-1/16"
Bulb	ST-16
Base	Medium-Shell Octal 8-Pin (JETEC No.B8-11)
Basing Designation for BOTTOM VIEW	8BD

Pin 1 – Grid of Unit No.2
Pin 2 – Plate of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4 – Grid of Unit No.1
Pin 5 – Plate of Unit No.1
Pin 6 – Cathode of Unit No.1
Pin 7 – Heater
Pin 8 – Heater



DC AMPLIFIER

Values are for Each Unit

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	250 max.	volts
PLATE CURRENT	125 max.	ma
PLATE DISSIPATION	13 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	300 max.	volts
Heater positive with respect to cathode	300 max.	volts

[o] Without external shield.

[■] Operation with fixed bias is not recommended.

← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6AS7-G

LOW-MU TWIN POWER TRIODE

Maximum Circuit Values (For maximum rated conditions):

Grid-Circuit Resistance:

For cathode-bias operation	1.0 max.	megohm
For fixed-bias operation	Not recommended	

BOOSTER SCANNING SERVICE

Values are for Each Unit

Maximum Ratings, *Design-Center Values:*

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

PEAK NEGATIVE-PULSE PLATE VOLTAGE•	1700 max.	volts
DC PLATE CURRENT	125 max.	ma
PLATE DISSIPATION.	13 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode .	300 max.	volts
Heater positive with respect to cathode .	300 max.	volts

Maximum Circuit Values (For maximum rated conditions):

Grid-Circuit Resistance:

For cathode-bias operation	1.0 max.	megohm
For fixed-bias operation	Not recommended	

□ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

• The duration of the voltage pulse must 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.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

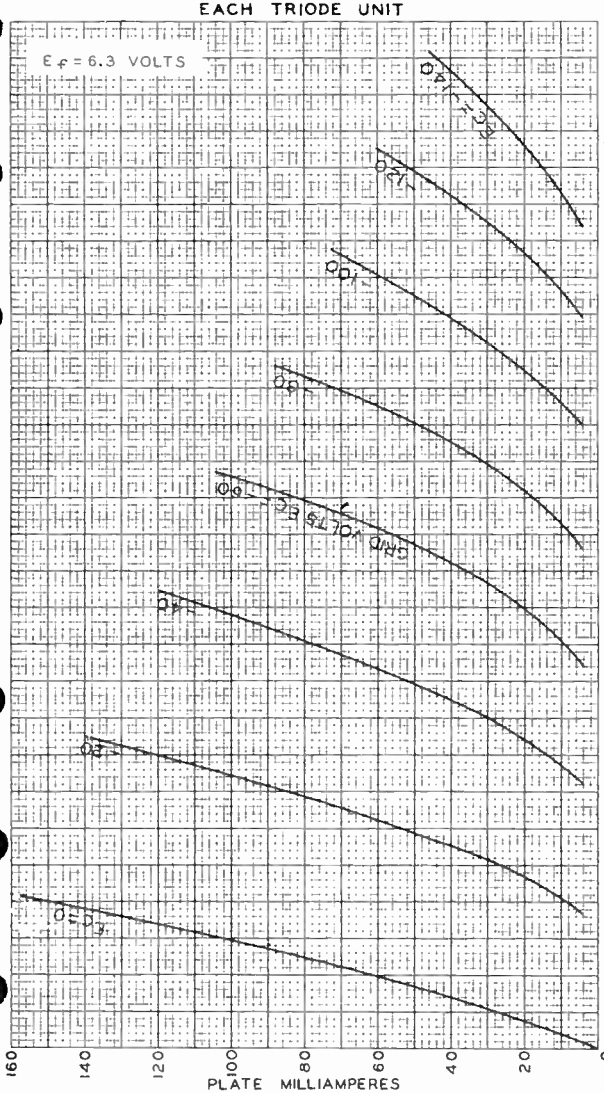
World Radio History

RCA

6AS7-G

AVERAGE PLATE CHARACTERISTICS

EACH TRIODE UNIT



NOV. 6, 1945 RCA VICTOR DIVISION 92CM-8618

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

Mobile Radio History

World Radio History

6F4
OSCILLATOR TRIODE
ACORN TYPE

For use at frequencies up to 1200 Mc approx.

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.225	amp.
Direct Interelectrode Capacitances:○		
Grid to Plate	1.9	μμf
Grid to Cathode & Heater	2.0	μμf
Plate to Cathode & Heater	0.6	μμf
Overall Length		1-7/32" ± 5/32"
Overall Diameter (including radial pins)		1-3/32" ± 1/16"
Bulb	*See Outline in General Section*	T-4½
Base	*See Outline in General Section*	Small Radial 7-Pin
Pin 1 - Heater		Pin 5 - Grid
Pin 2 - Grid		Pin 6 - Heater
Pin 3 - Plate		Pin 7 - Cathode
Pin 4 - Plate		
Mounting Position		Any

BOTTOM VIEW (7BR)

Maximum Ratings Are Design-Center Values

A-F AMPLIFIER

Plate Voltage	150 max. volts
Plate Supply Voltage	300 max. volts
Plate Current	15 max. ma.
Plate Dissipation	2 max. watts
D-C Heater-Cathode Potential	80 max. volts
Characteristics - Class A_1 Amplifier:	
Plate Voltage	80 volts
Cathode-Bias Resistor□	150 ohms
Amplification Factor	17
Plate Resistance	2900 ohms
Transconductance	5800 μmhos
Plate Current	13 ma.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

D-C Plate Voltage	150 max. volts
D-C Plate Supply Voltage	300 max. volts
D-C Grid Voltage	-50 max. volts
D-C Plate Current	20 max. ma.
D-C Grid Current	8 max. ma.
Plate Dissipation	2 max. watts
D-C Heater-Cathode Potential	80 max. volts
Typical Operation at Moderate Frequencies:●	
D-C Plate Voltage	150 volts
D-C Grid Voltage♦	-15 volts
	550 ohms
	2000 ohms
D-C Plate Current	20 ma.
D-C Grid Current (Approx.)⊙	7.5 ma.
Driving Power (Approx.)⊙	0.2 watt
Power Output (Approx.)	1.8 watts

○, □, ●, ♦, ⊙: See next page.

World Radio History

6F4

OSCILLATOR TRIODE

(continued from preceding page)

○ With no external shield.

□ Fixed-bias operation is not recommended. Under maximum rated conditions, the d-c resistance in the grid circuit should not exceed 0.5 megohm.

● Approximately 45 milliwatts can be obtained when the 6F4 is used at 1200 megacycles as an oscillator with 100 volts on plate, maximum rated plate dissipation, and grid resistor of 2000 ohms.

◆ Obtained from fixed supply, or by cathode resistor (550), grid resistor (2000), or partial self-bias methods.

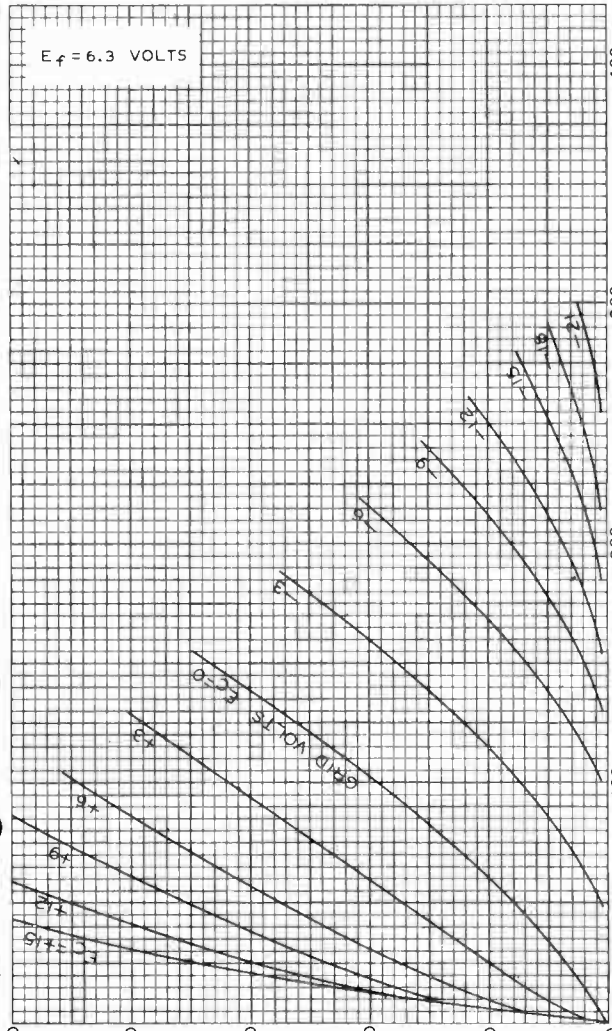
⊖ Subject to wide variations as explained under TUBE RATINGS in General Section.

The *socket* for the 6F4 should be electrically and mechanically compact, and be made with an insulating material having a loss factor not exceeding 0.035 to permit operation of the 6F4 at high frequencies. For most satisfactory performance of the 6F4, it is essential that the inductance of connections between tube and circuit be kept as low as possible.

World Radio History

6F4

AVERAGE PLATE CHARACTERISTICS



JULY 12, 1944

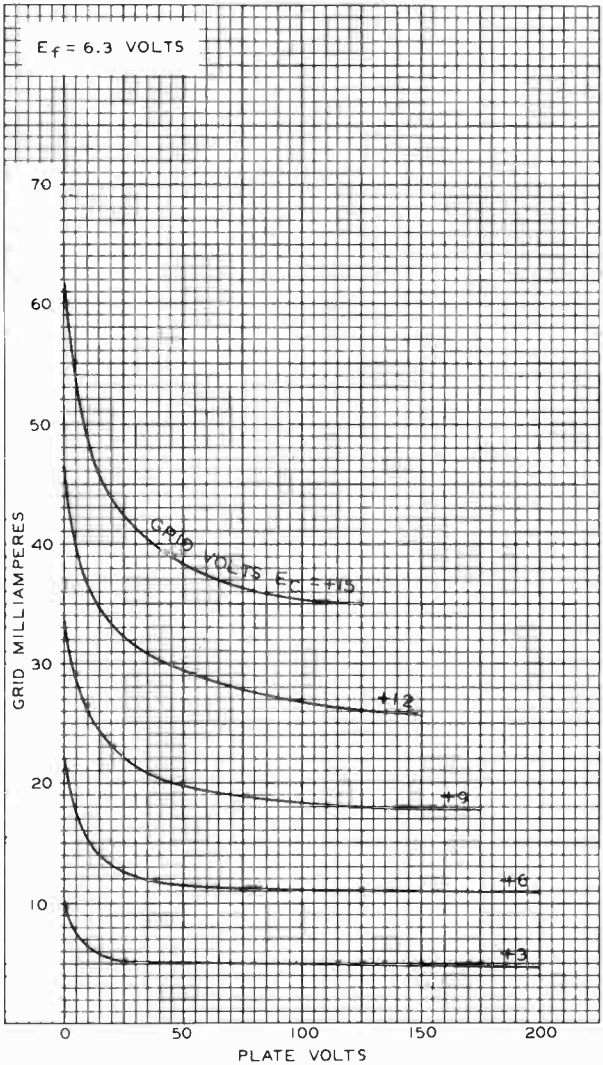
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6567

6F4

6F4

TYPICAL CHARACTERISTICS



6J4

U-H-F AMPLIFIER TRIODE

GROUNDED-GRID, MINIATURE TYPE

For use at frequencies up to 500 Mc. approx.

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.4	amp.
Direct Interelectrode Capacitances (Approx.):°		
Plate to Cathode & Heater	0.24 max.	μμf
Grid to Cathode & Heater	5.5	μμf
Grid to Plate	4	μμf
Heater to Cathode	2.8	μμf
Maximum Overall Length		2-1/8"
Maximum Seated Height		1-7/8"
Length from Base Seat to Bulb Top (excluding tip)		1-1/2" ± 3/32"
Maximum Diameter		3/4"
Bulb		T-5-1/2"
Base▲		Miniature Button 7-Pin
Pin 1 - Grid		Pin 5 - Grid
Pin 2 - Cathode		Pin 6 - Grid
Pin 3 - Heater		Pin 7 - Plate
Pin 4 - Heater		
RCA Socket		Stock No.9914
Mounting Position		Any

BOTTOM VIEW (7BQ)

Maximum Ratings Are Design-Center Values

GROUNDED-GRID AMPLIFIER

Plate Voltage	150 max. volts
Plate Dissipation	2.25 max. watts
Plate Current	20 max. ma.
D-C Heater-Cathode Potential	90 max. volts

Typical Operation and Characteristics - Class A_1 Amplifier:

Plate Voltage	100	150	volts
Cathode-Bias Resistor* (Suitably by-passed)	100	100	ohms
Amplification Factor	55	55	
Plate Resistance	5000	4500	ohms
Transconductance	11000	12000	μmhos
Plate Current	10	15	ma.

° With close-fitting shield connected to grid.

* The 6J4 should always be used with a cathode-bias resistor suitably by-passed. The d-c resistance in the grid circuit under maximum rated conditions should be limited to 0.25 megohm.

▲ *The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.*

6J4

U-H-F AMPLIFIER TRIODE

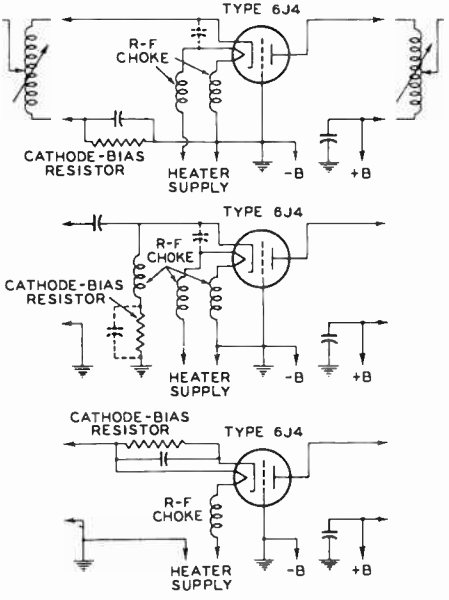
(continued from preceding page)

NOTE:

For grounded-grid operation, all three grid terminals should be grounded to minimize the effects of grid-lead inductance on u-h-f performance.

In arranging the circuit for the 6J4 used as a grounded-grid r-f amplifier or mixer, it is preferable to have the heater operate at the same r-f potential as the cathode, so that the cathode-heater capacitance will not be added across the input-circuit capacitance. Placing r-f chokes in series with the heater leads is suggested as a suitable method of operating heater and cathode at the same r-f potential.

TYPICAL GROUNDED-GRID CIRCUITS
Having Heater at R-F Cathode Potential



92CM-6550

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

World Radio History

6J4

RCA

6J4

AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$ VOLTS

PLATE VOLTS

350 300 250 200 150 100 50 0

PLATE MILLIAMPERES

50 40 30 20 10 0

$E_{c1} = 0$ VOLTS

-0.5

-1.0

-1.5

-2.0

-2.5

-3.0

-3.5

-4.0

-4.5

-5.0

-6.0

-7.0

FEB. 19 1944

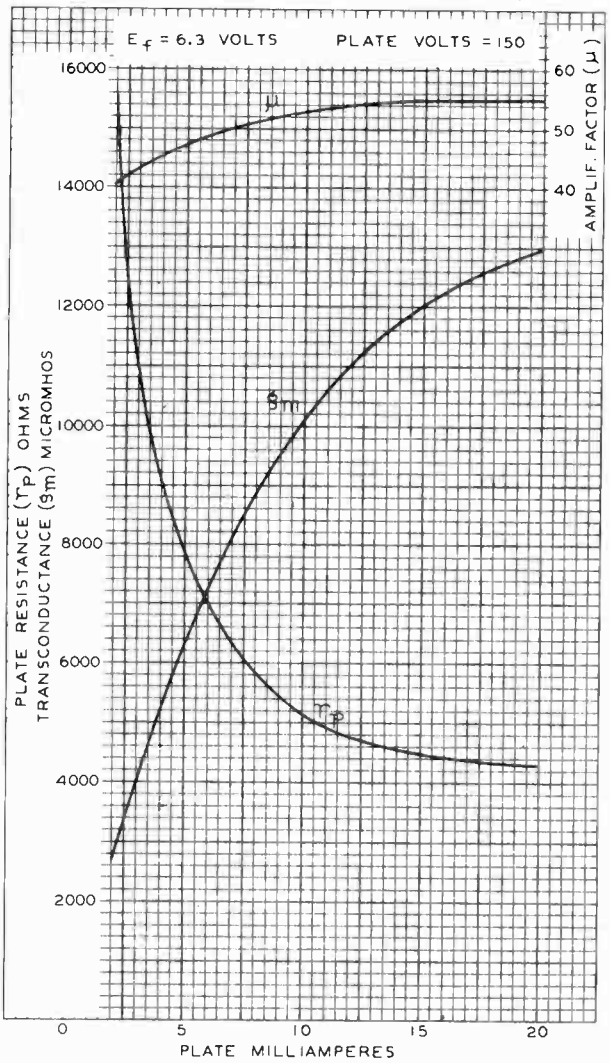
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6543

World Radio History

6J4

AVERAGE CHARACTERISTICS



MARCH 21, 1944 RCA VICTOR DIVISION 92CM-6548
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

RCA

6L4

OSCILLATOR TRIODE

ACORN TYPE

GENERAL DATA

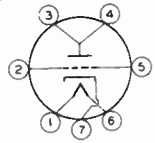
Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.225	amp
Direct Interelectrode Capacitances:*		
Grid to Plate	1.6	μμf
Grid to Cathode	1.8	μμf
Plate to Cathode	0.5	μμf

* With no external shield.

Mechanical:

Mounting Position	Any
Overall Length	1-7/32" ± 5/32"
Overall Diameter (Including radial pins)	1-3/32" ± 1/16"
Bulb	T-4-1/2
Base	Small Radial 7-Pin
Basing Designation for BOTTOM VIEW	7BR



Pin 1 – Heater
Pin 2 – Grid
Pin 3 – Plate
Pin 4 – Plate
Pin 5 – Grid
Pin 6 – Heater
Pin 7 – Cathode

AMPLIFIER – Class A_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	500 max.	volts
PLATE DISSIPATION	1.7 max.	watts
PLATE CURRENT	15 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	80 max.	volts
Heater positive with respect to cathode	80 max.	volts

Typical Operation and Characteristics:

Plate Voltage	80	volts
Cathode-Bias Resistor	150	ohms
Amplification Factor	28	
Plate Resistance	4400	ohms
Transconductance	6400	μmhos
Plate Current	9.5	ma

Maximum Circuit Values (for maximum rated conditions):

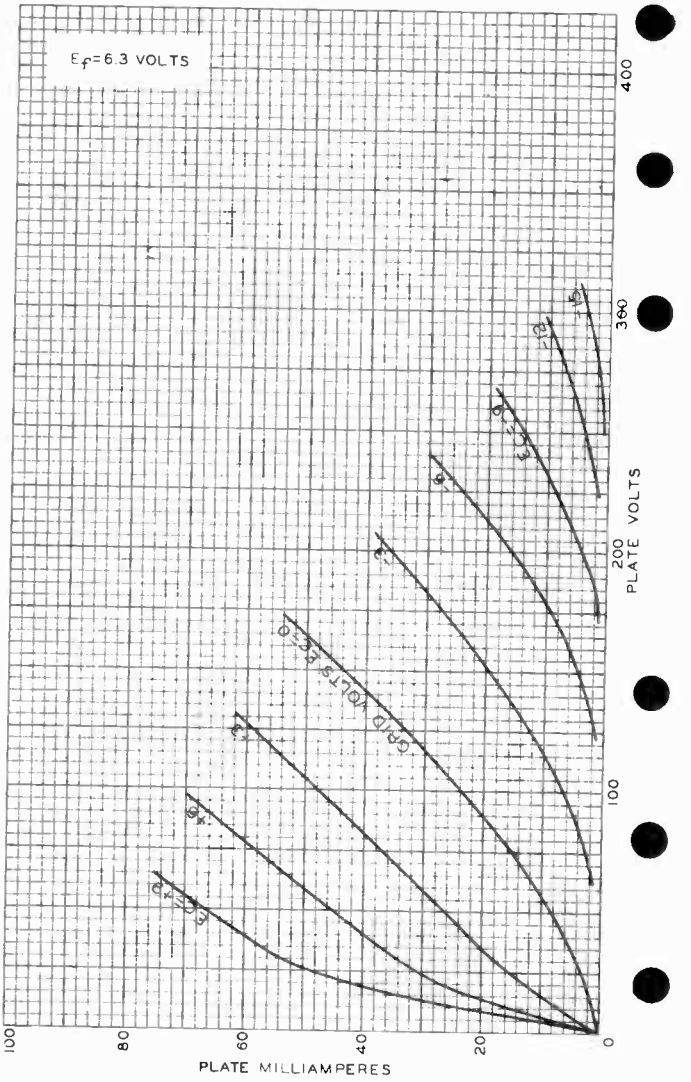
Grid-Circuit Resistance:	
For fixed bias	Not Recommended
For cathode bias	0.5 max. megohm

World Radio History

RCA

6L4

AVERAGE PLATE CHARACTERISTICS



MAR. 8, 1949

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

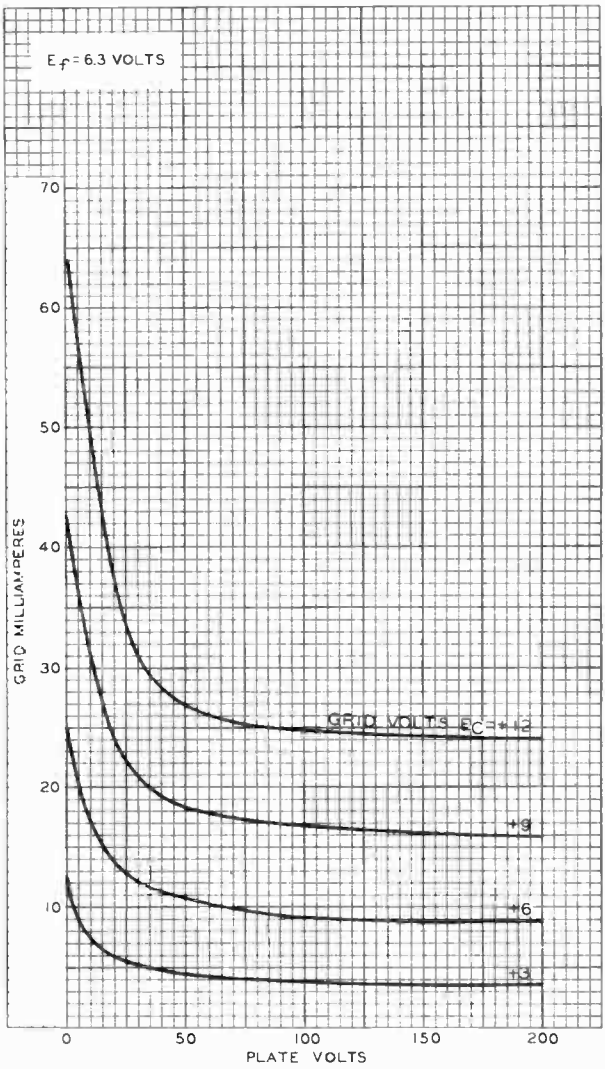
92CM-7199

World Radio History

RCA

6L4

TYPICAL CHARACTERISTICS



RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History

6BA6

Remote-Cutoff Pentode

7-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:			
Voltage (AC or DC)		6.3 ± 10%	volts ←
Current at 6.3 volts		0.3	amp
Direct Interelectrode Capacitances:			←
	Without External Shield	*With External Shield▲*	
Grid No.1 to plate	0.0035 max.	0.0035 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	5.5	5.5	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	5	5.5	μμf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	100	250	volts
Grid No.3	*Connected to cathode at socket*		
Grid-No.2 Supply Voltage	100	100	volts
Cathode Resistor	68	68	ohms
Plate Resistance (Approx.)	0.25	1	megohm
Transconductance	4300	4400	μmhos
Plate Current	10.8	11	ma
Grid-No.2 Current	4.4	4.2	ma
Grid-No.1 Voltage (Approx.) for transconductance (μmhos) = 40	-20	-20	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750" ←
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7BK ←

Pin 1 - Grid No.1
Pin 2 - Grid No.3, Internal Shield
Pin 3 - Heater

Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Cathode

← Indicates a change.

World Radio History

6BA6

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID No.3 (SUPPRESSOR GRID)	*Connect to cathode at socket*	
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts
GRID-No.2 VOLTAGE	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
GRID-No.2 INPUT:		
For grid-No.2 voltages up to 165 volts	0.7 max.	watt
For grid-No.2 voltages between 165 and 330 volts	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
PLATE DISSIPATION	3.4 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200● max.	volts

▲ With external shield JEDEC No.316 connected to cathode.

● The dc component must not exceed 100 volts.

→ Indicates a change.

World Radio History

Medium-Mu Triode—
Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-up Time

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield*	
Triode Unit:			
Grid to plate	1.5	1.5	μμf
Grid to cathode & pentode grid No.3, and heater	2	2.4	μμf
Plate to cathode & pentode grid No.3, and heater	0.5	1	μμf
Pentode Unit:			
Grid No.1 to plate	0.09 max.	0.06 max.	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	4.6	4.8	μμf
Plate to cathode & grid No.3, grid No.2, and heater	0.9	1.6	μμf
Pentode grid No.1 to triode plate	0.05 max.	0.04 max.	μμf
Pentode plate to triode plate	0.05 max.	0.008 max.	μμf
Heater to cathode	6.5	6.5*	μμf

Characteristics, Class A_1 Amplifier:

	Triode Unit	*Pentode Unit*		
Plate Voltage	125	100	125	volts
Grid No.3	–	*Connected to cathode at socket*		
Grid-No.2 Voltage	–	70	125	volts
Grid-No.1 Voltage	-1	–	-1	volt
Amplification Factor	40	–	–	
Plate Resistance (Approx.)	6000	–	300000	ohms
Transconductance	6500	5700	5500	μmhos
Plate Current	12	–	9	ma
Grid-No.2 Current	–	–	2.2	ma
Grid-No.1 Voltage (Approx.) for plate μa = 20	-7	–	-6.5	volts

← Indicates a change.

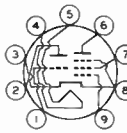
World Radio History

6CG8-A

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
→ Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9GF

Pin 1 – Triode Grid
Pin 2 – Triode Plate
Pin 3 – Cathode
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Pentode Plate
Pin 7 – Pentode Grid No.2
Pin 8 – Pentode Grid No.3, Cathode
Pin 9 – Pentode Grid No.1



→ **AMPLIFIER — Class A_1**

Maximum Ratings, *Design-Maximum Values:*

	Triode Unit	*Pentode Unit*
PLATE VOLTAGE	275 max.	275 max. volts
GRID No.3 (SUPPRESSOR GRID)	–	*Connect to cathode at socket*
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	–	275 max. volts
GRID-No.2 VOLTAGE	–	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section
GRID-No.1 (CONTROL-GRID) VOLTAGE: Positive-bias value	0 max.	0 max. volts
GRID-No.2 INPUT: For grid-No.2 voltages up to 137.5 volts	–	0.45 max. watt
For grid-No.2 voltages between 137.5 and 275 volts	–	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section
PLATE DISSIPATION	1.7 max.	2.3 max. watts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode	200 max.	200 max. volts
Heater positive with respect to cathode	200★ max.	200★ max. volts

▲ With external shield JEDEC No.315 connected to cathode except as noted.
● With external shield JEDEC No.315 connected to pentode plate.
★ The dc component must not exceed 100 volts.

Curves shown under Type 6X8 also apply to the 6CG8-A

→ Indicates a change.

World Radio History

Medium-Mu Triode—Sharp-Cutoff Tetrode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-up Time

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	6.3	volts
Current	0.45 ± 6%	amp ←
Warm-up time (Average)	11	sec

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield▲*	
Triode Unit:			
Grid to plate	1.8	1.8	μμf
Grid to cathode and heater	2.7	2.7	μμf
Plate to cathode and heater	0.4	1.2	μμf
Tetrode Unit:			
Grid No.1 to plate	0.019 max.	0.015 max.	μμf
Grid No.1 to cathode & internal shield, grid No.2, and heater	5	5	μμf
Plate to cathode & internal shield, grid No.2, and heater	2.5	3.3	μμf
Tetrode plate to triode plate	0.07 max.	0.01 max.	μμf
Heater to cathode (Each unit)	3	3●	μμf

Characteristics, Class A_1 Amplifier:

	Triode Unit	*Tetrode Unit*	
Plate Supply Voltage	125	125	volts
Grid-No.2 Supply Voltage	–	125	volts
Grid-No.1 Supply Voltage	–	-1	volt
Cathode Resistor	56	–	ohms
Amplification Factor	40	–	
Plate Resistance (Approx.)	5000	140000	ohms
Transconductance	8000	5800	μmhos
Plate Current	15	12	ma
Grid-No.2 Current	–	4.2	ma
Grid-No.1 Voltage (Approx.) for plate μa = 100	-7	-7	volts

Mechanical:

Operating Position . . . . . Any

← Indicates a change.

World Radio History

6CQ8

Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
→Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9GE

Pin 1 – Triode Plate
Pin 2 – Tetrode Grid No.1
Pin 3 – Tetrode Grid No.2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Tetrode Plate

Pin 7 – Tetrode Cathode, Internal Shield
Pin 8 – Triode Cathode
Pin 9 – Triode Grid

AMPLIFIER — Class A_1

→**Maximum Ratings,** *Design-Maximum Values:*

	Triode Unit	*Tetrode Unit*	
PLATE VOLTAGE	330 max.	330 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	–	330 max.	volts
GRID-No.2 VOLTAGE	–	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE: Positive-bias value	0 max.	0 max.	volts
GRID-No.2 INPUT: For grid-No.2 voltages up to 165 volts	–	0.7 max.	watt
For grid-No.2 voltages between 165 and 330 volts		See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID INPUT	0.55 max.	–	watt
PLATE DISSIPATION	3.1 max.	3.2 max.	watts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode	200 max.	200 max.	volts
Heater positive with respect to cathode	200* max.	200* max.	volts

Maximum Circuit Values:

	Triode Unit	*Tetrode Unit*	
Grid-No.1-Circuit Resistance: For fixed-bias operation	0.5 max.	0.25 max.	megohm
For cathode-bias operation	1 max.	1 max.	megohm

→ Indicates a change.

World Radio History

▲ With external shield JEDEC No.315 connected to cathode of unit under test except as noted.

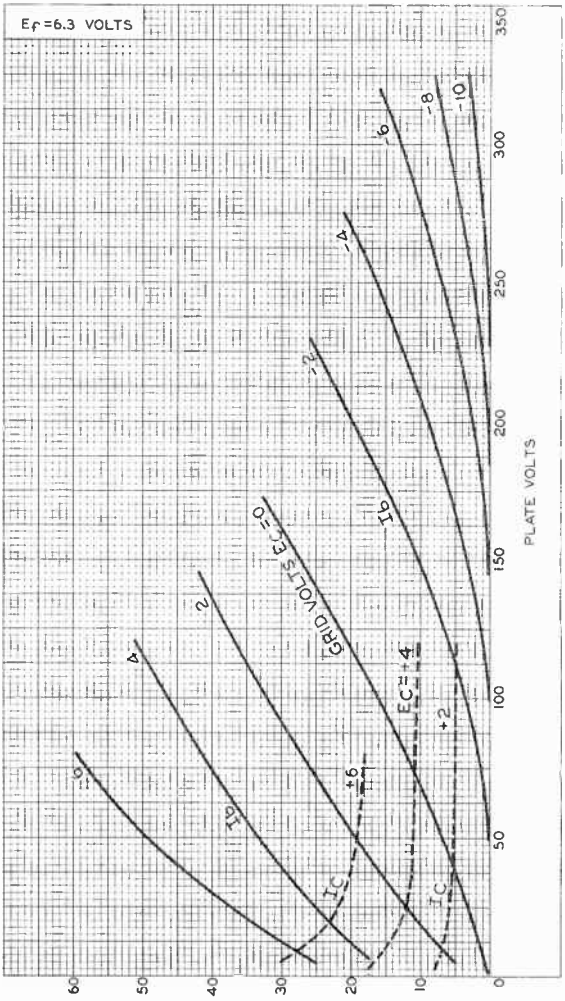
● With external shield JEDEC No.315 connected to ground.

★ The dc component must not exceed 100 volts.

World Radio History

6CQ8

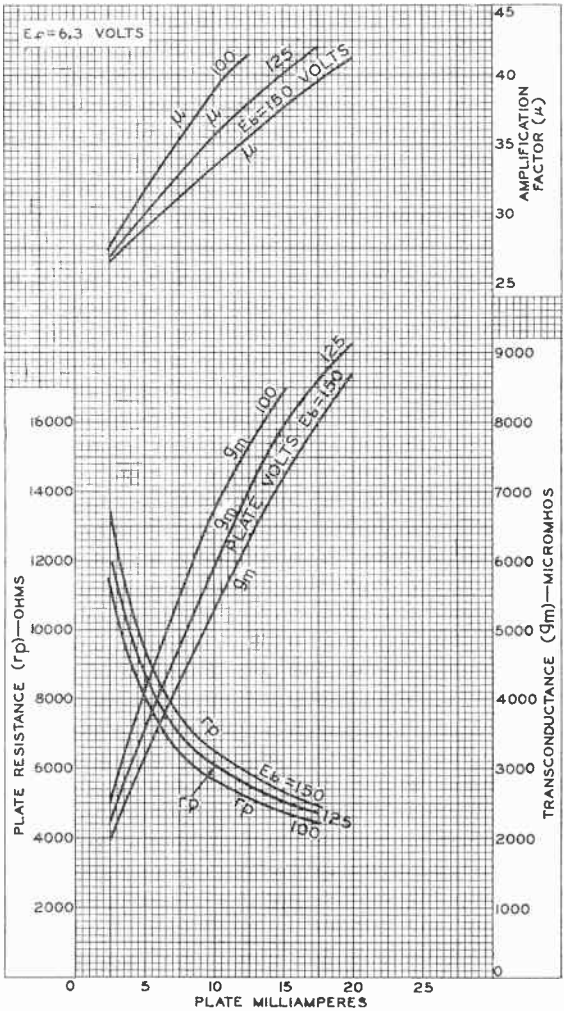
AVERAGE CHARACTERISTICS
Triode Unit



92CM-9190RI

World Radio History

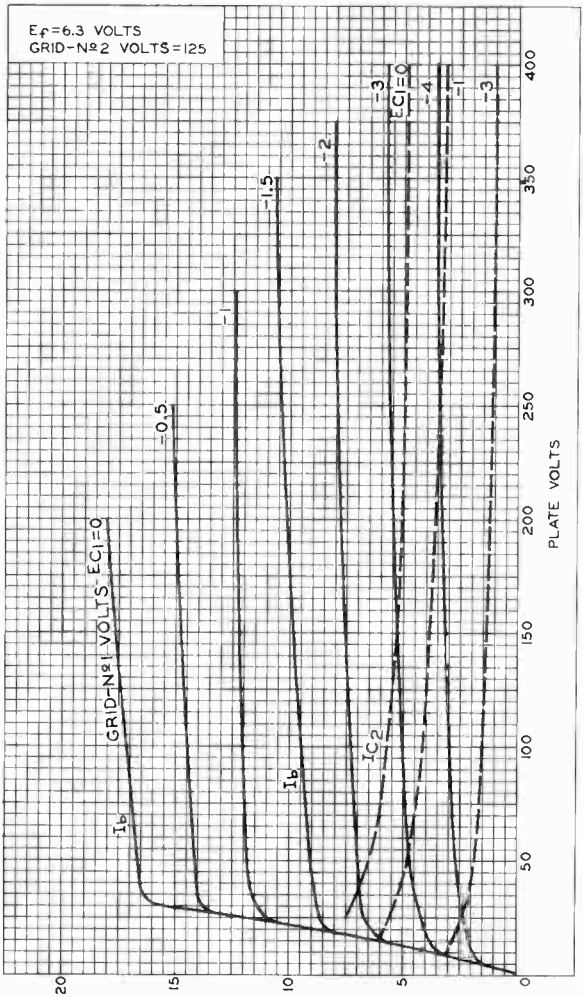
AVERAGE CHARACTERISTICS
Triode Unit



92CM-7871R1

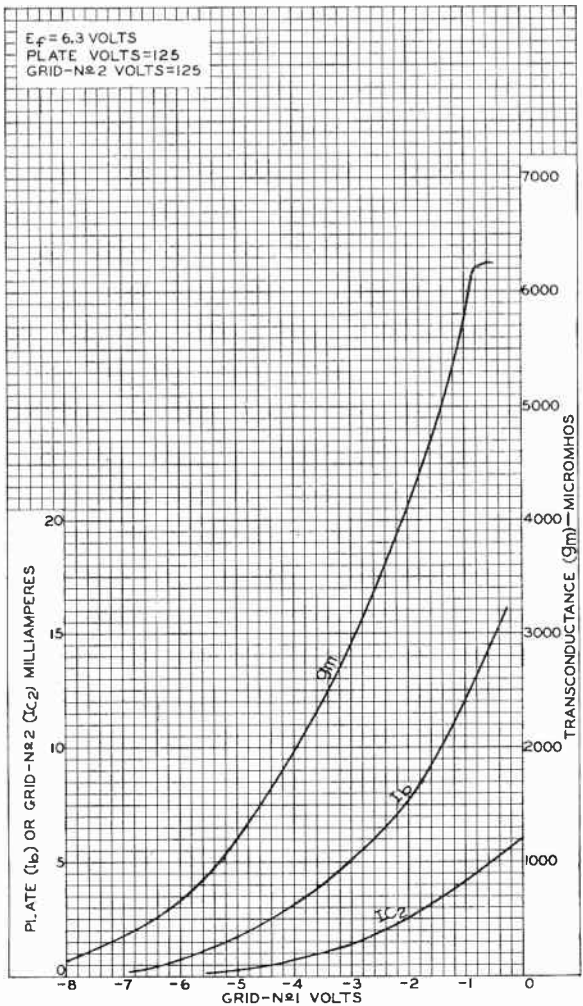
6CQ8

AVERAGE CHARACTERISTICS
Tetrode Unit



92CM-9197

AVERAGE CHARACTERISTICS
Tetrode Unit



92CM-9195

World Radio History

6DQ6-A

Beam Power Tube

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:			
Voltage (AC or DC)	6.3 ± 10%		volts
Current at 6.3 volts	1.2		amp
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 150, grid-No.2 volts = 150, grid-No.1 volts = 22.5	4.5		
Direct Interelectrode Capacitances (Approx.):[a]			
Grid No.1 to plate	0.5		μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	15		μμf
Plate to cathode & grid No.3, grid No.2, and heater	7		μμf

Characteristics, Class A_1 Amplifier:

Plate Voltage	60	250	volts
Grid-No.2 Voltage	150	150	volts
Grid-No.1 Voltage	0	-22.5	volts
Plate Resistance (Approx.)	-	20000	ohms
Transconductance	-	6600	μmhos
Plate Current	315[b]	55	ma
Grid-No.2 Current	25[b]	1.5	ma
Grid-No.1 Voltage (Approx.) for grid-No.2 volts = 150, plate ma. = 1, plate volts =			
250	-	-40	volts
5000	-	-100	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	4-1/4"
Seated Length	3-1/2" ± 3/16"
Diameter	1.438" to 1.562"
Bulb	T12
Cap	Skirted Miniature (JEDEC No.C1-3)
Base	Short Medium-Shell Octal 7-Pin with External Barriers, Style A, Arrangement 1 (JEDEC No.B7-111), Short Medium-Shell Octal 7-Pin with External Barriers, Style B, Arrangement 1 (JEDEC No.B7-119), Short Medium-Shell Octal 6-Pin With External Barriers, Style A, Arrangement 2 (JEDEC No.B6-148), or Short Medium-Shell Octal 6-Pin With External Barriers, Style B, Arrangement 2 (JEDEC No.B6-122)

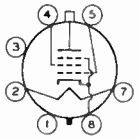
→ Indicates a change.

World Radio History

6DQ6-A

Basing Designation for BOTTOM VIEW. 6AM

Pin 1[c] - No Connection
Pin 2 - Heater
Pin 3 - No Connection
Pin 4 - Grid No.2



Pin 5 - Grid No.1
Pin 7 - Heater
Pin 8 - Cathode, Grid No.3
Cap - Plate

HORIZONTAL-DEFLECTION AMPLIFIER

→ **Maximum Ratings,** *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[d]

DC PLATE-SUPPLY VOLTAGE	770	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE[e]	6000	max.	volts
PEAK NEGATIVE-PULSE PLATE VOLTAGE	1500	max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	220	max.	volts
PEAK NEGATIVE-PULSE GRID-No.1 VOLTAGE	330	max.	volts
CATHODE CURRENT:			
Peak	540	max.	ma
Average	155	max.	ma
GRID-No.2 INPUT	3.6	max.	watts
PLATE DISSIPATION[f]	18	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[g]	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220	max.	°C

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:			
For grid resistor-bias operation	1	max.	megohm

[a] Without external shield.

[b] This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded.

[c] On the 6-pin bases, pin 1 as well as pin 6 is omitted.

[d] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

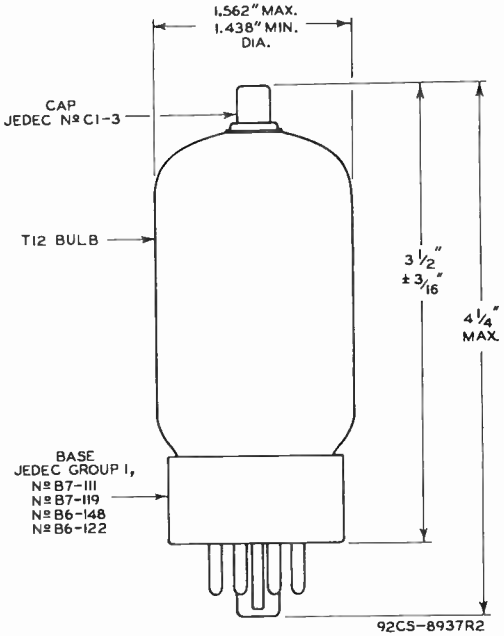
[e] This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

[f] An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

[g] The dc component must not exceed 100 volts.

→ Indicates a change.

World Radio History



World Radio History

World Radio History

6DQ6-B

Beam Power Tube

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:			
Voltage (AC or DC)	6.3 ± 10%		volts
Current at 6.3 volts	1.2		amp
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 150, grid-No.2 volts = 150, grid-No.1 volts = -22.5	4.4		
Direct Interelectrode Capacitances (Approx.):[a]			
Grid No.1 to plate	0.5		μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	15		μμf
Plate to cathode & grid No.3, grid No.2, and heater	7		μμf

Characteristics, Class A_1 Amplifier:

Plate Voltage	60	250	volts
Grid-No.2 Voltage	150	150	volts
Grid-No.1 Voltage	0	-22.5	volts
Plate Resistance (Aporox.)	-	18000	ohms
Transconductance	-	7300	μmhos
Plate Current	345[b]	65	ma
Grid-No.2 Current	27[b]	1.8	ma
Grid-No.1 Voltage (Approx.) for grid-No.2 volts = 150, plate ma. = 1, plate volts =			
250	-	-42	volts
5000	-	-100	volts

Mechanical:

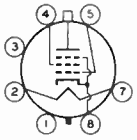
Operating Position	Any
Maximum Overall Length	4-1/4"
Seated Length	3-1/2" ± 3/16"
Diameter	1.438" to 1.562"
Bulb	T12
Cap	Skirted Miniature (JEDEC No.C1-3)
Base	Short Medium-Shell Octal 7-Pin with External Barriers, Style A, Arrangement 1 (JEDEC No.B7-111), Short Medium-Shell Octal 7-Pin with External Barriers, Style B, Arrangement 1 (JEDEC No.B7-119), Short Medium-Shell Octal 6-Pin with External Barriers, Style A, Arrangement 2 (JEDEC No.B6-148), or Short Medium-Shell Octal 6-Pin with External Barriers, Style B, Arrangement 2 (JEDEC No.B6-122)

World Radio History

6DQ6-B

Basing Designation for BOTTOM VIEW. 6AM

Pin 1[c] - No Connection
Pin 2 - Heater
Pin 3 - No Connection
Pin 4 - Grid No.2



Pin 5 - Grid No.1
Pin 7 - Heater
Pin 8 - Cathode, Grid No.3
Cap - Plate

HORIZONTAL-DEFLECTION AMPLIFIER

Maximum Ratings, *Design-Maximum Values:*

	For operation in a 525-line, 30-frame system[d]		
DC PLATE-SUPPLY VOLTAGE	770	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE[e]	6500	max.	volts
PEAK NEGATIVE-PULSE PLATE VOLTAGE	1500	max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	220	max.	volts
PEAK NEGATIVE-PULSE GRID-No.1 VOLTAGE	330	max.	volts
CATHODE CURRENT:			
Peak	610	max.	ma
Average	175	max.	ma
GRID-No.2 INPUT	3.6	max.	watts
PLATE DISSIPATION[f]	18	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[g]	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220	max.	°C

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:			
For grid resistor-bias operation	1	max.	megohm

[a] Without external shield.

[b] This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded.

[c] On the 6-pin bases, pin 1 as well as pin 6 is omitted.

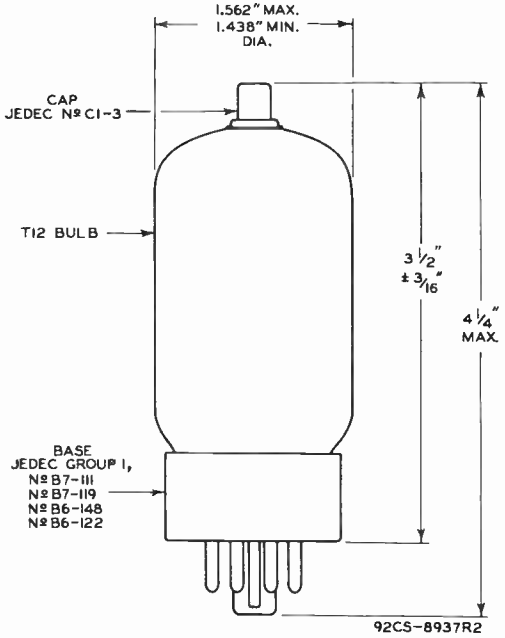
[d] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

[e] 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.

[f] An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

[g] The dc component must not exceed 100 volts.

World Radio History



World Radio History

World Radio History

Beam Power Tube

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:			
Voltage (AC or DC)	6.3 ± 10%		volts
Current at 6.3 volts	1.2		amp
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 150, grid-No.2 volts = 150, grid-No.1 volts = -22.5	4.4		
Direct Interelectrode Capacitances (Approx.):[a]			
Grid No.1 to plate	0.5		μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	17		μμf
Plate to cathode & grid No.3, grid No.2, and heater	7		μμf

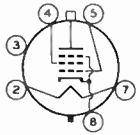
Characteristics, Class A_1 Amplifier:

Plate Voltage	60	250	volts
Grid-No.2 Voltage	150	150	volts
Grid-No.1 Voltage	0	-22.5	volts
Plate Resistance (Approx.)	-	15000	ohms
Transconductance	-	7100	μmhos
Plate Current	390[b]	70	ma
Grid-No.2 Current	32[b]	2.1	ma
Grid-No.1 Voltage (Approx.) for plate ma. = 1	-	-42	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	4-1/4"
Seated Length	3-1/2" ± 3/16"
Diameter	1.438" to 1.562"
Bulb	T12
Cap	Skirted Miniature (JEDEC No.C1-3)
Base	Short Medium-Shell Octal 6-Pin with External Barriers, Style B, Arrangement 2 (JEDEC No.B6-122)
Basing Designation for BOTTOM VIEW	6AM

Pin 2 - Heater
Pin 3 - No Connection
Pin 4 - Grid No.2
Pin 5 - Grid No.1



Pin 7 - Heater
Pin 8 - Cathode, Grid No.3
Cap - Plate

World Radio History

HORIZONTAL-DEFLECTION AMPLIFIER

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[c]

DC PLATE-SUPPLY VOLTAGE	770	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE[d]	6500	max.	volts
PEAK NEGATIVE-PULSE PLATE VOLTAGE	1500	max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	220	max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-55	max.	volts
PEAK NEGATIVE-PULSE GRID-No.1 VOLTAGE	330	max.	volts
CATHODE CURRENT:			
Peak	550	max.	ma
Average	175	max.	ma
GRID-No.2 INPUT	3.5	max.	watts
PLATE DISSIPATION[e]	17.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[f]	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	240	max.	°C

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:			
For grid resistor-bias operation	1	max.	megohm

[a] Without external shield.

[b] This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded.

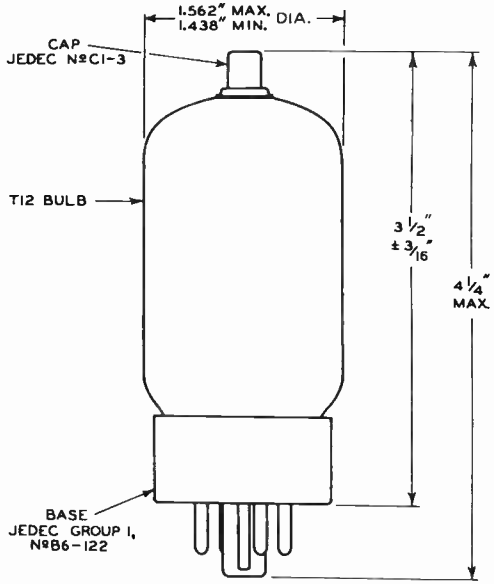
[c] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

[d] 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.

[e] An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

[f] The dc component must not exceed 100 volts.

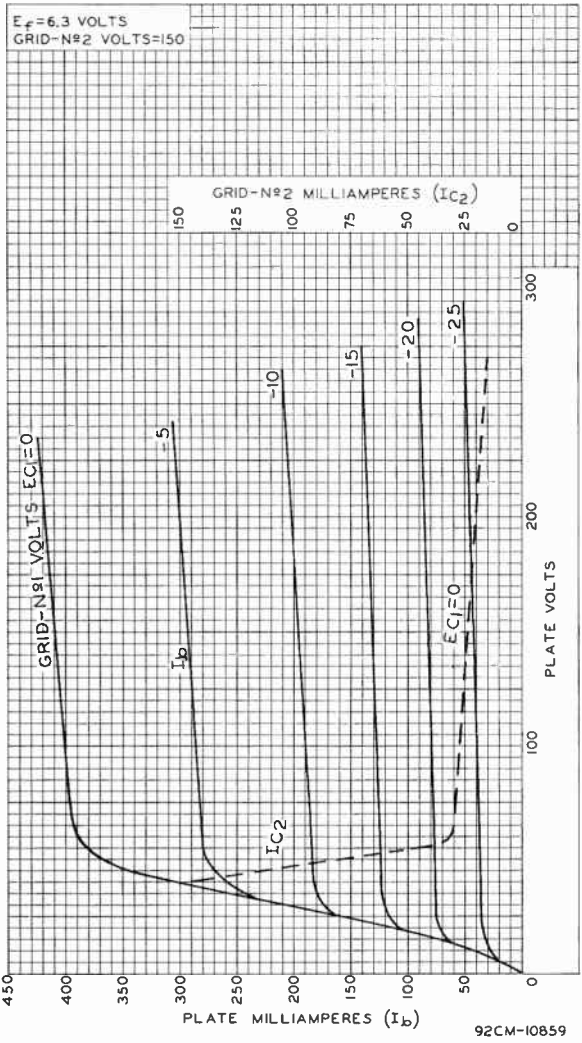
World Radio History



World Radio History

6GW6

AVERAGE CHARACTERISTICS



High-Mu Triode—
Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.75	amp
Direct Interelectrode Capacitances:▲		
Triode Unit:		
Grid to plate	3.5	μμf
Grid to cathode, pentode cathode & grid No.3 & internal shield, and heater	2.8	μμf
Plate to cathode, pentode cathode & grid No.3 & internal shield, and heater	2.6	μμf
Pentode Unit:		
Grid No.1 to plate	0.1 max.	μμf
Grid No.1 to cathode & internal shield & grid No.3, grid No.2, and heater	10	μμf
Plate to cathode & internal shield & grid No.3, grid No.2, and heater	4.2	μμf
Triode grid to pentode plate	0.015 max.	μμf

Characteristics, Class A_1 Amplifier:

	Triode Unit	*Pentode Unit*		
Plate Supply Voltage	200	45	200	volts
Grid-No.2 Supply Voltage	–	125	125	volts
Grid-No.1 Voltage	-2	0	–	volts
Cathode Resistor	–	–	68	ohms
Amplification Factor	70	–	–	
Plate Resistance (Approx.)	17500	–	75000	ohms
Transconductance	4000	–	12500	μmhos
Plate Current	4	40●	25	ma
Grid-No.2 Current	–	15●	7	ma
Grid-No.1 Voltage (Approx.) for plate μa = 100	–	–	-9	volts
Grid-No.1 Voltage (Approx.) for plate μa = 20	-6	–	–	volts

Mechanical:

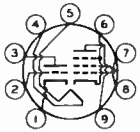
Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"

World Radio History

6HF8

Length, Base Seat to Bulb Top (Excluding tip) . . . 2" ± 3/32"
Diameter . . . . . 0.750" to 0.875"
Dimensional Outline. . . . . .See *General Section*
Bulb T6-1/2
Base . . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW 9DX

Pin 1 – Triode Cathode
Pin 2 – Triode Grid
Pin 3 – Triode Plate
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Pentode Cathode, Grid No.3, Internal Shield
Pin 7 – Pentode Grid No.1
Pin 8 – Pentode Grid No.2
Pin 9 – Pentode Plate

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

	Triode Unit	*Pentode Unit*	
PLATE VOLTAGE.	330 max.	330 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	–	330 max.	volts
GRID-No.2 VOLTAGE.	–	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE: Positive-bias value. . . .	0 max.	0 max.	volts
GRID-No.2 INPUT: For grid-No.2 voltages up to 165 volts.	–	1.1 max.	watts
For grid-No.2 voltages between 165 and 330 volts.	–	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
PLATE DISSIPATION.	1 max.	5 max.	watts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode . . .	200 max.	200 max.	volts
Heater positive with respect to cathode . . .	200* max.	200* max.	volts

Maximum Circuit Values:

	Triode Unit	*Pentode Unit*	
Grid-No.1-Circuit Resistance:			
For fixed-bias operation .	0.5 max.	0.25 max.	megohm
For cathode-bias operation.	1 max.	1 max.	megohm

World Radio History

▲ Without external shield.

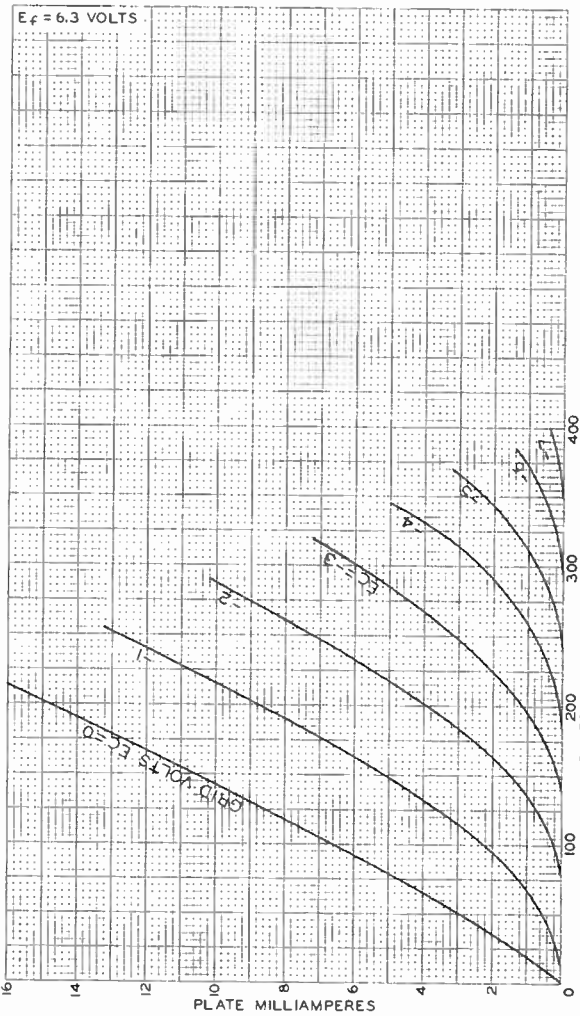
● This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded.

★ The dc component must not exceed 100 volts.

World Radio History

6HF8

AVERAGE PLATE CHARACTERISTICS
Triode Unit

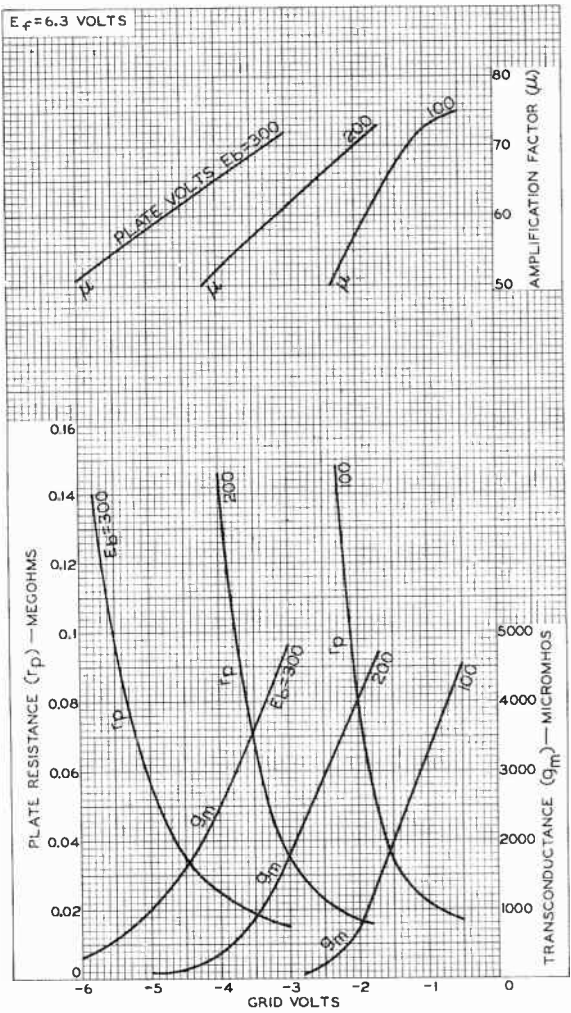


92CM-8644

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

World Radio History

AVERAGE CHARACTERISTICS
Triode Unit

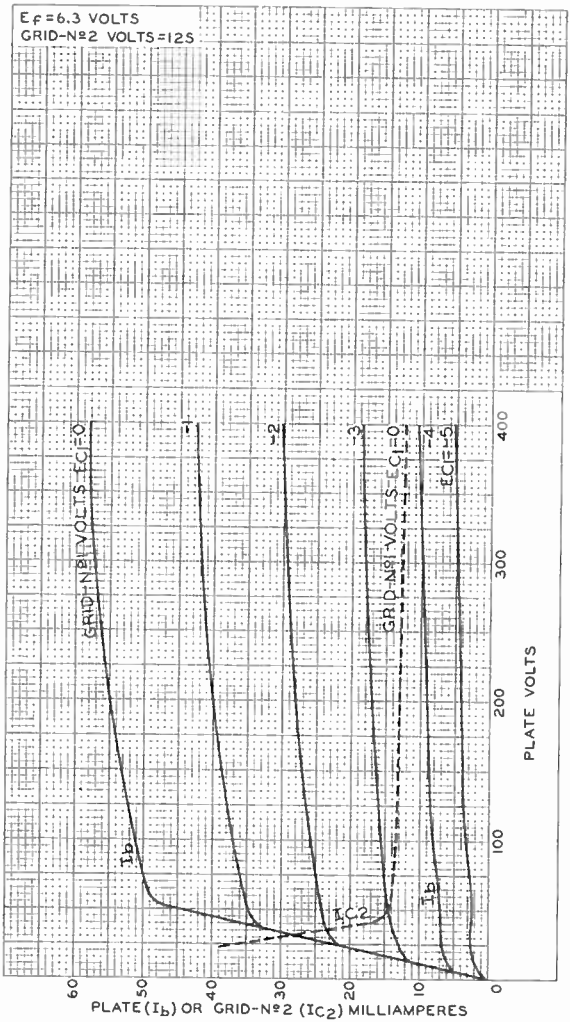


92CM-10874

World Radio History

6HF8

AVERAGE CHARACTERISTICS
Pentode Unit

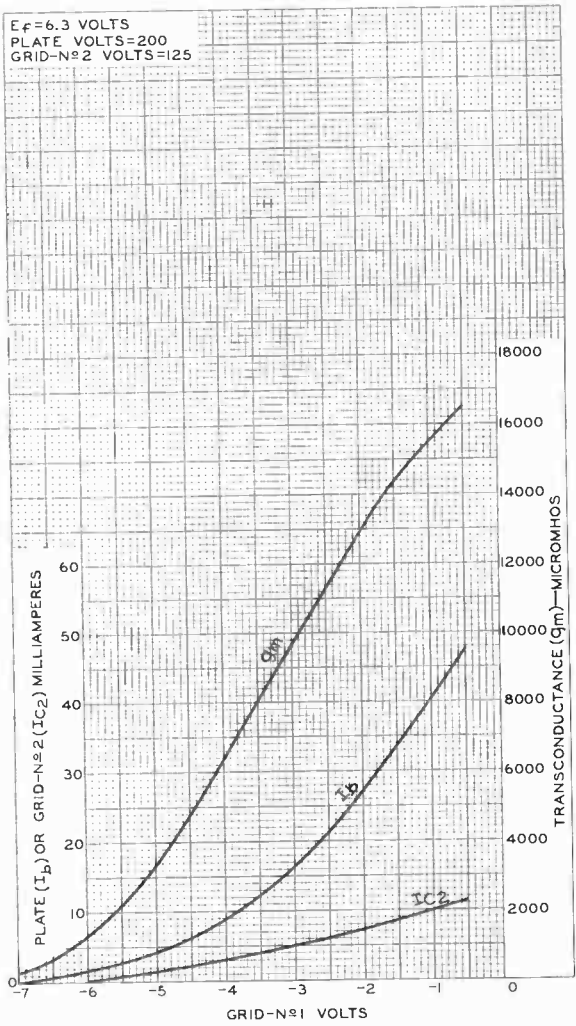


92CM-9906

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

World Radio History

AVERAGE CHARACTERISTICS
Pentode Unit



92CM-9905RI

World Radio History

World Radio History

10DE7

Dual Triode

With Medium-Mu Unit and Low-Mu Unit

9-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 10DE7 is the same as the 6DE7 except for the following items:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	9.7	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

Dual Triode

With Medium-Mu Unit and Low-Mu Unit

For Equipment Having Series Heater-String Arrangement

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	9.7	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

Direct Interelectrode Capacitances (Approx.):

	Unit No.1	Unit No.2	
Grid to plate	4.4	9.5	μμf
Grid to cathode and heater	2.2	7	μμf
Plate to cathode and heater	0.6	1.6	μμf

Characteristics, Class A_1 Amplifier:

	Unit No.1	Unit No.2	
Plate Voltage	250	150	volts
Grid Voltage	-11	-17.5	volts
Amplification Factor	17.5	6	
Plate Resistance (Approx.)	8750	800	ohms
Transconductance	2000	7500	μmhos
Plate Current	5.5	45	ma
Plate Current for grid volts = -25	-	8	ma
Plate Current for plate volts = 60 and grid volts = 0	-	95•	ma
Grid Voltage (Approx.) for plate μa = 10	-20	-	volts
Grid Voltage (Approx.) for plate μa = 100	-	-40	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	3"
Maximum Seated Length	2-7/16"
Maximum Diameter	1-9/32"
Bulb	T9
Base	Short Intermediate-Shell Octal 8-Pin with External Barriers (JEDEC Group 1, No.B8-58)
Basing Designation for BOTTOM VIEW	8BD

Pin 1 - Grid of Unit No.2
Pin 2 - Plate of Unit No.2
Pin 3 - Cathode of Unit No.2
Pin 4 - Grid of Unit No.1

Pin 5 - Plate of Unit No.1
Pin 6 - Cathode of Unit No.1
Pin 7 - Heater
Pin 8 - Heater

World Radio History

10EG7

VERTICAL-DEFLECTION OSCILLATOR

Values are for Unit No.1

Maximum Ratings, *Design-Maximum Values:*

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

DC PLATE VOLTAGE	330	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	400	max.	volts
CATHODE CURRENT:			
Peak	77	max.	ma
Average	22	max.	ma
PLATE DISSIPATION	1.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200♦	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:			
For cathode-bias operation	2.2	max.	megohms

VERTICAL-DEFLECTION AMPLIFIER

Values are for Unit No.2

Maximum Ratings, *Design-Maximum Values:*

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

DC PLATE VOLTAGE	330	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE♦	1500	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	250	max.	volts
CATHODE CURRENT:			
Peak	175	max.	ma
Average	50	max.	ma
PLATE DISSIPATION	10	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200♦	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:			
For cathode-bias operation	2.2	max.	megohms

▲ Without external shield.

● This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded.

★ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

♦ The dc component must not exceed 100 volts.

♦ This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 15 per cent of one vertical scanning cycle is 2.5 milliseconds.

DIMENSIONAL OUTLINE

shown under Type 6EM7 also applies to the 10EG7

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

World Radio History

10HF8

High-Mu Triode—
Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 10HF8 is the same as the 6HF8 except for the following items:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	10.5	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

11CY7

Dual Triode

With High-Mu Unit and Low-Mu Unit

9-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 11CY7 is the same as the 6CY7 except for the following items:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	11	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

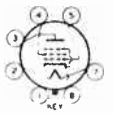
World Radio History

World Radio History

12A6

BEAM POWER AMPLIFIER

Heater#	Coated Unipotential Cathode	
Voltage	12.6	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances (Approx.):°		
Grid to Plate	0.3	μμf
Input	9.0	μμf
Output	9.0	μμf
Maximum Overall Length		3-1/4"
Maximum Seated Height		2-11/16"
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Base		Small Wafer Octal 7-Pin
Pin 1 - Shell		Pin 5 - Grid
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Plate		Pin 8 - Cathode
Pin 4 - Screen		
Mounting Position		Any



BOTTOM VIEW (7AC)

Maximum Ratings Are Design-Center Values

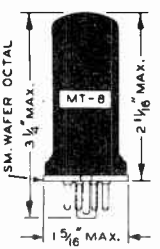
AMPLIFIER

Plate Voltage	250 max.	volts
Screen Voltage	250 max.	volts
Plate Dissipation	7.5 max.	watts
Screen Dissipation	1.5 max.	watts
Operating Conditions and Characteristics-Class A_1 Amplifier:		
Plate	250	volts
Screen	250	volts
Grid *	-12.5	volts
Peak A-F Grid Voltage	12.5	volts
Zero-Signal Plate Current	30	ma.
Max.-Signal Plate Current	32	ma.
Zero-Signal Screen Current	3.5 approx.	ma.
Max.-Signal Screen Current	5.5 approx.	ma.
Plate Resistance	70000 approx.	ohms
Transconductance	3000	μmhos
Load Resistance	7500	ohms
Total Harmonic Distortion	7	%
Max.-Signal Power Output	3.4	watts ←

In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

* The d-c resistance in the grid circuit should not exceed 0.1 megohm when fixed bias is used, or 0.5 megohm when cathode bias is used.

° With shell connected to cathode.



← Indicates a change.

World Radio History

12A6

AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION

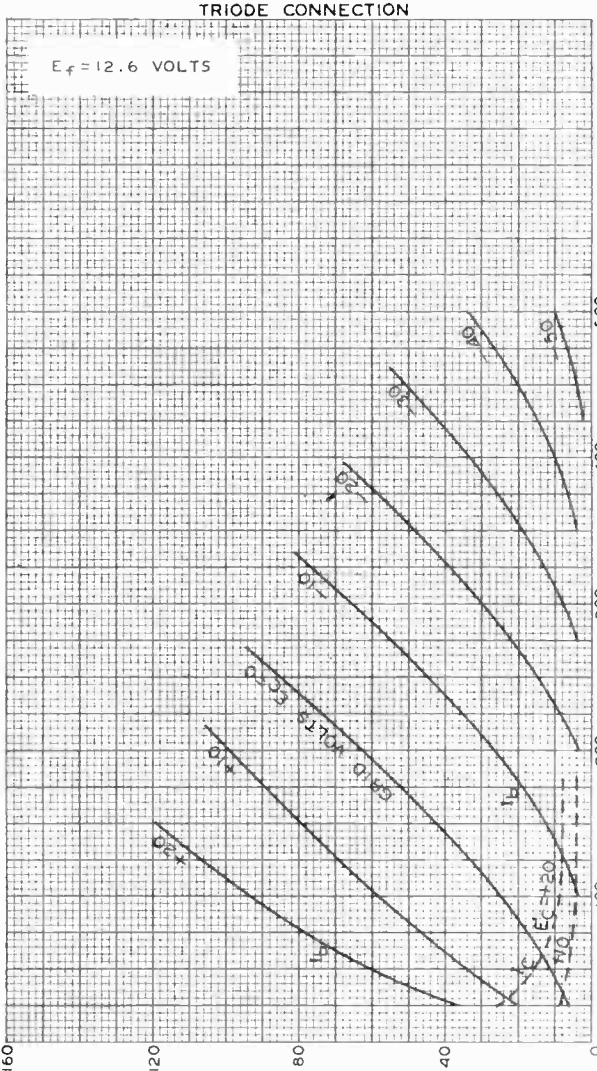
OCT. 14, 1941
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.
92C-6329

World Radio History

12A6

AVERAGE PLATE CHARACTERISTICS

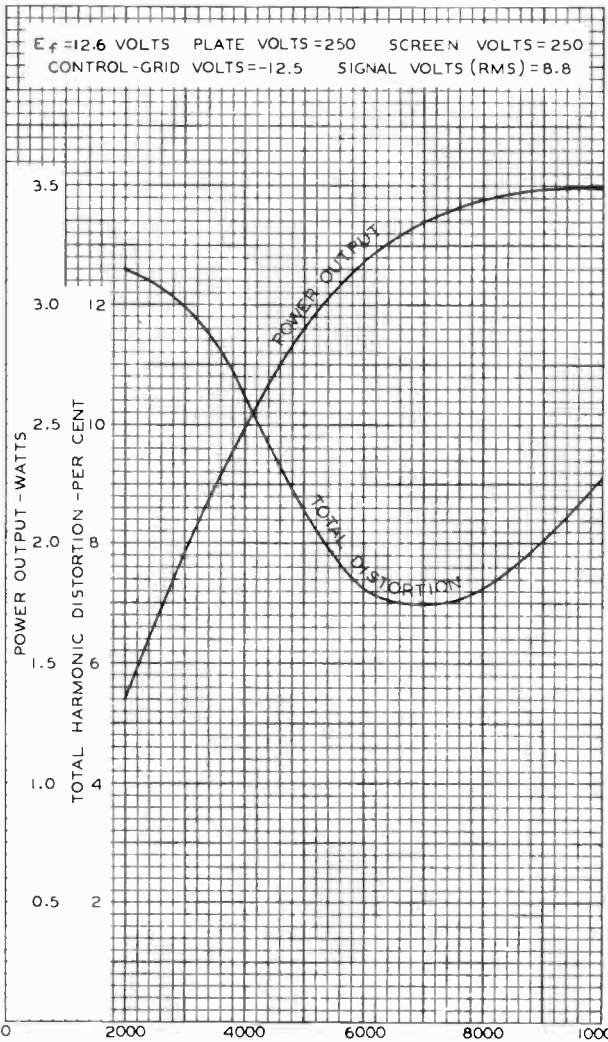
TRIODE CONNECTION



World Radio History

12A6

OPERATION CHARACTERISTICS



12AE7

Dual Triode

With Medium-Mu Unit and Low-Mu Unit

9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating Directly from 6-Cell Storage Batteries

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Voltage range (DC)	10 to 15.9	volts
For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.		
Current (Approx.) at 12.6 volts	0.45	amp

Direct Interelectrode Capacitances (Approx.):

	Unit No.1	*Unit No.2*	
Grid to plate	3.9	3.4	μμf
Grid to cathode and heater	4.7	4.2	μμf
Plate to cathode and heater	0.75	0.85	μμf

Characteristics, Class A_1 Amplifier:

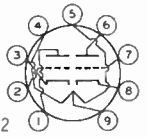
With heater voltage of 12.6 volts

	Unit No.1	*Unit No.2*	
Plate Voltage	12.6	12.6	volts
Grid Resistor	1.5	1	megohms
Amplification Factor	13	6.4	
Plate Resistance (Approx.)	3150	985	ohms
Transconductance	4000	6500	μmhos
Plate Current	1.9	7.5	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pins 4 & 9 – Heater of Unit No.2



Pins 5 & 9 – Heater of Unit No.1
Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Tap

World Radio History

AUDIO DRIVER

Values are for Each Unit

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	16 max.	volts
GRID VOLTAGE:		
Positive-bias value	0 max.	volts
PLATE DISSIPATION	1 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	16 max.	volts
Heater positive with respect to cathode	16 max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance	1.5 max.	megohms

World Radio History

12AX4-GTA

Half-Wave Vacuum Rectifier

For Damper Service in TV Equipment Having Series Heater-String Arrangement

The 12AX4-GTA is the same as the 6AX4-GT except for the following items:

Heater, for Unipotential Cathode:

Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

12AX4-GTB

Half-Wave Vacuum Rectifier

For Damper Service in TV Equipment Having Series Heater-String Arrangement

The 12AX4-GTB is the same as the 6AX4-GTB except for the following items:

Heater, for Unipotential Cathode:

Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

Full-Wave Vacuum Rectifier

9-PIN MINIATURE TYPE

The 12BW4 is the same as the 6BW4 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.45	amp

World Radio History

World Radio History

12BY7-A

Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:			
Heater arrangement	*Series*	*Parallel*	
Voltage (AC or DC)	12.6 ± 10%	6.3	volts
Current	0.3	0.6 ± 6%	amp
Warm-up time (Average)	-	11	sec
Direct Interelectrode Capacitances:[a]			
Grid No.1 to plate		0.063	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater		10.2	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater		3.5	μμf

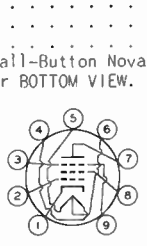
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	250	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Supply Voltage	180	volts
Cathode Resistor	100	ohms
Plate Resistance (Approx.)	93000	ohms
Transconductance	11000	μmhos
Plate Current	26	ma
Grid-No.2 Current	5.75	ma
Grid-No.1 Voltage (Approx.) for plate μa = 20	-11.6	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9BF

Pin 1 - Cathode
Pin 2 - Grid No.1
Pin 3 - Grid No.3, Internal Shield
Pin 4 - Heater
Pin 5 - Heater



Pin 6 - Heater Tap
Pin 7 - Plate
Pin 8 - Grid No.2
Pin 9 - Grid No.3, Internal Shield

← Indicates a change.

World Radio History

12BY7-A

→ **AMPLIFIER — Class A_1**

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330	max.	volts
GRID No.3 (SUPPRESSOR GRID)	*Connect to cathode at socket*		
GRID-No.2 (SCREEN-GRID) VOLTAGE	190	max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:			
Negative-bias value	55	max.	volts
Positive-bias value	0	max.	volts
GRID-No.2 INPUT	1.2	max.	watts
PLATE DISSIPATION	6.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[b]	max.	volts

Maximum Circuit Values:

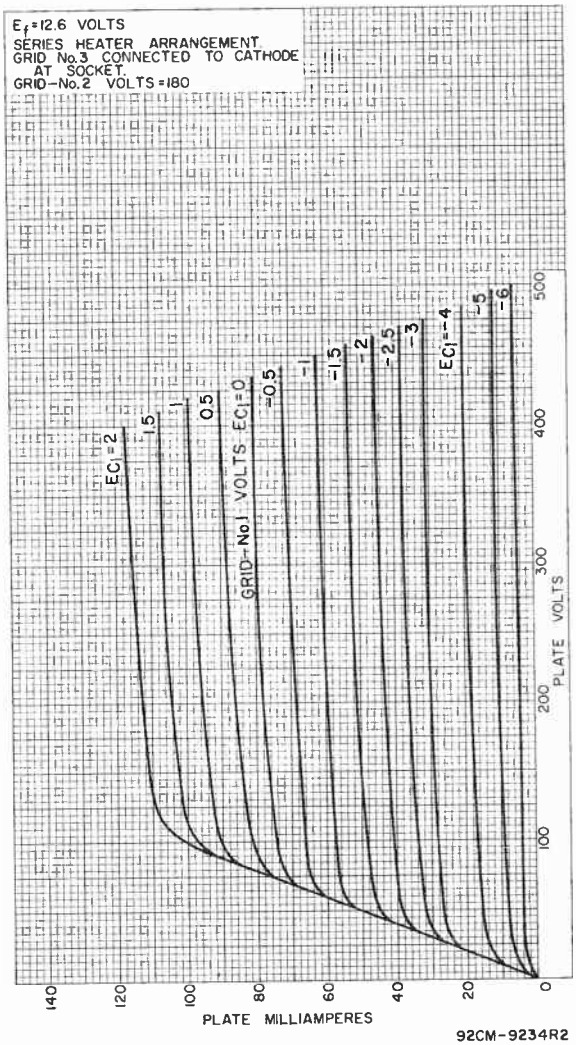
Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.25	max.	megohm
For cathode-bias operation	1	max.	megohm

[a] Without external shield.
[b] The dc component must not exceed 100 volts.

→ Indicates a change.

World Radio History

AVERAGE PLATE CHARACTERISTICS

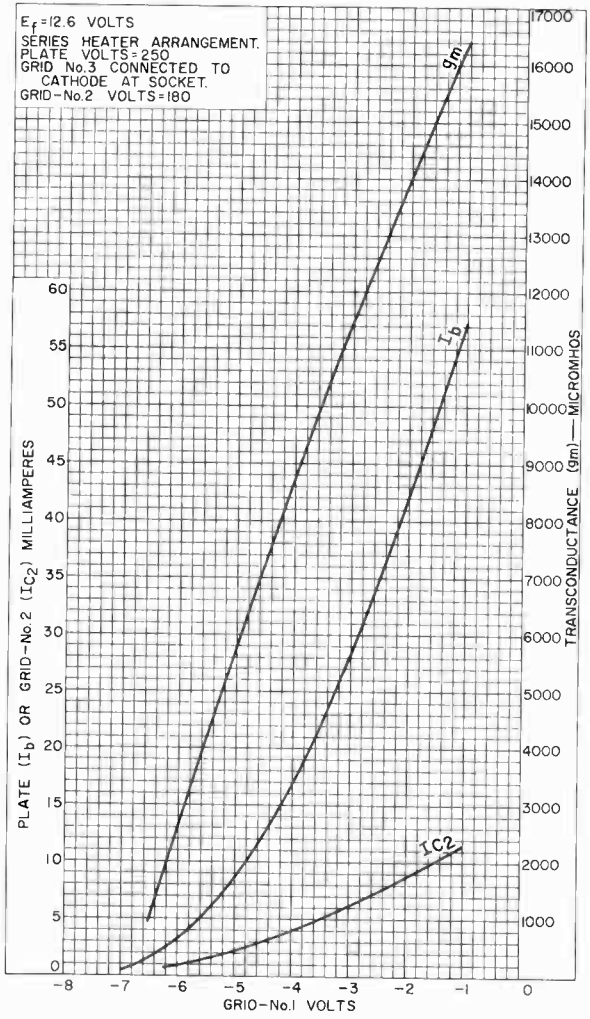


92CM-9234R2

World Radio History

12BY7-A

AVERAGE CHARACTERISTICS



92CM-11051

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

Semiremote-Cutoff Pentode

7-PIN MINIATURE TYPE

The 12BZ6 is the same as the 6BZ6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6 ± 10%	volts
Current.	0.15	amp

World Radio History

World Radio History

Diode—Remote-Cutoff Pentode

9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating Directly from 6-Cell Storage Batteries

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage range	10 to 15.9	volts
For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.		
Current (Approx.) at 12.6 volts	0.2	amp
Direct Interelectrode Capacitances:▲		
Pentode Unit:		
Grid No.1 to plate	0.006 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	5.5	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	5.7	μμf
Diode Unit:		
Plate to cathode, pentode grid No.3 & internal shield, and heater	3.7	μμf
Cathode to plate and heater	5.7	μμf
Pentode grid No.1 to diode plate	0.018 max.	μμf
Pentode plate to diode plate	0.012 max.	μμf
Pentode grid No.1 to diode cathode	0.13 max.	μμf
Pentode plate to diode cathode	0.0016 max.	μμf

Characteristics, Class A_1 Amplifier (Pentode Unit):

Heater Voltage	12.6	volts
Plate Voltage	12.6	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Voltage	12.6	volts
Grid-No.1 Voltage: Developed across a 2.2-megohm grid resistor	−0.8	volt
Plate Resistance (Approx.)	0.3	megohm
Transconductance	1500	μmhos
Plate Current	1.3	ma
Grid-No.2 Current	0.5	ma
Grid-No.1 Voltage (Approx.) for transconductance (μmhos) = 10	−6	volts

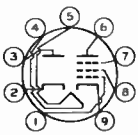
Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*

World Radio History

12DE8

Bulb. T6-1/2
Base. . . . . .Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW. 9HG



Pin 1 – Pentode Grid No.1
Pin 2 – Diode Cathode
Pin 3 – Diode Plate
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Pentode Plate
Pin 7 – Pentode Grid No.3, Internal Shield
Pin 8 – Pentode Grid No.2
Pin 9 – Pentode Cathode

PENTODE UNIT — AMPLIFIER — Class A_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	30 max.	volts
GRID No.3 (SUPPRESSOR GRID) . . .	*Connect to cathode at socket*	
GRID-No.2 (SCREEN-GRID) VOLTAGE	30 max.	volts
CATHODE CURRENT	20 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	30 max.	volts
Heater positive with respect to cathode.	30 max.	volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance.	10 max.	megohms

DIODE UNIT

Maximum Ratings, *Design-Center Values:*

PLATE CURRENT	5 max.	ma

Characteristics, Instantaneous Test Condition:

Plate Current for plate volts = 5	20	ma

▲ Without external shield.

World Radio History

Twin Diode—Power Tetrode

9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating Directly from 6-Cell Storage Batteries

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage range (DC)	10 to 15.9	volts
For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.		
Current (Approx.) at 12.6 volts	0.5	amp

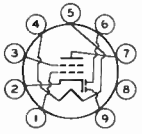
Characteristics, Class A_1 Amplifier (Tetrode Unit):

Heater Voltage	12.6	volts
Plate Voltage	12.6	volts
Grid-No.2 Voltage	12.6	volts
Grid-No.1 Resistor (Bypassed)	2.2	megohms
Plate Resistance (Approx.)	4000	ohms
Transconductance	5000	μmhos
Plate Current	6	ma
Grid-No.2 Current	1	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9HZ

Pin 1 – Tetrode Grid No.1
Pin 2 – Cathode
Pin 3 – Tetrode Grid No.2
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Diode-No.2 Plate
Pin 7 – Tetrode Plate
Pin 8 – Internal Connection—Do Not Use
Pin 9 – Diode-No.1 Plate

TETRODE UNIT — AMPLIFIER — Class A_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	30 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	30 max.	volts
PLATE CURRENT	10 max.	ma
PLATE DISSIPATION	0.5 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	30 max.	volts
Heater positive with respect to cathode	30 max.	volts

World Radio History

12DK7

Typical Operation:

Heater Voltage	12.6	volts
Plate Voltage	12.6	volts
Grid-No.2 Voltage	12.6	volts
Grid-No.1 Voltage	*Obtained by rectification through 15-megohm grid-No.1 resistor*	
Peak AF Grid-No.1 Voltage from 0.2-megohm signal source	1.4	volts
Zero-Signal Plate Current	6	ma
Max.-Signal Plate Current	2.5	ma
Load Resistance	3500	ohms
Total Harmonic Distortion	10	%
Max.-Signal Power Output	10	mw

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	15 max.	megohms

DIODE UNITS — Two

Values are for Each Unit

Characteristics, Instantaneous Test Condition:

Heater Voltage	12.6	volts
Plate Current for plate volts = 10	1	ma

World Radio History

12DQ6-A

Beam Power Tube

For Equipment Having Series Heater-String Arrangement

The 12DQ6-A is the same as the 6DQ6-A except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

12DQ6-B

Beam Power Tube

For Equipment Having Series Heater-String Arrangement

The 12DQ6-B is the same as the 6DQ6-B except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

Twin Diode—Power Tetrode

9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating Directly from 6-Cell Storage Batteries

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage range (DC)	10 to 15.9	volts
For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.		
Current (Approx.) at 12.6 volts	0.25	amp
Direct Interelectrode Capacitances:▲		
Tetrode Unit:		
Grid No.1 to plate	0.6	μμf
Grid No.1 to cathode, grid No.2, and heater	11	μμf
Plate to cathode, grid No.2, and heater	3.6	μμf
Tetrode grid No.1 to diode-No.1 plate	0.22 max.	μμf
Tetrode grid No.1 to diode-No.2 plate	0.12 max.	μμf

Characteristics, Class A_1 Amplifier (Tetrode Unit):

Heater Voltage	12.6	volts
Plate Voltage	12.6	volts
Grid-No.2 Voltage	12.6	volts
Grid-No.1 Resistor (Bypassed)	2.2	megohms
Plate Resistance (Approx.)	6000	ohms
Transconductance	6200	μmhos
Plate Current	12	ma
Grid-No.2 Current	1.5	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9JX

Pin 1 – Tetrode Grid No.1
Pin 2 – Cathode
Pin 3 – Tetrode Grid No.2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Tetrode Plate

Pin 7 – Diode-No.2 Plate
Pin 8 – Internal Connection—Do Not Use
Pin 9 – Diode-No.1 Plate

World Radio History

12DU7

TETRODE UNIT — AUDIO DRIVER

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	16 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	16 max.	volts
Heater positive with respect to cathode	16 max.	volts

Typical Operation:

Heater Voltage	12.6	volts
Plate Voltage	12.6	volts
Grid-No.2 Voltage	12.6	volts
Grid-No.1 Voltage	*Obtained by rectification through 2.2-megohm grid-No.1 resistor*	
Peak AF Grid-No.1 Voltage	2.2	volts
Load Resistance	2700	ohms
Total Harmonic Distortion	10	%
Max.-Signal Power Output	25	mw

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	10 max.	megohms

DIODE UNITS — Two

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE CURRENT	1 max.	ma

Characteristics, Instantaneous Test Condition:

Heater Voltage	12.6	volts
Plate Current for plate volts = 10	1.3	ma

▲ Without external shield.

World Radio History

Dual Triode

With High-Mu Unit and Medium-Mu Unit

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

	Series	*Parallel*	
Heater arrangement			
Voltage (AC or DC)	12.6	6.3 ± 10%	volts
Current	0.15 ± 6%	0.3	amp

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	*With External Shield*[a]	
Unit No.1:			
Grid to plate	1.7	1.7	μμf
Grid to cathode and heater	1.6	1.8	μμf
Plate to cathode and heater	0.44	2	μμf
Unit No.2:			
Grid to plate	1.5	1.5	μμf
Grid to cathode and heater	1.7	1.8	μμf
Plate to cathode and heater	0.4	2.4	μμf

Characteristics, Class A_1 Amplifier:

	Unit No.1		*Unit No.2*		
Plate Voltage	100	250	100	250	volts
Grid Voltage	-1	-2	0	-8.5	volts
Amplification Factor	100	100	20	17	
Plate Resistance (Approx.)	80000	62500	6500	7700	ohms
Transconductance	1250	1600	3100	2200	μmhos
Plate Current	0.5	1.2	11.8	10.5	ma
Grid Voltage (Approx.) for plate μa = 10	-	-	-	-24	volts

Mechanical:

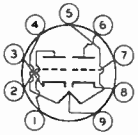
Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

World Radio History

12DW7

Basing Designation for BOTTOM VIEW. 9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pins 4 & 9 – Heater of Unit No.2
Pins 5 & 9 – Heater of Unit No.1



Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Tap

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

	Unit No.1	*Unit No.2*	
PLATE VOLTAGE.	330 max.	330 max.	volts
GRID VOLTAGE:			
Negative-bias value.	55 max.	–	volts
Positive-bias value.	0 max.	–	volts
CATHODE CURRENT.	–	22 max.	ma
PLATE DISSIPATION.	1.2 max.	3.3 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200 max.	200 max.	volts
Heater positive with respect to cathode	200[b] max.	200[b] max.	volts

Maximum Circuit Values:

	Unit No.1	*Unit No.2*	
Grid-Circuit Resistance:			
For fixed-bias operation . .	0.25 max.	0.25 max.	megohm
For cathode-bias operation .	1 max.	1 max.	megohm

[a] With external shield JEDEC No.315 connected to cathode of unit under test.
[b] The dc component must not exceed 100 volts.

World Radio History

Medium-Mu Triode—Remote-Cutoff Tetrode

9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating Directly from 6-Cell Storage Batteries

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Voltage range (DC)	10 to 15.9	volts
For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.		
Current (Approx.) at 12.6 volts	0.35	amp

Direct Interelectrode Capacitances (Approx.):[a]

Triode Unit:		
Grid to plate	1.5	μμf
Grid to cathode & internal shield, and heater	2	μμf
Plate to cathode & internal shield, and heater	2	μμf
Tetrode Unit:		
Grid No.1 to plate	0.74	μμf
Grid No.1 to cathode, grid No.2, and heater	11	μμf
Plate to cathode, grid No.2, and heater	3	μμf

Characteristics, Class A_1 Amplifier:

With heater voltage of 12.6 volts

	Triode Unit	*Tetrode Unit*	
Plate Voltage	12.6	12.6	volts
Grid-No.2 Voltage	–	12.6	volts
Grid-No.1 Voltage	0	–	volts
Grid-No.1 Resistor	–	2.2	megohms
Amplification Factor	20	–	
Plate Resistance (Approx.)	10000	5000	ohms
Transconductance	2000	6000	μmhos
Plate Current	1.2	14	ma
Grid-No.2 Current	–	2	ma
Grid Voltage (Approx.) for plate μa = 10	-2	–	volts
Grid-No.1 Voltage (Approx.) for plate μa = 20	–	-9	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"

World Radio History

12DY8

Diameter. . . . . 0.750" to 0.875"
Dimensional Outline . . . . . See *General Section*
Bulb. T6-1/2
Base. . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW. 9JD

Pin 1 – Tetrode Grid No.1
Pin 2 – Tetrode Cathode
Pin 3 – Tetrode Grid No.2
Pin 4 – Heater
Pin 5 – Heater

Pin 6 – Tetrode Plate
Pin 7 – Triode Cathode, Internal Shield
Pin 8 – Triode Plate
Pin 9 – Triode Grid No.1

TETRODE UNIT — RELAY-CONTROL SERVICE

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	16 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	16 max.	volts
Heater positive with respect to cathode	16 max.	volts

Typical Operation:

Heater Voltage	10	15	volts
Plate Supply Voltage	10	15	volts
Grid-No.2 Voltage	10	15	volts
Grid-No.1 Voltage	–	-6	volts
Grid-No.1 Resistor	10	–	megohms
Plate Load Resistor	700	700	ohms
Plate Current	5 min.	3 max.	ma

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	10 max.	megohms

TRIODE UNIT — AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	16 max.	volts
Heater positive with respect to cathode	16 max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance	10 max.	megohms

[a] without external shield.

World Radio History

Medium-Mu Triode—
Semiremote-Cutoff Pentode

9-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating Directly from 6-Cell Storage Batteries

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Voltage range (DC)	10 to 15.9	volts
For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.		
Current (Approx.) at 12.6 volts	0.225	amp

Direct Interelectrode Capacitances:[a]

Triode Unit:		
Grid to plate	1.7	μμf
Grid to cathode and heater	2.6	μμf
Plate to cathode and heater	0.4	μμf
Pentode Unit:		
Grid No.1 to plate	0.02 max.	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater	4.6	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater	2.6	μμf
Heater to cathode (Each unit)	2.6	μμf

Characteristics, Class A_1 Amplifier:

With heater voltage of 12.6 volts

	Triode Unit	*Pentode Unit*	
Plate Supply Voltage	12.6	12.6	volts
Grid-No.2 Voltage	-	12.6	volts
Grid-No.1 Supply Voltage	0	0	volts
Grid-No.1 Resistor	4700	33000	ohms
Amplification Factor	25	-	
Plate Resistance (Approx.)	6000	750000	ohms
Transconductance	4700	2000	μmhos
Plate Current	2.4	0.66	ma
Grid-No.2 Current	-	0.28	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-2.2	-1.6	volts

Mechanical:

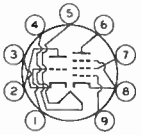
Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

World Radio History

12EC8

Basing Designation for BOTTOM VIEW. 9FA

Pin 1 – Triode Grid
Pin 2 – Triode Plate
Pin 3 – Triode Cathode
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Pentode Plate
Pin 7 – Pentode Grid No.2
Pin 8 – Pentode Cathode, Grid No.3, Internal Shield
Pin 9 – Pentode Grid No.1



AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

	Triode Unit	*Pentode Unit*	
PLATE VOLTAGE.	16 max.	16 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE. . .	–	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	16 max.	16 max.	volts
Heater positive with respect to cathode	16 max.	16 max.	volts

Maximum Circuit Values:

	Triode Unit	*Pentode Unit*	
Grid-No.1-Circuit Resistance	1 max.	1 max.	megohm

[a] Without external shield.

World Radio History

Pentagrid Converter

7-PIN MINIATURE TYPE

For Automobile Radio Receivers Operating Directly from 6-Cell Storage Batteries

GENERAL DATA

Electrical:

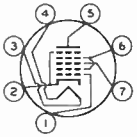
Heater, for Unipotential Cathode:
Voltage range (DC). . . . . 10 to 15.9 volts
For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.
Current (Approx.) at 12.6 volts . . . . . 0.15 amp

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield*[a]	
Grid No.3 to all other electrodes (RF input)	8	8	μμf
Plate to all other electrodes (Mixer output) . . .	8	13	μμf
Grid No.1 to all other electrodes (Oscillator input) .	5	5	μμf
Grid No.3 to plate.	0.3 max.	0.25 max.	μμf
Grid No.3 to grid No.1.	0.15 max.	0.15 max.	μμf
Grid No.1 to plate.	0.1 max.	0.05 max.	μμf
Grid No.1 to cathode & grid No.5. .	2.5	2.5	μμf
Cathode & grid No.5 to all other electrodes except grid No.1 . .	15	20	μμf

Mechanical:

Operating Position. . . . . Any
Maximum Overall Length. . . . . 2-1/8"
Maximum Seated Length . . . . . 1-7/8"
Length, Base Seat to Bulb Top (Excluding tip) . . 1-1/2" ± 3/32"
Diameter. . . . . 0.650" to 0.750"
Dimensional Outline . . . . . See *General Section*
Bulb. T5-1/2
Base. . . . . Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW. 7CH



Pin 1 - Grid No.1
Pin 2 - Cathode, Grid No.5
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2, Grid No.4
Pin 7 - Grid No.3

CONVERTER

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE . . . . . 16 max. volts

World Radio History

12GA6

GRID-No.3 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	16 max.	volts
Positive-bias value	0 max.	volts
GRIDS-No.2 & No.4 (SCREEN-GRID) VOLTAGE	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	16 max.	volts
Heater positive with respect to cathode	16 max.	volts

Typical Operation and Characteristics:

With separate excitation[b] and with heater voltage of 12.6 volts

Plate Voltage	12.6	volts
Grids-No.2 & No.4 Voltage	12.6	volts
Grid-No.3 Supply Voltage	0	volts
Grid-No.3 Resistor (Bypassed)	2.2	megohms
RMS Grid-No.1 (Oscillator-Grid) Voltage	1.6	volts
Grid-No.1 Resistor	33000	ohms
Plate Resistance (Approx.)	1	megohm
Conversion Transconductance	140	μmhos
Grid-No.3 Voltage (Approx.) for conversion transconductance (μmhos) =		
5	-3	volts
20	-2.5	volts
Plate Current	0.3	ma
Grids-No.2 & No.4 Current	0.8	ma
Grid-No.1 Current	0.06	ma

Oscillator Characteristics (Not Oscillating):

With grids No.2 & No.4 connected to plate and with heater voltage of 12.6 volts

Plate and Grids-No.2 & No.4 Voltage	12.6	volts
Grid-No.3 Voltage	0	volts
Grid-No.1 Voltage	0	volts
Amplification Factor between grid No.1 and grids No.2 & No.4 connected to plate	9	
Transconductance between grid No.1 and grids No.2 & No.4 connected to plate	2400	μmhos
Cathode Current	3.6	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-3.3	volts

Maximum Circuit Values:

Grid-No.3-Circuit Resistance	10 max.	megohms

[a] With external shield JEDEC No.316 connected to cathode & grid No.5.

[b] The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited oscillator circuit operating with zero bias.

World Radio History

Beam Power Tube

For Equipment Having Series Heater-String Arrangement

The 12GW6 is the same as the 6GW6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

12L8-GT

TWIN-PENTODE POWER AMPLIFIER

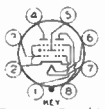
Heater	Coated Unipotential Cathode		
Voltage	12.6		a-c or d-c volts
Current	0.15		amp.

Direct Interelectrode Capacitances (Approx.):°

	Pentode Unit P_1	*Pentode Unit P_2*	
Grid to Plate	0.7	0.7	μμf
Input	5.0	5.0	μμf
Output	6.0	6.0	μμf
Grid to Grid	0.08		μμf
Plate to Plate	1.5		uu f
Grid P_1 to Plate P_2	0.2		μμf
Grid P_2 to Plate P_1	0.1		uμf

Maximum Overall Length	3-5/16"
Maximum Seated Height	2-3/4"
Maximum Diameter	1-5/16"
Bulb	T-9
Base	Intermediate Shell Octal 8-Pin

Pin 1 - Grid P_1
Pin 2 - {Cathode, Suppressor P_1 & P_2}
Pin 3 - Grid P_2



BOTTOM VIEW (8BU)

Pin 4 - Plate P_2
Pin 5 - Screen P_1 & P_2
Pin 6 - Heater
Pin 7 - Heater
Pin 8 - Plate P_1

Mounting Position: Any

For convenience, one pentode unit is identified as P_1; the other as P_2.

Maximum Ratings Are Design-Center Values

AMPLIFIER - Each Unit

Plate Voltage	180 max.	volts
Screen Voltage	180 max.	volts
Plate Dissipation	2.5 max.	watts
Screen Dissipation	1.0 max.	watt
D-C Heater-Cathode Potential	100 max.	volts

Typical Operation and Characteristics - Class A_1 Amplifier:

Plate Voltage	180	volts
Screen Voltage	180	volts
Grid Voltage (Grid No.1)	-9	volts
Peak A-F Grid Voltage	9	volts
Zero-Sig. Plate Cur.	13	ma.
Max.-Sig. Plate Cur.	13.5	ma.
Zero-Sig. Screen Cur.	2.8	ma.
Max.-Sig. Screen Cur.	4.6	ma.
Plate Resistance	0.16	megohm
Transconductance	2150	μmhos
Load Resistance	10000	ohms
Power Output (Total harmonic dist. 10%)	1.0	watt

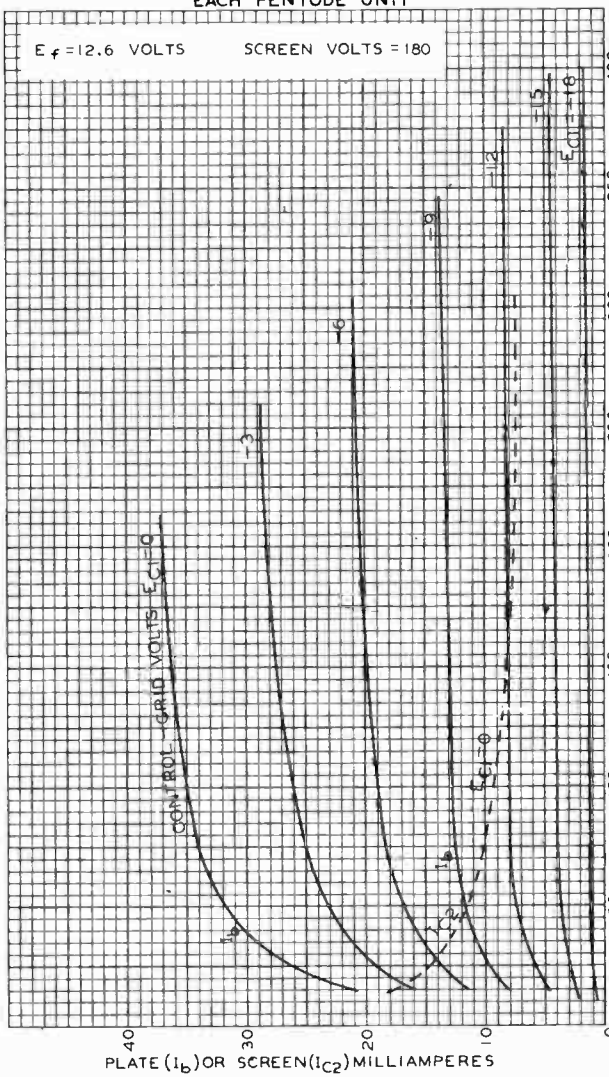
° with no external shield.

World Radio History

12L8-GT

12L8-GT

AVERAGE PLATE CHARACTERISTICS
EACH PENTODE UNIT



OCT. 1, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6391

World Radio History

12SW7

DUPLEX-DIODE TRIODE

For use with 12-cell storage-battery supply

GENERAL DATA

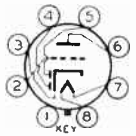
Electrical:

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.15	amp.
Direct Interelectrode Capacitances–Triode Unit:[o]		
Grid to Plate	2.4	μμf
Grid to Cathode	3.0	μμf
Plate to Cathode	2.8	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-1/16"
Maximum Diameter	1-5/16"
Bulb	Metal Shell, MT8G
Base	Small Wafer Octal 8-Pin
Basing Designation for BOTTOM VIEW	8Q

Pin 1 – Shell
Pin 2 – Triode Grid
Pin 3 – Cathode
Pin 4 – Diode Plate No.2
Pin 5 – Diode Plate No.1
Pin 6 – Triode Plate
Pin 7 – Heater
Pin 8 – Heater



CLASS A_1 AMPLIFIER

Maximum Ratings, ***Design-Center Values:***

PLATE VOLTAGE	250 max. volts
PLATE DISSIPATION	2.5 max. watts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode	90 max. volts
Heater positive with respect to cathode	90 max. volts

Characteristics:

Plate Voltage	26.5	250	volts
Grid Voltage:			
From a fixed supply of	–	-9	volts
From a grid resistor of	2	–	megohms
Amplification Factor	17	16	
Plate Resistance	15500	8500	ohms
Transconductance	1100	1900	μmhos
Plate Current	1.1	9.5	ma.

Typical Operation with Resistance Coupling:

See RESISTANCE-COUPLED AMPLIFIER CHART, Type 6R7.

[o] with shell connected to cathode. Values are approximate.

WorldRadioHistory

12SW7

12SW7

DUPLEX-DIODE TRIODE

DIODE UNITS - Two

The two diode plates are placed around a cathode, the sleeve of which is common to the triode unit. Each diode plate has its own base pin. Diode curves in the front of the RECEIVING TUBE SECTION apply to the 12SW7.

Additional curves applying to the 12SW7 are shown under Types 6R7, and 6SR7

World Radio History

RCA

12SX7-GT

TWIN-TRIODE AMPLIFIER

For use with 12-cell storage-battery supply

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	12.6	ac or dc volts
Current	0.3	amp

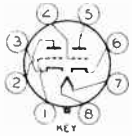
Direct Interelectrode Capacitances (Approx.):[o]

	Triode Unit No.1	Triode Unit No.2	
Grid to Plate	3.6	3.6	μμf
Grid to Cathode	3.0	2.8	μμf
Plate to Cathode	0.8	1.2	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	3-5/16"
Maximum Seated Length	2-3/4"
Maximum Diameter	1-5/16"
Bulb	T-9
Base	Intermediate Shell Octal 8-Pin
Basing Designation for BOTTOM VIEW	8BD

Pin 1 – Grid of Unit No.2
Pin 2 – Plate of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4 – Grid of Unit No.1



Pin 5 – Plate of Unit No.1
Pin 6 – Cathode of Unit No.1
Pin 7 – Heater
Pin 8 – Heater

CLASS A_1 AMPLIFIER

Values are for each unit

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	300 max.	volts
GRID VOLTAGE:		
Negative bias value	50 max.	volts
Positive bias value	0 max.	volts
CATHODE CURRENT	20 max.	ma.
PLATE DISSIPATION	2.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical Operation and Characteristics:

Plate Voltage	26.5	90	250	volts
Grid Voltage:				
From a fixed supply of	–	0	-8	volts
From a grid resistor of	0.05	–	–	megohm
Amplification Factor	21	20	20	
Plate Resistance	11500	6700	7700	ohms

[o] With no external shield.

World Radio History

12SX7-GT

12SX7-GT

TWIN-TRIODE AMPLIFIER

Transconductance	1800	3000	2600	μmhos
Plate Current.	1.8	10	9.0	ma.

Maximum Circuit Values (for maximum rated conditions):

Grid-Circuit Resistance per unit. . . . . 1.0 max. megohm

Typical Operation with Resistance Coupling:

See RESISTANCE-COUPLED AMPLIFIER CHART, Type 6F8-G.

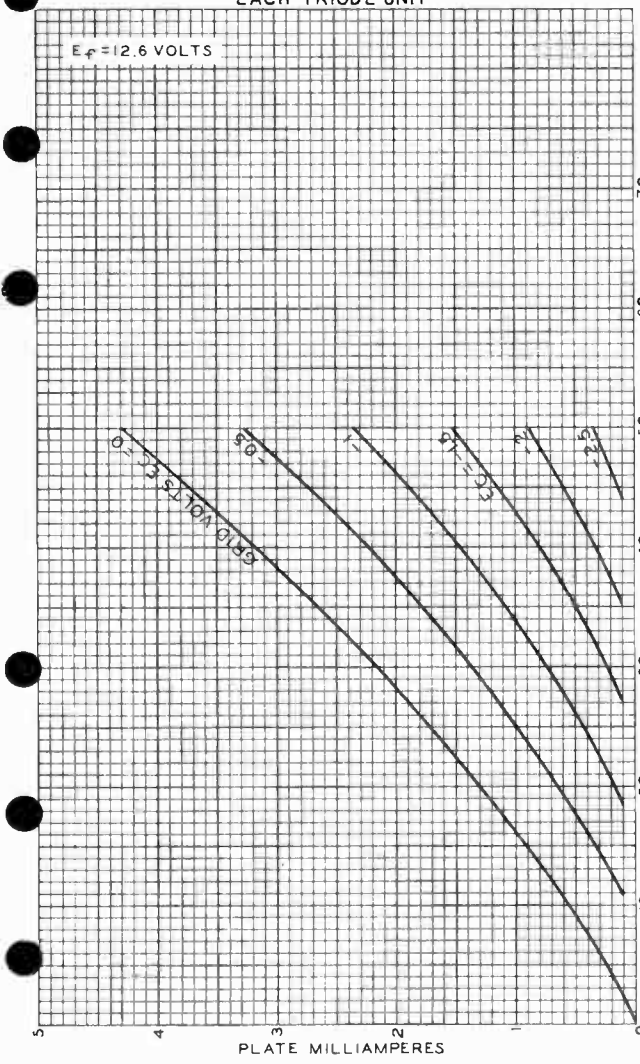
The curves under Types 6J5 and 6SN7-GT also apply to each unit of the 12SX7-GT

World Radio History

RCA

12SX7-GT

AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



World Radio History

RCA

12SY7
PENTAGRID CONVERTER

SINGLE-ENDED METAL TYPE

For use with 12-cell storage-battery supply

GENERAL DATA

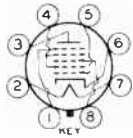
Electrical:

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.15	amp
Direct Interelectrode Capacitances:		
Grid No.3 to All Other Electrodes (RF Input)	9.5●	μμf
Plate to All Other Electrodes (Mixer Output)	12●	μμf
Grid No.1 to All Other Electrodes (Osc. Input)	7●	μμf
Grid No.3 to Plate	0.13 max.●	μμf
Grid No.1 to Grid No.3	0.15 max.●	μμf
Grid No.1 to Plate	0.06 max.●	μμf
Grid No.1 to Shell, Grid No.5, and All Other Electrodes Except Cathode	4.4	μμf
Grid No.1 to Cathode	2.6	μμf
Cathode to Shell, Grid No.5, and All Other Electrodes Except Cathode	5	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-1/16"
Maximum Diameter	1-5/16"
Bulb	Metal Shell, MT-8G
Base	Small Wafer Octal 8-Pin
Basing Designation for BOTTOM VIEW	8R

Pin 1 – Shell, Grid No.5
Pin 2 – Heater
Pin 3 – Plate
Pin 4 – Grids No.2 & No.4
Pin 5 – Grid No.1
Pin 6 – Cathode
Pin 7 – Heater
Pin 8 – Grid No.3



CONVERTER

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	300 max. volts
GRIDS-No.2 and No.4 (SCREEN) VOLTAGE	100 max. volts
GRIDS-No.2 and No.4 SUPPLY VOLTAGE	300 max. volts
PLATE DISSIPATION	1.0 max. watt
GRIDS-No.2 & No.4 DISSIPATION	1.0 max. watt
TOTAL CATHODE CURRENT	14 max. ma.
GRID-No.3 (CONTROL GRID) VOLTAGE:	
Negative bias value	50 max. volts
Positive bias value	0 max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode	90 max. volts
Heater positive with respect to cathode	90 max. volts

● With shell connected to cathode.

World Radio History

12SY7

12SY7

PENTAGRID CONVERTER

Characteristics - *Separate Excitation*: *				
Plate Voltage.	26.5	100	250	volts
Grids-No.2 & No.4 Voltage	26.5	100	100	volts
Grid-No.3 Voltage.	-1	-2	-2	volts
Grid-No.1 (Oscillator Grid) Resistor	20000	20000	20000	ohms
Plate Resistance (Approx.)	-	0.5	1.0	megohm
Conversion Transconductance	250	425	450	μmhos
Conversion Transconductance (Approx.)	8♦	2□	2□	μmhos
Plate Current.	0.45	3.3	3.5	ma.
Grids-No.2 & No.4 Current	1.7	8.5	8.5	ma.
Grid-No.1 Current.	0.1	0.5	0.5	ma.
Total Cathode Current. . .	2.25	12.3	12.5	ma.

NOTE: The transconductance between grid No.1 and grids No.2 and No.4 connected to plate (not oscillating) is approximately 4500 μmhos under the following conditions: grids No.1, No.3, No.5 and shell at 0 volts; grids No.2 and No.4 and plate at 100 volts. Under the same conditions, the plate current is 27 milliamperes, and the amplification factor is 13.

* The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited oscillator circuit operating with zero bias.

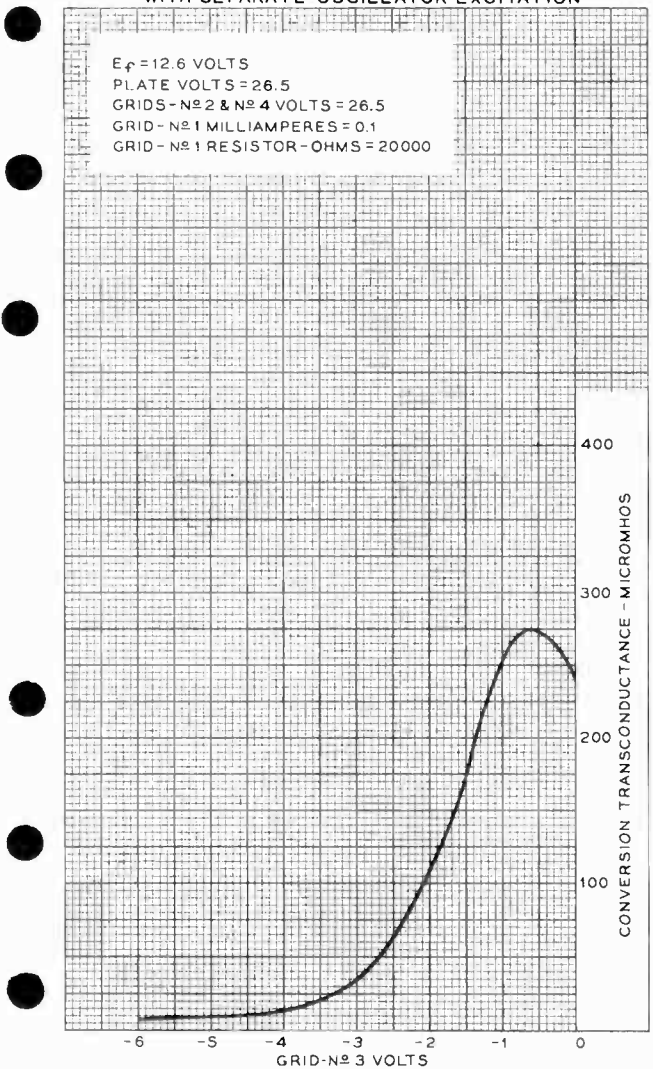
♦ With grid-No.3 bias of -6 volts.

□ With grid-No.3 bias of -35 volts.

The curves under Type 6SA7 also apply to the 12SY7.

World Radio History

12SY7
OPERATION CHARACTERISTICS
WITH SEPARATE OSCILLATOR EXCITATION



JULY 29,1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C M-6786

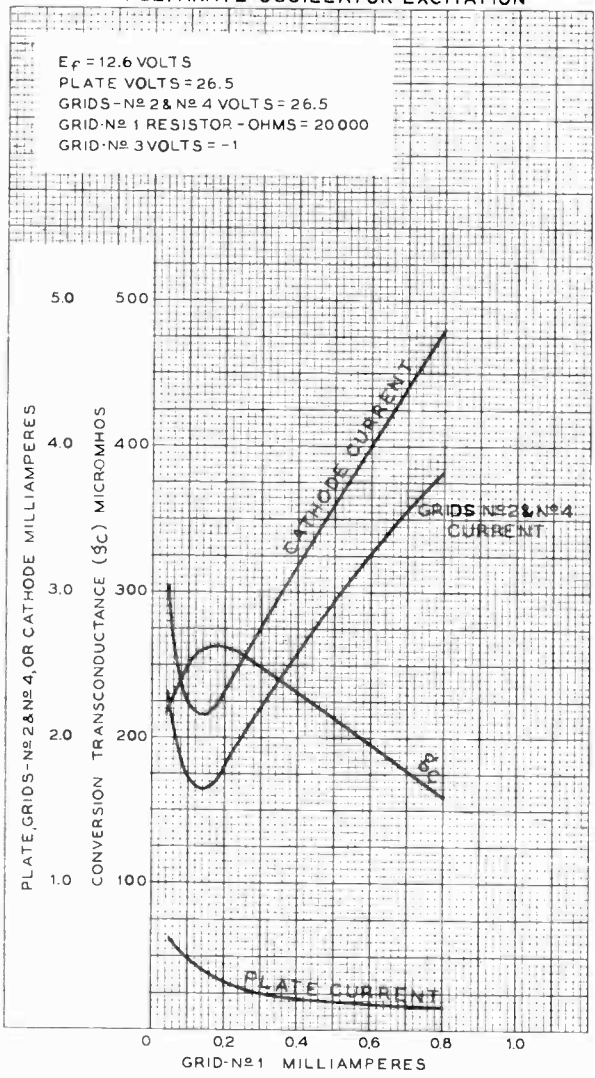
12SY7

RCA

12SY7

OPERATION CHARACTERISTICS

WITH SEPARATE OSCILLATOR EXCITATION



JULY 30, 1946

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6787

World Radio History

Power Pentode

9-PIN MINIATURE TYPE

The 16GK6 is the same as the 6GK6 except for the following items:

Heater Characteristics and Ratings:

Current	0.300 ± 0.020	amp
Voltage (AC or DC) at heater amperes = 0.300	16.0	volts
Warm-up time (Average)	11	sec

World Radio History

World Radio History

17AX4-GT

Half-Wave Vacuum Rectifier

For Damper Service in TV Equipment Having Series Heater-String Arrangement

The 17AX4-GT is the same as the 6AX4-GT except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	16.8	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

17AX4-GTA

Half-Wave Vacuum Rectifier

For Damper Service in TV Equipment Having Series Heater-String Arrangement

The 17AX4-GTA is the same as the 6AX4-GTB except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	16.8	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

17BQ6-GTB

Beam Power Tube

For Equipment Having Series Heater-String Arrangement

The 17BQ6-GTB is the same as the 6BQ6-GTB/6CU6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	16.8	volts
Current	0.45	amp
Warm-up time (Average)	11	sec

World Radio History

17D4

Half-Wave Vacuum Rectifier

For Damper Service in TV Equipment
Having Series Heater-String Arrangement

The 17D4 is the same as the 6DA4 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	16.8	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

17DE4

Half-Wave Vacuum Rectifier

For Damper Service in TV Equipment
Having Series Heater-String Arrangement

The 17DE4 is the same as the 6DE4 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	17	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

17DQ6-A

Beam Power Tube

For Equipment Having Series Heater-String Arrangement

The 17DQ6-A is the same as the 6DQ6-A except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	16.8	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

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

World Radio History

17DQ6-B

Beam Power Tube

For Equipment Having Series Heater-String Arrangement

The 17DQ6-B is the same as the 6DQ6-B except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	16.8	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

Beam Power Tube

For Equipment Having Series Heater-String Arrangement

The 17GW6 is the same as the 6GW6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	16.8	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

19CL8-A

Medium-Mu Triode—Sharp-Cutoff Tetrode

9-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 19CL8-A is the same as the 6CL8-A except for the following items:

Heater, for Unipotential Cathodes:

Voltage (AC or DC)	18.9	volts
Current	0.15 ± 6%	amp

19EA8

Medium-Mu Triode—Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 19EA8 is the same as the 6EA8 except for the following items:

Heater, for Unipotential Cathodes:

Voltage (AC or DC)	18.9	volts
Current	0.15 ± 6%	amp

World Radio History

World Radio History

26A6

R-F AMPLIFIER PENTODE

MINIATURE REMOTE-CUTOFF TYPE

For use with 12-cell storage-battery supply

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	26.5	ac or dc volts
Current	0.07	amp
Direct Interelectrode Capacitances:[o]		
Grid No.1 to Plate	0.0035 max.	μμf
Input	6.0	μμf
Output	5.0	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length from Base Seat to Bulb Top (excluding tip)	1-1/2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Miniature Button 7-Pin
Basing Designation for BOTTOM VIEW	$7BK_1$

Pin 1 – Grid No.1
Pin 2 – Grid No.3, Internal Shield
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Plate
Pin 6 – Grid No.2
Pin 7 – Cathode

CLASS A_1 AMPLIFIER

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	250 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	100 max.	volts
GRID-No.2 SUPPLY VOLTAGE	250 max.	volts
PLATE DISSIPATION	3 max.	watts
GRID-No.2 DISSIPATION	0.4 max.	watt
GRID-No.1 (CONTROL GRID) VOLTAGE:		
Negative bias value	50 max.	volts
Positive bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical Operation and Characteristics:

Plate Voltage	26.5	250	volts
Grid No.3 (Suppressor)	Connected to cathode at socket		
Grid No.2 Voltage	26.5	100	volts
Grid-No.1 Voltage:			
From a grid-No.1 resistor of	2	–	megohms
From a cathode resistor of	–	125	ohms

[o] with external shield connected to cathode.

World Radio History

26A6

26A6

R-F AMPLIFIER PENTODE

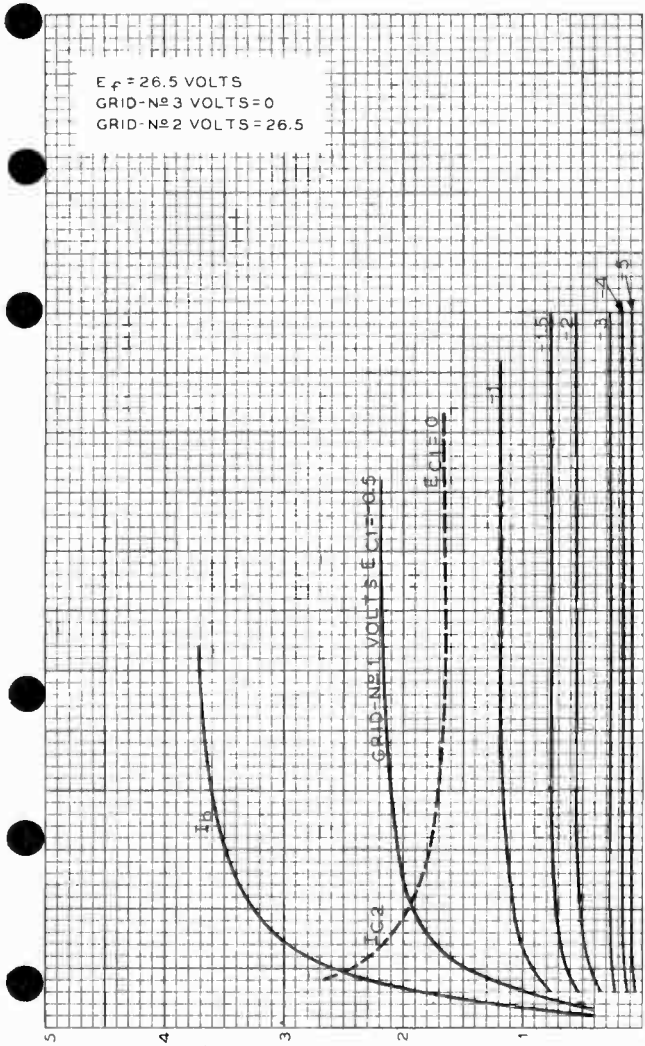
Plate Resistance (Approx.)	0.25	1.0	megohm
Transconductance	2000	4000	μmhos
Grid-No.1 Bias (Approx.) for transconductance of 40 μmhos	-	-25	volts
Grid-No.1 Bias (Approx.) for transconductance of 20 μmhos	-8	-	volts
Plate Current	1.7	10.5	ma.
Grid-No.2 Current	0.7	4.0	ma.

World Radio History

RCA

26A6

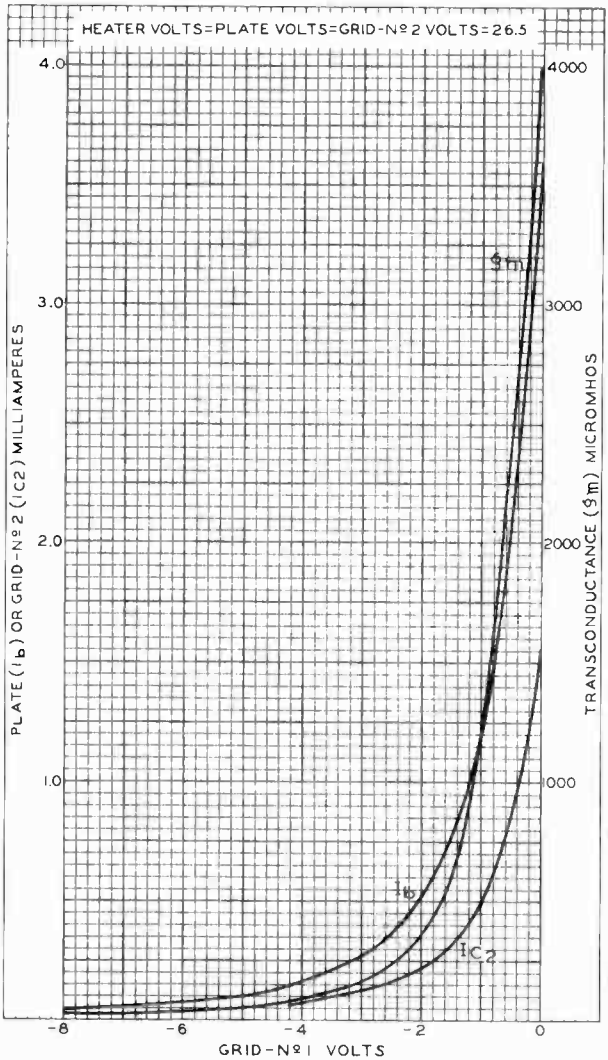
AVERAGE PLATE CHARACTERISTICS



RCA

26A6

AVERAGE CHARACTERISTICS



JUNE 25, 1946

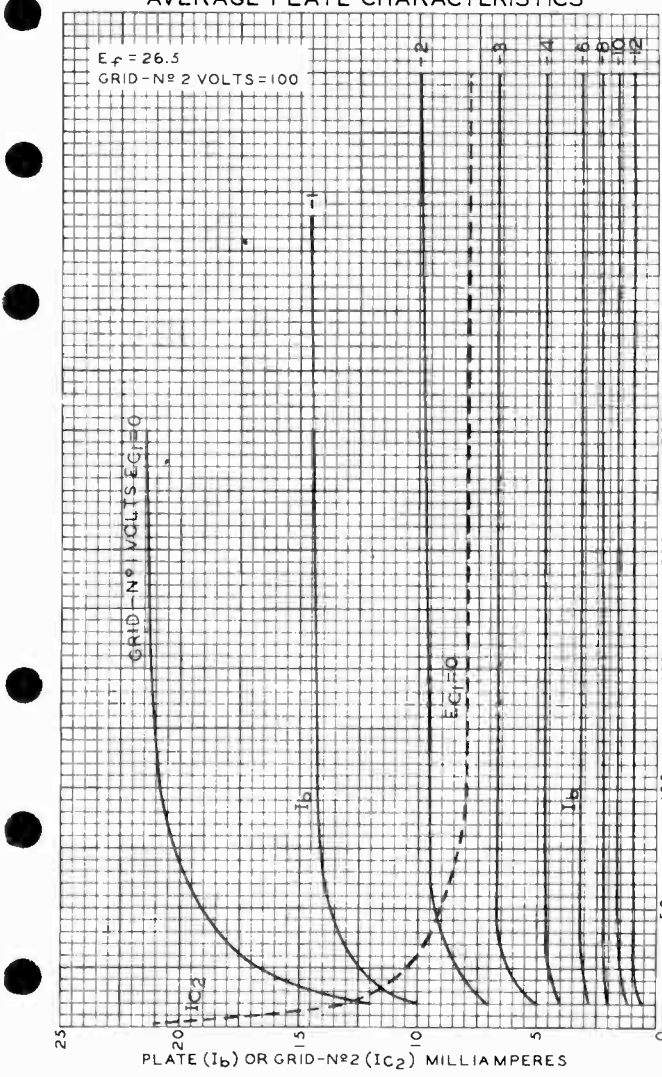
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6778

RCA

26A6

AVERAGE PLATE CHARACTERISTICS



World Radio History

26A7-GT

TWIN BEAM POWER TUBE

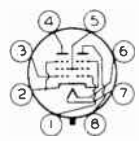
GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	26.5	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):°		
Grid No.1 to plate▲	1.2	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater▲	16	μμf
Plate to cathode & grid No.3, grid No.2, and heater▲	13	μμf
Grid No.1 of unit No.1 to grid No.1 of unit No.2	0.2	μμf
Plate of unit No.1 to plate of unit No.2	0.2	μμf
Grid No.1 of unit No.1 to plate of unit No.2	0.2	μμf
Grid No.1 of unit No.2 to plate of unit No.1	0.2	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	3-13/16"
Maximum Seated Length	3-1/4"
Maximum Diameter	1-9/32"
Bulb	T-9
Base	Intermediate-Shell Octal 8-Pin (JETEC No.B8-6), or Short Intermediate-Shell Octal 8-Pin (JETEC No.B8-58)
Basing Designation for BOTTOM VIEW	8BU



Pin 1 – Grid No.1 of Unit No.1
Pin 2 – Cathode, Grid No.3 of Units No.1 & No.2
Pin 3 – Grid No.1 of Unit No.2
Pin 4 – Plate of Unit No.2
Pin 5 – Grid No.2 of Units No.1 & No.2
Pin 6 – Heater
Pin 7 – Heater
Pin 8 – Plate of Unit No.1

AMPLIFIER - Class A_1

Values are for Each Unit

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	50 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	50 max.	volts
PLATE DISSIPATION	2 max.	watts

° Without external shield.
▲ Each unit.

→← Indicates a change.

World Radio History

26A7-GT

TWIN BEAM POWER TUBE

GRID-No.2 INPUT	0.5 max.	watt
→ PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

→ **Typical Operation and Characteristics (Each unit):**

Plate Voltage	26.5	volts
Grid-No.2 Voltage	26.5	volts
Grid-No.1 (Control-Grid) Voltage	-4.5	volts
Peak AF Grid-No.1 Voltage	4.5	volts
Zero-Signal Plate Current	20	ma
Max.-Signal Plate Current	20.5	ma
Zero-Signal Grid-No.2 Current	1.9	ma
Max.-Signal Grid-No.2 Current	5.5	ma
Transconductance	5700	μmhos
Load Resistance	1500	ohms
Total Harmonic Distortion	7	%
Max.-Signal Power Output	180	mw

→ **Maximum Circuit Values:**

Grid-No.1-Circuit Resistance:

For maximum rated conditions:		
With cathode bias	0.5 max.	megohm
With fixed bias	0.1 max.	megohm
For conditions where the maximum design values of plate voltage and grid-No.2 voltage do not exceed 26.5 volts:		
With grid-resistor bias	0.5 max.	megohm

AF POWER AMPLIFIER - Class AB$_1$

Unless otherwise specified, values are on a Per-Tube Basis

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	50 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	50 max.	volts
PLATE DISSIPATION (Per unit)	2 max.	watts
GRID-No.2 INPUT (Per unit)	0.5 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical Push-Pull Operation:

Plate Voltage	26.5	volts
Grid-No.2 Voltage	26.5	volts
Grid-No.1 (Control-Grid) Voltage	-7	volts
Peak AF Grid-No.1-to-Grid No.1 Voltage	14	volts
Zero-Signal Plate Current	19	ma

→ Indicates a change.

Mobile Radio History

26A7-GT

TWIN BEAM POWER TUBE

Max.-Signal Plate Current	30		ma
Zero-Signal Grid-No.2 Current (Approx.)	2		ma
Max.-Signal Grid-No.2 Current (Approx.)	8.5		ma
Effective Load Resistance (Plate to plate)	2500		ohms
Total Harmonic Distortion	5		%
Max.-Signal Power Output	500		mw

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:			
For maximum rated conditions:			
With cathode bias	0.5	max.	megohm
With fixed bias	0.1	max.	megohm
For conditions where the maximum design values of plate voltage and grid-No.2 voltage do not exceed 26.5 volts:			
With grid-resistor bias	0.5	max.	megohm

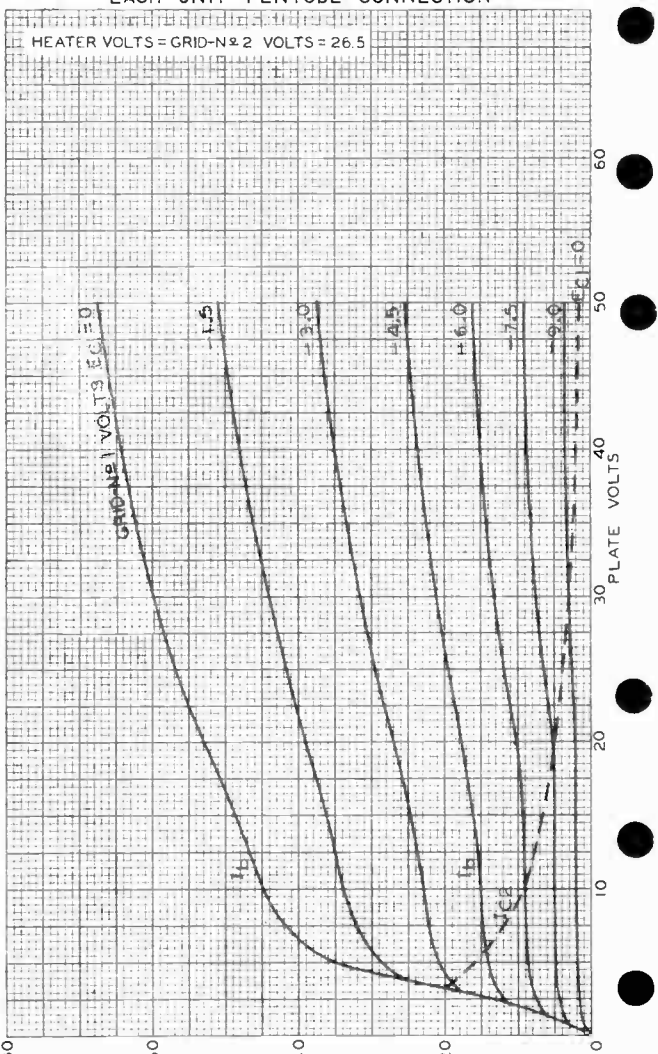
→ Indicates a change.

World Radio History

RCA

26A7-GT

AVERAGE PLATE CHARACTERISTICS
EACH UNIT - PENTODE CONNECTION



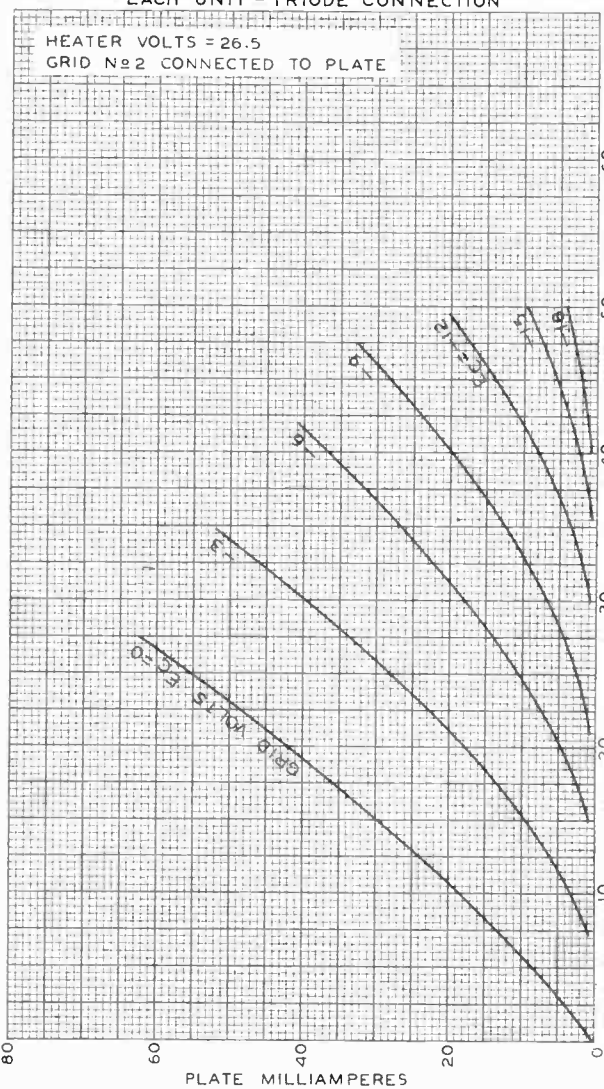
World Radio History

RCA

26A7-GT

AVERAGE PLATE CHARACTERISTICS

EACH UNIT - TRIODE CONNECTION



MAR. 24, 1945

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6510

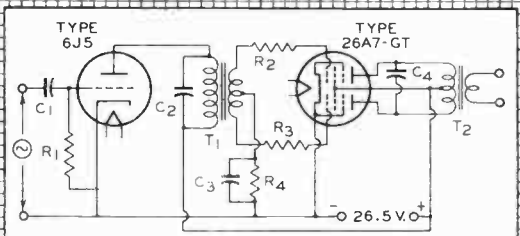
World Radio History

26A7-GT

OPERATION CHARACTERISTICS

PUSH-PULL CIRCUIT

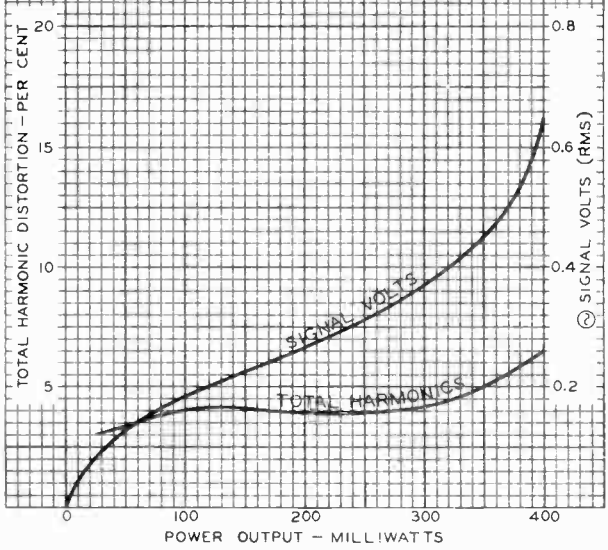
HEATER VOLTS = 26.5



C_1, C_4 = 0.01 μf
C_2 = 0.002 μf
C_3 = 1.0 μf
R_1 = 2.2 MEGOHMS
R_2, R_3 = 100 OHMS
R_4 = 0.2 MEGOHM

T_1 = INTERSTAGE COUPLING TRANSFORMER: TURNS RATIO (PRIMARY TO ½ SECONDARY) = 3:1

T_2 = OUTPUT TRANSFORMER: PLATE-TO-PLATE LOAD, 2000 OHMS



World Radio History

26C6
DUPLEX-DIODE TRIODE

MINIATURE TYPE

For use with 12-cell storage-battery supply

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	26.5	ac or dc volts
Current	0.07	amp
Direct Interelectrode Capacitances:[D]		
Triode Unit: Grid to Plate	2.0	µµf
Grid to Cathode & Heater	1.8	µµf
Plate to Cathode & Heater	1.4	µµf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length from Base Seat to Bulb Top (excluding tip)	1-1/2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Miniature Button 7-Pin
Basing Designation for BOTTOM VIEW	7BT

Pin 1 – Triode Grid
Pin 2 – Cathode
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Diode Plate No.2
Pin 6 – Diode Plate No.1
Pin 7 – Triode Plate

TRIODE UNIT – Class A_1 AMPLIFIER

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	250 max.	volts
PLATE DISSIPATION	2.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Characteristics:

Plate Voltage	26.5	250	volts
Grid Voltage:			
From a fixed supply of	–	-9	volts
From a grid resistor of	2.0	–	megohms
Amplification Factor	17	16	
Plate Resistance	15500	8500	ohms
Transconductance	1100	1900	µmhos
Plate Current	1.1	9.5	ma.

Typical Operation with Resistance Coupling:

See RESISTANCE-COUPLED AMPLIFIER CHART, Type 6R7.

[D] with external shield connected to cathode. Values are approximate.

www.radiomuseum.org

26C6

DUPLEX-DIODE TRIODE

DIODE UNITS - Two

The two diode plates are placed around a cathode, the sleeve of which is common to the triode unit. Each diode plate has its own base pin. Diode curves in the front of the RECEIVING TUBE SECTION apply to the 26C6.

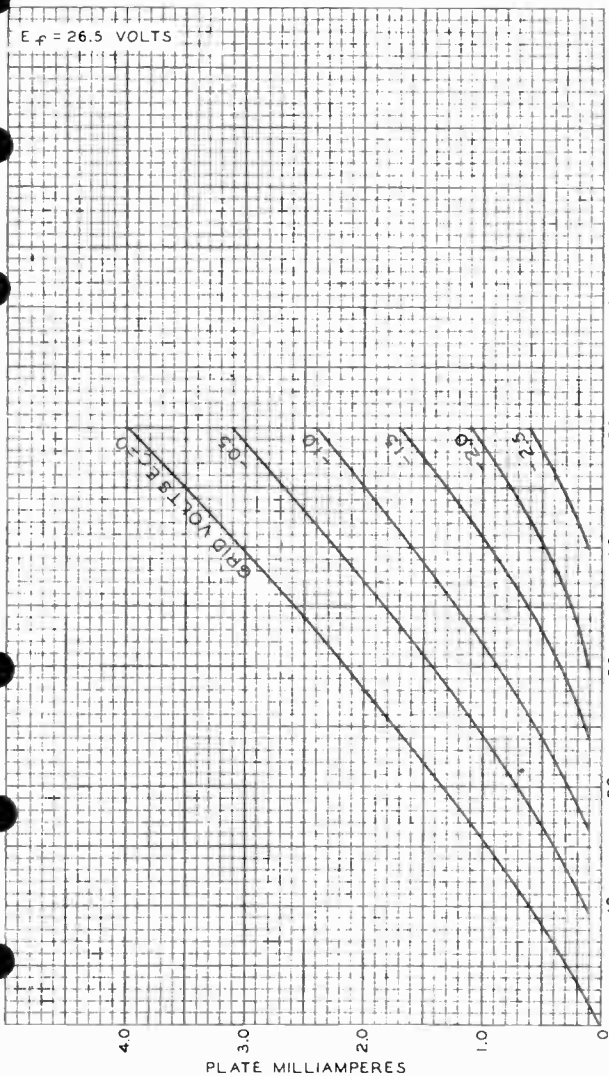
Additional curves applying to the 26C6 are shown under Types 6R7, and 6SR7

Watchtubehistory

RCA

26C6

AVERAGE PLATE CHARACTERISTICS



JUNE 10,1946 TUBE DEPARTMENT 92CM-6772

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History

26D6

PENTAGRID CONVERTER

MINIATURE TYPE

For use with 12-cell storage-battery supply

GENERAL DATA

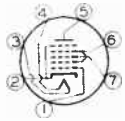
Electrical:

Heater, for Unipotential Cathode:		
Voltage	26.5	ac or dc volts
Current	0.07	amp
Direct Interelectrode Capacitances:		
Grid #3 to All Other Electrodes (RF Input)	7.5●	μμf
Plate to All Other Electrodes (Mixer Output)	14●	μμf
Grid #1 to All Other Electrodes (Osc. Input)	5.8●	μμf
Grid #3 to Plate	0.30 max.●	μμf
Grid #1 to Grid #3	0.15 max.●	μμf
Grid #1 to Plate	0.03 max.●	μμf
Grid #1 to External Shield and All Other Electrodes Except Cathode & Grid No.5	2.9	μμf
Grid #1 to Cathode & Grid #5	2.8▲	μμf
Cathode to External Shield and All Other Electrodes Except Grid #1	15.5	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length from Base Seat to Bulb Top (excluding tip)	1-1/2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Miniature Button 7-Pin
Basing Designation for BOTTOM VIEW	7CH

Pin 1 – Grid No.1
Pin 2 – Cathode, Grid No.5
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Plate
Pin 6 – Grid No.2, Grid No.4
Pin 7 – Grid No.3



CONVERTER

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	300 max. volts
GRIDS-No.2 & No.4 (SCREEN) VOLTAGE	100 max. volts
GRIDS-No.2 & No.4 SUPPLY VOLTAGE	300 max. volts
PLATE DISSIPATION	1.0 max. watt
GRIDS-No.2 & No.4 DISSIPATION	1.0 max. watt
TOTAL CATHODE CURRENT	14 max. ma.
GRID-No.3 (CONTROL GRID) VOLTAGE:	
Negative bias value	50 max. volts
Positive bias value	0 max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode	90 max. volts
Heater positive with respect to cathode	90 max. volts

● With external shield connected to cathode.
▲ With external shield connected to other electrodes.

World Radio History

RCA

26D6

PENTAGRID CONVERTER

Characteristics - *Separate Excitation*:□				
Plate Voltage.	26.5	100	250	volts
Grids-No.2 & No.4 Voltage. .	26.5	100	100	volts
Grid-No.3 Voltage.	-0.5	-1.5	-1.5	volts
Grid-No.1 (Oscillator-Grid) Resistor	20000	20000	20000	ohms
Plate Resistance (Approx.) .	-	0.5	1.0	megohm
Conversion Transconductance	270	455	475	μmhos
Conversion Transconductance (Approx.)*	-	4	4	μmhos
Conversion Transconductance (Approx.)**	8	-	-	μmhos
Plate Current.	0.45	2.8	3.0	ma.
Grids-No.2 & No.4 Current. .	1.6	8.0	7.8	ma.
Grid-No.1 Current.	0.1	0.5	0.5	ma.
Total Cathode Current. . . .	2.15	11.3	11.3	ma.

Characteristics of Oscillator Section:▲			
Plate Voltage.	26.5	100	volts
Grids-No.2 & No.4 Voltage. . . .	26.5	100	volts
Grid-No.3 Voltage.	0	0	volts
Grid-No.1 Voltage.	0	0	volts
Amplification Factor	-	22	
Transconductance	4500	7200	μmhos
Plate Current.	5.5	27	ma.

□ The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited oscillator circuit operating with zero bias.

* With grid-No.3 bias of -30 volts.

** With grid-No.3 bias of -6 volts.

▲ Measured between grid No.1 and grids-No.2 and No.4 connected to plate (not oscillating).

The curves under Type 6BE6 also apply to the 26D6

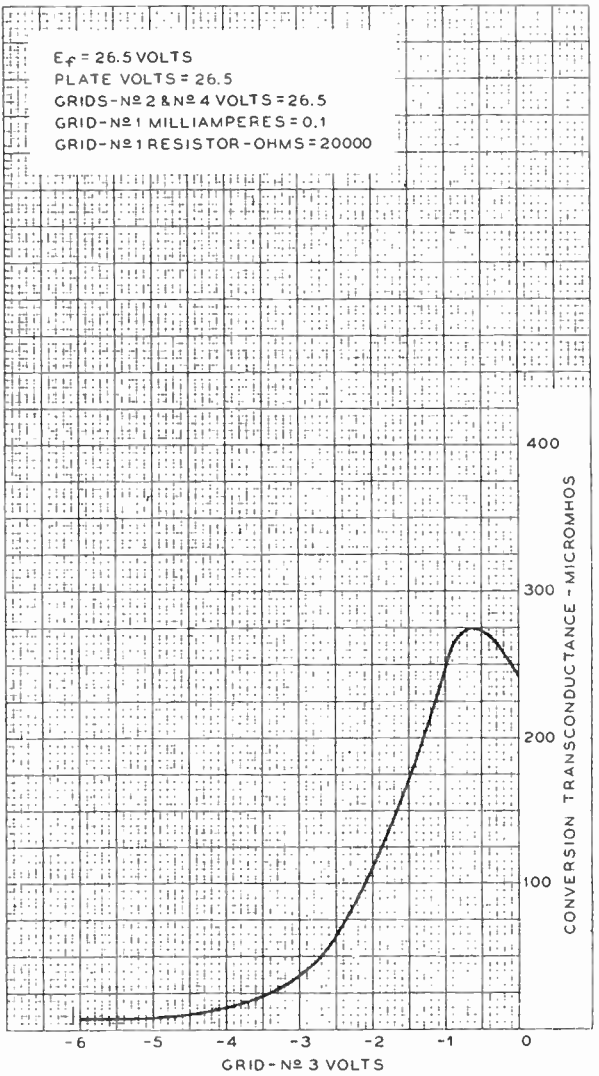
World Radio History

RCA

26D6

OPERATION CHARACTERISTICS

WITH SEPARATE OSCILLATOR EXCITATION

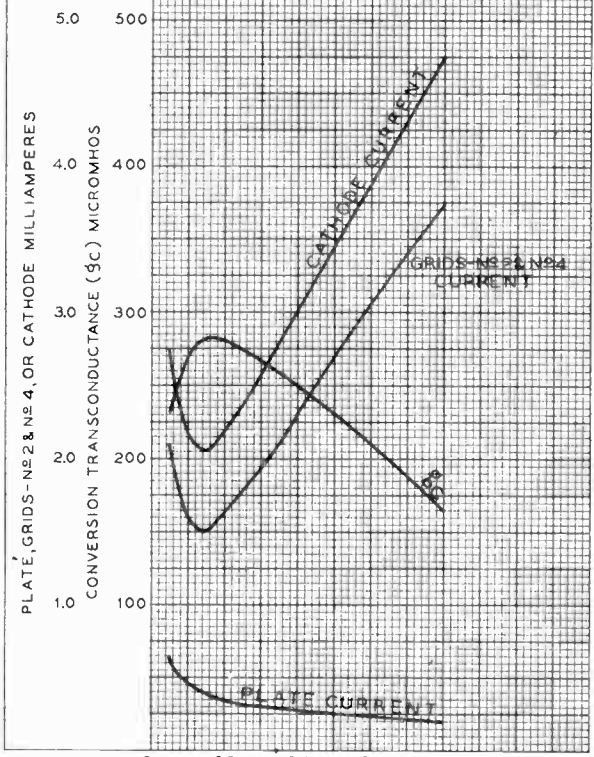


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
Radiomuseum.org

RCA

26D6
OPERATION CHARACTERISTICS
WITH SEPARATE OSCILLATOR EXCITATION

E_f = 26.5 VOLTS
PLATE VOLTS = 26.5
GRIDS - Nº 2 & Nº 4 VOLTS = 26.5
GRID - Nº 1 RESISTOR - OHMS = 20000
GRID - Nº 3 VOLTS = - 0.5



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

Full-Wave Mercury-Vapor Rectifier

For DC Power Supplies Having Large Current Requirements

GENERAL DATA

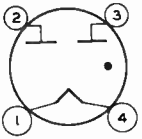
Electrical:

Filament, Coated:		
Voltage (AC or DC)	5.0	volts
Current	3.000	amp

Mechanical:

Operating Position	vertical, base down
Maximum Overall Length	5-3/8"
Maximum Seated Length	4-3/4"
Maximum Diameter	2-1/16"
Bulb	ST-16
Base	Medium 4-Pin
Basing Designation for BOTTOM VIEW	4C

Pin 1 - Filament
Pin 2 - Plate of Unit No. 2



Pin 3 - Plate of Unit No. 1
Pin 4 - Filament

FULL-WAVE RECTIFIER

Maximum and Minimum Ratings:

PEAK INVERSE VOLTAGE	1550 max.	volts
PEAK PLATE CURRENT PER PLATE	1 max.	amp
CONDENSED MERCURY TEMPERATURE RANGE	20 - 60	°C
With Capacitor-Input Filter		
AC PLATE VOLTAGE PER PLATE (RMS)	450 max.	volts
TOTAL EFFECTIVE PLATE-SUPPLY IMPEDANCE PER PLATE[a]	50 min.	ohms
DC OUTPUT CURRENT	225 max.	ma
With Choke-Input Filter		
AC PLATE VOLTAGE PER PLATE (RMS)	550 max.	volts
INPUT-CHOKE INDUCTANCE	3 min.	henries
DC OUTPUT CURRENT	225 max.	ma

Characteristics:

Tube Voltage Drop (Approx.)	15	volts

[a] When a filter-input capacitor larger than 40 μf is used, it may be necessary to use more plate-supply impedance than the minimum value shown to limit the peak plate current to the rated value.

World Radio History

HALF-WAVE RECTIFIER

As a half-wave rectifier, the 83 is operated with plates connected in parallel. Two 83's so connected in a full-wave circuit can supply twice the output current of a single tube. Both plates within the same tube should be connected to the same terminal of the plate transformer. To equalize the current distribution between plates, a resistor of not less than 50 ohms should be connected in series with each plate.

World Radio History

Medium-Mu Twin Triode

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings:

	Series	Parallel	
Heater-section arrangement			
Voltage (AC or DC)	40.0 ± 2.0	20.0 ± 1.0	volts
Current	0.050[a]	0.100[b]	amp
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	100 max.		volts
Heater positive with respect to cathode	100 max.		volts

Direct Interelectrode Capacitances:[c]		
Grid to plate (Each unit)	1.1	pf
Grid to cathode, internal shield, and heater (Each unit)	2.2	pf
Plate to cathode, internal shield, and heater (Each unit)	1.0	pf
Plate to plate	0.1 max.	pf

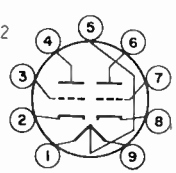
Characteristics, Class A_1 Amplifier (Each Unit):

Plate Supply Voltage	150	volts
Cathode Resistor	240	ohms
Amplification Factor	35	
Plate Resistance (Approx.)	6350	ohms
Transconductance	5500	μmhos
Plate Current	8.2	ma
Grid Voltage for maximum plate μa =45	-10	volts

Mechanical:

Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

BOTTOM VIEW



Pins 1&5 - Heater of Unit No.2
Pin 2 - Cathode of Unit No.2
Pin 3 - Grid of Unit No.2
Pin 4 - Plate of Unit No.2
Pin 5 - Heater Tap, Internal Shield
Pin 6 - Plate of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Cathode of Unit No.1
Pins 9&5 - Heater of Unit No.1

World Radio History

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Absolute-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
CATHODE CURRENT	18 max.	ma
GRID CURRENT	3 max.	ma
PLATE DISSIPATION	1.35 max.	watts

Maximum Circuit Values:

Grid-Circuit Resistance	0.5 max.	megohm

[a] At heater volts = 40.0.
[b] At heater volts = 20.0.
[c] Without external shield.

Radio Radio History

Sharp-Cutoff Pentode

7-PIN MINIATURE TYPE

GENERAL DATA

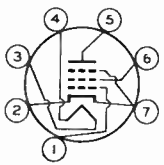
Electrical:

Heater Characteristics and Ratings:		
Voltage (AC or DC)	20.0 ± 1.0	volts
Current at heater volts = 20.0	0.050	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances:[a]		
Grid No.1 to plate	0.01	pf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater	4.0	pf
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater	2.8	pf

Characteristics, Class A_1 Amplifier:		
Plate Supply Voltage	120	volts
Grid-No.2 Supply Voltage	120	volts
Cathode Resistor[b]	200	ohms
Plate Resistance (Approx.)	0.34	megohm
Transconductance	5000	μmhos
Plate Current	7	ma
Grid-No.2 Current	2.2	ma
Grid-No.1 Voltage for maximum plate μa = 200	-10	volts

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7BD



Pin 1 - Grid No.1
Pin 2 - Cathode, Grid No.3
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Cathode, Grid No.3

World Radio History

AMPLIFIER — Class A_1

Maximum Ratings, *Absolute-Maximum Values:*

PLATE VOLTAGE	180 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	180 max.	volts
GRID-No.2 VOLTAGE	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive-bias value	0 max.	volts
GRID-No. 2 INPUT:		
For grid-No.2 voltages up to 90 volts.	0.5 max.	watt
For grid-No.2 voltages between 90 and 180 volts.	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
PLATE DISSIPATION	1.7 max.	watts

[a] With external shield JEDEC No.316 connected to cathode.

[b] Fixed-bias operation is not recommended.

World Radio History

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DETECTOR AMPLIFIER PENTODE

ACORN TYPE

Especially for wavelengths as short as 2.7 meter

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances:		
Grid to Plate●	0.007 max.	μμf
Input	3.4	μμf
Output	3.0	μμf
Overall Length		1-11/16" ± 3/16"
Overall Diameter		1-3/32" ± 1/16"
Bulb	*See Outline in GENERAL SECTION*	T-4½
End Terminals		Twc
Base		Small Radial 5-Pin
Pin 1 - Heater		Pin 5 - Cathode
Pin 2 - Grid No.2		P - Plate
Pin 3 - Grid No.3		G_1 - Grid No.1
Pin 4 - Heater		
RCA Socket		Stock No.9925
RCA Grid & Plate Clips		Stock No.9939
Mounting Position		Any

P is on Long Part of Bulb: Top
G_1 is on Short Part of Bulb: Bottom

BOTTOM VIEW (5BB)

Maximum and Minimum Ratings Are Design-Center Values

A-F AMPLIFIER

D-C Plate Voltage		250 max.	volts
D-C Screen (Grid No.2) Voltage		100 max.	volts
D-C Grid (No.1) Voltage		-3 min.	volts
Plate Dissipation		0.5 max.	watt
Screen Dissipation		0.1 max.	watt
D-C Heater-Cathode Potential		90 max.	volts
Characteristics— Class A_1 Amplifier:			
D-C Plate Voltage	90	250	volts
Suppressor (Grid No.3)	Connected to cathode at socket		
D-C Screen Voltage	90	100	volts
D-C Grid Voltage■	-3	-3	volts
Plate Resistance	1.0	Greater than 1.0	megohm
Transconductance	1100	1400	μmhos
D-C Plate Current	1.2	2.0	ma.
D-C Screen Current	0.5	0.7	ma.
Typical Operation with Resistance-Coupling:			
Plate-Supply Voltage○		250	volts
Suppressor	Connected to cathode at socket		
D-C Screen Voltage		50	volts
D-C Grid Voltage■		-2.1	volts
Load Resistance		0.25	megohm
D-C Plate Current		0.5	ma.
Second Harmonic Distortion		5	%
Voltage Output		40 to 50 RMS	volts
Voltage Gain		100 approx.	

●, ■, ○: See next page. ◄ Indicates a change.

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DETECTOR AMPLIFIER PENTODE

(continued from preceding page)

DETECTOR

D-C Plate Voltage	250 max.	volts
D-C Screen (Grid No.2) Voltage	100 max.	volts
D-C Heater-Cathode Potential	80 max.	volts
Typical Operation — Biased Detector:		
Plate-Supply Voltage°	250	volts
Suppressor (Grid No.3)	Connected to cathode at socket	
D-C Screen Voltage	100	volts
D-C Grid (No.1) Voltage	-6 approx.	volts
Load Resistance	0.25	megohm
D-C Plate Current	Adjusted to 0.1 ma. with no input signal	
Cathode Resistor	20000 to 50000	ohms

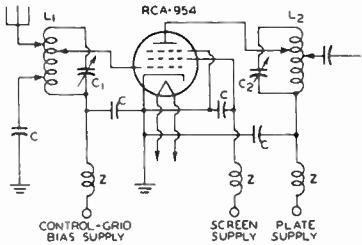
● With shield baffle.

■ Under maximum rated conditions, the resistance in the grid circuit should not exceed 0.5 megohm with fixed bias, or 1.0 megohm with cathode bias.

o This is a plate-supply voltage value. The voltage effective at the plate will be plate-supply voltage minus the voltage drop in load caused by the plate current.

R-f grounding by means of condensers placed close to the tube terminals is required if the full capabilities of the 954 for ultra-high-frequency uses are to be obtained. It is important in the cases of the plate and control-grid circuits that separate r-f grounding returns be made to a common point in order to avoid r-f inter-action through common return circuits. It may also be advisable in some applications to supplement the action of the by-pass condensers by r-f chokes placed close to the condensers in the return or supply lead for the grid, the screen, the suppressor, the plate, and the heater.

TYPICAL R-F AMPLIFIER CIRCUIT



For ultra-high frequencies, coils L1 and L2 may be tapped at suitable points determined by test to reduce effect of tube loading on circuit impedances.

Because electronic plate loading is not serious in a pentode, the use of coil L2 with tapped plate connection may not be necessary to give satisfactory results.

The condensers should all be of high quality and be designed for ultra-high frequency operation.

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

WAVE-LENGTH RANGE		2.75 TO 5.3 METERS APPROX.	1 TO 3 METERS APPROX.	0.8 METER APPROX.
L_1, L_2	TURNS	10	4	5
	WIRE	N≥16 B.C.*	N≥16 B.C.*	N≥30 B.C.*
	OUTSIDE DIA.	3/8"	3/8"	1/8"
	LENGTH	3/4"	5/16"	1/8"
C_1, C_2 (VARIABLE)		3 TO 25 μμf	3 TO 25 μμf	3 TO 4 μμf
C		100 TO 500 μμf	100 TO 500 μμf	100 TO 500 μμf
Z	TURNS	15	15	15
	WIRE	N≥30	N≥30	N≥30
	OUTSIDE DIA.	1/4"	1/4"	1/4"
	WINDING	S.L.°	S.L.°	S.L.°

92CM-4386R2

*B.C.= BARE COPPER °S.L.= SINGLE LAYER

→ Indicates a change. NOTE: THE ABOVE DATA ARE NECESSARILY APPROXIMATE

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MONOGRAM MANUALS

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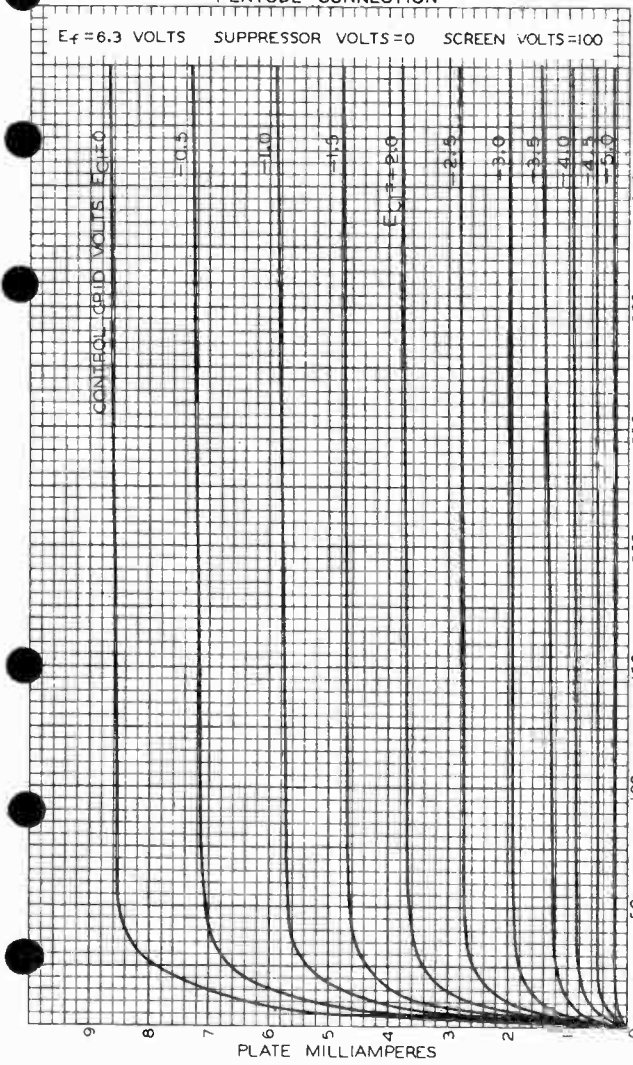
AVERAGE PLATE CHARACTERISTICS

PENTODE CONNECTION

E_f = 6.3 VOLTS SUPPRESSOR VOLTS = 0 SCREEN VOLTS = 100



MAR. 11, 1935

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92C-4378

MARC RADIO MUSEUM

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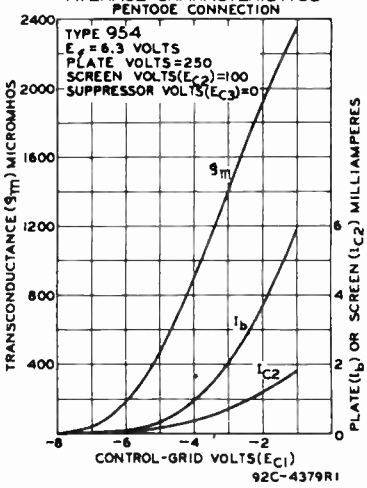
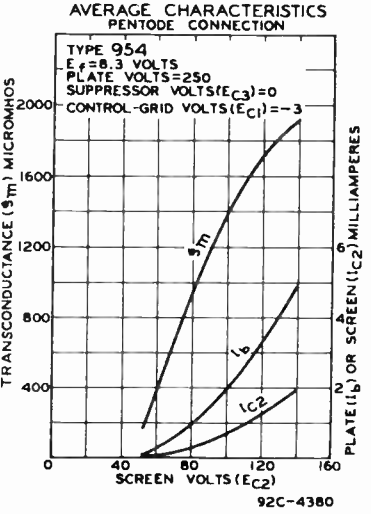
CHARACTERISTICS CURVES





MoldyRadioHistory

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DETECTOR, AMPLIFIER, OSCILLATOR

ACORN TYPE

Especially for wavelengths between 0.5 meter and 5 meters

Heater	Coated Unipotential Cathode		
Voltage	6.3	a-c or d-c	volts
Current	0.15		amp.
Direct Interelectrode Capacitances:*			
Grid to Plate	1.4		μμf
Grid to Cathode	1.0		μμf
Plate to Cathode	0.6		μμf
Overall Length		1-7/32" ± 5/32"	
Overall Diameter		1-3/32" ± 1/16"	
Bulb }	*See Outline in*	T-4½	
Base }	*GENERAL SECTION*	Small Radial 5-Pin	◄
Pin 1 - Heater		Pin 4 - Heater	
Pin 2 - Plate		Pin 5 - Cathode	
Pin 3 - Grid			
RCA Socket		Stock No. 9925	
Mounting Position		Any	

Short Part of Bulb: Bottom

BOTTOM VIEW (5BC)

Maximum Ratings Are Design-Center Values

A-F AMPLIFIER

D-C Plate Voltage	250 max.	volts
Plate Dissipation	1.6 max.	watts
D-C Heater-Cathode Potential	90 max.	volts ◄

Typical Operation and Characteristics — Class A_1 Amplifier:

D-C Plate Voltage	90	135	180	250	volts
D-C Grid Voltage*	-2.5	-3.75	-5	-7	volts
Amplification Factor	25	25	25	25	
Plate Resistance	14700	13200	12500	11400	ohms
Transconductance	1700	1900	2000	2200	μmhos
D-C Plate Current	2.5	3.5	4.5	6.3	ma.
Load Resistance	-	-	20000	-	ohms
Second Harmonic Dist.	-	-	5	-	%
Power Output	-	-	125	-	mw

Typical Operation with Resistance-Coupling:

Plate-Supply Voltage°	180	volts
D-C Grid Voltage*	-3.5	volts
Load Resistance	250000	ohms
Plate Current	0.42	ma.
Second Harmonic Distortion	5	%
Voltage Output	45 RMS	volts
Voltage Gain	20 approx.	

R-F POWER AMPLIFIER & OSCILLATOR - Class C

Plate Modulated or C.W.

D-C Plate Voltage	180 max.	volts
D-C Plate Current	8 max.	ma.
D-C Grid Current	2 max.	ma.
D-C Heater-Cathode Potential	90 max.	volts ◄
Typical Operation:		
D-C Plate Voltage	180	volts
D-C Grid Voltage	-35 approx.	volts
D-C Plate Current	7	ma.

•, *, °: See next page. ◄ Indicates a change.

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RCA

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DETECTOR, AMPLIFIER, OSCILLATOR

(continued from preceding page)

D-C Grid Current	1.5 approx.ma.
Power Output**	0.5 approx.watt

Typical Operation:	DETECTOR *Biased*	*Grid-Leak*	
Plate-Supply Voltage°	180	45	volts
Grid Voltage	−7 approx.	Grid Return to Cathode	volts
Load Resistance	0.25	–	megohm
Plate Current	Adjusted to 0.2 ma. approx. with no input signal.	–	ma.
Cathode Resistor	50000 aporox.	–	ohms
Grid Leak	–	1 to 5	megohms
Grid Condenser	–	0.00025	µf

→ • With no external shield.

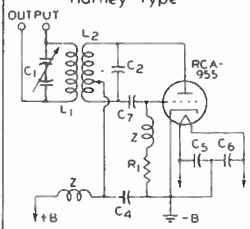
* Under maximum rated conditions, the resistance in the grid circuit should not exceed 0.1 megohm with fixed bias, or 0.5 megohm with cathode bias.

° This is a plate-supply voltage value. The voltage effective at plate will be plate-supply voltage minus the voltage drop in load caused by plate current.

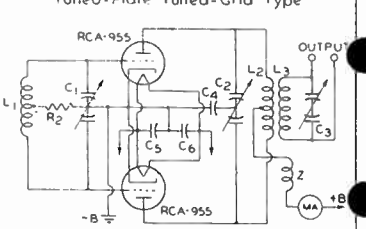
** At 5 meters, only moderate reduction in this value will be found for wavelengths as low as 1 meter. Below 1 meter, the power output decreases as the wavelength is decreased.

R-F grounding by means of condensers placed close to the tube pins is required if the full capabilities of the 955 for ultra-high-frequency uses are to be obtained.

U-H-F OSCILLATOR
Hartley Type



PUSH-PULL U-H-F OSCILLATOR
Tuned-Plate Tuned-Grid Type



L_1C_1, L_2C_2, L_3C_3 = DEPEND ON FREQUENCY RANGE DESIRED

C_4, C_5, C_6 = 100 µµf

C_7 = 50 µµf

R_1 = 20000 TO 25000 OHMS, ½ WATT

R_2 = 10000 TO 12500 OHMS, ½ WATT

Z = R-F CHOKE

92CM-6558

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

← Indicates a change.

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World Radio History

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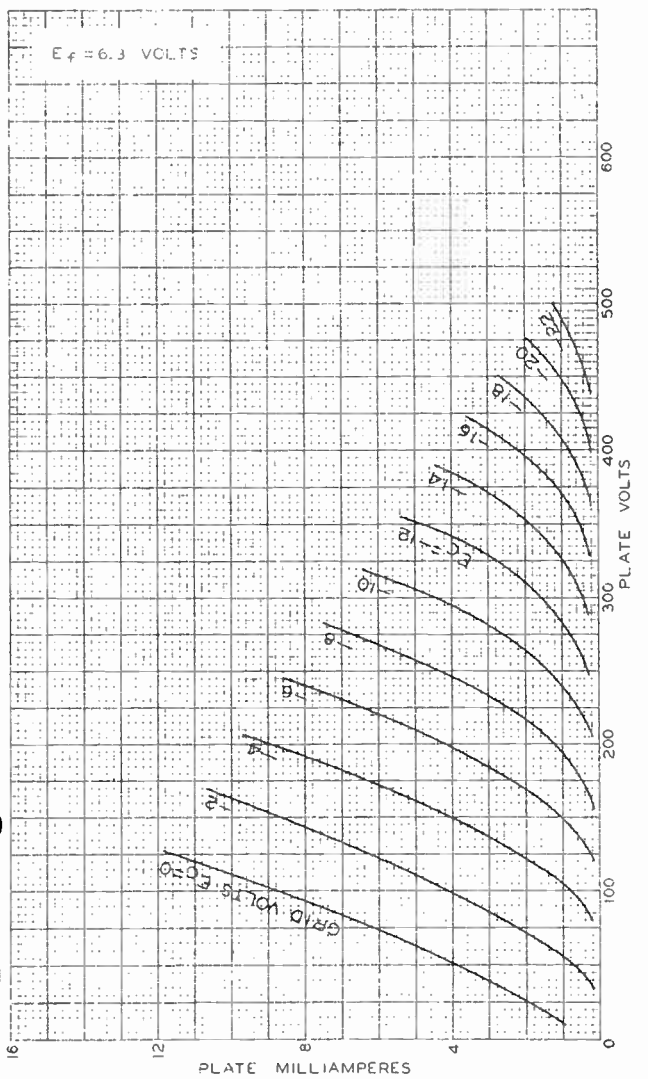
AVERAGE PLATE CHARACTERISTICS



WORLDRADIOHISTORY

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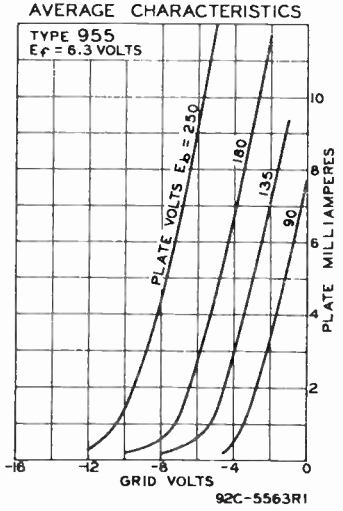
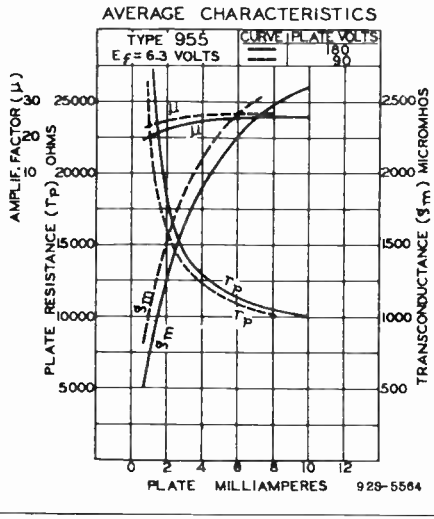
CHARACTERISTICS CURVES





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92C-5563R1
92S-5564

World Radio History

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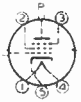
SUPER-CONTROL R-F AMPLIFIER PENTODE

ACORN TYPE

Especially for wavelengths as short as 0.7 meter

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances:		
Grid to Plate•	0.007 max.	μμf
Input	3.4	μμf
Output	3.0	μμf
Overall Length		1-11/16" ± 3/16"
Overall Diameter		1-3/32" ± 1/16"
Bulb	See Outline in GENERAL SECTION	T-4½
End Terminals		Two
Base		Small Radial 5-Pin
Pin 1 - Heater		Pin 5 - Cathode
Pin 2 - Grid No.2		P - Plate
Pin 3 - Grid No.3		G_1 - Grid No.1
Pin 4 - Heater		
RCA Socket		Stock No.9925
RCA Grid & Plate Clips		Stock No.9939
Mounting Position		Any



P is on Long Part of Bulb: Top
G_1 is on Short Part of Bulb: Bottom

BOTTOM VIEW (5BB)

Maximum and Minimum Ratings Are Design-Center Values

AMPLIFIER

D-C Plate Voltage	250 max.	volts
D-C Screen (Grid No.2) Voltage	100 max.	volts
Grid (No.1) Voltage	-3 min.	volts
Plate Dissipation	1.7 max.	watts
Screen Dissipation	0.3 max.	watt
D-C Heater-Cathode Potential	80 max.	volts
Characteristics— Class A_1 Amplifier:		
D-C Plate Voltage	250	volts
Suppressor (Grid No.3) Connected to cathode at socket		
D-C Screen Voltage	100	volts
D-C Grid (No.1) Voltage*	-3	volts
Plate Resistance	0.7	approx.megohm
Transconductance	1800	μmhos
Grid Bias for Transcond. of approx. 2 μmhos	-45	volts
D-C Plate Current	6.7	ma.
D-C Screen Current	2.7	ma.

MIXER — In Superheterodyne Circuit

D-C Plate Voltage	250 max.	volts
D-C Screen Voltage	100 max.	volts
D-C Heater-Cathode Potential	80 max.	volts
Typical Operation:		
D-C Plate Voltage	100	250 volts
Suppressor	Connected to cathode at socket	
D-C Screen Voltage	100	100 volts
D-C Grid Voltage	-10	-10 approx. volts

The grid bias shown is minimum for an oscillator peak voltage of 9 volts. These values are optimum.

•, * : See next page. — indicates a change.

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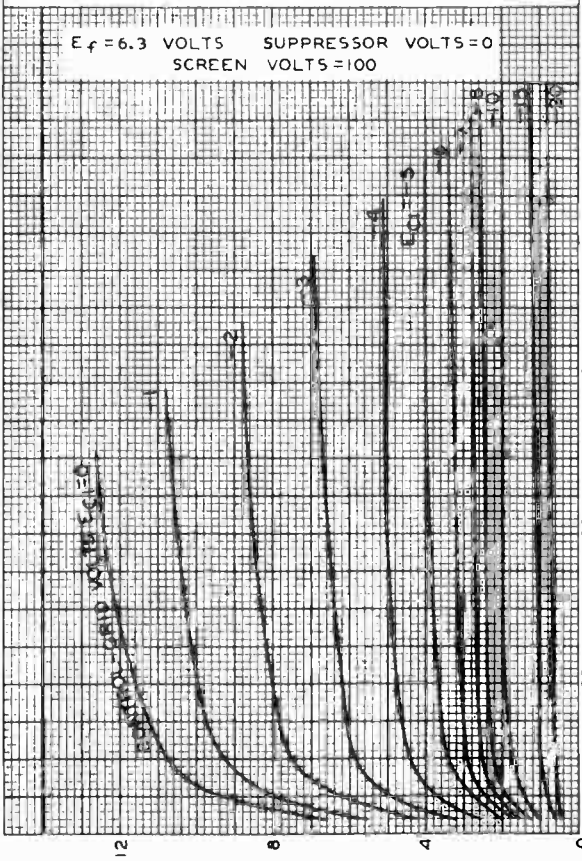
SUPER-CONTROL R-F AMPLIFIER PENTODE

(continued from preceding page)

● With shield baffle.
* Under maximum rated conditions, the resistance in the grid circuit should not exceed 0.5 megohm with fixed bias, or 1.0 megohm with cathode bias.

Typical R-F Amplifier Circuit for the 956 is the same as that for Type 954.

AVERAGE PLATE CHARACTERISTICS



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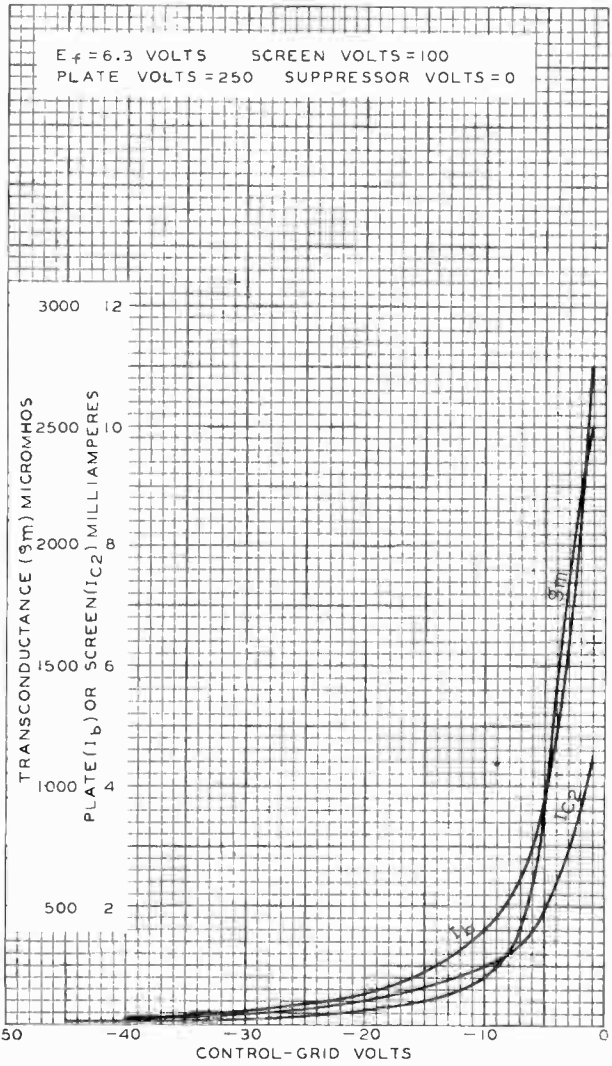
AVERAGE CHARACTERISTICS



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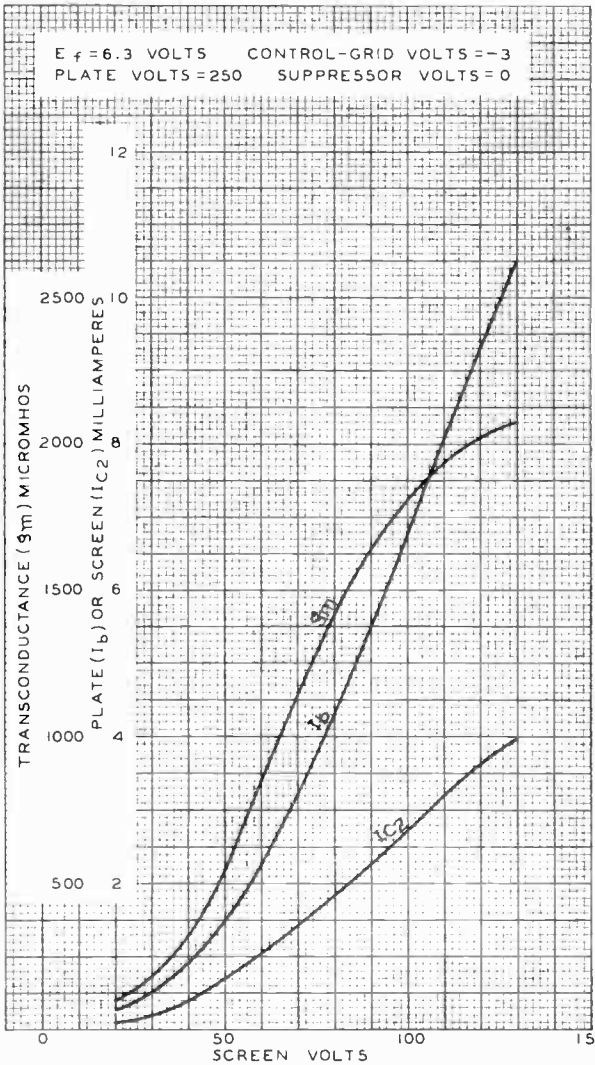
AVERAGE CHARACTERISTICS



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World Radio History

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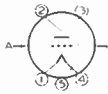
DETECTOR, AMPLIFIER, OSCILLATOR

ACORN TYPE

Filament	Coated	
Voltage	1.25	d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances:○		
Grid to Plate	1.2	μμf
Grid to Filament	0.3	μμf
Plate to Filament	0.7	μμf
Overall Length		1-7/32" ± 5/32"
Overall Diameter		1-3/32" ± 1/16"
Bulb	*See Outline in GENERAL SECTION*	T-4½
Base		Small Radial 5-Pin
Pin 1 - Filament		Pin 5 - Filament -
Pin 2 - Plate		AA' - Plane of Electrodes
Pin 3 - Grid		
Pin 4 - Filament -		
RCA Socket		Stock No. 9925
Mounting Position		Vertical◇



Short Part of Bulb: Bottom

BOTTOM VIEW (5BC)

Maximum Ratings Are Design-Center Values

AMPLIFIER

D-C Plate Voltage	135 max.	volts
Characteristics — Class A_1 Amplifier:		
D-C Plate Voltage	135	volts
D-C Grid Voltage*	-5	volts
Amplification Factor	13.5	
Plate Resistance	20800 approx.	ohms
Transconductance	650	μmhos
D-C Plate Current	2	ma.

○ With no external shield.

◇ Horizontal operation permitted if plane of electrodes is vertical (plate on edge).

* Under maximum rated conditions, the resistance in the grid circuit should not exceed 0.1 megohm with fixed bias, or 0.5 megohm with cathode bias.

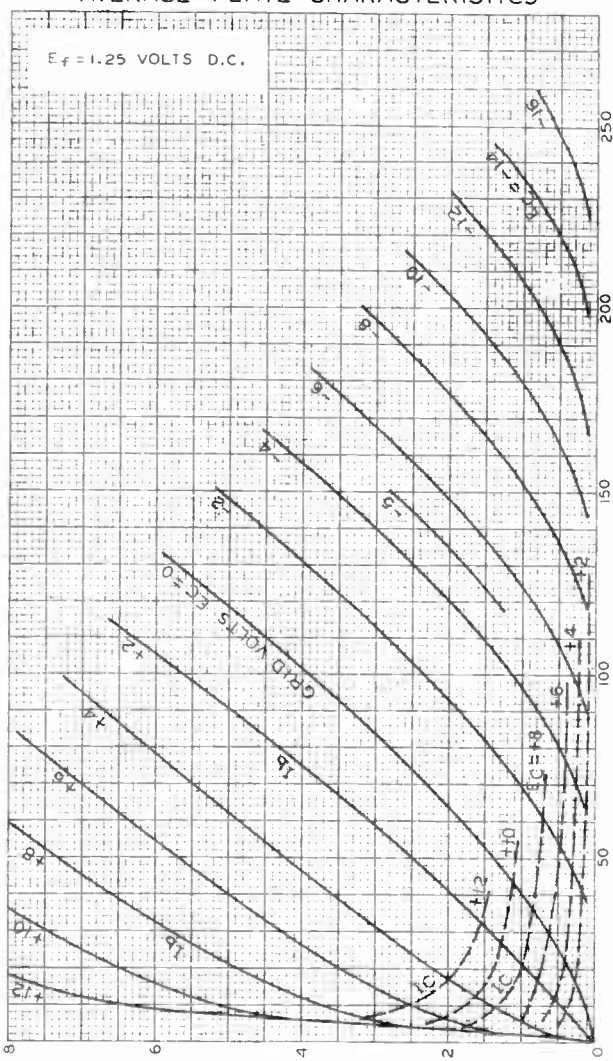
R-F grounding by means of condensers placed close to the tube pins is required if the full capabilities of the 957 for ultra-high-frequency uses are to be obtained.

← Indicates A change.

World Radio History

957

AVERAGE PLATE CHARACTERISTICS



JUNE 15, 1944 RCA VICTOR DIVISION 92CM-6336RI
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

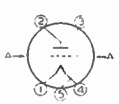
World Radio History

958-A

AMPLIFIER TRIODE

ACORN TYPE

Filament	Coated	
Voltage	1.25	d-c volts
Current	0.10	amp.
Direct Interelectrode Capacitances:°		
Grid to Plate	2.6	μμf
Grid to Filament	0.6	μμf
Plate to Filament	0.8	μμf
Overall Length		1-7/32" ± 5/32"
Overall Diameter		1-3/32" ± 1/16"
Bulb } Base }	*See Outline in GENERAL SECTION*	T-4½ Small Radial 5-Pin
Pin 1 - Filament +		Pin 5 - Filament -
Pin 2 - Plate		AA' - Plane of Electrodes
Pin 3 - Grid		
Pin 4 - Filament -		
RCA Socket		Stock No. 9925
Mounting Position		Vertical◊



Short Part of Bulb: Bottom

BOTTOM VIEW (5BC)

Maximum Ratings Are Design-Center Values

A-F AMPLIFIER

D-C Plate Voltage	135 max.	volts
D-C Plate Current	5 max.	ma.
Plate Dissipation	600 max.	mw
Characteristics — Class A_1 Amplifier:		
D-C Plate Voltage	135	volts
D-C Grid Voltage*	-7.5	volts
Amplification Factor	12	
Plate Resistance	10000	ohms
Transconductance	1200	μmhos
D-C Plate Current	3	ma.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation

D-C Plate Voltage	135 max.	volts
D-C Grid Voltage	-30 max.	volts
D-C Plate Current	7 max.	ma.
D-C Grid Current	1 max.	ma.
D-C Plate Input	950 max.	mw
Plate Dissipation	600 max.	mw
Typical Operation at Moderate Frequencies:		
D-C Plate Voltage	135	volts
D-C Grid Voltage•	-20	volts
	20000	ohms
	2500	ohms
Peak R-F Grid Voltage	40	volts
D-C Plate Current	7	ma.
D-C Grid Current**	1 approx.	ma.
Driving Power**	35 approx.	mw
Power Output	600	mw

°, #, ◊, *, **, •: See next page.

World Radio History

958-A

AMPLIFIER TRIODE

(continued from preceding page)

° With no external shield.

◊ Horizontal operation permitted if plane of electrodes is vertical (plate on edge).

* Under maximum rated conditions, the resistance in the grid circuit should not exceed 0.1 megohm with fixed bias, or 0.5 megohm with cathode bias.

\# Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

● Obtained by a grid resistor (20000), cathode resistor (2500), or fixed supply.

** Subject to wide variation as explained under Tube Ratings in General Section.

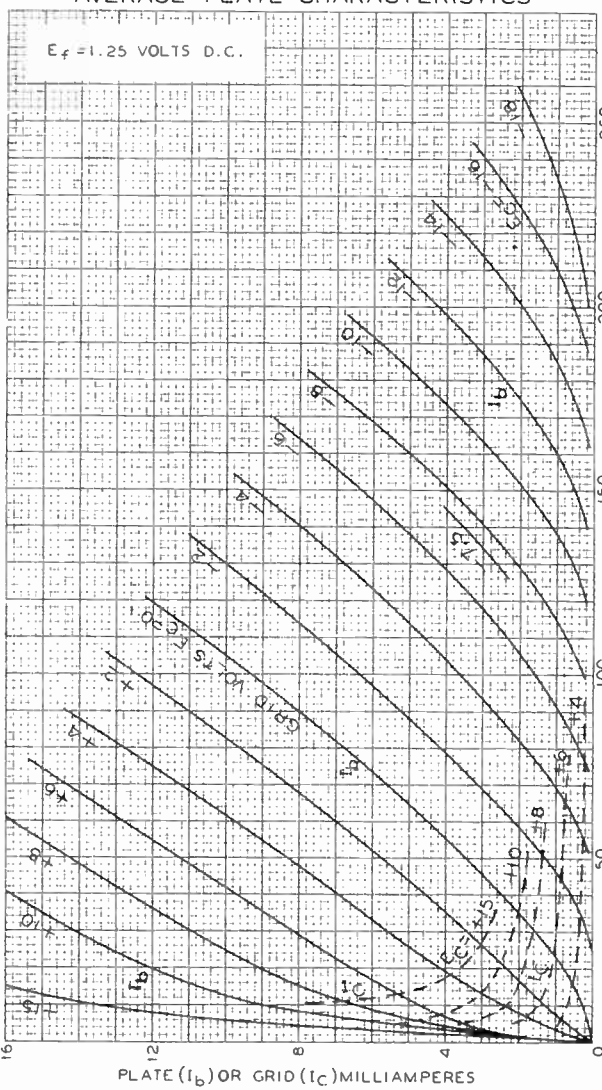
NOTE: The 958-A is capable of producing a useful power output at frequencies up to approx. 350 megacycles.

R-F grounding by means of condensers placed close to the tube pins is required if the full capabilities of the 958-A for ultra-high-frequency uses are to be obtained.

World Radio History

958-A

AVERAGE PLATE CHARACTERISTICS



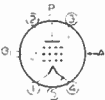
World Radio History

959

DETECTOR AMPLIFIER PENTODE

ACORN TYPE

Filament	Coated	
Voltage	1.25	d-c volts
Current	0.05	amp.
Direct Interelectrode Capacitances:		
Grid to Plate°	0.015 max.	μμf
Input	1.8	μμf
Output	2.5	μμf
Overall Length		1-11/16" ± 3/16"
Overall Diameter		1-3/32" ± 1/16"
Bulb	See Outline in GENERAL SECTION	T-4½
End Terminals		Two
Base		Small Radial 5-Pin ←
Pin 1 - Filament		P - Plate
Pin 2 - Grid No.2		G_1 - Grid No.1
Pin 3 - Grid No.3		AA' - Plane of Electrodes
Pin 4 - Filament -		
Pin 5 - Filament -		
RCA Socket		Stock No. 3925
RCA Grid & Plate Clips		Stock No. 9939
Mounting Position		Vertical◊



P is on Long Part of Bulb: Top
G_1 is on Short Part of Bulb: Bottom

BOTTOM VIEW (5BE)

Maximum Ratings are Design-Center Values

AMPLIFIER

D-C Plate Voltage	145 max.	volts ←
D-C Screen (Grid No.2) Voltage	67.5 max.	volts
Characteristics — Class A_1 Amplifier:		
D-C Plate Voltage	135	volts
Suppressor (Grid No.3)	Connected to filament(-) at socket	
D-C Screen Voltage	67.5	volts
D-C Grid (No.1) Voltage #	-3	volts
Plate Resistance	0.8 approx.	megohm
Transconductance	600	μmhos
D-C Plate Current	1.7	ma.
D-C Screen Current	0.4	ma.

° with shield baffle.

◊ Horizontal operation permitted if plane of electrodes is vertical (plate on edge).

Under maximum rated conditions, the resistance in the grid circuit should not exceed 0.1 megohm with fixed bias, or 0.5 megohm with cathode bias.

R-f grounding by means of condensers placed close to the tube terminals is required if the full capabilities of the 959 for ultra-high-frequency uses are to be obtained. It is important in the cases of the plate and control-grid circuits that separate r-f grounding returns be made to a common point in order to avoid r-f inter-action through common return circuits. It may also be advisable in some applications to supplement the action of the by-pass condensers by r-f chokes placed close to the condensers in the return or supply lead for the grid, the screen, the suppressor, the plate, and the filament.

← Indicates a change.

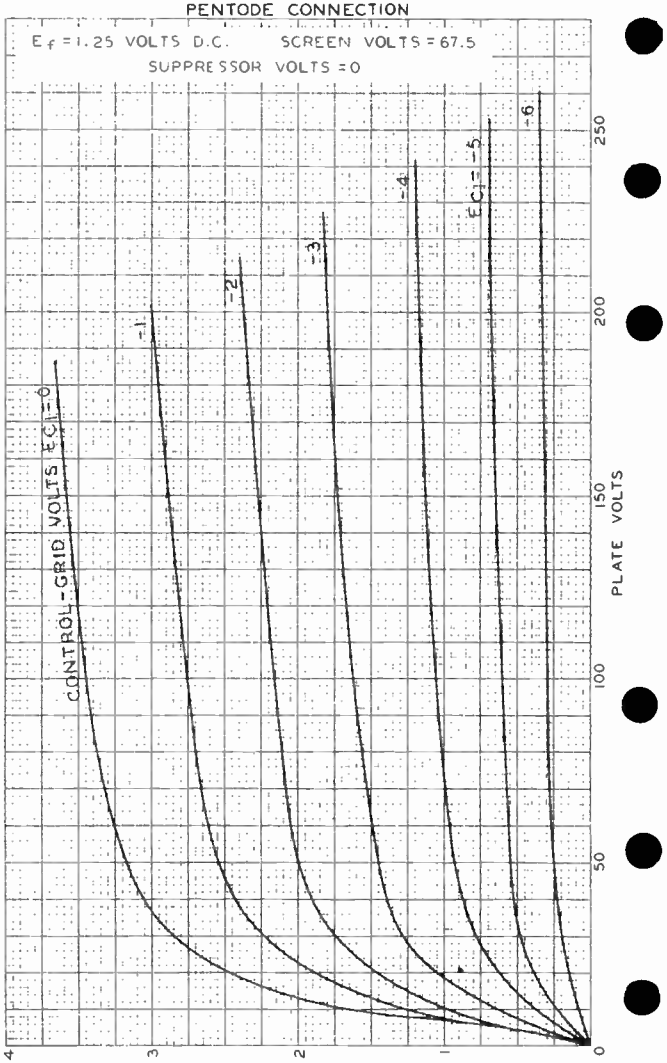
World Radio History

959

959

AVERAGE PLATE CHARACTERISTICS

PENTODE CONNECTION



JUNE 14, 1944

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA HARRISON NEW JERSEY

92CM-6338R1

World Radio History

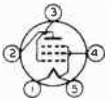
RCA

1609

AMPLIFIER PENTODE

For applications critical as to microphonics

Filament	Coated	
Voltage	1.1	d-c volts
Current	0.25	amp.
Direct Interelectrode Capacitances:°		
Grid to Plate	1.0	μμf
Input	7	μμf
Output	7	μμf
Maximum Overall Length		4-3/16"
Maximum Seated Height		3-9/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base		Small 5-Pin
Pin 1 - Filament +		Pin 4 - Screen
Pin 2 - Plate		Pin 5 - Filament -
Pin 3 - Grid		
Mounting Position		Any



BOTTOM VIEW

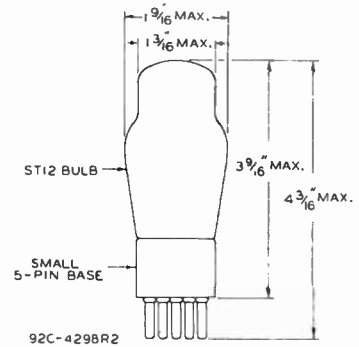
Maximum Ratings Are Absolute Values

A-F AMPLIFIER

Plate Voltage	135 max.	volts
Screen Voltage	67.5 max.	volts
Typical Operation and Characteristics - Class A_1 Amplifier:		
Plate	135	volts
Screen	67.5	volts
Grid *	-1.5	volts
Plate Res.	0.4 approx.	megohm
Transcond.	725	μmhos
Plate Cur.	2.5	ma.
Screen Cur.	0.65	ma.

° Without shield.

* The d-c resistance in the grid circuit of the 1609 should not exceed 0.5 megohm for fixed-bias conditions.



◄ Indicates a change.

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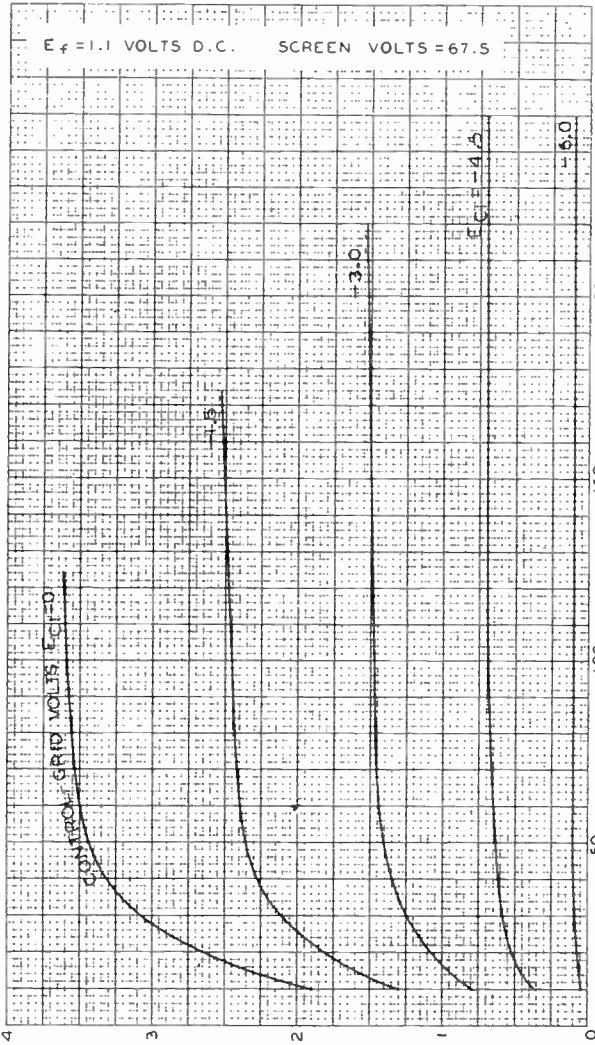
1609

1609

AVERAGE PLATE CHARACTERISTICS



JAN. 26, 1937

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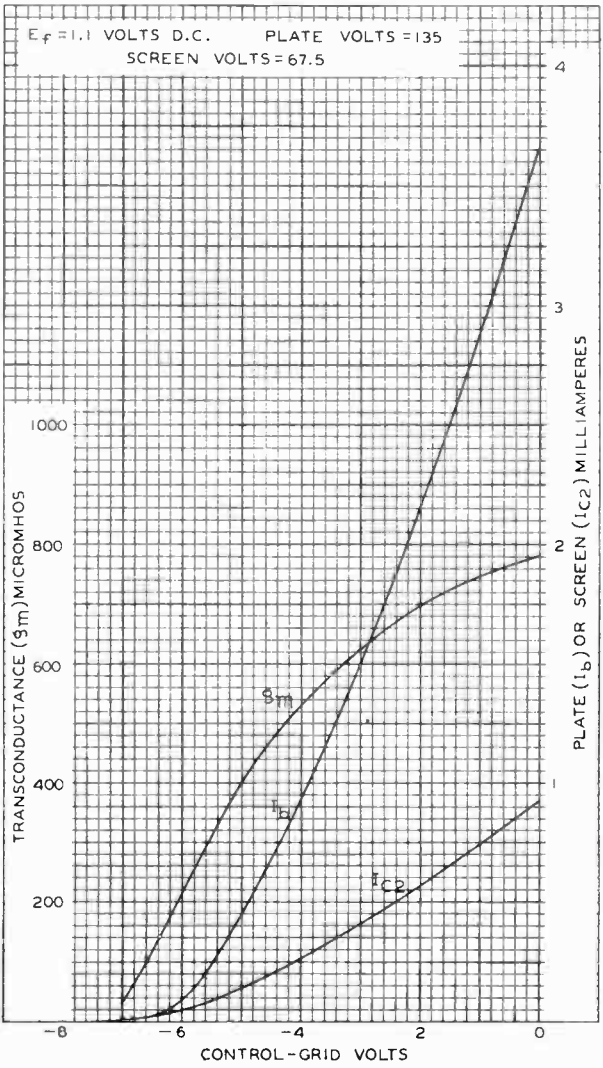
World Radio History

1609

AVERAGE CHARACTERISTICS



World Radio History

1611

POWER AMPLIFIER PENTODE

The 1611 is a power pentode intended for use as a relay tube in equipment on ships for automatically announcing SOS signals. To meet the special requirements of such service, the 1611 features an i_p-e_g characteristic having suitable slope and minimized variation between tubes. Physical characteristics of the 1611 are the same as those of Type 6F6.

RCA-1611 is available only through Radiomarine Corporation of America, 75 Varick Street, New York, N. Y.

World Radio History

1612

PENTAGRID AMPLIFIER

For applications critical as to microphonics

Heater ■	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances: ○		
Grid #1 to Grid #3	0.20 max.	μμf
Grid #1 to Plate	0.001 max.	μμf
Grid #3 to Plate	0.10 max.	μμf
Grid #1 to All Other Electrodes	7.5	μμf
Grid #3 to All Other Electrodes	10	μμf
Plate to All Other Electrodes	11	μμf
Maximum Overall Length		3-1/8"
Maximum Seated Height		2-9/16"
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Cap		Miniature
Base		Small Wafer Octal 7-Pin
Pin 1 - Shell		Pin 5 - Grid #3
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Plate		Pin 8 - Cathode
Pin 4 - Grids #2 & #4		Cap - Grid #1
Mounting Position		Any

BOTTOM VIEW

Maximum Ratings Are Design-Center Values

AMPLIFIER

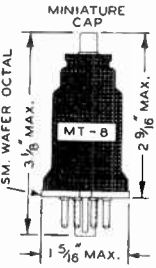
Plate Voltage	250 max.	volts
Screen Voltage	100 max.	volts
Plate Dissipation	1.5 max.	watts
Screen Dissipation	1.0 max.	watt
Typical Operation and Characteristics - Class A_1 Amplifier:		
Plate	250	volts
Screen (Grids #2 & #4)	100	volts
Control Grid (Grid #1)	-3	volts
Control Grid (Grid #3)	-3	volts
Plate Res.	0.6	megohm
Transcond. (Grid #1 - Plate)	1100	μmhos
Transcond. (Grid #1 - Plate)•	5 approx.	μmhos
Plate Cur.	5.3	ma.
Screen Cur.	2.5	ma.

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

○ With shell connected to cathode.

• With Grid #1 bias = -15 volts; Grid #4 bias = -15 volts.

Curves under Type 6L7 also apply to the 1612.



← Indicates a change.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

1620

1620

TRIPLE-GRID DETECTOR AMPLIFIER

For applications critical as to microphonics

→ Heater ■	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.3	amp.
Direct Interelectrode Capacitances: ○		
Pentode Connection		
Grid to Plate	0.005 max.	μμf
Input	7.0	μμf
Output	12.0	μμf
Maximum Overall Length		3-1/8"
Maximum Seated Height		2-9/16"
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Cap		Miniature
Base		Small Wafer Octal 7-Pin
Pin 1 - Shell		Pin 5 - Suppressor
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Plate		Pin 8 - Cathode
Pin 4 - Screen		Cap - Grid
Mounting Position	BOTTOM VIEW	Any

Maximum Ratings Are Design-Center Values

AMPLIFIER - Pentode Connection

Plate Voltage	250 max.	volts
Screen Voltage	100 max.	volts

→ *Typical Operation and Characteristics - Class A_1 Amplifier:*

Plate	100	250	volts
Screen	100	100	volts
Grid #	-3	-3	volts
Supporessor	Connected to cathode at socket		
Plate Res.	1.0	▲	megohm
Transcond.	1185	1225	μmhos
Grid Bias for cathode current cut-off	-7	-7	volts
Plate Cur.	2.0	2.0	ma.
Screen Cur.	0.5	0.5	ma.

AMPLIFIER - Triode Connection ○○

→ Plate Voltage 250 max. volts

Typical Operation and Characteristics - Class A_1 Amplifier:

Plate	180	250	volts
Grid #	-5.3	-8	volts
Amp. Fact.	20	20	
Plate Res.	11000	10500	ohms
Transcond.	1800	1900	μmhos
Plate Cur.	5.3	6.5	ma.

■ For cathode-bias operation of the 1620 a minimum cathode-resistor by-pass condenser of 25 μf is recommended to minimize hum, particularly in circuits where the 1620 is followed by high-gain stages. When a 25 μf condenser or larger is used, the voltage difference between heater and cathode is not critical, but it should be kept as low as possible. If less than a 25 μf condenser is used, positive or negative biasing of the heater with respect to the cathode is required, but the bias value chosen for minimum hum should be within the range of +5 to +50 volts or -5 to -50 volts.

○ With shell connected to cathode.

\# Under maximum rated conditions, the d-c resistance in the grid circuit should not exceed 1.0 megohm.

▲ Greater than 1.0 megohm.

○○ Screen and suppressor tied to plate.

→ Indicates a change.

OUTLINE DIMENSIONS for the 1620 are the same as for 1612.

Curves under Type 6J7 also apply to the 1620.

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Radiomuseum.org

1622

BEAM POWER AMPLIFIER

For applications requiring continuity of service

Heater ■	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.9	amp.
Direct Interelectrode Capacitances (approx.): °		
Grid to Plate	0.4	μμf
Input	10	μμf
Output	12	μμf
Maximum Overall Length		4-5/16"
Maximum Seated Height		3-3/4"
Maximum Diameter		1-9/16" ± 1/16" →
Bulb		Metal Shell, MT-10
Base		Small Wafer Octal 7-Pin
Pin 1 - Shell		Pin 5 - Grid
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Plate		Pin 8 - Cathode
Pin 4 - Screen		
Mounting Position	BOTTOM VIEW (7AC)	Any

Maximum Ratings Are Design-Center Values

PUSH-PULL AMPLIFIER

Plate Voltage	300 max.	volts
Screen Voltage	250 max.	volts
Plate Dissipation	13.8 max.	watts
Screen Dissipation	1.4 max.	watts
Typical Operation - Class A_1 Amplifier:		
Unless otherwise specified, values are for 2 tubes		
Plate Voltage	300	volts
Screen Voltage	250	volts
D-C Grid Voltage #	-20	volts
Peak A-F Grid-to-Grid Voltage	40	volts
Zero-Sig. Plate Current	86	ma.
Max.-Sig. Plate Current	125	ma.
Zero-Sig. Screen Current	4	ma.
Max.-Sig. Screen Current	10.5	ma.
Load Resistance (plate to plate)	4000	ohms
Total Harmonic Distortion	1	%
Power Output	10	watts

■ The heater voltage should never fluctuate so that it exceeds 7 volts. The potential difference between heater and cathode should be kept as low as possible.

\# The type of input coupling used should not introduce too much resistance in the grid circuit. Transformer- or impedance-coupling devices are recommended. When the grid circuit has a resistance not higher than 0.1 megohm, fixed bias may be used; for higher values, cathode bias is required. With cathode bias, the grid circuit may have a resistance not to exceed 0.5 megohm, provided the heater voltage is not allowed to rise more than 10% above the rated value under any condition of operation.

° With shell connected to cathode.

Curves under Type 6L6 also apply to the 1622 within the limitations of its maximum ratings.

→ Indicates a change.

World Radio History

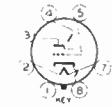
World Radio History

1629

ELECTRON-RAY TUBE

INDICATOR TYPE WITH TRIODE UNIT

Heater	Coated Unipotential Cathode	
Voltage	12.6	a-c or d-c volts
Current	0.15	amp.
Overall Length		3-15/16" ± 3/16"
Seated Height		3-3/8" ± 3/16" ←
Maximum Diameter		1-3/16"
Bulb		T-9
Base		Small Shell Octal 7-Pin
Pin 1 - No Connection		Pin 5 - Grid
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Plate		Pin 8 - Cathode
Pin 4 - Target		
Mounting Position		Any▲ ←



BOTTOM VIEW (7AL)

Maximum and Minimum Ratings Are Design-Center Values

INDICATOR SERVICE

Plate-Supply Voltage	250 max. volts
Target Voltage	250 max. volts 125 min. volts ←
D-C Heater-Cathode Potential	90 max. volts ←

Typical Operation: ←

Plate and Target Supply Voltage	200	250	volts
Series Triode Plate Resistor□	1	1	megohm
Target Current † ◇	3	4	ma.
Triode-Plate Current◇	0.19	0.24	ma.
Triode-Grid Voltage (Approx.)			
For shadow angle of 0°	-6.5	-8.0	volts
For shadow angle of 90°	0	0	volts

□ Designated as R in the circuit diagram under Type 6E5, in the Receiving Tube Section.

† Subject to wide variation.

◇ For triode-grid bias of 0 volts.

▲ The plane of the ray-control electrode passes through the tube axis and base key.

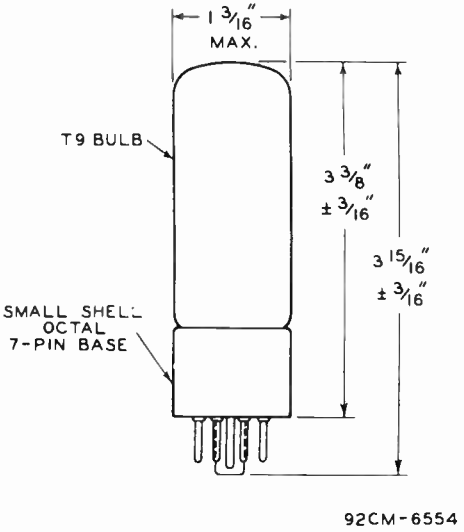
Curves for Type 1629 are the same as for the 6E5 in the Receiving-Tube Section.

← Indicates a change.

1629

1629

ELECTRON-RAY TUBE



World Radio History

1631

BEAM POWER AMPLIFIER

For applications critical as to uniformity of characteristics

Heater	Coated Unipotential Cathode	
Voltage	12.6	a-c or d-c volts
Current	0.45	amp.
Plate Dissipation		16 max. watts

Other ratings, characteristics, dimensions, and socket connections for the 1631 are the same as those for Type 6L6. Typical operating data for the 6L6 also apply to the 1631 within the limitation of the maximum plate-dissipation rating.

1632

BEAM POWER AMPLIFIER

For applications critical as to uniformity of characteristics

Heater	Coated Unipotential Cathode	
Voltage	12.6	a-c or d-c volts
Current	0.6	amp.
Plate Voltage		117 max. volts
Screen Voltage		117 max. volts
Plate Dissipation		5.5 max. watts

Dimensions and socket connections for the 1632 are the same as for Type 25L6. Typical operating data for the 1632 are the same within its plate voltage and dissipation limitations as for the 25L6.

1633

TWIN-TRIODE AMPLIFIER

For applications critical as to matching of the two triode units

Heater	Coated Unipotential Cathode	
Voltage	25	a-c or d-c volts
Current	0.15	amp.

Direct Interelectrode Capacitances (Approx.):[o]

	Triode Unit T_1	Triode Unit T_2	
Grid to Plate	3.6	3.6	μμf
Grid to Cathode	3.0	2.8	μμf
Plate to Cathode	0.8	1.2	μμf

Maximum Overall Length	3-5/16"
Maximum Seated Height	2-3/4"
Maximum Diameter	1-5/16"
Bulb	T-9
Base	Intermediate Shell Octal 8-Pin
Pin 1 - Grid T_2	Pin 5 - Plate T_1
Pin 2 - Plate T_2	Pin 6 - Cathode T_1
Pin 3 - Cathode T_2	Pin 7 - Heater
Pin 4 - Grid T_1	Pin 8 - Heater
Mounting Position	Any

BOTTOM VIEW (8BD)

For convenience, one triode unit is identified as T_1; the other as T_2.

o - See next page.

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World Radio History

1633
TWIN-TRIODE AMPLIFIER

(continued from preceding page)

Maximum And Minimum Ratings Are Design-Center Values

AMPLIFIER - Each Unit

Plate Voltage	300 max.	volts
Grid Voltage	0 min.	volts
Cathode Current	20 max.	ma.
Plate Dissipation	2.5 max.	watt
D-C Heater-Cathode Potential	90 max.	volts
Characteristics - Class A_1 Amplifier:		
Plate Voltage	250	volts
Grid Voltage[#]	-8	volts
Amplification Factor	18	
Plate Resistance	6900	ohms
Transconductance	2600	μmhos
Plate Current	11.5	ma.

[o] With no external shield.

[#] The d-c resistance in the grid circuit should not exceed 1.0 megohm under maximum rated conditions per unit.

Curves for Type 1633 are the same as for the 6J5, and 6SN7-GT.

1634
TWIN-TRIODE AMPLIFIER

For applications critical as to matching of the two triode units

Maximum ratings, characteristics, dimensions, and socket connections for the 1634 are the same as for Type 12SC7.

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

1635

HIGH-MU TWIN POWER TRIODE

GENERAL DATA

Electrical:

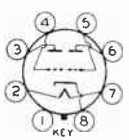
Heater, for Unipotential Cathode:

Voltage	6.3	ac or dc volts
Current	0.6	amp

Mechanical:

Mounting Position	Any
Maximum Overall Length	3-5/16"
Maximum Seated Length	2-3/4"
Maximum Diameter	1-5/16"
Bulb	T-9
Base	Intermediate-Shell Octal 8-Pin
Basing Designation for BOTTOM VIEW	G-8B

Pin 1 - No Connection
Pin 2 - Heater
Pin 3 - Plate of Unit No.2
Pin 4 - Grid of Unit No.2



Pin 5 - Grid of Unit No.1
Pin 6 - Plate of Unit No.1
Pin 7 - Heater
Pin 8 - Cathode

AF POWER AMPLIFIER - Class B

Maximum Ratings, ***Design-Center Values:***

DC PLATE VOLTAGE	300 max.	volts
PEAK PLATE CURRENT (per plate)	90 max.	ma.
PLATE DISSIPATION (per plate)	3 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical Operation:

Values are for 2 units unless otherwise specified

DC Plate Voltage	300	300	volts
DC Grid Voltage	0	0	volts
Peak AF Grid-to-Grid Voltage	70	108*	volts
Zero-Signal DC Plate Current	6.6	6.6	ma.
Max.-Signal DC Plate Current	54	54	ma.
Peak Grid Current (per unit)	38	39	ma.
Plate-Supply Impedance	0	1000*	ohms
Effective Load Resistance (plate-to-plate)	12000	12000	ohms
Effective Grid-Circuit Impedance (per unit)	0	516**	ohms
Total Harmonic Distortion	4	5	%
Max.-Signal Power Output	10.4	10.4	watts

*,**: See next page.

←Indicates a change.

World Radio History

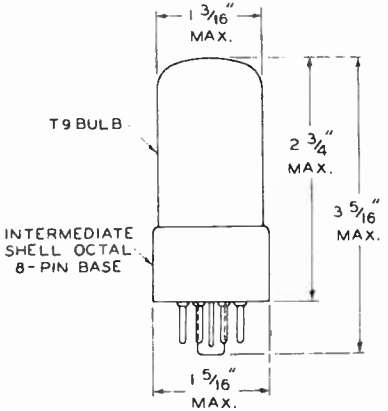
1635

HIGH-MU TWIN POWER TRIODE

• Includes peak voltage drop through the grid-circuit impedance.

• Practical design value.

•• At 400 cycles for class B stage in which the effective resistance per grid circuit is 500 ohms, and the leakage reactance of the coupling transformer is 50 millihenrys. The driver stage should be capable of supplying the grids of the class B stage with the specified values at low distortion.

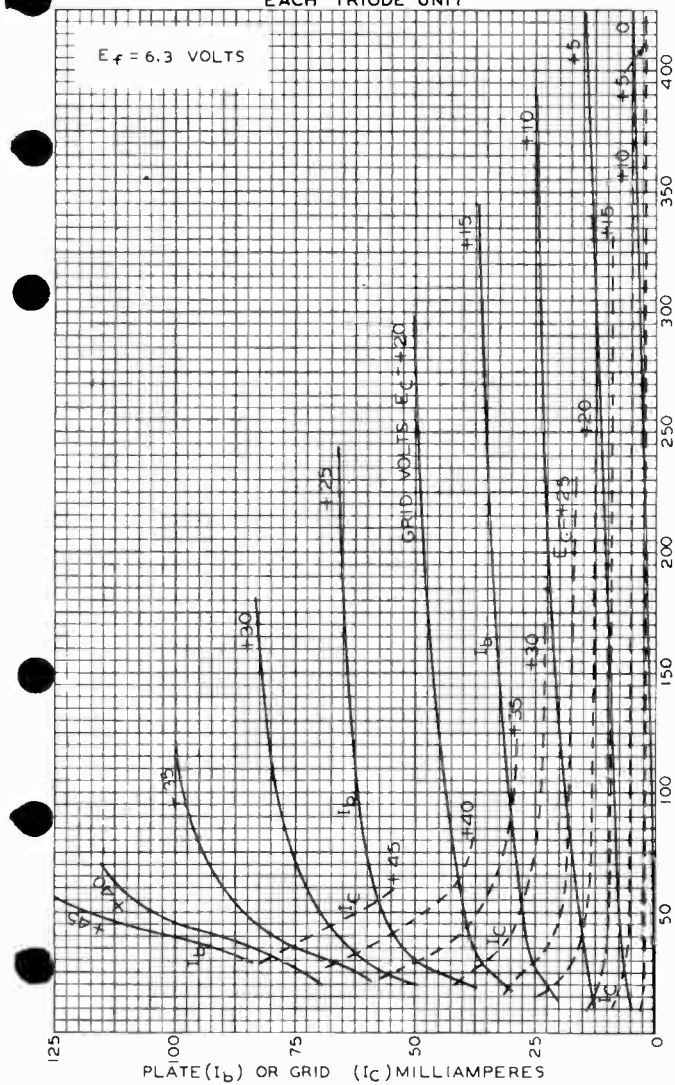


92C-6393

World Radio History

1635

AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



FEB. 26, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6358

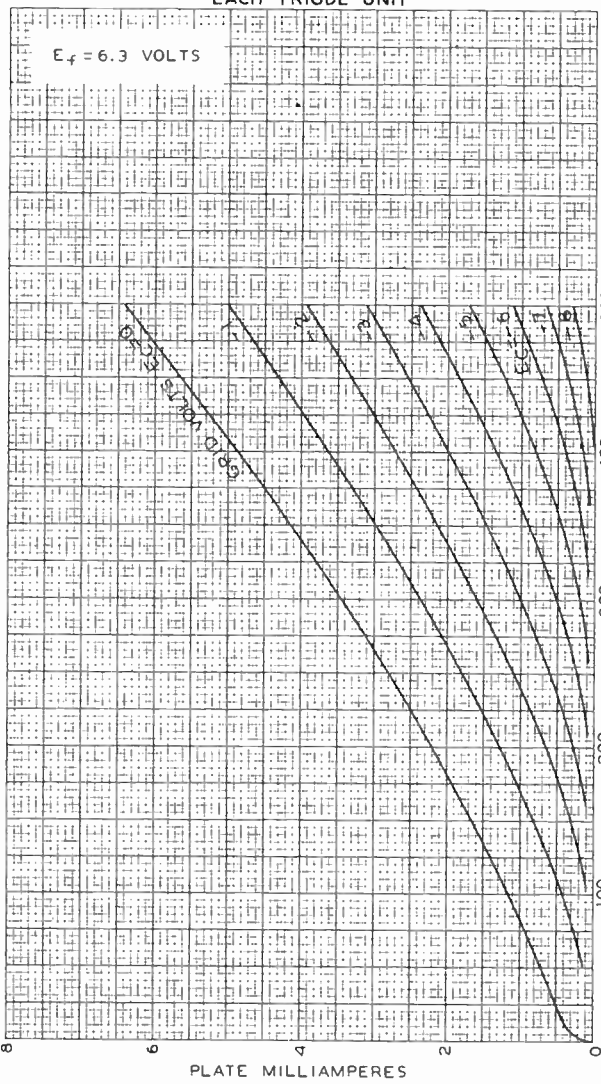
RCA RADIOTRON DIVISION

1635

1635

AVERAGE PLATE CHARACTERISTICS

EACH TRIODE UNIT



FEB. 27, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

92C-6369

World Radio History

Medium-Mu Twin Triode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 7AU7 is the same as the 12AU7A except for the following items:

Heater, for Unipotential Cathodes.

	Series	*Parallel*	
Heater arrangement			
Voltage (AC or DC)	7 ± 10%	3.5	volts
Current	0.3	0.6 ± 6%	amp
Warm-up time (Average)	–	11	sec

World Radio History

World Radio History

Beam Power Tube

With Heater Having Controlled Warm-Up Time

The 7EY6 is the same as the 6EY6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	7.2	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

Medium-Mu Triode—Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings:			
Current	0.450 ±0.030		amp
Voltage (AC or DC) at heater amperes = 0.450	8.4		volts
Warm-up time (Average)	11		sec
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts
Direct Interelectrode Capacitances:[b]			
Triode Unit:			
Grid to plate	2.2		pf
Grid to cathode and heater	2.6		pf
Plate to cathode and heater	0.34		pf
Pentode Unit:			
Grid No.1 to plate	0.044		pf
Grid No.1 to cathode & internal shield & grid No.3, grid No.2, and heater	7.5		pf
Plate to cathode & internal shield & grid No.3, grid No.2, and heater	2.4		pf
Triode grid to pentode plate	0.022	max.	pf
Pentode grid No.1 to triode plate	0.006	max.	pf
Pentode plate to triode plate	0.12	max.	pf

Characteristics, Class A_1 Amplifier:

	Triode Unit	*Pentode Unit*	
Plate Supply Voltage	150	200	volts
Grid-No.2 Supply Voltage	–	125	volts
Cathode Resistor	150	82	ohms
Amplification Factor	40	–	
Plate Resistance (Approx.)	8200	150000	ohms
Transconductance	4900	7000	μmhos
Plate Current	9	15	ma
Grid-No.2 Current	–	3.4	ma
Grid-No.1 Voltage (Approx.) for plate μa = 100	-6.5	8	volts

Mechanical:

Operating Position . . . . . Any

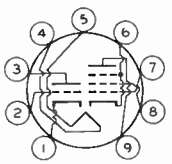
Type of Cathodes . . . . . Coated Unipotential

World Radio History

8AU8

Maximum Overall Length . . . . . 2-5/8"
Maximum Seated Length . . . . . 2-3/8"
Length, Base Seat to Bulb Top (Excluding Tip) . . . 2" ± 3/32"
Diameter. . . . . 0.750" to 0.875"
Dimensional Outline . . . . . See *General Section*
Bulb. T6-1/2
Base. . . . . Small-Button Noval 9-Pin (JEDEC No. E9-1)
Basing Designation for BOTTOM VIEW. 3CY

Pin 1 – Triode Cathode
Pin 2 – Triode Grid
Pin 3 – Triode Plate
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Pentode Cathode, Grid No.3, Internal Shield
Pin 7 – Pentode Grid No.1
Pin 8 – Pentode Grid No.2
Pin 9 – Pentode Plate

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Center Values:*

	Triode Unit	*Pentode Unit*	
PLATE VOLTAGE	300 max.	300 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	-	300 max.	volts
GRID-No.2 VOLTAGE	-	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE: Positive-bias value	0 max.	0 max.	volts
GRID-No.2 INPUT: For grid-No.2 voltages up to 150 volts		1 max.	watt
For grid-No.2 voltages between 150 and 300 volts . .	-	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
PLATE DISSIPATION	2.5 max.	3 max.	watts

Maximum Circuit Values:

	Triode Unit	*Pentode Unit*	
Grid-No.1-Circuit Resistance:			
For fixed-bias operation. . .	0.5 max.	0.25 max.	megohm
For cathode-bias operation. .	1 max.	1 max.	megohm

OPERATING CONSIDERATIONS

Because the *internal shield* is connected to the cathode and grid No.3, the impedance in the cathode circuit should be kept as low as possible to minimize cross-coupling effects.

[a] The dc component must not exceed 100 volts.
[b] Without external shield.

World Radio History

8AW8A

High-Mu Triode—
Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

The 8AW8A is the same as the 6AW8A except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	8.4	volts
Warm-up time (Average)	11	sec

8B10

Twin Diode—
Medium-Mu-Twin Triode

DUODECAR TYPE

The 8B10 is the same as the 6B10 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	8.5	volts
Warm-up time (Average)	11	sec

8BA8A

Medium-Mu Triode—
Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

The 8BA8A is the same as the 6BA8A except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	8.4	volts
Warm-up time (Average)	11	sec

World Radio History

8BH8

Medium-Mu Triode—Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

The 8BH8 is the same as the 6BH8 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	8.4	volts
Warm-up time (Average)	11	sec

8BN8

Twin Diode—High-Mu Triode

9-PIN MINIATURE TYPE

The 8BN8 is the same as the 6BN8 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	8.4	volts
Warm-up time (Average)	11	sec

8BQ5

Power Pentode

9-PIN MINIATURE TYPE

The 8BQ5 is the same as the 6BQ5 except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	8.0	volts
Warm-up time (Average)	11	sec

World Radio History

8CG7

Medium-Mu Twin Triode

CONTROLLED HEATER WARM-UP TIME

The 8CG7 is the same as the 6CG7 except for the following items:

Heater Characteristics and Ratings:

Current . . . . . .

Voltage (for heater-cathode voltage) . . . . . .

8CM7

Medium-Mu Dual Triode

With Dissimilar Units

CONTROLLED HEATER WARM-UP TIME

The 8CM7 is the same as the 6CM7 except for the following items:

Heater Characteristics and Ratings:

Current . . . . . .

Voltage (for heater-cathode voltage) . . . . . .

8CN7

Twin Diode—High-Mu Triode

CONTROLLED HEATER WARM-UP TIME

The 8CN7 is the same as the 6CN7 except for the following items:

Heater Characteristics and Ratings:

Heater connection

	Parallel	*Series*	*Series*
Voltage			
(for heater-cathode voltage)	6.3 [a]	12.6 [b]	25.2
Current	0.45 [c]		

[a] At 0.450 ampere.
[b] At 0.225 ampere.
[c] At 6.3 volts.

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

World Radio History

8CS7

Medium-Mu Dual Triode

With Dissimilar Units

CONTROLLED HEATER WARM-UP TIME

The 8CS7 is the same as the 6CS7 except for the following items:

Heater Characteristics and Ratings:

Current	0.600 ± 0.060	amp
Voltage (AC or DC)	6.4	volts

8CW5

Beam Power Tube

The 8CW5 is the same as the 6CW5 except for the following items:

Heater Characteristics and Rating:

Current	0.600 ± 0.060	amp
Voltage (AC or DC) at 0.600 amp	6.3	volts

8CX8

Medium-Mu Triode—Sharp-Cutoff Pentode

The 8CX8 is the same as the 6CX8 except for the following items:

Heater Characteristics and Rating:

Current	1.50 ± 0.15	amp
Voltage (AC or DC) at 1.50 amp	8.4	volts
Warm-up time (Average)	11	sec

8EB8

High-Mu Triode—Sharp-Cutoff Pentode

The 8EB8 is the same as the 6EB8 except for the following items:

Heater Characteristics and Ratings:

Current	0.300 ± 0.030	amp
Voltage (AC or DC) at 0.300 amp	6.3	volts
Warm-up time (Average)	11	sec

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

World Radio History

Twin Diode—
Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	8	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec
Direct Interelectrode Capacitances:[a]		
Diode Units:		
Either plate to cathode & internal shield, pentode grid No.3 & pentode cathode & pentode internal shield, and heater	1.5	μμf
Cathode & internal shield to either plate, pentode grid No.3 & pentode cathode & pentode internal shield, and heater	7.5	μμf
Pentode Unit:		
Grid No.1 to plate	0.1 max.	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, diode-units cathode & diode-units internal shield, and heater	10	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2, diode-units cathode & diode-units internal shield, and heater	4.2	μμf
Pentode grid No.1 to either diode plate	0.005 max.	μμf
Pentode plate to either diode plate	0.02 max.	μμf

Characteristics, Class A_1 Amplifier (Pentode Unit):

Plate Supply Voltage	60	200	volts
Grid-No.2 Supply Voltage	150	150	volts
Grid-No.1 Voltage	0	–	volts
Cathode Resistor	–	100	ohms
Plate Resistance (Approx.)	–	60000	ohms
Transconductance	–	11500	μmhos
Plate Current	55[b]	25	ma
Grid-No.2 Current	18[b]	5.5	ma
Grid-No.1 Voltage (Approx.) for plate μa = 100	–	-10	volts

Mechanical:

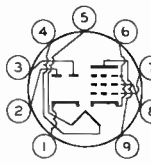
Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"

World Radio History

8ET7

Dimensional Outline. . . . . .See *General Section*
Bulb T6-1/2
Base . . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW 9LT

Pin 1 – Diode-Units Cathode, Internal Shield
Pin 2 – Diode Plate No.2
Pin 3 – Diode Plate No.1
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Pentode Grid No.3, Cathode, Internal Shield
Pin 7 – Pentode Grid No.1
Pin 8 – Pentode Grid No.2
Pin 9 – Pentode Plate

PENTODE — AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE.	330	max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE . .	330	max.	volts
GRID-No.2 VOLTAGE. . . . . See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section			
GRID-No.1 (CONTROL-GRID) VOLTAGE:			
Positive-bias value.	0	max.	volts
GRID-No.2 INPUT:			
For grid-No.2 voltages up to 165 volts .	1.1	max.	watts
For grid-No.2 voltages between 165 and 330 volts. . . . . See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section			
PLATE DISSIPATION.	5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	200	max.	volts
Heater positive with respect to cathode.	200[c]	max.	volts

Maximum Circuit Values:

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

DIODE UNITS — Two

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

DC PLATE CURRENT	3	max.	ma
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	200	max.	volts
Heater positive with respect to cathode.	200[c]	max.	volts

Characteristics, Instantaneous Test Condition:

Plate Current for plate volts = 10	1.5	ma

[a] Without external shield.
[b] This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded.
[c] The dc component must not exceed 100 volts.

World Radio History

8FQ7

Medium-Mu Twin Triode

The 8FQ7 is the same as the 6FQ7 except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at 0.450 A	8.4	V
Warm-up time (Average)	11	s

8GJ7

Medium-Mu Triode—Sharp-Cutoff Pentode

The 8GJ7 is the same as the 6GJ7 except for the following items:

Heater Characteristics and Ratings

Current	0.300 ± 0.020	A
Voltage (AC or DC) at 0.300 A	8.0	V
Warm-up time (Average)	11	s

8GN8

High-Mu Triode—Sharp-Cutoff Pentode

The 8GN8 is the same as the 6GN8 except for the following items:

Heater Characteristics and Ratings

Current	0.600 ± 0.040	A
Voltage (AC or DC) at 0.600 A	8.0	V
Warm-up time (Average)	11	s

8JV8

High-Mu Triode—Sharp-Cutoff Pentode

The 8JV8 is the same as the 6JV8 except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at 0.450 A	8.5	V
Warm-up time (Average)	11	s

World Radio History

8KA8

High-Mu Triode—Sharp-Cutoff Pentode

Pentode Unit Has Two Independent Control Grids

The 8KA8 is the same as the 6KA8 except for the following items:

Heater Characteristics and Ratings

[illegible]	0.450 ± 0.030	A
[illegible]	8.4	V
[illegible]	11	s

8LC8

High-Mu Triode—Sharp-Cutoff Pentode

The 8LC8 is the same as the 6LC8 except for the following items:

Heater Characteristics and Ratings

[illegible]	0.450 ± 0.030	A
[illegible]	8.4	V
[illegible]	11	s

9AU7

Medium-Mu Twin Triode

The 9AU7 is the same as the 12AU7 except for the following items:

Heater, for Unipotential Cathodes

	Series	*Parallel*	
[illegible]			
Voltage (AC or DC)	9.4 ± 10%	4.7	V
[illegible]	0.225	0.45 ± 6%	A
[illegible]	–	11	s

10AL11

Beam Power Tube—Sharp-Cutoff Pentode

DUODECAR TYPE

The 10AL11 is the same as the 6AL11 except for the following items:

Heater Characteristics and Ratings

[illegible]	0.600 ± 0.040	A
[illegible]	9.8	V
[illegible]	11	s

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

World Radio History

Medium-Mu Twin Triode

9-PIN MINIATURE TYPE
With Heater Having Controlled Warm-Up Time

The 9AU7 is the same as the 12AU7A except for the following items:

Heater, for Unipotential Cathodes:

	Series	*Parallel*	
Heater arrangement			
Voltage (AC or DC)	9.4 ± 10%	4.7	volts
Current	0.225	0.45 ± 6%	amp
Warm-up time (Average)	–	11	sec

World Radio History

World Radio History

Beam Power Tube—
Sharp-Cutoff Pentode

DUODECAR TYPE

The 10AL11 is the same as the 6AL11 except for the following items:

Heater Characteristics and Ratings:

Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	9.8	volts
Warm-up time (Average)	11	sec

World Radio History

World Radio History

RCA

10C8

HIGH-MU TRIODE—
SHARP-CUTOFF PENTODE

Maximum Circuit Values:

	Triode Unit	*Pentode Unit*	
Grid-No.1-Circuit Resistance:			
For fixed-bias operation. . . .	0.5 max.	0.25 max.	megohm
For cathode-bias operation. . .	1 max.	1 max.	megohm

VERTICAL-DEFLECTION OSCILLATOR

Triode Unit

Maximum Ratings, *Design-Maximum Values:*

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

DC PLATE VOLTAGE	300	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	400	max.	volts
CATHODE CURRENT:			
Peak	35	max.	ma
Average.	12	max.	ma
PLATE DISSIPATION.	1	max.	watt
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	200	max.	volts
Heater positive with respect to cathode.	200▲	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:			
For fixed-bias, grid-resistor-bias, or cathode-bias operation.	2.2	max.	megohms

VERTICAL-DEFLECTION AMPLIFIER

Pentode Unit (Triode Connection◆*)*

Maximum Ratings, *Design-Maximum Values:*

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

DC PLATE VOLTAGE	300	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE* . . .	1000	max.	volts
PEAK NEGATIVE-PULSE GRID-No.1 VOLTAGE. .	250	max.	volts
CATHODE CURRENT:			
Peak	55	max.	ma
Average.	18	max.	ma
PLATE DISSIPATION.	2.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	200	max.	volts
Heater positive with respect to cathode.	200	max.	volts

Maximum Circuit Values:

Grid-No.1 Circuit Resistance:			
For grid-resistor-bias or cathode-bias operation	2.2	max.	megohms

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

10C8

HIGH-MU TRIODE—
SHARP-CUTOFF PENTODE

○ Without external shield.

♦ Grid No.2 connected to plate.

* This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded.

▲ The dc component must not exceed 100 volts.

□ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

This rating is applicable when the duration of the voltage pulse does not exceed 15 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 15 per cent of one vertical scanning cycle is 2.5 milliseconds.

World Radio History

10DE7

Dual Triode

With Medium-Mu Unit and Low-Mu Unit

9-PIN MINIATURE TYPE

The 10DE7 is the same as the 6DE7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	9.7	volts
Warm-up time (Average)	11	sec

10DR7

Dual Triode

With High-Mu Unit and Low-Mu Unit

9-PIN MINIATURE TYPE

The 10DR7 is the same as the 6DR7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	9.7	volts
Warm-up time (Average)	11	sec

10DX8

High-Mu Triode
Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

The 10DX8 is the same as the 6DX8 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	10.2	volts

World Radio History

World Radio History

10EM7

Dual Triode
With High-Mu Unit and Low-Mu Unit

The 10EM7 is the same as the 6EM7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	9.7	volts
Warm-up time (Average)	11	sec

10GF7

Dual Triode
With High-Mu Unit and Low-Mu Unit

NOVAR TYPE

The 10GF7 is the same as the 6GF7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	9.7	volts
Warm-up time (Average)	11	sec

10GF7A

Dual Triode
With High-Mu Unit and Low-Mu Unit

NOVAR TYPE

The 10GF7A is the same as the 6GF7A except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	9.7	volts
Warm-up time (Average)	11	sec

World Radio History

10GN8

High-Mu Triode—
Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

The 10GN8 is the same as the 6GN8 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	10.5	volts
Warm-up time (Average)	11	sec

10HF8

High-Mu Triode—
Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

The 10HF8 is the same as the 6HF8 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	10.5	volts
Warm-up time (Average)	11	sec

World Radio History

10JA8

High-Mu Triode—Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

For Use in Sync-Separator, Sync-Clipper, Voltage Amplifier, Phase-Inverter, and Video Output Amplifier Circuits in TV Receivers

Electrical:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater current = 0.450 amperes	10.5	volts
Warm-up time (Average)	11	sec
Peak heater-cathode voltage (Each Unit):		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200[a] max.	volts
Direct Interelectrode Capacitances:[b]		
Triode Unit:		
G_T to P_T	4.0	pf
Input: G_T to (K_T, K_P+$G2_P$+I_S, H)	2.6	pf
Output: P_T to (K_T, K_P+$G3_P$+I_S, H)	2.6	pf
Pentode Unit:		
$G1_P$ to I_P	0.1 max.	pf
Input: $G1_P$ to (K_P+$G3_P$+I_S, $G2_P$, H)	11	pf
Output: P_P to (K_P+$G3_P$+I_S, $G2_P$, H)	4.4	pf
$G1_P$ to P_T	0.005 max.	pf
P_P to G_T	0.018 max.	pf
P_P to P_T	0.17 max.	pf

Characteristics, Class A_1 Amplifier:

		Triode Unit		
Plate Voltage		135	200	volts
Grid Voltage		−2	−2	volts
Amplification Factor		60	70	
Plate Resistance (Approx.)		39000	19000	ohms
Transconductance		1550	3700	μmhos
Plate Current		1	3.5	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10		−4.8	−7	volts
		Pentode Unit		
Plate Voltage	30	135	200	volts
Grid-No.2 Voltage	135	135	135	volts
Grid-No.1 Voltage	0	−1.5	−1.5	volts
Plate Resistance (Approx.)	–	66000	70000	ohms
Transconductance	–	12600	14000	μmhos
Plate Current	32[c]	17	18	ma
Grid-No.2 Current	14[c]	4.2	4	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	–	−5	−5	volts

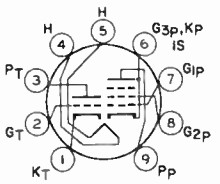
World Radio History

10JA8

Mechanical:

Operating Position. . . . . Any
Types of Cathodes . . . . . Coated Unipotential
Maximum Overall Length. . . . . 2-5/8"
Maximum Seated Length . . . . . 2-3/8"
Length, Base Seat to Bulb Top
(Excluding tip) . . . . . 2" ± 3/32"
Diameter. . . . . 0.750" to 0.875"
Dimensional Outline . . . . . See *General Section*
Bulb. T6-1/2
Base. . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW. 9DX

Pin 1 – Triode Cathode
Pin 2 – Triode Grid
Pin 3 – Triode Plate
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Pentode Cathode, Pentode Grid No.3, Internal Shield
Pin 7 – Pentode Grid No.1
Pin 8 – Pentode Grid No.2
Pin 9 – Pentode Plate



AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

	Triode Unit	*Pentode Unit*	
Plate Voltage.	300 max.	330 max.	volts
Grid-No.2 (Screen-Grid) Supply Voltage	–	330 max.	volts
Grid-No.2 Voltage.	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section		
Grid-No.1 (Control-Grid) Voltage: Positive-bias value.	0 max.	0 max.	volts
Plate Dissipation.	1 max.	5 max.	watts
Grid-No.2 Input: For grid-No.2 voltages up to 165 volts.	–	1.5 max.	watts
For grid-No.2 voltages between 165 and 330 volts.	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section		

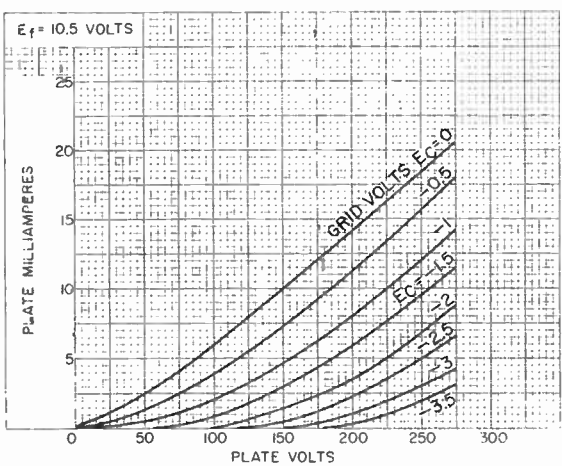
Maximum Circuit Values:

	Triode Unit	*Pentode Unit*	
Grid-No.1 Circuit Resistance:			
For cathode-bias operation. .	1.0 max.	1.0 max.	megohm
For fixed-bias operation. . .	0.5 max.	0.25 max.	megohm

World Radio History

[a] The dc component must not exceed 100 volts.
[b] Without external shield.
[c] This value can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

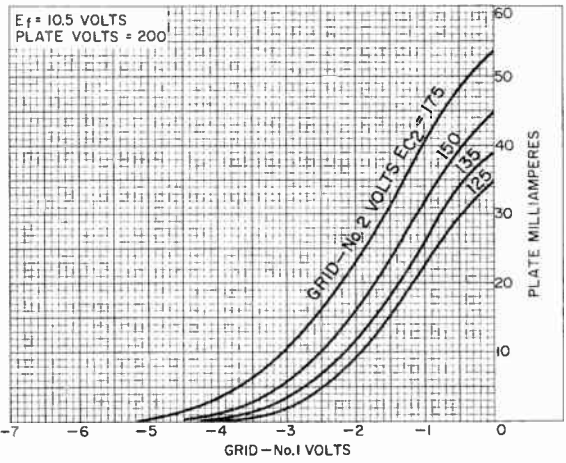
AVERAGE PLATE CHARACTERISTICS
Triode Unit



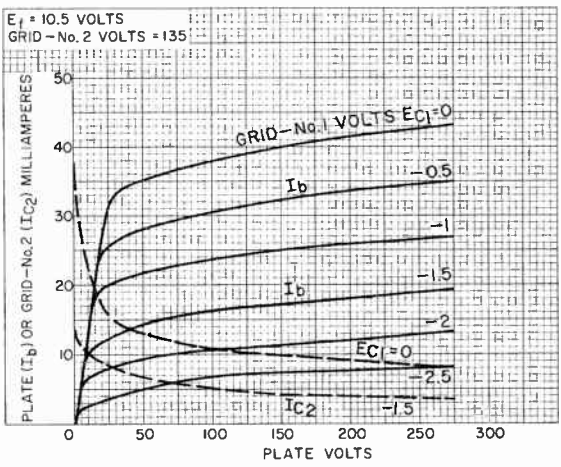
92LS-12158

Vacuum Tube History

AVERAGE CHARACTERISTICS
Pentode Unit



92CS-12160



92CS-12159

World Radio History

10LE8

Twin Dual-Control Pentode

The 10LE8 is the same as the 6LE8 except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at 0.450 A	10	V
Warm-up time (Average)	11	s

11AR11

Semiremote-Cutoff Twin Pentode

DUODECAR TYPE

The 11AR11 is the same as the 6AR11 except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at 0.45 A	11.2	V
Warm-up time (Average)	11	s

11CY7

Dual Triode

With High-Mu Unit and Low-Mu Unit

The 11CY7 is the same as the 6CY7 except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at 0.450 A	11.0	V
Warm-up time (Average)	11	s

World Radio History

World Radio History

11HM7

Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE
FRAME-GRID CONSTRUCTION g_m = 30000 μmho

For Video-Output Amplifier Service in Color-TV Receivers

ELECTRICAL CHARACTERISTICS

Bogey Values[a]

		Series	Parallel	
Heater Voltage (AC or DC)	E_h	11.0	5.50	V
Heater Current	I_h	300	600	mA
Direct Interelectrode Capacitances				
Without external shield				
Grid No.1 to plate	c_{g1-p}		0.15 max	pF
Input: G1 to (K, G3 + IS, G2, H)	c_i		14	pF
Output: P to (K, G3 + IS, G2, H)	c_o		5.0	pF

For the following characteristics, see Conditions

Plate Resistance (Approx.)	r_p	40	kΩ
Transconductance	g_m	30000	μmho
DC Plate Current	I_b	30	mA
DC Grid-No.2 Current	I_{c2}	5.2	mA
Cutoff DC Grid-No.1 Voltage. Plate μA = 100	$E_{c1(co)}$	-4.5	V

Conditions

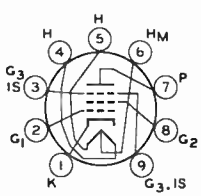
		Bogey Value	
Heater Voltage	E_h		V
DC Plate Supply Voltage	E_{bb}	200	V
DC Grid-No.3 Voltage	E_{c3}	0	V
DC Grid-No.2 Supply Voltage	E_{cc2}	135	V
DC Grid-No.1 Supply Voltage	E_{cc1}	0	V
Cathode Resistor	R_k	47	Ω

MECHANICAL CHARACTERISTICS

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2.625 in
Maximum Seated Length	2.375 in
Maximum Diameter	0.875 in
Dimensional Outline (JEDEC 6-3)	See *General Section*
Envelope	JEDEC T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC E9-1)

TERMINAL DIAGRAM (Bottom View)

Pin 1 – Cathode
Pin 2 – Grid No.1
Pin 3 – Grid No.3, Internal Shield
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Heater Tap
Pin 7 – Plate
Pin 8 – Grid No.2
Pin 9 – Grid No.3, Internal Shield



9BF

World Radio History

DESIGN-MAXIMUM RATINGS

For operation as a Class A1 Amplifier Tube

DC Plate Voltage	E_b	330	V
DC Grid-No.2 (Screen-Grid) Supply Voltage	E_{cc2}	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
DC Grid-No.1 (Control-Grid) Voltage			
Positive-bias value	E_{c1}	0	V
Heater-Cathode Voltage			
Peak	e_{hkm}	±200	V
Average[b]	$E_{hk(av)}$	100	V
Heater Voltage (AC or DC)	E_f		
Series	-	9.9 min 12.1 max	V
Parallel	-	4.95 min 6.05 max	V
Grid-No.2 Input	P_{g2}		
For $E_{c2} \leq 165$ V	-	1	W
For $E_{c2} > 165$ V and ≤ 330 V	-	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
Plate Dissipation	P_b	7	W

MAXIMUM CIRCUIT VALUES

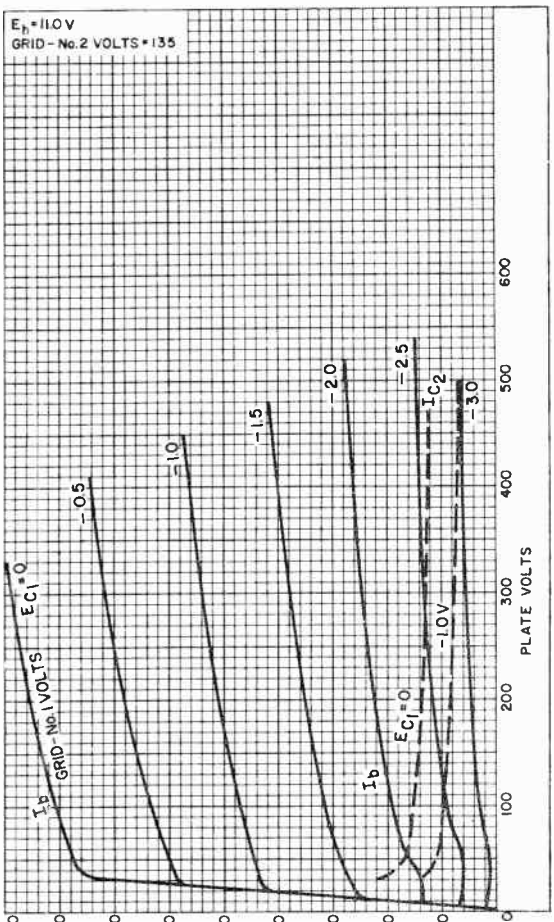
Grid-No.1 Circuit Resistance	$R_{g1(ckt)}$		
For fixed-bias operation	-	0.1	MΩ
For cathode-bias operation	-	0.25	MΩ

[a] Unless otherwise specified.
[b] Measured with a dc meter.

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

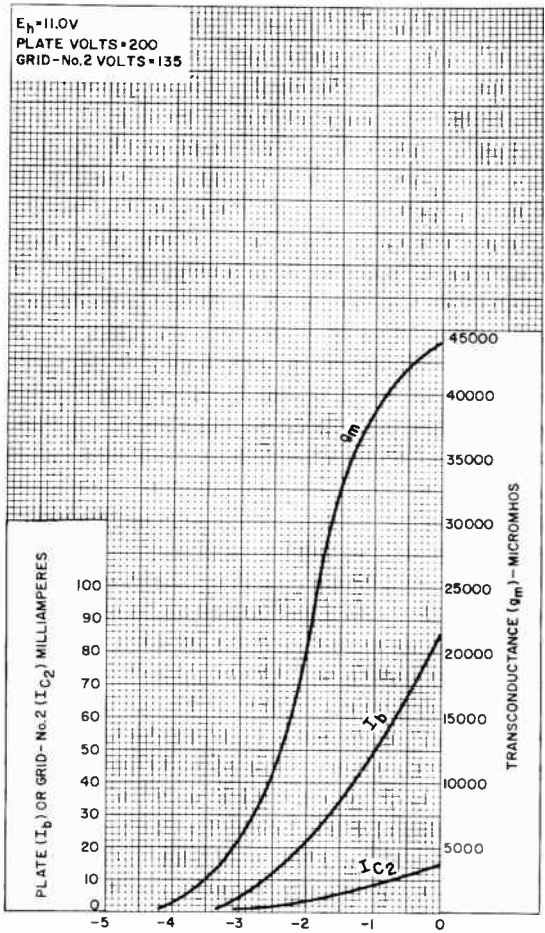
World Radio History

Typical Characteristics



92CM-13833

Typical Characteristics



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

World Radio History

11KV8

High-Mu Triode—
Sharp-Cutoff Pentode

The 11KV8 is the same as the 6KV8 except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at 0.450 A	10.9	V
Warm-up time (Average)	11	s

11LQ8

Medium-Mu Triode—
Sharp-Cutoff Pentode

The 11LQ8 is the same as the 6LQ8 except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at 0.450 A	10.9	V
Warm-up time (Average)	11	s

World Radio History

World Radio History

RCA

12AB5

BEAM POWER TUBE

9-PIN MINIATURE TYPE

For use in automobile radio receivers operating from 12-volt storage batteries

GENERAL DATA

Electrical:

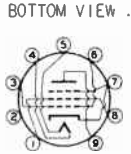
Heater•, for Unipotential Cathode:

Voltage range	10.0 to 15.9	dc volts
This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.		
Current (Approx.), at 12.6 volts. . .	0.2	amp
Direct Interelectrode Capacitances:°		
Grid No.1 to plate	0.7 max.	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater.	8	μμf
Plate to cathode & grid No.3, grid No.2, and heater.	8.5	μμf

Mechanical:

Mounting Position.	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length.	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip). . .	2" ± 3/32"
Maximum Diameter	7/8"
Dimensional Outline.	*See General Section*
Bulb	T-6-1/2
Base . . . . . Small-Button Noval 9-Pin (JETEC No.E9-1)	
Basing Designation for BOTTOM VIEW	9EU

Pin 1 – Grid No.2
Pin 2 – No Connection
Pin 3 – Grid No.1
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Grid No.1
Pin 7 – Cathode, Grid No.3
Pin 8 – Grid No.2
Pin 9 – Plate

AF POWER AMPLIFIER - Class A_1

Maximum Ratings, *Design-Center Values:*

For application of these design-center ratings to storage-battery operation, see Operating Considerations

PLATE VOLTAGE.	315 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	285 max.	volts
PLATE DISSIPATION.	12 max.	watts
GRID-No.2 INPUT.	2 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	90 max.	volts
Heater positive with respect to cathode.	90 max.	volts
BULB TEMPERATURE (At hottest point or bulb surface)	250 max.	°C

•, °: see next page.

RCA

12AB5

BEAM POWER TUBE

Characteristics with 12.6 volts on heater:			
Plate Voltage	250	250	volts
Grid-No.2 Voltage	200	250	volts
Grid-No.1 (Control-Grid) Voltage	–	-12.5	volts
Cathode-Bias Resistor	270	–	ohms
Peak AF Grid-No.1 Voltage	10.5	12.5	volts
Zero-Signal Plate Current	33.5	45	ma
Max.-Signal Plate Current	36	47	ma
Zero-Signal Grid-No.2 Current (Approx.)	1.6	4.5	ma
Max.-Signal Grid-No.2 Current (Approx.)	3.2	7	ma
Plate Resistance (Approx.)	75000	50000	ohms
Transconductance	4000	4100	μmhos
Load Resistance	6000	5000	ohms
Total Harmonic Distortion	8	8	%
Max.-Signal Power Output	3.3	4.5	watts

Maximum Circuit Values:

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

PUSH-PULL AF POWER AMPLIFIER – Class AB_1

Maximum Ratings, *Design-Center Values:*

For application of these design-center ratings to storage-battery operation, see Operating Considerations

PLATE VOLTAGE	315 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	285 max.	volts
PLATE DISSIPATION	12 max.	watts
GRID-No.2 INPUT	2 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Characteristics with 12.6 volts on heater: *Values are for 2 tubes*		
Plate Voltage	250	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 (Control-Grid) Voltage	-15	volts
Peak Af Grid-No.1-to-Grid-No.1 Voltage	30	volts
Zero-Signal Plate Current	70	ma
Max.-Signal Plate Current	79	ma

• Operation of heater in series with other heaters is not recommended.
o Without external shield.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12AB5

BEAM POWER TUBE

Zero-Signal Grid-No.2 Current (Approx.)	5	ma
Max.-Signal Grid-No.2 Current (Approx.)	13	ma
Effective Load Resistance (Plate to plate)	10000	ohms
Total Harmonic Distortion	5	%
Max.-Signal Power Output	10	watts

Maximum Circuit Values:

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

OPERATING CONSIDERATIONS

The *maximum ratings* in the tabulated data for the 12AB5 are working design-center maximums established according to the standard design-center system of rating electron tubes. Tubes so rated will give satisfactory performance in storage-battery-operated equipment provided the following stipulations are observed:

In the case of storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. This fluctuation imposes severe operating conditions on tubes. Under these conditions, the equipment should be designed so that 90 per cent of the design-center maximum values of plate voltage, grid-No.2 voltage, plate dissipation, and grid-No.2 input is never exceeded for a battery terminal potential of 13.2 volts. Although the operating voltages of the 12AB5 in this service will, at times, exceed the design-center maximum values, satisfactory performance with probable sacrifice in life will be obtained.

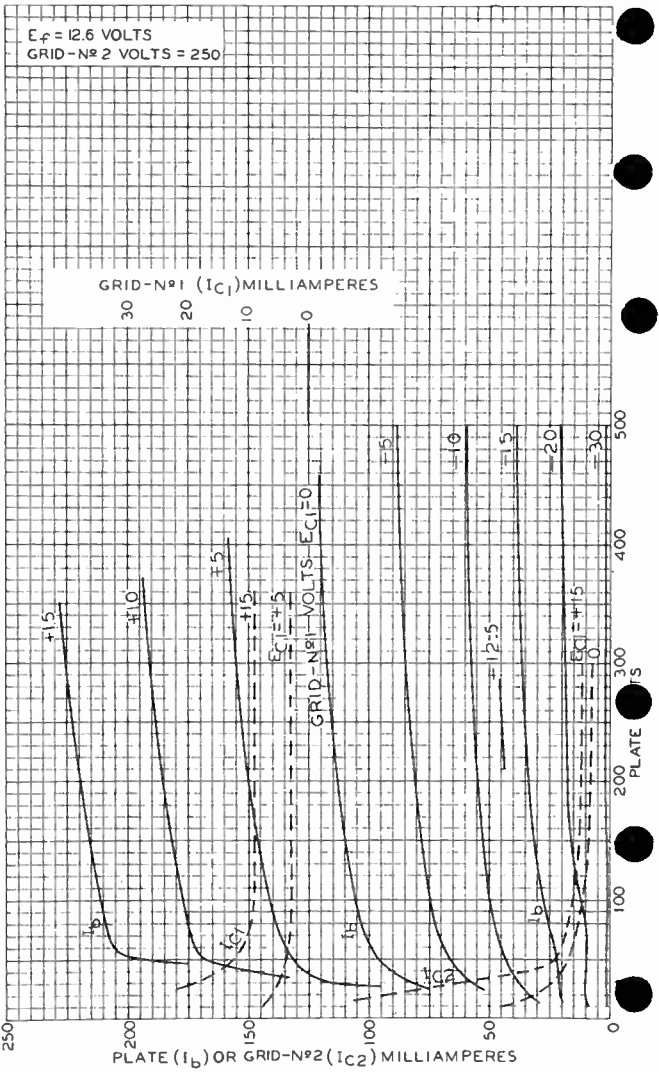
World Radio History

12AB5

RCA

12AB5

AVERAGE CHARACTERISTICS

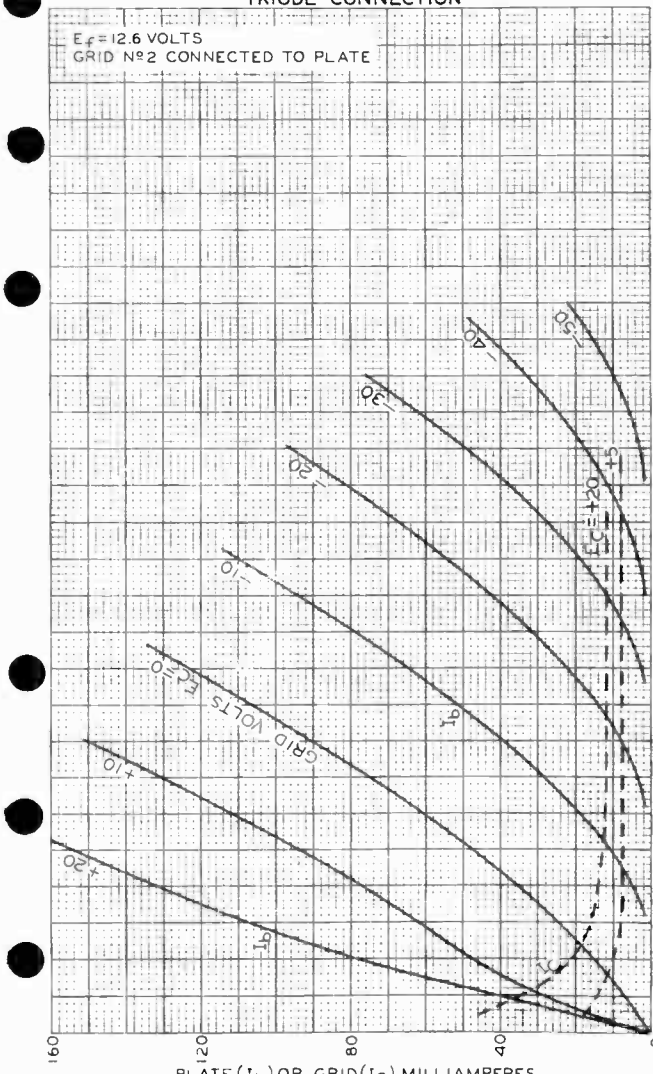


World Radio History

RCA

12AB5

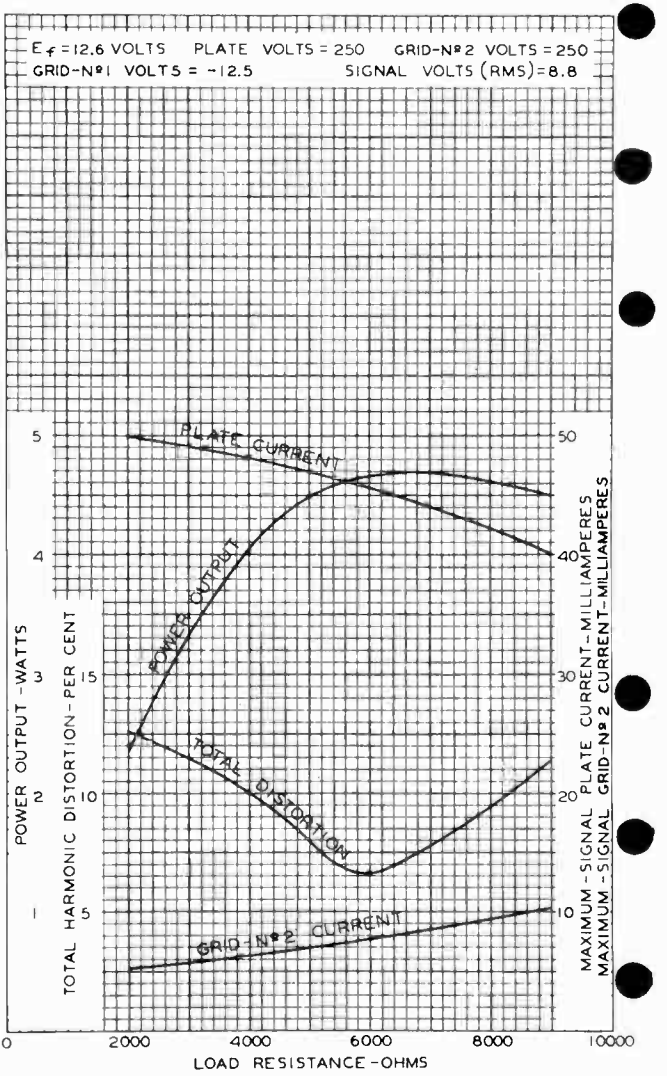
AVERAGE CHARACTERISTICS
TRIODE CONNECTION



RCA

12AB5

OPERATION CHARACTERISTICS



12AF3
HALF-WAVE VACUUM RECTIFIER

9-PIN MINIATURE TYPE

For damper service in TV receivers having series heater-string arrangement

The 12AF3 is the same as the 6AF3 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

12AL5

TWIN DIODE

MINIATURE TYPE

Heater, for Unipotential Cathodes:		
Voltage	12.6	ac or dc volts
Current	0.15	amp

The 12AL5 is the same as the 6AL5 except for heater rating.

World Radio History

Beam Power Tube—
Sharp-Cutoff Pentode

DUODECAR TYPE

The 12AL11 is the same as the 6AL11 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	12.6	volts
Warm-up time (Average)	11	sec

World Radio History

World Radio History

12AQ5
BEAM POWER AMPLIFIER

MINIATURE TYPE

GENERAL DATA

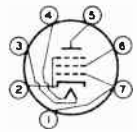
Electrical:

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.225	amp
Direct Interelectrode Capacitances (Approx., without external shield):		
Grid No.1 to Plate	0.35	μμf
Input	8.3	μμf
Output	8.2	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding Tip)	2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)

BOTTOM VIEW



Pin 1 – Grid No.1
Pin 2 – Grid No.3, Cathode
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Plate
Pin 6 – Grid No.2
Pin 7 – Grid No.1

AF POWER AMPLIFIER – Class A_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	250 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
PLATE DISSIPATION	12 max.	watts
GRID-No.2 INPUT	2 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)*	250 max.	°C

Typical Operation and Characteristics:

Plate Voltage	180	250	volts
Grid-No.2 Voltage	180	250	volts
Grid-No.1 (Control-Grid) Voltage	-8.5	-12.5	volts
Peak AF Grid-No.1 Voltage	8.5	12.5	volts
Zero-Signal Plate Current	29	45	ma
Max.-Signal Plate Current	30	47	ma

*: See next page.

RCA

12AQ5

BEAM POWER AMPLIFIER

Zero-Signal Grid-No.2 Current (Approx.)	3	4.5	ma
Max.-Signal Grid-No.2 Current (Approx.)	4	7	ma
Plate Resistance (Approx.)	58000	52000	ohms
Transconductance	3700	4100	μmhos
Load Resistance	5500	5000	ohm
Total Harmonic Distortion	8	8	per cen
Max.-Signal Power Output	2.0	4.5	watts

Maximum Circuit Values:

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

AF POWER AMPLIFIER - Class AB_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	250 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
PLATE DISSIPATION	12 max.	watts
GRID-No.2 INPUT	2 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)●	250 max.	°C

Typical Operation:

Unless otherwise indicated, values are for 2 tubes

Plate Voltage	250	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 (Control-Grid) Voltage#	-15	vol
Peak AF Grid-No.1-to-Grid-No.1 Voltage	30	vol
Zero-Signal Plate Current	70	ma
Max.-Signal Plate Current	79	ma
Zero-Signal Grid-No.2 Current (Approx.)	5	ma
Max.-Signal Grid-No.2 Current (Approx.)	13	ma
Plate Resistance (Approx. per tube)	60000	ohms
Transconductance (Per tube)	3750	μmho
Effective Load Resistance (Plate to plate)	10000	oh
Total Harmonic Distortion	5	per cent
Max.-Signal Power Output	10	watts

● High ambient temperature and shielding may necessitate a reduction in operating dissipation. When tube shields are used, it is advisable to paint the inside and outside surfaces of the tube shield a dull black and to provide ventilation slots to reduce operating temperature.

#: See next page.

World Radio History

12AQ5

BEAM POWER AMPLIFIER

Maximum Circuit Values Per Tube:▲

Grid-No.1-Circuit Resistance:#

For fixed bias	0.1 max.	megohm
For cathode bias	0.5 max.	megohm

The type of input coupling used should not introduce too much resistance in the grid-No.1 circuit. Transformer- or impedance-coupling devices are recommended.

▲ If the grid-No.1-circuit resistance is common to two tubes, the indicated maximum values per tube should be halved.

Curves shown under Type 6V6 also apply to 12AQ5

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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12AT6

12AT6

TWIN DIODE—HIGH-MU TRIODE

MINIATURE TYPE

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.15	amp

The 12AT6 is the same as the 6AT6 except for heater rating.

12AT7
HIGH-MU TWIN TRIODE

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater Arrangement	*Series*	*Parallel*	
Voltage	12.6	6.3	ac or dc volts
Current	0.15	0.3	amp

Direct Interelectrode Capacitances (Approx.)[o]: ←

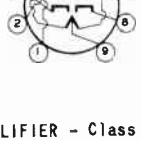
	Unit No.1	*Unit No.2*	
Grid-Drive Operation:			
Grid to Plate	1.5	1.5	μμf
Grid to Cathode	2.2	2.2	μμf
Plate to Cathode	0.5	0.4	μμf
Heater to Cathode	2.4	2.4	μμf
Cathode-Drive Operation:			
Plate to Cathode	0.2	0.2	μμf
Grid & Heater to Cathode	4.6	4.6	μμf
Grid & Heater to Plate	1.8	1.8	μμf
Grid to Grid	0.005 max.		μμf
Plate to Plate	0.4 max.		μμf

[o] with no external shield.

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Maximum Diameter	7/8"
Bulb	T-6-1/2"
Base	Small-Button Noval 9 Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Center-Tap

AMPLIFIER - Class A_1

Values are for each unit

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	300 max.	volts
GRID VOLTAGE:		
Negative Bias Value	-50 max.	volts
PLATE DISSIPATION	2.5 max.	watts

← indicates a change

World Radio History

12AT7

12AT7

HIGH-MU TWIN TRIODE

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . .	90 max.		volts
Heater positive with respect to cathode . .	90 max.		volts

→ **Characteristics:**

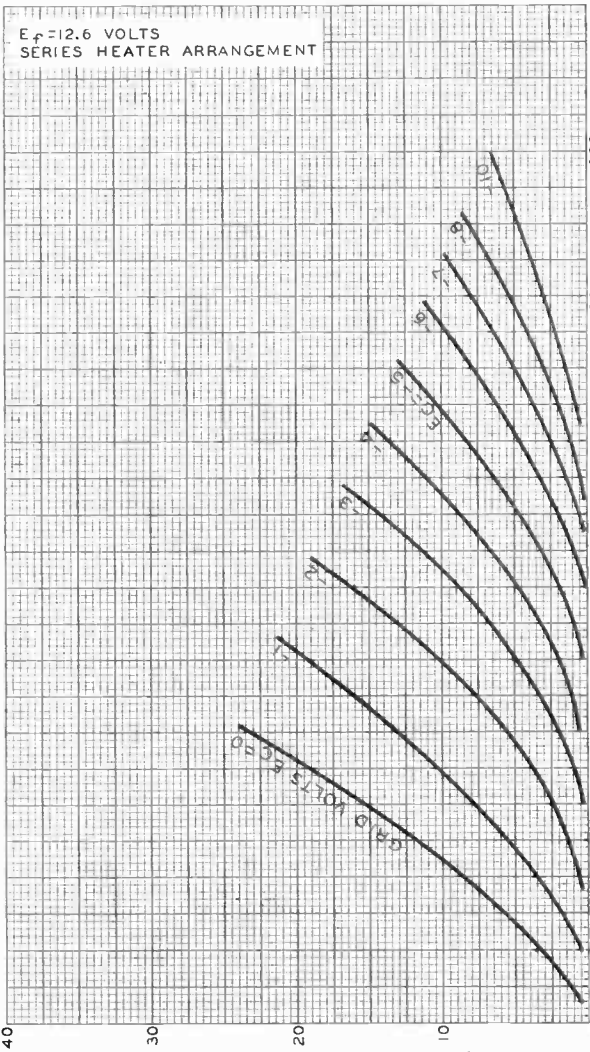
Plate Supply Voltage	100	250	volts
Cathode-Bias Resistor	270	200	ohms
Amplification Factor	60	60	
Plate Resistance (Approx.)	15000	10900	ohms
Transconductance	4000	5500	μmhos
Grid Voltage (Approx.) for plate current of 10 μamp . .	-5	-12	volts
Plate Current	3.7	10	ma

→ Indicates a change

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

12AT7
AVERAGE PLATE CHARACTERISTICS
EACH UNIT



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92CM-7056

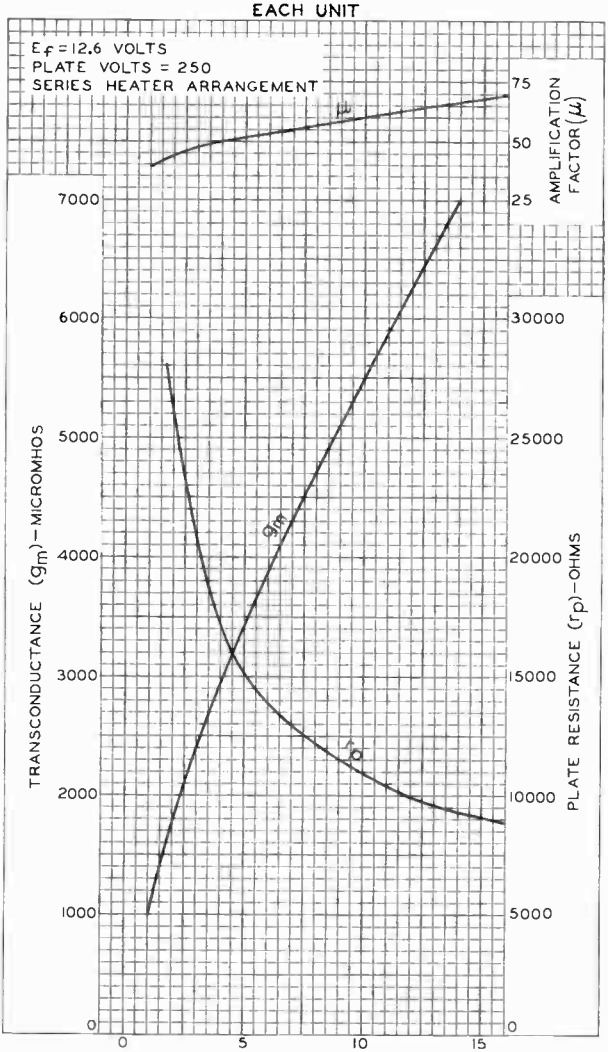
World Radio History

12AT7

RCA

12AT7

AVERAGE CHARACTERISTICS
EACH UNIT



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9314

World Radio History

12AU6

SHARP-CUTOFF PENTODE

7-PIN MINIATURE TYPE

The 12AU6 is the same as the 6AU6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.15	amp

World Radio History

World Radio History

12AU7A

Medium-Mu Twin Triode

9-PIN MINIATURE TYPE

For Applications Critical as to Microphonics

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

	Series	*Parallel*	
Heater arrangement			
Voltage (AC or DC)	12.6	6.3 ± 10%	volts
Current	0.15 ± 6%	0.3	amp

Direct Interelectrode Capacitances (Approx.):[a]

	Unit No.1	*Unit No.2*	
Grid to plate	1.5	1.5	μμf
Grid to cathode and heater	1.6	1.6	μμf
Plate to cathode and heater	0.5	0.35	μμf

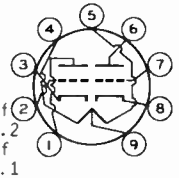
Characteristics, Class A_1 Amplifier (Each Unit):

Plate Voltage	100	250	volts
Grid Voltage	0	-8.5	volts
Amplification Factor	19.5	17	
Plate Resistance (Approx.)	6250	7700	ohms
Transconductance	3100	2200	μmhos
Plate Current	11.8	10.5	ma
Grid Voltage (Approx.) for plate μa = 10	-	-24	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 - Plate of Unit No.2
Pin 2 - Grid of Unit No.2
Pin 3 - Cathode of Unit No.2
Pins 4 & 9 - Heater of Unit No.2
Pins 5 & 9 - Heater of Unit No.1



Pin 6 - Plate of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Cathode of Unit No.1
Pin 9 - Heater Tap

← Indicates a change.

World Radio History

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330	max.	volts
CATHODE CURRENT	22	max.	ma
PLATE DISSIPATION:			
Either plate	2.75	max.	watts
Both plates (Both units operating)	5.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[b]	max.	volts

Typical Operation as Resistance-Coupled Amplifier:

See *RESISTANCE-COUPLED AMPLIFIER CHART No. 10* at front of this Section

Maximum Circuit Values:

Grid-Circuit Resistance:			
For fixed-bias operation	1	max.	megohm

HORIZONTAL-DEFLECTION OSCILLATOR

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[c]

DC PLATE VOLTAGE	330	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	660	max.	volts
CATHODE CURRENT:			
Peak	330	max.	ma
Average	22	max.	ma
PLATE DISSIPATION:			
Either plate	2.75	max.	watts
Both plates (Both units operating)	5.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[b]	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance	2.2	max.	megohms

VERTICAL-DEFLECTION OSCILLATOR

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[c]

DC PLATE VOLTAGE	330	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	440	max.	volts
CATHODE CURRENT:			
Peak	66	max.	ma
Average	22	max.	ma

→ Indicates a change.

World Radio History

PLATE DISSIPATION:			
Either plate	2.75	max.	watts
Both plates (Both units operating)	5.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[b]	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance	2.2	max.	megohms

VERTICAL-DEFLECTION AMPLIFIER

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[c]

DC PLATE VOLTAGE	300	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE[d]	1200	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	275	max.	volts
CATHODE CURRENT:			
Peak	66	max.	ma
Average	22	max.	ma
PLATE DISSIPATION:			
Either plate	2.75	max.	watts
Both plates (Both units operating)	5.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[b]	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:			
For cathode-bias operation	2.2	max.	megohms

[a] Without external shield.

[b] The dc component must not exceed 100 volts.

[c] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

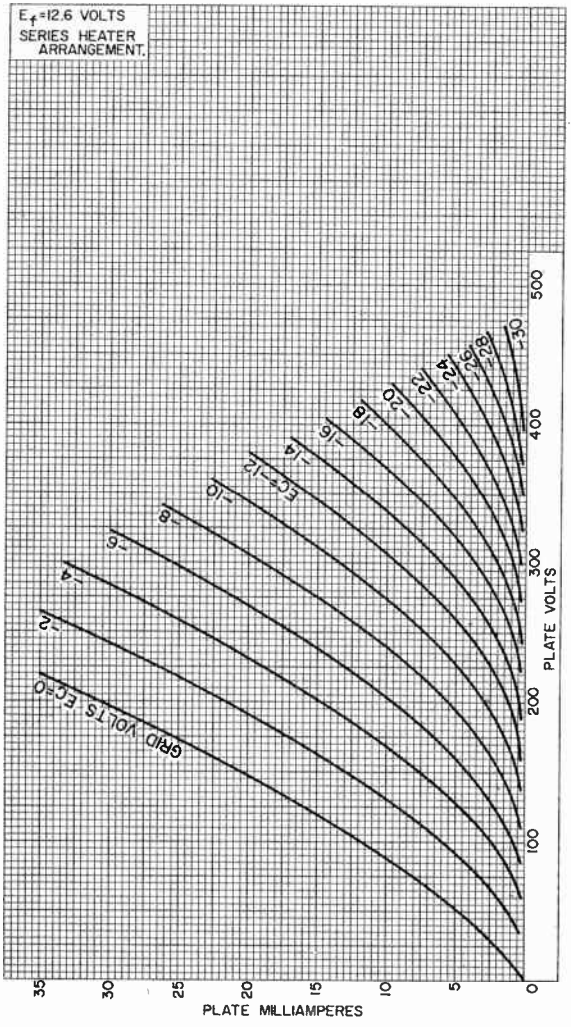
[d] This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 15 per cent of one vertical scanning cycle is 2.5 milliseconds.

→ Indicates a change.

World Radio History

12AU7A

AVERAGE PLATE CHARACTERISTICS
Each Unit



92CM-10548

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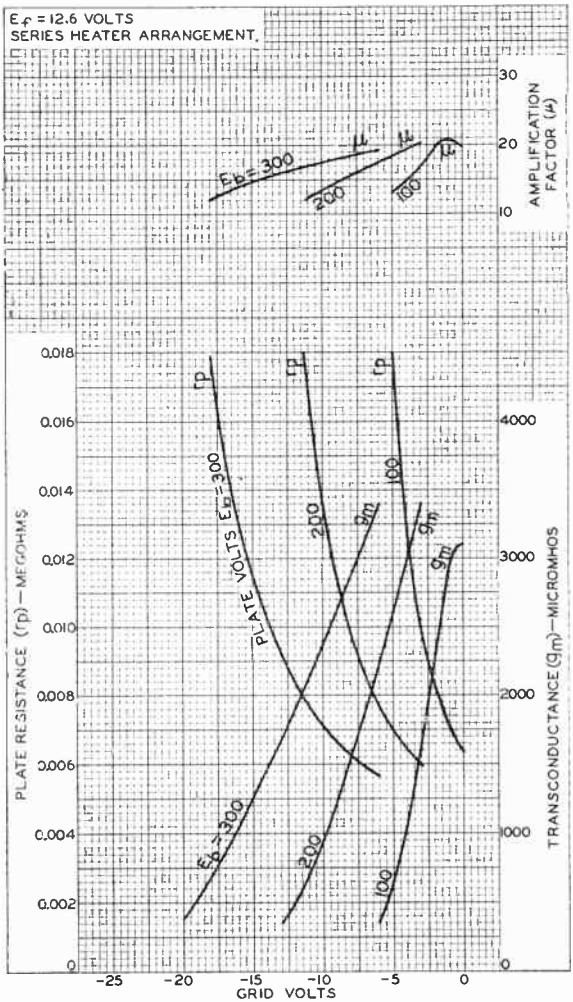
Electron Tube Division Harrison, N. J.

AVERAGE CHARACTERISTICS
Each Unit



92CM-8564R2

World Radio History

World Radio History

12AV5-GA
BEAM POWER TUBE

Intended for use in equipment having series heater-string arrangement

The 12AV5-GA is the same as the 6AV5-GA except for the following items:

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.6	amp
Warm-up time (Average)	11	sec

For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of this Section.

12AV6
TWIN DIODE—HIGH-MU TRIODE

7-PIN MINIATURE TYPE

The 12AV6 is the same as the 6AV6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.15	amp

World Radio History

World Radio History

12AX4-GT

HALF-WAVE VACUUM RECTIFIER

For Television Damper Service

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.6	amp

The 12AX4-GT is the same as the 6AX4-GT except for heater rating.

12AX4-GTA

HALF-WAVE VACUUM RECTIFIER

Intended for TV damper service in equipment having series heater-string arrangement

The 12AX4-GTA is the same as the 6AX4-GT except for the following items:

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.6	amp
Warm-up time (Average)	11	sec

For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of this Section.

World Radio History

High-Mu Twin Triode

9-PIN MINIATURE TYPE

For High-Fidelity Audio-Amplifier Applications Critical as to Noise and Hum

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater arrangement	*Series*	*Parallel*	
Voltage (AC or DC)	12.6	6.3 ± 10%	volts
Current	0.15 ± 6%	0.3	amp

Direct Interelectrode Capacitances (Approx.):▲

	Unit No. 1	*Unit No. 2*	
Grid to plate	1.7	1.7	μμf
Grid to cathode and heater	1.6	1.6	μμf
Plate to cathode and heater	0.46	0.34	μμf

Equivalent Noise and Hum Voltage (Referenced to Grid, Each Unit):

Average Value (RMS) . . . . . 1.8 μvolts

Measured in "true rms" units under the following conditions: Heater volts (AC) = 6.3; center-tap of heater transformer connected to ground; plate supply volts (DC) = 250; plate load resistor (megohms) = 0.1; cathode resistor (ohms) = 2700; cathode bypass capacitor (μf) = 100; grid resistor (ohms) = 0; amplifier frequency range 25 to 10000 cps.

Characteristics, Class A_1 Amplifier (Each Unit):

Plate Voltage	100	250	volts
Grid Voltage	−1	−2	volts
Amplification Factor	100	100	
Plate Resistance (Approx.)	80000	62500	ohms
Transconductance	1250	1600	μmhos
Plate Current	0.5	1.2	ma

Mechanical:

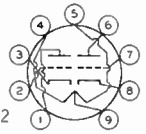
Operating Position . . . . . Any
Maximum Overall Length . . . . . 2-3/16"
Maximum Seated Length . . . . . 1-15/16"
Length, Base Seat to Bulb Top (Excluding tip) . 1-9/16" ± 3/32"
Diameter . . . . . 0.750" to 0.875"
Dimensional Outline . . . . . See *General Section*
Bulb T6-1/2
Base . . . . . Small-Button Noval 9-Pin (JEDEC No. E9-1)

World Radio History

12AX7-A

Basing Designation for BOTTOM VIEW 9A

Pin 1 – Plate of Unit No. 2
Pin 2 – Grid of Unit No. 2
Pin 3 – Cathode of Unit No. 2
Pins 4 & 9 – Heater of Unit No. 2
Pins 5 & 9 – Heater of Unit No. 1
Pin 6 – Plate of Unit No. 1
Pin 7 – Grid of Unit No. 1
Pin 8 – Cathode of Unit No. 1
Pin 9 – Heater Tap



AMPLIFIER — CLASS A_1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330	max.	volts
GRID VOLTAGE:			
Negative-bias value	55	max.	volts
Positive-bias value	0	max.	volts
PLATE DISSIPATION	1.2	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200●	max.	volts

Typical Operation as Resistance-Coupled Amplifier:

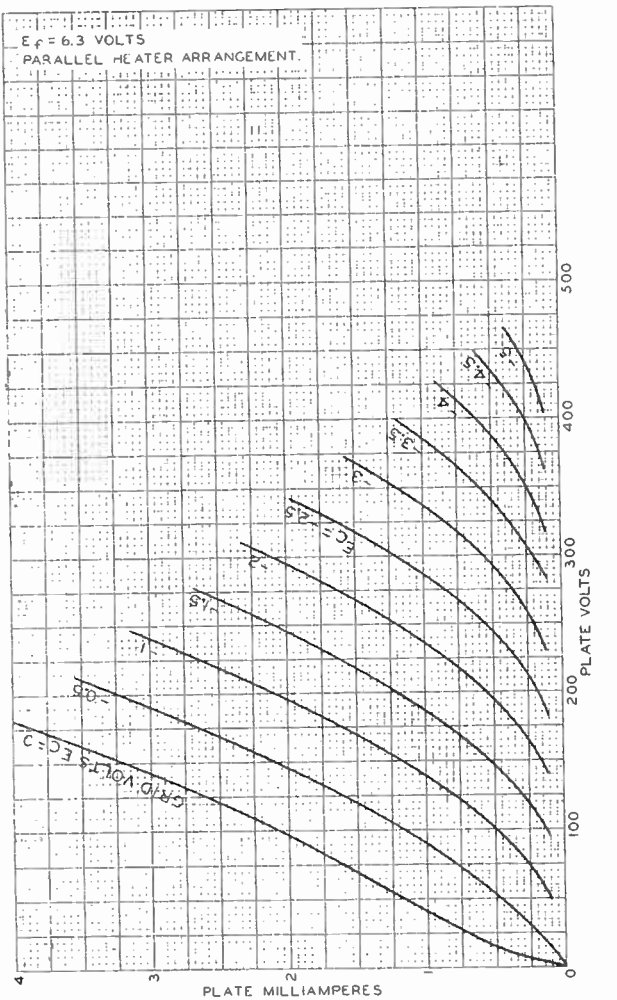
See *RESISTANCE-COUPLED-AMPLIFIER CHART No. 25* at front of this Section

▲ Without external shield.

● The dc component must not exceed 100 volts.

World Radio History

AVERAGE PLATE CHARACTERISTICS
Each Unit

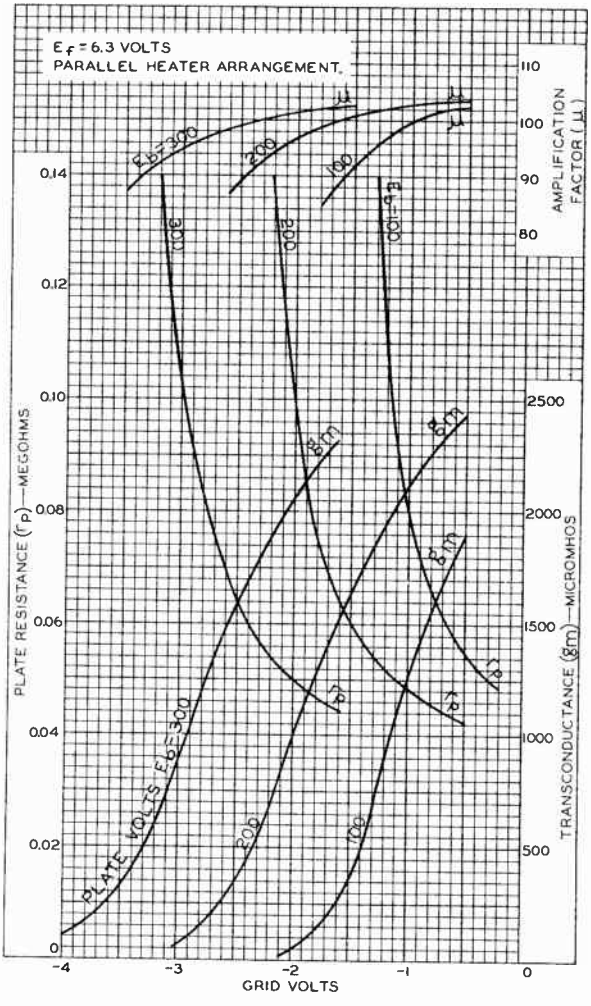


92CM-6879

World Radio History

12AX7-A

AVERAGE CHARACTERISTICS
Each Unit



92CM-6880

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

World Radio History

12AY3

Half-Wave Vacuum Rectifier

NOVAR TYPE

For TV Damper Service

The 12AY3 is the same as the 6AY3 except for the following items:

Heater Characteristics and Ratings:

Current	0.600 ± 0.040	amp
Voltage (AC or DC)	12.6	volts
Warm-up time (Average)	11	sec

12AY3A

Half-Wave Vacuum Rectifier

NOVAR TYPE

For TV Damper Service

The 12AY3A is the same as the 6AY3B except for the following items:

Heater Characteristics and Ratings:

Current	0.600 ± 0.040	amp
Voltage (AC or DC)	12.6	volts
Warm-up time (Average)	11	sec

World Radio History

World Radio History

12AY7

MEDIUM-MU TWIN TRIODE

MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:			
Heater Arrangement	*Series*	*Parallel*	
Voltage	12.6*	6.3	ac or dc volts
Current	0.15	0.3	amp
Direct Interelectrode Capacitances (Without External Shield)—Each Unit:			
Grid to Plate	1.3		μμf
Input	1.3		μμf
Output	0.6		μμf

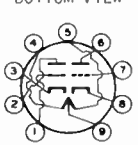
Characteristics, Class A_1 Amplifier (Each Unit):

Plate Voltage	250	volts
Grid Voltage	-4	volts
Amplification Factor	40	
Plate Resistance (Approx.)	22800	ohms
Transconductance	1750	μmhos
Plate Current	3	ma
Grid Voltage (Aporox.) for plate current of 10 μamp	-11	volts

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Maximum Diameter	7/8"
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No. E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Mid-Tap

* Use of the 12.6-volt connection with an ac-heater supply is not recommended for applications involving low hum.

(continued on next page)

World Radio History

12AY7

RCA

12AY7

MEDIUM-MU TWIN TRIODE

AMPLIFIER-Class A$_1$

Values are for each unit

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	300 max.	volts
GRID VOLTAGE:		
Negative bias value	50 max.	volts
Positive bias value	0 max.	volts
PLATE DISSIPATION	1.5 max.	watts
CATHODE CURRENT	10 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART No.28 at front of Receiving Tube Section

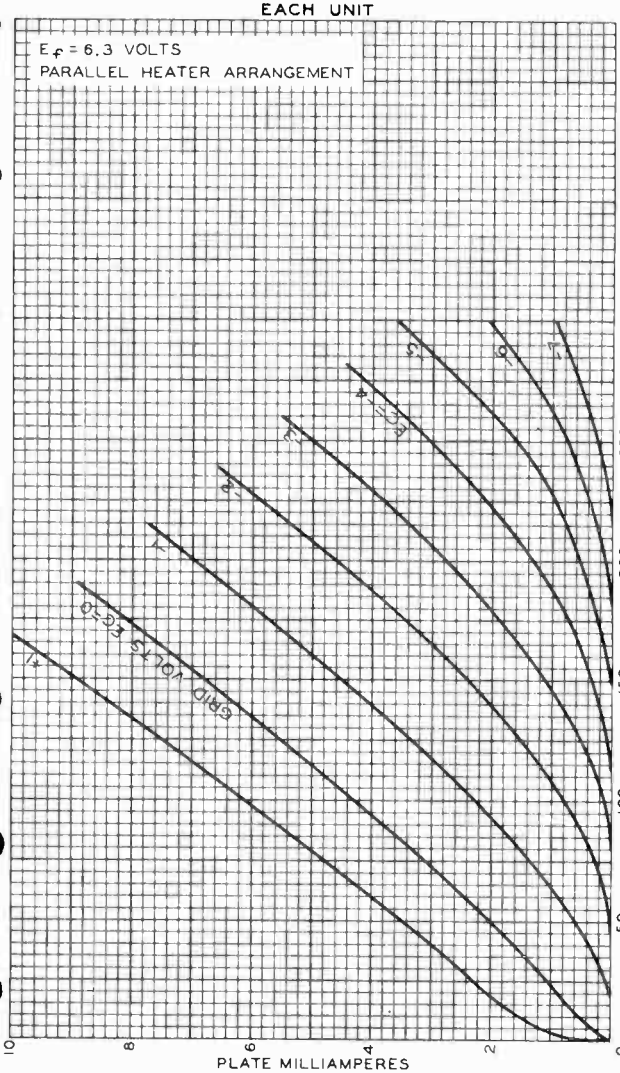
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

12AY7

AVERAGE PLATE CHARACTERISTICS
EACH UNIT



World Radio History

High-Mu Twin Triode

9-PIN MINIATURE TYPE
With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

	Series	Parallel	
Heater arrangement			
Voltage (AC or DC)	12.6 ± 10%	6.3	volts
Current	0.225	0.45 ± 6%	amp
Warm-up time (Average)	-	11	sec

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	With External Shield[a]	
Unit No.1:			
Grid to plate	2	1.9	μμf
Grid to cathode and heater	2.6	2.8	μμf
Plate to cathode and heater	0.44	1.4	μμf
Unit No.2:			
Grid to plate	2	1.9	μμf
Grid to cathode and heater	2.6	2.8	μμf
Plate to cathode and heater	0.36	1.6	μμf

Characteristics, Class A_1 Amplifier (Each Unit):

Plate Supply Voltage	100	250	volts
Cathode Resistor	270	200	ohms
Amplification Factor	60	60	
Plate Resistance (Approx.)	15000	10900	ohms
Transconductance	4000	5500	μmhos
Plate Current	3.7	10	ma
Grid Voltage (Approx.) for plate μa = 10	-5	-12	volts

Mechanical:

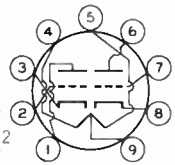
Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3-32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

World Radio History

12AZ7A

Basing Designation for BOTTOM VIEW. 9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pins 4 & 9 – Heater of Unit No.2
Pins 5 & 9 – Heater of Unit No.1
Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Tap



AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330	max.	volts
GRID VOLTAGE:			
Negative-bias value	55	max.	volts
PLATE DISSIPATION	2.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	200	max.	volts
Heater positive with respect to cathode.	200[b]	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:			
For fixed-bias operation.	0.25	max.	megohm
For cathode-bias operation.	1	max.	megohm

[a] With external shield JEDEC No. 315 connected to cathode of unit under test.
[b] The dc component must not exceed 100 volts.

CURVES
shown under Type 12AT7 also apply to the 12AZ7A

World Radio History

12B4-A
LOW-MU TRIODE

9-PIN MINIATURE TYPE

Intended for use in equipment having series heater-string arrangement

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Heater arrangement	Series	Parallel	
Voltage	12.6	6.3	ac or dc volts
Current	0.300	0.600	amp
Warm-up time (Average)	-	11	sec

For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of this Section.

Direct Interelectrode Capacitances (Approx.):[o]

Grid to plate	4.8	μμf
Grid to cathode and heater	5	μμf
Plate to cathode and heater	1.5	μμf

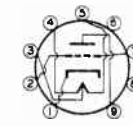
Characteristics, Class A_1 Amplifier:

Plate Voltage	150	volts
Grid Voltage	-17.5	volts
Amplification Factor	6.5	
Plate Resistance (Approx.)	1030	ohms
Transconductance	6300	μmhos
Plate Current	34	ma
Grid Voltage (Approx.) for plate current of 200 μamp	-32	volts
Plate Current for grid voltage of -23 volts	9.6	ma

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Maximum Diameter	7/8"
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9AG

Pin 1 - Cathode
Pin 2 - Grid
Pin 3 - Heater Mid-Tap
Pin 4 - Heater
Pin 5 - Heater



Pin 6 - No Connection
Pin 7 - Grid
Pin 8 - No Connection
Pin 9 - Plate

[o] With external shield JETEC No.315 connected to cathode.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12B4-A

LOW-MU TRIODE

AMPLIFIER - Class A_1

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	550	max.	volts
GRID VOLTAGE:			
Negative bias value	50	max.	volts
PLATE DISSIPATION	5.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200▲	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:			
For fixed-bias operation	0.47	max.	megohm
For cathode-bias operation	2.2	max.	megohms

VERTICAL DEFLECTION AMPLIFIER

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

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

DC PLATE VOLTAGE	550	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE (Absolute maximum)#	1000■	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	250	max.	volts
CATHODE CURRENT:			
Peak	105	max.	ma
Average	30	max.	ma
PLATE DISSIPATION	5.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater negative with respect to cathode	200▲	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:			
For cathode-bias operation	2.2	max.	megohms

▲ The dc component must not exceed 100 volts.

□ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 15 per cent of one vertical scanning cycle is 2.5 milliseconds.

■ Under no circumstances should this absolute value be exceeded.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12BA6

Remote-Cutoff Pentode

7-PIN MINIATURE TYPE

The 12BA6 is the same as the 6BA6 except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

12BA7

Pentagrid Converter

9-PIN MINIATURE TYPE

The 12BA7 is the same as the 6BA7 except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

12BD6

Remote-Cutoff Pentode

7-PIN MINIATURE TYPE

The 12BD6 is the same as the 6BD6 except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

World Radio History

12BE3

Half-Wave Vacuum Rectifier

DUODECAR TYPE

The 12BE3 is the same as the 6BE3 except for the following items:

Heater Characteristics and Ratings:

Current	0.05 + 0.450	amp
Voltage (AC or DC) at heater current (0.600)	12.6	volts
Warm-up time (Average)	11	sec

12BE6

Pentagrid Converter

7-PIN MINIATURE TYPE

The 12BE6 is the same as the 6BE6 except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

12BF6

Twin Diode—Medium-Mu Triode

7-PIN MINIATURE TYPE

The 12BF6 is the same as the 6BF6 except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

World Radio History

12BH7

MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

The 12BH7 is the same as the 12BH7-A except that the 12BH7 does not have a controlled heater Warm-up Time, and is not intended for use in equipment having series heater-string arrangement.

World Radio History

World Radio History

12BH7-A

MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

Intended for use in equipment having series heater-string arrangement

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater arrangement	*Series*	*Parallel*	
Voltage	12.6	6.3	ac or dc volts
Current	0.3	0.6	amp
Warm-up time (Average)	—	11	sec

For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of this Section.

Direct Interelectrode Capacitances (Approx.):[o]

	Unit No.1	*Unit No.2*	
Grid to plate	2.6	2.6	μμf
Grid to cathode and heater	3.2	3.2	μμf
Plate to cathode and heater	0.5	0.4	μμf
Plate of unit No.1 to plate of unit No.2	0.8		μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ±3/32"
Maximum Diameter	7/8"
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pins 4 & 9 – Heater of Unit No.2
Pins 5 & 9 – Heater of Unit No.1

Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Mid-Tap

AMPLIFIER - Class A_1

Values are for Each Unit

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	300 max. volts

[o] Without external shield.

World Radio History

12BH7-A

MEDIUM-MU TWIN TRIODE

GRID VOLTAGE:		
Negative bias value	50 max.	volts
Positive bias value	0 max.	volts
CATHODE CURRENT	20 max.	ma
PLATE DISSIPATION	3.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200▲max.	volts

Characteristics:

Plate Voltage	250	volts
Grid Voltage	-10.5	volts
Amplification Factor	16.5	
Plate Resistance (Approx.)	5300	ohms
Transconductance	3100	μmhos
Plate Current	11.5	ma
Plate Current for grid voltage of -14 volts	4	ma
Grid Voltage (Approx.) for plate current of 50 μamp	-23	volts

Maximum Circuit Values:

Grid-Circuit Resistance:		
For fixed-bias operation	0.25 max.	megohm
For cathode-bias operation	1.0 max.	megohm

HORIZONTAL DEFLECTION OSCILLATOR

Values are for Each Unit

Maximum Ratings, *Design-Center Values:*

For operation in a 525-line, 30-frame system[D]

DC PLATE VOLTAGE	450 max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE♦	600 max.	volts
CATHODE CURRENT:		
Peak	300 max.	ma
Average	20 max.	ma
PLATE DISSIPATION	3.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200▲max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:		
For fixed-bias, grid-resistor bias, or cathode-bias operation	2.2 max.	megohms

♦ 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.

▲,D: See next page.

World Radio History

RCA

12BH7-A

MEDIUM-MU TWIN TRIODE

VERTICAL DEFLECTION OSCILLATOR

Values are for Each Unit

Maximum Ratings, *Design-Center Values:*

For operation in a 525-line, 30-frame system[D]

DC PLATE VOLTAGE	450 max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	400 max.	volts
CATHODE CURRENT:		
Peak	70 max.	ma
Average	20 max.	ma
PLATE DISSIPATION	3.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200▲max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:

For fixed-bias, grid-resistor bias, or cathode-bias operation	2.2 max.	megohms

VERTICAL DEFLECTION AMPLIFIER

Values are for Each Unit

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

For operation in a 525-line, 30-frame system[D]

DC PLATE VOLTAGE	450 max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE# (Absolute Maximum)	1500■max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	250 max.	volts
CATHODE CURRENT:		
Peak	70 max.	ma
Average	20 max.	ma
PLATE DISSIPATION	3.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200▲max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:

For cathode-bias operation	2.2 max.	megohms

▲ The dc component must not exceed 100 volts.

[D] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 15 per cent of one vertical scanning cycle is 2.5 milliseconds.

■ Under no circumstances should this absolute value be exceeded.

World Radio History

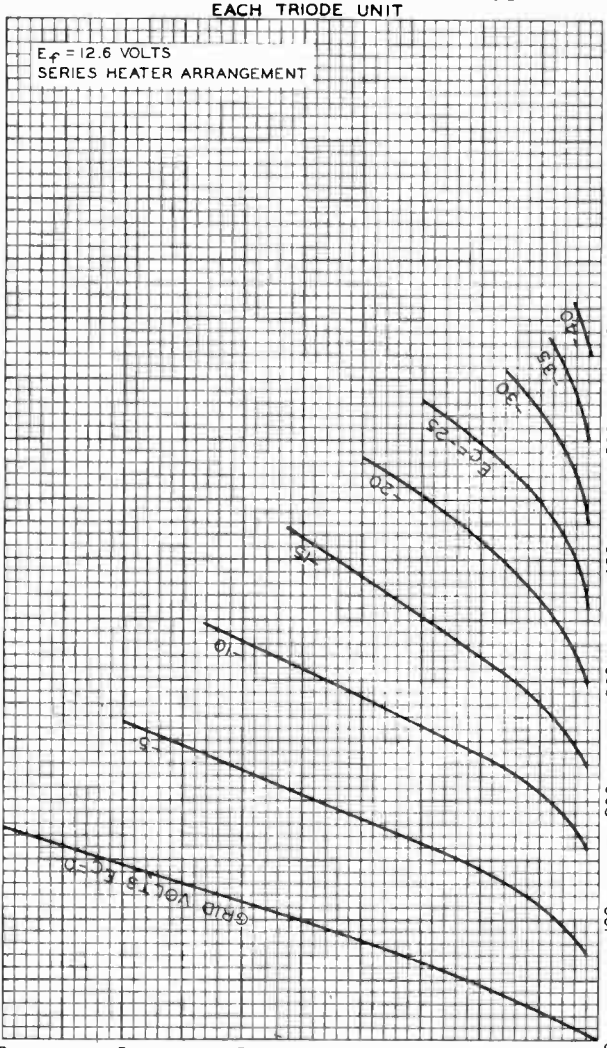
12BH7-A

RCA

12BH7-A

AVERAGE PLATE CHARACTERISTICS

EACH TRIODE UNIT



MAR. 1, 1955

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7742R1

12BQ6GTB/12CU6

Beam Power Tube

The 12BQ6GTB/12CU6 is the same as the 6BQ6GTB/6CU6 except for the following items:

Heater Characteristics and Ratings:		
Current.	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	12.6	volts
Warm-up time (Average)	11	sec

12BS3

Half-Wave Vacuum Rectifier

NOVAR TYPE

For TV Damper Service

The 12BS3 is the same as the 6BS3 except for the following items:

Heater Characteristics and Ratings:		
Current.	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.500	12.6	volts
Warm-up time (Average)	11	sec

12BS3A

Half-Wave Vacuum Rectifier

NOVAR TYPE

For TV Damper Service

The 12BS3A is the same as the 6BS3A except for the following items:

Heater Characteristics and Ratings:		
Current.	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	12.6	volts
Warm-up time (Average)	11	sec

World Radio History

World Radio History

RCA

12CA5

BEAM POWER TUBE

MINIATURE TYPE

Intended for use in equipment having series heater-string arrangement

GENERAL DATA

Electrical:

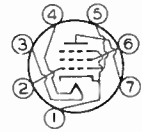
Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.6	amp
Warm-up time (Average)	11	sec

For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of this Section.

Direct Interelectrode Capacitances (Approx.):[o]		
Grid No.1 to plate	0.5	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	15	μμf
Plate to cathode & grid No.3, grid No.2, and heater	9	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV



Pin 1 - Cathode, Grid No.3
Pin 2 - Grid No.1
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Grid No.1
Pin 6 - Grid No.2
Pin 7 - Plate

AMPLIFIER - Class A_1

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	130 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	130 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive bias value	0 max.	volts
PLATE DISSIPATION	5 max.	watts
GRID-No.2 INPUT	1.4 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200▲max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	180 max.	°C

[o] Without external shield.

▲ The dc component must not exceed 100 volts.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

Microcodification

12CA5

RCA

12CA5

BEAM POWER TUBE

Typical Operation and Characteristics:

Plate Voltage	110	125	volts
Grid-No.2 Voltage	110	125	volts
Grid-No.1 Voltage	-4	-4.5	volts
Peak AF Grid-No.1 Voltage	4	4.5	volts
Zero-Signal Plate Current	32	37	ma
Max.-Signal Plate Current	31	36	ma
Zero-Signal Grid-No.2 Current	3.5	4	ma
Max.-Signal Grid-No.2 Current	7.5	11	ma
Plate Resistance (Approx.)	16000	15000	ohms
Transconductance	8100	9200	μmhos
Load Resistance	3500	4500	ohms
Total Harmonic Distortion	5	6	%
Max.-Signal Power Output	1.1	1.5	watts

Maximum Circuit Values:

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

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

12CA5

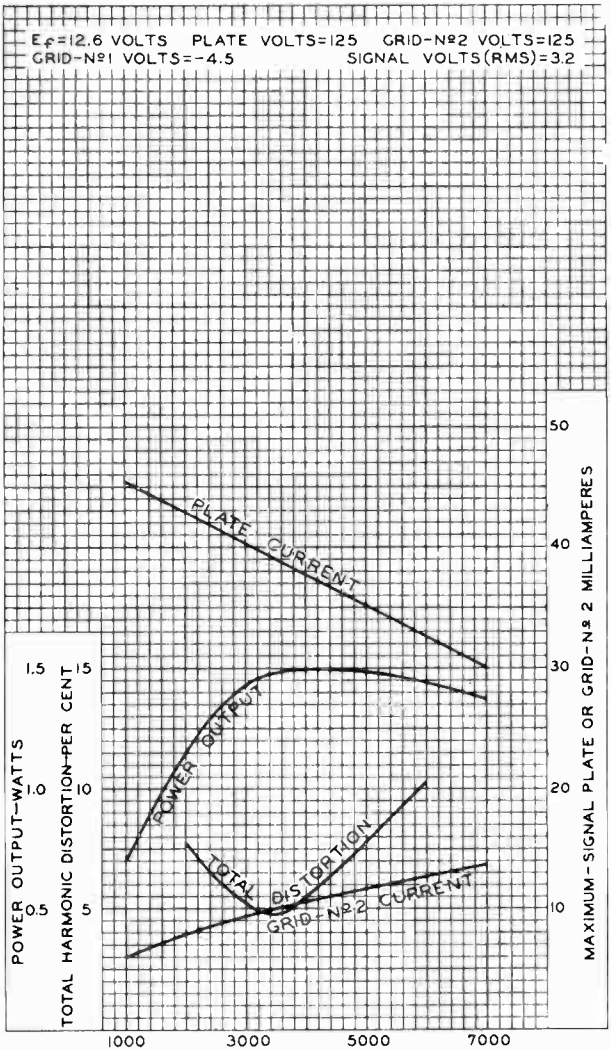
12CA5
AVERAGE PLATE CHARACTERISTICS
Ef=12.6 VOLTS GRID-№2 VOLTS=125
PLATE VOLTS
0
100
200
300
PLATE (Ib) OR GRID-№2 (Ic2) MILLIAMPERES
100
80
60
40
20
0
Ib
Ic2
Ic1
Ib
Ic2
Ic1
Ib
Ic2
Ic1

12CA5

RCA

12CA5

OPERATION CHARACTERISTICS



JAN. 20, 1955 TUBE DIVISION 92CM-8506RI
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12CR6

DIODE—REMOTE-CUTOFF PENTODE

7-PIN MINIATURE TYPE

GENERAL DATA

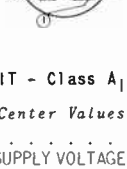
Electrical:

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.15	amp

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Maximum Diameter	3/4"
Dimensional Outline	*See General Section*
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No. E7-1)
Basing Designation for BOTTOM VIEW	7EA

Pin 1 – Cathode, Pentode Grid No.3
Pin 2 – Diode Plate
Pin 3 – Heater
Pin 4 – Heater



Pin 5 – Pentode Plate
Pin 6 – Pentode Grid No.2
Pin 7 – Pentode Grid No.1

PENTODE UNIT - Class A_1 Amplifier

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	300 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	300 max.	volts
GRID-No.2 VOLTAGE	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive bias value	0 max.	volts
PLATE DISSIPATION	2.5 max.	watts
GRID-No.2 INPUT:		
For grid-No.2 voltages up to 150 volts	0.3 max.	watt
For grid-No.2 voltages between 150 and 300 volts	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Characteristics:

Plate Voltage	250	volts
Grid-No.2 Voltage	100	volts
Grid-No.1 Voltage	-2	volts
Plate Resistance (Approx.)	0.8	megohm
Transconductance	2200	μmhos

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

12CR6

DIODE–REMOTE-CUTOFF PENTODE

Plate Current	9.6	ma
Grid-No.2 Current	2.6	ma
Grid-No.1 Voltage (Approx.) for transconductance of 10 μmhos	-32	volts

Maximum Circuit Values:

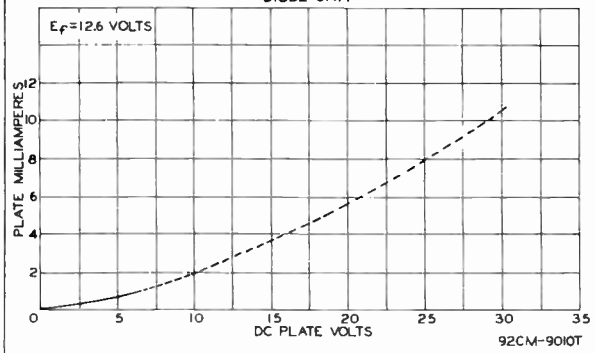
Grid-No.1-Circuit Resistance:		
For cathode-bias operation	1.0 max.	megohm
For fixed-bias operation	0.25 max.	megohm

DIODE UNIT

Maximum Ratings, *Design-Center Values:*

PLATE CURRENT	1.0 max.	ma

AVERAGE PLATE CHARACTERISTIC
DIODE UNIT



TENTATIVE DATA

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World Radio History

12CR6

RCA

12CR6

AVERAGE PLATE CHARACTERISTICS
PENTODE UNIT

Ef=12.6 VOLTS
GRID-No2 VOLTS=100

PLATE MILLIAMPERES

PLATE VOLTS

GRID-No1 VOLTS Ec1=-3

Ec1=0
-1
-2
-6
-9
-12
-15

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

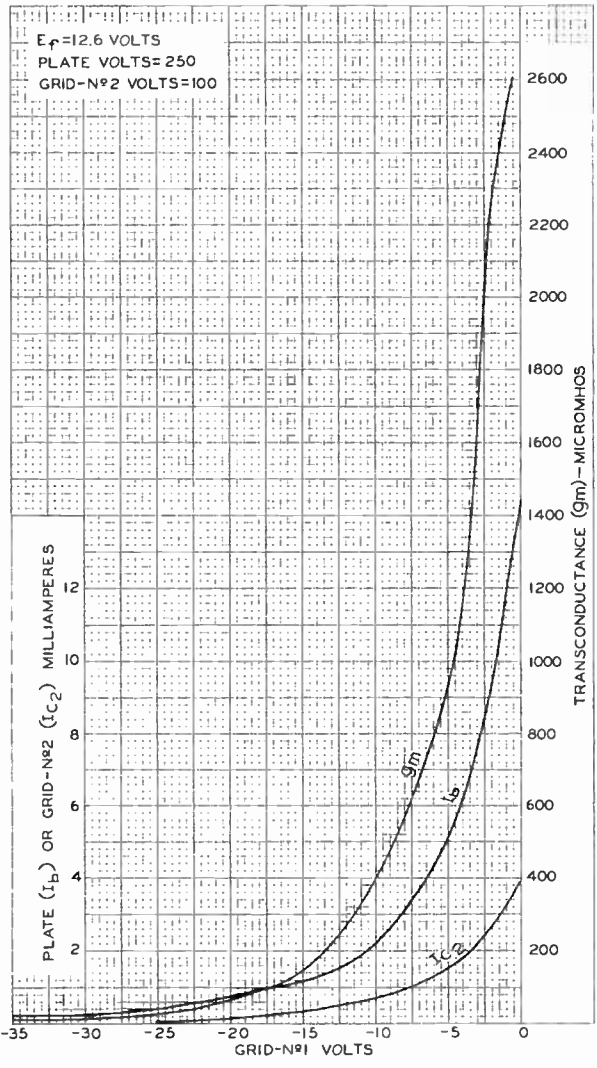
92CM-9006

World Radio History

RCA

12CR6

AVERAGE CHARACTERISTICS
PENTODE UNIT



World Radio History

Beam Power Tube

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 12CU5/12C5 is the same as the 6CU5 except for the following items.

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6 ± 6%	volts
Current	0.6	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

12D4

HALF-WAVE VACUUM RECTIFIER

Intended for TV damper service in equipment having series heater-string arrangement

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	12.6	ac or dc volts
Current	0.6	amp
Warm-up time (Average)	11	sec

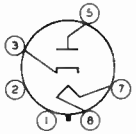
For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of this Section.

Direct Interelectrode Capacitances (Approx.):[○]

Plate to cathode and heater	6	μμf
Cathode to plate and heater	8	μμf
Heater to cathode	3	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	3-5/16"
Maximum Seated Length	2-3/4"
Maximum Diameter	1-9/32"
Dimensional Outline	*See General Section*
Bulb	T9
Base	Intermediate-Shell Octal 5-Pin, Arrangement 2 (JEDEC Group 1, No.B5-82), Intermediate-Shell Octal 6-Pin, Arrangement 1 (JEDEC Group 1, No.B6-8), Short Intermediate-Shell Octal 5-Pin with External Barriers, Arrangement 2 (JEDEC Group 1, No.B5-85), or Short Intermediate-Shell Octal 6-Pin with External Barriers, Arrangement 1 (JEDEC Group 1, No.B6-60)
Basing Designation for BOTTOM VIEW	4CG



Pin 1◆ – Same as Pin 2
Pin 2 – Internal Connection – Do Not Use●
Pin 3 – Cathode
Pin 5 – Plate
Pin 7 – Heater
Pin 8 – Heater

DAMPER SERVICE

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[□]

PEAK INVERSE PLATE VOLTAGE*	4400	max.	volts
PEAK PLATE CURRENT	900	max.	ma
DC PLATE CURRENT	155	max.	ma

○ ◆ ● □ *: See next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA

World Radio History

12D4

HALF-WAVE VACUUM RECTIFIER

PLATE DISSIPATION.	5.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	4400▲	max.	volts
Heater positive with respect to cathode.	300#	max.	volts

○ Without external shield.

◆ On the 5-pin bases, pin 1 as well as pins 4 and 6 is omitted.

● Socket terminals 1, 2, 4 and 6 should not be used as tie points.

□ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

* This rating is applicable when the duty cycle 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.

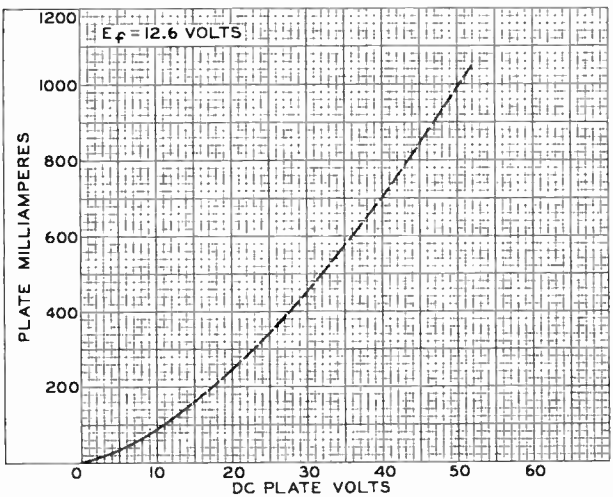
▲ The dc component must not exceed 900 volts.

The dc component must not exceed 100 volts.

4-59

TENTATIVE DATA

AVERAGE PLATE CHARACTERISTIC



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CS-9757

World Radio History

Beam Power Tube

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 12DB5 is the same as the 6DB5 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

12DM4

Half-Wave Vacuum Rectifier

For Damper Service in TV Equipment
Having Series Heater-String Arrangement

The 12DM4 is the same as the 6DM4 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

12DQ6A

Beam Power Tube

For Equipment Having Series Heater-String Arrangement

The 12DQ6A is the same as the 6DQ6A except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

12DQ6B

Beam Power Tube

For Equipment Having Series Heater-String Arrangement

The 12DQ6B is the same as the 6DQ6B except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

12DT5
BEAM POWER TUBE

9-PIN MINIATURE TYPE

Intended for use in equipment having series heater-string arrangement

The 12DT5 is the same as the 6DT5 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

12DT8
HIGH-MU TWIN TRIODE

9-PIN MINIATURE TYPE

The 12DT8 is the same as the 6DT8 except for the following items:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	12.6	volts
Current	0.15	amp

World Radio History

World Radio History

RCA

12DZ6

REMOTE-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in automobile radio receivers operating directly from 6-cell storage-battery systems

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage range (DC)	10 to 15.9	volts
For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.		
Current (Approx.) at 12.6 volts	0.19	amp
Direct Interelectrode Capacitances:[o]		
Grid No.1 to plate	0.05 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	9.5	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	4	μμf

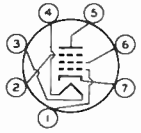
Characteristics, Class A_1 Amplifier:

Heater Voltage	12.6	volts
Plate Voltage	12.6	volts
Grid No.3 and Internal Shield	*Connected to cathode at socket*	
Grid-No.2 Voltage	12.6	volts
Grid-No.1 Supply Voltage	0	volts
Grid-No.1 Resistor (Bypassed)	10	megohms
Grid-No.3 Resistor (Bypassed)	10	megohms
Plate Resistance (Approx.)	25000	ohms
Transconductance	3800	μmhos
Plate Current	4.5	ma
Grid-No.2 Current	2.2	ma
Grids No.1 and No.3 Supply Voltage (Approx.) for transconductance, grid No.1 to plate (μmhos) = 10	-10	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7BK

Pin 1 - Grid No.1
Pin 2 - Grid No.3, Internal Shield
Pin 3 - Heater



Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Cathode

[o] Without external shield.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

12DZ6

REMOTE-CUTOFF PENTODE

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	16 max.	volts
GRID No.3 (SUPPRESSOR GRID)	*Connect to cathode at socket*	
GRID-No.2 (SCREEN-GRID) VOLTAGE	16 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive-bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	16 max.	volts
Heater positive with respect to cathode	16 max.	volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	10 max.	megohms
Grid-No.3-Circuit Resistance	10 max.	megohms

World Radio History

RCA

12DZ6

AVERAGE CHARACTERISTICS

E_f = 12.6 VOLTS
GRID No.3 AND INTERNAL SHIELD CONNECTED TO CATHODE AT SOCKET.
GRID-No.2 VOLTS = 12.6

GRID-No.1 VOLTS, E_{C1} = 0, -0.5, -1, -0.5, -1, -1.5, -2, -2.5, -3

I_b, I_{C2}

PLATE VOLTS: 0, 5, 10, 15, 20, 25

PLATE (I_b) OR GRID-No.2 (I_{C2}) MILLIAMPERES: 0, 1, 2, 3, 4, 5, 6, 7, 8

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-10399

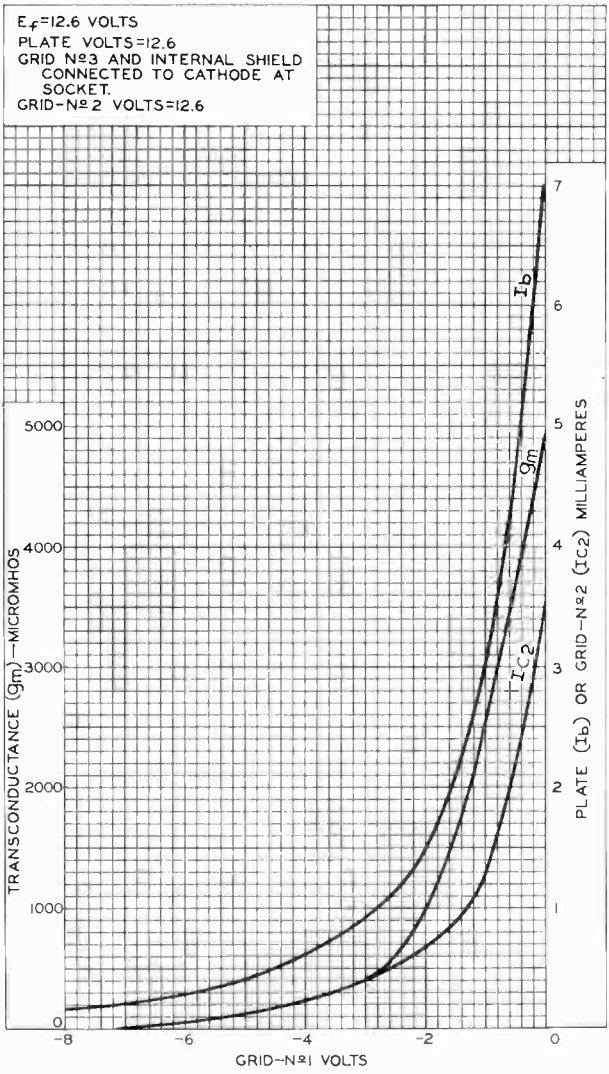
World Radio History

12DZ6

RCA

12DZ6

AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM—10404

High-Mu Twin Double-Plate Triode

9-PIN MINIATURE TYPE

For Frequency-Divider and Complex-Wave-Generator Circuits of Electronic Musical Instruments

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6 ± 10%	volts
Current at 12.6 volts	0.15	amp
Direct Interelectrode Capacitances (Approx.):▲		
Grid to either plate (Each unit)	0.9	μμf
Grid to cathode and heater (Each Unit)	1.8	μμf
Plate A of unit No.1 to cathode and heater	0.34	μμf
Plate B of unit No.1 to cathode and heater	0.24	μμf
Plate A of unit No.2 to cathode and heater	0.3	μμf
Plate B of unit No.2 to cathode and heater	0.18	μμf
Plate A to plate B (Each unit)	0.7	μμf
Plate A of unit No.1 to plate A of unit No.2	0.4	μμf

Characteristics, Class A₁ Amplifier (Each Unit):

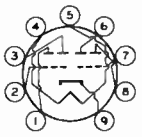
Using either plate A or plate B, with plate not in use connected to ground

Plate Voltage	250	volts
Grid Voltage	-1.5	volts
Amplification Factor	95	
Plate Resistance (Approx.)	76000	ohms
Transconductance	1250	μmhos
Plate Current	1.5	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9KT

Pin 1 – Plate B of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Plate A of Unit No.2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Plate B of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Plate A of Unit No.1
Pin 9 – Cathode



World Radio History

12FQ8

FREQUENCY-DIVIDER & COMPLEX-WAVE-GENERATOR SERVICE

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

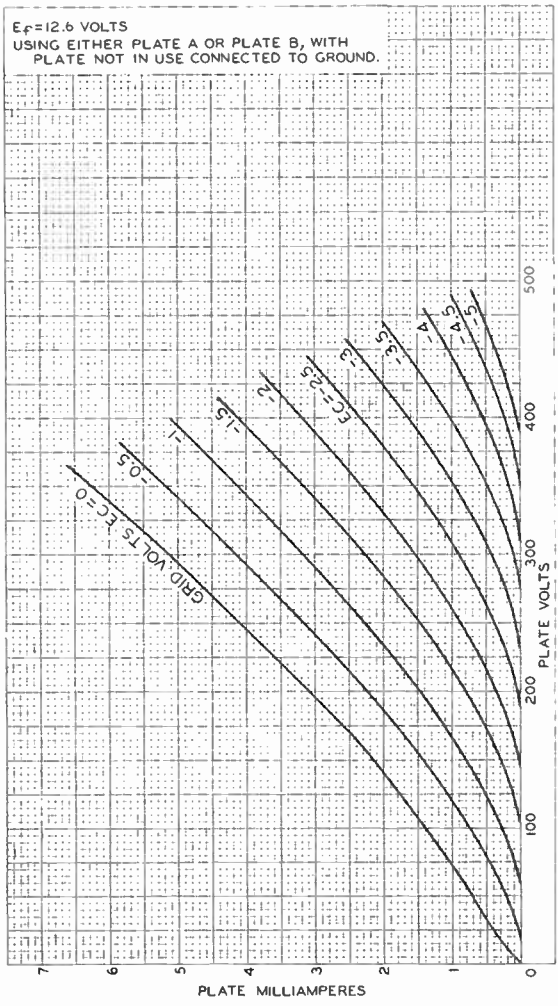
PLATE A VOLTAGE	330 max.	volts
PLATE B VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Positive-bias value	0 max.	volts
PLATE A DISSIPATION	0.5 max.	watt
PLATE B DISSIPATION	0.5 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200● max.	volts

▲ Without external shield.

● The dc component must not exceed 100 volts.

World Radio History

AVERAGE PLATE CHARACTERISTICS
Each Unit

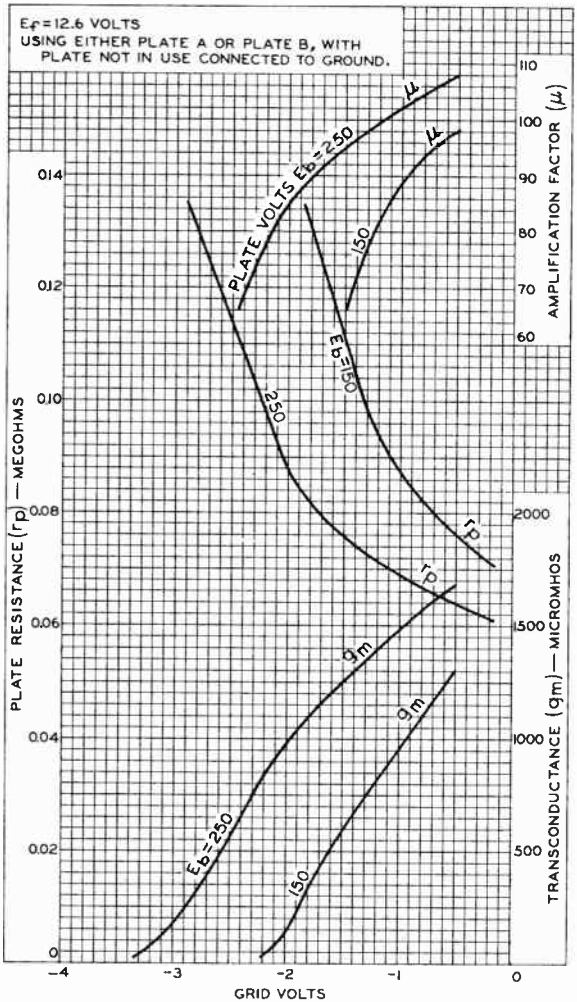


92CM-10755RI

World Radio History

12FQ8

AVERAGE CHARACTERISTICS
Each Unit



92CM-10754RI

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

Power Pentode

7-PIN MINIATURE TYPE

The 12FX5 is the same as the 6FX5 except for the following items:

Heater Characteristics and Ratings:			
Voltage (AC or DC)	12.6[a]	12.6 ± 1.3	volts
Current	0.450 ± 0.030	0.450[b]	amp
Warm-up time (Average)	11	-	sec

[a] At heater amperes = 0.450.
[b] At heater volts = 12.6.

World Radio History

World Radio History

12GC6

Beam Power Tube

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

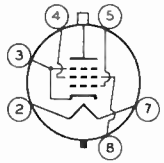
Heater, for Unipotential Cathode:			
Voltage (AC or DC)	12.6		volts
Current	0.6 ± 6%		amp
Warm-up time (Average)	11		sec
Direct Interelectrode Capacitances:[a]			
Grid No.1 to plate	0.55		μμf
Grid No.1 to cathode, grid No.3, grid No.2, and heater	15		μμf
Plate to cathode, grid No.3, grid No.2, and heater	7		μμf

Characteristics, Class A_1 Amplifier:

Plate Voltage	60	250	volts
Grid-No.2 Voltage	150	150	volts
Grid-No.1 Voltage	0	-22.5	volts
Triode Amplification Factor for plate volts = grid-No.2 volts = 150	–	4.1	
Plate Resistance (Approx.)	–	20000	ohms
Transconductance	–	6600	μmhos
Plate Current	345[b]	75	ma
Grid-No.2 Current	30[b]	2.4	ma
Grid-No.1 Voltage (Approx.) for plate ma. = 1	–	-46	volts
Grid-No.1 Voltage (Approx.) for peak positive-pulse plate volts = 5000, grid-No.2 volts = 150, and plate ma. = 1	–	-100	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	4-1/4"
Seated Length	3-1/2" ± 3/16"
Maximum Diameter	1-9/16"
Bulb	T12
Cap	Skirted Miniature (JEDEC No.C1-3)
Base	Short Medium-Shell Octal 6-Pin with External Barriers, Arrangement 2, Style B, (JEDEC Group 1, No.B6-122)
Basing Designation for BOTTOM VIEW	8JX



Pin 2 - Heater
Pin 3 - Cathode, Grid No.3
Pin 4 - Grid No.2
Pin 5 - Grid No.1
Pin 7 - Heater
Pin 8 - Grid No.2
Cap - Plate

World Radio History

HORIZONTAL-DEFLECTION AMPLIFIER

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[c]

DC PLATE VOLTAGE	770	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE[d]	6500	max.	volts
PEAK NEGATIVE-PULSE PLATE VOLTAGE	1500	max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	220	max.	volts
PEAK NEGATIVE-PULSE GRID-No.1 VOLTAGE	330	max.	volts
CATHODE CURRENT:			
Peak	550	max.	ma
Average	175	max.	ma
GRID-No.2 INPUT	4.5	max.	watts
PLATE DISSIPATION[e]	17.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[f]	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220	max.	°C

Maximum Circuit Values:

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

[a] Without external shield.

[b] This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded.

[c] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

[d] 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.

[e] An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

[f] The dc component must not exceed 100 volts.

World Radio History

12GE5

Beam Power Tube

DUODECAR TYPE

The 12GE5 is the same as the 6GE5 except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	12.6	volts
Warm-up time (Average)	11	sec

12GJ5

Beam Power Tube

NOVAR TYPE

The 12GJ5 is the same as the 6GJ5 except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	12.6	volts
Warm-up time (Average)	11	sec

World Radio History

World Radio History

12GT5

Beam Power Tube

NOVAR TYPE

The 12GT5 is the same as the 6GT5 except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	12.6	volts
Warm-up time (Average)	11	sec

12GT5A

Beam Power Tube

NOVAR TYPE

The 12GT5A is the same as the 6GT5A except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	12.6	volts
Warm-up time (Average)	11	sec

12GW6

Beam Power Tube

The 12GW6 is the same as the 6GW6 except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	12.6	volts
Warm-up time (Average)	11	sec

World Radio History

12H6

Twin Diode

The 12H6 is the same as the 6H6 except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

12JB6, 12JB6A

Beam Power Tube

NOVAR TYPE

The 12JB6 and 12JB6A are the same as the 6JB6 and 6JB6A, respectively, except for the following items:

Heater Characteristics and Ratings:

Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	12.6	volts
Warm-up time (Average)	11	sec

12JT6, 12JT6A

Beam Power Tube

NOVAR TYPE

The 12JT6 and 12JT6A are the same as the 6JT6 and 6JT6A respectively, except for the following items:

Heater Characteristics and Ratings:

Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	12.6	volts
Warm-up time (Average)	11	sec

World Radio History

12SA7

Pentagrid Converter

The 12SA7 is the same as the 6SA7 except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

12SJ7

Sharp-Cutoff Pentode

The 12SJ7 is the same as the 6SJ7 except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

12SL7GT

High-Mu Twin Triode

The 12SL7GT is the same as the 6SL7GT except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

12SN7GTA

Medium-Mu Twin Triode

The 12SN7GTA is the same as the 6SN7GTA except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.300	amp

World Radio History

12SQ7

Twin Diode-Medium-Mu Triode

The 12SQ7 is the same as the 6SQ7 except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.150	amp

12V6GT

Beam Power Tube

The 12V6GT is the same as the 6V6GT except for the following items:

Heater Characteristics and Ratings:

Voltage (AC or DC)	12.6	volts
Current	0.225	amp

12W6GT

Beam Power Tube

The 12W6GT is the same as the 6W6GT except for the following items:

Heater Characteristics and Ratings:

Current	0.600	amp
Voltage (AC or DC)	12.6	volts
Warm-up time (Average)	11	sec

Peak Heater-Cathode Voltage:

Heater negative with respect to cathode	300 max.	volts
Heater positive with respect to cathode	200[a] max.	volts

[a] The dc component must not exceed 100 volts.

World Radio History

12X4

Full-Wave Vacuum Rectifier

The 12X4 is the same as the 6X4 except for the following items:

Heater Characteristics and Ratings:		
Current	0.300	amp
Voltage (AC or DC) at heater amperes = 0.300	12.6	volts

13CW4

High-Mu Triode

NUVISTOR TYPE

For Use as Grounded-Cathode, Neutralized RF-Amplifier Tube in Tuners of VHF Television and FM Receivers

The 13CW4 is the same as the 6CW4 except for the following items:

Heater Characteristics and Ratings:		
Current	0.060	amp
Voltage (AC or DC) at heater amperes = 0.060	13.5	volts

13DE7

Dual Triode

With Medium-Mu Unit and Low-Mu Unit

9-PIN MINIATURE TYPE

The 13DE7 is the same as the 6DE7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

World Radio History

13DR7

Dual Triode

With High-Mu Unit and Low-Mu Unit

The 13DR7 is the same as the 6DR7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

13EM7

Dual Triode

With High-Mu Unit and Low-Mu Unit

The 13EM7 is the same as the 6EM7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

13FD7

Dual Triode

With High-Mu Unit and Low-Mu Unit

The 13FD7 is the same as the 6FD7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

World Radio History

13FM7

Dual Triode

With High-Mu Unit and Low-Mu Unit

DUODECAR TYPE

The 13FM7 is the same as the 6FM7 except for the following items:

Heater Characteristics and Ratings:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp.	13.0	volts
Warm-up time (Average)	11	sec

13GB5

Beam Power Tube

The 13GB5 is the same as the 6GB5 except for the following items:

Heater Characteristics and Ratings:

Current	0.600 ± 0.040	amp
Voltage (AC or DC) at 0.600 amp.	12.6	volts

13GF7

Dual Triode

With High-Mu Unit and Low-Mu Unit

NOVAR TYPE

The 13GF7 is the same as the 6GF7 except for the following items:

Heater Characteristics and Ratings:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp.	13.0	volts
Warm-up time (Average)	11	sec

World Radio History

13GF7A

Dual Triode

With High-Mu Unit and Low-Mu Unit

NOVAR TYPE

The 13GF7A is the same as the 6GF7A except for the following items:

[illegible]	0.450 ± 0.030	amp
[illegible]	13.2	volts
[illegible]	11	sec

13J10

Pentode — Beam Power Tube

DUODECAR TYPE

The 13J10 is the same as the 6J10 except for the following items:

[illegible]	0.450 ± 0.030	amp
Voltage (Se or Ef) at 0.450 amp.	13.2	volts
Warm-up Time (Average)	11	sec

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

World Radio History

13DE7

Dual Triode

With Medium-Mu Unit and Low-Mu Unit

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 13DE7 is the same as the 6DE7 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

13DR7

Dual Triode

With High-Mu Unit and Low-Mu Unit

With Heater Having Controlled Warm-Up Time

The 13DR7 is the same as the 6DR7 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

13EM7

Dual Triode

With High-Mu Unit and Low-Mu Unit

With Heater Having Controlled Warm-Up Time

The 13EM7 is the same as the 6EM7 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

World Radio History

13FD7

Dual Triode

With High-Mu Unit and Low-Mu Unit

With Heater Having Controlled Warm-Up Time

The 13FD7 is the same as the 6FD7 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

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

World Radio History

Dual Triode

With High-Mu Unit and Low-Mu Unit

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*			
Current	0.450 ± 0.030		amp
Voltage (AC or DC) at heater amperes = 0.450	13.0		volts
Warm-up time (Average)	11		sec
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts

Direct Interelectrode Capacitances (Approx.):[b]

	Unit No.1	*Unit No.2*	
Grid to plate	4.5	10	μμf
Grid to cathode and heater	2.2	6.5	μμf
Plate to cathode and heater	0.4	1.2	μμf

Characteristics, Class A_1 Amplifier:

	Unit No.1	*Unit No.2*		
Plate Voltage	250	60	150	volts
Grid Voltage	-3	0	-17.5	volts
Amplification Factor	64	-	6	
Plate Resistance (Aporox.)	40000	-	800	ohms
Transconductance	1600	-	7500	μmhos
Plate Current	1.4	95[c]	40	ma
Grid Voltage (Approx.) for plate μa =				
10	-5.5	-	-	volts
10δ	-	-	-40	volts
Transconductance for plate ma. = 1	-	-	500	μmhos
Plate Current for grid volts = -25	-	-	6	ma

Mechanical:

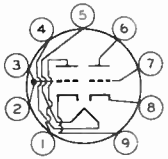
Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	2.900"
Maximum Seated Length	2.620"
Length, Base Seat to Bulb Top (Excluding tip)	2.070" to 2.310"
Diameter	1.062" to 1.188"
Bulb	T9
Base	JEDEC No.E9-82

World Radio History

13FD7

Basing Designation for BOTTOM VIEW 9HF

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Grid of Unit No.2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Cathode of Unit No.2



VERTICAL-DEFLECTION OSCILLATOR

Values are for Unit No.1

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[d]

DC PLATE VOLTAGE	330 max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	400 max.	volts
CATHODE CURRENT:		
Peak	70 max.	ma
Average	20 max.	ma
PLATE DISSIPATION	1.5 max.	watts

Maximum Circuit Values:

Grid-Circuit Resistance:

For grid-resistor-bias or cathode-bias operation	2.2 max.	megohms

VERTICAL-DEFLECTION AMPLIFIER

Values are for Unit No.2

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[d]

DC PLATE VOLTAGE	330 max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE[e]	1500 max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	250 max.	volts
CATHODE CURRENT:		
Peak	175 max.	ma
Average	90 max.	ma
PLATE DISSIPATION	10 max.	watts

Maximum Circuit Values:

Grid-Circuit Resistance:

For grid-resistor-bias or cathode-bias operation	2.2 max.	megohms

[a] The DC component must not exceed 100 volts.

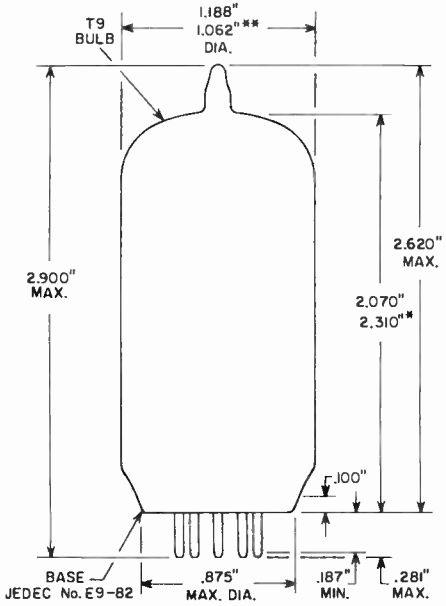
[b] Without external shield.

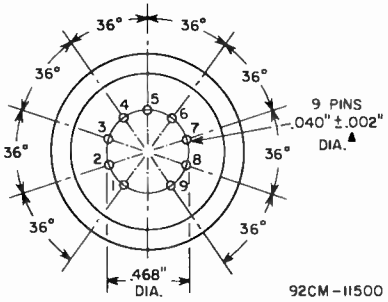
[c] This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded

[d] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

[e] This rating is applicable when the duration of the voltage pulse does not exceed 15 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 15 per cent of one vertical scanning cycle is 2.5 milliseconds.

World Radio History





** APPLIES IN ZONE STARTING 0.625" FROM BASE SEAT.

* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.600" INSIDE DIAMETER.

▲ BASE-PIN CONTOUR AND GAUGE (JEDEC No. GE9-4) INFORMATION FOR THIS BASE IS THE SAME AS THAT SHOWN IN GENERAL SECTION FOR BASE JEDEC No. E9-68 (LARGE-BUTTON NEONOVAL 9-PIN).

World Radio History

World Radio History

Twin Diode—High-Mu Triode

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage (AC or DC)	14 ± 10%	volts
Current at 14 volts	0.15	amp
Direct Interelectrode Capacitances:▲		
Triode Unit:		
Grid to plate	1.8	μμf
Grid to cathode and heater	1.6	μμf
Plate to cathode and heater	0.24	μμf
Diode Units:		
Diode-No.1 plate to triode grid	0.09 max.	μμf
Diode-No.2 plate to triode grid	0.07 max.	μμf
Either diode cathode to all other tube electrodes	6.5	μμf
Diode plate to cathode and heater (Each unit)	2.4	μμf

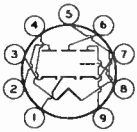
Characteristics, Class A_1 Amplifier (Triode Unit):

Plate Voltage	250	volts
Grid Voltage	-3	volts
Amplification Factor	72	
Plate Resistance (Approx.)	72000	ohms
Transconductance	1000	μmhos
Plate Current	0.7	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9KR

Pin 1 - Diode-No.2 Cathode
Pin 2 - Diode-No.1 Plate
Pin 3 - Diode-No.1 Cathode
Pin 4 - Heater



Pin 5 - Heater
Pin 6 - Diode-No.2 Plate
Pin 7 - Triode Cathode
Pin 8 - Triode Grid
Pin 9 - Triode Plate

TRIODE UNIT — AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330 max.	volts

World Radio History

GRID VOLTAGE:			
Positive-bias value	0	max.	volts
PLATE DISSIPATION	1.1	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200●	max.	volts

DIODE UNITS — Two

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE CURRENT	5	max.	ma
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200●	max.	volts

Characteristics, Instantaneous Test Condition:

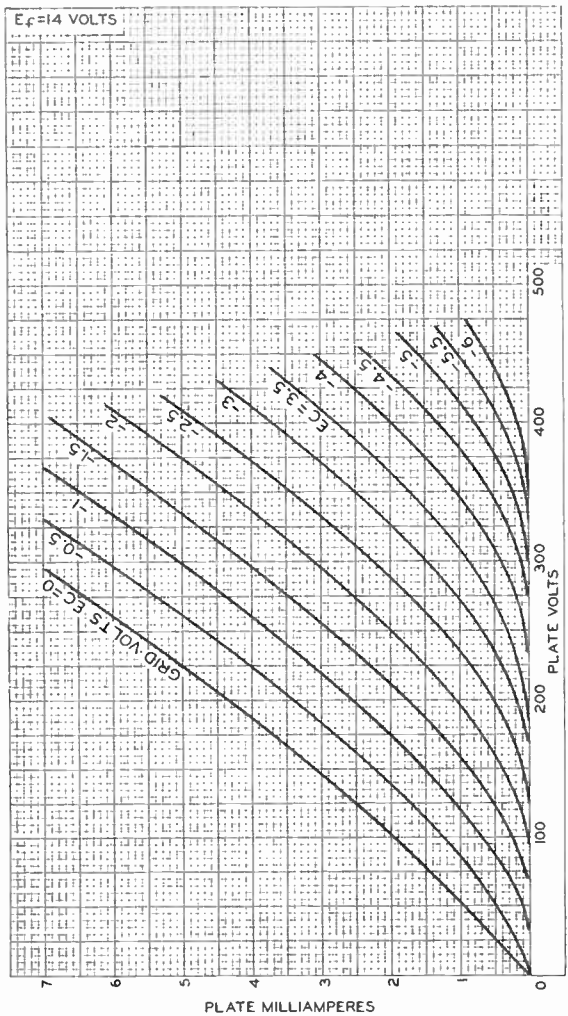
Plate Current for plate volts = 5	18	ma

▲ Without external shield.

● The dc component must not exceed 100 volts.

World Radio History

AVERAGE PLATE CHARACTERISTICS
Triode Unit

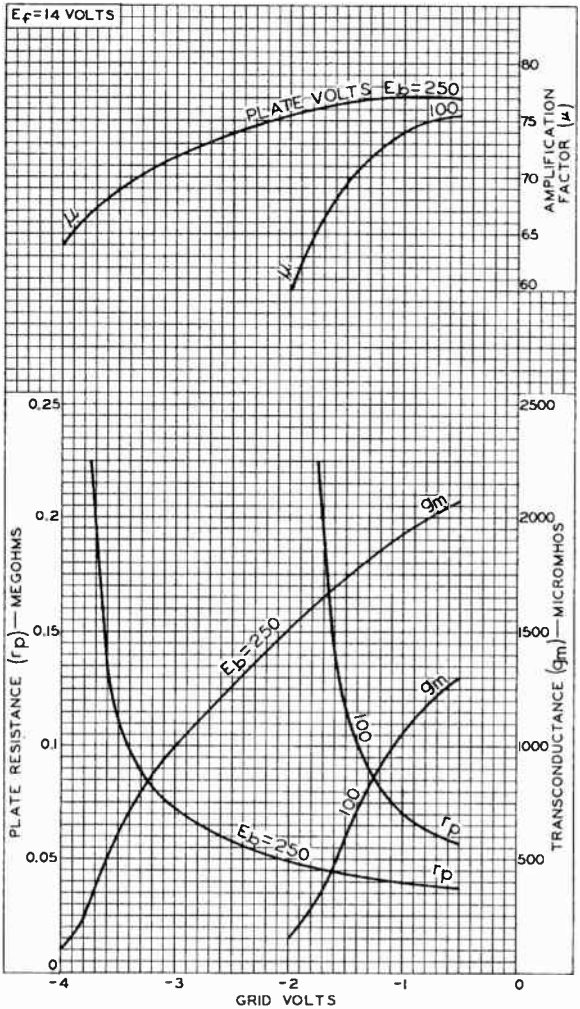


92CM-10835

World Radio History

14GT8

AVERAGE CHARACTERISTICS
Triode Unit



92CM-10838

World Radio History

15AF11

Dual Triode—
Sharp-Cutoff Pentode

DUODECAR TYPE

The 15AF11 is the same as the 6AF11 except for the following items:

Heater Characteristics and Ratings:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp	14.7	volts
Warm-up time (Average)	11	sec

15BD11

Dual Triode—
Sharp-Cutoff Pentode

DUODECAR TYPE

The 15BD11 is the same as the 6BD11 except for the following items:

Heater Characteristics and Ratings:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp	14.7	volts
Warm-up time (Average)	11	sec

15CW5

Beam Power Tube

The 15CW5 is the same as the 6CW5 except for the following items:

Heater Characteristics and Ratings:

Current	0.300 ± 0.020	amp
Voltage (AC or DC) at 0.300 amp	15.0	volts

World Radio History

15FM7

Dual Triode

DUODECAR TYPE

The 15FM7 is the same as the 6FM7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp	14.8	volts
Warm-up time (Average)	11	sec

15FY7

Dual Triode

DUODECAR TYPE

The 15FY7 is the same as the 6FY7 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp	14.7	volts
Warm-up time (Average)	11	sec

15HB6

Power Pentode

The 15HB6 is the same as the 6HB6 except for the following items:

Heater Characteristics and Ratings:		
Current	0.300 ± 0.020	amp
Voltage (AC or DC) at 0.300 amp	14.7	volts
Warm-up time (Average)	11	sec

World Radio History

High-Mu Triode—Beam Power Tube

NOVAR TYPE

For Combined Vertical-Deflection Oscillator and Amplifier Service in TV Receivers

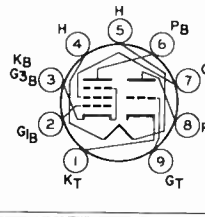
Electrical:

Heater Characteristics and Ratings:			
Current	0.450 ± 0.030		amp
Voltage (AC or DC) at heater amperes = 0.450	15.0		volts
Warm-up time (Average)	11		sec
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts
Direct Interelectrode Capacitances (Approx.):[b]			
Triode Unit:			
Grid to plate	0.44		pf
Input: G_T to (K_T,H)	15.0		pf
Output: P_T to (K_T,H)	7.0		pf
Beam Power Unit:			
Grid No.1 to plate	0.048		pf
Input: $G1_P$ to (K_B+$G3_B$,$G2_B$,H)	2.6		pf
Cutout: P_P to (K_B+$G3_B$,$G2_B$,H)	0.28		pf

Mechanical:

Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	3.110"
Maximum Seated Length	2.730"
Length, Base Seat to Bulb Top (Excluding tip)	2.210" to 2.390"
Diameter	1.062" to 1.188"
Bulb	T9
Socket	Cinch Mfg. Co. No.149 19 00 033, Industrial Electronics Hardware Corp. No.SO-0968-SL1, or equivalent
Base	Small Button Novar 9-Pin (JEDEC No.E9-75)
Basing Designation for BOTTOM VIEW	90T

Pin 1 – Triode Cathode
Pin 2 – Beam Power Grid No.1
Pin 3 – Beam Power Cathode & Grid No.3
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Beam Power Plate
Pin 7 – Beam Power Grid No.2
Pin 8 – Triode Plate
Pin 9 – Triode Grid



World Radio History

15KY8

Characteristics, Class A_1 Amplifier:

	Triode Unit	*Beam Power Unit*			
Plate Voltage	250	56	135	170	volts
Grid-No.2 Voltage	–	135	135	*Connected to plate at socket*	volts
Grid-No.1 Voltage	-5	-3	-20	-10	volts
Amplification Factor	64	–	–	7	
Plate Resistance (Approx.)	20000	–	18000	–	ohms
Transconductance	3200	–	8100	–	μmhos
Plate Current	1.3	17[c]	29	–	ma
Grid-No.2 Current	–	4[c]	3	–	ma
Grid-No.1 Voltage (Approx.) for plate ma.= 1.	–	–	-24	–	volts

VERTICAL-DEFLECTION OSCILLATOR

Triode Unit

Maximum Ratings, *Absolute-Maximum Values:*

For operation in a 525-line, 30-frame system[d]

DC Plate Voltage	330 max.	volts
Peak Negative-Pulse Grid Voltage	400 max.	volts
Cathode Current:		
Peak	77 max.	ma
Average	22 max.	ma
Plate Dissipation	1.5 max.	watts

Maximum Circuit Values:

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

VERTICAL-DEFLECTION AMPLIFIER

Beam Power Unit

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[d]

DC Plate Voltage	300 max.	volts
→ Peak Positive-Pulse Plate Voltage[e]	2000 abs.max.	volts
DC Grid-No.2 (Screen-Grid) Voltage	150 max.	volts
Peak Negative-Pulse Grid-No.1 (Control-Grid) voltage	250 max.	volts
Cathode Current:		
Peak	200 max.	ma
→ Average	70 max.	ma

→ Indicates a change.

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PLATE DISSIPATION	12 max.	watts
GRID-No. 2 INPUT	1.9 max.	watts

Maximum Circuit Values:

Grid-No. 1-Circuit Resistance:

For grid-resistor-bias operation. . .	2.2 max.	megohms

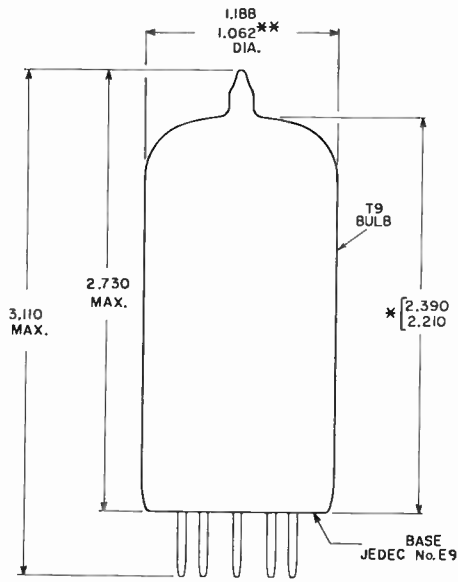
[a] The dc component must not exceed 100 volts.

[b] Without external shield.

[c] These values can be measured by a method involving a recurrent wave form such that the plate dissipation and grid-No. 2 input will be kept within ratings in order to prevent damage to the tube.

[d] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

[e] This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 15 per cent on one vertical scanning cycle is 2.5 milliseconds.



ALL DIMENSIONS IN INCHES

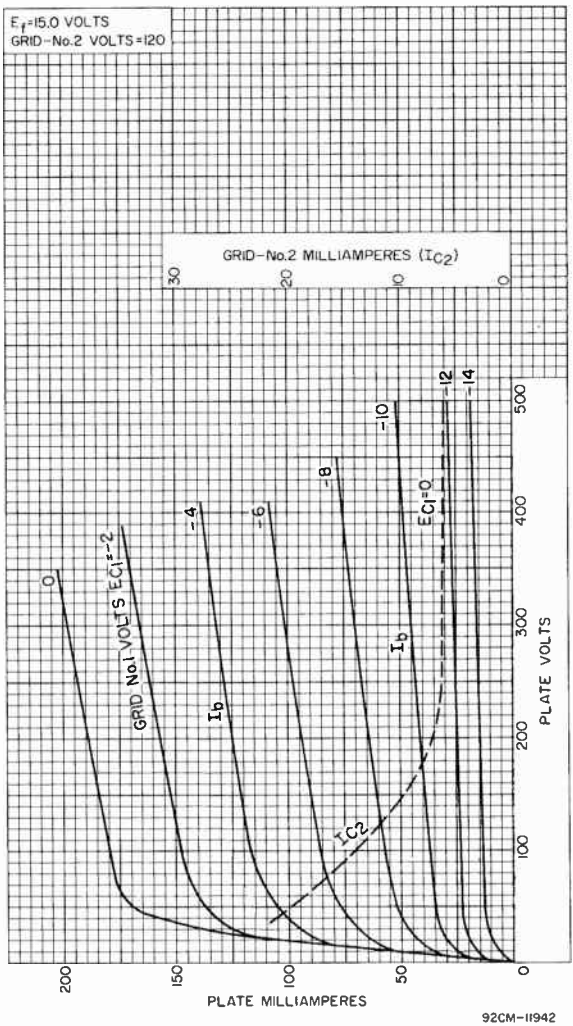
** APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.

* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.600" INSIDE DIAMETER.

World Radio History

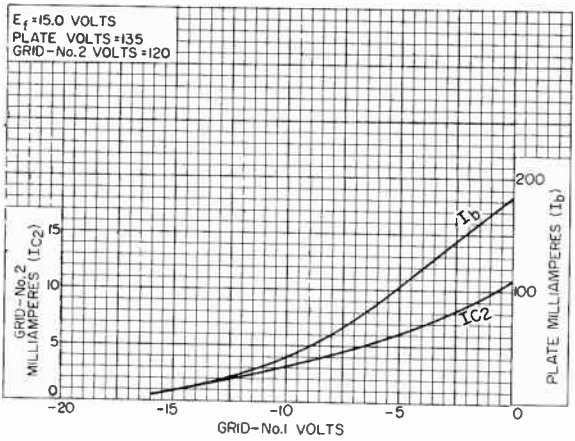
15KY8

AVERAGE CHARACTERISTICS
Beam Power Unit



92CM-11942

AVERAGE CHARACTERISTICS
Beam Power Unit

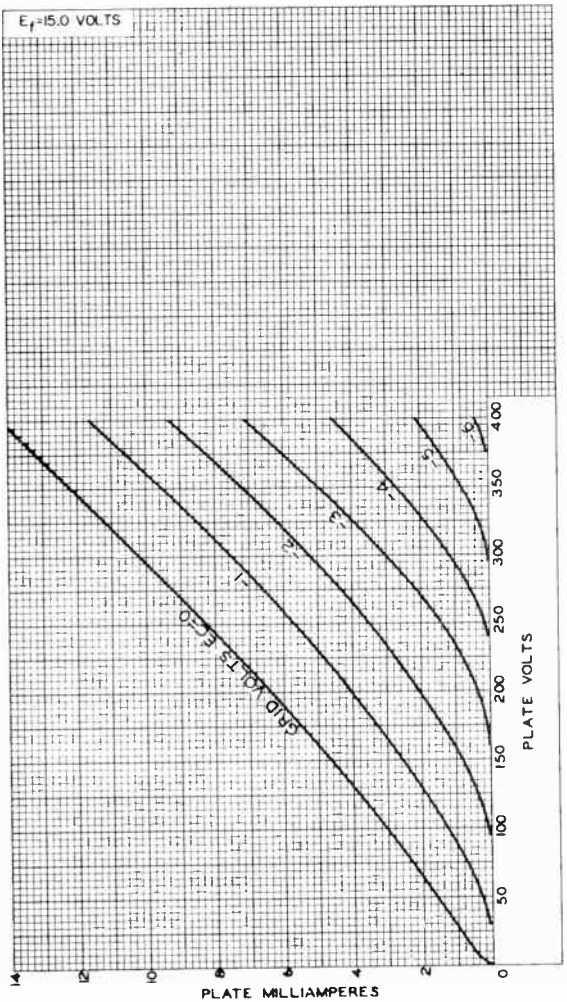


92CS-11929

World Radio History

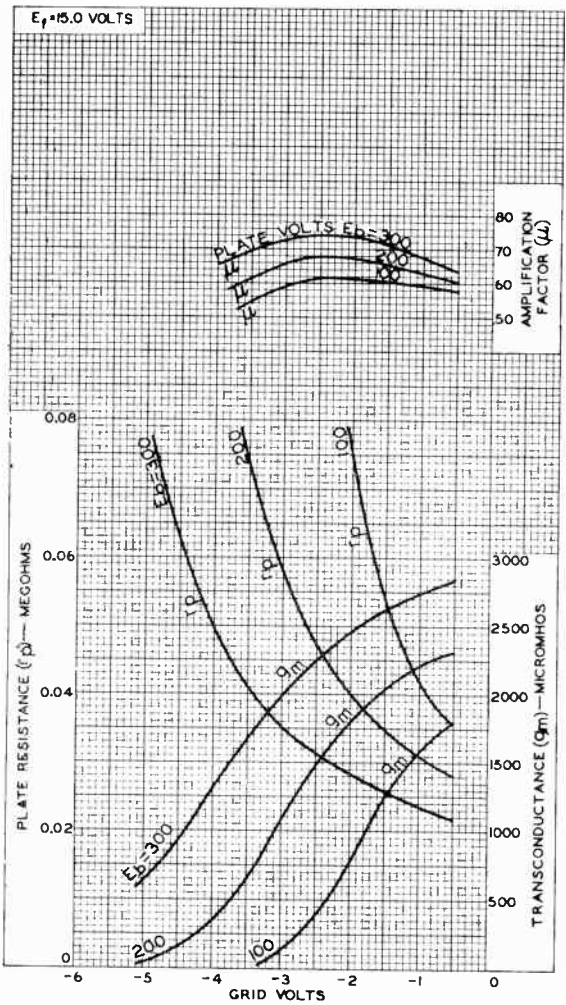
15KY8

AVERAGE CHARACTERISTICS
Triode Unit



92CM-11944

AVERAGE CHARACTERISTICS
Triode Unit



92CM-11945

World Radio History

World Radio History

High-Mu Triode—Beam Power Tube

NOVAR TYPE

For Combined Vertical-Deflection Oscillator and Amplifier Service in TV Receivers

The 15KY8A is the same as the 6KY8A except for the following items:

Heater Characteristics and Ratings:		
Current.	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450.	15.0	volts
Warm-up time (Average)	11	sec

World Radio History

World Radio History

16GK6

Power Pentode

9-PIN MINIATURE TYPE

The 16GK6 is the same as the 6GK6 except for the following items:

Heater Characteristics and Ratings:		
Current	0.300 ± 0.020	amp
Voltage (AC or DC) at heater amperes = 0.300	16.0	volts
Warm-up time (Average)	11	sec

17AX3

Half-Wave Vacuum Rectifier

DUODECAR TYPE

The 17AX3 is the same as the 6AX3 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	16.8	volts
Warm-up time (Average)	11	sec

17AX4GTA

Half-Wave Vacuum Rectifier

For TV Damper Service

The 17AX4GTA is the same as the 6AX4GTB except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	16.8	volts
Warm-up time (Average)	11	sec

World Radio History

17AY3,17AY3A

Half-Wave Vacuum Rectifier

NOVAR TYPE

For TV Damper Service

The 17AY3 and 17AY3A are the same as the 6AY3 and 6AY3B, respectively, except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	16.8	volts
Warm-up time (Average)	11	sec

17BE3

Half-Wave Vacuum Rectifier

DUODECAR TYPE

The 17BE3 is the same as the 6BE3 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	16.8	volts
Warm-up time (Average)	11	sec

17BF11

Beam Power Tube— Sharp-Cutoff Pentode

DUODECAR TYPE

The 17BF11 is the same as the 6BF11 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	16.8	volts
Warm-up time (Average)	11	sec

World Radio History

17BH3A

Half-Wave Vacuum Rectifier

NOVAR TYPE

For TV Damper Service

The 17BH3A is the same as the 6BH3A except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	17	volts
Warm-up time (Average)	11	sec

17BS3, 17BS3A

Half-Wave Vacuum Rectifier

NOVAR TYPE

For TV Damper Service

The 17BS3 and 17BS3A are the same as the 6BS3 and 6BS3A, respectively, except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	16.8	volts
Warm-up time (Average)	11	sec

17CU5

Beam Power Tube

7-PIN MINIATURE TYPE

The 17CU5 is the same as the 6CU5 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	16.8	volts
Warm-up time (Average)	11	sec

World Radio History

17D4

Half-Wave Vacuum Rectifier

For TV Damper Service

The 17D4 is the same as the 6DA4 except for the following items:

Heater Characteristics and Ratings:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	16.8	volts
Warm-up Time (Average)	11	sec

17DE4

Half-Wave Vacuum Rectifier

For TV Damper Service

The 17DE4 is the same as the 6DE4 except for the following items:

Heater Characteristics and Ratings:

Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	17	volts
Warm-up Time (Average)	11	sec

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

World Radio History

17DM4A

Half-Wave Vacuum Rectifier

For Television Damper Service

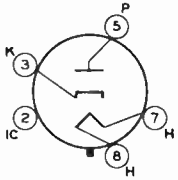
Electrical:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	16.8	volts
Warm-up time (Average)	11	sec
Maximum heater-cathode voltage:		
Heater negative with respect to cathode[a]		
Peak	5000	volts
DC component	900	volts
Heater positive with respect to cathode		
Peak	300	volts
DC component	100	volts
Direct Interelectrode Capacitances (Approx.):		
P to (K,H)	8.5	pf
K to (P,H)	11.5	pf
Heater to cathode	4.0	pf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	3-13/16"
Maximum Seated Length	3-1/4"
Maximum Diameter	1-9/32"
Bulb	T9
Base . . Short Intermediate-Shell Octal 5-Pin (JEDEC No. B5-85)	
Basing Designation for BOTTOM VIEW	4CG

Pin 2 - Do Not Use[b]
Pin 3 - Cathode
Pin 5 - Plate
Pin 7 - Heater
Pin 8 - Heater



DAMPER SERVICE

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[c]

Peak Inverse Plate Voltage[a]	5000	volts
Peak Plate Current	1200	ma
DC Plate Current	200	ma
Plate Dissipation	6.5	watts

Characteristics, Instantaneous Value:

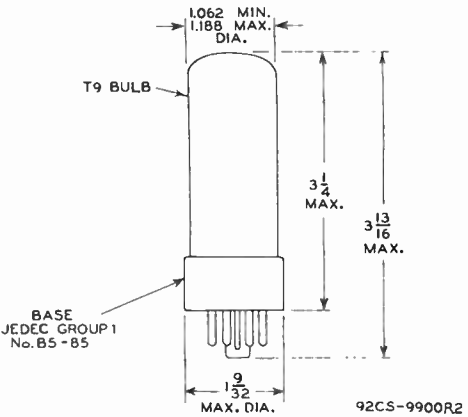
Tube Voltage Drop for plate ma = 400	35 volts

[a] This rating is applicable when the duty cycle 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.

World Radio History

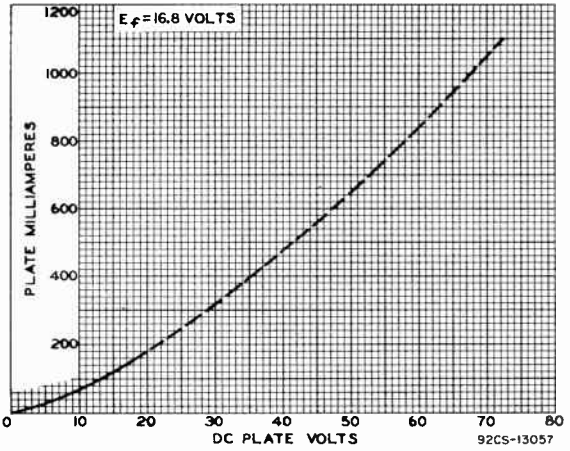
[b] Socket terminals 1, 2, 4 and 6 should not be used as tie points.
[c] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

DIMENSIONAL OUTLINE



DIMENSIONS IN INCHES

AVERAGE PLATE CHARACTERISTISTIC



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

World Radio History

17DQ6B

Beam Power Tube

The 17DQ6B is the same as the 6DQ6B except for the following items:

Heater Characteristics and Ratings:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp.	16.8	volts
Warm-up time (Average)	11	sec

17GJ5, 17GJ5A

Beam Power Tube

NOVAR TYPE

The 17GJ5 and 17GJ5A are the same as the 6GJ5 and 6GJ5A, respectively, except for the following items:

Heater Characteristics and Ratings:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp.	16.8	volts
Warm-up time (Average)	11	sec

17GT5A

Beam Power Tube

NOVAR TYPE

The 17GT5A is the same as the 6GT5A except for the following items:

Heater Characteristics and Ratings:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp.	16.8	volts
Warm-up time (Average)	11	sec

17GW6

Beam Power Tube

NOVAR TYPE

The 17GW6 is the same as the 6GW6 except for the following items:

Heater Characteristics and Ratings:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp.	16.8	volts
Warm-up time (Average)	11	sec

World Radio History

17JB6, 17JB6A

Beam Power Tube

NOVAR TYPE

The 17JB6 and 17JB6A are the same as the 6JB6 and 6JB6A, respectively, except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp	16.8	volts
Warm-up time (Average)	11	sec

17JG6, 17JG6A

Beam Power Tube

NOVAR TYPE

The 17JG6 and 17JG6A are the same as the 6JG6 and 6JG6A, respectively, except for the following items:

Heater Characteristics and Ratings:		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at 0.600 amp	16.8	volts
Warm-up time (Average)	11	sec

17JT6, 17JT6A

Beam Power Tube

NOVAR TYPE

The 17JT6 and 17JT6A are the same as the 6JT6 and 6JT6A, respectively, except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp	16.8	volts
Warm-up time (Average)	11	sec

17JZ8

Medium-Mu Triode—Beam Power Tube

DUODECAR TYPE

The 17JZ8 is the same as the 6JZ8 except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at 0.450 amp	16.8	volts
Warm-up time (Average)	11	sec

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

World Radio History

Remote-Cutoff Pentode

7-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	18	volts
Current	0.1 ± 6%	amp
Direct Interelectrode Capacitances:▲		
Grid No.1 to plate	0.0035 max.	μμf
Grid No.1 to cathode, grid No.3, grid No.2, and heater	5.5	μμf
Plate to cathode, grid No.3, grid No.2, and heater	5	μμf

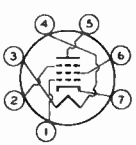
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	100	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Supply Voltage	100	volts
Cathode Resistor	68	ohms
Plate Resistance (Approx.)	0.25	megohm
Transconductance	4400	μmhos
Plate Current	11	ma
Grid-No.2 Current	4.4	ma
Grid-No.1 Voltage (Approx.) for transconductance (μmhos) = 25	-20	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CC

Pin 1 - Grid No.1
Pin 2 - Grid No.3, Internal Shield
Pin 3 - Heater



Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Cathode

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150 max.	volts
GRID No.3 (SUPPRESSOR GRID)	*Connected to cathode at socket*	
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	150 max.	volts

← Indicates a change.

World Radio History

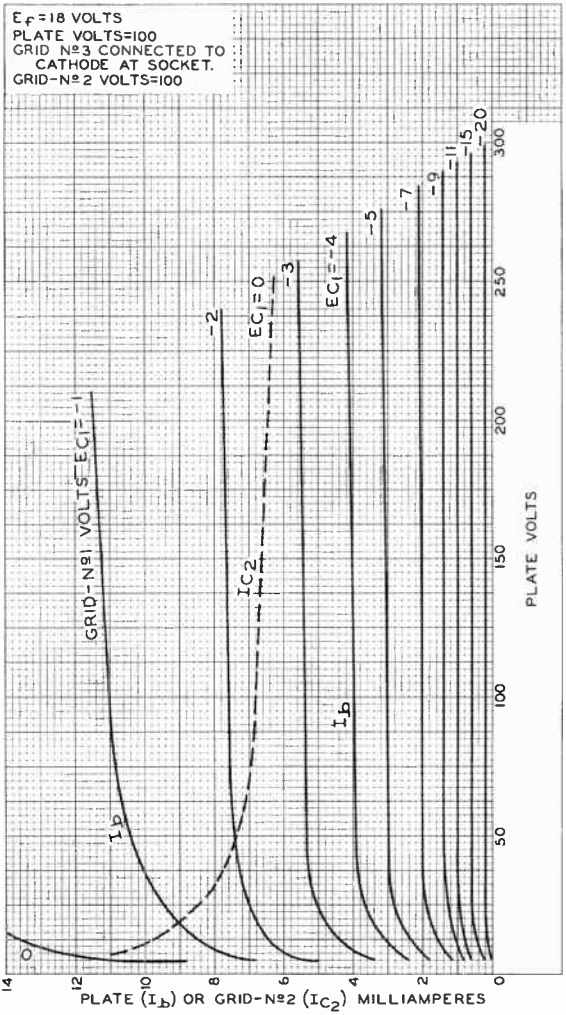
18FW6

GRID-No.2 VOLTAGE	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No.2 INPUT:		
For grid-No.2 voltages up to 75 volts . .	0.6 max.	watt
For grid-No.2 voltages between 75 and 150 volts	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
PLATE DISSIPATION	2.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode .	100 max.	volts
Heater positive with respect to cathode .	100 max.	volts

▲ With external shield JEDEC No.316 connected to cathode.

World Radio History

AVERAGE CHARACTERISTICS

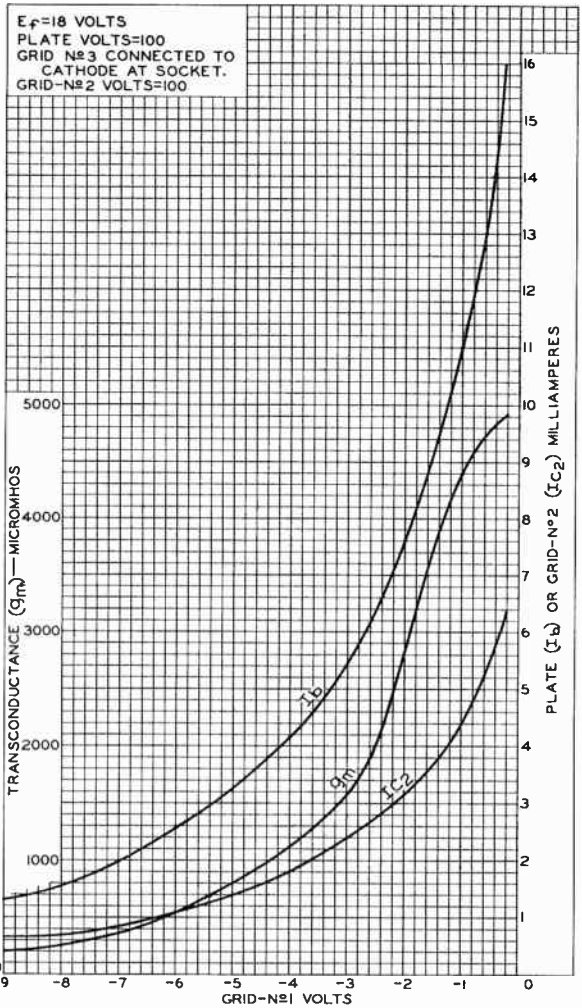


92CM-10778

World Radio History

18FW6

AVERAGE CHARACTERISTICS



92CM-10776

18FW6A

Remote-Cutoff Pentode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

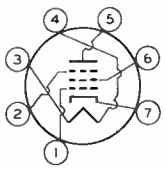
Heater, for Unipotential Cathode:		
Voltage (AC or DC)	18	volts
Current	0.1 ± 6%	amp
Warm-up time (Average)	20	sec
Direct Interelectrode Capacitances:[a]		
Grid No.1 to plate	0.0035 max.	μμf
Grid No.1 to cathode, grid No.3, grid No.2, and heater	5.5	μμf
Plate to cathode, grid No.3, grid No.2, and heater	5	μμf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	100	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Supply Voltage	100	volts
Cathode Resistor	68	ohms
Plate Resistance (Approx.)	0.25	megohm
Transconductance	4400	μmhos
Plate Current	11	ma
Grid-No.2 Current	4.4	ma
Grid-No.1 Voltage (Approx.) for transconductance (μmhos) = 25	-20	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1 1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CC



Pin 1 - Grid No.1
Pin 2 - Grid No.3, Internal Shield
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Cathode

World Radio History

AMPLIFIER — Class A_1

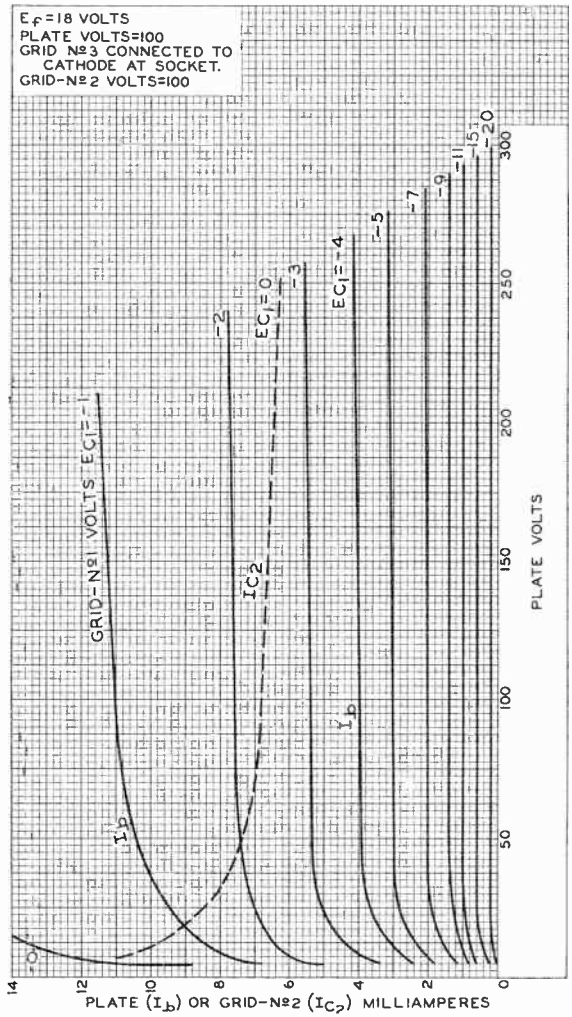
Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE . . . . . 150 max. volts
GRID No.3 (SUPPRESSOR GRID) . . *Connected to cathode at socket*
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE. . . 150 max. volts
GRID-No.2 VOLTAGE . . . . . See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section
GRID-No.2 INPUT:
For grid-No.2 voltages up to 75 volts . . 0.6 max. watt
For grid-No.2 voltages between 75 and 150 volts . . . . . See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section
PLATE DISSIPATION . . . . . 2.5 max. watts
PEAK HEATER-CATHODE VOLTAGE:
Heater negative with respect to cathode . 100 max. volts
Heater positive with respect to cathode . 100 max. volts

[a] With external shield JEDEC No.316 connected to cathode.

World Radio History

AVERAGE CHARACTERISTICS



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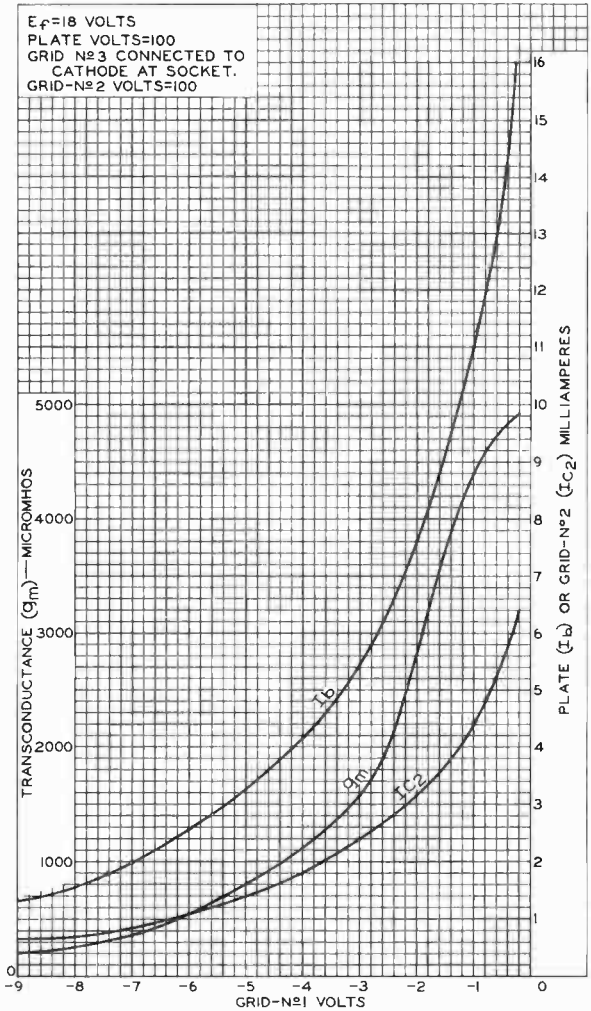
World Radio History

18FW6A

AVERAGE CHARACTERISTICS



92CM-10776

18FX6

PENTAGRID CONVERTER

7-PIN MINIATURE TYPE

GENERAL DATA

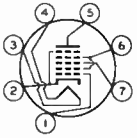
Electrical:

Heater, for Unipotential Cathode:			
Voltage (AC or DC)		18 ± 10%	volts
Current		0.1	amp
Direct Interelectrode Capacitances:	*Without External Shield*	*With External Shield[a]*	
Grid No.3 to all other electrodes (RF input)	7	7	μμf
Plate to all other electrodes (Mixer input)	8	13	μμf
Grid No.1 to all other electrodes (Oscillator input)	5.5	5.5	μμf
Grid No.3 to plate	0.30 max.	0.25 max.	μμf
Grid No.3 to grid No.1	0.15 max.	0.15 max.	μμf
Grid No.1 to plate	0.1	0.05	μμf
Grid No.1 to cathode & grid No.5	3	3	μμf
Cathode & grid No.5 to all other electrodes except grid No.1	15	20	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CH

Pin 1 - Grid No.1
Pin 2 - Cathode, Grid No.5
Pin 3 - Heater
Pin 4 - Heater



Pin 5 - Plate
Pin 6 - Grid No.2, Grid No.4
Pin 7 - Grid No.3

CONVERTER

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150 max.	volts
GRIDS-No.2 & No.4 (SCREEN-GRIDS) SUPPLY VOLTAGE	150 max.	volts
GRIDS-No.2 & No.4 VOLTAGE	110 max.	volts
GRIDS-No.2 & No.4 INPUT	1.2 max.	watts
PLATE DISSIPATION	1 max.	watt

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

18FX6

18FX6

PENTAGRID CONVERTER

PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts

Characteristics:

*With Separate Excitation**

Plate Voltage	100	volts
Grids-No.2 & No.4 Voltage	100	volts
Grid-No.3 Voltage	-1.5	volts
Grid-No.1 Resistor.	20000	ohms
Plate Resistance (Approx.).	0.4	megohm
Conversion Transconductance	480	μmhos
Plate Current	2.3	ma
Grids-No.2 & No.4 Current	6.2	ma
Grid-No.1 Current	0.5	ma
Total Cathode Current	9	ma
Grid-No.3 Voltage (Approx.) for conversion transconductance (μmhos) = 10.	-21	volts

Oscillator Characteristics (Not Oscillating):■

Plate & Grids-No.2 & No.4 Voltage . . .	100	volts
Grid-No.3 Voltage	0	volts
Grid-No.1 Voltage	0	volts
Amplification Factor†	22	
Oscillator Transconductance†.	7000	μmhos
Cathode Current	24	ma
Grid-No.1 Voltage (Approx.) for plate μa = 20	-9.2	volts

° With external shield JEDEC No.316 connected to cathode.

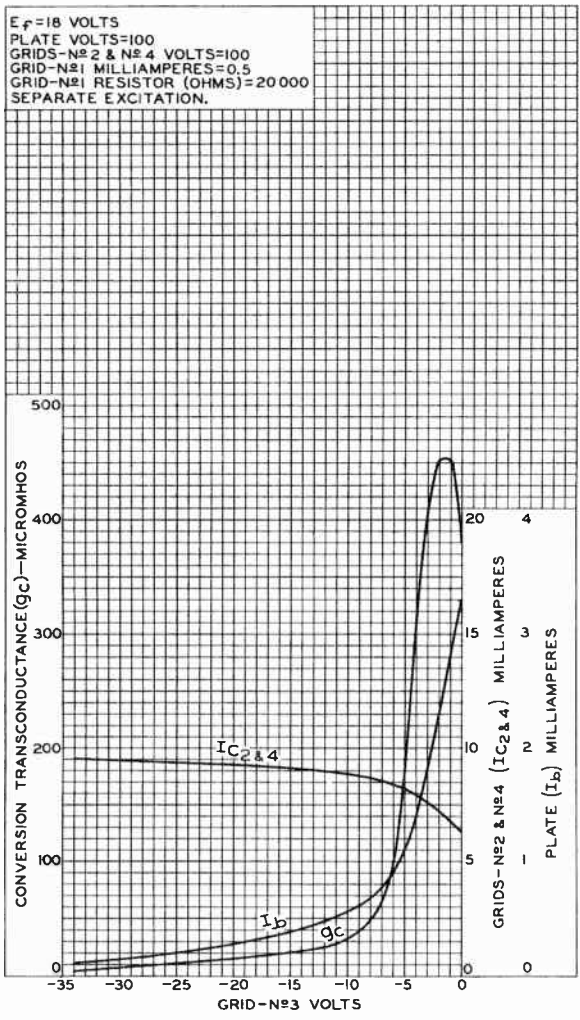
* The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited-oscillator circuit operating with zero bias.

■ With grids No.2 & No.4 connected to plate.

† Between grid No.1 and grids No.2 & No.4 connected to plate.

World Radio History

AVERAGE CHARACTERISTICS



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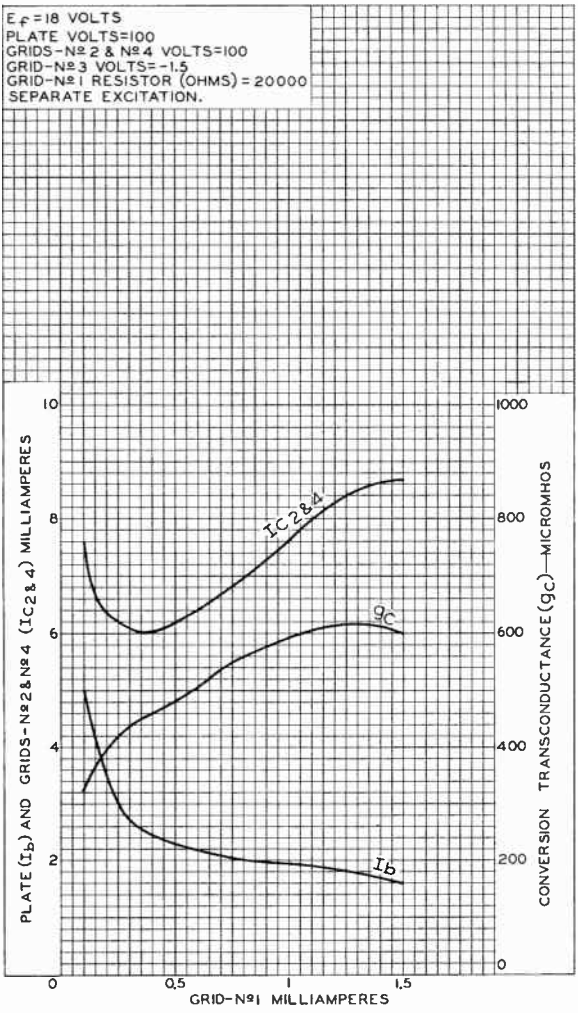
18FX6

AVERAGE CHARACTERISTICS



92CM-10782

Pentagrid Converter

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	18	volts
Current	0.1 ± 6%	amp
Warm-up time (Average)	20	sec

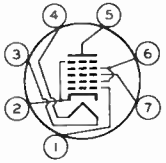
Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield*[a]	
Grid No.3 to all other electrodes (RF input)	7	7	μμf
Plate to all other electrodes (Mixer input)	8	13	μμf
Grid No.1 to all other electrodes (Oscillator input)	5.5	5.5	μμf
Grid No.3 to plate	0.3 max.	0.25 max.	μμf
Grid No.3 to grid No.1	0.15 max.	0.15 max.	μμf
Grid No.1 to plate	0.1	0.05	μμf
Grid No.1 to cathode & grid No.5	3	3	μμf
Cathode & grid No.5 to all other electrodes except grid No.1	15	20	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CH

Pin 1 – Grid No.1
Pin 2 – Cathode, Grid No.5
Pin 3 – Heater
Pin 4 – Heater



Pin 5 – Plate
Pin 6 – Grid No.2, Grid No.4
Pin 7 – Grid No.3

CONVERTER

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150 max.	volts
GRIDS-No.2 & No.4 (SCREEN-GRIDS) SUPPLY VOLTAGE	150 max.	volts

World Radio History

18FX6A

GRIDS-No.2 & No.4 VOLTAGE	110 max.	volts
GRIDS-No.2 & No.4 INPUT	1.2 max.	watts
PLATE DISSIPATION	1 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Characteristics:

With Separate Excitation[b]

Plate Voltage	100	volts
Grids-No.2 & No.4 Voltage	100	volts
Grid-No.3 Voltage	-1.5	volts
Grid-No.1 Resistor	20000	ohms
Plate Resistance (Approx.)	0.4	megohm
Conversion Transconductance	480	μmhos
Plate Current	2.3	ma
Grids-No.2 & No.4 Current	6.2	ma
Grid-No.1 Current	0.5	ma
Total Cathode Current	9	ma
Grid-No.3 Voltage (Approx.) for conversion transconductance (μmhos) = 10	-21	volts

Oscillator Characteristics (Not Oscillating):[c]

Plate & Grids-No.2 & No.4 Voltage	100	volts
Grid-No.3 Voltage	0	volts
Grid-No.1 Voltage	0	volts
Amplification Factor[d]	22	
Oscillator Transconductance[d]	7000	μmhos
Cathode Current	24	ma
Grid-No.1 Voltage (Approx.) for plate μa = 20	-9.2	volts

[a] With external shield JEDEC No.316 connected to cathode.

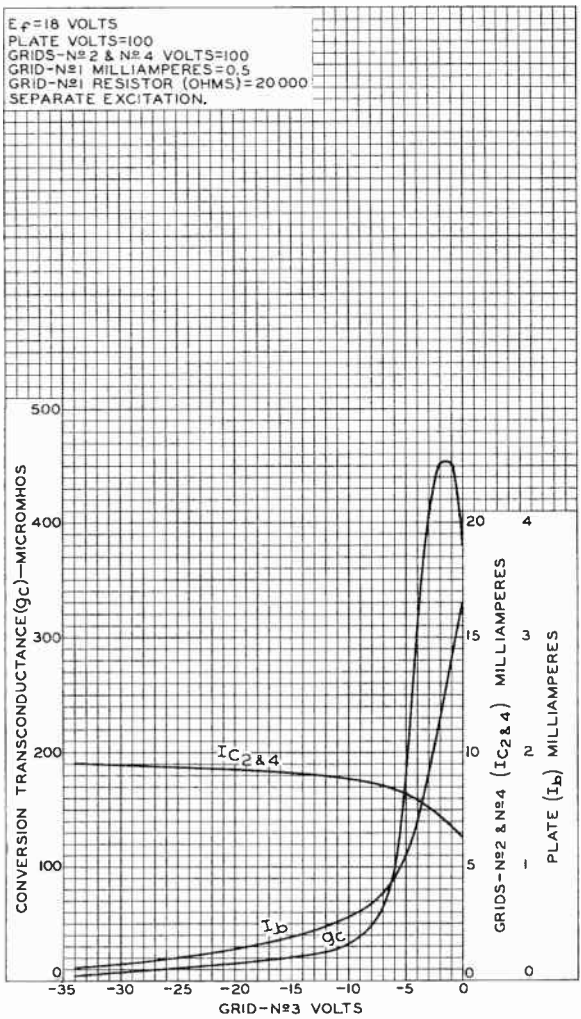
[b] The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited-oscillator circuit operating with zero bias.

[c] With grids No.2 & No.4 connected to plate.

[d] Between grid No.1 and grids No.2 & No.4 connected to plate.

World Radio History

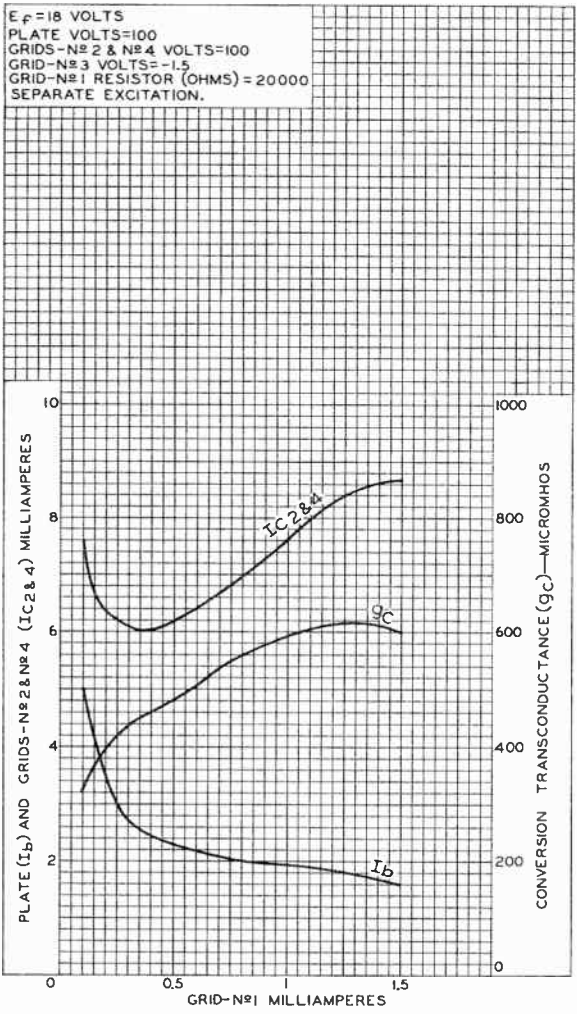
AVERAGE CHARACTERISTICS



92CM-10777

18FX6A

AVERAGE CHARACTERISTICS



92CM-10782

18FY6

TWIN DIODE—HIGH-MU TRIODE

7-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:			
Voltage (AC or DC)		18 ± 10%	volts
Current		0.1	amp
Direct Interelectrode Capacitances:			
	Without External Shield	*With External Shield°*	
Triode grid to triode plate	1.8	1.8	μμf
Triode grid to cathode and heater	2.4	2.4	μμf
Triode plate to cathode and heater	0.22	2	μμf
Plate of diode unit No.2 to triode grid	0.2 max.	0.2 max.	μμf

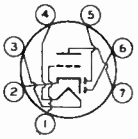
Characteristics, Class A_1 Amplifier (Triode Unit):

Plate Voltage	100	volts
Grid Voltage	−1	volt
Amplification Factor	100	
Plate Resistance (Approx.)	77000	ohms
Transconductance	1300	μmhos
Plate Current	0.6	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7BT

Pin 1 – Grid of Triode Unit
Pin 2 – Cathode of Triode Unit and Diode Units No.1 and No.2
Pin 3 – Heater
Pin 4 – Heater



Pin 5 – Plate of Diode Unit No.2
Pin 6 – Plate of Diode Unit No.1
Pin 7 – Plate of Triode Unit

° With external shield JEDEC No.316 connected to cathode.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

18FY6

TWIN DIODE—HIGH-MU TRIODE

TRIODE UNIT — AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150 max.	volts
GRID VOLTAGE:		
Positive-bias value	0 max.	volts
PLATE DISSIPATION	0.5 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

DIODE UNITS — Two

Maximum Ratings, *Design-Maximum Values:*

Values are for Each Unit

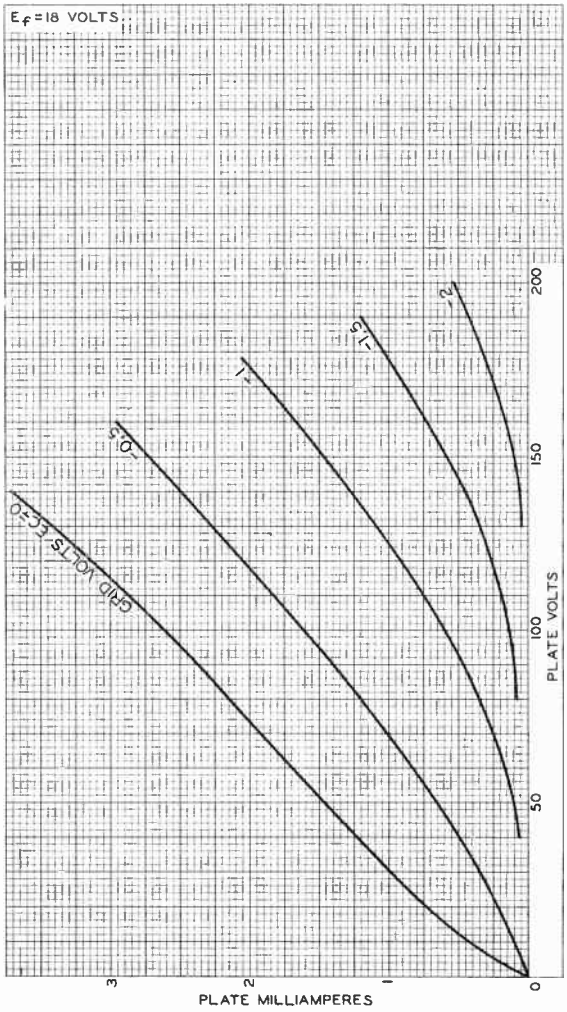
PLATE CURRENT	1 max.	ma

Characteristics:

Plate Current for plate volts = 10	2	ma

World Radio History

AVERAGE PLATE CHARACTERISTICS
Triode Unit



92CM-10775

World Radio History

World Radio History

Twin Diode—High-Mu Triode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:			
Voltage (AC or DC)		18	volts
Current		0.1 ± 6%	amp
Warm-up time (Average)		20	sec
Direct Interelectrode Capacitances:			
	Without External Shield	*With External Shield*[a]	
Triode grid to triode plate	1.8	1.8	μμf
Triode grid to cathode and heater	2.4	2.4	μμf
Triode plate to cathode and heater	0.22	2	μμf
Plate of diode unit No.2 to triode grid	0.2 max.	0.2 max.	μμf

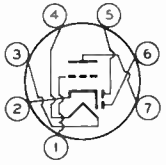
Characteristics, Class A_1 Amplifier (Triode Unit):

Plate Voltage	100	volts
Grid Voltage	-1	volt
Amplification Factor	100	
Plate Resistance (Approx.)	77000	ohms
Transconductance	1300	μmhos
Plate Current	0.6	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7BT

Pin 1 - Grid of Triode Unit
Pin 2 - Cathode of Triode Unit and Diode Units No.1 and No.2
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate of Diode Unit No.2
Pin 6 - Plate of Diode Unit No.1
Pin 7 - Plate of Triode Unit



World Radio History

18FY6A

TRIODE UNIT — AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150 max.	volts
GRID VOLTAGE:		
Positive-bias value	0 max.	volts
PLATE DISSIPATION	0.5 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

DIODE UNITS — Two

Maximum Ratings, *Design-Maximum Values:*

Values are for Each Unit

PLATE CURRENT	1 max.	ma

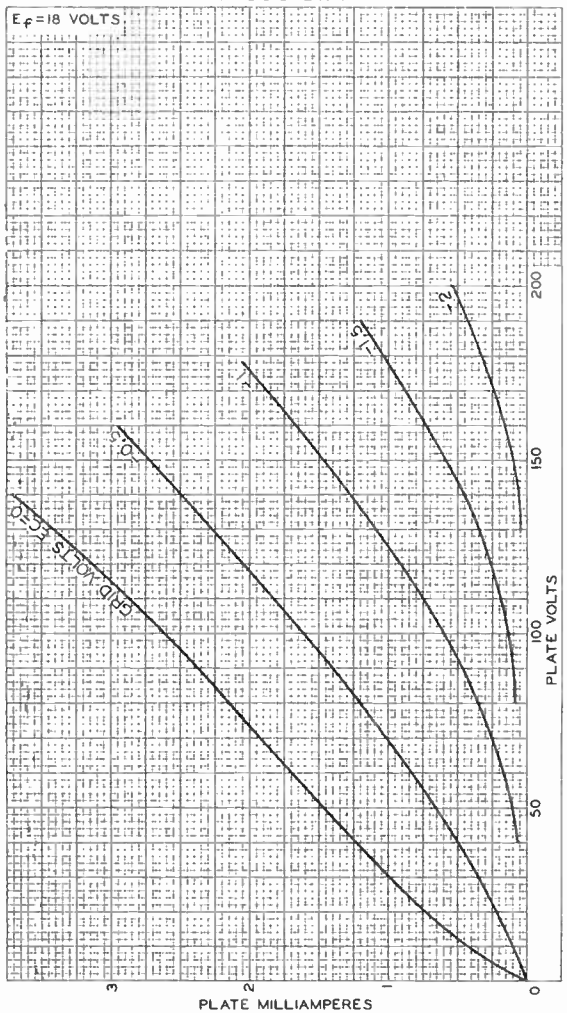
Characteristics, Instantaneous Test Condition:

Plate Current for plate volts = 10	2	ma

[a] With external shield JEDEC No.316 connected to cathode.

World Radio History

AVERAGE PLATE CHARACTERISTICS
Triode Unit



92CM-10775

World Radio History

World Radio History

18GD6A

Sharp-Cutoff Pentode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	18	volts
Current	0.1 ± 6%	amp
Warm-up time (Average)	20	sec
Direct Interelectrode Capacitances:		

	Without External Shield	*With External Shield*[a]	
Grid No.1 to plate	0.0035 max.	0.0035 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	6	6	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	5	5	μμf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	100	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Supply Voltage	100	volts
Cathode Resistor	150	ohms
Plate Resistance (Approx.)	0.5	megohm
Transconductance	4300	μmhos
Plate Current	5	ma
Grid-No.2 Current	2	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-4.7	volts

Mechanical:

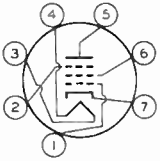
Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)

World Radio History

18GD6A

Basing Designation for BOTTOM VIEW. 7BK

Pin 1 – Grid No.1
Pin 2 – Grid No.3, Internal Shield
Pin 3 – Heater



Pin 4 – Heater
Pin 5 – Plate
Pin 6 – Grid No.2
Pin 7 – Cathode

RF AMPLIFIER and AUTODYNE CONVERTER

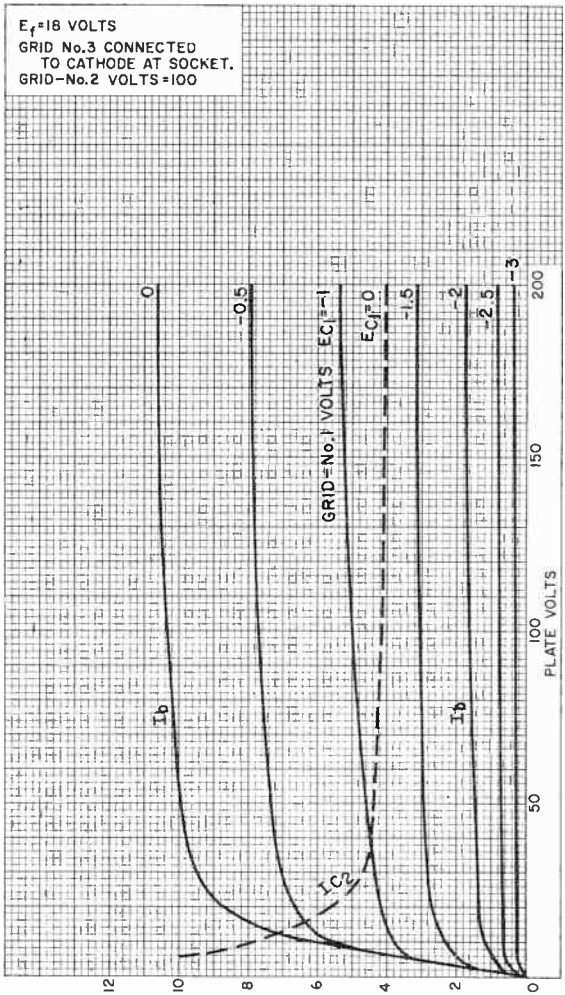
Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE . . . . . 150 max. volts
GRID No.3 (SUPPRESSOR GRID) . . . *Connect to cathode at socket*
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE. . . . 150 max. volts
GRID-No.2 VOLTAGE . . . . . .See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section
GRID-No.2 INPUT:
For grid-No.2 voltages up to 75 volts . . . 0.6 max. watt
For grid-No.2 voltages between 75 and 150 volts. . . . . .See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section
PLATE DISSIPATION . . . . . 2.5 max. watts
PEAK HEATER-CATHODE VOLTAGE:
Heater negative with respect to cathode . . 100 max. volts
Heater positive with respect to cathode . . 100 max. volts

[a] With external shield JEDEC No.316 connected to cathode.

World Radio History

AVERAGE CHARACTERISTICS

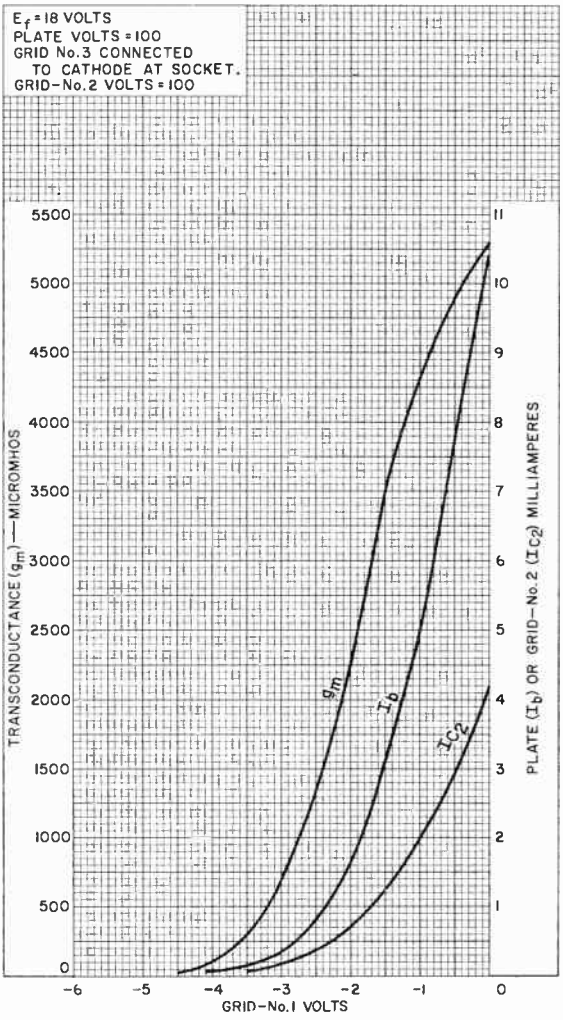


92CM-11138RI

World Radio History

18GD6A

AVERAGE CHARACTERISTICS



92CM-11136R1

World Radio History

19AU4

HALF-WAVE VACUUM RECTIFIER

Intended for TV damper service in equipment having series heater-string arrangement

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	18.9	ac or dc volts
Current	0.6	amp
Warm-up time (Average)	11	sec

For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of this Section.

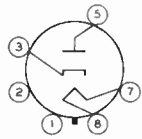
Direct Interelectrode Capacitances (Approx.):[C]

Plate to heater and cathode	8.5	μμf
Cathode to heater and plate	11.5	μμf
Heater to cathode	4	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	3-13/16"
Maximum Seated Length	3-1/4"
Maximum Diameter	1-9/32"
Dimensional Outline	*See General Section*
Bulb	T-9
Base	Short Intermediate-Shell Octal 5-Pin with External Barriers (JEDEC No.E5-85), or Short Intermediate-Shell Octal 6-Pin with External Barriers (JETEC No.B6-60)
Basing Designation for BOTTOM VIEW	4CC

Pin 1♦ - Same as Pin 2
Pin 2 - No Connection - Do Not Use●



Pin 3 - Cathode
Pin 5 - Plate
Pin 7 - Heater
Pin 8 - Heater

DAMPER SERVICE

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

For operation in a 525-line, 30-frame system[D]

PEAK INVERSE PLATE VOLTAGE (Absolute maximum)♦	4500■	max.	volts
PEAK PLATE CURRENT	1050	max.	ma
DC PLATE CURRENT	175	max.	ma
PLATE DISSIPATION	6	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode (Absolute maximum)	4500■▲	max.	volts
Heater positive with respect to cathode	300▲	max.	volts

[C] Without external shield.

♦ On the 5-pin base, pin 1 as well as pins 4 and 6 is omitted.

●,□,▪,■,▲,#: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON NEW JERSEY

TENTATIVE DATA

World Radio History

19AU4

HALF-WAVE VACUUM RECTIFIER

● Socket terminals 1,2,4, and 6 should not be used as tie points.

□ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

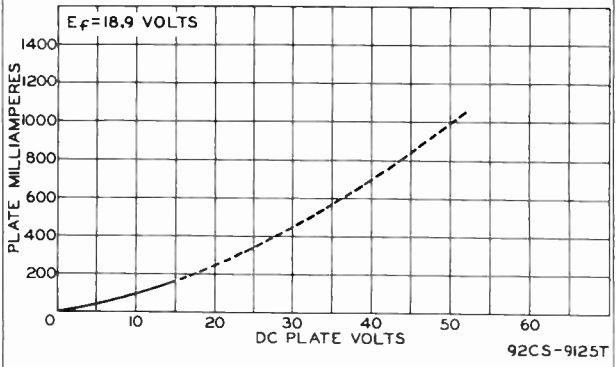
• This rating is applicable when the duty cycle of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

■ Under no circumstances should this absolute value be exceeded.

▲ The dc component must not exceed 900 volts (Absolute maximum).

* The dc component must not exceed 100 volts.

AVERAGE PLATE CHARACTERISTIC



92CS-9125T

TENTATIVE DATA

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

19CL8A

Medium-Mu Triode—Sharp-Cutoff Tetrode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 19CL8A is the same as the 6CL8A except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.150 ± 0.010	amp
Voltage (AC or DC) at heater amperes = 0.150	18.9	volts

19EA8

Medium-Mu Triode—Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 19EA8 is the same as the 6EA8 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.150 ± 0.010	amp
Voltage (AC or DC) at heater amperes = 0.150	18.9	volts

19HR6

Semiremote-Cutoff Pentode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 19HR6 is the same as the 6HR6 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.150 ± 0.010	amp
Voltage (AC or DC) at heater amperes = 0.150	18.9	volts
Warm-up time (Average)	17	sec

World Radio History

19HS6

Sharp-Cutoff Pentode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 19HS6 is the same as the 6HS6 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.150 ± 0.010	amp
Voltage (AC or DC) at heater amperes = 0.150	18.9	volts
Warm-up time (Average)	17	sec

World Radio History

Diode—Remote-Cutoff Pentode

9-PIN MINIATURE TYPE

The 20EQ7 is the same as the 6EQ7 except for the following items:

Heater, for Unipotential Cathode:

Voltage (AC or DC)	20 ± 10%	volts
Current at 20 volts	0.1	amp

World Radio History

World Radio History

High-Mu Twin Triode

9-PIN MINIATURE TYPE

For High-Gain, Resistance-Coupled, Low-Level Audio-Amplifiers Operating at Low-Signal Levels, such as Preamplifiers for Low-Cost Stereophonic Phonographs

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:			
Voltage (AC or DC)	20		volts
Current	0.1 ± 6%		amp
Direct Interelectrode Capacitances (Approx.):[a]	*Unit No.1*	*Unit No.2*	
Grid to plate	1.5	1.5	μμf
Grid to cathode and heater	1.6	1.6	μμf
Plate to cathode and heater	0.2	0.3	μμf

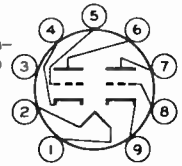
Characteristics, Class A_1 Amplifier (Each Unit):

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

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9PG

Pin 1 – Heater
Pin 2 – Heater
Pin 3 – Internal Connection—Do Not Use
Pin 4 – Cathode of Unit No.2
Pin 5 – Grid of Unit No.2
Pin 6 – Plate of Unit No.2
Pin 7 – Plate of Unit No.1
Pin 8 – Grid of Unit No.1
Pin 9 – Cathode of Unit No.1



AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330 max.	volts

→ Indicates a change.

World Radio History

20EZ7

GRID VOLTAGE:			
Negative-bias value.	55	max.	volts
Positive-bias value.	0	max.	volts
PLATE DISSIPATION.	1.2	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode. .	200	max.	volts
Heater positive with respect to cathode. .	200[b]	max.	volts

Typical Operation as Resistance-Coupled Amplifier:

See *RESISTANCE-COUPLED-AMPLIFIER CHART No.25* at front of this Section

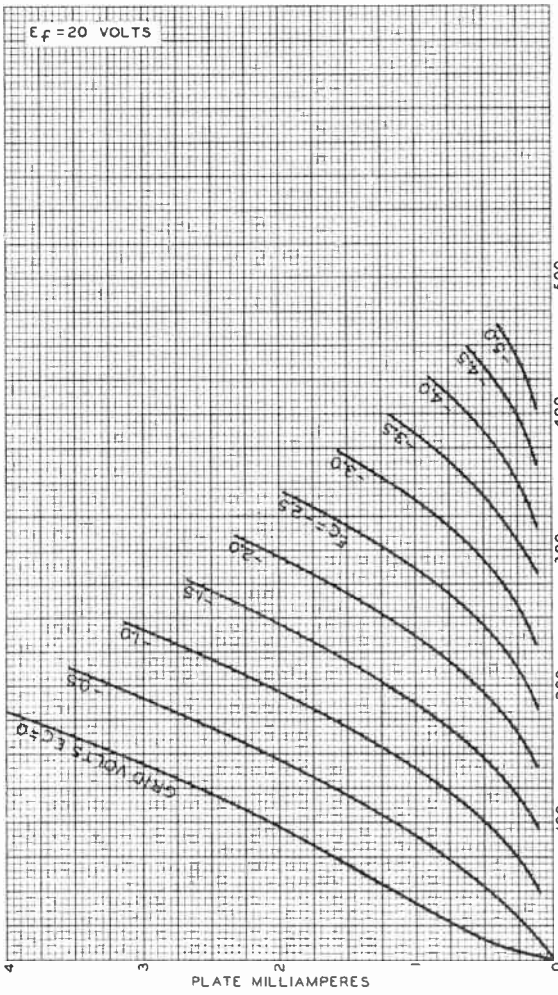
[a] without external shield.

[b] The dc component must not exceed 100 volts.

World Radio History

AVERAGE PLATE CHARACTERISTICS

Each Unit

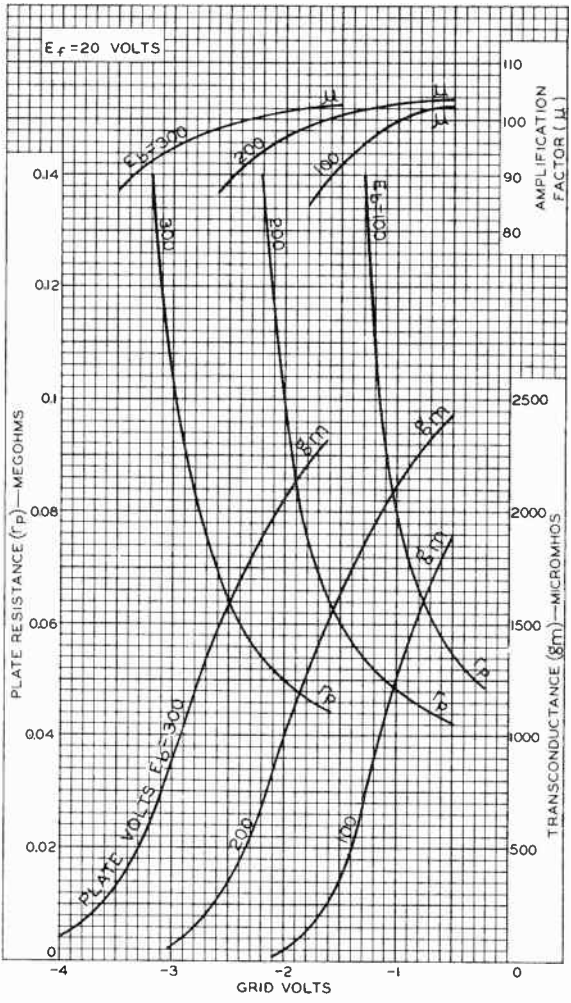


92CM-10804

World Radio History

20EZ7

AVERAGE CHARACTERISTICS
Each Unit



92CM-10805

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

World Radio History

Beam Power Tube

DUODECAR TYPE

The 21HJ5 is the same as the 6HJ5 except for the following items:

Heater Characteristics and Ratings

Current	0.600 ± 0.040	A
Voltage (AC or DC) at heater amperes = 0.600	21.5	V
Warm-up time (Average)	11	s

World Radio History

World Radio History

High-Mu Triode—Beam Power Tube

NOVAR TYPE

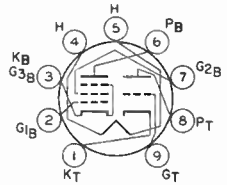
For Combined Vertical-Deflection Oscillator and Amplifier Service in Color TV Receivers

ELECTRICAL CHARACTERISTICS

Bogey Values

Heater Current	I_f	450	mA
Heater Voltage (AC or DC) at I_f = 450 mA	E_f	21.0	V
Heater Warm-up Time (Average)		11	s
Direct Interelectrode Capacitances (Approx.)			
Triode Unit			
grid to plate	c_{gp}	6.0	pF
[illegible]	c_i	6.5	pF
[illegible]	c_o	1.6	pF
Beam Power Unit:			
[illegible]	c_{gp}	0.7 max	pF
[illegible]	c_i	16.0	pF
[illegible]	c_o	9.0	pF
[illegible]		0.12 max	pF
[illegible]		0.32 max	pF
Basing Designation for BOTTOM VIEW			9QT

Pin 1 – Triode Cathode
Pin [illegible] – Beam Power Unit No.2 [illegible]
Pin [illegible] – Beam Power Unit [illegible]
[illegible]
Pin 4 – Heater
Pin [illegible] – Heater
Pin [illegible] – Beam Power Unit [illegible]
Pin 7 – Beam Power Unit No.2 [illegible]
Pin 8 – Triode Plate
Pin [illegible] – Internal [illegible]



CLASS A_1 AMPLIFIER

For the following characteristics, see Conditions

		Triode Unit	*Beam Power Unit*			
Amplification Factor	μ	58	-	-	6.5[a]	
Plate Resistance (Approx.)	r_p	16000	-	12000	-	Ω
Transconductance	g_m	3600	-	9300	-	μmhos
DC Plate Current	I_b	2.3	200[b]	56	-	mA
DC Grid-No.2 Current	I_g	-	20[b]	3	-	mA
Cutoff DC Grid-No.1 Voltage						
[illegible]	$E_{c(co)}$	-6.6	-	-	-	V
[illegible]	$E_{c(co)}$	-	-	-26	-	V
[illegible]	$E_{c(co)}$	-	-	-30	-	V

World Radio History

Conditions

		Triode Unit	Beam Power Unit			
Heater Voltage	E_f	21.0	21.0	21.0	21.0	V
Plate Voltage	E_b	250	45	135	120	V
Grid-No.2 Voltage	E_c	-	125	120	120	V
Grid-No.1 Voltage	E_c	-4	0	-10	-10	V

MECHANICAL CHARACTERISTICS

Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length (l_m)	3.710 in
Maximum Seated Length (l_m)	3.330 in
Length, Base Seat to Bulb Top (Excluding tip)	2.810 to 2.990 in
Diameter (d)	1.438 to 1.562 in
Envelope	T12
Bases (alternates)	
[illegible]	[illegible]
[illegible]	[illegible]

VERTICAL-DEFLECTION OSCILLATOR *(Triode Unit)*

Maximum Ratings, Design-Maximum Values

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

DC Plate Voltage	E_b	400	V
Peak Negative-Pulse Grid Voltage	e_{cm}	400	V
Peak Cathode Current	i_{km}	105	mA
Average Cathode Current	$I_{k(av)}$	30	mA
Plate Dissipation	P_b	2.5	W
Peak Power Output	P_o	2.5	W

Maximum Circuit Values

Grid-Circuit Resistance	$R_{g(ckt)}$		
[illegible]		2.2	MΩ

VERTICAL-DEFLECTION AMPLIFIER *(Beam Power Unit)*

Maximum Ratings, Design-Maximum Values

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

DC Plate Voltage	E_b	400	V
Peak Positive-Pulse Plate Voltage[c]	e_{bm}	2500[d]	V
DC Grid-No.2 (Screen-Grid) Voltage	E_c	300	V
Peak Negative-Pulse Grid-No.1 (Control-Grid) Voltage	e_{cm}	250	V
Peak Cathode Current	i_{km}	260	mA
Average Cathode Current	$I_{k(av)}$	75	mA
Plate Dissipation[e]	P_b	14	W
Grid-No.2 Input[e]	P_c	2.75	W
Envelope Temperature	T_E	210	°C

MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance	$R_{g(ckt)}$		
[illegible]		1	MΩ
[illegible]		2.2	MΩ

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

World Radio History

[a] Triode connection.

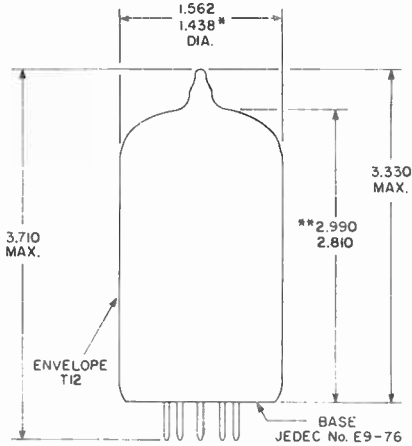
[b] This value can be measured by a method involving a recurrent wave form such that the plate dissipation and grid-No.2 input will be kept within ratings in order to prevent damage to the tube.

[c] This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one vertical scanning cycle. In a 525-line, 30-frame system, 15 per cent of one vertical scanning cycle is 2.5 milliseconds.

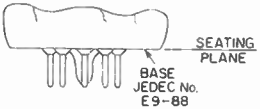
[d] Absolute Maximum value.

[e] An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

DIMENSIONAL OUTLINE
Top Exhaust (JEDEC No. 12-65)



92CS-13502A



92CS-11127R3B

DIMENSIONS IN INCHES

Bottom-exhaust version has the same dimensions for maximum overall length and seated length as the top-exhaust outline shown.

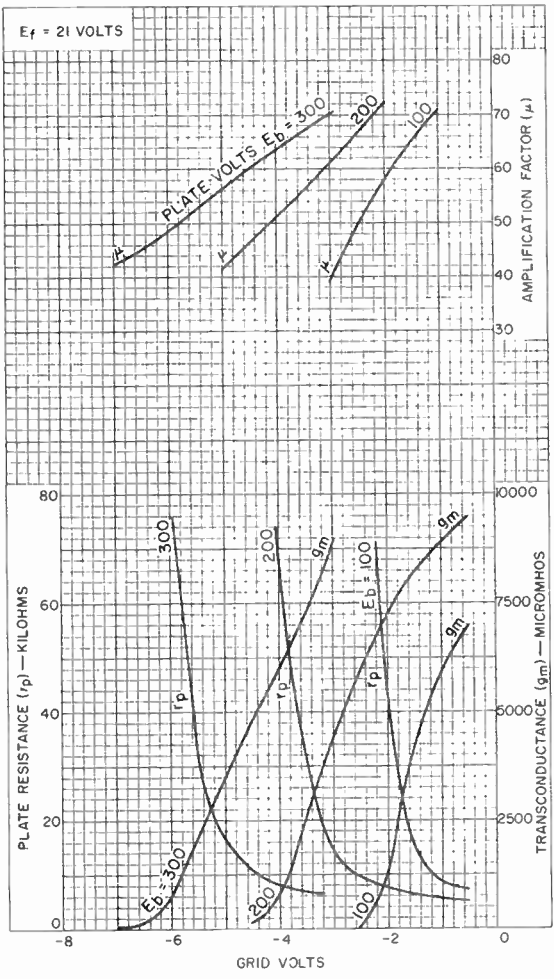
* Applies to the minimum diameter except in the area of the seal.

** Measured from the last seat to bulb-top line as determined by a ring gauge of 0.600" I.D.

World Radio History

Typical Characteristics

Triode Unit

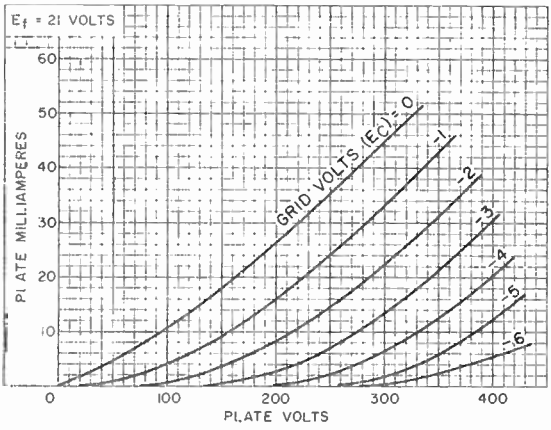


RADIO CORPORATION OF AMERICA
Electronic Components and Devices Harrison, N. J.

World Radio History

Typical Plate Characteristics

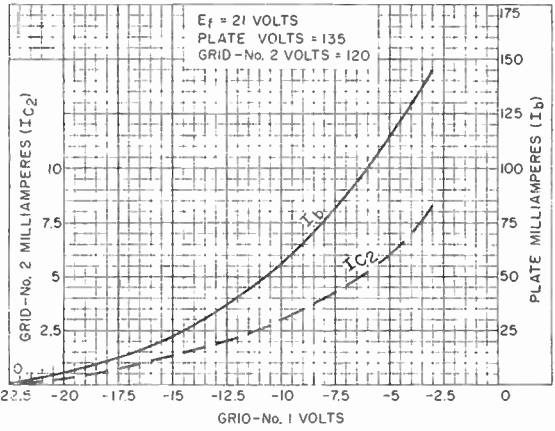
Triode Unit



92CS-13508

Typical Characteristics

Beam Power Unit

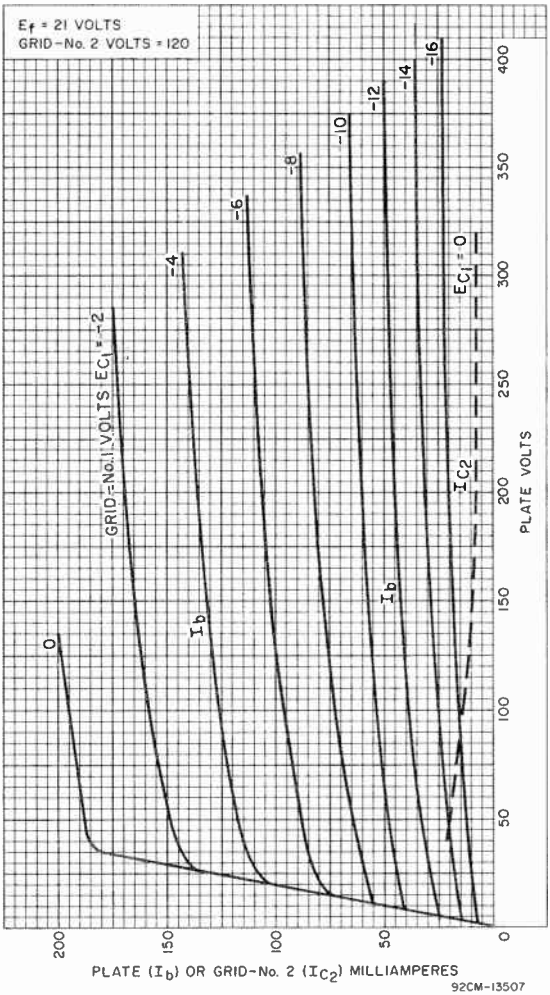


92CS-13509

World Radio History

Typical Characteristics

Beam Power Unit



92CM-13507

RADIO CORPORATION OF AMERICA
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22BH3

Half-Wave Vacuum Rectifier

NOVAR TYPE

For TV Damper Service

The 22BH3 is the same as the 6BH3 except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at heater current = 0.450	22.4	V
Warm-up Time (Average)	11	s

22BH3A

Half-Wave Vacuum Rectifier

NOVAR TYPE

For TV Damper Service

The 22BH3A is the same as the 6BH3A except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at heater current = 0.450	22.4	V
Warm-up Time (Average)	11	s

22DE4

Half-Wave Vacuum Rectifier

For TV Damper Service

The 22DE4 is the same as the 6DE4 except for the following items:

Heater Characteristics and Ratings

Current	0.450 ± 0.030	A
Voltage (AC or DC) at heater current = 0.450	22.4	V
Warm-up Time (Average)	11	s

World Radio History

World Radio History

22JF6

Beam Power Tube

NOVAR TYPE

For Horizontal-Deflection-Amplifier Service in Low-B+, Black-and-White TV Receivers

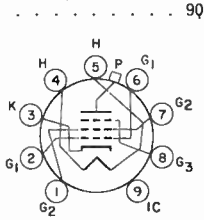
ELECTRICAL

Heater Characteristics and Ratings		
Current	0.450 ± 0.030	A
Voltage (AC or DC)	22.0	V
At heater amperes = 0.450		
Warm-up time (Average)	11	s
Maximum heater-cathode voltage:		
Heater negative with respect to cathode:		
Peak	200	V
Heater positive with respect to cathode:		
Peak	200	V
DC component	100	V
Direct Interelectrode Capacitances[a]		
Grid No.1 to plate	1.2	pF
Input: G1 to (K, G3, G2, H)	22.0	pF
Output: P to (K, G3, G2, H)	9.0	pF

MECHANICAL

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	3.550 in
Seated Length	2.910 to 3.170 in
Diameter	1.438 to 1.562 in
Dimensional Outline	See *General Section*
Bulb	T12
Cap	Skirted Miniature (JEDEC No.C1-2 or C1-3)
Base	Large-Button Novar 9-Pin with Exhaust Tip (JEDEC No.E9-88)
Basing Designation for BOTTOM VIEW	9QL

Pin 1 – Grid No.2
Pin 2 – Grid No.1
Pin 3 – Cathode
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Grid No.1
Pin 7 – Grid No.2
Pin 8 – Grid No.3
Pin 9 – Do Not Use
Cap – Plate



CHARACTERISTICS

Peak Positive-Pulse Plate Voltage[b]	6500	–	–	V
Plate Voltage	–	50	130	V
Grid No.3	Connected to cathode at socket			
Grid-No.2 Voltage	125	125	125	V
Grid-No.1 Voltage	–	0	-20	V
Plate Resistance (Approx.)	–	–	12000	Ω

World Radio History

Transconductance	-	-	10000	μmhos
Plate Current	-	525[c]	80	mA
Grid-No.2 Current	-	32[c]	2.5	mA
Grid-No.1 Voltage (Approx.) For plate mA = 1	-125	-	-40	V
Triode Amplification Factor (Triode connection: grid No.2 connected to plate at socket. Plate volts = grid-No.2 volts = 125; grid-No.1 volts = -20)	-	-	4.1	

HORIZONTAL-DEFLECTION AMPLIFIER

Maximum Ratings, Design-Maximum Values

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

DC Plate Supply Voltage	770	V
Peak Positive-Pulse Plate Voltage[d]	6500	V
Peak Negative-Pulse Plate Voltage	1500	V
DC Grid-No.3 Voltage[e]	100	V
DC Grid-No.2 (Screen-Grid) Voltage	220	V
Peak Negative-Pulse Grid-No.1 (Control-Grid) Voltage	330	V
Cathode Current		
Peak	950	mA
Average	275	mA
Grid-No.2 Input	3.5	W
Plate Dissipation[f]	17	W
Bulb Temperature At hottest point on bulb surface	240	°C

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance		
For grid-resistor-bias operation[f]	0.47	MΩ
For plate-pulsed operation (Horizontal-deflection circuits only)	10	MΩ

[a] Without external shield.

[b] Under conditions shown in footnote[d].

[c] This value can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

[d] 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.

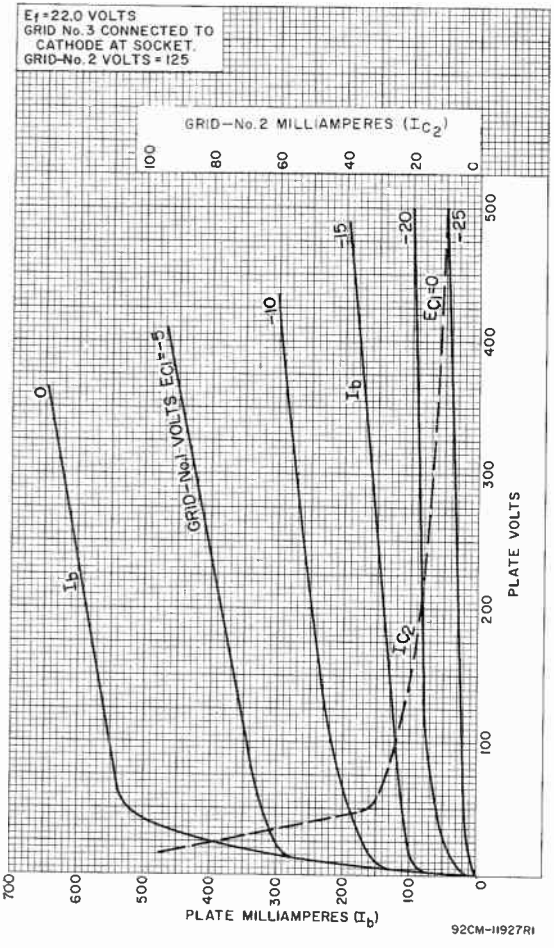
[e] In horizontal-deflection-amplifier service, a positive voltage may be applied to grid No.3 to reduce interference from "snivets" which may occur in both vhf and uhf television receivers. A typical value for this voltage is 50 volts.

[f] An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

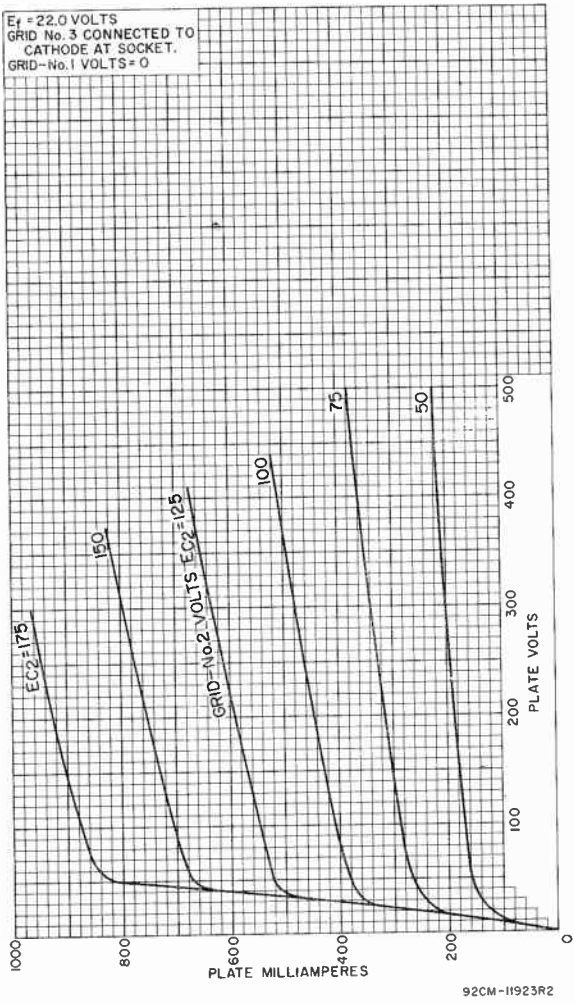
RADIO CORPORATION OF AMERICA
Electronic Components and Devices Harrison, N. J.

World Radio History

Average Characteristics



Average Characteristics



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

Beam Power Tube

NOVAR TYPE

For Horizontal-Deflection-Amplifier Service in Low-B+ TV Receivers

GENERAL DATA

Electrical:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	22.0	volts
Warm-up time (Average)	11	sec
Peak heater-cathode voltage:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200[a] max.	volts
Direct Interelectrode Capacitances (Approx.):[b]		
Grid No.1 to plate	0.7	pf
Grid No.1 to cathode, grid No.3, grid No.2, and heater	22.0	pf
Plate to cathode, grid No.3, grid No.2, and heater	9.0	pf

Characteristics, Class A_1 Amplifier:

	Triode Connection[c]	*Pentode Connection*		
Plate Voltage	125	50	130	volts
Grid No.3	*Connected to cathode at socket*			
Grid-No.2 Voltage	–	125	125	volts
Grid-No.1 Voltage	-20	0	-20	volts
Amplification Factor	4.1	–	–	
Plate Resistance (Approx.)	–	–	12000	ohms
Transconductance	–	–	10000	μmhos
Plate Current	–	525[d]	80	ma
Grid-No.2 Current	–	32[d]	2.5	ma
Grid-No.1 Voltage (Approx.) for plate ma. = 1	–	–	-40	volts

Mechanical:

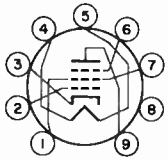
Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	3.410"
Maximum Seated Length	3.030"
Length, Base Seat to Bulb Top (Excluding tip)	2.510" to 2.690"
Diameter	1.438" to 1.562"
Bulb	T12
Socket	Cinch Mfg. Co. No.149 19 00 033, Industrial Electronic Hardware Corp. No.SO-0968-SL1, or equivalent

World Radio History

22JG6

Base. . . . . Large-Button Novar 9-Pin (JEDEC No. E9-76)
Basing Designation for BOTTOM VIEW. 9QU

Pin 1 -Grid No.2
Pin 2 -Grid No.1
Pin 3 -Cathode
Pin 4 -Heater
Pin 5 -Heater



Pin 6 -Grid No.3
Pin 7 -Grid No.2
Pin 8 -Do Not Use
Pin 9 -Plate

HORIZONTAL-DEFLECTION AMPLIFIER

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[e]

DC PLATE SUPPLY VOLTAGE	770 max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE[f]. . .	6500 max.	volts
PEAK NEGATIVE-PULSE PLATE VOLTAGE . . .	1500 max.	volts
DC GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE (See *Operating Considerations*). . . .	75 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE. . .	220 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE: Negative-bias value	55 max.	volts
PEAK NEGATIVE-PULSE GRID-No.1 VOLTAGE .	330 max.	volts
CATHODE CURRENT:		
Peak	950 max.	ma
Average	275 max.	ma
GRID-No.2 INPUT	3.5 max.	watts
PLATE DISSIPATION[g].	17 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface).	220 max.	°C

Maximum Circuit Values:

Grid-No.1-Circuit Resistance: For grid-No.1-resistor-bias operation	2.2 max.	megohms

[a] The dc component must not exceed 100 volts.

[b] Without external shield.

[c] With grid No.2 connected to plate at socket.

[d] This value can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

[e] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

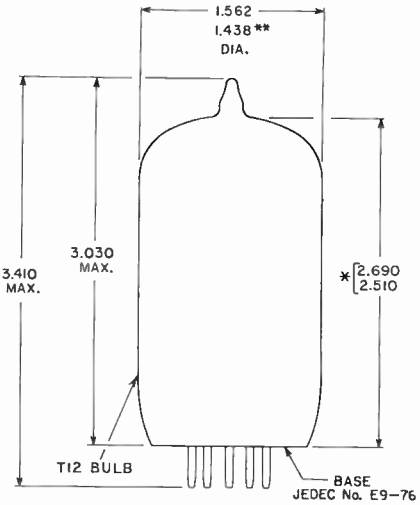
[f] This rating is applicable where the duration of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system 15 per cent of one horizontal scanning cycle is 10 microseconds.

[g] An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

World Radio History

OPERATING CONSIDERATIONS

In *Horizontal-Deflection-Amplifier Service*, a positive voltage may be applied to grid No.3 to reduce interference from "snivets" which may occur in both vhf and uhf television receivers. A typical value for this voltage is 30 volts.



92CS-11227R3

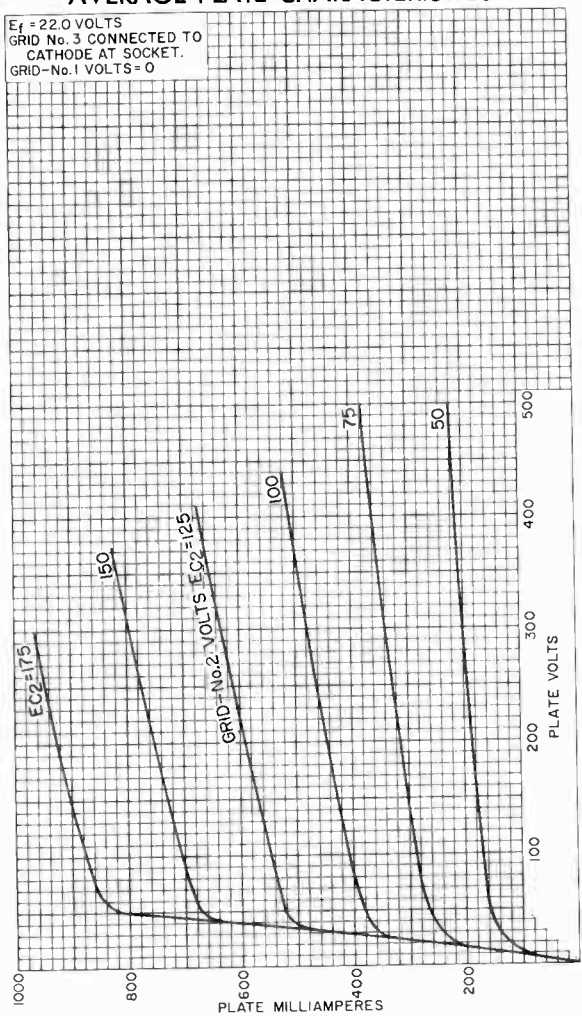
ALL DIMENSIONS IN INCHES.

** APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.
* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.600" INSIDE DIAMETER.

World Radio History

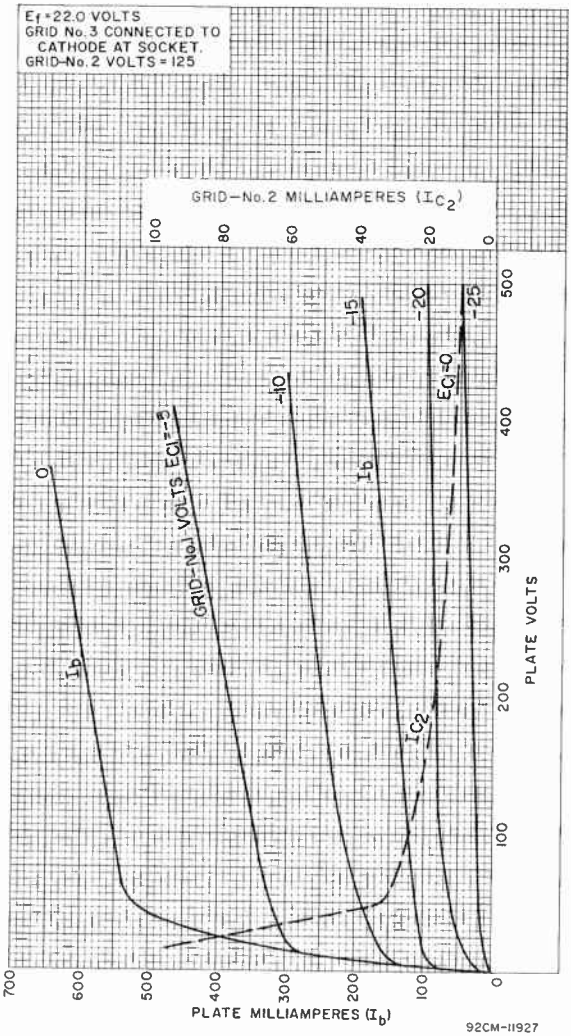
22JG6

AVERAGE PLATE CHARACTERISTICS



92CM-11923

AVERAGE CHARACTERISTICS



World Radio History

22JG6A

Beam Power Tube

NOVAR TYPE

The 22JG6A is the same as the 6JG6A except for the following items:

Heater Characteristics and Ratings:		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	22.0	volts
Warm-up time (Average)	11	sec

World Radio History

World Radio History

Beam Power Tube

NOVAR TYPE
SEPARATE GRID-No.3 BASE-PIN TERMINAL FOR "SNIVETS" CONTROL[h]

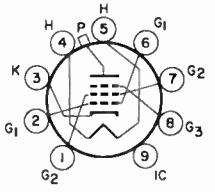
For Horizontal-Deflection-Amplifier Service
in Low-B+, Black-and-White TV Receivers

Electrical:

Heater Characteristics and Ratings:
Current . . . . . 1.45 ± 0.1 amp
Voltage (AC or DC) at heater
current = 1.45A . . . . . 25.2 volts
Warm-up time (Average) . . . . . 11 sec
Peak heater-cathode voltage:
Heater negative with
respect to cathode . . . . . 200 max. volts
Heater positive with
respect to cathode . . . . . 200[a] max. volts
Direct Interelectrode Capacitances
(Approx.)[b]:
Grid No.1 to plate . . . . . 1.2 pf
Input: G1 to (K,G3,G2,H) . . . . . 22.0 pf
Output: P to (K,G3,G2,H) . . . . . 9.0 pf

Mechanical:

Operating Position . . . . . Any
Type of Cathode . . . . . Coated Unipotential
Maximum Overall Length . . . . . 3.550"
Seated Length . . . . . 3.406" to 3.472"
Diameter . . . . . 1.438" to 1.500"
Bulb T12
Cap . . . . . Skirted Miniature (JEDEC No.C2-0 or C1-3)
Socket . . . . . Novar
Bases (Alternates):
Large-Button Novar 9-Pin (JEDEC No.E9-76)
Large-Button Novar 9-Pin with Exhaust Tip (JEDEC No.E9-88)
Basing Designation for BOTTOM VIEW 9DL
Pin 1 - Grid No.2
Pin 2 - Grid No.1
Pin 3 - Cathode
Pin 4 - Heater
Pin 5 - Heater
Pin 6 - Grid No.1
Pin 7 - Grid No.2
Pin 8 - Grid No.3
Pin 9 - Do Not Use
Cap - Plate



Characteristics:

				Triode Connection[c]	
Plate Voltage	–	50	130	125	volts
Peak Positive-Pulse Plate Voltage[d]	6000	–	–	–	volts

World Radio History

			Triode Connection[c]		
Grid No.3	Connected to cathode at socket				
Grid-No.2 Voltage	125	125	125	125	volts
Grid-No.1 Voltage	–	0	-20	-20	volts
Amplification Factor	–	–	–	4.7	
Plate Resistance (Approx.)[d]	–	–	18000	–	ohms
Transconductance	–	–	7000	–	μmhos
Plate Current	–	44[e]	45	–	ma
Grid-No.2 Current	–	3[e]	1.5	–	ma
Grid-No.1 Voltage (Approx.) for plate ma. = 1.	-75	–	-32	–	volts

HORIZONTAL-DEFLECTION AMPLIFIER

Maximum Ratings, *Design-Maximum Values:*

For operation in a 525-line, 30-frame system[f]

DC Plate Supply Voltage	770 max.	volts
Peak Positive-Pulse Plate Voltage[g]	6500 max.	volts
Peak Negative-Pulse Plate Voltage	1500 max.	volts
DC Grid-No.3 Voltage[h]	75 max.	volts
DC Grid-No.2 (Screen-Grid) Voltage	220 max.	volts
DC Grid-No.1 (Control-Grid) Voltage:		
Negative-bias value	55 max.	volts
Peak Negative-Pulse Grid-No.1 Voltage	330 max.	volts
Cathode Current:		
Peak	950 max.	ma
Average	275 max.	ma
Grid-No.2 Input	3.5 max.	watts
Plate Dissipation[j]	17 max.	watts
Bulb Temperature (At hottest point on bulb surface)	220 max.	°C

Maximum Circuit Values:

Grid-No.1 Circuit Resistance:		
For grid-No.1-resistor-bias operation[j]	0.47 max.	megohm
For plate-pulsed operation (Horizontal-deflection circuits only)	10 max.	megohms

[a] The dc component must not exceed 100 volts.

[b] Without external shield.

[c] With grid No.2 connected to plate at socket.

[d] Under conditions shown in footnote[g].

[e] This value can be measured by a method involving a recurrent waveform such that the maximum ratings of the tube will not be exceeded.

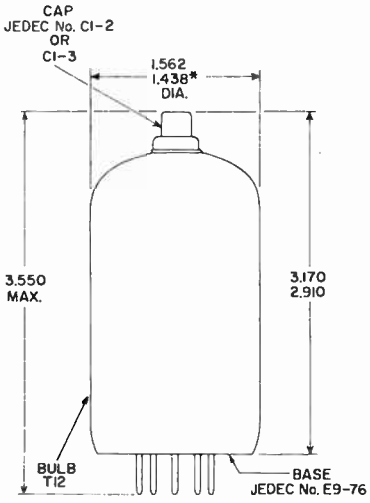
[f] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

[g] 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.

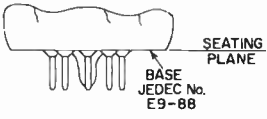
[h] In horizontal-deflection-amplifier service, a positive voltage may be applied to grid No.3 to reduce interference from "snivets" which may occur in both vhf and uhf television receivers. A typical value for this voltage is 30 volts.

[j] An adequate bias resistor or other means is required to protect the tube in the absence of excitation.

World Radio History



Alternative Base
Bottom Exhaust



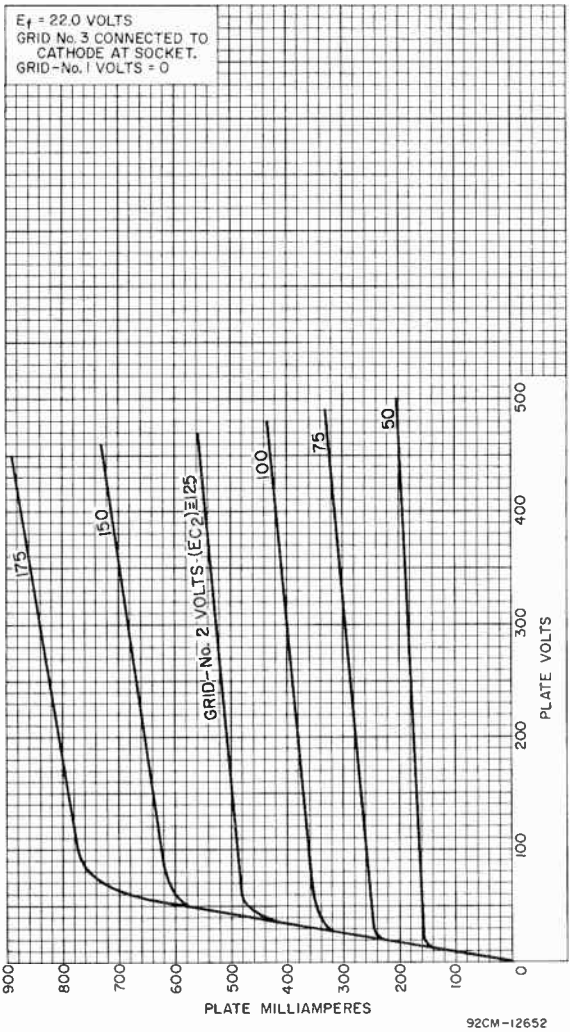
DIMENSIONS IN INCHES

A detailed drawing of the E9-88 base is available from RCA, Commercial Engineering 51-2, Harrison, N.J. 07029.

*Applies to the minimum diameter except in the area of the seal.

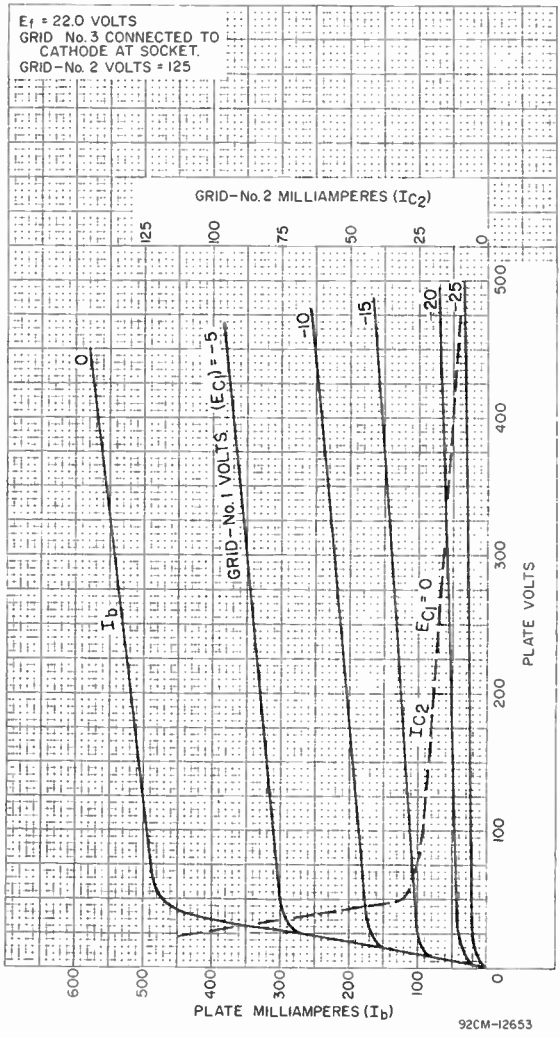
World Radio History

AVERAGE PLATE CHARACTERISTICS



92CM-12652

AVERAGE CHARACTERISTICS



World Radio History

World Radio History

25AV5-GA
BEAM POWER TUBE

The 25AV5-GA is the same as the 6AV5-GA except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	25	volts
Current	0.3	amp

25AX4-GT
HALF-WAVE VACUUM RECTIFIER

For television damper service

The 25AX4-GT is the same as the 6AX4-GT except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	25	volts
Current	0.3	amp

25BK5
BEAM POWER TUBE

9-PIN MINIATURE TYPE

The 25BK5 is the same as the 6BK5 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	25	volts
Current	0.3	amp

25BQ6-GTB/25CU6
BEAM POWER TUBE

The 25BQ6-GTB/25CU6 is the same as the 6BQ6-GTB/6CU6 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	25	volts
Current	0.3	amp

World Radio History

World Radio History

25C5

BEAM POWER TUBE

7-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	25	ac or dc volts
Current	0.3	amp
Direct interelectrode Capacitances (Approx.)°:		
Grid No.1 to plate	0.6	μμf
Grid No.1 to cathode & grid No.3, grid No.2 and heater	13	μμf
Plate to cathode & grid No.3, grid No.2 and heater	8.5	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Maximum Diameter	3/4"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV

Pin 1 – Cathode, Grid No.3
Pin 2 – Grid No.1
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Grid No.1
Pin 6 – Grid No.2
Pin 7 – Plate

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	135	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	117	max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:			
Positive bias value	0	max.	volts
GRID-No.2 INPUT	1.25	max.	watts
PLATE DISSIPATION	6	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200*	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220	max.	°C

Typical Operation and Characteristics:

Plate Voltage	120	volts
Grid-No.2 Voltage	110	volts
Grid-No.1 Voltage	-8	volts

°,*: see next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

TENTATIVE DATA

World Radio History

25C5

BEAM POWER TUBE

Peak AF Grid-No.1 Voltage	8	volts
Zero-Signal Plate Current	49	ma
Max.-Signal Plate Current	50	ma
Zero-Signal Grid-No.2 Current	4	ma
Max.-Signal Grid-No.2 Current	8.5	ma
Plate Resistance (Approx.)	10000	ohms
Transconductance	7500	μmhos
Load Resistance	2500	ohms
Total Harmonic Distortion	10	%
Max.-Signal Power Output	2.3	watts

Maximum Circuit Values:

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

° without external shield.

* The dc component must not exceed 100 volts.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA

World Radio History

RCA

25C5

AVERAGE CHARACTERISTICS

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

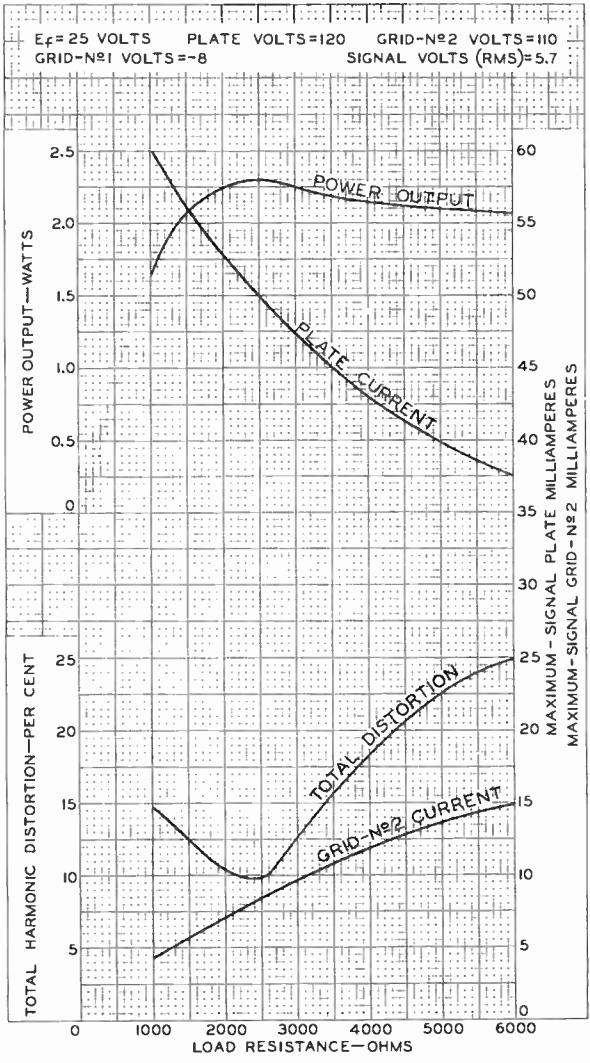
92CM-8908R2

World Radio History

RCA

25C5

OPERATION CHARACTERISTICS



ELECTRON TUBE DIVISION 92CM-8918RI
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

25CD6-GB

BEAM POWER TUBE

Intended for use in equipment having series heater-string arrangement

The 25CD6-GB is the same as the 6CD6-GA except for the following items:

Heater, for Unipotential Cathode:

Voltage	25	ac or dc volts
Current	0.6	amp
Warm-up time (Average)	11	sec

For definition of heater warm-up time and method of determining it, see sheet HEATER WARM-UP TIME MEASUREMENT at front of this Section.

World Radio History

World Radio History

25EH5

POWER PENTODE

7-PIN MINIATURE TYPE

The 25EH5 is the same as the 6EH5 except for the following items:

Heater, for Unipotential Cathode:		
Voltage	25	ac or dc volts
Current	0.3	amp

World Radio History

32ET5

POWER PENTODE

7-PIN MINIATURE TYPE

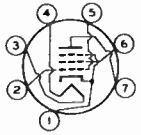
GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	32 ± 10%	volts
Current	0.1	amp
Direct Interelectrode Capacitances (Approx.):[o]		
Grid No.1 to plate	0.6	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	12	μμf
Plate to cathode & grid No.3, grid No.2, and heater	6	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV



Pin 1 – Cathode, Grid No.3
Pin 2 – Grid No.1
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Grid No.1
Pin 6 – Grid No.2
Pin 7 – Plate

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	130	max.	volts
GRID-No.2 INPUT	1.2	max.	watts
PLATE DISSIPATION	5.4	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200▲	max.	volts

Typical Operation and Characteristics:

Plate Voltage	110	volts
Grid-No.2 Voltage	110	volts
Grid-No.1 Voltage	-7.5	volts
Peak AF Grid-No.1 Voltage	7.5	volts
Zero-Signal Plate Current	30	ma
Zero-Signal Grid-No.2 Current	2.8	ma
Plate Resistance (Approx.)	21500	ohms
Transconductance	5500	μmhos
Load Resistance	2800	ohms

World Radio History

32ET5

POWER PENTODE

Total Harmonic Distortion	10		%
Max.-Signal Power Output	1.2		watts

Maximum Circuit Values:

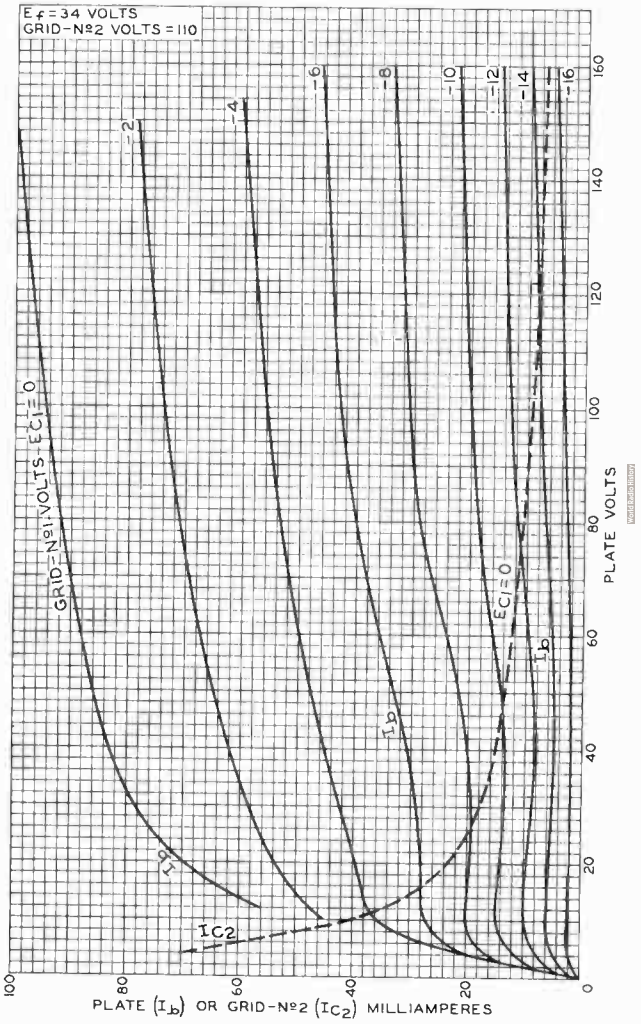
Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.1	max.	megohm
For cathode-bias operation	0.5	max.	megohm

[o] without external shield.

▲ The dc component must not exceed 100 volts.

World Radio History

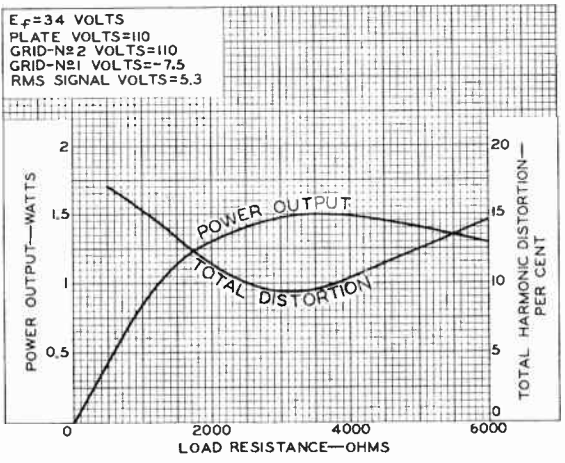
AVERAGE CHARACTERISTICS



92CM-10779

34GD5

OPERATION CHARACTERISTICS



92CS-10780

World Radio History

34GD5A

Beam Power Tube

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

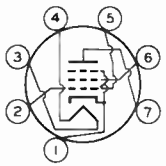
GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	34	volts
Current	0.1 ± 6%	amp
Warm-up time (Average)	20	sec
Direct Interelectrode Capacitances (Approx.):[a]		
Grid No.1 to plate	0.6	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	12	μμf
Plate to cathode & grid No.3, grid No.2, and heater	6	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV



Pin 1 - Cathode, Grid No.3
Pin 2 - Grid No.1
Pin 3 - Heater

Pin 4 - Heater
Pin 5 - Grid No.1
Pin 6 - Grid No.2
Pin 7 - Plate

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	130	max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:			
Negative-bias value	50	max.	volts
Positive-bias value	0	max.	volts
GRID-No.2 INPUT	1.1	max.	watts
PLATE DISSIPATION	5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[b]	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250	max.	°C

World Radio History

34GD5A

Typical Operation and Characteristics:

Plate Voltage	110	volts
Grid-No.2 Voltage	110	volts
Grid-No.1 Voltage	-7.5	volts
Peak AF Grid-No.1 Voltage	7.5	volts
Zero-Signal Plate Current	35	ma
Zero-Signal Grid-No.2 Current	3	ma
Plate Resistance (Approx.)	13000	ohms
Transconductance	5700	μmhos
Load Resistance	2500	ohms
Total Harmonic Distortion	10	%
Max.-Signal Power Output	1.4	watts

Maximum Circuit Values:

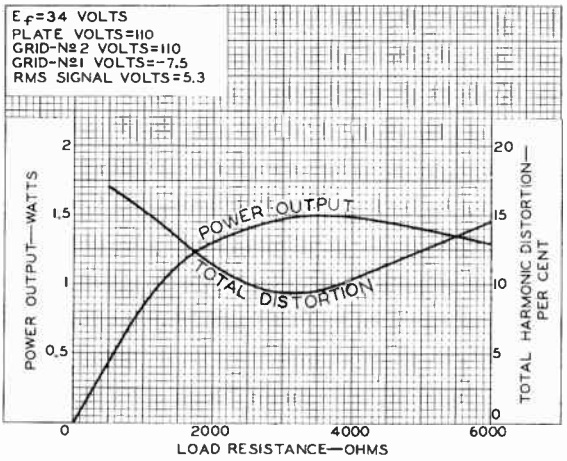
Grid-No.1-Circuit Resistance:

For fixed-bias operation	0.1 max.	megohm
For cathode-bias operation	0.5 max.	megohm

[a] Without external shield.

[b] The dc component must not exceed 100 volts.

OPERATION CHARACTERISTICS



92CS-10780

World Radio History

AVERAGE CHARACTERISTICS

92CM-10779

World Radio History

Beam Power Tube

7-PIN MINIATURE TYPE

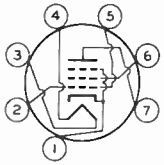
GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	35 ± 10%	volts ←
Current at 35 volts	0.15	amp
Direct Interelectrode Capacitances (Approx.):[a]		
Grid No.1 to plate	0.6	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	12	μμf
Plate to cathode & grid No.3, grid No.2, and heater	9	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV



Pin 1 – Cathode, Grid No.3
Pin 2 – Grid No.2
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Grid No.1
Pin 6 – Grid No.2
Pin 7 – Plate

AF POWER AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:* ←

PLATE VOLTAGE	150	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	130	max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:			
Positive-bias value	0	max.	volts
GRID-No.2 INPUT	1.1	max.	watts
PLATE DISSIPATION	5.2	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[b]	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250	max.	°C

←Indicates a change.

World Radio History

35C5

Typical Operation and Characteristics:

Plate Voltage	110	volts
Grid-No.2 Voltage	110	volts
Grid-No.1 (Control-Grid) Voltage	-7.5	volts
Peak AF Grid-No.1 Voltage	7.5	volts
Zero-Signal Plate Current	40	ma
Max.-Signal Plate Current	41	ma
Zero-Signal Grid-No.2 Current	3	ma
Max.-Signal Grid-No.2 Current	7	ma
Plate Resistance (Approx.)	13000	ohms
Transconductance	5800	μmhos
Load Resistance	2500	ohms
Total Harmonic Distortion	10	%
Max.-Signal Power Output	1.5	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

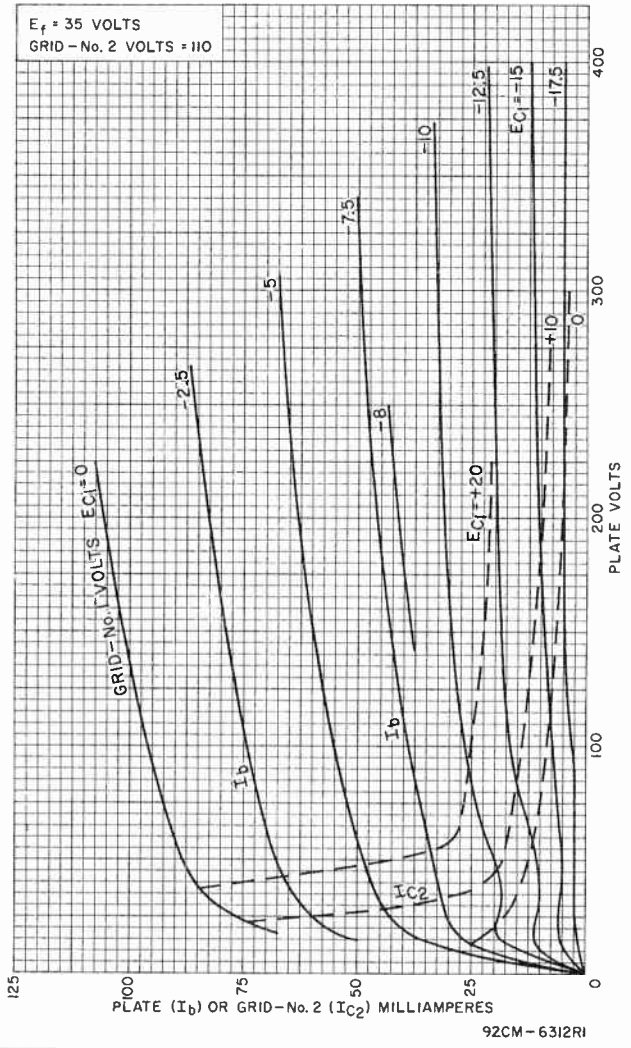
For fixed-bias operation	0.1 max.	megohm
For cathode-bias operation	0.5 max.	megohm

[a] Without external shield.

[b] The dc component must not exceed 100 volts.

World Radio History

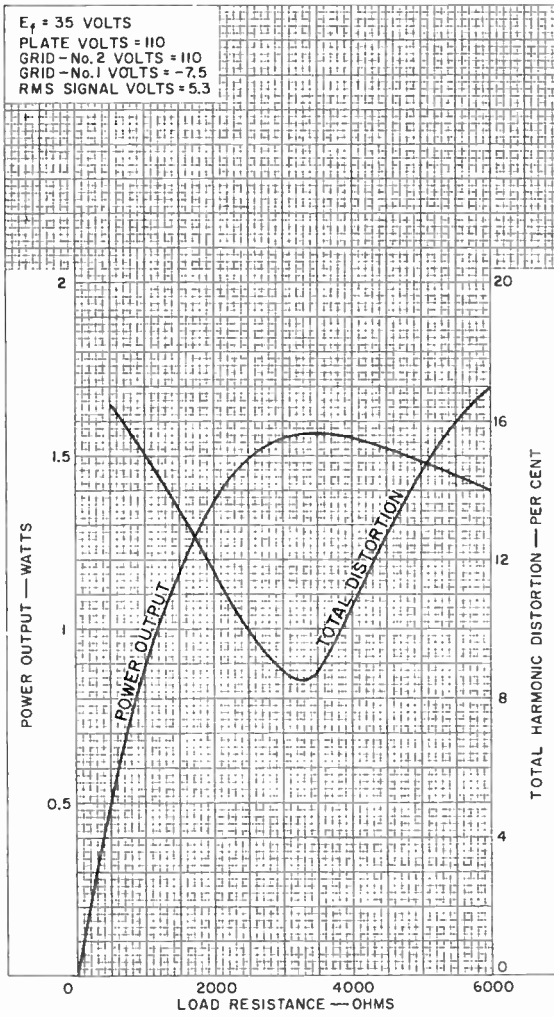
AVERAGE CHARACTERISTICS



92CM – 6312R1

World Radio History

OPERATION CHARACTERISTICS



92CM-6794

World Radio History

Power Pentode

7-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	35 ± 10%	volts
Current at 35 volts	0.15	amp
Direct Interelectrode Capacitances (Approx.):▲		
Grid No.1 to plate	0.65	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	17	μμf
Plate to cathode & grid No.3, grid No.2, and heater	9	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV

Pin 1 – Cathode, Grid No.3
Pin 2 – Grid No.1
Pin 3 – Heater

Pin 4 – Heater
Pin 5 – Grid No.1
Pin 6 – Grid No.2
Pin 7 – Plate

AF POWER AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	130	max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:			
Positive-bias value	0	max.	volts
GRID-No.2 INPUT	1.75	max.	watts
PLATE DISSIPATION	5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200●	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	225	max.	°C

World Radio History

35EH5

Typical Operation and Characteristics:

Plate Supply Voltage	110	volts
Grid-No.2 Supply Voltage	115	volts
Cathode Resistor	62	ohms
Peak AF Grid-No.1 Voltage	3	volts
Zero-Signal Plate Current	32	ma
Max.-Signal Plate Current	32	ma
Zero-Signal Grid-No.2 Current	7.2	ma
Max.-Signal Grid-No.2 Current	12	ma
Plate Resistance (Approx.)	14000	ohms
Transconductance	12000	μmhos
Load Resistance	3000	ohms
Total Harmonic Distortion	8	%
Max.-Signal Power Output	1.2	watts

Maximum Circuit Values:

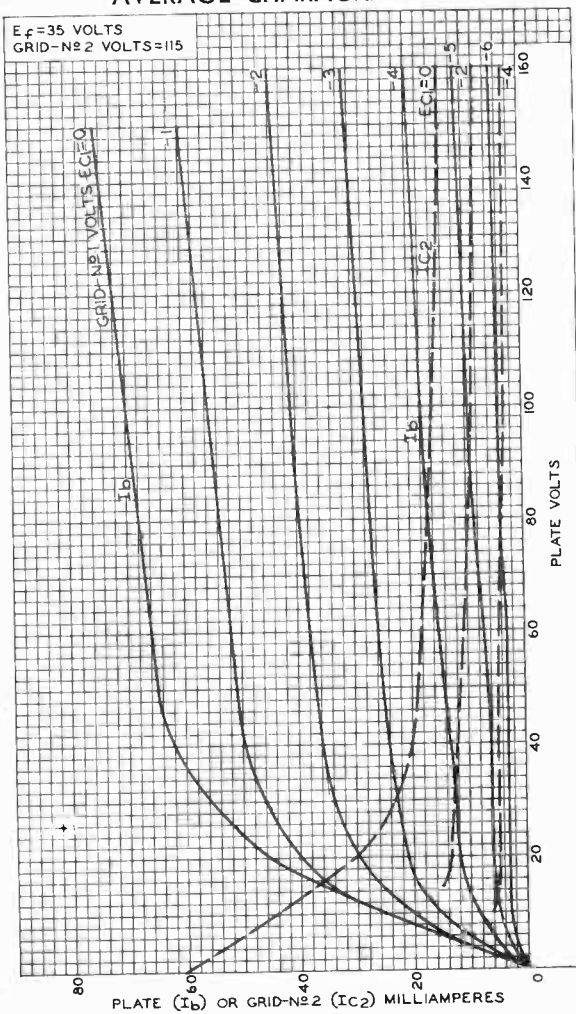
Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.1 max.	megohm
For cathode-bias operation	0.5 max.	megohm

▲ Without external shield.

● The dc component must not exceed 100 volts.

Mould Radio History

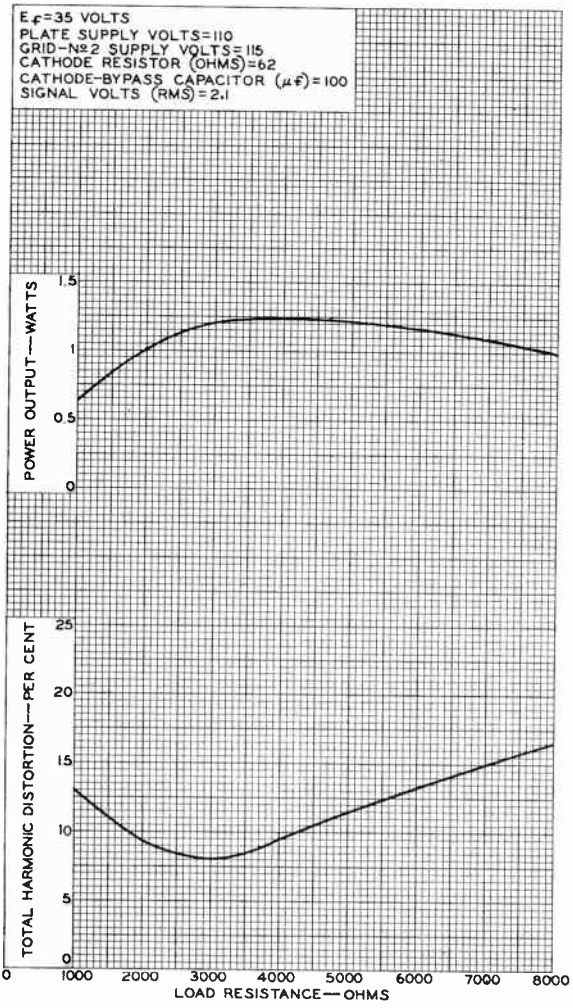
AVERAGE CHARACTERISTICS



92CM-10551

35EH5

OPERATION CHARACTERISTICS



92CM-10547

35L6-GT
BEAM POWER AMPLIFIER

GENERAL DATA

Electrical:

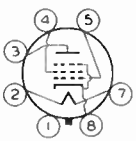
Heater, for Unipotential Cathode:		
Voltage	35	ac or dc volts
Current	0.15	amp
Direct Interelectrode Capacitances (Approx.):[o]		
Grid No.1 to Plate	0.8	μμf
Input	13	μμf
Output	9.5	μμf

[o] With no external shield.

Mechanical:

Mounting Position	Any
Maximum Overall Length	3-5/16"
Maximum Seated Length	2-3/4"
Maximum Diameter	1-5/16"
Bulb	T-9
Base	Intermediate-Shell Octal 7-Pin
Basing Designation for BOTTOM VIEW	G-7AC

Pin 1 - No Connection
Pin 2 - Heater
Pin 3 - Plate
Pin 4 - Grid No.2



Pin 5 - Grid No.1
Pin 7 - Heater
Pin 8 - Cathode, Grid No.3

AF POWER AMPLIFIER - Class A_1

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	200 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	117 max.	volts
PLATE DISSIPATION	8.5 max.	watts
GRID-No.2 DISSIPATION	1.0 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical Operation and Characteristics:

Plate Voltage	110	200	volts
Grid-No.2 Voltage	110	110	volts
Grid-No.1 (Control-Grid) Voltage	-7.5	-8	volts
Peak AF Grid-No.1 Voltage	7.5	8	volts
Zero-Signal Plate Current	40	41	ma.
Max.-Signal Plate Current	41	44	ma.
Zero-Signal Grid-No.2 Current	3	2	ma.
Max.-Signal Grid-No.2 Current	7	7	ma.
Plate Resistance (Approx.)	14000	40000	ohms
Transconductance	5800	5900	μmhos
Load Resistance	2500	4500	ohms
Total Harmonic Distortion	10	10	%
Max.-Sig. Power Output	1.5	3.3	watts

World Radio History

35L6-GT
BEAM POWER AMPLIFIER

Maximum Circuit Values (for maximum rated conditions):

Grid-No.1-Circuit Resistance:

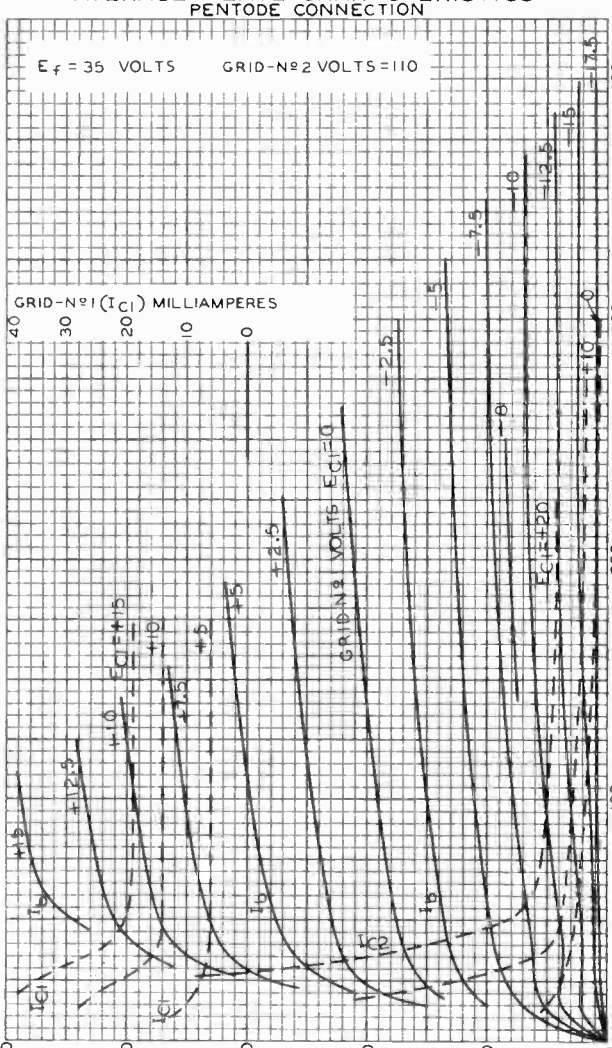
For fixed bias	0.1	. . megohm
For cathode bias	0.5	. . megohm

Curves shown under Type 35B5 are also applicable to the 35L6-GT.

World Radio History

35L6-GT

AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION



AUG. 11, 1941

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

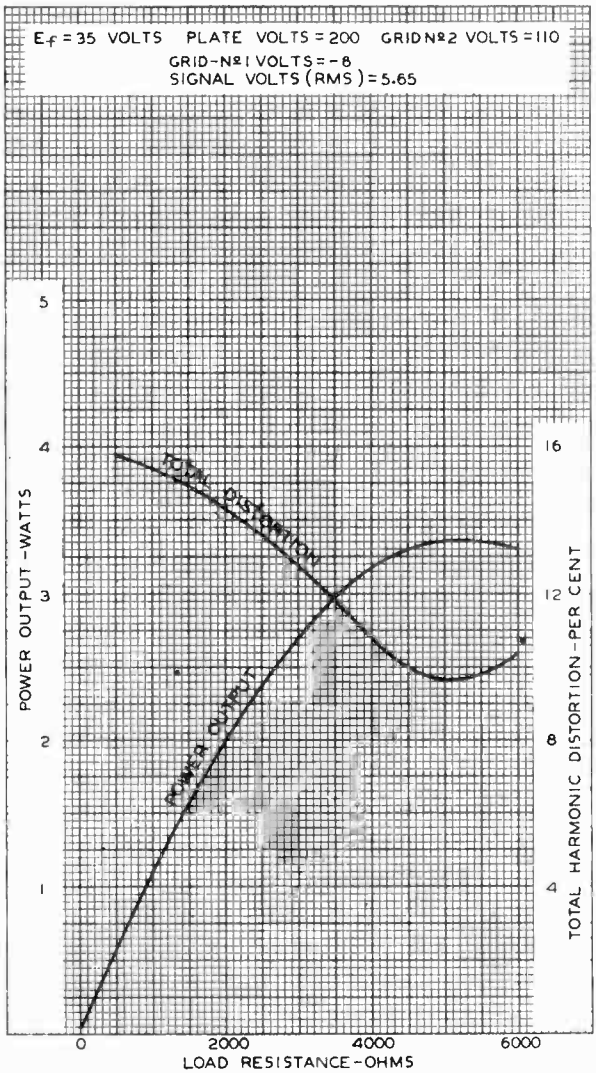
92CM-6309

World Radio History

RCA

35L6-GT

OPERATION CHARACTERISTICS

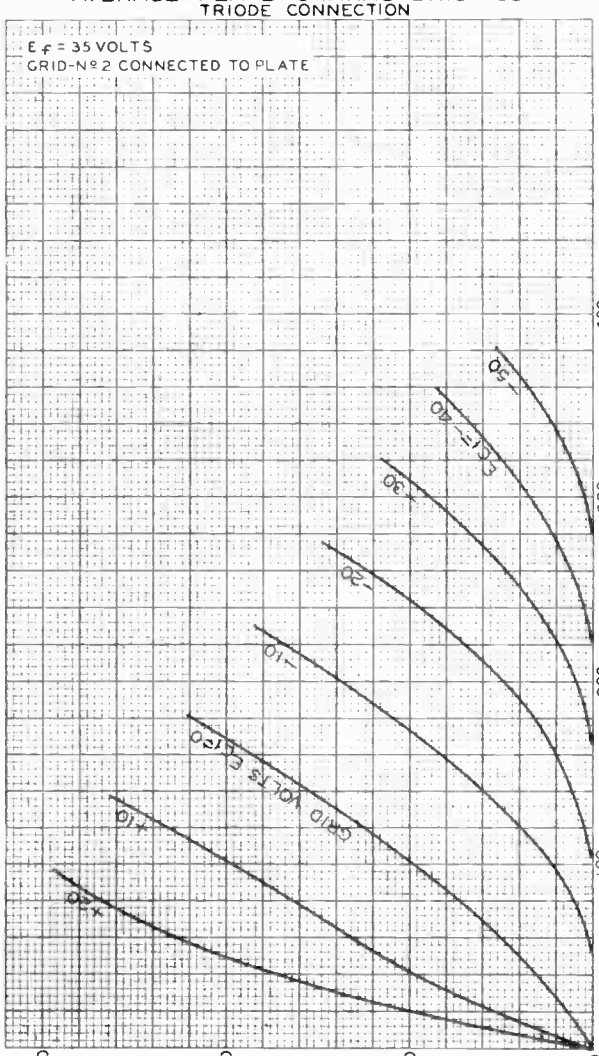


AUG. 21, 1941

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6315

35L6-GT
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION



AUG. 6, 1941
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
92CM-6307RI

World Radio History

World Radio History

Half-Wave Vacuum Rectifier

7-PIN MINIATURE TYPE
With Heater Having Controlled Warm-Up Time

GENERAL DATA

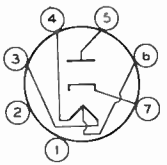
Electrical:

Heater[a], for Unipotential Cathode:

Voltage (AC or DC):		
Entire heater (Pins 3 and 4)	36	volts
Tap-section (Pins 3 and 6)	32	volts
Current:		
Tap-section (Pins 3 and 6)	0.1 ± 6%	amp
Warm-up time (Average)	20	sec

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small Button Miniature 7-Pin (JEDEC No. E7-1)
Basing Designation for BOTTOM VIEW	5BQ



Pin 1 - No Connection
Pin 2 - No Connection
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Heater Tap
Pin 7 - Cathode

HALF-WAVE RECTIFIER

Maximum Ratings, *Design-Maximum Values:*

PEAK INVERSE PLATE VOLTAGE	365	max.	volts
PEAK PLATE CURRENT	530	max.	ma
DC OUTPUT CURRENT	82	max.	ma
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	350[b]	max.	volts
Heater positive with respect to cathode	200[c]	max.	volts

Typical Operation:

In accompanying typical half-wave circuit with capacitor-input filter

AC Plate Supply Voltage (RMS)	120	volts
Filter-Input Capacitor	40	μf
Total Effective Plate Supply Resistance	a	
DC Output Current	75	ma
DC Output Voltage at Input to Filter (Approx.)	118	volts

World Radio History

36AM3B

Characteristics:

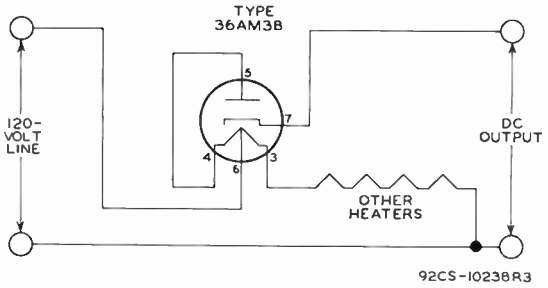
Tube-Voltage Drop for plate ma. = 150 . . . . 16 volts

[a] The *heater* of the 36AM3B is designed so that the heater section between pins 4 and 6 is used as a limiting resistance in the rectifier plate circuit (See accompanying *Typical Half-Wave Circuit*). This type is not designed for use with a panel lamp where the heater section between pins 4 and 6 is used as a panel-lamp shunt.

[b] The DC component must not exceed 350 volts.

[c] The DC component must not exceed 100 volts.

TYPICAL HALF-WAVE CIRCUIT



92CS-10238R3

World Radio History

50B5

BEAM POWER AMPLIFIER

MINIATURE TYPE

GENERAL DATA

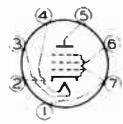
Electrical:

Heater, for Unipotential Cathode:		
Voltage	50	ac or dc volts
Current	0.15	amp.
Direct Interelectrode Capacitances (Approx.):[o]		
Grid-No.1 to Plate	0.5	μμf
Input	13	μμf
Output	6.5	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length from Base Seat to Bulb Top (excluding tip)	2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Miniature Button 7-Pin
Basing Designation for BOTTOM VIEW	7BZ

Pin 1 - Grid No.1
Pin 2 - Cathode, Grid No.3
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Grid No.1



CLASS A_1 AMPLIFIER

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	117 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	117 max.	volts
PLATE DISSIPATION	5.5 max.	watts
GRID-No.2 DISSIPATION	1.25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical Operation and Characteristics:

Plate Voltage	110	volts
Grid-No.2 Voltage	110	volts
Grid-No.1 Voltage	-7.5	volts
Peak A-F Grid-No.1 Voltage	7.5	volts
Zero-Signal Plate Current	49	ma.
Max.-Signal Plate Current	50	ma.

[o] With no external shield.

Mouser Electronics

50B5

BEAM POWER AMPLIFIER

Zero-Signal Grid-No.2 Current (Approx.)	4	ma.
Max.-Signal Grid-No.2 Current (Approx.)	8.5	ma.
Plate Resistance (Approx.)	14000	ohms
Transconductance	7500	μmhos
Load Resistance	2500	ohms
Total Harmonic Distortion	9	%
Max.-Sig. Power Output	1.9	watts

Maximum Circuit Values (for maximum rated conditions):

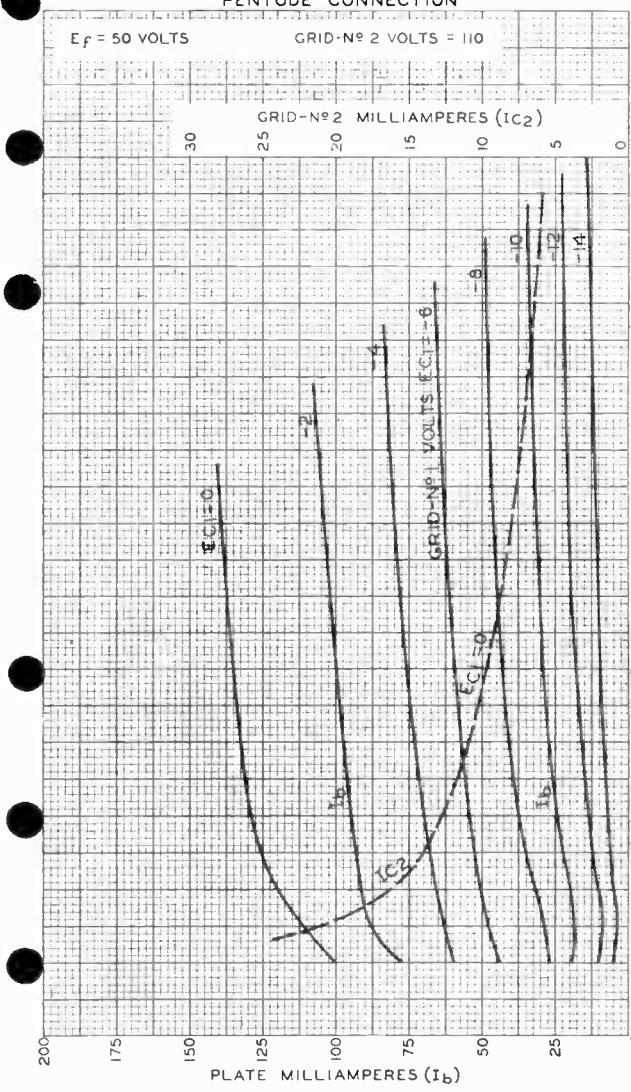
Grid-No.1-Circuit Res.	fixed bias	0.1	megohm
	cathode bias	0.5	megohm

World Radio History

50B5

AVERAGE PLATE CHARACTERISTICS

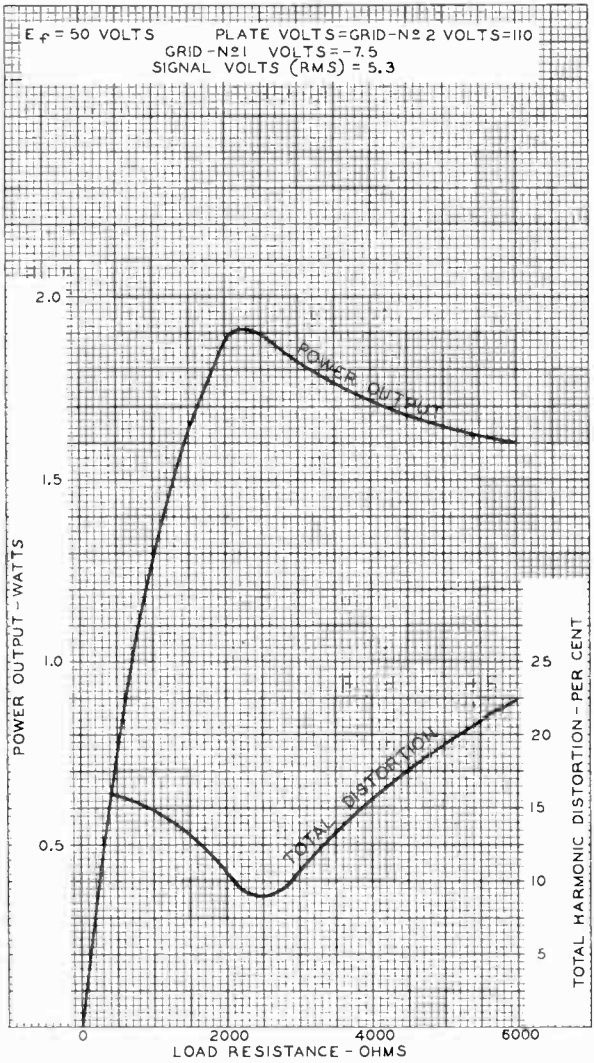
PENTODE CONNECTION



WorldRadioHistory

50B5

OPERATION CHARACTERISTICS
PENTODE CONNECTION



WorldRadioHistory

50C5

BEAM POWER TUBE

7-PIN MINIATURE TYPE

GENERAL DATA

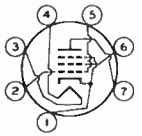
Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	50 + 10%	volts
Current	0.15	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to plate	0.6	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	13	μμf
Plate to cathode & grid No.3, grid No.2, and heater	8.5	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV

Pin 1 - Cathode, Grid No.3
Pin 2 - Grid No.1
Pin 3 - Heater



Pin 4 - Heater
Pin 5 - Grid No.1
Pin 6 - Grid No.2
Pin 7 - Plate

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	130	max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE	0	max.	volts
GRID-No.2 INPUT	1.4	max.	watts
PLATE DISSIPATION	7	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200▲	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220	max.	°C

→ Indicates a change.

World Radio History

50C5

BEAM POWER TUBE

Typical Operation and Characteristics:

Plate Voltage	120	volts
Grid-No.2 Voltage	110	volts
Grid-No.1 Voltage	-8	volts
Peak AF Grid-No.1 Voltage	8	volts
Zero-Signal Plate Current	49	ma
Max.-Signal Plate Current	50	ma
Zero-Signal Grid-No.2 Current	4	ma
Max.-Signal Grid-No.2 Current	8.5	ma
Plate Resistance (Approx.)	10000	ohms
Transconductance	7500	μmhos
Load Resistance	2500	ohms
Total Harmonic Distortion	10	%
Max.-Signal Power Output	2.3	watts

Maximum Circuit Values:

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

o Without external shield.

▲ The dc component must not exceed 100 volts.

NOTE: Except for a different basing arrangement, which simplifies the problem of meeting Underwriters' Laboratories requirements in the design of ac/dc receivers, the 50C5 is similar to the miniature type 50B5.

→indicates a change.

World Radio History

50C5

RCA

50C5

AVERAGE CHARACTERISTICS

Ef=50 VOLTS
GRID-№2 VOLTS=110

GRID-№2 MILLIAMPERES (I_{C_2})

PLATE VOLTS

PLATE MILLIAMPERES (I_b)

GRID-№1 VOLTS Ec1=-6

Ec1=0

-2
-4
-8
-10
-12
-14

I_{C_2}

I_b

I_c

92CM-6603

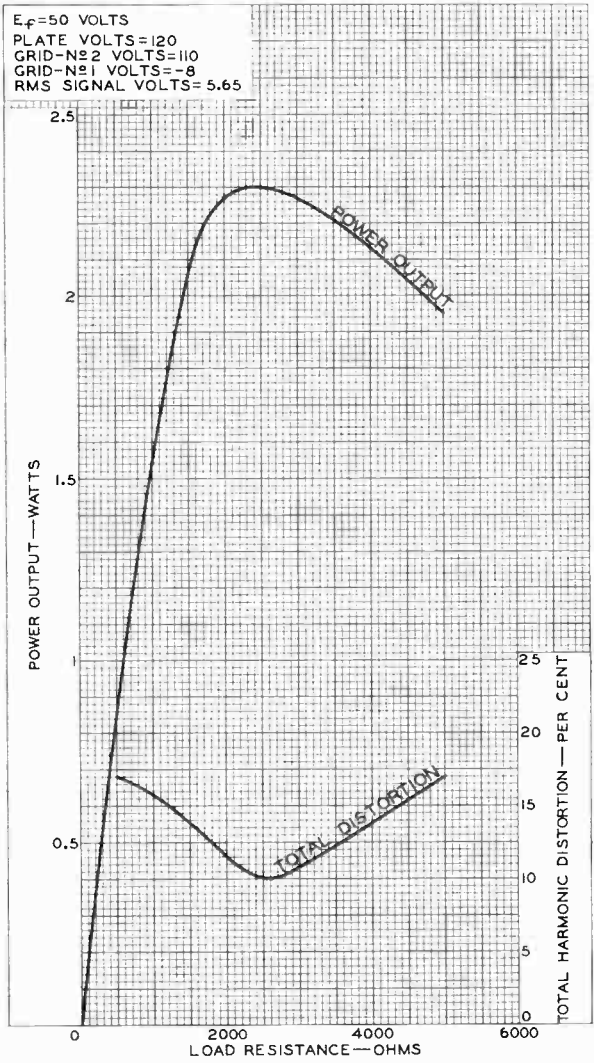
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

50C5

OPERATION CHARACTERISTICS



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6612R1

World Radio History

50C6-G

BEAM POWER AMPLIFIER

GENERAL DATA

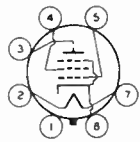
Electrical:

Heater, for Unipotential Cathode:		
Voltage	50	ac or dc volts
Current	0.15	amp

Mechanical:

Mounting Position	Any
Maximum Overall Length	4-5/8"
Seated Length	3-7/8" + 3/16" - 5/16"
Maximum Diameter	1-13/16"
Bulb	ST-14
Base	Medium-Shell Octal 7-Pin
Basing Designation for BOTTOM VIEW	G-7AC

Pin 1 - No Connection
Pin 2 - Heater
Pin 3 - Plate
Pin 4 - Grid No.2



Pin 5 - Grid No.1
Pin 7 - Heater
Pin 8 - Cathode, Grid No.3

AF POWER AMPLIFIER - Class A_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	200 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	135 max.	volts
PLATE DISSIPATION	12.5 max.	watts
GRID-No.2 INPUT	1.75 max.	watts

Typical Operation and Characteristics:

Plate Voltage	135	200	volts
Grid-No.2 Voltage	135	135	volts
Grid-No.1 (Control-Grid) Voltage	-13.5	-14	volts
Peak AF Grid-No.1 Voltage	13.5	14	volts
Zero-Signal Plate Current	58	61	ma
Max.-Signal Plate Current	60	66	ma
Zero-Signal Grid-No.2 Current	3.5	2.2	ma
Max.-Signal Grid-No.2 Current	11.5	9.0	ma
Plate Resistance (Approx.)	9300	18300	ohms
Transconductance	7000	7100	μmhos
Load Resistance	2000	2600	ohms
Total Harmonic Distortion	10	10	%
Max.-Signal Power Output	3.6	6.0	watts

Curves shown under Type 6Y6-G also apply to the 50C6-G.

World Radio History

World Radio History

50DC4

HALF-WAVE VACUUM RECTIFIER

7-PIN MINIATURE TYPE

GENERAL DATA

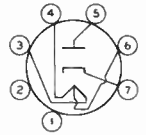
Electrical:

	Without Panel Lamp	*With No.40 or No.47 Panel Lamp*	
Heater, for Unipotential Cathode:			
Voltage:			
Entire heater (Pins 3 and 4).	50 ± 10%	45 ± 10%	ac or dc volts
Panel-lamp section (Pins 4 and 6) . . .	7.5	5.5	ac or dc volts
Current:			
Between pins 3 and 4. .	0.15	–	amp
Between pins 3 and 6. .	–	0.15	amp

Mechanical:

Operating Position.	Any
Maximum Overall Length.	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip) . . .	2" ± 3/32"
Diameter.	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb.	T5-1/2
Base.	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW.	5BQ

Pin 1 – No Connection
Pin 2 – No Connection
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Plate



Pin 6 – Heater Tap
Pin 7 – Cathode

Panel-lamp heater section is between pins 4 and 6.

HALF-WAVE RECTIFIER

Maximum Ratings, *Design-Maximum Values:*

PEAK INVERSE PLATE VOLTAGE.	330 max.	volts
PEAK PLATE CURRENT.	720 max.	ma
DC OUTPUT CURRENT:		
With panel lamp and no shunting resistor.	70 max.	ma
With panel lamp and shunting resistor†	110 max.	ma
Without panel lamp.	120 max.	ma
PANEL-LAMP-SECTION VOLTAGE (RMS):		
When panel lamp fails	16.5 max.	volts

† Required when the dc output current is greater than 70 milliamperes.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA

World Radio History

50DC4

HALF-WAVE VACUUM RECTIFIER

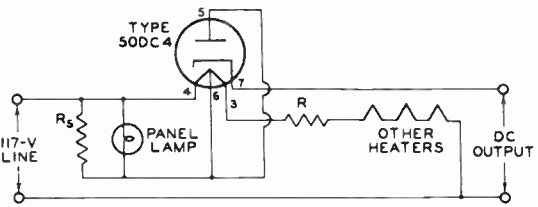
PEAK HEATER-CATHODE VOLTAGE:					
Heater negative with respect to cathode.				330 max.	volts
Heater positive with respect to cathode.				330 max.	volts
Typical Operation:					
With panel lamp in accompanying half-wave circuit with capacitor input to filter					
AC Plate-Supply Voltage (RMS). . .	117	117	117	117	volts
Filter-Input Capacitor	40	40	40	40	μf
Minimum Total Effective Plate-Supply Impedance	15	15	15	15	ohms
Panel-Lamp Shunting Resistor . . .	450	200	100	75	ohms
DC Output Current.	70	80	90	100	ma

Without panel lamp in half-wave circuit with capacitor input to filter

AC Plate-Supply Voltage (RMS).	117	volts
Filter-Input Capacitor	40	μf
Minimum Total Effective Plate-Supply Impedance .	15	ohms
DC Output Current.	110	ma
DC Output Voltage at Input to Filter (Approx.):		
At half-load current of 55 ma.	130	volts
At full-load current of 110 ma..	110	volts
Voltage Regulation (Approx.):		
Half-load to full-load current	20	volts

HALF-WAVE CIRCUIT

With panel lamp No.40 or No.47



DROP ACROSS R AND ALL HEATERS (WITH PANEL LAMP) SHOULD EQUAL 117 VOLTS AT 0.15 AMPERE. R_S = SHUNTING RESISTOR REQUIRED WHEN DC OUTPUT CURRENT EXCEEDS 70 MILLIAMPERES

92CS-9923

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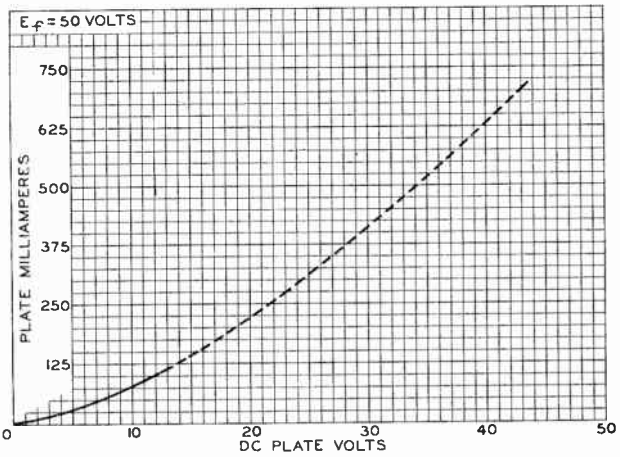
World Radio History

50DC4

AVERAGE PLATE CHARACTERISTIC



92CS-9893

World Radio History

World Radio History

50EH5

Power Pentode

7-PIN MINIATURE TYPE

The 50EH5 is the same as the 6EH5 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	50	volts
Current	0.15	amp

50FE5

Beam Power Tube

For Audio-Output Stages of Low-Cost, Compact Stereophonic Equipment

The 50FE5 is the same as the 6FE5 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	50 ± 10%	volts
Current at 50 volts	0.15	amp
Peak Heater-Cathode Voltage:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200* max.	volts

* The dc component must not exceed 100 volts.

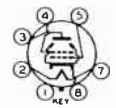
World Radio History

World Radio History

50L6-GT

BEAM POWER AMPLIFIER

Heater ■	Coated Unipotential Cathode	
Voltage	50	a-c or d-c volts
Current	0.15	amp.
Maximum Overall Length		3-5/16"
Maximum Seated Height		2-3/4" ←
Maximum Diameter		1-5/16"
Bulb		T-9
Base	Intermediate Shell Octal 7-Pin	
Pin 1 - No Connection		Pin 5 - Grid
Pin 2 - Heater		Pin 7 - Heater
Pin 3 - Plate		Pin 8 - Cathode
Pin 4 - Screen		
Mounting Position		Any



BOTTOM VIEW (G-7AC)

AMPLIFIER

Plate Voltage		200 max.	volts
Screen Voltage		117 max.	volts
Plate Dissipation		10 max.	watts
Screen Dissipation		1.25 max.	watts
Typical Operation and Characteristics - Class A, Amplifier:			
Plate	110	200	volts
Screen	110	110	volts
Grid *	-7.5	-8	volts
Peak A-F Grid Voltage	7.5	8	volts
Zero-Sig. Plate Cur.	49	50	ma.
Max.-Sig. Plate Cur.	50	55	ma.
Zero-Sig. Screen Cur.	4	2 approx.	ma.
Max.-Sig. Screen Cur.	11	7 approx.	ma.
Plate Resistance	13000	30000 approx.	ohms
Transconductance	9000	9500	μmhos
Load Resistance	2000	3000	ohms
Total Harmonic Dist.	10	10	%
Power Output	2.1	4.3	watts

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

* The type of input coupling should not introduce too much resistance in the grid circuit. Transformer- or impedance-coupling devices are recommended. When the grid circuit has a resistance not higher than 0.1 megohm, fixed bias may be used; for higher values, cathode bias is required. With cathode bias, the grid circuit may have a resistance not to exceed 0.5 megohm.

Curves under Type 25L6-GT also apply to the 50L6-GT.

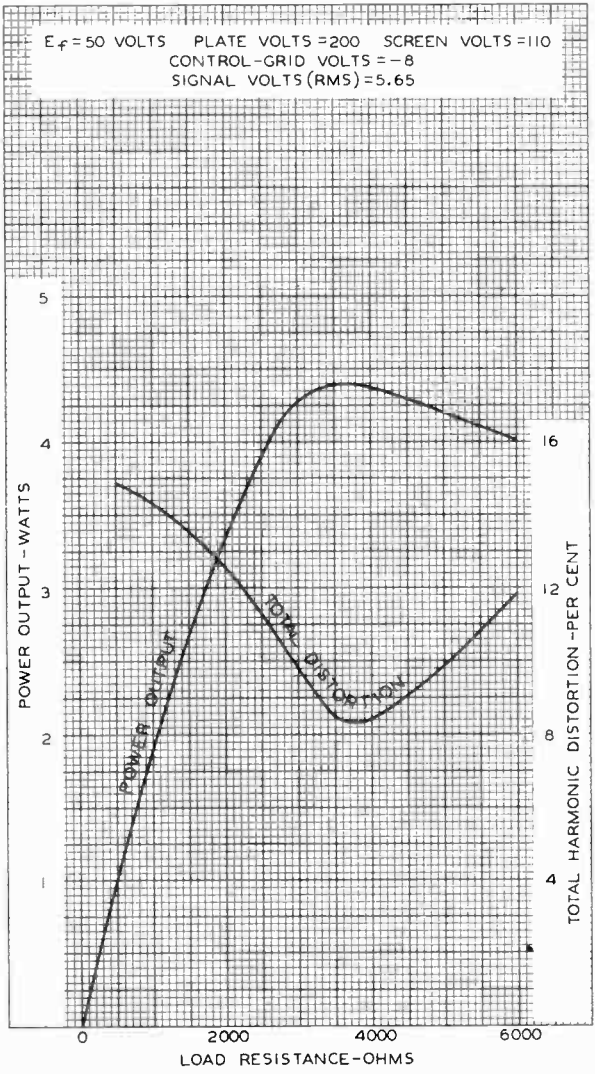
← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

50L6-GT

OPERATION CHARACTERISTICS



World Radio History

RCA

50L6-GT
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION

E_f = 50 VOLTS GRID-№2 VOLTS = 110

GRID-№1 (I_{C1}) OR GRID-№2 (I_{C2}) MILLIAMPERES

PLATE VOLTS

PLATE (I_b) MILLIAMPERES

JAN. 27, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

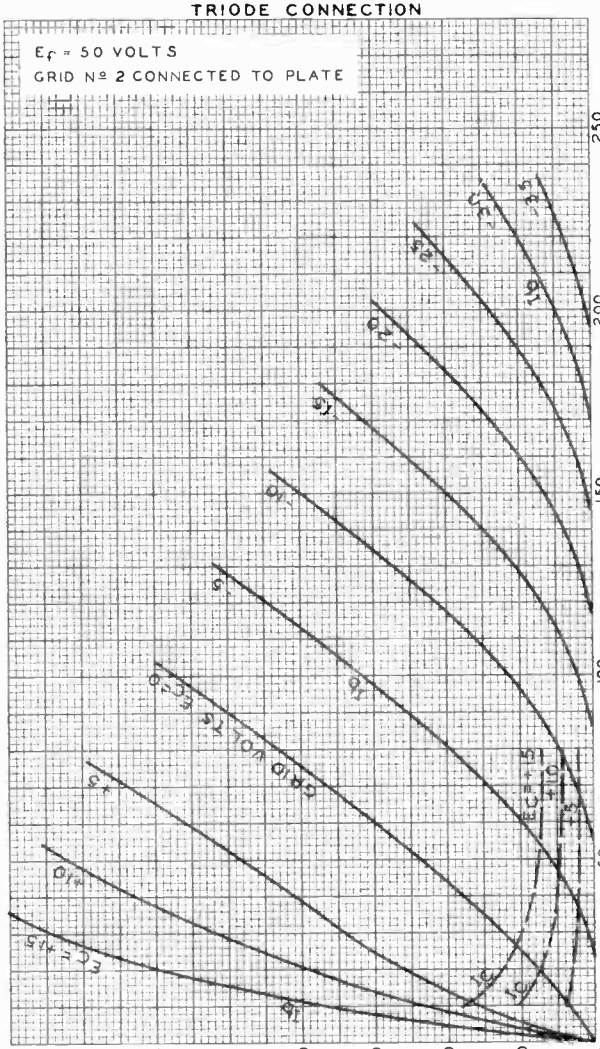
92CM-6314RI

World Radio History

50L6-GT

AVERAGE PLATE CHARACTERISTICS

TRIODE CONNECTION



APRIL 6, 1948 TUBE DEPARTMENT 92CM-6316RI
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

60FX5

Power Pentode

7-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

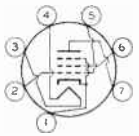
Heater, for Unipotential Cathode:		
Voltage (AC or DC)	60 ± 10%	volts
Current at 60 volts	0.1	amp
Direct Interelectrode Capacitances (Approx.):▲		
Grid No.1 to plate	0.65	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	17	μμf
Plate to cathode & grid No.3, grid No.2, and heater	9	μμf

Characteristics, Class A$_1$ Amplifier:

Plate Supply Voltage	110	volts
Grid-No.2 Supply Voltage	115	volts
Cathode Resistor	62	ohms
Plate Resistance (Approx.)	17500	ohms
Transconductance	13500	μmhos
Plate Current	36	ma
Grid-No.2 Current	10	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV



Pin 1 - Cathode, Grid No.3
Pin 2 - Grid No.1
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Grid No.1
Pin 6 - Grid No.2
Pin 7 - Plate

AF POWER AMPLIFIER — Class A$_1$

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	130	max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE: Positive-bias value	0	max.	volts
GRID-No.2 INPUT	2	max.	watts
PLATE DISSIPATION	5.5	max.	watts

World Radio History

60FX5

PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200●	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	225	max.	°C

Typical Operation:

Plate Supply Voltage	110		volts
Grid-No.2 Supply Voltage	115		volts
Cathode Resistor	62		ohms
Peak AF Grid-No.1 Voltage	3		volts
Zero-Signal Plate Current	36		ma
Max.-Signal Plate Current	35		ma
Zero-Signal Grid-No.2 Current	10		ma
Max.-Signal Grid-No.2 Current	12		ma
Load Resistance	3000		ohms
Total Harmonic Distortion	8		%
Max.-Signal Power Output	1.3		watts

Maximum Circuit Values:

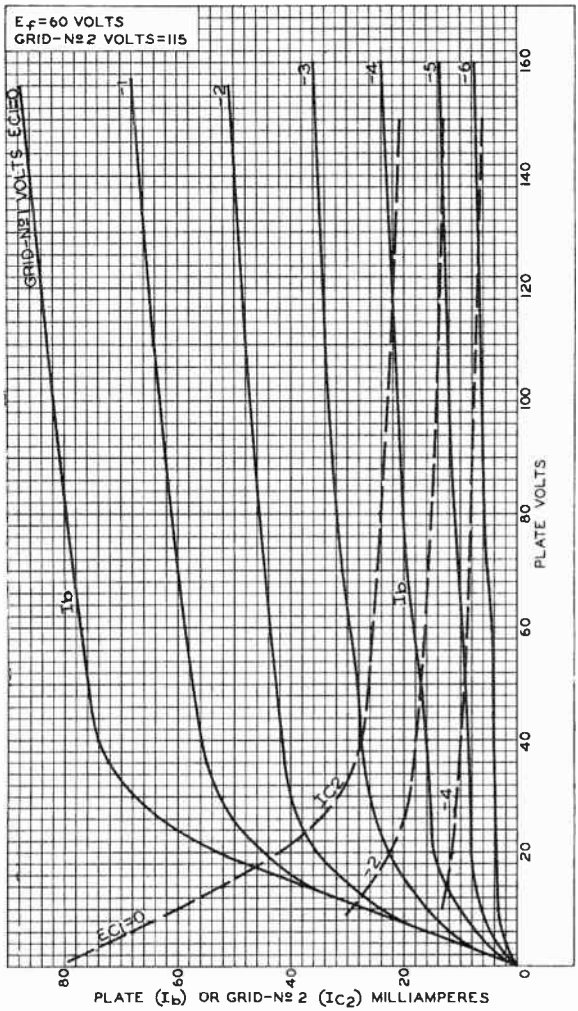
Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.1	max.	megohm
For cathode-bias operation	0.5	max.	megohm

▲ Without external shield.

● The dc component must not exceed 100 volts.

World Radio History

AVERAGE CHARACTERISTICS

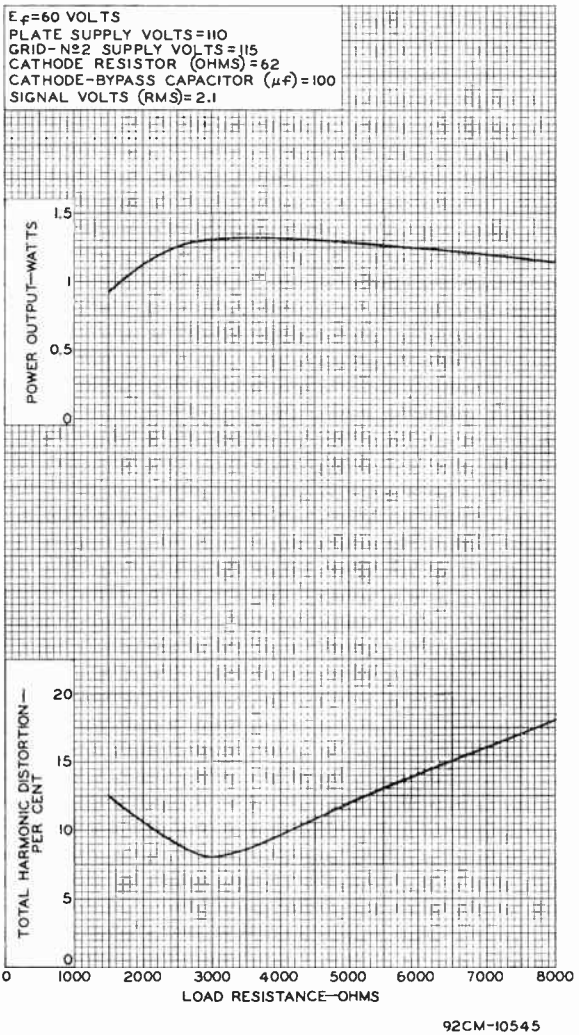


92CM-10546

World Radio History

60FX5

OPERATION CHARACTERISTICS



92CM-10545

World Radio History

RCA

5879

SHARP-CUTOFF PENTODE

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage	6.3	ac or dc volts
Current	0.15	amp
Direct Interelectrode Capacitances:[o]		
Pentode Connection:		
Grid No.1 to Plate	0.15 max.	μμf ←
Input	2.7	μμf
Output	2.4	μμf
Triode Connection (Grids No.2 & No.3 connected to plate):		
Grid No.1 to Plate	1.4	μμf
Grid No.1 to Cathode & Heater	1.4	μμf
Plate to Cathode & Heater	0.85	μμf

[o] With no external shield.

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ±3/32"
Maximum Diameter	7/8"
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9AD

Pin 1 – Grid No.1
Pin 2 – No Connection
Pin 3 – Cathode
Pin 4 – Heater
Pin 5 – Heater

Pin 6 – No Connection
Pin 7 – Grid No.2
Pin 8 – Plate
Pin 9 – Grid No.3

AMPLIFIER - Class A_1

Pentode Connection

Maximum Rating, *Design-Center Values:*

PLATE VOLTAGE	300 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	150 max.	volts
GRID-No.2 SUPPLY VOLTAGE	300 max.	volts
GRID-No.2 INPUT	0.25 max.	watt
PLATE DISSIPATION	1.25 max.	watts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative Bias Value	50 max.	volts
Positive Bias Value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

← Indicates a change

World Radio History

5879

5879

SHARP-CUTOFF PENTODE

Characteristics:

Plate Voltage	250	volts
Grid No.3 (Suppressor)	Connected to cathode at socket	
Grid-No.2 Voltage	100	volts
Grid-No.1 Voltage	-3	volts
Plate Resistance (Approx.)	2	megohm
Transconductance	1000	μmho
Grid-No.1 Bias (Approx.) for plate current of 10 μamp	-8	volts
→ Plate Current	1.8	ma
Grid-No.2 Current	0.4	ma

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	2.2 max.	megohm

AMPLIFIER - Class A_1

Triode Connection - Grids No.2 & No.3 Connected to Plate

Maximum Ratings, *Design-Center Values*:

PLATE VOLTAGE	250 max.	volts
TOTAL PLATE DISSIPATION	1.5 max.	watts
GRID-No.1 VOLTAGE		
Negative Bias Value	50 max.	volts
Positive Bias Value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Characteristics:

Plate Voltage	100	250	volts
Grid-No.1 Voltage	-3	-8	volts
Amplification Factor	21	21	
Plate Resistance (Approx.)	17000	13700	ohms
Transconductance	1240	1530	μmhos
Total Plate Current	2.2	5.5	ma

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	2.2 max.	megohms

Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHARTS at front of Receiving Tube Section.

→ Indicates a change

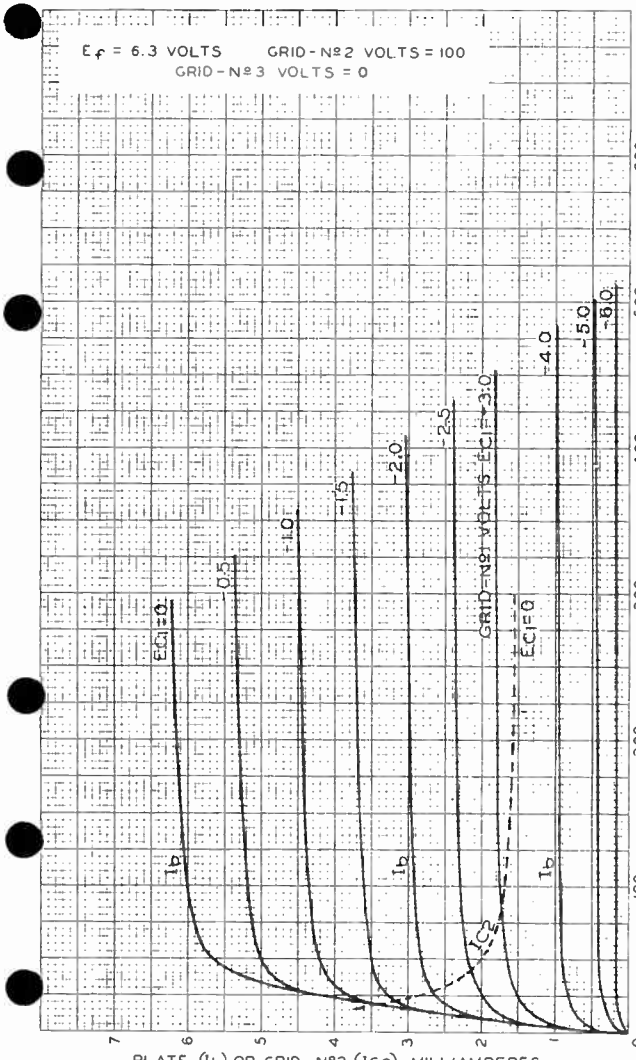
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

5879

AVERAGE PLATE CHARACTERISTICS



FEB. 1, 1950

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-7439

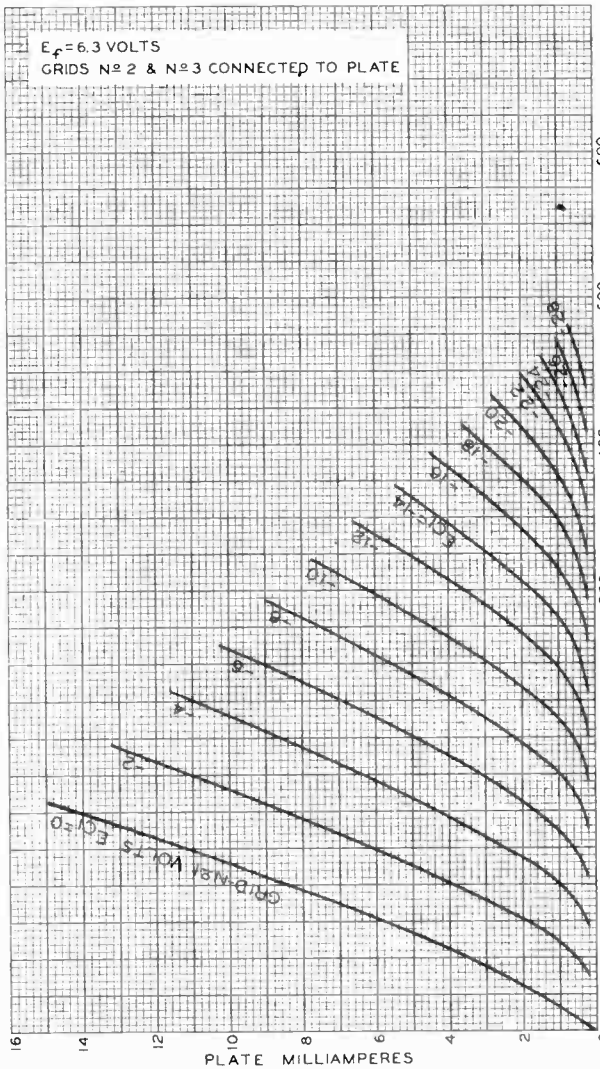
World Radio History

5879

RCA

5879

AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION



FEB. 9, 1950

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA HARRISON NEW JERSEY

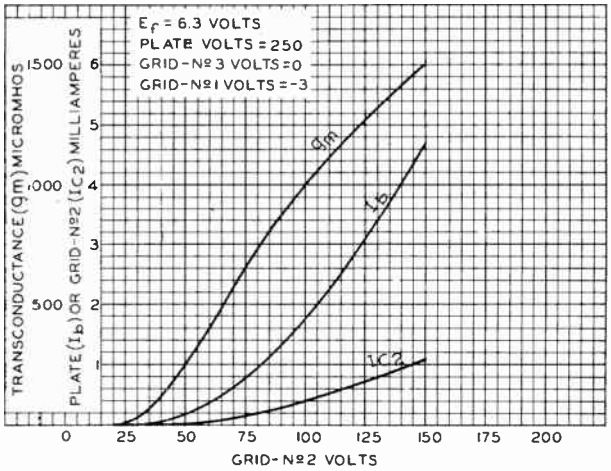
92CM-7446

World Radio History

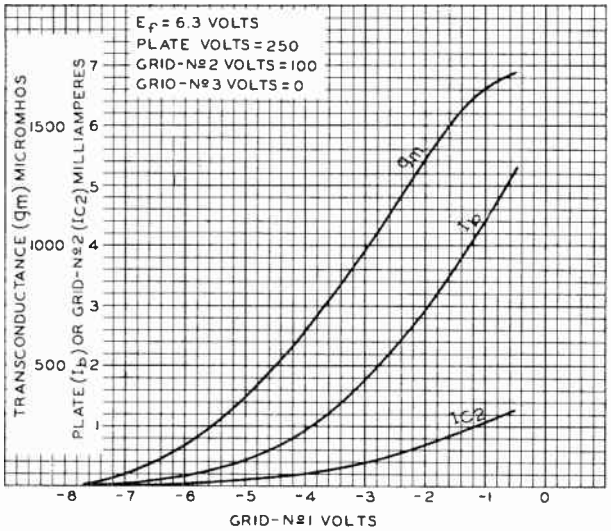
Vacuum Tube History

5879

AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS



World Radio History

6973

Beam Power Tube

9-PIN MINIATURE TYPE
For High-Fidelity Audio-Amplifier Applications

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.45	amp
Direct Interelectrode Capacitances:[o]		
Grid No.1 to plate	0.4 max.	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	9	μμf
Plate to cathode & grid No.3, grid No.2, and heater	6	μμf

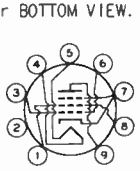
Characteristics, Class A_1 Amplifier:

Plate Voltage	250 volts
Grid-No.2 Voltage	250 volts
Grid-No.1 Voltage	−15 volts
Plate Resistance (Approx.)	73000 ohms
Transconductance	4800 μmhos
Plate Current	46 ma
Grid-No.2 Current	3.5 ma
Grid-No.1 Voltage (Approx.) for plate μa = 100	−40 volts

Mechanical:

Operating Position	Any
Maximum Overall Length	3-1/16"
Maximum Seated Length	2-13/16"
Length, Base Seat to Bulb Top (Excluding tip)	2-7/16" ± 3/32"
Maximum Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9EU

Pin 1 – Grid No.2
Pin 2 – No Connection
Pin 3 – Grid No.1
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Grid No.1
Pin 7 – Grid No.3, Cathode
Pin 8 – Grid No.2
Pin 9 – Plate

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	440 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	330 max.	volts

→ indicates a change.

World Radio History

GRID-No. 2 INPUT	2	max.	watts
PLATE DISSIPATION	12	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200▲	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250	max.	°C

Typical Operation with Fixed Bias:

Values are for 2 tubes

Plate Voltage	250	350	400	volts
Grid-No. 2 Voltage	250	280	290	volts
Grid-No. 1 (Control-Grid) Voltage●	−15	−22	−25	volts
Peak AF Grid-No. 1-to-Grid-No. 1 Voltage	30	44	50	volts
Zero-Signal Plate Current	92	58	50	ma
Max.-Signal Plate Current	105	106	107	ma
Zero-Signal Grid-No. 2 Current	7	3.5	2.5	ma
Max.-Signal Grid-No. 2 Current	16	14	13.7	ma
Effective Load Resistance (Plate to plate)	8000	7500	8000	ohms
Total Harmonic Distortion	2	1.5	2	%
Max.-Signal Power Output	12.5	20	24	watts

Typical Operation with Cathode Bias:

Values are for 2 tubes

Plate Supply Voltage	300	310	volts
Grid-No. 2 Supply Voltage	300	310	volts
Cathode Resistor	230	270	ohms
Peak AF Grid-No. 1-to-Grid-No. 1 Voltage	48	55	volts
Zero-Signal Plate Current	80	77	ma
Max.-Signal Plate Current	96	92	ma
Zero-Signal Grid-No. 2 Current	6	5	ma
Max.-Signal Grid-No. 2 Current	14	14	ma
Effective Load Resistance (Plate to plate)	5500	6000	ohms
Total Harmonic Distortion	2	4	%
Max.-Signal Power Output	15	17	watts

Maximum Circuit Values:

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

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Grid No. 2 of each tube connected to tap on plate winding of output transformer

→ **Maximum Ratings,** *Design-Maximum Values:*

PLATE AND GRID-No. 2 (SCREEN-GRID) SUPPLY VOLTAGE	410 max.	volts

→ Indicates a change.

World Radio History

7025

HIGH-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For high-fidelity audio-amplifier applications critical as to noise and hum. In other respects, the 7025 is similar to the 12AX7.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

	Series	*Parallel*	
Heater arrangement			
Voltage	12.6	6.3	ac or dc volts
Current	0.15	0.3	amp

Direct Interelectrode Capacitances (Approx.):[o]

	Unit No. 1	*Unit No. 2*	
Grid to plate	1.7	1.7	μμf
Grid to cathode and heater	1.6	1.6	μμf
Plate to cathode and heater	0.46	0.34	μμf

Equivalent-Noise and Hum Voltage (Referenced to Grid):

Values are for Each Unit

Average Value (RMS) . . . . . 1.8 microvolts

Measured in "true rms" units under the following conditions: heater volts = 6.3 ac (parallel connection), center-tap of heater transformer connected to ground, dc plate-supply volts = 250, plate load resistor (megohms) = 0.1, cathode resistor (ohms) = 2700, cathode-bypass capacitor (μf) = 100, grid resistor (ohms) = 0, and amplifier covering frequency range between 25 and 10,000 cps.

Maximum Value (RMS) . . . . . 7 microvolts

Measured in "true rms" units under the same conditions as for "Average Value" except that the cathode resistor is unbypassed, and grid resistor (megohms) = 0.05.

Characteristics, Class A_1 Amplifier (Each Unit):

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

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2

[o]: See next page.

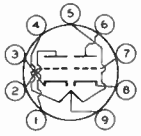
World Radio History

7025

HIGH-MU TWIN TRIODE

Base . . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW 9A

Pin 1 - Plate of Unit No.2
Pin 2 - Grid of Unit No.2
Pin 3 - Cathode of Unit No.2
Pins 4 & 9 - Heater of Unit No.2
Pins 5 & 9 - Heater of Unit No.1



Pin 6 - Plate of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Cathode of Unit No.1
Pin 9 - Heater Mid-Tap

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330	max.	volts
GRID VOLTAGE:			
Negative-bias value	55	max.	volts
Positive-bias value	0	max.	volts
PLATE DISSIPATION	1.2	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200▲	max.	volts

Typical Operation as Resistance-Coupled Amplifier (Each Unit):

See RESISTANCE-COUPLED AMPLIFIER CHART No.25 at front of Receiving Tube Section

○ Without external shield.
▲ The dc component must not exceed 100 volts.

OPERATING CONSIDERATIONS

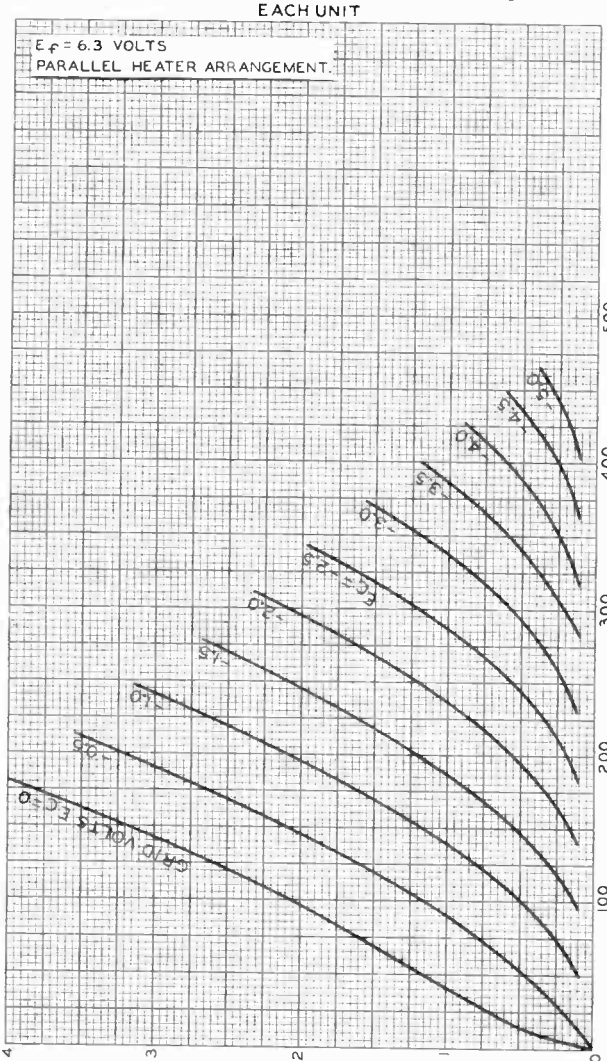
Parallel heater arrangement is recommended for use in high-gain, resistance-coupled-amplifier applications such as in the preamplifier stages of phonographs, microphones, and tape recorders. With closely paired, electrostatically shielded heater leads, a hum-balance control is unnecessary when the center-tap of the heater transformer is connected to ground. In applications where the heater-transformer winding does not have a center-tap, a 100-ohm hum-balancing potentiometer should be connected across the heater leads with the slider connected to ground.

World Radio History

7025

AVERAGE PLATE CHARACTERISTICS

EACH UNIT



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSE

92CM-6879

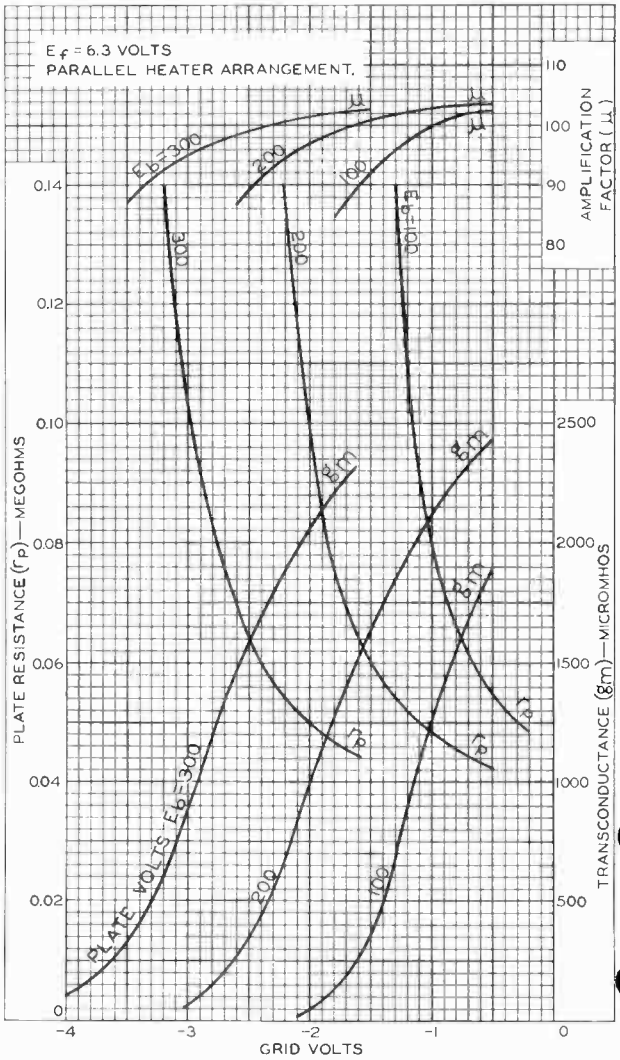
World Radio History

7025

7025

AVERAGE CHARACTERISTICS

EACH UNIT



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6880

World Radio History

7027-A

BEAM POWER TUBE

For high-fidelity audio-amplifier applications

Supersedes Type 7027

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3	volts
Current	0.9	amp
Direct Interelectrode Capacitances:[o]		
Grid No.1 to plate	1.5	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	10	μμf
Plate to cathode & grid No.3, grid No.2, and heater	7.5	μμf

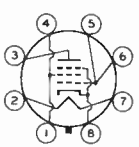
Characteristics, Class A_1 Amplifier:

Plate Voltage	250	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage	-14	volts
Plate Resistance (Approx.)	22500	ohms
Transconductance	6000	μmhos
Plate Current	72	ma
Grid-No.2 Current	5	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	4.62"
Maximum Seated Length	4.06"
Maximum Diameter	1.63"
Bulb	T12
Base	Small-Wafer Octal 8-Pin with "950" Sleeve (JEDEC Group 1, No.B8-191)
Basing Designation for BOTTOM VIEW	8HY

Pin 1 - Grid No.2
Pin 2 - Heater
Pin 3 - Plate
Pin 4 - Grid No.2
Pin 5 - Grid No.1



Pin 6 - Grid No.1
Pin 7 - Heater
Pin 8 - Cathode, Grid No.3

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	600	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	500	max.	volts
GRID-No.2 INPUT	5	max.	watts
PLATE DISSIPATION	35	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200▲	max.	volts

World Radio History

7027-A

BEAM POWER TUBE

Typical Operation with Fixed Bias:

Values are for 2 tubes

Plate Voltage	400	450	540	volts
Grid-No.2 Voltage	300	350	400	volts
Grid-No.1 (Control-Grid) Voltage●	-25	-30	-38	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	50	60	76	volts
Zero-Signal Plate Current	102	95	100	ma
Max.-Signal Plate Current	152	194	220	ma
Zero-Signal Grid-No.2 Current	6	3.4	5	ma
Max.-Signal Grid-No.2 Current	17	19.2	21.4	ma
Effective Load Resistance (Plate to plate)	6600	6000	6500	ohms
Total Harmonic Distortion	2	1.5	2	%
Max.-Signal Power Output	34	50	76	watts

Typical Operation with Cathode Bias:

Values are for 2 tubes

Plate Supply Voltage	400	380	425	volts
Grid-No.2 Supply Voltage	300	380	425	volts
Cathode Resistor	200	180	200	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage	57	68.5	86	volts
Zero-Signal Plate Current	112	138	150	ma
Max.-Signal Plate Current	128	170	196	ma
Zero-Signal Grid-No.2 Current	7	5.6	8	ma
Max.-Signal Grid-No.2 Current	16	20	20	ma
Effective Load Resistance (Plate to plate)	6600	4500	3800	ohms
Total Harmonic Distortion	2	3.5	4	%
Max.-Signal Power Output	32	36	44	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:●

For fixed-bias operation	0.1	max.	megohm
For cathode-bias operation	0.5	max.	megohm

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Grid No.2 of each tube connected to tap on plate winding of output transformer

Maximum Ratings, *Design-Maximum Values:*

PLATE AND GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	600	max.	volts
GRID-No.2 INPUT	4.5	max.	watts
PLATE DISSIPATION	35	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200▲	max.	volts

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

7027-A

BEAM POWER TUBE

Typical Operation:

Values are for 2 tubes

Plate Supply Voltage	410	volts
Grid-No.2 Supply Voltage	*	volts
Cathode Resistor	220	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage	68	volts
Zero-Signal Cathode Current	134	ma
Max.-Signal Cathode Current	155	ma
Effective Load Resistance (Plate to plate)	8000	ohms
Total Harmonic Distortion	1.6	%
Max.-Signal Power Output	24	watts

Maximum Circuit Values:

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

° Without external shield.

▲ The dc component must not exceed 100 volts.

● The type of input coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer- or impedance-coupling devices are recommended.

* Obtained from taps on the primary winding of the output transformer. The taps are located on each side of the center-tap (B+) so as to apply 43 per cent of the plate signal voltage to grid No.2 of each output tube.

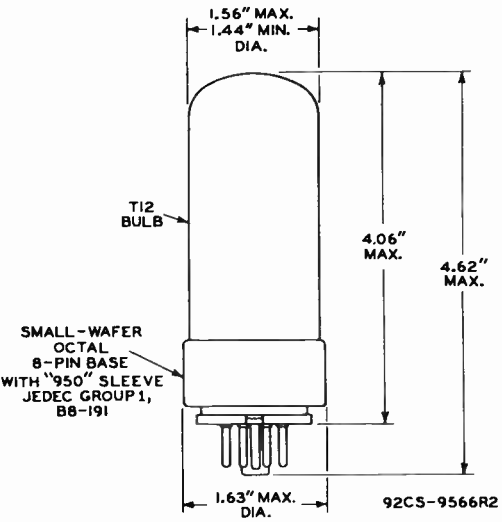
OPERATING CONSIDERATIONS

The *bulb* becomes hot during operation. To insure adequate cooling, therefore, it is essential that free circulation of air be provided around the 7027-A.

World Radio History

7027-A

BEAM POWER TUBE



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

7027-A

RCA

7027-A

AVERAGE PLATE CHARACTERISTICS

E_f=6.3 VOLTS
GRID-N°1 VOLTS=0

GRID-N°2 VOLTS-E_{C_2}=250

E_{C_2}=450
400
350
300
200
150
100
E_{C_2}=50

PLATE VOLTS
0 100 200 300 400 500 600 700

PLATE MILLIAMPERES
0 100 200 300 400

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-10132

World Radio History

7027-A

RCA

7027-A

AVERAGE CHARACTERISTICS

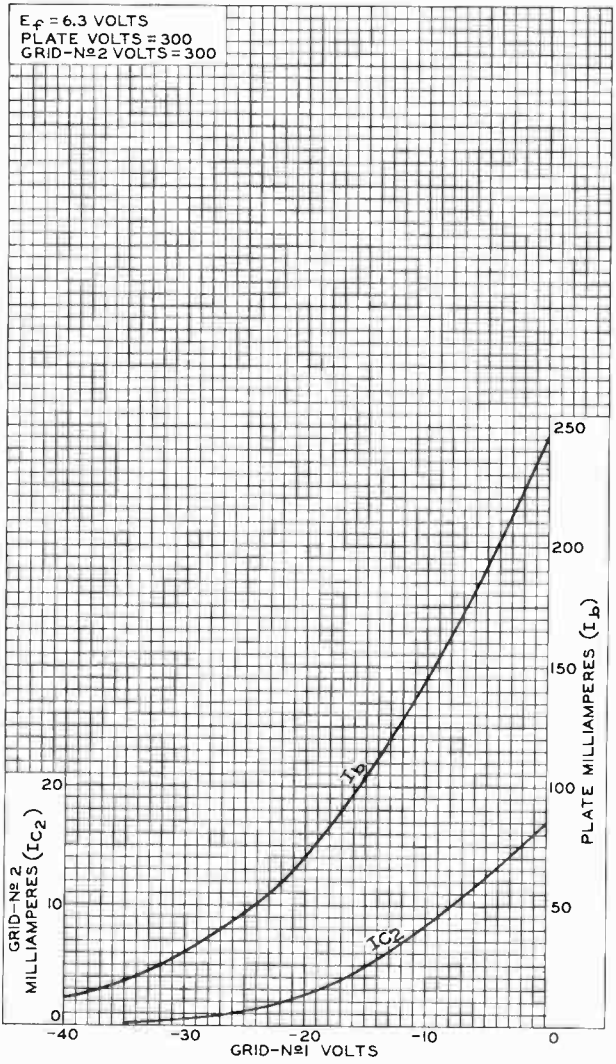
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-10133

World Radio History

7027-A

AVERAGE CHARACTERISTICS

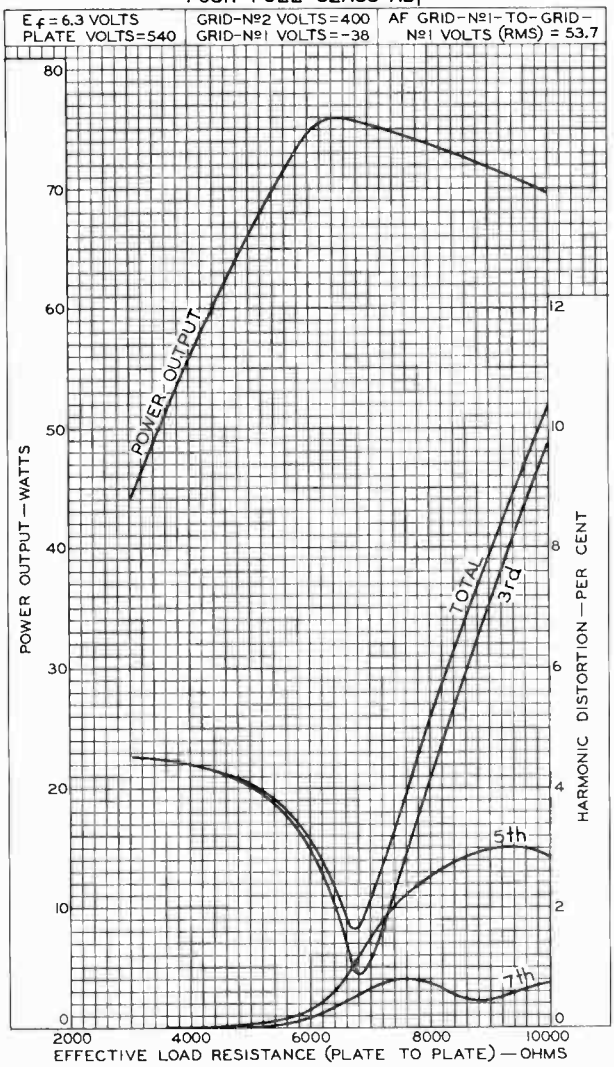


RCA

7027-A

OPERATION CHARACTERISTICS

PUSH-PULL CLASS AB$_1$



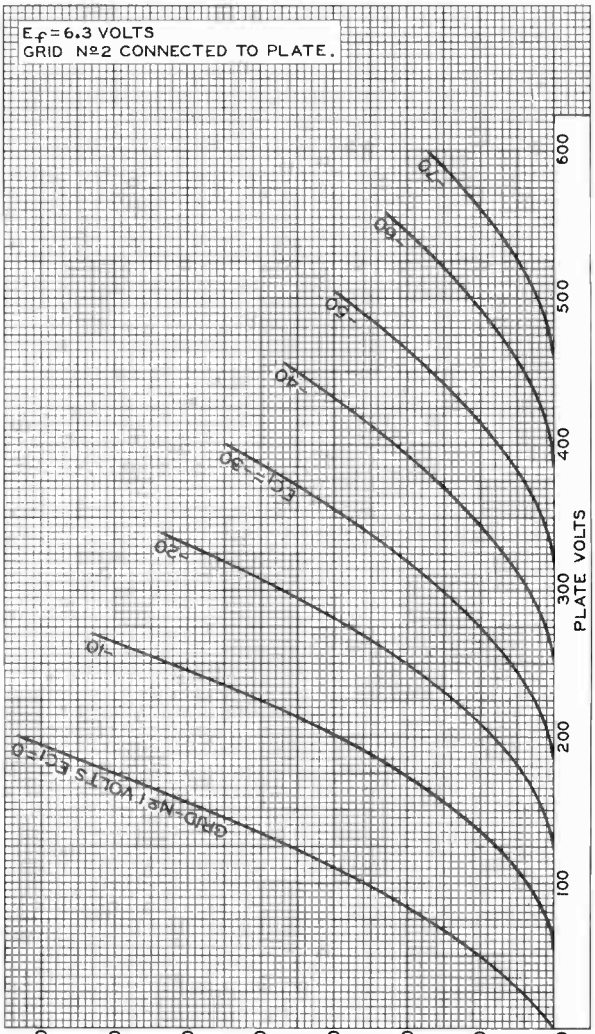
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-10128

7027-A

AVERAGE PLATE CHARACTERISTICS

TRIODE CONNECTION



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9568

World Radio History

7189

POWER PENTODE

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3	volts
Current	0.76	amp
Direct Interelectrode Capacitances (Approx.):[o]		
Grid No.1 to plate	0.5	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	10.8	μμf
Plate to cathode & grid No.3, grid No.2, and heater	6.5	μμf
Grid No.1 to heater	0.25	μμf

Characteristics, Class A_1 Amplifier:

Plate Voltage	250	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage	-7.3	volts
Mu-Factor, Grid No.2 to Grid No.1	19.5	
Plate Resistance (Approx.)	40000	ohms
Transconductance	11300	μmhos
Plate Current	48	ma
Grid-No.2 Current	5.5	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	3-1/16"
Maximum Seated Length	2-13/16"
Length, Base Seat to Bulb Top (Excluding tip)	2-7/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9CV

Pin 1 - Internal Connection—Do Not Use
Pin 2 - Grid No.1
Pin 3 - Cathode, Grid No.3

Pin 4 - Heater
Pin 5 - Heater
Pin 6 - Same as Pin 1
Pin 7 - Plate
Pin 8 - Same as Pin 1
Pin 9 - Grid No.2

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	400 max.	volts
GRID-No.2 VOLTAGE	300 max.	volts
CATHODE CURRENT	65 max.	ma
PLATE DISSIPATION	12 max.	watts
ZERO-SIGNAL GRID-No.2 INPUT	2 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT	4 max.	watts

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POWER PENTODE

PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts

Typical Operation:

Values are for 2 tubes

Plate Voltage	400	volts
Grid-No.2 Voltage	300	volts
Grid-No.1 Voltage	-15	volts
Peak AF Grid-No.1 Voltage	14.8	volts
Zero-Signal Plate Current	15	ma
Max.-Signal Plate Current	105	ma
Zero-Signal Grid-No.2 Current	1.6	ma
Max.-Signal Grid-No.2 Current	25	ma
Effect Load Resistance (Plate to plate)	8000	ohms
Total Harmonic Distortion	4	%
Max.-Signal Power Output	24	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.3 max.	megohm

PUSH-PULL AF POWER AMPLIFIER — Class AB1

Grid No.2 of each tube connected to tap on plate winding of output transformer

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	375 max.	volts
CATHODE CURRENT	65 max.	ma
PLATE DISSIPATION	12 max.	watts
ZERO-SIGNAL GRID-No.2 INPUT	2 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT	4 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts

Typical Operation:

Values are for 2 tubes

Plate Supply Voltage	375	volts
Grid-No.2 Supply Voltage	♦	
Cathode Resistor	220	ohms
Peak AF Grid-No.1 Voltage	17.7	volts
Zero-Signal Plate Current	70	ma
Max.-Signal Plate Current	81	ma
Effective Load Resistance (Plate to plate)	11000	ohms
Total Harmonic Distortion	3	%
Max.-Signal Power Output	16.5	watts

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POWER PENTODE

Maximum Circuit Values:

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

○ Without external shield.

◖ Obtained from taps on the primary winding of the output transformer. The taps are located on each side of the center-tap (B+) so as to supply 43 per cent of the plate signal voltage to grid No.2 of each output tube.

World Radio History

World Radio History

Medium-Mu Triode—Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

For High-Fidelity Audio-Amplifier Applications Critical as to Noise and Hum

GENERAL DATA

Electrical:

Heater Characteristics and Ratings:			
Voltage (AC or DC)	6.3 ± 0.6		volts
Current at heater volts = 6.3	0.450		amp
Peak heater-cathode voltage (Each Unit):			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts
Direct Interelectrode Capacitances:[b]			
Triode Unit:			
Grid to plate	2		pf
Grid to cathode and heater	2.3		pf
Plate to cathode and heater	0.3		pf
Pentode Unit:			
Grid No.1 to plate	0.06	max.	pf
Grid No.1 to cathode & internal shield & grid No.3, grid No.2, and heater	5		pf
Plate to cathode & internal shield & grid No.3, grid No.2, and heater	2		pf

Equivalent-Hum and Noise Voltage (Referenced to Grid): ←

Triode Unit

Average Value (RMS)	10	microvolts
Maximum Value (RMS)	50	microvolts

Measured in "true rms" units under the following conditions: heater volts = 6.3 ac, center-tap of heater transformer connected to ground, plate-supply volts = 250, plate load resistor (megohms) = 0.1, cathode resistor (ohms) unbypassed = 1500, grid resistor (megohms) = 0.05, and amplifier covering frequency range between 25 and 10,000 cps.

Pentode Unit

Average Value (RMS)	15	microvolts
Maximum Value (RMS)	35	microvolts

Measured in "true rms" units under the following conditions: heater volts = 6.3 ac, center-tap of heater transformer connected to ground, plate-supply volts = 250, plate-load resistor (megohms) = 0.22, grid-No.2 supply volts = 250; grid No.2 voltage divider: resistor (megohm) from grid No.2 to B+ = 0.68, resistor (megohm) from grid-No.2 to ground = 0.33; bypass ca-

← Indicates a change.

World Radio History

pacitor (μf) from grid No.2 to cathode = 0.1; cathode resistor (ohms unbypassed) = 680; grid No.1 resistor (megohm) = 0.27; and amplifier covering frequency range between 25 and 10,000 cps.

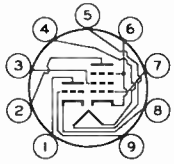
Characteristics, Class A_1 Amplifier:

	Triode Unit	*Pentode Unit*		
Plate-Supply Voltage	215	100	220	volts
Grid-No.2 Supply Voltage	–	50	130	volts
Grid-No.1 Voltage	-8.5	–	–	volts
Cathode Resistor	–	1000	62	ohms
Amplification Factor	17	–	–	
Plate Resistance (Approx.)	0.0081	1	0.4	megohm
Transconductance	2100	1500	7000	μmhos
Plate Current	9	1.1	12.5	ma
Grid-No.2 Current	–	0.35	3.5	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-40	-4	–	volts

Mechanical:

Operating Position . . . . . Any
Type of Cathodes . . . . . Coated Unipotential
Maximum Overall Length . . . . . 2-3/16"
Maximum Seated Length . . . . . 1-15/16"
Length, Base Seat to Bulb Top (Excluding tip) . 1-9/16" ± 3/32"
Diameter . . . . . 0.750" to 0.875"
Dimensional Outline . . . . . *See General Section*
Bulb T6-1/2
Base . . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW 9JT

Pin 1 – Triode Plate
Pin 2 – Pentode Plate
Pin 3 – Pentode Grid No.2
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Pentode Cathode, Grid No.3, Internal Shield
Pin 7 – Pentode Grid No.1
Pin 8 – Triode Cathode
Pin 9 – Triode Grid

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

	Triode Unit	*Pentode Unit*	
PLATE VOLTAGE	330 max.	330 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	–	330 max.	volts
GRID-No.2 VOLTAGE	–	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE: Positive-bias value	0 max.	0 max.	volts

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	Triode Unit	*Pentode Unit*	
GRID-No.2 INPUT:			
For grid-No.2 voltages up to 165 volts	–	0.6 max.	watt
For grid-No.2 voltages between 165 and 330 volts	–	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
PLATE DISSIPATION	2.4 max.	3 max.	watts

Maximum Circuit Values:

	Triode Unit	*Pentode Unit*	
Grid-No.1-Circuit Resistance:[c]			
For fixed-bias operation	0.5 max.	0.25 max.	megohm
For cathode-bias operation	1 max.	1 max.	megohm

[a] The dc component must not exceed 100 volts.

[b] Without external shield.

[c] If either unit is operated at maximum rated conditions, grid-No.1-circuit resistances for both units should not exceed the stated values.

World Radio History

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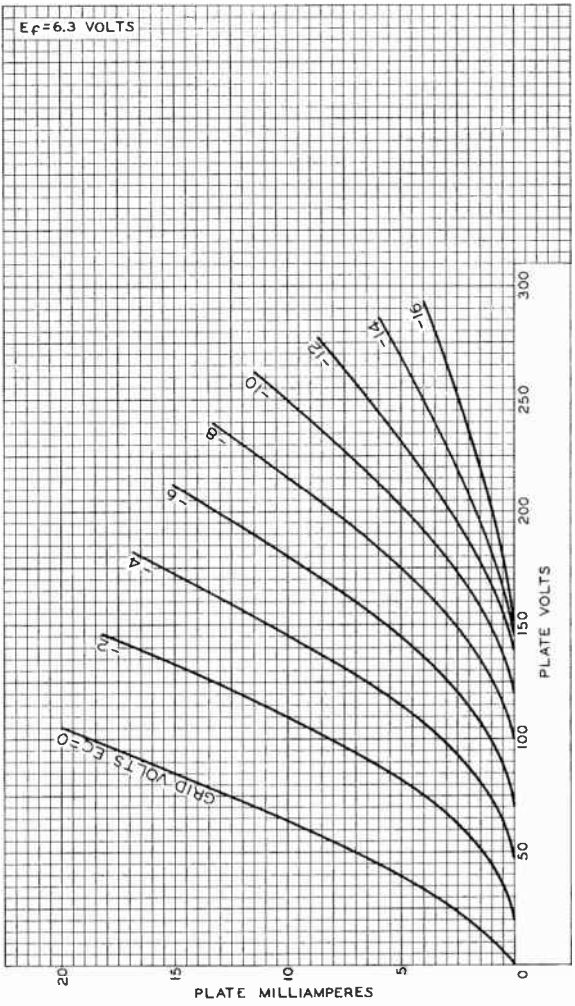
AVERAGE PLATE CHARACTERISTICS
Triode Unit



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World Radio History

RCA

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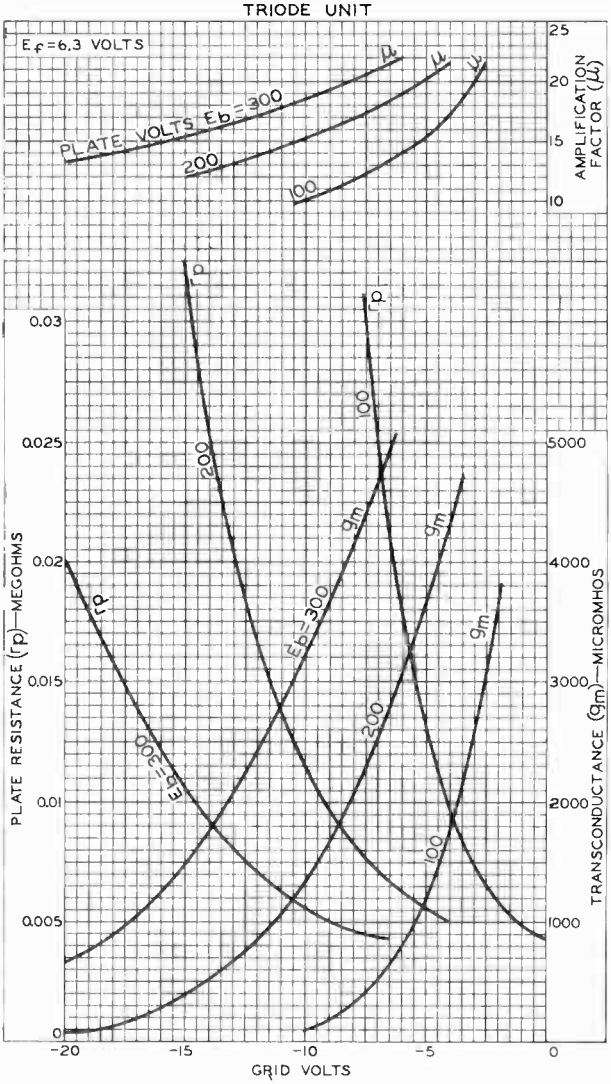
AVERAGE CHARACTERISTICS

TRIODE UNIT



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92CM-9704

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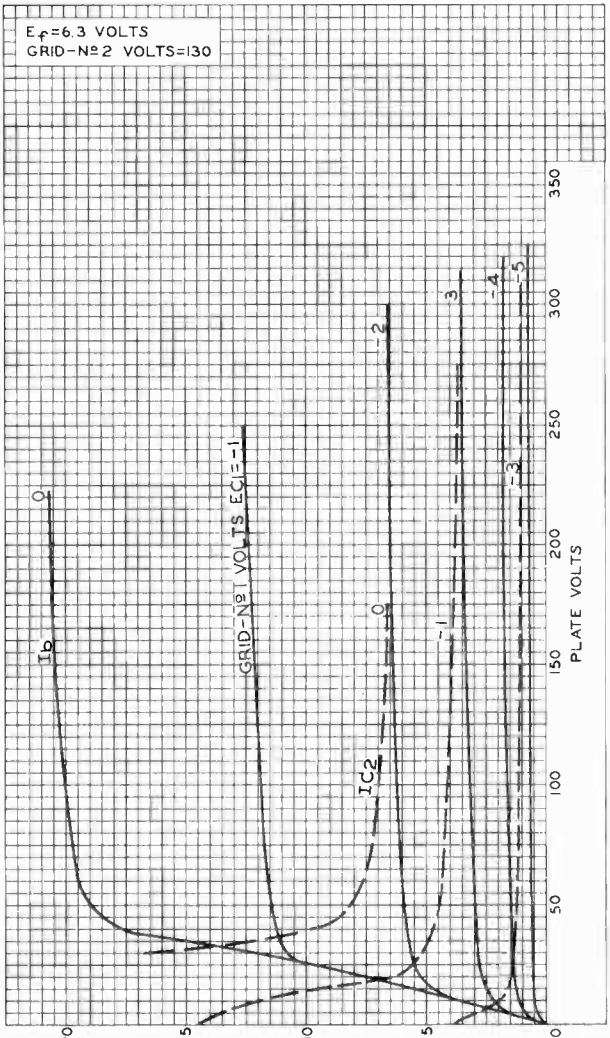
AVERAGE CHARACTERISTICS
PENTODE UNIT



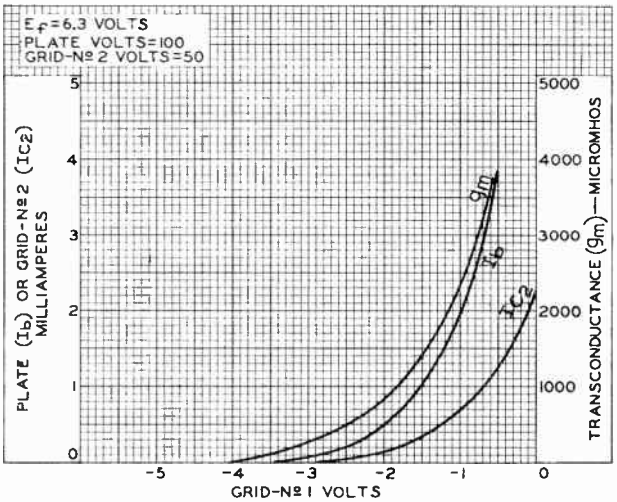
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9701

RCA

7199

AVERAGE CHARACTERISTICS
PENTODE UNIT



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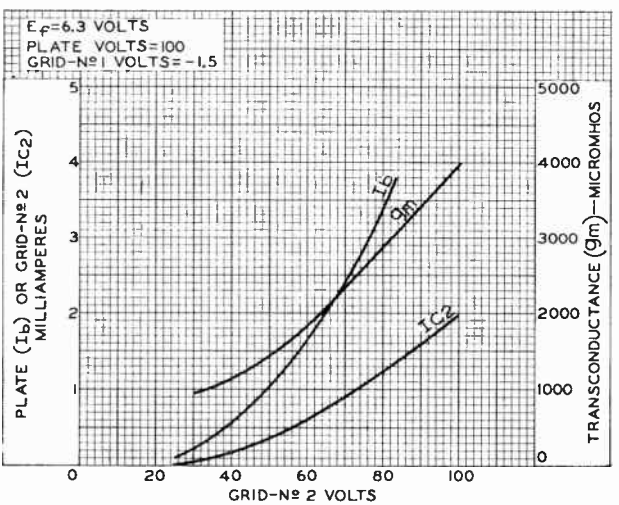


92CS-9703

World Radio History

Beam Power Tube

GENERAL DATA

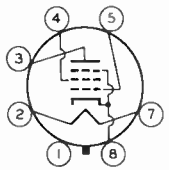
Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*.		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	0.450	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200[a] max.	volts
Direct Interelectrode Capacitances (Approx.):[b]		
Grid No.1 to plate	0.7	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	9	μμf
Plate to cathode & grid No.3, grid No.2, and heater	7.5	μμf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	3-5/16"
Maximum Seated Length	2-3/4"
Maximum Diameter	1-9/32"
Dimensional Outline	See *General Section*
Bulb	T9
Bases (Alternates):	
Intermediate-Shell Octal: 7-Pin, Arrangement 1 (JEDEC Group 1, No.B7-7)	
Short Intermediate-Shell Octal with External Barriers: 7-Pin, Arrangement 1 (JEDEC Group 1, No.B7-59)	
Basing Designation for BOTTOM VIEW	7S

Pin 1 - No Internal Connection
Pin 2 - Heater
Pin 3 - Plate
Pin 4 - Grid No.2



Pin 5 - Grid No.1
Pin 7 - Heater
Pin 8 - Cathode, Grid No.3

AF POWER AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	350 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	315 max.	volts
GRID-No.2 INPUT	2.2 max.	watts
PLATE DISSIPATION	14 max.	watts

Typical Operation and Characteristics:

Plate Voltage	60	250	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 (Control-Grid) Voltage	0	-12.5	volts
Peak AF Grid-No.1 Voltage	-	12.5	volts

World Radio History

Zero-Signal Plate Current	100[c]	45	ma
Max.-Signal Plate Current	–	47	ma
Zero-Signal Grid-No.2 Current	22[c]	4.5	ma
Max.-Signal Grid-No.2 Current	–	7	ma
Plate Resistance (Approx.)	–	50000	ohms
Transconductance	–	4100	μmhos
Load Resistance	–	5000	ohms
Total Harmonic Distortion	–	7	%
Max.-Signal Power Output	–	4.5	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

For fixed-bias operation	0.1 max.	megohm
For cathode-bias operation	0.5 max.	megohm

[a] The dc component must not exceed 100 volts.

[b] Without external shield.

[c] This value can be measured by a method involving a recurrent wave form such that the maximum ratings of the tube will not be exceeded.

World Radio History

Sharp-Cutoff Pentode

7-PIN MINIATURE TYPE

For High-Gain, Resistance-Coupled-Amplifier Applications Critical as to Hum and Microphonism

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage (AC or DC)	6.3	volts
Current	0.3	amp

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield▲*	
Pentode Connection:			
Grid No.1 to plate	0.0035 max.	0.0035 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	5.5	5.5	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	5	5	μμf
Triode Connection:●			
Grid No.1 to plate, grid No.3 & internal shield, and grid No.2	2.6	2.6	μμf
Grid No.1 to cathode and heater	3.2	3.2	μμf
Plate, grid No.3 & internal shield, and grid No.2 to cathode and heater	1.2	8.5	μμf

Hum Output Voltage:

Average Value (RMS, Cathode Bypassed) . . . . 1.2 millivolts
Measured in "true rms" units under the following conditions: heater volts = 6.3; center-tap of heater transformer connected to ground; plate and grid-No.2 supply volts = 250; plate load resistor (megohms) = 0.27; grid No.3 and internal shield connected to cathode at socket; grid-No.2 resistor (megohms) = 0.68; grid-No.1 resistor (megohms) = 0.1; cathode resistor (ohms) = 1000; grid resistor of following stage (megohms) = 10; and stage gain of 340.

Average Value (RMS, Cathode Unbypassed) . . . 0.9 millivolt
Measured in "true rms" units under the same conditions as for "Average Value" except that the cathode resistor is unbypassed, and the stage gain is 110.

Characteristics, Class A_1 Amplifier:

	Pentode Connection		
Plate Supply Voltage	100	250	250 volts
Grid No.3 & Internal Shield	*Connected to cathode at socket*		

World Radio History

Grid-No.2 Supply Voltage	100	125	150	volts
Cathode Resistor	150	100	68	ohms
Plate Resistance (Approx.)	0.5	1.5	1	megohms
Transconductance	3900	4500	5200	μmhos
Plate Current	5	7.6	10.6	ma
Grid-No.2 Current	2.1	3	4.3	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-4.2	-5.5	-6.5	volts

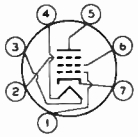
Triode Connection•

Plate Supply Voltage	250	volts
Cathode Resistor	330	ohms
Amplification Factor	36	
Plate Resistance (Approx.)	7500	ohms
Transconductance	4800	μmhos
Plate Current	12.2	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7BK

Pin 1 - Grid No.1
Pin 2 - Grid No.3, Internal Shield
Pin 3 - Heater



Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Cathode

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Center Values:*

	Triode Connection•	*Pentode Connection*	
PLATE VOLTAGE	250 max.	300 max.	volts
GRID No.3 (SUPPRESSOR GRID)	-	*Connect to cathode at socket*	
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	-	300 max.	volts
GRID-No.2 VOLTAGE	-	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No.1 (CONTROL-GRID) VOLTAGE: Positive-bias value	0 max.	0 max.	volts
GRID-No.2 INPUT: For grid-No.2 voltages up to 150 volts	-	0.65 max.	watt
For grid-No.2 voltages between 150 and 300 volts	-	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	

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PLATE DISSIPATION.	3.2 max.	3 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200 max.	200 max.	volts
Heater positive with respect to cathode	200* max.	200* max.	volts

Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED-AMPLIFIER CHART No.8 at front of this Section

▲ With external shield JEDEC No.316 connected to cathode.
● Grid No.3 & internal shield and grid No.2 connected to plate.
★ The dc component must not exceed 100 volts.

CURVES

For the 7543, within its ratings, are the same as those shown for Type 6AU6

World Radio History

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Power Pentode

NOVAR TYPE

For Output Stages of High Fidelity
Audio-Amplifiers and Radio Receivers

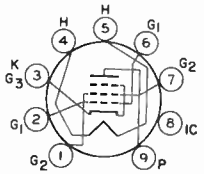
Electrical:

Heater Characteristics and Ratings:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	0.600	amp
Maximum Heater-Cathode Voltage:		
Heater negative with respect to cathode.	200	volts
Heater positive with respect to cathode		
Peak	200	volts
DC component	100	volts
Direct Interelectrode Capacitances (Approx.):[a]		
Grid No.1 to plate	0.15	pf
Input: G1 to (K + G3, G2, H)	11.0	pf
Output: P to (K + G3, G2, H)	4.4	pf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	3.110"
Maximum Seated Length	2.730"
Diameter	1.062" to 1.188"
Bulb	T-9
Dimensional Outline	See *General Section*
Bases (Alternates):	
Small-Button Novar 9-Pin	(JEDEC No.E9-75)
Small-Button Novar 9-Pin with Exhaust Tip	(JEDEC No.E9-89)
Basing Designation for BOTTOM VIEW	9NZ

Pin 1 - Grid No.2
Pin 2 - Grid No.1
Pin 3 - Cathode, Grid No.3
Pin 4 - Heater
Pin 5 - Heater
Pin 6 - Grid No.1
Pin 7 - Grid No.2
Pin 8 - Do Not Use
Pin 9 - Plate



AF POWER AMPLIFIER — Class A1

Maximum Ratings, *Design-Maximum Values:*

Plate Voltage	550	volts
Grid-No.2 (Screen-Grid) Voltage	440	volts
Cathode Current	90	ma
Grid-No.2 Input	3.3[b]	watts
Plate Dissipation	19	watts
Bulb Temperature (At hottest point on bulb surface)	240	°C

← Indicates a change.

World Radio History

Typical Operation and Characteristics:

Plate Voltage	300	volts
Grid-No.2 Voltage	300	volts
Grid-No.1 (Control-Grid) Voltage	-10	volts
Peak AF Grid-No.1 Voltage	10	volts
Zero-Signal Plate Current	60	ma
Max.-Signal Plate Current	75	ma
Zero-Signal Grid-No.2 Current	8	ma
Max.-Signal Grid-No.2 Current	15	ma
Plate Resistance (Approx.)	29000	ohms
Transconductance	10200	μmhos
Effective Load Resistance	3000	ohms
Total Harmonic Distortion	13	%
Max.-Signal Power Output	11	watts

Maximum-Circuit Values:

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.3	megohm
For cathode-bias operation	1	megohm

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Maximum Ratings, *Design-Maximum Values:*

Plate Voltage	550	volts
Grid-No.2 (Screen-Grid) Voltage	440	volts
Cathode Current	90	ma
Grid-No.2 Input	3.3[b]	watts
Plate Dissipation	19	watts
Bulb Temperature (At hottest point on bulb surface)	240	°C

Typical Operation:

Values are for 2 tubes

	Fixed Bias					Cathode Bias	
Plate Supply Voltage	300	350	400	450	450	450	volts
Grid-No.2 Supply Voltage	300	350	350	350	400	400	volts
Grid-No.1 Voltage	-12.5	-15.5	-16	-16.5	-21	c	volts
Cathode Resistor (Common to both cathodes)	-	-	-	-	-	170	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage	25	31	32	33	42	31	volts
Zero-Signal Plate Current	74	72	64	60	40	86	ma
Max.-Signal Plate Current	116	130	135	142	145	94	ma
Zero-Signal Grid-No.2 Current	10	9.5	8	7.2	5	10	ma
Max.-Signal Grid-No.2 Current	28	32	28	26	30	20	ma

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	Fixed Bias					Cathode Bias	
Effective Load Resistance (Plate to plate)	6600	6600	6600	6600	6600	10000	ohms
Total Harmonic Distortion	5	2.5	2	2.5	5	2	%
Max.-Signal Power Output	24	30	34	38	44	28	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.3	megohm
For cathode-bias operation	1	megohm

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Grid No.2 of each tube connected to tap on plate winding of output transformer

Maximum Ratings, *Design-Maximum Values:*

Plate and Grid-No.2 (Screen-Grid) Supply Voltage	440	volts
DC Cathode Current	90	ma
Grid-No.2 Input	3.3[b]	watts
Plate Dissipation	19	watts
Bulb Temperature (At hottest point on bulb surface)	230	°C

Typical Operation:

Values are for 2 tubes

	Fixed Bias	Cathode Bias	
Plate Supply Voltage	400	425	volts
Grid-No.2 Supply Voltage	d	d	volts
Grid-No.1 Voltage	-20.5	c	volts
Cathode Resistor (Common to both cathodes)	-	185	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage	41	42	volts
Zero-Signal Plate Current	66	68	ma
Max.-Signal Plate Current	115	100	ma
Zero-Signal Grid-No.2 Current	8	12	ma
Max.-Signal Grid-No.2 Current	18	16	ma
Effective Load Resistance (Plate to plate)	6600	6600	ohms
Total Harmonic Distortion	2.5	3.5	%
Max.-Signal Power Output	23	21	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.3	megohm
For cathode-bias operation	1	megohm

World Radio History

[a] Without external shield.

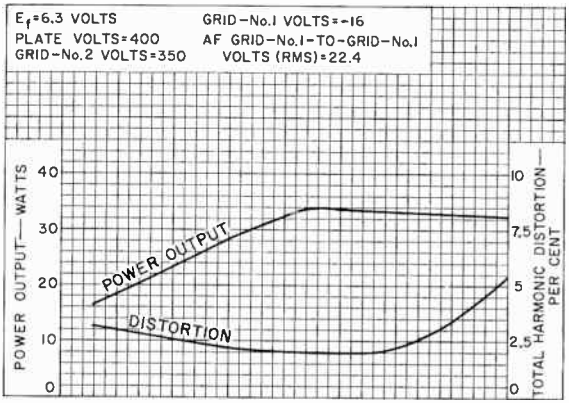
[b] Grid-No. 2 input may reach 6 watts during peak levels of speech and music signals.

[c] Connected to negative end of cathode resistor.

[d] Obtained from taps on the primary winding of the output transformer. The taps are located on each side of the center-tap (B+) so as to supply 50 per cent of the plate signal voltage to the grid No. 2 of each output tube.

Operation Characteristics

Push-Pull Class AB_1



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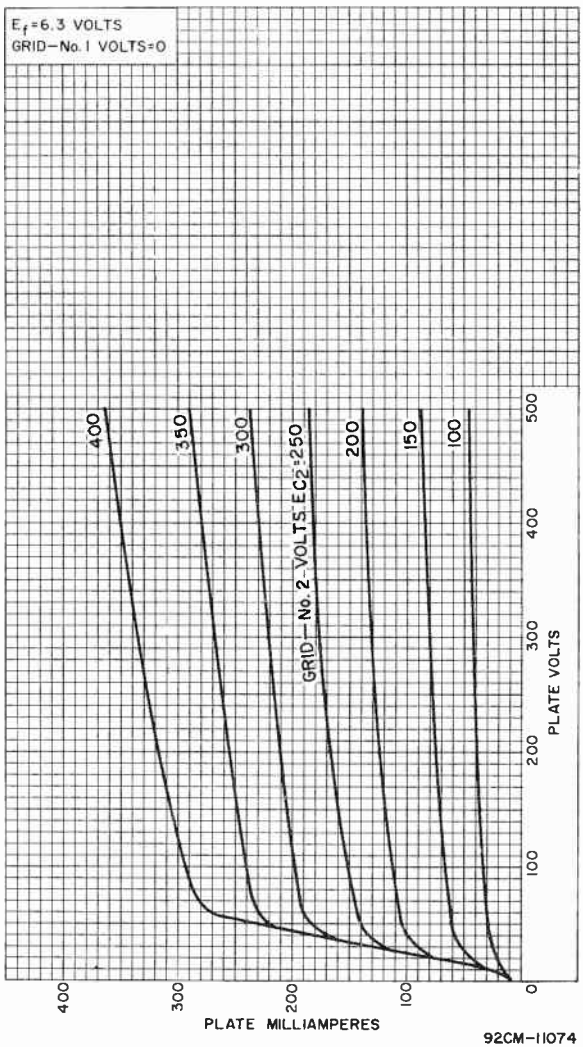
AVERAGE PLATE CHARACTERISTICS



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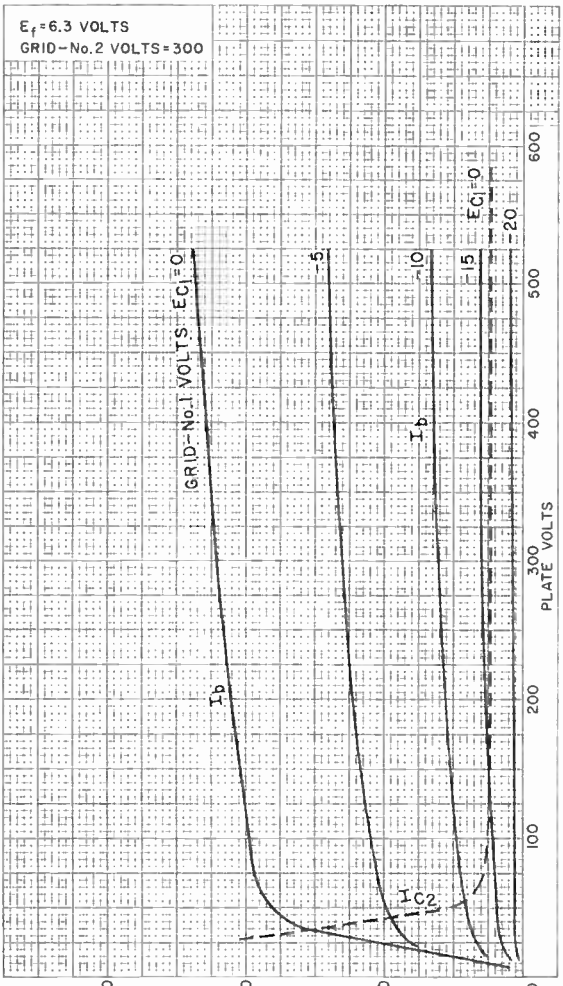
AVERAGE CHARACTERISTICS



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World Radio History

5842/417A

Medium-Mu Triode

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Absolute-Maximum Values):*			
Voltage (AC or DC)	6.3 ± 0.6		volts
Current at heater volts = 6.3	0.300		amp
Peak heater-cathode voltage:			
Heater negative with respect to cathode		55 max.	volts
Heater positive with respect to cathode		55 max.	volts
Direct Interelectrode Capacitances (Approx.):[a]			
Plate to cathode and heater	0.55		μμf
Cathode to grid and heater	9		μμf
Plate to grid and heater	1.8		μμf

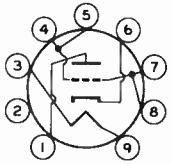
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	130	150	volts
Grid Voltage[b]	9	–	volts
Cathode Resistor	360	60	ohms
Amplification Factor	43	43	
Plate Resistance (Approx.)	1600	1700	ohms
Transconductance	27000	25000	μmhos
Plate Current	27	25	ma

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (rxcluding tip)	1-1/8" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9V

Pin 1 – Plate
Pin 2 – No Internal Connection
Pin 3 – Heater
Pin 4 – Grid



Pin 5 – Grid
Pin 6 – Cathode
Pin 7 – Grid
Pin 8 – Grid
Pin 9 – Heater

AMPLIFIER — Class A_1

Maximum Ratings, *Absolute-Maximum Values:*

PLATE VOLTAGE	200 max.	volts
CATHODE CURRENT	38 max.	ma

World Radio History

PLATE DISSIPATION.	4.5 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface).	160 max.	°C

[a] Without external shield.
[b] Measured with respect to the negative end of the cathode resistor.

World Radio History

5847/404A

Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Absolute-Maximum Values)*:			
Voltage (AC or DC)		6.3 ± 0.6	volts
Current at heater volts = 6.3		0.300	amp
Peak heater-cathode voltage:			
Heater negative with respect to cathode		55 max.	volts
Heater positive with respect to cathode		55 max.	volts
Direct Interelectrode Capacitances:	*Without External Shield*	*With External Shield*[a]	
Grid No.1 to plate	0.05 max.	0.04 max.	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater	7	7.1	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater	2.5	2.9	μμf
Characteristics, Class A_1 Amplifier:		[b]	
Plate Supply Voltage	150	160	volts
Grid-No.2 Supply Voltage	150	160	volts
Grid-No.1 Voltage	-	8.5	volts
Cathode Resistor	110	600	ohms
Transconductance	12500	12500	μmhos
Plate Current	13	13	ma
Grid-No.2 Current	4.5	4.5	ma

Mechanical:

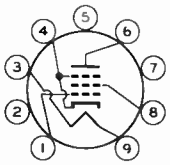
Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Diameter	0.750" to 0.375"
Dimensional Outline	See *General Section*
Bulb	T6-1/2

World Radio History

5847/404A

Base. . . . . .Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW. 9X

Pin 1 - Grid No.1
Pin 2 - No Internal Connection
Pin 3 - Heater
Pin 4 - Cathode, Grid No.3, Internal Shield



Pin 5 - No Internal Connection
Pin 6 - Plate
Pin 7 - No Internal Connection
Pin 8 - Grid No.2
Pin 9 - Heater

AMPLIFIER — Class A_1

Maximum Ratings, *Absolute-Maximum Values:*

PLATE VOLTAGE	200 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	165 max.	volts
CATHODE CURRENT	40 max.	ma
GRID-No.2 INPUT	0.85 max.	watt
PLATE DISSIPATION	3.3 max.	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	0.1 max.	megohm

[a] With external shield JEDEC No.315 connected to cathode.
[b] Operating conditions to minimize gain variations due to supply-voltage fluctuations.

World Radio History

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PREMIUM TYPE 5636

SHARP-CUTOFF PENTODE

SUBMINIATURE TYPE

Intended for applications at altitudes up to 60,000 feet where dependable performance under shock and vibration is paramount

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathode:

Voltage	6.3	ac or dc volts
Current	0.150	amp

Direct Interelectrode Capacitances:

	Without External Shield	With External Shield*	
Grid No.1 to plate	0.034 max.	0.02 max.	μμf
Grid No.1 to all other electrodes	4	4	μμf
Grid No.3 to all other electrodes	3.8	4	μμf
Plate to all other electrodes	1.9	3.4	μμf
Grid No.1 to grid No.3	0.17 max.	0.15 max.	μμf
Grid No.3 to plate	1.1 max.	1.1 max.	μμf

Characteristics, Class A_1 Amplifier:

Plate-Supply Voltage	100	100	volts
Grid No.3	♦	-	
Grid-No.3 Supply Voltage	-	-1	volt
Grid-No.2 Supply Voltage	100	100	volts
Cathode Resistor	150	150	ohms
Plate Resistance (Approx.)	0.11	0.05	megohm
Transconductance:			
Grid No.1 to plate	3200	1950	μmhos
Grid No.3 to plate	500	950	μmhos
Plate Current	5.6	4	ma
Grid-No.2 Current	4	5.8	ma
Grid-No.1 Voltage (Approx.) for plate current of 10 μa.	-7.5	-	volts
Grid-No.3 Voltage (Approx.) for plate current of 10 μa.	-	-8	volts

Mechanical:

Mounting Position	Any
Maximum Length (Excluding flexible leads)	1-3/8"
Length, Bulb Seat to Bulb Top (Excluding tip)	1.075" ± 0.060"
Diameter	0.366" to 0.400"
Dimensional Outline	*See General Section*
Bulb	T3
Leads, Flexible	8
Length	1-1/2" to 1-3/4"
Orientation and diameter	*See Dimensional Outline*

* With external shield having inside diameter of 0.405" connected to lead 8.

♦ Connected to cathode at socket.

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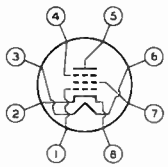
SHARP-CUTOFF PENTODE

BOTTOM VIEW



Lead 1 – Grid No.1
Lead 2 – Cathode
Lead 3 – Heater
Lead 4 – Grid No.3
Lead 5 – Plate
Lead 6 – Heater
Lead 7 – Grid No.2
Lead 8 – Cathode

AMPLIFIER – Class A_1

Maximum Ratings, *Absolute Values:*

For Operation at Altitudes up to 60,000 Feet

PLATE VOLTAGE	165 max.	volts
GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE:		
Positive bias value	30 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	155 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative bias value	55 max.	volts
Positive bias value	0 max.	volts
PLATE CURRENT	11 max.	ma
GRID-No.2 CURRENT	7 max.	ma
GRID-No.2 INPUT	0.7 max.	watt
PLATE DISSIPATION	1.1 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	200 max.	volts
Heater positive with respect to cathode.	200 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Characteristics as Mixer:■

Plate-Supply Voltage	100	volts
Grid-No.3 Supply Voltage (RMS)	15	volts
Grid-No.2 Supply Voltage	100	volts
Cathode Resistor	150	ohms
Plate Resistance (Approx.)	0.32	megohm
Conversion Transconductance	1280	μmhos
Plate Current	3.5	ma
Grid-No.2 Current	5.7	ma

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For cathode-bias operation	1.1 max.	megohms

■ With local oscillator injection to grid No.3. DC grid-No.3-circuit resistance should be kept as low as possible at high frequencies.

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SHARP-CUTOFF PENTODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN•

Values are Initial, Unless Otherwise Specified

	Note	Min.	Max.	
Heater Current	1	0.140	0.160	amp
Direct Interelectrode Capacitances:				
Grid No.1 to all other electrodes	2	3.5	4.5	μμf
Grid No.3 to all other electrodes	2	3.5	4.5	μμf
Plate to all other electrodes	2	2.9	3.9	μμf
Plate Current (1)	1,3	3.7	6.9	ma
Plate Current (2)	1,4	-	100	μa
Plate Current (3)	1,5	-	100	μa
Grid-No.2 Current	1,3	2.8	5.4	ma
Transconductance, Grid No.1 to Plate:				
Gange with heater volts = 6.3	3	2700	4000	μmhos
Change with heater volts = 5.7	3	-	15	%
Change at end of 500 hours with heater volts = 6.3	3	-	20	%
Change at end of 500 hours with heater volts = 5.7	3	-	15	%
Difference between average transconductance initially, and average after 500 hours, expressed as a percentage of the initial average	1,3	-	15	%
Transconductance, Grid No.3 to Plate	1,6	500	1800	μmhos
Reverse Grid-No.1 Current	1,7	-	0.3	μa
Reverse Grid-No.1 Current at 500 hours	1,7	-	0.9	μa
Grid-No.1 Emission Current	8	-	0.5	μa
Heater-Cathode Leakage Current:				
Heater 100 volts negative with respect to cathode	1,3	-	5	μa
Heater 100 volts positive with respect to cathode	1,3	-	5	μa
Heater-Cathode Leakage Current at 500 hours:				
Heater 100 volts negative with respect to cathode	1,3	-	10	μa

•, Notes 1 to 8: See next page.

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SHARP-CUTOFF PENTODE

	Note	Min.	Max.	
Heater 100 volts positive with respect to cathode. . . .	1,3	-	10	μa
Leakage Resistance:				
Grid No.1 to all other electrodes	1,9	100	-	megohms
Plate to all other electrodes	1,10	100	-	megohms
Leakage Resistance at 500 hours:				
Grid No.1 to all other electrodes	1,9	50	-	megohms
Plate to all other electrodes	1,10	50	-	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With external shield having inside diameter of 0.405" connected to lead 8.

Note 3: With plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 100, and cathode resistor (ohms) = 150.

Note 4: With plate volts = 100, grid No.3 connected to cathode, grid-No.2 volts = 100, and grid-No.1 volts = -7.5.

Note 5: With plate-supply volts = 100, grid-No.3 supply volts = -8, grid-No.2 supply volts = 100, and cathode resistor (ohms) = 150.

Note 6: With plate-supply volts = 100, grid-No.3 supply volts = -1, grid-No.2 supply volts = 100, and cathode resistor (ohms) = 150.

Note 7: With plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 100, cathode resistor (ohms) = 150, and grid-No.1-circuit resistance (megohms) = 1.

Note 8: With ac or dc heater volts = 7.5, plate volts = 100, grid-No.3 volts = 0, grid-No.2 volts = 100, grid-No.1 volts = -7.5, and grid-No.1-circuit resistance (megohms) = 1.

Note 9: With grid No.1 100 volts negative with respect to all other electrodes connected together.

Note 10: With plate 300 volts negative with respect to all other electrodes connected together.

• Each tube is stabilized before characteristics testing by continuous operation for at least 45 hours at room temperature and with dissipation values equivalent to life-test conditions.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration. . . . . 450 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are tested in four different positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance change.

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SHARP-CUTOFF PENTODE

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 60 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance change.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 60 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 6.3, plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 100, cathode resistor (ohms) = 150, cathode-bypass capacitor (μf) = 1000, plate-load resistance (ohms) = 10,000, and vibrational acceleration of 15 g at 40 cycles per second.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . 2000 min. cycles

Under the following conditions: heater volts = 7 cycled one minute on and one minute off, heater 140 volts rms with respect to cathode, and all other electrodes connected to ground.

Audio-Frequency Noise and Microphonic Performance:

RMS Output Voltage . . . . . 70 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 6.3, plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 19, cathode resistor (ohms) = 150, grid-No.1-circuit resistance (megohms) = 0.1, grid-No.2-circuit resistance (ohms) = 1000, plate-load resistance (megohms) = 0.2, and cathode-bypass capacitor (μf) = 1000. The output voltage of a tube, when tapped, will not cause a reading on a vu meter greater than that produced when a calibrating signal of 70 millivolts rms is applied to the plate of the tube.

Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid-No.1 current in excess of 1.0 microampere under the conditions specified in the CHARACTERISTICS RANGE VALUES for reverse grid-No.1 current.

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SHARP-CUTOFF PENTODE

1-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Tubes are checked for transconductance under conditions specified under 500-Hour Intermittent Life Performance. At the end of 1 hour, the value of transconductance is read. The variation in transconductance from the 0-hour reading will not exceed 15 per cent.

100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run under conditions specified under 500-Hour Intermittent Life Performance to insure a low percentage of early inoperatives. At the end of 100 hours, a tube is considered inoperative if it shows a permanent or temporary short or open circuit or a grid-No.1-to-plate transconductance of less than 2350 micromhos under the conditions specified in CHARACTERISTICS RANGE VALUES.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: heater volts = 6.3, plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 100, heater 200 volts positive with respect to cathode, cathode resistor (ohms) = 150, grid-No.1-circuit resistance (megohms) = 1, and bulb temperature (°C) = 220. At the end of 500 hours, tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass established initial limits of heater current, grid-No.1-to-plate transconductance change, grid-No.3-to-plate transconductance, and 500-hour limits for reverse grid-No.1 current, heater-cathode leakage current, leakage resistance, and the difference in the grid-No.1-to-plate transconductance between the initial value and the average value shown under CHARACTERISTICS RANGE VALUES.

OPERATING CONSIDERATIONS

The *heater supply* should be well regulated because life and reliability of the 5636 are adversely affected by departures from the 6.3-volt value. The extent to which life is affected is a function of the amount of these departures and their durations.

The *flexible leads* of the 5636 are usually soldered to the circuit elements. Soldering of the connections should be made as far as possible from the glass button. If this precaution is not followed, the heat of the soldering operation may crack the glass seals of the leads and damage the tube.

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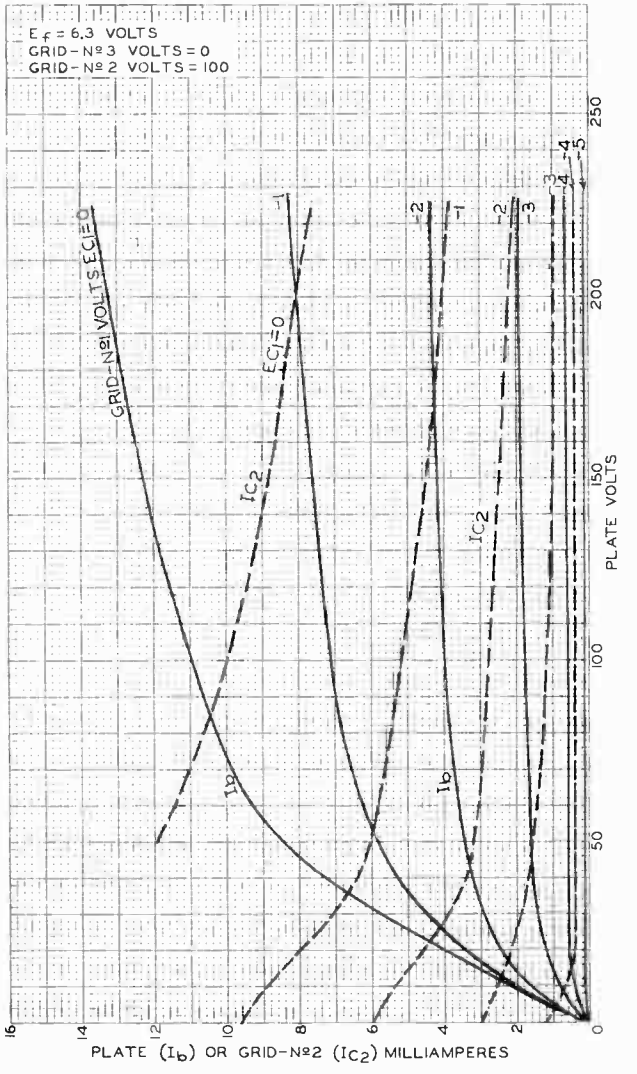
AVERAGE CHARACTERISTICS



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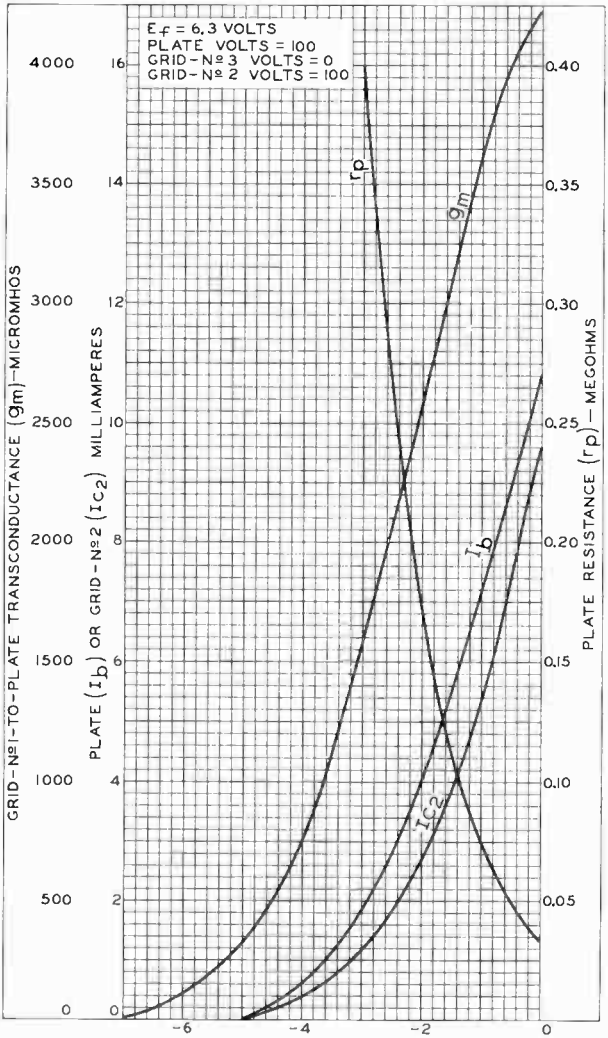
AVERAGE CHARACTERISTICS



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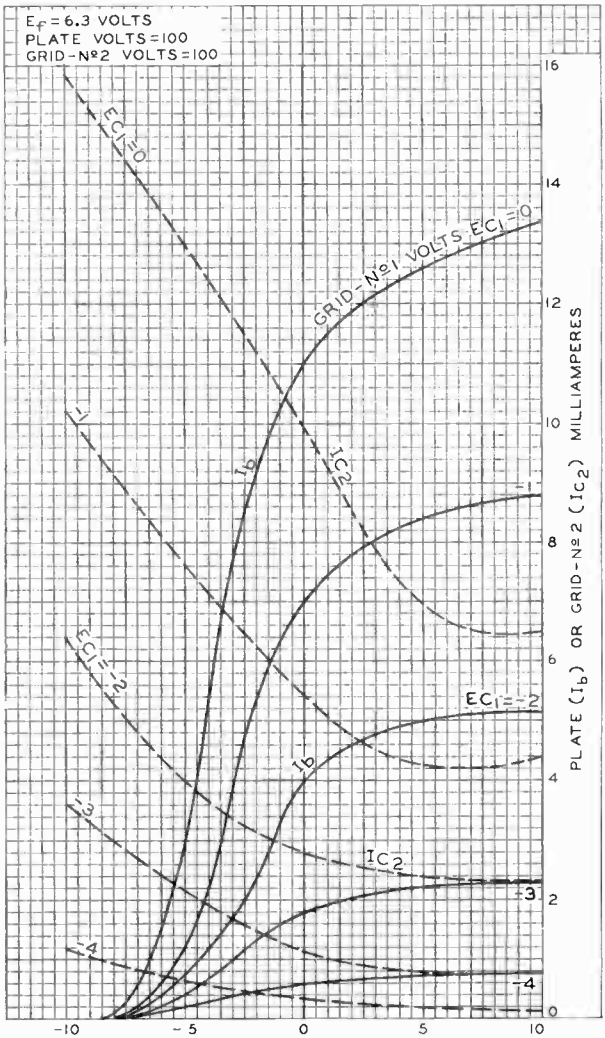
AVERAGE CHARACTERISTICS



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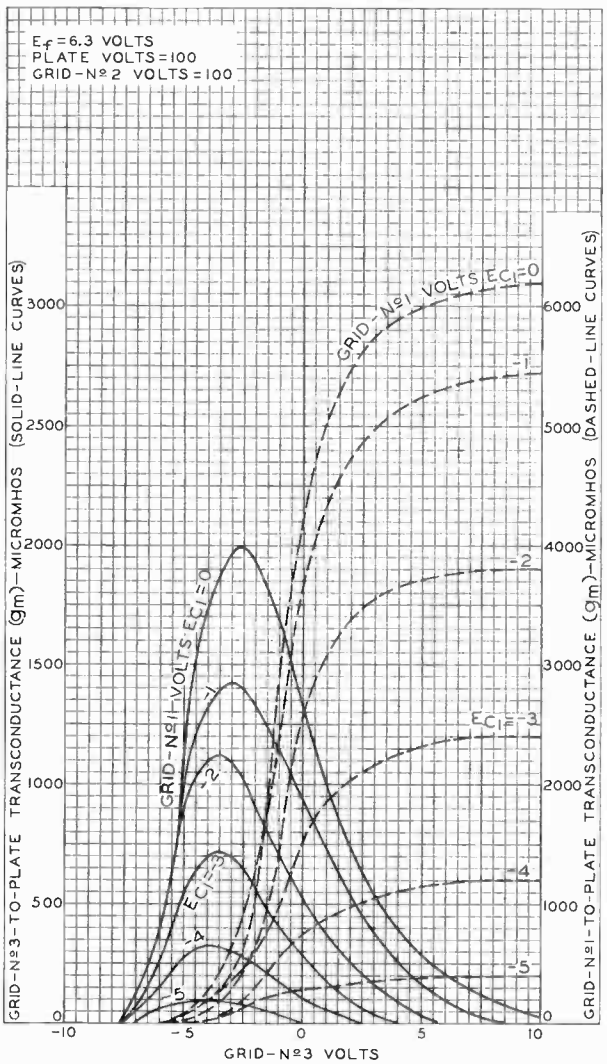
AVERAGE CHARACTERISTICS



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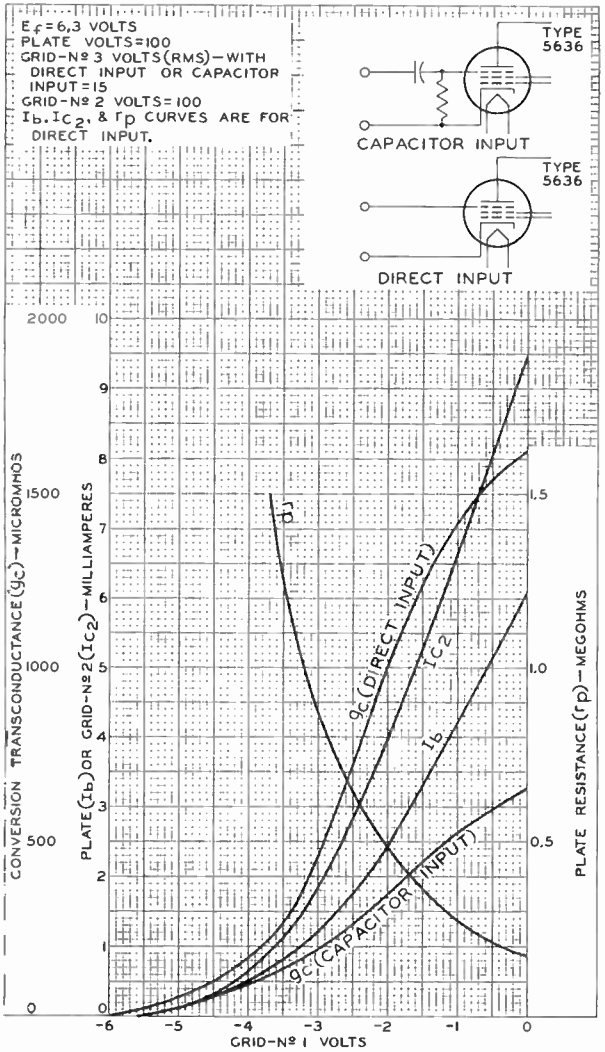
AVERAGE CHARACTERISTICS



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5642

HALF-WAVE VACUUM RECTIFIER

SUBMINIATURE TYPE

For compact, portable high-voltage-rectifier applications

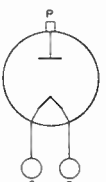
GENERAL DATA

Electrical:

Filament, Coated:		
Voltage	1.25	ac or dc volts
Current	0.2	amp
Direct Interelectrode Capacitance (Approx.):[c]		
Plate to filament	0.6	$\mu\mu f$

Mechanical:

Operating Position	Any
Maximum Length (Excluding flexible leads)	2.380"
Length, Base Seat to Bulb Top (Excluding tip)	1.700" ± 0.060"
Diameter	0.366" to 0.400"
Bulb	T3
Plate Terminal:	
Minimum length	0.250"
Leads, Flexible, Tinned	2
Minimum length	1.5"
Orientation and diameter	*See Dimensional Outline*
Maximum untinned distance from base seat	0.050"
Base	Special 2-Lead



P – Plate Terminal

F – Filament Lead

PULSED-RECTIFIER SERVICE

Maximum and Minimum Ratings, *Design-Center Values:*

For operation in a 525-line, 30-frame system[1]

PEAK INVERSE PLATE VOLTAGE	10000 max.	volts
PEAK PLATE CURRENT	5 max.	ma
DC PLATE CURRENT	0.25 max.	ma
FREQUENCY OF SUPPLY VOLTAGE	5 min.	kc

Typical Operation:

Peak-Pulse Plate Voltage[e]	8000	volts
DC Output Voltage (2 tubes)	12000	volts
DC Output Current	0.15	ma

Characteristics:

Plate Current for plate volt = 30	4	ma

o.f.[e]: See next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON NEW JERSEY

TENTATIVE DATA

World Radio History

5642

5642

HALF-WAVE VACUUM RECTIFIER

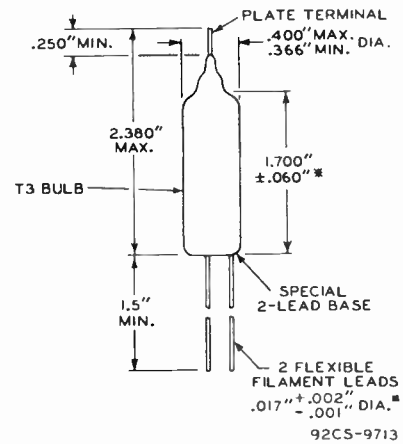
○ Without external shield.

□ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

● The duration of the voltage pulse must 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

The *flexible leads* of the 5642 are usually soldered to the circuit elements. Soldering of the connections should be made as far as possible from the glass button and the glass tip. If this precaution is not followed, the heat of the soldering operation will crack the glass seals of the leads and damage the tube.



* Measured from base seat to bulb-top line as determined by a ring gauge of 0.210" ± 0.001" inside diameter.

■ The specified lead diameter applies only in the zone between 0.050" and 0.250" from the base seat. Between 0.250" and 1.500", a maximum diameter of 0.021" is held. Outside of these zones, the lead diameter is not controlled.

World Radio History

5654 PREMIUM TYPE

5654

SHARP-CUTOFF PENTODE

MINIATURE TYPE

Intended for RF and IF Broad-Band Applications where dependable performance under shock and vibration are paramount. The 5654 is a "premium" version of the 6AK5.

GENERAL DATA

Electrical:

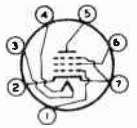
Heater, Pure Tungsten, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.175	amp
Direct Interelectrode Capacitances:▲		
Grid No.1 to Plate	0.020 max.	μμf
Input	4.0	μμf
Output	2.85	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length from Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)

BOTTOM VIEW

Pin 1 – Grid No.1
Pin 2 – Cathode, Grid No.3, Int. Shield
Pin 3 – Heater
Pin 4 – Heater



Pin 5 – Plate
Pin 6 – Grid No.2
Pin 7 – Cathode, Grid No.3, Int. Shield

AMPLIFIER - Class A_1

Maximum Ratings, *Absolute Values*:

PLATE VOLTAGE	200 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	155 max.	volts
PLATE DISSIPATION	1.85 max.	watts
GRID-No.2 INPUT	0.55 max.	watt
CATHODE CURRENT	20 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater positive with respect to cathode	100 max.	volts
Heater negative with respect to cathode	100 max.	volts

Typical Operation and Characteristics:

Plate Voltage	120	180	volts
Grid-No.2 Voltage	120	120	volts

▲ According to RTMA Standard ET-109A with external shield No.316.

World Radio History

RCA

5654

SHARP-CUTOFF PENTODE

Cathode-Bias Resistor	180	180	ohms
Plate Resistance (Approx.)	0.30	0.50	megohm
Transconductance	5000	5100	μmhos
Plate Current	7.5	7.7	ma
Grid-No.2 Current	2.5	2.4	ma
Grid-No.1 Voltage (Approx.) for plate current of 10 μamp	-8.5	-8.5	volts

Maximum Circuit Values:

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

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 500 max. g

Tubes are held rigid in three different positions in a Navy Type, High Imoact (flyweight) Shock Machine and are subjected to 500 g impact acceleration.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 60 cycles per second for 32 hours.

Heater Cycling Life Performance:

Cycles of Intermittent Operation . . . 2000 min. cycles

Under the following conditions: With heater voltage of 7.5 volts cycled 1 minute on and 1 minute off, heater positive with respect to cathode by +100 volts dc, and plate, grid-No.2, and grid-No.1 voltage = 0 volts.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.160	0.190	amp
Grid-No.1-to-Plate Capacitance	-	-	0.020	μμf
Input Capacitance	-	3.4	4.6	μμf
Output Capacitance	-	2.45	3.25	μμf
Plate Current	1,2	3.0	12.0	ma
Transconductance	1,2	3500	6500	μmhos
Reverse Grid Current	1,3	-	0.1	μamp

Note 1: With 6.3 volts ac on heater.

Note 2: With plate voltage of 120 volts, grid-No.2 voltage of 120 volts, and grid-No.1 voltage of -2 volts.

Note 3: With plate voltage of 120 volts, grid-No.2 voltage of 120 volts, grid-No.1 voltage of -2 volts, and grid-No.1 resistor of 0.1 megohm.

CURVES
are the same as shown for Type 6AK5
in the Receiving Tube Section

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5670

Medium-Mu Twin Triode

9-PIN MINIATURE TYPE
SHOCK AND VIBRATION RATINGS — LOW MICROPHONISM
LIFE PERFORMANCE DATA — RCA DARK HEATER

"Command" Type for a Wide Variety of Applications Including: Mixers, Oscillators and Amplifiers up through the VHF Region; Multivibrators, Synchronizing Amplifiers and Industrial Control Circuits; and Mobile, Military, and Aircraft Equipment at Altitudes up to 80,000 Feet

GENERAL DATA

Electrical:

Heater Characteristics and Ratings:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	0.350	amp
Peak heater-cathode voltage (Each unit):		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances:[a]		
Grid to plate (Each unit)	1.1	pf
Grid to cathode and heater (Each unit)	2.2	pf
Plate to cathode and heater (Each unit)	1.0	pf
Plate to plate	0.1 max.	pf

Characteristics, Class A_1 Amplifier (Each Unit):

Plate Supply Voltage	150	volts
Cathode Resistor	240	ohms
Amplification Factor	35	
Plate Resistance (Approx.)	6400	ohms
Transconductance	5500	μmhos
Plate Current	8.2	ma
Grid Voltage (Approx.) for plate μa = 10	-8	volts

Mechanical:

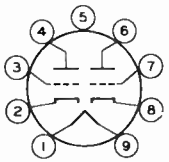
Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	TG-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

World Radio History

5670

Basing Designation for BOTTOM VIEW. 8CJ

Pin 1 – Heater
Pin 2 – Cathode of Unit No.2
Pin 3 – Grid of Unit No.2
Pin 4 – Plate of Unit No.2
Pin 5 – Internal Shield[b]



Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Absolute-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
CATHODE CURRENT	18 max.	ma
GRID CURRENT	3 max.	ma
PLATE DISSIPATION	1.35 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	165 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance	0.5 max.	megohm

PUSH-PULL AMPLIFIER — Class AB_1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

Same as for AMPLIFIER — Class A_1

Typical Operation:

Values are for Both Units

Plate Supply Voltage	300	volts
Cathode Resistor (Common to both units)	800	ohms
Peak AF Grid-to-Grid Voltage	19.8	volts
Zero-Signal Plate Current	9.8	ma
Max.-Signal Plate Current	12.6	ma
Effective Load Resistance (Plate-to-plate)	27000	ohms
Total Harmonic Distortion	10	%
Max.-Signal Power Output (Approx.)	1	watt

Maximum Circuit Values:

Grid-Circuit Resistance	0.5 max.	megohm

[a] Without external shield.
[b] Pin 5 should be connected to ground.

World Radio History

CHARACTERISTICS RANGE VALUES

Values are For Each Unit and Are Initial Unless Otherwise Specified

	Note	Min.	Max.	
Heater Current	1	330	370	ma
Heater Current at 500 Hours	1	330	375	ma
Heater Current at 1000 Hours	1	330	380	ma
Direct Interelectrode Capacitances:				
Grid to plate	2	0.8	1.4	pf
Grid to cathode and heater	2	1.7	2.7	pf
Plate to cathode and heater	2	0.7	1.3	pf
Plate to plate	2	-	0.10	pf
Amplification Factor	1,3	26	44	
Plate Current (1)	1,3	5.9	10.5	ma
Plate-Current Difference Between Units	1,3	-	1.8	ma
Plate Current (2)	1,4	-	45	μa
Plate Current (3)	1,11	5	-	μa
Transconductance:				
With heater volts = 6.3	3	4500	6500	μmhos
Change with heater volts = 5.7	3	-	15	%
Change at end of 500 hours with heater volts = 6.3	3	-	20	%
Change at end of 1000 hours with heater volts = 6.3	3	-	25	%
Change at end of 500 hours from heater volts = 6.3 to heater volts = 5.7	3	-	15	%
Transconductance Change: Difference between average transconductance initially and average transconductance after 500 hours expressed as a percentage of the initial average	1,3	-	15	%
Reverse Grid Current	1,5	-	0.3	μa
Reverse Grid Current at end of 500 hours	1,5	-	0.3	μa
Reverse Grid Current at end of 1000 hours	1,5	-	0.3	μa
Grid Emission Current	6,7	-	0.5	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,8	-	7	μa
Heater positive with respect to cathode	1,8	-	7	μa
Heater-Cathode Leakage Current at end of 500 hours:				
Heater negative with respect to cathode	1,8	-	7	μa
Heater positive with respect to cathode	1,8	-	7	μa

World Radio History

	Note	Min.	Max.	
Heater-Cathode Leakage Current at end of 1000 Hours:				
Heater negative with respect to cathode.	1,8	-	7	μa
Heater positive with respect to cathode.	1,8	-	7	μa
Leakage Resistance:				
Between grid and all other electrodes tied together. .	1,9	100	-	megohms
Between plate and all other electrodes tied together. .	1,10	100	-	megohms
Leakage Resistance at the end of 500 hours:				
Between grid and all other electrodes tied together. .	1,9	50	-	megohms
Between plate and all other electrodes tied together. .	1,10	50	-	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With no external shield.

Note 3: With dc plate supply voltage of 150 volts, cathode resistor of 240 ohms, and cathode bypass capacitor of 1000 μf. Each unit is tested separately. Electrodes of units not under test are grounded.

Note 4: With dc plate voltage of 150 volts, plate load resistance of 0.25 megohm, and dc grid voltage of -10 volts. Each unit is tested separately. Electrodes of unit not under test are grounded.

Note 5: With dc plate supply voltage of 150 volts, grid resistor of 0.5 megohm, cathode resistor of 240 ohms, and cathode bypass capacitor of 1000 μf. Each unit is tested separately. Electrodes of unit under test are grounded.

Note 6: With 7.5 volts ac or dc on heater.

Note 7: With dc plate voltage of 150 volts, grid resistor of 0.5 megohm, and dc grid voltage of -10 volts. Each unit is tested separately. Electrodes of unit not under test are grounded.

Note 8: With 100 volts dc between heater and cathode.

Note 9: With grid 100 volts negative with respect to all other electrodes tied together.

Note 10: With plate 300 volts negative with respect to all other electrodes tied together.

Note 11: With dc plate voltage of 150 volts and dc grid voltage of -4 volts.

SPECIAL TESTS & PERFORMANCE DATA

600-g Shock Test:

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are subjected in four different positions to an impact acceleration of 600 g. At the end of this test, tubes will not show permanent or temporary shorts, or open circuits, and are required to meet established limits for low frequency vibration, heater cathode leakage current, transconductance, and reverse grid current.

Fatigue Test:

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and are subjected to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours in each of three positions. At the end of this test,

World Radio History

tubes will not show permanent or temporary shorts, or open circuits, and are required to meet established limits for low frequency vibration, heater-cathode leakage current, transconductance, and reverse grid current.

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: Plate of unit No.1 tied to plate of unit No.2, grid of unit No.1 tied to grid of unit No.2, ac heater volts = 6.3, plate supply volts = 90, dc grid volts = -3, plate load resistor (ohms) = 2000 and vibrational acceleration = 10 g at 40 cycles per second. The rms output voltage across the plate load resistor as a result of vibration of the tube must not exceed 130 millivolts.

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. Tubes will withstand a minimum of 2000 cycles of intermittent operation under the following conditions: ac heater voltage of 7.5 volts cycled one minute on, one minute off, with heater at a potential of +135 volts with respect to cathode, all other elements disconnected. At the end of this test, tubes will not show open heaters, open cathodes, heater-cathode shorts or excessive heater-cathode leakage.

Audio-Frequency Noise and Microphony Performance:

This test is performed on a sample lot of tubes from each production run, under the following conditions: Plate of unit No.1 tied to plate of unit No.2, grid of unit No.1 to plate of unit No.2, ac heater volts = 6.3, cathode resistor (ohms) = 240, plate supply volts = 250, and plate load resistor (ohms) = 10,000. The output voltage must be less than 200 mv ac when the tube is tapped.

Shorts and Continuity Test (Thyratron-Type Detector Circuit):

This test, in addition to a 100% factory test, is performed on a sample lot of tubes from each production run. A tube is considered inoperative if either unit shows a permanent or temporary short or open circuit or a value of reverse grid current in excess of 1 microampere under the conditions specified in the *Characteristics Range Values* for reverse grid current.

Grid-Pulse Emission Test:

This test is performed on a sample lot of tubes from each production run, under the following conditions: ac heater volts = 6.3, plate volts = 150, grid driven 36 volts positive, from a cutoff bias of -70 volts dc, with a 10 microsecond pulse at a pulse repetition rate of 1000 pulses per second. Tubes must meet a minimum peak current value of 270 milliamperes.

AC Emission Test:

This test is performed on a sample lot of tubes from each production run under the following conditions: ac heater volts = 6.0, plate volts = 100, and grid volts (rms) = 5.0. Tubes must meet a limit dc plate current of 11 milliamperes.

World Radio History

2- and 20-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run, under the following conditions: ac heater volts = 6.3, plate supply volts = 150, cathode resistor each unit (ohms) = 250, grid resistor each unit (megohm) = 0.5, dc heater to cathode voltage of 135 volts (heater positive with respect to cathode), and room temperature. The value of transconductance measured at the end of two and twenty hours, must be within 10 per cent of the initial reading.

100-hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. The conditions are the same as for the two and twenty hour Stability Life Performance except that the heater is switched off once every two hours and the tube cools with electrode potentials applied. A tube is considered inoperative at the end of 100 hours total heater-on time if it shows a permanent short, open circuit, or a value of reverse grid current in excess of 1 microampere measured under the conditions specified in *Characteristics Range Values* for reverse grid current. Tube must also meet minimum g_m limit.

500-hour Intermittent Life Performance:

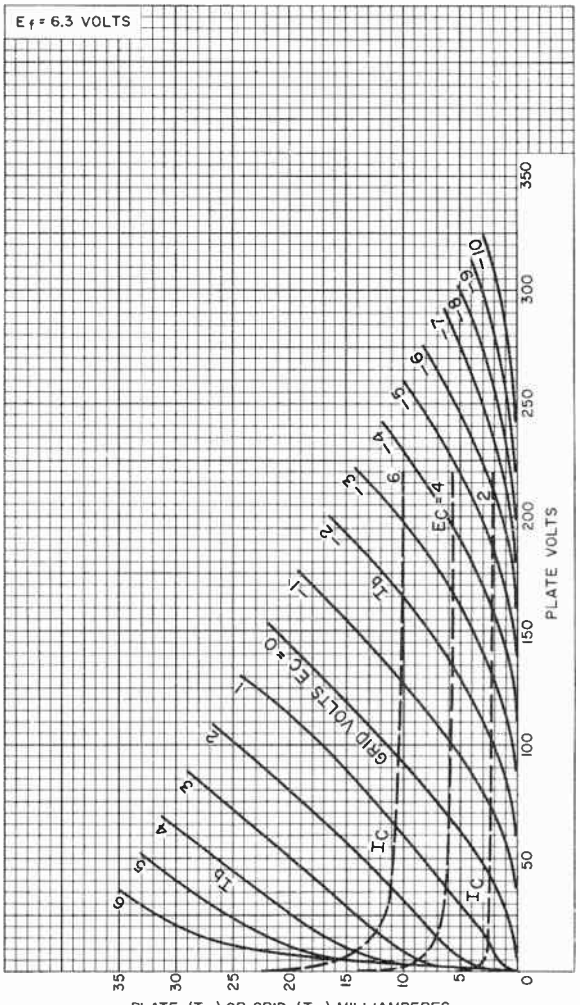
This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. The conditions for life test are as given above for the two and twenty hour Stability Life Performance test except that the bulb temperature is maintained at 165° C. At the end of 500 hours total heater-on time tubes must not show any shorts or open circuits and must pass the established 500 hours limits of heater current, reverse grid current, heater cathode leakage current, transconductance changes and leakage resistance shown under *Characteristics Range Values*.

1000-hour Intermittent Life Performance:

This test is performed on a minimum of one production run per month under the same condition as the 500 hour Intermittent Life Performance. At the end of 1000 hours total heater-on time, tubes must not show permanent or temporary shorts or open circuits and must pass the established 1000-hour limits for heater current, transconductance change, reverse grid current and heater cathode leakage current shown under the *Characteristics Range Values*.

World Radio History

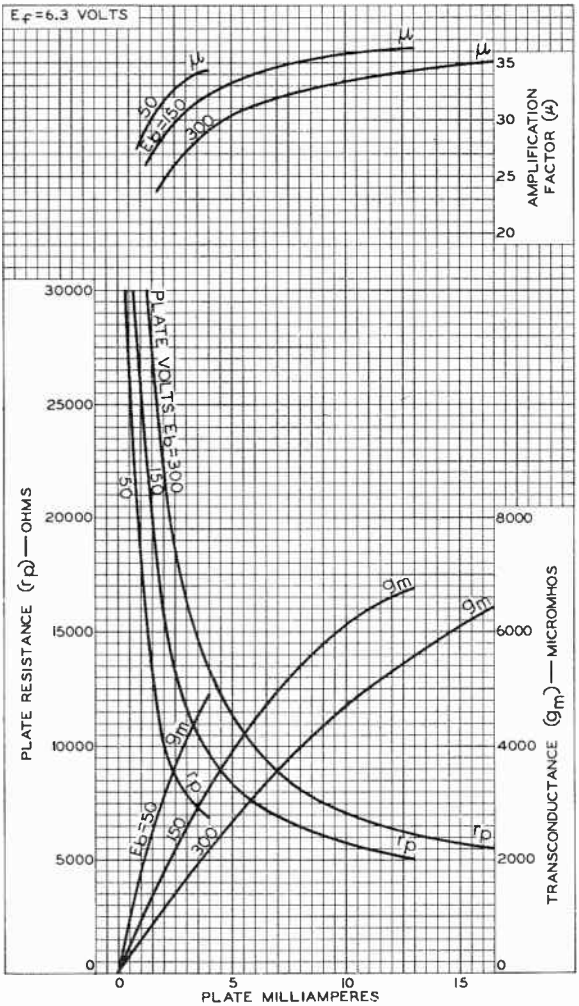
AVERAGE PLATE CHARACTERISTICS
Each Unit



92CM-12087

World Radio History

AVERAGE CHARACTERISTICS



92CM-12088

RCA

5686

BEAM POWER TUBE

5686 PREMIUM TYPE

9-PIN MINIATURE TYPE

For af or rf power-amplifier applications at frequencies up to 160 Mc

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:
Voltage. . . . . 6.3 . . . . . ac or dc volts
Current. . . . . 0.35 . . . . . amp

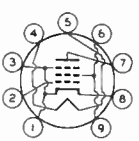
Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield°*	
Grid No.1 to plate	0.11 max.	0.08 max.	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater.	6.4	6.5	μμf
Plate to cathode & grid No.3, grid No.2, and heater.	4	8.5	μμf

Mechanical:

Operating Position . . . . . Any
Maximum Overall Length . . . . . 2-3/16"
Maximum Seated Length. . . . . 1-15/16"
Length, Base Seat to Bulb Top (Excluding tip). .1-9/16" ± 3/32"
Diameter . . . . . 0.750" to 0.875"
Dimensional Outline. . . . . *See General Section*
Bulb T6-1/2
Base . . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW 9G

Pin 1 - Cathode, Grid No.3
Pin 2 - Grid No.1
Pin 3 - Cathode, Grid No.3
Pin 4 - Heater



Pin 5 - Heater
Pin 6 - Grid No.2
Pin 7 - Plate
Pin 8 - Cathode, Grid No.3
Pin 9 - Grid No.2

AUDIO-FREQUENCY POWER AMPLIFIER — Class A_1

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE.	275 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE.	275 max.	volts
GRID-No.2 INPUT.	3.3 max.	watts
PLATE DISSIPATION.	8.25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts

Typical Operation and Characteristics:

Plate Voltage.	250	volts
Grid-No.2 Voltage.	250	volts

°: See next page.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

5686

BEAM POWER TUBE

Grid-No.1 (Control-Grid) Voltage	-12.5	volts
Peak AF Grid-No.1 Voltage	12.5	volts
Zero-Signal Plate Current	27	ma
Zero-Signal Grid-No.2 Current	3	ma
Plate Resistance (Approx.)	45000	ohms
Transconductance	3100	μmhos
Load Resistance	9000	ohms
Max.-Signal Power Output	2.7	watts

Maximum Circuit Values:

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

RADIO-FREQUENCY POWER AMPLIFIER — Class C

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	275 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	275 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE	-165 max.	volts
PLATE CURRENT	44 max.	ma
GRID-No.2 CURRENT	16.5 max.	ma
GRID-No.1 CURRENT	3.3 max.	ma
PLATE INPUT	11 max.	watts
GRID-No.2 INPUT	3.3 max.	watts
PLATE DISSIPATION	8.25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Typical Operation:

	At frequencies up to 160 Mc		
Plate Voltage	250	250	volts
Grid-No.2 Voltage	180	250	volts
Grid-No.1 Voltage	-30	-50	volts
From grid-No.1 resistor of	15000	25000	ohms
Peak RF Grid-No.1 Voltage	50	75	volts
Plate Current	30	40	ma
Grid-No.2 Current (Approx.)	6.5	10.5	ma
Grid-No.1 Current (Approx.)	2	2	ma
RF Grid-No.1 Driving Power (Approx.)	0.1	0.15	watt
Power Output (Approx.)	5	6.5	watts
Useful Power Output at 125 Mc	-	5.25	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	50000 max.	ohms

° With external shield JEDEC NO.315 connected to cathode & grid No.3.

5686

BEAM POWER TUBE

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are subjected in four different positions to an impact acceleration of 450 g.

Fatigue Rating:

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected to 2.5 g vibrational acceleration at a fixed frequency of 25 cycles per second for 100 hours in each of three positions.

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. Tubes will withstand a minimum of 2000 cycles of intermittent operation under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 100 volts positive with respect to cathode, and all other elements connected to ground.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:			
Heater arrangement	*Series*	*Parallel*	
Voltage	12.6	6.3	ac or dc volts
Current	0.45	0.9	amp
Direct Interelectrode Capacitances (Approx.):[D]			
Grid to plate (Each unit)		4	μμf
Grid to cathode and heater (Each unit)		4	μμf
Plate to cathode and heater:			
Unit No.1		0.6	μμf
Unit No.2		0.5	μμf
Heater to cathode (Each unit)		7	μμf
Grid to grid		0.025	μμf
Plate to plate		0.75	μμf

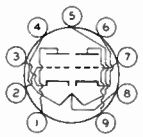
Characteristics, Class A_1 Amplifier (Each Unit):

Plate Voltage	120	180	250	volts
Grid Voltage	-2	-7	-12.5	volts
Amplification Factor	18	17	16	
Plate Resistance (Approx.)	1560	2000	3000	ohms
Transconductance	11500	8500	5400	μmhos
Plate Current	36	23	12	ma
Grid Voltage (Approx.) for plate μa = 100	-9	-14	-19	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9H

Pin 1 - Plate of Unit No.2
Pin 2 - Grid of Unit No.2
Pin 3 - Cathode of Unit No.2
Pins 4 & 8 - Heater of Unit No.2
Pins 5 & 8 - Heater of Unit No.1



Pin 6 - Cathode of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Heater Mid-Tap
Pin 9 - Plate of Unit No.1

[D]: See next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA

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MEDIUM-MU TWIN TRIODE

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, ***Absolute Values:***

PLATE VOLTAGE	330 max.	volts
GRID CURRENT	6.6 max.	ma
PLATE DISSIPATION:		
Either plate	4.2 max.	watts
Both plates (Both units operating)	7.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance	1 max.	megohm

[o] without external shield.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA

World Radio History

RCA

5690

SPECIAL RED TUBE 5690

FULL-WAVE VACUUM RECTIFIER

Intended for critical industrial and aircraft applications where 10,000-hour life, extreme uniformity, rigid construction, and exceptional stability are paramount.

GENERAL DATA

Electrical:

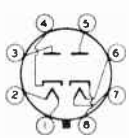
Heaters, Pure Tungsten, for Unipotential Cathodes:

Of Units 1 & 2 connected in	*Series*	*Parallel*	
Voltage	12.6 ± 5%*	6.3 ± 5%*	volts
Current	1.2	2.4	amp

Mechanical:

Mounting Position	Any
Maximum Overall Length	4-1/4"
Maximum Seated Length	3-11/16"
Maximum Diameter	1-23/32"
Bulb	T-12
Base	Short Jumbo-Shell Octal 8-Pin, Non Hygroscopic (JETEC No. B8-71)

BOTTOM VIEW



Pin 1: Heater of Unit No.2
Pin 2: Heater of Unit No.2
Pin 3: Plate of Unit No.2
Pin 4: Cathode of Unit No.2
Pin 5: Plate of Unit No.1
Pin 6: Heater of Unit No.1
Pin 7: Heater of Unit No.1
Pin 8: Cathode of Unit No.1

RECTIFIER

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	For Altitudes up to 40000 Feet	
PEAK INVERSE PLATE VOLTAGE	1120 max.	volts
PEAK VOLTAGE BETWEEN PLATE OF UNIT No.1 AND PLATE OF UNIT No.2	1120 max.	volts
PEAK PLATE CURRENT PER PLATE	375 max.	ma
AC PLATE SUPPLY VOLTAGE (RMS) PER PLATE	*See Rating Chart I*	
DC OUTPUT CURRENT PER PLATE	*See Rating Chart I*	

HOT-SWITCHING CURRENT:

Even occasional hot-switching with capacitor-input circuits permits the flow of plate currents having magnitudes which can adversely affect the life and reliability of tubes designed for life values in the order of 10000 hours. If capacitor-input circuits are to be used, protect the circuits against the possibility of hot-switching and do not exceed a maximum peak current value per plate of 3 amperes during the initial cycles of the hot-switching transient. If hot-switching is required in operation, the use of choke-input circuits is recommended for maximum reliability and for long life. Such circuits limit the hot-switching current to a value no higher than that of the peak plate current.

* May deviate ± 10 per cent from rated value provided such deviation occurs for less than 2 per cent of operating time.

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FULL-WAVE VACUUM RECTIFIER

PEAK HEATER-CATHODE VOLTAGE:●		
Heater negative with respect to cathode	400 max.	volts
Heater positive with respect to cathode	400 max.	volts
BULB TEMPERATURE	200 max.	°C

Typical Operation as Full-Wave Rectifier with Capacitor-Input Filter

AC Plate-to-Plate Supply Voltage (RMS)	700	volts
Filter-Input Capacitor▲	10	μf
Effective Plate-Supply Resistance per Plate	350	ohms
DC Output Voltage at Input to Filter (Approx.):		
At half-load current of 55 ma	415	volts
At full-load current of 110 ma	355	volts
Voltage Regulation (Approx.):		
Half-load to full-load current	60	volts

Typical Operation as Full-Wave Rectifier with Choke-Input Filter:

AC Plate-to-Plate Supply Voltage (RMS)	700	volts
Filter Input Choke	10	henries
DC Output Voltage at Input to Filter (Approx.):		
At half-load current of 67.5 ma	305	volts
At full-load current of 135 ma	300	volts
Voltage Regulation (Approx.):		
Half-load to full-load current	5	volts

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 500 max. g

Tubes are held rigid in three different positions in a Navy Type, High Impact (flyweight) Shock Machine and are subjected to 500 g impact acceleration.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours.

CHARACTERISTICS RANGE RALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	2.30	2.50	amp

● For maximum reliability, it is recommended that the cathode of each unit be connected directly to the mid-point or one side of the heater winding.

▲ Higher values of capacitance than indicated may be used but the effective plate-supply resistance should be increased to prevent exceeding the maximum rating for peak plate current. *See Rating Chart II.*

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5690

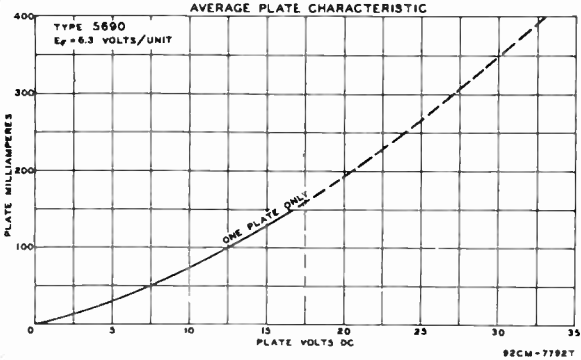
FULL-WAVE VACUUM RECTIFIER

	Note	Min.	Max.	
Heater–Cathode Current:				
Heater negative with respect to cathode . . .	1,2	–	30	μamp
Heater positive with respect to cathode . . .	1,2	–	30	μamp
Tube Voltage Drop	1,3	15	19	volts

Note 1: With 6.3 volts on heater of unit No.1 connected in parallel with heater of unit No.2.

Note 2: With 300 volts between heater and cathode.

Note 3: With dc voltage per plate adjusted to give dc plate current of 150 ma. per unit.



RATING CHARTS and OPERATION CHARACTERISTICS

Rating Chart I represents graphically the relationships between absolute maximum ac voltage input and absolute maximum dc output current derived from the fundamental ratings for conditions of capacitor-input and choke-input filters. This graphical presentation gives the equipment designer considerable latitude in choice of operating conditions.

Rating Chart II represents graphically the relationships between maximum rectification efficiency and absolute maximum dc output current per plate for conditions of capacitor input to filter.

Rating Chart III represents graphically the relationships between minimum plate-supply resistance per plate and absolute maximum ac plate-supply voltage per plate under no-load conditions for conditions of capacitor input to filter when occasional hot-switching is employed.

World Radio History

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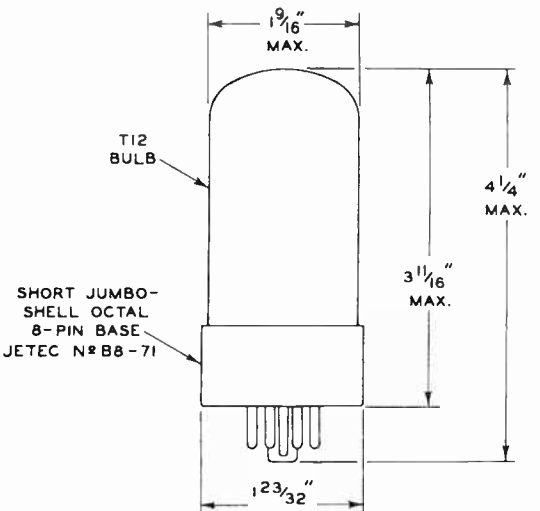
FULL-WAVE VACUUM RECTIFIER

The *Operation Characteristics for the 5690 in Full-Wave Circuit with 4μf, 10μf, and 20μf-Capacitor Input to Filter* show not only typical operating curves for different plate-supply voltages and different effective plate-supply resistances, but also by means of boundary line "AED" the limiting current and voltage relationships presented on *Rating Chart I.*

The *Operation Characteristics for the 5690 in Full-Wave Circuit with Choke Input to Filter* show not only typical operating curves for different plate-supply voltages but also by means of boundary line "ABC" the limiting current and voltage relationships presented on *Rating Chart I.* These curves also give information as to the effect of various sizes of chokes on regulation. The solid-line curves show the dc voltage outputs which would be obtained if the filter chokes had infinite inductance. The long-dash lines radiating from the zero position are boundary lines for various sizes of chokes as indicated. The intersection of one of these lines with a solid-line curve indicates the point on the curve at which the choke no longer behaves as though it had infinite inductance. To the left of the choke boundary line, the regulation curves depart from the solid-line curves as shown by the representative short-dash regulation curves.



World Radio History

RCA

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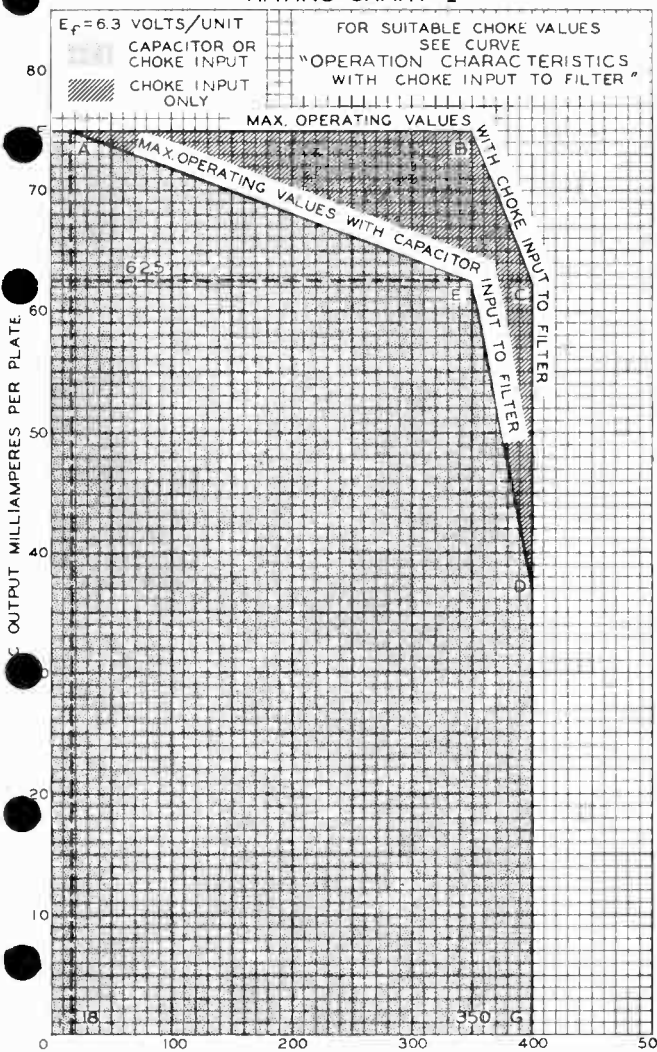
RATING CHART I



5690

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RATING CHART II
CAPACITOR INPUT TO FILTER

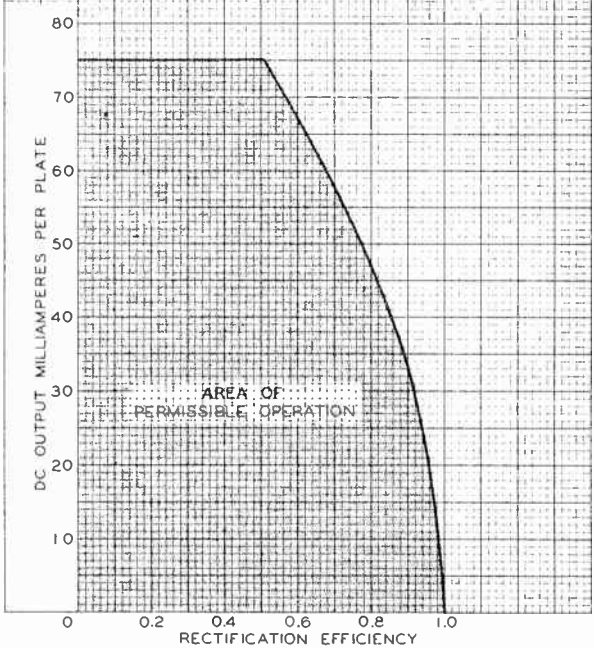
E_f = 6.3 VOLTS/UNIT

MAX. PEAK PLATE CURRENT PER PLATE = 375 MA

RECTIFICATION EFFICIENCY = $\frac{\bar{E}}{\sqrt{2}\ E_S}$

WHERE $\bar{E}$ = DC OUTPUT VOLTS AT INPUT TO FILTER

E_S = AC PLATE SUPPLY VOLTS (RMS) PER PLATE



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RATING CHART III
CAPACITOR INPUT TO FILTER

E_f = 6.3 VOLTS/UNIT MAX. HOT-SWITCHING CUR. = 3 AMP.

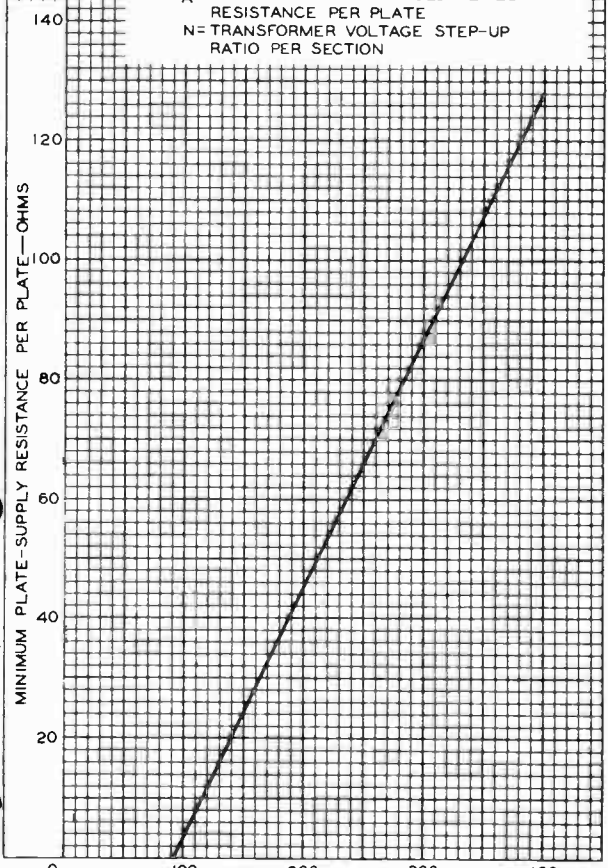
PLATE-SUPPLY RESISTANCE PER PLATE = $R_{SEC} + N^2 R_{PRI} + R_A$

WHERE R_{SEC} = DC RESISTANCE OF TRANSFORMER SECONDARY PER SECTION

R_{PRI} = DC RESISTANCE OF TRANSFORMER PRIMARY

R_A = DC RESISTANCE OF ADDED SERIES RESISTANCE PER PLATE

N = TRANSFORMER VOLTAGE STEP-UP RATIO PER SECTION



World Radio History

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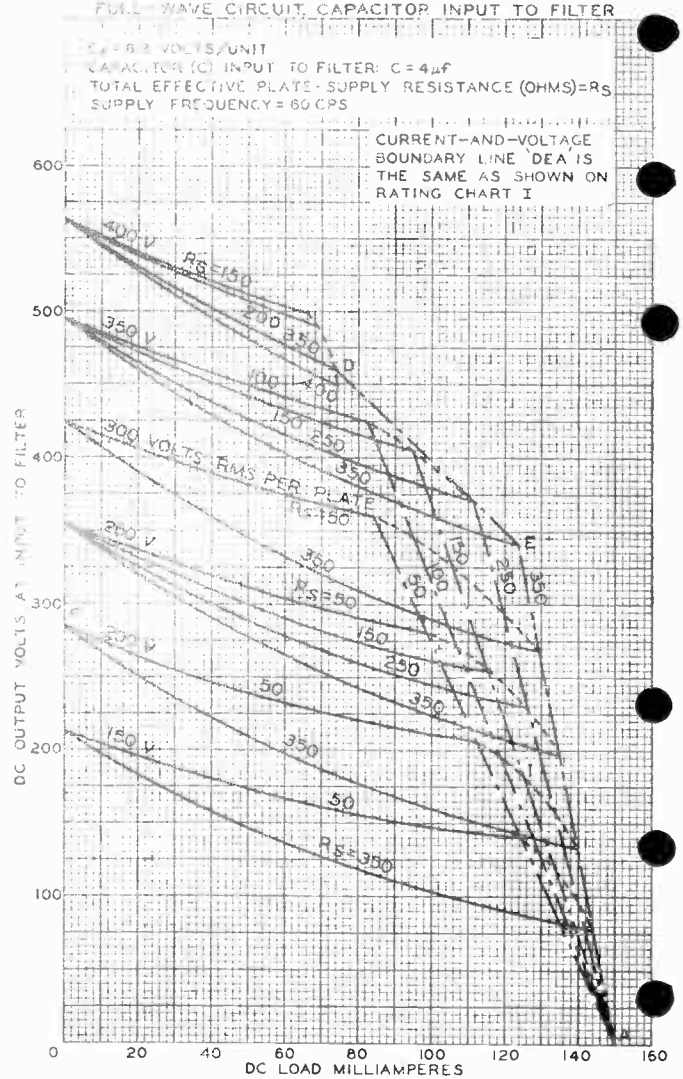
OPERATION CHARACTERISTICS

FULL-WAVE CIRCUIT, CAPACITOR INPUT TO FILTER

E_{rms} = 6.2 VOLTS/UNIT
CAPACITOR (C) INPUT TO FILTER: C = 4 μf
TOTAL EFFECTIVE PLATE-SUPPLY RESISTANCE (OHMS) = R_S
SUPPLY FREQUENCY = 60 CPS

CURRENT-AND-VOLTAGE BOUNDARY LINE DEA IS THE SAME AS SHOWN ON RATING CHART I



World Radio History

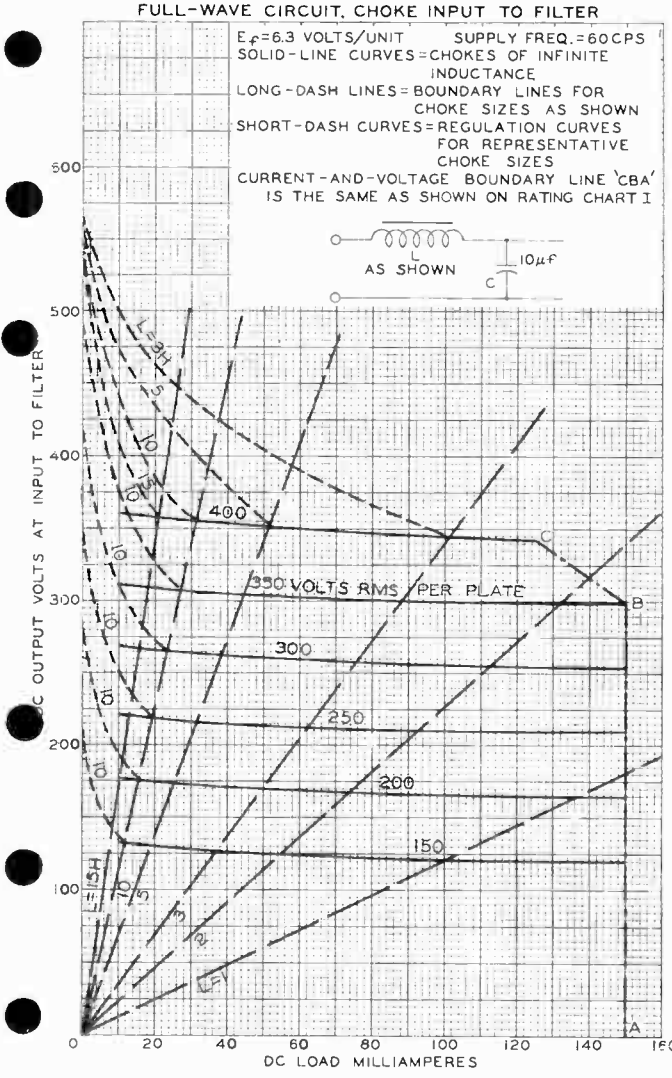
RCA

5690

OPERATION CHARACTERISTICS

FULL-WAVE CIRCUIT, CHOKE INPUT TO FILTER

E_f=6.3 VOLTS/UNIT SUPPLY FREQ.=60 CPS
SOLID-LINE CURVES=CHOKES OF INFINITE INDUCTANCE
LONG-DASH LINES=BOUNDARY LINES FOR CHOKE SIZES AS SHOWN
SHORT-DASH CURVES=REGULATION CURVES FOR REPRESENTATIVE CHOKE SIZES
CURRENT-AND-VOLTAGE BOUNDARY LINE 'CBA' IS THE SAME AS SHOWN ON RATING CHART I



MAY 15, 1952 TUBE DEPARTMENT 92CM-7796

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World Radio History

World Radio History

RCA

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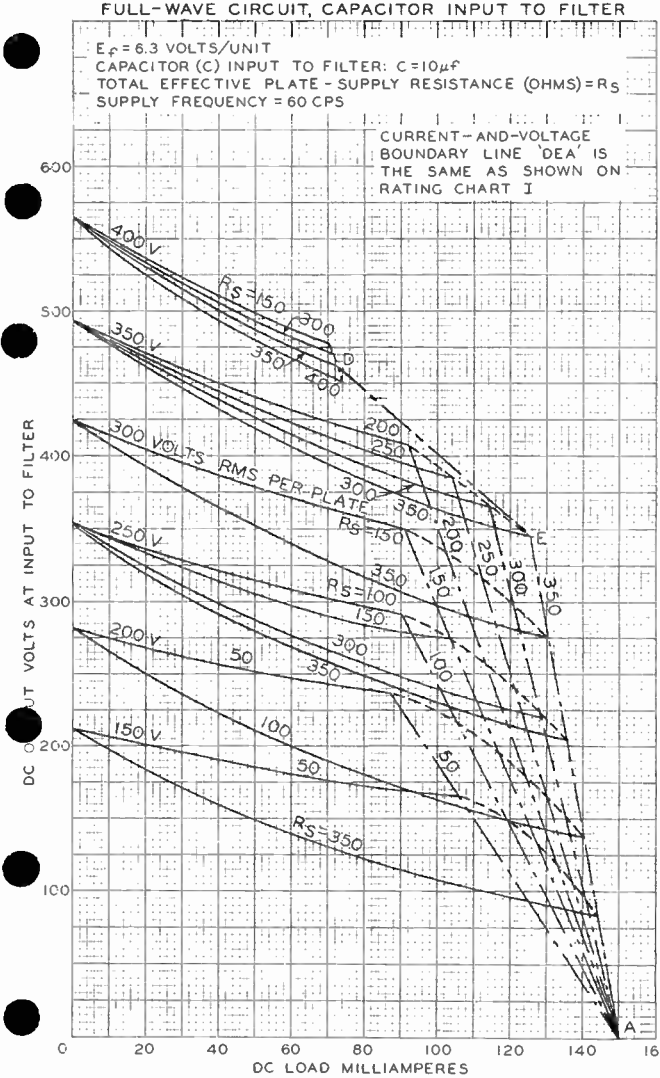
OPERATION CHARACTERISTICS

FULL-WAVE CIRCUIT, CAPACITOR INPUT TO FILTER



RADIO CORPORATION OF AMERICA HARRISON, N.J. U.S.A.

World Radio History

RCA

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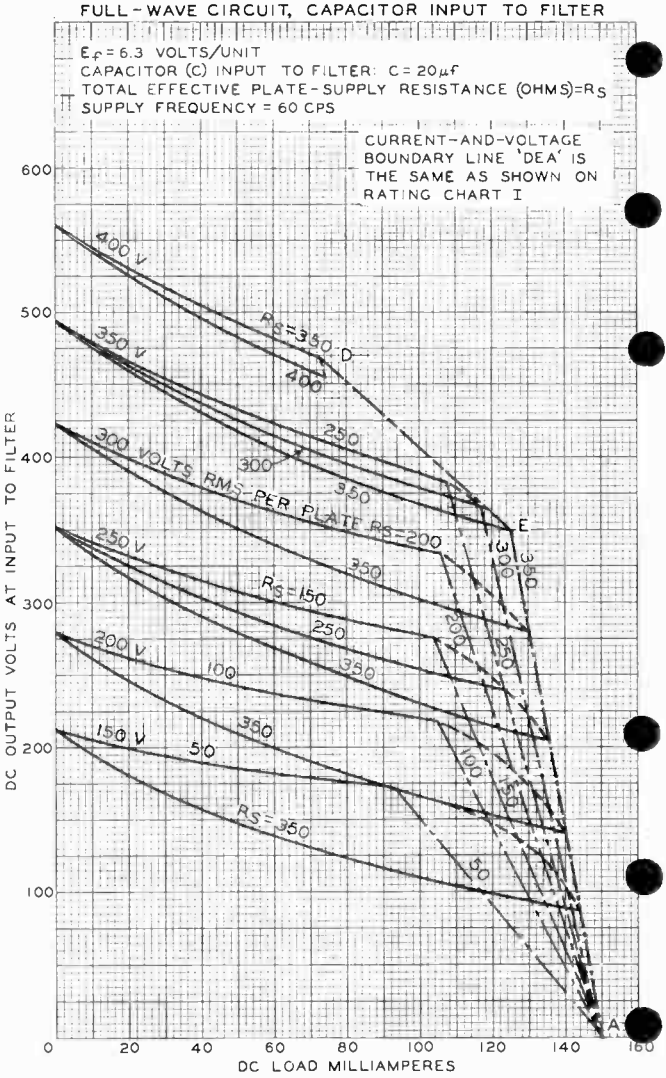
OPERATION CHARACTERISTICS

FULL-WAVE CIRCUIT, CAPACITOR INPUT TO FILTER



MAY 7, 1952 TUBE DEPARTMENT 92CM-7793

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5691
SPECIAL RED TUBE

5691
HIGH-MU TWIN TRIODE

Intended for critical industrial applications where 10,000-hour life, extreme uniformity, rigid construction, and exceptional stability are paramount. Within its ratings, the 5691 may be used to replace its receiving-tube counterpart, type 6SL7-GT, where heater transformer will carry increased current.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:
Voltage. . . . . 6.3 ± 5%* . . . ac or dc volts
Current. . . . . 0.6 . . . . . amp

Direct Interelectrode Capacitances:°

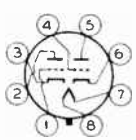
	Min.	Av.	Max.	
Triode No.1:				
Grid to Plate.	3.1	3.6	4.1	μμf
Grid to Cathode.	1.9	2.4	2.9	μμf
Plate to Cathode	1.8	2.3	2.8	μμf
Triode No.2:				
Grid to Plate.	3.1	3.6	4.1	μμf
Grid to Cathode.	2.2	2.7	3.2	μμf
Plate to Cathode	2.1	2.6	3.1	μμf
Plate of Triode No.1 to Plate of Triode No.2	0.27	0.32	0.37	μμf

* May deviate ±10% from rated value provided such deviation occurs for less than 2% of the operating time.

° With no external shield.

Mechanical:

Mounting Position. . . . . Any
Maximum Overall Length . . . . . 2-7/8"
Maximum Seated Length. . . . . 2-5/16"
Maximum Diameter . . . . . 1-9/32"
Bulb T-9
Base . . . . . Short Intermediate-Shell Octal 8-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW 8BD



Pin 1 - Grid of Triode No.2
Pin 2 - Plate of Triode No.2
Pin 3 - Cathode of Triode No.2
Pin 4 - Grid of Triode No.1
Pin 5 - Plate of Triode No.1
Pin 6 - Cathode of Triode No.1
Pin 7 - Heater
Pin 8 - Heater

(continued on next page)

World Radio History

5691

5691
HIGH-MU TWIN TRIODE

INDUSTRIAL SERVICE

Includes applications such as dc and audio amplifiers

Values are for each unit

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	275 max.	volts
DC PLATE-SUPPLY VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Negative bias range	1• min. to 100 max.	volts
Negative peak value	200 max.	volts
DC GRID CURRENT	2 max.	ma
DC CATHODE CURRENT	10 max.	ma
PLATE DISSIPATION	1 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
AMBIENT TEMPERATURE RANGE	-55 to +90	°C

• For resistance-coupled amplifier applications, the negative bias may be as low as 0.5 volt.

Maximum Circuit Value (for any operating condition):

Grid-Circuit Resistance	2 max.	megohms

Characteristics and Range Values:

Heater Volts, 6.3; Plate Volts, 250; Grid Volts, -2

	Min.	Av.	Max.	
Heater Current	0.55	0.6	0.65	amp
Heater-Cathode Current with heater-cathode voltage of ± 100 volts	-	-	5	μamp
Plate Current	1.7	2.3	2.9	ma
Difference in Plate Current between triode units	-	-	0.9	ma
Plate Current for grid voltage of -5.5 volts	-	-	15	μamp
Reverse Grid Current	-	-	0.2	μamp
Amplification Factor	60	70	80	
Plate Resistance	-	44000	-	ohms
Transconductance	1300	1600	1900	μmhos

Typical Operation as Resistance-Coupled Amplifier (Each Unit)

See RESISTANCE-COUPLED AMPLIFIER CHART No. 7 at front of Receiving Tube Section.

World Radio History

RCA

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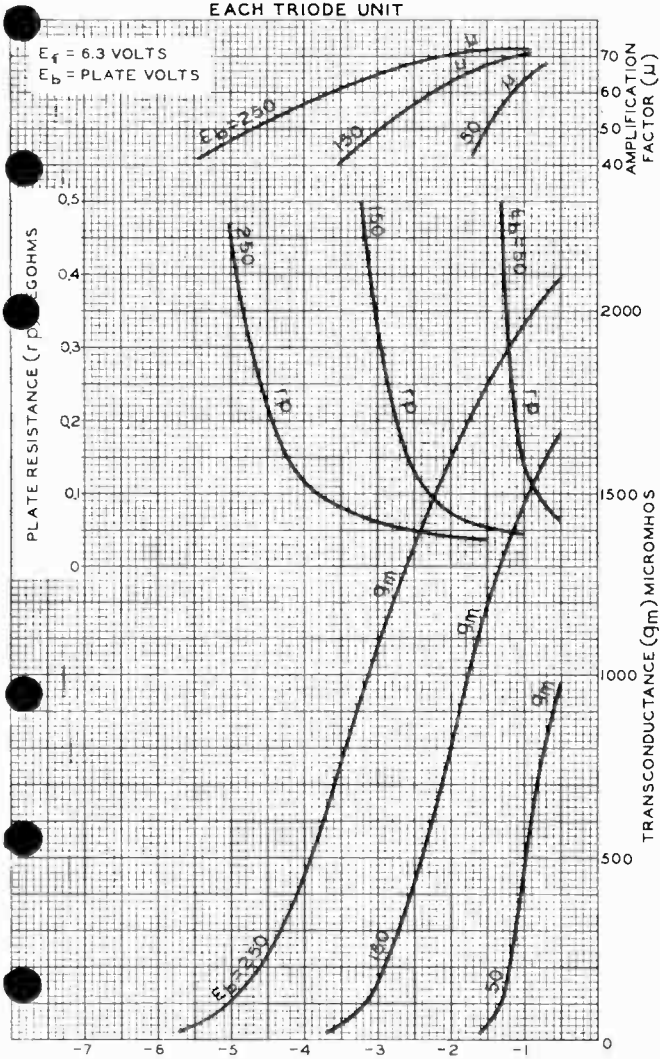
AVERAGE CHARACTERISTICS
EACH TRIODE UNIT



NOV. 21, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6913

World Radio History

World Radio History

5692 SPECIAL RED TUBE

5692

MEDIUM-MU TWIN TRIODE

Intended for critical industrial applications where 10,000-hour life, extreme uniformity, rigid construction, and exceptional stability are paramount. Within its ratings, the 5692 may be used to replace its receiving-tube counterpart, type 6SN7-GT.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Voltage	6.3 ± 5%*	ac or dc volts
Current	0.6	amp

Direct Interelectrode Capacitances:°

	Min.	Av.	Max.	
Triode No.1:				
Grid to Plate	3.0	3.5	4.0	μμf
Grid to Cathode	1.8	2.3	2.8	μμf
Plate to Cathode	2.0	2.5	3.0	μμf
Triode No.2:				
Grid to Plate	2.8	3.3	3.8	μμf
Grid to Cathode	2.1	2.6	3.1	μμf
Plate to Cathode	2.2	2.7	3.2	μμf
Plate of Triode No.1 to Plate of Triode No.2	0.27	0.32	0.37	μμf

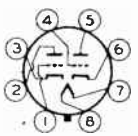
* Heater voltage may deviate ± 10% from rated value, provided such deviation occurs for less than 2% of the operating time.

° With no external shield.

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-7/8"
Maximum Seated Length	2-5/16"
Maximum Diameter	1-9/32"
Bulb	T-9
Base	Short Intermediate-Shell Octal 8-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	8BD

Pin 1 - Grid of Triode No.2
Pin 2 - Plate of Triooe No.2
Pin 3 - Cathode of Triode No.2
Pin 4 - Grid of Triode No.1



Pin 5 - Plate of Triode No.1
Pin 6 - Cathode of Triode No.1
Pin 7 - Heater
Pin 8 - Heater

(continued on next page)

World Radio History

5692

5692
MEDIUM-MU TWIN TRIODE

INDUSTRIAL SERVICE

Including applications such as dc amplifiers, audio amplifiers, and relaxation oscillators.

Values are for each unit

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	275 max.	volts
DC PLATE-SUPPLY VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Negative bias range	1• min. to 100 max.	volts
Negative peak value	200 max.	volts
DC GRID CURRENT	2 max.	ma
DC CATHODE CURRENT	15 max.	ma
PLATE DISSIPATION	1.75 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
AMBIENT TEMPERATURE RANGE	−55 to +90	°C

• For resistance-coupled amplifier applications, the negative bias may be as low as 0.5 volt.

Maximum Circuit Value (for any operating condition):

Grid-Circuit Resistance	2 max. megohms

Characteristics and Range Values:

Heater Volts, 6.3; Plate Volts, 250; Grid Volts, −9

	Min.	Av.	Max.	
Heater Current	0.55	0.6	0.65	amp
Heater-Cathode Current with heater-cathode voltage of ± 100 volts	−	−	5	μamp
Plate Current	4.8	6.5	8.2	ma
Difference in Plate Current between triode units	−	−	2.0	ma
Plate Current for grid voltage of −24 volts	−	−	15	μamp
Reverse Grid Current	−	−	0.2	μamp
Amplification Factor	18	20	22	
Plate Resistance	−	9100	−	ohms
Transconductance	1825	2200	2575	μmhos

Typical Operation as Resistance-Coupled Amplifier (Each Unit)

See RESISTANCE-COUPLED AMPLIFIER CHART No. 13 at front of Receiving Tube Section.

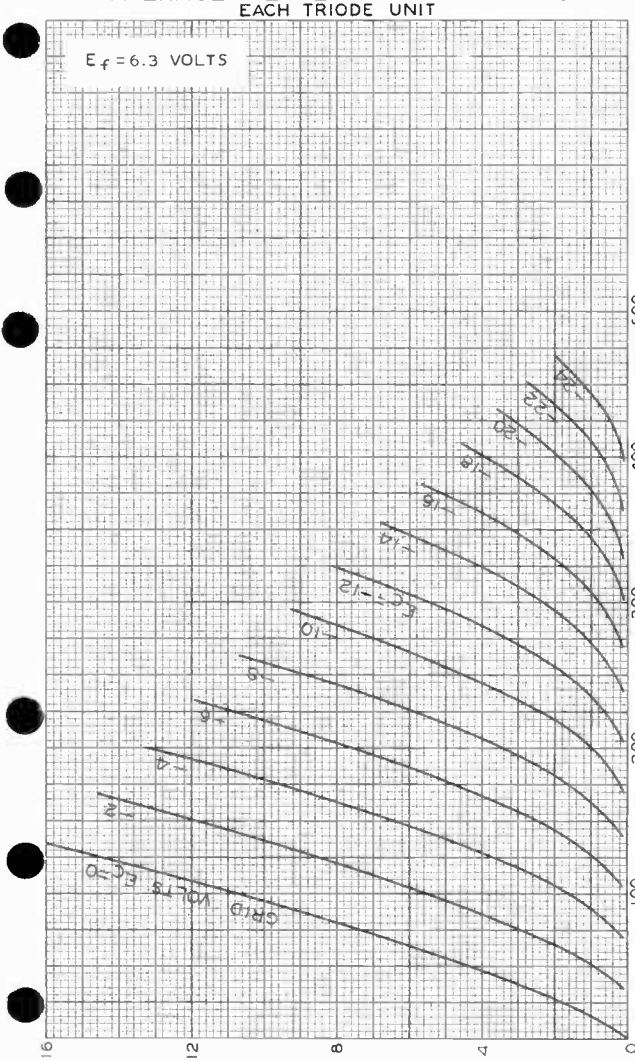
OUTLINE DIMENSIONS for the 5692 are the same as those shown for type 5691

World Radio History

RCA

5692

AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



FEB. 21, 1941

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6257

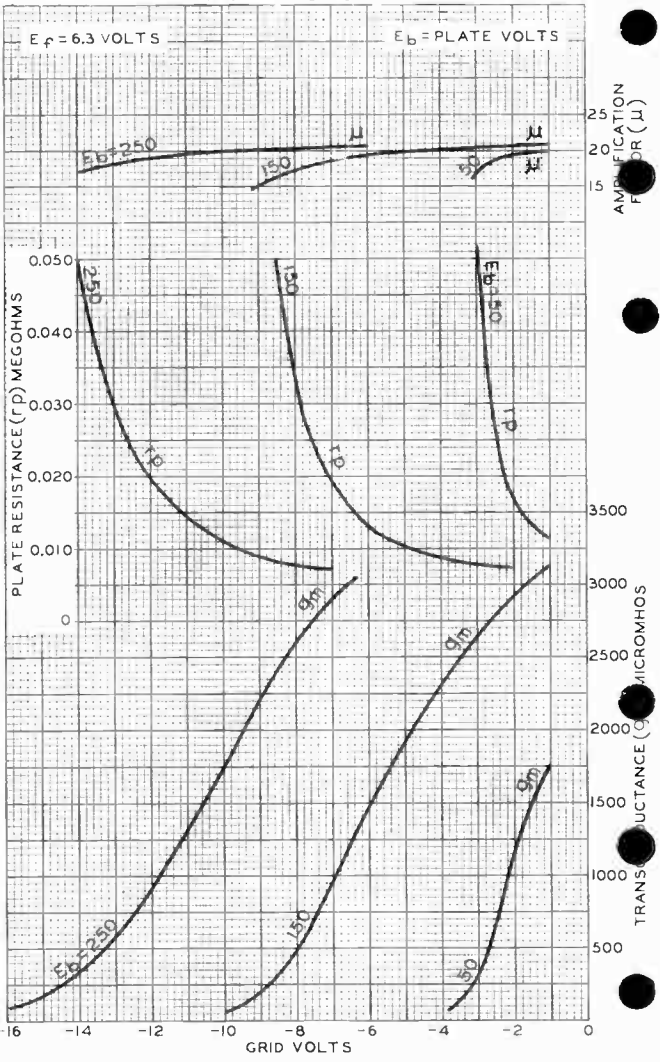
World Radio History

5692

RCA

5692

AVERAGE CHARACTERISTICS
EACH TRIODE UNIT



NOV. 10, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6914

World Radio History

RCA

5693

5693 SPECIAL RED TUBE

SHARP-CUTOFF PENTODE

Intended for critical industrial applications where 10,000-hour life, extreme uniformity, rigid construction, and exceptional stability are paramount. Within its ratings, the 5693 may be used to replace its receiving-tube counterpart, type 6SJ7.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:
Voltage . . . . . 6.3 ± 5%* . . . ac or dc volts
Current . . . . . 0.3 . . . . . amp

Direct Interelectrode Capacitances:°

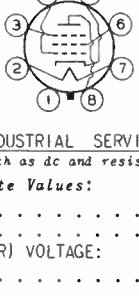
	Min.	Av.	Max.	
Grid to Plate	–	–	0.005	μμf
Input	4.8	5.3	5.8	μμf
Output	5.6	6.2	6.8	μμf

* May deviate ± 10% from rated value provided such deviation occurs for less than 2% of the operating time.

° With shell connected to cathode.

Mechanical:

Mounting Position . . . . . Any
Maximum Overall Length . . . . . 2-5/8"
Seated Length . . . . . 1-31/32" ± 3/32"
Maximum Diameter . . . . . 1-5/16"
Bulb . . . . . Metal Shell MT-8
Base . . . . . Small-Wafer Octal 8-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW 8N



Pin 1 – Shell
Pin 2 – Heater
Pin 3 – Grid No.3
Pin 4 – Grid No.1
Pin 5 – Cathode
Pin 6 – Grid No.2
Pin 7 – Heater
Pin 8 – Plate

INDUSTRIAL SERVICE

Includes applications such as dc and resistance-coupled amplifiers

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	300 max. volts
DC PLATE-SUPPLY VOLTAGE	330 max. volts
DC GRID-No.3 (SUPPRESSOR) VOLTAGE:	
Negative bias value	0 min. volts -100 max. volts
DC GRID-No.2 (SCREEN) VOLTAGE▲	125 max. volts
DC GRID-No.2-SUPPLY VOLTAGE	330 max. volts

▲: See next page.

World Radio History

5693

5693
SHARP-CUTOFF PENTODE

GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative bias range	-1■ min. to -50 max.	volts
Negative peak value	-50 max.	volts
DC CATHODE CURRENT	10 max.	ma
PLATE DISSIPATION	2 max.	watts
GRID-No.2 DISSIPATION	0.3 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
AMBIENT TEMPERATURE RANGE	-55 to +90	°C

Maximum Circuit Value:

See curve on a following page giving maximum values of the grid-No.1 resistor.

Characteristics and Range Values:

Heater volts, 6.3; Plate Volts, 250; Grid-No.3 Volts, 0; Grid-No.2 Volts, 100; Grid-No.1 Volts, -3.

	Min.	Av.	Max.	
Heater Current	0.275	0.300	0.325	amp
Heater-Cathode Current with heater-cathode voltage of ± 100 volts	-	-	5	μamp
Plate Current	2.3	3.0	3.7	ma
Plate Current for grid-No.1 voltage of -7.5 volts	2	30	80	μamp
Plate Current for grid-No.3 voltage of -70 volts	150	450	750	μamp
Grid-No.2 Current	0.60	0.85	1.10	ma
Reverse Grid-No.1 Current	-	-	0.1	μamp
Plate Resistance	1.0	-	-	megohm
Transconductance	1400	1650	1900	μmhos

Typical Operation as Resistance-Coupled Amplifier:

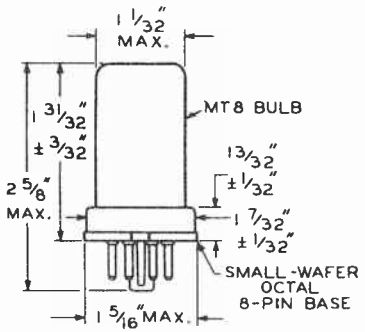
See RESISTANCE-COUPLED AMPLIFIER CHART No.2c at front of Receiving Tube Section.

▲ The 5693 may be operated at a grid-No.2 voltage as high as the rated grid-No.2 supply voltage when the grid-No.2 dissipation rating is not exceeded for any signal condition and when a resistor is used in series with grid-No.2 and its supply voltage.

■ For resistance-coupled amplifier applications, the grid-No.1 negative bias may be as low as -0.5 volt.

World Radio History

5693
SHARP-CUTOFF PENTODE



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

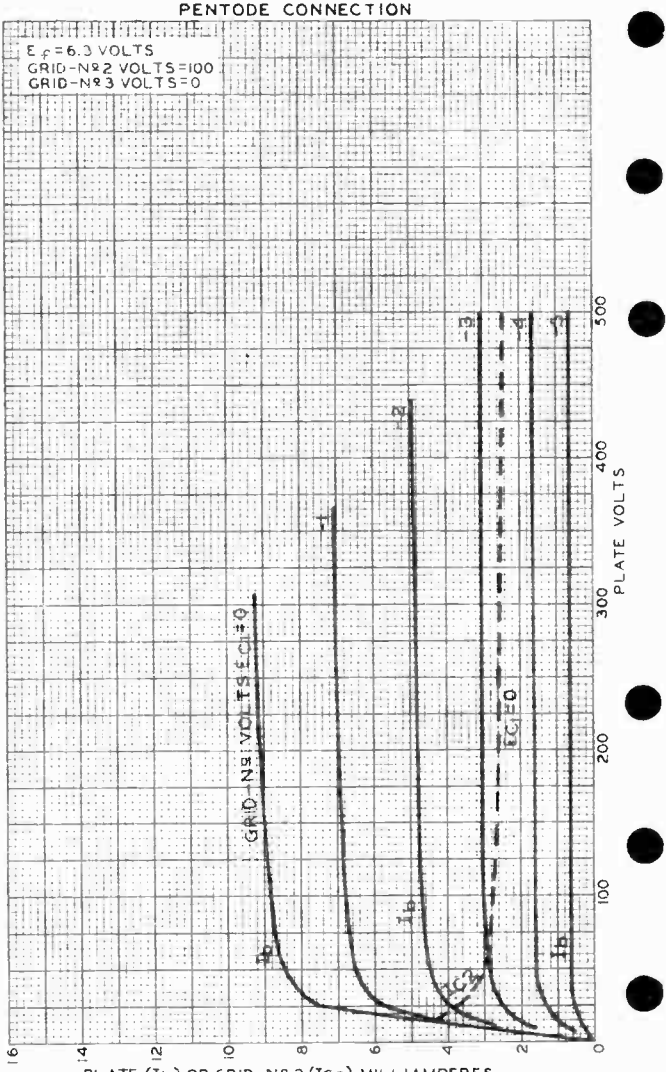
World Radio History

5693

RCA

5693

AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION



OCT. 16, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4939R1

World Radio History

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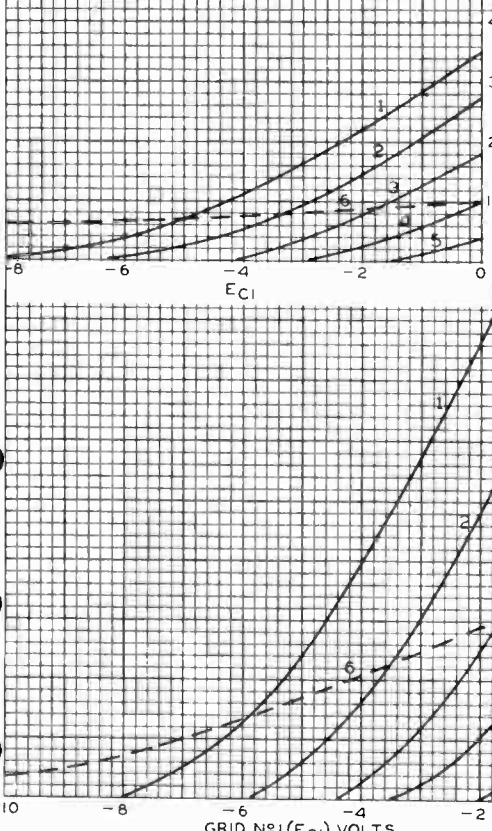
5693

AVERAGE CHARACTERISTICS
PENTODE CONNECTION

E_f = 6.3 VOLTS PLATE VOLTS = 300 GRID-№3 VOLTS = 0

CURVE	GRID-№2-SUPPLY VOLTS	SERIES GRID-№2 RESISTOR-OHMS
1	125	—
2	100	—
3	75	—
4	50	—
5	25	—
6	300	250000



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5693

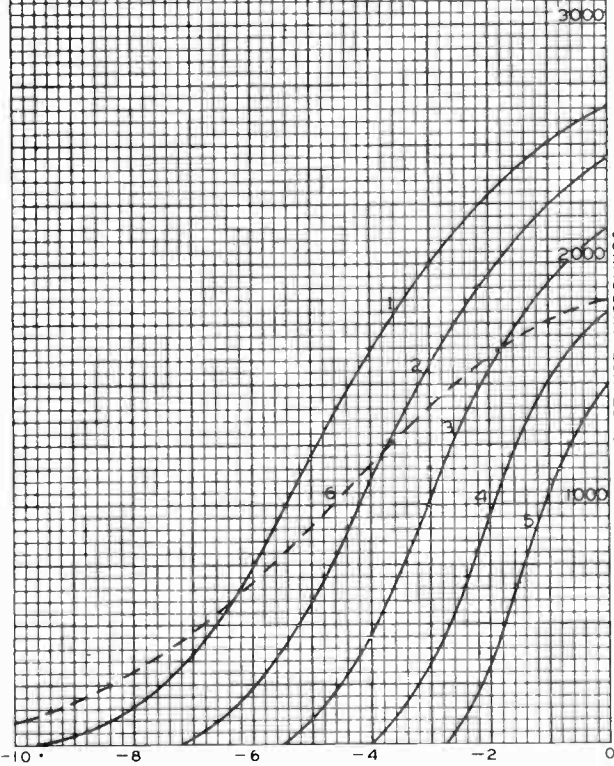
RCA

5693

AVERAGE CHARACTERISTICS
PENTODE CONNECTION

E_f = 6.3 VOLTS PLATE VOLTS = 300 GRID-№3 VOLTS = 0

CURVE	GRID-№2-SUPPLY VOLTS	SERIES GRID-№2 RESISTOR-OHMS
1	125	——
2	100	——
3	75	——
4	50	——
5	25	——
6	300	250000



MARCH 5, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

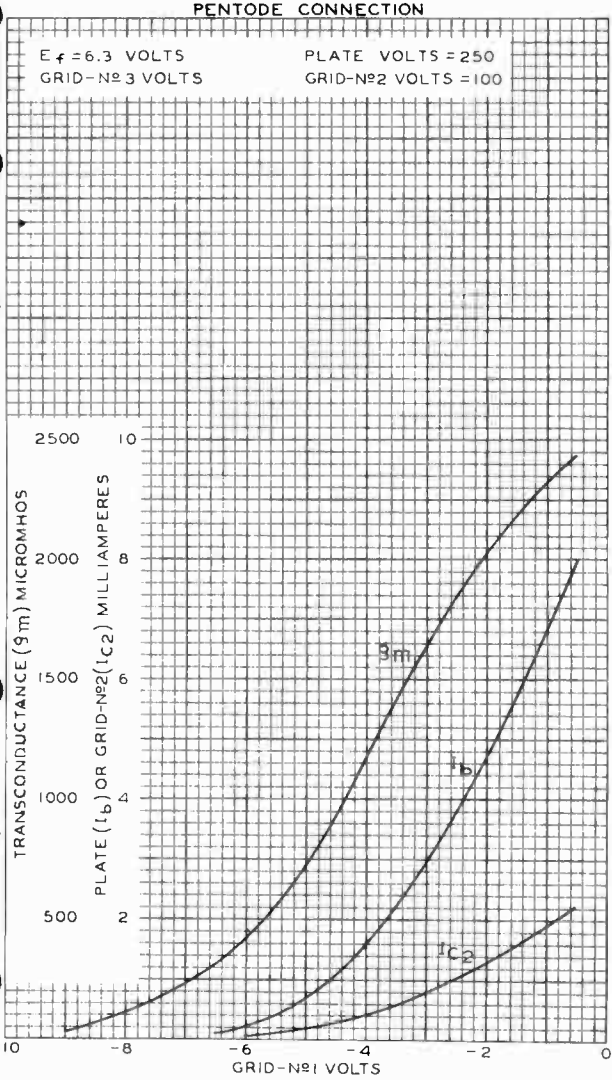
92CM—6444R1

World Radio History

RCA

5693

AVERAGE CHARACTERISTICS
PENTODE CONNECTION



World Radio History

5718 PREMIUM TYPE

5718

MEDIUM-MU TRIODE

SUBMINIATURE TYPE

Intended for applications where dependable performance under shock and vibration is paramount.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	6.3 ± 5%	ac or dc volts
Current	0.150	amp

Direct Interelectrode Capacitances:

	With External Shield°	*Without External Shield*	
Grid to Plate	1.3	1.4	μμf
Input	2.4	2.2	μμf
Output	2.4	0.7	μμf

° Having inside diameter of 0.405" and connected to lead No.5.

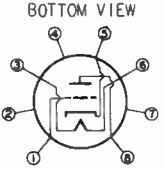
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	100	150	volts
Cathode Resistor	150	180	ohms
Amplification Factor	27	27	
Plate Resistance	4650	4150	ohms
Transconductance	5800	6500	μmhos
Plate Current	8.5	13.0	ma
Grid Volts (Approx.) for plate current of 10 μamp	−7	−11	volts

Mechanical:

Operating Position	Any
Maximum Bulb Length	1-3/8"
Length from Button Seal to Bulb Top (Excluding tip)	1.075" ± 0.060"
Diameter	0.383" ± 0.017"
Bulb	T-3
Leads, Flexible	8
Length	1-1/2" to 1-3/4"
Orientation and Diameter	See Dimensional Outline

BOTTOM VIEW



Lead No.1 – Grid
Lead No.2 – No Conn.
Lead No.3 – Heater
Lead No.4 – No Conn.
Lead No.5 – Cathode
Lead No.6 – Heater
Lead No.7 – No Conn.
Lead No.8 – Anode

AMPLIFIER – Class A_1

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	165 max. volts

5718

MEDIUM-MU TRIODE

PLATE DISSIPATION	3.3 max.	watts
PEAK HEATER–CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART at end of tabulated data for this type

Maximum Circuit Values:

Grid-Circuit Resistance:
For cathode-bias operation . . . . . 1.2 max. megohms
For fixed-bias operation . . . . . Not recommended

Cathode-Bias Resistance – An adequate value of cathode-bias resistor should be used to protect the tube in event of temporary failure of excitation and resultant loss in developed bias.

RF AMPLIFIER and OSCILLATOR – Class C

Operation with full input is permissible up to 1000 Mc.

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	165 max.	volts
DC GRID VOLTAGE	−55 max.	volts
DC PLATE CURRENT	22 max.	ma
DC GRID CURRENT	5.5 max.	ma
PLATE DISSIPATION	3.3 max.	watts
PEAK HEATER–CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:
For cathode-bias operation . . . . . 1.2 max. megohms
For fixed-bias operation . . . . . Not recommended

Cathode-Bias Resistance – An adequate value of cathode-bias resistor should be used to protect the tube in event of temporary failure of excitation and resultant loss in developed bias.

5718

MEDIUM-MU TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN*

	Note	Min.	Max.	
Heater Current	1	0.138	0.162	amp
Grid-to-Plate Capacitance	2	1.1	1.8	μμf
Inout Capacitance	2	1.6	2.8	μμf
Output Capacitance	2	0.5	0.9	μμf
Amplification Factor	1,3	23	31	
Plate Current	1,3	6.0	11.0	ma
Plate Current	1,4	–	100	μamp
Transconductance	1,3	4800	6800	μmhos
Transconductance	5,3	4500	–	μmhos
Grid Current	1,6	–	±0.4	μamp
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,7	–	7.0	μamp
Heater positive with respect to cathode	1,7	–	7.0	μamp
Leakage Resistance:				
Between Grid and All Other Electrodes Tied	1,8	100	–	megohms
Between Plate and All Other Electrodes Tied	1,9	100	–	megohms
Useful Power Output	1,10	600	–	mw

* Each tube is stabilized before characteristics testing by continuous operation for at least 45 hours at room temperature and with dissipation values equivalent to life test conditions.

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With external shield.

Note 3: With dc plate supply voltage of 100 volts, cathode resistor of 150 ohms, and cathode bypass capacitor of 1000 microfarads.

Note 4: With dc plate voltage of 100 volts, and dc grid voltage of -7 volts.

Note 5: With 5.5 volts ac or dc on heater.

Note 6: With dc plate supply voltage of 100 volts, cathode resistor of 150 ohms, and grid resistor of 0.5 megohm.

Note 7: With 100 volts dc between heater and cathode.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together.

Note 9: With plate 300 volts negative with respect to all other electrodes tied together.

Note 10: In self-excited oscillator with dc plate voltage of 150 volts, grid resistor and feedback optimized to give useful power output at a plate current of 20 ma. and frequency of 500 MC.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 450 max. g

Tubes are held rigid in three different positions in a Navy Type, High Impact (flyweight) Shock Machine and are subjected to 450 g impact acceleration.

RCA

5718

MEDIUM-MU TRIODE

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours.

Uniform Acceleration Rating . . . . . 1000 max. g

Tubes are subjected in each of three positions to a gradually applied uniform acceleration up to 1000 g.

High-Frequency Vibration Performance:

RMS Output Voltage . . . . . 60 max. mv

Under the following conditions: A 100-volt plate and grid-No.2 voltage supply having an impedance not exceeding that of a 40-μf capacitor, plate load resistance of 10000 ohms, grid-No.1 resistor of 0.1 megohm, cathode resistor of 150 ohms, cathode bypass capacitor of 1000 μf, and vibrational acceleration of 15 g at 40 cps.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . 2500 max. cycles

Under the following conditions: With heater voltage of 7.0 volts cycled 1 minute on and 4 minutes off, heater-cathode voltage of 140 volts (rms), and plate, grid-No.2, and grid-No.1 voltage = 0 volts.

Average Life Performance:

The average life performance based on a 500-hour test at 175°C ambient temperature is not less than 450 hours. This life test is made on sample lot of tubes with heater voltage of 6.3 volts; plate supply voltage of 100 volts; grid-No.2 supply voltage of 100 volts; dc heater-cathode voltage (heater positive with respect to cathode) of 200 volts; cathode resistor of 150 ohms; and grid-No.1 resistor of 1 megohm.

The 500-hour end-point limits for the 5840 with heater voltage of 6.3 volts, plate supply voltage of 100 volts, grid-No.2 supply voltage of 100 volts, cathode resistor of 150 ohms bypassed by capacitor having a maximum reactance of 3 ohms, and dc heater-cathode voltage of 100 volts with heater either positive or negative with respect to cathode are: transconductance, 3250 micromhos minimum; heater-cathode leakage current, 20 microamperes maximum; and grid-No.1 current, +0.9 microampere maximum or −0.9 microampere maximum.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5718

MEDIUM-MU TRIODE

OPERATING CONDITIONS AS RESISTANCE-COUPLED AMPLIFIER

Plate-Supply Voltage	100						volts
Plate Load Resistor	0.047		0.10		0.27		meg
Grid-No.1 Resistor[o]	0.10	0.27	0.27	0.47	0.27	0.47	meg
Cathode Resistor	1000	1200	2200	2700	6800	8200	ohms
Sig. Input Volt. (rms)	0.5	0.5	0.5	0.5	0.5	0.5	volt
Output Voltage (rms)	8.2	8.5	8.2	8.2	7.3	7.4	volts
Voltage Gain[▲]	16.4	17.0	16.4	16.4	14.6	14.8	
Distortion	3.9	3.2	3.0	2.71	3.4	2.8	%
Sig. Input Volt. (rms)[*]	0.59	0.70	0.67	0.81	0.75	0.86	volt
Output Voltage (rms)	9.7	11.75	11.0	13.1	11.0	12.7	volts
Voltage Gain[▲]	16.4	16.8	16.4	16.2	14.6	14.8	
Distortion	4.5	4.7	4.1	4.6	5.0	5.0	%

Plate-Supply Voltage	200						volts
Plate Load Resistor	0.047		0.10		0.27		meg
Grid-No.1 Resistor[o]	0.10	0.27	0.27	0.47	0.27	0.47	meg
Cathode Resistor	820	1000	1800	2200	4700	5600	ohms
Sig. Input Volt. (rms)	1.0	1.0	1.0	1.0	1.0	1.0	volt
Output Voltage (rms)	19.0	19.5	18.6	18.1	16.2	16.2	volts
Voltage Gain[▲]	19.0	19.5	18.6	18.1	16.2	16.2	
Distortion	4.0	3.3	3.2	3.1	3.8	3.2	%
Sig. Input Volt. (rms)[*]	1.23	1.45	1.43	1.56	1.34	1.58	volts
Output Voltage (rms)	23.4	28.0	26.0	28.2	21.6	25.0	volts
Voltage Gain[▲]	19.0	19.3	18.2	18.1	16.1	15.8	
Distortion	5.0	5.0	4.9	5.0	5.1	5.1	%

[o] of following stage.

[▲] Ratio of signal output to signal input.

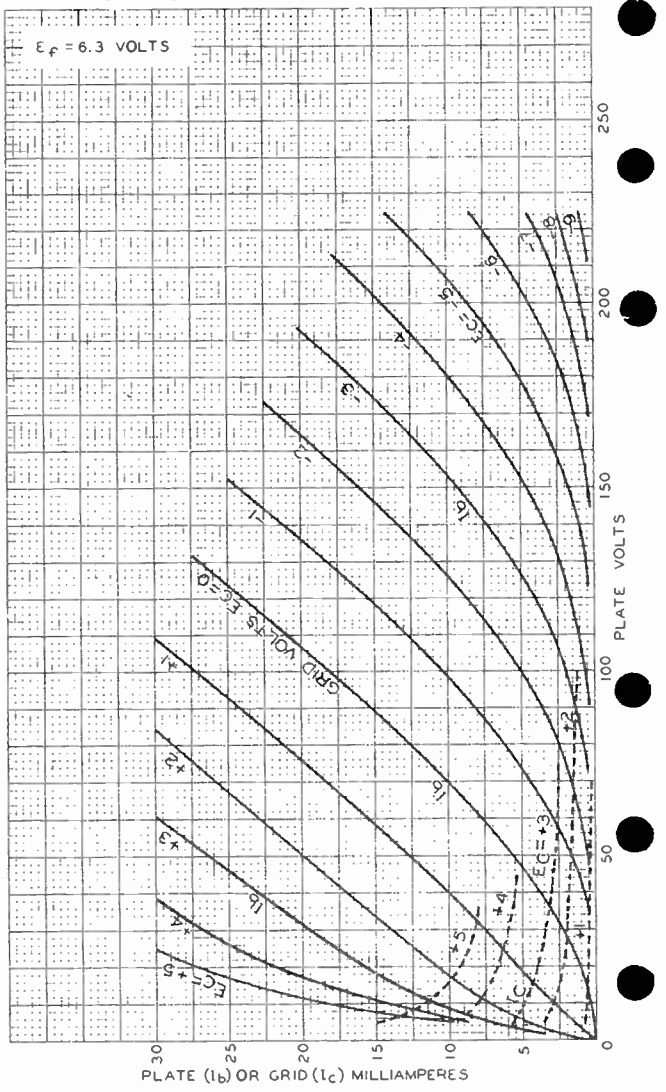
[*] Maximum value to swing the grid of resistance-coupled amplifier tube to the point where its grid No.1 starts to draw current.

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

RCA

5718

AVERAGE PLATE CHARACTERISTICS



SEPT. 23, 1952 TUBE DEPARTMENT 92CM-7848

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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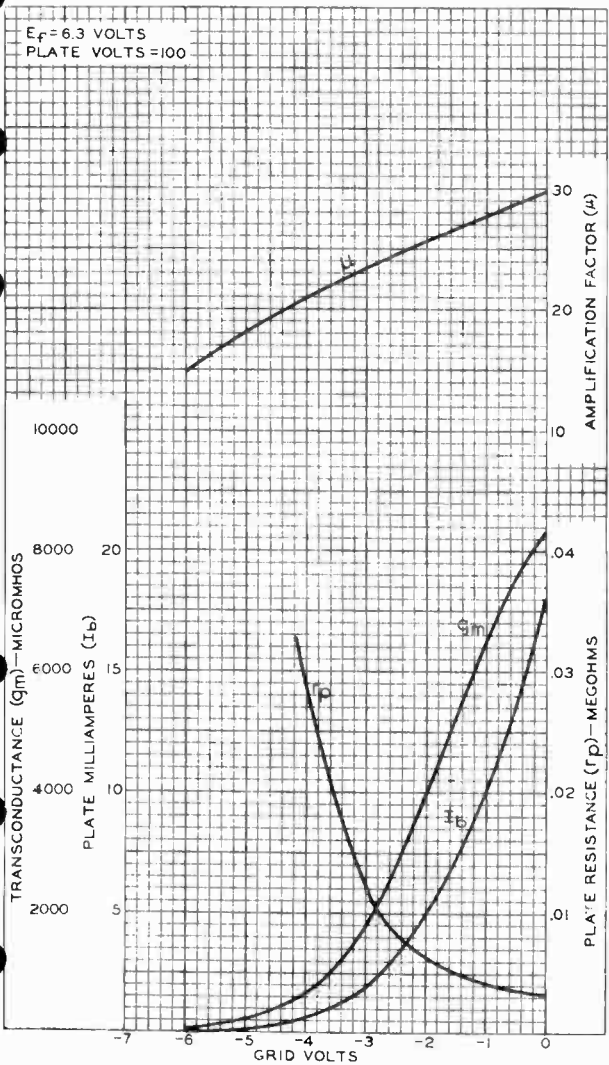
RCA

5718

AVERAGE CHARACTERISTICS



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5718

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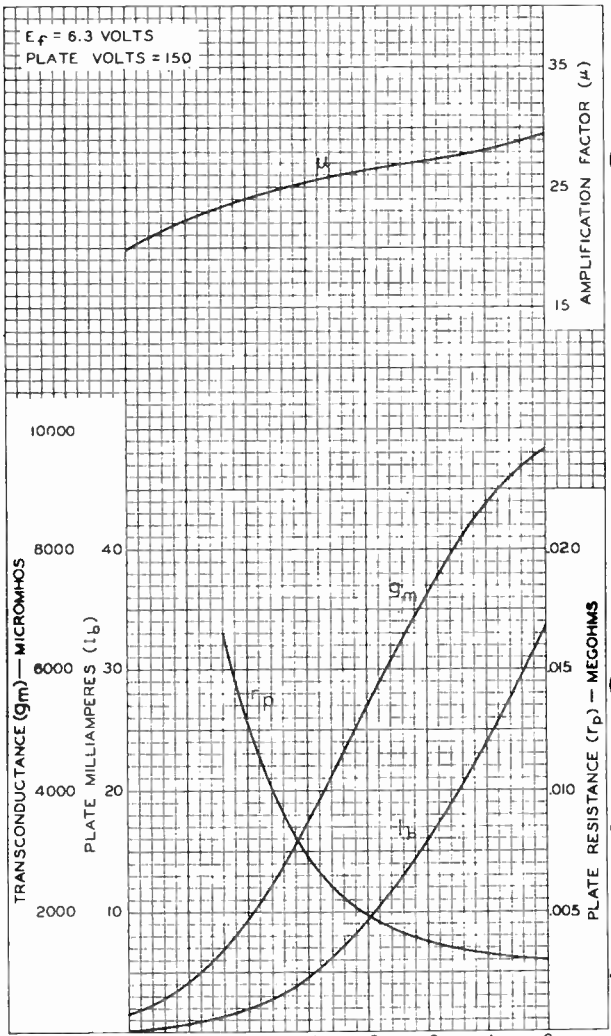
5718

AVERAGE CHARACTERISTICS



APRIL 22, 1955

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-785IRI

World Radio History

RCA

5719

PREMIUM TYPE 5719

HIGH-MU TRIODE

SUBMINIATURE TYPE

Intended for applications where dependable performance under shock and vibration is paramount.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	6.3 ± 5%	ac or dc volts
Current	0.150	amp

Direct Interelectrode Capacitances:

	With External Shield[o]	*Without External Shield*	
Grid to Plate	0.8	0.8	μμf
Input	1.9	1.7	μμf
Output	2.2	0.6	μμf

[o] Having inside diameter of 0.405" and connected to cathode.

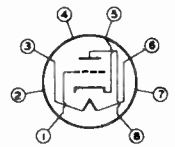
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	100	150	volts
Cathode Resistor	1500	680	ohms
Amplification Factor	70	70	
Plate Resistance	41000	30500	ohms
Transconductance	1700	2300	μmhos
Plate Current	0.73	1.85	ma
Grid volts (Approx.) for plate current of 10 μamp	-2.5	-3.8	volts

Mechanical:

Operating Position	Any
Maximum Bulb Length	1-3/8"
Length from Button Seal to Bulb Top (Excluding tip)	1.075" ± 0.060"
Diameter	0.383" ± 0.017"
Bulb	T-3
Leads, Flexible	8
Length	1-1/2" to 1-3/4"
Orientation and Diameter	See Dimensional Outline in GENERAL SECTION

BOTTOM VIEW



Lead No.1 – Grid
Lead No.2 – No Conn.
Lead No.3 – Heater
Lead No.4 – No Conn.
Lead No.5 – Cathode
Lead No.6 – Heater
Lead No.7 – No Conn.
Lead No.8 – Plate

AMPLIFIER – Class A_1

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	165 max. volts

Radiomuseum.org

5719

HIGH-MU TRIODE

GRID VOLTAGE	-55 max.	volts
PLATE CURRENT	3.3 max.	ma
PLATE DISSIPATION	0.55 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with resoect to cathode	200 max.	volts
Heater positive with respect to cathode	200 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART at end of tabulated data for this type

Maximum Circuit Values:

Grid-Circuit Resistance:		
For cathode-bias operation	1.2 max.	megohms
For fixed-bias operation	Not recommended	

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN*

	Note	Min.	Max.	
Heater Current	1	0.138	0.162	amp
Grid-to-Plate Capacitance	2	0.6	1.0	μμf
Input Capacitance	2	1.2	2.2	μμf
Output Capacitance	2	0.4	0.8	μμf
Amplification Factor	1,3	60	80	
Plate Current	1,3	0.5	0.9	ma
Plate Current	1,4	-	50	μamp
Transconductance	1,3	1400	2000	μmhos
Transconductance	5,3	1300	-	μmhos
Grid Current	1,6	-	±0.3	μamp
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,7	-	7.0	μamp
Heater positive with respect to cathode	1,7	-	7.0	μamp
Leakage Resistance:				
Between Grid and All Other Electrodes Tied Together	1,8	100	-	megohms
Between Plate and All Other Electrodes Tied Together	1,9	100	-	megohms

* Each tube is stabilized before characteristics testing by continuous operation for at least 45 hours at room temperature and with dissipation values equivalent to life test conditions.

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Without external shield.

Note 3: With plate supply voltage of 100 volts, cathode resistor of 150 ohms, and cathode bypass capacitor of 1000 microfarads.

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HIGH-MU TRIODE

Note 4: With dc plate voltage of 100 volts, and dc grid voltage of -2.5 volts.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With plate supply voltage of 100 volts, cathode resistor of 1500 ohms, cathode bypass capacitor of 1000 microfarads and grid resistor of 0.1 megohm.

Note 7: With 100 volts dc between heater and cathode.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together.

Note 9: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 450 max. g

Tubes are held rigid in three different positions in a Navy Type, High Impact (flyweight) Shock Machine and are subjected to 450 g impact acceleration.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours.

Uniform Acceleration Rating: . . . . . 1000 max. g

Tubes are subjected in each of three positions to a gradually applied uniform acceleration up to 1000 g.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 25 max. mv

Under the following conditions: A 150-volt plate voltage supply having an impedance not exceeding that of a 40 μf capacitor, plate load resistance of 10000 ohms, grid resistor of 0.1 megohm, cathode resistor of 1500 ohms, cathode bypass capacitor of 1000 μf, and vibrational acceleration of 15 g at 40 cps.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . . 2500 min. cycles

Under the following conditions: With heater voltage of 7.0 volts cycled 1 minute on and 4 minutes off, heater-cathode voltage of 140 volts (rms), and plate and grid voltage = 0 volts.

Average Life Performance:

The average life performance based on a 500-hour test at 175°C ambient temperature is not less than 450 hours. This life test is made on sample lot of tubes with heater voltage of 6.3 volts; plate supply voltage of 100 volts; dc heater-cathode voltage (heater positive with respect to cathode) of 200 volts; cathode resistor of 1500 ohms; and grid resistor of 1 megohm.

The 500-hour end-point limits for the 5719 with heater voltage of 6.3 volts, plate supply voltage of 100 volts, cathode resistor of 680 ohms bypassed by capacitor having a maximum reactance of 3 ohms, and dc heater-cathode voltage of 100 volts with heater either positive or negative with respect to cathode are: transconductance, 1000 micromhos minimum; heater-cathode leakage current, 20 microamperes maximum; and grid current, +0.9 microampere maximum or -0.9 microampere maximum.

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HIGH-MU TRIODE

OPERATING CONDITIONS AS RE-

Cathode-Bias

Plate Supply Voltage	100				
Plate Load Resistor	0.1	0.1	0.27	0.27	0.47
Grid Resistor°	0.27	0.47	0.47	1.0	0.47
Cathode Resistor	2700	2700	5600	6800	10000
Signal Input Volts (rms)	0.1	0.1	0.1	0.1	0.1
Output Volts (rms)	3.7	3.9	4.1	4.2	3.95
Gain▲	37	39	41	42	39.5
Oistortion	2.4	2.1	2.1	1.8	2.4
Signal Input Volts (rms)*	0.20	0.20	0.20	0.26	0.20
Output Volts (rms)	7.3	7.7	8.1	10.7	7.8
Gain▲	36.5	38.5	40.5	41.2	39
Oistortion	5.0	4.5	4.3	4.9	5.0

Zero-Bias

Plate-Supply Voltage	100				
Plate Load Resistor	0.1	0.1	0.27	0.27	0.47
Grid Resistor°	0.27	0.47	0.47	1.0	0.47
Signal Input Volts (rms)	0.1	0.1	0.1	0.1	0.1
Output Volts (rms)	3.8	4.0	4.3	4.55	4.2
Gain▲	38	40	43	45.5	42
Oistortion	2.2	2.0	1.9	1.6	2.1
Signal Input Volts (rms)*	0.2	0.21	0.22	0.26	0.2
Output Volts (rms)	7.25	7.9	8.95	11	7.9
Gain▲	36.2	37.6	40.6	42.4	39.5
Distortion	5.0	4.8	4.9	4.8	4.8

Note 1: Coupling capacitors should be selected to give desired frequency response. Cathode resistor should be adequately bypassed.

° of following stage.

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HIGH-MU TRIODE

SISTANCE-COUPLED AMPLIFIER

Operation

			200				volts
0.47	0.1	0.1	0.27	0.27	0.47	0.47	megohm
1.0	0.27	0.47	0.47	1.0	0.47	1.0	megohm
10000	1500	1800	3300	3900	5600	6800	ohms
0.1	0.1	0.1	0.1	0.1	0.1	0.1	volt
4.3	4.4	4.6	4.9	5.0	4.8	5.0	volts
43	44	46	49	50	48	50	
1.7	0.7	0.7	0.9	0.7	0.9	0.7	per cent
0.25	0.51	0.61	0.50	0.59	0.49	0.64	volt
10.7	22	27	24.2	29	23.2	31.6	volts
42.8	43.1	44.3	48.4	49.2	47.3	49.4	
4.5	3.9	5.0	4.5	4.5	5.0	5.0	per cent

Operation

			200				volts
0.47	0.1	0.1	0.27	0.27	0.47	0.47	megohm
1.0	0.27	0.47	0.47	1.0	0.47	1.0	megohm
0.1	0.1	0.1	0.1	0.1	0.1	0.1	volt
4.55	4.7	4.9	5.35	5.4	5.2	5.4	volts
45.5	47	49	53.5	54	52	54	
1.6	0.4	0.4	0.8	0.7	0.9	0.7	per cent
0.27	0.59	0.63	0.54	0.65	0.5	0.63	volt
11.3	25	27.7	25.8	31.5	23.5	30.5	volts
41.8	42.4	43.9	47.7	48.5	47	48.4	
5.0	4.9	5.0	4.9	5.0	5.0	4.8	per cent

* Maximum value to swing the grid of resistance-coupled amplifier tube to the point where its grid starts to draw current.

▲ Ratio of signal output to signal input.

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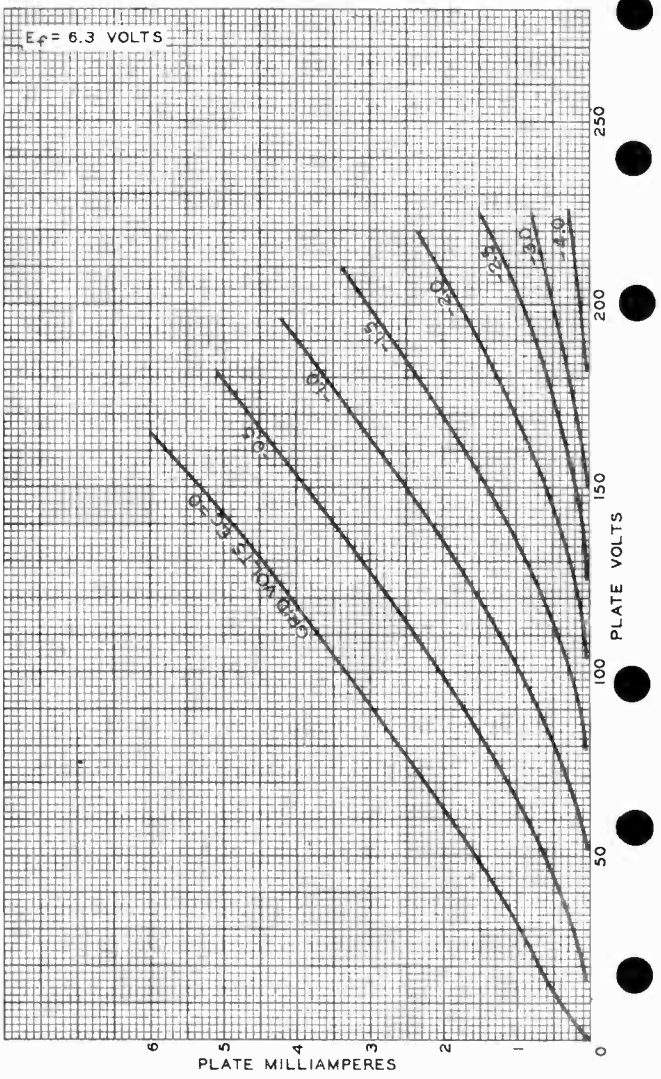
AVERAGE PLATE CHARACTERISTICS



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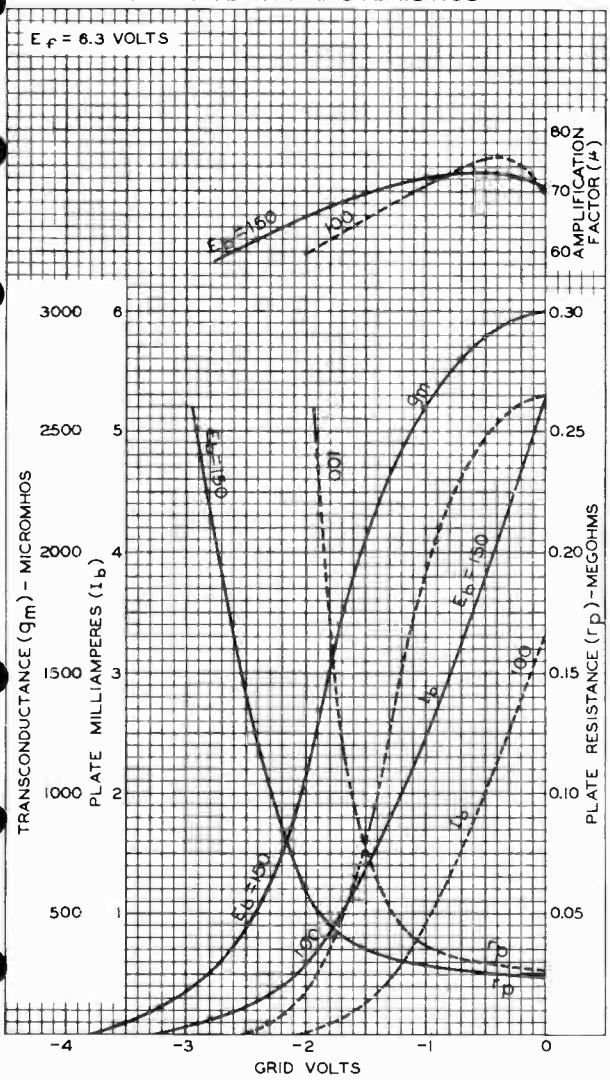
AVERAGE CHARACTERISTICS



World Radio History

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5725

PREMIUM TYPE 5725

SHARP-CUTOFF PENTODE

7-PIN MINIATURE TYPE

Intended for applications where dependable performance under shock and vibration is paramount. This "premium" type is similar to the 6AS6.

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.175	amp
Direct Interelectrode Capacitances:[o]		
Grid No.1 to plate	0.02 max.	μμf
Grid No.1 to cathode & internal shield, grid No.3, grid No.2, and heater	3.9	μμf
Plate to cathode & internal shield, grid No.3, grid No.2, and heater	3	μμf
Grid No.1 to grid No.3	0.15 max.	μμf

Characteristics, Class A_1 Amplifier:

Plate Voltage	120	volts
Grid-No.3 (Suppressor-Grid) Voltage	0	volts
Grid-No.2 (Screen-Grid) Voltage	120	volts
Grid-No.1 (Control-Grid) Voltage	-2	volts
Transconductance:		
Grid No.1 to plate	3200	μmhos
Grid No.3 to plate	470	μmhos
Plate Current	5.2	ma
Grid-No.2 Current	3.5	ma

Mechanical:

Mounting Position	Any
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Maximum Diameter	3/4"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CM

Pin 1 - Grid No.1
Pin 2 - Cathode, Internal Shield
Pin 3 - Heater

Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Grid No.3

AMPLIFIER - Class A_1

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	200 max.	volts

[o] With external shield JETEC No.316 connected to cathode.

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SHARP-CUTOFF PENTODE

GRID-No.3 (SUPPRESSOR-GRID VOLTAGE):		
Positive bias value	30 max.	volts
Negative bias value	55 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	155 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive bias value	0 max.	volts
Negative bias value	55 max.	volts
GRID-No.3 CURRENT	0.2 max.	ma
CATHODE CURRENT	20 max.	ma
GRID-No.2 INPUT	0.55 max.	watt
PLATE DISSIPATION	1.65 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	165 max.	°C
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	0.1 max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN•

Values are Initial, Unless Otherwise Specified

	Note	Min.	Max.	
Heater Current	1	160	190	ma
Direct Interelectrode Capacitances:				
Grid No.1 to cathode & internal shield, grid No.3, grid No.2, and heater	2	3.5	4.5	μμf
Plate to cathode & internal shield, grid No.3, grid No.2, and heater	2	2.6	3.4	μμf
Plate Current (1)	1,3	2.5	9	ma
Plate Current (2)	1,4	–	200	μa
Plate Current (3)	1,5	5	–	μa
Plate Current (4)	1,6	–	200	μa
Plate Current (5)	1,7	5	–	μa
Grid-No.2 Current	1,3	1.5	5.5	ma
Transconductance (1), Grid No.1 to Plate	1,3	2500	4500	μmhos
Transconductance (1), at 500 hours	1,3	2200	4500	μmhos
Transconductance (2), Grid No.1 to Plate	1,8	700	1700	μmhos
Transconductance (3), Grid No.3 to Plate	1,9	400	1150	μmhos
Transconductance Change	10	–	15	%

• Each tube is stabilized before characteristics testing by continuous operation for at least 45 hours at room temperature and with dissipation values equivalent to life test conditions.

Notes 1 to 10: See next page.

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SHARP-CUTOFF PENTODE

	Note	Min.	Max.	
Transconductance Change at 500 hours.	10	-	15	%
Reverse Grid Current.	1,11	-	0.1	μa
Reverse Grid Current at 500 hours.	1,11	0	0.1	μa
Grid Emission Current	12	-	1	μa
Heater-Cathode Leakage Current:				
Heater 100 volts negative with respect to cathode . .	1	-	10	μa
Heater 100 volts positive with respect to cathode . .	1	-	10	μa
Heater-Cathode Leakage Current at 500 hours:				
Heater 100 volts negative with respect to cathode . .	1	-	10	μa
Heater 100 volts positive with respect to cathode . .	1	-	10	μa
Leakage Resistance:				
Between grid No.1 and all other electrodes tied together.	1,13	100	-	megohms
Between grid No.3 and all other electrodes tied together.	1,14	100	-	megohms
Between plate and all other electrodes tied together.	1,15	100	-	megohms
Leakage Resistance at 500 hours:				
Between grid No.1 and all other electrodes tied together.	1,13	50	-	megohms
Between grid No.3 and all other electrodes tied together.	1,14	50	-	megohms
Between plate and all other electrodes tied together.	1,15	50	-	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With external shield JETEC No.316 connected to cathode.

Note 3: With plate volts = 120, grid-No.3 volts = 0, grid-No.2 volts = 120, and grid-No.1 volts = -2.

Note 4: With plate volts = 120, grid-No.3 volts = -10, grid-No.2 volts = 120, and grid-No.1 volts = -3.

Note 5: With plate volts = 120, grid-No.3 volts = -6, grid-No.2 volts = 120, and grid-No.1 volts = -3.

Note 6: With plate volts = 120, grid-No.3 volts = 0, grid-No.2 volts = 120, and grid-No.1 volts = -8.

Note 7: With plate volts = 120, grid-No.3 volts = 0, grid-No.2 volts = 120, and grid-No.1 volts = -6.

Notes 8 to 15: See next page.

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SHARP-CUTOFF PENTODE

Note 8: With plate volts = 120, grid-No.3 volts = -5, grid-No.2 volts = 120, and grid-No.1 volts = -2.

Note 9: With plate volts = 120, grid-No.3 volts = -3, grid-No.2 volts = 120, and grid-No.1 volts = -2.

Note 10: With 5.7 volts ac or dc on heater, plate volts = 120, grid-No.3 volts = 0, grid-No.2 volts = 120, and grid-No.1 volts = -2.

Note 11: With plate volts = 120, grid-No.3 volts = 0, grid-No.2 volts = 120, grid-No.1 volts = -2, and grid-No.1-circuit resistance (megohms) = 0.1.

Note 12: With 7.5 volts ac or dc on heater, plate volts = 120, grid-No.3 volts = 0, grid-No.2 volts = 120, grid-No.1 volts = -10, and grid-No.1-circuit resistance (megohms) = 0.1.

Note 13: With grid-No.1 volts = -100, and all other electrodes connected to ground.

Note 14: With grid-No.3 volts = -100, and all other electrodes connected to ground.

Note 15: With plate volts = -300, and all other electrodes connected to ground.

SPECIAL RATINGS AND PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 450 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are tested in four different positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 60 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for reverse grid current, low-frequency vibration, heater-cathode leakage current, and transconductance.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 150 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: heater voltage of 6.3 volts ac or dc, plate volts = 120, grid-No.3 volts = 0, grid-No.2 volts = 120, grid-No.1 volts = -2, plate load resistance (ohms) = 10,000, and vibrational acceleration of 2.5 g at 25 cycles per second.

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SHARP-CUTOFF PENTODE

Heater-Cycling Life Performance:

Cycles of Intermittent Operation. . . . 2000 min. cycles
Under the following conditions: heater voltage of 7.5 volts cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other electrodes connected to ground.

Audio-Frequency Noise and Microphonic Performance:

RMS Output Voltage. . . . . 175 max. mv
This test is performed on a sample lot of tubes from each production run under the following conditions: heater voltage of 6.3 volts ac or dc, plate-supply volts = 200, grid-No.3 supply volts = 0, grid-No.2 supply volts = 200, grid-No.1 volts = 0, plate load resistance (megohms) = 0.1, grid-No.2-circuit resistance (megohms) = 0.5, cathode resistor (ohms) = 1000, grid-No.2 bypass capacitor (μf) = 2, and cathode bypass capacitor (μf) = 1000. The output voltage of a tube, when tapped, will not cause a reading on a VU output meter greater than that produced when a calibrating signal of 175 millivolts RMS is applied to the plate of the tube.

Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid current in excess of 1 microampere under the conditions specified in the CHARACTERISTICS RANGE VALUES for reverse grid current.

1-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Tubes are checked for transconductance under conditions of maximum rated plate dissipation. At the end of 1 hour, the value of transconductance is read. The variation in transconductance from the 0-hour reading will not exceed 10 per cent.

100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run under conditions of maximum rated plate dissipation to insure a low percentage of early inoperatives. At the end of 100 hours, a tube is considered inoperative it it shows a permanent or temporary short or open circuit, a value of reverse grid current in excess of 1 microampere, or a transconductance (1) value of less than 2200 micromhos under the conditions specified in CHARACTERISTICS RANGE VALUES.

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SHARP-CUTOFF PENTODE

500-Hour Intermittent Life Performance:

This test is made on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: heater voltage of 6.3 volts ac or dc, plate-supply volts = 180, grid-No.3 supply volts = 0, grid-No.2 supply volts = 125, grid-No.1 volts = 0, grid-No.1-circuit resistance (megohms) = 0.1, cathode resistor (ohms) = 130, heater 135 volts positive with respect to cathode, and bulb temperature (°C) = 165. At the end of 500 hours, tubes will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass the established initial limits for heater current, reverse grid current and heater-cathode leakage current, and 500-hour limits for transconductance (1), transconductance change, and leakage resistance as shown under CHARACTERISTICS RANGE VALUES.

Curves shown under Type 6AS6 also apply to the 5725

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5726

5726 PREMIUM TYPE

TWIN DIODE

MINIATURE TYPE

Intended for applications where dependable performance under shock and vibration is paramount. The 5726 is a "premium" version of the 6AL5W.

GENERAL DATA

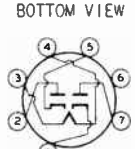
Electrical:

Heater, for Unipotential Cathodes:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.3	amp
Resonant Frequency (Each unit, approx.)	700	Mc
Direct Interelectrode Capacitances (With external shield JETEC No.316):		
Unit No.1:		
Plate to Cathode + External Shield, Heater, and Internal Shield	3.2	μμf
Cathode to Plate + External Shield, Heater, and Internal Shield	3.9	μμf
Unit No.2:		
Plate to Cathode + External Shield, Heater, and Internal Shield	3.2	μμf
Cathode to Plate + External Shield, Heater, and Internal Shield	3.9	μμf
Plate of Unit No.1 to Plate of Unit No.2*	0.026 max.	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)

BOTTOM VIEW



Pin 1 – Cathode of Diode Unit No.1
Pin 2 – Plate of Diode Unit No.2
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Cathode of Diode Unit No.2
Pin 6 – Internal Shield
Pin 7 – Plate of Diode Unit No.1

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values*:

PEAK INVERSE PLATE VOLTAGE	360 max.	volts
PEAK PLATE CURRENT PER PLATE	60 max.	ma

* With external and internal shield connected to ground.

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TWIN DIODE

HOT-SWITCHING TRANSIENT PLATE CURRENT		
For duration of 0.2 second maximum . . .	350 max.	ma
DC OUTPUT CURRENT PER PLATE	10 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	360 max.	volts
Heater positive with respect to cathode	360 max.	volts

Typical Operation:

The two units may be used separately or in parallel

AC Plate-Supply Voltage Per Plate (RMS)	117	volts
Minimum Total Effective Plate-Supply Impedance Per Plate	300	ohms
DC Output Current Per Plate	9	ma

Shock and Vibration Tests:

These tests are made as indicated in the JAN Specifications: JAN 1-A for Electron Tubes, May 1946 under the section as follows:

Section F6b (9e) Shock Test:		
Instantaneous Impact Acceleration . .	700 max.	g
Section F6b (9f) Vibration Test:		
Vibrational Acceleration	2.5 max.	g

Heater Cycling Life Test:

This test is made as indicated in the JAN Specifications JAN 1-A for Electron Tubes for type 5726/6AL5W.

Cycles of Intermittent Operation:		
At a heater voltage of 7.5 volts . . .	2000 min.	cycles

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.275	0.325	amp
Direct Interelectrode Capacitances (With external shield JETEC No.316):				
Unit No.1:				
Plate to Cathode + External Shield, Heater, and Internal Shield	-	2.4	4.0	μμf
Cathode to Plate + External Shield, Heater, and Internal Shield	-	2.8	4.4	μμf
Unit No.2:				
Plate to Cathode + External Shield, Heater, and Internal Shield	-	2.4	4.0	μμf
Cathode to Plate + External Shield, Heater, and Internal Shield	-	2.8	4.4	μμf

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TWIN DIODE

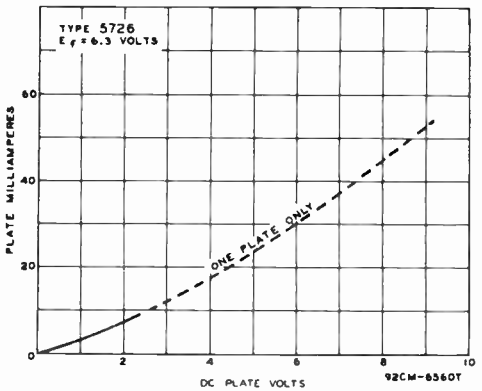
	Note	Min.	Max.	
Plate of Unit No.1 to Plate of Unit No.2	2	-	0.026	μμf
Plate Current (Per Plate) . . .	1,3	40	-	ma

Note 1: With 6.3 volts ac on heater.

Note 2: With external and internal shield connected to ground.

Note 3: With dc plate voltage = 10 volts. Each unit tested separately with electrodes of opposite unit grounded.

AVERAGE PLATE CHARACTERISTIC



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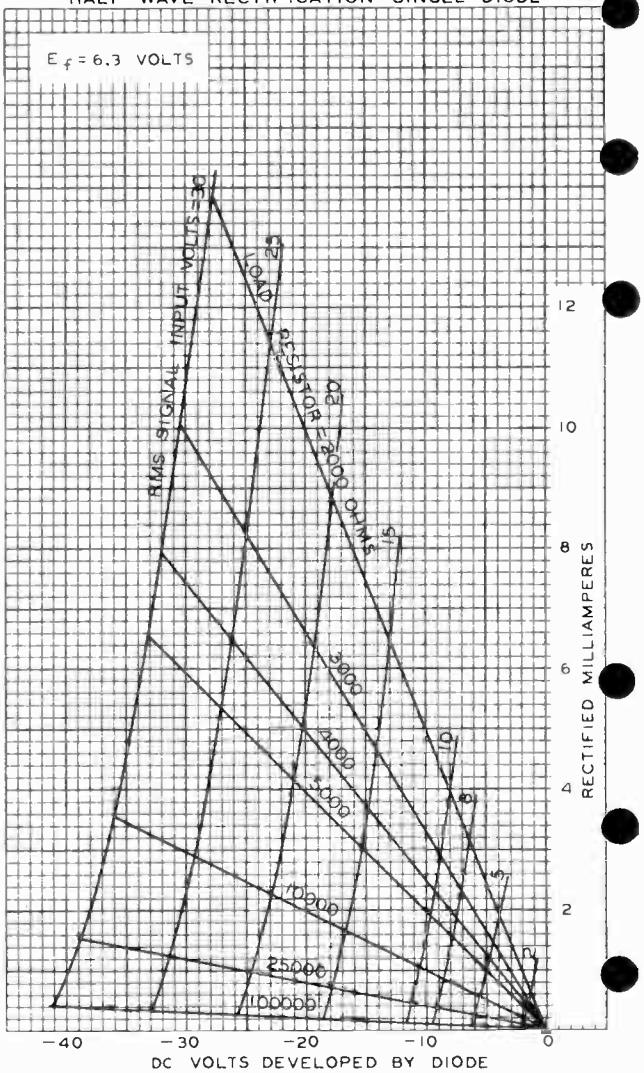
AVERAGE CHARACTERISTICS

HALF-WAVE RECTIFICATION - SINGLE DIODE



JUNE 7, 1944 TUBE DEPARTMENT 92CM-6561

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5734
MECHANO-ELECTRONIC TRANSDUCER

TRIODE TYPE

GENERAL DATA

Electrical:

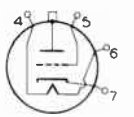
Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.15	amp

Mechanical:

Mounting Position	Any
Maximum Angular Deflection of Plate Shaft	±0.5 degree
Maximum Overall Length (Excluding flexible leads)	1.300"
Maximum Diameter	0.328"
Envelope	Metal Shell MT-2-1/4

Terminal Connections, BOTTOM VIEW

Lead 4 – Heater
Lead 5 – Grid
Lead 6 – Heater



Lead 7 – Cathode, Internal Shield
Shell – Plate

Maximum Ratings, *Design-Center Values*:

DC PLATE-SUPPLY VOLTAGE	300 max.	volts
DC PLATE CURRENT	5 max.	ma
PLATE DISSIPATION	0.4 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical Operation:

DC Plate-Supply Voltage	300	volts
DC Grid Voltage	0	volts
Amplification Factor▲	20	
Plate Resistance▲	72000	ohms
Transconductance▲	275	micromhos
DC Plate Current▲	1.5	ma
Load Resistance	75000	ohms
Deflection Sensitivity♦	40	volts/degree
	2300	volts/radian
Moment of Inertia of Plate●	3.4	milligram cm²
Rotational Compliance of Diaphragm●	0.0013×10^{-3}	radian/dyne cm
	0.075	degree/gram cm

▲ For plate shaft in undeflected position.

♦ Average change in voltage across 75000-ohm plate-load resistor when the plate shaft is deflected from −0.5 to +0.5 degree. The plane of deflection of the plate shaft must coincide with the plane through terminal No.5 and the axis of the tube.

● Based on external plate-shaft length of 1/8" and the center of the diaphragm as pivot.

5734

MECHANO-ELECTRONIC TRANSDUCER

OPERATING PRINCIPLES

The plate shaft extends through the center of a thin metal diaphragm. Angular displacement of the plate shaft changes the distance between the fixed grid and the plate and results in a change in the plate current. The plane of deflection of the plate shaft coincides with the plane through terminal No. 5 and the axis of the tube.

The part of the plate shaft within the tube has a minimum free cantilever resonance of 12000 cycles per second permitting, with suitable mechanical coupling to the external end of the plate shaft, measurements of vibration up to 12000 cycles per second.

OPERATING NOTES

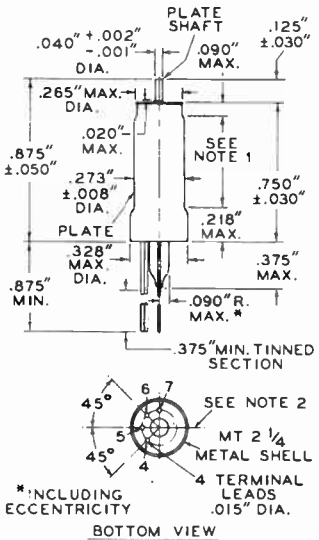
The 5734 may be mounted by means of a supporting clamp which should firmly grip the metal shell of the tube within the designated clamping space indicated on the Outline Drawing. It is essential, however, that the pressure exerted on the shell by the clamp be held to a minimum to prevent possible fracture of the seals.

Under no circumstances should the plate shaft be displaced from its normal position by more than 0.5 degree. A larger displacement of the plate shaft will distort the flexible diaphragm and may damage the tube electrodes.

A non-corrosive flux must be used in soldering the actuating stylus to the plate shaft. Unless this precaution is observed, the plate shaft and the diaphragm will be damaged.

5734

MECHANO-ELECTRONIC TRANSDUCER



NOTE 1: TUBE SUPPORTING CLAMP ON METAL SHELL MUST BE WITHIN THIS SPACE, AND SHOULD BE FASTENED ONLY TIGHT ENOUGH TO INSURE GOOD CONTACT FOR THE PLATE CONNECTION.

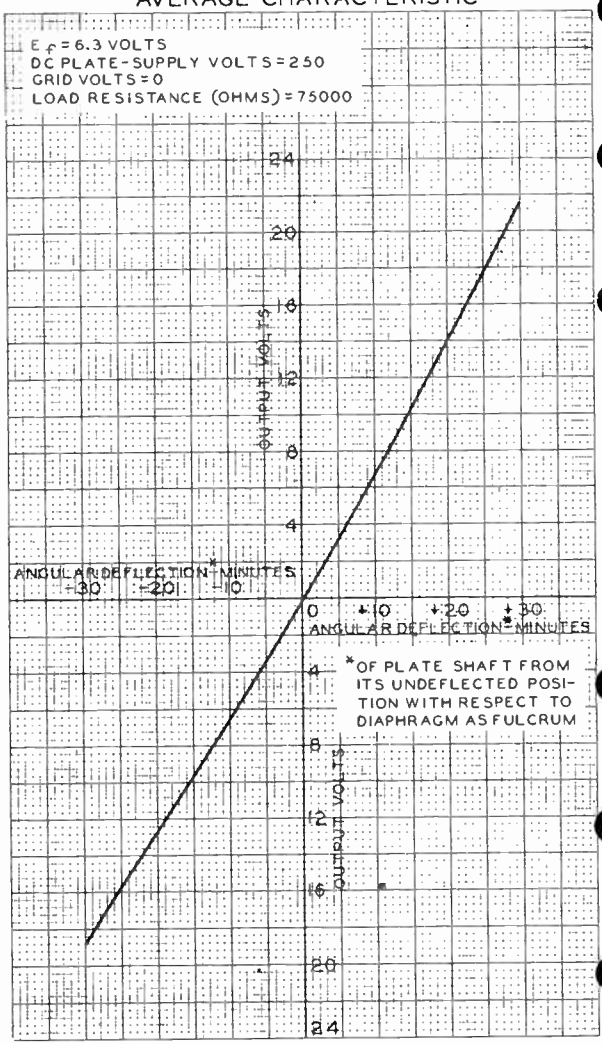
NOTE 2: THE PLANE OF DEFLECTION OF THE PLATE SHAFT WILL COINCIDE WITH THE PLANE THROUGH TERMINAL LEAD No. 5 AND THE AXIS OF THE TUBE.

92CS-7036

RCA

5734

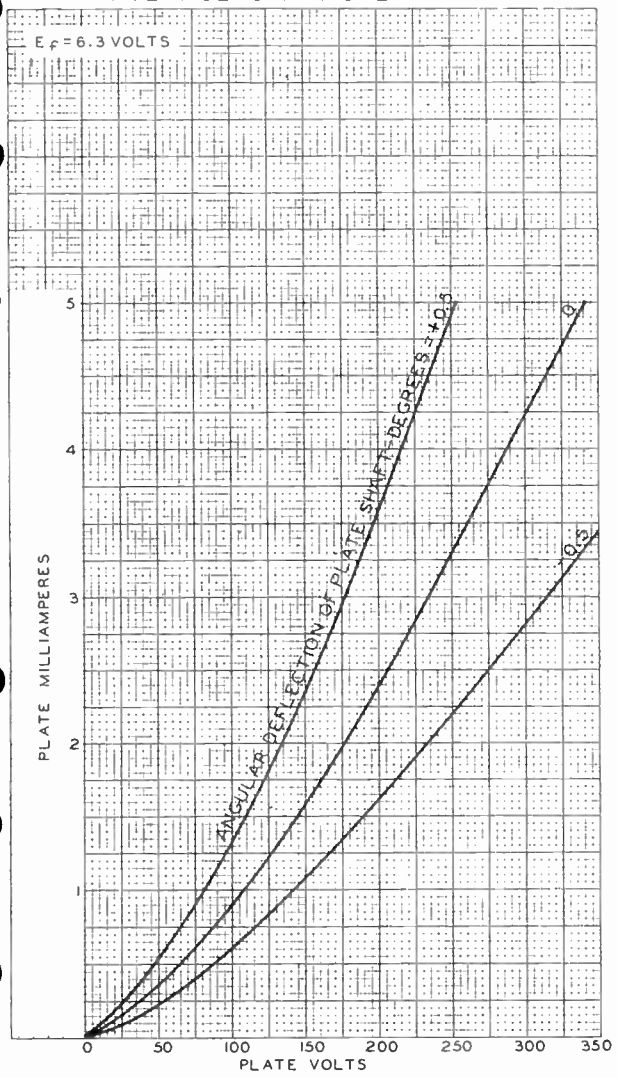
AVERAGE CHARACTERISTIC



RCA

5734

AVERAGE CHARACTERISTICS



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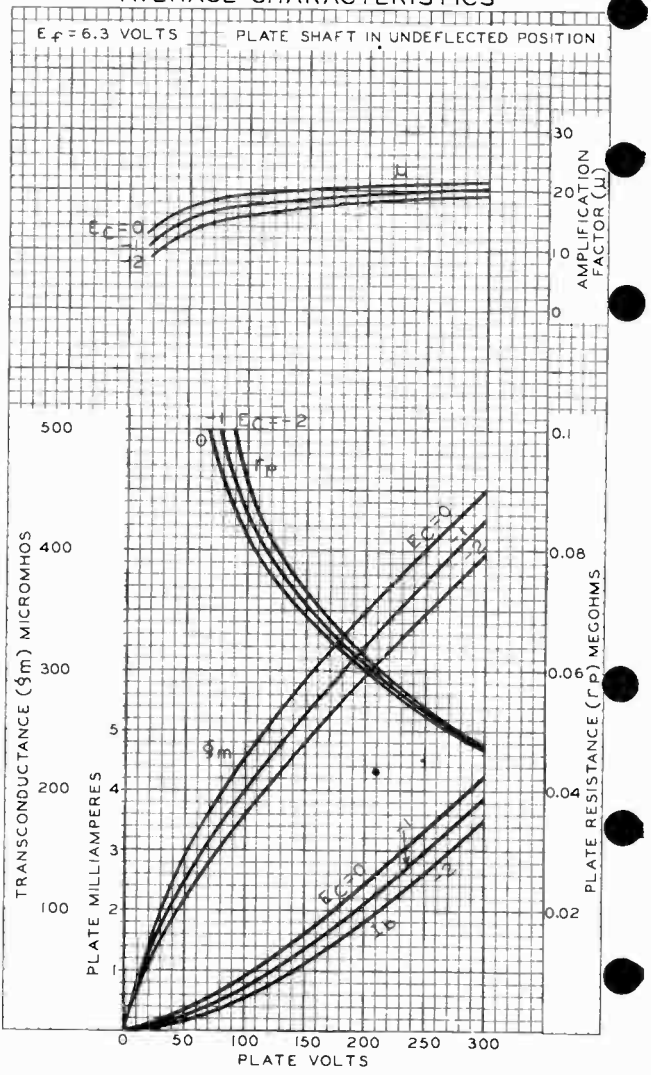
5734

AVERAGE CHARACTERISTICS



AUG. 17, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-7057

5750
PENTAGRID CONVERTER

7-PIN MINIATURE TYPE

For use as a combined mixer and oscillator tube particularly in mobile and aircraft communications receivers in which dependability is paramount. This "premium" type is similar to the 6BE6.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.3	amp
Direct Interelectrode Capacitances:[o]		
Grid No.3 to all other electrodes (RF input)	7.1	μμf
Plate to all other electrodes (Mixer input)	7.6	μμf
Grid No.1 to all other electrodes (Oscillator input)	5.5	μμf
Grid No.3 to plate	0.3 max.	μμf
Grid No.3 to grid No.1	0.15 max.	μμf
Grid No.1 to cathode & grid No.5	3	μμf
Cathode & grid No.5 to all other electrodes except grid No.1	15	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CH

Pin 1 - Grid No.1
Pin 2 - Cathode, Grid No.5
Pin 3 - Heater
Pin 4 - Heater

Pin 5 - Plate
Pin 6 - Grid No.2, Grid No.4
Pin 7 - Grid No.3

CONVERTER

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	330 max.	volts
GRID-No.3 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
GRIDS-No.2 & No.4 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts

[o]: See next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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RCA

5750

PENTAGRID CONVERTER

GRIDS-No.2 & No.4 VOLTAGE	110 max.		volts
TOTAL CATHODE CURRENT	15.5 max.		ma
GRIDS-No.2 & No.4 INPUT	1.1 max.		watts
PLATE DISSIPATION	1.1 max.		watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	100 max.		volts
Heater positive with respect to cathode	100 max.		volts
BULB TEMPERATURE (At hottest point on bulb surface)	165 max.		°C

Characteristics:

	*With Separate Excitation**		
Plate Voltage	100	250	volts
Grids-No.2 & No.4 Voltage	100	100	volts
Grid-No.3 Voltage	-1.5	-1.5	volts
RMS Grid-No.1 (Oscillator-grid) Voltage	10	10	volts
Grid-No.1 Resistor	20000	20000	ohms
Plate Resistance (Approx.)	0.4	1	megohm
Conversion Transconductance	455	475	μmhos
Plate Current	2.6	2.6	ma
Grids-No.2 & No.4 Current	7.5	7.5	ma
Grid-No.1 Current	0.5	0.5	ma
Total Cathode Current	10.6	10.6	ma
Grid-No.3 Voltage (Approx.) for conversion transconductance of:			
10 μmhos	-30	-30	volts
100 μmhos	-6	-6	volts

Oscillator Characteristics (Not Oscillating):■

Plate & Grids-No.2 & No.4 Voltage	100	volts
Grid-No.3 Voltage	0	volts
Grid-No.1 Voltage	0	volts
Amplification Factor§	22.5	
Oscillator Transconductance§	7800	μmhos
Cathode Current	25	ma
Grid-No.1 Voltage (Approx.) for plate μa. = 10	-11	volts

° Without external shield.

* The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited oscillator circuit operating with zero bias.

■ With grids No.2 & No.4 connected to plate.

§ Between grid No.1 and grids No.2 & No.4 connected to plate.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration	450 max.	g

This test is performed in a Navy-Type, High-Impact (fly-

World Radio History

weight) Shock Machine.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g
This test is performed for a period of 100 hours minimum at a frequency of 25 cycles per second.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . . 2000 min. cycles
Under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground.

CURVES
shown under Type 6BE6 in the Receiving-Tube Section also apply to the 5750

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RCA

5751

5751 PREMIUM TYPE

HIGH-MU TWIN TRIODE

9-PIN MINIATURE TYPE

Intended for applications where dependable performance under shock and vibration is paramount

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater Arrangement	*Series*	*Parallel*	
Voltage (AC or DC)	12.6 ± 10%	6.3 ± 10%	volts
Current	0.175	0.35	amp

Characteristics, Class A_1 Amplifier:

Plate Voltage	100	250	volts
Grid Voltage	-1	-3	volts
Amplification Factor	70	70	
Plate Resistance	58000	58000	ohms
Transconductance	1200	1200	μmhos
Plate Current	0.9	1.0	ma

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Maximum Diameter	7/8"
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)

BOTTOM VIEW

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Mid-Tap

AMPLIFIER – Class A_1

Values are for each unit

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Negative bias value	55 max.	volts
Positive bias value	0 max.	volts
PLATE DISSIPATION	0.8 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	165 max.	°C

RCA

5751

HIGH-MU TWIN TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN*

	Note	Min.	Max.	
Heater Current	1	0.160	0.190	amp
Amplification Factor	1,2	55	85	
Plate Current	1,2	0.4	1.8	ma
Plate Current	1,3	-	10.5	μamp
Transconductance	1,2	900	1600	μmhos
Reverse Grid Current	1,4	-	0.4	μamp
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,5	-	10	μamp
Heater positive with respect to cathode	1,5	-	10	μamp
Leakage Resistance:				
Between Grid and All Other Electrodes Tied Together	1,6	500	-	megohms
Between Plate and All Other Electrodes Tied Together	1,7	500	-	megohms

* Each tube is stabilized before characteristics testing by continuous operation for at least 45 hours at room temperature and with dissipation values equivalent to life test conditions.

Note 1: With 12.6 volts ac or dc on heater (series connected).

Note 2: With dc plate voltage of 250 volts and dc grid voltage of -3 volts. Each unit is tested separately. Electrodes of unit not under test are grounded.

Note 3: With dc plate voltage of 250 volts, plate load resistance of 0.1 megohm, and dc grid voltage of -10.5 volts. Each unit is tested separately. Electrodes of unit not under test are grounded.

Note 4: With dc plate voltage of 250 volts, grid resistor of 1.0 megohm, and dc grid voltage of -3 volts. Each unit is tested separately. Electrodes of unit not under test are grounded.

Note 5: With 100 volts dc between heater and cathode, and units connected in parallel.

Note 6: With grid 100 volts negative with respect to all other electrodes tied together.

Note 7: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 600 max. g

Tubes are held rigid in three different positions in a Navy Type, High Impact (flyweight) Shock Machine and are subjected to 600 g impact acceleration.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours.

5751

HIGH-MU TWIN TRIODE

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 100 max. mv
Under the following conditions and with units connected in parallel; heater voltage of 12.6 volts (series connected), dc plate voltage of 250 volts, dc grid voltage of -3 volts, plate load resistance of 2000 ohms, and vibrational acceleration of 2.5 g at 25 cycles per second.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . . 2000 min. cycles
Under the following conditions and with parallel heater arrangement: heater voltage of 7.5 volts cycled one minute on and one minute off, heater 100 volts positive with respect to catnode, and plate and grid voltage = 0 volts.

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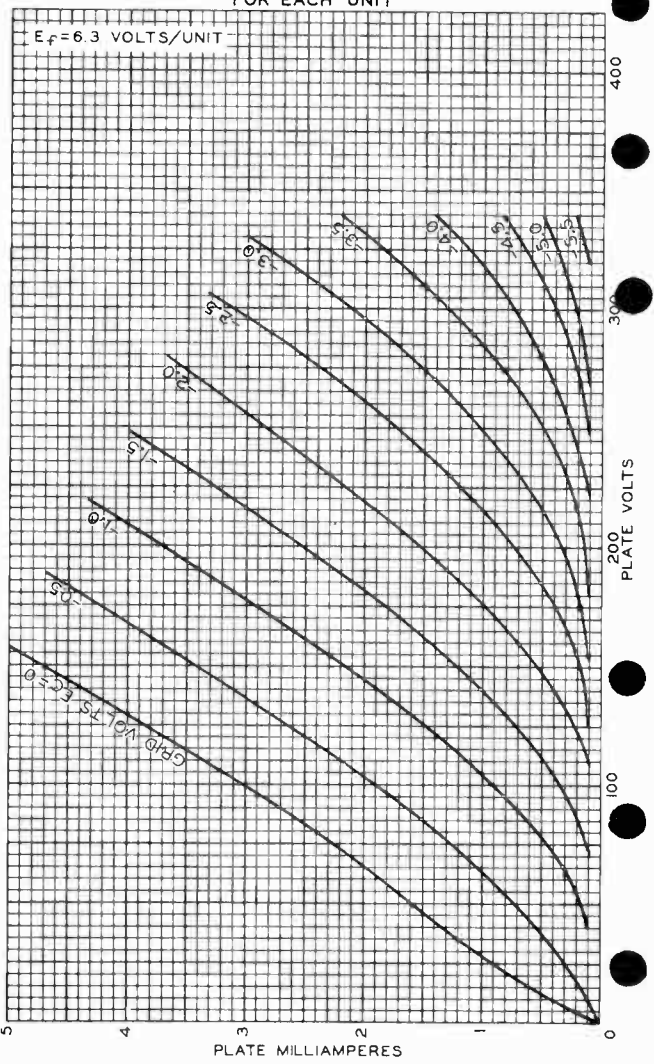
AVERAGE PLATE CHARACTERISTICS

FOR EACH UNIT



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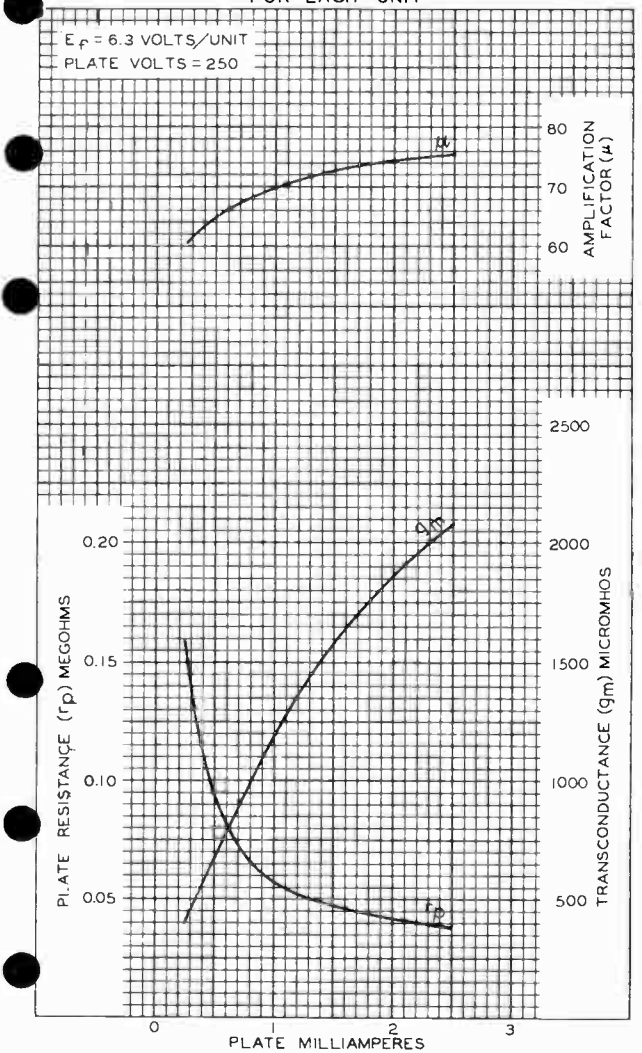
AVERAGE CHARACTERISTICS FOR EACH UNIT



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
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5840 PREMIUM TYPE

5840

SHARP-CUTOFF PENTODE

SUBMINIATURE TYPE

Intended for applications where dependable performance under shock and vibration is paramount.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	6.3 ± 5%	ac or dc volts
Current	0.150	amp

Direct Interelectrode Capacitances:

	With External Shield°	*Without External Shield*	
Grid No.1 to Plate	0.015 max.	0.03 max.	μμf
Input	4.2	4.0	μμf
Output	3.4	1.9	μμf

° Having inside diameter of 0.405" and connected to cathode.

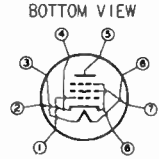
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	100	volts
Grid-No.2 Supply Voltage	100	volts
Cathode Resistor	150	ohms
Plate Resistance	260000	ohms
Transconductance	5000	μmhos
Plate Current	7.5	ma
Grid-No.2 Current	2.4	ma
Grid-No.1 Volts (Approx.) for plate current of 10 μamp	−9	volts

Mechanical:

Operating Position	Any
Maximum Bulb Length	1-3/8"
Length from Button Seal to Bulb Top (Excluding tip)	1.075" ± 0.060"
Diameter	0.383" ± 0.017"
Bulb	T-3
Leads, Flexible	8
Length	1-1/2" to 1-3/4"
Orientation and Diameter	See Dimensional Outline in GENERAL SECTION

BOTTOM VIEW



Lead No.1 – Grid No.1
Lead No.2 – Cathode, Grid No.3
Lead No.3 – Heater
Lead No.4 – Cathode, Grid No.3
Lead No.5 – Plate
Lead No.6 – Heater
Lead No.7 – Grid No.2
Lead No.8 – Cathode, Grid No.3

AMPLIFIER – Class A_1

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	165 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	155 max.	volts

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RCA

5840

SHARP-CUTOFF PENTODE

GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative bias value	55 max.	volts
PLATE DISSIPATION	1.1 max.	watts
GRID-No.2 INPUT	0.55 max.	watt
DC CATHODE CURRENT	16.5 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART at end of tabulated data for this type

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For cathode-bias operation	1.2 max.	megohms
For fixed-bias operation	Not recommended	

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN*

	Note	Min.	Max.	
Heater Current	1	0.138	0.162	amp
Grid-No.1-to-Plate Capacitance	2	–	0.015	μμf
Input Capacitance	2	3.5	4.9	μμf
Output Capacitance	2	2.9	3.9	μμf
Plate Current	1,3	5.5	9.5	ma
Plate Current	1,4	–	50	μamp
Transconductance	1,3	4100	5900	μmho
Transconductance	5,3	3750	–	μmho
Grid-No.1 Current	1,6	–	±0.3	μamp
Grid-No.2 Current	1,3	0.5	3.5	ma
Plate Resistance	1,7	0.175	–	megohm
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,8	–	7.0	μamp
Heater positive with respect to cathode	1,8	–	7.0	μamp
Leakage Resistance:				
Between Grid No.1 and All Other Electrodes Tied Together	1,9	100	–	megohms
Between Plate and All Other Electrodes Tied Together	1,10	100	–	megohms

* See next page.

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SHARP-CUTOFF PENTODE

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With external shield having inside diameter of 0.405" and connected to cathode.

Note 3: With plate supply voltage of 100 volts, grid-No.2 supply voltage of 100 volts, cathode resistor of 150 ohms, and cathode bypass capacitor of 1000 microfarads.

Note 4: With dc plate voltage of 100 volts, dc grid-No.2 voltage of 100 volts, and dc grid-No.1 voltage of −9 volts.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With plate supply voltage of 100 volts, grid-No.2 supply voltage of 100 volts, cathode resistor of 150 ohms, cathode bypass capacitor of 1000 microfarads, and grid-No.1 resistor of 0.1 megohm.

Note 7: With plate supply voltage of 100 volts, grid-No.2 supply voltage of 100 volts, cathode resistor of 150 ohms bypassed by capacitor having a maximum reactance of 3 ohms.

Note 8: With 100 volts dc between heater and cathode.

Note 9: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 10: With plate 300 volts negative with respect to all other electrodes tied together.

* Each tube is stabilized before characteristics testing by continuous operation for at least 45 hours at room temperature and with dissipation values equivalent to life test conditions.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 450 max. g

Tubes are held rigid in three different positions in a Navy Type, High Impact (flyweight) Shock Machine and are subjected to 450 g impact acceleration.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours.

Uniform Acceleration Rating . . . . . 1000 max. g

Tubes are subjected in each of three positions to a gradually applied uniform acceleration up to 1000 g.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 60 max. mv

Under the following conditions: A 100-volt plate and grid-No.2 voltage supply having an impedance not exceeding that of a 40-μf capacitor, plate load resistance of 10000 ohms, grid-No.1 resistor of 0.1 megohm, cathode resistor of 150 ohms, cathode bypass capacitor of 1000 μf, and vibrational acceleration of 15 g at 40 cps.

5840

SHARP-CUTOFF PENTODE

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . 2500 min. cycles
Under the following conditions: With heater voltage of 7.0 volts cycled 1 minute on and 4 minutes off, heater-cathode voltage of 140 volts (rms), and plate, grid-No.2, and grid-No.1 voltage = 0 volts.

Average Life Performance:

The average life performance based on a 500-hour test at 175°C ambient temperature is not less than 450 hours. This life test is made on sample lot of tubes with heater voltage of 6.3 volts; plate supply voltage of 100 volts; grid-No.2 supply voltage of 100 volts; dc heater-cathode voltage (heater positive with respect to cathode) of 200 volts; cathode resistor of 150 ohms; and grid-No.1 resistor of 1 megohm.

The 500-hour end-point limits for the 5840 with heater voltage of 6.3 volts, plate supply voltage of 100 volts, grid-No.2 supply voltage of 100 volts, cathode resistor of 150 ohms bypassed by capacitor having a maximum reactance of 3 ohms, and dc heater-cathode voltage of 100 volts with heater either positive or negative with respect to cathode are: transconductance, 3250 micromhos minimum; heater-cathode leakage current, 20 microamperes maximum; and grid-No.1 current, +0.9 microampere maximum or −0.9 microampere maximum.

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5840

SHARP-CUTOFF PENTODE

OPERATING CONDITIONS AS RESISTANCE-COUPLED AMPLIFIER

Plate-Supply Voltage	100						volts
Plate Load Resistor	0.10	0.10	0.27	0.27	0.47	0.47	meg
Grid-No.2 Resistor	0.22	0.22	0.68	0.68	1.2	1.2	meg
Grid-No.1 Resistor°	0.27	0.47	0.47	1.0	0.47	1.0	meg
Cathode Resistor	820	820	2200	2200	3300	3300	ohms
Sig. Input Volt. (rms)	0.1	0.1	0.1	0.1	0.1	0.1	volt
Output Voltage (rms)	8.2	9.0	9.5	11.8	9.2	11.7	volts
Voltage Gain▲	82	90	95	118	92	117	
Distortion	2.8	3.8	2.5	3.0	3.1	2.3	%
Sig. Input Volt. (rms)*	0.23	0.22	0.15	0.16	0.12	0.14	volt
Output Voltage (rms)	17.7	18.6	13.6	17	11	16	volts
Voltage Gain▲	77	85	91	106	92	114	
Distortion	4.9	4.8	4.7	4.4	4.8	5.0	%

Plate-Supply Voltage	150						volts
Plate Load Resistor	0.10	0.10	0.27	0.27	0.47	0.47	meg
Grid-No.2 Resistor	0.27	0.27	0.82	0.82	1.5	1.5	meg
Grid-No.1 Resistor°	0.27	0.47	0.47	1.0	0.47	1.0	meg
Cathode Resistor	560	560	1500	1500	2200	2200	ohms
Sig. Input Volts. (rms)	0.1	0.1	0.1	0.1	0.1	0.1	volt
Output Voltage (rms)	11.5	12.5	13.2	15.5	13	16.7	volts
Voltage Gain▲	115	125	132	155	130	167	
Distortion	1.5	2.2	2.4	2.4	3.7	3.0	%
Sig. Input Volt. (rms)*	0.20	0.18	0.16	0.16	0.11	0.14	volt
Output Voltage (rms)	21.7	21.7	20.5	24	14	22.2	volts
Voltage Gain▲	109	120	128	150	127	159	
Distortion	4.8	5.0	4.9	4.8	4.2	4.8	%

° of following stage.

▲ Ratio of signal output to signal input.

* Maximum value to swing the grid of resistance-coupled amplifier tube to the point where its grid No.1 starts to draw current.

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

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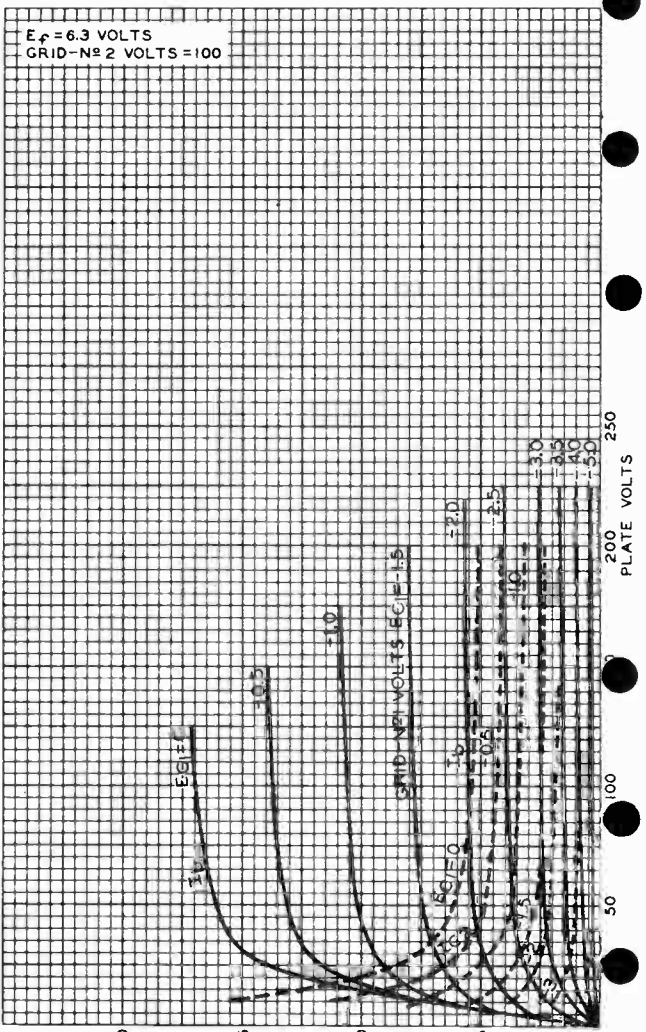
AVERAGE PLATE CHARACTERISTICS



JAN. 8, 1953

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7893

World Radio History

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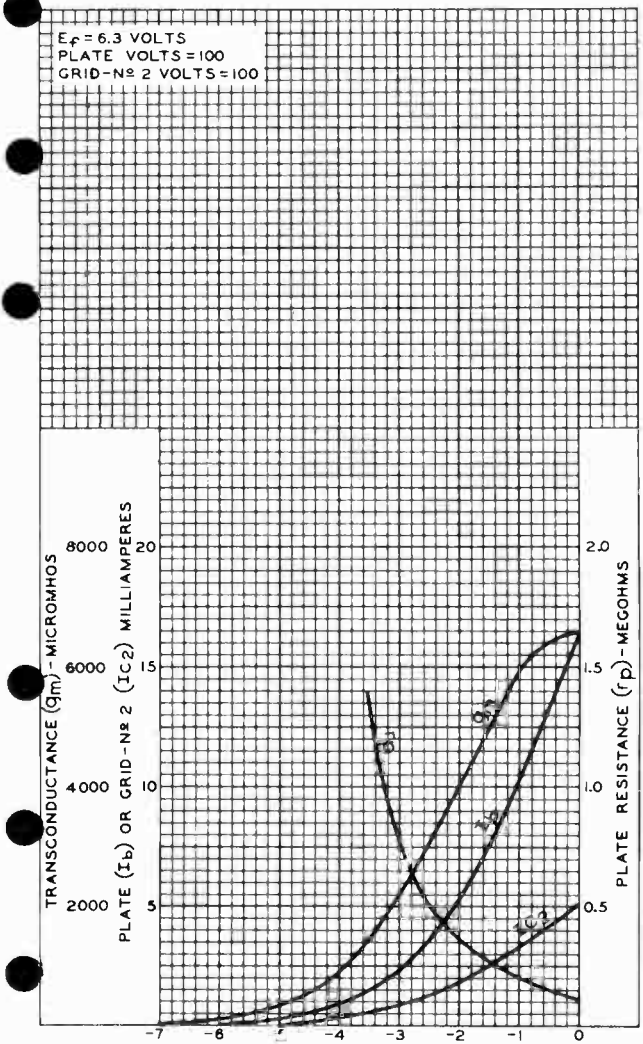
AVERAGE CHARACTERISTICS



World Radio History

Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

For Audio-Amplifier Applications Critical as to Microphonism, Leakage Noise, and Hum

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.15	amp
Direct Interelectrode Capacitances:[a]		
Pentode Connection:		
Grid No.1 to plate	0.11 max.	μμf
Grid No.1 to cathode, grid No.3, grid No.2, heater, and pins 2 and 6	2.7	μμf
Plate to cathode, grid No.3, grid No.2, heater, and pins 2 and 6	2.4	μμf
Triode Connection:[b]		
Grid No.1 to plate	1.4	μμf
Grid No.1 to cathode	1.4	μμf
Plate to cathode	0.85	μμf

Characteristics, Class A_1 Amplifier:

	Triode Connection[b]		*Pentode Connection*	
Plate Voltage	100	250	250	volts
Grid No.3	-	-	*Connected to cathode at socket*	
Grid-No.2 Voltage	-	-	100	volts
Grid-No.1 Voltage	-3	-8	-3	volts
Amplification Factor	21	21	-	
Plate Resistance (Approx.)	0.017	0.0137	2	megohms
Transconductance	1240	1530	1000	μmhos
Plate Current	2.2	5.5	1.8	ma
Grid-No.2 Current	-	-	0.4	ma
Grid-No.1 Voltage (Approx.) for plate $\mu a = 10$	-	-	-8	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875" ←
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

← Indicates a change.

World Radio History

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Basing Designation for BOTTOM VIEW. 9AD

Pin 1 - Grid No.1
Pin 2 - No Connection
Pin 3 - Cathode
Pin 4 - Heater
Pin 5 - Heater

Pin 6 - No Connection
Pin 7 - Grid No.2
Pin 8 - Plate
Pin 9 - Grid No.3

AMPLIFIER — Class A_1

→**Maximum Ratings,** *Design-Maximum Values:*

	Triode Connection[b]	*Pentode Connection*	
PLATE VOLTAGE.	275 max.	330 max.	volts
GRID No.3 (SUPPRESSOR GRID).	-	*Connect to cathode at socket*	
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	-	330 max.	volts
GRID-No.2 VOLTAGE.	-	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE:			
Negative-bias value. . . .	55 max.	55 max.	volts
Positive-bias value. . . .	0 max.	0 max.	volts
GRID-No.2 INPUT:			
For grid-No.2 voltages up to 165 volts	-	0.25 max.	watt
For grid-No.2 voltages between 165 and 330 volts.	-	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
PLATE DISSIPATION.	1.7 max.	1.25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode . . .	100 max.	100 max.	volts
Heater positive with respect to cathode . . .	100 max.	100 max.	volts

Typical Operation as Resistance-Coupled Amplifier:

See *RESISTANCE-COUPLED-AMPLIFIER CHARTS No.26 & No.27* at front of this Section

Maximum Circuit Values:

	Triode Connection[b]	*Pentode Connection*	
Grid-No.1-Circuit Resistance	2.2 max.	2.2 max.	megohms

[a] Without external shield.
[b] Grid No.3 and grid No.2 connected to plate.

→Indicates a change.

World Radio History

OPERATING CONSIDERATIONS

It is recommended that pins 2 and 6 be grounded in all applications. Grounding of these pins will effectively shield grid No. 1 and plate from heater and help to reduce hum level when an ac heater supply is used.

←Indicates a change.

World Radio History

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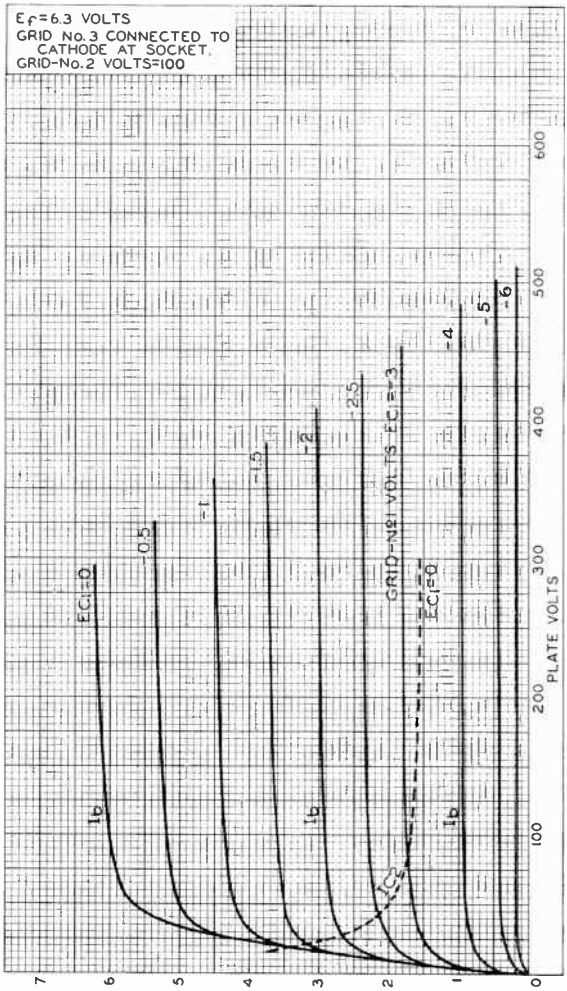
AVERAGE CHARACTERISTICS
Pentode Connection

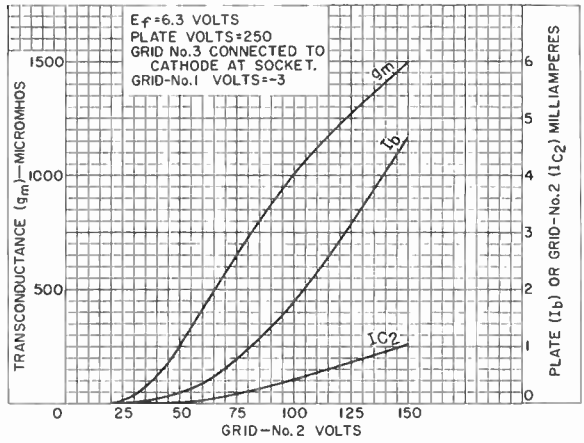


92CM-7439RI

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

World Radio History

AVERAGE CHARACTERISTICS
Pentode Connection



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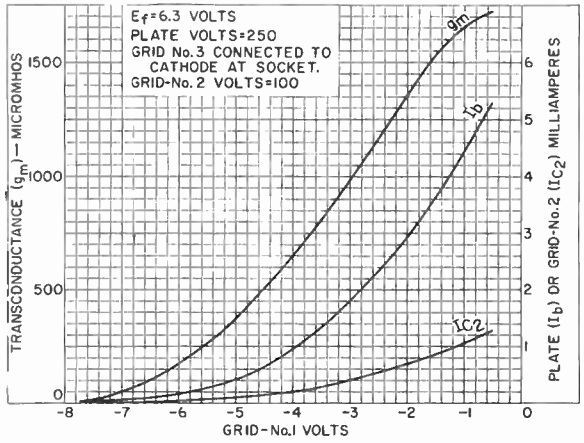

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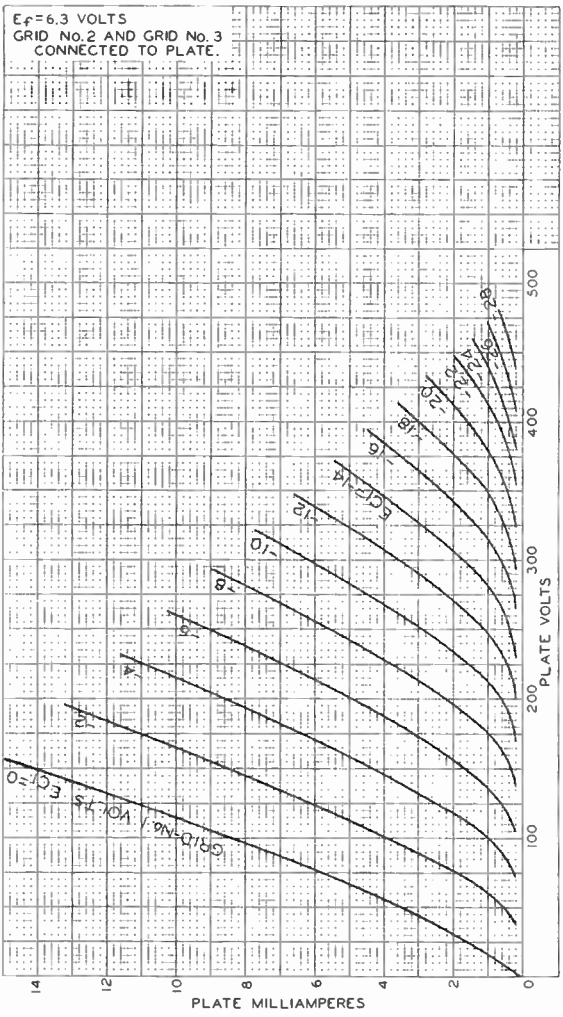
AVERAGE PLATE CHARACTERISTICS
Triode Connection



92CM-7446

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PENTAGRID AMPLIFIER

FOR "ON-OFF" CONTROL APPLICATIONS INVOLVING
LONG PERIODS OF OPERATION UNDER CUTOFF CONDITIONS

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.3	amp
Microphonism		Not Tested
Direct Interelectrode Capacitances (Approx.):°		
Grid No.1 to Plate	0.08 max.	μμf
Grid No.3 to Plate	0.35 max.	μμf
Grid No.1 to Grid No.3	0.15 max.	μμf
Grid No.1 to All Other Electrodes and Heater	5.4	μμf
Grid No.3 to All Other Electrodes and Heater	6.9	μμf
Plate to All Other Electrodes and Heater	7.6	μμf

° with no external shield.

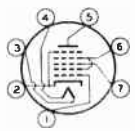
Characteristics, Class A Amplifier:

Plate Voltage	67.5	67.5	volts
Grids-No.2 and No.4 Voltage	67.5	67.5	volts
Grid-No.3 Voltage	0	-4	volts
Grid-No.1 Voltage	0	0	volts
Grid-No.1-to-Plate Transconductance	2000	-	μmhos
Grid-No.3-to-Plate Transconductance	-	1100	μmhos

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin
Basing Designation for BOTTOM VIEW	7CH

Pin 1 - Grid No.1
Pin 2 - Cathode, Grid No.5
Pin 3 - Heater
Pin 4 - Heater



Pin 5 - Plate
Pin 6 - Grid No.2, Grid No.4
Pin 7 - Grid No.3

GATED AMPLIFIER IN COMPUTER SERVICE & "ON-OFF" CONTROL SERVICE

Maximum Ratings, *Absolute Values*:

PLATE VOLTAGE	250 max.	volts

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PENTAGRID AMPLIFIER

GRIDS–No.2 and No.4 VOLTAGE	See Curve	
GRIDS–No.2 and No.4 SUPPLY VOLTAGE	250 max.	volts
GRID–No.3 SUPPLY VOLTAGE:		
Negative bias value	100 max.	volts
Positive bias value	0 max.	volts
Peak negative value	200 max.	volts
Peak positive value	90 max.	volts
GRID–No.1 SUPPLY VOLTAGE:		
Negative bias value	100 max.	volts
Positive bias value	0 max.	volts
Peak negative value	200 max.	volts
Peak positive value: Limited in any application by the peak cathode current and the grid–No.1 input		
PLATE DISSIPATION	1 max.	watt
GRID–No.3 INPUT	0.5 max.	watt
GRIDS–No.2 and No.4 INPUT	1 max.	watt
GRID–No.1 INPUT	0.5 max.	watt
DC CATHODE CURRENT	20 max.	ma
PEAK CATHODE CURRENT	70 max.	ma
PEAK HEATER–CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	120 max.	°C

Typical Operation:

	CUTOFF CONDITION		*ZERO-BIAS CONDITION*	
	Grid-No.1 Control	*Grid-No.3 Control*		
Plate–Supply Voltage	150	150	150	volts
Grid–No.3 Supply Voltage	0	−10	0	volts
Grids–No.2 & No.4 Supply Voltage	75	75	75	volts
Grid–No.1 Supply Voltage	−10	0	0	volts
Plate–Circuit Resistance	20000	20000	20000	ohms
Grid–No.3–Circuit Resistance	47000	47000	47000	ohms
Grids–No.2 & No.4 Series Resistor	470	470	470	ohms
Grid–No.1–Circuit Resistance	47000	47000	47000	ohms
Plate Current	0	0	5.8	ma
Grids–No.2 & No.4 Current	0	14	9	ma

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PENTAGRID AMPLIFIER

Maximum Circuit Values:

Grid-No.1 or Grid-No.3-Circuit Resistance:

For fixed-bias operation . . . . . 0.5 max. megohm

For cathode-bias operation . . . . . 1.0 max. megohm

RANGE VALUES FOR EQUIPMENT DESIGN

Cutoff Condition	*Note*	*Min.*	*Max.*	
Plate Current. . . .	1a and 1b	–	0.2	ma
Zero-Bias Condition				
Plate Current. . . .	2	5.0	6.5	ma

Note 1a: For conditions with grid No.1 as control electrode: 6.3 volts on heater, plate-supply volts = 150, grid-No.3 supply volts = 0, grids-No.2 & No.4 supply volts = 75, grid-No.1 supply volts = −10, plate-circuit resistance (ohms) = 20000, grid-No.3 circuit resistance (ohms) = 47000, grids-No.2 & No.4 series resistor (ohms) = 470, and grid No.1-circuit resistance (ohms) = 47000.

Note 1b: For conditions with grid No.3 as control electrode: values are same as for Note 1a except that grid-No.3 supply volts = −10 and grid-No.1 supply volts = 0.

Note 2: For conditions with 6.3 volts on heater, plate-supply volts = 150, grids-No.2 and No.4 supply volts = 75, grid-No.3 supply volts = 0, grid No.1 supply volts = 0, plate-circuit resistance (ohms) = 20000, grid-No.3-circuit resistance (ohms) = 47000, grids-No.2 and No.4 series resistor (ohms) = 470, and grid-No.1-circuit resistance (ohms) = 47000.

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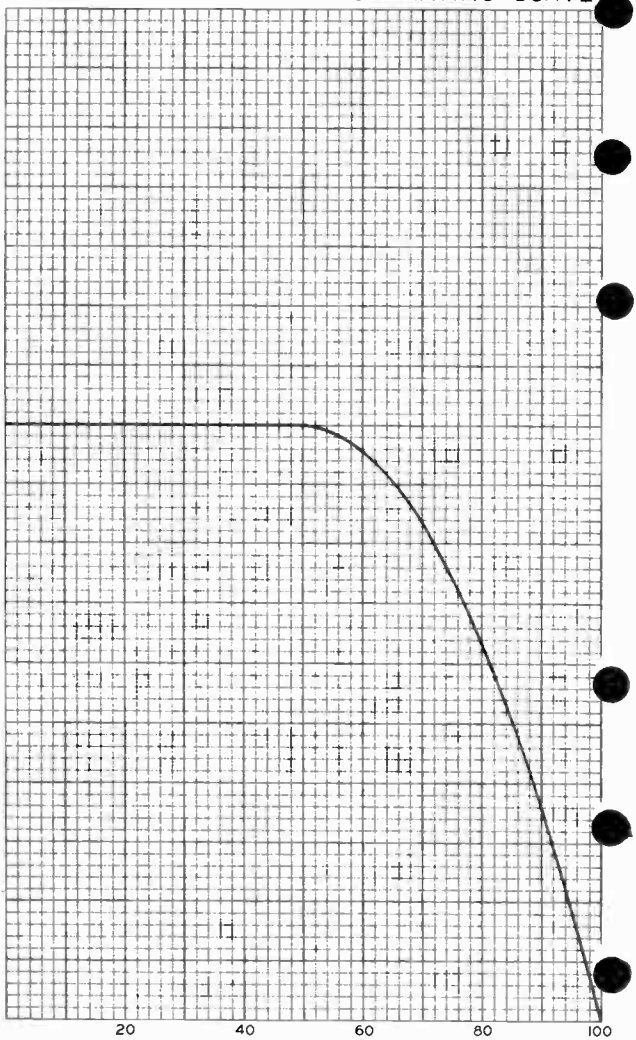
GRIDS – Nº 2 & Nº 4 INPUT RATING CURVE



JUNE 8, 1950

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM – 7500

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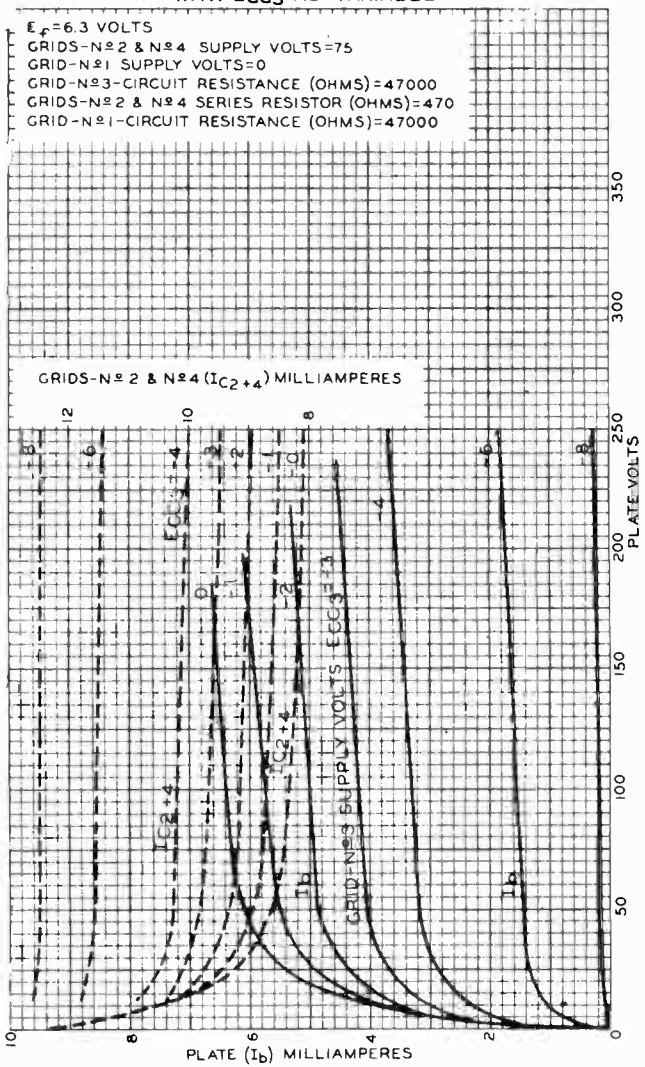
AVERAGE OPERATION CHARACTERISTICS
WITH E_{CC3} AS VARIABLE

E_f=6.3 VOLTS
GRIDS-N°2 & N°4 SUPPLY VOLTS=75
GRID-N°1 SUPPLY VOLTS=0
GRID-N°3-CIRCUIT RESISTANCE (OHMS)=47000
GRIDS-N°2 & N°4 SERIES RESISTOR (OHMS)=470
GRID-N°1-CIRCUIT RESISTANCE (OHMS)=47000



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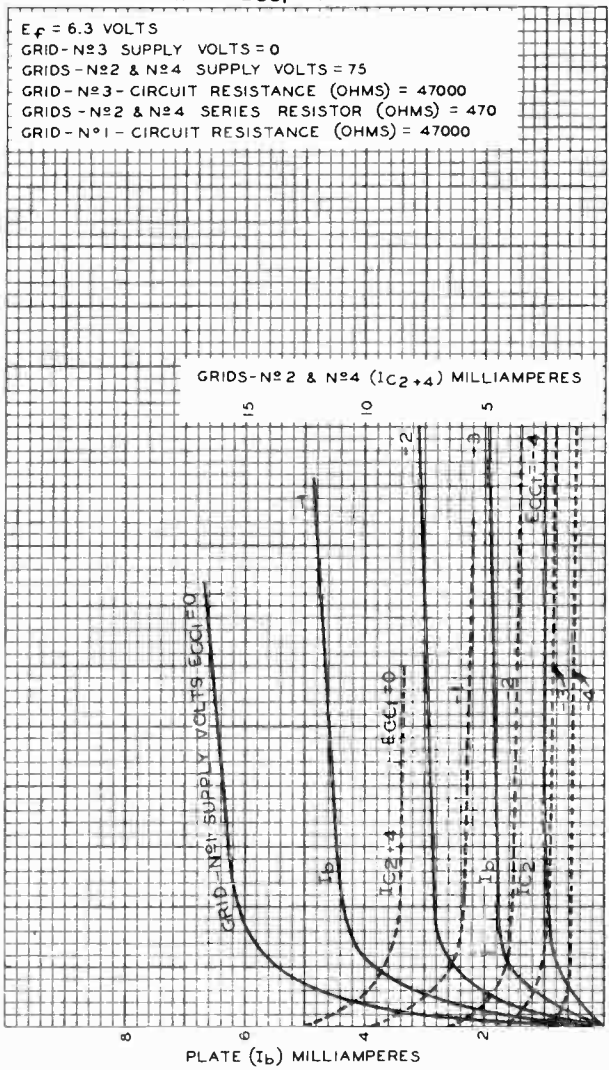
AVERAGE OPERATION CHARACTERISTICS

WITH E_{CC1} AS VARIABLE

E_f = 6.3 VOLTS
GRID-№3 SUPPLY VOLTS = 0
GRIDS-№2 & №4 SUPPLY VOLTS = 75
GRID-№3-CIRCUIT RESISTANCE (OHMS) = 47000
GRIDS-№2 & №4 SERIES RESISTOR (OHMS) = 470
GRID-№1-CIRCUIT RESISTANCE (OHMS) = 47000



World Radio History

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MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

for "on-off" control applications involving long periods of operation under cutoff conditions

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathodes:

	Series	*Parallel*	
Heater arrangment			
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current	0.15	0.3	amp

Microphonism	Not Tested	
Direct Interelectrode Capacitances (Approx.):[o]		
	Unit No.1	*Unit No.2*
Grid to plate	1.5	1.5 μμf
Grid to cathode and heater	1.9	1.9 μμf
Plate to cathode and heater	0.5	0.35 μμf
Grid of unit No.1 to grid of unit No.2	0.1 max.	μμf

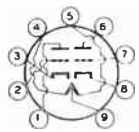
Characteristics, Class A_1 Amplifier (Each Unit):

Plate Voltage	67.5	volts
Grid Voltage	0	volts
Amplification Factor	21	
Plate Resistance (Approx.)	6600	ohms
Transconductance	3200	μmhos
Plate Current	8.5	ma

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-5/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ±3/32"
Maximum Diameter	7/8"
Dimensional Outline	*See General Section*
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 - Plate of Unit No.2
Pin 2 - Grid of Unit No.2
Pin 3 - Cathode of Unit No.2
Pins 4 & 9 - Heater of Unit No.2
Pins 5 & 9 - Heater of Unit No.1
Pin 6 - Plate of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Cathode of Unit No.1
Pin 9 - Heater Mid-Tap



[o] without external shield.

← Indicates a change.

World Radio History

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MEDIUM-MU TWIN TRIODE

FREQUENCY DIVIDER IN COMPUTER SERVICE and "ON-OFF" CONTROL SERVICE

Values are for Each Unit

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	250 max.	volts
GRID VOLTAGE:		
Negative bias value	100 max.	volts
Positive bias value	0 max.	volts
Peak negative value	200 max.	volts
PLATE DISSIPATION	2.5 max.	watts
GRID INPUT	0.5 max.	watt
CATHODE CURRENT:		
Peak	100 max.	ma
DC	20 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	120 max.	°C

Typical Operation as Frequency Halfer:

	Cutoff Condition	*Zero-Bias Condition*	
Plate-Supply Voltage	150	150	volts
Grid Voltage	-15	0	volts
Plate-Circuit Resistance	20000	20000	ohms
Grid-Circuit Resistance	47000	47000	ohms
Plate Current	0	5.1	ma

Maximum Circuit Values:

Grid-Circuit Resistance:		
For fixed-bias operation	0.5 max.	megohm
For cathode-bias operation	1.0 max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Cutoff Condition				
Plate Current	1	-	50	μamp
Difference in Plate Current Between Units	-	-	50	μamp
Zero-Bias Condition				
Plate Current	2	4.6	5.4	ma
Difference in Plate Current Between Units	-	-	0.8	ma

Note 1: For conditions with 12.6 volts on heater, plate-supply volts = 150, grid-supply volts = -15, plate-circuit resistance (ohms) = 20000, and grid-circuit resistance (ohms) = 47000.

Note 2: Conditions are same as for Note 1 except that grid-supply volts = 0.

→ Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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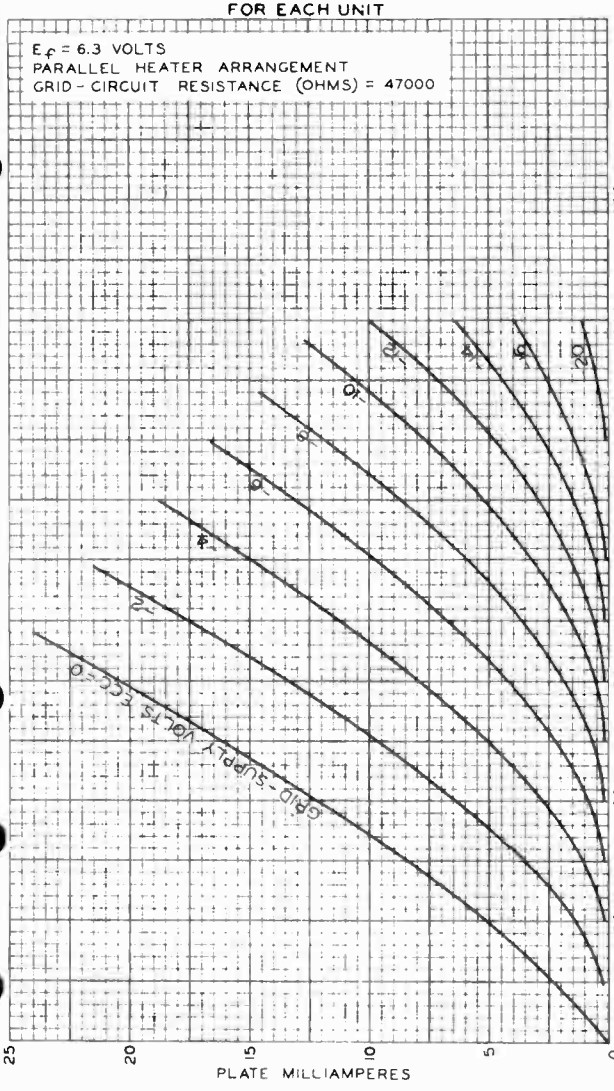
AVERAGE OPERATION CHARACTERISTICS
FOR EACH UNIT



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MEDIUM-MU TWIN TRIODE

FOR "ON-OFF" CONTROL APPLICATIONS INVOLVING
LONG PERIODS OF OPERATION UNDER CUTOFF CONDITIONS

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.45	amp
Microphonism		Not Tested
Direct Interelectrode Capacitances (Approx.):°		
Each Unit:		
Grid to Plate	1.3	μμf
Grid to Cathode and Heater	2.1	μμf
Plate to Cathode and Heater	0.4	μμf
Grid of Unit No.1 to Grid of Unit No.2	0.4 max.	μμf

° With no external shielding.

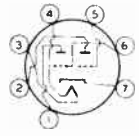
Characteristics, Class A Amplifier (Each Unit, with both units operating):

Plate Voltage	100	volts
Cathode-Bias Resistor•	50	ohms
Amplification Factor	39	
Plate Resistance	6500	ohms
Transconductance	6000	μmhos
Plate Current	9.5	ma

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin
Basing Designation for BOTTOM VIEW	7BF

Pin 1 – Plate of Triode No.2
Pin 2 – Plate of Triode No.1
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Grid of Triode No.1
Pin 6 – Grid of Triode No.2
Pin 7 – Cathode



FREQUENCY DIVIDER IN COMPUTER SERVICE & "ON-OFF" CONTROL SERVICE

Values are for each unit

Maximum Ratings, *Absolute Values*:

PLATE VOLTAGE	250 max.	volts

• Common to both units.

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MEDIUM-MU TWIN TRIODE

GRID VOLTAGE:		
Negative bias value	100 max.	volts
Positive bias value	0 max.	volts
Peak negative value	200 max.	volts
PLATE DISSIPATION	1.5 max.	watts
GRID INPUT	0.1 max.	watt
DC CATHODE CURRENT*	15 max.	ma
PEAK CATHODE CURRENT*	75 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	150 max.	°C

Typical Operation as Frequency Halfer (Each Unit):

	Cutoff Condition	*Zero-Bias Condition*	
Plate-Supply Voltage	150	150	volts
Plate-Circuit Resistance	20000	20000	ohms
Grid-Supply Voltage	−10	0	volts
Grid-Circuit Resistance	47000	47000	ohms
Plate Current	0	5	ma

Maximum Circuit Values:

Grid-Circuit Resistance:		
For fixed-bias operation	0.5 max.	megohm
For cathode-bias operation	1.0 max.	megohm

RANGE VALUES FOR EQUIPMENT DESIGN

Cutoff Condition	*Note*	*Min.*	*Max.*	
Plate Current (Each Unit)	1	-	0.2	ma
Difference in Plate Current Between Units	-	-	0.2	ma
Zero-Bias Condition				
Plate Current (Each Unit)	2	4.3	5.7	ma
Difference in Plate Current Between Units	-	-	1.4	ma

Note 1: For conditions with 6.3 volts on heater, plate-supply volts = 150, plate-circuit resistance (ohms) = 20000, grid-supply volts = −10, and grid-circuit resistance (ohms) = 47000.

Note 2: Conditions are same as for Note 1 except that grid-supply volts = 0.

* With both units operating, the dc cathode current should not exceed 30 milliamperes, and the peak cathode current should not exceed 150 milliamperes.

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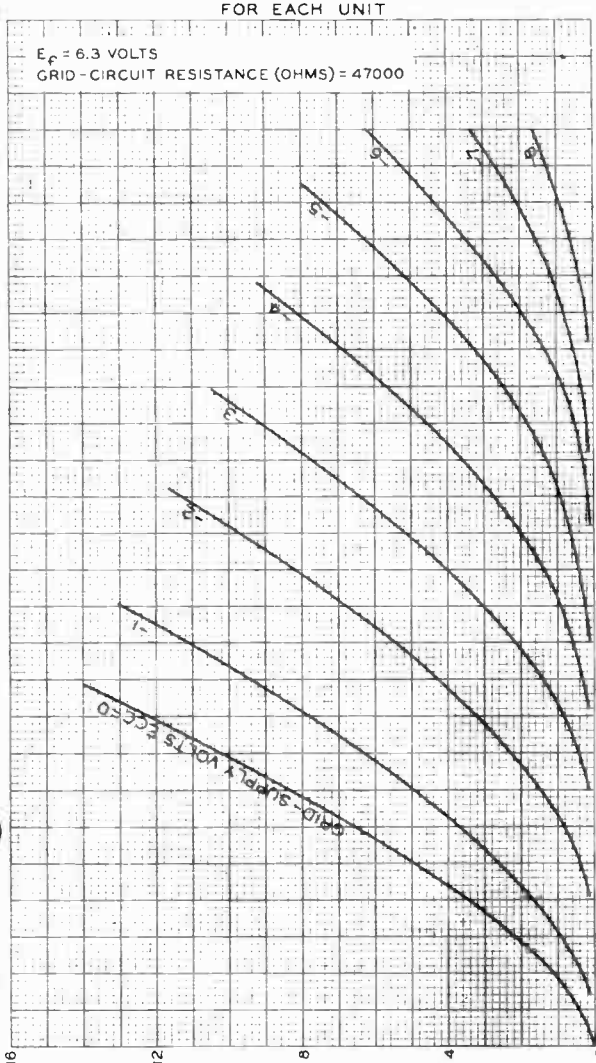
AVERAGE OPERATION CHARACTERISTICS
FOR EACH UNIT



RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For "on-off" control applications involving long periods of operation under cutoff conditions.

GENERAL DATA

Electrical:

	Series	Parallel	
Heater, for Unipotential Cathodes:			
Heater arrangement			
Voltage (AC or DC)	12.6 ± 5%	6.3 ± 5%	volts
Current	0.225	0.45	amp
Direct Interelectrode Capacitances (Approx.):*			
Grid to plate (Each unit)		3.0	μμf
Grid to cathode and heater (Each unit)		3.8	μμf
Plate to cathode and heater (Unit No.1)		0.5	μμf
Plate to cathode and heater (Unit No.2)		0.38	μμf
Plate of unit No.1 to plate of unit No.2		0.5	μμf

Characteristics, Class A_1 Amplifier (Each Unit):		
Plate Supply Voltage	150	volts
Cathode-Bias Resistor	220	ohms
Amplification Factor	47	
Plate Resistance	7250	ohms
Transconductance	6500	μmhos
Plate Current	8.2	ma
Grid Voltage (Approx.) for plate current of 150 μamo	-5.5	volts

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length from Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Maximum Diameter	7/8"
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4,9 – Heater of Unit No.2
Pin 5,9 – Heater of Unit No.1

Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Mid-Tap

* Without external shield.

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MEDIUM-MU TWIN TRIODE

FREQUENCY DIVIDER IN COMPUTER SERVICE and "ON-OFF" CONTROL SERVICE

Values are for Each Unit

Maximum Ratings, *Absolute Values*:

PLATE VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Negative bias value	150 max.	volts
PLATE DISSIPATION	2.4 max.	watts
Total for both units	4.4 max.	watts
DC CATHODE CURRENT	16.5 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200# max.	volts
Heater positive with respect to cathode	200# max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	165 max.	°C

Typical Operation in Computer Service:

	Cutoff Condition	*Conduction Condition*	
Plate Supply Voltage	150	150	volts
Plate Load Resistor	7200	7200	ohms
Plate Current	–	10.5	ma
Grid Voltage (Approx.) for grid current of 140 μamp	–	less than 1 volt	
Grid Voltage (Approx.) for plate current of 150 μamp	-5.5	–	volts
Difference in Grid Voltage Between Units (For plate current of 150 μamp per unit)	1.5	–	volts

Maximum Circuit Values:

Grid-Circuit Resistance:		
For fixed-bias operation	0.1 max.	megohm
For cathode-bias operation	0.5 max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.207	0.243	amp
Amplification Factor (Each Unit)	1,2	39	55	
Grid Voltage for plate current of 150 μamp (Each Unit)	1,3	–	-7.5	volts
Difference in Grid Voltage Between Units (For plate current of 150 μamp per unit)	–	–	1.5	volts
Plate Current 1 (Each Unit)	1,2	6	10.4	ma

The dc component must not exceed 100 volts.

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MEDIUM-MU TWIN TRIODE

	Note	Min.	Max.	
Plate Current 2 (Each Unit) . .	1,4	9.75	–	ma
Reverse Grid Current (Each Unit)	1,5	–	1	μamp
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,6	–	20	μamp
Heater positive with respect to cathode	1,6	–	20	μamp
Transconductance	1,2	5100	7900	μmhos

Note 1: With 12.6 volts ac or dc on heater (series connected).

Note 2: With plate supply voltage of 150 volts and cathode resistor for each cathode of 220 ohms adequately bypassed for a signal frequency of 60 cps. Each unit tested separately. Unit not under test biased to cutoff.

Note 3: With plate supply voltage of 150 volts, grid supply voltage adjusted to give dc plate current of 150 microamperes, and plate load resistor of 7200 ohms. Each unit tested separately. Unit not under test biased to cutoff.

Note 4: With plate supply voltage of 150 volts, grid supply voltage adjusted to give dc grid current of 140 microamperes, and plate load resistor of 7200 ohms. Each unit tested separately. Unit not under test biased to cutoff.

Note 5: With plate supply voltage of 150 volts, cathode resistor for each cathode of 220 ohms, and grid-circuit resistance of 0.5 megohm. Each unit tested separately. Unit not under test biased to cutoff.

Note 6: With 100 volts dc between heater and cathode and units connected in parallel.

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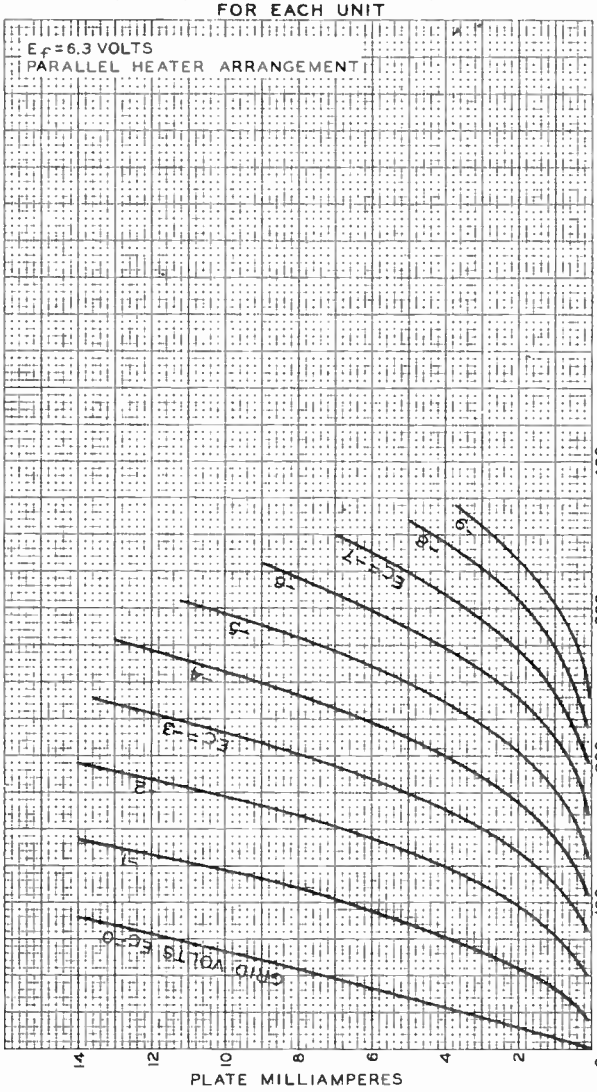
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



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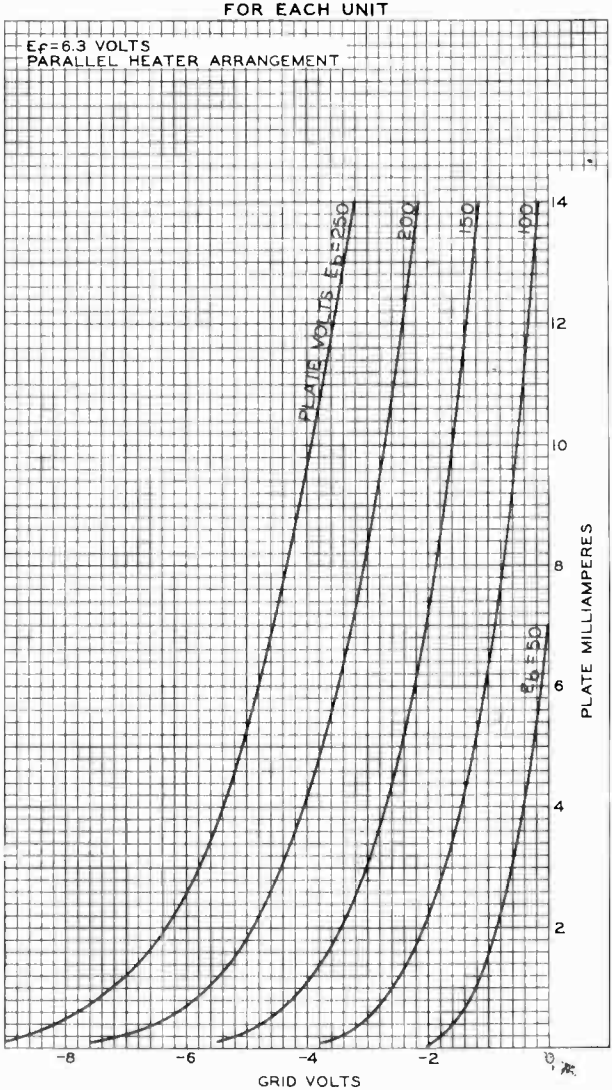
AVERAGE CHARACTERISTICS
FOR EACH UNIT



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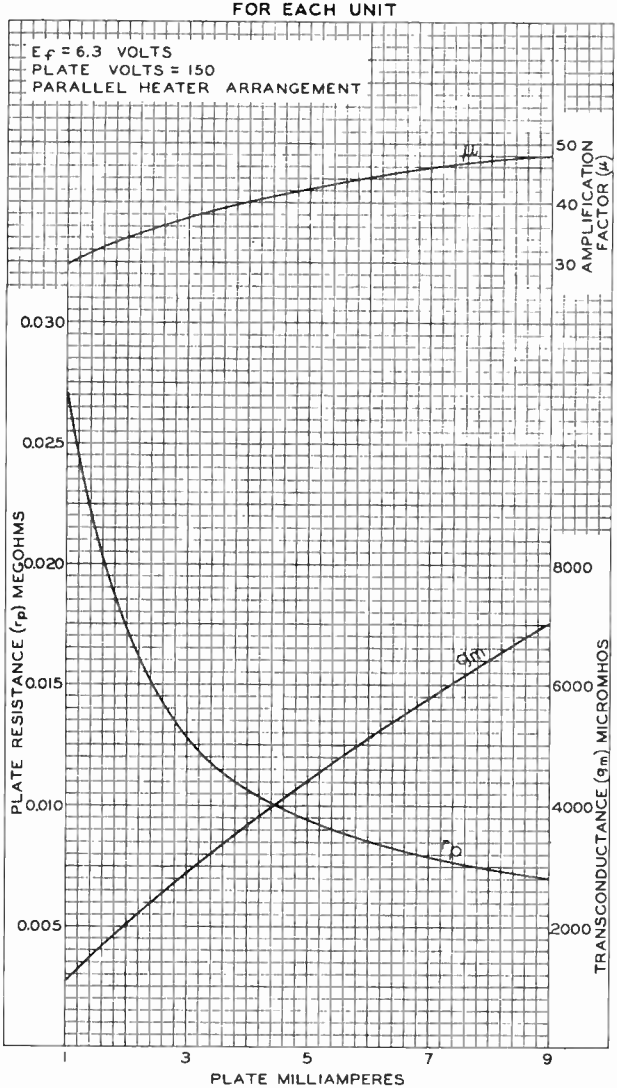
AVERAGE CHARACTERISTICS
FOR EACH UNIT



MAR. 8, 1954

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8265

RCA

6021

PREMIUM TYPE 6021

MEDIUM-MU TWIN TRIODE

SUBMINIATURE TYPE

Intended for applications at altitudes up to 60,000 feet where dependable performance under shock and vibration is paramount

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathodes:

Voltage	6.3	ac or dc volts
Current	0.3	amp

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield°*	
Grid to plate (Each unit)	1.5	1.4	μμf
Grid to cathode and heater (Each unit)	2.4	2.1	μμf
Plate to cathode and heater (Unit No.1)	0.28	1.3	μμf
Plate to cathode and heater (Unit No.2)	0.32	1.4	μμf
Grid to grid	0.013 max.	0.011 max.	μμf
Plate to plate	0.52 max.	0.33 max.	μμf

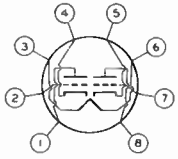
Characteristics, Class A_1 Amplifier (Each Unit):

Plate-Supply Voltage	100	volts
Cathode Resistor	150	ohms
Amplification Factor	35	
Plate Resistance (Approx.)	6500	ohms
Transconductance	5400	μmhos
Plate Current	6.5	ma
Grid Voltage (Approx.) for plate current of 10 μa	-6.5	volts

Mechanical:

Operating Position	Any
Maximum Length (Excluding flexible leads)	1-3/8"
Length, Bulb Seat to Bulb Top (Excluding tip)	1.075" ± 0.060"
Diameter	0.366" to 0.400"
Dimensional Outline	*See General Section*
Bulb	T3
Leads, Flexible	8
Length	1-1/2" to 1-3/4"
Orientation and diameter	*See Dimensional Outline*

BOTTOM VIEW



Lead 1 - Plate of Unit No.2
Lead 2 - Grid of Unit No.2
Lead 3 - Heater
Lead 4 - Cathode of Unit No.2
Lead 5 - Cathode of Unit No.1
Lead 6 - Heater
Lead 7 - Grid of Unit No.1
Lead 8 - Plate of Unit No.1

°: See next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 1

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6021

MEDIUM-MU TWIN TRIODE

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Absolute Values:*

For Operation at Altitudes up to 60,000 Feet

PLATE VOLTAGE	165 max.	volts
GRID VOLTAGE:		
Positive bias value	0 max.	volts
Negative bias value	55 max.	volts
PLATE CURRENT	22 max.	ma
GRID CURRENT	5.5 max.	ma
PLATE DISSIPATION	1.1 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:		
For cathode-bias operation	1.1 max.	megohms

° With external shield having inside diameter of 0.405" connected to cathode of unit under test.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Values are for Each Unit (Other unit connected to ground) and are Initial, Unless Otherwise Indicated

	Note	Min.	Max.	
Heater Current	1	0.28	0.32	amp
Heater Current at 500 hours	1	0.276	0.328	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	1.2	1.8	μμf
Grid to cathode and heater	2	1.8	3	μμf
Plate to cathode and heater (Unit No.1)	2	0.2	0.36	μμf
Plate to cathode and heater (Unit No.2)	2	0.22	0.42	μμf
Grid to grid	3	-	0.013	μμf
Plate to plate	3	-	0.52	μμf
Amplification Factor	1,4	30	40	
Plate Current (1)	1,4	4.5	8.5	ma
Plate-Current Difference Between Units	1,4	-	1.6	ma
Plate Current (2)	1,5	-	100	μa
Transconductance (1)	1,4	4450	6350	μmhos

Notes 1 to 5: See next page.

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MEDIUM-MU TWIN TRIODE

	Note	Min.	Max.	
Transconductance (1) Change:				
With heater voltage reduced to 5.7 volts. .	4	–	15	%
Individual at 500 hours .	1,4	–	25	%
Average at 500 hours. . .	1,4	–	15	%
Average at 500 hours: With heater voltage reduced to 5.7 volts. .	4	–	15	%
Reverse Grid Current. . . .	1,6	–	0.3	μa
Reverse Grid Current at 500 hours	1,6	–	0.9	μa
Grid Emission Current . . .	7	–	-0.5	μa
Heater-Cathode Leakage Current:				
Heater 100 volts negative with respect to cathode.	1	–	5	μa
Heater 100 volts positive with respect to cathode.	1	–	5	μa
Heater-Cathode Leakage Current at 500 hours:				
Heater 100 volts negative with respect to cathode.	1	–	10	μa
Heater 100 volts positive with respect to cathode.	1	–	10	μa
Leakage Resistance:				
Between grid and all other electrodes tied together.	1,3,8	100	–	megohms
Between plate and all other electrodes tied together.	1,3,9	100	–	megohms
Leakage Resistance at 500 hours:				
Between grid and all other electrodes tied together.	1,3,8	50	–	megohms
Between plate and all other electrodes tied together.	1,3,9	50	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Without external shield.

Note 3: Other electrodes connected to ground.

Note 4: With dc plate-supply voltage of 100 volts, cathode resistor of 150 ohms, and cathode-resistor bypass capacitor of 1000 μf.

Note 5: With dc plate voltage of 100 volts and grid voltage of -6.5 volts.

Note 6: With dc plate-supply voltage of 150 volts, cathode resistor of 300 ohms, and grid resistor of 1 megohm.

Note 7: With ac or dc heater voltage of 7.5 volts, dc plate voltage of 150 volts, grid voltage of -7.5 volts, and grid resistor of 1 megohm.

Note 8: With grid voltage of -100 volts.

Note 9: With dc plate voltage of -300 volts.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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MEDIUM-MU TWIN TRIODE

SPECIAL RATINGS AND PERFORMANCE DATA

Shock Rating:

Impact Acceleration. . . . . 450 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are tested in four different positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance change.

Fatigue Ratings:

Vibrational Acceleration . . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 60 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance change.

Variable-Frequency Vibration Performance:

This test is performed on a sample lot from each production run. Tubes are vibrated over the frequency range of 5 to 50 cps at a total excursion of 0.08" for 3 minutes. At the end of this test, tubes are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance change.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 50 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: Heater voltage of 6.3 volts, plate-supply voltage of 100 volts, cathode resistor of 150 ohms, plate load resistor of 10000 ohms and vibrational acceleration of 15 g at 40 cps.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . 2000 min. cycles

Under the following conditions: Heater voltage of 7.0 volts cycled one minute on and four minutes off, heater 140 volts rms with respect to both cathodes tied together.

Audio-Frequency Noise and Microphonic Performance:

RMS Output Voltage . . . . . 65 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: Heater voltage of 6.3 volts, plate-supply voltage of 100 volts, cathode resistor of 75 ohms, grid-No.1 resistor of 0.1

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megohm, plate load resistor of 0.01 megohm, and cathode-bypass capacitor of 1000 μf. Units are connected in parallel. The output voltage of a tube, when tapped, will not cause a reading on a vu meter greater than that produced when a calibrating signal of 65 millivolts rms is applied to the plates of the tube.

Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid current in excess of 1.0 microampere under the conditions specified in the Characteristics Range Values for reverse grid current.

1-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Conditions of life testing are specified under 500-Hour Intermittent Life Performance, except test run at room temperature. Tubes are initially read for transconductance (1). At the end of 1 hour, the value of transconductance (1) is read. The variation in transconductance (1) from the 0-hour reading will not exceed 15 per cent under the conditions specified in Characteristics Range Values.

100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Conditions of life testing are specified under 500-Hour Intermittent Life Performance, except test run at room temperature. At the end of 100 hours, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, reverse grid current in excess of 1.0 microampere, or a transconductance (1) of less than 4000 micromhos under the conditions specified in Characteristics Range Values.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: Heater voltage of 6.3 volts, plate-supply voltage of 100 volts, heater-cathode voltage of 200 volts (heater positive with respect to cathode), cathode resistor of 150 ohms, grid resistor of 1 megohm and bulb temperature of 220° C. At the end of 500 hours, tube will not show permanent shorts or open circuits and will be criticized for the total number of

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RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY
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MEDIUM-MU TWIN TRIODE

defects in the sample lot and for the number of tubes failing to pass established initial limits of heater current, individual, average, and 5.7-heater-voltage transconductance change, reverse grid current and heater-cathode leakage current shown under Characteristics Range Values.

OPERATING CONSIDERATIONS

The *heater supply* should be well regulated because life and reliability of the 6021 are adversely affected by departures from the 6.3-volt value. The extent to which life is affected is a function of the amount of these departures and their durations.

The *flexible leads* of the 6021 are usually soldered to the circuit elements. Soldering of the connections should be made as far as possible from the glass button. If this precaution is not followed, the heat of the soldering operation may crack the glass seals of the leads and damage the tube.

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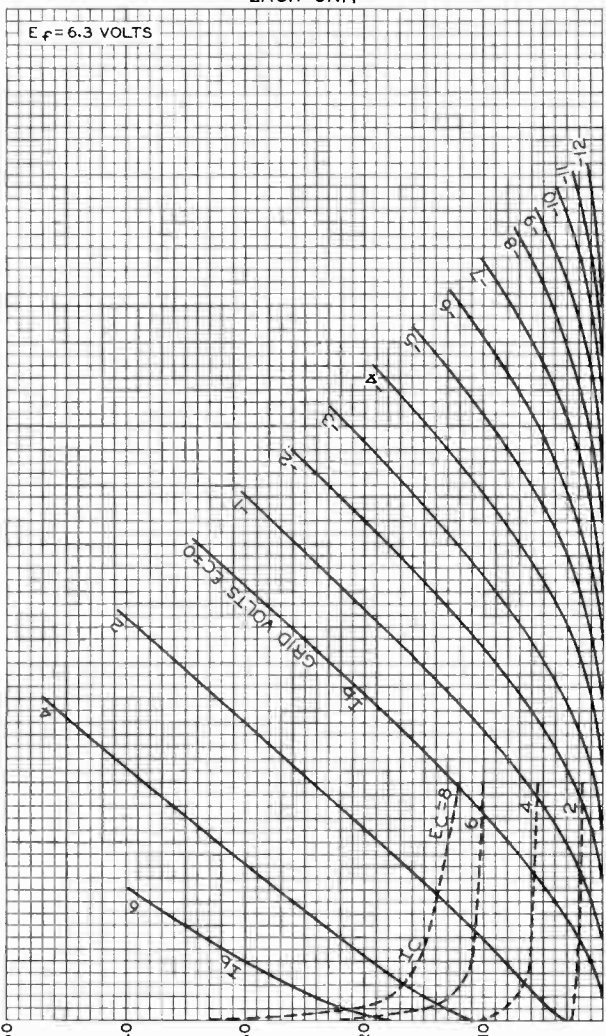
AVERAGE CHARACTERISTICS
EACH UNIT



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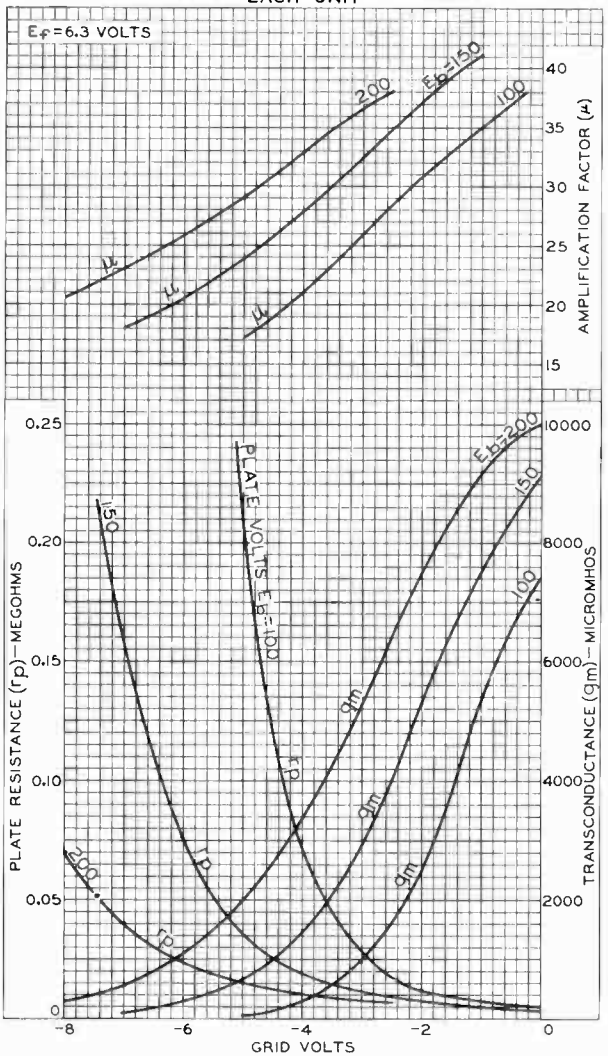
AVERAGE CHARACTERISTICS
EACH UNIT



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6072

6072 PREMIUM TYPE

MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For use in industrial and military applications critical as to microphonics and in which dependability is paramount. Characteristics are similar to those of the 12AY7.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater arrangement	*Series*	*Parallel*	
Voltage	12.6	6.3	ac or dc volts
Current	0.175	0.35	amp

Direct Interelectrode Capacitances (Approx.):[c]

Grid to plate (Each unit)	1.4	μμf
Grid to cathode and heater (Each unit)	1.5	μμf
Plate to cathode and heater:		
Unit No.1	0.5	μμf
Unit No.2	0.38	μμf

Characteristics, Class A_1 Amplifier (Each Unit):

Plate Voltage	250	volts
Grid Voltage	-4	volts
Amplification Factor	44	
Plate Resistance (Approx.)	25000	ohms
Transconductance	1750	μmhos
Plate Current	3	ma
Grid Voltage (Approx.) for plate μa = 10	-8	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 - Plate of Unit No.2
Pin 2 - Grid of Unit No.2
Pin 3 - Cathode of Unit No.2
Pins 4 & 9 - Heater of Unit No.2
Pins 5 & 9 - Heater of Unit No.1

Pin 6 - Plate of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Cathode of Unit No.1
Pin 9 - Heater Mid-Tap

[c] Without external shield.

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MEDIUM-MU TWIN TRIODE

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Positive-bias value	0 max.	volts
PLATE DISSIPATION	1.65 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	165 max.	°C

Typical Operation:

In low-level stages of high-gain af amplifier with parallel-heater arrangement

Plate-Supply Voltage	150	volts
Plate-Load Resistor	20000	ohms
Grid Resistor	0.1	megohm
Cathode Resistor	2700	ohms
Cathode Capacitor	40	μf
Voltage Gain	12.5	

Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART at end of tabulated data for this type

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 600 max. g

Tubes are held rigid in four different positions in a Navy-Type, High-Impact (Flyweight) Shock Machine and are subjected to 20 blows at a hammer angle of 42° (equivalent to the specified maximum impact acceleration).

Fatigue Rating:

Vibrational Acceleration. . . . . 2.5 max. g

This test is performed for a period of 100 hours minimum at a frequency of 25 cycles per second.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation. . . . 2000 min. cycles

Under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground.

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MEDIUM-MU TWIN TRIODE

OPERATING CONDITIONS AS RESISTANCE-COUPLED AMPLIFIER
(Each Unit)

With Effective Source Impedance of 200 ohms (Approx.)

Plate-Supply Voltage		90		volts
Plate Load Resistor	0.1	0.24	0.51	megohm
Grid Resistor (Of following stage)	0.24	0.51	1	megohm
Cathode Resistor	2100	4800	10000	ohms
Peak Output Voltage	14	16	16	volts
Voltage Gain▲	25	27	27	

Plate-Supply Voltage		180		volts
Plate Load Resistor	0.1	0.24	0.51	megohm
Grid Resistor (Of following stage)	0.24	0.51	1	megohm
Cathode Resistor	1500	3100	7200	ohms
Peak Output Voltage	34	35	35	volts
Voltage Gain▲	28	28	29	

Plate-Supply Voltage		300		volts
Plate Load Resistor	0.1	0.24	0.51	megohm
Grid Resistor (Of following stage)	0.24	0.51	1	megohm
Cathode Resistor	1300	2700	6000	ohms
Peak Output Voltage	64	64	64	volts
Voltage Gain▲	29	31	31	

With Effective Source Impedance of 0.1 Megohm (Approx.)

Plate-Supply Voltage		90		volts
Plate Load Resistor	0.1	0.24	0.51	megohm
Grid Resistor (Of following stage)	0.24	0.51	1	megohm
Cathode Resistor	3000	6200	12000	ohms
Peak Output Voltage	17	18	20	volts
Voltage Gain▲	23	25	26	

Plate-Supply Voltage		180		volts
Plate Load Resistor	0.1	0.24	0.51	megohm
Grid Resistor (Of following stage)	0.24	0.51	1	megohm
Cathode Resistor	1900	4100	8100	ohms
Peak Output Voltage	38	41	44	volts
Voltage Gain▲	27	28	29	

▲ At 2 volts (rms) output.

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

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MEDIUM-MU TWIN TRIODE

Plate-Supply Voltage	300			volts
Plate Load Resistor	0.1	0.24	0.51	megohm
Grid Resistor (Of following stage)	0.24	0.51	1	megohm
Cathode Resistor	1600	3400	6700	ohms
Peak Output Voltage	68	72	76	volts
Voltage Gain▲	28	30	30	

▲ At 2 volts (rms) output.

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

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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6111

MEDIUM-MU TWIN TRIODE

SUBMINIATURE TYPE

Intended for applications at altitudes up to 60,000 feet where dependable performance under shock and vibration is paramount

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathodes:

Voltage	6.3	ac or dc volts
Current	0.3	amp

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield**	
Grid to plate (Each unit)	1.5	1.4	μμf
Grid to cathode and heater (Each unit)	1.9	2.1	μμf
Plate to cathode and heater (Unit No.1)	0.28	1.3	μμf
Plate to cathode and heater (Unit No.2)	0.32	1.4	μμf
Grid of unit No.1 to grid of unit No.2	0.011 max.	0.01 max.	μμf
Plate of unit No.1 to plate of unit No.2	0.5 max.	0.3 max.	μμf

Characteristics, Class A_1 Amplifier (Each Unit):

Plate-Supply Voltage	100	volts
Cathode Resistor	220	ohms
Amplification Factor	20	
Plate Resistance (Approx.)	4000	ohms
Transconductance	5000	μmhos
Plate Current	8.5	ma
Grid Voltage (Approx.) for plate current of 10 μa	-9	volts

Mechanical:

Operating Position	Any
Maximum Length (Excluding flexible leads)	1-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	1.075" ± 0.060"
Diameter	0.366" to 0.400"
Dimensional Outline	*See General Section*
Bulb	T3
Leads, Flexible, Tinned	8
Minimum length	1.5"
Orientation and diameter	*See Dimensional Outline*
Maximum untinned distance from base seat	0.050"

*: See next Page.

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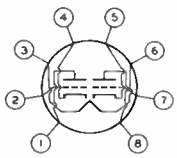
MEDIUM-MU TWIN TRIODE

Base. . . . . JETEC No.E8-10

BOTTOM VIEW



Lead 1 - Plate of Unit No.2
Lead 2 - Grid of Unit No.2
Lead 3 - Heater
Lead 4 - Cathode of Unit No.2
Lead 5 - Cathode of Unit No.1
Lead 6 - Heater
Lead 7 - Grid of Unit No.1
Lead 8 - Plate of Unit No.1

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Absolute Values:*

For operation at altitudes up to 60,000 feet

PLATE VOLTAGE	165 max.	volts
GRID VOLTAGE:		
Positive bias value	0 max.	volts
Negative bias value	55 max.	volts
PLATE DISSIPATION	1.1 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:		
For cathode-bias operation	1.2 max.	megohms

* With external shield having inside diameter of 0.405" connected to cathode of unit under test.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Values are for Each Unit and are Initial, Unless Otherwise Specified

	Note	Min.	Max.	
Heater Current	1	280	320	ma
Direct Interelectrode Capacitances:				
Grid to plate	2	1.2	1.8	μμf
Grid to cathode and heater	2	1.4	2.4	μμf
Plate to cathode and heater (Unit No.1)	2	0.2	0.36	μμf
Plate to cathode and heater (Unit No.2)	2	0.22	0.42	μμf
Grid of unit No.1 to grid of unit No.2	2	-	0.011	μμf

Notes 1 and 2: See next page.

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	Note	Min.	Max.	
Plate of unit No.1 to plate of unit No.2	2	–	0.5	μμf
Amplification Factor	1,3	17	23	
Plate Current (1)	1,3	6	11	ma
Plate-Current Difference Between Units	1,3	–	2	ma
Plate Current (2)	1,4	–	100	μa
Transconductance:				
With heater volts = 6.3	3	4100	5900	μmhos
Individual change from 0 to 500 hours	1,3	–	20	%
Individual change at end of 500-hour life test with heater voltage reduced to 5.7 volts	3	–	15	%
Difference between average transconductance initially, and average after 500-hours, expressed as a percentage of the initial average	1,3	–	15	%
Reverse Grid Current	1,5	–	0.3	μa
Grid-Emission Current	6,7	–	−0.5	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,8	–	5	μa
Heater positive with respect to cathode	1,8	–	5	μa
Heater-Cathode Leakage Current at 500 hours:				
Heater negative with respect to cathode	1,8	–	10	μa
Heater positive with respect to cathode	1,8	–	10	μa
Leakage Resistance:				
Grid to all other electrodes tied together	1,9	100	–	megohms
Plate to all other electrodes tied together	1,10	100	–	megohms
Leakage Resistance at 500 hours:				
Grid to all other electrodes tied together	1,9	50	–	megohms
Plate to all other electrodes tied together	1,10	50	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Without external shield.

Note 3: With plate-supply volts = 100, cathode resistor (ohms) = 220, and cathode-bypass capacitor (μf) = 1000. Each unit tested separately. Unit not under test connected to ground.

Notes 4 to 10: See next page.

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MEDIUM-MU TWIN TRIODE

Note 4: With plate volts = 100 and grid volts = -9. Each unit tested separately. Unit not under test connected to ground.

Note 5: With plate volts = 100, grid resistor (megohms) = 1, and cathode resistor (ohms) = 200. Each unit tested separately. Unit not under test connected to ground.

Note 6: With 7.5 volts dc on heater.

Note 7: With plate volts = 100, grid resistor (megohms) = 1, and grid volts = -9. Preheated prior to testing for 5 minutes at heater volts = 7.5 ac or dc, plate volts = 100, grid resistor (megohms) = 1, and cathode resistor (ohms) = 220.

Note 8: With 100 volts between heater and cathode. Each unit tested separately. Unit not under test connected to ground.

Note 9: With grid 100 volts negative with respect to all other electrodes tied together.

Note 10: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS AND PERFORMANCE DATA

Values are for Each Unit, Unless Otherwise Specified

Shock Rating:

Impact Acceleration . . . . . 450 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are tested in four different positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance change.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 60 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance change.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 100 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: Heater volts = 6.3, plate-supply volts = 100, cathode resistor (ohms) = 220, cathode-bypass capacitor (μf) = 1000, plate load resistor (ohms) = 10,000, and vibrational acceleration of 15 g at 40 cps.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . . 2000 min. cycles

Under the following conditions: Heater volts = 7 cycled one minute on and four minutes off, heater 140 volts

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rms with respect to cathode, and all other elements connected to ground. At the end of this test, tubes will not show heater-cathode shorts or open circuits.

Audio-Frequency Noise and Microphonic Performance:

RMS Output Voltage. . . . . 65 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: Units connected in parallel, heater volts = 6.3, plate-supply volts = 100, cathode resistor (ohms) = 100, plate load resistor (megohms) = 0.01, and cathode-bypass capacitor (μf) = 1000. The output voltage of a tube, when tapped, will not cause a reading on a vu meter greater than that produced when a calibrating signal of 65 millivolts rms is applied to the plates of the tube.

Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid current in excess of 1 microampere under the conditions specified in the CHARACTERISTICS RANGE VALUES for reverse grid current.

1-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Life-test conditions are the same as those specified under 500-Hour Intermittent Life Performance, except that the test run at room temperature. At the end of 1 hour, the value of transconductance is read. The variation in transconductance from the 0-hour reading will not exceed 10 per cent.

100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Life test conditions are the same as those specified under 500-Hour Intermittent Life Performance, except that the test run at room temperature. At the end of 100 hours, a tube is considered inoperative if it shows a permanent or temporary short or open circuit or a value of reverse grid current in excess of 1 microampere under the conditions specified in CHARACTERISTICS RANGE VALUES.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: Heater volts = 6.3, plate-supply volts = 100, heater-cathode volts = 200 (heater positive with

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MEDIUM-MU TWIN TRIODE

respect to cathode), cathode resistor (ohms) = 220, grid resistor (megohms) = 1, and bulb temperature (°C) = 220. At the end of 500 hours, tube will not show permanent shorts or open circuits, and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass established initial limits of heater current, individual transconductance change, transconductance change with heater volts = 5.7, and 500-hour limits for reverse grid current, heater-cathode leakage current, leakage resistance, and the difference in transconductance between the initial value and average value shown under CHARACTERISTICS RANGE VALUES.

OPERATING CONSIDERATIONS

The *heater supply* should be well regulated because life and reliability of the 6111 are adversely affected by departures from the 6.3-volt value. The extent to which life is affected is a function of the amount of these departures and their durations.

The *flexible leads* of the 6111 are usually soldered to the circuit elements. Soldering of the connections should be made as far as possible from the glass button. If this precaution is not followed, the heat of the soldering operation will crack the glass seals of the leads and damage the tube.

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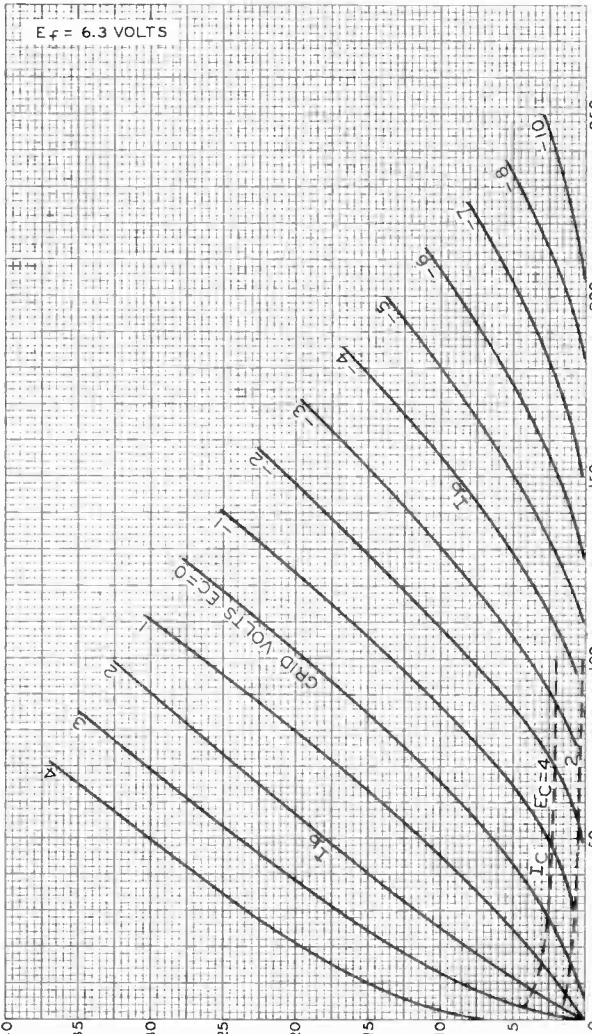
AVERAGE CHARACTERISTICS
EACH UNIT



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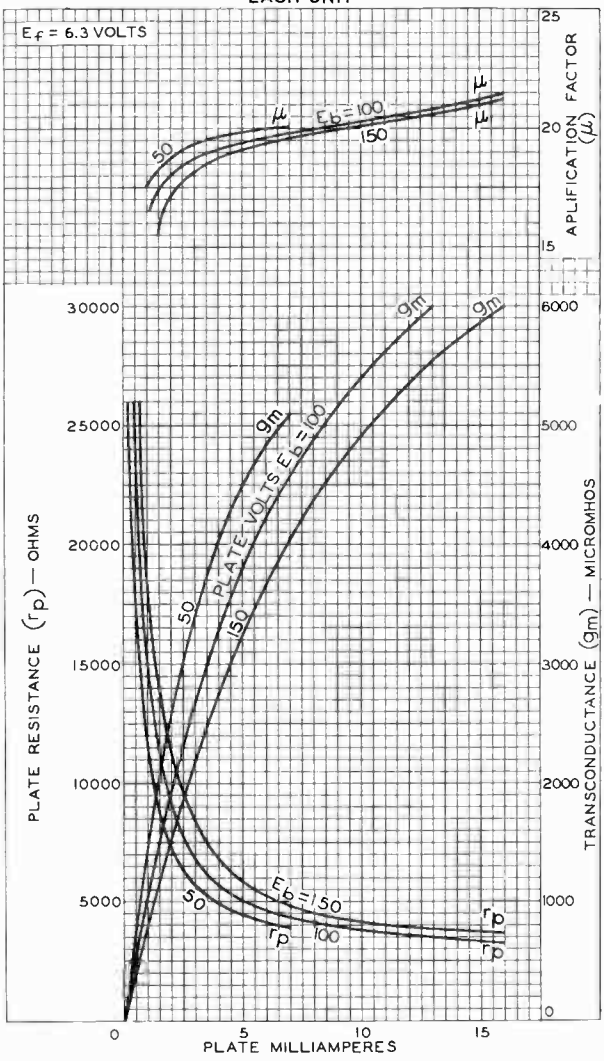
AVERAGE CHARACTERISTICS
EACH UNIT



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6136

PREMIUM TYPE 6136

SHARP-CUTOFF PENTODE

7-PIN MINIATURE TYPE

Intended for applications where dependable performance under shock and vibration is paramount. This "premium" type is similar to the 6AU6

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:			
Voltage	6.3 ± 10%		ac or dc volts
Current	0.3		amp
Direct Interelectrode Capacitances:◇			
Grid No.1 to plate	0.0035 max.		μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	6		μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	5		μμf

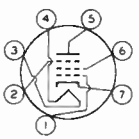
Characteristics, Class A_1 Amplifier:

Plate-Supply Voltage	100	250	volts
Grid No.3 (Suppressor Grid)	♦	♦	
Grid-No.2 (Screen-Grid) Supply Voltage	100	150	volts
Cathode Resistor	150	68	ohms
Plate Resistance (Approx.)	0.5	1	megohm
Transconductance	3900	5200	μmhos
Plate Current	5	10.6	ma
Grid-No.2 Current	2.1	4.3	ma
Grid-No.1 (Control-Grid) Voltage (Approx.) for plate current of 10 μa	-4.2	-6.5	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Maximum Diameter	3/4"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)
Basing Designation for BOTTOM VIEW	7BK

Pin 1 – Grid No.1
Pin 2 – Grid No.3, Internal Shield
Pin 3 – Heater



Pin 4 – Heater
Pin 5 – Plate
Pin 6 – Grid No.2
Pin 7 – Cathode

AMPLIFIER — Class A_1

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	330 max.	volts

◇, ♦: See next page.

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SHARP-CUTOFF PENTODE

GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE	0 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	165 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive bias value	0 max.	volts
GRID-No.2 INPUT	0.7 max.	watt
PLATE DISSIPATION	3.3 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	165 max.	°C

Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART at end of tabulated data for this type

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

For fixed-bias operation	0.25 max.	megohm
For cathode-bias operation	0.5 max.	megohm

° Without external shield.

♦ Connected to cathode at socket.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Values are Initial, Unless Otherwise Specified

	Note	Min.	Max.	
Heater Current	1	0.275	0.325	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.0035	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	2	4.8	7.2	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	2	3.9	5.9	μμf
Plate Current (1)	1,3	8	13.5	ma
Plate Current (2)	1,4	–	35	μa
Grid-No.2 Current	1,3	2.6	6	ma
Transconductance, Grid No.1 to Plate:				
With heater volts = 6.3	3	4150	6250	μmhos
With heater volts = 5.5	3	3900	–	μmhos
At 500 hours with heater volts = 6.3	3	3600	6250	μmhos

Notes 1 to 4: See next page.

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SHARP-CUTOFF PENTODE

	Note	Min.	Max.	
Difference between average transconductance initially, and average after 500 hours, expressed as a percentage of the initial average	1,3	-	17	%
Reverse Grid-No.1 Current.	1,5	-	1	μa
Reverse Grid-No.1 Current at 500 hours.	1,5	-	1	μa
Grid-No.1-Emission Current	6	-	-2	μa
Heater-Cathode Leakage Current:				
Heater 100 volts negative with respect to cathode. . . .	1	-	10	μa
Heater 100 volts positive with respect to cathode. . . .	1	-	10	μa
Heater-Cathode Leakage Current at 500 hours:				
Heater 100 volts negative with respect to cathode. . . .	1	-	10	μa
Heater 100 volts positive with respect to cathode. . . .	1	-	10	μa
Leakage Resistance:				
Grid No.1 to all other electrodes	1,7	100	-	megohms
Plate to all other electrodes. .	1,8	100	-	megohms
Leakage Resistance at 500 hours:				
Grid No.1 to all other electrodes	1,7	50	-	megohms
Plate to all other electrodes. .	1,8	50	-	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Without external shield.

Note 3: With plate-supply voltage of 250 volts, grid-No.2 supply voltage of 150 volts, cathode resistor of 68 ohms, cathode-bypass capacitor of 1000 μf, and grid No.3 tied to cathode.

Note 4: With plate voltage of 250 volts, grid-No.2 voltage of 150 volts, grid-No.1 voltage of -9 volts, plate load resistor of 0.1 megohm, and grid No.3 tied to cathode.

Note 5: With plate voltage of 250 volts, grid-No.3 voltage of 0 volts, grid-No.2 voltage of 150 volts, grid-No.1 voltage of -1 volt, and grid-No.1 resistor of 0.25 megohm.

Note 6: With 7.5 volts ac or dc on heater, plate voltage of 250 volts, grid-No.3 voltage of 0 volts, grid-No.2 voltage of 150 volts, grid-No.1 voltage of -10 volts, and grid-No.1 resistor of 0.25 megohm.

Note 7: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 8: With plate 300 volts negative with respect to all other electrodes tied together.

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SHARP-CUTOFF PENTODE

SPECIAL RATINGS AND PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 450 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are tested in four different positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, reverse grid-No.1 current and transconductance.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 60 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, reverse grid-No.1 current, and transconductance.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 300 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: Heater voltage of 6.3 volts, plate-supply voltage of 250 volts, grid No.3 tied to cathode, grid-No.2 supply voltage of 150 volts, cathode resistor of 68 ohms, cathode-bypass capacitor of 1000 μf, plate load resistor of 2000 ohms and vibrational acceleration of 2.5 g at 25 cps.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . 2000 min. cycles

Under the following conditions: Heater voltage of 7.5 volts cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground.

Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid-No.1 current in excess of 1.0 microampere under the conditions specified in the Characteristics Range Values for reverse grid-No.1 current.

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SHARP-CUTOFF PENTODE

1-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Tubes are checked for transconductance under conditions specified under 500-Hour Intermittent Life Performance. At the end of 1 hour, the value of transconductance is read. The variation in transconductance from the 0-hour reading will not exceed 10 per cent.

100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run under conditions specified under 500-Hour Intermittent Life Performance to insure a low percentage of early inoperatives. At the end of 100 hours, a tube is considered inoperative if it shows a permanent or temporary short or open circuit or a value of reverse grid-No.1 current in excess of 1.0 microampere under the conditions specified in Characteristics Range Values.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: Heater voltage of 6.3 volts, plate-supply voltage of 300 volts, grid No.3 tied to cathode, grid-No.2 supply voltage of 150 volts, heater-cathode voltage of 135 volts (heater positive with respect to cathode), cathode resistor of 80 ohms and grid-No.1 resistor of 0.5 megohm. At the end of 500 hours, tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass established initial limits of heater current, and 500 hour limits for reverse grid-No.1 current, heater-cathode leakage current, leakage resistance, transconductance range, and the difference in transconductance between the initial value and average value shown under Characteristics Range Values.

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SHARP-CUTOFF PENTODE

OPERATING CONDITIONS AS RESISTANCE-COUPLED AMPLIFIER

Plate-Supply Voltage	90			volts
Plate Load Resistor	0.1	0.22	0.47	megohm
Grid-No.2 Resistor	0.09	0.26	0.75	megohm
Grid-No.1 Resistor (Of following stage)	0.22	0.47	1	megohm
Cathode Resistor	2100	3200	6500	ohms
Peak Output Voltage●	32	32	32	volts
Voltage Gain■	72	99	126	
Plate-Supply Voltage	180			volts
Plate Load Resistor	0.1	0.22	0.47	megohm
Grid-No.2 Resistor	0.15	0.43	1	megohm
Grid-No.1 Resistor (Of following stage)	0.22	0.47	1	megohm
Cathode Resistor	900	1700	3400	ohms
Peak Output Voltage●	82	67	65	volts
Voltage Gain■	116	171	232	
Plate-Supply Voltage	300			volts
Plate Load Resistor	0.1	0.22	0.47	megohm
Grid-No.2 Resistor	0.24	0.5	1.1	megohm
Grid-No.1 Resistor (Of following stage)	0.22	0.47	1	megohm
Cathode Resistor	600	1000	1900	ohms
Peak Output Voltage●	103	108	105	volts
Voltage Gain■	145	230	318	

● Obtained across grid-No.1 resistor of following stage and is for the condition where the signal level is adequate to swing the grid-No.1 of the resistance-coupled amplifier tube to the point where its grid-No.1 starts to draw current.

■ At 5 volts (RMS) output.

Note: Coupling capacitors should be selected to give desired frequency response. Cathode and grid-No.2 resistors should be adequately bypassed.

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AVERAGE PLATE CHARACTERISTICS

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AVERAGE CHARACTERISTICS

E_f=6.3 VOLTS
GRID-№2 VOLTS=100
GRID-№3 VOLTS=0

PLATE VOLTS

0 100 200 300 400 500

PLATE (I_b) OR GRID-№2 (I_{c2}) MILLIAMPERES

0 2 4 6 8 10 12 14 16

I_b

I_{c2}

GRID-№1 VOLTS E_{c1}=-1.0

E_{c1}=0

-0.5

-1.5

-2.5

-3.0

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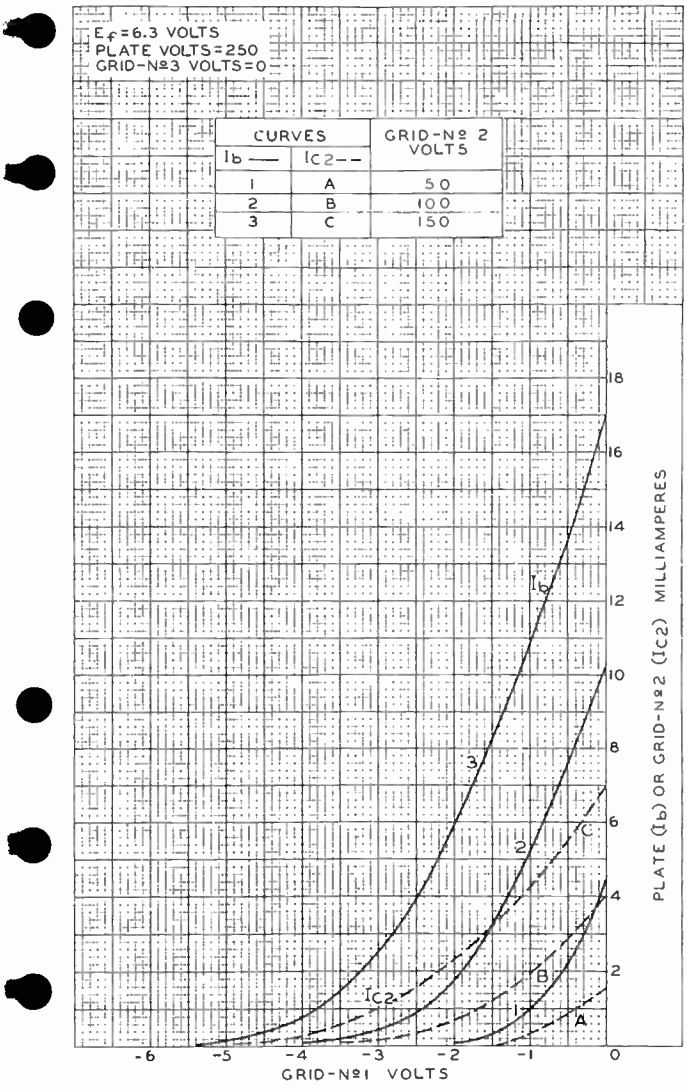
AVERAGE CHARACTERISTICS



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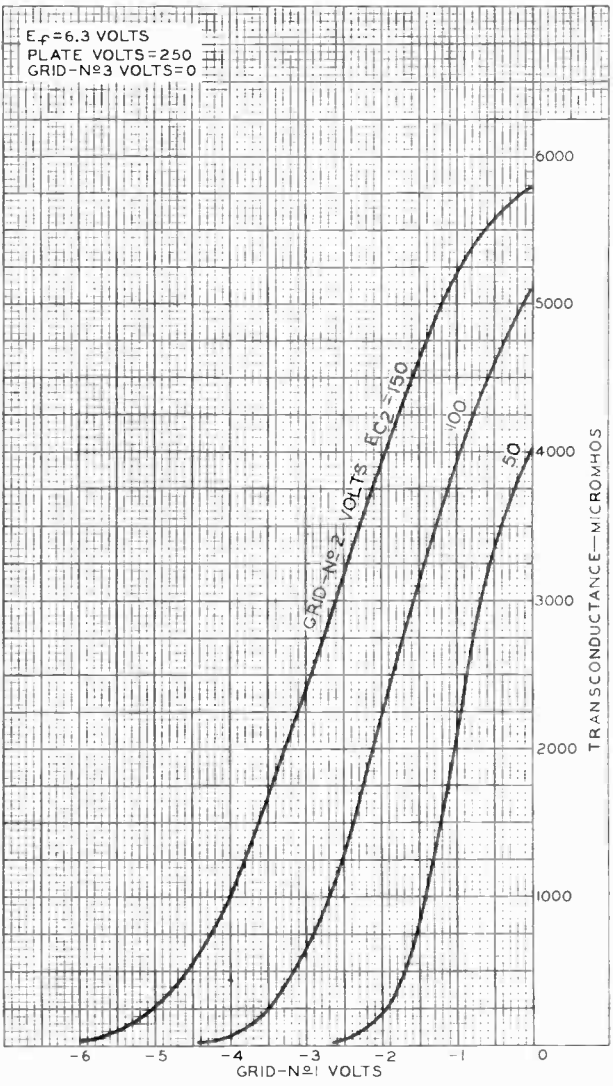
AVERAGE CHARACTERISTICS



World Radio History

6130/3C45

HYDROGEN THYRATRON

POSITIVE-CONTROL TRIODE TYPE

For Operation at Altitudes up to 50000 Feet

GENERAL DATA

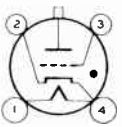
Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 +5% -10%	ac or dc volts
Current at 6.3 volts:		
Minimum	2.0	amp
Average	2.3	amp
Maximum	2.5	amp
Minimum heating time	2	minutes
Direct Interelectrode Capacitances (Approx.):		
Grid to anode	3.9	μμf
Grid to cathode	8.6	μμf
Ionization Time (Approx.)[□]	0.6	μsec
Deionization Time (Approx.)	25	μsec
Anode-Cathode Voltage Drop (Approx.):		
At middle of pulse duration	150	volts
Maximum Variation in Firing Time (Jitter)	0.06	μsec

Mechanical:

Operating Position	Any
Overall Length	5" ± 3/16"
Seated Length	4-3/8" ± 3/16"
Maximum Diameter	1-9/16"
Bulb	T-12
Cap	Small (JETEC No.C1-1)
Base	Medium-Micanol-Shell Small 4-Pin (JETEC No.A4-9)

BOTTOM VIEW



Pin 1 – Heater
Pin 2 – Cathode
Pin 3 – Grid
Pin 4 – Heater, Cathode
Cap – Anode

Cooling . . . . . Natural

PULSE MODULATOR SERVICE

Maximum and Minimum CCS[•] Ratings, *Absolute Values:*

	For Pressures Down to 70 mm of Hg[#]	
DC ANODE-SUPPLY VOLTAGE	800 min.	volts

□ Defined as the time interval between the point on the rising portion of the grid pulse which is 26% of the peak unloaded pulse amplitude and the point on the anode-current pulse which is 26% of its peak amplitude. The anode-current pulse has a time rise of 0.05 microsecond maximum. The grid pulse has a peak amplitude of 130 volts minimum, has a rise time of 0.5 microsecond maximum, and is supplied by a driver having 1500 ohms maximum internal impedance.

• Continuous Commercial Service.

Corresponds to altitude of about 50000 feet.

RCA

6130

HYDROGEN THYRATRON

PEAK ANODE VOLTAGE:		
Forward (E_{bmf})*	3000 max.	volts
Inverse	5% of E_{bmf} min.	volts
After anode-current pulse:▲		
During first 25 μsec	1500 max.	volts
After first 25 μsec	3000 max.	volts
GRID VOLTAGE:		
Negative (DC or Peak), before conduction	200 max.	volts
Peak positive pulse	175 min.	volts
ANODE CURRENT:		
Peak	35 max.	amp
Average°	0.045 max.	amp
Rate of Rise	750 max.	amp/μsec
OPERATION FACTOR†	3×10^8 max.	
PULSE DURATION●	6 max.	μsec
AMBIENT TEMPERATURE	-50 to +90	°C

Typical Operation♦ at 2000 pps in Accompanying Circuit:

	Pulse Duration of 0.5 μsec	
DC Anode-Supply Voltage	1250	volts
Peak Anode Voltage:		
Forward	3000	volts
Inverse:		
Immediately after anode-current pulse	530	volts
Grid Voltage:		
Negative, before conduction	0	volts
Peak positive pulse (Unloaded)	175	volts
Effective Grid-Circuit Resistance	1000	ohms
Anode Current:		
Peak	35	amp
Average°	0.035	amp
Operation Factor†	2.1×10^8	
Peak Power Output to Pulse Transformer (T)	43000	watts

Maximum Circuit Values:

Effective Grid-Circuit Resistance	1500 max.	ohms

* In applications where the anode voltage is applied instantaneously, the power-supply filter should be designed so that the peak forward anode voltage is applied at a rate not to exceed 75000 volts per second.

▲ Exclusive of spike not having more than 0.05 microsecond duration.

♦ Operation with a bulb temperature within the approximate range of 60° to 90°C measured on the bulb directly opposite the anode is recommended for longest life. To attain this temperature under operating conditions involving low ambient temperature, the use of a heat-conserving enclosure for the tube may be necessary.

° Averaged over any cycle.

† Defined as *Peak Forward Anode Volts x Pulse Repetition Rate (pps) x Peak Anode Amperes* (excluding spike).

●: See next page.

Vacuumtubehistory

6080

LOW-MU TWIN POWER TRIODE

★ When combined fixed- and cathode-bias is used, the cathode-bias portion should have a minimum value of 7.5 volts dc at the normal operating conditions.

▲ As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission.

● The duration of the voltage pulse must 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.

◆ Operation of this tube is not recommended with a damper pulse between heater and cathode.

SPECIAL RATINGS & PERFORMANCE DATA ←

Shock Rating:

Impact Acceleration . . . . . 450 max. g

Tubes are held rigid in four different positions in a Navy Type, High Impact (flyweight) Shock Machine and are subjected to 450 g impact acceleration.

Fatigue Rating:

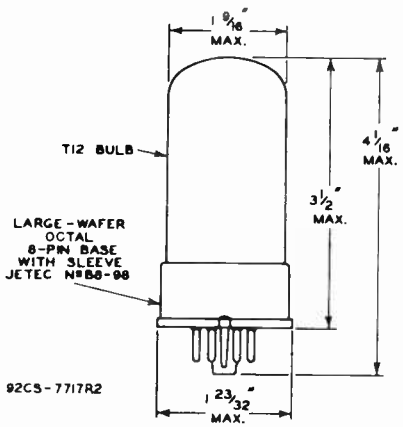
Vibrational Acceleration . . . . . 2.5 max. g

Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 200 max. mv

Under the following conditions and with units connected in parallel: Heater voltage of 6.3 volts, plate voltage supply of 135 volts, dc grid voltage of −7 volts, plate load resistance of 2000 ohms, and vibrational acceleration of 2.5 g at 25 cycles per second.



← Indicates a change

World Radio History

6080

AVERAGE PLATE CHARACTERISTICS

EACH TRIODE UNIT

RCA

6080

$E_f = 6.3$ VOLTS

GRID VOLTS E_{c1}

$E_{c1} = 0$

-10

-20

-30

-40

-50

-60

PLATE VOLTS

0 50 100 150 200 250

PLATE MILLIAMPERES

0 20 40 60 80 100 120 140 160

OCT. 19, 1951

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7695

World Radio History

6082

LOW-MU TWIN POWER TRIODE

GENERAL DATA

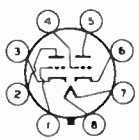
Heater, for Unipotential Cathodes:		
Voltage	26.5 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		←
(Each Unit, without external shield)		
Grid to Plate	8	μμf
Input	6	μμf
Output	2.2	μμf
Heater to Cathode:		
Triode Unit No.1	13	μμf
Triode Unit No.2	13	μμf
Grid of Unit No.1 to Grid of Unit No.2	0.5	μμf
Plate of Unit No.1 to Plate of Unit No.2	2	μμf

Characteristics, Amplifier Class A_1 (Each Unit):

Plate-Supply Voltage	135	volts
Cathode-Bias Resistor	250	ohms
Amplification Factor	2	
Plate Resistance	280	ohms
Transconductance	7000	μmhos
Plate Current	125	ma

Mechanical:

Mounting Position	Any	
Maximum Overall Length	4-1/16"	←
Maximum Seated Length	3-1/2"	←
Maximum Diameter	1-23/32"	
Bulb	T-12	
Base	Large-Wafer Octal 8-Pin with Sleeve and External Barriers (JETEC No.B8-98)	←
Basing Designation for BOTTOM VIEW	8BD	



Pin 1 - Grid of Unit No.2
Pin 2 - Plate of Unit No.2
Pin 3 - Cathode of Unit No.2
Pin 4 - Grid of Unit No.1
Pin 5 - Plate Unit No.1
Pin 6 - Cathode of Unit No.1
Pin 7 - Heater
Pin 8 - Heater

DC AMPLIFIER

Values are for Each Unit

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	250 max.	volts
PLATE CURRENT	125 max.	ma
PLATE DISSIPATION	13 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	300 max.	volts
Heater positive with respect to cathode	300 max.	volts

← Indicates a change

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

RCA

6082

LOW-MU TWIN POWER TRIODE

BULB TEMPERATURE®	200 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:		
For cathode-bias operation	1.0 max.	megohm
For fixed-bias operation□	0.1 max.	megohm
For combined fixed- and cathode-bias operation*	0.1 max.	megohm

→ **CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

	Note	Min.	Max.	
Heater Current	1	0.55	0.65	amp
Amplification Factor (Each Unit)	1,2	1.4	2.6	
Plate Current (Each Unit) . . .	1,2	100	150	ma
Transconductance (Each Unit)	1,2	5800	8200	μmhos
Reverse Grid Current (Units in Parallel).	1,3	-	4	μamp

Note 1: With 26.5 volts ac or dc on heater.

Note 2: With plate-supply voltage of 135 volts, and cathode-bias resistor of 250 ohms in each cathode (both triode units operating).

Note 3: With plate-supply voltage of 135 volts, grid resistor of 1 megohm in each grid and cathode-bias resistor of 250 ohms in each cathode (both triode units operating).

® At hottest point on bulb surface.

□ When fixed bias is used, the plate circuit should contain a protective resistance to provide a minimum drop of 15 volts dc at the normal operating conditions.

* When combined fixed- and cathode-bias is used, the cathode-bias portion should have a minimum value of 7.5 volts dc at the normal operating conditions.

→ **SPECIAL RATINGS & PERFORMANCE DATA**

Shock Rating:

Impact Acceleration . . . . . 450 max. g

Tubes are held rigid in four different positions in a Navy Type, High Impact (flyweight) Shock Machine and are subjected to 450 g impact acceleration.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 200 max. mv

Under the following conditions and with units connected in parallel: Heater voltage of 26.5 volts, plate voltage

→ Indicates a change

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6082

LOW-MU TWIN POWER TRIODE

supply of 135 volts, dc grid voltage of -7 volts, plate load resistance of 2000 ohms, and vibrational acceleration of 2.5 g at 25 cycles per second.

Outline Drawing and Average Plate Characteristics Curve for the 6082 are the same as shown for Type 6080

World Radio History

World Radio History

RCA

6101

PREMIUM TYPE 6101

MEDIUM-MU TWIN TRIODE

MINIATURE TYPE

Intended for applications at altitudes up to 55000 feet and where dependable performance under shock and vibration is paramount.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.45	amp
Direct Interelectrode Capacitances (Each Unit, approx.)*:		
Grid to Plate	1.5	μμf
Input	2.0	μμf
Output	0.4	μμf
Heater to Cathode	6.0	μμf

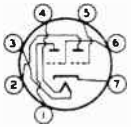
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	100	volts
Cathode-Bias Resistor	50#	ohms
Amplification Factor	38	
Plate Resistance	6300	ohms
Transconductance	6000	μmhos
Plate Current	8.5	ma

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)

BOTTOM VIEW



Pin 1 - Plate of Unit No.2
Pin 2 - Plate of Unit No.1
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Grid of Unit No.1
Pin 6 - Grid of Unit No.2
Pin 7 - Cathode

AMPLIFIER - Class A_1

Values are for each unit

Maximum Ratings, *Absolute Values:*

	*For Pressures Down to 55±5 mm of Hg***
PLATE VOLTAGE	330 max. volts

* With no external shield.
** Corresponds to altitude of about 55000 feet.
# Value is common to both units operating at the specified conditions.

RCA

6101

MEDIUM-MU TWIN TRIODE

PLATE DISSIPATION	0.85 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	180 max.	volts
Heater positive with respect to cathode	180 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	165 max.	°C

Maximum Circuit Values (For maximum rated conditions):

Grid-Circuit Resistance:		
For fixed-bias operation	Not recommended	
For cathode-bias operation	0.5 max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.420	0.480	amp
Grid-to-Plate Capacitance (Each Unit)	2	1.2	1.8	μμf
Grid-to-Cathode Capacitance (Each Unit)	2	1.4	2.8	μμf
Plate-to-Cathode Capacitance (Unit No.1)	2	0.25	0.65	μμf
Plate-to-Cathode Capacitance (Unit No.2)	2	0.25	0.55	μμf
Heater-to-Cathode Capacitance	2	4.0	8.0	μμf
Amplification Factor	1,3	28	48	
Plate Current (1)	1,4	6.5	11.5	ma
Plate Current (2)	1,5	-	200	μamp
Plate Current (3)	1,7	5	-	μamp
Transconductance (1)	1,4	4500	7500	μmhos
Transconductance (2)	6,4	▲	-	μmhos
Reverse Grid Current (1)	1,8	-	0.5	μamp
Reverse Grid Current (2)	9,10	-	1.0	μamp
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,11	-	10	μamp
Heater positive with respect to cathode	1,11	-	10	μamp
Leakage Resistance Per Unit:				
Between Grid and All Other Electrodes Tied Together	1,12	100	-	megohms
Between Plate and All Other Electrodes Tied Together	1,13	100	-	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With no external shield.

Note 3: With plate supply voltage of 100 volts, cathode-bias resistor of 50 ohms common to both units, and a cathode bypass capacitor of 1000 μf. Each unit tested separately and with both units operating.

Note 4: With plate supply voltage of 100 volts and cathode-bias resistor of 50 ohms common to both units. Each unit tested separately and with both units operating.

World Radio History

6101

MEDIUM-MU TWIN TRIODE

Note 5: With dc plate voltage of 250 volts, and dc grid voltage of −14.5 volts. Each unit tested separately and with both units operating.

Note 6: With 5.7 volts ac or dc on heater.

Note 7: With plate supply voltage of 250 volts and dc grid voltage of −10.5 volts. Each unit tested separately and with both units operating.

Note 8: With plate supply voltage of 250 volts, grid-circuit resistance of 1.0 megohm common to both units, and cathode-bias resistor of 500 ohms common to both units. Plate of unit No.1 tied to plate of unit No.2; grid of unit No.1 tied to grid of unit No.2.

Note 9: With 7.0 volts ac or dc on heater.

Note 10: With plate supply voltage of 100 volts, grid-circuit resistance of 1 megohm common to both units and cathode-bias resistor of 50 ohms common to both units. Plate of unit No.1 tied to plate of unit No.2; grid of unit No.1 tied to grid of unit No.2.

Note 11: With 100 volts dc between heater and cathode.

Note 12: With grid 100 volts negative with respect to all other electrodes tied together.

Note 13: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 500 max. g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-Impact (Flyweight) Shock Machine and are subjected to 20 blows at a hammer angle of 30° (equivalent to the specified maximum impact acceleration). At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for vibration, heater-cathode leakage current, and transconductance.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified vibrational acceleration. Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 60 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for fatigue, heater-cathode leakage current, and transconductance.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 25 max. millivolts

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand low-frequency vibration of its elements with consequent

World Radio History

RCA

6101

MEDIUM-MU TWIN TRIODE

generation of audio noise as determined by the measured rms output voltage. Plate of unit No.1 tied to plate of unit No.2 and grid of unit No.1 tied to grid of unit No.2; dc plate voltage of 250 volts, dc grid voltage of -8 volts, plate load resistance of 20000 ohms, and vibrational acceleration of 2.5 g at 25 cps.

Audio-Frequency Noise and Microphonic Performance:

RMS Output Voltage . . . . . 70 max. millivolts

This test is performed on a sample lot of tubes from each production run to determine susceptibility of tube to movement of its elements when tapped and consequent generation of audio noise as determined by the measured rms output voltage. Plate of unit No.1 tied to plate of unit No.2, grid of unit No.1 tied to grid of unit No.2, plate supply voltage of 100 volts, grid-circuit resistance of 0.1 megohm common to both units, cathode-bias resistor of 50 ohms common to both units, and plate load resistance of 10000 ohms.

Glass Strain Test:

This test is performed on a sample lot of tubes from each production run to check for tubes which may have been improperly processed. Tubes are completely submerged in boiling water (97°C to 100°C) for a period of 15 seconds and then immediately submerged in ice water (0°C to 3°C). Tubes will withstand this treatment without loss of vacuum.

Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid current in excess of 1.0 microampere under the conditions specified in the CHARACTERISTICS RANGE VALUES for reverse grid current (1).

1-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. With both units operating, each unit is checked for variation in transconductance under conditions of maximum rated plate dissipation. At the end of 1 hour, the value of transconductance of each unit is read. The variation in transconductance from the 0-hour reading will not exceed 12 per cent.

100-Hour Life Performance:

This test is performed on a sample lot of tubes from each production run under conditions of maximum rated plate dissipation to insure a low percentage of early inopera-

World Radio History

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MEDIUM-MU TWIN TRIODE

tives. At the end of 100 hours, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid current in excess of 1.0 microampere under the conditions specified in CHARACTERISTICS RANGE VALUES for reverse grid current (1).

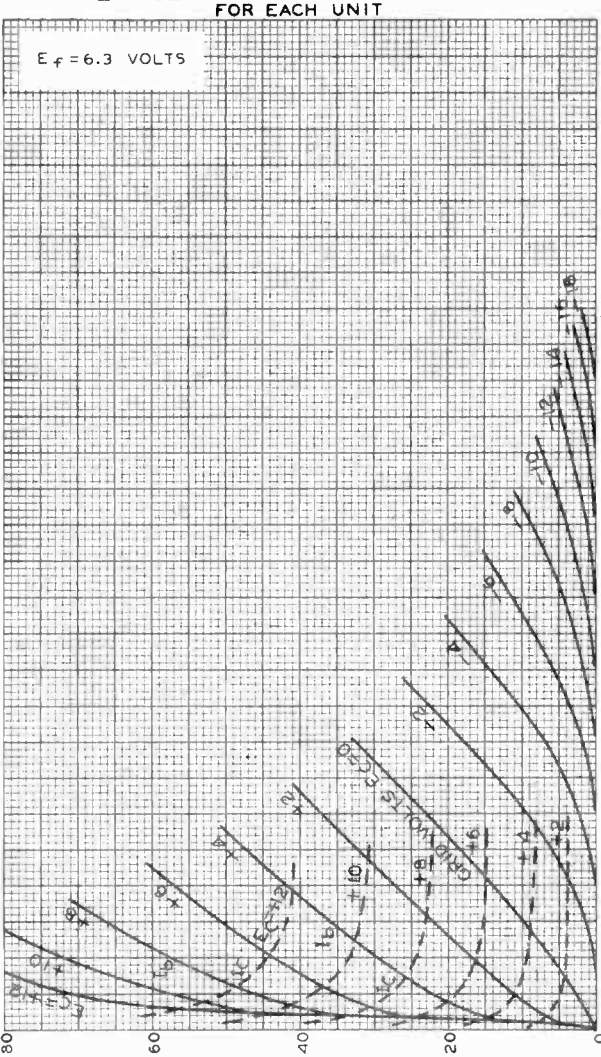
500-Hour Average Life Performance:

This 500-hour test is made on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. With both units operating, each unit is life tested separately at room temperature under the following conditions: heater voltage of 6.3 volts ac or dc, plate supply voltage of 100 volts, dc heater-cathode voltage (heater positive with respect to cathode) of 180 volts, and cathode bias resistor (common to both units) of 50 ohms. At the end of 500 hours, the tubes will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass the established limits of heater current, transconductance with 6.3 volts ac or dc on heater, transconductance with 5.7 volts ac or dc on heater, plate current (1), reverse grid current (2), heater-cathode leakage current, and leakage resistance per unit.

RCA

6101

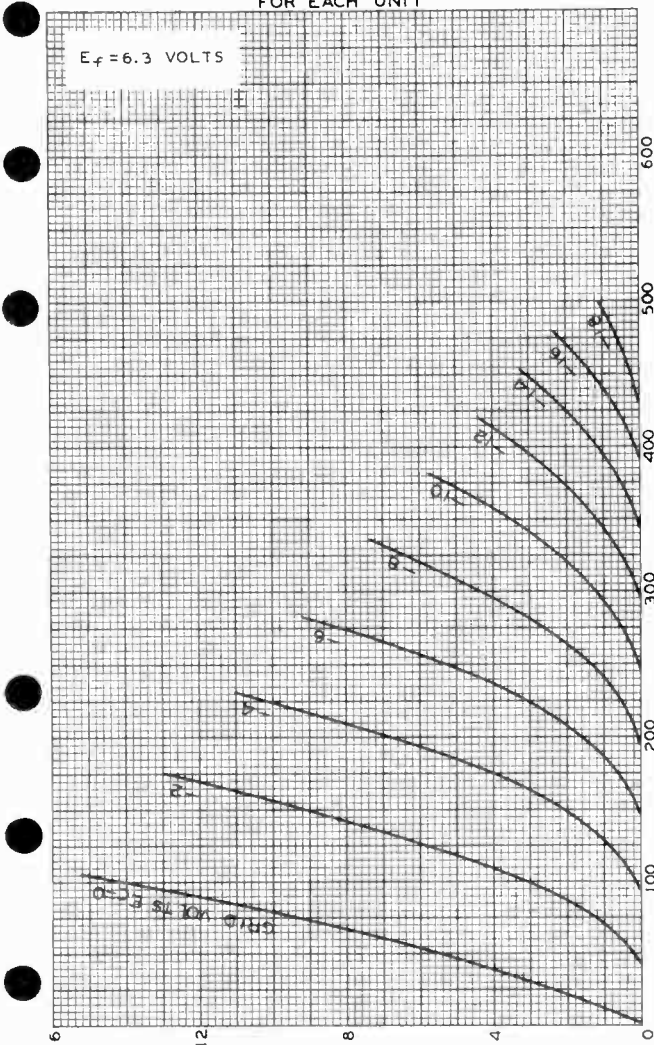
AVERAGE PLATE CHARACTERISTICS FOR EACH UNIT



RCA

6101

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



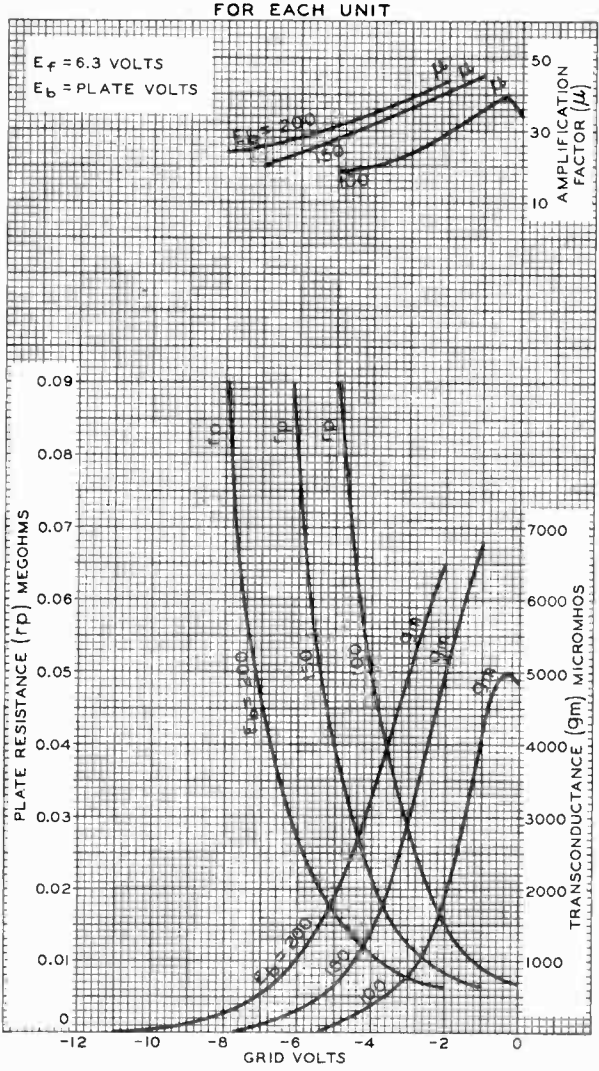
JULY 13, 1953

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8033

RCA

6101
AVERAGE CHARACTERISTICS
FOR EACH UNIT



6173
UHF DIODE

"PENCIL" TYPE

For use in pulse-detection and pulse-power-measuring service at frequencies up to 3300 Mc

GENERAL DATA

Electrical:

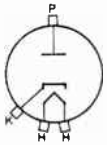
Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.135	amp
Resonant Frequency (Approx.)	1600	Mc
Direct Interelectrode Capacitance (Approx.):°		
Plate to cathode	1.1	μμf

Mechanical:

Operating Position	Any
Dimensions	*See Dimensional Outline*
Socket	Cinch No. 54A16325, or equivalent
Terminal Connections *(See Dimensional Outline)*:	

H – Heater Leads

P – Plate Terminal (Adjacent to pinch-off)



K – Cathode Terminal (Adjacent to heater leads)

PULSE-DETECTION and PULSE-POWER-MEASURING SERVICE▲

Maximum Ratings, *Absolute Values:*

PEAK INVERSE PLATE VOLTAGE	1000 max.	volts
PEAK PULSE PLATE VOLTAGE	150 max.	volts
PEAK PULSE PLATE CURRENT	1 max.	amp
DC PLATE CURRENT	1 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
SEAL TEMPERATURE (Plate or cathode)	175 max.	°C

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values:*

PEAK INVERSE PLATE VOLTAGE	375 max.	volts
PEAK PLATE CURRENT	50 max.	ma
HOT-SWITCHING TRANSIENT PLATE CURRENT:●		
For duration of 0.2 second maximum	250 max.	ma
DC OUTPUT CURRENT	5.5 max.	ma

°,▲,●: See next page.

World Radio History

RCA

6173

UHF DIODE

PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode .	90 max.	volts
Heater positive with respect to cathode .	90 max.	volts
SEAL TEMPERATURE (Plate or cathode)	175 max.	°C

○ Without external shield.

▲ In this class of service, the heater should be allowed to warm up for a minimum of 60 seconds before plate voltage is applied in order to allow the cathode to reach normal operating temperature and to be able to supply the high peak plate currents encountered in this class of service.

● A minimum plate-load impedance (including the source impedance) of 300 ohms is required to limit the hot-switching transient plate current and thereby prevent damage to the tube when the plate voltage is applied.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current.	1	0.127	0.143	amp
Direct Interelectrode Capacitance:				
Plate to cathode.	2	0.8	1.4	μμf
Tube Voltage Drop	1,3	-	15	volts

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Without external shield.

Note 3: With peak plate current of 50 milliamperes provided by an applied dc voltage. Tube drop is measured by a voltmeter connected between plate and cathode.

OPERATING CONSIDERATIONS

Connections to the cathode terminal and the plate terminal should be made by flexible spring contacts only. The connectors must make firm, large-surface contact, yet must be sufficiently flexible so that no part of the tube is subjected to strain. Unless this recommendation is observed, the glass-to-metal seals may be damaged.

The *heater leads* should not be soldered to the circuit elements. The heat of the soldering operation may crack the glass seals of the heater leads and damage the tube.

The accompanying *Pulse Rating Chart* represents graphically the relationships between pulse duration, pulse-repetition rate, and peak-pulse plate current. This Chart gives the equipment designer a wide choice of operating parameters within the tube's ratings.

Dotted boundary line "ABC" is the locus of the maximum peak-pulse-plate-current values for various pulse durations. In most applications, two of the three parameters shown in the Pulse Rating Chart are known. Knowing any two parameters, the equipment designer can select from the Chart the maximum allowable value of the third parameter. For example, if an application requires a 1-microsecond pulse and a pulse-repetition rate of 1000 pulses per second, the maximum allowable peak-pulse plate current is 1 ampere. Since the pulse-repetition rate of 1000 is a maximum value for a pulse duration

→ Indicates a change.

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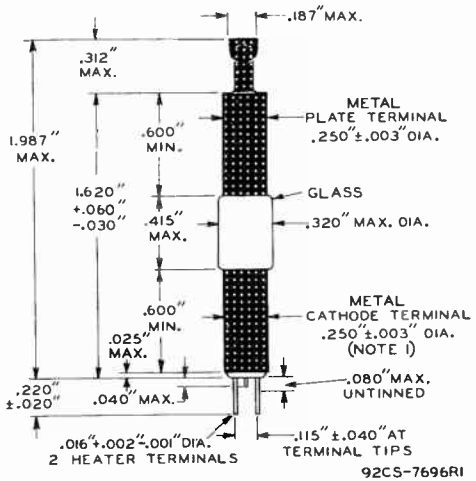
of 1 microsecond, it follows that any pulse-repetition rate up to 1000 may be used under these conditions. If a longer pulse duration is required, e.g., 1.5 microseconds, and the same pulse-repetition rate of 1000 is required, the maximum allowable peak-pulse plate current is 0.67 ampere.

In applications where groups of pulses are employed, the equipment designer can total the pulse duration of the individual pulses in any one group and then treat the pulse duration of the group as a single wide pulse.



NOTE 1: THE MAXIMUM ECCENTRICITY OF THE CATHODE TERMINAL WITH RESPECT TO THE PLATE TERMINAL IS 0.008". ECCENTRICITY IS MEASURED BY CHUCKING THE PLATE TERMINAL 0.050" TO 0.100" FROM THE GLASS MID-SECTION, ROTATING THE TUBE, AND MEASURING ONE-HALF THE TOTAL TRAVEL DISTANCE OF THE CATHODE TERMINAL AT A POINT 0.080" FROM THE FREE END OF THE CATHODE TERMINAL.

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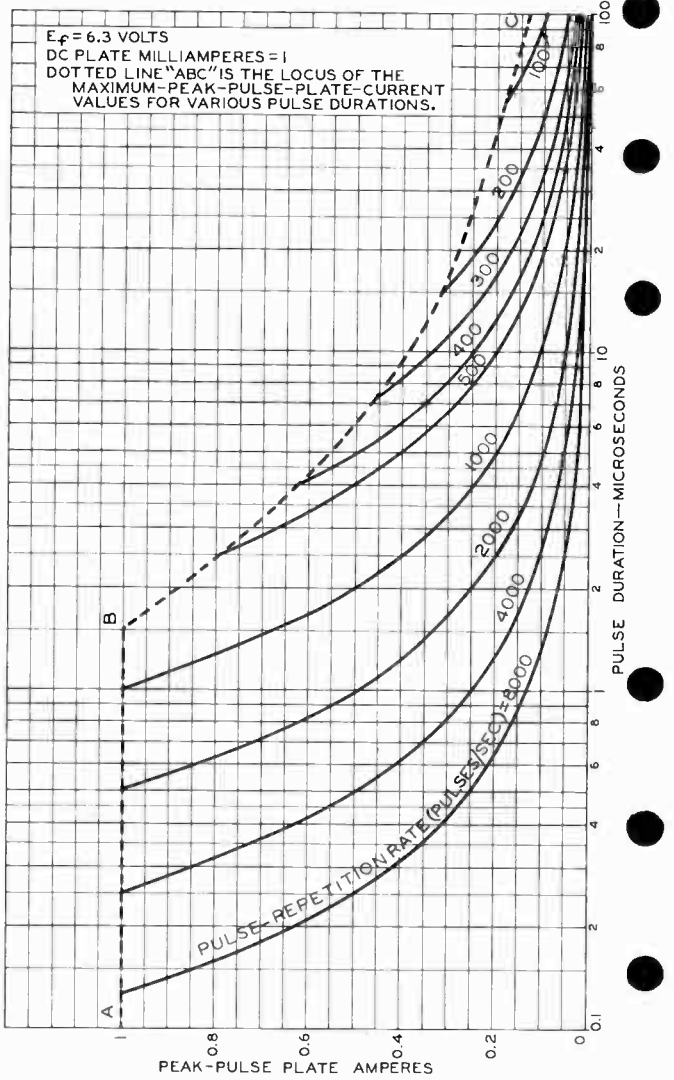
PULSE RATING CHART



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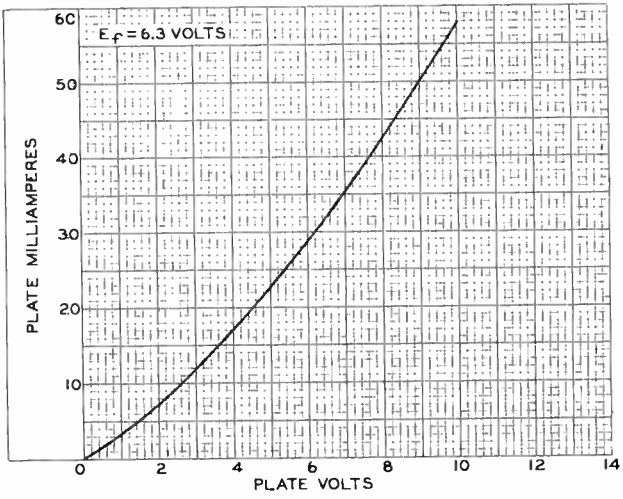
AVERAGE PLATE CHARACTERISTICS



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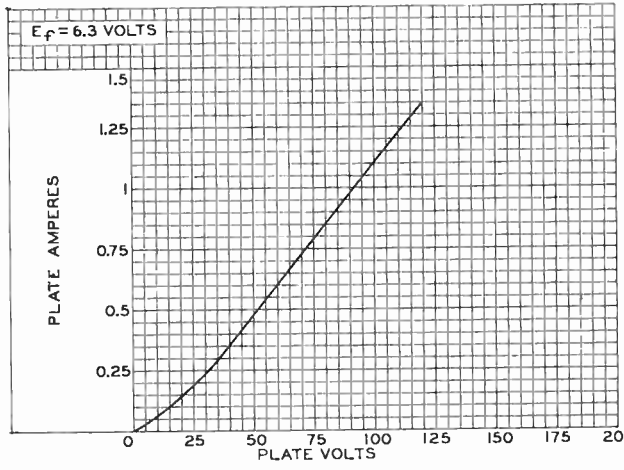

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POWER PENTODE

FOR "ON-OFF" CONTROL APPLICATIONS INVOLVING
LONG PERIODS OF OPERATION UNDER CUTOFF CONDITIONS

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathode:		
Voltage	6.3 ± 5%	ac or dc volts
Current at 6.3 volts	0.65	amp
Direct Interelectrode Capacitances (Approx. with no external shield):		
Grid No.1 to Plate	0.125	μμf
Grid No.1 to Cathode and Heater	11.5	μμf
Plate to Cathode and Heater	5.0	μμf
Heater to Cathode	8.5	μμf

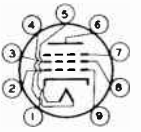
Characteristics, Class A_1 Amplifier:

Heater Voltage	6.3	volts
Plate Voltage	250	volts
Grid No.3	Connected to Cathode at Socket	
Grid-No.2 Voltage	150	volts
Grid-No.1 Voltage	-3	volts
Mu-Factor, Grid No.2 to Grid No.1	22	
Plate Resistance	90000	ohms
Transconductance	11000	μmhos
Plate Current	30	ma
Grid-No.2 Current	7	ma
Maximum Plate Current for grid-No.1 voltage of -12 volts	100	μamp

Mechanical:

Mounting Position	vertical; Horizontal operation permitted if pins No.3 and No.8 are in a vertical plane
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Maximum Diameter	7/8"
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)

BOTTOM VIEW



Pin 1: Cathode
Pin 2: Grid No.1
Pin 3: Grid No.2
Pin 4: Heater
Pin 5: Heater
Pin 6: Plate
Pin 7: Grid No.3, Int. Shield
Pin 8: Grid No.2
Pin 9: Grid No.1

FREQUENCY DIVIDER IN COMPUTER SERVICE and "ON-OFF" CONTROL SERVICE

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	300 max.	volts
GRID-No.3 (SUPPRESSOR) VOLTAGE	0 max.	volts

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POWER PENTODE

GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE	-50 max.	volts
PLATE DISSIPATION	7.5 max.	watts
GRID-No.2 INPUT	2.5 max.	watts
CATHODE CURRENT	50 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	180• max.	volts
Heater positive with respect to cathode	180• max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	200 max.	°C

Maximum Circuit Values:

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

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.61	0.69	amp
Mu-Factor, Grid No.2 to Grid No.1	1,2	19	25	
Plate Current (1)	1,3	26	46	ma
Plate Current (2)	1,4	20	40	ma
Plate Current (3)	1,5	-	100	μamp
Grid-No.2 Current	1,4	5	9	ma
Reverse Grid-No.1 Current	1,6	-	2	μamp
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,7	-	40	μamp
Heater positive with respect to cathode	1,7	-	40	μamp
Transconductance	1,4	9000	13000	μmhos

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With grid No.3 tied to cathode, grid No.2 tied to plate, plate voltage of 150 volts, grid-No.2 voltage of 150 volts, and grid-No.1 voltage of -3 volts.

Note 3: With plate voltage of 50 volts, grid No.3 tied to cathode, grid No.2 voltage of 100 volts, and grid-No.1 voltage of 0 volts.

Note 4: With plate voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 voltage of 150 volts, and grid-No.1 voltage of -3 volts.

Note 5: With plate voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 voltage of 150 volts, and grid-No.1 voltage of -12 volts.

Note 6: With plate voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 voltage of 150 volts, grid-No.1 supply voltage of -3 volts, and grid-No.1 resistor of 0.25 megohm.

Note 7: With 90 volts dc between heater and cathode.

• DC component must not exceed 90 volts.

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AVERAGE PLATE CHARACTERISTICS
WITH EC2 AS VARIABLE
Ef=6.3 VOLTS
GRID No.3 CONNECTED TO CATHODE
GRID-No.1 VOLTS=0
GRID-No.2 (IC2) MILLIAMPERES
40
30
20
10
0
Ib
EC2=250
IC2
EC2=200
150
200
IC2
100
50
Ib
GRID-No.2 VOLTS EC2=100
50
160
140
120
100
80
60
40
20
0
100
200
300
400
500
PLATE VOLTS
PLATE MILLIAMPERES (Ib)
DEC. 8, 1953
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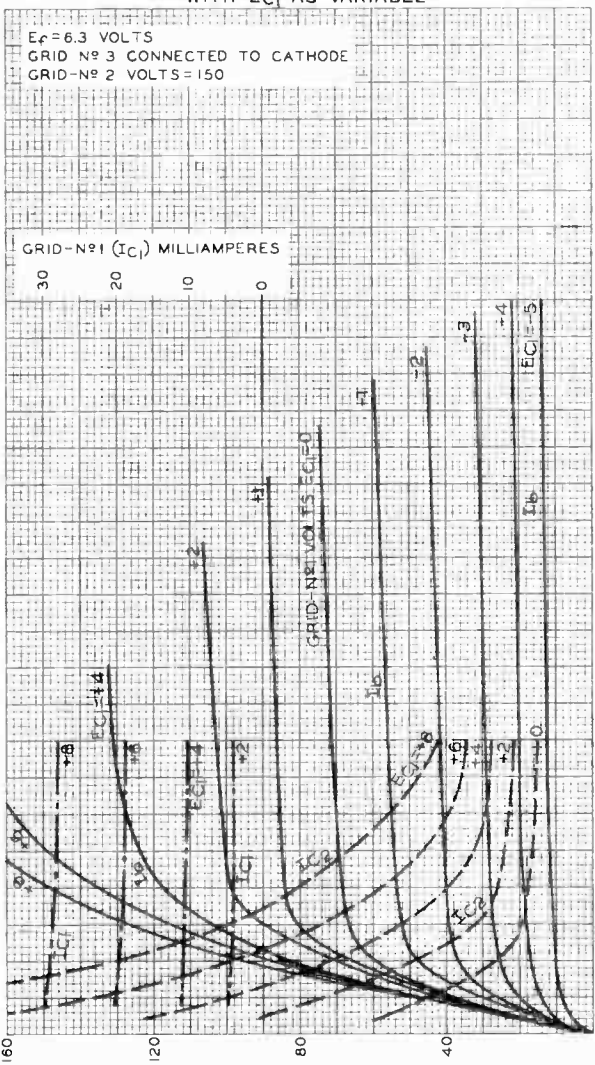
AVERAGE PLATE CHARACTERISTICS
WITH E_{C_1} AS VARIABLE



DEC. 4, 1953 TUBE DEPARTMENT 92CM-8285

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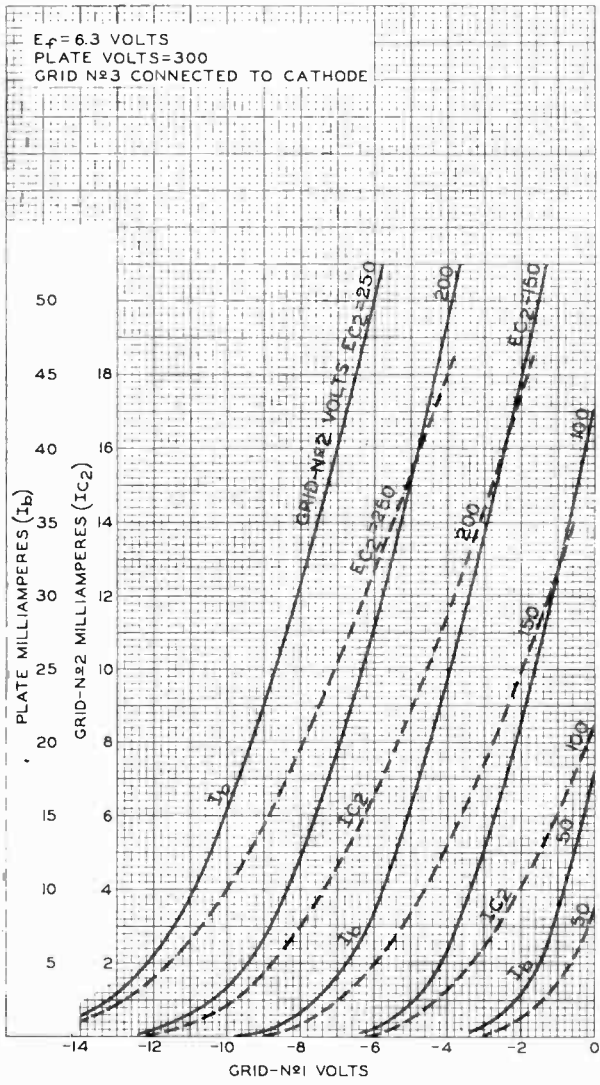
AVERAGE CHARACTERISTICS



DEC. 4, 1953

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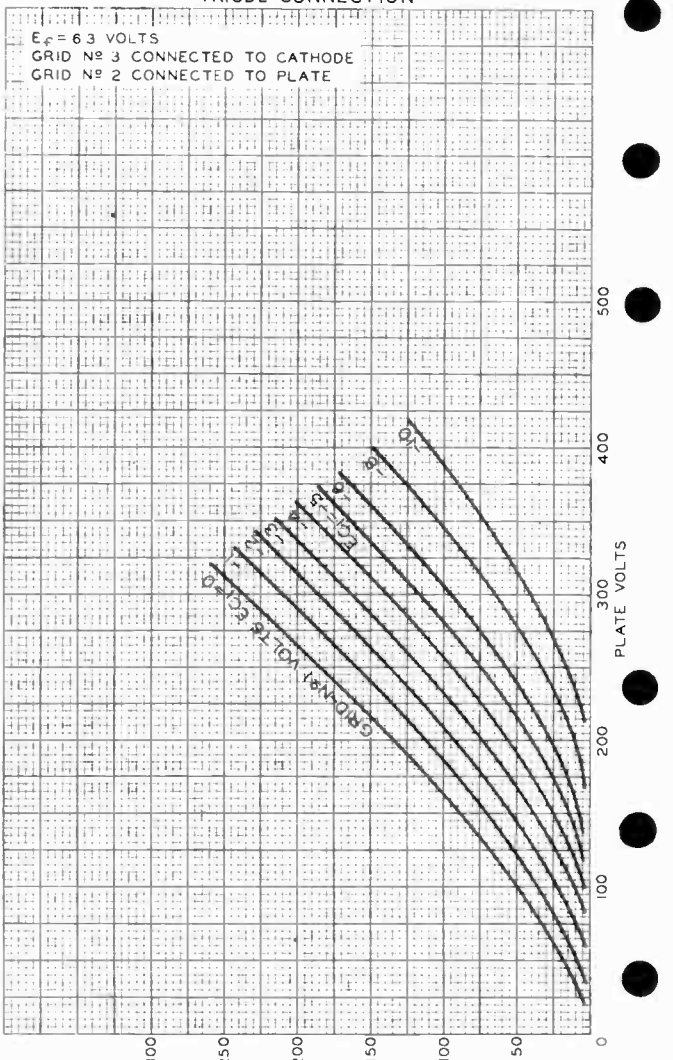
AVERAGE PLATE CHARACTERISTICS

TRIODE CONNECTION



DEC. 4, 1953

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HIGH-MU TWIN TRIODE

9-PIN MINIATURE TYPE

Intended for applications where dependable performance under shock and vibration is paramount, and for "on-off" control applications involving long periods of operation under cutoff conditions. The 6201, a "premium" version of the 12AT7, may be used at frequencies up to 300 Mc.

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathodes:

Heater arrangement	*Series*	*Parallel*	
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current	0.15	0.3	amp

Direct Interelectrode Capacitances (Approx.):

Grid-Drive Operation:	*Without External Shield*	*With External Shield**	
Grid to plate (Each unit)	1.6	1.6	μμf
Grid to cathode and heater (Each unit)	2.5	2.5	μμf
Plate to cathode and heater (Unit No.1)	0.45	1.2	μμf
Plate to cathode and heater (Unit No.2)	0.38	1.3	μμf
Heater to cathode (Each unit)	2.8	2.8	μμf
Plate to plate	0.24	-	μμf
Cathode-Drive Operation:	*Without External Shield*	*With External Shield•*	
Plate to cathode (Unit No.1)	0.2	0.18	μμf
Plate to cathode (Unit No.2)	0.24	0.2	μμf
Cathode to grid and heater (Each unit)	5	5	μμf
Plate to grid and heater (Unit No.1)	1.9	2.7	μμf
Plate to grid and heater (Unit No.2)	1.8	2.7	μμf

Characteristics, Class A_1 Amplifier (Each Unit):

Plate-Supply Voltage	100	250	volts
Cathode Resistor	270	200	ohms
Amplification Factor	57	60	
Plate Resistance (Approx.)	14300	10900	ohms
Transconductance	4000	5500	μmhos
Plate Current	3.3	10	ma
Grid Voltage (Approx.) for plate current of 10 μamp	-5	-12	volts

*,•: See next page.

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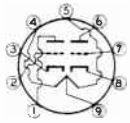
HIGH-MU TWIN TRIODE

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Maximum Diameter	7/8"
Dimensional Outline	*See General Section*
Bulb	T-6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pins 4 & 9 – Heater of Unit No.2
Pins 5 & 9 – Heater of Unit No.1



Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Mid-Tap

AMPLIFIER - Class A_1

Values are for Each Unit

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Negative bias value	55 max.	volts
Positive bias value	0 max.	volts
PLATE DISSIPATION	2.75 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	180 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:		
For fixed-bias operation	0.25 max.	megohm
For cathode-bias operation	1.0 max.	megohm

Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART at end of tabulated data for this type

* With external shield JETEC No.315 connected to cathode of unit under test.

● With external shield JETEC No.315 connected to grid of unit under test.

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HIGH-MU TWIN TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN*

Values Are For Each Unit and are Initial. Unless Otherwise Specified

	Note	Min.	Max.	
Heater Current	1	0.138	0.162	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	1.3	1.9	μμf
Grid to cathode and heater	2	2	3	μμf
Plate to cathode and heater (Unit No.1)	2	0.2	0.7	μμf
Plate to cathode and heater (Unit No.2)	2	0.16	0.6	μμf
Heater to cathode	2	2.1	3.5	μμf
Plate to plate	3	0.15	0.33	μμf
Amplification Factor	1,4	50	70	
Plate Current (1)	1,4	7	14	ma
Plate-Current Difference Between Units	1,4	-	3.2	ma
Plate Current (2)	1,5	-	100	μamp
Transconductance (1)	1,4	4500	6500	μmhos
Transconductance (1) at 500 Hours	1,4	3800	6500	μmhos
Transconductance (2)	3,6	4100	-	μmhos
Transconductance Change: Difference between average transconductance (1) initially, and average after 500 hours, expressed as a percentage of the initial average	1,4	-	15	%
Reverse Grid Current	1,7	-	0.7	μamp
Grid Emission Current	8,9	-	1.5	μamp
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,10	-	10	μamp
Heater positive with respect to cathode	1,10	-	10	μamp
Leakage Resistance: Between grid and all other electrodes tied together	1,11	100	-	megohms

* Each tube is stabilized before characteristics testing by continous operation for at least 45 hours at room temperature and with dissipation values equivalent to life test conditions.

Notes 1 to 11: See next page.

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HIGH-MU TWIN TRIODE

	Note	Min.	Max.	
Leakage Resistance:				
Between plate and all other electrodes tied together.	1,12	100	–	megohms
Leakage Resistance at 500 Hours:				
Between grid and all other electrodes tied together.	1,11	50	–	megohms
Between plate and all other electrodes tied together.	1,12	50	–	megohms

Note 1: With 12.6 volts ac or dc on heater (series connection).

Note 2: Without external shield and with unit not under test connected to ground.

Note 3: Without external shield.

Note 4: With dc plate-supply volts = 250, cathode resistor (ohms) = 200, and cathode bypass capacitor of 1000 μf. Each unit tested separately. Unit not under test connected to ground.

Note 5: With dc plate-supply volts = 250, plate load resistance (megohms) = 0.1, and dc grid volts = −20. Each unit tested separately. Unit not under test connected to ground.

Note 6: With 11.0 volts ac or dc on heater (series connection).

Note 7: With dc plate-supply volts = 250, grid-circuit resistance (megohms) = 0.5, cathode resistor (ohms) = 200, and cathode bypass capacitor of 1000 μf. Each unit tested separately. Unit not under test connected to ground.

Note 8: With 15.0 volts ac or dc on heater (series connection).

Note 9: With dc plate volts = 250, grid-circuit resistance (megohms) = 0.5, and dc grid volts = −20. Each unit tested separately.

Note 10: With 100 volts dc between heater and cathode and units connected in parallel.

Note 11: With grid 100 volts negative with respect to all other electrodes tied together.

Note 12: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration. . . . . 600 max. g

This test is performed on a sample lot of tubes from each production run in a Navy Type, High-Impact (flyweight) Shock Machine. Tubes are held rigid in four different positions and are subjected to 20 blows at the specified maximum impact acceleration. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for vibrational acceleration, heater-cathode leakage current, and transconductance.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each

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RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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HIGH-MU TWIN TRIODE

production run. Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for impact acceleration, heater-cathode leakage current, and transconductance.

Low-Frequency Vibration Performance:

RMS Output Voltage. . . . . 100 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: plate of unit No.1 tied to plate of unit No.2, grid of unit No. 1 tied to grid of unit No.2, heater volts = 12.6, dc plate volts = 250, dc grid volts = -3, plate load resistance (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cycles per second.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation. . . . . 2000 min. cycles

Under the following conditions and with the heaters of unit No.1 and unit No.2 connected in parallel: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and plate and grid volts = 0.

Audio-Frequency Noise and Microphonic Performance:

RMS Output Voltage. . . . . 100 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: plate of unit No.1 tied to plate of unit No.2, grid of unit No.1 tied to grid of unit No.2, dc heater volts = 12.6, plate-supply volts = 300, cathode resistor (ohms) = 200 common to both units, and plate load resistance (ohms) = 10,000.

Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid current in excess of 1.4 microamperes under the conditions specified in the CHARACTERISTICS RANGE VALUES for reverse grid current.

1-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. With both units operating, each unit is checked for variation in transconductance under conditions of maximum rated plate dissipation. At the end of 1 hour, the value of transconductance is read. The variation in transconductance from the 0-hour reading will not exceed 10 per cent.

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HIGH-MU TWIN TRIODE

100-Hour Life Performance:

This test is performed on a sample lot of tubes from each production run under the conditions of maximum rated plate dissipation to insure a low percentage of early inoperatives. At the end of 100 hours, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid current in excess of 1.4 microamperes under the conditions specified in CHARACTERISTICS RANGE VALUES for reverse grid current.

500-Hour Average Life Performance:

This 500-hour test is made on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. With both units operating, each unit is life tested separately at room temperature under the following conditions: heater volts = 12.6 ac or dc (series connection), plate-supply volts = 250, cathode resistor (ohms) = 200, grid-circuit resistance (megohms) = 0.5, heater 135 volts positive with respect to cathode, and bulb temperature (°C) = 180. At the end of 500 hours, tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass the established initial limits for heater current, reverse grid current, heater-cathode leakage current, and 500-hour limits for transconductance (1), transconductance change, and leakage resistance as shown under CHARACTERISTICS RANGE VALUES.

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HIGH-MU TWIN TRIODE

OPERATING CONSIDERATIONS AS RESISTANCE-COUPLED AMPLIFIER
(Each Unit)

Plate-Supply Voltage	90			volts
Plate Load Resistor	0.1	0.24	0.51	megohm
Grid Resistor (Of following stage)	0.24	0.51	1	megohm
Cathode Resistor	2400	5300	11000	ohms
Peak Output Voltage	13	15	16	volts
Voltage Gain▲	27	28	28	
Plate-Supply Voltage	180			volts
Plate Load Resistor	0.1	0.24	0.51	megohm
Grid Resistor (Of following stage)	0.24	0.51	1	megohm
Cathode Resistor	1400	3600	7100	ohms
Peak Output Voltage	28	31	33	volts
Voltage Gain▲	33	33	32	
Plate-Supply Voltage	300			volts
Plate Load Resistor	0.1	0.24	0.51	megohm
Grid Resistor (Of following stage)	0.24	0.51	1	megohm
Cathode Resistor	1200	2900	6400	ohms
Peak Output Voltage	47	52	55	volts
Voltage Gain▲	33	34	34	

▲ At 2 volts (rms) output.

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

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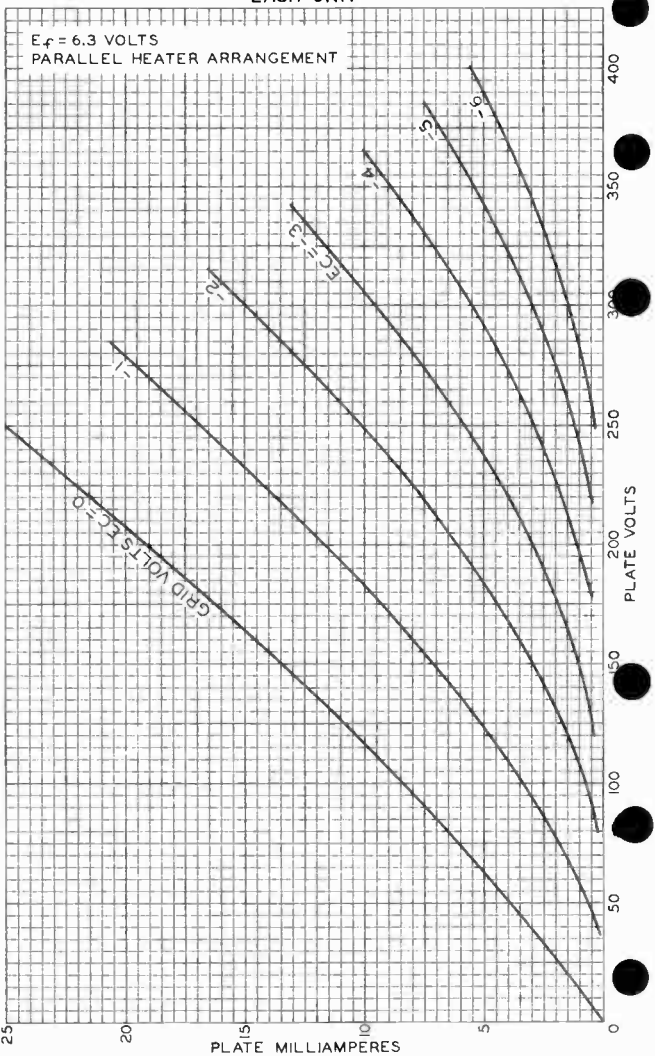
AVERAGE PLATE CHARACTERISTICS

EACH UNIT



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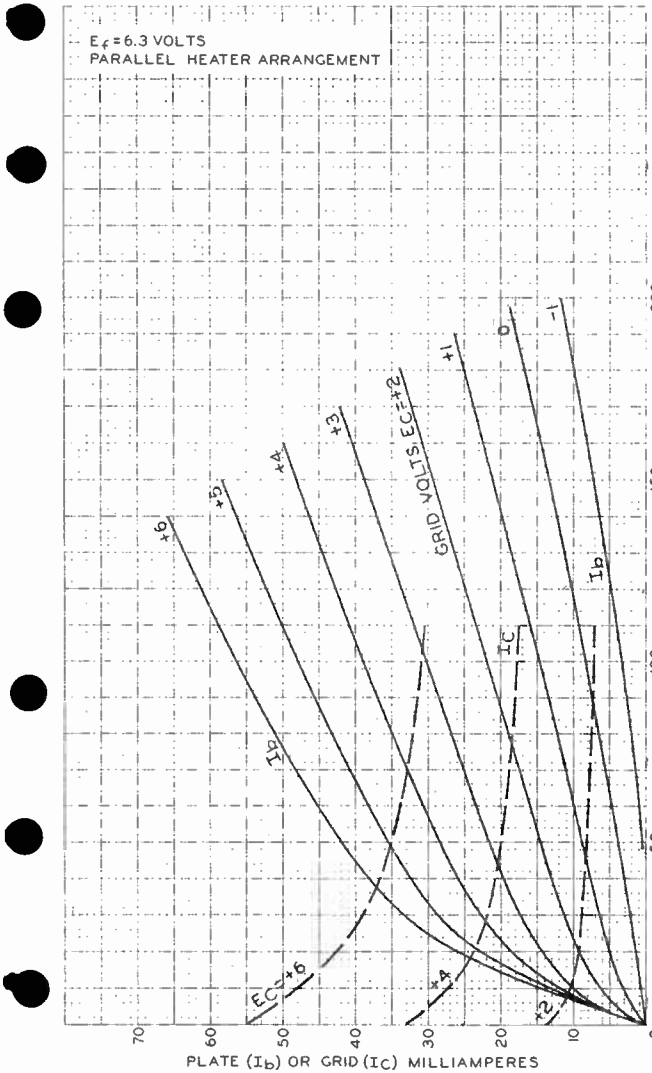
AVERAGE CHARACTERISTICS
EACH UNIT



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World Radio History

6201

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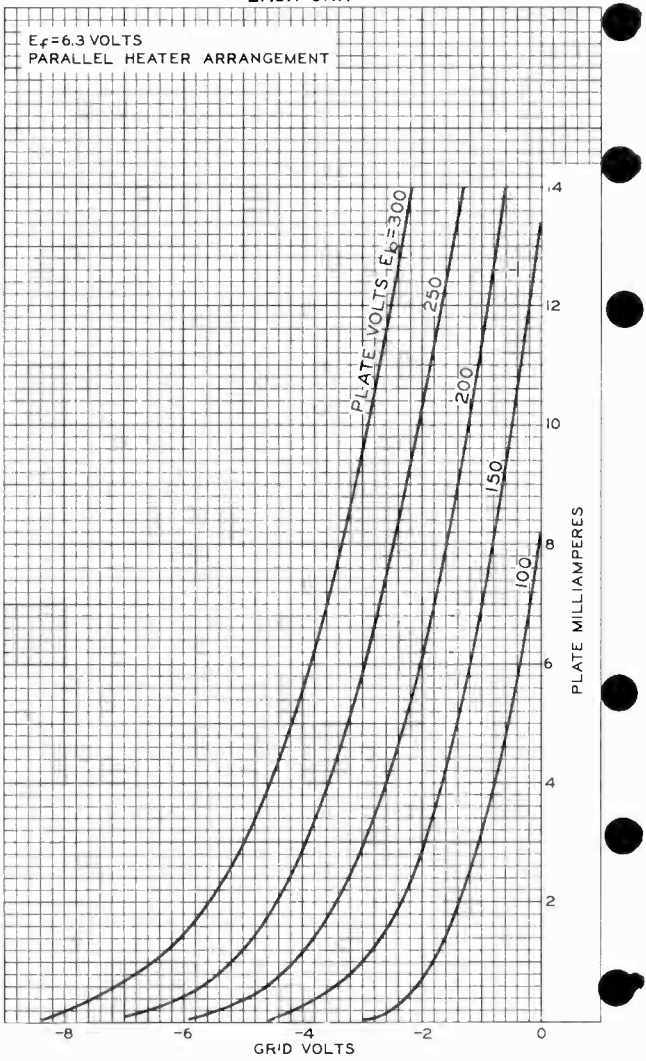
6201

AVERAGE CHARACTERISTICS
EACH UNIT



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9023

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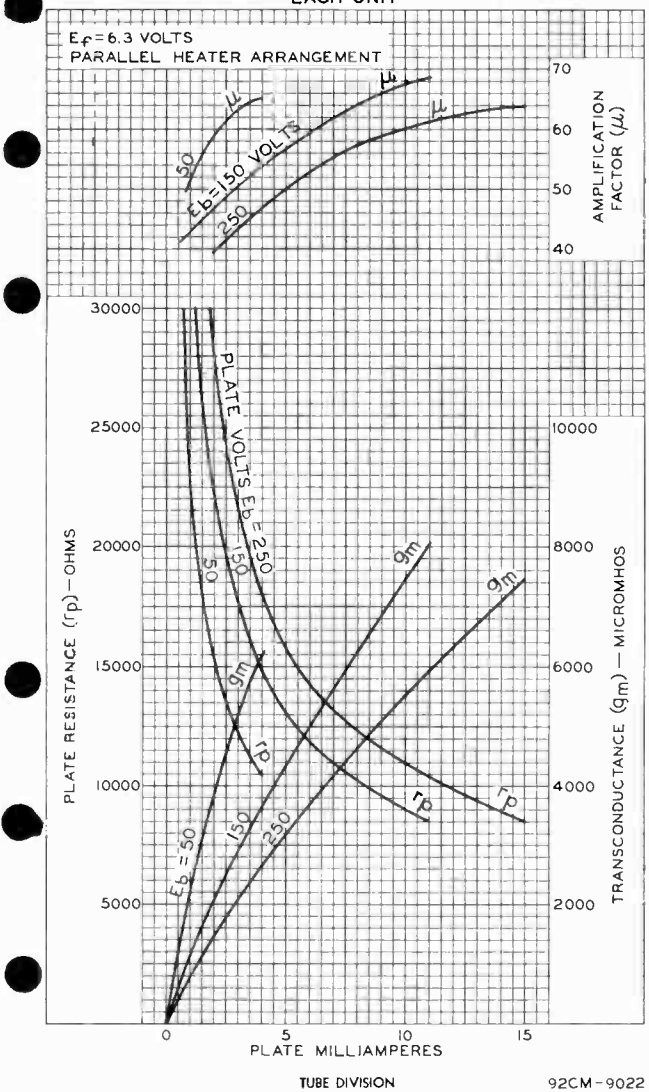
AVERAGE CHARACTERISTICS
EACH UNIT



World Radio History

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MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For "on-off" control applications involving long periods of operation under cutoff conditions

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathodes:

Heater arrangement	*Series*	*Parallel*	
Voltage	12.6 ± 5%	6.3 ± 5%	ac or dc volts
Current	0.15	0.3	amp

Direct Interelectrode Capacitances:[a]

	Unit No.1	*Unit No.2*	
Grid to plate	2.22	2.22	μμf
Grid to cathode and heater	2.90	2.90	μμf
Plate to cathode and heater	0.54	0.46	μμf
Heater to cathode	3.25	3.25	μμf
Plate of unit No.1 to plate of unit No.2	0.56		μμf
Grid of unit No.1 to grid of unit No.2	0.06 max.		μμf

Characteristics, Class A₁ Amplifier (Each Unit):

Plate-Supply Voltage	100	volts
Cathode Resistor	470	ohms
Amplification Factor	27	
Plate Resistance (Approx.)	7500	ohms
Transconductance	3600	μmhos
Plate Current	4.6	ma
Grid Voltage (Approx.) for plate voltage of 150 volts and plate current of 100 μamp	−8	volts

Mechanical:

Mounting Position . . . . . Vertical, base up or down, or Horizontal with pins 1 and 5 in vertical plane

Maximum Overall Length . . . . . 2-3/16"

Maximum Seated Length . . . . . 1-5/16"

Length, Base Seat to Bulb Top (Excluding tip) . 1-9/16" ± 3/32"

Maximum Diameter . . . . . 7/8"

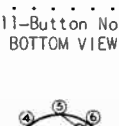
Dimensional Outline . . . . . *See General Section*

Bulb T-6-1/2

Base . . . . . Small-Button Noval 9-Pin (JETEC No.E9-1)

Basing Designation for BOTTOM VIEW 9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid Unit No.2
Pin 3 – Cathode of Unit No.2
Pins 4 & 9 – Heater of Unit No.2
Pins 5 & 9 – Heater of Unit No.1
Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Mid-Tap



[a] Without external shield.

← Indicates a change.

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MEDIUM-MU TWIN TRIODE

FREQUENCY DIVIDER IN COMPUTER SERVICE and "ON-OFF" CONTROL SERVICE

Values are for Each Unit

Maximum Ratings, ***Absolute Values:***

PLATE VOLTAGE	200 max.	volts
GRID VOLTAGE:		
Negative bias value	100 max.	volts
→ Positive bias value	1 max.	volt
→ DC POSITIVE GRID CURRENT	2 max.	ma
→ DC CATHODE CURRENT	16 max.	ma
PLATE DISSIPATION	1 max.	watt
→ PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	180 max.	volts
Heater positive with respect to cathode	180▲max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	120 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:		
For fixed-bias operation	0.1 max.	megohm
For cathode-bias operation	0.5 max.	megohm

→ CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.138	0.162	amp
Plate Current (Each unit)	1,2	4.8	5.5	ma
Plate Current (Each unit)	1,3	3.6	5.6	ma
Plate Current (Each unit)	1,2,4	–	100	μamp
Transconductance	1,2,3	2700	4500	μmhos
Reverse Grid Current (Units in parallel)	1,5	–	1	μamp
Leakage Resistance (Each unit):				
Between grid and all other electrodes	1,6	100	–	megohms
Between plate and all other electrodes	1,7	100	–	megohms
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,8	–	20	μamp
Heater positive with respect to cathode	1,8	–	20	μamp
Difference in Grid Voltage Between Units	1,2,9	–	1	volt
Contact Potential	1,10	–	1	volt
Amplification Factor (Each unit)	1,2	23	31	

Note 1: With 12.6 volts ac or dc on heater (series arrangement).

▲ The dc component must not exceed 90 volts.

→ Indicates a change.

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Marketing Electronics

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MEDIUM-MU TWIN TRIODE

Note 2: With plate-supply volts = 150, plate-circuit resistance (ohms) = 20,000, and grid-circuit resistance (ohms) = 47,000. Each unit tested separately. Unit not under test connected to ground.

Note 3: With plate-supply volts = 100, cathode resistor (ohms) = 470, and cathode bypass capacitor of 1000 μf. Each unit tested separately. Unit not under test connected to ground.

Note 4: With grid volts = −10.

Note 5: With plate-supply volts = 150, cathode resistor (ohms) = 470, and grid-circuit resistance (megohm) = 0.5.

Note 6: With grid 100 volts negative with respect to all other electrodes tied together.

Note 7: With plate 300 volts negative with respect to all other electrodes tied together.

Note 8: With 100 volts dc between heater and cathode and units connected in parallel.

Note 9: With grid voltage adjusted for plate current of 100 μamp.

Note 10: With plate volts = 100, grid current (μamp) = 0.1, and grid-circuit resistance (megohm) = 0.1. Each unit tested separately. Unit not under test connected to ground.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

Cycles of Intermittent Operation. . . . . 2000 min. cycles

For conditions: Series heater arrangement, heater volts = 17, cycled 1 minute on and 4 minutes off, heater positive with respect to cathode by +100 volts dc, plate volts = 0, and grid volts = 0.

→ Indicates a change.

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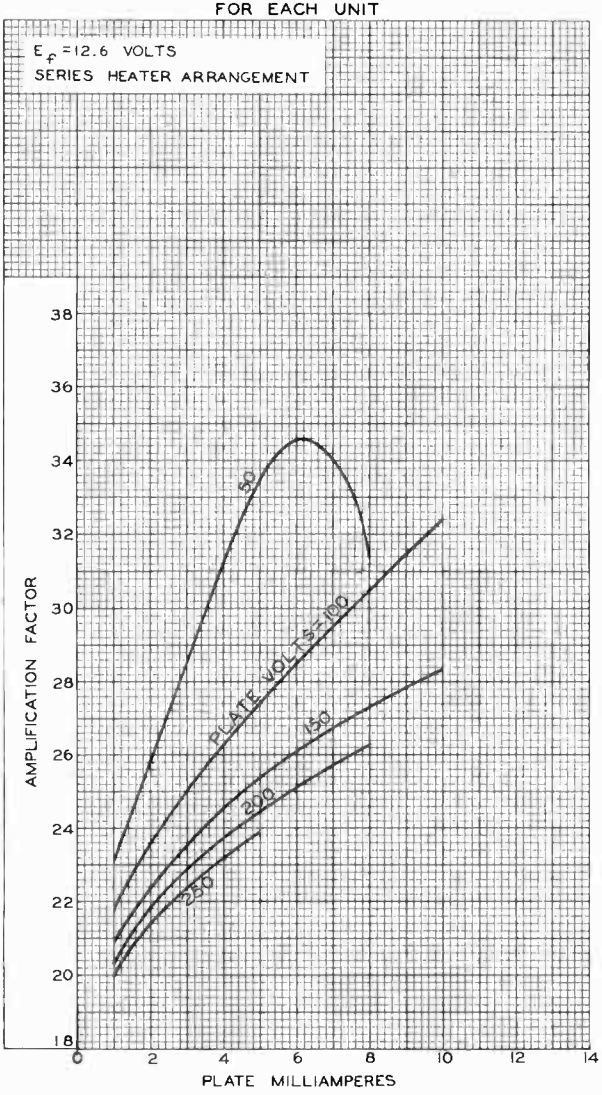
AVERAGE CHARACTERISTICS
FOR EACH UNIT



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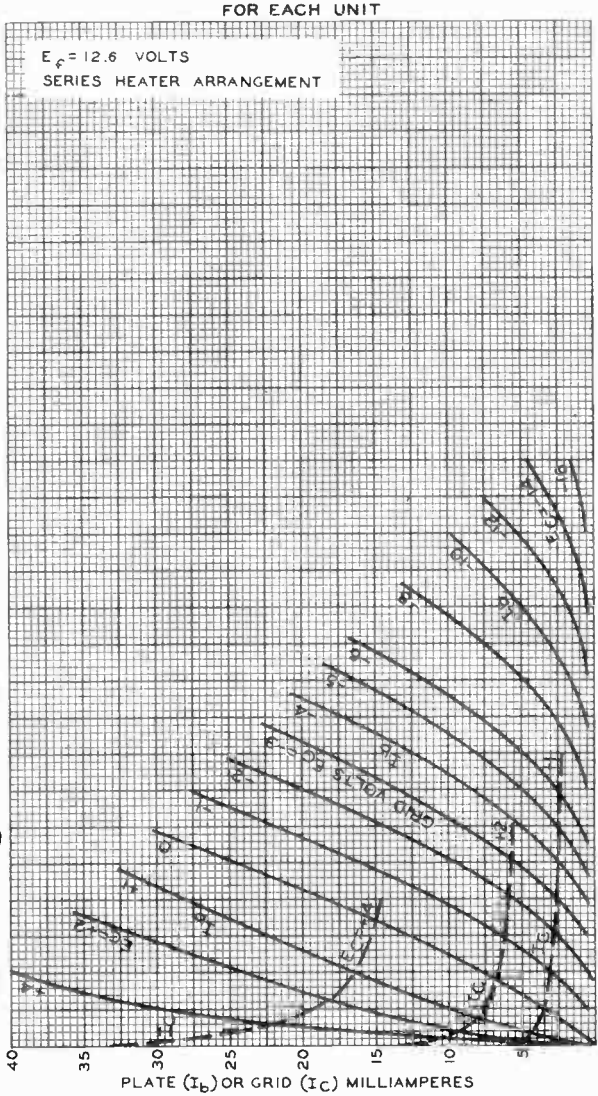
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



JULY 9, 1952

TUBE DEPARTMENT

92CM-7822

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Mouser Electronics

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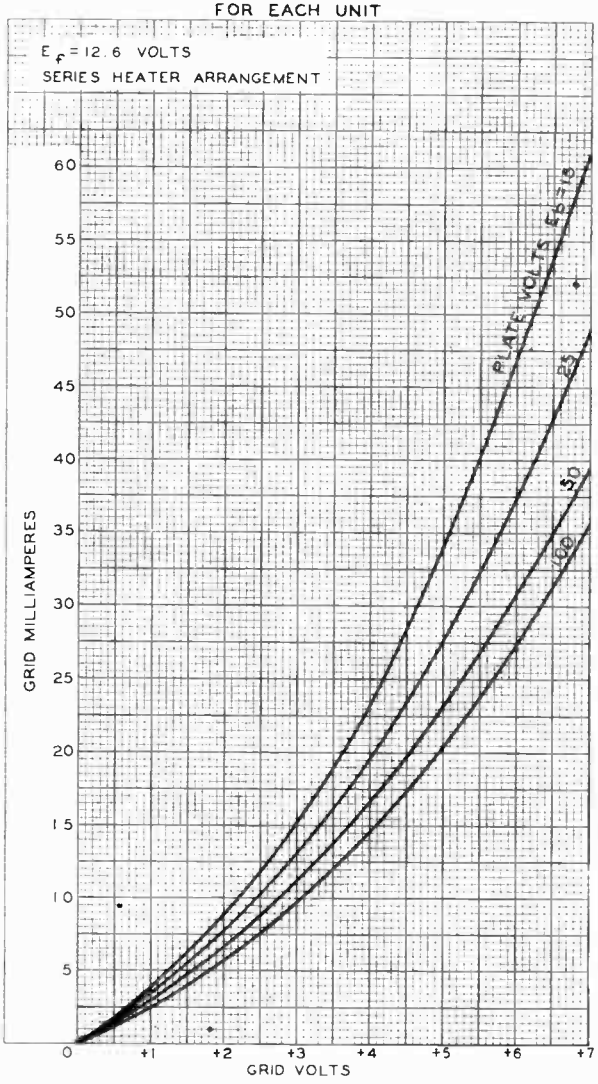
AVERAGE CHARACTERISTICS

FOR EACH UNIT



6336A

Low-Mu Twin Triode

For Use as a Series-Regulator Tube
in Regulated DC Power Supplies

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Absolute-Maximum Values)*:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	5.000	amp
Peak heater-cathode voltage (Each Unit):		
Heater negative with respect to cathode	300 max.	volts
Heater positive with respect to cathode	300 max.	volts
Cathode Warm-Up Time (Minimum)	30	sec
Direct Interelectrode Capacitances:		
Grid to plate (Each Unit)	21.8	μμf
Grid to cathode (Each Unit)	16.7	μμf
Plate to cathode (Each Unit)	3.8	μμf
Heater to cathode (Each Unit)	15	μμf
Plate to plate	0.6	μμf

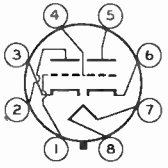
Characteristics, Class A_1 Amplifier (Each Unit):

Plate Supply Voltage	190	volts
Cathode Resistor	200	ohms
Amplification Factor	2.7	
Plate Resistance (Approx.)	200	ohms
Transconductance	13500	μmhos

Mechanical:

Operating Position	Vertical, base down or up, or Horizontal with pins 1 and 4 in vertical plane
Type of Cathodes	Coated Unipotential
Maximum Overall Length	4.750"
Maximum Seated Length	4.188"
Maximum Diameter	2.070"
Bulb	T16
Base	Large-Wafer Octal 8-Pin with External Barriers and Sleeve (JEDEC Group 7, No.B8-98)
Basing Designation for BOTTOM VIEW	8BD

Pin 1 – Grid of Unit No.2
Pin 2 – Plate of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4 – Grid of Unit No.1



Pin 5 – Plate of Unit No.1
Pin 6 – Cathode of Unit No.1
Pin 7 – Heater
Pin 8 – Heater

World Radio History

SERIES-REGULATOR SERVICE

Values are for Each Unit

Maximum Ratings, *Absolute-Maximum Values:*

For operation at altitudes up to 60,000 feet[a]

PLATE VOLTAGE	400 max.	volts
GRID VOLTAGE:		
Negative-bias value	300 max.	volts
Positive-bias value	0 max.	volts
PLATE CURRENT	400 max.	ma
PLATE DISSIPATION	30 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:[b]		
For fixed-bias operation	0.2 max.	megohm
For cathode-bias operation	0.5 max.	megohm

[a] Cooling must be provided to keep bulb temperature within ratings at altitudes above 10,000 feet.

[b] Minimum resistance per cathode should be 27 ohms or that resistance necessary to provide 10 per cent of the grid bias voltage, whichever is greater.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	4.75	5.25	amp
Amplification Factor (Each Unit)	1,2	2	3.4	
Plate Current (Each Unit)	1,2	165	200	ma
Plate Current (Each Unit)	1,3	0	10	ma
Transconductance (Each Unit)	1,2	11000	16000	μmhos

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With plate supply voltage of 190 volts, grid resistor of 500 ohms (each grid), and cathode resistor of 200 ohms (each cathode), both triode units operating.

Note 3: With plate voltage of 200 volts, and a grid-No.1 voltage of -100 volts (both triode units operating).

SPECIAL RATINGS AND PERFORMANCE DATA

Shock Rating:

Impact Acceleration	720 max.	g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-Impact (Flyweight) Shock Machine and are subjected to 20 blows at a hammer angle of 48°. At the end of this test, tubes will be considered inoperative if they do not have a minimum plate current per unit of 150 milliamperes, a minimum transconductance per unit of 9000 micromhos, a maximum heater-to-cathode leakage current (both units) of 100 microamperes, and a maximum reverse grid current (both units) of 8 microamperes.

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Variable-Frequency-Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: Heater voltage of 6.3 volts, plate supply voltage of 190 volts, grid resistor of 500 ohms in each grid, cathode resistor of 200 ohms in each cathode (both units operating), and a plate load resistance of 2000 ohms per unit. During operation, tubes are vibrated through the frequency range from 10 to 50 cycles per second with a constant vibrational acceleration of 10 g. During the test, tubes will not show an rms output voltage across the plate load resistor in excess of 200 millivolts.

1000-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: Heater voltage of 6.3 volts, plate supply voltage of 190 volts, grid resistor of 500 ohms in each grid, and cathode resistor of 200 ohms in each cathode (both units operating).

At the end of 1000 hours, tubes will be considered inoperative if they do not have a minimum plate current per unit of 150 milliamperes, a minimum transconductance per unit of 9000 micromhos, a maximum heater-to-cathode leakage current (both units) of 100 microamperes, and a maximum reverse grid current (both units) of 8 microamperes.

OPERATING CONSIDERATIONS

Operating conditions for the 6336A should be selected to assure that there is always some voltage drop across the tube. In addition, bias voltage provided by the drop across the plate load resistor of the amplifier tube should not be less than 5 volts to allow for variations in the characteristics of individual 6336A's. A grid resistor of approximately 1000 ohms should be used to prevent parasitic oscillations.

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MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For "on-off" control applications involving long periods of operation under cutoff conditions

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathodes:

	Series	*Parallel*	
Heater arrangement			
Voltage	12.6 ± 5%	6.3 ± 5%	ac or dc volts
Current	0.3	0.6	amp

Direct Interelectrode Capacitances:[o]

Grid to plate (Each unit)	3.2	μμf
Grid to cathode and heater (Each unit)	3.6	μμf
Plate to cathode and heater (Each unit)	0.6	μμf
Heater to cathode (Each unit)	4.6	μμf
Grid to grid	0.042 max.	μμf
Plate to plate	1 max.	μμf

Characteristics, Class A_1 Amplifier (Each Unit):

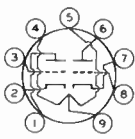
Plate Voltage	150	volts
Grid Voltage	-5	volts
Amplification Factor	18	
Plate Resistance (Approx.)	3900	ohms
Transconductance	4600	μmhos
Plate Current	11	ma
Grid Voltage (Approx.) for plate voltage of 150 volts and plate current of 100 μa	-11	volts
Grid Voltage (Approx.) for plate voltage of 200 volts and plate current of 1 ma	-12	volts

Mechanical:

Operating Position . . . Any, but for the utmost in service, tube should be Vertical with base up or down, or Horizontal with pins 6 and 9 in vertical plane

Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Maximum Diameter	7/8"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9CZ

Pin 1 - Plate of Unit No.2
Pin 2 - Cathode of Unit No.2
Pin 3 - Grid of Unit No.2
Pins 4 & 9 - Heater of Unit No.2
Pins 5 & 9 - Heater of Unit No.1



Pin 6 - Plate of Unit No.1
Pin 7 - Cathode of Unit No.1
Pin 8 - Grid of Unit No.1
Pin 9 - Heater Mid-Tap

[o] Without external shield.

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MEDIUM-MU TWIN TRIODE

COMPUTER SERVICE and "ON-OFF" CONTROL SERVICE

Unless Otherwise Specified, Values are for Each Unit

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	330	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE*	1000	max.	volts
DC GRID VOLTAGE:			
Negative bias value	80	max.	volts
Positive bias value	4	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE*	440	max.	volts
PEAK POSITIVE-PULSE GRID VOLTAGE*	14	max.	volts
DC GRID CURRENT	5.5	max.	ma
PEAK GRID CURRENT*	110	max.	ma
DC CATHODE CURRENT	45	max.	ma
PEAK CATHODE CURRENT*	350	max.	ma
PLATE DISSIPATION:			
Either plate	4	max.	watts
Both plates (Both units operating)	7	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	220	max.	volts
Heater positive with respect to cathode	220▲	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	120	max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:			
For fixed-bias operation	0.1	max.	megohm
For cathode-bias operation	0.5	max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Unless Otherwise Specified, Values are for Each Unit

	Note	Min.	Max.	
Heater Current	1	0.275	0.325	amp
Plate Current (1)	1,2	6	16	ma
Plate Current (2)	1,3	–	1	ma
Plate Current (3)	1,4	–	100	μa
Transconductance	1,2	3200	6000	μmhos
Amplification Factor	1,2	15	21	
Reverse Grid Current (Units in parallel)	1,5	–	2.5	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,6	–	15	μa
Heater positive with respect to cathode	1,6	–	15	μa

* Under the following conditions: rectangular pulse; pulse duration, 0.08 microsecond; pulse-repetition rate, 1 x 10⁶ pps; and duty factor, 0.08.

▲ The dc component must not exceed 110 volts.

Notes 1 to 6: See next page.

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MEDIUM-MU TWIN TRIODE

	Note	Min.	Max.	
Grid-Voltage Difference Between Units	1,7	-	2.5	volts
Leakage Resistance:				
Between grid and all other electrodes tied together	1,8	100	-	megohms
Between plate and all other electrodes tied together	1,9	100	-	megohms

Note 1: With 12.6 volts ac or dc on heater (series arrangement).

Note 2: With plate volts = 150 and grid volts = -5. Each unit tested separately. Unit not under test connected to ground.

Note 3: With plate volts = 200 and grid volts = -15. Each unit tested separately. Unit not under test connected to ground.

Note 4: With plate volts = 150 and grid volts = -15. Each unit tested separately. Unit not under test connected to ground.

Note 5: With plate volts = 180, grid volts = -5, and grid-circuit resistance (megohms) = 0.1.

Note 6: With 100 volts dc between heater and cathode.

Note 7: With plate volts = 200 and grid voltage adjusted for plate current of 1 milliampere.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together.

Note 9: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . 2000 min. cycles

Under the following conditions: heater volts = 7.5 cycled one minute on and four minutes off, heater 180 volts positive with respect to cathode, and all other elements connected to ground.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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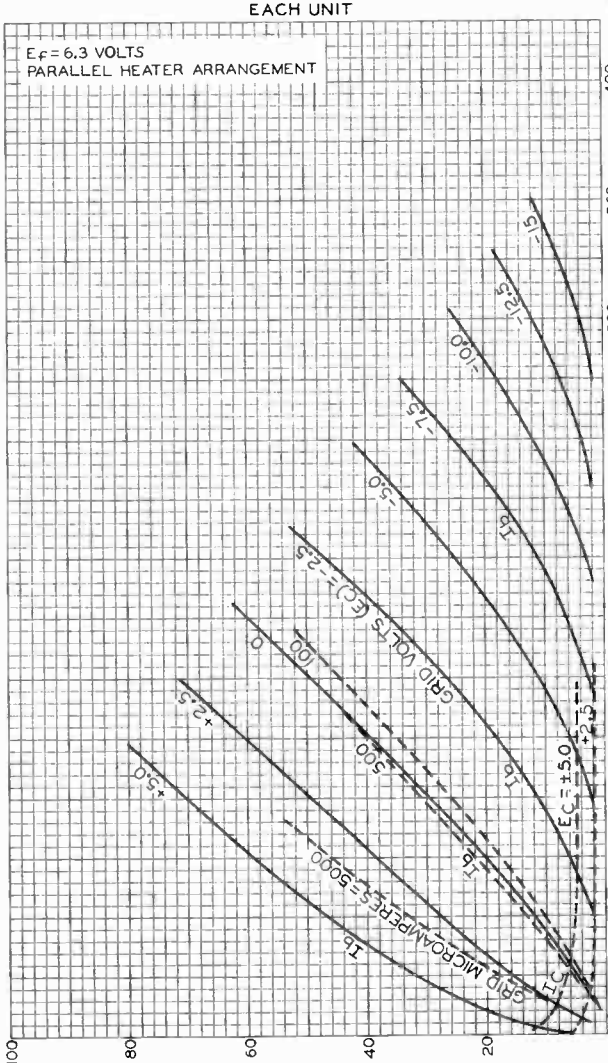
AVERAGE CHARACTERISTICS
EACH UNIT



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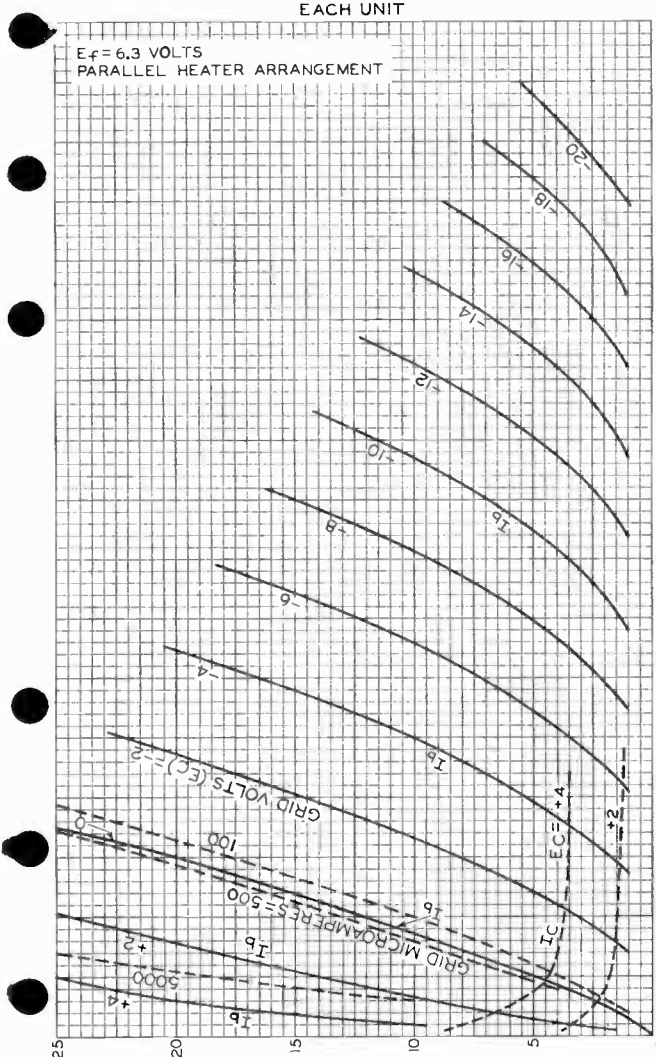
AVERAGE CHARACTERISTICS

EACH UNIT



ELECTRON TUBE DIVISION

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92CM-9272

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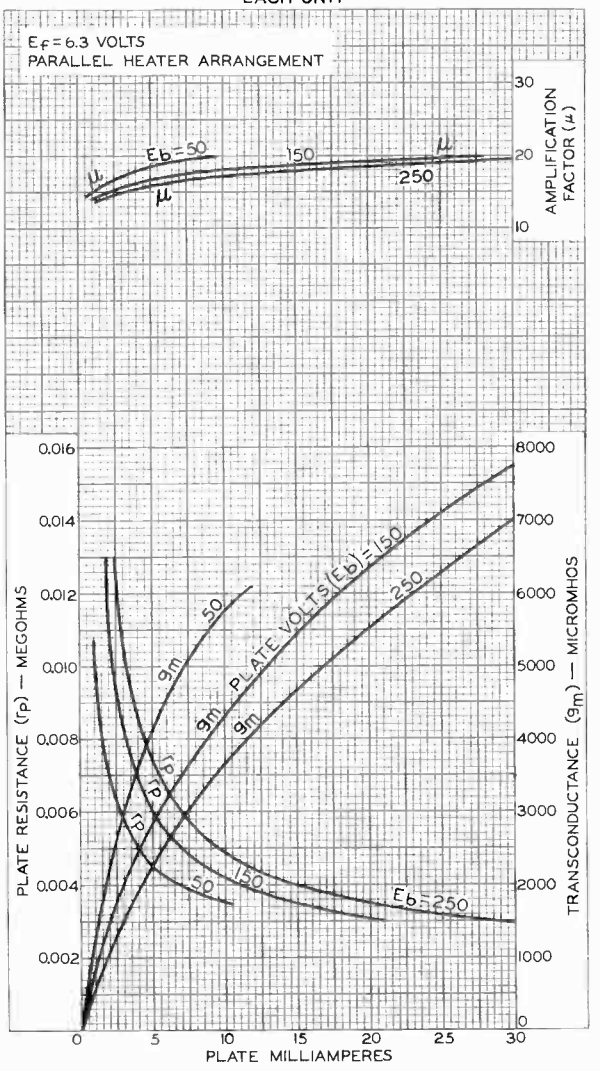
AVERAGE CHARACTERISTICS
EACH UNIT



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
92CM-9271

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Beam Power Tube

GENERAL DATA

Electrical:

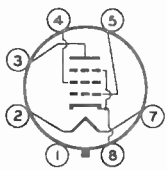
Heater Characteristics and Ratings *(Design-Center Values)*:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	1.600	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode	300[a] max.	volts
Heater positive with respect to cathode	200[b] max.	volts
Direct Interelectrode Capacitances (Approx.):[c]		
Grid No.1 to plate	0.85	μμf
Grid No.1 to cathode & grid No.3, grid No.2, base sleeve, and heater	14.0	μμf
Plate to cathode & grid No.3, grid No.2, base sleeve, and heater	12.0	μμf

Characteristics, Class A_1 Amplifier:

		Triode Connection[d]		
Plate Voltage	250	450	400	volts
Grid-No.2 Voltage	250	450	225	volts
Grid-No.1 Voltage	-14	-46	-16.5	volts
Amplification Factor	8	7.5	-	
Plate Resistance (Approx.)	12000	-	27000	ohms
Transconductance	11000	-	9000	μmhos
Plate Current	140	150	87	ma
Grid-No.2 Current	12	-	4	ma
Grid-No.1 Voltage (Approx.) for plate ma. = 1	-40	-	-35	volts

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	4-3/4"
Maximum Seated Length	4-3/16"
Maximum Diameter	2-1/16"
Bulb	S-16
Base	Large-Wafer Octal 8-Pin with Sleeve (JEDEC Group 1, No.B8-86)
Basing Designation for BOTTOM VIEW	7S



Pin 1 - Base Sleeve
Pin 2 - Heater
Pin 3 - Plate
Pin 4 - Grid No.2
Pin 5 - Grid No.1
Pin 6 - No Interna' Connection
Pin 7 - Heater
Pin 8 - Cathode, Grid No.3

World Radio History

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AF POWER AMPLIFIER — Class A_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	600 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	300 max.	volts
Positive-bias value	0 max.	volts
CATHODE CURRENT	175 max.	ma
GRID-No.2 INPUT	6 max.	watts
PLATE DISSIPATION	35 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Typical Operation and Characteristics:

Plate Voltage	250	400	volts
Grid-No.2 Voltage	250	225	volts
Grid-No.1 Voltage	−14	−16.5	volts
Peak AF Grid-No.1 Voltage	14	16.5	volts
Zero-Signal Plate Current	140	87	ma
Max.-Signal Plate Current	150	105	ma
Zero-Signal Grid-No.2 Current	12	4	ma
Max.-Signal Grid-No.2 Current	28	18	ma
Plate Resistance (Approx.)	12000	27000	ohms
Transconductance	11000	9000	μmhos
Load Resistance	1500	3000	ohms
Total Harmonic Distortion	7	13.5	%
Max.-Signal Power Output	12.5	20	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.05 max.	megohm
For cathode-bias operation	0.25 max.	megohm

PUSH-PULL AF POWER AMPLIFIER — Class A_1

Maximum Ratings, *Design-Center Values:*

Same as for AF POWER AMPLIFIER — Class A_1

Typical Operation and Characteristics:

Values are for 2 tubes

	Fixed Bias		*Cathode Bias*	
Plate Supply Voltage	400	600	400	volts
Grid-No.2 Supply Voltage	275	300	300	volts
Grid-No.1 Voltage	−23	−31	−	volts
Cathode Resistor	−	−	140	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage	46	62	53	volts
Zero-Signal Plate Current	180	115	166	ma
Max.-Signal Plate Current	270	273	190	ma
Zero-Signal Grid-No.2 Current	9	4	7.5	ma
Max.-Signal Grid-No.2 Current	44	41	39	ma
Effective Load Resistance (Plate to plate)	3500	5000	4500	ohms

World Radio History

Total Harmonic Distortion	3	2.5	4	%
Max.-Signal Power Output	55	100	41	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

For fixed-bias operation	0.05 max.	megohm
For cathode-bias operation	0.25 max.	megohm

PUSH-PULL AF POWER AMPLIFIER — Class AI

Triode Connection[d]

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	495 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	440 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	330 max.	volts
Positive-bias value	0 max.	volts
CATHODE CURRENT	192.5 max.	ma
GRID-No.2 INPUT	6.6 max.	watts
PLATE DISSIPATION	44 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	250 max.	°C

Typical Operation and Characteristics:

Values are for 2 tubes

Plate Voltage	450	volts
Grid No.1 Voltage	-46	volts
Peak AF Grid-No.1-to-Grid-No.1-Voltage	92	volts
Zero-Signal Plate Current	150	ma
Max.-Signal Plate Current	220	ma
Effective Load Resistance (Plate to plate)	4000	ohms
Total Harmonic Distortion	2.5	%
Max.-Signal Power Output	28	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

For fixed-bias operation	0.05 max.	megohm
For cathode-bias operation	0.25 max.	megohm

[a] The dc component must not exceed 300 volts.
[b] The dc component must not exceed 100 volts
[c] Without external shield.
[d] Grid No.2 connected to plate.

World Radio History

World Radio History

6660/6BA6

REMOTE-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:
Voltage. . . . . 6.3 ± 20%* . . . ac or dc volts
Current at 6.3 volts . . 0.3 . . . . . amp

Direct Interelectrode Capacitances:

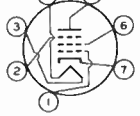
	Without External Shield	*With External Shield°*	
Grid No.1 to plate	0.0035 max.	0.0035 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater. . .	5.5	5.5	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	5	5.5	μμf

Characteristics, Class A_1 Amplifier:

Heater Voltage.	6.3	6.3	volts
Plate Supply Voltage.	100	250	volts
Grid No.3	*Connected to cathode at socket*		
Grid-No.2 Supply Voltage.	100	100	volts
Cathode Resistor.	68	68	ohms
Plate Resistance (Approx.).	0.25	1	megohm
Transconductance.	4300	4400	μmhos
Plate Current	10.8	11	ma
Grid-No.2 Current	4.4	4.2	ma
Grid-No.1 Voltage (Approx.) for transconductance = 40 μmhos	-20	-20	volts

Mechanical:

Operating Position. . . . . Any
Maximum Overall Length. . . . . 2-1/8"
Maximum Seated Length . . . . . 1-7/8"
Length, Base Seat to Bulb Top (Excluding tip) 1-1/2" ± 3/32"
Diameter. . . . . 0.650" to 0.750"
Dimensional Outline . . . . . *See General Section*
Bulb. T5-1/2
Base. . . . . Small-Button Miniature 7-Pin (JEDEC No. E7-1)
Basing Designation for BOTTOM VIEW. 7BK



Pin 1 - Grid No.1
Pin 2 - Grid No.3 Internal Shield
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Cathode

World Radio History

6660/6BA6

REMOTE-CUTOFF PENTODE

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID-No. 2 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts
GRID-No. 2 VOLTAGE	*See Grid-No. 2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No. 1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
GRID-No. 2 INPUT:		
For grid-No. 2 voltages up to 165 volts	0.65 max.	watt
For grid-No. 2 voltages between 165 and 330 volts	*See Grid-No. 2 Input Rating Chart at front of Receiving Tube Section*	
PLATE DISSIPATION	3.3 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

° With external shield JEDEC No. 316 connected to cathode.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Average Value	3500	μmhos

With heater volts = 5, plate supply volts = 250, grid No. 3 connected to cathode at socket, grid-No. 2 supply volts = 100, and cathode resistor (ohms) bypassed = 68.

World Radio History

6661/6BH6

SHARP-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:
Voltage. . . . . 6.3 ± 20%* . . . .ac or dc volts
Current at 6.3 volts . . 0.15 . . . . . amp

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield°*	
Grid No.1 to plate	0.0035 max.	0.0035 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater. . .	5.4	5.4	μμf
Plate to cathode, grid No.3 & internal shield, grid No. 2, and heater. . . .	4.4	4.4	μμf

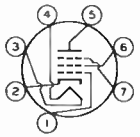
Characteristics, Class A_1 Amplifier:

Heater Voltage.	6.3	volts
Plate Supply Voltage.	250	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Supply Voltage.	150	volts
Cathode Resistor.	100	ohms
Plate Resistance (Approx.).	1.4	megohms
Transconductance.	4600	μmhos
Plate Current	7.4	ma
Grid-No.2 Current	2.6	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-7.7	volts

Mechanical:

Operating Position. . . . . Any
Maximum Overall Length. . . . . 2-1/8"
Maximum Seated Length . . . . . 1-7/8"
Length, Base Seat to Bulb Top (Excluding tip) 1-1/2" ± 3/32"
Diameter. . . . . 0.650" to 0.750"
Dimensional Outline . . . . . *See General Section*
Bulb. T5-1/2
Base. . . . . Small-Button Miniature 7-Pin (JEDEC No. E7-1)
Basing Designation for BOTTOM VIEW. 7CM

Pin 1 - Grid No.1
Pin 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate



Pin 6 - Grid No.2
Pin 7 - Grid No.3, Internal Shield

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

6661/6BH6

SHARP-CUTOFF PENTODE

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID-No. 2 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts
GRID-No. 2 VOLTAGE	*See Grid-No. 2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No. 1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
GRID-No. 2 INPUT:		
For grid-No. 2 voltages up to 165 volts	0.55 max.	watt
For grid-No. 2 voltages between 165 and 330 volts	*See Grid-No. 2 Input Rating Chart at front of Receiving Tube Section*	
PLATE DISSIPATION	3.3 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

° With external shield JEDEC No. 316 connected to cathode.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Average Value . . . . . 3600 μmhos

With heater volts = 5, plate supply volts = 250, grid No. 3 connected to cathode at socket, grid-No. 2 supply volts = 150, and cathode resistor (ohms) bypassed = 100.

World Radio History

6662/6BJ6

REMOTE-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:
Voltage. . . . . 6.3 ± 20%* . . . . ac or dc volts
Current at 6.3 volts . . 0.15 . . . . . amp

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield°*	
Grid No.1 to plate	0.0035 max.	0.0035 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater. . .	4.5	4.5	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	5.5	5.5	μμf

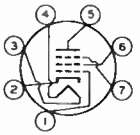
Characteristics, Class A_1 Amplifier:

Heater Voltage.	6.3	6.3	volts
Plate Supply Voltage.	100	250	volts
Grid No.3	*Connected to cathode at socket*		
Grid-No.2 Supply Voltage.	100	100	volts
Cathode Resistor.	80	80	ohms
Plate Resistance (Approx.).	0.25	1.3	megohms
Transconductance.	3650	3600	μmhos
Plate Current	9	9.2	ma
Grid-No.2 Current	3.5	3.3	ma
Grid-No.1 Voltage (Approx.) for transconductance = 10 μmhos	-20	-20	volts

Mechanical:

Operating Position. . . . . Any
Maximum Overall Length. . . . . 2-1/8"
Maximum Seated Length . . . . . 1-7/8'
Length, Base Seat to Bulb Top (Excluding tip) 1-1/2" ± 3/32"
Diameter. . . . . 0.650" to 0.750"
Dimensional Outline . . . . . *See General Section*
Bulb. T5-1/2
Base. . . . . Small-Button Miniature 7-Pin (JEDEC No. E7-1)
Basing Designation for BOTTOM VIEW. 7CM

Pin 1 - Grid No.1
Pin 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate



Pin 6 - Grid No.2
Pin 7 - Grid No.3 Internal Shield

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6662/6BJ6

REMOTE-CUTOFF PENTODE

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID-No. 2 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts
GRID-No. 2 VOLTAGE	*See Grid-No. 2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No. 1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
GRID-No. 2 INPUT:		
For grid-No. 2 voltages up to 165 volts	0.65 max.	watt
For grid-No. 2 voltages between 165 and 330 volts.	*See Grid-No. 2 Input Rating Chart at front of Receiving Tube Section*	
PLATE DISSIPATION	3.3 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

° With external shield JEDEC NO.316 connected to cathode.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Average Value . . . . . 2900 μmhos

With heater volts = 5, plate supply volts = 250, grid No.3 connected to cathode at socket, grid-No.2 supply volts = 100, and cathode resistor (ohms) bypassed = 80.

World Radio History

6663/6AL5
TWIN DIODE

7-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Voltage	6.3 ± 20%*	ac or dc volts
Current at 6.3 volts	0.3	amp

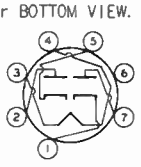
Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield°*	
Plate to cathode, internal shield, and heater (Each unit)	2.5	3.2	μμf
Cathode to plate, internal shield, and heater (Each unit)	3.4	3.6	μμf
Plate of unit No. 1 to plate of unit No. 2	0.068 max.	0.026 max.	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No. E7-1)
Basing Designation for BOTTOM VIEW	6BT

Pin 1 – Cathode of Unit No. 1
Pin 2 – Plate of Unit No. 2
Pin 3 – Heater
Pin 4 – Heater



Pin 5 – Cathode of Unit No. 2
Pin 6 – Internal Shield
Pin 7 – Plate of Unit No. 1

RECTIFIER

Values are for Each Unit

Maximum Ratings, ***Design-Maximum Values:***

PEAK INVERSE PLATE VOLTAGE	275 max.	volts
PEAK PLATE CURRENT	60 max.	ma
PEAK PLATE CURRENT (For pulse duration of 0.1 second maximum)	350 max.	ma
DC PLATE CURRENT	10 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	275 max.	volts
Heater positive with respect to cathode	100 max.	volts

World Radio History

6663/6AL5
TWIN DIODE

Characteristics:

Heater Voltage	6.3	volts
Plate Voltage	10	volts
Plate Current	60	ma

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

° With external shield JEDEC No.316 connected to pin 6.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6664/6AB4

High-Mu Triode

7-PIN MINIATURE TYPE

For Mobile-Communications Equipment

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Absolute-Maximum Values)*:

Voltage (AC or DC)	6.3[a]		volts
Current at heater volts = 6.3	0.150		amp
Peak heater-cathode voltage:			
Heater negative with respect to cathode	100	max.	volts
Heater positive with respect to cathode	100	max.	volts

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	*With External Shield*[b]	
Grid to plate	1.5	1.5	$\mu\mu f$
Grid to cathode and heater	2.2	2.2	$\mu\mu f$
Plate to cathode and heater	0.5	1.4	$\mu\mu f$
Cathode to plate	0.24	0.20[c]	$\mu\mu f$
Cathode to grid and heater	5.0	5.2[d]	$\mu\mu f$
Plate to grid and heater	1.7	2.6[d]	$\mu\mu f$
Heater to cathode	2.9	2.9[c]	$\mu\mu f$

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	100	250	volts
Cathode Resistor	270	200	ohms
Amplification Factor	60	60	
Plate Resistance (Approx.)	15000	10900	ohms
Transconductance	4000	5500	μmhos
Plate Current	3.7	10	ma
Grid Voltage (Approx.) for plate μa = 10	-5	-12	volts

Mechanical:

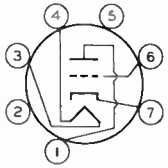
Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)

World Radio History

6664/6AB4

Basing Designation for BOTTOM VIEW. 5CE

Pin 1 – Plate
Pin 2 – No Internal Connection
Pin 3 – Heater
Pin 4 – Heater



Pin 5 – No Internal Connection
Pin 6 – Grid
Pin 7 – Cathode

AMPLIFIER — Class A_1

Maximum Ratings, *Absolute-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
PLATE DISSIPATION	2.9 max.	watts

[a] When operated from storage-battery systems, the heater may be subjected to voltage variations as great as ± 20 per cent. Although such extremes in heater voltage may be tolerated for short periods, increased equipment reliability can be achieved with improved supply-voltage regulation.

[b] With external shield JEDEC No.316 connected to cathode except as noted.

[c] With external shield JEDEC NO.316 connected to ground.

[d] With external shield JEDEC No.316 connected to grid.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling:

Cycles of Intermittent Operation . . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Average Value. . . . . 3200 μmhos

With heater volts = 5.0, plate supply volts = 250, and cathode resistor (ohms) bypassed = 200.

World Radio History

6669/6AQ5-A
BEAM POWER TUBE

7-PIN MINIATURE TYPE

For use in mobile communications equipment

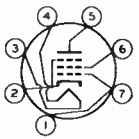
GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 20%*	ac or dc volts
Current at 6.3 volts	0.45	amp
Direct Interelectrode Capacitances (Approx.):[o]		
Grid No.1 to plate	0.4	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	8	μμf
Plate to cathode & grid No.3, grid No.2, and heater	8.5	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7BZ



Pin 1 - Grid No.1
Pin 2 - Cathode, Grid No.3
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Grid No.1

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	250 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	250 max.	volts
GRID-No.2 INPUT	2 max.	watts
PLATE DISSIPATION	12 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	225 max.	°C

Typical Operation and Characteristics:

Heater Voltage	6.3	volts
Plate Voltage	250	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 (Control-grid) Voltage	-12.5	volts
Peak AF Grid-No.1 Voltage	12.5	volts

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6669/6AQ5-A

BEAM POWER TUBE

Zero-Signal Plate Current	45	ma
Max.-Signal Plate Current	47	ma
Zero-Signal Grid-No.2 Current	4.5	ma
Max.-Signal Grid-No.2 Current	7	ma
Plate Resistance (Approx.)	52000	ohms
Transconductance	4100	μmhos
Load Resistance	5000	ohms
Total Harmonic Distortion	8	%
Max.-Signal Power Output	4.5	watts

Maximum Circuit Values:

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

AMPLIFIER — Class AB$_1$

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	250 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	250 max.	volts
GRID-No.2 INPUT	2 max.	watts
PLATE DISSIPATION	12 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	225 max.	°C

Typical Push-Pull Operation:

Unless otherwise specified, values are for 2 tubes

Heater Voltage	6.3	volts
Plate Voltage	250	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 (Control-grid) Voltage	-15	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	30	volts
Zero-Signal Plate Current	70	ma
Max.-Signal Plate Current	79	ma
Zero-Signal Grid-No.2 Current	5	ma
Max.-Signal Grid-No.2 Current	13	ma
Effective Load Resistance (Plate to plate)	10000	ohms
Total Harmonic Distortion	5	%
Max.-Signal Power Output	10	watts

Maximum Circuit Values:

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

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

World Radio History

6669/6AQ5-A

BEAM POWER TUBE

[o] Without external shield.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Power Output at Reduced Heater Voltage:

Average Value. . . . . 4.1 watts

With heater volts = 5, plate volts = 250, grid-No.2 volts = 250, grid-No.1 volts = -12.5, rms signal volts = 8.8, and load resistance (ohms) = 5000.

World Radio History

World Radio History

6676/6CB6A

Sharp-Cutoff Pentode

7-PIN MINIATURE TYPE

For Mobile-Communications Equipment

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Absolute-Maximum Values)*:			
Voltage (AC or DC)	6.3[a]		volts
Current at heater volts = 6.3	0.300		amp
Peak heater-cathode voltage:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[b]	max.	volts

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield*[c]	
Grid No.1 to plate	0.025 max.	0.015 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	6.5	6.5	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	2.0	3.0	μμf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	125	125	volts
Grid No.3	*Connected to cathode at socket*		
Grid No.2 Supply Voltage	125	125	volts
Grid-No.1 Voltage	-3		volts
Cathode Resistor	-	56	ohms
Plate Resistance (Approx.)	-	0.28	megohm
Transconductance	-	8000	μmhos
Plate Current	2.8	13	ma
Grid-No.2 Current		3.7	ma
Grid No.1 Voltage (Approx.) for plate μa = 20		-6.5	volts

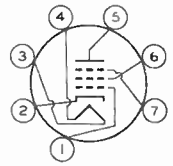
Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)

World Radio History

6676/6CB6A

Basing Designation for BOTTOM VIEW. 7CM



Pin 1 - Grid No.1
Pin 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate

Pin 6 Grid No.2
Pin 7 Grid No.3
Internal
Shield

AMPLIFIER — Class A_1

Maximum Ratings, *Absolute-Maximum Values:*

PLATE VOLTAGE . . . . . 330 max. volts
GRID No.3 (SUPPRESSOR GRID) . . . *Connect to cathode at socket*
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE . . . 330 max. volts
GRID No.2 VOLTAGE . . . . . *See Grid No.2 Input Rating Chart* at front of Receiving Tube Section
GRID-No.1 (CONTROL-GRID) VOLTAGE:
Positive-bias value . . . . . 0 max. volts
GRID-No.2 INPUT:
For grid-No.2 voltages up to 165 volts . . . . . 0.55 max. watt
For grid-No.2 voltages between 165 and 330 volts . *See Grid-No.2 Input Rating Chart* at front of Receiving Tube Section
PLATE DISSIPATION . . . . . 2.3 max. watts

[a] When operated from storage-battery systems, the heater may be subjected to voltage variations as great as ± 20 per cent. Although such extremes in heater voltage may be tolerated for short periods, increased equipment reliability can be achieved with improved supply-voltage regulation.

[b] The dc component must not exceed 100 volts.

[c] With external shield JEDEC No.316 connected to cathode.

SPECIAL RATINGS & PERFORMANCE DATA

Heater Cycling:

Cycles of Intermittent Operation. . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Average Value . . . . . 7100 μmhos

With heater volts = 5.0, plate supply volts = 125, grid-No.3 connected to cathode at socket, grid-No.2 supply volts = 125, and cathode resistor (ohms) bypassed = 56.

World Radio History

6677/6CL6
POWER PENTODE

9-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

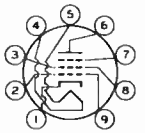
Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 20%*	ac or dc volts
Current at 6.3 volts	0.65	amp
Direct Interelectrode Capacitances:◇		
Grid No.1 to plate	0.12 max.	μμf
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	11	μμf
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	5.5	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9BV

Pin 1 - Cathode
Pin 2 - Grid No.1
Pin 3 - Grid No.2
Pin 4 - Heater
Pin 5 - Heater
Pin 6 - Plate



Pin 7 - Grid No.3, Internal Shield
Pin 8 - Grid No.2
Pin 9 - Grid No.1

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE	0 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts
GRID-No.2 VOLTAGE	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	50 max.	volts
Positive-bias value	0 max.	volts
GRID-No.2 INPUT:		
For grid-No.2 voltages up to 165 volts	2 max.	watts
For grid-No.2 voltages between 165 and 330 volts	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	

6677/6CL6

POWER PENTODE

PLATE DISSIPATION	8.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	210 max.	°C

Typical Operation and Characteristics:

Heater Voltage	6.3	volts
Plate Voltage	250	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Voltage	150	volts
Grid-No.1 Voltage	-3	volts
Peak AF Grid-No.1 Voltage	3	volts
Zero-Signal Plate Current	30	ma
Max.-Signal Plate Current	31	ma
Zero-Signal Grid-No.2 Current	7	ma
Max.-Signal Grid-No.2 Current	7.2	ma
Plate Resistance (Approx.)	0.15	megohm
Transconductance	11000	μmhos
Load Resistance	7500	ohms
Total Harmonic Distortion	8	%
Max.-Signal Power Output	2.8	watts

Maximum Circuit Values:

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

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

° Without external shield.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Average Value	8800	μmhos

With heater volts = 5, plate volts = 250, grid No.3 connected to cathode at socket, grid-No.2 volts = 150, and grid-No.1 volts = -3.

World Radio History

6678/6U8-A
MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE

9-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Voltage	6.3 ± 20%*	ac or dc volts
Current at 6.3 volts	0.45	amp

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield°*	
Triode Unit:			
Grid to plate	1.8	1.8	μμf
Grid to cathode and heater	2.5	2.5	μμf
Plate to cathode and heater	0.4	1	μμf
Pentode Unit:			
Grid No.1 to plate	0.01 max.	0.006 max.	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater	5	5	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater	2.6	3.5	μμf
Heater to cathode (Each unit)	3	3•	μμf

Characteristics, Class A_1 Amplifier:

With heater voltage of 6.3 volts

	Triode Unit	*Pentode Unit*	
Plate Supply Voltage	150	250	volts
Grid-No.2 (Screen-grid) Supply Voltage	–	110	volts
Cathode Resistor	56	68	ohms
Amplification Factor	40	–	
Plate Resistance (Approx.)	5000	400000	ohms
Transconductance	8500	5200	μmhos
Plate Current	18	10	ma
Grid-No.2 Current	–	3.5	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	−12	−10	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"

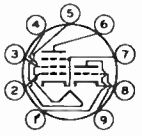
World Radio History

6678/6U8-A

MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE

Dimensional Outline. . . . . *See General Section*
Bulb T6-1/2
Base . . . . . Small-Button Noval 9-Pin (JEDEC No. E9-1)
Basing Designation for BOTTOM VIEW 9AE

Pin 1 – Triode Plate
Pin 2 – Pentode Grid No. 1
Pin 3 – Pentode Grid No. 2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Pentode Plate



Pin 7 – Pentode Cathode, Pentode Grid No. 3, Internal Shield
Pin 8 – Triode Cathode
Pin 9 – Triode Grid

CONVERTER SERVICE

Maximum Ratings, *Design-Maximum Values:*

	Triode Unit as Osc.	*Pentode Unit as Mixer*	
PLATE VOLTAGE.	330 max.	330 max.	volts
GRID-No. 2 (SCREEN-GRID) SUPPLY VOLTAGE	–	330 max.	volts
GRID-No. 2 VOLTAGE.	–	*See Grid-No. 2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No. 1 (CONTROL-GRID) VOLTAGE: Positive-bias value. . . .	0 max.	0 max.	volts
GRID-No. 2 INPUT: For grid-No. 2 voltages up to 165 volts	–	0.55 max.	watt
For grid-No. 2 voltages between 165 and 330 volts.	–	*See Grid-No. 2 Input Rating Chart at front of Receiving Tube Section*	
PLATE DISSIPATION.	3 max.	3 max.	watts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode . . .	200 max.	200 max.	volts
Heater positive with respect to cathode . . .	200▲ max.	200▲ max.	volts

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

° With external shield JEDEC No. 316 connected to cathode of unit under test except as noted.

● With external shield JEDEC No. 315 connected to ground.

▲ The dc component must not exceed 100 volts.

World Radio History

6678/6U8-A

MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Triode Unit:

Average value. . . . . 6800 μmhos

With heater volts = 5, plate supply volts = 150, and cathode resistor (ohms) bypassed = 56.

Pentode Unit:

Average value. . . . . 4100 μmhos

With heater volts = 5, plate supply volts = 250, grid-No. 2 supply volts = 110, and cathode resistor (ohms) bypassed = 68.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

World Radio History

6679/12AT7

HIGH-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:			
Heater arrangement	*Series*	*Parallel*	
Voltage	12.6 ± 20%*	6.3 ± 20%*	ac or dc volts
Current:			
At 12.6 volts	0.15	-	amp
At 6.3 volts	-	0.3	amp

Direct Interelectrode Capacitances (Approx.):	*Without External Shield*	*With External Shield°*	
Grid-Drive Operation:			
Grid to plate (Each unit)	1.5	1.5	μμf
Grid to cathode and heater (Each unit)	2.2	2.2	μμf
Plate to cathode and heater:			
Unit No.1	0.5	1.2	μμf
Unit No.2	0.4	1.5	μμf
Cathode-Drive Operation:			
Plate to cathode (Each unit)	0.2	0.2	μμf
Cathode to grid and heater (Each unit)	4.6	4.6	μμf
Plate to grid and heater (Each unit)	1.8	2.6	μμf
Heater to cathode (Each unit)	2.4	2.4•	μμf

Characteristics, Class A1 Amplifier (Each Unit):		
Heater Voltage:		
For series connection	12.6	volts
For parallel connection	6.3	volts
Plate Supply Voltage	250	volts
Cathode Resistor	200	ohms
Amplification Factor	60	
Plate Resistance (Approx.)	10900	ohms
Transconductance	5500	μmhos
Plate Current	10	ma
Grid Voltage (Approx.) for plate μa = 10	-12	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

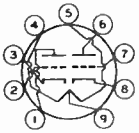
World Radio History

6679/12AT7

HIGH-MU TWIN TRIODE

Basing Designation for BOTTOM VIEW 9A

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pins 4 & 9 – Heater of Unit No.2
Pins 5 & 9 – Heater of Unit No.1



Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Heater Mid-Tap

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE.	330 max.	volts
GRID VOLTAGE:		
Negative-bias value.	55 max.	volts
Positive-bias value.	0 max.	volts
PLATE DISSIPATION.	2.8 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

○ With external shield JEDEC No.315 connected to heater except as noted.

● With external shield JEDEC No.315 connected to ground.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 15 (Series connection) cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Average Value (Each unit). . . . . 4400 μmhos

With heater volts = 10 (Series connection), plate supply volts = 250, and cathode resistor (ohms) bypassed = 200

World Radio History

6680/12AU7-A

MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

	Series	*Parallel*	
Heater arrangement			
Voltage	12.6 ± 20%*	6.3 ± 20%*	ac or dc volts
Current:			
At 12.6 volts	0.15	-	amp
At 6.3 volts	-	0.3	amp

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	*With External Shield°*	
Grid to plate (Each unit)	1.5	1.5	μμf
Grid to cathode and heater (Each unit)	1.6	1.8	μμf
Plate to cathode and heater:			
Unit No.1	0.4	2	μμf
Unit No.2	0.32	2	μμf

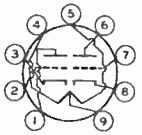
Characteristics, Class A_1 Amplifier (Each Unit):

Heater Voltage:			
For series connection	12.6	12.6	volts
For parallel connection	6.3	6.3	volts
Plate Voltage	100	250	volts
Grid Voltage	0	-8.5	volts
Amplification Factor	20	17	
Plate Resistance (Approx.)	6500	7700	ohms
Transconductance	3100	2200	μmhos
Plate Current	11.8	10.5	ma
Grid Voltage (Approx.) for plate μa = 10.	-	-24	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9A

Pin 1 - Plate of Unit No.2
Pin 2 - Grid of Unit No.2
Pin 3 - Cathode of Unit No.2
Pins 4 & 9 - Heater of Unit No.2
Pins 5 & 9 - Heater of Unit No.1



Pin 6 - Plate of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Cathode of Unit No.1
Pin 9 - Heater Mid-Tap

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6680/12AU7-A

MEDIUM-MU TWIN TRIODE

AMPLIFIER — Class A$_1$

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330	max.	volts
GRID VOLTAGE:			
Positive-bias value	0	max.	volts
PLATE DISSIPATION	3	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200▲	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:			
For fixed-bias operation	0.25	max.	megohm
For cathode-bias operation	1	max.	megohm

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

○ With external shield JEDEC NO. 315 connected to catnode of unit under test.

▲ The dc component must not exceed 100 volts.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 15 (Series connection) cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Average Value (Each unit) . . . . . 1750 μmhos

With heater volts = 10 (Series connection), plate volts = 250, and grid volts = -8.5.

World Radio History

6681/12AX7
HIGH-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

	Series	*Parallel*	
Heater arrangement			
Voltage	12.6 ± 20%*	6.3 ± 20%*	ac or dc volts
Current:			
At 12.6 volts	0.15	-	amp
At 6.3 volts	-	0.3	amp

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	*With External Shield°*	
Grid to plate (Each unit)	1.7	1.7	μμf
Grid to cathode and heater (Each unit)	1.6	1.8	μμf
Plate to cathode and heater:			
Unit No.1	0.46	1.9	μμf
Unit No.2	0.34	1.9	μμf

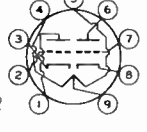
Characteristics, Class A1 Amplifier (Each Unit):

Heater Voltage:			
For series connection	12.6	12.6	volts
For parallel connection	6.3	6.3	volts
Plate Voltage	100	250	volts
Grid Voltage	-1	-2	volts
Amplification Factor	100	100	
Plate Resistance (Approx.)	0.08	0.0625	megohm
Transconductance	1250	1600	μmhos
Plate Current	0.5	1.2	ma

Mechanical:

Operating Position . . . . . Any
Maximum Overall Length . . . . . 2-3/16"
Maximum Seated Length . . . . . 1-15/16"
Length, Base Seat to Bulb Top (Excluding tip) . 1-9/16" ± 3/32"
Diameter . . . . . 0.750" to 0.875"
Dimensional Outline . . . . . *See General Section*
Bulb T6-1/2
Base . . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW 9A

Pin 1 - Plate of Unit No.2
Pin 2 - Grid of Unit No.2
Pin 3 - Cathode of unit No.2
Pins 4 & 9 - Heater of Unit No.2
Pins 5 & 9 - Heater of Unit No.1



Pin 6 - Plate of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Cathode of Unit No.1
Pin 9 - Heater Mid-Tap

World Radio History

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HIGH-MU TWIN TRIODE

AMPLIFIER — Class A1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330	max.	volts
GRID VOLTAGE:			
Negative-bias value	55	max.	volts
Positive-bias value	0	max.	volts
PLATE DISSIPATION	1.1	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200▲	max.	volts

* When the heater is operated from storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. Although such variation in heater voltage is permissible for short periods, reliability can be increased with improved supply-voltage regulation.

○ With external shield JEDEC No. 315 connected to cathode of unit under test.

▲ The dc component must not exceed 100 volts.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 15 (Series connection) cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

World Radio History

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MEDIUM-MU TRIODE

SUBMINIATURE TYPE

For "on-off" control applications involving long periods of operation under cutoff conditions with full ratings at altitudes up to 80,000 feet

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	6.3	ac or dc volts
Current	0.15	amp

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	*With External Shield°*	
Grid to plate	1.4	1.3	μμf
Gric to cathode and heater	2.2	2.4	μμf
Plate to cathode and heater	0.7	2.4	μμf

Characteristics, Class A_1 Amplifier:

Plate-Supply Voltage	100	volts
Cathode Resistor	150	ohms
Transconductance	6000	μmhos
Amplification Factor	29	
Plate Resistance (Approx.)	4800	ohms
Plate Current	10	ma
Plate Current for plate-supply volts = 125, grid-supply volts = +3, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000	15.5	ma
Maximum Grid-Supply Voltage for plate μa = 100 with plate-supply volts = 140, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000	-8.5	volts

Mechanical:

Operating Position	Any
Maximum Length (Excluding flexible leads)	1-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	1.075" ± 0.060"
Diameter	0.366" to 0.400"
Dimensional Outline	*See General Section*
Bulb	T3
Leads, Flexible, Tinned	8
Minimum length	1.5"
Orientation and diameter	*See Dimensional Outline*
Maximum untinned distance from base seat	0.050"
Base	JETEC No. E8-10

°: See next page.

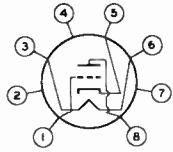
World Radio History

RCA

6814

MEDIUM-MU TRIODE

BOTTOM VIEW



Lead 1 – Grid
Lead 2 – No Connection
Lead 3 – Heater
Lead 4 – No Connection
Lead 5 – Cathode
Lead 6 – Heater
Lead 7 – No Connection
Lead 8 – Plate

COMPUTER SERVICE and "ON-OFF" CONTROL SERVICE

Maximum Ratings, *Absolute Values:*

For operation at altitudes up to 80,000 feet

DC PLATE VOLTAGE	275	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE*	600	max.	volts
DC GRID VOLTAGE:			
Negative bias value	55	max.	volts
Positive bias value	5.5	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE*	220	max.	volts
PEAK POSITIVE-PULSE GRID VOLTAGE*	27.5	max.	volts
DC GRID CURRENT	5.5	max.	ma
PEAK GRID CURRENT*	110	max.	ma
DC CATHODE CURRENT	22	max.	ma
PEAK CATHODE CURRENT*	440	max.	ma
PLATE DISSIPATION	2.2	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	200	max.	volts
Heater positive with respect to cathode.	200†	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	165	max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance	1	max.	megohm

° With external shield having inside diameter of 0.405" connected to cathode.

* Under the following conditions: rectangular pulse; pulse-repetition rate, 1000 pps; pulse width, 10 microseconds; and duty factor, 1 per cent.

† The dc component must not exceed 100 volts. For reliable operation, it is recommended that this value be kept as low as possible.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	138	162	ma
Heater Current at 500 hours	1	136	166	ma
Direct Interelectrode Capacitances:				
Grid to plate	2	1.1	1.8	μμf
Grid to cathode and heater	2	1.6	2.8	μμf
Plate to cathode and heater	2	0.5	0.9	μμf

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MEDIUM-MU TRIODE

	Note	Min.	Max.	
Plate Current (1)	1,3	7.5	12.5	ma
Plate Current (2)	4	13	–	ma
Plate Current (3)	1,5	14	–	ma
Plate Current (3):				
At 500 hours	1,5	13	–	ma
At 1000 hours	1,5	13	–	ma
Transconductance	1,3	5000	7000	μmhos
Amplification Factor	1,3	25	33	
Reverse Grid Current	1,6	–	-0.4	μa
Reverse Grid Current:				
At 500 hours	1,6	–	-0.6	μa
At 1000 hours	1,6	–	-0.6	μa
Grid Emission Current	7	–	-0.5	μa
Grid-Supply Voltage for plate μa = 100	1,8	–	-8.5	volts
Grid-Supply Voltage for plate μa = 100 at 500 and 1000 hours	1,8	–	-8.5	volts
Heater-Cathode Leakage Current:				
Heater 100 volts negative with respect to cathode	1	–	5	μa
Heater 100 volts positive with respect to cathode	1	–	5	μa
Heater-Cathode Leakage Current at 500 hours:				
Heater 100 volts negative with respect to cathode	1	–	10	μa
Heater 100 volts positive with respect to cathode	1	–	10	μa
Leakage Resistance:				
Between grid and all other electrodes tied together	1,9	50	–	megohms
Between plate and all other electrodes tied together	1,10	50	–	megohms
Leakage Resistance at 500 and 1000 hours:				
Between grid and all other electrodes tied together	1,9	25	–	megohms
Between plate and all other electrodes tied together	1,10	25	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Without external shield.

Note 3: With plate volts = 100, grid volts = 0, and cathode resistor (ohms) = 150.

Note 4: With heater volts = 5.7 ac or dc, plate-supply volts = 125, grid-supply volts = +3, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000.

Note 5: With plate-supply volts = 125, grid-supply volts = +3, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000.

Note 6: With plate-supply volts = 150, cathode resistor (ohms) = 220, and grid resistor (megohms) = 1.

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RCA

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MEDIUM-MU TRIODE

Note 7: With heater volts = 7.5 ac or dc, plate volts = 100, grid volts = -8.5, and grid resistor (megohms) = 1. Prior to this test, tubes are operated for a minimum of 5 minutes under the following conditions: heater volts = 7.5, plate-supply volts = 150, cathode resistor (ohms) = 220, and grid resistor (megohms) = 1.

Note 8: With plate-supply volts = 180, plate load resistor (ohms) = 2700, and grid resistor (ohms) = 60,000.

Note 9: With grid volts = -100.

Note 10: With plate volts = -300.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 450 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are subjected in four different positions to an impact acceleration of 450 g. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, plate current (3), and plate-current cutoff.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected to 2.5 g vibrational acceleration at a fixed frequency between 25 and 60 cps for 32 hours in each of three positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, plate current (3), and plate-current cutoff.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 50 max. mv

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 6.3, plate-supply volts = 100, cathode resistor (ohms) = 150, cathode-bypass capacitor (μf) = 1000, plate load resistor (ohms) = 10,000 and vibrational acceleration of 15 g at 40 cps.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7 cycled one minute on and four minutes off, heater 140 volts rms with respect to cathode, and all other elements connected to ground. At the end of this test, tubes will not show heater-cathode shorts, or open circuits.

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MEDIUM-MU TRIODE

Shorts and Continuity Test:

This test, in addition to a 100 per cent factory test, is performed on a sample lot of tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, a high-resistance intermittent short of less than 10 megohms for a duration of at least one millisecond, or a value of reverse grid current in excess of 1 microampere under the conditions specified in the CHARACTERISTICS RANGE VALUES for reverse grid current.

Cathode-Interface-Resistance Life Test:

A sample lot of tubes from each production run is life tested at an accelerated voltage of 7 volts and with zero cathode current. At the end of 500 hours, tubes will not show a cathode-interface resistance in excess of 50 ohms when measured in accordance with Method B, the Frost Method, of ASTM Standard F 300-55T at heater volts = 6, plate volts = 100, plate current adjusted to 1 milliampere, and with 50-kc, square-wave signal volts = 0.2.

100-Hour Survival Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Conditions of life testing are specified under 500-Hour Intermittent Life Performance, except test is run at room temperature. At the end of 100 hours, a tube will not show permanent or temporary shorts or open circuits and will meet the established limit for plate current (3) under the conditions specified in CHARACTERISTICS RANGE VALUES.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: heater volts = 6.3, plate-supply volts = 150, heater-cathode volts = 200 (heater positive with respect to cathode), cathode resistor (ohms) = 220, grid resistor (megohms) = 1 and bulb temperature (^{o}C) = 165. At the end of 500 hours, tube will not show permanent shorts or open circuits and will meet established 500-hour limits for heater current, plate current (3), plate-current cutoff, reverse grid current, heater-cathode leakage current, and leakage resistance as shown under CHARACTERISTICS RANGE VALUES.

1000-Hour Intermittent Life Performance:

This test is made on a sample lot of tubes from each production run to further insure high quality of the individual tube and to guard against epidemic failures of any

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MEDIUM-MU TRIODE

of the characteristics indicated below. Test conditions are the same as those specified under 500-Hour Average Life Performance. At the end of 1000 hours, tubes will not show permanent or temporary shorts or open circuits and will meet the established 1000-hour limits for plate current (3), plate-current cutoff, reverse grid current, and leakage resistance as shown under CHARACTERISTICS RANGE VALUES.

OPERATING CONSIDERATIONS

The *heater supply* should be well regulated because life and reliability of the 6814 are adversely affected by departures from the 6.3-volt value. The extent to which life is affected is a function of the amount of these departures and their durations.

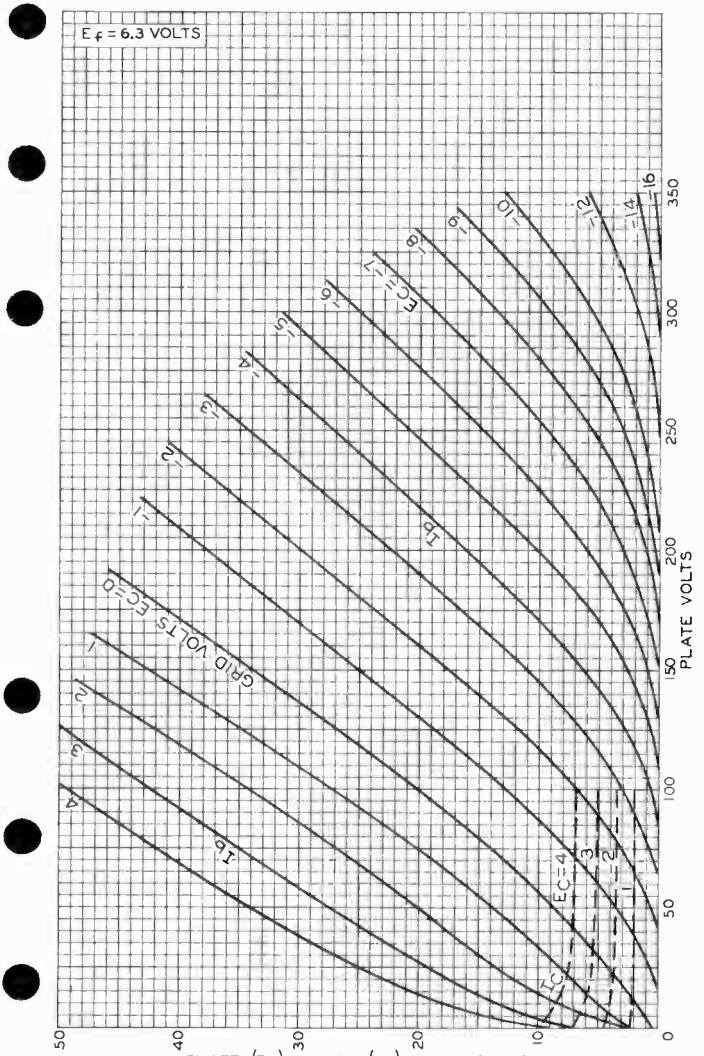
The *flexible leads* of the 6814 are usually soldered to the circuit elements. Soldering of the connections should be made as far as possible from the glass button. If this precaution is not followed, the heat of the soldering operation will crack the glass seals of the leads and damage the tube.

World Radio History

RCA

6814

AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION

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92CM-9508

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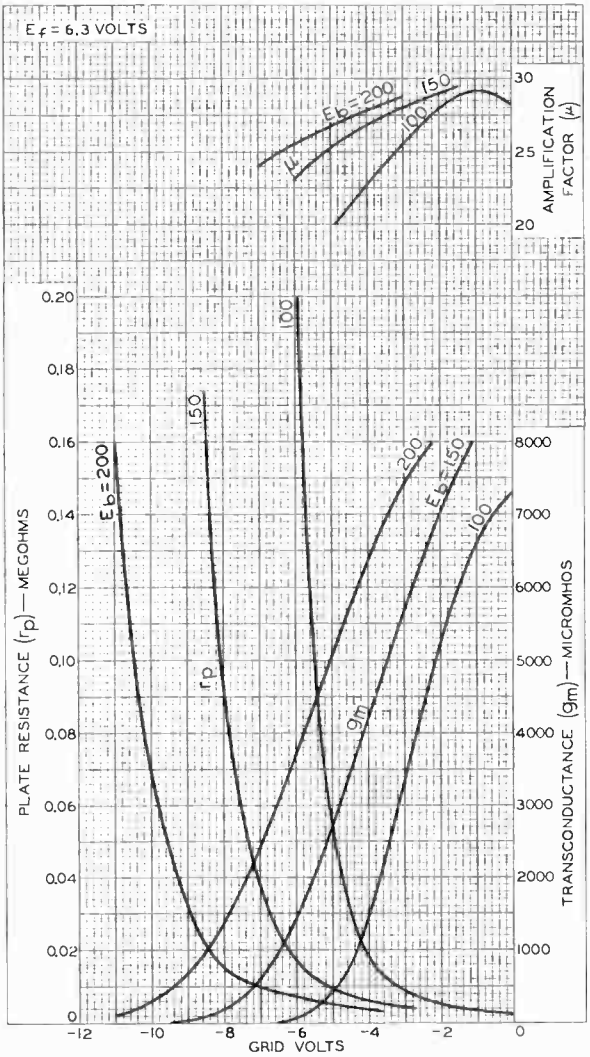
RCA

6814

AVERAGE CHARACTERISTICS



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RCA

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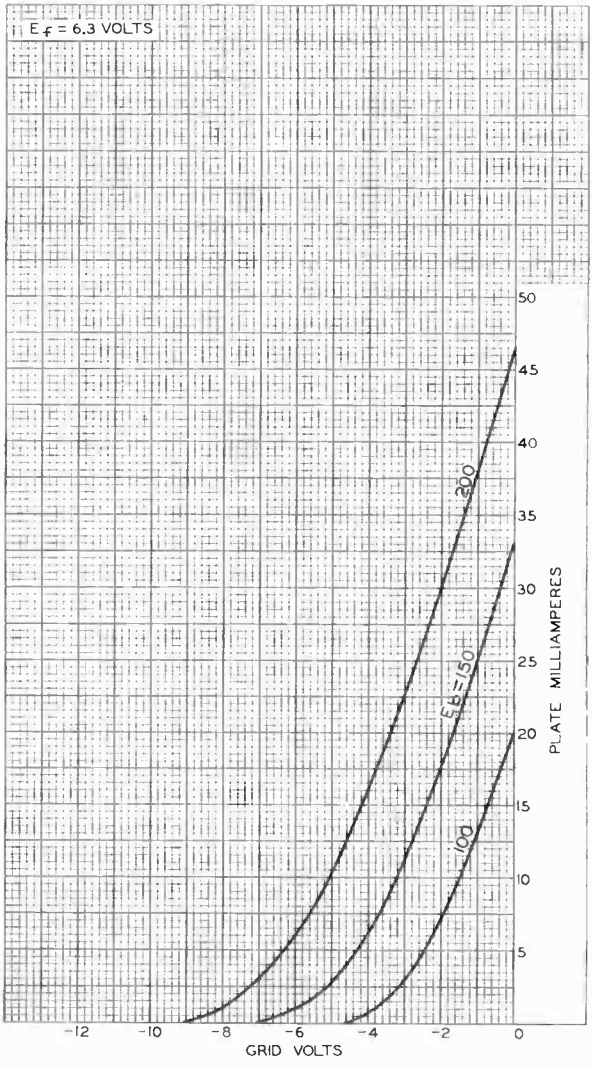
AVERAGE CHARACTERISTICS



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92CM-9507

World Radio History

RCA

6887

TWIN DIODE

7-PIN MINIATURE TYPE

For switching applications in electronic computers

GENERAL DATA

Electrical:

Heater, Pure Tungsten, for Unipotential Cathodes:

Voltage	6.3	ac or dc volts
Current	0.2	amp

Direct Interelectrode Capacitances (Each unit, approx.):[o]

Plate to cathode	1.4	μμf
Plate to cathode, internal shield, and heater	2.2	μμf
Cathode to plate, internal shield, and heater	3.5	μμf
Heater to cathode	2.1	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	1-5/8"
Maximum Seated Length	1-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	1" ± 3/32"
Maximum Diameter	3/4"
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)
Basing Designation for BOTTOM VIEW	6BT

Pin 1 – Cathode of Unit No.1
Pin 2 – Plate of Unit No.2
Pin 3 – Heater
Pin 4 – Heater

Pin 5 – Cathode of Unit No.2
Pin 6 – Internal Shield
Pin 7 – Plate of Unit No.1

SWITCHING SERVICE

Values are for Each Unit

Maximum Ratings, *Absolute Values:*

PEAK INVERSE PLATE VOLTAGE	360 max.	volts
PEAK PLATE CURRENT■	30 max.	ma
DC PLATE CURRENT	10 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	150 max.	volts
Heater positive with respect to cathode	150 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	120 max.	°C

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	180	220	ma

Note 1: With 6.3 volts ac or dc on heater.

o without external shield.

■: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON NEW JERSEY

TENTATIVE DATA

World Radio History

RCA

6887

TWIN DIODE

	Note	Min.	Max.	
Direct Interelectrode Capacitance (Each unit):				
Plate to cathode.	2	–	2	μμf
Plate Current (Each unit)	1,3	3	9	ma
Heater–Cathode Leakage Current (Each unit):				
Heater negative with respect to cathode.	1,4	–	20	μa
Heater positive with respect to cathode.	1,4	–	20	μa
Leakage Resistance between plate and all other electrodes tied together (Each unit)	1,5	100	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Without external shield and with electrodes of unit not under test connected to ground.

Note 3: With dc plate volts = 1.2. Electrodes of unit not under test connected to ground.

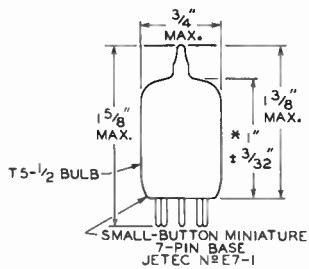
Note 4: With 150 volts dc between heater and cathode.

Note 5: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

Cycles of Intermittent Operation. . . . 2000 min. cycles
Under the following conditions: heater volts = 7.5 cycled one minute on and four minutes off, heater 180 positive with respect to cathode, and plate volts = 0.



■ Under the following conditions: rectangular pulse; pulse duration, 10 microseconds; pulse-repetition rate, 1000 pps; duty factor, 0.01 ± 0.1 per cent; rise time, less than 1 microsecond; fall time, less than 2 microseconds; overshoot, less than 5 per cent; and droop, less than 10 per cent.

* Measured from base seat to bulb-top line as determined by ring gauge of 7/16" I.D.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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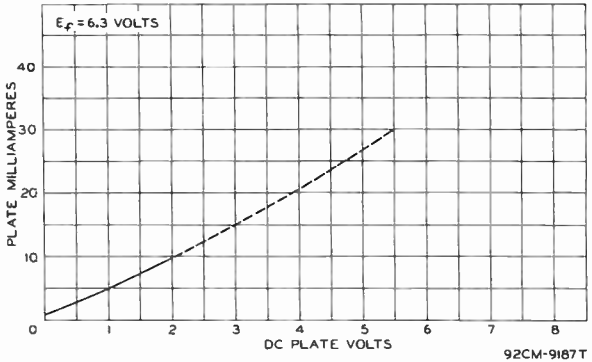
6887

TWIN DIODE

AVERAGE PLATE CHARACTERISTIC
EACH UNIT



92CM-9187T

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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6922

Medium-Mu Twin Triode

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

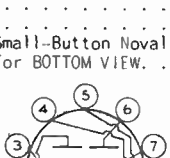
Heater Characteristics and Ratings *(Design-Center Values)*:			
Voltage (AC or DC)		6.3 ± 0.6	volts
Current at heater volts = 6.3		0.300	amp
Peak heater cathode voltage (Each unit):			
Heater negative with respect to cathode		60 max.	volts
Heater positive with respect to cathode		120 max.	volts
Direct Interelectrode Capacitances:[a]	*Unit No.1*	*Unit No.2*	
Grid to plate	1.4	1.4	$\mu\mu f$
Grid to cathode, internal shield, and heater	3.1	3.1	$\mu\mu f$
Plate to cathode, internal shield, and heater	1.75	1.65	$\mu\mu f$
Heater to cathode	2.6	2.7	$\mu\mu f$

Characteristics, Class A1 Amplifier (Each Unit):[b]			
Plate Supply Voltage	100	90	volts
Grid Supply Voltage	9	0	volts
Cathode Resistor	680	120	ohms
Amplification Factor	33	-	
Transconductance	12500	11500	μmhos
Plate Current	15	12	ma

Mechanical:

Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9AJ

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4 – Heater
Pin 5 – Heater



Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Internal Shield

World Radio History

AMPLIFIER — Class A1

Values are for Each Unit

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE:		
With plate dissipation = 0.8 watt or greater	220 max.	volts
With plate dissipation less than 0.8 watt	250 max.	volts
With plate ma. = 0	400 max.	volts
With cathode ma. = 0	550 max.	volts
GRID VOLTAGE:		
Negative-bias value	100 max.	volts
Peak-negative value[c]	200 max.	volts
CATHODE CURRENT:		
Peak[c]	100 max.	ma
Average	20 max.	ma
GRID INPUT	0.03 max.	watt
PLATE DISSIPATION:		
Either plate	1.5 max.	watts
Both plates (Both units operating)	2 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	170 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:	
For fixed-bias operation	Permitted only when plate ma. < 5
For cathode-bias operation	1 max. megohm

[a] Without external shield.

[b] Operation under conditions listed in left-hand column is recommended because of the small spread in characteristics.

[c] Pulse duration (microseconds) = 200 max., duty factor = 0.10 max.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration	500 max.	g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-impact (Flyweight) Shock Machine and are subjected to 5 blows at a hammer angle of 30°.

Fatigue Rating:

Vibrational Acceleration	2.5 max.	g

This test is performed on a sample lot of tubes to determine ability of tube to withstand the specified vibrational acceleration. Tubes are rigidly mounted and are subjected for 32 hours to 2.5-g vibrational acceleration at 50 cycles per second in each of three directions.

World Radio History

6939

Twin Power Pentode

9-PIN MINIATURE TYPE
INTERNALLY NEUTRALIZED FOR PUSH-PULL AMPLIFIER SERVICE
14 WATTS CW INPUT (ICAS) UP TO 500 Mc

For Communications Equipment Operating at Frequencies up to 500 Mc as a Push-Pull RF-Power-Amplifier or as a Frequency-Multiplier Tube

GENERAL DATA

Electrical:

	Series	*Parallel*	
Heater, for Unipotential Cathode:			
Heater arrangement			
Voltage (AC or DC)	12.6 ± 10%	6.3 ± 10%	volts
Current	0.3	0.6	amp
Transconductance (Each Unit) for dc plate volts = 150, dc grid-No.2 volts = 150, and dc plate ma. = 25	10500		μmhos
Mu-Factor, Grid No.2 to Grid No.1 (Each Unit) for dc plate volts = 150, dc grid No.2 volts = 150, and dc plate ma. = 25	31		
Direct Interelectrode Capacitances (Approx., Each Unit):[A]			
Grid No.1 to plate	0.15		μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	6.4		μμf
Plate to cathode & grid No.3, grid No.2, and heater	1.6		μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9HL

Pin 1 - Grid No.1 of Unit No.2
Pin 2 - Cathode, Grid No.3
Pin 3 - Grid No.1 of Unit No.1
Pin 4 - Heater
Pin 5 - Heater
Pin 6 - Plate of Unit No.2
Pin 7 - Grid No.2
Pin 8 - Plate of Unit No.1
Pin 9 - Heater Tap

World Radio History

6939

PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy•
and
PUSH-PULL RF POWER AMPLIFIER — Class C FM Telephony

Values are on a per-tube basis unless otherwise specified

Maximum Ratings, *Absolute-Maximum Values:*

	Up to 500 Mc		
	CCS★	*ICAS♦*	
DC PLATE VOLTAGE	250 max.	250 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-100 max.	-100 max.	volts
DC PLATE CURRENT	90 max.	100 max.	ma
DC GRID-No.1 CURRENT	6 max.	8 max.	ma
DC CATHODE CURRENT	100 max.	120 max.	ma
PLATE INPUT	12 max.	14 max.	watts
GRID-No.2 INPUT	3 max.	3.5 max.	watts
GRID-No.1 INPUT	0.2 max.	0.24 max.	watt
PLATE DISSIPATION	6 max.	7.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	225 max.	225 max.	°C

Typical Operation:

	At 500 Mc		
DC Plate Voltage	180	200	volts
DC Grid-No.2 Voltage	180	200	volts
DC Grid-No.1 Voltage	-20	-20	volts
From grid resistor for each grid No.1 of	27000	27000	ohms
Peak-to-Peak RF Grid-No.1 Voltage	50	50	volts
DC Plate Current	55	60	ma
DC Grid-No.2 Current	12.5	14	ma
DC Grid-No.1 Current	1.5	1.5	ma
Driver Power Output (Approx.)	1.2	1.2	watts
Useful Power Output (Approx.)♦	5	6	watts

World Radio History

PLATE-MODULATED PUSH-PULL RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Values are on a per-tube basis

Maximum Ratings, *Absolute-Maximum Values:*

	Up to 500 Mc		
	CCS★	*ICAS*♦	
DC PLATE VOLTAGE	200 max.	200 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-100 max.	-100 max.	volts
DC PLATE CURRENT	64 max.	80 max.	ma
DC GRID-No.1 CURRENT	6 max.	8 max.	ma
DC CATHODE CURRENT	80 max.	96 max.	ma
PLATE INPUT	8 max.	10 max.	watts
GRID-No.2 INPUT	2 max.	2.3 max.	watts
GRID-No.1 INPUT	0.2 max.	0.24 max.	watt
PLATE DISSIPATION	4 max.	5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	225 max.	225 max.	°C

Typical Operation:

	At 500 Mc		
DC Plate Voltage	180	180	volts
DC Grid-No.2 Voltage	180	180	volts
DC Grid-No.1 Voltage	-20	-20	volts
From grid resistor for each grid No.1 of	68000	27000	ohms
Peak-to-Peak RF Grid-No.1 Voltage	45	50	volts
DC Plate Current	40	55	ma
DC Grid-No.2 Current	9.5	12.5	ma
DC Grid-No.1 Current	0.6	1.5	ma
Driver Power Output (Approx.)	1	1.2	watts
Useful Power Output (Approx.)♦	3.5	5	watts

FREQUENCY TRIPLER — Class C

Values are on a per-tube basis

Maximum Ratings, *Absolute-Maximum Values:*

	Up to 500 Mc		
	CCS★	*ICAS*♦	
DC PLATE VOLTAGE	250 max.	250 max.	volts

World Radio History

	CCS★	ICAS♦	
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-100 max.	-100 max.	volts
DC PLATE CURRENT	60 max.	80 max.	ma
DC GRID-No.1 CURRENT	6 max.	8 max.	ma
DC CATHODE CURRENT	70 max.	80 max.	ma
PLATE INPUT	8 max.	10 max.	watts
GRID-No.2 INPUT	3 max.	3.5 max.	watts
GRID-No.1 INPUT	0.2 max.	0.24 max.	watt
PLATE DISSIPATION	6 max.	7.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	225 max.	225 max.	°C

Typical Operation:

	Up to 500 Mc		
DC Plate Voltage	180	200	volts
DC Grid-No.2 Voltage (Approx.)	180	190	volts
Through resistor of	1200	1200	ohms
DC Grid-No.1 Voltage	-74	-74	volts
From grid resistor for each grid No.1 of	82000	82000	ohms
Peak-to-Peak RF Grid-No.1 Voltage	165	165	volts
DC Plate Current	40	46	ma
DC Grid-No.2 Current	9.7	11	ma
DC Grid-No.1 Current	1.8	1.8	ma
Driver Power Output (Approx.)	1.1	1.1	watts
Useful Power Output (Approx.)♦	1.8	2.2	watts

▲ Without external shield.

● Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

★ Continuous Commercial Service.

♦ Intermittent Commercial and Amateur Service.

♦ This value of useful power is measured at load of output circuit.

OPERATING CONSIDERATIONS

Shielding of the 6939 in "straight-through" rf-amplifier service may be required for stable operation. To minimize external feedback from the plate to grid No.1, a grounded shield crossing the terminal end of the tube socket through the space between pins 4 and 5 and the space between pins 1 and 9, is generally adequate for this purpose.

World Radio History

The *heater may be effectively bypassed* by grounding one heater pin at the tube socket and bypassing the other heater pin to ground with a low inductance capacitor. If further isolation of the ungrounded heater pin is required a suitable rf choke followed by another low inductance bypass capacitor, is recommended.

The *cathode* of the 6939 should be grounded by means of the shortest possible connection to reduce the effect of cathode-lead inductance.

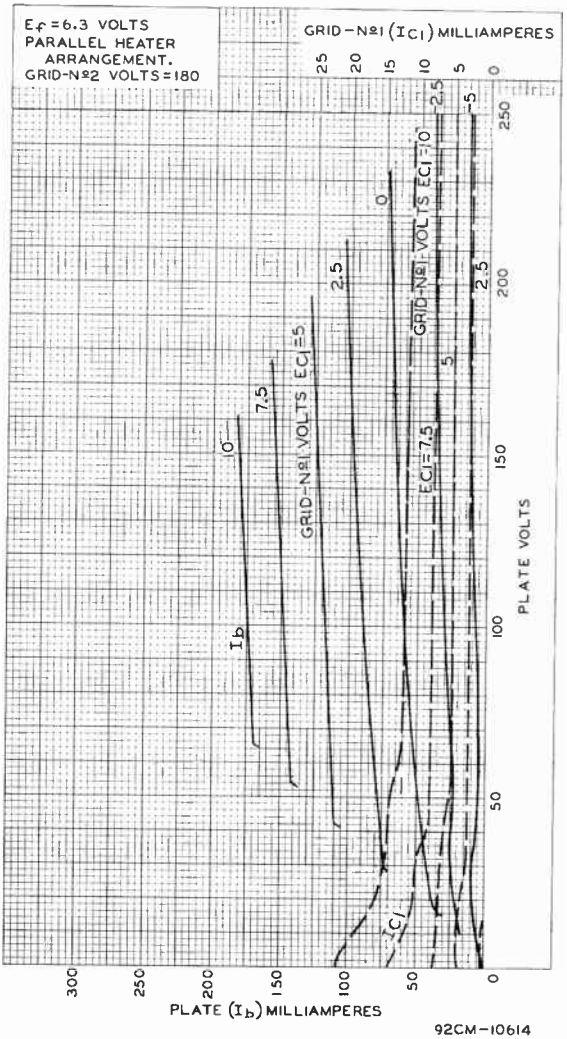
The *rf impedance between grid No.2 and the cathode* must be kept low, usually by means of a suitable bypass capacitor. In telephony service when grid No.2 is modulated, a smaller bypass capacitor than is used for telegraphy service may be required in order to avoid excessive af bypassing. However, if the capacitance value is too small, rf feedback may occur between plate and grid No.1, depending on the circuit layout, operating frequency, and power gain of the stage. AF bypassing difficulties can usually be eliminated if the grid-No.2 bypass capacitor is replaced by a series-resonant circuit which is tuned to resonate at the operating frequency. This circuit presents a high impedance to audio frequencies but a very low impedance to its resonant frequency.

To *prevent generation of parasitic oscillations*, it is recommended that a 100-ohm resistor be connected in series with grid No.2 as close to the socket as possible.

World Radio History

6939

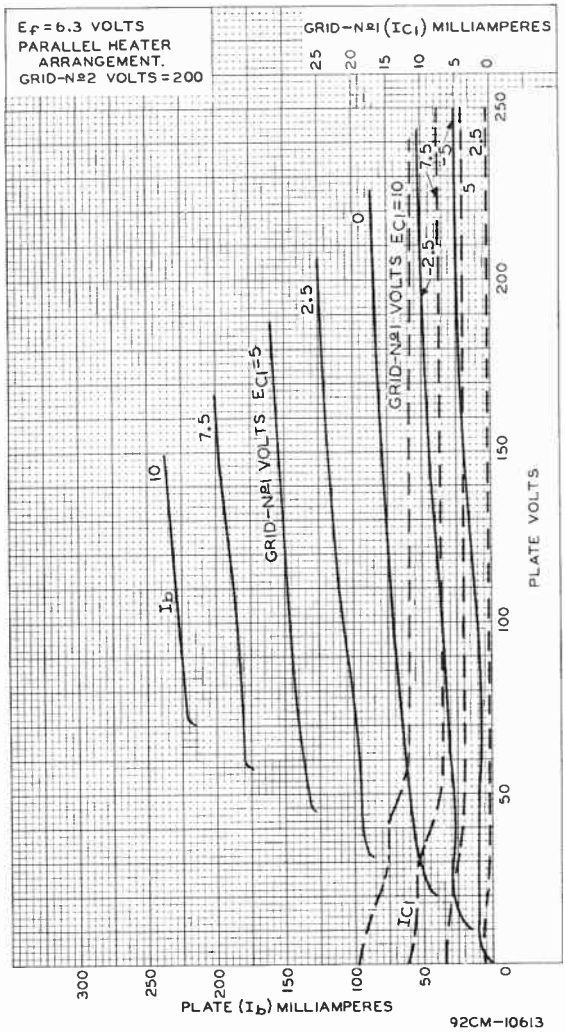
AVERAGE CHARACTERISTICS
Each Unit



92CM-10614

World Radio History

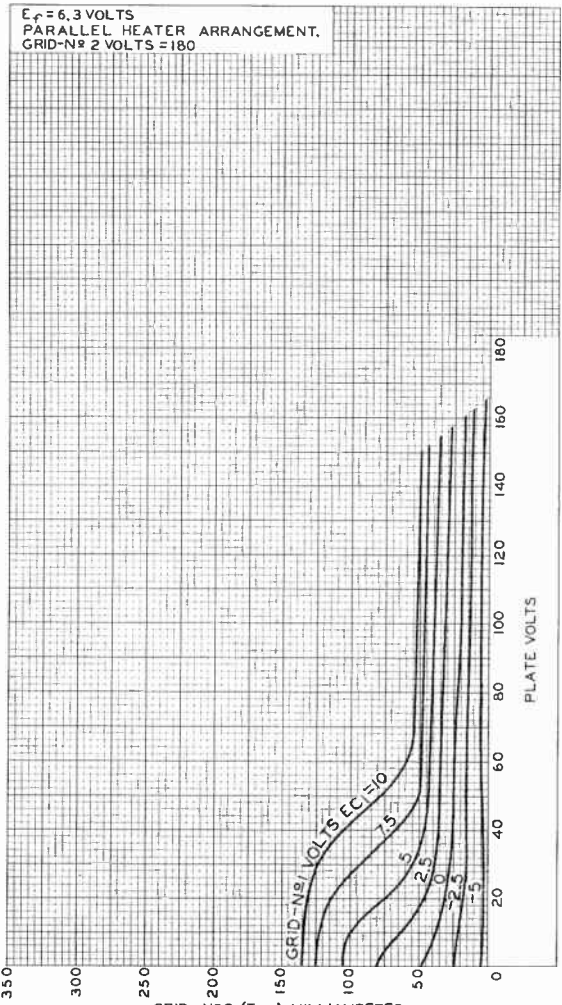
AVERAGE CHARACTERISTICS
Each Unit



92CM-10613

World Radio History

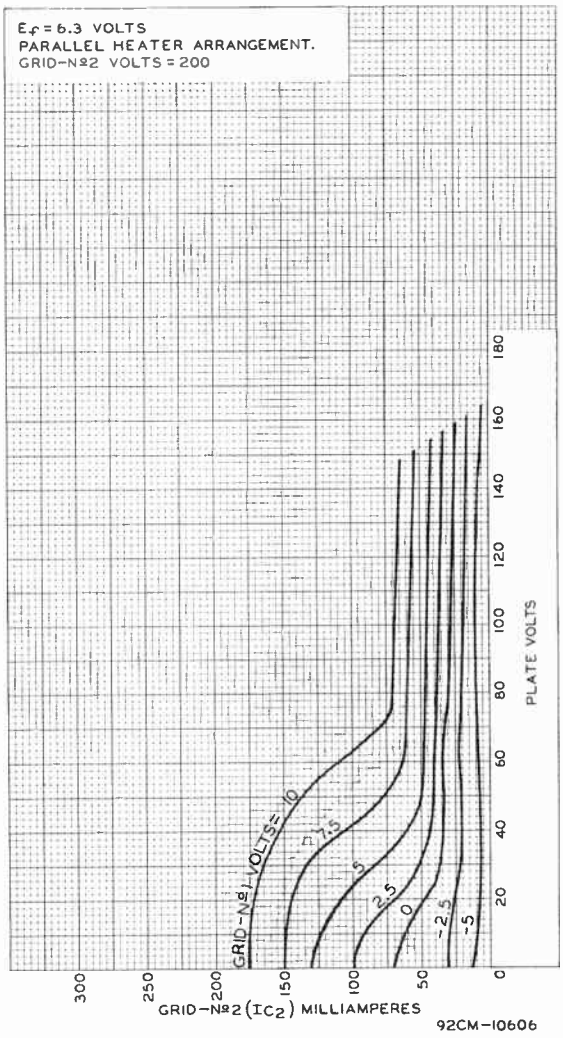
AVERAGE CHARACTERISTICS
Each Unit



92CM-10609

World Radio History

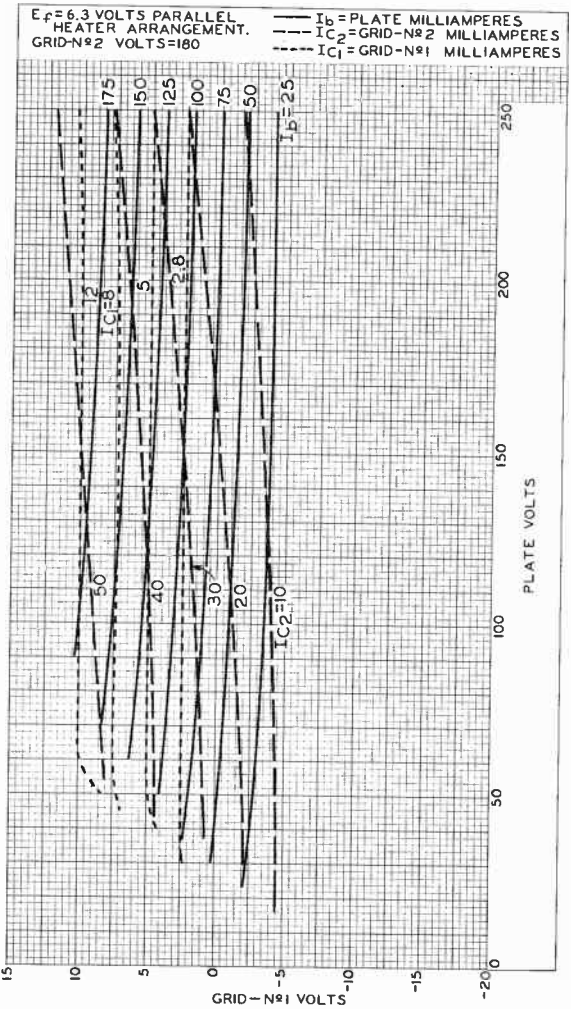
AVERAGE CHARACTERISTICS
Each Unit



World Radio History

6939

AVERAGE CONSTANT-CURRENT CHARACTERISTICS
Each Unit

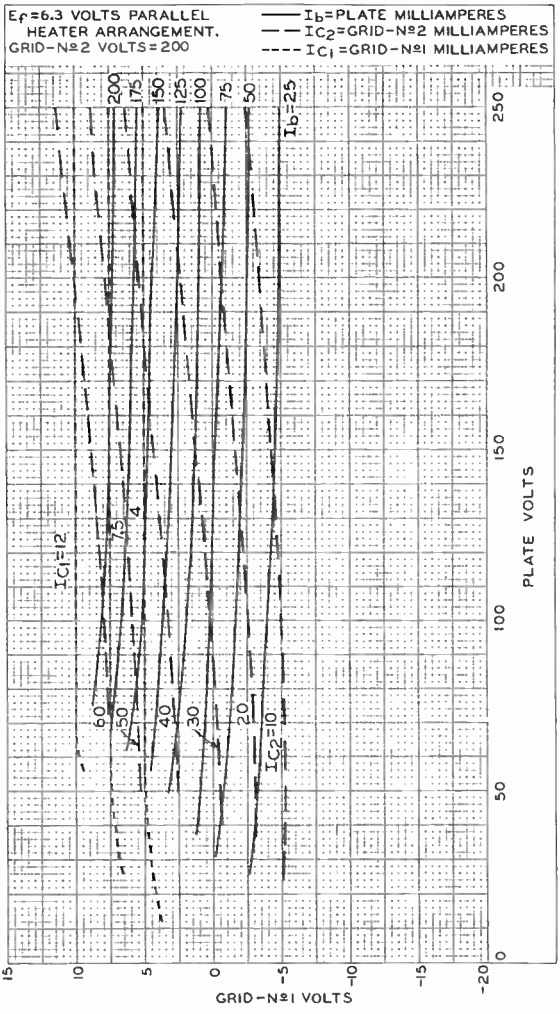


92CM-10608

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

World Radio History

AVERAGE CONSTANT-CURRENT CHARACTERISTICS
Each Unit



92CM-10603

World Radio History

World Radio History

Medium-Mu Twin Triode

9-PIN MINIATURE TYPE

For Computer and other "On-Off" Control Applications Involving Long Periods of Operation under Cutoff Conditions

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:			
Heater arrangement	*Series*	*Parallel*	
Voltage (AC or DC)	12.6 ± 5%	6.3 ± 5%	volts
Current	0.45	0.9	amp
Direct Interelectrode Capacitances (Approx.):[a]			
Grid to plate (Each unit)		6	μμf
Grid to cathode and heater (Each unit)		4.8	μμf
Plate to cathode and heater (Unit No.1)		0.65	μμf
Plate to cathode and heater (Unit No.2)		0.55	μμf
Grid to grid		0.1	μμf
Plate to plate		1.4	μμf
Heater to cathode (Each unit)		6	μμf

Characteristics (Each Unit):

Plate Voltage	90	120	volts
Grid Voltage	[b]	−2	volts
Amplification Factor	−	21	
Plate Resistance (Approx.)	−	1750	ohms
Transconductance	−	12000	μmhos
Plate Current	47	36	ma
Grid Current	250	−	μa
Grid Voltage (Approx.) for plate volts = 150 and plate μa = 200	−	−11	volts

Mechanical:

Operating Position . . . Any, but for the utmost in service, tube should be vertical with base down or up, or horizontal with pins 5 and 9 in vertical plane

Maximum Overall Length . . . . . 2-5/8"

Maximum Seated Length . . . . . 2-3/8"

Length, Base Seat to Bulb Top (Excluding tip) . . . 2" ± 3/32"

Diameter . . . . . 0.750" to 0.875"

Dimensional Outline . . . . . See *General Section*

Bulb T6-1/2

Base . . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)

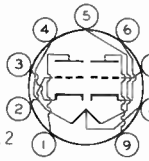
→ Indicates a change.

World Radio History

7044

Basing Designation for BOTTOM VIEW. 9H

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pins 4 & 8 – Heater of Unit No.2
Pins 5 & 8 – Heater of Unit No.1



Pin 6 – Cathode of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Heater Mid-Tap
Pin 9 – Plate of Unit No.1

COMPUTER SERVICE and "ON-OFF" CONTROL SERVICE

Unless Otherwise Specified, Values are for Each Unit

Maximum Ratings, *Absolute-Maximum Values:*

PLATE VOLTAGE:			
Average.	300	max.	volts
Peak positive-pulse[c]	600	max.	volts
GRID VOLTAGE:			
DC negative.	100	max.	volts
DC positive.	1	max.	volt
Peak negative-pulse[c]	300	max.	volts
Peak positive-pulse[c]	30	max.	volts
GRID CURRENT:			
Average.	5	max.	ma
Peak[c].	200	max.	ma
CATHODE CURRENT:			
Average.	50	max.	ma
Peak[c].	400	max.	ma
PLATE DISSIPATION:			
Either plate	4.5	max.	watts
Both plates (Both units operating) . . .	8	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	200	max.	volts
Heater positive with respect to cathode.	200[d]	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	160	max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:			
For fixed-bias operation	0.1	max.	megohm
For cathode-bias operation	0.5	max.	megohm

[a] Without external shield.

[b] Adjusted for indicated grid current.

[c] Under the following conditions: rectangular pulse; pulse duration, 10 microseconds; pulse-repetition rate, 1 x 10^3 pps; and duty factor, 0.010 ± 0.001. The rise time shall be less than 1 microsecond, fall time less than 2 microseconds, overshoot less than 5 per cent and droop less than 10 per cent.

[d] The dc component must not exceed 100 volts.

World Radio History

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Unless Otherwise Specified, Values are for Each Unit

	Note	Min.	Max.	
Heater Current	1	0.41	0.49	amp
Plate Current (1)	1,2	26	45	ma
Plate Current (2)	1,3	34	60	ma ←
Plate Current (3)	1,4	–	200	μa
Reverse Grid Current	1,2	–	-1.5	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,5	–	30	μa
Heater positive with respect to cathode	1,5	–	30	μa
Leakage Resistance:				
Between plate and all other electrodes tied together	1,6	50	–	megohms
Between grid and all other electrodes tied together	1,7	50	–	megohms

Note 1: With heater volts = 12.6 ac or dc (Series arrangement).

Note 2: With plate volts = 120 and grid volts = -2. Each unit tested separately. Unit not under test connected to ground.

Note 3: With plate volts = 90 and grid voltage adjusted for grid μa = 250. Each unit tested separately. Unit not under test connected to ground.

Note 4: With plate volts = 150 and grid volts = -14. Each unit tested separately. Unit not under test connected to ground.

Note 5: With 100 volts dc between heater and cathode.

Note 6: With plate volts = -500.

Note 7: With grid volts = -300.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 15 (Series heater arrangement) cycled one minute on and four minutes off, heater 180 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Cathode-Interface-Resistance Life Test: ←

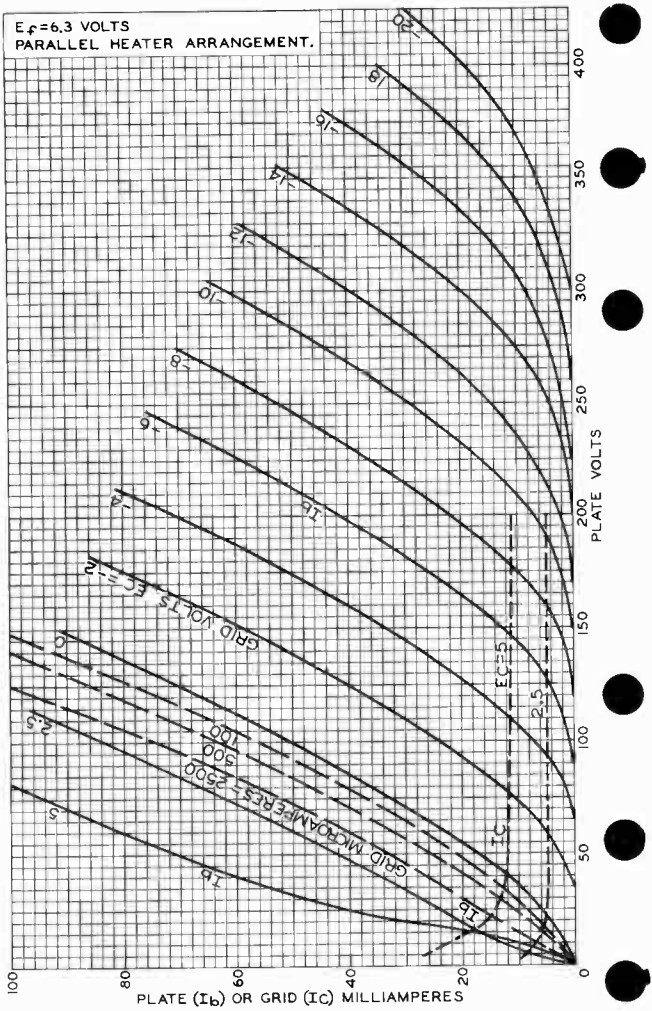
A sample lot of tubes from each production run is life tested at heater volts = 12.6 (Series heater arrangement) and with zero cathode current. At the end of 1000 hours, tubes will not show a cathode-interface resistance in excess of 25 ohms when measured in accordance with Method B, the Complementary Network Method, of ASTM Standard F 300-57T at heater volts = 11.4, plate volts = 75, plate current adjusted to 6.5 milliamperes, and 50-kc, square-wave signal voltage of 0.2 volt.

← Indicates a change.

World Radio History

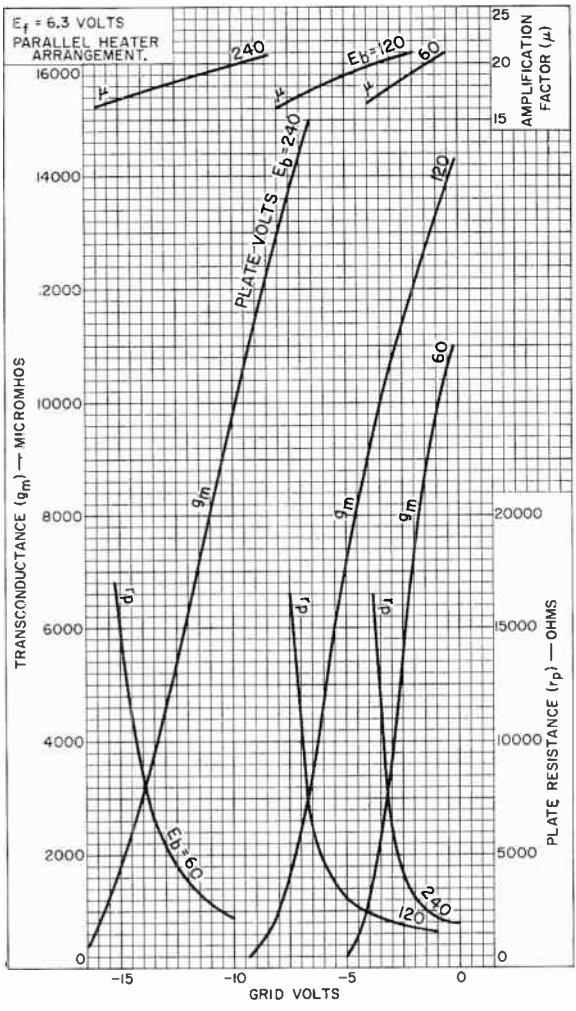
7044

AVERAGE CHARACTERISTICS
Each Unit



92CM-9856

AVERAGE CHARACTERISTICS
Each Unit



92CM-9857RI

World Radio History

Power Pentode

9-PIN MINIATURE TYPE

For Mobile-Communications Equipment Operating from 6-Cell Storage-Battery Systems. Useful as a Class-C RF-Power-Amplifier, Oscillator, and Frequency-Multiplier Tube up to 40 Mc, and as a Modulator and AF-Power-Amplifier Tube.

The 7054 is the same as the 8077/7054 except for the following items:

Mechanical:

Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"

World Radio History

World Radio History

7055

TWIN DIODE

7-PIN MINIATURE TYPE

For use in mobile communications equipment operating from 6-cell storage-battery systems. Useful as a detector in AM and FM receivers, as a full-wave rectifier in power supplies having low dc requirements, and in speech-clipper applications.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage range	12 to 15	ac or dc volts
Current (Approx.) at 13.5 volts	0.155	amp
Direct Interelectrode Capacitances (Approx.):[o]		
Plate to cathode, internal shield, and heater (Each unit)	3.2	μμf
Cathode to plate, internal shield, and heater (Each unit)	3.6	μμf
Plate of unit No.1 to plate of unit No.2	0.026	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	1-3/4"
Maximum Seated Length	1-1/2"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/8" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)
Basing Designation for BOTTOM VIEW	6BT

Pin 1 – Cathode of Unit No.1
Pin 2 – Plate of Unit No.2
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Cathode of Unit No.2
Pin 6 – Internal Shield
Pin 7 – Plate of Unit No.1

RECTIFIER

Maximum Ratings, *Absolute Values:*

PEAK INVERSE PLATE VOLTAGE	350 max.	volts
PEAK PLATE CURRENT PER PLATE	60 max.	ma
DC OUTPUT CURRENT PER PLATE	10 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	120 max.	volts
Heater positive with respect to cathode	120 max.	volts

Typical Operation:

The two units may be used separately or in parallel

Heater Voltage	13.5	volts

[o]: See next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

TENTATIVE DATA

7055

TWIN DIODE

AC Plate Voltage per Plate (RMS)	117	volts
Minimum Total Effective Plate-Supply Impedance per Plate	300	ohms
DC Output Current per Plate	9	ma

(1) With external shield JETEC No.316 connected to cathode of unit under test.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.143	0.167	amp
Plate Current per Plate	1,2	15	-	ma
Heater-Cathode Leakage Current (Each unit):				
Heater negative with respect to cathode	1,3	-	5	μa
Heater positive with respect to cathode	1,3	-	5	μa
Leakage Resistance:				
Plate to all other electrodes of both units tied together	1,4	50	-	megohms

Note 1: With ac or dc heater volts = 13.5.

Note 2: With plate volts = 5 and electrodes of unit not under test connected to ground.

Note 3: With 100 volts dc between heater and cathode.

Note 4: With plate 300 volts negative with respect to all other electrodes of both units tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

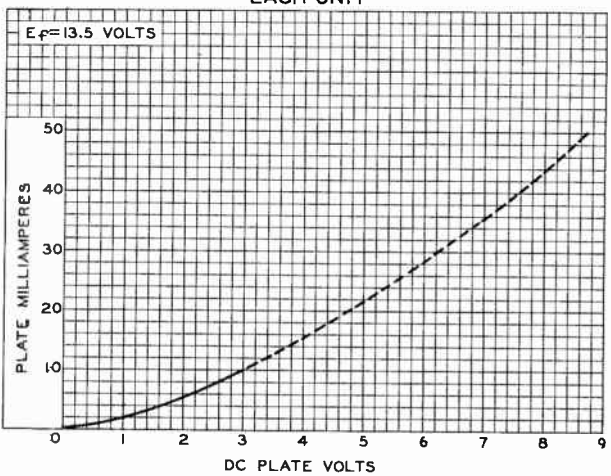
This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 17 cycled one minute on and four minutes off, heater 135 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: heater volts = 15 and maximum-rated plate current.

7055

AVERAGE PLATE CHARACTERISTIC
EACH UNIT



92CS-9774

World Radio History

7056

SHARP-CUTOFF PENTODE

7-PIN MINIATURE TYPE

For use in mobile communications equipment operating from 6-cell storage-battery systems. Useful as if or rf amplifier at frequencies up to 45 Mc.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:			
Voltage range	12 to 15		ac or dc volts
Current (Approx.) at 13.5 volts	0.15		amp
Direct Interelectrode Capacitances:	*Without External Shield*	*With External Shield*[o]	
Grid No.1 to plate	0.02 max.	0.01 max.	μμf
Grid No.1 to all other electrodes except plate	6.5	6.5	μμf
Plate to all other electrodes except grid No.1	2	3	μμf

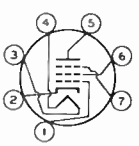
Characteristics, Class A_1 Amplifier:

Heater Voltage	13.5	volts
Plate-Supply Voltage	200	volts
Grid No.3 (Suppressor Grid)	*Connected to cathode at socket*	
Grid-No.2 (Screen-Grid) Supply Voltage	150	volts
Cathode Resistor	180	ohms
Plate Resistance (Approx.)	0.6	megohm
Transconductance	6200	μmhos
Plate Current	9.5	ma
Grid-No.2 Current	2.8	ma
Grid-No.1 (Control-Grid) Voltage (Approx.) for plate μa = 100	-7	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	*See General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JETEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CM

Pin 1 - Grid No.1
Pin 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate



Pin 6 - Grid No.2
Pin 7 - Grid No.3, Internal Shield

[o] With external shield JETEC No.316 connected to cathode.

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SHARP-CUTOFF PENTODE

AMPLIFIER — Class A_1

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	330 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts
GRID-No.2 VOLTAGE	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No.2 INPUT:		
For grid-No.2 voltages up to 165 volts	0.5 max.	watt
For grid-No.2 voltages between 165 volts and 330 volts	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
PLATE DISSIPATION	2 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	120 max.	volts
Heater positive with respect to cathode	120 max.	volts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.138	0.164	amp
Transconductance	1,2	5000	7400	μmhos
Plate Current	1,3	6.5	12.5	ma
Grid-No.2 Current	1,3	1.6	4	ma
Reverse Grid-No.1 Current	1,4	–	-1	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,5	–	20	μa
Heater positive with respect to cathode	1,5	–	20	μa
Leakage Resistance:				
Between grid-No.1 and all other electrodes tied together	1,6	50	–	megohms
Between plate and all other electrodes tied together	1,7	30	–	megohms

Note 1: With ac or dc heater volts = 13.5.

Note 2: With dc plate-supply volts = 200, grid-No.2 supply volts = 150, grid No.3 connected to cathode at socket, cathode resistor (ohms) = 180, and cathode-bypass capacitor (μf) = 1000.

Note 3: With dc plate-supply volts = 200, grid-No.2 supply volts = 150, grid No.3 connected to cathode at socket, and cathode resistor (ohms) = 180.

Note 4: With dc plate volts = 200, grid-No.2 volts = 150, grid No.3 connected to cathode at socket, and grid-No.1 volts = -1.5.

Note 5: With 100 volts dc between heater and cathode.

Note 6: With grid-No.1 100 volts negative with respect to all other electrodes tied together.

Note 7: With plate 300 volts negative with respect to all other electrodes tied together.

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SHARP-CUTOFF PENTODE

SPECIAL TESTS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 17 cycled one minute on and four minutes off, heater 135 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 13.5, plate-supply volts = 200, grid No.3 connected to cathode, grid-No.2 volts = 150, grid-No.1 volts = -2, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 250 millivolts.

500-Hour Intermittent Life Performance:

This test is made on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: heater volts = 15 and maximum-rated plate dissipation and grid-No.2 input.

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RCA

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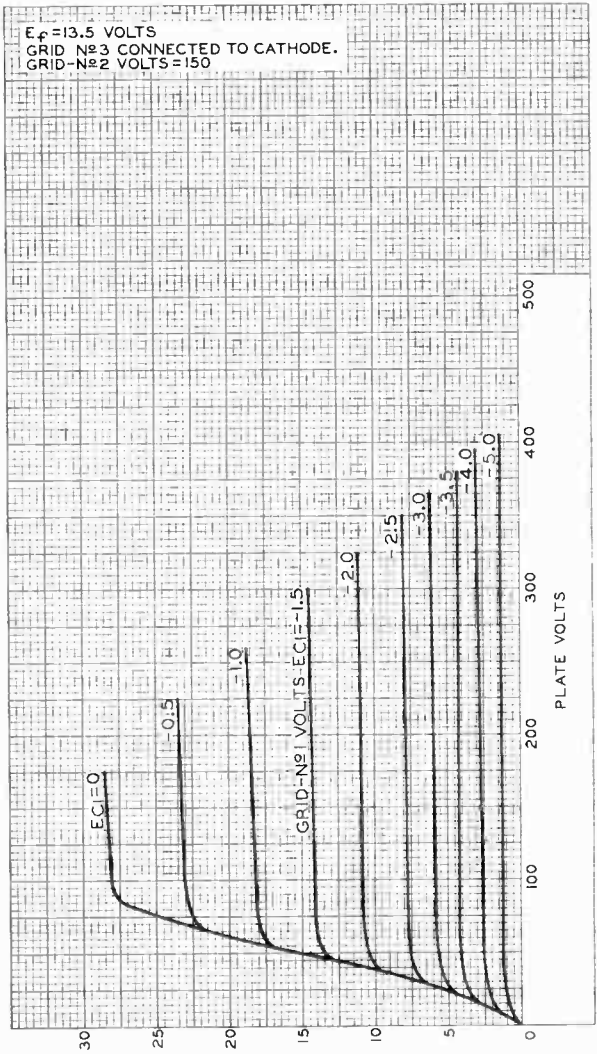
AVERAGE PLATE CHARACTERISTICS



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9791

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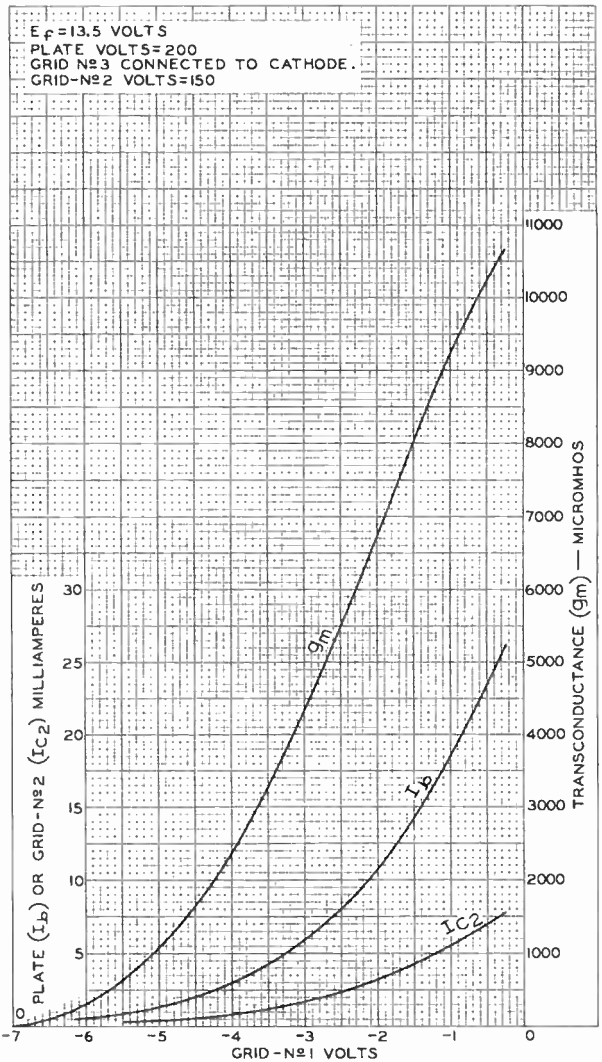
AVERAGE CHARACTERISTICS



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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
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World Radio History

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MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For use in mobile communications equipment operating from 6-cell storage-battery systems. Useful as an rf amplifier in direct-coupled cathode-drive circuits at frequencies up to 200 Mc.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Voltage range	12 to 15	ac or dc volts
Current (Approx.) at 13.5 volts	0.18	amp

Direct Interelectrode Capacitances:[o]

	Unit No.1	Unit No.2	
Grid to plate	1.2	1.2	μμf
Grid to cathode, internal shield, and heater	2.6	-	μμf
Plate to cathode, internal shield, and heater	1.2	-	μμf
Plate to cathode	0.12	0.12	μμf
Cathode to heater	2.6	2.7	μμf
Cathode to grid, internal shield, and heater	-	5	μμf
Plate to grid, internal shield, and heater	-	2.2	μμf
Plate of unit No.1 to plate of unit No.2	0.01 max.		μμf
Plate of unit No.2 to plate and grid of unit No.1	0.024 max.		μμf

Characteristics, Class A_1 Amplifier (Each Unit):

Heater Voltage	13.5	volts
Plate-Supply Voltage	150	volts
Cathode Resistor	220	ohms
Amplification Factor	36	
Plate Resistance (Approx.)	5300	ohms
Transconductance	6800	μmhos
Plate Current	10	ma
Grid Voltage (Approx.) for plate μa = 10.	-12	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2

[o] With external shield JETEC NO.315 connected to pin 9.

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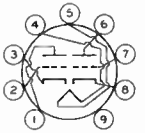
MEDIUM-MU TWIN TRIODE

Base. . . . . .Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW. 9AJ

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Internal Shield



AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, ***Absolute Values:***

PLATE VOLTAGE	275 max.	volts
PLATE DISSIPATION	2.2 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode .	150 max.	volts
Heater positive with respect to cathode .	150 max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance	0.5 max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Values are for Each Unit Unless Otherwise Specified

	Note	*Min.*	*Max.*	
Heater Current.	1	0.165	0.195	amp
Direct Interelectrode Capacitances:				
Grid to cathode, internal shield, and heater (Unit No.1)	2	2.05	3.15	μμf
Cathode to grid, internal shield, and heater (Unit No.2)	2	4.1	5.9	μμf
Plate to grid, internal shield, and heater (Unit No.2)	2	1.9	2.5	μμf
Amplification Factor.	1,3	26	46	
Plate Current	1,4	7	13	ma
Transconductance.	1,3	5800	7800	μmhos
Reverse Grid Current (Total—both units)	1,5	–	-2	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode.	1,6	–	20	μa
Heater positive with respect to cathode.	1,6	–	20	μa

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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MEDIUM-MU TWIN TRIODE

	Note	Min.	Max.	
Leakage Resistance:				
Between grid and all other electrodes of both units tied together.	1,7	50	–	megohms
Between plate and all other electrodes of both units tied together.	1,8	50	–	megohms

Note 1: With ac or dc heater volts = 13.5.

Note 2: With external shield JETEC No.315 connected to pin 9.

Note 3: With dc plate-supply volts = 150, cathode resistor (ohms) = 220, and cathode-bypass capacitor (μf) = 1000. Each unit tested separately. Electrodes of unit not under test are connected to ground.

Note 4: With dc plate-supply volts = 150, and cathode resistor (ohms) = 220. Each unit tested separately. Electrodes of unit not under test are connected to ground.

Note 5: With dc plate-supply volts = 250, cathode resistor (ohms) = 250, and grid resistor (megohms) = 0.5. Units are tested in parallel with cathode and grid resistors common to both units.

Note 6: With 150 volts dc between heater and cathode.

Note 7: With grid 100 volts negative with respect to all other electrodes of both units tied together.

Note 8: With plate 300 volts negative with respect to all other electrodes of both units tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 17 cycled one minute on and four minutes off, heater 180 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: units connected in parallel, heater volts = 13.5, plate-supply volts = 250, grid volts = −8, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 150 millivolts.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: heater volts = 15 and maximum-rated plate dissipation.

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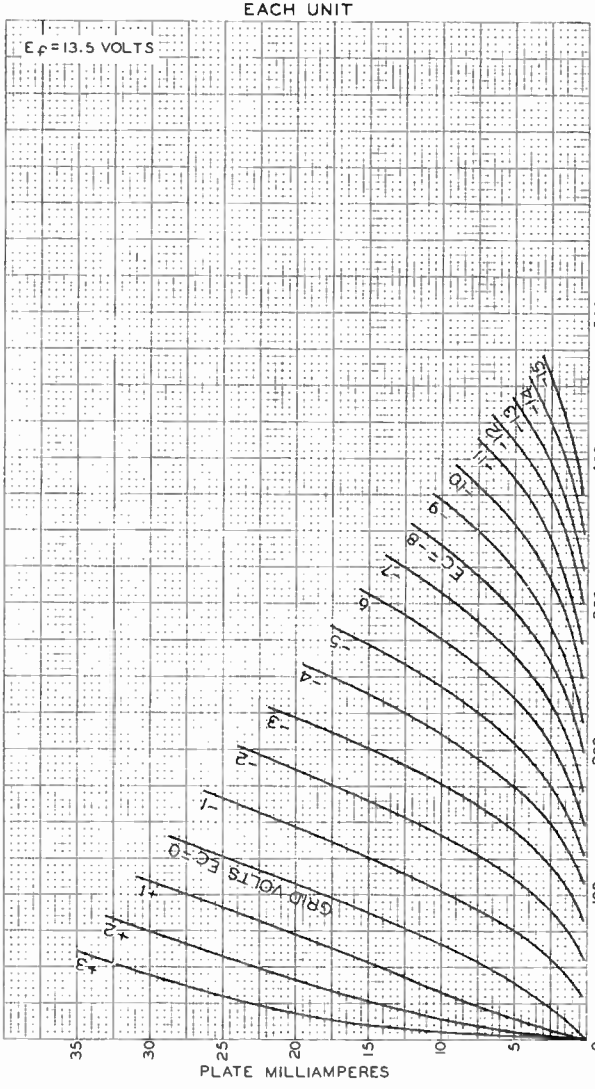
AVERAGE PLATE CHARACTERISTICS

EACH UNIT



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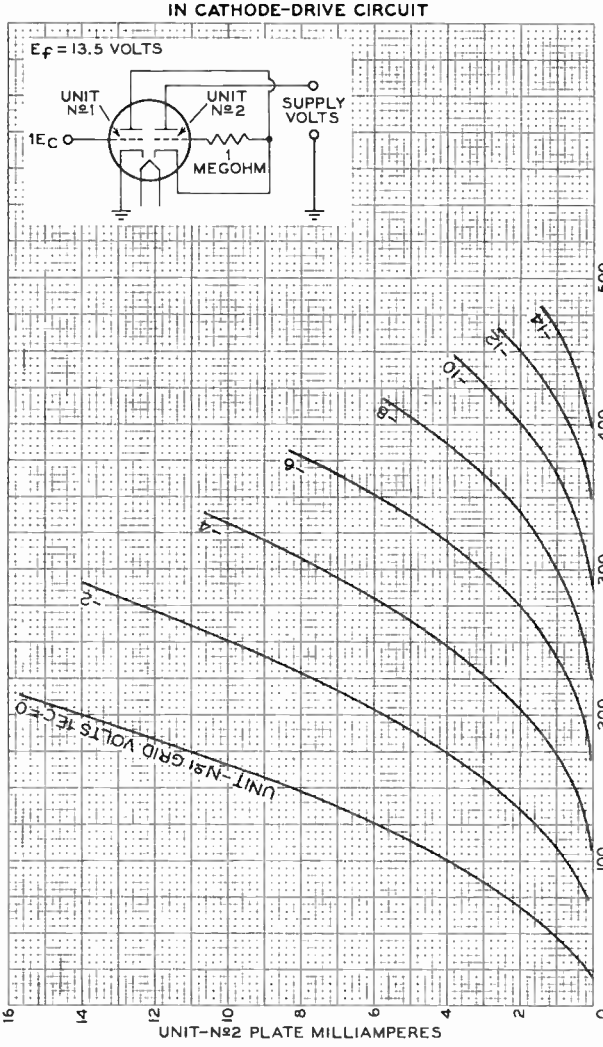
AVERAGE PLATE CHARACTERISTICS

DIRECT-COUPLED DRIVEN RF AMPLIFIER IN CATHODE-DRIVE CIRCUIT



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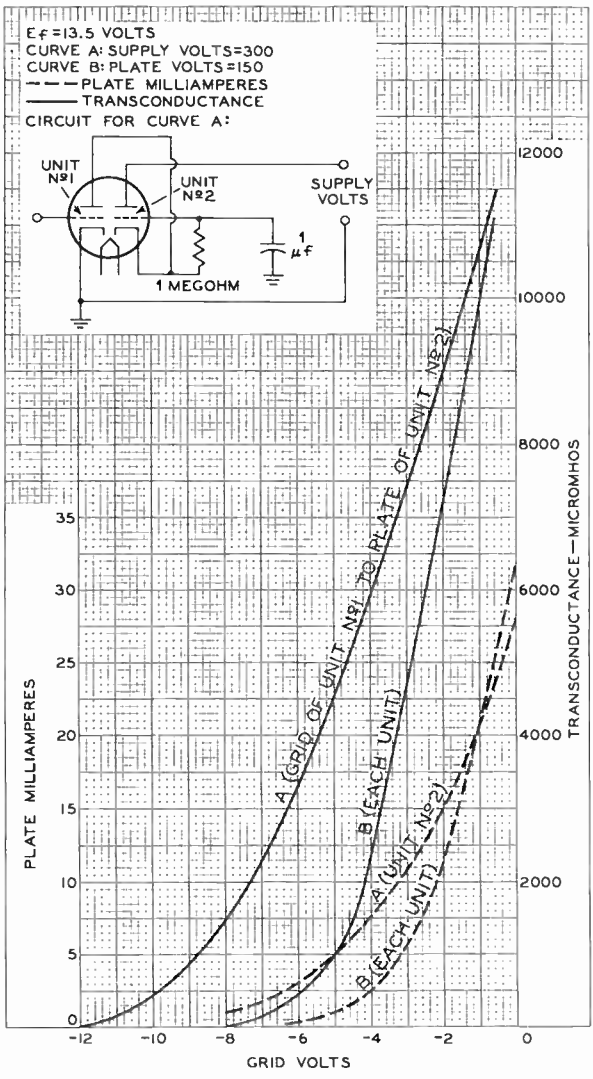
AVERAGE CHARACTERISTICS



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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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HIGH-MU TWIN TRIODE

9-PIN MINIATURE TYPE

For use in mobile communications equipment operating from 6-cell storage-battery systems. Useful in phase-inverter, resistance-coupled-amplifier, and low-frequency-oscillator applications.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage range	12 to 15	ac or dc volts
Current (Approx.) at 13.5 volts	0.155	amp

Direct Interelectrode Capacitances:[o]

	Unit No.1	Unit No.2	
Grid to plate	1.7	1.7	μμf
Grid to cathode and heater	1.6	1.6	μμf
Plate to cathode and heater	0.46	0.34	μμf

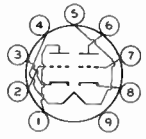
Characteristics, Class A_1 Amplifier (Each Unit):

Heater Voltage	13.5	volts
Plate Voltage	250	volts
Grid Voltage	−2	volts
Amplification Factor	100	
Plate Resistance (Approx.)	61000	ohms
Transconductance	1650	μmhos
Plate Current	1.25	ma
Grid Voltage (Approx.) for plate μa = 10	−5	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9EF

Pin 1 – Plate of Unit No.2
Pin 2 – Grid of Unit No.2
Pin 3 – Cathode of Unit No.2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Plate of Unit No.1
Pin 7 – Grid of Unit No.1
Pin 8 – Cathode of Unit No.1
Pin 9 – Internal Connection—Do Not Use



[o]: See next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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HIGH-MU TWIN TRIODE

AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	330 max.	volts
GRID VOLTAGE:		
Positive-bias value	0 max.	volts
Negative-bias value	55 max.	volts
PLATE DISSIPATION	1 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	120 max.	volts
Heater positive with respect to cathode.	120 max.	volts

Typical Operation as Resistance-Coupled Amplifier (Each Unit):

See RESISTANCE-COUPLED AMPLIFIER CHART No. 25 at front of Receiving Tube Section

Maximum Circuit Values:

Grid-Circuit Resistance:		
For fixed-bias operation.	0.5 max.	megohm
For cathode-bias operation.	1 max.	megohm

[o] Without external shield.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Values are for Each Unit Unless Otherwise Specified

	Note	Min.	Max.	
Heater Current	1	0.143	0.167	amp
Amplification Factor	1,2	85	115	
Plate Current	1,2	0.9	1.75	ma
Transconductance	1,2	1360	2100	μmhos
Reverse Grid Current (Total—both units)	1,3	–	-1	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode.	1,4	–	20	μa
Heater positive with respect to cathode.	1,4	–	20	μa
Leakage Resistance:				
Between grid and all other electrodes of both units tied together	1,5	50	–	megohms
Between plate and all other electrodes of both units tied together	1,6	50	–	megohms

Note 1: With ac or dc heater volts = 13.5.

Note 2: With dc plate volts = 250, and dc grid volts = -2. Each unit tested separately. Electrodes of unit not under test are connected to ground.

Note 3: With dc plate volts = 250, grid resistor (megohms) = 1 common to both units, and dc grid volts = -2. Units are tested in parallel.

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HIGH-MU TWIN TRIODE

Note 4: With 100 volts dc between heater and cathode.

Note 5: With grid 100 volts negative with respect to all other electrodes of both units tied together.

Note 6: With plate 300 volts negative with respect to all other electrodes of both units tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 17 cycled one minute on and four minutes off, heater 135 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: units connected in parallel, heater volts = 13.5, plate-supply volts = 250, grid volts = -2, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 150 millivolts.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: heater volts = 15 and maximum-rated plate dissipation.

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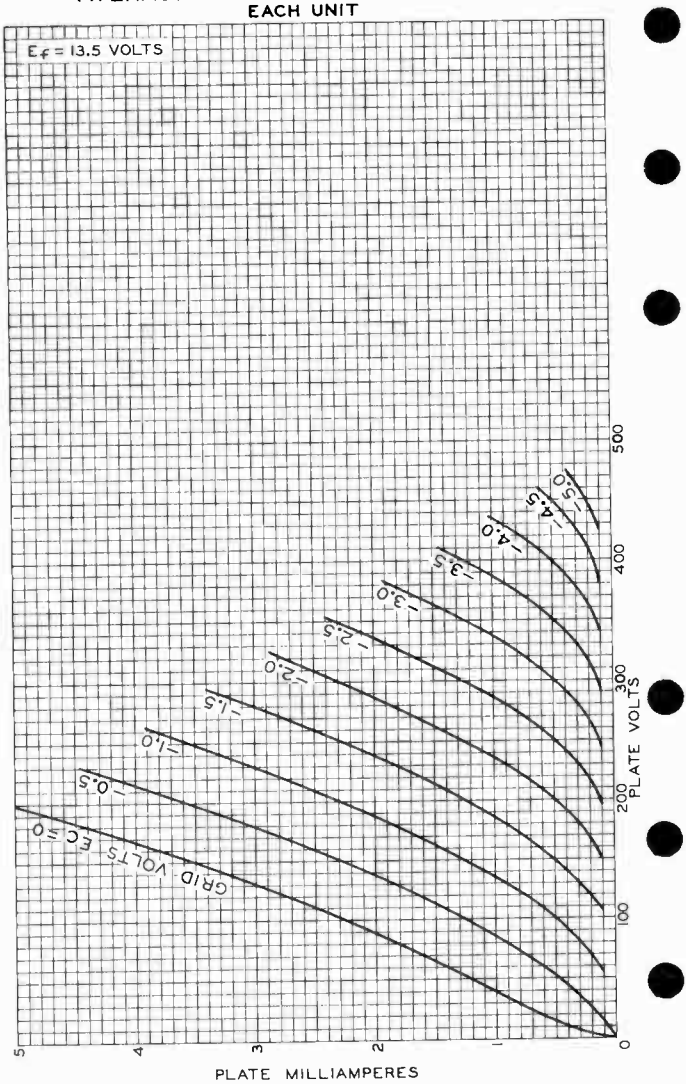
AVERAGE PLATE CHARACTERISTICS

EACH UNIT



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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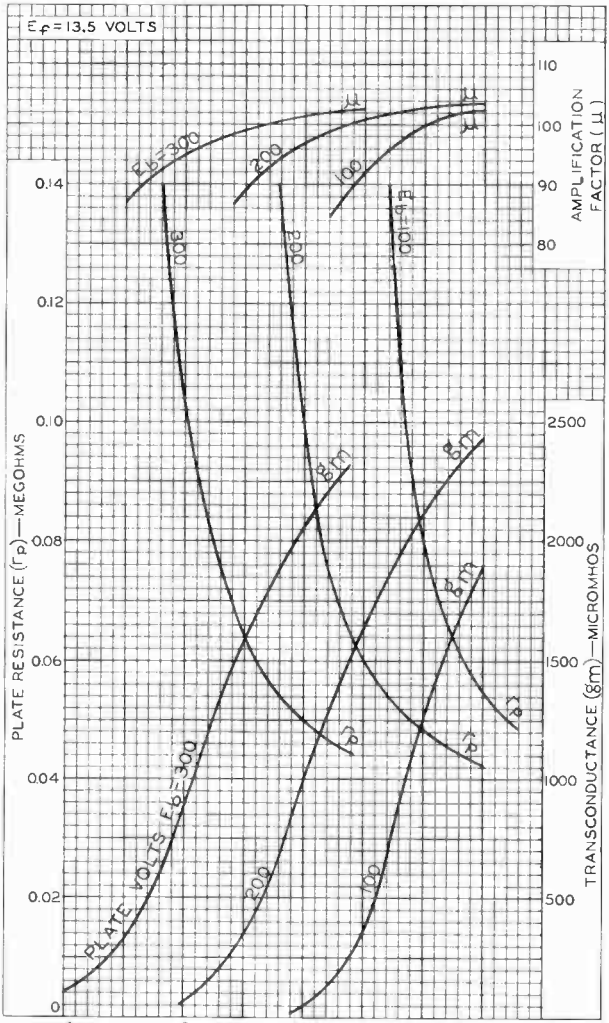
AVERAGE CHARACTERISTICS
EACH UNIT



World Radio History

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MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE

9-PIN MINIATURE TYPE

For use in mobile communications equipment operating from 6-cell storage-battery systems

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:
Voltage range. . . . . 12 to 15 . . . . . ac or dc volts
Current (Approx.) at
13.5 volts . . . . . 0.195 . . . . . amp

Direct Interelectrode Capacitances:

	Without External Shield	*With External Shield°*	
Triode Unit:			
Grid to plate.	1.7	1.7	μμf
Grid to cathode and heater .	2.7	2.7	μμf
Plate to cathode and heater	0.4	1	μμf
Pentode Unit:			
Grid No.1 to plate	0.01 max.	0.006 max.	μμf
Grid No.1 to all other electrodes except plate. .	5	5	μμf
Plate to all other electrodes except grid No.1.	2.5	3.4	μμf
Heater to cathode (Each unit).	3	3•	μμf

Characteristics, Class A_1 Amplifier:

	Triode Unit	*Pentode Unit*	
Heater Voltage	13.5	13.5	volts
Plate-Supply Voltage	150	250	volts
Grid-No.2 (Screen-Grid) Supply Voltage	–	110	volts
Cathode Resistor	56	68	ohms
Amplification Factor	40	–	
Plate Resistance (Approx.) . . .	4700	400000	ohms
Transconductance	8500	5200	μmhos
Plate Current.	18	10	ma
Grid-No.2 Current.	–	3.5	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10.	−12	−10	volts

Mechanical:

Operating Position . . . . . Any
Maximum Overall Length . . . . . 2-3/16"
Maximum Seated Length. . . . . 1-15/16"
Length, Base Seat to Bulb Top (Excluding tip) . 1-9/16" ± 3/32"
Diameter . . . . . 0.750" to 0.875"
Dimensional Outline. . . . . *See General Section*

°,•: see next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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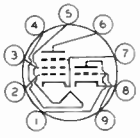
MEDIUM-MU TRIODE— SHARP-CUTOFF PENTODE

Bulb. T6-1/2
Base. . . . . Small-Button Novel 9-Pin (JETEC No.19-1)
Basing Designation for BOTTOM VIEW. 9AE

Pin 1 – Triode Plate
Pin 2 – Pentode Grid No.1
Pin 3 – Pentode Grid No.2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Pentode Plate
Pin 7 – Pentode Cathode, Pentode Grid No.3, Internal Shield
Pin 8 – Triode Cathode
Pin 9 – Triode Grid



AMPLIFIER — Class A_1

Maximum Ratings, *Absolute Values:*

	Triode Unit	*Pentode Unit*	
PLATE VOLTAGE	300 max.	300 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE.	–	300 max.	volts
GRID-No.2 VOLTAGE	–	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No.1 (CONTROL-GRID) VOLTAGE: Positive-bias value	0 max.	0 max.	volts
GRID-No.2 INPUT: For grid-No.2 voltages up to 150 volts	–	0.5 max.	watt
For grid-No.2 voltages between 150 and 300 volts .	–	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
PLATE DISSIPATION	2.5 max.	2.8 max.	watts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode.	120 max.	120 max.	volts
Heater positive with respect to cathode.	120 max.	120 max.	volts

Maximum Circuit Values:

	Triode Unit	*Pentode Unit*	
Grid-No.1-Circuit Resistance: For fixed-bias operation. . .	0.5 max.	0.5 max.	megohm
For cathode-bias operation. .	1 max.	1 max.	meg ohm

° With external shield JETEC No.315 connected to cathode of unit under test except as noted.

• With external shield JETEC No.315 connected to ground.

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MEDIUM-MU TRIODE—SHARP-CUTOFF PENTODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.179	0.211	amp
Transconductance (Triode unit)	1,2	6800	10200	μmhos
Plate Current (Triode unit)	1,3	12.7	23.3	ma
Transconductance (Pentode unit)	1,4	3900	6500	μmhos
Plate Current (Pentode unit)	1,5	7.5	12.5	ma
Grid-No.2 Current (Pentode unit)	1,5	2.2	4.8	ma
Reverse Grid-No.1 Current (Total—both units)	1,6	–	-1.5	μa
Heater-Cathode Leakage Current (Each unit):				
Heater negative with respect to cathode	1,7	–	5	μa
Heater positive with respect to cathode	1,7	–	5	μa
Leakage Resistance (Each unit):				
Between grid No.1 and all other electrodes of both units tied together	1,8	50	–	megohms
Between plate and all other electrodes of both units tied together	1,9	50	–	megohms

Note 1: With ac or dc heater volts = 13.5.

Note 2: With dc plate-supply volts = 150, cathode resistor (ohms) = 56, and cathode-bypass capacitor (μf) = 1000.

Note 3: With dc plate-supply volts = 150, and cathode resistor (ohms) = 56.

Note 4: With dc plate-supply volts = 250, grid-No.2 supply volts = 110, cathode resistor (ohms) = 68, and cathode-bypass capacitor (μf) = 1000.

Note 5: With dc plate-supply volts = 250, grid-No.2 supply volts = 110, and cathode resistor (ohms) = 68.

Note 6: With triode dc plate volts = 150, pentode dc plate volts = 250, grid-No.2 volts = 110, grid-No.1 volts = -1.5 on both units, and grid-No.1 resistor (megohms) = 0.5 for each unit.

Note 7: With 50 volts dc between heater and cathode.

Note 8: With grid No.1 100 volts negative with respect to all other electrodes of both units tied together.

Note 9: With plate 300 volts negative with respect to all other electrodes of both units tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 17 cycled one minute on and four minutes off, heater 135 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

World Radio History

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MEDIUM-MU TRIODE—
SHARP-CUTOFF PENTODE

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions:

Triode Unit:
Heater volts = 13.5, plate-supply volts = 150, grid volts = −1.5, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 150 millivolts.

Pentode Unit:
Heater volts = 13.5, plate-supply volts = 250, grid-No.2 volts = 110, grid-No.1 volts = −1.5, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 250 millivolts.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: heater volts = 15 and maximum-rated plate dissipation and grid-No.2 input.

World Radio History

RCA

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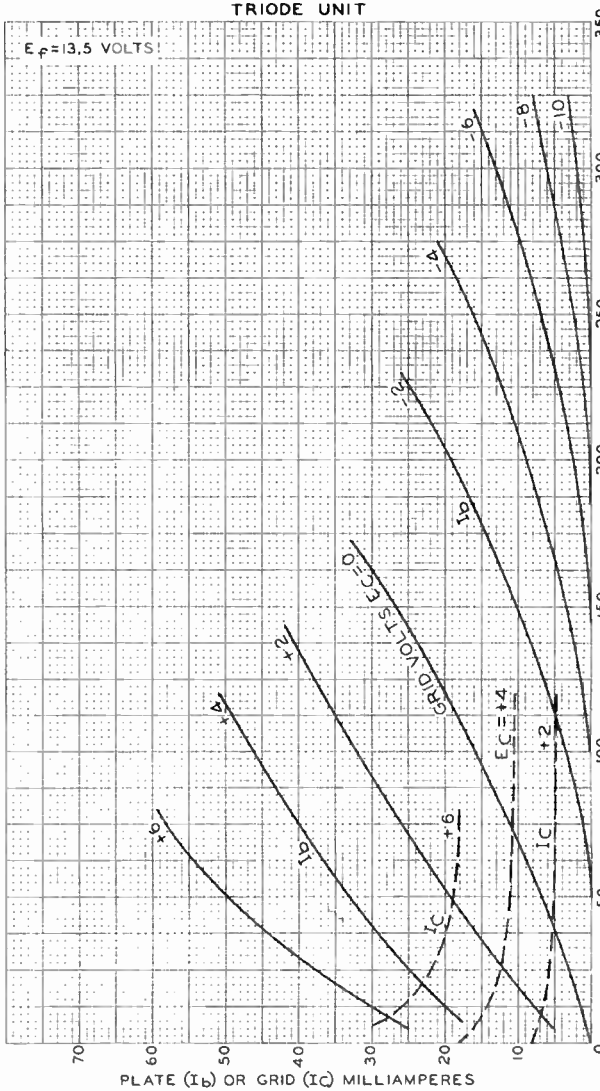
AVERAGE CHARACTERISTICS

TRIODE UNIT



ELECTRON TUBE DIVISION 92CM-9810

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World Radio History

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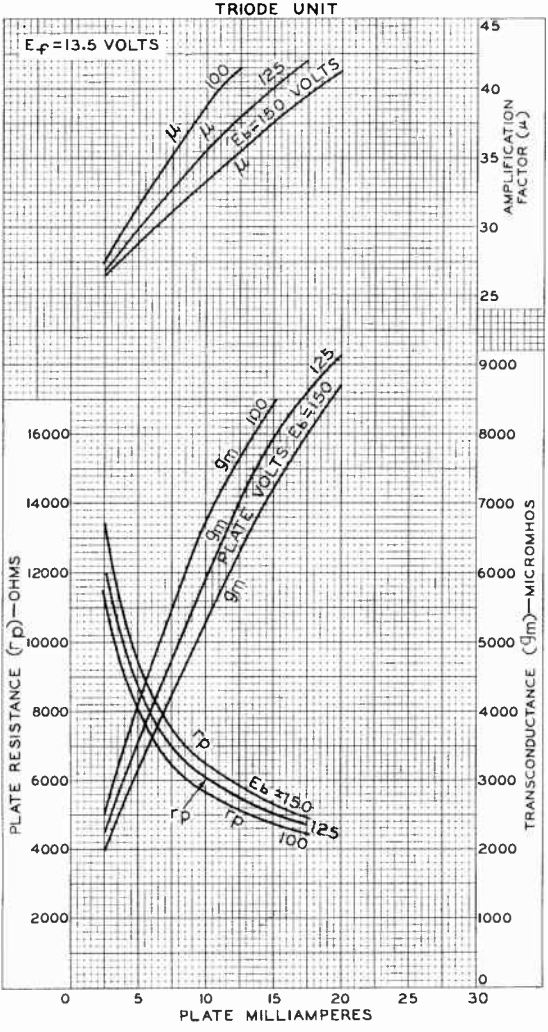
AVERAGE CHARACTERISTICS

TRIODE UNIT



ELECTRON TUBE DIVISION

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92CM-9812

World Radio History

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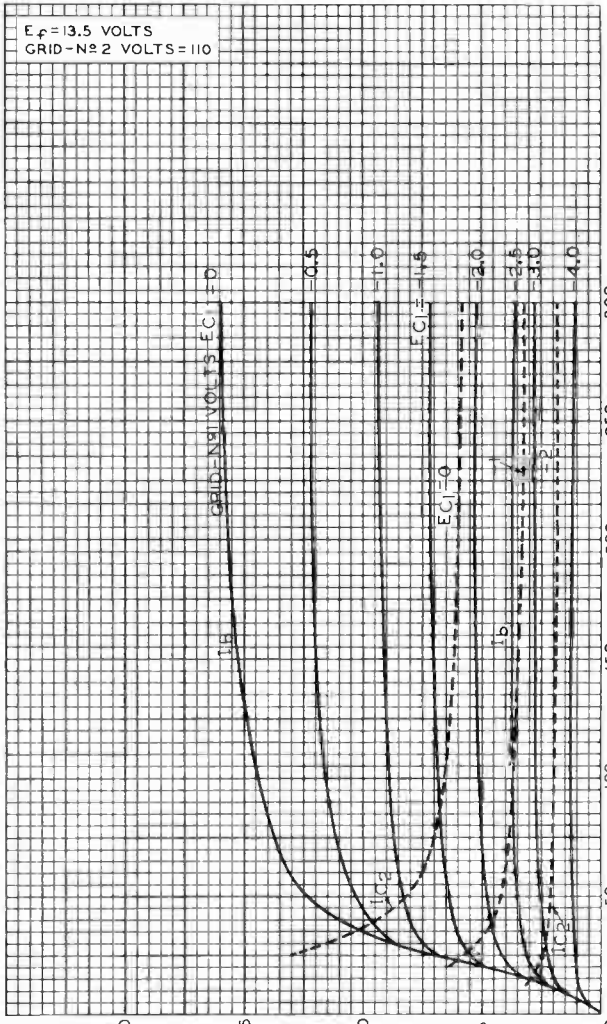
AVERAGE CHARACTERISTICS
PENTODE UNIT



ELECTRON TUBE DIVISION 92CM-9809

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World Radio History

World Radio History

7060

MEDIUM-MU TRIODE—POWER PENTODE

9-PIN MINIATURE TYPE

For use in mobile communications equipment operating from 6-cell storage-battery systems. The pentode unit is useful in class-C-amplifier and frequency-multiplier applications at frequencies up to 40 Mc. The triode unit is useful as a reactance modulator.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:		
Voltage range	12 to 15	ac or dc volts
Current (Approx.) at 13.5 volts	0.28	amp
Direct Interelectrode Capacitances:°		
Triode Unit:		
Grid to plate	2.2	μμf
Grid to cathode and heater	2.4	μμf
Plate to cathode and heater	0.22	μμf
Pentode Unit:		
Grid No.1 to plate	0.044	μμf
Grid No.1 to all other electrodes except plate	7.1	μμf
Plate to all other electrodes except grid No.1	2.5	μμf
Triode grid to pentode plate	0.022 max.	μμf
Pentode grid No.1 to triode plate	0.015 max.	μμf
Pentode plate to triode plate	0.16 max.	μμf

Characteristics, Class A_1 Amplifier:

	Triode Unit	*Pentode Unit*	
Heater Voltage	13.5	13.5	volts
Plate-Supply Voltage	150	200	volts
Grid-No.2 (Screen-Grid) Supply Voltage	–	125	volts
Cathode Resistor	150	82	ohms
Amplification Factor	40	–	
Plate Resistance (Approx.)	8200	150000	ohms
Transconductance	4900	7000	μmhos
Plate Current	9	15	ma
Grid-No.2 Current	–	3.4	ma
Grid-No.1 Voltage (Approx.) for plate μa = 100	-6.5	-8	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2

°: See next page.

World Radio History

7060

MEDIUM-MU TRIODE–POWER PENTODE

Base. . . . . .Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW. 9DA

Pin 1 – Triode Plate
Pin 2 – Triode Grid
Pin 3 – Triode Cathode
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Pentode Plate
Pin 7 – Pentode Grid No.2

Pin 8 – Pentode Grid No.1
Pin 9 – Pentode Grid No.3, Pentode Cathode, Internal Shield

AMPLIFIER — Class A_1

Maximum Ratings, *Absolute Values:*

	Triode Unit	*Pentode Unit*	
PLATE VOLTAGE	300 max.	300 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE.	–	300 max.	volts
GRID-No.2 VOLTAGE	–	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
GRID-No.1 (CONTROL-GRID) VOLTAGE:			
Positive-bias value	0 max.	0 max.	volts
GRID-No.2 INPUT:			
For grid-No.2 voltages up to 150 volts	–	1 max.	watt
For grid-No.2 voltages between 150 and 300 volts .	–	*See Grid-No.2 Input Rating Chart at front of Receiving Tube Section*	
PLATE DISSIPATION	2.5 max.	3 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	120 max.	120 max.	volts
Heater positive with respect to cathode.	120 max.	120 max.	volts

Maximum Circuit Values:

	Triode Unit	*Pentode Unit*	
Grid-No.1-Circuit Resistance:			
For fixed-bias operation. . .	0.5 max.	0.25 max.	megohm
For cathode-bias operation. .	1 max.	1 max.	megohm

D: See next page.

World Radio History

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MEDIUM-MU TRIODE—POWER PENTODE

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy■
and
RF POWER AMPLIFIER — Class C FM Telephony

Pentode Unit

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	150 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	50 max.	volts
Positive-bias value	0 max.	volts
DC PLATE CURRENT	20 max.	ma
DC GRID-No.2 CURRENT	7 max.	ma
DC GRID-No.1 CURRENT	3 max.	ma
GRID-No.2 INPUT	0.8 max.	watt
PLATE DISSIPATION	2.75 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	120 max.	volts
Heater positive with respect to cathode	120 max.	volts

Typical Operation:

At frequencies up to 40 Mc

Heater Voltage	13.5	13.5	13.5	volts
DC Plate Voltage	200	250	300	volts
DC Grid-No.2 Voltage	85	105	125	volts
DC Grid-No.1 Voltage	-7	-9	-11	volts
DC Plate Current	11	15	20	ma
DC Grid-No.2 Current	3.2	4.5	6	ma
DC Grid-No.1 Current (Approx.)	0.9	1.2	1.6	ma
Driving Power (Approx.)	9	15	25	mw
Power Output	1.3	2.1	3.5	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	0.1 max.	megohm

○ Without external shield.

■ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

● Continuous Commercial Service.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.26	0.3	amp
Amplification Factor (Triode unit)	1,2	32	48	
Transconductance (Triode unit)	1,2	3800	6000	μmhos
Plate Current (Triode unit)	1,3	6.5	12.5	ma
Transconductance (Pentode unit)	1,4	5200	8800	μmhos

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MEDIUM-MU TRIODE—POWER PENTODE

	Note	Min.	Max.	
Plate Current (Pentode unit) . .	1,5	11.2	22.8	ma
Grid-No.2 Current (Pentode unit).	1,5	2.2	4.6	ma
Direct Interelectrode Capacitance:				
Grid No.1 to plate (Pentode unit).	6	0.035	0.053	μμf
Reverse Grid-No.1 Current (Total—both units)	1,7	–	-2	μa
Heater-Cathode Leakage Current (Each unit):				
Heater negative with respect to cathode.	1,8	–	30	μa
Heater positive with respect to cathode.	1,8	–	30	μa
Leakage Resistance (Each unit):				
Between grid No.1 and all other electrodes of both units tied together	1,9	50	–	megohms
Between plate and all other electrodes of both units tied together	1,10	50	–	megohms

Note 1: With ac or dc heater volts = 13.5.

Note 2: With dc plate-supply volts = 150, cathode resistor (ohms) = 150, and cathode-bypass capacitor (μf) = 1000.

Note 3: With dc plate-supply volts = 150, and cathode resistor (ohms) = 150.

Note 4: With dc plate-supply volts = 200, grid-No.2 supply volts = 125, cathode resistor (ohms) = 82, and cathode-bypass capacitor (μf) = 1000.

Note 5: With dc plate-supply volts = 200, grid-No.2 supply volts = 125, and cathode resistor (ohms) = 82.

Note 6: Without external shield.

Note 7: With pentode dc plate-supply volts = 150, grid-No.2 supply volts = 180, pentode cathode resistor (ohms) = 120, pentode grid-No.1 resistor (megohms) = 1, triode dc plate-supply volts = 180, triode cathode resistor (ohms) = 75, and triode grid resistor (megohms) = 0.5.

Note 8: With 100 volts dc between heater and cathode.

Note 9: With grid No.1 100 volts negative with respect to all other electrodes of both units tied together.

Note 10: With plate 300 volts negative with respect to all other electrodes of both units tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 17 cycled one minute on and four minutes off, heater 135 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

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MEDIUM-MU TRIODE—POWER PENTODE

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions:

Triode Unit:

Heater volts = 13.5, plate-supply volts = 150, grid volts = −1.5, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 150 millivolts.

Pentode Unit:

Heater volts = 13.5, plate-supply volts = 200, grid-No.2 volts = 125, grid-No.1 volts = −2, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 250 millivolts.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against eqidemic failures. Life testing is conducted under the following conditions: heater volts = 15 and maximum-rated plate dissipation and grid-No.2 input.

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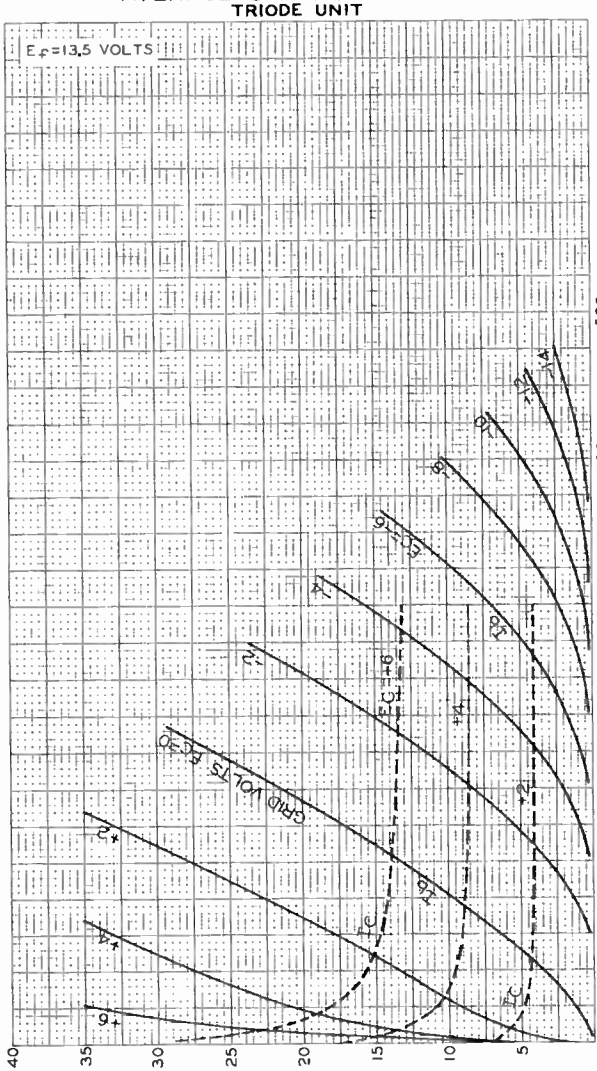
AVERAGE CHARACTERISTICS

TRIODE UNIT



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92CM-9807

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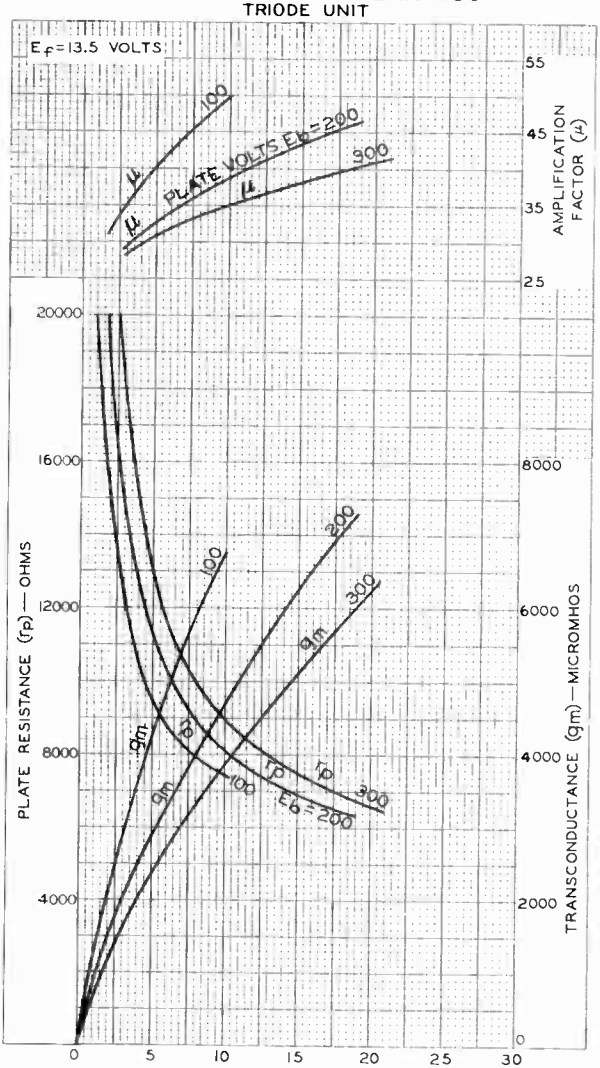
AVERAGE CHARACTERISTICS

TRIODE UNIT



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92CM-9806

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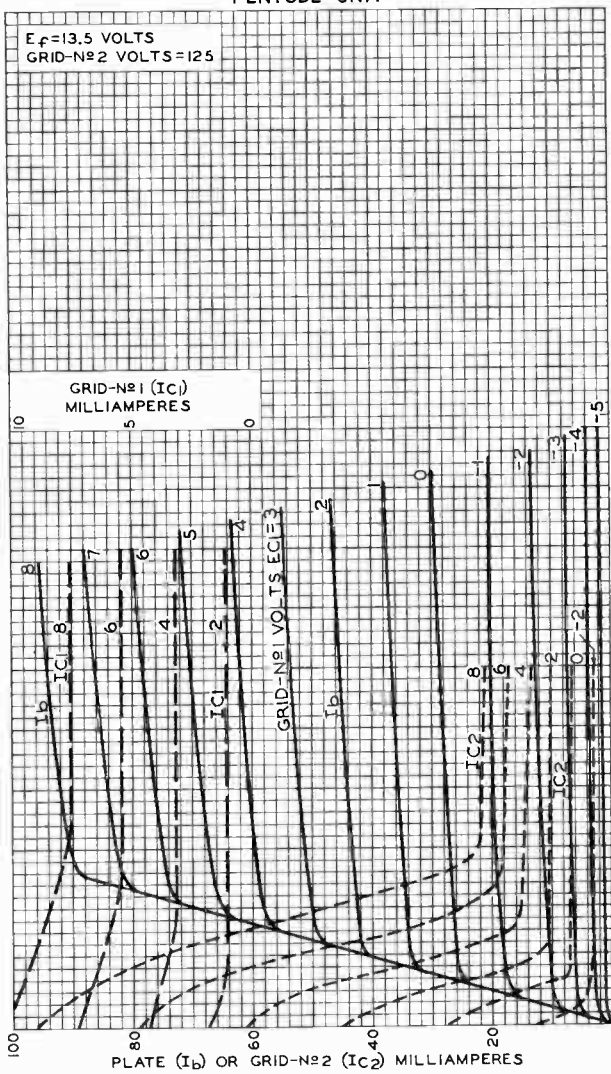
AVERAGE CHARACTERISTICS
PENTODE UNIT



ELECTRON TUBE DIVISION 92CM-9815

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World Radio History

7060

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7060

AVERAGE CHARACTERISTICS

PENTODE UNIT

E_f=13.5 VOLTS

GRID-№2 VOLTS=125

PLATE VOLTS

0 100 200 300 400 500

PLATE (I_b) OR GRID-№2 (I_{C2}) MILLIAMPERES

0 5 10 15 20 25 30 35 40

I_b

I_{C2}

E_{C1}=0

-0.5

-1

GRID-№1 VOLTS E_{C1}=-1.5

-2

-2.5

-3

-3.5

-4

-4.5

-5

-5.5

-6

E_{C1}=0

92CM-9811

ELECTRON TUBE DIVISION

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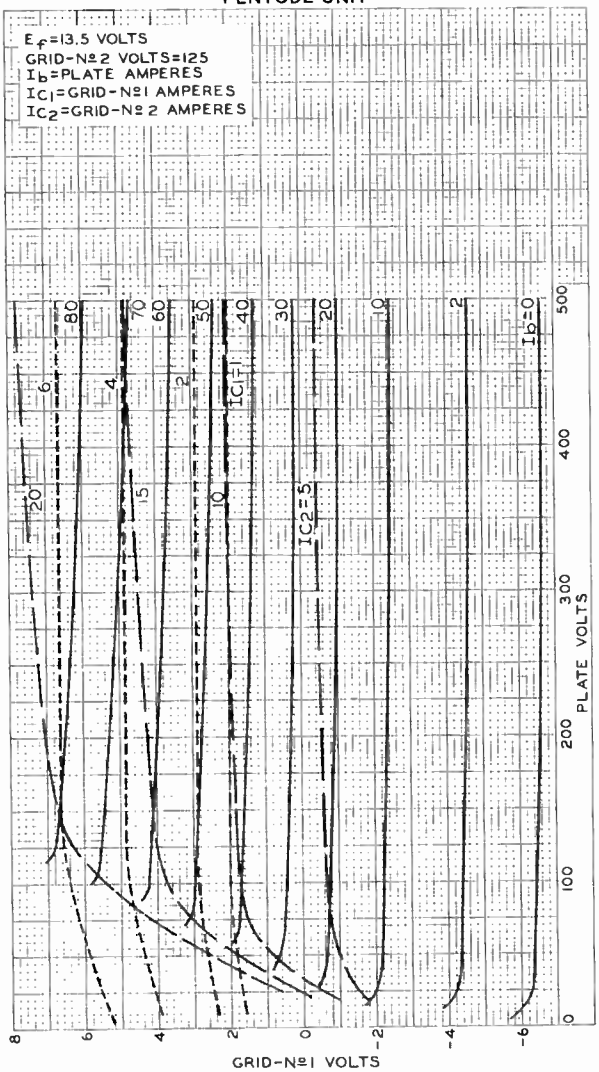
AVERAGE CONSTANT-CURRENT CHARACTERISTICS

PENTODE UNIT



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92CM-9803

World Radio History

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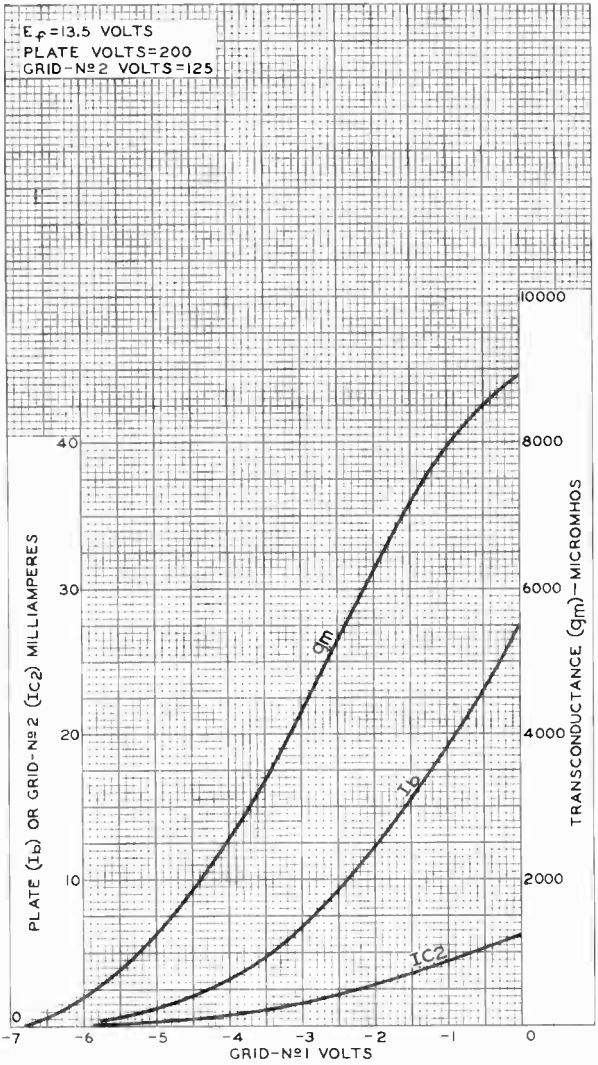
AVERAGE CHARACTERISTICS
PENTODE UNIT



World Radio History

7061

BEAM POWER TUBE

9-PIN MINIATURE TYPE

For use in mobile communications equipment operating from 6-cell storage-battery systems

GENERAL DATA

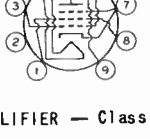
Electrical:

Heater, for Unipotential Cathode:		
Voltage range	12 to 15	ac or dc volts
Current (Approx.) at 13.5 volts	0.21	amp
Direct Interelectrode Capacitances:[c]		
Grid No.1 to plate	0.7 max.	μμf
Grid No.1 to all other electrodes except plate	8	μμf
Plate to all other electrodes except grid No.1	8.5	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JETEC No.E9-1)
Basing Designation for BOTTOM VIEW	9EU

Pin 1 - Grid No.2
Pin 2 - No Connection
Pin 3 - Grid No.1
Pin 4 - Heater
Pin 5 - Heater



Pin 6 - Grid No 1
Pin 7 - Cathode, Grid No.3
Pin 8 - Grid No.2
Pin 9 - Plate

AMPLIFIER — Class A_1

Maximum Ratings, *Absolute Values:*

PLATE VOLTAGE	345 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	310 max.	volts
GRID-No.2 INPUT	2 max.	watts
PLATE DISSIPATION	9 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	120 max.	volts
Heater positive with respect to cathode	120 max.	volts

Typical Operation and Characteristics:

Heater Voltage	13.5	volts
Plate Voltage	200	volts
Grid-No.2 Voltage	200	volts
Grid-No.1 (Control-Grid) Voltage	-10	volts

[c] Without external shield.

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World Radio History

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BEAM POWER TUBE

Peak AF Grid-No.1 Voltage	10	volts
Zero-Signal Plate Current	35.5	ma
Max.-Signal Plate Current	38	ma
Zero-Signal Grid-No.2 Current	9	ma
Max.-Signal Grid-No.2 Current	7.5	ma
Plate Resistance (Approx.)	60000	ohms
Transconductance	4200	μmhos
Load Resistance	5000	ohms
Total Harmonic Distortion	7	%
Max.-Signal Power Output	3	watts

Maximum Circuit Values:

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

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.19	0.23	amp
Transconductance	1,2	3100	5800	μmhos
Plate Current	1,2	26	45	ma
Grid-No.2 Current	1,2	–	6.5	ma
Reverse Grid-No.1 Current	1,3	–	-2	μa
Power Output	1,4	2.4	–	watts
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,5	–	50	μa
Heater positive with respect to cathode	1,5	–	50	μa
Leakage Resistance:				
Between grid No.1 and all other electrodes tied together	1,6	50	–	megohms
Between plate and all other electrodes tied together	1,7	50	–	megohms

Note 1: With ac or dc heater volts = 13.5.

Note 2: With dc plate volts = 200, grid-No.2 volts = 200, grid-No.1 volts = -10, and grid No.3 connected to cathode.

Note 3: With grid-No.1 resistor (megohms) = 0.1.

Note 4: With load resistor (ohms) = 5000, and rms signal volts = 7.1.

Note 5: With 100 volts dc between heater and cathode.

Note 6: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 7: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent

World Radio History

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BEAM POWER TUBE

operation is applied under the following conditions: heater volts = 17 cycled one minute on and four minutes off, heater 135 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 13.5, plate volts = 200, grid-No.2 volts = 200, grid-No.1 volts = -10, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 500 millivolts.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: heater volts = 15, and maximum-rated plate dissipation and grid-No.2 input.

World Radio History

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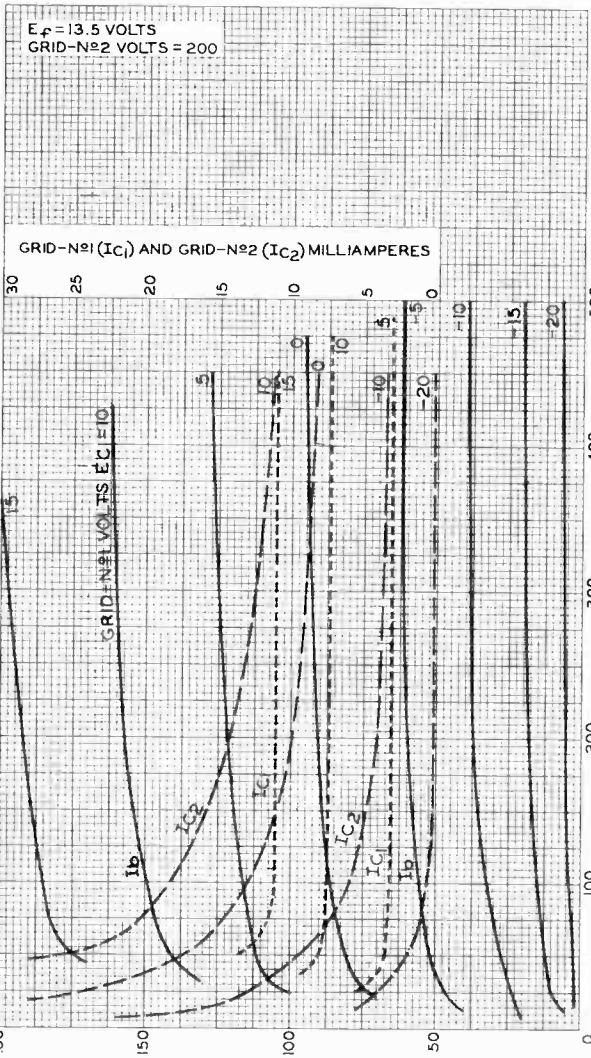
AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9802

World Radio History

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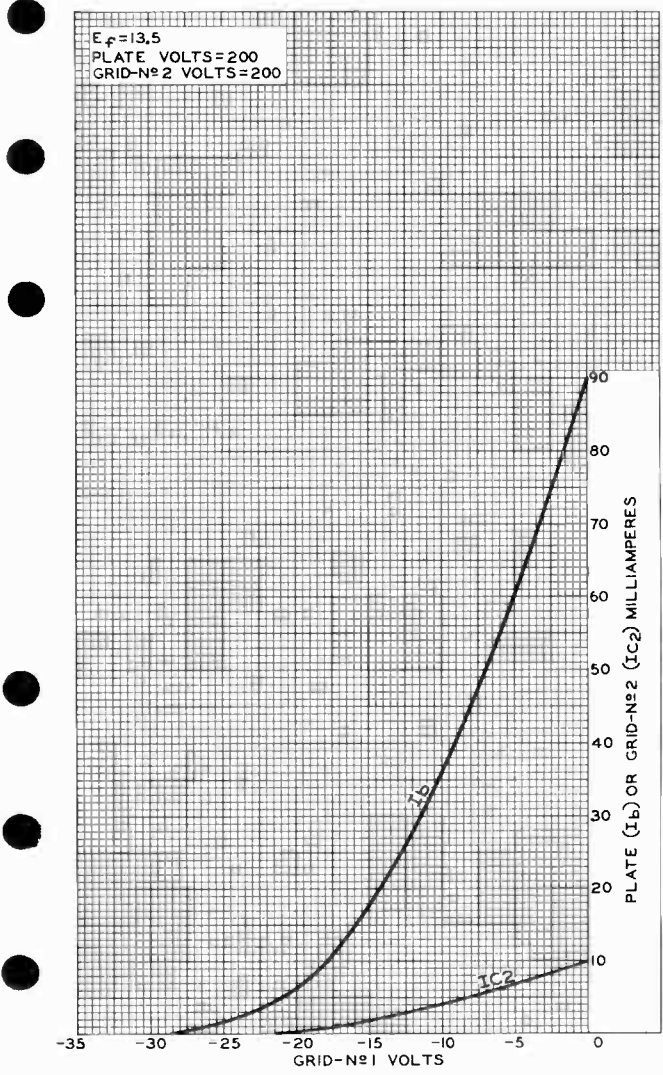
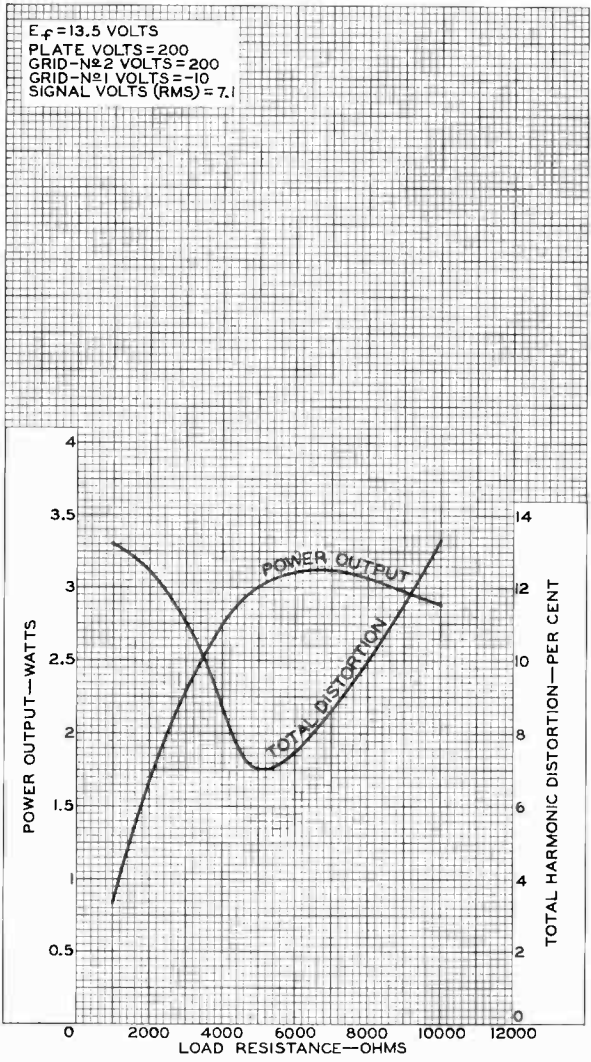
AVERAGE CHARACTERISTICS



7061

OPERATION CHARACTERISTICS



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9814

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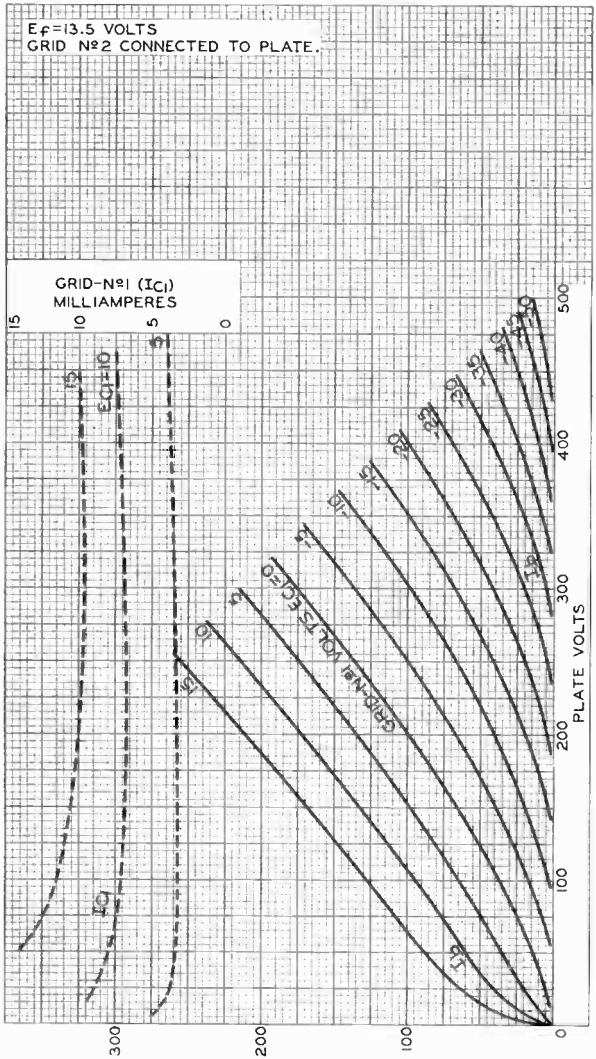
AVERAGE CHARACTERISTICS
TRIODE CONNECTION



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
92CM-9801

World Radio History

World Radio History

Power Pentode

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

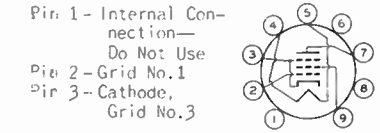
Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3	volts
Current	0.76	amp
Direct Interelectrode Capacitances (Approx.):[a]		
Grid No.1 to plate	0.5	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	10.8	μμf
Plate to cathode & grid No.3, grid No.2, and heater	6.5	μμf
Grid No.1 to heater	0.25	μμf

Characteristics, Class A_1 Amplifier:

Plate Voltage	250	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage	-7.3	volts
Mu-Factor, Grid No.2 to Grid No.1	19.5	
Plate Resistance (Approx.)	40000	ohms
Transconductance	11300	μmhos
Plate Current	48	ma
Grid-No.2 Current	5.5	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	3-1/16"
Maximum Seated Length	2-13/16"
Length, Base Seat to Bulb Top (Excluding tip)	2-7/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9CV



PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	400 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts
CATHODE CURRENT	65 max.	ma
PLATE DISSIPATION	12 max.	watts
ZERO-SIGNAL GRID-No.2 INPUT	2 max.	watts

World Radio History

MAX.-SIGNAL GRID-No.2 INPUT.	4 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. .	100 max.	volts
Heater positive with respect to cathode. .	100 max.	volts

Typical Operation:

Values are for 2 tubes

Plate Voltage.	400	volts
Grid-No.2 Voltage.	300	volts
Grid-No.1 Voltage.	-15	volts
Peak AF Grid-No.1 Voltage.	14.8	volts
Zero-Signal Plate Current.	15	ma
Max.-Signal Plate Current.	105	ma
Zero-Signal Grid-No.2 Current.	1.6	ma
Max.-Signal Grid-No.2 Current.	25	ma
Effective Load Resistance (Plate to plate)	8000	ohms
Total Harmonic Distortion.	4	%
Max.-Signal Power Output	24	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.3 max.	megohm

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Grid No.2 of each tube connected to tap on plate winding of output transformer

Maximum Ratings, *Design Center Values:*

→ PLATE AND GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	375 max.	volts
CATHODE CURRENT.	65 max.	ma
PLATE DISSIPATION.	12 max.	watts
ZERO-SIGNAL GRID-No.2 INPUT.	2 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT.	4 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. .	100 max.	volts
Heater positive with respect to cathode. .	100 max.	volts

Typical Operation:

Values are for 2 tubes

Plate Supply Voltage	375[b]	volts
Grid-No.2 Supply Voltage		
Cathode Resistor	220	ohms
Peak AF Grid-No.1 Voltage.	17.7	volts
→ Zero-Signal Cathode Current.	70	ma
→ Max.-Signal Cathode Current.	81	ma
Effective Load Resistance (Plate to plate)	11000	ohms
Total Harmonic Distortion.	3	%
Max.-Signal Power Output	16.5	watts

→ Indicates a change.

World Radio History

Maximum Circuit Values:

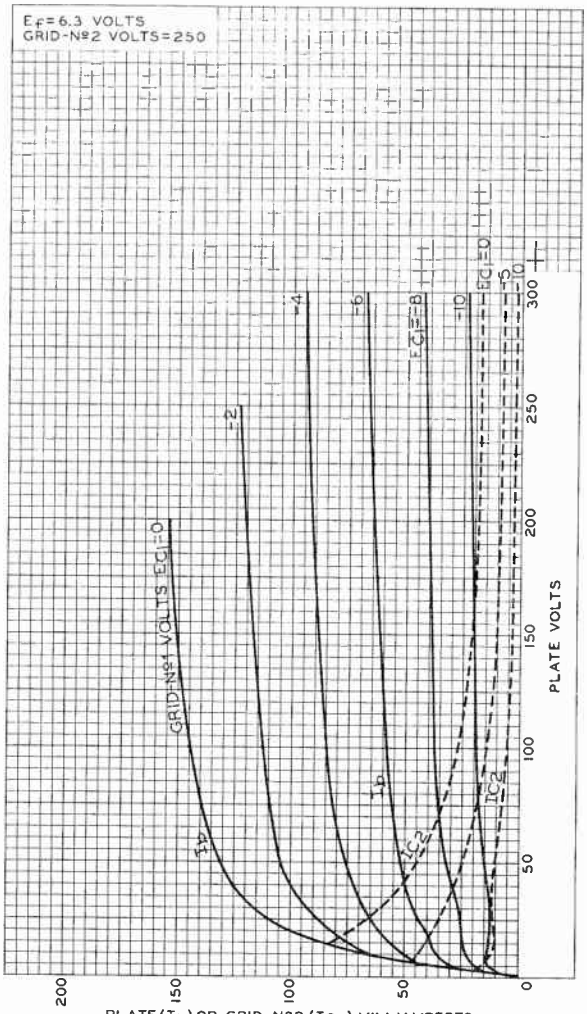
Grid-No.1-Circuit Resistance:
For cathode-bias operation. . . . . 1 max. megohm

[a] Without external shield.

[b] Obtained from taps on the primary winding of the output transformer. The taps are located on each side of the center-tap (B+) so as to supply 43 per cent of the plate signal voltage to grid No.2 of each output tube.

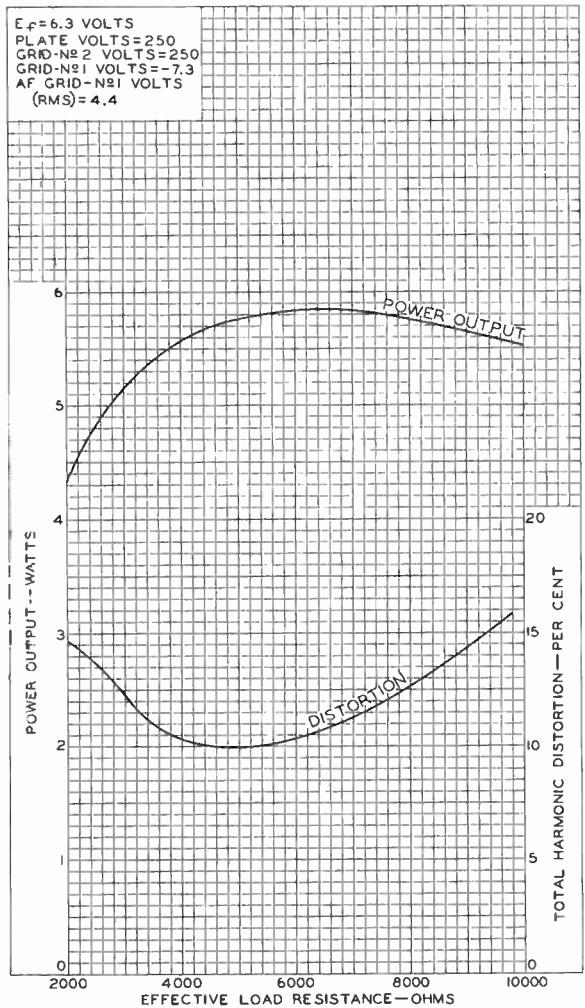
World Radio History

AVERAGE CHARACTERISTICS



92CM-9903

OPERATION CHARACTERISTICS



92CM-9902

World Radio History

Beam-Deflection Tube

9-PIN MINIATURE TYPE

For Use in Balanced-Modulator, Balanced Mixer, and Frequency-Converter Applications in Single- and Double-Sideband, Suppressed-Carrier Communication Equipment Operating at Frequencies up to 100 Mc

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current	0.35	amp
Direct Interelectrode Capacitances (Approx.):[a]		
Grid No.1 to all other electrodes except plate	7.5	μμf
Grid No.1 to deflecting electrode No.1	0.015	μμf
Grid No.1 to deflecting electrode No.2	0.015	μμf
Grid-No.1 to plate No.1	0.003	μμf
Grid No.1 to plate No.2	0.003	μμf
Plate No.1 to all other electrodes except deflecting electrode No.1	0.8	μμf
Plate No.2 to all other electrodes except deflecting electrode No.2	0.8	μμf
Plate No.1 to plate No.2	0.3	μμf
Deflecting electrode No.1 to all other electrodes except plate No.1	4.6	μμf
Deflecting electrode No.2 to all other electrodes except plate No.2	4.6	μμf
Deflecting electrode No.1 to plate No.1	4	μμf ←
Deflecting electrode No.2 to plate No.2	4	μμf ←
Deflecting electrode No.1 to deflecting electrode No.2	1.4	μμf

Characteristics, Class A_1 Amplifier:

Plate-No.1 Supply Voltage	150	volts
Plate-No.2 Supply Voltage	150	volts
Deflecting-Electrode-No.1 Supply Voltage	25	volts
Deflecting-Electrode-No.2 Supply Voltage	25	volts
Grid-No.2 Supply Voltage	175	volts
Cathode Resistor	150	ohms
Total Beam Current (Plate-No.1 current plus plate-No.2 current)	8.5	ma ←
Grid-No.2 Current	2.1	ma ←

← Indicates a change.

World Radio History

Transconductance:		
Grid No.1 to both plates connected together	5400	μmhos
→ Deflecting electrode No.1 to plate No.1[b]	800	μmhos
Deflecting electrode No.2 → to plate No.2[b]	800	μmhos
Switching Voltage[c]	11	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9KS

Pin 1 – Cathode, Internal Shield
Pin 2 – Grid No.2
Pin 3 – Grid No.1
Pin 4 – Heater
Pin 5 – Heater

Pin 6 – Plate No.2
Pin 7 – Plate No.1
Pin 8 – Deflecting Electrode No.2
Pin 9 – Deflecting Electrode No.1

BALANCED MODULATOR

Maximum Ratings, *Absolute-Maximum Values:*

PLATE-No.1 VOLTAGE	300	max.	volts
PLATE-No.2 VOLTAGE	300	max.	volts
DEFLECTING-ELECTRODE-No.1 VOLTAGE	±100	max.	volts
DEFLECTING-ELECTRODE-No.2 VOLTAGE	±100	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	250	max.	volts
GRID-No.2 INPUT	0.5	max.	watt
PLATE-No.1 DISSIPATION	1.5	max.	watts
PLATE-No.2 DISSIPATION	1.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	180	max.	volts
Heater positive with respect to cathode	180[d]	max.	volts

Typical Operation:

In accompanying balanced-modulator circuit utilizing separate excitation[e]

Plate Voltage (Each plate)	150	volts
Deflecting-Electrode Voltage (Approx., each electrode)	25	volts
Grid-No.2 Voltage	175	volts

→ Indicates a change.

World Radio History

Cathode Resistor	1200		ohms
Peak-to-Peak AF Deflecting-Electrode Voltage[f]	2.8		volts
Peak-to-Peak RF Grid-No.1 Voltage	10		volts
Plate Current (Each plate)	1.5		ma
Grid-No.2 Current	0.75		ma
Plate-to-Plate Load Impedance (Approx.)	5000		ohms
Push-Pull, Peak-to-Peak Double-Sideband Output Voltage	4		volts
Carrier Suppression[g]	60		db ←
Third-Order Distortion[g]	-47		db
Fourth-Order Distortion[g]	-45		db

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.5	max.	megohm
For cathode-bias operation	2.2	max.	megohms
Deflecting-Electrode-Circuit Resistance (Per deflecting electrode)	0.05	max.	megohm

BALANCED MIXER

Maximum Ratings, *Absolute-Maximum Values:*

PLATE-No.1 VOLTAGE	300	max.	volts
PLATE-No.2 VOLTAGE	300	max.	volts
DEFLECTING-ELECTRODE-No.1 VOLTAGE	±100	max.	volts
DEFLECTING-ELECTRODE-No.2 VOLTAGE	±100	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	250	max.	volts
GRID-No.2 INPUT	0.5	max.	watt
PLATE-No.1 DISSIPATION	1.5	max.	watts
PLATE-No.2 DISSIPATION	1.5	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	180	max.	volts
Heater positive with respect to cathode	180[d]	max.	volts

Typical Operation:

	In accompanying balanced-mixer circuit utilizing separate excitation[e]		
Plate Voltage (Each plate)	150		volts
Deflecting-Electrode Voltage (Approx., each electrode)	25		volts
Grid-No.2 Voltage	175		volts
Cathode Resistor	1200		ohms
Peak-to-Peak Single-Sideband Deflecting-Electrode Voltage[f]	8		volts
Peak-to-Peak RF Grid-No.1 Voltage	10		volts
Plate Current (Each plate)	1.5		ma
Grid-No.2 Current	0.75		ma

← Indicates a change.

World Radio History

Plate-to-Plate Load Impedance (Approx.)	10000		ohms
Push-Pull, Peak-to-Peak Single-Sideband Output Voltage	40		volts
Oscillator Rejection[g]	-40		db
Third-Order Distortion[g]	-40		db
Fourth-Order Distortion[g]	-39		db

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.5	max.	megohm
For cathode-bias operation	2.2	max.	megohms
Deflecting-Electrode-Circuit Resistance (Per deflecting electrode)	0.05	max.	megohm

[a] Without external shield.

[b] Defined as the partial derivative of the plate current with respect to the difference between the deflecting-electrode voltages, evaluated about the point of equal plate currents.

[c] Defined as the sum of (a) the absolute value of the difference between the deflecting-electrode voltages when the current to one plate is equal to 90% of the total beam current and (b) the absolute value of the difference between the deflecting-electrode voltages when the current to the same plate is equal to 10% of the total beam current. This sum, expressed in terms of signal voltage, corresponds to the peak-to-peak value of signal voltage that is required between the deflecting electrodes to produce peak-to-peak signal current at either plate equal to 80% of the total beam current.

[d] The dc component must not exceed 100 volts.

[e] Operation with self-excitation and cathode resistor of 300 ohms is similar to operation with separate excitation.

[f] To either deflecting electrode. The other deflecting electrode is bypassed.

[g] Referred to single-sideband output voltage.

OPERATING CONSIDERATIONS

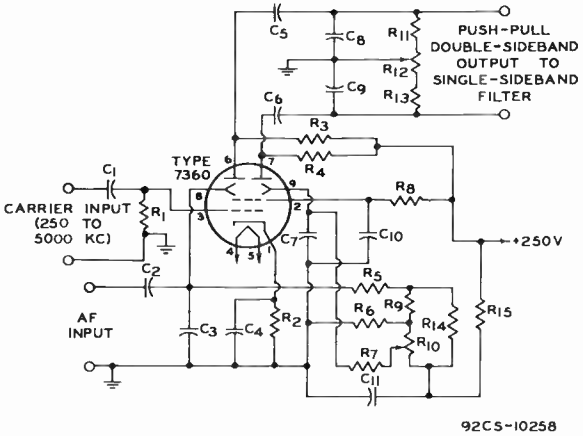
Deflecting-electrode-circuit resistance should be kept below 0.05 megohm to prevent nonlinear tube operation. The resistances of the two deflecting-electrode circuits should be approximately equal to minimize unbalance. The current drawn by each *deflecting-electrode* is in the order of 40 microamperes.

Magnetic fields adversely affect the intrinsic operating plate-current balance of the 7360. Although this tube is internally shielded to minimize this effect, the tube should be mounted as far as possible from all devices producing extraneous magnetic fields such as transformers, chokes, motors, or similar components. It is recommended that an external shield be used in those applications critical for balance.

Chassis layout should be such that all components and wiring associated with the plates and deflecting electrodes is symmetrical. This consideration is particularly important in rf applications where very small differences in stray capacitance can result in unbalance. Chassis layouts which permit heat or vibration to affect the components associated with one deflecting-electrode circuit or plate circuit more than the other, should be avoided. All components should be rigidly mounted.

World Radio History

BALANCED-MODULATOR CIRCUIT
With Separate Excitation



92CS-10258

C_1: 0.001 μf
C_2: 0.22 μf
C_3: 0.001 μf
C_4: 0.01 μf
C_5 C_6: 0.0033 μf
C_7: 0.1 μf
C_8 C_9: Sufficient to resonate input of SSB filter
C_{10}: 0.22 μf
C_{11}: 0.47 μf
R_1: 0.47 megohm
R_2: 1200 ohms
R_3 R_4: 68000 ohms
R_5: 47000 ohms
R_6: 12000 ohms
R_7: 47000 ohms
R_8: 0.1 megohm
R_9: 2700 ohms
R_{10}: Carrier-Balance Potentiometer, 5000 ohms
R_{11}: 2700 ohms
R_{12}: Quadrature-Balance Potentiometer, 2500 ohms
R_{13} R_{14}: 2700 ohms
R_{15}: 0.1 megohm
NOTE: All resistors 1/2 watt, ± 10% unless specified. All capacitors 400 volts.

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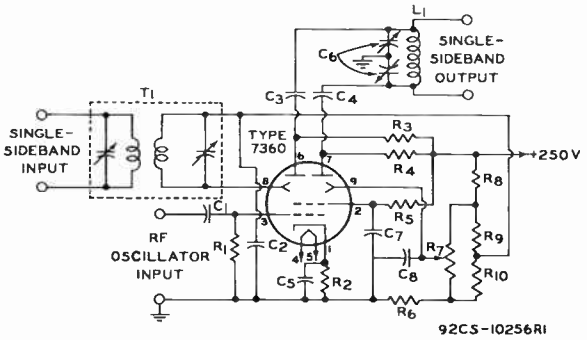
World Radio History

7360

BALANCED-MIXER CIRCUIT
With Separate Excitation



C_1: 0.001 μf
C_2: 0.04 μf
C_3 C_4: 0.001 μf
C_5: 0.04 μf
C_6: Split-Stator Tuning Capacitor to Resonate with L_1
C_7 C_8: 0.04 μf
L_1: Inductor
R_1: 0.47 megohm
R_2: 1200 ohms
R_3 R_4: 68000 ohms
R_5: 0.1 megohm
R_6: 12000 ohms
R_7: Oscillator-Rejection Potentiometer, 5000 ohms
R_8: 0.1 megohm
R_9 R_{10}: 2700 ohms
T_1: Tuned Input Transformer
NOTE: All resistors 1/2 watt, ± 10%, unless specified. All capacitors 400 volts.

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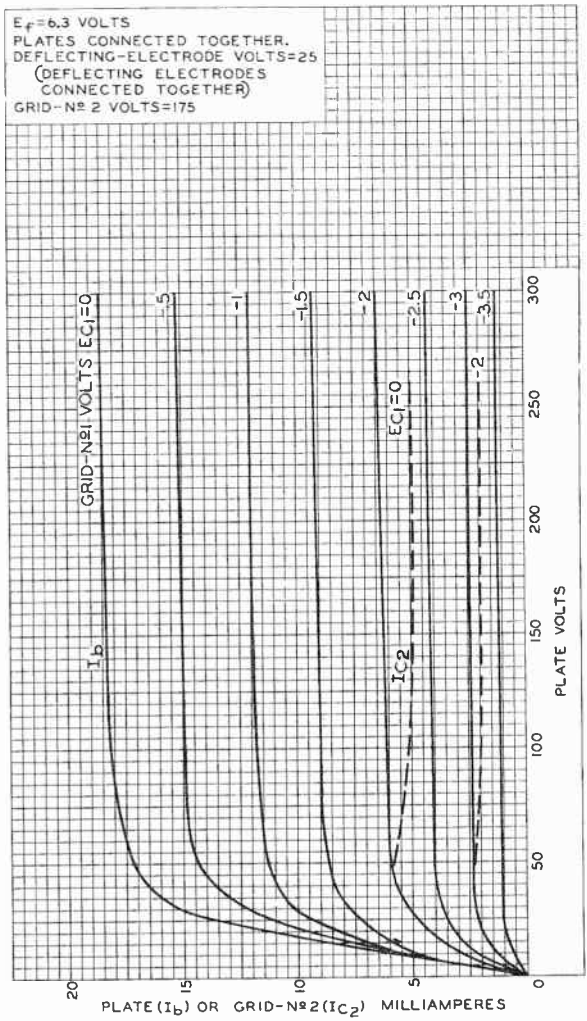
RADIO CORPORATION OF AMERICA
Electron Tube Division Harrison, N. J.

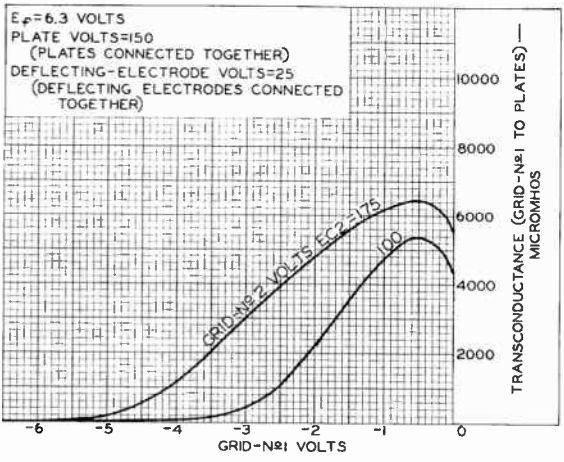
World Radio History

AVERAGE CHARACTERISTICS

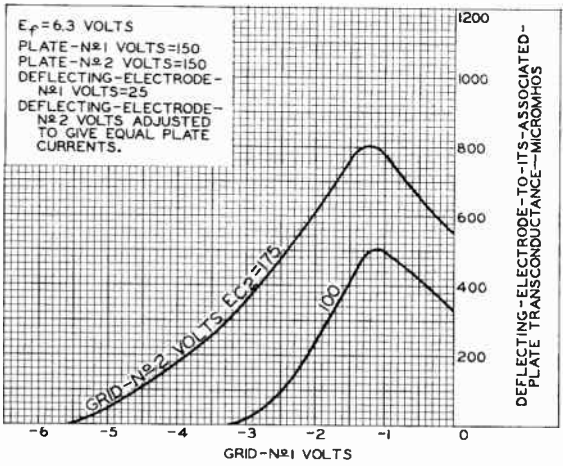


92CM-10253RI

AVERAGE CHARACTERISTICS

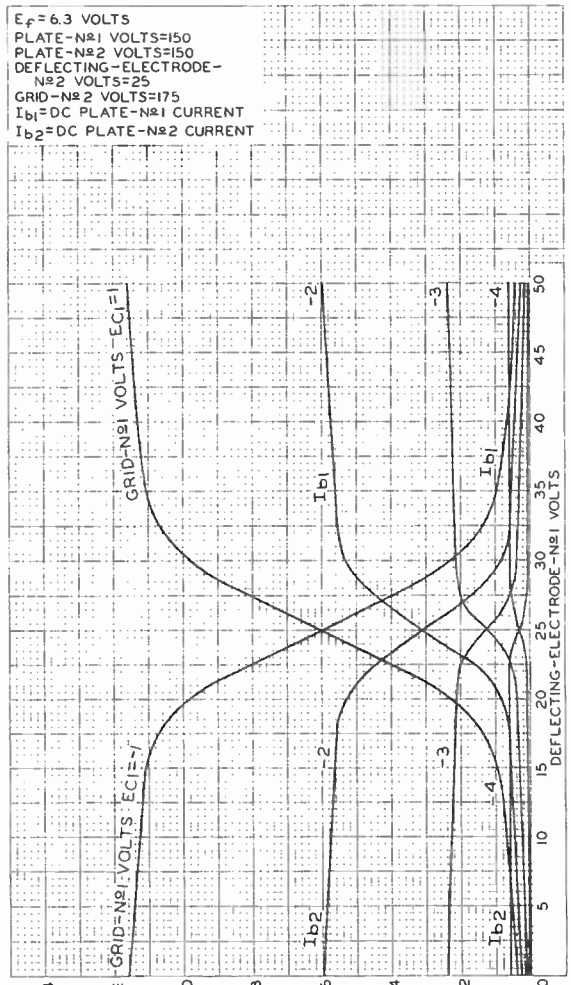


92CS-10250R2



92CS-10249R1

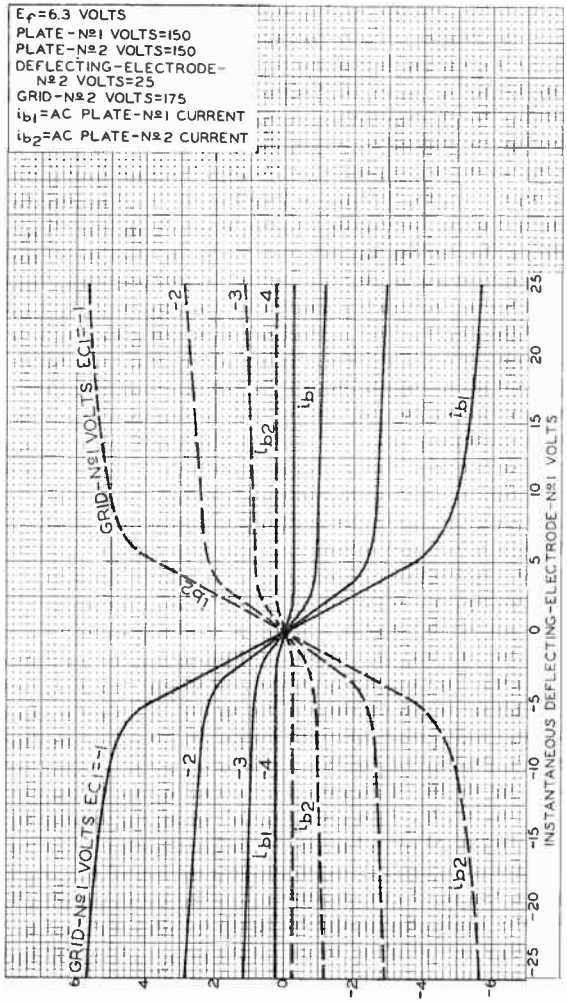
AVERAGE CHARACTERISTICS



92CM-10252R2

World Radio History

OPERATION CHARACTERISTICS



92CM-10264R2

World Radio History

Beam Power Tube

9-PIN MINIATURE TYPE

For Use in Communications Equipment Operating from 6-Cell Storage-Battery Systems

GENERAL DATA

Electrical:

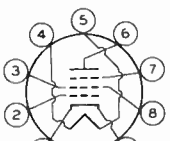
Heater Characteristics and Ratings:		
Voltage range	12 to 15	volts
Current at heater volts = 13.5	0.360	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances:[a]		
Grid No.1 to plate	0.15 max.	pf
Grid No.1 to cathode, grid No.3, grid No.2, and heater	10.0	pf
Plate to cathode, grid No.3, grid No.2, and heater	5.5	pf

Characteristics, Class A_1 Amplifier:

Heater Voltage	13.5	volts
Plate Voltage	250	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage	−18	volts
Mu-Factor, Grid No.2 to Grid No.1	8.7	
Transconductance	5300	μmhos
Plate Current	40	ma
Grid-No.2 Current	3	ma

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	*See General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9LK



Pin 1 – Cathode
Pin 2 – Grid No.1
Pin 3 – Grid No.2
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Plate
Pin 7 – Grid No.3
Pin 8 – Grid No.2
Pin 9 – Cathode

World Radio History

Bulb temperature (At hottest point) . . . . . max. °C

→ AF POWER AMPLIFIER & MODULATOR — Class AB$_1$♦

Maximum CCS● Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	750 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts
DC CATHODE CURRENT■	200 max.	ma
MAX. PEAK PLATE INPUT■	300 max.	watts
MAX. SIGNAL PLATE INPUT■	225 max.	watts
PLATE DISSIPATION■	150 max.	watts

Typical CCS Push-Pull Operation:

Values are for 2 tubes

Heater Voltage	6.3	volts
DC Plate Voltage	500	volts
Grid No.3	*Connected to cathode at socket*	
DC Grid-No.2 Voltage	250	volts
DC Grid-No.1 Voltage	-45	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	90	volts
Zero-Signal DC Plate Current	80	ma
Max.-Signal DC Plate Current	175	ma
Zero-Signal DC Grid-No.2 Current	7	ma
Max.-Signal DC Grid-No.2 Current	13	ma
Effective Load Impedance (Plate-to-plate)	10000	ohms
Max.-Signal Driving Power	0	watts
Total Harmonic Distortion	4	%
Max. Signal Power Output (Approx.)	70	watts

Maximum Circuit Values:

Grid No.1-Circuit Resistance . . . . . 0.1 max. megohm

→ RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy† and RF POWER AMPLIFIER — Class C FM Telephony

Maximum Ratings, *Absolute Maximum Values:*

	Up to 175 Mc		
	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	750 max.	850 max.	volts
GRID No.3 (SUPPRESSOR GRID)	0 max.	0 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	200 max.	250 max.	ma
DC GRID-No.2 CURRENT	15 max.	17 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT	225 max.	275 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	150 max.	175 max.	watts

→ Indicates a change.

World Radio History

Typical Operation:

As amplifier at 175 Mc

	CCS	ICAS	
[illegible]	[illegible]	[illegible]	volts
[illegible]	[illegible]	[illegible]	volts
[illegible]	*Connected to cathode at socket*		
[illegible]	[illegible]	[illegible]	volts
DC Grid-No.2 Voltage	[illegible]	[illegible]	volts
[illegible]	[illegible]	[illegible]	volts
[illegible]	[illegible]	[illegible]	ma
DC Grid-No.1 Current	[illegible]	[illegible]	ma
DC Grid-No.1 Current (Approx.)	[illegible]	[illegible]	ma
Driving Power (Approx.)▲▲	[illegible]	[illegible]	watt
Useful Power Output	[illegible]	[illegible]	watts

Maximum Circuit Values:

Grid-No.1-circuit [illegible]

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony ←

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum Ratings, *Absolute-Maximum Values:*

Up to 175 Mc

	CCS	ICAS	
[illegible]	[illegible]	300 max.	volts
[illegible]	[illegible]	[illegible]	volts
[illegible]			
[illegible]	[illegible]	[illegible]	volts
[illegible]			
VOLTAGE	−125 max.	−125 max.	volts
[illegible]	[illegible]	[illegible]	ma
[illegible]	[illegible]	[illegible]	ma
[illegible]	[illegible]	[illegible]	watts
[illegible]	[illegible]	[illegible]	watts
[illegible]	[illegible]	[illegible]	watts

Typical Operation: *At 175 Mc*

[illegible]	[illegible]	[illegible]	volts
[illegible]	[illegible]	[illegible]	volts
Grid No.2	*Connected to cathode at socket*		
DC Grid-No.2 Voltage▲	[illegible]	[illegible]	volts
DC Grid-No.1 Voltage★	[illegible]	[illegible]	volts
[illegible]			
[illegible]	20,000	25,000	ohms
DC Grid-No.1 Voltage	[illegible]	[illegible]	volts
DC Plate current	[illegible]	[illegible]	ma
DC Grid-No.1 current	[illegible]	[illegible]	ma
DC Grid-No.1 Current (Approx.)	[illegible]	[illegible]	ma
Driving Power (Approx.)▲▲	[illegible]	[illegible]	watt
Useful Power Output	[illegible]	[illegible]	watts

← Indicates a change.

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	CCS	ICAS	
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance. .	0.1 max.	0.1 max.	megohm

FREQUENCY MULTIPLIER

Maximum Ratings, *Absolute-Maximum Values:*

	CCS	ICAS	
DC PLATE VOLTAGE.	375 max.	375 max.	volts
GRID No.3 (SUPPRESSOR GRID) . .	0 max.	0 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT.	50 max.	60 max.	ma
DC GRID-No.2 CURRENT.	15 max.	15 max.	ma
DC GRID-No.1 CURRENT.	5 max.	5 max.	ma
PLATE INPUT	13 max.	15 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	10 max.	12 max.	watts

Typical Operation:

	As doubler to 175 Mc		
Heater Voltage.	13.5	13.5	volts
DC Plate Voltage.	250	250	volts
Grid No.3	*Connected to cathode at socket*		
DC Grid-No.2 Voltage.	200	250	volts

→ Indicates a change.

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BEAM POWER TUBE

DC Grid-No.1 Voltage⊕⊕. . . .	-53	-66	volts
From a grid-No.1 resistor of	53000	44000	ohms
Peak RF Grid-No.1 Voltage . .	60	74	volts
DC Plate Current.	50	60	ma
DC Grid-No.2 Current.	2.6	3.5	ma
DC Grid-No.1 Current (Approx.) . . . . . ▲▲ . .	1	1.5	ma
Driving Power (Approx.)▲▲ . .	0.4	0.6	watt
Useful Power Output*.	3	4.5	watts
As tripler to 175 Mc			
Heater Voltage.	13.5	13.5	volts
DC Plate Voltage.	200	250	volts
Grid No.3	*Connected to cathode at socket*		
DC Grid-No.2 Voltage.	200	250	volts
DC Grid-No.1 Voltage⊕⊕. . . .	-90	-120	volts
From a grid-No.1 resistor of	50000	70000	ohms
Peak RF Grid-No.1 Voltage . .	105	130	volts
DC Plate Current.	50	60	ma
DC Grid-No.2 Current.	3	3.9	ma
DC Grid-No.1 Current (Approx.) . . . . . ▲▲ . .	1.85	1.7	ma
Driving Power (Approx.)▲▲ . .	0.4	0.6	watt
Useful Power Output*.	1.4	2.3	watts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance.	0.1 max.	0.1 max.	megohm

○ Without external shield.

♦ Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

● Continuous Commercial Service.

■ Averaged over any audio-frequency cycle of sine-wave form.

§ Obtained preferably from a fixed supply.

† Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

⊕ Intermittent Commercial and Amateur Service.

CLI Obtained preferably from a separate source or from the plate-voltage supply with a voltage divider. If a series resistor is used, it should be adjustable to obtain the desired operating plate current after initial tuning adjustments are completed.

⊕⊕ Obtained from a grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

▲▲ Driver stage is required to supply tube losses and rf-circuit losses. The driver stage should be designed to provide an excess of power above the indicated values to take care of variations in line voltage, components, initial tube characteristics, and tube characteristics during life.

* Measured at load.

▲ Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor. It is recommended that this resistor be adjustable to obtain the desired operating plate current after initial tuning adjustments are made.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
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BEAM POWER TUBE

* Obtained from a grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor. The combination of grid-No.1 resistor and fixed supply has the advantage of not only protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.33	0.39	amp
Transconductance	1,2	4200	6400	μmhos
Plate Current	1,2	30	50	ma
Plate Current	1,3	-	50	μa
Grid-No.2 Current	1,2	-	7.5	ma
Reverse Grid-No.1 Current	1,4	-	2	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,5	-	20	μa
Heater positive with respect to cathode	1,5	-	20	μa
Leakage Resistance:				
Between grid No.1 and all other electrodes tied together	1,6	100	-	megohms
Between plate and all other electrodes tied together	1,7	100	-	megohms

Note 1: With 13.5 volts ac or dc on heater.

Note 2: With plate voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 voltage of 250 volts, and grid-No.1 voltage of -18 volts.

Note 3: With plate voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 voltage of 250 volts, and grid-No.1 voltage of -48 volts.

Note 4: With plate voltage of 180 volts, grid No.3 connected to cathode, grid-No.2 voltage of 250 volts, grid-No.1 resistor of 0.1 megohm, and cathode resistor of 170 ohms.

Note 5: With 100 volts dc between heater and cathode.

Note 6: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 7: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: Heater voltage of 17 volts cycled one minute on and two minutes off, heater = 135 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: Heater

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BEAM POWER TUBE

voltage of 13.5 volts, plate voltage of 250 volts, grid-No.2 voltage of 250 volts, grid-No.1 voltage of -18 volts, plate load resistor of 2000 ohms, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 200 millivolts.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: Heater voltage of 15 volts and at maximum rated plate dissipation and grid-No.2 input.

CURVES
shown under Type 7558 also apply for the 7551
with the exception that E_f = 13.5 volts

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High-Mu Triode

CERAMIC-METAL PENCIL TYPE
FAST WARM-UP TIME — STURDY COAXIAL-ELECTRODE STRUCTURE

For Use as a Low-Noise-Amplifier Tube in Receiver Applications up to 1500 Mc under Severe Shock and Vibration

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at heater volts = 6.3	0.225	amp
Cathode Warm-Up Time (Average) to reach 80% of operating plate current for dc plate-supply volts = 80, dc grid volts = 0, cathode resistor (ohms) = 0, load resistor (ohms) = 10, and heater volts = 6.3	10	sec
Amplification Factor	80	
Transconductance for dc plate ma. = 13, dc plate volts = 125, and cathode resistor (ohms) = 50	13500	μmhos
Direct Interelectrode Capacitances:[a]		
Grid to plate	2.4	μμf
Grid to cathode and heater	4.4	μμf
Plate to cathode and heater	0.04 max.	μμf
Heater to cathode	2.6	μμf
Cathode to plate	0.04 max.	μμf
Cathode to grid and heater	7.0	μμf
Plate to grid and heater	2.0	μμf

Mechanical:

Operating Position	Any
Dimensions	See *Dimensional Outline*
Weight (Approx.)	0.3 oz
Sockets:	
Heater-terminals connector	Amerac[b] No.1018-88[c], Grayhill[d] No.22-5, or equivalent
Socket for operation up to about 550 Mc (Including heater-terminals connector)	Jettron[e] No.CD7010, or equivalent
Cavities (Including heater-terminals connector)	J-V-M[f] No.D-7980 Series, Resdel[g] No.10 Series, or equivalent

← Indicates a change.

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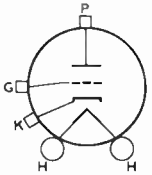
Terminal Connections (See *Dimensional Outline*):



H – Heater
K – Cathode

G – Grid
P – Plate

RADIO-FREQUENCY AMPLIFIER — Class A_1

Maximum CCS[h] Ratings, *Absolute-Maximum Values:*

For altitudes up to 100,000 feet and frequencies up to 1500 Mc

DC PLATE VOLTAGE	250 max.	volts
DC GRID VOLTAGE	-50 max.	volts
DC PLATE CURRENT	25 max.	ma
PLATE DISSIPATION	2.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	50 max.	volts
Heater positive with respect to cathode	50 max.	volts
PLATE-SEAL TEMPERATURE	225 max.	°C

Typical CCS[h] Operation in Cathode-Drive Circuit:

	At 550 Mc	*At 800 Mc*	*At 1100 Mc*	
DC Plate-to-Grid Voltage	125	125	150	volts
Cathode Resistor	50	50	50	ohms
Input-Signal-Level Range	-70 to -20	-70 to -20	-70 to -20	dbm
DC Plate Current	13	13	13.5	ma
Power Gain	16.5	18	16	db
Bandwidth	5	5	10	Mc
Noise Figure	6.5	8.5	12.5	db

Maximum Circuit Values:

Grid-Circuit Resistance:

For fixed-bias operation	Not recommended
For cathode-bias operation	0.25 max. megohm

[a] Without external shield.

[b] Amerac, Inc., Dunham Road, Beverly, Massachusetts.

[c] For use with cavities.

[d] Grayhill, Inc., 561 Hillgrove Avenue, LaGrange, Illinois.

[e] Jeltron Products, Inc., 56 Route 10, Hanover, N.J.

[f] J-V-M Microwave Co., 9300 W. 47th St., Brookfield, Illinois. Indicated No. applies to a series of cavities covering range from 220 up to 1000 Mc and above.

[g] Resdel Engineering Corp., 330 South Fair Oaks Avenue, Pasadena, California. This series of cavities covers the range from 215 to 2325 Mc.

[h] Continuous Commercial Service.

→ Indicates a change.

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CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN ←

	Note	Min.	Max.	
Heater Current	1	0.205	0.245	amp
Direct Interelectrode Capacitances:				
Grid to plate	–	2.0	2.7	μμf
Grid to cathode	–	3.7	4.9	μμf
Plate to cathode	–	–	0.04	μμf
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,2	–	30	μa
Heater positive with respect to cathode	1,3	–	30	μa
Leakage Resistance:				
From grid to plate and cathode connected together	1,4	100	–	megohms
From plate to grid and cathode connected together	1,5	100	–	megohms
Reverse Grid Current	1,6	–	0.3	μa
Emission Voltage	7	–	4	volts
Amplification Factor	1,8	60	100	
Transconductance	1,8	10000	17000	μmhos
Plate Current (1)	1,8	8.5	17.5	ma
Plate Current (2)	1,9	–	50	μa
Plate Current (3)	1,10	100	–	μa
Power Gain	1,11	13	–	db
Noise Figure	1,11	–	7.5	db
Change in Power Gain	11,12	–	-1	db
Change in Noise Figure	11,12	–	0.5	db
Change in Transconductance	11,12	–	15	%

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With 60 volts dc between heater and cathode, heater negative with respect to cathode.

Note 3: With 60 volts dc between heater and cathode, heater positive with respect to cathode.

Note 4: With grid 100 volts negative with respect to plate and cathode which are connected together.

Note 5: With plate 300 volts negative with respect to grid and cathode which are connected together.

Note 6: With dc plate voltage of 200 volts, dc grid voltage of -2 volts, grid resistor of 0.5 megohm.

Note 7: With dc voltage on grid and plate which are connected together adjusted to produce a cathode current of 30 ma., and with 5.5 volts on heater.

Note 8: With dc plate supply voltage of 125 volts, cathode resistor of 50 ohms, and cathode bypass capacitor of 1000 μf.

Note 9: With dc plate voltage of 125 volts and dc grid voltage of -5 volts.

Note 10: With dc plate voltage of 125 volts and dc grid voltage of -2.5 volts.

Note 11: With dc plate supply voltage of 125 volts and cathode resistor of 50 ohms in a single-tube rf amplifier of the cavity type having a bandwidth of 5 ± 0.5 Mc, signal input of -70 dbm, and operating frequency of 550 ± 10 Mc.

Note 12: Reduce heater voltage to 5.7 volts. Change in Power Gain, Noise Figure, and Transconductance values from those obtained with 6.3 volts on heater will not exceed indicated values.

←Indicates a change.

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SPECIAL TESTS & PERFORMANCE DATA

Low-Pressure Voltage-Breakdown Test:

This test (similar to MIL-E-1D, paragraph 4.9.12.1) is performed on a sample lot of tubes every 90 days. Tubes are tested in a chamber at an air pressure equivalent to an altitude of 100,000 feet. Breakdown will not occur when a 60-cycle rms voltage of 300 volts is applied between the plate cylinder and grid flange.

Low-Frequency Vibration Performance:

This test (similar to MIL-E-1D, paragraph 4.9.19.1) is performed on a sample lot of tubes from each production run under the following conditions: Heater voltage of 6.3 volts, dc plate-supply voltage of 125 volts, cathode resistor of 50 ohms, and plate load resistor of 10,000 ohms. The tubes are vibrated in a plane perpendicular to the tube axis at 40 cycles per second at an acceleration of 10 g. The rms output voltage across the plate load resistor as a result of vibration of the tube will not exceed 100 millivolts.

At the end of this test, the tubes will not show permanent shorts or open circuits and will meet the following test limit:

Heater Current. . . . . 300 max. ma
For conditions shown under *Characteristics Range Values, Note 1.*

Variable-Frequency Vibration Performance:

This test (similar to MIL-E-1D, paragraph 4.9.20.3) is performed on a sample lot of tubes from each production run. Tube operating conditions are the same as for *Low-Frequency Vibration Performance.* The tubes are vibrated perpendicular to the major axis through a frequency range from 5 to 1000 cps and back. From 5 to 50 cps, the tubes are vibrated at a constant displacement of 0.0400 ± 0.0025 inch. From 50 to 1000 cps, the tubes are vibrated at a constant acceleration of 10 ± 2 g. Total time to complete a sweep cycle is 10 ± 5 minutes. During the test, the tubes will not show an rms output voltage across the plate load resistor in excess of 150 millivolts. Each tube is vibrated for 60 seconds at the frequency which gives maximum vibrational noise output. If, at the end of 60 seconds the vibrational noise output is still increasing, the test shall continue until there is no further increase.

The rms output voltage across the plate load resistor as a result of the vibration of the tube will not exceed the specified limit at any time during the test.

At the end of this test, the tubes will not show permanent shorts or open circuits and will meet the following limits:

Heater Current. . . . . 300 max. ma
For conditions shown under *Characteristics Range Values, Note 1.*
Heater-Cathode Leakage Current. . . . 60 max. μa
For conditions shown under *Characteristics Range Values, Notes 1,3.*

→ Indicates a change.

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Shock Test:

This test (similar to MIL-E-ID, paragraph 4.9.20.5) is performed on a sample lot of tubes from each production run. Tubes are held rigid and are subjected in three different positions to an impact acceleration of 500 g, 5 blows in each position.

At the end of this test, tubes will not show permanent shorts or open circuits and will meet the following limits:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		
Heater-Cathode Leakage Current. . . .	60 max.	μa
For conditions shown under *Characteristics Range Values, Notes 1,3.*		
Low-Frequency Vibration Output. . . .	200 max.	mv
For conditions shown above under *Low-Frequency Vibration Performance.*		
Change in Transconductance.	-20 max.	%
From initial value for conditions shown under *Characteristics Range Values, Notes 1,8.*		

Fatigue Vibration Test:

This test (similar to MIL-E-ID, paragraph 4.9.20.6) is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected to 2.5 g vibrational acceleration in two positions (X1, Y1) for 32 hours each. At the end of this test, tubes will meet the limits specified for the *Shock Test.*

Shorts and Continuity Test:

This test (similar to MIL-E-ID, paragraph 4.7.3) is performed on all tubes from each production run. Voltage applied between adjacent elements of the tube under test will be between 20 and 70 volts dc or peak ac. Plate and cathode terminals are tied together and connected to the grid terminal through the shorts test equipment. Tubes are tapped with a rubber tapper three times in each of three mutually perpendicular directions. If a short indication is obtained, the tapping cycle is repeated two times for verification. Acceptance criteria is based on the "Resistance vs. Time Duration" curve shown in paragraph 4.7.7 of MIL-E-ID, Amendment 5.

At the end of this test, the tubes will not show permanent shorts or open circuits and will meet the following limit:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		

Ceramic-Seal-Fracture Test:

This test is performed on a sample lot of tubes every 90 days. With the cathode- and plate-cylinder-supports spaced 15/16" ± 1/64", and with the grid flange centered between these supports, the tubes will withstand gradual application of a force of 30 pounds, perpendicular to the axis of the tubes,

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upon the grid flange without causing fracture of the ceramic insulation.

Seal Strain Test:

This test (similar to MIL-E-1D, paragraph 4.9.6.3) is performed on a sample lot of tubes every 90 days. Tubes are tested by first immersing in water, having a temperature of at least 97° C for at least 15 seconds, and then immersing immediately in water at not more than 5° C for 5 seconds. After drying for 48 hours at room temperature, the tubes will meet the following test limit:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		

Heater-Cycling Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.7) is performed on a sample lot of tubes from each production run. With 6.3 volts on heater and no voltage on plate or grid, the heater is cycled three minutes on and three minutes off for at least 2000 cycles.

At the end of this test, tubes will not show permanent shorts or open circuits and will meet the following limits:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		
Heater-to-Cathode Leakage Current . .	60 max.	μa
For conditions shown under *Characteristics Range Values, Notes 1,3.*		
Grid-to-Cathode Leakage Resistance. .	50 min.	megohms
For conditions shown under *Characteristics Range Values, Notes 1,4.*		

1-Hour Stability Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.3.1.a) is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Types are operated under the following conditions: Heater voltage of 6.3 volts, plate-supply voltage of 215 volts, and cathode resistor of 150 ohms.

At the end of 1 hour, the change in transconductance value for each tube, referred to its initial transconductance reading, will not exceed 15% of the initial value for conditions shown under *Characteristics Range Values, Notes 1,8.*

In addition, the tubes will not show permanent shorts or open circuits and will meet the following limit:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		

100-Hour Survival Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.3.1.b) is performed on a sample lot of tubes from each production run

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to insure a low percentage of early inoperatives. Life-test conditions are the same as those specified for *1-Hour Stability Life Performance* except that all voltages are cycled at the rate of 110 minutes on and 10 minutes off.

At the end of 100 hours, the tubes will meet the following limits:

Transconductance.	3000 min.	μmhos
For conditions shown under *Characteristics Range Values, Notes 1,8.*		
Plate Current (2)	50 max.	μa
For conditions shown under *Characteristics Range Values, Notes 1,9.*		

In addition, the tubes will not show permanent shorts or open circuits, and will meet the following limit:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		

500- and 1000-Hour Average Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.3.2) is performed on a sample lot of tubes from each production run to insure excellent overall performance and to guard against epidemic failures of tubes to meet any of the characteristics indicated below.

Each tube is life tested under the following conditions: Heater voltage of 6.3 volts; plate-supply voltage of 215 volts; cathode resistor of 150 ohms; heater positive with respect to cathode by 67.5 volts; and plate-seal temperature of 225° C. Heater voltage is cycled at a rate of 110 minutes on and 10 minutes off.

At the end of 500 hours, the tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to meet the following limits:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		
Leakage Resistance:		
From grid to plate and cathode connected together.	60 min.	megohms
From plate to grid and cathode connected together.	60 min.	megohms
For conditions shown under *Characteristics Range Values, Notes 1,4, and 1,5.*		
Power Gain.	12 min.	db
For conditions shown under *Characteristics Range Values, Notes 1,11.*		
Noise Figure.	8.5 max.	db
For conditions shown under *Characteristics Range Values, Notes 1,11.*		
Change in Power Gain.	−1	db
For conditions shown under *Characteristics Range Values, Notes 1,11,12.*		

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At the end of 1000 hours, the tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to meet the following limits:

Heater Current	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		
Power Gain	11 min.	db
For conditions shown under *Characteristics Range Values, Notes 1, 11.*		
Noise Figure	9.5 max.	db
For conditions shown under *Characteristics Range Values, Notes 1, 11.*		

OPERATING CONSIDERATIONS

Connections to the cathode cylinder, grid flange, and plate cylinder should be made by flexible spring contacts. The connectors should make firm, large-surface contact, yet must be sufficiently flexible to insure that no part of the tube is subjected to excessive strain.

The *cathode* should preferably be connected to one side of the heater. When, in some circuit designs, the heater is not connected directly to the cathode, precautions must be taken to hold the peak heater-cathode voltage to the maximum-rated values shown in the tabulated data.

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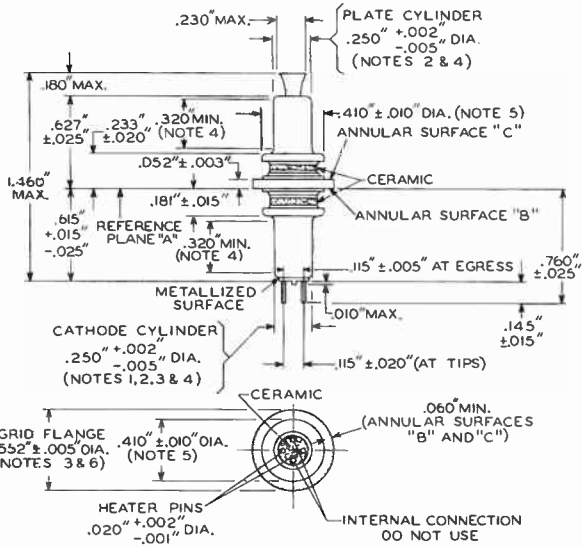

92CM-10274RI

REFERENCE PLANE "A" IS DEFINED AS THAT PLANE AGAINST WHICH ANNULAR SURFACE "B" OF THE GRID FLANGE ABUTS.

ANNULAR SURFACE "B" IS ON THE SIDE OF THE GRID FLANGE TOWARD THE CATHODE CYLINDER.

ANNULAR SURFACE "C" IS ON THE SIDE OF THE GRID FLANGE TOWARD THE PLATE CYLINDER.

NOTE 1: WITH ANNULAR SURFACE "B" RESTING ON REFERENCE PLANE "A", THE AXIS OF THE CATHODE CYLINDER WILL BE WITHIN 2° OF A LINE PERPENDICULAR TO REFERENCE PLANE "A".

NOTE 2: THE AXES OF THE PLATE CYLINDER AND CATHODE CYLINDER WILL COINCIDE WITHIN 0.010".

NOTE 3: THE AXES OF THE CATHODE CYLINDER AND GRID FLANGE WILL COINCIDE WITHIN 0.005".

NOTE 4: THE DIAMETER ALONG THE 0.320" MINIMUM LENGTH IS MEASURED WITH "GO" AND "NO-GO" RING GAUGES G_1-1 AND G_1-2, RESPECTIVELY.

NOTE 5: THIS DIAMETER IS MEASURED WITH "GO" AND "NO-GO" GAUGES G_2-1 AND G_2-2, RESPECTIVELY.

NOTE 6: THIS DIAMETER IS MEASURED WITH "GO" AND "NO-GO" GAUGES G_3-1 AND G_3-2, RESPECTIVELY.

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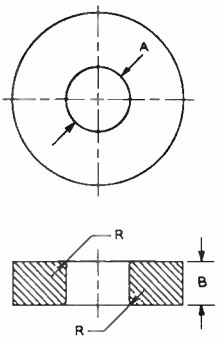
GAUGES

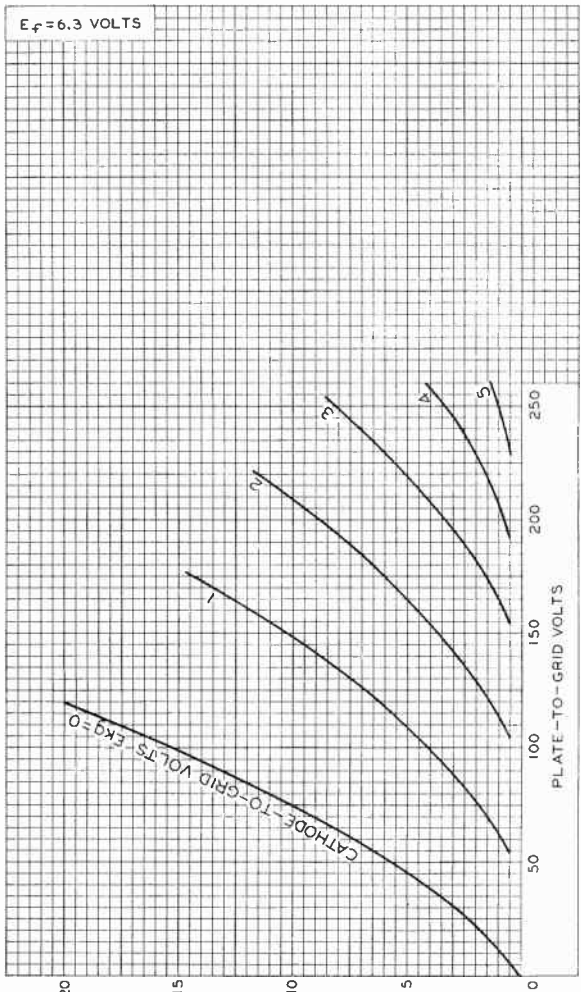


92CS-10370

Gauge	Type	Dimension		
		Diameter A	Thickness B	Radius R
G_1-1	GO	$0.25200"^{+0.00000"}_{-0.00007"}$	$0.320"^{+0.001"}_{-0.000"}$	0.003" MAX.
G_1-2	NO-GO	$0.24500"^{+0.00007"}_{-0.00000"}$	-	-
G_2-1	GO	$0.42000"^{+0.00000"}_{-0.00007"}$	-	-
G_2-2	NO-GO	$0.40000"^{+0.00007"}_{-0.00000"}$	-	-
G_3-1	GO	$0.55700"^{+0.00000"}_{-0.00007"}$	-	-
G_3-2	NO-GO	$0.54700"^{+0.00007"}_{-0.00000"}$	-	-

World Radio History

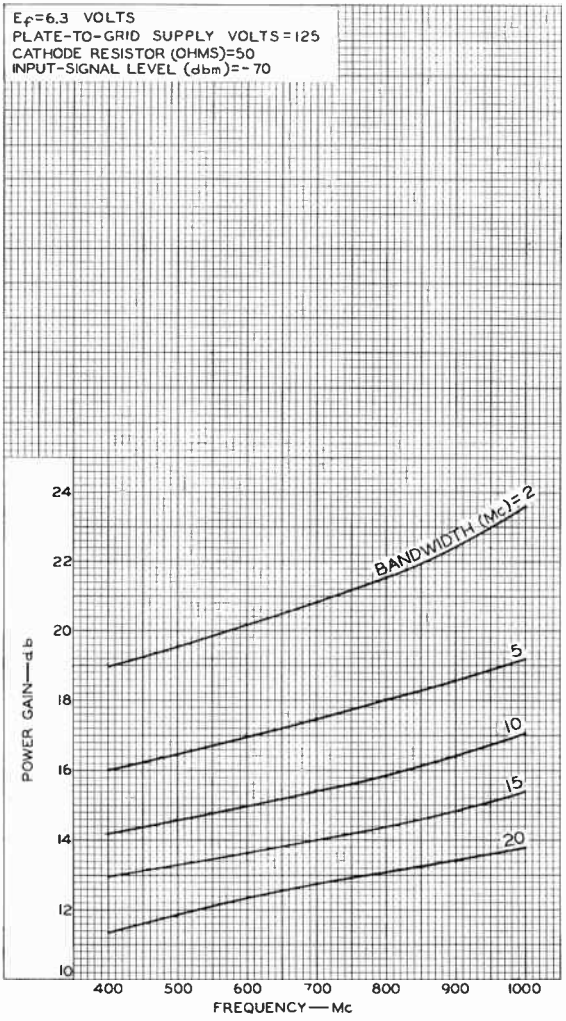
AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Service



92CM-10458

World Radio History

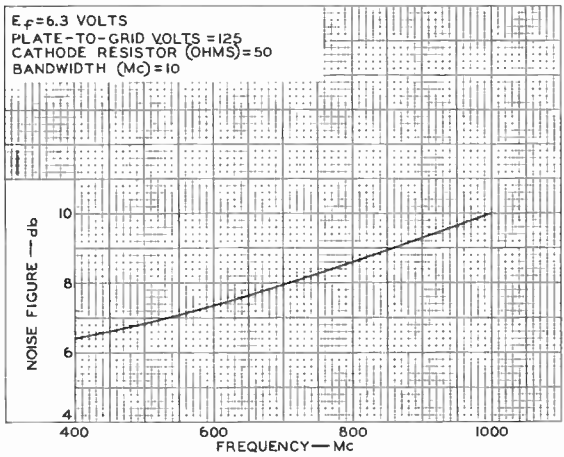
POWER-GAIN CHARACTERISTICS
Cathode-Drive Service



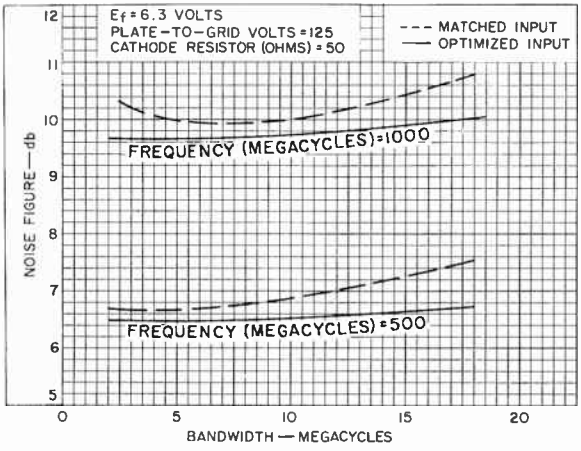
92CM-10271RI

World Radio History

NOISE-FIGURE CHARACTERISTICS
Cathode-Drive Service



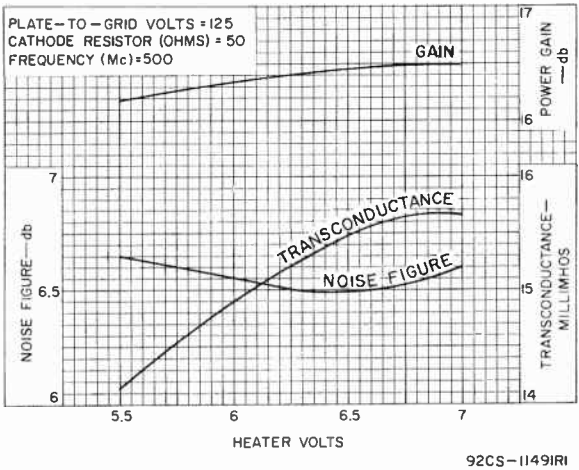
92CS-10270R3



92CS-11497RI

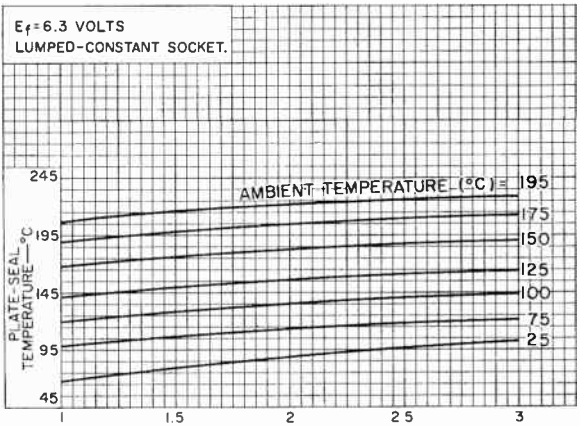
World Radio History

CHARACTERISTICS
Cathode-Drive Service



92CS—11491RI

PLATE-SEAL-TEMPERATURE CHARACTERISTICS



92CS-11488

World Radio History

High-Mu Triode

CERAMIC-METAL PENCIL TYPE
FAST WARM-UP TIME STURDY COAXIAL-ELECTRODE STRUCTURE

For Use as a Low-Noise-Amplifier Tube in Receiver Applications up to 1500 Mc under Severe Shock and Vibration

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at heater volts = 6.3	0.225	amp
Cathode Warm-Up Time (Average) to reach 80% of operating plate current for dc plate-supply volts = 80, dc grid volts = 0, cathode resistor (ohms) = 0, load resistor (ohms) = 10, and heater volts = 6.3	10	sec
Amplification Factor	80	
Transconductance for dc plate ma. = 12.5, dc plate volts = 125, and cathode resistor (ohms) = 50.	13000	μmhos
Direct Interelectrode Capacitances:[a]		
Grid to plate	2.4	μμf
Grid to cathode and heater	4.4	μμf
Plate to cathode and heater	0.03 max.	μμf
Heater to cathode	2.6	μμf
Cathode to plate	0.03 max.	μμf
Cathode to grid and heater	7	μμf
Plate to grid and heater	2.4	μμf

Mechanical:

Operating Position	Any
Dimensions	See *Dimensional Outline*
Weight (Approx.)	0.3 oz
Sockets:	
Heater-terminals connector	Amerac[b] No.1018-88,[c] Grayhill[d] No.22-5, or equivalent
Socket for operation up to about 550 Mc (Including heater-terminals connector)	Jettron[e] No.CD7010, or equivalent
Cavities (Including heater-terminals connector)	J-V-M[f] No.D-7980 Series, Resdel[g] No.10 Series, or equivalent

← Indicates a change.

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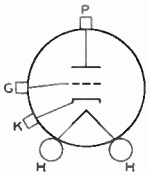
Terminal Connections (See *Dimensional Outline*):



H – Heater
K – Cathode
G – Grid
P – Plate

RADIO-FREQUENCY AMPLIFIER — Class A_1

Maximum CCS[h] Ratings, *Absolute-Maximum Values:*

For altitudes up to 100,000 feet and frequencies up to 1500 Mc

DC PLATE VOLTAGE	250 max.	volts
DC GRID VOLTAGE	−50 max.	volts
DC PLATE CURRENT	25 max.	ma
PLATE DISSIPATION	2.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	50 max.	volts
Heater positive with respect to cathode	50 max.	volts
PLATE-SEAL TEMPERATURE	225 max.	°C

Typical CCS[h] Operation in Cathode-Drive Circuit:

	At 550 Mc	*At 700 Mc*	
DC Plate-to-Grid Voltage	125	125	volts
Cathode Resistor	50	50	ohms
Input-Signal-Level Range	−70 to −20	−70 to −20	dbm
DC Plate Current	12.5	12.5	ma
Power Gain for a bandwidth of 5 Mc	16.5	17	db
Noise Figure	6.5	7	db

	At 1100 Mc	
DC Plate-to-Grid Voltage	150	volts
Cathode Resistor	50	ohms
Input-Signal-Level Range	−70 to −20	dbm
DC Plate Current	14	ma
Power Gain for a bandwidth of:		
4 Mc	20	db
8 Mc	18	db
Noise Figure	11.5	db

Maximum Circuit Values:

Grid-Circuit Resistance:

For fixed-bias operation	Not recommended	
For cathode-bias operation	0.25 max.	megohm

→ Indicates a change.

World Radio History

[a] Without external shield.

[b] Amperex, Inc., Durham Road, Beverly, Massachusetts.

[c] For use with cavities.

[d] Graybill, Inc., 561 Hillgrove Avenue, LaGrange, Illinois.

[e] Jetter Products, Inc., 56 Route 10, Hanover, N.J.

[f] J-K-M Microwave Co., 9300 W. 47th St., Brookfield, Illinois. Indicated No. applies to a series of cavities covering range from 225 up to 1000 MC and above.

[g] Resdel Engineering Corp., 936 South Fair Oaks Avenue, Pasadena, California. This series of cavities covers the range from 215 up to 2425 M.

[h] Continuous Commercial Service.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.35	0.415	amp
Direct Interelectrode Capacitances:				
Grid to plate	–	2.1	2.8	$\mu\mu f$
Grid to cathode	–	3.8	4.6	$\mu\mu f$
Plate to cathode	–	–	1.02	$\mu\mu f$
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,2	–	30	μa
Heater positive with respect to cathode	1,3	–	30	μa
Leakage Resistance:				
From grid to plate and cathode connected together	1,4	100	–	megohms
From plate to grid and cathode connected together	1,5	100	–	megohms
Reverse Grid Current	1,6	–	0.3	μa
Emission Voltage	7	–	3	volts
Amplification Factor	1,8	60	100	
Transconductance	1,8	10000	16000	μmhos
Plate Current (1)	1,8	8.5	16.5	ma
Plate Current (2)	1,9	–	50	μa
Plate Current (3)	1,10	100	–	μa
Power Gain	1,11	14	–	db
Noise Figure	1,11	–	7	db
Change in Power Gain	11,12	–	-1	db
Change in Noise Figure	11,12	–	+0.5	db
Change in Transconductance	11,12	–	15	%

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With 66 volts dc between heater and cathode, heater negative with respect to cathode.

Note 3: With 60 volts dc between heater and cathode, heater positive with respect to cathode.

Note 4: With grid 100 volts negative with respect to plate and cathode which are connected together.

Note 5: With plate 300 volts negative with respect to grid and cathode which are connected together.

Note 6: With dc plate voltage of 200 volts, dc grid voltage of -2 volts, grid resistor of 0.5 megohm.

← Indicates a change.

World Radio History

Note 7: With dc voltage on grid and plate which are connected together adjusted to produce a cathode current of 30 ma., and with 5.5 volts on heater.

Note 8: With dc plate-supply voltage of 125 volts, cathode resistor of 50 ohms, and cathode bypass capacitor of 1000 μf.

Note 9: With dc plate voltage of 125 volts and dc grid voltage of −5 volts.

Note 10: With dc plate voltage of 125 volts and dc grid voltage of −2.5 volts.

Note 11: With dc plate-supply voltage of 125 volts and cathode resistor of 50 ohms in a single-tube rf amplifier of the cavity type having a bandwidth of 5 ± 0.5 Mc, signal input of −70 dbm, and operating frequency of 550 ± 10 Mc.

Note 12: Reduce heater voltage to 5.7 volts. Change in Power Gain, Noise Figure, and Transconductance values from those obtained with 6.3 volts on heater will not exceed indicated values.

SPECIAL TESTS & PERFORMANCE DATA

Low-Pressure Voltage-Breakdown Test:

This test (similar to MIL-E-ID, paragraph 4.9.12.1) is performed on a sample lot of tubes every 90 days. Tubes are tested in a chamber at an air pressure equivalent to an altitude of 100,000 feet. Breakdown will not occur when a 60-cycle rms voltage of 300 volts is applied between the plate cylinder and grid flange.

Low-Frequency Vibration Performance:

This test (similar to MIL-E-ID, paragraph 4.9.19.1) is performed on a sample lot of tubes from each production run under the following conditions: heater voltage of 6.3 volts, dc plate-supply voltage of 125 volts, cathode resistor of 50 ohms, and plate load resistor of 10,000 ohms. The tubes are vibrated in a plane perpendicular to the tube axis at 40 cycles per second at an acceleration of 10 g. The rms output voltage across the plate load resistor as a result of vibration of the tube will not exceed 100 millivolts.

At the end of this test, the tubes will not show permanent shorts or open circuits and will meet the following test limit:

Heater Current.	300 max.	ma

For conditions shown under *Characteristics Range Values, Note 1.*

Variable-Frequency Vibration Performance:

This test (similar to MIL-E-ID, paragraph 4.9.20.3) is performed on a sample lot of tubes from each production run. Tube operating conditions are the same as for *Low-Frequency Vibration Performance.* The tubes are vibrated perpendicular to the major tube axis through a frequency range from 5 to 2000 cps and back. From 5 to 50 cps, the tubes are vibrated at a constant displacement of 0.0400 ± 0.0025 inch. From 50 to 2000 cps, the tubes are vibrated at a constant acceleration of 10 ± 2 g. Total time to complete a sweep cycle is 10 ± 5 minutes. During the test, the tubes will not show an rms output voltage across the plate load resistor in excess of 50 millivolts. Each tube is vibrated for 60 seconds at the frequency which

→ Indicates a change.

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gives maximum vibrational noise output. If, at the end of 60 seconds the vibrational noise output is still increasing, the test is continued until there is no further increase.

The rms output voltage across the plate load resistor as a result of the vibration of the tube will not exceed the specified limit at any time during the test.

At the end of this test, the tubes will not show permanent shorts or open circuits and will meet the following limits:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		
Heater-Cathode Leakage Current. . . .	60 max.	μa
For conditions shown under *Characteristics Range Values, Notes 1,3.*		

Shock Test:

This test (similar to MIL-E-ID, paragraph 4.9.20.5) is performed on a sample lot of tubes from each production run. Tubes are held rigid and are subjected in three different positions to an impact acceleration of 500 g, 5 blows in each position.

At the end of this test, tubes will not show permanent shorts or open circuits and will meet the following limits:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		
Heater-Cathode Leakage Current. . . .	60 max.	μa
For conditions shown under *Characteristics Range Values, Notes 1,3.*		
Low-Frequency Vibration Output. . . .	200 max.	mv
For conditions shown above under *Low-Frequency Vibration Performance.*		
Change in Transconductance.	-20 max.	%
From initial value for conditions shown under *Characteristics Range Values, Notes 1,8.*		

Fatigue Vibration Test:

This test (similar to MIL-E-ID, paragraph 4.9.20.6) is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected to 2.5 g vibrational acceleration in two positions (XI, YI) for 32 hours each. At the end of this test, tubes will meet the limits specified for the *Shock Test.*

Shorts and Continuity Test:

This test (similar to MIL-E-ID, paragraph 4.7.3) is performed on all tubes from each production run. Voltage applied between adjacent elements of the tube under test will be between 20 and 70 volts dc or peak ac. Plate and cathode terminals are tied together and connected to the grid terminal through the shorts test equipment. Tubes are tapped with a rubber tapper three times in each of three mutually perpendicular directions. If a short indication is obtained, the

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tapping cycle is repeated two times for verification. Acceptance criteria is based on the "Resistance vs. Time Duration" curve shown in caragraph 4.7.7 of MIL-E-ID, Amendment 5.

At the end of this test, the tubes will not show permanent shorts or open circuits and will meet the following limit:

Heater Current.	300 max.	ma

For conditions shown under *Characteristics Range Values, Note 1.*

Ceramic-Seal-Fracture Test:

This test is performed on a sample lot of tubes every 90 days. With the cathode- and plate-cylinder-supports spaced 15/16" ± 1/64", and with the grid flange centered between these supports, the tubes will withstand gradual application of a force of 30 pounds, perpendicular to the axis of the tubes, upon the grid flange, without causing fracture of the ceramic insulation.

Seal Strain Test:

This test (similar to MIL-E-ID, paragraph 4.9.6.3) is performed on a sample lot of tubes every 90 days. Tubes are tested by first immersing in water having a temperature of at least 97° C for at least 15 seconds and then immersing immediately in water at not more than 5° C for 5 seconds. After drying for 48 hours at room temperature, the tubes will meet the following test limit:

Heater Current.	300 max.	ma

For conditions shown under *Characteristics Range Values, Note 1.*

Grid Blackout:

This test is performed as follows on a sample lot of tubes from each production run:

Signal-output voltage is measured under conditions with heater voltage of 6.3 volts, dc plate-supply voltage of 200 volts, plate load resistor of 10,000 ohms, grid resistor of 15 ohms, and a sine-wave voltage having a frequency of 100 kc and a peak-to-peak value of 0.1 volt applied between the grid and cathode. Then, in addition to the above conditions, a pulse signal with repetition rate of 2000 pps, peak-to-peak voltage of 5 volts, and pulse duration of 0.25 μsec is applied between the grid and cathode. Next, measurement of signal-output voltage is made 0.8 μsec after the leading edge of a pulse. This value of signal-output voltage referred to the initial value will not show a change in excess of -5 db.

Heater-Cycling Life Performance:

This test (similar to MIL-E-ID, paragraph 4.11.7) is performed on a sample lot of tubes from each production run. With 6.3 volts on heater and no voltage on plate or grid, the heater is cycled three minutes on and three minutes off for at least 2000 cycles.

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At the end of this test, tubes will not show temporary or permanent shorts or open circuits and will meet the following limits:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		
Heater-to-Cathode Leakage Current . .	60 max.	μa
For conditions shown under *Characteristics Range Values, Notes 1,3.*		
Grid-to-Cathode Leakage Resistance. .	50 min.	megohms
For conditions shown under *Characteristics Range Values, Notes 1,4.*		

1-Hour Stability Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.3.1.a) is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Tubes are operated under the following conditions:

Heater voltage of 6.3 volts, plate-supply voltage of 215 volts, and cathode resistor of 150 ohms.

At the end of 1 hour, the change in transconductance value for each tube, referred to its initial transconductance reading, will not exceed 15% of the initial value for conditions shown under *Characteristics Range Values, Notes 1,8.*

In addition, the tubes will not show permanent shorts or open circuits and will meet the following limit:

Heater Current.	330 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		

44-Hour Grid-Emission Life Performance:

This test is performed on a sample lot of tubes from each production run to insure excellent over-all performance and to guard against epidemic failures of tubes to meet this test requirement. Tubes are operated under the following conditions:

Heater voltage of 7.5 volts, dc plate voltage of 215 volts, grid voltage of −2 volts, and grid resistor of 0.5 megohm.

At the end of 44 hours, the reverse grid current will not exceed 2 microamperes when grid resistor is shorted and grid voltage is increased to −5 volts, other conditions remaining unchanged from the above values.

100-Hour Survival Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.3.1.b) is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Life-test conditions are the same as those specified for *1-Hour Stability Life Performance* except that all voltages are cycled at the rate of 110 minutes on and 10 minutes off.

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At the end of 100 hours, the tubes will not show permanent shorts or open circuits and will meet the following limits:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		
Transconductance.	8000 min.	μmhos
For conditions shown under *Characteristics Range Values, Notes 1,8.*		
Plate Current (2)	50 max.	μa
For conditions shown under *Characteristics Range Values, Notes 1,9.*		

500- and 1000-Hour Average Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.3.2) is performed on a sample lot of tubes from each production run to insure excellent over-all performance and to guard against epidemic failures of tubes to meet any of the characteristics indicated below. Each tube is life-tested under the following conditions:

Heater voltage of 6.3 volts, plate-supply voltage of 215 volts, cathode resistor of 150 ohms, heater positive with respect to cathode by 67.5 volts, and plate-seal temperature of 225° C. Heater voltage is cycled at a rate of 110 minutes on and 10 minutes off.

At the end of 500 hours, the tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to meet the following limits:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		
Leakage Resistance:		
From grid to plate and cathode connected together. . . .	60 min.	megohms
From plate to grid and cathode connected together. . . .	60 min.	megohms
For conditions shown under *Characteristics Range Values, Notes 1,4 and 1,5.*		
Power Gain.	13 min.	db
For conditions shown under *Characteristics Range Values, Notes 1,11.*		
Noise Figure.	8 max.	db
For conditions shown under *Characteristics Range Values, Notes 1,11.*		
Change in Power Gain.	-1 max.	db
For conditions shown under *Characteristics Range Values, Notes 1,11,12.*		

At the end of 1000 hours, the tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to meet the following limits:

Heater Current.	300 max.	ma
For conditions shown under *Characteristics Range Values, Note 1.*		

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Power Gain. . . . . 12 min. db
For conditions shown under *Characteristics Range Values, Notes 1, 11.*
Noise Figure. . . . . 9.5 max. db
For conditions shown under *Characteristics Range Values, Notes 1, 11.*

OPERATING CONSIDERATIONS

Connections to the cathode cylinder, grid flange, and plate cylinder should be made by flexible spring contacts. The connectors should make firm, large-surface contact, yet must be sufficiently flexible to insure that no part of the tube is subjected to excessive strain.

The *cathode* should preferably be connected to one side of the heater. When, in some circuit designs, the heater is not connected directly to the cathode, precautions must be taken to hold the peak heater-cathode voltage to the maximum-rated values shown in the tabulated data.

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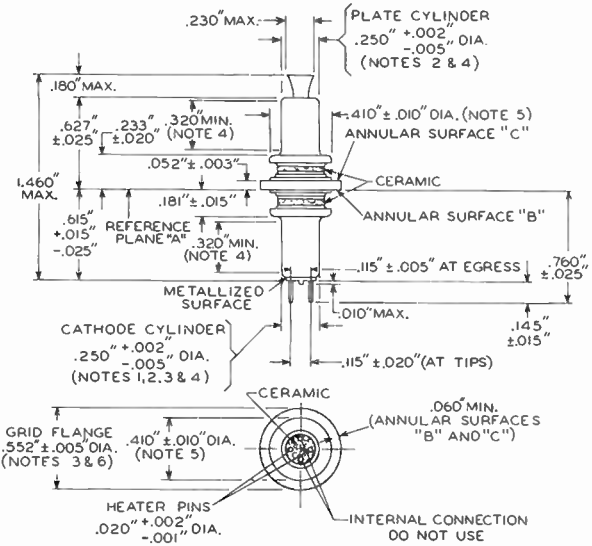

92CM-10274RI

REFERENCE PLANE "A" IS DEFINED AS THAT PLANE AGAINST WHICH ANNULAR SURFACE "B" OF THE GRID FLANGE ABUTS.

ANNULAR SURFACE "B" IS ON THE SIDE OF THE GRID FLANGE TOWARD THE CATHODE CYLINDER.

ANNULAR SURFACE "C" IS ON THE SIDE OF THE GRID FLANGE TOWARD THE PLATE CYLINDER.

NOTE 1: WITH ANNULAR SURFACE "B" RESTING ON REFERENCE PLANE "A", THE AXIS OF THE CATHODE CYLINDER WILL BE WITHIN 2^{o} OF A LINE PERPENDICULAR TO REFERENCE PLANE "A".

NOTE 2: THE AXES OF THE PLATE CYLINDER AND CATHODE CYLINDER WILL COINCIDE WITHIN 0.010".

NOTE 3: THE AXES OF THE CATHODE CYLINDER AND GRID FLANGE WILL COINCIDE WITHIN 0.005".

NOTE 4: THE DIAMETER ALONG THE 0.320" MINIMUM LENGTH IS MEASURED WITH "GO" AND "NO-GO" RING GAUGES G_1-1 AND G_1-2, RESPECTIVELY.

NOTE 5: THIS DIAMETER IS MEASURED WITH "GO" AND "NO-GO" GAUGES G_2-1 AND G_2-2, RESPECTIVELY.

NOTE 6: THIS DIAMETER IS MEASURED WITH "GO" AND "NO-GO" GAUGES G_3-1 AND G_3-2, RESPECTIVELY.

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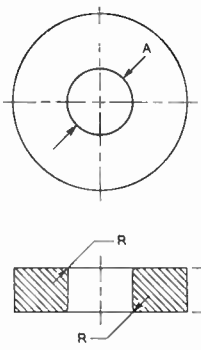
GAUGES



92CS-10370

Gauge	Type	Dimension		
		Diameter A	Thickness B	Radius R
G_1-1	GO	$0.25200"^{+0.00000"}_{-0.00007"}$	$0.320"^{+0.001"}_{-0.000"}$	0.003" MAX.
G_1-2	NO-GO	$0.24500"^{+0.00007"}_{-0.00000"}$	-	-
G_2-1	GO	$0.42000"^{+0.00000"}_{-0.00007"}$	-	-
G_2-2	NO-GO	$0.40000"^{+0.00007"}_{-0.00000"}$	-	-
G_3-1	GO	$0.55700"^{+0.00000"}_{-0.00007"}$	-	-
G_3-2	NO-GO	$0.54700"^{+0.00007"}_{-0.00000"}$	-	-

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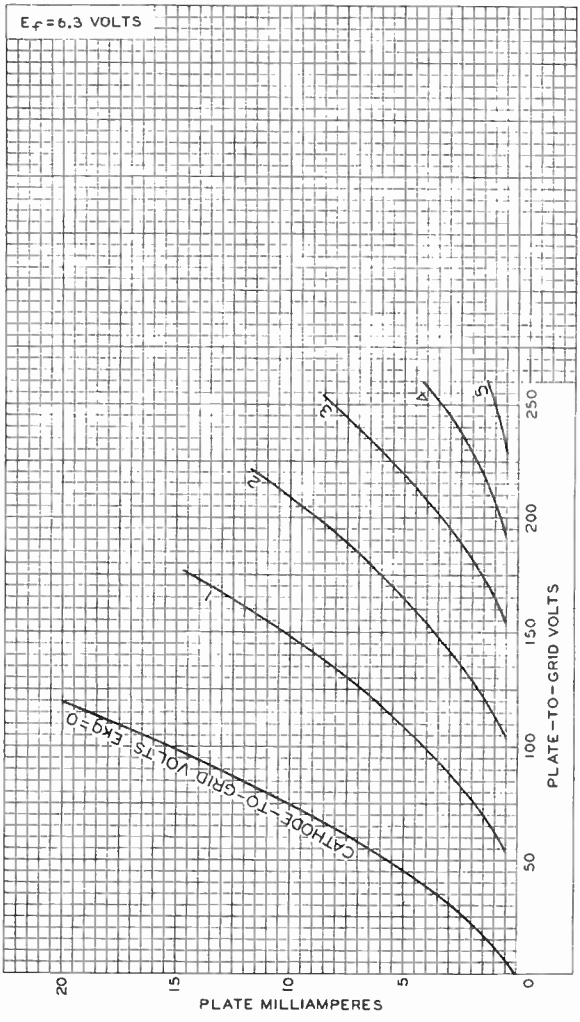
AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Service



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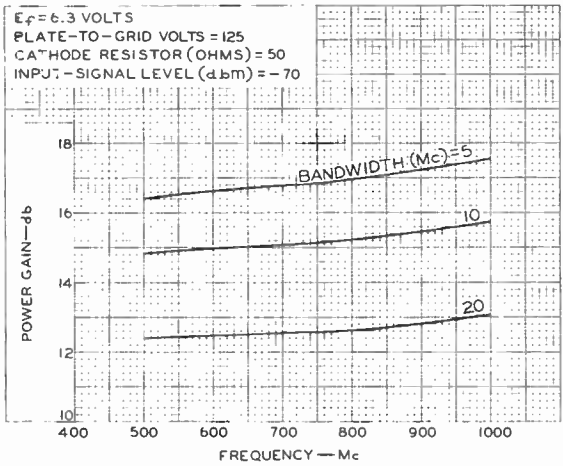
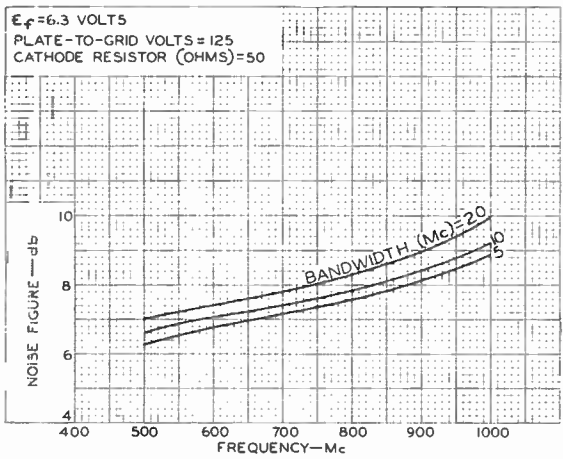
POWER-GAIN CHARACTERISTICS
Cathode-Drive Service



92CS-10456RI

NOISE-FIGURE CHARACTERISTICS
Cathode-Drive Service



92CS-10455R2

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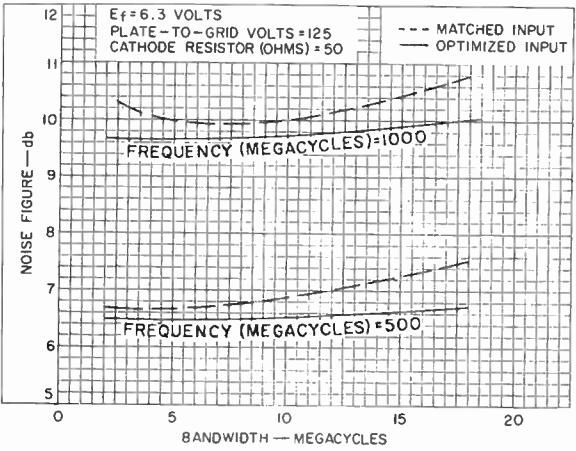
CHARACTERISTICS
Cathode-Drive Service



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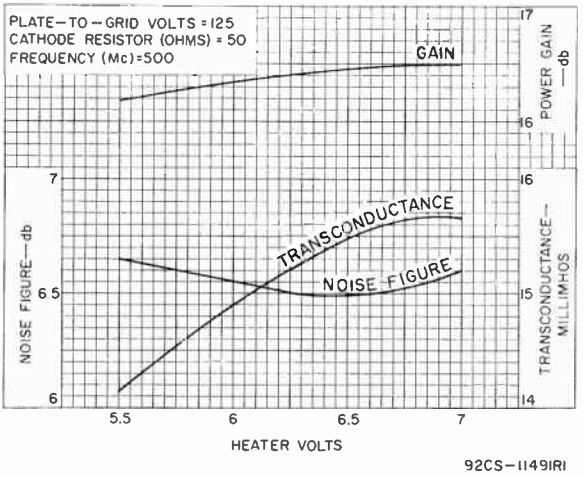

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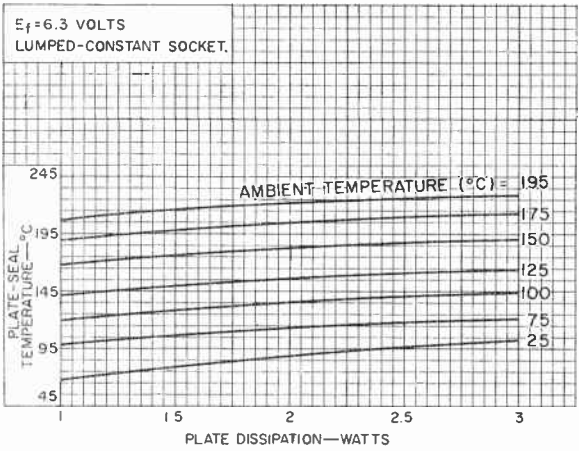
PLATE-SEAL-TEMPERATURE CHARACTERISTICS



92CS-11488

World Radio History

World Radio History

7558

Beam Power Tube

For Use in Communications Equipment at Frequencies Up to 175 Mc.
9-PIN MINIATURE TYPE

Electrical:

Heater Characteristics and Ratings:		
Voltage (AC or DC)	6.3 ± 5%	volts
Current	0.800	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances:[o]		
Grid No.1 to plate	0.15	pf
Grid No.1 to cathode, grid No.3, grid No.2, and heater	10.0	pf
Plate to cathode, grid No.3, grid No.2, and heater	5.5	pf

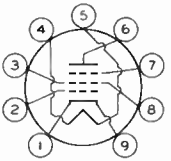
Characteristics, Class A_1 Amplifier:

Plate Voltage	250	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage	-18	volts
Mu-Factor, Grid No.2 to Grid No.1	8.7	
Transconductance	5300	μmhos
Plate Current	40	ma
Grid-No.2 Current	3	ma

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9LK

Pin 1 - Cathode
Pin 2 - Grid No.1
Pin 3 - Grid No.2
Pin 4 - Heater
Pin 5 - Heater



Pin 6 - Plate
Pin 7 - Grid No.3
Pin 8 - Grid No.2
Pin 9 - Cathode

Bulb Temperature (At hottest point on bulb surface)	225 max.	°C

World Radio History

→ AF POWER AMPLIFIER & MODULATOR — Class AB_1 ♦

Maximum CCS● Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	375 max.	volts
GRID No.3 (SUPPRESSOR GRID)	0 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT■	70 max.	ma
MAX.-SIGNAL PLATE INPUT■	21 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT■	2 max.	watts
PLATE DISSIPATION■	12 max.	watts

Typical CCS Push-Pull Operation:

Values are for 2 tubes

DC Plate voltage	300	volts
Grid No.3	*Connected to cathode at socket*	
DC Grid-No.2 voltage♦	250	volts
DC Grid-No.1 voltage♦	-21	volts
Peak AF Grid-No.1-to-Grid-No.1 voltage	40	volts
Zero-signal DC Plate current	40	ma
Max.-signal DC Plate current	125	ma
Zero-signal DC Grid-No.2 current	2	ma
Max.-signal DC Grid-No.2 current	14	ma
Effective Load Resistance (Plate-to-plate)	[illegible]	ohms
Max.-signal Driving Power	0	watts
Total Harmonic Distortion	[illegible]	%
Max.-signal Power Output (Approx.)	20.5	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	0.1 max.	megohm

→ RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy† and RF POWER AMPLIFIER — Class C FM Telephony

Maximum Ratings, *Absolute-Maximum Values:*

	CCS●	FCAS●●	
DC PLATE VOLTAGE	375 max.	375 max.	volts
GRID No.3 (SUPPRESSOR GRID)	0 max.	0 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	70 max.	80 max.	ma
DC GRID-No.2 CURRENT	15 max.	15 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT	21 max.	24 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	12 max.	12 max.	watts

→ Indicates a change.

World Radio History

Typical Operation:

As amplifier at 175 Mc

	CCS	ICAS	
DC Plate Voltage	250	300	volts
Grid No.3	*Connected to cathode at socket*		
DC Grid-No.2 Voltage[▲▲]	250	250	volts
DC Grid-No.1 Voltage[▲▲]	−40	−45	volts
Peak RF Grid-No.1 Voltage	57	65	volts
DC Plate Current	60	70	ma
DC Grid-No.2 Current	3.1	3.1	ma
DC Grid-No.1 Current (Approx.)	1.5	1.7	ma
Driver Power Output (Approx.)[▲▲]	1	1	watt
Useful Power Output (Approx.)	6.5	8.5	10	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . 0.1 max. 0.1 max. megohm

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony ←

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum Ratings, *Absolute-Maximum Values:*

	Up to 175 Mc		
	CCS	ICAS	
DC PLATE VOLTAGE	300 max.	300 max.	volts
GRID No.3 (SUPPRESSOR GRID)	0 max.	0 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	−125 max.	−125 max.	volts
DC PLATE CURRENT	70 max.	70 max.	ma
DC GRID-No.2 CURRENT	10 max.	10 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT	15 max.	17.5 max.	watts
GRID-No.2 INPUT	1.4 max.	1.4 max.	watts
PLATE DISSIPATION	7 max.	8 max.	watts

Typical Operation:

At 175 Mc

DC Plate Voltage	250	250	volts
Grid No.3	*Connected to cathode at socket*		
DC Grid-No.2 Voltage[▲]	250	250	volts
DC Grid-No.1 Voltage[▲]	−70	−75	volts
From a grid-No.2 resistor of	33000	33000	ohms
RF Grid-No.1 Voltage	75	80	volts
DC Plate Current	60	70	ma
DC Grid-No.2 Current	2.7	3	ma
DC Grid-No.1 Current (Approx.)	2.1	2.3	ma
Driving Power (Approx.)[▲▲]	1	1	watt
Useful Power Output[▲]	6.5	7.5	watts

← Indicates change.

World Radio History

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	0.1 max.	0.1 max.	megohm

FREQUENCY MULTIPLIER

Maximum Ratings, *Absolute-Maximum Values:*

	CCS	*ICAS*	
DC PLATE VOLTAGE	375 max.	375 max.	volts
GRID No.3 (SUPPRESSOR GRID)	0 max.	0 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	50 max.	60 max.	ma
DC GRID-No.2 CURRENT	15 max.	15 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT	13 max.	15 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	10 max.	12 max.	watts

Typical Operation:

	As doubler to 175 Mc		
DC Plate Voltage	250	250	volts
Grid No.3	*Connected to cathode at socket*		
DC Grid-No.2 Voltage	200	250	volts
DC Grid-No.1 Voltage[⊕⊕]	-53	-66	volts
From a grid-No.1 resistor of	53000	44000	ohms

→ Indicates a change.

World Radio History

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BEAM POWER TUBE

Peak RF Grid-No.1 Voltage	60	74	volts
DC Plate Current	50	60	ma
DC Grid-No.2 Current	2.6	3.5	ma
DC Grid-No.1 Current (Approx.)	1	1.5	ma
Driving Power (Approx.)▲▲	0.4	0.6	watt
Useful Power Output*	3	4.5	watts
As tripler at 175 Mc			
DC Plate Voltage	200	250	volts
Grid No.3	*Connected to cathode at socket*		
DC Grid-No.2 Voltage	200	250	volts
DC Grid-No.1 Voltage®®	-90	-120	volts
From a grid-No.1 resistor of	50000	70000	ohms
Peak RF Grid-No.1 Voltage	105	130	volts
DC Plate Current	50	60	ma
DC Grid-No.2 Current	3	3.9	ma
DC Grid-No.1 Current (Approx.)	1.85	1.7	ma
Driving Power (Approx.)▲▲	0.4	0.6	watt
Useful Power Output*	1.4	2.3	watts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance	0.1 max.	0.1 max.	megohm

o Without external shield.

♦ Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

● Continuous Commercial Service.

■ Averaged over any audio-frequency cycle of sine-wave form.

§ Obtained preferably from a fixed supply.

† Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●● Intermittent Commercial and Amateur Service.

□□ Obtained preferably from a separate source or from the plate-voltage supply with a voltage divider. If a series resistor is used, it should be adjustable to obtain the desired operating plate current after initial tuning adjustments are completed.

®® Obtained from a grid-No.1 resistor, or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

▲▲ Driver stage is required to supply tube losses and rf-circuit losses. The driver stage should be designed to provide an excess of power above the indicated values to take care of variations in line voltage, components, initial tube characteristics, and tube characteristics during life.

* Measured at load.

▲ Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor. It is recommended that this resistor be adjustable to obtain the desired operating plate current after initial tuning adjustments are made.

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World Radio History

7558

BEAM POWER TUBE

★ Obtained from a grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor. The combination of grid-No.1 resistor and fixed supply has the advantage of not only protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.745	0.855	amp
Transconductance	1,2	4200	6400	μmhos
Plate Current	1,2	30	50	ma
Plate Current	1,3	–	50	μa
Grid-No.2 Current	1,2	–	7.5	ma
Reverse Grid-No.1 Current	1,4	–	2	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,5	–	20	μa
Heater positive with respect to cathode	1,5	–	20	μa
Leakage Resistance:				
Between grid-No.1 and all other electrodes tied together	1,6	100	–	megohms
Between plate and all other electrodes tied together	1,7	100	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With plate voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 voltage of 250 volts, and grid-No.1 voltage of −18 volts.

Note 3: With plate voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 voltage of 250 volts, and grid-No.1 voltage of −48 volts.

Note 4: With plate voltage of 180 volts, grid No.3 connected to cathode, grid-No.2 voltage of 250 volts, grid-No.1 resistor of 0.1 megohm, and cathode resistor of 170 ohms.

Note 5: With 100 volts dc between heater and cathode.

Note 6: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 7: With plate 300 volts negative with respect to all other electrodes tied together.

World Radio History

RCA

7558

AVERAGE CHARACTERISTICS

E_f=6.3 VOLTS
GRID №3 CONNECTED TO CATHODE AT SOCKET
GRID-№2 VOLTS=200

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-10305RI

World Radio History

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RCA

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AVERAGE CHARACTERISTICS

ELECTRON TUBE DIVISION 92CM-10304R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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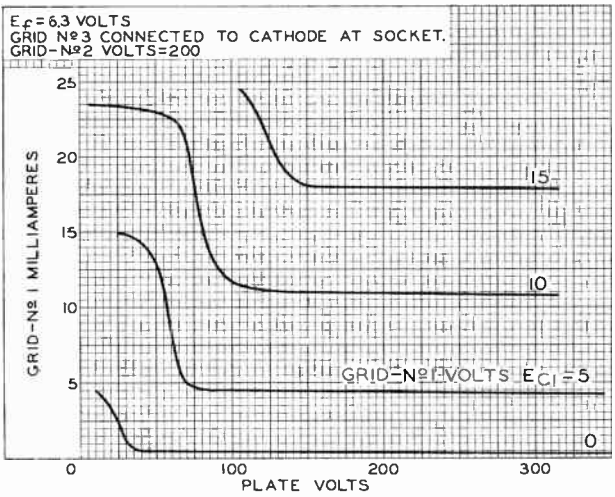
AVERAGE CHARACTERISTICS



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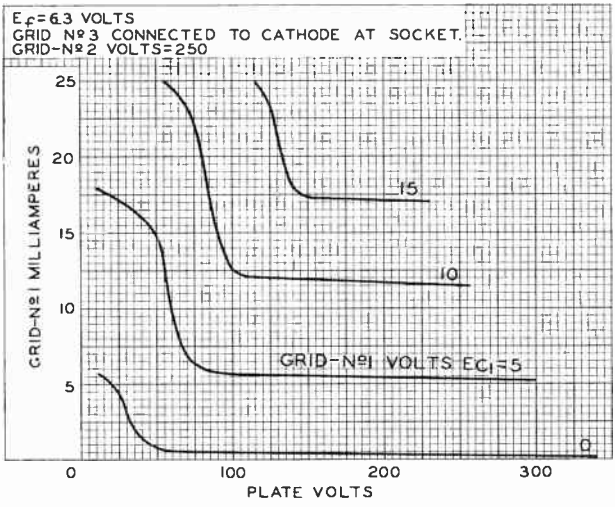

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CS-10307RI

World Radio History

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RCA

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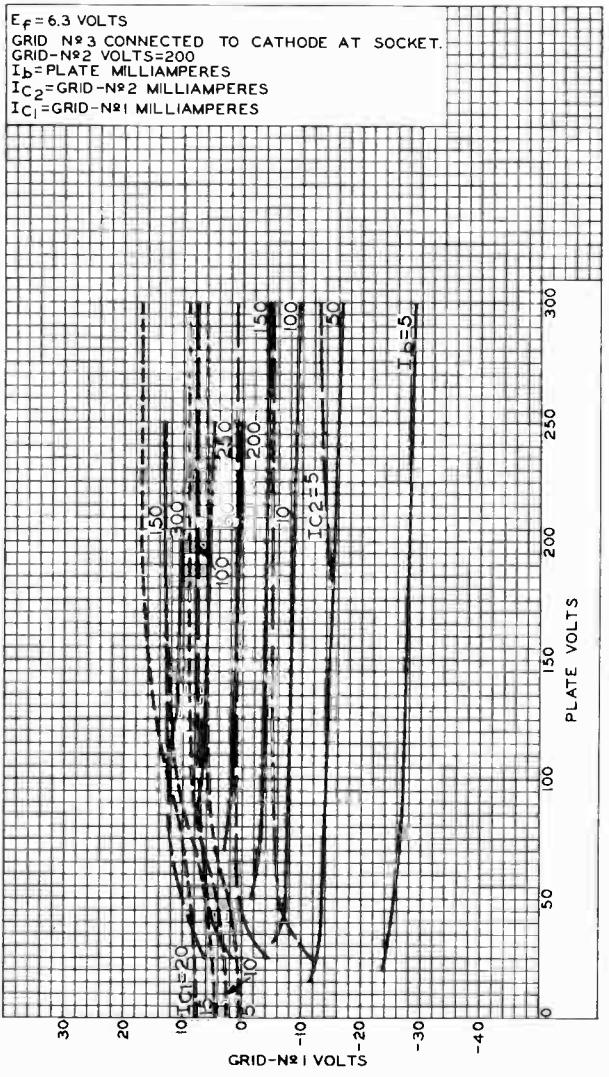
AVERAGE CONSTANT—CURRENT CHARACTERISTICS

E_f = 6.3 VOLTS
GRID Nº3 CONNECTED TO CATHODE AT SOCKET.
GRID-Nº2 VOLTS=200
I_b = PLATE MILLIAMPERES
I_{C_2} = GRID-Nº2 MILLIAMPERES
I_{C_1} = GRID-Nº1 MILLIAMPERES



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-10303RI

World Radio History

7558

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

ELECTRON TUBE DIVISION 92CM-10308R1
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

World Radio History

7586

Medium-Mu Triode

NUVISTOR TYPE

ALL-CERAMIC-AND-METAL CONSTRUCTION

Designed to Withstand Severe Mechanical Shock and Vibration in Industrial Applications, the 7586 is a General-Purpose Tube for Use in Amplifier and Oscillator Service at Frequencies Extending into the UHF Region.

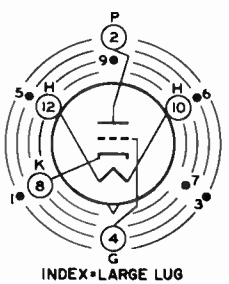
Electrical:

Heater Characteristics and Ratings:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	0.135	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts
Direct Interelectrode Capacitances (Approx.):		
Grid to plate	2.2	pf
Input: G to (K,S,H)	4.2	pf
Output: P to (K,S,H)	1.6	pf
Cathode to plate	0.26	pf
Heater to cathode	1.4	pf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	0.800"
Maximum Seated Length	0.625"
Maximum Diameter	0.440"
Weight (Approx.)	1.9 grams
Envelope	Metal Shell MT4
Socket	See *Socket & Connector Information for RCA Nuvistor Tubes* at front of this Section
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)
Basing Designation for BOTTOM VIEW	12AQ

Pin 1[a] – Do Not Use
Pin 2 – Plate
Pin 3[a] – Do Not Use
Pin 4 – Grid
Pin 5[a] – Do Not Use
Pin 6[a] – Do Not Use
Pin 7[a] – Do Not Use
Pin 8 – Cathode
Pin 9[a] – Do Not Use
Pin 10 – Heater
Pin 12 – Heater



INDEX•LARGE LUG
●=SHORT PIN; IC—DO NOT USE

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	–	–	75	volts
Plate Voltage	26.5	40	–	volts

→ Indicates a change.

World Radio History

Grid Supply Voltage	0	0	0	volts
Cathode Resistor	–	–	100	ohms
Amplification Factor	31	35	35	
Grid Resistor	0.5	0.5	–	megohm
Plate Resistance (Approx.)	4400	3000	3000	ohms
Transconductance	7000	11500	11500	μmhos
Plate Current	2.8	7.5	10.5	ma
Grid Voltage (Approx.) for plate μa = 10	–	–	-7	volts

INDUSTRIAL SERVICE

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

Plate Supply Voltage	330	volts
Plate Voltage	110	volts
Grid Voltage:		
Negative-bias value	55	volts
Peak-positive value	4	volts
Grid Current	2	ma
Cathode Current	15	ma
Plate Dissipation	1	watt

Maximum Circuit Values:

Grid-Circuit Resistance:[b]		
For fixed-bias operation	0.5	megohm
For cathode-bias operation	1	megohm

[a] Pin is cut off close to ceramic wafer.

→ [b] For operation at metal-shell temperature of 150° C. For operation at other metal-shell temperatures, see *Grid-Circuit Resistance Rating Chart.* Metal-shell temperatures are measured in Zone "A" (See accompanying *Dimensional Outline).*

CHARACTERISTICS RANGE VALUES

	Note	*Min.*	*Max.*	
Heater Current	1	0.125	0.145	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	1.8	2.6	pf
Input: G to (K,S,H)	2	3.8	4.6	pf
Output: P to (K,S,H)	2	1.4	1.8	pf
Heater to cathode	2	1.1	1.7	pf
Cathode to plate	2	0.20	0.32	pf
Plate Current (1)	1,3	9	12.5	ma
Plate Current (2)	1,4	–	50	μa
Transconductance (1)	1,3	10000	13000	μmhos
Transconductance (2)	3,5	9000	–	μmhos
Transconductance Change: Difference between Transconductance (1) and Transconductance (2), expressed in per cent of Transconductance (1)	–	–	15	%
Reverse Grid Current	1,6	–	0.1	μa
→ Amplification Factor	1,3	28	42	

→ Indicates a change.

World Radio History

Heater-Cathode Leakage Current:				
Heater negative with respect to cathode.	1,7	-	5	μa
Heater positive with respect to cathode.	1,7	-	5	μa
Leakage Resistance:				
Between grid and all other electrodes tied together.	1,8	1000	-	megohms
Between plate and all other electrodes tied together.	1,9	1000	-	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 75, dc grid supply volts = 0, cathode resistor = 100 ohms, cathode-bypass capacitor = 1000μf, and metal shell connected to ground. ←

Note 4: With dc plate volts = 75, dc grid volts = -7, and metal shell connected to ground.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With dc plate volts = 80, grid supply volts = -1.2, grid resistor = 0.5 megohm, and metal shell connected to ground.

Note 7: With 100 volts dc applied between heater and cathode.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together, and metal shell connected to ground. ←

Note 9: With plate 300 volts negative with respect to all other electrodes tied together, and metal shell connected to ground. ←

SPECIAL RATINGS & PERFORMANCE DATA ←

Shock Rating:

Peak Impact Acceleration. . . . . 1000 g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in four different positions (X_1, X_2, Y_1, Y_2) in a Navy Type, High-impact (flyweight) Shock Machine, and with tube electrodes applied, are subjected to 20 blows (5 in each position) at the specified Peak Impact Acceleration. At the end of this test, tubes are criticized for change in transconductance, reverse grid current, and heater-cathode leakage current, and are then subjected to the Variable-Frequency Vibration Test described below.

Fatigue Rating:

Peak Vibrational Acceleration. . . . . 2.5 max. g

This test is performed on a sample lot of tubes to determine ability of tube to withstand the specified Peak Vibrational Acceleration. Tubes are rigidly mounted, supplied with center heater voltage only, and subjected for 48 hours to 2.5-g Peak Vibrational Acceleration at 60 cycles per second in the X1 position. At the end of this test, tubes are criticized for the same characteristics and end-point values as in the Shock Rating Test described above.

Variable-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run. The tube is operated under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate-load resistor of 2000 ohms.

← Indicates a change.

Marketing History

During operation, tube is vibrated in the X_1 position through the frequency range from 50 to 15,000 cycles per second with a constant vibrational acceleration of 1g. During the test, tube must not show an rms output voltage across the plate-load resistor in excess of:

25 millivolts over the frequency range of 3000 to 6000 cps
500 millivolts over the frequency range of 6000 to 15000 cps

Post-Impact and Post-Fatigue Vibration Limits:

35 millivolts over the frequency range of 3000 to 6000 cps
700 millivolts over the frequency range of 6000 to 15000 cps

Low-Pressure Voltage-Breakdown Test:

This test is performed on a sample lot of tubes to determine the ability of the tube to withstand high-altitude (low-air-pressure) conditions. Tubes are operated with 250 rms volts applied between plate and all other electrodes and metal shell connected together and will not break down or show evidence of corona when subjected to air pressures equivalent to altitudes of up to 100,000 feet (8.0 ± 0.5 mm Hg.)

Heater Cycling:

Cycles of Intermittent Operation. . . . . 2000 cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts= 8.5 cycled one minute on and two minutes off; heater 180 volts negative with respect to cathode; grid, plate, and metal shell connected to ground. At the end of this test, tubes are tested for open heaters and heater-cathode shorts, open cathode circuits, and heater-cathode leakage currents.

Shorts and Continuity:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-1D, Amendment 2, Paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper[c]. See accompanying Shorts-Test Acceptance-Limits curve. Tubes are criticized for permanent or temporary shorts and open circuits.

Early-Hour Stability Life Performance (20 hours):

This test is performed on a sample lot of tubes from each production run to insure that tubes are properly stabilized. Tubes are operated at center heater voltage for 20 hours at maximum-rated plate dissipation. After 2 hours of operation and again after 20 hours of operation, tubes are checked for transconductance under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1). A tube is rejected if its transconductance after 2 or 20 hours of operation has changed more than 10 per cent from the 0-hour value.

Survival-Rate Life (100 hours):

This test is performed on a sample lot of tubes from each production run to assure a minimum of early-hour inoperatives. Tubes are operated with center heater voltage cycled 100 minutes on and 20 minutes off for 100 hours at maximum-rated plate

[c] Specification for tapper supplied on request.

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dissipation, and then subjected to the Shorts and Continuity Test Transconductance (1), and Reverse Grid Current. Tubes must then show a transconductance of not less than 8300 micromhos and reverse grid current no greater than 0.2 microampere.

Intermittent Conduction Life (1000 hours):

This test is performed on a sample lot of tubes from each production run to assure the high quality of individual tubes and to prevent epidemic failures due to excessive changes in tube characteristics. Tubes are operated with center heater voltage cycled 110 minutes on and 10 minutes off, and maximum rated plate dissipation, at a shell temperature of 150° C.

Tubes are criticized at 500 and 1000 hours for Inoperatives,[d] reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, a tube is rejected if its Transconductance (1) after 500 hours has changed more than 20 per cent or after 1000 hours has changed more than 25 per cent from the 0-hour value. The average change in Transconductance (1) of the lot from the 0-hour value must not exceed 15 per cent at 500 hours and 20-per cent at 1000 hours.

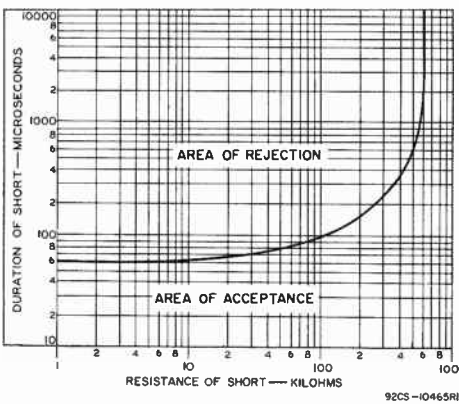
Standby Life (1000 hours):

This test is performed on a sample lot of tubes from each production run. Tubes are operated with only the center heater voltage applied.

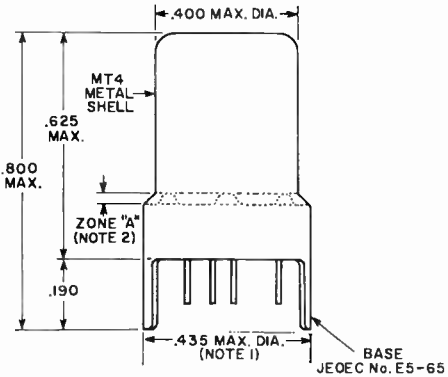
At 500 and 1000 hours the tubes are criticized for leakage resistance, reverse grid current, the change in Transconductance (1) of individual tubes from the 0-hour values, and for cathode interface resistance greater than 25 ohms. Interface resistance is measured by Method B of ASTM specification F300-61T.

[d] An inoperative is defined as a tube having a discontinuity, permanent short, or air leak.

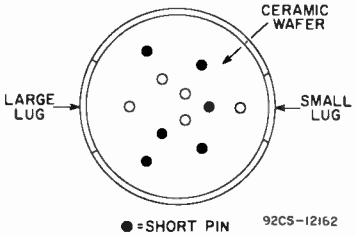
SHORTS-TEST ACCEPTANCE LIMITS



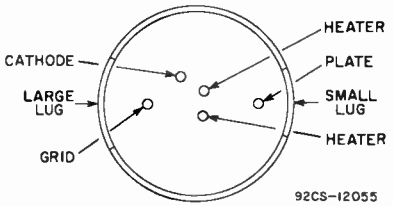
World Radio History



BOTTOM VIEW
Showing Arrangement of All 11 Base Pins



MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown

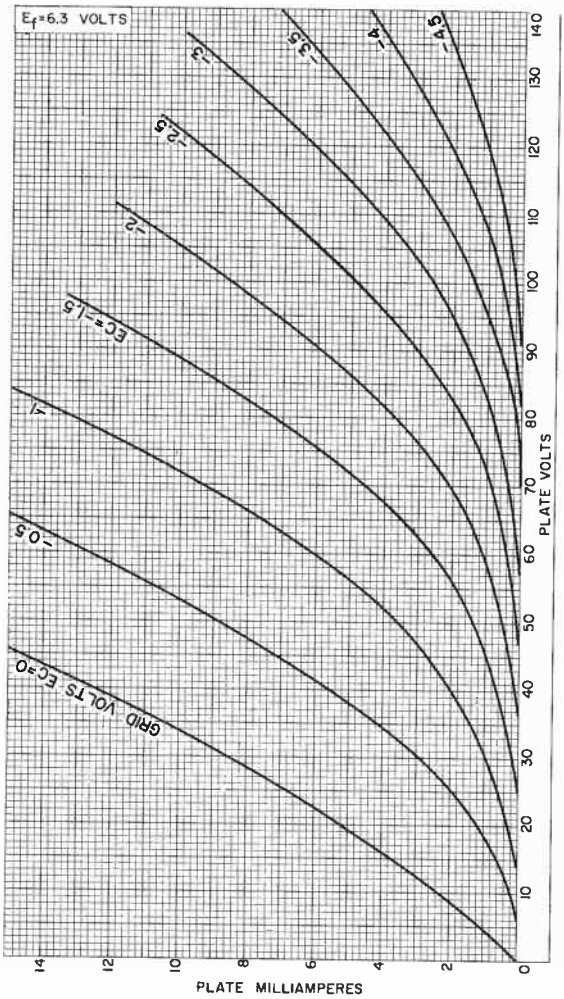


Note 1: Maximum outside diameter of 0.440" is permitted along 0.190" lug length.

Note 2: Metal-shell temperature should be measured in Zone "A".

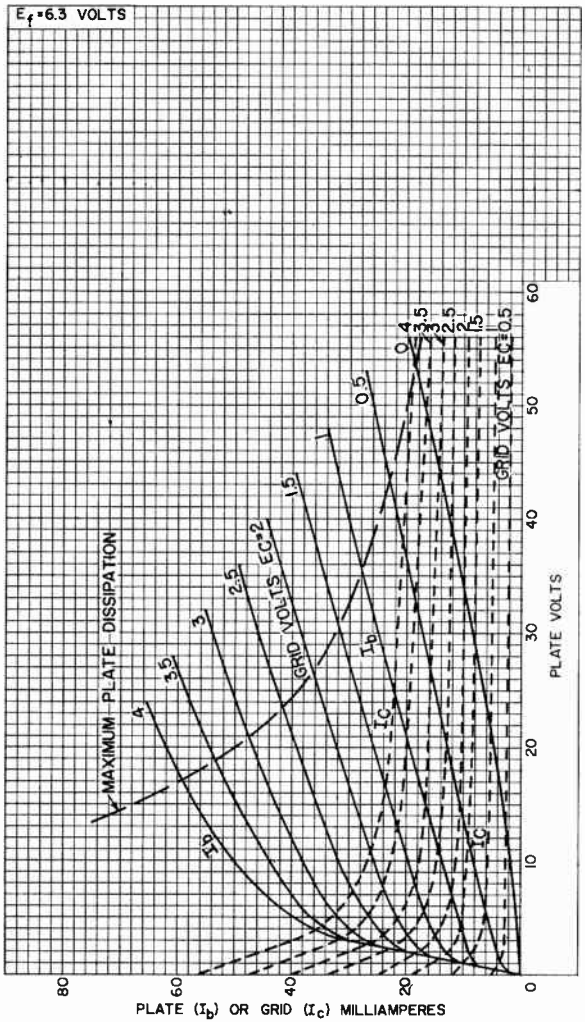
World Radio History

AVERAGE PLATE CHARACTERISTICS



92CM-10460R2

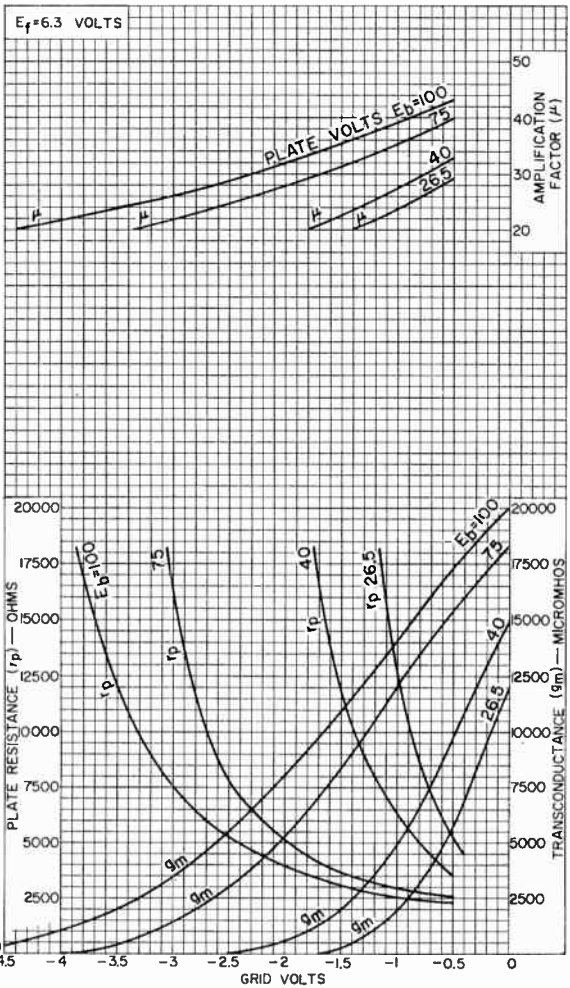
AVERAGE CHARACTERISTICS



92CM-10464RI

World Radio History

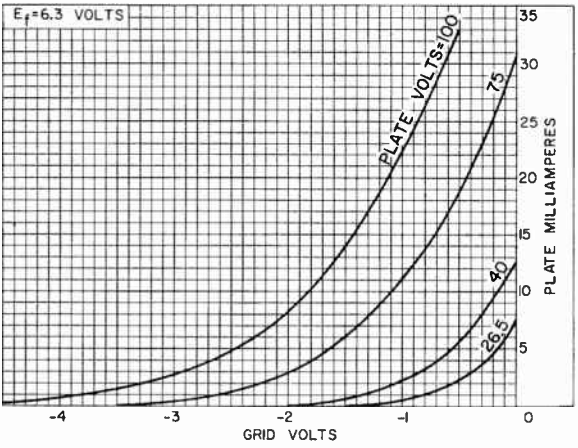
AVERAGE CHARACTERISTICS



92CM-10964

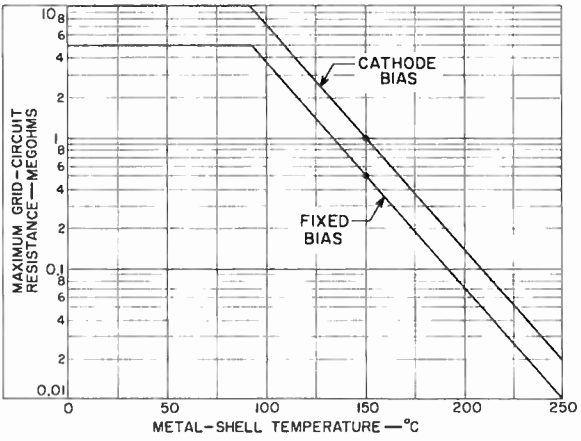
World Radio History

AVERAGE CHARACTERISTICS



92CS-10461R1

GRID-CIRCUIT-RESISTANCE RATING CHART



92CS-11911

7587

Sharp-Cutoff Tetrode

NUVISTOR TYPE

For Industrial Applications

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.15	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to plate	0.01	μμf
Grid No.1 to cathode, grid No.2, shell, and heater	6.5	μμf
Plate to cathode, grid No.2, shell, and heater	1.4	μμf
Heater to cathode	1.4	μμf

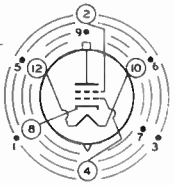
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	125	volts
Grid-No.2 Supply Voltage	50	volts
Cathode Resistor	68	ohms
Plate Resistance (Approx.)	0.2	megohm
Transconductance	10600	μmhos
Plate Current	10	ma
Grid-No.2 Current	2.7	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-4.5	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	1.050"
Maximum Seated Length	0.840"
Maximum Diameter	0.440"
Weight (Approx.)	1/10 oz
Envelope	Metal Shell MT4 and Ceramic Cylinder
Cap	Skirted Miniature (JEDEC No.C1-44)
Socket	Cinch Mfg. Corp. No.133 65 10 001, or equivalent
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)
Basing Designation for BOTTOM VIEW	12AS

Pin 1[a] - Internal Connection—Do Not Use
Pin 2 - Grid No.2
Pin 3 - Same as Pin 1
Pin 4 - Grid No.1
Pin 5 - Same as Pin 1



INDEX = LARGE LUG
a = PIN CUT OFF

Pin 6 - Same as Pin 1
Pin 7 - Same as Pin 1
Pin 8 - Cathode
Pin 9 - Same as Pin 1
Pin 10 - Heater
Pin 12 - Heater
Cap - Plate

World Radio History

INDUSTRIAL SERVICE

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

PLATE SUPPLY VOLTAGE	330 max.	volts
PLATE VOLTAGE	250 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts
GRID-No.2 VOLTAGE	110 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	55 max.	volts
Peak-positive value	2 max.	volts
CATHODE CURRENT	20 max.	ma
GRID-No.1 CURRENT	2 max.	ma
GRID-No.2 INPUT	0.2 max.	watt
PLATE DISSIPATION	2.2 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:[b]		
For fixed-bias operation	0.5 max.	megohm
For cathode-bias operation	1 max.	megohm

[a] Pin 1 is cut off close to ceramic wafer.

[b] For operation at metal-shell temperatures up to 150° C.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.14	0.16	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	0.009	0.011	μμf
Grid No.1 to cathode, grid No.2, shell, and heater	2	6	7	μμf
Plate to cathode, grid No.2, shell, and heater	2	1.2	1.6	μμf
Heater to cathode	2	1.1	1.7	μμf
Plate Current (1)	1,3	8.5	11.5	ma
Plate Current (2)	1,4	–	50	μa
Grid-No.2 Current	1,3	1.8	3.6	ma
Transconductance (1)	1,3	9000	12200	μmhos
Transconductance (2)	3,5	8000	–	μmhos
Transconductance Change: Difference between Transconductance (1) and Transconductance (2), expressed in per cent of Transconductance (1)	–	–	20	%
Reverse Grid Current	1,6	–	0.1	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,8	–	5	μa
Heater positive with respect to cathode	1,8	–	5	μa

World Radio History

Leakage Resistance:				
Between grid No.2 and all other electrodes tied together.	1,7	500	–	megohms
Between grid No.1 and all other electrodes tied together.	1,9	500	–	megohms
Between plate and all other electrodes tied together. . .	1,9	500	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 125, grid-No.2 supply volts = 50, cathode resistor = 68 ohms, and cathode-bypass capacitor = 1000 μf.

Note 4: With dc plate volts = 125, dc grid-No.2 volts = 50, dc grid-No.1 volts = -6, and metal shell connected to ground.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With dc plate volts = 200, dc grid-No.2 volts = 70, dc grid-No.1 supply volts = -1.6, grid-No.1 resistor = 0.5 megohm, and metal shell connected to ground.

Note 7: With grid No.2 100 volts negative with respect to all other electrodes tied together.

Note 8: With 100 volts dc applied between heater and cathode.

Note 9: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 10: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 1000 max. g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-impact (flyweight) Shock Machine and are subjected to 20 blows at the specified maximum impact acceleration. At the end of this test, tubes are criticized for change in transconductance, reverse grid current, and heater-cathode leakage current, and are then subjected to the Variable-Frequency Vibration Test described below.

Fatigue Rating:

Vibrational Acceleration. . . . . 2.5 max. g

This test is performed on a sample lot of tubes to determine ability of tube to withstand the specified vibrational acceleration. Tubes are rigidly mounted, supplied with rated heater voltage only, and subjected for 48 hours to 2.5-g vibrational acceleration at 60 cycles per second in a direction perpendicular to the longitudinal axis of the tube. At the end of this test, tubes are criticized for the same characteristics and end-point values as in the Shock Rating Test described above.

World Radio History

Variable-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run. The tube is operated under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate-load resistor of 2000 ohms. During operation, tube is vibrated in a direction perpendicular to the longitudinal axis of the tube through the frequency range from 50 to 15,000 cycles per second with a constant vibrational acceleration of 1 g. During the test, tube will not show an rms output voltage across the plate-load resistor in excess of: (1) 35 millivolts from 50 to 6000 cps, (2) 500 millivolts from 6000 to 15,000 cps.

Low-Pressure Voltage-Breakdown Test:

The test is performed on a sample lot of tubes from each production run. In this test, tubes are operated with 240 rms volts applied between plate and all other electrodes and will not break down or show evidence of corona when subjected to air pressures equivalent to altitudes of up to 100,000 feet.

Heater Cycling:

Cycles of Intermittent Operation. . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7.5 cycled one minute on and two minutes off; heater 100 volts negative with respect to cathode; grid No.1, grid No.2, plate, and metal shell connected to ground. At the end of this test, tubes are tested for open heaters and heater-cathode shorts.

Shorts and Continuity:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-ID, Ammendent 2, Paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper[c]. See accompanying *Shorts-Test Acceptance-Limits* curve. Tubes are criticized for permanent or temporary shorts and open circuits.

Early-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that tubes are properly stabilized. In this test, tubes are operated for 20 hours at maximum-rated plate dissipation. After 2 hours of operation and again after 20 hours of operation, tubes are checked for transconductance under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1). A tube is rejected if its transconductance after 2 or 20 hours of operation has changed more than 10 per cent from the 0-hour value.

World Radio History

100-Hour Life Performance:

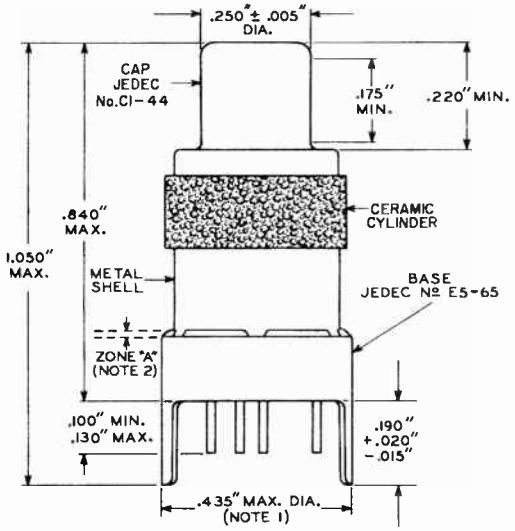
This test is performed on a sample lot of tubes from each production run to insure a low percentage of early-hour inoperatives. Tubes are operated for 100 hours at maximum-rated plate dissipation, and then subjected to the *Shorts and Continuity* Test previously described. Tubes must then show a transconductance of not less than 7500 micromhos under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1).

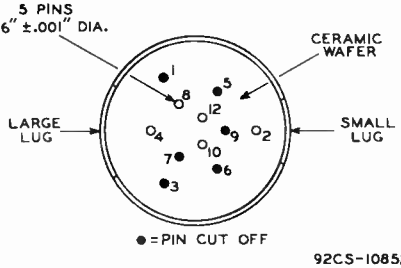
1000-Hour Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation, and then criticized for inoperatives, reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, the average change in transconductance of the lot from the 0-hour value for Transconductance (1) specified in CHARACTERISTICS RANGE VALUES, must not exceed 20 per cent at 500 hours, and 25 per cent at 1000 hours.

[c] Specifications for tapper supplied on request.

World Radio History





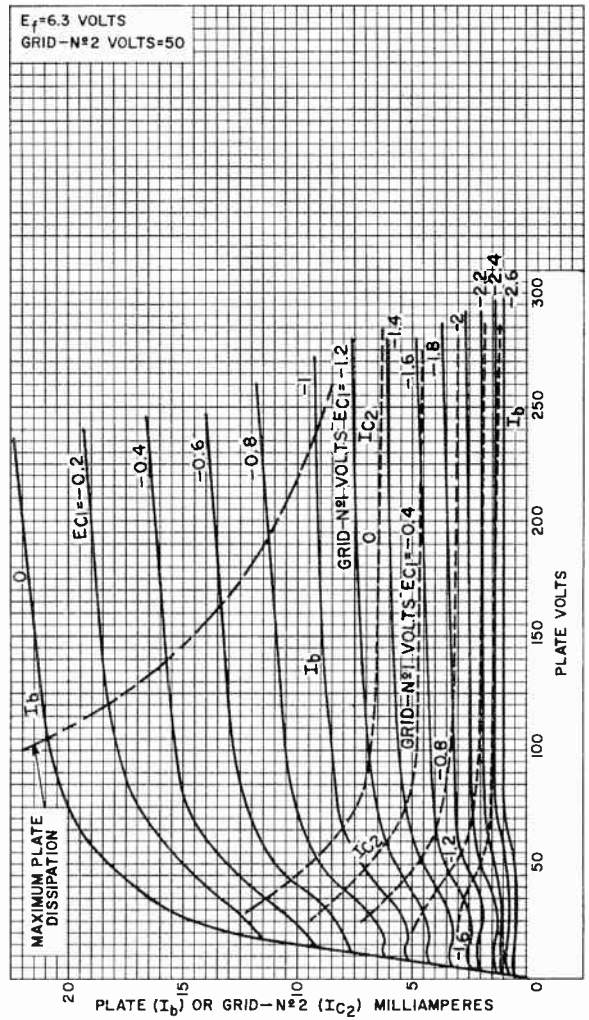
92CS-10852RI

NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A" BETWEEN BROKEN LINES.

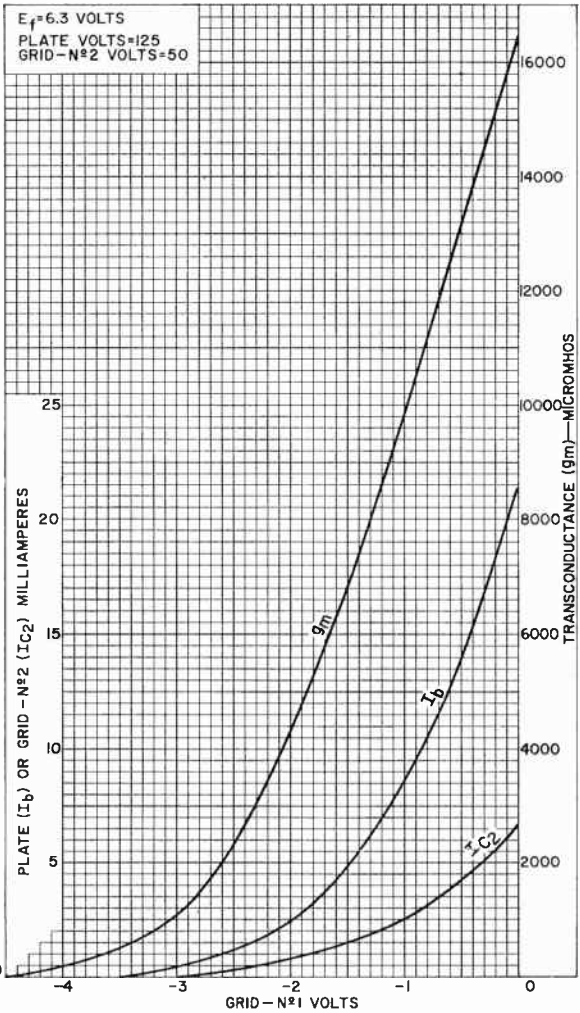
World Radio History

AVERAGE CHARACTERISTICS



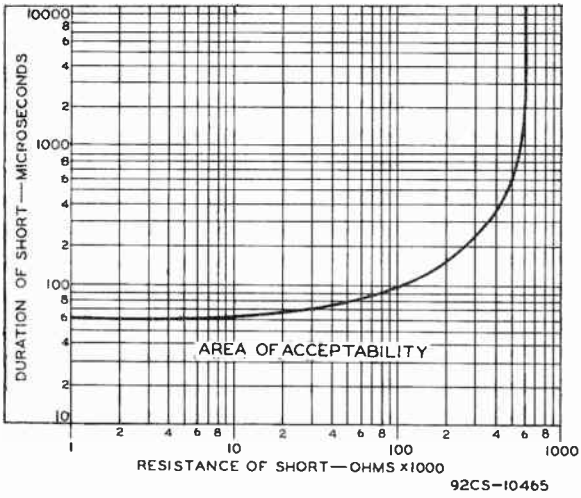
92CM-10926

AVERAGE CHARACTERISTICS



92CM-10927

SHORTS-TEST ACCEPTANCE LIMITS



World Radio History

World Radio History

7717/6CY5

Sharp-Cutoff Tetrode

7-PIN MINIATURE TYPE

For Mobile-Communications Equipment

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:

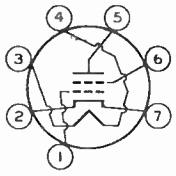
Voltage (AC or DC)	6.3 $^{+1.2}_{-0.3}$		volts
Current at heater volts = 6.3	0.200		amp
Peak heater-cathode voltage:			
Heater negative with respect to cathode	100	max.	volts
Heater positive with respect to cathode	100[a]	max.	volts
Direct Interelectrode Capacitances:[b]			
Grid No.1 to plate	0.03	max.	$\mu\mu$f
Grid No.1 to cathode & internal shield, grid No.2, and heater	4.4		$\mu\mu$f
Plate to cathode & internal shield, grid No.2, and heater	2.74		$\mu\mu$f

Characteristics, Class A_1 Amplifier:

Plate Voltage	125	volts
Grid-No.2 Voltage	80	volts
Grid-No.1 Voltage	-1	volt
Plate Resistance (Approx.)	0.125	megohm
Transconductance	8000	μmhos
Plate Current	10	ma
Grid-No.2 Current	1.4	ma
Grid-No.1 Voltage (Approx.) for transconductance (μmhos) = 100	-5	volts

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7EW



Pin 1 - Grid No.1
Pin 2 - Cathode, Internal Shield
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Plate
Pin 6 - Grid No.2
Pin 7 - Cathode, Internal Shield

World Radio History

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	180 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	180 max.	volts
GRID-No.2 VOLTAGE	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive-bias value	0 max.	volts
CATHODE CURRENT	20 max.	ma
GRID-No.2 INPUT:		
For grid-No.2 voltages up to 90 volts	0.5 max.	watt
For grid-No.2 voltages between 90 and 180 volts.	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
PLATE DISSIPATION	2 max.	watts

Maximum Circuit Values:

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

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling:

Cycles of Intermittent Operation	2000 min.	cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7.5 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage:

Average Value	5900	μmhos

With heater volts = 5.0, plate volts = 125, grid-No.2 volts = 80, grid-No.1 volts = -1.

[a] The dc component must not exceed 50 volts.
[b] With external shield JEDEC No.316 connected to cathode.

World Radio History

7724/14GT8

Twin Diode—High-Mu Triode

9-PIN MINIATURE TYPE

For Mobile-Communications Equipment

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:			
Voltage (AC or DC)	14.0[a]		volts
Current at heater volts = 14.0	0.150		amp
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[b]	max.	volts
Direct Interelectrode Capacitances:[c]			
Triode Unit:			
Grid to plate	1.8		μμf
Grid to cathode and heater	1.6		μμf
Plate to cathode and heater	0.24		μμf
Diode Units:			
Diode-No.1 plate to triode grid	0.09	max.	μμf
Diode-No.2 plate to triode grid	0.07	max.	μμf
Either diode cathode to all other tube electrodes	6.5		μμf
Diode plate to cathode and heater (Each unit)	2.4		μμf

Characteristics, Class A_1 Amplifier (Triode Unit):

Plate Voltage	250	volts
Grid Voltage	-3	volts
Amplification Factor	72	
Plate Resistance (Approx.)	72000	ohms
Transconductance	1000	μmhos
Plate Current	0.7	ma

Mechanical:

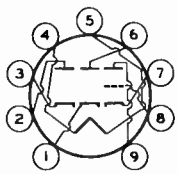
Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

World Radio History

7724/14GT8

Basing Designation for BOTTOM VIEW. 9KR

Pin 1 – Diode-No.2 Cathode
Pin 2 – Diode-No.1 Plate
Pin 3 – Diode-No.1 Cathode
Pin 4 – Heater



Pin 5 – Heater
Pin 6 – Diode-No.2 Plate
Pin 7 – Triode Cathode
Pin 8 – Triode Grid
Pin 9 – Triode Plate

TRIODE UNIT — AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE.	330 max.	volts
GRID VOLTAGE:		
Positive-bias value.	0 max.	volts
PLATE DISSIPATION.	1.1 max.	watts

DIODE UNITS — Two

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE CURRENT.	5 max.	ma

Characteristics, Instantaneous Value:

Plate Current for plate volts = 5.	18	ma

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling:

Cycles of Intermittent Operation . . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 18.9 cycled one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Transconductance at Reduced Heater Voltage (Triode Unit):

Average Value. . . . . 900 μmhos

With heater volts = 10.8, plate volts = 250, and grid volts = -3.

[a] For satisfactory operation, it is recommended that the heater be operated within the voltage range of 12.0 to 15.0 volts.
[b] The dc component must not exceed 100 volts.
[c] Without external shield.

World Radio History

7895

High-Mu Triode

NUVISTOR TYPE

For Industrial Applications

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.135	amp
Direct Interelectrode Capacitances (Approx.):		
Grid to plate	0.9	μμf
Grid to cathode, shell, and heater	4.2	μμf
Plate to cathode, shell, and heater	1.7	μμf
Plate to cathode	0.22	μμf
Heater to cathode	1.3	μμf

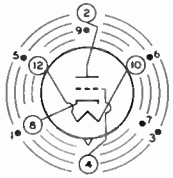
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	110	volts
Grid Supply Voltage	0	volts
Cathode Resistor	150	ohms
Amplification Factor	64	
Plate Resistance (Approx.)	6800	ohms
Transconductance	9400	μmhos
Plate Current	7	ma
Grid Voltage (Approx.) for plate μa = 10	-4	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	0.800"
Maximum Seated Length	0.625"
Maximum Diameter	0.440"
Weight (Approx.)	1 lb oz
Envelope	Metal Shell
Socket	Cinch Mfg. Corp. No.133 65 10 001, or equivalent
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)
Basing Designation for BOTTOM VIEW	12AQ

Pin 1[a] - Internal Connection—Do Not Use
Pin 2 - Plate
Pin 3 - Same as Pin 1
Pin 4 - Grid
Pin 5 - Same as Pin 1
Pin 6 - Same as Pin 1
Pin 7 - Same as Pin 1
Pin 8 - Cathode
Pin 9 - Same as Pin 1
Pin 10 - Heater
Pin 12 - Heater



INDEX=LARGE LUG
●=PIN CUT OFF

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INDUSTRIAL SERVICE

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

PLATE SUPPLY VOLTAGE	330 max.	volts
PLATE VOLTAGE	110 max.	volts
GRID VOLTAGE:		
Negative-bias value	55 max.	volts
Peak-positive value	2 max.	volts
GRID CURRENT	2 max.	ma
PLATE CURRENT	20 max.	ma
CATHODE CURRENT	15 max.	ma
PLATE DISSIPATION	1 max.	watt
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:[b]		
For fixed-bias operation	0.5 max.	megohm
For cathode-bias operation	1 max.	megohm

[a] Pin is cut off close to ceramic wafer.

[b] For operation at metal-shell temperatures up to 150° C.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.125	0.145	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	0.8	1	μμf
Grid to cathode, shell, and heater	2	3.4	5	μμf
Plate to cathode, shell, and heater	2	1.3	2.1	μμf
Heater to cathode	2	1	1.6	μμf
Plate to cathode	2	0.16	0.28	μμf
Plate Current (1)	1,3	5.5	8.8	ma
Plate Current (2)	1,4	–	50	μa
Transconductance (1)	1,3	7900	10900	μmhos
Transconductance (2)	3,5	6900	–	μmhos
Transconductance Change: Difference between Transconductance (1) and Transconductance (2), expressed in per cent of Transconductance (1)	–	–	15	%
Reverse Grid Current	1,6	–	0.1	μa
Amplification Factor	1,3	54	74	
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,7	–	5	μa
Heater positive with respect to cathode	1,7	–	5	μa

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Leakage Resistance:				
Between grid and all other electrodes tied together	1,8	1000	–	megohms
Between plate and all other electrodes tied together	1,9	1000	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 110, cathode resistor = 150 ohms, and cathode-bypass capacitor = 1000 μf.

Note 4: With dc plate volts = 110, dc grid volts = -5, and metal shell connected to ground.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With dc plate volts = 150, grid supply volts = -1.7, grid resistor = 0.5 megohm, and metal shell connected to ground.

Note 7: With 100 volts dc applied between heater and cathode.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together.

Note 9: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 1000 max. g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-impact (flyweight) Shock Machine and are subjected to 20 blows at the specified maximum impact acceleration. At the end of this test, tubes are criticized for change in transconductance, reverse grid current, and heater-cathode leakage current, and are then subjected to the Variable-Frequency Vibration Test described below.

Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g

This test is performed on a sample lot of tubes to determine ability of tube to withstand the specified vibrational acceleration. Tubes are rigidly mounted, supplied with normal heater voltage only, and subjected for 48 hours to 2.5-g vibrational acceleration at 60 cycles per second in a direction perpendicular to the longitudinal axis of the tube. At the end of this test, tubes are criticized for the same characteristics and end-point values as in the Shock Rating Test described above.

Variable-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run. The tube is operated under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate-load resistor of 2000 ohms. During operation, tube is vibrated in a direction perpendicular to the longitudinal axis of the tube through the frequency range from 50 to 15,000 cycles per second under the following conditions: a sweep rate of one octave per 30 seconds from

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50 to 3000 cps, a 7-second sweep from 3000 to 15,000 cps, and a constant vibrational acceleration of 1 g. During the test, tube must not show an rms output voltage in excess of: (1) 35 millivolts from 50 to 3000 cps, (2) 60 millivolts from 3000 to 6000 cps, and (3) 500 millivolts from 6000 to 15,000 cps.

Low-Pressure Voltage-Breakdown Test:

This test is performed on a sample lot of tubes from each production run. In this test, tubes are operated with 240 rms volts applied between plate and all other electrodes and will not break down or show evidence of corona when subjected to air pressures equivalent to altitudes of up to 100,000 feet.

Heater Cycling:

Cycles of Intermittent Operation . . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7.5 cycled one minute on and two minutes off; heater 100 volts negative with respect to cathode; grid, plate, and metal shell connected to ground. At the end of this test, tubes are tested for open heaters, heater-cathode shorts, and heater-cathode leakage current.

Shorts and Continuity:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-1D, Amendment 2, paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper[c]. See accompanying *Shorts-Test Acceptance-Limits* curve. Tubes are criticized for permanent or temporary shorts and open circuits.

Early-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that tubes are properly stabilized. In this test, tubes are operated for 20 hours at maximum-rated plate dissipation. After 2 hours of operation and again after 20 hours of operation, tubes are checked for transconductance under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1). A tube is rejected if its transconductance after two or 20 hours of operation has changed more than 10 per cent from the 0-hour value.

100-Hour Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early-hour inoperatives. Tubes are operated for 100 hours at maximum-rated plate dissipation, and then subjected to the Shorts and Continuity test previously described. Tubes must show a value not less than 6200 micromhos for Transconductance (1), and a value not greater than 0.2 microamperes for reverse grid current under conditions specified in CHARACTERISTICS RANGE VALUES.

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1000-Hour Conduction Life Performance:

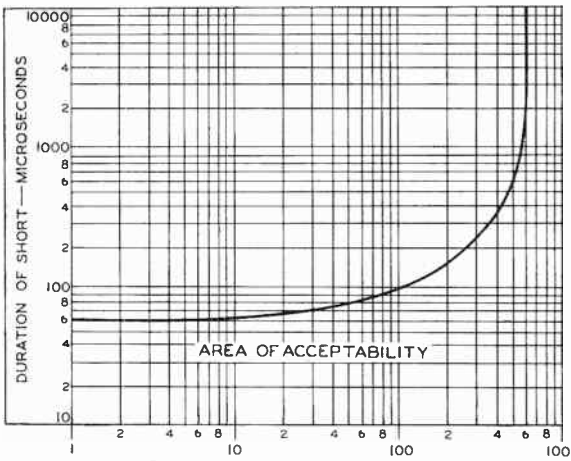
This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation, and then criticized for inoperatives, reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, the average change in transconductance of the lot from the 0-hour value for Transconductance (1) specified in CHARACTERISTICS RANGE VALUES, must not exceed 15 per cent at 500 hours, and 20 per cent at 1000 hours.

1000-Hour Standby Life Performance:

This test is performed on a sample lot of tubes from each production run. The tubes are operated for 1000 hours with only normal heater voltage applied. Tubes are criticized for inter-electrode leakage, reverse grid current, change in transconductance of individual tubes from values at 0-hours and cathode interface resistance greater than 25 ohms. Interface resistance is measured by Method B of ASTM specification F300-57T.

[c] Specifications for tapper supplied on request.

SHORTS-TEST ACCEPTANCE LIMITS



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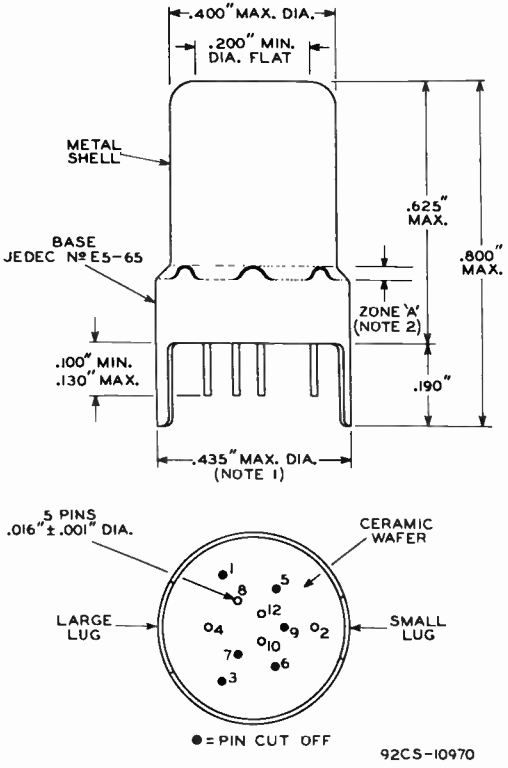

NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A" BETWEEN BROKEN LINES.

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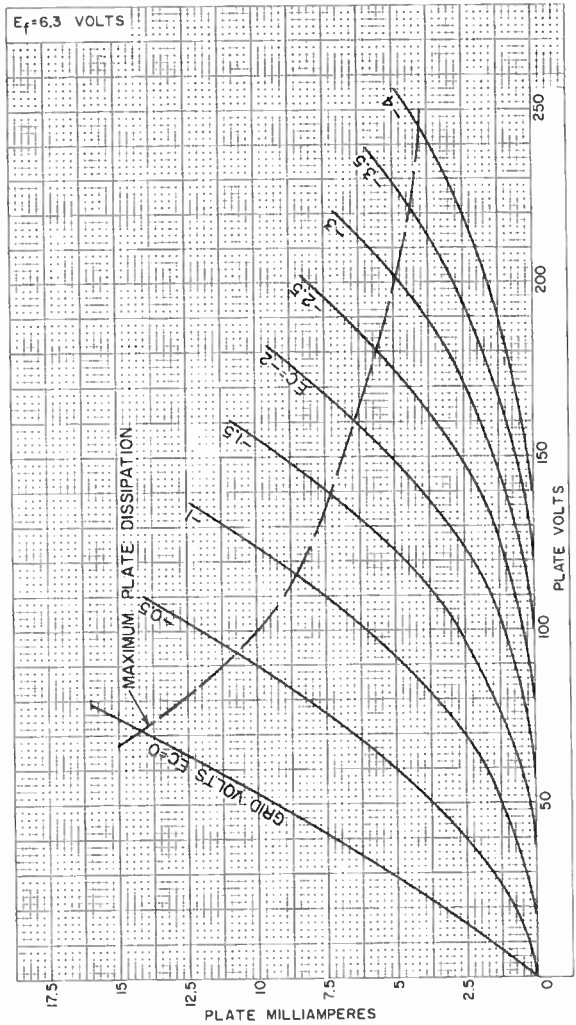
AVERAGE PLATE CHARACTERISTICS



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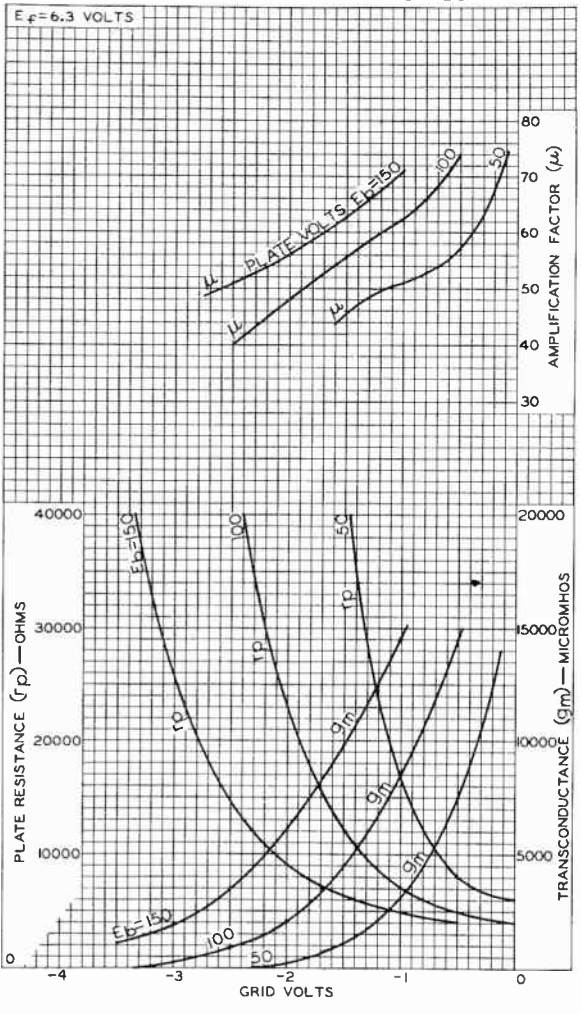
AVERAGE CHARACTERISTICS



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High-Mu Twin Triode

9-PIN MINIATURE TYPE

For Use in Mobile-Communications Equipment Operating from 6-Cell Storage-Battery Systems

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Absolute-Maximum Values)*:		
Voltage (AC or DC)[a]	13.5 ± 1.5	volts
Current at heater volts = 13.5	0.150	amp
Peak heater-cathode voltage (Each unit):		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	*With External Shield*[b]	
Grid-Drive Operation:			
Grid to plate (Each unit)	1.6	1.6	μμf
Grid to cathode and heater (Each unit)	2.5	2.5	μμf
Plate to cathode and heater (Unit No.1)	0.45	1.2	μμf
Plate to cathode and heater (Unit No.2)	0.38	1.3	μμf
Cathode-Drive Operation:			
Cathode to plate (Unit No.1)	0.2	0.18[d]	μμf
Cathode to plate (Unit No.2)	0.24	0.2[d]	μμf
Cathode to grid and heater (Each unit)	5	5[d]	μμf
Plate to grid and heater (Unit No.1)	1.9	2.7[d]	μμf
Plate to grid and heater (Unit No.2)	1.8	2.7[d]	μμf
Heater to cathode (Each unit)	2.8	2.8[c]	μμf
Plate to plate	0.24	-	μμf

Characteristics, Class A_1 Amplifier (Each Unit):

Heater Voltage	13.5	volts
Plate Supply Voltage	250	volts
Cathode Resistor	200	ohms
Amplification Factor	60	
Plate Resistance (Approx.)	10900	ohms
Transconductance	5500	μmhos
Plate Current	10	ma
Grid Voltage (Approx.) for plate μa = 10	-12	volts

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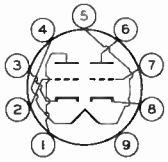
Mechanical:

Operating Position . . . . . .Any
Type of Cathodes . . . . . .Coated Unipotential
Maximum Overall Length . . . . . 2-3/16"
Maximum Seated Length. . . . . 1-15/16"
Length, Base Seat to Bulb Top (Excluding tip). 1-9/16" ±3/32"
Diameter . . . . . 0.750" to 0.875"
Dimensional Outline. . . . . .See *General Section*
Bulb T6-1/2
Base . . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW 9EP

Pin 1 - Plate of Unit No.2
Pin 2 - Grid of Unit No.2
Pin 3 - Cathode of Unit No.2
Pin 4 - Heater
Pin 5 - Heater



Pin 6 - Plate of Unit No.1
Pin 7 - Grid of Unit No.1
Pin 8 - Cathode of Unit No.1
Pin 9 - Do Not Use

AMPLIFIER — Class A[1]

Values are for Each Unit

Maximum Ratings, ***Absolute-Maximum Values:***

PLATE VOLTAGE.	330 max.	volts
GRID VOLTAGE:		
Negative-bias value.	55 max.	volts
Positive-bias value.	0 max.	volts
PLATE DISSIPATION.	2.75 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	180 max.	°C

Maximum Circuit Values:

Grid-Circuit Resistance:		
For fixed-bias operation	0.25 max.	megohm
For cathode-bias operation	1 max.	megohm

[a] Heater will withstand momentary excursions from 11.0 to 16.0 volts.
[b] With external shield JEDEC NO.315 connected to cathode of unit under test except as noted.
[c] With external shield JEDEC No.315 connected to ground.
[d] With external shield JEDEC NO.315 connected to grid of unit under test.

SPECIAL RATINGS AND PERFORMANCE DATA

Heater-Cycling:

Cycles of Intermittent Operation . . . . . 1160 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: Heater volts = 19.5 cycled one minute on and two minutes off; heater 135 volts negative with respect to cathode; all other elements

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connected to ground. At the end of this test, tubes are tested for heater-cathode shorts and open circuits.

Low-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run under the following conditions: Units connected in parallel, heater volts = 13.5, plate-supply volts = 250, grid volts = -3, plate load resistor (ohms) = 2000, and vibrational acceleration = 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 150 millivolts.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: Heater volts = 15.0 and maximum-rated plate dissipation.

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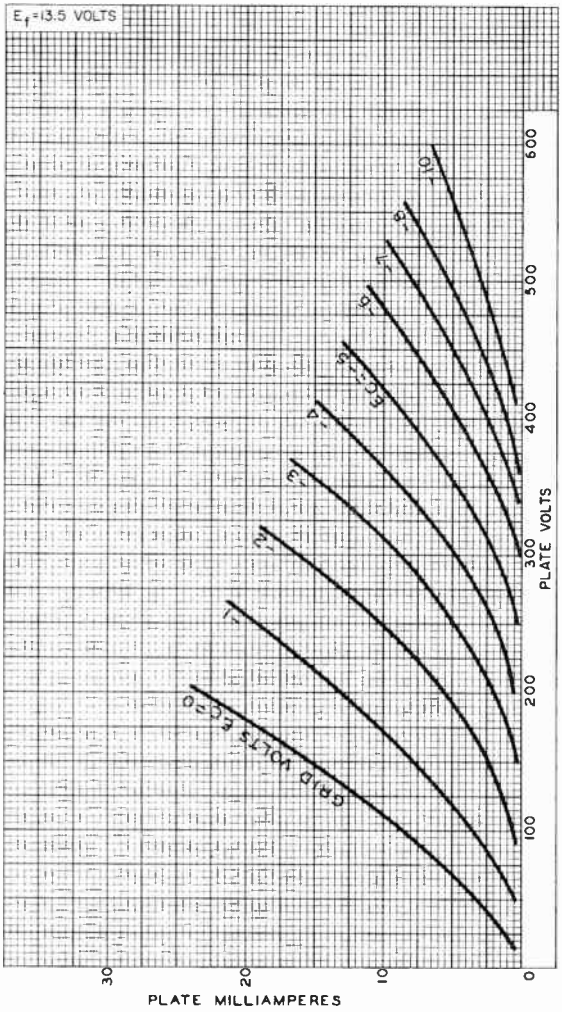
AVERAGE PLATE CHARACTERISTICS



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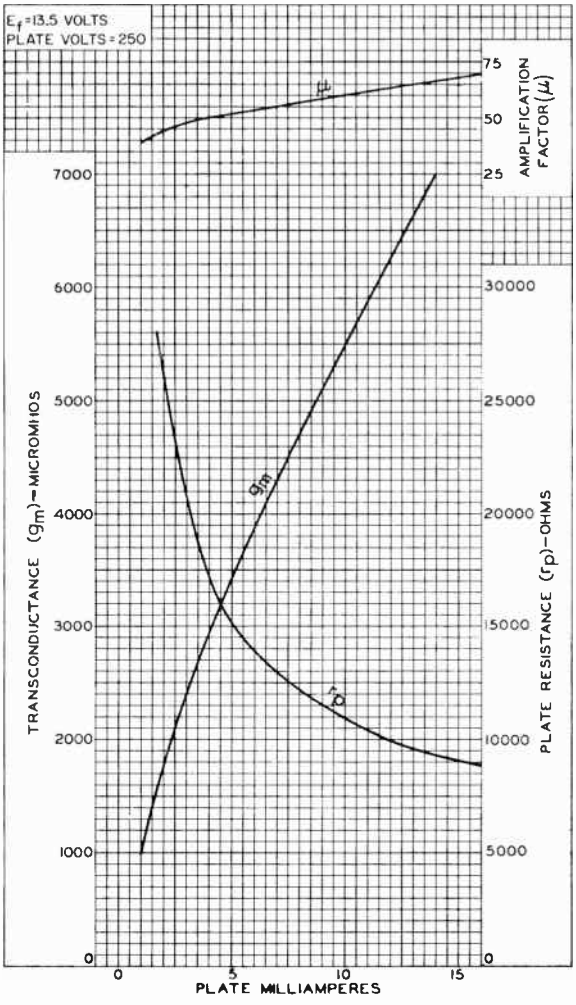
AVERAGE CHARACTERISTICS



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Beam Power Tube

9-PIN MINIATURE TYPE

Quick-Heating-Filament Type for
Mobile-Communications Equipment

GENERAL DATA

Electrical:

Filament, Coated:		
Voltage (AC or DC)	6.3 ± 10%	volts

When operated from storage-battery systems, the filament may be subjected to voltage variations as great as ± 20 per cent. Although such extremes in filament voltage may be tolerated for short periods, increased equipment reliability can be achieved with improved supply-voltage regulation.

Current at 6.3 volts	0.65	amp
Heating time	Less than 1	second
Direct Interelectrode Capacitances:[a]		
Grid No.1 to plate	0.14 max.	pf
Grid No.1 to filament, grid No.3, and grid No.2	8.5	pf
Plate to filament, grid No.3, and grid No.2	5.5	pf

Characteristics, Class A_1 Amplifier:

Plate Voltage	200	volts
Grid No.3	*Connected to pin 1 at socket*	
Grid-No.2 Voltage	185	volts
Grid-No.1 Voltage	-6	volts
Mu-Factor, Grid No.2 to Grid No.1	11.5	
Transconductance	6700	μmhos
Plate Current	36	ma
Grid-No.2 Current	2.5	ma

Mechanical:

Operating Position	Vertical, base up or down, or Horizontal with pins 2 and 8 in vertical plane
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

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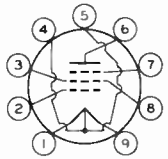
Basing Designation for BOTTOM VIEW. 9PB



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

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[b]
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum ICAS[c] Ratings, *Absolute-Maximum Values:*

	Up to 175 Mc	
DC PLATE VOLTAGE	300 max.	volts
GRID No.3 (SUPPRESSOR GRID)	*Connect to pin 1 at socket*	
DC GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	300 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	–125 max.	volts
DC PLATE CURRENT	60 max.	ma
DC GRID-No.2 CURRENT	10 max.	ma
DC GRID-No.1 CURRENT	5 max.	ma
PLATE INPUT	18 max.	watts
GRID-No.2 INPUT	1.5 max.	watts
PLATE DISSIPATION	10 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	225 max.	°C

Typical ICAS[c] Operation:[d]

	As amplifier at 175 Mc		
DC Plate Voltage	300	300	volts
Grid No.3	*Connected to pin 1 at socket*		
DC Grid-No.2 Voltage[e]	160	185	volts
DC Grid-No.1 Voltage[f] from a grid-No.1 resistor of 18,000 ohms	–36	–39	volts
Peak RF Grid-No.1 Voltage	41	43	volts
DC Plate Current	50	60	ma
DC Grid-No.2 Current	2.5	4	ma
DC Grid-No.1 Current (Approx.)	2	2.2	ma
Driving Power[g] (Approx.)	1	1	watt
Useful Power Output[h] (Approx.)	5.5	7	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	0.1 max.	megohm

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PLATE MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum ICAS[c] Ratings, *Absolute-Maximum Values:*

	Up to 175 Mc	
DC PLATE VOLTAGE	250 max.	volts
GRID No.3	*Connect to pin 1 at socket*	
DC GRID-No.2 VOLTAGE	250 max.	volts
DC GRID-No.1 VOLTAGE	-125 max.	volts
DC PLATE CURRENT	60 max.	ma
DC GRID-No.2 CURRENT	10 max.	ma
DC GRID-No.1 CURRENT	5 max.	ma
PLATE INPUT	15 max.	watts
GRID-No.2 INPUT	1.4 max.	watts
PLATE DISSIPATION	7 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	225 max.	°C

Typical ICAS[c] Operation:[d]

	At 175 Mc	
DC Plate Voltage	250	volts
Grid No.3	*Connected to pin 1 at socket*	
DC Grid-No.2 Voltage[e]	250	volts
DC Grid-No.1 Voltage[f] from a grid-No.1 resistor of 33,000 ohms	-70	volts
Peak RF Grid-No.1 Voltage	75	volts
DC Plate Current	60	ma
DC Grid-No.2 Current	2.5	ma
DC Grid-No.1 Current (Approx.)	2.1	ma
Driving Power[g] (Approx.)	1	watt
Useful Power Output[h] (Approx.)	6.5	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	0.1 max.	megohm

FREQUENCY MULTIPLIER

Maximum ICAS[c] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	300 max.	volts
GRID No.3	*Connect to pin 1 at socket*	
DC GRID-No.2 SUPPLY VOLTAGE	300 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	volts
DC GRID-No.1 VOLTAGE	-125 max.	volts
DC PLATE CURRENT	50 max.	ma
DC GRID-No.2 CURRENT	10 max.	ma
DC GRID-No.1 CURRENT	5 max.	ma
PLATE INPUT	15 max.	watts
GRID-No.2 INPUT	1.5 max.	watts
PLATE DISSIPATION	10 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	225 max.	°C

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Typical ICAS[c] Operation:

As doubler to 175 Mc			
DC Plate Voltage	250	300	volts
Grid No.3	*Connected to pin 1 at socket*		
DC Grid-No.2 Voltage[e]	200	215	volts
DC Grid-No.1 Voltage[f] from a grid-No.1 resistor of 53,000 ohms	-53	-80	volts
Peak RF Grid-No.1 Voltage	60	87	volts
DC Plate Current	45	50	ma
DC Grid-No.2 Current	3.4	3.4	ma
DC Grid-No.1 Current (Approx.)	1	1.5	ma
Driving Power[g] (Approx.)	0.4	0.5	watt
Useful Power Output[j] (Approx.)	2.5	3.5	watts
As tripler to 175 Mc			
DC Plate Voltage	250	250	volts
Grid No.3	*Connected to pin 1 at socket*		
DC Grid-No.2 Voltage[e]	180	225	volts
DC Grid-No.1 Voltage[g] from a grid-No.1 resistor of:			
50,000 ohms	-90	-	volts
60,000 ohms	-	-108	volts
Peak RF Grid-No.1 Voltage	105	118	volts
DC Plate Current	40	50	ma
DC Grid-No.2 Current	2.5	3.4	ma
DC Grid-No.1 Current (Approx.)	1.8	1.8	ma
Driving Power[g] (Approx.)	0.4	0.6	watt
Useful Power Output[h] (Approx.)	1.4	2	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	0.1 max.	megohm

[a] Without external shield.

[b] Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115 per cent of the carrier conditions.

[c] Intermittent Commercial and Amateur Service.

[d] Pins 4 and 5 at rf ground.

[e] Obtained preferably from a separate source or from the plate-voltage supply with a voltage divider. If a series resistor is used, it should be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are completed.

[f] Obtained from a grid-No.1 resistor, or from a combination of grid-No.1 resistor and either fixed supply or cathode resistor. The combination of grid-No.1 resistor and fixed supply has the advantage of not only protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

[g] Driving power includes circuit losses and is the actual power measured at the input to the grid circuit.

[h] Measured at load.

[j] Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are made.

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CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	0.59	0.71	amp
Transconductance	1,2	5700	–	μmhos
Plate Current	1,2	27	52	ma
Plate Current	1,3	–	75	μa
Grid-No.2 Current	1,2	–	5	ma
Reverse Grid-No.1 Current	1,4	–	1	μa
Leakage Resistance:				
Between grid No.1 and all other electrodes tied together.	1,5	100	–	megohms
Between plate and all other electrodes tied together.	1,6	100	–	megohms

Note 1: With 6.3 volts dc on filament.

Note 2: With dc plate volts = 200, grid No.3 connected to pin 1 at socket, dc grid-No.2 volts = 185, and dc grid-No.1 volts = -6.

Note 3: With dc plate volts = 200, grid No.3 connected to pin 1 at socket, dc grid-No.2 volts = 185, and dc grid-No.1 volts = -36.

Note 4: With dc plate volts = 215, grid No.3 connected to pin 1 at socket, dc grid-No.2 volts = 215, and dc grid-No.1 resistor = 0.1 megohm.

Note 5: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 6: With plate 300 volts negative with respect to all other electrodes tied together.

OPERATING CONSIDERATIONS

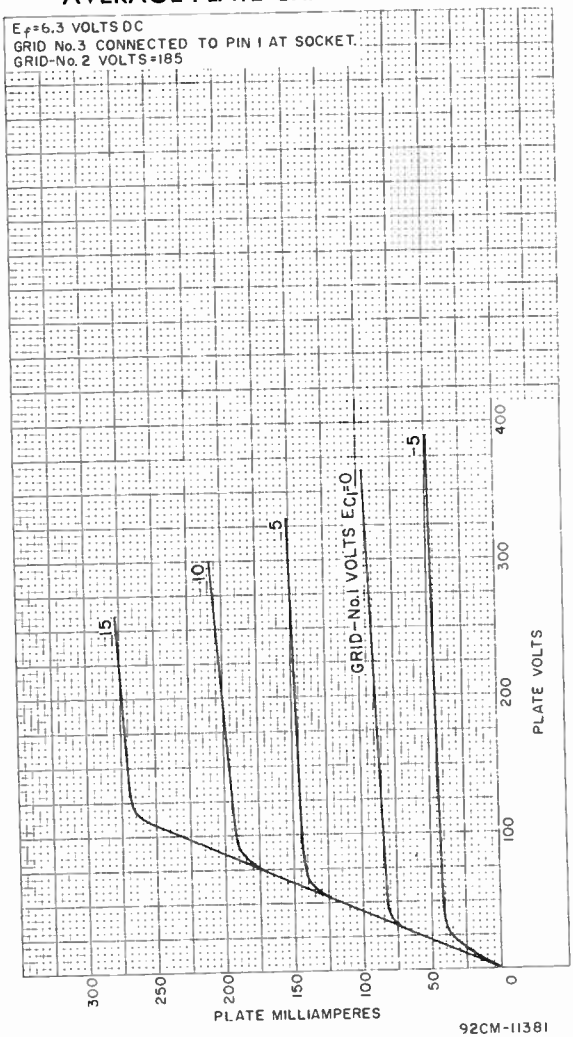
The socket connections to pins 4 and 5, which are designated LC on the basing diagram, may be used to minimize the absorption of rf power in the filament circuit by connecting pins 4 and 5 to ground through a capacitor, close to the socket. Pin 1 is directly grounded and pin 9 is bypassed by using a feedthrough capacitor when bringing this filament lead through the chassis.

Shielding of the 7905 may be used in "straight-through" rf amplifier service to minimize external feedback from the plate to grid No.1. A grounded shield crossing the terminal end of the tube socket through the space between pins 2 and 3 and the space between pins 8 and 9, is generally adequate for this purpose. No shielding is necessary for either frequency doubler or tripler operation.

World Radio History

7905

AVERAGE PLATE CHARACTERISTICS

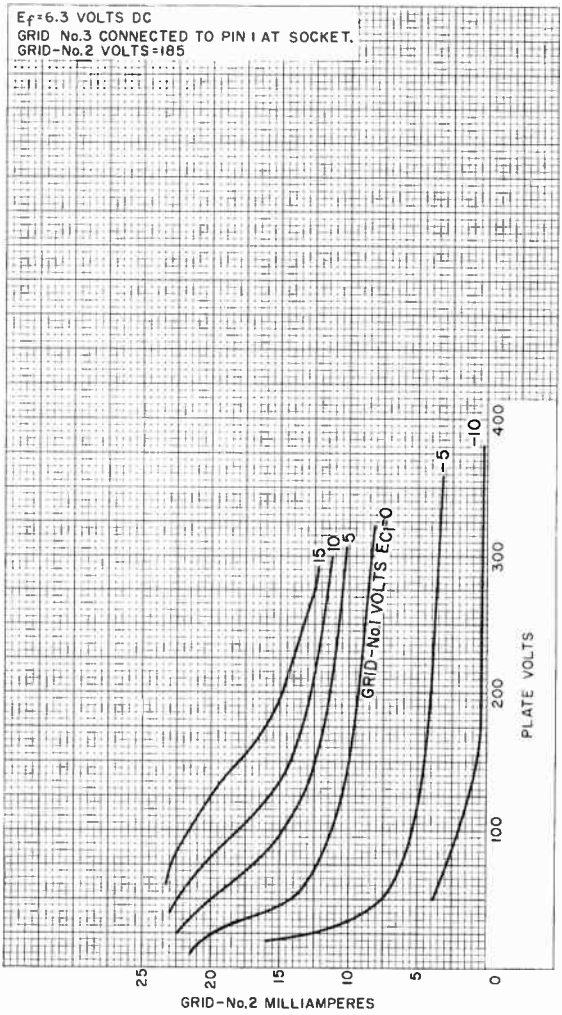


92CM-11381

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

World Radio History

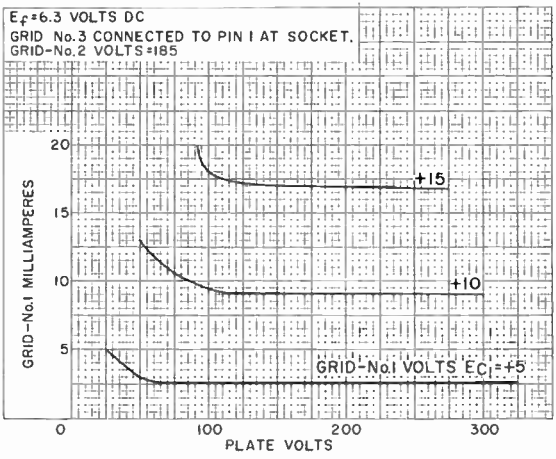
AVERAGE CHARACTERISTICS



92CM-11390

World Radio History

AVERAGE CHARACTERISTICS



92CS-11383

World Radio History

Medium-Mu Triode

NUVISTOR TYPE

For Use with Low-Voltage Power Supplies in Industrial and Military Applications

GENERAL DATA

Electrical:

Heater Characteristics and Ratings:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	0.135	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances (Approx.):		
Grid to plate	2.1	pf
Grid to cathode, shell, and heater	4.0	pf
Plate to cathode, shell, and heater	1.7	pf
Plate to cathode	0.34	pf
Heater to cathode	1.4	pf

Characteristics, Class A$_1$ Amplifier: ←

Plate Supply Voltage	24	volts
Grid	Connected to negative end of cathode resistor	
Cathode Resistor	100	ohms
Amplification Factor	11.5	
Plate Resistance (Approx.)	1530	ohms
Transconductance	7500	μmhos
Plate Current	8.7	ma
Grid Voltage (Approx.) for plate μa = 50	-5	volts

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	0.800"
Maximum Seated Length	0.625"
Maximum Diameter	0.440"
Weight (Approx.)	1.9 grams
Envelope	Metal Shell MT4

Socket:

Crimp Mounting —

Cinch Mfg.,Co., 1026 South Homan Ave., Chicago 24, Ill., No.133 65 10 001.

Industrial Electronic Hardware Corp., 109 Prince Street, New York 12, N.Y., No.MSN 0905-1, MSN 0905-2, MSN 0905-3; or equivalent.

Flange Mounting —

Cinch Mfg. Co., No.133 65 10 003, or equivalent.

Printed Board (Stand-off) —

Cinch Mfg. Co., No.133 65 10 041, or equivalent.

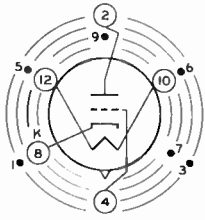
← Indicates a change.

World Radio History

8056

Base. . . Medium Ceramic-Wafer Twelve-Pin (JEDEC No. E7-88)
Basing Designation for BOTTOM VIEW. 12AQ

Pin 1[a] - Do Not Use
Pin 2 - Plate
Pin 3 - Same as Pin 1
Pin 4 - Grid
Pin 5 - Same as Pin 1
Pin 6 - Same as Pin 1
Pin 7 - Same as Pin 1
Pin 8 - Cathode
Pin 9 - Same as Pin 1
Pin 10 - Heater
Pin 12 - Heater



INDEX=LARGE LUG
●=SHORT PIN; IC—DO NOT USE

INDUSTRIAL SERVICE

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

PLATE VOLTAGE	50 max.	volts
GRID VOLTAGE:		
Negative-bias value	55 max.	volts
Peak-positive value	2 max.	volts
GRID CURRENT	2 max.	ma
CATHODE CURRENT	15 max.	ma
PLATE DISSIPATION	0.45 max.	watt

→ **Typical Operation:**

Plate Supply Voltage	12	24	volts
Grid Supply Voltage	–	0.7	volt
Grid Resistor	33000	–	ohms
Amplification Factor	12	12	
Plate Resistance (Approx.)	2500	2500	ohms
Transconductance	4800	4800	μmhos
Plate Current	9.5	9.5	ma

Maximum Circuit Values:

Grid Circuit Resistance:[b]

For fixed-bias operation	10 max.	megohms
For cathode-bias operation	10 max.	megohms

→ [a] Finish of a lead is such that its end does not touch the socket insertion plane.

[b] For operation at metal-shell temperatures up to 150° C., metal-shell temperatures are measured in zone "A" (See *Dimensional Outline*). For temperatures above 150° C., see accompanying *Grid-Circuit-Resistance Rating Chart*.

→ **CHARACTERISTICS RANGE VALUES**

	Note	Min.	Max.	
Heater Current	1	0.125	0.145	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	1.8	2.4	μμf

→ Indicates a change.

World Radio History

	Note	Min.	Max.	
Grid to cathode, shell, and heater	2	3.4	4.6	pf
Plate to cathode, shell, and heater	2	1.4	2.0	pf
Heater to cathode	2	1.1	1.7	pf
Plate to cathode	2	0.26	0.42	pf
Plate Current (1)	1,3	1.7	[illegible]	ma
Plate Current (2)	1,4	-	50	μa
Transconductance (1)	1,3	[illegible]	[illegible]	μmhos
Transconductance (2)	3,5	[illegible]		μmhos
Transconductance Change: Difference between transconductance (1) and transconductance (2), expressed in per cent of transconductance (1)		-	15	%
Reverse Grid Current	1,6	-	0.05	μa
Amplification Factor	1,3	9	14	
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,7	-		μa
Heater positive with respect to cathode	1,7	-		μa
Leakage Resistance:				
Between grid and all other electrodes tied together	1,8	1000	-	megohms
Between plate and all other electrodes tied together	1,9	1000	-	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 24, cathode resistor = 100 ohms, and cathode-bypass capacitor = 1000 μf.

Note 4: With dc plate volts = 24, dc grid volts = -10, and metal shell connected to ground.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With dc plate volts = 40, grid supply volts = -2, grid resistor = 1 megohm, and metal shell connected to ground.

Note 7: With 100 volts dc applied between heater and cathode.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together.

Note 9: With plate 100 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 1000 max. g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-impact (flyweight) Shock Machine and are subjected to 20 blows at the specified maximum impact acceleration. At the end of this test, tubes are criticized for change in transconductance, reverse grid

World Radio History

current, and heater-cathode leakage current, and are then subjected to the Variable-Frequency Test described below.

Fatigue Rating:

Vibrational Acceleration. . . . . 2.5 max. g

This test is performed on a sample lot of tubes to determine ability of tube to withstand the specified vibrational acceleration. Tubes are rigidly mounted, supplied with nominal heater voltage only, and subjected for 48 hours to 2.5-g vibrational acceleration at 60 cycles per second in the X_1 position. At the end of this test, tubes are criticized for the same characteristics and end-point values as in the Shock Rating Test described above.

Variable-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run. The tube is operated under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate-load resistor of 2000 ohms. During operation, tube is vibrated in the X_1 position through the frequency range from 50 to 15,000 cycles per second under the following conditions: a sweep rate of one octave per 30 seconds from 50 to 3000 cps, a 7-second sweep from 3000 to 15,000 cps, and a constant vibrational acceleration of 4 g. During the test, tube must not show an output voltage across the plate-load resistor in excess of: (1) 20 rms millivolts from 50 to 3000 cps, (2) 50 peak millivolts from 3000 to 6000 cps, and (3) 500 peak millivolts from 6000 to 15,000 cps.

Low-Pressure Voltage-Breakdown Test:

This test is performed on a sample lot of tubes from each production run. In this test, tubes are operated with 250 rms volts applied between plate and all other electrodes and will not break or show evidence of corona when subjected to air pressures equivalent to altitudes of up to 100,000 feet.

Heater Cycling Life Performance:

Cycles of Intermittent Operation. . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 8.5 cycled one minute on and two minutes off; heater 180 volts negative with respect to cathode; grid, plate, and metal shell connected to ground. At the end of this test, tubes are tested for open heaters and heater-cathode shorts.

Shorts and Continuity:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-ID, Amendment 2, Paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper[c]. See accompanying *Shorts-Test Acceptance-Limits* curve. Tubes are criticized for permanent or temporary shorts and open circuits.

World Radio History

Early-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that tubes are properly stabilized. In this test, tubes are operated for 20 hours at maximum-rated plate dissipation. After 2 hours of operation and again after 20 hours of operation, tubes are checked for transconductance under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1). A tube is rejected if its transconductance after 2 or 20 hours of operation has changed more than 10 per cent from the 0-hour value.

100-Hour Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early-hour inoperatives. Tubes are operated for 100 hours at maximum-rated plate dissipation, and then subjected to the Shorts and Continuity Test previously described. Tubes must then show a transconductance of not less than 5500 μmhos under the ← conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1).

1000-Hour Conduction Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation[d], and then criticized for inoperatives, reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, the average change in transconductance of the lot from the 0-hour value for Transconductance (1) specified in CHARACTERISTICS RANGE VALUES, must not exceed 15 per cent at 500 hours, and 20 per cent at 1000 hours.

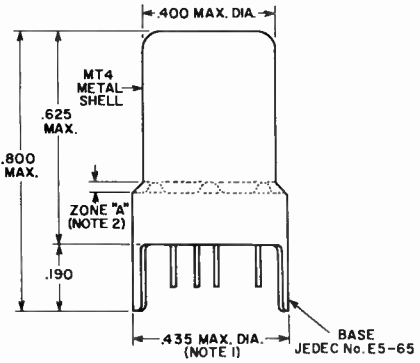
1000-Hour Standby Life Performance:

This test is performed on a sample lot of tubes from each production run. The tubes are operated for 1000 hours with only heater voltage applied. Tubes are criticized for interelectrode leakage, reverse grid current, and for cathode inter- ← face resistance greater than 25 ohms. Interface resistance is measured by Method B of ASTM specification F300-57T.

[c] Specifications for tapper supplied on request.
[d] At metal-shell temperature of 150° C.

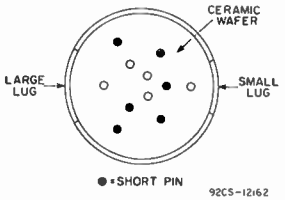
← Indicates a change.

World Radio History

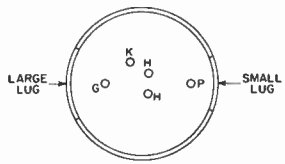


DIMENSIONS IN INCHES

BOTTOM VIEW
Showing Arrangement for All 11 Base Pins



MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown

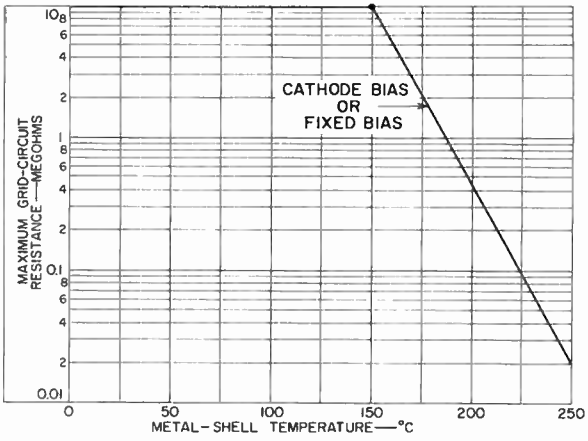


NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

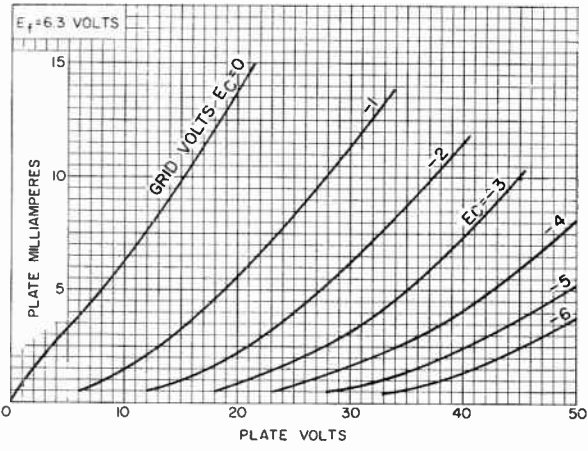
World Radio History

GRID-CIRCUIT-RESISTANCE RATING CHART



92CS-11479RI

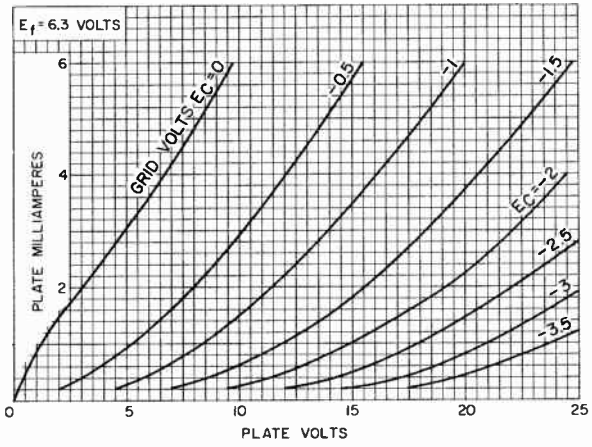
AVERAGE PLATE CHARACTERISTICS



92CS-11469RI

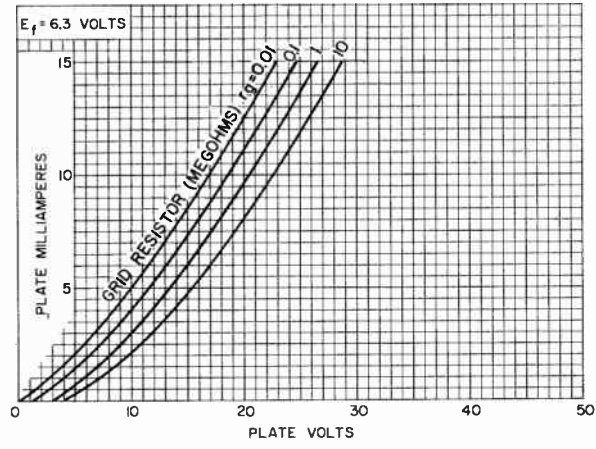
World Radio History

AVERAGE PLATE CHARACTERISTICS



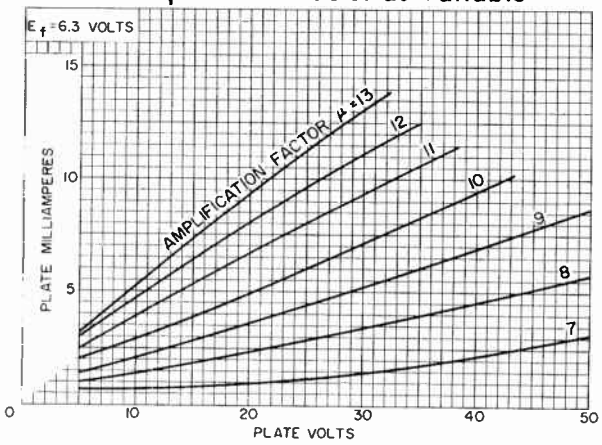
92CS-11467

AVERAGE PLATE CHARACTERISTICS
With Grid Resistor as Variable



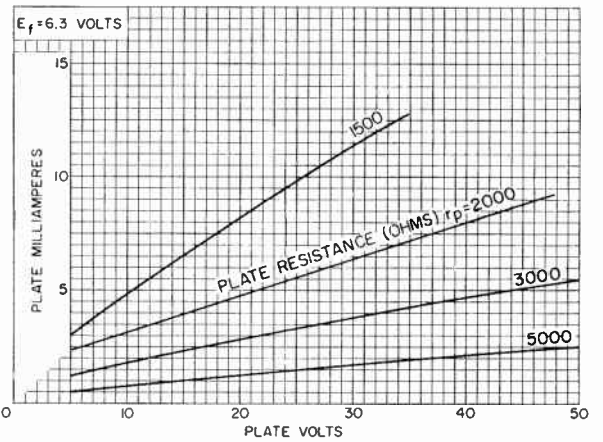
92CS-11466

AVERAGE PLATE CHARACTERISTICS
With Amplification Factor as Variable



92CS-11471R1

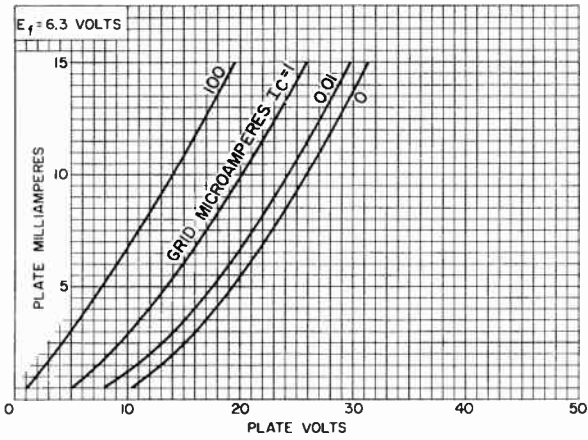
AVERAGE PLATE CHARACTERISTICS
With Plate Resistance as Variable



92CS-11465R2

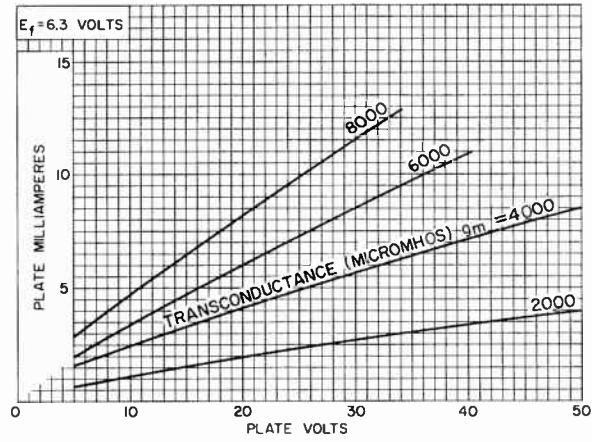
World Radio History

AVERAGE PLATE CHARACTERISTICS
With Grid Current as Variable



92CS-11468

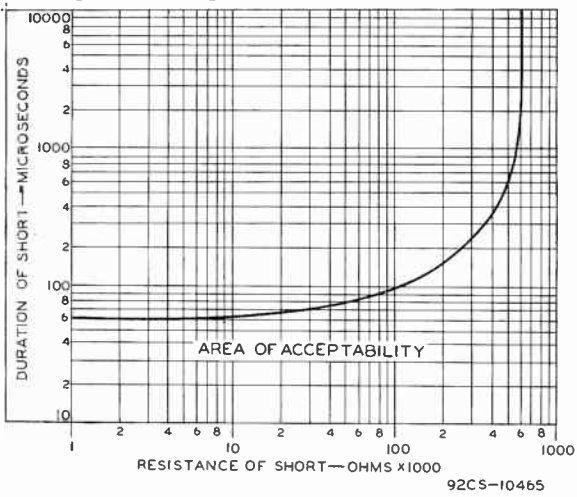
AVERAGE PLATE CHARACTERISTICS
With Transconductance as Variable



92CS-11470R2

World Radio History

SHORTS-TEST ACCEPTANCE LIMITS



World Radio History

World Radio History

High-Mu Triode

NUVISTOR TYPE
For Industrial Applications

GENERAL DATA

Electrical:

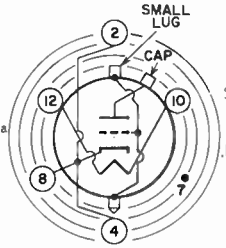
Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.135	amp
Direct Interelectrode Capacitances:		
Cathode to plate	0.046 max.	pf
Cathode to grid & shell and heater	6	pf
Plate to grid & shell and heater	1.3	pf
Heater to cathode	1.4	pf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	110	volts
Cathode Resistor	47	ohms
Amplification Factor	70	
Plate Resistance (Approx.)	5600	ohms
Transconductance	12400	μmhos
Plate Current	10	ma
Grid Voltage (Approx.) for plate μa = 10	-5	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	0.985"
Maximum Seated Length	0.780"
Maximum Diameter	0.440"
Weight (Approx.)	1/13 oz
Envelope	Metal Shell MT4 and Ceramic Cylinder
Cap	Skirted Miniature (JEDEC No.C1-44)
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-79)
Basing Designation for BOTTOM VIEW	12CT



Pin 2 – Cathode
Pin 4 – Cathode
Pin 7 – Do Not Use[a]
Pin 8 – Cathode
Pin 10 – Heater
Pin 12 – Heater

SMALL LUG – Grid, Metal Shell
LARGE LUG – Grid, Metal Shell
CAP – Plate

INDEX=LARGE LUG
●=PIN CUT OFF

World Radio History

INDUSTRIAL SERVICE

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

PLATE SUPPLY VOLTAGE	330 max.	volts
PLATE VOLTAGE	150 max.	volts
GRID VOLTAGE:		
Negative-bias value	55 max.	volts
Peak-positive value	0 max.	volts
CATHODE CURRENT	15 max.	ma
PLATE DISSIPATION	1.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:[b]		
For fixed-bias operation	0.5 max.	megohm
For cathode-bias operation	1 max.	megohm

Typical Operation:

As cathode-drive rf amplifier

At frequency of	*450*	*700*	*1200*	*Mc*
Plate Supply Voltage	110	110	110	volts
Cathode Resistor	47	47	47	ohms
Plate Current	10	10	10	ma
Bandwidth	6	12	12	Mc
Power Gain	16.5	12.5	10.5	db
Noise Factor[c]	6.5	9.5	12.2	db

[a] Pin is cut off close to ceramic wafer.

[b] For operation at metal-shell temperatures up to 150° C. See *Dimensional Outline.*

[c] Argon noise source. Input is tuned for optimum value.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.125	0.145	amp
Direct Interelectrode Capacitances:	2			
Cathode to plate	–	–	0.046	pf
Cathode to grid & shell and heater	–	5	7	pf
Plate to grid & shell and heater	–	1.1	1.5	pf
Heater to cathode	–	1.1	1.7	pf
Plate Current (1)	1,3	7.8	12.2	ma
Plate Current (2)	1,4	–	50	μa
Transconductance (1)	1,3	10000	14800	μmhos
Transconductance (2)	3,5	8700	–	μmhos
Reverse Grid Current	1,6	–	0.1	μa
Amplification Factor	1,3	54	86	

World Radio History

Heater-Cathode Leakage Current:				
Heater negative with respect to cathode.	1,7	–	5	μa
Heater positive with respect to cathode.	1,7	–	5	μa
Leakage Resistance:				
Between grid and all other electrodes tied together. . .	1,8	5000	–	megohms
Between plate and all other electrodes tied together. . .	1,9	10000	–	megohms

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 110, cathode resistor = 47 ohms, and cathode-bypass capacitor = 1000 μf.

Note 4: With dc plate volts = 110, dc grid volts = -5.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With dc plate volts = 150, grid supply volts = -1.3, grid resistor = 0.5 megohm.

Note 7: With 100 volts dc applied between heater and cathode.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together.

Note 9: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration	500 max.		g

This test is performed on a sample lot of tubes to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-impact (flyweight) Shock Machine and are subjected to 20 blows at the specified maximum impact acceleration. At the end of this test, tubes are criticized for change in transconductance, reverse grid current, and heater-cathode leakage current, and are then subjected to the Variable-Frequency Vibration Test described below.

Variable-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run. The tube is operated under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate-load resistor of 2000 ohms. During operation, tube is vibrated in a direction perpendicular to the logitudinal axis of the tube through the frequency range from 50 to 15,000 cycles per second under the following conditions: a sweep rate of one octave per 30 seconds from 50 to 3000 cps, a 7-second sweep from 3000 to 15,000 cps, and a constant vibrational acceleration of 1 g. During the test, tube must not show an output voltage in excess of: (1) 35 millivolts rms from 50 to 3000 cps, (2) 80 millivolts peak from 3000 to 6000 cps, and (3) 700 millivolts peak from 6000 to 15,000 cps.

World Radio History

Low-Pressure Voltage-Breakdown Test:

This test is performed on a sample lot of tubes. In this test, tubes are operated with 250 volts rms applied between plate and all other electrodes and will not break down or show evidence of corona when subjected to air pressures equivalent to altitudes of up to 100,000 feet.

Heater Cycling:

Cycles of Intermittent Operation. . . . . 2000 min. cycles

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7.5 cycled one minute on and two minutes off; heater 100 volts negative with respect to cathode; grid & metal shell and plate connected to ground. At the end of this test, tubes are tested for open heaters, heater-cathode shorts, and heater-cathode leakage current.

Shorts and Continuity:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-1D, Amendment 2, Paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper[d]. See accompanying Shorts-Test Acceptance-Limits curve. Tubes are criticized for permanent or temporary shorts and open circuits.

1000-Hour Conduction Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation and with a metal-shell temperature of 150° C; then criticized for inoperatives, reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, the average change in transconductance of the lot from the 0-hour value for Transconductance (1) specified in CHARACTERISTICS RANGE VALUES, must not exceed 15 per cent at 500 hours, and 20 per cent at 1000 hours.

Interelectrode Leakage:

Leakage Resistance between plate and all other electrodes tied together. 10000 min. megohms

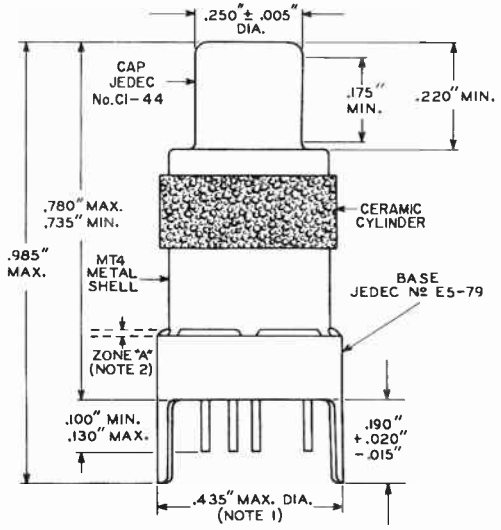
This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts (ac or dc) = 6.3, plate volts = 300 negative with respect to all other electrodes tied together.

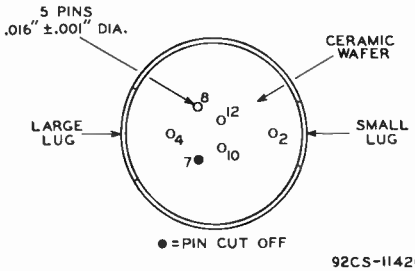
Leakage Resistance between grid and all other electrodes tied together. 5000 min. megohms

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts (ac or dc) = 6.3, grid volts = 100 negative with respect to all other electrodes tied together.

[d] Specification for tapper will be supplied on request.

World Radio History





92CS-11420R1

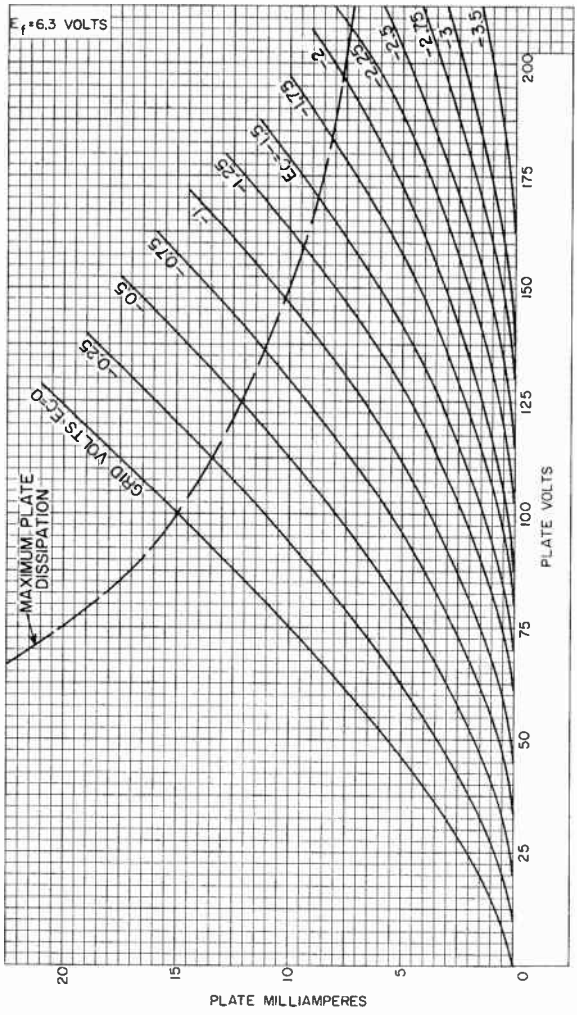
NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: SHELL TEMPERATURE SHOULD BE MEASURED IN THE ZONE "A" INDICATED BY BROKEN LINES.

World Radio History

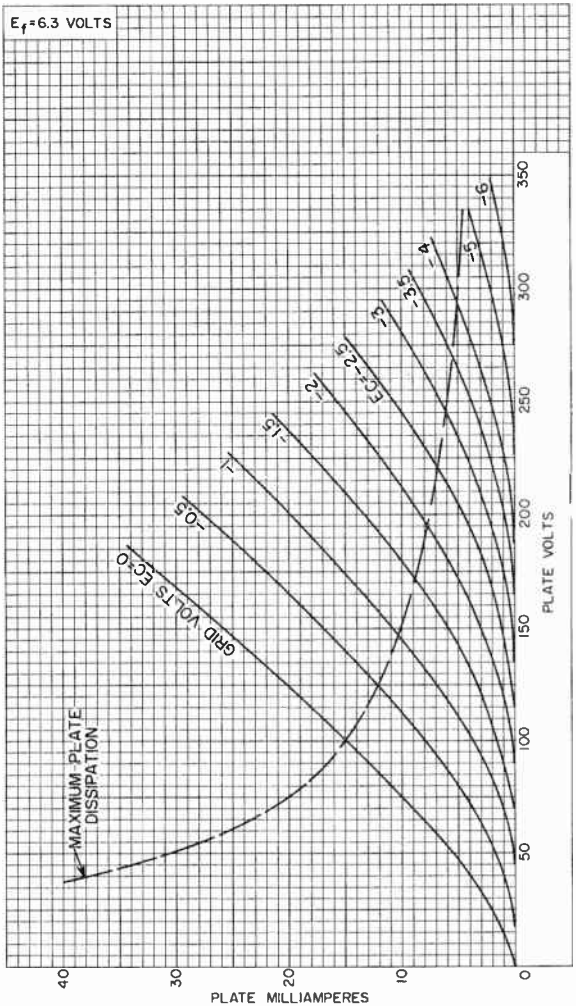
World Radio History

AVERAGE PLATE CHARACTERISTICS



92CM-11426

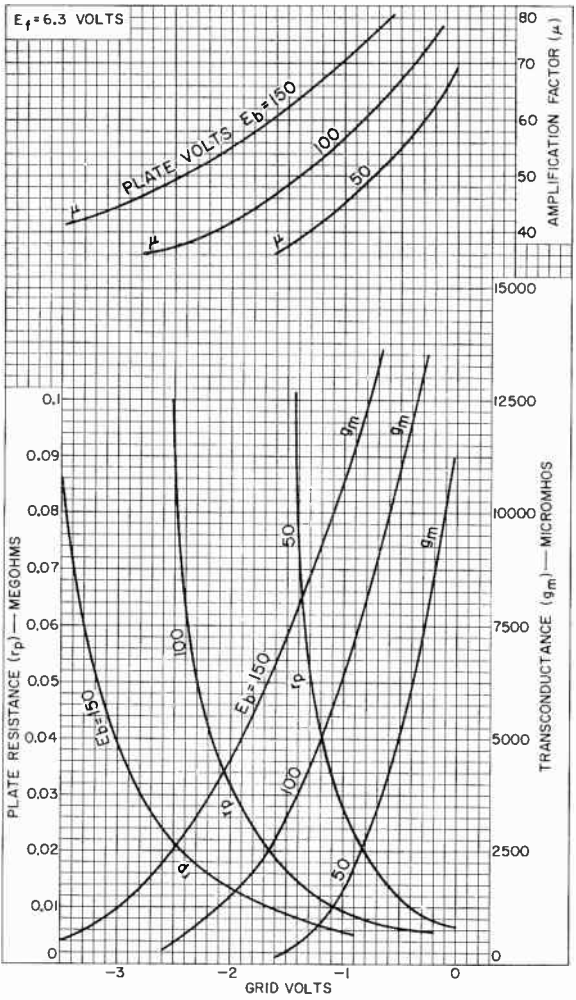
AVERAGE PLATE CHARACTERISTICS



92CM-11430

World Radio History

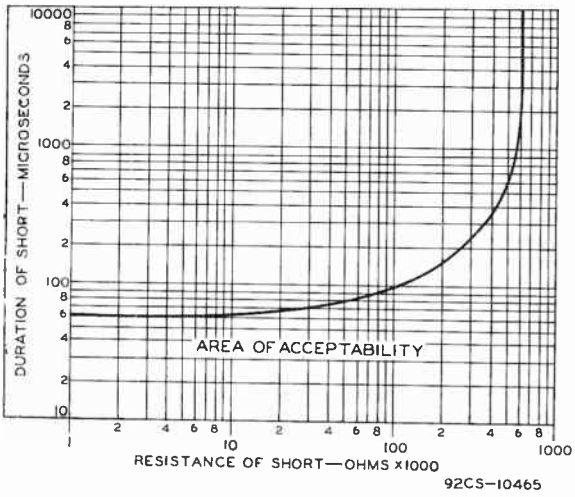
AVERAGE CHARACTERISTICS



92CM-11410

World Radio History

SHORTS-TEST ACCEPTANCE LIMITS



World Radio History

World Radio History

8077/7054

Power Pentode

9-PIN MINIATURE TYPE

For Mobile-Communications Equipment Operating from 6-Cell Storage-Battery Systems. Useful as a Class-C RF-Power-Amplifier, Oscillator, and Frequency-Multiplier Tube up to 40 Mc, and as a Modulator and AF-Power-Amplifier Tube.

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Absolute-Maximum Values)*:		
Voltage (AC or DC)[a]	13.5 ± 1.5	volts
Current at heater volts = 13.5	0.275	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode	120 max.	volts
Heater positive with respect to cathode	120 max.	volts
Direct Interelectrode Capacitances (Approx.):[b]		
Grid No.1 to plate	0.063	μμf
Grid No.1 to all other electrodes except plate	10.2	μμf
Plate to all other electrodes except grid No.1	3.5	μμf

Characteristics, Class A1 Amplifier:

Heater Voltage	13.5	volts
Plate Supply Voltage	250	volts
Grid No.3	*Connected to cathode at socket*	
Grid No.2 Supply Voltage	150	volts
Cathode Resistor	120	ohms
Plate Resistance (Approx.)	0.1	megohm
Transconductance	11500	μmhos
Plate Current	19	ma
Grid-No.2 Current	3.5	ma
Grid-No.1 Voltage (Approx.) for plate μa = 20	-10	volts

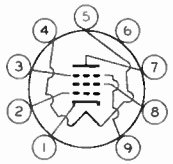
Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

World Radio History

8077/7054

Basing Designation for BOTTOM VIEW. 9GK



AF POWER AMPLIFIER — Class A_1

Maximum Ratings, *Absolute Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID No.3 (SUPPRESSOR GRID)	*Connect to cathode at socket*	
GRID-No.2 (SCREEN-GRID) VOLTAGE	180 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
GRID-No.2 INPUT	1 max.	watt
PLATE DISSIPATION	5 max.	watts

Maximum Circuit Values:

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

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[c]
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS[d] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	300 max.	volts
DC GRID No.3 (SUPPRESSOR GRID)	*Connect to cathode at socket*	
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	175 max.	volts
DC GRID No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	50 max.	volts
DC PLATE CURRENT	33 max.	ma
DC GRID-No.2 CURRENT	5.5 max.	ma
DC GRID-No.1 CURRENT	3 max.	ma
GRID-No.2 INPUT	1 max.	watt
PLATE DISSIPATION	5 max.	watts

Typical Operation:

At frequencies up to 40 Mc

Heater Voltage	13.5	13.5	13.5	volts
DC Plate Voltage	200	250	300	volts
Grid No.3	*Connected to cathode at socket*			
DC Grid-No.2 Voltage	115	145	175	volts
DC Grid-No.1 Voltage	-7	-9	-12	volts
Peak RF Grid-No.1 Voltage	9	11	16	volts
DC Plate Current	14.5	20	26	ma
DC Grid-No.2 Current	3	4.1	5.5	ma
DC Grid-No.1 Current (Approx.)	0.6	0.85	1	ma

World Radio History

Driving Power (Approx.)	10	12	15	mw
Power Output (Approx.)	1.5	2.7	4	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 0.1 max. megohm

FREQUENCY MULTIPLIER

Maximum CCS[d] Ratings, *Absolute-Maximum Values:*

Same as for RF POWER AMPLIFIER & OSCILLATOR

Typical Operation:

As doubler up to 40 Mc

DC Plate Voltage	200	250	300	volts
Grid No.3	*Connected to cathode at socket*			
DC Grid-No.2 Voltage	115	145	175	volts
DC Grid-No.1 Voltage	-16	-20	-25	volts
Peak RF Grid-No.1 Voltage	19	24	31	volts
DC Plate Current	11	15	20	ma
DC Grid-No.2 Current	2	3	4	ma
DC Grid-No.1 Current (Approx.)	0.3	0.45	0.6	ma
Driving Power (Approx.)	5	9	13	mw
Useful Power Output (Approx.)	1.4	1.9	2.5	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 0.1 max. megohm

[a] The heater will take momentary excursions of 11.0 to 16.0 volts.

[b] Without external shield.

[c] Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115 per cent of the carrier conditions.

[d] Continuous Commercial Service.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.260	0.290	amp
Transconductance	1,2	8500	14500	μmhos
Plate Current	1,3	13	25	ma
Grid-No.2 Current	1,3	2	5	ma
Reverse Grid-No.1 Current	1,4	-	1.5	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,5	-	20	μa
Heater positive with respect to cathode	1,5	-	20	μa
Leakage Resistance:				
Between grid-No.1 and all other electrodes tied together	1,6	50	-	megohms
Between plate and all other electrodes tied together	1,7	50	-	megohms

World Radio History

Note 1: With ac or dc heater volts = 13.5.

Note 2: With dc-plate-supply volts = 250, grid-No.2 volts = 150, grid No.3 connected to cathode at socket, cathode resistor (ohms) = 120, and cathode-bypass capacitor (μf) = 1000.

Note 3: With dc plate-supply volts = 250, grid-No.2 supply volts = 150, grid No.3 connected to cathode at socket, and cathode resistor (ohms) = 120.

Note 4: With dc plate-supply volts = 250, grid-No.2 supply volts = 150, grid No.3 connected to cathode at socket, cathode resistor (ohms) = 120, and grid-No.1 resistor (megohms) = 1.

Note 5: With 100 volts dc between heater and cathode.

Note 6: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 7: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 10.5 cycled one minute on and two minutes off, heater 135 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

Low-Frequency Vibration Performance:

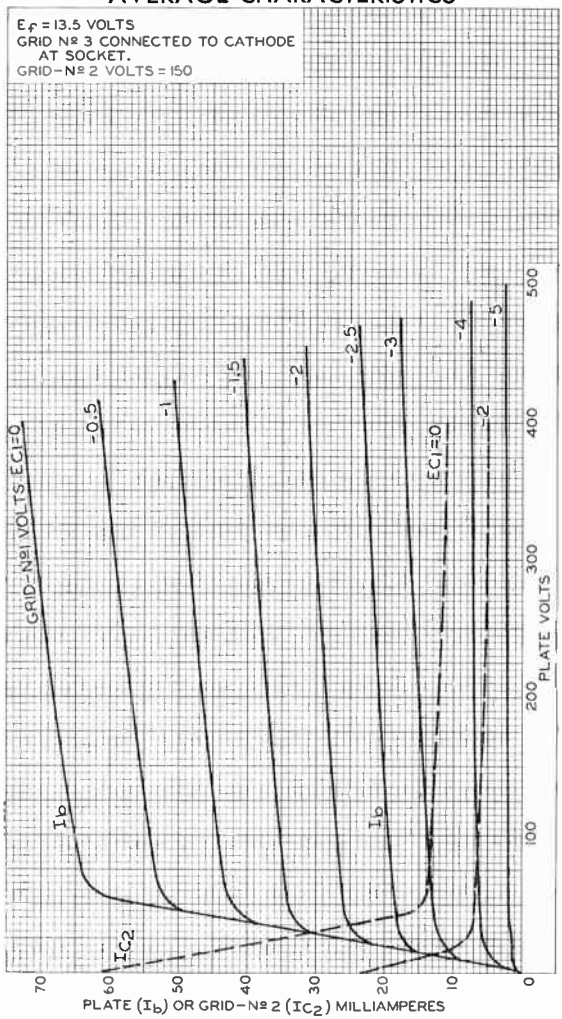
This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 13.5, plate-supply volts = 250, grid No.3 connected to cathode, grid-No.2 supply volts = 150, cathode resistor (ohms) = 120, cathode-bypass capacitor (μf) = 1000, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 150 millivolts.

500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: heater volts = 15 and maximum-rated plate dissipation and grid-No.2 input.

World Radio History

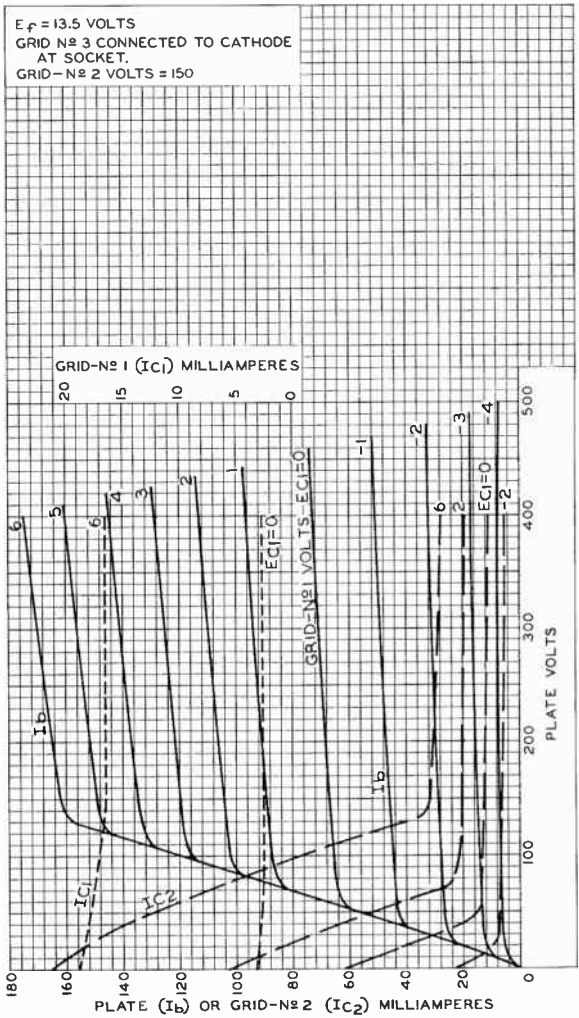
AVERAGE CHARACTERISTICS



92CM-9777RI

World Radio History

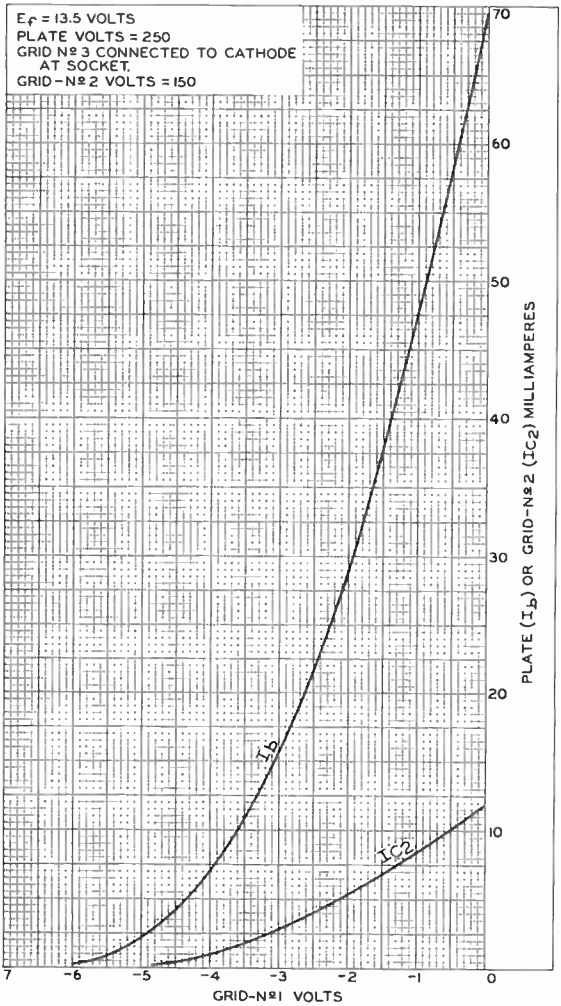
AVERAGE CHARACTERISTICS



92CM-9778RI

World Radio History

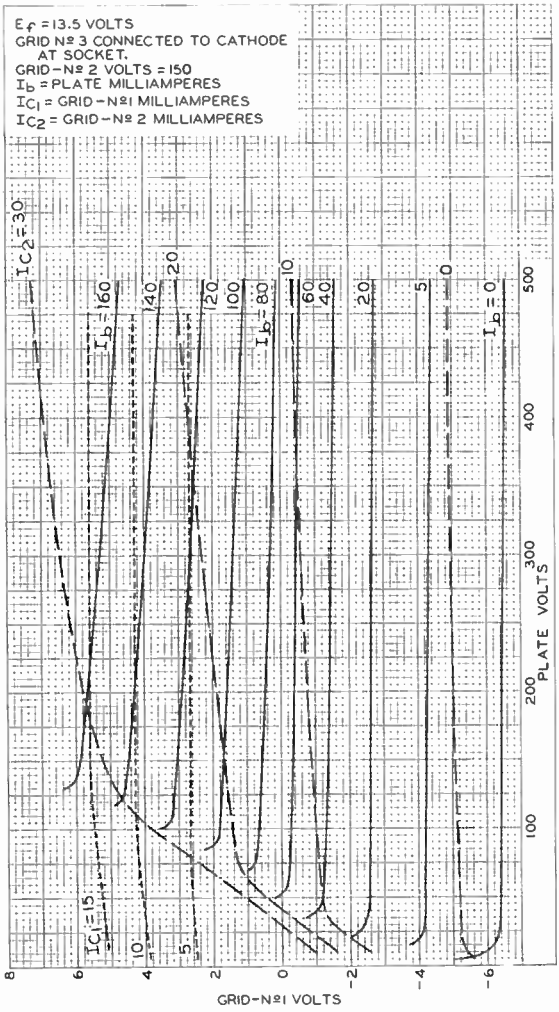
AVERAGE CHARACTERISTICS



92CM-9775RI

World Radio History

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



92CM-9776RI

World Radio History

Power Tetrode

NUVISTOR TYPE

Heater Designed to Operate from Battery Supplies Used in Sonobuoy and Other Expendable Equipment

Electrical:

Heater Characteristics and Ratings:

Voltage (DC). . . . .Tubes will be supplied with the heater designed to operate within ±10% of any specified center heater voltage between 6.0 and 8.5 volts to meet specific battery-supply requirements in sonobuoy and other expendable equipment.

Input	1.1	watts
Peak heater-cathode voltage:		
Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts
Direct Interelectrode Capacitances:		
Grid No.1 to plate	0.015 max.	pf
Grid No.1 to cathode, grid No.2, shell, and heater	7.0	pf
Plate to cathode, grid No.2, shell, and heater	1.4	pf
Heater to cathode	1.4	pf

Characteristics, Class A_1 Amplifier:

Heater Voltage	Specified center value	
Plate Supply Voltage	100	volts
Grid-No.2 Supply Voltage	50	volts
Grid No.1 . . . . Connected to negative end of cathode resistor		
Cathode Resistor	68	ohms
Transconductance	11000	μmhos
Plate Current	11	ma
Grid-No.2 Current	2.9	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-7	volts

Mechanical:

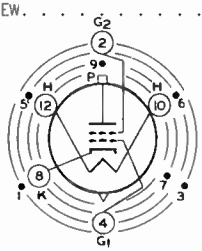
Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	1.050"
Seated Length	0.790" to 0.840"
Maximum Diameter	0.440"
Weight (Approx.)	2.4 grams
Envelope	Metal Shell MT4 with Ceramic Insulator
Socket and Connector	See *Socket & Connector Information for RCA Nuvistor Tubes* at front of this Section
Cap	Skirted Miniature (JEDEC No.C1-44)
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)

World Radio History

8380

Basing Designation for BOTTOM VIEW. 12AS

Pin 1[a] – Do Not Use
Pin 2 – Grid No.2
Pin 3[a] – Do Not Use
Pin 4 – Grid No.1
Pin 5[a] – Do Not Use
Pin 6[a] – Do Not Use
Pin 7[a] – Do Not Use
Pin 8 – Cathode
Pin 9[a] – Do Not Use
Pin 10 – Heater
Pin 12 – Heater
Top Cap – Plate



INDEX = LARGE LUG
• = SHORT PIN; IC— DO NOT USE

AMPLIFIER — Class A

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

Plate Supply Voltage.	300 max.	volts
Plate Voltage	250 max.	volts
Grid-No.2 (Screen-Grid) Supply Voltage. .	300 max.	volts
Grid-No.2 Voltage	100 max.	volts
Grid-No.1 (Control-Grid) Voltage:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
Cathode Current	25 max.	ma
Grid-No.2 Input	0.2 max.	watt
Plate Dissipation	1.6 max.	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:[b]		
For fixed-bias operation.	0.5 max.	megohm
For cathode-bias operation.	1 max.	megohm

COMBINED RF OSCILLATOR and FREQUENCY DOUBLER — Class C

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

	Up to 80 Mc	
Plate Supply Voltage.	300 max.	volts
Plate Voltage	250 max.	volts
Grid-No.2 (Screen-Grid) Supply Voltage. .	300 max.	volts
Grid-No.2 Voltage	100 max.	volts
Grid-No.1 (Control-Grid) Voltage:		
Negative-bias value	55 max.	volts
Peak-positive value	3 max.	volts
Cathode Current	25 max.	ma
Grid-No.1 Current	3 max.	ma
Grid-No.2 Input	0.5 max.	watt
Plate Dissipation	1.6 max.	watts
Metal-Shell Temperature (Measured in Zone "A" as shown on *Dimensional Outline*) . .	150 max.	°C

World Radio History

Typical Operation:[c]

	Specified center value		
Heater Voltage			
Plate Supply Voltage	80	150	volts
Grid-No.2 Supply Voltage	80	150	volts
Grid-No.2 Resistor	–	12000	ohms
Grid-No.1 Resistor	27000	10000	ohms
Plate Current	7.5	10	ma
Grid-No.2 Current	6	6	ma
Useful Power Output at 80 Mc[d]	260	650	mw

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	0.05 max.	megohm

[a] Pins 1, 3, 5, 6, 7, and 9 are of a length such that their ends do not touch the socket insertion plane.

[b] For operation at metal-shell temperature of 150° C measured in Zone "A" as shown on *Dimensional Outline*. For operation at other metal-shell temperatures, see *Grid-No.1-Circuit-Resistance Rating Chart*.

[c] Cathode, grid No.1, and grid No.2 are operated as a 40-Mc, Colpitts-type, electron-coupled oscillator with grid No.2 functioning as the "plate" of the oscillator, and the plate circuit tuned to 80 Mc.

[d] Measured at load.

CHARACTERISTICS RANGE VALUES

	Note	Min.	Max.	
Heater Current	1	$0.95\left[\frac{1.1}{E_{f(ctr)}}\right]$	$1.05\left[\frac{1.1}{E_{f(ctr)}}\right]$	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.015	pf
Grid No.1 to cathode, grid No.2, shell, and heater	2	6.0	8.0	pf
Plate to cathode, grid No.2, shell, and heater	2	1.2	1.6	pf
Heater to cathode	2	1.1	1.7	pf
Plate Current (1)	1,3	9	13	ma
Plate Current (2)	1,4	–	50	μa
Grid-No.2 Current	1,3	–	4	ma
Transconductance (1)	1,3	9000	13000	μmhos
Transconductance, Grid No.1 to Grid No.2	1,3	2000	–	μmhos
Useful Power Output (1)	1,5	0.550	–	watt
Useful Power Output (2)	5,6	0.500	–	watt
Reverse Grid-No.1 Current	1,7	–	0.3	μa
AC Emission	1,8	15	–	ma
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,9	–	10	μa
Heater positive with respect to cathode	1,9	–	10	μa

World Radio History

	Note	Min.	Max.	
Leakage Resistance:				
Between grid No.1 and all other electrodes tied together.	1,10	5000	-	megohms
Between grid No.2 and all other electrodes tied together.	1,11	5000	-	megohms
Between plate and all other electrodes tied together.	1,12	10000	-	megohms

Note 1: With dc heater volts = specified center value, E_f(ctr).

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 100, dc grid-No.2 supply volts = 50, grid No.1 and metal shell connected to negative end of cathode resistor, cathode resistor (ohms) = 68, and cathode-bypass capacitor (μf) = 1000.

Note 4: With dc plate volts = 100, dc grid-No.2 volts = 50, dc grid-No.1 volts = -7, and metal shell connected to ground.

Note 5: Measured at load in 40-Mc oscillator-80-Mc doubler circuit with dc plate supply volts = 150, dc grid-No.2 supply volts = 150, grid-No.2 resistor (ohms) = 12000, and grid-No.1 resistor (ohms) = 10000.

Note 6: With dc heater volts = 0.9 specified center value.

Note 7: With dc plate supply volts = 125, dc grid-No.2 supply volts = 60, dc grid-No.1 supply volts = -1.5, grid-No.1-circuit resistance (megohms) $\leq$ 1 (the internal resistance of the current meter used for this measurement), and metal shell connected to ground.

Note 8: With dc plate supply volts = 100, dc grid-No.2 supply volts = 50, dc grid-No.1 supply volts = -6.5, rms 60-cps ac grid-No.1 signal volts = 7.5, dc grid-No.1-circuit resistance (ohms) $\leq$ 2, plate- and grid-No.1-voltage supplies each bypassed with capacitor (μf) $\geq$ 500, and metal shell connected to ground. "AC Emission" is measured as the dc component of current in the plate circuit.

Note 9: With dc heater-cathode volts = 100.

Note 10: With grid No.1 100 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

Note 11: With grid No.2 100 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

Note 12: With plate 300 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

SPECIAL TESTS

Short-Duration Shock (1):

Peak Impact Acceleration . . . . . 1000 g

This test is performed on a sample lot of tubes to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of four different positions (X_1, X_2, Y_1, and Y_2) in a Navy-Type High-Impact (Flyweight) Shock Machine and, with tube-electrode voltages applied, are subjected to 20 blows (5 in each position) at the specified Peak Impact Acceleration.

At the end of this test, tubes are criticized for Continuity and Shorts, Useful Power Output (1), Reverse Grid-No.1 Current, and Heater-Cathode Leakage Current.

World Radio History

Long-Duration Shock (2):

Peak Impact Acceleration . . . . . 50 g

This test is performed, using a half-sine-wave, 11-millisecond, mechanical shock pulse, on a sample lot of tubes from each production run to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of two positions in three mutually perpendicular axes on a free-fall table. The longitudinal axis of the tube is coincident with one of the three axes. The table is dropped a total of 18 times to a horizontal surface from a height sufficient to produce the specified Peak Impact Acceleration. The material of the horizontal surface is such that the duration of the half-sine-wave shock pulse is 11 milliseconds. No tube-electrode voltages are applied during this test.

At the end of this test, tubes are criticized for Continuity and Shorts, Useful Power Output (1), Reverse Grid-No.1 Current, and Heater-Cathode Leakage Current.

Sweep-Frequency Fatigue Vibration:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand the Sweep-Frequency Fatigue Vibration specified below. Tubes are held rigid and operated with dc heater-cathode volts = 120. During operation, the tube is vibrated through the frequency range from 5 to 500 cps and back to 5 cps. One such vibration sweep cycle takes approximately 15 minutes. This cycle is repeated for a period of 3 hours along each of three mutually perpendicular axes for a total of 9 hours. The longitudinal axis of the tube is coincident with one of the three axes. The vibrations are applied as follows:

a. The vibration from 5 to 50 cps is applied with a constant peak amplitude of 0.060 inch (0.080 inch peak-to-peak)

b. The vibration from 50 to 500 cps is applied with a constant acceleration of 10 g.

c. The vibration from 500 to 50 cps and then to 5 cps follows the same procedure, but in reverse.

At the end of this test, tubes are criticized for Continuity and Shorts, Useful Power Output (1), Reverse Grid-No.1 Current, and Heater-Cathode Leakage Current.

Low-Pressure Voltage Breakdown:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand high-altitude (low-air-pressure) conditions. Tubes are operated with 250 volts rms (60-cycle, ac) applied between plate and all other electrodes and metal shell connected together. Tubes must not break down or show evidence of corona when subjected to an air pressure (8.0 ± 0.5 mm Hg) corresponding to an altitude of 100,000 feet.

vacuumtubedevicehistory

Continuity and Shorts:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-ID, Amendment 5, Paragraph 4. 7.7, except that tapping is done by hand with a soft rubber tapper (Specifications for this tapper will be supplied upon request). The areas of acceptance and rejection for this test are shown in the accompanying *Shorts-Test Acceptance-Limits* graph. In this test, tubes are criticized for permanent or temporary shorts and open circuits.

Reliability Life (20 Hours):

This test is performed on a sample size (minimum of 80 tubes/lot for a 5-lot sampling plan or a minimum of 400 tubes for a single-lot sampling plan) designed to assure a process average AFR (Acceptable Failure Rate) of 0.5 per cent for Inoperatives and 2.1 per cent for Total Defectives and a process average RFR (Rejectable Failure Rate) of 2.0 per cent for Inoperatives and 4.7 per cent for Total Defectives.

During this test, tubes are operated at maximum-rated plate dissipation.

At the end of this test, tubes are criticized for Useful Power Output (2), Inoperatives, and Total Defectives. A tube is considered Inoperative if Useful Power Output (2) is less than 0.200 watt.

Heater-Cycling Life (100 Hours):

Intermittent Operation . . . . . 2000 cycles

This test is performed on a sample lot of tubes from each production run with heater volts = 1.35x specified center value cycled 1 minute ON and 2 minutes OFF, dc heater-cathode volts = -100, all other tube electrodes and metal shell connected to ground.

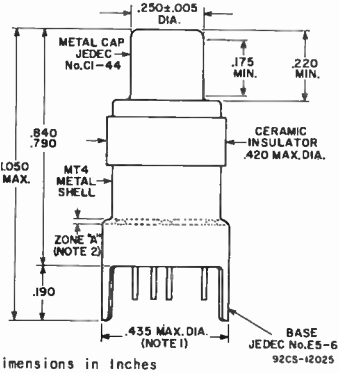
At the end of this test, tubes are criticized for Heater-Cathode Leakage Current, Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

Combined Oscillator-Doubler Life (100 Hours):

This test is performed on a sample lot of tubes from each production run.

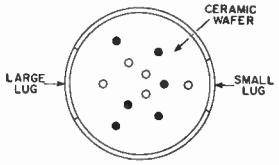
During this test, tubes are operated as a combined oscillator and frequency doubler at maximum-rated plate dissipation.

At the end of this test, tubes are criticized for Useful Power Output (2), Reverse Grid-No.1 Current, Inoperatives, and Total Defectives. A tube is considered Inoperative if Useful Power Output (2) is less than 0.200 watt.

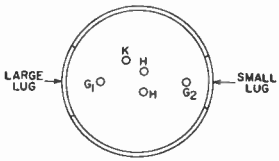


Dimensions in Inches

BOTTOM VIEW
Showing Arrangement of All 11 Base Pins



MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown

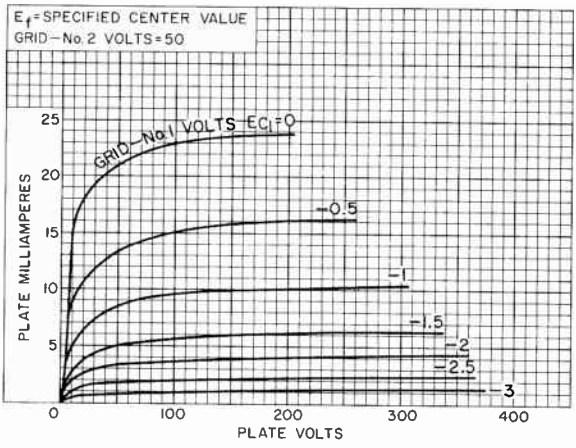


NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

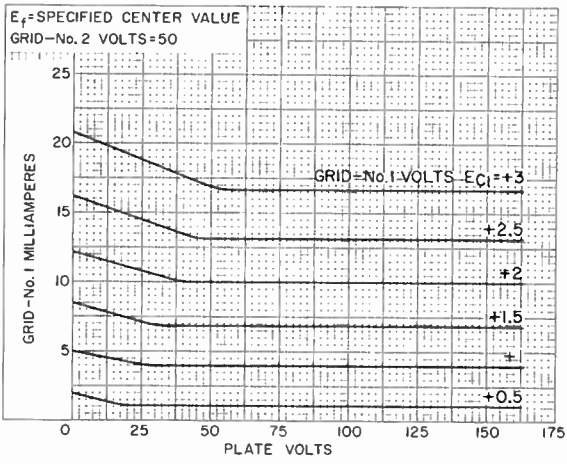
World Radio History

AVERAGE PLATE CHARACTERISTISTICS



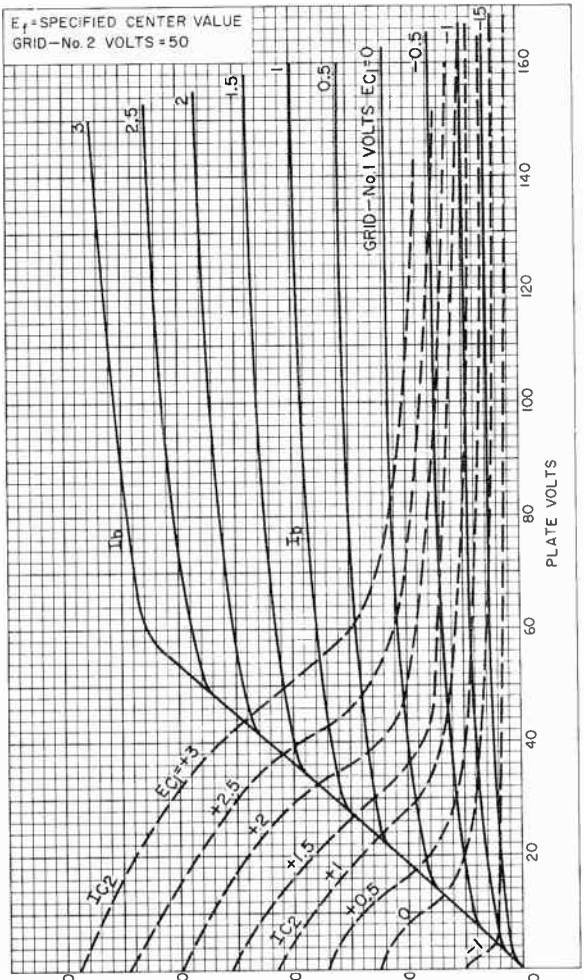
92CS-12173

AVERAGE CHARACTERISTICS



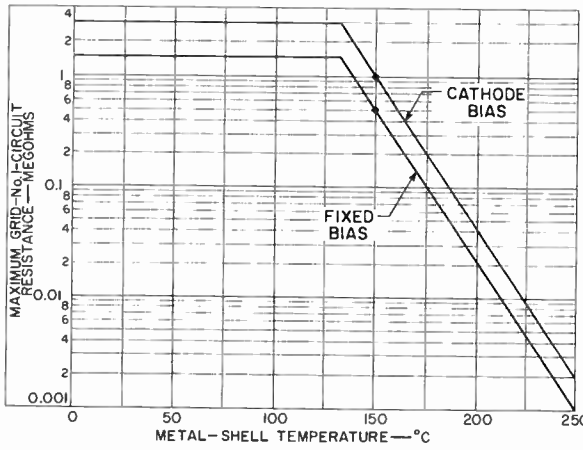
92CS-12172

AVERAGE CHARACTERISTICS



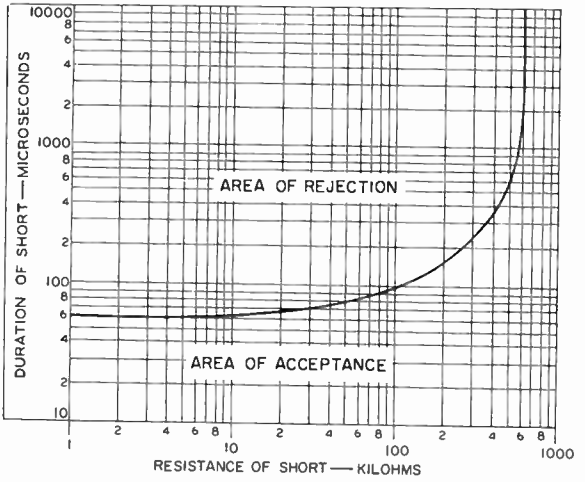
92CM-12175

GRID-No.1-CIRCUIT-RESISTANCE RATING CHART
Class A Amplifier



92CS-11896

SHORTS-TEST ACCEPTANCE LIMITS



92CS-10465RI

8382

Power Triode

NUVISTOR TYPE

Heater Designed to Operate from Battery Supplies Used in Sonobuoy and Other Expendable Equipment

Electrical:

Heater Characteristics and Ratings:		
Voltage (DC) . . . . Tubes will be supplied with the heater designed to operate within ±10% at any specified center heater voltage between 6.0 and 8.5 volts, to meet specific battery-supply requirements in sonobuoy and other expendable equipment.		
Input.	0.90	watt
Peak heater cathode voltage:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances (Approx.):		
Grid to plate.	2.3	pf
Grid to cathode, shell, and heater	4.2	pf
Plate to cathode, shell, and heater	1.0	pf
Plate to cathode	0.15	pf
Heater to cathode.	1.4	pf

Characteristics, Class A_1 Amplifier:

Heater Voltage	per tube's center value	
Plate Supply Voltage	75	volts
Grid . . . . . .Connected to negative end of cathode resistor		
Cathode Resistor	100	ohms
Amplification Factor	28	
Plate Resistance (Approx.)	4.0k	ohms
Transconductance	12800	μmhos
Plate Current.	15	ma
Grid Voltage (Approx.) for plate μa = 10	-8	volts

Mechanical:

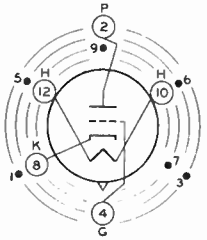
Operating Position	Any
Type of Cathode.	Coated Unipotential
Maximum Overall Length	0.300"
Maximum Seated Length.	0.625"
Maximum Diameter	0.440"
Weight (Approx.)	1.9 grams
Envelope	Metal Shell MT4
Socket . . . . . See *Socket & Connector Information* for *RCA Nuvistor Tubes* at front of this section	
Base . . .Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)	

World Radio History

8382

Basing Designation for BOTTOM VIEW 12A0

Pin 1[a] – Do Not Use
Pin 2 – Plate
Pin 3[a] – Do Not Use
Pin 4 – Grid
Pin 5[a] – Do Not Use
Pin 6[a] – Do Not Use
Pin 7[a] – Do Not Use
Pin 8 – Cathode
Pin 9[a] – Do Not Use
Pin 10 – Heater
Pin 12 – Heater



INDEX=LARGE LUG
●=SHORT PIN; IC—DO NOT USE

RF AMPLIFIER or OSCILLATOR — Class C

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

	Up to 175 Mc	
Plate-supply Voltage	300 max.	volts
Plate Voltage	250 max.	volts
Grid Voltage:		
Negative-bias value	55 max.	volts
Peak-positive value	4 max.	volts
Grid Current	5 max.	ma
Cathode Current	25 max.	ma
Plate Dissipation	2 max.	watts
Metal-Shell Temperature (Measured in Zone "A" as shown on *Dimensional Outline*)	150 max.	°C

Typical Operation:

As cathode-drive rf amplifier

	At 175 Mc	
Heater Voltage	Specified center value	
Plate Supply Voltage	150	volts
Grid Resistor	4700	ohms
Driver Power Output	250	mw
Useful Power Output[b]	1.6	watts

As oscillator

	At 175 Mc	
Heater Voltage	Specified center value	
Plate Supply Voltage	170	volts
Grid Resistor	4700	ohms
Plate Input	3	watts
Useful Power Output[b]	1.5	watts

Maximum Circuit Values:

Grid-Circuit Resistance	0.05 max.	megohm

World Radio History

FREQUENCY DOUBLER — Class C

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

	Up to 175 Mc	
Plate Supply Voltage	300 max.	volts
Plate Voltage	250 max.	volts
Grid Voltage:		
Negative-bias value	200 max.	volts
Peak-positive value	4 max.	volts
Grid Current	5 max.	ma
Cathode Current	22 max.	ma
Plate Dissipation	2 max.	watts
Meta-Shell Temperature (Measured in Zone "A" as shown on *Dimensional Outline*)	150 max.	°C

Typical Operation:

	80-to-160 Mc	
Heater Voltage	Specified center value	
Plate Supply Voltage	135	volts
Grid Resistor	30000	ohms
Driver Power Output	150	mw
Useful Power Output[b]	800	mw

Maximum Circuit Values:

Grid Circuit Resistance	0.05 max.	megohm

[a] Pins 1, 3, 5, 6, 7, and 9 are of a length such that their ends do not touch the socket insertion plane.

[b] Measured at load.

CHARACTERISTICS RANGE VALUES

	Note	*Min.*	*Max.*	
Heater Current	1	$0.95\left[\frac{0.85}{E_{f(ctr)}}\right]$	$1.05\left[\frac{0.85}{E_{f(ctr)}}\right]$	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	1.8	2.6	pf
Grid to cathode, shell, and heater	2	3.8	4.6	pf
Plate to cathode, shell, and heater	2	1.4	1.8	pf
Plate to cathode	2	0.20	0.32	pf
Heater to cathode	2	1.1	1.7	pf
Plate Current (1)	1,3	11	19	ma
Plate Current (2)	1,4	–	100	μa
Transconductance (1)	1,3	11400	14200	μmhos
Useful Power Output (1)	1,5	1.4	–	watts
Useful Power Output (2)	5,6	1.3	–	watts
Reverse Grid Current	1,7	–	0.3	μa
AC Emission	1,8	20	–	ma
Amplification Factor	1,3	22	34	

World Radio History

	Note	Min.	Max.	
Heater-Cathode				
Leakage Current:				
Heater negative with respect to cathode	1,9	-	5	μa
Heater positive with respect to cathode	1,9	-	5	μa
Leakage Resistance:				
Between grid and all other electrodes tied together	1,10	5000	-	megohms
Between plate and all other electrodes tied together	1,11	10000	-	megohms

Note 1: With dc heater volts = specified center value, E_f(ctr).

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 75, grid and metal shell connected to negative end of cathode resistor, cathode resistor (ohms) = 100, and cathode-bypass capacitor (μf) = 1000.

Note 4: With dc plate volts = 75, dc grid volts = -9, and metal shell connected to ground.

Note 5: Measured at load in 175-Mc, cathode-drive, rf-amplifier circuit with dc plate supply volts = 150, grid resistor (ohms) = 2500, and driver power output (milliwatts) = 250.

Note 6: With dc heater volts = 0.9 specified center value.

Note 7: With dc plate supply volts = 80, dc grid supply volts = -1.7, grid-circuit resistance (megohms) = 1 (the internal resistance of the current meter used for this measurement), and metal shell connected to ground.

Note 8: With dc plate supply volts = 80, dc grid supply volts = -6.5, rms 60-cps ac grid signal volts = 8, dc grid-circuit resistance (ohms) = 2, plate- and grid-voltage supplies each bypassed with capacitor (μf) = 500, and metal shell connected to ground. "AC Emission" is measured as the dc component of current in the plate circuit.

Note 9: With dc heater-cathode volts = 100.

Note 10: With grid 100 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

Note 11: With plate 300 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

SPECIAL TESTS

Short-Duration Shock (1):

Peak Impact Acceleration	1000	g

This test is performed on a sample lot of tubes to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of four different positions (X_1, X_2, Y_1, and Y_2) in a Navy-Type High-Impact (Flyweight) Shock Machine and, with tube-electrode voltages applied, are subjected to 20 blows (5 in each position) at the specified Peak Impact Acceleration.

At the end of this test, tubes are criticized for Continuity and Shorts, Useful Power Output (1), Reverse Grid Current, and Heater-Cathode Leakage Current.

World Radio History

Long-Duration Shock (2):

Peak Impact Acceleration . . . . . 50 g

This test is performed, using a half-sine-wave, 11-millisecond, mechanical shock pulse, on a sample lot of tubes from each production run to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of two positions in three mutually perpendicular axes on a free-fall table. The longitudinal axis of the tube is coincident with one of the three axes. The table is dropped a total of 18 times to a horizontal surface from a height sufficient to produce the specified Peak Impact Acceleration. The material of the horizontal surface is such that the duration of the half-sine-wave shock pulse is 11 milliseconds. No tube-electrode voltages are applied during this test.

At the end of this test, tubes are criticized for Continuity and Shorts, Useful Power Output (1), Reverse Grid Current, and Heater-Cathode Leakage Current.

Sweep-Frequency Fatigue Vibration:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand the Sweep-Frequency Fatigue Vibration specified below. Tubes are held rigid and operated with dc heater-cathode volts = 100. During operation, the tube is vibrated through the frequency range from 5 to 500 cps and back to 5 cps. One such vibration sweep cycle takes approximately 15 minutes. This cycle is repeated for a period of 3 hours along each of three mutually perpendicular axes for a total of 9 hours. The longitudinal axis of the tube is coincident with one of the three axis. The vibrations are applied as follows:

a. The vibration from 5 to 50 cps is applied with a constant peak amplitude of 0.040 inch (0.080 inch peak-to-peak).

b. The vibration from 50 to 500 cps is applied with a constant acceleration of 10 g.

c. The vibration from 500 to 50 cps and then to 5 cps follows the same procedure, but in reverse.

At the end of this test, tubes are criticized for Continuity and Shorts, Useful Power Output (1), Reverse Grid Current, and Heater-Cathode Leakage Current.

Low-Pressure Voltage Breakdown:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand high-altitude (low-air-pressure) conditions. Tubes are operated with 250 volts rms (60-cycle, ac) applied between plate and all other electrodes and metal shell connected together. Tubes must not break down or show evidence of corona when subjected to an air pressure (8.0 ± 0.5 mm Hg) corresponding to an altitude of 100,000 feet.

World Radio History

Continuity and Shorts:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-1D, Amendment 5, Paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper (Specifications for this tapper will be supplied upon request). The areas of acceptance and rejection for this test are shown in the accompanying *Shorts-Test Acceptance-limits* graph. In this test, tubes are criticized for permanent or temporary shorts and open circuits.

Reliability Life (20 Hours):

This test is performed on a sample size (minimum of 80 tubes/lot for a 5-lot sampling plan or a minimum of 400 tubes for a single-lot sampling plan) designed to assure a process average AFR (Acceptable Failure Rate) of 0.5 per cent for Inoperatives and 2.1 per cent for Total Defectives and a process average RFR (Rejectable Failure Rate) of 2.0 per cent for Inoperatives and 4.7 per cent for Total Defectives.

During this test, tubes are operated at maximum-rated plate dissipation.

At the end of this test, tubes are criticized for Useful Power Output (2), Inoperatives, and Total Defectives. A tube is considered Inoperative if Useful Power Output (2) is less than 0.700 watt.

Heater-Cycling Life (100 Hours):

Intermittent Operation . . . . . 2000 cycles

This test is performed on a sample lot of tubes from each production run with heater volts = 1.35x specified center value cycled 1 minute ON and 2 minutes OFF, dc heater-cathode volts = -100, all other tube electrodes and metal shell connected to ground.

At the end of this test, tubes are criticized for Heater-Cathode Leakage Current, Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

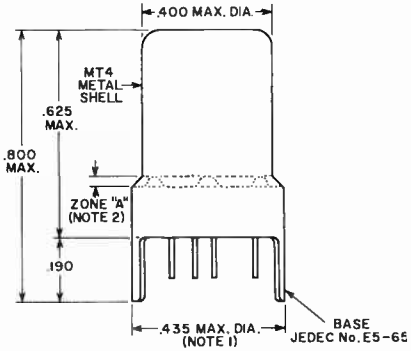
Oscillator Life (100 Hours):

This test is performed on a sample lot of tubes from each production run.

During this test, tubes are operated as 175-Mc oscillator at maximum-rated plate dissipation.

At the end of this test, tubes are criticized for Useful Power Output (2), Reverse Grid Current, Inoperatives, and Total Defectives. A tube is considered Inoperative if Useful Power Output (2) is less than 0.700 watt.

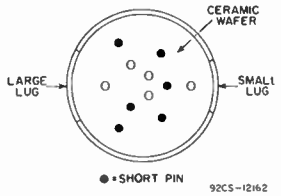
World Radio History



Dimensions in Inches

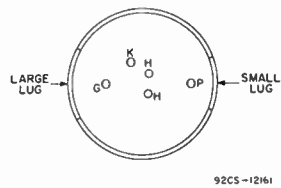
BOTTOM VIEW

Showing Arrangement of All 11 Base Pins



MODIFIED BOTTOM VIEW

With Element Connections Indicated
and Short Pins Not Shown

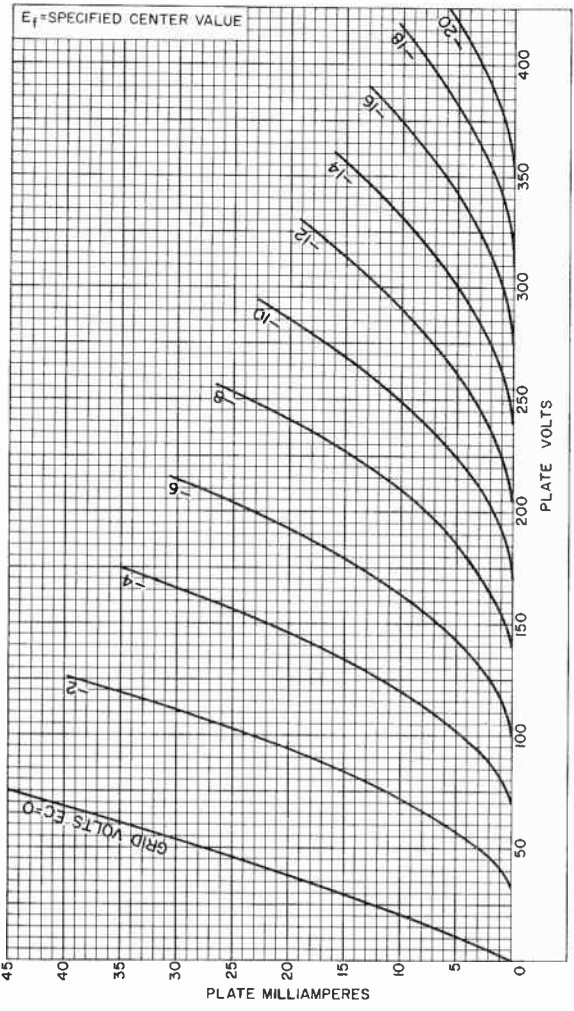


NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

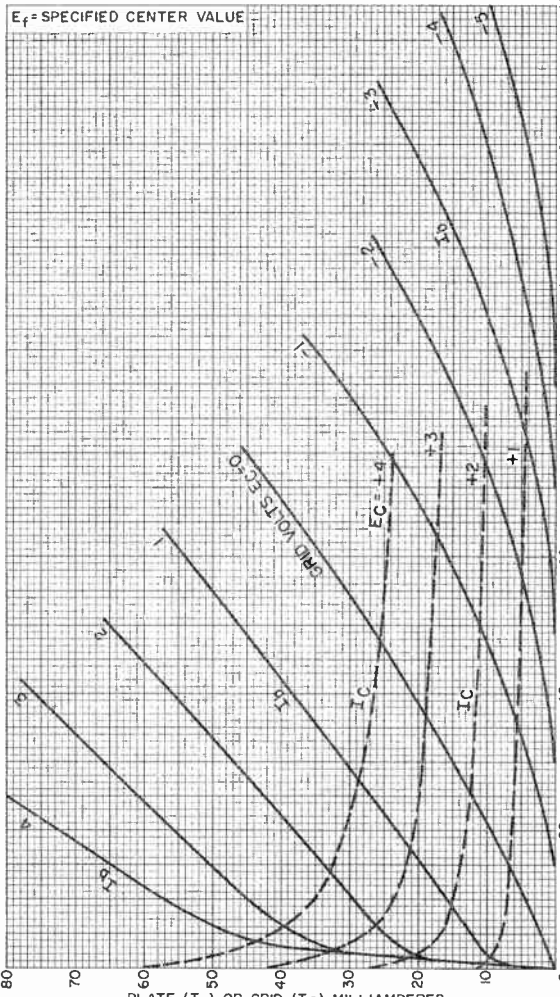
World Radio History

AVERAGE PLATE CHARACTERISTICS



92CM-12169

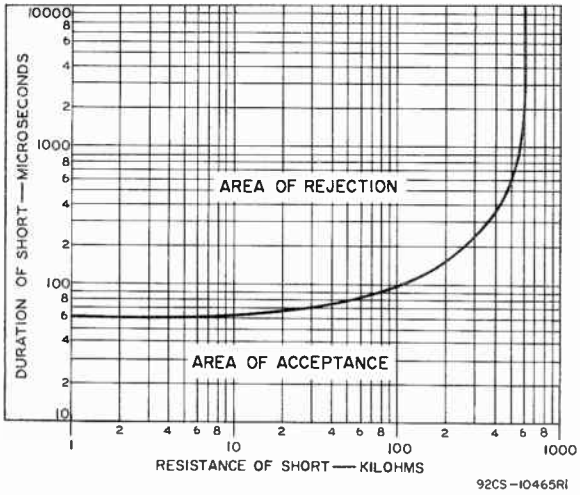
AVERAGE CHARACTERISTICS



92CM-12174

World Radio History

SHORT-TEST ACCEPTANCE LIMITS



Medium-Mu Triode

NUVISTOR TYPE

ALL-CERAMIC-AND-METAL CONSTRUCTION

Designed to Withstand Severe Mechanical Shock and Vibration in Industrial Applications, the 8393 is a General-Purpose Tube for Use in Amplifier and Oscillator Service at Frequencies Extending into the UHF Region

The 8393 is the same as the 7586 except for the following items:

Electrical:

Heater Characteristics and Ratings:		
Voltage (AC or DC)	13.5 ± 1.4	volts
Current at heater volts = 13.5	0.060	amp
Direct Interelectrode Capacitances (Approx.):		
Grid to plate	2.4	pf
Input: G to (K,S,H)	4.4	pf
Heater to cathode	1.7	pf

CHARACTERISTICS RANGE VALUES

	Note[a]	Min.	Max.	
Heater Current	10	0.055	0.065	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	2.0	2.8	pf
Input: G to (K,S,H)	2	4.0	4.8	pf
Heater to cathode	2	1.4	2.0	pf
Transconductance (2)	11	9000	-	μmhos

Note 10: With 13.5 volts ac or dc on heater.

Note 11: With 12.0 volts ac or dc on heater.

SPECIAL RATINGS & PERFORMANCE DATA

Heater Cycling:
Heater volts = 18.0

[a] Notes 1 and 5 shown in 7586 data sheets are to be substituted by Notes 10 and 11 respectively for type 8393.

World Radio History

World Radio History

8441

High-Mu Triode

NUVISTOR TYPE

Heater Designed to Operate from Battery Supplies Used in Sonobuoy and Other Expendable Equipment

Electrical:

Heater Characteristics and Ratings:		
Voltage (DC). . . .Tubes will be supplied with the heater designed to operate within ±10% of any specified center heater voltage between 6.0 and 8.5 volts to meet specific battery-supply requirements in sonobuoy and other expendable equipment.		
Input.	0.85	watt
Peak heater-cathode voltage:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances (Approx.):		
Grid to plate.	0.9	pf
Grid to cathode, shell, and heater	4.2	pf
Plate to cathode, shell, and heater	1.7	pf
Plate to cathode	0.22	pf
Heater to cathode.	1.3	pf

Characteristics, Class A_1 Amplifier:

Heater Voltage	Specified center value	
Plate Supply Voltage	110	volts
Grid . . . . . .Connected to negative end of cathode resistor		
Cathode Resistor	150	ohms
Amplification Factor	64	
Plate Resistance (Approx.)	6800	ohms
Transconductance	9400	μmhos
Plate Current.	7	ma
Grid Voltage (Approx.) for plate μa = 10.	-4	volts

Mechanical:

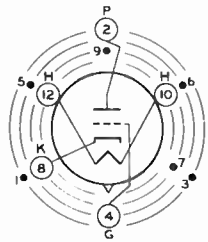
Operating Position	.Any
Type of Cathode.	.Coated Unipotential
Maximum Overall Length	0.800"
Maximum Seated Length.	0.625"
Maximum Diameter	0.440"
Weight (Approx.)	1.9 grams
Envelope	.Metal Shell MT4
Socket	See *Socket & Connector Information for RCA Nuvistor Tubes* at front of this Section
Base. . . .Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)	

World Radio History

8441

Basing Designation for BOTTOM VIEW. 12AQ

Pin 1[a] – Do Not Use
Pin 2 – Plate
Pin 3[a] – Do Not Use
Pin 4 – Grid
Pin 5[a] – Do Not Use
Pin 6[a] – Do Not Use
Pin 7[a] – Do Not Use
Pin 8 – Cathode
Pin 9[a] – Do Not Use
Pin 10 – Heater
Pin 12 – Heater



INDEX=LARGE LUG
●=SHORT PIN; IC–DO NOT USE

AMPLIFIER — Class A

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

	Rating 1	*Rating 2*[b]	
Plate Supply Voltage	300 max.	300 max.	volts
Plate Voltage	250 max.	250 max.	volts
Grid Voltage:			
Negative-bias value	55 max.	55 max.	volts
Positive-bias value		0 max.	volts
Peak-positive value	7 max.	–	volts
Cathode Current	15 max.	2.5 max.	ma
Plate Dissipation	1 max.	0.2 max.	watt

Maximum Circuit Values:

	Rating 1	*Rating 2*[b]	
Grid-Circuit Resistance:			
For fixed-bias operation	0.5[c] max.	40 max.	megohms
For cathode-bias operation	1[c] max.	40 max.	megohms

[a] Pins 1, 3, 5, 6, 7, and 9 are of a length such that their ends do not touch the socket insertion plane.

[b] For high-reliability, 20-hour-life applications.

[c] For operation at metal-shell temperature of 150° C measured in Zone "A" as shown on *Dimensional Outline*. For operation at other metal-shell temperatures, see *Grid-Circuit-Resistance Rating Chart*.

CHARACTERISTICS RANGE VALUES

	Note	*Min.*	*Max.*	
Heater Current	1	$0.95\left[\frac{0.85}{E_f(ctr)}\right]$	$1.05\left[\frac{0.85}{E_f(ctr)}\right]$	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	0.8	1.0	pf
Grid to cathode, shell, and heater	2	3.4	5.0	pf

World Radio History

	Note	Min.	Max.	
Plate to cathode, shell, and heater.	2	1.3	2.1	pf
Plate to cathode	2	0.16	0.28	pf
Heater to cathode.	2	1.0	1.6	pf
Plate Current (1).	1,3	5.5	8.8	ma
Plate Current (2).	1,4	–	50	μa
Transconductance (1)	1,3	7900	10900	μmhos
Transconductance (2)	3,5	6700	–	μmhos
Reverse Grid Current	1,6	–	0.05	μa
Amplification Factor	1,3	54	74	
Heater-Cathode Leakage Current: Heater negative with respect to cathode	1,7	–	5	μa
Heater positive with respect to cathode	1,7	–	5	μa
Leakage Resistance: Between grid and all other electrodes tied together.	1,8	5000	–	megohms
Between plate and all other electrodes tied together.	1,9	10000	–	megohms

Note 1: With dc heater volts = specified center value, E_f(ctr).

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 110, grid and metal shell connected to negative end of cathode resistor, cathode resistor (ohms) = 150, and cathode-bypass capacitor (μf) = 1000.

Note 4: With dc plate volts = 110, dc grid volts = -5, and metal shell connected to ground.

Note 5: With dc heater volts = 0.9 specified center value.

Note 6: With dc plate supply volts = 150, dc grid supply volts = -1.7, grid-circuit resistance (megohms) ≤ 1 (the internal resistance of the current meter used for this measurement), and metal shell connected to ground.

Note 7: With dc heater-cathode volts = 100.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together.

Note 9: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL TESTS

Short-Duration Shock (1):

Peak Impact Acceleration	1000	g

This test is performed on a sample lot of tubes to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of four different positions (X_1, X_2, Y_1, and Y_2) in a Navy-Type High-Impact (Flyweight) Shock Machine and, with tube-electrode voltages applied, are subjected to 20 blows (5 in each position) at the specified Peak Impact Acceleration.

At the end of this test, tubes are criticized for continuity and Shorts, Transconductance (1), Reverse Grid Current, and Heater-Cathode Leakage Current.

World Radio History

Long-Duration Shock (2):

Peak Impact Acceleration . . . . . 50 g

This test is performed, using a half-sine-wave, 11-millisecond, mechanical shock pulse, on a sample lot of tubes from each production run to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of two positions in three mutually perpendicular axes on a free-fall table. The longitudinal axis of the tube is coincident with one of the three axes. The table is dropped a total of 18 times to a horizontal surface from a height sufficient to produce the specified Peak Impact Acceleration. The material of the horizontal surface is such that the duration of the half-sine-wave shock pulse is 11 milliseconds. No tube-electrode voltages are applied during this test.

At the end of this test, tubes are criticized for Continuity and Shorts, Transconductance (1), Reverse Grid Current, and Heater-Cathode Leakage Current.

Sweep-Frequency Fatigue Vibration:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand the Sweep-Frequency Fatigue Vibration specified below. Tubes are held rigid and operated with dc heater-cathode volts = 100. During operation, the tube is vibrated through the frequency range from 5 to 500 cps and back to 5 cps. One such vibration sweep cycle takes approximately 15 minutes. This cycle is repeated for a period of 3 hours along each of three mutually perpendicular axes for a total of 9 hours. The longitudinal axis of the tube is coincident with one of the three axes. The vibrations are applied as follows:

a. The vibration from 5 to 50 cps is applied with a constant peak amplitude of 0.040 inch (0.080 inch peak-to-peak).
b. The vibration from 50 to 500 cps is applied with a constant acceleration of 10 g.
c. The vibration from 500 to 50 cps and then to 5 cps follows the same procedure, but in reverse.

At the end of this test, tubes are criticized for Continuity and Shorts, Transconductance (1), Reverse Grid Current, and Heater-Cathode Leakage Current.

Low-Pressure Voltage Breakdown:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand high-altitude (low-air-pressure) conditions. Tubes are operated with 250 volts rms (60-cycle, ac) applied between plate and all other electrodes and metal shell connected together. Tubes must not break down or show evidence of corona when subjected to an air pressure (8.0 ± 0.5 mm Hg) corresponding to an altitude of 100,000 feet.

Continuity and Shorts:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type

World Radio History

Shorts Test described in MIL-E-1D, Amendment 5, Paragraph 4. 7.7, except that tapping is done by hand with a soft rubber tapper (Specifications for this tapper will be supplied upon request). The areas of acceptance and rejection for this test are shown in the accompanying *Shorts-Test Acceptance-Limits* graph. In this test, tubes are criticized for permanent or temporary shorts and open circuits.

Reliability Life (20 Hours):

This test is performed on a sample size (minimum of 80 tubes/lot for a 5-lot sampling plan or a minimum of 400 tubes for a single-lot sampling plan) designed to assure a process average AFR (Acceptable Failure Rate) of 0.5 per cent for Inoperatives and 2.1 per cent for Total Defectives and a process average RFR (Rejectable Failure Rate) of 2.0 per cent for Inoperatives and 4.7 per cent for Total Defectives.

During this test, tubes are operated at maximum rated plate dissipation (*Rating 2*—0.2 watt).

At the end of this test, tubes are criticized for Change in Transconductance (1), Inoperatives, and Total Defectives. A tube is considered Inoperative if it has a discontinuity, permanent short, or air leak.

Heater-Cycling Life (100 Hours):

Intermittent Operation . . . . . 2000 cycles

This test is performed on a sample lot of tubes from each production run with heater volts = 1.35x specified center value cycled 1 minute ON and 2 minutes OFF, dc heater-cathode volts = -100, all other tube electrodes and metal shell connected to ground.

At the end of this test, tubes are criticized for Heater-Cathode Leakage Current, Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

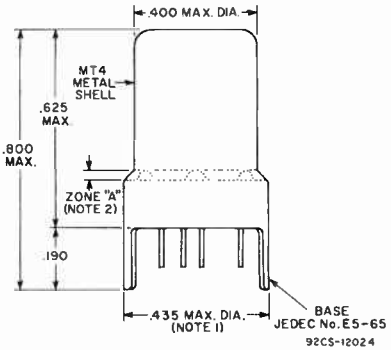
Intermittent Life (100 Hours):

This test is performed on a sample lot of tubes from each production run.

During this test, tubes are operated at maximum rated plate dissipation (*Rating 1*—1 watt).

At the end of this test, tubes are criticized for Transconductance (1), Reverse Grid Current, Inoperatives, and Total Defectives. A tube is considered Inoperative if it has a discontinuity, permanent short, or air leak.

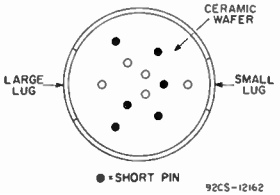
World Radio History



DIMENSIONS IN INCHES

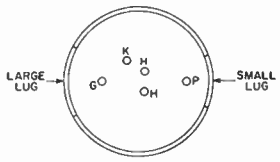
BOTTOM VIEW

Showing Arrangement of All 11 Base Pins



MODIFIED BOTTOM VIEW

With Element Connections Indicated
and Short Pins Not Shown

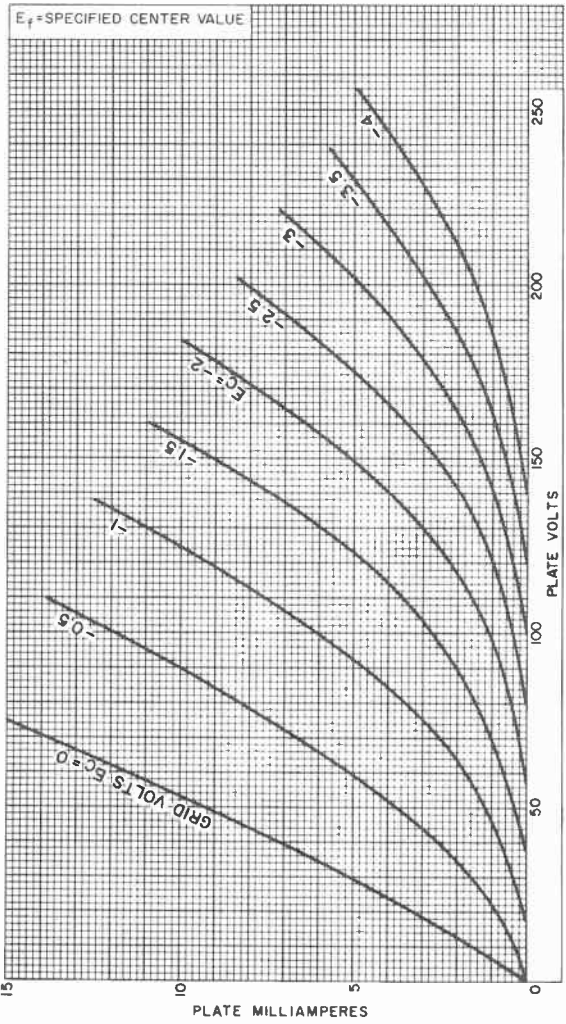


NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

World Radio History

AVERAGE PLATE CHARACTERISTICS



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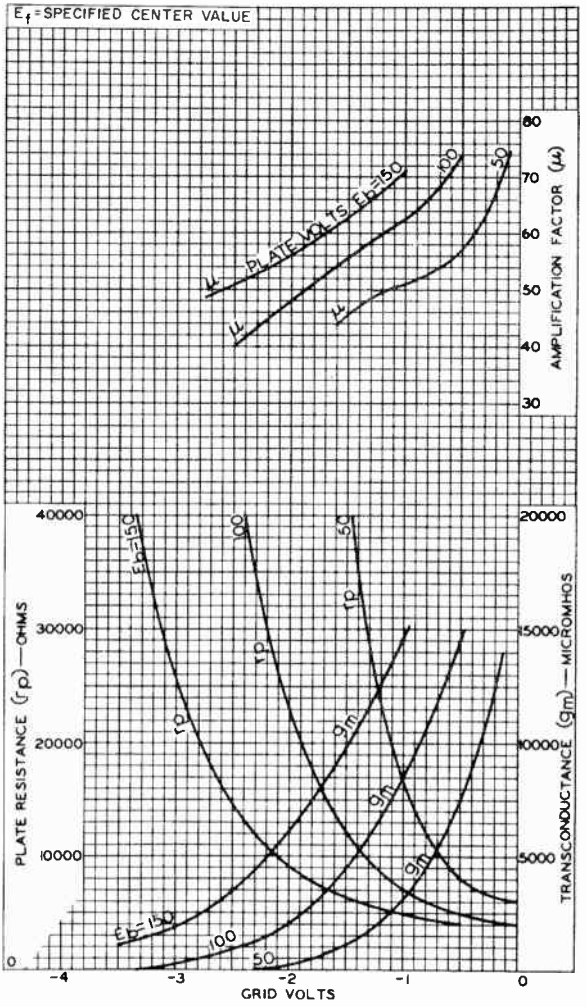
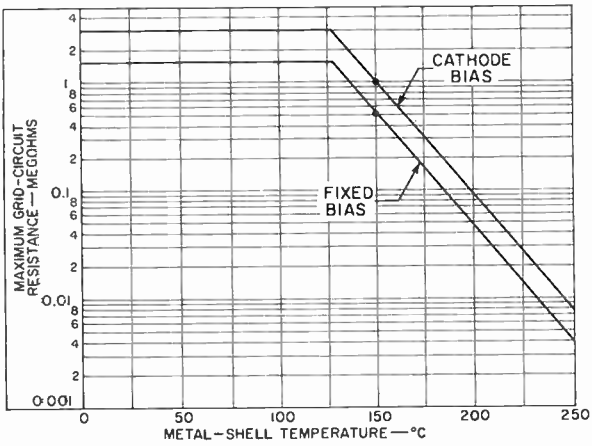
AVERAGE CHARACTERISTICS



92CM-12168

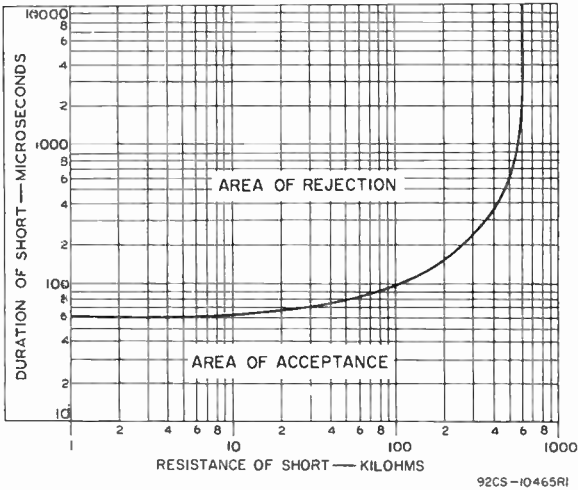
World Radio History

GRID-CIRCUIT-RESISTANCE RATING CHART
Class A Amplifier—Rating 1



92CS-12023

SHORTS TEST ACCEPTANCE LIMITS



92CS-10465RI

World Radio History

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Medium-Mu Triode

NUVISTOR TYPE

Heater Designed to Operate from Battery Supplies Used in Sonobuoy and Other Expendable Equipment

Electrical:

Heater Characteristics and Rating:

Voltage (DC). . . . .Tubes will be supplied with the heater designed to operate within ± 10% of any specified center heater voltage between 6.0 and 8.5 volts to meet specific battery-supply requirements in sonobuoy and other expendable equipment.

Input	0.85	watt
Peak heater-cathode voltage:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances (Approx.):		
Grid to plate	2.1	pf
Grid to cathode, shell, and heater	4.0	pf
Plate to cathode, shell, and heater	1.7	pf
Plate to cathode	0.34	pf
Heater to cathode	1.4	pf

Characteristics, Class A_1 Amplifier:

Heater Voltage	Specified center value	
Plate Supply Voltage	24	volts
Grid	Connected to negative end of cathode resistor	
Cathode Resistor	100	ohms
Amplification Factor	11.5	
Plate Resistance (Approx.)	1530	ohms
Transconductance	7500	μmhos
Plate Current	6.7	ma
Grid Voltage (Approx.) for plate μa = 50	-5	volts

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	0.800"
Maximum Seated Length	0.625"
Maximum Diameter	0.440"
Weight (Approx.)	1.9 grams
Envelope	Metal Shell MT4
Socket	See *Socket & Connector Information for RCA Nuvistor Tubes* at front of this Section
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No. E5-65)

World Radio History

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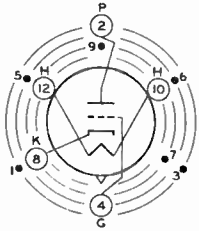
Basing Designation for BOTTOM VIEW 12AQ

Pin 1[a] - Do Not Use
Pin 2 - Plate
Pin 3[a] - Do Not Use
Pin 4 - Grid
Pin 5[a] - Do Not Use
Pin 6[a] - Do Not Use
Pin 7[a] - Do Not Use
Pin 8 - Cathode
Pin 9[a] - Do Not Use
Pin 10 - Heater
Pin 12 - Heater



INDEX=LARGE LUG
●=SHORT PIN; IC—DO NOT USE

AMPLIFIER — Class A

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

Plate Voltage	50 max.	volts
Grid Voltage:		
Negative-bias value	55 max.	volts
Peak-positive value	2 max.	volts
Grid Current	2 max.	ma
Cathode Current	15 max.	ma
Plate Dissipation	0.45 max.	watt

Typical Operation:

	Specified	center value	
Heater Voltage	12	24	volts
Plate Supply Voltage	12	24	volts
Grid Voltage	-	-0.7	volt
Grid Resistor	33000	-	ohms
Amplification Factor	12	12	
Plate Resistance (Approx.)	1500	1500	ohms
Transconductance	8000	8000	μmhos
Plate Current	5.5	9.5	ma

Maximum Circuit Values

Grid-Circuit Resistance:[b]

For fixed-bias operation	10 max.	megohms
For cathode-bias operation	10 max.	megohms

[a] Pins 1, 3, 5, 6, 7, and 9 are of a length such that their ends do not touch the socket insert on plane.

[b] For operation at metal-shell temperatures up to 150° C, measured in Zone "A" as shown on *Dimensional Outline*. For operation at metal-shell temperatures above 150° C, see accompanying *Grid-Circuit-Resistance Rating Chart*.

CHARACTERISTICS RANGE VALUES

	Note	Min.	Max.	
Heater Current . . .		$0.95\left[\frac{0.45}{E_f(\text{ctr})}\right]$	$1.05\left[\frac{0.85}{E_f(\text{ctr})}\right]$	amp
Direct Interelectrode Capacitances:				
Grid to plate. . . .	4	1.6	2.4	pf
Grid to cathode, shell, and heater	2	4.3	5.6	pf
Plate to cathode, shell, and heater	2	0.4	0.7	pf
Plate to cathode.	3	0.26	0.42	pf
Heater to cathode.	3	1.1	1.7	pf
Plate Current (1).	1,4	0.7	1.7	ma
Plate Current (2) . .	1,5	-	5	μa
Transconductance (1)	1,4	4000	6400	μmhos
Transconductance . .	4,6	4250	-	μmhos
Reverse Grid Current	1,5	-	0.1	μa
Amplification Factor	1,4	60	82	
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode.	1,7	-	5	μa
Heater positive with respect to cathode. . . .	1,7	-	5	μa
Leakage Resistance:				
Between grid and all other electrodes tied together	1,8	5000		megohms
Between plate and all other electrodes tied together	1,9	10000	-	megohms

Note 1: With dc heater volts = specified center value, $E_f(\text{ctr})$.

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 24, grid and metal shell connected to negative end of cathode resistor, cathode resistor (ohms) = 100, and cathode-bypass capacitor (μf) = 1000.

Note 4: With dc plate volts = 24, dc grid volts = -10, and metal shell connected to ground.

Note 5: With dc heater volts = 0.9 specified center value.

Note 6: With dc plate supply volts = 40, dc grid supply volts = -2, grid circuit resistance (megohms) $\triangleq$ 1 (the internal resistance of the current meter used for this measurement), and metal shell connected to ground.

Note 7: With dc heater-cathode volts = 100.

Note 8: With grid 100 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

Note 9: With plate 300 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

SPECIAL TESTS

Short-Duration Shock (1):

Peak Impact Acceleration. . . . . 1000 g

This test is performed on a sample lot of tubes to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of four different positions (X_1, X_2, Y_1, and Y_2) in a Navy-Type High-Impact (Flyweight) Shock Machine and, with tube-electrode voltages applied, are subjected to 20 blows (5 in each position) at the specified Peak Impact Acceleration.

At the end of this test, tubes are criticized for Continuity and Shorts, Transconductance (1), Reverse Grid Current, and Heater-Cathode Leakage Current.

Long-Duration Shock (2):

Peak Impact Acceleration. . . . . 50 g

This test is performed, using a half-sine-wave, 11-millisecond, mechanical shock pulse, on a sample lot of tubes from each production run to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of two positions in three mutually perpendicular axes on a free-fall table. The longitudinal axis of the tube is coincident with one of the three axes. The table is dropped a total of 18 times to a horizontal surface from a height sufficient to produce the specified Peak Impact Acceleration. The material of the horizontal surface is such that the duration of the half-sine-wave shock pulse is 11-milliseconds. No tube-electrode voltages are applied during this test.

At the end of this test, tubes are criticized for Continuity and Shorts, Transconductance (1), Reverse Grid Current, and Heater-Cathode Leakage Current.

Sweep-Frequency Fatigue Vibration:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand the Sweep-Frequency Fatigue Vibration specified below. Tubes are held rigid and operated with dc heater-cathode volts = 100. During operation, the tube is vibrated through the frequency range from 5 to 500 cps and back to 5 cps. One such vibration sweep cycle takes approximately 15 minutes. This cycle is repeated for a period of 3 hours along each of three mutually perpendicular axes for a total of 9 hours. The longtudinal axis of the tube is coincident with one of the three axes. The vibrations are applied as follows:

a. The vibration from 5 to 50 cps is applied with a constant peak amplitude of 0.040 inch (0.080 inch peak-to-peak).

b. The vibration from 50 to 500 cps is applied with a constant acceleration of 10 g.

c. The vibration from 500 to 50 cps and then to 5 cps follows the same procedure, but in reverse.

At the end of this test, tubes are criticized for Continuity

and Shorts, Transconductance (1), Reverse Grid Current, and Heater-Cathode Leakage Current.

Low-Pressure Voltage Breakdown:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand high-altitude (low-air-pressure) conditions. Tubes are operated with 250 volts rms (60-cycle, ac) applied between plate and all other electrodes and metal shell connected together. Tubes must not break down or show evidence of corona when subjected to an air pressure (8.0 ± 0.5 mm Hg) corresponding to an altitude of 100,000 feet.

Continuity and Shorts:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-F-1E, Amendment 5, Paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper (Specifications for this tapper will be supplied upon request). The areas of acceptance and rejection for this test are shown in the accompanying *Shorts Test Acceptance-Limits* graph. In this test, tubes are criticized for permanent or temporary shorts and open circuits.

Reliability Life (20 Hours):

This test is performed on a sample size (minimum of 80 tubes/lot for a 5-lot sampling plan or a minimum of 400 tubes for a single-lot sampling plan) designed to assure a process average AFR (Acceptable Failure Rate) of 0.5 per cent for Inoperatives and 2.1 per cent for Total Defectives and a process average RFR (Rejectable Failure Rate) of 2.0 per cent for Inoperatives and 4.7 per cent for Total Defectives.

During this test, tubes are operated at maximum-rated plate dissipation.

At the end of this test, tubes are criticized for Change in Transconductance (1), Inoperatives, and Total Defectives. A tube is considered Inoperative if it has a discontinuity, permanent short, or air leak.

Heater-Cycling Life (100 Hours)

Intermittent Operation . . . . . 2000 cycles

This test is performed on a sample lot of tubes from each production run with heater volts = 1.35x specified center value cycled 1 minute ON and 2 minutes Off, dc heater-cathode volts = -100, all other tube electrodes and metal shell connected to ground.

At the end of this test, tubes are criticized for Heater-Cathode Leakage Current, Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

World Radio History

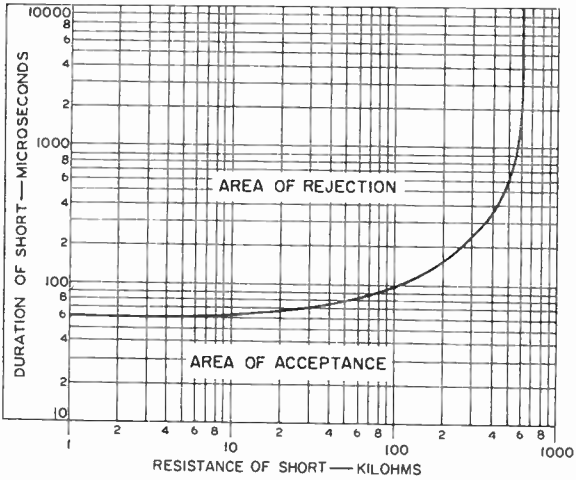
Intermittent Life (100 Hours):

This test is performed on a sample lot of tubes from each production run.

During this test, tubes are operated at maximum-rated plate dissipation.

At the end of this test, tubes are criticized for Transconductance (1), Reverse Grid Current, Inoperatives, and Total Defectives. A tube is considered inoperative if it has a discontinuity, permanent short, or air leak.

SHORTS-TEST ACCEPTANCE LIMITS



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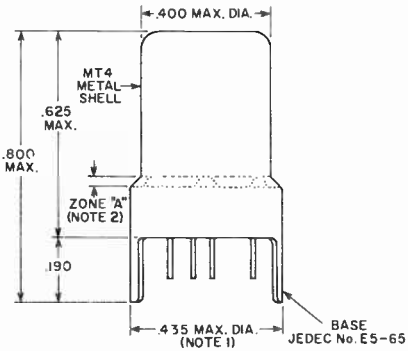
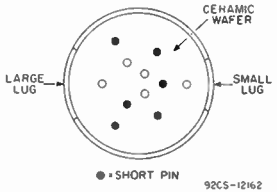
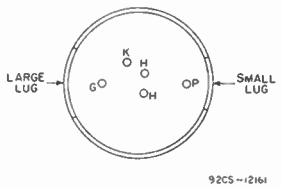


Dimensions in Inches

BOTTOM VIEW
Showing Arrangement of All 11 Base Pins



MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown

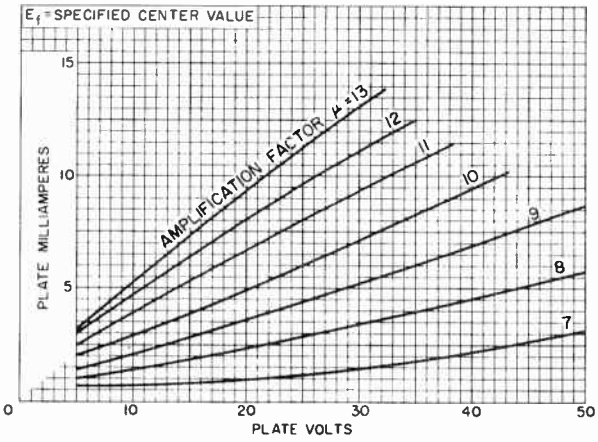


NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

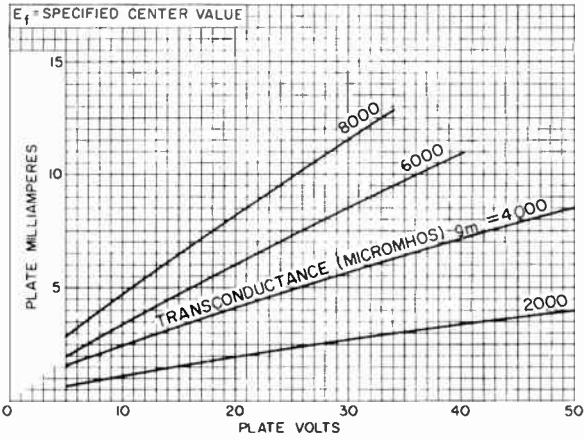
World Radio History

AVERAGE PLATE CHARACTERISTICS
With Amplification Factor as Variable



92CS-12165

AVERAGE PLATE CHARACTERISTICS
With Transconductance as Variable



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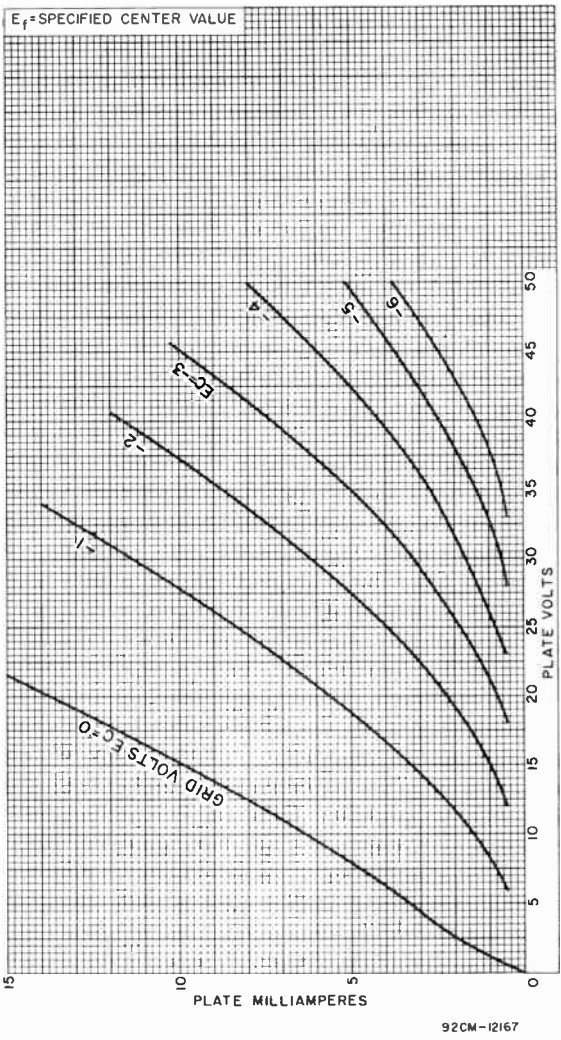
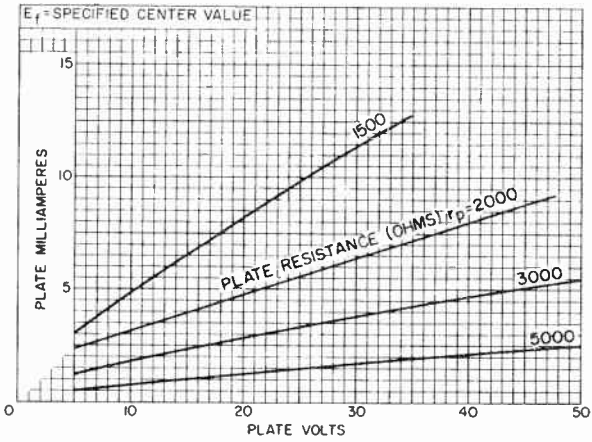
World Radio History

AVERAGE PLATE CHARACTERISTICS



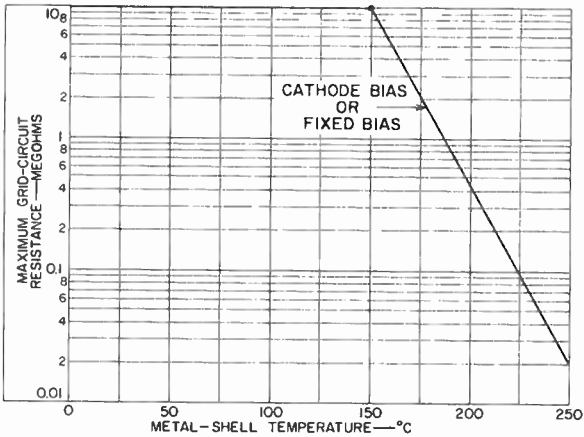
92CM-12167

AVERAGE PLATE CHARACTERISTICS
With Plate Resistance as Variable



92CS-12164

GRID-CIRCUIT-RESISTANCE RATING CHART



92CS-11479RI

8532/6J4WA

High-Mu Triode

7-PIN MINIATURE TYPE

FRAME-GRID CONSTRUCTION **"PREMIUM" VERSION OF 6J4**

For Cathode-Drive UHF Amplifier Applications (up to 500 Mc) in Equipment Requiring Exceptional Stability and Reliability under Severe Environmental Conditions

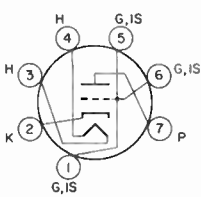
Electrical:

Heater Ratings and Characteristics:		
Voltage (AC or DC)	6.3 ± 0.3	volts
Current at heater volts = 6.3	0.400	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances:[a]		
Cathode to plate	0.2 max.	pf
Input (Cathode-drive operation):		
K to (G + IS, H)[b]	7.5	pf
Output (Cathode-drive operation):		
P to (G + IS, H)[b]	5.0 max.	pf
Grid and internal shield to plate	2.8	pf
Heater to cathode	2.8	pf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline (JEDEC No. 9-2)	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No. E7-1)
Basing Designation for BOTTOM VIEW	7BQ

Pin 1 – Grid, Internal Shield
Pin 2 – Cathode
Pin 3 – Heater
Pin 4 – Heater
Pin 5 – Same as Pin 1
Pin 6 – Same as Pin 1
Pin 7 – Plate



Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	150	volts
Grid	Connected to negative end of cathode resistor	
Cathode Resistor	100	ohms
Amplification Factor	52.5	
Plate Resistance (Approx.)	4800	ohms
Transconductance	11000	μmhos

World Radio History

Plate Current	13.5	ma
Grid Voltage (Approx.) for plate μa = 60	-15	volts

CLASS A_1 AMPLIFIER

Maximum Ratings, *Absolute-Maximum Values:*

For operation at altitudes up to 80,000 feet and frequencies up to 500 Mc

Plate Voltage	150	volts
Grid Voltage:		
Negative-bias value	55	volts
Positive-bias value	0	volts
Cathode Current	20	ma
Plate Dissipation	2.5	watts
Bulb Temperature (At hottest point on bulb surface)	120	°C

Maximum Circuit Values:

Grid-Circuit Resistance:		
For grid-resistor-bias operation	0.25	megohm

[a] With external shield JEDEC No.316 connected to ground except as noted.
[b] With external shield JEDEC No.316 connected to grid.

CHARACTERISTICS RANGE VALUES

	Note	Min.	Max.	
Heater Current	1	0.375	0.425	amp
Direct Interelectrode Capacitances:	2			
Cathode to plate	3	-	0.2	pf
Input (Cathode-drive operation):				
K to (G + IS, H)	4	5.5	9.5	pf
Output (Cathode-drive operation):				
P to (G + IS, H)	4	-	5.0	pf
Grid and Internal shield to plate	3	2.3	3.3	pf
Heater to cathode	3	1.0	4.5	pf
Plate Current (1)	1,5	9	18	ma
Plate Current (2)	1,6	-	60	μa
Transconductance (1)	1,5	8800	13200	μmhos
Transconductance (2) for an individual tube expressed as a per cent of Transconductance (1)	5,7	-	15	%
Reverse Grid Current	1,8	0	0.5	μa
Amplification Factor	1,5	40	65	
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,9	-	10	μa
Heater positive with respect to cathode	1,9	-	10	μa

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Leakage Resistance:			
Between grid and all other elements connected together	1.10	500 –	megohms
Between plate and all other elements connected together	1.11	500 –	megohms

Note 1: With ac or dc heater volts = 6.3.

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With external shield JEDEC No.316 connected to ground.

Note 4: With external shield JEDEC No.316 connected to grid.

Note 5: With dc plate-supply volts = 150, grid connected to negative end of cathode resistor, cathode resistor (ohms) = 100, and cathode-bypass capacitor (μf) = 1000.

Note 6: With dc plate volts = 150 and dc grid volts = -1.5.

Note 7: With ac or dc heater volts = 5.7.

Note 8: With dc plate supply volts = 175, grid-circuit resistance (megohms) = 0.25, and cathode resistor (ohms) = 150.

Note 9: With dc heater-cathode volts = 100.

Note 10: With grid 100 volts negative with respect to all other elements connected together.

Note 11: With plate 300 volts negative with respect to all other elements connected together.

SPECIAL TESTS

High-Impact, Short-Duration Shock:

Peak Impact Acceleration	450	g
Duration of half-sine-wave mechanical-shock pulse	1	msec

This test is performed on sample tubes from each production lot to determine the ability of the tubes to withstand the specified acceleration for a short time interval. Tubes are rigidly mounted in each of four different positions (X_1, X_2, Y_1, and Y_2) in a Navy-Type High-Impact (Flyweight) Shock Machine and are subjected to 20 blows (5 in each position) under the following conditions; heater volts = 6.3, dc plate supply volts = 150, dc grid volts = -1.5, grid resistor (megohms) = 0.1, and dc heater-cathode volts = 100.

Tubes are then criticized for Transconductance change (1), Reverse Grid Current, and Heater-Cathode Leakage Current under the conditions specified in the CHARACTERISTICS RANGE VALUES and are subjected to the Constant-Frequency Vibration Test and the Continuity and Shorts Test described below.

Fatigue Vibration:

Peak Vibrational Acceleration	5	g
Vibration Frequency	25	cps
Duration of Test	96	hours

This test is performed periodically on sample tubes to determine the ability of the tubes to withstand the specified acceleration at a constant vibration frequency for an extended time interval. Tubes are rigidly mounted on a platform vibrating with simple harmonic motion at a constant vibration frequency of 25 cps and, with heater volts = 6.3, are subjected to the specified acceleration for 96 hours (32 hours in each of three different positions X_1, X_2, and Y_1).

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Tubes are then criticized for changes in Transconductance (1), Reverse Grid Current, and Heater-Cathode Leakage Current under the conditions specified in the CHARACTERISTICS RANGE VALUES and are subjected to the Constant-Frequency Vibration Test and the Continuity and Shorts Test described below.

Constant-Frequency Vibration:

Peak Vibrational Acceleration	10	g
Vibration Frequency	40	cps
RMS Voltage across plate load resistor	150 max.	mv

This test is performed on sample tubes from each production lot to determine if loose parts or mechanical resonance are present at the specified acceleration and vibration frequency. Tubes are rigidly mounted on a platform vibrating with simple harmonic motion at a constant frequency of 40 cps and, with the tubes operating under the conditions specified in the CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate load resistor of 2000 ohms, are subjected to the specified acceleration. During this test, the rms voltage across the plate load resistor must not exceed 150 millivolts.

Variable-Frequency Vibration:

Peak Vibrational Acceleration	10	g
Vibration-Frequency Range	50 to 500	cps
RMS Voltage across plate load resistor	100 max.	mv

This test is performed periodically on sample tubes to determine if mechanical resonance is present at the specified acceleration over the specified frequency range. Tubes are rigidly mounted on a platform vibrating with simple harmonic motion over a frequency range of 50 to 500 cps and, with the tubes operating under the conditions specified in the CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate load resistor of 2000 ohms, are subjected to the specified acceleration in each of two different positions, X_1 and X_2. The acceleration over the frequency range is within ±20 percent of the reference acceleration at 100 cps. The frequency is increased from 50 to 500 cps with approximately logarithmic progression and 4 to 5 minutes are required to traverse the frequency range. During this test, the rms voltage across the plate load resistor must not exceed 100 millivolts.

High-Altitude Voltage Breakdown:

Effective Altitude	80000	ft
Air Pressure	21 ± 2	mm Hg
Ambient Temperature	25 ± 5	°C
RMS Voltage between plate base pin and adjacent pins	500	volts

This test is performed periodically on sample tubes from each production lot to determine the ability of the tubes to withstand high-altitude (low-air-pressure) conditions. In this test at an ambient temperature of 25° ± 5° C, while the tubes

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are subjected to a reduced air pressure of 21 ± 2 mm Hg corresponding to an altitude of 80,000 feet, a 60-cps, ac rms voltage of 500 volts is applied between the plate base pin and adjacent pins. Tubes must not break down (arc over) or show evidence of corona.

Continuity and Shorts:

This test is performed periodically on sample tubes from each production lot to determine the presence of open circuits, temporary or permanent shorts, or air leaks. Tubes are subjected to the Thyratron-Type Shorts Test described in Military Specification MIL-E-1F, method 1201.

Heater-Cycling Life:

Duration of Test. . . . . 2000 cycles

This test is performed on sample tubes from each production lot with heater volts = 7.0 cycled 1 minute ON and 4 minutes OFF for 2000 cycles, dc heater-cathode volts = 100 continuously ON, and no voltages applied to the plate or grid. After 2000 cycles, tubes are criticized for changes in Heater-Cathode Leakage Current and Leakage Resistance, and for Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

Stability Life (20 Hours):

This test is performed at room temperature on sample tubes from each production lot to determine if the tubes are stable. After 2 hours and again after 20 hours of operation under the conditions specified in the CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a grid resistor of 0.25 megohm and with dc heater-cathode volts = 100, tubes are criticized for the change in Transconductance (1).

Early-Hour Survival-Rate Life (100 Hours):

This test is performed on sample tubes from each production lot to assure a high early-hour survival rate. After 100 hours of operation under the conditions specified for the Stability Life Test above, tubes are criticized for the change in Transconductance (1) and are then subjected to the Continuity and Shorts Test.

Intermittent-Conduction Life (1000 Hours):

This test is performed on sample tubes from each production lot to assure the high quality of individual tubes and to guard against epidemic failures due to excessive transconductance change in any of the characteristics specified below. After 500 hours of operation under the conditions specified for the Stability Life Test above and, in addition, with heater voltage cycled 110 minutes ON and 10 minutes OFF, and bulb temperature = 120° C, tubes are criticized for changes in Heater Current, Transconductance (1), Transconductance (2), Reverse Grid Current, Heater-Cathode Leakage Current, Leakage Resistance, and for Open Circuits, Permanent Shorts, Air Leaks, and Total Defectives. After 1000 hours of operation, tubes are again criticized for all of the preceding defects with the exception of the change in Transconductance (2).

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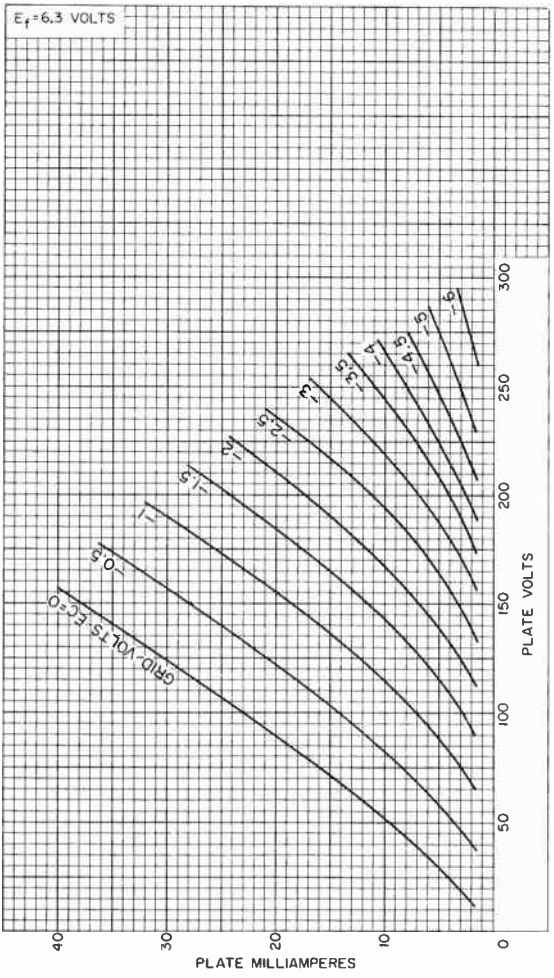
AVERAGE PLATE CHARACTERISTICS



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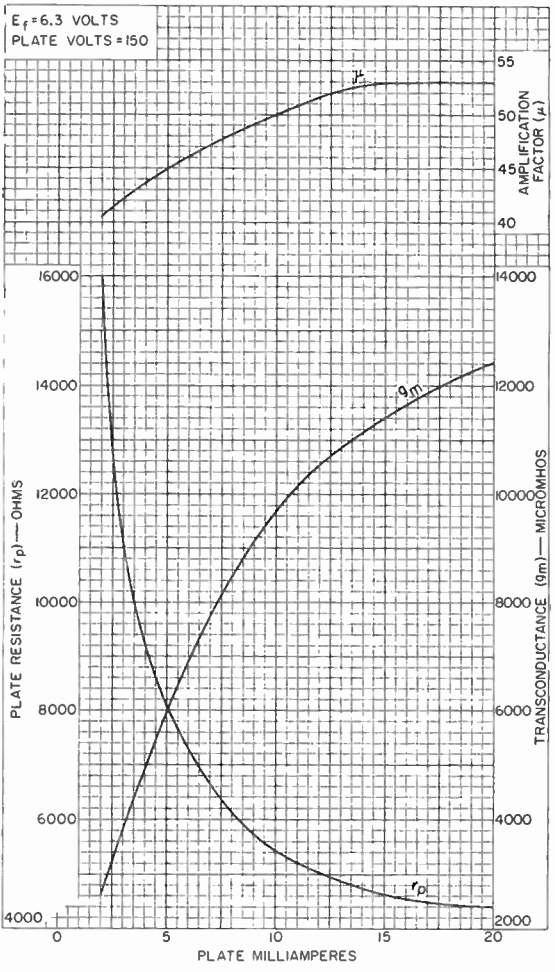
AVERAGE CHARACTERISTICS



92CM-12533

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High-Mu Triode

ENVIRONMENTAL TESTS — NUVISTOR TYPE — LIFE TESTS

For Condenser-Microphone Preamplifiers, Piezoelectric- and Ceramic-Pickup Preamplifiers, and Other Voltage Amplifier Applications Requiring Amplification of Extremely Small Signals at DC to 200 kc/s

ELECTRICAL CHARACTERISTICS

Bogey Values

Heater Voltage, (DC or AC)	E_f	6.3	V
Heater Current at E_f = 6.3 V	I_f	100	mA
Heater Input	P_f	0.63	W
Direct Interelectrode Capacitances			
Without external shield			
Input: G to (K, S, H)	c_i	3.4	pF
Output: P to (K, S, H)	c_o	1.7	pF
Plate to cathode	c_{pk}	0.20	pF
Grid to cathode	c_{gk}	2.6	pF
Heater to cathode	c_{hk}	1.0	pF

CLASS A$_1$ AMPLIFIER

For Following Characteristics see Conditions

Amplification Factor	μ	127	
Plate Resistance (Approx.)	r_p	41	kΩ
Transconductance	g_m	3100	μmho
DC Plate Current	I_b	1.5	mA
Cutoff DC Grid Voltage for I_b = 10 μA.	$E_{c(co)}$	-1.7	V

Conditions

Heater Voltage	E_f	6.3	V
Plate Supply Voltage	E_{bb}	120	V
Grid Supply Voltage	E_{cc}	0	V
Cathode Resistor	Rk	200	Ω
Metal Shell	Connected to system ground		

ABSOLUTE MAXIMUM RATINGS

For operation as a Class-A$_1$ Amplifier Tube at frequencies up to 200 kc/s

Plate Supply Voltage	E_{bb}	330	V
DC Plate Voltage	E_b	250	V
Grid Voltage			
Peak positive value	e_{cm}	0	V
DC positive value	E_c	0	V
DC negative value	E_c	-55	V
Peak Heater-Cathode Voltage	e_{hkm}	±100	V
Heater Voltage, DC or AC	E_f	5.7 to 6.9	V
Instantaneous Voltage. Between base pins and metal shell	See *Breakdown-Voltage Characteristics Curve*		
Average Cathode Current	$I_{k(av)}$	2	mA
Plate Dissipation	P_b	0.3	W
Envelope Temperature[C]	T_E	150	°C

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MAXIMUM CIRCUIT VALUES

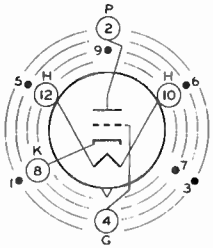
Grid-Circuit Resistance

For fixed-bias operation	$R_{g(ckt)}$	50	MΩ
For cathode-bias operation	$R_{g(ckt)}$	100	MΩ

MECHANICAL CHARACTERISTICS

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length (l_m)	0.800 in
Maximum Seated Length (l_{sm})	0.625 in
Maximum Diameter (d_m)	0.440 in
Weight (Approx.)	1.9 g
Dimensional Outline	JEDEC No. 4-4
Envelope	JEDEC Designation MT4
Base[a]	Medium-Ceramic-Wafer Twelvar 5-Pin (JEDEC E5-65)
Basing Designation for BOTTOM VIEW	12AQ

Pin 1[b] – Do Not Use
Pin 2 – Plate
Pin 3[b] – Do Not Use
Pin 4 – Grid
Pin 5[b] – Do Not Use
Pin 6[b] – Do Not Use
Pin 7[b] – Do Not Use
Pin 8 – Cathode
Pin 9[b] – Do Not Use
Pin 10 – Heater
Pin 11 – Omitted
Pin 12 – Heater



INDEX=LARGE LUG
●=SHORT PIN—IC

TYPICAL OPERATION

In High-Input-Impedance, Cathode-Follower Circuit

Heater Voltage	E_f	6.3	V
Plate Supply Voltage	E_{bb}	150	V
Cathode Bias Resistor (Bypassed)	$R_{k(bias)}$	3.3	kΩ
Cathode Load Resistor	$R_{k(load)}$	15	kΩ
Grid Resistor	R_g	100	MΩ
Input Resistance (Approx.)	R_i	1	GΩ
Output Resistance (Approx.)			
Source resistance (R_s) = 1 kΩ	R_o	7	kΩ
Average Grid Current	$I_{c(av)}$	-0.1	nA
Average Plate Current	$I_{b(av)}$	0.3	mA

[a] Designed to mate with Cinch Mfg. Co. Socket No. 133 65 92 025, 133 65 91 034, or equivalent.

[b] Pins 1, 3, 5, 6, 7, and 9 are of a length such that their ends do not touch the socket insertion plane.

[c] Measured on metal shell in Zone "A" (See Dimensional Outline).

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INITIAL CHARACTERISTICS LIMITS

	Note	Min	Max	
Heater Current	1	90	110	mA
Direct Interelectrode Capacitances				
Grid to plate	2	-	0.7	pF
Input (Grid to All)	2	3.0	3.8	pF
Output (Plate to All)	2	1.5	1.9	pF
Plate to cathode	2	0.17	0.23	pF
Grid to cathode	2	2.2	3.0	pF
Heater to cathode	2	0.8	1.2	pF
Amplification Factor	3	95	160	
Transconductance	3	2200	4000	μmho
Plate Current	3	0.7	2.3	mA
Cutoff Plate Current	4	-	200	μA
AC Voltage Amplification	5	7	-	V
Total Grid Current	6	-	-0.05	μA
Heater-Cathode Leakage Current	7	-	±5	μA
Leakage Resistance				
Between grid and all other electrodes connected together	8	50	-	GΩ
Between plate and all other electrodes connected together	9	100	-	GΩ
Inoperatives	10			

Note 1: With E_f = 6.3 V.

Note 2: Measured without external shield.

Note 3: With E_f = 6.3 V, E_{bb} = 120 V, E_{cc} = 0 V, R_k = 200 Ω, C_k = 1000 μF, metal shell grounded.

Note 4: With E_f = 6.3 V, E_b = 120 V, E_c = -1.7 V, metal shell grounded.

Note 5: With E_f = 6.3 V, E_{bb} = 120 V, E_{cc} = 0 V, R_g = 10 MΩ, $C_{c(in)}$ = 0.1 μF, grid-signal-source internal impedance < 2500 Ω, E_g = 0.2 V (rms, 60 c/s, sinewave), R_p = 0.5 MΩ, $C_{c(out)}$ = 0.5 μF. RMS voltage component measured across the series plate resistor with a 5 MΩ (min.) input impedance vacuum-tube voltmeter.

Note 6: With E_f = 6.3 V, E_b = 200 V, E_{cc} = -1 V, R_g = 1 MΩ, metal shell grounded.

Note 7: With E_f = 6.3 V, E_{hk} = ±100 V.

Note 8: With E_f = 6.3 V, $E_{g\text{-all}}$ = -100 V, metal shell grounded.

Note 9: With E_f = 6.3 V, $E_{p\text{-all}}$ = -300 V, metal shell grounded.

Note 10: Tubes are criticized for Shorts, Discontinuities, and Air Leaks.

ENVIRONMENTAL TESTS

High-Impact, Short-Duration Shock

Peak Impact Acceleration	1000	g
Duration of Approximate Half-Sine-Wave Mechanical-Shock Pulse	0.8 ± 0.2	ms

Operating Conditions during Test

E_f = 6.3 V, E_{bb} = 120 V, E_{cc} = 0 V, R_g = 1 MΩ, R_k = 200 Ω, C_k = 1000 μF.

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	Min	Max	
Post-Shock Limits and Rejection Criteria			
[illegible] Voltage Amplification	6	–	V
I_c	–	-0.1	μA
I_{bk}	–	±10	μA
[illegible]-Variable-Frequency-Vibration Test Limits over Vibration-Frequency Range of:			
2 to 6 kc/s	–	50	mV
6 to 15 kc/s	–	1000	mV
Tap and Permanent Shorts, and Discontinuities		✓	

Low-Impact, Long-Duration Shock

Peak Impact Acceleration	50	g
Duration of Approximate Half-Sine-Wave Mechanical-Shock Pulse	11 ± 2	ms

Condition during Test

No tube-element voltages are applied.

Post-Shock Limits and Rejection Criteria

Same as those specified above for the High-Impact, Short-Duration Shock Test.

Sweep-Frequency-Vibration Fatigue

Vibration-Frequency Range (Overall)	5 to 500 to 5	c/s
Peak Displacement		
5 to 500 to 5 c/s	0.040	in
Peak-to-peak value	0.080	in
Peak Vibrational Acceleration	10	g
50 to 500 to 50 c/s		
Period of 1 Sweep Cycle (Approx.)	15	m
5 to 500 to 5 c/s		
Duration of Test (Overall)	9	h
Along each of 3 mutually perpendicular axes	3	h

Operating Condition during Test

[illegible] V

Post-Sweep-Frequency-Vibration-Fatigue Limits and Rejection Criteria

Same as those specified above for the High-Impact-Short-Duration Shock Test.

Variable-Frequency Vibration

Vibration-Frequency Range (Overall)	3 to 15		kc/s
Peak Vibrational Acceleration	1		g
[illegible] position			
Period of 1 Sweep Cycle (3 to 15 kc/s)	7		s

Operating Conditions during Test

E_f = 6.3 V, E_{bb} = 250 V, E_c = 0 V, R_k = 200 Ω, R_g = 2 kΩ.

Limits	Min	Max	
Fuge over Vibration-Frequency Range of:			
3 to 6 kc/s	–	35	mV
6 to 15 kc/s	–	700	mV

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LIFE TESTS

Heater Cycling

Duration of Test . . . . . 2000 cycles

Operating Conditions

E_f = 8.5 V cycled: 1 minute ON and 2 minutes OFF, E_{bk} = −150 V continuously ON.

Rejection Criteria

Heater-Cathode shorts, and Heater and Cathode Discontinuities.

Intermittent Operation (2, 20, 100, 500, and 1000 Hours)

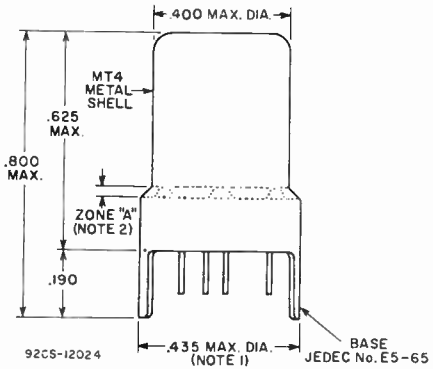
Operating Conditions

E_f = 6.3 V cycled 110 minutes ON and 10 minutes OFF, I_b = 120 V, E_{cc} = −1 V, E_{bk} = 100 V, R_k = 0 Ω, R_g = 1 MΩ, P_b = 0.3 W (approx.), T_f = 150°C min.

End-Point Limits At	2 and 20		100		500		1000		h
	Min	Max	Min	Max	Min	Max	Min	Max	
g_m	–	–	2000	–	–	–	–	–	μmho
$\Delta g_m/t$	–	±10	–	–	–	–	–	–	%
$\Delta I_{Rp}/t$	–	–	–	–	–	±10	–	±15	%
$Avg\lvert\Delta I_{Rp}/t\rvert$	–	–	–	–	–	7	–	10	%
I_c	–	–	–	−0.2	–	−0.1	–	−0.2	μA
I_{bk}	–	–	–	–	–	±10	–	±10	μA

DIMENSIONAL OUTLINE

JEDEC No. 4-4



DIMENSIONS IN INCHES

Note 1: Maximum outside diameter of 0.440" is permitted along 0.190" lug length.

Note 2: Envelope temperature should be measured in zone "A".

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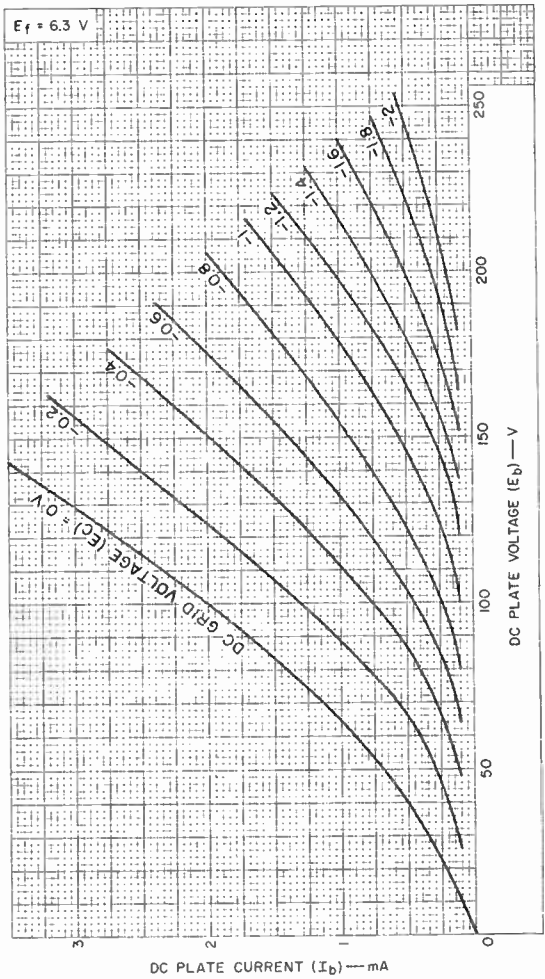
Typical Plate Characteristics



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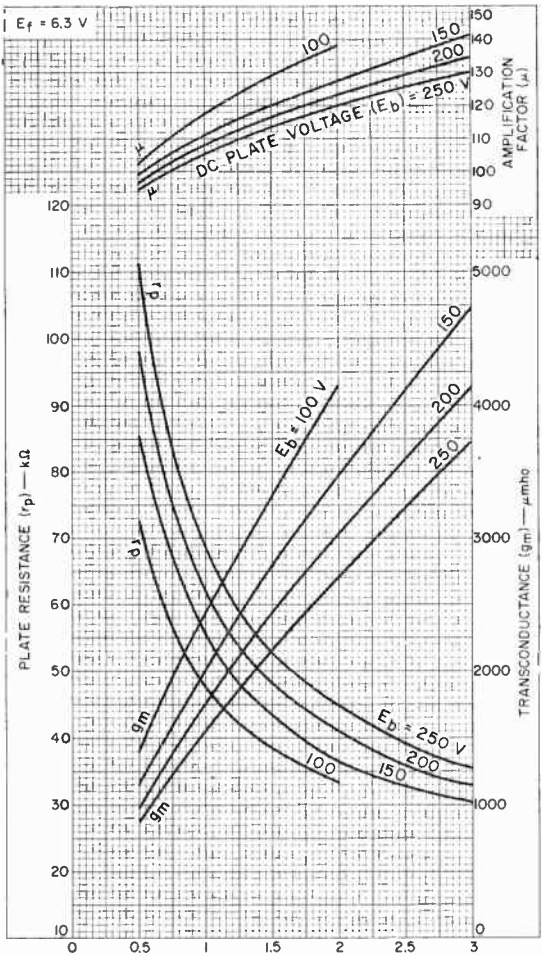
Typical Characteristics



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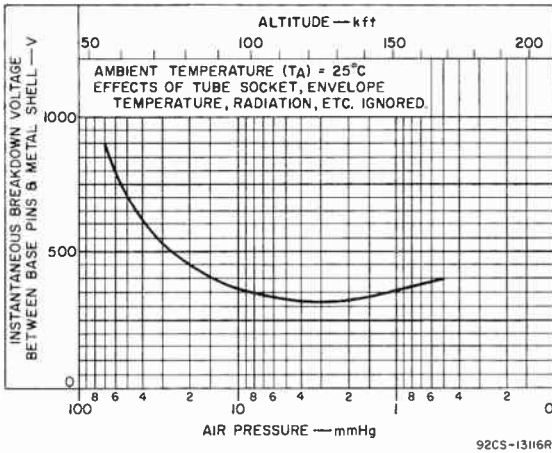
Breakdown-Voltage Characteristic



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9001

DETECTOR AMPLIFIER PENTODE

MIDGET TYPE

Heater ■	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances:		
Grid to Plate	0.01 max.	μμf
Input	3.6	μμf
Output	3.0	μμf
Maximum Overall Length		1-13/16"
Maximum Seated Height		1-9/16"
Length from Base Seat to Bulb Top (excluding tip)		1-3/16" ± 3/32"* ←
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base▲		Miniature Button 7-Pin
Pin 1 - Grid		Pin 5 - Plate
Pin 2 - Cathode		Pin 6 - Screen
Pin 3 - Heater		Pin 7 - Cathode, Grid No. 3, Internal Shield
Pin 4 - Heater		
RCA Socket		Stock No. 9914 ←
Mounting Position	BOTTOM VIEW	Any

Maximum and Minimum Ratings Are Design-Center Values

AMPLIFIER

Plate Voltage	250 max.	volts
Screen Voltage	100 max.	volts
Grid Voltage	-3 min.	volts
Plate Dissipation	0.5	watt ←
Screen Dissipation	0.1	watt ←

Typical Operation and Characteristics - Class A₁ Amplifier:

Plate Voltage	90	250	volts
Screen Voltage	90	100	volts
Grid Voltage	-3	-3	volts
Plate Resistance	1.0	•	approx. megohm
Transconductance	1100	1400	μmhos
Plate Current	1.2	2.0	ma.
Screen Current	0.5	0.7	ma.

Typical Operation as Mixer in Superheterodyne Circuit:

Plate Voltage	100	250	volts
Screen Voltage	100	100	volts
Grid Voltage #	-5	-5	approx. volts
Conversion Transconductance	-	550	approx. μmhos

Shielding and *r-f by-passing* of each r-f amplifier stage may be required in order to prevent interstage coupling and to provide the shortest possible circuit returns when the tube is operated at the ultra-high frequencies. R-f by-passing can be accomplished by the use of small condensers having short leads placed close to the tube terminals. It may also be advisable in some applications to supplement the action of the by-pass condensers by r-f chokes close to the condensers in the return or supply leads for the grid, screen,

■, ▲, •, #: See next page.*Temporary minimum length = 1-1/16".

← Indicates a change.

9001

DETECTOR AMPLIFIER PENTODE

(continued from preceding page)

plate and heater. The 9001 has two cathode leads in order that the plate and screen r-f circuits may be completed with a minimum of circuit inductance in common with the grid circuit. The grid return may be connected to one cathode terminal and the plate and screen returns may be connected to the other cathode terminal.

■ The cathode of the 9001, when operated from a transformer, should preferably be connected to the heater circuit. In the case of d-c operation of the heater from a storage battery, the cathode circuit is tied in either directly or through bias resistors to the negative battery terminal. In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

• Greater than 1.0 megohm.

The grid bias is minimum for an oscillator peak voltage of 4 volts. These values are optimum.

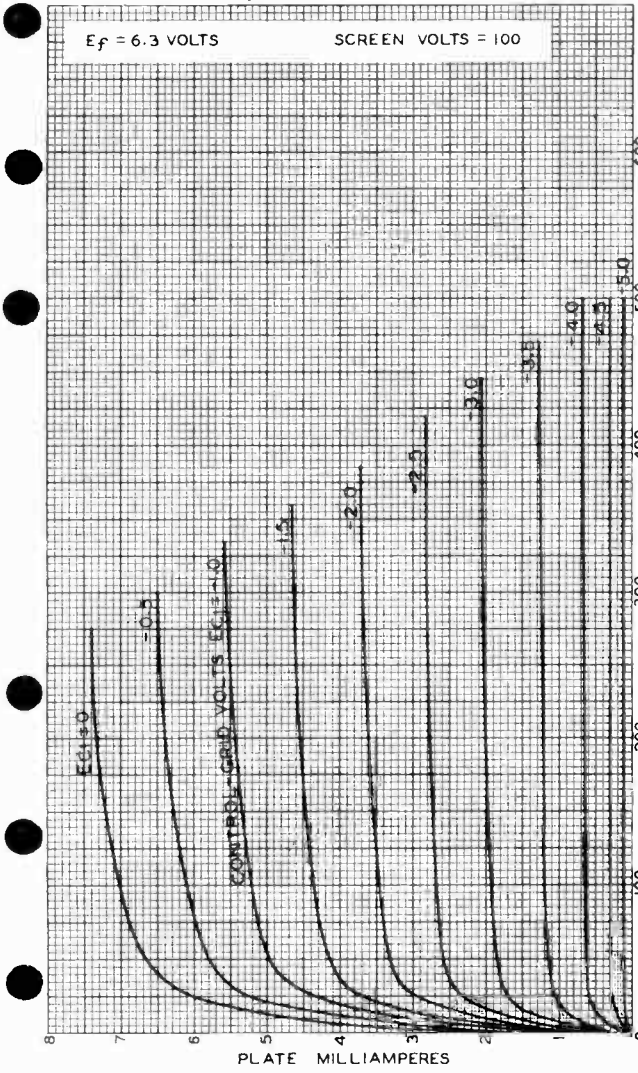
▲ *The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.*

worldradiohistory

9001

AVERAGE PLATE CHARACTERISTICS

PENTODE CONNECTION



MAY 22, 1941

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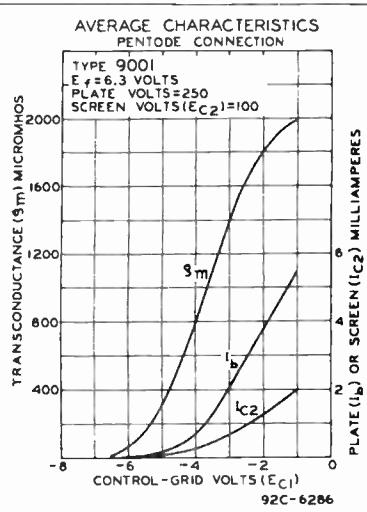
RCA MANUFACTURING COMPANY, INC.

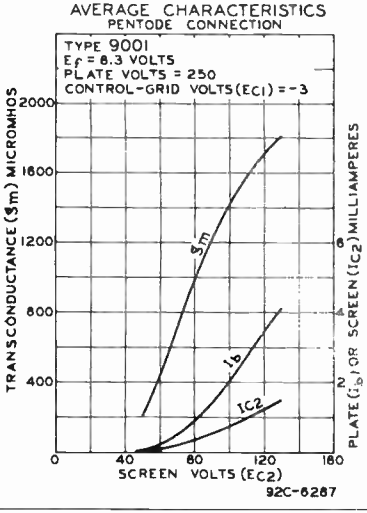
92C-6291

World Radio History

9001

DETECTOR AMPLIFIER PENTODE





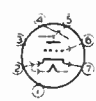
World Radio History

9002

DETECTOR, AMPLIFIER, OSCILLATOR

VIDGET TYPE

Heater ■	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances:		
Grid to Plate	1.4	μμf
Grid to Cathode	1.2	μμf
Plate to Cathode	1.1	μμf
Maximum Overall Length		1-13/16"
Maximum Seated Height		1-9/16"
Length from Base Seat to Bulb Top (excluding tip)		1-3/16" ± 3/32"* ◄
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base ▲		Miniature Button 7-Pin
Pin 1 - Plate		Pin 5 - Plate
Pin 2 - Cathode		Pin 6 - Grid
Pin 3 - Heater		Pin 7 - Cathode
Pin 4 - Heater		
RCA Socket		Stock No. 9914 ◄
Mounting Position	BOTTOM VIEW	Any



Maximum Ratings Are Design-Center Values

AMPLIFIER

Plate Voltage	250 max. volts
Plate Dissipation	1.5 max. watts

Typical Operation and Characteristics - Class A_1 Amplifier:

Plate	90	135	180	250	volts
Grid	-2.5	-3.75	-5	-7	volts
Amp. Fact.	25	25	25	25	
Plate Res.	14700	13200	12500	11400	ohms
Transcond.	1700	1900	2000	2200	μmhos
Plate Cur.	2.5	3.5	4.5	6.3	ma.

■ The cathode of the 9002, when operated from a transformer, should preferably be connected to the heater circuit. In the case of d-c operation of the heater from a storage battery, the cathode circuit is tied in either directly or through bias resistors to the negative battery terminal. In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

▲ *The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.*

*Temporary minimum length = 1-1/16".

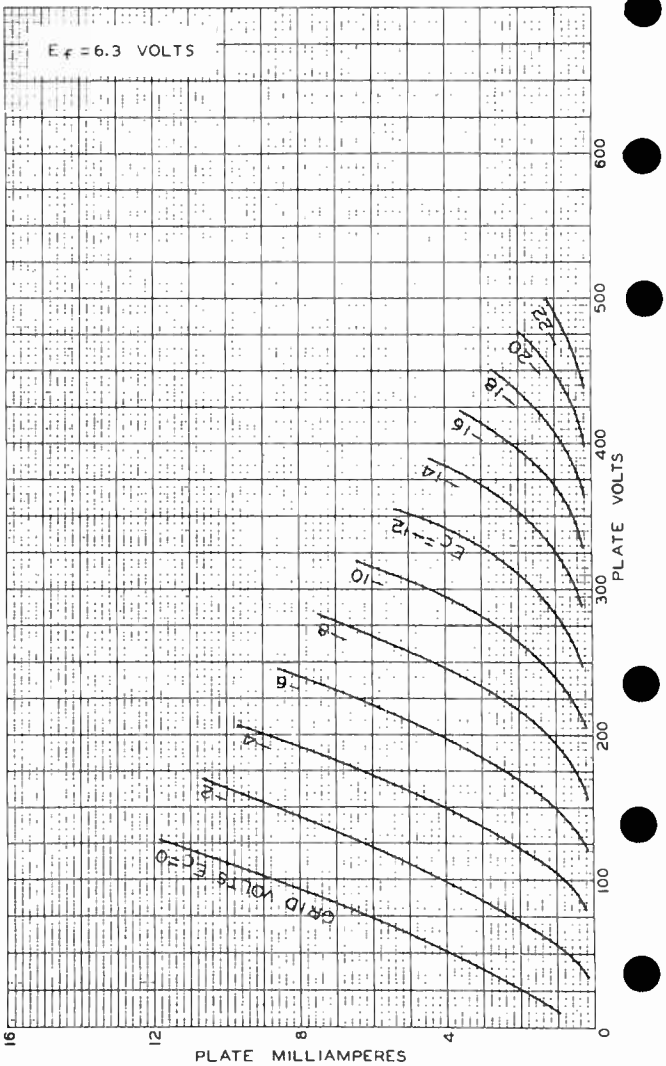
◄ Indicates a change.

World Radio History

9002

9002

AVERAGE PLATE CHARACTERISTICS



SEPT. 17, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6284

9003

SUPER-CONTROL R-F AMPLIFIER PENTODE

MIDGET TYPE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances:		
Grid to Plate	0.01 max.	μμf
Input	3.4	μμf
Output	3.0	μμf
Maximum Overall Length		1-13/16"
Maximum Seated Height		1-9/16"
Length from Base Seat to Bulb Top (excluding tip)		1-3/16" ± 3/32"* ←
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base▲		Miniature Button 7-Pin
Pin 1 - Grid		Pin 5 - Plate
Pin 2 - Cathode		Pin 6 - Screen
Pin 3 - Heater		Pin 7 - Cathode, Grid No. 3, Internal Shield
Pin 4 - Heater		
RCA Socket		Stock No. 9914 ←
Mounting Position	BOTTOM VIEW	Any

Maximum and Minimum Ratings Are Design-Center Values

	AMPL'FIER	
Plate Voltage	250 max.	volts
Screen Voltage	100 max.	volts
Grid Voltage	-3 min.	volts
Plate Dissipation	1.7 max.	watts ←
Screen Dissipation	0.3 max.	watt ←
Typical Operation and Characteristics - Class A_1 Amplifier:		
Plate Voltage	250	volts
Screen Voltage	100	volts
Grid Voltage	-3	volts
Plate Resistance	0.7 approx.	megohm
Transconductance	1800	μmhos
Grid Bias for Transcond. of 15 μmhos	-35	volts
Grid Bias for Transcond. of 2 μmhos	-45	volts
Plate Current	6.7	ma.
Screen Current	2.7	ma.

Typical Operation as Mixer in Superheterodyne Circuit:			
Plate Voltage	100	250	volts
Screen Voltage	100	100	volts
Grid Voltage #	-10	-10 approx.	volts
Conversion Transconductance	-	600 approx.	μmhos

The grid bias is minimum for an oscillator peak voltage of 9 volts. These values are optimum.

▲ *The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.*

Shielding Considerations & Heater-Cathode Connections for the 9003 are the same as for Type 9001.

← Indicates a change.

*Temporary minimum length = 1-1/16".

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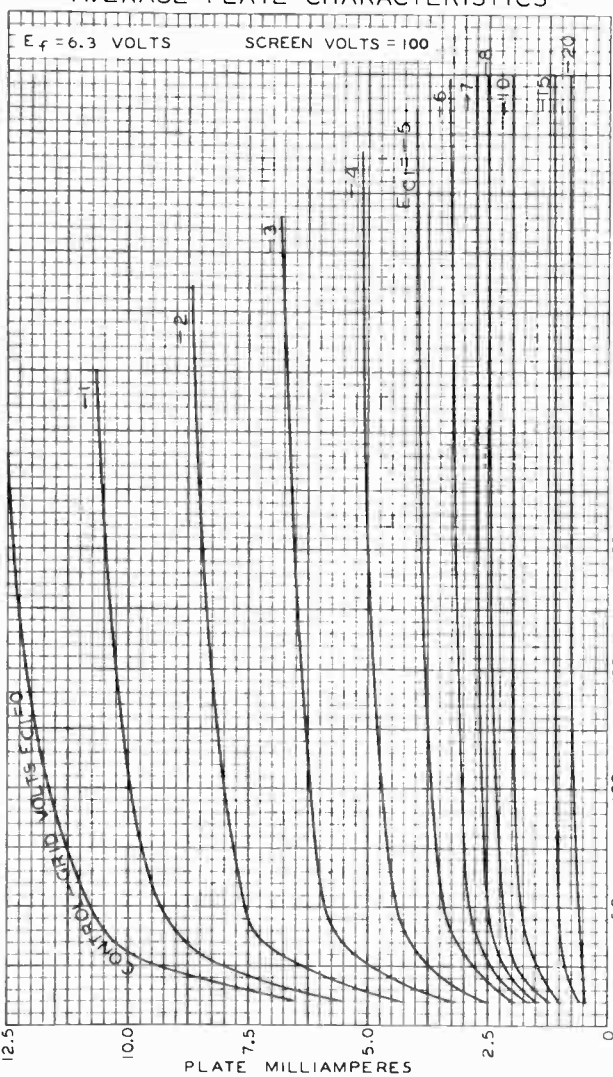
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

9003

9003

AVERAGE PLATE CHARACTERISTICS



SEPT. 17, 1943

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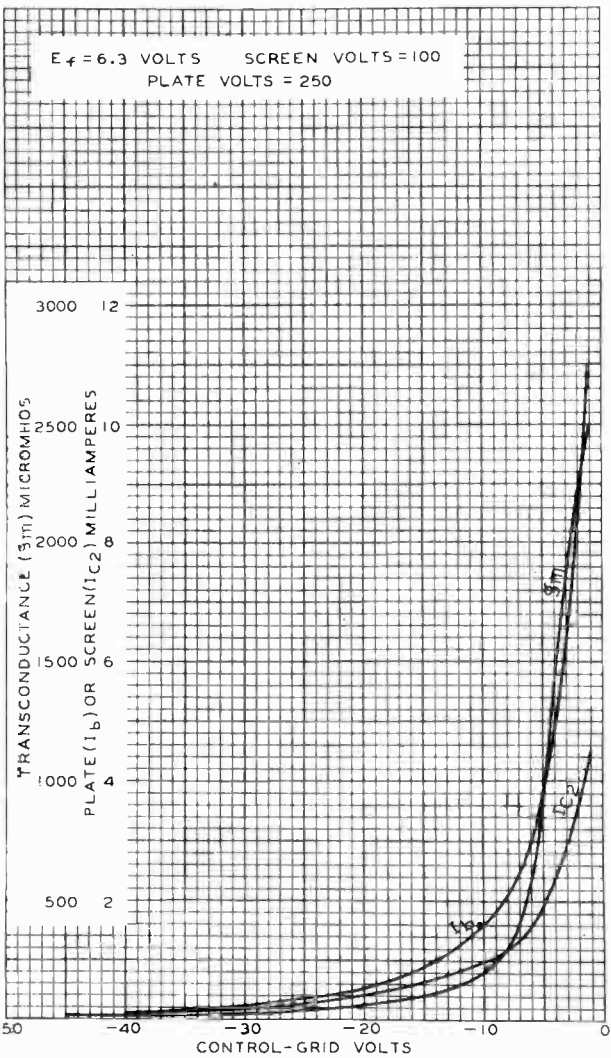
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6288

World Radio History

9003

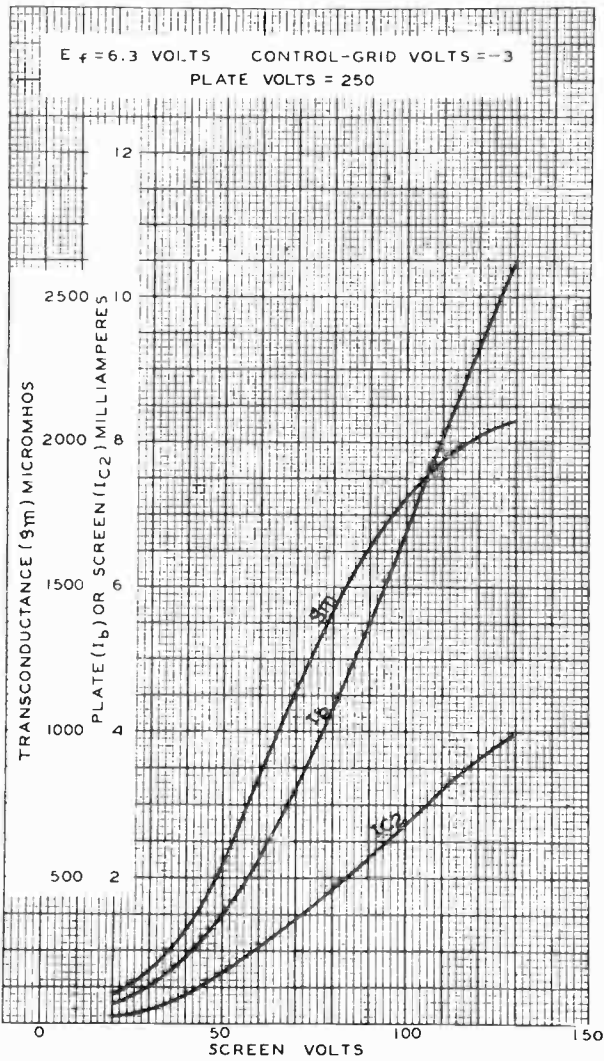
AVERAGE CHARACTERISTICS



9003

9003

AVERAGE CHARACTERISTICS



9004

U-H-F DIODE

ACORN TYPE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances:°		
Plate to Cathode	1.3	μμf
Plate to Heater	0.3 approx.	μμf
Heater to Cathode	2.2 approx.	μμf
Overall Length		1-7/32" ± 5/32"
Overall Diameter		1-3/32" ± 1/16"
Bulb		T-4½
RCA Socket		Stock No. 9925
Mounting Position		Any

Maximum Ratings Are Design-Center Values

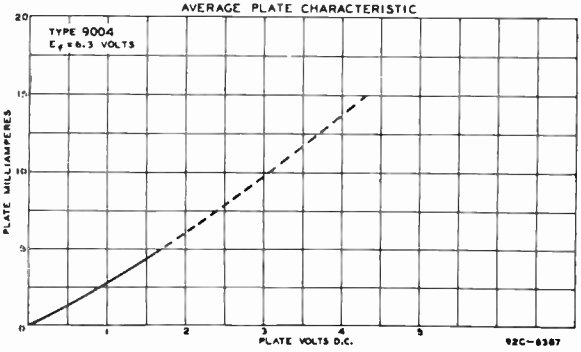
RECTIFIER

A-C Plate Voltage (RMS)	117 max. volts
D-C Output Current	5 max. ma.

The resonant frequency of the 9004 is approximately 850 Mc.

°With no external shield.

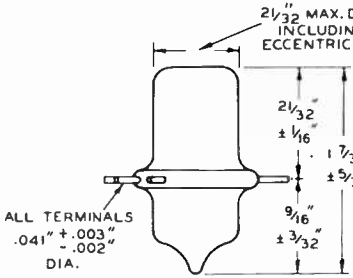
AVERAGE PLATE CHARACTERISTIC

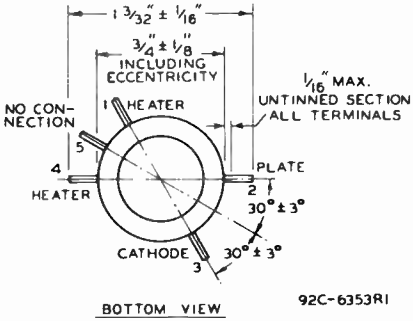


World Radio History

9004

U-H-F DIODE





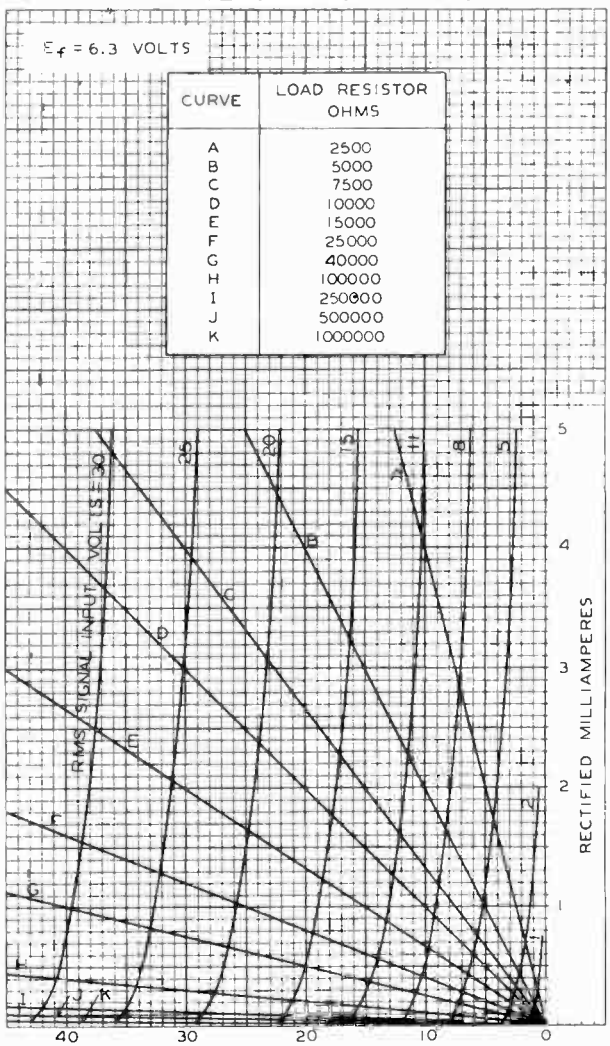
BOTTOM VIEW

92C-6353R1

→ Indicates a change.

9004

AVERAGE CHARACTERISTICS



MARCH 18, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

9005

U-H-F DIODE

ACORN TYPE

Heater	Coated Unipotential Cathode	
Voltage	3.6	a-c or d-c volts
Current	0.165	amp.
Direct Interelectrode Capacitances:°		
Plate to Cathode	0.8	μμf
Plate to Heater	0.2 approx.	μμf
Heater to Cathode	1.1 approx.	μμf
Overall Length		1-7/32" ±5/32"
Overall Diameter		1-3/32" ±1/16"
Bulb		T-4½
RCA Socket		Stock No.9925
Mounting Position		Any

Maximum Ratings are Design-Center Values

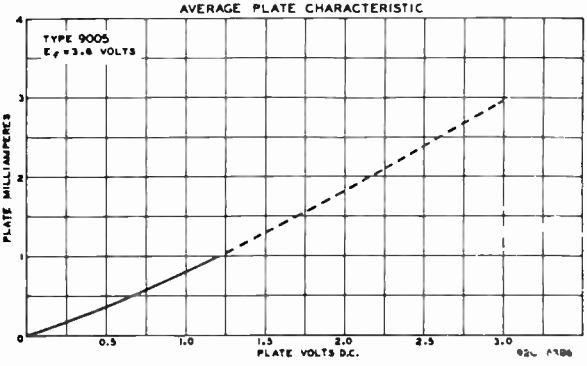
RECTIFIER

A-C Plate Voltage (RMS)	117 max. volts
D-C Output Current	1.0 max. ma.

The resonant frequency of the 9005 is approximately 1500 Mc.

°With no external shield.

AVERAGE PLATE CHARACTERISTIC



Dec. 1, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

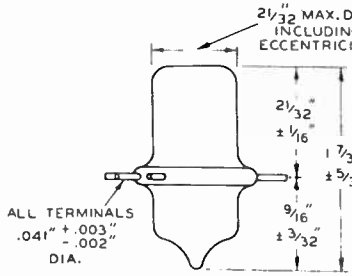
TENTATIVE DATA

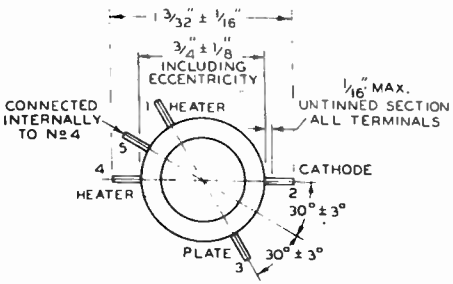
World Radio History

9005

9005

U-H-F DIODE





BOTTOM VIEW

92C-6366R1

→ Indicates a change.

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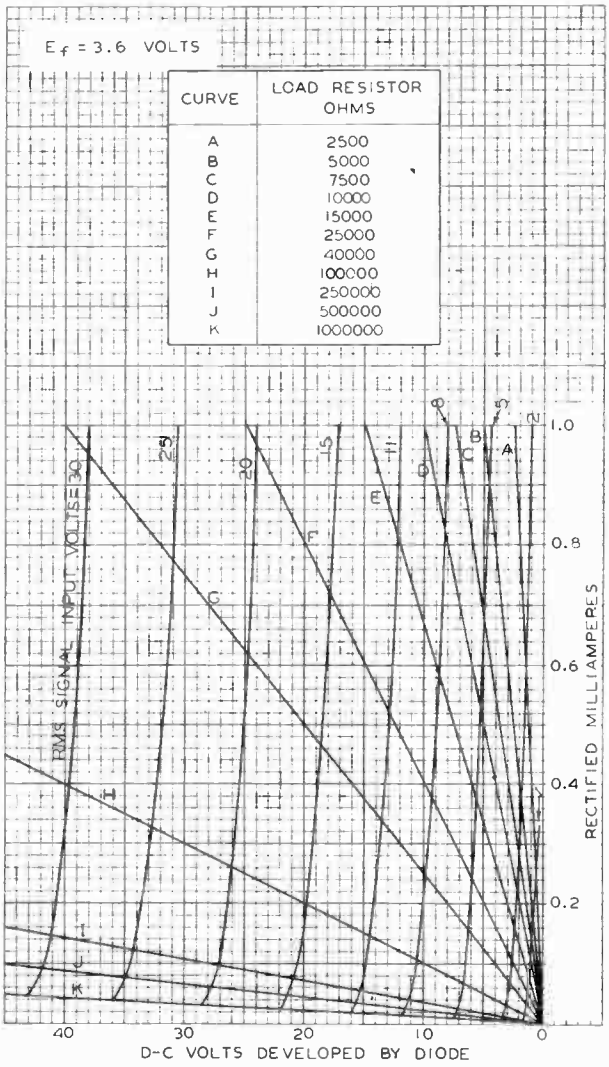
RCA MANUFACTURING COMPANY INC

World Radio History

RCA

9005

AVERAGE CHARACTERISTICS



MARCH 20, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C—6384

World Radio History

World Radio History

9006

U-H-F DIODE

MIDGET TYPE

Heater	Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.15	amp.
Direct Interelectrode Capacitances:♦		
Plate to Cathode	1.4	μμf
Plate to Heater	0.2	μμf
Cathode to Heater	2.2	μμf
Maximum Overall Length		1-13/16"
Maximum Seated Height		1-9/16"
Length from Base Seat to Bulb Top (excluding tip)		1-3/16 ± 3/32"*
Maximum Diameter		3/4"
Bulb		T-5-1/2
Base▲		Miniature button 7-Pin
Pin 1 - Plate		Pin 5 - Plate
Pin 2 - Cathode		Pin 6 - No Connection
Pin 3 - Heater		Pin 7 - Cathode
Pin 4 - Heater		
RCA Socket		Stock No. 9914
Mounting Position	BOTTOM VIEW (6BH)	Any

Maximum Ratings Are Design-Center Values

RECTIFIER

Peak Inverse Plate Voltage	750 max.	volts
Peak Plate Current	15 max.	ma.
D-C Output Current	5 max.	ma.
D-C Heater-Cathode Potential	100 max.	volts
Typical Operation as Rectifier:		
A-C Plate Supply Voltage (RMS)	270	volts
Min. Total Effective Plate-Supply Impedance	100	ohms
D-C Output Current	5	ma.

♦ With no external shield.

The resonant frequency of the 9006 is 700 megacycles(approx).

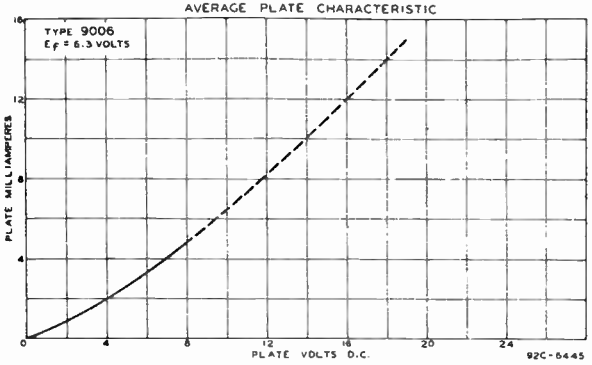
▲ *The center hole in sockets designed for this base provides for the possibility that this tube type may be manufactured with the exhaust-tube tip at the base end. For this reason, it is recommended that in equipment employing this tube type, no material be permitted to obstruct the socket hole.*

*Temporary minimum length = 1-1/16".

World Radio History

9006

U-H-F DIODE



World Radio History

Integral-Cavity, 1030-Mc/s TRF Amplifier & Preselector

3-SECTION FILTER, LOW LOSS
3-STAGE INTEGRAL CAVITY TRF AMPLIFIER[a]
(Interchangeable in field without realignment)

For Use in Class 2 (MIL-E-5400G) Airborne Transponder Equipment and Other Fixed-Cavity Applications

MECHANICAL

Operating Position	Any
Weight (Approx.)	7 oz
Length (Without connectors)	
Filter	8.70 ± 0.05 in
Amplifier	7.70 ± 0.10 in
Diameter	See accompanying *Dimensional Outline*
Connectors	Subminiature Screw-on Types, See *Operating Considerations*
Tuning-Screw Locknut	Hexagonal, 1/4 in

ABSOLUTE-MAXIMUM RATINGS

Values For Each Stage

For Operation at Any Altitude

Heater Voltage (AC or DC)	E_f	6.3 + 5%	V
Heater-Cathode Voltage (Peak)	e_{hkm}	+150	V
Cathode Supply Voltage	E_{kkp}	-150	V
Cathode Voltage	E_{kp}	-110	V
Cathode Current	I_k	20	mA
Grid Voltage			
Positive value	E_{gk}	0	V
Negative value	E_{gk}	-100	V
RF Input Voltage (Peak)		10	V
At 1G3 Mc/ with average power = zero			
Plate Dissipation	P_b	2	W
Shell Temperature		115	°C

MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance	R_g	0.1	MΩ
common to all three stages			

INITIAL CHARACTERISTICS LIMITS AT 1030 Mc/s[b]

Gain at 25° C	45 ± 2	dB
Noise Figure (Including filter)	14 max	dB
Bandpass Characteristics[c]		
Bandwidth:		
At -3 dB points	7.5 min	Mc/s
At -40 dB points	25 max	Mc/s
Attenuation:		
At 1060 Mc/s	60 min	dB
At 1090 Mc/s	60 min	dB

World Radio History

Stability (Over Temperature Range -54 to 95° C)			
Center frequency shift (Average of -6 dB pts.)		±1 max	Mc/s
Gain variation (from value at 25° C)		±2 max	dB
RF Input VSWR		1.5 max	

SPECIAL TESTS

Receiver Protection — RF Input Voltage (Peak). 1030-Mc/s Input Pulse having an average power of -20 dBm, for a period of 2½ minutes		10 max	V
Thermal Shock		-62 to 115	°C
For MIL-E-5400G (ASG) — Class 2			
Long Duration Shock (11 ms)		15	g
Sweep Frequency Vibration		10	g
Ref. Curve IV MIL-T-5422B (ASG)			

TYPICAL OPERATION AS A 1030-Mc/s TRF AMPLIFIER

For the following typical operation, see Conditions

Total Cathode Current	Ik	34	mA
Grid-to-Cathode Voltage (Approx.)	Egk(co)	-5	V
For cathode current = 10 μA per stage			
Gain at 25° C	Ao	45.5	dB
Noise Figure (Including filter)	NF	11.5	dB
Bandwidth Characteristics			
Bandwidth:			
At -6 dB level		8	Mc/s
At -40 dB level		22.3	Mc/s
Attenuation:			
At 100 Mc/s		70	dB
At 105 Mc/s		77	dB

Conditions

Heater Voltage	Ef	6.3	V
Heater Current (Total)	If	405	mA
Heater Dissipation (Total)	Pf	2.55	W
Cathode Supply Voltage (Per stage)	Ekkp	-100	V
Cathode Resistor			
First stage (Input)	R1k	3.9	Ω
Second stage	R2k	22	Ω
Third stage (Output)	R3k	47	Ω
Grid-Circuit Resistance	Rg	1500	Ω
Common to all three stages			
Plate Voltage . . . . . Plate connected to system ground			

[a] A mechanically-modified Type 8058 nuvistor tube is utilized in each amplifier stage. The plate and one end of the heater of each tube are connected to a common de-ground terminal (tab) on the metal shell of the amplifier; the cathode and other end of the heater are brought out to separate terminals through 470-pF feed-thru capacitors; the grid has a separate terminal and is bypassed with a 1000-pF capacitor. Each amplifier or amplifier-filter combination has an input impedance of 50 ohms, and is designed for use with a load having an impedance of 50 ohms.

[b] Data apply for an average temperature rise of 20° C above the specified equipment temperatures as shown in MIL-E-5400G (ASG) — Class 2, with conditions the same as those shown under *Typical Operation*.

[c] The bandpass characteristic of the FD-2200 is essentially gaussian. These data apply for an equipment ambient temperature range of -54° to +95° C.

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

World Radio History

OPERATING CONSIDERATIONS

Connectors: The preselector and amplifier sections may be connected to each other using RG-188/U cable with UG-1465/U (Sealectro 50-007-0000 or equivalent) connectors. The overall length of the cable and connectors must be 4.9 ± 0.1 inch to avoid altering the bandpass characteristics of the FD-2200. Where rigid-type interconnections are preferred, the Sealectro 50-073-0000 or 50-073-0029 connectors, or equivalents, may be used.

The rf input-and-output terminals of the FD-2200 fit the UG-1465/U (Sealectro 50-007-0000, or equivalent) connectors.

DC Connections: Connections to the cathode, and one end of the heater of each 8058 nuvistor are made through separate integral 470-pF-feed-through capacitors. The plate and the other end of the heater of each nuvistor are internally connected to a common dc-ground terminal on the shell of the amplifier unit. Connection to the grid is made through a separate internally bypassed terminal. The input capacitance of the grid circuit is approximately 1000-pF per stage.

Mounting: The FD-2200 is designed to be conduction cooled and should be clamped to the mounting surface of the equipment. The recommended locations for the clamps are shown as shaded areas in the dimensional outlines.

Provision must be made to allow for the differential expansion of the FD-2200 and the equipment chassis. For example: With an aluminum chassis, the differential expansion between room temperature (25° C) and the cold-shock temperature (-62° C) over the 7.7 inch length of the amplifier, is 0.015 inch.

Simple mounting arrangements, which also facilitate conduction cooling, can be designed by casting the transponder case with contoured brackets to seat the FD-2200 in the desired position. The FD-2200 may be held in the brackets with a leaf spring or strap. When fixed (rigid) clamps are used, the end clamps should be designed with either a silicon rubber insert, a fingered spring, or similar spacer to permit axial differential expansion without undue stress on the filter and amplifier.

When a rigid filter-to-amplifier connection is used, provision must be made to accommodate a 0.010 inch center-to-center variation between different units of the FD-2200. In addition, differences between center-to-center spacing of the rigid connectors should be considered. The center-to-center spacing with the Sealectro connector 50-073-0000 is approximately 1.26 inches; with the Sealectro connector 50-073-0029, approximately 1.19 inches.

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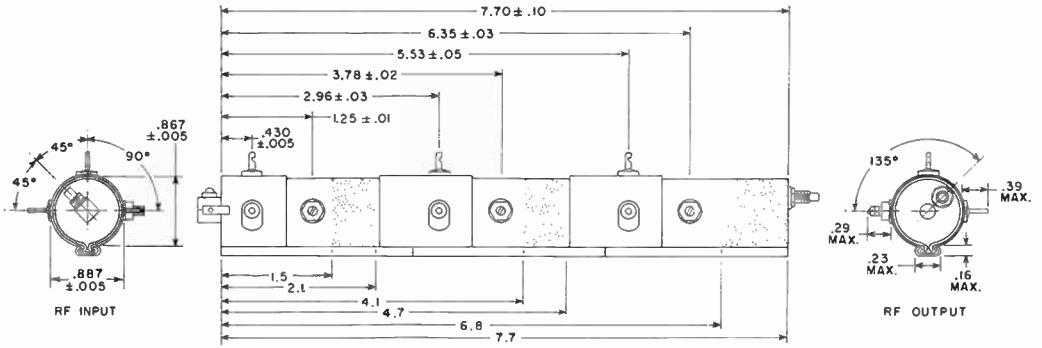
DIMENSIONAL OUTLINE

Amplifier FD-2200



RECOMMENDED CLAMPING AREA
(Shaded Area)

92CM-13096RI

DIMENSIONS IN INCHES

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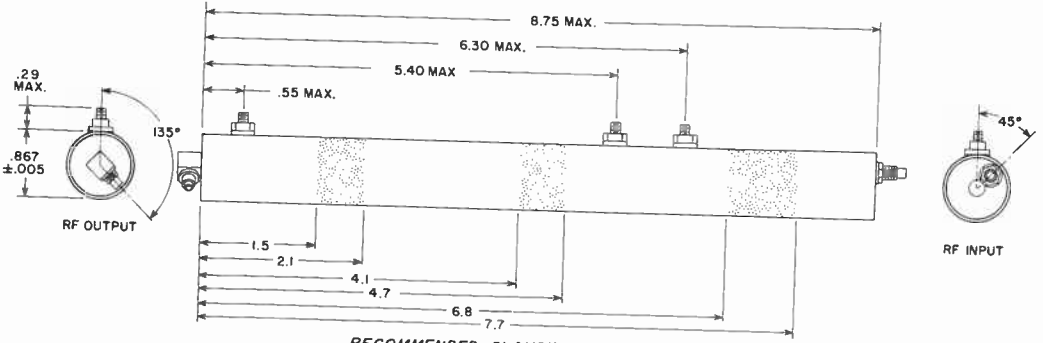
DIMENSIONAL OUTLINE (Cont'd.)

Preselector (Filter) FD-2200



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DIMENSIONS IN INCHES

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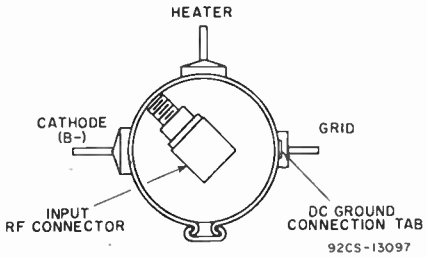
DIMENSIONAL OUTLINE (Cont'd.)

DC Input Connection to FD-2200



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