RCA TUBE
HANDBOOK
HB-3

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.

Receiving-Type
Industrial Tubes

RCA Industrial Receiving-Type Tube Application Guide

1 *AF Amplifier*

CLASS - A_1

Twin Diode—Med.-Mu Triodes

12SW7 26C6

High-Mu Triode - 5719

Power Triodes

955 5718 9002

Medium-Mu Twin Triodes

▲5670 5692 ▲6189
5687 6072

High-Mu Twin Triodes

6112 6681/12AX7A

Twin Power Triode - 3A5

Sharp-Cutoff Pentodes

6AH6WA 1620

Power Pentodes

3A4 5672
6AG7Y 6677/6CL6
6AK6 7054
1621 8077/7054

Beam Power Tubes

12A6 ▲6005
1622 6550
5686 6550/V1
5824 6669/6AQ5A
5881 7061
5902

Twin Beam Power Tube

26A7GT

Pentagrid Amplifier - 1612

Beam-Deflection Tube - 7360

RCA Industrial Receiving-Type Tube Application Guide

CLASS - AB_1

Medium-Mu Twin Triode

▲5670

Beam Power Tubes

1614 1619 ▲6005 6669/6AQ5A 7551 7558

Twin Beam Power Tube

26A7GT

CLASS - B

Twin Power Triode - 1635

2 *Automatic Gain Control*

Remote-Cutoff Pentode

▲5749

3 *Balanced Modulator/ Balanced Mixer*

Beam-Deflection Tube

7360

4 *Cathode-Coupled, Direct-Drive (RF)*

Medium-Mu Twin Triodes

6DJ8/ECC88
6922/E88CC

5 *Cathode Drive (RF) (Grounded Grid)*

High-Mu Triodes

6J4 ■8058 ▲8532

6 *Cathode Follower*

Medium-Mu Triodes

6814 ■8056

Medium-Mu Twin Triodes

▲5670 5687 5965 6350 6922/E88CC 7044 7308

7 *Clipper*

Twin Diodes

▲5726 705

8 *Converter*

Pentagrid Converters

12SY7 26D6 5750

9 *DC Amplifier*

Sharp-Cutoff Pentode - 5693

Medium-Mu Twin Triode - 5692

High-Mu Twin Triode - 5691

10 *Delay Circuit*

Sharp-Cutoff Pentodes

6AS6 5636 ▲5725

11 *Demodulator*

Beam-Deflection Tube - 7360

12 *Detector Audio*

Twin Diode — Med.-Mu Triodes

12SW7 26C6

VHF

Twin Diodes

▲5726 5896 6663/6AL5 6887 7055

UHF

Diodes

9005 9006

13 Driver

Beam Power Tubes

5763, 6417, 7551, 7558, 7905

14 Frequency Converter

High-Mu Triode - 6664/6AB4

High-Mu Twin Triode

6679/12AT7

Beam-Deflection Tube - 7360

15 Frequency Divider

Medium-Mu Twin Triodes

▲5670, 5687, 5963, 5964, 6211, 6350, 7044

Power Pentode - 6197

16 Frequency Multiplier

FREQUENCY DOUBLER

High-Mu Triode

■8808

Power Triode

■8203, ■8627

Twin Tetrode - 6360A

Power Pentodes

7054, 8077/7054

Beam Power Tubes

5763, 6417, 7551, 7558, 7905

FREQUENCY TRIPLER

Beam Power Tubes

5763, 6417, 7905

Twin Power Pentode - 6939

17 Gated Amplifier

Sharp-Cutoff Pentodes

6AS6, 5636, ▲5725

Pentagrid Amplifier - 5915

18 Grid-Controlled Rectifier

Triodes (Thyratron)

6D4, 884

Tetrodes (Thyratron)

2D21, 2050, 2050A, 5696, ▲5727, 6012

19 Indicator, Voltage

Electron-Ray Tubes

1629, 6977

20 IF Amplifier

VHF

Medium-Mu Triodes

■7586, ■8056

Medium-Mu Twin Triodes

5687, 6386, 6922/E88CC, 7308

Sharp-Cutoff Pentodes

▲6AU6WB‡, ▲5654, 6676/6CB6A, 7056

Remote-Cutoff Pentodes

▲5749 6660/6BA6

Sharp-Cutoff Tetrode - ■7587

High-Mu Triode - ■7895

UHF

Sharp-Cutoff Pentodes

5840 ▲6186

Semiremote-Cutoff Pentodes

5899 6206

Remote-Cutoff Pentode - 9003

21 *Inverter*

Medium-Mu Triode - 6814

Medium-Mu Twin Triodes

6350 7044

22 *Limiter*

High-Mu Twin Triode - 7898

23 *Low-Plate-Voltage Nuvistor Type for Hybrid Equipment*

Medium-Mu Triode - ■8056

24 *Mixer*

VHF

Medium-Mu Twin Triodes

407A ▲5814A 6922/E88CC
▲5670 6386

High-Mu Twin Triodes

▲12AT7WA‡ 7898

▲12AT7WB‡

Medium-Mu Triode — Sharp-Cutoff Pentodes

6678/6U8A 7059

Sharp-Cutoff Tetrode - ■7587

Sharp-Cutoff Pentodes

6AS6 ▲5725

Pentagrid Converters

12SY7 26D6 5750

UHF

Diode - 9005

Medium-Mu Twin Triode

▲6J6WA

Sharp-Cutoff Pentodes

5636 9001

Remote-Cutoff Pentode - 9003

25 *Modulator*

Twin Tetrode - 6360A

Beam Power Tubes

7551 7558

Power Pentodes

7054 8077/7054

26 *Multivibrator*

Medium-Mu Twin Triodes

407A ▲6189
▲5670 6350
5687 6680/12AU7A
5692 6922/E88CC
▲5814A 7044

High-Mu Twin Triodes

▲12AT7WA‡ ▲5751

27 *Oscillator, RF*

VHF

Power Triode - ■8203

High-Mu Triode - 6664/6AB4

Medium-Mu Twin Triodes

407A ▲5814A 6680/12AU7A
▲5670 6111

High-Mu Twin Triodes

▲12AT7WA‡ 7898
▲12AT7WB‡

Medium-Mu Triode — Sharp-Cutoff Pentodes

6678/6U8A 7059

Twin Tetrode - 6360A

Beam Power Tubes

3B4WA‡	5763	7558
1614	6417	7905
1619	7551	

Power Pentodes

1613 7054 8077/7054

Medium-Mu Triode — Power Pentode

7060

Pentagrid Converters

12SY7 26D6 5750

UHF

Medium-Mu Triodes

6F4 ■8056 ■8393
■7586

High-Mu Triodes

■7895 ■8058 ■8808

Power Triodes

955 ■8627 9002
5718

Medium-Mu Twin Triodes

▲6J6WA‡ 6021

Sharp-Cutoff Tetrode - ■7587

Twin Power Pentode - 6939

28 *"On-Off" Control*

(Involving Long Periods of Operation Under Cutoff Conditions)

Twin Diode - 6887

Medium-Mu Triode - 6814

Medium-Mu Twin Triodes

5844	5965	6922/E88CC
5963	6211	7044
5964	6350	

Sharp-Cutoff Pentode - 6AS6

Power Pentode - 6197

Pentagrid Amplifier - 5915

29 *Phase Inverter*

Medium-Mu Triode - 6814

Medium-Mu Twin Triodes

▲5670	6350
5687	6680/12AU7A
▲5814A	6922/E88CC
▲6189	7044

High-Mu Twin Triodes

5691 7058
▲5751

30 *Pulse Amplifier*

Medium-Mu Triode - 6814

Medium-Mu Twin Triodes

▲5670 6350 7044
5687

31 *Pulse Modulator*

Twin Diode

▲5726

32 RF Power Amplifier

VHF

Power Triode - ■8203

Twin Power Triode - 3A5

Beam Power Tubes

3B4WA‡	5686	7551
1614	5763	7558
1619	6417	7905

Medium-Mu Triode — Power Pentode

7060

Power Pentodes

3A4	6AN5	7054
6AG7Y	1613	8077/7054

UHF

High-Mu Triode

■8808

Power Triodes

955	■8627	9002
5718		

Twin Power Tetrode - 6360A

Twin Power Pentode - 6939

33 RF Voltage Amplifier

VHF

Medium-Mu Triodes

5842/417A	■8056	■8393
■7586		

High-Mu Triodes

6664/6AB4	■7895	■8628

Medium-Mu Twin Triodes

6DJ8/ECC88	6386
407A	6922/E88CC
6111	7057

High-Mu Twin Triode

6679/12AT7

Sharp-Cutoff Tetrodes

■7587	7717/6CY5

Sharp-Cutoff Pentodes

1L4	5693
6AC7W	5847/404A
6AH6WA	▲6186
▲6AU6WB	6661/6BH6
6SJ7Y	6676/6CB6A
408A	6688A
▲5654	7056
5678	

Remote-Cutoff Pentodes

26A6	6660/6BA6
▲5749	6662/6BJ6

Medium-Mu Triode — Power Pentode

7060

UHF

High-Mu Triodes

6J4	▲8532
■8058	

Sharp-Cutoff Pentodes

959	5840	9001

Semiremote-Cutoff Pentodes

5899	6206

Remote-Cutoff Pentode - 9003

34 Rectifier

POWER

Full-Wave Gas Type - 83

Full-Wave Vacuum Types

5R4GYB	2076/5R4GYB
6X4W	6202

LOW CURRENT

Twin Diodes

▲5726	6663/6AL5
5896	7055

Single Diodes

9005 9006

PULSE

Half-Wave Vacuum Type - 5642

35 *Relay*

Glow-Discharge (Cold-Cathode) Tubes

OA4G 1C21 5823

Triodes (Thyratron)

6D4 884

Tetrodes (Thyratron)

2D21 5663 ▲5727
2050 5696 6012
2050A

36 *Sweep-Circuit Oscillator*

Triode (Thyratron) - 884

37 *Switching*

Twin Diode - 6887

Beam-Deflection Tube - 7360

38 *Transducer*

Mechano-Electronic Transducer

5734

39 *Tubes Operating from Battery Supplies*

NOMINAL-12-VOLT STORAGE BATTERY SYSTEMS

Twin Diode - 7055

Twin Diode — High-Mu Triode

7724/14GT8

Medium-Mu Twin Triode - 7057

High-Mu Twin Triodes

7058 7898

Medium-Mu Triode — Sharp-Cutoff Pentodes

7059 7258

Medium-Mu Triode — Power Pentode

7060

Sharp-Cutoff Pentode - 7056

Power Pentodes

7054 8077/7054

Beam Power Tubes

7061 7551

NOMINAL-6-VOLT STORAGE BATTERY SYSTEMS

Twin Diode - 6663/6AL5

High-Mu Triode - 6664/6AB4

Medium-Mu Twin Triode

6680/12AU7A

High-Mu Twin Triodes

6679/12AT7
6681/12AX7A

Medium-Mu Triode — Sharp-Cutoff Pentode

6678/6U8A

Twin Tetrode - 6360A

Remote-Cutoff Pentodes

6660/6BA6 6662/6BJ6

Sharp-Cutoff Pentodes

6661/6BH6 6676/6CB6A

Power Pentode - 6677/6CL6

Beam Power Tubes

6669/6AQ5A 7905

NOMINAL-24-VOLT STORAGE BATTERY SYSTEMS

Twin Diode - Medium-Mu Triode
26C6

Twin Power Triode - 6082

Remote-Cutoff Pentode - 26A6

Pentagrid Converter - 26D6

Twin Beam Power Tube
26A7GT

FILAMENTARY-CATHODE TYPES OPERATING FROM DRY-CELL BATTERY SUPPLIES

Half-Wave Vacuum Rectifier
5642

Twin Power Triode - 3A5

Sharp-Cutoff Pentode - 1L4

Power Pentode - 3A4

Beam Power Tube - 1619

40 Video Amplifier

Sharp-Cutoff Tetrode - 7587

Sharp-Cutoff Pentode - 5639

Power Pentodes

6AG7Y 6677/6CL6
6AN5

41 Voltage Reference

Glow Discharge (Cold-Cathode) Tubes

5651A ▲5651WA‡ 5783

42 Voltage Regulator

Glow Discharge (Cold-Cathode) Tubes

OA2	OC2	6073
▲OA2WA‡	OC3	6073/OA2
OA3	OC3A	6074
OA3A	OD3	6074/OB2
OB2	OD3A	6626/ OA2WA
▲OB2WA‡	991	

43 Voltage Regulator, Series

Low-Mu Twin Triodes

6AS7G ▲6080WA 6336A
6080 6082

Beam Power Tube - 5902

44 Volume Expander-Compressor

Pentagrid Mixer - 1612

▲ Premium Type. Premium types are subjected to more rigorous tests and controls than other types.

■ Nuvistor Type.

‡ For data on this type, refer to Military Specification. A copy of the applicable Military Specification may be obtained from: Specification Division, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pa. 19120.

Note:

For data on types in this guide which do not appear in the *Index of Types*, refer to RCA publication RIT-104G. A copy of this publication may be obtained from: RCA Commercial Engineering, Harrison, N.J. 07029.

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.

3A4

POWER AMPLIFIER PENTODE

MINIATURE TYPE

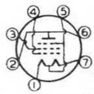
Filament	Coated		
Filament Arrangement	*Series* *	*Parallel***	
Voltage	2.8	1.4	d-c volts
Current	0.1	0.2	amp.

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 2 - Plate
Pin 3 - Screen
Pin 4 - Grid



Pin 5 {Fil. Mid-Tap (- parallel)
Pin 6 - Plate
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 A_1 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.

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

3A4

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.

o 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.*

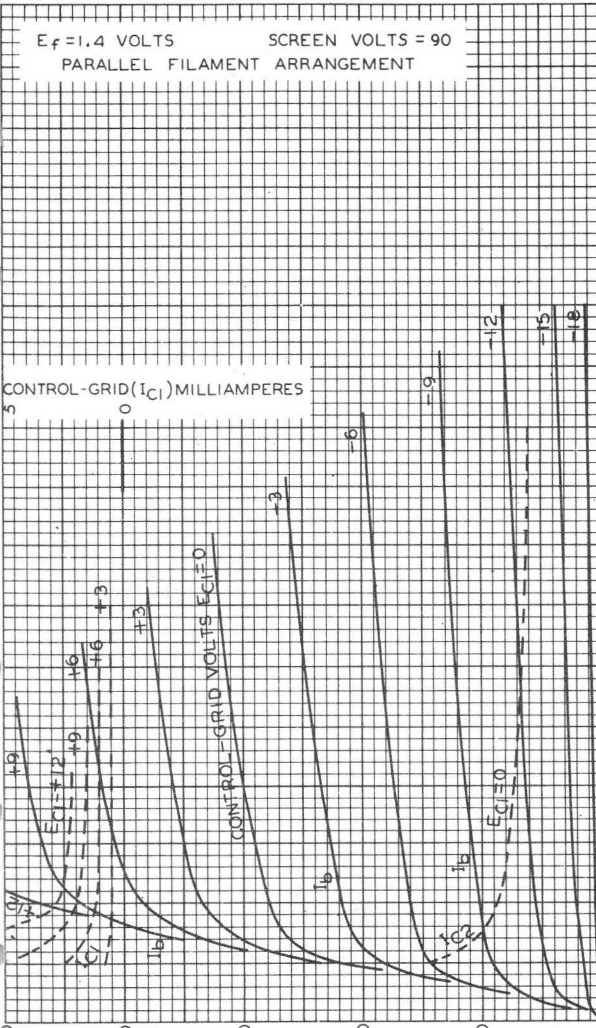
← Indicates a change.

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

RCA

3A4

AVERAGE PLATE CHARACTERISTICS



FEB. 19 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6370

3A5

H-F TWIN TRIODE

MINIATURE TYPE

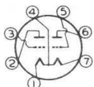
Filament	Coated		
Filament Arrangement	*Series**	*Parallel***	
Voltage	2.8	1.4	d-c volts
Current	0.11	0.22	amp.

Direct Interelectrode Capacitances:°

	Triode Unit T1	*Triode Unit T2*	
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)

RCA Socket		Stock No. 9914
Mounting Position	BOTTOM VIEW (7BC)	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

*, **, o, ●, ▲, :see next page

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

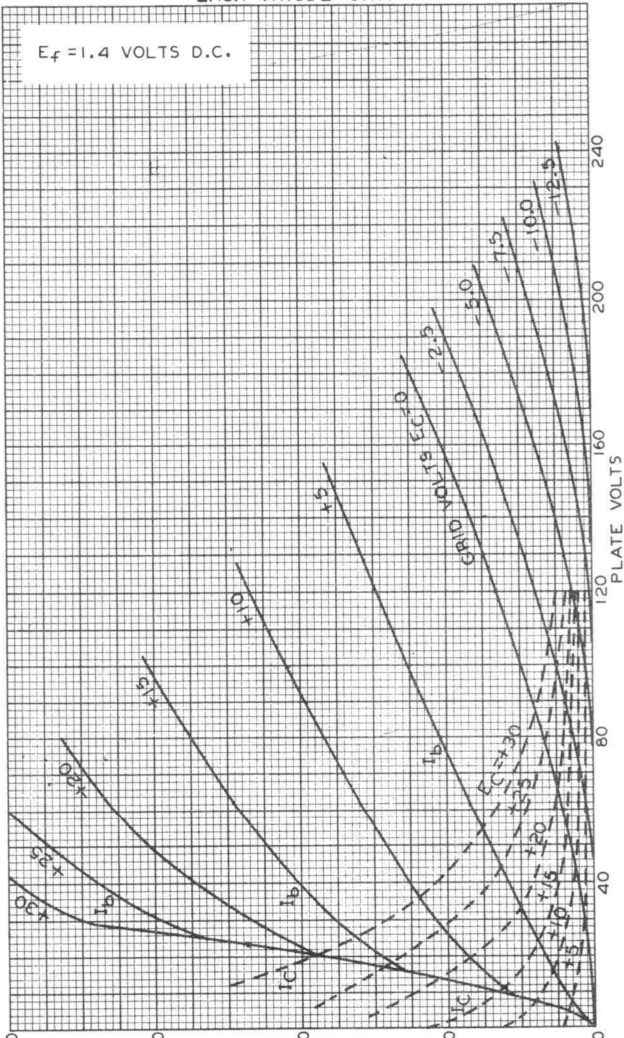
● Obtained by grid resistor (4000), cathode resistor (570), or fixed supply.

▲ *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.*

3A5

3A5

AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



MARCH 14, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6376

Full-Wave Vacuum Rectifier

For Industrial & Military Applications

GENERAL DATA

Electrical:

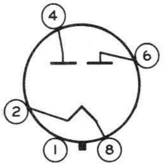
Filament, Coated:[a]

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

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

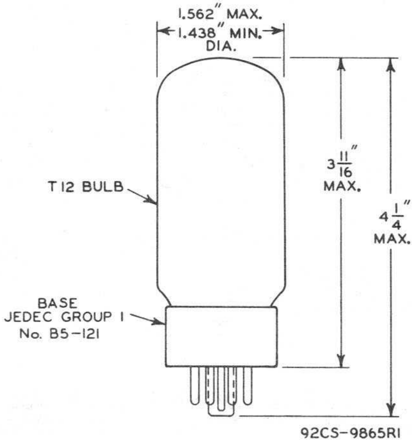
With choke-input filter

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

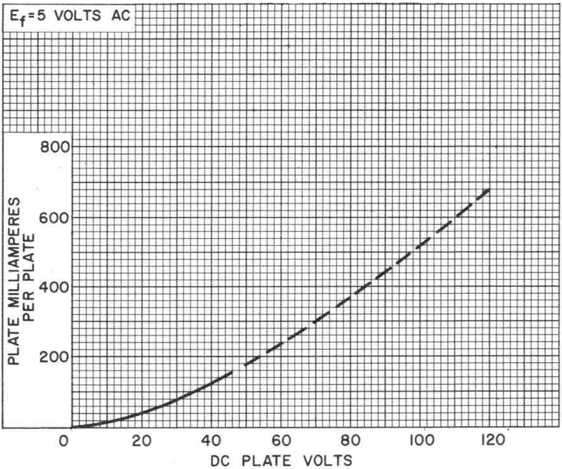
[a] See accompanying chart *Operating Areas for Simultaneous and Delayed Application of Plate Voltage* for conditions necessitating delay in application of plate voltage until filament has reached operating temperature.

[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.


1.562" MAX.
1.438" MIN.
DIA.
T 12 BULB
BASE
JEDEC GROUP 1
No. B5-121
3 11/16" MAX.
4 1/4" MAX.
92CS-9865R1

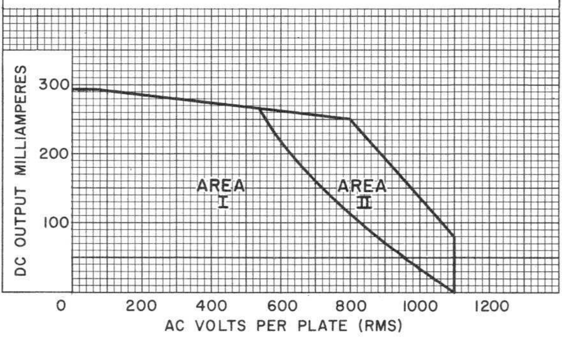
AVERAGE PLATE CHARACTERISTIC



92CS–11183

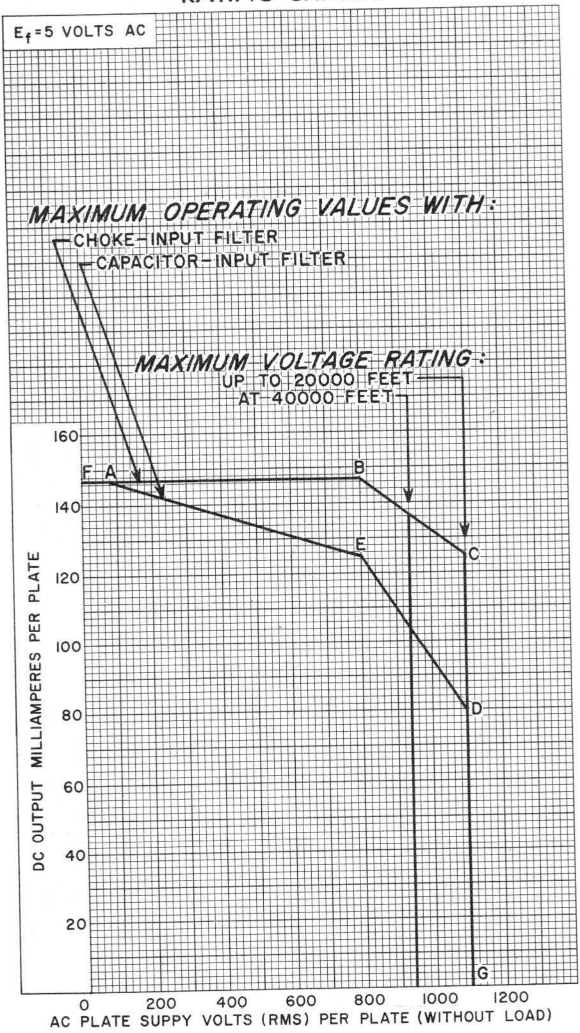
OPERATING AREAS FOR SIMULTANEOUS AND DELAYED APPLICATION OF PLATE VOLTAGE

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

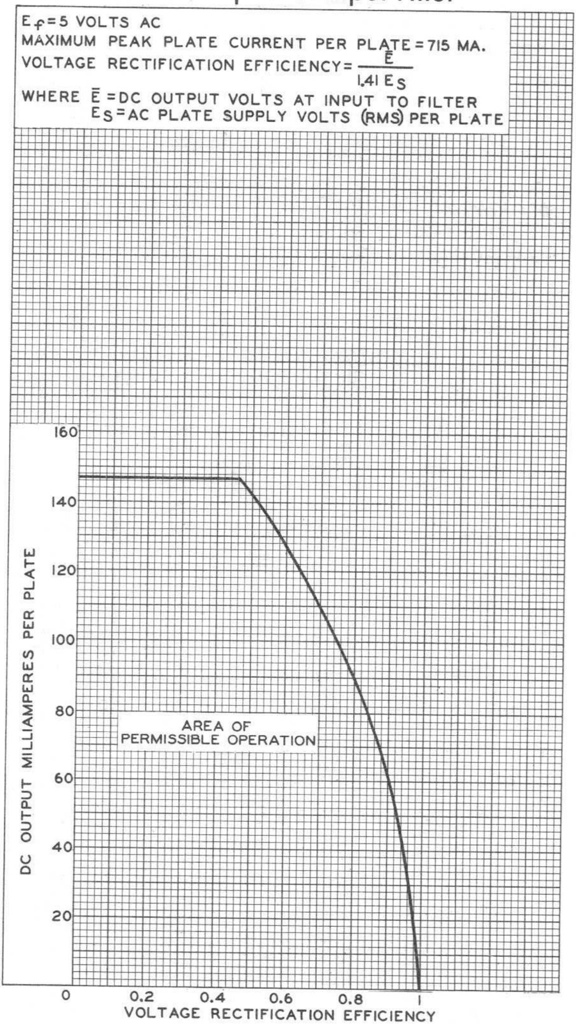
RATING CHART I



92CM-9943RI

5R4GYB

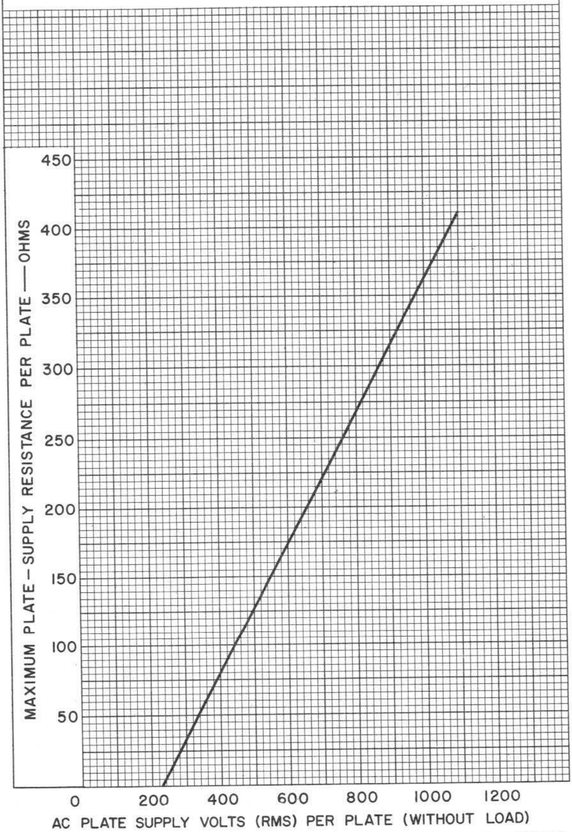
RATING CHART II
With Capacitor-Input Filter



92CM-9953R1

RATING CHART III
With Capacitor-Input Filter

E_f = 5 VOLTS AC
MAXIMUM HOT-SWITCHING AMPERES = 3
PLATE-SUPPLY RESISTANCE PER PLATE = $R_{SEC.} + N^2 R_{PRI.} + R_A$
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



92CM-6416R4

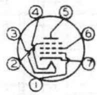
6AK6

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 2 - Grid No. 3
Pin 3 - Heater
Pin 4 - Heater



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

RCA Socket		Stock No. 9914
Mounting Position	BOTTOM VIEW (7BK)	Any

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 A_1 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.*

OCT. 1, 1943 — TENTATIVE DATA

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

6AK6

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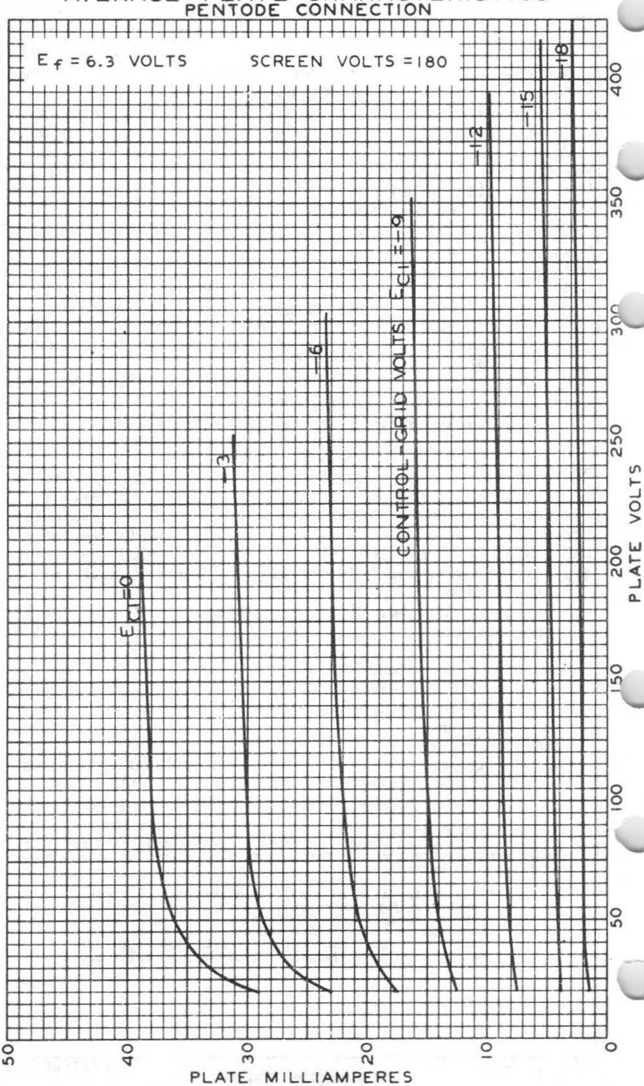
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION



AUG. 11, 1943

RCA VICTOR DIVISION

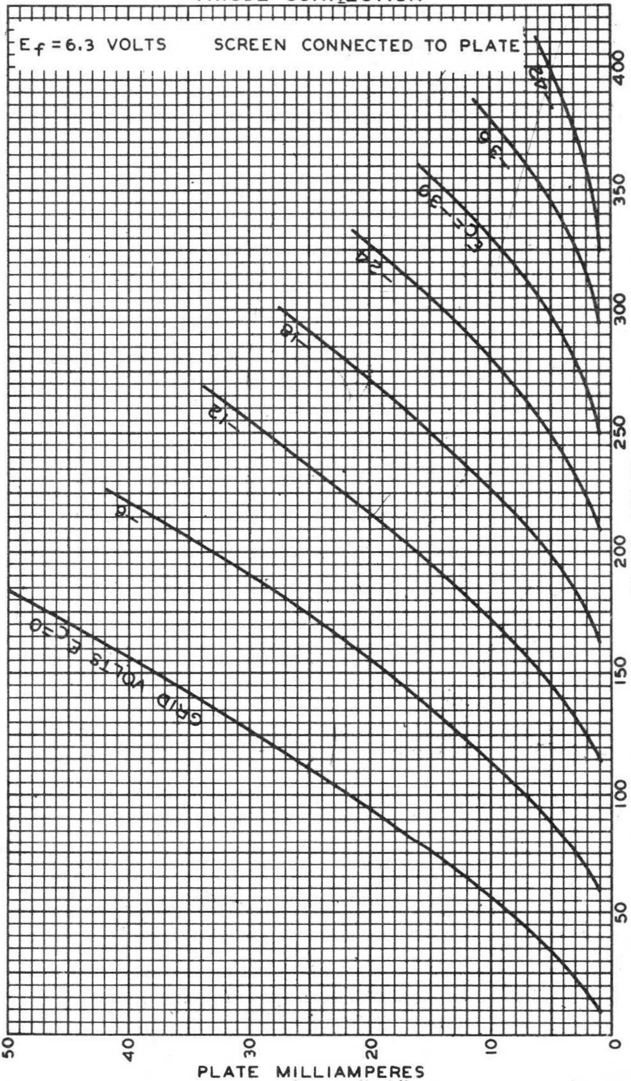
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6450

6AK6

6AK6

AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION



AUG. 11, 1943

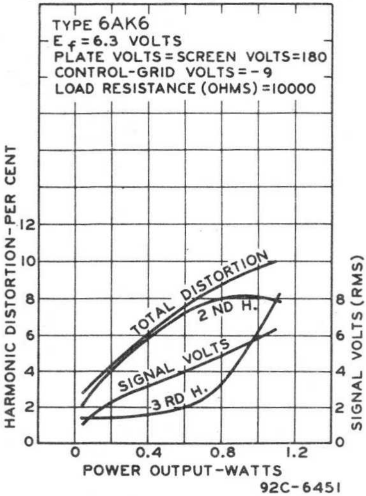
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6449

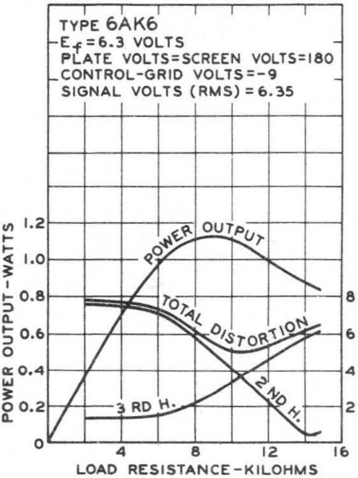
6AK6

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

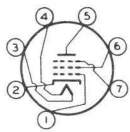
Direct Interelectrode Capacitances:

	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

RCA

6AS6

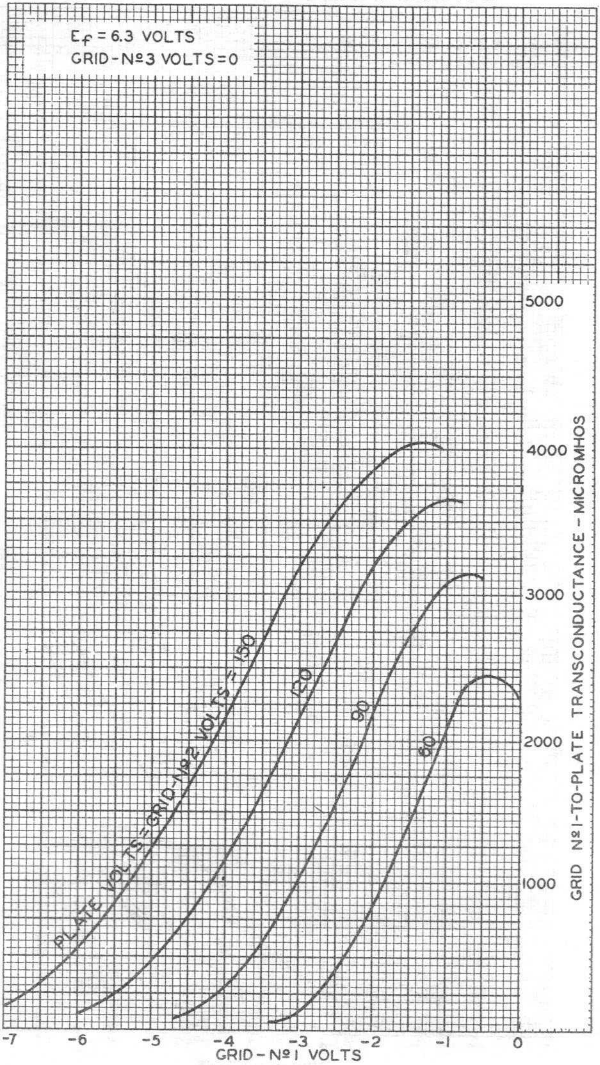
SHARP-CUTOFF PENTODE

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

RCA

6AS6

AVERAGE CHARACTERISTICS



6AS6

RCA

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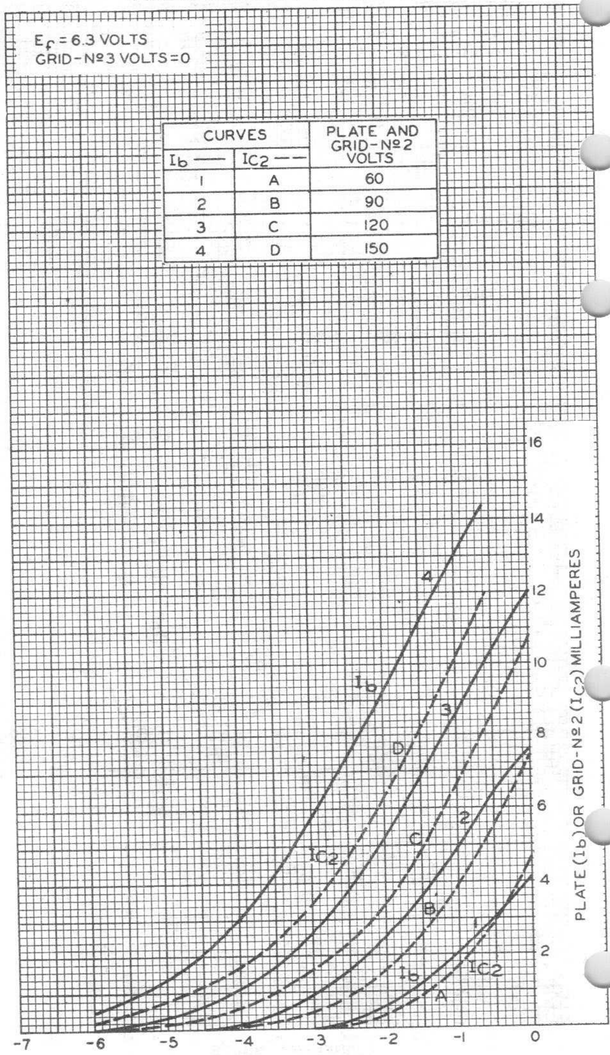
AVERAGE CHARACTERISTICS



CURVES		PLATE AND GRID-№2 VOLTS
I_b ——	I_{C2} - - -	
1	A	60
2	B	90
3	C	120
4	D	150

NOV. 7, 1949

TUBE DEPARTMENT

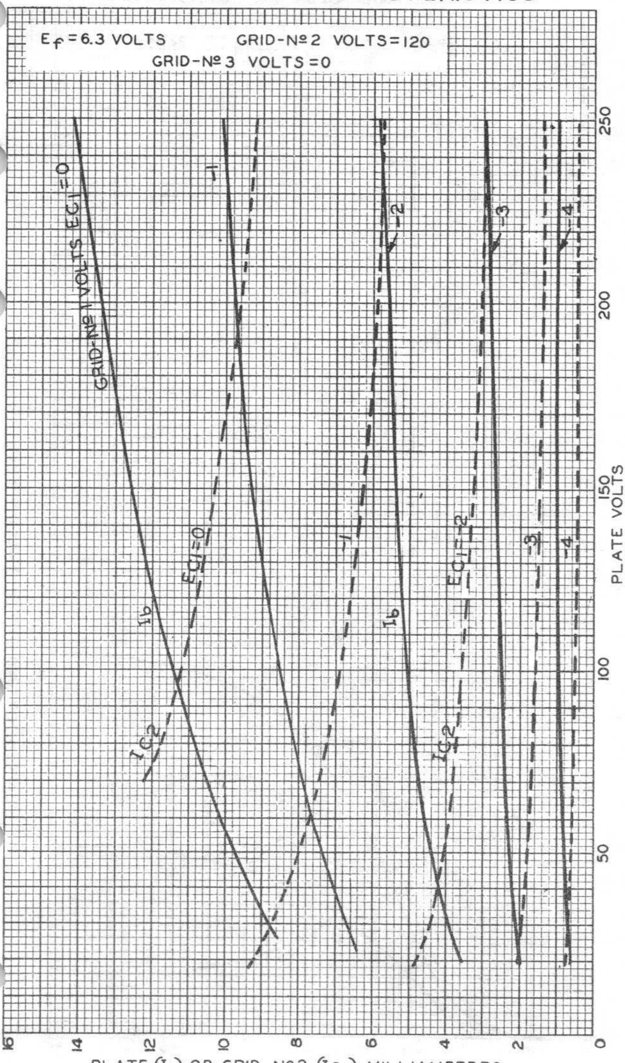
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7402

6AS6

6AS6

AVERAGE PLATE CHARACTERISTICS



NOV. 4, 1949

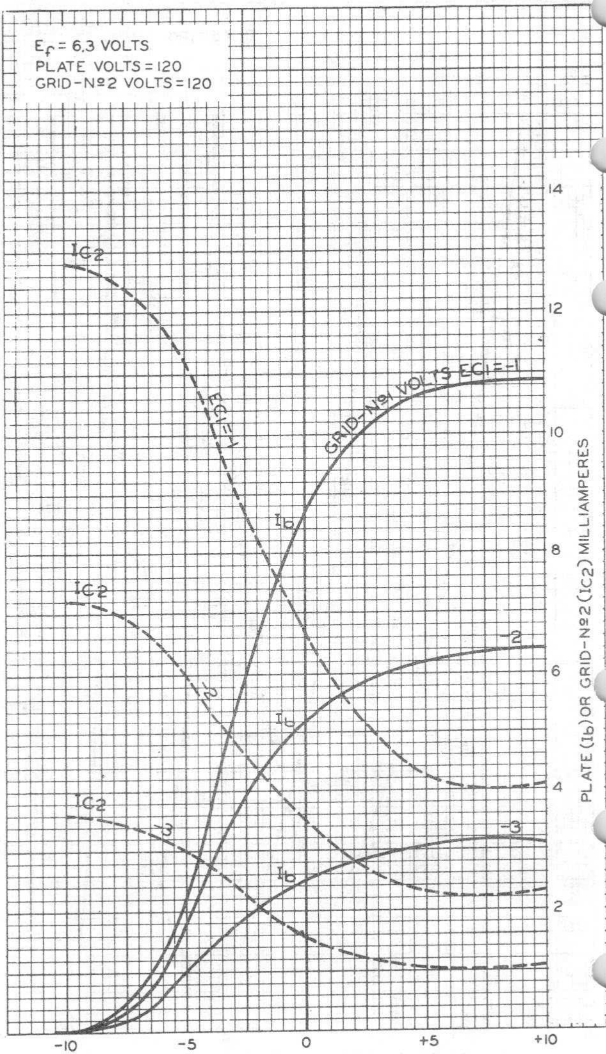
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7408

RCA

6AS6

AVERAGE CHARACTERISTICS



NOV. 9, 1949

TUBE DEPARTMENT

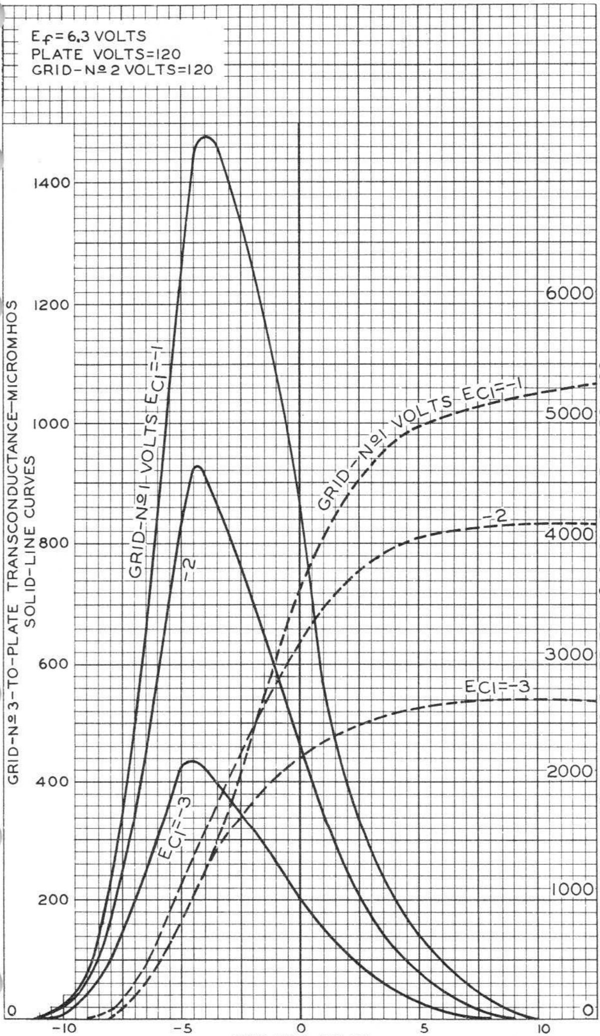
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7403

6AS6

6AS6

AVERAGE CHARACTERISTICS



TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7404R1

RCA

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

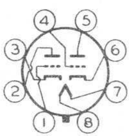
Characteristics, Class A_1 Amplifier (Each unit):

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.

RCA

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.

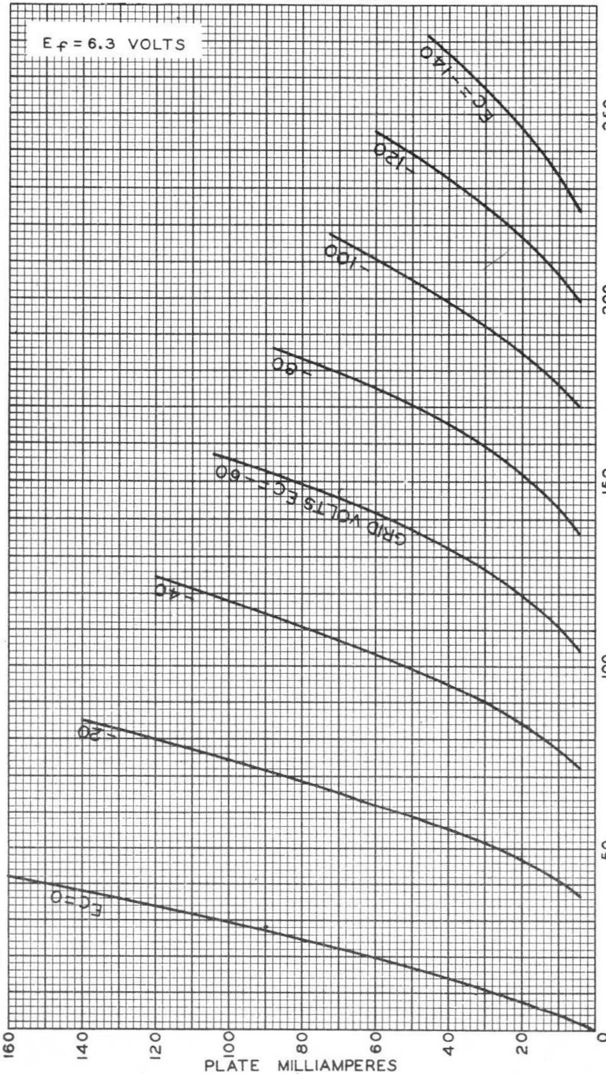
● The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

6AS7-G

AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



NOV. 6, 1945

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

92CM-6618

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)	6.3	volts
Current at 6.3 volts	0.3 ± 6%	amp
Warm-up time (Average)	11	sec

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

Characteristics, Class A_1 Amplifier:

Pentode Connection

Plate Supply Voltage	100	250	250	volts
Grid No.3	*Connected to cathode at socket*			
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	

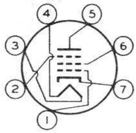
6AU6-A

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-Maximum Values:*

	Triode Connection●	*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:			
Positive-bias value. . . .	0 max.	0 max.	volts
GRID-No.2 INPUT:			
For grid-No.2 voltages up to 165 volts	-	0.75 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.	3.5 max.	3.5 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

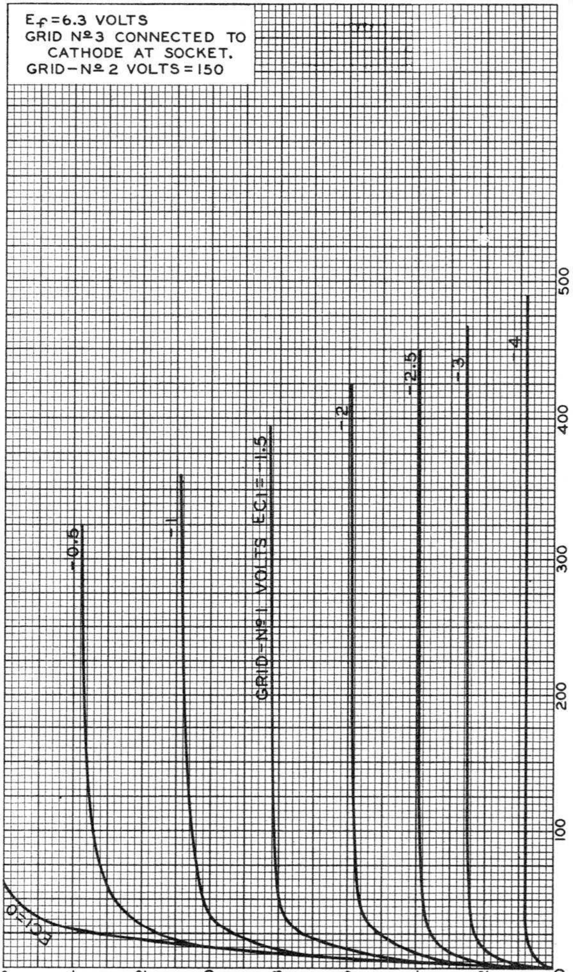
Typical Operation as Resistance-Coupled Amplifier:

See *RESISTANCE-COUPLED-AMPLIFIER CHART No.8* at front of this Section

▲ With external shield JEDEC No.316 connected to cathode.
● Grid No.3 and grid No.2 connected to plate.
★ The dc component must not exceed 100 volts.

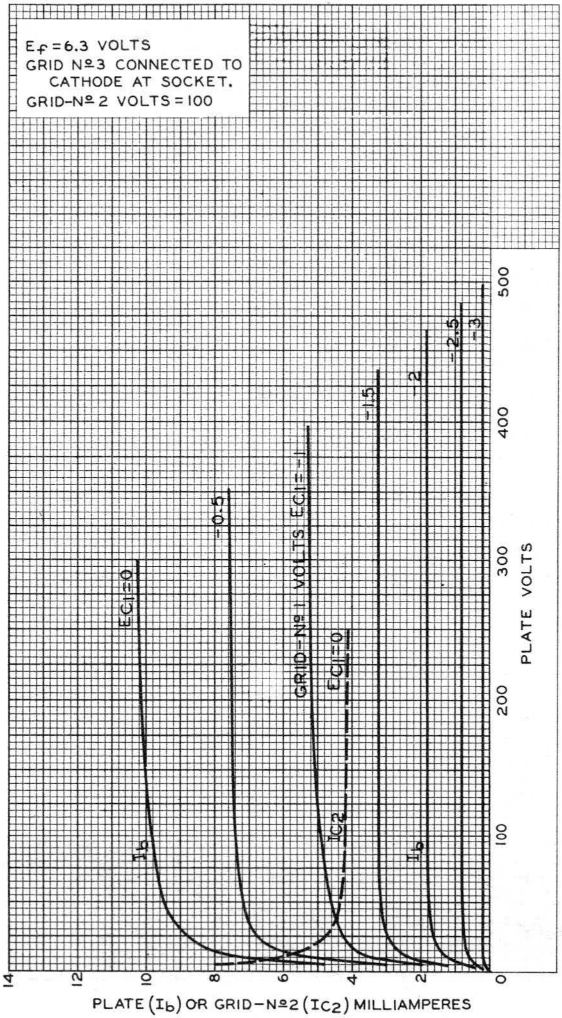
6AU6-A

AVERAGE PLATE CHARACTERISTICS
Pentode Connection



92CM-6613R3

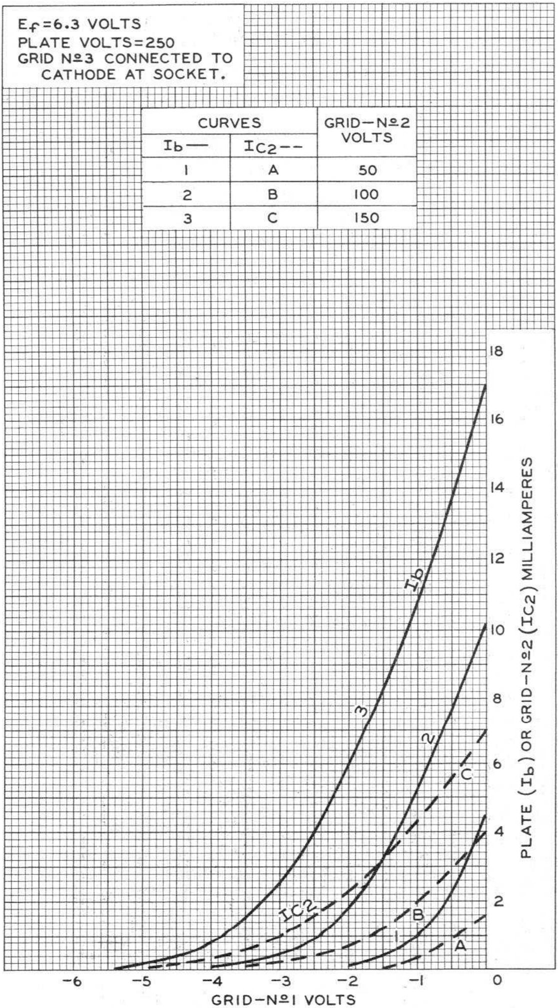
AVERAGE CHARACTERISTICS
Pentode Connection



92CM-6611R3

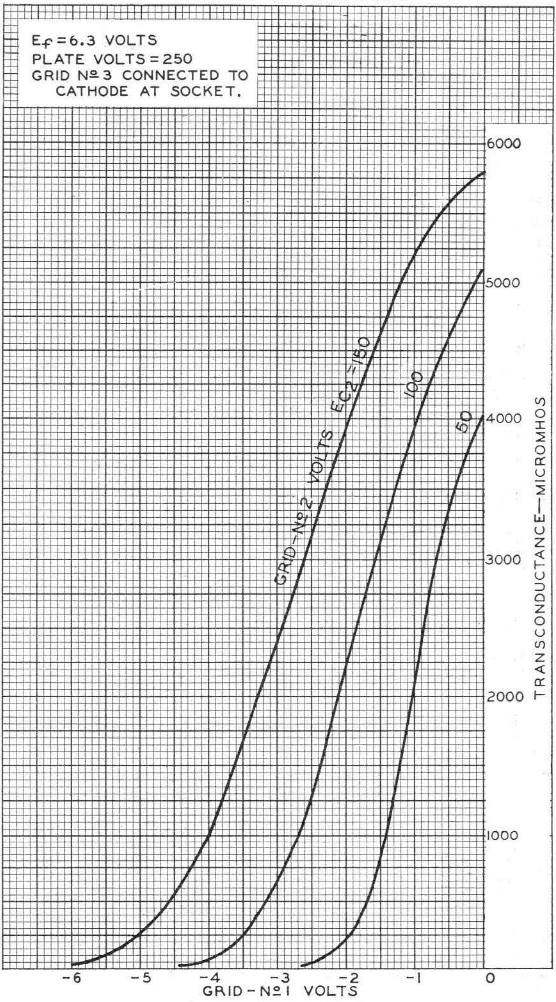
6AU6-A

AVERAGE CHARACTERISTICS
Pentode Connection



92CM—6623R3

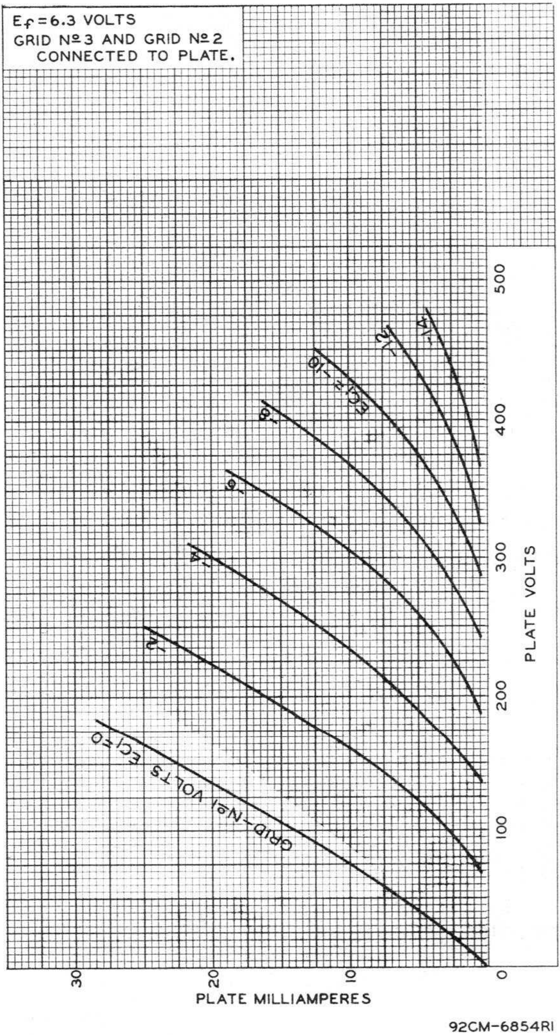
AVERAGE CHARACTERISTICS
Pentode Connection



92CM-6614R3

6AU6-A

AVERAGE PLATE CHARACTERISTICS
Triode Connection



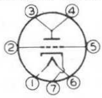
92CM-6854R1

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		Small Radial 7-Pin

Pin 1 - Heater
Pin 2 - Grid
Pin 3 - Plate
Pin 4 - Plate



Pin 5 - Grid
Pin 6 - Heater
Pin 7 - Cathode

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.

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

6F4

OSCILLATOR TRIODE

(continued from preceding page)

o 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.

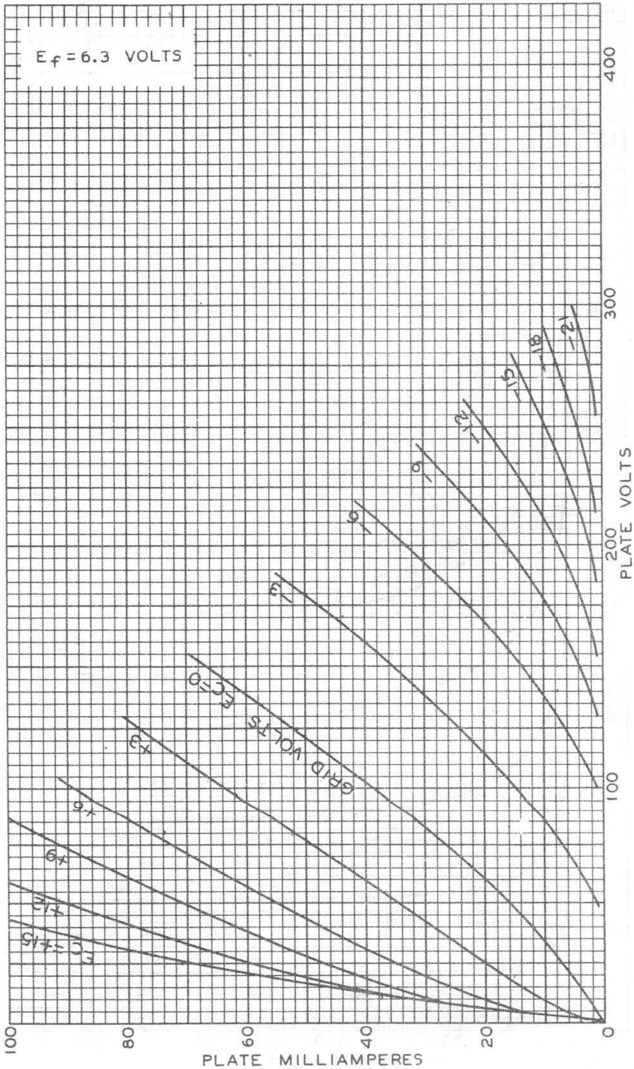
⊙ Subject to wide variations as explained under TUBE RATINGS in General Section.

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.

RCA

6F4

AVERAGE PLATE CHARACTERISTICS



JULY 12, 1944

RCA VICTOR DIVISION

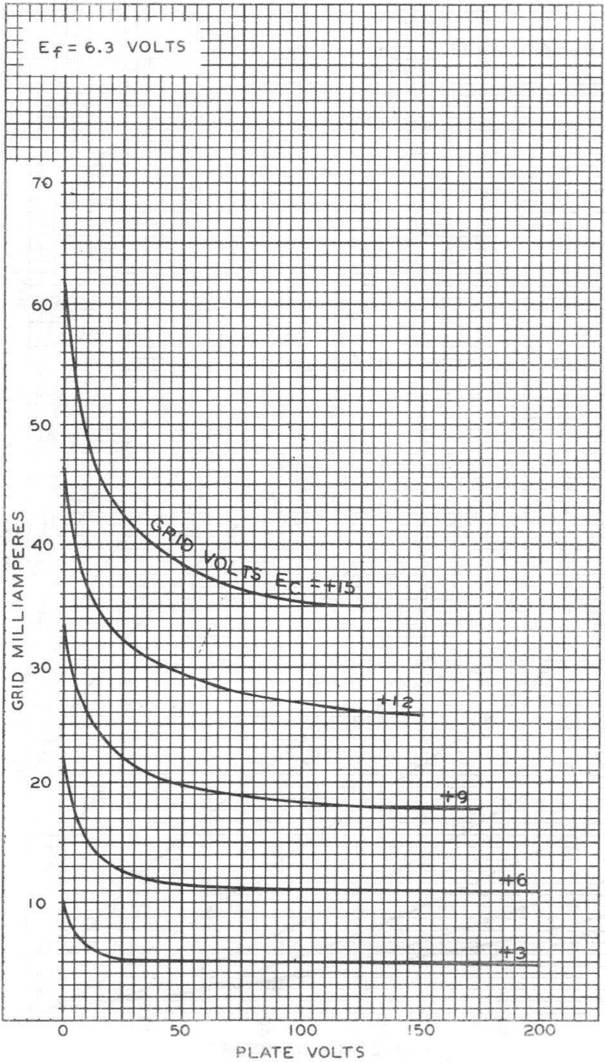
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6567

6F4

6F4

TYPICAL CHARACTERISTICS



JULY 13, 1944 | RCA VICTOR DIVISION | 92CM—6470

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

6J4

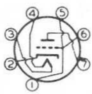
U-H-F AMPLIFIER TRIODE

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 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Grid
Pin 6 - Grid
Pin 7 - Plate



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.*

APRIL 1, 1944

TENTATIVE DATA

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

6J4

U-H-F AMPLIFIER TRIODE

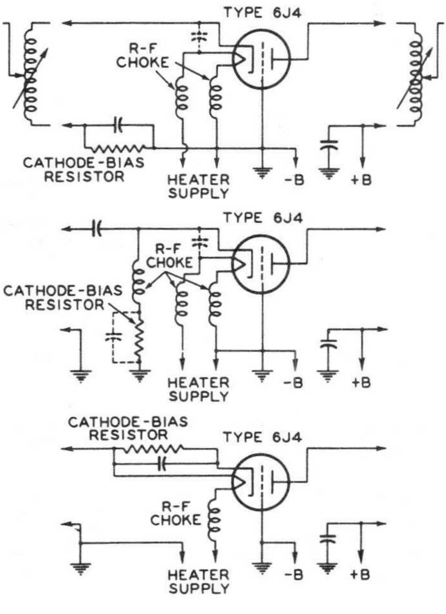
(continued from preceding page)

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



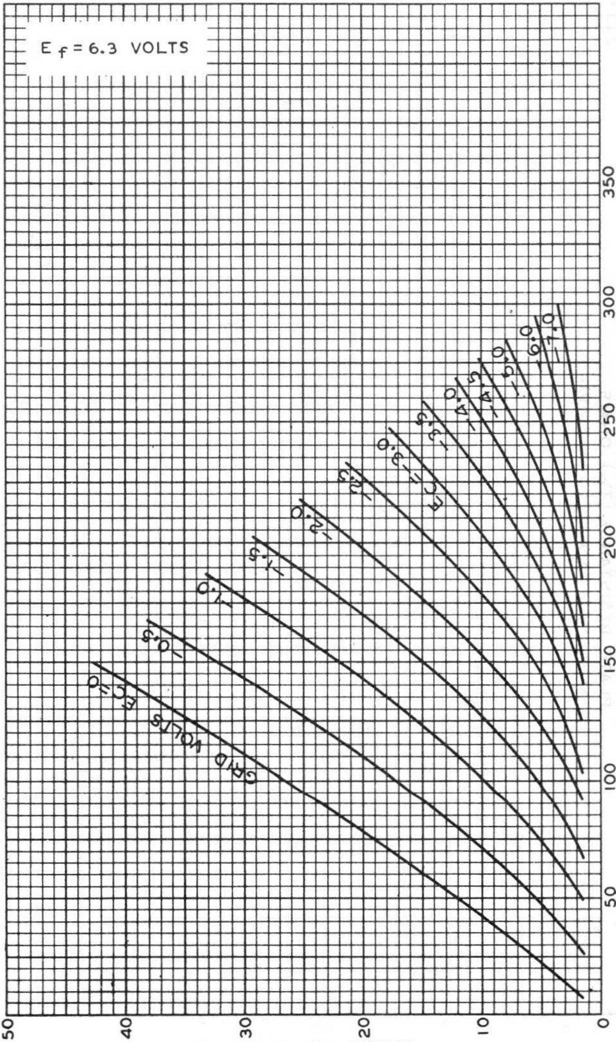
92CM-6550

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

RCA

6J4

AVERAGE PLATE CHARACTERISTICS



FEB. 19 1944

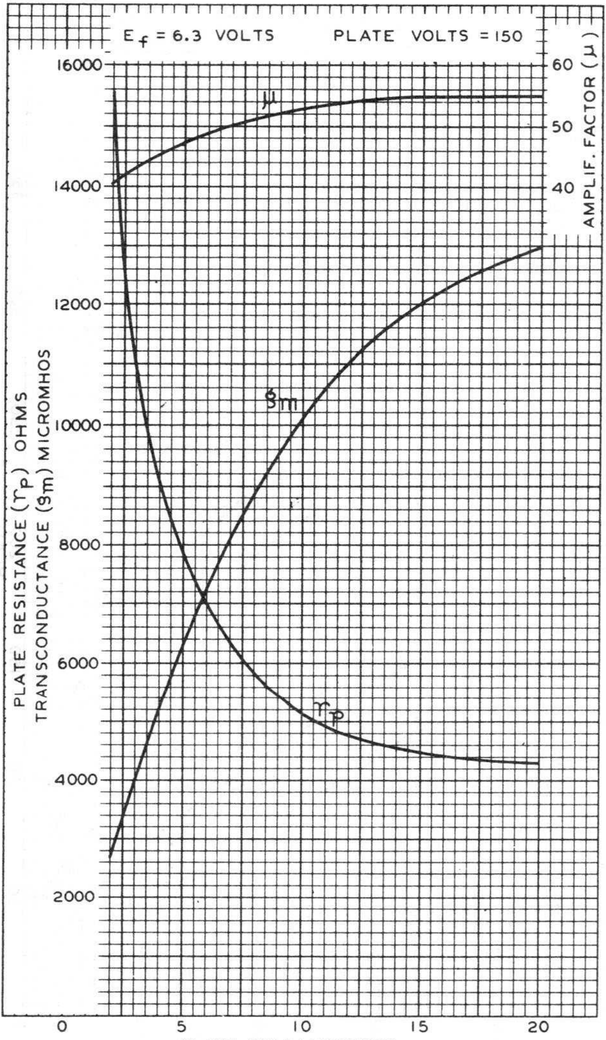
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6543

6J4

6J4

AVERAGE CHARACTERISTICS



MARCH 21, 1944

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

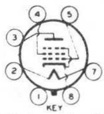
92CM-6548

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 2 - Heater
Pin 3 - Plate
Pin 4 - Screen



Pin 5 - Grid
Pin 7 - Heater
Pin 8 - Cathode

Mounting Position: Any

BOTTOM VIEW (7AC)

Maximum Ratings Are Design-Center Values

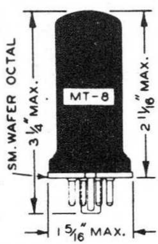
AMPLIFIER

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.

May 1, 1942

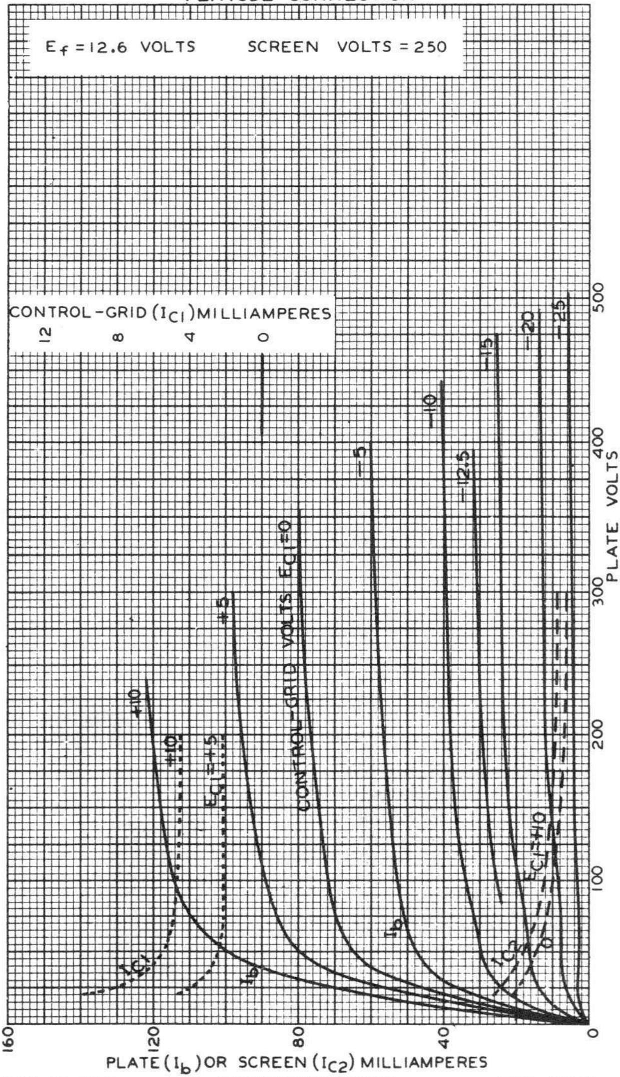
TENTATIVE DATA

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

12A6

12A6

AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION



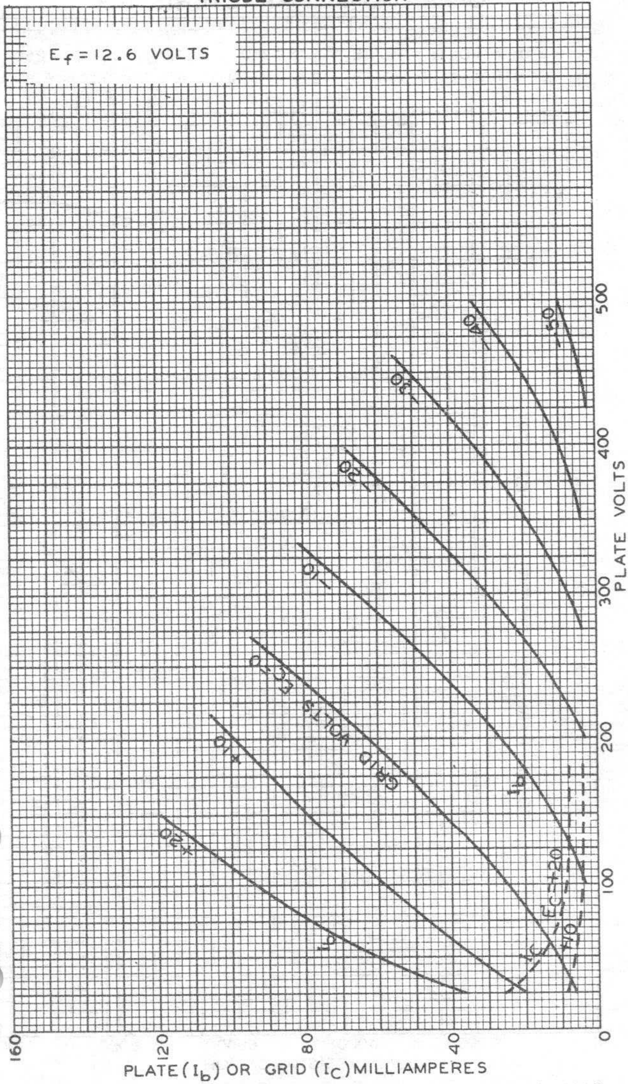
OCT. 14, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6329

RCA

12A6
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION



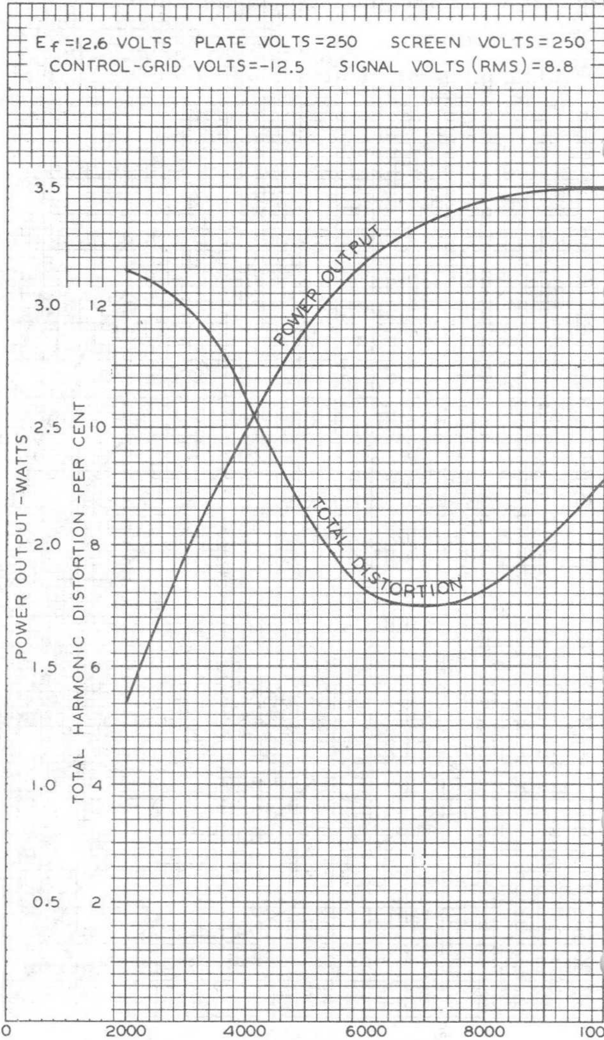
OCT. 13, 1941 | RCA RADIOTRON DIVISION | 92C-6327

RCA MANUFACTURING COMPANY, INC.

RCA

12A6

OPERATION CHARACTERISTICS



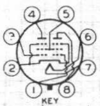
RCA

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		μμf
Grid P_1 to Plate P_2	0.2		μμf
Grid P_2 to Plate P_1	0.1		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 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:

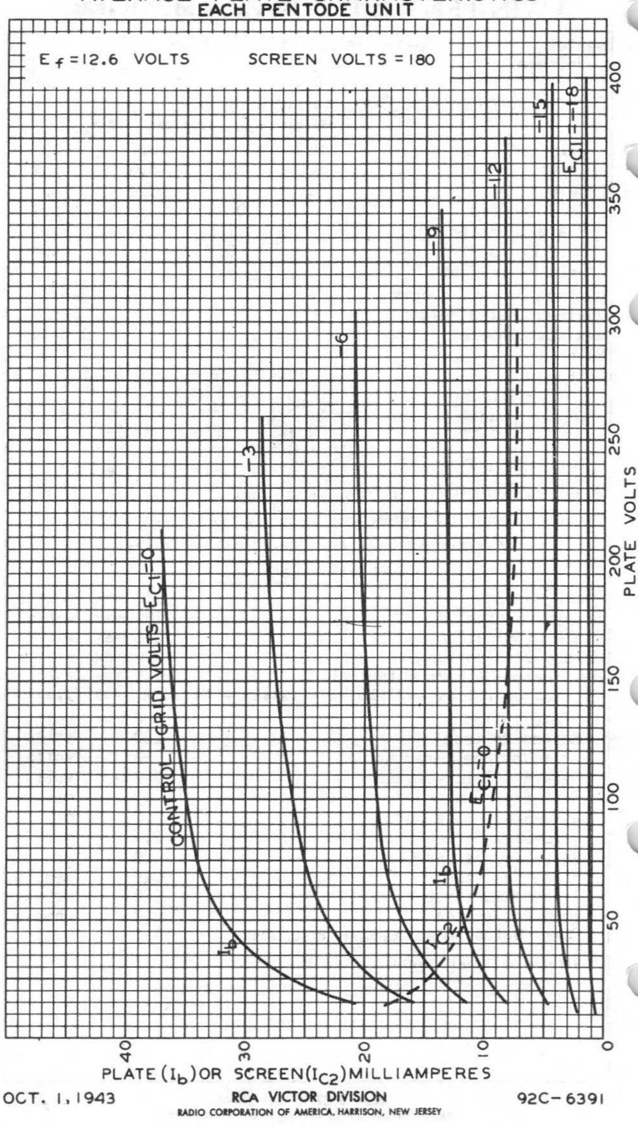
Plate Voltage	180	volts
Screen Voltage	180	volts
Grid Voltage (Grid No. 1)	-9	volts
Peak A-F Grid Voltage	9	volts
Zero-Sig. Plate Cur.	13	ma.
Max.-Sig. Plate Cur.	13.5	ma.
Zero-Sig. Screen Cur.	2.8	ma.
Max.-Sig. Screen Cur.	4.6	ma.
Plate Resistance	0.16	megohm
Transconductance	2150	μmhos
Load Resistance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

° With no external shield.

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

12L8-GT

AVERAGE PLATE CHARACTERISTICS
EACH PENTODE UNIT



OCT. 1, 1943

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

92C-6391

RCA

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.

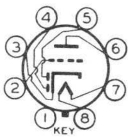
Direct Interelectrode Capacitances—Triode Unit:°

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.

° With shell connected to cathode. Values are approximate.

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

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

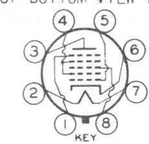
Direct Interelectrode Capacitances:

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.

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.

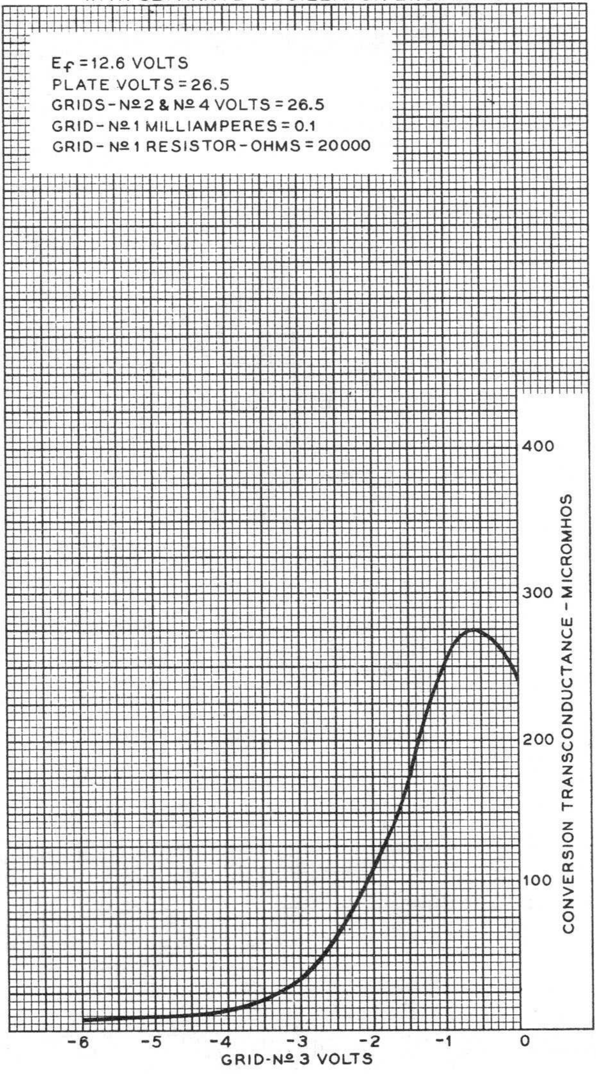
□ With grid-No.3 bias of -35 volts.

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

RCA

12SY7

OPERATION CHARACTERISTICS WITH SEPARATE OSCILLATOR EXCITATION



JULY 29,1946

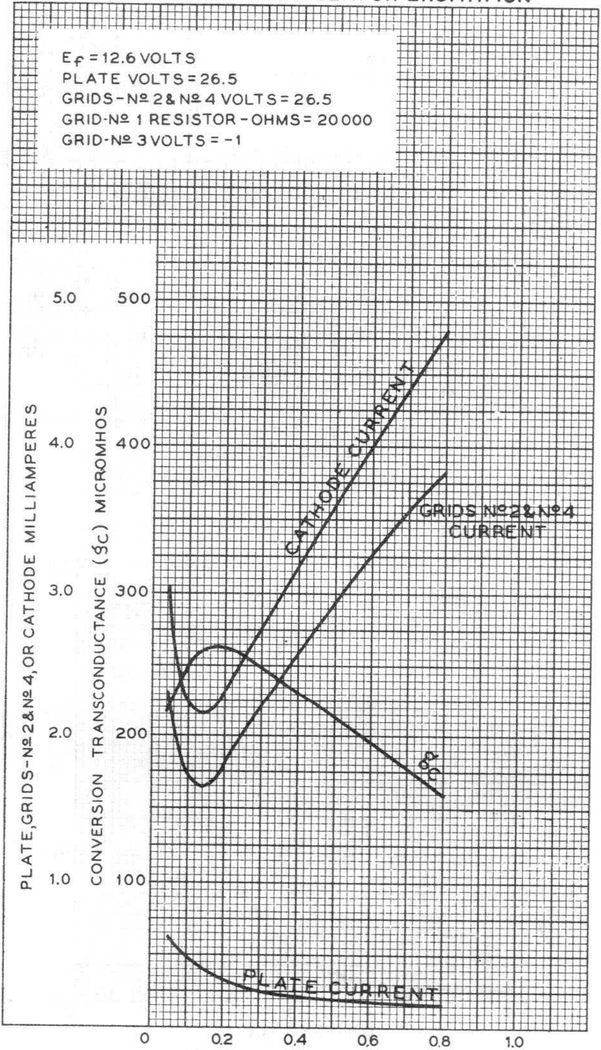
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6786

12SY7

RCA

12SY7
OPERATION CHARACTERISTICS
WITH SEPARATE OSCILLATOR EXCITATION



JULY 30, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6787

26A6
R-F AMPLIFIER PENTODE
MINIATURE REMOTE-CUTOFF TYPE

For use with 12-cell storage-battery supply

GENERAL DATA

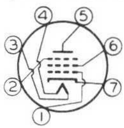
Electrical:

Heater, for Unipotential Cathode:		
Voltage	26.5	ac or dc volts
Current	0.07	amp
Direct Interelectrode Capacitances:°		
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

° With external shield connected to cathode.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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.

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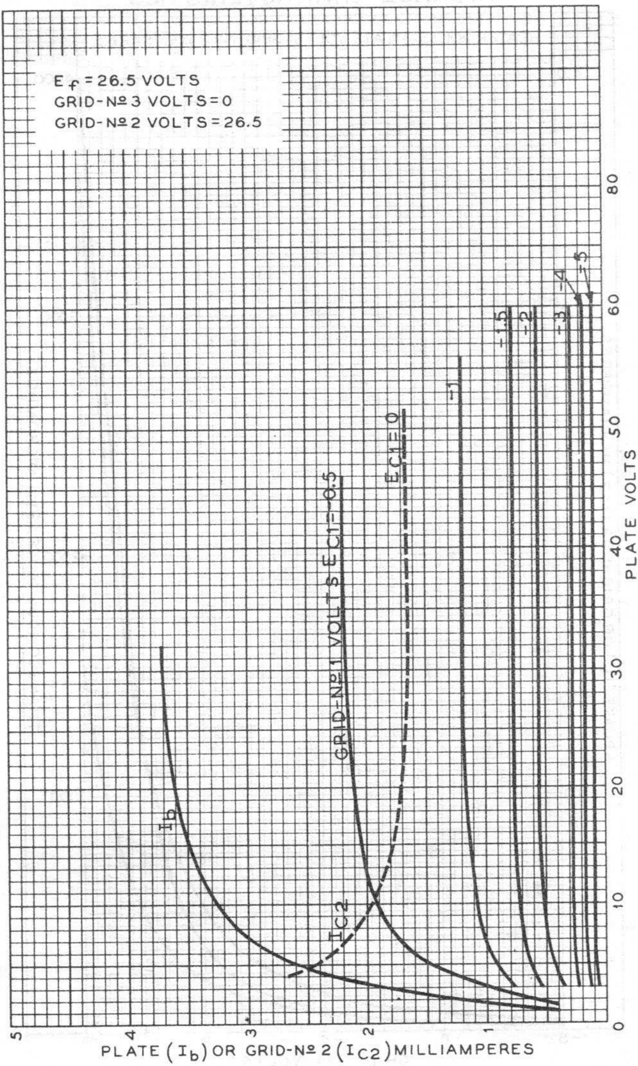
RCA

26A6

AVERAGE PLATE CHARACTERISTICS

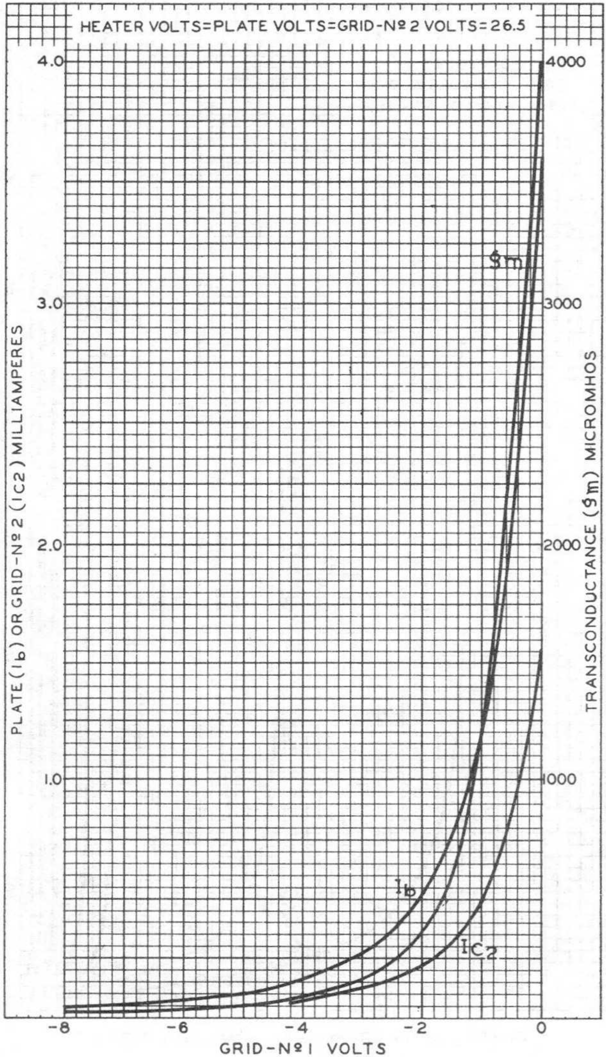


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

26A6

26A6

AVERAGE CHARACTERISTICS



JUNE 25, 1946

TUBE DIVISION

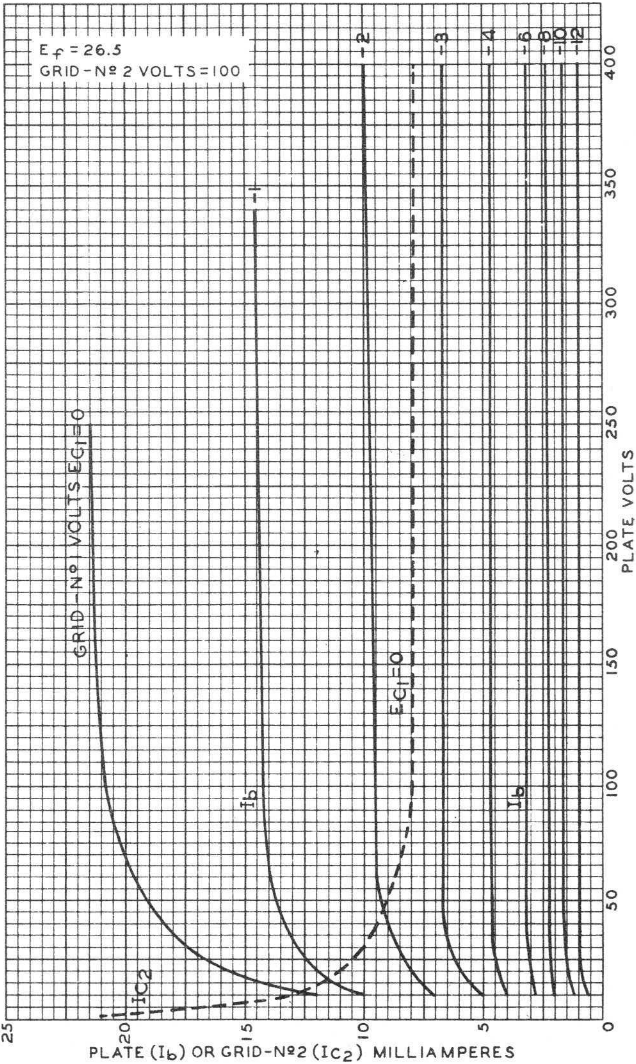
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6778

RCA

26A6

AVERAGE PLATE CHARACTERISTICS



26A7-GT

26A7-GT

TWIN BEAM POWER TUBE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	26.5	ac or dc volts
Current	0.6	amp

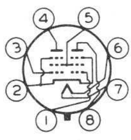
Direct Interelectrode Capacitances (Approx.):° ←

Grid No.1 to plate▲	1.2	$\mu\mu f$
Grid No.1 to cathode & grid No.3, grid No.2, and heater▲	16	$\mu\mu f$
Plate to cathode & grid No.3, grid No.2, and heater▲	13	$\mu\mu f$
Grid No.1 of unit No.1 to grid No.1 of unit No.2	0.2	$\mu\mu f$
Plate of unit No.1 to plate of unit No.2	0.2	$\mu\mu f$
Grid No.1 of unit No.1 to plate of unit No.2	0.2	$\mu\mu f$
Grid No.1 of unit No.2 to plate of unit No.1	0.2	$\mu\mu f$

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.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

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.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

26A7-GT

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.

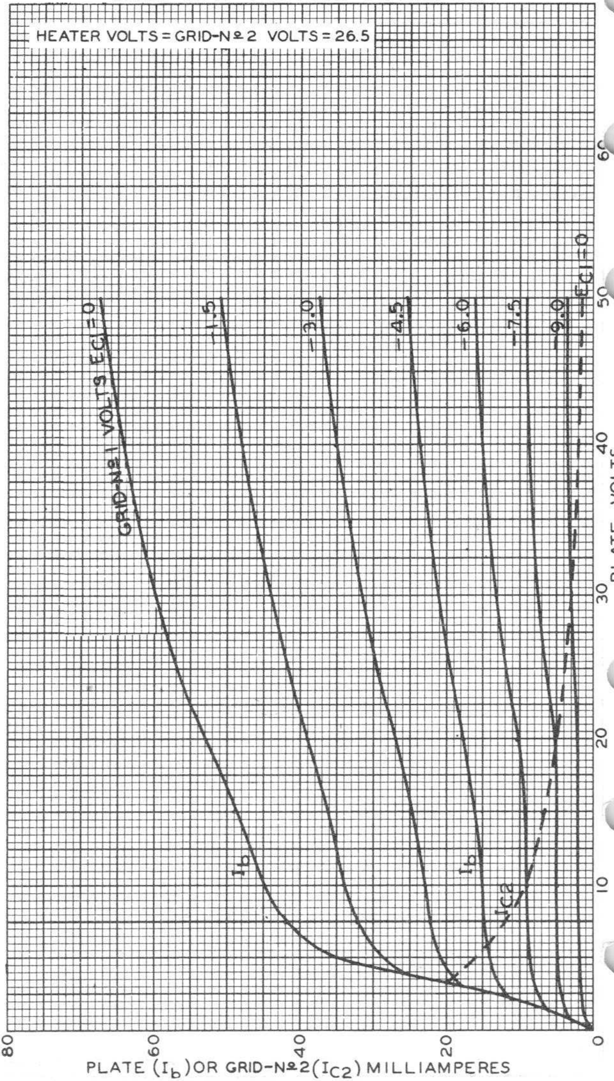
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

26A7-GT

RCA

26A7-GT

AVERAGE PLATE CHARACTERISTICS
EACH UNIT-PENTODE CONNECTION



JAN. 3, 1955

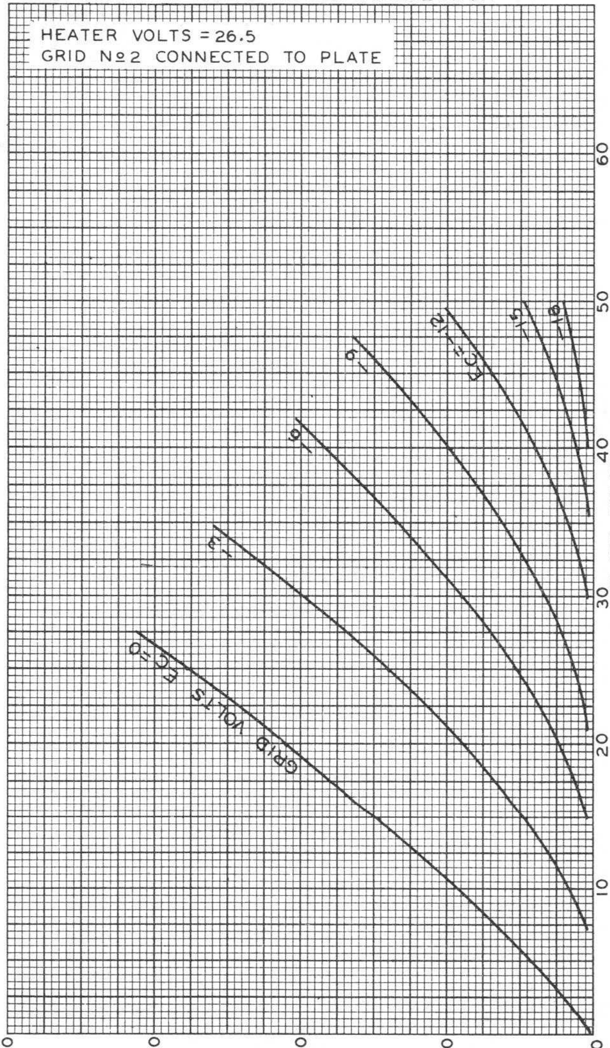
TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6509R1

26A7-GT

26A7-GT
AVERAGE PLATE CHARACTERISTICS
EACH UNIT - TRIODE CONNECTION



MAR. 24, 1945

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

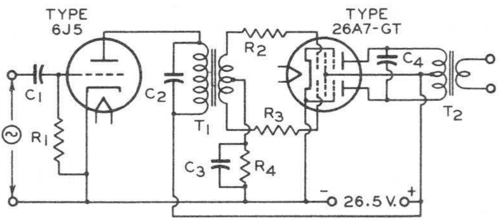
92CM-6510

RCA

26A7-GT

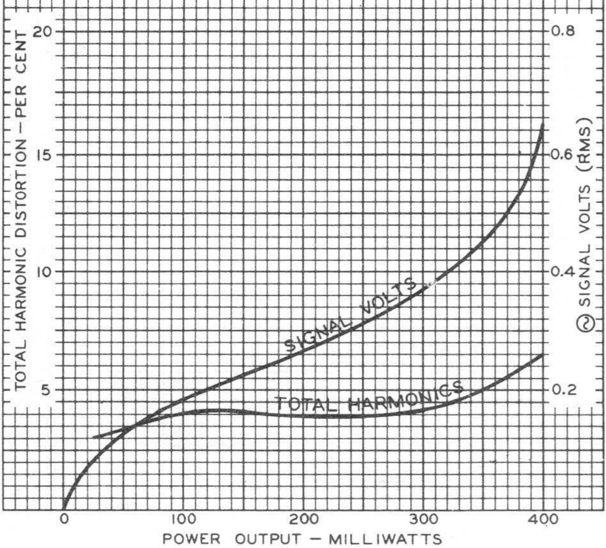
OPERATION CHARACTERISTICS
PUSH-PULL CIRCUIT

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 1/2 SECONDARY) = 3:1
T_2 = OUTPUT TRANSFORMER: PLATE-TO-PLATE LOAD, 2000 OHMS



26C6

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

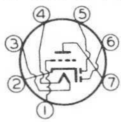
Direct Interelectrode Capacitances:°

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.

° With external shield connected to cathode. Values are approximate.

RCA

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.

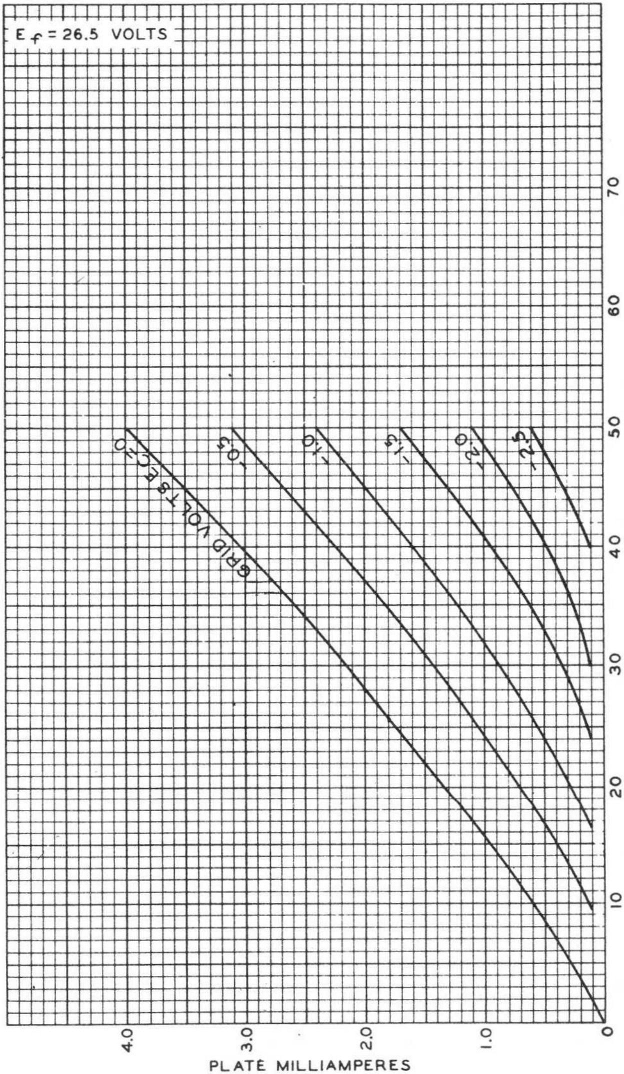
Additional curves applying to the 26C6 are shown under Types 6R7, and 6SR7

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

26C6

AVERAGE PLATE CHARACTERISTICS



JUNE 10,1946

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6772

26D6

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

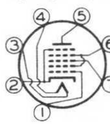
Direct Interelectrode Capacitances:

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.

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.

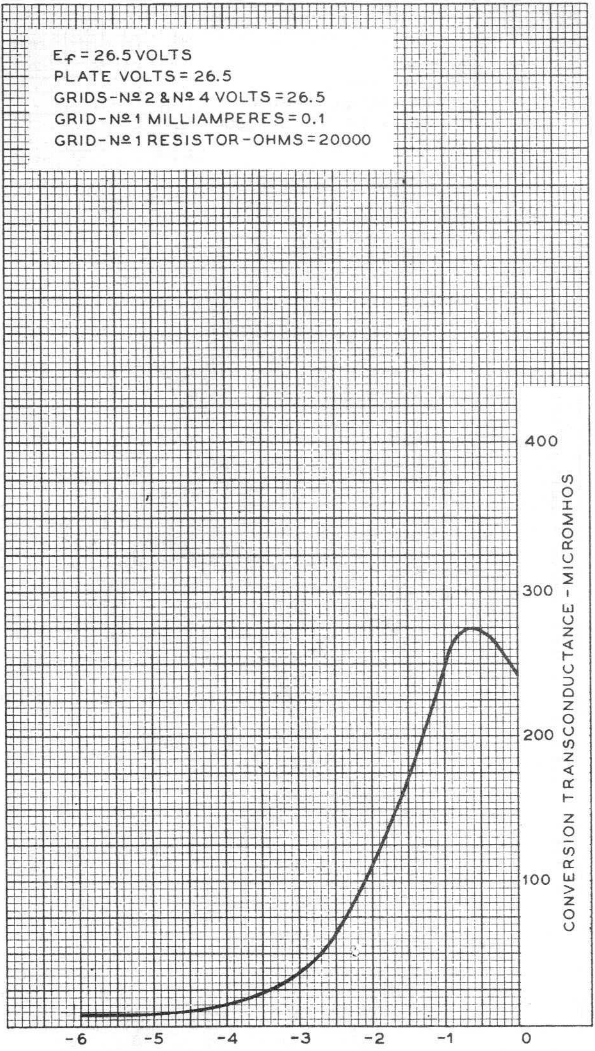
▲ Measured between grid No.1 and grids-No.2 and No.4 connected to plate (not oscillating).

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

26D6

26D6

OPERATION CHARACTERISTICS
WITH SEPARATE OSCILLATOR EXCITATION

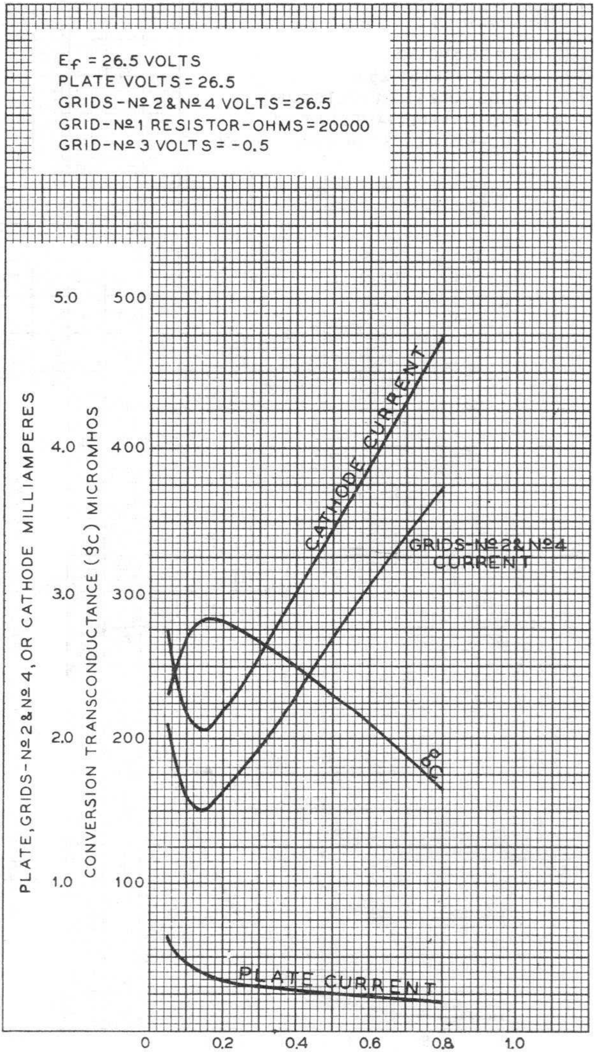


26D6

RCA

26D6

OPERATION CHARACTERISTICS
WITH SEPARATE OSCILLATOR EXCITATION



AUGUST 1,1946 TUBE DEPARTMENT 92CM-6790

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

Full-Wave Mercury-Vapor Rectifier

For DC Power Supplies Having Large Current Requirements

GENERAL DATA

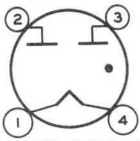
Electrical:

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.

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.

Medium-Mu Twin Triode

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings:

Heater-section arrangement	*Series*	*Parallel*	
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

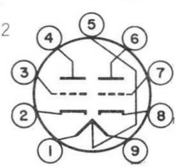
Characteristics, Class A_1 Amplifier (Each Unit):

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

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.

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

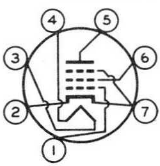
Characteristics, Class A_1 Amplifier:

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

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

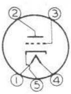
[a] With external shield JEDEC No.316 connected to cathode.

[b] Fixed-bias operation is not recommended.

955
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	80 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	-	-	135	-	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	80 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.

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

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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

	DETECTOR		
Typical Operation:	*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 approx.	−	ohms
Grid Leak	−	1 to 5	megohms
Grid Condenser	−	0.00025	µf

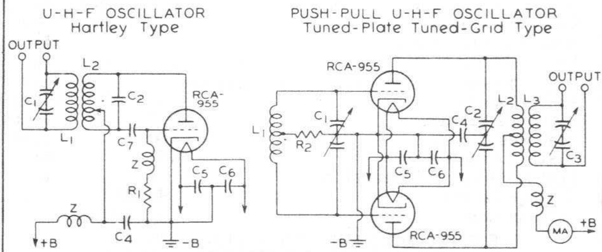
● With no external shield.

* 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.



L_1C_1, L_2C_2, L_3C_3 = DEPEND ON FREQUENCY RANGE DESIRED
$C_4, C_5, C_6 = 100\,\mu\mu f$
$C_7 = 50\,\mu\mu f$
R_1 = 20000 TO 25000 OHMS, ½ WATT
R_2 = 10000 TO 12500 OHMS, ½ WATT
Z = R-F CHOKE

92CM-6558

 ← Indicates a change.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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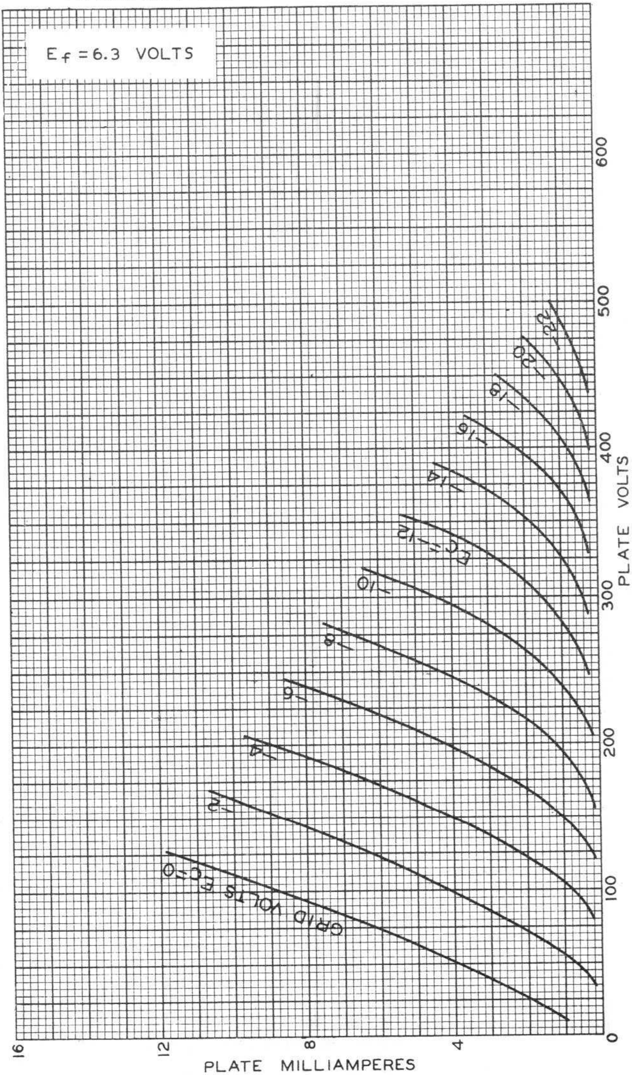
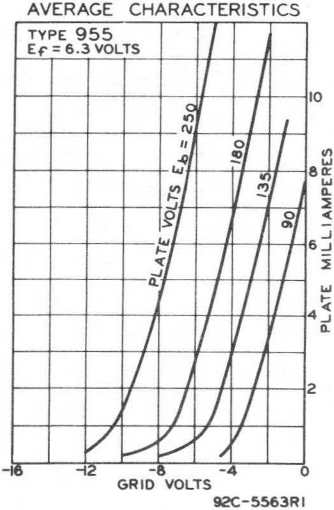
AVERAGE PLATE CHARACTERISTICS

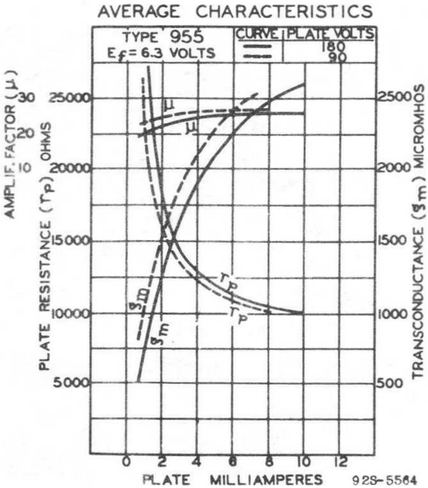


955

955

CHARACTERISTICS CURVES





July 1, 1941

92C-5563R1
92S-5564

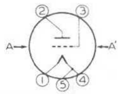
957

957

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	*See Outline in GENERAL SECTION*	Small Radial 5-Pin ←
Pin 1 - Filament		Pin 5 - Filament -
Pin 2 - Plate		AA' - Plane of
Pin 3 - Grid		Electrodes
Pin 4 - Filament -		
RCA Socket		Stock No.9925
Mounting Position		Vertical◊



Short Part of Bulb: Bottom

BOTTOM VIEW (5BD)

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.

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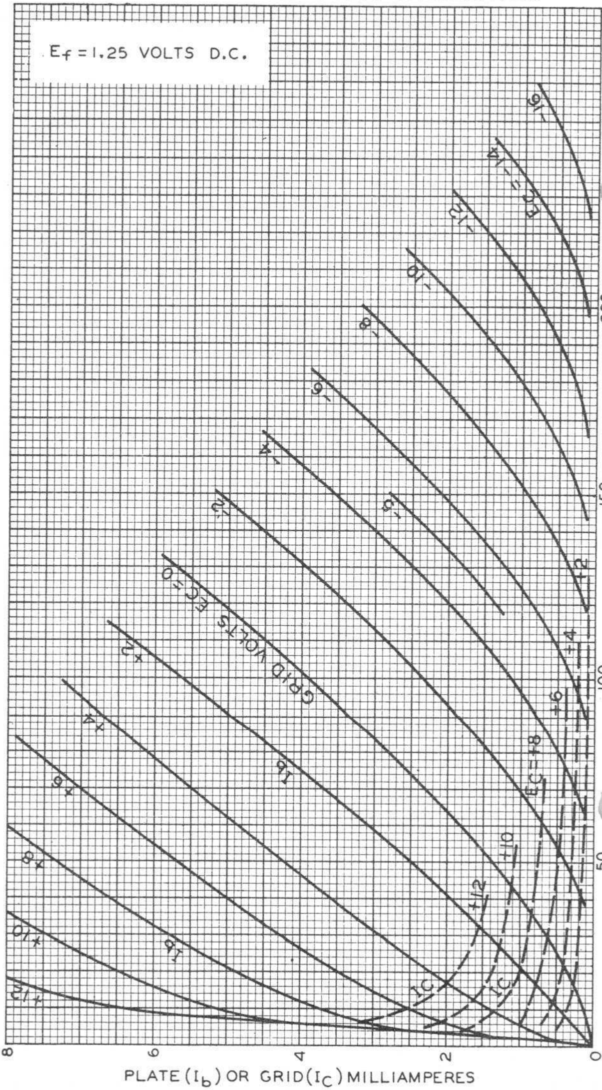
957

RCA

957

AVERAGE PLATE CHARACTERISTICS



JUNE 15, 1944

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6336R1

959

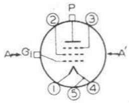
959

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. 9925
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.

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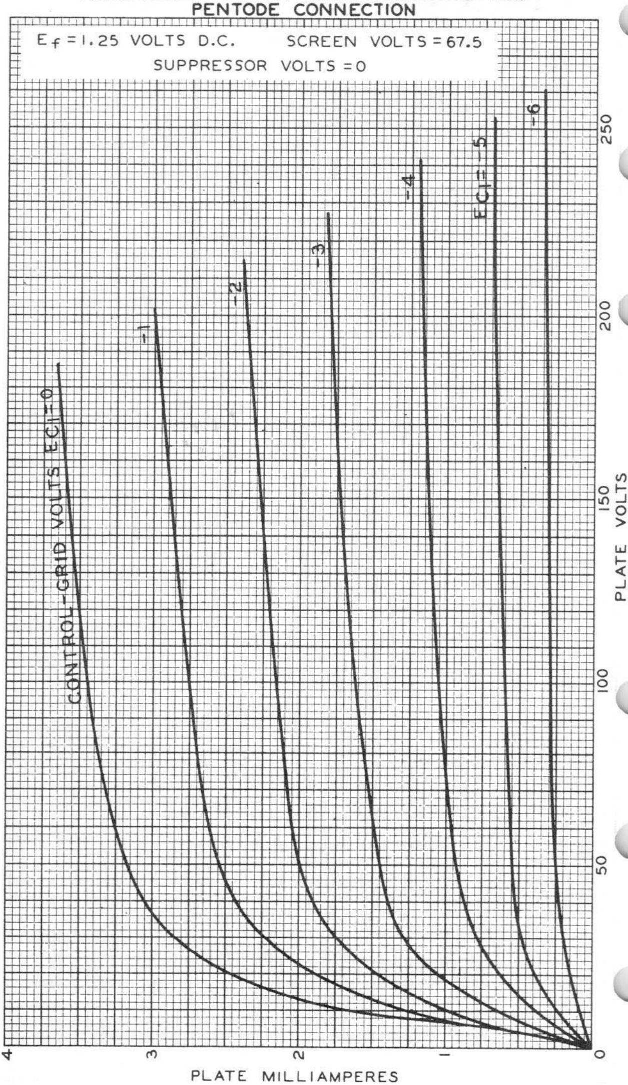
959

959

AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION

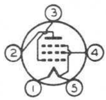


1609

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



BOTTOM VIEW

Pin 1 - Filament +
Pin 2 - Plate
Pin 3 - Grid
Pin 4 - Screen
Pin 5 - Filament -

Mounting Position: Any

Maximum Ratings Are Absolute Values

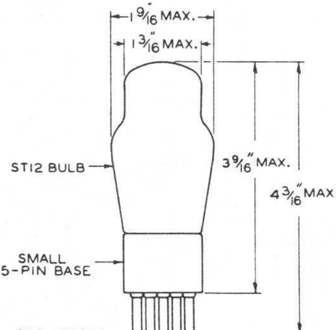
A-F AMPLIFIER

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.

Jan. 1, 1943

DATA

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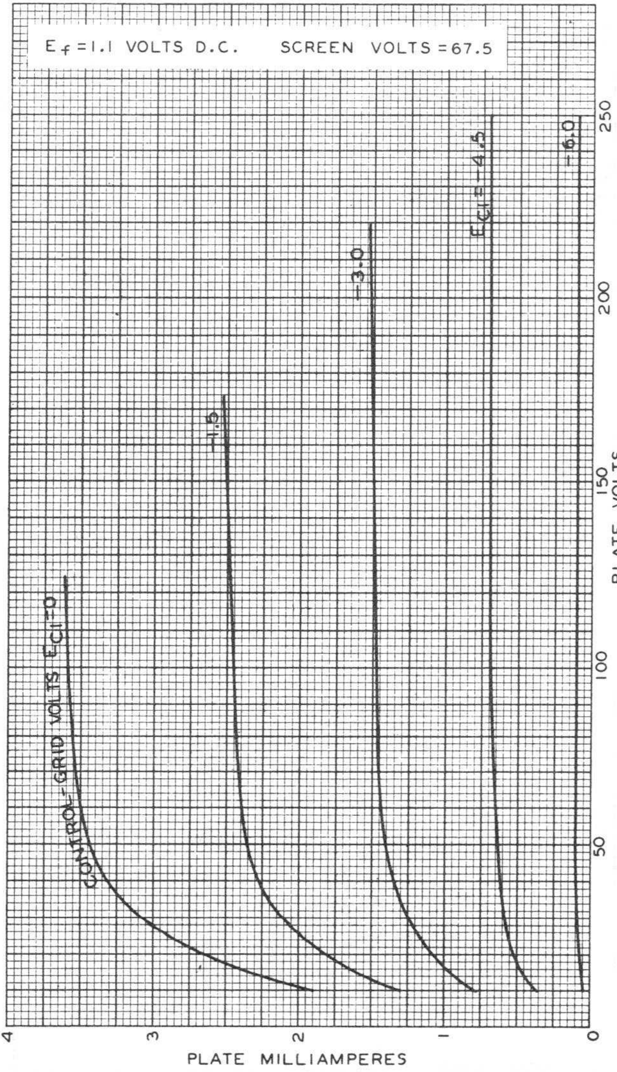
1609

1609

AVERAGE PLATE CHARACTERISTICS



JAN. 26, 1937

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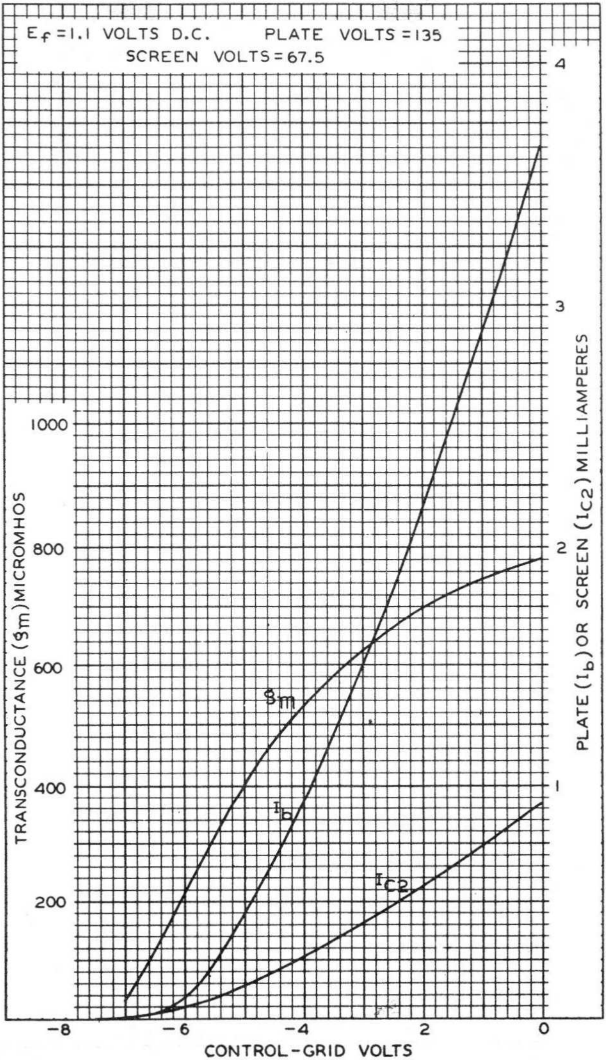
92C-4721

RCA

1609

AVERAGE CHARACTERISTICS



1611

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.

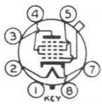
RCA-1611 is available only through Radiomarine Corporation of America, 75 Varick Street, New York, N. Y.

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



BOTTOM VIEW

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

Maximum Ratings Are Design-Center Values

AMPLIFIER

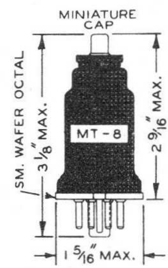
Plate Voltage	250 max.	volts
Screen Voltage	100 max.	volts
Plate Dissipation	1.5 max.	watts
Screen Dissipation	1.0 max.	watt

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.	6.5	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 #3 bias = -15 volts.

Curves under Type 6L7 also apply to the 1612.



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Jan. 1, 1943 DATA

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

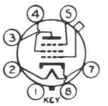
1620

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

BOTTOM VIEW

Mounting Position: 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
Suppressor	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.

Jan. 1, 1943 DATA

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

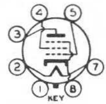
1621

1621

POWER AMPLIFIER PENTODE

For applications requiring continuity of service

Heater ■	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.7	amp.
Direct Interelectrode Capacitances (Approx.):° ←		
Grid to Plate	0.20	μμf
Input	7.5	μμf
Output	11.5	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	

BOTTOM VIEW

Mounting Position: Any

Maximum Ratings Are Design-Center Values

PUSH-PULL AMPLIFIER - Triode Connection†

Recommended with Cathode-Bias Operation only. ←

Plate Voltage	300 max.	volts
Plate Dissipation	8.3 max.	watts

Typical Operation - Class A_1 Amplifier:
Unless otherwise specified, values are for 2 tubes

Plate Supply *	327.5	volts
Cathode Resistor ▲	500	ohms
Peak A-F Grid-to-Grid Voltage	54	volts
Zero-Sig. Plate Current	55	ma.
Max.-Sig. Plate Current	59	ma.
Load Resistance (plate-to-plate)	5000	ohms
Total Harmonic Distortion	1	%
Power Output	2	watts

* Actual voltage between cathode and plate will be plate-supply voltage minus drop in cathode resistor.

▲ Type of input coupling used should not introduce too much resistance in the grid circuit. Transformer- or impedance-coupling devices are recommended. The grid circuit may have a resistance as high as, but not greater than, 0.5 megohm provided the heater voltage is not allowed to rise more than 10% above rated value under any condition of operation.

PUSH-PULL AMPLIFIER - Pentode Connection ←

Plate Voltage	300 max.	volts
Screen Voltage	300 max.	volts
Plate Dissipation	7.9 max.	watts
Screen Input	1.9 max.	watts

Typical Operation - Class A_1 Amplifier:

Unless otherwise specified, values are for 2 tubes

Plate	300	volts
Screen	300	volts
D-C Grid Voltage #	-30	volts
Peak A-F Grid-to-Grid Voltage	60	volts
Zero-Sig. Plate Current	38	ma.
Max.-Sig. Plate Current	69	ma.

■, †, #,°: See next page. ← Indicates a change.

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

1621

1621

POWER AMPLIFIER PENTODE

(continued from preceding page)

Zero-Sig. Screen Current	6.5	ma.
Max.-Sig. Screen Current	13	ma.
Load Resistance (plate-to-plate)	4000	ohms
Total Harmonic Distortion	3	%
Power Output	5	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.

o With shell connected to cathode.

† Screen connected to plate.

* 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 0.05 megohm, fixed bias may be used; for higher values, cathode bias is required. With cathode bias, the grid circuit may have a resistance as high as, but not greater than, 0.5 megohm provided the heater voltage is not allowed to rise more than 10% above rated value under any conditions of operation.

OUTLINE DIMENSIONS for the 1621 are the same as those for Type 12A6.

Curves under Type 6F6 also apply to the 1621.

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

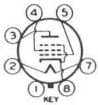
1622

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		Any



BOTTOM VIEW (7AC)

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.

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1629

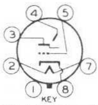
ELECTRON-RAY TUBE

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 2 - Heater
Pin 3 - Plate
Pin 4 - Target

Pin 5 - Grid
Pin 7 - Heater
Pin 8 - Cathode



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.

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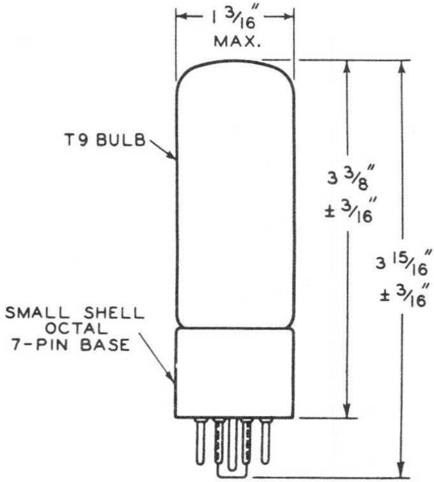
1629

ELECTRON-RAY TUBE



92CM-6554

1635

HIGH-MU TWIN POWER TRIODE

GENERAL DATA

Electrical:

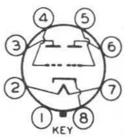
Heater, for Unipotential Cathode:

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.

1635

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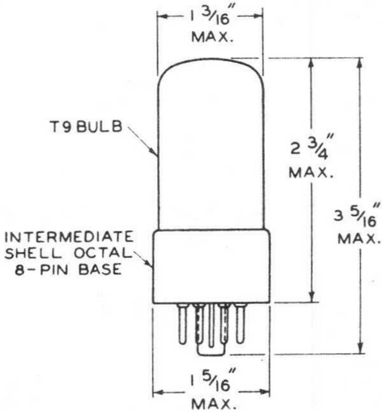
HIGH-MU TWIN POWER TRIODE

● 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

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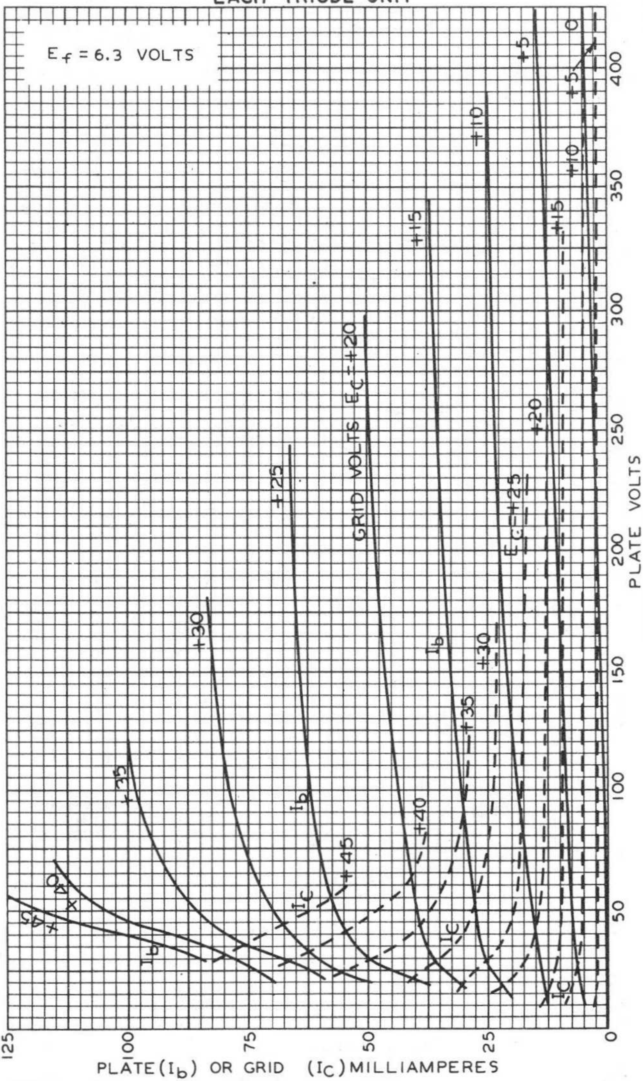
1635

AVERAGE PLATE CHARACTERISTICS

EACH TRIODE UNIT



FEB. 26, 1942

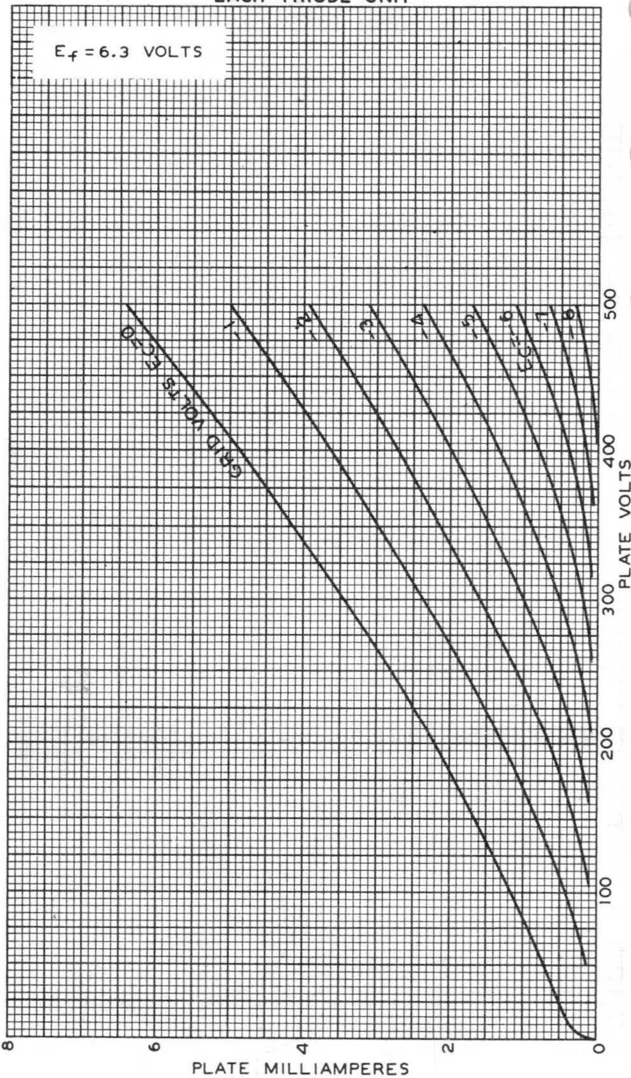
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6358

1635

1635

1635
AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



FEB. 27, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6369

PREMIUM 5636 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.	$\mu\mu$f
Grid No.1 to all other electrodes	4	4	$\mu\mu$f
Grid No.3 to all other electrodes	3.8	4	$\mu\mu$f
Plate to all other electrodes	1.9	3.4	$\mu\mu$f
Grid No.1 to grid No.3	0.17 max.	0.15 max.	$\mu\mu$f
Grid No.3 to plate	1.1 max.	1.1 max.	$\mu\mu$f

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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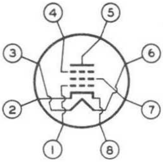
SHARP-CUTOFF PENTODE

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

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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:				
Range 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.

ELECTRON TUBE DIVISION

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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.

5636

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 (^{o}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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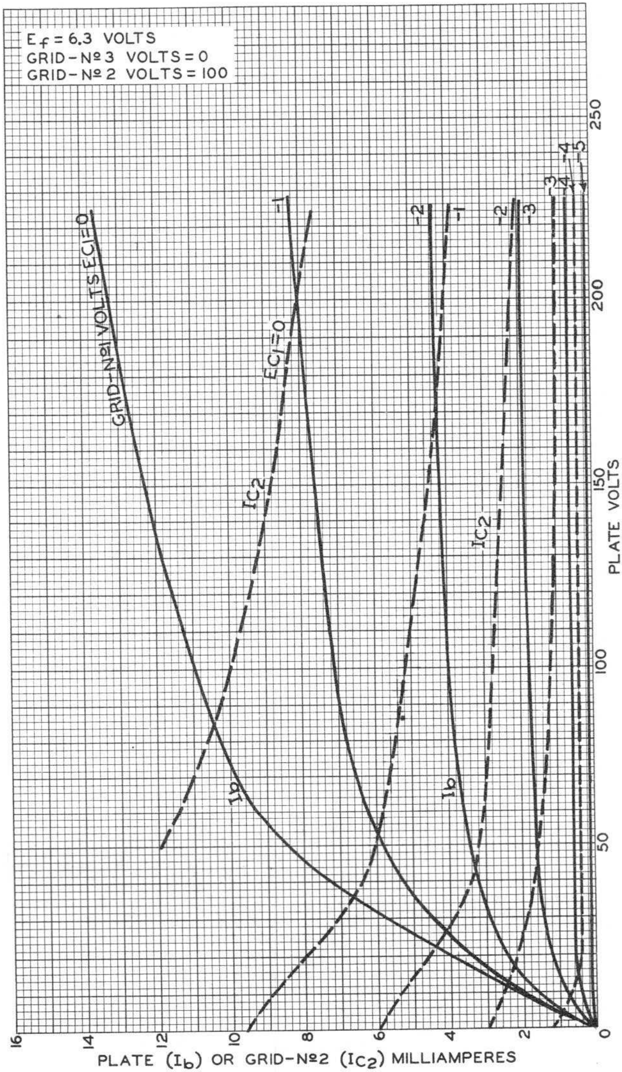
5636

5636

AVERAGE CHARACTERISTICS



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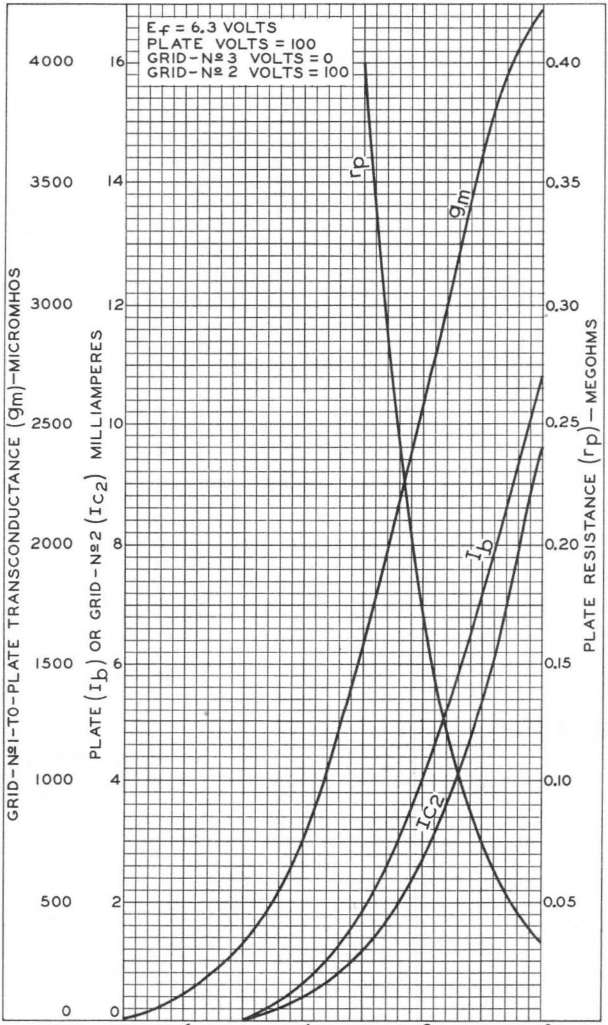
92CM-9212

5636

RCA

5636

AVERAGE CHARACTERISTICS



92CM-9207

ELECTRON TUBE DIVISION

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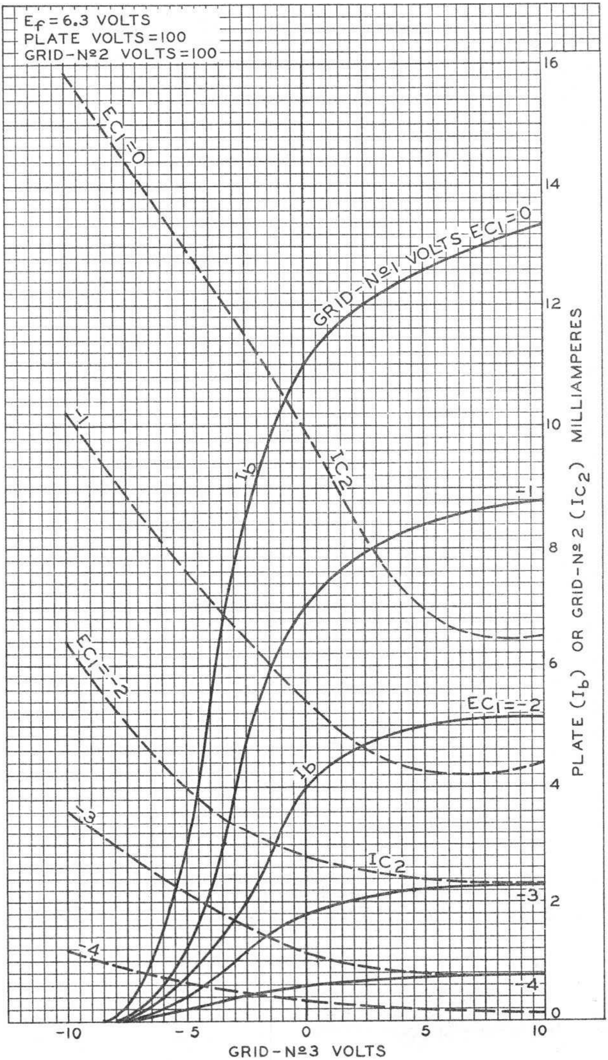
5636

AVERAGE CHARACTERISTICS



92CM-9210

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5636

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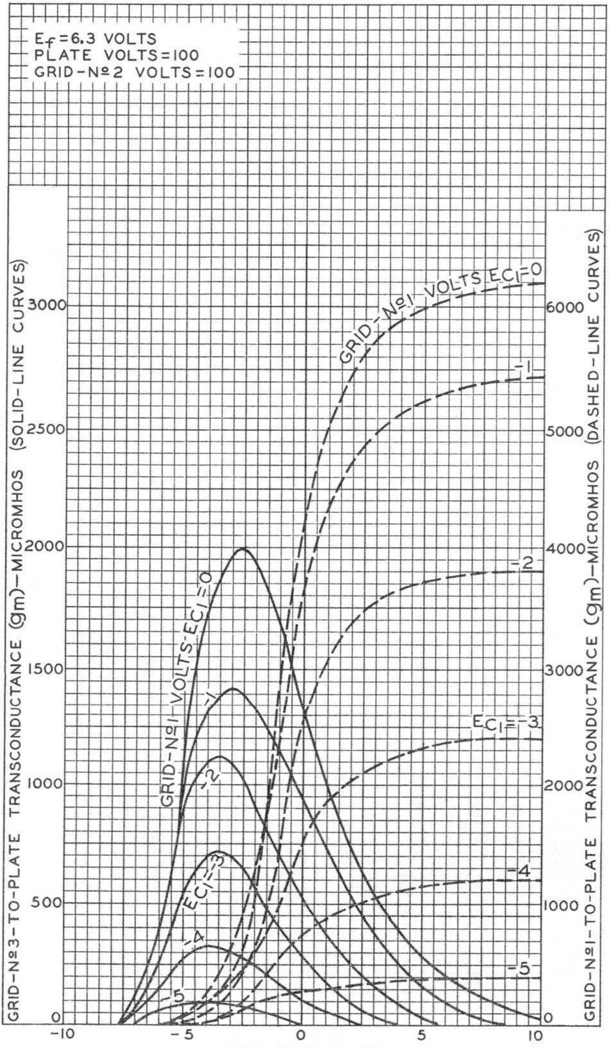
AVERAGE CHARACTERISTICS



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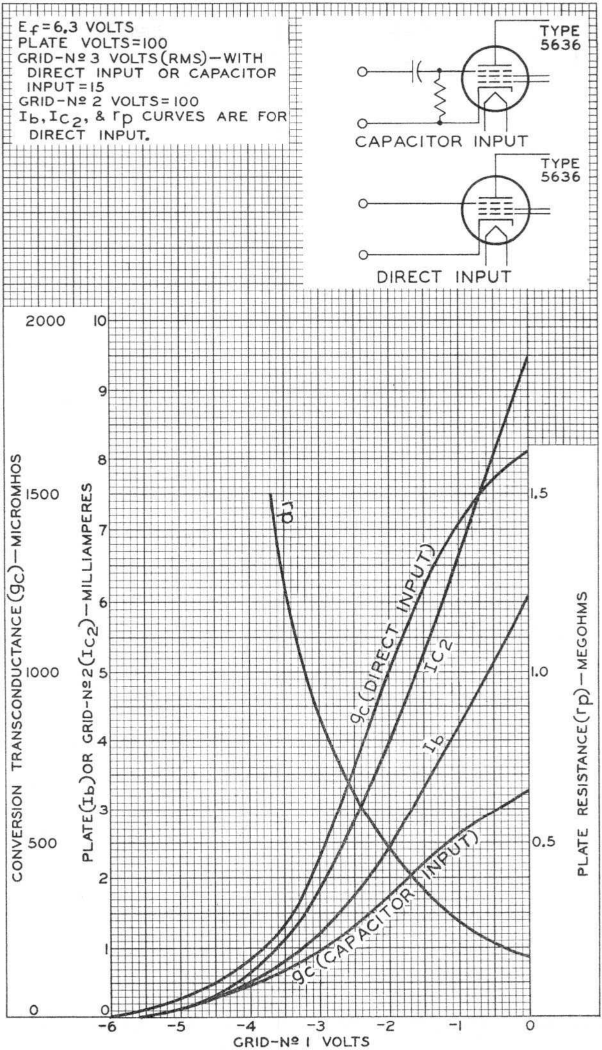
92CM-9214

5636

5636

AVERAGE CHARACTERISTICS



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92CM-9215

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

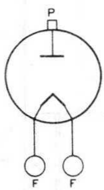
Direct Interelectrode Capacitance (Approx.):[○]

Plate to filament	0.6	μμf

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[□]

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[⊕]	8000	volts
DC Output Voltage (2 tubes)	12000	volts
DC Output Current	0.15	ma

Characteristics:

Plate Current for plate volts = 30	4	ma

○, □, ⊕: See next page.

5642

RCA

5642

HALF-WAVE VACUUM RECTIFIER

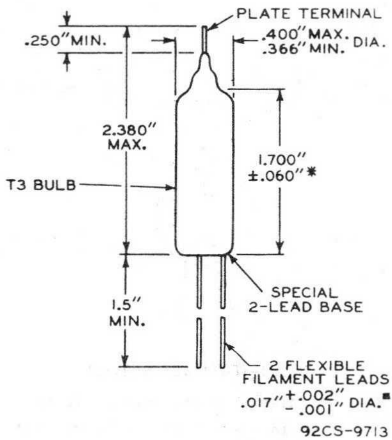
○ Without external shield.

□ 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.

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

TENTATIVE DATA

PREMIUM TYPE 5654

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:▲

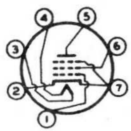
Grid No.1 to Plate	0.020 max.	μμf
Input	4.0	μμf
Output	2.85	μμf

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.

5654

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 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 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

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

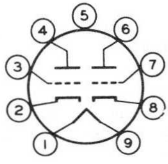
Mechanical:

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	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No. E9-1)

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.

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

	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, 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 = 150, 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 30 volts positive, from a cutoff bias of −30 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 = 5.0, plate volts = 100, and grid volts (rms) = 5.0. Tubes must meet a limit dc plate current of 11 milliamperes.

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) = 240, 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 gm limit.

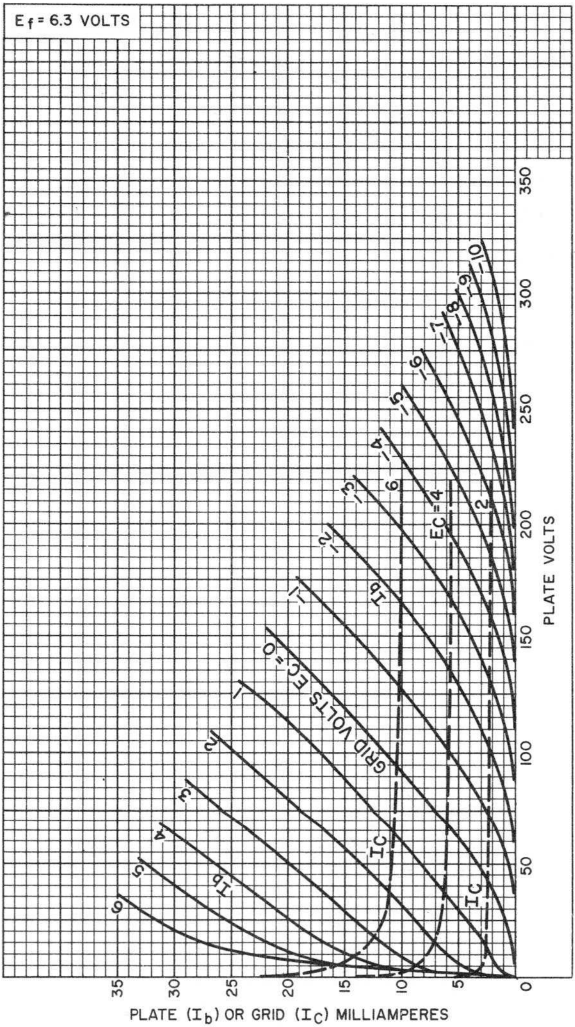
500-hour Intermittent Life Performance:

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:

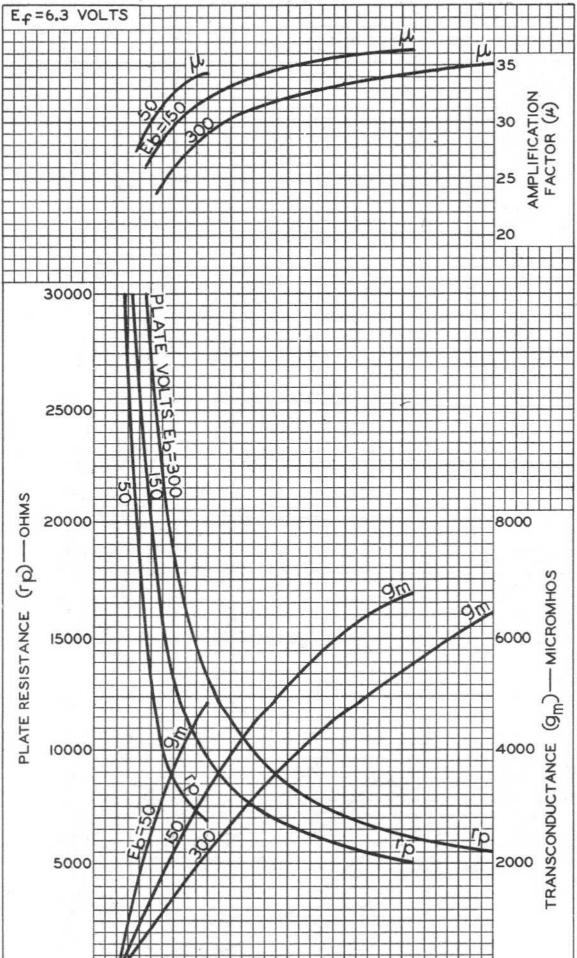
This test is performed on a minimum of one production run per month under the same condition as the 500 hour Intermittent Life Performance. At the end of 1000 hours total heater-on time, tubes must not show permanent or temporary shorts or open circuits and must pass the established 1000-hour limits for heater current, transconductance change, reverse grid current and heater cathode leakage current shown under the *Characteristics Range Values.*

AVERAGE PLATE CHARACTERISTICS
Each Unit



92CM—12087

AVERAGE CHARACTERISTICS



92CM—12088

PREMIUM 5686 TYPE

5686

BEAM POWER TUBE

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

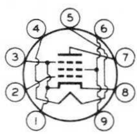
Direct Interelectrode Capacitances:

	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.

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

5686

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.

RCA

5686

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

5687

RCA 5687

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.):°

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

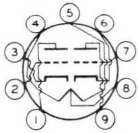
Characteristics, Class A_1 Amplifier (Each Unit):

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

°: See next page.

5687

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

° Without external shield.

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

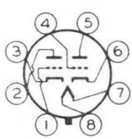
* May deviate ±10% from rated value provided such deviation occurs for less than 2% of the operating time.

° 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)

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

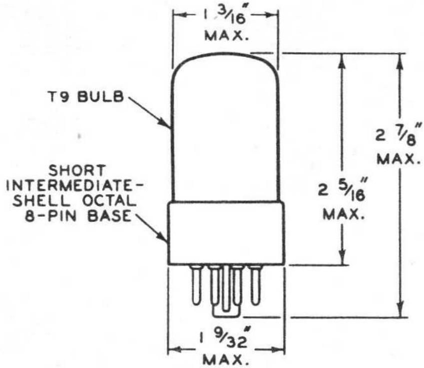
Typical Operation as Resistance-Coupled Amplifier (Each Unit)

See RESISTANCE-COUPLED AMPLIFIER CHART No. 7 at front of Receiving Tube Section.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

5691
HIGH-MU TWIN TRIODE

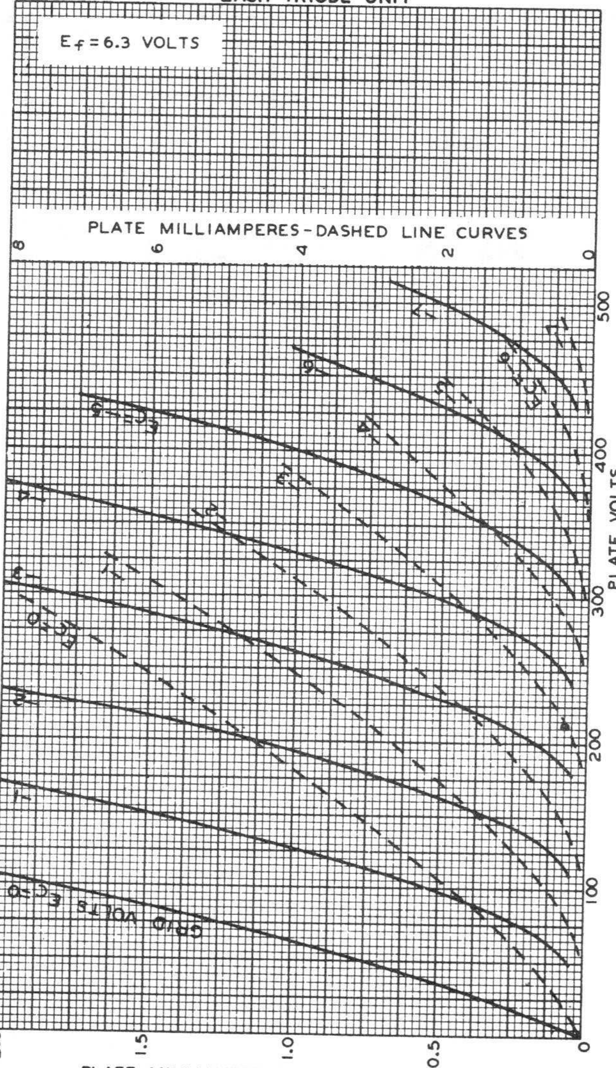


5691

RCA

5691

AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



JUNE 16, 1941

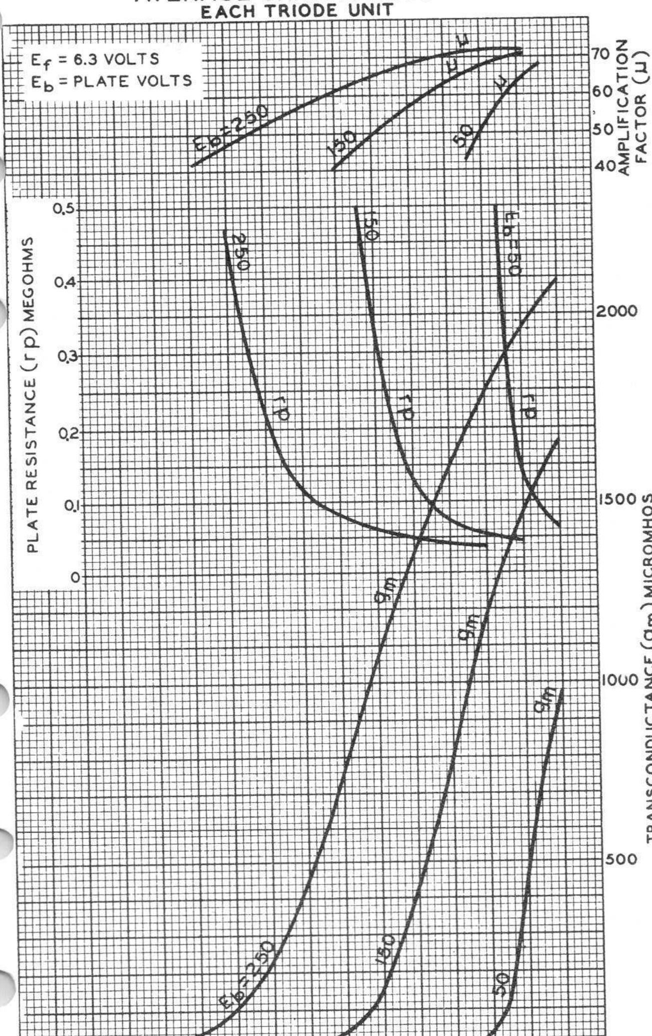
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6298

RCA

5691

AVERAGE CHARACTERISTICS
EACH TRIODE UNIT



NOV. 21,1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6913

SPECIAL RED TUBE 5692

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

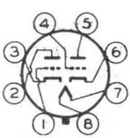
* Heater voltage may deviate ± 10% from rated value, provided such deviation occurs for less than 2% of the operating time.

° 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 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)

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.

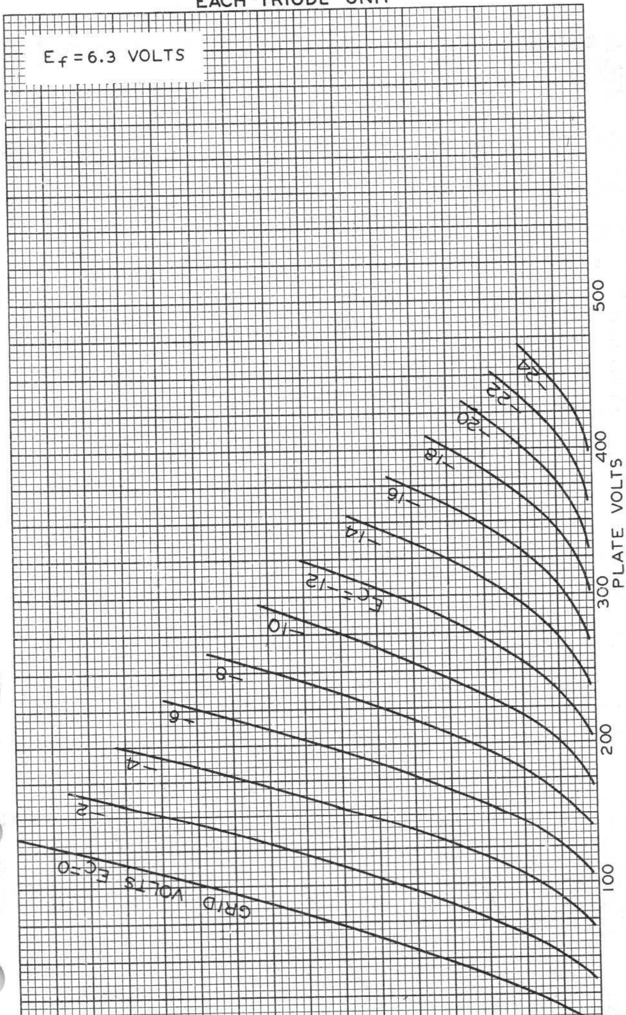
OUTLINE DIMENSIONS for the 5692 are the same as those shown for type 5691

5692

5692

AVERAGE PLATE CHARACTERISTICS

EACH TRIODE UNIT



FEB. 21, 1941

TUBE DEPARTMENT

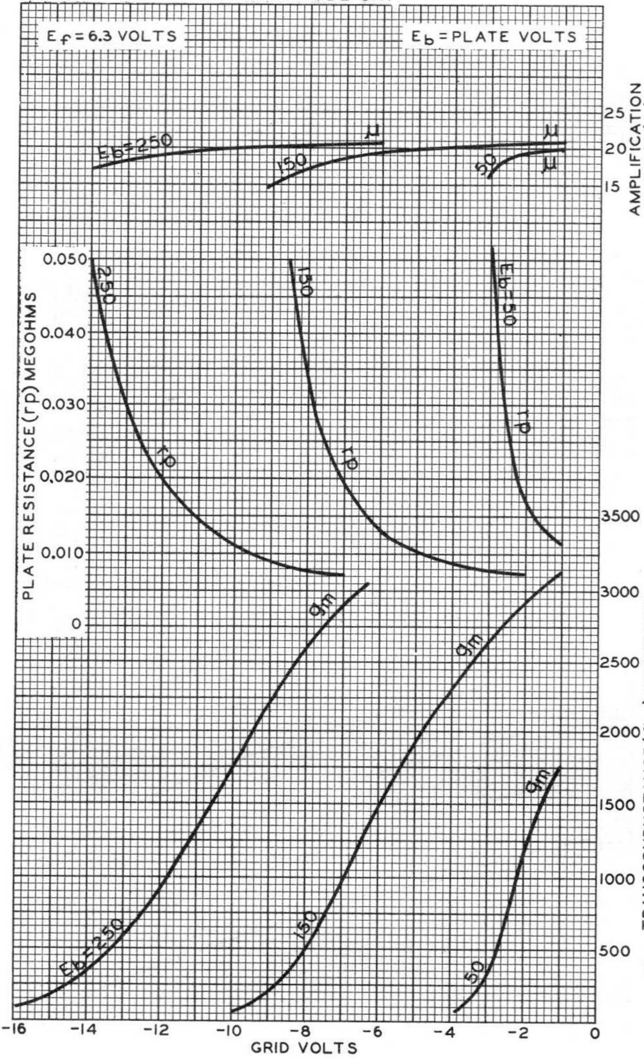
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6257

5692

5692

AVERAGE CHARACTERISTICS
EACH TRIODE UNIT



NOV. 10, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6914

5693 SPECIAL RED TUBE

5693

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.

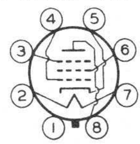
° With shell connected to cathode.

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.

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. 20 at front of Receiving Tube Section.

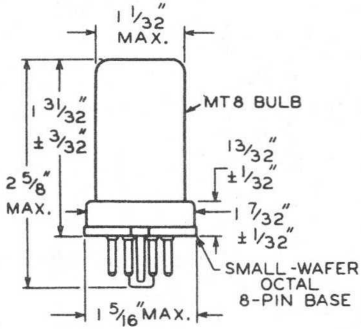
▲ The 5693 may be operated at a grid-No.2 voltage as high as the rated grid-No.2 supply voltage when the grid-No.2 dissipation rating is not exceeded for any signal condition and when a resistor is used in series with grid-No.2 and its supply voltage.

■ For resistance-coupled amplifier applications, the grid-No.1 negative bias may be as low as -0.5 volt.

5693

5693

SHARP-CUTOFF PENTODE



5693

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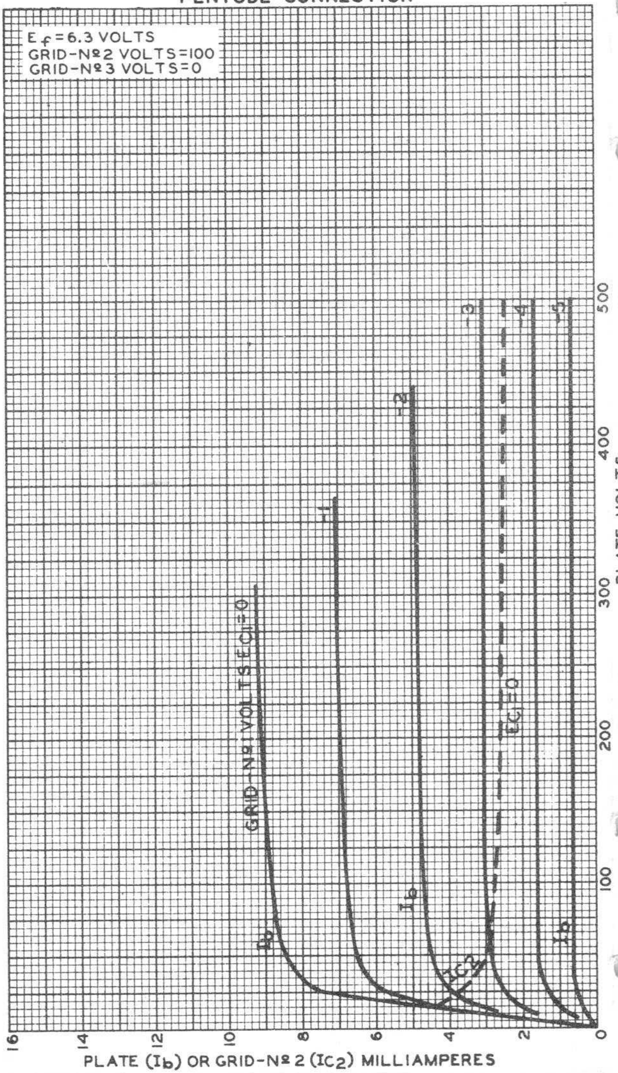
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION



OCT. 16, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4939R1

RCA

5693

OPERATION CHARACTERISTICS

E_f = 6.3 VOLTS PLATE VOLTS = 300 GRID-№ 3 VOLTS = 0

CURVE	GRID-№ 2 RESISTOR	GRID-№ 2 SUPPLY VOLTS
1	0 MEG.	100
2	0.25 MEG.	300
3	0.5 MEG.	300
4	0.75 MEG.	300

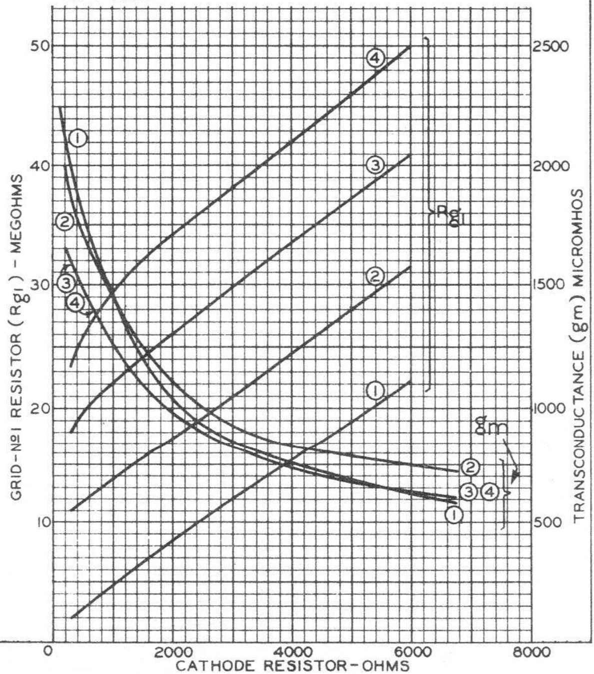
THESE CURVES ARE BASED ON THE FOLLOWING VALUES: $\Delta I_K = 300 \mu AMP$, $\Delta I_{g_1} = 0.1 \mu AMP$

EXPRESSING THESE VALUES AS A RATIO, WE HAVE:

$$\frac{\Delta I_K}{\Delta I_{g_1}} = \frac{300}{0.1} \text{ OR } 3000$$

FOR THOSE APPLICATIONS PERMITTING OTHER VALUES OF ΔI_K, A NEW RATIO OF $\Delta I_K / \Delta I_{g_1}$ CAN BE CALCULATED. THE VALUES OF R_{g_1} AS READ FROM THE CURVE MUST BE MULTIPLIED BY A FACTOR WHICH IS THE QUOTIENT OF THE NEW RATIO DIVIDED BY THE OLD RATIO. FOR EXAMPLE, IF THE NEW RATIO IS 6000 THE MULTIPLYING FACTOR IS 6000/3000, OR 2, AND VALUES OF R_{g_1} AS READ FROM THE CURVE ARE THEREFORE MULTIPLIED BY 2.

NOTE: TRANSCONDUCTANCE CURVES WERE OBTAINED WITH GRID-№ 2 RESISTOR AND CATHODE RESISTOR SUITABLY BYPASSED.



JAN. 6, 1948

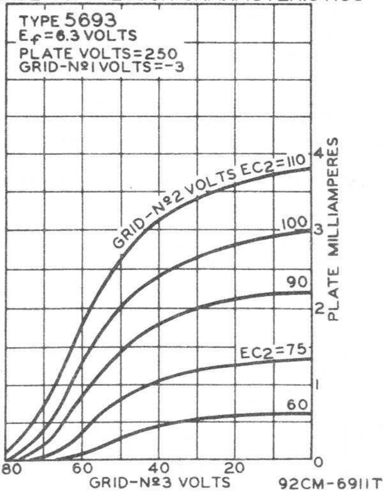
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6920R1

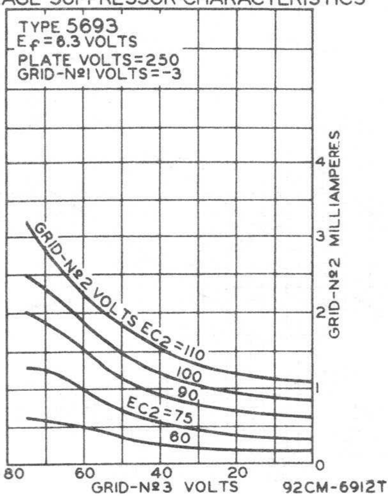
5693

SHARP-CUTOFF PENTODE

AVERAGE SUPPRESSOR CHARACTERISTICS



AVERAGE SUPPRESSOR CHARACTERISTICS



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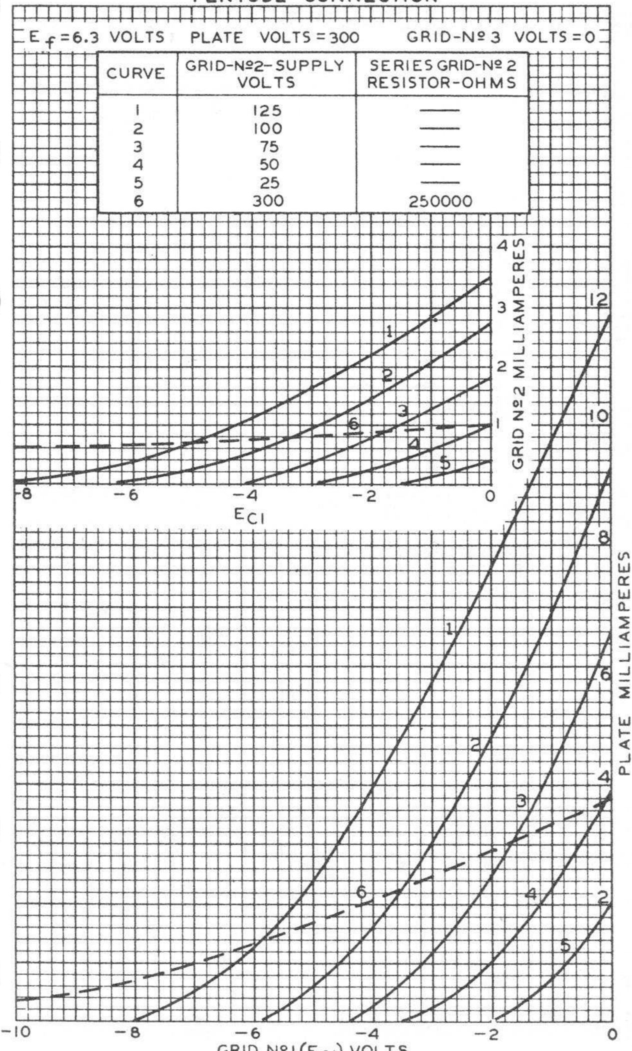
AVERAGE CHARACTERISTICS
PENTODE CONNECTION



CURVE	GRID-Nº2-SUPPLY VOLTS	SERIES GRID-Nº2 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-6443R1

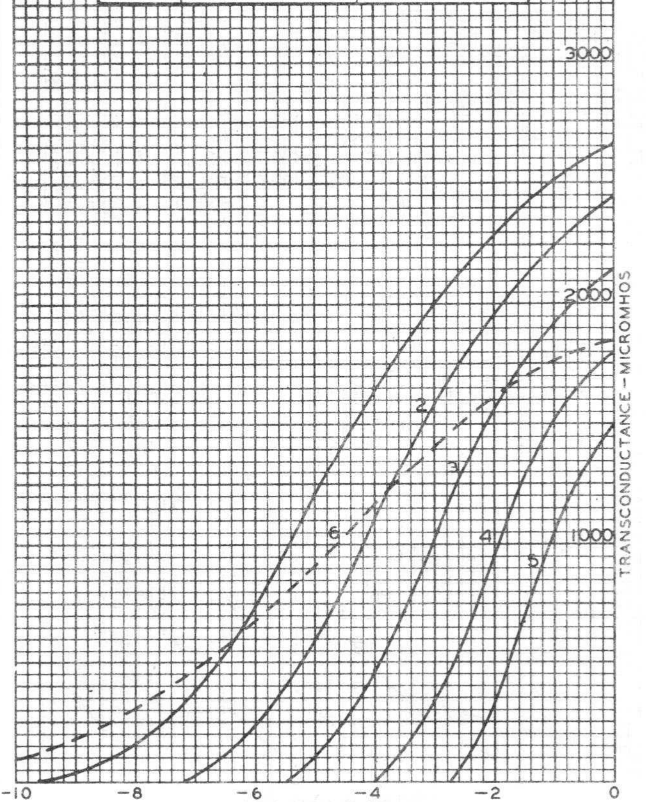
5693

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

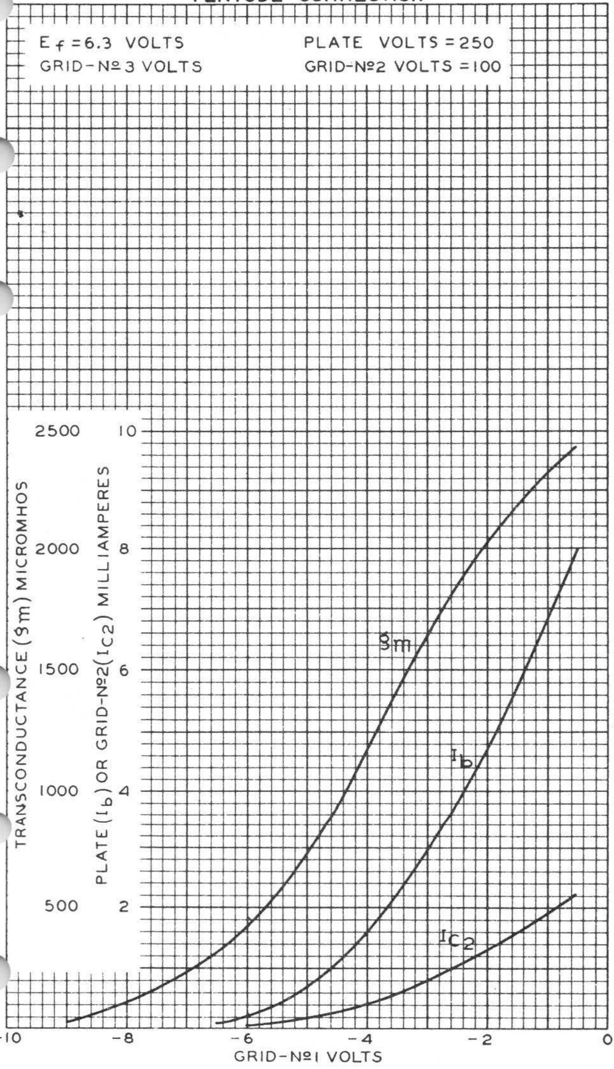


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

5693

AVERAGE CHARACTERISTICS
PENTODE CONNECTION



RCA

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
Input 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.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5718

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

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	$\mu\mu$f
Input	2.4	2.2	$\mu\mu$f
Output	2.4	0.7	$\mu\mu$f

° Having inside diameter of 0.405" and connected to lead No.5.

Characteristics, Class A_1 Amplifier:

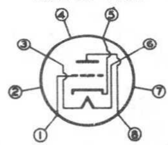
Plate Supply Voltage. . .	100	150	volts
Cathode Resistor	150	180	ohms
Amplification Factor . .	27	27	
Plate Resistance	4650	4150	ohms
Transconductance	5800	6500	μmhos
Plate Current	8.5	13.0	ma
Grid Volts (Approx.) for plate current of 10 μamp	−7	−11	volts

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

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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.

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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°	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°	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	%

° 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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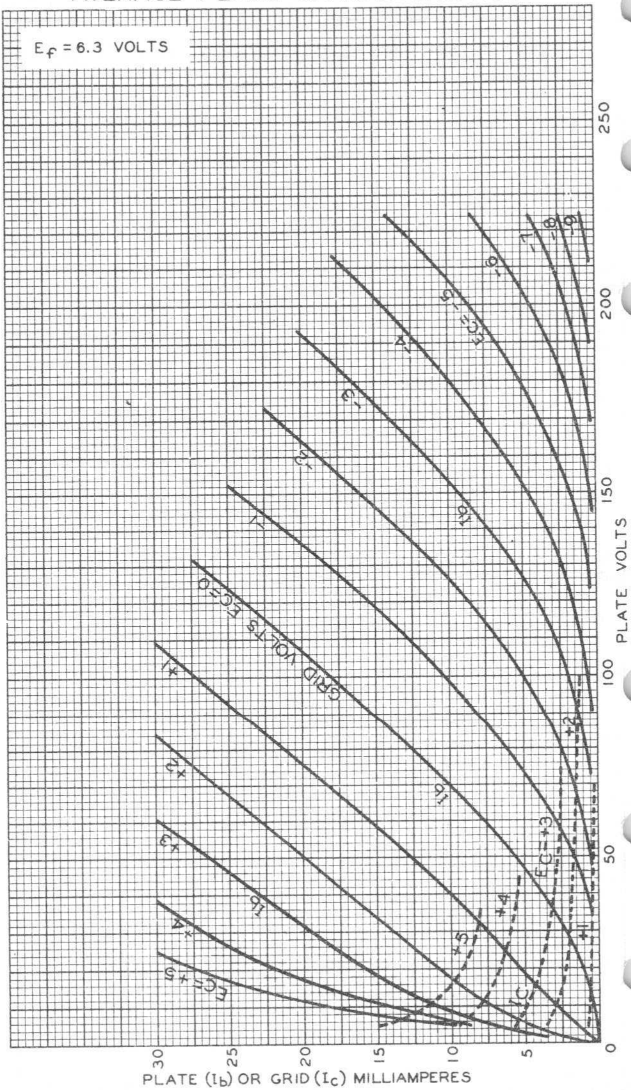
AVERAGE PLATE CHARACTERISTICS



SEPT. 23, 1952

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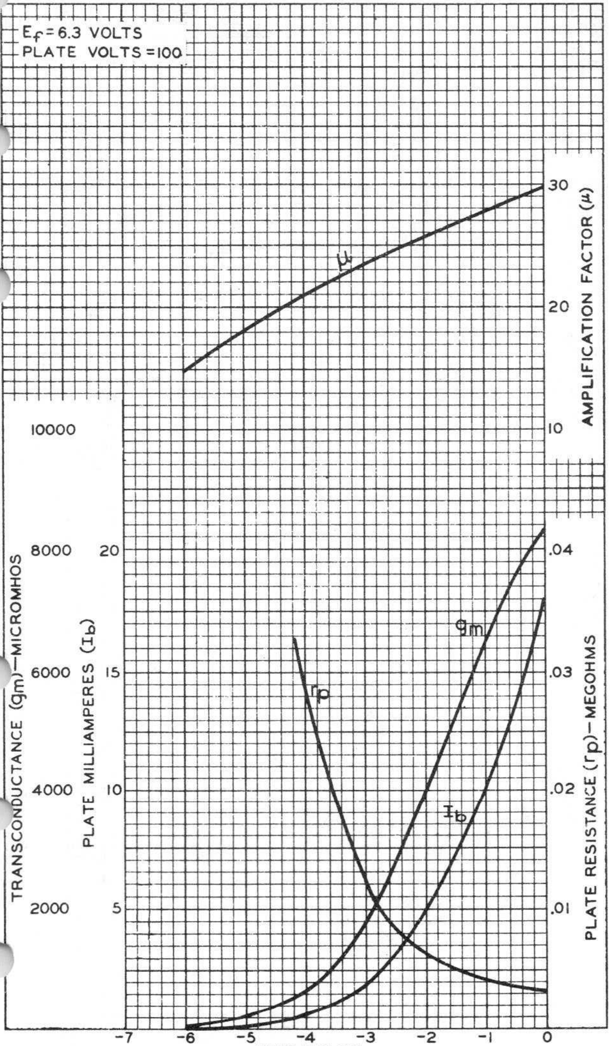
AVERAGE CHARACTERISTICS



SEPT. 25, 1952

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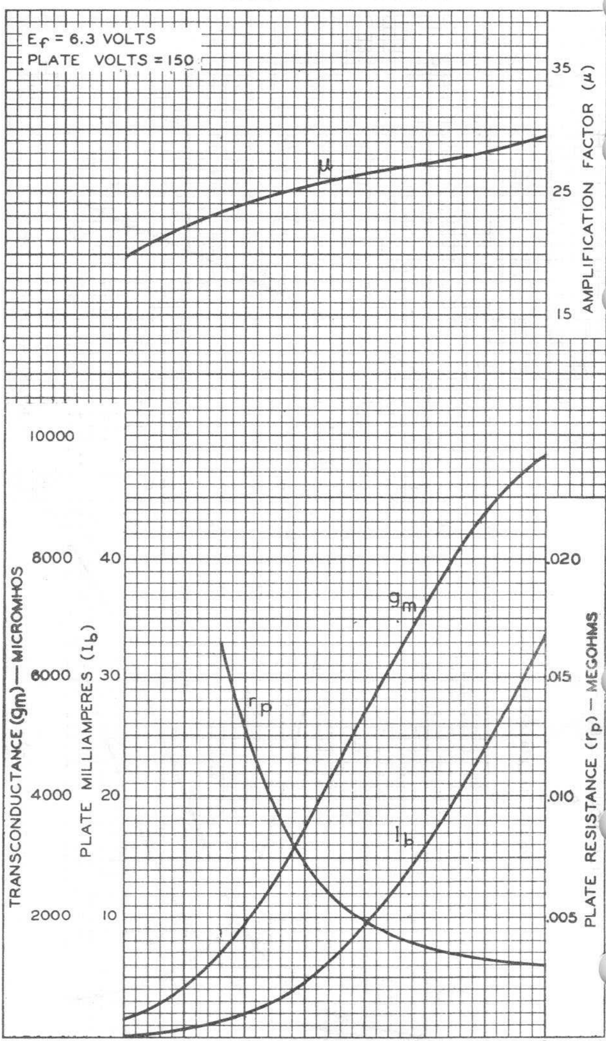
AVERAGE CHARACTERISTICS



PREMIUM TYPE 5719

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°	*Without External Shield*	
Grid to Plate	0.8	0.8	μμf
Input	1.9	1.7	μμf
Output	2.2	0.6	μμf

° Having inside diameter of 0.405" and connected to cathode.

Characteristics, Class A_1 Amplifier:

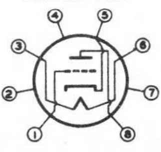
Plate Supply Voltage	100	150	volts
Cathode Resistor	1500	680	ohms
Amplification Factor	70	70	
Plate Resistance	41000	30500	ohms
Transconductance	1700	2300	μmhos
Plate Current	0.73	1.85	ma
Grid volts (Approx.) for plate current of 10 μamp	−2.5	−3.8	volts

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

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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 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	

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
Distortion	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
Distortion	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
Distortion	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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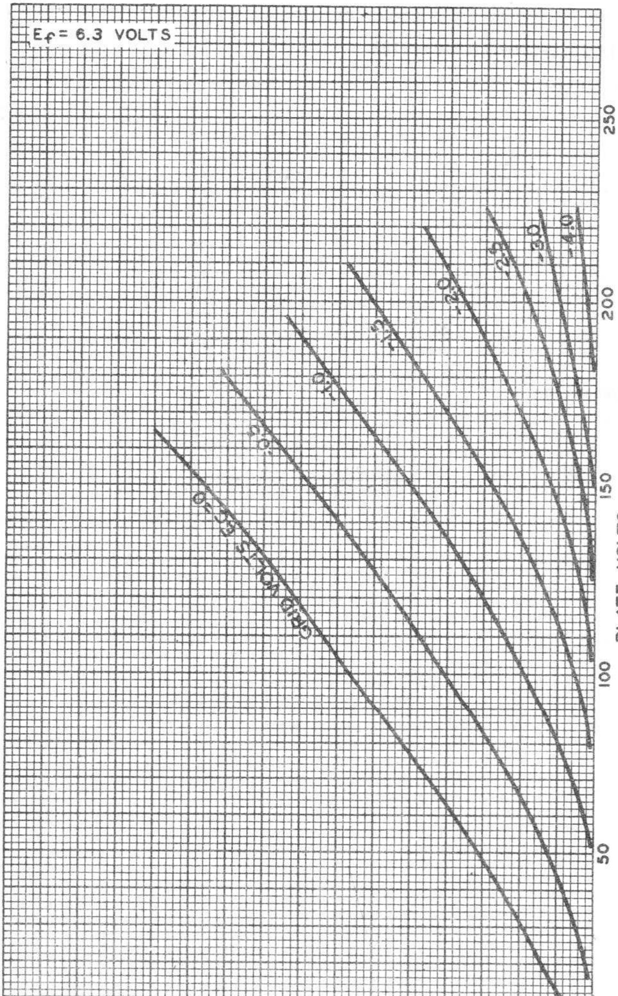
AVERAGE PLATE CHARACTERISTICS



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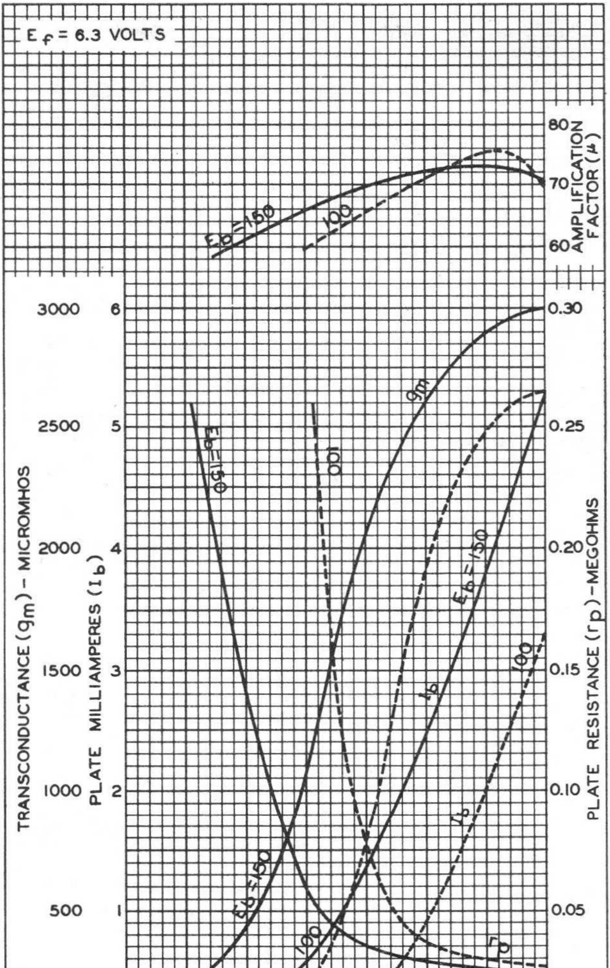
AVERAGE CHARACTERISTICS



FEB. 16, 1953

TUBE DEPARTMENT
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92CM-7926

PREMIUM TYPE 5725

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:°

Grid No.1 to plate.	0.02 max.	$\mu\mu$f
Grid No.1 to cathode & internal shield, grid No.3, grid No.2, and heater. . .	3.9	$\mu\mu$f
Plate to cathode & internal shield, grid No.3, grid No.2, and heater. . .	3	$\mu\mu$f
Grid No.1 to grid No.3.	0.15 max.	$\mu\mu$f

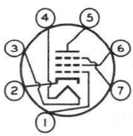
Characteristics, Class A_1 Amplifier:

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

° 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.

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.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5725

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.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

5725

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

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

PREMIUM 5726 TYPE

5726

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

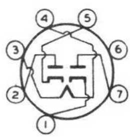
Electrical:

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.

5726

5726

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

RCA

5726

TWIN DIODE

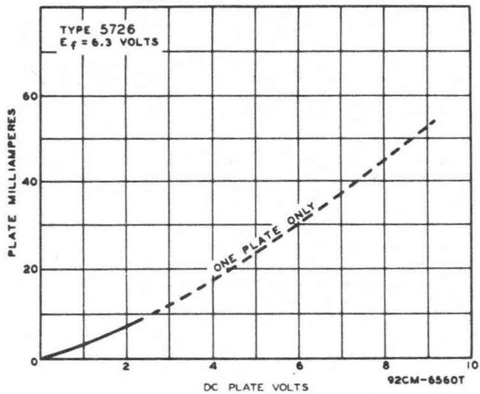
	Note	Min.	Max.	
Plate of Unit No.1 to Plate of Unit No.2	2	–	0.026	μμf
Plate Current (Per Plate) . . .	1,3	40	–	ma

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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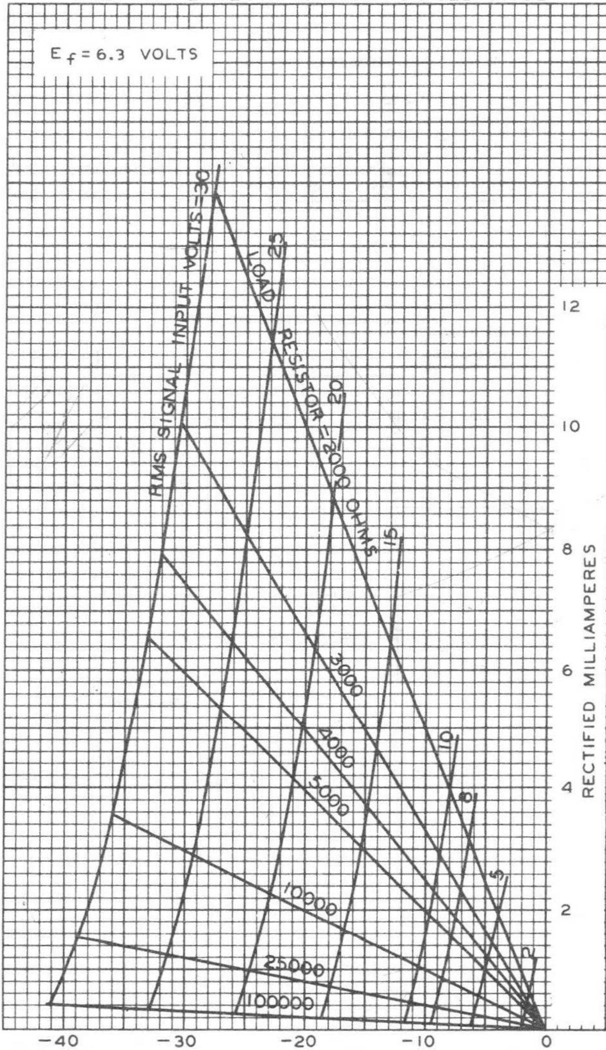
AVERAGE CHARACTERISTICS
HALF-WAVE RECTIFICATION-SINGLE DIODE



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:

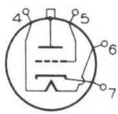
Mounting Position	Any
Maximum Angular Deflection of Plate Shaft	±0.5 degree
Maximum Overall Length (Excluding flexible leads)	1.300"
Maximum Diameter	0.328"
Envelope	Metal Shell MT-2-1/4

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 cm^2
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.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

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.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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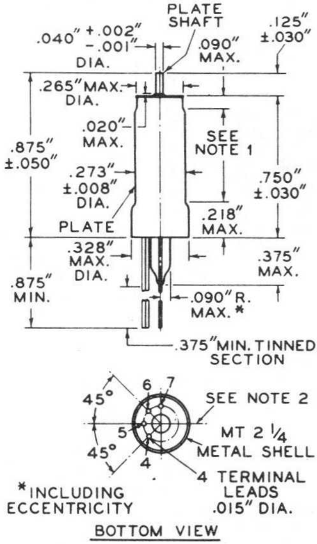
5734

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.

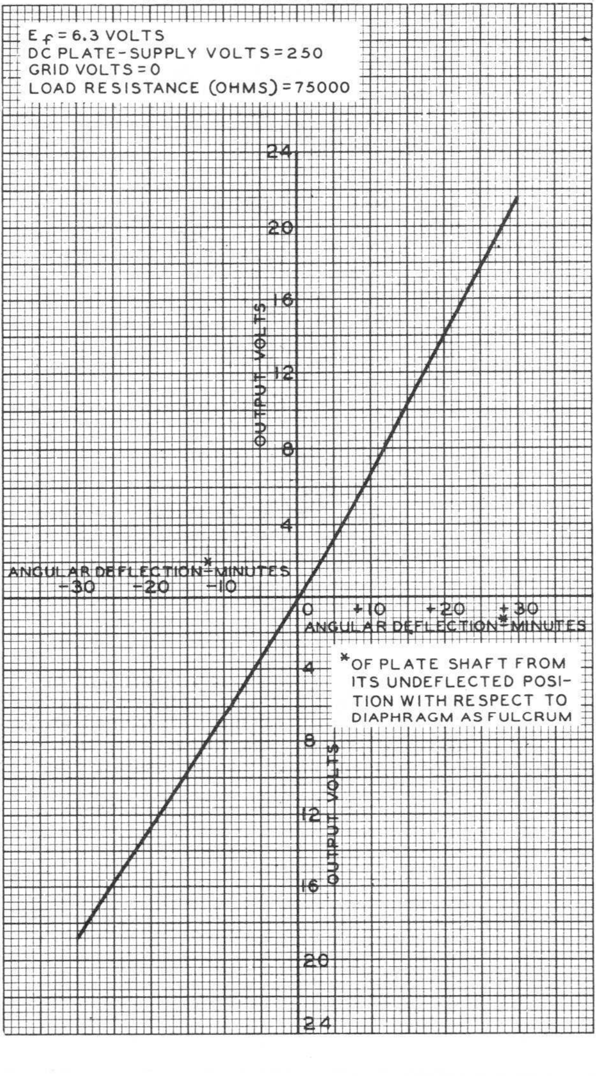
NOTE 2: THE PLANE OF DEFLECTION OF THE PLATE SHAFT WILL COINCIDE WITH THE PLANE THROUGH TERMINAL LEAD No. 5 AND THE AXIS OF THE TUBE.

92CS-7036

RCA

5734

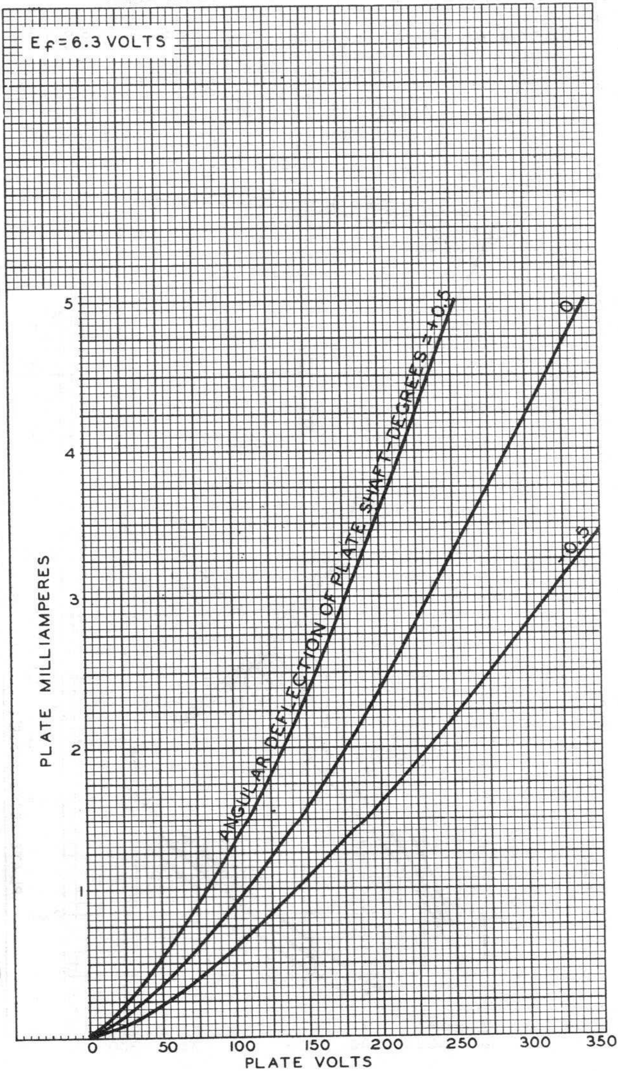
AVERAGE CHARACTERISTIC



RCA

5734

AVERAGE CHARACTERISTICS



AUG. 17, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

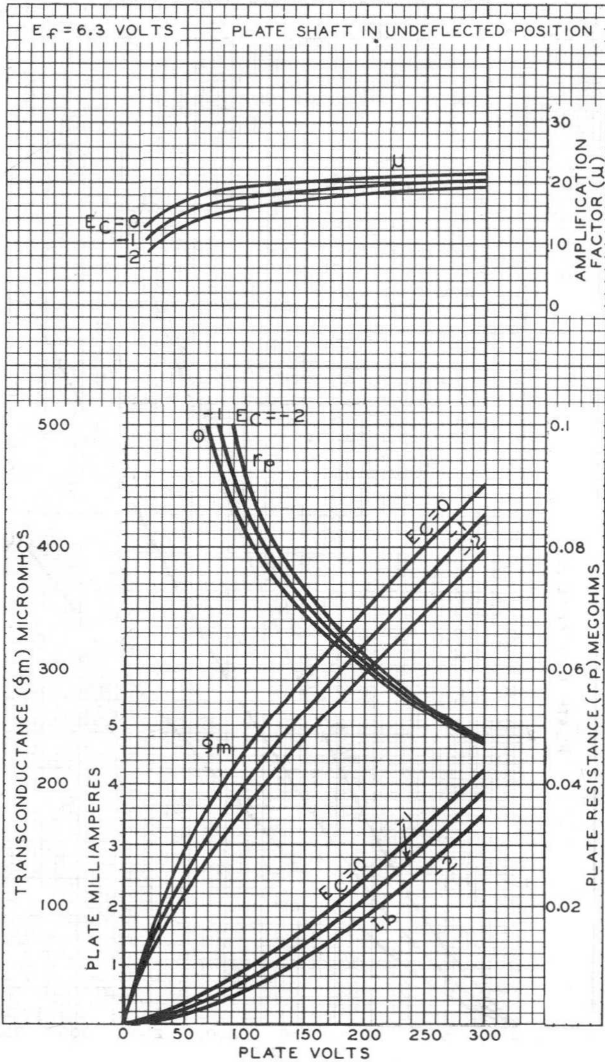
92CM-7059

5734

RCA

5734

AVERAGE CHARACTERISTICS



AUG. 17, 1948

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7057

PREMIUM TYPE 5750

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

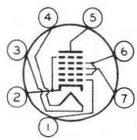
Electrical:

Heater, for Unipotential Cathode:			
Voltage	6.3		ac or dc volts
Current	0.3		amp
Direct Interelectrode Capacitances:°			
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

°: See next page.

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

5750

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

o 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-

PENTAGRID CONVERTER

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

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

PREMIUM TYPE 5751

5751

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:

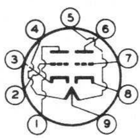
Plate Voltage	100	250	volts
Grid Voltage	−1	−3	volts
Amplification Factor	70	70	
Plate Resistance	58000	58000	ohms
Transconductance	1200	1200	μmhos
Plate Current	0.9	1.0	ma

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

5751

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:

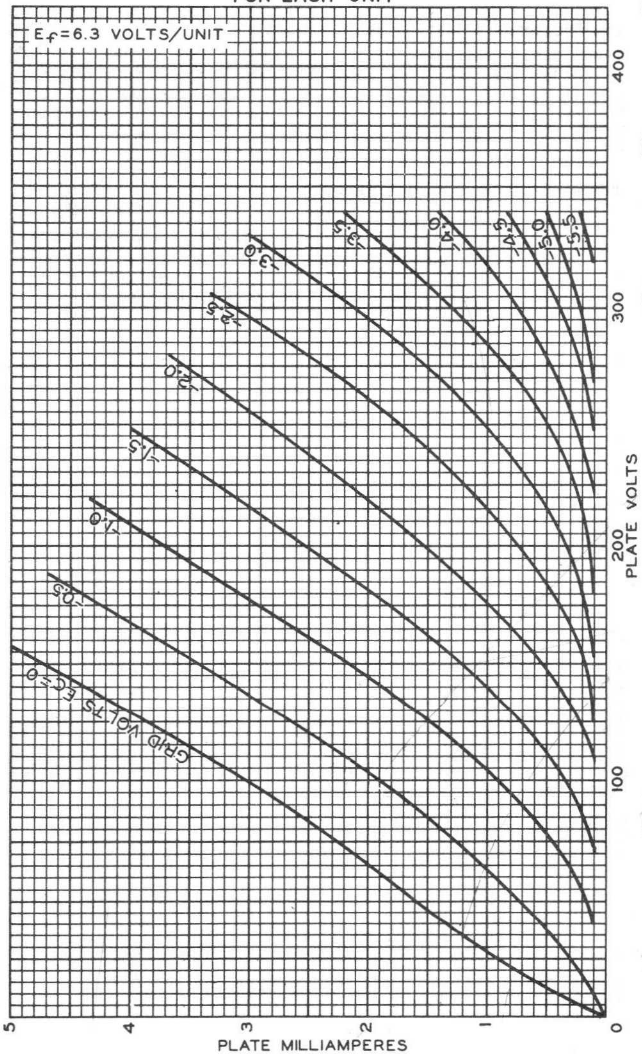
Cycles of Intermittent Operation . . . . . 2000 min. cycles

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 cathode, and plate and grid voltage = 0 volts.

RCA

5751

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



MAR. 13, 1953

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92CM-7948

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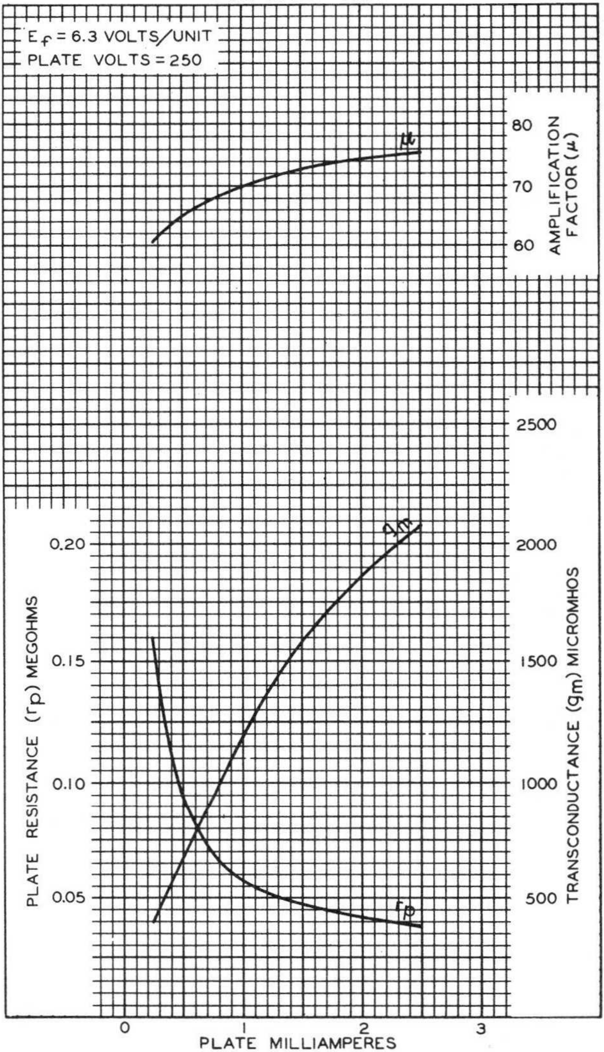
AVERAGE CHARACTERISTICS
FOR EACH UNIT



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PREMIUM TYPE 5814-A

5814-A

MEDIUM-MU TWIN TRIODE

9-PIN MINIATURE TYPE

Intended for applications where dependable performance under shock and vibration is paramount. The 5814-A, a "premium" version of the 12AU7, supersedes type 5814.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater arrangement	*Series*	*Parallel*	
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current	0.175	0.35	amp

Direct Interelectrode Capacitances (Approx.):°

	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	0.4	μμf

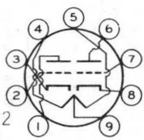
Characteristics, Class A_1 Amplifier (Each Unit):

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 current of 10 μamp. . .	–	-22	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"
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

° Without external shield.

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5814-A
MEDIUM-MU TWIN TRIODE

CATHODE CURRENT	22 max.	ma
PLATE DISSIPATION	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-Circuit Resistance:		
For fixed-bias operation	0.25 max.	megohm
For cathode-bias operation	1.0 max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN•

Values are for Each Unit and are Initial, Unless Otherwise Specified

	Note	*Min.*	*Max.*	
Heater Current	1	0.160	0.190	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	1.2	1.8	$\mu\mu$f
Grid to cathode and heater	2	1.25	1.95	$\mu\mu$f
Plate to cathode and heater (Unit No.1)	2	0.3	0.7	$\mu\mu$f
Plate to cathode and heater (Unit No.2)	2	0.2	0.6	$\mu\mu$f
Amplification Factor	1,3	15.5	18.5	
Plate Current (1)	1,3	6.5	14.5	ma
Plate-Current Difference Between Units	1,3	–	3.5	ma
Plate Current (2)	1,4	–	20	μamp
Transconductance (1)	1,3	1750	2650	μmhos
Transconductance (2)	1,5	2500	3700	μmhos
Transconductance (2) at 500 hours	1,5	2000	3700	μmhos
Transconductance (3)	5,6	2250	–	μmhos
Transconductance Change: Difference between average transconductance (2) initially, and average after 500 hours, expressed as a percentage of the initial average	1,5	–	15	%

•, Notes 1 to 6: See next page.

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MEDIUM-MU TWIN TRIODE

	Note	Min.	Max.	
Reverse Grid Current.	1,7	–	0.5	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	–	500	megohms
Between plate and all other electrodes tied together	1,12	–	500	megohms
Leakage Resistance at 500 hours:				
Between grid and all other electrodes tied together	1,11	–	250	megohms
Between plate and all other electrodes tied together	1,12	–	250	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: With dc plate volts = 250, and dc grid volts = -8.5. Each unit tested separately. Unit not under test connected to ground.

Note 4: With dc plate-supply volts = 250, plate load resistance (megohms) = 0.5, and dc grid volts = -30. Each unit tested separately. Unit not under test connected to ground.

Note 5: With dc plate volts = 100, and dc grid volts = 0. 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 volts = 250, grid-circuit resistance (megohms) = 0.5, and dc grid volts = -8.5. 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 = -30. Each unit tested separately. Unit not under test connected to ground.

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.

• 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.

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MEDIUM-MU TWIN TRIODE

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 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 (1).

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 = -8.5, 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) = 1500 common to both units, and plate load resistance (ohms) = 50,000.

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MEDIUM-MU TWIN TRIODE

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. With both units operating, each unit is checked for variation in transconductance (1) 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 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 1.0 microampere 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 volts = 250, grid volts = -8.5, grid-circuit resistance (megohms) = 0.5, heater 135 volts positive with respect to cathode, and bulb temperature (^{o}C) = 165. 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 (2), transconductance change, and leakage resistance are shown under CHARACTERISTICS RANGE VALUES.

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MEDIUM-MU TWIN TRIODE

OPERATING CONDITIONS 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	3400	9400	22000	ohms
Peak Output Voltage	16	19	20	volts
Voltage Gain▲	12	12	12	
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	2800	8400	20000	ohms
Peak Output Voltage	32	37	42	volts
Voltage Gain▲	13	13	13	
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	2600	7000	18000	ohms
Peak Output Voltage	44	52	58	volts
Voltage Gain▲	14	13	13	

▲ At 2 volts (rms) output.

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

5814-A

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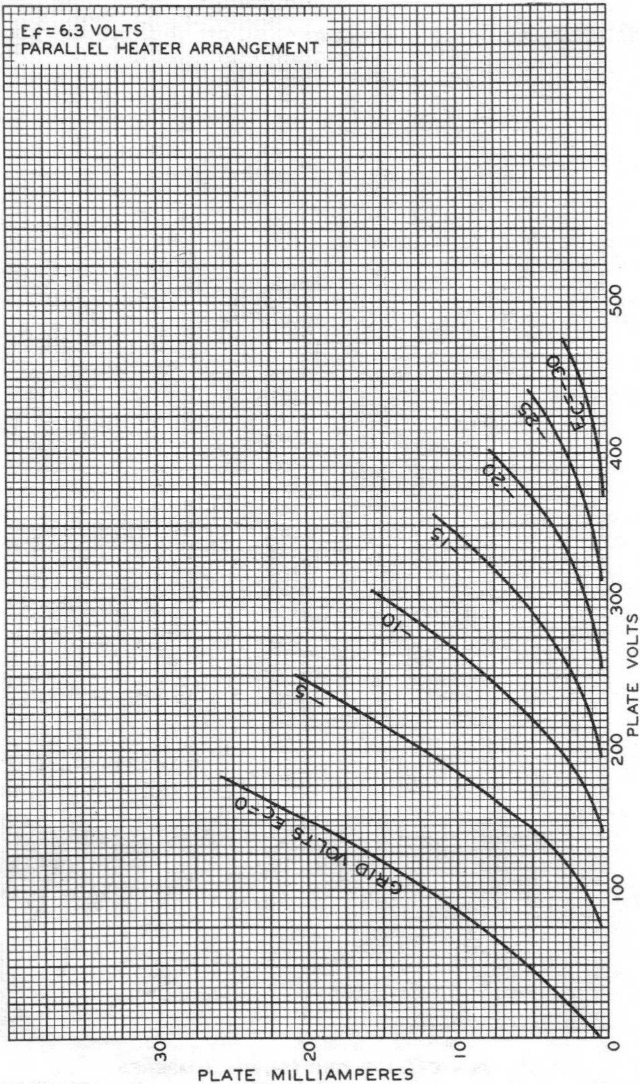
5814-A
AVERAGE PLATE CHARACTERISTICS
EACH UNIT



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5814-A

AVERAGE CHARACTERISTICS

EACH UNIT

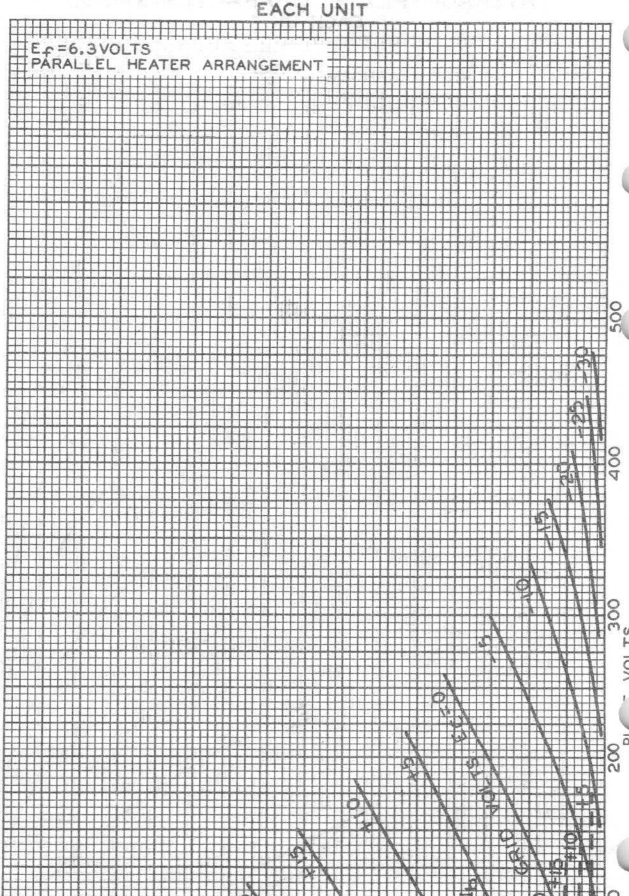

PLATE (I_b) OR GRID (I_c) MILLIAMPERES

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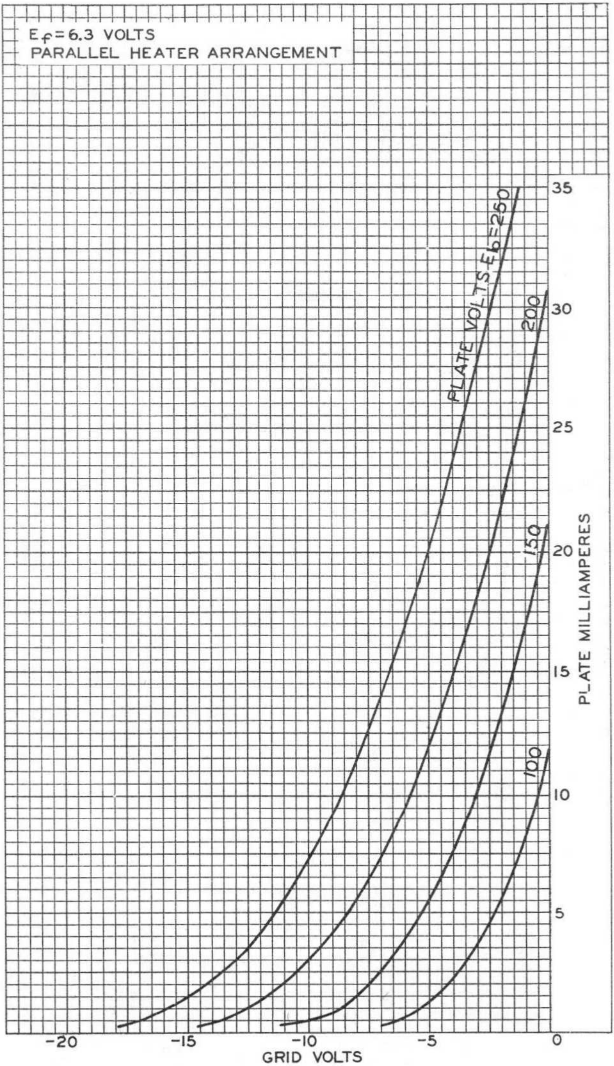
AVERAGE CHARACTERISTICS

EACH UNIT



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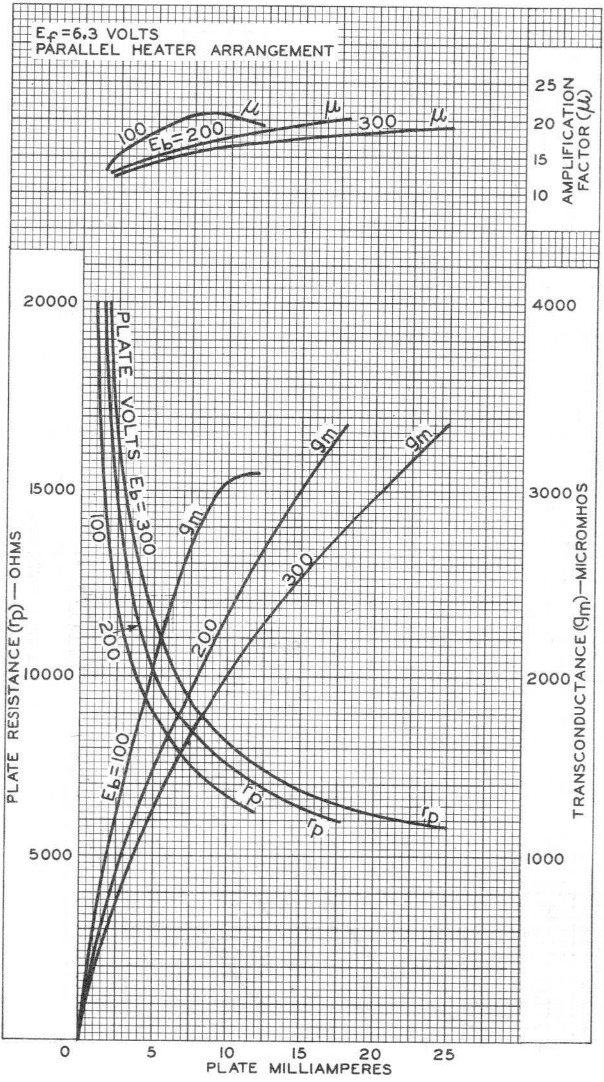
92CM-9097

5814-A

5814-A
AVERAGE CHARACTERISTICS
EACH UNIT



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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:

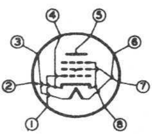
Plate Supply Voltage	100	volts
Grid-No.2 Supply Voltage	100	volts
Cathode Resistor	150	ohms
Plate Resistance	260000	ohms
Transconductance	5000	μmhos
Plate Current	7.5	ma
Grid-No.2 Current	2.4	ma
Grid-No.1 Volts (Approx.) for plate current of 10 μamp . . .	-9	volts

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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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	μmhos
Transconductance	5,3	3750	-	μmhos
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.

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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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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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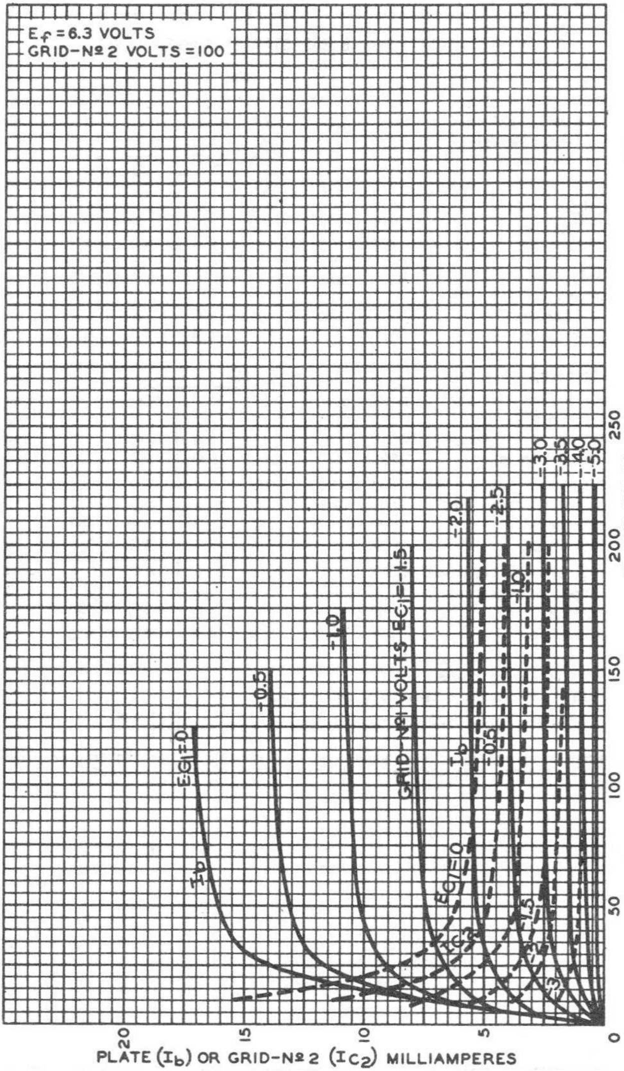
AVERAGE PLATE CHARACTERISTICS

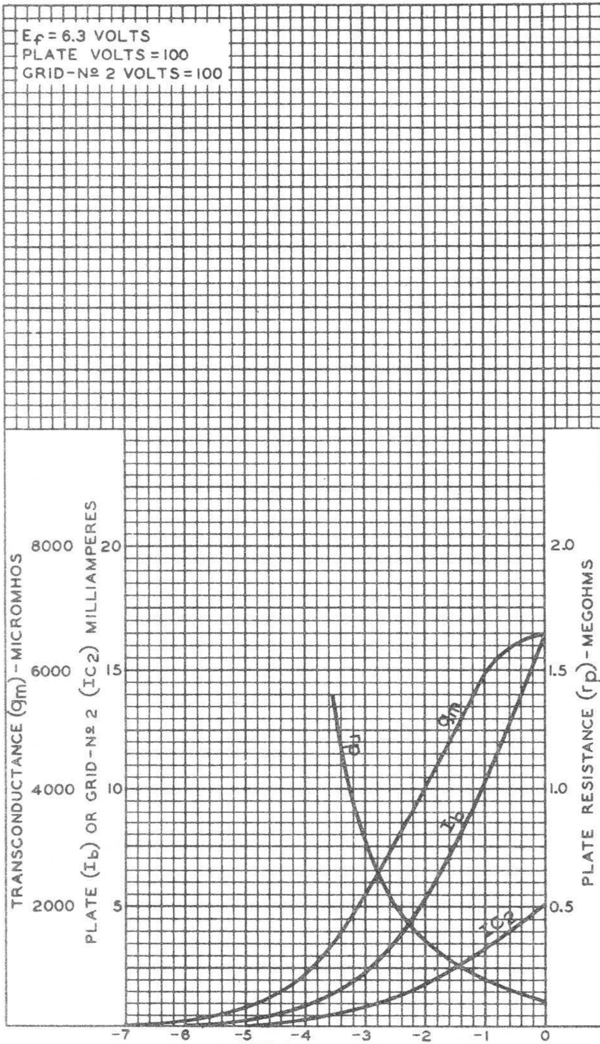


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

5840

AVERAGE CHARACTERISTICS



JAN. 8, 1953

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7892

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

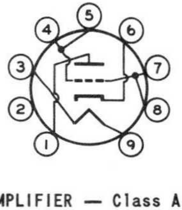
Characteristics, Class A_1 Amplifier:

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 (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)
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

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.

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.	$\mu\mu$f
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater	7	7.1	$\mu\mu$f
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater	2.5	2.9	$\mu\mu$f

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

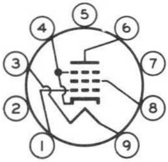
Mechanical:

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 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2

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.

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 μa = 10	–	–	–8	volts

Mechanical:

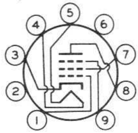
Operating Position	Any
Maximum Overall Length	2-3/16"
Maximum Seated Length	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip)	1-9/16" ± 3/32"
Diameter	0.750" to 0.875"
Dimensional Outline	See *General Section*
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)

← Indicates a change.

5879

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 A₁

→ **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.

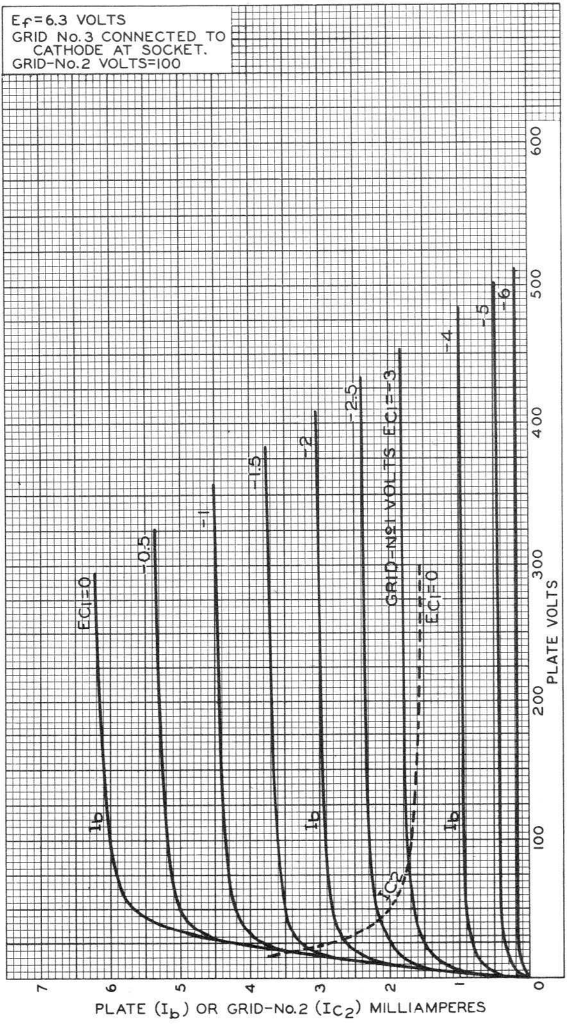
→ Indicates a change.

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.

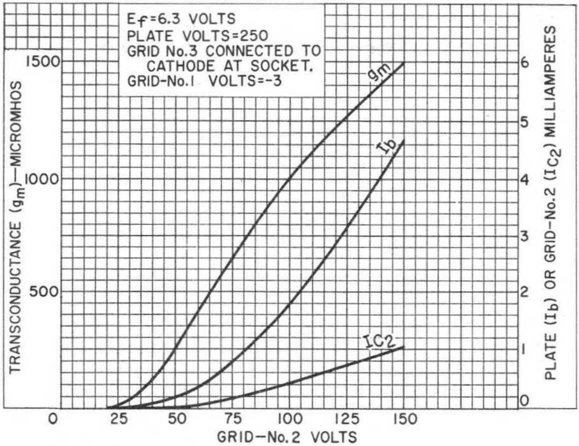
← Indicates a change.

AVERAGE CHARACTERISTICS
Pentode Connection

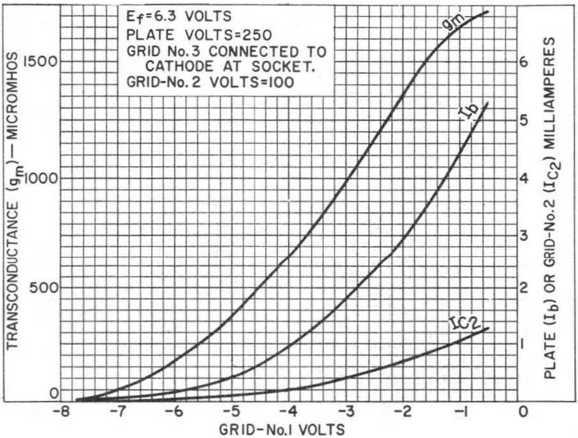


92CM-7439R1

AVERAGE CHARACTERISTICS
Pentode Connection

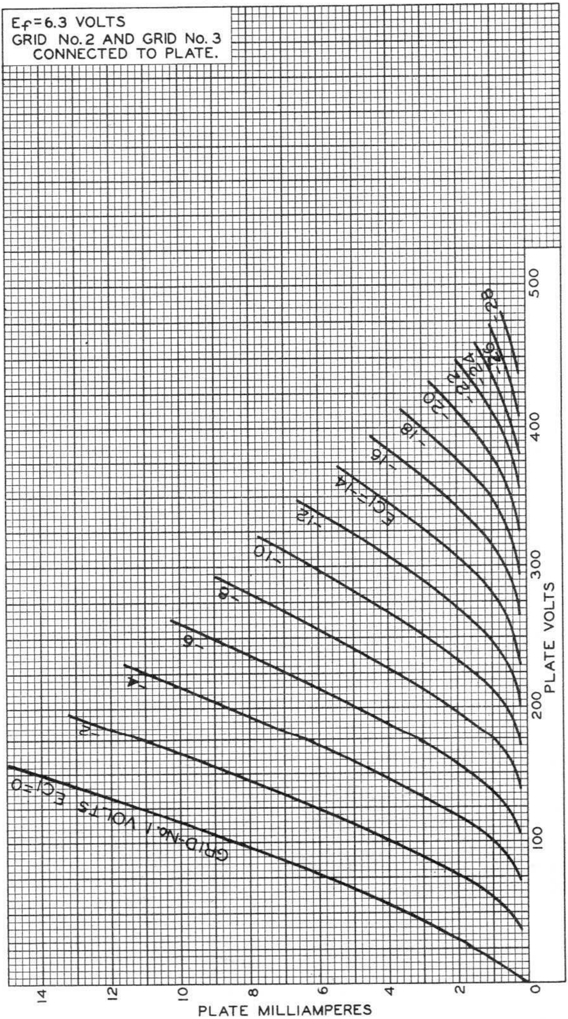


92CS—11053



92CS-11052

AVERAGE PLATE CHARACTERISTICS
Triode Connection



92CM-7446

5881

BEAM POWER TUBE

For audio-frequency power amplifier applications

GENERAL DATA

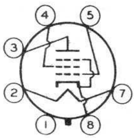
Electrical:

Heater, for Unipotential Cathode:
- Voltage . . . . 6.3 . . . . . . .ac or dc volts
- Current . . . . 0.9 . . . . amp

Mechanical:

Mounting Position . . . . Any
Maximum Overall Length. . . . . 3-15/32"
Maximum Seated Length . . . . 2-29/32"
Maximum Diameter. 1-7/16"
Bulb. T11
Base. . . . . .Short Intermediate-Shell Octal 7-Pin with External Barriers (JETEC No.B7-59)
Basing Designation for BOTTOM VIEW. 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	400 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
GRID-No.2 INPUT	3 max.	watts
PLATE DISSIPATION	23 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	250	300	350	volts
Grid-No.2 Voltage	250	200	250	volts
Grid-No.1 (Control-Grid) Voltage	-14	-12.5	-18	volts
Peak AF Grid-No.1 Voltage . . .	14	12.5	18	volts
Zero-Signal Plate Current . . .	75	48	53	ma
Max.-Signal Plate Current . . .	80	55	65	ma
Zero-Signal Grid-No.2 Current .	4.3	2.5	2.5	ma
Max.-Signal Grid-No.2 Current .	7.6	4.7	8.5	ma
Plate Resistance (Approx.). . .	30000	35000	48000	ohms
Transconductance.	6100	5300	5200	μmhos
Load Resistance	2500	4500	4200	ohms
Total Harmonic Distortion . . .	10	11	13	%
Max.-Signal Power Output. . . .	6.7	6.5	11.3	watts

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5881

BEAM POWER TUBE

Maximum Circuit Values:

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

AF POWER AMPLIFIER - Class A_1

Triode Connection - Grid No.2 Connected to Plate

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE.	400 max.	volts
PLATE DISSIPATION.	26 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.	250	300	volts
Grid-No.1 (Control-Grid) Voltage.	−18	−20	volts
Peak AF Grid-No.1 Voltage. . . .	18	20	volts
Zero-Signal Plate Current. . . .	52	78	ma
Max.-Signal Plate Current. . . .	58	85	ma
Amplification Factor	8	–	
Transconductance	5250	–	μmhos
Load Resistance.	4000	4000	ohms
Total Harmonic Distortion. . . .	6	5.5	%
Max.-Signal Power Output	1.4	1.8	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

PUSH-PULL AF POWER AMPLIFIER - Class A_1

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE.	400 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
GRID-No.2 INPUT.	3 max.	watts
PLATE DISSIPATION.	23 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:

Unless otherwise specified, values are for 2 tubes

Plate Voltage.	250	270	volts
Grid-No.2 Voltage.	250	270	volts
Grid-No.1 (Control-Grid) Voltage.	−16	−17.5	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	32	35	volts

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BEAM POWER TUBE

Zero-Signal Plate Current. . .	120	134	ma
Max.-Signal Plate Current. . .	140	155	ma
Zero-Signal Grid-No.2 Current.	10	11	ma
Max.-Signal Grid-No.2 Current.	16	17	ma
Plate Resistance (Approx., per tube).	24500	23500	ohms
Transconductance (Per tube). .	5500	5700	μmhos
Effective Load Resistance (Plate to plate)	5000	5000	ohms
Total Harmonic Distortion. . .	2	2	%
Max.-Signal Power Output . . .	14.5	17.5	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:*

PLATE VOLTAGE.	400 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE.	400 max.	volts
GRID-No.2 INPUT.	3 max.	watts
PLATE DISSIPATION.	23 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:

Values are for 2 tubes

Plate Voltage.	360	360	volts
Grid-No.2 Voltage.	270	270	volts
Grid-No.1 (Control-Grid) Voltage†	-22.5	-22.5	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	45	45	volts
Zero-Signal Plate Current. . . .	88	88	ma
Max.-Signal Plate Current. . . .	132	140	ma
Zero-Signal Grid-No.2 Current. .	5	5	ma
Max.-Signal Grid-No.2 Current. .	15	11	ma
Effective Load Resistance (Plate to plate)	6600	3800	ohms
Total Harmonic Distortion. . . .	2	2	%
Max.-Signal Power Output	26.5	18	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

†: See next page.

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BEAM POWER TUBE

PUSH-PULL AF POWER AMPLIFIER - Class AB_1

Triode Connection - Grid No.2 Connected to Plate

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	400 max.	volts
PLATE DISSIPATION	26 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:

Values are for 2 tubes

Plate Voltage	400	volts
Grid-No.1 (Control-Grid) Voltage†	-45	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	90	volts
Zero-Signal Plate Current	65	ma
Max.-Signal Plate Current	130	ma
Effective Load Resistance (Plate to plate)	4000	ohms
Total Harmonic Distortion	4.4	%
Max.-Signal Power Output	13.3	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

PUSH-PULL AF POWER AMPLIFIER - Class AB_2

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	400 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
GRID-No.2 INPUT	3 max.	watts
PLATE DISSIPATION	23 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:

Values are for 2 tubes

Plate Voltage	360	360	volts
Grid-No.2 Voltage	225	270	volts
Grid-No.1 (Control-Grid) Voltage■	-18	-22.5	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	52	72	volts
Zero-Signal Plate Current	78	88	ma

† 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.

■: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5881

BEAM POWER TUBE

Max.-Signal Plate Current . . .	142	205	ma
Zero-Signal Grid-No.2 Current .	3.5	5	ma
Max.-Signal Grid-No.2 Current .	11	16	ma
Effective Load Resistance (Plate to plate).	6000	3800	ohms
Total Harmonic Distortion . . .	2	2	%
Max.-Signal Power Output. . . .	31	47	watts

Maximum Circuit Values:

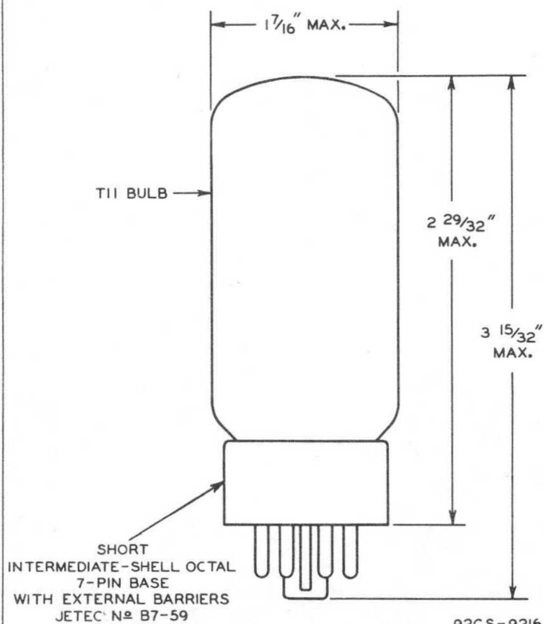
Grid-No.1-Circuit Resistance:■

For fixed-bias operation. . . . . 0.1 max. megohm

For cathode-bias operation. . . . . Not recommended

■ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the AB_2 stage should be held at a low value. For this purpose, the use of transformer coupling is recommended.

Curves shown under Types 6L6, 6L6-G also apply to the 5881



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5915

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.

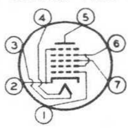
Characteristics, Class A Amplifier:

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

5915

5915
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.	^{o}C

Typical Operation:

	CUTOFF CONDITION Grid-No.1 Control	*CUTOFF CONDITION* Grid-No.3 Control	*ZERO-BIAS CONDITION*	
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

	Note	Min.	Max.	
Cutoff Condition				
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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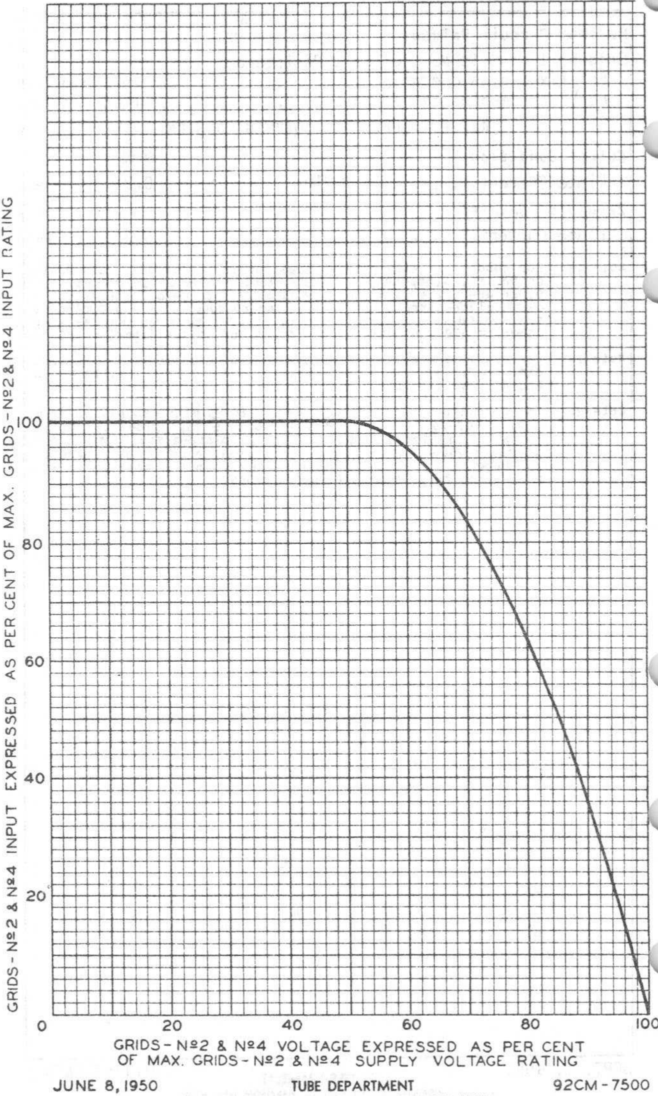
GRIDS—№ 2 & № 4 INPUT RATING CURVE



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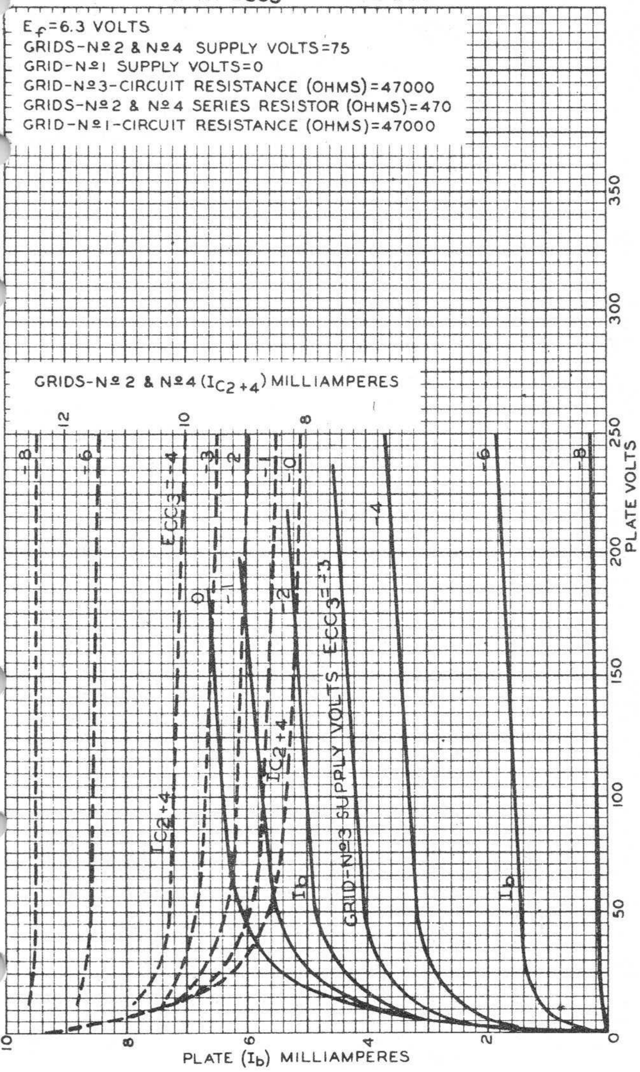
AVERAGE OPERATION CHARACTERISTICS
WITH E_{CC3} AS VARIABLE



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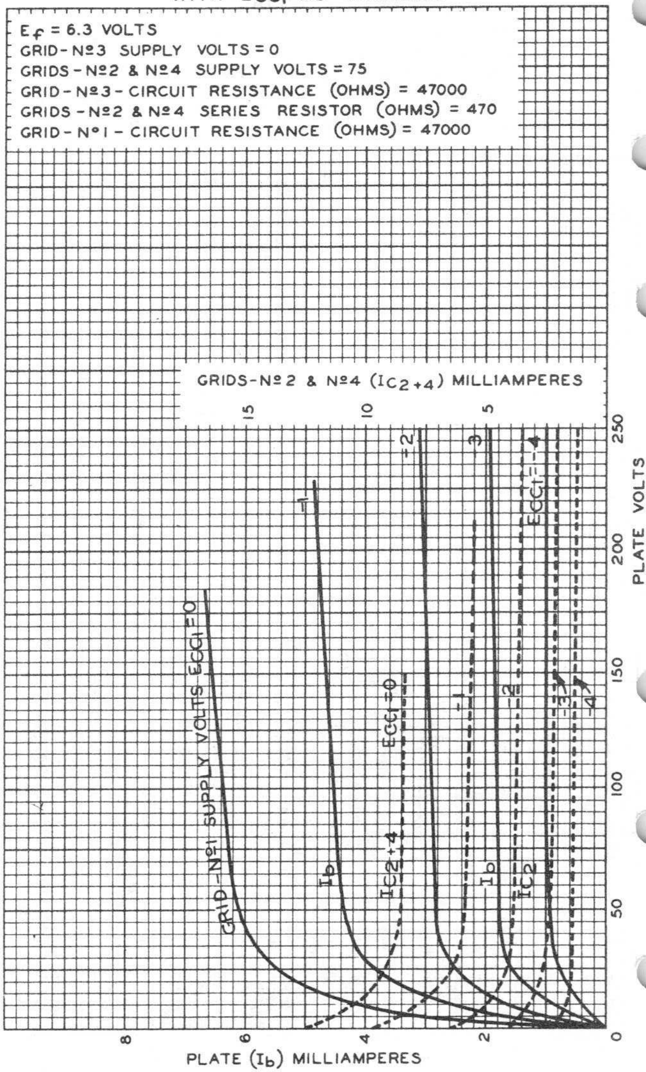
AVERAGE OPERATION CHARACTERISTICS
WITH E_{CC1} AS VARIABLE



JUNE 8, 1950

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92CM-7498

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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 arrangment	*Series*	*Parallel*	
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current	0.15	0.3	amp

Microphonism . . . . Not Tested

Direct Interelectrode Capacitances (Approx.):°

	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

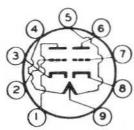
Characteristics, Class A_1 Amplifier (Each Unit):

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

° 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	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.

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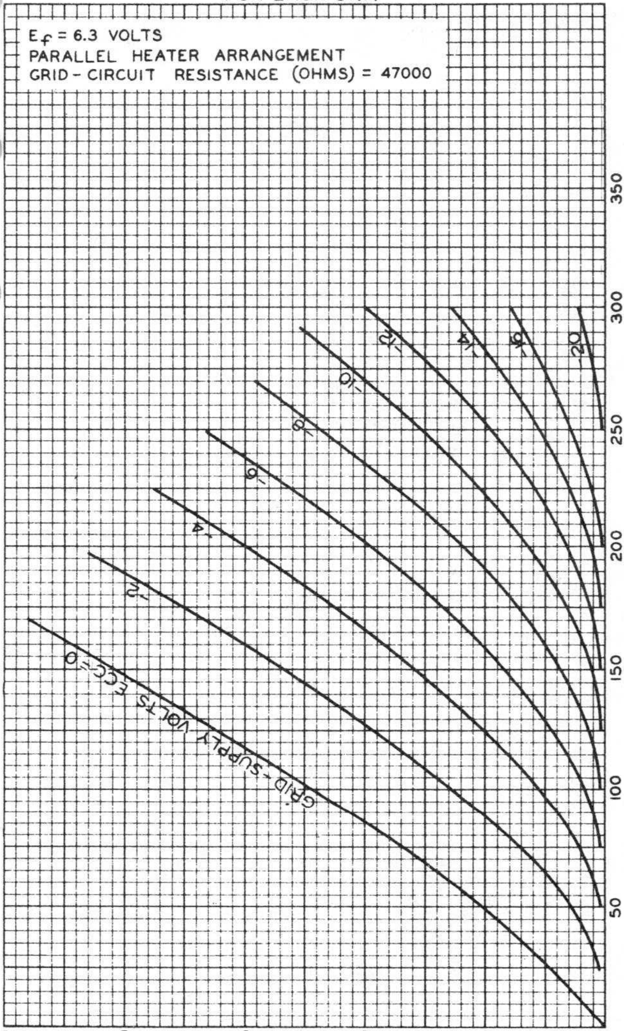
AVERAGE OPERATION CHARACTERISTICS
FOR EACH UNIT



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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	$\mu\mu f$
Grid to Cathode and Heater	2.1	$\mu\mu f$
Plate to Cathode and Heater	0.4	$\mu\mu f$
Grid of Unit No.1 to Grid of Unit No.2	0.4 max.	$\mu\mu f$

° With no external shielding.

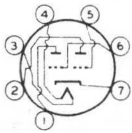
Characteristics, Class A Amplifier (Each Unit, with both units operating):

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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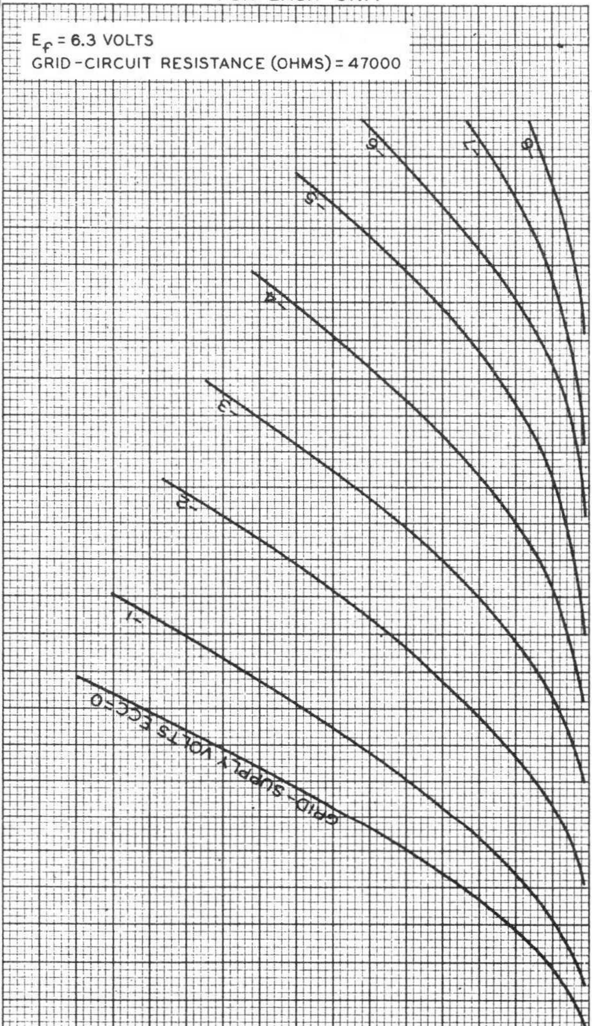
AVERAGE OPERATION CHARACTERISTICS
FOR EACH UNIT



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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, for Unipotential Cathodes:

Heater arrangement	*Series*	*Parallel*	
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

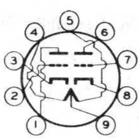
Characteristics, Class A_1 Amplifier (Each Unit):

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 μamp	–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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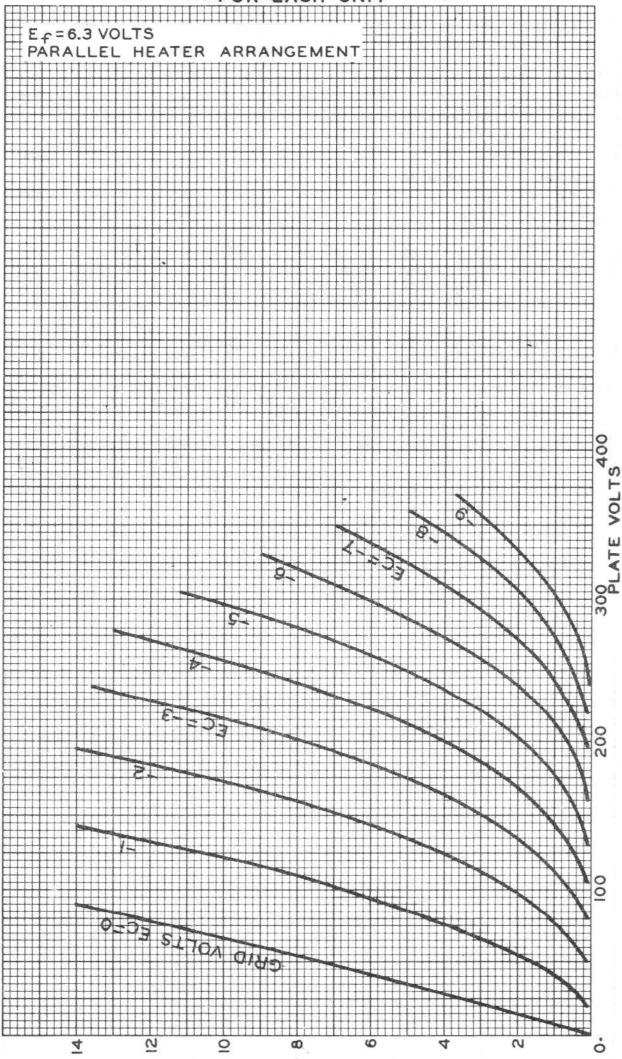
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



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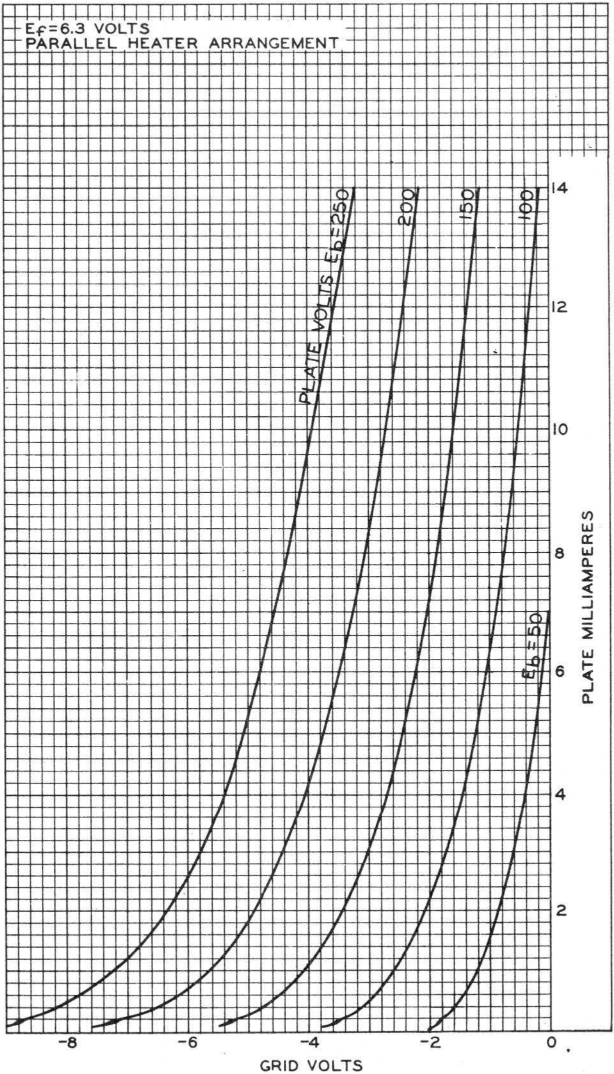
AVERAGE CHARACTERISTICS
FOR EACH UNIT



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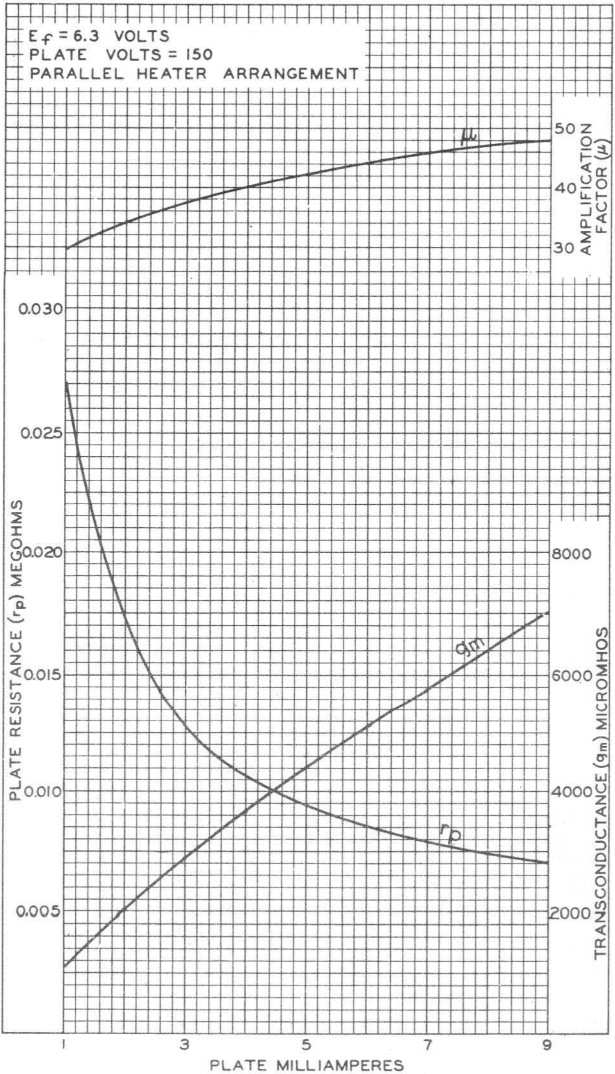
AVERAGE CHARACTERISTICS
FOR EACH UNIT



MAR. 8, 1954 | TUBE DIVISION | 92CM-8265

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PREMIUM 6021 TYPE

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	$\mu\mu$f
Grid to cathode and heater (Each unit)	2.4	2.1	$\mu\mu$f
Plate to cathode and heater (Unit No.1)	0.28	1.3	$\mu\mu$f
Plate to cathode and heater (Unit No.2)	0.32	1.4	$\mu\mu$f
Grid to grid	0.013 max.	0.011 max.	$\mu\mu$f
Plate to plate	0.52 max.	0.33 max.	$\mu\mu$f

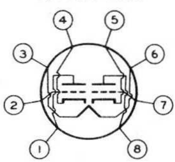
Characteristics, Class A_1 Amplifier (Each Unit):

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.

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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.

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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

MEDIUM-MU TWIN TRIODE

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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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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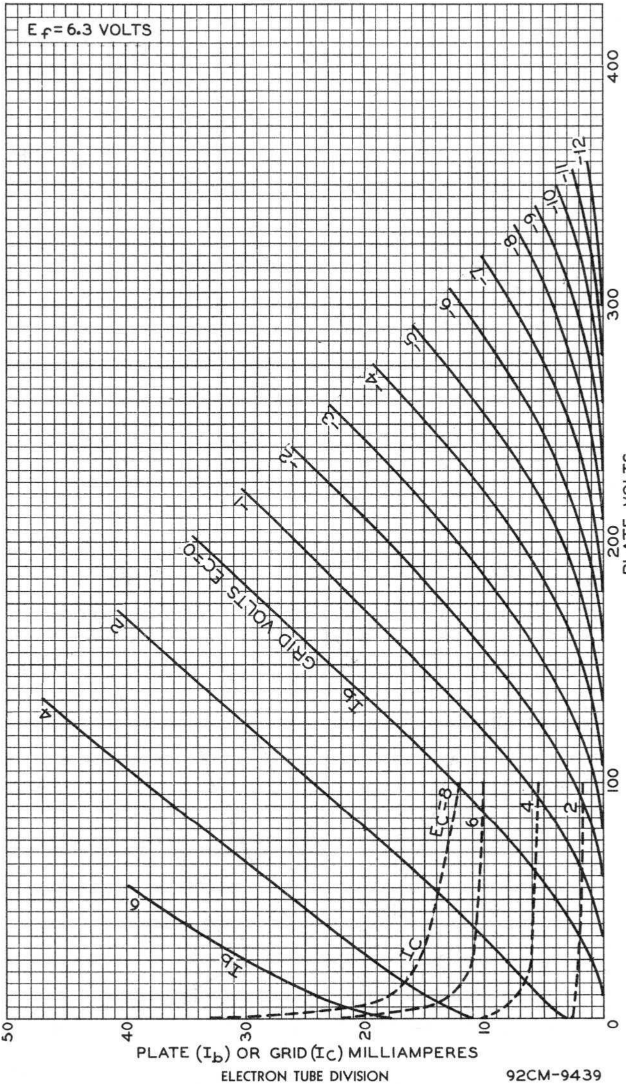
AVERAGE CHARACTERISTICS
EACH UNIT



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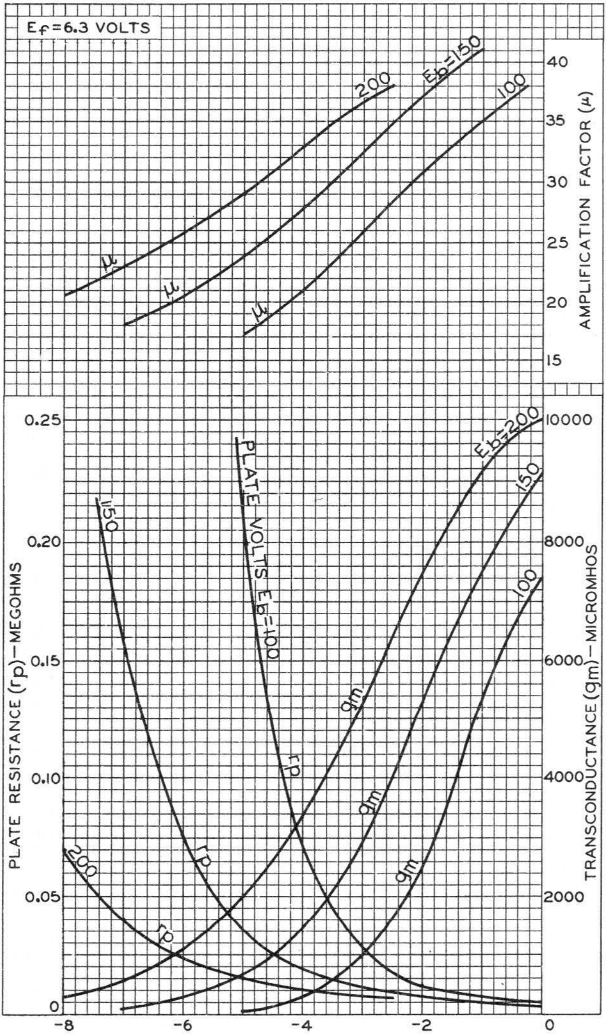
AVERAGE CHARACTERISTICS

EACH UNIT



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6072

PREMIUM 6072 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.):°

Grid to plate (Each unit)	1.4	$\mu\mu$f
Grid to cathode and heater (Each unit)	1.5	$\mu\mu$f
Plate to cathode and heater:		
Unit No.1	0.5	$\mu\mu$f
Unit No.2	0.38	$\mu\mu$f

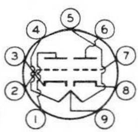
Characteristics, Class A_1 Amplifier (Each Unit):

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

° 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.	^{o}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^{o} (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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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.

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LOW-MU TWIN POWER TRIODE

GENERAL DATA

Heater, for Unipotential Cathodes:

Voltage	6.3 ± 10% . . .	ac or dc volts
Current	2.5	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 . . .	6.5	μμf
Triode Unit No.2 . . .	6	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

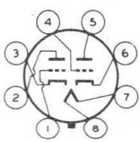
Characteristics, Amplifier Class A_1 (Each Unit):

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 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, *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

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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

BOOSTER SCANNING SERVICE

Values are for Each Unit

Maximum Ratings, ***Absolute Values*****:**

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

PEAK NEGATIVE-PULSE PLATE VOLTAGE●	3000 max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	2300 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
BULB TEMPERATURE⊕.	200 max.	°C

Maximum Circuit Values (For maximum rated conditions):

Grid-Circuit Resistance:		
For cathode-bias operation	1.0 max.	megohm
For fixed-bias operation	not recommended	

→ CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	2.26	2.74	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 6.3 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.

★,▲,●,✥: See next page.

→ Indicates a change

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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:

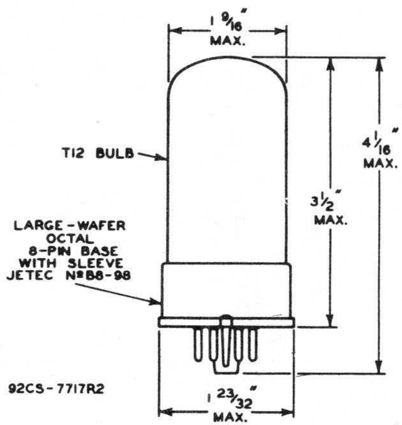
Vibrational Acceleration . . . . 2.5 max. g

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.



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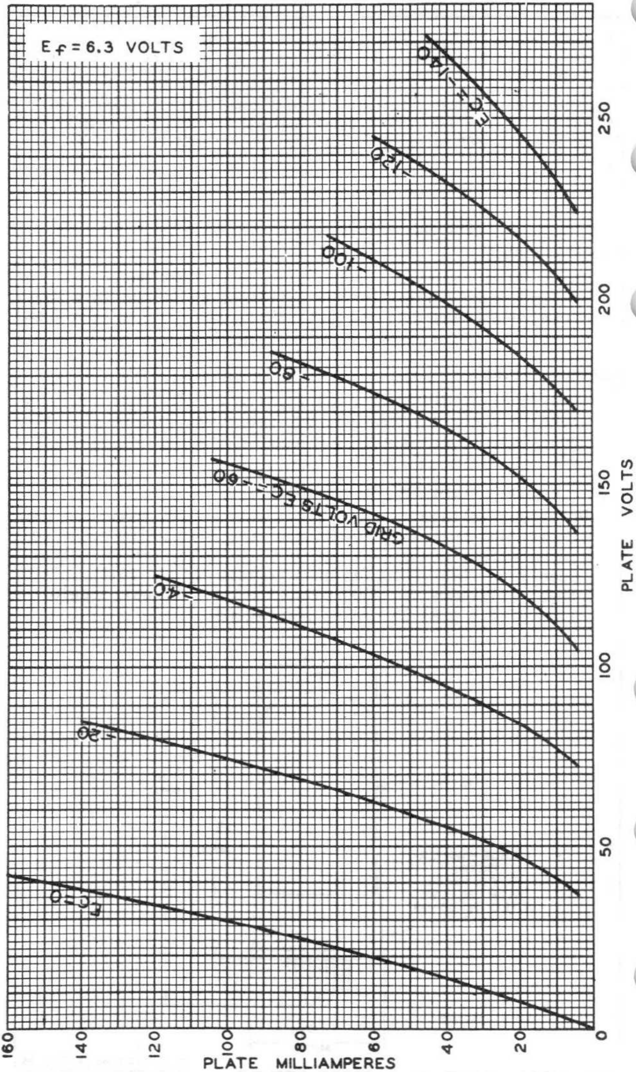
AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



OCT. 19, 1951

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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):

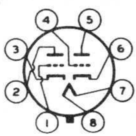
Plate-Supply Voltage	135	volts
Cathode-Bias Resistor	250	ohms
Amplification Factor	2	
Plate Resistance	280	ohms
Transconductance	7000	μmhos
Plate Current	125	ma

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

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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

TUBE DEPARTMENT
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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

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6101

MEDIUM-MU TWIN TRIODE

PREMIUM TYPE 6101

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	$\mu\mu$f
Input	2.0	$\mu\mu$f
Output	0.4	$\mu\mu$f
Heater to Cathode	6.0	$\mu\mu$f

Characteristics, Class A_1 Amplifier:

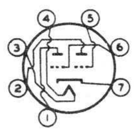
Plate Supply Voltage	100	volts
Cathode-Bias Resistor	50#	ohms
Amplification Factor	38	
Plate Resistance	6300	ohms
Transconductance	6000	μmhos
Plate Current	8.5	ma

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.

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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.	$^{\circ}C$

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	$\mu\mu f$
Grid-to-Cathode Capacitance (Each Unit).	2	1.4	2.8	$\mu\mu f$
Plate-to-Cathode Capacitance (Unit No.1).	2	0.25	0.65	$\mu\mu f$
Plate-to-Cathode Capacitance (Unit No.2).	2	0.25	0.55	$\mu\mu f$
Heater-to-Cathode Capacitance .	2	4.0	8.0	$\mu\mu f$
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.

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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

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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-

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.

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AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT

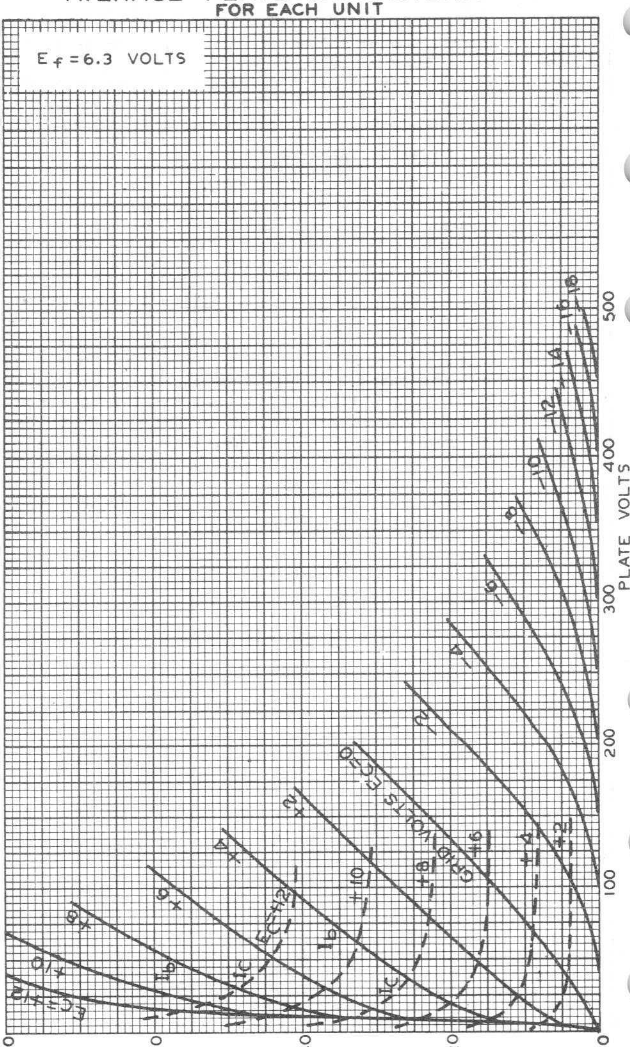

PLATE (I_b) OR GRID (I_C) MILLIAMPERES

JULY 13, 1953 — 92CM-8034

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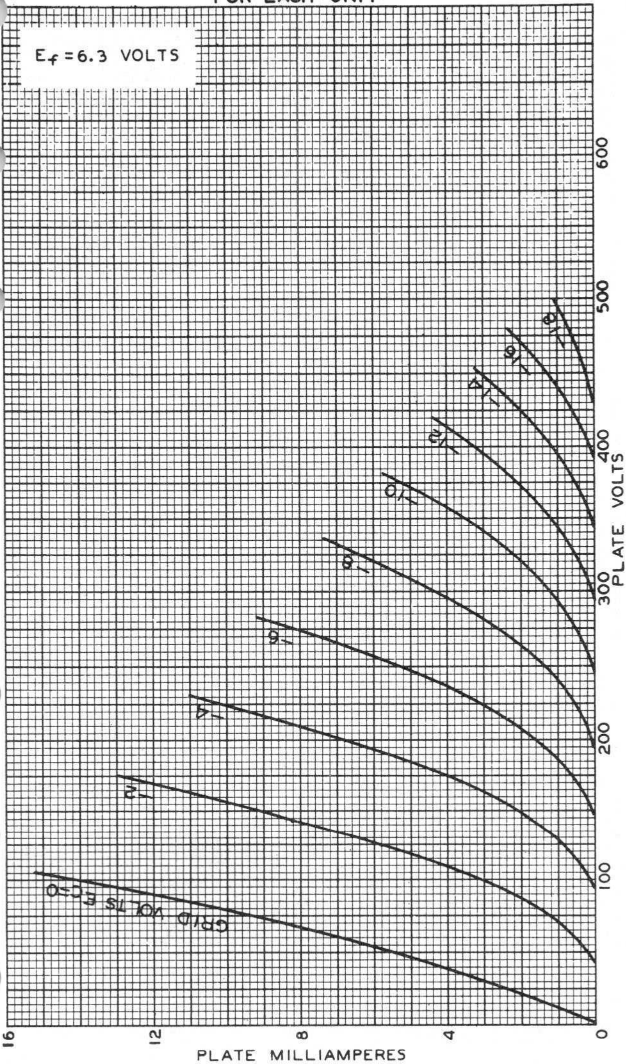
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



JULY 13, 1953

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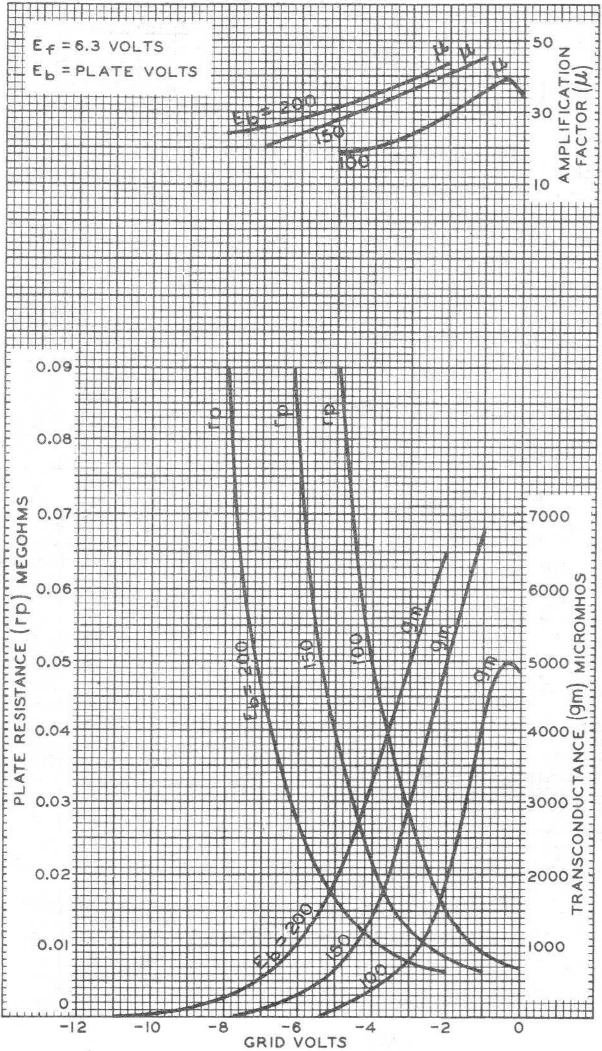
AVERAGE CHARACTERISTICS

FOR EACH UNIT



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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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	$\mu\mu$f
Grid to cathode and heater (Each unit)	1.9	2.1	$\mu\mu$f
Plate to cathode and heater (Unit No.1)	0.28	1.3	$\mu\mu$f
Plate to cathode and heater (Unit No.2)	0.32	1.4	$\mu\mu$f
Grid of unit No.1 to grid of unit No.2	0.011 max.	0.01 max.	$\mu\mu$f
Plate of unit No.1 to plate of unit No.2	0.5 max.	0.3 max.	$\mu\mu$f

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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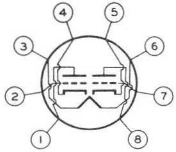
MEDIUM-MU TWIN TRIODE

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.	^{o}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	$\mu\mu f$
Grid to cathode and heater. . .	2	1.4	2.4	$\mu\mu f$
Plate to cathode and heater (Unit No.1)	2	0.2	0.36	$\mu\mu f$
Plate to cathode and heater (Unit No.2)	2	0.22	0.42	$\mu\mu f$
Grid of unit No.1 to grid of unit No.2	2	-	0.011	$\mu\mu f$

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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MEDIUM-MU TWIN TRIODE

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 (^{o}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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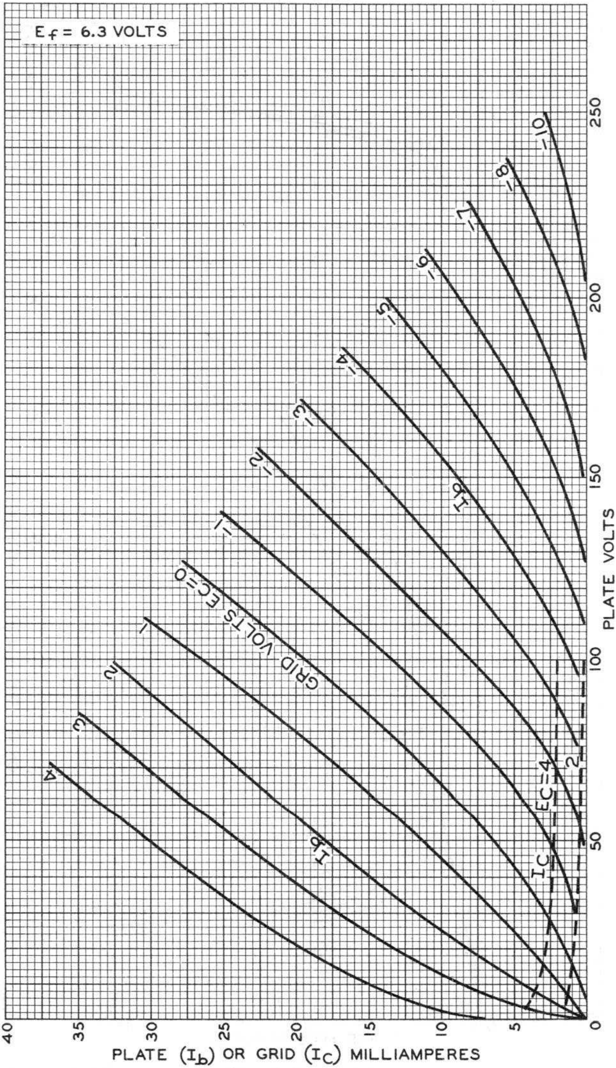
AVERAGE CHARACTERISTICS

EACH UNIT



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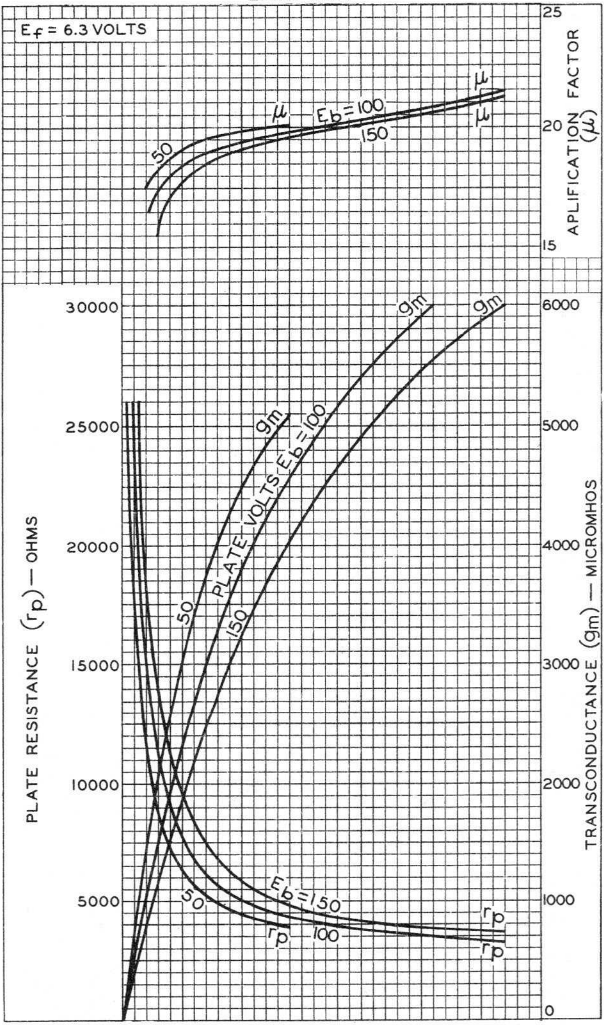
AVERAGE CHARACTERISTICS
EACH UNIT



ELECTRON TUBE DIVISION

92CM-9443

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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

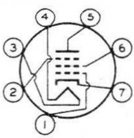
Characteristics, Class A_1 Amplifier:

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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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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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.

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

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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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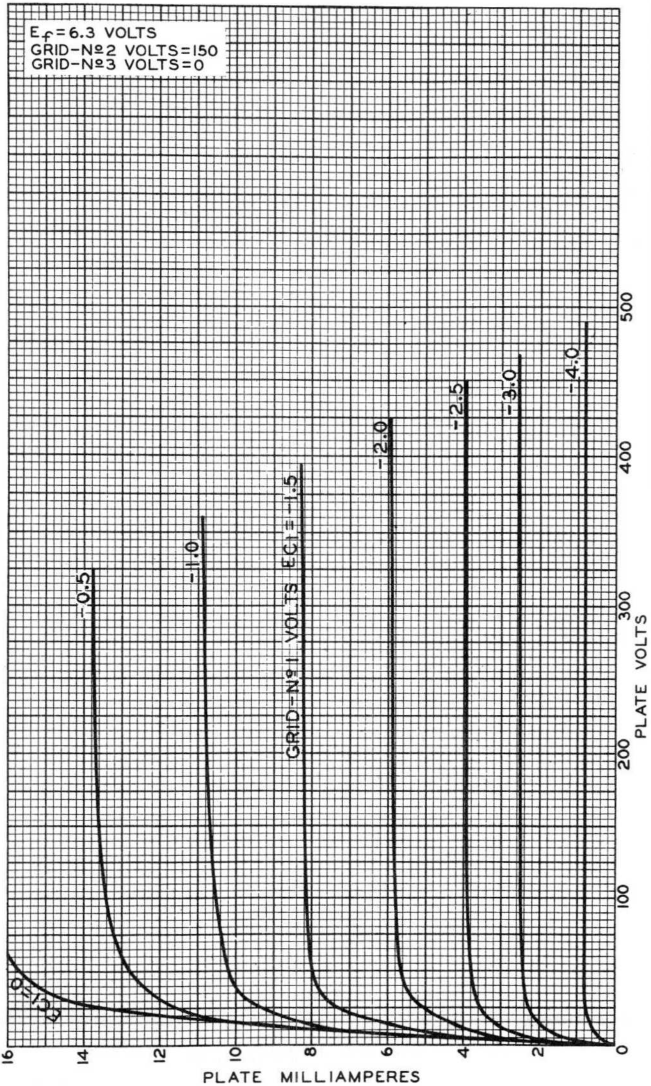
AVERAGE PLATE CHARACTERISTICS



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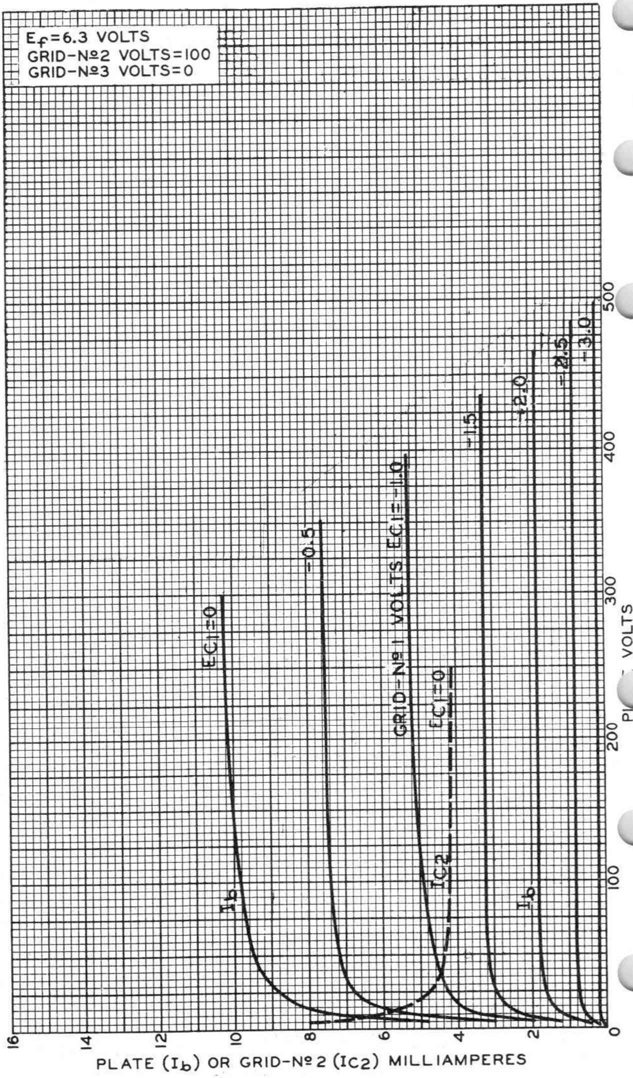
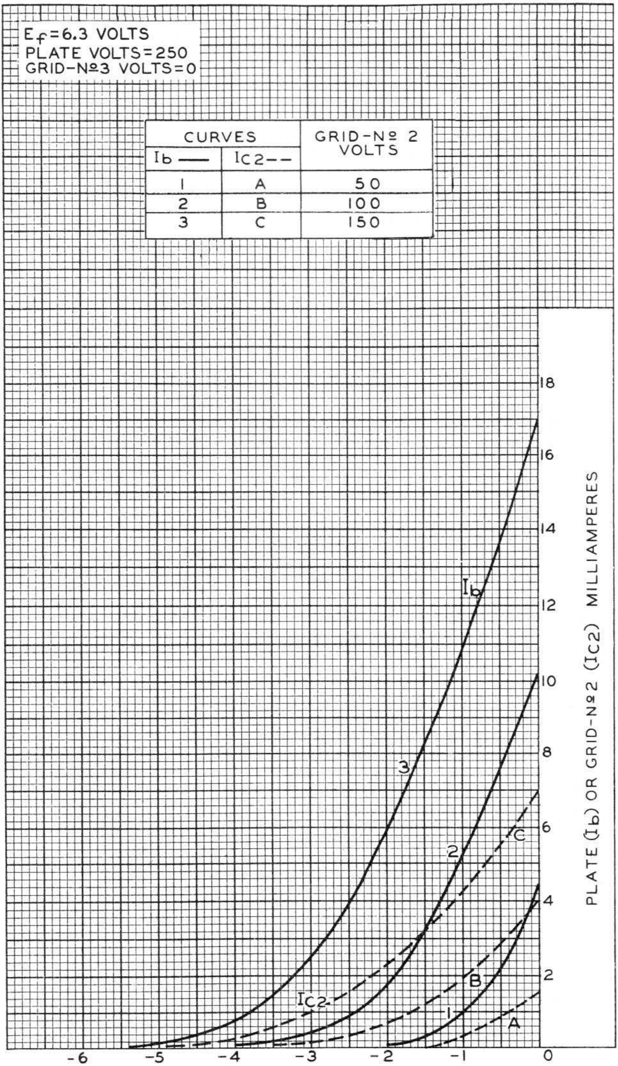
AVERAGE CHARACTERISTICS



6136

6136

AVERAGE CHARACTERISTICS



CURVES		GRID-No.2 VOLTS
Ib ——	Ic2 - -	
1	A	50
2	B	100
3	C	150

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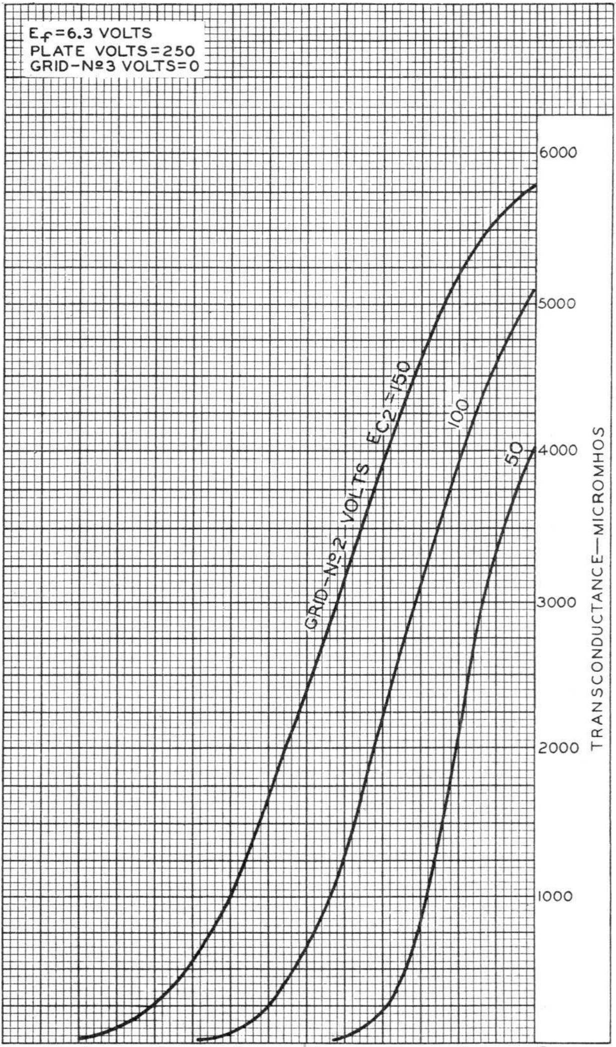
6136

AVERAGE CHARACTERISTICS



6173

UHF DIODE

"PENCIL" TYPE

For use in pulse-detection and pulse-power-measuring service at frequencies up to 3300 Mc

GENERAL DATA

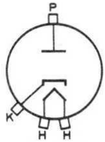
Electrical:

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	$\mu\mu$f

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.

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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	$\mu\mu$f
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.

RCA

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UHF DIODE

"PENCIL TYPE" FOR PULSE-DETECTION SERVICE

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GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

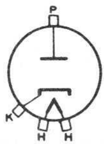
Voltage	6.3 ± 10%	ac or dc volts
Current	0.135	amp
Resonant Freq. (Approx.)	1600	Mc
Direct Interelectrode Capacitance (Approx.):		
Plate to Cathode	1.1	$\mu\mu$f

Mechanical:

Terminal Connections:

H – Heater Leads

P – Plate Cylinder (Adjacent to Pinch-off)



K – Cathode Cylinder (Adjacent to Heater Leads)

Mounting Position . . . . Any

Dimensions . . . . See Outline Drawing

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	1.0 max.	amp
AVERAGE 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

(continued on next page)

▲ 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.

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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

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.123	0.143	amp
Plate-to-Cathode Capacitance	–	0.8	1.4	$\mu\mu$f
Tube Voltage Drop.	1,2	–	15	volts

Note 1: With 6.3 volts ac or dc on heater.

Note 2: 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.

INSTALLATION CONSIDERATIONS

Connections to the cathode cylinder and plate cylinder 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 of the 6173 fit the Cinch Socket No.54A16325. They should not be soldered to circuit elements. The heat of the soldering operation may crack the glass seals of the heater leads and damage the tube.

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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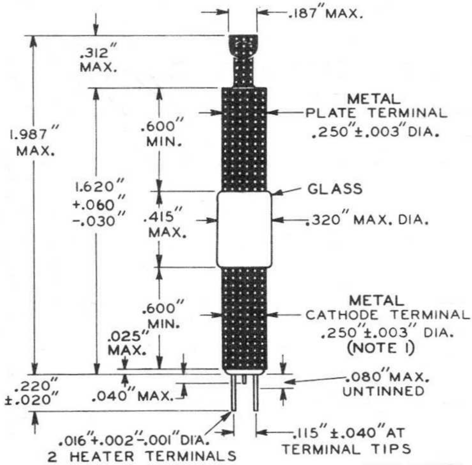
UHF DIODE

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.

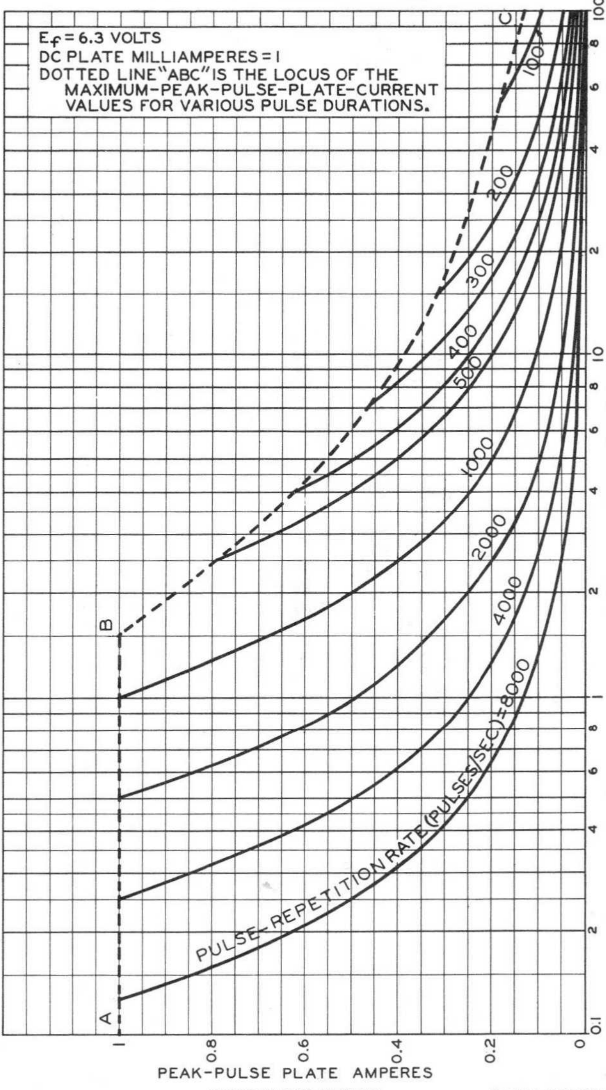


92CS-7696R1

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.

6173

PULSE RATING CHART



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92CM-7727R1

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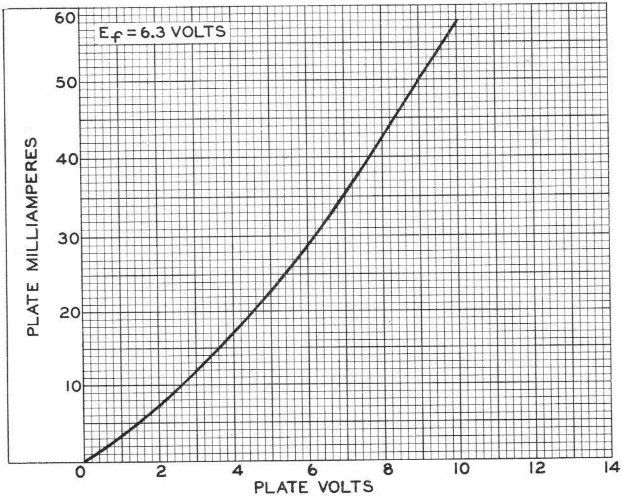
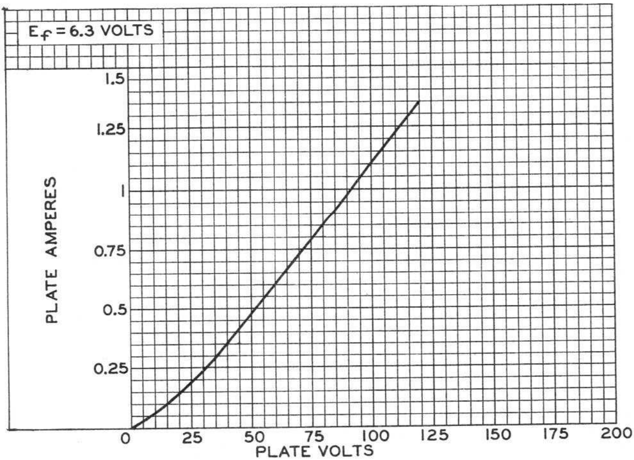
AVERAGE PLATE CHARACTERISTICS



92CS-9638



92CS-9637

RCA

6197

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	$\mu\mu$f
Grid No.1 to Cathode and Heater	11.5	$\mu\mu$f
Plate to Cathode and Heater	5.0	$\mu\mu$f
Heater to Cathode	8.5	$\mu\mu$f

Characteristics, Class A_1 Amplifier:

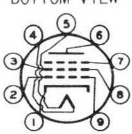
Heater Voltage	6.3	volts
Plate Voltage	250	volts
Grid No.3	Connected to Cathode at Socket	
Grid-No.2 Voltage	150	volts
Grid-No.1 Voltage	−3	volts
Mu-Factor, Grid No.2 to Grid No.1	22	
Plate Resistance	90000	ohms
Transconductance	11000	μmhos
Plate Current	30	ma
Grid-No.2 Current	7	ma
Maximum Plate Current 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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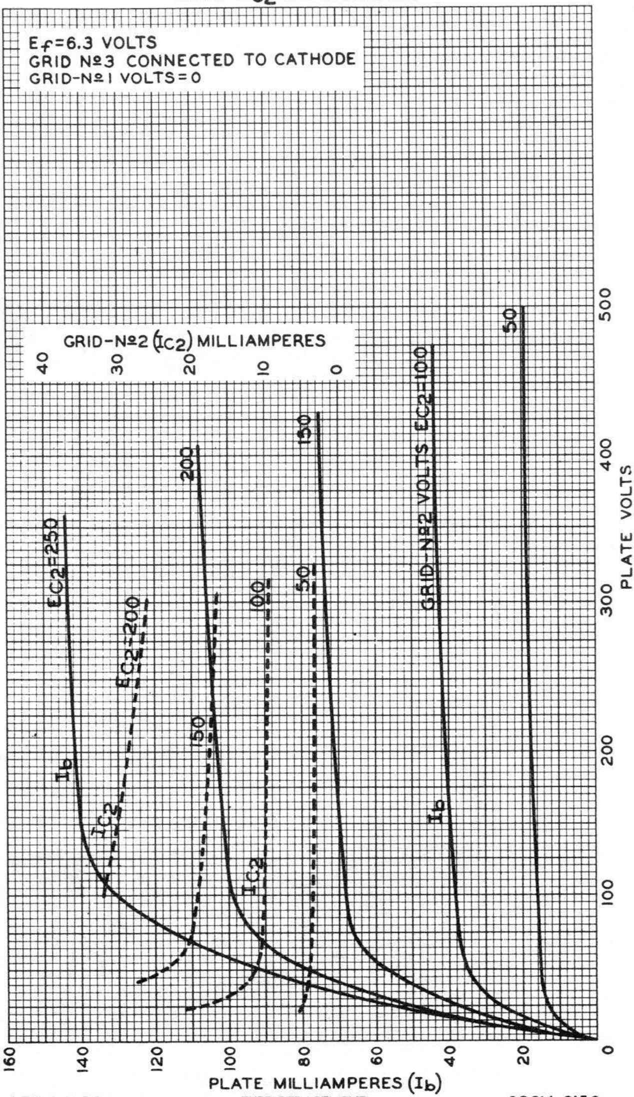
AVERAGE PLATE CHARACTERISTICS
WITH E_{C2} AS VARIABLE



DEC.8,1953 | TUBE DEPARTMENT | 92CM-8150

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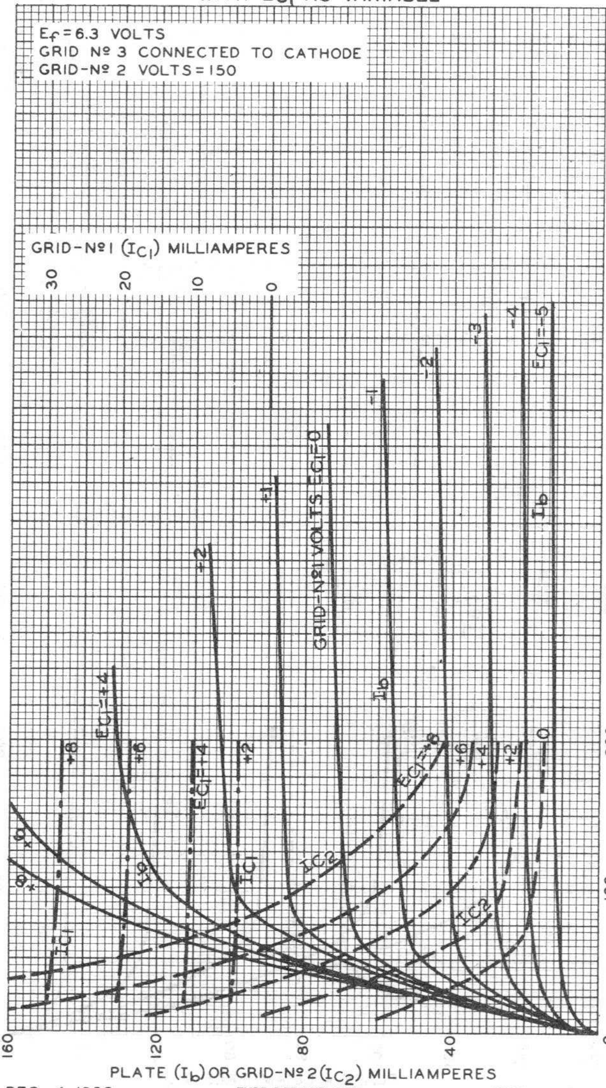
AVERAGE PLATE CHARACTERISTICS WITH E_{C1} AS VARIABLE



DEC. 4, 1953 TUBE DEPARTMENT 92CM-8285

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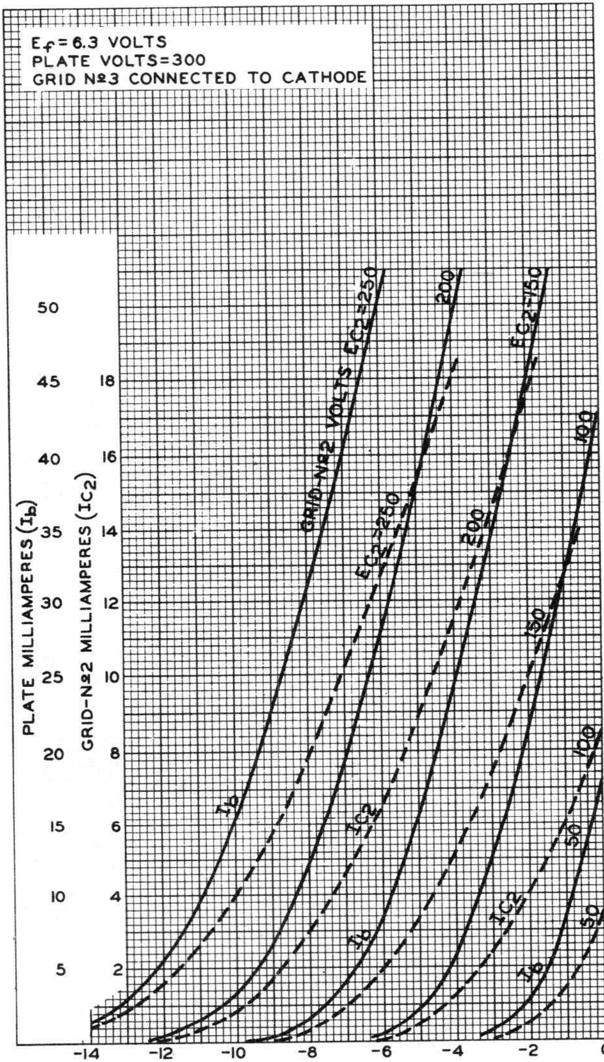
AVERAGE CHARACTERISTICS



DEC.4,1953

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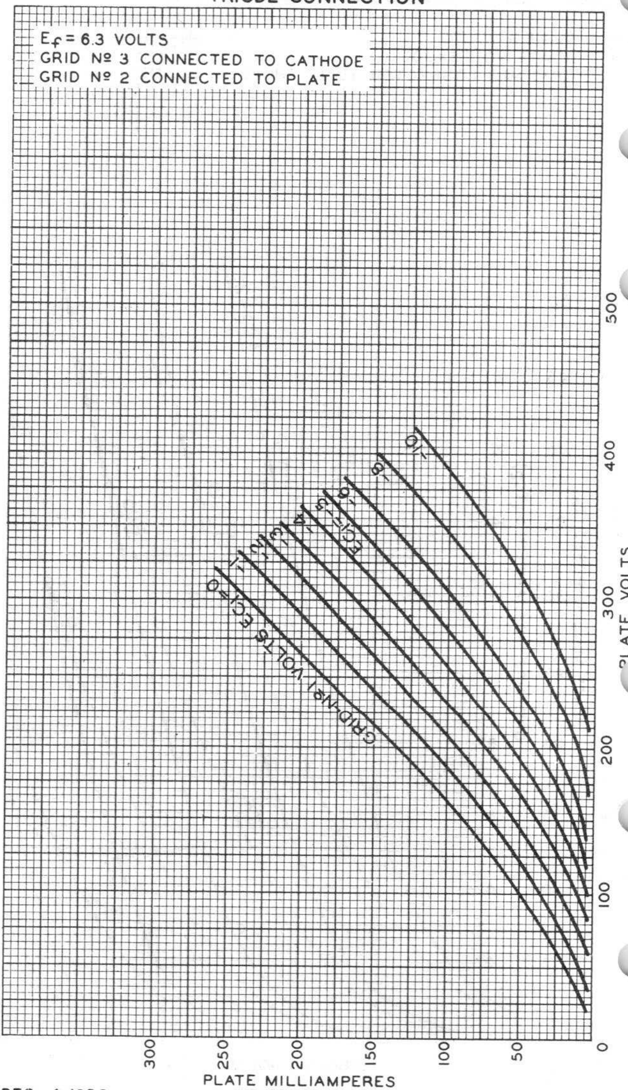
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION



DEC. 4, 1953

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8286

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6201

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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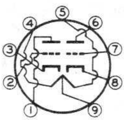
HIGH-MU TWIN TRIODE

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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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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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 (^{o}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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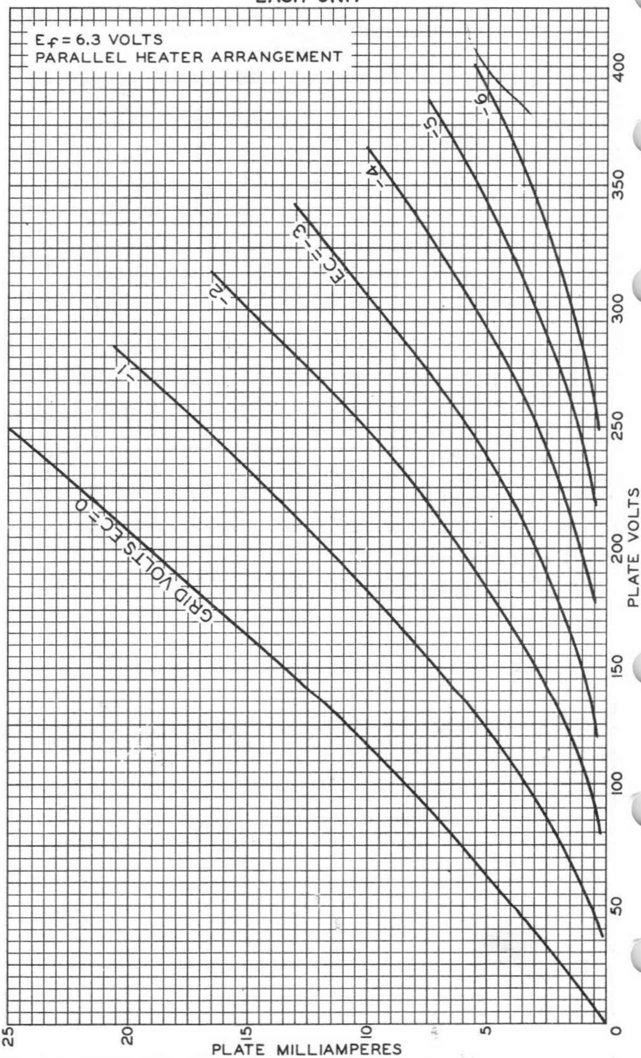
AVERAGE PLATE CHARACTERISTICS

EACH UNIT



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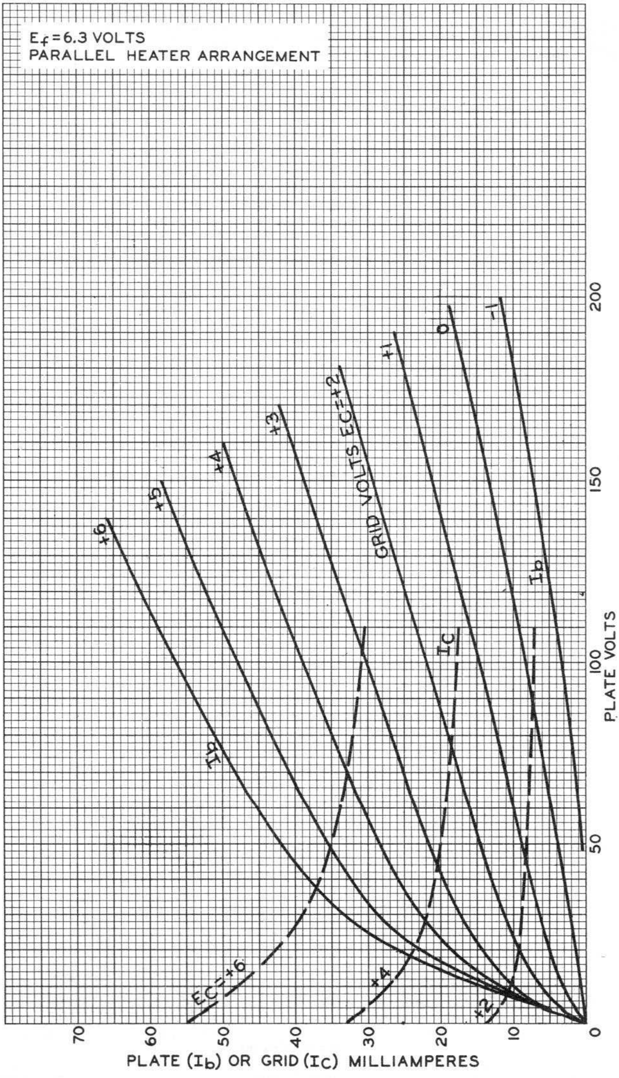
AVERAGE CHARACTERISTICS
EACH UNIT



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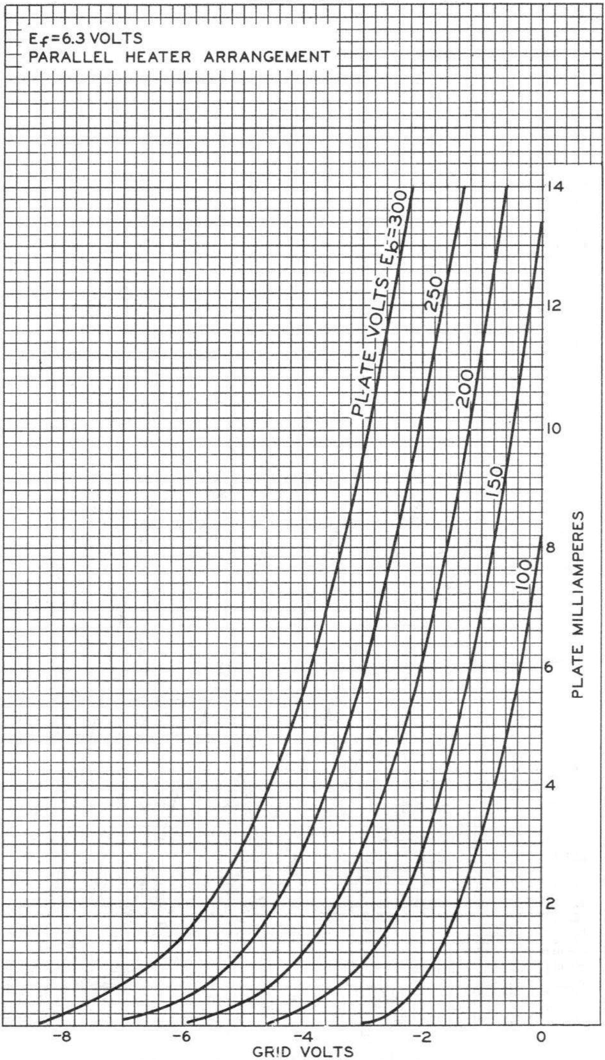
AVERAGE CHARACTERISTICS
EACH UNIT



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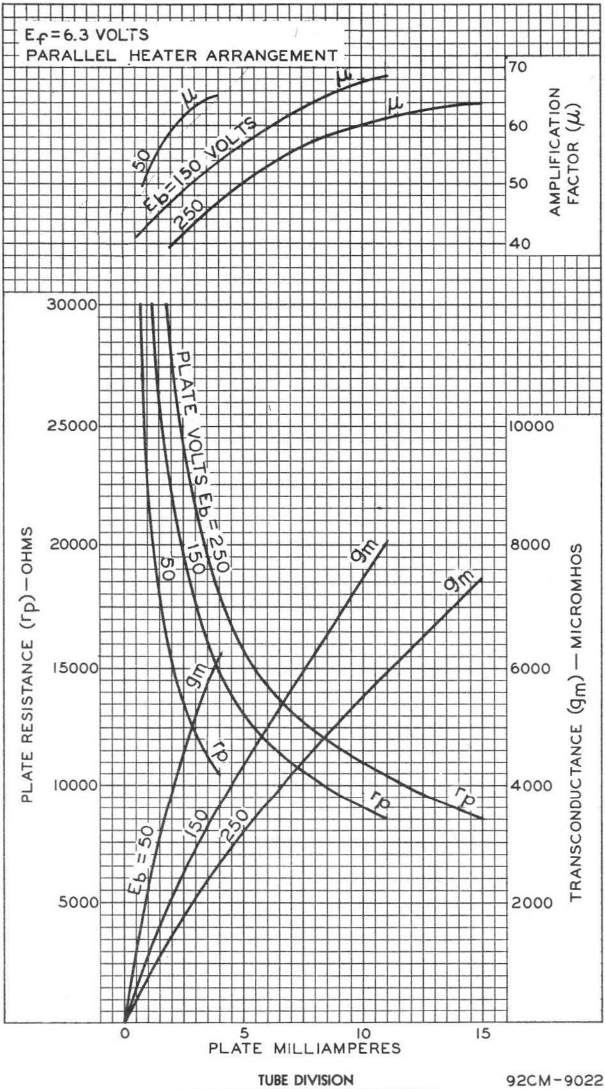
AVERAGE CHARACTERISTICS
EACH UNIT



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92CM-9022

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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:°

	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 A$_1$ 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

° 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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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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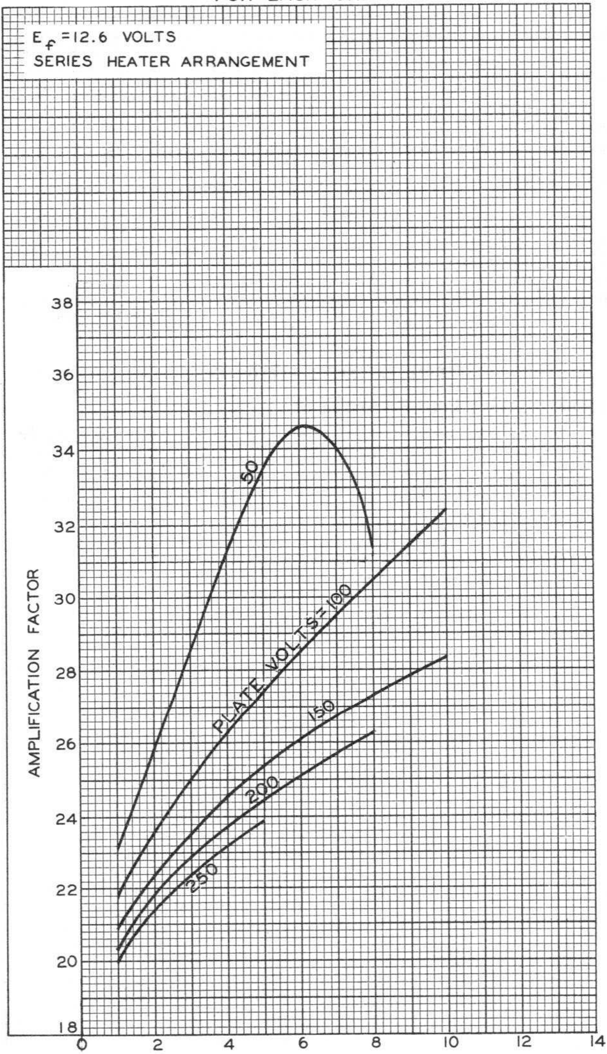
AVERAGE CHARACTERISTICS
FOR EACH UNIT



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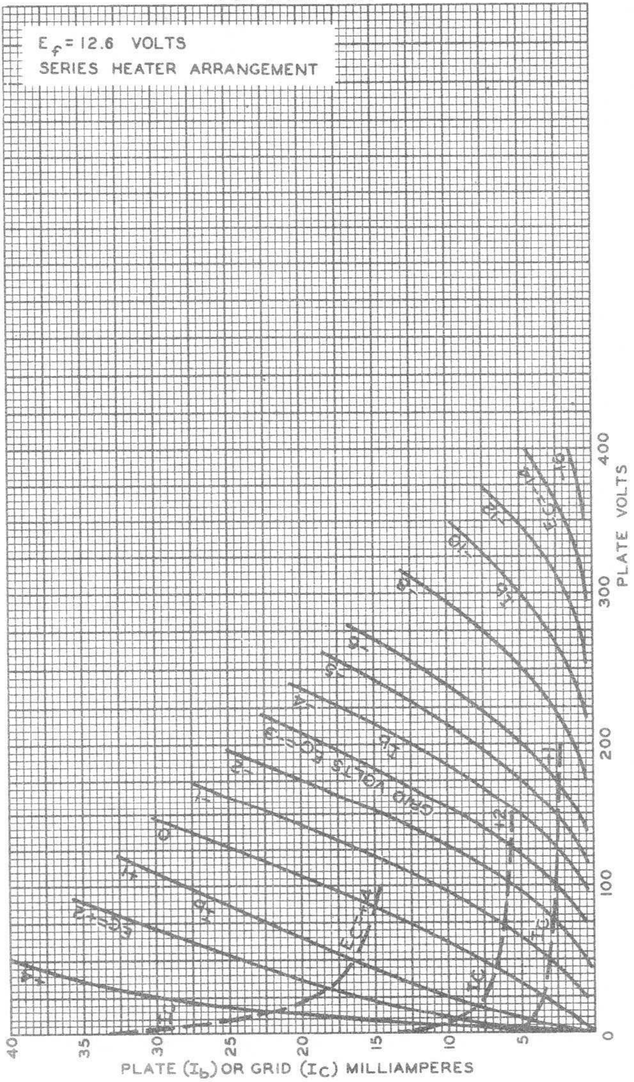
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



JULY 9, 1952

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92CM-7822

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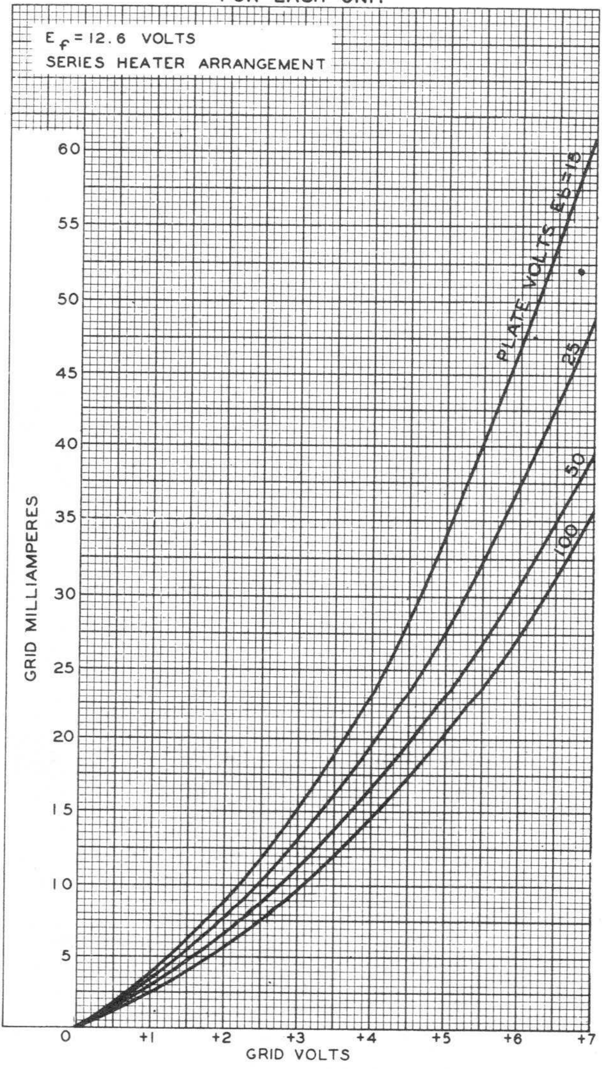
AVERAGE CHARACTERISTICS

FOR EACH UNIT



JAN.6,1953

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7823R1

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	$\mu\mu$f
Grid to cathode (Each Unit)	16.7	$\mu\mu$f
Plate to cathode (Each Unit)	3.8	$\mu\mu$f
Heater to cathode (Each Unit)	15	$\mu\mu$f
Plate to plate	0.6	$\mu\mu$f

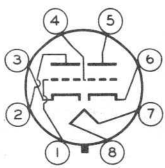
Characteristics, Class A_1 Amplifier (Each Unit):

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	TT16
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

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.

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.

RCA

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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	0.3	0.6	amp

Direct Interelectrode Capacitances:°

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):

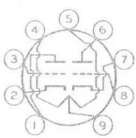
Plate Voltage	150	volts
Grid Voltage	−5	volts
Amplification Factor	18	
Plate Resistance (Approx.)	3900	ohms
Transconductance	4600	μmhos
Plate Current	11	ma
Grid Voltage (Approx.) for plate voltage of 150 volts and plate current of 100 μa	−11	volts
Grid Voltage (Approx.) for plate voltage of 200 volts 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

° 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 10^6 pps; and duty factor, 0.08.

▲ The dc component must not exceed 110 volts.

Notes 1 to 6: See next page.

ELECTRON TUBE DIVISION
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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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RCA

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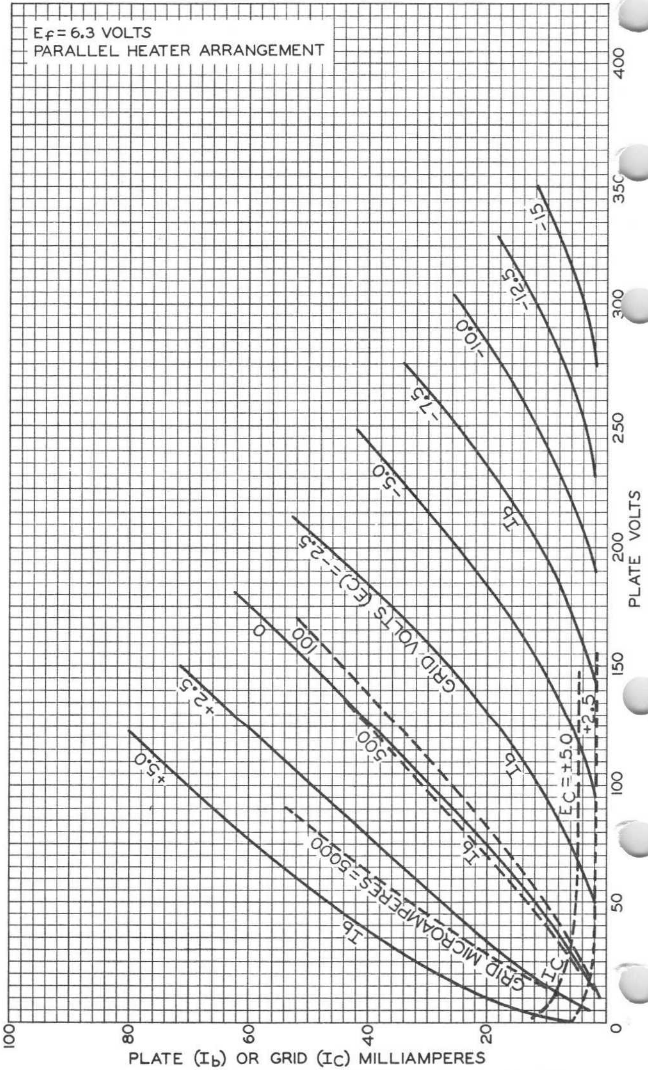
AVERAGE CHARACTERISTICS
EACH UNIT



ELECTRON TUBE DIVISION

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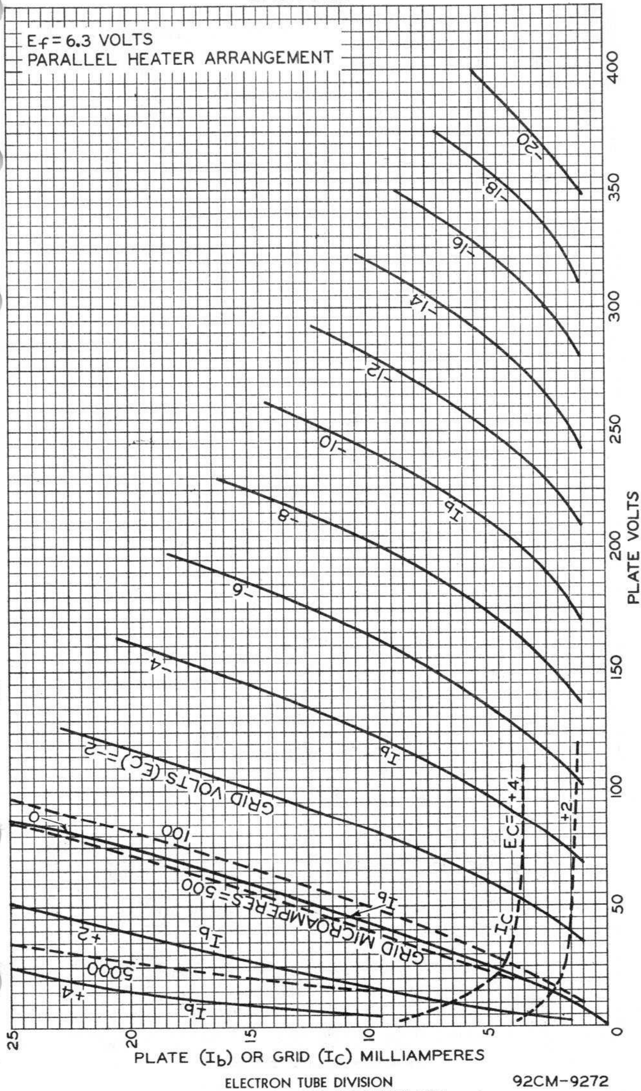
AVERAGE CHARACTERISTICS
EACH UNIT



ELECTRON TUBE DIVISION

92CM-9272

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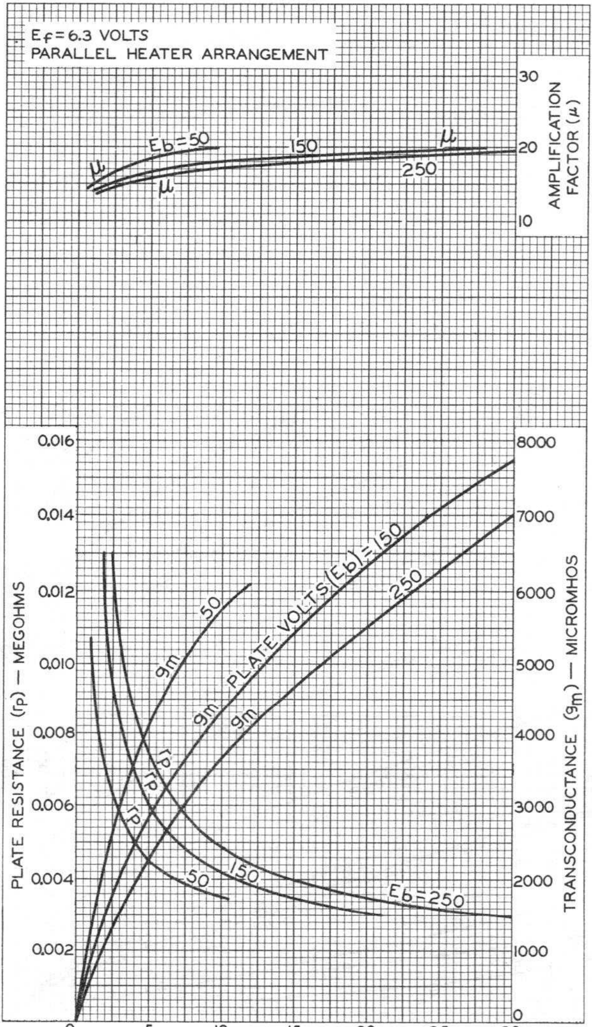
AVERAGE CHARACTERISTICS
EACH UNIT



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

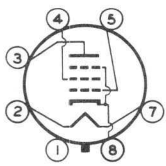
Characteristics, Class A_1 Amplifier:

	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. ST16
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 Internal Connection
Pin 7 - Heater
Pin 8 - Cathode, Grid No.3

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

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 A1

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.

6660

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

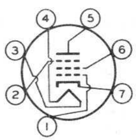
Characteristics, Class A_1 Amplifier:

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

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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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.

ELECTRON TUBE DIVISION
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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

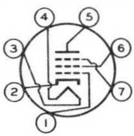
Characteristics, Class A_1 Amplifier:

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

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

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.

6662

RCA

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.	$\mu\mu$f
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	4.5	4.5	$\mu\mu$f
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	5.5	5.5	$\mu\mu$f

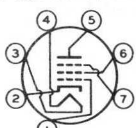
Characteristics, Class A_1 Amplifier:

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

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.

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

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

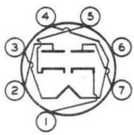
Direct Interelectrode Capacitances:

	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

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

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.

o 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.

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

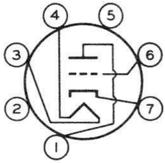
Mechanical:

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	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)

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.

6669/6AQ5-A
BEAM POWER TUBE

7-PIN MINIATURE TYPE

For use in mobile communications equipment

GENERAL DATA

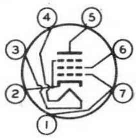
Electrical:

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

RCA

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.

6669/6AQ5-A

BEAM POWER TUBE

° 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.

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.	$\mu\mu$f
Grid No.1 to cathode, grid No.3 & internal shield, grid No.2, and heater	6.5	6.5	$\mu\mu$f
Plate to cathode, grid No.3 & internal shield, grid No.2, and heater	2.0	3.0	$\mu\mu$f

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

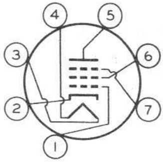
Mechanical:

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)

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.

RCA

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

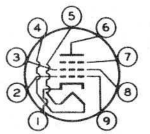
Direct Interelectrode Capacitances:°

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*	

RCA

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.

RCA

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"

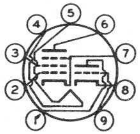
6678

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.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6678

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.

6679/12AT7

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	*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 A_1 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)

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

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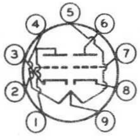
6679/12AT7

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

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

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	*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 to plate (Each unit)	1.5	1.5	$\mu\mu$f
Grid to cathode and heater (Each unit)	1.6	1.8	$\mu\mu$f
Plate to cathode and heater:			
Unit No.1	0.4	2	$\mu\mu$f
Unit No.2	0.32	2	$\mu\mu$f

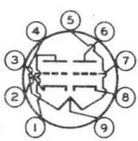
Characteristics, Class A_1 Amplifier (Each Unit):

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

6680

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 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.

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.

6681

6681/12AX7

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 to plate (Each unit)	1.7	1.7	$\mu\mu$f
Grid to cathode and heater (Each unit)	1.6	1.8	$\mu\mu$f
Plate to cathode and heater:			
Unit No.1	0.46	1.9	$\mu\mu$f
Unit No.2	0.34	1.9	$\mu\mu$f

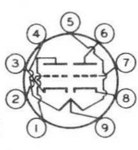
Characteristics, Class A$_1$ Amplifier (Each Unit):

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	−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

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

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HIGH-MU TWIN TRIODE

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	1.1	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.

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

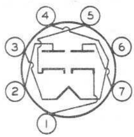
Direct Interelectrode Capacitances (Each unit, approx.):[o]

Plate to cathode	1.4	$\mu\mu$f
Plate to cathode, internal shield, and heater	2.2	$\mu\mu$f
Cathode to plate, internal shield, and heater	3.5	$\mu\mu$f
Heater to cathode.	2.1	$\mu\mu$f

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

6887

6887

TWIN DIODE

	Note	Min.	Max.	
Direct Interelectrode Capacitance (Each unit):				
Plate to cathode.	2	–	2	$\mu\mu$f
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.

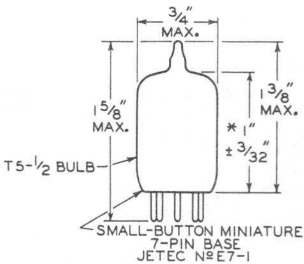
Note 4: With 150 volts dc between heater and cathode.

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.



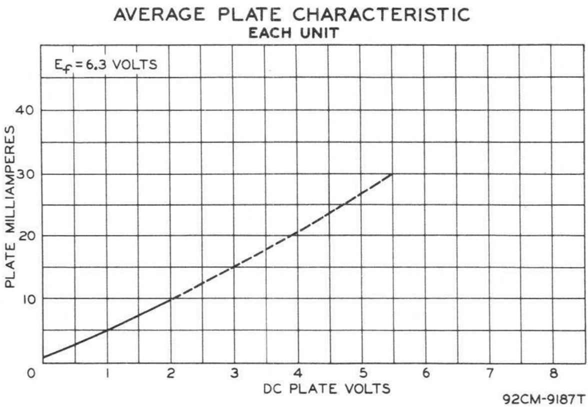
■ Under the following conditions: rectangular pulse; pulse duration, 10 microseconds; pulse-repetition rate, 1000 pps; duty factor, 0.01 ± 0.1 per cent; rise time, less than 1 microsecond; fall time, less than 2 microseconds; overshoot, less than 5 per cent; and droop, less than 10 per cent.

* Measured from base seat to bulb-top line as determined by ring gauge of 7/16" I.D.

6887

6887

TWIN DIODE



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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	μμf
Grid to cathode, internal shield, and heater	3.1	3.1	μμf
Plate to cathode, internal shield, and heater	1.75	1.65	μμf
Heater to cathode	2.6	2.7	μμf

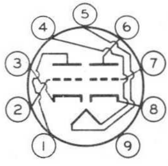
Characteristics, Class A$_1$ Amplifier (Each Unit):[b]

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

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.	^{o}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.

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

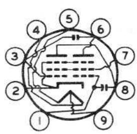
Electrical:

Heater, for Unipotential Cathode:			
Heater arrangement	*Series*	*Parallel*	
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):▲			
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

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

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

	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.

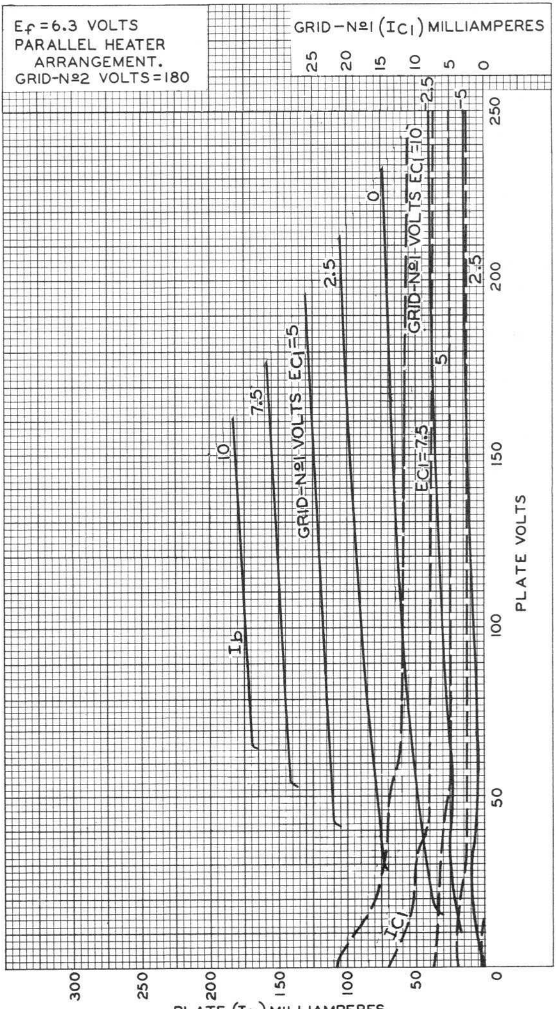
The *heater may be effectively bypassed* by grounding one heater pin at the tube socket and bypassing the other heater pin to ground with a low inductance capacitor. If further isolation of the ungrounded heater pin is required a suitable rf choke followed by another low inductance bypass capacitor, 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.

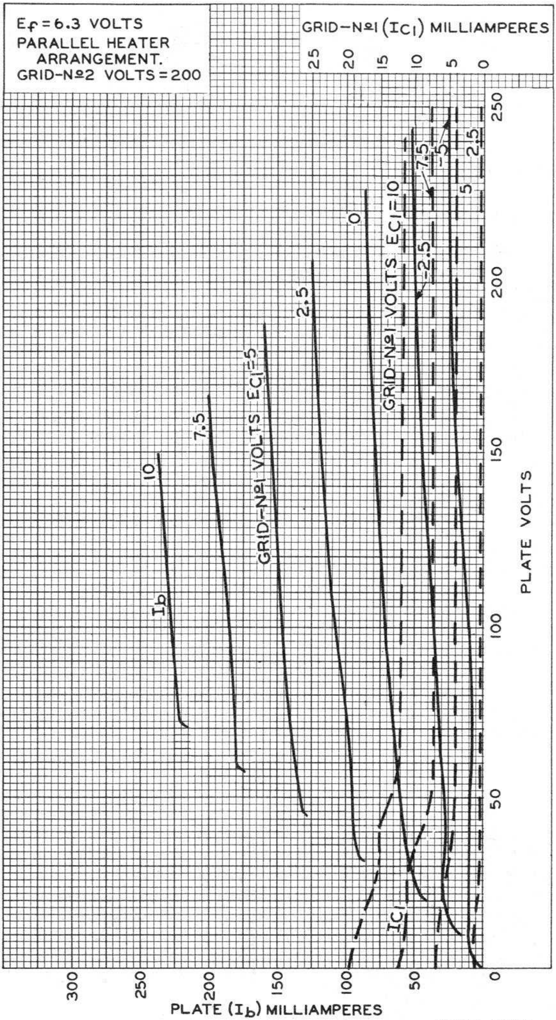
To *prevent generation of parasitic oscillations*, it is recommended that a 100-ohm resistor be connected in series with grid No.2 as close to the socket as possible.

AVERAGE CHARACTERISTICS
Each Unit



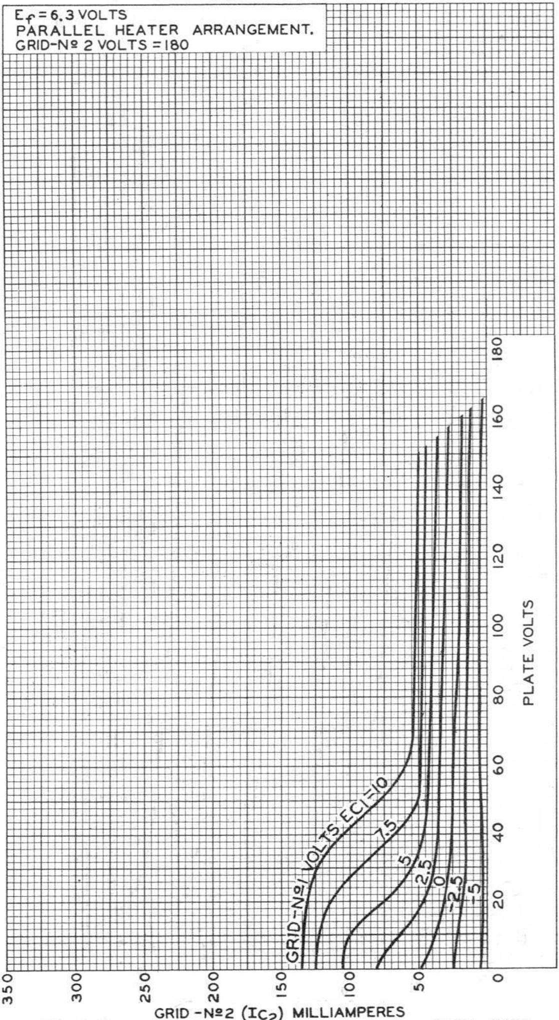
92CM-10614

AVERAGE CHARACTERISTICS
Each Unit



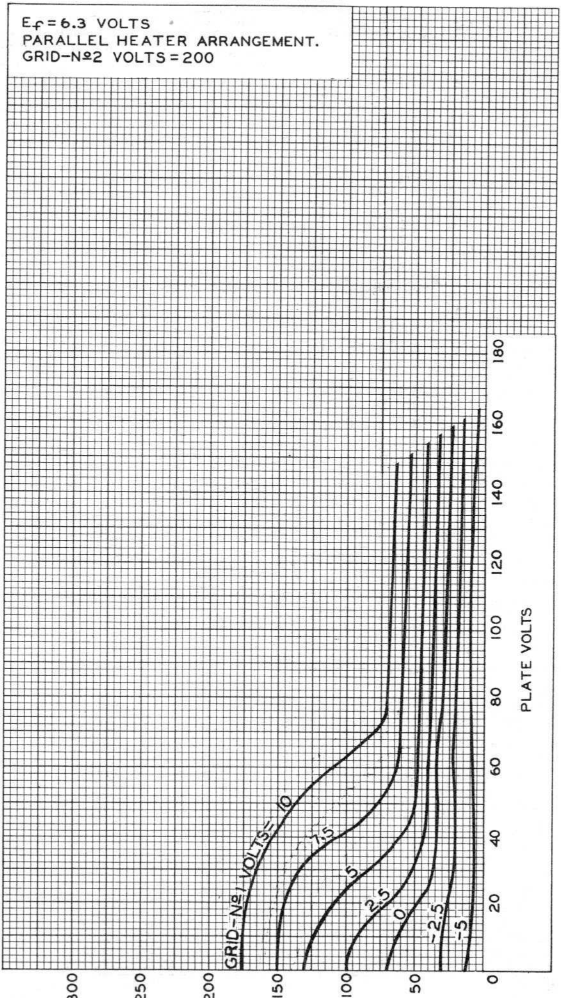
92CM-10613

AVERAGE CHARACTERISTICS
Each Unit



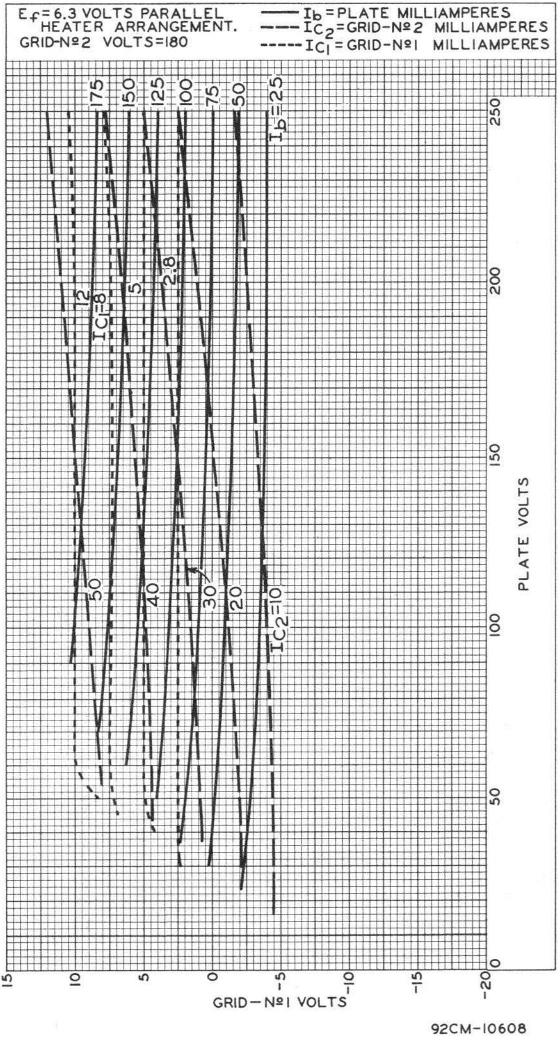
92CM-10609

AVERAGE CHARACTERISTICS
Each Unit

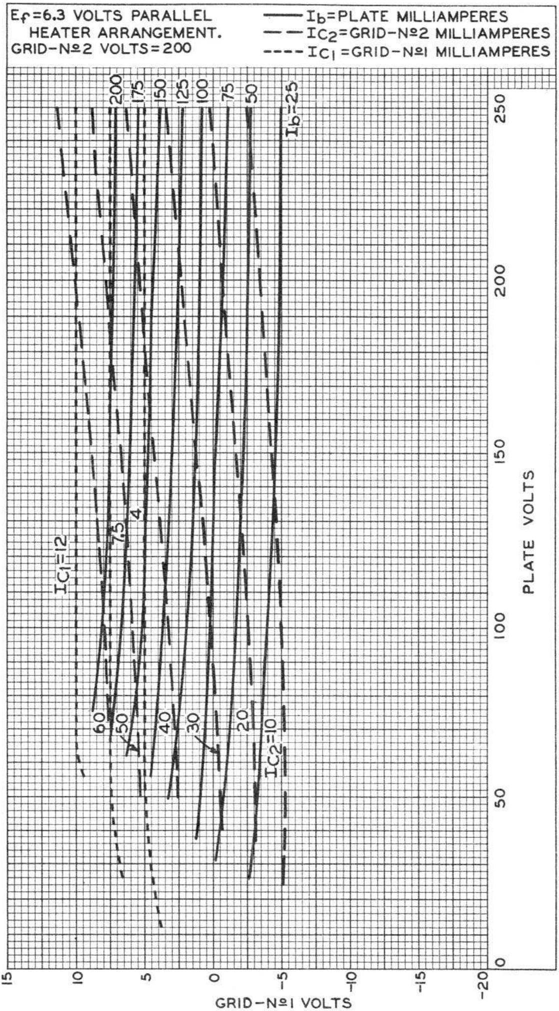


92CM-10606

AVERAGE CONSTANT-CURRENT CHARACTERISTICS
Each Unit



AVERAGE CONSTANT-CURRENT CHARACTERISTICS
Each Unit



92CM-10603

6973

BEAM POWER TUBE

9-PIN MINIATURE TYPE

For high-fidelity audio-amplifier applications

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	6.3	ac or dc volts
Current	0.45	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

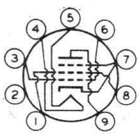
Characteristics, Class A_1 Amplifier:

Plate Voltage	250	volts
Grid-No.2 (Screen-Grid) Voltage	250	volts
Grid-No.1 (Control-Grid) 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 current of 100 μa	−40	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"
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	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-Center Values:*

PLATE VOLTAGE	400 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts
GRID-No.2 INPUT	2 max.	watts
PLATE DISSIPATION	12 max.	watts

°: See next page.

RCA

6973

BEAM POWER TUBE

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-Center Values:*

PLATE AND GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	375 max.	volts

○,▲,●: See next page.

6973

BEAM POWER TUBE

GRID-No.2 INPUT	1.75	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:

Values are for 2 tubes

	Fixed Bias	*Cathode Bias*	
Plate-Supply Voltage	375	370	volts
Grid-No.2 Supply Voltage	*	#	volts
Grid-No.1 (Control-Grid) Voltage●	-33.5	–	volts
Cathode Resistor	–	355	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage	67	62	volts
Zero-Signal Cathode Current	62	74	ma
Max.-Signal Cathode Current	95	84	ma
Effective Load Resistance (Plate to plate)	12500	13000	ohms
Total Harmonic Distortion	1.5	1.2	%
Max.-Signal Power Output	18.5	15	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:●			
For fixed-bias operation	0.5	max.	megohm
For cathode-bias operation	1	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 50 per cent of the plate signal voltage to grid No.2 of each output tube.

\# 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.

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

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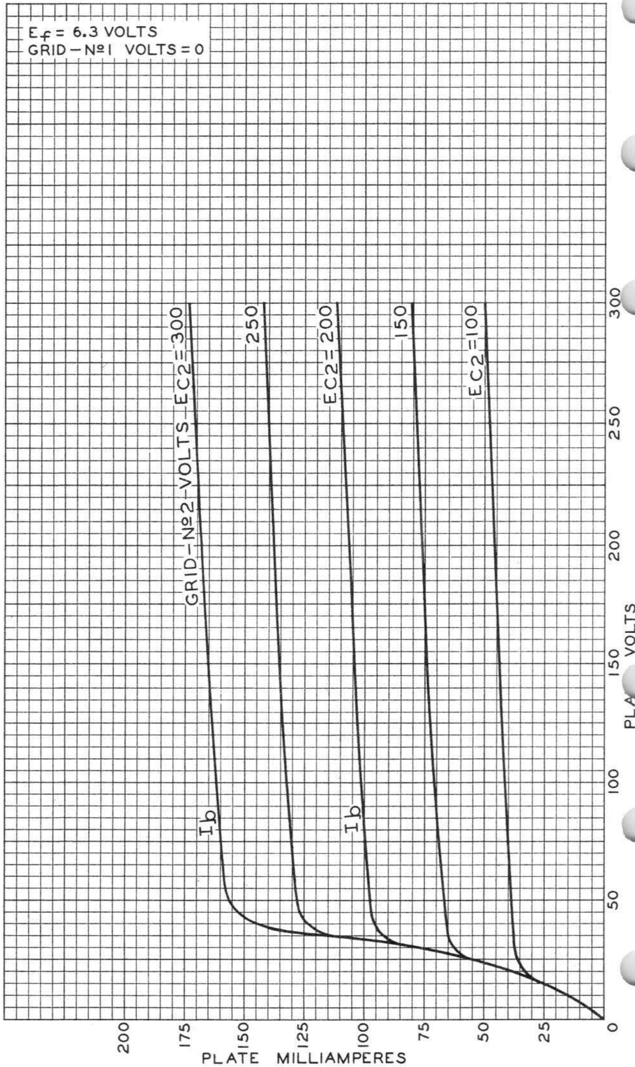
AVERAGE PLATE CHARACTERISTICS



ELECTRON TUBE DIVISION
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92CM—9380

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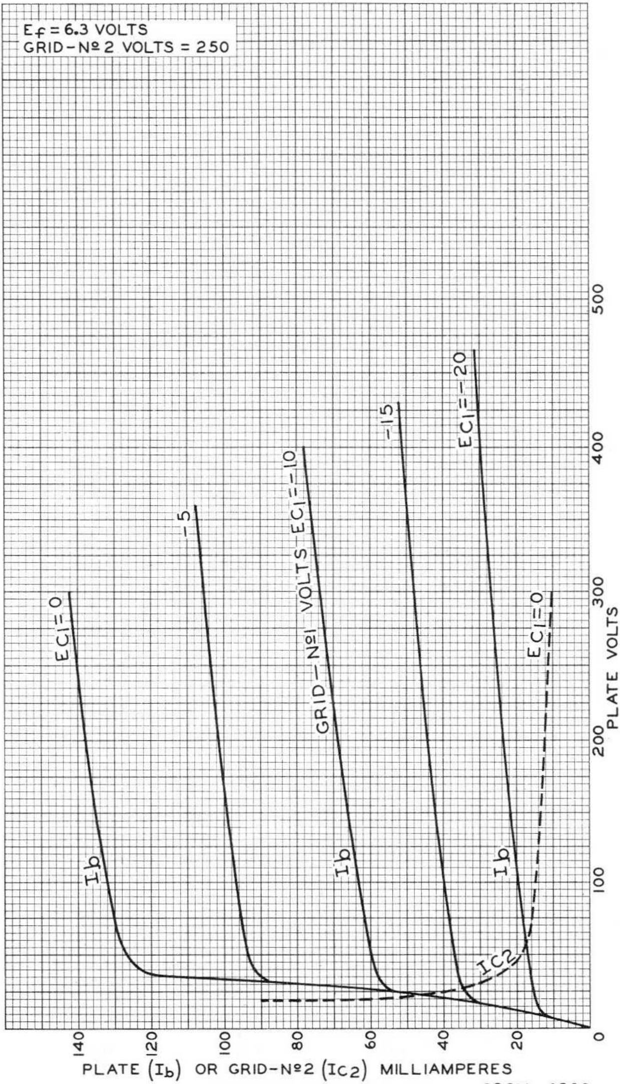
AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION 92CM-9389

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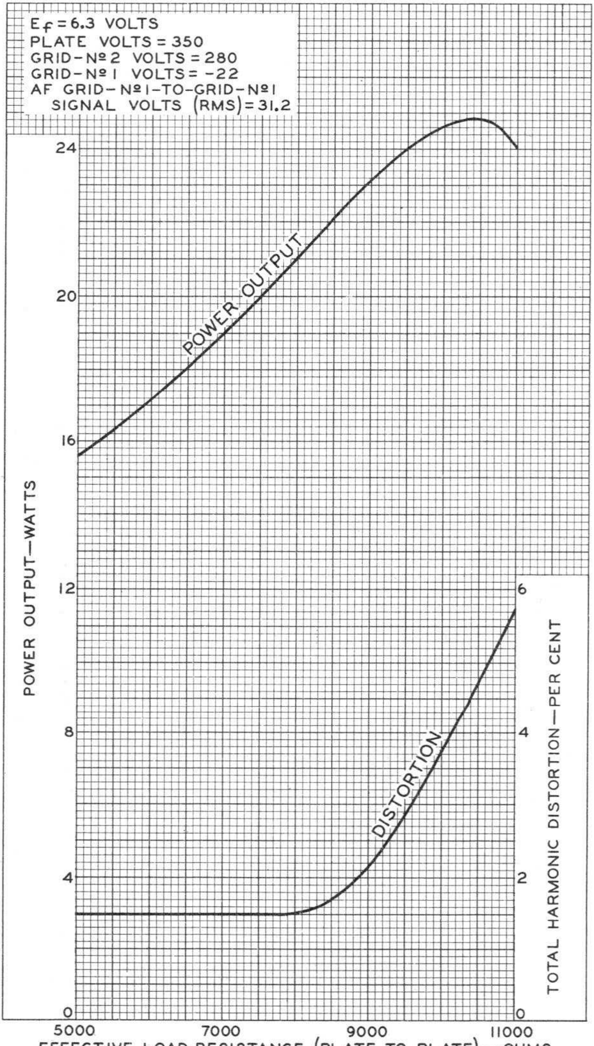
OPERATION CHARACTERISTICS

PUSH-PULL CLASS AB1 OPERATION



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9381

7027

BEAM POWER TUBE

For high-fidelity audio-amplifier applications

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage	6.3	ac or dc volts
Current	0.9	amp

Direct Interelectrode Capacitances:°

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

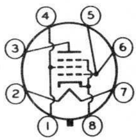
Characteristics, Class A_1 Amplifier:

Plate Voltage	250	volts
Grid-No.2 (Screen-Grid) Voltage	250	volts
Grid-No.1 (Control-Grid) 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 Sleeve (JETEC 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-Center Values:*

PLATE VOLTAGE	450	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	400	max.	volts
CATHODE CURRENT:			
Peak	400	max.	ma
DC	110	max.	ma
GRID-No.2 INPUT	3.5	max.	watts
PLATE DISSIPATION	25	max.	watts

°: See next page.

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7027

BEAM POWER TUBE

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode.	200 max.	volts
Heater positive with respect to cathode.	200▲ max.	volts

Typical Operation with Fixed Bias:

Values are for 2 tubes

Plate Voltage	330	400	450	volts
Grid-No.2 Voltage	330	300	350	volts
Grid-No.1 (Control-Grid) Voltage●.	-24	-25	-30	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	48	50	60	volts
Zero-Signal Plate Current . . .	122	102	95	ma
Max.-Signal Plate Current . . .	184	152	194	ma
Zero-Signal Grid-No.2 Current .	5.6	6	3.4	ma
Max.-Signal Grid-No.2 Current .	18.5	17	19.2	ma
Effective Load Resistance (Plate to plate).	4500	6600	6000	ohms
Total Harmonic Distortion . . .	1	2	1.5	%
Max.-Signal Power Output. . . .	31.5	34	50	watts

Typical Operation with Cathode Bias:

Values are for 2 tubes

Plate-Supply Voltage.	400	380	volts
Grid-No.2 Supply Voltage. . . .	300	380	volts
Cathode Resistor.	200	180	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage	57	68.5	volts
Zero-Signal Plate Current . . .	112	138	ma
Max.-Signal Plate Current . . .	128	170	ma
Zero-Signal Grid-No.2 Current .	7	5.6	ma
Max.-Signal Grid-No.2 Current .	16	20	ma
Effective Load Resistance (Plate to plate).	6600	4500	ohms
Total Harmonic Distortion . . .	2	3.5	%
Max.-Signal Power Output. . . .	32	36	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-Center Values:*

PLATE AND GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE.	450 max.	volts

o,▲,●: See next page.

BEAM POWER TUBE

CATHODE CURRENT:			
Peak	400	max.	ma
DC	110	max.	ma
GRID-No.2 INPUT	3	max.	watts
PLATE DISSIPATION	25	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:

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.

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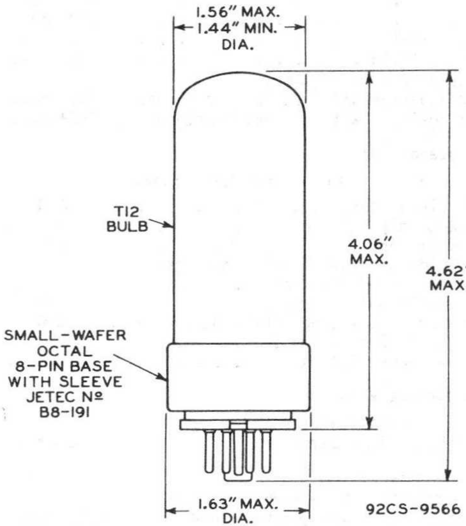
BEAM POWER TUBE



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

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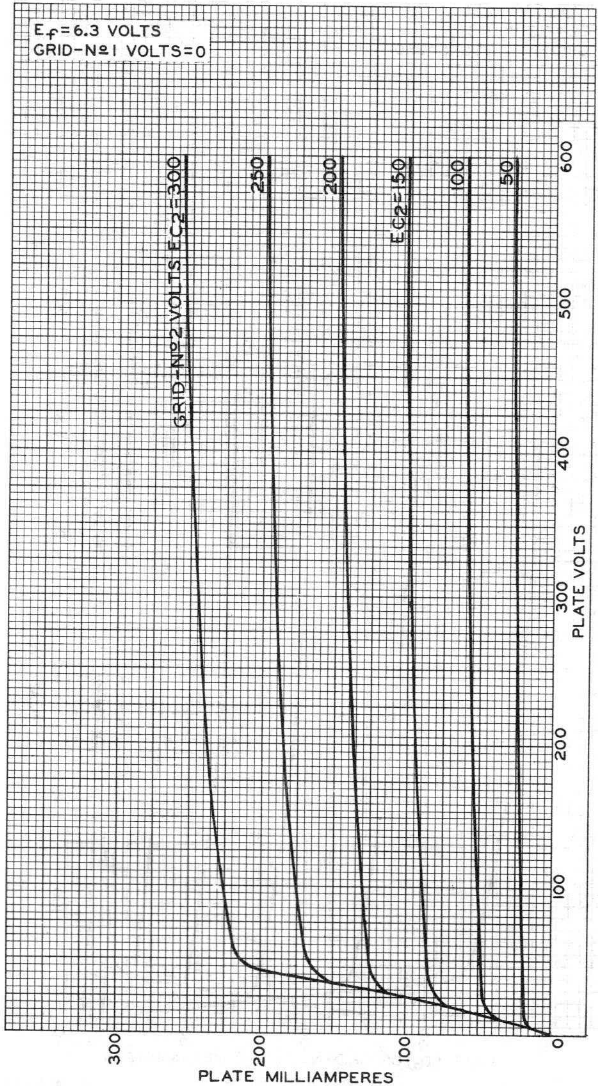
AVERAGE PLATE CHARACTERISTICS



ELECTRON TUBE DIVISION

92CM-9569

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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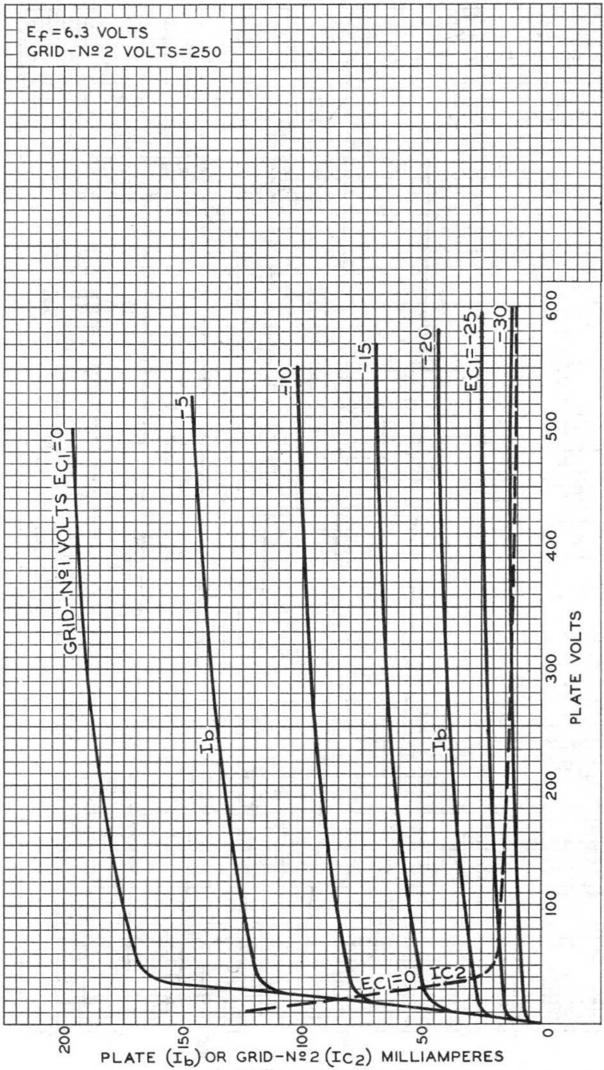
AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION

92CM-9570

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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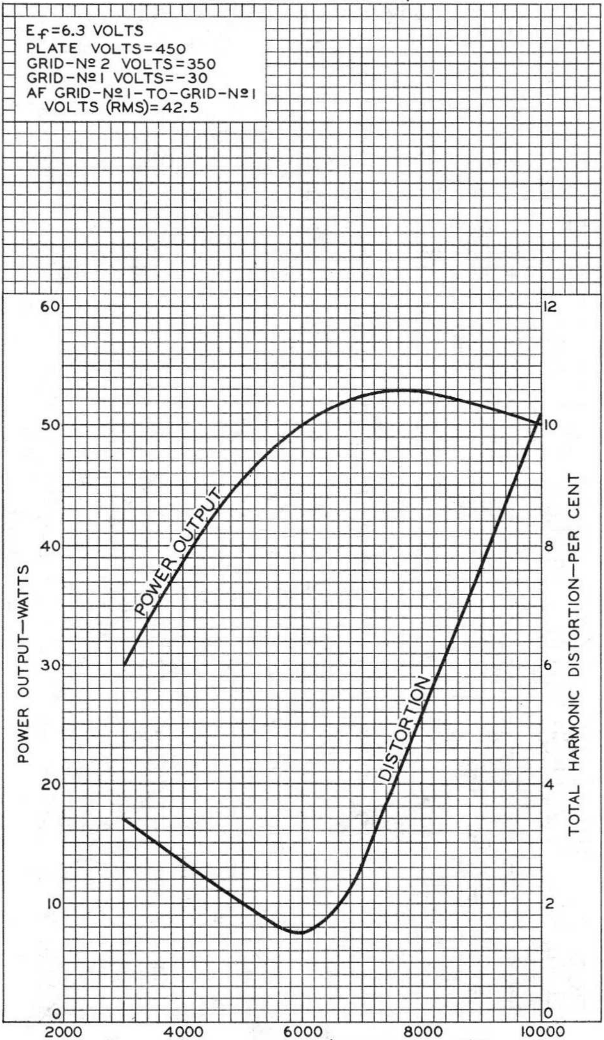
OPERATION CHARACTERISTICS

PUSH-PULL CLASS AB1



92CM-9575

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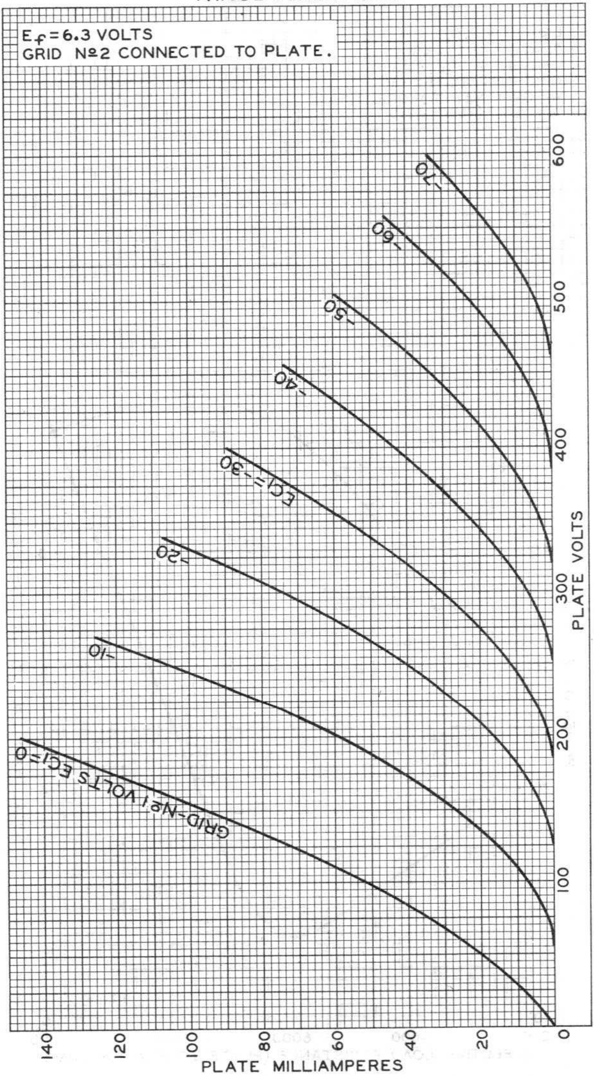
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION



92CM-9568

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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	$\mu\mu$f
Grid to cathode and heater (Each unit)	4.8	$\mu\mu$f
Plate to cathode and heater (Unit No.1)	0.65	$\mu\mu$f
Plate to cathode and heater (Unit No.2)	0.55	$\mu\mu$f
Grid to grid	0.1	$\mu\mu$f
Plate to plate	1.4	$\mu\mu$f
Heater to cathode (Each unit)	6	$\mu\mu$f

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*

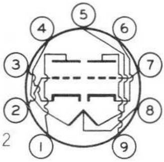
Bulb T6-1/2

Base . . . . Small-Button Noval 9-Pin (JEDEC No.E9-1)

← Indicates a change.

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, 1×10^3 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.

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:

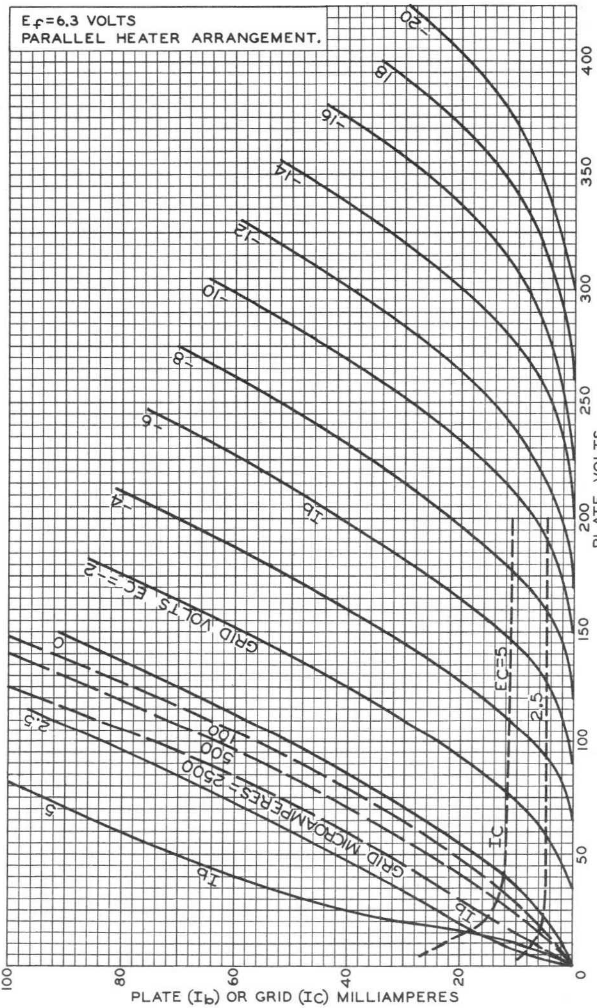
This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 15 (Series heater arrangement) cycled one minute on and four minutes off, heater 180 volts positive with respect to cathode, 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.

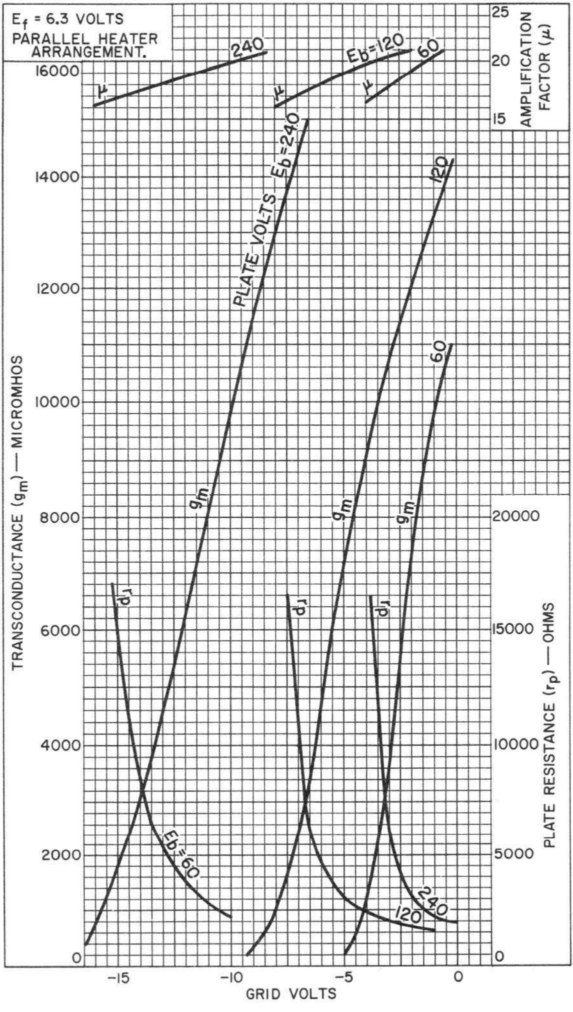
← Indicates a change.

AVERAGE CHARACTERISTICS
Each Unit



92CM-9856

AVERAGE CHARACTERISTICS
Each Unit



92CM-9857R1

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"

RCA

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

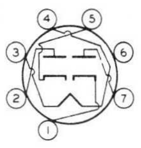
Direct Interelectrode Capacitances (Approx.):°

Plate to cathode, internal shield, and heater (Each unit)	3.2	$\mu\mu$f
Cathode to plate, internal shield, and heater (Each unit)	3.6	$\mu\mu$f
Plate of unit No.1 to plate of unit No.2.	0.026	$\mu\mu$f

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

°: See next page.

RCA

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

° 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.

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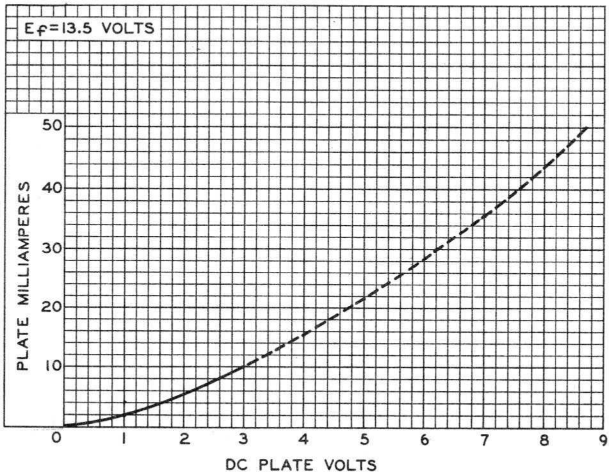
AVERAGE PLATE CHARACTERISTIC
EACH UNIT



92CS-9774

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7056

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°	
Grid No.1 to plate	0.02 max.	0.01 max.	$\mu\mu f$
Grid No.1 to all other electrodes except plate. . .	6.5	6.5	$\mu\mu f$
Plate to all other electrodes except grid No.1	2	3	$\mu\mu f$

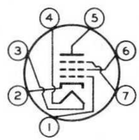
Characteristics, Class A_1 Amplifier:

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

° With external shield JETEC No.316 connected to cathode.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7056

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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	50	–	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.

7056

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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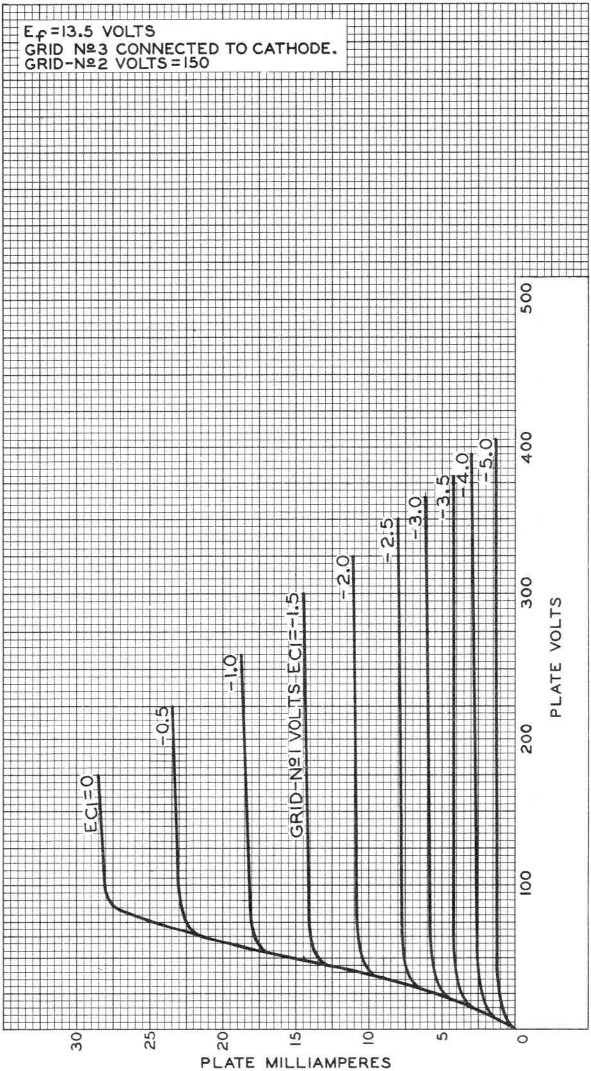
AVERAGE PLATE CHARACTERISTICS



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92CM-9791

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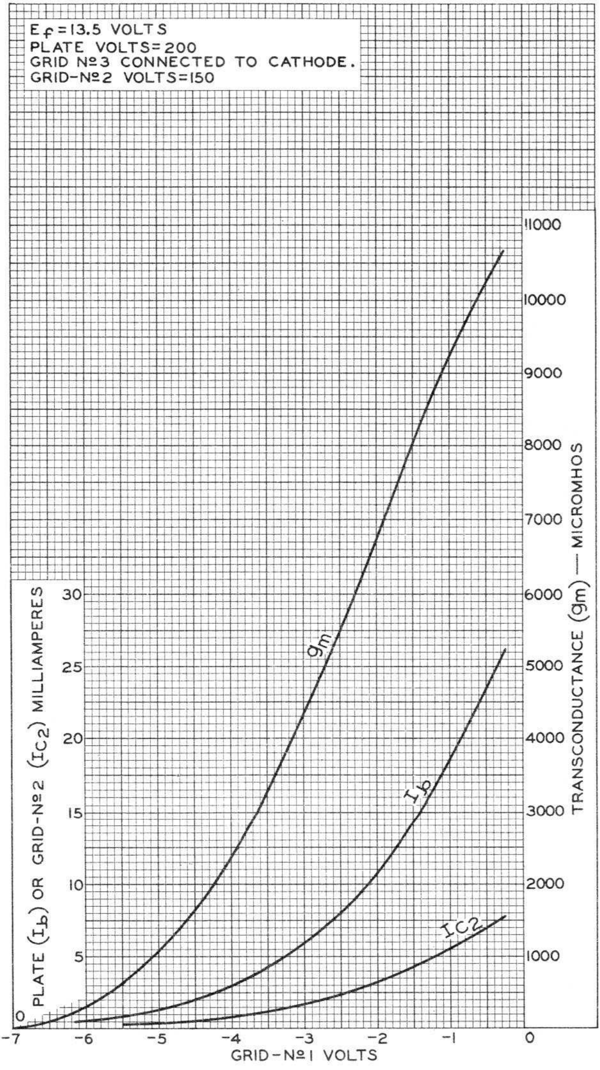
AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION

92CM-9789

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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7057

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:°

	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

° With external shield JETEC No.315 connected to pin 9.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7057

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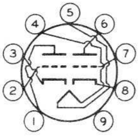
7057

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	$\mu\mu$f
Cathode to grid, internal shield, and heater (Unit No.2)	2	4.1	5.9	$\mu\mu$f
Plate to grid, internal shield, and heater (Unit No.2)	2	1.9	2.5	$\mu\mu$f
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

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.

7057

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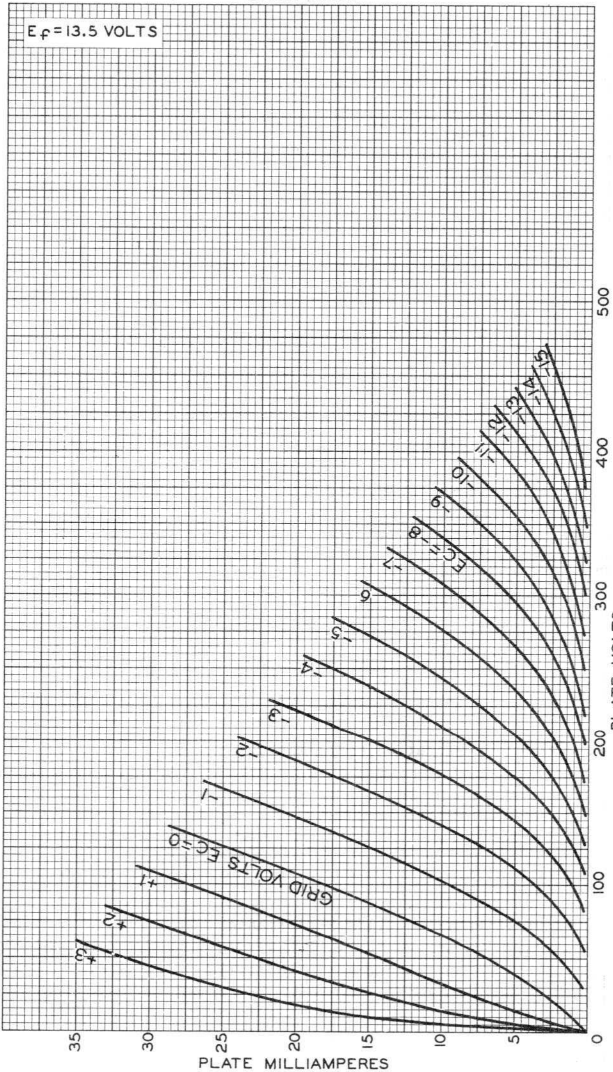
AVERAGE PLATE CHARACTERISTICS
EACH UNIT



ELECTRON TUBE DIVISION

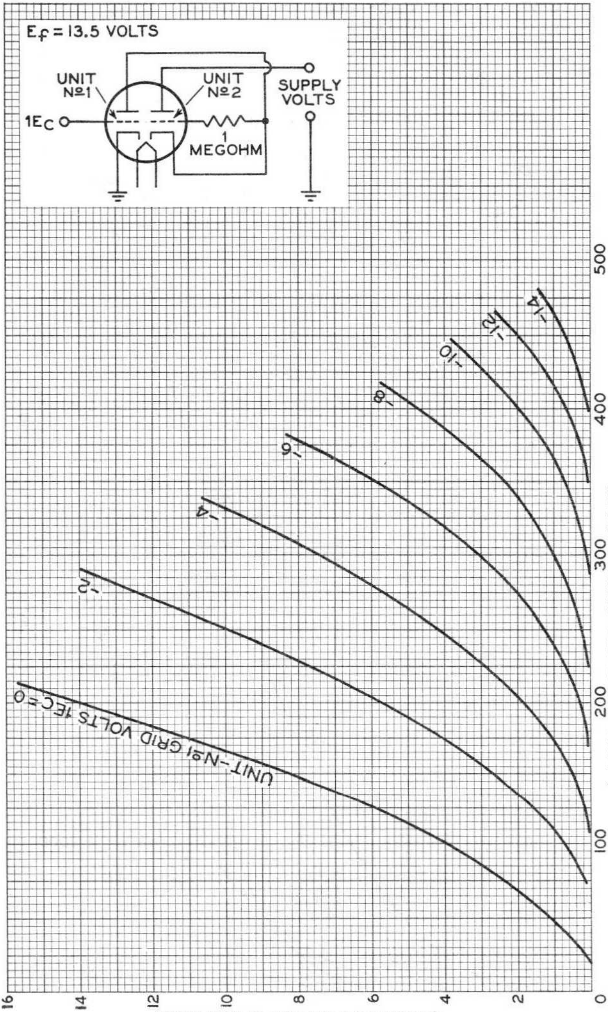
92CM-9816

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

7057

AVERAGE PLATE CHARACTERISTICS
DIRECT-COUPLED DRIVEN RF AMPLIFIER IN CATHODE-DRIVE CIRCUIT



92CM-9792

RCA

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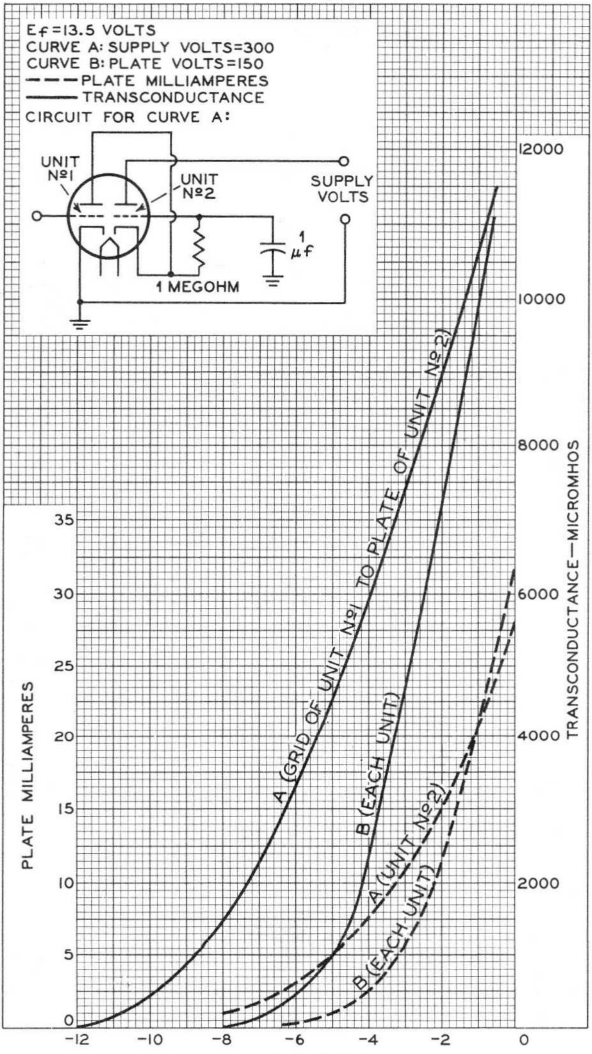
AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION

92CM-9790

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7058

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:°

	Unit No. 1	Unit No. 2	
Grid to plate	1.7	1.7	$\mu\mu$f
Grid to cathode and heater . . .	1.6	1.6	$\mu\mu$f
Plate to cathode and heater . . .	0.46	0.34	$\mu\mu$f

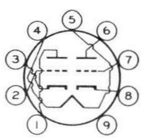
Characteristics, Class A_1 Amplifier (Each Unit):

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 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 – Internal Connection—Do Not Use

°: See next page.

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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

° 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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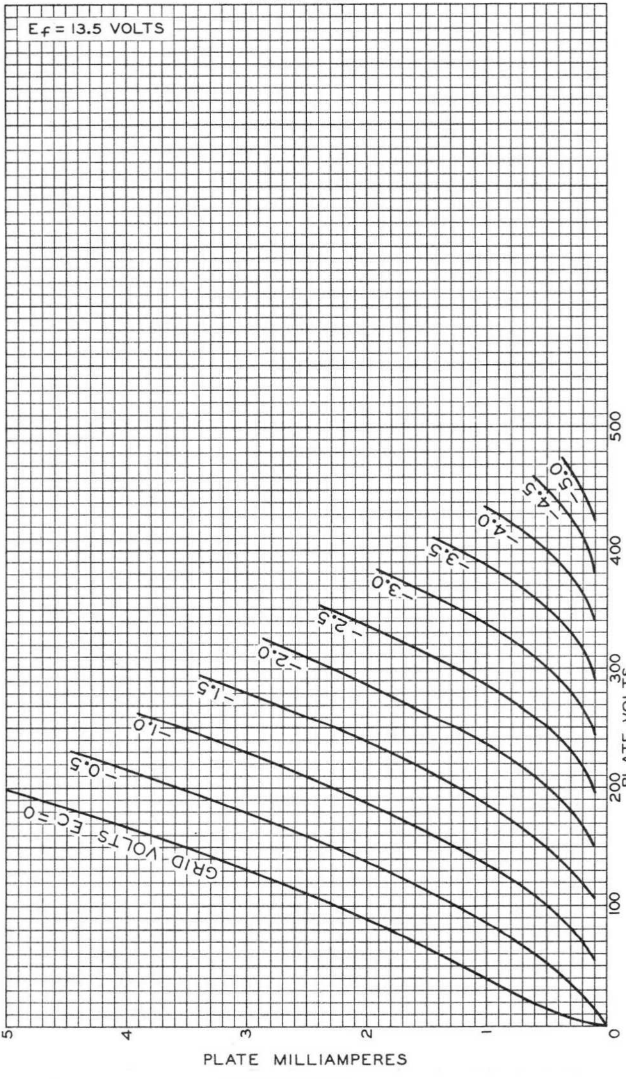
AVERAGE PLATE CHARACTERISTICS
EACH UNIT



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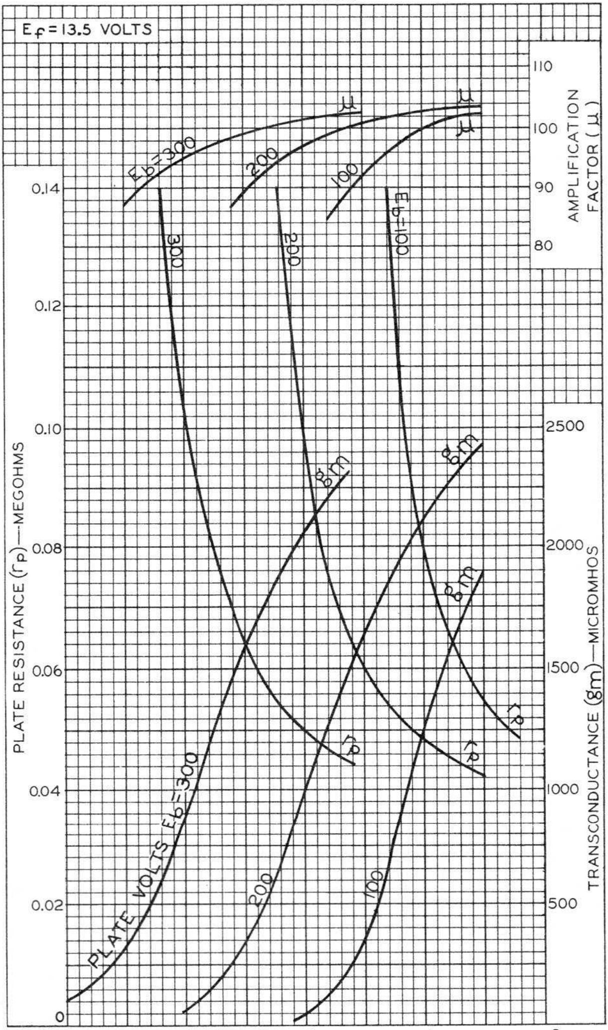
92CM-9793

7058

7058

AVERAGE CHARACTERISTICS

EACH UNIT



ELECTRON TUBE DIVISION

92CM-9805

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

7059

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

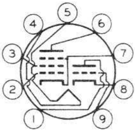
RCA

7059

MEDIUM-MU TRIODE— SHARP-CUTOFF PENTODE

Bulb. T6-1/2
Base. . . . . .Small-Button Noval 9-Pin (JETEC 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

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.	megohm

° 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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7059
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.

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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.

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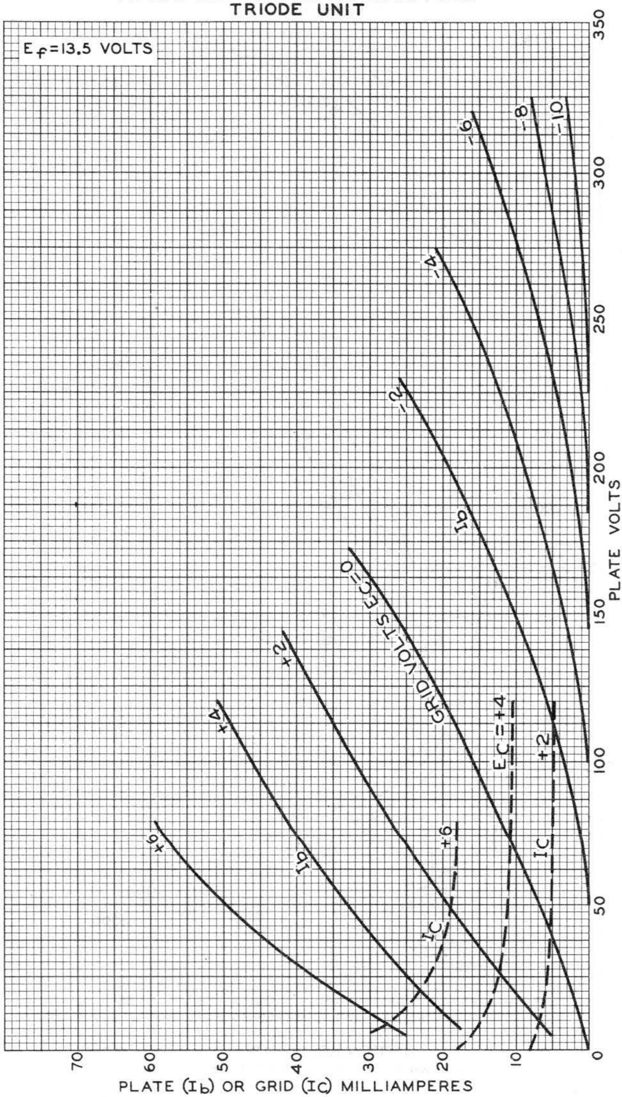
AVERAGE CHARACTERISTICS
TRIODE UNIT



ELECTRON TUBE DIVISION

92CM-9810

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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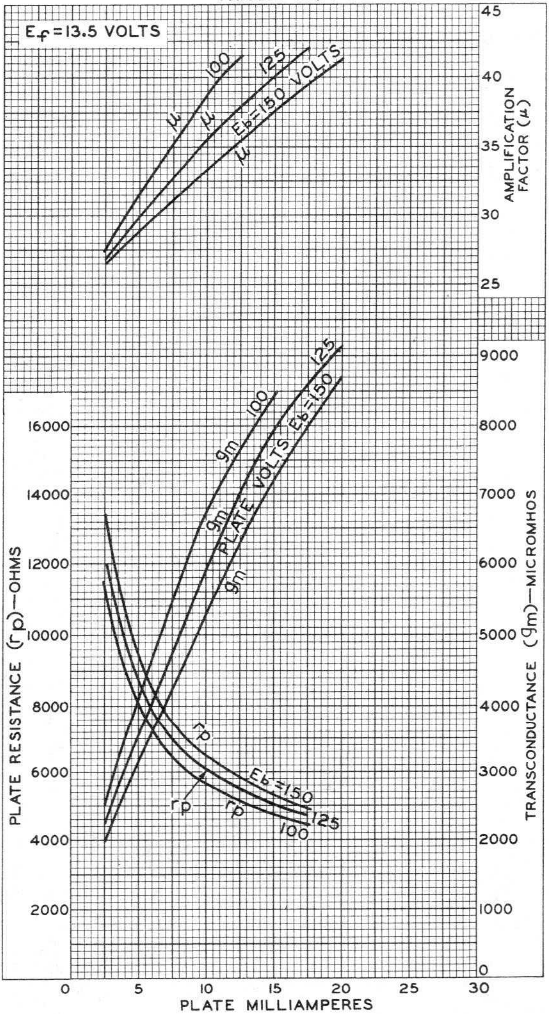
7059

AVERAGE CHARACTERISTICS

TRIODE UNIT



ELECTRON TUBE DIVISION

92CM-9812

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7059

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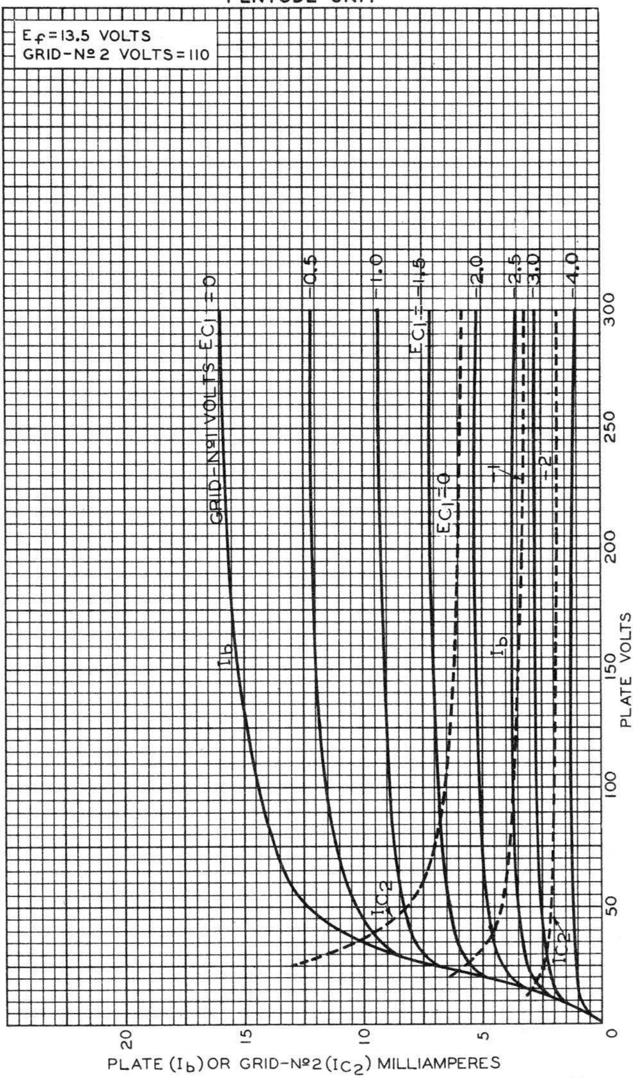
AVERAGE CHARACTERISTICS
PENTODE UNIT



ELECTRON TUBE DIVISION

92CM-9809

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7060

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	$\mu\mu f$
Grid to cathode and heater	2.4	$\mu\mu f$
Plate to cathode and heater	0.22	$\mu\mu f$
Pentode Unit:		
Grid No.1 to plate	0.044	$\mu\mu f$
Grid No.1 to all other electrodes except plate	7.1	$\mu\mu f$
Plate to all other electrodes except grid No.1	2.5	$\mu\mu f$
Triode grid to pentode plate	0.022 max.	$\mu\mu f$
Pentode grid No.1 to triode plate	0.015 max.	$\mu\mu f$
Pentode plate to triode plate	0.16 max.	$\mu\mu f$

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.

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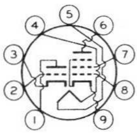
MEDIUM-MU TRIODE—POWER PENTODE

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

°: See next page.

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

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7060

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 wmth 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	11.5	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	$\mu\mu$f
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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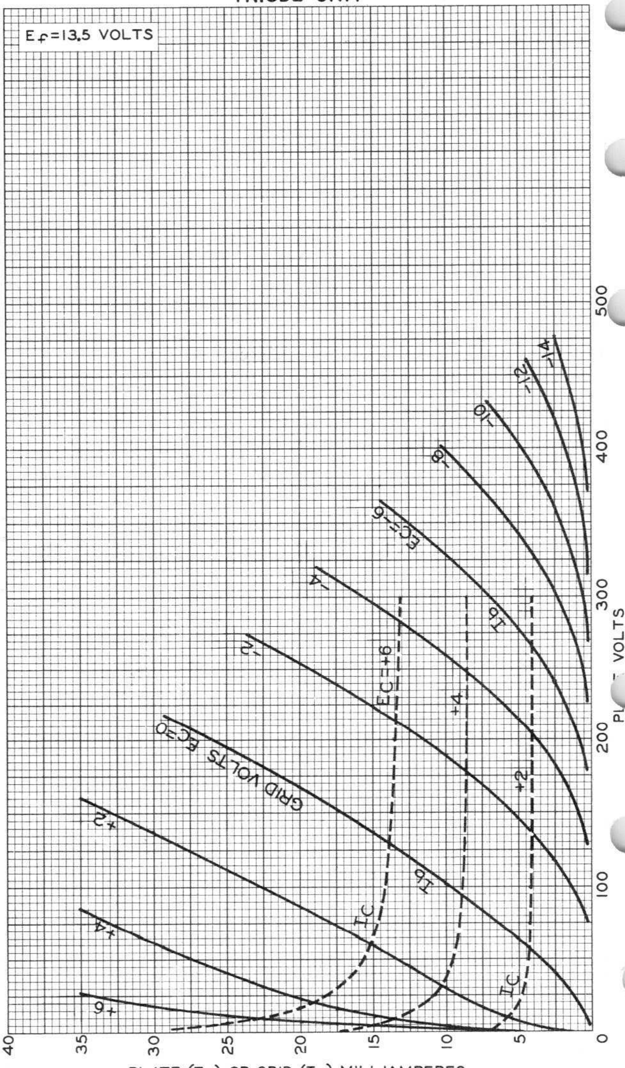
AVERAGE CHARACTERISTICS
TRIODE UNIT



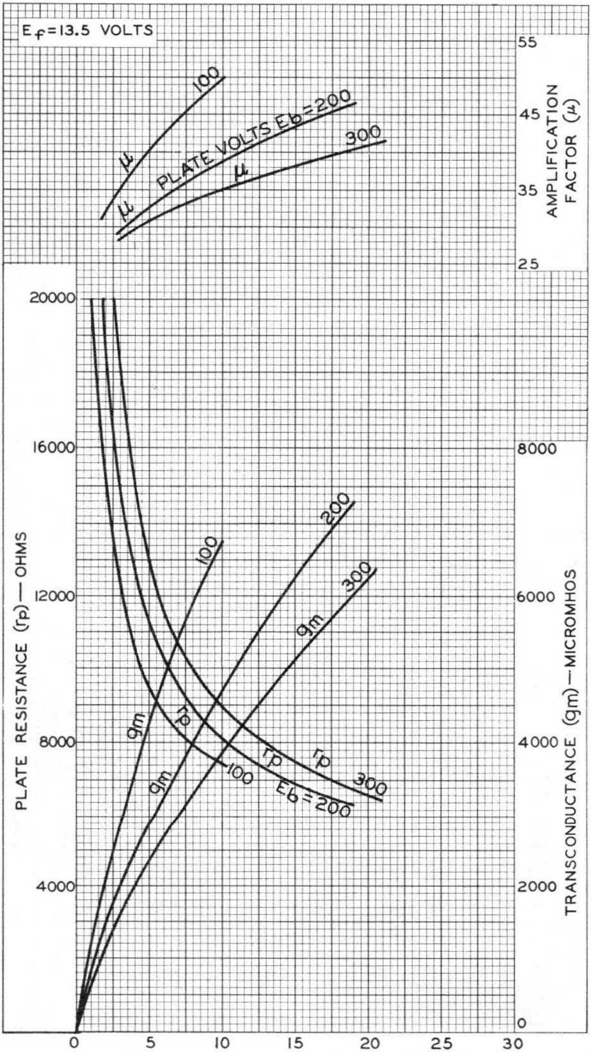
ELECTRON TUBE DIVISION 92CM-9807

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

7060

AVERAGE CHARACTERISTICS
TRIODE UNIT



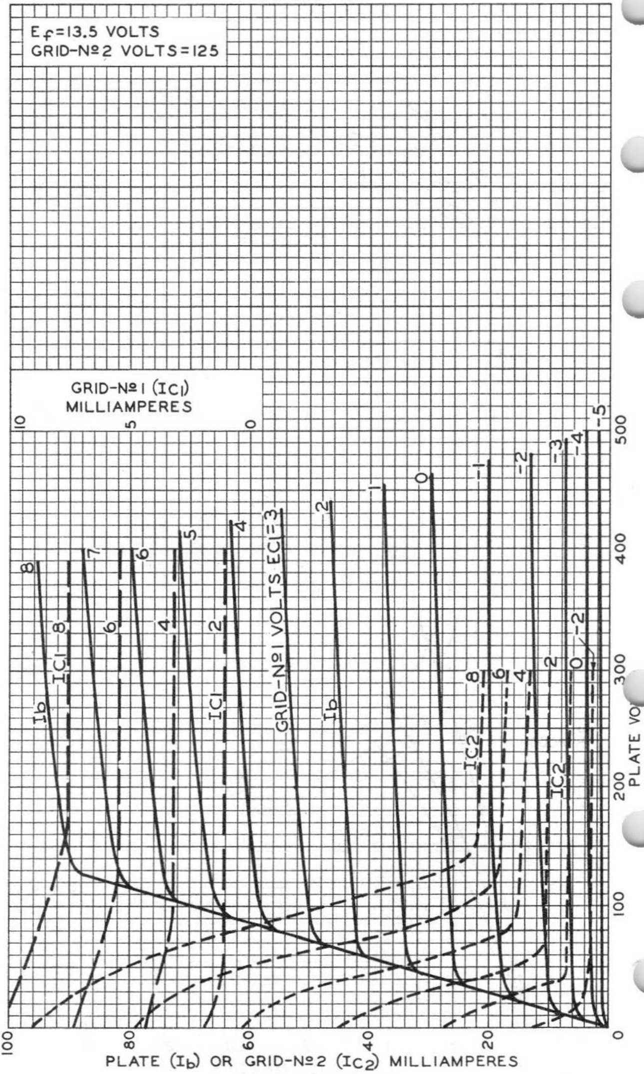
ELECTRON TUBE DIVISION
92CM-9806
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7060

7060

AVERAGE CHARACTERISTICS

PENTODE UNIT



ELECTRON TUBE DIVISION

92CM-9815

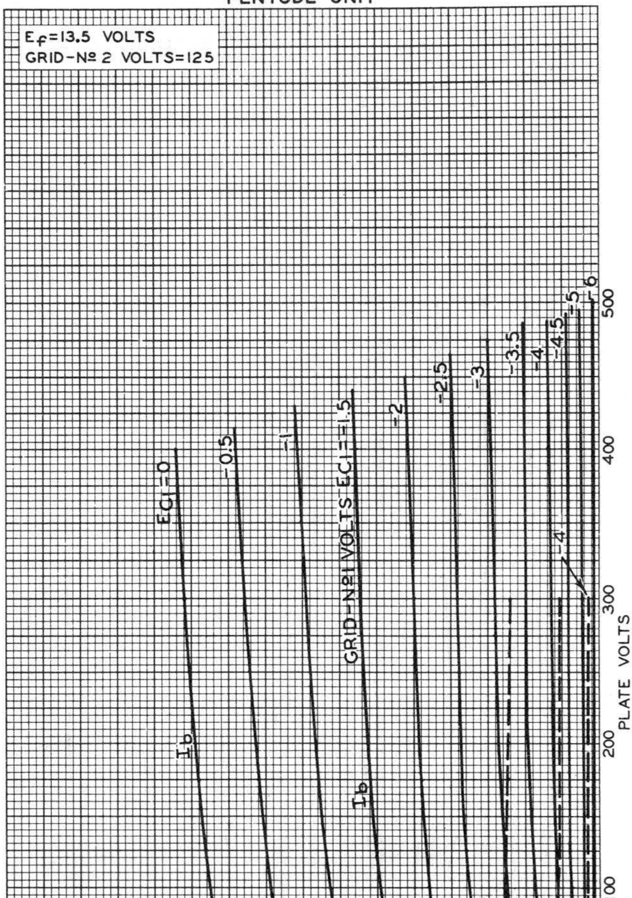
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

7060

AVERAGE CHARACTERISTICS

PENTODE UNIT



ELECTRON TUBE DIVISION

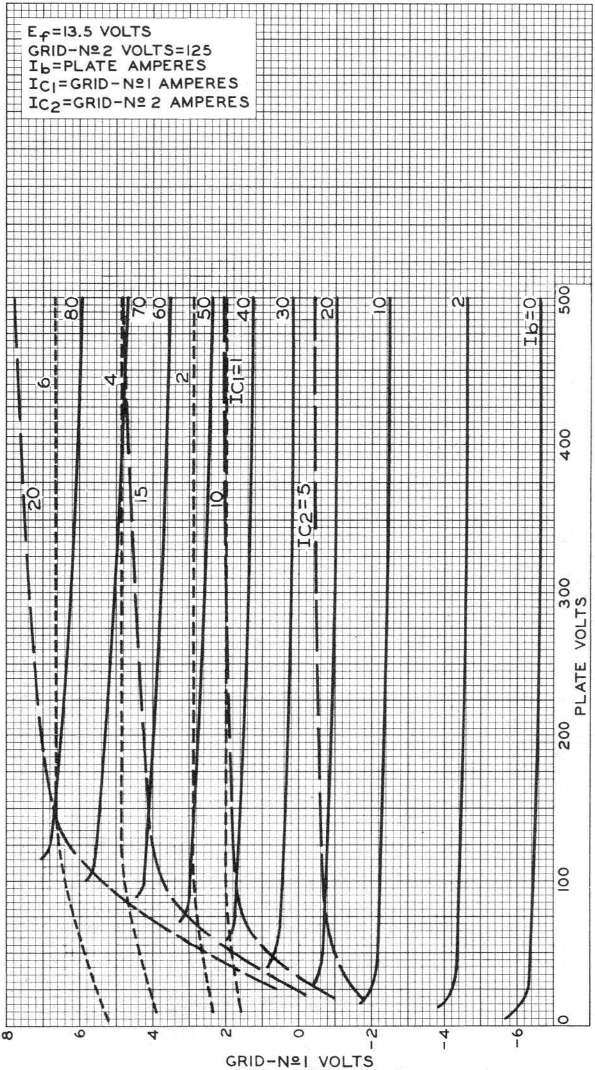
92CM-9811

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7060

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

PENTODE UNIT



ELECTRON TUBE DIVISION

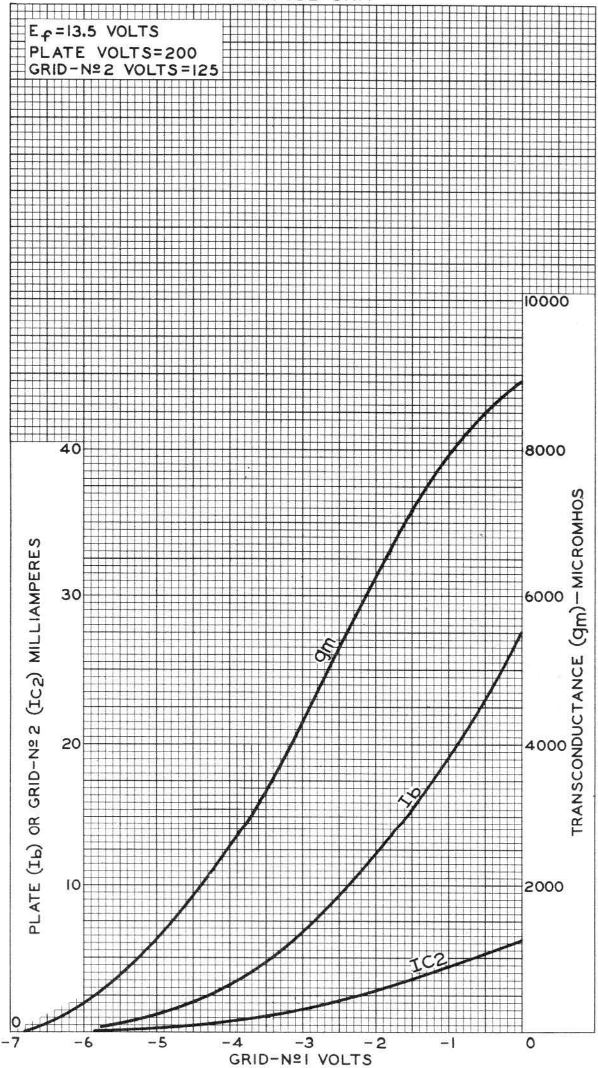
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9803

RCA

7060

AVERAGE CHARACTERISTICS
PENTODE UNIT



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

92CM-9813

7061

BEAM POWER TUBE

9-PIN MINIATURE TYPE

For use in mobile communications equipment operating from 6-cell storage-battery systems

GENERAL DATA

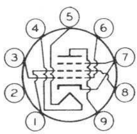
Electrical:

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:°		
Grid No.1 to plate	0.7 max.	$\mu\mu$f
Grid No.1 to all other electrodes except plate	8	$\mu\mu$f
Plate to all other electrodes except grid No.1	8.5	$\mu\mu$f

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

° Without external shield.

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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

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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.

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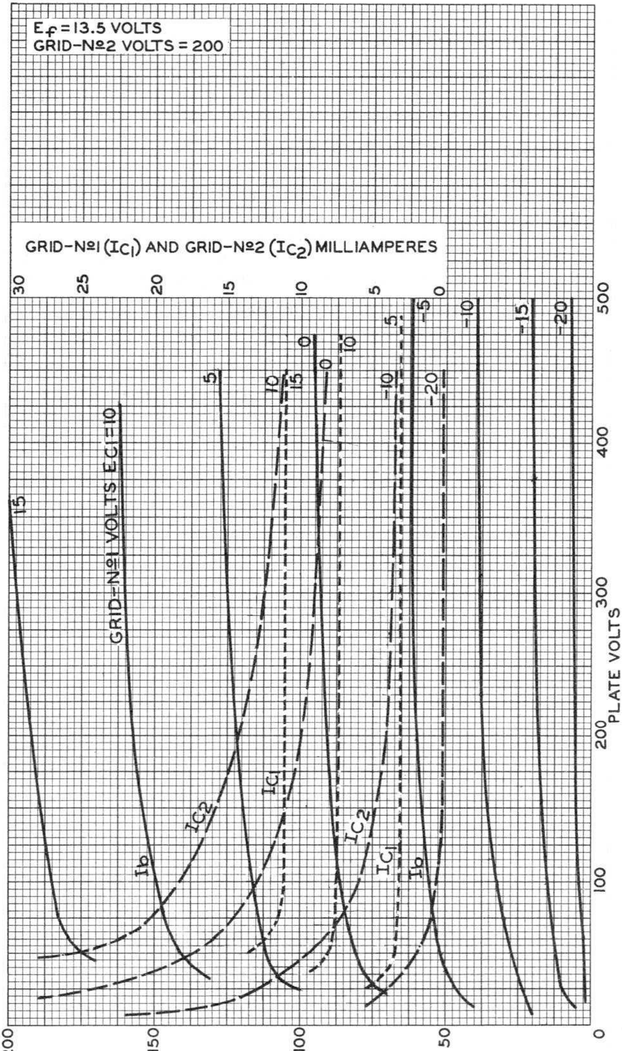
AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION

92CM-9802

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RCA

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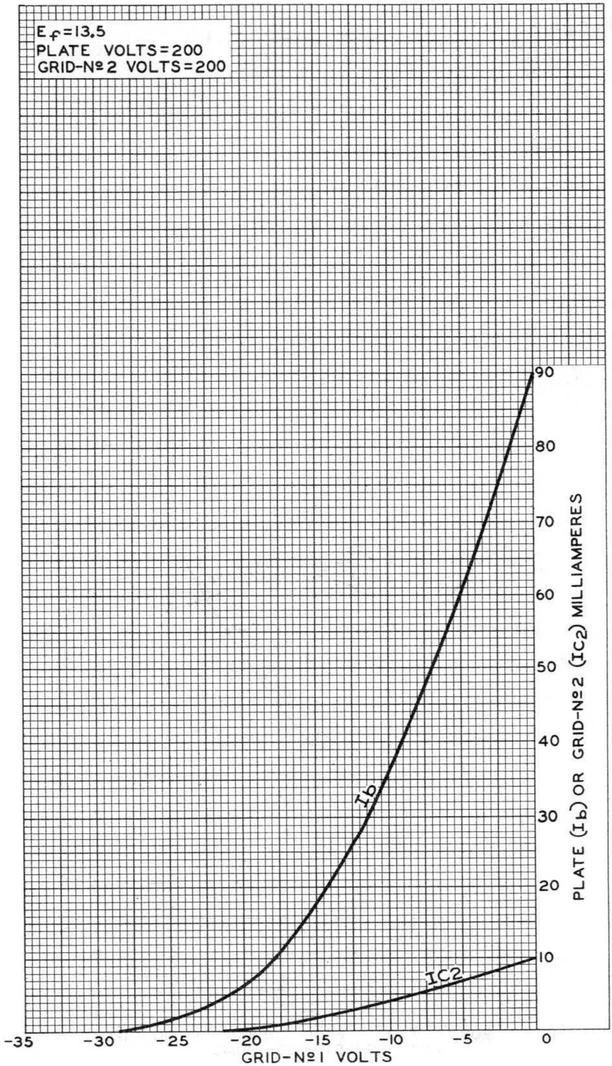
AVERAGE CHARACTERISTICS



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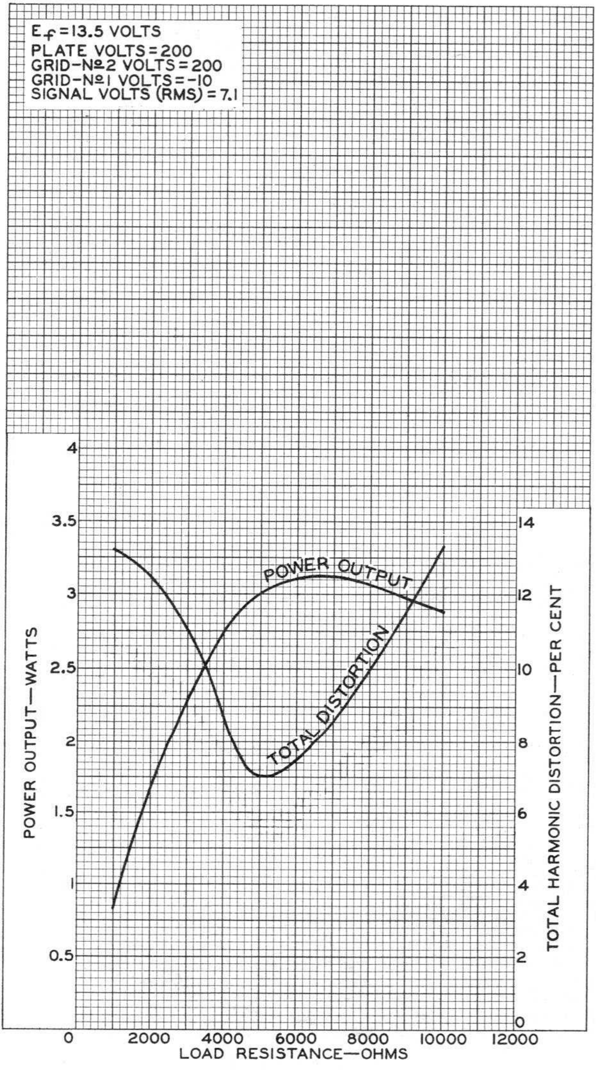
OPERATION CHARACTERISTICS



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

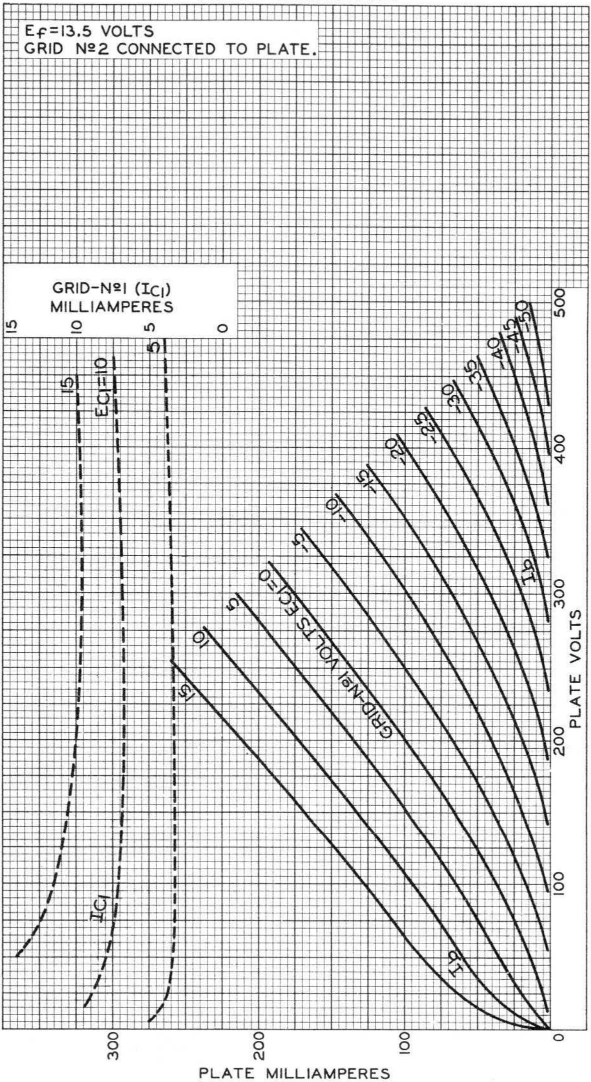
92CM-9814

RCA

7061

AVERAGE CHARACTERISTICS

TRIODE CONNECTION



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9801

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	$\mu\mu$f
Grid No.1 to cathode & grid No.3, grid No.2, and heater	10.8	$\mu\mu$f
Plate to cathode & grid No.3, grid No.2, and heater	6.5	$\mu\mu$f
Grid No.1 to heater	0.25	$\mu\mu$f

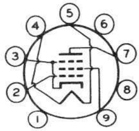
Characteristics, Class A_1 Amplifier:

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 (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

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	volts
Grid-No.2 Supply Voltage	b	
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.

Maximum Circuit Values:

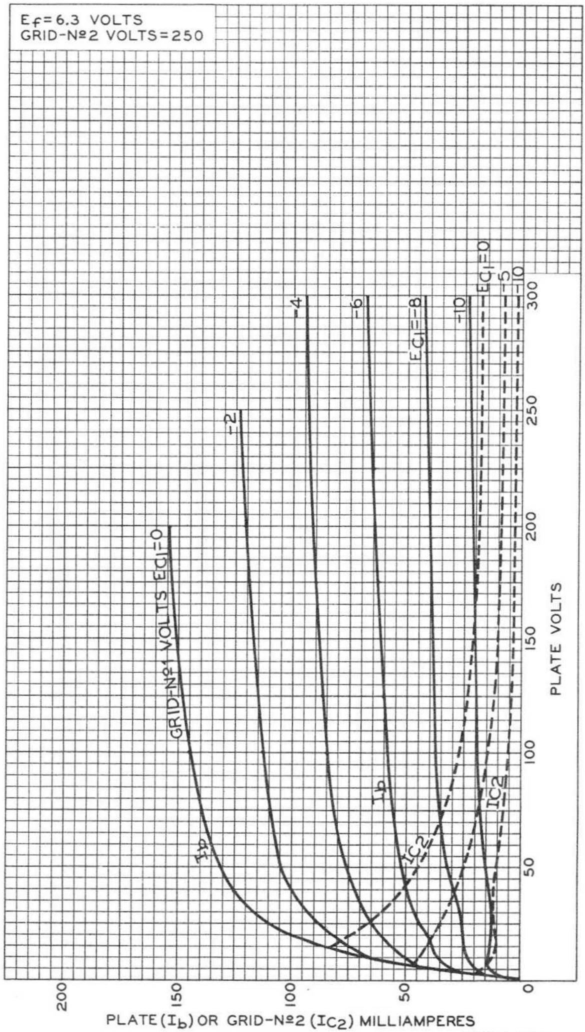
Grid-No.1-Circuit Resistance:

For cathode-bias operation.	1 max.	megohm

[a] Without external shield.

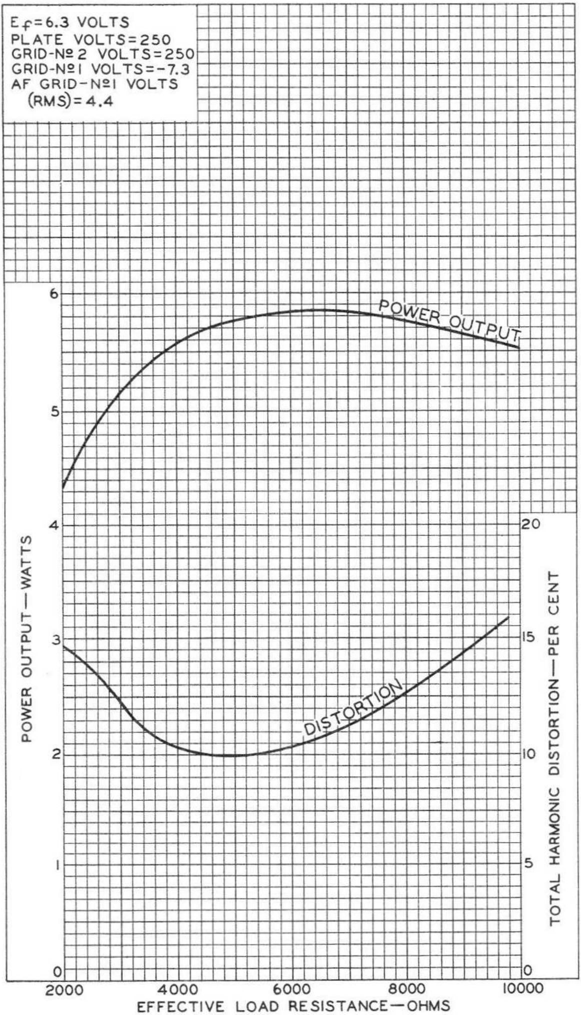
[b] Obtained from taps on the primary winding of the output transformer. The taps are located on each side of the center-tap (B+) so as to supply 43 per cent of the plate signal voltage to grid No.2 of each output tube.

AVERAGE CHARACTERISTICS



92CM-9903

OPERATION CHARACTERISTICS



92CM-9902

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 ←

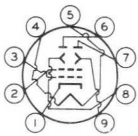
← Indicates a change.

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.

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.

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.

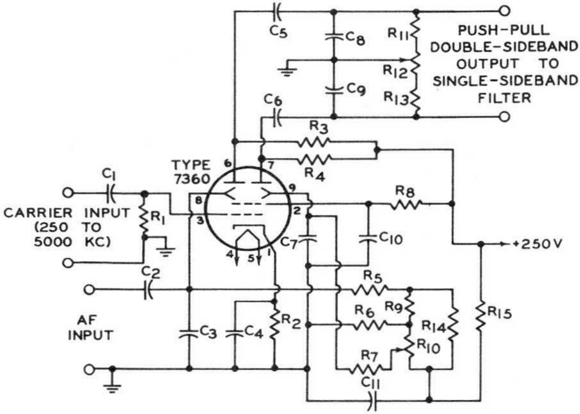
OPERATING CONSIDERATIONS

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.

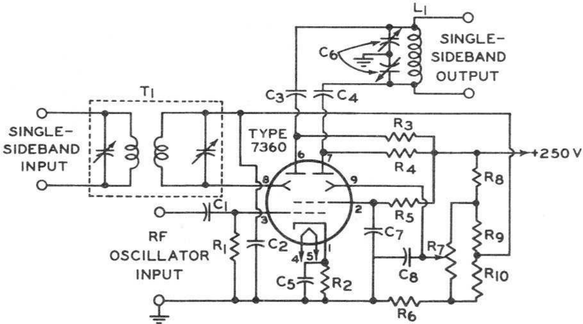
BALANCED-MODULATOR CIRCUIT
With Separate Excitation



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.

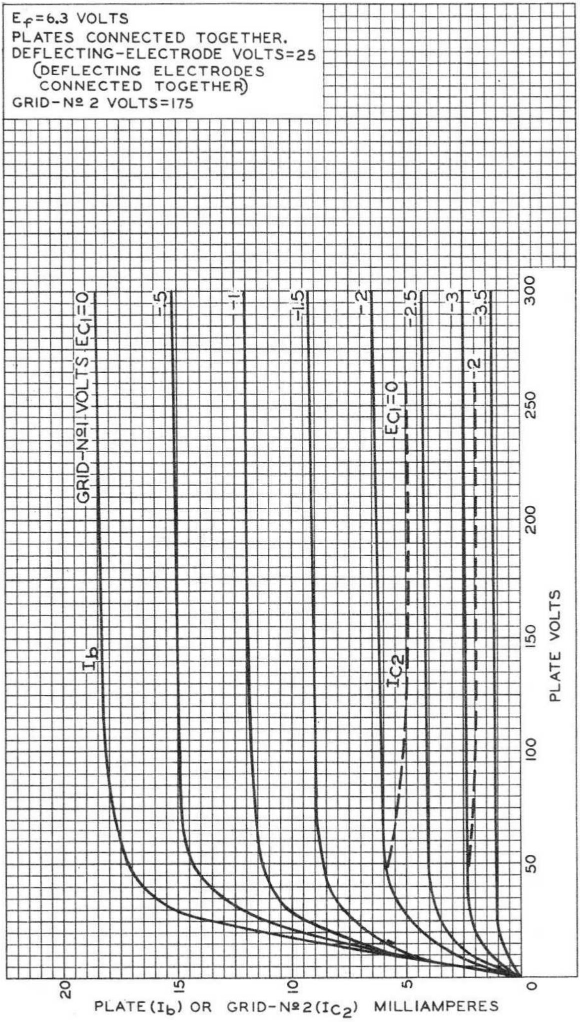
BALANCED-MIXER CIRCUIT
With Separate Excitation



92CS-10256R1

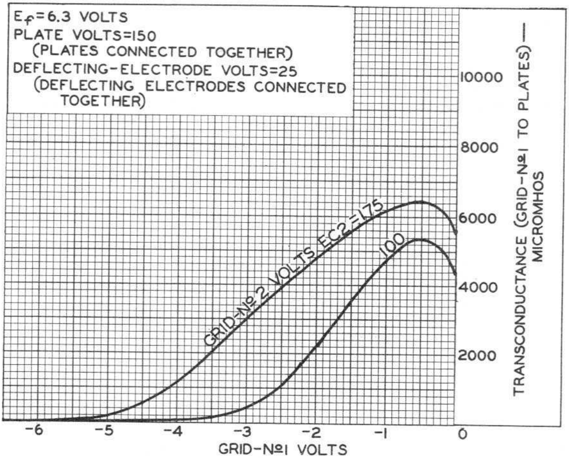
C_1: 0.001 µf
C_2: 0.04 µf
C_3 C_4: 0.001 µf
C_5: 0.04 µf
C_6: Split-Stator Tuning Capacitor to Resonate with L_1
C_7 C_8: 0.04 µf
L_1: Inductor
R_1: 0.47 megohm
R_2: 1200 ohms
R_3 R_4: 68000 ohms
R_5: 0.1 megohm
R_6: 12000 ohms
R_7: Oscillator-Rejection Potentiometer, 5000 ohms
R_8: 0.1 megohm
R_9 R_{10}: 2700 ohms
T_1: Tuned Input Transformer
NOTE: All resistors 1/2 watt, ± 10%, unless specified. All capacitors 400 volts.

AVERAGE CHARACTERISTICS

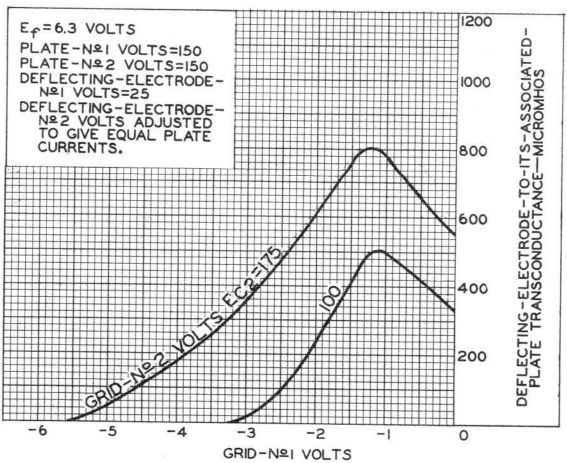


92CM-10253RI

AVERAGE CHARACTERISTICS

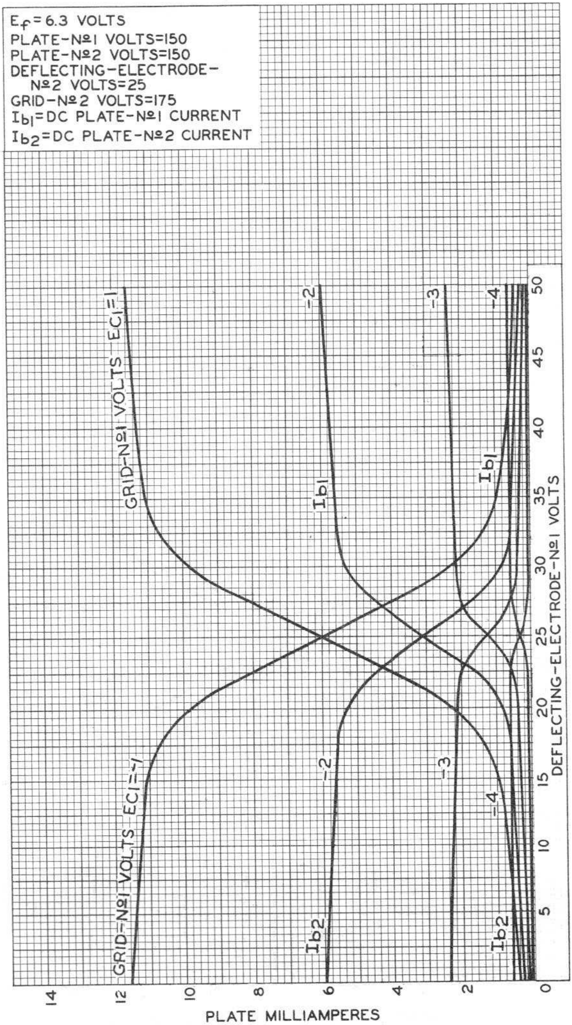


92CS-10250R2



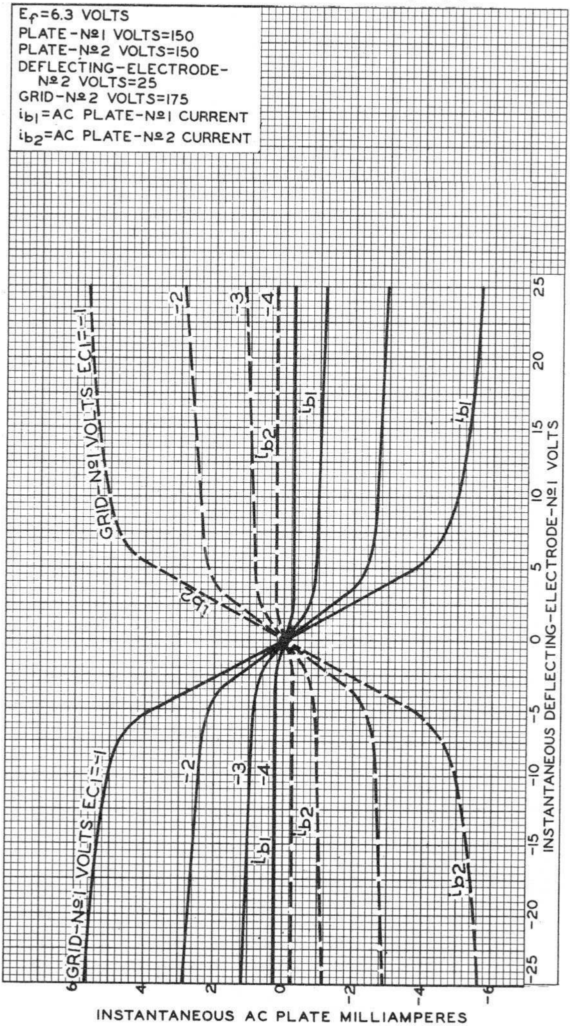
92CS-10249R1

AVERAGE CHARACTERISTICS



92CM-10252R2

OPERATION CHARACTERISTICS



92CM-10264R2

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:°		
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

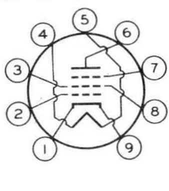
Characteristics, Class A_1 Amplifier:

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

Bulb Temperature (At hottest point on bulb surface). . . . . 225 max. °C

→ 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■	10 max.	watts

Typical CCS Push-Pull Operation:

Values are for 2 tubes

Heater Voltage	13.5	volts
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)	5000	ohms
Max.-Signal Driving Power	0	watts
Total Harmonic Distortion	5	%
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:*

	Up to 175 Mc		
	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	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	10 max.	12 max.	watts

→ Indicates a change.

Typical Operation:

As amplifier at 175 Mc		*CCS*	*ICAS*	
Heater Voltage	13.5	13.5	13.5	volts
DC Plate Voltage	250	300	300	volts
Grid No.3	*Connected to cathode at socket*			
DC Grid-No.2 Voltage[□□]	200	200	250	volts
DC Grid-No.1 Voltage[⊕⊕]	−40	−42	−55	volts
Peak RF Grid-No.1 Voltage	47	52	62	volts
DC Plate Current	60	70	80	ma
DC Grid-No.2 Current	3.7	3.7	5.1	ma
DC Grid-No.1 Current (Approx.)	1.5	2.1	1.6	ma
Driver Power Output (Approx.)[▲▲]	1	1	1.5	watts
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	60 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*

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[▲]	250	250	volts
DC Grid-No.1 Voltage[★]	−70	−75	volts
From a grid-No.1 resistor of	33000	33000	ohms
RF Grid-No.1 Voltage	75	80	volts
DC Plate Current	60	70	ma
DC Grid-No.2 Current	2.5	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 a change.

	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.

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.

→ 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.

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 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, 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 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.	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.*		

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.*		

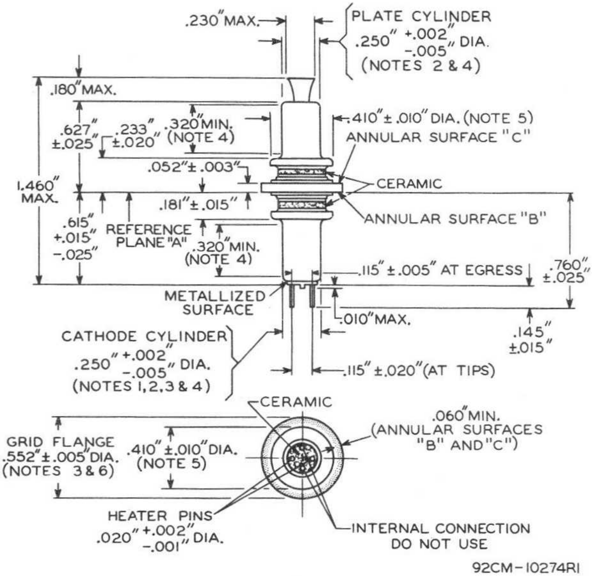
At the end of 1000 hours, the tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to meet the following limits:

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.



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".

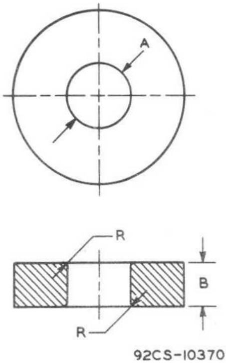
NOTE 3: THE AXES OF THE CATHODE CYLINDER AND GRID FLANGE WILL COINCIDE WITHIN 0.005".

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.

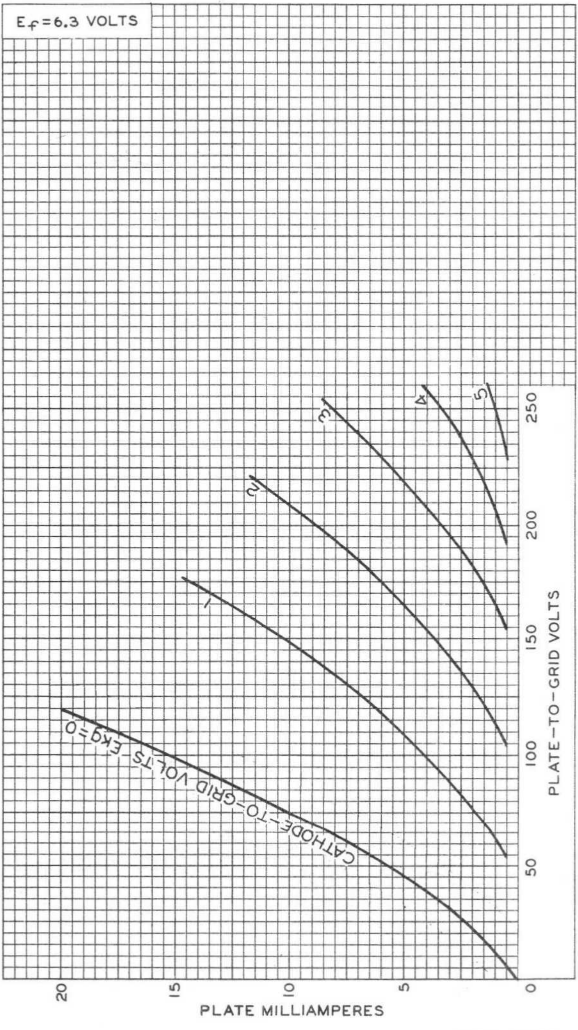
NOTE 6: THIS DIAMETER IS MEASURED WITH "GO" AND "NO-GO" GAUGES G_3-1 AND G_3-2, RESPECTIVELY.

GAUGES



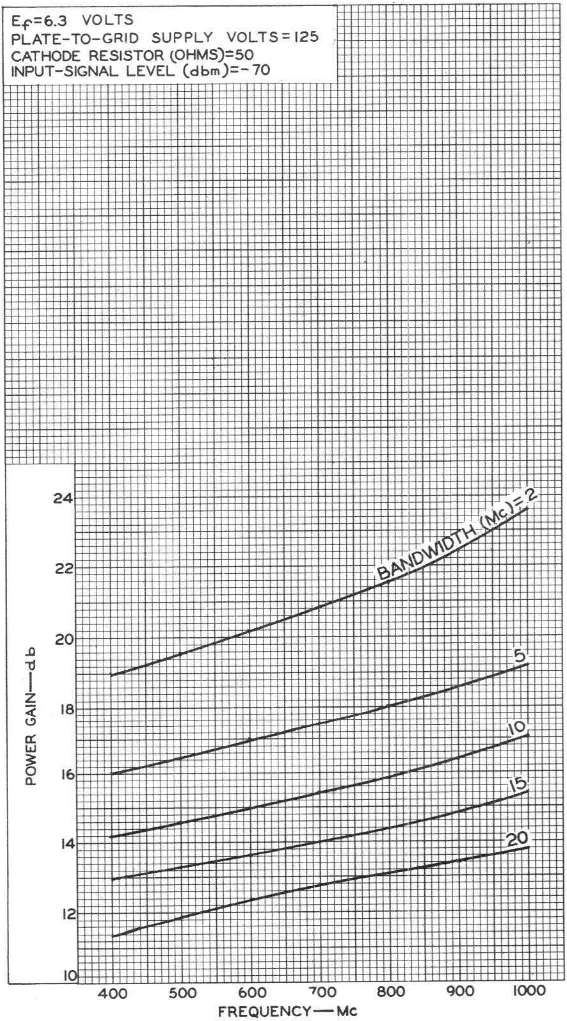
Gauge	Type	Dimension		
		Diameter A	Thickness B	Radius R
G_1-1	GO	$0.25200'' {}^{+0.00000''}_{-0.00007''}$	$0.320'' {}^{+0.001''}_{-0.000''}$	0.003" MAX.
G_1-2	NO-GO	$0.24500'' {}^{+0.00007''}_{-0.00000''}$	–	–
G_2-1	GO	$0.42000'' {}^{+0.00000''}_{-0.00007''}$	–	–
G_2-2	NO-GO	$0.40000'' {}^{+0.00007''}_{-0.00000''}$	–	–
G_3-1	GO	$0.55700'' {}^{+0.00000''}_{-0.00007''}$	–	–
G_3-2	NO-GO	$0.54700'' {}^{+0.00007''}_{-0.00000''}$	–	–

AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Service



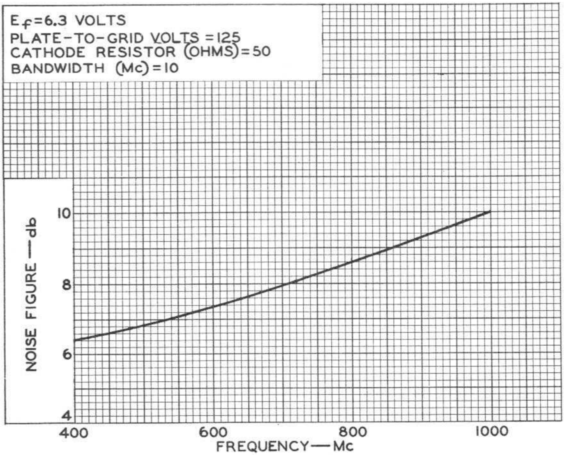
92CM—10458

POWER-GAIN CHARACTERISTICS
Cathode-Drive Service

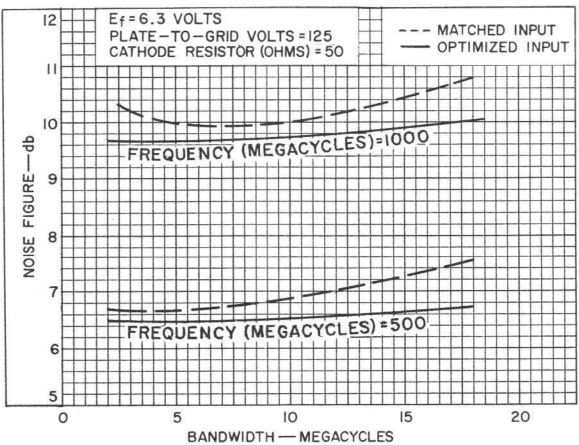


92CM-10271R1

NOISE-FIGURE CHARACTERISTICS
Cathode-Drive Service

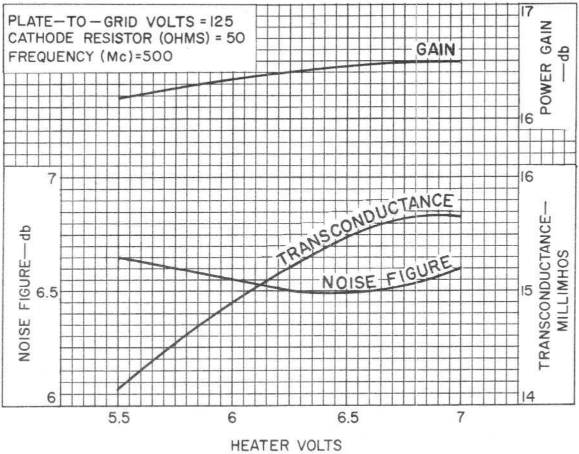


92CS-10270R3



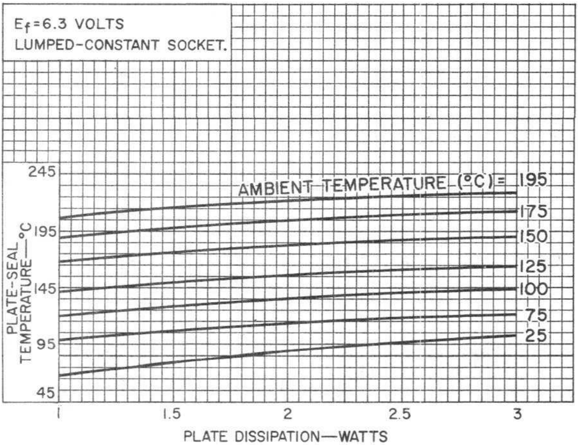
92CS-11497R1

CHARACTERISTICS
Cathode-Drive Service



92CS-11491R1

PLATE-SEAL-TEMPERATURE CHARACTERISTICS



92CS-11488

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

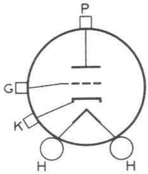
Mechanical:

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.

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.

[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] Jettron 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 up to 2325 Mc.
[h] Continuous Commercial Service.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN ←

	Note	*Min.*	*Max.*	
Heater Current.	1	0.205	0.245	amp
Direct Interelectrode Capacitances:				
Grid to plate	–	2.1	2.8	$\mu\mu$f
Grid to cathode	–	3.8	4.8	$\mu\mu$f
Plate to cathode.	–	–	0.03	$\mu\mu$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 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.

← Indicates a change.

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-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 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.

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 (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-1D, 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-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.*

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-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 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.	300 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.

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:

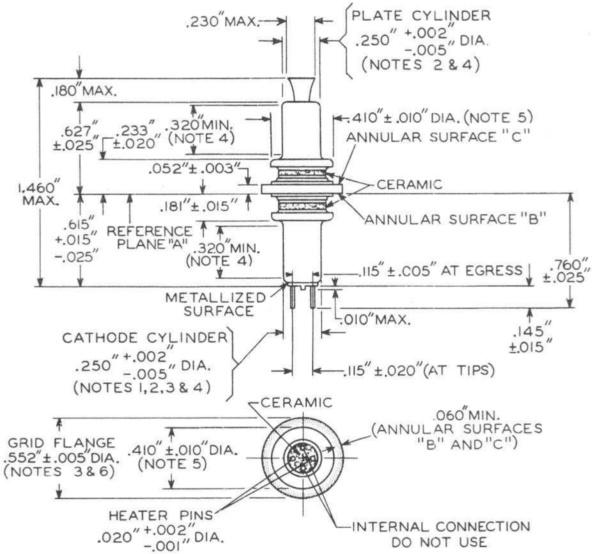
Heater Current. . . . . 300 max. ma
For conditions shown under *Characteristics Range Values, Note 1.*

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.



92CM-10274R1

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".

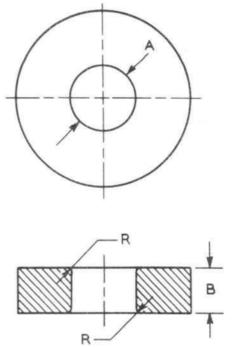
NOTE 3: THE AXES OF THE CATHODE CYLINDER AND GRID FLANGE WILL COINCIDE WITHIN 0.005".

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.

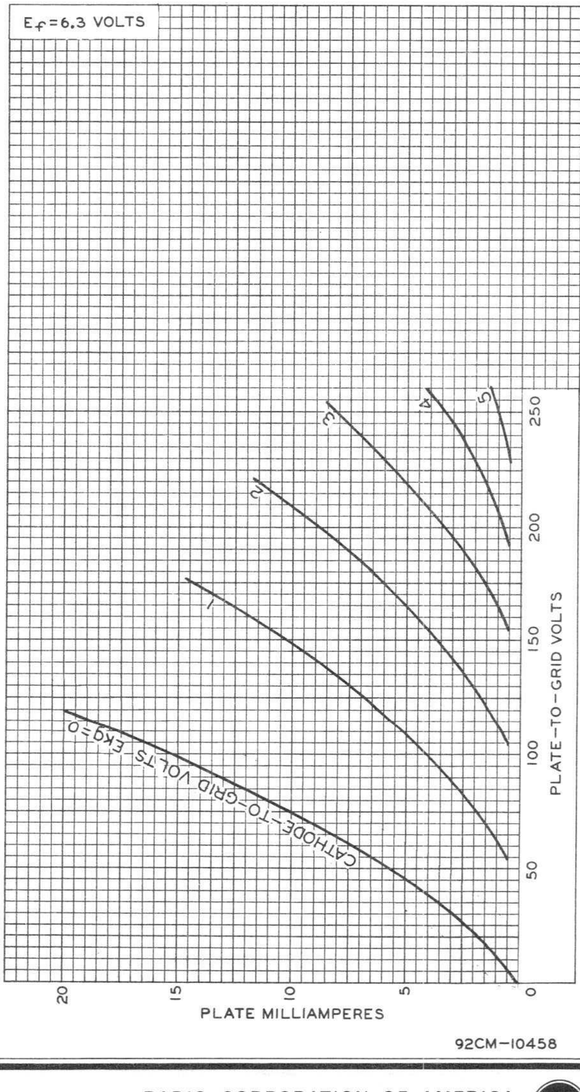
NOTE 6: THIS DIAMETER IS MEASURED WITH "GO" AND "NO-GO" GAUGES G_3-1 AND G_3-2, RESPECTIVELY.

GAUGES



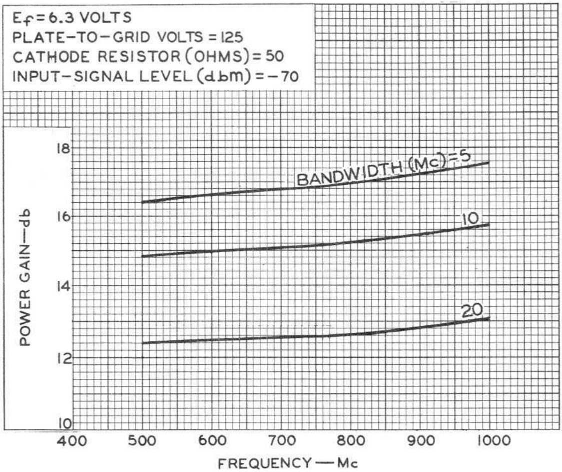
Gauge	Type	Dimension		
		Diameter A	Thickness B	Radius R
G_1-1	GO	$0.25200''^{+0.00000''}_{-0.00007''}$	$0.320''^{+0.001''}_{-0.000''}$	0.003" MAX.
G_1-2	NO-GO	$0.24500''^{+0.00007''}_{-0.00000''}$	–	–
G_2-1	GO	$0.42000''^{+0.00000''}_{-0.00007''}$	–	–
G_2-2	NO-GO	$0.40000''^{+0.00007''}_{-0.00000''}$	–	–
G_3-1	GO	$0.55700''^{+0.00000''}_{-0.00007''}$	–	–
G_3-2	NO-GO	$0.54700''^{+0.00007''}_{-0.00000''}$	–	–

AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Service



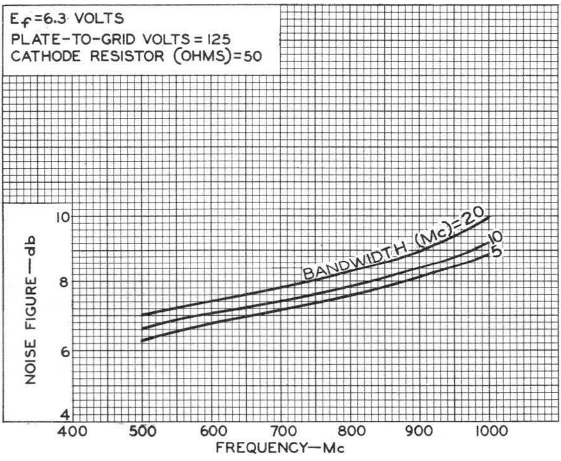
92CM-10458

POWER-GAIN CHARACTERISTICS
Cathode-Drive Service



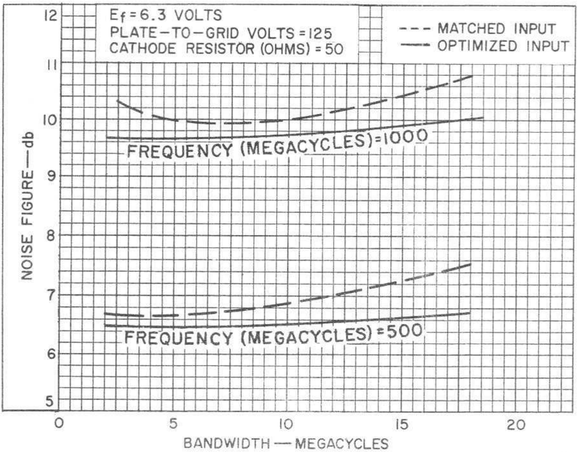
92CS-10456R1

NOISE-FIGURE CHARACTERISTICS
Cathode-Drive Service



92CS-10455R2

CHARACTERISTICS
Cathode-Drive Service



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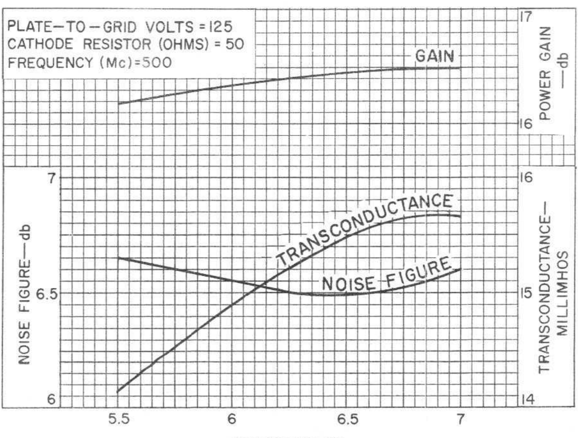
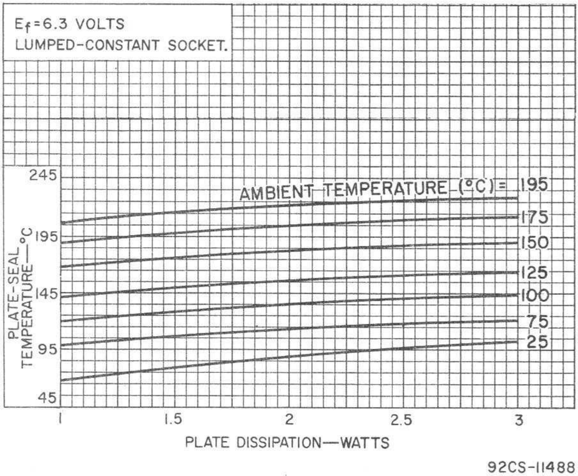


92CS-11491R1

PLATE-SEAL-TEMPERATURE CHARACTERISTICS



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:°		
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

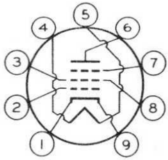
Characteristics, Class A_1 Amplifier:

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

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■	10 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)	5000	ohms
Max.-Signal Driving Power	0	watts
Total Harmonic Distortion	5	%
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:*

	Up to 175 Mc		
	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	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	10 max.	12 max.	watts

→ Indicates a change.

Typical Operation:

	As amplifier at 175 Mc			
	CCS		*ICAS*	
DC Plate Voltage	250	300	300	volts
Grid No.3	Connected to cathode at socket			
DC Grid-No.2 Voltage□□	200	200	250	volts
DC Grid-No.1 Voltage⊕⊕	-40	-42	-55	volts
Peak RF Grid-No.1 Voltage	47	52	62	volts
DC Plate Current	60	70	80	ma
DC Grid-No.2 Current	3.7	3.7	5.1	ma
DC Grid-No.1 Current (Approx.)	1.5	2.1	1.6	ma
Driver Power Output (Approx.)▲▲	1	1	1.5	watts
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	60 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	2.5	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 a change.

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.

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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

○ 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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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.

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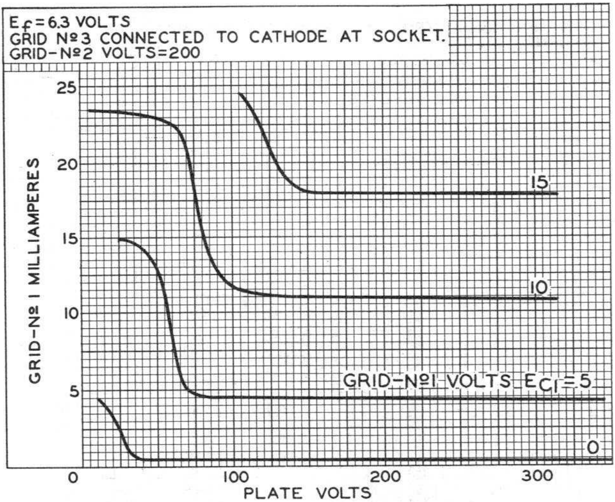
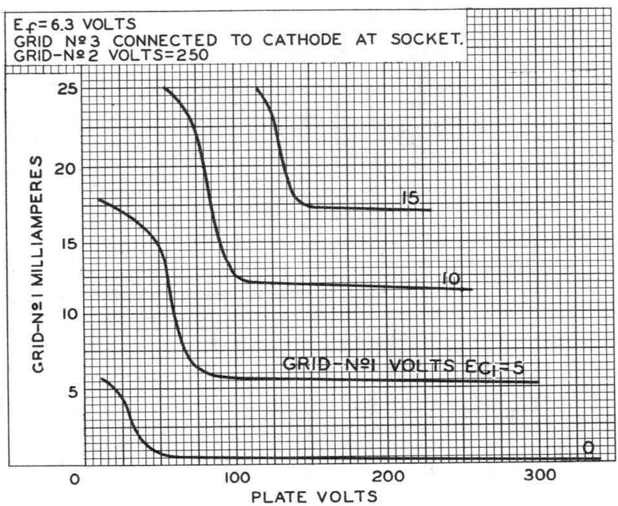
AVERAGE CHARACTERISTICS



92CS-10306R1



92CS-10307R1

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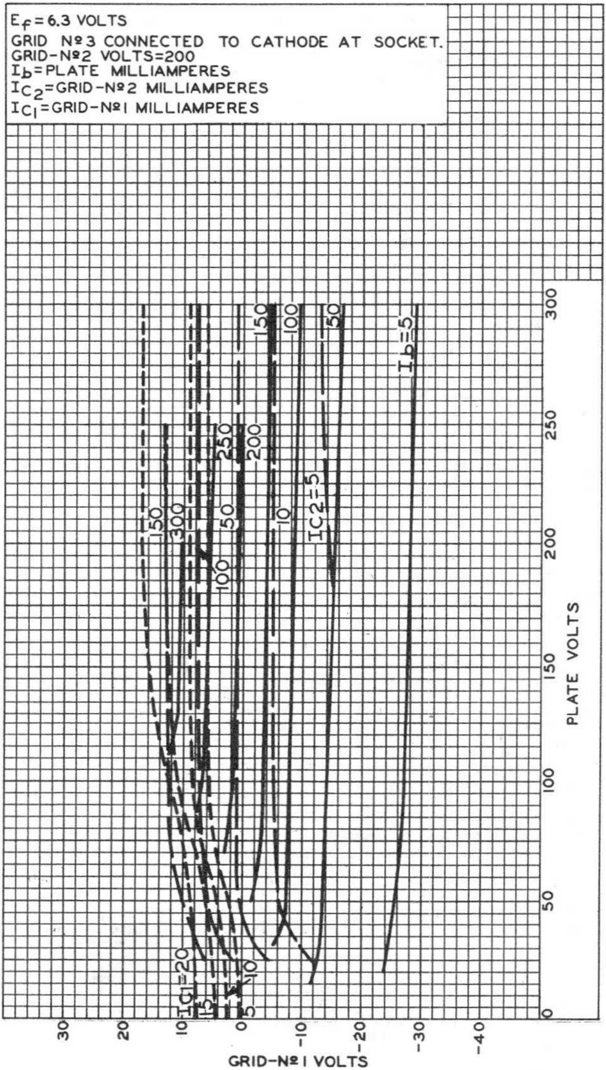
AVERAGE CONSTANT—CURRENT CHARACTERISTICS



ELECTRON TUBE DIVISION 92CM-10303R1

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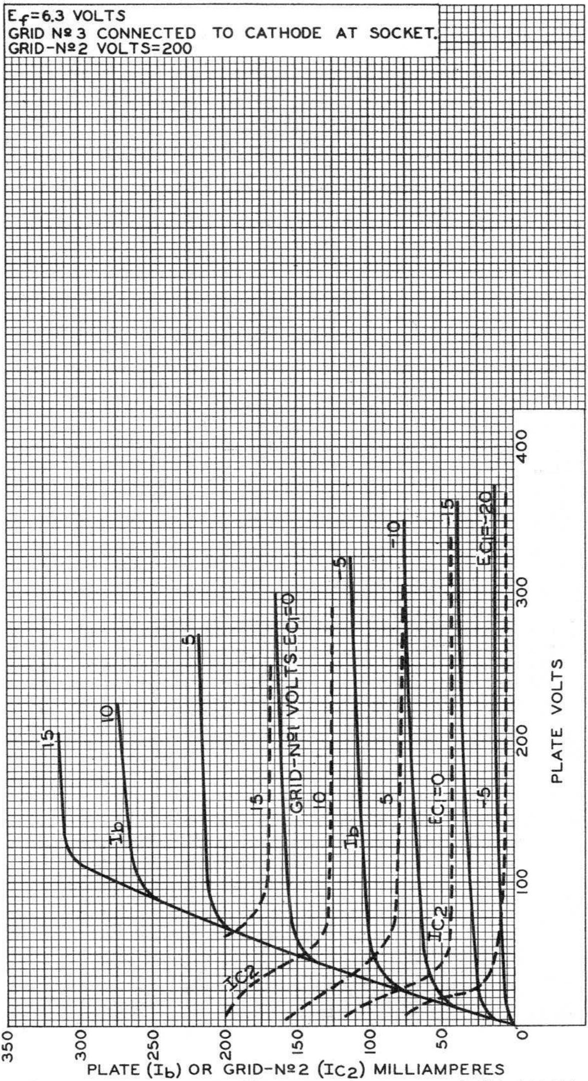
AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION 92CM-10305R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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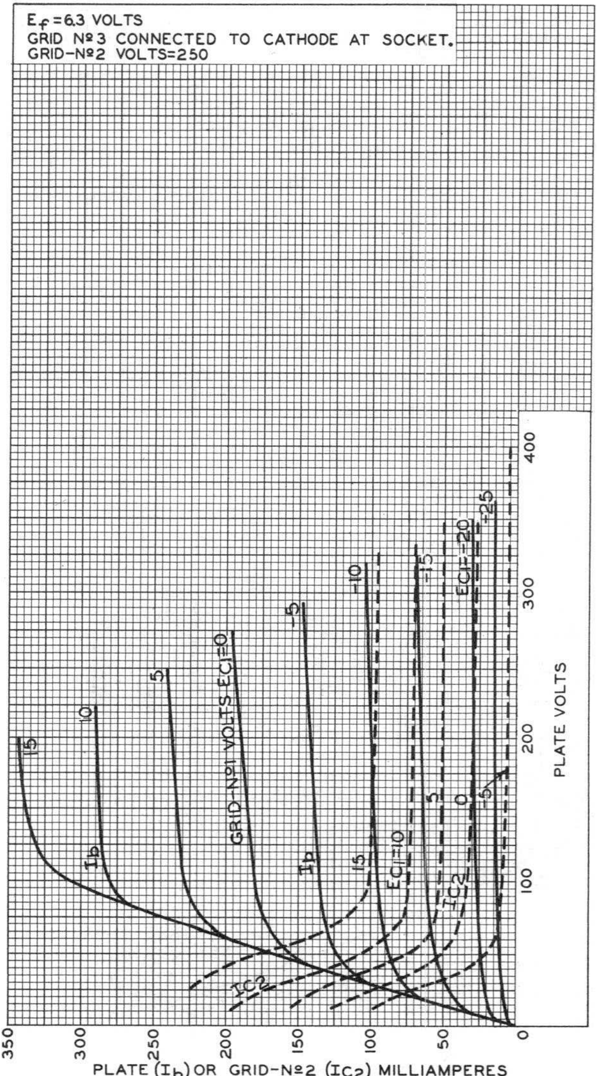
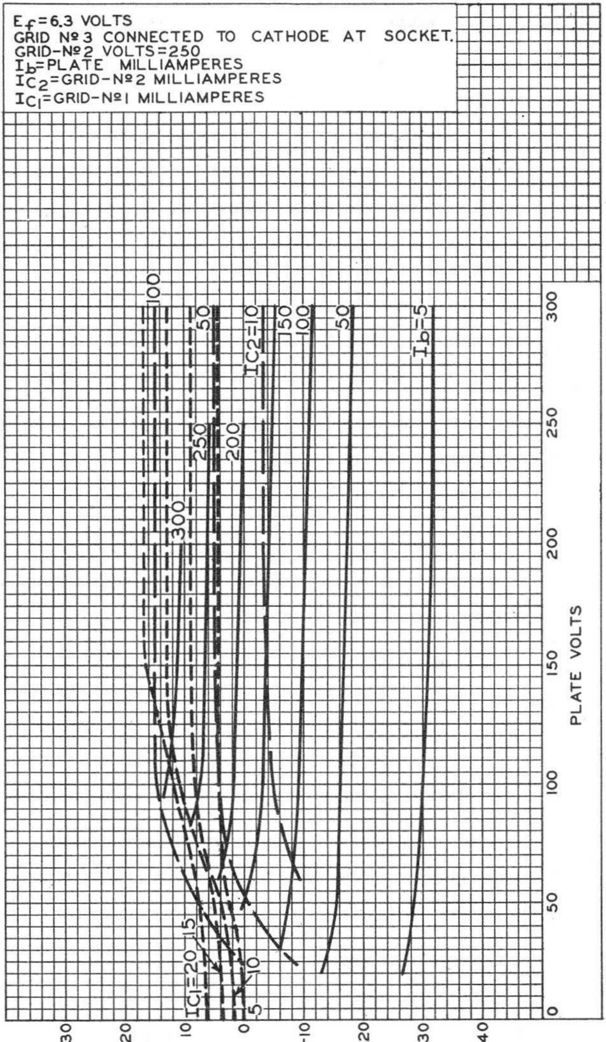
AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION 92CM-10304R1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

AVERAGE CONSTANT—CURRENT CHARACTERISTICS



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.

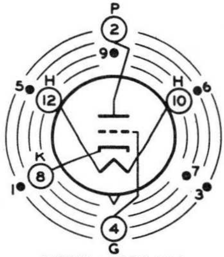
Electrical:

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.

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.

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 = 1000 μf, 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 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.

← Indicates a change.

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.

dissipation, and then subjected to the Shorts and Continuity Test Transconductance (I), 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 (I) 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 (I) of the lot from the 0-hour value must not exceed 15 per cent at 500 hours and 20-per cent at 1000 hours.

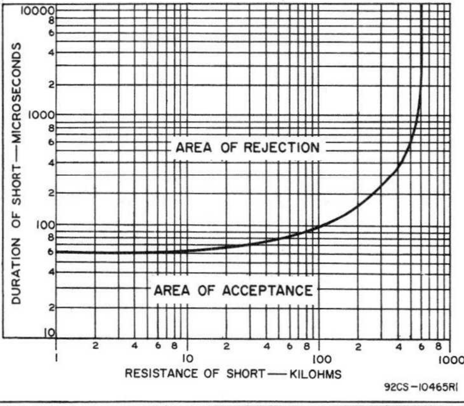
Standby Life (1000 hours):

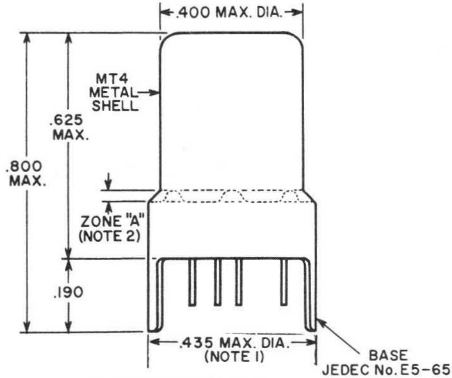
This test is performed on a sample lot of tubes from each production run. Tubes are operated with only the center heater voltage applied.

At 500 and 1000 hours the tubes are criticized for leakage resistance, reverse grid current, the change in Transconductance (I) 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.

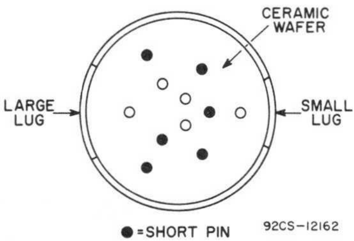
SHORTS-TEST ACCEPTANCE LIMITS





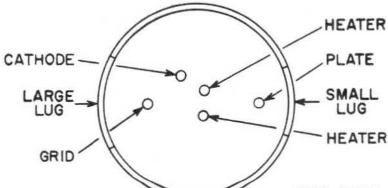
DIMENSIONS IN INCHES 92CS-12024

BOTTOM VIEW
Showing Arrangement of All 11 Base Pins



92CS-12162

MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown

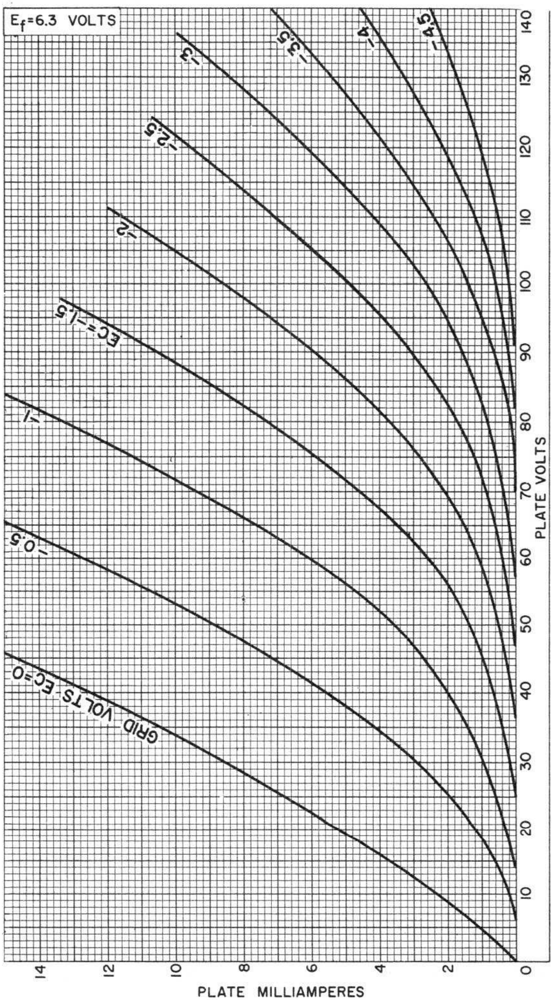


92CS-12055

Note 1: Maximum outside diameter of 0.440" is permitted along 0.190" lug length.

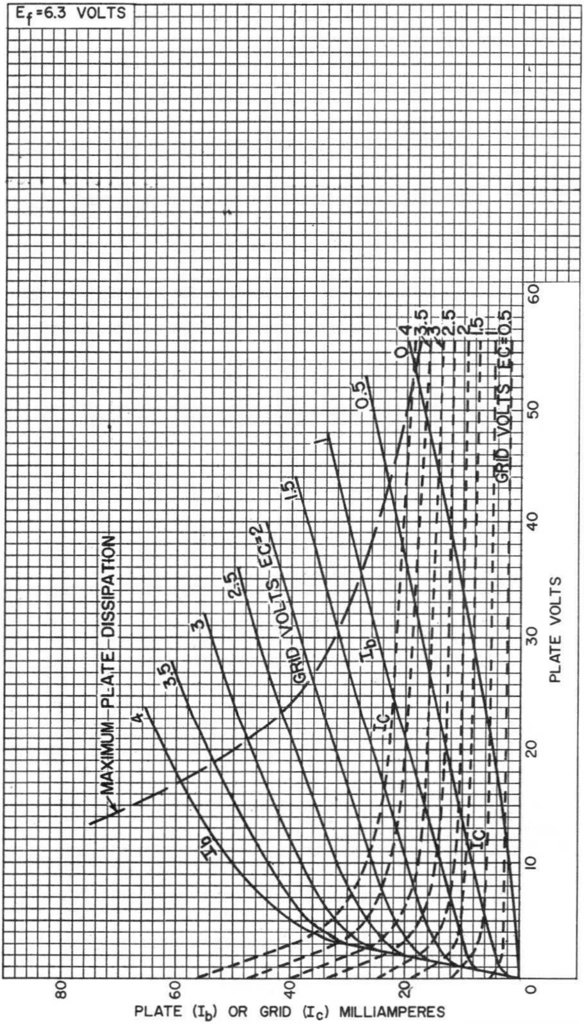
Note 2: Metal-shell temperature should be measured in Zone "A".

AVERAGE PLATE CHARACTERISTICS



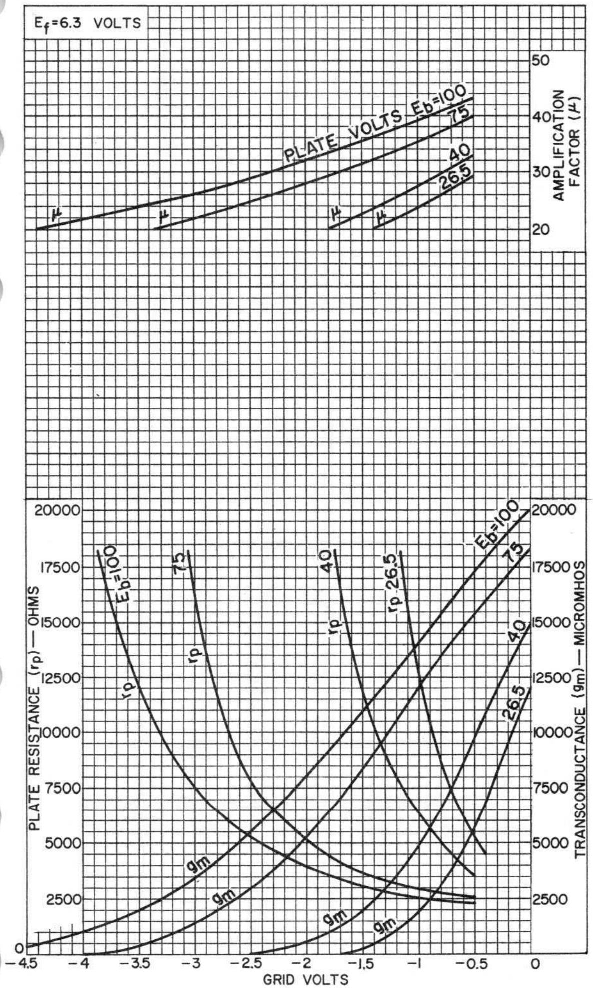
92CM-10460R2

AVERAGE CHARACTERISTICS



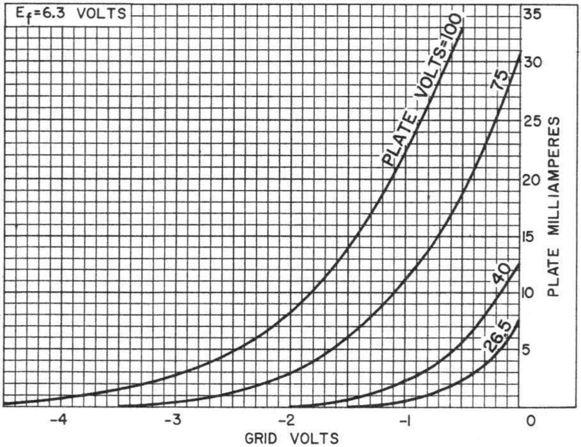
92CM-10464RI

AVERAGE CHARACTERISTICS



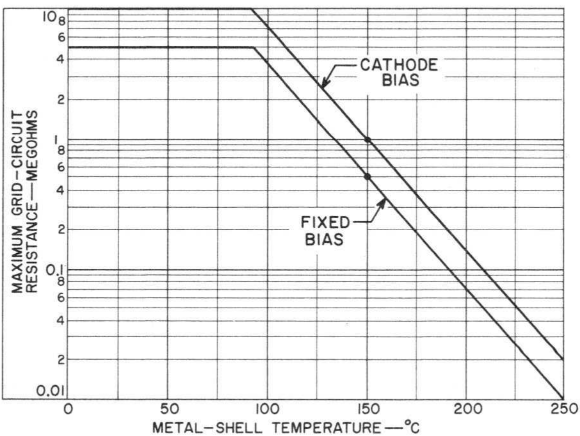
92CM-10964

AVERAGE CHARACTERISTICS



92CS-10461R1

GRID-CIRCUIT-RESISTANCE RATING CHART



92CS-11911

Sharp-Cutoff Tetrode

NUVISTOR TYPE

For Industrial Applications

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	0.150	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:

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:

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

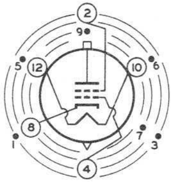
Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
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)

← Indicates a change.

Basing Designation for BOTTOM VIEW. 12AS

Pin 1[a] - 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
Pin 6 - Same as Pin 1



INDEX = LARGE LUG
● = SHORT PIN

Pin 7 - Same as Pin 1
Pin 8 - Cathode
Pin 9 - Same as Pin 1
Pin 10 - Heater
Pin 12 - Heater
Cap - Plate

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

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 of a length such that its end does not touch the socket insertion plane.
[b] For operation at metal-shell temperatures up to 150° C.

→ CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current.	1	0.140	0.160	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	8.5	11.5	ma
Plate Current (2)	1,4	-	50	μa
Grid-No.2 Current	1,3	-	3.6	ma
Transconductance (1).	1,3	9000	12000	μmhos

→ Indicates a change.

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
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	1,10	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.

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-1D, 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 (I). 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.

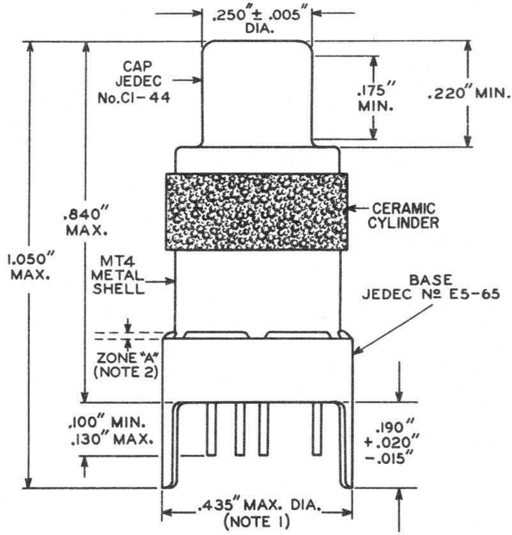
100-Hour Life Performance:

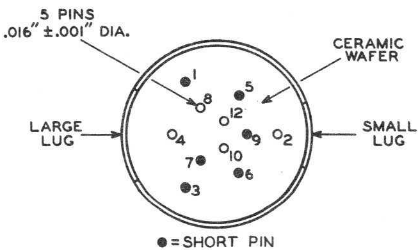
This test is performed on a sample lot of tubes from each production run to insure a low percentage of early-hour inoperatives. Tubes are operated for 100 hours at maximum-rated plate dissipation, and then subjected to the *Shorts and Continuity* Test previously described. Tubes must then show a transconductance of not less than 7500 micromhos under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (I).

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 (I) 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.



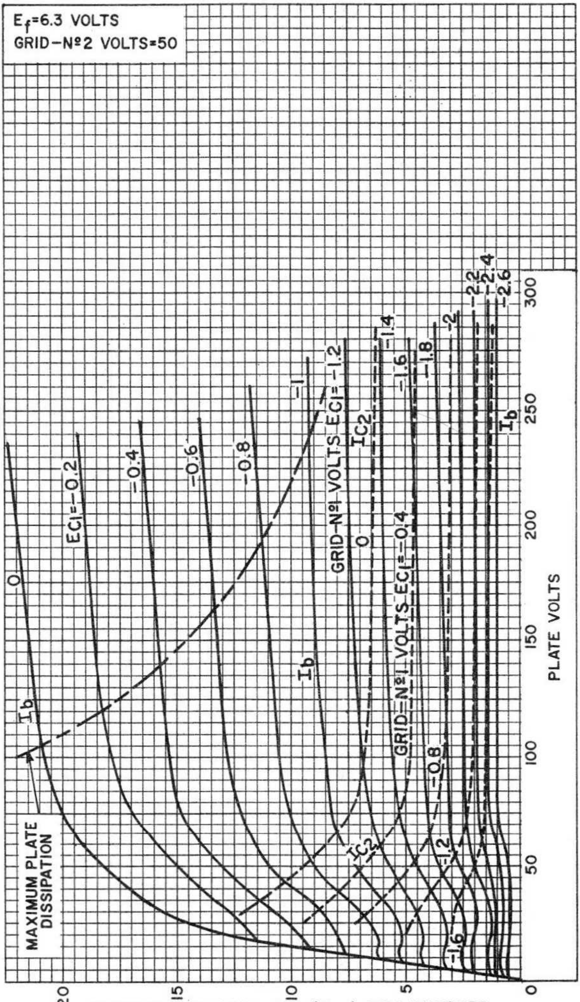


92CS-10852R2

NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

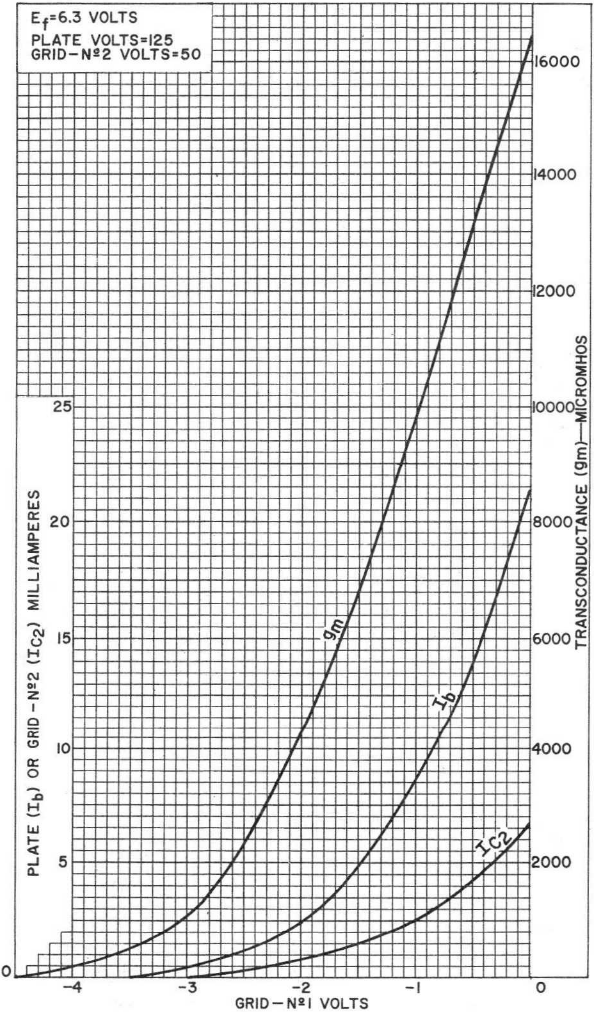
NOTE 2: SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A" BETWEEN BROKEN LINES.

AVERAGE CHARACTERISTICS



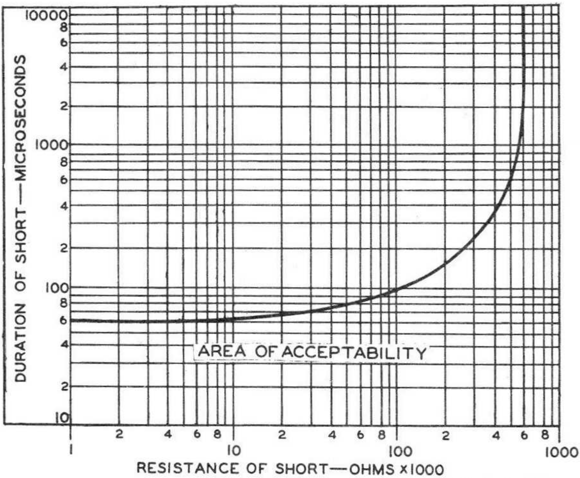
92CM-10926

AVERAGE CHARACTERISTICS



92CM-10927

SHORTS-TEST ACCEPTANCE LIMITS



92CS-10465

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.	μμf
Grid No.1 to cathode & internal shield, grid No.2, and heater	4.4		μμf
Plate to cathode & internal shield, grid No.2, and heater	2.74		μμf

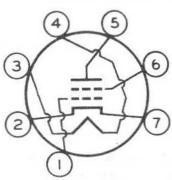
Characteristics, Class A_1 Amplifier:

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

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

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.

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

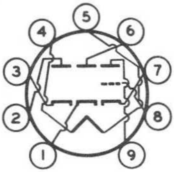
Mechanical:

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)

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.

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:

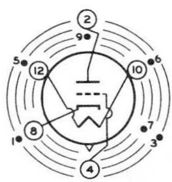
Plate Supply Voltage	110	volts
Grid Supply Voltage	0	volts
Cathode Resistor	150	ohms
Amplification Factor	64	
Plate Resistance (Approx.)	6800	ohms
Transconductance	9400	μmhos
Plate Current	7	ma
Grid Voltage (Approx.) for plate μa = 10	−4	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	0.800"
Maximum Seated Length	0.625"
Maximum Diameter	0.440"
Weight (Approx.)	1/15 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

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

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 (I) 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

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.

1000-Hour Conduction Life Performance:

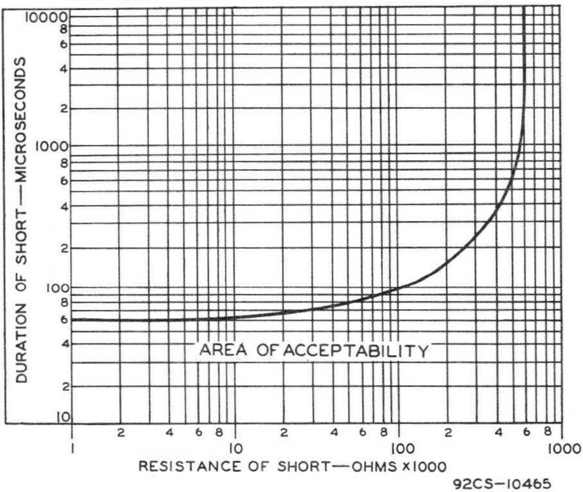
This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation, 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.

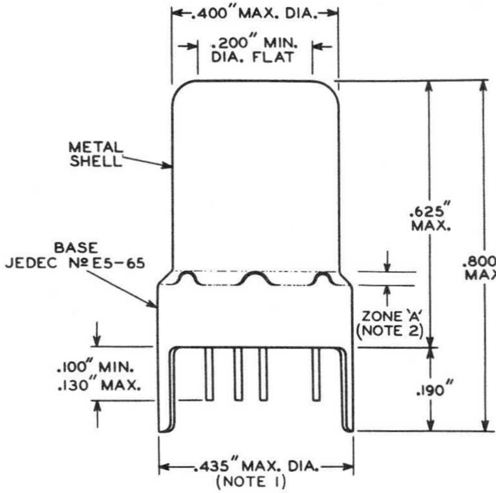
1000-Hour Standby Life Performance:

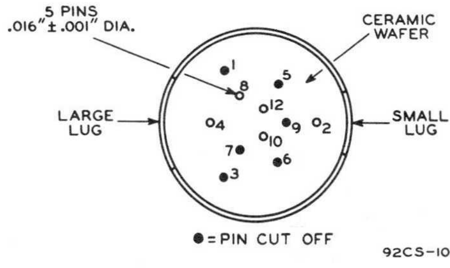
This test is performed on a sample lot of tubes from each production run. The tubes are operated for 1000 hours with only normal heater voltage applied. Tubes are criticized for inter-electrode leakage, reverse grid current, change in transconductance of individual tubes from values at 0-hours and cathode 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



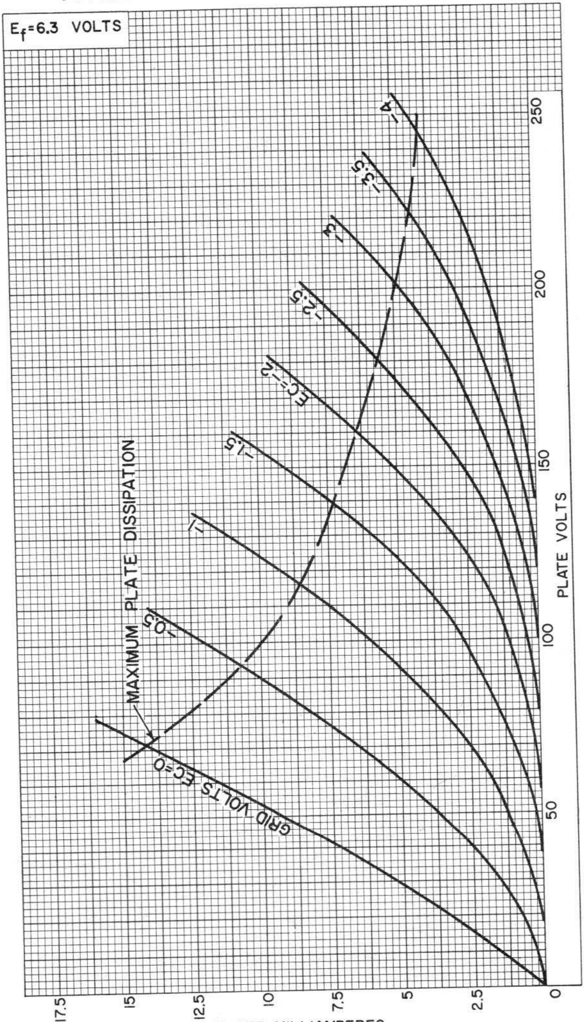




NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

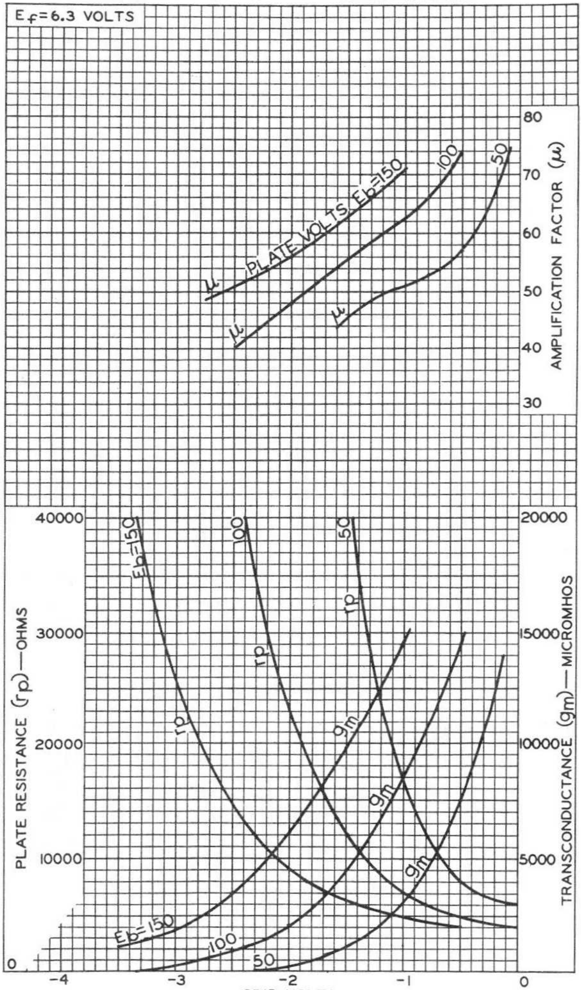
NOTE 2: SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A" BETWEEN BROKEN LINES.

AVERAGE PLATE CHARACTERISTICS



92CM-10965

AVERAGE CHARACTERISTICS



92CM-10967

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

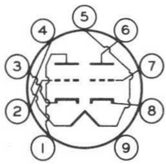
Characteristics, Class A_1 Amplifier (Each Unit):

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

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 A₁

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 connected to ground. At the end of this test, tubes are tested for heater-cathode shorts and open circuits.

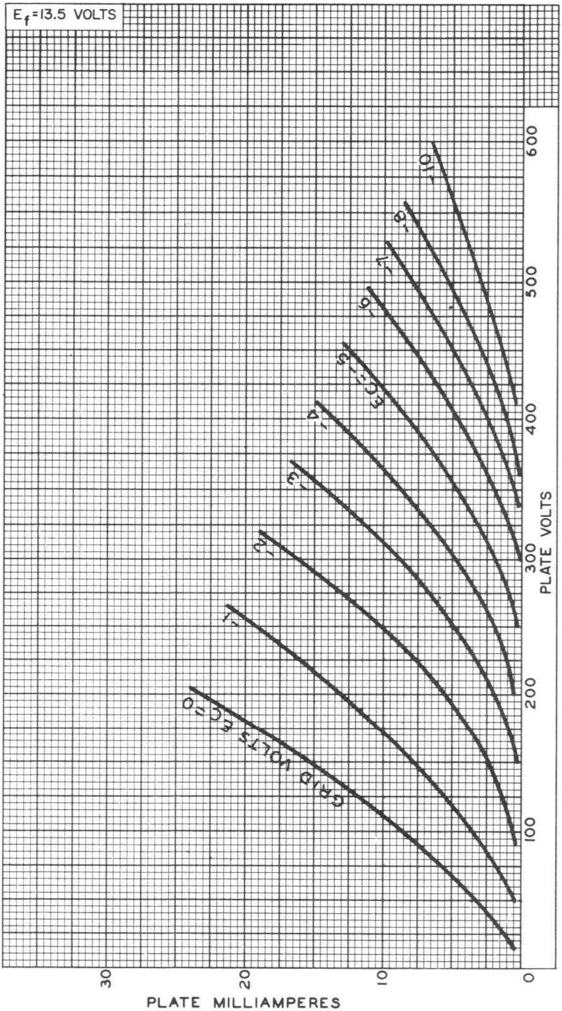
Low-Frequency Vibration Performance:

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:

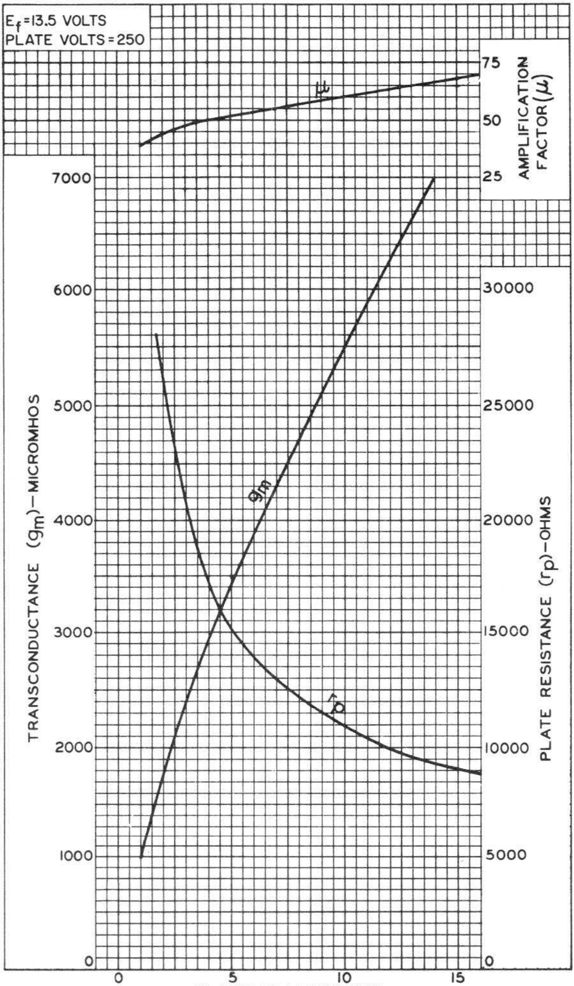
This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: Heater volts = 15.0 and maximum-rated plate dissipation.

AVERAGE PLATE CHARACTERISTICS



92CM-11487

AVERAGE CHARACTERISTICS



92CM-11486

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

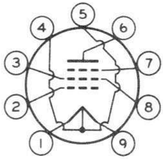
Characteristics, Class A_1 Amplifier:

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)

Basing Designation for BOTTOM VIEW. 9PB



Pin 1 – Filament (–)
Pin 2 – Grid No.1
Pin 3 – Grid No.2
Pin 4 – LC (See NOTE)
Pin 5 – LC (See NOTE)
Pin 6 – Plate
Pin 7 – Grid No.3
Pin 8 – Grid No.2
Pin 9 – Filament (+)

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

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[j]	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

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.

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.

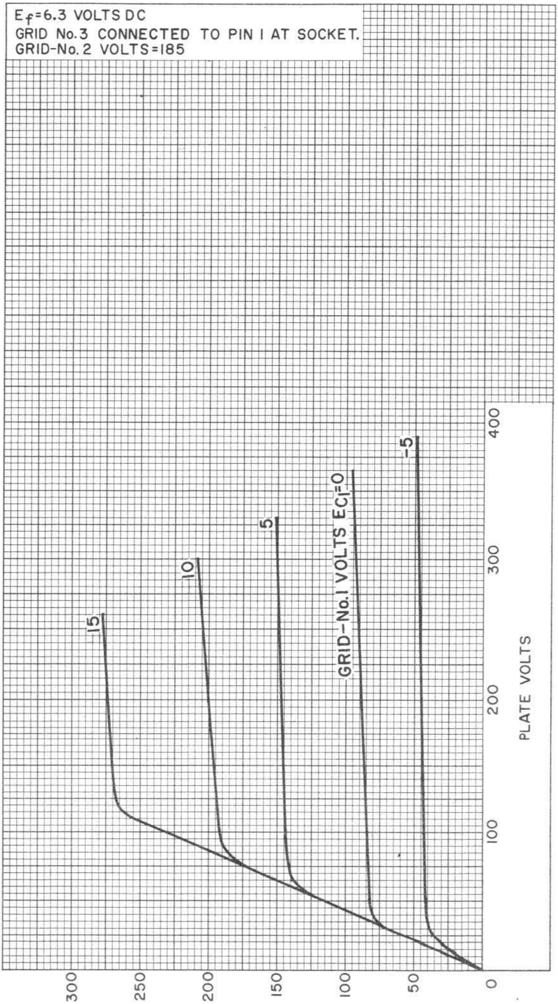
OPERATING CONSIDERATIONS

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.

7905

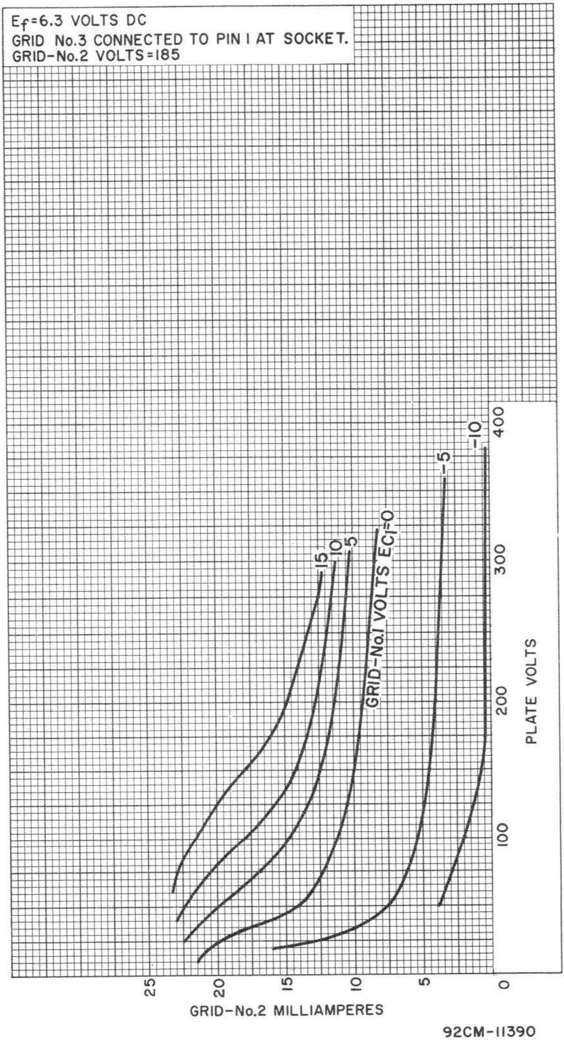
AVERAGE PLATE CHARACTERISTICS



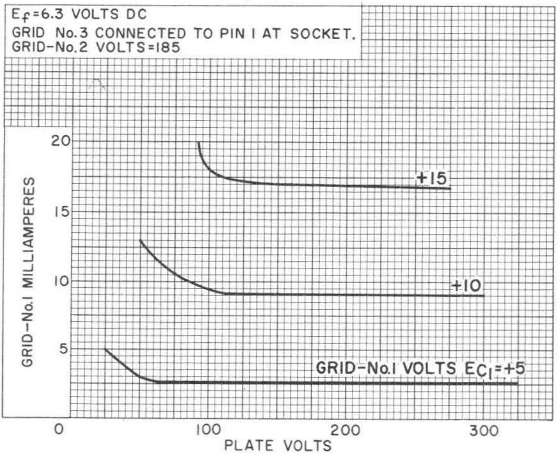
92CM-11381

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

AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS



92CS-11383

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

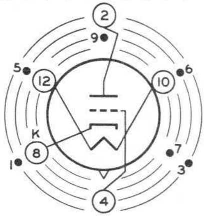
Socket:
- Crimp Mounting —
  - Cinch Mfg.,Co., 1026 South Homan Ave., Chicago 24, Ill., No.133 65 10 001.
  - Industrial Electronic Hardware Corp., 109 Prince Street, New York 12, N.Y., No.MSN 0905-1, MSN 0905-2, MSN 0905-3; or equivalent.
- Flange Mounting —
  - Cinch Mfg. Co., No.133 65 10 003, or equivalent.
- Printed Board (Stand-off) —
  - Cinch Mfg. Co., No.133 65 10 041, or equivalent.

← Indicates a change.

8056

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 - 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.)	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] Pin is of a length 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	pf

→ Indicates a change.

	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	6.7	10.7	ma
Plate Current (2)	1,4	–	50	μa
Transconductance (1)	1,3	6500	8500	μmhos
Transconductance (2)	3,5	5700	–	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	–	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 = 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 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-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 (I). 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 (I).

1000-Hour Conduction Life Performance:

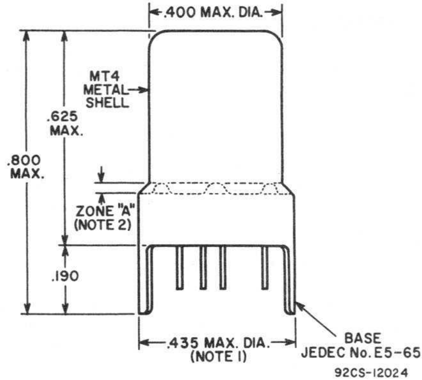
This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation[d], 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 (I) 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.

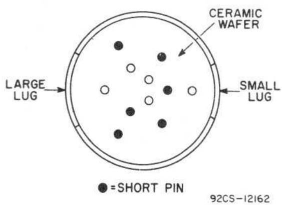
[c] Specifications for tapper supplied on request.
[d] At metal-shell temperature of 150° C.

← Indicates a change.

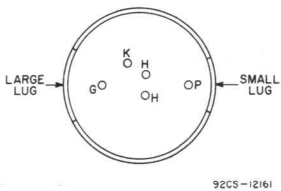


DIMENSIONS IN INCHES

BOTTOM VIEW
Showing Arrangement for All 11 Base Pins



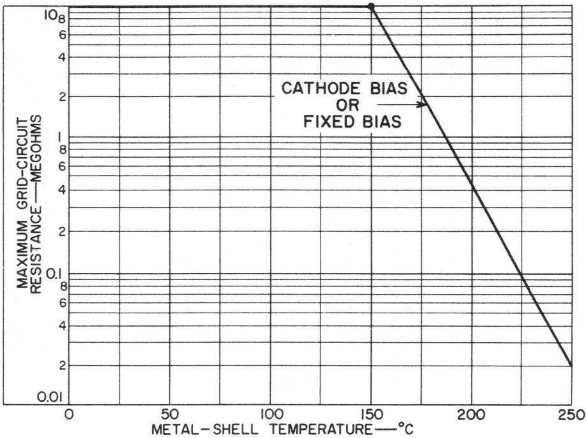
MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown



NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

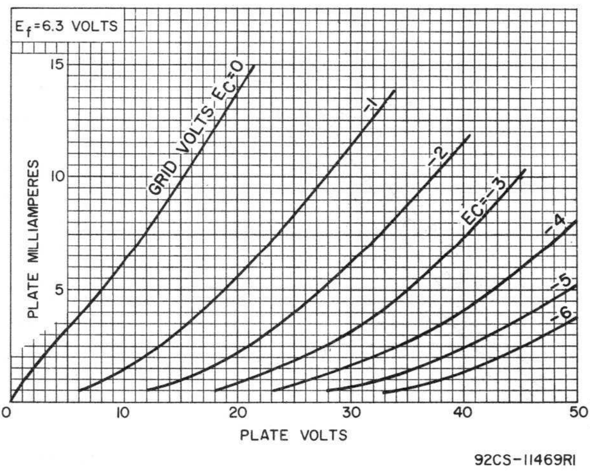
NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

GRID-CIRCUIT-RESISTANCE RATING CHART



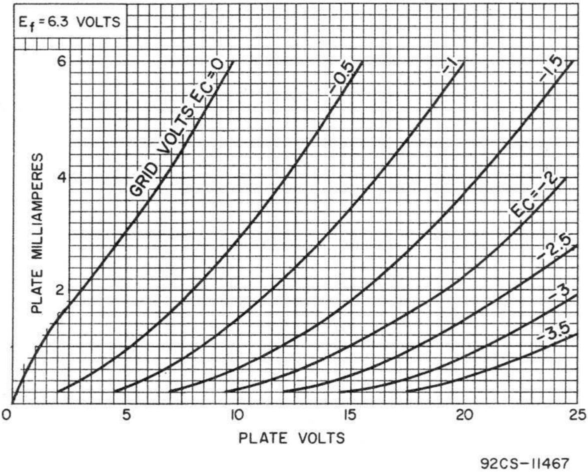
92CS-11479R1

AVERAGE PLATE CHARACTERISTICS

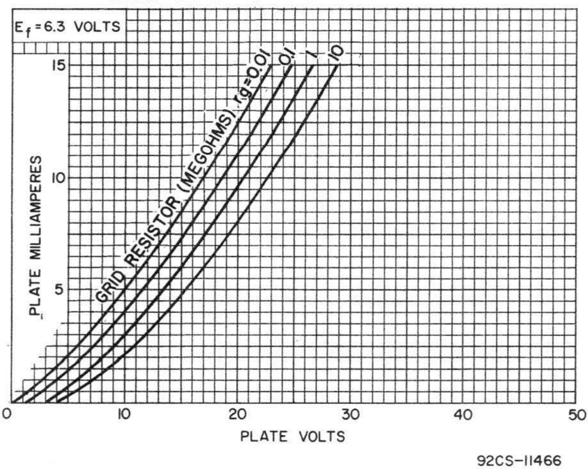


92CS-11469R1

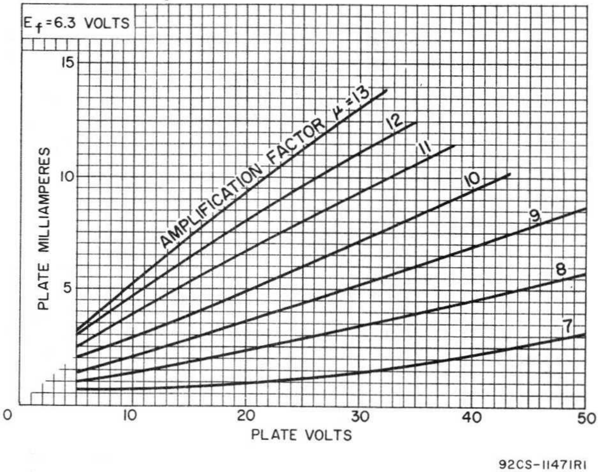
AVERAGE PLATE CHARACTERISTICS



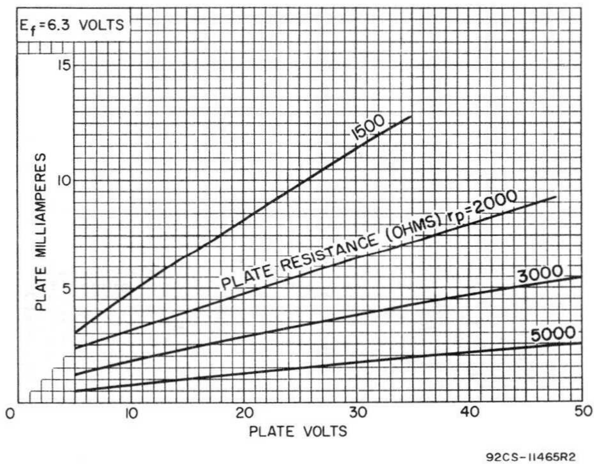
AVERAGE PLATE CHARACTERISTICS With Grid Resistor as Variable



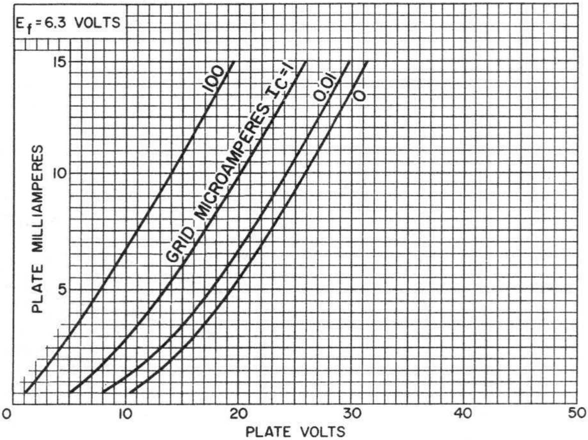
AVERAGE PLATE CHARACTERISTICS
With Amplification Factor as Variable



AVERAGE PLATE CHARACTERISTICS
With Plate Resistance as Variable

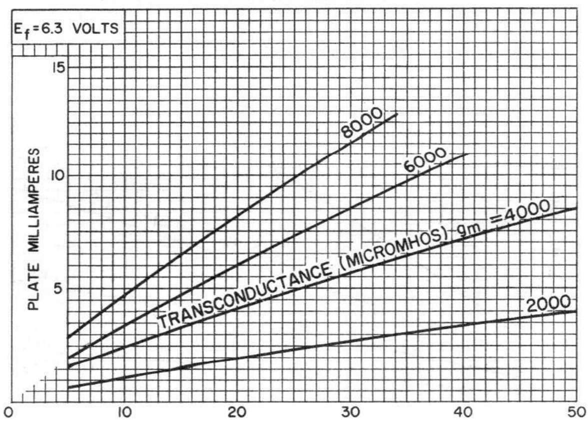


AVERAGE PLATE CHARACTERISTICS
With Grid Current as Variable



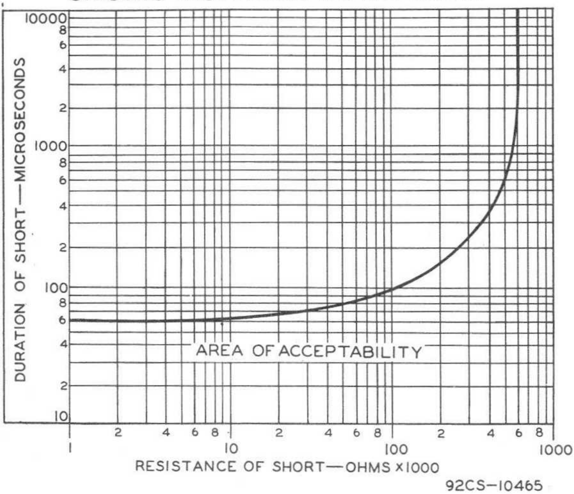
92CS-11468

AVERAGE PLATE CHARACTERISTICS
With Transconductance as Variable



92CS-11470R2

SHORTS-TEST ACCEPTANCE LIMITS



High-Mu Triode

NUVISTOR TYPE

For Cathode-Drive-Amplifier Applications at Frequencies Up to 1200 MHz and as an Oscillator Tube having Excellent Stability Over a Wide Range of Frequencies

ELECTRICAL CHARACTERISTICS

Bogey Values

Heater Voltage, AC or DC	E_h	6.3	V
Heater Current at E_h = 6.3 V	I_h	135	mA
Direct Interelectrode Capacitances			
Input: K to (G, S, H)	c_i	6.0	pF
Output: P to (G, S, H)	c_o	1.3	pF
Cathode to plate	c_{kp}	0.046 max	pF
Heater to cathode	c_{hk}	1.4	pF

CLASS A_1 AMPLIFIER

For Following Characteristics see Conditions

Amplification Factor	μ	70	
Plate Resistance (Approx.)	r_p	5600	Ω
Transconductance	g_m	12400	µmho
DC Plate Current	I_b	10	mA
Cutoff DC Grid Voltage for I_b = 10 µA	$E_{c(co)}$	-5	V

Conditions

Heater Voltage	E_h	6.3	V
Plate Supply Voltage	E_{bb}	110	V
Grid Supply Voltage	E_{cc}	0	V
Cathode Resistor	R_k	47	Ω

ABSOLUTE-MAXIMUM RATINGS

For operation at any altitude

Plate Supply Voltage	E_{bb}	330	V
DC Plate Voltage	E_b	150	V
Grid Voltage			
DC positive value	E_c	0	V
DC negative value	E_c	-55	V
Peak Heater-Cathode Voltage	e_{hkm}	±100	V
Heater Voltage, AC or DC	E_h	5.7 to 6.9	
Average Cathode Current	$I_{k(av)}$	15	mA
Plate Dissipation	P_b	1.5	W

MAXIMUM CIRCUIT VALUES

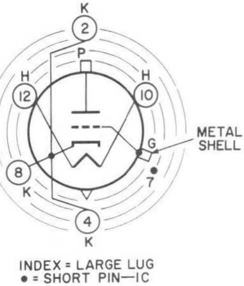
Grid-Circuit Resistance[a]			
For fixed-bias operation	$R_{g(ckt)}$	0.5	MΩ
For cathode-bias operation	$R_{g(ckt)}$	1	MΩ

MECHANICAL CHARACTERISTICS

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length (l_m)	0.985 in
Maximum Seated Length (l_{sm})	0.780 in
Maximum Diameter (d_m)	0.440 in
Weight (Approx.)	2.2 g
Dimensional Outline	JEDEC No.4-6
Envelope	JEDEC MT4
Base	Medium-Ceramic-Wafer Twelvar 5-Pin (JEDEC E5-79)

→ BASING DIAGRAM (Bottom View)

Pin 2 – Cathode
Pin 4 – Cathode
Pin 7[b] – Do Not Use
Pin 8 – Cathode
Pin 10 – Heater
Pin 12 – Heater
Metal Shell – Grid
Top Cap – Plate



12CT

TYPICAL OPERATION

As Cathode-Drive RF Amplifier

Frequency	f	450	700	1200	MHz
Heater Voltage	E_h	6.3	6.3	6.3	V
Plate Supply Voltage	E_{bb}	110	110	110	V
Cathode Resistor	R_k	47	47	47	Ω
Average Plate Current	$I_{b(av)}$	10	10	10	mA
Bandwidth	-	6	12	12	MHz
Power Gain	-	16.5	12.5	10.5	dB
Noise Factor[c]	NF	6.5	9.5	12.2	dB

→ [a] For operation at metal-shell temperature of 150 °C. For operation at other metal-shell temperatures, see *Grid-Circuit Resistance Chart*. Metal-shell temperature are measured in zone "A" (See *Dimensional Outline*).

[b] Pin 7 is of such a length such that its end does not touch the socket insertion plane.

[c] Argon noise source. Input is tuned for optimum value.

→ Indicates a change.

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INITIAL CHARACTERISTICS LIMITS

		Note	Min	Max	
Heater Current	I_h	1	0.125	0.145	A
Direct Interelectrode Capacitances					
Cathode to plate	c_{kp}	2	-	0.046	pF
Cathode to grid & shell and heater.	c_i	2	5	7	pF
Plate to grid & shell and heater.	c_o	2	1.1	1.5	pF
Heater to cathode.	c_{hk}	2	1.1	1.7	pF
Plate Current (1).	$1\ I_b$	1,3	7.8	13.2	mA
Plate Current (2).	$2\ I_b$	1,4	-	50	μA
Transconductance (1)	$1\ g_m$	1,3	10000	14800	μmho
Transconductance (2)	$2\ g_m$	3,5	8700	-	μmho
Reverse Grid Current	$-I_c$	1,6	-	0.1	μA
Amplification Factor	μ	1,3	54	86	
Heater-Cathode Leakage Current	I_{hk}	1,7	-	±5	μA
Leakage Resistance:					
Between grid and all other electrodes tied together.	r_g-all	1,8	5000	-	MΩ
Between plate and all other electrodes tied together.	r_p-all	1,9	10000	-	MΩ

Note 1: With E_f = 6.3 V.

Note 2: Measured without external shield in accordance with the current issue of EIA Standard RS-191.

Note 3: With E_{bb} = 110 V, R_k = 47 Ω, C_k = 1000 μF.

Note 4: With E_b = 110 V, E_c = -5 V.

Note 5: With E_f = 5.7 V.

Note 6: With E_b = 150 V, E_c = -1.3 V, R_g = 0.5 MΩ.

Note 7: With E_{hk} = ±100 V.

Note 8: With E_g-all = -100 V.

Note 9: With E_p-all = -300 V.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating

Impact Acceleration. . . . . 1000 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.

← Indicates a change.

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 c/s per second under the following conditions: a sweep rate of one octave per 30 seconds from 50 to 3000 c/s, a 7-second sweep from 3000 to 15,000 c/s, 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 c/s, (2) 80 millivolts peak from 3000 to 6000 c/s, and (3) 700 millivolts peak from 6000 to 15,000 c/s.

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-ID, 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 of 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.

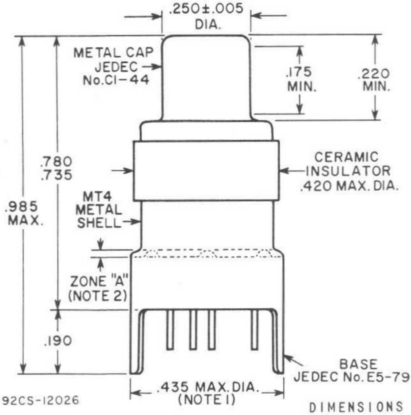
Leakage Resistance between grid and all other electrodes tied together . . . 5000 min megohms

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.

DIMENSIONAL OUTLINE

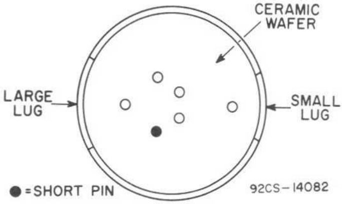
JEDEC No. 4-6



DIMENSIONS IN INCHES

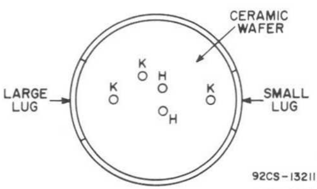
BOTTOM VIEW

Showing Arrangement of All 6 Base Pins



MODIFIED BOTTOM VIEW

With Element Connections Indicated and Short Pin Not Shown



DIMENSIONS IN INCHES

Note 1: Maximum outside diameter of 0.440 inch is permitted along 0.190" lug length.

Note 2: Metal-shell temperature should be measured in zone "A".

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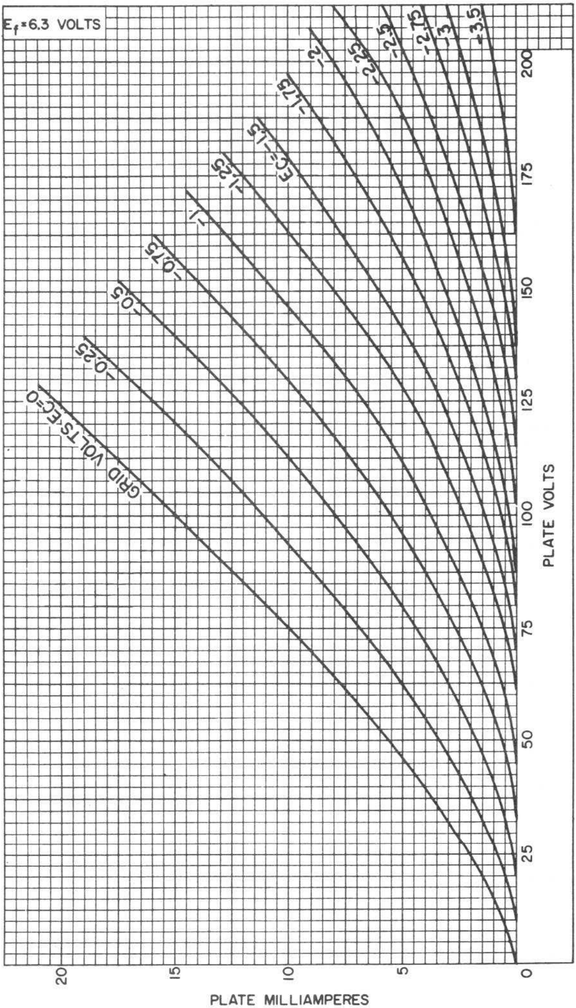
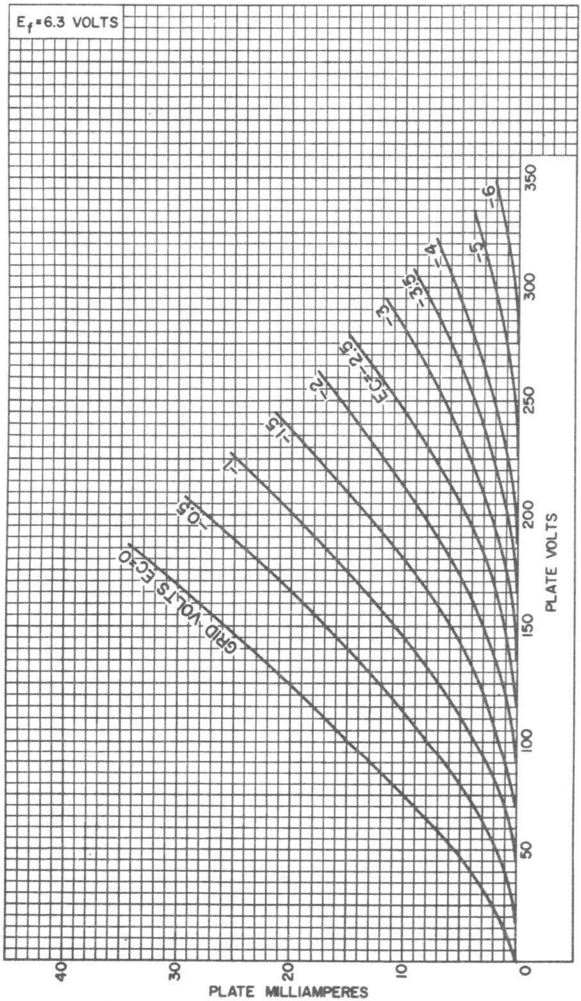
Average Plate Characteristics



92CM-11426RI

Average Plate Characteristics



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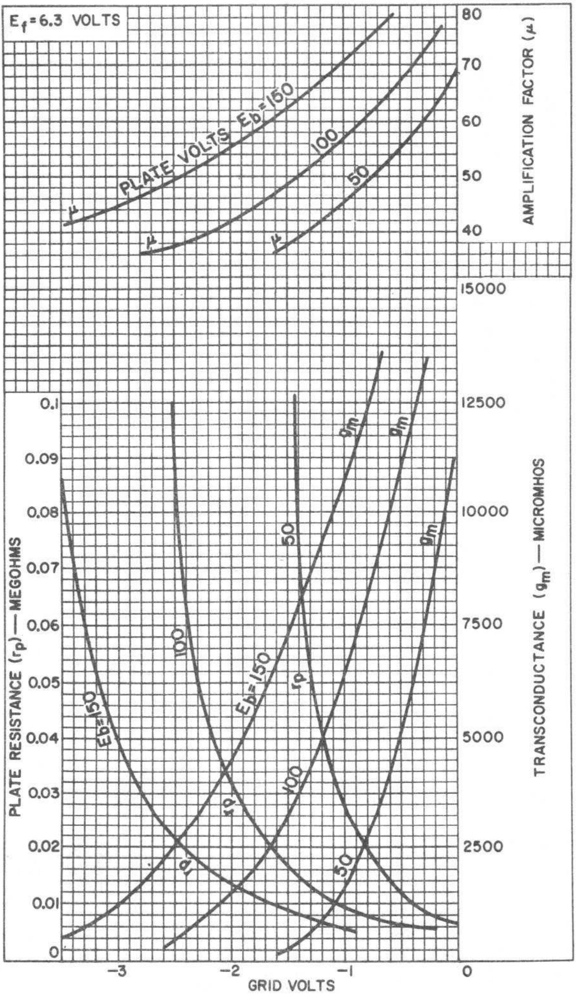
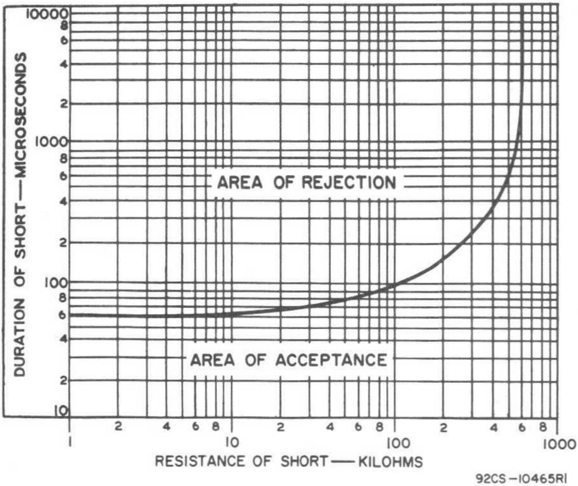
Average Characteristics

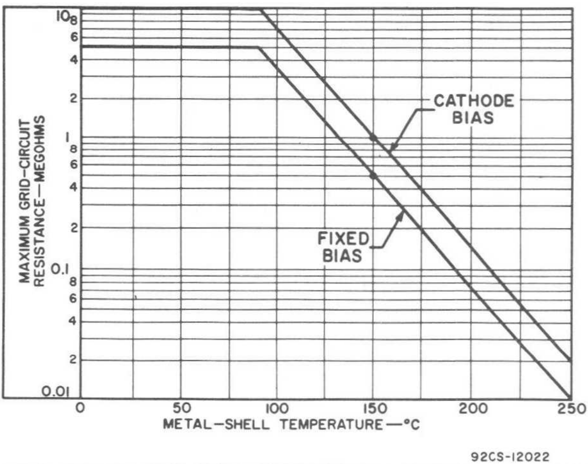


92CM-11410

Shorts-Test Acceptance Limits



Grid-Circuit-Resistance Chart



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 A$_1$ 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

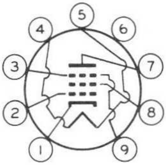
Mechanical:

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)

8077/7054

Basing Designation for BOTTOM VIEW. 9GK

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



Pin 6 – No Internal Connection
Pin 7 – Plate
Pin 8 – Grid No.2
Pin 9 – Grid No.3, Internal Shield

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

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

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 = 19.5 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.

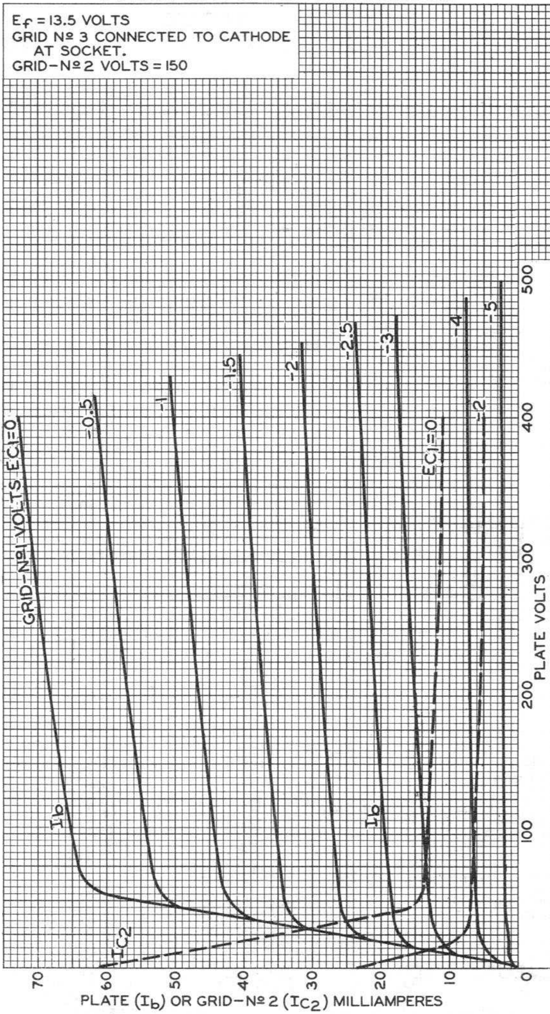
Low-Frequency Vibration Performance:

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:

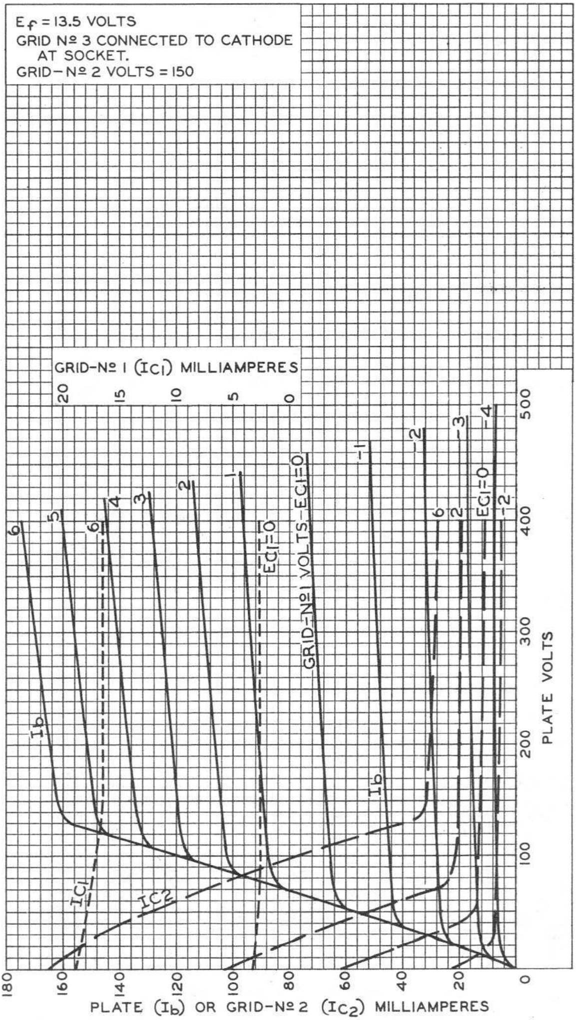
This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: heater volts = 15 and maximum-rated plate dissipation and grid-No.2 input.

AVERAGE CHARACTERISTICS



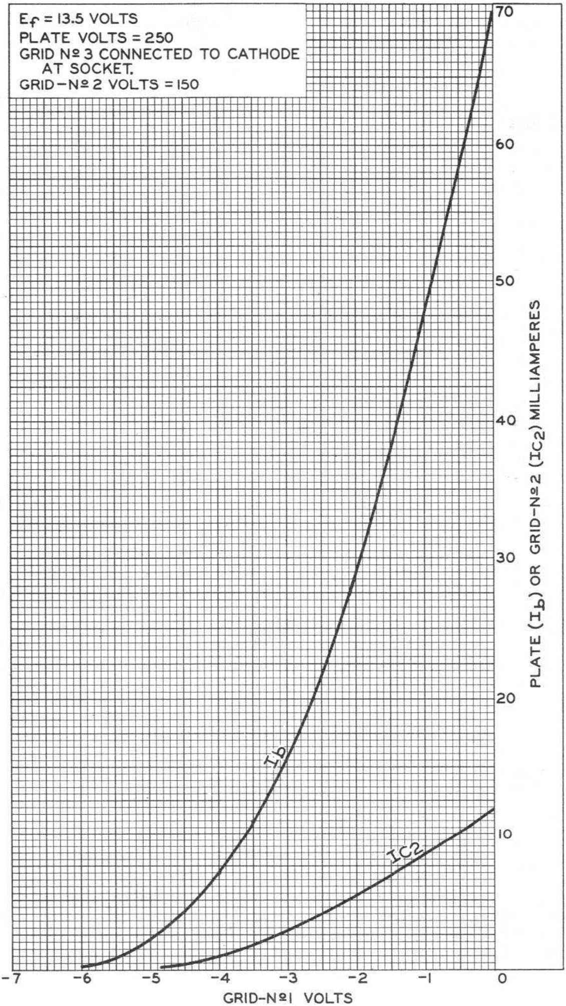
92CM-9777R1

AVERAGE CHARACTERISTICS



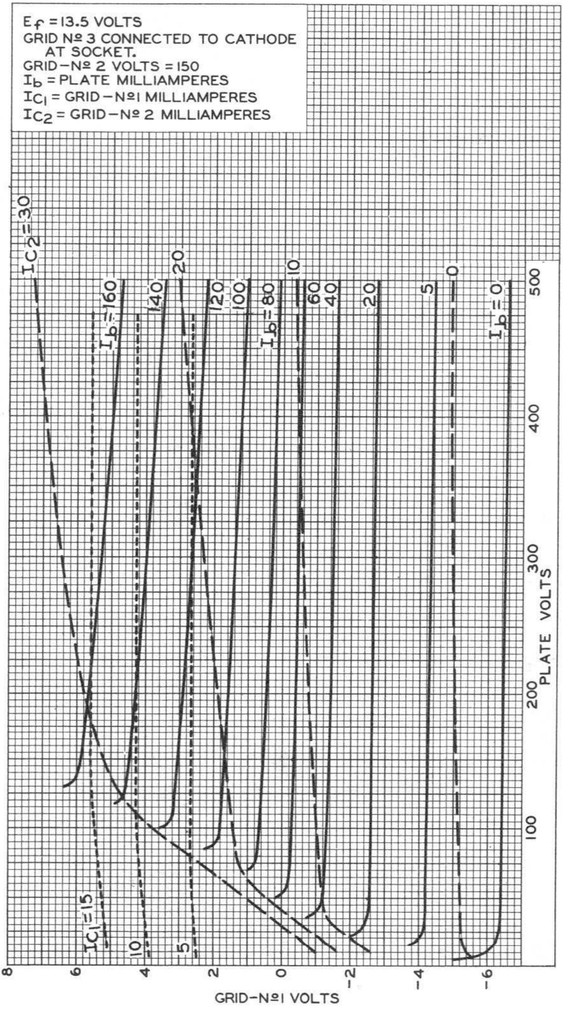
92CM-9778R1

AVERAGE CHARACTERISTICS



92CM-9775R1

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



92CM-9776R1

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

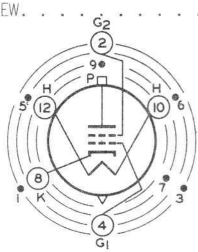
Mechanical:

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)

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

Typical Operation:[c]

Heater Voltage	Specified center value		
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

	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) $\leqq$ 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) $\leqq$ 2, plate- and grid-No.1-voltage supplies each bypassed with capacitor (μf) $\geqq$ 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 (I):

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 (I), Reverse Grid-No.1 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, 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 = 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, 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.

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.

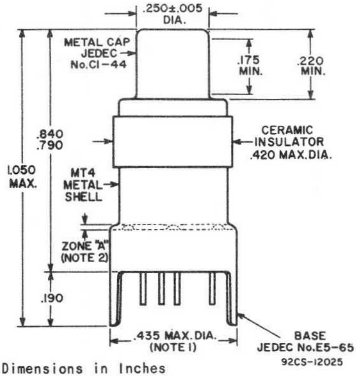
At the end of this test, tubes are criticized for Heater-Cathode Leakage Current, Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

Combined Oscillator-Doubler Life (100 Hours):

This test is performed on a sample lot of tubes from each production run.

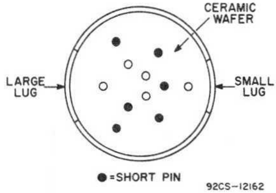
During this test, tubes are operated as a combined oscillator and frequency doubler at maximum-rated plate dissipation.

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.

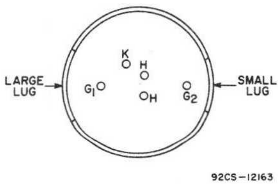


Dimensions in Inches

BOTTOM VIEW
Showing Arrangement of All 11 Base Pins



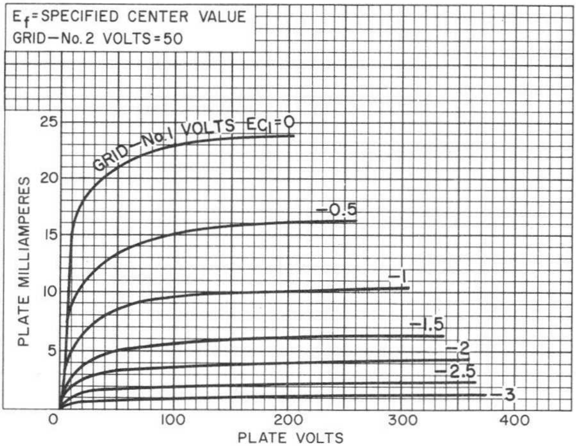
MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown



NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

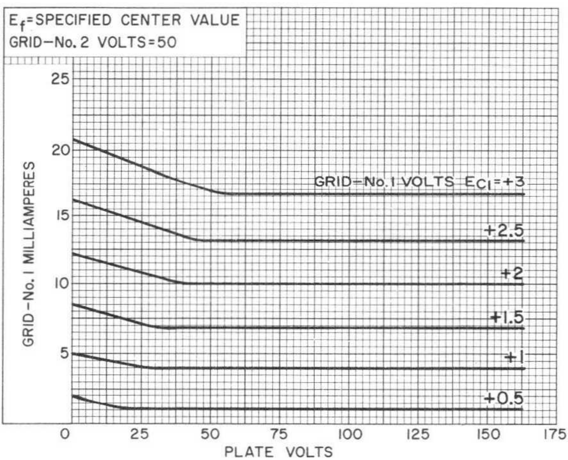
NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

AVERAGE PLATE CHARACTERISTISTICS



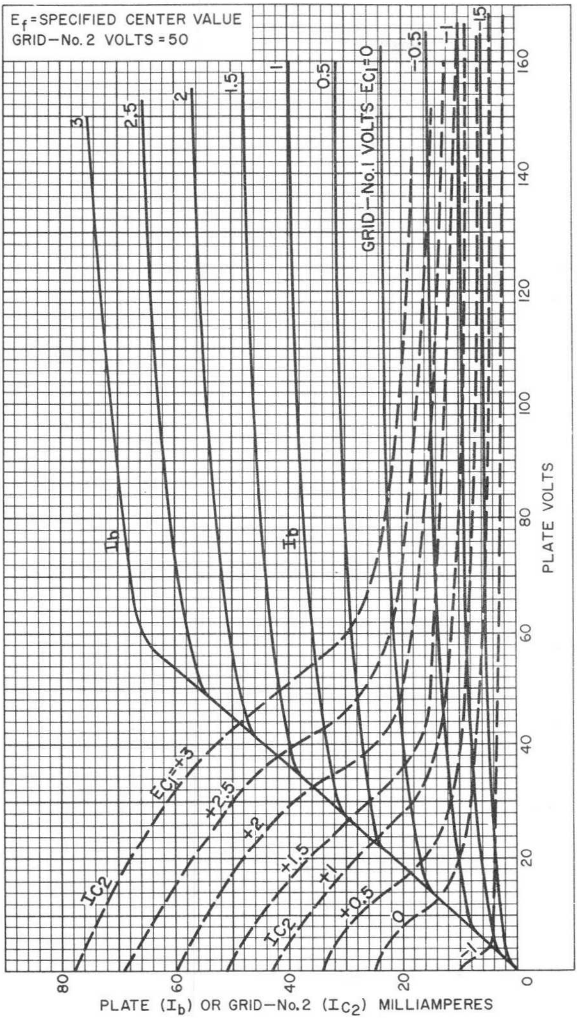
92CS—12173

AVERAGE CHARACTERISTICS



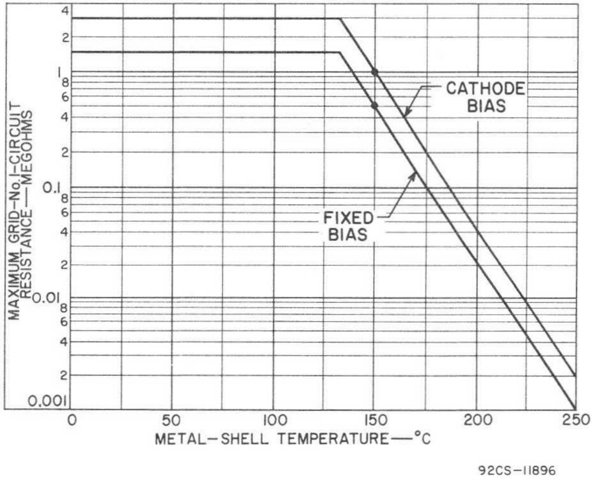
92CS—12172

AVERAGE CHARACTERISTICS

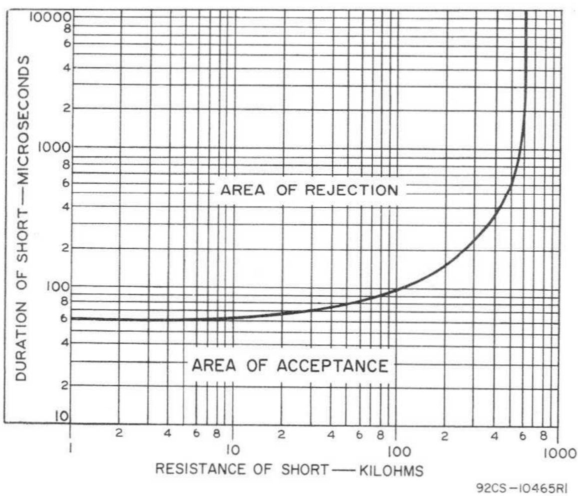


92CM—12175

GRID-No.1-CIRCUIT-RESISTANCE RATING CHART
Class A Amplifier



SHORTS-TEST ACCEPTANCE LIMITS



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% 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	2.2	pf
Grid to cathode, shell, and heater	4.2	pf
Plate to cathode, shell, and heater	1.6	pf
Plate to cathode	0.26	pf
Heater to cathode	1.4	pf

Characteristics, Class A_1 Amplifier:

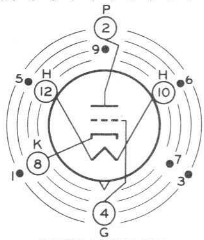
Heater Voltage	Specified center value	
Plate Supply Voltage	75	volts
Grid	Connected to negative end of cathode resistor	
Cathode Resistor	100	ohms
Amplification Factor	28	
Plate Resistance (Approx.)	2200	ohms
Transconductance	12800	μmhos
Plate Current	15	ma
Grid Voltage (Approx.) for plate μa = 10	-8	volts

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	0.800"
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

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

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
Metal-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	

	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 = -1.2, grid-circuit resistance (megohms) $\leqq$ 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 = 40, dc grid supply volts = -6.5, rms 60-cps ac grid signal volts = 8, dc grid-circuit resistance (ohms) $\leqq$ 2, plate- and grid-voltage supplies each bypassed with capacitor (μf) $\geqq$ 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 (I):

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 (I), 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, 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.

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.

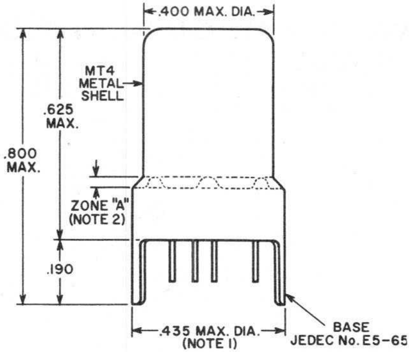
At the end of this test, tubes are criticized for Heater-Cathode Leakage Current, Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

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.

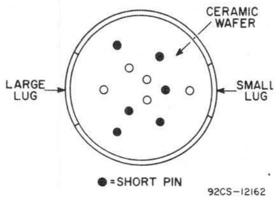
At the end of this test, tubes are criticized for Useful Power Output (2), Reverse Grid Current, Inoperatives, and Total Defectives. A tube is considered Inoperative if Useful Power Output (2) is less than 0.700 watt.



Dimensions in Inches

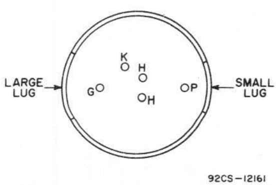
BOTTOM VIEW

Showing Arrangement of All 11 Base Pins



MODIFIED BOTTOM VIEW

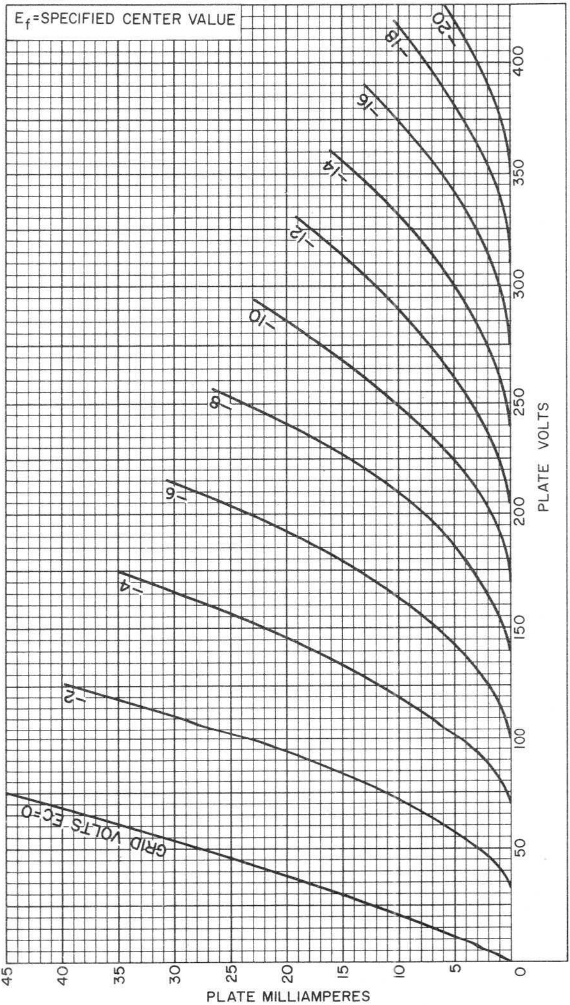
With Element Connections Indicated and Short Pins Not Shown



NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

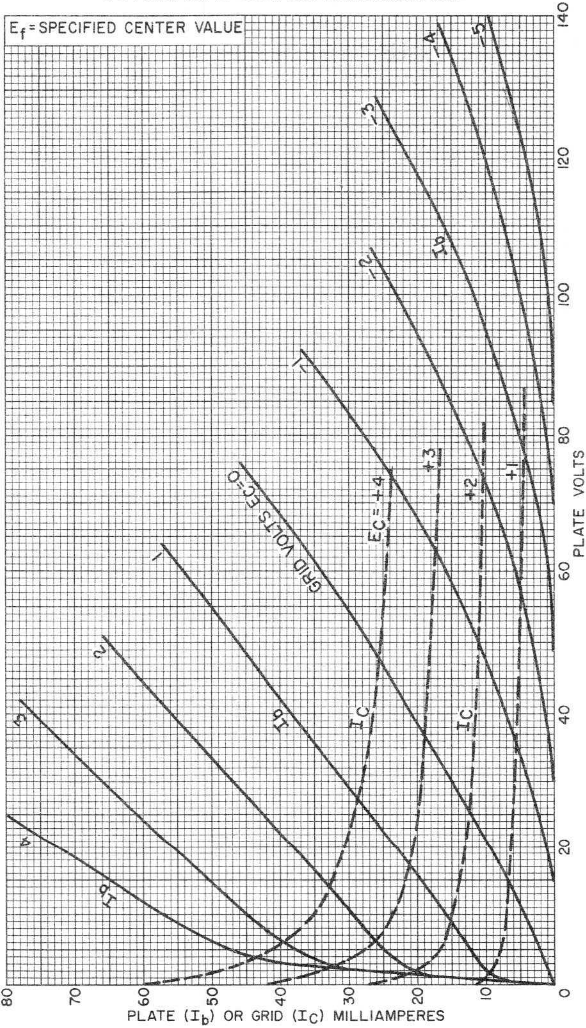
NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

AVERAGE PLATE CHARACTERISTICS



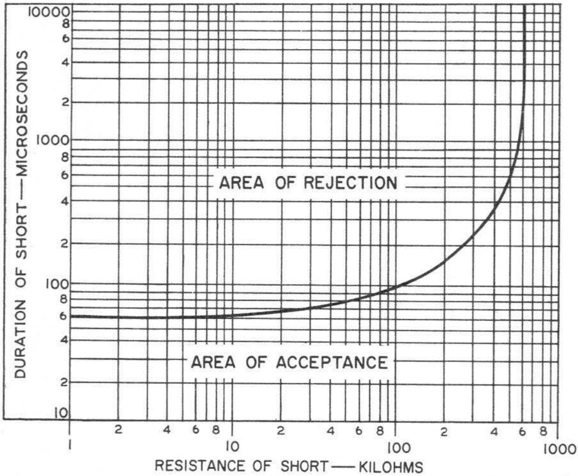
92CM-12169

AVERAGE CHARACTERISTICS



92CM-12174

SHORT-TEST ACCEPTANCE LIMITS



92CS-10465R1

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.

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:

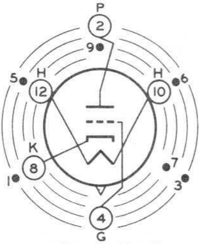
Heater Voltage	Specified center value	
Plate Supply Voltage	110	volts
Grid	Connected to negative end of cathode resistor	
Cathode Resistor	150	ohms
Amplification Factor	64	
Plate Resistance (Approx.)	6800	ohms
Transconductance	9400	μmhos
Plate Current	7	ma
Grid Voltage (Approx.) for plate μa = 10	−4	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)

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	2 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

	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) $\leq$ 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 (I):

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 (I), 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 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

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.

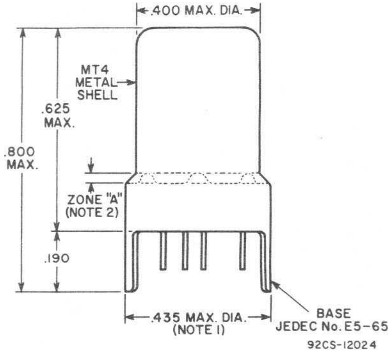
At the end of this test, tubes are criticized for Heater-Cathode Leakage Current, Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

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).

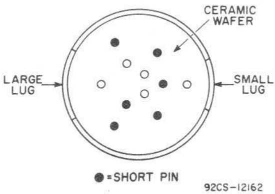
At the end of this test, tubes are criticized for Transconductance (1), Reverse Grid Current, Inoperatives, and Total Defectives. A tube is considered Inoperative if it has a discontinuity, permanent short, or air leak.



DIMENSIONS IN INCHES

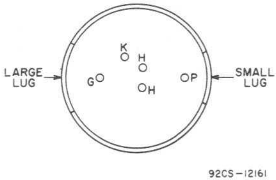
BOTTOM VIEW

Showing Arrangement of All 11 Base Pins



MODIFIED BOTTOM VIEW

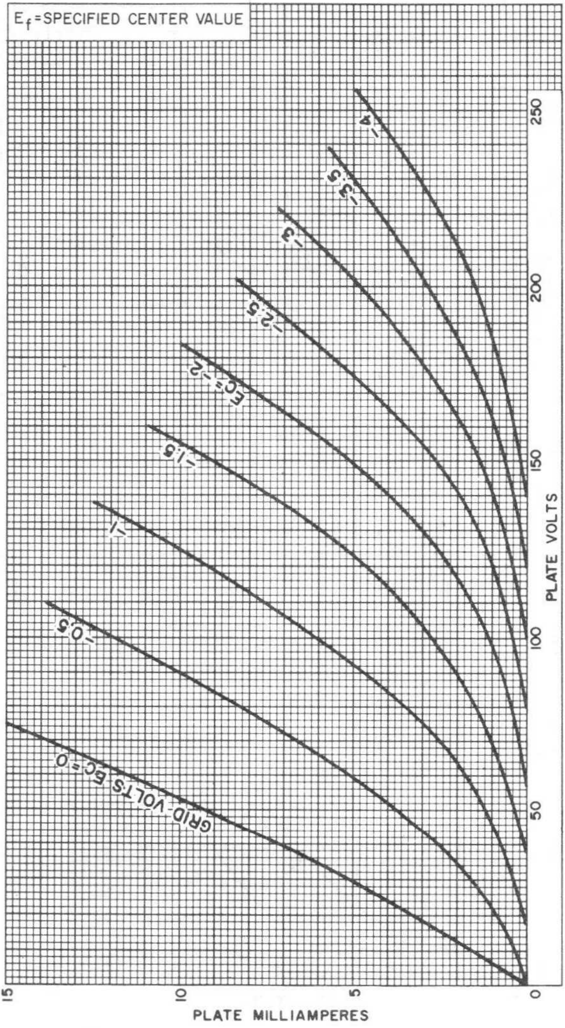
With Element Connections Indicated
and Short Pins Not Shown



NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

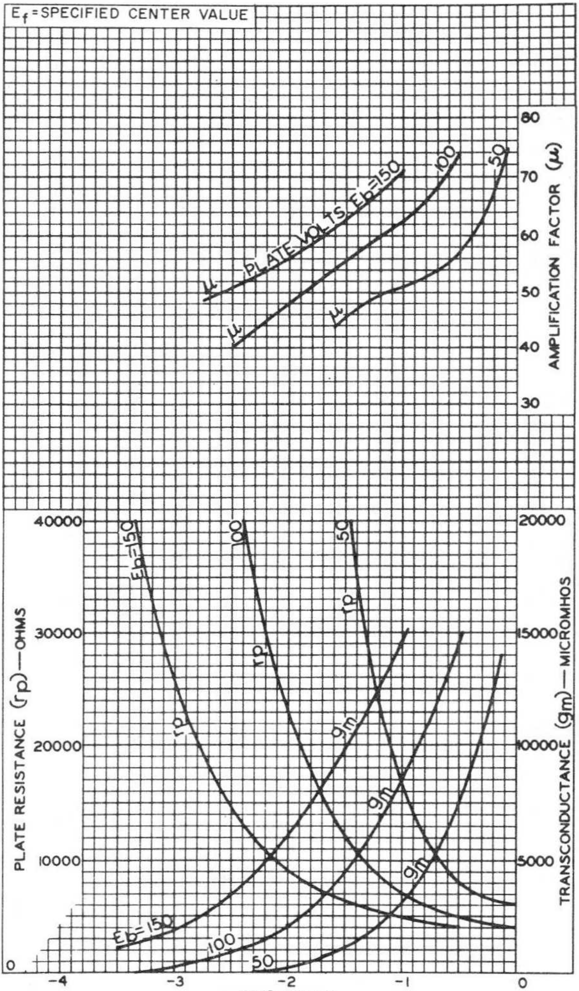
NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

AVERAGE PLATE CHARACTERISTICS



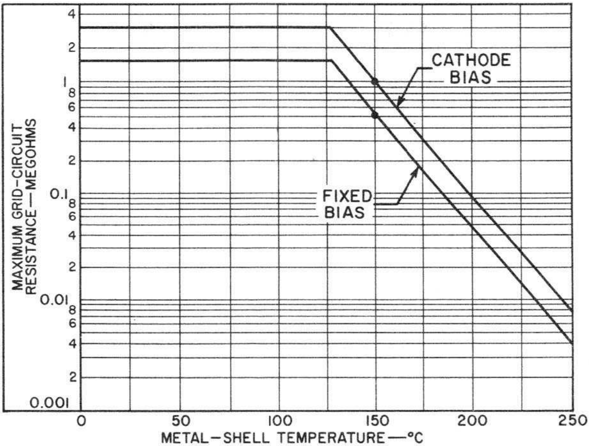
92CM-12170

AVERAGE CHARACTERISTICS



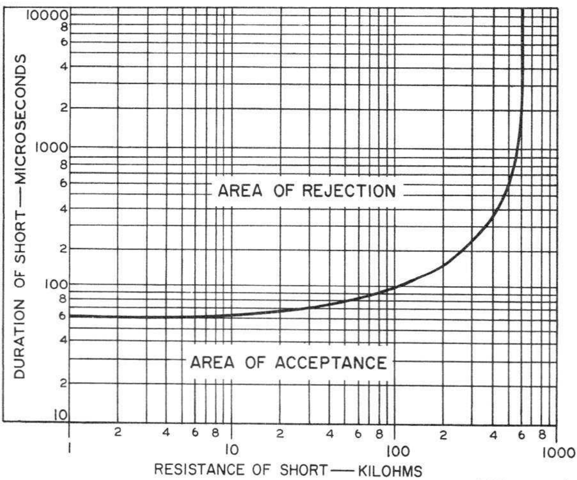
92CM-12168

GRID-CIRCUIT-RESISTANCE RATING CHART
Class A Amplifier—Rating 1



92CS-12023

SHORTS TEST ACCEPTANCE LIMITS



92CS-10465R1

Medium-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	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	8.7	ma
Grid Voltage (Approx.) for plate μa = 50	−5	volts

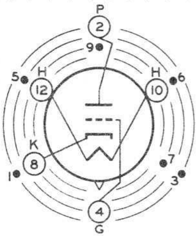
Mechanical:

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	See *Socket & Connector Information for RCA Nuvistor Tubes* at front of this Section
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No. E5-65)

8456

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:

Heater Voltage	Specified center value		
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 insertion 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 . . .	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	2.4	pf
Grid to cathode, shell, and heater	2	3.4	4.6	pf
Plate to cathode, shell, and heater	2	1.4	2.0	pf
Plate to cathode .	2	0.26	0.42	pf
Heater to cathode.	2	1.1	1.7	pf
Plate Current (1). .	1,3	6.7	10.7	ma
Plate Current (2). .	1,4	–	50	μa
Transconductance (1)	1,3	6500	8500	μmhos
Transconductance (2)	3,5	5700	–	μmhos
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	–	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 = 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) ≦ 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 (I), 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-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 Change in Transconductance (I), 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.

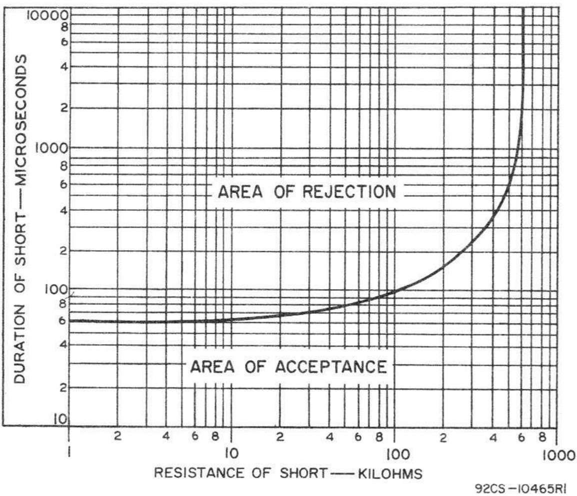
Intermittent Life (100 Hours):

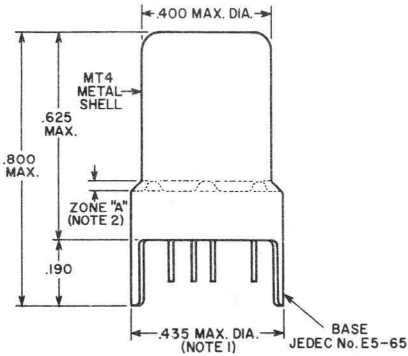
This test is performed on a sample lot of tubes from each production run.

During this test, tubes are operated at maximum-rated plate dissipation.

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.

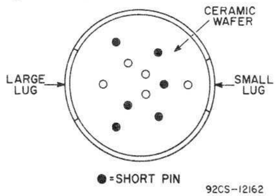
SHORTS-TEST ACCEPTANCE LIMITS



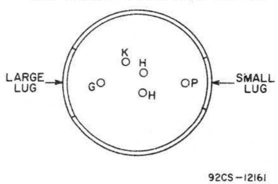


Dimensions in Inches

BOTTOM VIEW
Showing Arrangement of All 11 Base Pins



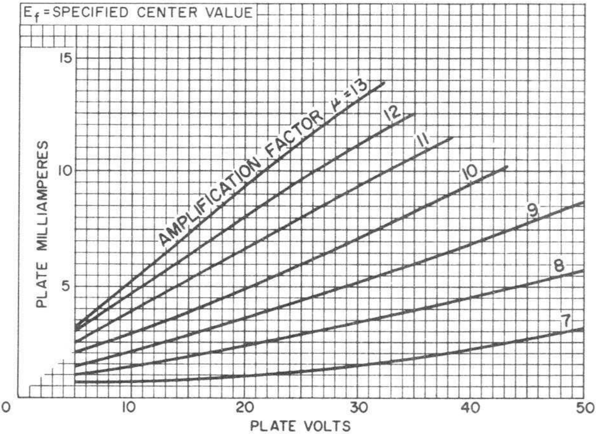
MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown



NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

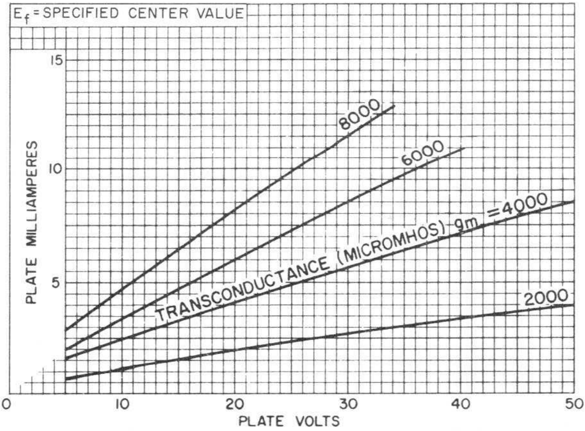
NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

AVERAGE PLATE CHARACTERISTICS
With Amplification Factor as Variable



92CS-12165

AVERAGE PLATE CHARACTERISTICS
With Transconductance as Variable



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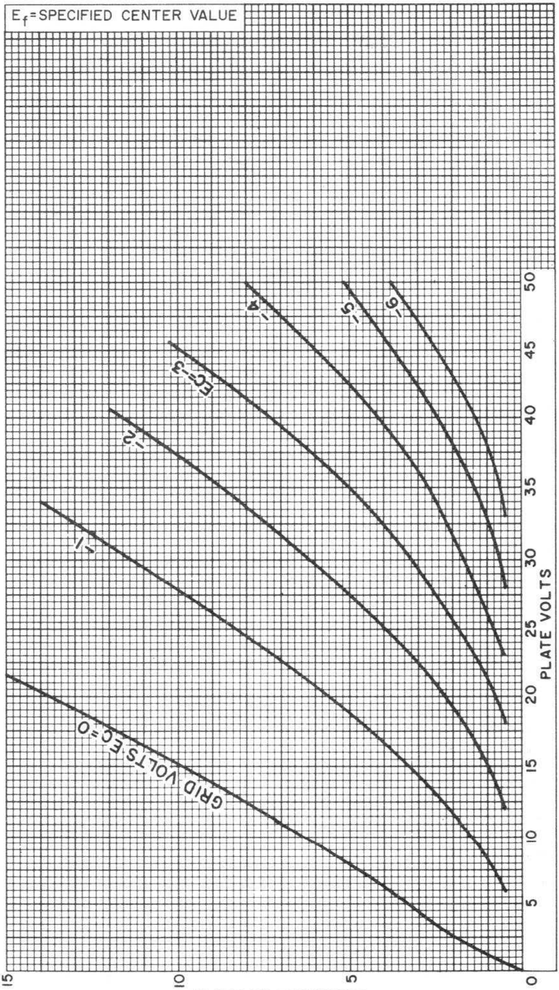
AVERAGE PLATE CHARACTERISTICS



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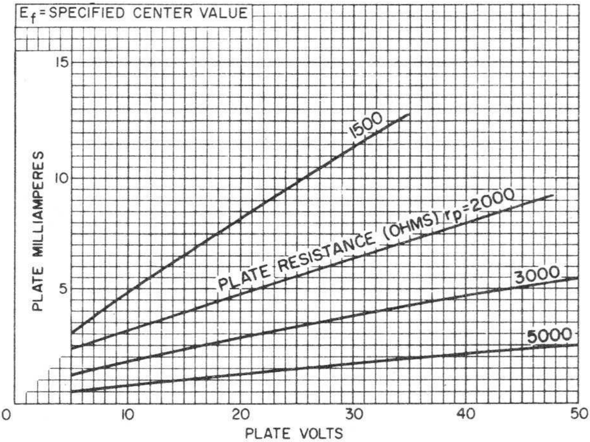
AVERAGE PLATE CHARACTERISTICS
With Plate Resistance as Variable



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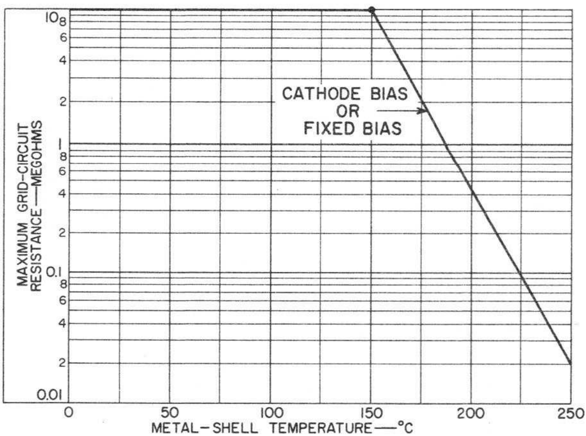
GRID-CIRCUIT-RESISTANCE RATING CHART



92CS-11479R1

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

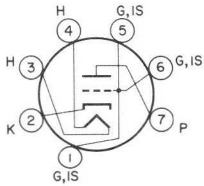
Electrical:

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.5-2)	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

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

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 = −15.

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).

Tubes are then criticized for changes in Transconductance (I), 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 (I) 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 (I) 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 per cent 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	^{o}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 $25^{o} \pm 5^{o}$ C, while the tubes

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Electronic Components and Devices Harrison, N. J.

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-1E, 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).

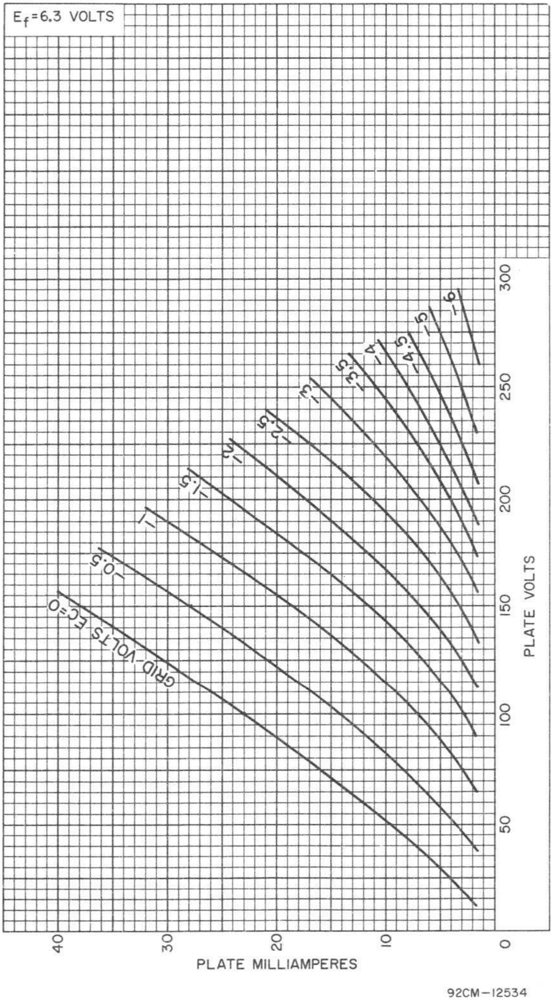
Early-Hour Survival-Rate Life (100 Hours):

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).

AVERAGE PLATE CHARACTERISTICS



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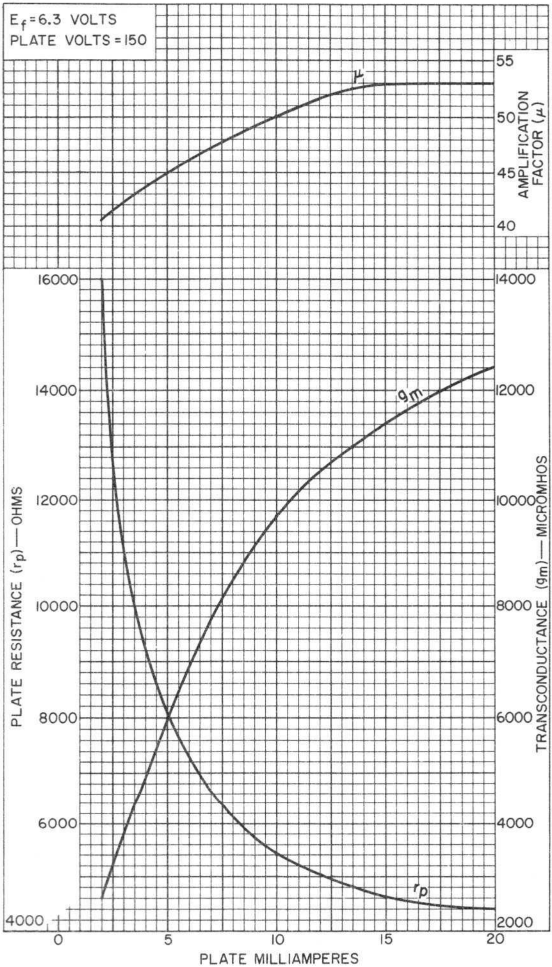
AVERAGE CHARACTERISTICS



92CM—12533

High-Mu Triode

NUVISTOR TYPE

ENVIRONMENTAL TESTS 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	R_k	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

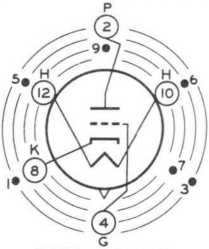
MAXIMUM CIRCUIT VALUES

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 GΩ	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*).

INITIAL CHARACTERISTICS LIMITS

	Note	Min	Max	
Heater Current	1	90	110	mA
Direct Interelectrode Capacitances				
Grid to plate	2	-	0.7	pF
Input: G to (K, S, H)	2	3.0	3.8	pF
Output: P to (K, S, H)	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, $E_{hk} = \pm 100$ 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, $R_k = 200$ Ω, $R_g = 1$ MΩ, $E_{hk} = 100$ V.

	Min	Max	
Post-Shock Limits and Rejection Criteria			
E_{Rp} (AC Voltage Amplification)	6	-	V
I_c	-	-0.1	μA
I_{hk}	-	±10	μA
E_{Rpm} (Variable-Frequency-Vibration Test Limits) over Vibration-Frequency Range of:			
3 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 50 & 50 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

$E_f = 6.3$ 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
In X_1 position		
Period of 1 Sweep Cycle (3 to 15 kc/s)	7	s

Operating Conditions during Test

$E_f = 6.3$ V, $E_{bb} = 120$ V, $E_{cc} = 0$ V, $R_k = 200\ \Omega$, $R_p = 2\ k\Omega$.

Limits	Min	Max	
E_{Rpm} over Vibration-Frequency Range of:			
3 to 6 kc/s.	-	35	mV
6 to 15 kc/s.	-	700	mV

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_{hk} = −180 V continuously ON.

Rejection Criteria

Heater-Cathode Shorts, and Heater and Cathode Discontinuities.

Intermittent Operation (2, 20, 100, 500, and 1000 Hours)

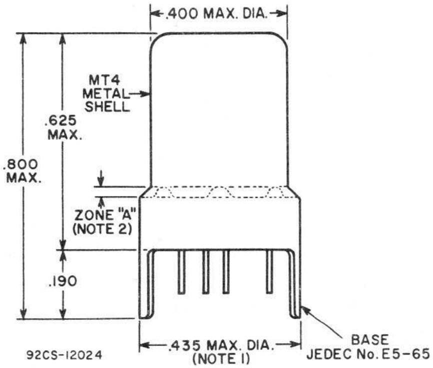
Operating Conditions

E_f = 6.3 V cycled 110 minutes ON and 10 minutes OFF, E_b = 120 V, E_{cc} = −1 V, E_{hk} = 100 V, R_k = 0 Ω, R_g = 1 MΩ, P_b = 0.3 W (approx.), T_E = 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	–	–	–	–	–	–	%
$\Delta E_{Rp}/t$	–	–	–	–	–	±10	–	±15	%
Avg $\lvert \Delta E_{Rp}/t \rvert$	–	–	–	–	–	7	–	10	%
I_c	–	–	–	−0.05	–	−0.1	–	−0.1	μA
I_{hk}	–	–	–	–	–	±10	–	±10	μA

DIMENSIONAL OUTLINE

JEDEC No. 4-4

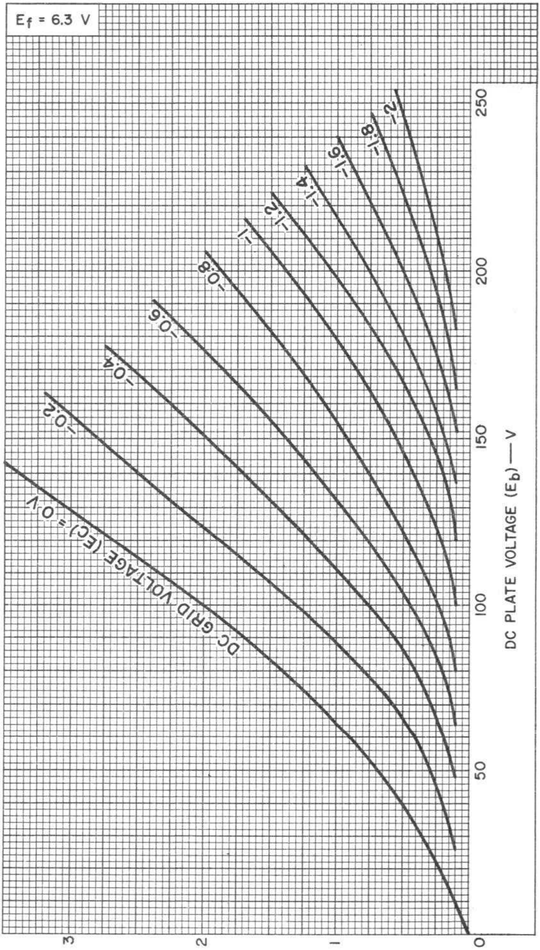


DIMENSIONS IN INCHES

Note 1: Maximum outside diameter of 0.440" is permitted along 0.190" lug length.

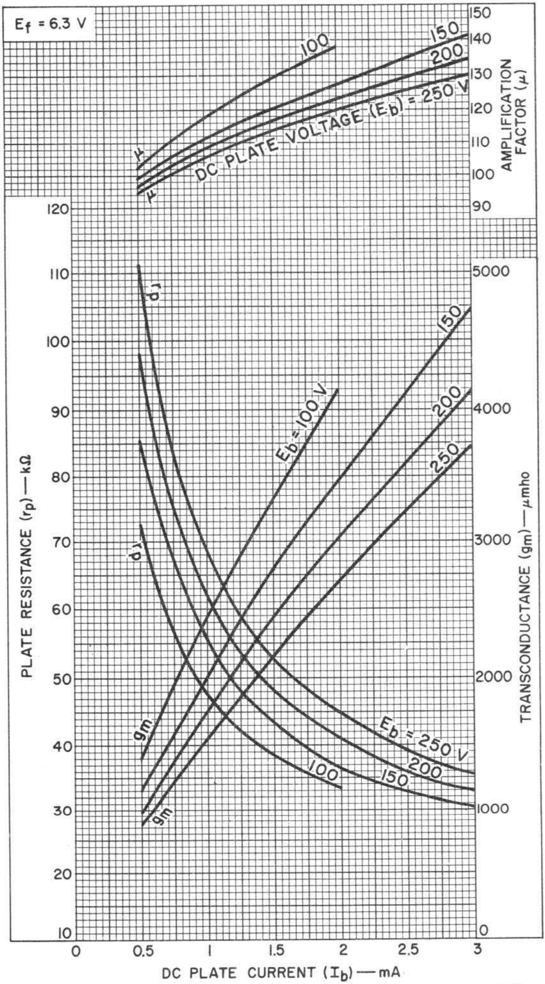
Note 2: Envelope temperature should be measured in zone "A".

Typical Plate Characteristics



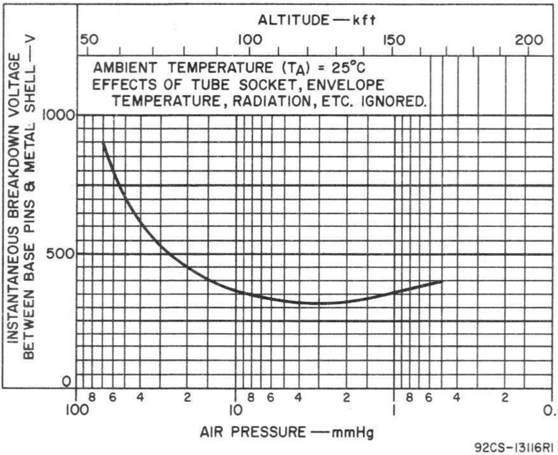
RADIO CORPORATION OF AMERICA
Electronic Components and Devices Harrison, N. J.

Typical Characteristics



92CM-13214

Breakdown-Voltage Characteristic



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

High-Mu Triode

NUVISTOR TYPE

For Cathode-Drive, Low-Level Class-C RF-Power-Amplifier, Oscillator, or Frequency-Multiplier Applications to 1.2 GHz

ELECTRICAL CHARACTERISTICS - Bogey Values

Heater Voltage, dc or ac	E_h	6.3	V
Heater Current at E_h = 6.3 V .	I_h	340	mA
Direct Interelectrode Capacitances:			
Without external shield			
Input: K to (G, S, H)	c_i	9.6	pF
Output: P to (G, S, H)	c_o	2.7	pF
Heater to cathode	c_{hk}	2.6	pF
Plate to cathode	c_{pk}	0.050	pF

For the following characteristics, see Conditions below:

Amplification Factor	μ	100	
Plate Resistance (Approx.) ..	r_p	6400	Ω
Transconductance	g_m	18000	µmho
DC Plate Current	I_b	15	mA
Cutoff DC Grid Voltage for I_b = 10 µA	$E_{c(co)}$	-5	V

Conditions

Heater Voltage	E_h	6.3	V
Plate Supply Voltage	E_{bb}	200	V
Grid Supply Voltage	E_{cc}	0	V
Cathode Resistor	R_k	68	Ω

MECHANICAL CHARACTERISTICS

Dimensional Outline	See Outline Drawing
Maximum Overall Length (l_m)	0.985 in
Maximum Seated Length (l_{sm})	0.780 in
Maximum Diameter (d_m)	0.440 in
Envelope	JEDEC Designation MT4
Top Cap[a]	Small (JEDEC Designation C1-46)

Base[a]	Medium-Ceramic-Wafer Twelvar 6-Pin (JEDEC Designation E6-93)		
Type of Cathode	Coated Unipotential		
Operating Position	Any		
Cooling	Conduction		

MAXIMUM RATINGS - Absolute-Maximum Values[b]

For operation as a low-level class-C rf-power-amplifier, oscillator, or frequency-multiplier tube at frequencies up to 1.2 GHz

		ICAS[c]	
Plate Supply Voltage (E_{bb})			
Up to 50,000 feet		1000[d]	V
Above 50,000 feet	See *Breakdown-Voltage Characteristics*		
DC Plate Voltage	E_b	1000	V
Grid Voltage:			
Peak	e_c	30	V
DC	E_c	+0	V
		-100	V
Peak Heater-Cathode Voltage	e_{hk}	±100	V
Heater Voltage, dc or ac	E_h	5.7 to 6.9	V
Peak Cathode Current	i_k	1000	mA
		See *Pulse-Rating Chart*	
Average Cathode Current	I_k	75	mA
Plate Dissipation	P_b	6[e]	W
Grid Dissipation	P_g	200	mW
		See *Grid-Dissipation Rating Chart*	
Envelope Temperature[f]	T_E	200	°C

MAXIMUM CIRCUIT VALUES

		ICAS	
Grid-Circuit Resistance:	R_g		
For fixed-bias or cathode-bias operation:		50	kΩ
		See *Grid-Circuit-Resistance Rating Chart*	

TYPICAL OPERATION - CCS[g]

As cathode-drive rf power amplifier

Frequency	f	1	GHz
Heater Voltage	E_h	6.3	V
DC Plate-to-Grid Voltage	E_{bg}	206	V

DC Cathode-to-Grid Voltage ..	E_{kg}		5.8	V
From grid resistor of	R_g		300	Ω
Average Plate Current	I_b		50	mA
Average Grid Current	I_c		19	mA
Driving Power (Approx.)	P_g		1.0	mW
Useful Power Output (Approx.)	P_o		5	W

As cathode-drive frequency doubler

Output Frequency	f_o		1.2	GHz
Heater Voltage	E_h		6.3	V
DC Plate-to-Grid Voltage......	E_{bg}		200	V
DC Cathode-to-Grid Voltage..	E_{kg}		11	V
From grid resistor of	R_g		1000	Ω
Average Plate Current	I_b		38	mA
Average Grid Current	I_c		10.5	mA
Driving Power (Approx.)	P_g		1	W
Useful Power Output (Approx.).	P_o		2	W

TYPICAL OPERATION

As pulsed cathode-drive class-C amplifier

Output Frequency	f_o	1	1	GHz
DC Plate-to-Grid Voltage	E_{bg}	500	1000	V
DC Cathode-to-Grid Voltage ...	E_{kg}	16	20	V
Average Plate Current	I_b	9	4.75	mA
Average Grid Current	I_c	5.5	1.4	mA
Duty Factor	-	2.5	1	%
Pulse Length	-	5	5	μs
Peak Driving Power	-	30	50	W
Average Driving Power	-	0.75	0.5	W
Peak Useful Power Output (Approx.)	-	105	240	W
Average Power Output	-	2.5	2.4	W
Plate Dissipation (Approx.) ..	-	2.4	2.7	W
Gain.............................	-	5.4	6.8	dB

[a] See *Socket and Connector Information*.

[b] As defined in the current issue of EIA Standard RS-239.

[c] Intermittent Commercial and Amateur Service.

[d] Under no circumstances should this absolute-maximum value be exceeded. For high-altitude operation, the maxi-

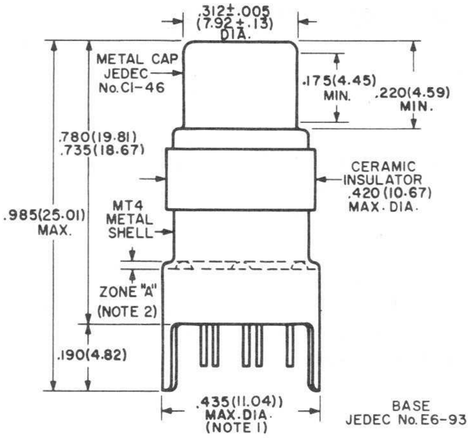
mum permissible plate voltage is dependent on atmospheric pressure.

[e] This rating applies when the plate-seal temperature is maintained below 200°C by means of an external heat sink such as the center conductor of a coaxial resonator. If no provision is made for additional heat removal, the maximum seal temperature of 200°C will not be exceeded with 4 watts of plate dissipation and a chassis temperature of 25°C.

[f] Measured on metal shell in Zone "A" (See *Dimensional Outline*).

[g] Continuous Commercial Service.

DIMENSIONAL OUTLINE - Dimensions in Inches (mm)

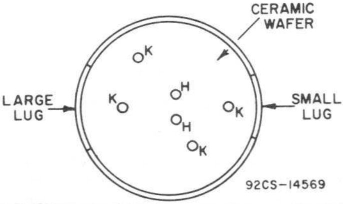


Note 1: Maximum outside diameter of 0.440" (11.17 mm) is permitted along 0.190" (4.83 mm) lug length.

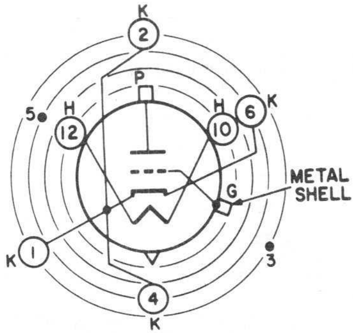
Note 2: Envelope temperature should be measured in zone "A".

MODIFIED BOTTOM VIEW

With Element Connections Indicated and Short Pins Not Shown



TERMINAL DIAGRAM (Bottom View)



INDEX = LARGE LUG
● = SHORT PIN—IC

Pin 1 - Cathode
Pin 2 - Cathode
Pin 3* - Do Not Use
Pin 4 - Cathode
Pin 5* - Do Not Use

Pin 6 - Cathode
Pin 10 - Heater
Pin 12 - Heater
Metal Shell - Grid
Top Cap - Plate

* Pin is of a length such that its end does not touch the socket insertion plane.

TYPE 8808 SOCKET AND CONNECTOR INFORMATION

SOCKET			
Mounting	Body Material	Cinch Mfg. Co.▲ No.	Cinch-Jones Sales-Division Distributor No.
Crimp	HALON□	133 67 90 040§	5NS-4
TOP-CAP CONNECTOR			
For Distributed-Constant Circuit	International Electronic Research Corp⊕ Therma-Link Retainer Part No.TXBE-032-031G, or equivalent		
For Lumped-Constant Circuit	Wakefield Engineering, Inc.● Semiconductor Cooler Type NF207, or equivalent		

▲ 1026 South Homan Ave., Chicago, Illinois 60624.

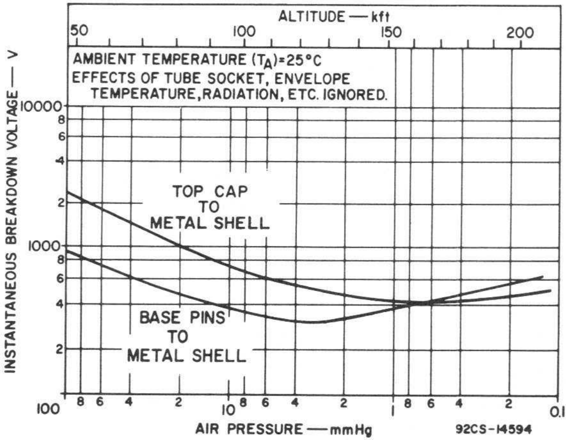
□ TRADE MARK: Allied Chemical Corp., Morristown, N. J.

⊕ 135 West Magnolia Blvd., Burbank, Calif. 91502.

● 139 Foundry St., Wakefield, Mass. 01880.

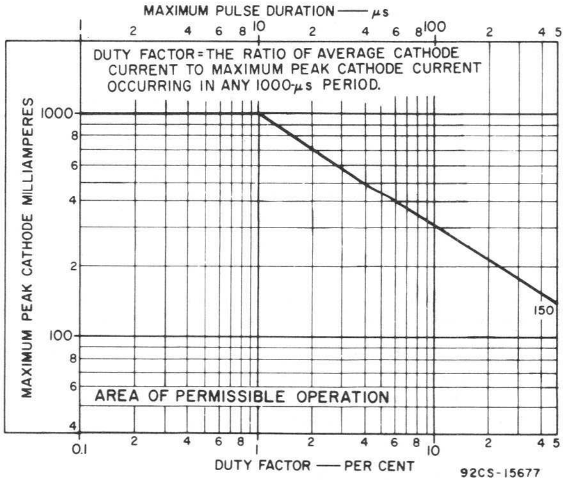
§ This UHF heat-dissipating socket, or equivalent, is recommended to insure adequate electrical and thermal connection to the index rim.

BREAKDOWN-VOLTAGE CHARACTERISTICS

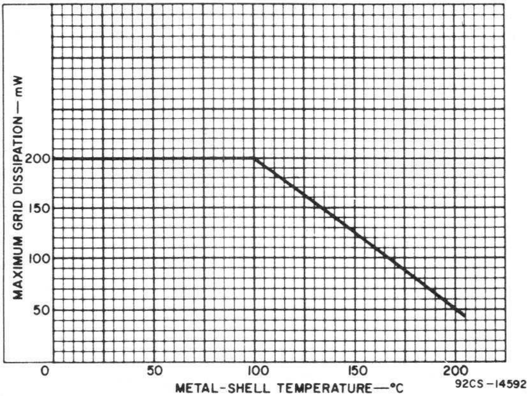


PULSE RATING CHART

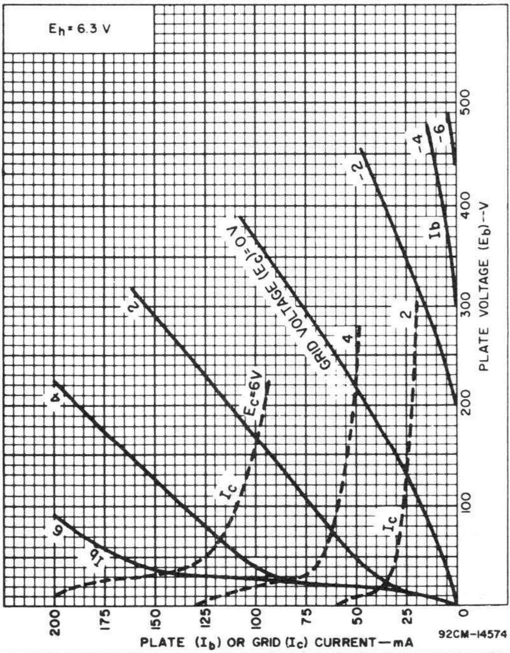
The peak cathode current is for a duty factor of up to 1% or pulse duration up to 10 μs, whichever is greater.



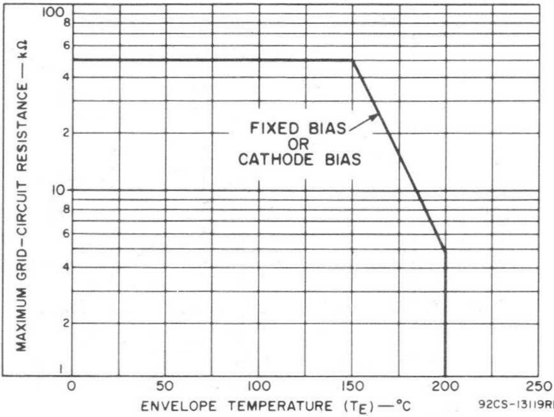
GRID-DISSIPATION RATING CHART



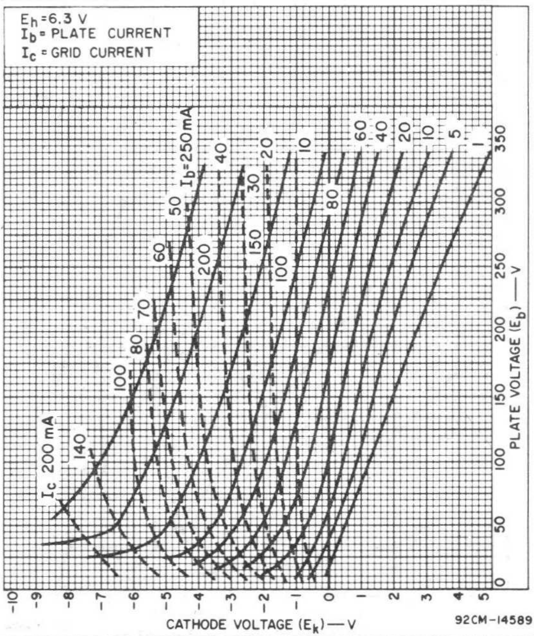
TYPICAL CHARACTERISTICS



GRID-CIRCUIT-RESISTANCE RATING CHART



TYPICAL CONSTANT-CURRENT CHARACTERISTICS



CW Klystron Amplifier

High Power Output
Very High Gain
Long Life, High Reliability
Integral Cavity Construction
Water/Vapor Cooled
Electromagnet Focusing

Easy to Install and Operate
Modulating Anode – permits both visual and aural application with a single beam supply

Electrical

Frequency Range	470-566 MHz
Cathode Type	Indirectly heated, tungsten dispenser cathode
Heater (dc or 50-60 Hz):	
Voltage[a]	6.0 ± 0.5 V
Current @ 6.0 V, typical	16.4 A
Surge current, maximum	30.0 A
Warm-up time, minimum	180 sec
Focusing	RCA-AJ2166 Electromagnet

Mechanical

Mounting Position	Vertical, cathode down
Dimensions, Maximum:	
Height	(1485.9 mm) 58.5 in
Width	(381.0 mm) 15.0 in
Weight, Approximate:	
Uncrated	(90.7 kg) 200 lbs
Crated	(213.1 kg) 470 lbs
Inlet Coolant Connector	Mates with Hansen B2-H16
Outlet Coolant Connector	Mates with Hansen LL3-H21
Steam Outlet	See Dimensional Outline

Electrical Connections

RF Input	UG-22B/U jack mates with UG-21D/U plug
RF Output	See Dimensional Outline
Collector[b]	Pins F and G, Cannon Rec.[c]
Thermocouple:	
Chromel	Pin H Cannon Rec.[c]
Alumel	Pin J Cannon Rec.[c]
Body	Pin E Cannon Rec.[c]

Modulating Anode	See Dimensional Outline
Heater-Cathode	See Dimensional Outline
Heater	See Dimensional Outline
Interlock #1	Pins A and B, Cannon Rec.[c]
Interlock #2	Pins C and D, Cannon Rec.[c]

Thermal

Collector Temperature	145	max.	°C
Body Temperature	100	max.	°C
Electron Gun Insulator Temperature	250	max.	°C
Storage Temperature	-65	min.	°C

Coolant Requirements

Collector and Body				
Water flow	(7.5 l/m)	2.0	min.	gpm
Inlet water temperature		70	max.	°C
Electron Gun				
Forced air flow	(24 l/s)	50	min.	cfm
Water Pressure Differential for Typical Flow of 2.1 gpm	($3.5\ kg/cm^2$)	50	max.	psi
Water Pressure at any Inlet	($4.2\ kg/cm^2$)	60	max.	psi

Maximum Ratings, *Absolute-Maximum Values*

Beam Voltage, DC	20	max.	kV
Beam Current, DC	5.5	max.	A
Body Current, DC	250	max.	mA
Modulating Anode Voltage, DC	20	max.	kV
Load VSWR	1.5:1.0		

Typical Operation, UHF Television Service (Visual 471.25 MHz, Aural 475.75 MHz)

	Visual	Aural	
Collector Voltage, DC[f]	0	0	V
Body Voltage, DC	0	0	V
Beam Current, DC	4.7	2.4	A
Body Current, DC[g]	70	15	mA

Modulating Anode Voltage, DC	0	-6	kV
Modulating Anode Current, DC	1.5	1.0	mA
Cathode Voltage, DC	-18	-18	kV
Focusing Current, DC (Typical with RCA-AJ2166 Electromagnet)	28	28	A
Load VSWR	1.1:1	1.1:1	–
Drive Power, for Visual Peak-of-Sync or Aural CW	10	1.1	W
Output, for Visual Peak-of-Sync or Aural CW	31	12	kW
Gain	35	40	dB
Efficiency	37	28	%

a Careful attention to maintaining the minimum value of filament voltage consistent with adequate emission will result in conserving the life of the tube.

b Pins F and G must always be used in parallel.

c Type CA22365-2729 Cannon Receptacle.

d All water must be removed from the water course during storage.

e Cooling air blower must be directed toward the electron gun and located within a distance of 24 inches.

f A DC ammeter make the connection between the collector and ground.

g The body is connected directly to ground. Body current is measured in the ground leg of the beam power supply.

General Information

Cooling

The electron gun is cooled by forced-air directed at the cathode-seal area. Air flow must be at least 50 cfm. (24.0 l/sec) The remainder of the tube is cooled by water/vapor system with water cooling the resonators and drift-tube sections and vapor cooling the collector.

The use of distilled water is essential. The liquid flow must start before application of any voltages and preferably should continue for five minutes after removal of voltages. Interlocking of the liquid flow through each of the cooled elements with the beam supply is recommended to prevent damage in case of cooling failure.

A steam exhaust sleeve must be provided for the top of the klystron boiler. A flexible, neoprene type is recommended. The sleeve is placed over the lip provided at the top of the boiler (see Dimensional Outline) and clamped securely in place for a water-tight connection.

Electrical Connections to Tube Terminals

Connections to the Heater, Heater-Cathode and Modulating Anode Terminals (see Dimensional Outline) are made with preformed finger stock or knife blade type fuse clips. Care should be taken when making these connections not to place excessive stress on the ceramic-to-metal seals.

Protection Circuits

Protection circuits serve a threefold purpose: safety of personnel, protection of the tube and protection of tube circuits. Consult Application Note AN4206 for complete information on protection circuits required.

RF Output Coaxial Adapter

The RF output coaxial adapter shown in the klystron Outline Drawing is shipped as a separate item within the tube crate. It must be screwed on after the tube is installed within the electromagnet.

Installation and Operation

RCA reference publications required for the installation and operation of this device include the following:

Data Sheet – RCA-8824
Application Note AN4206
Application Guide 1CE-279A

These publications are available as a complete packet – request PWR-537, "Applications Information for the RCA-8824 Super-Power Klystron,"

Personnel Safety

The high voltages and microwave radiations from this device can be dangerous to life. High voltage shielding and interlock precautions must be taken and all rf connections must be tightly closed and rf terminals adequately shielded.

This device, in operation, may produce X-radiation which can constitute a health hazard. Shielding or other precautions may be required.

Packaging

The klystron is shipped in a specially designed shipping crate featuring steel tracks for receiving the rollers on the tube sides. Unpacking instructions are attached to the crate.

RCA AJ2166 Electromagnet

The RCA 8824 klystron is designed to be mounted in and its beam focused by the water-cooled, single-coil electromagnet, RCA-AJ2166. The exposed surfaces of the electromagnet are treated by painting or plating to resist corrosion.

General Data

Voltage, DC		125 max. V
Current, DC		30 max. A
Dimensions		See Outline Drawing
Weight (approx.)	(158.7 kg)	350 lbs
Cooling:		
Water flow, minimum	(3.8 l/m)	1 gpm
Inlet temperature, maximum		70° C
Maximum water pressure differential for typical flow	(3.5 kg/cm^2)	50 psig
Maximum water pressure at any inlet	(4.2 kg/cm^2)	60 psig

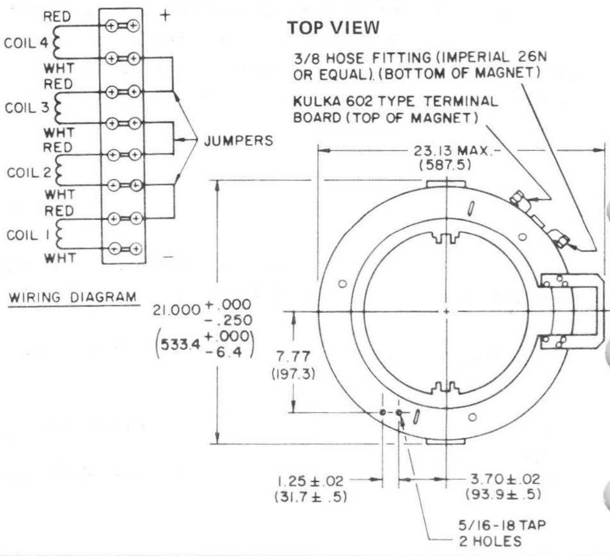
Operating Considerations

Typical operating coil currents are noted under "Typical Operation" data section.

It is recommended that the coil coolant flow start before the application of any coil voltage and preferably continue for five minutes after the removal of voltages. Interlocking of the coolant flow with the klystron beam and modulating-anode voltages and coil voltages is highly recommended to prevent tube and coil damage in the event of inadequate coolant flow.

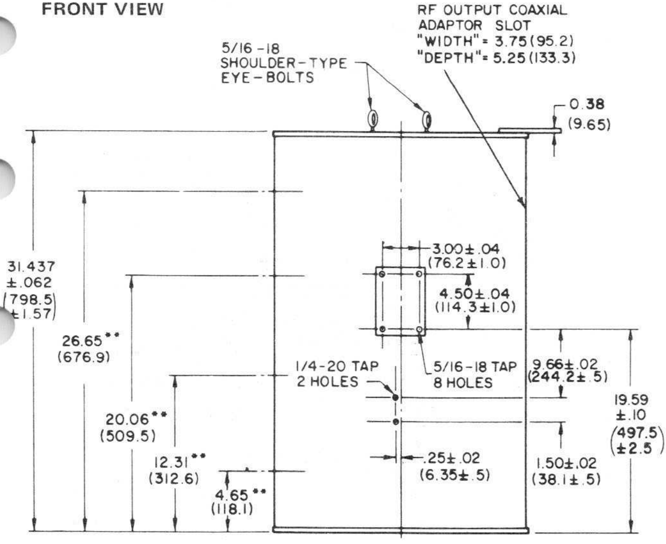
The use of a solid-state diode connected in parallel with the electromagnet is recommended to prevent excessive transient voltage build-up in the event of coil current interruptions. Connections should be made so the coil current will flow through the diode when the polarity of the normal coil voltage becomes reversed.

ELECTROMAGNET DIMENSIONAL OUTLINE



ELECTROMAGNET DIMENSIONAL OUTLINE

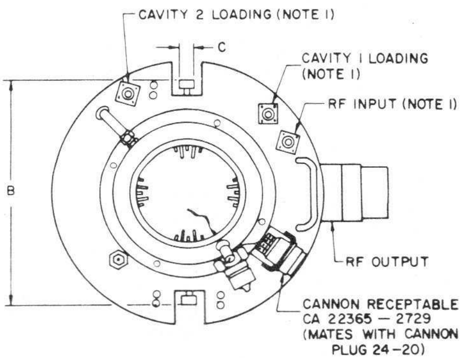
FRONT VIEW



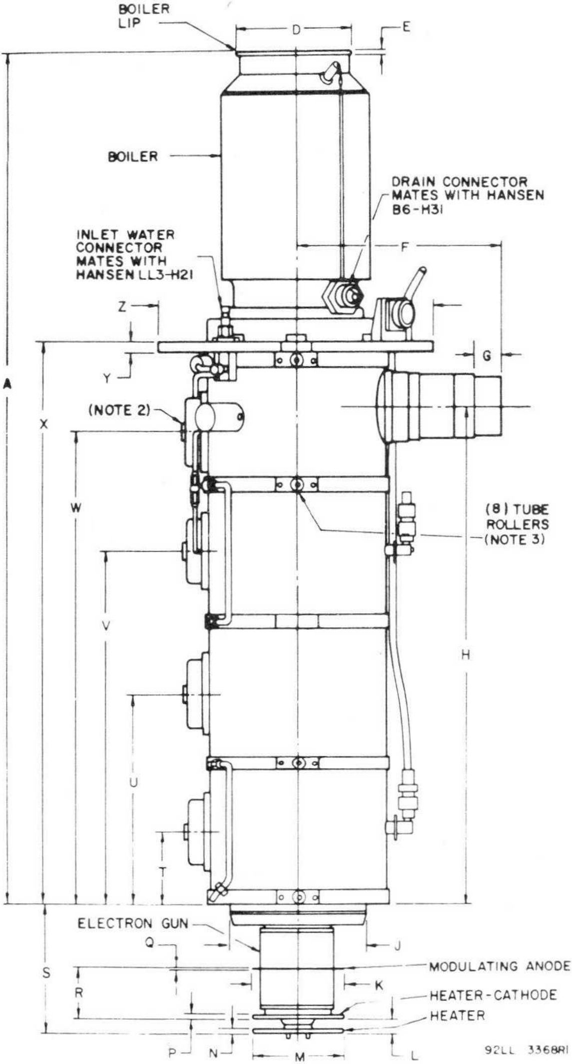
**LOCATION OF 1" DIAMETER TUNING PORTS

KLYSTRON DIMENSIONAL OUTLINE

TOP VIEW



KLYSTRON DIMENSIONAL OUTLINE (Cont'd)



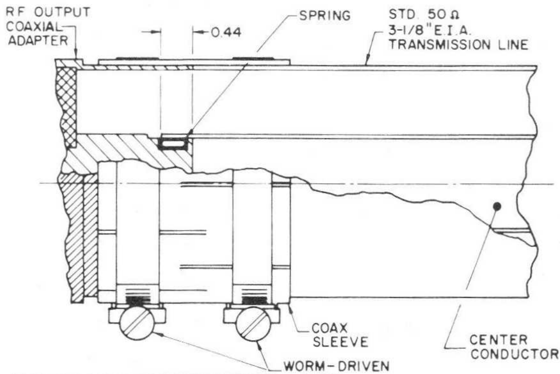
KLYSTRON OUTLINE DIMENSIONS

Ref.	Inches	Millimeters
A	50.83 ± 0.25	1290.0 ± 6.3
B	12.40 Max.	314.9 Max.
C Dia.	0.75 Ref.	19.05
D Dia.	6.40 ± 0.04	162.56 ± 1.0
E	0.23 ± 0.04	5.84 ± 1.0
F	11.00 ± 0.12	279.4 ± 3.0
G	1.51 ± 0.01	38.35 ± 0.25
H	27.52 ± 0.06	699.0 ± 1.5
J Dia.	7.50 Max.	190.5 Max.
K Dia.	5.00 ± 0.01	127.00 ± 0.25
L	0.69 ± 0.05	17.53 ± 1.2
M Dia.	5.00 ± 0.03	127.00 ± 0.76
N	0.19 ± 0.01	4.82 ± 0.25
P	0.19 ± 0.01	4.82 ± 0.25
Q	0.04	1.0
R	2.79 ± 0.05	70.86 ± 1.2
S	6.89 ± 0.07	175.0 ± 1.7
T	4.16 ± 0.03	105.66 ± 0.76
U	11.80 ± 0.04	299.72 ± 1.0
V	19.60 ± 0.05	497.8 ± 1.3
W	26.20 ±0.06	665.5 ± 1.5
X	30.82 ± 0.09	782.8 ± 2.2
Y	0.50 ± 0.02	12.70 ± 0.5
Z Dia.	15.00 Max.	381.0 Max.

Notes:

1. UG-22 B/U jack mates with UG-21 D/U
2. Channel tuning screws 5/16″ hex socket head.
3. Tube rollers mate with RCA AJ2166 electromagnet.

DETAIL RF OUTPUT CONNECTOR



CANNON RECEPTACLE CA 22365 – 2729		
PIN CONNECTIONS		
A, B	JUMPER, #16 AWG	
C, D	JUMPER, #16 AWG	
E	BODY (GROUND)	
F	COLLECTOR *	
G	COLLECTOR	
H	CHROMEL	THERMOCOUPLE CONNECTIONS
J	ALUMEL	THERMOCOUPLE CONNECTIONS

*ALWAYS USE PINS F AND G IN PARALLEL

More complete information covering the handling, installation, safety and operation of this type may be obtained through an RCA Field Representative or by writing RCA Super Power Tube Marketing, Lancaster, PA. 17604.

CW Klystron Amplifier

- High Power Output
- Very High Gain
- Long Life, High Reliability
- Integral Cavity Construction
- Water/Vapor Cooled
- Electromagnet Focusing
- Easy to Install and Operate
- Modulating Anode – permits both visual and aural application with a single beam supply

Electrical

Frequency Range	566-698 MHz
Cathode Type	Indirectly heated, tungsten dispenser cathode
Heater (dc or 50-60 Hz):	
Voltage[a]	6.0 ± 0.5 V
Current @ 6.0 V, typical	16.4 A
Surge current, maximum	30.0 A
Warm-up time, minimum	180 sec
Focusing	RCA-AJ2167 Electromagnet

Mechanical

Mounting Position	Vertical, cathode down
Dimensions, Maximum:	
Height	(1346 mm) 53 in
Width (excluding output connector)	(381.0 mm) 15.0 in
Weight, Approximate:	
Uncrated	(90.7 kg) 200 lbs
Crated	(213.1 kg) 470 lbs
Inlet Coolant Connector	Mates with Hansen B2-H16
Outlet Coolant Connector	Mates with Hansen LL3-H21
Steam Outlet	See Dimensional Outline

Electrical Connections

RF Input	UG-22B/U jack mates with UG-21D/U plug
RF Output	See Dimensional Outline
Collector[b]	Pins F and G, Cannon Rec.[c]
Thermocouple:	
Chromel	Pin H Cannon Rec.[c]
Alumel	Pin J Cannon Rec.[c]
Body	Pin E Cannon Rec.[c]

Modulating Anode	See Dimensional Outline
Heater-Cathode	See Dimensional Outline
Heater	See Dimensional Outline
Interlock #1	Pins A and B, Cannon Rec.[c]
Interlock #2	Pins C and D, Cannon Rec.[c]

Thermal

Collector Temperature	145	max.	°C
Body Temperature	100	max.	°C
Electron Gun Insulator Temperature	250	max.	°C
Storage Temperature	-65	min.	°C

Coolant Requirements

Collector and Body				
Water flow	(7.5 l/m)	2.0	min.	gpm
Inlet water temperature		70	max.	°C
Electron Gun				
Forced air flow	(24 l/s)	50	min.	cfm
Water Pressure Differential for Typical Flow of 2.1 gpm	(3.5 kg/cm^2)	50	max.	psi
Water Pressure at any Inlet	(4.2 kg/cm^2)	60	max.	psi

Maximum Ratings, ***Absolute-Maximum Values***

Beam Voltage, DC	20	max.	kV
Beam Current, DC	5.5	max.	A
Body Current, DC	250	max.	mA
Modulating Anode Voltage, DC	20	max.	kV
Load VSWR	1.5:1.0		

Typical Operation, UHF Television Service (Visual 627.25 MHz, Aural 631.75 MHz)

	Visual	Aural	
Collector Voltage, DC[f]	0	0	V
Body Voltage, DC	0	0	V
Beam Current, DC	4.7	2.4	A
Body Current, DC[g]	70	15	mA

Modulating Anode Voltage, DC	0	-6	kV
Modulating Anode Current, DC	1.5	1.0	mA
Cathode Voltage, DC	-18	-18	kV
Focusing Current, DC (Typical with RCA-AJ2167 Electromagnet)	28	28	A
Load VSWR	1.1:1	1.1:1	–
Drive Power, for Visual Peak-of-Sync or Aural CW	10	1.1	W
Output, for Visual Peak-of-Sync or Aural CW	31	12	kW
Gain	35	40	dB
Efficiency	37	28	%

a Careful attention to maintaining the minimum value of filament voltage consistent with adequate emission will result in conserving the life of the tube.

b Pins F and G must always be used in parallel.

c Type CA22365-2729 Cannon Receptacle.

d All water must be removed from the water course during storage.

e Cooling air blower must be directed toward the electron gun and located within a distance of 24 inches.

f A DC ammeter make the connection between the collector and ground.

g The body is connected directly to ground. Body current is measured in the ground leg of the beam power supply.

GENERAL INFORMATION

Cooling

The electron gun is cooled by forced-air directed at the cathode-seal area. Air flow must be at least 50 cfm. (24.0 l/sec) The remainder of the tube is cooled by water/vapor system with water cooling the resonators and drift-tube sections and vapor cooling the collector.

The use of distilled water is essential. The liquid flow must start before application of any voltages and preferably should continue for five minutes after removal of voltages. Interlocking of the liquid flow through each of the cooled elements with the beam supply is recommended to prevent damage in case of cooling failure.

A steam exhaust sleeve must be provided for the top of the klystron boiler. A flexible, neoprene type is recommended. The sleeve is placed over the lip provided at the top of the boiler (see Dimensional Outline) and clamped securely in place for a water-tight connection.

Electrical Connections to Tube Terminals

Connections to the Heater, Heater-Cathode and Modulating Anode Terminals (see Dimensional Outline) are made with preformed finger stock or knife blade type fuse clips. Care should be taken when making these connections not to place excessive stress on the ceramic-to-metal seals.

Protection Circuits

Protection circuits serve a threefold purpose: safety of personnel, protection of the tube and protection of tube circuits. Consult Application Note AN4206 for complete information on protection circuits required.

RF Output Coaxial Adapter

The RF output coaxial adapter shown in the klystron Outline Drawing is shipped as a separate item within the tube crate. It must be screwed on after the tube is installed within the electromagnet.

Installation and Operation

RCA reference publications required for the installation and operation of this device include the following:

Data Sheet – RCA-8825
Application Note AN4206
Application Guide 1CE-279A

These publications are available as a complete packet – request PWR-538, "Applications Information for the RCA-8825 Super-Power Klystron,"

Personnel Safety

The high voltages and microwave radiations from this device can be dangerous to life. High voltage shielding and interlock precautions must be taken and all rf connections must be tightly closed and rf terminals adequately shielded.

This device, in operation, may produce X-radiation which can constitute a health hazard. Shielding or other precautions may be required.

Packaging

The klystron is shipped in a specially designed shipping crate featuring steel tracks for receiving the rollers on the tube sides. Unpacking instructions are attached to the crate.

RCA AJ2167 Electromagnet

The RCA 8825 klystron is designed to be mounted in and its beam focused by the water-cooled, single-coil electromagnet, RCA-AJ2167. The exposed surfaces of the electromagnet are treated by painting or plating to resist corrosion.

General Data

Voltage, DC	125 max. V
Current, DC	30 max. A
Dimensions	See Outline Drawing
Weight (approx.) (158.7 kg)	350 lbs
Cooling:	
Water flow, minimum	(3.8 l/m) 1 gpm
Inlet temperature, maximum	70° C
Maximum water pressure differential for typical flow	(3.5 kg/cm^2) 50 psig
Maximum water pressure at any inlet	(4.2 kg/cm^2) 60 psig

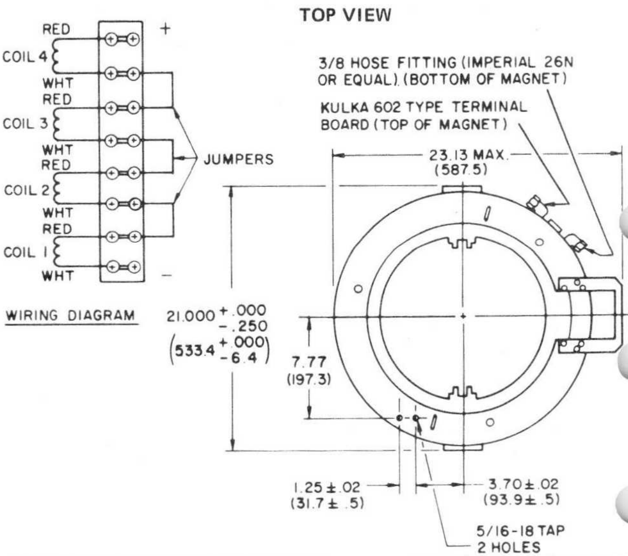
Operating Considerations

Typical operating coil currents are noted under "Typical Operation" data section.

It is recommended that the coil coolant flow start before the application of any coil voltage and preferably continue for five minutes after the removal of voltages. Interlocking of the coolant flow with the klystron beam and modulating-anode voltages and coil voltages is highly recommended to prevent tube and coil damage in the event of inadequate coolant flow.

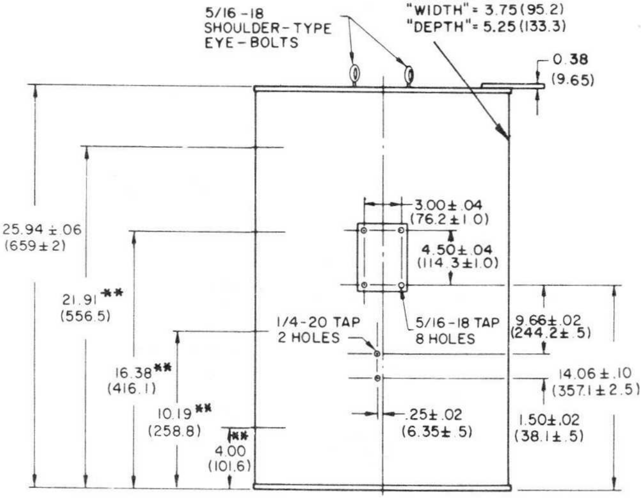
The use of a solid-state diode connected in parallel with the electromagnet is recommended to prevent excessive transient voltage build-up in the event of coil current interruptions. Connections should be made so the coil current will flow through the diode when the polarity of the normal coil voltage becomes reversed.

ELECTROMAGNET DIMENSIONAL OUTLINE



ELECTROMAGNET DIMENSIONAL OUTLINE

FRONT VIEW

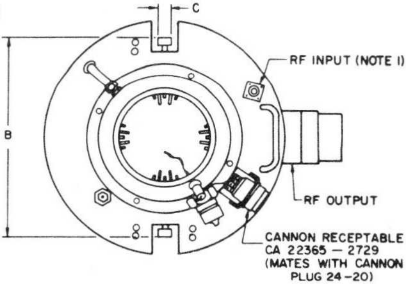


** LOCATION OF 1" DIAMETER TUNING PORTS

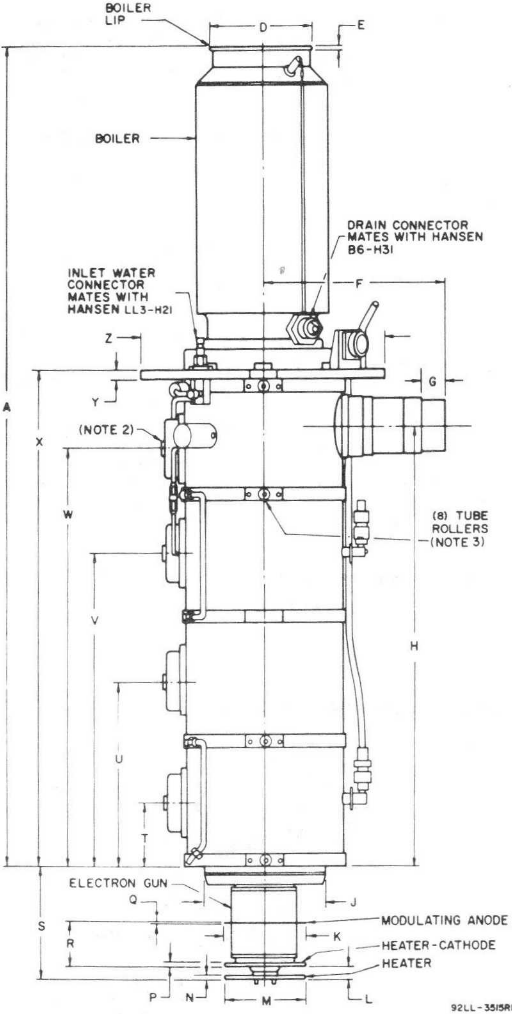
92LL-3514

KLYSTRON DIMENSIONAL OUTLINE

TOP VIEW



KLYSTRON DIMENSIONAL OUTLINE (Cont'd)



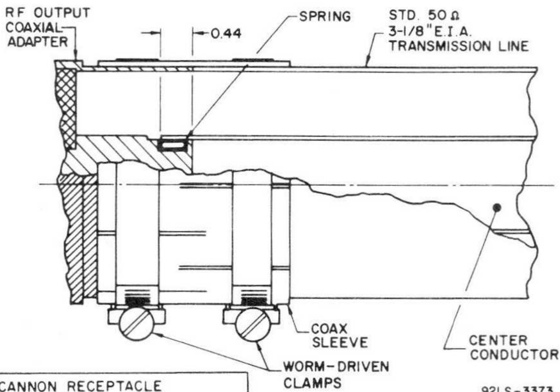
KLYSTRON OUTLINE DIMENSIONS

Ref.	Inches	Millimeters
A	45.77 ± 0.25	1162.6 ± 6.3
B	12.40 Max.	314.9 Max.
C Dia.	0.75 Ref.	19.05 Ref.
D Dia.	6.40 ± 0.04	162.6 ± 1.0
E	0.23 ± 0.04	5.8 ± 1.0
F	11.00 ± 0.12	279.4 ± 3.0
G	1.51 ± 0.01	38.35 ± 0.25
H	21.97 ± 0.06	558.0 ± 1.5
J Dia.	7.50 Max.	190.5 Max.
K Dia.	5.00 ± 0.01	127.00 ± 0.25
L	0.69 ± 0.05	17.53 ± 1.3
M Dia.	5.00 ± 0.03	127.00 ± 0.76
N	0.19 ± 0.01	4.82 ± 0.25
P	0.19 ± 0.01	4.82 ± 0.25
Q	0.04 Ref.	1.0 Ref.
R	2.79 ± 0.05	70.86 ± 1.3
S	6.89 ± 0.07	175.0 +± 1.7
T	3.45 ± 0.03	87.63 ± 0.76
U	9.65 ± 0.04	245.1 ± 1.0
V	15.85 ± 0.05	402.6 ± 1.3
W	21.37 ±0.06	542.8 ± 1.5
X	25.26 ± 0.09	641.6 ± 2.2
Y	0.50 ± 0.02	12.70 ± 0.5
Z Dia.	15.00 Max.	381.0 Max.

Notes:

1. UG-22 B/U jack mates with UG-21 D/U
2. Channel tuning screws 5/16'' hex socket head.
3. Tube rollers mate with RCA AJ2167 electromagnet.

DETAIL RF OUTPUT CONNECTOR



CANNON RECEPTACLE CA 22365 – 2729	
PIN CONNECTIONS	
A, B	JUMPER, #16 AWG
C, D	JUMPER, #16 AWG
E	BODY (GROUND)
F	COLLECTOR *
G	COLLECTOR
H	CHROMEL (THERMOCOUPLE CONNECTIONS)
J	ALUMEL (THERMOCOUPLE CONNECTIONS)

*ALWAYS USE PINS F AND G IN PARALLEL

More complete information covering the handling, installation, safety and operation of this type may be obtained through an RCA Field Representative or by writing RCA Super Power Tube Marketing, Lancaster, PA. 17604.

9001

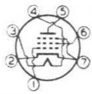
9001

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 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater



BOTTOM VIEW

Pin 5 - Plate
Pin 6 - Screen
Pin 7 - Cathode, Grid No. 3, Internal Shield

RCA Socket		Stock No. 9914 ←
Mounting Position		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 A_1 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.

OCT. 1, 1943

DATA

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

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.*

RCA VICTOR DIVISION

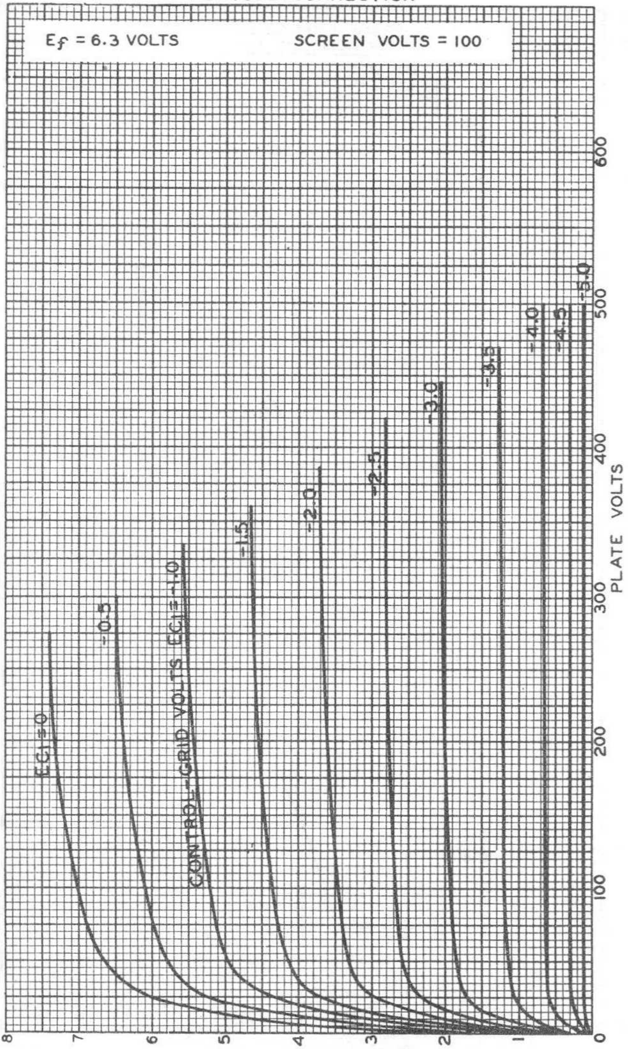
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

9001

AVERAGE PLATE CHARACTERISTICS

PENTODE CONNECTION



MAY 22, 1941

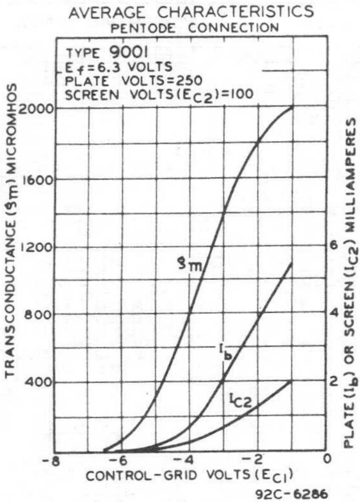
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

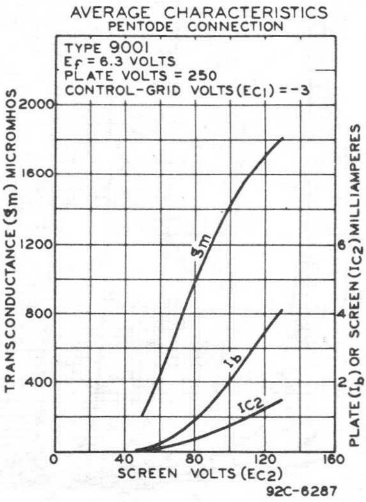
92C-6291

RCA

9001

DETECTOR AMPLIFIER PENTODE





July 1, 1941

92C-6286
92C-6287

9002

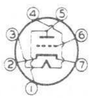
9002

DETECTOR, AMPLIFIER, OSCILLATOR

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	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 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater



BOTTOM VIEW

Pin 5 - Plate
Pin 6 - Grid
Pin 7 - Cathode

RCA Socket	Stock No. 9914 ←
Mounting Position	Any

Maximum Ratings Are Design-Center Values

AMPLIFIER

Plate Voltage	250 max. volts
Plate Dissipation	1.6 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.*

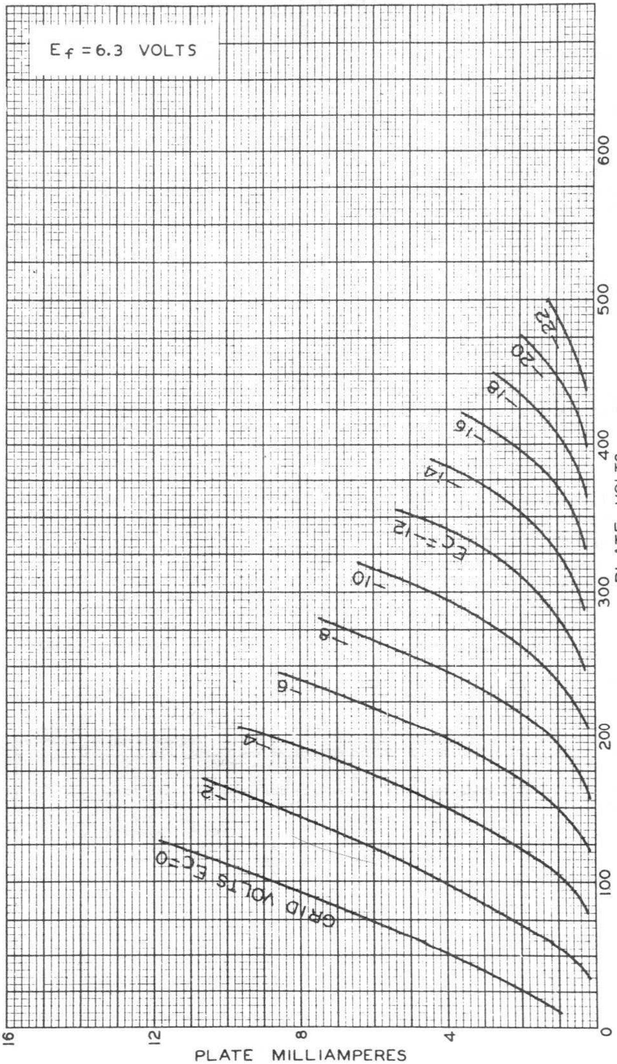
*Temporary minimum length = 1-1/16".

← Indicates a change.

9002

9002

AVERAGE PLATE CHARACTERISTICS



SEPT. 17, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6284

9003

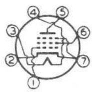
RCA 9003

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



BOTTOM VIEW

RCA Socket	Stock No. 9914 ←
Mounting Position	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	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.

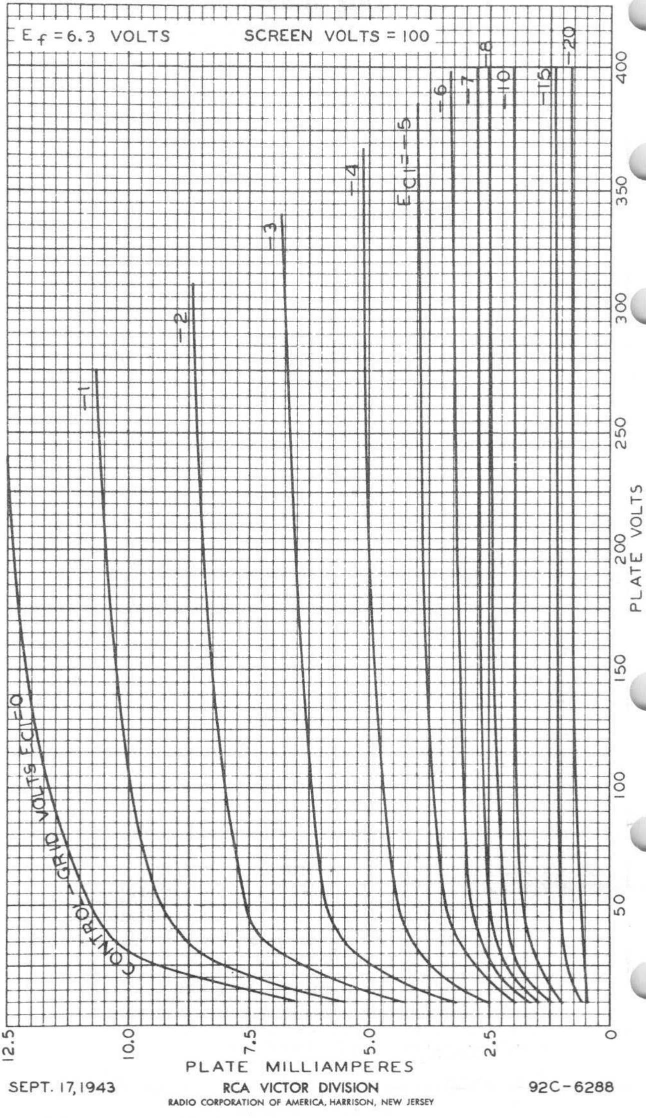
← Indicates a change. *Temporary minimum length = 1-1/16".

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

9003

9003

AVERAGE PLATE CHARACTERISTICS



SEPT. 17, 1943

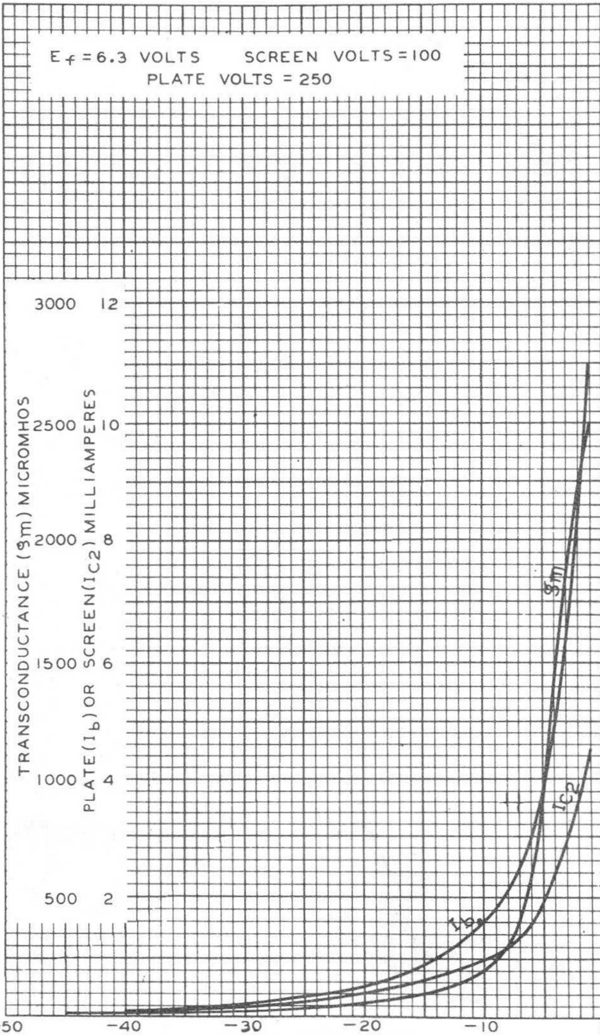
RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6288

9003

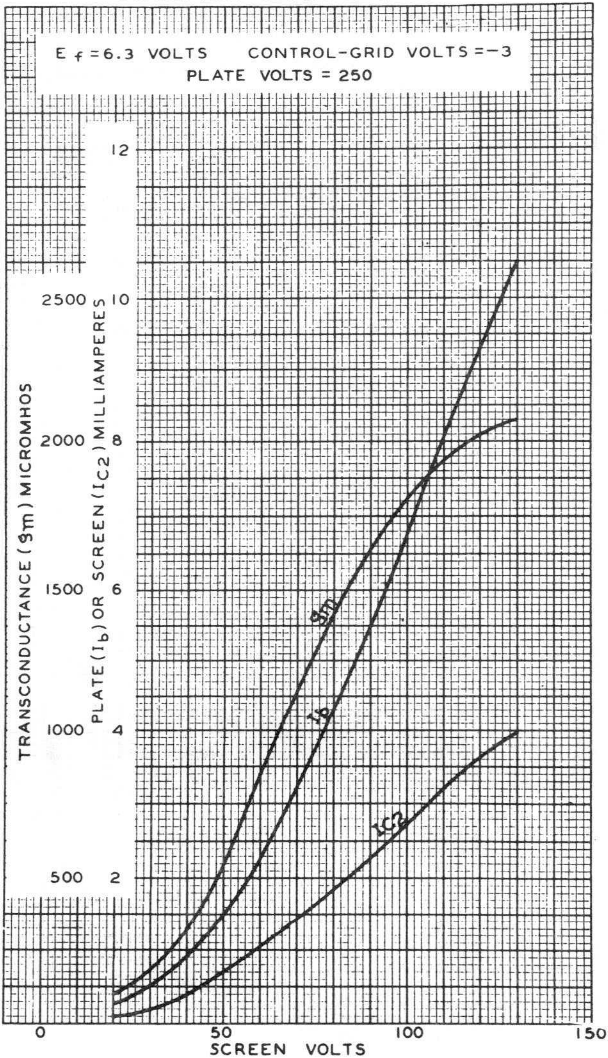
AVERAGE CHARACTERISTICS



9003

9003

AVERAGE CHARACTERISTICS



MAY 29, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6290

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

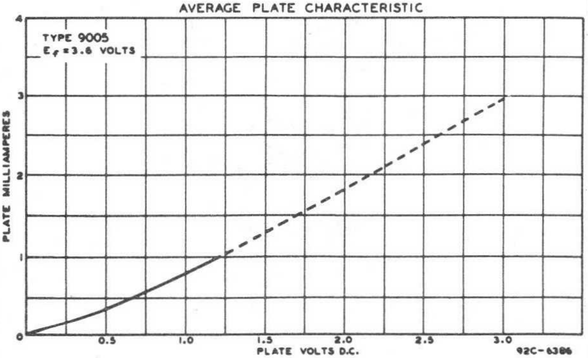
RECTIFIER

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.

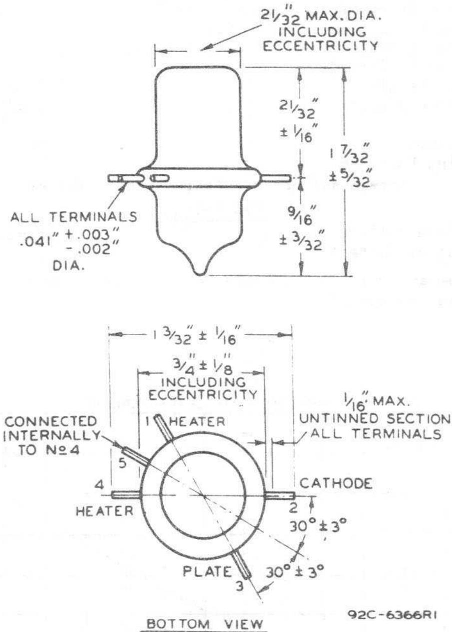
AVERAGE PLATE CHARACTERISTIC



9005

9005

U-H-F DIODE



←— Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

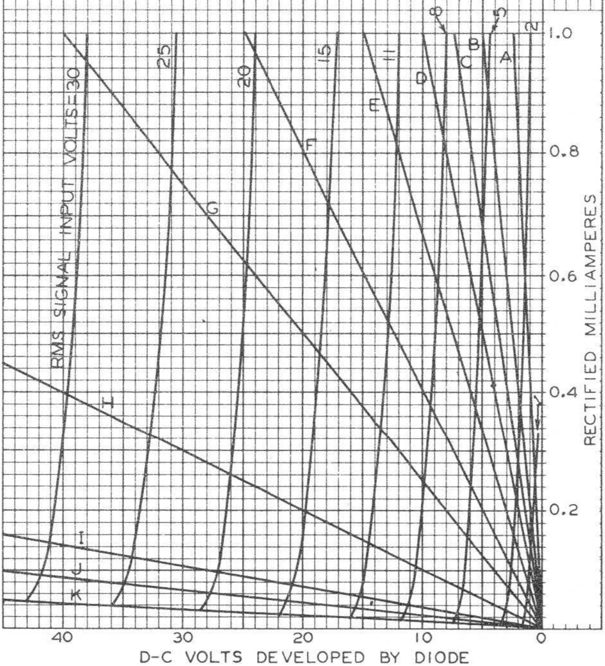
RCA

9005

AVERAGE CHARACTERISTICS

$E_f = 3.6$ VOLTS

CURVE	LOAD RESISTOR OHMS
A	2500
B	5000
C	7500
D	10000
E	15000
F	25000
G	40000
H	100000
I	250000
J	500000
K	1000000



9006

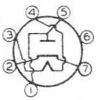
9006

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 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater



Pin 5 - Plate
Pin 6 - No Connection
Pin 7 - Cathode

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.*

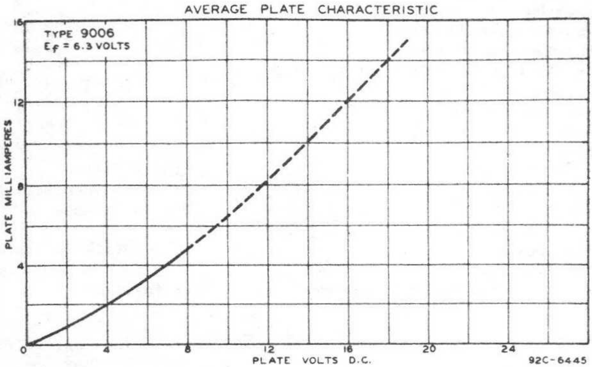
*Temporary minimum length = 1-1/16".

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

9006

9006

U-H-F DIODE



OCT.1, 1943

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

CE-6445