RCA TUBE
HANDBOOK
HB-3

TRANSMITTING TUBE SECTION

This Section contains data on vacuum power tubes, rectifier tubes, magnetrons, and other tube types used in broadcast, television, and communications transmitters, as well as in other types of electronic equipment handling appreciable power.

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

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TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

NOTE: The Max. Ratings shown in this Guide are given for Continuous Commercial Servcie, unless otherwise noted. Tube types marked with * may also be operated in Intermittent Commercial and Amateur Service at higher ratings as shown on their data pages.

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	TYPE
CLASS A AMPLIFIERS, A-F				
(1) Triodes				
7.5	350	7.5	4.5	5556
12	425	12	7.5	841, 842
12	425	12	2.5	843
20	600	20	7.5	801-A
75	1250	75	10.0	211
100	1250	100	10.0	845
150	1250	100	10.0	845**
300	3000	300	11.0	849
600	2500	600	11.0	851
3500	10000	3500	☆	891-R
7500	12000	7500	☆	891
(2) Pentodes				
18♦	500	18♦	6.3	*802
(3) Beam Power Tubes				
10	300	10	6.3	2E26
15	400	15	2.5	1619
15	400	15	2.5	1619**
40	375	21	6.3	*1614**
75	2000	75	5.0	4E27/8001
225	1750	70	10.0	*828**
CLASS B AMPLIFIERS, A-F				
(1) Triodes				
25	425	15	7.5	841
40	425	20	2.5	1608
42	600	20	7.5	801-A
75	750	25	6.3	*809, *1623
85	1250	35	7.5	800
125	1250	40	6.3	*811, *812
150	1000	60	10.0	830-B
150	1500	50	7.5	*808
220	1250	100	10.0	203-A, 211
220	1250	100	10.0	838
225	1250	75	10.0	*8005
315	1500	125	10.0	805
330	1350	100	10.0	8003
425	2500	125	10.0	*810, *8000
500	3000	150	5.0	*806
600	3000	250	11.0	204-A
825	3000	300	11.0	849
1000	3000	300	5.0	304TH
1000	3000	300	10.0	304TH
1125	3000	300	10.0	833-A*
1200	3000	400	11.0	6C24
1600	4000	400	10.0	*833-A**
2250	3000	750	11.0	851
5000	5000	2000	12.6	7C24
10500	10000	3500	☆	891-R
12000	8500	5000	11.0	889-A
12000	8500	5000	11.0	889R-A
12000	12500	4000	☆	892-R

♦ Plate and Screen (total). * Natural cooling.

** Class AB, operation. ☆ See data pages for this type. ** Forced-air cooling.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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CLASS B AMPLIFIERS, A-F—(Continued)

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	TYPE
(1) Triodes—(Continued)				
20000	11500	7500	6.0	9C26
20000	15000	5000	☆	891
20000	15000	7500	22.0	207
20000	15000	7500	☆	892
40000	10500	15000	12.6	880
40000	11500	17500	6.0	9C25
40000	11500	25000	6.0	9C27
40000	20000	20000	22.0	858
60000	15000	20000	19.5	9C22
60000	20000	20000	☆	893-A
60000	20000	20000	☆	893A-R
90000	15000	40000	19.5	9C21
100000	15000	50000	33.0	862-A
100000	15000	50000	☆	898-A
(2) Tetrode				
390	3000	125	5.0	4-125A/4D21
(3) Beam Power Tubes				
30	400	10	6.3	2E26§
30	400	15	2.5	1619§
54	600	25	2.5	1624§
60	400	20	6.3	•815□, §
60	400	20	12.6	•815□, §
60	600	25	6.3	•807§
60	600	25	12.6	•1625§
360	2250	100	10.0	•813§

CLASS B AMPLIFIERS, R-F Telephony

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
(1) Triodes					
13.5	450	15	2.5	6	843
14	350	10	4.5	6	5556
22.5	450	15	7.5	6	841
30	425	20	2.5	45	1608
30	600	20	7.5	60	801-A
37.5	750	25	6.3	60	•809, •1623
50	1250	35	7.5	60	800
60	1250	40	6.3	60	•811, •812
65	1000	60	7.5	250	826
75	1250	50	7.5	100	834
90	1000	60	10.0	15	830-B
110	1250	75	10.0	60	•8005
150	1250	100	10.0	15	203-A, 211
150	1250	100	10.0	30	838
150	1350	100	10.0	30	8003
185	1500	125	10.0	30	805
185	2000	125	10.0	30	•810
190	2000	125	10.0	30	•8000
225	3000	150	5.0	30	•806

• See NOTE on first page of this GUIDE.
§ Class AB_1 operation.
■ For rated max. plate input and voltage.
☆ See data pages for this type.
□ Push-Pull Type.

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MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS B AMPLIFIERS, R-F Telephony—(Continued)					
(1) Triodes—(Continued)					
400	2500	250	11.0	3	204-A
450	3000	300	10.0	30	833-A°
600	2500	400	11.0	3	849
600	3000	400	11.0	160	6C24
600	4000	400	10.0	20	•833-A••
1100	2500	750	11.0	3	851
3800	5000	2000	12.6	110	7C24
3750	7500	2500	11.0	50	846
5500	10000	3500	☆	1.6	891-R
6000	12500	4000	☆	1.6	892-R
7500	8500	5000	11.0	50	889-A
7500	8500	5000	11.0	40	889R-A
10000	15000	6000	☆	1.6	891
11500	11500	7500	6.0	30	9C26
15000	15000	10000	22.0	1.6	207
15000	15000	10000	☆	1.6	892
20000	20000	15000	22.0	1.6	858
26000	11500	17500	6.0	30	9C25
32000	10500	20000	12.6	25	880
32000	20000	20000	☆	5	893-A
32000	20000	20000	☆	5	893A-R
36000	11500	25000	6.0	30	9C27
100000	20000	75000	33.0	1.6	862-A
100000	20000	75000	☆	1.6	898-A
(2) Tetrodes					
22.5	750	15	7.5	15	865
150	3000	100	10.0	30	860
600	3500	400	11.0	20	861
1200	3500	800	7.5	110	827-R
(3) Pentodes					
15	500	10	6.3	30	•802
16	500	12	12.6	20	837
60	1250	40	7.5	15	•804
180	2000	125	10.0	20	803
(4) Beam Power Tubes					
30	400	20	6.3	125	•815□
30	400	20	12.6	125	•815□
37.5	600	25	6.3	60	•807
37.5	600	25	12.6	60	•1625
75	1250	50	10.0	30	•814
105	1250	70	10.0	30	•828
150	2000	100	10.0	30	•813
CLASS C AMPLIFIERS, R-F Telephony					
(1) Triodes, Plate Modulated					
14	350	7	4.5	6	5556
14	350	10	2.5	6	843
17.5	350	10	7.5	8	10-Y
21	350	10	7.5	6	841
30	350	13.5	2.5	45	1608
30	500	13.5	7.5	60	801-A

° See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
□ Push-Pull Type.
☆ See data pages for this type.
• Notural cooling.
•• Forced-air cooling.

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MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS C AMPLIFIERS, R-F Telephony—(Continued)					
(1) Triodes, Plate Modulated—(Continued)					
33	800	27	6.3	500	8012-A°°
50	600	17.5	6.3	60	•809, •1623
50	800	27	6.3	500	•8025-A°°
75	800	40	7.5	250	826
80	800	40	10.0	15	830-B
80	1000	23	7.5	60	800
100	1000	35	7.5	100	834
105	1000	27	6.3	60	•811, •812
135	1250	35	7.5	30	•808
160	1000	50	10.0	60	•8005
170	800	130	6.3	1200	5588
175	1000	67	10.0	15	203-A, 211
175	1000	67	10.0	30	838
220	1100	67	10.0	30	8003
220	1250	85	10.0	30	805
335	1600	85	10.0	30	•810, •8000
500	2500	110	5.0	30	•806
550	2000	167	11.0	3	204-A
700	2000	270	11.0	3	849
835	2500	200	10.0	30	833-A*
1000	2500	265	11.0	160	6C24
1250	3000	270	10.0	20	•833-A°°
1800	2000	500	11.0	3	851
3000	6000	1660	11.0	50	846
3300	4000	1300	12.6	110	7C24
6000	6000	3000	11.0	50	889-A
6000	6000	3000	11.0	40	889R-A
8000	8000	4000	☆	1.6	891
8000	8500	2500	☆	1.6	891-R
10000	10000	2500	☆	1.6	892-R
10000	10000	6600	22.0	1.6	207
10000	10000	6600	☆	1.6	892
12000	12000	10000	22.0	1.6	858
13000	9000	5000	6.0	30	9C26
24000	12000	12000	☆	5	893-A
24000	12000	12000	☆	5	893A-R
26000	9000	11500	6.0	30	9C25
26000	9000	15000	6.0	30	9C27
36000	10500	12000	12.6	25	880
50000	12500	14000	19.5	5	9C22
50000	12500	28000	19.5	15	9C21
60000	12000	50000	33.0	1.6	862-A
60000	12000	50000	☆	1.6	898-A
(2) Triodes, Grid Modulated					
50	1000	40	6.3	500	8012-A°°
60	1000	40	6.3	500	•8025-A°°
65	1000	60	7.5	250	826
190	2000	125	10.0	30	•8000
(3) Tetrodes, Plate Modulated					
16	400	6.7	6.3	30	•802‡
20	400	8	12.6	20	837‡
30	500	10	7.5	15	865
80	1000	27	7.5	15	•804‡

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
☆ See data pages for this type.
* Natural cooling.
°° Forced-air cooling.
‡ With tetrode connection.

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MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS C AMPLIFIERS, R-F Telephony—(Continued)					
(3) Tetrodes, Plate Modulated—(Continued)					
170	2000	67	10.0	30	860
250	1600	85	10.0	20	803‡
380	2500	85	5.0	120	4-125A/4D21
650	3000	270	11.0	20	861
1200	3000	550	7.5	110	827-R
(4) Tetrodes, Grid Modulated					
1200	3500	800	7.5	110	827-R
10000	6000	6000	4.2	300	8D21
(5) Pentodes, Plate Modulated					
11.5	275	7	6.3	45	1613
16	400	6.7	6.3	30	•802
20	400	8	12.6	20	837
80	1000	27	7.5	15	•804
250	1600	85	10.0	20	803
(6) Pentodes, Grid or Suppressor Modulated					
15	500	10	6.3	30	•802
16	500	12	12.6	20	837
60	1250	40	7.5	15	•804
180	2000	125	10.0	20	803
(7) Beam Power Tubes, Grid Modulated					
15	400	15	2.5	45	1619
22	750	15	6.3	200	832-A□
22	750	15	12.6	200	832-A□
30	400	20	6.3	125	•815□
30	400	20	12.6	125	•815□
37.5	600	25	2.5	60	1624
45	750	30	6.3	200	•829-B□,°
45	750	30	12.6	200	•829-B□,°
60	750	40	6.3	200	•829-B□,°°
60	750	40	12.6	200	•829-B□,°°
75	1250	50	10.0	30	•814
105	1250	70	10.0	30	•828
150	2000	100	10.0	30	•813
(8) Beam Power Tubes, Plate Modulated					
20	325	10	2.5	45	1619
20	400	6.7	6.3	125	•2E26
22	600	10	6.3	200	832-A□
22	600	10	12.6	200	832-A□
23	325	14	6.3	80	•1614°
23	325	14	6.3	80	•1614
27	500	9	6.3	125	••2E24
37.5	500	16.5	2.5	60	1624
40	325	13.5	6.3	125	•815□
40	325	13.5	12.6	125	•815□
40	475	16.5	6.3	60	•807
40	475	16.5	12.6	60	•1625
67.5	600	21	6.3	200	•829-B□,°
67.5	600	21	12.6	200	•829-B□,°
90	560	30	6.3	15	⊡3E22□
90	560	30	12.6	15	⊡3E22□

• See NOTE on first page of this GUIDE.
° With triode connection.
■ For rated max. plate input and voltage.
* Natural cooling.
□ Push-Pull Type.
‡ With tetrode connection.
** Forced-air cooling.
•• ICAS Ratings only.
⊡ IMS Ratings only—see data pages for this type.

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MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS C AMPLIFIERS, R-F Telephony—(Continued)					
(8) Beam Power Tubes, Plate Modulated—(Continued)					
90	600	28	6.3	200	•829-B□, °°
90	600	28	12.6	200	•829-B□, °°
120	1000	34	10.0	30	•814
135	1000	47	10.0	30	•828
240	1600	67	10.0	30	•813
240	1800	65	5.0	75	4E27/8001
(9) Beam Power Tubes, Suppressor Modulated					
110	2000	75	5.0	75	4E27/8001
CLASS C AMPLIFIERS, R-F Telegraphy					
(1) Triodes					
6.25	250	5	12.6	30	1626
14	350	10	4.5	6	5556
18	450	15	2.5	6	843
27	450	15	7.5	6	841
27	450	15	7.5	8	10-Y
40	425	20	2.5	45	1608
42	600	20	7.5	60	801-A
50	1000	40	6.3	500	8012-A°°
75	750	25	6.3	60	•809, •1623
75	1000	40	6.3	500	•8025-A°°
100	1250	35	7.5	60	800
125	1000	60	7.5	250	826
125	1250	50	7.5	100	834
150	1000	60	10.0	15	830-8
155	1250	40	6.3	60	•811 •812
200	1500	50	7.5	30	•808
220	1250	100	10.0	15	203-A, 211
220	1250	100	10.0	30	838
240	1250	75	10.0	60	•8005
250	1,000	200	6.3	1200	5588
315	1500	125	10.0	30	805
330	1350	100	10.0	30	8003
500	2000	125	10.0	30	•810, •8000
600	3000	150	5.0	30	•806
690	2500	250	11.0	3	204-A
875	2500	400	11.0	3	849
1250	3000	300	10.0	30	833-A*
1500	3000	300	5.0	40	304TH
1500	3000	300	10.0	40	304TH
1500	3000	400	11.0	160	6C24
1800	4000	400	10.0	20	•833-A**
2500	2500	750	11.0	3	851
5000	5000	2000	12.6	110	7C24
7500	7500	2500	11.0	50	846
15000	10000	4000	☆	1.6	891-R
16000	8500	5000	11.0	40	889R-A
16000	8500	5000	11.0	50	889-A
18000	12000	6000	☆	1.6	891
18000	12500	4000	☆	1.6	892-R
20000	11500	7500	6.0	30	9C26
30000	15000	10000	22.0	1.6	207
30000	15000	10000	☆	1.6	892

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
□ Push-Pull Type.
* Natural cooling.
** Forced-air cooling.
☆ See data pages for this type.

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MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS C AMPLIFIERS, R-F Telegraphy—(Continued)					
(1) Triodes—(Continued)					
40000	11500	17500	6.0	30	9C25
40000	11500	25000	6.0	30	9C27
40000	20000	20000	22.0	1.6	858
50000	11500	17500	11.0	50	5592
60000	10500	20000	12.6	25	880
70000	20000	20000	☆	5	893-A
70000	20000	20000	☆	5	893A-R
100000	17000	20000	19.5	5	9C22
150000	17000	40000	19.5	15	9C21
200000	20000	100000	33.0	1.6	862-A
200000	20000	100000	☆	1.6	898-A
(2) Tetrodes					
25	500	10	6.3	30	•802‡
32	500	12	12.6	20	837‡
45	750	15	7.5	15	865
120	1250	40	7.5	15	•804‡
300	3000	100	10.0	30	860
350	2000	125	10.0	20	803‡
500	3000	125	5.0	120	4-125A/4D21
1200	3500	400	11.0	20	861
1500	3500	800	7.5	110	827-R
(3) Pentodes					
9	400	6	2.5	20	1610
17.5	350	10	6.3	45	1613
25	500	10	6.3	30	•802
32	500	12	12.6	20	837
120	1250	40	7.5	15	•804
350	2000	125	10.0	20	803
(4) Beam Power Tubes					
30	400	15	2.5	45	1619
30	500	10	6.3	125	•2E26
35	375	21	6.3	80	•1614
36	750	15	6.3	200	832-A□
36	750	15	12.6	200	832-A□
40	600	13.5	6.3	125	••2E24
54	600	25	2.5	60	1624
60	400	20	6.3	125	•815□
60	400	20	12.6	125	•815□
60	600	25	6.3	60	•807
60	600	25	12.6	60	•1625
90	750	30	6.3	200	•829-B□,*
90	750	30	12.6	200	•829-B□,*
100	600	35	6.3	200	⊡3E22□
100	600	35	12.6	200	⊡3E22□
120	750	40	6.3	200	•829-B□, **
120	750	40	12.6	200	•829-B□, **
180	1250	50	10.0	30	•814
200	1250	70	10.0	30	•828
300	2000	75	5.0	75	4E27/8001
360	2000	100	10.0	30	•813

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
□ Push-Pull Type.
☆ See data pages for this type.
‡ With tetrode connection.
* Noturol cooling.
** Forced-air cooling.
•• ICAS Ratings only.
⊡ IMS Ratings only—see data pages for this type.

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MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS RMS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.* Mc.	TYPE
CLASS C AMPLIFIERS, Self-Rectifying Oscillators					
(1) Triodes					
125	1500	40	6.3	60	812
240	1750	75	10.0	60	8005
330	1500	100	10.0	30	8003
450	2500	125	10.0	30	8000

MISCELLANEOUS SERVICES

See data pages for each type.

(1) CONTROL AMPLIFIER..... 3C33
(2) PULSE AMPLIFIER & OSCILLATOR..... 8014-A
(3) PULSE AMPLIFIER & MODULATOR..... 3E29

MAX. AV. PLATE AMPERES	MAX. PEAK PLATE AMPERES	MAXIMUM PEAK INVERSE PLATE VOLTS	FILAMENT VOLTS	TYPE
RECTIFIERS				
(1) Half-Wave, Mercury-Vapor				
0.125	0.5	5000 20–60°	2.5	816
0.25	1.0	5000 25–70° 10000 25–60°	2.5	866-A
0.5	2.0	2000 25–70°	2.5	866-A
1.25	5.0	5000 20–70° 10000 20–60°	5.0	872-A 8008
1.5	7.0	10000 25–55°	5.0	575-A
1.5	6.0	15000 25–50°		673
2.5	10	10000 30–60° 20000 30–40°	5.0	869-B
2.5	15	2000 30–80° 5000 30–60°	5.0	5558
4.0	16	10000 25–50°	5.0	5561
6.4	40	3000 40–80°		
10	40	10000 25–65° 22000 30–40°	5.0	857-B
75	450	7500 35–50° 16000 35–40°	5.0	870-A

Where two ratings are given for any type, better temperature control is required for the higher voltage rating.

(2) Half-Wave, Gas

0.5	2.0	4500	2.5	3B25

(3) Half-Wave, High-Vacuum

0.15	0.6	7500	10.0	217-C
0.25	1.0	5000	2.5	836
0.13	0.8	5500	2.5	1616

* For rated max. plate input and voltage.

World Radio History

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

The MAXIMUM RATINGS given for each type on its data pages apply only when the type is operated at frequencies lower than some specified value which depends on the design of the type. As the frequency is raised above the specified value, the radio-frequency currents, dielectric losses, and heating effects increase rapidly. Most types can be operated above their specified maximum frequency provided the plate voltage and plate input are reduced in accordance with the information given in the following tabulation.

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated	Class C Plate-Modulated	Class C
2E24 & 2E26	125 150 160 175	– – – –	100 83 75 68	100 83 75 68
3E22	15	–	100	100 ←
4-65A	50	–	100	100
4-125A/ 4D21	120 150 200 250	– – – –	100 84 64 – } Volt.	100 80 64 56 } Volt.
4-250A/ 5D22	75 100 120	– – –	100 75 62 } Volt.	100 72 62 } Volt.
4C33	625	Plate-Pulsed Oscillator 100		←
4E27/ 8001	75 120 150	100 90 80	100 75 50	100 75 50
4E27A/ 5-125B	75	–	100	100 ←
4X150A	500	–	–	100
4X500A	120	–	–	100
7C24	110	100	100	100
8D21	300	100	–	100 ←
9C21	15 20 25	– – –	100 88 81	100 82 70
9C22	5 12 25	– – –	100 90 81	100 84 70
9C25	30 50 75 100	100 93 87 80	100 87 74 61	100 87 74 61

← Indicates a change.

World Radio History

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated	Class C Plate-Modulated	Class C
10-Y	8	–	100	100
	Not recommended for operation at frequencies above 8 MC.			
203-A	15	100	100	100
	30	88	80	80
	80	70	50	50
204-A	3	100	100	100
	10	84	75	75
	30	69	50	50
207	Same as for Type 892			
211	Same as for Type 203-A			
800	60	100	100	100
	100	90	80	80
	180	79	55	55
801-A	60	100	100	100
	75	93	80	80
	120	78	50	50
802	30	100	100	100
	55	88	77	77
	100	76	55	55
803	20	100	100	100
	40	86	77	77
	60	80	60	60
804	15	100	100	100
	35	88	75	75
	80	76	50	50
805	30	100	100	100
	45	90	82	82
	80	77	55	55
806	30	100	100	100
	50	90	80	80
	100	78	50	50
807	60	100	100	100
	80	90	80	80
	125	75	55	55
808	30	–	100	100
	60	–	75	75
	130	–	50	50
809	60	100	100	100
	70	93	88	88
	120	75	50	50
810	30	100	100	100
	60	88	70	70
	100	80	50	50

World Radio History

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT			
		TELEPHONY			TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated		Class C plate-Modulated	Class C
892	1.6 7.5 20	100 85 76		100 85 75	100 75 50
892-R	1.6 7.5 20	100 85 76		100 75 50	100 75 50
893-A		*Volt.*	*Input*	*Volt.* *Input*	*Volt.* *Input*
	5	100	100	100 100	100 100
	20	85	82	80 75	80 66
	40	65	73	64 64	60 50
893A-R					*Volt.* *Input*
	5	100		100	100 100
	12	86		81	81 75
	25	74		65	65 50
898-A	1.6	100		100	100
	Not recommended for operation at frequencies above 1.6 MC.				
1613	45	–		100	100
	60	–		90	90
	90	–		85	85
1614	80	–		100	100
	120	–		75	75
1619	45	100		100	100
	60	93		90	90
	90	85		77	77
1623	60	100		100	100
	70	93		88	88
	100	80		60	60
1624	60	100		100	100
	80	90		80	80
	125	75		55	55
1625	Same as for Type 807				
1626	30	–		–	100
	60	–		–	96
	90	–		–	93
5556	6	100		100	100
	15	85		75	75
	30	70		50	50
5588	1200	–		100	100
	1350	–		90	90
	1500	–		80	80
	2000	–		80	80

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid of Suppressor Modulated	Class C Plate-Modulated	Class C
5592				*Volt.* *Input*
	50	–	–	100 100
	75	–	–	85 88
	108	–	–	65 67
5618				*Volt.* *Input*
	100	–	–	100 100
	165	–	–	100 90
5671	10	–	100	100
	18	–	88	88
	25	–	80	80
5713	220	–	–	100
5762▲	30	–	100	100
	110	–	84	84
	220	–	52	52
	For Television Service, see data pages for this type.			
→ 5763			*Volt.* *Input*	*Volt.* *Input*
	50	–	100 100	100 100
	175	–	100 80	100 80
5770	20	–	100	100
	27	–	88	88
	35	–	77	77
5771				*Volt.* *Input*
	1.6	100	100	120 112.5
	25	100	100	100
	50	75	75	75
5786	160	–	100	100
5831	See data pages for this type.			
5946		*Plate-Pulsed Oscillator and Amplifier Service*		
	1300	100		
	2000	75		
6146			*Volt.* *Input*	*Volt.* *Input*
	60	–	100 100	100 100
	120	–	67 79	67 79
	175	–	53 66	53 66
	See Curve Charts under data for this type.			
6159		Same as for type 6146		
6161	900	–	100	100
	1200	–	80	80
	1400	–	71	71
	1650	–	62.5	62.5
	2000	–	62.5	62.5
	For Television Service, see data pages for this type.			

▲ In Self-Rectifying Oscillator or Amplifier Service, and in Amplifier or Oscillator Service with Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply, the 5762 has the same maximum permissible percentages as those shown for Class C Telegraphy.

→ Indicates a change.

Vacuum Tube Museum

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT			
		TELEPHONY		TELEGRAPHY	
		Class B, Class C Grid or Suppressor Modulated	Class C plate-Modulated	Class C	
6166	30 220	– –	100 90	100 90	
	For Television Service, see data pages for this type.				
6181	900	–	100	100	
	For Television Service, see data pages for this type.				
6524			*Volt. Input*	*Volt. Input*	
	100 220 470	– – –	100 100 79 80 75 53	100 100 79 78 76 51	←
	See Curve Charts under data for this type.				
8000	Same as for Type 810				
8001	See 4E27/8001				
8003	30 50	100 90	100 83	100 83	
8005	60 80 100	100 90 83	100 75 60	100 75 60	
8012-A and 8025-A	500 600	100 80*	100 70*	100 70*	
	* Maximum permissible percentage of only maximum plate voltage; the maximum plate input may be 100% of its rated value.				

← Indicates a change

World Radio History

World Radio History

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

TUBE TYPE	OPERATING FREQUENCY *Megacycles per second*	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT		
		TELEPHONY		TELEGRAPHY
		Class B, Class C Grid or Suppressor Modulated	Class C plate-Modulated	Class C
6166	30 220	– –	100 90	100 90
	For Television Service, see data pages for this type.			
6181	900	–	100	100
	For Television Service, see data pages for this type.			
8000	Same as for Type 810			
8001	See 4E27/8001			
8003	30 50	100 90	100 83	100 83
8005	60 80 100	100 90 83	100 75 60	100 75 60
8012-A and 8025-A	500 600	100 80*	100 70*	100 70*
	* Maximum permissible percentage of only maximum plate voltage; the maximum plate input may be 100% of its rated value.			

← Indicates a change

World Radio History

F.C.C. POWER RATINGS* OF RCA TRANSMITTING TUBES

"The maximum rated carrier power of a standard broadcast transmitter shall be determined as the sum of the applicable power ratings of the vacuum tubes employed in the last radio stage. The approved power ratings of vacuum tubes for operation in the last radio stages of broadcast transmitters are fixed as set out in the following tables:"

TABLE A
High-Level Modulation or Plate-Modulation in the Last Radio Stage

Power Rating (watts)	Tube Type
50	808
75	203-A 211 838 850 852 860
125	803 805 810
250	204-A 806 831 861
350	849
500	833-A
750	851
1000	846
2500	520-B 1652
5000	207 848 863 891 892 892-R
10000	858 893-R
25000	9C22
40000	862 898

TABLE B
Low-Level Modulation or Last Radio Stage Operating as Linear Power Amplifier

Power Rating (watts)	Tube Type
25	203-A
50	803 806 810
75	204-A
125	833-A 849
250	851
500	846
1000	520-B 1652
2500	207 863 892
5000	858
25000	862 898

TABLE D
Grid Modulation in the Last Radio Stage (Operating Efficiency 35 %)

Power Rating (watts)	Tube Type
2500	892

* From Federal Communications Commission's "Standards of Good Engineering Practice Concerning Standard Broadcast Stations (550-1600 kc), Section 8, Revision of Mar. 15, 1944, Mimeo No.37482. Ratings apply only for tubes used in the last radio stage of standard broadcast transmitters and may not be applicable to any other service.

← Indicates a change.

World Radio History

World Radio History

2AF4A

Medium-Mu Triode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 2AF4A is the same as the 6AF4A except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	2.35	volts
Warm-up time (Average)	11	sec

Typical Operation:

At frequency of 1000 Mc

Plate Supply Voltage	100	volts
Plate Resistor	220	ohms
Grid Resistor	10000	ohms
Plate Current	17.5	ma
Grid Current (Approx.)	700	μa

2AF4B

Medium-Mu Triode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 2AF4B is the same as the 6AF4A except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	2.35	volts
Warm-up time (Average)	11	sec
Peak heater-cathode voltage:		
Heater negative with respect to cathode	180 max.	volts
Heater positive with respect to cathode	180[a] max.	volts

Typical Operation:

At frequency of 1000 Mc

Plate Supply Voltage	100	volts
Plate Resistor	220	ohms
Grid Resistor	10000	ohms
Plate Current	17.5	ma
Grid Current (Approx.)	700	μa

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

World Radio History

World Radio History

Half-Wave Vacuum Rectifier

DUODECAR TYPE

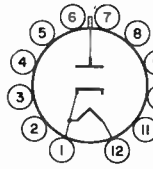
GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Voltage (AC or DC)	2.5 ± 0.4	volts
Current at heater volts = 2.5	0.300	amp
Direct Interelectrode Capacitance (Approx.):[a]		
Plate to cathode & internal shield & heater	1.4	pf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	3.375"
Seated Length	2.750" to 3.000"
Diameter	1.062" to 1.188"
Bulb	T9
Cap	Small (JEDEC No.C1-1) or Small With Tubular Support (JEDEC No.C1-34)
Base	Small-Button Duodecar 12-Pin (JEDEC No.E12-70)
Basing Designation for BOTTOM VIEW	12DG



Pin 1 – Cathode, Internal Shield, Heater
Pin 2 – Do Not Use[b]
Pin 3 – Do Not Use[b]
Pin 4 – See *NOTE*
Pin 5 – Do Not Use[b]
Pin 6 – Do Not Use[b]
Pin 7 – Do Not Use[b]
Pin 8 – Do Not Use[b]
Pin 9 – Do Not Use[b]
Pin 10 – See *NOTE*
Pin 11 – Do Not Use[b]
Pin 12 – Heater
Cap – Plate

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

PULSED-RECTIFIER SERVICE

Maximum Ratings, *Design-Maximum Values:*

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

INVERSE PLATE VOLTAGE:		
Total dc and peak[d]	30000 max.	volts
DC	24000 max.	volts
PEAK PLATE CURRENT	80 max.	ma
AVERAGE PLATE CURRENT	1.5 max.	ma

Characteristics, Instantaneous Value:

Tube Voltage Drop for plate ma. = 7	100	volts

[a] Without external shield.
[b] Socket terminals 2,3,5,6,7,8,9, and 11 should not be used as tie points.
[c] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

World Radio History

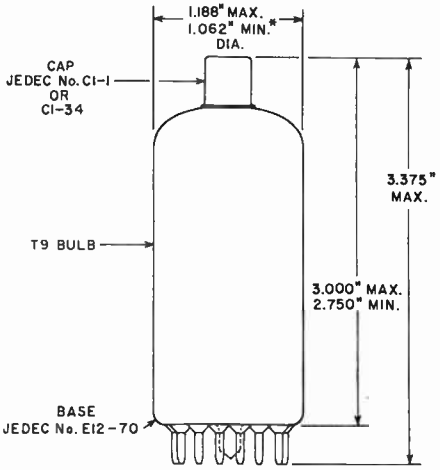
[d] This rating is applicable when the duration of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.

OPERATING CONSIDERATIONS

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

The high voltages at which the 2AH2 is operated are very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with these high voltages. Particular care against fatal shock should be taken in the measurement of filament voltage. Under all circumstances, circuit parts which may be at high potentials should be enclosed or adequately insulated.

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



* APPLIES TO MINIMUM DIAMETER EXCEPT IN AREA OF SEAL.

World Radio History

2BN4

Medium-Mu Triode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 2BN4 is the same as the 6BN4 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	2.3	volts
Warm-up time (Average)	11	sec

2BN4A

Medium-Mu Triode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 2BN4A is the same as the 6BN4A except for the following items:

Heater Characteristics and Ratings *(Design-Center Values):*		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	2.35	volts
Warm-up time (Average)	11	sec

2CW4

High-Mu Triode

NUVISTOR TYPE

With Heater Having Controlled Warm-Up Time

The 2CW4 is the same as the 6CW4 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	2.1	volts
Warm-up time (Average)	8	sec ←

← Indicates a change.

World Radio History

2CY5

Sharp-Cutoff Tetrode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 2CY5 is the same as the 6CY5 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values)*:

Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	2.4	volts
Warm-up time (Average)	11	sec

2DS4

High-Mu Triode

NUVISTOR TYPE

HAVING EXTENDED CUTOFF CHARACTERISTIC

With Heater Having Controlled Warm-Up Time

The 2DS4 is the same as the 6DS4 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values)*:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	2.1	volts
Warm-up time (Average)	8	sec

2DV4

Medium-Mu Triode

NUVISTOR TYPE

With Heater Having Controlled Warm-Up Time and Having Gold-Plated Envelope and Base Pins to Assure Positive Grounding and Low Pin-Contact Resistance for Oscillator Applications at UHF Frequencies

The 2DV4 is the same as the 6DV4 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values)*:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	2.1	volts
Warm-up time (Average)	8	sec

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

World Radio History

2BN4

Medium-Mu Triode

7-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 2BN4 is the same as the 6BN4 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	2.3	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

2CW4

High-Mu Triode

NUVISTOR TYPE

For Equipment Having Series Heater-String Arrangement

The 2CW4 is the same as the 6CW4 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	2.1	volts
Current	0.45 ± 6%	amp
Warm-up time (Average)	11	sec

2CY5

Sharp-Cutoff Tetrode

7-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 2CY5 is the same as the 6CY5 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	2.4	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

Power Triode

FORCED-AIR COOLED

Particularly suitable for cathode-drive circuits

GENERAL DATA

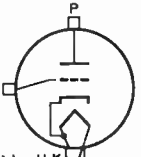
Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)[a]	6.3	volts
Current	1.0	amp
Heating time	1	minute
Amplification Factor	100	
Transconductance, for plate current of 70 ma. and plate voltage of 600 volts.	24000	μmhos
Direct Interelectrode Capacitances (Approx.):		
Grid to plate	2.0	μμf
Grid to cathode	6.6	μμf
Plate to cathode	0.035 max.	μμf

Mechanical:

Terminal Connections *(See Dimensional Outline)*:

BOTTOM VIEW



G - GRID TERMINAL (Adjacent to Cathode & Heater Terminal)

H - HEATER TERMINALS (Cylinder within Cathode Terminal & Cathode Terminal)

K - CATHODE TERMINAL (Outside Cylinder on End Opposite Radiator)

P - PLATE TERMINAL (Between Plate Flange & Glass Section)

Operating Position	Any
Maximum Overall Length	2-3/4"
Diameter	1-1/4" ± 1/64"
Weight (Approx.)	2 oz
Radiator	Integral part of tube
Mounting	Special

Thermal:

Air Flow:

Through Radiator—Adequate air flow should be delivered by a blower during the application of any voltages. Cooling must be sufficient to limit the radiator temperature to the specified maximum value.

To Plate, Grid, Cathode, and Heater Seals—A sufficient quantity of air should be delivered to these seals to prevent their temperature from exceeding the specified maximum value.

Incoming-Air Temperature	15 max.	°C

← Indicates a change.

World Radio History

Radiator Temperature (Measured on core adjacent to plate seal)	175	max.	°C
Seal Temperature (Plate, grid, cathode, and heater)	175	max.	°C

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	600[c]	max.	volts
GRID VOLTAGE:			
DC	-150	max.	volts
→ Peak negative RF	400	max.	volts
Peak positive RF	30	max.	volts
DC GRID CURRENT	50	max.	ma
DC CATHODE CURRENT	100	max.	ma
GRID INPUT	2	max.	watts
PLATE DISSIPATION	70	max.	watts

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	1000	max.	volts
GRID VOLTAGE:			
DC	-150	max.	volts
→ Peak negative RF	400	max.	volts
Peak positive RF	30	max.	volts
DC GRID CURRENT	50	max.	ma
DC CATHODE CURRENT	125	max.	ma
GRID INPUT	2	max.	watts
PLATE DISSIPATION	100	max.	watts

[a] Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life. For most applications where liberal cooling of the seals is provided, reduction of heater voltage to the values shown in the following table is suggested.

Frequency Mc	*Heater Voltage Volts*
→ up to 300	6.3
→ 300 to 1000	6.0
1000 to 1500	5.5
1500 to 2000	5.0
2000 and above	4.5

Permitted tolerance on the heater-voltage values in the above table is ± 10%. However, for long tube life, it is recommended that the tolerance be held to ± 5%.

When long life in continuous service is desired, the 2C39A should always be put in operation with full rated heater voltage (6.3 volts) which should then be reduced to the lowest value that will give the desired output.

[b] Continuous Commercial Service.

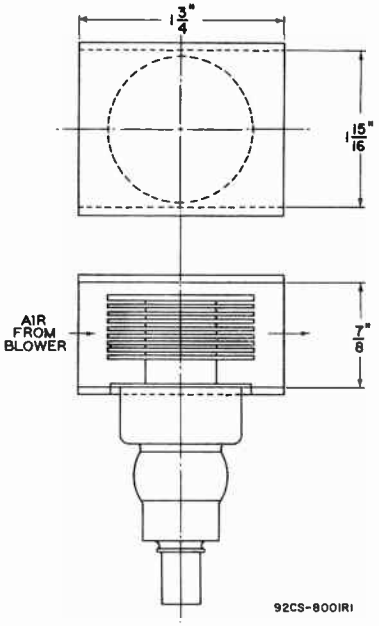
[c] For less than 100% modulation, it is permissible to use a higher dc plate voltage provided the sum of the peak positive modulating voltage and the dc plate voltage does not exceed 1200 volts.

[d] Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

→ Indicates a change.

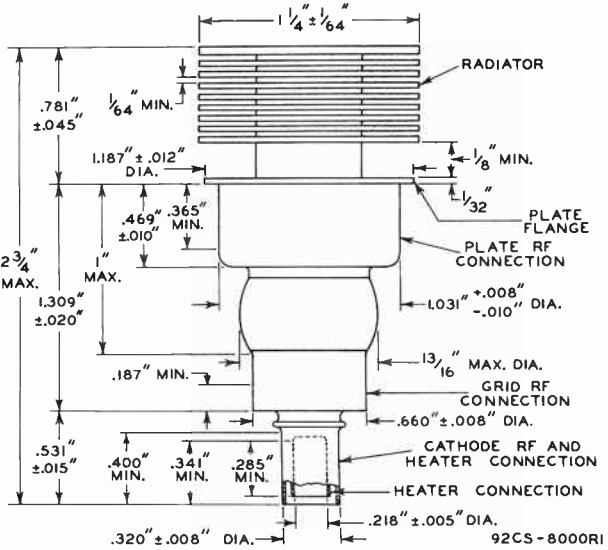
World Radio History

RECOMMENDED COWLING FOR DIRECTING AIR FLOW
THROUGH RADIATOR OF TYPE 2C39A



World Radio History

2C39A



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

World Radio History

Power Triode

LIGHTHOUSE TYPE

GENERAL DATA

Electrical:

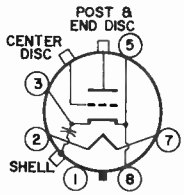
Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 0.3	volts
Current at heater volts = 6.3	0.750	amp
Direct Interelectrode Capacitances:[a]		
Grid to plate	1.3	μμf
Grid to cathode	2.2	μμf
Plate to cathode	0.03 max.	μμf
Cathode rf terminal to cathode	100	μμf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	250	volts
Cathode Resistor	200	ohms
Amplification Factor	36	
Transconductance	4850	μmhos
Plate Current	17	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-9/16"
Maximum Seated Length	1.973"
Maximum Diameter	1.312"
Weight (Approx.)	1.2 oz
Base	Small H-Wafer 6-Pin (JEDEC Group 1, No.86-108)
Basing Designation for BOTTOM VIEW	6BY



Pin 1 – Do Not Use
Pin 2 – Heater
Pin 3 – Cathode
Pin 5 – Cathode
Pin 7 – Heater
Pin 8 – Cathode

Shell – Cathode RF Terminal
Center Disc–Grid Terminal
Post & End Disc–Plate Terminal

Thermal:

Cooling	Convection and Conduction	
Seal Temperature	175 max.	°C

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

For frequencies up to 3370 Mc

DC PLATE VOLTAGE	500 max.	volts
DC GRID VOLTAGE:		
Negative-bias value	50 max.	volts

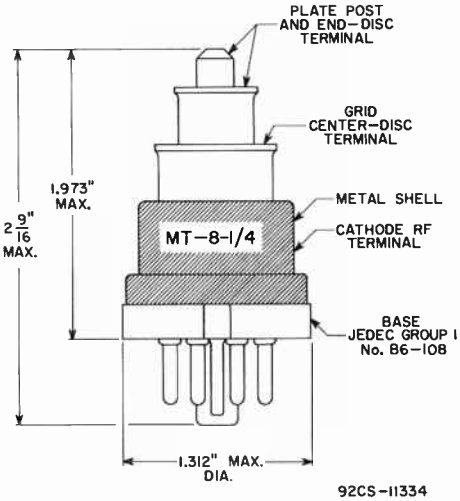
→ Indicates a change.

World Radio History

2C40

DC PLATE CURRENT	25 max.	ma
DC GRID CURRENT	8 max.	ma
PLATE DISSIPATION	6.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
PEAK CATHODE-SHELL VOLTAGE:		
Shell negative with respect to cathode.	90 max.	volts
Shell positive with respect to cathode.	90 max.	volts

[a] Without external shield.
[b] Continuous Commercial Service.



World Radio History

2C40A

Power Triode

LIGHTHOUSE TYPE

GENERAL DATA

Electrical:

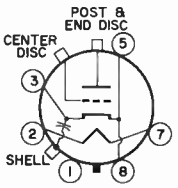
Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 0.3	volts
Current at heater volts = 6.3	0.750	amp
Cathode Heating Time	See *Operating Considerations*	
Direct Interelectrode Capacitances (Approx.):[a]		
Grid to plate	1.3	μμf
Grid to cathode	2.2	μμf
Plate to cathode	0.03	μμf
Cathode rf terminal to cathode	100	μμf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	250	volts
Cathode Resistor	200	ohms
Amplification Factor	35	
Transconductance	5100	μmhos
Plate Current	17	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-9/16"
Maximum Seated Length	1.973"
Maximum Diameter	1.312"
Weight (Approx.)	1.2 oz
Base	Small H-Wafer 6-Pin (JEDEC Group 1, No. B6-108)
Basing Designation for BOTTOM VIEW	6BY



Pin 1 – Do Not Use
Pin 2 – Heater
Pin 3 – Cathode
Pin 5 – Cathode
Pin 7 – Heater
Pin 8 – Cathode

Shell – Cathode RF Terminal
Center Disc – Grid Terminal
Post & End Disc – Plate Terminal

Thermal:

Cooling	Convection and Conduction
Seal Temperature	175 max. °C

← Indicates a change.

World Radio History

2C40A

PLATE-PULSED OSCILLATOR

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

For frequencies up to 3370 Mc, maximum duty factor of plate pulse = 0.002[c], and maximum pulse duration of 1.5 microseconds

PEAK POSITIVE-PULSE PLATE SUPPLY VOLTAGE	1400 max.	volts
NEGATIVE GRID VOLTAGE:		
Average during plate pulse	100 max.	volts
PLATE CURRENT:		
Average[c]	3 max.	ma
Average during plate pulse	2 max.	amp
GRID CURRENT:		
Average[c]	1.5 max.	ma
Average during plate pulse	1 max.	amp
PLATE DISSIPATION[c]	4 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
PEAK CATHODE-SHELL VOLTAGE:		
Shell negative with respect to cathode	90 max.	volts
Shell positive with respect to cathode	90 max.	volts

[a] Without external shield.
[b] Continuous Commercial Service.
[c] In any 500-microsecond interval.

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

For frequencies up to 3370 Mc

DC PLATE VOLTAGE	500 max.	volts
DC GRID VOLTAGE:		
Negative-bias value	50 max.	volts
DC PLATE CURRENT	25 max.	ma
DC GRID CURRENT	8 max.	ma
PLATE DISSIPATION	6.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts
PEAK CATHODE-SHELL VOLTAGE:		
Shell negative with respect to cathode	90 max.	volts
Shell positive with respect to cathode	90 max.	volts

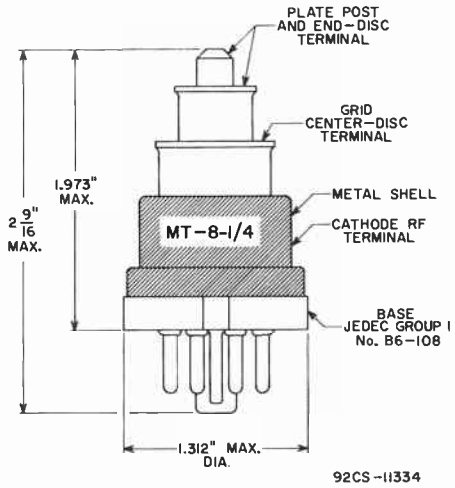
OPERATING CONSIDERATIONS

In *Plate-Pulsed Oscillator Service*, the plate voltage must not be applied until a minimum of 1 minute after the application of the heater voltage.

In *RF Power Amplifier & Oscillator — Class C Telegraphy Service*, the plate voltage and the heater voltage may be applied simultaneously.

→ indicates a change.

World Radio History



World Radio History

World Radio History

2C43

Power Triode

LIGHTHOUSE TYPE

GENERAL DATA

Electrical:

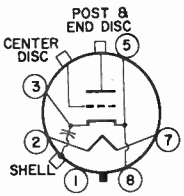
Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 0.3	volts
Current at heater volts = 6.3	0.900	amp
Cathode Heating Time	See *Operating Considerations*	
Direct Interelectrode Capacitances:[a]		
Grid to plate	1.8	μμf
Grid to cathode	3.0	μμf
Plate to cathode	0.04 max.	μμf
Cathode rf terminal to cathode	100	μμf

Characteristics, Class A1 Amplifier:

Plate Supply Voltage	250	volts
Cathode Resistor	100	ohms
Amplification Factor	50	
Transconductance	8100	μmhos
Plate Current	21	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2.6875"
Maximum Seated Length	2.078"
Maximum Diameter	1.312"
Weight (Approx.)	1 oz
Base	Small H-Wafer 6-Pin (JEDEC Group 1, No. B6-108)
Basing Designation for BOTTOM VIEW	6BY



Pin 1 – Do Not Use
Pin 2 – Heater
Pin 3 – Cathode
Pin 5 – Cathode
Pin 7 – Heater
Pin 8 – Cathode

Shell – Cathode RF Terminal
Center Disc – Grid Terminal
Post & End Disc – Plate Terminal

Thermal:

Cooling	Convection and Conduction	
Seal Temperature	175 max.	°C

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

For frequencies up to 1500 Mc

DC PLATE VOLTAGE	500 max.	volts
DC PLATE CURRENT	40 max.	ma

← Indicates a change.

World Radio History

DC CATHODE CURRENT.	55 max.	ma
PLATE DISSIPATION	12 max.	watts
PEAK HEATER–CATHODE VOLTAGE:		
Heater negative with respect to cathode .	90 max.	volts
Heater positive with respect to cathode .	90 max.	volts
PEAK CATHODE–SHELL VOLTAGE:		
Shell negative with respect to cathode. .	90 max.	volts
Shell positive with respect to cathode. .	90 max.	volts

PLATE-PULSED OSCILLATOR

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

For frequencies up to 3370 Mc. maximum duty factor of plate pulse = 0.006, and maximum pulse duration of 10 microseconds

PEAK POSITIVE-PULSE PLATE SUPPLY VOLTAGE. .	3500 max.	volts
PLATE CURRENT:		
Average during plate pulse.	2.75 max.	amp
CATHODE CURRENT:		
Average during plate pulse.	4 max.	amp
PLATE DISSIPATION	12 max.	watts
PEAK HEATER–CATHODE VOLTAGE:		
Heater negative with respect to cathode .	90 max.	volts
Heater positive with respect to cathode .	90 max.	volts
PEAK CATHODE–SHELL VOLTAGE:		
Shell negative with respect to cathode. .	90 max.	volts
Shell positive with respect to cathode. .	90 max.	volts

[a] Without external shield.
[b] Continuous Commercial Service.

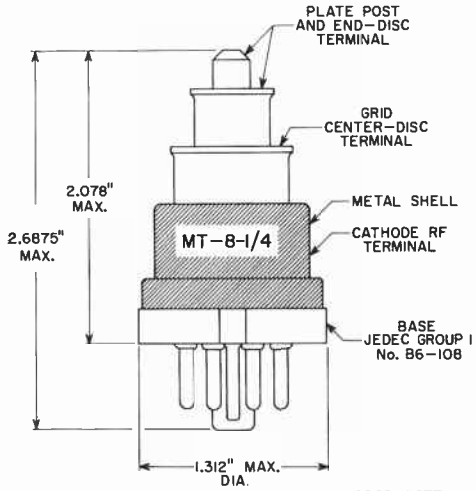
→ Indicates a change.

World Radio History

OPERATING CONSIDERATIONS

In *Plate-Pulsed Oscillator Service*, the plate voltage must not be applied until a minimum of 1 minute after the application of the heater voltage.

In *RF Power Amplifier & Oscillator — Class C Telegraphy Service*, the plate voltage and the heater voltage may be applied simultaneously.



← Indicates a change.

World Radio History

World Radio History

2ER5

High-Mu Triode

7-PIN MINIATURE TYPE

The 2ER5 is the same as the 6ER5 except for the following items:

Heater Characteristics and Ratings (*Design-Center Values*):		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	2.3	volts

2FH5

High-Mu Triode

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

The 2FH5 is the same as the 6FH5 except for the following items:

Heater Characteristics and Ratings (*Design-Maximum Values*):		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	2.35	volts
Warm-up time (Average)	11	sec

2FS5

Beam Hexode

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

The 2FS5 is the same as the 6FS5 except for the following items:

Heater Characteristics and Ratings (*Design-Maximum Values*):		
Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	2.4	volts
Warm-up time (Average)	11	sec

World Radio History

2GK5

High-Mu Triode

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 2GK5 is the same as the 6GK5 except for the following items:

Heater Characteristics and Ratings (*Design-Maximum Values*):

Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater current = 0.600	2.3	volts
Warm-up time (Average)	11	sec

World Radio History

High-Mu Triode

7-PIN MINIATURE TYPE

The 2ER5 is the same as the 6ER5 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	2.3	volts
Current	0.6	amp

World Radio History

World Radio History

Beam Power Tube

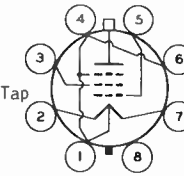
GENERAL DATA

Electrical:

Filament, Coated:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at filament volts = 6.3	0.65	amp
Heating time	Less than 2 seconds	
Transconductance, for plate volts = 500, grid-No.2 volts = 200, and plate ma. = 16	3200	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts and grid-No.2 volts = 200, and plate ma. = 16	7.5	
Direct Interelectrode Capacitances:[a]		
Grid No.1 to plate	0.11 max.	μμf
Grid No.1 to filament tap & grid No.3 & internal shield, and grid No.2	8.5	μμf
Plate to filament tap & grid No.3 & internal shield, and base sleeve	6.5	μμf

Mechanical:

Operating Position	Vertical, or horizontal with plane of pins 3 and 7 vertical
Maximum Overall Length	3-21/32"
Seated Length	2-15/16" ± 5/32"
Maximum Diameter	1-5/16"
Weight (Approx.)	1.3 oz
Bulb	T9
Cap	Small (JEDEC No.C1-1)
Base	Small-Micanol-Wafer Octal 8-Pin with "640" Sleeve (JEDEC Group 1, No.B8-44)
Basing Designation for BOTTOM VIEW	7CL



Pin 1 - Grid No.3, Internal Shield, Filament Tap
Pin 2 - Filament
Pin 3 - Grid No.2
Pin 4 - Same as Pin 1
Pin 5 - Grid No.1
Pin 6 - Same as Pin 1
Pin 7 - Filament
Pin 8 - Base Sleeve
Cap - Plate

Thermal:

Bulb Temperature (At hottest point on bulb surface)	210 max.	°C

AF POWER AMPLIFIER & MODULATOR — Class A_1[b]

Maximum Ratings, *Absolute-Maximum Values:*

	CCS[c]	
DC PLATE VOLTAGE	300 max.	volts

→ Indicates a change.

World Radio History

	CCS[c]	
DC GRID-No.2 VOLTAGE	200 max.	volts
GRID-No.2 INPUT	2.5 max.	watts
PLATE DISSIPATION	10 max.	watts

Typical Operation:

DC Plate Voltage	250	volts
DC Grid-No.2 Voltage	160	volts
DC Grid-No.1 Voltage[d]	-8	volts
Peak AF Grid-No.1 Voltage	8	volts
Zero-Signal DC Plate Current	35	ma
Max.-Signal DC Plate Current	40	ma
Zero-Signal DC Grid-No.2 Current	2.6	ma
Max.-Signal DC Grid-No.2 Current	6.8	ma
Load Resistance	6000	ohms
Total Harmonic Distortion	10	%
Power Output	3.9	watts

→ **Maximum Circuit Values:**

Grid-No.1-Circuit Resistance:[e]

With fixed bias	0.1 max.	megohm
With cathode bias	0.5 max.	megohm

AF POWER AMPLIFIER & MODULATOR — Class AB_2[f]

Maximum Ratings, *Absolute-Maximum Values:*

	CCS[c]	ICAS[g]	
DC PLATE VOLTAGE	400 max.	500 max.	volts
DC GRID-No.2 VOLTAGE	200 max.	200 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[h]	75 max.	75 max.	ma
MAX.-SIGNAL PLATE INPUT[h]	30 max.	37.5 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT[h]	2.5 max.	2.5 max.	watts
PLATE DISSIPATION[h]	10 max.	13.5 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	400	500	volts
DC Grid-No.2 Voltage	125	125	volts
DC Grid-No.1 Voltage[d]	-15	-15	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	82	82	volts
Zero-Signal DC Plate Current	18	20	ma
Max.-Signal DC Plate Current	150	150	ma
Zero-Signal DC Grid-No.2 Current	0.6	0.6	ma
Max.-Signal DC Grid-No.2 Current	26	28	ma
Effective Load Resistance (Plate-to-plate)	7000	9000	ohms
Max.-Signal Driving Power (Approx.)[j]	0.43	0.46	watt
Max.-Signal Power Output (Approx.)	42	54	watts

→ Indicates a change.

World Radio History

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance[k]	30000 max.		ohms

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:*

	CCS[c]	*ICAS*[g]	
DC PLATE VOLTAGE.	400 max.	500 max.	volts
DC GRID-No.2 VOLTAGE.	200 max.	200 max.	volts
DC GRID-No.1 VOLTAGE.	-175 max.	-175 max.	volts
DC PLATE CURRENT.	60 max.	70 max.	ma
DC GRID-No.1 CURRENT.	3.5 max.	3.5 max.	ma
PLATE INPUT	20 max.	27 max.	watts
GRID-No.2 INPUT	1.7 max.	2.3 max.	watts
PLATE DISSIPATION	6.7 max.	9 max.	watts

Typical Operation:

DC Plate Voltage.	400	500	volts
DC Grid-No.2 Voltage[m]	180	180	volts
From a series resistor of . .	27500	40000	ohms
DC Grid-No.1 Voltage[d,n]	-45	-45	volts
From a grid resistor of . . .	18000	18000	ohms
Peak RF Grid-No.1 Voltage . . .	61	62	volts
DC Plate Current.	50	54	ma
DC Grid-No.2 Current.	8	8	ma
DC Grid-No.1 Current (Approx.).	2.5	2.5	ma
Driving Power (Approx.)	0.15	0.16	watt
Power Output (Approx.).	13.5	18	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance[k]	30000 max.		ohms

RF POWER AMPLIFIER AND OSCILLATOR — Class C Telegraphy[p]
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum Ratings, *Absolute-Maximum Values:*

	CCS[c]	*ICAS*[g]	
DC PLATE VOLTAGE.	500 max.	600 max.	volts
DC GRID-No.2 VOLTAGE.	200 max.	200 max.	volts
DC GRID-No.1 VOLTAGE.	-175 max.	-175 max.	volts
DC PLATE CURRENT.	75 max.	85 max.	ma
DC GRID-No.1 CURRENT.	3.5 max.	3.5 max.	ma
PLATE INPUT	30 max.	40 max.	watts
GRID-No.2 INPUT	2.5 max.	2.5 max.	watts
PLATE DISSIPATION	10 max.	13.5 max.	watts

← Indicates a change.

World Radio History

2E24

Typical Operation up to 125 Mc:

	CCS[c]		*ICAS*[g]	
DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage[g]	200	190	195	volts
From a series resistor of	20000	29000	40500	ohms
DC Grid-No.1 Voltage[d,k,q]	−45	−45	−50	volts
From a grid resistor of	15000	15000	16700	ohms
Peak RF Grid-No.1 Voltage	62	65	71	volts
DC Plate Current	75	60	66	ma
DC Grid-No.2 Current	10	10.5	10	ma
DC Grid-No.1 Current (Approx.)	3	3	3	ma
Driving Power (Approx.)	0.19	0.2	0.21	watt
Power Output (Approx.)	20	20	27	watts

Typical Operation up to 160 Mc:

DC Plate Voltage	–		350	volts
DC Grid-No.2 Voltage[q]	–		170	volts
From a series resistor of	–		18000	ohms
DC Grid-No.1 Voltage[d,k,r]	–		−50	volts
From a grid resistor of	–		16500	ohms
Peak RF Grid-No.1 Voltage	–		70	volts
DC Plate Current	–		85	ma
DC Grid-No.2 Current	–		10	ma
DC Grid-No.1 Current (Approx.)	–		3	ma
Driving Power (Approx.)	–		2	watts
Power Output (Approx.)	–		16.5	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance[k] . . . . . 30000 max. ohms

[a] Without external shield and with base sleeve connected to ground.

[b] Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

[c] Continuous Commercial Service.

[d] With ac on filament.

[e] 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. When grid No.1 is operated in the negative region with fixed bias, the dc grid-No.1-circuit resistance should not exceed 100,000 ohms. For higher values of dc grid-No.1-circuit resistance, cathode bias is required. Under no circumstances should the total dc grid-No.1-circuit resistance exceed 0.5 megohm.

[f] Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

[g] Intermittent Commercial & Amateur Service.

[h] Averaged over any audio-frequency cycle of sine-wave form.

[j] Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage. The effective resistance per grid-No.1 circuit of the AB_2 stage should be held at low value.

[k] When grid No.1 is driven positive and the 2E24 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed 30,000 ohms. If additional bias is required, it must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100,000 ohms.

[m] Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through series resistor of the value shown.

[n] Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

World Radio History

[p] 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.

[q] Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor of the value shown. The grid-No.2 voltage must not exceed 600 volts under key-up conditions.

[r] Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current.	1	0.59	0.71	amp
Grid No.1-Plate Capacitance . .	2	-	0.11	μμf
Input Capacitance	2	7.0	10.0	μμf
Output Capacitance.	2	4.9	8.1	μμf
Plate Current	1,3	24	46	ma
Grid-No.2 Current	1,3	-	5	ma
Grid-No.1 Current	1,4	-	-5	μa
Useful Power Output	1,5	18	-	watts

Note 1: With 6.3 volts ac on filament.

Note 2: Without external shield. Base pin No.8 grounded.

Note 3: With dc plate voltage of 200 volts, dc grid-No.2 voltage of 135 volts, and dc grid-No.1 voltage of -5 volts.

Note 4: With dc plate voltage of 500 volts, dc grid-No.2 voltage of 200 volts, and dc grid-No.1 voltage adjusted to give dc plate current of 20 ma.

Note 5: With dc plate voltage of 500 volts, dc grid-No.2 voltage of 200 volts, grid-No.1 resistor of 0.015 megohm ± 10%, dc plate current of 60 ma., dc grid-No.1 current of 2.5 to 3.5 ma., and frequency of 15 Mc.

OUTLINE DIMENSIONS
for the 2E24 are the same as those for the 2E26

OPERATING NOTES

The 2E24 is intended for use in mobile and emergency-communications equipment. Its filament combines sturdiness and efficiency with quick heating and provides wide latitude in operating-voltage range. Although designed for intermittent operation, the filament will give reasonable life when it is operated continuously. In continuous-service applications where extremely long life is desired, it is recommended that the heater-cathode type 2E26 be used.

MAXIMUM RATINGS vs OPERATING FREQUENCY

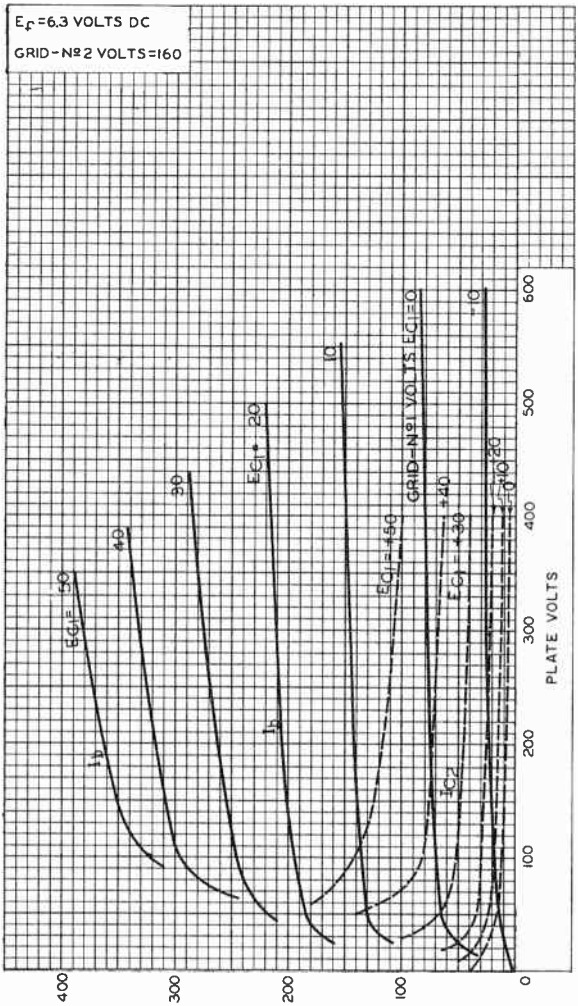
FREQUENCY	125	150	160	175	Mc
MAXIMUM-PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED PLATE VOLTAGE OR PLATE INPUT:					
Class C plate-modulated telephony	100	83	75	68	%
Class C telegraphy	100	83	75	68	%

← Indicates a change.

World Radio History

2E24

AVERAGE PLATE CHARACTERISTICS



92CM-6660RI

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

World Radio History

2E24

VHF BEAM POWER AMPLIFIER

GENERAL DATA

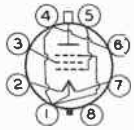
Electrical:

Filament, Coated:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.65	amp
Heating Time	Less than 2 seconds	
Transconductance, for plate volts = 500, grid-No.2 volts = 200 and plate ma. = 16	3200	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts and grid-No.2 volts = 200. and plate ma. = 16	7.5	
Direct Interelectrode Capacitances:°		
Grid No.1 to Plate	0.11 max.	μμf
Input	8.5	μμf
Output	6.5	μμf

° with no external shielding, and with base sleeve connected to ground.

Mechanical:

Mounting Position	Vertical, or horizontal with plane of pins 3 and 7 vertical
Maximum Overall Length	3-21/32"
Seated Length	2-15/16 ± 5/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Cap	Small
Base	Small-Micanol-Wafer Octal 8-Pin, with Sleeve No.R6159
Basing Designation for BOTTOM VIEW	7CL



Pin 1 - Grid No.3, Int.Shield & Filament Center-Tap
Pin 2 - Filament
Pin 3 - Grid No.2
Pin 4 - Same as Pin 1
Pin 5 - Grid No.1
Pin 6 - Same as Pin 1
Pin 7 - Filament
Pin 8 - Base Sleeve
Cap - Plate

AF POWER AMPLIFIER & MODULATOR- Class A1†

Maximum Ratings, *Absolute Values*:

	CCS●	
DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	volts
GRID-No.2 INPUT	2.5 max.	watts
PLATE DISSIPATION	10 max.	watts

Typical Operation:

DC Plate Voltage	250	volts
DC Grid-No.2 Voltage	160	volts

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

●: See next page. ← Indicates a change.

World Radio History

RCA

2E24

VHF BEAM POWER AMPLIFIER

	CCS●	
DC Grid-No.1 (Control-Grid) Voltage□●	-8	volts
Peak AF Grid-No.1 Voltage	8	volts
Zero-Signal DC Plate Current	35	ma
Max.-Signal DC Plate Current	40	ma
Zero-Signal DC Grid-No.2 Current	2.6	ma
Max.-Signal DC Grid-No.2 Current	6.8	ma
Load Resistance	6000	ohms
Total Harmonic Distortion	10	%
Power Output	3.9	watts

→ AF POWER AMPLIFIER & MODULATOR- Class AB_2▲

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	400 max.	500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	200 max.	volts
MAX.-SIG. DC PLATE CURRENT§	75 max.	75 max.	ma
MAX.-SIG. PLATE INPUT§	30 max.	37.5 max.	watts
MAX.-SIG. GRID-No.2 INPUT§	2.5 max.	2.5 max.	watts
PLATE DISSIPATION§	10 max.	13.5 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	400	500	volts
DC Grid-No.2 Voltage	125	125	volts
DC Grid-No.1 (Control Grid) Voltage□●	-15	-15	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	82	82	volts
Zero-Signal DC Plate Current	18	20	ma
Max.-Signal DC Plate Current	150	150	ma
Zero-Signal DC Grid-No.2 Cur.	0.6	0.6	ma
Max.-Signal DC Grid-No.2 Cur.	26	28	ma
Effective Load Resistance, (Plate-to-plate)	7000	9000	ohms
Max.-Signal Driving Power, (Approx.)♦	0.43	0.46	watt
Max.-Signal Power Output (Approx.)	42	54	watts

▲ Subscript 2 indicates that grid-No.1 current flows during some part of input cycle.

§ Averaged over any audio-frequency cycle of sine-wave form.

♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage. The effective resistance per grid-No.1 circuit of the AB_2 stage should be held at low value.

● 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. When grid No.1 is operated in the negative region with fixed bias, the dc grid-No.1-circuit resistance should not exceed 100000 ohms. For higher values of dc grid-No.1-circuit resistance, cathode bias is required. Under no circumstances should the total dc grid-No.1-circuit resistance exceed 0.5 megohm.

●, ●●, □, *: See next page. → indicates a change.

World Radio History

2E24

VHF BEAM POWER AMPLIFIER

PLATE-MODULATED RF POWER AMPLIFIER- Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	400 max.	500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE.	-175 max.	-175 max.	volts
DC PLATE CURRENT	60 max.	70 max.	ma
DC GRID-No.1 CURRENT	3.5 max.	3.5 max.	ma
PLATE INPUT.	20 max.	27 max.	watts
GRID-No.2 INPUT.	1.7 max.	2.3 max.	watts
PLATE DISSIPATION.	6.7 max.	9 max.	watts

Typical Operation:

DC Plate Voltage	400	500	volts
DC Grid-No.2 Voltage♦	180	180	volts
From a series resistor of.	27500	40000	ohms
DC Grid-No.1 Voltage○○*	-45	-45	volts
From a grid resistor of.	18000	18000	ohms
Peak RF Grid-No.1 Voltage.	61	62	volts
DC Plate Current	50	54	ma
DC Grid-No.2 Current	8	8	ma
DC Grid-No.1 Current (Approx.)	2.5	2.5	ma
Driving Power (Approx.).	0.15	0.16	watt
Power Output (Approx.)	13.5	18	watts

RF POWER AMPLIFIER AND OSCILLATOR- Class C Telegraphy

Key-down conditions per tube without amplitude modulation##

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE.	-175 max.	-175 max.	volts
DC PLATE CURRENT	75 max.	85 max.	ma
DC GRID-No.1 CURRENT	3.5 max.	3.5 max.	ma
PLATE INPUT.	30 max.	40 max.	watts
GRID-No.2 INPUT.	2.5 max.	2.5 max.	watts
PLATE DISSIPATION.	10 max.	13.5 max.	watts

♦ Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through series resistor of the value shown.

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

○ Obtained from grid resistor of value shown, or by partial self-bias methods.

●,●●,□,*: See next page.

←Indicates a change.

World Radio History

2E24

VHF BEAM POWER AMPLIFIER

	CCS●		ICAS●●	
Typical Operation up to 125 Mc:				
DC Plate Voltage	400	500	600	volts
DC Grid–No.2 Voltage●■	200	190	195	volts
From a series resistor of.	20000	29500	40500	ohms
DC Grid–No.1 Voltage■□*	−45	−45	−50	volts
From a grid resistor of.	15000	15000	16700	ohms
Peak RF Grid–No.1 Voltage.	62	65	71	volts
DC Plate Current	75	60	66	ma
DC Grid–No.2 Current	10	10.5	10	ma
DC Grid–No.1 Current (Approx.)	3	3	3	ma
Driving Power (Approx.).	0.19	0.20	0.21	watt
Power Output (Approx.)	20	20	27	watts
Typical Operation up to 160 Mc:				
DC Plate Voltage	–		350	volts
DC Grid–No.2 Voltage●■	–		170	volts
From a series resistor of.	–		18000	ohms
DC Grid–No.1 Voltage■□*	–		−50	volts
From a grid resistor of.	–		16500	ohms
Peak RF Grid–No.1 Voltage.	–		70	volts
DC Plate Current	–		85	ma
DC Grid–No.2 Current	–		10	ma
DC Grid–No.1 Current (Approx.)	–		3	ma
Driving Power (Approx.).	–		2.0	watts
Power Output (Approx.)	–		16.5	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	0.59	0.71	amp
Grid No.1–Plate Capacitance.	2	–	0.11	μμf
Input Capacitance.	2	7	10	μμf
Output Capacitance	2	4.9	8.1	μμf
Plate Current.	1,3	24	46	ma
Grid–No.2 Current.	1,3	–	5	ma
Grid–No.1 Current.	1,4	–	−5	μa
Useful Power Output.	1,5	18	–	watts

Note 1: With 6.3 volts ac on filament.

Note 2: With no external shield. Base pin No.8 grounded.

Note 3: With dc plate voltage of 200 volts, dc grid–No.2 voltage of 135 volts, and dc grid–No.1 voltage of −5 volts.

Note 4: With dc plate voltage of 500 volts, dc grid–No.2 voltage of 200 volts, and dc grid–No.1 voltage adjusted to give dc plate current of 20 ma.

Note 5: With dc plate voltage of 500 volts, dc grid–No.2 voltage of 200 volts, grid–No.1 resistor of 0.015 megohm ± 10%, dc plate current of 60 ma., dc grid–No.1 current of 2.5 to 3.5 ma., and frequency of 15 Mc.

● Continuous Commercial Service.

●● Intermittent Commercial & Amateur Service.

□ With ac on filament.

*, ●●, ■: See next page.

2E24

VHF BEAM POWER AMPLIFIER

* When grid No.1 is driven positive and the 2E24 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed 30000 ohms. If additional bias is required, it must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

** Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor of the value shown. The grid-No.2 voltage must not exceed 600 volts under key-up conditions.

* Obtained from fixed supply or by grid-No.1 resistor of value shown.

Data on operating frequencies for the 2E24 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

OUTLINE DIMENSIONS
for the 2E24 are the same as those for the 2E26

OPERATING NOTES

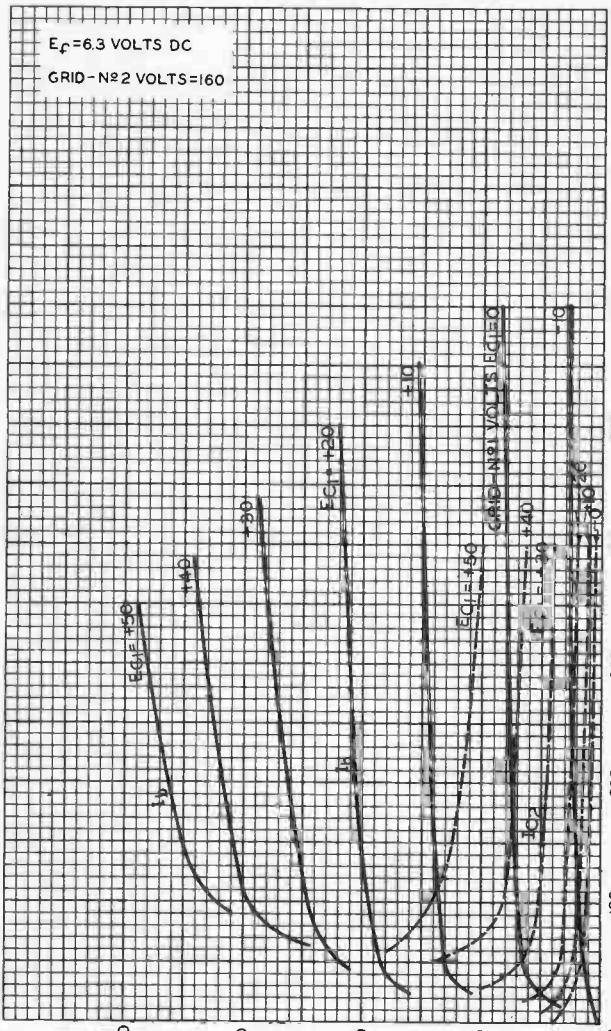
The 2E24 is intended for use in mobile and emergency-communications equipment. Its filament combines sturdiness and efficiency with quick heating and provides wide latitude in operating-voltage range. Although designed for intermittent operation, the filament will give reasonable life when it is operated continuously. In continuous-service applications where extremely long life is desired, it is recommended that the heater-cathode type 2E26 be used.

2E24

RCA

2E24

AVERAGE PLATE CHARACTERISTICS



AUG. 22, 1949

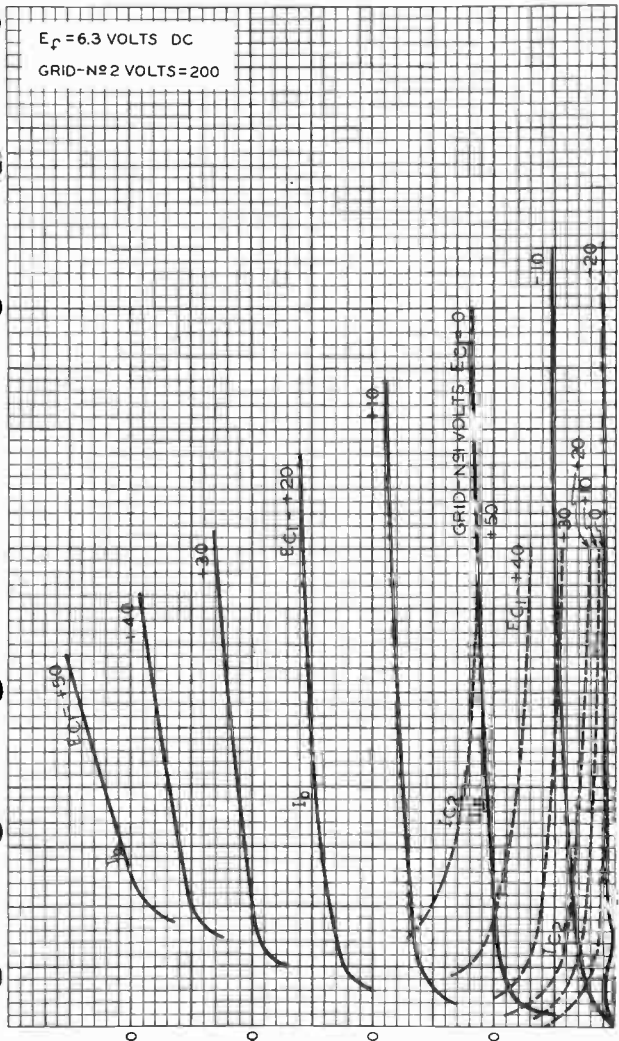
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6660RI

2E24

AVERAGE PLATE CHARACTERISTICS

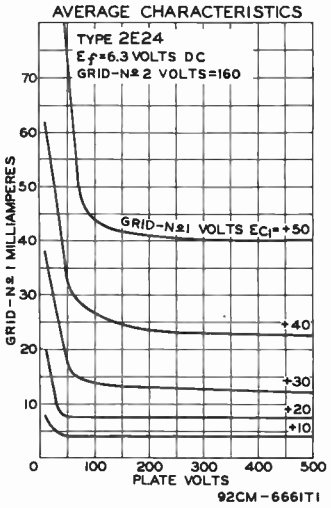


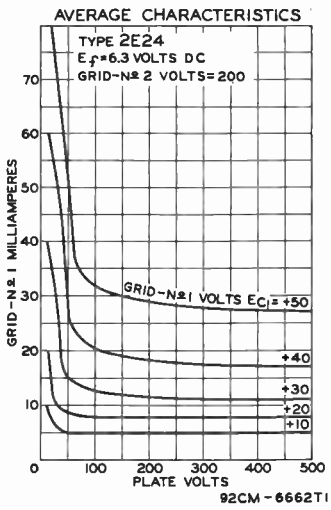
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

2E24

2E24

VHF BEAM POWER AMPLIFIER





TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

2E26

BEAM POWER TUBE

Useful at frequencies up to 175 Mc

GENERAL DATA

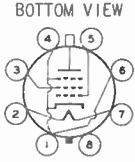
Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts ←
Current	0.8	amp
Transconductance, for plate volts = 500, grid-No.2 volts = 200, and plate ma. = 20	3500	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 20	6.5	
Direct Interelectrode Capacitances (With no external shield):		
Grid No.1 to plate	0.2 max.	μμf
Grid No.1 to cathode & grid No.3, grid No.2, internal shield, base sleeve, and heater	12.5	μμf ←
Plate to cathode, & grid No.3, grid No.2, internal shield, base sleeve, and heater	7	μμf

Mechanical:

Mounting Position	Any
Overall Length	3-1/2" ± 5/32"
Seated Length	2-15/16" ± 5/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Cap	Small (JETEC No.C1-1)
Base	Small-Micanol-Wafer Octal 8-Pin with Sleeve (JETEC No.B8-44)

BOTTOM VIEW



Pin 1 – Cathode, Grid No.3, Internal Shield
Pin 2 – Heater
Pin 3 – Grid No.2
Pin 4 – Same as Pin 1
Pin 5 – Grid No.1
Pin 6 – Same as Pin 1
Pin 7 – Heater
Pin 8 – Base Sleeve Cap – Plate

Bulb Temperature (At hottest point)	210 max.	°C ←
Weight (Approx.)	1.4	ounces ←

AF POWER AMPLIFIER & MODULATOR – Class A_1 †

Maximum Ratings, *Absolute Values:*

	CCS●	
DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	volts
PLATE DISSIPATION	10 max.	watts
GRID-No.2 INPUT	2.5 max.	watts

● †: See next page.

← Indicates a change.

World Radio History

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2E26

BEAM POWER TUBE

	CCS●	
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Typical Operation:		
DC Plate Voltage	250	volts
DC Grid-No.2 Voltage	160	volts
DC Grid-No.1 (Control-Grid) Voltage	-14	volts
Peak AF Grid-No.1 Voltage	14	volts
Zero-Signal DC Plate Current	35	ma
Max.-Signal DC Plate Current	42	ma
Zero-Signal DC Grid-No.2 Current	7	ma
Max.-Signal DC Grid-No.2 Current	10	ma
Load Resistance	5500	ohms
Total Harmonic Distortion	10	%
→ Power Output	4	watts
→ **Maximum Circuit Values:**		
Grid-No.1-Circuit Resistance:oo		
With fixed bias	0.1 max.	megohm
With cathode bias	0.5 max.	megohm

→ **AF POWER AMPLIFIER & MODULATOR--Class AB_2#**

	CCS●	ICAS●●	INS○	
Maximum Ratings, *Absolute Values:*				
DC PLATE VOLTAGE	400 max.	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	200 max.	200 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	75 max.	75 max.	75 max.	ma
MAX.-SIGNAL PLATE INPUT**	30 max.	37.5 max.	45 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT**	2.5 max.	2.5 max.	2.5 max.	watts
PLATE DISSIPATION**	10 max.	12.5 max.	17 max.	watts
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode	100 max.	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	100 max.	volts

oo 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. When grid No.1 is operated in the negative region with fixed bias, the dc grid-No.1-circuit resistance should not exceed the specified value of 0.1 megohm. For higher values of dc grid-No.1-circuit resistance, cathode bias is required. Under no circumstances should the total dc grid-No.1-circuit resistance exceed the specified value of 0.5 megohm.

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

#,**,●,●●,○: See next page. →indicates a change.

World Radio History

2E26

BEAM POWER TUBE

Typical Operation:	CCS●	ICAS●●	IMS○	
	Values are for 2 tubes			
DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage▲⊕ .	125	125	125	volts
DC Grid-No.1 (Control-Grid) Voltage:				
From fixed-bias source	-15	-15	-20	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage . .	60	60	102	volts
Zero-Signal DC Plate Current	20	22	26	ma
Max.-Signal DC Plate Current	150	150	150	ma
Max.-Signal DC Grid-No.2 Current . .	32	32	32	ma
Effective Load Resistance (Plate to plate)	6200	8000	8800	ohms
Max.-Signal Driving Power (Approx.)♦ . .	0.36	0.36	0.91	watt
Max.-Signal Power Output (Approx.) . .	42	54	58	watts

Maximum Circuit Values (CCS, ICAS, or IMS Conditions):

Grid-No.1-Circuit Resistance:♦

With fixed bias . . . . . 30000 max. ohms

With cathode bias . . . . . Not recommended

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*	CCS●	ICAS●●	IMS○	
DC PLATE VOLTAGE	400 max.	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-175 max.	-175 max.	-175 max.	volts
DC PLATE CURRENT . . .	60 max.	70 max.	70 max.	ma
DC GRID-No.1 CURRENT .	3.5 max.	3.5 max.	3.5 max.	ma
PLATE INPUT	20 max.	27 max.	37 max.	watts

Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

** Averaged over any audio-frequency cycle of sine-wave form.

▲ preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

⊕ In applications requiring the use of screen voltages above 135 volts, provision should be made for the adjustment of grid-No.1 bias for each tube separately. The necessity for this adjustment at the lower screen voltages depends on the distortion requirements and on whether the plate dissipation rating is exceeded at zero-signal plate current.

♦, ●, ●●, ○: See next page.]

← Indicates a change.

World Radio History

RCA

2E26

BEAM POWER TUBE

	CCS●	*ICAS*●●	*IMS*○	
GRID-No.2 INPUT	1.7 max.	2.3 max.	2.5 max.	watts
PLATE DISSIPATION . . .	6.7 max.	9 max.	12 max.	watts
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode	100 max.	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	100 max.	volts
Typical Operation:				
DC Plate Voltage . . .	400	500	600	volts
DC Grid-No.2 Voltage♦ .	160	180	200	volts
From a series resistor of	32000	35500	40000	ohms
DC Grid-No.1 Voltage* .	-50	-50	-50	volts
From a grid resistor of	20000	20000	20000	ohms
Peak RF Grid-No.1 Voltage	60	60	60	volts
DC Plate Current . . .	50	54	60	ma
DC Grid-No.2 Current .	7.5	9	10	ma
DC Grid-No.1 Current (Approx.)	2.5	2.5	2.5	ma
Driving Power (Approx.)	0.15	0.15	0.15	watt
Power Output (Approx.).	13.5	18	24	watts
Maximum Circuit Values (CCS, ICAS, or IMS Conditions):				
Grid-No.1-Circuit Resistance‡		30000 max.		ohms

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□ and RF POWER AMPLIFIER--Class C FM Telephony

	CCS●	*ICAS*●●	*IMS*○	
Maximum Ratings, *Absolute Values:*				
DC PLATE VOLTAGE . . .	500 max.	600 max.	700 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	200 max.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	-175 max.	-175 max.	volts
DC PLATE CURRENT . . .	75 max.	85 max.	85 max.	ma

♦ 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. In no case, however, should the total dc grid-No.1-circuit resistance exceed 30000 ohms when the 2E26 is operated at maximum ratings. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

♦ Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor.

* Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

□ 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.

●, ●●, ○, ‡: See next page. → Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

BEAM POWER TUBE

	CCS[•]	ICAS[••]	IMS[o]	
DC GRID-No.1 CURRENT	3.5 max.	3.5 max.	3.5 max.	ma
PLATE INPUT	30 max.	40 max.	55 max.	watts
GRID-No.2 INPUT	2.5 max.	2.5 max.	2.5 max.	watts
PLATE DISSIPATION	10 max.	13.5 max.	18.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode	100 max.	100 max.	100 max.	volts
Heater positive with respect to cathode	100 max.	100 max.	100 max.	volts
	Up to 125 Mc		*At 160 Mc*	
Typical CCS[•] Operation:				
DC Plate Voltage	400	500	300	volts
DC Grid-No.2 Voltage[◆◆]	190	185	170	volts
From a series resistor of	19000	28500	21500	ohms
DC Grid-No.1 Voltage[■]	-30	-40	-75	volts
From a grid-No.1 resistor of	10000	13500	30000	ohms
Peak RF Grid-No.1 Voltage	41	50	85	volts
DC Plate Current	75	60	75	ma
DC Grid-No.2 Current	11	11	6	ma
DC Grid-No.1 Current (Approx.)	3	3	2.5	ma
Driving Power (Approx.)	0.12	0.15	1.5	watts
Power Output (Approx.)	20	20	13	watts
Typical ICAS[••] Operation:				
DC Plate Voltage	600		350	volts
DC Grid-No.2 Voltage[◆◆]	185		200	volts
From a series resistor of	41500		21500	ohms
DC Grid-No.1 Voltage[■]	-45		-90	volts
From a grid resistor of	15000		30000	ohms
Peak RF Grid-No.1 Voltage	57		105	volts
DC Plate Current	66		85	ma
DC Grid-No.2 Current	10		7	ma
DC Grid-No.1 Current (Approx.)	3		3	ma
Driving Power (Approx.)	0.17		2	watts
Power Output (Approx.)	27		16.5	watts
Typical IMS[o] Operation:				
DC Plate Voltage	650			volts
DC Grid-No.2 Voltage[◆◆]	200			volts
From a series resistor of	45000			ohms
DC Grid-No.1 Voltage[■]	-49			volts
From a grid-No.1 resistor of	16300			ohms
Peak RF Grid-No.1 Voltage	68			volts
DC Plate Current	84			ma
DC Grid-No.2 Current	10			ma

• Continuous Commercial Service.

◆◆ Intermittent Commercial and Amateur Service.

o, ‡, ◆◆, ■: See next page.

← Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

2E26

2E26

BEAM POWER TUBE

	Up to 125 Mc	
DC Grid-No.1 Current (Approx.) . . .	3	ma
Driver Power (Approx.)	0.2	watt
Power Output (Approx.)	36	watts

Maximum Circuit Values (CCS, ICAS, or IMS Conditions):

Grid-No.1-Circuit Resistance‡ . . .	30000 max.	ohms

→ **CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

	Note	Min.	Max.	
Heater Current	1	0.74	0.86	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.20	μμf
Grid No.1 to cathode & grid No.3, grid No.2, internal shield, base sleeve, and heater	2	10.3	14.7	μμf
Plate to cathode & grid No.3, grid No.2, internal shield base sleeve, and heater .	2	5.3	8.7	μμf
Plate Current.	3	23	47	ma
Grid-No.2 Current	3	–	4	ma
Useful Power Output	4	18	–	watts

Note 1: With 6.3 volts ac on heater.

Note 2: With no external shield.

Note 3: With 6.3 volts ac on heater, dc plate voltage of 200 volts, dc grid-No.2 voltage of 135 volts, and dc grid-No.1 voltage of −10 volts.

Note 4: In a single-tube self-excited oscillator circuit, and with 6.3 volts ac on heater, dc plate voltage of 500 volts, dc grid-No.2 voltage of 200 volts, grid-No.1 resistor of .015 ± 10% megohm, max. dc plate current of 60 ma., dc grid-No.1 current of 1.8 to 2.2 ma., and frequency of 15 Mc.

‡ When grid No.1 is driven positive and the 2E26 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

o Intermittent Mobile Service.

●● Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 2E26 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 600 volts under key-up conditions.

■ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

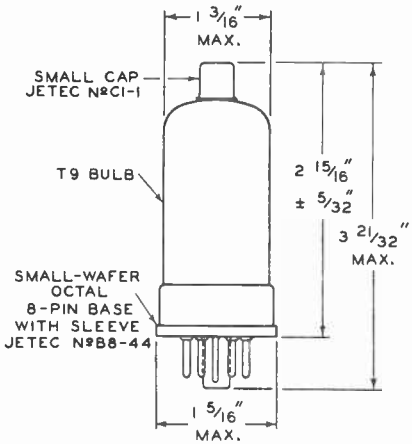
Data on operating frequencies for the 2E26 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

→ indicates a change

World Radio History

2E26

BEAM POWER TUBE



92CS-6607R2

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

AVERAGE PLATE CHARACTERISTICS

2E26

RCA

2E26

E_f=6.3 VOLTS

GRID-N°2 VOLTS=160

GRID-N°1 VOLTS E_{c1}=+20

E_{c1}=+50

+40

+30

+20

+10

0

-10

I_b

I_{c2}

PLATE VOLTS

0 100 200 300 400 500 600

PLATE (I_b) OR GRID-N°2 (I_{c2}) MILLIAMPERES

0 100 200 300 400 500 600 700

NOV. 15, 1945

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6631

World Radio History

2E26

AVERAGE PLATE CHARACTERISTICS

RCA

2E26

E_f = 6.3 VOLTS

GRID-№2 VOLTS = 200

PLATE VOLTS

PLATE (I_b) OR GRID-№2 (I_{c2}) MILLIAMPERES

NOV. 15, 1945

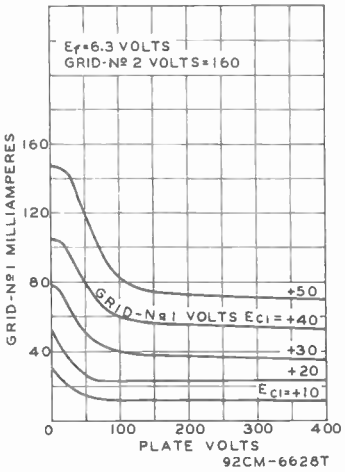
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6630

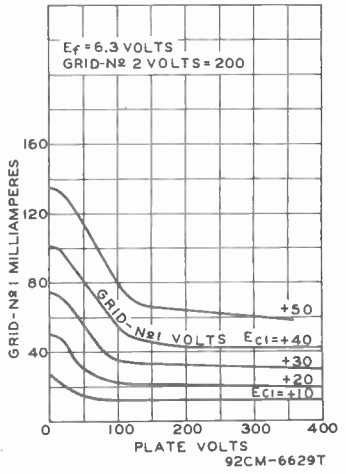
World Radio History

2E26
BEAM POWER TUBE

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

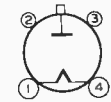
World Radio History

3B25

HALF-WAVE GAS RECTIFIER

HOT-CATHODE TYPE

Filament*	Coated	
Voltage	2.5	a-c volts
Current	5.0	amp.
Tube Voltage Drop (Approx.)	10	volts
Overall Length		5-7/8" ± 7/16"
Seated Height		5-1/4" ± 7/16"
Maximum Diameter		2-1/16"
Bulb		T-16
Cap		Medium
Base		Medium 4-Pin, Bayonet
Pin 1 - Filament		Pin 4 - Filament, Cathode Shield
Pin 2 - No Connection		
Pin 3 - No Connection		Cap - Anode
RCA Socket		Stock No. 9919
Mounting Position		Any



BOTTOM VIEW (4P)

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS

Peak Inverse Anode Voltage•	4500 max.	volts ←
Peak Anode Current	2 max.	amp.
Average Anode Current**	0.5 max.	amp.
Surge Anode Current for max. of 0.1 sec.	20 max.	amp.
Ambient Temperature Range	-75 to +90	°C

* Filament voltage must be applied at least 30 seconds before application of anode voltage.

• These ratings apply to the 3B25 when it is operated from a power supply having a frequency up to 500 cycles per second. If a contemplated application involves high supply frequencies, please write, stating the proposed operating frequency, to the attention of the Commerical Engineering Department, Harrison, N.J., as to the required reduction in ratings.

** For an averaging period of 30 seconds.

If the plate return of each tube is not connected to the center-tap of the filament-supply winding, the return should be made to that side of the filament to which the cathode shield is connected.

For *rectifier circuits*, refer to Type 872-A/872.

The table below classifies suitable rectifier circuits for the 3B25 and shows their safe maximum input and maximum output operating conditions for a peak inverse voltage of 4000 volts. The values are based on a sine-wave input and the use of a suitable choke preceding any condenser in the filter circuit.

CIRCUIT	MAXIMUM A-C INPUT VOLTS□ (RMS)	APPROX. D-C OUTPUT VOLTS TO FILTER	MAX. D-C OUTPUT CURRENT amperes
SINGLE-PHASE FULL-WAVE (2 tubes) Fig. 1	1400 per tube	1270	1.0
SINGLE-PHASE FULL-WAVE (4 tubes) Fig. 2	2800 total	2540	1.0
THREE-PHASE HALF-WAVE Fig. 3	1630 per leg	1910	1.5
THREE-PHASE DOUBLE-Y PARALLEL Fig. 4	1630 per leg	1910	3.0
THREE-PHASE FULL-WAVE Fig. 5	1630 per leg	3820	1.5

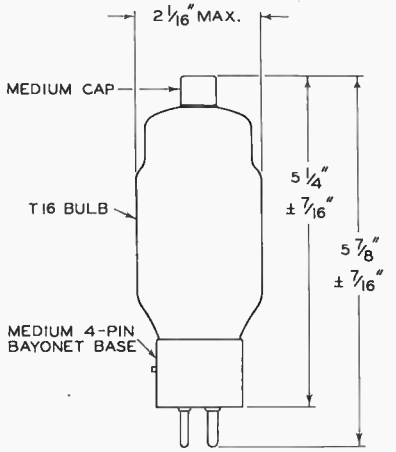
□ For maximum peak inverse voltage of 4000 volts. ← Indicates a change.

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

World Radio History

3B25

HALF-WAVE GAS RECTIFIER



92CM-6555R1

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

World Radio History

Twin Power Triode

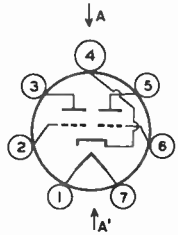
GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	12.6 ± 10%	volts
Current at heater volts = 12.6	1.125	amp
Amplification Factor (Each unit)	11	
Direct Interelectrode Capacitances (Each unit):		
Grid to plate	5.4	μμf
Grid to cathode	7.8	μμf
Plate to cathode	4.2	μμf

Mechanical:

Operating Position	Vertical, base up or down; Horizontal, with plane of each plate vertical
Overall Length	3-1/2" ± 3/16"
Seated Length	3-1/16" ± 3/16"
Maximum Diameter	See *Outline Drawing*
Weight (Approx.)	3 oz
Bulb	T16
Base	Medium Molded-Flare Septar 7-Pin
Basing Designation for BOTTOM VIEW	7CG



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

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

CONTROL AMPLIFIER

Values are for each unit unless otherwise specified

Maximum Ratings, *Absolute-Maximum Values:*

PEAK PLATE VOLTAGE	±2000 max.	volts
DC GRID VOLTAGE	-200 max.	volts
PEAK CATHODE CURRENT	500 max.	ma
AVERAGE PLATE CURRENT	120 max.	ma
AVERAGE GRID CURRENT	7.5 max.	ma
PLATE DISSIPATION	15 max.	watts

← Indicates a change.

World Radio History

3C33

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).	250 max.	°C

Typical Operation in Accompanying Circuit:

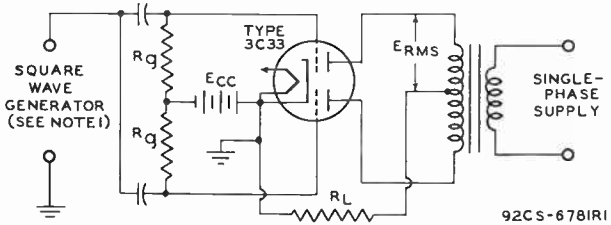
Plate-Supply Voltage (E_{RMS})[a].	600	volts
DC Grid-Supply Voltage (E_{CC}).	-160	volts
Peak Grid Voltage (See *Note 1*).	160	volts
Grid-Circuit Resistance (R_g).	0.5	megohm
Load Resistance (R_L).	3000	ohms
Peak Output Current[b].	210	ma

Maximum Circuit Values:

Grid-Circuit Resistance:		
When grid potential is always negative. .	0.5	megohm
When grid potential swings positive . . .	0.03	megohm

[a] Plates are operated 180° out of phase.

[b] Output-current wave-shape is essentially that of a half-sine wave.



NOTE 1: VOLTAGE DELIVERED BY SQUARE-WAVE GENERATOR TO THE PARALLELED GRIDS SHOULD BE IN PHASE WITH THE PLATE VOLTAGE ON ONE OF THE UNITS TO PERMIT CONDUCTION THROUGH THAT UNIT WITH RESULTANT CURRENT FLOW THROUGH R_L, AND SHOULD BE REVERSIBLE IN PHASE TO PERMIT CONDUCTION THROUGH THE OTHER UNIT WITH RESULTANT CURRENT FLOW THROUGH R_L.

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World Radio History

RCA

3C33

TWIN-TRIODE POWER AMPLIFIER

GENERAL DATA

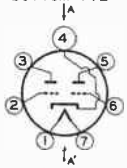
Electrical:

Heater, for Unipotential Cathode:		
Voltage	12.6 ± 10%	ac or dc volts
Current	1.125	amp
Amplification Factor, (per unit)	11	
Direct Interelectrode Capacitances (per unit):		
Grid to Plate	5	μμf
Grid to Cathode	8.5	μμf
Plate to Cathode	4	μμf

Mechanical:

Mounting Position	Vertical, base up or down; Horizontal, with plane of each plate vertical
Overall Length	3-1/2" ± 3/16"
Seated Length	3-1/16" ± 3/16"
Maximum Diameter	See Outline Drawing
Bulb	T-16
Base	Medium Molded-Flare Septar 7-Pin
Basing Designation for BOTTOM VIEW	7CG

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



PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

CONTROL AMPLIFIER SERVICE

Values are for each unit unless otherwise specified

Maximum Ratings, *Absolute Values*:

PEAK PLATE VOLTAGE	± 2000 max.	volts
DC GRID VOLTAGE	-200 max.	volts
PEAK CATHODE CURRENT	500 max.	ma.
AVERAGE PLATE CURRENT	120 max.	ma.
AVERAGE GRID CURRENT	7.5 max.	ma.
PLATE DISSIPATION	15 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 in Accompanying Circuit:

Plate-Supply Voltage (E_{RMS})*	600	volts
DC Grid-Supply Voltage (E_{CC})	-160	volts

* See next page.

World Radio History

3C33

TWIN-TRIODE POWER AMPLIFIER

Peak Grid Voltage (See Note 1)	160	volts
Grid-Circuit Resistance (R_g)	0.5	megohm
Load Resistance (R_L)	3000	ohms
Peak Output Current°	210	ma.

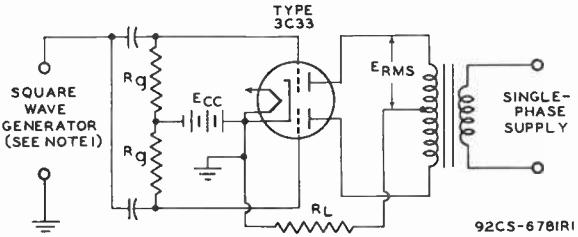
Maximum Circuit Values:

Grid-Circuit Resistance:

→ When grid potential is always negative.	0.5	megohm
When grid potential swings positive	0.03	megohm

* Plates are operated 180° out of phase.

° Output-current wave-shape is essentially that of a half-sine wave.



NOTE I: VOLTAGE DELIVERED BY SQUARE-WAVE GENERATOR TO THE PARALLELED GRIDS SHOULD BE IN PHASE WITH THE PLATE VOLTAGE ON ONE OF THE UNITS TO PERMIT CONDUCTION THROUGH THAT UNIT WITH RESULTANT CURRENT FLOW THROUGH R_L, AND SHOULD BE REVERSIBLE IN PHASE TO PERMIT CONDUCTION THROUGH THE OTHER UNIT WITH RESULTANT CURRENT FLOW THROUGH R_L.

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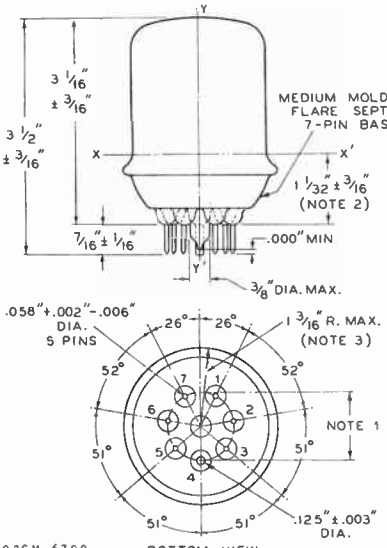
→ Indicates a change.

World Radio History

3C33
TWIN-TRIODE POWER AMPLIFIER



THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ±5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

NOTE 2: A FLAT-PLATE FLANGE GAUGE WITH HOLE 2.063" - 0.000" + 0.003" IS LOWERED OVER TUBE SEATED IN BASE-PIN GAUGE SO THAT THE HOLE AXIS IS COINCIDENT WITH AXIS YY' WITHIN 0.150", AND SO THAT THE BOTTOM SURFACE OF THE FLANGE GAUGE IS PARALLEL TO THE TOP SURFACE OF THE BASE-PIN GAUGE, AND UNTIL THE FLANGE GAUGE RESTS ON THE TUBE-FLANGE SEAL AT POSITION XX'. THE PERPENDICULAR DISTANCE BETWEEN THE TWO GAUGES WILL BE AS SHOWN.

NOTE 3: MINIMUM DIAMETER OF TUBE-SEAL FLANGE WILL BE SUCH THAT A RING GAUGE HAVING AN INSIDE DIAMETER OF 2.125" - 0.000" + 0.003" AND THICKNESS OF 0.125" ± 0.010" WILL NOT PASS THE FLANGE WHEN TRIED AT ANY ANGLE.

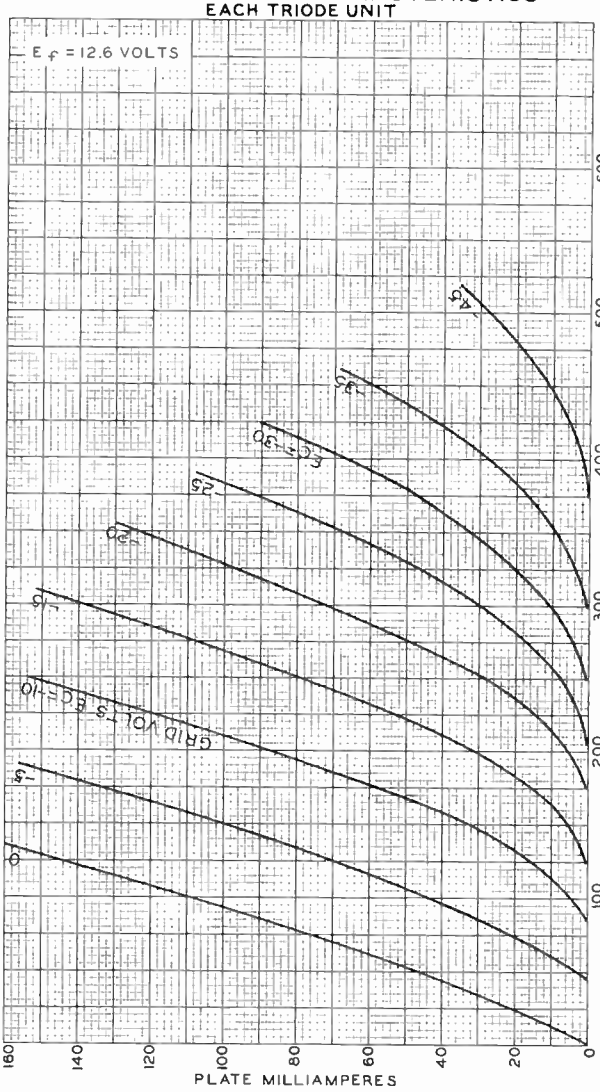
World Radio History

3C33

RCA

3C33

AVERAGE PLATE CHARACTERISTICS
EACH TRIODE UNIT



JULY 5, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6779

World Radio History

Sharp-Cutoff Pentode

With Two Independent Control Grids

7-PIN MINIATURE TYPE

For Equipment Having Series Heater-String Arrangement

The 3DT6-A is the same as the 6DT6-A except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	3.15	volts
Current	0.6 ± 6%	amp
Warm-up time (Average)	11	sec

World Radio History

World Radio History

3E22

PUSH-PULL H-F BEAM POWER AMPLIFIER

Unless otherwise specified, values are for both units

GENERAL DATA

Electrical:

Heaters, for Unipotential Cathodes.

	Series	Parallel	
Arrangement . .			
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts ←
Current	0.8	1.6	. . . . . amp
Transconductance, for plate current of 25 ma . .	4000		. . . . . μmhos
Grid-Screen Mu-Factor . .	6.5		

Direct Interelectrode Capacitances (Each Unit):*

Grid No.1 to Plate. . .	0.22 max.	. . . . . μμf
Input	14	. . . . . μμf
Output.	8.5	. . . . . μμf

Mechanical:

Mounting Position . . . . . Vertical, base up or down; or Horizontal, plane of plates vertical

Overall Length. . . . . 4-3/8" ± 3/16"

Seated Length . . . . . 3-13/16" ± 3/16"

Maximum Diameter. . . . . 2-3/8"

Bulb. T-16

Caps (Two). . . . . Small

Base. . . Large Wafer Octal 8-Pin Micanol with Sleeve No.T253 ←

Basing Designation for BOTTOM VIEW. 8BY

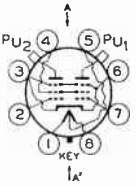
Pin 1 - Heater

Pin 2 - Grid No.1 of Unit No.2 ←

Pin 3 - Cathode, Grid No.3, Internal Shield

Pin 4 - Grid No.2

Pin 5 - Heater Center-Tap



PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

Pin 6 - Cathode, Grid No.3, Internal Shield ←

Pin 7 - Grid No.1 of Unit No.1 ←

Pin 8 - Heater

PU_1 - Plate of Unit No.1

PU_2 - Plate of Unit No.2

PLATE-MODULATED PUSH-PULL RF POWER AMP. — Class C Telephony

Carrier conditions per tube for use with a maximum average modulation factor of 0.25

Maximum Ratings, *Absolute Values:*

	INS●
DC PLATE VOLTAGE.	560 max. volts
DC GR.D-No.2 (SCREEN) VOLTAGE	225 max. volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max. volts
DC PLATE CURRENT.	160 max. ma.
DC GR'D-No.1 CURRENT.	11 max. ma.
PLATE INPUT	90 max. watts

*.●, See next page. ←Indicates a change.

World Radio History

3E22

3E22

PUSH-PULL H-F BEAM POWER AMPLIFIER

GRID-No.2 INPUT	6 max. watts
PLATE DISSIPATION	30 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:

DC Plate Voltage	560 volts
DC Grid-No.2 Voltage[□]	200 volts
	18000 ohms
DC Grid-No.1 Voltage [Δ]	−50 volts
	7700 ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage	130 volts
DC Plate Current	160 ma.
DC Grid-No.2 Current	20 ma.
DC Grid-No.1 Current (Approx.)	6.5 ma.
Driving Power (Approx.)	0.4 watt
Power Output (Approx.)	67 watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance§	30000 max. ohms

PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation #

Maximum Ratings, *Absolute Values:*

	DCS[●]
DC PLATE VOLTAGE	600 max. volts
DC GRID-No.2 (SCREEN) VOLTAGE	225 max. volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE	−175 max. volts
DC PLATE CURRENT	175 max. ma.
DC GRID-No.1 CURRENT	11 max. ma.
PLATE INPUT	100 max. watts
GRID-No.2 INPUT	6 max. watts
PLATE DISSIPATION	35 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:

DC Plate Voltage	600 volts
DC Grid-No.2 Voltage[⊕]	200 volts
	20000 ohms
DC Grid-No.1 Voltage ‡	−55 volts
	7850 ohms
	295 ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage	140 volts
DC Plate Current	160 ma.
DC Grid-No.2 Current	20 ma.
DC Grid-No.1 Current (Approx.)	7 ma.

*,●,□,Δ,#,⊕,‡,§: See next page.

World Radio History

3E22

PUSH-PULL H-F BEAM POWER AMPLIFIER

Driving Power (Approx.)	0.45	watt
Power Output (Approx.)	72	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance§	30000 max.	ohms

• Intermittent Mobile Service (IMS) is defined to include those applications, such as aircraft, where the transmitter design factors of minimum size, light weight, and exceedingly high power output for short intervals are the primary requirements, even though the average life expectancy of tubes used in such transmitters is reduced to about 100 hours.

Tube ratings for IMS service are established on the basis that the transmissions have maximum "on" periods of 15 seconds followed by "off" periods of at least 60 seconds, except that it is permissible to make equipment tests with maximum "on" periods of 5 minutes followed by off periods of at least 5 minutes provided the total "on" time of such periods does not exceed 10 hours during the life of any tube.

Although the use of tubes under IMS ratings involves great reduction in tube life, such use can be justified as economical practice in applications where high power is intermittently desired from small tubes.

* With no external shielding.

□ Obtained preferably from a separate source modulated with the plate supply or from the modulated plate-supply through a series resistor of the value shown.

Δ Obtained from grid-resistor of value shown or by partial self-bias methods.

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

⊕ Obtained preferably from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown. The grid-No.2 voltage must not exceed 600 volts under key-up conditions.

‡ Obtained from fixed-supply, by grid resistor of value shown, or cathode resistor of value shown, respectively.

§ Any additional bias required must be supplied by a cathode resistor or a fixed supply.

OUTLINE DIMENSIONS AND CURVES for the 3E22 are the same as those for the 815.

World Radio History

World Radio History

Plate Current:			
Peak	5	10	amp
DC	0.010	0.010	amp
DC Grid-No.2 Current	0.0011	0.002	amp
DC Grid-No.1 Current	0.001	0.001	amp
Load Resistance	300	400	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current (Parallel connection)	1	2.00	2.50	amp
Heater Current (Series connection)	2	1.00	1.25	amp
Grid-No.1-to-Plate Capacitance (Each unit)	3	-	0.12	μμf
Input Capacitance (Each unit)	-	12.8	16.2	μμf
Output Capacitance (Each unit)	-	5.25	8.75	μμf
Plate Current (Each unit)	1,4	38	82	ma
Grid-No.1 Voltage	1,5	-	-55	volts
Grid-No.2 Current (Each unit)	1,4	-	10	ma
Peak Plate Current	1,6	9	-	amp

Note 1: With 6.3 volts on heater.

Note 2: With 12.6 volts on heater.

Note 3: With external shield having length of 3/4" and inside diameter of 2-3/8". Shield is placed around base end of tube and is connected to cathode.

Note 4: With dc plate voltage of 250 volts, dc grid-No.2 voltage of 175 volts, and dc grid-No.1 voltage of -11 volts. Grid No.1 of unit not under test is biased -100 volts with respect to its cathode.

Note 5: With units in parallel, dc plate voltage of 400 volts, dc grid-No.2 voltage of 225 volts, and dc grid-No.1 voltage adjusted to give dc plate current of 200 microamperes.

Note 6: With the units in parallel in the accompanying test circuit under the following conditions: rectangular-wave modulation applied to grid No.1; pulse duration of 1 microsecond approx; pulse repetition rate of 1500 cps approx; dc plate-supply voltage of 5000 volts; dc grid-No.2 voltage of 850 volts; dc grid-No.1 volts of -225 volts; peak positive grid-No.1 swing of 150 volts; and dc plate current of 15 ma. minimum obtained by adjusting the pulse repetition rate. ←

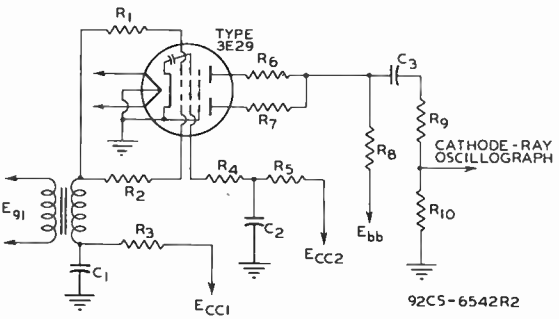
DIMENSIONAL OUTLINE
shown under Type 8298 also applies to the 3E29

← Indicates a change.

World Radio History

3E29

TEST CIRCUIT



R1 R2: 20 ohms, 1 watt non-inductive
R3: 15000 ohms, 1 watt
R4: 25 ohms, 1 watt, non-inductive
R5: 10000 ohms, 1 watt
R6 R7: 10 ohms, 5 watts, non-inductive
R8: 10000 ohms, 50 watts
R9: 400 ± 5% ohms, 50 watts non-inductive
R10: 10 ± 1% ohms, 5 watts
C1: 0.1 μf, 600 v dc
C2: 0.1 μf, 1000 v dc
C3: 0.1 μf, 5000 v dc
Ecc1: Grid-No.1 Supply Voltage
Ecc2: Grid-No.2 Supply Voltage
Ebb: Plate Supply Voltage
Eg1: Signal Voltage

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

World Radio History

3E29

TWIN-UNIT BEAM POWER TUBE

Unless Otherwise Specified, Values are on a Per Tube Basis

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

	Parallel	*Series*	
Arrangement			
Voltage (AC or DC)	6.3 $^{+10\%}_{-5\%}$	12.6 $^{+10\%}_{-5\%}$	volts
Current at 6.3 volts	2.25	–	amp
Current at 12.6 volts	–	1.125	amp

Transconductance (Each Unit):
With plate volts = 250, grid-No.2 volts = 175, and plate ma. = 60 . . . . 8500 μmhos

Mu-Factor, Grid No.2 to Grid No.1 (Each Unit):
With plate volts = 225, grid-No.2 volts = 225, and plate ma. = 60 9

Direct Interelectrode Capacitances (Each Unit):

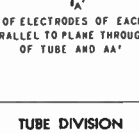
Grid No.1 to plate (with external shield□)	0.12 max.	μμf
Input	14	μμf
Outout	7	μμf

Mechanical:

Mounting Position	Vertical, base up or down; Horizontal, plane of each plate vertical
Overall Length	4-1/8" ± 3/16"
Seated Length	3-11/16" ± 3/16"
Maximum Diameter	2-3/8"
Bulb	T-16
Bulb Terminals (Two)	See Dimensional Outline
Weight (Approx.)	3.5 oz.
Base	Medium Molded-Flare Septar 7-Pin (JETEC No.E7-2)

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Grid No.1 of Unit No.2
Pin 3 – Grid No.2 of Both Units
Pin 4 – Cathode, Grid No.3 of Both Units
Pin 5 – Heater Center-Tap



Pin 6 – Grid No.1 of Unit No.1
Pin 7 – Heater

P_{U1} – Plate Terminal of Unit No.1
P_{U2} – Plate Terminal of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

□: See next page.

←Indicates a change

World Radio History

3E29

3E29

TWIN-UNIT BEAM POWER TUBE

MODULATOR—Rectangular-Wave Modulation

Values are for Units in Parallel

Maximum CCS● Ratings, *Absolute Values:*

For Duty Factor between 0.0001 and 1.0 and Maximum Averaging Time of 1200 μsec in Any Interval*

DC PLATE SUPPLY VOLTAGE▲	5000 max.	volts
INSTANTANEOUS PLATE VOLTAGE	5750 max.	volts
DC GRID-No.2 (SCREEN) SUPPLY VOLTAGE▲	850 max.	volts
DC GRID-No.1 (CONTROL-GRID) SUPPLY VOLTAGE▲	-225 max.	volts
INSTANTANEOUS GRID-No.1 VOLTAGE	-600 max.	volts
PEAK POSITIVE GRID-No.1 VOLTAGE	250 max.	volts
PEAK PLATE CURRENT	See Rating Chart	
PEAK GRID-No.2 CURRENT	3.5 max.	amp
PEAK GRID-No.1 CURRENT	4 max.	amp
PLATE INPUT	85 max.	watts
GRID-No.2 INPUT	3 max.	watts
GRID-No.1 INPUT	1 max.	watt
PLATE DISSIPATION#	15 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 with Rectangular-Wave Shapes in Accompanying Test Circuit:

With Duty Factor of*	*0.002*	*0.001*	
DC Plate Supply Voltage	2000	5000	volts
DC Grid-No.2 Supply Voltage	650	850	volts
DC Grid-No.1 Supply Voltage	-175	-200	volts
Peak Positive Grid-No.1 Voltage	50	150	volts

□ Having length of 3/4" and inside diameter of 2-3/8". Shield is placed around base end of tube and is connected to cathode.

● Continuous Commercial Service.

▲ For tube protection, it is essential that sufficient dc resistance be used in the plate supply circuit, the grid-No.2 supply circuit, and the grid-No.1 supply circuit so that the short-circuit current is limited to 0.5 ampere in each circuit.

* *Duty Factor* for the 3E29 is defined as the "on" time in microseconds divided by 1200 microseconds.

"On" time is defined as the sum of the durations of all the individual pulses which occur during any 1200-microsecond interval.

Pulse Duration is defined as the time interval between the two points on the pulse at which the instantaneous value is 70% of the peak value. The peak value is defined as the maximum value of a smooth curve through the average of the fluctuations over the top portion of the pulse.

Averaged over any interval not exceeding 1200 microseconds. Care should be used in determining the plate dissipation. A calculated value based on rectangular pulses can be considerably in error when the actual pulses have a finite rise and fall time. Plate dissipation should preferably be determined by measuring the bulb temperature under actual operating conditions; then, with the tube in the same socket and under the same ambient-temperature conditions, apply to the tube sufficient dc input to obtain the same bulb temperature. This value of dc input is a measure of the plate dissipation.

→ indicates a change

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

3E29

TWIN-UNIT BEAM POWER TUBE

Plate Current:			
Peak	5	10	amp
DC	0.010	0.010	amp
DC Grid-No.2 Current	0.0011	0.002	amp
DC Grid-No.1 Current	0.001	0.001	amp
Load Resistance	300	400	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current (Parallel Connection)	1	2.00	2.50	amp
Heater Current (Series Connection)	2	1.00	1.25	amp
Grid-No.1-to-Plate Capacitance (Each unit)	3	-	0.12	μμf
Input Capacitance (Each unit)	-	12.8	16.2	μμf
Output Capacitance (Each unit)	-	5.25	8.75	μμf
Plate Current (Each unit)	1,4	38	82	ma
Grid-No.1 Voltage	1,5	-	-55	volts
Grid-No.2 Current (Each unit)	1,4	-	10	ma
Peak Plate Current	1,6	9	-	amp

Note 1: With 6.3 volts on heater.

Note 2: With 12.6 volts on heater.

Note 3: With external shield having length of 1/4" and inside diameter of 2-3/8". Shield is placed around base end of tube and is connected to cathode.

Note 4: With dc plate voltage of 250 volts, dc grid-No.2 voltage of 175 volts, and dc grid-No.1 voltage of -11 volts. Grid No.1 of unit not under test is biased -100 volts with respect to its cathode.

Note 5: With units in parallel, dc plate voltage of 400 volts, dc grid-No.2 voltage of 225 volts, and dc grid-No.1 voltage adjusted to give dc plate current of 200 microamperes.

Note 6: With the units in parallel in the accompanying test circuit under the following conditions: rectangular-wave modulation applied to grid No.1; pulse duration of 1 microsecond approx.; pulse repetition rate of 1500 cps approx.; dc plate-supply voltage of 5000 volts; dc grid-No.2 voltage of 850 volts; dc grid-No.1 volts of -200 volts; peak positive grid-No.1 swing of 150 volts; and dc plate current of 15 ma. minimum obtained by adjusting the pulse repetition rate.

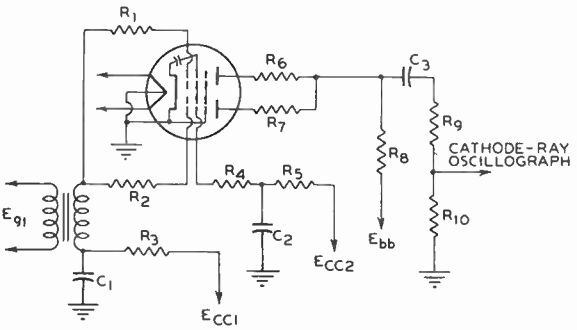
DIMENSIONAL OUTLINE for the 3E29
is the same as that shown for type 829-B

← Indicates a change

3E29

TWIN-UNIT BEAM POWER TUBE

TEST CIRCUIT



R1 R2: 20 ohms, 1 watt non-inductive

R3: 15000 ohms, 1 watt

R4: 25 ohms, 1 watt, non-inductive

R5: 10000 ohms, 1 watt

R6 R7: 10 ohms, 5 watts, non-inductive

R8: 10000 ohms, 50 watts

R9: 400 ± 5% ohms, 50 watts non-inductive

R10: 10 ± 1% ohms, 5 watts

C1: 0.1 μf, 600 v dc

C2: 0.1 μf, 1000 v dc

C3: 0.1 μf, 5000 v dc

Ecc1: Grid-No.1 Supply Voltage

Ecc2: Grid-No.2 Supply Voltage

Ebb: Plate Supply Voltage

Eg1: Signal Voltage

92CS-6542R1

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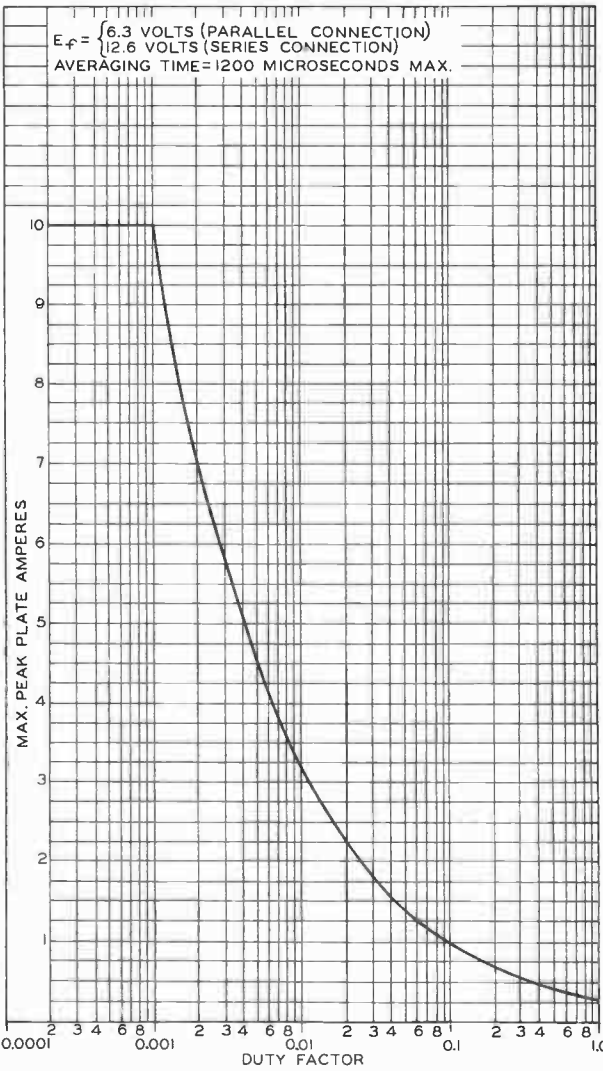
World Radio History

RCA

3E29

RATING CHART



World Radio History

RCA

3E29

AVERAGE CHARACTERISTICS
UNITS IN PARALLEL IN TEST CIRCUIT*

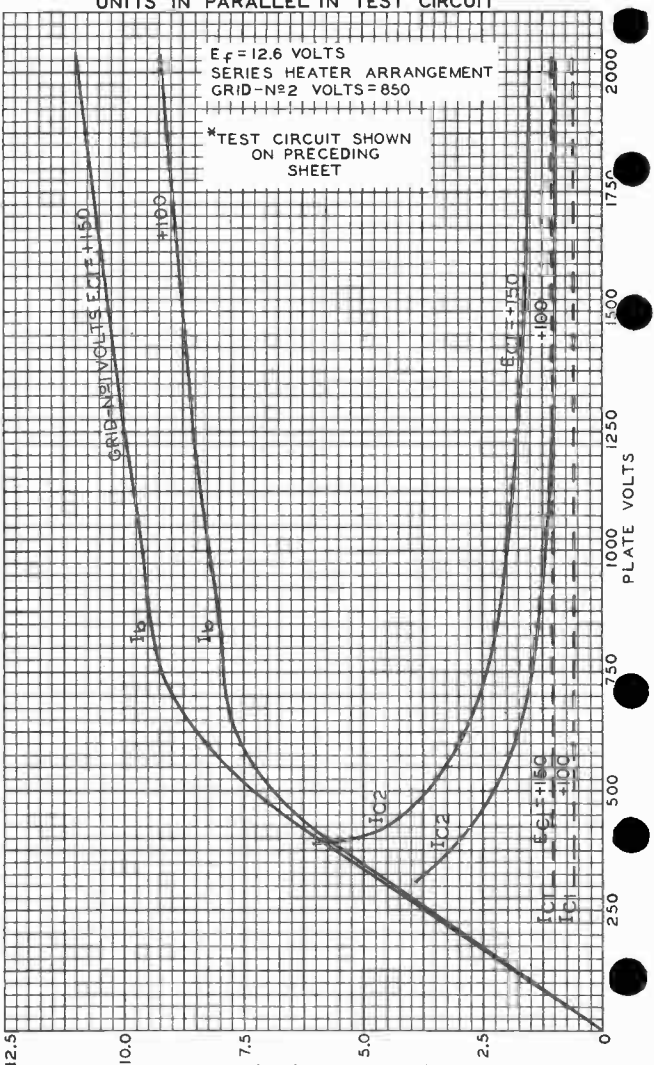


PLATE (I_b), GRID-№2 (I_{C2}) OR GRID-№1 (I_{C1}) AMPERES

NOV. 25, 1946 TUBE DIVISION 92CM-6530RI

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4-125A/4D21

Beam Power Tube

FORCED-AIR COOLED ABOVE 30 Mc

For use at frequencies up to 240 Mc

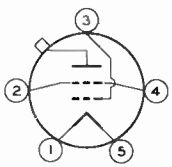
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC or DC)	5.0 ± 5%	volts
Current at filament volts = 5.0	6.5	amp
Transconductance, for plate volts = 2500, grid-No.2 volts = 400, and plate ma. = 50.	2500	μmhos
Mu-Factor, Grid No.2 to Grid No.1	5.9	
Direct Interelectrode Capacitances:[a]		
Grid No.1 to plate	0.05 max.	μμf
Grid No.1 to filament, grid No.2, and base shell	11.0	μμf
Plate to filament, grid No.2, and base shell	3.2	μμf

Mechanical:

Operating Position	Vertical, base down or up
Maximum Overall Length	5-11/16"
Seated Length	4-11/16" ± 1/4"
Maximum Diameter	2-7/8"
Weight (Approx.)	6.5 oz
Cap	Skirted Small (JEDEC No.C1-22)
Base	Special Metal-Shell Giant 5-Pin
Basing Designation for BOTTOM VIEW	5BK



Pin 1 – Filament
Pin 2 – Grid No.2
Pin 3 – Grid No.1
Pin 4 – Grid No.2
Pin 5 – Filament
Cap – Plate

Thermal:

Forced-Air Cooling:

Through base toward bulb . . . . . 5 cfm

The specified air flow from a small fan or centrifugal blower should be applied simultaneously with filament power.

To bulb and plate seal:

Continuous service: At frequencies below 30 Mc, relatively slow movement of air past the bulb is sufficient to prevent exceeding the specified plate-seal temperature of 170° C. At frequencies above 30 Mc, special attention should be given to adequate cooling of bulb and plate seal. A small stream of air directed toward the upper part of the bulb will generally provide sufficient cooling.

← Indicates a change.

World Radio History

Intermittent service ("On" period does not exceed 5 minutes and is followed by "off" period of the same or greater duration): In this service, a plate-seal temperature as high as 220°C is permissible. At frequencies below 30 Mc and for ambient temperatures below 30° C, forced-air cooling of the bulb and plate seal is not usually required, provided a heat-radiating plate connector is used, and free circulation of air is provided. At frequencies above 30 Mc, special attention should be given to adequate cooling to prevent exceeding the specified plate-seal temperature.

Plate-Seal Temperature (Measured on top of plate cap):		
Continuous service.	170 max.	°C
Intermittent service (As defined above) .	220 max.	°C

Components:

Socket. . . E.F. Johnson Co. Socket No. 122-275, or equivalent
Heat-Radiating Plate Connector. . . Eimac HR-6, or equivalent

AF POWER AMPLIFIER & MODULATOR — Class AB_1[b]

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE.	3000 max.	volts
DC GRID-No. 2 VOLTAGE.	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[d]	225 max.	ma
GRID-No. 2 INPUT[d].	20 max.	watts
PLATE DISSIPATION[d].	125 max.	watts

→ **AF POWER AMPLIFIER & MODULATOR — Class AB_2[e]**

Maximum Ratings, *Absolute-Maximum Values:*

	CCS[c]	*ICAS*[f]	
DC PLATE VOLTAGE.	3000 max.	3200 max.	volts
DC GRID-No. 2 VOLTAGE.	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[d] . .	225 max.	250 max.	ma
GRID-No. 2 INPUT[d].	20 max.	20 max.	watts
PLATE DISSIPATION[d].	125 max.	125 max.	watts

→ **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:*

	CCS[c]	*ICAS*[f]	
	Up to 120 Mc	*Up to 30 Mc*	
DC PLATE VOLTAGE.	2500 max.	3200 max.	volts
DC GRID-No. 2 VOLTAGE.	400 max.	400 max.	volts
DC GRID-No. 1 VOLTAGE.	-500 max.	-500 max.	volts
DC PLATE CURRENT.	200 max.	200 max.	ma
GRID-No. 2 INPUT	20 max.	20 max.	watts
GRID-No. 1 INPUT	5 max.	5 max.	watts
PLATE DISSIPATION	85 max.	100 max.	watts

→ indicates a change.

World Radio History

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[g]
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum Ratings, *Absolute-Maximum Values:*

	CCS[c]	*ICAS*[f]	
	Up to 120 Mc	*Up to 30 Mc*	
DC PLATE VOLTAGE.	3000 max.	4000 max.	volts
DC GRID-No. 2 VOLTAGE.	400 max.	400 max.	volts
DC GRID-No. 1 VOLTAGE.	-500 max.	-500 max.	volts
DC PLATE CURRENT.	225 max.	225 max.	ma
GRID-No. 2 INPUT	20 max.	20 max.	watts
GRID-No. 1 INPUT	5 max.	5 max.	watts
PLATE DISSIPATION	125 max.	125 max.	watts

[a] Without external shield.

[b] Subscript 1 indicates that grid-No. 1 current does not flow during any part of the input cycle.

[c] Continuous Commercial Service.

[d] Averaged over any audio-frequency cycle of sine-wave form.

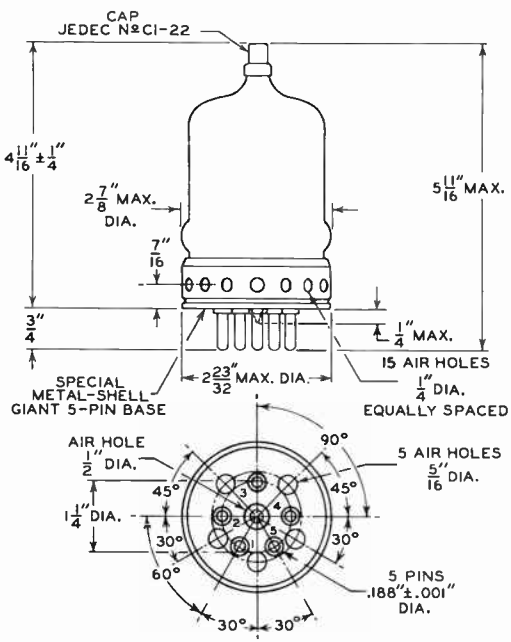
[e] Subscript 2 indicates that grid-No. 1 current flows during some part of the input cycle.

[f] Intermittent Commercial and Amatuer Service.

[g] 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.

World Radio History

4-125A/4D21



92CS-6764R2

World Radio History

4-125A/4D21
VHF POWER TETRODE

GENERAL DATA

Electrical:

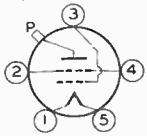
Filament, Thoriated Tungsten:		
Voltage	5.0	ac or dc volts
Current	6.5	amp
Transconductance, for plate current of 50ma.	2450	μmhos
Grid-Screen Mu-Factor	6.2	
Direct Interelectrode Capacitances:		
Grid No.1 to Plate*	0.05	μμf
Input	10.8	μμf
Output	3.1	μμf

* With no external shielding and base shell connected to ground.

Mechanical:

Mounting Position	Vertical, Base Up or Down
Overall Length	5-7/16" ± 1/4"
Seated Length	4-11/16" ± 1/4"
Maximum Diameter	2-7/8"
Cap	Skirted Small
Base	Special Metal-Shell Giant 5-Pin
Basing Designation	BOTTOM VIEW 5BK

Pin 1 – Filament
Pin 2 – Grid No.2
Pin 3 – Grid No.1
Pin 4 – Grid No.2
Pin 5 – Filament
Cap – Plate



AF POWER AMPLIFIER & MODULATOR – Class AB2▲

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	3000 max. volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max. volts
MAX.-SIGNAL DC PLATE CURRENT**	225 max. ma.
GRID-No.2 DISSIPATION**	20 max. watts
PLATE DISSIPATION**	125 max. watts

Typical Operation with Fixed Bias:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage	350	350	350	350	volts
DC Grid-No.1 (Control Grid) Voltage	-41	-45	-43	-51	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	282	210	178	198	volts

▲,**: See next page.

World Radio History

4-125A/4D21
VHF POWER TETRODE

Zero-Sig. DC Plate Cur. . .	87	72	93	55	. .	ma.
Max.-Sig. DC Plate Cur. . .	400	300	260	260	. .	ma.
Zero-Sig. DC Grid-No.2 Cur.	0	0	0	0	. .	ma.
Max.-Sig. DC Grid-No.2 Cur.	34	5	6	3.5	. .	ma.
Effective Load Resistance (plate to plate) . .	7200	13600	22200	27700	. .	ohms
Peak Grid-No.1 Input Power○	5.2	3.1	2.4	2.5	. .	watts
Max.-Sig. Power Output○○ . .	350	350	400	520	. .	watts
Total Harmonic Distortion○○	2.5	1	2.2	1.8	. .	%

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	2500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-500 max.	volts
DC PLATE CURRENT	200 max.	ma.
PLATE DISSIPATION.	85 max.	watts
GRID-No.2 DISSIPATION.	20 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

Typical Operation:

DC Plate Voltage	2000	2500	. .	volts
DC Grid-No.2 Voltage◆.	350	350	. .	volts
	50000	70000	. .	ohms
DC Grid-No.1 Voltage	-220	-210	. .	volts
Peak RF Grid-No.1 Voltage (Approx.).	375	360	. .	volts
DC Plate Current	150	152	. .	ma.
DC Grid-No.2 Current	33	30	. .	ma.
DC Grid-No.1 Current	10	9	. .	ma.
Driving Power (Approx.).	3.8	3.3	. .	watts
Power Output (Approx.)	225	300	. .	watts

RF POWER AMPLIFIER AND OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-500 max.	volts
DC PLATE CURRENT	225 max.	ma.
PLATE DISSIPATION.	125 max.	watts
GRID-No.2 DISSIPATION.	20 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

Typical Operation:

DC Plate Voltage	2000	2500	3000 . .	volts
DC Grid-No.2 Voltage	350	350	350 . .	volts

▲, **, ○, ○○, ◆: See next page.

World Radio History

4-125A/4D21
VHF POWER TETRODE

DC Grid-No.1 Voltage.	-100	-150	-150	. . volts
Peak RF Grid-No.1 Volt. (Approx.)	230	320	280	. . volts
DC Plate Current.	200	200	167	. . ma.
DC Grid-No.2 Current.	50	40	30	. . ma.
DC Grid-No.1 Current.	12	12	9	. . ma.
Driving Power (Approx.)	2.8	3.8	2.5	. . watts
Power Output (Approx.).	285	375	375	. . watts

▲ Subscript (2) indicates that grid-No.1 current flows during a part of input cycle.

** Averaged over any audio-frequency cycle of sine-wave form.

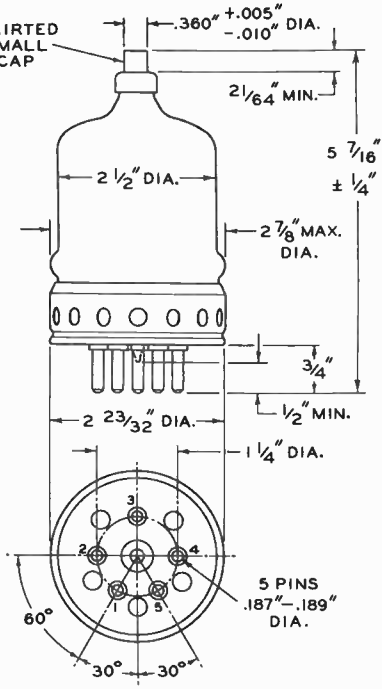
° Driver stage should be capable of supplying the No.1 grids of the class AB_2 stage with the specified driving power at low distortion. The effective resistance per grid-No.1 circuit of the class AB_2 stage should be kept below 250 ohms.

°° With zero-impedance driver and perfect regulation, plate-circuit distortion will be as indicated. In practical circuit design, the useful power output will be several per cent less than the values shown.

♦ Obtained from fixed supply or through resistor of value indicated in series with the modulated plate supply.

World Radio History

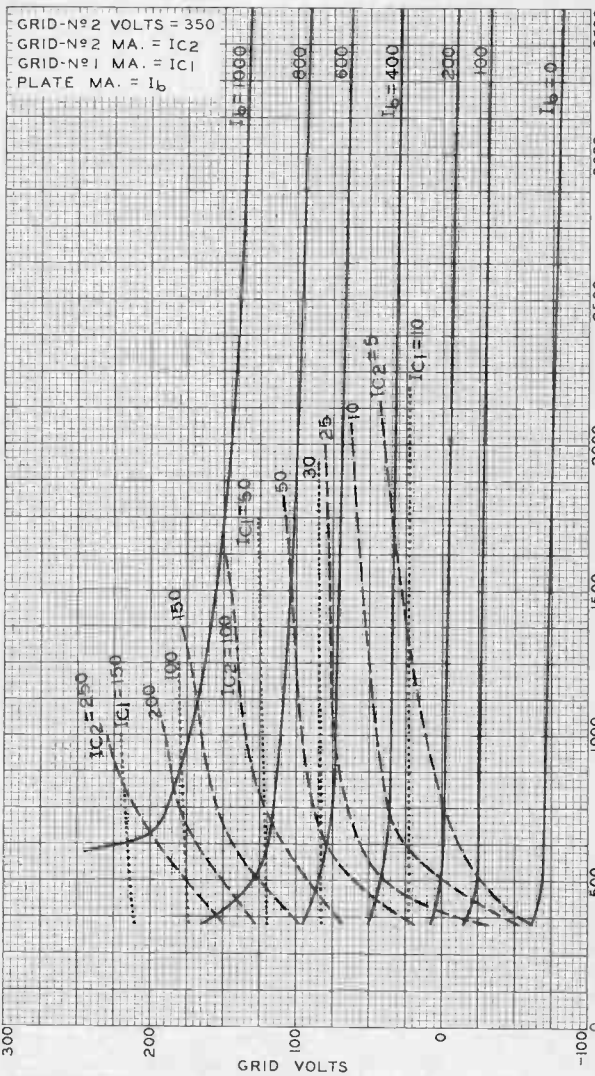
4-125A/4D21
VHF POWER TETRODE



Powered by Tung-Sol
World Radio History

4-125A/4D21

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAY 21, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6767

World Radio History

World Radio History

4E27/8001

TRANSMITTING BEAM POWER AMPLIFIER

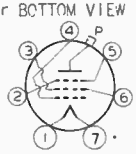
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	5.0	a-c or d-c volts
Current	7.5	amp.
Transconductance for plate current of 75 ma.	2800	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate	0.06	μμf
Input	12	μμf
Output	6.5	μμf

Physical:

Overall Length	5-15/16" ± 1/4"
Seated Length	5-5/16" ± 1/4"
Maximum Diameter	2-11/16"
Mounting Position	Vertical Only: Base up or down
Bulb	T-21
Base	Medium Metal Shell Giant 7-Pin, Bayonet
Basing Designation for BOTTOM VIEW	7BM



Pin 1 - Filament
Pin 2 - Grid No.3
Pin 3 - Grid No.2
Pin 4 - Grid No.1
Pin 5 - Grid No.3
Pin 6 - Grid No.2
Pin 7 - Filament
Bulb } - Plate
Ter- } - Plate
minal }
Base } - {Internal
Shell } {Shield

A-F POWER AMPLIFIER & MODULATOR - Class A1

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	2000 max.	volts
D-C SCREEN VOLTAGE (Grid No.2)	750 max.	volts
D-C PLATE CURRENT	150 max.	ma.
D-C SCREEN CURRENT	40 max.	ma.
PLATE INPUT	75 max.	watts
SCREEN INPUT	30 max.	watts
PLATE DISSIPATION	75 max.	watts

Typical Operation:

D-C Plate Voltage	500	1000	volts
D-C Suppressor Voltage (Grid No.3)◇	60	0	volts
D-C Screen Voltage	500	300	volts
D-C Grid Voltage (Grid No.1)*#	-47	-27	volts
Peak A-F Grid Voltage	47	27	volts
D-C Plate Current	150	75	ma.
D-C Screen Current	10	5	ma.
Load Resistance	2600	12000	ohms
Power Output	30	34 approx.	watts

*; #: See next page. ◇ : See end of tabulation. ◄ Indicates a change.

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

World Radio History

4E27

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	2000 max.	volts
D-C SUPPRESSOR VOLTAGE (Grid No.3)	-500 max.	volts
D-C SCREEN VOLTAGE (Grid No.2)	600 max.	volts
D-C GRID VOLTAGE (Grid No.1)	-500 max.	volts
D-C PLATE CURRENT	100 max.	ma.
D-C GRID CURRENT	25 max.	ma.
PLATE INPUT	110 max.	watts
SCREEN INPUT	27 max.	watts
PLATE DISSIPATION	75 max.	watts

Typical Operation:

D-C Plate Voltage	1500	2000	volts
D-C Suppressor Voltage◊	-210	-300	volts
D-C Screen Voltage**	500	600	volts
	22000	30000	ohms
D-C Grid Voltage	-130	-130	volts
Peak A-F Suppressor Voltage	210	300	volts
Peak R-F Grid Voltage	195	150	volts
D-C Plate Current	70	55	ma.
D-C Screen Current	44	45	ma.
D-C Grid Current	8	3	approx. ma.
Driving Power°	1.4	0.4	approx. watts
Power Output	33	35	approx. watts

* For a-c filament supply.

◊ Obtained from fixed supply or by cathode resistor. The d-c resistance in the grid circuit should not exceed 50000 ohms with fixed bias, or 500000 ohms with cathode bias.

** Obtained preferably from plate-voltage supply through series resistor of value shown.

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	3000 max.	volts
D-C SCREEN VOLTAGE (Grid No.2)	600 max.	volts
D-C GRID VOLTAGE (Grid No.1)	-500 max.	volts
D-C PLATE CURRENT	135 max.	ma.
D-C SCREEN CURRENT	30 max.	ma.
D-C GRID CURRENT	25 max.	ma.
PLATE INPUT	250 max.	watts
SCREEN INPUT	18 max.	watts
PLATE DISSIPATION	65 max.	watts

◄ Indicates a change.

World Radio History

4E27

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

Typical Operation:

D-C Plate Voltage	1500	2500	volts
D-C Suppressor Voltage(Grid No.3)◇	60	60	volts
D-C Screen Voltage ##	600	600	volts
	82000	240000	ohms
D-C Grid Voltage***	-200	-200	volts
	145000	330000	ohms
	110000	250000	ohms
	310	450	ohms
Peak R-F Grid Voltage	255	220	volts
D-C Plate Current	135	100	ma.
D-C Screen Current	11	8	ma.
D-C Grid Current	1.4	0.6	approx. ma.
Driving Power	0.4	0.1	approx. watt
Power Output	145	200	approx. watts

Obtained preferably from modulated fixed supply. May also be obtained from modulated plate-voltage supply through series resistor of values shown.

***Obtained from fixed supply, grid resistor (145000,330000), or combination of cathode resistor (310,450) and grid resistor (110000,250000).

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation▲

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	4000 max.	volts
D-C SCREEN VOLTAGE (Grid No.2)	750 max.	volts
D-C GRID VOLTAGE (Grid No.1)	-500 max.	volts
D-C PLATE CURRENT	150 max.	ma.
D-C SCREEN CURRENT	30 max.	ma.
D-C GRID CURRENT	25 max.	ma.
PLATE INPUT	300 max.	watts
SCREEN INPUT	25 max.	watts
PLATE DISSIPATION	75 max.	watts

Typical Operation:

D-C Plate Voltage	2000	3000	volts
D-C Suppressor Voltage(Grid No.3)◇	0	60	volts
D-C Screen Voltage△	750	750	volts
	70000	280000	ohms
D-C Grid Voltage□	-200	-200	volts
	300000	----	ohms
	1200	1800	ohms
Peak R-F Grid Voltage	225	170	volts
D-C Plate Current	150	100	ma.
D-C Screen Current	18	8	ma.
D-C Grid Current	0.7	0	approx. ma.
Driving Power	0.2	0	approx. watt
Power Output	230	235	approx. watts

◇; ▲; △; □: See next page.

← Indicates a change.

World Radio History

4E27

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

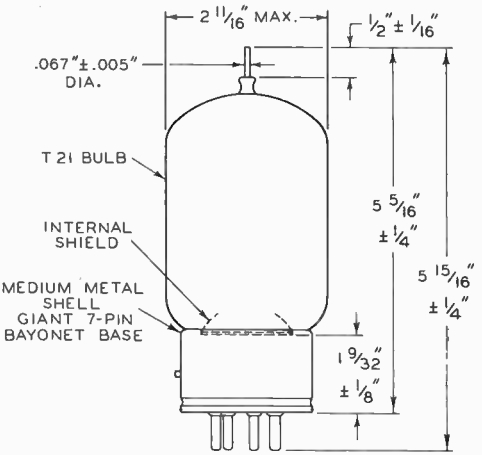
◇ Suppressor should be connected to the mid-point of filament circuit operated on a.c., or to the negative end of the filament operated on d.c.

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

Δ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown. Series screen resistor should be used only where 4E27 is employed as buffer amplifier and is not keyed. The screen voltage must not exceed 1500 volts under key-up conditions.

□ Obtained from fixed supply, grid resistor (300000), or cathode resistor (1200, 1800). When a preceding stage is keyed, sufficient fixed bias must be used to maintain the plate current at a low value when the key is up.

Data on operating frequencies for the 4E27/8001 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



92CM-6260RI

← Indicates a change.

World Radio History

AVERAGE PLATE CHARACTERISTICS

4E27

E_f = 5.0 VOLTS D.C. SCREEN VOLTS = 500
SUPPRESSOR VOLTS = 0

CONTROL-GRID VOLTS E_{C1}=0

+50

+25

I_b

I_{C2}

E_{C1}=+20

+12

+6

0

-6

-25

-50

-75

E_{C1} = -100

PLATE (I_b) OR SCREEN (I_{C2}) MILLIAMPERES

0 200 400 600 800

PLATE VOLTS

500 1000 1500 2000 2500 3000 3500

MAR. 26, 1945

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6261R1

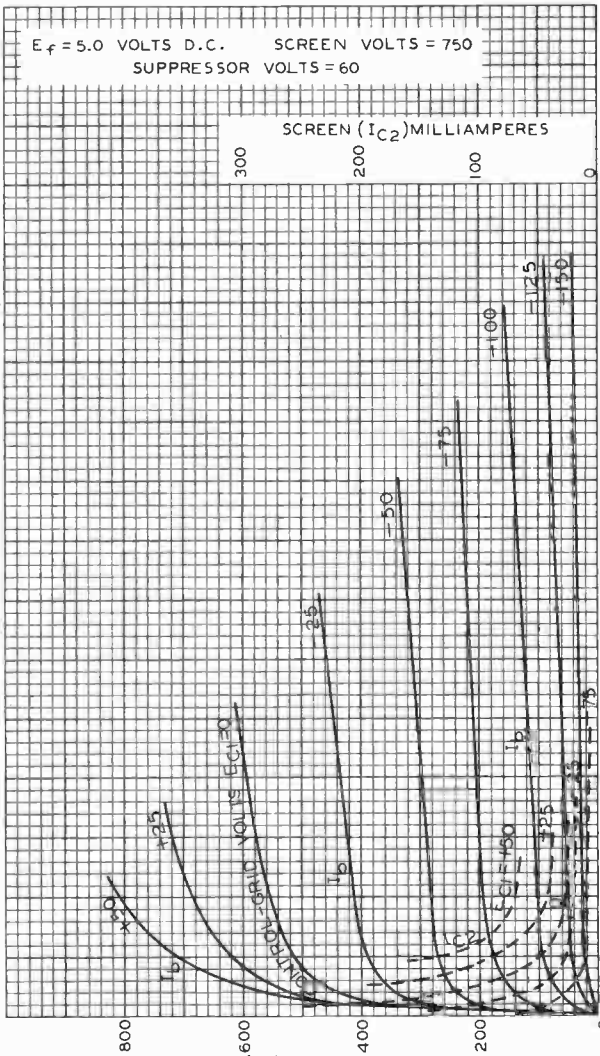
4E27

World Radio History

4E27

4E27

AVERAGE PLATE CHARACTERISTICS



JAN. 22, 1945

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6259R1

World Radio History

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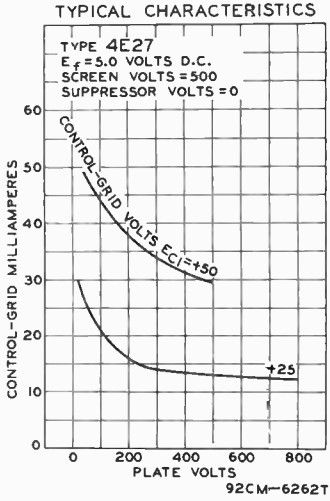
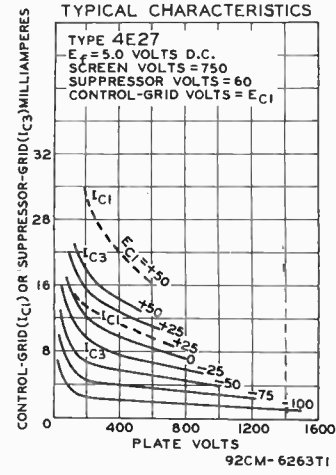
TRANSMITTING BEAM POWER AMPLIFIER





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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

4E27A/5-125B
BEAM POWER TUBE

Full Input at Frequencies up to 75 Mc

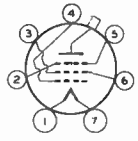
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	5.0	ac or dc volts
Current	7.5	amp
Transconductance (Approx.) For plate volts = 2500, grid-No.3 volts = 0, grid-No.2 volts = 500, and plate ma. = 50	2150	μmhos
Mu-Factor, Grid No.2 to Grid No.1	5	
Direct Interelectrode Capacitances:		
Grid No.1 to plate*	0.08	μμf
Input	10.5	μμf
Output	4.7	μμf

Mechanical:

Mounting Position	Vertical, base down or up ←
Maximum Overall Length	5-9/16" ←
Seated Length	5-3/8" ± 1/4"
Maximum Diameter	2-3/4"
Plate Terminal	See Dimensional Outline
Weight	6 ounces ←
Base	Ventilated Medium-Metal-Shell Giant 7-Pin
Basing Designation for BOTTOM VIEW	7BM



Pin 1 – Filament
Pin 2 – Grid No.3
Pin 3 – Grid No.2
Pin 4 – Grid No.1
Pin 5 – Grid No.3
Pin 6 – Grid No.2
Pin 7 – Filament
Bulb Terminal – Plate

Seal Temperature (Plate and stem)	225 max.	°C
Bulb Temperature (At hottest point)	250 max.	°C

Components:

Socket	Johnson No.122-237, or equivalent
Heat-Radiating Plate Connector (Supplied with tube)	Eimac HR-5

AF POWER AMPLIFIER & MODULATOR – Class AB_1† ←

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

* With no external shielding and base shell connected to ground.

®: See next page.

← Indicates a change.

World Radio History

4E27A

BEAM POWER TUBE

DC PLATE CURRENT*	200 max.	ma
PLATE DISSIPATION*	125 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION*	20 max.	watts
GRID-No.2 DISSIPATION*	20 max.	watts
GRID-No.1 DISSIPATION*	5 max.	watts

→ **Typical Operation:**

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.3 Voltage	0	0	0	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage◊	-70	-80	-85	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	140	160	170	volts
Zero-Signal DC Plate Current	110	85	65	ma
Max.-Signal DC Plate Current	205	210	220	ma
Zero-Signal DC Grid-No.2 Current (Approx.)	0	0	0	ma
Max.-Signal DC Grid-No.2 Current (Approx.)	15	13	8	ma
Effective Load Resistance (Plate to plate)	13700	18000	20000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	watts
Max.-Signal Power Input	310	420	550	watts
Max.-Signal Power Output (Approx.)	200	250	300	watts

→ **Maximum Circuit Values:**

DC Resistance in Series with Grid No.1 of Each Tube	0.25 max.	megohm

→ **AF POWER AMPLIFIER & MODULATOR — Class AB_2#**

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	200 max.	ma
PLATE DISSIPATION	125 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION	20 max.	watts
GRID-No.2 DISSIPATION	20 max.	watts
GRID-No.1 DISSIPATION	5 max.	watts

* Averaged over any audio-frequency cycle of sine-wave form.

\# Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

*,◊: See next page.

→ indicates a change.

Mouser Electronics

4E27A

BEAM POWER TUBE

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.3 Voltage	60	0	0	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage◇	-70	-80	-85	volts
Grid-No.1-to-Grid-No.1 Voltage	200	200	190	volts
Zero-Signal DC Plate Current	110	85	65	ma
Max.-Signal DC Plate Current	365	295	250	ma
Zero-Signal DC Grid-No.2 Current (Approx.)	0	0	0	ma
Max.-Signal DC Grid-No.2 Current (Approx.)	11	16	13	ma
Effective Load Resistance (Plate to plate)	7300	13000	20000	ohms
Max.-Signal Driving Power (Approx.)	0.5	0.3	0.2	watt
Max.-Signal Power Input	550	590	625	watts
Max.-Signal Power Output (Approx.)	300	350	400	watts

GRID No.3-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max. volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max. volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max. volts
DC PLATE CURRENT	200 max. ma
PLATE DISSIPATION	125 max. watts
GRID-No.3 (SUPPRESSOR) DISSIPATION	20 max. watts
GRID-No.2 DISSIPATION	20 max. watts
GRID-No.1 DISSIPATION	5 max. watts

Typical Operation:

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.3 Voltage	-220	-260	-305	volts
Fixed DC Grid-No.2 Supply Voltage	610	645	650	volts
DC Grid-No.2 Voltage	400	400	400	volts
From a series grid-No.2 resistor of	5500	9100	10000	ohms
DC Grid-No.1 Voltage	-170	-180	-190	volts
Peak AF Grid-No.3 Voltage	220	260	305	volts
Peak RF Grid-No.1 Voltage	230	235	245	volts
DC Plate Current	59	59	59	ma

◇ Adjust to stated zero-signal dc plate current.

←Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

4E27A

BEAM POWER TUBE

DC Grid-No.2 Current (Approx.) . .	38	27	25	ma
DC Grid-No.1 Current (Approx.) . .	6	5	5	ma
Driving Power (Approx.)	1.4	1.3	1.2	watts
Power Output (Approx.)	35	50	61	watts

PLATE-MODULATED RF POWER AMPLIFIER—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3200 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-500 max.	volts
DC PLATE CURRENT	160 max.	ma
PLATE DISSIPATION	85 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION . . .	20 max.	watts
GRID-No.2 DISSIPATION	20 max.	watts
GRID-No.1 DISSIPATION	5 max.	watts

→**Typical Operation with Grid No.3 Grounded and Grid-No.2 Volts = 500:**

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-195	-200	-205	volts
Peak AF Grid-No.2 Voltage	350	350	350	volts
Peak RF Grid-No.1 Voltage	265	270	275	volts
DC Plate Current	150	151	152	ma
DC Grid-No.2 Current (Approx.) . .	18	17	16	ma
DC Grid-No.1 Current (Approx.) . .	7	8	8	ma
Driving Power (Approx.)	2	2	2	watts
Power Output (Approx.)	153	220	295	watts

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy□ and RF POWER AMPLIFIER—Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-500 max.	volts
DC PLATE CURRENT	200 max.	ma
PLATE DISSIPATION.	125 max.	watts
GRID-No.3 (SUPPRESSOR) DISSIPATION	20 max.	watts
GRID-No.2 DISSIPATION.	20 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

● Continuous Commercial Service.

□ 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.

●,□: See next page.

→Indicates a change.

Mouser Electronics

4E27A

BEAM POWER TUBE

Typical Operation with Grid No.3 Grounded and Grid-No.2 Volts = 500:

DC Plate Voltage	1000	2000	3000	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-120	-150	-200	volts
Peak RF Grid-No.1 Voltage	170	240	270	volts
DC Plate Current	145	200	167	ma
DC Grid-No.2 Current (Approx.)	17	23	12	ma
DC Grid-No.1 Current (Approx.)	6	11	7	ma
Driving Power (Approx.)	1	2.6	1.9	watts
Power Output (Approx.)	90	275	375	watts

Typical Operation with Grid No.3 Grounded and Grid-No.2 Volts = 750:

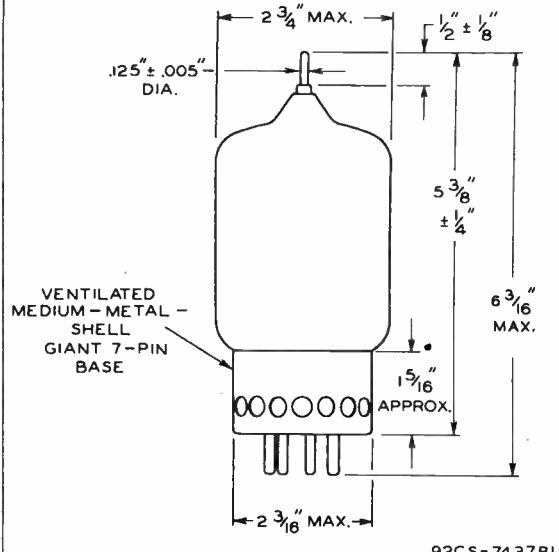
DC Plate Voltage	1000	2000	3000	volts
DC Grid-No.2 Voltage	750	750	750	volts
DC Grid-No.1 Voltage	-170	-200	-250	volts
Peak RF Grid-No.1 Voltage	205	257	290	volts
DC Plate Current	160	200	167	ma
DC Grid-No.2 Current (Approx.)	21	22	9	ma
DC Grid-No.1 Current (Approx.)	3	6	3	ma
Driving Power (Approx.)	0.6	1.5	0.9	watts
Power Output (Approx.)	115	300	375	watts

Typical Operation with Grid-No.3 Volts = 60 and Grid-No.2 Volts = 500:

DC Plate Voltage	1000	2000	3000	volts
DC Grid-No.3 Voltage	60	60	60	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-120	-150	-200	volts
Peak RF Grid-No.1 Voltage	170	222	260	volts
DC Plate Current	167	200	167	ma
DC Grid-No.3 Current (Approx.)	6	4	3	ma
DC Grid-No.2 Current (Approx.)	11	11	5	ma
DC Grid-No.1 Current (Approx.)	6	8	6	ma
Driving Power (Approx.)	1	1.8	1.6	watts
Power Output (Approx.)	120	300	375	watts

World Radio History

4E27A
BEAM POWER TUBE



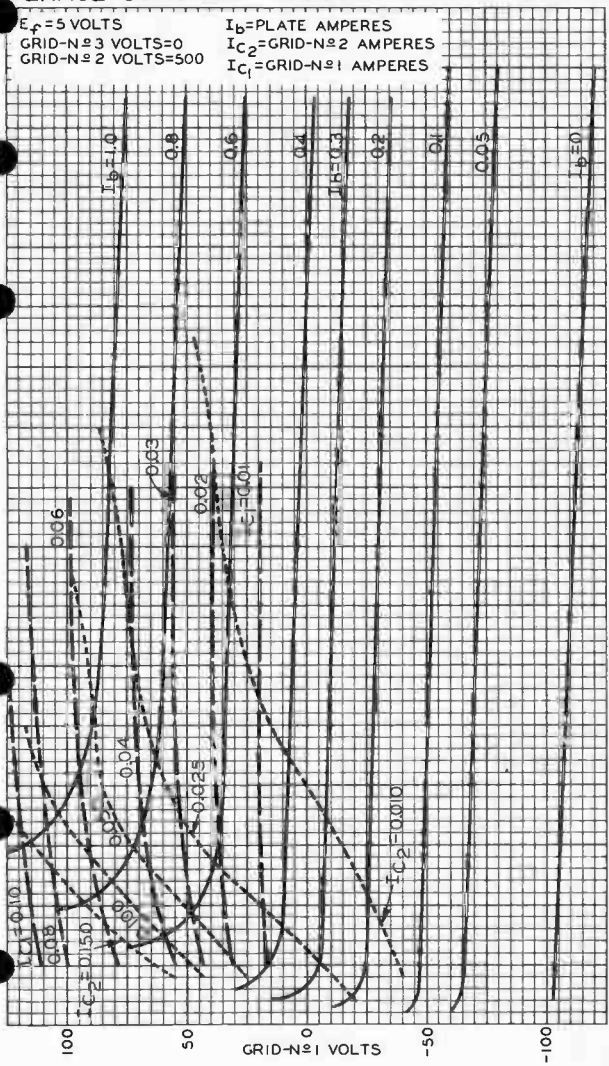
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

4E27A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



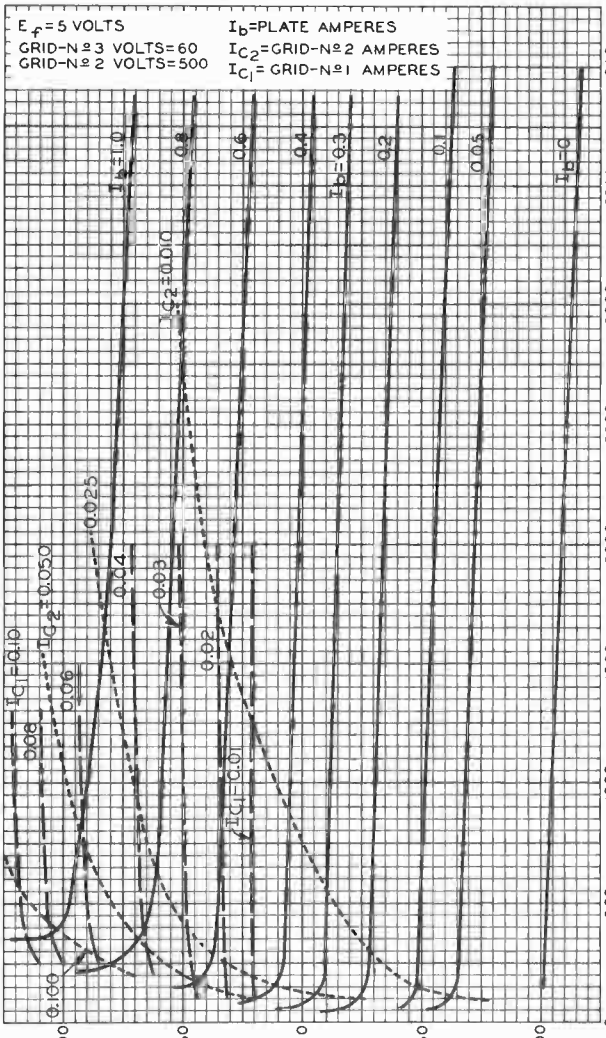
World Radio History

4E27A

RCA

4E27A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



JULY 20, 1950

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7513

4X150A

BEAM POWER TUBE

FORCED-AIR COOLED

Useful at frequencies up to 500 Mc

GENERAL DATA

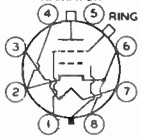
Electrical:

Heater, for Unipotential Cathode:		
Voltage§	6.0 ± 10%	ac or dc volts
Current at 6.0 volts	2.6	amp
Minimum heating time	30	sec
Mu-Factor, Grid No.2 to Grid No.1, for grid-No.2 volts = 300 and grid-No.2 ma. = 50	5	
Direct Interelectrode Capacitances:◇		
Grid No.1 to plate	0.02	μμf
Grid No.1 to cathode, grid No.2, and heater	16	μμf
Plate to cathode, grid No.2, and heater	4.2	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	2-15/32"
Maximum Seated Length	1.912"
Maximum Diameter	1.635"
Weight (Approx.)	5 oz
Radiator	Integral part of tube
Socket	Eimac 4X150A Air-System Socket, or equivalent
Base	Special 8-Pin

BOTTOM VIEW



Pin 1◆ - Grid No.2
Pin 2 - Cathode
Pin 3 - Heater
Pin 4 - Cathode
Pin 5 - Internal Connection - Do Not Use
Pin 6 - Cathode
Pin 7 - Heater
Pin 8 - Cathode
Base Index Plug - Grid No.1
Radiator - Plate
Ring Surface Terminal■ - Grid No.2

Air Flow:

Through Radiator—Under any condition, the air flow must be adequate to limit the temperature of the radiator to its specified maximum value. The air flow must be applied before or simultaneously with electrode voltages and may be removed simultaneously with them. Typical values of air flow for various plate dissipations are shown in the table below.

Percentage of Max. Rated Plate Dissipation for Each Class of Service	100	80	60	per cent
Minimum Air flow	5.6	4.1	2.5	cfm
Static Pressure	0.26	0.14	0.05	in. of water

§ Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

◆ For use at lower frequencies.

■ For use at higher frequencies.

◇: See next page.

← Indicates a change.

World Radio History

4X150A

BEAM POWER TUBE

To Base--Forced-air cooling of the base end of the tube must be provided to limit the temperature of the base seals to the specified value.

Through Eimac 4X150A Air System Socket--This fitting directs the air over the base seals, past the grid-No.2 seal and glass envelope, and through the radiator to provide effective cooling with minimum air flow. When the tube is operated at maximum plate dissipation, a minimum air flow of 7.5 cfm is required through the socket and radiator. The corresponding pressure drop is 0.6 inch of water. These requirements are for operation at sea level and at an ambient temperature of 20°C. At higher altitudes and ambient temperatures, the air flow must be increased and must be adequate to limit the radiator and seal temperatures to 150°C.

Radiator Temperature (Measured on metal surface between radiator core and glass envelope)	150 max.	°C
Temperature of Base Seals and Envelope Seals.	150 max.	°C

AF POWER AMPLIFIER & MODULATOR - Class AB_1◆

Maximum CCS° Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1250 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	250 max.	ma
PLATE DISSIPATION*	150 max.	watts
GRID-No.2 DISSIPATION*	12 max.	watts
→ PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	150 max.	volts
Heater positive with respect to cathode	150 max.	volts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	600	800	1000	1250	volts
DC Grid-No.2 Voltage	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage	-44	-47	-47	-48	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	88	94	94	96	volts
Zero-Signal DC Plate Current	160	120	120	115	ma
Max.-Signal DC Plate Current	380	380	380	390	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current	65	65	60	40	ma

◆ Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

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

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

4X150A

BEAM POWER TUBE

Effective Load Resistance (Plate to plate)	3550	4625	5850	7200	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	0	watts
Max.-Signal Power Output (Approx.)	140	195	240	310	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance (Per tube)	0.1 max.	megohm

AF POWER AMPLIFIER & MODULATOR - Class AB_2#

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1250 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	250 max.	ma
PLATE DISSIPATION*	150 max.	watts
GRID-No.2 DISSIPATION*	12 max.	watts
GRID-No.1 (CONTROL-GRID) DISSIPATION	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

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	600	800	1000	1250	volts
DC Grid-No.2 Voltage	300	300	300	300	volts
DC Grid-No.1 Voltage	-41	-43	-43	-44	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	94	96	98	100	volts
Zero-Signal DC Plate Current	185	160	165	180	ma
Max.-Signal DC Plate Current	485	490	495	475	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current	80	75	70	65	ma
Effective Load Resistance (Plate to plate)	2600	3500	4600	5600	ohms
Max.-Signal Driving Power (Approx.)	0.15	0.15	0.15	0.15	watt
Max.-Signal Power Output (Approx.)	170	240	315	425	watts

* Averaged over any audio-frequency cycle of sine-wave form.

\# Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

°,•: See next page.

→ Indicates a change.

4X150A

BEAM POWER TUBE

RF POWER AMPLIFIER - Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS® Ratings, *Absolute Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE	1250 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-250 max.	volts
DC PLATE CURRENT (AVERAGE)®	250 max.	ma
PLATE DISSIPATION	150 max.	watts
GRID-No.2 DISSIPATION	12 max.	watts
GRID-No.1 DISSIPATION	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

Typical Operation (With bandwidth of 5 Mc):

DC Plate Voltage	750	1000	1250	volts
DC Grid-No.2 Voltage	300	300	300	volts
DC Grid-No.1 Voltage	-60	-65	-70	volts
Peak RF Grid-No.1 Voltage:				
Synchronizing level	85	95	100	volts
Pedestal level	65	70	75	volts
DC Plate Current:				
Synchronizing level	335	330	305	ma
Pedestal level	245	240	230	ma
DC Grid-No.2 Current:				
Synchronizing level	50	45	45	ma
Pedestal level	20	15	10	ma
DC Grid-No.1 Current:				
Synchronizing level	15	20	25	ma
Pedestal level	4	4	4	ma
Driver Power Output (Approx.):♦				
Synchronizing level	7	8	9	watts
Pedestal level	4.25	4.7	5.5	watts
Useful Power Output (Approx.):				
Synchronizing level	135	200	250	watts
Pedestal level	75	110	140	watts

PLATE-MODULATED RF POWER AMPLIFIER -- Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values:*

	Up to 500 Mc	
DC PLATE VOLTAGE	1000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts

® Averaged over any frame.

°,•,♦: See next page.

→ indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4X150A

BEAM POWER TUBE

DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .				−250 max.	volts
DC PLATE CURRENT				200 max.	ma
PLATE DISSIPATION				100 max.	watts
GRID-No.2 DISSIPATION				12 max.	watts
GRID-No.1 DISSIPATION				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
Typical Operation at Frequencies up to 165 Mc:					
DC Plate Voltage.	400	600	800	1000	volts
DC Grid-No.2 Voltage (Modulated approx. 55%)▲. .	250	250	250	250	volts
DC Grid-No.1 Voltage.	−90	−95	−100	−105	volts
Peak AF Grid-No.2 Voltage (For 100% modulation) . . .	140	150	160	170	volts
Peak RF Grid-No.1 Voltage . .	110	120	120	125	volts
DC Plate Current.	200	200	200	200	ma
DC Grid-No.2 Current.	40	35	25	20	ma
DC Grid-No.1 Current (Approx.)	7	8	10	15	ma
Driving Power (Approx.) . . .	1	1	1.5	2	watts
Power Output (Approx.). . . .	55	80	100	140	watts
Maximum Circuit Values:					
Grid-No.1-Circuit Resistance.				25000 max.	ohms

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy† and RF POWER AMPLIFIER - Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

	Up to 500 Mc	
DC PLATE VOLTAGE.	1250 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE. . . .	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	−250 max.	volts
DC PLATE CURRENT.	250 max.	ma
PLATE DISSIPATION	150 max.	watts
GRID-No.2 DISSIPATION	12 max.	watts
GRID-No.1 DISSIPATION	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

▲ The dc grid-No.2 voltage must be modulated approximately 55% in phase with the plate modulation in order to obtain 100% modulation of the 4X150A. The use of a series grid-No.2 resistor or reactor may not give satisfactory performance and is therefore not recommended.

● Continuous Commercial Service.

† 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.

°, ♦: See next page.

→ Indicates a change.

World Radio History

RCA

4X150A

BEAM POWER TUBE

Typical Operation at Frequencies up to 165 Mc:					
DC Plate Voltage	600	750	1000	1250	volts
DC Grid-No.2 Voltage	250	250	250	250	volts
DC Grid-No.1 Voltage	−75	−80	−80	−90	volts
Peak RF Grid-No.1 Voltage	91	96	95	106	volts
DC Plate Current	200	200	200	200	ma
DC Grid-No.2 Current	37	37	31	20	ma
DC Grid-No.1 Current (Approx.)	11	11	10	11	ma
Driving Power (Approx.)	1	1	1	1.2	watts
Power Output (Approx.)	85	110	150	195	watts

Typical Operation at Frequency of 500 Mc with Coaxial Cavity:					
DC Plate Voltage	600	800	1000	1250	volts
DC Grid-No.2 Voltage	250	250	250	280	volts
DC Grid-No.1 Voltage	−110	−110	−110	−115	volts
DC Plate Current	170	200	200	200	ma
DC Grid-No.2 Current	6	7	7	5	ma
DC Grid-No.1 Current (Approx.)	6	10	10	10	ma
Driver Power Output (Approx.)♦	15	20	25	30	watts
Useful Power Output (Approx.)	50	95	120	140	watts

Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	25000 max.	ohms

→ **CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

	Note	*Min.*	*Max.*	
Heater Current	1,5	2.3	2.9	amp
Direct Interelectrode Capacitances:[o]				
Grid No.1 to plate	–	–	0.06	μμf
Grid No.1 to cathode, grid No.2, and heater	–	14.2	17.2	μμf
Plate to cathode, grid No.2, and heater	–	3.8	4.8	μμf
Grid-No.1 Voltage	1,2,5,6	−30	−46	volts
Grid-No.2 Current	1,2,5,6	−7	+3	ma
Mu-Factor, Grid No.2 to Grid No.1	1,3,5,6	4	6	
Power Output	4,5,6	100	–	watts

[o] With cylindrical shield having inside diameter of 1-13/16" completely surrounding radiator, and insulated from the top and sides of it by a 1/16" thickness of insulating material; and with a cylindrical shield having inside diameter of 1.460" and length of 5/16" surrounding the grid-No.2 ring terminal and insulated from it. Both shields are connected to ground.

♦, Notes 1 to 6: See next page. → Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

4X150A

BEAM POWER TUBE

Note 1: With 6.0 volts on heater.

Note 2: With dc plate voltage of 1000 volts, dc grid-No.2 voltage of 300 volts, grid-No.1 voltage adjusted to give plate current of 150 ma.

Note 3: With dc grid-No.2 voltage of 300 volts, and grid-No.2 current of 50 ma.

Note 4: With heater voltage of 5.5 volts and with dc plate voltage of 1000 volts, dc grid-No.2 voltage of 250 volts, dc grid-No.1 bias of −90 volts, dc grid-No.1 current of 20 ma. maximum, grid-No.1 signal voltage adjusted to produce dc plate current of 200 ma., and a frequency of 475 Mc.

Note 5: With Forced-Air Cooling as specified under GENERAL DATA.

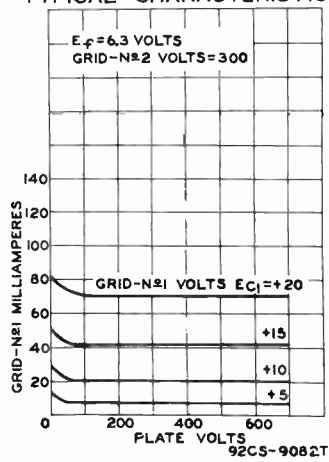
Note 6: Heater voltage must be applied for at least 30 seconds before application of other voltages.

♦ The 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, in components, in initial tube characteristics, and in tube characteristics during life.

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	500	Mc
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE AND PLATE INPUT:		
Class C Telegraphy	100	%

TYPICAL CHARACTERISTICS



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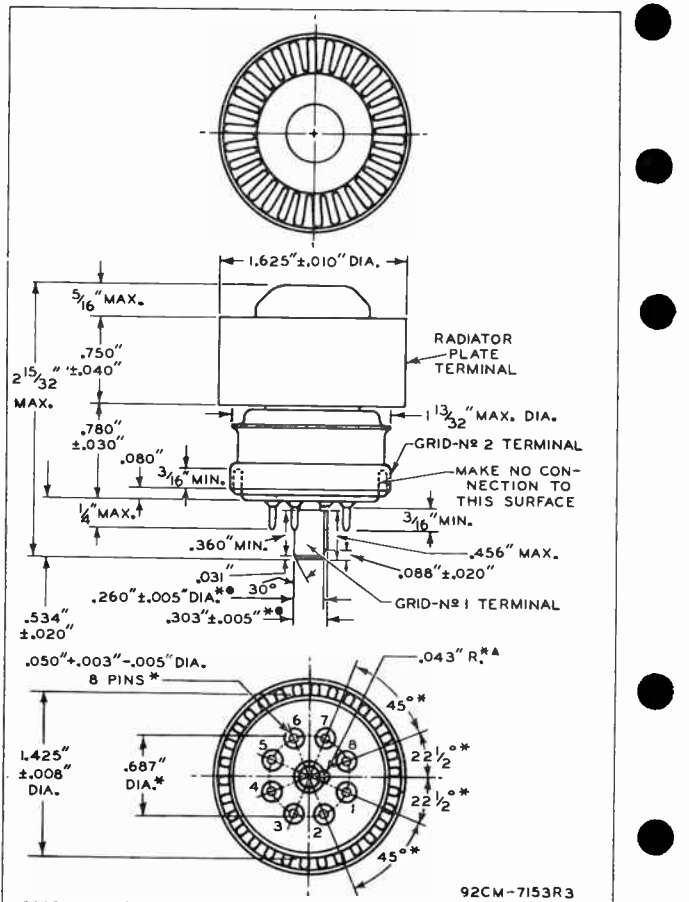
World Radio History

4X150A

BEAM POWER TUBE



GRID-No. 1 PLUG DIMENSIONS ARE MEASURED BY THE USE OF THE SERIES OF GAUGES SHOWN IN SKETCHES G_1 AND G_2. IN THE FOLLOWING INSTRUCTIONS FOR THE USE OF THESE GAUGES, "GO" INDICATES THAT THE ENTIRE GRID-No. 1 PLUG KEY WILL ENTER THE GAUGE; AND "NO-GO" INDICATES THAT THE GRID-No. 1 PLUG KEY WILL NOT ENTER THE GAUGE MORE THAN 1/16". INSTRUCTIONS FOR THE USE OF THE GAUGES FOLLOW:

*, ●, ▲: See next page.

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World Radio History

4X150A

BEAM POWER TUBE

▲ GAUGES G_1-1, G_1-2, G_1-3, AND G_1-4:

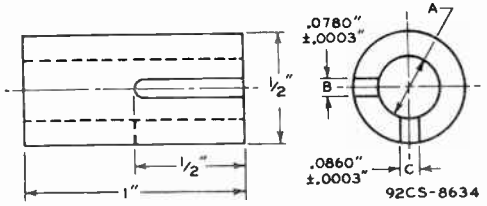
USING ONLY SLOT C, TRY THESE GAUGES IN NUMERICAL ORDER UNTIL ONE IS FOUND THAT WILL ACCEPT THE ENTIRE GRID-No. 1 PLUG. USING THE FIRST GAUGE THUS FOUND, IT WILL NOT BE POSSIBLE TO INSERT THE GRID-No.1 PLUG IN SLOT B.

● GAUGES G_2-1, G_2-2, AND G_2-3:

THE GRID-No.1 PLUG WILL BE REJECTED BY GAUGES G_2-1 AND G_2-2, BUT WILL BE ACCEPTED BY GAUGE G_2-3.

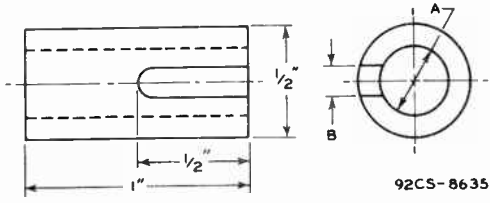
* BASE-PIN POSITIONS ARE HELD TO TOLERANCES SUCH THAT THE ENTIRE LENGTH OF THE PINS WILL, WITHOUT UNDUE FORCE, PASS INTO AND DISENGAGE FROM THE FLAT-PLATE GAUGE SHOWN IN SKETCH G_3.

GAUGE SKETCH G_1



Gauge	Dimension A
G_1-1	.2575" + .0000" − .0005"
G_1-2	.2600" + .0000" − .0005"
G_1-3	.2625" + .0000" − .0005"
G_1-4	.2650" + .0000" − .0005"

GAUGE SKETCH G_2



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

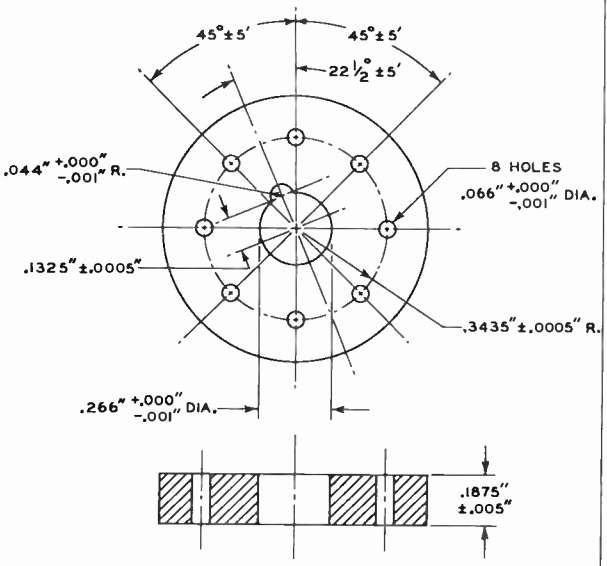
World Radio History

4X150A

BEAM POWER TUBE

Gauge	Dimension	
	A	B
G_2-1	.2550" $^{+\ .0000"}_{-\ .0005"}$	.125"
G_2-2	.2980" $^{+\ .0000"}_{-\ .0005"}$	none
G_2-3	.3080" $^{+\ .0000"}_{-\ .0005"}$	none

GAUGE SKETCH G_3



TOLERANCES ARE NOT CUMULATIVE

92CS-7975

Mouser Electronics

RCA

4X150A

AVERAGE PLATE CHARACTERISTICS

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

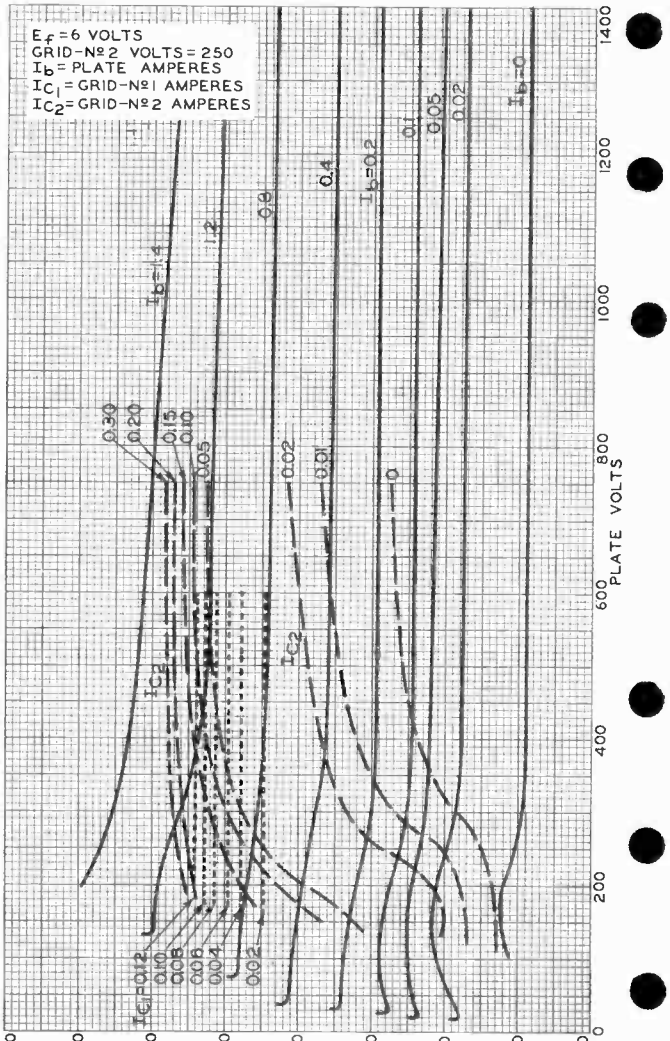
92CM-7950

World Radio History

RCA

4X150A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON NEW JERSEY

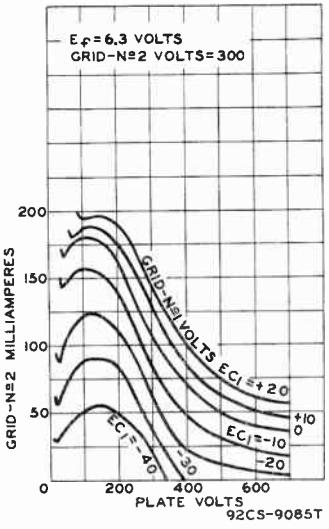
92CM-7152R2

World Radio History

4X150A

BEAM POWER TUBE

TYPICAL CHARACTERISTICS



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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

World Radio History

4X150D

BEAM POWER TUBE

FORCED-AIR COOLED

Useful at frequencies up to 500 Mc

The 4X150D is the same as the 4X150A except for the following items:

Heater, for Unipotential Cathode:

Voltage§	26.5 ± 10%	ac or dc volts
Current at 26.5 volts	0.58	amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.50	0.62	amp

Note 1: With 26.5 volts on heater.

§ Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

World Radio History

4-65A
BEAM POWER TUBE

Useful at maximum ratings with natural cooling at frequencies up to 50 Mc; at maximum ratings with forced-air cooling from 50 to 150 Mc; and with reduced ratings at higher frequencies

GENERAL DATA

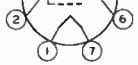
Electrical:

Filament, Thoriated Tungsten:		
Voltage	6 ± 5%	ac or dc volts ←
Current	3.5	amp
Transconductance, for plate volts = 500, grid-No.2 volts = 250, and plate ma. = 125	4000	μmhos ←
Mu-Factor, Grid No.2 to Grid No.1	5	
Direct Interelectrode Capacitances:[o]		
Grid No.1 to plate	0.12 max.	μμf
Grid No.1 to filament and grid No.2	8	μμf
Plate to filament and grid No.2	2.1	μμf

Mechanical:

Operating Position	Vertical, base down or up
Maximum Overall Length	4-3/8"
Seated Length	3-11/16" ± 3/16"
Maximum Diameter	2-3/8"
Weight (Approx.)	3 oz ←
Cap	Skirted Small (JETEC No.C1-22) ←
Heat-Radiating Plate Connector	Eimac HR-6, or equivalent
Socket	Johnson No.122-101, or equivalent
Base	Special-Button Septar 5 Pin ←

BOTTOM VIEW



Pin 1 - Filament
Pin 2 - Grid No.2
Pin 4 - Grid No.1
Pin 6 - Grid No.2
Pin 7 - Filament
Cap - Plate

Bulb and Seal Temperatures:

Continuous Service . . . . . 225 max. °C ←

Adequate ventilation around the tube must be provided to prevent the temperature of the bulb and seals from exceeding the specified maximum value.

[o]: See next page.

← Indicates a change.

World Radio History

RCA

4-65A

BEAM POWER TUBE

Intermittent Service ("On" period does not exceed 5 minutes and is followed by "off" period of the same or greater duration)	250 max.	°C

When ambient temperature does not exceed 30° C and the operating frequency is below 50 Mc, it will not usually be necessary to provided forced-air cooling of the bulb and seals to prevent exceeding the specified maximum temperature value provided a heat-radiating plate connector is used and adequate ventilation is provided.

AF POWER AMPLIFIER & MODULATOR — Class AB_1*

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	150 max.	ma
MAX.-SIGNAL GRID-No.2 INPUT**	10 max.	watts
PLATE DISSIPATION**	65 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1000	1500	1750	volts
DC Grid-No.2 Voltage■	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage▲	-85	-90	-90	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	170	180	180	volts
Zero-Signal DC Plate Current	60	60	60	ma
Max.-Signal DC Plate Current	170	180	170	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	ma
Max.-Signal DC Grid-No.2 Current	30	20	23	ma
Effective Load Resistance (Plate to plate)	9000	15000	20000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	watts
Max.-Signal Power Output (Approx.)	80	145	175	watts

Maximum Circuit Values:

Effective Grid-No.1-Circuit Resistance	0.25 max.	megohm

AF POWER AMPLIFIER & MODULATOR — Class AB_2†

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts

o, *, ●, **, ■, ▲, †: See next page.

→ Indicates a change.

World Radio History

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BEAM POWER TUBE

MAX.-SIGNAL DC PLATE CURRENT**	150 max.	ma
MAX.-SIGNAL DC GRID-No.2 INPUT**	10 max.	watts
PLATE DISSIPATION**	65 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	600	1000	1500	1800	volts
DC Grid-No.2 Voltage	250	250	250	250	volts
DC Grid-No.1 (Control-Grid) Voltage:▲▲					
From fixed supply of	-40	-40	-45	-50	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	240	210	200	180	volts
Zero-Signal DC Plate Current	60	60	60	50	ma
Max.-Signal DC Plate Current	300	300	250	220	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current	80	60	40	30	ma
Effective Load Resistance (Plate to plate)	3600	6800	14000	20000	ohms
Max.-Signal Average Driving Power (Approx.)	3.7	3	1.9	1.3	watts
Max.-Signal Peak Driving Power (Approx.)§	7.4	6	3.8	2.6	watts
Max.-Signal Power Output (Approx.)	90	170	250	270	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2500 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	120 max.	ma
GRID-No.1 INPUT	5 max.	watts
GRID-No.2 INPUT	10 max.	watts
PLATE DISSIPATION	45 max.	watts

Typical Operation:

DC Plate Voltage	600	1000	1500	2000	2500	volts
DC Grid-No.2 Voltage○○	250	250	250	250	250	volts
DC Grid-No.1 Voltage⊕	-120	-125	-125	-130	-135	volts
Peak AF Grid-No.2 Voltage (For 100% modulation)	250	250	250	250	250	volts
Peak RF Grid-No.1 Voltage	215	220	220	225	215	volts
DC Plate Current	120	120	120	120	110	ma
DC Grid-No.2 Current	40	40	40	40	25	ma

○, *, ●, **, ■, ▲, †, ▲▲, §, ○○, ⊕: See next page. ← Indicates a change.

World Radio History

4-65A

BEAM POWER TUBE

DC Grid-No.1 Current (Approx.)	15	16	16	16	12	ma
Driving Power (Approx.)	3.2	3.5	3.5	3.6	2.6	watts
Power Output (Approx.)	45	90	140	195	230	watts

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy#
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS• Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	150 max.	ma
GRID-No.1 INPUT	5 max.	watts
GRID-No.2 INPUT	10 max.	watts
PLATE DISSIPATION	65 max.	watts

→ **Typical Operation:**

DC Plate Voltage	600	1000	1500	2000	3000	volts
DC Grid-No.2 Voltage	250	250	250	250	250	volts
DC Grid-No.1 Voltage	-75	-80	-85	-90	-100	volts
Peak RF Grid-No.1 Voltage	170	175	180	190	170	volts
DC Plate Current	150	150	150	140	115	ma
DC Grid-No.2 Current	40	40	40	40	22	ma
DC Grid-No.1 Current (Approx.)	18	17	18	11	10	ma
Driving Power (Approx.)	3.1	3	3.2	2.1	1.7	watts
Power Output (Approx.)	45	95	165	215	280	watts

→ ### LINEAR RF POWER AMPLIFIER — Class AB$_1$
Single-Sideband Suppressed-Carrier Service

Maximum CCS• Ratings, *Absolute Values:*

	Up to 60 Mc	
DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT	150 max.	ma
GRID-No.2 INPUT	10 max.	watts
PLATE DISSIPATION	65 max.	watts

Typical Operation for "Single-Tone Modulation" and/or "Two-Tone Modulation":

DC Plate Voltage	1000	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage	510	480	450	405	360	volts
DC Grid-No.1 (Control-Grid) Voltage▲	-110	-105	-100	-90	-85	volts
Zero-Signal DC Plate Current	45	30	22	17	15	ma

o, *, •, **, ■, ▲, †, ▲▲, §, ○○, ®, #: see next page. →Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

4-65A

BEAM POWER TUBE

Effective RF Load Resistance.	3240	7500	12600	19000	24900	ohms
"Single-Tone Modulation":♦						
Max.-Signal Peak RF Grid-No.1 Voltage	110	105	100	90	85	volts
Max.-Signal DC Plate Current	100	90	80	70	65	ma
Max.-Signal DC Grid-No.2 Current. . .	17	13	11	8.5	6.5	ma
Max.-Signal DC Grid-No.1 Current. . .	0	0	0	0	0	ma
Max.-Signal Power Output.	40	75	100	115	130	watts
"Two-Tone Modulation":♦♦						
Average DC Plate Current	80	70	60	50	45	ma
Average DC Grid-No.2 Current. . .	6	4	3	2.5	1.5	ma

o Without external shield.

* Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

● Continuous commercial service.

** Averaged over any audio-frequency cycle of sine-wave form.

■ Obtained from a source having good regulation.

▲ Adjusted to give indicated value of zero-signal plate current.

† Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

▲▲ Adjusted to give indicated value of zero-signal plate current. The dc resistance of the bias source should not exceed 250 ohms.

§ The driver stage should be capable of supplying the No.1 grids of the class AB_2 stage with the specified driving power at low distortion. The effective resistance per grid-No.1 circuit of the class AB_2 stage should be held at a low value.

∞ Modulation voltage for grid No.2 is obtained by supplying the dc grid-No.2 voltage from the modulated plate supply through a series dropping resistor or an af reactor, or from a separate winding on the modulation transformer.

⊕ The use of bias obtained partially from a grid resistor is recommended.

\# 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. When the 4-65A is used in the final amplifier or a preceeding stage of a transmitter designed for break-in operation or oscillator keying, a small amount of fixed bias must be used to maintain the plate dissipation within the rated value. With 2000 volts on the plate, and 250 volts on grid No.2, a fixed bias of at least -40 volts should be used.

♦ "Single-Tone" operation refers to that class of amplifier service in which the grid-No.1 input consists of a monofrequency rf signal having constant amplitude. This signal is produced in a single-sideband suppressed-carrier system when a single audio frequency of constant amplitude is applied to the input of the system.

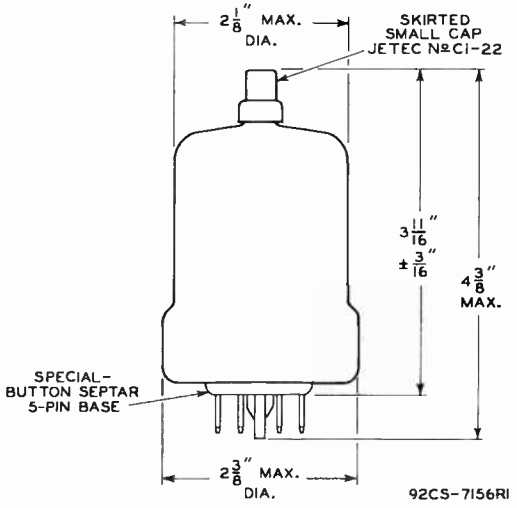
♦♦ "Two-Tone" operation refers to the simultaneous amplification of the two equal-amplitude, radio-frequency signals resulting from modulation of a single-sideband, suppressed-carrier transmitter by two audio-frequency signals of equal amplitude. The data shown for "Two-Tone" modulation refer to the case in which the peak amplitude of the resultant rf grid signal is equal to "(Max.-Signal) Peak RF Grid-No.1 Voltage" as specified under "Single-Tone" modulation.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

4-65A

BEAM POWER TUBE

MAXIMUM RATINGS vs OPERATING FREQUENCY		
FREQUENCY	50	Mc
MAXIMUM-PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED PLATE VOLTAGE OR PLATE INPUT:		
Class C plate-modulated telephony	100	%
Class C telegraphy	100	%



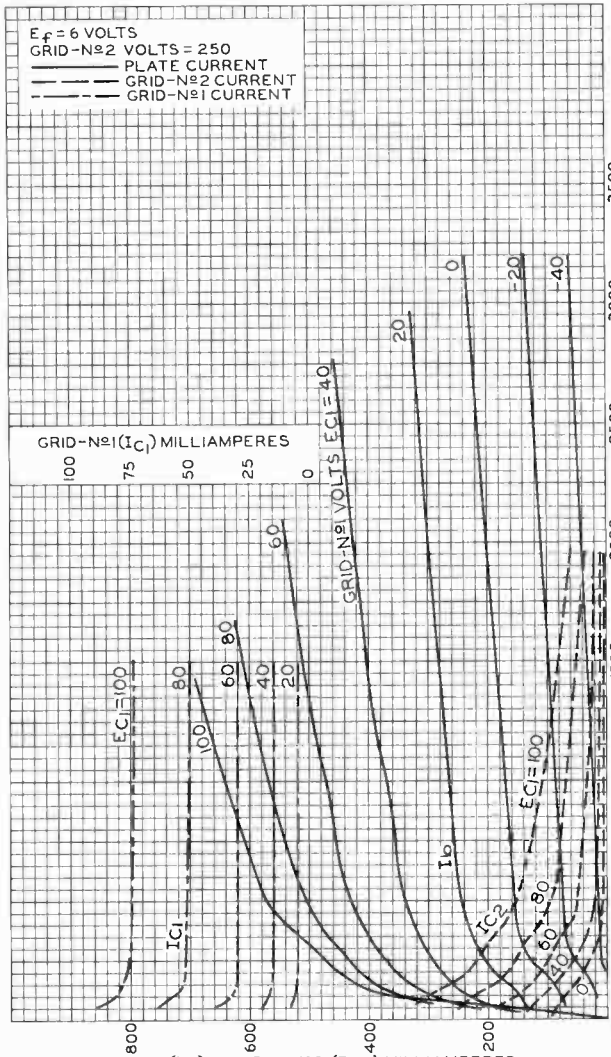
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

4-65A

TYPICAL CHARACTERISTICS



ELECTRON TUBE DIVISION

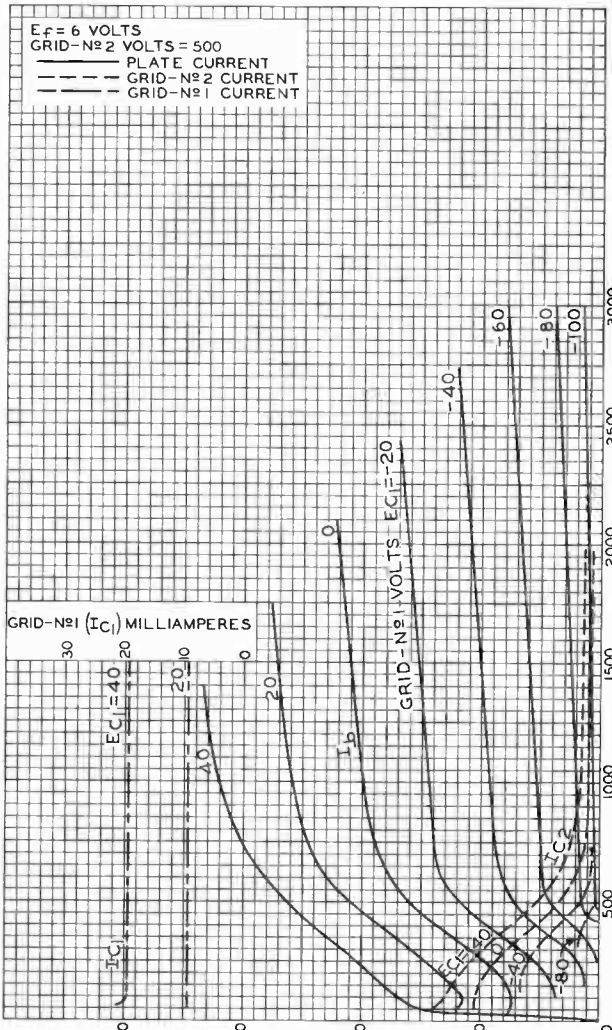
92CM-9591

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

4-65A

TYPICAL CHARACTERISTICS



ELECTRON TUBE DIVISION

92CM-9590

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

4-65A

TYPICAL CONSTANT-CURRENT CHARACTERISTICS

E_f = 6 VOLTS
GRID-№2 VOLTS = 250
GRID-№2 MILLIAMPERES = I_{C_2}
GRID-№1 MILLIAMPERES = I_{C_1}
PLATE MILLIAMPERES = I_b

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

92CM-7155R1

World Radio History

World Radio History

4-250A/5D22

Beam Power Tube

FORCED-AIR COOLED

GENERAL DATA

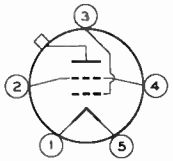
Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC or DC)	5.0 ± 5%	volts
Current at filament volts = 5.0	14.5	amp
Transconductance, for plate volts = 2500, grid-No.2 volts = 500, and plate ma. = 100	4000	μmhos
Mu-Factor, Grid No.2 to Grid No.1	5.1	
Direct Interelectrode Capacitances:[a]		
Grid No.1 to plate	0.12 max.	μμf
Grid No.1 to filament, grid No.2, and base shell	13.0	μμf
Plate to filament, grid No.2, and base shell	4.6	μμf

Mechanical:

Operating Position	Vertical, base down or up
Maximum Overall Length	6-3/8"
Seated Length	5-3/8" ± 1/4"
Maximum Diameter	3-9/16"
Weight (Approx.)	8 oz
Cap	Skirted Small (JEDEC No.C1-22)
Base[b]	Special Metal-Shell Giant 5-Pin
Basing Designation for BOTTOM VIEW	5BK

Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1



Pin 4 - Grid No.2
Pin 5 - Filament
Cap - Plate

Thermal:

Forced-Air Cooling:

Upward through base toward bulb:

Base-cooling air flow from a small fan or centrifugal blower should be applied simultaneously with filament power. In continuous service at frequencies below 30 Mc, 2 cfm at a static pressure of 0.1 inch of water are required through the base; at frequencies above 30 Mc, 5 cfm at a static pressure of 0.2 inch of water are required. In intermittent service, regardless of the operating frequency, an air flow of 5 cfm through the base must be maintained.

← Indicates a change.

World Radio History

To bulb and plate seal:

Continuous Service: At frequencies below 30 Mc, relatively slow movement of air past the bulb is sufficient to prevent exceeding the specified plate-seal temperature of 170° C. At frequencies above 30 Mc, special attention should be given to adequate cooling of bulb and plate seal. A small stream of air directed toward the upper part of the bulb will generally provide sufficient cooling.

Plate-Seal Temperature (Measured on top of plate cap):

Continuous service	170 max.	°C

Components:

Socket. . . E.F. Johnson Co. Socket No.122-275, or equivalent
Heat-Radiating Plate Connector. . . Eimac HR-6, or equivalent

AF POWER AMPLIFIER & MODULATOR — Class AB_1[c]

Maximum CCS[d] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 VOLTAGE	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[e]	350 max.	ma
GRID-No.2 INPUT[e]	35 max.	watts
GRID-No.1 INPUT[e]	10 max.	watts
PLATE DISSIPATION[e]	250 max.	watts

AF POWER AMPLIFIER & MODULATOR — Class AB_2[f]

Maximum CCS[d] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 VOLTAGE	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[e]	350 max.	ma
GRID-No.2 INPUT[e]	35 max.	watts
GRID-No.1 INPUT[e]	10 max.	watts
PLATE DISSIPATION[e]	250 max.	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS[d] Ratings, *Absolute-Maximum Values:*

	Up to 75 Mc	
DC PLATE VOLTAGE	3200 max.	volts
DC GRID-No.2 VOLTAGE	600 max.	volts
DC GRID-No.1 VOLTAGE	-500 max.	volts
DC PLATE CURRENT	275 max.	ma
GRID-No.2 INPUT	35 max.	watts
GRID-No.1 INPUT	10 max.	watts
PLATE DISSIPATION	165 max.	watts

→ Indicates a change.

World Radio History

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[g]
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS[d] Ratings, *Absolute Maximum Values:*

	Up to 75 Mc	
DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 VOLTAGE	600 max.	volts
DC GRID-No.1 VOLTAGE	-500 max.	volts
DC PLATE CURRENT	350 max.	ma
GRID-No.2 INPUT	35 max.	watts
GRID-No.1 INPUT	10 max.	watts
PLATE DISSIPATION	250 max.	watts

[a] Without external shield.

[b] Metal base shell should be grounded by means of suitable spring fingers.

[c] Subscript 1 indicates that grid-No.1 current does not flow during any part of input cycle.

[d] Continuous Commercial Service.

[e] Averaged over any audio-frequency cycle of sine-wave form.

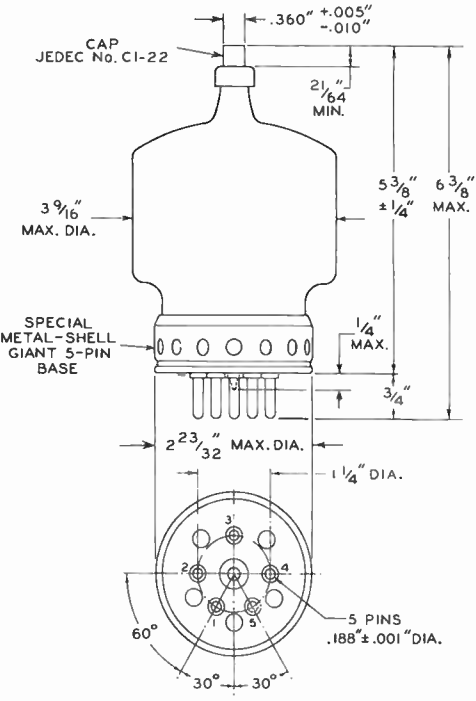
[f] Subscript 2 indicates that grid-No.1 current flows during some part of input cycle.

[g] 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.

← Indicates a change.

World Radio History

4-250A/5D22



92CS-7075R2

World Radio History

4-250A/5D22
BEAM POWER TUBE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	5.0	ac or dc volts
Current	14.5	amp
Transconductance, for plate volts = 2500, grid-No.2 volts = 500, and plate ma = 100	4000	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 0, grid-No.2 volts = 500, and grid-No.2 ma = 70	5.1	
Direct Interelectrode Capacitances:[o]		
Grid No.1 to plate	0.14 max.	μμf ←
Grid No.1 to filament, grid No.2, and base shell	12.7	μμf
Plate to filament, grid No.2, and base shell	4.5	μμf

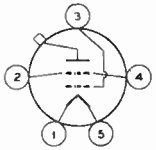
Mechanical:

Mounting Position	Vertical, base down or up
Maximum Overall Length	6-3/8" ←
Seated Length	5-3/8" ± 1/4"
Maximum Diameter	3-9/16"
Weight (Approx.)	8 oz ←
Cap	Skirted Small
Base[■]	Special Metal-Shell Giant 5-Pin
Basing Designation for BOTTOM VIEW	5BK

Pin 1 - Filament

Pin 2 - Grid No.2

Pin 3 - Grid No.3



Pin 4 - Grid No.2

Pin 5 - Filament

Cap - Plate

Forced-Air Cooling: ←

Upward through base toward bulb:

Base-cooling air flow from a small fan or centrifugal blower should be applied simultaneously with filament power. In continous service at frequencies below 30 Mc, 2 cfm at a static pressure of 0.1 inch of water are required through the base; at frequencies above 30 Mc, 5 cfm at a static pressure of 0.2 inch of water are required. In intermittent service, regardless of the operating frequency, an air flow of 5 cfm through the base must be maintained.

To bulb and plate seal:

Continous Service: At frequencies below 30 Mc, relatively slow movement of air past the bulb is suffi-

[o] Without external shield.

[■] Metal base shell should be grounded by means of suitable spring fingers.

← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

4-250A/5D22
BEAM POWER TUBE

cient to prevent exceeding the specified plate-seal temperature of 170°C. At frequencies above 30 Mc, special attention should oe given to adequate cooling of bulb and plate seal. A small stream of air directed toward the upper part of the bulb will generally provide sufficient cooling.

Intermittent Service ("On" period does not exceed 5 minutes and is followed by "off" period of the same or greater duration): In this service, a plate-seal temperature as high as 220°C is permissible. At frequencies below 30 Mc and for ambient temperatures below 30°C, forced-air cooling of the bulb and plate seal is not usually required, provided a heat-radiating plate connector is used, and free circulation of air is provided. At frequencies above 30 Mc, special attention should be given to adequate cooling to prevent exceeding the specified plate-seal temperature.

Plate-Seal Temperature (Measured on top of plate cap):		
Continuous service	170 max.	°C
Intermittent service (As defined above)	220 max.	°C
→ Base-Seal Temperature	200 max.	°C

→ **Components:**

Socket. . . E.F. Johnson Co. Socket No.122-275, or equivalent
Heat-Radiating Plate Connector. . . Eimac HR-6, or equivalent

AF POWER AMPLIFIER & MODULATOR -- Class AB_1#

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	350 max.	ma
PLATE DISSIPATION*	250 max.	watts
GRID-No.2 INPUT*	35 max.	watts
→ GRID-No.1 INPUT	10 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	3000	volts
→ DC Grid-No.2 Voltage▲	600	600	600	600	volts
→ DC Grid-No.1 (Control-Grid) Voltage®®	-95	-104	-110	-116	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	128	176	180	186	volts
Zero-Signal DC Plate Current	120	110	120	120	volts

Subscript 1 indicates that grid-No.1 current does not flow during any part of input cycle.

® Total effective grid-No.1-circuit resistance should not exceed 0.25 megohm.

●,*,▲,®: See next page. → Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

Mond Radio History

4-250A/5D22

BEAM POWER TUBE

Max.-Signal DC Plate Current	400	405	430	417	ma
Zero-Signal DC Grid-No.2 Current	-0.4	-0.3	-0.3	-0.2	ma
Max.-Signal DC Grid-No.2 Current	23	22	13	10.5	ma
Effective Load Resistance (Plate to plate)	6250	9170	11400	15000	ohms
Max.-Signal Driving Power	0	0	0	0	watts
Total Harmonic Distortion	4	2.5	2	2.5	%
Max.-Signal Power Output (Approx.)	310	460	625	750	watts

AF POWER AMPLIFIER & MODULATOR -- Class AB_2*

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	350 max.	ma
GRID-No.2 INPUT*	35 max.	watts
GRID-No.1 INPUT*	10 max.	watts ←
PLATE DISSIPATION*	250 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage▲	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage▲▲	-48	-48	-51	-53	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	192	198	200	198	volts
Zero-Signal DC Plate Current	100	120	120	125	ma
Max.-Signal DC Plate Current	485	510	500	473	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current	34	26	23	33	ma
Effective Load Resistance (Plate to plate)	5400	8000	10900	16000	ohms
Max.-Signal Peak Driving Power (Approx.)★	4.7	5.5	4.8	4.6	watts
Max.-Signal Average Driving Power (Approx.)★	2.1	2.3	2.2	1.9	watts
Total Harmonic Distortion	3	4	4	4.5	%
Max.-Signal Power Output (Approx.)	428	650	840	1040	watts

* Averaged over any audio-frequency cycle of sine-wave form.

▲ Obtained from a source having good regulation.

●,◆,★,▲▲,★: See next page.]

← Indicates a change.

World Radio History

RCA

4-250A/5D22

BEAM POWER TUBE

PLATE-MODULATED RF POWER AMPLIFIER -- Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3200 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	275 max.	ma
GRID-No.2 INPUT	35 max.	watts
→ GRID-No.1 INPUT	10 max.	watts
PLATE DISSIPATION	165 max.	watts

Typical Operation at Frequencies up to 110 Mc:

DC Plate Voltage	2500	3000	volts
DC Grid-No.2 Voltage†	400	400	volts
DC Grid-No.1 Voltage††	-200	-310	volts
→ Peak AF Grid-No.2 Voltage (For 100% modulation)	350	350	volts
Peak RF Grid-No.1 Voltage (Approx.)	255	365	ma
DC Plate Current	200	225	volts
DC Grid-No.2 Current	30	30	ma
DC Grid-No.1 Current (Approx.)	9	9	ma
Driving Power (Approx.)	2.2	3.2	watts
Power Output (Approx.)	375	510	watts

RF POWER AMPLIFIER & OSCILLATOR -- Class C Telegraphy□ and RF POWER AMPLIFIER -- Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	350 max.	ma
GRID-No.2 INPUT	35 max.	watts
→ GRID-NO.1 INPUT	10 max.	watts
PLATE DISSIPATION	250 max.	watts

● Continuous Commercial Service.

✻ Adjusted to give indicated value of plate current.

★ Subscript 2 indicates that grid-No.1 current flows during some part of input cycle.

▲▲ Obtained from fixed supply having dc resistance not exceeding 250 ohms.

✓ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class AB_2 stage. The effective resistance per grid-No.1 circuit of the class AB_2 stage should be held at a low value.

□ 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.

†, ††: See next page. → Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

4-250A/5D22

BEAM POWER TUBE

Typical Operation at Frequencies up to 110 Mc:

DC Plate Voltage.	2500	3000	4000	volts
DC Grid-No.2 Voltage.	500	500	500	volts
DC Grid-No.1 Voltage.	-150	-180	-225	volts
Peak RF Grid-No.1 Voltage (Approx.)	220	265	303	volts
DC Plate Current.	300	345	312	ma
DC Grid-No.2 Current.	60	60	45	ma
DC Grid-No.1 Current (Approx.)	9	10	9	ma
Driving Power (Approx.) . . .	1.7	2.6	2.5	watts
Power Output (Approx.). . . .	575	800	1000	watts

† Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor.

†† For high-level modulated service, the use of partial grid-No.1-resistor bias is recommended. Bypass capacitors across the grid-No.1 resistor should have a reactance at the highest modulation frequency equal to at least twice the grid-No.1-resistor value.

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	110	150	Mc
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE:			
Class C Plate-Modulated Telephony	100	75	%
Class C Telegraphy	100	75	%

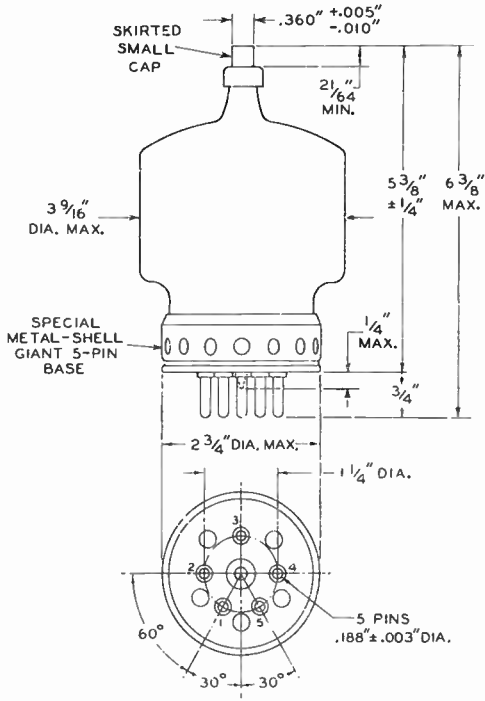
← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

4-250A/5D22

BEAM POWER TUBE

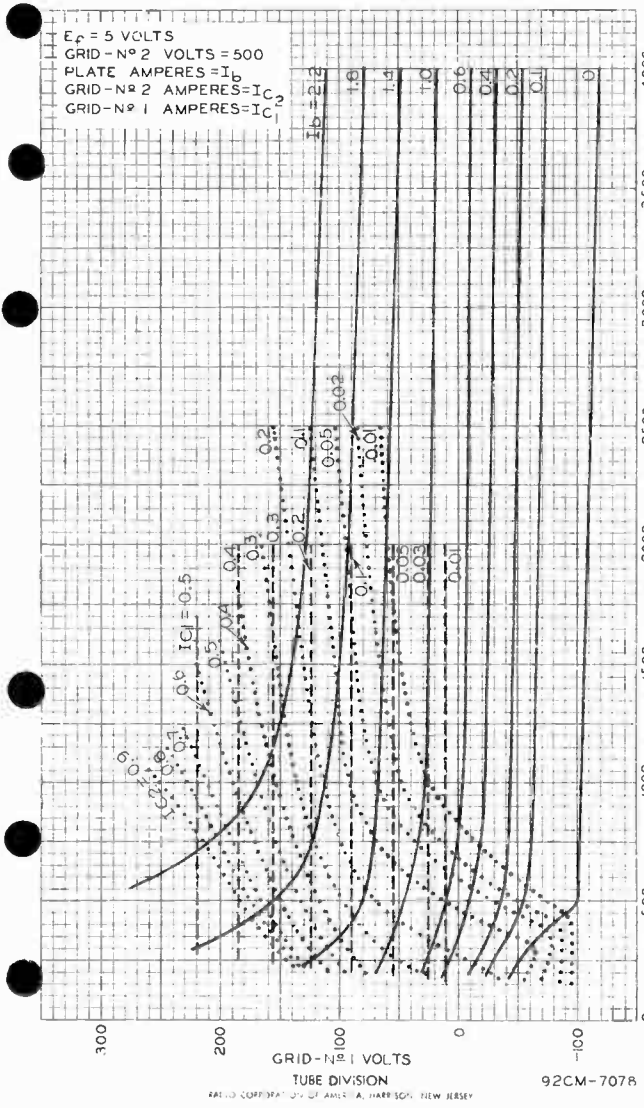


TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History

4-250A/5D22

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7078

World Radio History

World Radio History

4X500A

Beam Power Tube

FORCED-AIR COOLED

GENERAL DATA

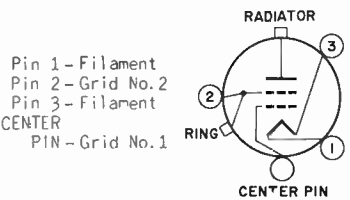
Electrical:

Filament, Thoriated Tungsten:			
Voltage (AC or DC)	5.0		volts
Current	12.2 to 13.7		amp
Transconductance, for plate volts = 2500, grid-No.2 volts = 500, and plate ma. = 200	5200		μmhos
Mu-Factor, Grid No.2 to Grid No.1	4.5 to 6.5		
Direct Interelectrode Capacitances:			
Grid No.1 to plate	0.1	max.	μμf
Grid No.1 to filament and grid No.2	10.5 to 14.4		μμf
Plate to filament and grid No.2	4.9 to 6.9		μμf

Mechanical:

Operating Position. . . . . Vertical, radiator up or down
Overall Length. . . . . 4-1/2" ± 1/4"
Maximum Diameter. . . . . 2-5/8"
Weight (Approx.). . . . . 1.7 lbs
Radiator. . . . . Integral part of tube
Terminal Diagram (See *Dimensional Outline*):

BOTTOM VIEW



Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Filament
CENTER PIN - Grid No.1

RING - Grid No.2
RADIATOR - Plate

Thermal:

Forced-Air Cooling:
Through base toward bulb. . . . . 20 min. cfm
The specified air flow at a pressure drop of 2.25 inches of water should be passed through the radiator using the recommended socket and should be started before the application of filament voltage.

Radiator-Core Temperature	150 max.	°C
Glass-Metal Seals Temperature	150 max.	°C

Components:

Socket. . . . . Eimac SK900, or equivalent

Indicates a change.

World Radio History

4X500A

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[a] and RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

	Up to 120 Mc	
DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No. 2 VOLTAGE	500 max.	volts
DC GRID-No. 1 VOLTAGE	-500 max.	volts
DC PLATE CURRENT	350 max.	ma
GRID-No. 2 INPUT	30 max.	watts
GRID-No. 1 INPUT	10 max.	watts
PLATE DISSIPATION	500 max.	watts

→ **RF POWER AMPLIFIER — Class B Television Service**

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

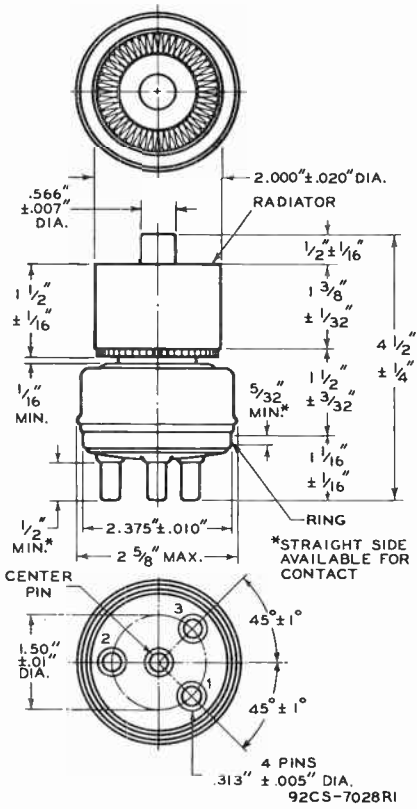
	Up to 220 Mc	
DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No. 2 VOLTAGE	500 max.	volts
DC GRID-No. 1 VOLTAGE	-500 max.	volts
DC PLATE CURRENT	350 max.	ma
GRID-No. 2 INPUT	30 max.	watts
GRID-No. 1 INPUT	10 max.	watts
PLATE DISSIPATION	500 max.	watts

[a] 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.

[b] Continuous Commercial Service.

→ Indicates a change.

World Radio History



World Radio History

World Radio History

RCA

4X500A
POWER TETRODE

FORCED-AIR COOLED

GENERAL DATA

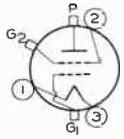
Electrical:

Filament, Thoriated Tungsten:		
Voltage	5.0	ac or dc volts
Current	13.5	amp
Transconductance, for plate current of 200 ma.	5200	μmhos
Mu-Factor, Grid No.2 to Grid No.1	6.2	
Direct Interelectrode Capacitances:		
Grid No.1 to Plate	0.05	μμf
Input	12.8	μμf
Output	5.6	μμf

Mechanical:

Terminal Connections:

Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Filament
P - Plate Radiator Terminal



G_1 - Grid No.1 (Center Terminal on Filament End of Tube)

G_2 - Grid No.2 (Ring)

Mounting Position	Vertical, radiator up or down
Overall Length	4-1/2" ± 1/4"
Maximum Diameter	2-5/8"
Radiator	Integral part of tube

Forced-Air Cooling:

Of Radiator	22 min.	cfm

The specified air flow at a pressure drop of 1.4 inches of water should be passed through the radiator and should be started before the application of filament voltage.

Of Glass at Filament End of Tube	1000 min.	fpm

The glass at the filament end of the tube must be cooled by passing air at the specified velocity across the filament end of tube. This air can be provided by a small fan or blower and should be supplied before applying the filament voltage.

RF POWER AMPLIFIER & OSCILLATOR -

Class C Telegraphy or FM Telephony

Key-down conditions per tube without amplitude modulation

Maximum Ratings, *Absolute Values:*

For operating frequencies up to 120 Mc.

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	500 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	350 max.	ma
PLATE DISSIPATION	500 max.	watts
GRID-No.2 DISSIPATION	30 max.	watts
GRID-No.1 DISSIPATION	10 max.	watts

4X500A

4X500A
POWER TETRODE

Typical Operation in Push-Pull Amplifier at 110 Mc:

Values are for 2 tubes

DC Plate Voltage	2500	3000	volts
DC Grid-No.2 Voltage	500	400	volts
DC Grid-No.1 Voltage	-250	-200	volts
DC Plate Current	690	600	ma
DC Grid-No.2 Current	100	95	ma
DC Grid-No.1 Current	40	45	ma
Driving Power (Approx.)	20	18	watts
Power Output (Approx.)	1300	1320	watts

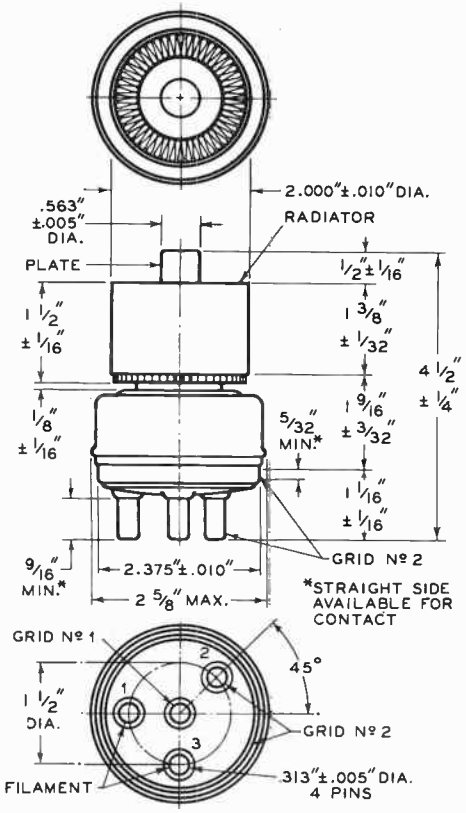
Typical Operation in Push-Pull Amplifier at 110 Mc:

Values are for 4 tubes

DC Plate Voltage	4000	volts
DC Grid-No.2 Voltage	500	volts
DC Grid-No.1 Voltage	-250	volts
DC Plate Current	1250	ma
DC Grid-No.2 Current	160	ma
DC Grid-No.1 Current	70	ma
Driving Power (Approx.)	50	watts
Power Output (Approx.)	3900	watts

Data on operating frequencies for the 4X500A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

4X500A
POWER TETRODE

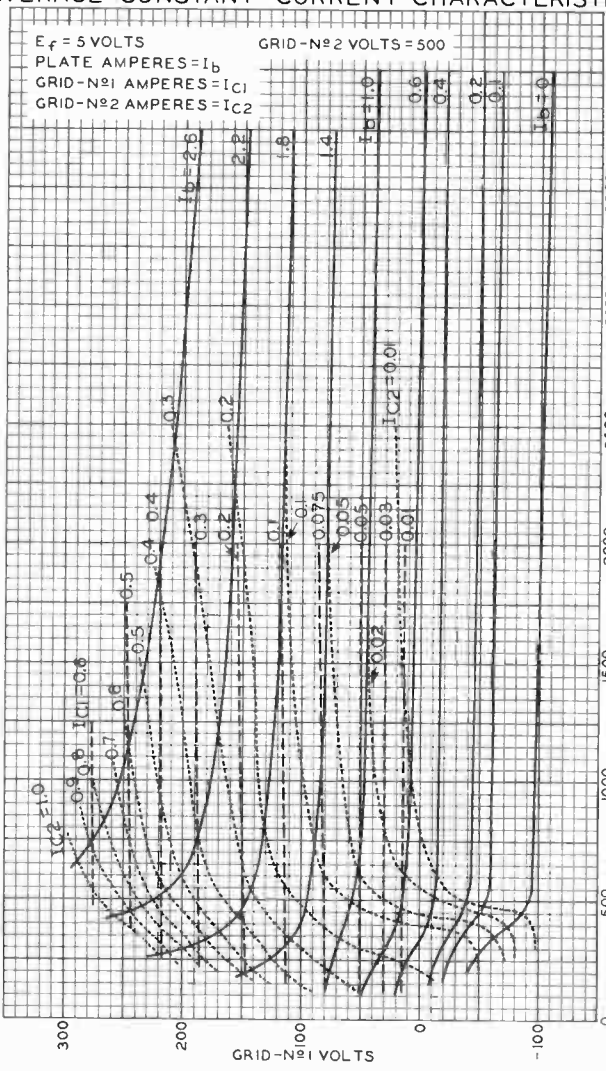


World Radio History

RCA

4X500A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAY 20,1948

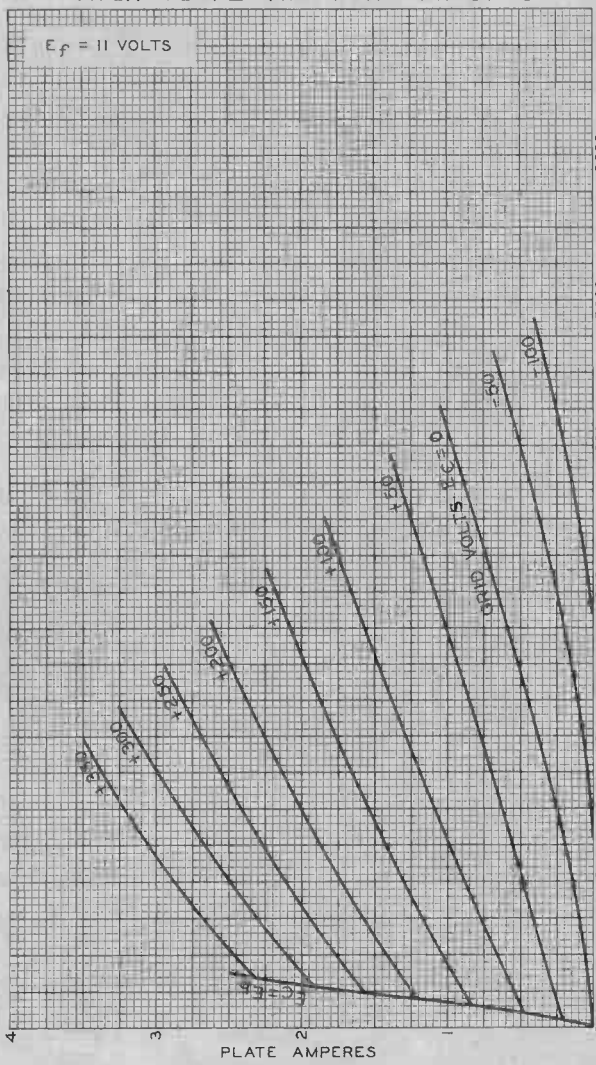
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6984

World Radio History

6C24

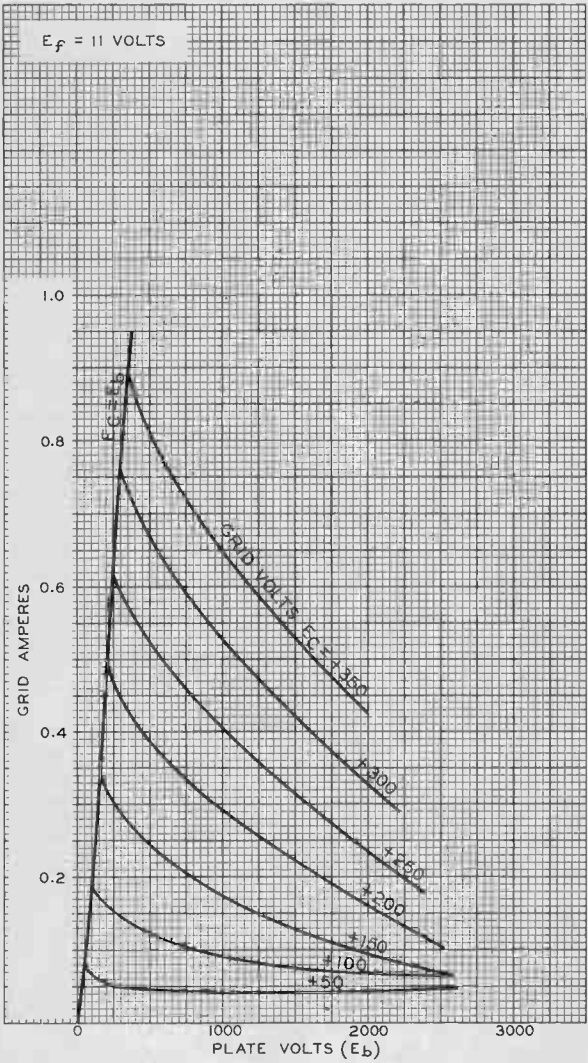
AVERAGE PLATE CHARACTERISTICS



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

6C24

TYPICAL CHARACTERISTICS



7C24

POWER TRIODE

(continued from preceding page)

Driving Power (Approx.)##	130	..	watts
Power Output (Approx.)	2.6	..	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)	525	..	watts
Power Output (Approx.)	2.6	..	kw

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without amplitude modulation□

Maximum CCS * Ratings, *Absolute Values*:

DC PLATE VOLTAGE	5000 max.	volts
DC GRID VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	1.4 max.	amp.
DC GRID CURRENT	0.3 max.	amp.
PLATE INPUT	5 max.	kw
PLATE DISSIPATION	2 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	4000	5000	..	volts
DC Grid Voltage:				
from a fixed supply of	-350	-400	..	volts
from a grid resistor of	1250	1450	..	ohms
from a cathode resistor of	230	310	..	ohms
Peak RF Grid Voltage	650	650	..	volts
DC Plate Current	1.25	1.0	..	amp.
DC Grid Current (Approx.)##	0.275	0.275	..	amp.
Driving Power (Approx.)##.	160	160	..	watts
Power Output (Approx.)	3.8	4.0	..	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)	820	710	..	watts
Power Output	4.45	4.55	..	kw

RF POWER AMPLIFIER – Class C FM Telephony

Maximum CCS* Ratings, *Absolute Values*:

DC PLATE VOLTAGE	5000 max.	volts
DC GRID VOLTS	-1000 max.	volts
DC PLATE CURRENT	1.4 max.	amp.
DC GRID CURRENT	0.3 max.	amp.
PLATE INPUT	5.0 max.	kw
PLATE DISSIPATION	2.0 max.	kw

*, ##, □, ▲, **, OO: See next page.

World Radio History

7C24

7C24

POWER TRIODE

Typical Operation in Grounded-Grid Circuit:

DC Plate Voltage	4000	5000 . .	volts
DC Grid Voltage:			
from a fixed supply of . .	-350	-400 . .	volts
from a grid resistor of. .	1250	1450 . .	ohms
from a cathode resistor. .	230	310 . .	ohms
Peak RF Grid Voltage	650	650 . .	volts
DC Plate Current	1.25	1.0 . .	amp.
DC Grid Current (Approx.)##	0.275	0.275 . .	amp.
Driving Power (Approx.). . .	820	710 . .	watts
Power Output (Approx.) . . .	4.45	4.45 . .	kw

* CCS = Continuous Commercial Service.

Subject to wide variations depending on the impedance of the load circuit. High-impedance circuits require more grid current and driving power to attain the desired output. Low-impedance circuits need less grid current and driving power, but plate-circuit efficiency is sacrificed. The driving stage should have a tank circuit of good regulation and should be capable of supplying considerably more than the required driving power.

□ Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115% of the carrier conditions.

▲ Obtained by grid resistor of value shown or by partial self-bias methods.

** Obtained from a fixed or well-regulated supply.

OO At crest of af cycle with modulation factor of 1.0.

NOTE: When the 7C24 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With a plate voltage of 5000 volts, a fixed bias of at least -190 volts should be used.

Data on operating frequencies for the 7C24 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

World Radio History

7C24
POWER TRIODE

GROUNDED-GRID TYPE

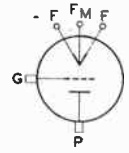
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	12.6	ac or dc volts
Current	29	amp.
Starting Current: Filament current must never exceed, even momentarily, 50 amperes.		
Resistance (Cold)	0.052	ohm
Amplification Factor	29	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	16.5	μμf
Grid to Filament	19	μμf
Plate to Filament	0.50	μμf

Mechanical:

Terminal Connections:



F – Filament
FM – Filament Mid-Tap

G – Grid Terminal (Flange)
P – Plate Terminal (Radiator)

Mounting Position	Vertical Only . . . Filament end up
Maximum Length (Rigid, excluding flexible ribbon leads)	7-1/8"
Diameter	4-5/8" ± 1/16"
Radiator	Integral Part of Tube
Air Flow:	
Upward through Radiator	275 min. cfm
The specified air flow at a pressure of 1.6 inches of water should be delivered by a blower vertically upward through the radiator before and during the application of any voltages.	
To Filament Seals	10 cfm
The specified air flow must be directed into the filament header before and during the application of any voltages in order to limit the temperature of the filament and grid seals to the maximum value.	
Incoming Air Temperature (to Radiator)	45 max. °C
Radiator Temperature (measured at core at upper end, away from incoming air)	180 max. °C
Bulb Temperature at hottest point	150 max. °C

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS* Ratings, *Absolute Values*:

DC PLATE VOLTAGE	5000 max.	volts
MAX.-SIG. DC PLATE CURRENT#	1.4 max.	amp.
MAX.-SIG. PLATE INPUT#	5 max.	kw
PLATE DISSIPATION#	2 max.	kw

Typical Operation:

Values are for 2 tubes unless otherwise specified

DC Plate Voltage	5000	volts
DC Grid Voltage**o	−200	volts

\# Averaged over any af cycle of sine-wave form.

o Use separate bias supply for each tube for balancing currents.

*, **: See next page.

◄ Indicates a change.

World Radio History

RCA

7C24

POWER TRIODE

(continued from preceding page)

Peak AF Grid-to-Grid Voltage	760	volts
Zero-Signal DC Plate Current	0.4	amp.
Max.-Signal DC Plate Current	2.0	amp.
Effective Load Resistance (plate-to-plate)	6000	ohms
Max.-Signal Driving Power (Approx.)	110	watts
Max.-Signal Power Output (Approx.)	7	kw

RF POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS* Ratings, *Absolute Values*:

DC PLATE VOLTAGE	5000 max.	volts
DC PLATE CURRENT	1.0 max.	amp.
PLATE INPUT	3 max.	kw
PLATE DISSIPATION	2 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	5000	volts
DC Grid Voltage**	-200	volts
Peak RF Grid Voltage	190	volts
DC Plate Current	0.6	amp.
→ Driving Power (Approx.)##^{OO}	50	watts
Power Output (Approx.)	1.0	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.):		
Carrier	100	watts
Crest^{OO}	400	watts
Power Output (Approx.)	1.1	kw

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS* Ratings, *Absolute Values*:

DC PLATE VOLTAGE	4000 max.	volts
DC GRID VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	1.0 max.	amp.
DC GRID CURRENT	0.3 max.	amp.
PLATE INPUT	3.3 max.	kw
PLATE DISSIPATION	1.3 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	4000	volts
DC Grid Voltage:▲		
from a fixed supply of	-350	volts
from a grid resistor of	1400	ohms
Peak RF Grid Voltage	570	volts
DC Plate Current	0.8	amp.
DC Grid Current (Approx.)##	0.25	amp.

*, **, ##, ^{OO}, ▲: See next page. →Indicates a change.

World Radio History

8D21

PUSH-PULL POWER TETRODE

WATER AND FORCED-AIR COOLED

GENERAL DATA

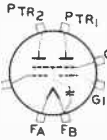
Electrical:

Filament, Thoria-Coated:

Voltage (AC or DC)	3.2 av., 3.4 max. volts. See DATA 3 for operating instructions on conserving filament life.	
Current, with 3.2 volts on filament. . .	125	amp
Starting Current	Must never exceed 220 amperes, even momentarily	
Cold Resistance.	0.0077	ohm
Minimum Heating Time	5	sec
Mu-Factor, Grid No.2 to Grid No.1 (Each Unit)	5	
Direct Interelectrode Capacitances (Each Unit):*		
Grid No.1 to Plate	**	
Input.	25.5	μμf
Output	6.5	μμf
Internal Grid-No.2 Bypass Capacitor (Approx.). . .	200	μμf

Mechanical:

Terminal Connections:



F_A - Filament
F_B - Fil., Mounting Flange
$G_{1_{TR_1}}$ - Grid No.1 of Tetrode #1
$G_{1_{TR_2}}$ - Grid No.1 of Tetrode #2
G_2 - Grid No.2 of Tetrodes #1 & #2
$P_{1_{TR_1}}$ - Plate of Tetrode #1
$P_{1_{TR_2}}$ - Plate of Tetrode #2

Mounting Position. . . Plane of grid-No.1 leads horizontal and below horizontal plane of plate leads

Maximum Overall Length	12-9/32"
Maximum Diameter	5-3/4"

Air Cooling:

Forced-air cooling of the glass envelope is required. The air flow must start with application of plate voltage, and should be directed from a 2"-diameter nozzle at the plate end of the tube so as to cool the area between the plate seals as well as the sides of the glass envelope. The air flow may be removed simultaneously with removal of plate voltage. Interlocking of the air flow with the power supplies is recommended to prevent the application of voltages to the tube without air cooling.

Air Flow	40 min.	cfm
Bulb and Seal Temperature.	150 max.	°C

Water Cooling:

Water cooling of the filament block, the No.1 grids, the No.2 grids, and the plates is required. The water flow must start before application of any voltages and preferably should continue for several seconds after removal of all voltages. Interlocking of the water flow through each of the electrodes with all power supplies is recommended to prevent tube damage in case of failure of adequate water flow.

*,**: See next page. ← indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

8D21
PUSH-PULL POWER TETRODE

→Water Cooling (Continued):

Water Flow Required:			
Filament Block, Cooling pipes in series.	0.1	min.	gpm
No.1 Grids, Cooling pipes in series. .	0.1	min.	gpm
No.2 Grids	0.1	min.	gpm
Plate of Each Unit:			
With dissipation of 1.5 kw	0.3	min.	gpm
With dissipation of 2.25 kw	0.4	min.	gpm
With dissipation of 3 kw	0.5	min.	gpm

Water Flow Obtained with Pressure Drop of 60 psi:	*Min.*	*Max.*	
Filament Block, Cooling pipes in series	0.18	0.37	gpm
No.1 Grids, Cooling pipes in series.	0.18	0.35	gpm
No.2 Grids	0.18	0.38	gpm
Plate of Each Unit	0.55	1.00	gpm
Water Pressure		100 max.	psi
Minimum Recommended Value.		60	psi
Outlet Water Temperature		70 max.	°C

GRID-MODULATED PUSH-PULL RF POWER AMPLIFIER--

Class C Television Service

Synchronizing-Level Conditions unless otherwise noted;
Values are total for both units

Maximum CCS® Ratings, *Absolute Values*:		
DC PLATE VOLTAGE	6000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	1000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE--White Level. . .	-1000 max.	volts
→DC PLATE CURRENT(At Crest of Modulation)	2 max.	amp
PLATE INPUT.	10000 max.	watts
GRID-No.2 INPUT.	400 max.	watts
PLATE DISSIPATION.	6000 max.	watts
GRID-No.1 DISSIPATION.	50 max.	watts

Typical Operation in Television Service up to 216 Mc—Bandwidth of 6 Mc:			
DC Plate Voltage	5000	. .	volts
DC Grid-No.2 Voltage	800	. .	volts
DC Grid-No.1 Voltage:			
Synchronizing Level.	-220	. .	volts
→Pedestal Level	-400	. .	volts
→White Level.	-820	. .	volts
Peak RF Grid-No.1-to-Grid-No.1 Voltage .	1300	. .	volts
→DC Plate Current:			
Synchronizing Level.	1.9	. .	amp
Pedestal Level	1.45	. .	amp
DC Grid-No.2 Current:			
Pedestal Level	-0.025	. .	amp

*,**,●: See next page. →Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

8D21
PUSH-PULL POWER TETRODE

DC Grid-No.1 Current:		
Synchronizing Level	0.050	amp
Pedestal Level	0.010	amp
Driving Power (Approx.)*	300 to 500	watts ←
Power Output:		←
Synchronizing Level	5300	watts
Pedestal Level	3100	watts

PUSH-PULL RF POWER AMPLIFIER—

Class C Telegraphy or FM Telephony ←

Key-down conditions without amplitude modulation;
Values are total for both units

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	6000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	2 max.	amp
PLATE INPUT	10000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	6000 max.	watts
GRID-No.1 DISSIPATION	50 max.	watts

Typical Operation in CW Service at 300 Mc:

DC Plate Voltage	6000	volts
DC Grid-No.2 Voltage	800	volts
DC Grid-No.1 Voltage▲	-275	volts
Peak RF Grid-No.1-to-Grid-No.1 Voltage	1350	volts
DC Plate Current	1.6	amp
DC Grid-No.2 Current	0.040	amp
DC Grid-No.1 Current (Approx.)	0.085	amp
Driving Power (Approx.)	500	watts
Power Output (Approx.)	6500	watts

Typical Operation in FM Service up to 216 Mc:

DC Plate Voltage	4500	volts
DC Grid-No.2 Voltage	700	volts
DC Grid-No.1 Voltage	-300	volts
Peak RF Grid-No.1-to-Grid-No.1 Voltage	1150	volts
DC Plate Current	1	amp
DC Grid-No.2 Current	0.050	amp
DC Grid-No.1 Current (Approx.)	0	amp
Driving Power (Approx.)	400	watts
Power Output (Approx.)	2500	watts

Maximum Circuit Values (CW or FM Service):

Grid-No.1-Circuit Resistance	6000 max.	ohms

*,**,●,▲: See next page. ← Indicates a change.

World Radio History

8D21
PUSH-PULL POWER TETRODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Values are for each unit, unless otherwise indicated

	Note	Min.	Max.	
Filament Current	1	110	140	amp
Input Capacitance.	–	22.5	28.5	μμf
Output Capacitance	–	5.3	7.7	μμf
Plate Current.	1,2	–	0.1	amp
Plate Current.	1,3	3.0	5.0	amp
Plate Current Average of Both Units. . .	1,3	3.25	–	amp
Grid-No.1 Current.	1,3	−0.15	+0.40	amp
Grid-No.1 Current Average of Both Units. . .	1,3	–	0.25	amp
Grid-No.2 Current.	1,3	–	1.5	amp
Grid-No.2 Current.	1,4	–	0.15	amp
Grid-No.2 Current Average of Both Units. . .	1,4	–	0.10	amp
Peak Cathode Current . . .	1,5	7	–	amp

Note 1: AC filament volts = 3.2.

Note 2: With dc plate voltage of 5000 volts; dc grid-No.2 voltage of 800 volts; and dc grid-No.1 voltage of −220 volts.

Note 3: With dc plate voltage of 1500 volts; dc grid-No.2 voltage of 800 volts; and dc grid-No.1 voltage of +500 volts.

Note 4: With dc plate voltage of 2500 volts; dc grid-No.2 voltage of 800 volts; and dc grid-No.1 voltage of +300 volts.

Note 5: Designers should limit the maximum usable cathode current to this value.

* With no external shielding.

** Grid-No.1-to-plate capacitance is internally neutralized by the tube structure to within 0.02 μμf.

● Continuous Commercial Service.

★ Driving power is accounted for largely by circuit losses and is less at lower frequencies. In practical grid-modulated circuit design with damping resistors, the indicated driving power, depending on frequency, is required to take care of losses in the damping resistors, the circuit losses, and the tube driving power.

▲ Obtained from combination of fixed bias and a grid-No.1 resistor of 2500 to 3000 ohms.

Data on operating frequencies for the 8D21 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

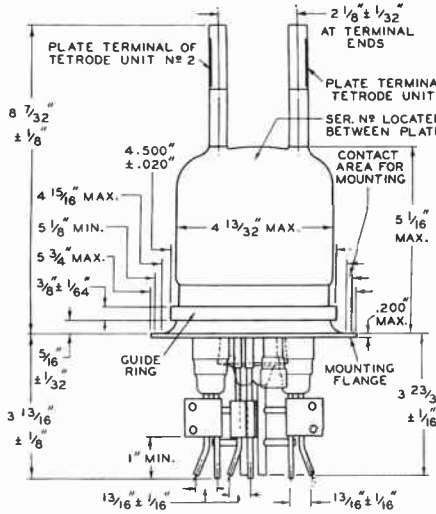
8D21
PUSH-PULL POWER TETRODE

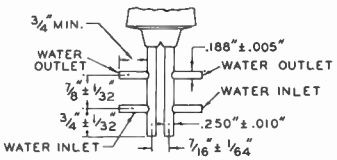
OPERATING INSTRUCTIONS FOR CONSERVING FILAMENT LIFE

Filament life of the 8D21 can be conserved by operating its filament at the lowest voltage which will give the desired power output. Because the filament of this tube when operated at the tabulated value of 3.2 volts provides emission usually in excess of any requirements within ratings, it is recommended that the filament voltage be reduced below 3.2 volts to a value that will give adequate but not excessive emission for any particular application. The proper operating value may be found by reducing the filament voltage, with normal modulation applied to the transmitter, until a reduction in output is observed. The filament voltage must then be increased by an amount equivalent to the maximum percentage regulation of the filament-voltage supply, and then further increased by about 0.1 volt to allow for other variations. It is suggested that the adjustment procedure be carried out daily. However, if no significant changes in the operating voltage are found necessary, the adjustment procedure can be scheduled less frequently. Good regulation of the filament voltage is in general economically advantageous from the viewpoint of tube life.

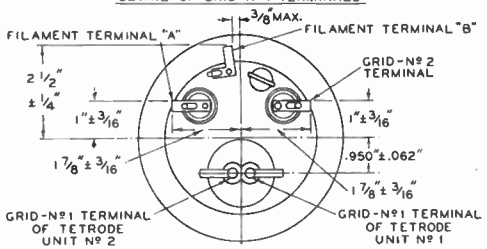
World Radio History

8D21
PUSH-PULL POWER TETRODE





DETAIL OF GRID-Nº1 TERMINALS

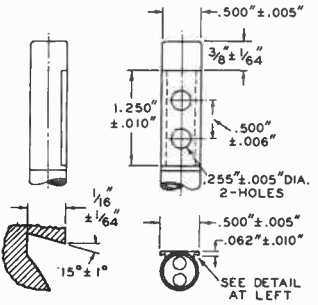


TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

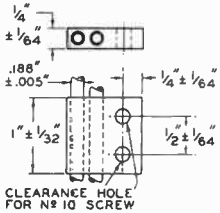
World Radio History

8D21
PUSH-PULL POWER TETRODE

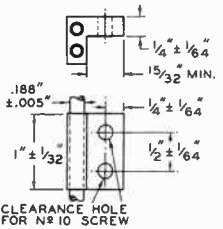
OUTLINE DETAILS



DETAIL OF PLATE TERMINALS



DETAIL OF FILAMENT
TERMINAL "A" AND
GRID-Nº 2 TERMINAL



DETAIL OF FILAMENT
TERMINAL "B"

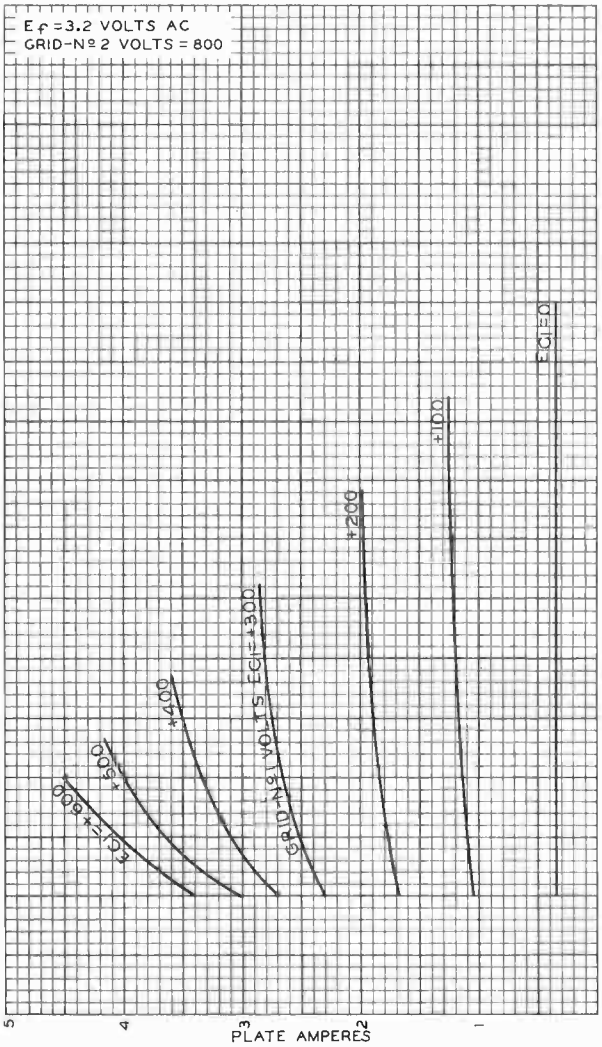
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

8D21

8D21

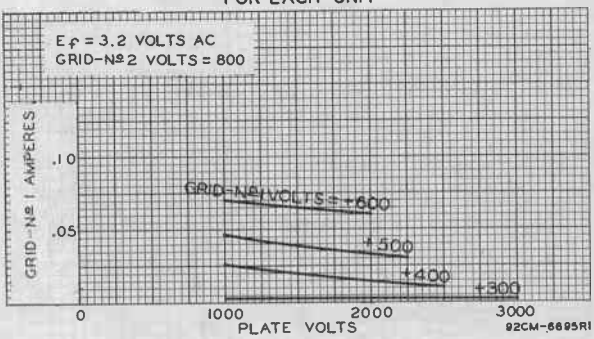
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



8D21

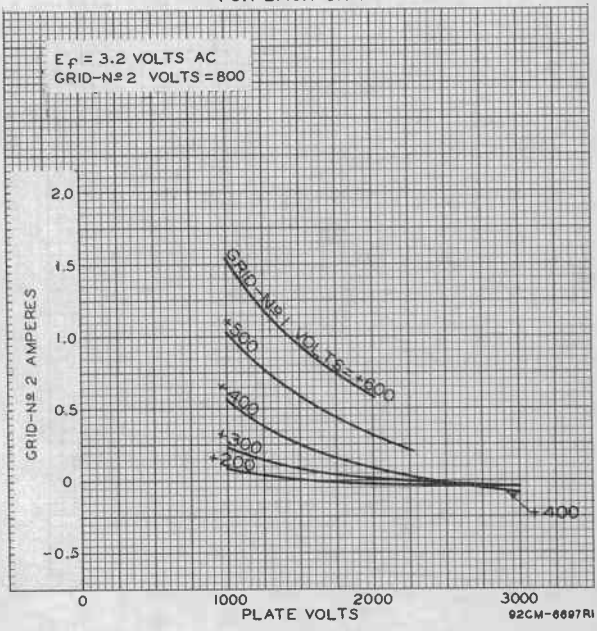
TYPICAL CHARACTERISTICS

FOR EACH UNIT



TYPICAL CHARACTERISTICS

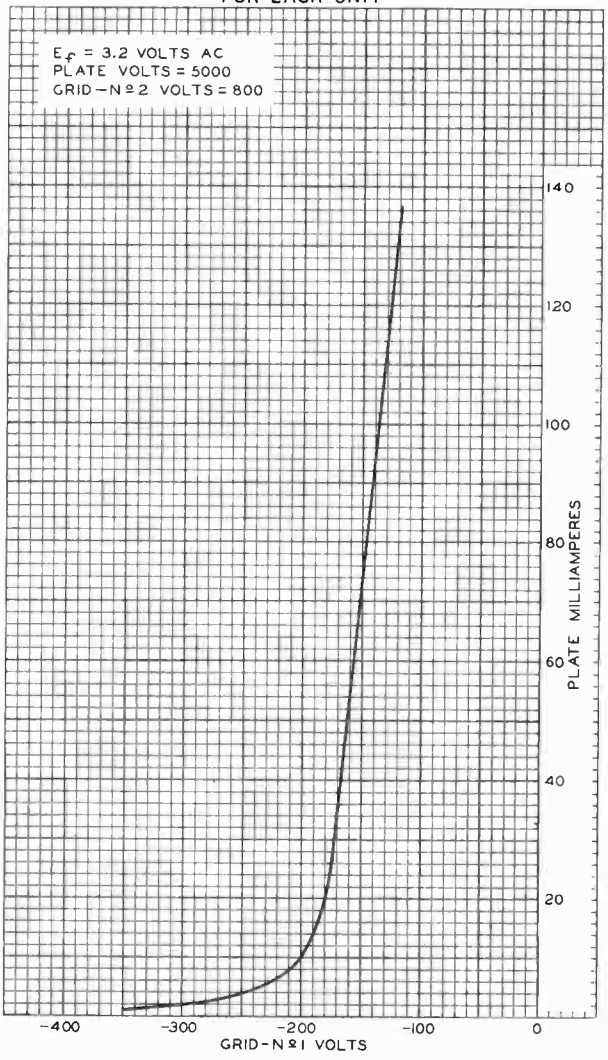
FOR EACH UNIT



World Radio History

8D21

8D21
AVERAGE CHARACTERISTIC
FOR EACH UNIT



MAY 27, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6990

RCA

9C21

POWER TRIODE

WATER- & FORCED-AIR-COOLED

GENERAL DATA

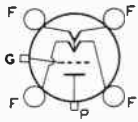
Electrical:

Filament, Multistrand Tungsten:

Excitation . . .	Single Phase AC or DC		
Voltage.	19.5	. . . . .	ac or dc volts
Current.	415	. . . . .	amp
Starting Current:	The filament current must never exceed 750 amperes, even momentarily.		
Cold Resistance. . . .	0.0042	. . . . .	ohm ←
Amplification Factor . .	36		←
Direct Interelectrode Capacitances (Approx.):			←
Grid to Plate.	46	. . . . .	μμf
Grid to Filament . . .	100	. . . . .	μμf
Plate to Filament. . .	2.0	. . . . .	μμf

Mechanical:

Terminal Connections:



F – Filament
G – Grid–Flange Terminal

P – Water–Cooled Plate Terminal

DIAMETRICALLY OPPOSITE TERMINALS MUST BE CONNECTED TOGETHER

Mounting Position.	Vertical, Filament End Up	
Maximum Overall Length	24-1/2"	
Maximum Diameter	9-1/2"	
Water Jacket	RCA MI – 19460	←
Gasket	RCA MI – 27001	←
Water Flow	15 to 20 gpm	

The water flow must start before the application of any voltages and must continue for at least 2 minutes after the removal of all voltages.

Air Flow:

To Filament Seals.	10 min. cfm	←

The specified air flow directed by a nozzle of 1-1/8" diameter into the filament header is required before and during the application of any voltages to limit the temperature of the filament seals to the maximum value.

To Plate Seal and Bulb	250 cfm	←

The specified air flow at a pressure of 1.3 inches of water must be directed at and distributed uniformly around the plate seal and bulb to limit the temperature of each to its maximum value at the hottest point.

Outlet Water Temperature	70 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate) . . .	165 max.	°C ←

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	6 max.	amp
MAX.-SIGNAL PLATE INPUT**	90 max.	kw
PLATE DISSIPATION**	40 max.	kw

** See next page. ← Indicates a change.

World Radio History

9C21

9C21
POWER TRIODE

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	10200	14000	volts
DC Grid Voltage	-220	-300	volts
Peak AF Grid-to-Grid Voltage	850	1050	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.7	7.1	amp
Effective Load Resistance (plate-to-plate)	3600	4000	ohms
Max.-Signal Driving Power (Approx.)#	110	150	watts
Max.-Signal Power Output (Approx.)	36	61	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500 max.		volts
DC GRID VOLTAGE	-2000 max.		volts
DC PLATE CURRENT	4 max.		amp
→ DC GRID CURRENT	1.5 max.		amp
PLATE INPUT	50 max.		kw
PLATE DISSIPATION	28 max.		kw

Typical Operation:

DC Plate Voltage	10200	12500	volts
DC Grid Voltage®	-1500	-1670	volts
	2000	2100	ohms
Peak RF Grid Voltage	1960	2190	volts
DC Plate Current	3.1	3.5	amp
DC Grid Current (Approx.)○	0.75	0.79	amp
Driving Power (Approx.)○	1320	1570	watts
Power Output (Approx.)	27.5	38	kw

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	17000 max.		volts
DC GRID VOLTAGE	-2000 max.		volts
DC PLATE CURRENT	9 max.		amp
→ DC GRID CURRENT	1.5 max.		amp
PLATE INPUT	150 max.		kw
PLATE DISSIPATION	40 max.		kw

Typical Operation:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage▲▲	-1500	-1600	volts
	230	180	ohms
	1800	1780	ohms

●, *, #, ®, ○, □□, ▲▲: See next page. → Indicates a change.

World Radio History

9C21
POWER TRIODE

Peak RF Grid Voltage	2000	2200	volts
DC Plate Current	5.8	7.9	amp
DC Grid Current (Approx.).	0.83	0.9	amp
Driving Power (Approx.).	1500	1800	watts
Power Output (Approx.)	61	100	kw

● Continuous Commercial Service.

* Averaged over any audio-frequency cycle of sine-wave form.

The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

⊕ Obtained by grid resistor (2000, 2100) or by partial self-bias methods.

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

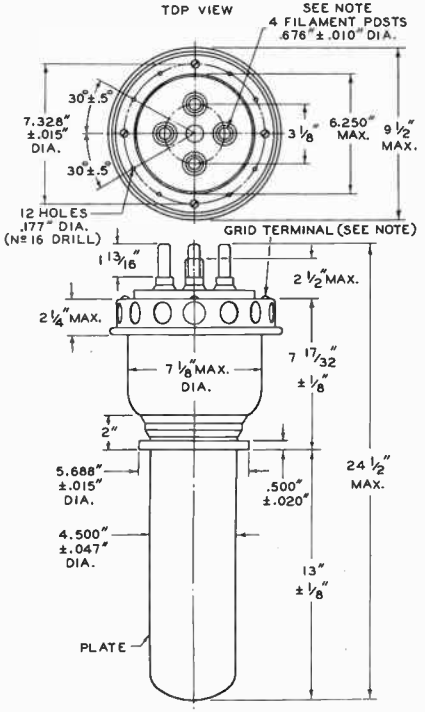
□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲▲ Obtained from cathode resistor (230, 180), or grid resistor (1800, 1780) or by partial self-bias methods.

Data on operating frequencies for the 9C21 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

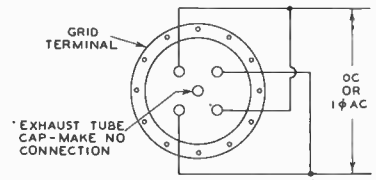
9C21
POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-8438R1

FILAMENT CONNECTIONS

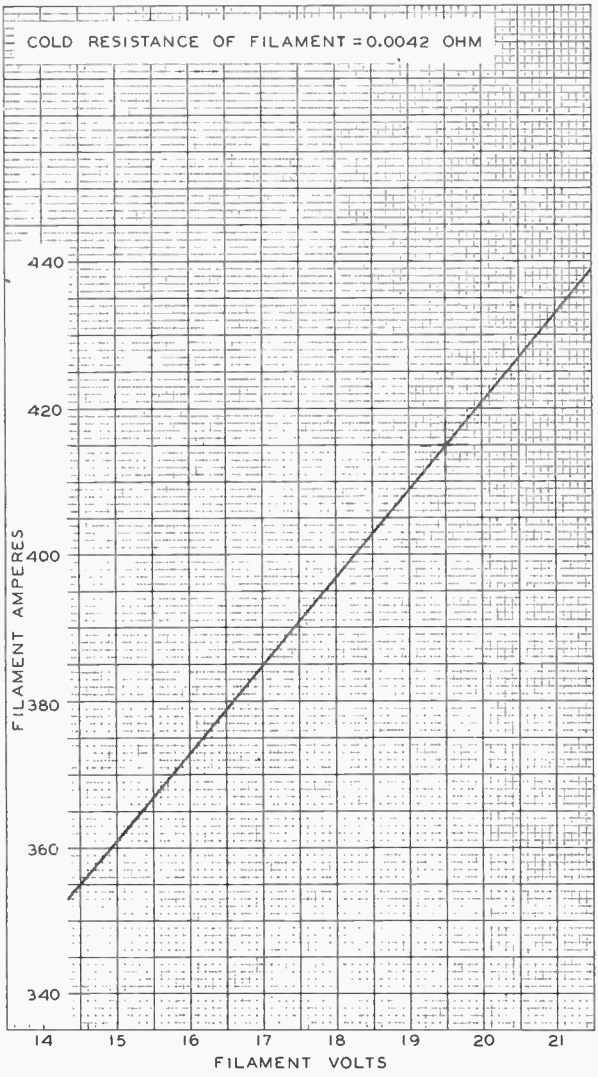


92CS-6519

World Radio History

9C21

AVERAGE FILAMENT CHARACTERISTIC



DEC. 1, 1943

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

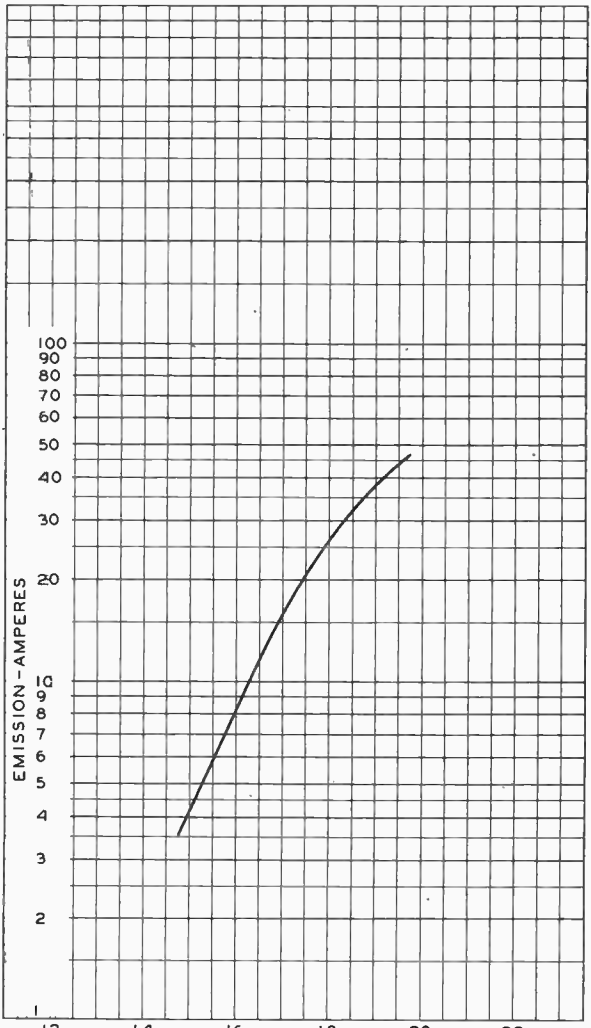
92CM-6457

World Radio History

World Radio History

9C21

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



DEC. 1, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6458

World Radio History

9C21

AVERAGE PLATE CHARACTERISTICS

$E_f = 19.5$ VOLTS A.C.

DEC. 1, 1943

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6461

9C21

World Radio History

9C21

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

9C21

E_f = 19.5 VOLTS A.C.
I_C = GRID AMPERES
I_b = PLATE AMPERES

PLATE KILOVOLTS (E_b)

GRID VOLTS (E_C)

DEC. 1, 1943

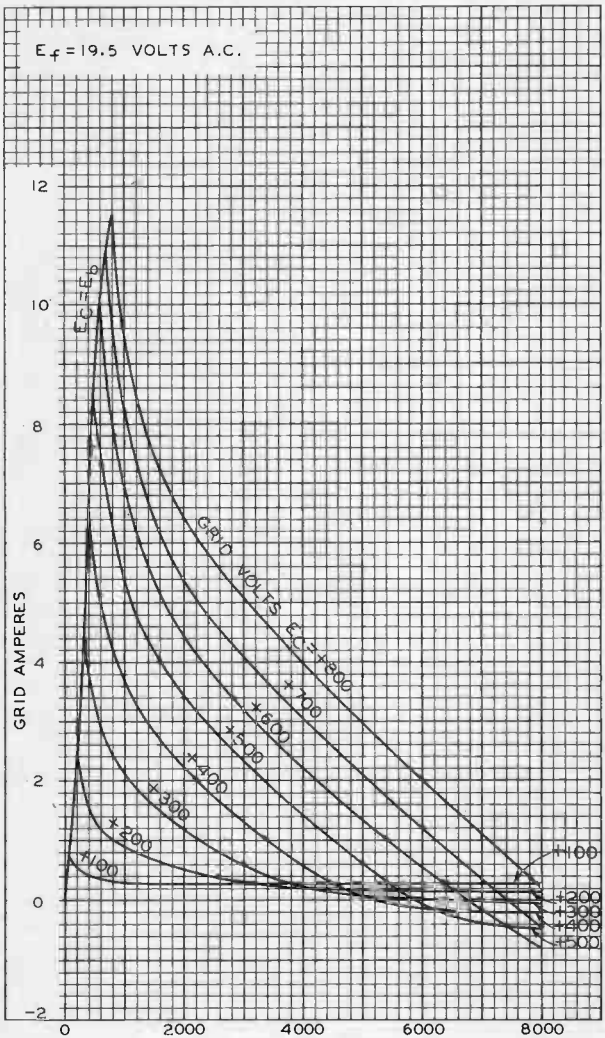
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6462

World Radio History

9C21

TYPICAL CHARACTERISTICS



DEC. 1, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6463

World Radio History

9C22
POWER TRIODE
FORCED-AIR-COOLED

GENERAL DATA

Electrical:

Filament, Multistrand Tungsten:

Excitation	Single Phase AC or DC	
Voltage	19.5	ac or dc volts
Current	415	amp

Starting Current: The filament current should never exceed 750 amperes, even momentarily.

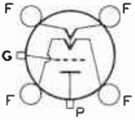
Cold Resistance	0.0042	ohm ←
Amplification Factor	36	←

Direct Interelectrode Capacitances (Approx.): ←

Grid to Plate	50	μμf
Grid to Filament	100	μμf
Plate to Filament	2.2	μμf

Mechanical:

Terminal Connections:



F – Filament
G – Grid-Flange Terminal

P – Radiator-Cooled Plate Terminal

DIAMETRICALLY OPPOSITE TERMINALS MUST BE CONNECTED TOGETHER

Mounting Position	Vertical, Filament End Up
Maximum Overall Length	25"
Maximum Diameter	16-15/16"
Radiator	Integral Part of Tube
Air Jacket	RCA MI – 28190 ←

Air Flow:

Through Radiator (For max. ratings)	1800 min.	cfm

The specified air flow at a pressure of 2.2 inches of water should be delivered by a blower vertically upward through the radiator before and during the application of any voltages. ←

To Filament Seals	10 min.	cfm

The specified air flow directed by a nozzle of 1-1/4" diameter downward into the filament header is required before and during the application of any voltages in order to limit the temperature of the filament seals to the maximum value. ←

Input Air Temperature (To radiator)	45 max.	°C ←
Radiator Temperature (Measured at core, upper end, away from incoming air)	180 max.	°C
Seal Temperature (Filament, grid, plate)	165 max.	°C ←

AF POWER AMPLIFIER & MODULATOR — Class B

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	6 max.	amp
MAX.-SIGNAL PLATE INPUT*	60 max.	kw
PLATE DISSIPATION*	20 max.	kw

●,*: See next page.

← Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

9C22

9C22
POWER TRIODE

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	10200	14000	volts
DC Grid Voltage	-220	-300	volts
Peak AF Grid-to-Grid Voltage	850	1050	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.7	7.1	amp
Effective Load Resistance (plate-to-plate)	3600	4000	ohms
Max.-Signal Driving Power (Approx.)#	110	150	watts
Max.-Signal Power Output (Approx.)	36	61	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	4 max.	amp
→ DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	50 max.	kw
PLATE DISSIPATION	14 max.	kw

Typical Operation:

DC Plate Voltage	10200	12500	volts
DC Grid Voltage®	-1500	-1670	volts
	2000	2100	ohms
Peak RF Grid Voltage	1960	2190	volts
DC Plate Current	3.1	3.5	amp
DC Grid Current (Approx.)□	0.75	0.79	amp
Driving Power (Approx.)□	1320	1570	watts
Power Output (Approx.)	27.5	38	kw

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	17000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	8 max.	amp
→ DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	100 max.	kw
PLATE DISSIPATION	20 max.	kw

Typical Operation:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage▲▲	-1500	-1600	volts
	230	275	ohms
	1800	2000	ohms

●,*,#,®,□,□□,▲▲: See next page. → indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

9C22
POWER TRIODE

Peak RF Grid Voltage	2000	2050	volts
DC Plate Current	5.8	5	amp
DC Grid Current (Approx.).	0.83	0.8	amp
Driving Power (Approx.).	1500	1450	watts
Power Output (Approx.)	61	65	kw

● Continuous Commercial Service.

* Averaged over any audio-frequency cycle of sine-wave form.

⋕ The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

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

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

▲▲ Obtained from cathode resistor (230, 275), from grid resistor (1800, 2000) or by partial self-bias methods.

Data on operating frequencies for the 9C22 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

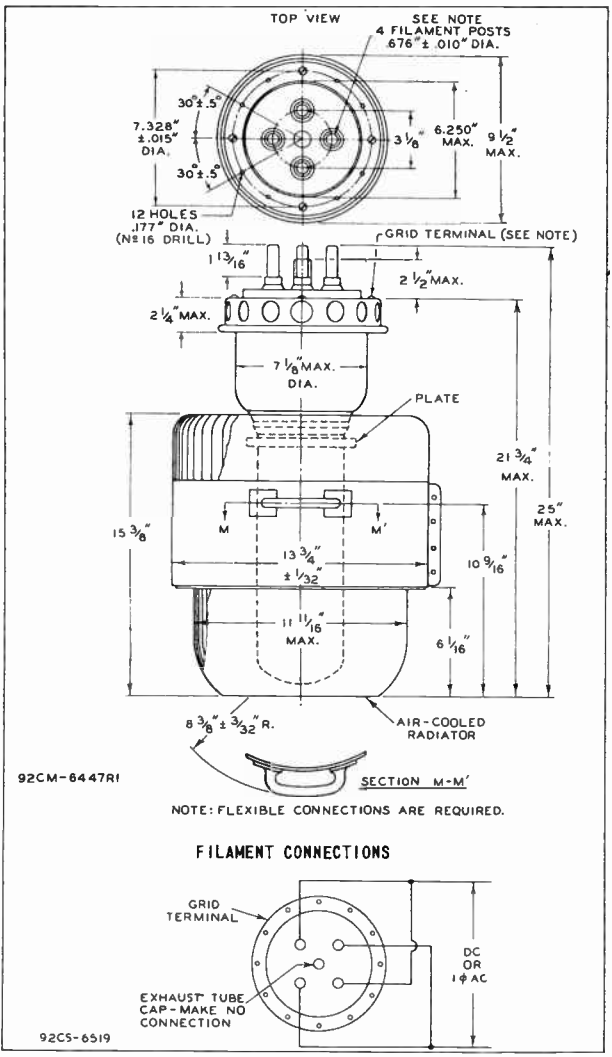
CURVES
for the 9C22 are the same
as those for Type 9C21

World Radio History

9C22

9C22

POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

FILAMENT CONNECTIONS

World Radio History

9C25

POWER TRIODE

FORCED-AIR-COOLED, GROUNDED-GRID TYPE

GENERAL DATA

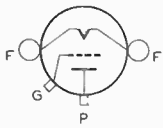
Electrical:

Filament, Multistrand Thoriated Tungsten:		
Excitation. . . . Single Phase AC or DC		
Voltage.	6.0	. . . . . ac or dc volts
Current.	285	. . . . . amp
Starting Current: The filament current should never exceed 425 amperes, even momentarily.		
Cold Resistance.	0.0025	. . . . . ohms
Amplification Factor . . .	32	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate.	40	. . . . . μμf
Grid to Filament	58	. . . . . μμf
Plate to Filament. . . .	0.9	. . . . . μμf

Mechanical:

Terminal Connections:

F – Filament
G – Grid-Flange Terminal



P – Radiator-Cooled Plate Terminal

Mounting Position.	Vertical, Filament End Up	
Maximum Overall Length	17-3/8"	
Maximum Diameter	14-1/4"	
Radiator	Integral Part of Tube	
Mounting	Special	
Air Flow:		
Upward through Radiator.	1000 min.	cfm
The specified air flow at a pressure of 2 inches of water should be delivered by a blower vertically upward through the radiator before and during the application of any voltages.		
To Filament Seals.	10	cfm
The specified air flow must be directed into the filament header before and during the application of any voltages in order to limit the temperature of the filament and grid seals to the maximum value.		
Output Air Temperature (from Radiator) . .	70 max.	°C
Radiator Temperature (measured in thermometer well). .	180 max.	°C
Bulb Temperature	180 max.	°C
Filament-Seal Temperature.	165 max.	°C

AF POWER AMPLIFIER & MODULATOR—Class B

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	11500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	4 max.	amp
MAX.-SIGNAL PLATE INPUT*	40 max.	kw
PLATE DISSIPATION*	17.5 max.	kw

®, *: See next page.

World Radio History

9C25
POWER TRIODE

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	10500	volts
DC Grid Voltage	-250	volts
Peak AF Grid-to-Grid Voltage	1310	volts
Zero-Signal DC Plate Current	1.7	amp
Max.-Signal DC Plate Current	7	amp
Effective Load Resistance (plate-to-plate)	3300	ohms
Max.-Signal Driving Power (Approx.)	1500	watts
Max.-Signal Power Output (Approx.)	50	kw

RF POWER AMPLIFIER—Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	11500 max.	volts
DC PLATE CURRENT	3.2 max.	amp
PLATE INPUT	26 max.	kw
PLATE DISSIPATION	17.5 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	10000	volts
DC Grid Voltage	-230	volts
Peak RF Grid Voltage	400	volts
DC Plate Current	2.5	amp
DC Grid Current (Approx.)**	0.016	amp
Driving Power (Approx.)**°	800	watts
Power Output (Approx.)	9.2	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.):		
Carrier	800	watts
Crest°	4000	watts
Power Output (Approx.)	10	kw

PLATE-MODULATED RF POWER AMPLIFIER—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	9000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	3.2 max.	amp
DC GRID CURRENT	0.65 max.	amp
PLATE INPUT	26 max.	kw
PLATE DISSIPATION	11.5 max.	kw

●, *, **, °: See next page.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

9C25
POWER TRIODE

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	8000	volts
DC Grid Voltage:		
from a fixed supply of	−650	volts
from a grid resistor of	1280	ohms
Peak RF Grid Voltage	1100	volts
DC Plate Current	2.5	amp
DC Grid Current (Approx.)**	0.51	amp
Driving Power (Approx.)**	510	watts
Power Output (Approx.)	15.8	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)◆	3000	watts
Power Output (Approx.)	18	kw

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy

Key-down conditions per tube without amplitude modulation□

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	11500 max.	volts
DC GRID VOLTAGE	−2000 max.	volts
DC PLATE CURRENT	4 max.	amp
DC GRID CURRENT	0.65 max.	amp
PLATE INPUT	40 max.	kw
PLATE DISSIPATION	17.5 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	10000	11000	volts
DC Grid Voltage:			
from a fixed supply of	−540	−540	volts
from a grid resistor of	860	900	ohms
from a cathode resistor of	125	130	ohms
Peak RF Grid Voltage	1000	1050	volts
DC Plate Current	3.5	3.6	amp
DC Grid Current (Approx.)**	0.58	0.61	amp
Driving Power (Approx.)**	515	575	watts
Power Output (Approx.)	25	29.5	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)	3400	3750	watts
Power Output (Approx.)	28	32.5	kw

● CCS – Continuous Commercial Service.

* Averaged over any audio-frequency cyle of sine-wave form.

**, ○, ◆, □: See next page.

World Radio History

9C25
POWER TRIODE

** Subject to wide variations depending on the impedance of the plate circuit. High-impedance plate circuits require more grid current and driving power to obtain the desired output. Low-impedance plate circuits need less grid current and driving power, but plate-circuit efficiency is sacrificed. The driving stage should have a tank circuit of good regulation and should be capable of supplying considerably more than the required driving power.

○ At crest of audio-frequency cycle with modulation factor of 1.0.

♩ Carrier power of driver modulated 100%.

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

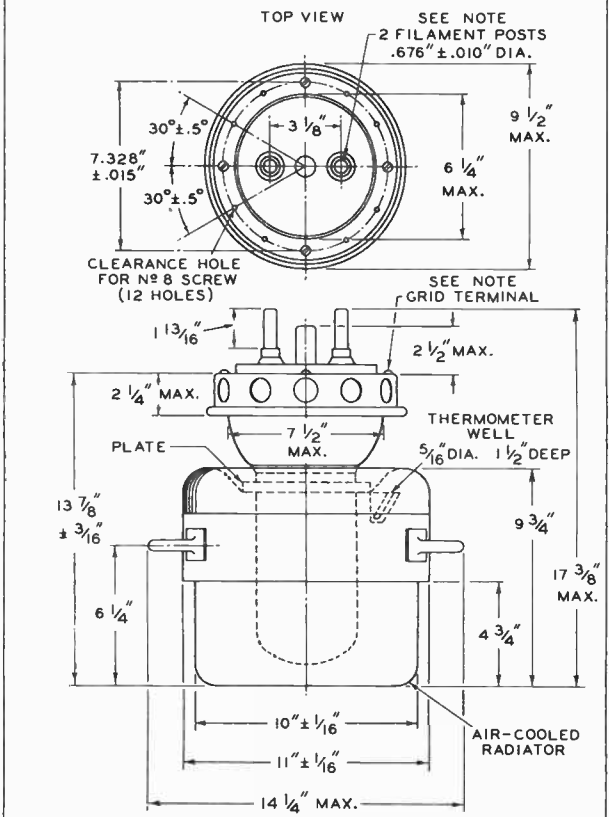
Data on operating frequencies for the 9C25 are given on the Sheet TRANS. TUBE RATINGS vs. FREQUENCY.

CURVES

AVERAGE FILAMENT CHARACTERISTIC,
AVERAGE PLATE CHARACTERISTIC,
AND
TYPICAL GRID CHARACTERISTIC
are the same as those for Type 9C27

World Radio History

9C25
POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6750

World Radio History

9C25

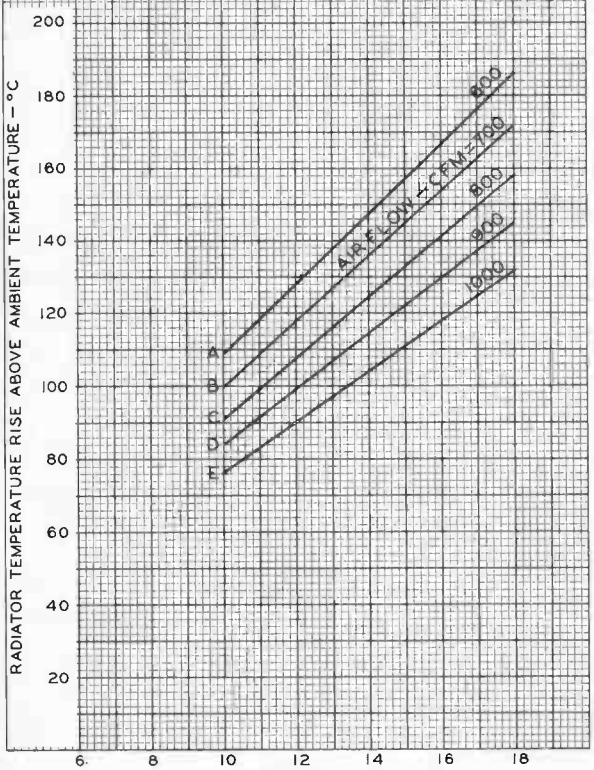
COOLING REQUIREMENTS

E_f = 6 VOLTS
MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	0.74
B	1.0
C	1.3
D	1.65
E	2.0

CURVES TAKEN ACCORDING TO NAFM* STANDARDS — BULLETIN Nº 103

*NATIONAL ASSOCIATION OF FAN MFGRS., GENERAL MOTORS BLDG., DETROIT, MICH.



9C27

POWER TRIODE

WATER- & FORCED-AIR-COOLED, GROUNDED-GRID TYPE

GENERAL DATA

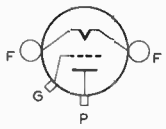
Electrical:

Filament, Multistrand Thoriated Tungsten:			
Excitation.	Single Phase AC or DC:		
Voltage	6.0	. . . . .	ac or dc volts
Current	285	. . . . .	amp
Starting Current: The filament current must never exceed 425 amperes, even momentarily.			
Cold Resistance	0.0025	. . . . .	ohms
Amplification Factor. . . .	32		
Direct Interelectrode Capacitances (Approx.):			
Grid to Plate	36	. . . . .	μμf
Grid to Filament.	58	. . . . .	μμf
Plate to Filament	0.8	. . . . .	μμf

Mechanical:

Terminal Connections:

F – Filament
G – Grid-Flange Terminal



P – Water-Cooled Plate Terminal

Mounting Position	Vertical, Filament End Up
Maximum Overall Length.	16-3/8"
Maximum Diameter.	9-1/2"
Water Jacket.	Special
Gasket.	RCA Stock No.43244
Water Flow.	12 to 15 gpm

The water flow must start before the application of any voltages and must continue for at least 2 minutes after the removal of all voltages.

Air Flow:

To Filament Seals	10	cfm

The specified air flow directed into the filament header before and during the application of any voltages is required to limit the temperature of the filament seals to the maximum value.

To Plate Seal and Bulb.	250	cfm

The specified air flow must be directed at and distributed uniformly around the plate seal and bulb to limit the temperature of each to its maximum value at the hottest point.

Outlet Water Temperature.	70 max.	°C
Bulb Temperature.	180 max.	°C
Seal Temperature (Filament & Plate)	165 max.	°C

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE.	11500 max.	volts
MAX-SIGNAL DC PLATE CURRENT*.	4 max.	amp
MAX-SIGNAL PLATE INPUT*	40 max.	kw
PLATE DISSIPATION*.	25 max.	kw

●, *: See next page.

World Radio History

9C27

9C27
POWER TRIODE

Typical Operation:

Values are for 2 Tubes

DC Plate Voltage	10500	volts
DC Grid Voltage	-250	volts
Peak AF Grid-to-Grid Voltage	1310	volts
Zero-Signal DC Plate Current	1.7	amp
Max.-Signal DC Plate Current	7	amp
Effective Load Resistance (plate-to-plate)	3300	ohms
Max.-Signal Driving Power (Approx.)	1500	watts
Max.-Signal Power Output (Approx.)	50	kw

RF POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS• Ratings, *Absolute Values*:

DC PLATE VOLTAGE	11500 max.	volts
DC PLATE CURRENT	3.5 max.	amp
PLATE INPUT	36 max.	kw
PLATE DISSIPATION	25 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	10000	volts
DC Grid Voltage	-230	volts
Peak RF Grid Voltage	400	volts
DC Plate Current	2.5	amp
DC Grid Current (Approx.)**	0.016	amp
Driving Power (Approx.)**°	800	watts
Power Output (Approx.)	9.2	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.):		
Carrier	800	watts
Crest°	4000	watts
Power Output (Approx.)	10	kw

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS• Ratings, *Absolute Values*:

DC PLATE VOLTAGE	9000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	3.2 max.	amp
DC GRID CURRENT	0.65 max.	amp
PLATE INPUT	26 max.	kw
PLATE DISSIPATION	15 max.	kw

•, *, **, °: See next page.

World Radio History

9C27
POWER TRIODE

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	8000		volts
DC Grid Voltage:			
from a fixed supply of	-650		volts
from a grid resistor of	1280		ohms
Peak RF Grid Voltage	1100		volts
DC Plate Current	2.5		amp
DC Grid Current (Approx.)**	0.51		amp
Driving Power (Approx.)**	510		watts
Power Output (Approx.)	15.8		kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)♦	3000		watts
Power Output (Approx.)	18		kw

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy

Key-down conditions per tube without amplitude modulation□

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	11500	max.	volts
DC GRID VOLTAGE	-2000	max.	volts
DC PLATE CURRENT	4	max.	ma
DC GRID CURRENT	0.65	max.	ma
PLATE INPUT	40	max.	kw
PLATE DISSIPATION	25	max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	10000	11000		volts
DC Grid Voltage:				
from a fixed supply of	-500	-540		volts
from a grid resistor of	860	900		ohms
from a cathode resistor of	125	130		ohms
Peak RF Grid Voltage	1000	1050		volts
DC Plate Current	3.5	3.6		amp
DC Grid Current (Approx.)**	0.58	0.61		amp
Driving Power (Approx.)**	515	575		watts
Power Output (Approx.)	25	29.5		kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)	3400	3750		watts
Power Output (Approx.)	28	32.5		kw

● CCS = Continuous Commercial Service.

* Averaged over any audio-frequency cycle of sine-wave form.

**, □, ♦, ∃: See next page.

World Radio History

9C27
POWER TRIODE

** Subject to wide variations depending on the impedance of the plate circuit. High-impedance plate circuits require more grid current and driving power to obtain the desired output. Low-impedance plate circuits need less grid current and driving power, but plate-circuit efficiency is sacrificed. The driving stage should have a tank circuit of good regulation and should be capable of supplying considerably more than the required driving power.

o At crest of audio-frequency cycle with modulation factor of 1.0.

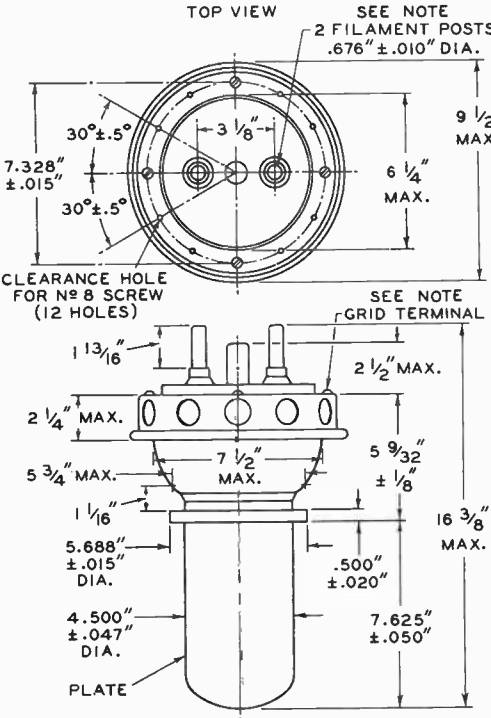
♦ Carrier power of driver modulated 100%.

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

Data on operating frequencies for the 9C27 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

9C27
POWER TRIODE



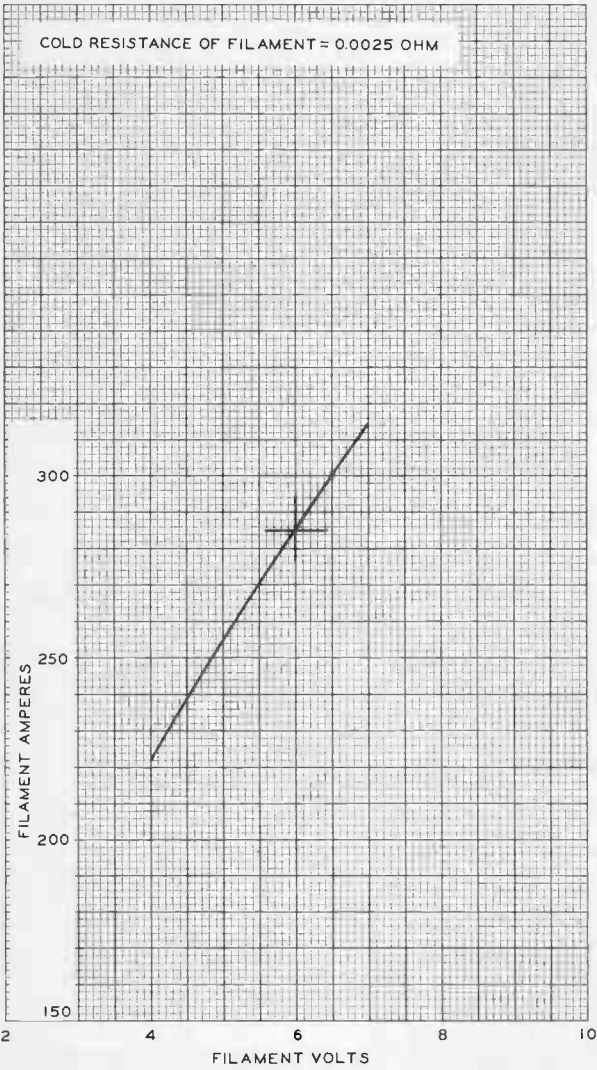
NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6709

World Radio History

9C27

9C27
AVERAGE FILAMENT CHARACTERISTIC



APRIL 15, 1946 TUBE DEPARTMENT 92CM-6756

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

9C27

AVERAGE PLATE CHARACTERISTICS

APRIL 17, 1946

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

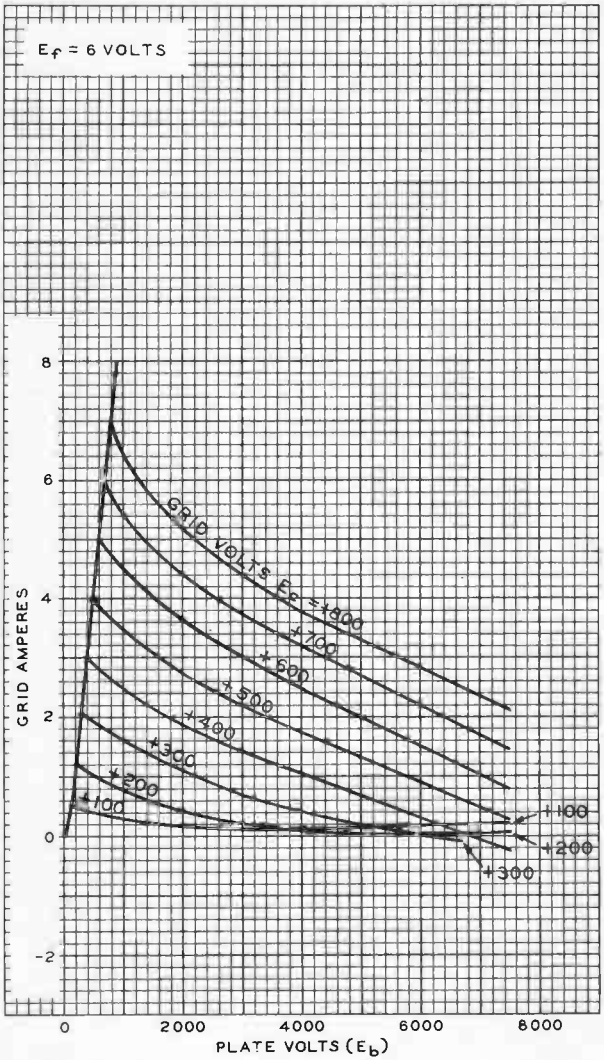
92CM-6757

World Radio History

9C27

9C27

TYPICAL GRID CHARACTERISTICS



APRIL 23, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6759

10-Y
POWER AMPLIFIER TRIODE

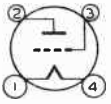
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	7.5	ac or dc volts
Current	1.25	amp
Amplification Factor	8	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	7	μμf
Grid to Filament	4	μμf
Plate to Filament	3	μμf

Mechanical:

Mounting 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-Shell Small 4-Pin Micanol, Bayonet
Basing Designation for BOTTOM VIEW	4D



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

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	350 max.	volts
DC GRID VOLTAGE	-200 max.	volts
DC PLATE CURRENT	60 max.	ma.
DC GRID CURRENT	15 max.	ma.
PLATE INPUT	17.5 max.	watts
PLATE DISSIPATION	10 max.	watts

Typical Operation:

DC Plate Voltage	250	350	volts
DC Grid Voltage	-95	-135	volts
Peak RF Grid Voltage	195	235	volts
DC Plate Current	45	45	ma.
DC Grid Current (Approx.)□	15	15	ma.
Driving Power (Approx.)□	3	3.5	watts
Power Output (Approx.)	5.5	8	watts

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

World Radio History

10-Y

10-Y
POWER AMPLIFIER TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation[□□]

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	450 max.	volts
DC GRID VOLTAGE	-200 max.	volts
DC PLATE CURRENT	60 max.	ma.
DC GRID CURRENT	15 max.	ma.
PLATE INPUT	27 max.	watts
PLATE DISSIPATION	15 max.	watts

Typical Operation:

DC Plate Voltage	350	450	. .	volts
DC Grid Voltage	-90	-115	. .	volts
Peak RF Grid Voltage	190	215	. .	volts
DC Plate Current	55	55	. .	ma.
DC Grid Current (Approx.)[□]	15	15	. .	ma.
Driving Power (Approx.)[□]	3	3.3	. .	watts
Power Output (Approx.)	9	13	. .	watts

[□] Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

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

Data on operating frequencies for the 10-Y are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

World Radio History

203-A
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	25	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	14.5	μμf
Grid to Filament	6.5	μμf
Plate to Filament	5.5	μμf
Maximum Overall Length		7-7/8"
Maximum Diameter		2-5/16"
Bulb		T-18
Base		Jumbo 4-Large Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		1250 max.	volts
Max-Signal D-C Plate Current *		175 max.	ma.
Max-Signal Plate Input *		220 max.	watts
Plate Dissipation *		100 max.	watts
Typical Operation - 2 tubes:			
Unless otherwise specified, values are for 2 tubes.			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage	-35	-45	volts
Peak A-F Grid-to-Grid Voltage	310	330	volts
Zero-Signal D-C Plate Current	26	26	ma.
Max-Signal D-C Plate Current	320	320	ma.
Load Resistance (per tube)	1725	2250	ohms
Effective Load Res.(plate to plate)	6900	9000	ohms ←
Max-Signal Driving Power	10	11	approx.watts
Max-Signal Power Output	200	260	approx.watts

* Averaged over any audio frequency cycle of sine-wave form. ←

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0			
D-C Plate Voltage		1250 max.	volts
D-C Plate Current		150 max.	ma.
R-F Grid Current		6 max.	amp.
Plate Input		150 max.	watts
Plate Dissipation		100 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage	-35	-45	volts
Peak R-F Grid Voltage	95	90	volts
D-C Plate Current	130	106	ma.
D-C Grid Current **	5	3	approx.ma.
Driving Power ** °	5	3	approx.watts
Power Output	40	42.5	approx.watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS
° At crest of a-f cycle with Modulation Factor of 1.0.
← Indicates a change

RCA MANUFACTURING COMPANY, INC
World Radio History

203-A

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			1000 max.	volts
→ D-C Grid Voltage			-400 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			60 max.	ma.
R-F Grid Current			6 max.	amp.
Plate Input			175 max.	watts
Plate Dissipation			67 max.	watts
Typical Operation:				
Filament Voltage	10	10	a-c	volts
D-C Plate Voltage	750	1000		volts
D-C Grid Voltage	-100	-135		volts
Peak R-F Grid Voltage	235	275		volts
D-C Plate Current	150	150		ma.
D-C Grid Current **	50	50	approx.	ma.
Driving Power **	12	14	approx.	watts
Power Output	65	100	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage			1250 max.	volts
→ D-C Grid Voltage			-400 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			60 max.	ma.
R-F Grid Current			7.5 max.	amp.
Plate Input			220 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage	-75	-100	-125	volts
Peak R-F Grid Voltage	195	225	255	volts
D-C Plate Current	150	150	150	ma.
D-C Grid Current **	25	25	25 approx.	ma.
Driving Power **	5	6	7 approx.	watts
Power Output	65	100	130 approx.	watts

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

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 203-A at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 203-A are the same as for the 211

← Indicates a change

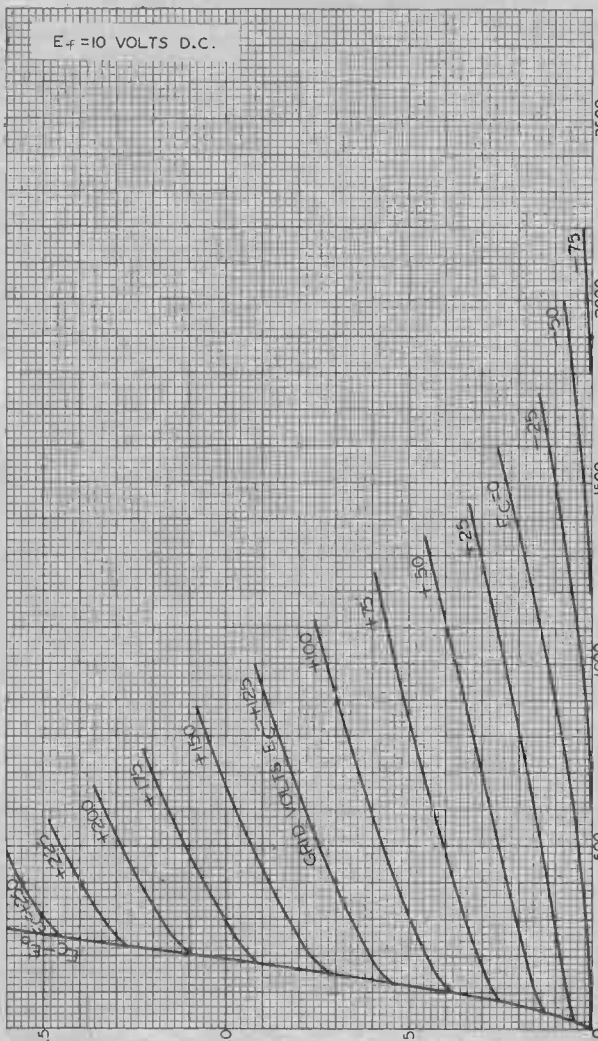
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

RCA

203-A

AVERAGE PLATE CHARACTERISTICS



FEB. 27, 1934

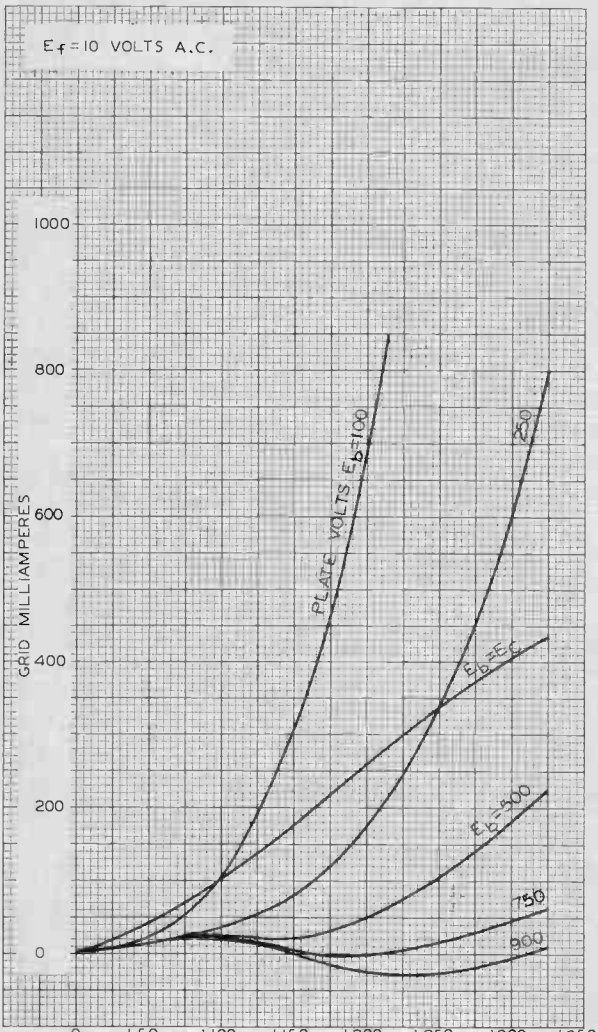
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925-5463

RCA

203-A

AVERAGE CHARACTERISTICS



RCA MANUFACTURING COMPANY, INC.
World Radio History

204-A

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	3.85	amp.
Amplification Factor	23	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	15	μμf
Grid to Filament	12.5	μμf
Plate to Filament	2.3	μμf
Overall Length		14-1/4" ± 1/8"
Maximum Diameter		4-1/16"
Bulb		T-32
Cap		No.1904
Base		No.3502

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			3000 max.	volts
Max.-Signal D-C Plate Current*			275 max.	ma.
Max.-Signal Plate Input*			600 max.	watts
Plate Dissipation*			250 max.	watts
Typical Operation - 2 tubes:				
Unless otherwise specified, values are for 2 tubes.				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage	-60	-80	-100	volts
Peak A-F Grid-to-Grid Volt.	500	500	500	volts
Zero-Sig. D-C Plate Cur.	80	80	80	ma.
Max.-Sig. D-C Plate Cur.	500	420	372	ma.
Load Resistance (per tube)	2200	3400	5000	ohms
Effective Load Resistance (plate to plate)	8800	13600	20000	ohms
Max.-Signal Driving Power	20	18	18	approx.watts
Max.-Signal Power Output	600	650	700	approx.watts

* Averaged over any audio-frequency cycle.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0				
D-C Plate Voltage			2500 max.	volts
D-C Plate Current			225 max.	ma.
R-F Grid Current			8 max.	amp.
Plate Input			400 max.	watts
Plate Dissipation			250 max.	watts
Typical Operation:				
Filament Voltage		11	11	a-c volts
D-C Plate Voltage		1500	2000	volts
D-C Grid Voltage		-50	-70	volts
Peak R-F Grid Voltage		170	165	volts
D-C Plate Current		200	160	ma.
Driving Power** °		18	15	approx.watts
Power Output		80	100	approx.watts

**, °: See next page.

(continued on next page)

World Radio History

204-A

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2000 max.	volts
D-C Grid Voltage			-500 max.	volts
D-C Plate Current			275 max.	ma.
D-C Grid Current			80 max.	ma.
R-F Grid Current			8 max.	amp.
Plate Input			550 max.	watts
Plate Dissipation			167 max.	watts
Typical Operation:				
Filament Voltage	11	11	a-c	volts
D-C Plate Voltage	1500	2000		volts
D-C Grid Voltage	-200	-250		volts
Peak R-F Grid Voltage	450	500		volts
D-C Plate Current	250	250		ma.
D-C Grid Current **	35	35	approx.	ma.
Driving Power **	20	20	approx.	watts
Power Output	225	350	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			2500 max.		volts
D-C Grid Voltage			-500 max.		volts
D-C Plate Current			275 max.		ma.
D-C Grid Current			80 max.		ma.
R-F Grid Current			10 max.		amp.
Plate Input			690 max.		watts
Plate Dissipation			250 max.		watts
Typical Operation:					
Filament Voltage	11	11	11	a-c	volts
D-C Plate Voltage	1500	2000	2500		volts
D-C Grid Voltage	-150	-175	-200		volts
Peak R-F Grid Voltage	400	425	440		volts
D-C Plate Current	250	250	250		ma.
D-C Grid Current **	30	30	30	approx.	ma.
Driving Power **	15	15	15	approx.	watts
Power Output	240	350	450	approx.	watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

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

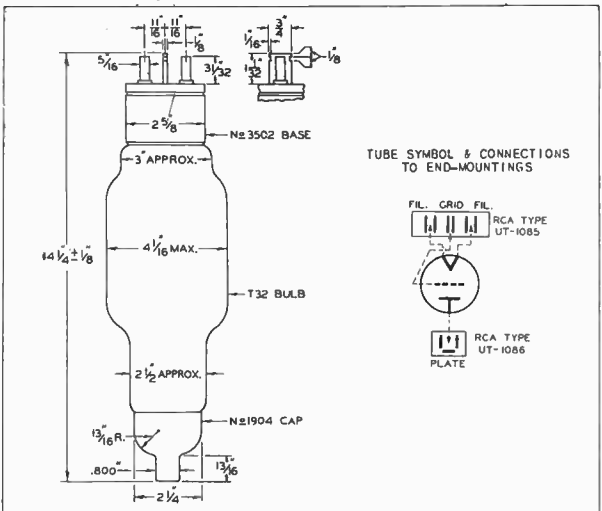
° At crest of audio-frequency cycle with modulation factor of 1.0.

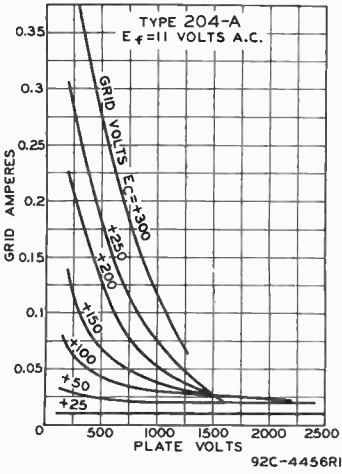
For use of the 204-A at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

204-A
R-F POWER AMPLIFIER, OSCILLATOR CLASS B MODULATOR





World Radio History

204-A

AVERAGE PLATE CHARACTERISTICS

204-A

Ef = 11 VOLTS A.C.

PLATE AMPERES

0 0.5 1.0 1.5 2.0

PLATE VOLTS (Eb)

0 500 1000 1500 2000 2500 3000

GRID VOLTS Ec = +300 +250 +200 +150 +100 +50 +25 Ec=0 -25 -50 -75

Ec=Eb

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

JUNE 3, 1935

92C-4508

World Radio History

207
POWER TRIODE
WATER COOLED

GENERAL DATA

Electrical:

Filament, Tungsten:

Voltage	22	ac or dc volts
Current	52	amp
Starting Current: The filament current must never exceed 100 amperes, even momentarily.		
Cold Resistance	0.03	ohm

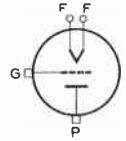
NOTE: This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in the General Section. ←

Amplification Factor	20	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	27	μμf
Grid to Filament	18	μμf
Plate to Filament	2	μμf

Mechanical: ←

Terminal Connections:

F – Filament
G – Grid
Terminal



P – Water-Cooled Plate Terminal

Mounting Position	Vertical, Filament End Up	
Maximum Overall Length	20-1/4"	
Maximum Radius	6-1/2"	
Water Flow	3 to 8	gpm

The water flow must start before the application of any voltages and must continue for 2 minutes after the removal of all voltages.

Outlet Water Temperature	70 max.	°C
Water Pressure in Jacket	80 max.	psi

Components:

Water Jacket	RCA MI-7415
Gasket	RCA MI-7440

AF POWER AMPLIFIER & MODULATOR – Class B

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

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2 max.	amp
MAX.-SIGNAL PLATE INPUT*	20 max.	kw
PLATE DISSIPATION*	7.5 max.	kw

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	6000	10000	12500	volts
DC Grid Voltage†	-210	-410	-575	volts
Peak AF Grid-to-Grid Voltage	1520	2140	2300	volts
Zero-Signal DC Plate Current	0.5	0.5	0.4	amp
Max.-Signal DC Plate Current	2.5	3.2	2.8	amp

,,†: See next page.

←Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

207
POWER TRIODE

Effective Load Resistance (Plate-to-plate) . . .	4200	6400	10000	ohms
Max.-Signal Driving Power (Approx.) . . .	190	380	400	watts
Max.-Signal Power Output (Approx.) . . .	8	20	22.5	kw

* Averaged over any audio-frequency cycle of sine-wave form.

RF POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	15000 max.	volts
DC PLATE CURRENT	1 max.	amp
PLATE INPUT.	15 max.	kw
PLATE DISSIPATION.	10 max.	kw

Typical Operation:

DC Plate Voltage	6000	10000	14000	volts
DC Grid Voltage†	-225	-440	-650	volts
Peak RF Grid Voltage	400	600	730	volts
DC Plate Current	0.62	0.93	1	amp
Driving Power (Approx.)▲ . . .	72	16	0	watts
Power Output (Approx.)	1	2.5	4	kw

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	10000 max.	volts
DC GRID VOLTAGE.	-3000 max.	volts
DC PLATE CURRENT	1 max.	amp
DC GRID CURRENT.	0.2 max.	amp
PLATE INPUT.	10 max.	kw
PLATE DISSIPATION.	6.6 max.	kw

Typical Operation:

DC Plate Voltage	6000	8000	10000	volts
DC Grid Voltage®#	-1200	-1600	-2000	volts
Peak RF Grid Voltage	1860	2300	2660	volts
DC Plate Current	0.76	0.78	0.75	amp
DC Grid Current (Approx.). . .	0.15	0.14	0.07	amp
Driving Power (Approx.). . . .	280	325	185	watts
Power Output (Approx.)	3.5	5	6	kw

† For dc filament supply.
▲ At crest of audio-frequency cycle with modulation factor of 1.0.
® Obtained by grid resistor or by partial self-bias methods.

•, #: See next page.

World Radio History

207
POWER TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation[□□]

Maximum CCS[●] Ratings, *Absolute Values:*

DC PLATE VOLTAGE	15000 max.	volts
DC GRID VOLTAGE	-3000 max.	volts
DC PLATE CURRENT	2 max.	amp
DC GRID CURRENT	0.2 max.	amp
PLATE INPUT	30 max.	kw
PLATE DISSIPATION	10 max.	kw

Typical Operation:

DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage[▲▲#]	-1000	-1200	-1600	volts
Peak RF Grid Voltage	1730	2050	2650	volts
DC Plate Current	1.10	1.33	1.67	amp
DC Grid Current (Approx.)	0.17	0.12	0.09	amp
Driving Power (Approx.)	295	245	235	watts
Power Output (Approx.)	6.5	10	15	kw

● Continuous Commercial Service.

\# For ac filament supply.

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

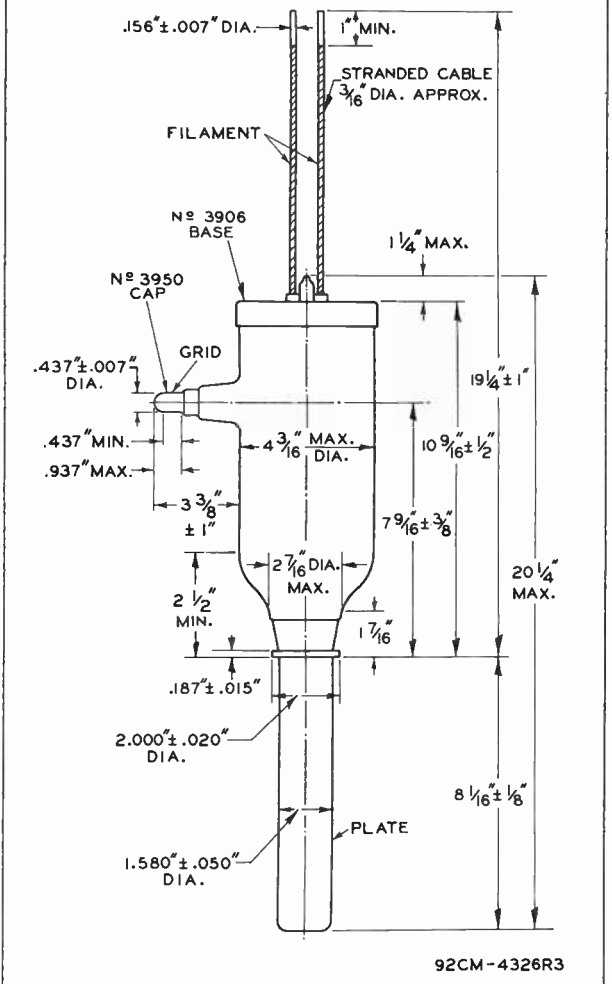
▲▲ Obtained from fixed supply, by grid resistor, or by cathode resistor.

Data on operating frequencies for the 207 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

RCA

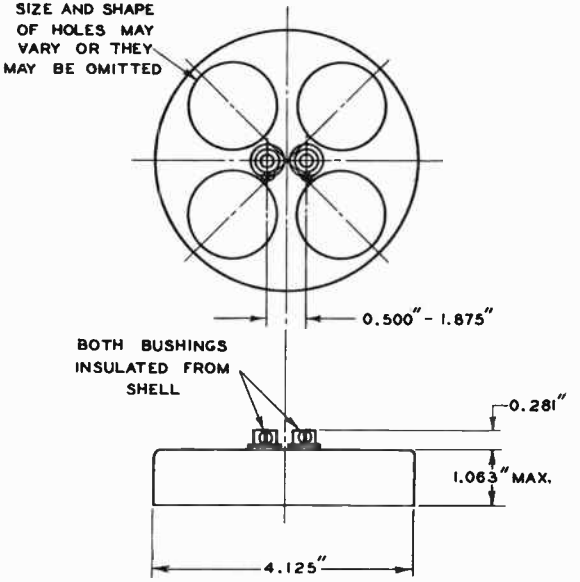
207
POWER TRIODE



World Radio History

207
POWER TRIODE

TERMINAL-SUPPORT SHELL
No. 3906



92CS-7020

World Radio History

RCA

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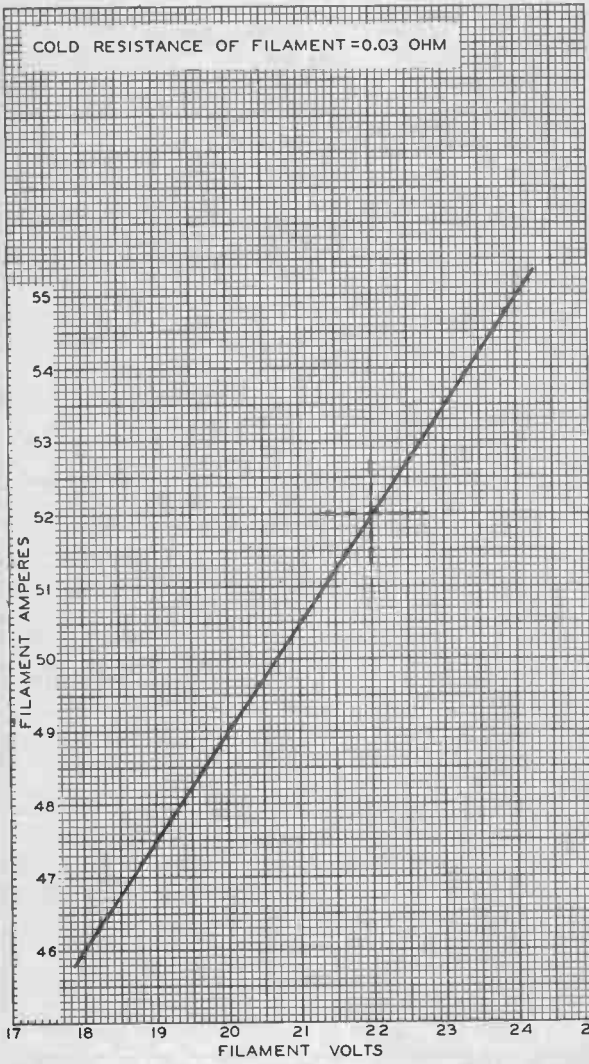
AVERAGE FILAMENT CHARACTERISTIC



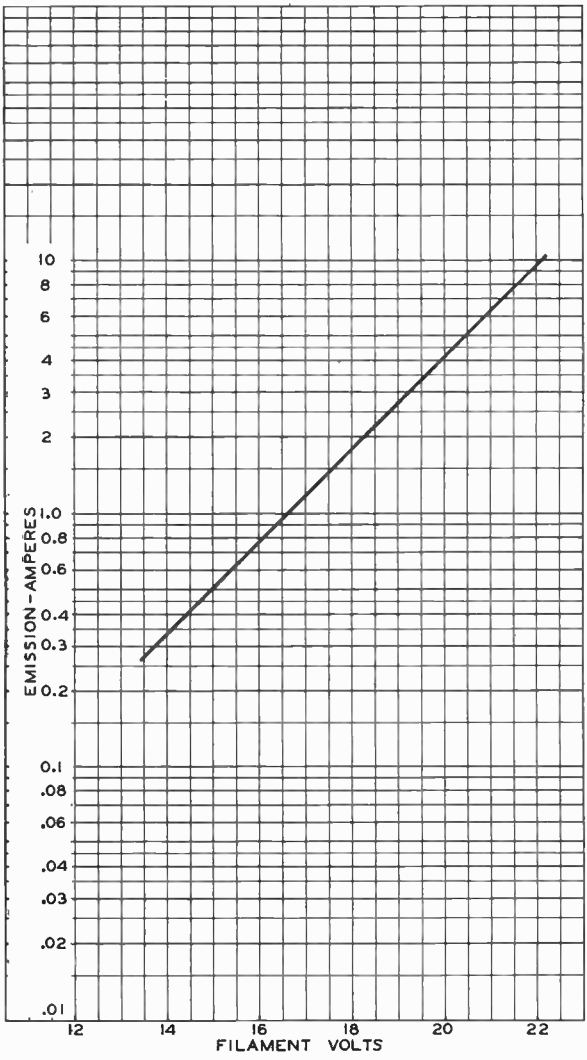
SEPT. 2, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4550

207

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



SEPT. 2,1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

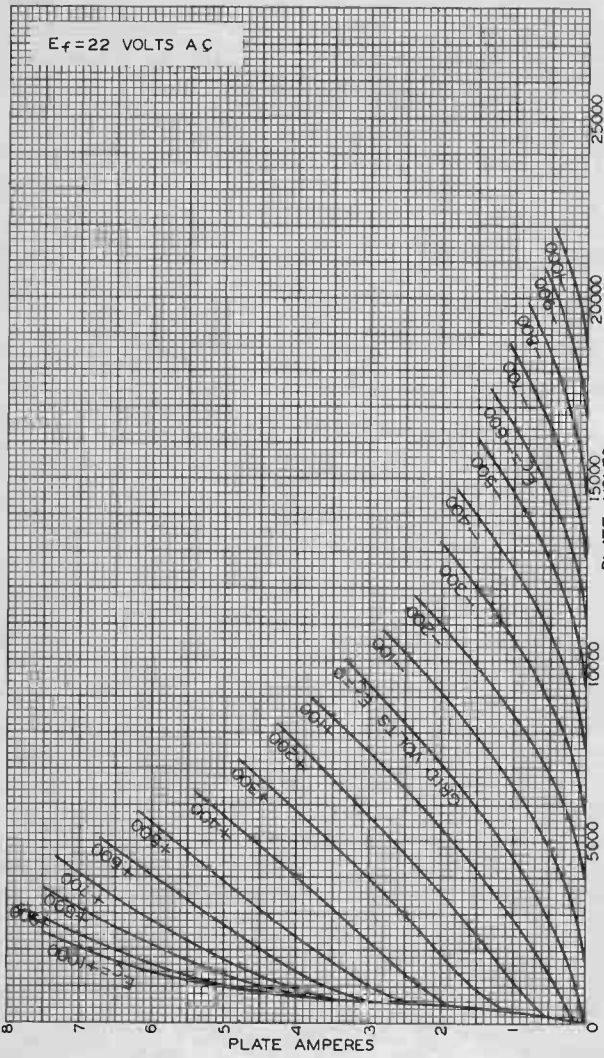
92CM—4551

World Radio History

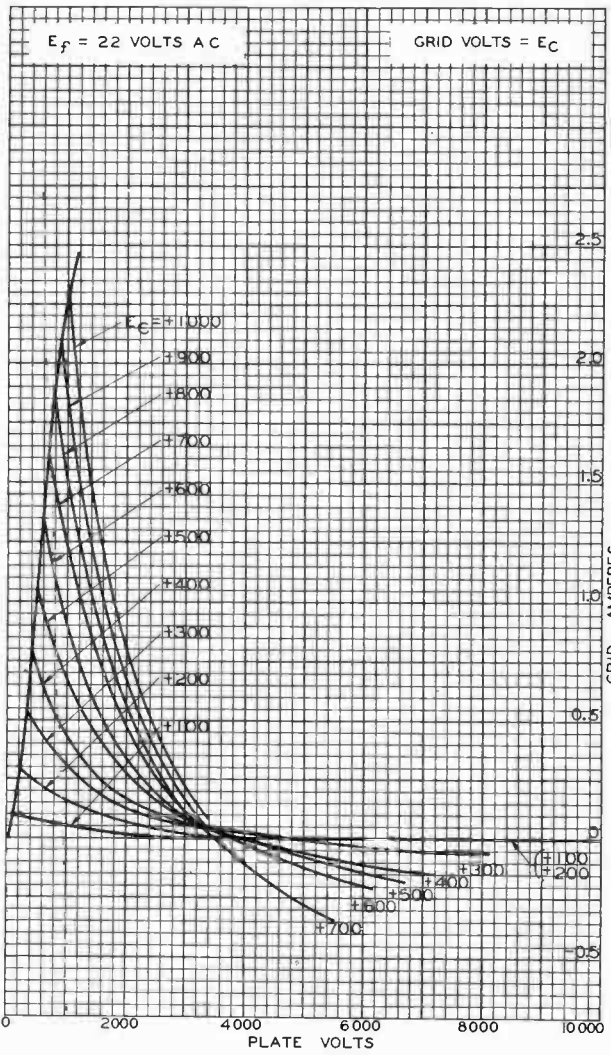
RCA

207

AVERAGE PLATE CHARACTERISTICS



TYPICAL CHARACTERISTICS



World Radio History

207

RCA

207

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

E_f = 22 VOLTS AC

GRID AMPERES = Ic
PLATE AMPERES = I_b

PLATE KILOVOLTS (E_b)

GRID VOLTS (Ec)

SEPT. 2, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6084

World Radio History

211

R-F POWER AMPLIFIER, OSCILLATOR, A-F POWER AMPLIFIER, MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	12	
Direct Interelectrode Capacitances:		
Grid to Plate	14.5	μμf
Grid to Filament	6.0	μμf
Plate to Filament	5.5	μμf
Maximum Overall Length		7-7/8"
Maximum Diameter		2-5/16"
Bulb		T-18
Base		Jumbo 4-Large Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A

D-C Plate Voltage			1250 max.	volts
Plate Dissipation			75 max.	watts
Typical Operation and Characteristics:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage	-46	-61	-80	volts
Peak A-F Grid Voltage	41	56	75	volts
D-C Plate Current	34	53	60	ma.
Plate Resistance	4400	3800	3600	ohms
Mutual Conductance	2750	3150	3300	μmhos
Load Resistance	8800	7600	9200	ohms
U.P.O. (5% second harmonic)	5.6	12	19.7	watts

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			1250 max.	volts
Max-Signal D-C Plate Current *			175 max.	ma.
Max-Signal Plate Input *			220 max.	watts
Plate Dissipation *			100 max.	watts
Typical Operation - 2 tubes:				
Unless otherwise specified, values are for 2 tubes.				
Filament Voltage		10	10	a-c volts
D-C Plate Voltage		1000	1250	volts
D-C Grid Voltage		-77	-100	volts
Peak A-F Grid-to-Grid Voltage		380	410	volts
Zero-Sig. D-C Plate Current		20	20	ma.
Max-Sig. D-C Plate Current		320	320	ma.
Load Resistance (per tube)		1725	2250	ohms
Effective Load Res. (plate-to-plate)		6900	9000	ohms
Max-Signal Driving Power		1.5	8	approx. watts
Max-Signal Power Output		200	260	approx. watts

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	1250 max.	volts
D-C Plate Current	150 max.	ma.
R-F Grid Current	6 max.	amp.

* Averaged over any audio-frequency cycle.

(continued on next page)

World Radio History

211

R-F POWER AMPLIFIER, OSCILLATOR, A-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

Plate Input			150 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation:				
Filament Voltage	10	10	a-c	volts
D-C Plate Voltage	1000	1250		volts
D-C Grid Voltage	-77	-100		volts
Peak R-F Grid Voltage	125	125		volts
D-C Plate Current	130	106		ma.
D-C Grid Current**	5	1	approx.	ma.
Driving Power**	10	7.5	approx.	watts
Power Output	40	42.5	approx.	watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	1000 max.		volts
D-C Grid Voltage	-400 max.		volts
D-C Plate Current	175 max.		ma.
D-C Grid Current	50 max.		ma.
R-F Grid Current	6 max.		amp.
Plate Input	175 max.		watts
Plate Dissipation	67 max.		watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	750	1000	volts
D-C Grid Voltage	-200	-260	volts
Peak R-F Grid Voltage	350	410	volts
D-C Plate Current	150	150	ma.
D-C Grid Current**	35	35	approx. ma.
Driving Power**	12	14	approx. watts
Power Output	65	100	approx. watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

D-C Plate Voltage			1250 max.		volts
D-C Grid Voltage			-400 max.		volts
D-C Plate Current			175 max.		ma.
D-C Grid Current			50 max.		ma.
R-F Grid Current			7.5 max.		amp.
Plate Input			220 max.		watts
Plate Dissipation			100 max.		watts
Typical Operation:					
Filament Voltage	10	10	10	a-c	volts
D-C Plate Voltage	750	1000	1250		volts
D-C Grid Voltage	-135	-175	-225		volts
Peak R-F Grid Voltage	275	315	375		volts
D-C Plate Current	150	150	150		ma.
D-C Grid Current**	18	18	18	approx.	ma.
Driving Power**	5	6	7	approx.	watts
Power Output	65	100	130	approx.	watts

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 15% of the carrier conditions.

**: See next page.

(continued on next page)

World Radio History

211

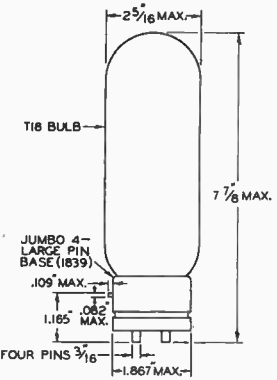
R-F POWER AMPLIFIER, OSCILLATOR, A-F POWER AMPLIFIER, MODULATOR

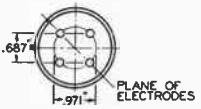
(continued from preceding page)

° At crest of a-f cycle with modulation factor of 1.0.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

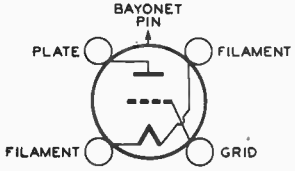
For use of the 211 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.





BOTTOM VIEW OF BASE

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



World Radio History

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211

AVERAGE PLATE CHARACTERISTICS

E f = 10 VOLTS A.C.

PLATE VOLTS (E_b)

2000 1500 1000 500 0

GRID VOLTS (E_c)

−125 −100 −75 −50 −25 0 +25 +50 +75 +100 +125 +150 +175 +200 +225

$E_c = E_b$

0 0.5 1.0 1.5

PLATE AMPERES

JAN. 10, 1936

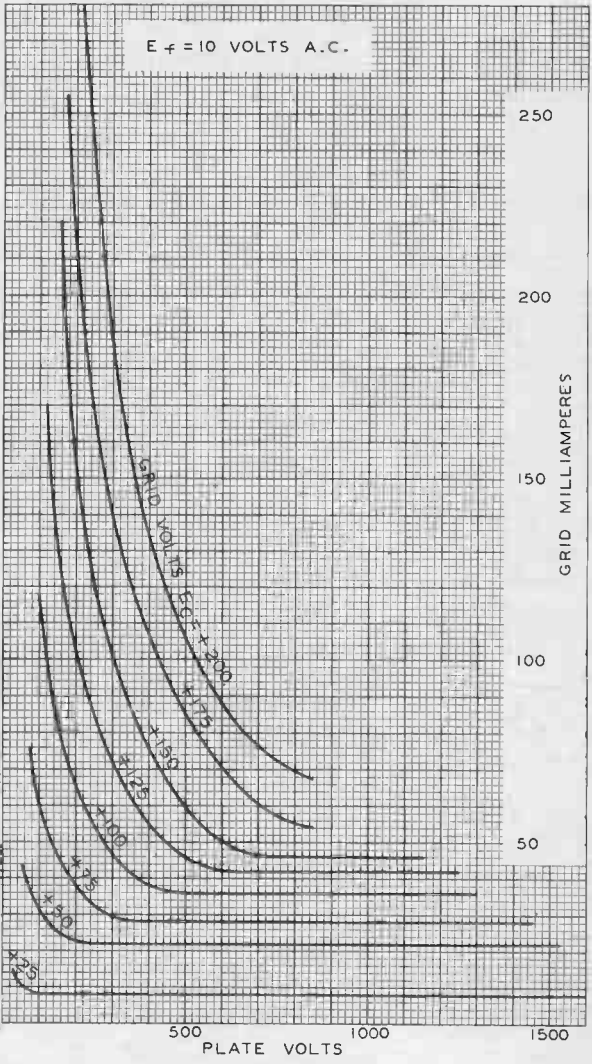
RCA RADIOTRON DIVISION

92C-4537

World Radio History

211

AVERAGE CHARACTERISTICS



AVERAGE PLATE CHARACTERISTICS

RCA
211

Ef=10 VOLTS D.C.

AUG. 7, 1931

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925-5311RI

World Radio History

217-C

HALF-WAVE VACUUM RECTIFIER

NOT RECOMMENDED FOR NEW EQUIPMENT DESIGN

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

Voltage	10.0	ac volts
Current	3.25	amp

Mechanical:

Mounting Position	Vertical only, base down
Overall Length	8-1/4" ± 1/4"
Seated Length	7-15/16" ± 1/4"
Maximum Diameter	2-5/16"
Bulb	T-18
Cap	Medium
Base	Medium-Metal-Shell Jumbo 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	2C

Pin 1 – No Connection
Pin 2 – Filament
Pin 3 – No Connection

Pin 4 – Filament
Cap – Plate

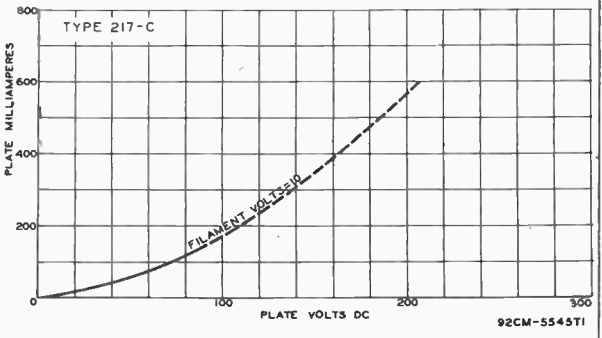
HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values*:

PEAK INVERSE PLATE VOLTAGE	7500 max.	volts
PEAK PLATE CURRENT	0.6 max.	amp
AVERAGE PLATE CURRENT	0.15 max.	amp

OUTLINE DIMENSIONS for the 217-C are the same as those for Type 805.

AVERAGE PLATE CHARACTERISTIC



World Radio History

World Radio History

304TH

H-F POWER TRIODE

GENERAL DATA

Electrical:

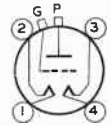
Filament, Thoriated Tungsten:

Arrangement	*Series*	*Parallel*	
Voltage	10	5	ac or dc volts
Current	12.5	25	amp

Amplification Factor	20	
Direct Interelectrode Capacitances:		
Grid to Plate	10.2	μμf
Grid to Filament	13.5	μμf
Plate to Filament	0.7	μμf

Mechanical:

Mounting Position	Vertical, base down
Overall Length	7-7/16" ± 3/16"
Seated Length	6-11/16" ± 3/16"
Maximum Radius	1-13/16"
Cap	Beaded Small
Base	See next page
Basing Designation for BOTTOM VIEW	4BC



Pin 1 – Filament No. 2
Pin 2 – Filament No. 2
Pin 3 – Filament No. 1
Pin 4 – Filament No. 1
End Terminal – Plate
Side Cap – Grid

AF POWER AMPLIFIER & MODULATOR —Class B

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	3000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	900 max.	ma.
PLATE DISSIPATION*	300 max.	watts

Typical Operation:

Values are for two tubes

DC Plate Voltage	1500	2000	3000	volts
DC Grid Voltage (Approx.)	-65	-90	-150	volts
Peak AF Grid-to-Grid Volt.	330	350	420	volts
Zero-Signal DC Plate Cur.	267	200	134	ma.
Max.-Signal DC Plate Cur.	1066	900	667	ma.
Effective Load Resistance (plate-to-plate)	2840	4820	10200	ohms
Max.-Signal Driving Power (Approx.)	17	12	6	watts
Max.-Signal Power Output (Approx.)	1000	1200	1400	watts

* Averaged over any audio-frequency cycle of sine-wave form.

World Radio History

304TH
H-F POWER TRIODE

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy

Key-down conditions per tube without modulation

Maximum Ratings, *Absolute Values*:

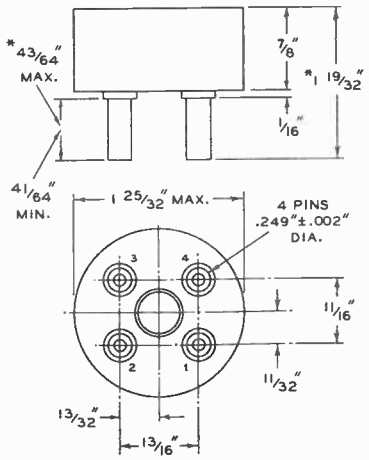
DC PLATE VOLTAGE	3000 max.	volts
DC PLATE CURRENT	900 max.	ma.
DC GRID CURRENT	170 max.	ma.
PLATE DISSIPATION	300 max.	watts

Typical Operation:

DC Plate Voltage	1500	2000	3000	volts
DC Grid Voltage	-125	-200	-300	volts
Peak RF Grid Volt. (Approx.)	250	325	395	volts
DC Plate Current	667	600	500	ma.
DC Grid Current (Approx.)	115	125	135	ma.
Driving Power (Approx.)	25	39	53	watts
Power Output (Approx.)	700	900	1200	watts

Data on operating frequencies for the 304TH are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

304TH BASE



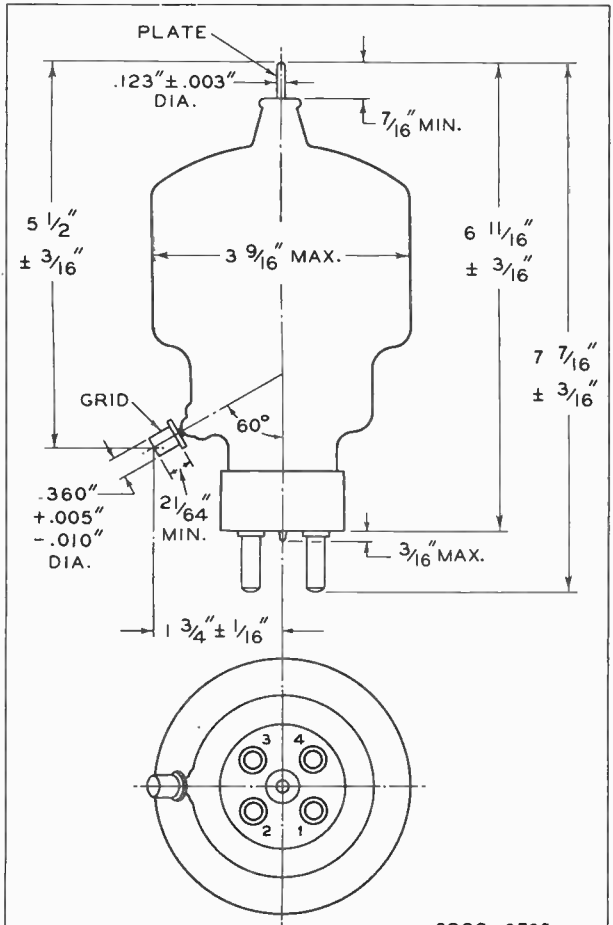
*ON FINISHED TUBE ADD .060" FOR SOLDER

92CS-6766

World Radio History

304TH

H-F POWER TRIODE



World Radio History

304TH

304TH

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

GRID AMPERES=Ic
PLATE AMPERES=Ib

PLATE VOLTS

GRID VOLTS

MAY 22,1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6768

World Radio History

Beam Power Tube

FORCED-AIR COOLED

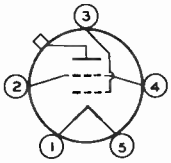
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC or DC)	5 ± 5%	volts
Current at 5 volts	14.5	amp
Transconductance, for plate volts = 2500, grid-No.2 volts = 500, and plate ma. = 200	4000	μmhos
Mu-Factor, Grid No.2 to Grid No.1	5.1	
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to plate	0.12	μμf
Grid No.1 to filament, grid No.2, and base shell	13	μμf
Plate to filament, grid No.2, and base shell	4.6	μμf

Mechanical:

Operating Position	Vertical, base down or up
Maximum Overall Length	6-3/8"
Seated Length	5-3/8" ± 1/4"
Maximum Diameter	3-9/16"
Weight (Approx.)	9 oz
Cap	Skirted Small (JEDEC No.C1-22)
Base[a]	Special Metal-Shell Giant 5-Pin
Basing Designation for BOTTOM VIEW	58K



Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1
Pin 4 - Grid No.2
Pin 5 - Filament
Cap - Plate

Thermal:

Forced-Air Cooling:

Upward through base toward bulb:

Base-cooling air flow from a small fan or centrifugal blower should be applied simultaneously with filament power. In continuous service 14 cfm at a static pressure of 0.25 inch of water are required through the base when the Eimac socket and chimney are used.

Base-Seal Temperature	200 max.	°C
Plate-Seal Temperature	225 max.	°C

World Radio History

Components:

Socket. . . . . Eimac SK-400, or equivalent
Chimney . . . . . Eimac SK-406, or equivalent
Heat-Radiating Plate Connector. . . Eimac HR-6, or equivalent

AF POWER AMPLIFIER & MODULATOR — Class AB

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE.	4000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE. . .	800 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[c]	350 max.	ma
GRID-No.2 INPUT[c].	35 max.	watts
GRID-No.1 (CONTROL-GRID) INPUT[c]	10 max.	watts
PLATE DISSIPATION[c].	400 max.	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

At frequencies up to 75 Mc

DC PLATE VOLTAGE.	3200 max.	volts
DC GRID-No.2 VOLTAGE.	600 max.	volts
DC GRID-No.1 VOLTAGE.	-500 max.	volts
DC PLATE CURRENT.	275 max.	ma
GRID-No.2 INPUT	35 max.	watts
GRID-No.1 INPUT	10 max.	watts
PLATE DISSIPATION	270 max.	watts

Maximum ICAS[d] Ratings, *Absolute-Maximum Values:*

At frequencies up to 30 Mc

DC PLATE VOLTAGE.	4000 max.	volts
DC GRID-No.2 VOLTAGE.	600 max.	volts
DC GRID-No.1 VOLTAGE.	-500 max.	volts
DC PLATE CURRENT.	275 max.	ma
GRID-No.2 INPUT	35 max.	watts
GRID-No.1 INPUT	10 max.	watts
PLATE DISSIPATION	270 max.	watts

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[e]
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS[b] Ratings, *Absolute-Maximum Values:*

At frequencies up to 110 Mc

DC PLATE VOLTAGE.	4000 max.	volts
DC GRID-No.2 VOLTAGE.	600 max.	volts
DC GRID-No.1 VOLTAGE.	-500 max.	volts
DC PLATE CURRENT.	350 max.	ma
GRID-No.2 INPUT	35 max.	watts
GRID-No.1 INPUT	10 max.	watts
PLATE DISSIPATION	400 max.	watts

World Radio History

a Metal base shell should be grounded by means of suitable spring fingers.

b Continuous Commercial Service.

c Averaged over any audio-frequency cycle of sine-wave form.

d Intermittent Commercial and Amateur Service.

e 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.

World Radio History

World Radio History

575-A

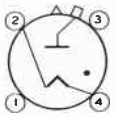
HALF-WAVE MERCURY-VAPOR RECTIFIER

The 575-A is the same as the 673 except for the following items:

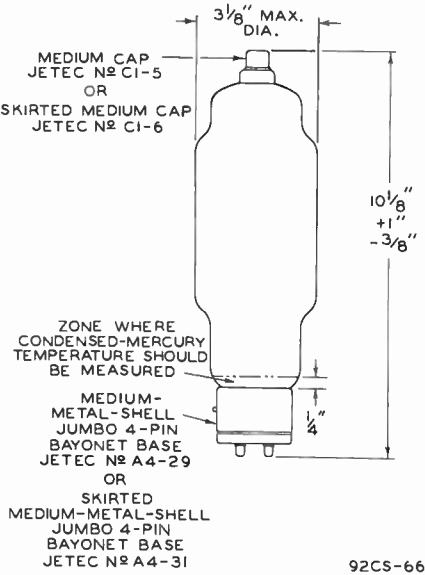
Mechanical:

Overall Length	10-1/8" + 1" - 3/8" ←
Maximum Diameter	3-1/8" ←
Weight (Approx.)	10.8 oz ←
Cap	Medium (JETEC No.C1-5), or ← Skirted Medium (JETEC No.C1-6)
Base	Medium-Metal-Shell Jumbo 4-Pin ← with Bayonet (JETEC No.A4-29), or Skirted Medium-Metal-Shell Jumbo 4-Pin with Bayonet (JETEC No.A4-31)
Basing Designation for BOTTOM VIEW	4AT

Pin 1 – No Connection
Pin 2 – Filament, Cathode Shield



Pin 3 – No Connection
Pin 4 – Filament Cap – Anode



92CS-6654R2

←Indicates a change.

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

World Radio History

World Radio History

Semiremote-Cutoff Twin Pentode

DUODECAR TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:			
Voltage (AC or DC)	6.3 ± 0.6		volts
Current at heater volts = 6.3	0.800		amp
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts
Direct Interelectrode Capacitances:[b]			
Unit No.1:			
Grid No.1 to plate	0.026		pf
Grid No.1 to cathode, grid No.2, grid No.3 & internal shield, and heater	10		pf
Plate to cathode, grid No.2, grid No.3 & internal shield, and heater	2.8		pf
Unit No.2:			
Grid No.1 to plate	0.026		pf
Grid No.1 to cathode, grid No.2, grid No.3, grid No.3 of unit No.1 & internal shield, and heater	10		pf
Plate to cathode, grid No.2, grid No.3, grid No.3 of unit No.1 & internal shield, and heater	3.0		pf
Plate of unit No.1 to plate of unit No.2	0.02	max.	pf
Grid No.1 of unit No.1 to plate of unit No.2	0.002	max.	pf
Grid No.1 of unit No.2 to plate of unit No.1	0.002	max.	pf

Characteristics, Class A_1 Amplifier (Each Unit):

Plate Supply Voltage	125	volts
Grid No.3	*Connected to cathode at socket*	
Grid-No.2 Supply Voltage	125	volts
Cathode Resistor	56	ohms
Plate Resistance (Approx.)	0.2	megohm
Transconductance	10500	μmhos
Plate Current	11	ma
Grid-No.2 Current	3.5	ma
Grid-No.1 Voltage (Approx.) for transconductance (μmhos) = 50	-15	volts

Mechanical:

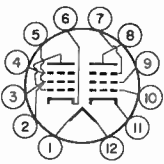
Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	1.875"

World Radio History

6AR11

Seated Length . . . . . 1.250" to 1.500"
Diameter. . . . . 1.062" to 1.188"
Bulb. T9
Base. . . . . .Small-Button Duodecar 12-Pin (JEDEC No.E12-70)
Basing Designation for BOTTOM VIEW. 12DM

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



Pin 8 - Plate of Unit No.1
Pin 9 - Grid No.2 of Unit No.1
Pin 10 - Grid No.1 of Unit No.1
Pin 11 - Cathode of Unit No.1
Pin 12 - Heater

AMPLIFIER — Class A_1

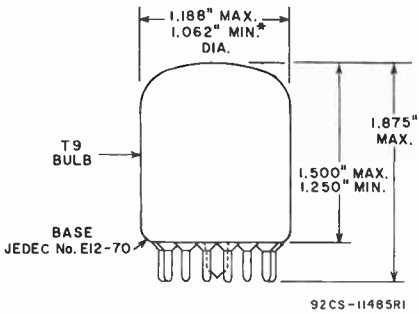
Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
GRID No.3 (SUPPRESSOR GRID) . . .	*Connect to cathode at socket*	
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE . .	330 max.	volts
GRID-No.2 VOLTAGE	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
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	3.1 max.	watts

[a] The dc component must not exceed 100 volts.
[b] With external shield JEDEC No.309 connected to cathode of unit under test.

World Radio History



* APPLIES TO MINIMUM DIAMETER EXCEPT IN AREA OF SEAL.

World Radio History

World Radio History

Dual Triode—Sharp-Cutoff Pentode

Dual Triode Has High-Mu Unit & Medium-Mu Unit

DUODECAR TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*			
Voltage (AC or DC)	6.3 ± 0.6		volts
Current at heater volts = 6.3	1.050		amp
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts
Direct Interelectrode Capacitances:[b]			
Triode Unit No.1:			
Grid to plate	1.9		pf
Grid to cathode, cathode of triode unit No.2 & internal shield, pentode cathode & pentode grid No.3 & internal shield, and heater.	3.0		pf
Plate to cathode, cathode of triode unit No.2 & internal shield, pentode cathode & pentode grid No.3 & internal shield, and heater.	2.2		pf
Triode Unit No.2:			
Grid to plate	3.6		pf
Grid to cathode & internal shield, pentode cathode & pentode grid No.3 & internal shield, and heater.	2.4		pf
Plate to cathode & internal shield, pentode cathode & pentode grid No.3 & internal shield, and heater.	3.8		pf
Pentode Unit:			
Grid No.1 to plate	0.11		pf
Grid No.1 to cathode of triode unit No.2 & internal shield, cathode & grid No.3 & internal shield, grid No.2, and heater	9.5		pf
Plate to cathode of triode unit No.2 & internal shield, cathode & grid No.3 & internal shield, grid No.2, and heater	4.4		pf
Pentode plate to plate of triode unit No.2	0.044	max.	pf
Plate of triode unit No.1 to plate of triode unit No.2	0.06	max.	pf

World Radio History

6AS11

Characteristics, Class A_1 Amplifier:

Triode Units

	Unit No.1	Unit No.2	
Plate Supply Voltage	200	200	volts
Grid Voltage	-2	-	volts
Cathode Resistor	-	220	ohms
Amplification Factor	68	41	
Plate Resistance (Approx.)	12400	9400	ohms
Transconductance	5500	4400	μmhos
Plate Current	7	9.2	ma
Grid Voltage (Approx.) for plate μa = 10	-5.5	-	volts
Grid Voltage (Approx.) for plate μa = 100	-	-6.5	volts

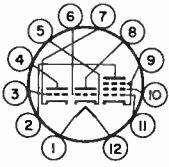
Pentode Unit

Plate Supply Voltage	200	volts
Grid-No.2 Supply Voltage	125	volts
Cathode Resistor	68	ohms
Plate Resistance(Approx.)	70000	ohms
Transconductance	10500	μmhos
Plate Current	24	ma
Grid-No.2 Current	5.2	ma
Grid-No.1 Voltage (Approx.) for plate μa = 100	-8	volts

Mechanical:

Operating Position	Any
Types of Cathodes	Coated Unipotential
Maximum Overall Length	2.375"
Seated Length	1.750" to 2.000"
Diameter	1.062" to 1.188"
Bulb	T9
Base	Small-Button Duodecar 12-Pin (JEDEC No.E12-70)
Basing Designation for BOTTOM VIEW	12DP

Pin 1 - Heater
Pin 2 - Pentode Plate
Pin 3 - Grid of Triode Unit No.2
Pin 4 - Plate of Triode Unit No.2
Pin 5 - Cathode of Triode Unit No.1
Pin 6 - Grid of Triode Unit No.1
Pin 7 - Cathode of Triode Unit No.2, Internal Shield



Pin 8 - Plate of Triode Unit No.1
Pin 9 - Pentode Cathode, Pentode Grid No.3, Internal Shield
Pin 10 - Pentode Grid No.2
Pin 11 - Pentode Grid No.1
Pin 12 - Heater

World Radio History

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

Triode Units

	Unit No.1	*Unit No.2*	
PLATE VOLTAGE	330 max.	330 max.	volts
GRID (CONTROL-GRID) VOLTAGE:			
Positive-bias value	0 max.	0 max.	volts
PLATE DISSIPATION	1.5 max.	2 max.	watts

Pentode Unit

PLATE VOLTAGE	330 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts
GRID-No.2 VOLTAGE	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive-bias value	0 max.	volts
GRID-No.2 INPUT:		
For grid-No.2 voltages up to 165 volts.	1.1 max.	watts
For grid-No.2 voltages between 165 and 330 volts	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
PLATE DISSIPATION	5 max.	watts

Maximum Circuit Values:

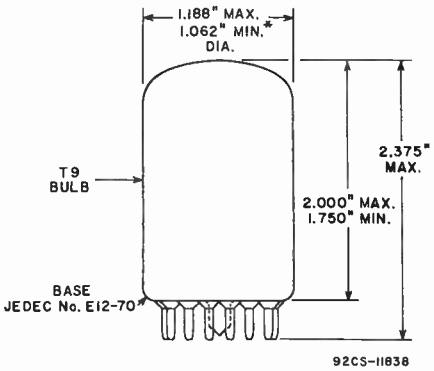
Values are for Each Unit

	Triode Units	*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

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

World Radio History

6AS11



* APPLIES TO MINIMUM DIAMETER EXCEPT IN AREA OF SEAL.

World Radio History

Half-Wave Vacuum Rectifier

DUODECAR TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	1.200	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode[a]	5000[b] max.	volts
Heater positive with respect to cathode	300[c] max.	volts
Direct Interelectrode Capacitances (Approx.):[d]		
Plate to cathode and heater	5.5	μμf
Cathode to plate and heater	7.5	μμf
Heater to cathode	2.8	μμf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2.625"
Seated Length	2.000" to 2.250"
Diameter	1.062" to 1.188"
Bulb	T9
Base	Small-Button Duodecar 12-Pin (JEDEC No.E12-70)
Basing Designation for BOTTOM VIEW	12BL

Pin 1 – Heater
Pin 2 – No Internal Connection
Pin 3 – Same as Pin 2
Pin 4 – Plate
Pin 5 – Do Not Use[e]
Pin 6 – Do Not Use[e]
Pin 7 – Cathode
Pin 8 – Do Not Use[e]
Pin 9 – Do Not Use[e]
Pin 10 – Plate
Pin 11 – Same as Pin 2
Pin 12 – Heater

DAMPER SERVICE

Maximum Ratings, *Design-Maximum Values:*

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

PEAK INVERSE PLATE VOLTAGE[a]	5000 max.	volts
PEAK PLATE CURRENT	1000 max.	ma
DC PLATE CURRENT	165 max.	ma
PLATE DISSIPATION	5.3 max.	watts

Characteristics, Instantaneous Value:

Tube Voltage Drop for plate ma. = 250	32	volts

World Radio History

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

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

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

[d] Without external shield.

[e] Socket terminals 5,6,8, and 9 should not be used as tie points.

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

World Radio History

Half-Wave Vacuum Rectifier

NOVAR TYPE

For Television Damper Service

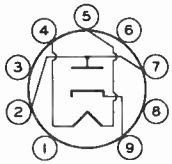
GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	1.200	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode[a]	5000[b] max.	volts
Heater positive with respect to cathode	300[c] max.	volts
Direct Interelectrode Capacitances (Approx.):[d]		
Plate to cathode and heater	6.5	pf
Cathode to plate and heater	9.0	pf
Heater to cathode	2.8	pf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	3.54"
Maximum Seated Length	3.16"
Length, Base Seat to Bulb Top (Excluding tip)	2.60" ± 0.09"
Diameter	1.062" to 1.188"
Bulb	T9
Socket	Novar 9-Contact
Base	Small-Button Novar 9-Pin (JEDEC No.E9-75)
Basing Designation for BOTTOM VIEW	9HP



Pin 1 – Do Not Use[e]
Pin 2 – Plate
Pin 3 – Do Not Use[e]
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Do Not Use[e]
Pin 7 – Plate
Pin 8 – Do Not Use[e]
Pin 9 – Cathode

DAMPER SERVICE

Maximum Ratings, *Design-Maximum Values:*

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

PEAK INVERSE PLATE VOLTAGE[a]	5000	max.	volts
PEAK PLATE CURRENT	1100	max.	ma
DC PLATE CURRENT	175	max.	ma
PLATE DISSIPATION	6.5	max.	watts

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

◄ Indicates a change.

World Radio History

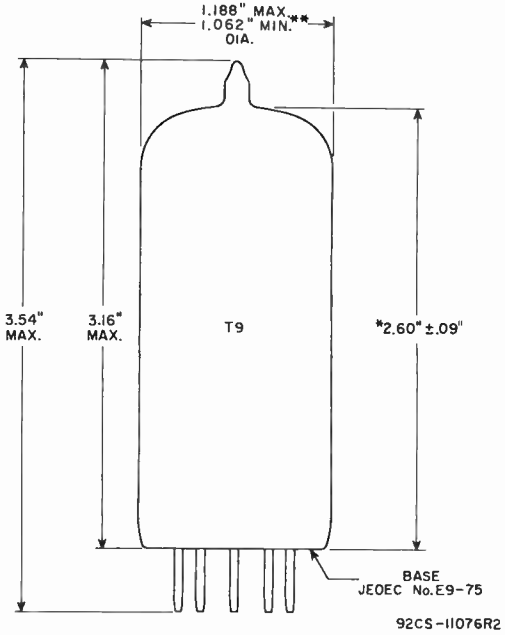
b The dc component must not exceed 900 volts.

c The dc component must not exceed 100 volts.

d Without external shield.

e Socket terminals 1, 3, 6, and 8 should not be used as tie points. It is recommended that the socket clips for these pins be removed to reduce the possibility of arc-over and to minimize leakage.

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



** APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.

* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.600" INSIDE DIAMETER.

World Radio History

Twin Diode—Medium-Mu-Twin Triode

DUODECAR TYPE
With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:			
Voltage (AC or DC)	6.3[a]	6.3 ± 0.6	volts
Current	0.600 ± 0.040	0.600[b]	amp
Warm-up time (Average)	11	-	sec
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	200 max.		volts
Heater positive with respect to cathode	200[c] max.		volts
Direct Interelectrode Capacitances (Approx.):[d]			
Diode Units:			
Plate of unit No.1 to cathode, internal shield, and heater	1.9		pf
Plate of unit No.2 to cathode, internal shield, and heater	1.8		pf
Triode Units:	*Unit No.1*	*Unit No.2*	
Grid to plate	1.5	1.5	pf
Grid to cathode, internal shield, and heater	1.7	1.8	pf
Plate to cathode, internal shield, and heater	1.6	0.6	pf
Plate of diode unit No.1 to plate of diode unit No.2	0.7		pf
Triode grid to plate of diode unit No.1	0.015	0.005	pf
Triode grid to plate of diode unit No.2	0.02	0.005	pf
Plate of triode unit No.1 to plate of triode unit No.2	0.9		pf

Characteristics, Class A_1 Amplifier (Each Triode Unit):

Plate Voltage	250	volts
Grid Voltage	-8	volts
Amplification Factor	18	
Plate Resistance (Approx.)	7200	ohms
Transconductance	2500	μmhos
Plate Current	10	ma
Grid Voltage (Approx.) for plate μa = 50	-20	volts

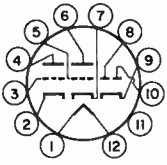
World Radio History

6B10

Mechanical:

Operating Position. . . . . Any
Types of Cathodes . . . . . Coated Unipotential
Maximum Overall Length. . . . . 1.875"
Seated Length . . . . . 1.250" to 1.500"
Diameter. . . . . 1.062" to 1.188"
Bulb. T9
Base. . . . . Small-Button Duodecar 12-Pin (JEDEC No.E12-70)
Basing Designation for BOTTOM VIEW. 12BF

Pin 1 – Heater
Pin 2 – Cathode of Triode Unit No.2
Pin 3 – Grid of Triode Unit No.2
Pin 4 – Plate of Triode Unit No.2
Pin 5 – Grid of Triode Unit No.1
Pin 6 – Plate of Triode Unit No.1
Pin 7 – Cathode of Triode Unit No.1
Pin 8 – Plate of Diode Unit No.2
Pin 9 – Cathode of Diode Units No.1 & No.2
Pin 10 – Plate of Diode Unit No.1
Pin 11 – Internal Shield
Pin 12 – Heater



TRIODE UNITS — AMPLIFIER — Class A_1

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	330 max.	volts
DC CATHODE CURRENT.	20 max.	ma
PLATE DISSIPATION	3 max.	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

For fixed-bias operation.	0.25 max.	megohm
For cathode-bias operation.	1 max.	megohm

DIODE UNITS — Two

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

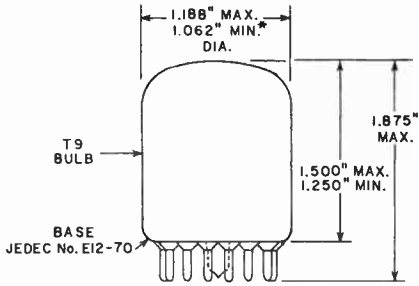
PLATE CURRENT	5 max.	ma

Characteristics, Instantaneous Value:

Plate Current for plate volts = 5 . . .	20	ma

[a] At heater amperes = 0.600.
[b] At heater volts = 6.3.
[c] The dc component must not exceed 100 volts.
[d] Without external shield.

World Radio History



* APPLIES TO MINIMUM DIAMETER EXCEPT IN AREA OF SEAL.

World Radio History

World Radio History

Half-Wave Vacuum Rectifier

NOVAR TYPE

For Television Damper Service

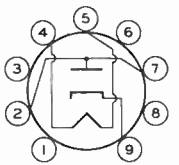
GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	1.600	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode[a]	5500[b] max.	volts
Heater positive with respect to cathode	300[c] max.	volts
Direct Interelectrode Capacitances (Approx):[d]		
Plate to cathode and heater	6.5	pf
Cathode to plate and heater	9.0	pf
Heater to cathode	2.8	pf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	3.54"
Maximum Seated Length	3.16"
Length, Base Seat to Bulb Top (Excluding tip)	2.60" ± 0.09"
Diameter	1.062" to 1.188"
Bulb	T9
Socket	Novar 9-Contact
Base	Small-Button Novar 9-Pin (JEDEC No.E9-75)
Basing Designation for BOTTOM VIEW	9HP



Pin 1 – Do Not Use[e]
Pin 2 – Plate
Pin 3 – Do Not Use[e]
Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Do Not Use[e]
Pin 7 – Plate
Pin 8 – Do Not Use[e]
Pin 9 – Cathode

DAMPER SERVICE

Maximum Ratings, *Design-Maximum Values:*

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

PEAK INVERSE PLATE VOLTAGE[a]	5500 max.	volts
PEAK PLATE CURRENT	1100 max.	ma
DC PLATE CURRENT	180 max.	ma
PLATE DISSIPATION	6.5 max.	watts

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

→ Indicates a change.

World Radio History

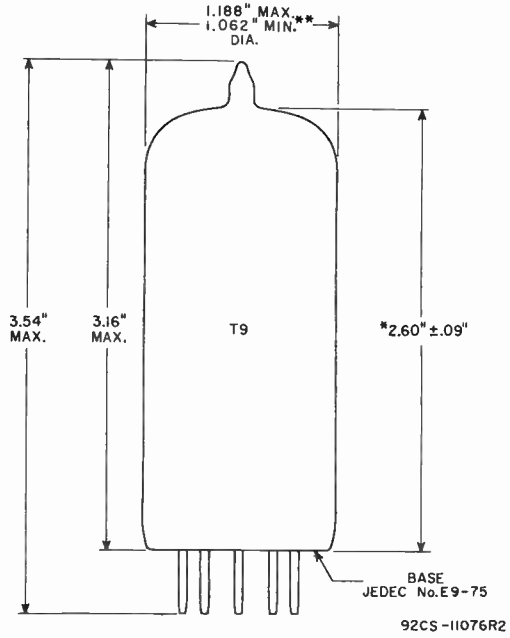
[b] The dc component must not exceed 900 volts.

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

[d] Without external shield.

[e] Socket terminals 1, 3, 6, and 8 should not be used as tie points. It is recommended that the socket clips for these pins be removed to reduce the possibility of arc-over and to minimize leakage.

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



** APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.

* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.600" INSIDE DIAMETER.

World Radio History

Sharp-Cutoff Dual Tetrode

10-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*			
Voltage (AC or DC)		6.3 ± 0.6	volts
Current at heater volts = 6.3		0.400	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]	*Unit No.1*	*Unit No.2*	
Grid No.1 to plate	0.055 max.	0.06 max.	μμf
Grid No.1 to cathode & internal shield, grid No.2, and heater	–	4.2	μμf
Grid No.1 to cathode, grid No.2, cathode of unit No.2 & internal shield, and heater	4.4	–	μμf
Plate to cathode & internal shield, grid No.2, and heater	–	2.2	μμf
Plate to cathode, grid No.2, cathode of unit No.2 & internal shield, and heater	2.2	–	μμf
Heater to cathode	4.2[b]	4.8[b]	μμf
Plate of unit No.1 to plate of unit No.2	0.003 max.		μμf
Grid No.1 of unit No.1 to grid No.1 of unit No.2	0.001 max.		μμf
Grid No.1 of unit No.1 to plate of unit No.2	0.001 max.		μμf
Grid No.1 of unit No.2 to plate of unit No.1	0.032 max.		μμf

Characteristics, Class A_1 Amplifier (Each Unit):

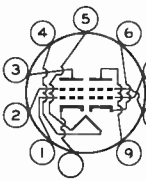
Plate Voltage	125	volts
Grid-No.2 Voltage	80	volts
Grid-No.1 Voltage	-1	volt
Plate Resistance (Approx.)	0.1	megohm
Transconductance	8000	μmhos
Plate Current	10	ma
Grid-No.2 Current	1.5	ma
Grid-No.1 Voltage (Approx.) for plate μa = 20	-6	volts

World Radio History

Mechanical:

Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	2.190"
Maximum Seated Length	1.940"
Length, Base Seat to Bulb Top (Excluding tip)	1.460" to 1.660"
Diameter	0.750" to 0.875"
Bulb	T6-1/2
Base	Small-Button Miniature 10-Pin (JEDEC No.E10-73)
Basing Designation for BOTTOM VIEW	10F

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



CENTER PIN

Pin 8 - Grid No.2 of Unit No.1
Pin 9 - Plate of Unit No.1
CENTER PIN - Cathode of Unit No.2, Internal Shield

AMPLIFIER — Class A_1

Unless Otherwise Specified, Values are for Each Unit

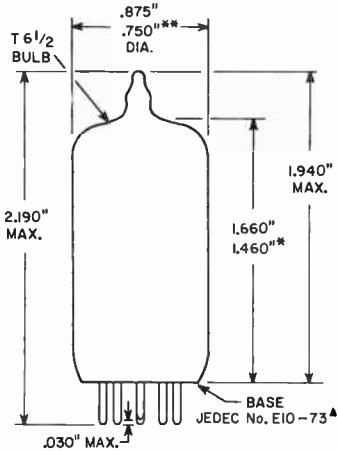
Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	250 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	
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 volts and 180 volts	See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section	
PLATE DISSIPATION:		
Either plate	1.5 max.	watts
Both plates (Both units operating)	2.5 max.	watts

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

[b] With external shield JEDEC No.315 connected to ground.

World Radio History



92CS-11493

** APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.

* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.438" INSIDE DIAMETER.

▲ THIS BASE IS IDENTICAL TO BASE JEDEC No. E9-1 (SMALL-BUTTON NOVAL 9-PIN) EXCEPT THAT IT HAS A TENTH PIN WHICH IS SHORTER THAN THE OTHERS AND LOCATED AT THE CENTER.

World Radio History

World Radio History

Twin Diode—High-Mu Triode

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

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:

Heater-section arrangement	*Parallel*	*Series*	*Series*	
Voltage (AC or DC)	3.15[a]	6.3[b]	6.3 ± 0.6	volts
Current	0.600 ± 0.040	0.300 ± 0.020	0.300[c]	amp
Warm-up time (Average)	11	11	–	sec

Peak heater-cathode voltage (Each unit):

Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200[d] max.	volts

Direct Interelectrode Capacitances (Approx):[e]

Triode Unit:		
Grid to plate	1.8	pf
Grid to cathode and heater	1.5	pf
Plate to cathode and heater	0.5	pf
Diode Units:		
Diode-No.1 plate to cathode of diodes No.1 and No.2 & internal shield, and heater	3.6	pf
Diode-No.2 plate to cathode of diodes No.1 and No.2 & internal shield, and heater	3.6	pf
Triode grid to either diode plate	0.006	pf

Characteristics, Class A_1 Amplifier (Triode Unit):

Plate Voltage	100	250	volts
Grid Voltage	−1	−3	volts
Amplification Factor	70	70	
Plate Resistance (Approx.)	54000	58000	ohms
Transconductance	1300	1200	μmhos
Plate Current	0.8	1	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)

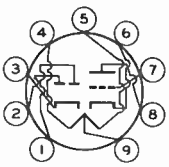
→ Indicates a change.

World Radio History

6CN7

Basing Designation for BOTTOM VIEW. 9EN

Pin 1 – Diode–No.2 Plate
Pin 2 – Diode–No.1 Plate
Pin 3 – Cathode of Diodes No.1 & No.2, Internal Shield



Pin 4 – Heater
Pin 5 – Heater
Pin 6 – Triode Cathode
Pin 7 – Triode Grid
Pin 8 – Triode Plate
Pin 9 – Heater Tap

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

Typical Operation as Resistance-Coupled Amplifier:

See *RESISTANCE-COUPLED AMPLIFIER CHART No.7* at front of this section

DIODE UNITS — Two

Values are for Each Unit

Maximum Ratings, *Design-Maximum Values:*

PLATE CURRENT	5.5	max.	ma

Characteristics, Instantaneous Value:

Plate Current for plate volts = 5	20	ma

[a] At heater amperes = 0.600.
[b] At heater amperes = 0.300.
[c] At heater volts = 6.3
[d] The dc component must not exceed 100 volts.
[e] Without external shield.

CURVES

For Triode shown under Type 6T8A also apply to the 6CN7

World Radio History

High-Mu Triode

NUVISTOR TYPE

For Use as Grounded-Cathode, Neutralized RF-Amplifier Tube in Tuners of VHF Television and FM Receivers

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	0.135	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	0.92	pf
Grid to cathode, shell, and heater	4.3	pf
Plate to cathode, shell, and heater	1.8	pf
Plate to cathode	0.18	pf
Heater to cathode	1.6	pf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	110	volts
Grid Supply Voltage	0	volts
Cathode Resistor	130	ohms
Amplification Factor	65	
Plate Resistance (Approx.)	6600	ohms
Transconductance	9800	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"
Envelope	Metal Shell MT4
Socket	Cinch Mfg. Corp. No. 133 65 10 001, Industrial Electronic Hardware Co. No. Nu 5044 or No. Nu 5060, or equivalent
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No. E5-65)

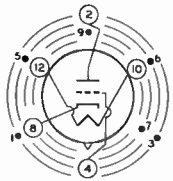
← Indicates a change.

World Radio History

6CW4

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

AMPLIFIER — Class A1

Maximum Ratings, *Design-Maximum Values:*

PLATE SUPPLY VOLTAGE	300[b]	max.	volts
→ PLATE VOLTAGE	135	max.	volts
GRID VOLTAGE:			
Negative-bias value	55	max.	volts
Peak-positive value	0	max.	volts
CATHODE CURRENT	15	max.	ma
→ PLATE DISSIPATION:			
With a minimum series plate-circuit resistance of 5000 ohms	1.5	max.	watts
For lower values of series plate-circuit resistance	See accompanying *Plate-Dissipation-Rating Chart*		

Typical Operation:

Plate Voltage	70	volts
Grid Supply Voltage	0	volts
Grid Resistor	47000	ohms
Amplification Factor	68	
Plate Resistance (Approx.)	5440	ohms
Transconductance	12500	μmhos
→ Plate Current	7.2	ma

Maximum Circuit Values:

Grid-Circuit Resistance:[c]			
For fixed-bias operation	0.5	max.	megohm
For cathode-bias operation	2.2	max.	megohms

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

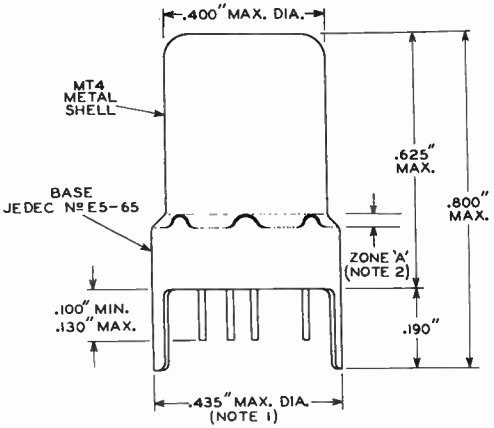
→ [b] A plate supply voltage of 300 volts may be used provided sufficient plate-circuit resistance and agc voltage are used to limit the voltage at the plate of the tube to 135 volts under conditions of maximum-rated plate dissipation (1.5 watts).

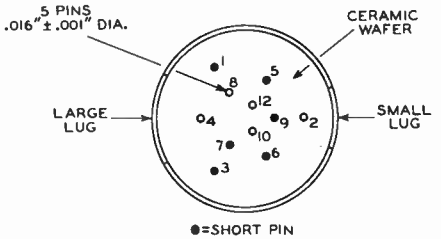
→ [c] For operation at metal-shell temperatures up to 135° C.

→ Indicates a change.

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

World Radio History





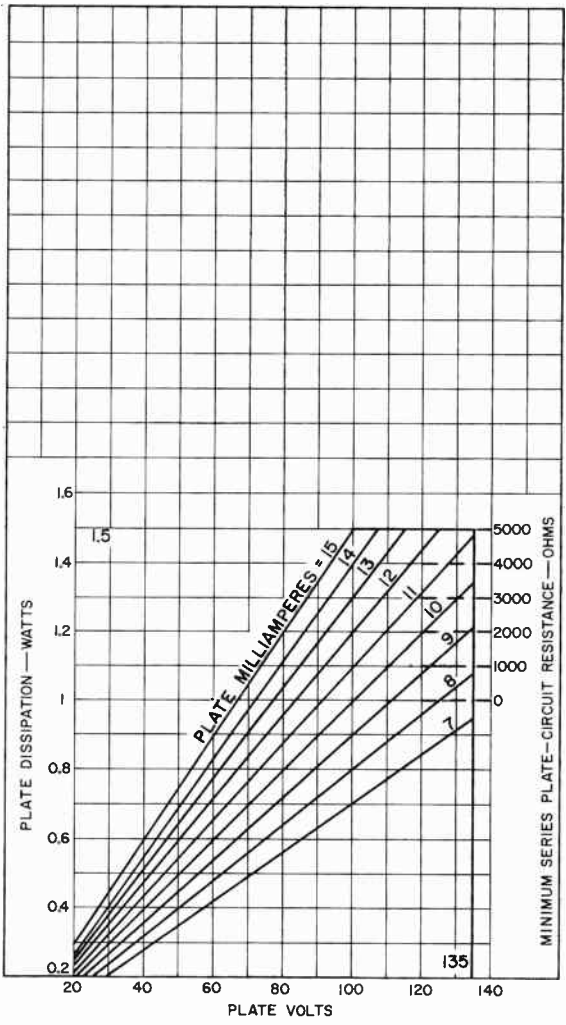
92CS-10970R3

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

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

World Radio History

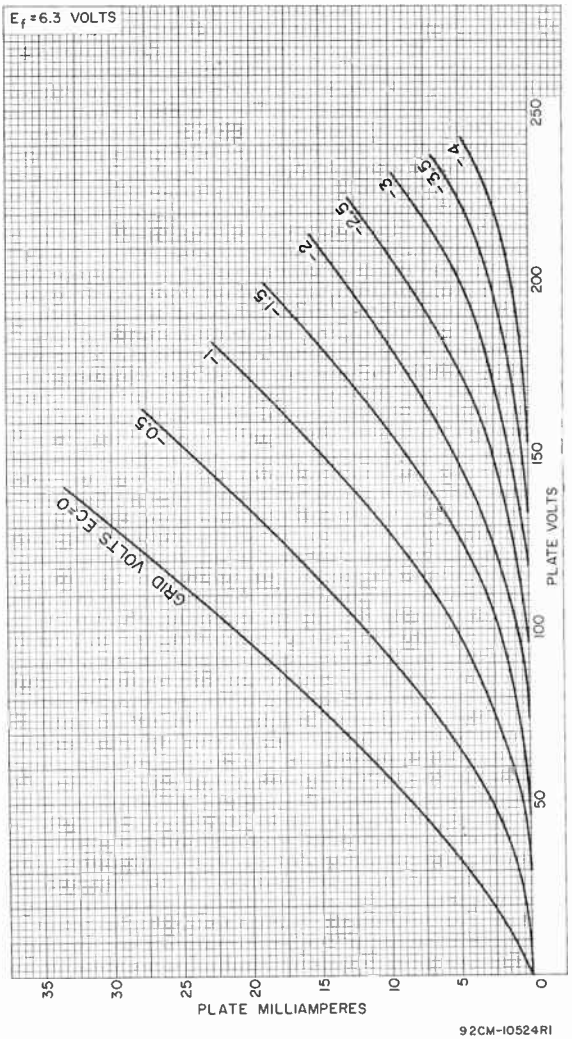
PLATE-DISSIPATION-RATING CHART



92CM-11681

World Radio History

AVERAGE PLATE CHARACTERISTICS

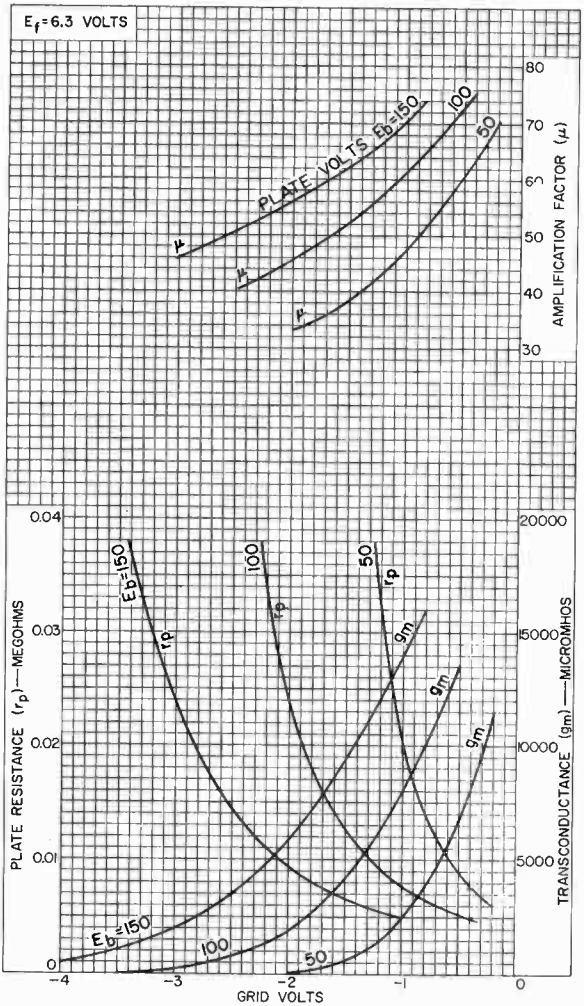


92CM-10524RI

World Radio History

6CW4

AVERAGE CHARACTERISTICS



92CM-10520R1

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

6DS4

High-Mu Triode

NUVISTOR TYPE

HAVING EXTENDED CUTOFF CHARACTERISTIC

For Use as Grounded-Cathode, Neutralized RF-Amplifier Tube in Tuners of VHF Television and FM Receivers Featuring Improved Weak-Signal-Area Reception

GENERAL DATA

Electrical: ←

Heater Characteristics and Ratings *(Design-Maximum Values)*:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	0.135	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	0.92	μμf
Grid to cathode, shell, and heater	4.3	μμf
Plate to cathode, shell, and heater	1.8	μμf
Plate to cathode	0.18	μμf
Heater to cathode	1.6	μμf

Characteristics, Class A$_1$ Amplifier:

Plate Supply Voltage	110	volts
Grid Supply Voltage	0	volts
Cathode Resistor	130	ohms
Amplification Factor	63	
Plate Resistance (Approx.)	7000	ohms
Transconductance	9000	μmhos
Plate Current	6.5	ma
Grid Voltage (Approx.) for plate μa = 100.	-5	volts
Grid Voltage (Approx.) for plate μa = 10 .	-6.8	volts

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	0.800"
Maximum Seated Length	0.625"
Maximum Diameter	0.440"
Envelope	Metal Shell MT4
Socket	Cinch Mfg. Corp. No. 133 65 10 001, Industrial Electronic Hardware Co. No. Nu 5044 or No. Nu 5060, or equivalent
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No. E5-65)

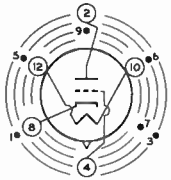
← Indicates a change.

World Radio History

6DS4

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

AMPLIFIER — Class A|

Maximum Ratings, *Design-Maximum Values:*

PLATE SUPPLY VOLTAGE.	300[b]	max.	volts
PLATE VOLTAGE	135	max.	volts
GRID VOLTAGE:			
Negative-bias value	55	max.	volts
Peak-positive value	0	max.	volts
CATHODE CURRENT	15	max.	ma
→ PLATE DISSIPATION:			
With a minimum series plate-circuit resistance of 5000 ohms	1.5	max.	watts
For lower values of series plate-circuit resistance.	See accompanying *Plate-Dissipation-Rating Chart*		

Typical Operation:

Plate Voltage	70	volts
Grid Supply Voltage	0	volts
Grid Resistor	47000	ohms
Amplification Factor.	68	
Plate Resistance (Approx.).	5440	ohms
Transconductance.	12500	μmhos
→ Plate Current	7	ma

Maximum Circuit Values:

Grid-Circuit Resistance:[c]			
For fixed-bias operation.	0.5	max.	megohm
For cathode-bias operation.	2.2	max.	megohms

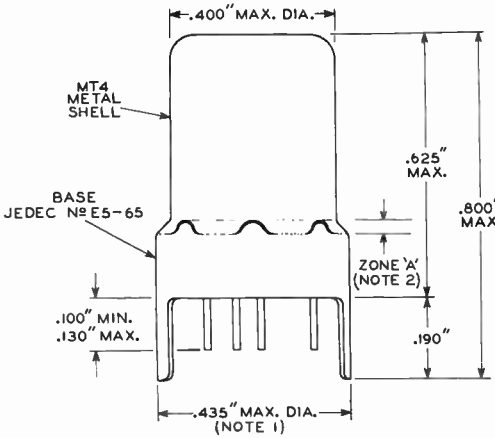
[a] Pin is of a length such that its end does not touch the socket insertion plane.

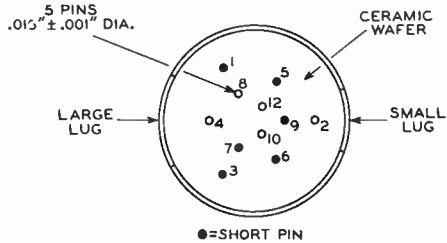
→ [b] A plate supply voltage of 300 volts may be used provided sufficient plate-circuit resistance and agc voltage are used to limit the voltage at the plate of the tube to 135 volts under conditions of maximum-rated plate dissipation (1.5 watts).

→ [c] For operation at metal-shell temperatures up to 135° C.

→ Indicates a change.

World Radio History





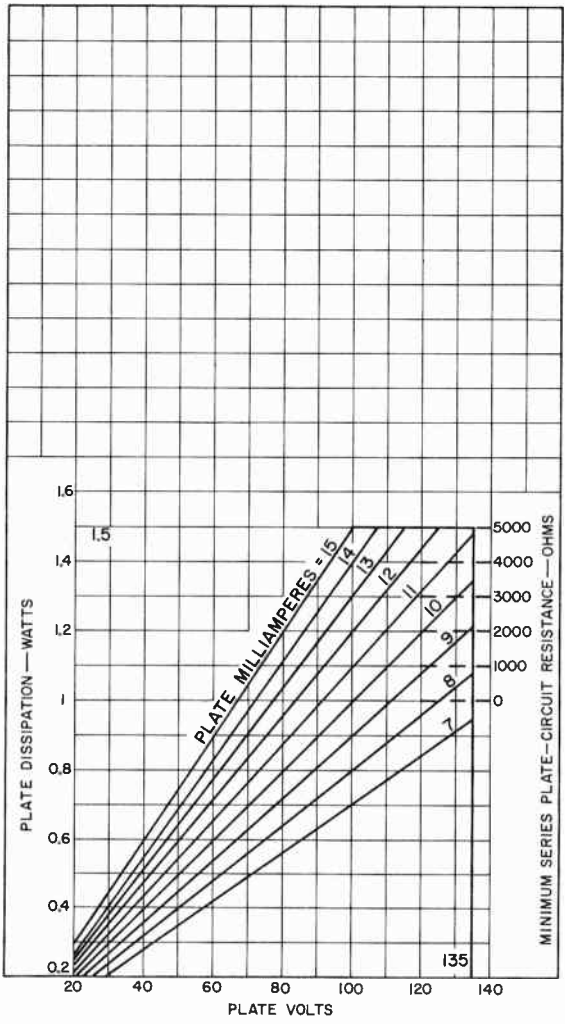
92CS-10970R3

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

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

World Radio History

PLATE-DISSIPATION-RATING CHART



92CM-11681

World Radio History

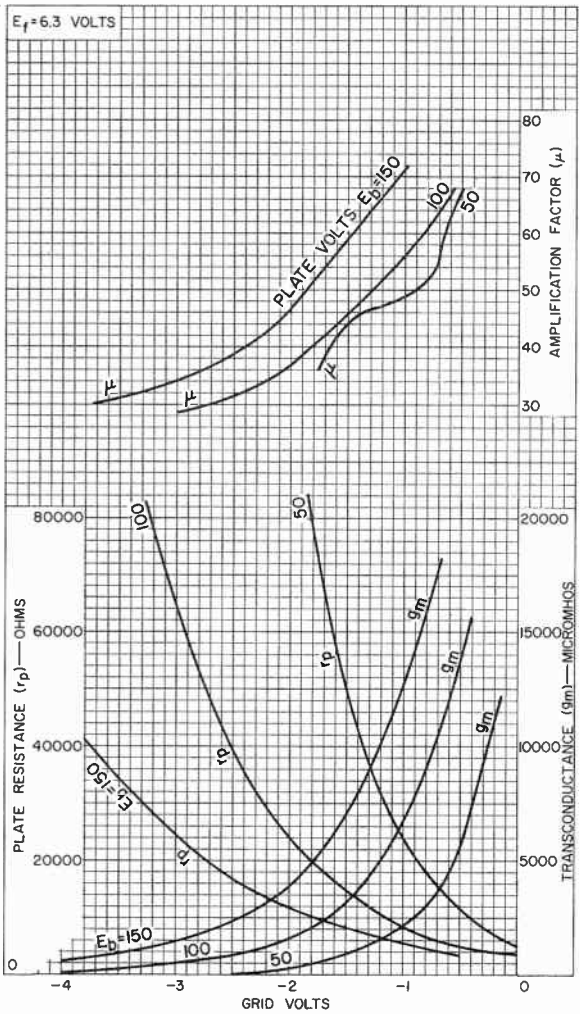
AVERAGE PLATE CHARACTERISTICS

92CM-11209

World Radio History

6DS4

AVERAGE CHARACTERISTICS



92CM-11210

Medium-Mu Triode

NUVISTOR TYPE

Having Gold-Plated Envelope and Base Pins to Assure Positive Grounding and Low Pin-Contact Resistance for Oscillator Applications at UHF Frequencies

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	0.135	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	1.8	pf
Grid to cathode, shell, and heater	4.4	pf
Plate to cathode, shell, and heater	1.9	pf
Plate to cathode	0.25	pf
Heater to cathode	1.4	pf
Grid to cathode	3.7	pf

Characteristics, Class A$_1$ Amplifier:

Plate Supply Voltage	75	volts
Cathode Resistor	100	ohms
Amplification Factor	35	
Plate Resistance (Approx.)	3100	ohms
Transconductance	11500	μmhos
Plate Current	10.5	ma
Grid Voltage (Approx.) for plate μa = 10.	-7	volts

Mechanical:

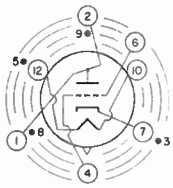
Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	0.800"
Maximum Seated Length	0.625"
Maximum Diameter	0.440"
Envelope	Metal Shell MT4
Socket	Industrial Electronic Hardware Corp. No. MSN0707-1, or equivalent
Base	Medium Ceramic-Wafer Twelvar 7-Pin (JEDEC No.E7-83)

World Radio History

6DV4

Basing Designation for BOTTOM VIEW. 12EA

Pin 1 – Plate
Pin 2 – Plate
Pin 3[a] – Do Not Use
Pin 4 – Grid
Pin 5 – Same as Pin 3
Pin 6 – Grid
Pin 7 – Cathode
Pin 8 – Same as Pin 3
Pin 9 – Same as Pin 3
Pin 10 – Heater
Pin 12 – Heater



INDEX = LARGE LUG
• = SHORT PIN

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE SUPPLY VOLTAGE	300[b]	max.	volts
PLATE VOLTAGE	125	max.	volts
GRID VOLTAGE:			
Negative-bias value	55	max.	volts
Peak-positive value	2	max.	volts
CATHODE CURRENT	15	max.	ma
PLATE DISSIPATION	1	max.	watt

Typical Operation:

As oscillator at 950 Mc

Plate Voltage	60	volts
Grid Voltage	−2	volts
Grid Resistor	5600	ohms
Plate Current	8	ma
Grid Current	350	μa

Maximum Circuit Values:

Grid-Circuit Resistance:[c]

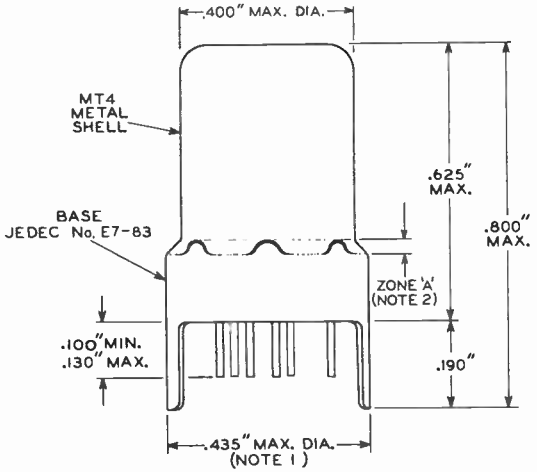
For fixed-bias operation	0.1	max.	megohm
For cathode-bias operation	0.2	max.	megohm

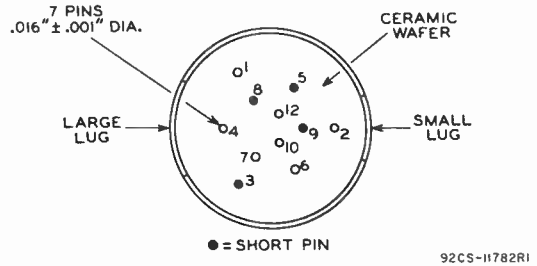
[a] Pin is of a length such that its end does not touch the socket insertion plane.

[b] A plate supply voltage of 300 volts may be used provided that a sufficiently large resistor is used in the plate circuit to limit the plate dissipation to one watt under any condition of operation.

[c] For operation at metal-shell temperatures up to 135° C.

World Radio History





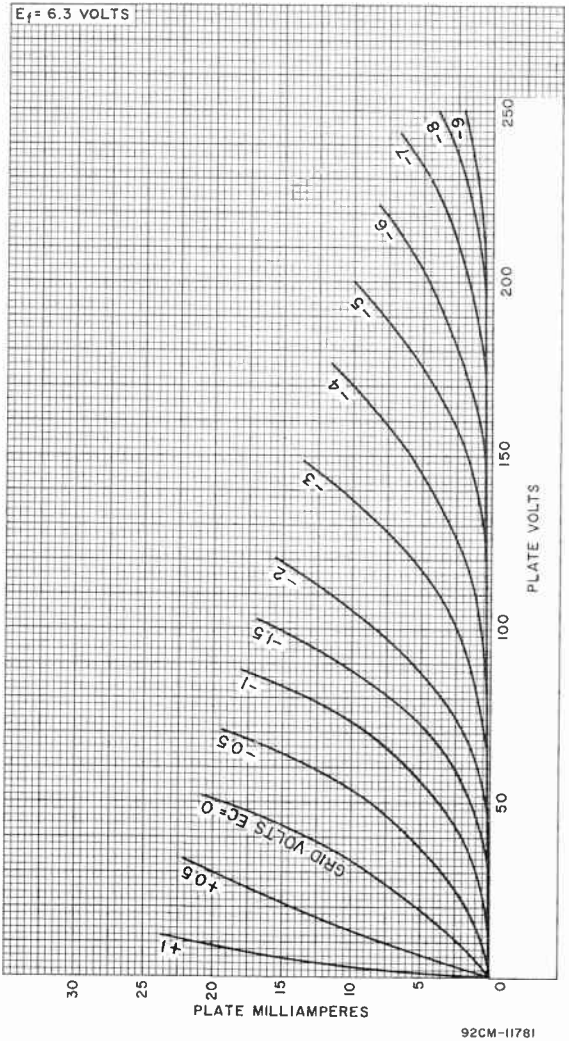
NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

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

World Radio History

6DV4

AVERAGE PLATE CHARACTERISTICS

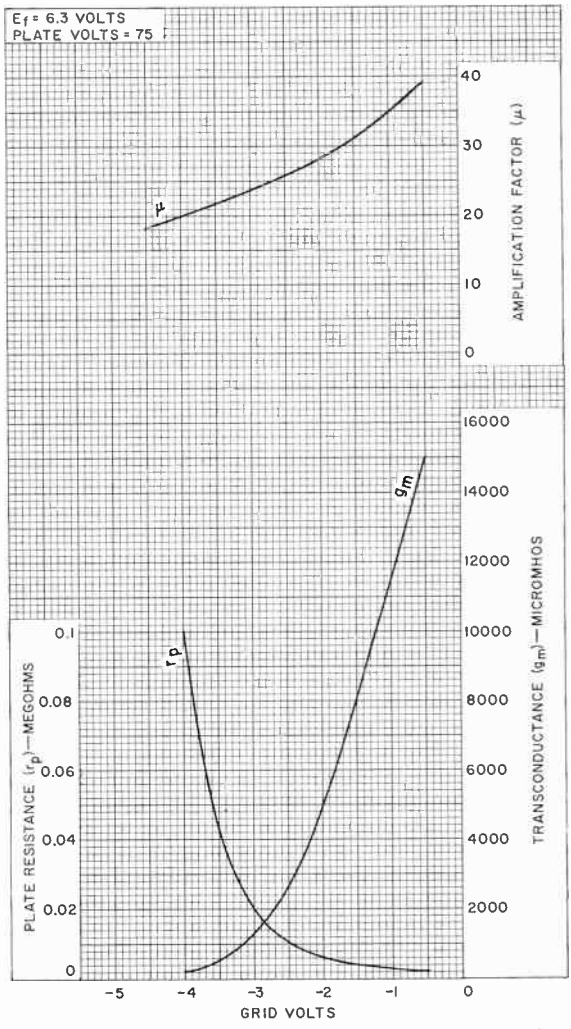


92CM-11781

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

World Radio History

AVERAGE CHARACTERISTICS

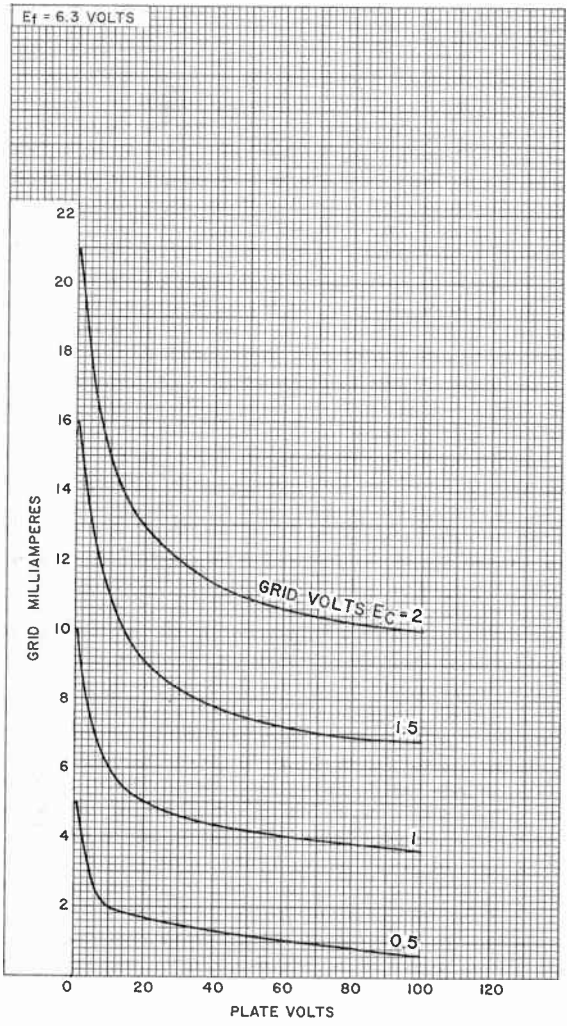


92CM-11780

World Radio History

6DV4

AVERAGE CHARACTERISTICS



92CM-11779

6DW4

Half-Wave Vacuum Rectifier

NOVAR TYPE

For Television Damper Service

GENERAL DATA

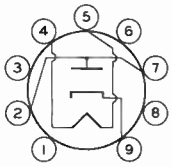
Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Voltage (AC or DC)	6.3 ± 0.6	volts
Current at heater volts = 6.3	1.200	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode[a]	5000[b] max.	volts
Heater positive with respect to cathode	300[c] max.	volts
Direct Interelectrode Capacitances (Approx.):[d]		
Plate to cathode and heater	6.5	pf
Cathode to plate and heater	9.0	pf
Heater to cathode	2.8	pf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	3.54"
Maximum Seated Length	3.16"
Length, Base Seat to Bulb Top (Excluding tip)	2.60" ± 0.09"
Diameter	1.062" to 1.188"
Bulb	T9
Socket	Novar 9-Contact
Base	Small-Button Novar 9-Pin (JEDEC No.E9-75)
Basing Designation for BOTTOM VIEW	9HP

Pin 1 – Do Not Use[e]
Pin 2 – Plate
Pin 3 – Do Not Use[e]
Pin 4 – Heater



Pin 5 – Heater
Pin 6 – Do Not Use[e]
Pin 7 – Plate
Pin 8 – Do Not Use[e]
Pin 9 – Cathode

DAMPER SERVICE

Maximum Ratings, *Design-Maximum Values:*

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

PEAK INVERSE PLATE VOLTAGE[a]	5000 max.	volts
PEAK PLATE CURRENT	1300 max.	ma
DC PLATE CURRENT	250 max.	ma
PLATE DISSIPATION	8.5 max.	watts

→ Indicates a change.

World Radio History

Characteristics, Instantaneous Value:

Tube Voltage Drop for plate ma. = 350 . . . 25 volts

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

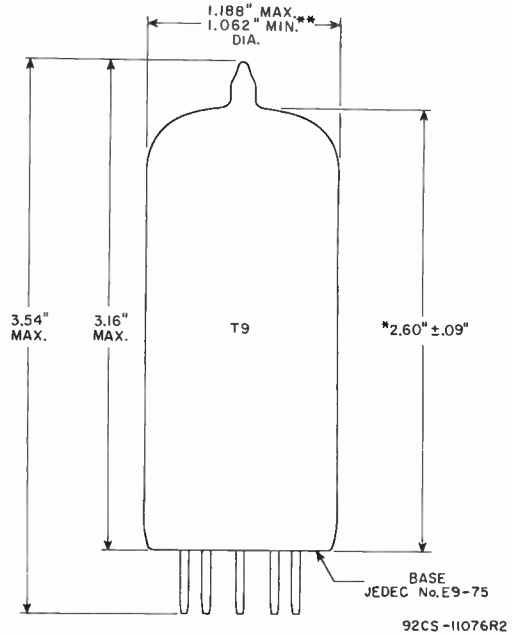
[b] The dc component must not exceed 900 volts.

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

[d] Without external shield.

[e] Socket terminals 1, 3, 6, and 8 should not be used as tie points. It is recommended that the socket clips for these pins be removed to reduce the possibility of arc-over and to minimize leakage.

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



** APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.

* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.600" INSIDE DIAMETER.

World Radio History

Medium-Mu Dual Triode

DUODECAR TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:

Voltage (AC or DC)	6.3 ± 0.6		volts
Current at heater volts = 6.3	0.900		amp
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts

Direct Interelectrode Capacitances (Approx.):[b]

	Unit No.1	*Unit No.2*	
Grid to plate	3.8	5.0	pf
Grid to cathode and heater	2.2	4.0	pf
Plate to cathode and heater	0.48	0.54	pf

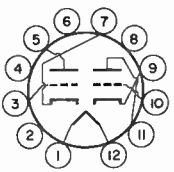
Characteristics, Class A$_1$ Amplifier:

	Unit No.1	*Unit No.2*		
Plate Voltage	250	150	250	volts
Grid Voltage	-8	0	-9.5	volts
Amplification Factor	22.5	–	15.4	
Plate Resistance (Approx.)	9000	–	2000	ohms
Transconductance	2500	–	7700	μmhos
Plate Current	8	68[c]	41	ma
Grid Voltage (Approx.) for plate μa = 10	-18	–	–	volts
Grid Voltage (Approx.) for plate μa = 50	–	–	-23	volts

Mechanical:

Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	2.375"
Seated Length	1.750" to 2.000"
Diameter	1.062" to 1.188"
Bulb	T9
Base	Small-Button Duodecar 12-Pin (JEDEC No.E12-70)
Basing Designation for BOTTOM VIEW	12BM

Pin 1 – Heater
Pin 2 – No Internal Connection
Pin 3 – Grid of Unit No.2
Pin 4 – Same as Pin 2
Pin 5 – Plate of Unit No.2
Pin 6 – Do Not Use
Pin 7 – Cathode of Unit No.2



Pin 8 – Same as Pin 2
Pin 9 – Cathode of Unit No.1
Pin 10 – Grid of Unit No.1
Pin 11 – Plate of Unit No.1
Pin 12 – Heater

World Radio History

VERTICAL-DEFLECTION OSCILLATOR

Values are for Unit No.1

Maximum Ratings, *Design-Maximum Values:*

DC PLATE VOLTAGE	350	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	400	max.	volts
PLATE DISSIPATION	1	max.	watt

Maximum Circuit Values:

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

VERTICAL-DEFLECTION AMPLIFIER

Values are for Unit No.2

Maximum Ratings, *Design-Maximum Values:*

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

DC PLATE VOLTAGE	550	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE[e]	2500	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	250	max.	volts
CATHODE CURRENT:			
Peak	150	max.	ma
Average	50	max.	ma
PLATE DISSIPATION	10	max.	watts

Maximum Circuit Values:

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

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

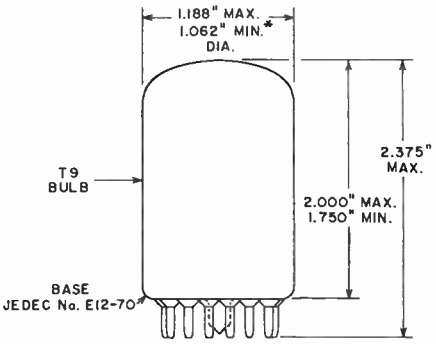
[b] Without external shield.

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

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

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

World Radio History



* APPLIES TO MINIMUM DIAMETER EXCEPT IN AREA OF SEAL.

World Radio History

World Radio History

Dual Triode

With High-Mu Unit and Low-Mu Unit

NOVAR TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*			
Voltage (AC or DC)	6.3 ± 0.600		volts
Current at heater volts = 6.3	0.985		amp
Peak heater-cathode voltage (Each unit):			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts

Direct Interelectrode Capacitances (Approx.):

	Unit No.1	*Unit No.2*	
Grid to plate	4.6	9.0	pf
Grid to cathode and heater	2.4	6.5	pf
Plate to cathode and heater	0.26	1.4	pf

Characteristics, Class A$_1$ Amplifier:

	Unit No.1	*Unit No.2*	
Plate Voltage	250	150	volts
Grid Voltage	-3	-20	volts
Amplification Factor	64	5.4	
Plate Resistance (Approx.)	40000	750	ohms
Transconductance	1600	7200	μmhos
Plate Current	1.4	50	ma
Plate Current for plate volts = 60 and grid volts = 0	-	95	ma
Plate Current for grid volts = -28	-	10	ma
Grid Voltage (Approx.) for plate μa = 10	-5.5	-	volts
Grid Voltage (Approx.) for plate μa = 100	-	-45	volts

Mechanical:

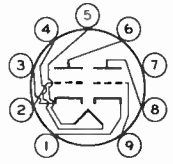
Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	3.00"
Maximum Seated Length	2.62"
Length, Base Seat to Bulb Top (Excluding Tip)	2.10" to 2.28"
Diameter	1.062" to 1.188"
Bulb	T9
Base	Small-Button Novar 9-Pin (JEDEC No.E9-75)

World Radio History

6GF7

Basing Designation for BOTTOM VIEW. 9QD

Pin 1 – Cathode of Unit No. 1
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. 2
Pin 7 – No Internal Connection
Pin 8 – Plate of Unit No. 1
Pin 9 – Grid of Unit No. 1

VERTICAL-DEFLECTION OSCILLATOR

Values are for Unit No. 1

Maximum Ratings, *Design-Maximum Values:*

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

DC PLATE VOLTAGE	330	max.	volts
PEAK NEGATIVE PULSE-GRID VOLTAGE	400	max.	volts
CATHODE CURRENT:			
Peak	77	max.	ma
Average	22	max.	ma
PLATE DISSIPATION	1.5	max.	watts

Maximum Circuit Values:

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

VERTICAL-DEFLECTION AMPLIFIER

Values are for Unit No. 2

Maximum Ratings, *Design-Maximum Values Except as Noted:*

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

DC PLATE VOLTAGE	330	max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE (Absolute-maximum value)[c]	1500[d]	max.	volts
PEAK NEGATIVE-PULSE GRID VOLTAGE	250	max.	volts
CATHODE CURRENT:			
Peak	175	max.	ma
Average	50	max.	ma
PLATE DISSIPATION	11	max.	watts

Maximum Circuit Values:

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

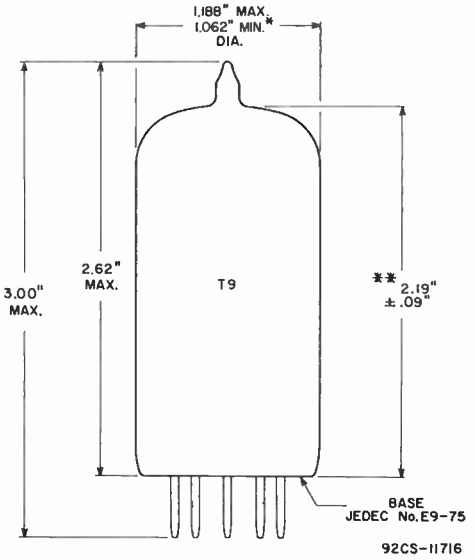
[a] The dc component must not exceed 100 volts

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

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

[d] Under no circumstances should this absolute-maximum value be exceeded.

World Radio History



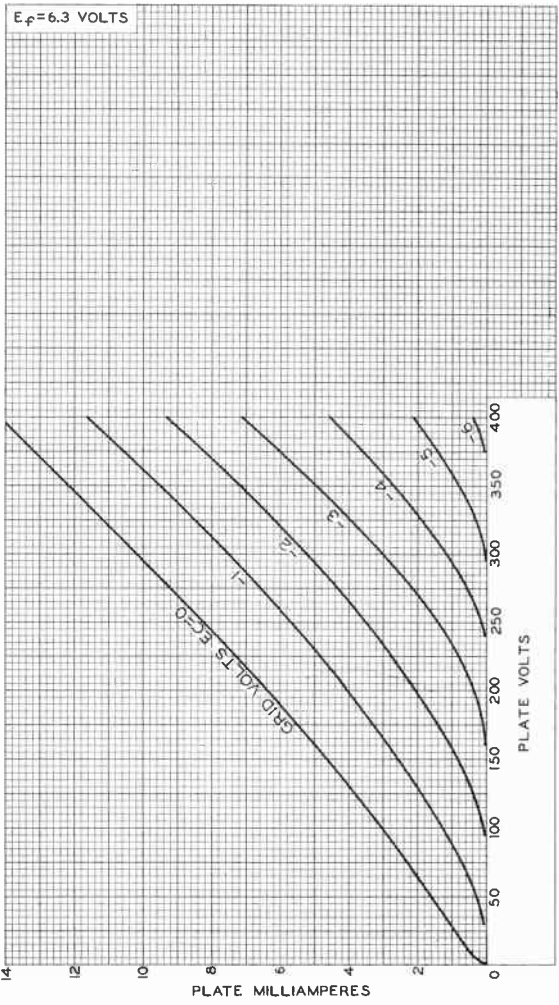
* APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.

** MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.600" INSIDE DIAMETER.

World Radio History

6GF7

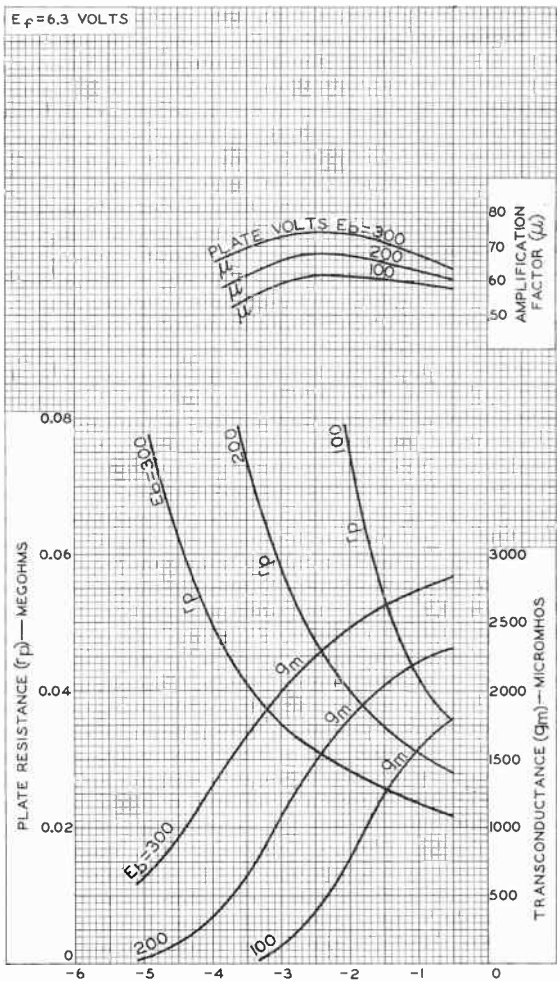
AVERAGE PLATE CHARACTERISTICS
Unit No.1



92CM-9912

World Radio History

AVERAGE CHARACTERISTICS
Unit No.1

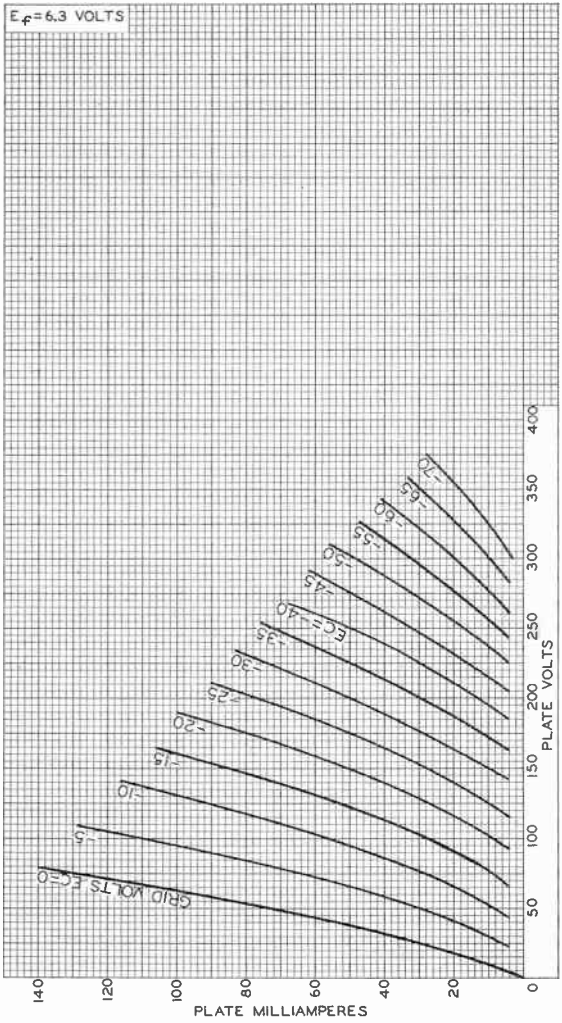


92CM-9915RI

World Radio History

6GF7

AVERAGE PLATE CHARACTERISTICS
Unit No.2

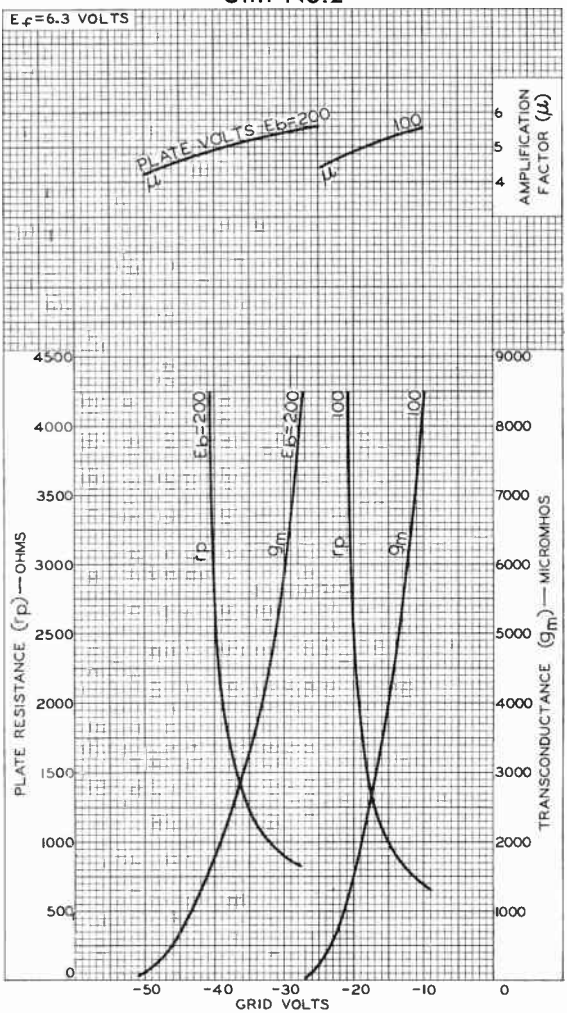


92CM-10466

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

World Radio History

AVERAGE CHARACTERISTICS
Unit No.2



92CM-10467

World Radio History

Sharp-Cutoff Twin Pentode

With Common Cathode, Grid No.1, & Grid No.2

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:			
Voltage (AC or DC)	6.3 ± 0.6		volts
Current at heater volts = 6.3	0.300		amp
Peak heater-cathode voltage:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts
Direct Interelectrode Capacitances:[b]			
Grid No.3 to plate (Each unit)	2.0		pf
Grid No.1 to all other electrodes	6.0		pf
Grid No.3 (Each unit) to all other electrodes	3.6		pf
Plate (Each unit) to all other electrodes	3.0		pf
Grid No.3 (Unit No.1) to grid No.3 (Unit No.2)	0.015	max.	pf

Characteristics, Class A_1 Amplifier:

With one unit operating and plate and grid No.3 of other unit connected to ground

Plate Voltage	100	100	volts
Grid-No.3 Voltage	0	0	volts
Grid-No.2 Voltage	67.5	67.5	volts
Grid-No.1 Voltage	0	[c]	volts
Grid-No.3-to-Plate Transconductance	–	450	μmhos
Grid-No.1-to-Plate Transconductance	1100	–	μmhos
Plate Current	–	2	ma
Grid-No.3 Voltage (Approx.) for plate μa = 100.	–	-3.5	volts ←
Grid-No.1 Voltage (Approx.) for plate μa = 100.	–	-2.3	volts

With both units operating

Plate Voltage (Each unit)	100	100	volts
Grid-No.3 Voltage (Each unit)	-10	0	volts
Grid-No.2 Voltage	67.5	67.5	volts
Grid-No.1 Voltage	[c]	[c]	volts
Plate Current (Each unit)	–	2	ma
Grid-No.2 Current	7	4.4	ma
Cathode Current	7.1	8.5	ma

← Indicates a change.

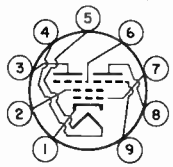
World Radio History

6HS8

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	9FG

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



Pin 6 – Grid No.3 of Unit No.2
Pin 7 – Grid No.1
Pin 8 – Plate of Unit No.1
Pin 9 – Grid No.3 of Unit No.1

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE (Each unit)	300 max.	volts
GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE (Each unit):		
Peak positive value	50 max.	volts
DC negative value	50 max.	volts
DC positive value	3 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	150 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	50 max.	volts
CATHODE CURRENT	12 max.	ma
GRID-No.2 INPUT	0.75 max.	watt
PLATE DISSIPATION (Each unit)	1.1 max.	watts

Maximum Circuit Values:

Grid-No.3-Circuit Resistance (Each unit)	0.5 max.	megohm
Grid-No.1-Circuit Resistance	0.5 max.	megohm

[a] The dc component must not exceed 100 volts.
[b] Without external shield.
[c] Adjusted to give a dc grid-No.1 current of 100 microamperes.

→ Indicates a change.

World Radio History

Sharp-Cutoff Pentode

With Two Independent Control Grids

7-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:			
Voltage (AC or DC)	6.3[a]	6.3 ± 0.6	volts
Current	0.450 ± 0.030	0.450[b]	amp
Warm-up time (Average)	11	-	sec
Peak heater-cathode voltage:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[c]	max.	volts
Direct Interelectrode Capacitances (Approx):[d]			
Grid No.1 to plate	0.023		pf
Grid No.1 to cathode & internal shield, grid No.3, grid No.2 & internal shield, and heater	8.2		pf
Grid No.1 to grid No.3	0.09		pf
Grid No.3 to plate	1.6		pf
Grid No.3 to cathode & internal shield, plate, grid No.2 & internal shield, grid No.1, and heater	7.2		pf

Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	150	volts
Grid-No.3 Supply Voltage	0	volts
Grid-No.2 Supply Voltage	100	volts
Grid-No.1 Supply Voltage	0	volts
Cathode Resistor	180	ohms
Plate Resistance (Approx.)	0.11	megohm
Transconductance, Grid No.1 to Plate	3400	μmhos
Transconductance, Grid No.3 to Plate	600	μmhos
Plate Current	3.2	ma
Grid-No.2 Current	3.2	ma
Grid-No.1 Supply Voltage (Approx.) for plate μa = 20	-4.5	volts
Grid-No.3 Supply Voltage (Approx.) for plate μa = 20	-7	volts

Mechanical:

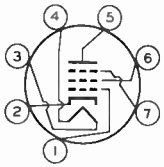
Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"

World Radio History

6HZ6

Bulb. T5-1/2
Base. . . . . .Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation For BOTTOM VIEW. 7EN

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



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

FM SOUND-DETECTOR SERVICE

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	300	max.	volts
GRID-No.3 (CONTROL-GRID) VOLTAGE:			
Negative value (DC and peak)	100	max.	volts
Positive value (DC and peak)	25	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:			
Negative-bias value	50	max.	volts
Positive-bias value	0	max.	volts
GRID-No.3 INPUT	0.1	max.	watt
GRID-No.2 INPUT:			
For grid-No.2 voltages up to 150 volts	1	max.	watt
For grid-No.2 voltages between 150 volts and 300 volts . See *Grid-No.2 Input Rating Chart* at front of Receiving Tube Section			
PLATE DISSIPATION	1.7	max.	watts

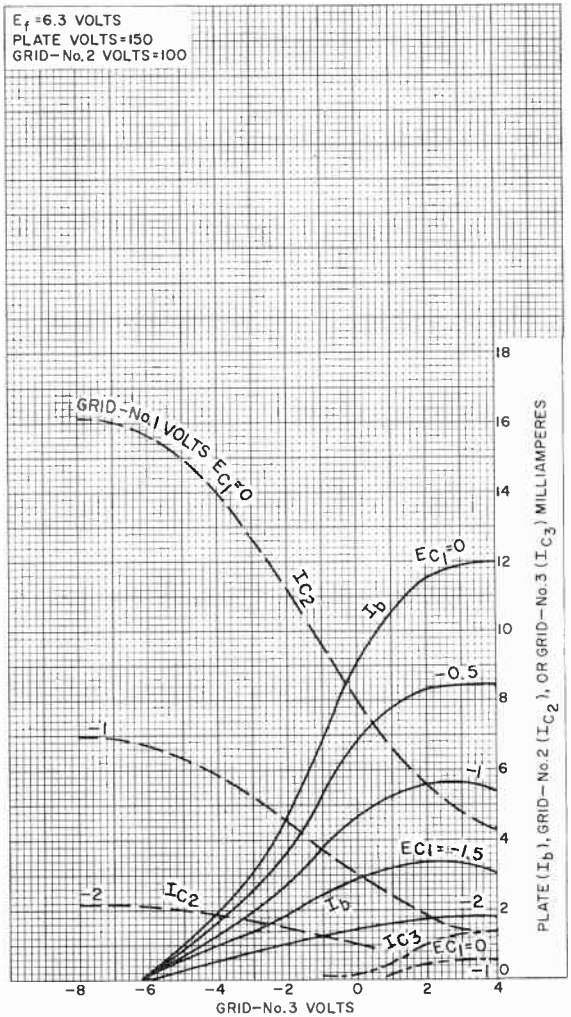
Maximum Circuit Values:

Grid-No.3-Circuit Resistance	0.68	max.	megohm
Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.22	max.	megohm
For cathode-bias operation	0.47	max.	megohm

[a] At heater amperes = 0.450.
[b] At heater volts = 6.3.
[c] The dc component must not exceed 100 volts.
[d] Without external shield.

World Radio History

AVERAGE CHARACTERISTICS



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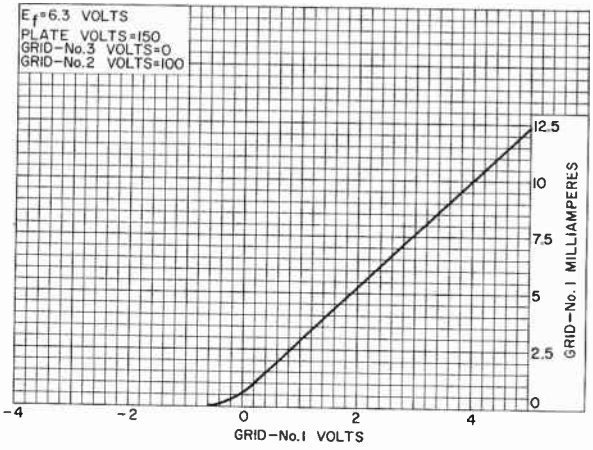
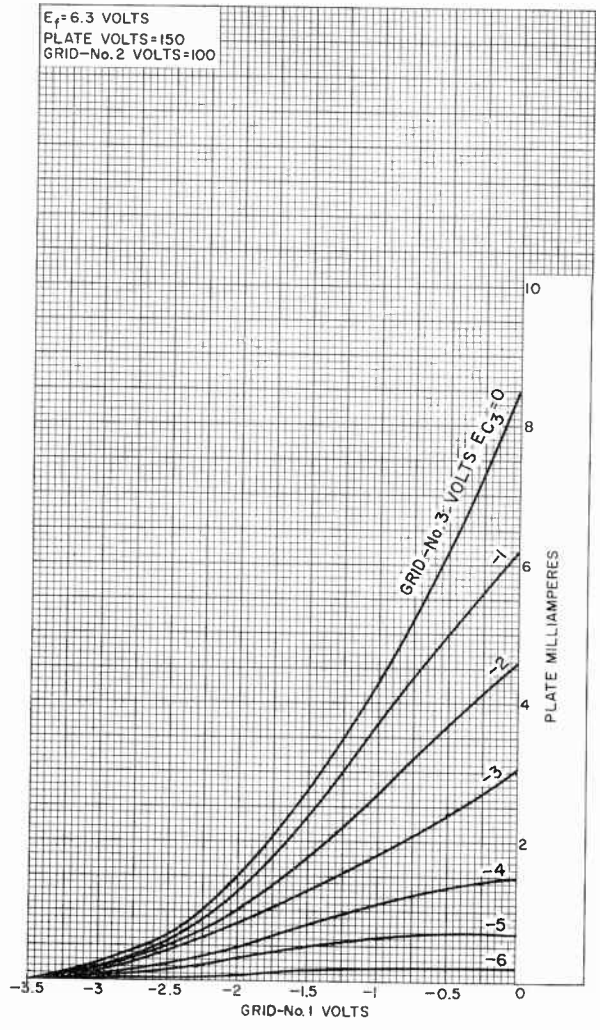
World Radio History

AVERAGE GRID-No.1 CHARACTERISTIC



92CS-11004

AVERAGE CHARACTERISTICS

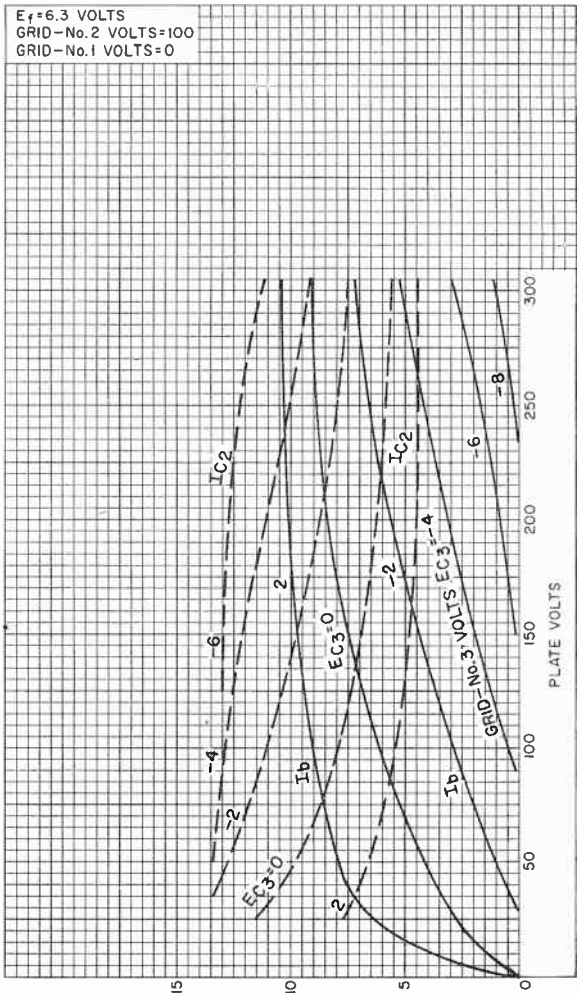


92CM-11788

World Radio History

6HZ6

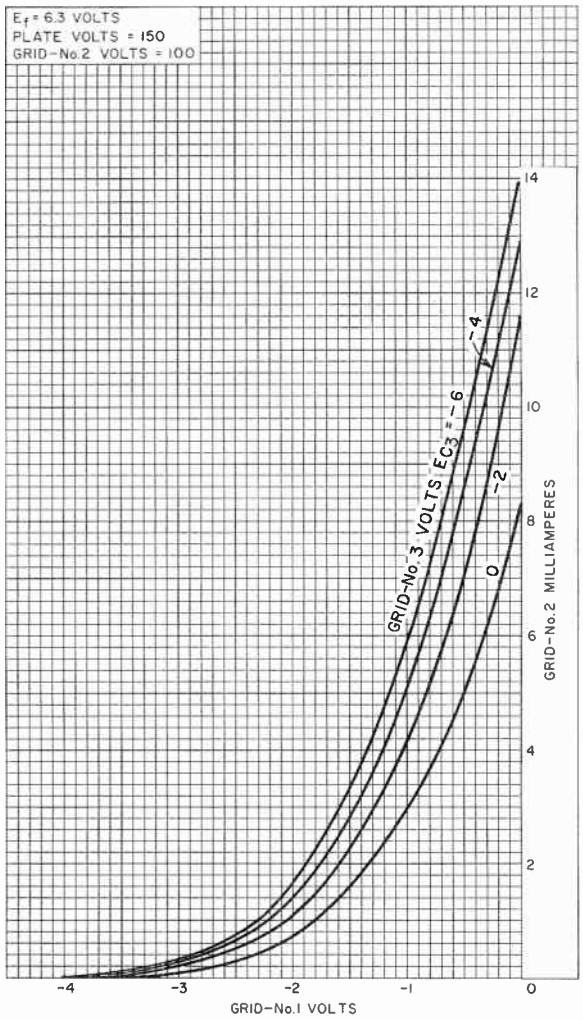
AVERAGE CHARACTERISTICS



92CM-11793

World Radio History

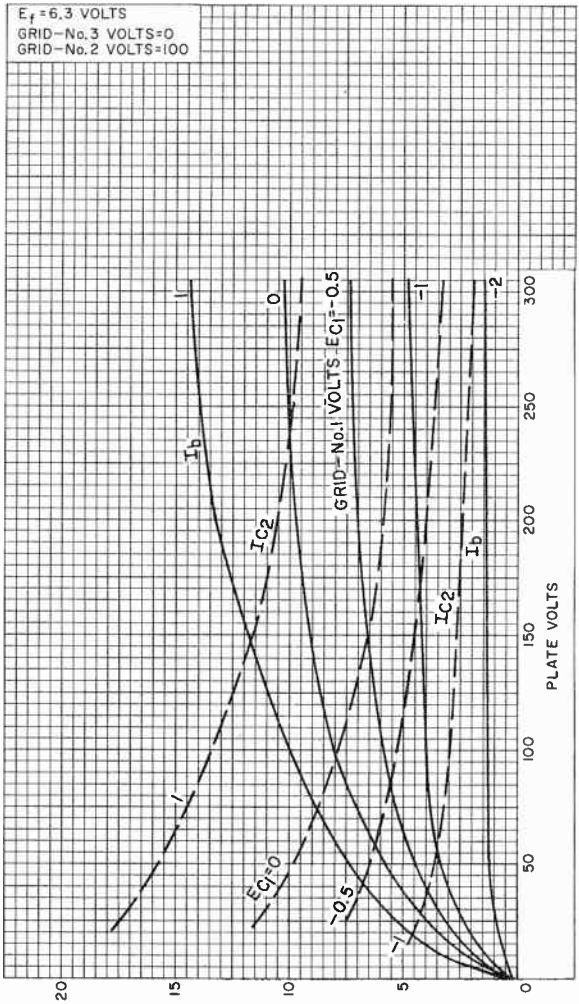
AVERAGE CHARACTERISTICS



92CM-11791

6HZ6

AVERAGE CHARACTERISTICS



92CM–11792

Diode—
Sharp-Cutoff Three-Plate Tetrode

9-PIN MINIATURE TYPE

For Frequency-Divider and Complex-Wave-Generator Circuits of Electronic Musical Instruments

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values)*:			
Voltage (AC or DC)	6.3 ± 0.6		volts
Current at heater volts = 6.3	0.300		amp
Peak heater-cathode voltage:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts
Direct Interelectrode Capacitances:[b]			
Tetrode Unit:			
Grid No.1 to plate 1A	0.02	max.	pf
Grid No.1 to plate 1B	0.02	max.	pf
Grid No.1 to plate 2	0.06	max.	pf
Grid No.1 to cathode & internal shield, grid No.2, and heater	5.5		pf
Plate 1A to cathode & internal shield, grid No.2, and heater	1.2		pf
Plate 1B to cathode & internal shield, grid No.2, and heater	1.3		pf
Plate 2 to cathode & internal shield, grid No.2, and heater	1.8		pf
Tetrode grid No.1 to diode plate	0.024	max.	pf
Tetrode plate 1A to diode plate	0.18		pf
Tetrode plate 1B to diode plate	0.024		pf
Tetrode plate 2 to diode plate	0.013		pf

Characteristics, Class A_1 Amplifier (Tetrode Unit):

Plates 1A, 1B, and 2 connected together at socket

Plate Voltage	100	volts
Grid-No.2 Voltage	100	volts
Grid-No.1 Supply Voltage	0	volts
Grid-No.1 Resistor (Bypassed)	2.2	megohms
Plate Resistance (Approx.)	30000	ohms
Transconductance	3400	μmhos
Plate Current	4.2	ma
Grid-No.2 Current	1.7	ma
Grid-No.1 Voltage (Approx.) for plate μa = 20	-4	volts

Triode Connection—
Grid No.2 connected to plates 1A, 1B, and 2 at socket

Plate Voltage	100	volts
Grid-No.1 Supply Voltage	0	volts

World Radio History

6KM8

Grid-No.1 Resistor (Bypassed)	2.2	megohms
Transconductance	4500	μmhos
Amplification Factor	45	
Plate Current	5.5	ma

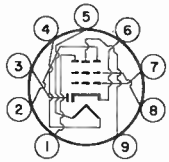
Separate plate operation, plates not under test grounded

Plate Voltage:		
Plate 1A	100	volts
Plate 1B	100	volts
Plate 2	100	volts
Grid-No.2 Voltage	100	volts
Grid-No.1 Supply Voltage	0	volts
Grid-No.1 Resistor (Bypassed)	2.2	megohms
Transconductance:		
Grid No.1 to plate 1A	2000	μmhos
Grid No.1 to plate 1B	2000	μmhos
Grid No.1 to plate 2	1800	μmhos
Plate Resistance (Approx.):		
Plate 1A	0.1	megohm
Plate 1B	0.1	megohm
Plate 2	0.12	megohm
Plate Current:		
Plate 1A	2.3	ma
Plate 1B	2.3	ma
Plate 2	2.1	ma
Grid-No.2 Current:		
For plate 1A volts = 100	3.8	ma
For plate 1B volts = 100	3.8	ma
For plate 2 volts = 100	3.3	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	9QG

Pin 1 - Tetrode Plate 1B
Pin 2 - Tetrode Plate 1A
Pin 3 - Diode Plate
Pin 4 - Heater
Pin 5 - Heater



Pin 6 - Cathode, Internal Shield
Pin 7 - Tetrode Grid No.1
Pin 8 - Tetrode Grid No.2
Pin 9 - Tetrode Plate 2

World Radio History

FREQUENCY-DIVIDER & COMPLEX-WAVE-GENERATOR SERVICE

TETRODE UNIT

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE:		
PLATE 1A	330 max.	volts
PLATE 1B	330 max.	volts
PLATE 2	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	50 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 1A DISSIPATION	1 max.	watt
PLATE 1B DISSIPATION	1 max.	watt
PLATE 2 DISSIPATION	1 max.	watt

Maximum Circuit Values:

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

DIODE UNIT

Maximum Ratings, *Design-Maximum Values:*

PLATE CURRENT	1 max.	ma

Characteristics, *Instantaneous Test Condition:*

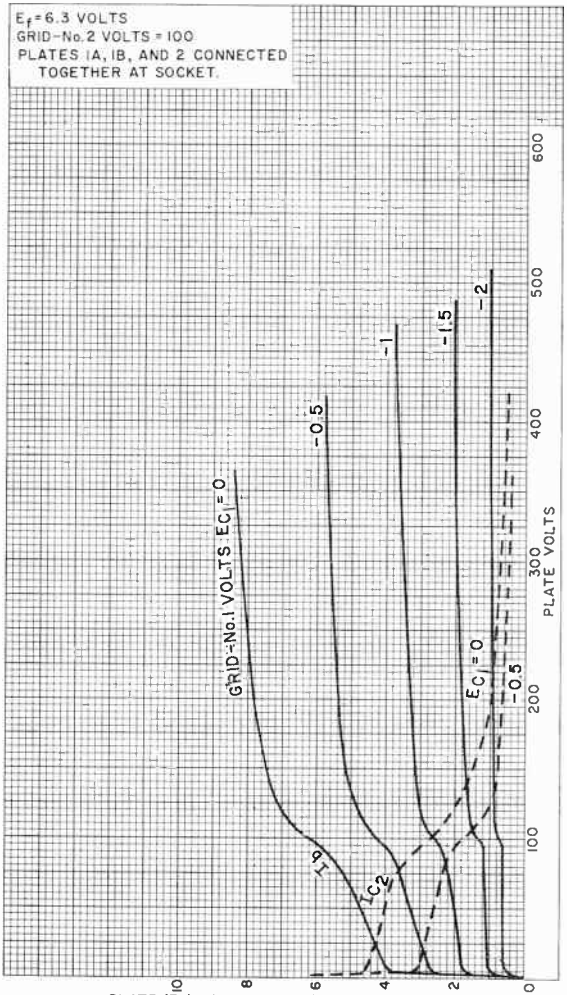
Plate Current for plate volts = 10	2	ma

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

World Radio History

6KM8

AVERAGE CHARACTERISTICS
Tetrode Unit



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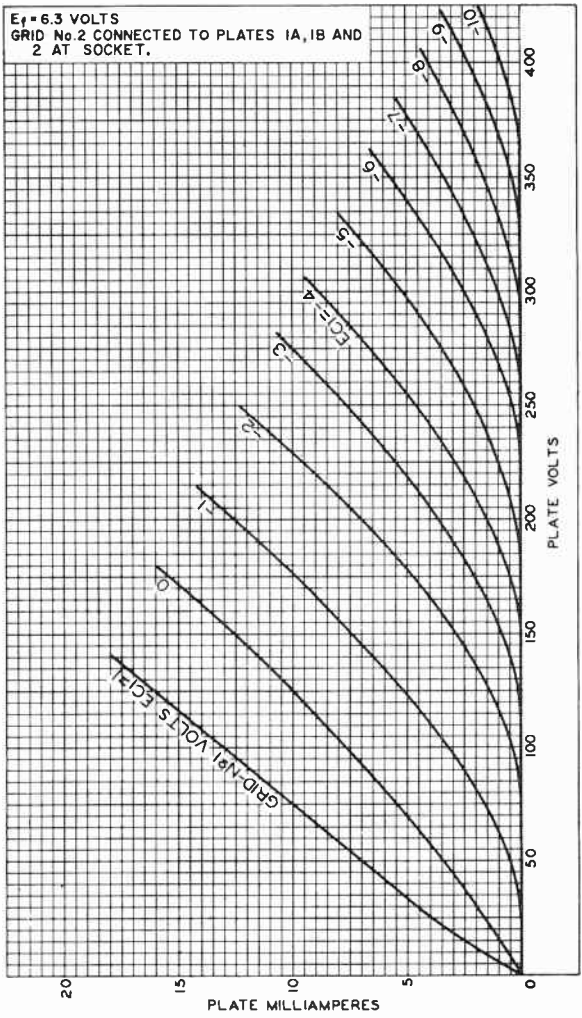
AVERAGE PLATE CHARACTERISTICS
Tetrode Unit—Triode Connection



92CM-11748

World Radio History

World Radio History

Three-Unit Triode

With Medium-Mu Unit and Two High-Mu Units

DUODECAR TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*				
Voltage (AC or DC) . . .	6.3[a]		6.3 ± 0.6	volts
Current.	0.600	±0.040	0.600[b]	amp
Warm-up time (Average) .	11		-	sec
Peak heater-cathode voltage (Each unit):				
Heater negative with respect to cathode	200	max.		volts
Heater positive with respect to cathode	200[c]	max.		volts

Direct Interelectrode Capacitances (Approx.):[d]

	Unit No.1	*Unit No.2*	*Unit No.3*	
Grid to plate.	1.8	2.0	2.0	pf
Grid to cathode, internal shield, and heater	1.9	1.8	1.8	pf
Plate to cathode, internal shield, and heater	1.7	0.6	1.7	pf

Characteristics:

Class A_1 Amplifier

	Unit No.1	*Units No. 2 or 3*		
Plate Voltage.	150	100	250	volts
Grid Voltage	0	-1	-2	volts
Amplification Factor	18	100	100	
Plate Resistance (Approx.)	7000	80000	62500	ohms
Transconductance	2500	1250	1600	μmhos
Plate Current.	22	0.5	1.2	ma
Grid Voltage (Approx.) for plate μa = 10.	-13	-	-4.5	volts

Pulse Amplifier[e]

	Unit No.1	
Plate Voltage.	30	volts
Grid Voltage	30	volts
Peak Cathode Current	200	ma
Ratio, Plate Current to Grid Current	1	

Mechanical:

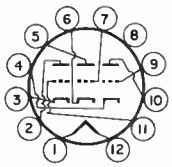
Operating Position . . . . . Any
Type of Cathodes . . . . . Coated Unipotential
Maximum Overall Length . . . . . 1.875"

World Radio History

6Q11

Seated Length . . . . . 1.250" to 1.500"
Diameter. . . . . 1.062" to 1.188"
Bulb. T9
Base. . . . . Small-Button Duodecar 12-Pin (JEDEC No.E12-70)
Basing Designation for BOTTOM VIEW. 12BY

Pin 1 - Heater
Pin 2 - Plate of Unit No.3
Pin 3 - Cathode of Unit No.3
Pin 4 - Cathode of Unit No.1
Pin 5 - Plate of Unit No.2
Pin 6 - Cathode of Unit No.2



Pin 7 - Grid of Unit No.2
Pin 8 - Internal Shield
Pin 9 - Grid of Unit No.1
Pin 10 - Plate of Unit No.1
Pin 11 - Grid of Unit No.3
Pin 12 - Heater

GATED AGC AMPLIFIER & SYNC CLIPPER

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

Maximum Ratings, *Design-Maximum Values:*

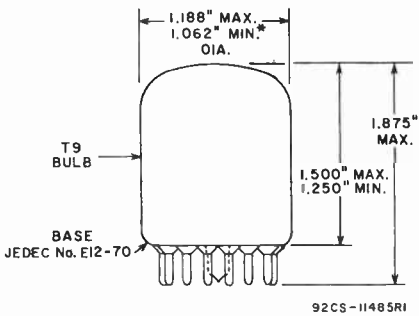
	Unit No. 1	*Units No. 2 or 3*	
PLATE VOLTAGE	330 max.	330 max.	volts
PEAK POSITIVE-PULSE PLATE VOLTAGE[e].	5 max.	-	volts
GRID VOLTAGE:			
Negative-bias value	100 max.	100 max.	volts
Positive-bias value	0 max.	0 max.	volts
PEAK POSITIVE-PULSE GRID VOLTAGE.	60 max.	-	volts
PLATE DISSIPATION	3 max.	1.2 max.	watts

Maximum Circuit Values:

	Unit No. 1	*Units No. 2 or 3*	
Grid-Circuit Resistance	5 max.	5 max.	megohms

[a] At heater amperes = 0.600.
[b] At heater volts = 6.3.
[c] Without external shield.
[d] The dc component must not exceed 100 volts.
[e] This rating is applicable where the duty cycle of the voltage pulse does not exceed 15 per cent of one horizontal scanning cycle. In a 525-line, 30-frame system, 15 per cent of one horizontal scanning cycle is 10 microseconds.
[f] As described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission.

World Radio History



* APPLIES TO MINIMUM DIAMETER EXCEPT IN AREA OF SEAL.

World Radio History

World Radio History

DC Grid-No.1 Current:		
Synchronizing level	0.050	amp
Pedestal level	0.010	amp
Driving Power (Approx.)*	300 to 500	watts
Power Output:		
Synchronizing level	5300	watts
Pedestal level	3100	watts

PUSH-PULL RF POWER AMPLIFIER — Class C Telegraphy# or FM Telephony

Values are for both units

Maximum CCS● Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	6000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	2 max.	amp
PLATE INPUT	10000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	6000 max.	watts
GRID-No.1 DISSIPATION	50 max.	watts

Typical Operation in CW Service at 300 Mc:

DC Plate Voltage	6000	volts
DC Grid-No.2 Voltage	800	volts
DC Grid-No.1 Voltage▲	-275	volts
Peak RF Grid-No.1-to-Grid-No.1 Voltage	1350	volts
DC Plate Current	1.6	amp
DC Grid-No.2 Current	0.040	amp
DC Grid-No.1 Current (Approx.)	0.085	amp
Driving Power (Approx.)	500	watts
Power Output (Approx.)	6500	watts

Typical Operation in FM Service up to 216 Mc:

DC Plate Voltage	4500	volts
DC Grid-No.2 Voltage	700	volts
DC Grid-No.1 Voltage	-300	volts
Peak RF Grid-No.1-to-Grid-No.1 Voltage	1150	volts
DC Plate Current	1	amp
DC Grid-No.2 Current	0.050	amp
DC Grid-No.1 Current (Approx.)	0	amp
Driving Power (Approx.)	400	watts
Power Output (Approx.)	2500	watts

Maximum Circuit Values (CW or FM Service):

Grid-No.1-Circuit Resistance	6000 max.	ohms

*,**,●,★,▲,#,: See next page.

World Radio History

8D21

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Values are for each unit, unless otherwise indicated

	Note	Min.	Max.	
Filament Current	1	110	140	amp
Input Capacitance	-	22.5	28.5	μμf
Output Capacitance	-	5.3	7.7	μμf
Plate Current	1,2	-	0.1	amp
Plate Current	1,3	3.0	5.0	amp
Plate Current Average of Both Units	1,3	3.35	-	amp
Peak Cathode Current	1,4	7	-	amp

Note 1: AC filament volts = 3.2.

Note 2: With dc plate voltage of 5000 volts; dc grid-No.2 voltage of 800 volts; and dc grid-No.1 voltage of -220 volts.

Note 3: With dc plate voltage of 1500 volts; dc grid-No.2 voltage of 800 volts; and dc grid-No.1 voltage of +500 volts.

Note 4: Designers should limit the maximum usable cathode current to this value.

*

** Without external shield.

Grid-No.1-to-plate capacitance is internally neutralized by the tube structure to within 0.03 μμf.

● Continuous Commercial Service.

★ Driving power is accounted for largely by circuit losses and is less at lower frequencies. In practical, grid-modulated circuit design with damping resistors, the indicated driving power, depending on frequency, is required to take care of losses in the damping resistors, the circuit losses, and the tube driving power.

▲ Obtained from combination of fixed bias and a grid-No.1 resistor of 2500 to 3000 ohms.

Key-down conditions per tube without amplitude modulation. 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.

Data on operating frequencies for the 8D21 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

→ Indicates a change.

World Radio History

10EM7

Dual Triode

With High-Mu Unit and Low-Mu Unit

With Heater Having Controlled Warm-Up Time

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

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

10GF7

Dual Triode

With High-Mu Unit and Low-Mu Unit

NOVAR TYPE

With Heater Having Controlled Warm-Up Time

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

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

10HF8

High-Mu Triode— Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

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

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

World Radio History

11CY7

Dual Triode

With High-Mu Unit and Low-Mu Unit

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

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

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.450 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.450	11	volts
Warm-up time (Average)	11	sec

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

World Radio History

12AX3

Half-Wave Vacuum Rectifier

DUODECAR TYPE
With Heater Having Controlled Warm-Up Time

The 12AX3 is the same as the 6AX3 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Voltage (AC or DC)	12.6[a]	12.6 ± 1.2	volts
Current	0.600 ± 0.040	0.600[b]	amp
Warm-up time (Average)	11	–	sec

12AX4GTA

Half-Wave Vacuum Rectifier

For Damper Service in TV Equipment With
Heater Having Controlled Warm-Up Time

The 12AX4GTA is the same as the 6AX4GT except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Voltage (AC or DC)	12.6[a]	12.6 ± 1.2	volts
Current	0.600 ± 0.040	0.600[b]	amp
Warm-up time (Average)	11	–	sec

12AX4GTB

Half-Wave Vacuum Rectifier

For Damper Service in TV Equipment With
Heater Having Controlled Warm-Up Time

The 12AX4GTB is the same as the 6AX4GTB except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Voltage (AC or DC)	12.6[a]	12.6 ± 1.2	volts
Current	0.600 ± 0.040	0.600[b]	amp
Warm-up time (Average)	11	–	sec

[a] At heater amperes = 0.600.
[b] At heater volts = 12.6.

World Radio History

World Radio History

Medium-Mu Triode—Pentagrid Converter

9-PIN MINIATURE TYPE

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

GENERAL DATA

Electrical:

Heater Characteristics and Ratings *(Design-Center Values):*

Voltage (DC)[a]	12.6 $^{+3.3}_{-2.6}$	volts
Current at heater volts = 12.6	0.270	amp
Peak heater-cathode voltage (Each unit):		
Heater negative with respect to cathode	16 max.	volts
Heater positive with respect to cathode	16 max.	volts

Direct Interelectrode Capacitances:[b]

Triode Unit:		
Grid to plate	1.3	pf
Grid to cathode & heater	2.2	pf
Plate to cathode & heater	0.25	pf
Heptode Unit:		
Grid No.3 to plate	0.28 max.	pf
Grid No.3 to grid No.1	0.12 max.	pf
Grid No.3 to cathode & grid No.5 & internal shield, plate, grids No.2 & No.4, grid No.1, and heater (RF input)	6.0	pf
Plate to cathode & grid No.5 & internal shield, grids No.2 & No.4, grid No.1, and heater (Mixer output)	5.0	pf
Grid No.1 to cathode & grid No.5 & internal shield, grid No.3, grids No.2 & No.4, and heater (Oscillator input)	5.0	pf
Grid No.1 to cathode & grid No.5 & internal shield	3.0	pf
Cathode & grid No.5 & internal shield to plate, grids No.2 & No.4, grid No.3, and heater (Oscillator output)	17.0	pf
Grid No.1 to plate	0.16 max.	pf
Triode grid to heptode grid No.3	0.01 max.	pf
Triode plate to heptode grid No.3	0.18 max.	pf
Triode plate to heptode plate	0.2 max.	pf

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

With heater voltage of 12.6 volts

Plate Voltage	12.6	volts
Grid Voltage developed across a 2.2-megohm grid resistor	-0.8	volt

World Radio History

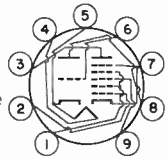
12FX8A

Amplification Factor	10	
Plate Resistance (Approx.)	7150	ohms
Transconductance	1400	μmhos
Plate Current	1.3	ma
Grid Voltage (Approx.) for plate μa = 10.	-3.2	volts

Mechanical:

Operating Position	Any
Type of Cathodes	Coated Unipotential
Maximum Overall Length	2.440"
Maximum Seated Length	2.190"
Length, Base Seat to Bulb Top (Excluding tip)	1.720" to 1.910"
Diameter	0.750" to 0.875"
Bulb	T6-1/2
Base	Small-Button Noval 9-Pin (JEDEC No.E9-1)
Basing Designation for BOTTOM VIEW	9KV

Pin 1 - Heptode Grid No.2, Grid No.4
Pin 2 - Heptode Grid No.1
Pin 3 - Heptode Plate
Pin 4 - Heater
Pin 5 - Heater, Triode Cathode



Pin 6 - Triode Grid
Pin 7 - Heptode Grid No.5, Cathode, Internal Shield
Pin 8 - Triode Plate
Pin 9 - Heptode Grid No.3

HEPTODE UNIT — CONVERTER

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	16 max.	volts
GRID-No.3 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	16 max.	volts
Positive-bias value	0 max.	volts
GRIDS-No.2 & No.4 (SCREEN-GRID) VOLTAGE	16 max.	volts

Typical Operation and Characteristics:

With self-excitation and heater voltage of 12.6 volts

Plate Voltage	12.6	volts
Grid-No.3 Voltage developed across a 2.2-megohm grid-No.3 resistor	-0.5	volt
Grids-No.2 & No.4 Voltage	12.6	volts
RMS Grid-No.1 (Oscillator-Grid) Voltage	1.6	volts
Grid-No.1 Resistor	33000	ohms
Plate Resistance (Approx.)	0.5	megohm
Conversion Transconductance	300	μmhos
Grid-No.3 Voltage (Approx.) for conversion transconductance (μmhos) =		
10	-3	volts
1	-8	volts
Plate Current	290	μa
Grids-No.2 & No.4 Current	1.25	ma

World Radio History

Oscillator Characteristics (Not Oscillating):

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

Plate and Grids-No.2 & No.4 Voltage	12.6	volts
Grid-No.3 Voltage	0	volts
Grid-No.1 Voltage	0	volts
Amplification Factor between grid No.1 and grids No.2 & No.4 connected to plate.	9	
Transconductance between grid No.1 and grids No.2 & No.4 connected to plate.	3600	μmhos
Cathode Current	4.4	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-4.5	volts

Maximum Circuit Values:

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

TRIODE UNIT — AMPLIFIER — Class A[1]

Maximum Ratings, *Design-Center Values:*

PLATE VOLTAGE	16 max.	volts

Maximum Circuit Values:

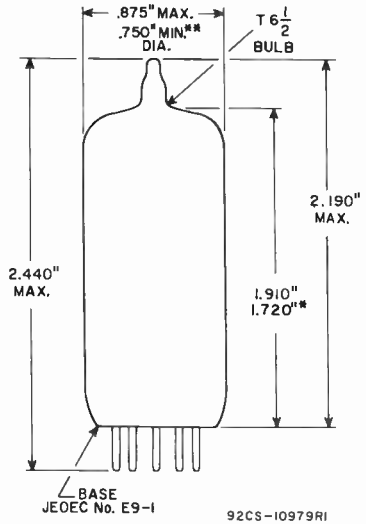
Grid-Circuit Resistance	10 max.	megohms

[a] For longest life, it is recommended that the heater be operated within the range of 11.0 to 14.0 volts.

[b] Without external shield.

World Radio History

12FX8A



* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.438" INSIDE DIAMETER.

** APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.

World Radio History

13CW4

High-Mu Triode

NUVISTOR TYPE

The 13CW4 is the same as the 6CW4 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Voltage (AC or DC)	13.5 ± 1.4	volts
Current at heater volts = 13.5	0.060	amp

13DE7

Dual Triode

With Medium-Mu Unit and Low-Mu Unit

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 13DE7 is the same as the 6DE7 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

13DR7

Dual Triode

With High-Mu Unit and Low-Mu Unit

With Heater Having Controlled Warm-Up Time

The 13DR7 is the same as the 6DR7 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

World Radio History

13EM7

Dual Triode

With High-Mu Unit and Low-Mu Unit

With Heater Having Controlled Warm-Up Time

The 13EM7 is the same as the 6EM7 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

13FD7

Dual Triode

With High-Mu Unit and Low-Mu Unit

With Heater Having Controlled Warm-Up Time

The 13FD7 is the same as the 6FD7 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

13GF7

Dual Triode

With High-Mu Unit and Low-Mu Unit

NOVAR TYPE

With Heater Having Controlled Warm-Up Time

The 13GF7 is the same as the 6GF7 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	13.0	volts
Warm-up time (Average)	11	sec

World Radio History

Sharp-Cutoff Dual Tetrode

10-PIN MINIATURE TYPE

The 17C9 is the same as the 6C9 except for the following items:

Heater Characteristics and Ratings *(Design-Maximum Values):*

Current	0.150 ± 0.010	amp
Voltage (AC or DC) at heater amperes = 0.150	16.8	volts

World Radio History

World Radio History

Beam Power Tube

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

GENERAL DATA

Electrical:

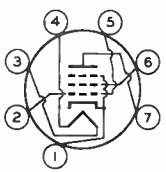
Heater Characteristics and Ratings *(Design-Maximum Values)*:			
Current	0.150 ± 0.010		amp
Voltage (AC or DC) at heater amperes = 0.150	25.0		volts
Warm-up time (Average)	17		sec
Peak heater-cathode voltage:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[a]	max.	volts
Direct Interelectrode Capacitances (Approx.):[b]			
Grid No.1 to plate	0.44		pf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	12.0		pf
Plate to cathode & grid No.3, grid No.2, and heater	8.0		pf

Characteristics, Class A_1 Amplifier:

Plate Voltage	110	volts
Grid-No.2 Voltage	110	volts
Grid-No.1 Voltage	-7.5	volts
Plate Resistance (Approx.)	13000	ohms
Transconductance	6400	μmhos
Plate Current	43	ma
Grid-No.2 Current	3.8	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	0.650" to 0.750"
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV



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

World Radio History

25F5A

AF POWER AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	130 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive-bias value	0 max.	volts
GRID-No.2 INPUT	1.1 max.	watts
PLATE DISSIPATION	5.5 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	°C

Typical Operation:

Plate Voltage	110	volts
Grid-No.2 Voltage	110	volts
Grid-No.1 Voltage	-7.5	volts
Peak AF Grid-No.1 Voltage	7.5	volts
Zero-Signal Plate Current	43	ma
Max.-Signal Plate Current	45	ma
Zero-Signal Grid-No.2 Current	3.8	ma
Max.-Signal Grid-No.2 Current	7.3	ma
Effective Load Resistance	2500	ohms
Total Harmonic Distortion	7	%
Maximum-Signal Power Output	1.5	watts

Maximum Circuit Values:

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

PUSH-PULL AF POWER AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	130 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Positive-bias value	0 max.	volts
GRID-No.2 INPUT	1.1 max.	watts
PLATE DISSIPATION	5.5 max.	watts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	°C

Typical Operation:

Values are for two tubes

Plate Voltage	110	volts
Grid-No.2 Voltage	110	volts
Grid-No.1 Voltage	-8	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	14.4	volts
Zero-Signal Plate Current	82	ma
Max.-Signal Plate Current	88	ma
Zero-Signal Grid-No.2 Current	7.2	ma
Max.-Signal Grid-No.2 Current	12.5	ma
Effective Load Resistance (Plate-to-plate)	4500	ohms

World Radio History

Total Harmonic Distortion	2.6	%
Maximum-Signal Power Output	2.9	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:

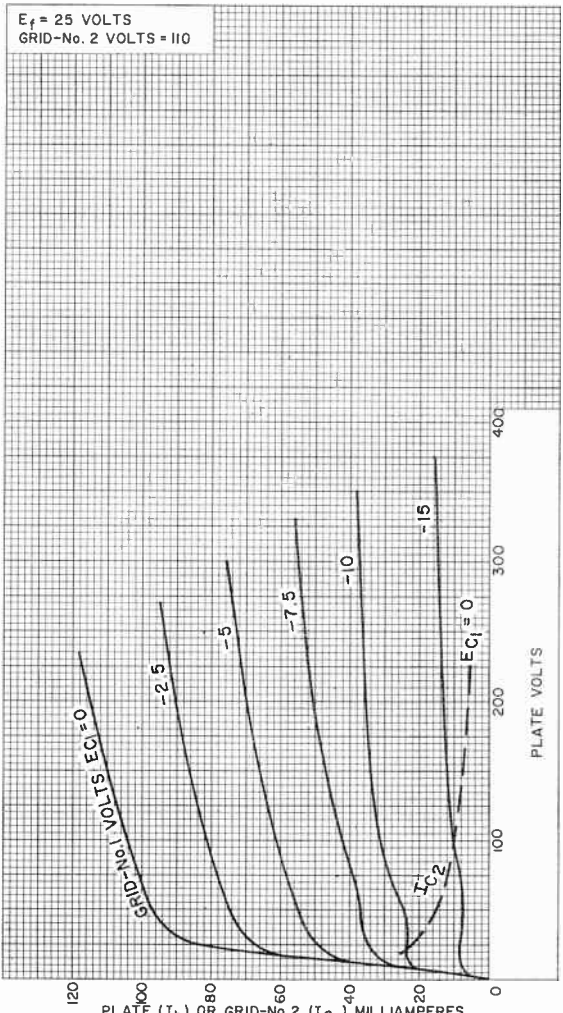
For fixed-bias operation.	0.1 max.	megohm
For cathode-bias operation.	0.5 max.	megohm

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

World Radio History

25F5A

AVERAGE CHARACTERISTICS

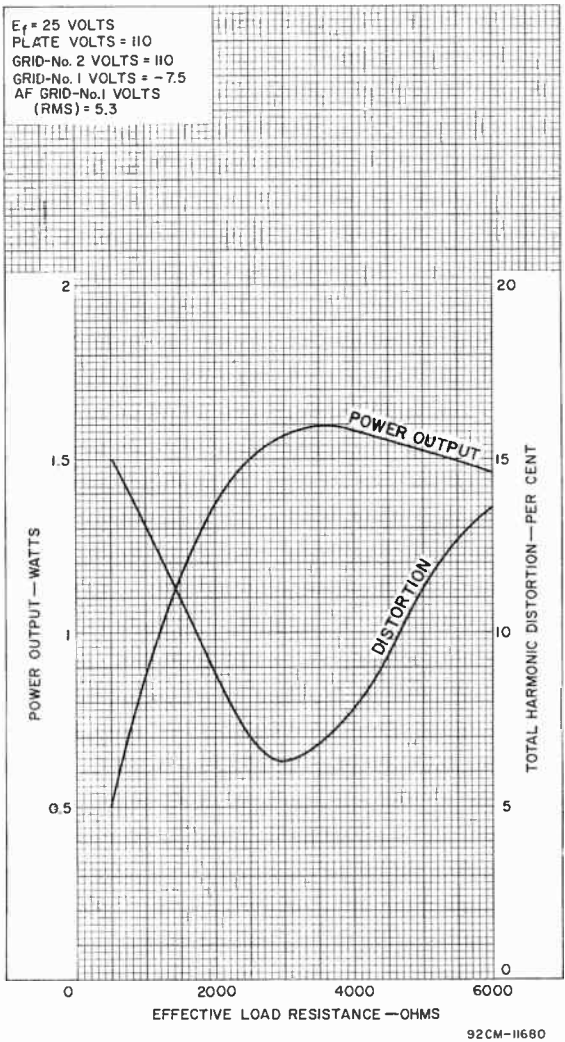


92CM-11682

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

World Radio History

OPERATION CHARACTERISTICS



World Radio History

World Radio History

32ET5A

Power Pentode

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

GENERAL DATA

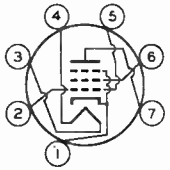
Electrical:

Heater Characteristics and Ratings *(Design-Maximum Values):*		
Current	0.100 ± 0.006	amp
Voltage (AC or DC) at heater amperes = 0.100	32	volts
Warm-up time (Average)	20	sec
Peak heater-cathode voltage:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200[a] max.	volts
Direct Interelectrode Capacitances (Apprcx.):[b]		
Grid No.1 to plate	0.6	pf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	12.0	pf
Plate to cathode & grid No.3, grid No.2, and heater	6.0	pf

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	0.650" to 0.750"
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7CV

Pin 1 - Cathode, Grid No.3
Pin 2 - Grid No.1
Pin 3 - Heater



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

AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	150 max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	130 max.	volts
GRID-No.2 INPUT	1.2 max.	watts
PLATE DISSIPATION	5.4 max.	watts

World Radio History

32ET5A

Typical Operation and Characteristics:

Plate Voltage	110		volts
Grid-No.2 Voltage	110		volts
Grid-No.1 Voltage	-7.5		volts
Peak AF Grid-No.1 Voltage	7.5		volts
Zero-Signal Plate Current	30		ma
Zero-Signal Grid-No.2 Current	2.8		ma
Plate Resistance (Approx.)	21500		ohms
Transconductance	5500		μmhos
Load Resistance	2800		ohms
Total Harmonic Distortion	10		%
Max.-Signal Power Output	1.2		watts

Maximum Circuit Values:

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

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

World Radio History

Half-Wave Vacuum Rectifier

HIGH-VOLTAGE, LOW-CURRENT TYPE

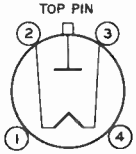
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC)	2.5 ± 5%	volts
Current at filament volts = 2.5	6	amp

Mechanical:

Operating Position	Vertical, base down or up
Overall Length	7-3/16" ± 1/4"
Maximum Diameter	2-1/8" ←
Bulb	T16
Plate Terminal	0.050"-Diameter Pin Located at Top of Bulb
Base	Medium-Shell Super-Jumbo 4-Pin (JEDEC No.A4-16)
Basing Designation for BOTTOM VIEW	70



Pin 1 – No Internal Connection
Pin 2 – Filament
Pin 3 – Filament
Pin 4 – No Internal Connection
TOP PIN – Plate

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute-Maximum Values:*

PEAK INVERSE PLATE VOLTAGE	20000 max.	volts
PLATE CURRENT:		
Peak	270 max.	ma
Average	25 max.	ma
AMBIENT TEMPERATURE	50 max.	°C
BULB TEMPERATURE	75 max.	°C

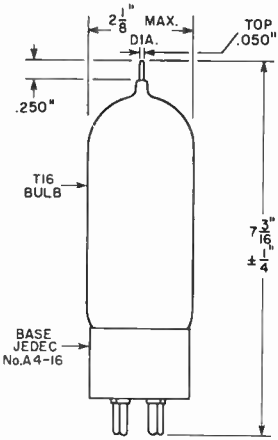
OPERATING CONSIDERATIONS ←

X-Radiation Warning. X radiation is produced when the 579B is operated with a peak inverse plate voltage above 16,000 volts (Absolute-Maximum value). This radiation can constitute a health hazard unless the tube is adequately shielded for X radiation.

← Indicates a change.

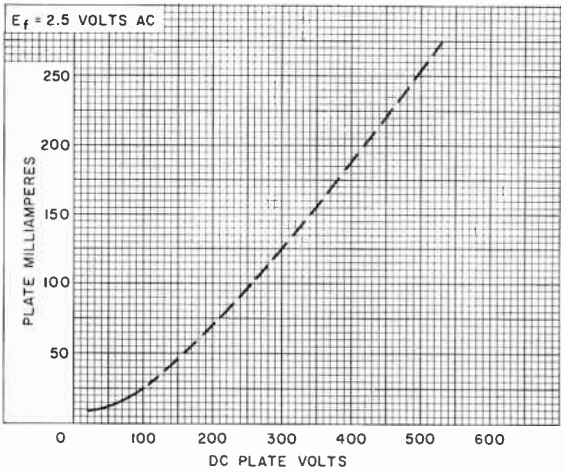
World Radio History

579B



92CS-6720RI

AVERAGE PLATE CHARACTERISTIC



92CS-6719RI

World Radio History

632-B
MERCURY-VAPOR THYRATRON

NEGATIVE-CONTROL TETRODE TYPE

GENERAL DATA

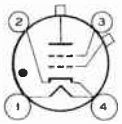
Electrical:

Heater, for Unipotential Cathode:		
Voltage	5*	ac or dc volts
Current	5	amp
Cathode:		
Minimum heating time prior to tube conduction	5	minutes
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to anode	0.04	μμf
Grid No.2 to anode	3	μμf
Ionization Time (Approx.)	10	μsec
Deionization Time (Approx.)	1000	μsec
Maximum Critical Grid-No.1 Current	2	μamp
Anode Voltage Drop (Approx.)	12	volts

Mechanical:

Mounting Position	Vertical, base down
Maximum Overall Length	8-5/16"
Seated Length	7-1/2" ± 1/4"
Maximum Radius (Including side cap)	1-3/4"
Weight (Approx.)	9 oz
Bulb	T-18
Top Cap	Skirted Medium (JETEC No.C1-29)
Side Cap	Saddle Medium
Base	Skirted-Medium-Shell Small 4-Pin with Bayonet (JETEC No.A4-71)
Basing Designation for BOTTOM VIEW	4CD

Pin 1 - Heater
Pin 2 - Cathode, Circuit Returns
Pin 3 - Grid No.2



Pin 4 - Heater, Cathode
Top Cap - Anode
Side Cap - Grid No.1

Temperature Control:

Heating--When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating range specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling--When the operating conditions are such that the maximum value of the operating condensed-mercury temperature is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

* Under operating conditions where the average anode current does not exceed 0.5 ampere, the heater voltage may be increased to 5.5 volts.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

632-B

MERCURY-VAPOR THYRATRON

IGNITOR-FIRING AND GRID-CONTROLLED RECTIFIER SERVICE

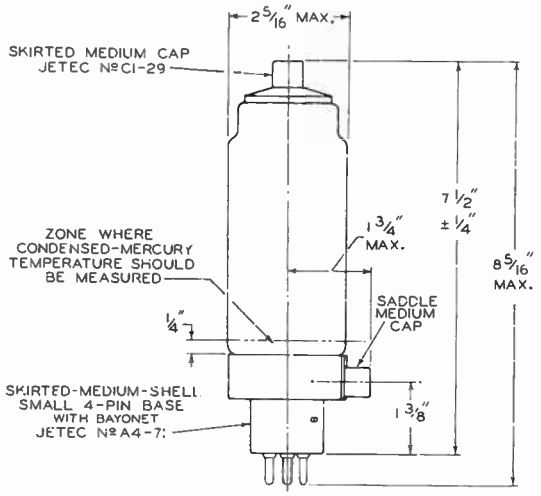
Maximum Ratings, *Absolute Values:*

For anode-supply frequency of 60 cps

	Operating Condensed-Mercury Temperature Range 40° to 80°C■	
PEAK ANODE VOLTAGE:		
Forward	1500 max.	volts
Inverse	1500 max.	volts
GRID-No.2 (SHIELD-GRID) VOLTAGE:		
Peak, before tube conduction	-300 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Peak, before tube conduction	-1000 max.	volts
CATHODE CURRENT:		
Peak	30 max.	amp
Average#	2.5 max.	amp
Fault, for duration of 0.1 second max.	150 max.	amp
AVERAGE GRID-No.2 CURRENT#	+0.25 max.	amp
AVERAGE GRID-No.1 CURRENT#	+0.25 max.	amp

■ Recommended temperature range of condensed mercury is 45° to 50°C.

\# Averaged over any interval of 30 seconds maximum.

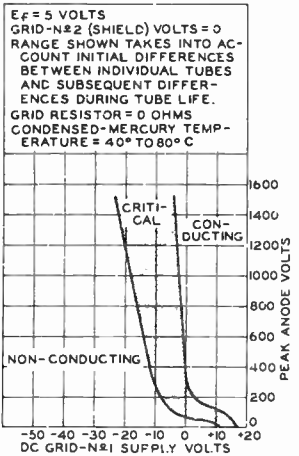


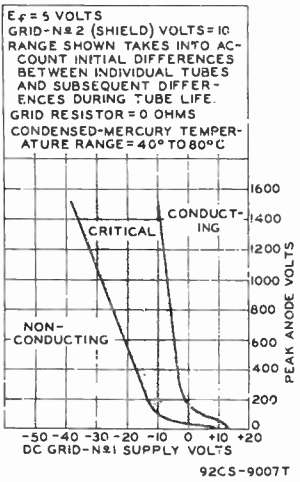
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

632-B
MERCURY-VAPOR THYRATRON

OPERATIONAL RANGES OF CRITICAL GRID-No.1 VOLTAGE





World Radio History

World Radio History

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HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

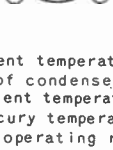
Electrical:

Filament, Coated:		
Voltage	5 ± 5%	ac volts
Current at 5 volts	10	amp
Minimum heating time at rated voltage	30	sec
Peak Tube Voltage Drop (Approx.)	10	volts

Mechanical:

Operating Position	Vertical, base down
Maximum Overall Length	11-7/16" ←
Seated Length	9-9/16" + 1-1/16" - 1/4" ←
Maximum Diameter	3-1/8" ←
Weight (Approx.)	10.8 oz ←
Cap	Medium (JETEC No.C1-5)
Base	Large-Metal-Shell Super-Jumbo 4-Pin with Bayonet (JETEC No.A4-18)
Basing Designation for BOTTOM VIEW	2P

Pin 1 – No Connection
Pin 2 – Filament, Cathode Shield



Pin 3 – Filament
Pin 4 – No Connection
Cap – Anode

Temperature Control:

Heating--When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling--When the operating conditions are such that the maximum value of the operating condensed-mercury-temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.):

No load*	12	°C
Full load▲	17.5	°C

* With 4.75 volts rms on filament, and no heat-conserving enclosure.

▲ With 5.25 volts rms on filament, quadrature operation, average anode current = 2.5 amperes, and no heat-conserving enclosure.

← Indicates a change.

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RCA

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HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER — In-Phase Operation•

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury-Temperature Range 20° to 60° C	20° to 50° C	
PEAK INVERSE ANODE VOLTAGE	10000 max.	15000 max.	volts
ANODE CURRENT:			
Peak	7 max.	6 max.	amp
Average**	1.75 max.	1.5 max.	amp
Fault, for duration of 0.1 second maximum	100 max.	100 max.	amp

HALF-WAVE RECTIFIER — Quadrature Operation••

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury-Temperature Range 20° to 60° C	20° to 50° C	
PEAK INVERSE ANODE VOLTAGE	10000 max.	15000 max.	volts
ANODE CURRENT:			
Peak	10 max.	10 max.	amp
Average**	2.5 max.	2.5 max.	amp
Fault, for duration of 0.1 second maximum	100 max.	100 max.	amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	-	11.5	amp
Critical Anode Voltage	2	-	100	volts
Peak Tube Voltage Drop	3	-	16	volts

Note 1: With 5 volts rms on filament.

Note 2: With 4.75 volts rms on filament, and condensed-mercury temperature at 20° C.

Note 3: With 5 volts rms on filament, condensed-mercury temperature of 35° ± 5° C, peak anode current of 20 amperes provided by half-cycle pulse from a 60-cps sine wave and recurring approximately once a second. Tube drop is measured by an oscilloscope connected between anode and center-tap of filament transformer.

• Filament voltage in phase with anode voltage.

** Averaged over any interval of 20 seconds maximum.

•• Filament voltage out of phase (60° to 120°) with anode voltage.

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

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HALF-WAVE MERCURY-VAPOR RECTIFIER

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}	MAX. DC OUTPUT KW TO FILTER Pdc
Fig. 1				
Half-Wave	10600□	4800	1.50	7.1
Single-Phase	7000▲	3200	1.75	5.5
In-Phase Operation				
Fig. 2				
Full-Wave	5300□	4800	3.00	14.2
Single-Phase	3500▲	3200	3.50	11.0
In-Phase Operation				
Fig. 3				
Series	10600□	9600	3.00	28.4
Single-Phase	7000▲	6400	3.50	22.0
In-Phase Operation				
Fig. 4				
Half-Wave	6100□	7200	4.50	32.2
Three-Phase	4000▲	4800	5.25	25.0
In-Phase Operation				
Fig. 5				
Parallel	6100□	7200	15.0	108
Three-Phase	4000▲	4800	15.0	72
Quadrature Operation				
Fig. 6				
Series	6100□	4300	7.5	108
Three-Phase	4000▲	9600	7.5	72
Quadrature Operation				
Fig. 7			*Resistive Load* / *Inductive Load*	*Resistive Load* / *Inductive Load*
Half-Wave				
Four-Phase				
Quadrature Operation	5300□	6750	9.0 / 10.0	60.8 / 67.5
	3500▲	4500	9.0 / 10.0	40.5 / 45.0
Fig. 8			*Resistive Load* / *Inductive Load*	*Resistive Load* / *Inductive Load*
Half-Wave				
Six-Phase				
Quadrature Operation	5300□	7200	9.5 / 10.0	68.4 / 72.0
	3500▲	4800	9.5 / 10.0	45.6 / 48.0

□ For maximum peak inverse anode voltage of 15,000 volts, and condensed-mercury-temperature range of 20° to 50° C.

▲ For maximum peak inverse anode voltage of 10,000 volts, and condensed-mercury-temperature range of 20° to 60° C.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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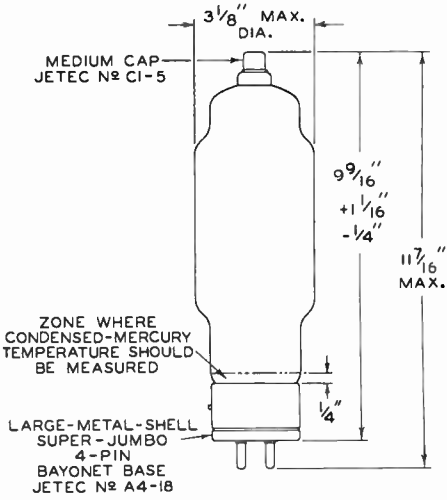
HALF-WAVE MERCURY-VAPOR RECTIFIER

OPERATING CONSIDERATIONS

Shields and rf filter circuits should be provided for the 673 if it is subjected to extraneous high-frequency fields during operation. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. When shields are used, special attention must be given to providing adequate ventilation and to maintaining normal condensed-mercury temperature. Rf filters are employed to prevent damage caused by rf currents which might otherwise be fed back into the rectifier tubes.



92CS-6655R3

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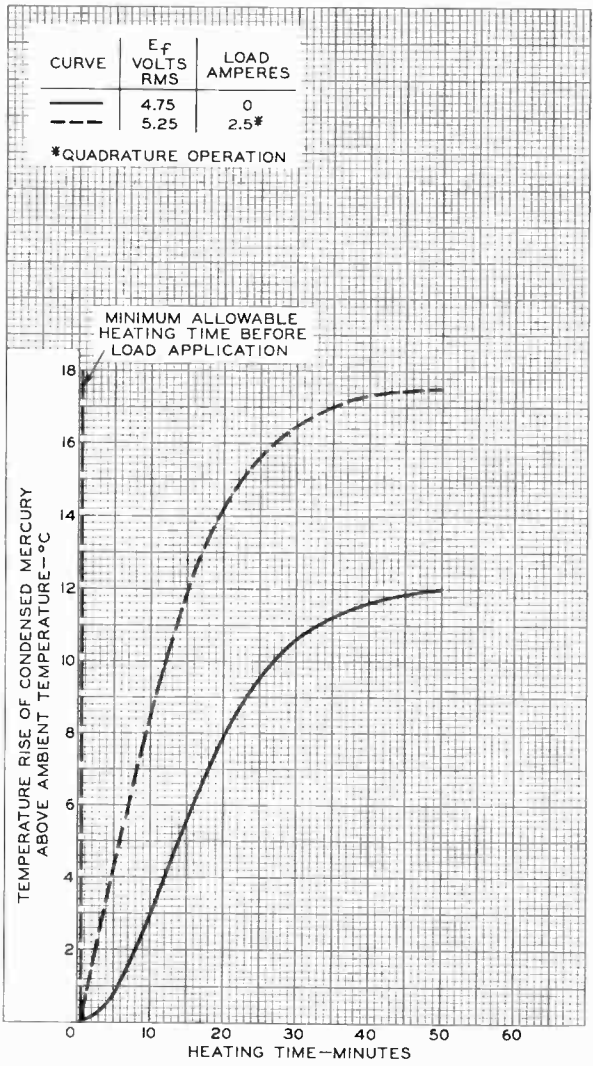
RATE OF RISE OF COND-MERCURY TEMPERATURE



World Radio History

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6883

BEAM POWER TUBE

Useful with full input up to 60 Mc and with reduced input up to 175 Mc

The 6883 is the same as the 6146 except for the following items:

Electrical:

Heater, for Unipotential Cathode:
Voltage . . . . . 12.6 ± 10% . . .ac or dc volts
Current . . . . . 0.625 . . . . . amp

Mechanical:

Maximum Diameter. . . . . 1-21/32" ←
Base. . . . . Small-Wafer Octal 8-Pin with Sleeve (JETEC No.B8-150)

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN ←

	Note	Min.	Max.	
Heater Current.	1	0.588	0.663	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate.	2	–	0.24	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater.	2	11.1	15.9	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater.	2	6.4	10.6	μμf
Plate Current	3	46	94	ma
Grid-No.2 Current	3	–	5.5	ma
Useful Power Output	4	47	–	watts

Note 1: With 12.6 volts ac on heater.

Note 2: Without external shield.

Note 3: With 12.6 volts ac on heater, dc plate volts = 300, dc grid-No.2 volts = 200, and dc grid-No.1 volts = -33.

Note 4: In a single-tube self-excited oscillator circuit, and with 12.6 volts ac on heater, dc plate volts = 600, dc grid-No.2 volts = 180, grid-No.1 resistor (ohms) = 30000 ± 10%, dc plate ma. = 100 to 112, dc grid-No.1 ma. = 2 to 2.5, and frequency (Mc) = 15.

← Indicates a change.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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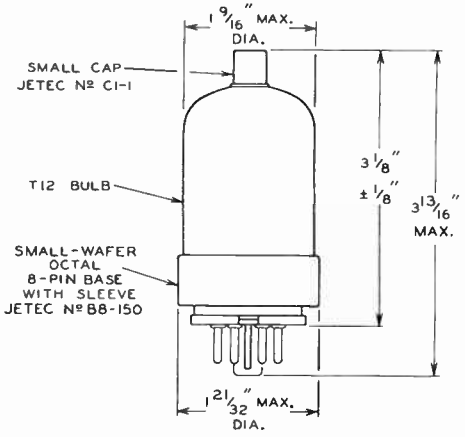
RCA

6883

BEAM POWER TUBE



92CS-9520

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World Radio History

RCA

6949

SUPER-POWER SHIELDED-GRID BEAM TRIODE

COAXIAL-ELECTRODE STRUCTURE — WATER-COOLED ELECTRODES
500-KW CW POWER OUTPUT — INTEGRAL WATER DUCTS

Useful with full input up to 75 Mc

GENERAL DATA

Electrical:

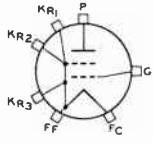
Filament, Mult'strand Thoriated Tungsten:		
Voltage (Single-phase AC or DC)	7.3 min. / 7.8 max.	volts
Current at 7.3 volts	1040	amp
Current at 7.8 volts	1130	amp
Starting current	Must never exceed 1700 amperes, even momentarily	
Cold resistance	0.0013	ohm
Minimum heating time	60	seconds
Amplification Factor, for dc grid volts = -50 and dc plate voltage adjusted to give dc plate current of 10 amperes	60	
Direct Interelectrode Capacitances:		
Grid to plate	12	μμf
Grid to filament	1300	μμf
Plate to filament	160	μμf

Mechanical:

Operating Position	Vertical, with lifting ring up
Maximum Overall Length	40"
Maximum Diameter	10.06"
Weight (Approx.)	140 lbs

Terminal Connections *(See Dimensional Outline)*:

F_C – Filament Cylindrical Terminal
F_F – Filament Flange Terminal
K_{R_1} – Output-Circuit-Return Terminal
P – Plate Terminal



K_{R_2} – Flange Input-Circuit-Return Terminal
K_{R_3} – Cylindrical Input-Circuit-Return Terminal
G – Grid Terminal

Air Cooling:

It is important that the temperature of any external part of the tube should not exceed 150° C. In general, forced-air cooling of the ceramic bushings will not be required unless the 6949 is used in cavity-type circuits or in a confined space without free circulation of air. Under such conditions, provision should be made for blowing an adequate quantity of air at the ceramic bushings to limit their temperature to 150° C. Forced-air cooling of the output-

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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SUPER-POWER SHIELDED-GRID BEAM TRIODE

circuit-return terminal (K_{R_1}) and the flange input-circuit-return terminal (K_{R_2}) may be necessary to prevent exceeding the maximum temperature rating of 150° C, particularly at vhf frequencies.

Water Cooling:

Water cooling of the beam-forming cylinder, grid-terminal, and the plate is required. The water flow must start before application of any voltages and preferably should continue for several minutes after removal of all voltages. Interlocking of the water flow for each of the cooled elements with all power supplies is recommended to prevent tube damage in case of failure of adequate water flow. The use of distilled water is essential.

Water Flow:

	Absolute Min. Flow gpm	*Typical Flow* gpm	*Pressure Drop*[⊕] *for Typical Flow* psi	*Max. Gauge Pressure*[□] psi
To plate (In direction shown on *Dimensional Outline*):				
For plate dissipation up to 125 kw. . . .	40	44	18	100
For plate dissipation of 260 kw	60	66	35	100
For plate dissipation of 330 kw	70	77	48	100
For plate dissipation of 400 kw	80	88	65	100
To grid-terminal connector	1	–	–	–
To beam-forming cylinder.	7	8	9	50

Outlet Water Temperature (Any outlet) . . 70 max. °C

Minimum Plate-Water-Column Resistance . 1/2 megohm per kv of dc plate voltage

Ceramic-Bushing Temperature . . . . . 150 max. °C

Metal-Surface Temperature . . . . . 150 max. °C

Fittings:

Fittings for the plate and beam-forming-cylinder water connections may be obtained from the Breco Division, Perfecting Service Co., 332 Atando Ave., Charlotte 6, North Carolina, USA.

⊕,□: See next page.

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6949
SUPER-POWER SHIELDED-GRID BEAM TRIODE

LINEAR RF POWER AMPLIFIER
Single-Sideband Suppressed-Carrier Service

Crest of modulation conditions

Maximum CCS® Ratings, *Absolute Values:*

For altitudes up to 5,000 feet and frequencies up to 75 Mc

DC PLATE VOLTAGE	20000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT	60 max.	amp
MAX.-SIGNAL PLATE INPUT	1100000 max.	watts
MAX.-SIGNAL DC GRID CURRENT	1.5 max.	amp
PLATE DISSIPATION (Average)	400000 max.	watts

Typical CCS Class B Operation at 10 Mc:

DC Plate Voltage	18000	volts
DC Grid Voltage (Approx.)*	-300	volts
Zero-Signal DC Plate Current	5	amp
Effective RF Load Resistance	170	ohms
"Single-Tone" Operation:®		
Max.-signal dc plate current	57	amp
Max.-signal dc grid current	0.35	amp
Max.-signal peak rf grid voltage	1900	volts
Max.-signal driving power (Approx.)	10000**	watts
Max.-signal power output (Approx.)	600000	watts
"Two-Tone" Operation:♦♦		
Average dc plate current	37	amp
Average dc grid current	0.22	amp
Peak envelope rf grid voltage	1900	volts
Average power output (Approx.)	300000	watts
Peak envelope power output (Approx.)	600000	watts

RF POWER AMPLIFIER — Class C Telegraphy##
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS® Ratings, *Absolute Values:*

For altitudes up to 5,000 feet and frequencies up to 75 Mc

DC PLATE VOLTAGE	20000 max.	volts
DC GRID VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	50 max.	amp
DC GRID CURRENT	1.5 max.	amp
PLATE INPUT	1000000 max.	watts
PLATE DISSIPATION	400000 max.	watts

Typical CCS Operation at 425 Mc:

DC Plate Voltage	17500	volts
DC Grid Voltage▲	-625	volts
Peak RF Grid Voltage	2000	volts
DC Plate Current	40	amp
DC Grid Current	1	amp

®, D, ●, *, ⊕, **, ♦♦, ##, ▲: See next page.

World Radio History

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6949
SUPER-POWER SHIELDED-GRID BEAM TRIODE

Driving Power (Approx.)🌡.	2000	watts
Useful Power Output (Approx.) . . .	500000	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current.	1	870	1100	amp
Amplification Factor.	1,2	48	74	
Direct Interelectrode Capacitances:				
Grid to plate	–	–	20	μμf
Grid to filament.	–	1150	1550	μμf
Plate to filament	–	140	170	μμf

Note 1: With 7.3 volts ac on filament.

Note 2: For dc grid volts = −50 and dc plate voltage adjusted to give dc plate current of 10 amperes.

⊕ Directly across cooled element for the indicated typical flow.

□ At tube inlets.

● Continuous Commercial Service.

* Obtained from a fixed supply. Value should be adjusted to give indicated value of zero-signal plate current.

⊛ "Single-Tone" operation refers to that class of amplifier service in which the grid-No.1 input consists of a monofrequency rf signal having constant amplitude. This signal is produced in a single-sideband suppressed-carrier system when a single audio frequency of constant amplitude is applied to the input of the system.

** Includes tube losses, circuit losses, and "swamping power" losses.

👥 "Two-Tone" operation refers to the simultaneous amplification of the two equal-amplitude, radio-frequency signals resulting from modulation of a single-sideband, suppressed-carrier transmitter by two audio-frequency signals of equal amplitude. The data shown for "Two-Tone" modulation refer to the case in which the peak amplitude of the resultant rf grid signal is equal to the "Max.-Signal Peak RF Grid-No.1 Voltage" as specified under "Single-Tone" modulation.

\#\# Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲ Obtained from fixed supply.

🌡 Additional driving power is required at frequencies where circuit losses become significant.

OPERATING CONSIDERATIONS

A *high-speed, electronic protective device* must be used to remove the plate voltage within a few microseconds in the event of abnormal operation such as internal arcing. The protective device employed to remove the plate voltage in any installation must be approved by the RCA Electron Tube Division. In addition, the grid circuit should be provided with overload relays which will act to remove within a period of 0.1 second all grid power in the event of excessive grid-current flow. Inquiries concerning a high-speed, electronic protective device for removal of plate voltage from the 6949 may be addressed to Commercial Engineering, Electron Tube Division, RCA, Harrison, N.J.

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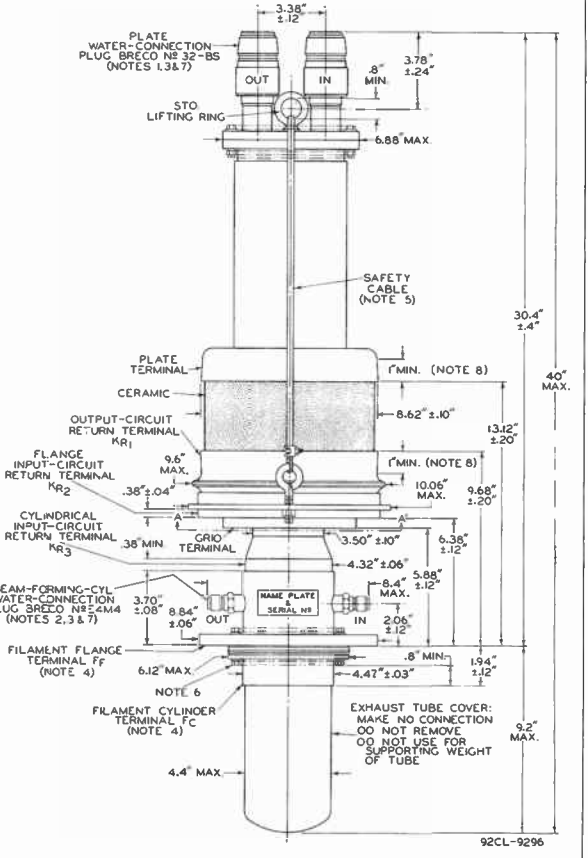
SUPER-POWER SHIELDED-GRID BEAM TRIODE

The 6949 can be operated with maximum ratings at frequencies up to 75 Mc and with reduced ratings to higher frequencies. The capabilities of the 6949 for operation at higher frequencies and at higher powers have not yet been determined but requests for information on specific applications will be welcomed.



Notes 1 to 8: See next page.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 3 & CE-9296A

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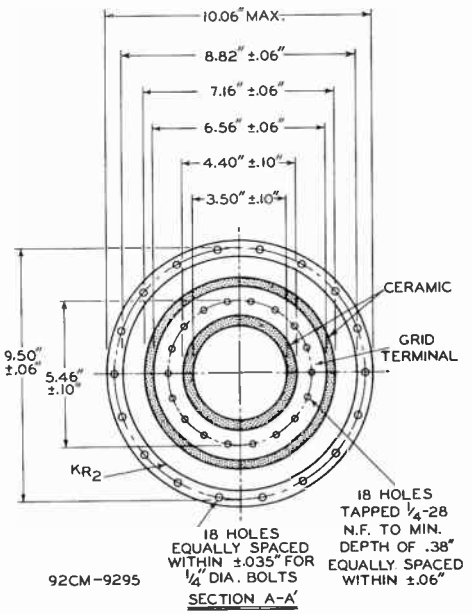
SUPER-POWER SHIELDED-GRID BEAM TRIODE



SECTION A-A'

NOTE 1: SOCKET No.412-BS 1-1/2" FOR THIS PLUG MAY BE OBTAINED FROM BRECO DIVISION, PERFECTING SERVICE CO., 332 ATANDO AVE., CHARLOTTE 6, N.C.

NOTE 2: SOCKET No.4EF4 1/2" (WITH FEMALE PIPE-THREAD CONNECTION) OR SOCKET No.4EM4 1/2" (WITH MALE PIPE-THREAD CONNECTION) MAY BE OBTAINED FROM SUPPLIER INDICATED IN NOTE 1.

NOTE 3: DIRECTION OF WATER FLOW THROUGH TUBE MUST BE IN DIRECTION INDICATED BY MARKINGS AT WATER CONNECTIONS.

NOTE 4: USE FOR FILAMENT POWER ONLY. INPUT-CIRCUIT RETURN SHOULD BE MADE TO BOTH INPUT-CIRCUIT-RETURN TERMINALS (K_{R_2} & K_{R_3}); OUTPUT-CIRCUIT RETURN SHOULD BE MADE TO OUTPUT-CIRCUIT-RETURN TERMINAL (K_{R_1}).

NOTE 5: REMOVE THIS CABLE BEFORE OPERATING TUBE AND KEEP CABLE FOR FUTURE TUBE HANDLING.

NOTE 6: DO NOT TAMPER WITH THESE BOLTS.

Notes 7 & 8: See next page.

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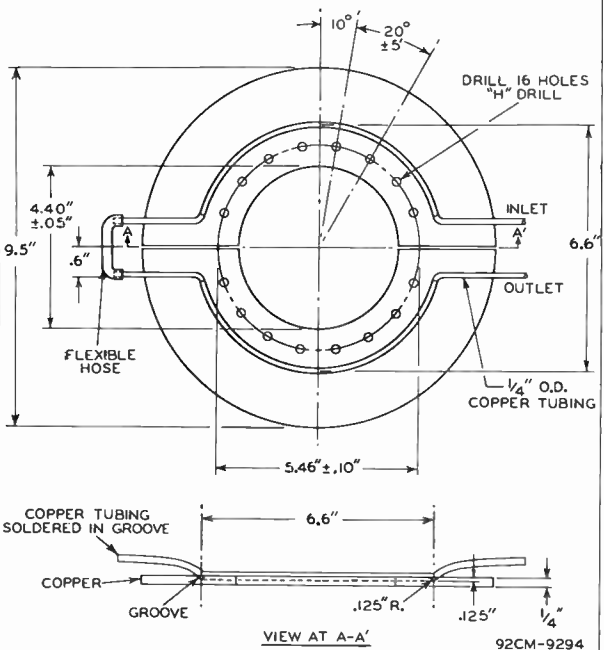
SUPER-POWER SHIELDED-GRID BEAM TRIODE

NOTE 7: INLET WATER CONNECTIONS (IN) ARE BOTH ON SAME SIDE OF TUBE AND TO THE RIGHT WHEN TUBE IS VIEWED WITH NAME PLATE TOWARD OBSERVER.

NOTE 8: THIS AREA IS SUBJECT TO A MAXIMUM TAPER OF 0.060" TO THE INCH. THE MAXIMUM DIAMETER ALONG THIS TAPER WILL BE ON THE END TOWARD THE CERAMIC.

DETAILS OF SUGGESTED WATER-COOLED GRID-TERMINAL CONNECTOR



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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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RCA

6949

TYPICAL CONSTANT-CURRENT CHARACTERISTICS

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9305

World Radio History

715-C

PULSE AMPLIFIER TETRODE

GENERAL DATA

Electrical:

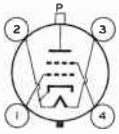
Heater, for Unipotential Cathode:			
Voltage	26 ± 2.5	ac or dc	volts
Current	2.1		amp
Minimum Heating Time	3		minutes
Direct Interelectrode Capacitances:[o]			
Grid No.1 to Plate	2 max.		μμf
Input	37.5		μμf
Output	7.5		μμf

[o] With no external shield.

Mechanical:

Mounting Position	Vertical, base up or down
Overall Length	5-3/4" ± 1/8"
Seated Length	5-5/16" ± 1/8"
Maximum Diameter	2-9/16"
Bulb	T-20
Cap	Medium with Dished Flange
Base	Medium-Ceramic-Wafer Jumboid 4-Pin

BOTTOM VIEW



Pin 1 – Grid No.1
Pin 2 – Heater, Cathode
Pin 3 – Heater
Pin 4 – Grid No.2
Cap – Plate

MODULATOR – Pulsed Rectangular-Wave

With Inductive Load

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE SUPPLY VOLTAGE*	15000 max.	volts
PEAK POSITIVE PLATE VOLTAGE	18000 max.	volts
DC GRID-No.2 (SCREEN) SUPPLY VOLTAGE*	1350 max.	volts
DC GRID-No.1 (CONTROL GRID) SUPPLY VOLTAGE	-1000 max.	volts
PEAK GRID-No.1 VOLTAGE:		
Negative Value	1200 max.	volts
Positive Value	300 max.	volts
PEAK PLATE CURRENT**, for duty factor□ not exceeding 0.001	15 max.	amp

● Continuous Commercial Service.

□ Duty Factor equals product of pulse duration in seconds and the pulse repetition frequency in cycles per second.

** For peak currents in excess of 5 amperes, the product of peak plate current in amperes and pulse duration in microseconds should not exceed 30, and the tube should not be operated longer than 5 microseconds in any 100-microsecond interval.

For peak currents less than 5 amperes, the duty factor is determined by the maximum plate-dissipation rating of 60 watts.

*: See next page.

715-C

715-C

PULSE AMPLIFIER TETRODE

PEAK GRID-No.2 CURRENT	5 max.	amp
PEAK GRID-No.1 CURRENT	2 max.	amp
PLATE INPUT	225 max.	watts
GRID-No.2 INPUT	8 max.	watts
GRID-No.1 INPUT	1 max.	watt
PLATE DISSIPATION	60 max.	watts

Typical Operation:

Duty Factor of 0.001

DC Plate Supply Voltage*	15000	volts
DC Grid-No.2 Supply Voltage*	1250	volts
DC Grid-No.1 Supply Voltage	-800	volts
Peak Positive Grid-No.1 Voltage	+225	volts
Plate Current:		
DC Value	0.015	amp
Peak Value	15	amp
DC Grid-No.2 Current	0.0015	amp
DC Grid-No.1 Current	0.010	amp
Load Resistance	800	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

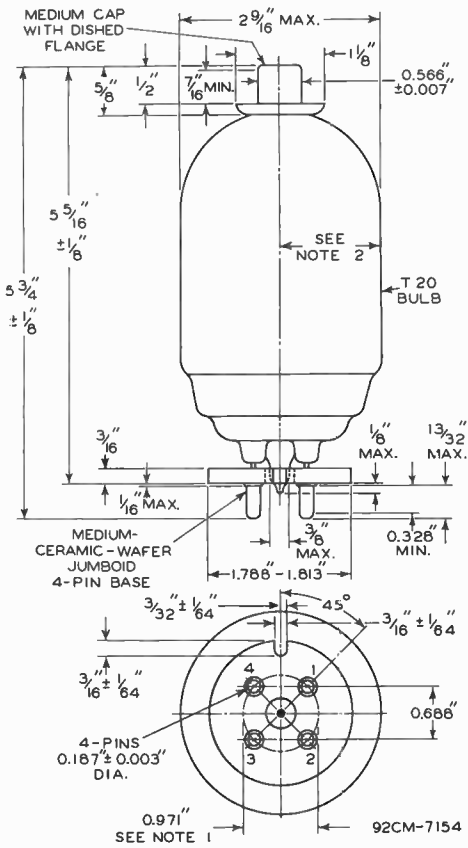
	Note	*Min.*	*Max.*	
Heater Current	1	1.9	2.3	amp
Grid-No.1-to-Plate Capacitance	-	-	2	μμf
Input	-	30	45	μμf
Output	-	5	10	μμf

Note 1: With 26 volts on heater.

* For tube protection, it is essential that the dc resistance in series with the plate supply and the grid-No.2 supply should be adequate to limit the short-circuit current to 0.5 ampere in either circuit.

715-C

PULSE AMPLIFIER TETRODE



NOTE 1: PINS WILL FIT A FLAT-PLATE GAUGE HAVING THICKNESS OF 1/4" AND FOUR HOLES 0.2140" ± 0.0005" SO LOCATED ON A 0.9710" ± 0.0005" DIAMETER CIRCLE THAT THE DISTANCE ALONG THE CHORD BETWEEN ANY TWO ADJACENT HOLE CENTERS IS 0.6875" ± 0.0005". GAUGE IS ALSO PROVIDED WITH A 7/16" DIAMETER HOLE CONCENTRIC WITH PIN CIRCLE FOR THE EXHAUST TIP.

NOTE 2: WHEN TUBE IS ROTATED ABOUT AXIS OF ITS BASE, THE MAXIMUM RADIAL DISTANCE BETWEEN ANY POINT ON THE BULB AND THE ROTATIONAL AXIS DOES NOT EXCEED 1-13/32".

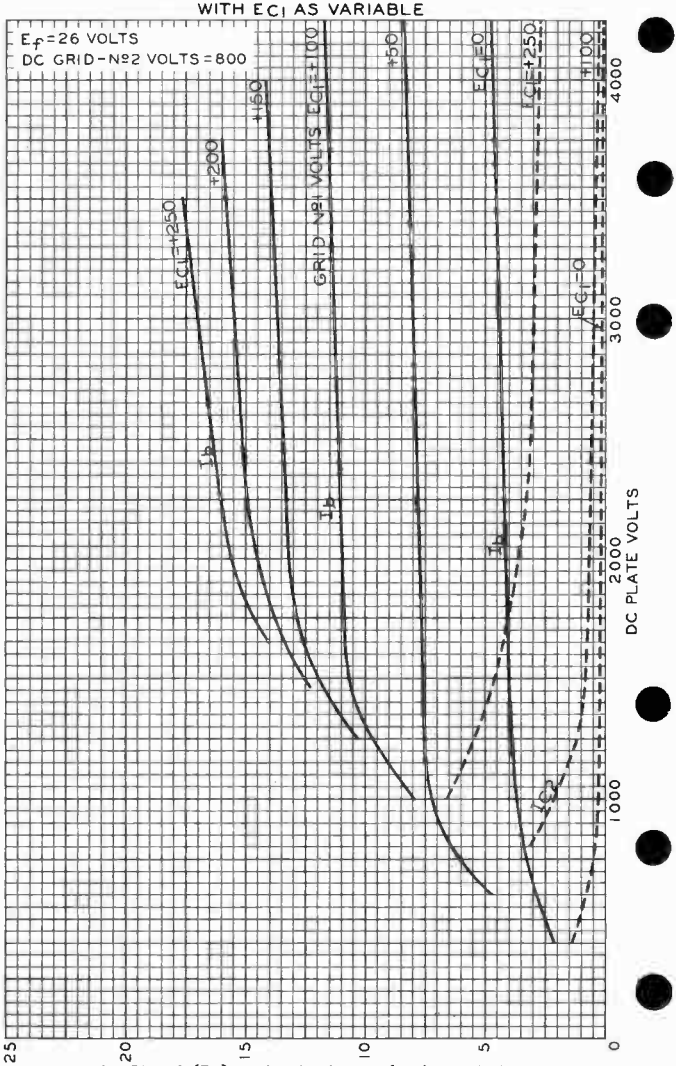
World Radio History

715-C

RCA

715-C

AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE



FEB. 21, 1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7186

World Radio History

RCA

715-C

AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE

FEB. 22, 1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7188

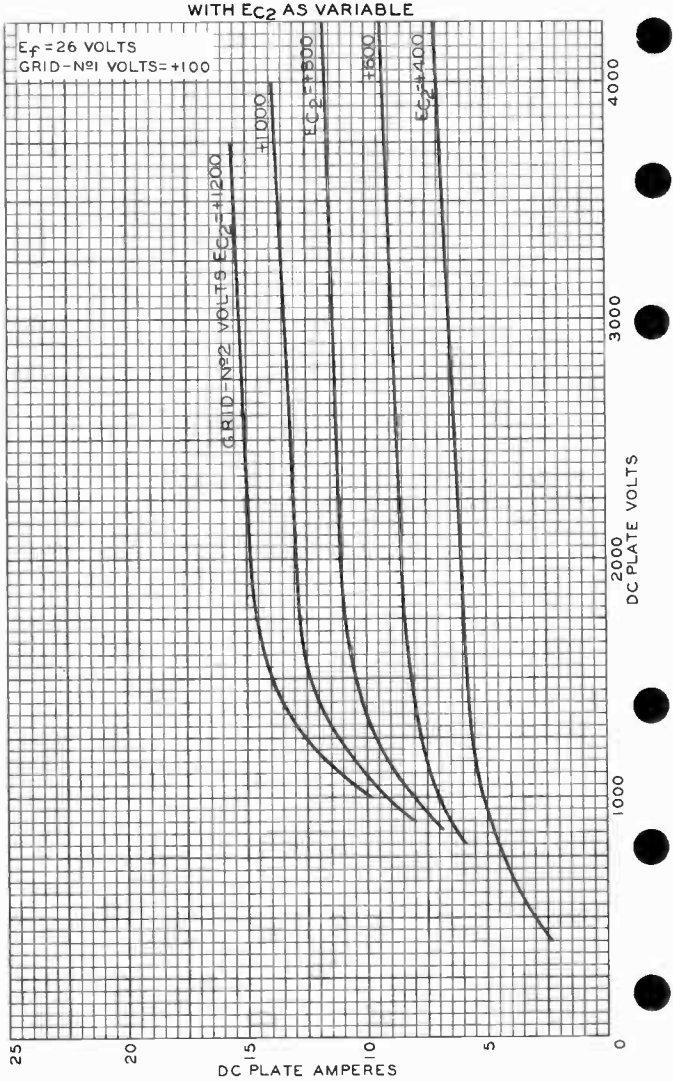
World Radio History

715-C

RCA

715-C

AVERAGE PLATE CHARACTERISTICS
WITH E_{C2} AS VARIABLE



FEB. 23, 1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

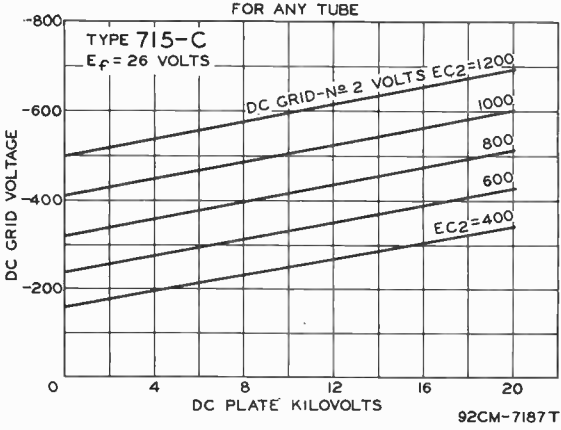
92CM-7190

World Radio History

715-C

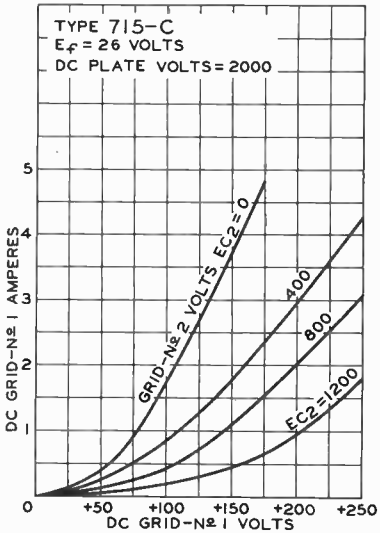
PULSE AMPLIFIER TETRODE

MAXIMUM CUTOFF CHARACTERISTICS
FOR ANY TUBE



92CM-7187T

AVERAGE CHARACTERISTICS



92CM-7189T

World Radio History

World Radio History

8CG7

Medium-Mu Twin Triode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

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

Heater Characteristics and Ratings *(Design-Maximum Values)*:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	8.4	volts

8CM7

Medium-Mu Dual Triode

With Dissimilar Units

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

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

Heater Characteristics and Ratings *(Design-Maximum Values)*:

Current	0.450 ± 0.030	amp
Voltage (AC or DC) at heater amperes = 0.450	8.4	volts

8CN7

Twin Diode—High-Mu Triode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

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

Heater Characteristics and Ratings *(Design-Maximum Values)*:

Heater-section arrangement	*Parallel*	*Series*	*Series*	
Voltage (AC or DC).	4.2[a]	8.4[b]	8.4 ± 0.8	volts
Current	0.450 ± 0.030	0.225 ± 0.010	0.225[c]	amp

[a] At heater amperes = 0.450.
[b] At heater amperes = 0.225.
[c] At heater volts = 8.4.

World Radio History

8CS7

Medium-Mu Dual Triode

With Dissimilar Units

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

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

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

8CX8

Medium-Mu Triode— Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

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

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

8EB8

High-Mu Triode— Sharp-Cutoff Pentode

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

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

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

World Radio History

Beam Power Tube

9-PIN MINIATURE TYPE

With Heater Having Controlled Warm-Up Time

The 8EM5 is the same as the 6EM5 except for the following items:

Heater Characteristics and Ratings *(Design-Center Values)*:

Current	0.600 ± 0.040	amp
Voltage (AC or DC) at heater amperes = 0.600	8.4	volts
Warm-up time (Average)	11	sec

World Radio History

World Radio History

RCA
800

TRANSMITTING TRIODE

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	3.1	amp. ←
Amplification Factor	15	
Direct Interelectrode Capacitances:		
Grid to Plate	2.5	μμf
Grid to Filament	2.8	μμf
Plate to Filament	2.8	μμf
Overall Length		6-5/32" ± 7/32" ←
Seated Height		5-17/32" ± 7/32" ←
Maximum Diameter		2-11/16"
Bulb		S-21
Caps (two)		Small
Base		Medium 4-Pin, Bayonet
RCA Socket		Stock No. 9937 ←

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			1250 max.	volts
Max.-Signal D-C Plate Current*			115 max.	ma.
Max.-Signal Plate Input*			85 max.	watts
Plate Dissipation*			35 max.	watts
Typical Operation:				
Unless otherwise specified, values are for 2 tubes.				
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage**	-40	-55	-70	volts
Peak A-F Grid-to-Grid Volt.	320	300	300	volts
Zero-Signal D-C Plate Cur.	26	28	30	ma.
Max.-Signal D-C Plate Cur.	210	150	130	ma.
Load Resistance (per tube)	1600	3125	5250	ohms
Effective Load Resistance (plate to plate)	6400	12500	21000	ohms
Max.-Signal Driving Power	6.0	4.4	3.4	approx. watts
Max.-Signal Power Output	90	100	106	approx. watts

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			1250 max.	volts
D-C Plate Current			45 max.	ma.
Plate Input			50 max.	watts
Plate Dissipation			35 max.	watts
Typical Operation:				
D-C Plate Voltage	750	1000		volts
D-C Grid Voltage**	-40	-55		volts
Peak R-F Grid Voltage	160	170		volts
D-C Plate Current	45	42		ma.
D-C Grid Current †	2	2	approx.	ma.
Driving Power °†	3.5	3.3	approx.	watts
Power Output	10	14	approx.	watts

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

World Radio History

RCA

800

TRANSMITTING TRIODE

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			1000 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			90 max.	ma.
D-C Grid Current			25 max.	ma.
Plate Input			80 max.	watts
Plate Dissipation			23 max.	watts
Typical Operation:				
D-C Plate Voltage	750	1000		volts
D-C Grid Voltage ††	-150	-200		volts
	10000	13300		ohms
Peak R-F Grid Voltage	275	325		volts
D-C Plate Current	70	70		ma.
D-C Grid Current †	15	15	approx.	ma.
Driving Power †	3	4	approx.	watts
Power Output	35	50	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without modulation****

D-C Plate Voltage			1250	max.	volts
D-C Grid Voltage			-400	max.	volts
D-C Plate Current			80	max.	ma.
D-C Grid Current			25	max.	ma.
Plate Input			100	max.	watts
Plate Dissipation			35	max.	watts
Typical Operation:					
D-C Plate Voltage	750	1000	1250		volts
D-C Grid Voltage †††	-100	-135	-175		volts
	6700	9000	11700		ohms
	1200	1600	2100		ohms
Peak R-F Grid Voltage	225	260	300		volts
D-C Plate Current	70	70	70		ma.
D-C Grid Current †	15	15	15	approx.	ma.
Driving Power †	2	3	4	approx.	watts
Power Output	35	50	65	approx.	watts

* Averaged over any audio-frequency cycle of sine-wave form.

** For a-c filament supply.

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

o At crest of a-f cycle with modulation factor of 1.0.

† Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

†† Obtained from grid resistor of value shown or by combination methods.

††† Obtained from a fixed supply, by grid resistor (6700, 9000, 11700) or by cathode resistor (1200, 1600, 2100).

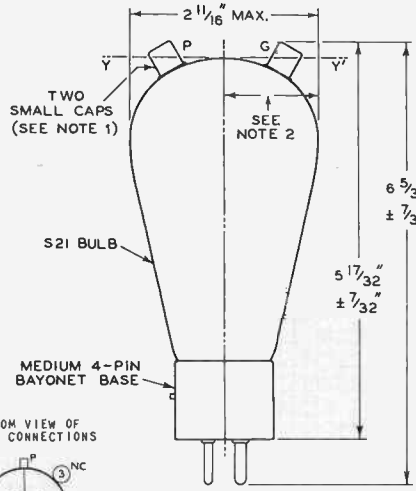
Data on operating frequencies for the 800 are given on the sheet TRANS. TUBE RATINGS vs. FREQUENCY.

←Indicates a change.

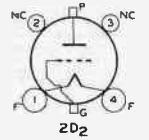
World Radio History

800

TRANSMITTING TRIODE

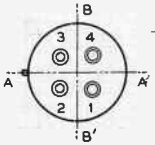


BOTTOM VIEW OF SOCKET CONNECTIONS



2D2

Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – No Connection
Pin 4 – Filament
Cap P – Plate
Cap G – Grid



92CM-4281R4

BOTTOM VIEW OF BASE

TUBE MOUNTING POSITION

VERTICAL: Base up or down.
HORIZONTAL: No.

AS USED BELOW, PLANES AA', BB', AND YY' HAVE THE FOLLOWING DEFINITIONS:

1. PLANE AA' IS PLANE THROUGH AXIS OF BASE AND POINT MID-WAY BETWEEN PINS No.1 AND No.4.
2. PLANE BB' IS PLANE THROUGH AXIS OF BASE AND PERPENDICULAR TO PLANE AA'.
3. PLANE YY' IS TANGENT TO TOP OF BULB AND PERPENDICULAR TO AXIS OF BASE.

NOTE 1 -- WITH ALL MEASUREMENTS MADE PARALLEL TO THE PLANE YY' AND AT OR ABOVE THE PLANE, THE TOP CAPS ARE POSITIONED SO THAT:

a. NO PORTION OF CONTACT SURFACE EXTENDS MORE THAN 1-11/32" FROM THE PLANE BB'.

b. NO PORTION OF CONTACT SURFACE IS NEARER THAN 1/2" TO THE PLANE BB'.

c. NO PORTION OF CONTACT SURFACE EXTENDS MORE THAN 1/2" FROM THE PLANE AA'.

NOTE 2 -- WHEN TUBE IS ROTATED ABOUT AXIS OF ITS BASE, THE MAXIMUM RADIAL DISTANCE BETWEEN ANY POINT ON THE BULB AND THE ROTATIONAL AXIS DOES NOT EXCEED 1-7/16".

← Indicates a change.

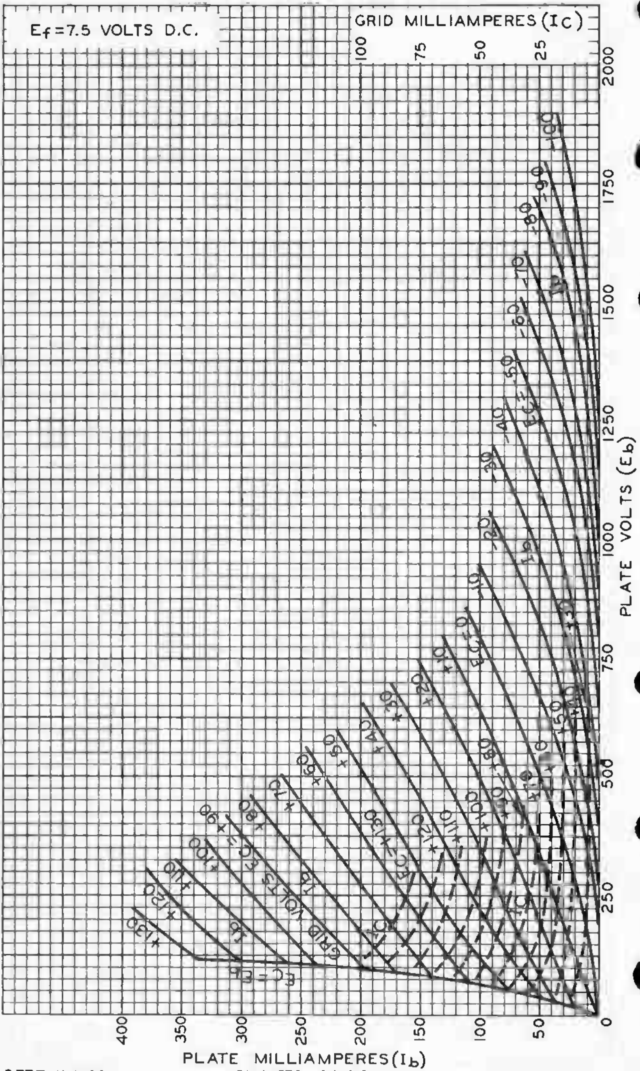
World Radio History

800

RCA

800

AVERAGE PLATE CHARACTERISTICS



SEPT. 11, 1933

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-5368

World Radio History

AVERAGE TRANSFER CHARACTERISTICS WITH LOAD

800

FEB. 9, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

CE-5377R1

800

World Radio History

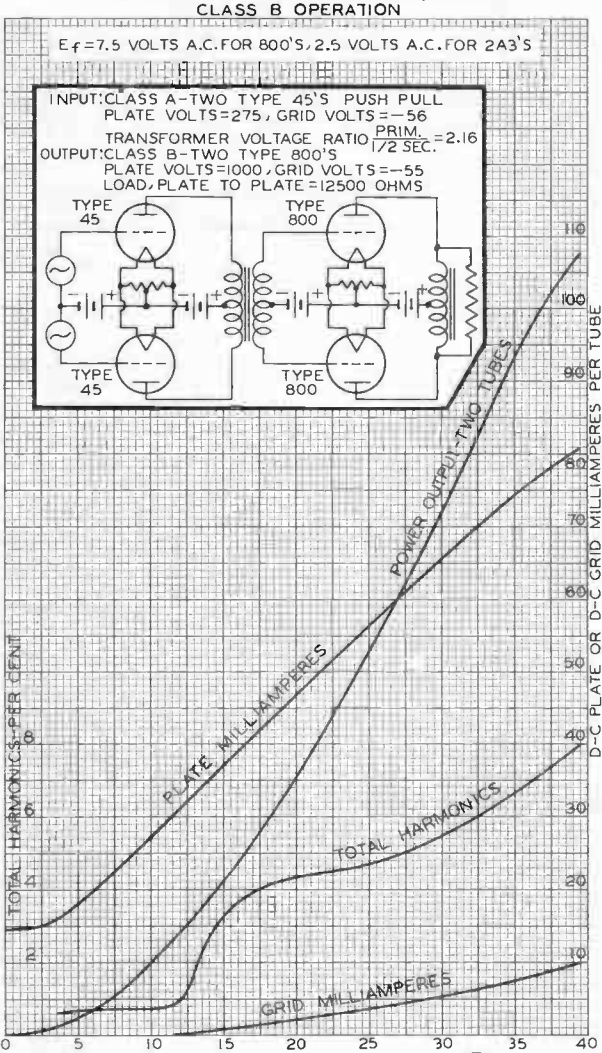
RCA

800

OPERATION CHARACTERISTICS
CLASS B OPERATION

E_f = 7.5 VOLTS A.C. FOR 800'S, 2.5 VOLTS A.C. FOR 2A3'S

INPUT: CLASS A – TWO TYPE 45'S PUSH PULL
PLATE VOLTS = 275, GRID VOLTS = −56
TRANSFORMER VOLTAGE RATIO $\frac{\text{PRIM.}}{1/2\ \text{SEC.}}$ = 2.16
OUTPUT: CLASS B – TWO TYPE 800'S
PLATE VOLTS = 1000, GRID VOLTS = −55
LOAD, PLATE TO PLATE = 12500 OHMS



World Radio History

801-A/801
R-F POWER AMPLIFIER, A-F POWER AMPLIFIER, MODULATOR

Filament	Thoriated tungsten	
Voltage	7.5	a-c or d-c volts
Current	1.25	amp.
Amplification Factor	8	
Direct Interelectrode Capacitances:		
Grid to Plate	6.0	μμf
Grid to Filament	4.5	μμf
Filament to Plate	1.5	μμf
Maximum Overall Length		5-3/8"
Maximum Diameter		2-1/16"
Bulb		ST-16
Base	Medium 4-Pin "MICANOL", Bayonet	←
RCA Socket	Type UR-542-A	

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A_1

D-C Plate Voltage			600 max.	volts
Plate Dissipation			20 max.	watts
Typical Operation:				
D-C Plate Voltage	425	500	600	volts
D-C Grid Voltage □△	-40	-45	-55	volts
Peak A-F Grid Voltage	35	40	50	volts
D-C Plate Current	18	24	30	ma.
Plate Resistance	5000	4600	4300	ohms
Transconductance	1600	1725	1840	μmhos
Load Resistance	10200	8000	7800	ohms
U.P.O. (5% second harmonic)	1.6	2.3	3.8	watts

□ The d-c resistance in the grid circuit should not exceed 0.5 megohm with cathode bias, or 0.1 megohm with fixed bias.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			600 max.	volts
Max.-Signal D-C Plate Current*			70 max.	ma.
Max.-Signal Plate Input*			42 max.	watts
Plate Dissipation*			20 max.	watts
Typical Operation:				
Unless otherwise specified, values are for 2 tubes				
D-C Plate Voltage	400	500	600	volts
D-C Grid Voltage △	-50	-60	-75	volts
Peak A-F Grid-to-Grid Voltage	270	290	320	volts
Zero-Signal D-C Plate Cur.	8	8	8	ma.
Max.-Signal D-C Plate Cur.	130	130	130	ma.
Load Resistance (per tube)	1500	2000	2500	ohms
Effective Load Resistance (plate to plate)	6000	8000	10000	ohms
Max.-Signal Driving Power	3	3	3	approx.watts
Max.-Signal Power Output	27	36	45	approx.watts

* Averaged over any audio-frequency cycle of sine-wave form.
△ With a-c filament supply.

← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

801-A
R-F POWER AMPLIFIER, A-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

R-F POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage		600 max.	volts
D-C Plate Current		50 max.	ma.
Plate Input		30 max.	watts
Plate Dissipation		20 max.	watts
Typical Operation:			
D-C Plate Voltage	500	600	volts
D-C Grid Voltage △	-60	-75	volts
Peak R-F Grid Voltage	85	90	volts
D-C Plate Current	45	45	ma.
D-C Grid Current**	0.2	0.2	approx. ma.
Driving Power** ○	2.2	2.3	approx. watts
Power Output	6	7.5	approx. watts

○ At crest of a-f cycle with modulation factor of 1.0

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		500 max.	volts
D-C Grid Voltage		-200 max.	volts
D-C Plate Current		60 max.	ma.
D-C Grid Current		15 max.	ma.
Plate Input		30 max.	watts
Plate Dissipation		13.5 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Grid Voltage ▲△	-150	-190	volts
	10000	12700	ohms
Peak R-F Grid Voltage	260	300	volts
D-C Plate Current	55	55	ma.
D-C Grid Current**	15	15	approx. ma.
Driving Power**	4	4.5	approx. watts
Power Output	14	18	approx. watts

▲ Obtained by grid resistor of value shown, or by combination of grid resistor with either fixed supply or suitably by-passed cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage		600 max.	volts
D-C Grid Voltage		-200 max.	volts
D-C Plate Current		70 max.	ma.
D-C Grid Current		15 max.	ma.
Plate Input		42 max.	watts
Plate Dissipation		20 max.	watts
Typical Operation:			
D-C Plate Voltage	500	600	volts
D-C Grid Voltage ▽△	-125	-150	volts
	8300	10000	ohms
	1560	1875	ohms
Peak R-F Grid Voltage	235	260	volts

**, #, ▽, △: see next page.

→ indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

801-A
R-F POWER AMPLIFIER, A-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

D-C Plate Current	65	65	ma.
D-C Grid Current**	15	15	approx.ma.
Driving Power**	3.5	4	approx.watts
Power Output	20	25	approx.watts

▽ Obtained from fixed supply, by grid resistor (8300, 10000), or by cathode resistor (1560, 1875). When the 801-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 600 volts, a fixed bias of at least 50 volts should be used.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

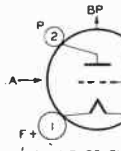
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

△ With a-c filament supply.

For use of the 801 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

For OUTLINE DIMENSIONS, refer to sheet OUTLINES OF RECEIVING TUBES, drawing of ST-16 bulb with 4-pin base.

BOTTOM VIEW OF SOCKET CONNECTIONS

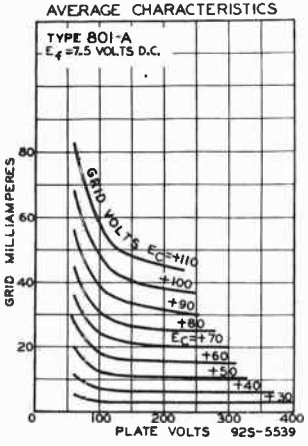


AA'=PLANE OF ELECTRODES

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Plane of plate vertical (on edge).

AVERAGE CHARACTERISTICS

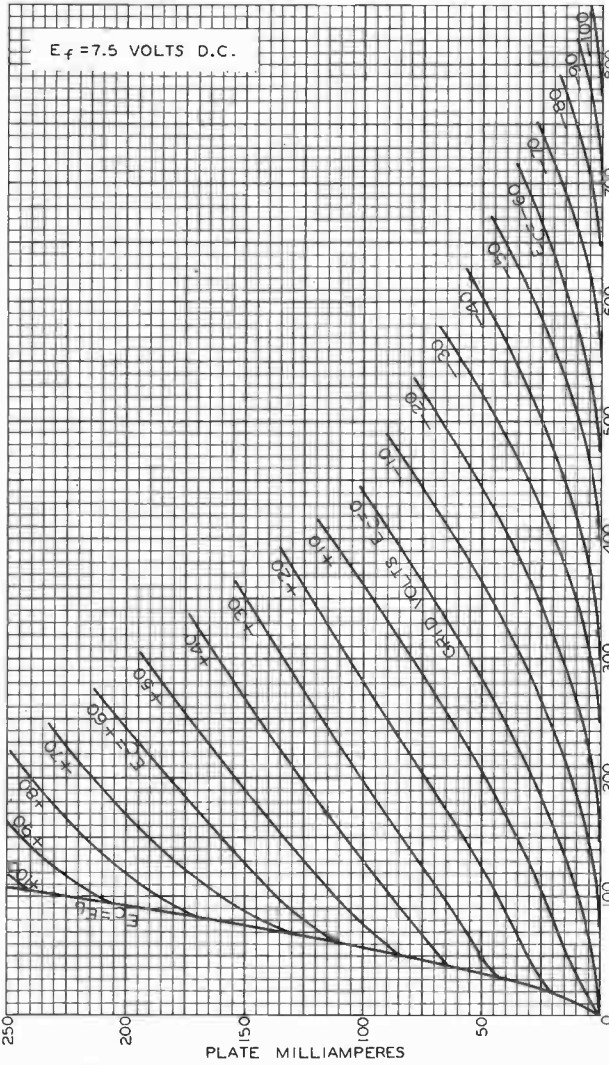


RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

801-A

AVERAGE PLATE CHARACTERISTICS



JULY 18, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92S—5538

World Radio History

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R-F POWER AMPLIFIER PENTODE

Heater©	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.9	amp.
Transconductance for plate current of 20 ma.	2250	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate (With external shielding)	0.15 max.	μμf
Input	12	μμf
Output	8.5	μμf
Maximum Overall Length		5-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 7-Pin Bayonet

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

A-F POWER AMPLIFIER & MODULATOR - Class A

		CCS		ICAS	
D-C Plate Voltage		500 max.		600 max.	volts
D-C Screen Voltage (Grid #2)		250 max.		250 max.	volts
Plate Input		15 max.		18 max.	watts
Screen Input		3 max.		3 max.	watts
Typical Operation:					
D-C Plate Voltage	400	500	500	600	volts
Suppressor (Grid #3)	0*	0*	0*	40	volts
D-C Screen Voltage	250	175	225	250	volts
D-C Grid Volt. (Grid #1)□	-18	-10	-17	-18.5	volts
	450	325	530	490	ohms
Peak A-F Grid Volt.	18	10	17	18.5	volts
Internal Shield*	-	-	-	-	
D-C Plate Current	30	25	25	30	ma.
D-C Screen Current	10	6	7	8	ma.
Load Resistance	10000	18000	16000	13200	ohms
Total Har. Distortion	8	4	10	9	%
Power Output	5.5	4	6.5	7.6	watts

□ Obtained from fixed supply or by cathode resistor of value shown. The d-c resistance in the grid circuit should not exceed 10000 ohms with fixed bias, or 500000 ohms with cathode bias.
* Connected to cathode at socket.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	500 max.	600 max.	volts
D-C Suppressor Volt. (Grid #3)	200 max.	200 max.	volts
D-C Screen Voltage (Grid #2)	250 max.	250 max.	volts
D-C Plate Current	30 max.	30 max.	ma.
Plate Input	15 max.	18 max.	watts

© In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS		ICAS	
Suppressor Input	2 max.		2 max.	watts
Screen Input	4 max.		4 max.	watts
Plate Dissipation	10 max.		13 max.	watts
Typical Operation:				
D-C Plate Voltage	400	500	600	volts
Suppressor *★	–	–	–	
D-C Screen Voltage	150	200	225	volts
D-C Grid Voltage (Grid #1)	-22	-28	-30	volts
Peak R-F Grid Voltage	35	32	35	volts
Internal Shield *	–	–	–	
D-C Plate Current	25	25	30	ma.
D-C Screen Current	6.5	7	8	ma.
D-C Grid Cur. (Approx.)	1	0	0.5	ma.
Driving Power (Approx.) ○	0.5	0.18	0.18	watts
Power Output (Approx.)	2.75	3.5	5.3	watts

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

		CCS		ICAS	
D-C Plate Voltage		500 max.		600 max.	volts
D-C Screen Voltage (Grid #2)		200 max.		250 max.	volts
D-C Grid Voltage (Grid #1)		-200 max.		-200 max.	volts
D-C Plate Current		30 max.		30 max.	ma.
D-C Grid Current		7.5 max.		7.5 max.	ma.
Plate Input		15 max.		18 max.	watts
Screen Input		6 max.		6 max.	watts
Plate Dissipation		10 max.		13 max.	watts
Typical Operation:					
D-C Plate Voltage	400	500	500	600	volts
D-C Sup'r Volt. (Grid #3)	-40	-53	-45	-45	volts
D-C Screen Voltage△	8900	10700	10700	14500	volts
D-C Grid Voltage□	-85	-90	-90	-100	volts
	11000	18000	20000	20000	ohms
Peak A-F Sup'r Volt.	40	53	65	65	volts
Peak R-F Grid Volt.	125	125	125	125	volts
Internal Shield *	–	–	–	–	
D-C Plate Current	18	20	22	30	ma.
D-C Screen Current	28	28	28	24	ma.
D-C Grid Cur. (Approx.)	7.5	5	4.5	5	ma.
Driving Power (Approx.)	0.9	0.6	0.5	0.6	watts
Power Output (Approx.)	2	3	3.5	6.3	watts

△ Voltage taken from unmodulated plate-voltage supply through resistor of value shown.
□ From fixed supply or grid resistor of value shown.

GRID-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	500 max.	600 max.	volts

*, ★, ○: See next page.

World Radio History

RCA

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS		ICAS	
D-C Suppressor Volt. (Grid #3)	200 max.		200 max.	volts
D-C Screen Voltage (Grid #2)	250 max.		250 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.		-200 max.	volts
D-C Plate Current	30 max.		30 max.	ma.
Plate Input	15 max.		18 max.	watts
Suppressor Input	2 max.		2 max.	watts
Screen Input	4 max.		4 max.	watts
Plate Dissipation	10 max.		13 max.	watts
Typical Operation:				
D-C Plate Voltage	400	500	600	volts
Suppressor * ★	–	–	–	
D-C Screen Voltage	150	200	250	volts
D-C Grid Voltage	-105	-130	-130	volts
Peak A-F Grid Voltage	40	50	50	volts
Peak R-F Grid Voltage	125	145	145	volts
Internal Shield *	–	–	–	
D-C Plate Current	25	25	30	ma.
D-C Screen Current	7.5	8	8	ma.
D-C Grid Cur. (Approx.)	2	1	1	ma.
Driving Power (Approx.) o	1	0.8	0.8	watt
Power Output (Approx.)	3	4	6	watts

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Pentode Connection

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	400 max.	500 max.	volts
D-C Suppressor Volt. (Grid #3)	200 max.	200 max.	volts
D-C Screen Voltage (Grid #2)	200 max.	250 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	40 max.	40 max.	ma.
D-C Grid Current	7.5 max.	7.5 max.	ma.
Plate Input	16 max.	20 max.	watts
Suppressor Input	2 max.	2 max.	watts
Screen Input	4 max.	4 max.	watts
Plate Dissipation	6.7 max.	8 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Suppressor Voltage	40	40	volts
D-C Screen Voltage #	195	245	volts
	11500	16300	ohms
D-C Grid Voltage ▲	-40	-40	volts
	27000	27000	ohms
Peak R-F Grid Voltage	55	55	volts

★ Applying a positive voltage of not more than 40 volts to the suppressor gives slightly increased output.
o At crest of a-f cycle with modulation factor of 1.0.
From modulated fixed supply or modulated plate-voltage supply through resistor of value shown.
*, ▲: See next page.

World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS	ICAS	
Internal Shield *	–	–	
D-C Plate Current	35	40	ma.
D-C Screen Current	17	15	ma.
D-C Grid Cur. (Approx.)	1.5	1.5	ma.
Driving Power (Approx.)	0.1	0.1	watt
Power Output (Approx.)	8	12	watts

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Tetrode Connection - Grids #2 & #3 tied together

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	400 max.	500 max.	volts
D-C Screen Volt. (Grids #2 & #3)	200 max.	200 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	40 max.	40 max.	ma.
D-C Grid Current	7.5 max.	7.5 max.	ma.
Plate Input	16 max.	20 max.	watts
Screen Input	6 max.	6 max.	watts
Plate Dissipation	6.7 max.	8 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Screen Voltage△	85	195	volts
	15000	18000	ohms
D-C Grid Voltage ▲	-120	-120	volts
	20000	20000	ohms
Peak R-F Grid Voltage	160	160	volts
Internal Shield *	–	–	
D-C Plate Current	35	40	ma.
D-C Screen Current	21	17	ma.
D-C Grid Current (Approx.)	6	6	ma.
Driving Power (Approx.)	0.9	0.9	watt
Power Output (Approx.)	8	12	watts

△ Preferably from unmodulated plate-voltage supply through resistor of value shown.
▲ Obtained by grid resistor of value shown or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Pentode Connection

*Key-down conditions per tube without modulation **

	CCS	ICAS	
D-C Plate Voltage	500 max.	600 max.	volts
D-C Suppressor Volt. (Grid #3)	200 max.	200 max.	volts
D-C Screen Volt. (Grid #2)	250 max.	250 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	60 max.	60 max.	ma.
D-C Grid Current	7.5 max.	7.5 max.	ma.
Plate Input	25 max.	33 max.	ma.
Suppressor Input	2 max.	2 max.	watts

* Connecteo to cathode at socket.

World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

		CCS		ICAS	
Screen Input		6 max.		6 max.	watts
Plate Dissipation		10 max.		13 max.	watts
Typical Operation:					
D-C Plate Voltage	400	500	500	600	volts
D-C Suppressor Volt.	0	0	40	40	volts
D-C Screen Volt. ♦	200	200	250	250	volts
	8000	13600	20800	22000	ohms
D-C Grid Volt. ¤	-100	-100	-100	-120	volts
	14000	17000	50000	42000	ohms
	1300	1370	1700	1620	ohms
Peak R-F Grid Volt.	155	155	155	165	volts
Internal Shield *	–	–	–	–	
D-C Plate Current	45	45	45	55	ma.
D-C Screen Current	25	22	12	16	ma.
D-C Grid Cur. (Approx.)	7	6	2	2.4	ma.
Driving Power (Approx.)	1.1	0.9	0.25	0.3	watt
Power Output (Approx.)	10	14	16	23	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Tetrode Connection - Grids #2 & #3 tied together
Key-down conditions per tube without modulation#

	CCS		ICAS	
D-C Plate Voltage	500 max.		600 max.	volts
D-C Screen Volt. (Grids #2 & #3)	200 max.		200 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.		-200 max.	volts
D-C Plate Current	60 max.		60 max.	ma.
D-C Grid Current	7.5 max.		7.5 max.	ma.
Plate Input	25 max.		33 max.	watts
Screen Input	6 max.		6 max.	watts
Plate Dissipation	10 max.		13 max.	watts
Typical Operation:				
D-C Plate Voltage	400	500	600	volts
D-C Screen Volt. ♦	100	100	150	volts
	20000	27000	30000	ohms
D-C Grid Volt. ■	-60	-60	-60	volts
	8600	10000	10000	ohms
	1000	1000	860	ohms
Peak R-F Grid Volt.	90	90	90	volts
Internal Shield *	–	–	–	
D-C Plate Current	45	45	55	ma.
D-C Screen Current	15	15	15	ma.
D-C Grid Cur. (Approx.)	7	6	6	ma.
Driving Power (Approx.)	0.7	0.5	0.5	watt
Power Output (Approx.)	10	12	23	watts

■ Obtained by grid resistor (8600, 10000), by cathode resistor (1000, 860), or from fixed supply.
♦ From fixed supply or plate-voltage supply through resistor of value shown. Under key-up conditions, max. screen voltage should not exceed 500 volts. Series screen resistor of value shown should not be used except where the 802 is employed as a buffer amplifier and is not keyed.
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions. * Connected to cathode at socket. ¤ See next page.

World Radio History

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R-F POWER AMPLIFIER PENTODE

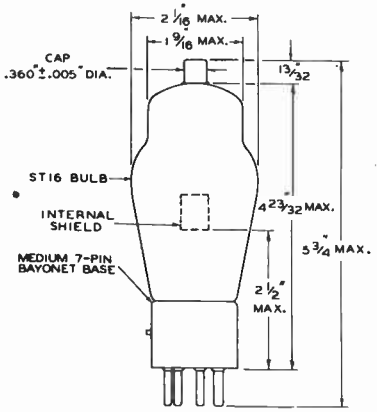
(continued from preceding page)

Obtained from grid resistor (14000, 17000, 50000, 42000), by cathode resistor (1300, 1370, 1700, 1620) or from fixed supply.

HIGH-FREQUENCY OPERATION

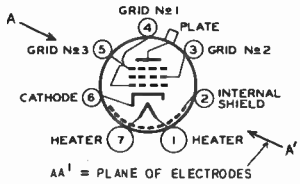
Maximum permissible percentage of maximum rated plate voltage and plate input

FREQUENCY (Mc)		30	55	100
TELEPHONY	Class B	100	88	76
	Class C, Grid-Mod.	100	88	76
	Class C, Sup'r-Mod.	100	88	76
	Class C, Plate-Mod.	100	77	55
TELEGRAPHY - Class C		100	77	55



92C-4364 R5

TOP VIEW OF SOCKET CONNECTIONS



TUBE MOUNTING POSITION
VERTICAL or HORIZONTAL

World Radio History

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AVERAGE PLATE CHARACTERISTICS

E_f = 6.3 VOLTS

D-C SCREEN VOLTS = 250

D-C SUPPRESSOR VOLTS = +40

CONTROL-GRID VOLTS E_{C1} = +100

PLATE VOLTS

0 200 400 600 800 1000 1200

PLATE MILLIAMPERES

0 100 200 300 400 500 600 700

E_{C1} = 0

-20

+20

+40

+60

-80

APRIL 24, 1936

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

92C-4606

World Radio History

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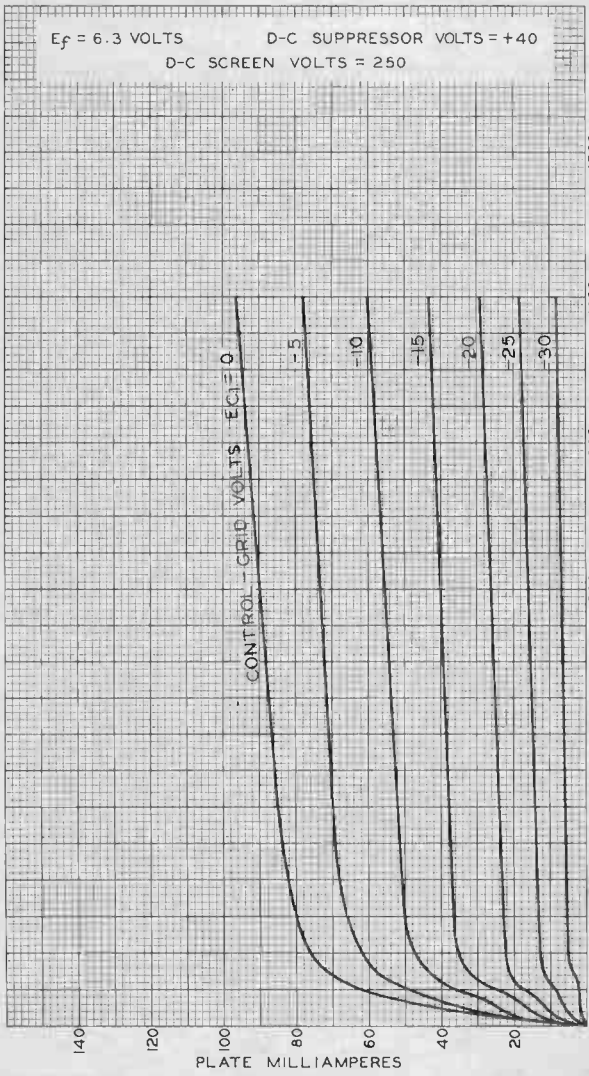
AVERAGE PLATE CHARACTERISTICS



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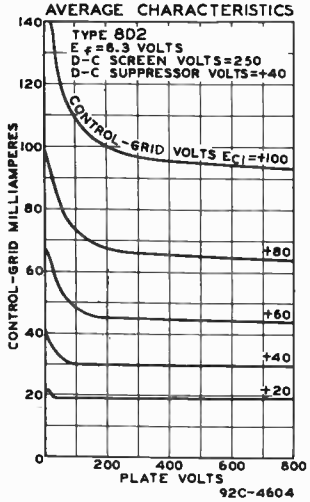
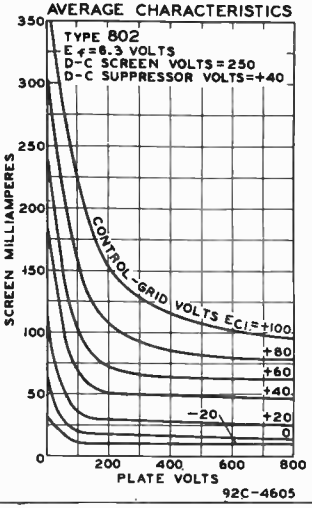
CHARACTERISTICS CURVES





World Radio History

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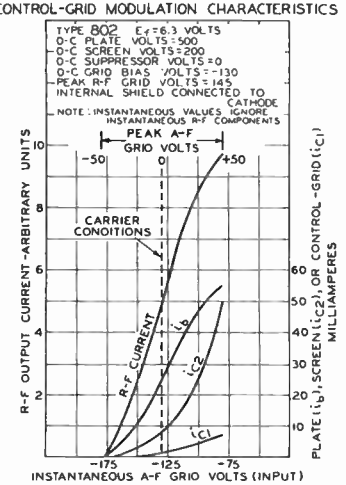
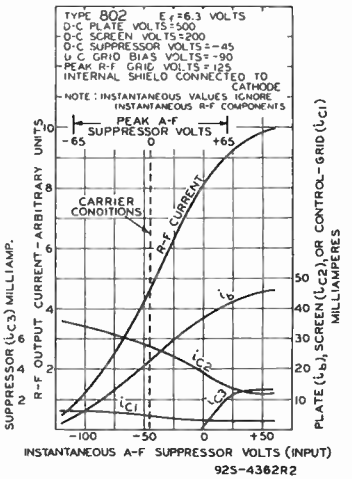
CHARACTERISTICS CURVES

CONTROL-GRID MODULATION CHARACTERISTICS



SUPPRESSOR MODULATION CHARACTERISTICS



World Radio History

RCA

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R-F POWER AMPLIFIER PENTODE

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	5	amp.
Transconductance for plate current of 62.5 ma.	4000	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate (with external shielding)	0.15 max.	μμf
Input	17	μμf
Output	29	μμf
Overall Length		9-1/16" ± 3/16" ←
Seated Height		8-5/16" ± 3/16"
Maximum Diameter		2-9/16"
Bulb		T-20
Cap		Medium
Base	Medium Shell Giant 5-Pin Micanol, Bayonet	←
RCA Socket		Stock No.9927

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2000	max.	volts
D-C Suppressor Voltage (Grid #3)			500	max.	volts
D-C Screen Voltage (Grid #2)			600	max.	volts
D-C Plate Current			160	max.	ma.
Plate Input			180	max.	watts
Suppressor Input			10	max.	watts
Screen Input			20	max.	watts
Plate Dissipation			125	max.	watts
Typical Operation:					
D-C Plate Voltage	1250	1500	2000		volts
D-C Suppressor Voltage	40	40	40		volts
D-C Screen Voltage**	500	550	600		volts
D-C Grid Voltage (Grid #1)●○	-30	-35	-40		volts ←
Peak R-F Grid Voltage	90	70	55		volts
D-C Plate Current	130	110	80		ma.
D-C Screen Current	33	30	20		ma.
D-C Grid Current	8	5	3	approx.	ma.
Driving Power*	4.5	3.0	1.5	approx.	watts
Power Output	52	53	53	approx.	watts

* At crest of a-f cycle with modulation factor of 1.0.

○ For a-c filament supply.

● Obtained from a fixed supply or from suitably by-passed cathode resistor. ←

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	2000	max.	volts
D-C Screen Voltage (Grid #2)	600	max.	volts
D-C Grid Voltage (Grid #1)	-500	max.	volts
D-C Plate Current	110	max.	ma.
D-C Grid Current	50	max.	ma.
Plate Input	180	max.	watts
Screen Input	30	max.	watts

← Indicates a change. **: See end of tabulation.

World Radio History

803

R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

Plate Dissipation			125	max.	watts
Typical Operation:					
D-C Plate Voltage	1250	1500	2000		volts
D-C Suppressor Voltage	-70	-90	-110		volts
D-C Screen Voltage△	13000	17000	35000		ohms
D-C Grid Voltage□	-110	-100	-100		volts
	5000	5000	7000		ohms
Peak A-F Suppressor Volt.	110	130	150		volts
Peak R-F Grid Voltage	200	190	170		volts
D-C Plate Current	100	100	80		ma.
D-C Screen Current	70	70	48		ma.
D-C Grid Current	22	20	15	approx.	ma.
Driving Power	4	3.5	2.5	approx.	watts
Power Output	40	50	53	approx.	watts

△ Voltage taken from unmodulated plate-voltage supply through resistor.

□ From fixed supply, grid resistor (5000, 5000, 7000), or cathode resistor.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2000	max.	volts
D-C Suppressor Voltage (Grid #3)			500	max.	volts
D-C Screen Voltage (Grid #2)			600	max.	volts
D-C Grid Voltage (Grid #1)			-500	max.	volts
D-C Plate Current			160	max.	ma.
Plate Input			180	max.	watts
Suppressor Input			10	max.	watts
Screen Input			20	max.	watts
Plate Dissipation			125	max.	watts
Typical Operation:					
D-C Plate Voltage	1250	1500	2000		volts
D-C Suppressor Voltage	40	40	40		volts
D-C Screen Voltage**	500	550	600		volts
D-C Grid Voltage	-100	-90	-80		volts
Peak R-F Grid Voltage	160	130	100		volts
Peak A-F Grid Voltage	75	65	50		volts
D-C Plate Current	130	110	80		ma.
D-C Screen Current	30	25	20		ma.
D-C Grid Current	8	6	4	approx.	ma.
Driving Power*	4	3	2	approx.	watts
Power Output	52	53	53	approx.	watts

* At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Pentode Connection

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	1600	max.	volts
D-C Suppressor Voltage (Grid #3)	500	max.	volts
D-C Screen Voltage (Grid #2)	500	max.	volts
D-C Grid Voltage (Grid #1)	-500	max.	volts
D-C Plate Current	160	max.	ma.
D-C Grid Current	50	max.	ma.

** See end of tabulation. ◄ Indicates a change.

World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

Plate Input		250 max.	watts
Suppressor Input		10 max.	watts
Screen Input		20 max.	watts
Plate Dissipation		85 max.	watts
Typical Operation:			
D-C Plate Voltage	1250	1600	volts
D-C Suppressor Voltage	100	100	volts
D-C Screen Voltage #	18000	27000	ohms
	350	400	volts
D-C Grid Voltage ▲	-80	-80	volts
	4000	4000	ohms
Peak R-F Grid Voltage	200	190	volts
D-C Plate Current	150	150	ma.
D-C Screen Current	50	45	ma.
D-C Grid Current	30	25 approx.	ma.
Driving Power	6	5 approx.	watts
Power Output	120	155 approx.	watts

\# From modulated fixed supply or modulated plate-voltage supply through resistor.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Tetrode Connection - Grids #2 & #3 tied together

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1600 max.	volts
D-C Screen Voltage (Grids #2 & #3)		500 max.	volts
D-C Grid Voltage (Grid #1)		-500 max.	volts
D-C Plate Current		160 max.	ma.
D-C Grid Current		50 max.	ma.
Plate Input		250 max.	watts
Screen Input		30 max.	watts
Plate Dissipation		85 max.	watts
Typical Operation:			
D-C Plate Voltage	1250	1600	volts
D-C Screen Voltage ##	15000	20000	ohms
	130	130	volts
D-C Grid Voltage ▲	-180	-180	volts
	4000	4000	ohms
Peak R-F Grid Voltage	305	320	volts
D-C Plate Current	150	150	ma.
D-C Screen Current	75	75	ma.
D-C Grid Current	45	45 approx.	ma.
Driving Power	15	15 approx.	watts
Power Output	125	155 approx.	watts

\## Preferably from unmodulated plate-voltage supply through resistor.

▲ Obtained from grid resistor of value shown, or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Pentode Connection

Key-down conditions per tube without modulation§

D-C Plate Voltage	2000 max.	volts
D-C Suppressor Voltage (Grid #3)	500 max.	volts

§ See next page.

← indicates a change.

World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

D-C Screen Voltage (Grid #2)			600 max.	volts
D-C Grid Voltage (Grid #1)			-500 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			50 max.	ma.
Plate Input			350 max.	watts
Suppressor Input			10 max.	watts
Screen Input			30 max.	watts
Plate Dissipation			125 max.	watts
Typical Operation:				
D-C Plate Voltage	1250	1500	2000	volts
D-C Suppressor Voltage	40	40	40	volts
D-C Screen Voltage ♦	500	500	500	volts
D-C Grid Voltage ■	-90	-90	-90	volts
	415	415	415	ohms
	7500	7500	7500	ohms
Peak R-F Grid Voltage	175	175	175	volts
D-C Plate Current	160	160	160	ma.
D-C Screen Current	45	45	45	ma.
D-C Grid Current	12	12	12	approx.ma.
Driving Power	2	2	2	approx.watts
Power Output	130	160	210	approx.watts

■ Obtained from fixed supply, cathode resistor (415), by grid resistor (7500), or by combination methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Tetrode Connection - Grids #2 & #3 tied together

Key-down conditions per tube without modulation§

D-C Plate Voltage			2000 max.	volts
D-C Screen Voltage (Grids #2 & #3)			600 max.	volts
D-C Grid Voltage (Grid #1)			-500 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			50 max.	ma.
Plate Input			350 max.	watts
Screen Input			30 max.	watts
Plate Dissipation			125 max.	watts
Typical Operation:				
D-C Plate Voltage	1250	1500	2000	volts
D-C Screen Voltage ♦	150	150	150	volts
D-C Grid Voltage ⊕	-90	-90	-90	volts
	445	445	445	ohms
	3500	3500	3500	ohms
Peak R-F Grid Voltage	190	190	190	volts
D-C Plate Current	160	160	160	ma.
D-C Screen Current	15	15	15	ma.
D-C Grid Current	28	27	26	approx.ma.
Driving Power	4.6	4.4	4.4	approx.watts
Power Output	130	160	210	approx.watts

♦ Use of series resistor is not recommended.

⊕ Obtained from fixed supply, cathode resistor (445), by grid resistor (3500), or by combination methods.

← Indicates a change. §, **: See next page.

World Radio History

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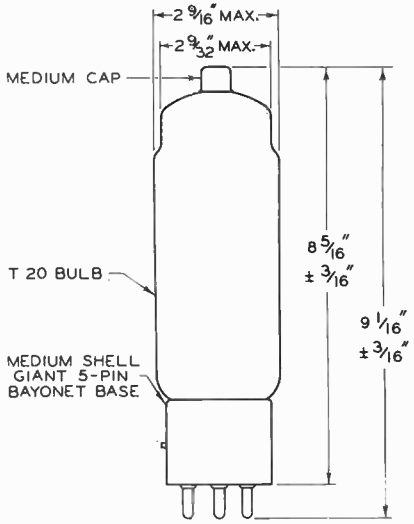
R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

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

** Preferably obtained from a separate source, or from the plate-voltage supply with a voltage divider.

Data on operating frequencies for the 803 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

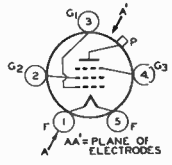


TUBE MOUNTING POSITION

VERTICAL: Base up or down.

92CM-4424R3

BOTTOM VIEW OF SOCKET CONNECTIONS



Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1
Pin 4 - Grid No.3
Pin 5 - Filament
Cap - Plate

5J

← Indicates a change.

World Radio History

R-F POWER AMPLIFIER PENTODE

AUG. 15, 1944 RCA VICTOR DIVISION 92CM-4519T2, 4426T1, & 4425T1
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

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AVERAGE PLATE CHARACTERISTICS

MAR. 8, 1937

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC

92C-4749

World Radio History

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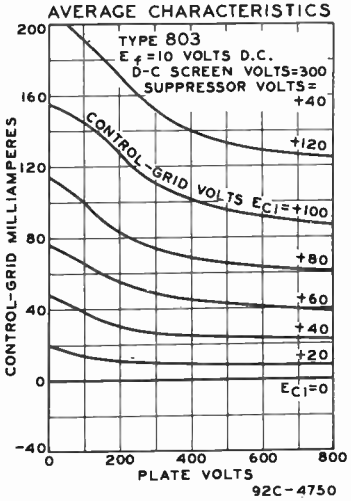
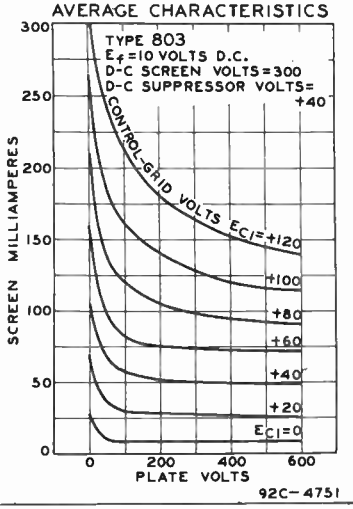
CHARACTERISTICS CURVES





RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

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R-F POWER AMPLIFIER PENTODE

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	3.0	amp.
Transconductance for plate current of 32 ma.	3250	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate (with external shielding)	0.01 max.	μμf
Input	16	μμf
Output	14.5	μμf
Maximum Overall Length		7-3/4"
Maximum Diameter		2-1/16"
Bulb		T-16
Cap		Small Metal
Base	Medium 5-Pin, "Micanol"	

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

			CCS	ICAS	
D-C Plate Voltage			1250 max.	1500 max.	volts
D-C Suppressor Volt. (Grid #3)			200 max.	200 max.	volts
D-C Screen Voltage (Grid #2)			300 max.	300 max.	volts
D-C Plate Current			50 max.	50 max.	ma.
Plate Input			60 max.	75 max.	watts
Suppressor Input			5 max.	5 max.	watts
Screen Input			10 max.	10 max.	watts
Plate Dissipation			40 max.	50 max.	watts
Typical Operation:					
Filament Volt.	7.5	7.5	7.5	7.5	a-c volts
D-C Plate Volt.	1000	1000	1250	1500	volts
D-C Suppressor Volt.	0	45	45	45	volts
D-C Screen Volt.	300	300	300	300	volts
D-C Grid Volt. (Grid #1)	-20	-20	-20	-26	volts
Peak R-F Grid Volt.	30	30	27	40	volts
D-C Plate Current	45	45	45	50	ma.
D-C Screen Current	12	11.5	11	12	ma.
D-C Grid Cur. (Approx.)	1	1	1	1.5	ma.
Driving Power (Approx.)°	0.35	0.3	0.25	0.5	watt
Power Output (Approx.)	11	12	16	28	watts

° At crest of a-f cycle with a modulation factor of 1.0.

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	1250 max.	1500 max.	volts
D-C Screen Volt. (Grid #2)	300 max.	300 max.	volts
D-C Grid Voltage (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	50 max.	50 max.	ma.

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RCA MANUFACTURING COMPANY, INC.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS		ICAS		
D-C Grid Current	15 max.		15 max.		ma.
Plate Input	60 max.		75 max.		watts
Screen Input	15 max.		15 max.		watts
Plate Dissipation	40 max.		50 max.		watts
Typical Operation:					
Filament Voltage	7.5	7.5	7.5	a-c	volts
D-C Plate Voltage	1000	1250	1500		volts
D-C Sup'r Volt. (Grid #3)	-35	-50	-50		volts
D-C Screen Volt. ●	21000	27000	37500		ohms
D-C Grid Voltage □	-100	-100	-115		volts
	18200	14300	16400		ohms
Peak A-F Sup'r Volt.	60	70	75		volts
Peak R-F Grid Volt.	140	140	150		volts
D-C Plate Current	45	48	50		volts
D-C Screen Current	33.5	35.5	32		volts
D-C Grid Cur. (Approx.)	5.5	7	7		ma.
Driving Power (Approx.)	0.7	0.85	0.95		watts
Power Output (Approx.)	16	21	28		watts

● From unmodulated plate-voltage supply through resistor of value shown.
□ From fixed supply or grid resistor of value shown.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS		ICAS		
D-C Plate Voltage	1250 max.		1500 max.		volts
D-C Suppressor Volt. (Grid #3)	200 max.		200 max.		volts
D-C Screen Voltage (Grid #2)	300 max.		300 max.		volts
D-C Grid Voltage (Grid #1)	-300 max.		-300 max.		volts
D-C Plate Current	50 max.		50 max.		ma.
Plate Input	60 max.		75 max.		watts
Suppressor Input	5 max.		5 max.		watts
Screen Input	10 max.		10 max.		watts
Plate Dissipation	40 max.		50 max.		watts
Typical Operation:					
Filament Voltage	7.5	7.5	7.5	a-c	volts
D-C Plate Voltage	1000	1000	1250	1500	volts
D-C Suppressor Volt.	0	45	45	45	volts
D-C Screen Volt.	300	300	300	300	volts
D-C Grid Volt.	-115	-115	-115	-130	volts
Peak R-F Grid Volt.	140	135	135	140	volts
Peak A-F Grid Volt.	35	35	35	40	volts
D-C Plate Current	45	45	45	50	ma.
D-C Screen Current	15	11	11	13.5	ma.
D-C Grid Cur. (Approx.)	2	2	2	3.7	ma.
Driving Power (Approx.) *	1.1	0.85	0.85	1.3	watts
Power Output (Approx.)	14	16	21	28	watts

* At crest of a-f cycle with a modulation factor of 1.0.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Pentode Connection

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	1000 max.	1250 max.	volts
D-C Suppressor Volt. (Grid #3)	200 max.	200 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	300 max.	volts
D-C Grid Voltage (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	80 max.	80 max.	ma.
D-C Grid Current	15 max.	15 max.	ma.
Plate Input	80 max.	100 max.	watts
Suppressor Input	5 max.	5 max.	watts
Screen Input	10 max.	10 max.	watts
Plate Dissipation	27 max.	35 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5 a-c	volts
D-C Plate Voltage	1000	1250	volts
D-C Suppressor Voltage	50	50	volts
D-C Screen Voltage oo	220	250	volts
	37000	50000	ohms
D-C Grid Voltage ▲	-90	-90	volts
	15000	15000	ohms
Peak R-F Grid Voltage	130	140	volts
D-C Plate Current	75	75	ma.
D-C Screen Current	21	20	ma.
D-C Grid Cur. (Approx.)	6	6	ma.
Driving Power (Approx.)	0.65	0.75	watt
Power Output (Approx.)	50	65	watts

oo From modulated fixed supply or modulated plate-voltage supply through resistor of value shown.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Tetrode Connection - Grids #2 & #3 tied together

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	1000 max.	1250 max.	volts
D-C Screen Volt. (Grids #2 & #3)	200 max.	200 max.	volts
D-C Grid Voltage (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	80 max.	80 max.	ma.
D-C Grid Current	15 max.	15 max.	ma.
Plate Input	80 max.	100 max.	watts
Screen Input	15 max.	15 max.	watts
Plate Dissipation	27 max.	35 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5 a-c	volts
D-C Plate Voltage	1000	1250	volts
D-C Screen Voltage #	155	170	volts
	30000	45000	ohms

Preferably from unmodulated plate-voltage supply through resistor of value shown.

▲ See next page.

World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS	ICAS	
D-C Grid Voltage ▲	−80	−80	volts
	10000	10000	ohms
Peak R-F Grid Volt.	145	145	volts
D-C Plate Current	75	75	ma.
D-C Screen Current	28	24	ma.
D-C Grid Cur. (Approx.)	8	8	ma.
Driving Power (Approx.)	1.1	1.1	watts
Power Output (Approx.)	50	65	watts

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Pentode Connection

Key-down conditions per tube without modulation##

		CCS			ICAS	
D-C Plate Voltage		1250 max.			1500 max.	volts
D-C Suppressor Volt. (Grid #3)		200 max.			200 max.	volts
D-C Screen Volt. (Grid #2)		300 max.			300 max.	volts
D-C Grid Voltage (Grid #1)		−300 max.			−300 max.	volts
D-C Plate Current		95 max.			100 max.	ma.
D-C Grid Current		15 max.			15 max.	ma.
Plate Input		120 max.			150 max.	watts
Suppressor Input		5 max.			5 max.	watts
Screen Input		15 max.			15 max.	watts
Plate Dissipation		40 max.			50 max.	watts
Typical Operation:						
Filament Voltage	7.5	7.5	7.5	7.5		a-c volts
D-C Plate Voltage	1000	1250	1250	1500		volts
D-C Sup'r Voltage	45	0	45	45		volts
D-C Screen Volt. ♦	300	300	300	300		volts
	24000	28800	35200	34000		ohms
D-C Grid Volt. ■	−100	−100	−100	−100		volts
	14300	14300	14300	14300		ohms
Peak R-F Grid Volt.	150	145	150	180		volts
D-C Plate Current	92	80	92	100		ma.
D-C Screen Current	29	33	27	35		ma.
D-C Grid Cur. (Approx.)	7	7	7	7		ma.
Driving Power (Approx.)	0.95	0.9	0.95	1.95		watts
Power Output (Approx.)	60	64	80	110		watts

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Tetrode Connection – Grids #2 & #3 tied together

Key-down conditions per tube without modulation##

	CCS	ICAS	
D-C Plate Voltage	1250 max.	1500 max.	volts
D-C Screen Volt. (Grids #2 & #3)	200 max.	200 max.	volts

▲ Obtained by grid resistor of value shown or by partial self-bias methods.

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

♦, ■; See next page.

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RCA MANUFACTURING COMPANY, INC.

World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

	CCS	ICAS	
D-C Grid Volt (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	95 max.	100 max.	ma.
D-C Grid Current	15 max.	15 max.	ma.
Plate Input	120 max.	150 max.	watts
Screen Input	15 max.	15 max.	watts
Plate Dissipation	40 max.	50 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	1250	1500	volts
D-C Screen Voltage ♦	180	200	volts
	46700	43500	ohms
D-C Grid Voltage ■	-100	-100	volts
	12500	7700	ohms
Peak R-F Grid Voltage	160	190	volts
D-C Plate Current	92	100	ma.
D-C Screen Current	23	30	ma.
D-C Grid Cur. (Approx.)	8	12	ma.
Driving Power (Approx.)	1.2	2.2	watts
Power Output (Approx.)	80	110	watts

♦ From fixed supply of value shown. Regulation of fixed supply should be adequate to limit the screen voltage, under key-up conditions, to 600 volts. Series screen resistor of value shown should not be used except where the 804 is employed as a buffer amplifier and is not keyed.

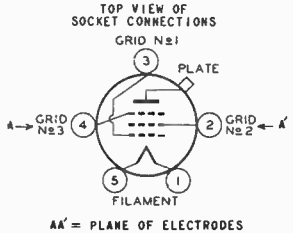
■ Obtained by grid resistor of value shown or by other self- or fixed-bias method.

For the 804 as a crystal-controlled oscillator, typical operating conditions are: d-c plate volts, 1250; d-c suppressor volts, 0; d-c screen volts, 300; grid resistor, 30000 ohms; d-c plate ma., 42; and d-c screen ma., 24.

HIGH-FREQUENCY OPERATION

Maximum permissible percentage of maximum rated plate voltage and plate input

FREQUENCY (MC)		15	35	80
TELEPHONY	Class C	100	88	76
	Class C, Grid-Mod.	100	88	76
	Class C, Sup'r-Mod.	100	88	76
	Class C, Plate-Mod.	100	75	50
TELEGRAPHY - Class C		100	75	50



AA' = PLANE OF ELECTRODES

OUTLINE DIMENSIONS of the 804 are the same as those for the 814.

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Plane of electrodes vertical.

World Radio History

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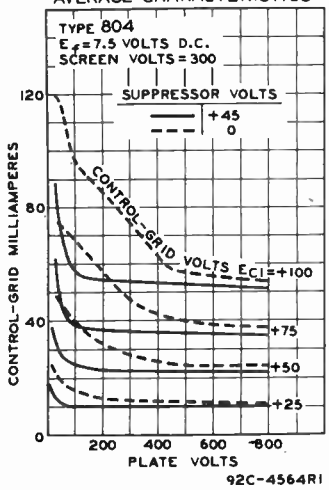
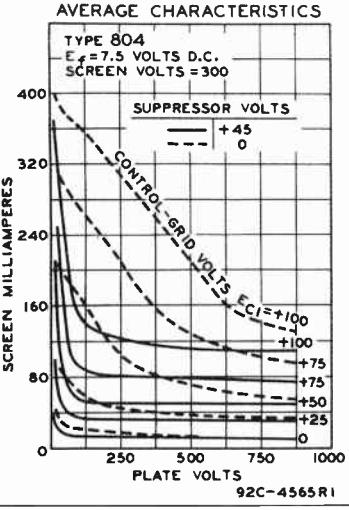
R-F POWER AMPLIFIER PENTODE





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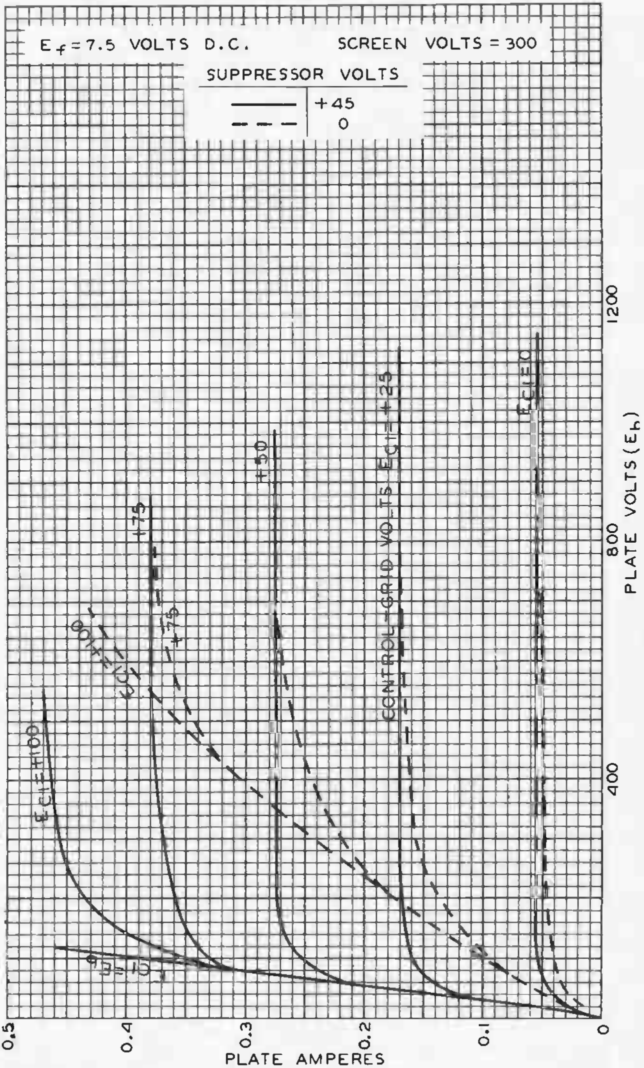
AVERAGE PLATE CHARACTERISTICS



DEC. 6, 1939

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4562R1

804

R-F POWER AMPLIFIER PENTODE

804

FEB. 2, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4567, 4568 & 4569R1

GRID MODULATION CHARACTERISTICS

TYPE 804
Ef = 7.5 VOLTS A.C.
D-C PLATE VOLTS = 1250
D-C SCREEN VOLTS = 300
D-C SUPPRESSOR VOLTS = +45
D-C GRID BIAS VOLTS = -115
PEAK R-F GRID VOLTS = 135

SUPPRESSOR MODULATION CHARACTERISTICS

TYPE 804 Ef = 7.5 VOLTS A.C.
D-C PLATE VOLTS = 1250
D-C SCREEN VOLTS = 1250 MINUS DROP IN SERIES SCREEN RESISTOR OF 27000 OHMS
D-C SUPPRESSOR VOLTS = -50
D-C GRID BIAS VOLTS = -100
PEAK R-F GRID VOLTS = 140
NOTE: INSTANTANEOUS VALUES IGNORE INSTANTANEOUS R-F COMPONENTS

OPERATION CHARACTERISTICS
CLASS B R-F AMPLIFIER

TYPE 804 Ef = 7.5 VOLTS A.C.
D-C PLATE VOLTS = 1250
D-C SCREEN VOLTS = 300
D-C SUPPRESSOR VOLTS = +45
D-C GRID BIAS VOLTS = -20

World Radio History

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R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	6.5	μμf
Grid to Filament	8.5	μμf
Plate to Filament	10.5	μμf
Maximum Overall Length		8-1/2"
Maximum Diameter		2-5/16"
Bulb		T-18
Cap		Medium Metal
Base		Jumbo 4-Large Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage	1500 max.	volts
Max-Signal D-C Plate Current *	210 max.	ma.
Max-Signal Plate Input *	315 max.	watts
Plate Dissipation *	125 max.	watts

Typical Operation - 2 tubes:

Unless otherwise specified, values are for 2 tubes.

Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1250	1500	volts
D-C Grid Voltage	0	-16	volts
Peak A-F Grid-to-Grid Voltage	235	280	volts
Zero-Sig. D-C Plate Current	148	84	ma.
Max-Sig. D-C Plate Current	400	400	ma.
Load Resistance (per tube)	1675	2050	ohms
Effective Load Res.(plate to plate)	6700	8200	ohms
Max-Signal Driving Power	6	7	approx. watts
Max-Signal Power Output	300 **	370#	approx. watts

* Averaged over any audio-frequency cycle.

** With 4% harmonic distortion approx.

\# With 3% harmonic distortion approx.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	1500 max.	volts
D-C Plate Current	150 max.	ma.
Plate Input	185 max.	watts
Plate Dissipation	125 max.	watts

Typical Operation:

Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1250	1500	volts
D-C Grid Voltage	0	-10	volts
Peak R-F Grid Voltage	75	70	volts
D-C Plate Current	135	115	ma.
D-C Grid Current **	15	15	approx. ma.
Driving Power ** ○	11	7.5	approx. watts
Power Output	55	57.5	approx. watts

○ At crest of a-f cycle with modulation factor of 1.0.

** See next page.

(continued on next page)

World Radio History

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R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			1250 max.	volts
D-C Grid Voltage			-500 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			70 max.	ma.
Plate Input			220 max.	watts
Plate Dissipation			85 max.	watts
Typical Operation:				
Filament Voltage	10	10	a-c	volts
D-C Plate Voltage	1000	1250		volts
D-C Grid Voltage	-155	-160		volts
Peak R-F Grid Voltage	295	300		volts
D-C Plate Current	160	160		ma.
D-C Grid Current **	60	60	approx.	ma.
Driving Power **	16	16	approx.	watts
Power Output	110	140	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			1500 max.		volts
D-C Grid Voltage			-500 max.		volts
D-C Plate Current			210 max.		ma.
D-C Grid Current			70 max.		ma.
Plate Input			315 max.		watts
Plate Dissipation			125 max.		watts
Typical Operation:					
Filament Voltage	10	10	10	a-c	volts
D-C Plate Voltage	1000	1250	1500		volts
D-C Grid Voltage	-95	-100	-105		volts
Peak R-F Grid Voltage	225	230	235		volts
D-C Plate Current	200	200	200		ma.
D-C Grid Current **	40	40	40	approx.	ma.
Driving Power **	8.5	8.5	8.5	approx.	watts
Power Output	130	170	215	approx.	watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

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

For use of the 805 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

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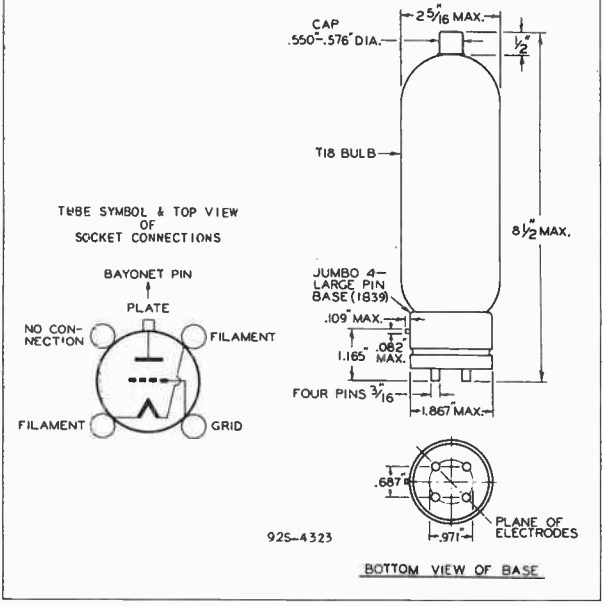
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)



FOR PLATE FAMILY, REFER TO CURVE 92C-4404 UNDER TYPE 838.

←Indicates a change

World Radio History

805

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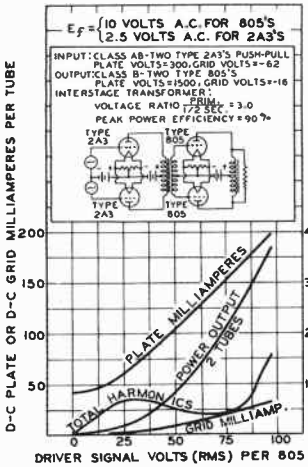
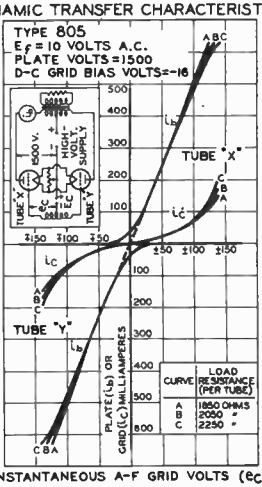
R-F POWER AMPLIFIER, OSCILLATOR CLASS B MODULATOR

OPERATION CHARACTERISTICS



92C-4570R1

DYNAMIC TRANSFER CHARACTERISTICS



92C-4571R1

APRIL 5, 1937

92C-4570R1 & 4571R1

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

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R-F POWER AMPLIFIER, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	5.0	a-c or d-c volts
Current	9.5	amp. ←
Amplification Factor	12.6	
Direct Interelectrode Capacitances:		←
Grid to Plate	4.0	μμf
Grid to Filament	5.5	μμf
Plate to Filament	0.4	μμf
Maximum Overall Length		10"
Maximum Diameter		3-13/16"
Bulb		GT-30
Cap (Top)		Skirted Medium
Cap (Side)		Saddle Medium
Base		Jumbo 4-Pin
RCA Socket		Stock No. 9936 ←

Cooling—Forced ventilation from fan directed at middle and upper portions of bulb is required for continuous key-down conditions in class C telegraph service and is recommended for other services at frequencies of 30 Mc or higher.

Maximum Ratings Are Absolute Values

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

A-F POWER AMPLIFIER & MODULATOR - Class B

	CCS	ICAS	
D-C Plate Voltage	3000 max.	3300 max.	volts
Max.-Sig. D-C Plate Cur.[oo]	200 max.	250 max.	ma.
Max.-Sig. Plate Input[oo]	500 max.	825 max.	watts ←
Plate Dissipation[oo]	150 max.	225 max.	watts

Typical Operation:
Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	2000	3000	3300	volts
D-C Grid Voltage	-140	-230	-240	volts
Peak A-F Grid-to-Grid Volt.	660	770	930	volts
Zero-Sig. D-C Plate Cur.	80	50	80	ma.
Max.-Sig. D-C Plate Cur.	390	330	475	ma.
Load Res. (per tube)	4500	5200	4000	ohms
Effective Load Res. (plate to plate)	18000	20800	16000	ohms
Max.-Sig. Driving Power (Approx.)	19	15	35	watts
Max.-Sig. Power Output (Approx.)	535	700	1120	watts

[oo] Averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	3000 max.	3300 max.	volts
D-C Plate Current	150 max.	150 max.	ma.
Plate Input	225 max.	338 max.	watts

← Indicates a change.

World Radio History

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R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

	CCS		ICAS	
Plate Dissipation	150 max.		225 max.	watts
Typical Operation:				
D-C Plate Voltage	2000	3000	3300	volts
D-C Grid Voltage	-150	-240	-280	volts
Peak R-F Grid Voltage	180	200	290	volts
D-C Plate Current	110	70	102	ma.
D-C Grid Cur. (Approx.)**	1	0	0	ma.
Driving Power (Approx.)**,°	8	5	10.3	watts
Power Output (Approx.)	70	70	115	watts

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS		ICAS	
D-C Plate Voltage	2500 max.		3000 max.	volts
D-C Grid Voltage	-1000 max.		-1000 max.	volts
D-C Plate Current	200 max.		200 max.	ma.
D-C Grid Current	50 max.		50 max.	ma.
Plate Input	500 max.		600 max.	watts
Plate Dissipation	110 max.		150 max.	watts
Typical Operation:				
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage §	-500	-600	-670	volts
	12500	15000	25000	ohms
Peak R-F Grid Volt.	790	890	970	volts
D-C Plate Current	195	195	195	ma.
D-C Grid Cur. (Approx.)**	40	40	27	ma.
Driving Power (Approx.)**	28	32	24	watts
Power Output (Approx.)	300	390	460	watts

§ Obtained by grid resistor of value shown or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy□

Key-down conditions per tube without modulation##

	CCS			ICAS	
D-C Plate Voltage	3000 max.			3300 max.	volts
D-C Grid Voltage	-1000 max.			-1000 max.	volts
D-C Plate Current	200 max.			305 max.	ma.
D-C Grid Current	50 max.			50 max.	ma.
Plate Input	600 max.			1000 max.	watts
Plate Dissipation	150 max.			225 max.	watts
Typical Operation:					
D-C Plate Volt.	2000	2500	3000	3300	volts
D-C Grid Volt.★	-400	-500	-600	-600	volts
	16000	20000	24000	15000	ohms
	1800	2300	2700	1730	ohms

□ See "Cooling" under this type.

** See next page.

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

→ indicates a change.

★ Obtained by grid resistor (16000, 20000, 24000, 12800), by cathode resistor (1800, 2300, 2700, 1730), or from fixed-bias source.

World Radio History

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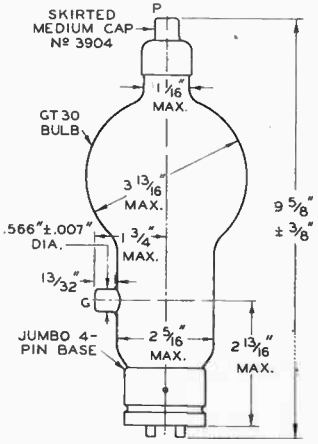
R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

	ecs			ICAS	
Peak R-F Grid Volt.	640	755	870	930	volts
D-C Plate Current	195	195	195	300	ma.
D-C Grid Cur. (Approx.)**	25	25	25	40	ma.
Driving Power (Approx.)**	15	17	20	34	watts
Power Output (Approx.)	280	370	450	780	watts

** Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

Data on operating frequencies for the 806 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

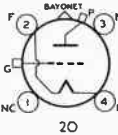


TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

92CM-4681R3

BOTTOM VIEW OF SOCKET CONNECTIONS



20

F - FILAMENT
G - GRID
NC - NO CONNECTION
P - PLATE

← Indicates a change.

World Radio History

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AVERAGE PLATE CHARACTERISTICS

806

DEC. 1, 1943

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-4690

$E_f = 5.0$ VOLTS D.C.

PLATE AMPERES

PLATE VOLTS (E_b)

GRID VOLTS E_c

$E_c = E_b$

+300

+270

+240

+210

+180

E_c = +150

+120

+90

+60

+30

0

−30

−60

−90

−120

E_c = −150

−180

−210

World Radio History

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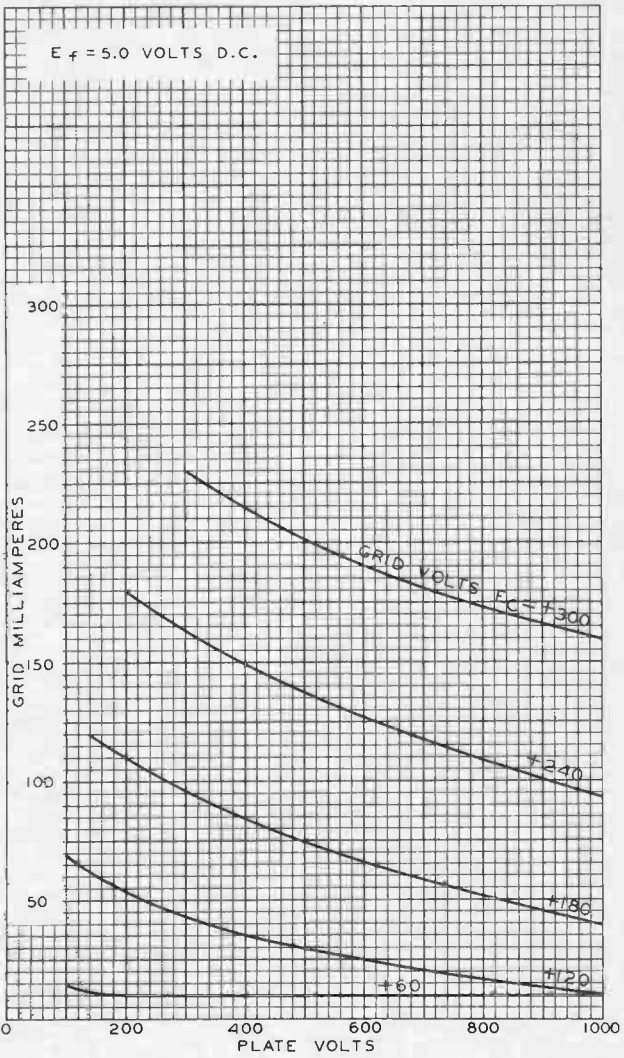
TYPICAL CHARACTERISTICS



World Radio History

RCA

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BEAM POWER TUBE

Useful at Frequencies up to 125 Mc

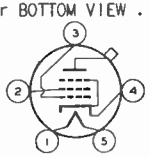
GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 0.6	ac or dc volts
Current	0.9	amp
Transconductance (Approx.) for plate volts = 250, grid-No.2 volts = 250, grid-No.1 volts = -14	6000	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 250, grid-No.2 volts = 250, and grid-No.1 volts = -20	8	
Direct Interelectrode Capacitances:		
Grid No.1 to plate[o]	0.2 max.	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	12	μμf
Plate to cathode & grid No.3, grid No.2, and heater	7	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	5-3/4"
Seated Length	4-31/32" ± 5/32"
Maximum Diameter	2-1/16"
Weight (Approx.)	3 oz
Bulb	ST-16
Cap.	Small (JETEC No.C1-1)
Base . . . Medium-Micanol-Shell Small 5-Pin (JETEC No.A5-11)	
Basing Designation for BOTTOM VIEW	5AW



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

AF POWER AMPLIFIER & MODULATOR - Class AB_1♦

Triode Connection--Grid No.2 Connected to Plate

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	125 max.	125 max.	ma
MAX.-SIGNAL DC PLATE PLUS GRID-No.2 INPUT*	50 max.	50 max.	watts
PLATE DISSIPATION PLUS GRID-No.2 INPUT*	25 max.	30 max.	watts

[o] With external shield JETEC No.312.

♦, ●, ●●, *: See next page.

→← Indicates a change.

World Radio History

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BEAM POWER TUBE

	CCS●	ICAS●●	
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
Typical Operation:⊕	CCS●	ICAS●●	
Values are for 2 tubes			
DC Plate Voltage	400	400	volts
DC Grid-No.1 (Control-Grid) Voltage.	-45	-45	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage⊕⊕.	90	90	volts
→ Zero-Signal DC Plate Current .	64	64	ma
Max.-Signal DC Plate Current .	140	140	ma
Effective Load Resistance (Plate to Plate)	3000	3000	ohms
Max.-Signal Driving Power (Approx.).	0	0	watts
Max.-Signal Power Output (Approx.).	15	15	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:○○

With fixed bias.	0.1 max. megohm
With cathode bias.	0.5 max. megohm

AF POWER AMPLIFIER & MODULATOR - Class AB_1♦

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	300 max.	300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	120 max.	120 max.	ma
MAX.-SIGNAL DC PLATE INPUT*. .	60 max.	90 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT* .	3.5 max.	3.5 max.	watts
PLATE DISSIPATION*	25 max.	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

♦ Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

⊕ In class AB_1 service, the normal design limitation is the requirement that grid-No.1 current should not flow. For this reason, the typical operating values shown for both CCS and ICAS conditions are the same.

⊕⊕ The driver stage should be capable of supplying the No.1 grids of the class AB_1 stage with the specified driving voltage at low distortion.

●, ●●, *, ○○: See next page.

→ Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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BEAM POWER TUBE

Typical Operation:	CCS●			ICAS●●	
Values are for 2 tubes					
DC Plate Voltage	400	500	600	750	volts
DC Grid-No.2 Voltage**	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage:					
From fixed-bias source	-30	-32	-34	-35	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	60	64	68	70	volts
Zero-Signal DC Plate Current	56	44	36	30	ma
Max.-Signal DC Plate Current	143	141	139	139	ma
Zero-Signal DC Grid-No.2 Current	2	1	0.6	0.5	ma
Max.-Signal DC Grid-No.2 Current	16	15	15	16	ma
Effective Load Resistance (Plate to plate)	6800	8200	10000	12000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	0	watts
Max.-Signal Power Output (Approx.)	36	46	56	72	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:○○
- With fixed bias. . . . . 0.1 max. megohm
- With cathode bias. . . . . Not recommended

AF POWER AMPLIFIER & MODULATOR - Class AB_2#

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	120 max.	120 max.	ma
MAX.-SIGNAL PLATE INPUT*	60 max.	90 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	3.5 max.	3.5 max.	watts
PLATE DISSIPATION*	25 max.	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

\# Subscript 2 indicates that the grid-No.1 current flows during some part of the input cycle.

* Averaged over any audio-frequency cycle of sine-wave form.

●, ●●, **, ○○: See next page.

←Indicates a change.

World Radio History

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RCA

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BEAM POWER TUBE

→ Typical Operation:	CCS●			ICAS●●	
Values are for 2 tubes					
DC Plate Voltage	400	500	600	750	volts
DC Grid-No.2 Voltage**	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage:					
From fixed-bias source	-28	-30	-32	-35	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	80	86	90	96	volts
Zero-Signal DC Plate Current	72	60	48	30	ma
Max.-Signal DC Plate Current	240	240	200	240	ma
Zero-Signal DC Grid-No.2 Current	2	0.9	0.7	0.5	ma
Max.-Signal DC Grid-No.2 Current	20	20	18	20	ma
Effective Load Resistance (Plate to plate)	3700	4600	6900	7300	ohms
Max.-Signal Driving Power (Approx.)◆◆	0.2	0.2	0.1	0.2	watt
Max.-Signal Power Output (Approx.)▲	55	75	80	120	watts

→ Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:○○

With fixed bias	30000 max.	ohms
With cathode bias	Not recommended	

RF POWER AMPLIFIER-Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
DC PLATE CURRENT	80 max.	90 max.	ma
PLATE INPUT	37.5 max.	45 max.	watts
GRID-No.2 INPUT	2.5 max.	2.5 max.	watts

** Preferably obtained from a separate source, or from the plate-voltage supply with a voltage divider.

◆◆ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class AB_2 stage. The effective resistance per grid-No.1 circuit of the class AB_2 stage should be kept below 500 ohms and the effective impedance should not exceed 700 ohms at the highest response frequency.

▲ With zero-impedance driver and perfect regulation, plate-circuit distortion does not exceed 2%. In practice, the regulation of the plate-voltage, grid-No.2 voltage, and grid-No.1 voltage should not be greater than 5%, 5%, and 3%, respectively.

●, ●●, ○○: See next page.

→ Indicates a change.

World Radio History

RCA

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BEAM POWER TUBE

				CCS●	ICAS●●	
PLATE DISSIPATION.				25 max.	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:						
Heater negative with respect to cathode				135 max.	135 max.	volts
Heater positive with respect to cathode				135 max.	135 max.	volts
Typical Operation:						
DC Plate Voltage	400	500	600	750		volts
DC Grid-No.2 Voltage . .	300	300	300	300		volts
DC Grid-No.1 (Control-Grid) Voltage♦	-40	-40	-40	-40		volts
Peak RF Grid-No.1 Voltage	40	38	36	35		volts
DC Plate Current	75	70	62.5	60		ma
DC Grid-No.2 Current . .	5	4	4	3		ma
DC Grid-No.1 Current (Approx.).	0	0	0	0		ma
Driving Power (Approx.)□	0.4	0.3	0.2	0.2		watt
Power Output (Approx.)	9	11	12.5	15		watts
Maximum Circuit Values (CCS or ICAS):						
Grid-No.1-Circuit Resistance∞				30000 max.		ohms

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	475 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-200 max.	-200 max.	volts
DC PLATE CURRENT	83 max.	100 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT.	40 max.	60 max.	watts
GRID-No.2 INPUT.	2.5 max.	2.5 max.	watts
PLATE DISSIPATION.	16.5 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

♦ Use of a fixed supply or bypassed cathode resistor is recommended.

□ At crest of audio-frequency cycle with a modulation factor of 1.0.

∞ 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.

●, ●●: See next page.

←Indicates a change.

World Radio History

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BEAM POWER TUBE

Typical Operation:	CCS●			ICAS●●	
DC Plate Voltage . . .	325	400	475	600	volts
DC Grid-No.2 Voltage▲▲	250	250	250	300	volts
From a series resistor of . . .	12500	25000	28000	37500	ohms
DC Grid-No.1 Voltage††	-75	-75	-85	-85	volts
From a grid-No.1 resistor of . . .	21400	21400	21200	21200	ohms
Peak RF Grid-No.1 Voltage	95	95	108	107	volts
DC Plate Current . . .	80	80	83	100	ma
DC Grid-No.2 Current .	6	6	8	8	ma
DC Grid-No.1 Current (Approx.)	3.5	3.5	4	4	ma
Driving Power (Approx.)	0.3	0.3	0.4	0.4	watt
Power Output (Approx.)	17	22	28	44	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance■ . . . . . 30000 max. ohms

RF POWER AMPLIFIER & OSCILLATOR-Class C Telegraphy■
and
RF POWER AMPLIFIER-Class C FM Telephony

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE .	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	100 max.	100 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT.	60 max.	75 max.	watts
GRID-No.2 INPUT.	3.5 max.	3.5 max.	watts
PLATE DISSIPATION.	25 max.	30 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

▲▲ Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor as indicated.

†† Obtained from a grid-No.1 resistor as indicated, or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

■ 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.

●, ■■, ■: See next page.

→ Indicates a change.

World Radio History

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BEAM POWER TUBE

Typical Operation:	CCS●			ICAS●●	
DC Plate Voltage . . .	400	500	600	750	volts
DC Grid-No.2 Voltage■■	250	250	250	250	volts
From a series resistor of. . . .	19000	31000	44000	62000	ohms
DC Grid-No.1 Voltage□□	-45	-45	-45	-45	volts
From a grid-No.1 resistor of. . . .	11200	11200	11200	11200	ohms
From a cathode resistor of. . . .	400	400	400	400	ohms
Peak RF Grid-No.1 Voltage.	65	65	65	65	volts
DC Plate Current . . .	100	100	100	100	ma
DC Grid-No.2 Current .	8	8	8	8	ma
DC Grid-No.1 Current (Approx.).	4	4	4	4	ma
Driving Power (Approx.).	0.3	0.3	0.3	0.3	watt
Power Output (Approx.)	25	32	40	54	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance◆. . . . . 30000 max. ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.81	0.99	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.2	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	–	10	14	μμf
Plate to cathode & grid No.3, grid No.2, and heater	–	5.3	8.7	μμf
Plate Current (1).	1,3	24	48	ma
Plate Current (2).	1,4	–	0.5	ma
Grid-No.2 Current.	1,3	–	4	ma
Power Output	1,5	33	–	watts

Note 1: Heater voltage = 6.3 volts.

Note 2: With external shield JETEC No.312.

Note 3: With dc plate voltage of 600 volts, dc grid-No.2 voltage of 300 volts, and dc grid-No.1 voltage of -29 volts.

Note 4: With dc plate voltage of 600 volts, dc grid-No.2 voltage of 300 volts, and dc grid-No.1 voltage of -100 volts.

Note 5: With dc plate voltage of 600 volts, dc grid-No.2 voltage of 200 volts, dc plate current of 100 ma. max., grid-No.1 current of 5 to 7 ma., grid-No.1 resistor of 10000 ohms ± 10%, and a frequency of 15 Mc.

●, ●●, ◆, ■, □□: See next page.

←Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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BEAM POWER TUBE

● Continuous Commercial Service.

●● Intermittent Commercial & Amateur Service.

* When grid No.1 is driven positive, the total dc grid-No.1-circuit resistance should not exceed 30000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

■■ Obtained from a separate source, from the plate-voltage supply with a voltage divider, or through a series resistor as indicated. A series grid-No.2 resistor should be employed only when the 807 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.

□□ Obtained from fixed supply, by grid-No.1 resistor as indicated, by cathode resistor as indicated, or by combination methods.

Data on Operating Frequencies for the 807 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

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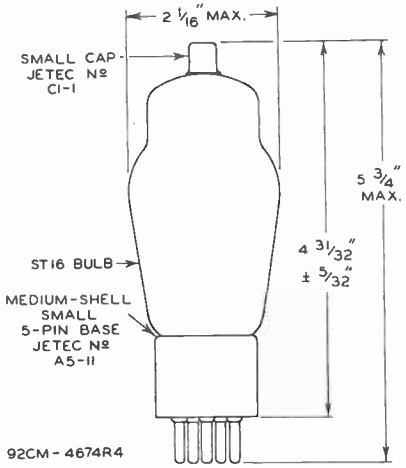
BEAM POWER TUBE



World Radio History

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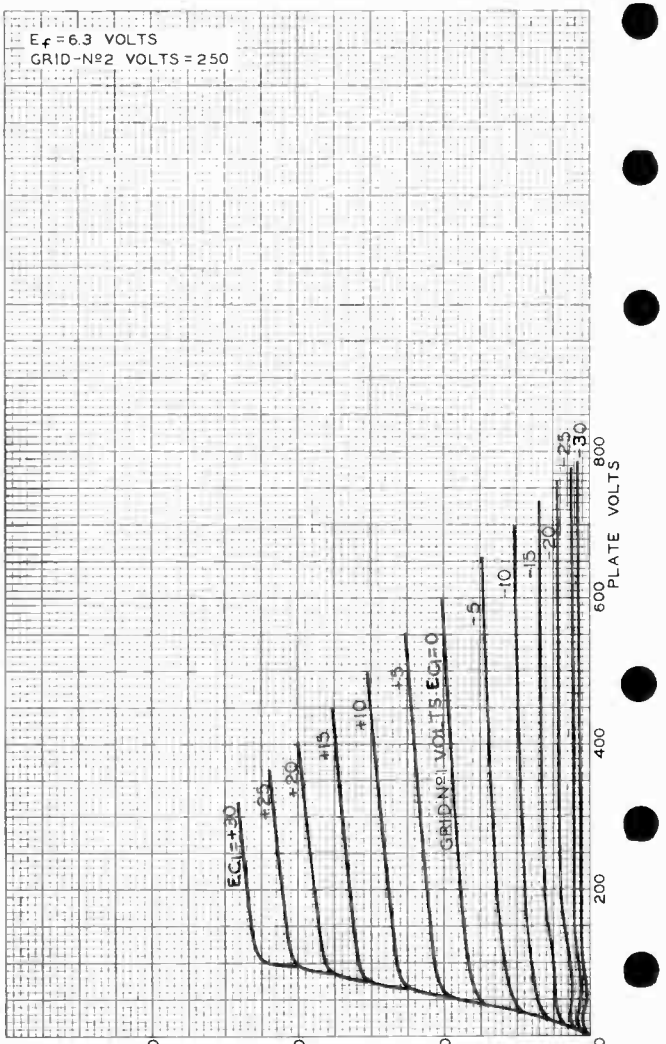
AVERAGE PLATE CHARACTERISTICS



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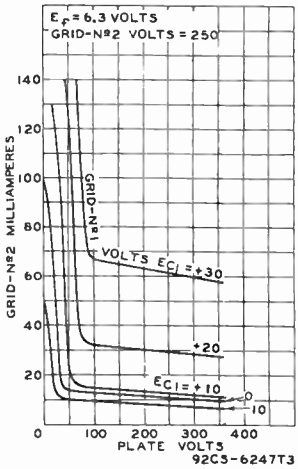
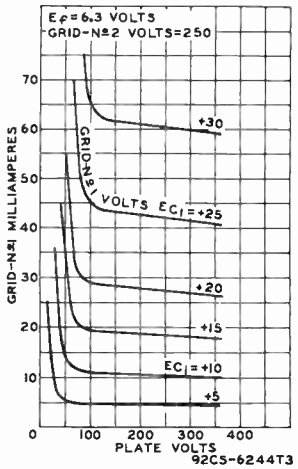
AVERAGE CHARACTERISTICS





ELECTRON TUBE DIVISION
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AVERAGE PLATE CHARACTERISTICS

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4682R3

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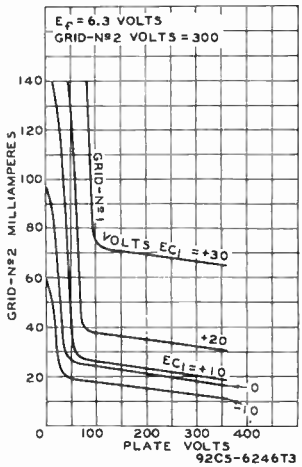
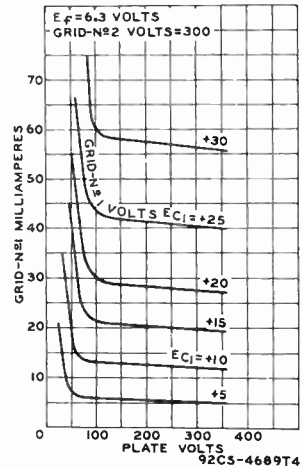
AVERAGE CHARACTERISTICS





ELECTRON TUBE DIVISION
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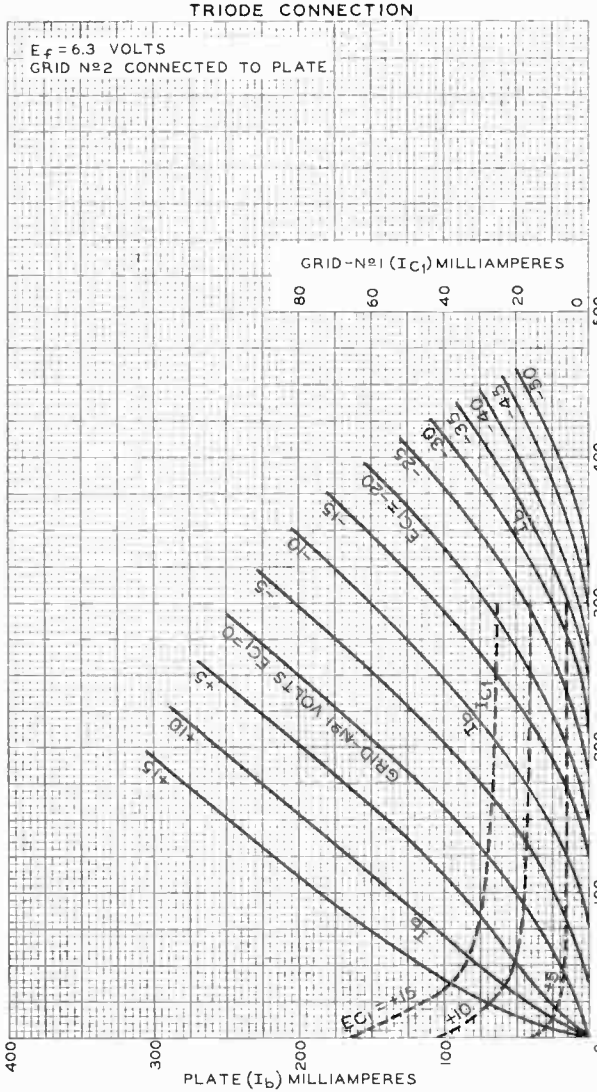
AVERAGE CHARACTERISTICS
TRIODE CONNECTION



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

92CM-7116R1

World Radio History

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TRANSMITTING TRIODE

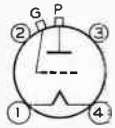
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	7.5	ac or dc volts
Current	4.0	amp
Amplification Factor	47	
Direct Interelectrode Capacitances:		
Grid to Plate	2.8	μμf
Grid to Filament	5.3	μμf
Plate to Filament	0.25	μμf ←

Mechanical:

Mounting Position	Vertical only, Base down
Overall Length	5-7/8" ± 3/16"
Seated Length	5-1/4" ± 3/16"
Maximum Diameter	2-13/16"
Bulb	G-22
Cap (top)	Medium
Cap (side)	Small
Base	Medium-Shell Small 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	$2D_1$



Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – No Connection
Pin 4 – Filament
P – Plate (Top)
G – Grid (Side)

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1500 max.	2000 max.	volts
MAX.-SIGNAL DC PLATE CUR.*	150 max.	150 max.	ma.
MAX.-SIGNAL PLATE INPUT*	150 max.	225 max.	watts
PLATE DISSIPATION*	50 max.	75 max.	watts

Typical Operation:

	Values are for 2 tubes			
DC Plate Voltage	1250	1500	2000	volts
DC Grid Voltage#	-16.5	-22.5	-36	volts
Peak AF Grid-to-Grid Volt.	245	215	270	volts
Zero-Signal DC Plate Cur.	40	30	40	ma.
Max.-Signal DC Plate Cur.	230	190	220	ma.
Effective Load Resistance (plate-to-plate)	12700	18300	21400	ohms
Max.-Signal Driving Power (Approx.)	7.8	4.8	8.8	watts

← Indicates a change.

* Averaged over any audio-frequency cycle of sine-wave form.

●, ●●, #: See next page.

World Radio History

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TRANSMITTING TRIODE

Max.-Signal Power Output (Approx.). . . .	190	185	300	. .	watts

* *For ac filament supply.*

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1250 max.	1600 max.	volts
DC GRID VOLTAGE	-400 max.	-400 max.	volts
DC PLATE CURRENT.	125 max.	125 max.	ma.
DC GRID CURRENT	35 max.	40 max.	ma.
PLATE INPUT	135 max.	200 max.	watts
PLATE DISSIPATION	35 max.	50 max.	watts

Typical Operation:

DC Plate Voltage.	1000	1250	1600	. .	volts
DC Grid Voltage⊕.	-135	-150	-170	. .	volts
	3900	5000	4600	. .	ohms
Peak RF Grid Voltage. . .	270	270	300	. .	volts
DC Plate Current.	120	100	125	. .	ma.
DC Grid Current (Approx.)□	35	30	37	. .	ma.
Driving Power (Approx.)□.	9	7.5	10	. .	watts
Power Output (Approx.). .	90	95	150	. .	watts

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1500 max.	2000 max.	volts
DC GRID VOLTAGE	-400 max.	-400 max.	volts
DC PLATE CURRENT.	150 max.	150 max.	ma.
DC GRID CURRENT	35 max.	40 max.	ma.
PLATE INPUT	200 max.	300 max.	watts
PLATE DISSIPATION	50 max.	75 max.	watts

Typical Operation:

DC Plate Voltage.	1250	1500	2000	. .	volts
DC Grid Voltage Δ	-150	-150	-150	. .	volts
	4300	4300	4200	. .	ohms
	880	940	800	. .	ohms
Peak RF Grid Voltage. . .	290	300	280	. .	volts
DC Plate Current.	135	125	150	. .	ma.
DC Grid Current (Approx.)□	35	35	36	. .	ma.
Driving Power (Approx.)□	9	9.5	9	. .	watts
Power Output (Approx.). .	125	140	225	. .	watts

→Indicates a change.

●, ●●, □, □□, Δ: See next page.

World Radio History

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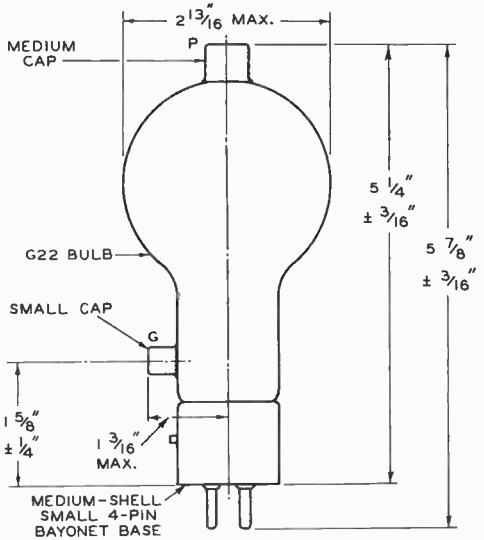
TRANSMITTING TRIODE

- ● Continuous Commercial Service.
- ●● Intermittent Commercial and Amateur Service.
- □ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.
- □□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
- Δ Obtained from fixed supply, by grid resistor (4300, 4300, 4200) or by cathode resistor (880, 940, 800).

NOTE: When the 808 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain plate current at a safe value. With a plate voltage of 2000 volts, a fixed bias of at least -30 volts should be used.

Data on operating frequencies for the 808 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY



THE PLANE THROUGH THE TUBE AXIS AND CENTER OF GRID CAP MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND CENTER OF BAYONET PIN BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°.

92CM-4677R3

World Radio History

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AVERAGE PLATE CHARACTERISTICS

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Ef=7.5 VOLTS D.C.

PLATE VOLTS (E_b)

0 500 1000 1500 2000 2500 3000

PLATE AMPERES

0 0.5 1.0 1.5

GRID VOLTS E_C=+90 +60 +30 E_C=0 -15 -30

E_C=+210 +180 +150 +120

E_b E_c

OCT. 26. 1936

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4678

World Radio History

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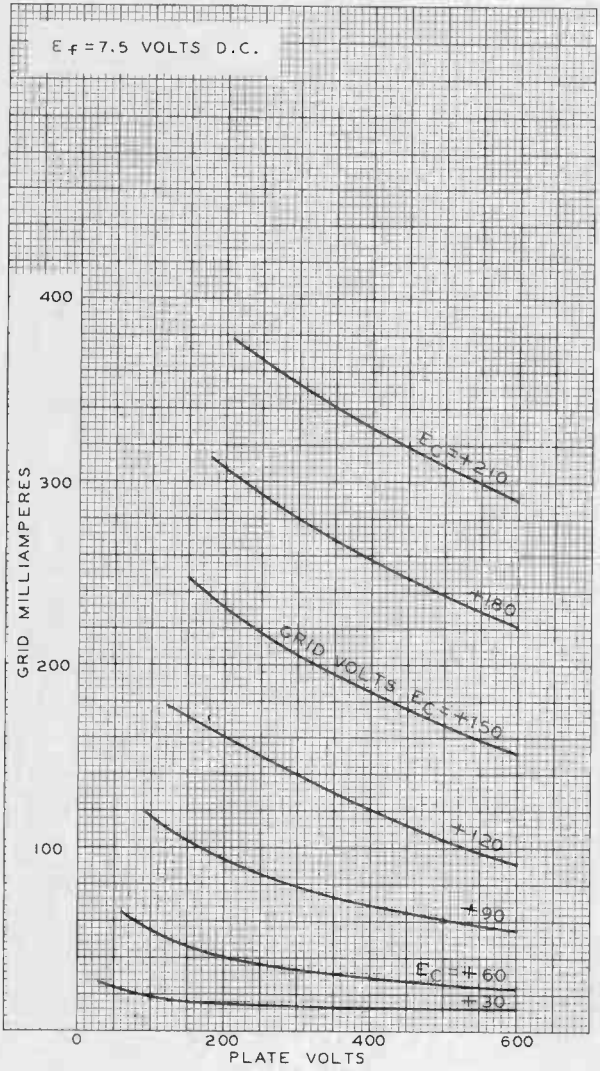
TYPICAL CHARACTERISTICS



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TRANSMITTING TRIODE

GENERAL DATA

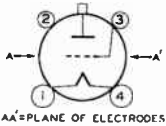
Electrical:

Filament, Thoriated Tungsten:		
Voltage	6.3	ac or dc volts
Current	2.5	amp
Amplification Factor	50	
Direct Interelectrode Capacitances:		
Grid to Plate	6.7	μμf
Grid to Filament	5.7	μμf
Plate to Filament	0.9	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, pins 1 & 4 in vertical plane
Overall Length	6-13/32" ± 5/32"
Seated Length	5-25/32" ± 5/32"
Maximum Diameter	2-7/16"
Bulb	ST-19
Cap	Medium
Base	Medium-Shell Small 4-Pin Micanol, Bayonet
Basing Designation for BOTTOM VIEW	3G

Pin 1 – Filament
Pin 2 – No Connection



AA'=PLANE OF ELECTRODES

Pin 3 – Grid
Pin 4 – Filament
Cap – Plate

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	750 max.	1000 max.	volts
MAX.-SIGNAL DC PLATE CUR.*	125 max.	125 max.	ma. ←
MAX.-SIGNAL PLATE INPUT*	75 max.	100 max.	watts
PLATE DISSIPATION*	25 max.	30 max.	watts

Typical Operation: ←

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	750	700	1000	volts
DC Grid Voltage#	-4.5	0	-9	volts
Peak AF Grid-to-Grid Voltage	145	160	155	volts
Zero-Signal DC Plate Current	40	70	40	ma.
Max.-Signal DC Plate Current	200	250	200	ma.
Effective Load Resistance (plate-to-plate)	8400	6200	11600	ohms

*, ●, ●●, #: See next page. ←Indicates a change.

World Radio History

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TRANSMITTING TRIODE

Max.-Signal Driving Power (Approx.) . . .	2.5	. .	3.4	2.7	watts
Max.-Signal Power Output (Approx.) . . .	105	. .	120	145	watts

RF POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	750 max.	1000 max.	volts
DC PLATE CURRENT	50 max.	60 max.	ma.
PLATE INPUT.	37.5 max.	45 max.	watts
PLATE DISSIPATION.	25 max.	30 max.	watts

Typical Operation:

DC Plate Voltage	500	750	1000 . .	volts
DC Grid Voltage#	−5	−10	−30 . .	volts
Peak RF Grid Voltage . .	35	40	60 . .	volts
DC Plate Current	50	50	45 . .	ma.
DC Grid Current (Approx.)□	6	5	4 . .	ma.
Driving Power (Approx.)□▲	1.4	1.4	1.5 . .	watts
Power Output (Approx.) .	7.5	12.5	15 . .	watts

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID VOLTAGE.	−200 max.	−200 max.	volts
DC PLATE CURRENT	83 max.	100 max.	ma.
DC GRID CURRENT.	35 max.	35 max.	ma.
PLATE INPUT.	50 max.	75 max.	watts
PLATE DISSIPATION.	17.5 max.	25 max.	watts

Typical Operation:

DC Plate Voltage	500	600	750 . .	volts
DC Grid Voltage⊕	−60	−60	−60 . .	volts
	2000	2000	2000 . .	ohms
Peak RF Grid Voltage . .	135	135	150 . .	volts
DC Plate Current	83	83	100 . .	ma.
DC Grid Current (Approx.)□	32	32	32 . .	ma.
Driving Power (Approx.)□	3.2	3.2	4.3 . .	watts
Power Output (Approx.) .	30	38	55 . .	watts

* Averaged over any audio-frequency cycle of sine-wave form.
\# For ac filament supply.
⊕ Obtained by grid resistor of value shown or by partial self-bias methods.
●, ●●, □, ▲: See next page.

World Radio History

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TRANSMITTING TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation[□□]

Maximum Ratings, *Absolute Values*:

	CCS[●]	*ICAS*[●●]	
DC PLATE VOLTAGE	750 max.	1000 max.	volts
DC GRID VOLTAGE	−200 max.	−200 max.	volts
DC PLATE CURRENT	100 max.	100 max.	ma.
DC GRID CURRENT	35 max.	35 max.	ma.
PLATE INPUT	75 max.	100 max.	watts
PLATE DISSIPATION	25 max.	30 max.	watts

Typical Operation:

DC Plate Voltage	500	750	1000	volts
DC Grid Voltage[▲▲]	−50	−60	−75	volts
	2500	3000	3000	ohms
	420	500	600	ohms
Peak RF Grid Voltage	135	140	160	volts
DC Plate Current	100	100	100	ma.
DC Grid Current (Approx.)[□]	20	20	25	ma.
Driving Power (Approx.)[□]	2.5	2.5	3.8	watts
Power Output (Approx.)	35	55	75	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

▲ At crest of audio-frequency cycle of sine-wave form.

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

▲▲ Obtained from fixed supply, by grid resistor (2500, 3000, 3000) or by cathode resistor (420,500,600).

NOTE: When the 809 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 1000 volts, a fixed bias of at least −10 volts should be used.

Data on operating frequencies for the 809 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

World Radio History

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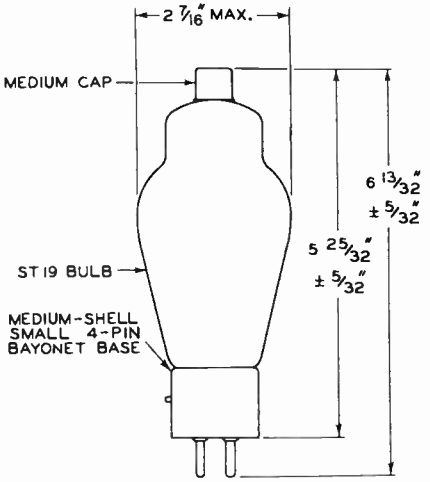
TRANSMITTING TRIODE



92CM-4835RI

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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RCA
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AVERAGE PLATE CHARACTERISTICS

$E_f = 6.3$ VOLTS D.C.

PLATE VOLTS (E_b)

0 200 400 600 800 1000 1200

$E_c = +40$
$E_c = +30$
$E_c = +20$
$E_c = +10$
$E_c = 0$
$E_c = -10$
$E_c = -20$
$E_c = -40$
$E_c = -60$
$E_c = -80$
$E_c = -100$

PLATE MILLIAMPERES

800 600 400 200 0

OCT. 11, 1937

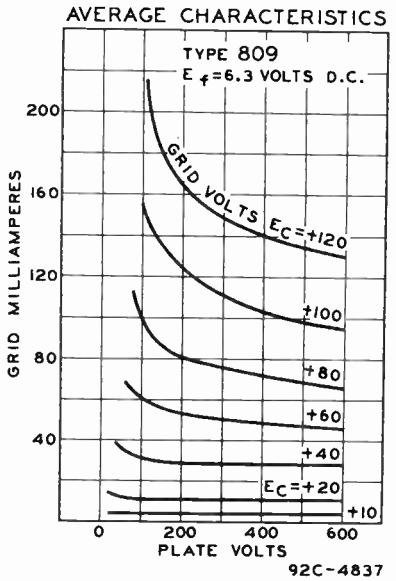
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4836

World Radio History

809

TRANSMITTING TRIODE



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

810

TRANSMITTING TRIODE

GENERAL DATA

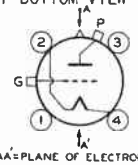
Electrical:

Filament, Thoriated Tungsten:		
Voltage	10	ac or dc volts
Current	4.5	amp
Amplification Factor	36	
Direct Interelectrode Capacitances:		
Grid to Plate	4.8	μμf
Grid to Filament	8.7	μμf
Plate to Filament	12	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, pins 1 & 2 in vertical plane
Overall Length	8-1/2" ± 1/4"
Seated Length	8-3/16" ± 1/4"
Maximum Radius	2-1/8" ± 1/8"
Bulb	T-20
Cap (top)	Skirted Medium
Cap (side)	Medium
Base	Medium Metal-Shell Jumbo 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	20_1

Pin 1 – No Connection
Pin 2 – Filament
Pin 3 – No Connection



AA'=PLANE OF ELECTRODES

Pin 4 – Filament
P – Plate (End Cap)
G – Grid (Side Cap)

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

	CCS*	ICAS**	
DC PLATE VOLTAGE	2500 max.	2750 max.	volts
MAX.-SIGNAL DC PLATE CUR.*	250 max.	250 max.	ma.
MAX.-SIGNAL PLATE INPUT*	425 max.	510 max.	watts
PLATE DISSIPATION*	125 max.	175 max.	watts ←

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	2000	2250	volts
DC Grid Voltage#	-50	-60	volts
Peak AF Grid-to-Grid Voltage	345	380	volts
Zero-Signal DC Plate Current	60	70	ma.
Max.-Signal DC Plate Current	420	450	ma.
Effective Load Resistance (plate to plate)	11000	11600	ohms

* Averaged over any audio-frequency cycle of sine-wave form.
*, **, #: See next page. ← Indicates a change.

World Radio History

810

TRANSMITTING TRIODE

Max.-Signal Driving Power (Approx.)	10	13	watts
Max.-Signal Power Output (Approx.)	590	725	watts

RF POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
→ DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC PLATE CURRENT	185 max.	185 max.	ma.
PLATE INPUT	185 max.	225 max.	watts
→ PLATE DISSIPATION	125 max.	175 max.	watts

Typical Operation:

DC Plate Voltage	1500	2000	2250	volts
DC Grid Voltage#	-50	-65	-70	volts
Peak RF Grid Voltage	110	100	100	volts
DC Plate Current	115	93	100	ma.
DC Grid Current (Approx.)□	2	2	2	ma.
Driving Power (Approx.)□▲	6	4	4	watts
Power Output (Approx.)	60	60	75	watts

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
→ DC PLATE VOLTAGE	1600 max.	2000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	210 max.	250 max.	ma.
→ DC GRID CURRENT	70 max.	75 max.	ma.
→ PLATE INPUT	335 max.	500 max.	watts
PLATE DISSIPATION	85 max.	125 max.	watts

→ **Typical Operation:**

DC Plate Voltage	1250	1600	2000	volts
DC Grid Voltage⊕	-200	-200	-350	volts
	4000	4000	5000	ohms
Peak RF Grid Voltage	370	370	550	volts
DC Plate Current	210	210	250	ma.
DC Grid Current (Approx.)□	50	50	70	ma.
Driving Power (Approx.)□	17	17	35	watts
Power Output (Approx.)	180	250	380	watts

For ac filament supply.

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

●, ●●, □, ▲: See next page.]

← indicates a change.

World Radio History

810
TRANSMITTING TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation □□

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	250 max.	300 max.	ma.
DC GRID CURRENT	70 max.	75 max.	ma.
PLATE INPUT	500 max.	750 max.	watts
PLATE DISSIPATION	125 max.	175 max.	watts

Typical Operation:

DC Plate Voltage	1500	2000	2500	volts
DC Grid Voltage▲▲	-120	-160	-180	volts
	3000	4000	3000	ohms
	415	550	500	ohms
Peak RF Grid Voltage	280	330	350	volts
DC Plate Current	250	250	300	ma.
DC Grid Current (Approx.)□	40	40	60	ma.
Driving Power (Approx.)□	10	12	19	watts
Power Output (Approx.)	275	375	575	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

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

▲▲ Obtained from fixed supply, by grid resistor (3000, 4000, 3000), or by cathode resistor (415, 550, 500).

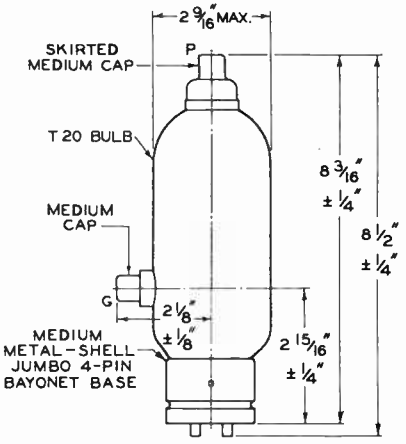
NOTE: When the 810 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 2500 volts, a fixed bias of at least -40 volts should be used.

Data on operating frequencies for the 810 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

← Indicates a change.

World Radio History

810
TRANSMITTING TRIODE

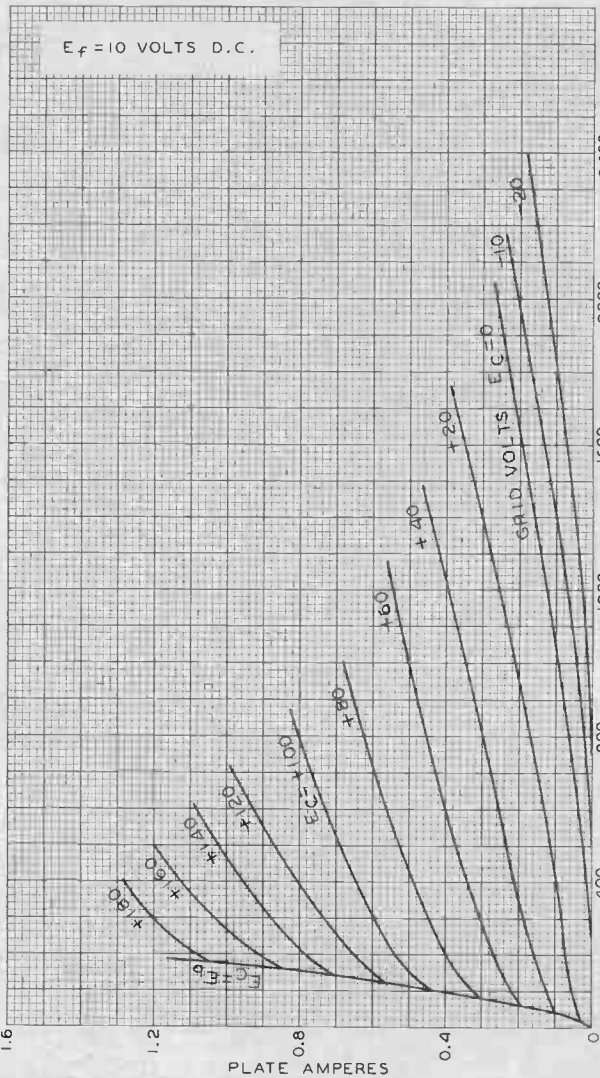


92CM-4965RI

World Radio History

810

AVERAGE PLATE CHARACTERISTICS



OCT. 13, 1938

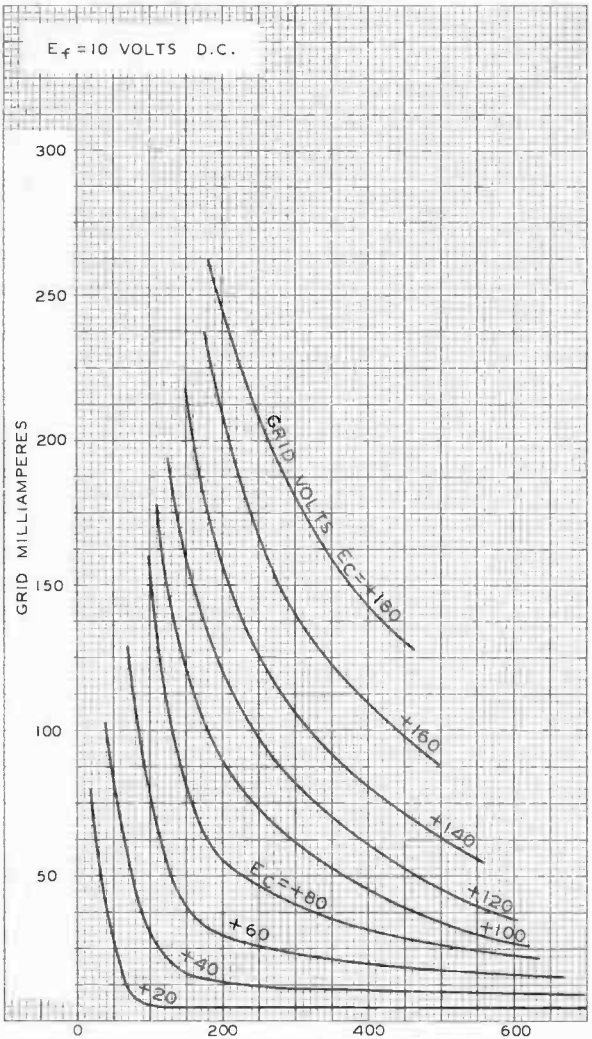
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

92C—4981

World Radio History

810

TYPICAL CHARACTERISTICS



NOV. 30, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4983

World Radio History

811

TRANSMITTING TRIODE

GENERAL DATA

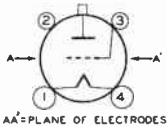
Electrical:

Filament, Thoriated Tungsten:		
Voltage	6.3	ac or dc volts
Current	4	amp
Amplification Factor	160	
Direct Interelectrode Capacitances:		
Grid to Plate	5.5	μμf
Grid to Filament	5.5	μμf
Plate to Filament	0.6	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, pins 1 & 4 in vertical plane
Overall Length	6-13/32" ± 5/32"
Seated Length	5-25/32" ± 5/32"
Maximum Diameter	2-7/16"
Bulb	ST-19
Cap	Medium
Base	Medium-Shell Small 4-Pin Micanol, Bayonet
Basing Designation for BOTTOM VIEW	3G

Pin 1 – Filament
Pin 2 – No Connection



AA'=PLANE OF ELECTRODES

Pin 3 – Grid
Pin 4 – Filament
Cap – Plate

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
MAX.-SIGNAL DC PLATE CUR.*	150 max.	150 max.	ma. ←
MAX.-SIGNAL PLATE INPUT*	125 max.	150 max.	watts
PLATE DISSIPATION	40 max.	50 max.	watts

Typical Operation: ←

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	1250		1250	1500	volts
DC Grid Voltage#	0		0	-9	volts
Peak AF Grid-to-Grid Volt.	130		150	150	volts
Zero-Signal DC Plate Cur.	48		48	20	ma.
Max.-Signal DC Plate Cur.	200		240	200	ma.
Effective Load Resistance (plate-to-plate)	14400		12000	17600	ohms

* Averaged over any audio-frequency cycle of sine-wave form.
●, ●●, #: See next page. ←Indicates a change.

World Radio History

811
TRANSMITTING TRIODE

Max.-Signal Driving Power (Approx.). .	2.6 . .	3.4	3.0	watts
Max.-Signal Power Output (Approx.). .	175 . .	210	220	watts

RF POWER AMPLIFIER -Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1250 max.	1500 max.	volts
DC Grid Voltage#	0 . .	-6 . .	volts
PLATE CURRENT.	60 max.	60 max.	ma.
PLATE INPUT	60 max.	75 max.	watts
PLATE DISSIPATION	40 max.	50 max.	watts

Typical Operation:

DC Plate Voltage.	1250 . .	1500 . .	volts
DC Grid Voltage#	0 . .	-6 . .	volts
Peak RF Grid Voltage. . . .	26 . .	35 . .	volts
DC Plate Current.	48 . .	50 . .	ma.
DC Grid Current (Approx.)□	6 . .	6 . .	ma.
Driving Power (Approx.)□▲ .	1 . .	1.5 . .	watts
Power Output (Approx.). . .	20 . .	25 . .	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1000 max.	1250 max.	volts
DC GRID VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT.	105 max.	125 max.	ma.
DC GRID CURRENT	50 max.	50 max.	ma.
PLATE INPUT	105 max.	155 max.	watts
PLATE DISSIPATION	27 max.	40 max.	watts

Typical Operation:

DC Plate Voltage.	1000 . .	1250 . .	volts
DC Grid Voltage⊕	-100 . .	-125 . .	volts
	2000 . .	2500 . .	ohms
Peak RF Grid Voltage. . . .	195 . .	230 . .	volts
DC Plate Current.	105 . .	125 . .	ma.
DC Grid Current (Approx.)□	50 . .	50 . .	ma.
Driving Power (Approx.)□. .	9 . .	11 . .	watts
Power Output (Approx.). . .	82 . .	120 . .	watts

For ac filament supply.
⊕ Obtained by grid resistor of value shown or by partial self-bias methods.
●, ●●, □, ▲: See next page.

World Radio History

811

TRANSMITTING TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation[□□]

Maximum Ratings, *Absolute Values*:

	CCS[●]	*ICAS*[●●]	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID VOLTAGE	−200 max.	−200 max.	volts
DC PLATE CURRENT	125 max.	150 max.	ma.
DC GRID CURRENT	50 max.	50 max.	ma.
PLATE INPUT	155 max.	225 max.	watts
PLATE DISSIPATION	40 max.	55 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	volts ←
DC Grid Voltage[▲▲]	−87.5	−113	volts
	2500	3200	ohms
	550	610	ohms
Peak RF Grid Voltage	180	225	volts
DC Plate Current	125	150	ma.
DC Grid Current (Approx.)[□]	35	35	ma.
Driving Power (Approx.)[□]	7	8	watts
Power Output (Approx.)	115	170	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

▲ At crest of audio-frequency cycle of sine-wave form.

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

▲▲ Obtained from fixed supply, by grid resistor (2500, 3200) or by cathode resistor (550, 610).

OUTLINE DIMENSIONS for the 811 are the same as those for the 809

Data on operating frequencies for the 811 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

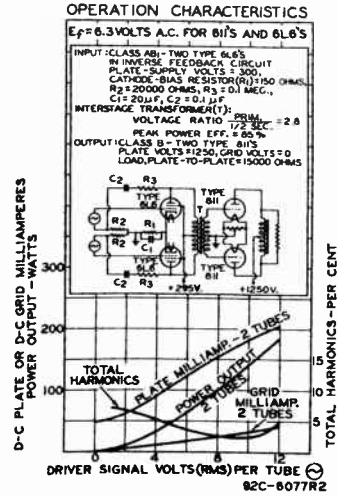
← Indicates a change.

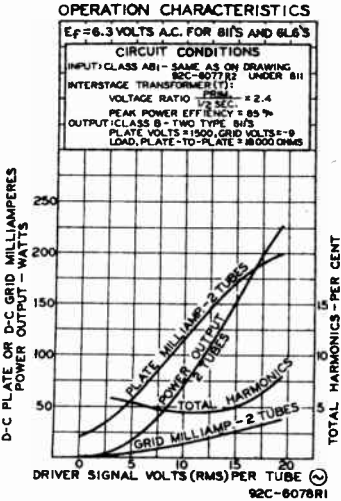
World Radio History

RCA

811

TRANSMITTING TRIODE





TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

811

AVERAGE PLATE CHARACTERISTICS

SEPT. 11, 1939

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

92C-6075

World Radio History

World Radio History

812-A
POWER TRIODE

SELF-RECTIFYING OSCILLATOR or AMPLIFIER – Class C

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

	CCS●	
AC PLATE VOLTAGE (RMS)	1750 max.	volts
DC GRID VOLTAGE	−125 max.	volts
DC PLATE CURRENT	75 max.	ma
DC GRID CURRENT	20 max.	ma
PLATE INPUT	145 max.	watts
PLATE DISSIPATION	45 max.	watts

Typical Operation in Push-Pull Circuit at 27 Mc.:

Values are for 2 tubes

AC Plate Voltage (RMS)	1740	volts
Grid Resistor●	3500	ohms
DC Plate Current	150	ma
DC Grid Current (at full load)	29	ma
Driving Power (Approx.)▲	12	watts
Power Output (Approx.)	200	watts
Useful Power Output (Approx.)– 75% circuit efficiency	150	watts

AMPLIFIER or OSCILLATOR – Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

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

	CCS●	
DC PLATE VOLTAGE	1125 max.	volts
DC GRID VOLTAGE	−125 max.	volts
DC PLATE CURRENT	160 max.	ma
DC GRID CURRENT	32 max.	ma
PLATE INPUT§	175 max.	watts
PLATE DISSIPATION	45 max.	watts

Typical Operation:

DC Plate Voltage	1125	volts
Grid Resistor●	2200	ohms
DC Plate Current	125	ma
DC Grid Current (Approx.)	30	ma
Driving Power (Approx.)§§	5	watts
Power Output (Approx.)	135	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

\# For ac filament supply.

●, ▲▲ Obtained by grid resistor of value shown or by partial self-bias methods. Obtained from a fixed supply, by grid resistor (3000, 4000) or by cath-resistor (530, 590).

□□, ▲, ◆, §, §§: See next page.

← Indicates a change.

World Radio History

812-A

812-A
POWER TRIODE

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

▲ From a self-rectified driver.

♣ The 812-A can be biased by any convenient method, but the use of a grid resistor is preferred because the bias is automatically varied as the load on the circuit varies. In those applications where grid current and grid voltage may vary widely because of fluctuating loads, it is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full-load to one-half of the corresponding maximum values. This operating condition permits grid-current and grid-voltage values to rise from zero load to twice their full-load values, and usually provides adequate leeway.

§ Power input to plate is 1.23 times the product of DC Plate Voltage and DC Plate Current.

§§ From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

NOTE: When the 812-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With a plate voltage of 1500 volts, a fixed bias of at least -45 volts should be used.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	3.75	4.25	amp
Amplification Factor	1,2	26	32	
Grid-Plate Capacitance . . .	-	4.8	5.2	μμf
Grid-Filament Capacitance. .	-	4.4	6.4	μμf
Plate-Filament Capacitance .	-	0.58	0.96	μμf
Grid Current	1,3	17	39	ma
Plate Current.	1,4	18	42	ma
Useful Power Output.	1,5	140	-	watts

Note 1: DC filament voltage = 6.3 volts.

Note 2: With dc grid voltage of -30 volts and plate voltage adjusted to give plate current of 30 ma.

Note 3: With dc plate voltage of 200 volts and dc grid voltage of +50 volts.

Note 4: With dc plate voltage of 1250 volts and dc grid voltage of -30 volts.

Note 5: With dc plate voltage of 1500 volts, plate current of 175 ma., grid current of 34 to 50 ma., grid resistor of 3500 ± 10% ohms and frequency of 15 Mc.

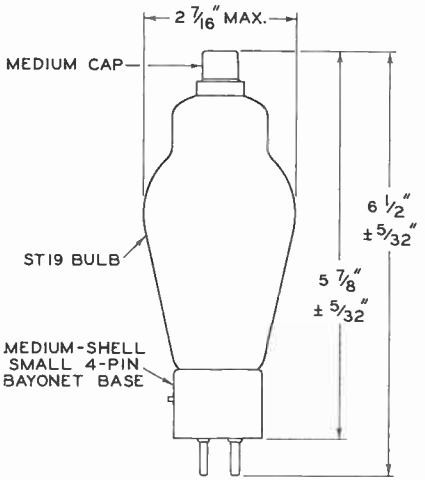
Data on operating frequencies for the 812-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

812-A

POWER TRIODE



92CS-6905

World Radio History

812-A

OPERATION CHARACTERISTICS

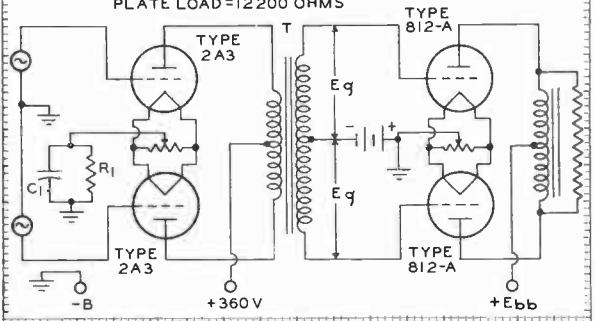
E_f = 6.3 VOLTS AC FOR 812-A's & 2.5 VOLTS AC FOR 2A3's

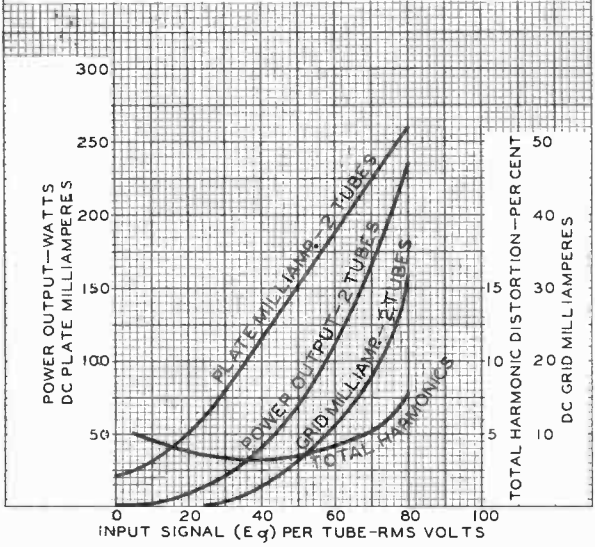
INPUT: CLASS AB_1 – TWO TYPE 2A3's; PLATE-SUPPLY VOLTS = 360; CATHODE-BIAS RESISTOR (R_1) = 780 OHMS; BYPASS CAPACITOR (C_1) = 80 μf

INTERSTAGE TRANSFORMER (T):

VOLTAGE RATIO $\frac{\text{PRIMARY}}{\frac{1}{2}\text{ SEC.}} = 1.4$

OUTPUT: CLASS B – TWO TYPE 812-A's; PLATE VOLTS (E_{bb}) = 1250; DC GRID VOLTS = −40; PLATE-TO-PLATE LOAD = 12200 OHMS



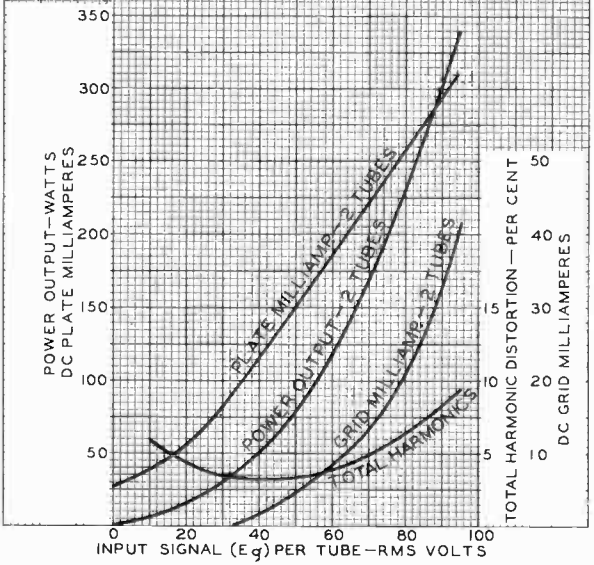


Radio Museum

812-A

OPERATION CHARACTERISTICS

E_f = 6.3 VOLTS AC FOR 812-A's & 2.5 VOLTS AC FOR 2A3's
CIRCUIT ARRANGEMENT: SAME AS ON DWG. 92CM-6938 UNDER TYPE 812-A
INPUT: CLASS AB_1 — TWO TYPE 2A3's; PLATE-SUPPLY VOLTS = 360; CATHODE-BIAS RESISTOR (R_1) = 780 OHMS; BYPASS CAPACITOR (C_1) = 80 μf
INTERSTAGE TRANSFORMER (T):
VOLTAGE RATIO $\frac{\text{PRIMARY}}{\frac{1}{2}\text{ SEC.}} = 1.4$
OUTPUT: CLASS B-TWO TYPE 812-A's; PLATE VOLTS (E_{bb}) = 1500; DC GRID VOLTS = -48; PLATE-TO-PLATE LOAD = 13200 OHMS



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

812-A
POWER TRIODE

SELF-RECTIFYING OSCILLATOR or AMPLIFIER - Class C

Maximum Ratings, *Absolute Values*:

	CCS●	
AC PLATE VOLTAGE (RMS)	1750 max.	volts
DC GRID VOLTAGE	-125 max.	volts
DC PLATE CURRENT	75 max.	ma
DC GRID CURRENT	20 max.	ma
PLATE INPUT	145 max.	watts
PLATE DISSIPATION	45 max.	watts

Typical Operation in Push-Pull Circuit at 27 Mc.:

Values are for 2 tubes

AC Plate Voltage (RMS)	1740	volts
Grid Resistor⊕	3500	ohms
DC Plate Current	150	ma
DC Grid Current (at full load)	29	ma
Driving Power (Approx.)▲	12	watts
Power Output (Approx.)	200	watts
Useful Power Output (Approx.)- 75% circuit efficiency	150	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	3.75	4.25	amp
Amplification Factor	1,2	26	32	
Grid-Plate Capacitance	-	4.8	6.2	μμf
Grid-Filament Capacitance	-	4.4	6.4	μμf
Plate-Filament Capacitance	-	0.58	0.96	μμf
Grid Current	1,3	17	39	ma
Plate Current	1,4	18	42	ma
Useful Power Output	1,5	140	-	watts

Note 1: DC filament voltage = 6.3 volts.

Note 2: With dc grid voltage of -30 volts and plate voltage adjusted to give plate current of 30 ma.

Note 3: With dc plate voltage of 200 volts and dc grid voltage of +50 volts.

Note 4: With dc plate voltage of 1250 volts and dc grid voltage of -30 volts.

Note 5: With dc plate voltage of 1500 volts, plate current of 175 ma., grid current of 34 to 50 ma., grid resistor of 3500 ± 10% ohms and frequency of 15 Mc.

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

\# For ac filament supply.

⊕ Obtained by grid resistor of value shown or by partial self-bias methods.

▲▲ Obtained from a fixed supply, by grid resistor (3000, 4000) or by cath-resistor (530, 590).

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

▲ From a self-rectified driver.

See next page.

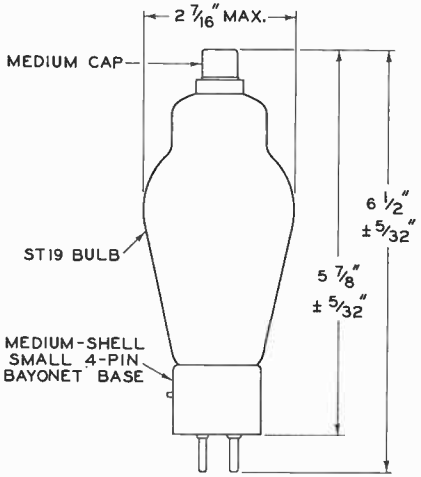
World Radio History

812-A
POWER TRIODE

* The 812-A can be biased by any convenient method, but the use of a grid resistor is preferred because the bias is automatically varied as the load on the circuit varies. In those applications where grid current and grid voltage may vary widely because of fluctuating loads, it is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full-load to one-half of the corresponding maximum values. This operating condition permits grid-current and grid-voltage values to rise from zero load to twice their full-load values, and usually provides adequate leeway.

NOTE: When the 812-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With a plate voltage of 1500 volts, a fixed bias of at least -45 volts should be used.

Data on operating frequencies for the 812-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY



92CS-6905

World Radio History

RCA

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BEAM POWER TUBE

DATA

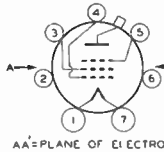
Electrical:

Filament, Thoriated Tungsten:		
Voltage	10.0 ± 5%	ac or dc volts
Current at 10.0 volts	5.0	amp
Transconductance (Approx.), for plate volts = 2000, grid-No.2 volts = 400, and plate current = 50 ma	3750	μmhos
Mu-Factor, grid No.2 to grid No.1, for plate volts = 2000, grid-No.2 volts = 400, and plate current = 50 ma	8.5	
Direct Interelectrode Capacitances:[o]		
Grid No.1 to plate	0.25 max.	μμf
Grid No.1 to filament, grid No.2, and grid No.3	16.3	μμf
Plate to filament, grid No.2, and grid No.3	14	μμf

Mechanical:

Mounting Position:	
Vertical	Base up or down
Horizontal	Pins 2 and 6 in vertical plane
Maximum Overall Length	7-1/2"
Seated Length	6-5/8" ± 1/4"
Maximum Diameter	2-9/16"
Weight (Approx.)	8 oz
Bulb	T-20
Cap	Medium (JETEC No.C1-5)
Base	Medium-Metal-Shell Giant 7-Pin with Bayonet (JETEC No.A7-17)
Basing Designation for BOTTOM VIEW	5BA

Pin 1 - Filament
Pin 2 - No Connection
Pin 3 - Grid No.2
Pin 4 - Grid No.1
Pin 5 - Grid No.3, Int. Shield
Pin 6 - No Connection
Pin 7 - Filament
Cap - Plate



AA'=PLANE OF ELECTRODES

AF POWER AMPLIFIER & MODULATOR - Class AB_1#

Maximum Ratings, *Absolute Values:*

	CCS*	ICAS**	
DC PLATE VOLTAGE	2250 max.	2500 max.	volts
DC GRID-NO.2 (SCREEN) VOLTAGE	1100 max.	1100 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	180 max.	225 max.	ma
MAX.-SIGNAL PLATE INPUT*	360 max.	450 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	22 max.	22 max.	watts
PLATE DISSIPATION*	100 max.	125 max.	watts

[o] Without external shield and with base shell floating.

#, *, **, *: See next page. ← Indicates a change.

World Radio History

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BEAM POWER TUBE

Typical Operation:	CCS●			ICAS●●	
Values are for 2 tubes					
DC Plate Voltage	1500	2000	2250	2500	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	0	volts
DC Grid-No.2 Voltage**	750	750	750	750	volts
DC Grid-No.1 (Control-Grid) Voltage:⊛					
From fixed-bias source	−85	−90	−95	−95	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage♦	160	160	170	180	volts
Zero-Signal DC Plate Current	50	50	50	50	ma
Max.-Signal DC Plate Current	305	265	255	290	ma
Zero-Signal DC Grid-No.2 Current	2	2	2	2	ma
Max.-Signal DC Grid-No.2 Current	45	43	53	54	ma
Effective Load Resistance (Plate to plate)	9300	16000	20000	19000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	0	watts
Max.-Signal Power Output (Approx.)	260	335	380	490	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:##

With fixed bias	30000 max.	ohms
With cathode bias	Not recommended	

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2000 max.	2250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts
DC PLATE CURRENT	100 max.	125 max.	ma
PLATE INPUT	150 max.	200 max.	watts
GRID-No.2 INPUT	15 max.	20 max.	watts
PLATE DISSIPATION	100 max.	125 max.	watts

\# Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

* Averaged over any audio-frequency cycle of sine-wave form.

** Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

♦ The driver stage should be capable of supplying the No.1 grids of the class AB_1 stage with the specified driving voltage at low distortion.

●, ●●, †, ⊛, ##: See next page. → Indicates a change.

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BEAM POWER TUBE

Typical Operation:	CCS●		ICAS●●	
DC Plate Voltage	1500	2000	2250	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	volts
DC Grid-No.2 Voltage	400	400	400	volts
DC Grid-No.1 (Control-Grid) Voltage⊕♦	-60	-75	-60	volts
Peak RF Grid-No.1 Voltage	70	80	70	volts
DC Plate Current	100	75	85	ma
DC Grid-No.2 Current	4	3	3	ma
DC Grid-No.1 Current	★	★	★	ma
Driving Power⊡##	▲	▲	▲	watts
Power Output (Approx.)	50	50	70	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance	30000 max.	ohms

GRID-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2000 max.	2250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	100 max.	125 max.	ma
PLATE INPUT	150 max.	200 max.	watts
GRID-No.2 INPUT	15 max.	20 max.	watts
PLATE DISSIPATION	100 max.	125 max.	watts

Typical Operation:

DC Plate Voltage	1500	2000	2250	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	volts
DC Grid-No.2 Voltage	400	400	400	volts
DC Grid-No.1 Voltage♦♦	-140	-120	-110	volts
Peak RF Grid-No.1 Voltage	145	120	135	volts
Peak AF Grid-No.1 Voltage	60	60	55	volts
DC Plate Current	70	75	85	ma
DC Grid-No.2 Current	3	3	2.5	ma
DC Grid-No.1 Current	★	★	★	ma
Driving Power⊕⊕	□□	□□	□□	watts
Power Output (Approx.)	40	50	75	watts

⊕⊕ 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. When the 813 is operated in class AB_1 service, only fixed bias should be used.

♦ Use of a fixed supply or bypassed cathode resistor is recommended.

□ At crest of audio-frequency cycle with a modulation factor of 1.0.

▲ Never more than 2 watts.

●, ●●, †, ⊕, ★, ⊕⊕, ♦♦, □□: See next page.

← Indicates a change.

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BEAM POWER TUBE

→ **Maximum Circuit Values (CCS or ICAS):**

Grid-No.1-Circuit Resistance:

With fixed bias.	30000 max. ohms
With cathode bias.	Not recommended

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1600 max.	2000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-300 max.	-300 max.	volts
DC PLATE CURRENT	150 max.	200 max.	ma
DC GRID-No.1 CURRENT	25 max.	30 max.	ma
PLATE INPUT.	240 max.	400 max.	watts
GRID-No.2 INPUT.	15 max.	20 max.	watts
PLATE DISSIPATION.	67 max.	100 max.	watts

Typical Operation:

DC Plate Voltage	1250	1600	2000	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	volts
DC Grid-No.2 Voltage▲▲	300	300	350	volts
From a series resistor of. .	27000	43000	41000	ohms
DC Grid-No.1 Voltage††	-160	-160	-175	volts
From a grid resistor of. . .	12500	13500	11000	ohms
Peak RF Grid-No.1 Voltage. . .	250	250	300	volts
DC Plate Current	150	150	200	ma
DC Grid-No.2 Current	35	30	40	ma
DC Grid-No.1 Current (Approx.)	13	12	16	ma
Driving Power (Approx.)▫▫. . .	2.9	2.7	4.3	watts
Power Output (Approx.)	140	180	300	watts

→ **Maximum Circuit Values (CCS or ICAS):**

Grid-No.1-Circuit Resistance . . . . . 30000 max. ohms

★ Usually negligible.

†† Obtained from fixed supply, or cathode resistor unbypassed for audio frequencies.

▫▫ RF driving power is never more than 2 watts. AF power is usually not more than 1 watt.

▲▲ Obtained from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor of the value shown for each operating condition.

●, ●●, †, ⊕, ▫▫, ††: See next page. → Indicates a change.

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BEAM POWER TUBE

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without amplitude modulation■

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2000 max.	2250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	-300 max.	volts
DC PLATE CURRENT	180 max.	225 max.	ma
DC GRID-No.1 CURRENT	25 max.	30 max.	ma
PLATE INPUT	360 max.	500 max.	watts
GRID-No.2 INPUT	22 max.	22 max.	watts
PLATE DISSIPATION	100 max.	125 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	2000	2250	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	0	volts
DC Grid-No.2 Voltage■■	300	300	400	400	volts
From a series resistor of	27000	40000	36000	46000	ohms
DC Grid-No.1 Voltage⊕††⊕	-75	-90	-120	-155	volts
From a grid resistor of	6000	7500	12000	10000	ohms
From a cathode resistor of	330	400	520	565	ohms
Peak RF Grid-No.1 Voltage	160	175	205	275	volts
DC Plate Current	180	180	180	220	ma
DC Grid-No.2 Current	35	30	45	40	ma
DC Grid-No.1 Current (Approx.)	12	12	10	15	ma
Driving Power (Approx.)⊕⊕	1.7	1.9	1.9	4.0	watts
Power Output (Approx.)	170	210	275	375	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance . . . . . 30000 max. ohms

●● Intermittent Commercial and Amateur Service.

⊕ For ac filament supply.

†† Obtained from a grid-No.1 resistor, from cathode resistor, or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

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

■■ Obtained from a separate source, from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown for each operating condition. A series grid-No.2 resistor should be used only when the 813 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 800 volts under key-up conditions.

⊕ If preceding stage is keyed, the grid-No.1 bias must be obtained partially from a fixed supply in order to limit the plate current and, therefore, the plate dissipation to a safe value.

●, †, ⊕⊕: See next page.

← Indicates a change.

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BEAM POWER TUBE

SELF-RECTIFYING OSCILLATOR or AMPLIFIER - Class C

Maximum CCS• Ratings, *Absolute Values*:

AC PLATE VOLTAGE (RMS)	2800 max.	volts
AC GRID-No.2 (SCREEN) VOLTAGE (RMS)	550 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-100 max.	volts
DC PLATE CURRENT	95 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT**	295 max.	watts
GRID-No.2 INPUT**	22 max.	watts
PLATE DISSIPATION	100 max.	watts

Typical Operation:

AC Plate Voltage (RMS)	2800	volts
DC Grid-No.3 (Suppressor) Voltage†	0	volts
AC Grid-No.2 Voltage (RMS)OO	530	volts
DC Grid-No.1 Voltage◆◆	-37	volts
From a grid resistor of	37000	ohms
DC Plate Current	95	ma
DC Grid-No.2 Current	12	ma
DC Grid-No.1 Current (Approx.)	1	ma
Driving Power (Approx.)**‡	1	watt
Output-Circuit Efficiency (Approx.)	75	per cent
Useful Power Output (Approx.)	170#	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	30000 max.	ohms

AMPLIFIER or OSCILLATOR - Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate and Grid-No.2 Supply

Maximum CCS• Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1800 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	360 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	volts
DC PLATE CURRENT	190 max.	ma
DC GRID-No.1 CURRENT	22 max.	ma
PLATE INPUT‡‡	360 max.	watts
GRID-No.2 INPUT‡‡	22 max.	watts
PLATE DISSIPATION	100 max.	watts

• Continuous Commercial Service.

** Power input is 1.11 times the product of the ac voltage (rms) and the dc current.

‡ From a self-rectified driver.

OO Obtained from a separate ac supply in phase with the plate supply or from a low-voltage tap on the plate transformer. Use of a grid-No.2 series voltage-dropping resistor is not recommended.

‡‡ Power input is 1.23 times the product of dc voltage and dc current.

†, **, ◆◆, #: See next page. → Indicates a change.

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BEAM POWER TUBE

Typical Operation:

DC Plate Voltage	1800	volts
DC Grid-No.3 (Suppressor) Voltage†	0	volts
DC Grid-No.2 Voltage‡	250	volts
DC Grid-No.1 Voltage◆◆	-120	volts
From a grid resistor of	10000	ohms
DC Plate Current	160	ma
DC Grid-No.2 Current	37	ma
DC Grid-No.1 Current (Approx.)	12	ma
Driving Power (Approx.)◆◆◆◆	2	watts
Output-Circuit Efficiency (Approx.)	75	per cent
Useful Power Output (Approx.)	210◪	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	30000 max.	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	4.7	5.3	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.25	μμf
Grid No.1 to filament, grid No.2, and grid No.3	2	13	19.6	μμf
Plate to filament, grid No.2, and grid No.3	2	10.5	17.5	μμf
Plate current (1)	1,3	35	65	ma
Plate current (2)	1,4	–	2	ma
Grid-No.2 current	1,3	–	4	ma
Useful power output	1,5	198	–	watts

Note 1: With 10 volts dc on filament.

Note 2: With no external shield and with base shell floating.

Note 3: With dc plate voltage of 2000 volts, grid No.3 connected to negative filament terminal, dc grid-No.2 voltage of 400 volts, and dc grid-No.1 voltage of -35 volts.

Note 4: With dc plate voltage of 2000 volts, grid No.3 connected to negative filament terminal, dc grid-No.2 voltage of 400 volts, and dc grid-No.1 voltage of -80 volts.

Note 5: In a self-excited oscillator with dc plate voltage of 2000 volts, grid No.3 connected to negative filament terminal, dc grid-No.2 voltage of 400 volts, dc grid-No.1 current of 9.6 to 14.4 ma, grid-No.1 resistor of 10000 ± 10% ohms, dc plate current of 180 ma, and frequency of 15 Mc.

† Grid No.3 should be connected to mid-tap on filament-transformer secondary winding or to negative end of filament operated on dc.

◆◆ Value shown for each operating condition is power required by grid No.1 and biasing device when the 813 is operated at frequency sufficiently low to avoid high-frequency losses. At moderate frequencies, the driver stage should be capable of providing about twice the tabulated value; at higher frequencies, the driver stage may have to supply 3 to 10 times the value shown.

◆◆, ◪, ‡, ◆◆◆◆: See next page.]

← Indicates a change.

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BEAM POWER TUBE

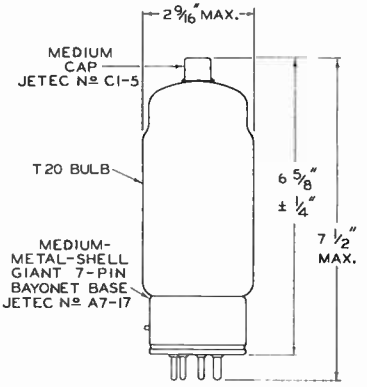
Obtained from a grid-No.1 resistor of the value shown or from a combination of grid-No.1 resistor and cathode resistor. Fixed-bias operation is not recommended. The bias resistors should not be bypassed for the plate and grid-No.2 voltage supply frequency.

This value of useful power is measured at load of output circuit having indicated efficiency.

Obtained from a separate, rectified, unfiltered, single-phase, full-wave supply in phase with the plate supply, or from the rectified, unfiltered, single-phase, full-wave supply by means of taps on the plate transformer.

From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

Data on operating frequencies for the 813 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY



92CM-4963R3

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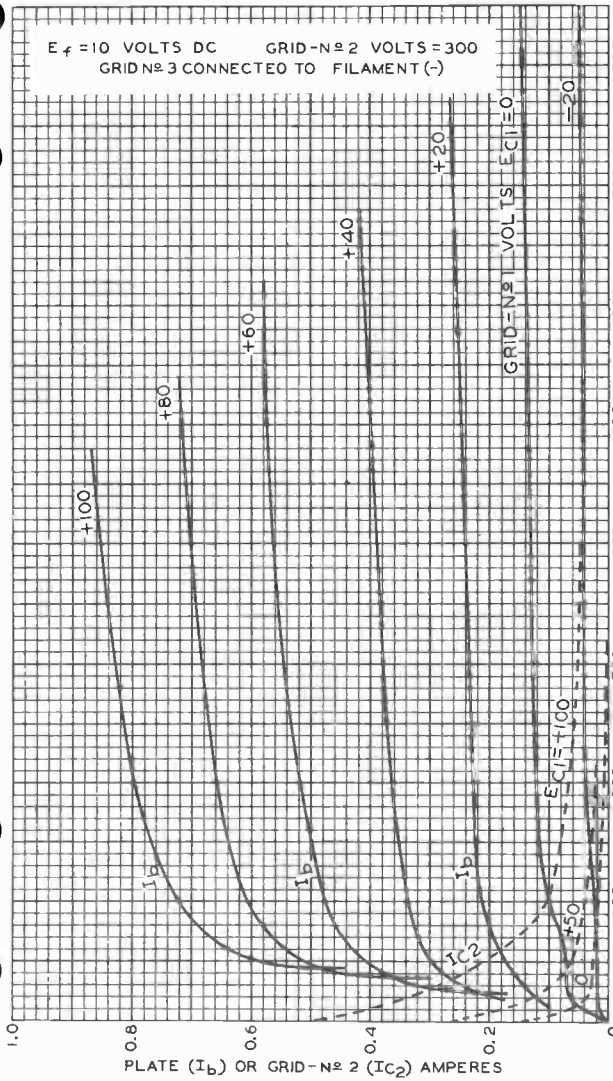
AVERAGE CHARACTERISTICS



MARCH 27, 1947

TUBE DIVISION
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92CM-4967R2

World Radio History

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AVERAGE CHARACTERISTICS

PLATE (I_b) OR GRID - Nº 2 (I_{C2}) AMPERES

MARCH 27, 1947 TUBE DIVISION 92CM-4968 R2

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AVERAGE CHARACTERISTICS

RCA

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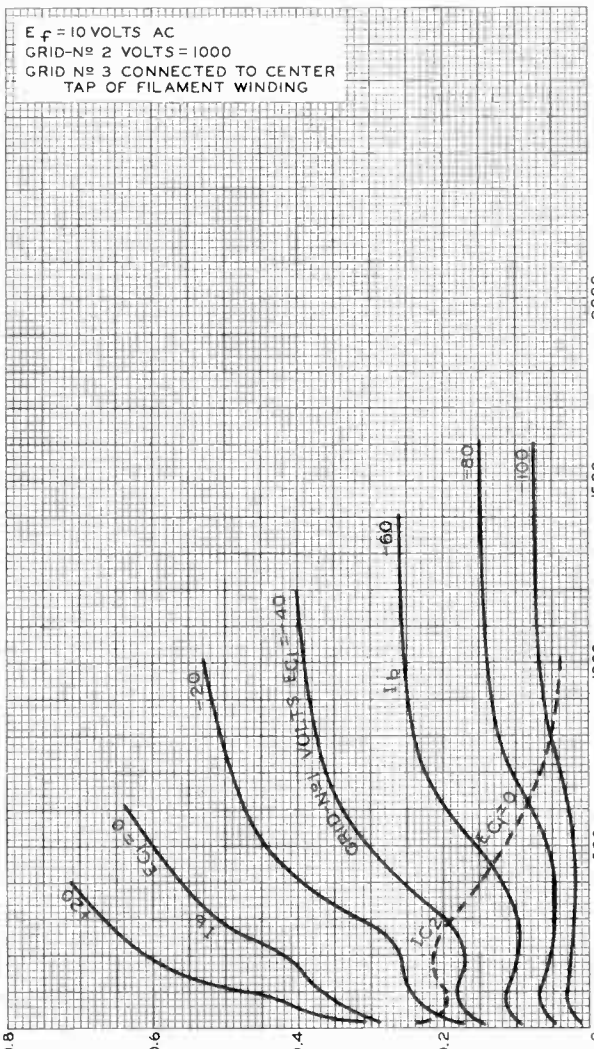
AVERAGE CHARACTERISTICS



NOV. 1, 1950 TUBE DIVISION 92CM-7565

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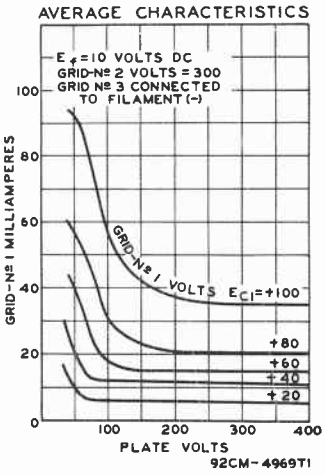
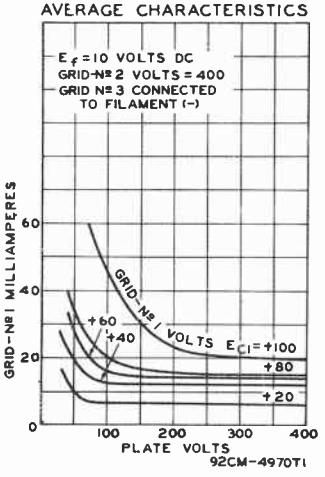
BEAM POWER TUBE





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TRANSMITTING BEAM POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Transconductance for	3300 approx.	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate (With external shielding)	0.1 max.	μμf
Input	13.5	μμf
Output	13.5	μμf
Maximum Overall Length		7-3/4"
Maximum Diameter		2-1/16"
Bulb		T-16
Cap		Small Metal
Base		Medium 5-Pin, "Micanol"

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS		ICAS	
D-C Plate Voltage	1250 max.		1500 max.	volts
D-C Screen Volt. (Grid #2)	300 max.		300 max.	volts
D-C Plate Current	60 max.		60 max.	ma.
Plate Input	75 max.		90 max.	watts
Screen Input	6.7 max.		6.7 max.	watts
Plate Dissipation	50 max.		60 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	1000	1250	1500	volts
D-C Screen Voltage	200	200	250	volts
D-C Grid Volt. (Grid #1)	-28	-28	-35	volts
Peak R-F Grid Volt.	50	50	56	volts
Beam-Forming-Plate Volt. *	0	0	0	volts
D-C Plate Current	60	60	60	ma.
D-C Screen Current	1.3	1	1.5	ma.
D-C Grid Cur. (Approx.)	1.8	1.8	1.5	ma.
Driving Power (Approx.) ○	0.65	0.65	0.85	watt
Power Output (Approx.)	20	25	30	watts

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	1250 max.	1500 max.	volts
D-C Screen Volt. (Grid #2)	300 max.	300 max.	volts
D-C Grid Volt. (Grid #1)	-250 max.	-250 max.	volts
D-C Plate Current	60 max.	60 max.	ma.
Plate Input	75 max.	90 max.	watts
Screen Input	6.7 max.	6.7 max.	watts
Plate Dissipation	50 max.	60 max.	watts

*, ○: See next page.

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TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

	CCS		ICAS	
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	1000	1250	1500	volts
D-C Screen Voltage	200	200	250	volts
D-C Grid Voltage	-100	-100	-120	volts
Peak R-F Grid Volt.	129	129	150	volts
Peak A-F Grid Volt.	64	64	60	volts
Beam-Forming-Plate Volt.*	0	0	0	volts
D-C Plate Current	60	60	60	ma.
D-C Screen Current	2	1.4	3	ma.
D-C Grid Cur. (Approx.)	3	2.8	2.5	ma.
Driving Power (Approx.) ○	2.5	2.3	4.2	ma.
Power Output (Approx.)	25	29	35	watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS		ICAS	
D-C Plate Voltage	1000 max.		1250 max.	volts
D-C Screen Volt. (Grid #2)	300 max.		300 max.	volts
D-C Grid Volt. (Grid #1)	-300 max.		-300 max.	volts
D-C Plate Current	120 max.		150 max.	ma.
D-C Grid Current	15 max.		15 max.	ma.
Plate Input	120 max.		180 max.	watts
Screen Input	6.7 max.		6.7 max.	watts
Plate Dissipation	34 max.		50 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	900	1000	1250	volts
D-C Screen Voltage §	300	300	300	volts
	40000	40000	48000	ohms
D-C Grid Voltage □	-150	-150	-150	volts
	15000	15000	15000	ohms
	1000	1000	860	ohms
Peak R-F Grid Volt.	215	222	222	volts
Beam-Forming-Plate Volt.*	0	0	0	volts
D-C Plate Current	120	120	144	ma.
D-C Screen Current	15	17.5	20	ma.
D-C Grid Cur. (Approx.)	10	10	10	ma.
Driving Power (Approx.)	2	2	3.2	watts
Power Output (Approx.)	76	87	130	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

	CCS	ICAS	
D-C Plate Voltage	1250 max.	1500 max.	volts
D-C Screen Volt. (Grid #2)	300 max.	300 max.	volts
D-C Grid Volt. (Grid #1)	-300 max.	-300 max.	volts
D-C Plate Current	150 max.	150 max.	ma.

*, ○, §, □, ##: See next page.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

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TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

	CCS		ICAS		
D-C Grid Current	15 max.		15 max.		ma.
Plate Input	180 max.		225 max.		watts
Screen Input	10 max.		10 max.		watts
Plate Dissipation	50 max.		65 max.		watts
Typical Operation:					
Filament Voltage	10	10	10	a-c	volts
D-C Plate Voltage	1000	1250	1500		volts
D-C Screen Voltage ▲	300	300	300		volts
	40000	42000	50000		ohms
D-C Grid Voltage ★	-70	-80	-90		volts
	7000	8000	9000		ohms
Peak R-F Grid Volt.	150	165	170		volts
Beam-Forming-Plate Volt.*	0	0	0		volts
D-C Plate Current	150	144	150		ma.
D-C Screen Current	17.5	22.5	24		ma.
D-C Grid Cur. (Approx.)	10	10	10		ma.
Driving Power (Approx.)	1.35	1.5	1.5		watts
Power Output (Approx.)	100	130	160		watts

* Beam-forming plates should be connected to the mid-point of filament operated on a.c., or to negative end of filament when d-c filament supply is used.

o At crest of audio-frequency cycle with modulation factor of 1.0.

§ Obtained preferably from modulated plate-voltage supply through resistor of value shown.

□ Obtained preferably from grid resistor (15000) although combination of either grid resistor and cathode resistor (1000, 860) or grid resistor and fixed supply may be used.

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

▲ From fixed supply of value shown. Series screen resistor of value shown should not be used except where the 814 is employed as a buffer amplifier and is not keyed.

★ Obtained by grid resistor of value shown or by other self- or fixed-bias method.

HIGH-FREQUENCY OPERATION

Maximum permissible percentage of maximum rated plate voltage and plate input

FREQUENCY (Mc)	30	50	75
TELEPHONY - Class B	100	90	85
TELEPHONY - Class C, Grid-Mod.	100	90	85
TELEPHONY - Class C, Plate-Mod.	100	80	64
TELEGRAPHY - Class C	100	80	64

World Radio History

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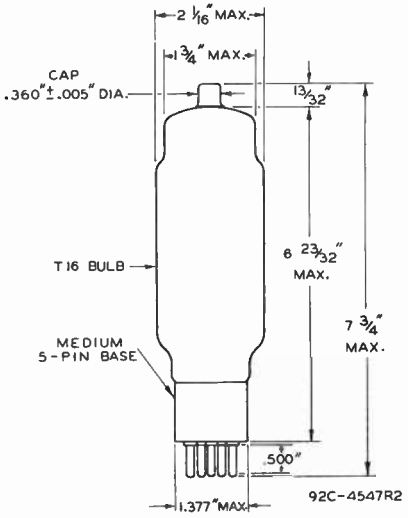
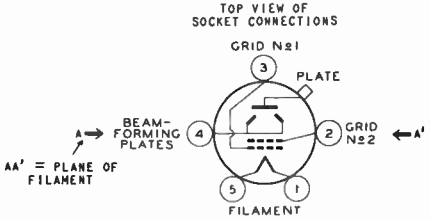
TRANSMITTING BEAM POWER AMPLIFIER





TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Filament in vertical plane (on edge).

World Radio History

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AVERAGE PLATE CHARACTERISTICS
WITH EC1 AS VARIABLE

814

E_f = 10 VOLTS D.C. SCREEN VOLTS = 300
BEAM-FORMING-PLATE VOLTS = 0

RCA RADIOTRON DIVISION
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NOV. 11, 1937

92C-4845

World Radio History

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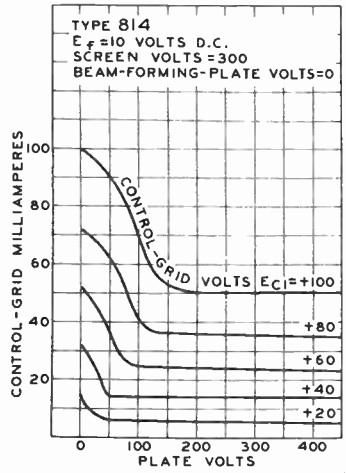
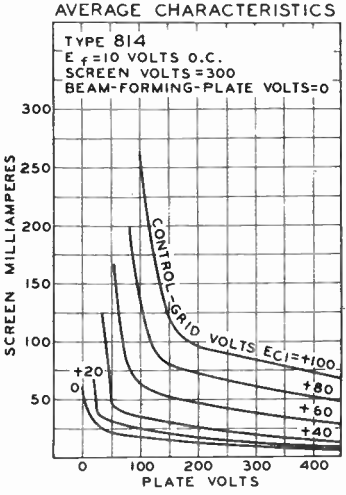
TRANSMITTING BEAM POWER AMPLIFIER



92C-4846



92C-4847

APRIL 20, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

92C-4846
92C-4847

World Radio History

815

815

PUSH-PULL R-F BEAM POWER AMPLIFIER

Unless otherwise specified, values are for both units

Heater	Coated Unipotential Cathode▽		
Heater Arrangement	*Series*	*Parallel*	
Voltage †	12.6	6.3	a-c or d-c volts
Current	0.8	1.6	amp.
Transconductance, for plate current of 25 ma.	4000		μmhos
Grid-Screen Mu-Factor	6.5		
Direct Interelectrode Capacitances (each unit):			
Grid-Plate (with external shielding)		0.2 max.	μμf
Input		14	μμf
Output		8.5	μμf
Maximum Overall Length		4-9/16"	
Maximum Radius		1-3/16"	
Bulb		T-16	
Caps (two)		Small	
Base		Large Wafer Octal 8-Pin, Sleeve	
RCA Socket		Stock No. 9924	←

† Should not deviate more than ±10% from the rated value.
▽ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should not exceed 100 volts.

Maximum Ratings Are Absolute Values

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

A-F POWER AMPLIFIER & MODULATOR - Class AB_2#

	CCS	*ICAS*		
D-C Plate Voltage	400 max.	500 max.	volts	
D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts	←
Max.-Sig. D-C Plate Current*	150 max.	150 max.	ma.	
Max.-Sig. Plate Input*	60 max.	75 max.	watts	
Max.-Sig. Screen Input*	4.5 max.	4.5 max.	watts	←
Plate Dissipation*	20 max.	25 max.	watts	
Typical Operation:				
D-C Plate Voltage	400	500	volts	
D-C Screen Voltage**‡	125	125	volts	
D-C Grid Voltage (Fixed bias, Grid #1)	-15	-15	volts	
Peak A-F Grid-to-Grid Volt.	60	60	volts	
Zero-Sig. D-C Plate Current	20	22	ma.	
Max.-Sig. D-C Plate Current	150	150	ma.	
Max.-Sig. D-C Screen Current	32	32	ma.	
Load Resistance (Per plate)	1550	2000	ohms	
Effective Load Resistance (Plate to plate)	6200	8000	ohms	
Max.-Sig. Driving Power♦	0.36	0.36	approx. watt	
Max.-Sig. Power Output	42	54	approx. watts	

Subscript 2 indicates that grid current flows during some part of input cycle.
** , ‡: See end of tabulation.
* Averaged over any audio-frequency cycle of sine-wave form.
♦ Driver stage should be capable of supplying the grids of the class AB_2 stage with the specified driving power at low distortion. The effective resistance per grid circuit of the class AB_2 stage should be kept below 500 ohms and the effective impedance at the highest desired response frequency should not exceed 700 ohms.

← Indicates a change.

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

World Radio History

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PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

PUSH-PULL R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS	ICAS	
D-C Plate Voltage	400 max.	500 max.	volts
→ D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts
D-C Plate Current	75 max.	75 max.	ma.
Plate Input	30 max.	37.5 max.	watts
→ Screen Input	4.0 max.	4.0 max.	watts
Plate Dissipation	20 max.	25 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Screen Voltage** ‡	125	125	volts
D-C Grid Voltage (Grid #1) ■	-25	-25	volts
Peak R-F Grid-to-Grid Volt.	50	50	volts
D-C Plate Current	75	75	ma.
D-C Screen Current	4	3	ma.
D-C Grid Current	Negligible		ma.
Driving Power°	0.8	0.7 approx.	watt
Power Output	10.5	13 approx.	watts

GRID-MODULATED PUSH-PULL R-F POWER AMP. - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS	ICAS	
D-C Plate Voltage	400 max.	500 max.	volts
→ D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts
D-C Grid Voltage (Grid #1)	-175 max.	-175 max.	volts
D-C Plate Current	75 max.	75 max.	ma.
Plate Input	30 max.	37.5 max.	watts
→ Screen Input	4.0 max.	4.0 max.	watts
Plate Dissipation	20 max.	25 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Screen Voltage ‡ **	125	125	volts
D-C Grid Voltage ■	-40	-40	volts
Peak R-F Grid-to-Grid Volt.	80	80	volts
Peak A-F Grid Voltage	19	17	volts
D-C Plate Current	75	75	ma.
D-C Screen Current	3	3	ma.
D-C Grid Current	0.4	0.4 approx.	ma.
Driving Power°	0.32	0.28 approx.	watt
Power Output	10.5	13 approx.	watts

° At crest of audio-frequency cycle with modulation factor of 1.0.
■ Obtained preferably from a fixed supply.

PLATE-MODULATED PUSH-PULL R-F POWER AMP. - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS	ICAS	
D-C Plate Voltage	325 max.	400 max.	volts
→ D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts
D-C Grid Voltage (Grid #1)	-175 max.	-175 max.	volts
D-C Plate Current	125 max.	150 max.	ma.

**, ‡: See end of tabulation.

← Indicates a change.

World Radio History

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PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

	CCS	ICAS	
D-C Grid Current	7 max.	7 max.	ma. ◄
Plate Input	40 max.	60 max.	watts
Screen Input	4.0 max.	4.0 max.	watts ◄
Plate Dissipation	13.5 max.	20 max.	watts
Typical Operation:			
D-C Plate Voltage	325	400	volts
D-C Screen Voltage□ ‡	165	175	volts
	10000	15000	ohms
D-C Grid Voltage § ⊕	-45	-45	volts
	11250	15000	ohms
Peak R-F Grid-to-Grid Volt.	112	116	volts
D-C Plate Current	123	150	ma.
D-C Screen Current	16	15	ma.
D-C Grid Current	4	3 approx.	ma.
Driving Power	0.2	0.16 approx.	watt
Power Output	30	45 approx.	watts

□ Preferably obtained from a separate source modulated with the plate supply, or obtained from the modulated plate-supply through resistor of value shown.
§ Obtained from grid resistor of value shown (per tube) or by partial self-bias methods.

PUSH-PULL R-F POWER AMPLIFIER & OSCILLATOR-Class C Telegraphy

Key-down conditions per tube without modulation ##

	CCS	ICAS	
D-C Plate Voltage	400 max.	500 max.	volts
D-C Screen Voltage (Grid #2)	225 max.	225 max.	volts ◄
D-C Grid Voltage (Grid #1)	-175 max.	-175 max.	volts
D-C Plate Current	150 max.	150 max.	ma.
D-C Grid Current	7 max.	7 max.	ma. ◄
Plate Input	60 max.	75 max.	watts
Screen Input	4.5 max.	4.5 max.	watts ◄
Plate Dissipation	20 max.	25 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Screen Voltage▲ ‡	145	200	volts
	15000	17500	ohms
D-C Grid Voltage⧄ ⊕	-45	-45	volts
	10000	13000	ohms
	260	265	ohms
Peak R-F Grid-to-Grid Volt.	116	112	volts
D-C Plate Current	150	150	ma.
D-C Screen Current	17	17	ma.
D-C Grid Current	4.5	3.5 approx.	ma.
Driving Power	0.23	0.18 approx.	watt
Power Output	44	56 approx.	watts

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

‡: See next page.

▲ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown. The screen voltage must not exceed 600 volts under key-up conditions.
⧄ Obtained from fixed supply, by grid resistor (10000.13000), or cathode resistor (260, 265).
⊕ The grid-circuit resistance should never exceed 15000 ohms (total) per tube, or 30000 ohms per unit. Any additional bias required must be supplied by a cathode resistor or a fixed supply. ◄ Indicates a change.

World Radio History

815

PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

** Preferably obtained from a separate source, or from the plate-voltage supply with a voltage divider.

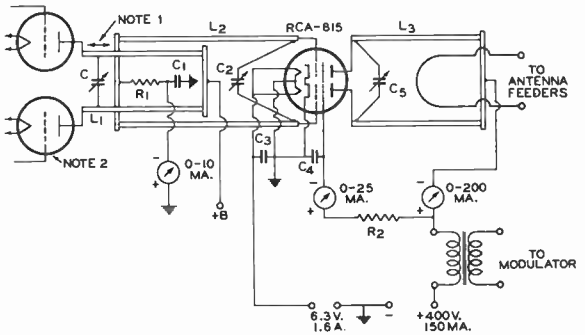
‡ In applications requiring the use of screen voltages above 135 volts, provision should be made for the adjustment of control-grid bias for each unit separately. The necessity for this adjustment at the lower screen voltages depends on the distortion requirements and on whether the plate-dissipation rating is exceeded at zero-signal plate current.

Data on operating frequencies for the 815 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

Shielding and by-passing considerations for the 815 are similar to those given under Type 832-A.

ULTRA-HIGH-FREQUENCY PLATE-MODULATED PUSH-PULL R-F POWER AMPLIFIER

112-116 Mc



C — See L_1

C_1 C_3 C_4 — 1" x 1½" copper sheet insulated from chassis by mica sheet 0.002" thick, or 0.0005-µf "postage stamp" mica condensers soldered to chassis with shortest practicable leads.

C_2 C_5 — Copper discs, 1/16" x 1½". Solder discs to 10-32 brass screws 1" long. Drill and tap grid and plate lines for 10-32 screws.

R_1 — 15000 ohms, 0.5 watt

R_2 — 15000 ohms, 25 watts, adjustable.

L_1 — ¼" dia. copper tubing. Length of tubing and capacitance of C depend upon driver tubes employed.

L_2 — ¼" dia. copper tubing, 12½" long and spaced approx. 7/8" between centers.

L_3 — ¼" dia. copper tubing, 13" long and spaced approx. 7/8" between centers.

NOTES

(1) The r-f driver stage should be able to deliver about one watt of useful r-f power, in order to insure ample grid excitation for the 815.

(2) Adjust coupling between L_1 and L_2 and tuning of C and C_2 for recommended d-c grid current of the 815.

(3) L_1 and L_2 should be effectively shielded from L_3 by a metal chassis, or by a vertical metal baffle plate used to mount the 815.

(4) Adjust coupling of "hairpin" antenna coil to L_3 so that the amplifier is properly loaded.

(5) A small lumped inductance can be substituted for the amplifier grid lines, if desired. Such a grid coil is preferably tuned by varying its inductance rather than by means of a variable condenser.

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

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World Radio History

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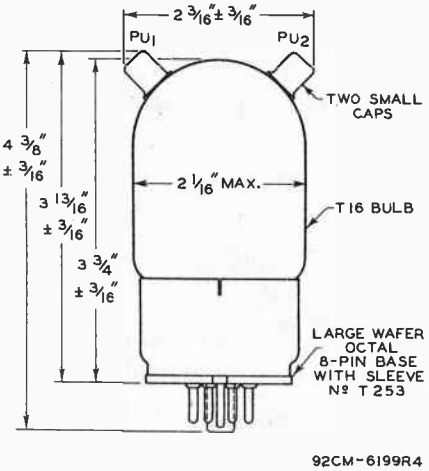
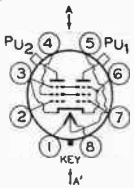
PUSH-PULL R-F BEAM POWER AMPLIFIER



BOTTOM VIEW OF SOCKET CONNECTIONS

Pin 1 – Heater
Pin 2 – Grid No.1 of Unit No.2
Pin 3 – Cathode, Internal Shield
Pin 4 – Grid No.2
Pin 5 – Heater Center-Tap



Pin 6 – Cathode, Internal Shield
Pin 7 – Grid No.1 of Unit No.1
Pin 8 – Heater
P_{U1} & P_{U2} – Plate Terminals of Units No.1 & No.2, respectively

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

TUBE MOUNTING POSITION

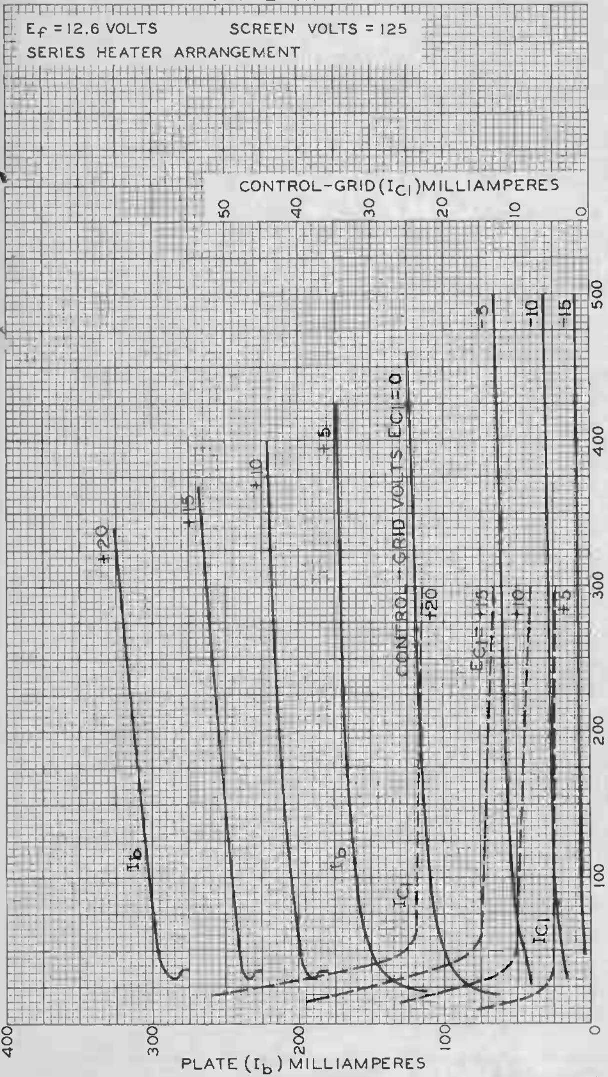
Any

World Radio History

815

815

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



SEPT. 17, 1943

RCA VICTOR DIVISION

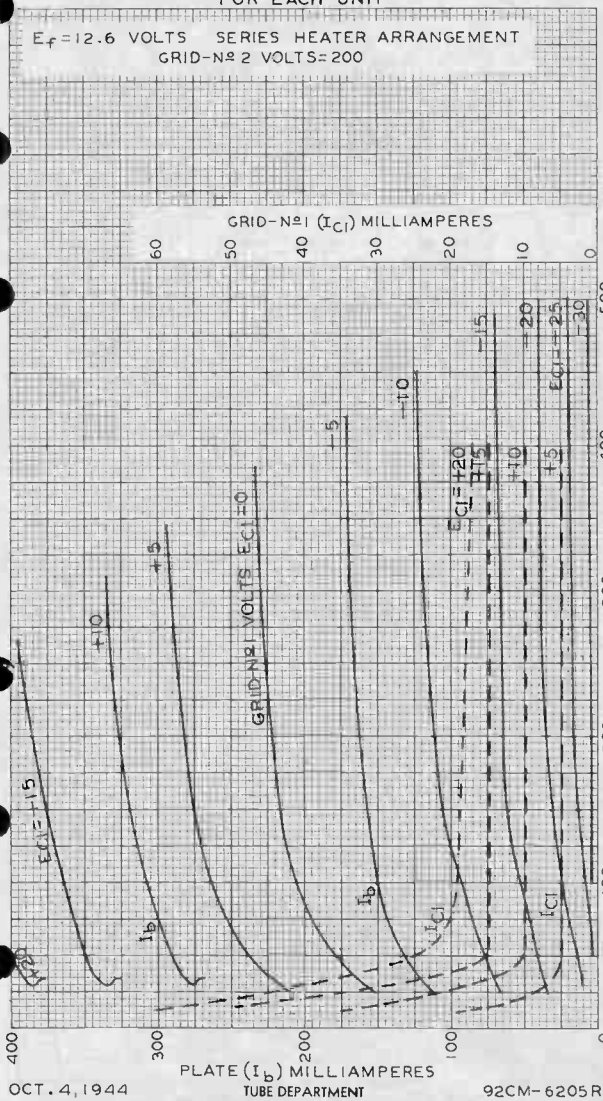
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6206R1

World Radio History

RCA

815
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



OCT. 4, 1944

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6205R1

World Radio History

RCA

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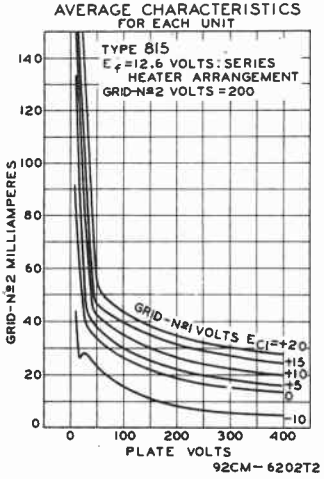
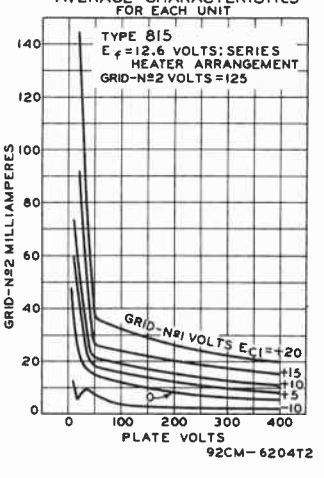
PUSH-PULL R-F BEAM POWER AMPLIFIER





TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
CE-6202T2-6204T2

World Radio History

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HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

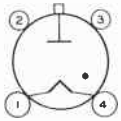
Electrical:

	Min.	Av.	Max.	
Filament, Coated:				
Voltage	2.25	2.5	2.75	ac volts
Current at 2.5 volts	–	2	2.2	amp
Heating time at rated voltage	10	–	–	sec
Peak Tube Voltage Drop (Approx.)	–	15	–	volts

Mechanical:

Operating Position . . . . . Vertical, base down
Maximum Overall Length . . . . . 4-11/16"
Seated Length . . . . . 3-15/16" ± 1/8"
Maximum Diameter . . . . . 1-9/16"
Weight (Approx.) . . . . . 1 oz
Bulb ST12
Cap . . . . . Small (JETEC No.C1-1)
Socket . . . . . Johnson No.122-224, or equivalent
Base . . . . . Small-Shell Small 4-Pin (JETEC No.A4-5)
Basing Designation for BOTTOM VIEW 4P

Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – No Connection



Pin 4 – Filament, Cathode Shield
Cap – Anode

Temperature Control:

Heating—When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling—When the operating conditions are such that the maximum value of the operating condensed-mercury-temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.):

No load	22	°C
Full load	26	°C

→ Indicates a change.

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

World Radio History

816

HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury-Temperature Range 20° to 60° C	
PEAK INVERSE ANODE VOLTAGE	7500 max.	volts
ANODE CURRENT:		
Peak	500 max.	ma
Average#	125 max.	ma
→ Fault, for duration of 0.1 second maximum	5 max.	amp

Averaged over any interval of 30 seconds maximum.

OPERATING CONSIDERATIONS

Shields and rf filter circuits should be provided for the 816 if it is subjected to extraneous high-frequency fields during operation. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. When shields are used, special attention must be given to providing adequate ventilation and to maintaining normal condensed-mercury temperature. Rf filters are employed to prevent damage caused by rf currents which might otherwise be fed back into the rectifier tubes.

→ Indicates a change.

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

World Radio History

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HALF-WAVE MERCURY-VAPOR RECTIFIER

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}		MAX. DC OUTPUT KW TO FILTER P_{dc}	
			Resistive Load	*Inductive Load*	*Resistive Load*	*Inductive Load*
Fig. 1 Half-Wave Single-Phase In-Phase Operation	5300[D]	2400	0.125		0.3	
Fig. 2 Full-Wave Single-Phase In-Phase Operation	2600[D]	2400	0.25		0.6	
Fig. 3 Series Single-Phase In-Phase Operation	5300[D]	4800	0.25		1.2	
Fig. 4 Half-Wave Three-Phase In-Phase Operation	3000[D]	3600	0.75		2.7	
Fig. 5 Parallel Three-Phase Quadrature Operation	3000[D]	3600	1.5		5.4	
Fig. 6 Series Three-Phase Quadrature Operation	3000[D]	7200	0.75		5.4	
Fig. 7 Half-Wave Four-Phase Quadrature Operation	2600[D]	3500	0.45	0.5	1.55	1.75
Fig. 8 Half-Wave Six-Phase Quadrature Operation	2600[D]	3600	0.47	0.5	1.7	1.8

[D] For maximum peak inverse anode voltage of 7500 volts and condensed-mercury-temperature range of 20° to 60° C.

World Radio History

RCA

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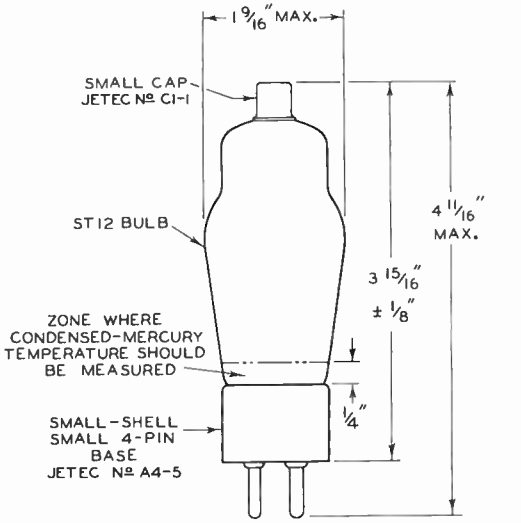
HALF-WAVE MERCURY-VAPOR RECTIFIER



92CM-6277R4

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

World Radio History

826

TRANSMITTING TRIODE

GENERAL DATA

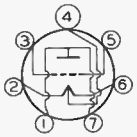
Electrical:

Filament, Thoriated Tungsten:†		
Voltage	7.5	ac or dc volts
Current	4	amp
Amplification Factor	31	
Direct Interelectrode Capacitances:		
Grid to Plate	3	μμf ←
Grid to Filament	3	μμf ←
Plate to Filament	1.1	μμf ←

Mechanical:

Mounting Position	Vertical Only, Base up or down
Overall Length	3-1/2" ± 3/16"
Seated Length	3-1/16" ± 3/16"
Maximum Diameter	See Outline Drawing
Bulb	T-16
Base	Medium Molded-Flare Septar 7-Pin
Basing Designation for BOTTOM VIEW	7BC

Pin 1 – Plate
Pin 2 – Filament
Pin 3 – Grid
Pin 4 – Filament Center-Tap



Pin 5 – Grid
Pin 6 – Filament
Pin 7 – Plate

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:* ←

	NATURAL COOLING CCS●	NATURAL COOLING ICAS●●	
DC PLATE VOLTAGE	800 max.	1000 max.	volts
DC GRID VOLTAGE	-600 max.	-600 max.	volts
DC PLATE CURRENT	95 max.	125 max.	ma
DC GRID CURRENT	40 max.	40 max.	ma
PLATE INPUT	60 max.	95 max.	watts
PLATE DISSIPATION	30 max.	45 max.	watts

Typical Operation with Natural Cooling: ←

DC Plate Voltage	–	1000	volts
DC Grid Voltage●#	–	-160	volts
	–	4000	ohms
Peak RF Grid Voltage	–	320	volts
DC Plate Current	–	95	ma
DC Grid Current (Approx.)□	–	40	ma
Driving Power (Approx.)□	–	11.5	watts
Power Output (Approx.)	–	70	watts

†, ●, ●●, ●, #, □: See next page.
← Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

826

TRANSMITTING TRIODE

→ Maximum Ratings, *Absolute Values*:	FORCED-AIR COOLING CCS●	FORCED-AIR COOLING ICAS●●	
DC PLATE VOLTAGE	800 max.	1000 max.	volts
DC GRID VOLTAGE	-600 max.	-600 max.	volts
DC PLATE CURRENT	95 max.	125 max.	ma
DC GRID CURRENT	40 max.	40 max.	ma
PLATE INPUT	75 max.	125 max.	watts
PLATE DISSIPATION	40 max.	60 max.	watts

→ Typical Operation with Forced-Air Cooling:			
DC Plate Voltage	800	1000	volts
DC Grid Voltage⊕#	-100	-100	volts
	2800	2800	ohms
Peak RF Grid Voltage	198	210	volts
DC Plate Current	94	125	ma
DC Grid Current (Approx.)□	35	35	ma
Driving Power (Approx.)□	6.3	6.6	watts
Power Output (Approx.)	53	90	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

→ Maximum Ratings, *Absolute Values*:	NATURAL COOLING CCS●	NATURAL COOLING ICAS●●	
DC PLATE VOLTAGE	1000 max.	1000 max.	volts
DC GRID VOLTAGE	-600 max.	-600 max.	volts
DC PLATE CURRENT	125 max.	140 max.	ma
DC GRID CURRENT	40 max.	40 max.	ma
PLATE INPUT	95 max.	130 max.	watts
PLATE DISSIPATION	45 max.	55 max.	watts

→ Typical Operation with Natural Cooling:			
DC Plate Voltage	-	1000	volts
DC Grid Voltage#▲	-	-70	volts
	-	2000	ohms
	-	425	ohms
Peak RF Grid Voltage	-	183	volts
DC Plate Current	-	130	ma
DC Grid Current (Approx.)	-	35	ma
Driving Power (Approx.)	-	5.8	watts
Power Output (Approx.)	-	90	watts

→ Maximum Ratings, *Absolute Values*:	FORCED-AIR COOLING CCS●	FORCED-AIR COOLING ICAS●●	
DC PLATE VOLTAGE	1000 max.	1250 max.	volts
DC GRID VOLTAGE	-600 max.	-600 max.	volts
DC PLATE CURRENT	125 max.	140 max.	ma
DC GRID CURRENT	40 max.	40 max.	ma
PLATE INPUT	125 max.	175 max.	watts
PLATE DISSIPATION	60 max.	75 max.	watts

†, ●, ●●, ⊕, #, □, □□, ▲: See next page. → Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

826

TRANSMITTING TRIODE

Typical Operation with Forced-Air Cooling:

DC Plate Voltage	1000	1250	volts
DC Grid Voltage#▲	-70	-125	volts
	2000	3600	ohms
	440	780	ohms
Peak RF Grid Voltage	183	245	volts
DC Plate Current	125	125	ma
DC Grid Current (Approx.)	35	35	ma
Driving Power (Approx.)	5.8	7.7	watts
Power Output (Approx.)	86	120	watts

† The filament is center-tapped and the center lead is brought out of the tube. With this design, it is possible to minimize the effect of filament-lead inductance by connecting all three filament leads in parallel through rf by-pass capacitors. The center lead of this parallel connection should not be returned directly to the center-tap of the filament-transformer winding or to ground, although it may be by-passed to either of these points if desired. RF by-passing of the grid- and plate-return circuits should be made to the center lead of the filament.

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

⊕ Obtained by grid resistor of value shown. Fixed supply not recommended for linear modulation.

Grid voltages are given with respect to the mid-point of filament operated on ac. If dc is used, each stated value of grid voltage should be decreased by one-half the filament voltage and the circuit returns made to the negative end of the filament.

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

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

▲ Obtained from fixed supply, by grid resistor (2000, 2000, 3600) or by cathode resistor (425, 440, 780).

NOTE: When the 826 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1250 volts, a fixed bias of at least -22.5 volts should be used.

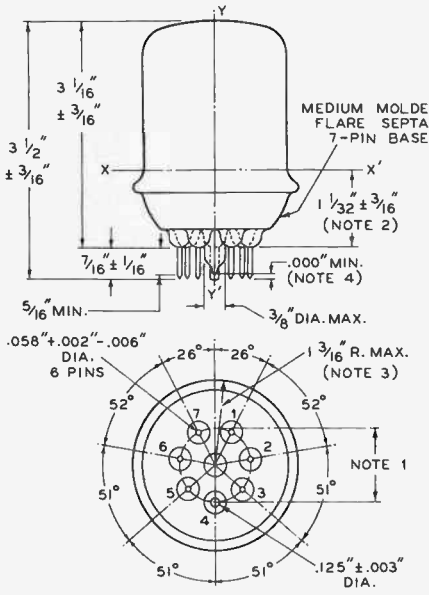
Data on operating frequencies for the 826 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY. Adequate shielding must be provided at the higher frequencies. At the very-high frequencies, push-pull operation is recommended and it is desirable to use each tube with its two grid terminals connected together as well as its two plate terminals connected together, in order to reduce the respective lead inductances.

← Indicates a change.

World Radio History

826

826
TRANSMITTING TRIODE



92CM-6131R2

BOTTOM VIEW

THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ±5° FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

NOTE 2: A FLAT-PLATE FLANGE GAUGE WITH HOLE 2.063" - 0.000" + 0.003" IS LOWERED OVER TUBE SEATED IN BASE-PIN GAUGE SO THAT THE HOLE AXIS IS COINCIDENT WITH AXIS YY' WITHIN 0.150", AND SO THAT THE BOTTOM SURFACE OF THE

(continued on next page)

World Radio History

826

TRANSMITTING TRIODE

FLANGE GAUGE IS PARALLEL TO THE TOP SURFACE OF THE BASE-PIN GAUGE, AND UNTIL THE FLANGE GAUGE RESTS ON THE TUBE-FLANGE SEAL AT POSITION XX. THE PERPENDICULAR DISTANCE BETWEEN THE TWO GAUGES WILL BE AS SHOWN.

NOTE 3: MINIMUM DIAMETER OF TUBE-SEAL FLANGE WILL BE SUCH THAT A RING GAUGE HAVING I.D. OF 2.125" - 0.000" + 0.003" AND THICKNESS OF 0.125" ± 0.010" WILL NOT PASS THE FLANGE WHEN TRIED AT ANY ANGLE.

NOTE 4: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

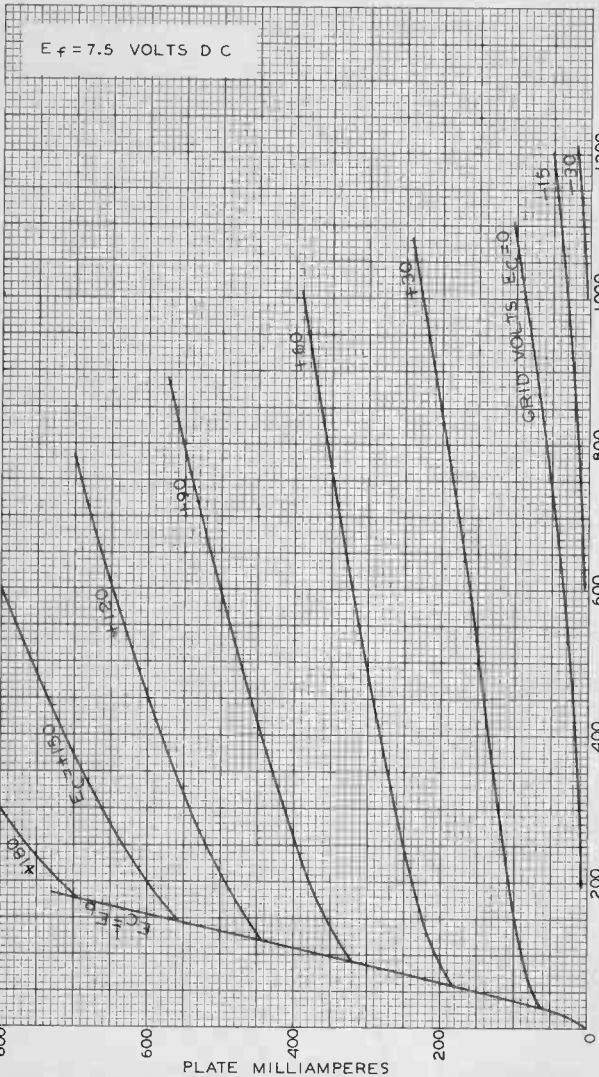
World Radio History

826

RCA

826

AVERAGE PLATE CHARACTERISTICS



SEPT. 9, 1940

TUBE DEPARTMENT

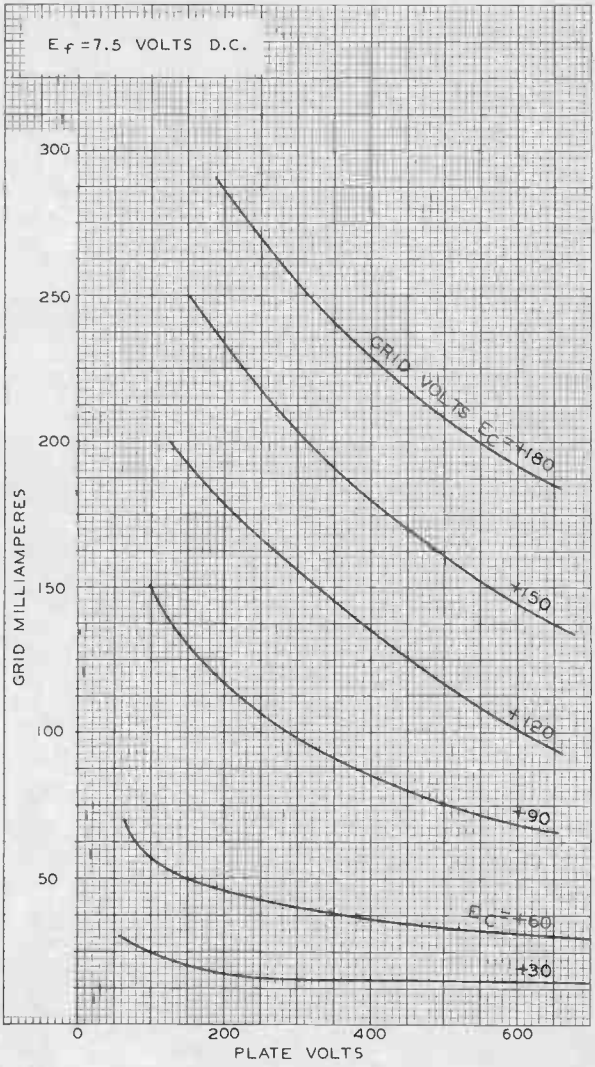
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6210

RCA

826

TYPICAL CHARACTERISTICS



FEB. 12, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6211

World Radio History

World Radio History

827-R

TRANSMITTING TETRODE
FORCED-AIR COOLED

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	25	amp.

Starting - The current must never exceed 50 amperes, even momentarily.

Grid-Screen Mu-Factor	16	
Direct Interelectrode Capacitances:		
Grid-Plate (with external shielding)	0.18 max.	μμf
Input	21	μμf
Output	13	μμf
Maximum Overall Length	5-15/16"	
Maximum Diameter	4-21/32"	
Radiator	Integral part of tube	

Cooling - vertical air flow of 100 cfm from plate to seal end required for max. plate dissipation rating and max. ambient temperature not more than 45°C. Also, flow of 10 cfm from 1"-diameter nozzle should be directed into header. Air flow must start before any voltages are applied.

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

		CCS	
D-C Plate Voltage		3500 max.	volts
D-C Screen Voltage (Grid No.2)		1000 max.	volts
D-C Plate Current		400 max.	ma.
Plate Input		1200 max.	watts
Screen Input		100 max.	watts
Plate Dissipation		800 max.	watts
Radiator Temperature		150 max.	°C
Typical Operation:			
D-C Plate Voltage	3000	3500	volts
D-C Screen Voltage	800	800	volts
D-C Grid Voltage (Grid No.1)*	-75	-75	volts
Peak R-F Grid Voltage	165	150	volts
D-C Plate Current	320	340	ma.
D-C Screen Current	10	12	ma.
D-C Grid Current	30	25 approx.	ma.
Driving Power •	50	38 approx.	watts
Power Output	350	400 approx.	watts

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

		CCS	
D-C Plate Voltage		3500 max.	volts
D-C Screen Voltage (Grid No.2)		1000 max.	volts
D-C Grid Voltage (Grid No.1)		-500 max.	volts
D-C Plate Current		400 max.	ma.
Plate Input		1200 max.	watts
Screen Input		100 max.	watts
Plate Dissipation		800 max.	watts
Radiator Temperature		150 max.	°C
Typical Operation:			
D-C Plate Voltage	3000	3500	volts

• See end of tabulation. ← Indicates a change. *With a-c filament supply.

World Radio History

827-R

TRANSMITTING TETRODE

(continued from preceding page)

D-C Screen Voltage	800	800	volts
D-C Grid Voltage	-300	-300	volts
Peak R-F Grid Voltage	410	410	volts
Peak A-F Grid Voltage	235	260	volts
D-C Plate Current	333	320	ma.
D-C Screen Current	15	13	ma.
D-C Grid Current	45	40 approx.	ma.
Driving Power ●	82	74 approx.	watts
Power Output	350	400 approx.	watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	
D-C Plate Voltage	3000 max.	volts
D-C Screen Voltage (Grid No.2)	800 max.	volts
D-C Grid Voltage (Grid No.1)	-500 max.	volts
D-C Plate Current	400 max.	ma.
D-C Grid Current	125 max.	ma.
Plate Input	1200 max.	watts
Screen Input	100 max.	watts
Plate Dissipation	550 max.	watts
Radiator Temperature	150 max.	°C

Typical Operation:

D-C Plate Voltage	2500	3000	volts
D-C Screen Voltage ◊	700	750	volts
	13000	18000	ohms
D-C Grid Voltage ▲	-350	-325	volts
	2800	2600	ohms
Peak R-F Grid Voltage	640	600	volts
D-C Plate Current	400	400	ma.
D-C Screen Current	140	125	ma.
D-C Grid Current	125	125 approx.	ma.
Driving Power	72	68 approx.	watts
Power Output	670	825 approx.	watts

◊ Obtained preferably from fixed supply modulated simultaneously with plate voltage. Series voltage-dropping resistor (13000, 18000 ohms) connected to modulated plate-voltage supply may also be used.

▲ Obtained by grid resistor of value shown or by combination of grid resistor with either fixed supply or cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

	CCS	
D-C Plate Voltage	3500 max.	volts
D-C Screen Voltage (Grid No.2)	1000 max.	volts
D-C Grid Voltage (Grid No.1)	-500 max.	volts
D-C Plate Current	500 max.	ma.
D-C Grid Current	150 max.	ma.
Plate Input	1500 max.	watts
Screen Input	150 max.	watts
Plate Dissipation	800 max.	watts
Radiator Temperature	150 max.	°C

●, ##: See end of tabulation.

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

World Radio History

827-R

TRANSMITTING TETRODE

(continued from preceding page)

Typical Operation:

D-C Plate Voltage	3000	3500	volts
D-C Screen Voltage §	900	700	volts
	12500	15100	ohms
D-C Grid Voltage □	-350	-300	volts
	560	570	ohms
	2800	3000	ohms
Peak R-F Grid Voltage	590	520	volts
D-C Plate Current	500	428	ma.
D-C Screen Current	165	185	ma.
D-C Grid Current	125	100	approx. ma.
Driving Power	66	50	approx. watts
Power Output	1000	1050	approx. watts

• At crest of audio-frequency cycle with modulation factor of 1.0.

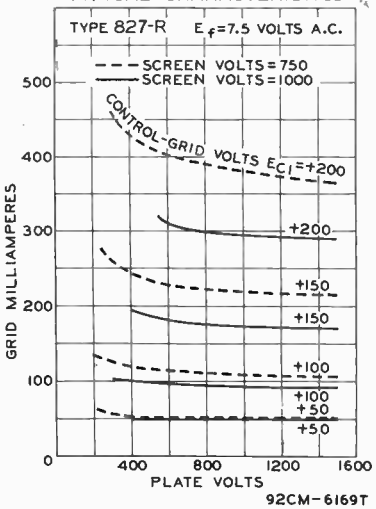
§ Obtained preferably from fixed supply or voltage divider. Screen voltage must not exceed twice the maximum screen-voltage rating under key-up conditions.

□ Obtained from fixed supply, cathode resistor (560, 570) or grid resistor (2800, 3000). If a preceding stage is keyed, sufficient fixed bias must be supplied to maintain plate current at a low value under key-up conditions.

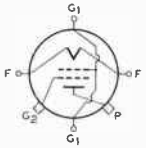
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 827-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TYPICAL CHARACTERISTICS



TOP VIEW OF TERMINAL CONNECTIONS

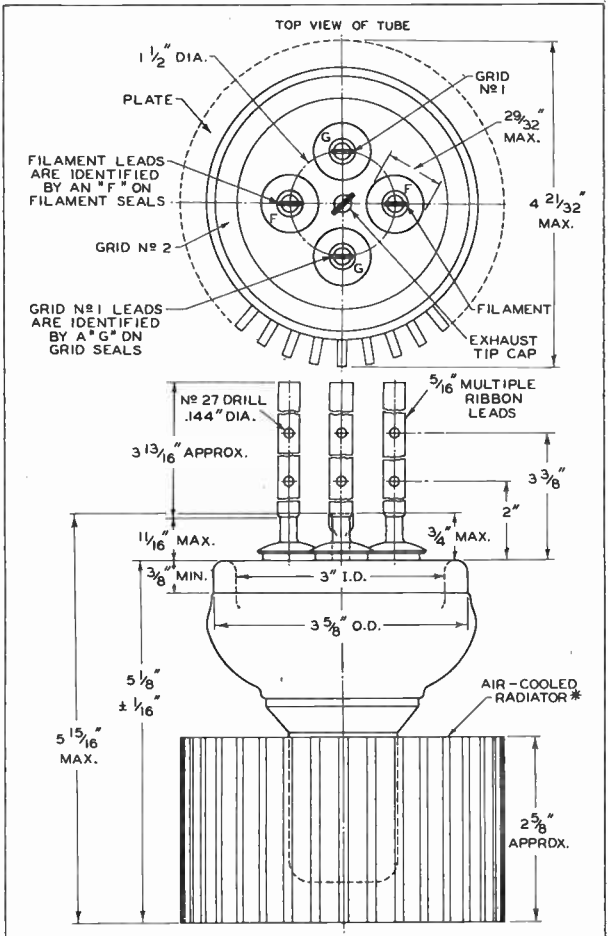


F - Filament
G_1 - Grid No. 1
G_2 - Grid No. 2
P - Plate

World Radio History

827-R

TRANSMITTING TETRODE



TUBE MOUNTING POSITION

VERTICAL: Radiator down.
HORIZONTAL: No.

* Either open-slot (as shown) or closed-slot type is supplied at our option.

→ Indicates a change.

World Radio History

827-R

827-R
AVERAGE PLATE CHARACTERISTICS
(TENTATIVE)

JUNE 5, 1940

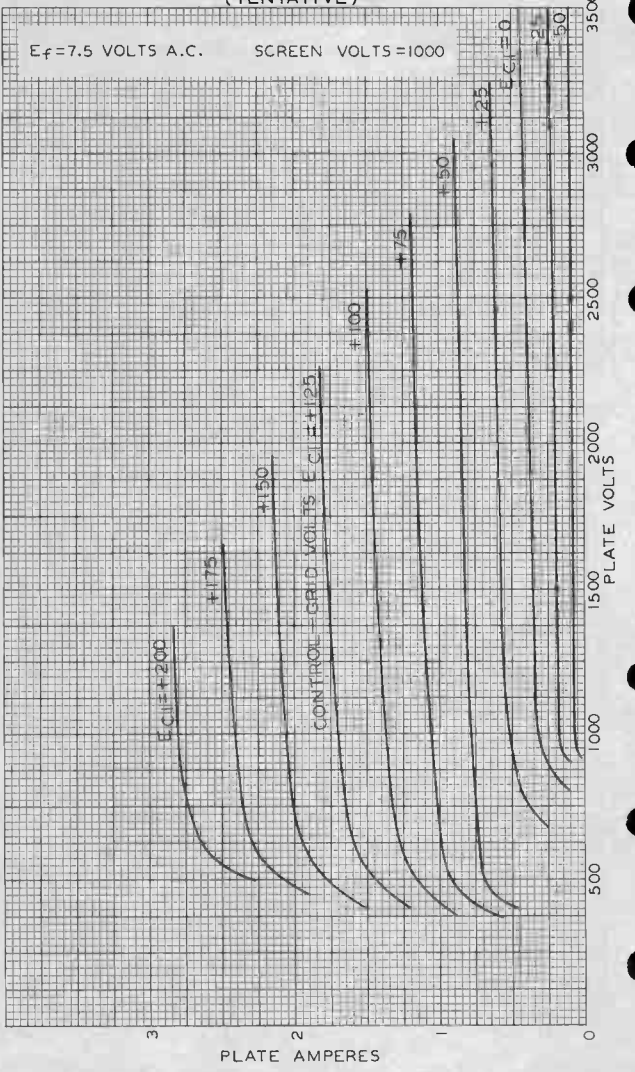
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92CM-6167

World Radio History

827-R

827-R
AVERAGE PLATE CHARACTERISTICS
(TENTATIVE)



JUNE 5, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92CM-6166

828

TRANSMITTING BEAM POWER AMPLIFIER

GENERAL DATA

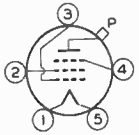
Electrical:

Filament, Thoriated Tungsten:			
Voltage	10 ± 0.5	. . .	ac or dc volts
Current	3.25	. . . . .	amp
Transconductance (Approx.) for plate current of 43 ma.	2700	. . . . .	μmhos ←
Direct Interelectrode Capacitances:			←
Grid No.1 to Plate	0.07 max.	. . . . .	μμf
Input	12	. . . . .	μμf
Output	14	. . . . .	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, pins 2 & 4 in vertical plane.
Overall Length	7-7/16" ± 1/4"
Seated Length	6-13/16" ± 1/4"
Maximum Diameter	2-1/16"
Bulb	T-16
Cap	Small
Base	Medium-Shell Small 5-Pin, Micanol
Basing Designation for BOTTOM VIEW	5J

Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1



Pin 4 - Grid No.3
Pin 5 - Filament
Cap - Plate

AF POWER AMPLIFIER & MODULATOR - Class AB_1*

Maximum Ratings, *Absolute Values*:

	CCS•	ICAS••	
DC PLATE VOLTAGE	1750 max.	2000 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	750 max.	750 max.	volts
MAX.-SIG. DC PLATE CURRENT*	150 max.	150 max.	ma
MAX.-SIG. PLATE INPUT*	225 max.	270 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	16 max.	23 max.	watts
PLATE DISSIPATION*	70 max.	80 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1750	2000	volts ←
DC Grid-No.3 Voltage	60	60	volts
DC Grid-No.2 Voltage †	750	750	volts

* Suscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

* Averaged over any audio-frequency cycle of sine-wave form.

† Zero-signal grid-No.2 voltage must not exceed 775 volts.

•, ••: See next page.

← Indicates a change.

World Radio History

828
TRANSMITTING BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
DC Grid-No.1 (Control-Grid) Voltage⊕.	-120	-120	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	240	240	volts
Zero-Signal DC Plate Current .	50	50	ma
Max.-Signal DC Plate Current .	248	270	ma
DC Grid-No.3 Current	9	9	ma
Zero-Signal DC Grid-No.2 Current.	4	2	ma
Max.-Signal DC Grid-No.2 Current.	43	60	ma
Effective Load Resistance (Plate-to-plate).	16200	18500	ohms
Max.-Signal Driving Power (Approx.)♦	0	0	watts
Max.-Signal Power Output (Approx.)	300●●	385	watts

♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class AB_1 stage. The effective resistance per grid-No.1 circuit of the class AB_1 stage should be held at a low value.

●● Distortion only 1% with 20 db of feedback to grid of driver.

RF POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:	CCS●	ICAS●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC PLATE CURRENT	100 max.	100 max.	ma
PLATE INPUT.	105 max.	120 max.	watts
GRID-No.3 INPUT.	5 max.	5 max.	watts
GRID-No.2 INPUT.	11 max.	11 max.	watts
PLATE DISSIPATION	70 max.	80 max.	watts
Typical Operation:			
DC Plate Voltage	1250	1500	volts
DC Grid-No.3 Voltage	75	75	volts
DC Grid-No.2 Voltage	400	400	volts
DC Grid-No.1 (Control-Grid) Voltage⊕♦	-50	-50	volts
Peak RF Grid-No.1 Voltage. . .	52	50	volts
DC Plate Current	84	80	ma
DC Grid-No.3 Current	4	4	ma
DC Grid-No.2 Current	5	5	ma
DC Grid-No.1 Cur. (Approx.). .	0.3	0.2	ma

●, ●●, ⊕, ♦: See next page.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
World Radio History

828
TRANSMITTING BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
Driving Power (Approx.)□ . . .	0.5 . .	0.4 . .	watt
Power Output (Approx.)	36 . .	41 . .	watts

♦ obtained from a source of good regulation or from suitably bypassed cathode resistor.

GRID-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-300 max.	-300 max.	volts
DC PLATE CURRENT	100 max.	100 max.	ma
PLATE INPUT.	105 max.	120 max.	watts
GRID-No.3 INPUT.	5 max.	5 max.	watts
GRID-No.2 INPUT.	11 max.	11 max.	watts
PLATE DISSIPATION.	70 max.	80 max.	watts

Typical Operation:

DC Plate Voltage	1250 . .	1500 . .	volts
DC Grid-No.3 Voltage	75 . .	75 . .	volts
DC Grid-No.2 Voltage	400 . .	400 . .	volts
DC Grid-No.1 Voltage♦♦● . . .	-150 . .	-150 . .	volts
Peak RF Grid-No.1 Voltage. . .	165 . .	165 . .	volts
Peak AF Grid-No.1 Voltage. . .	94 . .	94 . .	volts
DC Plate Current	84 . .	80 . .	ma
DC Grid-No.3 Current	4 . .	3.5 . .	ma
DC Grid-No.2 Current	5 . .	4 . .	ma
DC Grid-No.1 Cur. (Approx.). .	1.6 . .	1.3 . .	ma
RF Driving Power (Approx.)□ □□	2.5 . .	2.5 . .	watts
Power Output (Approx.)	36 . .	41 . .	watts

♦♦ Fixed supply or cathode-resistor bias, unbypassed for audio-frequencies, is recommended.

□ At crest of audio-frequency cycle with a modulation factor of 1.0.

□□ AF driving power is generally never more than 2 watts.

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	1000 max.	1250 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts

●, ●●, ⊕: See next page.

World Radio History

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828
TRANSMITTING BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-300 max.	-300 max.	volts
DC PLATE CURRENT	135 max.	160 max.	ma
DC GRID-No.1 CURRENT	15 max.	15 max.	ma
PLATE INPUT.	135 max.	200 max.	watts
GRID-No.3 INPUT.	5 max.	5 max.	watts
GRID-No.2 INPUT.	11 max.	11 max.	watts
PLATE DISSIPATION	47 max.	70 max.	watts
Typical Operation:			
DC Plate Voltage	1000 . .	1250 . .	volts
DC Grid-No.3 Voltage	75 . .	75 . .	volts
DC Grid-No.2 Voltage▲▲	400 . .	400 . .	volts
	26000 . .	30000 . .	ohms
DC Grid-No.1 Voltage††● . . .	-140 . .	-140 . .	volts
	14000 . .	11700 . .	ohms
Peak RF Grid-No.1 Voltage. . .	230 . .	250 . .	volts
DC Plate Current	135 . .	160 . .	ma
DC Grid-No.3 Current	13 . .	15 . .	ma
DC Grid-No.2 Current	23 . .	28 . .	ma
DC Grid-No.1 Current (Approx.)	10 . .	12 . .	ma
Driving Power (Approx.) . . .	2.1 . .	2.7 . .	watts
Power Output (Approx.)	100 . .	150 . .	watts

▲▲ Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate-supply through a series resistor of the value shown.

†† Obtained from a grid resistor of value shown or from a combination of grid resistor with either fixed supply or cathode resistor.

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation■

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	1250 max.	1500 max.	volts.
DC GRID-No.3 (SUPPRESSOR) VOLT.	100 max.	100 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-300 max.	-300 max.	volts
DC PLATE CURRENT.	160 max.	180 max.	ma
DC GRID-No.1 CURRENT. . . .	15 max.	15 max.	ma
PLATE INPUT	200 max.	270 max.	watts
GRID-No.3 INPUT	5 max.	5 max.	watts
GRID-No.2 INPUT	16 max.	16 max.	watts
PLATE DISSIPATION	70 max.	80 max.	watts

●, ●●, ●, ■: See next page.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

828

TRANSMITTING BEAM POWER AMPLIFIER

Typical Operation:

	CCS●	ICAS●●	
DC Plate Voltage	1250	1500	volts
DC Grid-No.3 Voltage	75	75	volts
DC Grid-No.2 Voltage■■	400	400	volts
	24300	39300	ohms
DC Grid-No.1 Voltage●#●	-95	-100	volts
	7900	8300	ohms
	415	430	ohms
Peak RF Grid-No.1 Voltage	195	205	volts
DC Plate Current	160	180	ma
DC Grid-No.3 Current	22	14	ma
DC Grid-No.2 Current	35	28	ma
DC Grid-No.1 Cur. (Approx.)	12	12	ma
Driving Power (Approx.)	2.1	2.2	watts
Power Output (Approx.)	150	200	watts

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

■■ Obtained from a separate source, from the plate-voltage supply with a voltage divider, or through a series resistor of value shown. Series grid-No.2 resistor should be used only when the 828 is used as a buffer amplifier and is not keyed. Grid-No.2 voltage must not exceed 800 volts under key-up conditions.

\# Obtained from fixed supply, by grid resistor (7900, 8300) or cathode resistor (415, 430).

●● If preceding stage is keyed, partial fixed-bias is required.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	3.10	3.40	amp
Grid No.1-Plate Capacitance	-	-	0.07	μμf
Input Capacitance	-	9.9	14.1	μμf
Output Capacitance	-	10.5	17.5	μμf
Plate Current	1,2	30	56	ma
Grid-No.2 Current	1,2	-	7	ma
Grid-No.1 Current	1,3	21	49	ma
Plate Current	1,4	-	10	ma
Power Output	1,5	180	-	watts

Note 1: DC filament volts = 10.0.

Note 2: With dc plate voltage of 1750 volts; dc grid-No.3 voltage of 0 volts; dc grid-No.2 voltage of 300 volts; dc grid-No.1 voltage of -25 volts.

Note 3: With dc plate voltage of 200 volts; dc grid-No.3 voltage of 200 volts; dc grid-No.2 voltage of 200 volts; and dc grid-No.1 voltage of +75 volts.

Note 4: With dc plate voltage of 1750 volts; dc grid-No.3 voltage of -180 volts; dc grid-No.2 voltage of 300 volts; and dc grid-No.1 voltage of -25 volts.

Note 5: With dc plate voltage of 1750 volts; dc grid-No.3 voltage of 100 volts; dc grid-No.2 voltage of 300 volts; plate current of 150 ma; grid-No.1 current of 10 - 15 ma.; grid-No.1 resistor of 10000 ± 10% ohms and frequency of 15 Mc.

●, ■■, ●: See next page.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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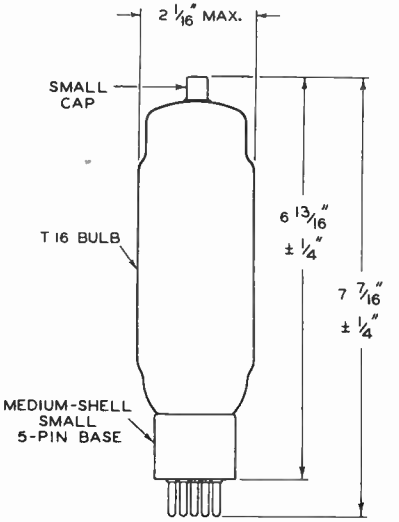
TRANSMITTING BEAM POWER AMPLIFIER

- Continuous Commercial Service.
- Intermittent Commercial & Amateur Service.
- For ac filament supply.

Data on operating frequencies for the 828 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



92CM-4547R3

World Radio History

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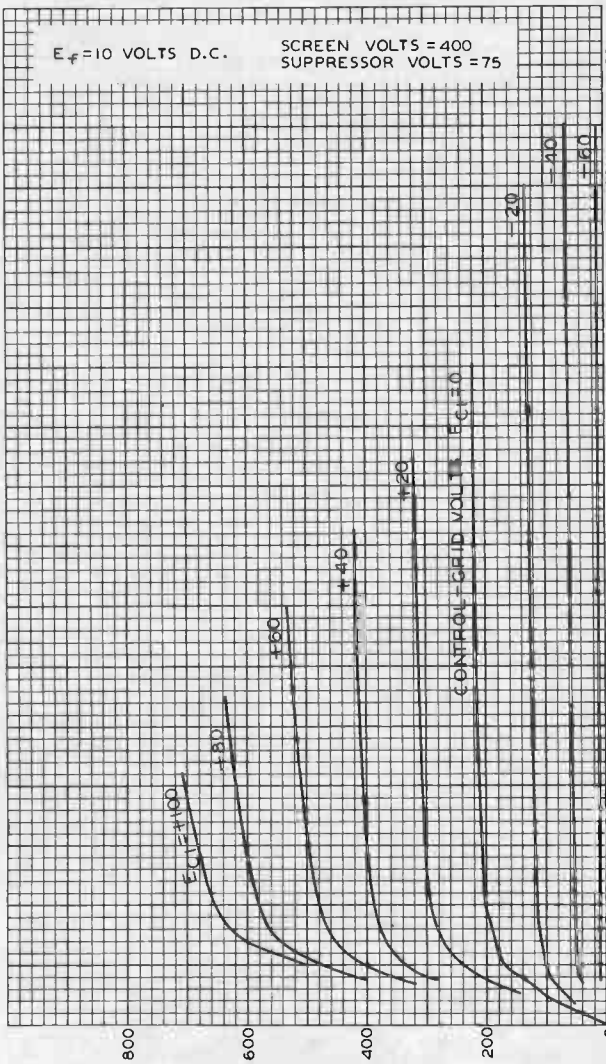
AVERAGE PLATE CHARACTERISTICS



SEPT. 28, 1939

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C—6080

World Radio History

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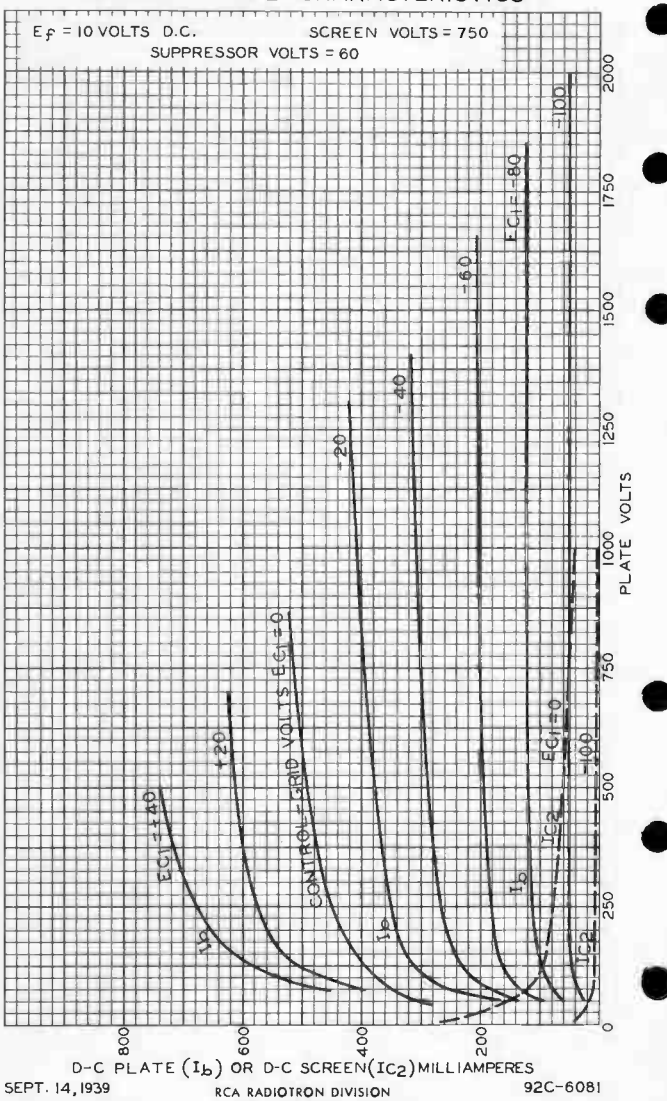
AVERAGE PLATE CHARACTERISTICS



SEPT. 14, 1939

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6081

World Radio History

RCA

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AVERAGE PLATE CHARACTERISTICS

E_f = 10 VOLTS D.C.
SCREEN VOLTS = 300
SUPPRESSOR VOLTS (EC_3) = 75
UNLESS OTHERWISE SPECIFIED

EC1 = +140
+120
+100
CONTROL-GRID VOLTS EC1 = +80
+80
+60
+40
+20
EC1 = +100, EC3 = 0
EC1 = 0
EC1 = EC3 = 0
-20
-40

PLATE VOLTS
0
200
400
600
800
1000
1200

D-C PLATE MILLIAMPERES
800
600
400
200

SEPT. 14, 1939

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

92C-6082

World Radio History

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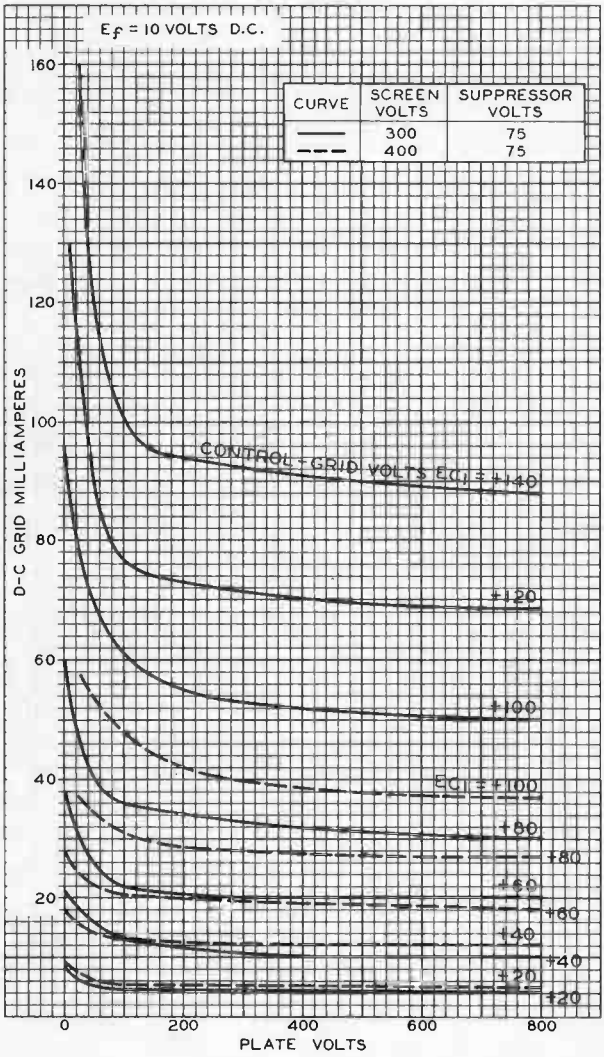
TYPICAL CHARACTERISTICS



SEPT. 15, 1939

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6083

829-B
PUSH-PULL RF BEAM POWER AMPLIFIER

The 829-B supersedes the type 829
Unless otherwise specified, values are for both units

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

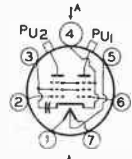
Heater Arrangement	*Series*	*Parallel*	
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current	1.125	2.25	amp
Transconductance, (Approx.) for plate current of 60 ma.		8500	μmhos
Grid-Screen Mu-Factor		9	
Direct Interelectrode Capacitances (Each Unit):			
Grid-No.1 to Plate[o]		0.12 max.	μμf
Input		14.5	μμf
Output		7.0	μμf
Grid-No.2-to-Cathode Capacitance including internal grid-No.2 bypass capacitor, (Approx.)		65	μμf

[o] With external shield up to flange seal.

Mechanical:

Mounting Position	Vertical, base up or down; Horizontal, plane of each plate vertical
Overall Length	4-1/8" ± 3/16"
Seated Length	3-11/16" ± 3/16"
Maximum Diameter	See Outline Drawing
Bulb	T-16
Bulb Terminals	See Outline Drawing
Base	Medium Molded-Flare Septar 7-Pin
Basing Designation for BOTTOM VIEW	7BP

Pin 1 - Heater
Pin 2 - Grid No.1 of Unit No.2
Pin 3 - Grid No.2
Pin 4 - Cathode, Grid No.3
Pin 5 - Heater Center-Tap



Pin 6 - Grid No.1 of Unit No.1
Pin 7 - Heater

P_{U1} - Plate of Unit No.1
P_{U2} - Plate of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'.

PLATE-MODULATED PUSH-PULL RF POWER AMP. - Class C Telephony

Carrier conditions per tube for use with a max.modulation factor of 1.0

NATURAL COOLING

Maximum Ratings, *Absolute Values*:

	CCS[•]	*ICAS*[••]	
DC PLATE VOLTAGE	600 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLT.	225 max.	225 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	-175 max.	volts

•, ••: See next page.

World Radio History

RCA

829-B

PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
DC PLATE CURRENT	212 max.	212 max.	ma
DC GRID-No.1 CURRENT	15 max.	15 max.	ma
PLATE INPUT	67.5 max.	90 max.	watts
GRID-No.2 INPUT	7 max.	7 max.	watts
PLATE DISSIPATION	21 max.	28 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	175 max.	190 max.	°C
→ **Typical Operation with Natural Cooling:**			
DC Plate Voltage	600	425 600	volts
DC Grid-No.2 Voltage#	200	200 200	volts
	15500	6400 13300	ohms
DC Grid-No.1 Voltage●▲▲	−70	−60 −70	volts
	8700	5500 5800	ohms
Peak RF Grid-No.1 to Grid No.1 Voltage	160	154 172	volts
DC Plate Current	112	212 150	ma
DC Grid-No.2 Current	26	35 30	ma
DC Grid-No.1 Current (Approx.)	8	11 12	ma
Driving Power (Approx.)	0.6	0.8 0.9	watt
Power Output (Approx.)	50	63 70	watts

FORCED-AIR COOLING

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	600 max.	volts
DC GRID-No.2 VOLTAGE	225 max.	250 max.	volts
DC GRID-No.1 VOLTAGE	−175 max.	−175 max.	volts
DC PLATE CURRENT	212 max.	240 max.	ma
DC GRID-No.1 CURRENT	15 max.	20 max.	ma
PLATE INPUT	90 max.	120 max.	watts
GRID-No.2 INPUT	7 max.	8 max.*	watts
PLATE DISSIPATION	28 max.	40 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	175 max.	175 max.	°C
→ **Typical Operation with Forced-Air Cooling:**			
DC Plate Voltage	425 600	600	volts
DC Grid-No.2 Voltage#	200 200	200	volts
	6400 13300	13300	ohms

●, ●●, #, ●, ▲▲, *: See next page.
→ Indicates a change.

RCA

829-B

PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●		ICAS●●	
DC Grid-No.1 Voltage●▲▲	−60	−70	−80	volts
	5500	5800	5300	ohms
Peak RF Grid-No.1 to Grid-No.1 Voltage	154	172	210	volts
DC Plate Current	212	150	200	ma
DC Grid-No.2 Current	35	30	30	ma
DC Grid-No.1 Current (Approx.)	11	12	15	ma
Driving Power (Approx.)	0.8	0.9	1.4	watts
Power Output (Approx.)	63	70	85	watts

* In ICAS applications at frequencies less than 20 Mc where duty-factor does not exceed 0.2, maximum "on" period does not exceed 30 seconds, and average modulation factor does not exceed 0.25, maximum grid-No.2 input of 12 watts is permitted.

Obtained from a separate source, modulated with the plate supply, or from the modulated plate supply through a series resistor of the value shown.

▲▲ Obtained from a grid resistor of value shown (per tube) or by partial self-bias methods.

PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation□□

NATURAL COOLING

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

	CCS●	ICAS●●	
DC PLATE VOLTAGE	750 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	225 max.	225 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	−175 max.	−175 max.	volts
DC PLATE CURRENT	240 max.	240 max.	ma
DC GRID-No.1 CURRENT	15 max.	15 max.	ma
PLATE INPUT	90 max.	120 max.	watts
GRID-No.2 INPUT	7 max.	7 max.	watts
PLATE DISSIPATION	30 max.	40 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	175 max.	190 max.	°C

Typical Operation with Natural Cooling:

DC Plate Voltage	750	500	750 volts
DC Grid-No.2 Voltage**	200	200	200 volts
	16200	9300	18300 ohms
DC Grid-No.1 Voltage●◆	−50	−45	−55 volts
	6300	3750	4600 ohms
	310	160	270 ohms
Peak RF Grid-No.1 to Grid-No.1 Voltage	120	124	140 volts

●, ●●, ●, □□, **, ◆: See next page.

← Indicates a change.

World Radio History

829-B

PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●	ICAS●●		
DC Plate Current	120	240	160	ma
DC Grid-No.2 Current	34	32	30	ma
DC Grid-No.1 Current (Approx.)	8	12	12	ma
Driving Power (Approx.)	0.45	0.7	0.8	watt
Power Output (Approx.)	65	83	87	watts

FORCED-AIR COOLING

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	750 max.	750 max.	volts
DC GRID-No.2 VOLTAGE	225 max.	250 max.	volts
DC GRID-No.1 VOLTAGE	-175 max.	-175 max.	volts
DC PLATE CURRENT	240 max.	240 max.	ma
DC GRID-No.1 CURRENT	15 max.	20 max.	ma
PLATE INPUT	120 max.	150 max.	watts
GRID-No.2 INPUT	7 max.	8 max.	watts
PLATE DISSIPATION	40 max.	45 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	175 max.	175 max.	°C

→ **Typical Operation with Forced-Air Cooling:**

DC Plate Voltage	500	750	750	volts
DC Grid-No.2 Voltage**	200	200	200	volts
	9300	18300	16200	ohms
DC Grid-No.1 Voltage⊕	-45	-55	-50	volts
	3750	4600	3100	ohms
	160	270	200	ohms
Peak RF Grid-No.1 to Grid-No.1 Voltage	124	140	150	volts
DC Plate Current	240	160	200	ma
DC Grid-No.2 Current	32	30	34	ma
DC Grid-No.1 Current (Approx.)	12	12	16	ma
Driving Power (Approx.)	0.7	0.8	1.1	watts
Power Output (Approx.)	83	87	110	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

⊕ The grid-circuit resistance should never exceed 15000 ohms (total) per tube, or 30000 ohms per unit. Any additional bias required must be supplied by a cathode resistor or a fixed supply.

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

** Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of value shown. The grid-No.2 voltage must not exceed 600 volts under key-up conditions.

Obtained from a fixed supply, or a grid resistor (3750, 4600, 3100) or cathode resistor (160, 270, 200) or by combination methods.

→ Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

829-B
PUSH-PULL RF BEAM POWER AMPLIFIER

SHIELDING and BYPASSING

Shielding of the 829-B in an rf amplifier is required for stable operation. A convenient method of shielding is to mount the tube with one end through a hole in a metal plate so that the edge of the hole is close to the internal shield of the tube. Due to the importance, at the very-high frequencies, of obtaining the shortest leads possible, rf bypassing must be accomplished close to the tube terminals. Ribbon leads acting as plates of the bypass capacitors are effective. All circuit returns should be made to the common cathode connection. RF chokes may be advisable in the voltage-supply leads.

Data on operating frequencies for the 829-B are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

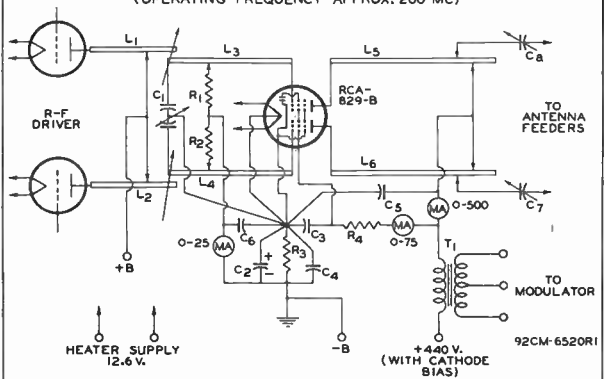
World Radio History

829-B

PUSH-PULL RF BEAM POWER AMPLIFIER

VHF PLATE-MODULATED PUSH-PULL R-F POWER AMPLIFIER

(OPERATING FREQUENCY APPROX. 200 Mc)



C_1 = 1.2 to 10 μμf per section
C_2 = 25 μf, 200 Volts
C_3 C_4 C_5 C_6 = 500 μμf, Mica
C_7 C_8 = 3 to 35 μμf
R_1 R_2 = 7500 to 15000 Ohms, 1 Watt
R_3 = 60 Ohms, 10 Watts
R_4 = 6400 Ohms, 15 Watts
T_1 = Modulation Transformer

L_1 L_2 = Dimensions dependent on type of driver tube; Approx. same as L_5 L_6

L_3 L_4 = 1/4" Dia. copper tubing, approx. 10" long and spaced approx. 7/8" between centers.

L_5 L_6 = 3/8" Dia. copper tubing, approx. 7" long and spaced approx. 7/8" between centers.

Note 1: Adjust coupling of L_1L_2 and L_3L_4 for optimum grid excitation.

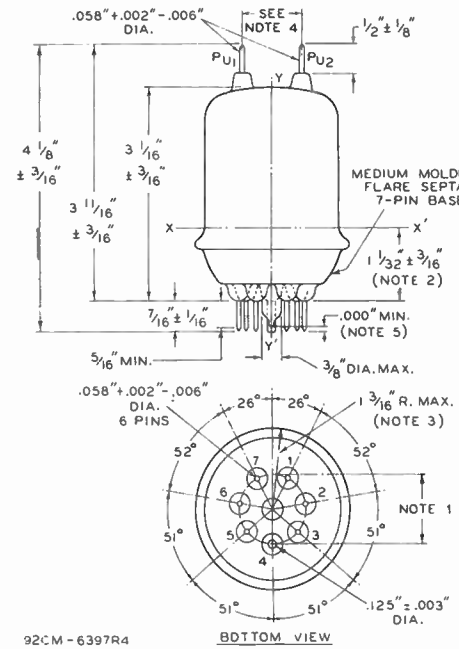
Note 2: Grid resistors should be adjusted on L_3L_4 at voltage node.

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.

World Radio History

829-B

PUSH-PULL R-F BEAM POWER AMPLIFIER



THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ± 5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

NOTE 2: A FLAT-PLATE FLANGE GAUGE WITH HOLE 2.063" - 0.000" + 0.003" IS LOWERED OVER TUBE SEATED IN BASE-PIN GAUGE SO THAT THE HOLE AXIS IS COINCIDENT WITH AXIS YY' WITHIN 0.150", AND SO THAT THE BOTTOM SURFACE OF THE

(continued on next page)

World Radio History

RCA

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PUSH-PULL R-F BEAM POWER AMPLIFIER

FLANGE GAUGE IS PARALLEL TO THE TOP SURFACE OF THE BASE-PIN GAUGE, AND UNTIL THE FLANGE GAUGE RESTS ON THE TUBE-FLANGE SEAL AT POSITION XX'. THE PERPENDICULAR DISTANCE BETWEEN THE TWO GAUGES WILL BE AS SHOWN.

NOTE 3: MINIMUM DIAMETER OF TUBE-SEAL FLANGE WILL BE SUCH THAT A RING GAUGE HAVING I.D. OF 2.125" - 0.000" + 0.003" AND THICKNESS OF 0.125" ± 0.010" WILL NOT PASS THE FLANGE WHEN TRIED AT ANY ANGLE.

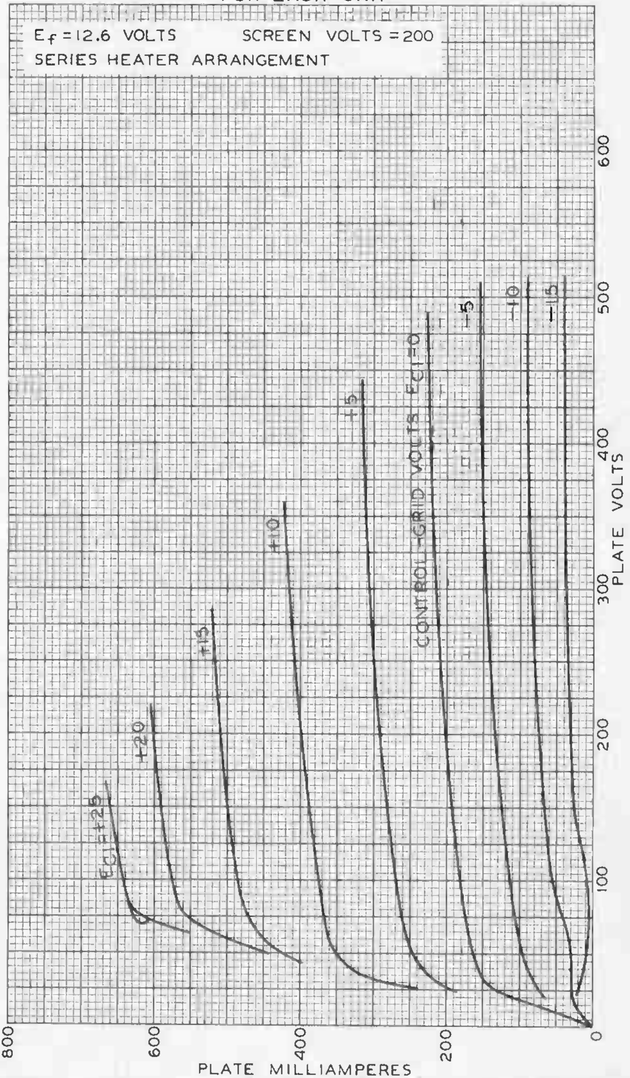
NOTE 4: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING MINIMUM THICKNESS OF 0.375" AND HAVING TWO HOLES 0.1200" ± 0.0005" WHOSE CENTERS ARE LOCATED AT A DISTANCE OF 0.424" ± 0.001" FROM THE AXIS YY' AND WHOSE AXES ARE PARALLEL TO YY'. THE PLANE THROUGH THESE AXES WILL BE 90° ± 5' FROM THE PLANE THROUGH YY' AND PIN NO.4.

NOTE 5: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

World Radio History

829-B
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT

E_f = 12.6 VOLTS   SCREEN VOLTS = 200
SERIES HEATER ARRANGEMENT



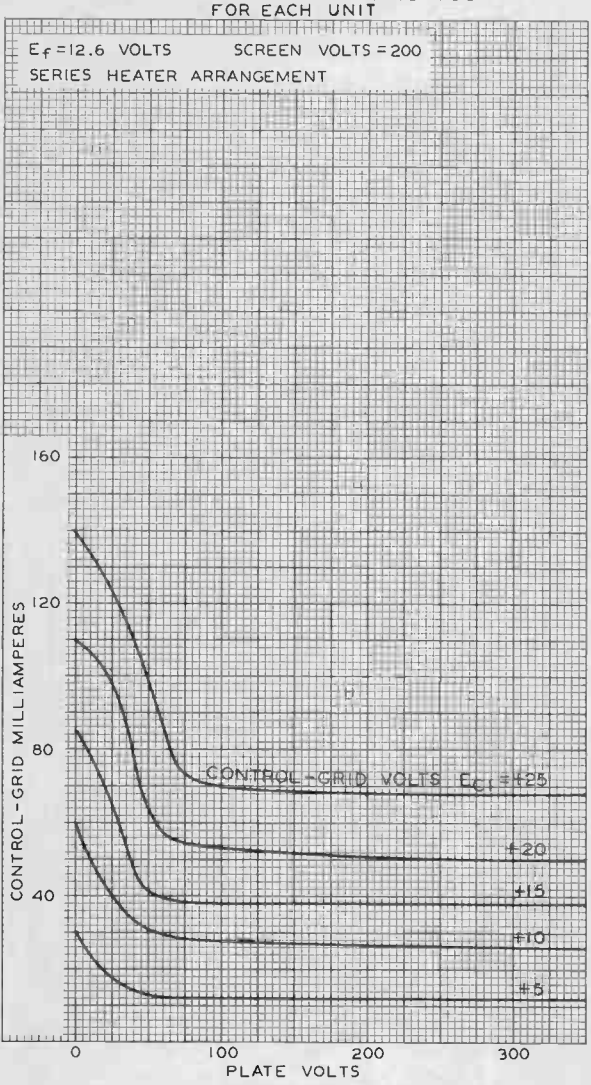
DEC. 1, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6112R2

829-B

TYPICAL CHARACTERISTICS
FOR EACH UNIT



DEC. 1, 1943 RCA VICTOR DIVISION 92CM-6114R2
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	2	amp.
Amplification Factor	25	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	11	μμf
Grid to Filament	5	μμf
Plate to Filament	1.8	μμf
Maximum Overall Length		6-11/16"
Maximum Diameter		2-1/16"
Cap		Small Metal
Base		Medium 4-Pin Bayonet

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		1000 max.	volts
Max-Signal D-C Plate Current*		150 max.	ma.
Max-Signal Plate Input*		150 max.	watts
Plate Dissipation*		60 max.	watts
Typical Operation - 2 tubes:			
Unless otherwise specified, values are for 2 tubes.			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	800	1000	volts
D-C Grid Voltage	-27	-35	volts
Peak A-F Grid-to-Grid Voltage	250	270	volts
Zero-Signal D-C Plate Current	20	20	ma.
Max-Signal D-C Plate Current	280	280	ma.
Load Resistance (per tube)	1500	1900	ohms
Effective Load Res. (plate to plate)	6000	7600	ohms
Max-Signal Driving Power	5	6	approx. watts
Max-Signal Power Output	135	175	approx. watts

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1000 max.	volts
D-C Plate Current		100 max.	ma.
Plate Input		90 max.	watts
Plate Dissipation		60 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	800	1000	volts
D-C Grid Voltage	-27	-35	volts
Peak R-F Grid Voltage	85	85	volts
D-C Plate Current	95	85	ma.
D-C Grid Current**	7	6	approx. ma.
Driving Power** °	9	6	approx. watts
Power Output	23	26	approx. watts

*, **, ° See next page.

(continued on next page)

World Radio History

830-B
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			800 max.	volts
D-C Grid Voltage			-300 max.	volts
D-C Plate Current			100 max.	ma.
D-C Grid Current			30 max.	ma.
Plate Input			80 max.	watts
Plate Dissipation			40 max.	watts
Typical Operation:				
Filament Voltage	10	10	a-c	volts
D-C Plate Voltage	600	800		volts
D-C Grid Voltage	-140	-150		volts
Peak R-F Grid Voltage	255	265		volts
D-C Plate Current	95	95		ma.
D-C Grid Current **	30	20	approx.	ma.
Driving Power **	7	5	approx.	watts
Power Output	38	50	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			1000 max.		volts
D-C Grid Voltage			-300 max.		volts
D-C Plate Current			150 max.		ma.
D-C Grid Current			30 max.		ma.
Plate Input			150 max.		watts
Plate Dissipation			60 max.		watts
Typical Operation:					
Filament Voltage	10	10	10	a-c	volts
D-C Plate Voltage	600	800	1000		volts
D-C Grid Voltage	-95	-105	-110		volts
Peak R-F Grid Voltage	235	245	250		volts
D-C Plate Current	140	140	140		ma.
D-C Grid Current **	30	30	30	approx.	ma.
Driving Power **	7	7	7	approx.	watts
Power Output	45	70	90	approx.	watts

* Averaged over any audio-frequency cycle.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

° At crest of a-f cycle with modulation factor of 1.0.

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

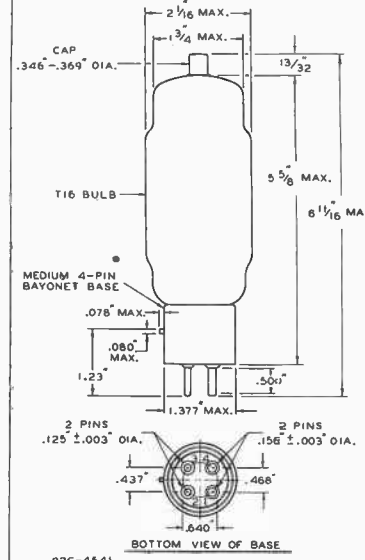
For operation of the 830-B at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

(continued on next page)

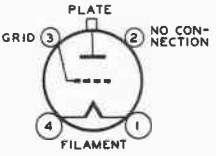
World Radio History

830-B
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

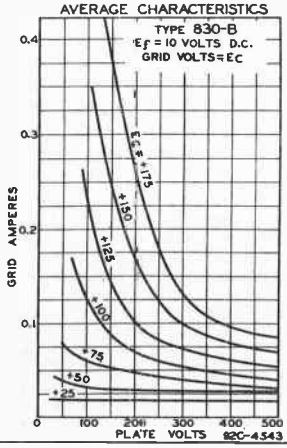
(continued from preceding page)



TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



AVERAGE CHARACTERISTICS



RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

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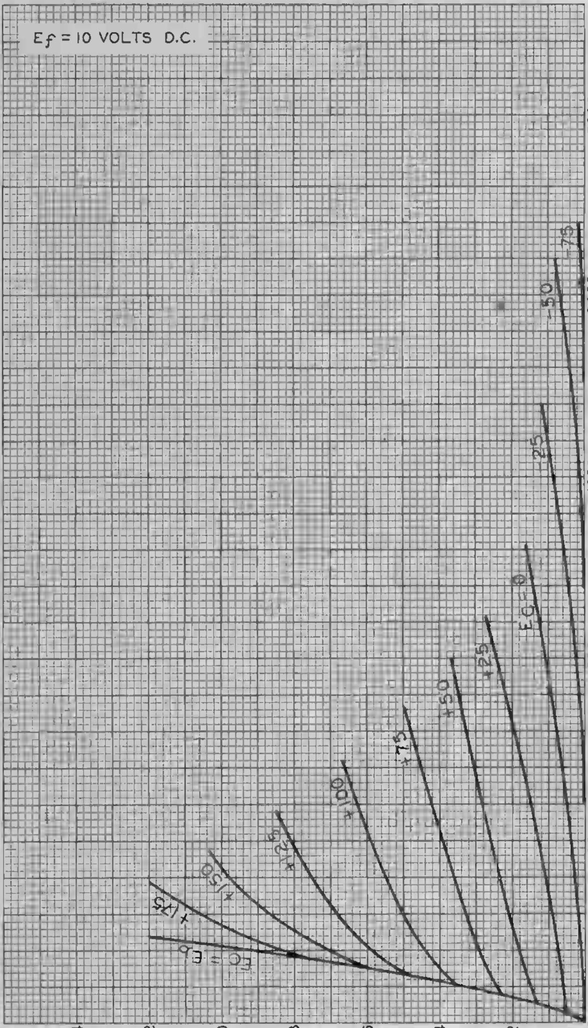
AVERAGE PLATE CHARACTERISTICS



JAN. 17, 1936

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4542

RCA

832-A

PUSH-PULL RF BEAM POWER AMPLIFIER

UNLESS OTHERWISE SPECIFIED, VALUES ARE ON A PER-TUBE BASIS

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater Arrangement	*Series*	*Parallel*	
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current	0.8	1.6	amp

Transconductance (Approx., each unit)
For grid-No.2 volts = 135 and plate ma. = 30. . . 3500 μmhos

Mu-Factor, Grid No.2 to Grid No.1
(Approx., each unit)
For grid-No.2 volts = 250 and plate ma. = 30 . . . 6.5 ←

Direct Interelectrode Capacitances (Each Unit):

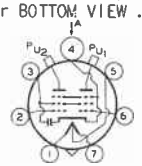
Grid-No.1 to Plate[o]	0.07 max.	μμf ←
Input	8.0	μμf
Output	3.8	μμf
Grid-No.2-to-Cathode Capacitance including internal grid-No.2 bypass capacitor (Approx.)	65	μμf

[o] With external shield in plane of seal flange.

Mechanical:

Mounting Position	Any
Overall Length	3-3/16" ± 1/8"
Seated Length	2-3/4" ± 1/8"
Maximum Diameter	See Outline Drawing
Bulb Terminals	See Outline Drawing
Base	Medium Molded-Flare Septar 7-Pin (JETEC No.E7-2)
Basing Designation for BOTTOM VIEW	7BP

Pin 1 - Heater
Pin 2 - Grid No.1 of Unit No.2
Pin 3 - Grid No.2
Pin 4 - Cathode, Grid No.3
Pin 5 - Heater Center-Tap



Pin 6 - Grid No.1 of Unit No.1
Pin 7 - Heater
P_{U1} - Plate of Unit No.1
P_{U2} - Plate of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

Bulb Temperature (At hottest point). . . . . 200 max. °C ←

PLATE-MODULATED PUSH-PULL RF POWER AMP. - Class C Telephony

Carrier conditions per tube for use with a max.modulation factor of 1.0

Maximum Ratings, *Absolute Values*: ←

	CCS[•]	*ICAS*[••]	
DC PLATE VOLTAGE	600 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	250 max.	volts

•, ••: See next page.

← Indicates a change.

World Radio History

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PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. .	-175 max.	-175 max.	volts
DC PLATE CURRENT.	75 max.	95 max.	ma
DC GRID-No.1 CURRENT. . . .	6 max.	6 max.	ma
PLATE INPUT	22 max.	36 max.	watts
GRID-No.2 INPUT	3.4 max.	5 max.	watts
PLATE DISSIPATION	10 max.	15 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**

DC Plate Voltage.	425	600	600	volts
DC Grid-No.2 Voltage# . . .	200	200	200	volts
From series resistor of .	14000	25000	20000	ohms
DC Grid-No.1 Voltage▲▲ . .	-60	-65	-70	volts
From grid resistor of . .	25000	25000	23000	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage .	140	150	160	volts
DC Plate Current.	52	36	60	ma
DC Grid-No.2 Current. . . .	16	16	20	ma
DC Grid-No.1 Cur. (Approx.)	2.4	2.6	3.0	ma
Driving Power (Approx.) . .	0.15	0.18	0.21	watt
Power Output (Approx.). . .	16	17	26	watts

PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR-Class C Telegraphy

Key-down conditions per tube without modulation□□

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

	CCS●	ICAS●●	
DC PLATE VOLTAGE.	750 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. .	-175 max.	-175 max.	volts
DC PLATE CURRENT.	90 max.	115 max.	ma
DC GRID-No.1 CURRENT. . . .	6 max.	6 max.	ma
PLATE INPUT	36 max.	50 max.	watts
GRID-No.2 INPUT	5 max.	5 max.	watts
PLATE DISSIPATION	15 max.	20 max.	watts

\# Obtained from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor of the value shown.

▲▲ Obtained from a grid resistor of value shown (per tube) or by partial self-bias methods.

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

●, ●●, ⊕: See next page. → Indicates a change.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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PUSH-PULL RF BEAM POWER AMPLIFIER

	CCS●	ICAS●●	
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:			
DC Plate Voltage	500	750 | 750	volts
DC Grid-No.2 Voltage●● . . .	200	200 | 200	volts
From series resistor of. .	21000	37000 | 25000	ohms
DC Grid-No.1 Voltage●. . . .	-65	-65 | -50	volts
From grid resistor of. . .	25000	23000 | 12500	ohms
From cathode resistor of .	730	1000 | 550	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage . .	150	150 | 130	volts
DC Plate Current	72	48 | 65	ma
DC Grid-No.2 Current	14	15 | 22	ma
DC Grid-No.1 Current (Approx.)	2.6	2.8 | 4.0	ma
Driving Power (Approx.). . .	0.18	0.19 | 0.24	watt
Power Output (Approx.) . . .	26	26 | 35	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current (Each section).	1	0.76	0.84	amp
Grid No.1—Plate Capacitance (Each unit).	2	–	0.07	μμf
Input (Each unit).	–	6.6	9.4	μμf
Output (Each unit)	–	2.8	4.8	μμf
Plate Current (Each unit). . .	3	18	42	ma
Grid-No.2 Current (Each unit).	3	0.1	5.5	ma
Positive Grid-No.1 Current (Each unit).	4	8	52	ma
Useful Power Output (Per tube)	5	14	–	watts

Note 1: With 6.3 volts on heater section under test.

Note 2: With external shield in plane of seal flange.

Note 3: With 6.3 volts on heater sections in parallel, dc plate voltage of 250 volts on unit under test, dc grid-No.2 voltage of 135 volts, dc grid-No.1 voltage of -10 volts on unit under test, and dc grid-No.1 voltage of -100 volts on unit not under test.

Note 4: With 6.3 volts on heater sections in parallel, dc plate voltage of 90 volts on unit under test, dc grid-No.2 voltage of 90 volts, dc grid-No.1 voltage of +20 volts on unit under test, and dc grid-No.1 voltage of -100 volts on unit not under test.

Note 5: In a push-pull self-excited oscillator circuit with 11 volts on heater sections in series, dc plate voltage of 400 volts on each unit, max. dc grid-No.2 voltage of 250 volts, total dc plate current of 90 ma., total dc grid-No.1 current of 2 to 6 ma., grid-No.1 resistor of 8000 to 18000 ohms, and frequency of 200 megacycles per second.

●, ●●, ⊕, ⊕⊕: See next page.

← Indicates a change.

RCA

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PUSH-PULL RF BEAM POWER AMPLIFIER

- Continuous Commercial Service.
- ●● Intermittent Commercial and Amateur Service.
- ⊕ The grid-circuit resistance should never exceed 25000 ohms (total) per tube; or 50000 ohms per unit. Any additional bias required must be supplied by a cathode resistor or a fixed supply.
- ** Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of value shown. The grid-No.2 voltage must not exceed 600 volts under key-up conditions.

Data on operating frequencies for the 832-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

OPERATING NOTES

Shielding of the 832-A in an rf amplifier is required for stable operation. A convenient method of shielding is to mount the tube with one end through a hole in a metal plate so that the edge of the hole is close to the internal shield of the tube. Due to the importance, at the ultra-high frequencies, of obtaining the shortest leads possible, rf bypassing must be accomplished close to the tube terminals. Ribbon leads acting as plates of the bypassing capacitors are effective. All circuit returns should be made to the common cathode connection. Rf chokes may be advisable in the voltage-supply leads.

RCA

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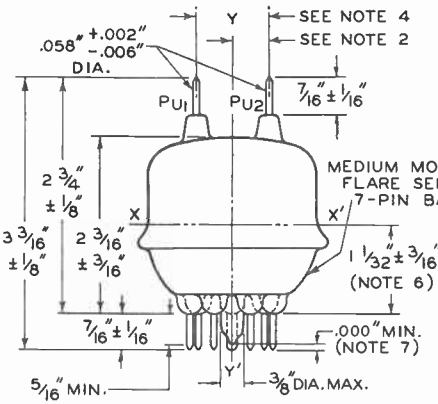
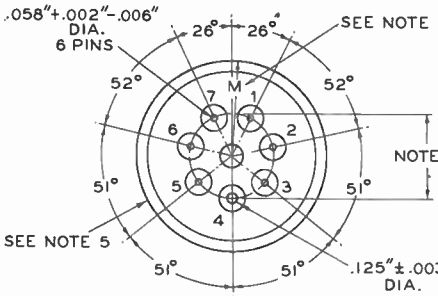
PUSH-PULL RF BEAM POWER AMPLIFIER





BOTTOM VIEW

THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1

92CM-6374R3

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ± 5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

RCA

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PUSH-PULL RF BEAM POWER AMPLIFIER

NOTE 2: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING MINIMUM THICKNESS OF 0.375" AND HAVING TWO HOLES 0.2000" ± 0.0005" WHOSE CENTERS ARE LOCATED AT A DISTANCE OF 0.424" ± 0.001" FROM THE AXIS YY' AND WHOSE AXES ARE PARALLEL TO YY'. THE PLANE THROUGH THESE AXES WILL BE 90° ± 5' FROM THE PLANE THROUGH YY' AND PIN No.4.

NOTE 3: WHEN THE TUBE IS SEATED IN THE BASE-PIN GAUGE AND CONSTRAINED BY THE PLATE-LEAD GAUGE OF NOTE 2, THE MAXIMUM RADIUS 'M' IS DETERMINED BY LOWERING OVER THE TUBE A CYLINDER GAUGE HAVING A RADIUS OF 1.156" + 0.000" - 0.003" WHOSE AXIS IS COINCIDENT WITH THE YY' AXIS.

NOTE 4: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING MINIMUM THICKNESS OF 0.375" AND HAVING TWO HOLES 0.2000" ± 0.0005" WHOSE CENTERS ARE SPACED 0.848" ± 0.001" FROM EACH OTHER.

NOTE 5: MINIMUM DIAMETER OF TUBE-SEAL FLANGE WILL BE SUCH THAT A RING GAUGE HAVING I.D. OF 2.125" - 0.000" + 0.003" AND THICKNESS OF 0.125" ± 0.010" WILL NOT PASS THE FLANGE WHEN TRIED AT ANY ANGLE.

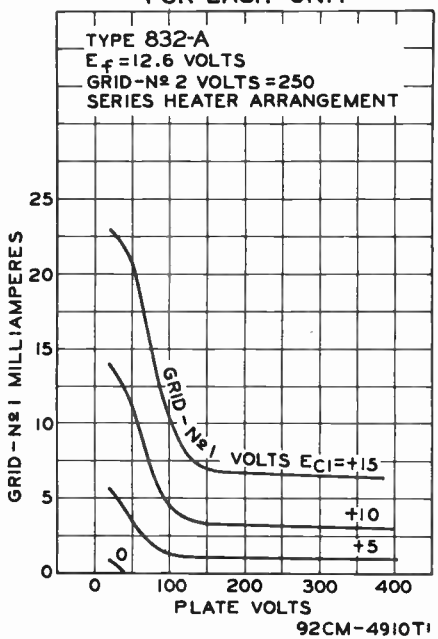
NOTE 6: A FLAT-PLATE FLANGE GAUGE WITH HOLE 2.063" - 0.000" + 0.003" IS LOWERED OVER TUBE SEATED IN BASE-PIN GAUGE SO THAT THE HOLE AXIS IS COINCIDENT WITH AXIS YY' WITHIN 0.150", AND SO THAT THE BOTTOM SURFACE OF THE FLANGE GAUGE IS PARALLEL TO THE TOP SURFACE OF THE BASE-PIN GAUGE, AND UNTIL THE FLANGE GAUGE RESTS ON THE TUBE-FLANGE SEAL AT POSITION XX'. THE PERPENDICULAR DISTANCE BETWEEN THE TWO GAUGES WILL BE AS SHOWN.

NOTE 7: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

832-A

PUSH-PULL RF BEAM POWER AMPLIFIER

TYPICAL CHARACTERISTICS
FOR EACH UNIT



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

832-A

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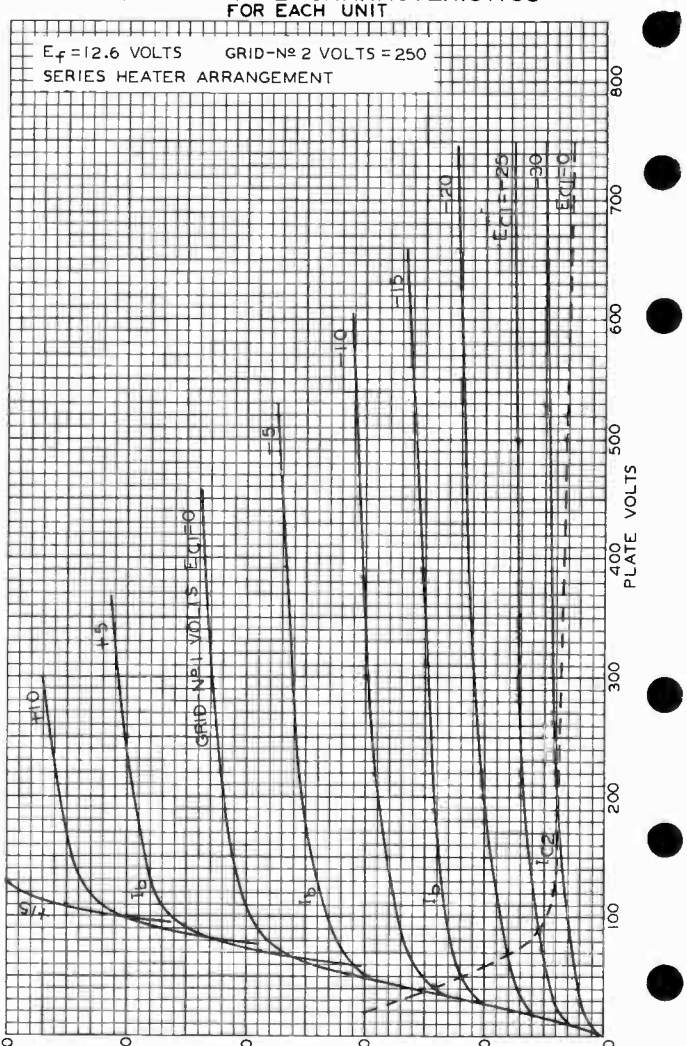
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



FEB. 27, 1951

TUBE DEPARTMENT

92CM-4912R2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

833-A
POWER TRIODE

Useful with full input up to 30 Mc with natural cooling (20 Mc with forced-air cooling), and with reduced input up to 75 Mc

GENERAL DATA

Electrical:

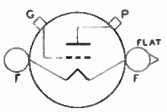
Filament, Thoriated Tungsten:		
Voltage	10 ± 5%	ac or dc volts
Current at 10 volts	10	amp
Amplification Factor, for grid volts = -10 and plate ma = 200	35	
Direct Interelectrode Capacitances:		
Grid to plate	6.3	μμf
Grid to filament	12.3	μμf
Plate to filament	8.5	μμf

Mechanical:

Terminal Connections:

F - Filament

G - Grid



P - Plate

Mounting Position . Vertical, with filament posts up or down, or Horizontal, with all terminals in same vertical plane

Overall Length . . . . . 8-5/8" ± 3/16"

Maximum Diameter . . . . . 4-19/32"

Bulb . . . . . T-36 ←

Cooling:

Natural or *Forced Air*—depending on the operating conditions. *Natural Cooling* means that adequate free circulation of air around the tube is necessary. *Forced-Air Cooling* means that an air flow of 40 cfm from a 2"-diameter nozzle directed vertically on bulb between grid and plate seals is required to limit temperature between these seals to 145°C.

Weight (Approx.) . . . . . 1 lb ←

Fittings: ←

Filament Connector Assembly RCA-207F1

Grid or Plate Connector (2 required) RCA-208F1

AF POWER AMPLIFIER & MODULATOR - Class B

NATURAL COOLING

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	3000 max.	3300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	500 max.	500 max.	ma

●, ●●, *: See next page. ← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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RCA

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POWER TRIODE

	CCS●	ICAS●●	
MAX.-SIGNAL PLATE INPUT*. .	1125 max.	1300 max.	watts
PLATE DISSIPATION*.	300 max.	350 max.	watts

Typical Operation with Natural Cooling:

Values are for 2 tubes

DC Plate Voltage.	3000	3300	volts
DC Grid Voltage#.	-70	-80	volts
Peak AF Grid-to-Grid Voltage	400	440	volts
Zero-Signal DC Plate Current	100	100	ma
Max.-Signal DC Plate Current	750	780	ma
Effective Load Resistance (Plate to plate).	9500	10500	ohms
Max.-Signal Driving Power (Approx.)	20	30	watts
Max.-Signal Power Output (Approx.)	1650	1900	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	4000 max.	4000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	500 max.	500 max.	ma
MAX.-SIGNAL PLATE INPUT* .	1600 max.	1800 max.	watts
PLATE DISSIPATION*.	400 max.	450 max.	watts

Typical Operation with Forced-Air Cooling:

Values are for 2 tubes

DC Plate Voltage.	4000	4000	volts
DC Grid Voltage#.	-100	-100	volts
Peak AF Grid-to-Grid Voltage	480	510	volts
Zero-Signal DC Plate Current	100	100	ma
Max.-Signal DC Plate Current	800	900	ma
Effective Load Resistance (Plate to plate).	12000	11000	ohms
Max.-Signal Driving Power (Approx.)	29	38	watts
Max.-Signal Power Output (Approx.)	2400	2700	watts

* Averaged over any audio-frequency cycle of sine-wave form.

●, ●●, #: See next page.

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POWER TRIODE

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	3000 max.	3300 max.	volts
DC PLATE CURRENT	300 max.	300 max.	ma
PLATE INPUT	450 max.	525 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
DC Plate Voltage	3000	3300	volts
DC Grid Voltage#	-70	-100	volts
Peak RF Grid Voltage	90	110	volts
DC Plate Current	150	150	ma
DC Grid Current (Approx.)	2	2	ma
Driving Power (Approx.)▲	10	11	watts
Power Output (Approx.)	150	200	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	4000 max.	4000 max.	volts
DC PLATE CURRENT	300 max.	300 max.	ma
PLATE INPUT	600 max.	675 max.	watts
PLATE DISSIPATION	400 max.	450 max.	watts
Typical Operation with Forced-Air Cooling:			
DC Plate Voltage	4000	4000	volts
DC Grid Voltage#	-120	-120	volts
Peak RF Grid Voltage	120	130	volts
DC Plate Current	150	150	ma
DC Grid Current (Approx.)	2	3	ma
Driving Power (Approx.)▲	14	21	watts
Power Output (Approx.)	225	250	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	2500 max.	3000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	400 max.	400 max.	ma

For ac filament supply.

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

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POWER TRIODE

	CCS●	ICAS●●	
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT	835 max.	1000 max.	watts
PLATE DISSIPATION	200 max.	250 max.	watts
Typical Operation with Natural Cooling:			
DC Plate Voltage.	2500	3000	volts
DC Grid Voltage⊕.	-300	-240	volts
From a grid resistor of .	4000	3400	ohms
Peak RF Grid Voltage. . . .	460	410	volts
DC Plate Current.	335	335	ma
DC Grid Current (Approx.)⊕.	75	70	ma
Driving Power (Approx.)⊕. .	30	26	watts
Power Output (Approx.). . .	635	800	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	3000 max.	4000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT.	450 max.	450 max.	ma
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT	1250 max.	1800 max.	watts
PLATE DISSIPATION	270 max.	350 max.	watts
Typical Operation with Forced-Air Cooling:			
DC Plate Voltage.	3000	4000	volts
DC Grid Voltage⊕.	-300	-325	volts
From a grid resistor of .	3600	3600	ohms
Peak RF Grid Voltage. . . .	490	520	volts
DC Plate Current.	415	450	ma
DC Grid Current (Approx.)⊕.	85	90	ma
Driving Power (Approx.)⊕. .	37	42	watts
Power Output (Approx.). . .	1000	1500	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□□ and RF POWER AMPLIFIER--Class C FM Telephony

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	3000 max.	3300 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT.	500 max.	500 max.	ma

⊕ Obtained by grid resistor, or from a combination of grid resistor with either fixed supply or cathode resistor.

□□ 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.

●, ●●, ⊕: See next page.

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POWER TRIODE

	CCS●		ICAS●●		
DC GRID CURRENT	100 max.		100 max.		ma
PLATE INPUT	1250 max.		1500 max.		watts
PLATE DISSIPATION	300 max.		350 max.		watts
Typical Operation with Natural Cooling:					
DC Plate Voltage.	2250	3000	3000	3000	volts
DC Grid Voltage	-125	-200	-160	-155	volts
From a grid resistor of	1500	3600	2300	2150	ohms
From a cathode resistor of	235	425	400	270	ohms
Peak RF Grid Voltage. . . .	300	360	310	350	volts
DC Plate Current.	445	415	335	500	ma
DC Grid Current (Approx.)⊕.	85	55	70	70	ma
Driving Power (Approx.)⊕.	23	20	20	25	watts
Power Output (Approx.)	780	1000	800	1150	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE.	4000 max.	4000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT.	500 max.	500 max.	ma
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT	1800 max.	2000 max.	watts
PLATE DISSIPATION	400 max.	450 max.	watts
Typical Operation with Forced-Air Cooling:			
DC Plate Voltage.	4000	4000	volts
DC Grid Voltage▲▲	-200	-225	volts
From a grid resistor of	2650	2400	ohms
From a cathode resistor of	380	380	ohms
Peak RF Grid Voltage. . . .	375	415	volts
DC Plate Current.	450	500	ma
DC Grid Current⊕.	75	95	ma
Driving Power (Approx.)⊕. .	26	35	watts
Power Output (Approx.). . .	1440	1600	watts

⊕ Subject to wide variation depending on the impedance of the load circuit. High-impedance load circuits require more grid current and driving power to obtain the desired output. Low-impedance load circuits need less grid current and driving power, but plate-circuit efficiency is sacrificed. The driver stage should have good regulation and should be capable of delivering considerably more than the required driving power.

▲▲ Obtained from fixed supply, by grid resistor, by cathode resistor, or by combination methods.

●, ●●: See next page. ← Indicates a change.

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POWER TRIODE

NOTE: When the 833-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 4000 volts, a fixed bias of at least -90 volts should be used.

→ SELF-RECTIFYING OSCILLATOR OR AMPLIFIER - Class C

NATURAL COOLING

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
AC PLATE VOLTAGE (RMS)	4250 max.	4650 max.	volts
DC GRID VOLTAGE	-315 max.	-315 max.	volts
DC PLATE CURRENT	250 max.	250 max.	ma
DC GRID CURRENT	50 max.	50 max.	ma
PLATE INPUT**	1180 max.	1290 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
AC Plate Voltage (RMS)	4000	4400	volts
DC Grid Voltage●	-80	-85	volts
From a grid resistor of	2200	2400	ohms
DC Plate Current	240	240	ma
DC Grid Current (Approx.)	37	36	ma
Driving Power (Approx.)##	13	13.5	watts
Output-Circuit Efficiency (Approx.)	85	85	%
Useful Power Output (Approx.)	710□	800□	watts

FORCED-AIR COOLING

	CCS●	
Maximum Ratings, *Absolute Values:*		
AC PLATE VOLTAGE (RMS)	5650 max.	volts
DC GRID VOLTAGE	-315 max.	volts
DC PLATE CURRENT	250 max.	ma
DC GRID CURRENT	50 max.	ma
PLATE INPUT	1570 max.	watts
PLATE DISSIPATION	400 max.	watts
Typical Operation with Forced-Air Cooling:		
AC Plate Voltage (RMS)	5300	volts
DC Grid Voltage●	-97	volts
From a grid resistor of	2700	ohms
DC Plate Current	240	ma
DC Grid Current (Approx.)	35	ma
Driving Power (Approx.)##	14	watts
Output-Circuit Efficiency (Approx.)	85	%
Useful Power Output (Approx.)	975□	watts

** Power input to plate is 1.11 times the product of ac plate voltage (rms) and the dc plate current.

From a self-rectified driver.

●, ●●, ●, □: See next page. → Indicates a change.

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POWER TRIODE

AMPLIFIER or OSCILLATOR - Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	2700 max.	3000 max.	volts
DC GRID VOLTAGE	−450 max.	−450 max.	volts
DC PLATE CURRENT	500 max.	500 max.	ma
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT†	1250 max.	1500 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
DC Plate Voltage	2500	2750	volts
DC Grid Voltage●	−130	−135	volts
From a grid resistor of	1560	1770	ohms
DC Plate Current	450	450	ma
DC Grid Current (Approx.)	83	76	ma
Driving Power (Approx.)††	27	25	watts
Output-Circuit Efficiency (Approx.)	85	85	%
Useful Power Output (Approx.)	1865□	2040□	watts

FORCED-AIR COOLING

	CCS●	
Maximum Ratings, *Absolute Values:*		
DC PLATE VOLTAGE	3600 max.	volts
DC GRID VOLTAGE	−450 max.	volts
DC PLATE CURRENT	500 max.	ma
DC GRID CURRENT	100 max.	ma
PLATE INPUT†	1800 max.	watts
PLATE DISSIPATION	400 max.	watts
Typical Operation with Forced-Air Cooling:		
DC Plate Voltage	3300	volts
DC Gric Voltage●	−155	volts
From a grid resistor of	2100	ohms
DC Plate Current	450	ma
DC Grid Current (Approx.)	73	ma
Driving Power (Approx.)††	26	watts
Output-Circuit Efficiency (Approx.)	85	%
Useful Power Output (Approx.)	2480□	watts

● Continous Commercial Service.

●● Intermittent Commercial and Amateur Service.

† Power input to plate is 1.23 times the product of dc plate voltage times dc plate current.

□ This value of useful power is measured at load of output circuit having the indicated efficiency.

●, ††: See next page.

← Indicates a change.

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POWER TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current.	1	9.4	10.6	amp
Direct Interelectrode Capacitances:				
Grid to plate	–	5.5	7.1	μμf
Grid to filament. . . .	–	10.1	14.5	μμf
Plate to filament . . .	–	6.4	10.6	μμf
Amplification Factor. . .	2	31.5	38.5	
Grid Current.	3	160	380	ma
Plate Current (1)	3	490	810	ma
Plate Current (2)	4	60	140	ma
Power Output.	5	1150	–	watts

Note 1: With 10 volts dc on filament.

Note 2: With 10 volts ac on filament, dc grid voltage of −10 volts, and dc plate voltage adjusted to give dc plate current of 200 ma.

Note 3: With 10 volts ac on filament, dc plate voltage of 100 volts, and dc grid voltage of +100 volts.

Note 4: With 10 volts ac on filament, dc plate voltage of 2500 volts, and dc grid voltage of −50 volts.

Note 5: In self-excited oscillator circuit, and with 10 volts ac on filament, dc plate voltage of 4000 volts, dc plate current of 450 ma., dc grid current of 80 to 120 ma., grid resistor of 5000 ohms, and frequency of 30 Mc.

♦ Obtained from a grid resistor of the value shown or from a combination of grid resistor and cathode resistor. Fixed bias operation is not recommended. The bias resistor should not be bypassed for the plate and grid voltage supply frequency.

†† From a driver with a rectified, unfiltered, single-phase, full wave plate supply.

RATINGS vs FREQUENCY WITH NATURAL COOLING

FREQUENCY	30	50	75	Mc
MAXIMUM PERMISSIBLE PERCENTAGE of MAXIMUM RATED PLATE VOLTAGE and PLATE INPUT:				
Class B Telephony	100	98	94	%
Class C Telephony	100	90	72	%
Class C Telegraphy	100	90	72	%

RATINGS vs FREQUENCY WITH FORCED-AIR COOLING

FREQUENCY	20	50	75	Mc
MAXIMUM PERMISSIBLE PERCENTAGE of MAXIMUM RATED PLATE VOLTAGE and PLATE INPUT:				
Class B Telephony	100	97	93	%
Class C Telephony	100	83	65	%
Class C Telegraphy	100	83	65	%

→ Indicates a change.

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RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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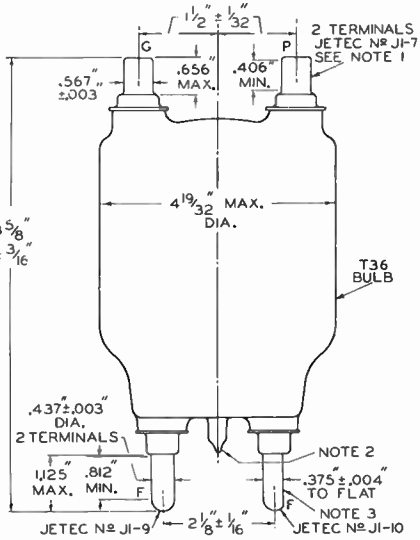
POWER TRIODE



92CM-4786R5

NOTE 1: THE ANGLE FORMED ON A PLANE NORMAL TO THE TUBE AXIS BY THE INTERSECTION OF THE PLANE DETERMINED BY THE AXIS OF THE FILAMENT TERMINALS WITH THE PLANE DETERMINED BY THE AXIS OF THE GRID AND PLATE TERMINALS IS NOT MORE THAN 5°.

NOTE 2: THE MOUNTING SHOULD PROVIDE LIBERAL CLEARANCE FOR THIS TIP.

NOTE 3: THE PLANE THROUGH THE FLAT SIDE OF THE FILAMENT TERMINAL IS 90° ±7° WITH RESPECT TO THE PLANE THROUGH THE AXES OF THE FILAMENT TERMINALS.

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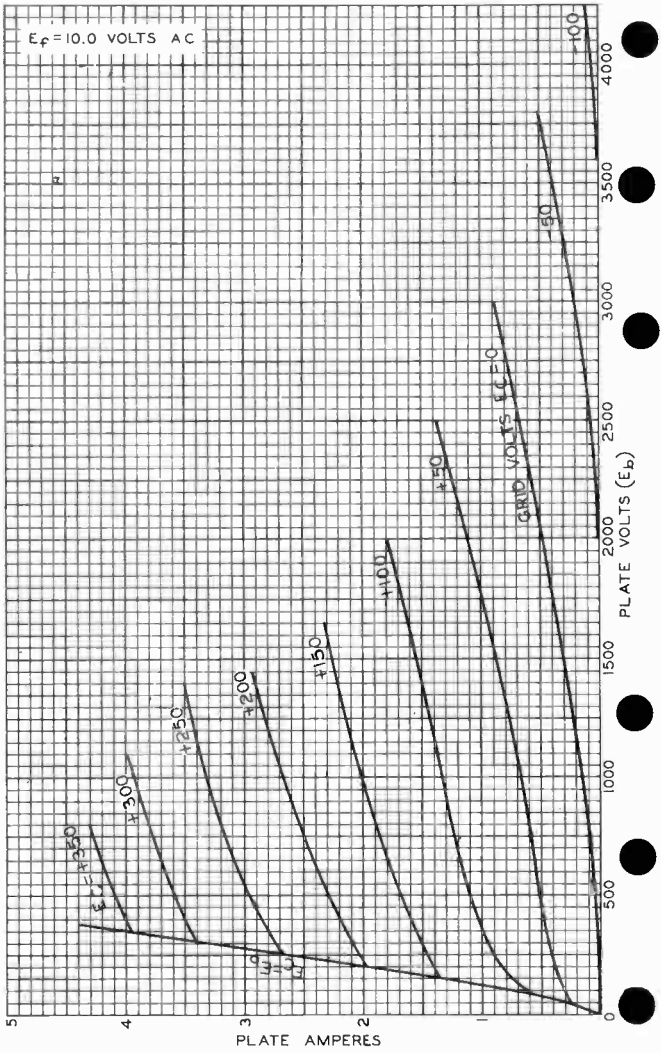
AVERAGE PLATE CHARACTERISTICS



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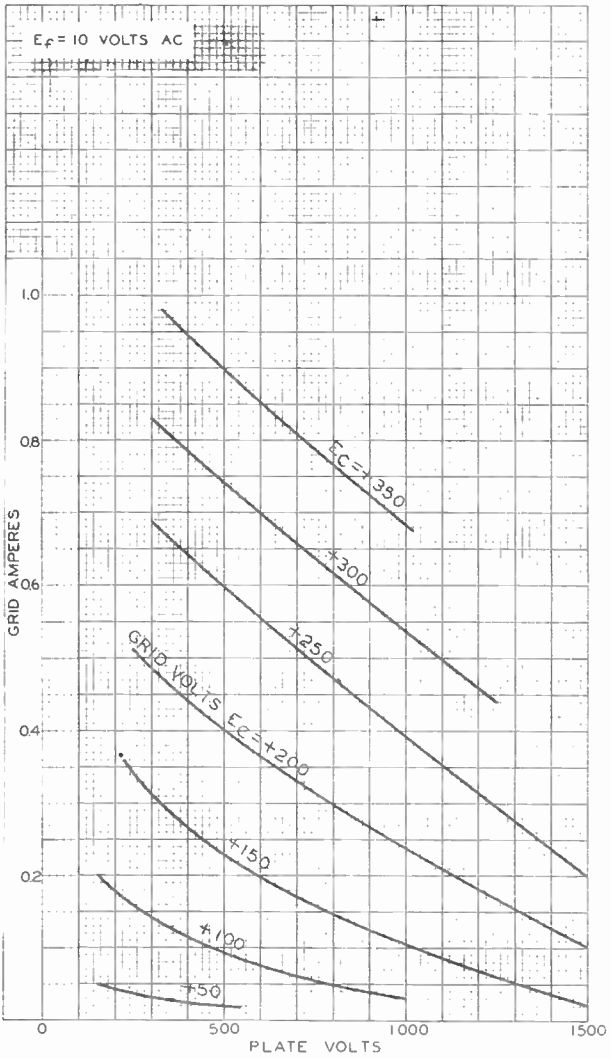
TYPICAL CHARACTERISTICS



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R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	3.1	amp. ←
Amplification Factor	10.5	
Direct Interelectrode Capacitances:		
Grid to Plate	2.6	μμf
Grid to Filament	2.2	μμf
Plate to Filament	0.6	μμf
Maximum Overall Length		6-7/8"
Maximum Diameter		2-11/16"
Bulb		S-21
Base		Medium 4-Pin, Bayonet
RCA Socket (Type UR-542A)		Stock No. 9919

Cooling- Forced air from fan directed at middle and upper portions of bulb is recommended for all classes of service above 60 Mc.

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			1250 max.	volts
D-C Plate Current			100 max.	ma.
Plate Input			75 max.	watts
Plate Dissipation			50 max.	watts
Typical Operation:				
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage #	-70	-90	-115	volts
Peak R-F Grid Voltage	90	100	115	volts
D-C Plate Current	50	50	50	ma.
D-C Grid Current **	1.0	0.5	0 approx.	ma.
Driving Power o **	3.3	3.1	3.0 approx.	watts
Power Output	11	16	20 approx.	watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			1000 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			100 max.	ma.
D-C Grid Current			20 max.	ma.
Plate Input			100 max.	watts
Plate Dissipation			35 max.	watts
Typical Operation:				
D-C Plate Voltage		750	1000	volts
D-C Grid Voltage *		14500	17700	hms
		-290	-310	volts
Peak R-F Grid Voltage		415	435	volts
D-C Plate Current		90	90	ma.
D-C Grid Current **		20	17.5 approx.	ma.
Driving Power **		7.5	6.5 approx.	watts
Power Output		42	58 approx.	watts

* Obtained by grid-leak resistor or by partial self-bias methods.
o At crest of a-f cycle with modulation factor of 1.0.
**, #: See next page. ← Indicates a change.

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R-F POWER AMPLIFIER

(continued from preceding page)

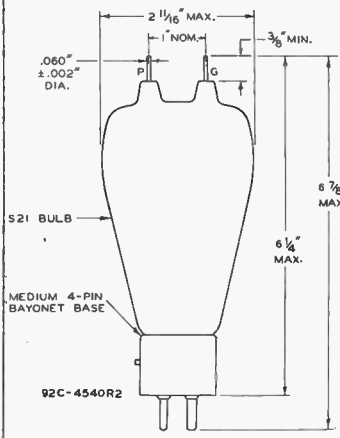
R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation##

D-C Plate Voltage			1250 max.	volts
D-C Grid Voltage			−400 max.	volts
D-C Plate Current			100 max.	ma.
D-C Grid Current			20 max.	ma.
Plate Input			125 max.	watts
Plate Dissipation			50 max.	watts
Typical Operation:				
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage †	−175	−200	−225	volts
	8750	11400	15000	ohms
	1600	1850	2150	ohms
Peak R-F Grid Voltage	300	325	350	volts
D-C Plate Current	90	90	90	ma.
D-C Grid Current **	20	17.5	15 approx.	ma.
Driving Power **	5.5	5.0	4.5 approx.	watts
Power Output	42	58	75 approx.	watts

\# For a-c filament supply. If d.c. is used, the stated voltage values should be decreased by approx. one-half of the rated filament voltage.
† Obtained from fixed supply, by grid resistor (8750, 11400, 15000), or cathode resistor (1600, 1850, 2150).
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

Data on operating frequencies for the 834 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY. See also "Cooling" under this type.

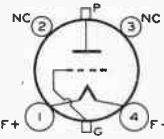


NOTE: Connections to tips P and G should be made by means of radiating connectors to which flexible circuit leads should be clamped.

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

BOTTOM VIEW OF SOCKET CONNECTIONS



Pin 1 – Filament +
Pin 2 – No Connection
Pin 3 – No Connection
Pin 4 – Filament –
P – Plate
G – Grid

→ Indicates a change.

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AVERAGE PLATE CHARACTERISTICS

$E_f = 7.5$ VOLTS D.C.

PLATE VOLTS (E_b)

0 500 1000 1500 2000 2500

PLATE MILLIAMPERES

0 100 200 300 400

GRID VOLTS E_c=0 +10 +20 +30 +40 +50 +60 +70 +80 +90 +100

E_c -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

JAN. 21, 1936

92C-4544

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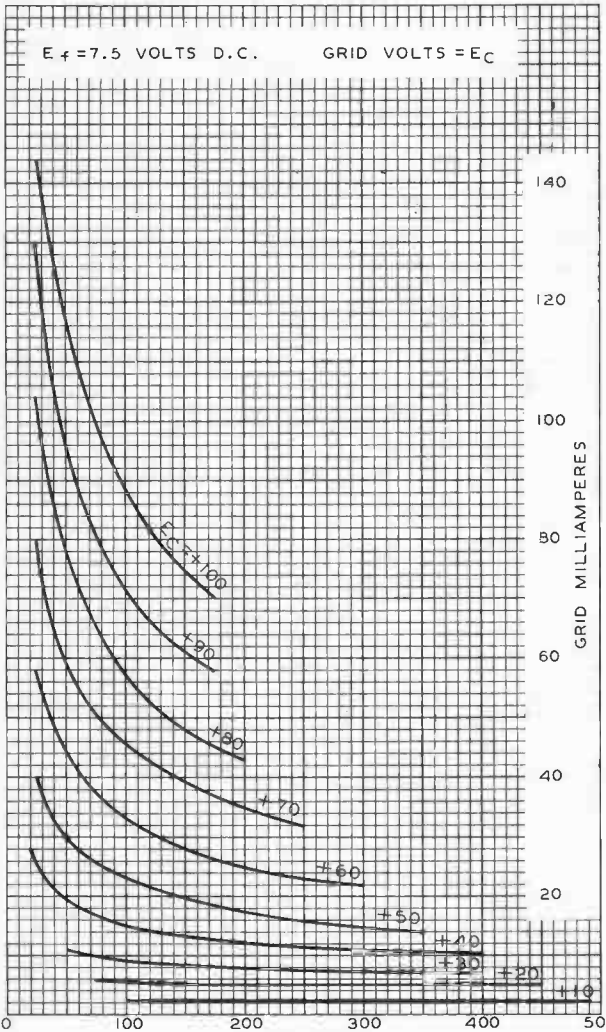
AVERAGE CHARACTERISTICS



835

R-F POWER AMPLIFIER, A-F POWER AMPLIFIER, MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	12	
Direct Interelectrode Capacitances:		
Grid to Plate	9.25	μμf
Grid to Filament	6	μμf
Plate to Filament	5	μμf
Maximum Overall Length		7-7/8"
Maximum Diameter		2-5/16"
Bulb		T-18
Base		Jumbo 4-Pin
RCA Socket (Type UT-541-A)		Stock No.9936

For additional data, see Type 211. The 211 and the 835 are identical except for interelectrode capacitances.

Data on operating frequencies for the 835 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

ONLY FOR RENEWAL FOR USE

836

HALF-WAVE HIGH-VACUUM RECTIFIER

Heater	Coated Unipotential Cathodes*	
Voltage	2.5	a-c volts
Current	5.0	amp.
Maximum Overall Length		6-9/16"
Maximum Diameter		2-7/16"
Bulb		ST-19
Cap		Medium
Base		Medium 4-Pin, Bayonet
RCA Socket (Type UR-542-A)		Stock No.9937

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS

Peak Inverse Plate Voltage	5000 max. volts
Peak Plate Current	1.0 max. amp.
Average Plate Current	0.25 max. amp.

* The cathodes should be allowed to come up to operating temperature before plate current is drawn from the tube. For average conditions the delay is approximately 40 seconds.

The 836 has two separate cathodes each of which is connected to its respective heater. Plate circuit return should be made to the center-tap of the heater transformer.

→ Indicates a change.

World Radio History

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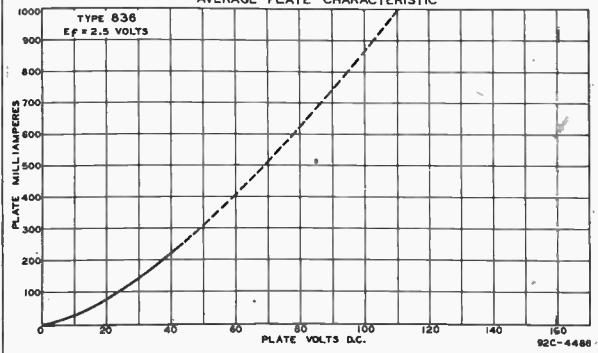
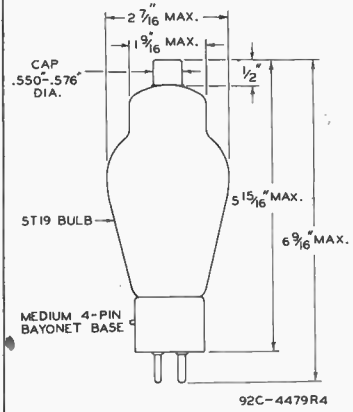
HALF-WAVE HIGH-VACUUM RECTIFIER

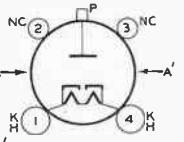
AVERAGE PLATE CHARACTERISTIC





TUBE MOUNTING POSITION
Any

BOTTOM VIEW OF
SOCKET CONNECTIONS



AA'=PLANE OF ELECTRODES

Pin 1 – Heater & Cathode
Pin 2 – No Connection
Pin 3 – No Connection
Pin 4 – Heater & Cathode
Cap – Plate

← Indicates a change.

Dec. 1, 1942

DATA

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World Radio History

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R-F POWER AMPLIFIER PENTODE

Heater °	Coated Unipotential Cathode			
Voltage ▫	12.6		a-c or d-c	volts ←
Current	0.7			amp.
Transconductance for plate current of 24 ma.	3400			μmhos
Direct Interelectrode Capacitances:				
Grid to Plate (with external shielding)		0.20	max.	μμf
Input		16		μμf
Output		10		μμf
Maximum Overall Length				5-7/8"
Maximum Diameter				2-1/16"
Bulb				ST-16
Cap				Small Metal
Base				Medium 7-Pin Ceramic, Bayonet

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			500	max.	volts
D-C Suppressor Voltage (Grid #3)			200	max.	volts
D-C Screen Voltage (Grid #2)			200	max.	volts
D-C Plate Current			40	max.	ma.
Plate Input			16	max.	watts
Suppressor Input			5	max.	watts
Screen Input			5	max.	watts
Plate Dissipation			12	max.	watts
Typical Operation:					
D-C Plate Voltage	400	500	500		volts
D-C Suppressor Voltage	0	0	40		volts
D-C Screen Voltage	200	200	200		volts
D-C Grid Voltage (Grid #1)	-25	-25	-25		volts
Peak R-F Grid Voltage	28	25	24		volts
Internal Shield	connected to cathode at socket				
D-C Plate Current	35	30	30		ma.
D-C Screen Current	10	15	12		ma.
D-C Grid Current	1	0	0	approx.	ma.
Driving Power *	0.4	0.2	0.1	approx.	watt
Power Output	4	5	5.5	approx.	watts

* At crest of a-f cycle with modulation factor of 1.0.

SUPPRESSOR-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage	500	max.	volts
D-C Screen Voltage (Grid #2)	200	max.	volts
D-C Grid Voltage (Grid #1)	-200	max.	volts
D-C Plate Current	40	max.	ma.
D-C Grid Current	8	max.	ma.
Plate Input	16	max.	watts
Screen Input	8	max.	watts
Plate Dissipation	12	max.	watts

▫ Should not deviate more than ±10% from rated value.
° See NOTE on DATA 3 page.
← Indicates a change.

World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

Typical Operation:				
D-C Plate Voltage	400	500		volts
D-C Suppressor Voltage (Grid #3)	-55	-65		volts
D-C Screen Voltage△	6500	14000		ohms
→ D-C Grid Voltage□§	-20	-20		volts
	2500	5700		ohms
Peak A-F Suppressor Voltage	55	65		volts
Peak R-F Grid Voltage	45	32		volts
Internal Shield	Connected to cathode at socket			
D-C Plate Current	35	30		ma.
D-C Screen Current	37	23		ma.
D-C Grid Current	8	3.5	approx.	ma.
Driving Power	0.4	0.1	approx.	watt
Power Output	4	5	approx.	watts

△ Voltage taken from unmodulated plate-voltage supply through resistor.

□ From fixed supply or grid-leak resistor.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			500 max.	volts
D-C Suppressor Voltage (Grid #3)			200 max.	volts
D-C Screen Voltage (Grid #2)			200 max.	volts
D-C Grid Voltage (Grid #1)			-200 max.	volts
D-C Plate Current			40 max.	ma.
Plate Input			16 max.	watts
Suppressor Input			5 max.	watts
Screen Input			5 max.	watts
Plate Dissipation			12 max.	watts
Typical Operation:				
D-C Plate Voltage	400	500	500	volts
D-C Suppressor Voltage	0	0	40	volts
D-C Screen Voltage	200	200	200	volts
→ D-C Grid Voltage§	-50	-45	-43	volts
Peak R-F Grid Voltage	58	48	44	volts
Peak A-F Grid Voltage	25	20	18	volts
Internal Shield	Connected to cathode at socket			
D-C Plate Current	35	30	30	ma.
D-C Screen Current	9	7	6	ma.
D-C Grid Current	1	0	0	approx. ma.
Driving Power *	0.5	0.2	0.15	approx. watt
Power Output	4	5	5.5	approx. watts

* At crest of a-f cycle with modulation factor of 1.0

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Pentode Connection

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage	400 max.	volts
D-C Suppressor Voltage (Grid #3)	200 max.	volts
D-C Screen Voltage (Grid #2)	200 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	volts
D-C Plate Current	50 max.	ma.

§ See end of tabulation.

← Indicates a change.

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World Radio History

837

R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

D-C Grid Current		8 max.	ma.
Plate Input		20 max.	watts
Screen Input		5 max.	watts
Suppressor Input		5 max.	watts
Plate Dissipation		8 max.	watts
Typical Operation:			
D-C Plate Voltage		400	volts
D-C Suppressor Voltage		40	volts
D-C Screen Voltage #		13000	ohms
		140	volts
D-C Grid Voltage▲ §		−40	volts ←
		8000	ohms ←
Peak R-F Grid Voltage		60	volts
Internal Shield	connected to cathode at socket		
D-C Plate Current		45	ma.
D-C Screen Current		20	ma.
D-C Grid Current		5	approx. ma.
Driving Power		0.3	approx. watt
Power Output		11	approx. watts

\# From modulated fixed supply or modulated plate-voltage supply through resistor.

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Tetrode Connection - Grids #2 & #3 tied together

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage		400 max.	volts
D-C Screen Voltage (Grids #2 & #3)		200 max.	volts
D-C Grid Voltage (Grid #1)		−200 max.	volts
D-C Plate Current		50 max.	ma.
D-C Grid Current		8 max.	ma.
Plate Input		20 max.	watts
Screen Input		7.5 max.	watts
Plate Dissipation		8 max.	watts
Typical Operation:			
D-C Plate Voltage		400	volts
D-C Screen Voltage ##		10000	ohms
		100	volts
D-C Grid Voltage▲ §		−70	volts ←
		10000	ohms ←
Peak R-F Grid Voltage		100	volts
Internal Shield	Connected to cathode at socket		
D-C Plate Current		45	ma.
D-C Screen Current		30	ma.
D-C Grid Current		7	approx. ma.
Driving Power		0.7	approx. watt
Power Output		11	approx. watts

\#\# Preferably from unmodulated plate-voltage supply through resistor.

▲ Obtained by grid-leak resistor or by partial self-bias methods.

§ See end of tabulation.

← Indicates a change.

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World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Pentode Connection

Key-down conditions per tube without modulation °°

D-C Plate Voltage			500	max.	volts
D-C Suppressor Voltage (Grid #3)			200	max.	volts
D-C Screen Voltage (Grid #2)			200	max.	volts
D-C Grid Voltage (Grid #1)			-200	max.	volts
D-C Plate Current			80	max.	ma.
D-C Grid Current			8	max.	ma.
Plate Input			32	max.	watts
Suppressor Input			5	max.	watts
Screen Input			8	max.	watts
Plate Dissipation			12	max.	watts
Typical Operation:					
D-C Plate Voltage	400	500	500		volts
D-C Suppressor Voltage	0	0	40		volts
D-C Screen Voltage♦	200	200	200		volts
	6300	10000	20000		ohms
D-C Grid Voltage■ §	-40	-85	-75		volts
	5000	10600	18700		ohms
Peak R-F Grid Voltage	70	120	100		volts
Internal Shield	Connected to cathode at socket				
D-C Plate Current	70	60	60		ma.
D-C Screen Current	32	30	15		ma.
D-C Grid Current	8	8	4	approx.	ma.
Driving Power	0.5	0.8	0.4	approx.	watt
Power Output	16	20	22	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Tetrode Connection – Grids #2 & #3 tied together

Key-down conditions per tube without modulation °°

D-C Plate Voltage		500	max.	volts
D-C Screen Voltage (Grids #2 & #3)		200	max.	volts
D-C Grid Voltage (Grid #1)		-200	max.	volts
D-C Plate Current		80	max.	ma.
D-C Grid Current		8	max.	ma.
Plate Input		32	max.	watts
Screen Input		8	max.	watts
Plate Dissipation		12	max.	watts
Typical Operation:				
D-C Plate Voltage	400	500		volts
D-C Screen Voltage ♦	11600	28000		ohms
	110	80		volts
D-C Grid Voltage ■ §	8700	8700		ohms
	-70	-70		volts
Peak R-F Grid voltage	115	110		volts
Internal Shield	Connected to cathode at socket			

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

♦, ■ See next page. § See end of tabulation.

← Indicates a change.

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World Radio History

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

D-C Plate Current	70	60	ma.
D-C Screen Current	25	15	ma.
D-C Grid Current	8	8	approx.ma.
Driving Power	0.75	0.7	approx.watt
Power Output	18	20	approx.watts

◆ Obtained from fixed supply or plate-voltage supply through resistor.

■ Obtained by grid-leak resistor or other self- or fixed-bias method.

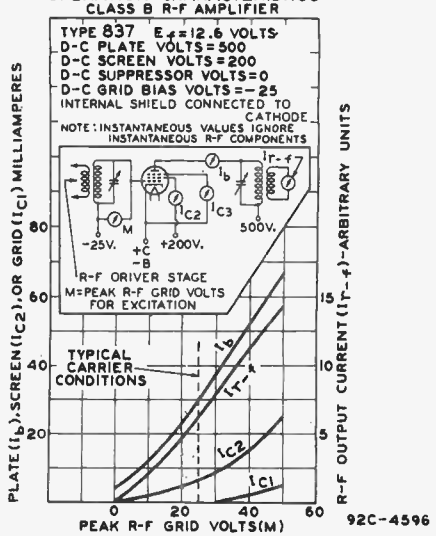
§ Maximum total effective grid circuit resistance should not exceed 25000 ohms.

NOTE: In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts.

The 837, as a crystal-controlled oscillator with either pentode or tetrode connection, may be operated under the conditions shown for class C telegraph services. Because the internal shielding in this tube is unusually effective, it generally is necessary to introduce external feedback in those circuits which depend on the control-grid-to-plate capacity for oscillation.

For use of the 837 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

OPERATION CHARACTERISTICS
CLASS B R-F AMPLIFIER



World Radio History

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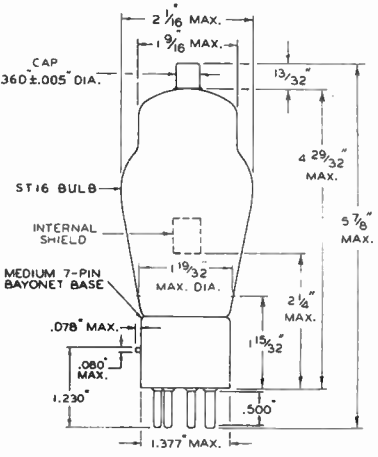
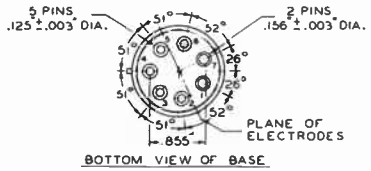
R-F POWER AMPLIFIER PENTODE

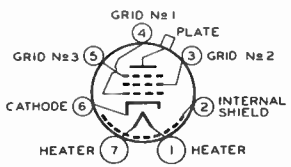




BOTTOM VIEW OF BASE

92C-4832

TOP VIEW OF
SOCKET CONNECTIONS



TUBE MOUNTING POSITION
VERTICAL OR HORIZONTAL

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World Radio History

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AVERAGE PLATE CHARACTERISTICS

837

E_f = 12.6 VOLTS

D-C SUPPRESSOR VOLTS = +40

D-C SCREEN VOLTS = 200

CONTROL-GRID VOLTS E_{C1}=+60 +30 +40 +30 +20 +10 E_{C1}=0 -10 -20

PLATE VOLTS

0 200 400 600 800 1000 1200

PLATE MILLIAMPERES

0 100 200 300 400 500 600 700

92C-4586

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MAR. 27, 1936

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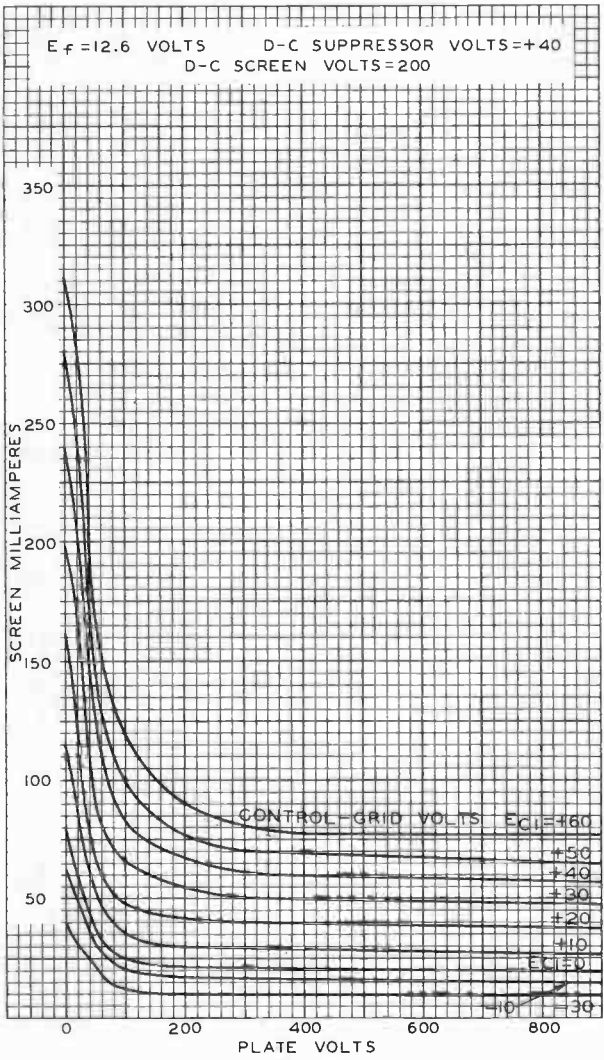
AVERAGE CHARACTERISTICS



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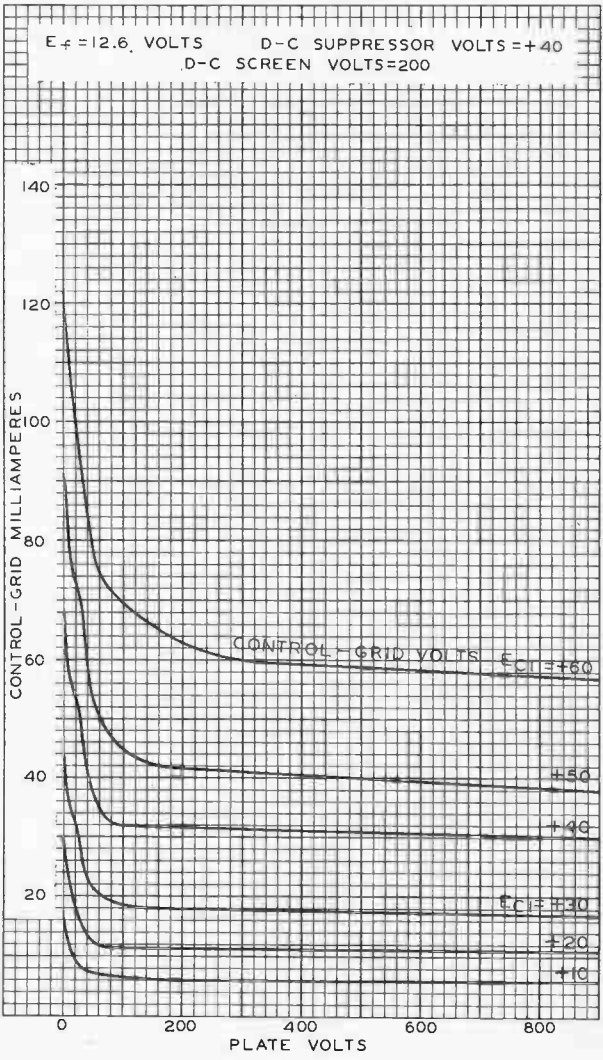
AVERAGE CHARACTERISTICS



MAY 15, 1936

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World Radio History

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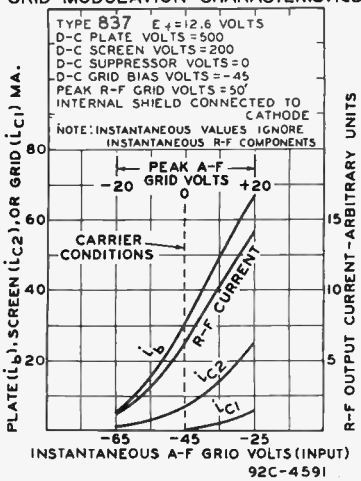
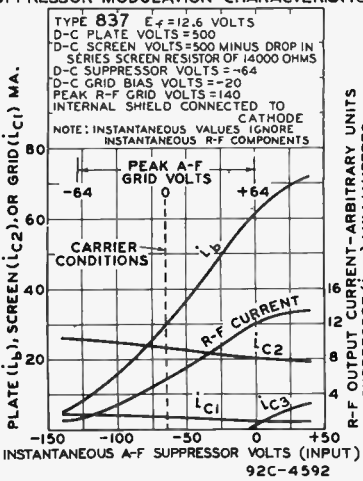
R-F POWER AMPLIFIER PENTODE

GRID MODULATION CHARACTERISTICS



SUPPRESSOR MODULATION CHARACTERISTICS



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World Radio History

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CLASS B MODULATOR
R-F POWER AMPLIFIER, OSCILLATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	8	μμf
Grid to Filament	6.5	μμf
Plate to Filament	5	μμf
Maximum Overall Length		7-7/8"
Maximum Diameter		2-5/16"
Bulb		T-18
Base		Jumbo 4-Large Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		1250 max.	volts
Max-Sig. D-C Plate Current*		175 max.	ma.
Max-Sig. Plate Input*		220 max.	watts
Plate Dissipation*		100 max.	watts
Typical Operation - 2 tubes:			
Unless otherwise specified, values are for 2 tubes.			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage	0	0	volts
Peak A-F Grid-to-Grid Voltage	200	200	volts
Zero-Sig. D-C Plate Current	106	148	ma.
Max.-Sig. D-C Plate Current	320	320	ma.
Load Resistance (per tube)	1725	2250	ohms
Effective Load Res. (Plate to plate)	6900	9000	ohms
Max.-Sig. Driving Power	7	7.5	approx.watts
Max.-Sig. Power Output #	200	260	approx.watts

* Averaged over any audio-frequency cycle of sine-wave form.
\# Approximately 4% harmonic distortion.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		1250 max.	volts
D-C Plate Current		150 max.	ma.
R-F Grid Current		6 max.	amp.
Plate Input		150 max.	watts
Plate Dissipation		100 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage	0	0	volts
Peak R-F Grid Voltage	70	60	volts
D-C Plate Current	130	106	ma.
D-C Grid Current**	15	15	approx.ma.
Driving Power ° **	8	6	approx.watts
Power Output	40	42.5	approx.watts

° At crest of a-f cycle with modulation factor of 1.0.

** See next page.

← Indicates a change

World Radio History

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CLASS B MODULATOR
R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			1000 max.	volts
→ D-C Grid Voltage			-400 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			70 max.	ma.
R-F Grid Current			6 max.	amp.
Plate Input			175 max.	watts
Plate Dissipation			67 max.	watts
Typical Operation:				
Filament Voltage	10	10	a-c	volts
D-C Plate Voltage	750	1000		volts
D-C Grid Voltage	-100	-135		volts
Peak R-F Grid Voltage	220	255		volts
D-C Plate Current	150	150		ma.
D-C Grid Current **	60	60	approx.	ma.
Driving Power **	14	16	approx.	watts
Power Output	65	100	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation#

D-C Plate Voltage			1250	max.	volts
→ D-C Grid Voltage			-400	max.	volts
D-C Plate Current			175	max.	ma.
D-C Grid Current			70	max.	ma.
R-F Grid Current			7.5	max.	amp.
Plate Input			220	max.	watts
Plate Dissipation			100	max.	watts.
Typical Operation:					
Filament Voltage	10	10	10	a-c	volts
D-C Plate Voltage	750	1000	1250		volts
D-C Grid Voltage	-80	-85	-90		volts
Peak R-F Grid Voltage	190	195	200		volts
D-C Plate Current	150	150	150		ma.
D-C Grid Current **	30	30	30	approx.	ma.
Driving Power **	6	6	6	approx.	watts
Power Output	65	100	130	approx.	watts

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

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 838 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 838 are the same as for the 211.

← Indicates a change

World Radio History

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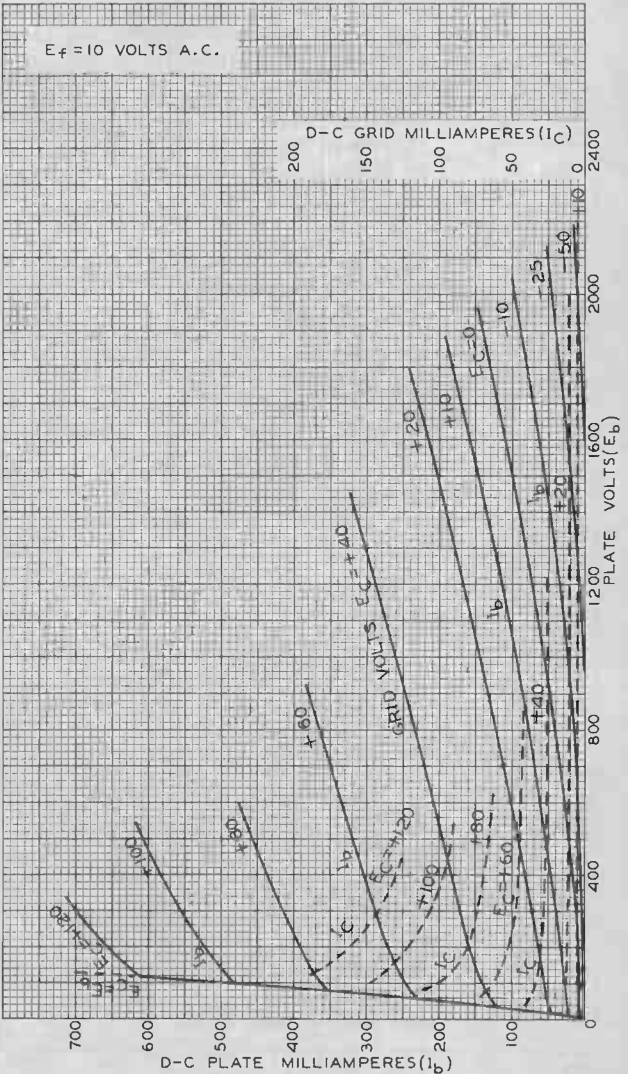
AVERAGE PLATE CHARACTERISTICS



APRIL 15, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

92C-4404

RCA

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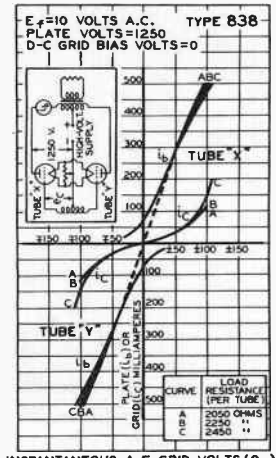
CHARACTERISTICS CURVES

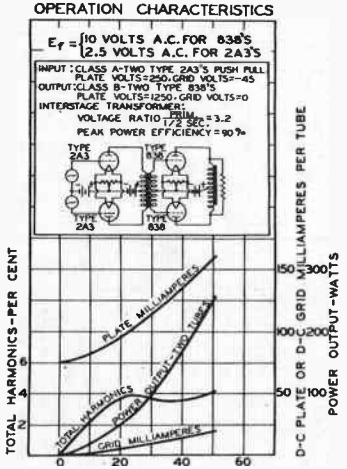
DYNAMIC TRANSFER CHARACTERISTICS



INSTANTANEOUS A-F GRID VOLTS (e_c)

92C-4407R1

OPERATION CHARACTERISTICS



92C-4406R1

JUNE 15, 1936

92C-4406R1 & 4407R1

World Radio History

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R-F POWER AMPLIFIER, OSCILLATOR, A-F VOLTAGE AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	1.25	amp.
Amplification Factor	30	
Direct Interelectrode Capacitances:		
Grid to Plate	7	μμf
Grid to Filament	4	μμf
Plate to Filament	3	μμf
Maximum Overall Length		5-5/8"
Maximum Diameter		2-3/16"
Bulb		S-17
Base		Medium 4-Pin Bayonet

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F VOLTAGE AMPLIFIER (Resistance-coupled)-Class A

D-C Plate Voltage		425 max.	volts
D-C Plate-Supply Voltage*		1250 max.	volts
Plate Dissipation		12 max.	watts
Typical Operation and Characteristics:			
Filament Voltage	7.5	7.5	d-c volts
D-C Plate-Supply Voltage*	425	1000	volts
D-C Grid Voltage	-6	-9	volts
Peak A-F Grid Voltage	6	9	volts
D-C Plate Current	0.7	2.2	ma.
Plate Resistance	63000	40000	ohms
Transconductance	450	750	μmhos
Load Resistance	250000	250000	ohms
Voltage Output (5% second harmonic)	126	225	volts

* Voltage effective at plate is less than the plate-supply voltage by an amount equal to the voltage drop in the load resistance caused by the plate current.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		425 max.	volts
Max-Signal D-C Plate Current*		60 max.	ma.
Max-Signal Plate Input*		25 max.	watts
Plate Dissipation*		15 max.	watts
Typical Operation - 2 tubes:			
Unless otherwise specified, values are for 2 tubes.			
Filament Voltage	7.5	7.5	d-c volts ←
D-C Plate Voltage	350	425	volts
D-C Grid Voltage	-5	-5	volts
Peak A-F Grid-to-Grid Voltage	176	180	volts
Zero-Signal D-C Plate Cur.	7	13	ma.
Max-Signal D-C Plate Cur.	114	120	ma.
Load Resistance (per tube)	1300	1750	ohms
Effective Load Res. (plate to plate)	5200	7000	ohms
Max-Signal Driving Power	3.2	3.6	approx. watts
Max-Signal Power Output	21	28	approx. watts

* Averaged over any audio frequency cycle of sine-wave form. ←

← Indicates a change

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

World Radio History

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R-F POWER AMPLIFIER, OSCILLATOR, A-F VOLTAGE AMPLIFIER

(continued from preceding page)

R-F POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		450 max.	volts
D-C Plate Current		50 max.	ma.
R-F Grid Current		4 max.	amp.
Plate Input		22.5 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5 a-c	volts
D-C Plate Voltage	350	450	volts
D-C Grid Voltage	-12	-15	volts
Peak R-F Grid Voltage	60	60	volts
D-C Plate Current	45	45	ma.
D-C Grid Current**	4	4	approx. ma
Driving Power** °	3.5	3.5	approx. watts
Power Output	4.25	6	approx. watts

→ ° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		350 max.	volts
→ D-C Grid Voltage		-200 max.	volts
D-C Plate Current		60 max.	ma.
D-C Grid Current		20 max.	ma.
R-F Grid Current		4 max.	amp.
Plate Input		21 max.	watts
Plate Dissipation		10 max.	watts
Typical Operation:			
Filament	7.5	7.5 a-c	volts
D-C Plate Voltage	250	350	volts
D-C Grid Voltage	-40	-47	volts
Peak R-F Grid Voltage	125	130	volts
D-C Plate Current	50	50	ma.
D-C Grid Current **	15	15	approx. ma.
Driving Power **	2	2	approx. watts
Power Output	7	11	approx. watts

R-F POWER AMPLIFIER & MODULATOR – Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage		450 max.	volts
→ D-C Grid Voltage		-200 max.	volts
D-C Plate Current		60 max.	ma.
D-C Grid Current		20 max.	ma.
R-F Grid Current		5 max.	amp.
Plate Input		27 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5 a-c	volts
D-C Plate Voltage	350	450	volts
D-C Grid Voltage	-30	-34	volts
Peak R-F Grid Voltage	115	120	volts
D-C Plate Current	50	50	ma.

##, ** See next page

← Indicates a change

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RCA MANUFACTURING COMPANY, INC.

World Radio History

841
R-F POWER AMPLIFIER
A-F VOLTAGE AMPLIFIER

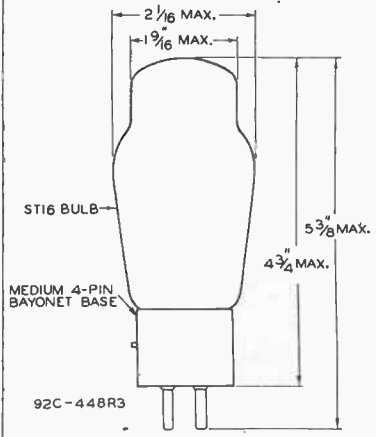
(continued from preceding page)

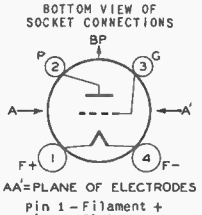
D-C Grid Current**	15	15	approx.ma.
Driving Power**	1.8	1.8	approx.watts
Power Output	11	15	approx.watts

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

** Subject to wide variations as explained on sheet TRANS.TUBE RATINGS.

For the use of the 841 at the higher frequencies refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

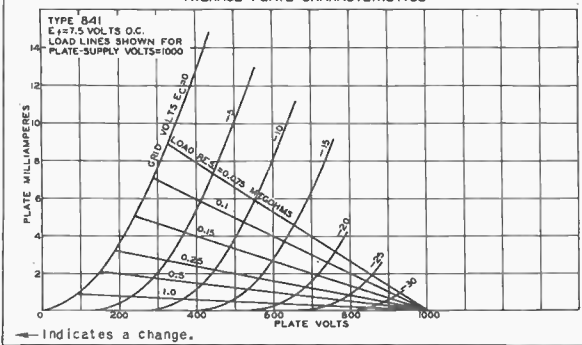




TUBE MOUNTING POSITION

VERTICAL: Base down
HORIZONTAL: Plate in vertical plane (on edge)

AVERAGE PLATE CHARACTERISTICS



← Indicates a change.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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AVERAGE PLATE CHARACTERISTICS

Ef = 7.5 VOLTS D.C.

PLATE VOLTS (E_b)

PLATE (I_b) OR GRID (I_c) MILLIAMPERES

GRID VOLTS E_c = +40

$E_b = E_c$

FEB. 12, 1934

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

925-5454

World Radio History

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A-F POWER AMPLIFIER, MODULATOR

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	1.25	amp.
Amplification Factor	3	
Direct Interelectrode Capacitances:		
Grid to Plate	7	μμf
Grid to Filament	4	μμf
Plate to Filament	3	μμf
Maximum Overall Length		5-5/8"
Maximum Diameter		2-3/16"
Bulb		S-17
Base		Medium 4-Pin Bayonet

A-F POWER AMPLIFIER & MODULATOR - Class A

D-C Plate Voltage		425 max.	volts
Plate Dissipation		12 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	350	425	volts
Grid Voltage*	-72	-100	volts
Peak Grid Swing	67	95	volts
Plate Current	34	28	ma.
Mutual Conductance	1250	1200	μmhos
Plate Resistance	2400	2500	ohms
Load Resistance	5000	8000	ohms
U.P.O. (5 % second harmonic)	2.1	3.0	watts

* Grid-voltage values are given with respect to the mid-point of filament operated on a.c. If d.c. is used, each stated value of grid voltage should be decreased by 5.0 volts and should be referred to the negative end of the filament.

In cases where the 842 is employed in resistance-coupled circuits, the recommended safe maximum value of grid leak is 1.0 megohm when the self-biasing method of obtaining grid bias is used. With fixed bias, however, the d-c resistance in the grid-coupling circuit should not exceed 0.25 megohm.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 842 are the same as for the 841.

RCA RADIOTRON COMPANY, INC.

World Radio History

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RCA

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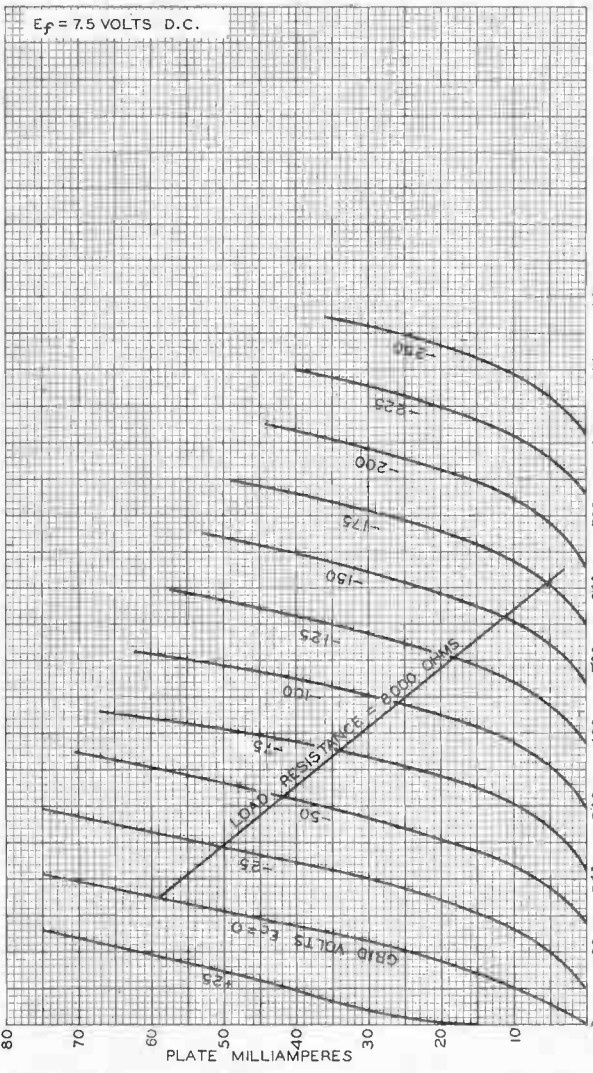
AVERAGE PLATE CHARACTERISTICS



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R-F POWER AMPLIFIER, OSCILLATOR, A-F POWER AMPLIFIER

Heater	Coated Unipotential Cathode *		
Voltage	2.5		a-c or d-c volts
Current	2.5		amp.
Amplification Factor	7.7		
Direct Interelectrode Capacitances:			
Grid to Plate	4.5		μμf
Grid to Cathode	4		μμf
Plate to Cathode	4		μμf
Maximum Overall Length			5-5/8"
Maximum Diameter			2-3/16"
Bulb			S-17
Base			Medium 5-Pin

A-F POWER AMPLIFIER - Class A

D-C Plate Voltage		425 max.	volts
Plate Dissipation		12 max.	watts
Typical Operation:			
D-C Plate Voltage	350	425	volts
D-C Grid Voltage	-25	-35	volts
A-F Grid Voltage	25	35	volts
D-C Plate Current	25	25	ma.
Transconductance	1600	1600	μmhos
Plate Resistance	4800	4800	ohms
Load Resistance	9500	12000	ohms
U.P.O. (5% second harmonic)	0.95	1.6	watts

The d-c resistance in the grid circuit should not exceed 0.5 megohm with cathode bias, or 0.1 megohm without cathode bias.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage		450 max.	volts
D-C Plate Current		30 max.	ma.
Plate Dissipation		15 max.	watts
Typical Operation:			
D-C Plate Voltage	350	450	volts
Grid Voltage	-40	-55	volts
D-C Plate Current	25	25	ma.
Power Output	2	3 approx.	watts

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage		350 max.	volts	
D-C Grid Voltage		200 max.	volts	←
D-C Plate Current		40 max.	ma.	
D-C Grid Current		7.5 max.	ma.	
Plate Input		14 max.	watts	←
Plate Dissipation		10 max.	watts	
Typical Operation:				
D-C Plate Voltage	250	350	volts	
Grid Voltage	-100	-150	volts	
D-C Plate Current **	30	30	ma.	
D-C Grid Current **	7	7 approx.	ma.	
Driving Power **	1.3	1.6 approx.	watts	
Power Output	3	5 approx.	watts	

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without modulation **

D-C Plate Voltage		450 max.	volts	
D-C Grid Voltage		-200 max.	volts	←
D-C Plate Current		40 max.	ma.	
D-C Grid Current		7.5 max.	ma.	
Plate Input		18 max.	watts	←
Plate Dissipation		15 max.	watts	
Typical Operation:				
D-C Plate Voltage	350	450	volts	
Grid Voltage	-100	-140	volts	
D-C Plate Current **	30	30	ma.	
D-C Grid Current **	5	5 approx.	ma.	
Driving Power **	0.8	1.0 approx.	watts	
Power Output	5	7.5 approx.	watts	

* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be limited to 45 volts.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

← Indicates a change.

For use of the 843 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

RCA MANUFACTURING COMPANY, INC.

World Radio History

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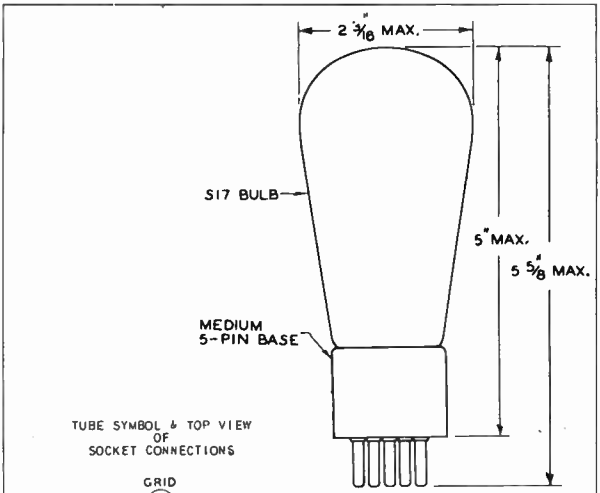
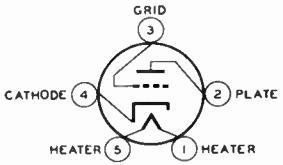
R-F POWER AMPLIFIER, OSCILLATOR, A-F POWER AMPLIFIER

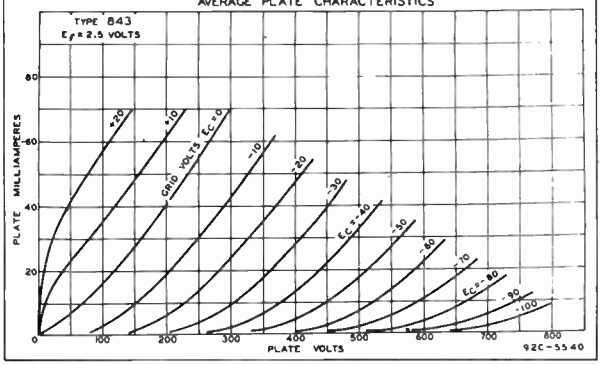


TUBE SYMBOL & TOP VIEW
OF
SOCKET CONNECTIONS



TUBE MOUNTING POSITION
VERTICAL or HORIZONTAL

AVERAGE PLATE CHARACTERISTICS



RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

RCA

845

MODULATOR, A-F POWER AMPLIFIER

Filament	Thoriated Tungsten		
Voltage	10		a-c or d-c volts
Current	3.25		amp.
Amplification Factor	5.3		
Direct Interelectrode Capacitances:			
Grid to Plate	13.5		μμf
Grid to Filament	6		μμf
Plate to Filament	6.5		μμf
Maximum Overall Length			7-7/8"
Maximum Diameter			2-5/16"
Bulb			T-18
Base			Jumbo 4-Large Pin
RCA Socket			Type UT-541 ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A₁

D-C Plate Voltage			1250 max.	volts
Plate Dissipation			100 max.	watts ←
Typical Operation:				←
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage*	-98	-145	-195	volts
Peak A-F Grid Voltage	93	140	190	volts
D-C Plate Current	95	90	80	ma.
Transconductance	3100	3100	3100	μmhos
Plate Resistance	1700	1700	1700	ohms
Load Resistance	3400	6000	11000	ohms
U.P.O. (5% second harmonic)	15	24	30	watts

NOTE: In cases where the input circuit to the 845 is resistance coupled, the resistance in the grid circuit should not exceed 0.5 megohm when cathode bias is used. Without cathode bias, the d-c resistance in the grid-coupling circuit should not exceed 0.1 megohm.

A-F POWER AMPLIFIER & MODULATOR - Class AB₁ ←

D-C Plate Voltage			1250 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			120 max.	ma.
Plate Input			150 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation:				
Unless otherwise specified, values are for 2 tubes				
D-C Plate Voltage	1000	1250		volts
D-C Grid Voltage*	-175	-225		volts
Peak A-F Grid-to-Grid Voltage	340	440		volts
Zero-Signal D-C Plate Current	40	40		ma.
Max.-Signal D-C Plate Current	230	240		ma.
Load Resistance (per tube)	1150	1650		ohms
Effective Load Res. (plate to plate)	4600	6600		ohms
Max.-Signal Power Output	75	115		approx. watts

* With a-c filament supply.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 845 are the same as for the 211.

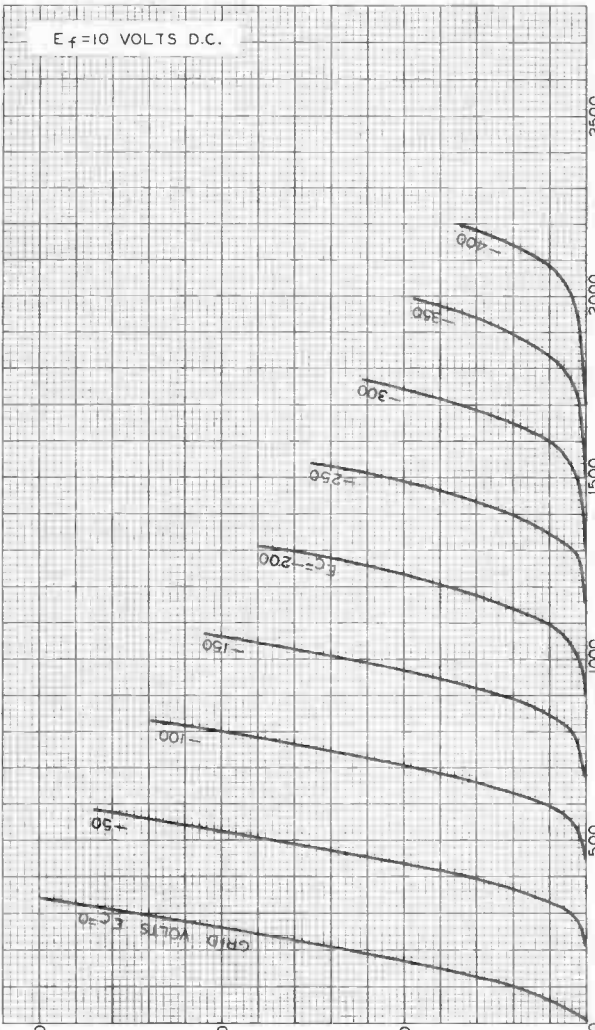
← Indicates a change.

World Radio History

845

845

AVERAGE PLATE CHARACTERISTICS



NOV. 1, 1933

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

92C-5310

World Radio History

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OSCILLATOR, R-F POWER AMPLIFIER

(WATER COOLED)

Filament	Tungsten		
Voltage	11		a-c or d-c volts
Current	51		amp.
Amplification Factor	40		
Direct Interelectrode Capacitances (approx.):			
Grid to Plate	9		μμf
Grid to Filament	6.5		μμf
Plate to Filament	1.5		μμf
Maximum Overall Length			9-1/2"
Maximum Radius			3-3/8"
Base			None
Water Jacket			Special

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

This tube can often be operated at reduced filament voltage as explained on sheet TYPES OF CATHODES in front of book.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	7500	max.	volts
D-C Plate Current	0.5	max.	amp.
R-F Grid Current	24	max.	amp.
Plate Input	3.75	max.	kw
Plate Dissipation	2.5	max.	kw
Typical Operation:			
Filament Voltage	11		d-c volts
D-C Plate Voltage	7000		volts
D-C Grid Voltage	-100	approx.	volts
Peak R-F Grid Voltage °	1275	approx.	volts
D-C Plate Current	0.45		amp.
Driving Power ** °	175	approx.	watts
Power Output	1	approx.	kw

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			6000	max.	volts
D-C Grid Voltage			-1000	max.	volts
D-C Plate Current			0.5	max.	amp.
D-C Grid Current			0.15	max.	amp.
R-F Grid Current			24	max.	amp.
Plate Input			3	max.	kw
Plate Dissipation			1.66	max.	kw
Typical Operation:					
Filament Voltage	11	11	11		a-c volts
D-C Plate Voltage	4000	5000	6000		volts
D-C Grid Voltage	-850	-900	-950	approx.	volts

** See next page.

(continued on next page)

World Radio History

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OSCILLATOR, R-F POWER AMPLIFIER

(continued from preceding page)

Peak R-F Grid Voltage	1600	1700	1950	approx. volts
D-C Plate Current	0.3	0.4	0.5	amp.
D-C Grid Current **	0.080	0.100	0.125	approx. amp.
Driving Power **	125	175	200	approx. watts
Power Output	0.9	1.5	2.25	approx. kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage			7500 max.	volts
D-C Grid Voltage			-1000 max.	volts
D-C Plate Current			1.0 max.	amp.
D-C Grid Current			0.15 max.	amp.
R-F Grid Current			30 max.	amp.
Plate Input			7.5 max.	kw
Plate Dissipation			2.5 max.	kw
Typical Operation:				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	5000	6000	7000	volts
D-C Grid Voltage	-800	-850	-900	approx. volts
Peak R-F Grid Voltage	1850	2040	2300	approx. volts
D-C Plate Current	0.60	0.75	0.90	amp.
D-C Grid Current **	0.11	0.125	0.14	approx. amp.
Driving Power **	175	235	300	approx. watts
Power Output	2	3	4.25	approx. kw

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

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 846 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs Frequency.

World Radio History

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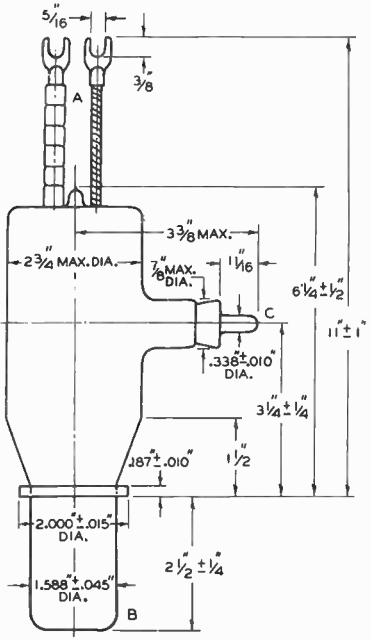
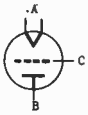
OSCILLATOR, R-F POWER AMPLIFIER



TUBE SYMBOL AND TERMINAL CONNECTIONS



A – Filament
B – Plate
C – Grid

World Radio History

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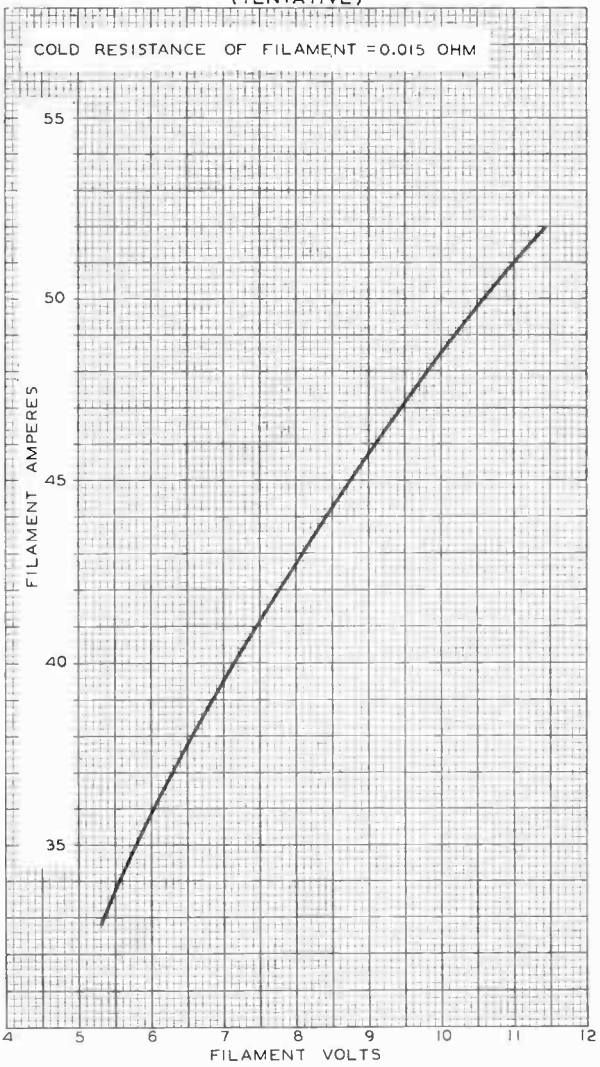
AVERAGE FILAMENT CHARACTERISTIC
(TENTATIVE)



World Radio History

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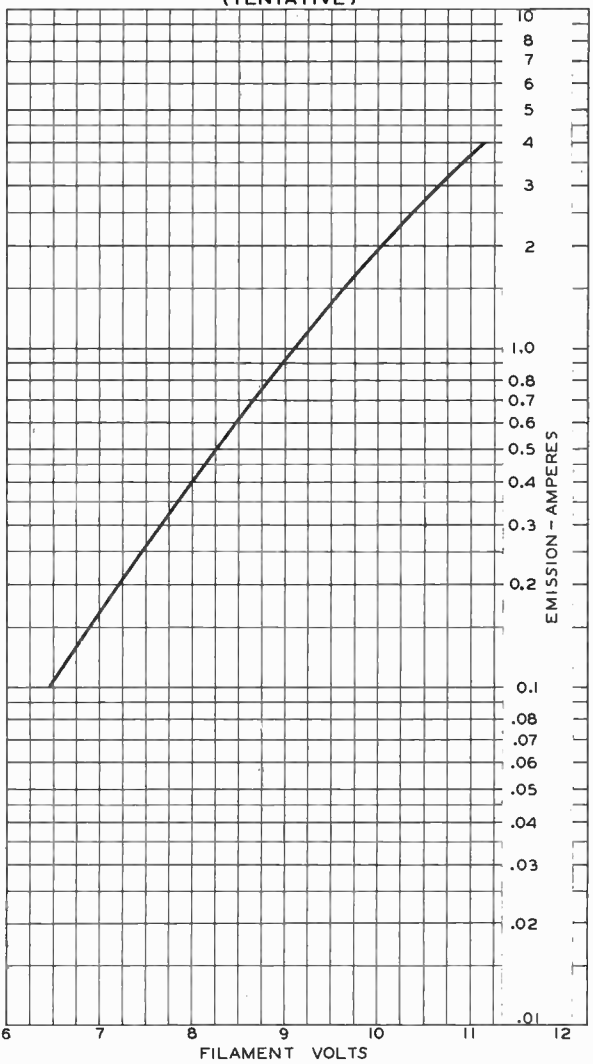
AVERAGE FILAMENT-EMISSION CHARACTERISTIC
(TENTATIVE)



DEC. 21, 1932

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4504

World Radio History

RCA

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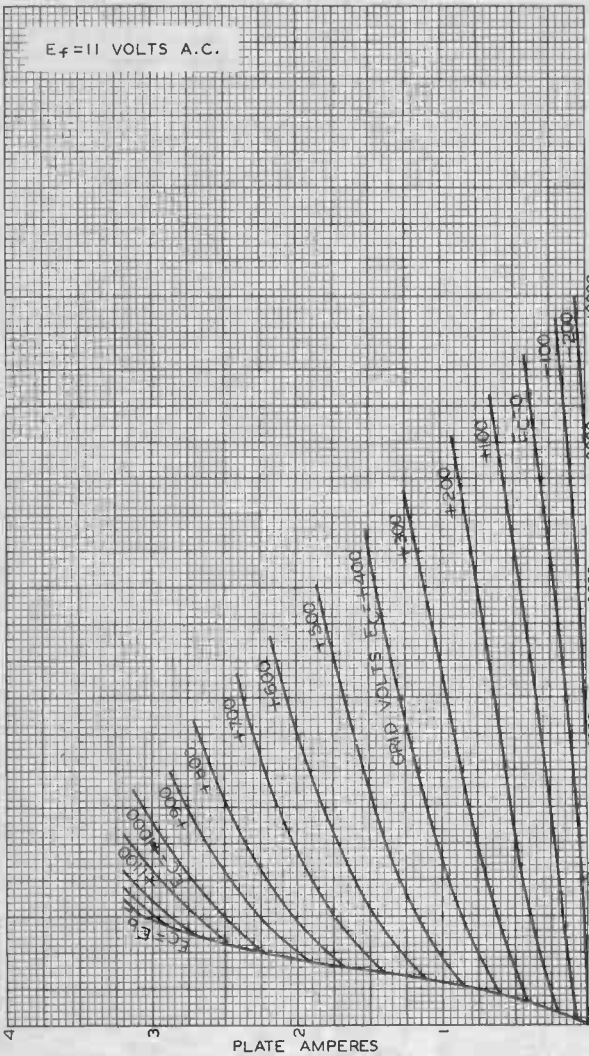
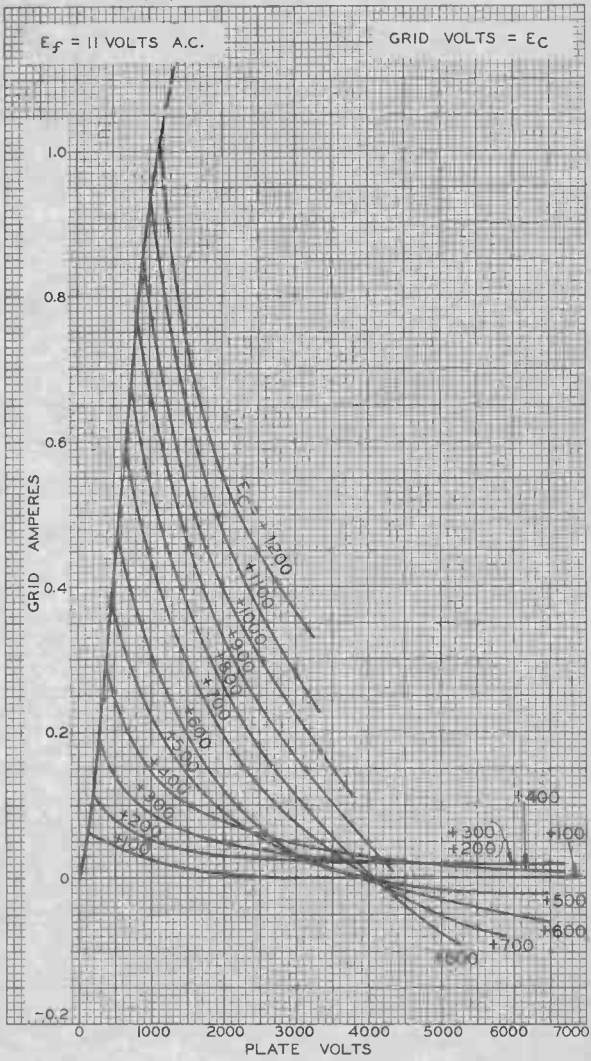
AVERAGE PLATE CHARACTERISTICS



TYPICAL CHARACTERISTICS



World Radio History

849

MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	5	amp.
Amplification Factor	19	
Direct Interelectrode Capacitances:		
Grid to Plate	33.5	μμf
Grid to Filament	17	μμf
Plate to Filament	3	μμf
Overall Length		14-1/4" ± 1/8"
Maximum Diameter		4-1/16"
Bulb		T-32
Cap		No.1904
Base		No.3503
RCA End-Mountings		Types UT-1085, UT-1086 ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A

D-C Plate Voltage			3000 max.	volts
Plate Dissipation			300 max.	watts
Typical Operation:				
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage	-74	-104	-132	volts
Peak A-F Grid Voltage	68	98	126	volts
D-C Plate Current	0.135	0.110	0.100	amp.
Mutual Conductance	6500	6050	5850	μmhos
Plate Resistance	2950	3150	3250	ohms
Load Resistance	6000	12000	18000	ohms
U.P.O. (5% second harmonic)	58	81	100	watts

The d-c resistance in the grid circuit should not exceed 0.25 megohm with cathode bias; 25000 ohms without cathode bias.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			3000 max.	volts
Max.-Signal D-C Plate Current *			0.35 max.	amp.
Max.-Signal Plate Input *			825 max.	watts
Plate Dissipation *			300 max.	watts
Typical Operation:				
Unless otherwise specified, values are for 2 tubes				
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage	-105	-130	-155	volts
Peak A-F Grid-to-Grid Volt.	450	480	500	volts
Zero-Sig. D-C Plate Cur.	0.014	0.02	0.024	amp.
Max.-Sig. D-C Plate Cur.	0.65	0.56	0.52	amp.
Load Resistance (per tube)	1600	2600	3200	ohms
Effective Load Resistance (plate to plate)	6400	10400	12800	ohms
Max.-Signal Driving Power	16	14	12	approx.watts ←
Max.-Signal Power Output	900	1000	1100	approx.watts

* Averaged over any audio-frequency cycle of sine-wave form.

← Indicates a change.

World Radio History

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MODULATOR, A-F POWER AMPLIFIER. R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

R-F POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2500 max.	volts
D-C Plate Current			0.35 max.	amp.
Plate Input			600 max.	watts
Plate Dissipation			400 max.	watts
Typical Operation:				
D-C Plate Voltage	1500	2000	2500	volts
D-C Grid Voltage	-70	-95	-125	volts
Peak R-F Grid Voltage	140	140	140	volts
D-C Plate Current	0.320	0.265	0.216	amp.
→ D-C Grid Current **	5	3	1	approx.ma.
Driving Power ** °	18	15	12	approx.watts
Power Output	150	170	180	approx.watts

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			2000 max.	volts
D-C Grid Voltage			-500 max.	volts
D-C Plate Current			0.35 max.	amp.
D-C Grid Current			0.125 max.	amp.
Plate Input			700 max.	watts
Plate Dissipation			270 max.	watts
Typical Operation:				
D-C Plate Voltage		1500	2000	volts
→ D-C Grid Voltage ¶		7100	10000	ohms
		-250	-300	volts
Peak R-F Grid Voltage		400	450	volts
D-C Plate Current		0.3	0.3	amp.
D-C Grid Current **		0.035	0.03	approx.amp.
Driving Power **		14	14	approx.watts
Power Output		300	425	approx.watts

¶ Obtained by grid leak or partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			2500 max.	volts
D-C Grid Voltage			-500 max.	volts
D-C Plate Current			0.35 max.	amp.
D-C Grid Current			0.125 max.	amp.
Plate Input			875 max.	watts
Plate Dissipation			400 max.	watts
Typical Operation:				
D-C Plate Voltage	1500	2000	2500	volts
→ D-C Grid Voltage △	5000	8000	12500	ohms
	-175	-200	-250	volts
Peak R-F Grid Voltage	310	325	360	volts
D-C Plate Current	0.3	0.3	0.3	amp.

**, ##, △ : See next page.

← Indicates a change.

World Radio History

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MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

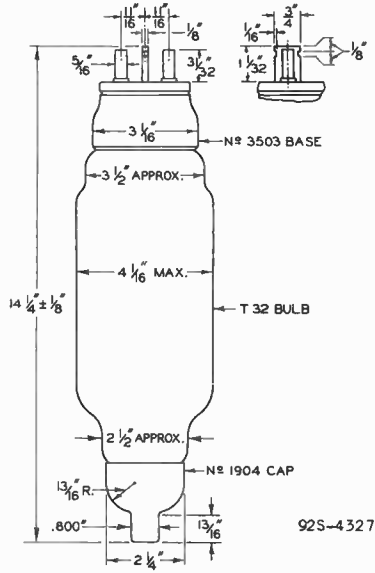
D-C Grid Current **	0.035	0.025	0.02	approx. amp.
Driving Power **	11	9	8	approx. watts
Power Output	300	425	560	approx. watts

△ Obtained by grid-leak resistor or other self- or fixed-bias method.

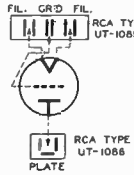
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 849 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.



TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



TUBE MOUNTING POSITION

VERTICAL: Filament base (large) up.
HORIZONTAL: Filament in vertical plane (on edge).

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

RCA

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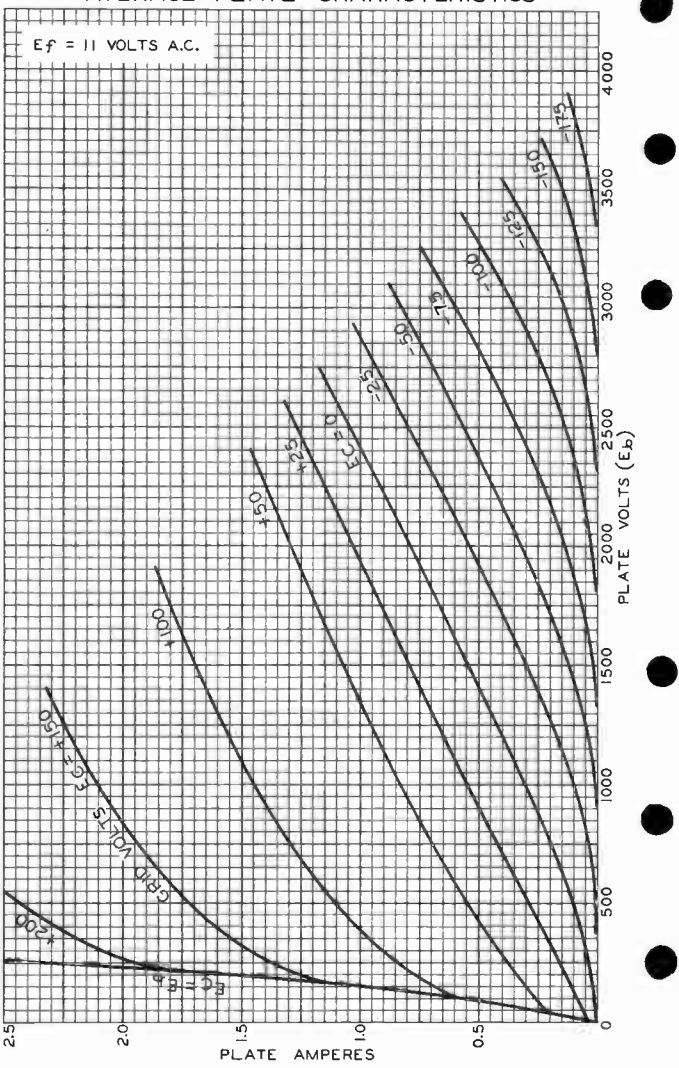
AVERAGE PLATE CHARACTERISTICS



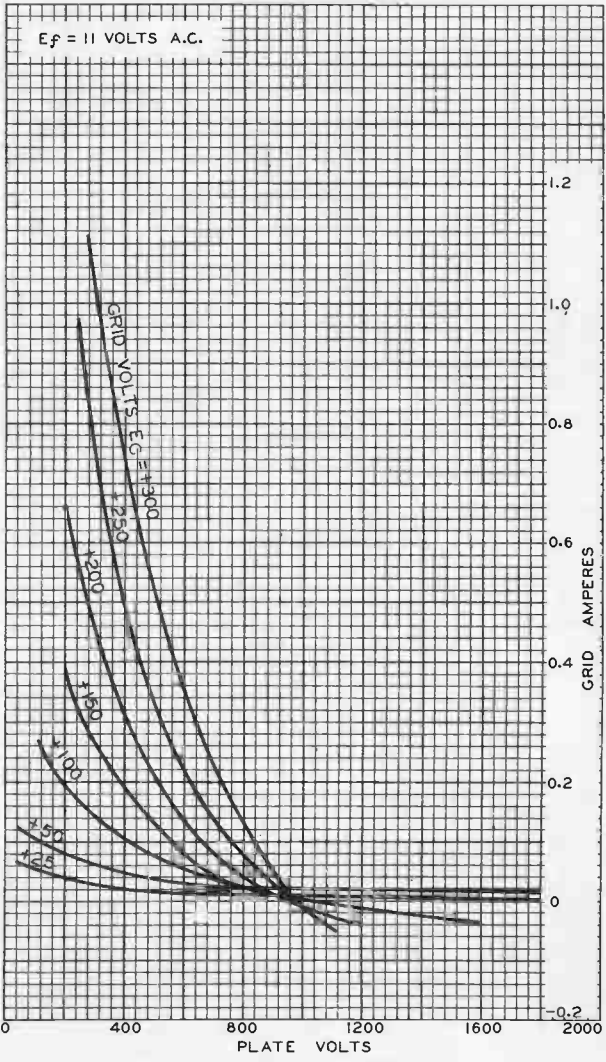
JUNE 3, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4460

World Radio History

TYPICAL CHARACTERISTICS

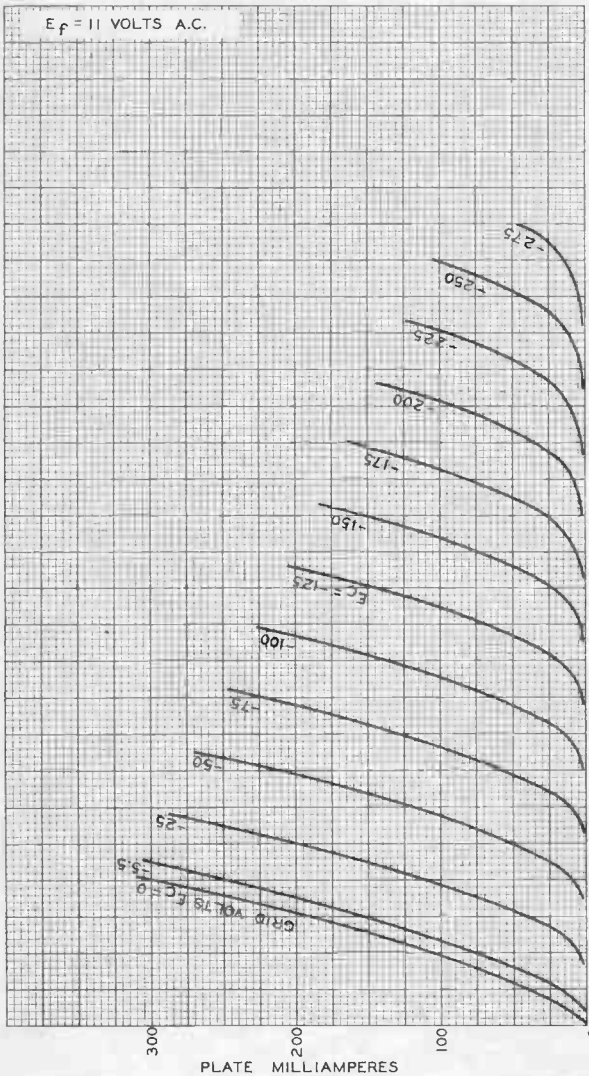


World Radio History

RCA

849

AVERAGE PLATE CHARACTERISTICS



World Radio History

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MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	15.5	amp.
Amplification Factor	20.5	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	47	μμf
Grid to Filament	25.5	μμf
Plate to Filament	4.5	μμf
Overall Length		17-1/2" ± 1/8"
Maximum Diameter		6-1/8"
Bulb		T-48
Cap		No.1902
Base		No.3117

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A

D-C Plate Voltage			2500 max.	volts
Plate Dissipation			600 max.	watts
Typical Operation:				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	1500	2000	2500	volts
D-C Grid Voltage	-49	-65	-92	volts
Peak A-F Grid Voltage	44	60	87	volts
D-C Plate Current	175	270	240	ma.
Plate Resistance	1800	1500	1600	ohms
Load Resistance	3700	3100	5000	ohms
Power Output	46	100	160	watts

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			3000 max.	volts
Max-Signal D-C Plate Current*			1 max.	amp.
Max-Signal Plate Input*			2250 max.	watts
Plate Dissipation*			750 max.	watts
Typical Operation - 2 tubes:				
Unless otherwise specified, values are for 2 tubes.				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage	-85	-111	-135	volts
Peak A-F Grid-to-Grid Volt.	500	490	490	volts
Zero-Signal D-C Plate Cur.	0.12	0.12	0.11	amp.
Max-Signal D-C Plate Cur.	1.7	1.4	1.2	amp.
Load Resistance (per tube)	650	1000	1400	ohms
Effective Load Resistance (plate to plate)	2600	4000	5600	ohms
Max-Signal Driving Power	20	12	6	approx. watts
Max-Signal Power Output	2.2	2.3	2.4	approx. kw

* Averaged over any audio frequency cycle of sine-wave form. ←

← Indicates a change

World Radio History

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MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

R-F POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2500	max.	volts
D-C Plate Current			0.75	max.	amp.
R-F Grid Current			8	max.	amp.
Plate Input			1100	max.	watts
Plate Dissipation			750	max.	watts
Typical Operation:					
Filament Voltage	11	11	11	a-c	volts
D-C Plate Voltage	1500	2000	2500		volts
D-C Grid Voltage	-60	-85	-110		volts
→ Peak R-F Grid Voltage	150	140	135		volts
D-C Plate Current	0.62	0.475	0.39		amp.
Driving Power** °	40	25	20	approx.	watts
Power Output	275	300	325	approx.	watts

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			2000	max.	volts
D-C Grid Voltage			-500	max.	volts
D-C Plate Current			1	max.	amp.
D-C Grid Current			0.2	max.	amp.
R-F Grid Current			8	max.	amp.
Plate Input			1800	max.	watts
Plate Dissipation			500	max.	watts
Typical Operation:					
Filament Voltage		11	11	a-c	volts
D-C Plate Voltage		1500	2000		volts
D-C Grid Voltage		-250	-300		volts
Peak R-F Grid Voltage		475	525		volts
D-C Plate Current		0.9	0.85		amp.
D-C Grid Current**		0.15	0.125	approx.	amp.
Driving Power**		75	65	approx.	watts
Power Output		900	1250	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

*Key-down conditions per tube without modulation**

D-C Plate Voltage			2500	max.	volts
→ D-C Grid Voltage			-500	max.	volts
D-C Plate Current			1	max.	amp.
D-C Grid Current			0.2	max.	amp.
R-F Grid Current			10	max.	amp.
Plate Input			2500	max.	watts
Plate Dissipation			750	max.	watts
Typical Operation:					
Filament Voltage	11	11	11	a-c	volts
D-C Plate Voltage	1500	2000	2500		volts

*, ** See next page.

← Indicates a change

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

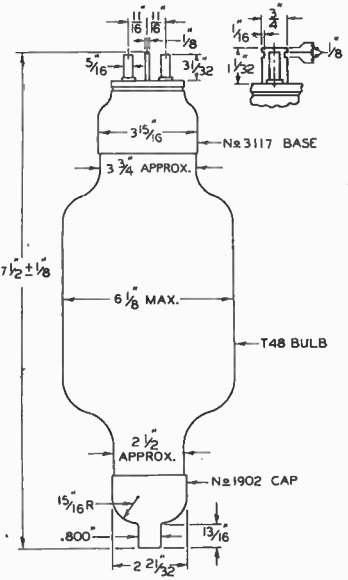
(continued from preceding page)

D-C Grid Voltage	-150	-200	-250	approx.volts
Peak R-F Grid Voltage	375	425	450	approx.volts
D-C Plate Current	0.9	0.9	0.9	amp.
D-C Grid Current **	0.15	0.12	0.1	approx.amp.
Driving Power **	55	50	45	approx.watts
Power Output	900	1250	1700	approx.watts

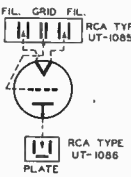
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

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

For use of the 851 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.



TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS.



RCA MANUFACTURING COMPANY, INC
World Radio History

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RCA

851

AVERAGE PLATE CHARACTERISTICS

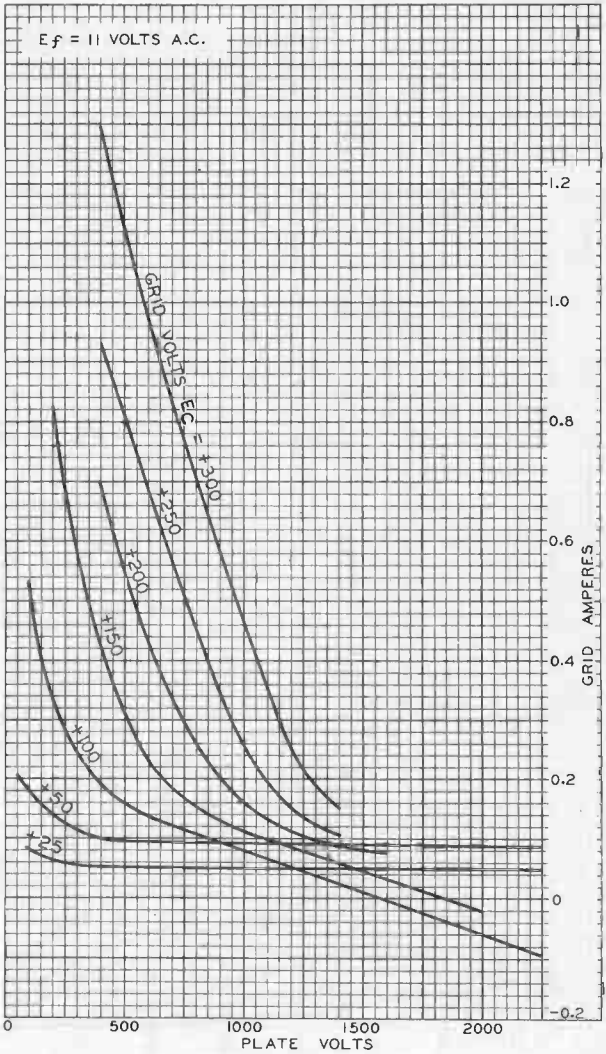
JUNE 3, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4454

World Radio History

TYPICAL CHARACTERISTICS



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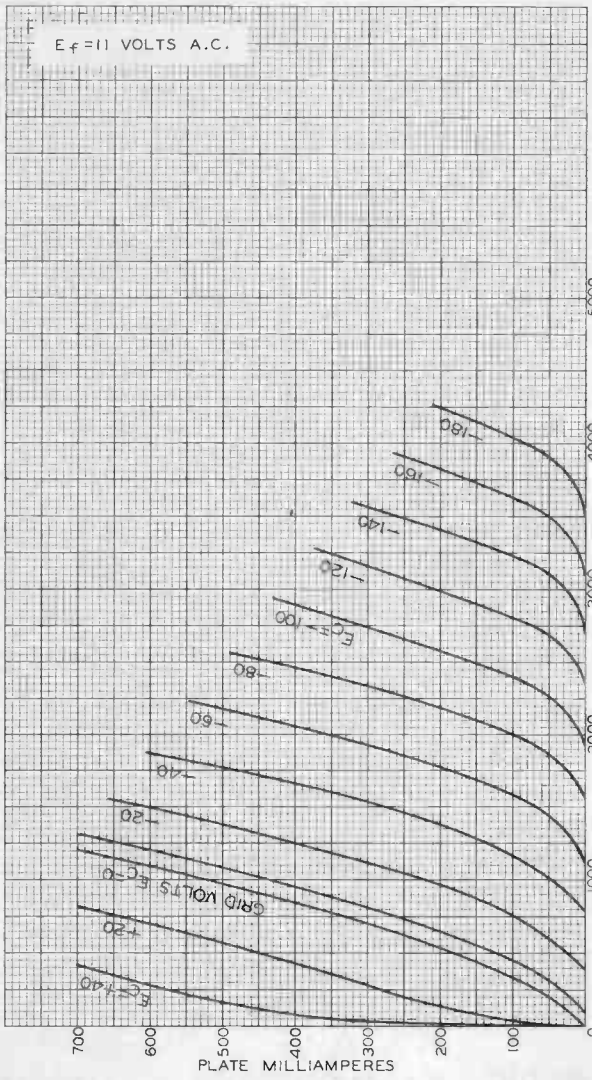
AVERAGE PLATE CHARACTERISTICS



AUG. 29, 1928

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

925-5497

World Radio History

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

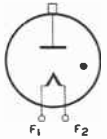
GENERAL DATA

Electrical:

Filamentary Cathode, Coated:		
Voltage	5 ± 5%	ac volts
Current	30	amp
Minimum heating time at rated voltage	60	sec
Peak Tube Voltage Drop (Approx.)	15	volts

Mechanical:

Terminal Connections:



F_1 – Filament (Insulated)

F_2 – Filament, Cathode Shield, Shell (Anode Return)

Cap – Anode

Mounting Position	Vertical with filament end down
Maximum Overall Length (Including flexible leads)	29-7/8"
Seated Length	19-1/2" ± 3/8"
Maximum Diameter	7-1/8"
Weight (Approx.)	4 lbs
Bulb	GT-56
Cap	Skirted Large (JETEC No. C1-10)
Base	Terminal-Support Shell (JETEC No. F0-2)

Temperature Control:

Heating--When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling--When the operating conditions are such that the maximum value of the operating condensed-mercury temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed-Mercury to Equilibrium Above Ambient Temperature (Approx.):*

No load	11.5	°C
Full load	15	°C

* With filament volts = 4.75 and no heat-conserving enclosure.

→ Indicates a change.

World Radio History

RCA

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values*: *For supply frequency of 60 cps*

	Operating Condensed-Mercury Temperature Range		
	25° to 60°C	30° to 40°C	
PEAK INVERSE ANODE VOLTAGE.	10000 max.	22000 max.	volts
ANODE CURRENT:			
Peak	40 max.	40 max.	amp
Average**.	10 max.	10 max.	amp
Fault, for duration of 0.2 second max.	400 max.	400 max.	amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	–	33	amp
Critical Anode Voltage . . .	2	–	100	volts
Peak Tube Voltage Drop . . .	3	–	25	volts

Note 1: With 5 volts rms on filament.

Note 2: With 4.75 volts rms on filament, and condensed-mercury temperature at 25°C, or above.,

Note 3: With 5 volts rms on filament, condensed-mercury temperature of 35° ± 5°C, peak anode current of 100 amperes provided by half-cycle pulse from a 60-cps sine wave and recurring approximately once a second. Tube drop is measured by an oscilloscope connected between anode and center tap of filament transformer.

OPERATING CONSIDERATIONS

X-Ray Warning. X-rays are produced when the 857-B is operated with a peak inverse voltage above 16000 volts (absolute value). These rays can constitute a health hazard unless the tube is adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure that it provides the required protection to the operator.

Shields and rf filter circuits should be provided for the 857-B if it is subjected to extraneous high-frequency fields during operation. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. When shields are used, special attention must be given to providing adequate ventilation and to maintaining normal condensed-mercury temperature. Rf filters are employed to prevent damage caused by rf currents which might otherwise be fed back into the rectifier tubes.

** Averaged over any period of 30 seconds maximum.

→ Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER Eav	MAX. DC OUTPUT AMPERES Iav	MAX. DC OUTPUT KW TO FILTER Pdc
Fig. 1 Half-Wave Single-Phase In-Phase Operation	15400□ 7000▲	7000 3200	10 10	70 32
Fig. 2 Full-Wave Single-Phase In-Phase Operation	7700□ 3500▲	7000 3200	20 20	140 64
Fig. 3 Series Single-Phase In-Phase Operation	15400□ 7000▲	14000 6400	20 20	280 128
Fig. 4 Half-Wave Three-Phase In-Phase Operation	8900□ 4000▲	10500 4800	30 30	315 144
Fig. 5 Parallel Three-Phase Quadrature Operation	8900□ 4000▲	10500 4800	60 60	630 288
Fig. 6 Series Three-Phase Quadrature Operation	8900□ 4000▲	21000 9600	30 30	630 288
Fig. 7 Half-Wave Four-Phase Quadrature Operation	7700□ 3500▲	10100 4600	*Resistive Load* 36 36	*Inductive Load* 40 40	*Resistive Load* 364 166	*Inductive Load* 404 184
Fig. 8 Half-Wave Six-Phase Quadrature Operation	7700□ 3500▲	10500 4800	*Resistive Load* 38 38	*Inductive Load* 40 40	*Resistive Load* 399 182	*Inductive Load* 420 192

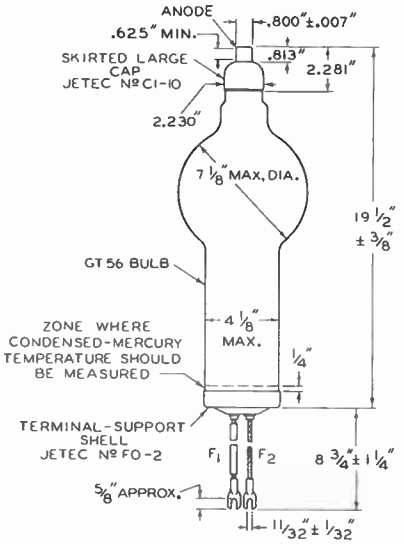
□ For maximum peak inverse anode voltage of 22000 volts and maximum average current of 10 amperes.

▲ For maximum peak inverse anode voltage of 10000 volts and maximum average current of 10 amperes.

World Radio History

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER



F1 = FILAMENT (INSULATED)
F2 = FILAMENT, CATHODE SHIELD, AND SHELL (ANODE RETURN)

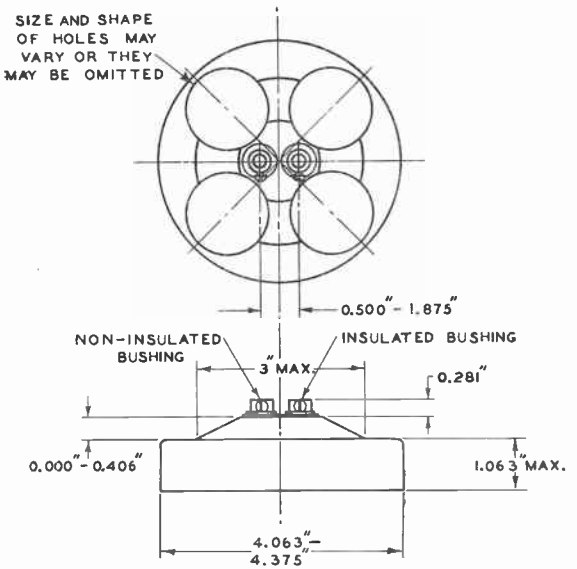
92CM-4649R3

World Radio History

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

TERMINAL-SUPPORT SHELL



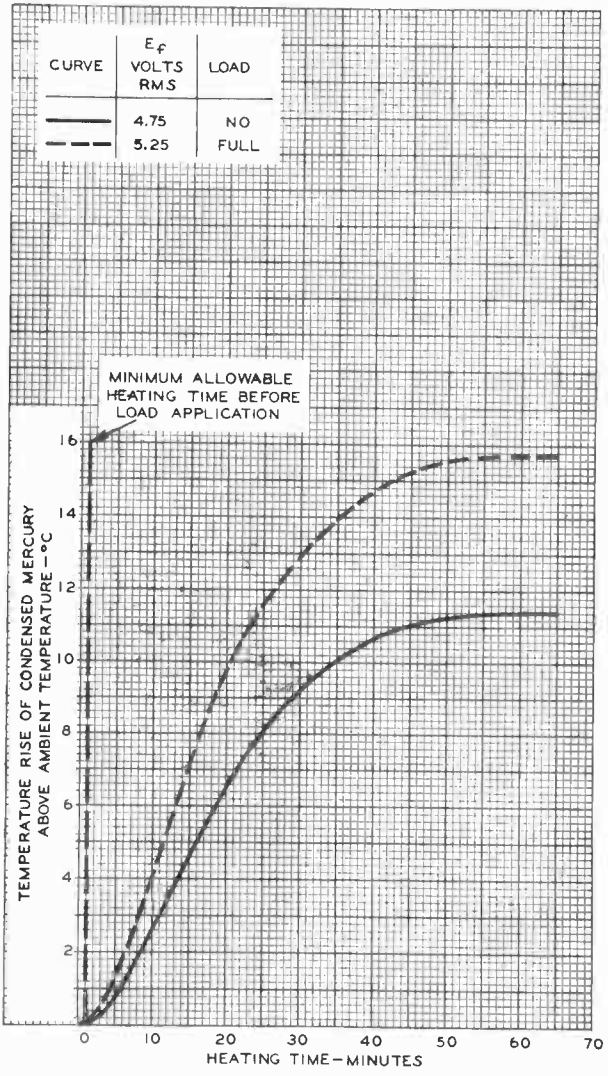
92CS-4653R2

JETEC No. FO-2
RCA No. 3911

World Radio History

857-B

RATE OF RISE OF COND.-MERCURY TEMPERATURE



RCA

860

POWER TETRODE

GENERAL DATA

Electrical:

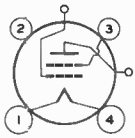
Filament, Thoriated Tungsten:		
Voltage	10	ac or dc volts
Current	3.25	amp
Transconductance, for plate current of 16 ma	1100	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate	0.08 max.*	μμf
Input	7.75	μμf
Output	7.5	μμf

* With external shielding.

Mechanical:

Mounting Position	Vertical, base down
Maximum Overall Length	8-3/4"
Maximum Radius	4-1/4"
Bulb	GT-30, with arm
Base	Medium-Metal-Shell Small 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	3F

Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – Screen
Pin 4 – Filament



Top Lead– Grid
Side Lead– Plate

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C Plate Voltage		3000 max.	volts
D-C Screen Voltage		500 max.	volts
D-C Plate Current		85 max.	ma.
Plate Input		150 max.	watts
Screen Input		10 max.	watts
Plate Dissipation		100 max.	watts
Typical Operation:			
D-C Plate Voltage	2000	3000	volts
D-C Screen Voltage □	300	300	volts
D-C Grid Voltage	-50	-50	volts
D-C Plate Current	60	43	ma.
Power Output	30	40 approx.	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C Plate Voltage	2000 max.	volts

□ Use of series screen resistor is not recommended.

World Radio History

RCA

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POWER TETRODE

D-C Screen Voltage			500 max.		volts
D-C Grid Voltage			-800 max.		volts
D-C Plate Current			85 max.		ma.
D-C Grid Current			40 max.		ma.
Plate Input			170 max.		watts
Screen Input			6.7 max.		watts
Plate Dissipation			67 max.		watts
Typical Operation:					
D-C Plate Voltage	1500	1800	2000		volts
D-C Screen Voltage ▲	60000	80000	100000		ohms
	300	300	220		volts
D-C Grid Voltage ¶	7500	7500	5300		ohms
	-225	-225	-200		volts
Peak R-F Grid Voltage	-	-	500		volts
D-C Plate Current	70	67	85		ma.
D-C Screen Current	-	-	25		ma.
D-C Grid Current **	30	30	38	approx.	ma.
Driving Power **	15	15	17	approx.	watts
Power Output	45	60	105	approx.	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation‡

Maximum Ratings, *Absolute Values*:					
D-C Plate Voltage			3000 max.		volts
D-C Screen Voltage			500 max.		volts
D-C Grid Voltage			-800 max.		volts
D-C Plate Current			150 max.		ma.
D-C Grid Current			40 max.		ma.
Plate Input			300 max.		watts
Screen Input			10 max.		watts
Plate Dissipation			100 max.		watts
Typical Operation:					
D-C Plate Voltage	1500	2000	2500	3000	volts
D-C Screen Voltage □	300	300	300	300	volts
D-C Grid Voltage ●	10000	10000	10000	10000	ohms
	-150	-150	-150	-150	volts
D-C Plate Current	90	90	90	85	ma.
D-C Grid Current **	15	15	15	15	approx. ma.
Driving Power **	7	7	7	7	approx. watts
Power Output	60	100	135	165	approx. watts

▲ Obtained from modulated plate-voltage supply through resistor or from modulated fixed supply.

¶ Obtained by grid-leak resistor or by partial self-bias methods.

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

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

□ Use of series resistor is not recommended.

● Obtained by grid-leak resistor or other self- or fixed-bias method.

World Radio History

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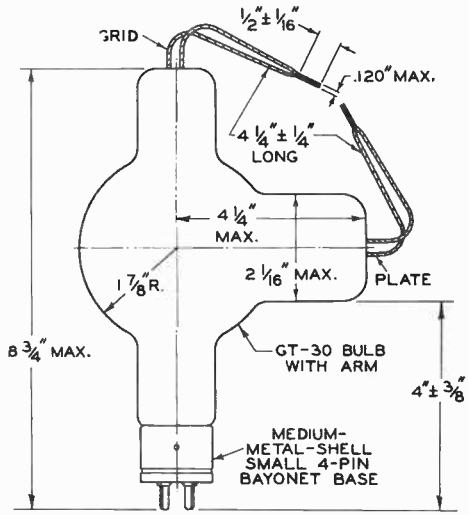
POWER TETRODE

For use of the 860 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.



92CM-4318R4

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

World Radio History

World Radio History

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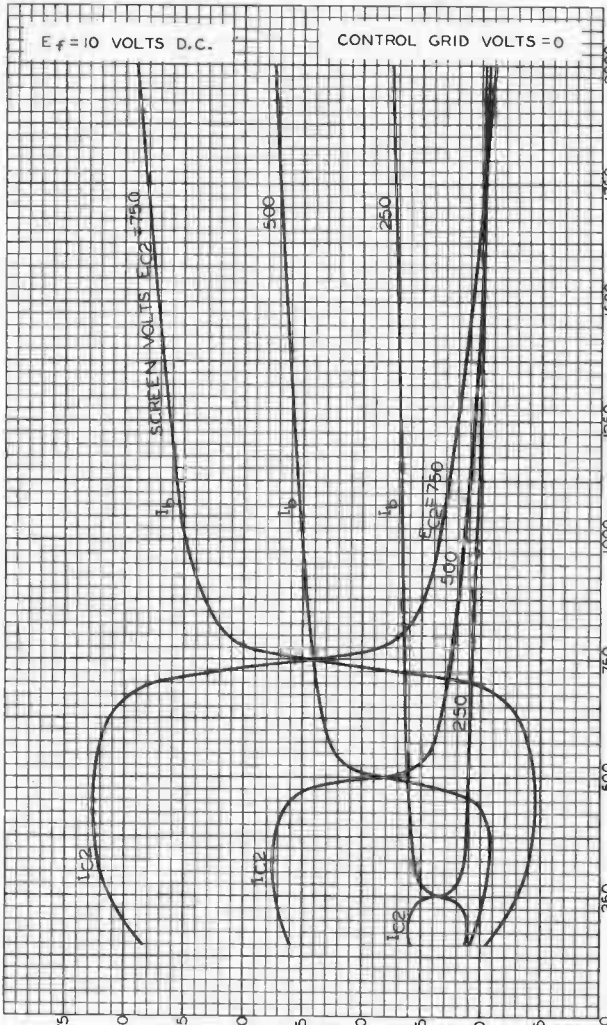
AVERAGE PLATE CHARACTERISTICS



JUNE 28, 1928

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925-5501

RCA

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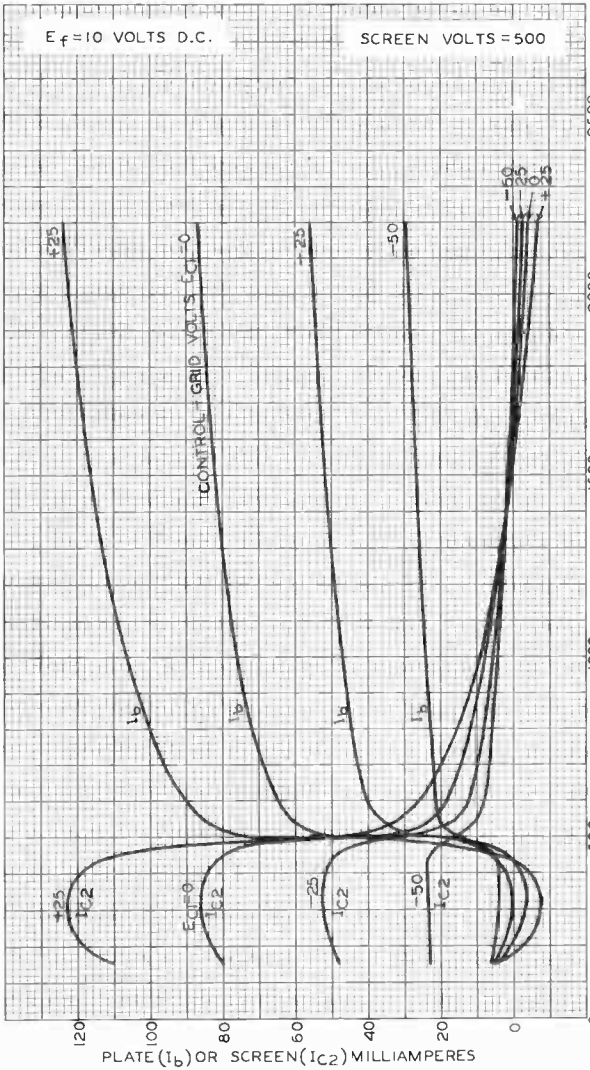
AVERAGE PLATE CHARACTERISTICS



APR. 19, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925-5309

World Radio History

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SCREEN GRID R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	10	amp.
Amplification Factor	300 approx.	
Transconductance for plate current of 130 ma.	2100	μmhos
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	0.10* maximum	μμf
Input	14.5	μμf
Output	10.5	μμf
Overall Length		17-3/32" ± 1/8"
Maximum Radius		6-5/8"
Bulb		GT-56 with arm
Cap (opposite filament base)		No.3909
Cap (on side of bulb)		No.3910
Base		No.3503
RCA End-Mountings		Types UT-1085, UT-1086 ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			3500 max.	volts
D-C Screen Voltage			750 max.	volts ←
D-C Plate Current			250 max.	ma.
Plate Input			600 max.	watts
Screen Input			35 max.	watts
Plate Dissipation			400 max.	watts
Typical Operation:				
D-C Plate Voltage	2500	3000	3500	volts
D-C Screen Voltage □	500	500	500	volts
D-C Grid Voltage	-60	-60	-60	volts
Peak R-F Grid Voltage	250	245	215	volts
D-C Plate Current	190	175	150	ma.
D-C Grid Current **	4	4	4	approx. ma.
Driving Power ○ **	20	15	15	approx. watts
Power Output	140	160	175	approx. watts

□ Use of a series resistor is not recommended.
○ At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage	3000 max.	volts
D-C Screen Voltage	750 max.	volts ←
D-C Grid Voltage	-1000 max.	volts
D-C Plate Current	300 max.	ma.
D-C Grid Current	75 max.	ma.
Plate Input	650 max.	watts
Screen Input	30 max.	watts
Plate Dissipation	270 max.	watts

* With external shielding.
** See next page.

← Indicates a change.

World Radio History

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SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

Typical Operation:				
D-C Plate Voltage	2000	2500	3000	volts
D-C Screen Voltage△	30000	50000	70000	ohms
	425	400	375	volts
→ D-C Grid Voltage ¶	3900	3800	3600	ohms
	-250	-225	-200	volts
Peak R-F Grid Voltage	675	625	575	volts
D-C Plate Current	250	220	200	ma.
D-C Grid Current **	65	60	55	approx.ma.
Driving Power **	45	40	35	approx.watts
Power Output	285	340	400	approx.watts

△ Obtained from modulated fixed supply or modulated plate-voltage supply through resistor.
¶ Obtained by grid-leak resistor or partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage			3500 max.	volts
→ D-C Screen Voltage			750 max.	volts
D-C Grid Voltage			-1000 max.	volts
D-C Plate Current			350 max.	ma.
D-C Grid Current			75 max.	ma.
Plate Input			1200 max.	watts
Screen Input			35 max.	watts
Plate Dissipation			400 max.	watts
Typical Operation:				
D-C Plate Voltage	2000	3000	3500	volts
D-C Screen Voltage □	500	500	500	volts
→ D-C Grid Voltage ●	6300	6300	6300	ohms
	-250	-250	-250	volts
Peak R-F Grid Voltage	725	725	725	volts
D-C Plate Current	300	300	300	ma.
D-C Screen Current	60	50	40	ma.
D-C Grid Current **	40	40	40	approx.ma.
Driving Power **	30	30	30	approx.watts
Power Output	400	600	700	approx.watts

● Obtained by grid-leak resistor or other fixed- or self-bias method.
□ Use of series resistor is not recommended.
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 861 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

→ Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

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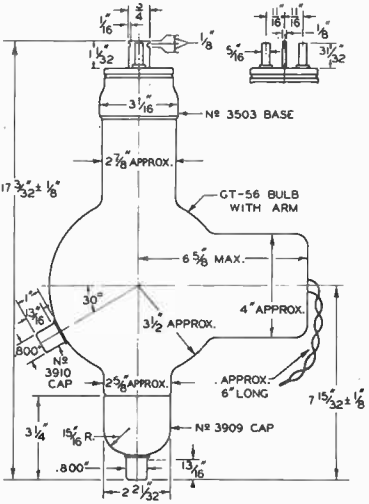
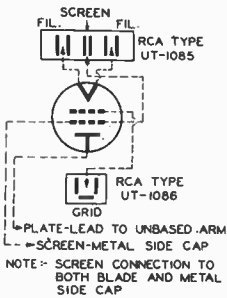
SCREEN GRID R-F POWER AMPLIFIER



92S-4324

TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



NOTE:- SCREEN CONNECTION TO BOTH BLADE AND METAL SIDE CAP

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

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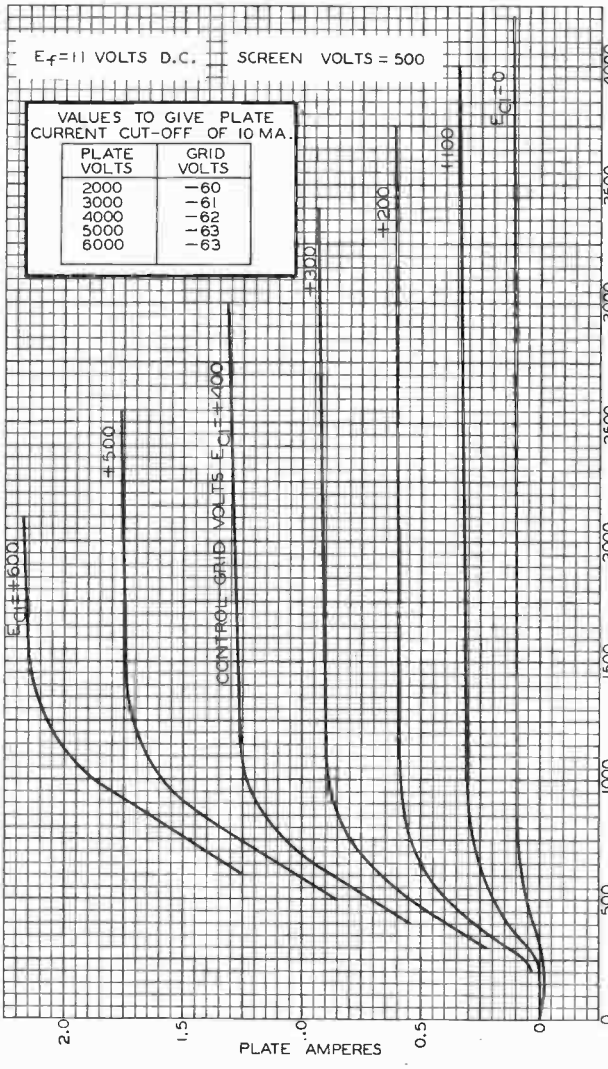
AVERAGE PLATE CHARACTERISTICS



World Radio History

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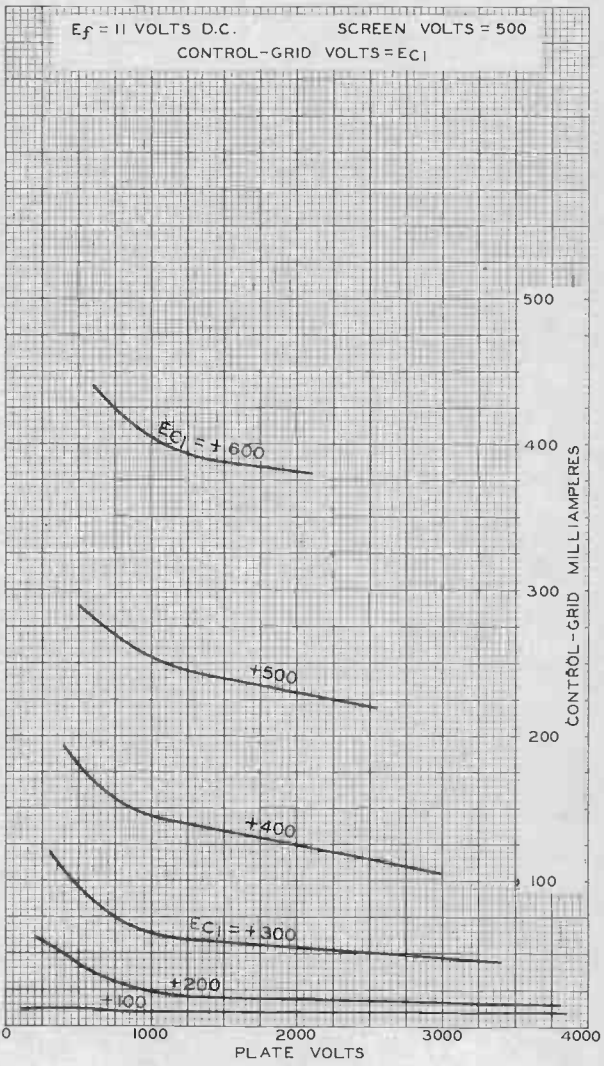
AVERAGE CHARACTERISTICS



World Radio History

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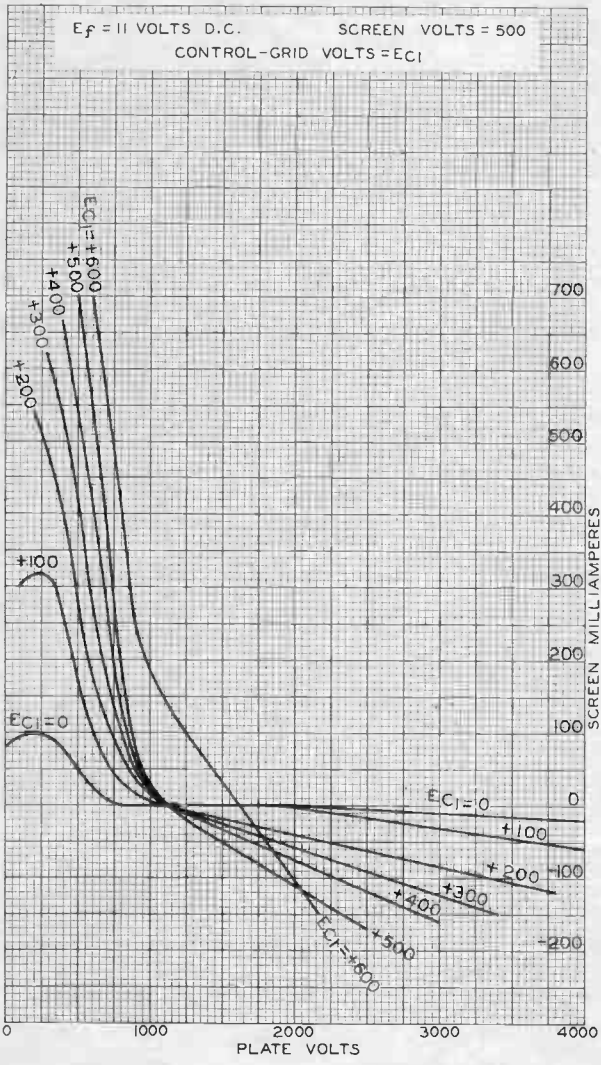
AVERAGE CHARACTERISTICS



RCA MANUFACTURING COMPANY, INC.
World Radio History

862-A

TRANSMITTING TRIODE
WATER & FORCED-AIR COOLED

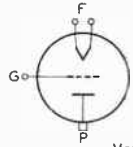
GENERAL DATA

Electrical:

Filament:	Tungsten	
Voltage	33	a-c or d-c volts
Current	207	amp.
Starting – The current should never exceed 400 amperes, even momentarily.		
Amplification Factor	45	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	70	μμf
Grid to Filament	53	μμf
Plate to Filament	4.5	μμf

Physical:

Terminal Legend:
F – Stranded Filament Terminal
G – Ribbon Grid Terminal
P – Water-cooled Plate Terminal



Mounting Position	Vertical only, glass end up
Maximum Overall Length	60-3/8"
Greatest Radius	10"
Base (with nozzle for air-cooling of filament seal)	No. 3908
Water Jacket (with nozzle for air-cooling of bulb)	Type UT-1289-A
Gasket	RCA Stock No. 17879

Cooling – *Water flow* of 15 to 25 gallons per minute must start before application of any voltages and continue for at least 10 minutes after removal of all voltages. Water temperature must not exceed 70°C at socket outlet under any conditions of operation. *Air flow* of 15 cubic feet per minute in bulb nozzle and 3 cubic feet per minute in filament-seal nozzle is required before the application of any voltages and must continue for at least 15 minutes after removal of voltages to limit the glass temperature to 150°C at the hottest part.

This tube can often be operated at reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL D-C PLATE CURRENT*	7.5 max.	amp.
MAX.-SIGNAL PLATE INPUT*	100 max.	kw
PLATE DISSIPATION*	50 max.	kw

Typical Operation:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	12000	volts
D-C Grid Voltage°	0	volts
Peak A-F Grid-to-Grid Voltage	2000	volts
Zero-Signal D-C Plate Current	3	amp.
Max.-Signal D-C Plate Current	13	amp.
Effective Load Res. (plate to plate)	1800	ohms
Max.-Signal Driving Power	450 approx.	watts
Max.-Signal Power Output	90 approx.	kw

* Averaged over any audio-frequency cycle of sine-wave form.
° For a-c filament supply.

World Radio History

862-A

TRANSMITTING TRIODE

(continued from preceding page)

R-F POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	20000 max.	volts
D-C PLATE CURRENT	5 max.	amp.
PLATE INPUT	100 max.	kw
PLATE DISSIPATION	75 max.	kw

Typical Operation:

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage[o]	-100	-150	-200	volts
Peak R-F Grid Voltage	500	625	750	volts
D-C Plate Current	2.8	3.5	4.2	amp.
Driving Power #,**	0.5	0.75	1.1	approx. kw
Power Output	11	17.5	25	approx. kw

** At crest of a-f cycle with modulation factor of 1.0.
[o] For a-c filament supply.

PLATE MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	12000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	5 max.	amp.
D-C GRID CURRENT	1.25 max.	amp.
PLATE INPUT	60 max.	kw
PLATE DISSIPATION	50 max.	kw

Typical Operation:

D-C Plate Voltage	8000	10000	12000	volts
D-C Grid Voltage	-700	-750	-800	volts
Peak R-F Grid Voltage	1700	1850	2000	volts
D-C Plate Current	4	4.5	5	amp.
D-C Grid Current #	1	1	1	approx. amp.
Driving Power #	1.7	1.85	2	approx. kw
Power Output	24	34	45	approx. kw

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation ##

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	20000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	10 max.	amp.
D-C GRID CURRENT	1 max.	amp.
PLATE INPUT	200 max.	kw
PLATE DISSIPATION	100 max.	kw

#, ##: See next page.

World Radio History

862-A

TRANSMITTING TRIODE

(continued from preceding page)

Typical Operation:

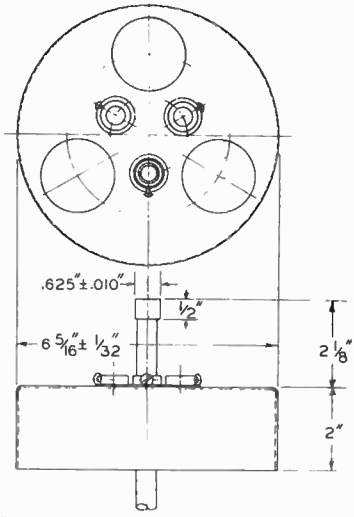
D-C Plate Voltage	12000	15000	18000	
D-C Grid Voltage.	-800	-900	-1000	. . . volts
Peak R-F Grid Voltage . .	2050	2300	2550	. . . volts
D-C Plate Current	6.25	7.5	8.33	. . . volts
D-C Grid Current #	0.8	0.85	0.9	approx. amp.
Driving Power #	1.6	2	2.4	approx. kw
Power Output.	50	75	100	approx. kw

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

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

Data on operating frequencies for the 862-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

Nº 3908 BASE OUTLINE



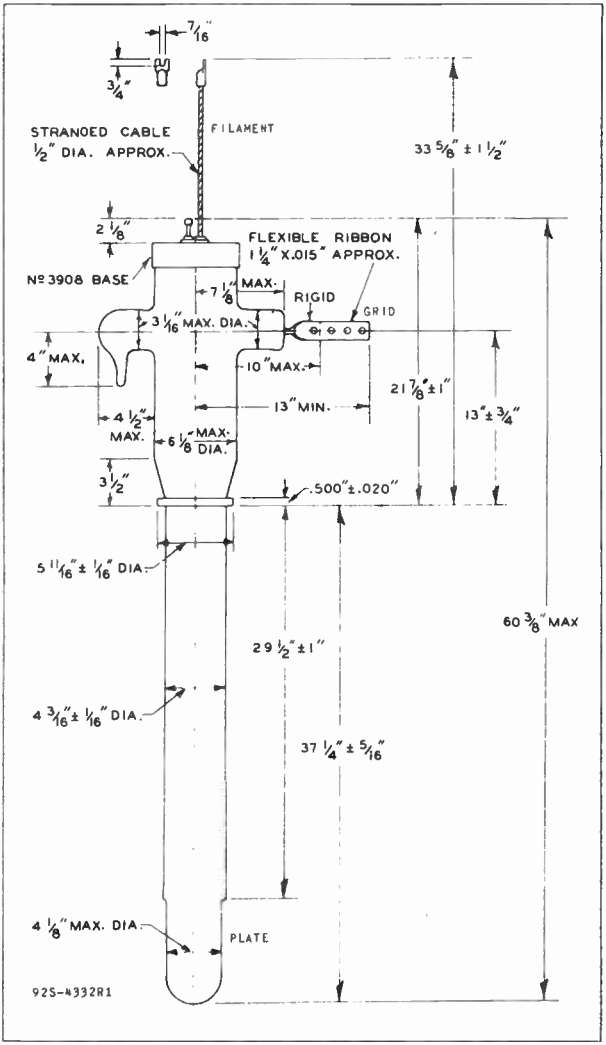
92CS-6577

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

World Radio History

862-A

TRANSMITTING TRIODE

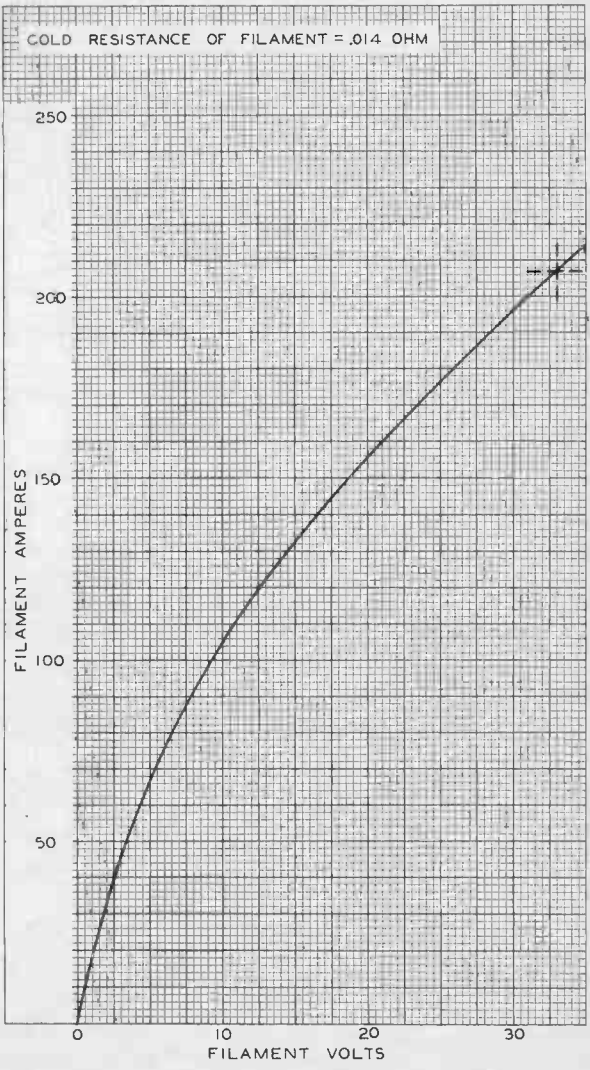


RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

862-A

AVERAGE FILAMENT CHARACTERISTIC



862-A

TRANSMITTING TRIODE

ADDITIONAL CURVES
FOR THE 862-A ARE THE SAME AS
THOSE FOR TYPE 898-A

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

World Radio History

865

SCREEN GRID R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	2.0	amp.
Amplification Factor	150 approx.	
Mutual Conductance for plate current of 18 ma.	750	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate	0.10*maximum	μμf
Input	8.5	μμf
Output	8.0	μμf
Maximum Overall Length		5-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 4-Pin Bayonet

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER - Class B (Telephony)

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		750 max.	volts
D-C Screen Voltage		175 max.	volts
D-C Plate Current		30 max.	ma.
R-F Grid Current		4 max.	amp.
Plate Input		22.5 max.	watts
Screen Input		3 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	500	750	volts
D-C Screen Voltage	125	125	volts
D-C Grid Voltage	-30	-30	volts
D-C Plate Current	30	22	ma.
D-C Grid Current	5	3	approx.ma.
Driving Power ° **	2	1.5	approx.watts
Power Output	3	4.5	approx.watts

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	500 max.	volts
D-C Screen Voltage	175 max.	volts
D-C Grid Voltage	-200 max.	volts
D-C Plate Current	60 max.	ma.
D-C Grid Current	15 max.	ma.
R-F Grid Current	4 max.	amp.

* With external shielding.

** See next page.

(continued on next page)

World Radio History

865

SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

Plate Input				30 max.	watts
Screen Input				2 max.	watts
Plate Dissipation				10 max.	watts
Typical Operation:					
Filament Voltage			7.5	7.5 a-c	volts
D-C Plate Voltage			375	500	volts
D-C Screen Voltage			125	125	volts
D-C Grid Voltage			-120	-120	volts
D-C Plate Current			50	40	ma.
D-C Grid Current **			11	9 approx.	ma.
Driving Power **			3	2.5 approx.	watts
Power Output			8.5	10 approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage				750 max.	volts
D-C Screen Voltage				175 max.	volts
D-C Grid Voltage				-200 max.	volts
D-C Plate Current				60 max.	ma.
D-C Grid Current				15 max.	ma.
R-F Grid Current				5 max.	amp.
Plate Input				45 max.	watts
Screen Input				3 max.	watts
Plate Dissipation				15 max.	watts
Typical Operation:					
Filament Voltage	7.5	7.5	7.5	7.5 a-c	volts
D-C Plate Voltage	375	500	625	750	volts
D-C Screen Voltage	125	125	125	125	volts
D-C Grid Voltage	-80	-80	-80	-80	volts
D-C Plate Current	55	50	45	40	ma.
D-C Grid Current **	11	9	6	5.5 approx.	ma.
Driving Power **	2.5	2.0	1.2	1.0 approx.	watts
Power Output	8.5	10	14	16 approx.	watts

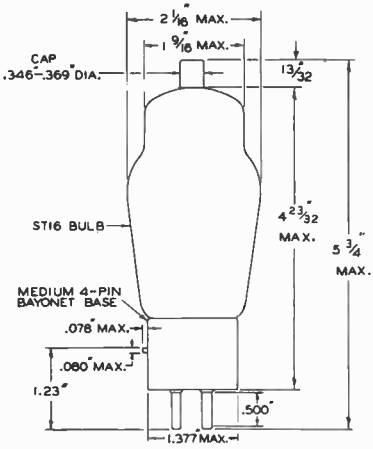
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

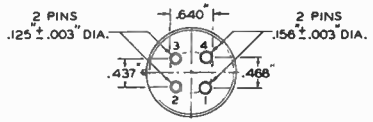
\# Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

For use of the 865 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs. FREQUENCY.

865

SCREEN GRID R-F POWER AMPLIFIER

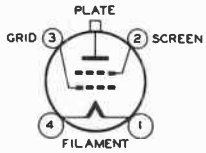




BOTTOM VIEW OF BASE

925-4272R3

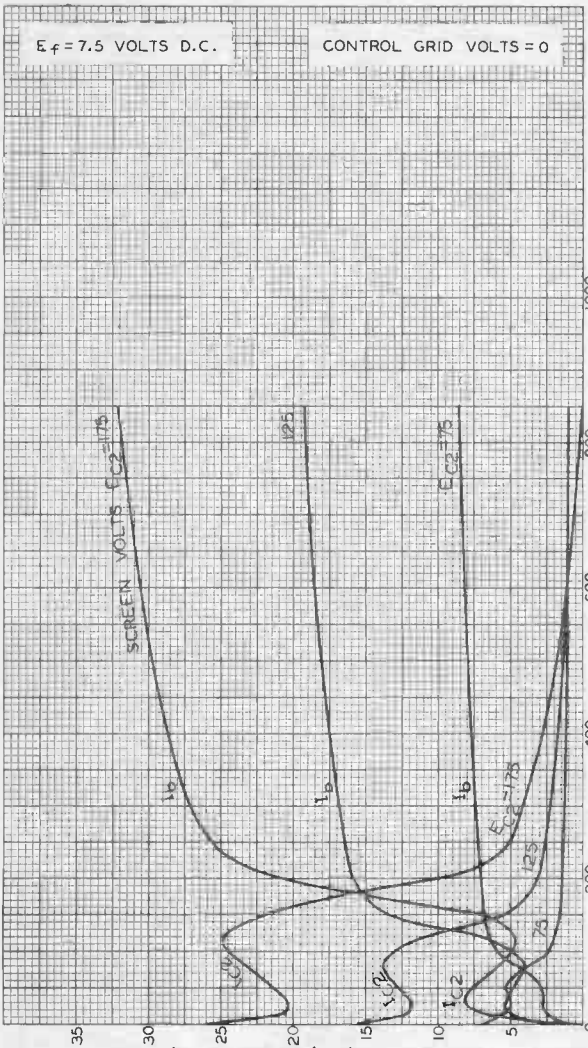
TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



World Radio History

865

AVERAGE PLATE CHARACTERISTICS



865

AVERAGE PLATE CHARACTERISTICS

865

E f = 7.5 VOLTS D.C.

SCREEN VOLTS = 125

GRID VOLTS E_{C1} = +175

E_{C1} = +125

+100

+50

+25

0

−10

−20

E_{C1} =

PLATE VOLTS

100 200 300 400 500

PLATE MILLIAMPERES

0 20 40 60 80 100 120 140 160

MAY 10, 1935

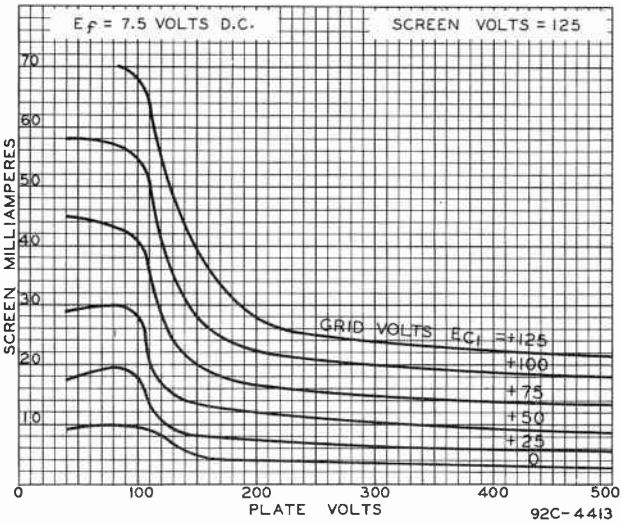
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

92C-4412

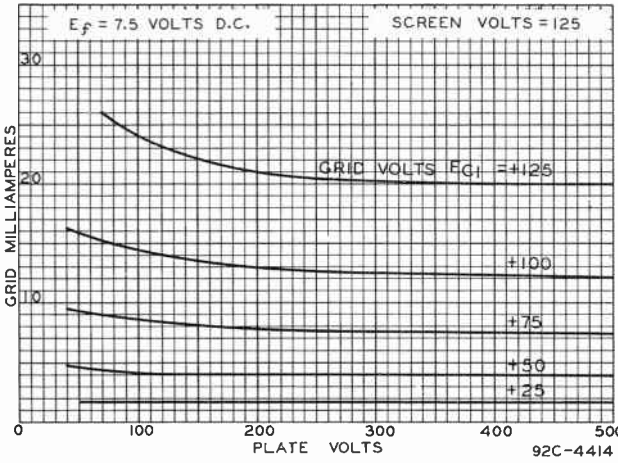
World Radio History

865

AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS



RCA

866-A

HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

Electrical:

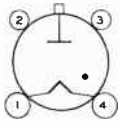
Filament, Coated:

	Min.	Av.	Max.	
Voltage	2.38	2.5	2.62	ac volts
Current at 2.5 volts	–	5	5.4	amp
Heating time at rated voltage	15	–	–	sec
Peak Tube Voltage Drop (Approx.)	–	15	–	volts

Mechanical:

Operating Position	Vertical, base down
Maximum Overall Length	6-9/16"
Maximum Seated Length	5-3/4" ± 3/16"
Maximum Diameter	2-7/16"
Weight (Approx.)	3 oz
Bulb	ST19
Cap	Medium (JETEC No.C1-5)
Socket	Johnson No.123-209, or equivalent
Base	Medium-Shell Small 4-Pin with Bayonet (JETEC No.A4-10)
Basing Designation for BOTTOM VIEW	4P

Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – No Connection



Pin 4 – Filament, Cathode Shield
Cap – Anode

Temperature Control:

Heating--When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling--When the operating conditions are such that the maximum value of the operating condensed-mercury-temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.):

No load*	26	°C
Full load▲	33	°C

* With 2.38 volts rms on filament, and no heat-conserving enclosure.

▲ With 2.62 volts rms on filament, average anode current = 0.5 ampere, and no heat-conserving enclosure.

← Indicates a change.

World Radio History

866-A

HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER

→ Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury-Temperature Range● 20° to 80° C	20° to 70° C	20° to 60° C	
PEAK INVERSE ANODE VOLTAGE. .	2500 max.	5000 max.	10000 max.	volts
ANODE CURRENT:				
Peak	2 max.	1 max.	1 max.	amp
Average#	0.5 max.	0.25 max.	0.25 max.	amp
Fault, for duration of 0.1 second maximum. . . .	20 max.	20 max.	20 max.	amp

● Operation at 40° ± 5° C is recommended.

Averaged over any interval of 30 seconds maximum.

OPERATING CONSIDERATIONS

→ *Shields and rf filter circuits* should be provided for the 866-A if it is subjected to extraneous high-frequency fields during operation. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. When shields are used, special attention must be given to providing adequate ventilation and to maintaining normal condensed-mercury temperature. Rf filters are employed to prevent damage caused by rf currents which might otherwise be fed back into the rectifier tubes.

→ Indicates a change.

World Radio History

866-A

HALF-WAVE MERCURY-VAPOR RECTIFIER

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}	MAX. DC OUTPUT KW TO FILTER P_{dc}
Fig. 1 Half-Wave Single-Phase In-Phase Operation	7000□	3200	0.25	0.8
	3500▲	1600	0.25	0.4
	1700*	800	0.5	0.4
Fig. 2 Full-Wave Single-Phase In-Phase Operation	3500□	3200	0.5	1.6
	1700▲	1600	0.5	0.8
	800*	800	1	0.8
Fig. 3 Series Single-Phase In-Phase Operation	7000□	6400	0.5	3.2
	3500▲	3200	0.5	1.6
	1700*	1600	1	1.6
Fig. 4 Half-Wave Three-Phase In-Phase Operation	4000□	4800	0.75	3.6
	2000▲	2400	0.75	1.8
	1000*	1200	1.5	1.8
Fig. 5 Parallel Three-Phase Quadrature Operation	4000□	4800	1.5	7.2
	2000▲	2400	1.5	3.6
	1000*	1200	3	3.6
Fig. 6 Series Three-Phase Quadrature Operation	4000□	9600	0.75	7.2
	2000▲	4800	0.75	3.6
	1000*	2400	1.5	3.6
			Resistive Load / *Inductive Load*	*Resistive Load* / *Inductive Load*
Fig. 7 Half-Wave Four-Phase Quadrature Operation	3500□	4500	0.91 / 1	4.05 / 4.5
	1700▲	2300	0.91 / 1	2.07 / 2.3
	800*	1100	1.82 / 2	1.98 / 2.2
			Resistive Load / *Inductive Load*	*Resistive Load* / *Inductive Load*
Fig. 8 Half-Wave Six-Phase Quadrature Operation	3500□	4800	0.95 / 1	4.6 / 4.8
	1700▲	2400	0.95 / 1	2.3 / 2.4
	800*	1200	1.9 / 2	2.28 / 2.4

□ For maximum peak inverse anode voltage of 10000 volts, and condensed-mercury-temperature range of 20° to 60° C.

▲ For maximum peak inverse anode voltage of 5000 volts, and condensed-mercury-temperature range of 20° to 70° C.

* For maximum peak inverse anode voltage of 2500 volts, and condensed-mercury-temperature range of 20° to 80° C.

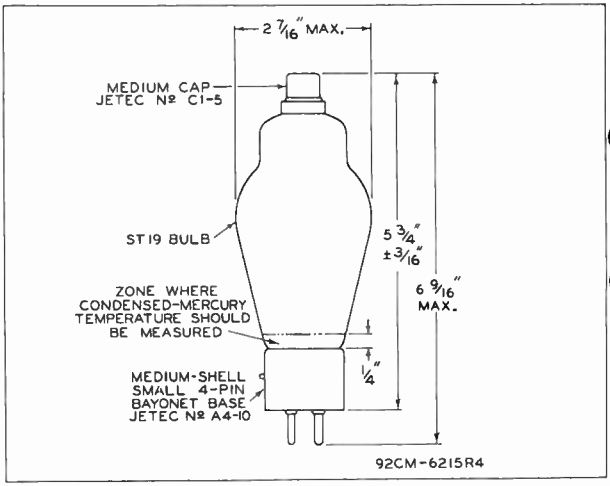
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

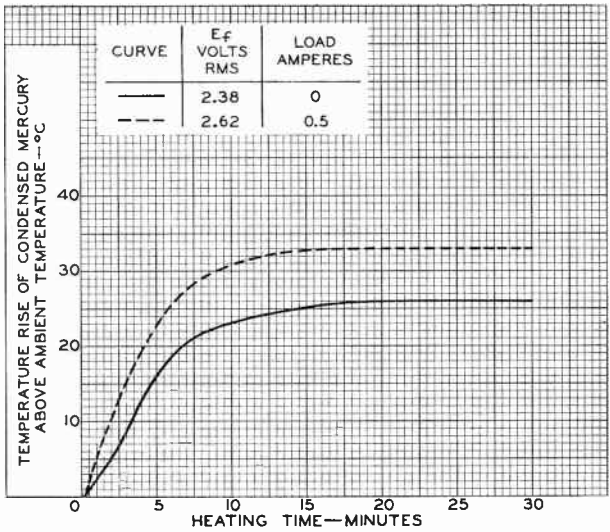
866-A

866-A

HALF-WAVE MERCURY-VAPOR RECTIFIER



RATE OF RISE OF CONDENSED-MERCURY TEMPERATURE



ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
92CS-9028RI

869-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

This Type Supersedes RCA Type 869-A

Filament*	Coated	
Voltage	5.0	a-c volts
Current	18.0	amp.
Overall Length		14-1/4" ± 3-3/16"
Maximum Diameter		5-1/16"
Bulb		GT-40
Cap		No. 3905
Base		No. 3502
RCA End Mountings		UT-1085, UT-1086

MAXIMUM RATINGS

	Filament Excitation	
	In-Phase	*Out-of-Phase (90° ± 30°)*
Peak Inverse Voltage:		
For supply frequency up to 150~		
Cond. Mercury Temp. 30° to 40°C #	20000 max.	15000 max. volts
Cond. Mercury Temp. 30° to 60°C ##	10000 max.	– volts
Peak Plate Current		
For supply frequency above 25~	10 max.	15 max. amp.
Average Plate Current °	2.5 max.	5 max. amp.
Surge Current for max. of 0.1 sec.	100 max.	amp.
Peak Tube Voltage Drop	10 approx.	volts

* The filament of the 869-B should be allowed to come up to operating temperature before plate voltage is applied. For average conditions the delay is approximately 1 minute.

\# Forced ventilation. Recommended temperature of condensed mercury 35°C ± 5°C.

\## Natural ventilation. Recommended temperature of condensed mercury 35°C ± 5°C.

° Averaged over a period of 30 sec. max.

For shielding and r-f filter circuits, refer to Type 871.

For circuits, refer to Type 872.

CIRCUIT	MAX. A-C INPUT VOLTS (RMS)	APPROX. D-C OUTPUT VOLTS TO FILTER	MAX. D-C OUTPUT CURRENT AMPERES	PHASE RELATION BETWEEN FILAMENT AND PLATE VOLTAGE
Single-Phase Full-Wave (2 tubes) Fig. 1	7000 per tube	6300	5	In-Phase
	5250 per tube	4725	10	60° to 120°
Single-Phase Full-Wave (4 tubes) Fig. 2	14000 total	12600	5	In-Phase
	10500 total	9450	10	60° to 120°
Three-Phase Half-Wave (3 tubes) Fig. 3	8150 per leg	9550	7.5	In-Phase
	6100 per leg	7150	15	60° to 120°
Three-Phase Double-Y Parallel (6 tubes) Fig. 4	8150 per leg	9550	15	In-Phase
	6100 per leg	7150	30	60° to 120°
Three-Phase Full-Wave (6 tubes) Fig. 5	8150 per leg	19100	7.5	In-Phase
	6100 per leg	14300	15	60° to 120°

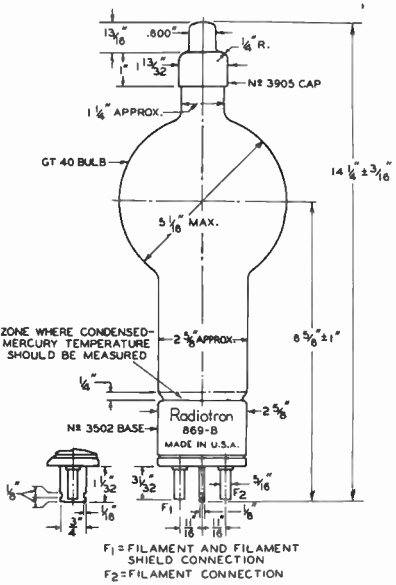
World Radio History

869-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

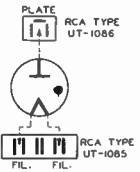
(continued from preceding page)

The table above classifies suitable rectifier circuits for the 869-B and shows their safe maximum input and maximum output operating conditions. The values are based on sine-wave input and the use of a suitable choke preceding any condenser in the filter circuit.



92S-4330R2

TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

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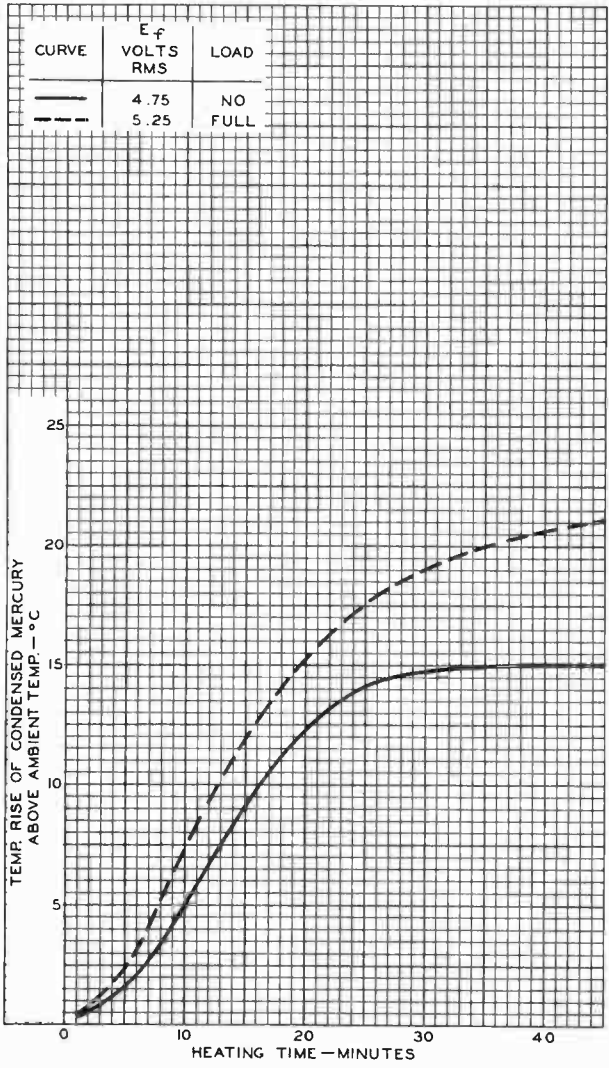
RCA MANUFACTURING COMPANY, INC.

World Radio History

RCA

869-B

RATE OF RISE OF COND.-MERCURY TEMPERATURE



APRIL 12, 1951

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7634

World Radio History

872-A

HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

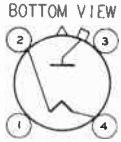
Electrical:

	Min.	Av.	Max.	
Filament, Coated:				
Voltage	4.75	5	5.25	ac volts
Current at 5 volts	–	7.5	8	amp
Heating time at rated voltage	30	–	–	sec
Peak Tube Voltage Drop (Approx.)	–	10	–	volts

Mechanical:

Operating Position	Vertical, base down
Overall Length	8-1/4" ± 1/4"
Maximum Diameter	2-5/16"
Weight (Approx.)	7 oz
Bulb	T18
Cap	Medium (JETEC No.C1-5)
Socket	Johnson No.123-211, or equivalent
Base	Medium-Metal-Shell Jumbo 4-Pin with Bayonet (JETEC No.A4-29)
Basing Designation for BOTTOM VIEW	4AT

Pin 1 – No Connection
Pin 2 – Filament, Cathode Shield



Pin 3 – No Connection
Pin 4 – Filament Cap – Anode

Temperature Control:

Heating—When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling—When the operating conditions are such that the maximum value of the operating condensed-mercury-temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.):		
No load*	14	°C
Full load▲	19	°C

* With 4.75 volts rms on filament, and no heat-conserving enclosure.

▲ With 5.25 volts rms on filament, average anode current = 1.25 amperes, and no heat-conserving enclosure.

← Indicates a change.

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

World Radio History

RCA

872-A

HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury-Temperature Range• 20° to 70° C	20° to 60° C	
PEAK INVERSE ANODE VOLTAGE	5000 max.	10000 max.	volts
ANODE CURRENT:			
Peak	5 max.	5 max.	amp
Average#	1.25 max.	1.25 max.	amp
Fault, for duration of 0.1 second maximum.	50 max.	50 max.	amp

• Operation at 40° ± 5° C is recommended.

Averaged over any interval of 15 seconds maximum.

OPERATING CONSIDERATIONS

Shields and rf filter circuits should be provided for the 872-A if it is subjected to extraneous high-frequency fields during operation. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. When shields are used, special attention must be given to providing adequate ventilation and to maintaining normal condensed-mercury temperature. Rf filters are employed to prevent damage caused by rf currents which might otherwise be fed back into the rectifier tubes.

→ Indicates a change.

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

World Radio History

872-A

HALF-WAVE MERCURY-VAPOR RECTIFIER

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}	MAX. DC OUTPUT KW TO FILTER P_{dc}
Fig. 1 Half-Wave Single-Phase In-Phase Operation	7000□ 3500▲	3200 1600	1.25 1.25	4 2
Fig. 2 Full-Wave Single-Phase In-Phase Operation	3500□ 1700▲	3200 1600	2.5 2.5	8 4
Fig. 3 Series Single-Phase In-Phase Operation	7000□ 3500▲	6400 3200	2.5 2.5	16 8
Fig. 4 Half-Wave Three-Phase In-Phase Operation	4000□ 2000▲	4800 2400	3.75 3.75	18 9
Fig. 5 Parallel Three-Phase Quadrature Operation	4000□ 2000▲	4800 2400	7.5 7.5	36 18
Fig. 6 Series Three-Phase Quadrature Operation	4000□ 2000▲	9600 4800	3.75 3.75	36 18
Fig. 7 Half-Wave Four-Phase Quadrature Operation	 3500□ 1700▲	 4500 2250	*Resistive Load* 4.5 4.5	*Inductive Load* 5 5	*Resistive Load* 20 10	*Inductive Load* 22.5 11.2
Fig. 8 Half-Wave Six-Phase Quacrature Operation	 3500□ 1700▲	 4800 2400	*Resistive Load* 4.75 4.75	*Inductive Load* 5 5	*Resistive Load* 22.8 11.4	*Inductive Load* 24 12

□ For maximum peak inverse anode voltage of 10000 volts and condensed-mercury-temperature range of 20° to 60° C.

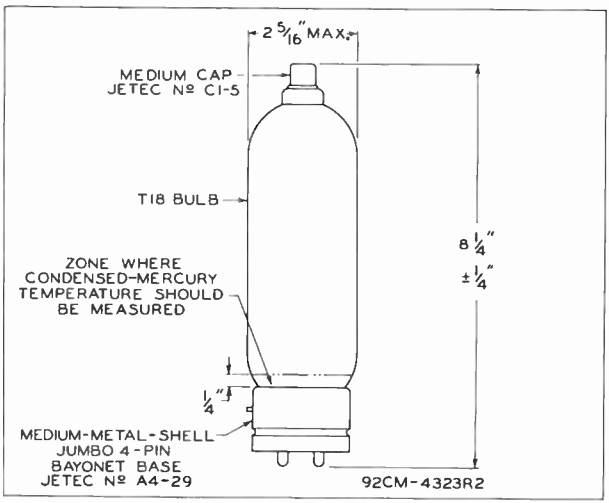
▲ For maximum peak inverse anode voltage of 5000 volts and condensed-mercury-temperature range of 20° to 70° C.

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

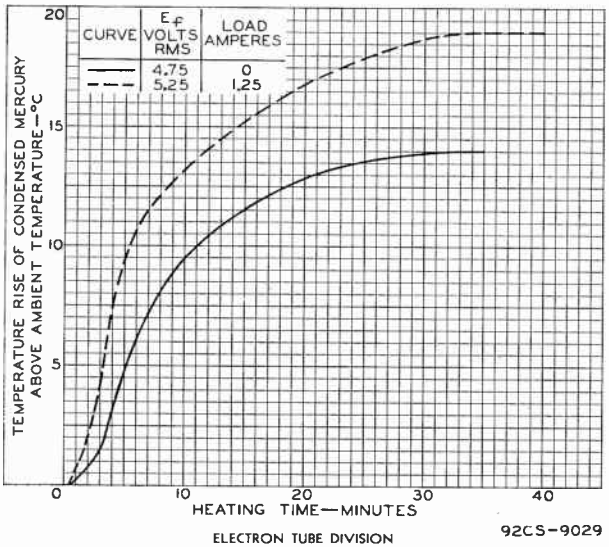
World Radio History

872-A

HALF-WAVE MERCURY-VAPOR RECTIFIER



RATE OF RISE OF CONDENSED-MERCURY TEMPERATURE



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

880

R-F POWER AMPLIFIER, CLASS B MODULATOR

(WATER COOLED)

Filament	Tungsten	
Voltage	12.6	a-c or d-c volts
Current	320	amp.
Starting - The filament current must never exceed 1-1/2 times the normal value, even momentarily.		
Amplification Factor	20	
Direct Interelectrode Capacitances:		
Grid to Plate	26	μμf
Grid to Filament	29	μμf
Plate to Filament	2.6	μμf
Maximum Overall Length		11-1/2"
Maximum Diameter		7"
Water Jacket		UT-4001
Cooling - Water flow of 12 to 20 gallons per minute must start before application of any voltages. Water temperature at jacket outlet must not exceed 70°C under any conditions of operation. Air flow of 20 cu. ft./min. from three-inch nozzle, directed toward the top portion of the bulb, is required.		

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in front of book.

A-F POWER AMPLIFIER - Class B

D-C Plate Voltage		10500 max.	volts
Max.-Signal D-C Plate Current*		5 max.	amp.
Max.-Signal Plate Input*		40 max.	kw
Plate Dissipation*		15 max.	kw
Typical Operation:			
Unless otherwise specified, values are for 2 tubes			
D-C Plate Voltage	7500	10000	volts
D-C Grid Voltage #	-300	-430	volts
Peak A-F Grid-to-Grid Voltage	1450	1690	volts
Zero-Signal D-C Plate Current	1.0	1.0	amp.
Max.-Signal D-C Plate Current	7	7	amp.
Load Resistance (per tube)	550	800	ohms
Effective Load Resistance (plate to plate)	2200	3200	ohms
Max.-Signal Driving Power	250	225 approx.	watts
Max.-Signal Power Output	30	45 approx.	kw

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage		10500 max.	volts
D-C Plate Current		4 max.	amp.
Plate Input		32 max.	kw
Plate Dissipation		20 max.	kw
Typical Operation:			
D-C Plate Voltage	7500	10000	volts
D-C Grid Voltage #	-310	-430	volts
Peak R-F Grid Voltage	450	550	volts
D-C Plate Current	3.5	3	amp.
Driving Power ** o	500	500 approx.	watts
Power Output **	8	10 approx.	kw

* Averaged over any audio-frequency cycle of sine-wave form.
#, o, **: See end of tabulation.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

880

R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage			10500 max.	volts
D-C Grid Voltage			-1200 max.	volts
D-C Plate Current			3.6 max.	amp.
D-C Grid Current			0.6 max.	amp.
Plate Input			36 max.	kw
Plate Dissipation			12 max.	kw
Typical Operation:				
D-C Plate Voltage	7500	10000		volts
D-C Grid Voltage △	-1000	-1200		volts
	3300	2400		ohms
Peak R-F Grid Voltage	1550	1770		volts
D-C Plate Current	3	3.6		amp.
D-C Grid Current**	0.3	0.5	approx.	amp.
Driving Power**	460	880	approx.	watts
Power Output	16	28	approx.	kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			10500 max.		volts
D-C Grid Voltage			-1200 max.		volts
D-C Plate Current			6 max.		amp.
D-C Grid Current			0.6 max.		amp.
Plate Input			60 max.		kw
Plate Dissipation			20 max.		kw
Typical Operation:					
D-C Plate Voltage	7500	10000	10000		volts
D-C Grid Voltage △	-600	-800	-800		volts
	1340	2000	1600		ohms
Peak R-F Grid Voltage	1250	1400	1500		volts
D-C Plate Current	5	4.5	6		amp.
D-C Grid Current**	0.45	0.4	0.5	approx.	amp.
Driving Power**	560	550	750	approx.	watts
Power Output	27	34	45	approx.	kw

\# Grid voltages are given with respect to the mid-point of filament operated on a.c. If d.c. is used, each stated value of grid voltage should be reduced by one-half the filament voltage and the circuit returns made to the negative end of the filament.

o At crest of audio-frequency cycle with modulation factor of 1.0.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

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

△ Obtained by grid resistor of value shown or by other self- or fixed-bias methods.

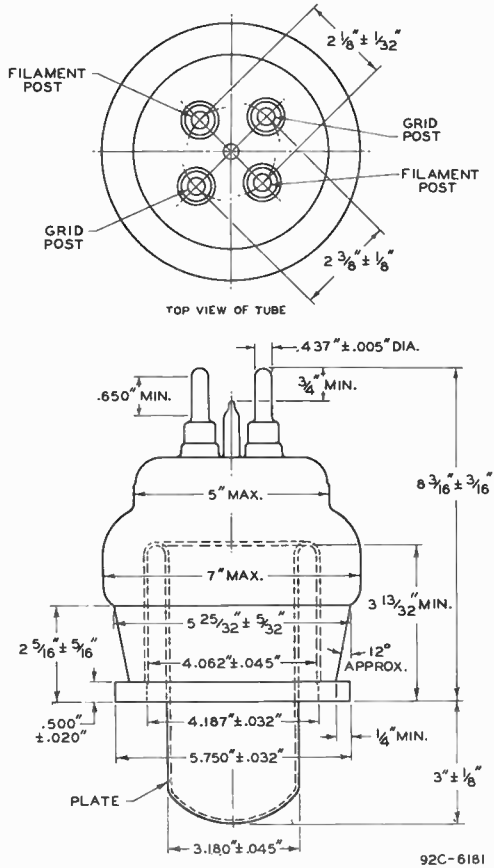
Data on operating frequencies for the 880 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

World Radio History

880

R-F POWER AMPLIFIER, CLASS B MODULATOR



TUBE MOUNTING POSITION

VERTICAL: Glass end up.
HORIZONTAL: No.

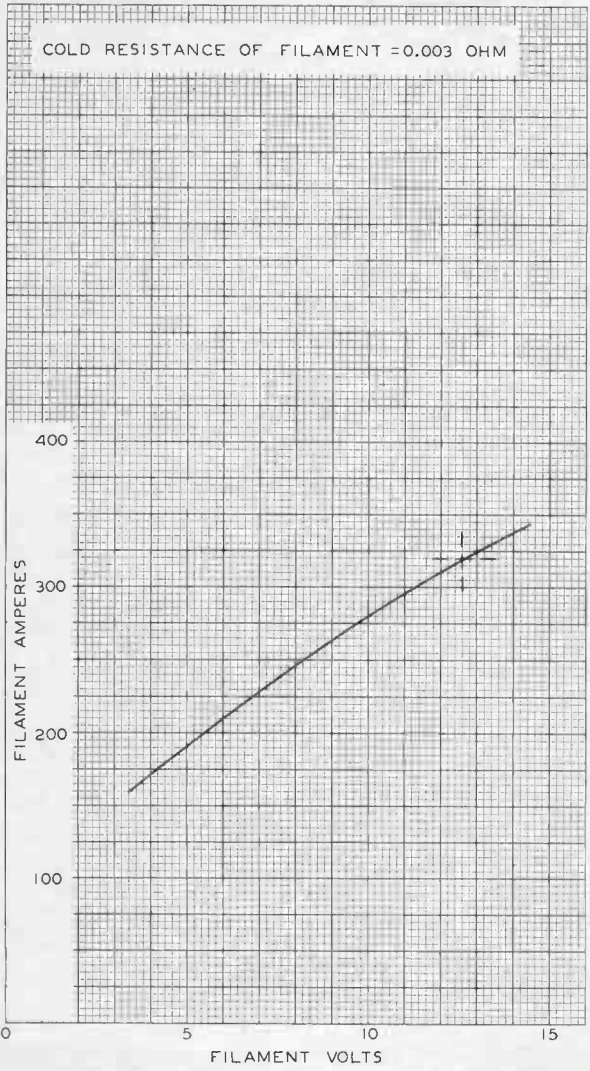
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

880

880

AVERAGE FILAMENT CHARACTERISTICS



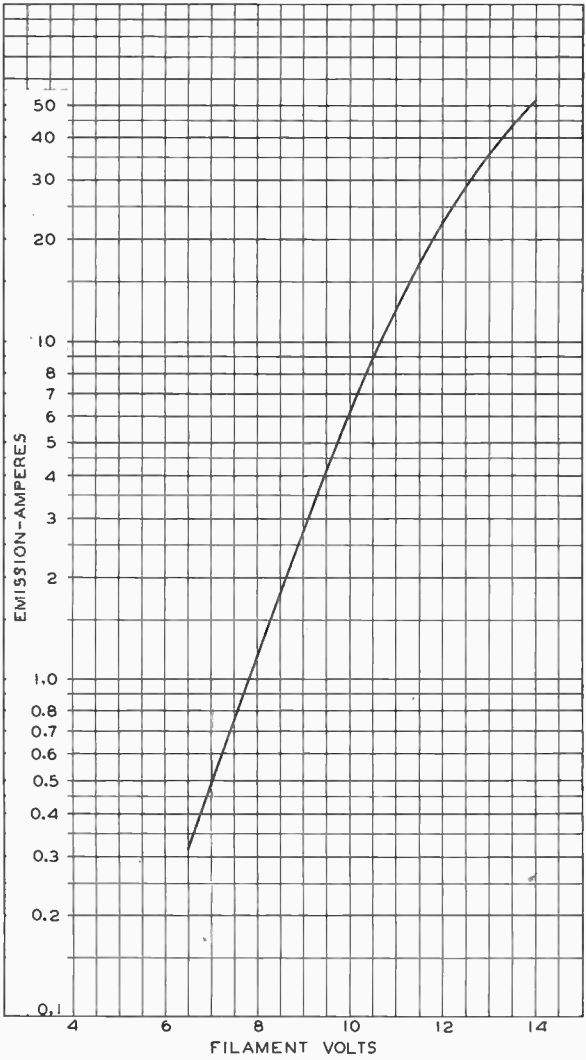
JUNE 17, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6179

880

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



JUNE 17, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6180

World Radio History

880

RCA

880

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

(TENTATIVE)

E_f = 12.6 VOLTS A.C.

GRID AMPERES = I_C

PLATE AMPERES = I_b

PLATE KILOVOLTS (E_b)

GRID VOLTS (E_C)

JUNE 17, 1940

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY INC.

92C-6178

World Radio History

889-A

TRANSMITTING TRIODE

WATER & FORCED-AIR COOLED

Supersedes Type 889

GENERAL DATA

Electrical:

Filament, Tungsten:

Voltage	11	volts
Current	125	amp
Starting Current:	The filament current must never exceed 187 amperes, even momentarily.	

Amplification Factor. . . . 21

Direct Interelectrode Capacitances (Approx.):

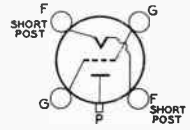
Grid to Plate	17.5	μμf
Grid to Filament	23.3	μμf
Plate to Filament	2.7	μμf

Mechanical:

Terminal Connections: TOP VIEW

F – Filament (Short Terminals)

G – Grid (Long Terminals)



P – Water-Cooled Plate Terminal

Mounting Position. . . . . Vertical only, glass end up

Overall Length . . . . . 10-7/16" ± 1/4"

Maximum Diameter . . . . . 3-5/8"

Water Jacket . . . . . Type UT-4000

Water Flow: 3 to 6 gallons per minute must start before application of any voltages, and must continue for at least 5 minutes after removal of all voltages. Water temperature at jacket outlet must not exceed 70°C under any conditions of operation.

Air Flow: 15 cu.ft. per minute through a 3-inch diameter nozzle must be directed downward toward grid and plate seals before and during the application of any voltages to limit temperature of glass at hottest point to 150°C.

This tube can often be operated at reduced filament voltage, as explained on sheet TYPES OF CATHODES in General Section.

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	8500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2 max.	amp
MAX.-SIGNAL PLATE INPUT*	12 max.	kw
PLATE DISSIPATION*	5 max.	kw

Typical Operation:

Unless otherwise specified, values are for two tubes

DC Plate Voltage	5000	6000	7500	volts
DC Grid Voltage●	-180	-230	-300	volts
Peak AF Grid-to-Grid Volt.	1460	1680	1700	volts

* Averaged over any audio-frequency cycle of sine-wave form.

●: See next page.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

889-A
TRANSMITTING TRIODE

Zero-Signal DC Plate Cur. . .	0.4	0.4	0.4	amp
Max.-Signal DC Plate Cur. . .	3.2	3.6	3.2	amp
Effective Load Resistance (plate-to-plate).	2520	3680	5000	ohms
Max.-Signal Driving Power (Approx.)	170	180	150	watts
Max.-Signal Power Output (Approx.)	8.8	12	15	kw

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE.	8500 max.	volts
DC PLATE CURRENT.	1.0 max.	amp
PLATE INPUT	7.5 max.	kw
PLATE DISSIPATION	5.0 max.	kw

Typical Operation:

DC Plate Voltage.	6000	7500	volts
DC Grid Voltage●.	-250	-300	volts
Peak RF Grid Voltage.	920	1000	volts
DC Plate Current.	0.9	0.9	amp
Driving Power (Approx.)**#.	95	80	watts
Power Output (Approx.).	1.5	2	kw

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE.	6000 max.	volts
DC GRID VOLTAGE	-1000 max.	volts
DC PLATE CURRENT.	1.0 max.	amp
DC GRID CURRENT	0.25 max.	amp
PLATE INPUT	6.0 max.	kw
PLATE DISSIPATION	3.0 max.	kw

Typical Operation:

DC Plate Voltage.	5000	6000	volts
DC Grid Voltage	-800	-900	volts
Peak RF Grid Voltage.	1300	1420	volts
DC Plate Current.	0.9	1.0	amp
DC Grid Current (Approx.)#.	0.12	0.1	amp
Driving Power (Approx.)#.	155	140	watts
Power Output (Approx.).	2.75	4	kw

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE.	8500 max.	volts
DC GRID VOLTAGE	-1000 max.	volts

●, **, #, ##: See next page.

World Radio History

RCA

889-A

TRANSMITTING TRIODE

DC PLATE CURRENT			2.0 max.	amp
DC GRID CURRENT			0.25 max.	amp
PLATE INPUT			16 max.	kw
PLATE DISSIPATION			5 max.	kw
Typical Operation:				
DC Plate Voltage	5000	6000	7500	volts
DC Grid Voltage	-500	-600	-800	volts
Peak RF Grid Voltage	1200	1460	1830	volts
DC Plate Current	1.5	1.8	2.0	amp
DC Grid Current (Approx.)#	0.19	0.21	0.24	amp
Driving Power (Approx.)#	220	290	400	watts
Power Output (Approx.)	5	7	10	kw

● With ac filament excitation.

** At crest of audio-frequency cycle with modulation factor of 1.0.

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

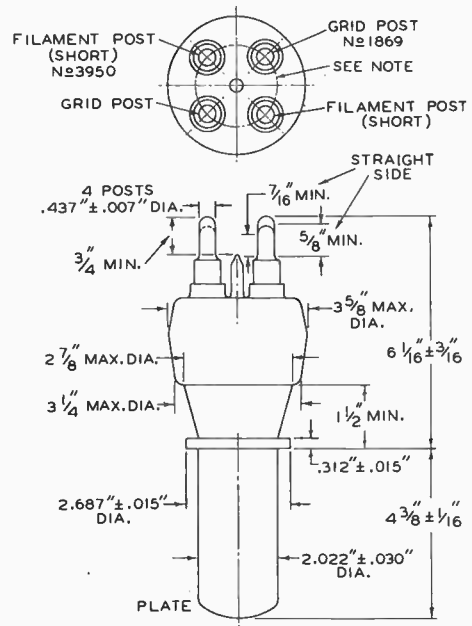
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Data on operating frequencies for the 889-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

889-A

889-A

TRANSMITTING TRIODE



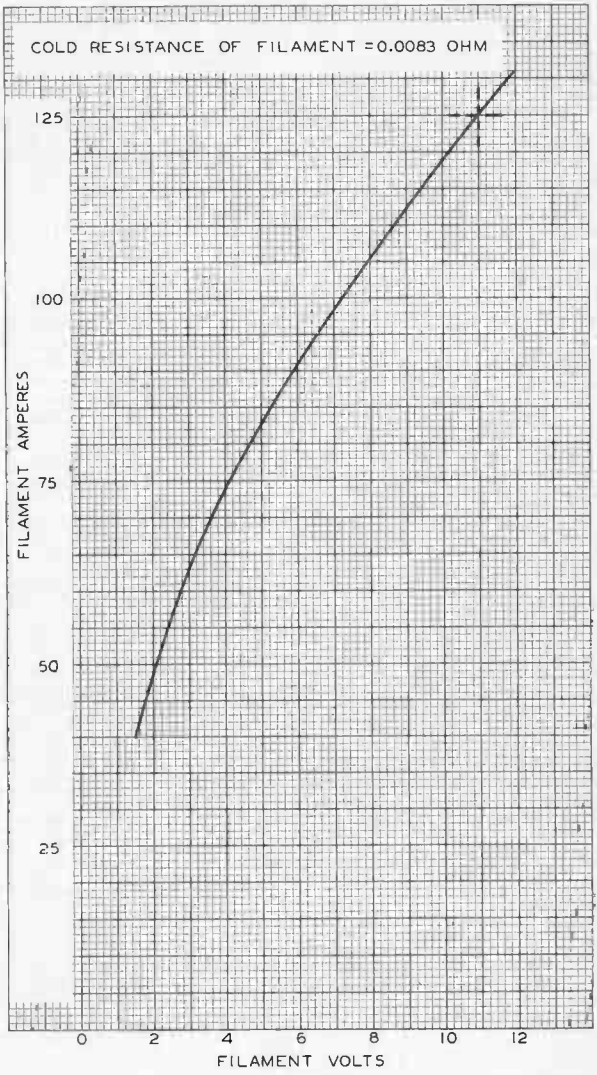
NOTE: THE TUBE BASE SHALL BE CAPABLE OF ENTERING TO A DISTANCE OF 5/8" IN A FLAT-PLATE GAUGE HAVING FOUR HOLES .536" ± .001" DIAMETER ARRANGED ON A CIRCLE OF 2.125" ± .001" DIAMETER AT ANGLES OF 90° ± 10'.

92CM-6039R2

World Radio History

889-A

AVERAGE FILAMENT CHARACTERISTIC

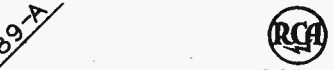


MAY 22, 1939

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

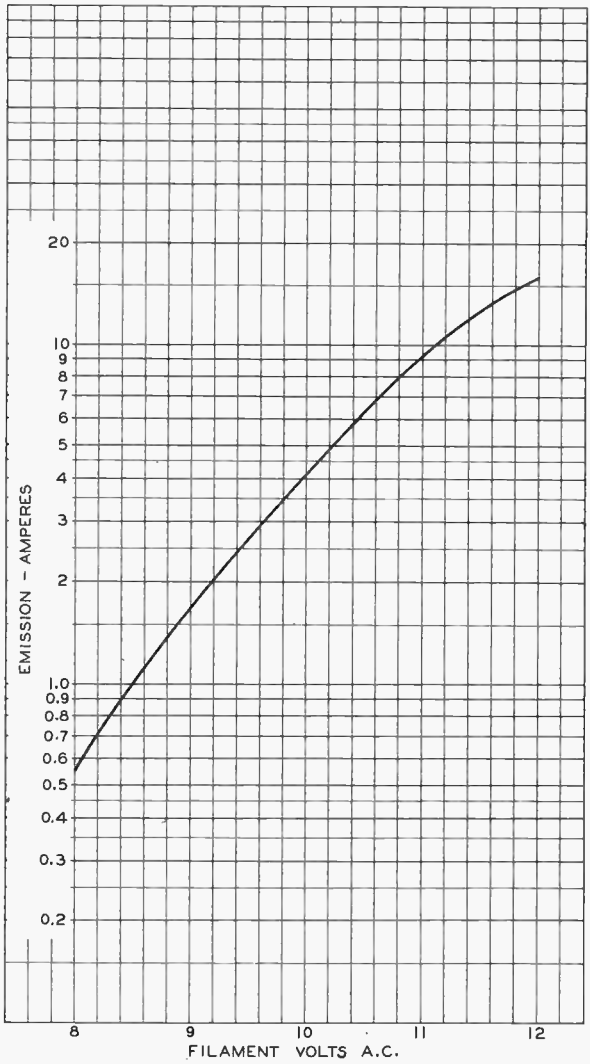
92C-6086

889-A



889-A

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



JUNE 10, 1940

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

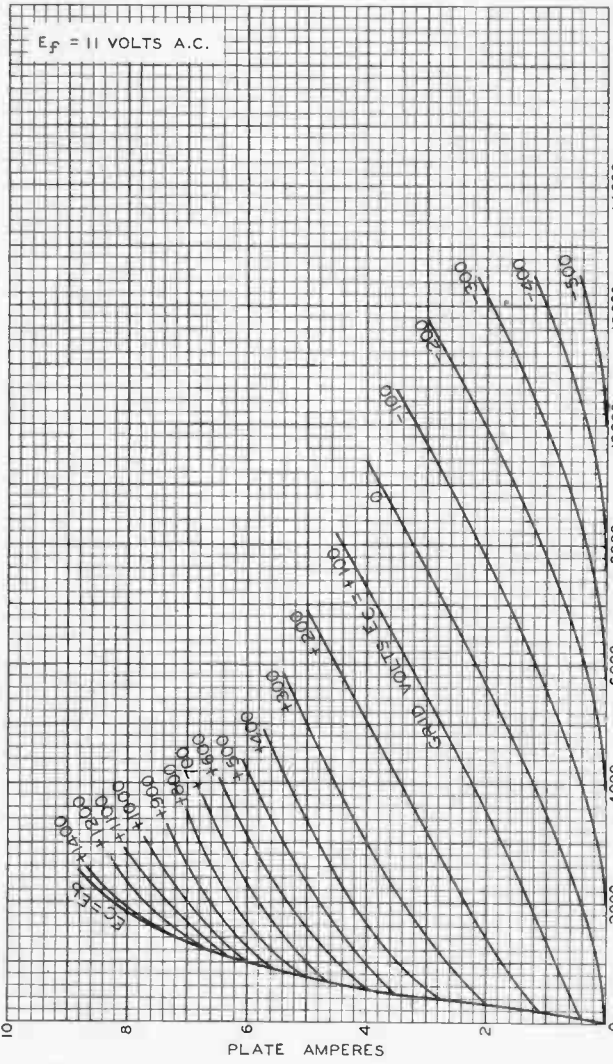
92C-6174

World Radio History

RCA

889-A

AVERAGE PLATE CHARACTERISTICS



JUNE 14, 1939

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6063

World Radio History

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RCA

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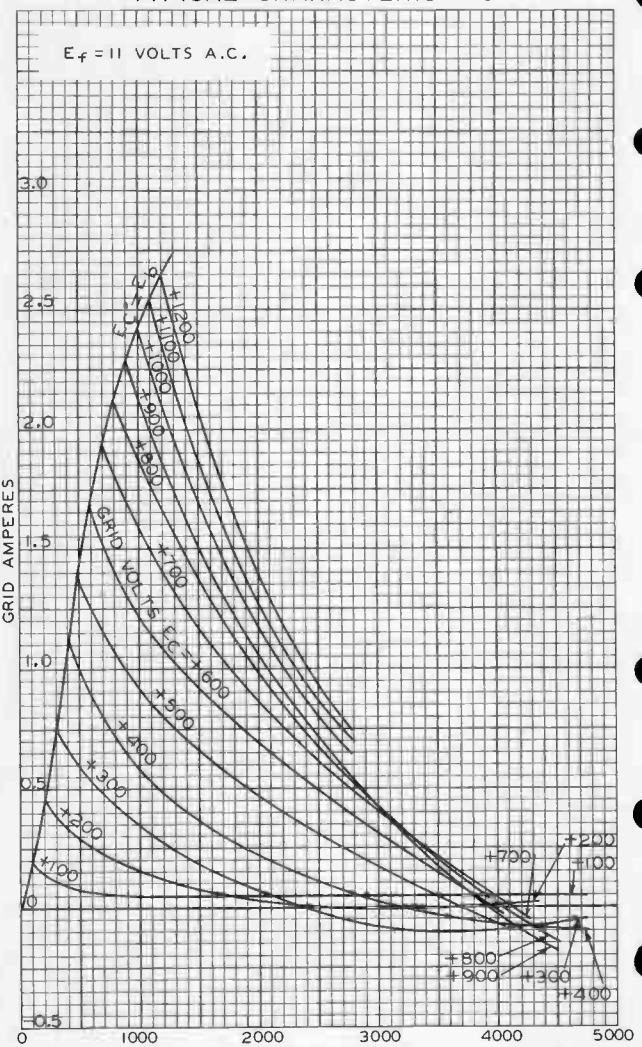
TYPICAL CHARACTERISTICS



World Radio History

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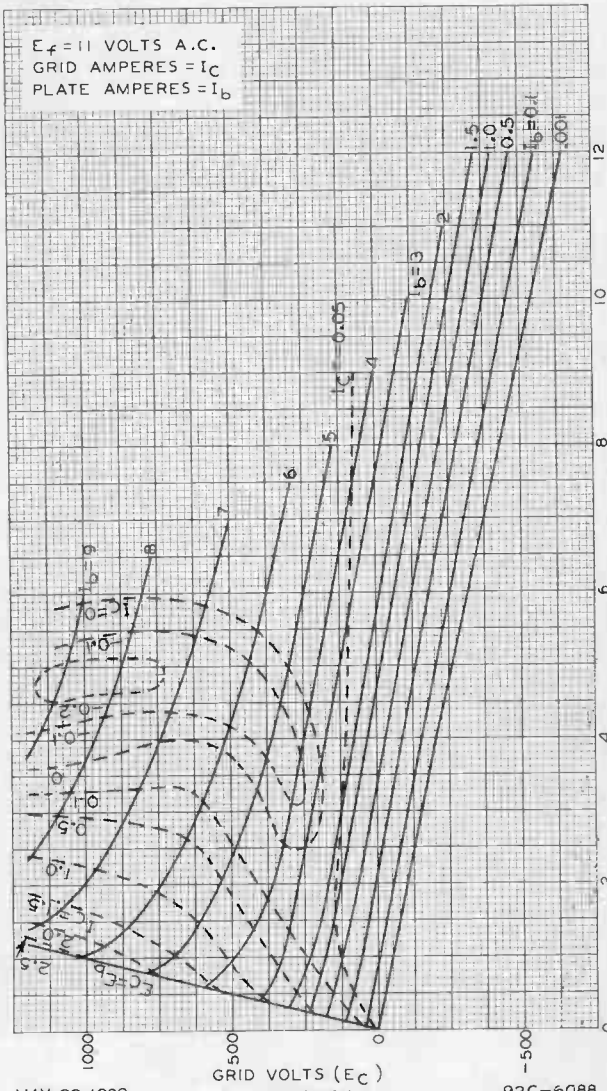
889-A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAY 22, 1939

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6088

World Radio History

World Radio History

889R-A

TRANSMITTING TRIODE

FORCED-AIR COOLED

Supersedes Type 889-R

GENERAL DATA

Electrical:

Filament, Tungsten:

Voltage	11	volts
Current	125	amp

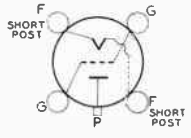
Starting Current: The filament current must never exceed 187 amperes, even momentarily.

Amplification Factor	21	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	18.5	μμf
Grid to Filament	23.3	μμf
Plate to Filament	3.0	μμf

Mechanical:

Terminal Connections:

F – Filament (Short Terminals)
G – Grid (Long Terminals)



P – Water-Cooled Plate Terminal

Mounting Position	Vertical only, glass end up
Overall Length	11-1/2" ± 3/8"
Radiator Clamp Diameter	10-7/8" ± 1/8"
Radiator	Integral part of tube

Air Flow:

	For Plate Dissipation of 3.3 Kw	4.0 Kw	5.0 Kw	
Through Radiator	325 min.	390 min.	500 min.	cfm
At Pressure of	0.38 min.	0.5 min.	0.7 min.	in. of water

The specified air flow should be delivered by a blower vertically upward through the radiator before and during the application of any voltages.

To Grid and Filament Seals . . . . . 15 . . . cfm

The specified air flow must be directed vertically downward from a 3-inch diameter nozzle upon the grid and filament seals before and during the application of any voltages in order to limit the temperature of the glass at the hottest part to the maximum specified value.

Bulb Temperature	150 max.	°C
Input Air Temperature (to Radiator)	50 max.	°C
Radiator Temperature	180 max.	°C

This tube can often be operated with reduced filament voltage, as explained on sheet TYPES OF CATHODES in General Section.

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	8500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2.0 max.	amp
MAX.-SIGNAL PLATE INPUT*	12 max.	kw
PLATE DISSIPATION*	5.0 max.	kw

* Averaged over any audio-frequency cycle of sine-wave form.

World Radio History

889R-A
TRANSMITTING TRIODE

Typical Operation:

Unless otherwise specified, values are for two tubes

DC Plate Voltage	5000	6000	7500	volts
DC Grid Voltage●	-180	-230	-300	volts
Peak AF Grid-to-Grid Volt.	1460	1680	1700	volts
Zero-Signal DC Plate Cur.	0.4	0.4	0.4	amp
Max.-Signal DC Plate Cur.	3.2	3.6	3.2	amp
Effective Load Resistance (plate-to-plate)	2520	3680	5000	ohms
Max.-Signal Driving Power (Approx.)	170	180	150	watts
Max.-Signal Power Output (Approx.)	8.8	12	15	kw

RF POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	8500 max.	volts
DC PLATE CURRENT	1.0 max.	amp
PLATE INPUT	7.5 max.	watts
PLATE DISSIPATION	5.0 max.	watts

Typical Operation:

DC Plate Voltage	6000	7500	volts
DC Grid Voltage	-250	-300	volts
Peak RF Grid Voltage	920	1000	volts
DC Plate Current	0.9	0.9	amp
Driving Power (Approx.)**#	95	80	watts
Power Output (Approx.)	1.5	2	kw

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	6000 max.	volts
DC GRID VOLTAGE●	-1000 max.	volts
DC PLATE CURRENT	1.0 max.	amp
DC GRID CURRENT	0.25 max.	amp
PLATE INPUT	6 max.	kw
PLATE DISSIPATION	3 max.	kw

Typical Operation:

DC Plate Voltage	5000	6000	volts
DC Grid Voltage	-800	-900	volts
Peak RF Grid Voltage	1300	1420	volts
DC Plate Current	0.9	1.0	amp
DC Grid Current (Approx.)#	0.12	0.1	amp

●, **, #: See next page.

World Radio History

889R-A

TRANSMITTING TRIODE

Driving Power (Approx.)#.	155	140	. .	watts
Power Output (Approx.).	2.75	4	. .	kw

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation##

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE.	8500 max.	volts
DC GRID VOLTAGE●.	-1000 max.	volts
DC PLATE CURRENT.	2.0 max.	amp
DC GRID CURRENT	0.25 max.	amp
PLATE INPUT	16 max.	kw
PLATE DISSIPATION	5 max.	kw

Typical Operation:

DC Plate Voltage.	5000	6000	7500	. . volts
DC Grid Voltage	-500	-600	-800	. . volts
Peak RF Grid Voltage.	1240	1460	1830	. . volts
DC Plate Current.	1.5	1.8	2.0	. . amp
DC Grid Current (Approx.)#. .	0.19	0.21	0.24	. . amp
Driving Power (Approx.)#. . .	220	290	400	. . watts
Power Output (Approx.). . . .	5	7	10	. . kw

● With ac filament excitation.

** At crest of audio-frequency cycle with modulation factor of 1.0.

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

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

Data on operating frequencies for the 889R-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

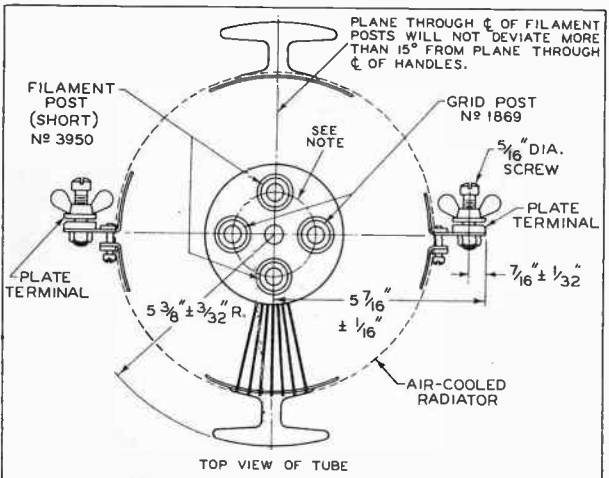
CURVES
FOR THE 889R-A ARE THE SAME
AS THOSE FOR TYPE 889-A

World Radio History

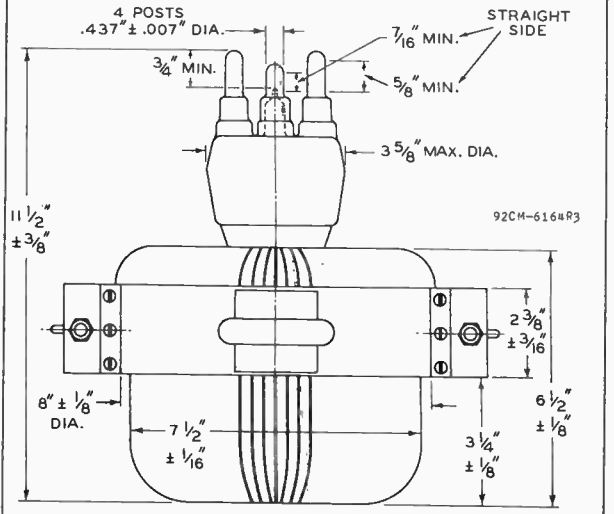
RCA

889R-A

TRANSMITTING TRIODE



TOP VIEW OF TUBE



NOTE: THE TUBE BASE SHALL BE CAPABLE OF ENTERING TO A DISTANCE OF 5/8" IN A FLAT-PLATE GAUGE HAVING FOUR HOLES .536" ± .001" DIAMETER ARRANGED ON A CIRCLE OF 2.125" ± .001" DIAMETER AT ANGLES OF 90° ± 10'.

World Radio History

R-F POWER AMPLIFIER, MODULATOR

(WATER COOLED)

Filament	Tungsten, Two-Unit Type	
Excitation	1φ A.C., 2φ A.C., or D.C.	
See FILAMENT CONNECTIONS under this type.		
Voltage per unit	11	volts
Current per unit	60	amp.
Starting: The current in each unit must never exceed 120 amperes.		←
Note: When a single-phase or d-c supply is used, do not connect the two filament units in parallel. Doing so will overheat common filament lead (large terminal) and damage tube.		←
Amplification Factor	8	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	27	μμf
Grid to Filament	18	μμf
Plate to Filament	2	μμf
Maximum Overall Length		20-5/8"
Maximum Radius		6-1/2"
Cap		No.3958
Base		No.3232
Water Jacket		Type UT-1285-A

Cooling — water flow of 3 to 8 gallons per minute must start before application of any voltages and continue for at least 5 minutes after removal of voltages. Water temperature must not exceed 70°C at jacket outlet under any conditions of operation. ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in front of book.

A-F POWER AMPLIFIER & MODULATOR — Class A_1

D-C Plate Voltage	12000 max.		volts
Plate Input	7.5 max.		kw ←
Plate Dissipation	7.5 max.		kw
Typical Operation:			
D-C Plate Voltage	8000		volts
D-C Grid Voltage ¶	-630		volts ←
Peak A-F Grid Voltage	700		volts ←
D-C Plate Current	0.9		amp.
Load Resistance	5200		ohms
U.P.O. (5% second harmonic)	2		kw

¶ The d-c resistance in the grid circuit should not exceed 100000 ohms when cathode bias is used, or 50000 ohms with fixed bias.

A-F POWER AMPLIFIER & MODULATOR — Class B

D-C Plate Voltage	15000 max.			volts
Max.-Signal D-C Plate Current*	2.0 max.			amp.
Max.-Signal Plate Input*	20 max.			kw
Plate Dissipation*	5 max.			kw
Typical Operation:				
Unless otherwise specified, values are for 2 tubes.				
D-C Plate Voltage	6000	10000	12500	volts
D-C Grid Voltage	-600	-1100	-1450	volts ←
Peak A-F Grid-to-Grid Volt.	2200	3400	3960	volts ←
Zero-Sig. D-C Plate Cur.	0.5	0.5	0.4	amp.
Max.-Sig. D-C Plate Cur.	2.3	3.2	2.8	amp.

* Averaged over any audio-frequency cycle of sine-wave form.

← indicates a change.

World Radio History

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R-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

Load Resistance (per tube)	1250	1600	2500	ohms
Effective Load Resistance (plate to plate)	5000	6400	10000	ohms
Max.-Signal Driving Power	260	324	350	approx. watts
Max.-Signal Power Output	8	20	22	approx. watts

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			15000 max.	volts
D-C Plate Current			1.0 max.	amp.
R-F Grid Current			24 max.	amp.
Plate Input			10 max.	kw
Plate Dissipation			6 max.	kw
Typical Operation:				
D-C Plate Voltage	6000	10000	14000	volts
→ D-C Grid Voltage	-600	-1130	-1600	volts
→ Peak R-F Grid Voltage	600	830	1000	volts
D-C Plate Current	0.7	0.8	0.56	amp.
Driving Power[o] [oo]	82	0	0	approx. watts
Power Output	1	2	2.275	approx. kw

[o] At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			8000 max.	volts
D-C Grid Voltage			-3000 max.	volts
D-C Plate Current			1.0 max.	amp.
D-C Grid Current			0.15 max.	amp.
R-F Grid Current			24 max.	amp.
Plate Input			8 max.	kw
Plate Dissipation			4 max.	kw
Typical Operation:				
D-C Plate Voltage		6000	8000	volts
D-C Grid Voltage		-2000	-2400	volts
Peak R-F Grid Voltage		2650	3100	volts
D-C Plate Current		0.75	0.78	amp.
D-C Grid Current [oo]		0.1	0.08	approx. amp.
Driving Power [oo]		260	260	approx. watts
Power Output		3.5	5	approx. kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage	12000 max.	volts
D-C Grid Voltage	-3000 max.	volts
D-C Plate Current	2.0 max.	amp.
D-C Grid Current	0.15 max.	amp.
R-F Grid Current	30 max.	amp.
Plate Input	18 max.	kw
Plate Dissipation	6 max.	kw

[oo] subject to wide variations as explained on sheet TRANS. TUBE RATINGS.
← indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

World Radio History

891

R-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

Typical Operation:			
D-C Plate Voltage	8000	10000	volts
D-C Grid Voltage	-1800	-2000	volts
Peak R-F Grid Voltage	2500	2900	volts
D-C Plate Current	1.1	1.45	amp.
D-C Grid Current ᵒᵒ	0.06	0.105	approx. watts
Driving Power ᵒᵒ	150	310	approx. watts
Power Output	6.5	10	approx. kw

ᵒᵒ subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

Data on operating frequencies for the 891 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

FILAMENT-EMISSION CHARACTERISTIC
is the same as that for Type 207

FILAMENT CHARACTERISTIC
is the same as that for Type 892

World Radio History

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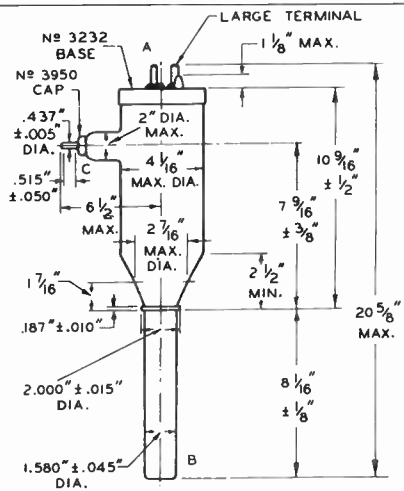
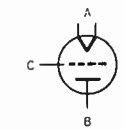
R-F POWER AMPLIFIER, MODULATOR



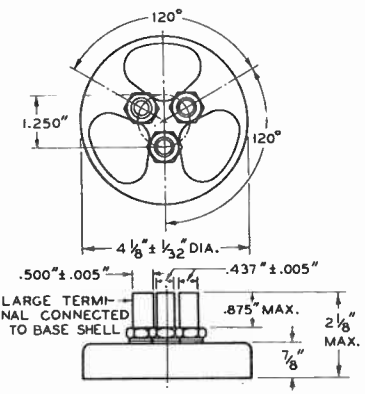
92C-4627RI

№ 3232 BASE OUTLINE

TUBE SYMBOL AND TERMINAL CONNECTIONS



A – FILAMENT
B – PLATE
C – GRID



TUBE MOUNTING POSITION

VERTICAL: Glass end up
HORIZONTAL: No

92C-4792

April 15, 1940

DATA 2

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

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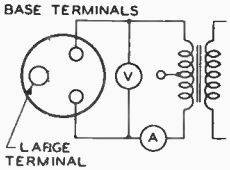
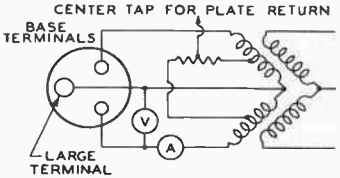
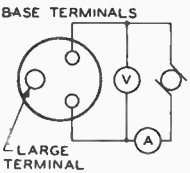
FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

WITH SINGLE-PHASE A-C EXCITATION	 V = 22 VOLTS A = 60 AMPERES
WITH TWO-PHASE (QUARTER PHASE) A-C EXCITATION	 V = 11 VOLTS A = 60 AMPERES
WITH D-C EXCITATION	 V = 22 VOLTS A = 60 AMPERES

World Radio History

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

891

E_f=22 VOLTS A.C.

GRID AMPERES = I_c

PLATE AMPERES = I_b

PLATE KILOVOLTS (E_b)

GRID VOLTS (E_c)

JAN. 25, 1940

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

92C-6134

World Radio History

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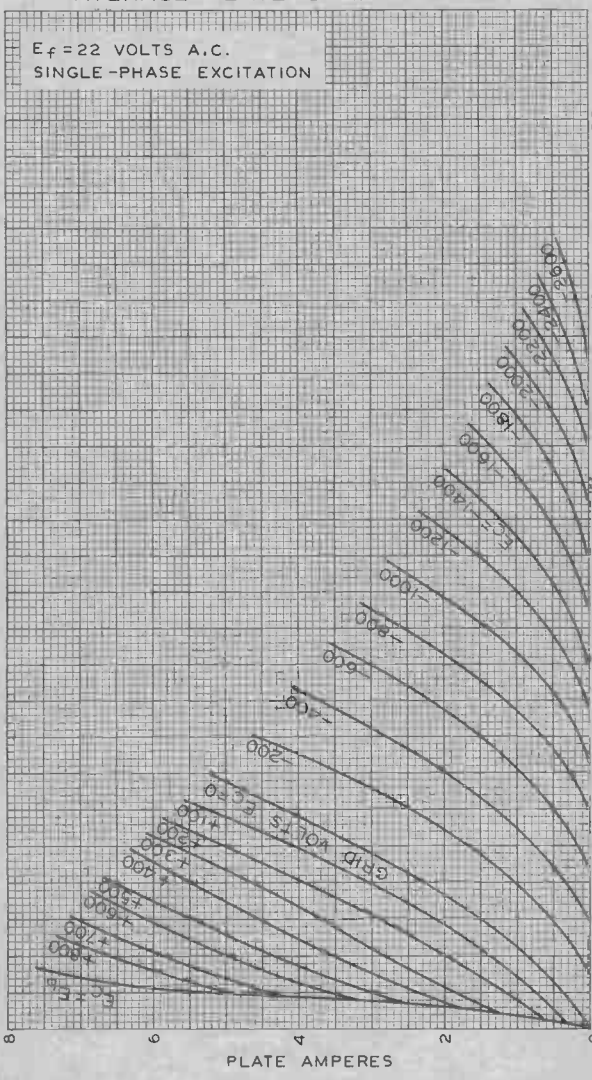
AVERAGE PLATE CHARACTERISTICS



MARCH 16,1944 RCA VICTOR DIVISION 92CM—4643R2

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History

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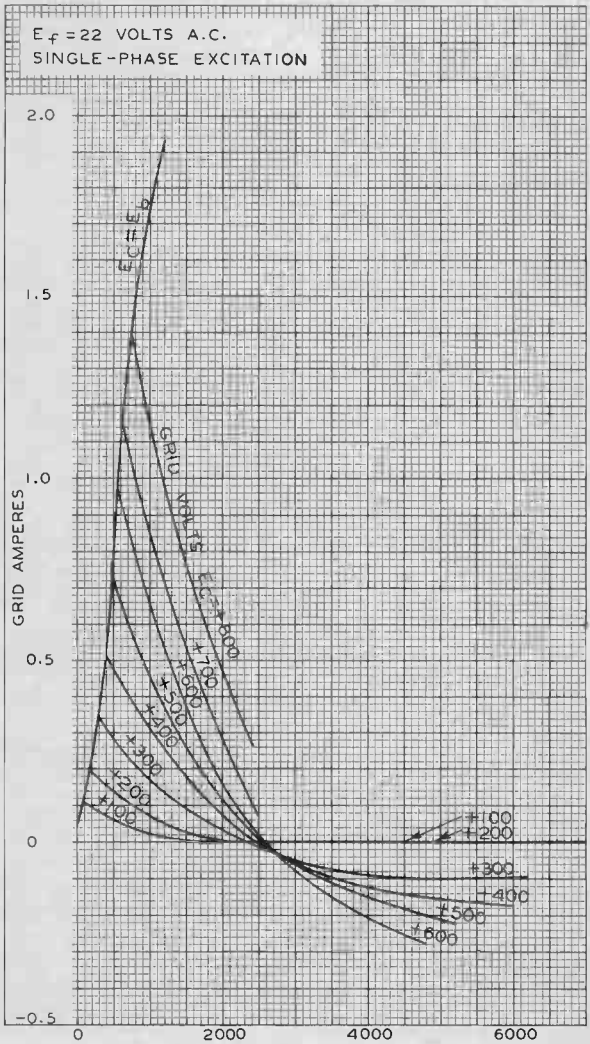
TYPICAL CHARACTERISTICS



MARCH 17, 1944 RCA VICTOR DIVISION 92CM-4642R2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

891-R

R-F POWER AMPLIFIER, MODULATOR
FORCED-AIR COOLED

Filament	Tungsten, Two-Section Type	
Excitation	1φA.C., 2φA.C., or D.C.	
See FILAMENT CONNECTIONS under Type 891.		
Voltage per section	11	volts
Current per section	60	amp.
Starting: The current in each section must never exceed 120 amperes. *Note: When a single-phase or d-c supply is used, do not connect the two filament sections in parallel. Doing so will overheat common filament lead (large terminal) and damage tube.*		
Amplification Factor	8	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	30	μμf
Grid to Filament	18	μμf
Plate to Filament	2	μμf
Maximum Overall Length		22"
Maximum Radius		6-1/2"
Cap		No.3950
Base		No.3232
Radiator		Integral Part of Tube
RCA Mounting		Type UT-4304 ←
Cooling - Air flow (normal volume is 450 cfm) must be started before application of any voltages. See table at end of tabulation.		←

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR - Class A_1

D-C Plate Voltage	10000 max.	volts
Plate Dissipation	3.5 max.	kw
Radiator Temperature▲	180 max.	°C
Typical Operation:		
D-C Plate Voltage	6000	volts
D-C Grid Voltage†	-560	volts
Peak A-F Grid Voltage	660	volts
D-C Plate Current	0.58	amp.
Radiator Temperature*	160	°C
Plate Resistance	2150	ohms ←
Load Resistance	8600	ohms
U.P.O. (5% second harmonic)	0.925	kw

† The d-c resistance in the grid circuit should not exceed 100000 ohms when cathode bias is used, or 50000 ohms with fixed bias.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage	10000 max.	volts
Max.-Signal D-C Plate Current*	2.0 max.	amp.
Max.-Signal Plate Input*	10.5 max.	kw
Plate Dissipation*	3.5 max.	kw
Radiator Temperature▲	180 max.	°C
Typical Operation:		
Unless otherwise specified, values are for 2 tubes		
D-C Plate Voltage	6000 8000	volts

* Averaged over any audio-frequency cycle of sine-wave form.
▲, ★: See end of tabulation ← Indicates a change.

World Radio History

891-R

R-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

D-C Grid Voltage	-600	-800	volts
Peak A-F Grid-to-Grid Voltage	2200	2400	volts
Zero-Sig. D-C Plate Current	0.5	0.5	amp.
Max.-Sig. D-C Plate Current	2.3	2.1	amp.
Radiator Temperature*	140	155	°C
Load Resistance (per tube)	1250	1850	ohms
Effective Load Resistance (plate to plate)	5000	7400	approx. ohms
Max.-Signal Driving Power	260	100	approx. watts
Max.-Signal Power Output	8	10	approx. kw

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		10000 max.	volts
D-C Plate Current		1.0 max.	amp.
Plate Input		5.5 max.	kw
Plate Dissipation		3.5 max.	kw
Radiator Temperature▲		180 max.	°C
Typical Operation:			
D-C Plate Voltage	6000	8000	volts
D-C Grid Voltage	-600	-820	volts
Peak R-F Grid Voltage	600	700	volts
D-C Plate Current	0.7	0.6	amp.
Radiator Temperature*	140	160	°C
Driving Power° **	82	0	approx. watts
Power Output	1	1.3	approx. kw

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		8500 max.	volts
D-C Grid Voltage		-3000 max.	volts
D-C Plate Current		1.0 max.	amp.
D-C Grid Current		0.15 max.	amp.
Plate Input		8 max.	kw
Plate Dissipation		2.5 max.	kw
Radiator Temperature▲		180 max.	°C
Typical Operation:			
D-C Plate Voltage	6000		volts
D-C Grid Voltage §	-2000 20000		volts approx. ohms
Peak R-F Grid Voltage	2650		volts
D-C Plate Current	0.75		amp.
D-C Grid Current**	0.1		approx. amp.
Radiator Temperature*	90		°C
Driving Power**	260		approx. watts
Power Output	3.5		approx. kw

§ Obtained by grid resistor of value shown or by partial self-bias methods.

▲, *, **: See next page.

World Radio History

891-R

R-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage		10000 max.	volts
D-C Grid Voltage		-3000 max.	volts
D-C Plate Current		2.0 max.	amp.
D-C Grid Current		0.15 max.	amp.
Plate Input		15 max.	kw
Plate Dissipation		4 max.	kw
Radiator Temperature▲		180 max.	°C
Typical Operation:			
D-C Plate Voltage	8000	10000	volts
D-C Grid Voltage¶	-1800	-2000	volts
	30000	18000	approx. ohms
Peak R-F Grid Voltage	2500	2900	volts
D-C Plate Current	1.1	1.4	amp.
D-C Grid Current**	0.06	0.11	approx. amp.
Radiator Temperature★	120	160	°C
Driving Power**	150	310	approx. watts
Power Output	6.5	10	approx. kw

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

¶ Obtained by grid resistor of value shown or by other methods.

▲ Measured in thermometer well.

★ This temperature corresponds to the normal rate of cooling-air flow of approximately 450 cubic feet per minute. The temperature of the cooling air should not exceed 45°C.

** Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

COOLING REQUIREMENTS

Volume of Cooling Air cfm□	MAXIMUM PLATE DISSIPATION-Kilowatts				
	Class A	Class B		Class C	
		A-F	R-F	Telephony	Telegraphy
400	3.25	3.25	3.25	2.30	3.70
450	3.50	3.50	3.50	2.50	4.00
500	3.75	3.75	3.75	2.70	4.30
600	4.25	4.25	4.25	3.00	4.85
700	4.65	4.65	4.65	3.30	5.30

□ To be supplied by blower having adequate size to force the required volume of air through the system.

Data on operating frequencies for the 891-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

FILAMENT-EMISSION CHARACTERISTIC
is the same as that for Type 207

FILAMENT CHARACTERISTIC
is the same as that for Type 892

AVERAGE CHARACTERISTICS CURVES
are the same as those for Type 891

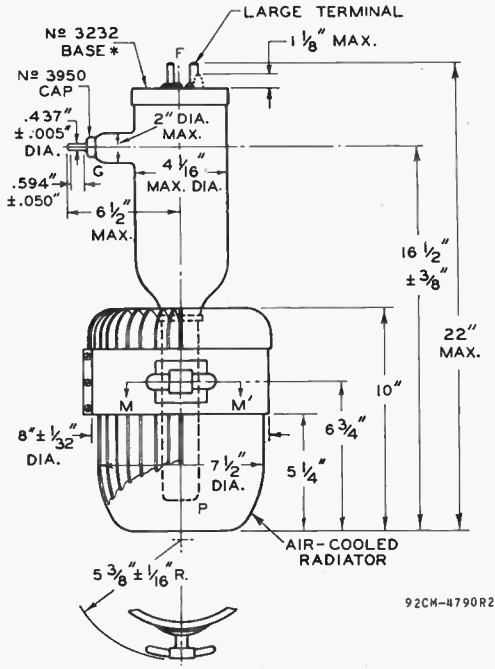
←Indicates a change.

World Radio History

RCA

891-R

R-F POWER AMPLIFIER, MODULATOR



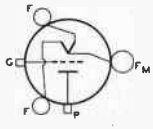
SECTION M-M'

TUBE MOUNTING POSITION

VERTICAL: Glass end up.
HORIZONTAL: No.

*FOR DIMENSIONS, SEE TYPE 891 OUTLINE.

TOP VIEW OF TERMINAL CONNECTIONS



F - FILAMENT
F_M - FILAMENT MID-TAP
G - GRID
P - PLATE

← Indicates a change.

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

World Radio History

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R-F POWER AMPLIFIER, CLASS B MODULATOR

WATER COOLED

Filament	Tungsten, Two-Section Type	
Excitation	1φA.C., 2φA.C., or D.C.	
See FILAMENT CONNECTIONS under Type 891.		
Voltage per section	11	volts
Current per section	60	amp.
Starting: The current in each section must never exceed 120 amperes. *Note: When a single-phase or d-c supply is used, do not connect the two filament sections in parallel. Doing so will overheat common filament lead (large terminal) and damage tube.*		
Amplification Factor	50	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	27	μμf
Grid to Filament	18	μμf
Plate to Filament	2	μμf
Maximum Overall Length		20-5/8"
Maximum Radius		6-1/2"
Cap		No. 3950
Base		No. 3232
Water Jacket		Type UT-1285-A

Cooling- Water flow of 3 to 8 gallons per minute must start before application of any voltages and continue for at least 5 minutes after removal of voltages. Water temperature must not exceed 70° at jacket outlet under any conditions of operation.

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage	15000 max.	volts
Max.-Signal D-C Plate Current*	2.0 max.	amp.
Max.-Signal Plate Input*	20 max.	kw
Plate Dissipation*	7.5 max.	kw

Typical Operation:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	6000	10000	12500	volts
D-C Grid Voltage	0	-90	-170	volts
Peak A-F Grid-to-Grid Volt.	1200	1620	1530	volts
Zero-Sig. D-C Plate Cur.	0.5	0.5	0.4	amp.
Max.-Sig. D-C Plate Cur.	2.5	3.2	2.8	amp.
Load Resistance (per tube)	1050	1600	2500	ohms
Effective Load Resistance (plate to plate)	4200	6400	10000	ohms
Max.-Signal Driving Power	415	525	420	approx. watts
Max.-Signal Power Output	8	20	22	approx. kw

* Averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	15000 max.	volts
D-C Plate Current	1.0 max.	amp.
Plate Input	15 max.	kw
Plate Dissipation	10 max.	kw

World Radio History

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R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

Typical Operation:				
D-C Plate Voltage	6000	10000	14000	volts
D-C Grid Voltage	0	-100	-190	volts
Peak R-F Grid Voltage	300	470	510	volts
D-C Plate Current	0.67	0.93	0.95	amp.
Driving Power ° ∞	65	50	30	approx. watts
Power Output	1	2.5	4	approx. kw

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage			10000 max.	volts
D-C Grid Voltage			-3000 max.	volts
D-C Plate Current			1.0 max.	amp.
D-C Grid Current			0.25 max.	amp.
Plate Input			10 max.	kw
Plate Dissipation			6.6 max.	kw
Typical Operation:				
D-C Plate Voltage	6000	8000	10000	volts
D-C Grid Voltage	-1000	-1300	-1600	volts
Peak R-F Grid Voltage	1675	2000	2400	volts
D-C Plate Current	0.77	0.75	0.72	amp.
D-C Grid Current ∞	0.19	0.18	0.12	approx. amp.
Driving Power ∞	310	350	260	approx. watts
Power Output	3.5	5	6	approx. kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without modulation***

D-C Plate Voltage			15000 max.	volts
D-C Grid Voltage			-3000 max.	volts
D-C Plate Current			2.0 max.	amp.
D-C Grid Current			0.25 max.	amp.
Plate Input			30 max.	kw
Plate Dissipation			10 max.	kw
Typical Operation:				
D-C Plate Voltage	8000	10000	12000	volts
D-C Grid Voltage	-1000	-1300	-1600	volts
Peak R-F Grid Voltage	1800	2300	2800	volts
D-C Plate Current	1.1	1.4	1.64	amp.
D-C Grid Current ∞	0.18	0.18	0.18	approx. amp.
Driving Power ∞	320	400	500	approx. watts
Power Output	6.5	10	14	approx. kw

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

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

Data on operating frequencies for the 892 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

← Indicates a change.

World Radio History

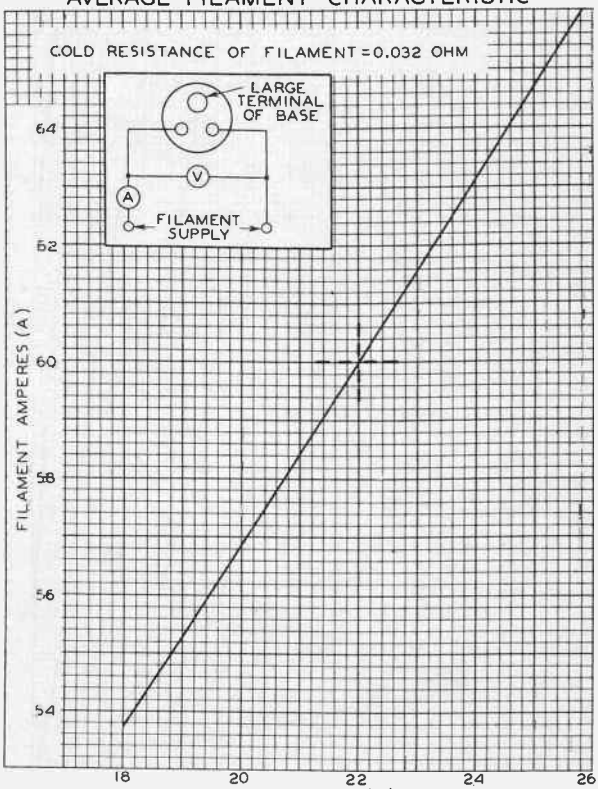
892
R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

DUTLINE DRAWING,
TUBE SYMBOL, and MOUNTING POSITION
are the same as shown for Type 891

FILAMENT-EMISSION CHARACTERISTIC
is the same as that for Type 207

AVERAGE FILAMENT CHARACTERISTIC



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

World Radio History

AVERAGE PLATE CHARACTERISTICS

RCA
892

E_f=22 VOLTS A.C.
SINGLE-PHASE EXCITATION

GRID VOLTS E_C=E_B
-200
-100
+100
+200
+300
+400
+500
+600
+700
+800
E_C=E_B

PLATE KILOVOLTS (E_b)
0
2
4
6
8
10
12
14

PLATE AMPERES
0
2
4
6
8

MARCH 14, 1944 RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY
92CM-4641R2

World Radio History

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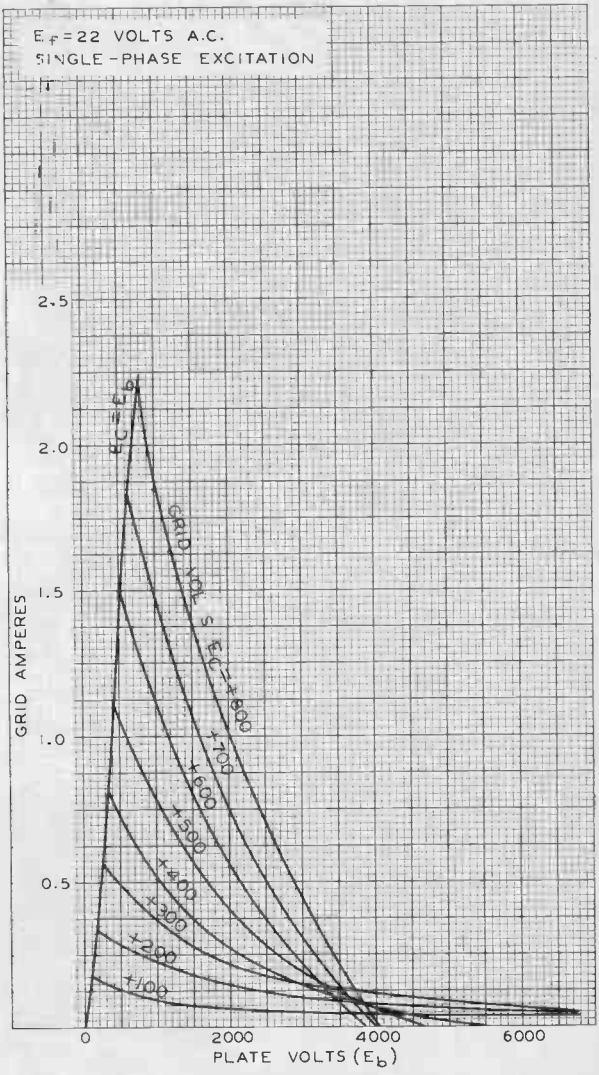
TYPICAL CHARACTERISTICS



World Radio History

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AVERAGE CONSTANT-CURRENT CHARACTERISTICS

892

E_f=22 VOLTS A.C.

GRID AMPERES = I_c

PLATE AMPERES = I_b

FEB.14,1940

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6136

World Radio History

892-R
R-F POWER AMPLIFIER, CLASS B MODULATOR

FORCED-AIR COOLED

Filament	Tungsten, Two-Section Type	
Excitation	1φA.C., 2φA.C., or D.C.	
See FILAMENT CONNECTION under Type 891.		
Voltage per section	11	volts
Current per section	60	amp.
Starting: The current in each section must never exceed 120 amperes. *Note: When a single-phase or d-c supply is used, do not connect the two filament sections in parallel. Doing so will overheat common filament lead (large terminal) and damage tube.*		
Amplification Factor	50	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	30	μμf
Grid to Filament	18	μμf
Plate to Filament	2	μμf
Maximum Overall Length		22"
Maximum Radius		6-1/2"
Cap		No.3950
Base		No.3232
Radiator		Integral Part of Tube
RCA Mounting		Type UT-4304
Cooling	Air flow (normal volume is 450 cfm) must be started before application of any voltages. See table at end of tabulation.	

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage	12500 max.	volts
Max.-Signal D-C Plate Current*	2.0 max.	amp.
Max.-Signal Plate Input*	12 max.	kw
Plate Dissipation*	4 max.	kw
Radiator Temperature▲	180 max.	°C

Typical Operation:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	6000	8000	volts
D-C Grid Voltage	0	-60	volts
Peak A-F Grid-to-Grid Volt.	1200	1000	volts
Zero-Sig. D-C Plate Cur.	0.5	0.5	amp.
Max.-Sig. D-C Plate Cur.	2.5	2.3	amp.
Radiator Temperature*	140	158	°C
Load Resistance (per tube)	1050	1700	ohms
Effective Load Resistance (plate to plate)	4200	6800	ohms
Max.-Signal Driving Power	415	400	approx.watts
Max.-Signal Power Output	8	10.5	approx.kw

* Averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	12500 max.	volts
D-C Plate Current	1.0 max.	amp.

▲, *: See end of tabulation. ← Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

892-R

892-R
R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

Plate Input		6 max.	kw
Plate Dissipation		4 max.	kw
Radiator Temperature▲		180 max.	°C
Typical Operation:			
D-C Plate Voltage	6000	8000	volts
D-C Grid Voltage	0	-40	volts
Peak R-F Grid Voltage	300	350	volts
D-C Plate Current	0.67	0.71	amp.
Radiator Temperature★	140	160	°C
Driving Power ° **	65	25	approx. watts
Power Output	1	1.7	approx. kw

° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		10000 max.	volts
D-C Grid Voltage		-3000 max.	volts
D-C Plate Current		1.0 max.	amp.
D-C Grid Current		0.25 max.	amp.
Plate Input		10 max.	kw
Plate Dissipation		2.5 max.	kw
Radiator Temperature▲		180 max.	°C
Typical Operation:			
D-C Plate Voltage	6000	8000	volts
D-C Grid Voltage §	-1000	-1300	volts
	5400	7400	approx. ohms
Peak R-F Grid Voltage	1675	2000	volts
D-C Plate Current	0.77	0.75	amp.
D-C Grid Current**	0.19	0.18	approx. amp.
Radiator Temperature★	90	90	°C
Driving Power**	310	350	approx. watts
Power Output	3.5	5	approx. kw

§ Obtained by grid resistor of value shown, or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage		12500 max.	volts
D-C Grid Voltage		-3000 max.	volts
D-C Plate Current		2.0 max.	amp.
D-C Grid Current		0.25 max.	amp.
Plate Input		18 max.	kw
Plate Dissipation		4 max.	kw
Radiator Temperature▲		180 max.	°C
Typical Operation:			
D-C Plate Voltage	8000	10000 max	volts
D-C Grid Voltage¶	-1000	-1300	volts
	5600	7200	approx. ohms

¶ Obtained by grid resistor of value shown or by other methods.

▲, ★, **, ##: See next page. ← Indicates a change.

World Radio History

892-R
R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

Peak R-F Grid Voltage	1800	2300	volts
D-C Plate Current	1.1	1.4	amp.
D-C Grid Current **	0.18	0.18	approx. amp.
Radiator Temperature *	120	160	°C
Driving Power **	320	400	approx. watts
Power Output	6.5	10	approx. kw

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
▲ Measured in thermometer wall.
★ This temperature corresponds to the normal rate of cooling-air flow of approximately 450 cubic feet per minute. The temperature of the cooling air should not exceed 45°C.
** Subject to wide variations as explained under TUBE RATINGS in General Section.

COOLING REQUIREMENTS

Volume of Cooling Air cfm□	MAXIMUM PLATE DISSIPATION-Kilowatts			
	CLASS B		CLASS C	
	A-F	R-F	Telephony	Telegraphy
400	3.70	3.70	2.30	3.70
450	4.00	4.00	2.50	4.00
500	4.30	4.30	2.70	4.30
600	4.85	4.85	3.00	4.85
700	5.30	5.30	3.30	5.30

□ To be supplied by blower having adequate size to force the required volume of air through the system.

Data on operating frequencies for the 892-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

**OUTLINE DRAWING,
TUBE SYMBOL, and MOUNTING POSITION
are the same as shown for Type 891-R**

**FILAMENT-EMISSION CHARACTERISTIC
is the same as that for Type 207**

**FILAMENT CHARACTERISTIC
is the same as that for Type 892**

**AVERAGE CHARACTERISTICS CURVES
are the same as those for Type 892**

World Radio History

World Radio History

893-A

TRANSMITTING TRIODE

WATER & FORCED-AIR COOLED

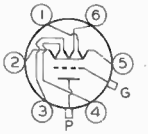
GENERAL DATA

Electrical:

Filament: Tungsten, Three-Section Type
Excitation . . 1φAC, 3φAC, 6φAC, or DC
Voltage per strand . . . . 10 . . . . . volts
Current per terminal . . . 61 . . . . . amp.
(See FILAMENT CONNECTIONS AND EXCITATION CIRCUITS under this type)
Starting – The current per terminal must never exceed 120 amperes, even momentarily.
Amplification Factor 36
Direct Interelectrode Capacitances (Approx.):
Grid to Plate. . . . . 33 . . . . . μμf
Grid to Filament . . . . . 48 . . . . . μμf
Plate to Filament. . . . . 3.2 . . . . . μμf

Physical:

Terminal Connections:
Term. 1 – Fil. No. 3
Term. 2 – Fil. No. 2
Term. 3 – Fil. No. 1
Term. 4 – Fil. No. 2
Term. 5 – Fil. No. 3
Term. 6 – Fil. No. 1



TERMINAL NO5 IS ABOVE GRID ARM

G – Grid Cap Terminal

P – Water-cooled Plate Terminal

Mounting Position. . . . . Vertical only, glass end up
Overall Length . . . . . 25-5/8" ± 1-1/8"
Greatest Radius. . . . . 6" ± 3/8"
Cap. . . . . No. 3935
Base (with nozzle for air-cooling of filament seal) No. 6628
Water Jacket . . . . . Type UT-1290-A
Gasket . . . . . RCA Stock No. 17880
Cooling – *Water flow* of 8 to 15 gallons per minute must start before application of any voltages and continue for at least 2 minutes after removal of voltages. Water temperature must not exceed 70°C under any conditions of operation.
Air flow of 2 cubic feet per minute in nozzle of filament base before application of any voltages is required to limit temperature of filament seal to 150°C.

This tube can often be operated at reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR – Class 8

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE. . . . . 20000 max. . volts
MAX.-SIGNAL D-C PLATE CURRENT* . . . . . 4 max. . amp.
MAX.-SIGNAL PLATE INPUT* . . . . . 60 max. . . kw
PLATE DISSIPATION* . . . . . 20 max. . . kw

Typical Operation:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage. . . . . 12000 15000 18000 . . . volts

* Averaged over any audio-frequency cycle of sine-wave form.

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

World Radio History

893-A

TRANSMITTING TRIODE

(continued from preceding page)

D-C Grid Voltage	-260	-350	-450	volts
Peak A-F Grid-to-Grid Voltage	1480	1560	1720	volts
Zero-Sig. D-C Plate Cur.	0.8	0.8	0.8	amp.
Max.-Sig. D-C Plate Cur.	7.0	6.0	5.5	amp.
Effective Load Res. (plate-to-plate)	4000	6000	8000	ohms
Max.-Signal Driving Power	220	190	140	approx. watts
Max.-Signal Power Output	52	60	70	approx. kw

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	20000 max.	volts
D-C PLATE CURRENT	2 max.	amp.
PLATE INPUT	32 max.	kw
PLATE DISSIPATION	20 max.	kw

Typical Operation:

D-C Plate Voltage	12000	15000	15000	volts
D-C Grid Voltage	-250	-340	-340	volts
Peak R-F Grid Voltage	350	395	450	volts
D-C Plate Current	1.5	1.5	2.0	amp.
Driving Power #**	130	150	200	approx. watts
Power Output #	6	7.5	10	approx. kw

**At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	12000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	2 max.	amp.
D-C GRID CURRENT	0.4 max.	amp.
PLATE INPUT	24 max.	kw
PLATE DISSIPATION	12 max.	kw

Typical Operation:

D-C Plate Voltage	10000	10000	12000	volts
D-C Grid Voltage	-800	-800	-1000	volts
Peak R-F Grid Voltage	1200	1280	1500	volts
D-C Plate Current	1.5	2.0	2.0	amp.
D-C Grid Current #	0.10	0.16	0.14	approx. amp.
Driving Power #	120	210	210	approx. watts
Power Output	11	15	18	approx. kw

: See next page.

World Radio History

893-A

TRANSMITTING TRIODE

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation ##

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	20000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	4 max.	amp.
D-C GRID CURRENT	0.4 max.	amp.
PLATE INPUT	70 max.	kw
PLATE DISSIPATION	20 max.	kw

Typical Operation:

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage	-800	-900	-1000	volts
Peak R-F Grid Voltage	1430	1520	1630	volts
D-C Plate Current	3.5	3.6	3.6	amp.
D-C Grid Current #	0.26	0.25	0.21	approx. amp.
Driving Power #	360	370	340	approx. watts
Power Output	30	40	50	approx. kw

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

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

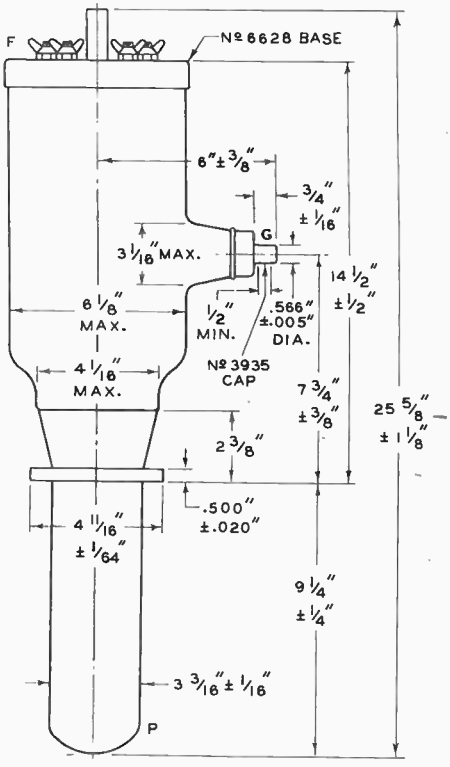
Data on operating frequencies for the 893-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

CURVES
FOR THE 893-A ARE THE SAME AS
THOSE FOR TYPE 893A-R

World Radio History

893-A

TRANSMITTING TRIODE



FOR CONNECTIONS OF FILAMENT TERMINALS SEE DRAWING FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

F = FILAMENT
P = PLATE
G = GRID

World Radio History

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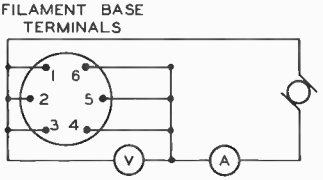
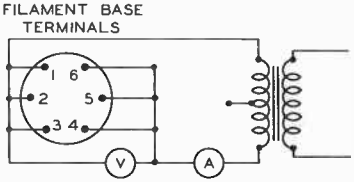
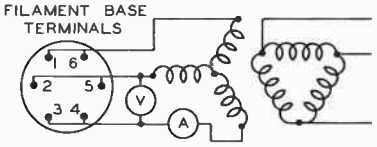
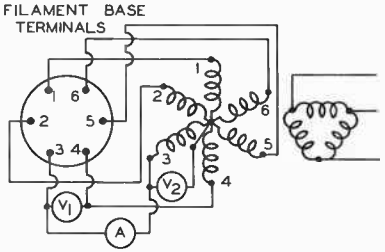
FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

D-C FILAMENT EXCITATION	 V = 20 VOLTS A = 183 AMP.
SINGLE-PHASE A-C FILAMENT EXCITATION	 V = 20 VOLTS A = 183 AMP.
THREE-PHASE A-C FILAMENT EXCITATION	 V = 17.3 VOLTS A = 122 AMP.
SIX-PHASE A-C FILAMENT EXCITATION NOTE: TERMINALS MUST BE CONNECTED IN CORRECT PHASE RELATION AS SHOWN	 V1 = 10 VOLTS V2 = 10 VOLTS A = 61 AMP.

World Radio History

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TRANSMITTING TRIODE
FORCED-AIR COOLED

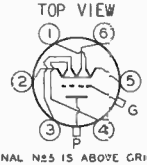
GENERAL DATA

Electrical:

Filament: Tungsten, Three-Section Type
Excitation . . 1φAC, 3φAC, 6φAC, or DC
Voltage per strand . . . . 10 . . . . . volts
Current per terminal . . . 61 . . . . . amp.
(See FILAMENT CONNECTIONS AND EXCITATION CIRCUITS under type 893-A)
Starting – The current per terminal must never exceed 120 amperes, even momentarily.
Amplification Factor 36
Direct Interelectrode Capacitances (Approx.):
Grid to Plate. . . . . 34 . . . . . μμf
Grid to Filament . . . . . 48 . . . . . μμf
Plate to Filament. . . . . 3.5 . . . . . μμf

Physical:

Terminal Connections:
Term. 1 – Fil. No. 3
Term. 2 – Fil. No. 2
Term. 3 – Fil. No. 1
Term. 4 – Fil. No. 2
Term. 5 – Fil. No. 3
Term. 6 – Fil. No. 1



G – Grid Cap Terminal

P – Radiator-cooled Plate Terminal

TERMINAL NO. 5 IS ABOVE GRID ARM

Mounting Position. . . . . Vertical only, glass end up
Overall Length . . . . . 26-7/8" ± 1-1/8"
Greatest Radius. . . . . 8-13/16"
Cap. . . . . No. 3935
Base (with nozzle for air-cooling of filament seal) No. 6628
Radiator . . . . . Integral part of tube
Cooling – A vertical air flow of at least 1800 cu. ft./min. should be delivered by a blower to the cooling radiator. An air flow of about 2 cu. ft./min. should be supplied to the air nozzle in the filament base. Cooling must be adequate to limit the glass temperature to not more than 150°C at the hottest part. Air flow must start before the application of any voltages. The incoming air temperature must not exceed 45°C.

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	20000 max. .	volts
MAX.-SIGNAL D-C PLATE CURRENT*	4 max. .	amp.
MAX.-SIGNAL PLATE INPUT*	60 max. . .	kw
PLATE DISSIPATION*	20 max. . .	kw
RADIATOR TEMPERATURE▲	180 max. . .	°C

* Averaged over any audio-frequency cycle of sine-wave form.
▲ : See next page.

World Radio History

893A-R

TRANSMITTING TRIODE

(continued from preceding page)

Typical Operation:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage	-260	-350	-450	volts
Peak A-F Grid-to-Grid Voltage	1480	1560	1720	volts
Zero-Sig. D-C Plate Cur.	0.8	0.8	0.8	amp.
Max.-Sig. D-C Plate Cur.	7.0	6.0	5.5	amp.
Effective Load Res. (plate-to-plate)	4000	6000	8000	ohms
Max.-Sig. Driving Power	220	190	140	approx. watts
Max.-Sig. Power Output	52	60	70	approx. kw

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	20000 max.	volts
D-C PLATE CURRENT	2 max.	amp.
PLATE INPUT	32 max.	kw
PLATE DISSIPATION	20 max.	kw
RADIATOR TEMPERATURE▲	180 max.	°C

Typical Operation:

D-C Plate Voltage	12000	15000	15000	volts
D-C Grid Voltage	-250	-340	-340	volts
Peak R-F Grid Voltage	350	395	450	volts
D-C Plate Current	1.5	1.5	2.0	amp.
Driving Power #**	130	150	200	approx. watts
Power Output #	6	7.5	10	approx. kw

** At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	12000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	2 max.	amp.
D-C GRID CURRENT	0.4 max.	amp.
PLATE INPUT	24 max.	kw
PLATE DISSIPATION	12 max.	kw
RADIATOR TEMPERATURE▲	180 max.	°C

Typical Operation:

D-C Plate Voltage	10000	10000	12000	volts
D-C Grid Voltage	-800	-800	-1000	volts

▲, #: See next page.

World Radio History

RCA

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TRANSMITTING TRIODE

(continued from preceding page)

Peak R-F Grid Voltage . .	1200	1280	1500	. . . volts
D-C Plate Current	1.5	2.0	2.0	. . . amp.
D-C Grid Current #	0.10	0.16	0.14	approx. amp.
Driving Power #	120	210	210	approx. watts
Power Output.	11	15	18	approx. kw

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation##

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	20000 max. . volts
D-C GRID VOLTAGE.	-3000 max. . volts
D-C PLATE CURRENT	4 max. . amp.
D-C GRID CURRENT.	0.4 max. . amp.
PLATE INPUT	70 max. . . kw
PLATE DISSIPATION	20 max. . . kw
RADIATOR TEMPERATURE▲	180 max. . . °C

Typical Operation:

D-C Plate Voltage	12000	15000	18000	. . . volts
D-C Grid Voltage.	-800	-900	-1000	. . . volts
Peak R-F Grid Voltage . .	1430	1520	1630	. . . volts
D-C Plate Current	3.5	3.6	3.6	. . . amp.
D-C Grid Current #	0.26	0.25	0.21	approx. amp.
Driving Power #	360	370	340	approx. watts
Power Output.	30	40	50	approx. kw

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

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

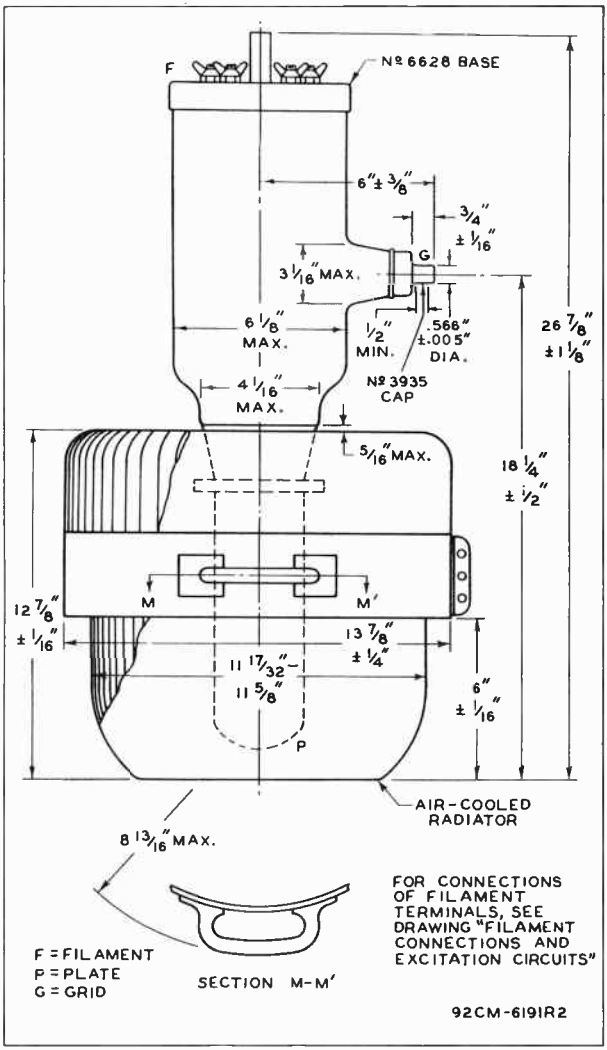
▲ Measured in thermometer well.

Data on operating frequencies for the 893A-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

893A-R

TRANSMITTING TRIODE



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

World Radio History

AVERAGE FILAMENT CHARACTERISTIC

893A-R

COLD RESISTANCE OF FILAMENT BETWEEN ANY TERMINAL AND NEUTRAL = 0.014 OHM

FILAMENT AMPERES PER TERMINAL

FILAMENT VOLTS A.C. – ANY TERMINAL TO NEUTRAL

FEB. 9, 1945

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6022R2

893A-R

World Radio History

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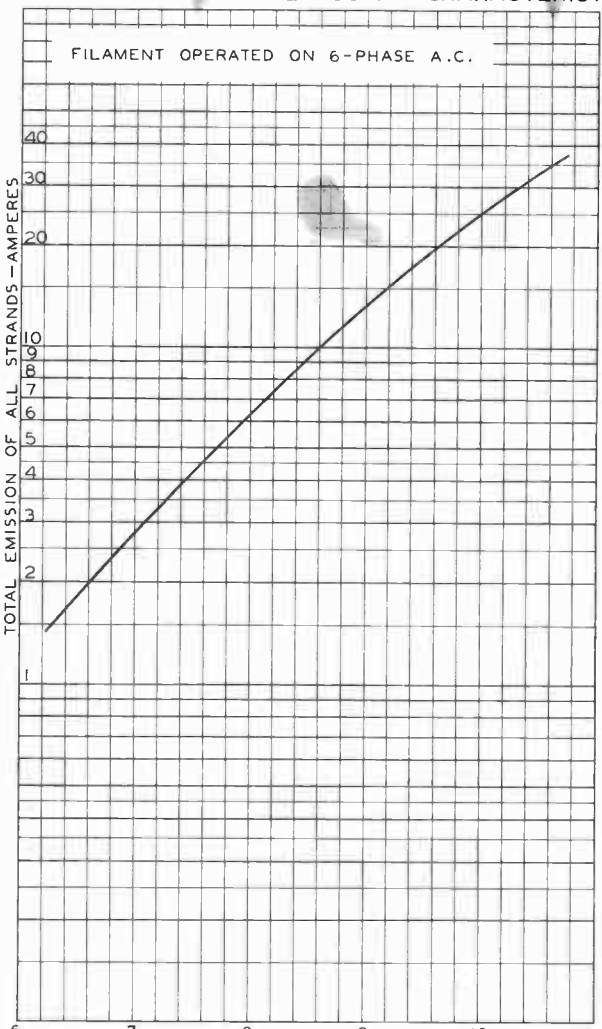
AVERAGE FILAMENT-EMISSION CHARACTERISTIC



FEB. 10, 1945

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

92CM-6185R1

World Radio History

RCA

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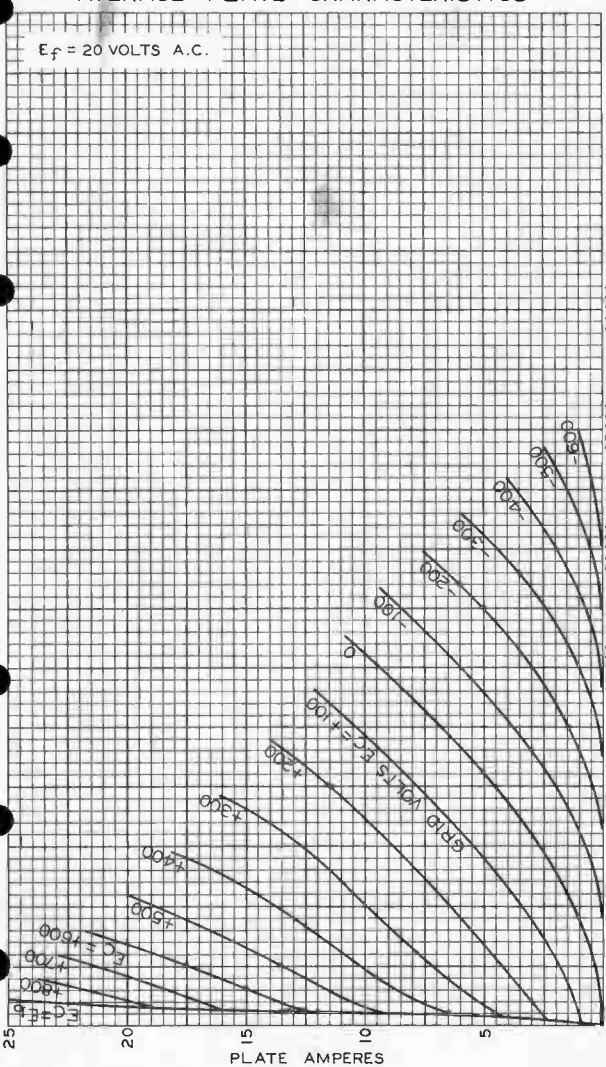
AVERAGE PLATE CHARACTERISTICS



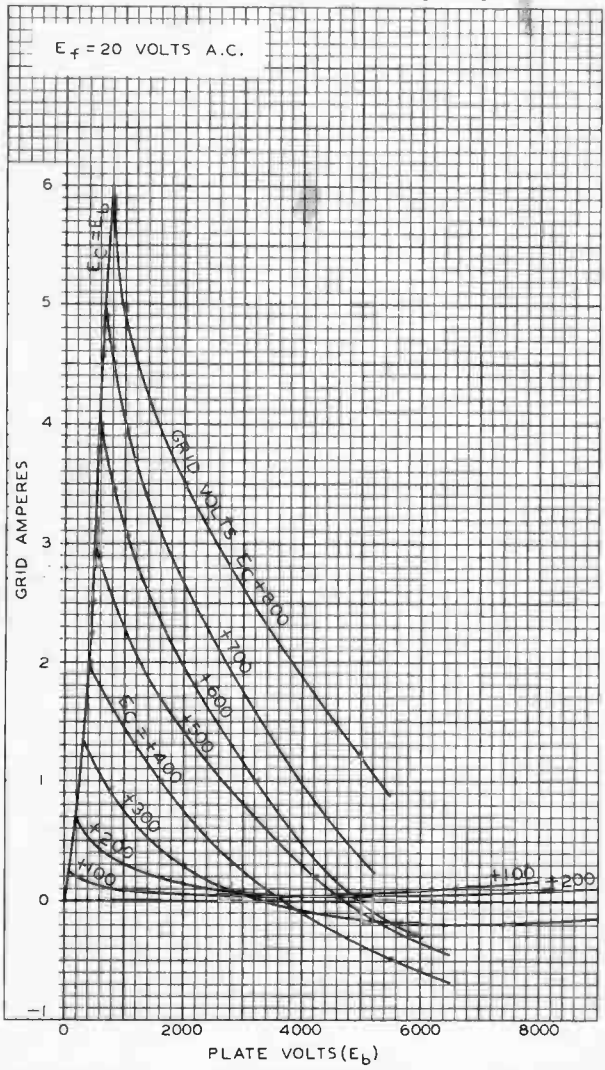
FEB. 10, 1945

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6186RI

893A-R

TYPICAL CHARACTERISTICS



FEB. 12, 1945

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6188R1

893A-R

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

893A-R

E_f = 20 VOLTS A.C.

GRID AMPERES = I_c
PLATE AMPERES = I_b

PLATE KILOVOLTS(E_b)

GRID VOLTS(E_c)

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6187R1

FEB. 10. 1945

World Radio History

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898-A

TRANSMITTING TRIODE

WATER & FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament: Tungsten, Three-Section Type

Excitation	1φAC, 3φAC, or DC	
Voltage per section	33	volts
Current per section	70	amp.

(See "FILAMENT CONNECTIONS AND EXCITATION CIRCUITS under this type)

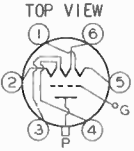
Starting – The current per section should never exceed 105 amperes, even momentarily.

Amplification Factor	45	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	62	μμf
Grid to Filament	52	μμf
Plate to Filament	4.2	μμf

Physical:

Terminal Connections:

Term. 1 – Fil. No. 3
Term. 2 – Fil. No. 2
Term. 3 – Fil. No. 1
Term. 4 – Fil. No. 2
Term. 5 – Fil. No. 3
Term. 6 – Fil. No. 1



TERMINAL NO5 IS ABOVE GRID ARM

G – Ribbon Grid Terminal

P – Water-cooled Plate Terminal

Mounting Position	Vertical only, glass end up
Maximum Overall Length	60-3/8"
Greatest Radius	10"
Base (with nozzle for air-cooling of filament seal)	No.6628
Water Jacket (with nozzle for air-cooling of bulb)	UT-1289-A
Gasket	RCA Stock No.17879

Cooling – *Water flow* of 15 to 25 gallons per minute must start before application of any voltages and continue for at least 10 minutes after removal of all voltages. Water temperature must not exceed 70°C at jacket outlet under any conditions of operation.

Air flow of 15 cubic feet per minute in bulb nozzle and 3 cubic feet per minute in filament-seal nozzle is required before the application of any voltages and must continue for at least 10 minutes after removal of voltages to limit the glass temperature to 150°C at the hottest part. The incoming air temperature must not exceed 50°C.

This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in General Section.

A-F POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL D-C PLATE CURRENT*	7.5 max.	amp.
MAX.-SIGNAL PLATE INPUT*	100 max.	kw
PLATE DISSIPATION*	50 max.	kw

* Averaged over any audio-frequency cycle of sine-wave form.

World Radio History

898-A

TRANSMITTING TRIODE

(continued from preceding page)

Typical Operation:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	12000	volts
D-C Grid Voltage●	-100	volts
Peak A-F Grid-to-Grid Voltage	2200	volts
Zero-Sig. D-C Plate Current	2	amp.
Max.-Sig. D-C Plate Current	13	amp.
Effective Load Res. (plate-to-plate)	2000	ohms
Max.-Sig. Driving Power	6	approx. kw
Max.-Sig. Power Output	90	approx. kw

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	20000 max.	volts
D-C PLATE CURRENT	5 max.	amp.
PLATE INPUT	100 max.	kw
PLATE DISSIPATION	75 max.	kw

Typical Operation:

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage●	-100	-175	-250	volts
Peak R-F Grid Voltage	525	650	775	volts
D-C Plate Current	2.8	3.5	4.2	amp.
Driving Power #●●	0.5	0.75	1.1	approx. kw
Power Output	11	17.5	25	approx. kw

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	12000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	5 max.	amp.
D-C GRID CURRENT	1.25 max.	amp.
PLATE INPUT	60 max.	kw
PLATE DISSIPATION	50 max.	kw

Typical Operation:

D-C Plate Voltage	12000	volts
D-C Grid Voltage	-800	volts
Peak R-F Grid Voltage	2000	volts
D-C Plate Current	5	amp.
D-C Grid Current #	1	approx. amp.
Driving Power #	2	approx. kw
Power Output	45	approx. kw

●; ●●; #: See next page.

World Radio History

898-A

TRANSMITTING TRIODE

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

*Key-down conditions per tube without modulation***

Maximum Ratings, *Absolute Values*:

D-C PLATE VOLTAGE	20000 max.	volts
D-C GRID VOLTAGE	-3000 max.	volts
D-C PLATE CURRENT	10 max.	amp.
D-C GRID CURRENT	1 max.	amp.
PLATE INPUT	200 max.	kw
PLATE DISSIPATION	100 max.	kw

Typical Operation:

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage	-800	-900	-1000	volts
Peak R-F Grid Voltage	2050	2300	2550	volts
D-C Plate Current	6.25	7.5	8.33	amp.
D-C Grid Current #	0.8	0.85	0.9	approx. amp.
Driving Power #	1.6	2.0	2.4	approx. kw
Power Output	50	75	100	approx. kw

• With a-c filament excitation.

** At crest of a-f cycle with modulation factor of 1.0.

Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

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

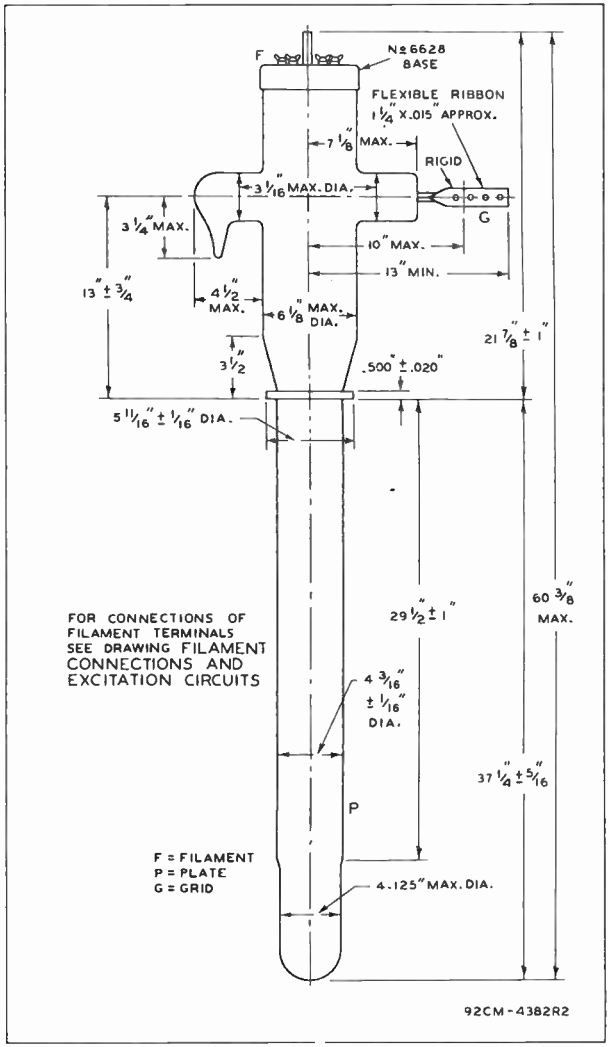
Data on operating frequencies for the 898-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

RCA

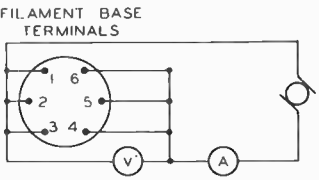
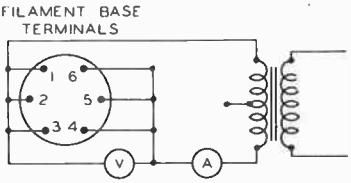
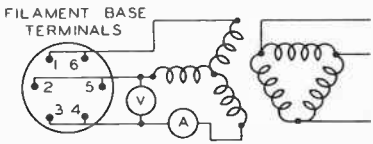
898-A

TRANSMITTING TRIODE



World Radio History

FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

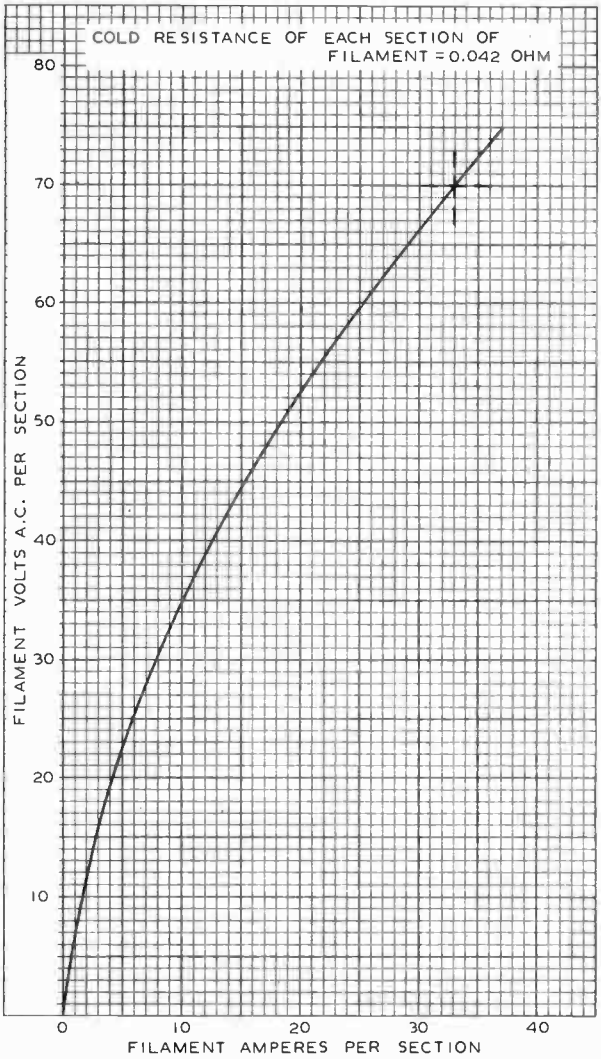
D-C FILAMENT EXCITATION	 V = 33 VOLTS A = 210 AMP.
SINGLE-PHASE A-C FILAMENT EXCITATION	 V = 33 VOLTS A = 210 AMP.
THREE-PHASE A-C FILAMENT EXCITATION	 V = 28.6 VOLTS A = 140 AMP.

World Radio History

898-A

898-A

AVERAGE FILAMENT CHARACTERISTIC



FEB. 3, 1945

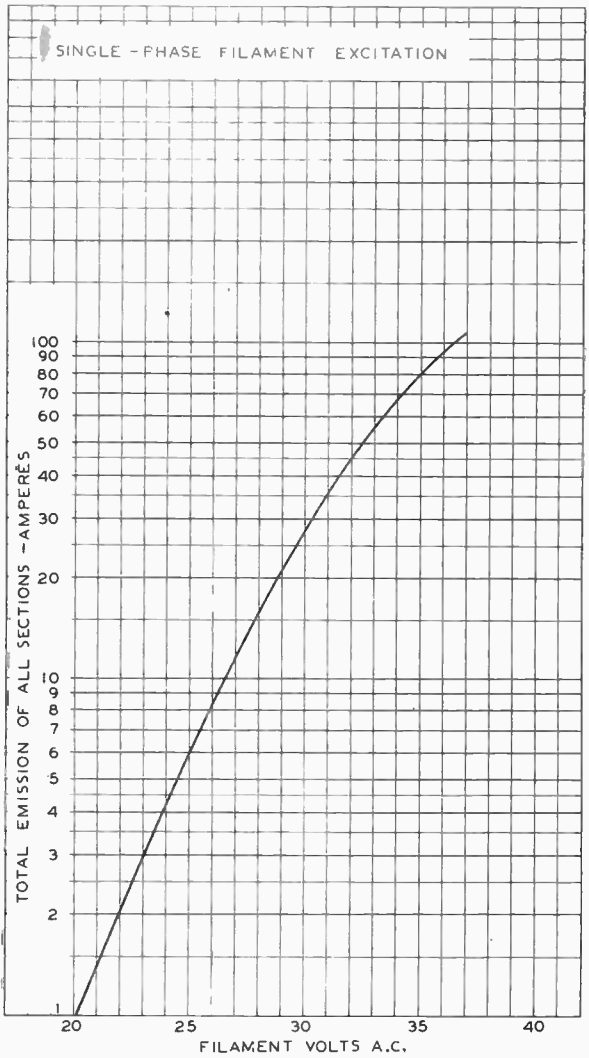
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM—4389R2

World Radio History

898-A

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



FEB. 8, 1945

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

92CM-4390R3

World Radio History

898-A

RCA

898-A

AVERAGE PLATE CHARACTERISTICS

FEB. 7, 1945

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

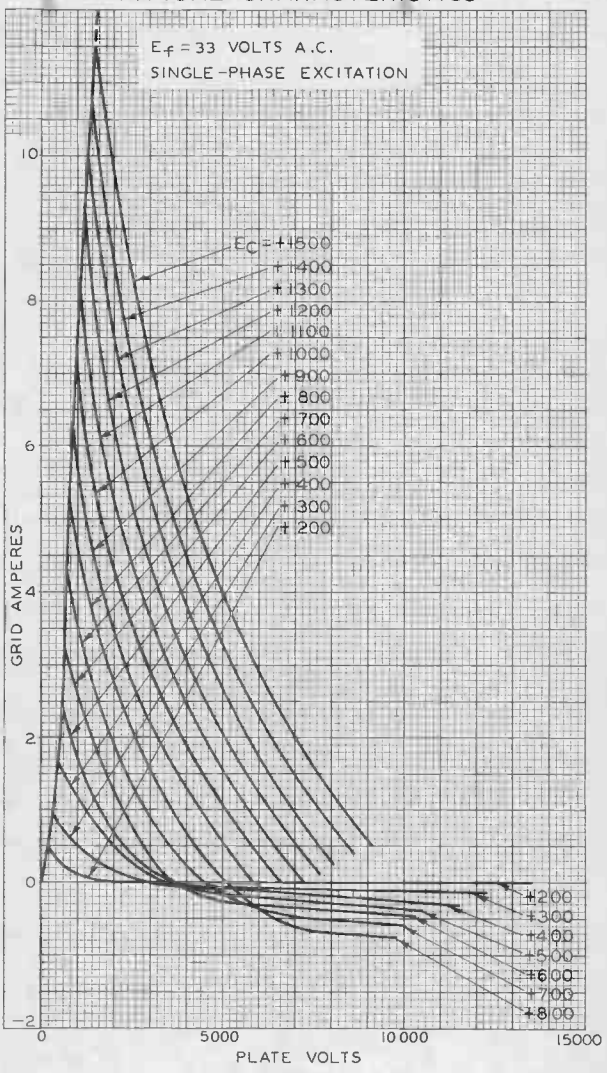
92CM-4383R2

World Radio History

World Radio History

898-A

TYPICAL CHARACTERISTICS



FEB. 9, 1945

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

92CM-4384R2

898-A

898-A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

E_f = 33 VOLTS A.C.
SINGLE-PHASE EXCITATION
I_C = GRID AMPERES
I_b = PLATE AMPERES

PLATE VOLTS (E_b)

0 5000 10000 15000 20000 25000

GRID VOLTS (EC)

2500 2000 1500 1000 500 0 -500 -1000

FEB. 7, 1945

RCA VICTOR DIVISION

92CM-6069R2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

1608

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	2.5	amp.
Amplification Factor	20	
Direct Interelectrode Capacitances:		
Grid to Plate	9	μμf
Grid to Filament	8.5	μμf
Plate to Filament	3	μμf
Maximum Overall Length		5-3/8" ←
Maximum Diameter		2-1/16" ←
Bulb		ST-16
Base		Medium 4-Pin Ceramic, Bayonet
RCA Socket		Type UR-542-A ←

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		425 max.	volts
Max.-Signal D-C Plate Current *		95 max.	ma.
Max.-Signal Plate Input *		40 max.	watts
Plate Dissipation *		20 max.	watts
Typical Operation:			
Unless otherwise specified, values are for 2 tubes			
D-C Plate Voltage	350	425	volts
D-C Grid Voltage	-10	-15	volts
Peak A-F Grid-to-Grid Voltage	120	190	volts ←
Zero-Signal D-C Plate Cur.	30	36	ma.
Max.-Signal D-C Plate Cur.	190	190	ma.
Load Resistance (per tube)	950	1200	ohms
Effective Load Res. (plate to plate)	3800	4800	ohms
Max.-Signal Driving Power	2.2	2.2	approx.watts
Max.-Signal Power Output	38	50	approx.watts

* Averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0			
D-C Plate Voltage		425 max.	volts
D-C Plate Current		70 max.	ma.
Plate Input		30 max.	watts
Plate Dissipation		20 max.	Watts
Typical Operation:			
D-C Plate Voltage	350	425	volts
D-C Grid Voltage	-10	-15	volts
Peak R-F Grid Voltage	35	40	volts
D-C Plate Current	70	70	ma.
D-C Grid Current **	4	4	approx.ma.
Driving Power ** o	2	2	approx.watts
Power Output	7	10	approx.watts

** See next page.
o At crest of a-f cycle with modulation factor of 1.0.
← Indicates a change.

World Radio History

1608
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		350 max.	volts
D-C Grid Voltage		-200 max.	volts
D-C Plate Current		85 max.	ma.
D-C Grid Current		25 max.	ma.
Plate Input		30 max.	watts
Plate Dissipation		13.5 max.	watts
Typical Operation:			
D-C Plate Voltage	325	350	volts
→ D-C Grid Voltage ¶	4000 ohms	4000 ohms	ohms
	-80 volts	-80 volts	volts
Peak R-F Grid Voltage	150	165	volts
D-C Plate Current	85	85	ma.
D-C Grid Current **	20	20	approx. ma.
Driving Power **	2.7	3	approx. watts
Power Output	16	18	approx. watts

¶ Obtained by grid-leak resistor or partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without modulation**

D-C Plate Voltage		425 max.	volts
D-C Grid Voltage		-200 max.	volts
D-C Plate Current		95 max.	ma.
D-C Grid Current		25 max.	ma.
Plate Input		40 max.	watts
Plate Dissipation		20 max.	watts
Typical Operation:			
D-C Plate Voltage	350	425	volts
→ D-C Grid Voltage△	4300 ohms	4500 ohms	ohms
	-85 volts	-90 volts	volts
Peak R-F Grid Voltage	150	155	volts
D-C Plate Current	95	95	ma.
D-C Grid Current **	20	20	approx. ma.
Driving Power **	3	3	approx. watts
Power Output	20	27	approx. watts

△ Obtained by grid-leak resistor or other self- or fixed-bias method.

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

** Subject to considerable variation as explained on sheet TRANS. TUBE RATINGS.

For use of the 1608 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 1608 are the same as for the 801.

→ Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

1608

AVERAGE PLATE CHARACTERISTICS

1608

$E_f = 2.5$ VOLTS D.C.

PLATE VOLTS (E_b)

0 200 400 600 800 1000 1200

GRID VOLTS E_c

−30 −20 −10 0 +10 +20 +30 +40 +50 +60 +70 +80 +90 +100 +110

$E_c = E_b/30$

0 250 500 750 1000

PLATE MILLIAMPERES

FEB. 4, 1937

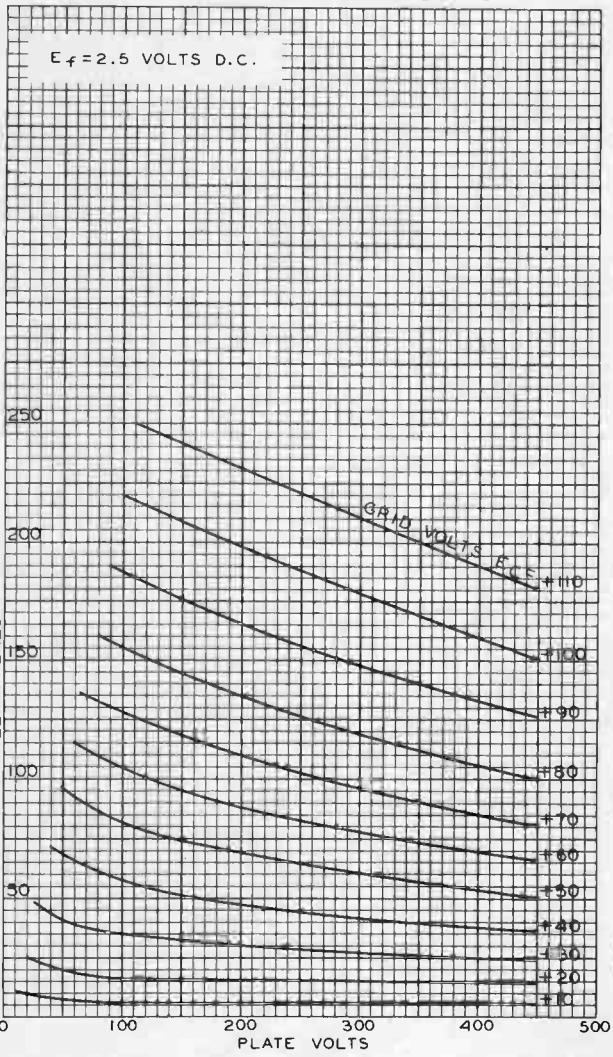
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4729

World Radio History

1608

AVERAGE CHARACTERISTICS



FEB. 5, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4730

1610

CRRAYSTAL-OSCILLATOR PENTODE

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	1.75	amp.
Transconductance for plate current of 31 ma.	2500	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate	1.2	μμf
Input	8.6	μμf
Output	13	μμf
Maximum Overall Length		5-3/8"
Maximum Diameter		2-1/16"
Bulb		ST-16
Base		Medium 5-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #			
D-C Plate Voltage		400 max.	volts
D-C Screen Voltage (Grid #2)		200 max.	volts
D-C Grid Voltage (Grid #1)		-100 max.	volts
D-C Plate Current		30 max.	ma.
D-C Grid Current		3 max.	ma.
Plate Input		9 max.	watts
Screen Input		2 max.	watts
Plate Dissipation		6 max.	watts
Typical Operation:			
Filament Voltage	2.5	2.5	a-c volts
D-C Plate Voltage	300	400	volts
D-C Screen Voltage	125	150	volts
D-C Grid Voltage	-60▲	-50▲	volts
Peak R-F Grid Voltage	110	75	volts
D-C Plate Current	30	22.5	ma.
D-C Screen Current	13	7	ma.
D-C Grid Current	2.5	1.5	approx. ma.
Driving Power	0.25	0.1	approx. watt
Power Output	5	5	approx. watts

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

▲ Bias may also be obtained with 30000-ohm grid resistor.

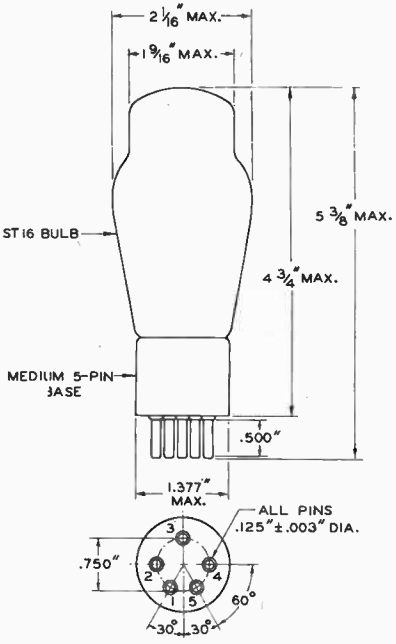
For use of the 1610 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

1610

CRYSTAL-OSCILLATOR PENTODE

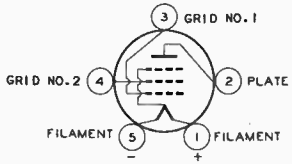
(continued from preceding page)



BOTTOM VIEW OF BASE

92C-4770

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



JUNE 21, 1937

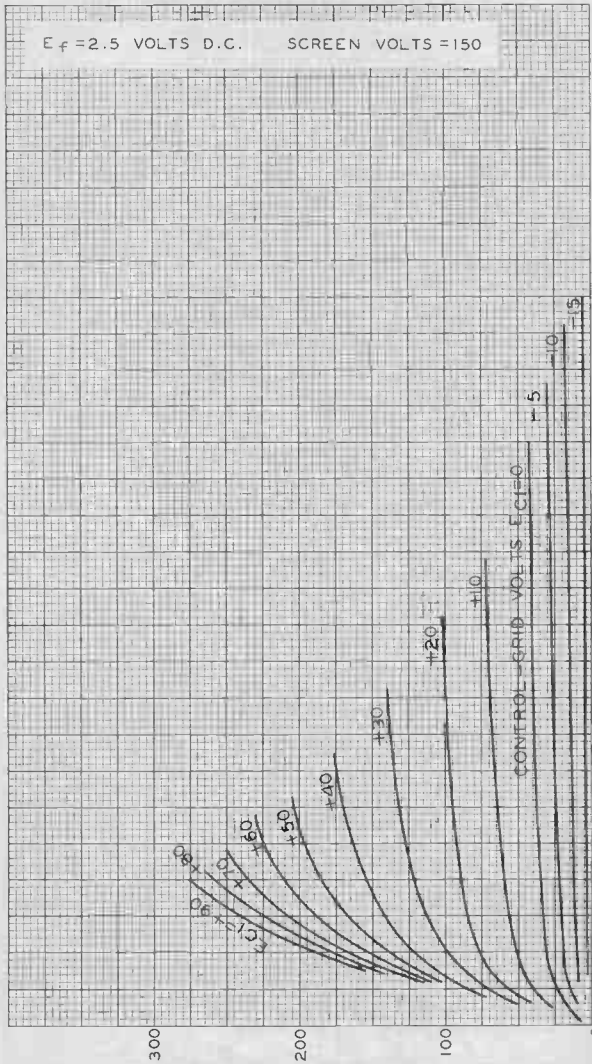
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

TENTATIVE DATA

World Radio History

1610

AVERAGE PLATE CHARACTERISTICS



JUNE 8, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

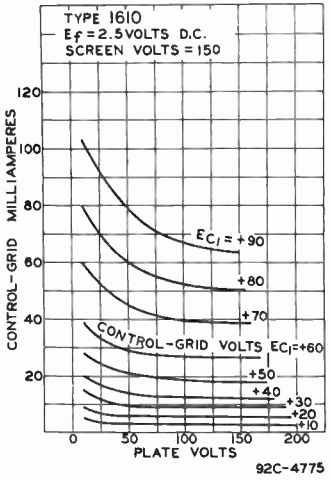
92C-4773

World Radio History

1610

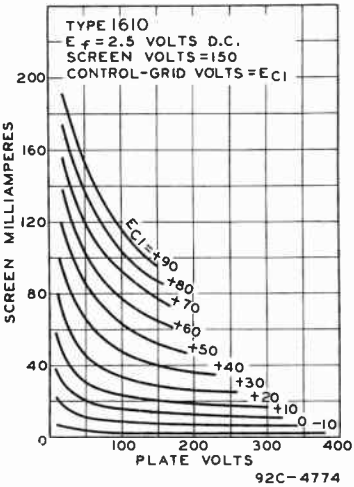
CRYSTAL-OSCILLATOR PENTODE

AVERAGE CHARACTERISTICS



92C-4775

AVERAGE CHARACTERISTICS



92C-4774

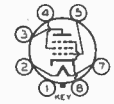
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

1613

R-F POWER AMPLIFIER PENTODE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.7	amp.
Transconductance for plate current of 31 ma.	2500	μmhos
Direct Interelectrode Capacitances:©		
Grid to Plate	0.26	μμf
Input	6.5	μμf
Output	13.5	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, Suppressor
Pin 4 - Screen		
Mounting Position		Any



BOTTOM VIEW (7S)

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C Plate Voltage	275 max.	volts
D-C Screen Voltage	275 max.	volts
D-C Grid Voltage	-100 max.	volts
D-C Plate Current	50 max.	ma.
D-C Grid Current	5 max.	ma.
Plate Input	11.5 max.	watts
Screen Input	2 max.	watts
Plate Dissipation	7 max.	watts
D-C Heater-Cathode Potential	100 max.	volts
Typical Operation:		
D-C Plate Voltage	275	volts
D-C Screen Voltage△	200	volts
	7500	ohms
D-C Grid Voltage□	-35	volts
	12500	ohms
Peak R-F Grid Voltage	65	volts
D-C Plate Current	42	ma.
D-C Screen Current	10	ma.
D-C Grid Current	2.8	approx.ma.
Driving Power	0.16	approx.watt
Power Output	6	approx.watts

□ Obtained by grid resistor or by partial self-bias methods.
△ Preferably obtained from a separate source modulated with the plate supply, or obtained from the modulated plate-voltage supply through resistor of value shown.
© With shell connected to cathode.

→ Indicates a change.

World Radio History

1613

R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage	350 max.	volts
D-C Screen Voltage	275 max.	volts
D-C Grid Voltage	-100 max.	volts
D-C Plate Current	50 max.	ma.
D-C Grid Current	5 max.	ma.
Plate Input	17.5 max.	watts
Screen Input	2.5 max.	watts
Plate Dissipation	10 max.	watts
D-C Heater-Cathode Potential	100 max.	volts
Typical Operation:		
D-C Plate Voltage	350	volts
D-C Screen Voltage■	200	volts
	15000	ohms
D-C Grid Voltage▲	-35	volts
	10000	ohms
Peak R-F Grid Voltage	70	volts
D-C Plate Current	50	ma.
D-C Screen Current	10	ma.
D-C Grid Current	3.5	approx. ma.
Driving Power	0.22	approx. watt
Power Output	9	approx. watts

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
▲ Obtained by grid resistor or other self- or fixed-bias method.
■ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown.

Data on operating frequencies for the 1613 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

◄ Indicates a change.

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

World Radio History

1614
TRANSMITTING BEAM POWER AMPLIFIER

GENERAL DATA

Electrical:

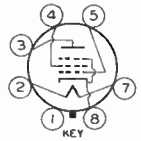
Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.9	amp
Transconductance: for plate current of 72 ma.	6050	μmhos
Direct Interelectrode Capacitances: °		
Grid-No.1 to Plate	0.4 max.	μμf
Input	10	μμf
Output	12	μμf

° With shell connected to cathode.

Mechanical:

Mounting Position	Any
Maximum Overall Length	4-5/16"
Maximum Seated Length	3-3/4"
Maximum Diameter	1-9/16" ± 1/16"
Bulb	MT-10A
Base	Small-Wafer Octal 7-Pin
Basing Designation for BOTTOM VIEW	7AC

Pin 1 - Shell
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 & MODULATOR - Class AB_1 *

Maximum Ratings, *Absolute Values*:

	CCS ●	*ICAS* ●●	
DC PLATE VOLTAGE	375 max.	550 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	400 max.	volts
DC PLATE CURRENT	110 max.	110 max.	ma.
PLATE INPUT	40 max.	60 max.	watts
GRID-No.2 DISSIPATION	3.5 max.	3.5 max.	watts
PLATE DISSIPATION	21 max.	25 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:
Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	360	530	volts
DC Grid-No.2 Voltage	270	340	volts

*, ●, ●●: See next page. ← Indicates a change.

World Radio History

1614

1614

TRANSMITTING BEAM POWER AMPLIFIER

DC Grid-No.1 (Control-Grid) Voltage	-22.5	-36	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	45	72	volts
Zero-Signal DC Plate Current	88	60	ma.
Max.-Signal DC Plate Current	132	160	ma.
Max.-Signal DC Grid-No.2 Current	15	20	ma.
Effective Load Resistance (plate-to-plate)	6600	7200	ohms
Total Harmonic Distortion	2	2.5	%
Max.-Signal Power Output	26.5	50	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

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

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	325 max.	375 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	70 max.	95 max.	ma.
DC GRID-No.1 Current	5 max.	5 max.	ma.
PLATE INPUT	23 max.	35 max.	watts
GRID-No.2 INPUT	2.5 max.	2.5 max.	watts
PLATE DISSIPATION	14 max.	21 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:**

DC Plate Voltage	325	375	volts
DC Grid-No.2 Voltage▲	245	250	volts
	10000	18000	ohms
DC Grid-No.1 Voltage□	-40	-50	volts
	20000	25000	ohms
Peak RF Grid-No.1 Voltage	51	80	volts
DC Plate Current	70	93	ma.
DC Grid-No.2 Current	8	7	ma.
DC Grid-No.1 Current (Approx.)	2	2	ma.
Driving Power (Approx.)	0.1	0.15	watts
Power Output (Approx.)	15	24.5	watts

▲ Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate-supply through a series resistor of the value shown.

⊕ Subscript 1 indicates that grid-current does not flow during any part of input cycle.

●, ●●, □: See next page. ←Indicates a change.

World Radio History

1614
TRANSMITTING BEAM POWER AMPLIFIER

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Triode Connection – Grid No.2 Connected to Plate

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	325 max.	375 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	70 max.	95 max.	ma.
DC GRID-No.1 CURRENT	10 max.	10 max.	ma.
PLATE INPUT	23 max.	35 max.	watts
PLATE DISSIPATION	14 max.	21 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:

DC Plate Voltage	325	375	volts
DC Grid-No.1 Voltage□	-85	-90	volts
	21000	15000	ohms
Peak RF Grid-No.1 Voltage	102	135	volts
DC Plate Current	65	90	ma.
DC Grid-No.1 Current (Approx.)	4	6	ma.
Driving Power (Approx.)	0.4	0.8	watts
Power Output (Approx.)	11.5	21	watts

□ Obtained from grid resistor of value shown or by partial self-bias methods.

RF AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	375 max.	450 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	110 max.	110 max.	ma.
DC GRID-No.1 CURRENT	5 max.	5 max.	ma.
PLATE INPUT	35 max.	45 max.	watts
GRID-No.2 INPUT	3.5 max.	3.5 max.	watts
PLATE DISSIPATION	21 max.	25 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

●, ●●, □□: See next page.

← Indicates a change.

World Radio History

1614

1614

TRANSMITTING BEAM POWER AMPLIFIER

→ **Typical Operation:**

DC Plate Voltage	375	450	volts
DC Grid-No.2 Voltage⊕	250	250	volts
	12500	25000	ohms
DC Grid-No.1 Voltage⊕⊕	−40	−45	volts
	20000	22500	ohms
	425	410	ohms
Peak RF Grid-No.1 Voltage	51	73	volts
DC Plate Current	80	100	ma.
DC Grid-No.2 Current	10	8	ma.
DC Grid-No.1 Current(Approx.)	2	2	ma.
Driving Power (Approx.)	0.1	0.15	watts
Power Output (Approx.)	21	31	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

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

⊕ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown.

⊕⊕ Obtained from fixed supply, by grid resistor (20000, 22500), by cathode resistor (425, 410) or by combination methods.

Data on operating frequencies for the 1614 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

CURVES under type 807 apply to the 1614 within its maximum ratings

← Indicates a change.

World Radio History

1616

HALF-WAVE HIGH-VACUUM RECTIFIER

Filament	Coated	
Voltage †	2.5	a-c volts
Current	5.0	amp.
Maximum Overall Length		6-13/16" ←
Maximum Diameter		2-1/16"
Bulb		T-16
Cap		Medium Metal
Base		Medium 4-Pin, Bayonet
RCA Socket (UT-542-A)		Stock No. 9937 ←

Maximum Ratings Are Absolute Values

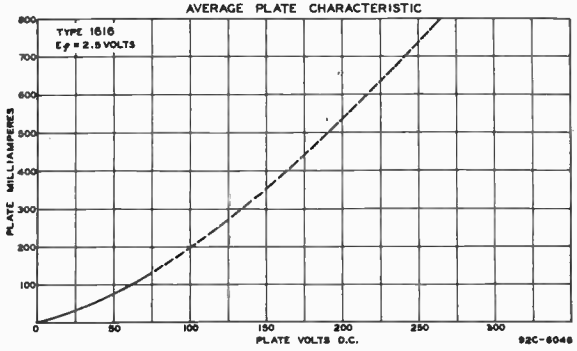
MAXIMUM RATINGS

Peak Inverse Voltage	5500 max.	volts
Peak Plate Current	0.8 max.	amp.
Surge Current	2.5 max.*	amp.
Average Plate Current	0.13 max.	amp.

* Equipment should be designed so that this value is not exceeded during switching operations.

† Should not deviate more than ±5% from the rated value.

AVERAGE PLATE CHARACTERISTIC



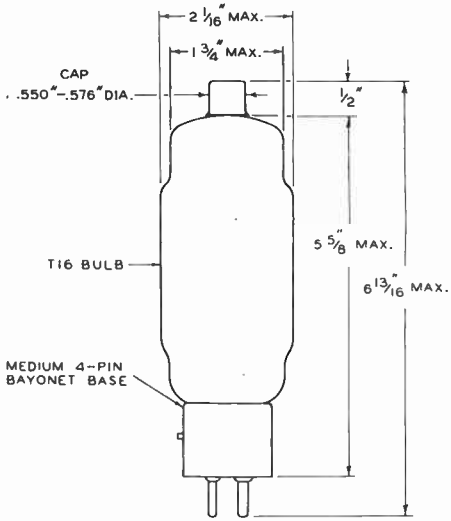
← Indicates a change.

World Radio History

1616

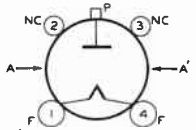
1616

HALF-WAVE HIGH-VACUUM RECTIFIER



92C-6156

BOTTOM VIEW OF SOCKET CONNECTIONS



AA'=PLANE OF ELECTRODES

F – Filament
NC – No Connection
P – Plate

TUBE MOUNTING POSITION

VERTICAL: Base down
HORIZONTAL: Plate in vertical plane (on edge)

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

1619

TRANSMITTING BEAM POWER AMPLIFIER

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	2.0	amp.
Transconductance for plate current of 50 ma.	4500 approx.	μmhos
Direct Interelectrode Capacitances:⊙		
Grid to Plate	0.29	μμf
Input	9.6	μμf
Output	12.5	μμf
Maximum Overall Length		4-5/16"
Maximum Diameter		1-9/16"±1/16" ←
Bulb		Metal Shell, MT-10
Base		Small Wafer Octal 7-Pin

Maximum Ratings Are Absolute Values

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

SINGLE-TUBE AMPLIFIER - Class A_1

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
Screen Input	3.5 max.	watts
Plate Dissipation	15 max.	watts
Typical Operation:		
D-C Plate Voltage	300	volts
D-C Suppressor Voltage (Grid #3)**	0	volts
D-C Screen Voltage	250	volts
D-C Grid Voltage (Grid #1) ## °	-10	volts
Peak A-F Grid Voltage	10	volts
Zero-Sig. D-C Plate Current	44	ma.
Max.-Sig. D-C Plate Current	46	ma.
Zero-Sig. D-C Screen Current	4	ma.
Max.-Sig. D-C Screen Current	6	ma.
Load Resistance	8800	ohms
Total Harmonic Distortion	7	%
Max.-Sig. Power Output	3 approx.	watts

The total effective grid-circuit resistance should not exceed 50000 ohms.

PUSH-PULL AMPLIFIER - Class AB_1

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
Screen Input *	3.5 max.	watts
Plate Dissipation *	15 max.	watts
Typical Operation with Fixed Bias:		
Unless otherwise specified, values are for 2 tubes		
D-C Plate Voltage	400	volts
D-C Suppressor Voltage (Grid #3) **	0	volts
D-C Screen Voltage	300	volts
D-C Grid Voltage (Grid #1) † °	-20	volts
Peak A-F Grid-to-Grid Voltage	40	volts
Zero-Sig. D-C Plate Current	52	ma.

°, *, **, †, ⊙: See end of tabulation. ← Indicates a change.

World Radio History

1619

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

Max.-Sig. D-C Plate Current	80	ma.
Zero-Sig. D-C Screen Current	3.5	ma.
Max.-Sig. D-C Screen Current	10	ma.
Load Resistance (per tube)	3500	ohms
Effective Load Res. (plate to plate)	14000	ohms
Total Harmonic Distortion	3	%
Max.-Sig. Power Output	17.5 approx.	watts

PUSH-PULL AMPLIFIER - Class AB_2

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
Max.-Sig. D-C Plate Current *	75 max.	ma.
Max.-Sig. Plate Input *	30 max.	watts
Screen Input *	3.5 max.	watts
Plate Dissipation *	15 max.	watts

Typical Operation with Fixed Bias:

Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	400	volts
D-C Suppressor (Grid #3) **	0	volts
D-C Screen Voltage	300	volts
D-C Grid Voltage (Grid #1) ○	-16.5	volts
Peak A-F Grid-to-Grid Voltage □	77	volts
Zero-Sig. D-C Plate Current	75	ma.
Max.-Sig. D-C Plate Current	150	ma.
Zero-Sig. D-C Screen Current	6.5	ma.
Max.-Sig. D-C Screen Current	11.5	ma.
Load Resistance (per tube)	1500	ohms
Effective Load Res. (plate to plate)	6000	ohms
Peak Grid Input Power ○○	0.4	watt
Total Harmonic Distortion	2.5	%
Max.-Sig. Power Output ◇	36 approx.	watts

◇ With zero-impedance driver and perfect regulation, plate-circuit distortion does not exceed 2%. In practice, plate-voltage regulation, screen voltage regulation and grid-bias regulation should not be greater than 5%, 5%, and 3% respectively.

□ The driver stage should be capable of supplying the grids of the class AB_2 stage with the specified peak grid voltage at low distortion. The effective resistance per grid circuit should not exceed 500 ohms and the effective impedance at the highest desired response frequency should not exceed 700 ohms.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier condition per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
D-C Grid Voltage (Grid #1)	-125 max.	volts
D-C Plate Current	37.5 max.	ma.
Plate Input	15 max.	watts
Screen Input	2.5 max.	watts
Plate Dissipation	15 max.	watts
Typical Operation:		
D-C Plate Voltage	400	volts

*, **, ○, ○○: See end of tabulation.

World Radio History

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

D-C Suppressor (Grid #3) **	0	volts
D-C Screen Voltage	250	volts
D-C Grid Voltage † •	−50	volts
	1500	ohms
Peak R-F Grid Voltage	58	volts
Peak A-F Grid Voltage	30	volts
D-C Plate Current	31	ma.
D-C Screen Current	1.5	ma.
D-C Grid Current	1.2 approx.	ma.
Driving Power ∞	0.25 approx.	watt
Power Output	3.8 approx.	watts

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.c

D-C Plate Voltage	325 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
D-C Grid Voltage (Grid #1)	−125 max.	volts
D-C Plate Current	62 max.	ma.
D-C Grid Current	5 max.	ma.
Plate Input	20 max.	watts
Screen Input	2.5 max.	watts
Plate Dissipation	10 max.	watts
Typical Operation:		
D-C Plate Voltage	325	volts
D-C Suppressor (Grid #3) **	0	volts
D-C Screen Voltage ♦	285	volts
	5000	ohms
D-C Grid Voltage † □	−50	volts
	18000	ohms
Peak R-F Grid Voltage	70	volts
D-C Plate Current	62	ma.
D-C Screen Current	7.5	ma.
D-C Grid Current	2.8 approx.	ma.
Driving Power	0.18 approx.	watt
Power Output	13 approx.	watts

♦ Preferably obtained from a separate source modulated with the plate supply, or obtained from the modulated plate-voltage supply through resistor of value shown.
□ Obtained by grid resistor of value shown or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation ■

D-C Plate Voltage	400 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	volts
D-C Grid Voltage (Grid #1)	−125 max.	volts
D-C Plate Current	75 max.	ma.
D-C Grid Current	5 max.	ma.
Plate Input	30 max.	watts
Screen Input	3.5 max.	watts
Plate Dissipation	15 max.	watts

**, ∞, †, •: See end of tabulation.

World Radio History

1619

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

Typical Operation:		
D-C Plate Voltage	400	volts
D-C Suppressor (Grid #3)**	0	volts
D-C Screen Voltage §	300	volts
	9500	ohms
D-C Grid Voltage † *	-55	volts
	11000	ohms
Peak R-F Grid Voltage	80	volts
D-C Plate Current	75	ma.
D-C Screen Current	10.5	ma.
D-C Grid Current	5	approx. ma.
Driving Power	0.36	approx. watt
Power Output	19.5	approx. watts

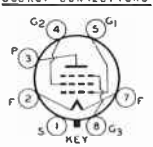
■ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
○ For a-c filament supply. If d.c. is used, the stated voltages should be decreased by 1.75 volts.
† The total effective grid-circuit resistance should not exceed 25000 ohms.
* Averaged over any audio-frequency cycle of sine-wave form.
** Grid No. 3 should be connected to the mid-point of filament operated on a.c., or to negative end of filament when d-c filament supply is used.
∞ At crest of a-f cycle with a modulation factor of 1.0.
● Obtained from fixed supply or by cathode resistor of value shown.
§ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown.
★ The screen voltage must not exceed 600 volts under key-up conditions. Obtained from fixed supply, by grid resistor (11000), or by combination methods. When a preceding stage is keyed, sufficient fixed bias must be used to maintain the plate current at a low value when the key is up.
⊖ With shell connected to cathode.

Data on operating frequencies for the 1619 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE MOUNTING POSITION

VERTICAL: Base up or down.
HORIZONTAL: No.

BOTTOM VIEW OF SOCKET CONNECTIONS



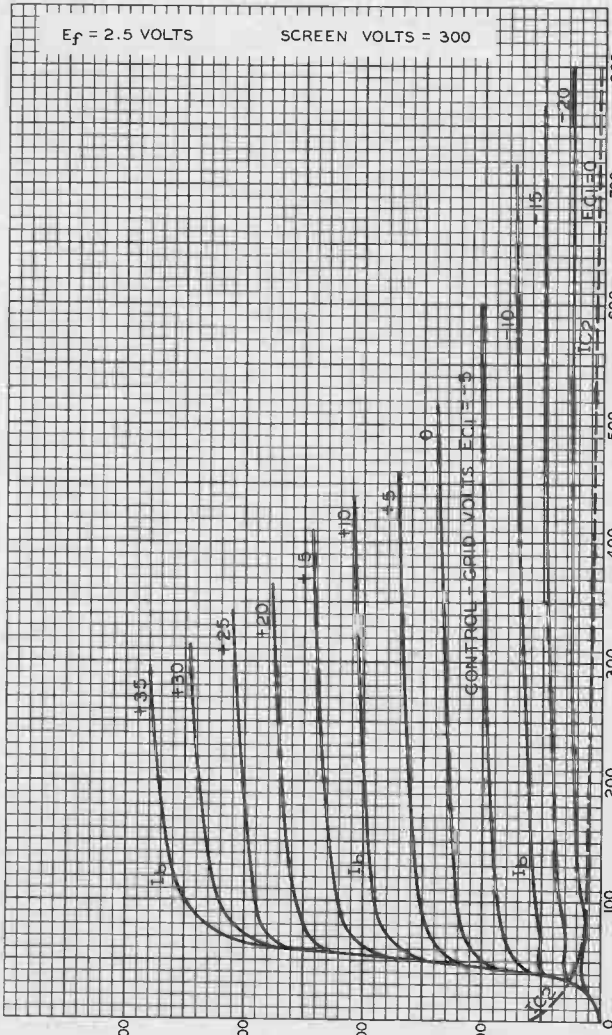
Pin 1 - Shell
Pin 2 - Filament
Pin 3 - Plate
Pin 4 - Grid No. 2
Pin 5 - Grid No. 1
Pin 7 - Filament
Pin 8 - Grid No. 3

← Indicates a change.

World Radio History

1619

AVERAGE PLATE CHARACTERISTICS



JUNE 15, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

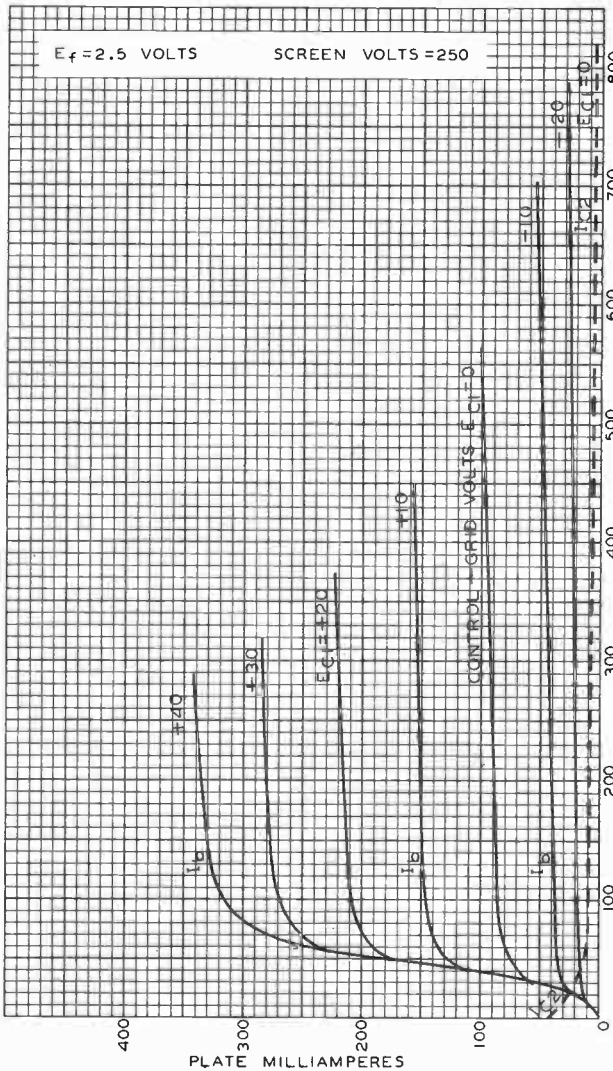
92C-4931

World Radio History

1619

1619

AVERAGE PLATE CHARACTERISTICS



JULY 27, 1938

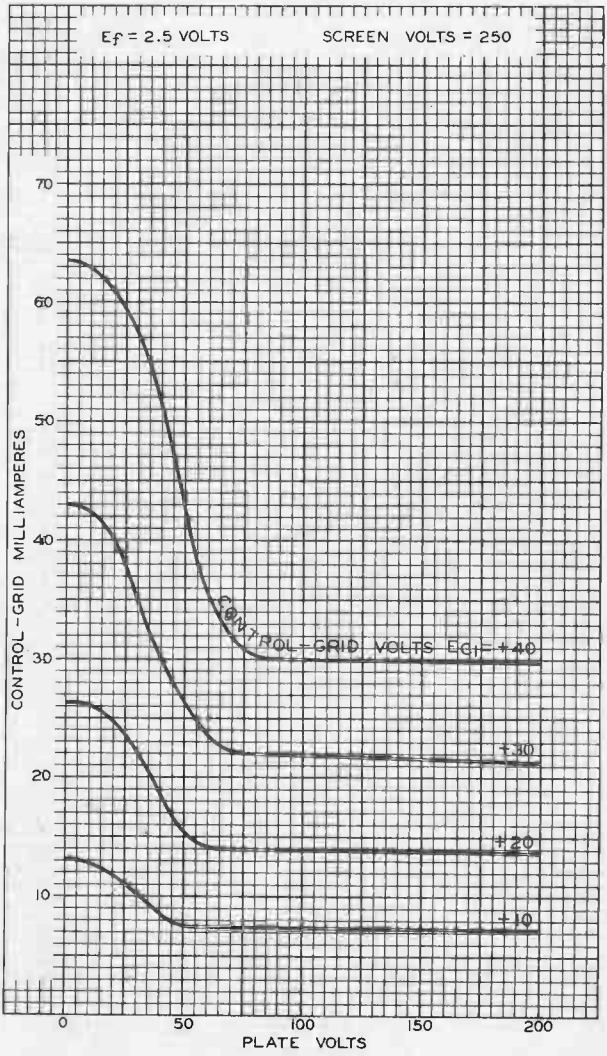
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4932

World Radio History

1619

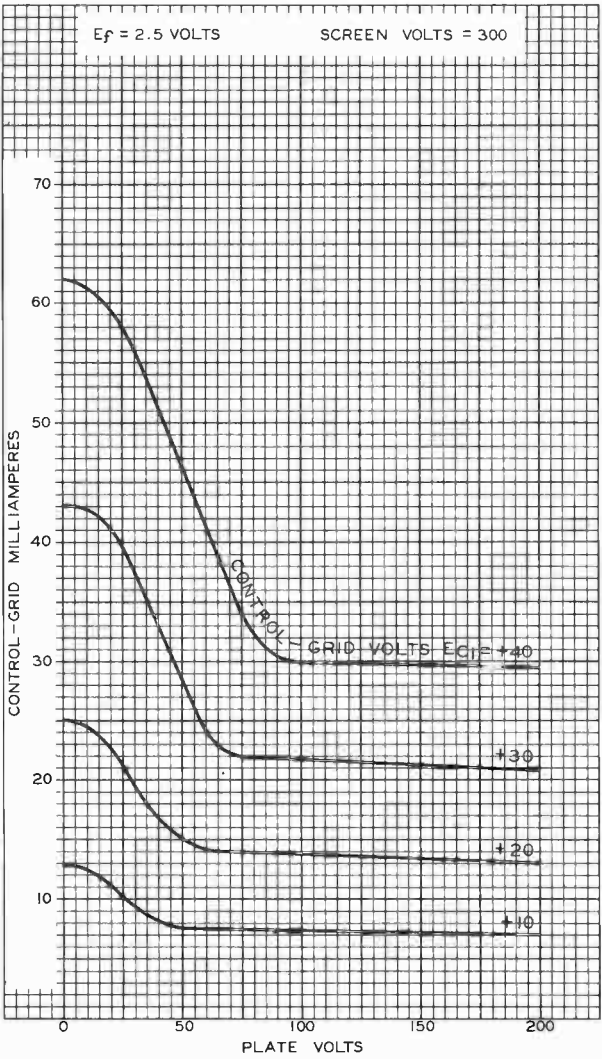
TYPICAL CHARACTERISTICS



1619

1619

TYPICAL CHARACTERISTICS



JUNE 9, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4925

1623

R-F POWER AMPLIFIER, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	6.3	a-c or d-c volts
Current	2.5	amp.
Amplification Factor	20	
Direct Interelectrode Capacitances:		
Grid to Plate	6.7	μμf
Grid to Filament	5.7	μμf
Plate to Filament	0.9	μμf
Maximum Overall Length		6-9/16"
Maximum Diameter		2-7/16"
Bulb		ST-19
Cap		Medium Metal
Base		Medium 4-Pin Ceramic, Bayonet
RCA Socket		Type UR-542-A

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

A-F POWER AMPLIFIER & MODULATOR - Class B

	CCS		ICAS	
D-C Plate Voltage	750 max.		1000 max.	volts
Max.-Signal D-C Plate Current*	100 max.		100 max.	ma.
Max.-Signal Plate Input*	75 max.		100 max.	watts
Plate Dissipation*	25 max.		30 max.	watts
Typical Operation: *Unless otherwise specified, values are for 2 tubes*				
D-C Plate Voltage	500	750	1000	volts
D-C Grid Voltage □	-10	-25	-40	volts
Peak A-F Grid-to-Grid Volt.	170	200	230	volts
Zero-Sig. D-C Plate Cur.	40	35	30	ma.
Max.-Sig. D-C Plate Cur.	200	200	200	ma.
Load Res. (Per tube)	1300	2100	3000	ohms
Effective Load Res. (plate to plate)	5200	8400	12000	ohms
Max.-Sig. Driving Power (Approx.)	3.5	4	4.2	watts
Max.-Sig. Power Output (Approx.)	60	100	145	watts

* averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier Conditions per tube for use with a max. modulation fact. of 1.0

	CCS		ICAS	
D-C Plate Voltage	750 max.		1000 max.	volts
D-C Plate Current	50 max.		50 max.	ma.
Plate Input	37.5 max.		45 max.	watts
Plate Dissipation	25 max.		30 max.	watts
Typical Operation:				
D-C Plate Voltage	500	750	1000	volts
D-C Grid Voltage □	-25	-40	-50	volts
Peak R-F Grid Voltage	50	60	62	volts
D-C Plate Current	50	50	45	ma.

□ with a-c filament supply.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

1623

R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

	CCS		ICAS	
D-C Grid Current (Approx.)**	2	1.5	0.5	ma.
Driving Power (Approx.)**°	1.8	1.4	1.7	watts
Power Output (Approx.)	7.5	12.5	16	watts

° At crest of a-f cycle with modulation factor of 1.0

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS		ICAS	
D-C Plate Voltage	600 max.		750 max.	volts
D-C Grid Voltage	-200 max.		-200 max.	volts
D-C Plate Current	83 max.		100 max.	ma.
D-C Grid Current	25 max.		25 max.	ma.
Plate Input	50 max.		75 max.	watts
Plate Dissipation	17.5 max.		25 max.	watts
Typical Operation:				
D-C Plate Voltage	500	600	750	volts
D-C Grid Voltage §□	-125	-125	-125	volts
	5000	5000	6250	ohms
Peak R-F Grid Voltage	200	200	215	volts
D-C Plate Current	83	83	100	ma.
D-C Grid Current (Approx.)**	25	25	20	ma.
Driving Power (Approx.)**	5	5	4	watts
Power Output (Approx.)	30	38	55	watts

§ Obtained by grid resistor of value shown or by partial self-bias methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation#

	CCS		ICAS	
D-C Plate Voltage	750 max.		1000 max.	volts
D-C Grid Voltage	-200 max.		-200 max.	volts
D-C Plate Current	100 max.		100 max.	ma.
D-C Grid Current	25 max.		25 max.	ma.
Plate Input	75 max.		100 max.	watts
Plate Dissipation	25 max.		30 max.	watts
Typical Operation:				
D-C Plate Voltage	500	750	1000	volts
D-C Grid Voltage ★□	-70	-85	-90	volts
	4100	5000	4500	ohms
	600	730	750	ohms
Peak R-F Grid Voltage	140	160	172	volts
D-C Plate Current	100	100	100	ma.
D-C Grid Current (Approx.)**	17	17	20	ma.
Driving Power (Approx.)**	2.2	2.5	3.1	watts
Power Output (Approx.)	33	55	75	watts

★ Obtained by grid resistor (4100, 5500, 4500), by cathode resistor (600, 730, 750) or from fixed-bias source. When the 1623 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1000 volts, a fixed bias of at least -35 volts should be used.

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

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

□ With a-c filament supply.

World Radio History

1623

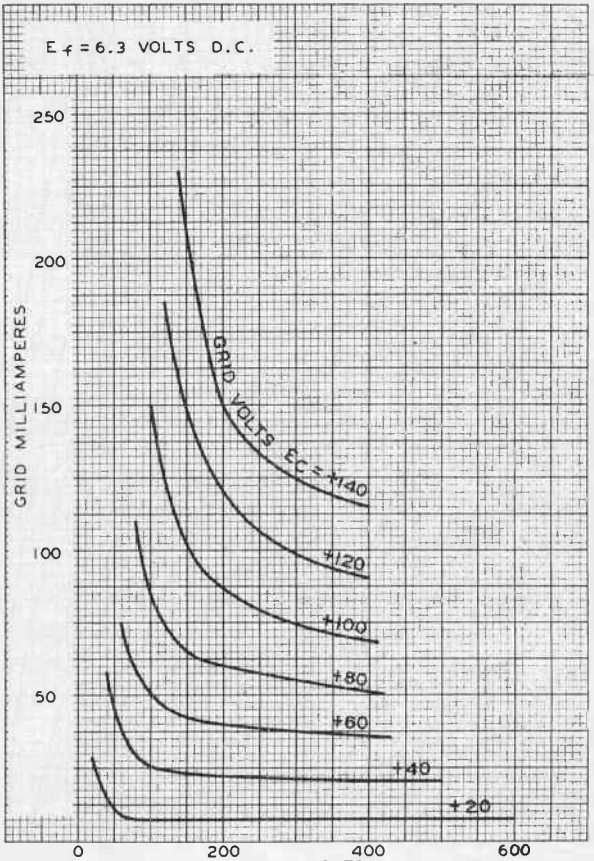
R-F POWER AMPLIFIER. CLASS B MODULATOR

(continued from preceding page)

Data on operating frequencies for the 1623 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 1623 are the same as for the 809.

TYPICAL CHARACTERISTICS



92C - 4982

DATA 2

April 15, 1940

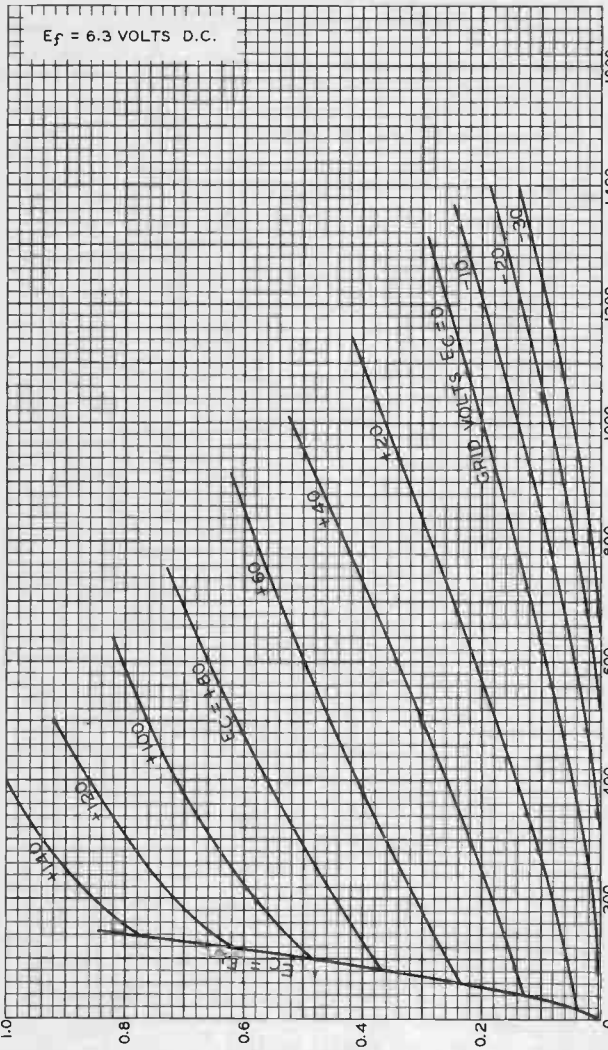
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

World Radio History

1623

1623

AVERAGE PLATE CHARACTERISTICS



OCT. 10, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4980

World Radio History

1624

TRANSMITTING BEAM POWER AMPLIFIER

Filament	Coated	
Voltage	2.5	a-c or d-c volts
Current	2.0	amp.
Transconductance for plate current of 50 ma.	4000 approx.	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate	0.25 max.⊙	μμf
Input	11	μμf
Output	7.5	μμf
Maximum Overall Length		5-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 5-Pin
RCA Socket		Stock No.9920

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

PUSH-PULL AMPLIFIER - Class AB_2 ††

D-C Plate Voltage		600 max.	volts
D-C Screen Voltage (Grid #2)		300 max.	volts
Max.-Sig. D-C Plate Current*		90 max.	ma.
Max.-Sig. Plate Input*		54 max.	watts
Screen Input*		3.5 max.	watts
Plate Dissipation*		25 max.	watts
Typical Operation (Fixed bias):			
Unless otherwise specified, values are for 2 tubes			
D-C Plate Voltage	400	600	volts
D-C Screen Voltage	300	300	volts
D-C Grid Voltage (Grid #1) □ o	-16.5	-25	volts
Peak A-F Grid-to-Grid Voltage	77	106	volts
Zero-Sig. D-C Plate Current	75	82	ma.
Max.-Sig. D-C Plate Current	150	180	ma.
Zero-Sig. D-C Screen Current	6.5	5	ma.
Max.-Sig. D-C Screen Current	11.5	15	ma.
Load Resistance (per tube)	1500	1870	ohms
Effective Load Res. (plate to plate)	6000	7500	ohms
Peak Grid Input Power	0.4	1.2	watts
Max.-Sig. Power Output**	36	72	approx. watts

* Averaged over any audio-frequency cycle of sine-wave form.

o For a-c filament supply. If d.c. is used, the stated voltages should be decreased by 1.75 volts.

□ Driver stage should be capable of supplying the grids of the class AB_2 stage with the specified peak grid voltage at low distortion. The effective resistance per grid circuit should be kept below 500 ohms and the effective impedance at the highest desired response frequency should not exceed 700 ohms.

** With zero-impedance driver and perfect regulation, plate-circuit distortion does not exceed 2%. In practice, plate-voltage regulation, screen-voltage regulation, and grid-bias regulation should not be greater than 5%, 5%, and 3%, respectively.

⊙ With external shielding.

†† See end of tabulation.

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0			
D-C Plate Voltage		600 max.	volts
D-C Screen Voltage (Grid #2)		300 max.	volts
D-C Grid Voltage (Grid #1)		-200 max.	volts
D-C Plate Current		75 max.	ma.
Plate Input		37.5 max.	watts
Screen Input		2.5 max.	watts
Plate Dissipation		25 max.	watts
Typical Operation:			
D-C Plate Voltage	400	600	volts
D-C Screen Voltage #	250	300	volts
D-C Grid Voltage +	-50	-60	volts
Peak R-F Grid Voltage	58	58	volts
Peak A-F Grid Voltage	30	30	volts
D-C Plate Current	31	40	ma.
D-C Screen Current	1.5	2.5	ma.

\# Obtained from a fixed supply or from a separate source.

\+ See end of tabulation.

Indicates a change

World Radio History

1624

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

D-C Grid Current	1.2	0	approx. ma.
Driving Power °°	0.25	0.4	approx. watt
Power Output	3.8	8	approx. watts

°° At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

D-C Plate Voltage		500 max.	volts
D-C Screen Voltage (Grid #2)		300 max.	volts
D-C Grid Voltage (Grid #1)		-200 max.	volts
D-C Plate Current		75 max.	ma.
D-C Grid Current		5 max.	ma.
Plate Input		37.5 max.	watts
Screen Input		2.5 max.	watts
Plate Dissipation		16.5 max.	watts
Typical Operation:			
D-C Plate Voltage □	325	500	volts
D-C Screen Voltage	285	275	volts
D-C Grid Voltage ★ +	-50	-50	volts
	18000	15000	ohms
Peak R-F Grid Voltage	70	80	volts
D-C Plate Current	62	75	ma.
D-C Screen Current	7.5	9	ma.
D-C Grid Current	2.8	3.3	approx. ma.
Driving Power	0.18	0.25	approx. watt
Power Output	13	24	approx. watts

□ Obtained preferably from a modulated fixed supply.

★ Obtained by grid resistor of value shown or by suitable combination of grid resistor with either fixed supply or cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage		600 max.	volts
D-C Screen Voltage (Grid #2)		300 max.	volts
D-C Grid Voltage (Grid #1)		-200 max.	volts
D-C Plate Current		90 max.	ma.
D-C Grid Current		5 max.	ma.
Plate Input		54 max.	watts
Screen Input		3.5 max.	watts
Plate Dissipation		25 max.	watts
Typical Operation:			
D-C Plate Voltage	400	600	volts
D-C Screen Voltage ●	300	300	volts
D-C Grid Voltage ◊ +	-55	-60	volts
	11000 ⊛	12000 ⊛	ohms
	610 ⊕	570 ⊕	ohms
Peak R-F Grid Voltage	80	95	volts
D-C Plate Current	75	90	ma.
D-C Screen Current	10.5	10	ma.
D-C Grid Current	5	5	approx. ma.
Driving Power	0.36	0.43	approx. watt
Power Output	19.5	35	approx. watts

● Obtained preferably from a fixed supply of value shown.

◊ Obtained by grid leak(⊛) or cathode resistor (⊕) of values shown, fixed supply, or by combination methods.

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

\+ The total effective grid-circuit resistance should not exceed 25000 ohms.

†† Subscript (2) indicates that grid current flows during a part of input cycle.

← Indicates a change

World Radio History

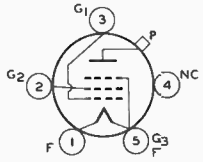
1624

TRANSMITTING BEAM POWER AMPLIFIER

OUTLINE DIMENSIONS for the 1624 are the same as those for the 807. For CURVES, refer to Type 1619.

Data on operating frequencies for the 1624 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY. ←

BOTTOM VIEW OF SOCKET CONNECTIONS



Pin 1 – Filament
Pin 2 – Grid No.2
Pin 3 – Grid No.1
Pin 4 – No Connection
Pin 5 – Filament –, Grid No.3
Cap – Plate

MOUNTING POSITION

VERTICAL: Base up or down.
HORIZONTAL: No.

←Indicates a change.

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

World Radio History

1625

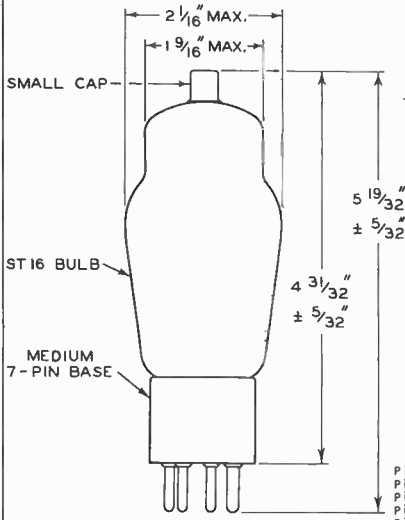
TRANSMITTING BEAM POWER AMPLIFIER

Heater	Coated Unipotential Cathode	
Voltage	12.6 (±10%)	a-c or d-c volts
Current	0.45	amp.
Transconductance for plate cur. of 72 ma.	6000 approx.	μmhos
Grid-Screen Mu-Factor	8	
Direct Interelectrode Capacitances:		
Grid to Plate (With external shielding)	0.2 max.	μμf
Input	11	μμf
Output	7	μμf
Overall Length	5-19/32" ± 5/32"	←
Seated Height	4-31/32" ± 5/32"	←
Maximum Diameter	2-1/16"	
Bulb	ST-16	
Cap	Small	
Base	Medium 7-Pin, Micanol	

Maximum Ratings Are Absolute Values

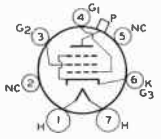
MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

These are the same as those for Type 807 except that maximum d-c heater-cathode potential is 135 volts. Curves under the 807 also apply to the 1625.



TUBE MOUNTING POSITION
Any

BOTTOM VIEW OF SOCKET CONNECTIONS



5AZ

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

← Indicates a change.

World Radio History

World Radio History

1626

TRANSMITTING TRIODE

For oscillator applications requiring unusually stable characteristics

Heater°	Coated Unipotential Cathode	
Voltage	12.6	a-c or d-c volts
Current	0.25	amp.
Amplification Factor	5	
Direct Interelectrode Capacitances:		
Grid to Plate	4.4	μμf
Grid to Cathode	3.2	μμf
Plate to Cathode	3.4	μμf
Maximum Overall Length		4-1/8"
Maximum Seated Height		3-9/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base	Small Shell Octal 8-Pin, MICANOL#	

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage	250 max.	volts
D-C Grid Voltage	-150 max.	volts
D-C Plate Current	25 max.	ma.
D-C Grid Current	8 max.	ma.
Plate Input	6.25 max.	watts
Plate Dissipation	5 max.	watts
Typical Operation:		
D-C Plate Voltage	250	volts
D-C Grid Voltage*	-70	volts
	14000	ohms
	2300	ohms
Peak R-F Grid Voltage	105	volts
D-C Plate Current	25	ma.
D-C Grid Current**	5 approx.	ma.
Driving Power**	0.5 approx.	watt
Power Output	4 approx.	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.

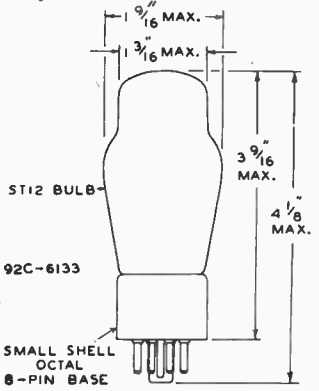
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

* Obtained from fixed supply (-70), by grid resistor (14000), or cathode resistor (233), or by combination methods. When the 1626 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a low value. With plate volts of 250, a fixed bias of at least -35 volts must be used.

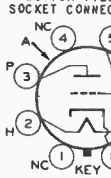
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

Registered trademark.

Data on operating frequencies for the 1626 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



BOTTOM VIEW OF SOCKET CONNECTIONS



AA' = PLANE OF ELECTRODES

Pin 1 - No Connection
Pin 2 - Heater
Pin 3 - Plate
Pin 4 - No Connection
Pin 5 - Grid
Pin 6 - No Connection
Pin 7 - Heater
Pin 8 - Cathode

TUBE MOUNTING POSITION

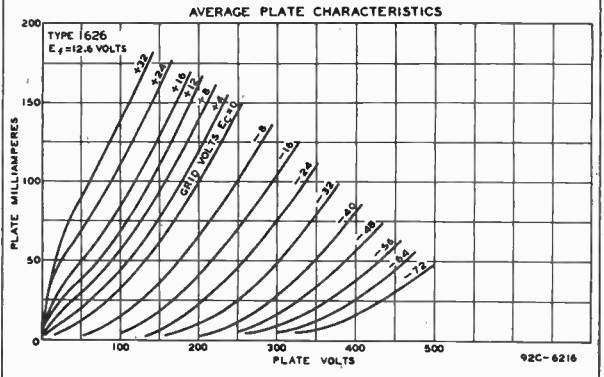
VERTICAL or HORIZONTAL

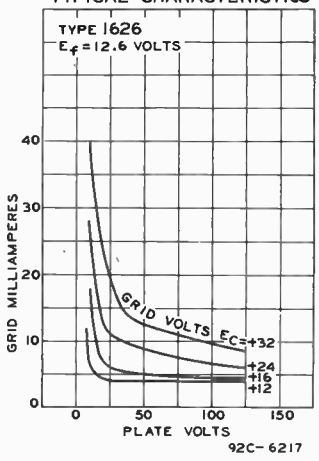
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

World Radio History

1626

1626
TRANSMITTING TRIODE





World Radio History

5556
POWER TRIODE

Useful at frequencies up to 30 Mc

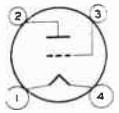
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	4.5	ac or dc volts
Current	1.1	amp
Amplification Factor, for plate volts = 350, grid volts = -20, and plate ma = 19	8.5	
Direct interelectrode Capacitances:		
Grid to plate	6.7	μμf ←
Grid to filament	2.3	μμf
Plate to filament	2.2	μμf

Mechanical:

Mounting Position	Vertical, base down or up, or Horizontal with pins 1 and 4 in vertical plane
Maximum Overall Length	4-1/2" ←
Maximum Diameter	1-5/8" ←
Weight (Approx.)	2 oz ←
Base	Medium-Shell Small 4-Pin with Bayonet (JETEC No. A4-10) ←
Basing Designation for BOTTOM VIEW	4D ←



Pin 1 – Filament
Pin 2 – Plate
Pin 3 – Grid
Pin 4 – Filament

AF POWER AMPLIFIER & MODULATOR -- Class A

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	350 max.	volts
PLATE DISSIPATION	7.5 max.	watts

Typical Operation:

DC Plate Voltage	350	volts
DC Grid Voltage*	-30	volts
Peak AF Grid Voltage (Approx.)	30	volts
DC Plate Current	9	ma
Plate Resistance (Approx.)	8700	ohms
Load Resistance	18000	ohms
Second Harmonic Distortion	5	%
Power Output	0.6	watt

RF POWER AMPLIFIER -- Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	350 max.	volts

*: See next page.

← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5556

POWER TRIODE

DC PLATE CURRENT	40 max.	ma
PLATE INPUT	14 max.	watts
PLATE DISSIPATION	10 max.	watts

Typical Operation:

DC Plate Voltage	350	volts
DC Grid Voltage●	-40	volts
Peak RF Grid Voltage	90	volts
DC Plate Current	32	ma
Driving Power (Approx.)#	0.1	watt
Power Output	2	watts

PLATE-MODULATED RF POWER AMPLIFIER -- Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	350 max.	volts
DC GRID VOLTAGE	-150 max.	volts
DC PLATE CURRENT	40 max.	ma
DC GRID CURRENT	10 max.	ma
PLATE INPUT	14 max.	watts
PLATE DISSIPATION	7 max.	watts

Typical Operation:

DC Plate Voltage	300	volts
DC Grid Voltage●	-100	volts
Peak RF Grid Voltage (Approx.)	140	volts
DC Plate Current	30	ma
DC Grid Current (Approx.)	2	ma
Driving Power (Approx.)	0.3	watt
Power Output (Approx.)	4	watts

RF POWER AMPLIFIER & OSCILLATOR -- Class C Telegraphy□ and RF POWER AMPLIFIER -- Class C FM Telephony

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	350 max.	volts
DC GRID VOLTAGE	-150 max.	volts
DC PLATE CURRENT	40 max.	ma
DC GRID CURRENT	10 max.	ma
PLATE INPUT	14 max.	watts
PLATE DISSIPATION	10 max.	watts

Typical Operation:

DC Plate Voltage	350	volts
DC Grid Voltage●	-80	volts
Peak RF Grid Voltage	130	volts

● with ac filament excitation.

#, □: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON NEW JERSEY

World Radio History

5556

POWER TRIODE

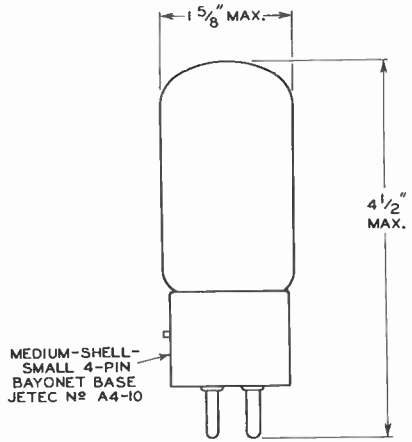
DC Plate Current	35	ma
DC Grid Current (Approx.)	2	ma
Driving Power (Approx.)	0.25	watt
Power Output (Approx.)	6	watts

At crest of af cycle with modulation factor of 1.

□ 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 .15% of the carrier conditions.

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	6	15	30	Mc
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B Telephony	100	85	70	%
Class C Telephony	100	75	50	%
Class C Telegraphy	100	75	50	%



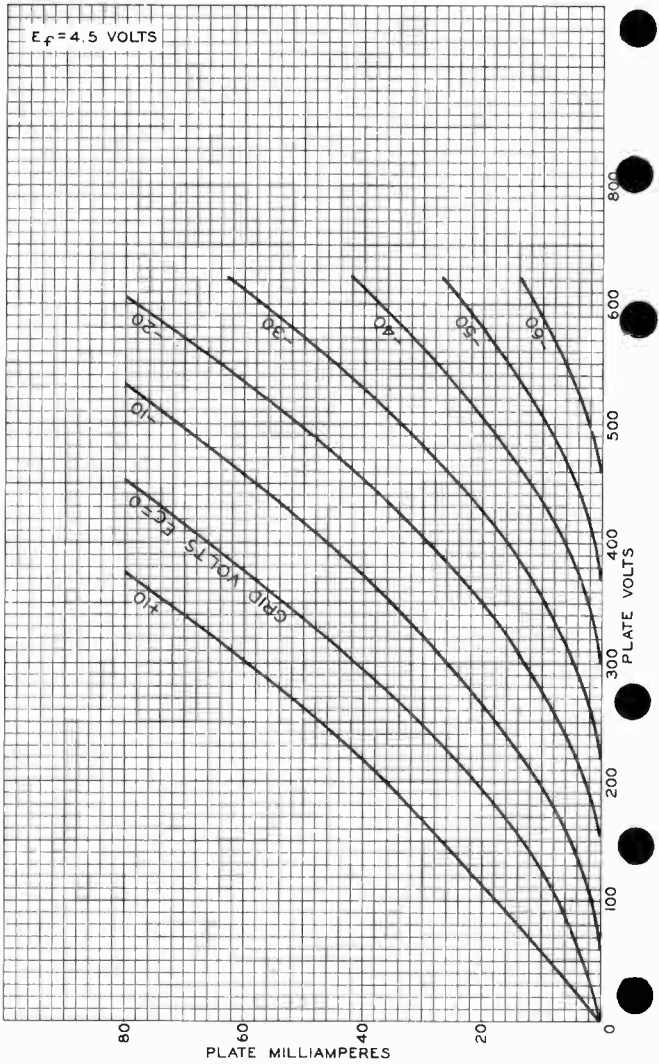
92CS-6717RI

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5556

AVERAGE PLATE CHARACTERISTICS



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6718RI

5558

HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

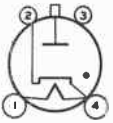
Electrical:

	Min.	Av.	Max.	
Heater, for Unipotential Cathode:				
Voltage	4.75	5.0	5.25	volts
Current at 5 volts	–	4.5	4.9	amp
Cathode:				
Heating Time, before tube conduction	5	–	–	minutes
Tube Voltage Drop	–	15	–	volts
Critical Anode Voltage	–	–	50	volts

Mechanical:

Mounting Position	Vertical, Base Down
Maximum Overall Length	7"
Seated Length	6-1/4" ± 1/4"
Maximum Diameter	3"
Bulb	ST-23
Cap	Medium (JETEC No. C1-5)
Base	Medium-Shell Small 4-Pin, Bayonet (JETEC No. A4-10)

BOTTOM VIEW



Pin 1 – Heater

Pin 2 – Cathode (Anode Return)

Pin 3 – No Conn.

Pin 4 – Heater, Cathode

Cap – Anode

Temperature Control:

Heating--When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling--When the operating conditions are such that the maximum value of the operating condensed-mercury temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.):*

No Load	22 °C
Full Load	28 °C

* With heater volts = 4.75 and no heat-conserving enclosure.

← Indicates a change

World Radio History

5558

5558

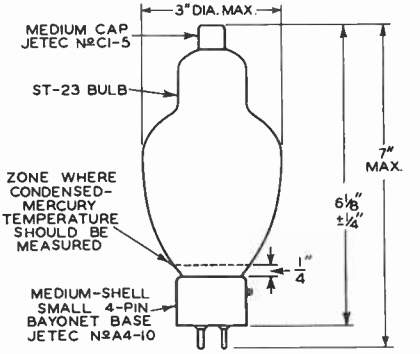
HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values: Up to 150 cps*

	Operating Condensed-Mercury Temperature Range		
	30° to 80°C	30° to 60°C	
PEAK INVERSE ANODE VOLTAGE	2000 max.	5000 max.	volts
CATHODE CURRENT:			
Peak	15 max.	15 max.	amp
Average■.	2.5 max.	2.5 max.	amp
Fault, for duration of 0.1 second max.	200 max.	200 max.	amp

■ Averaged over any interval of 15 seconds maximum.



92CS-6701R3

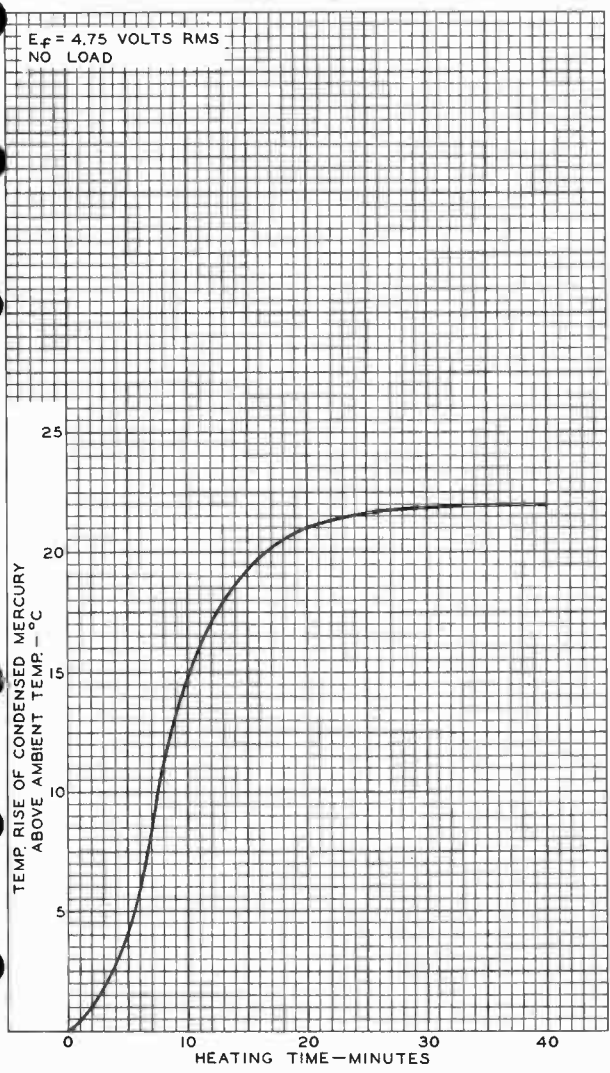
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

5558

RATE OF RISE OF COND.-MERCURY TEMPERATURE



World Radio History

5561

HALF-WAVE MERCURY-VAPOR RECTIFIER

DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage*	5	volts
Current	10	amp
Peak Voltage Drop(Approx.)	15	volts

Mechanical:

Mounting Position	Vertical, Base Down
Overall Length	11" ± 1/4 "
Maximum Diameter	3-13/16"
Bulb	ST-30
Cap	3917
Base	Large Metal-Shell Super-Jumbo 4-Pin, Bayonet

Maximum Ratings, Absolute Values:

	Continuous Service	Welder-Control Service	
PEAK INVERSE ANODE VOLTAGE	3000 max.	10000 max.	volts
INSTANTANEOUS ANODE CURRENT:			
Below 25 Cycles	12.8 max.	8 max.	amp
25 Cycles and Higher	40 max.	16 max.	amp
AVERAGE ANODE CURRENT#	6.4 max.	4 max.	amp
SURGE ANODE CURRENT for 0.1 sec. max.	200 max.	80 max.	amp
COND.-MERCURY TEMP. RANGE□	40 - 80	25 - 50	°C

* Heater voltage must be applied at least 5 minutes before anode voltage is applied.

\# Averaged over any 15-second interval.

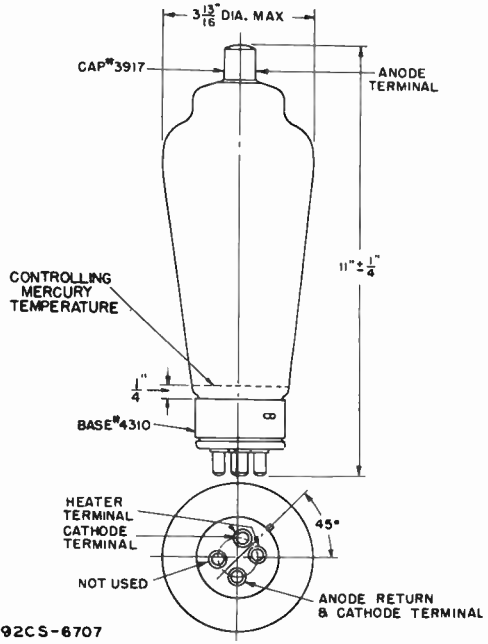
□ Recommended condensed-mercury temperature 40°C.

World Radio History

RCA

5561

HALF-WAVE MERCURY-VAPOR RECTIFIER



World Radio History

5588
UHF POWER TRIODE

FORCED-AIR COOLED, GROUNDED-GRID TYPE

GENERAL DATA

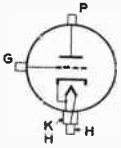
Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	2.5	amp
Minimum Heating Time▲	1.0	minute
Amplification Factor	16	
Direct Interelectrode Capacitances:		
Grid to Plate	6.0	μμf
Grid to Cathode	13	μμf
Plate to Cathode[o]	0.32 max.	μμf

[o] With external shield connected to grid.

Mechanical:

Terminal Connections:
- H – Heater Pin Terminal
- K&H – RF Cathode and Heater Cylindrical Terminal
- G – Grid RF Cylindrical Terminal
- P – Plate RF Contact Surface on Plate Ring



Mounting Position	Vertical, with radiator up or down
Overall Length	3-5/16" ± 3/32"
Maximum Diameter	1.750" ± 0.010"
Radiator	Integral Part of Tube
Mounting	Special
Air Flow:	
Through Radiator (for max. rated dissipation)	10 min. cfm

The specified air flow at a pressure of 1/2 inch of water should be delivered by a blower through the radiator toward the bulb and onto the grid terminal before and during the application of any voltages. Operation of tube at less than maximum rated dissipation will require less cooling as shown by accompanying curve of cooling requirements.

Incoming-Air Temperature	45 max.	°C
Radiator Temperature	180 max.	°C
Grid-Terminal Temperature	140 max.	°C

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	800 max.	volts
DC GRID VOLTAGE	-200 max.	volts
DC PLATE CURRENT	250 max.	ma.
DC GRID CURRENT	80 max.	ma.
PLATE INPUT	170 max.	watts
PLATE DISSIPATION	130 max.	watts

▲ Rated heater voltage must be applied for a minimum time of 1 minute before voltages are applied to the other electrodes. Heater voltage may then be reduced to the indicated typical operating value.

● Continuous Commercial Service.

World Radio History

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UHF POWER TRIODE

Typical Operation in Grounded-Grid Circuit at 1000 Mc:

Heater Voltage ▲	5	volts
DC Plate Voltage	650	volts
DC Grid Voltage	−70	volts
DC Plate Current	250	ma.
DC Grid Current (Approx.)	30	ma.
Driving Power (Required by tube and input circuit)*	32	watts
Power Output (Approx.)	65	watts

* Approximate. A portion of this power appears in the load circuit. In grounded-grid plate-modulated class C rf power amplifier service, the 5588 can be modulated 100 per cent if the rf driver stage is also modulated 100 per cent simultaneously. Care should be taken to insure that the driver-modulation and the amplifier-modulation voltages are exactly in phase.

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without amplitude modulation □

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1000 max.	volts
DC GRID VOLTAGE	−200 max.	volts
DC PLATE CURRENT	300 max.	ma.
DC GRID CURRENT	100 max.	ma.
PLATE INPUT	250 max.	watts
PLATE DISSIPATION	200 max.	watts

Typical Operation as Grounded-Grid Amplifier at 1000 Mc:

Heater Voltage ▲	4.5	volts
DC Plate Voltage	835	volts
DC Grid Voltage	−70	volts
DC Plate Current	300	ma.
DC Grid Current (Approx.)	40	ma.
Driving Power (Required by tube and input circuit)#	32	watts
Power Output (Approx.)	100	watts

Typical Operation as Grounded-Grid Oscillator at 1000 Mc:

Heater Voltage ▲	3	volts
DC Plate Voltage	835	volts
DC Grid Voltage	−70	volts
From cathode-bias resistor of	205	ohms
DC Plate Current	300	ma.
DC Grid Current (Approx.)	40	ma.
Power Output (Approx.)	75	watts

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

\# Approximate. A portion of this power appears in the load circuit.

▲, ●: See next page.

World Radio History

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UHF POWER TRIODE

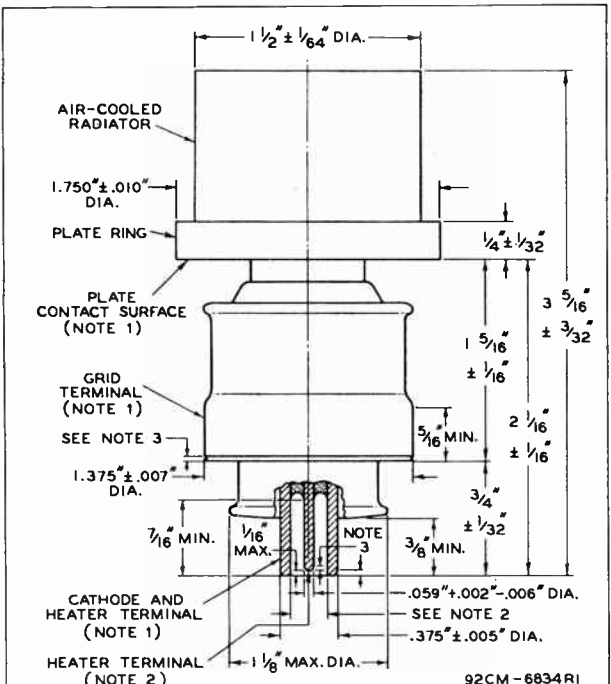
▲ Rated heater voltage must be applied for a minimum time of 1 minute before voltages are applied to the other electrodes. Heater voltage may then be reduced to the indicated typical operating value.

● CCS = Continuous Commercial Service.

Data on operating frequencies for the 5588 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

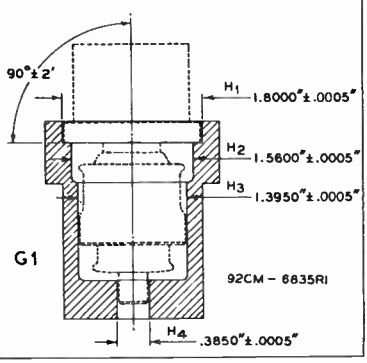
5588

5588
UHF POWER TRIODE



NOTE 1: WITH THE CYLINDRICAL SURFACES OF ITS GRID AND CATHODE TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G1. THE FOUR CYLINDRICAL HOLES H_1, H_2, H_3, and H_4 HAVE AXES COINCIDENT WITHIN D.DDD5", LENGTHS DETERMINED FROM THE OUTLINE DRAWING, AND SUCCESSIVELY SMALLER DIAMETERS AS SHOWN IN THE SKETCH.

(continued on next page)



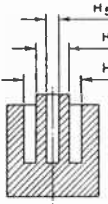
5588
UHF POWER TRIODE

(continued from preceding page)

THE PLATE RING WILL BE ENTIRELY ENGAGED BY HOLE H_1, AND THE CONTACT SURFACE OF THE PLATE RING WILL SEAT ON THE SHOULDER BETWEEN HOLES H_1 AND H_2. THE PLANE SURFACE OF THIS SHOULDER IS $90^0 \pm 2'$ TO THE AXES OF THE HOLES. SEATING IS DETERMINED BY FAILURE OF A 0.005" THICKNESS GAUGE, 1/8" WIDE, TO ENTER MORE THAN 1/16" BETWEEN THE SHOULDER SURFACE AND THE PLATE CONTACT SURFACE.

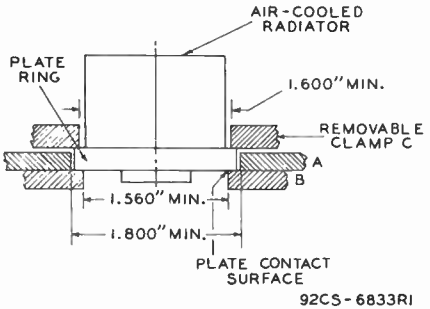
WITH THE TUBE PROPERLY SEATED AS DESCRIBED ABOVE, THE GRID TERMINAL WILL BE ENTIRELY ENGAGED BY HOLE H_3, AND THE CATHODE TERMINAL WILL BE ENGAGED BY HOLE H_4 TO A DEPTH OF AT LEAST 1/4".

NOTE 2: CONCENTRICITY OF THE HEATER TERMINAL WITH RESPECT TO THE CATHODE TERMINAL IS DETERMINED BY A GAUGE AS SHOWN IN SKETCH G2. THE CYLINDRICAL HOLE H_5 AND THE ANNULAR HOLE H_6 HAVE AXES COINCIDENT WITHIN 0.0005", LENGTHS DETERMINED FROM THE OUTLINE DRAWING, AND DIAMETERS AS SHOWN IN THE SKETCH. THE CATHODE TERMINAL AND THE HEATER TERMINAL WILL ENTER THIS GAUGE TO A DEPTH OF 3/8".



NOTE 3: ROUNDED OR BEVELED NOT TO EXCEED 1/16".

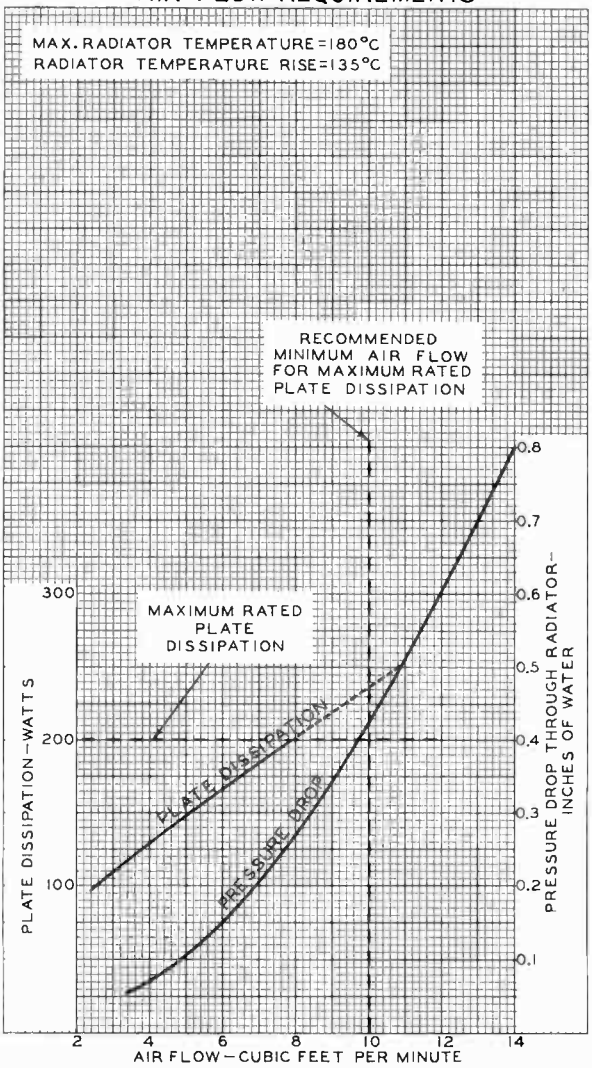
MOUNTING ARRANGEMENT
for use with coaxial-line
or cavity circuits



RCA

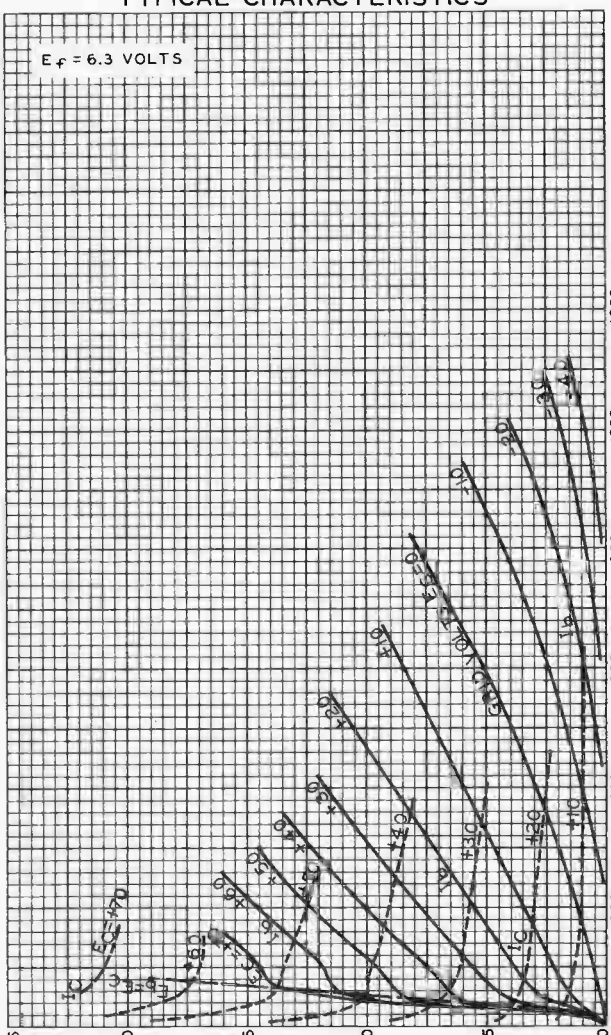
5588

AIR-FLOW REQUIREMENTS



5588

TYPICAL CHARACTERISTICS



JAN. 7, 1947

TUBE DEPARTMENT

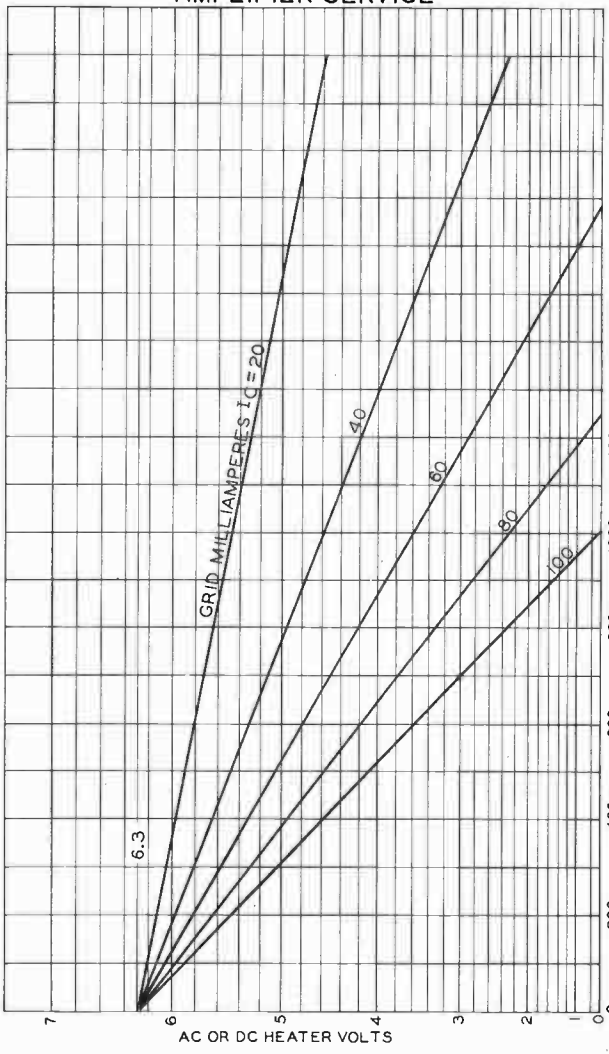
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6826

World Radio History

5588

RECOMMENDED HEATER VOLTAGES — AMPLIFIER SERVICE



JAN. 29, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6836

World Radio History

RCA

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RECOMMENDED HEATER VOLTAGES—OSCILLATOR SERVICE

JAN.29,1947 TUBE DEPARTMENT 92CM-6837
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

World Radio History

5592

POWER TRIODE

FORCED-AIR-COOLED, GROUNDED-GRID TYPE

GENERAL DATA

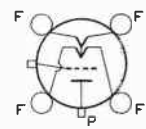
Electrical:

Filament, Multistrand Tungsten:		
Excitation . . .	Single-Phase AC or DC	
Voltage.	11	ac or dc volts
Current.	412	amp
Starting Current:	The filament current must never exceed 750 amperes, even momentarily.	
Cold Resistance. . . .	0.0026	ohm
Amplification Factor . .	32	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate.	35	μμf
Grid to Filament . . .	76	μμf
Plate to Filament. . .	1.2	μμf

Mechanical:

Terminal Connections:

F – Filament Posts
G – Grid-Flange Terminal



P – Radiator-Cooled Plate Terminal

DIAMETRICALLY OPPOSITE TERMINALS MUST BE CONNECTED TOGETHER

Mounting Position	Vertical, Filament end up	
Maximum Overall Length	17-3/8"	
Maximum Diameter	14-1/4"	
Radiator	Integral part of tube	
Mounting	Special	
Air Flow:		
Through Radiator (for max. ratings). . .	1100 min.	cfm
The specified air flow at a pressure of 2.4 inches of water should be delivered by a blower vertically upward through the radiator. Air flow should be started before the application of any voltages.		
To Filament Seals.	200 min.	cfm
The specified air flow from a duct 8 square inches in area directed into the filament header before and during the application of any voltages, is required to limit the temperature of the header and filament seals to the maximum value.		
Input--Air Temperature (to radiator). . . .	45 max.	°C
Radiator Temperature (measured in thermometer well). .	180 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (filament, grid, plate) .	165 max.	°C

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without amplitude modulation□

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	11500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	4.5 max.	amp
DC GRID CURRENT	0.8 max.	amp

□, ●: See next page.

World Radio History

5592
POWER TRIODE

PLATE INPUT		50 max.	kw
PLATE DISSIPATION		17.5 max.	kw
Typical Operation in Grounded-Filament Circuit:			
DC Plate Voltage	7500	11000	volts
DC Grid Voltage■	-360	-820	volts
	600	1000	ohms
	75	200	ohms
Peak RF Grid Voltage	900	1450	volts
DC Plate Current	4.4	3.6	amp
DC Grid Current (Approx.)*	0.6	0.8	amp
Driving Power (Approx.)*	450	1000	watts
Power Output (Approx.)	20	30	kw
Typical Operation as Amplifier in Grounded-Grid Circuit at 108 Mc:▲			
DC Plate Voltage		7500	volts
DC Grid Voltage■		-1000	volts
		1650	ohms
		200	ohms
Peak RF Grid Voltage		1550	volts
DC Plate Current		4.4	amp
DC Grid Current (Approx.)*		0.6	amp
Driving Power (Approx.)		9000	watts
Power Output (Approx.)		27	kw

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

● Continuous Commercial Service.

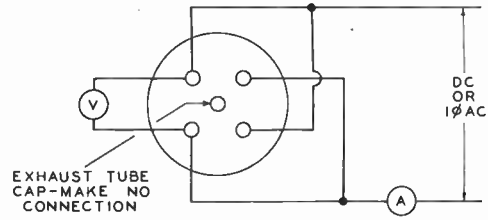
■ Obtained by grid-resistor (600, 1000), cathode-resistor (75, 200) or by partial self-bias methods.

* Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

▲ For Class C Telegraphy or Class C FM Telephony.

Data on operating frequencies for the 5592 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

FILAMENT CONNECTIONS



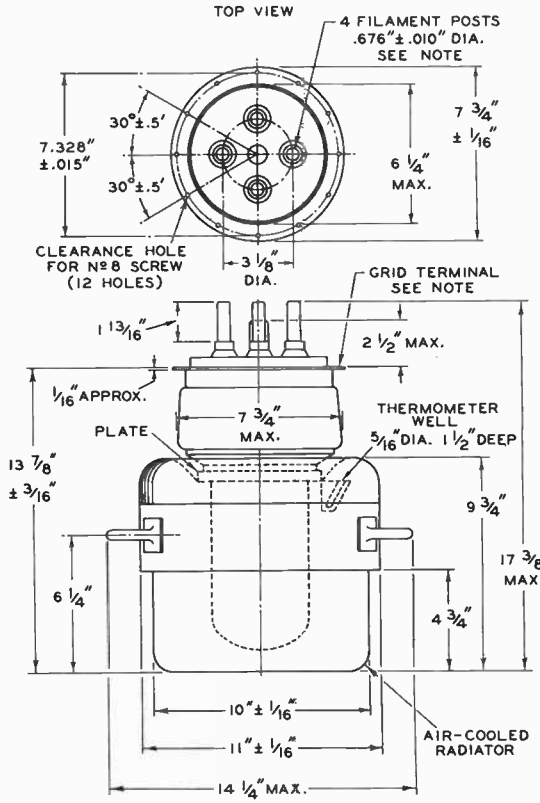
V= 11 VOLTS
A=412 AMP.

92CS-6828RI

World Radio History

5592

POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6827

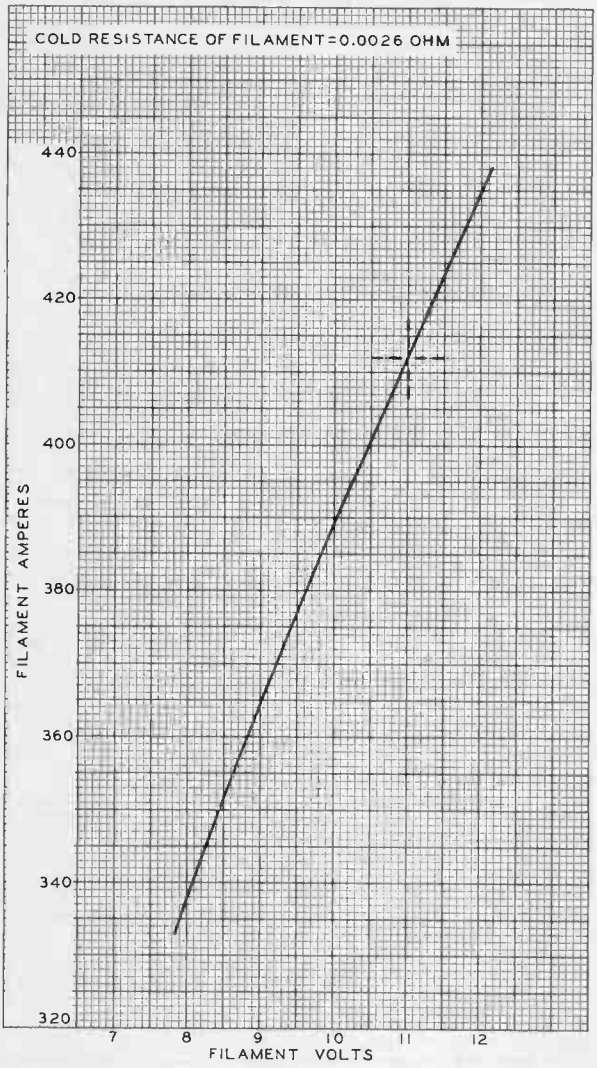
World Radio History

5592

RCA

5592

AVERAGE FILAMENT CHARACTERISTIC



FEB. 7, 1947

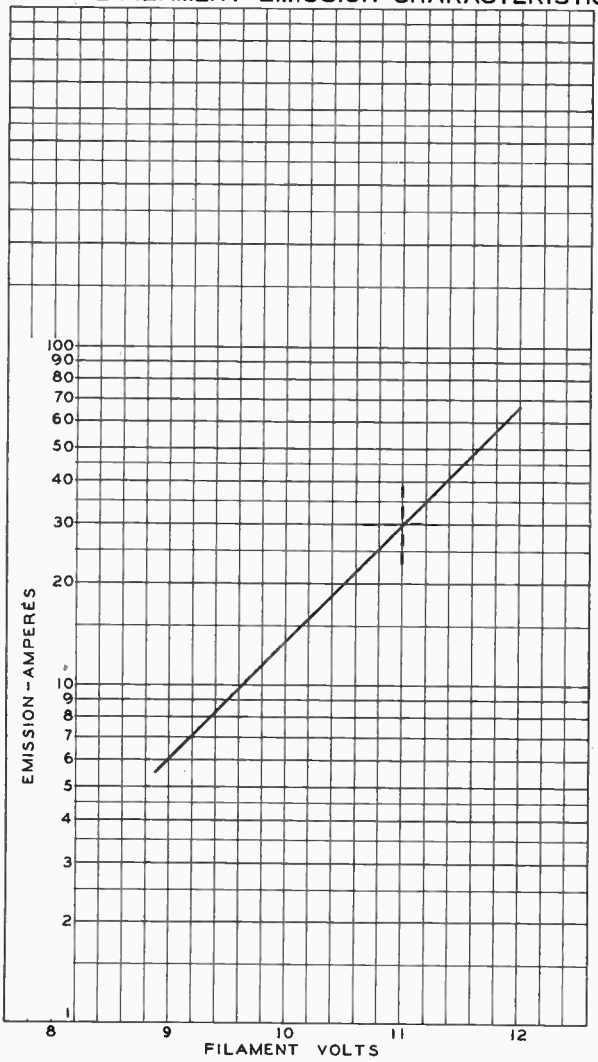
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6839

RCA

5592

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



FEB. 6, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6838

World Radio History

RCA

5592

COOLING REQUIREMENTS

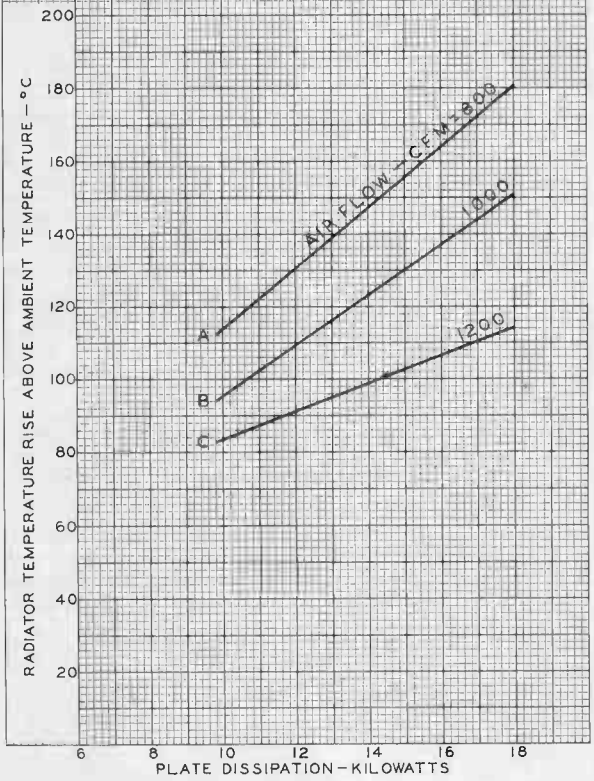
E_f = 11 VOLTS AC

MAXIMUM RADIATOR TEMPERATURE = 180 °C

CURVE	PRESSURE DROP INCHES OF WATER
A	1.3
B	2.0
C	2.9

CURVES TAKEN ACCORDING TO NAFM* STANDARDS— BULLETIN Nº103

* NATIONAL ASSOCIATION OF FAN MFRS., GENERAL MOTORS BLDG., DETROIT, MICH.



5592

AVERAGE PLATE CHARACTERISTICS

RCA

5592

E_f = 11 VOLTS AC

PLATE VOLTS (E_b)

0 2000 4000 6000 8000 10000 12000

PLATE AMPERES

0 5 10 15 20 25 30

GRID VOLTS E_c=0

-300 -200 -100 +100 +200 +300 +400 +500 +600 +700 E_c=+800

MAR. 3, 1947

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA HARRISON NEW JERSEY

92CM-6843

World Radio History

5592

RCA

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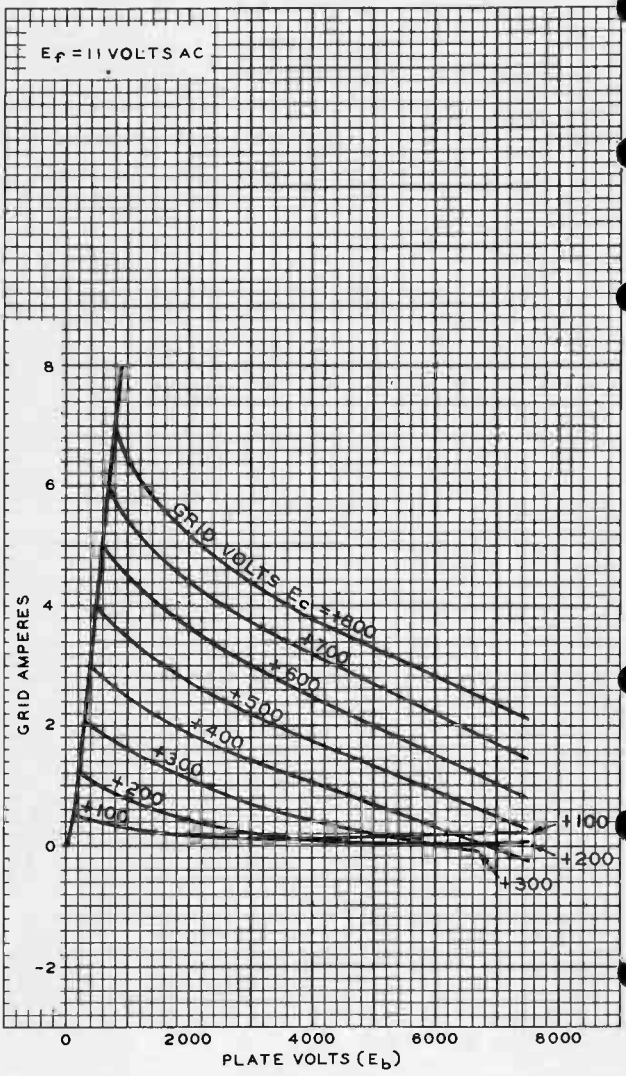
TYPICAL GRID CHARACTERISTICS



MAR. 3, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6844

5604-A
POWER TRIODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Multistrand Tungsten:

Voltage	11	ac or dc volts
Current	176	amp
Starting current:	The filament current must never exceed a value of 270 amperes, even momentarily.	
Cold resistance	0.0052	ohm

NOTE: This tube can often be operated with reduced filament voltage as explained on sheet TYPES OF CATHODES in the General Section.

Amplification Factor, for plate current = 1.25 amp and grid volts = -100. . 20

Direct Interelectrode Capacitances:

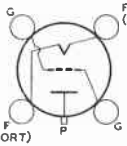
Grid to plate	24	μμf
Grid to filament	27	μμf
Plate to filament	1.25	μμf

Mechanical:

Terminal Connections: TOP VIEW

F - Filament

G - Grid



P - Plate (Either of two terminals on radiator band)

Mounting Position . . . . . Vertical, filament end up

Maximum Overall Length . . . . . 13-3/4"

Maximum Diameter (Including radiator handles) . . . . . 11"

Radiator . . . . . Integral part of tube

Air Flow:

Through Radiator--Typical flow values of incoming air at a temperature not exceeding 45°C for various plate dissipations, are indicated in the tabulation below. The air should be delivered by a blower vertically upward through the radiator during the application of any voltages. Under any condition, the air flow must be adequate to limit the temperature of the radiator to its specified maximum value. *See Cooling Requirements curves.*

Percentage of max. rated plate dissipation for each class of service	100	80	60	per cent
Air flow	650	460	310	cfm
Static pressure	2	1	0.45	in. of water

World Radio History

5604-A
POWER TRIODE

To Bulb and Seals--At frequencies below 15 Mc, adequate cooling of the bulb and seals is provided by the air flow through the radiator. At frequencies above 15 Mc, however, additional air flow directed onto the filament end of the tube should be supplied by a blower providing 50 cfm through a 3" nozzle in order to limit the temperature of the grid seals, filament seals, and bulb to 160°C.

Incoming-Air Temperature (To radiator)	45 max.	°C
Radiator Temperature (Measured on core at end adjacent to bulb)	230 max.	°C
Bulb Temperature	160 max.	°C
Seal Temperature (Filament, grid, and plate)	160 max.	°C
Weight (Approx.)	32	lbs

Fittings:

Air Jacket	RCA-211F1
Connector Wrench (2 required)	RCA-212F1
Grid or Filament Connector (4 required)	RCA-216F1
Bracelet	RCA-232F1
Air Manifold	RCA-234F1

AF POWER AMPLIFIER & MODULATOR--Class B

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	12500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2.75 max.	amp
MAX.-SIGNAL PLATE INPUT*	32500 max.	watts
PLATE DISSIPATION*	10000 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage	-370	-480	-600	volts
Peak AF Grid-to-Grid Voltage	1620	2020	2380	volts
Zero-Signal DC Plate Current	0.4	0.5	0.6	amp
Max.-Signal DC Plate Current	2.6	3.7	4.5	amp
Effective Load Resistance (Plate to plate)	7200	6100	5900	ohms
Max.-Signal Driving Power (Approx.)	140	150	160	watts
Max.-Signal Power Output (Approx.)	14500	25000	36000	watts

* Averaged over any audio-frequency cycle of sine-wave form.

●: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5604-A

POWER TRIODE

RF POWER AMPLIFIER--Class B Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum CCS[•] Ratings, *Absolute Values:*

DC PLATE VOLTAGE	12500 max.	volts
DC PLATE CURRENT	1.4 max.	amp
PLATE INPUT	16000 max.	watts
PLATE DISSIPATION	10000 max.	watts

Typical Operation:

DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage	-400	-500	-610	volts
Peak RF Grid Voltage	410	490	590	volts
DC Plate Current	0.6	0.8	1.0	amp
DC Grid Current (Approx.)	0	0	0	amp
Driving Power (Approx.)**	75	70	65	watts
Power Output (Approx.)	1700	2800	4400	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum CCS[•] Ratings, *Absolute Values:*

DC PLATE VOLTAGE	8000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	1.5 max.	amp
DC GRID CURRENT	0.45 max.	amp
PLATE INPUT	12000 max.	watts
PLATE DISSIPATION	6600 max.	watts

Typical Operation:

DC Plate Voltage	6000	8000	volts
DC Grid Voltage	-740	-1000	volts
Peak RF Grid Voltage	1140	1540	volts
DC Plate Current	0.7	1.1	amp
DC Grid Current (Approx.)	0.09	0.13	amp
Driving Power (Approx.)	100	200	watts
Power Output (Approx.)	3400	7100	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy

Key-down conditions per tube without amplitude modulation□

Maximum CCS[•] Ratings, *Absolute Values:*

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts

• Continuous Commercial Service.

**,□: See next page.

World Radio History

5604-A

POWER TRIODE

DC PLATE CURRENT			3 max.	amp
DC GRID CURRENT			0.45 max.	amp
PLATE INPUT			32500 max.	watts
PLATE DISSIPATION			10000 max.	watts
Typical Operation:				
DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage	-680	-870	-1170	volts
Peak RF Grid Voltage	1300	1620	2130	volts
DC Plate Current	1.5	2.0	2.5	amp
DC Grid Current (Approx.)	0.19	0.20	0.22	amp
Driving Power (Approx.)	250	320	470	watts
Power Output (Approx.)	9200	15000	22500	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	168	184	amp
Amplification Factor	1,2	17.5	22.5	
Grid-Plate Capacitance	-	21	27.5	μμf
Grid-Filament Capacitance	-	23	31	μμf
Plate-Filament Capacitance	-	-	2	μμf
DC Grid Voltage	1,3	-480	-600	volts
DC Plate Voltage (1)	1,4	3000	4000	volts
DC Plate Voltage (2)	1,5	6700	8300	volts
Peak Cathode Current	6	11.5	-	amp
Power Output	1,7	22.5	-	kw

Note 1: With 11 volts rms on filament.

Note 2: With dc grid voltage of -100 volts and dc plate current of 1.25 amperes.

Note 3: With dc plate voltage of 10000 volts, and dc plate current of 0.020 ampere.

Note 4: With dc grid voltage of 0 volts, and dc plate current of 1.25 amperes.

Note 5: With dc grid voltage of -200 volts, and dc plate current of 1.25 amperes.

Note 6: Designers should limit the maximum useable cathode current (plate current and grid current) to this value under any condition of operation.

Note 7: In amplifier or oscillator service at a frequency of 1.6 Mc, and with dc plate voltage of 12500 volts, dc plate current of 2.6 amperes, grid resistor of 6000 ± 10% ohms, and dc grid current of 0.225 ampere.

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

MAXIMUM RATINGS vs OPERATING FREQUENCY

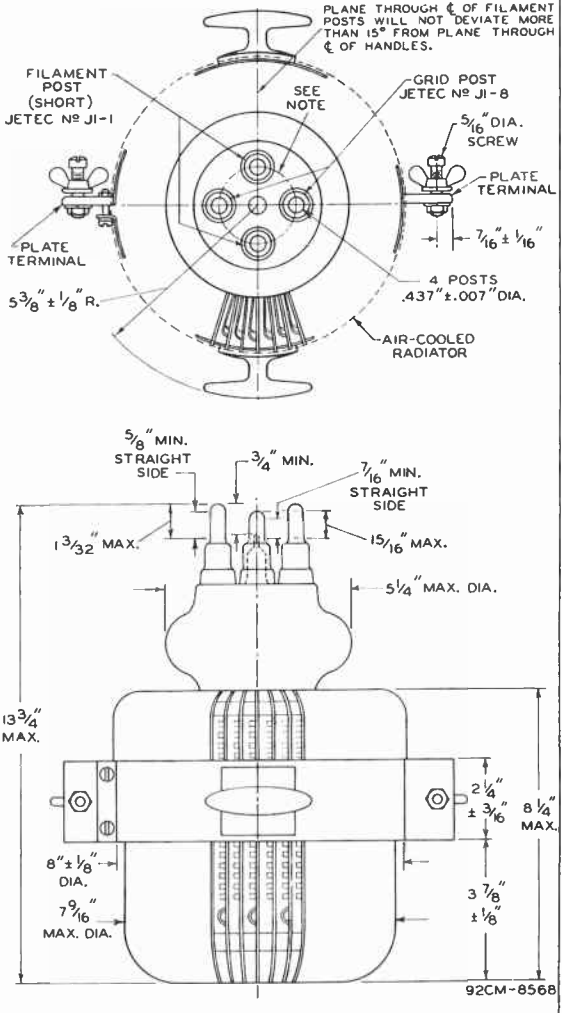
FREQUENCY	25	35	50	Mc
MAX. PERMISSIBLE PERCENTAGE OF MAX. RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B Telephony	100	85	70	per cent
Class C Telephony	100	80	50	per cent
Class C Telegraphy	100	80	50	per cent

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5604-A

POWER TRIODE



World Radio History

5604-A
POWER TRIODE

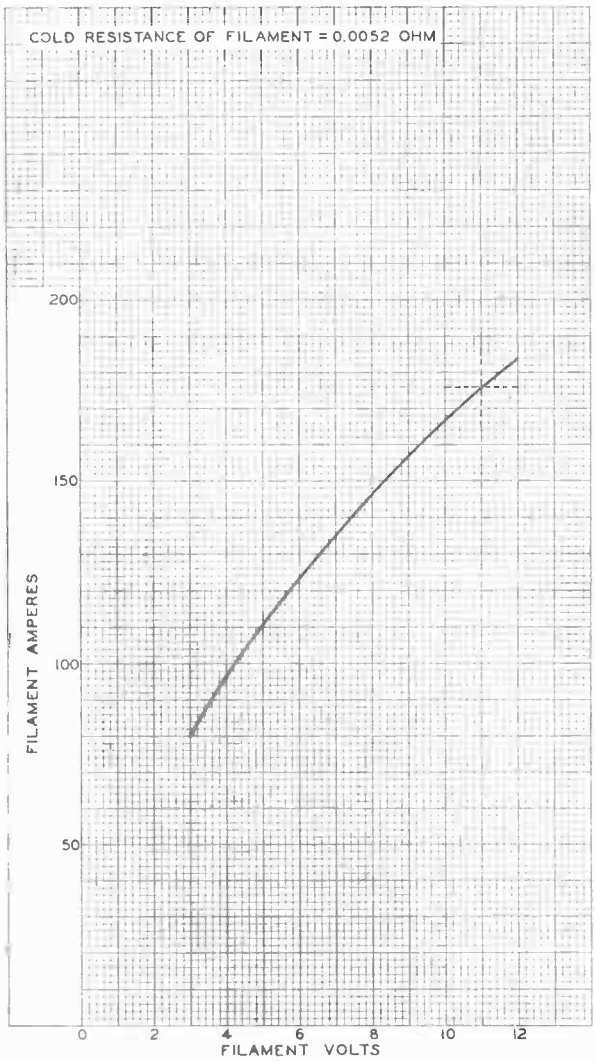
NOTE: ANGULAR VARIATIONS BETWEEN POSTS AND VARIATION IN POST-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT THE ENTIRE STRAIGHT-SIDE LENGTH OF THE POSTS WILL ENTER A 5/8" THICK FLAT-PLATE GAUGE HAVING 4 HOLES 0.536" ± 0.001" DIAMETER ARRANGED ON A 2.125" ± 0.001" DIAMETER CIRCLE AT ANGLES OF 90° ± 10', AND HAVING A CENTER CLEARANCE HOLE WITH DIAMETER OF 1" APPROX.

World Radio History

RCA

5604-A

AVERAGE FILAMENT CHARACTERISTIC

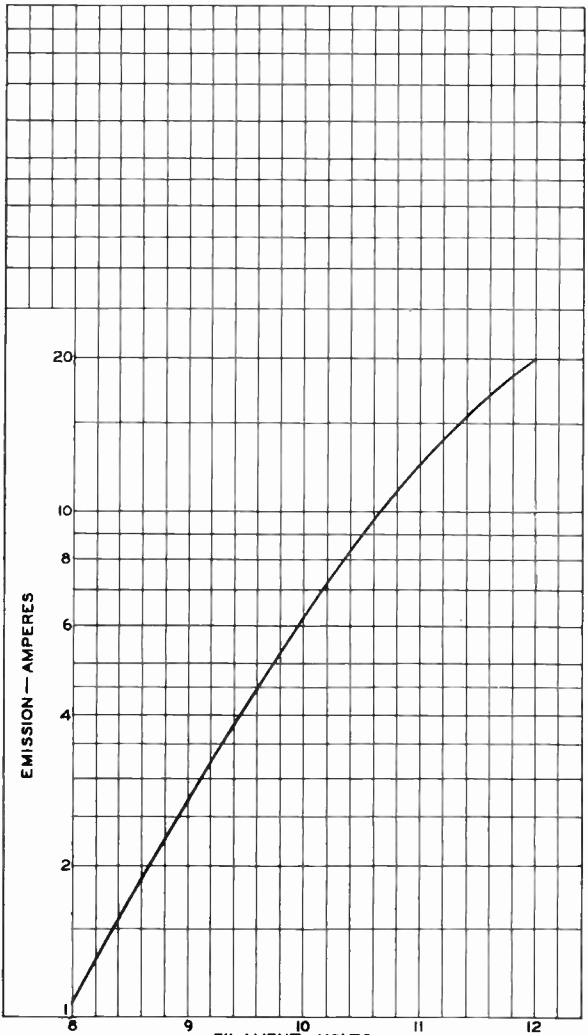


World Radio History

5604-A

5604-A

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



MAR. 4, 1955

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

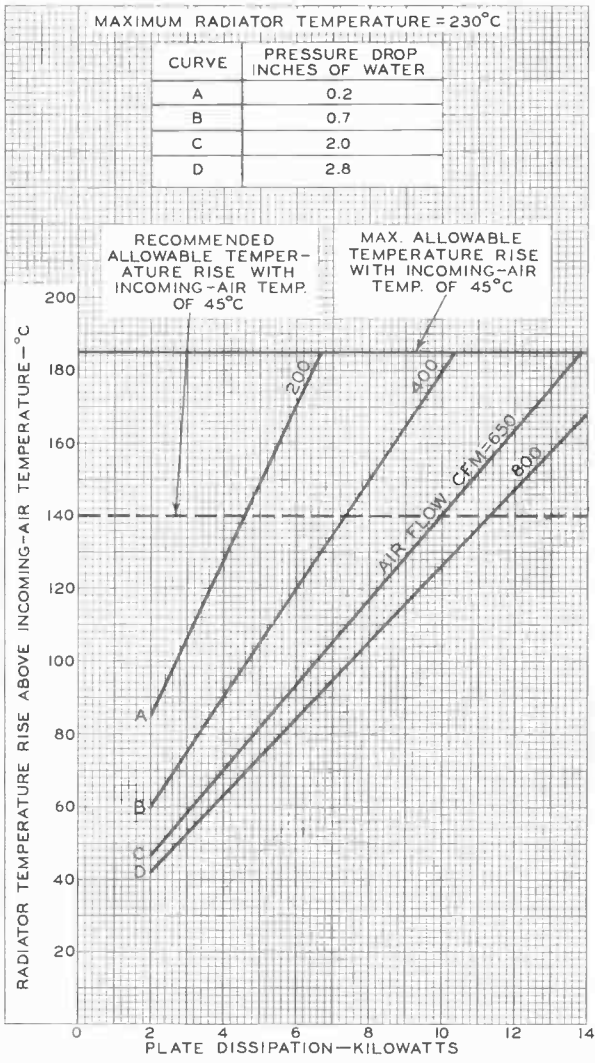
92CM-8557

World Radio History

RCA

5604-A

COOLING REQUIREMENTS

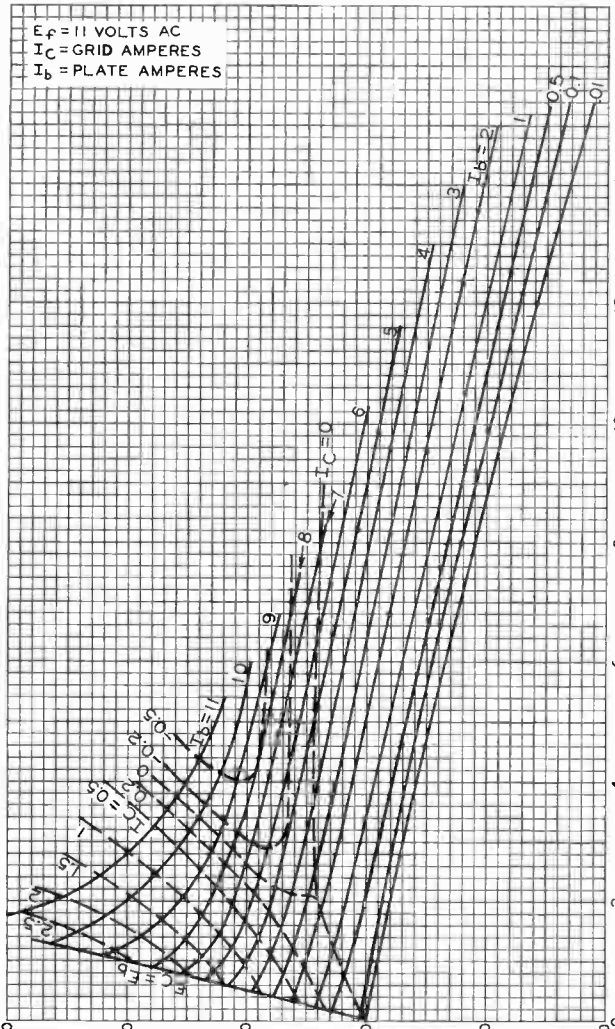


World Radio History

RCA

5604-A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAR. 7, 1955

92CM - 8558R1

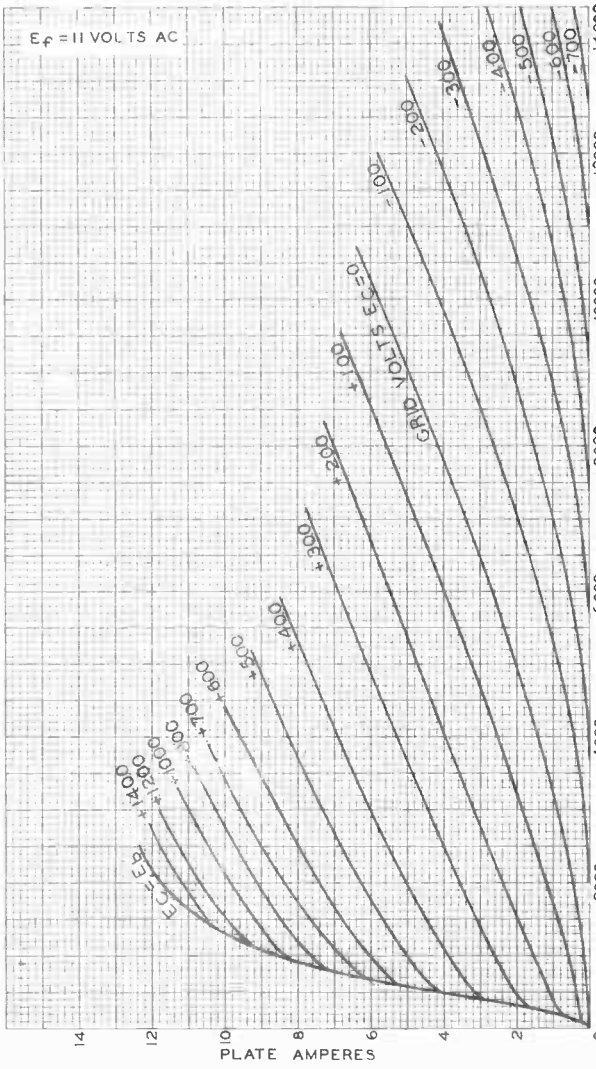
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

5604-A

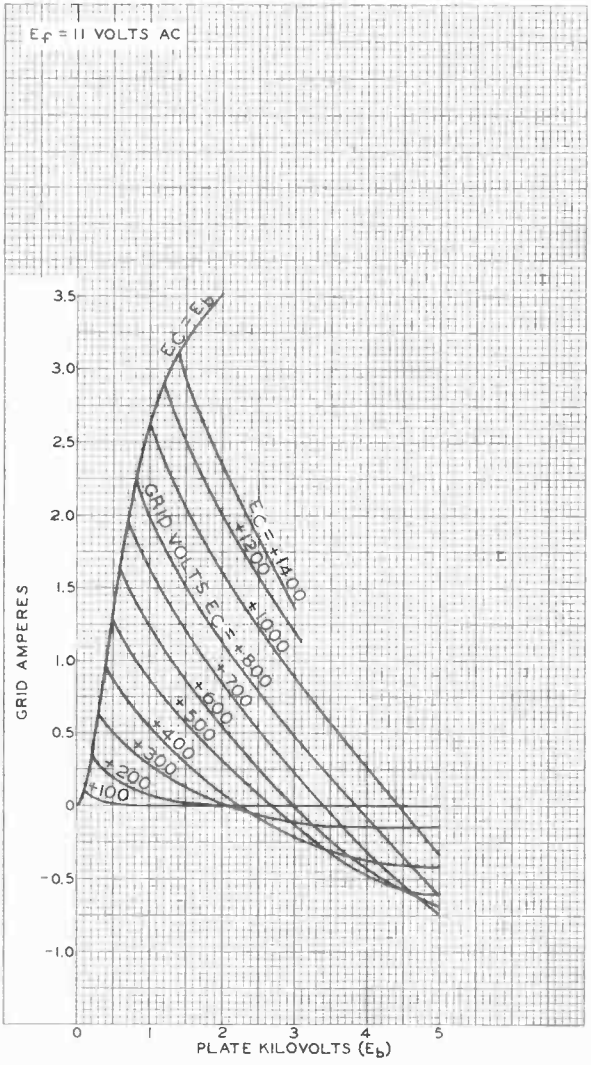
AVERAGE PLATE CHARACTERISTICS



World Radio History

5604-A

TYPICAL CHARACTERISTICS



World Radio History

5618
VHF POWER PENTODE

MINIATURE TYPE

GENERAL DATA

Electrical:

Filament, Coated:

Filament Arrangement	*Series**	*Parallel***	
Voltage	6.0 ± 10%	3.0 ± 10%	ac or dc volts
Current	0.23	0.46	amp

Direct Interelectrode Capacitances:[o]

Grid No.1 to Plate	0.24	μμf
Input	7.0	μμf
Output	5.0	μμf

[o] With no external shield.

Mechanical:

Mounting Position	Vertical, or Horizontal with pins No.1 & No.5 in a horizontal plane
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length from Base Seat to Bulb Top (excluding tip)	2" ± 3/32"
Maximum Diameter	3/4"
Bulb	T-5-1/2
Base	Small-Button Miniature 7-Pin
Basing Designation for BOTTOM VIEW	7CU

Pin 1 – Filament (–)
Pin 2 – Plate
Pin 3 – Grid No.2
Pin 4 – Grid No.3, Int. Shield

Pin 5 – Filament Mid-Tap
Pin 6 – Grid No.1
Pin 7 – Filament (+)

AF POWER AMPLIFIER & MODULATOR—Class A_1

Maximum ICAS Ratings, *Absolute Values*:**

DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	125 max.	volts
GRID-No.2 INPUT	2 max.	watts
PLATE DISSIPATION	5 max.	watts

Typical Operation:

Filament Arrangement	*Series**	*Parallel***	
DC Plate Voltage	250	250	volts
DC Grid-No.3 Voltage	0*	0**	volts
DC Grid-No.2 Voltage	75	75	volts
DC Grid-No.1 (Control-Grid) Voltage■	–8	–8	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	8	8	volts

*, **, ●●, ■: See next page.

World Radio History

5618

5618
VHF POWER PENTODE

Zero-Signal DC Plate Current . .	16	19	ma
Max.-Signal DC Plate Current . .	17.5	20.5	ma
Zero-Signal DC Grid-No.2 Current	1.5	2.0	ma
Max.-Signal DC Grid-No.2 Current	3.5	4.5	ma
Transconductance	3500	3600	μmhos
Effective Load Resistance (plate to plate). . .	12000	12000	ohms
Total Harmonic Distortion. . . .	10	10	%
Max.-Signal Power Output	1.2	1.4	watts

Circuit Values:

Grid-No.1-Circuit Resistance	5000 min.	ohms
	100000 max.	ohms

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy□□
and
RF POWER AMPLIFIER—Class C FM Telephony

Maximum ICAS●● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	125 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-125 max.	volts
DC PLATE CURRENT	30 max.	ma
DC GRID-No.1 CURRENT	3 max.	ma
PLATE INPUT.	7.5 max.	watts
GRID-No.2 INPUT.	2 max.	watts
PLATE DISSIPATION.	5 max.	watts

Typical Operation:⊕	*Up to 40 Mc*	*At 80 Mc*	
DC Plate Voltage	300	300	volts
DC Grid-No.3 Voltage⊕	0	0	volts
DC Grid-No.2 Voltage□	75	75	volts
	32000	32000	ohms
DC Grid-No.1 Voltage■■ ⊕	-45	-45	volts
	30000	30000	ohms
	1400	1400	ohms
Peak RF Grid-No.1 Voltage. . . .	65	65	volts
DC Plate Current	25	25	ma
DC Grid-No.2 Current	7	7	ma
DC Grid-No.1 Current (Approx.) .	1.5	1.5	ma
Driving Power (Approx.).	0.2	0.3	watt
Power Output (Approx.) ♦ . . .	5.4	5.2	watts

Circuit Values:

Grid-No.1-Circuit Resistance	5000 min.	ohms
	100000 max.	ohms

♦ Useful power output is approximately 5.0 watts for 40 Mc and 4.5 watts for 80 Mc.

*, **, ●●, □, □□, ■, ■■, ⊕: See next page.

World Radio History

5618
VHF POWER PENTODE

FREQUENCY MULTIPLIER

Maximum ICAS•• Ratings, *Absolute Values*:

DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	125 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	volts
DC PLATE CURRENT	30 max.	ma
DC GRID-No.1 CURRENT	3 max.	ma
PLATE INPUT	7.5 max.	watts
GRID-No.2 INPUT	2 max.	watts
PLATE DISSIPATION	5 max.	watts

Typical Operation:⊕	*Doubler to 80 Mc*	*Tripler to 80 Mc*	
DC Plate Voltage	300	300	volts
DC Grid-No.3 Voltage⊕	0	0	volts
DC Grid-No.2 Voltage□	75	75	volts
	41000	41000	ohms
DC Grid-No.1 Voltage♦	-125	-125	volts
	68000	68000	ohms
Peak RF Grid-No.1 Voltage	160	160	volts
DC Plate Current	25	25	ma
DC Grid-No.2 Current	5.5	5.5	ma
DC Grid-No.1 Current (Approx.)	1.85	1.85	ma
Driving Power (Approx.)	0.75	0.75	watt
Power Output (Approx.)♦♦	4.2	3.4	watts

Circuit Values:

Grid-No.1-Circuit Resistance	5000 min.	ohms
	100000 max.	ohms

♦♦ Useful power output is approximately 3.5 watts for doubler service and 2.7 watts for tripler operation.

* For series filament arrangement, filament voltage is applied between pins No.1 and No.7. The grid-No.1 voltage is referred to pin No.1, and grid-No.3 (pin No.4) is connected to pin No.1.

** For parallel filament arrangement, filament voltage is applied between pin No.5 and pins No.1 and No.7 connected together. The grid-No.1 voltage is referred to pin No.5 and grid No.3 (pin No.4) is connected to pin No.5.

●● Intermittent Commercial and Amateur Service.

■ For dc filament supply.

▬ Obtained from a fixed supply or by a grid-No.1 resistor (30000) or cathode resistor (1400).

□ Obtained from a separate source, or from the plate voltage supply with a voltage divider. Series screen resistor of value shown should be used only where the 5618 is employed as a buffer amplifier and is not keyed.

□□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

⊕ Filament may be connected in either parallel or series arrangement. With parallel connection, grid No.3 (pin No.4) is connected to pin No.5; for series operation, connect pin No.4 to pin No.1.

♦ Obtained from a fixed supply, or by a grid-No.1 resistor of value shown.

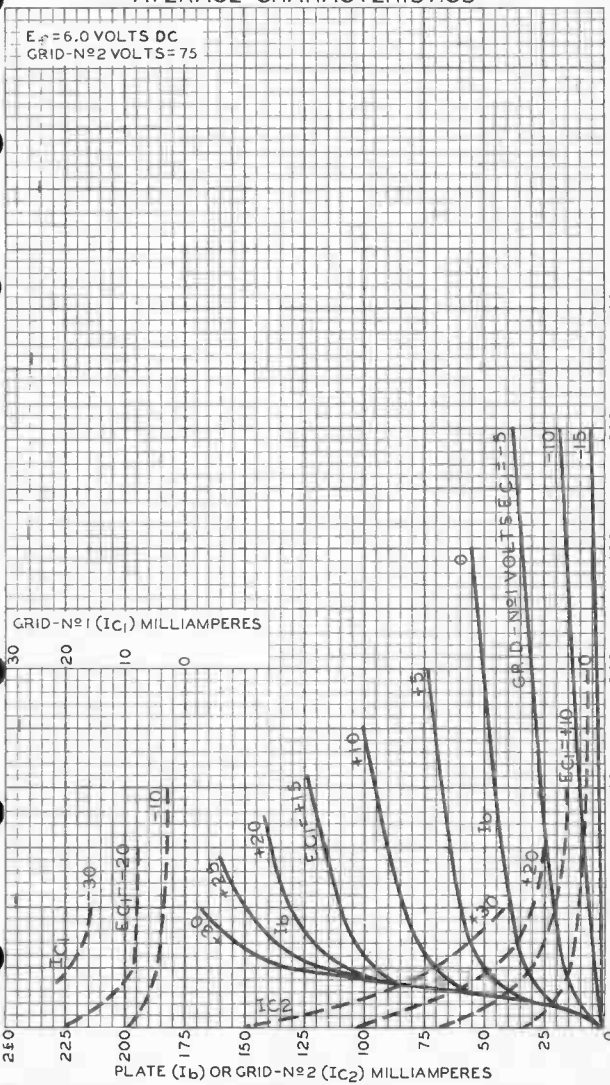
World Radio History

World Radio History

RCA

5618

AVERAGE CHARACTERISTICS



AUG. 1, 1947

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6881

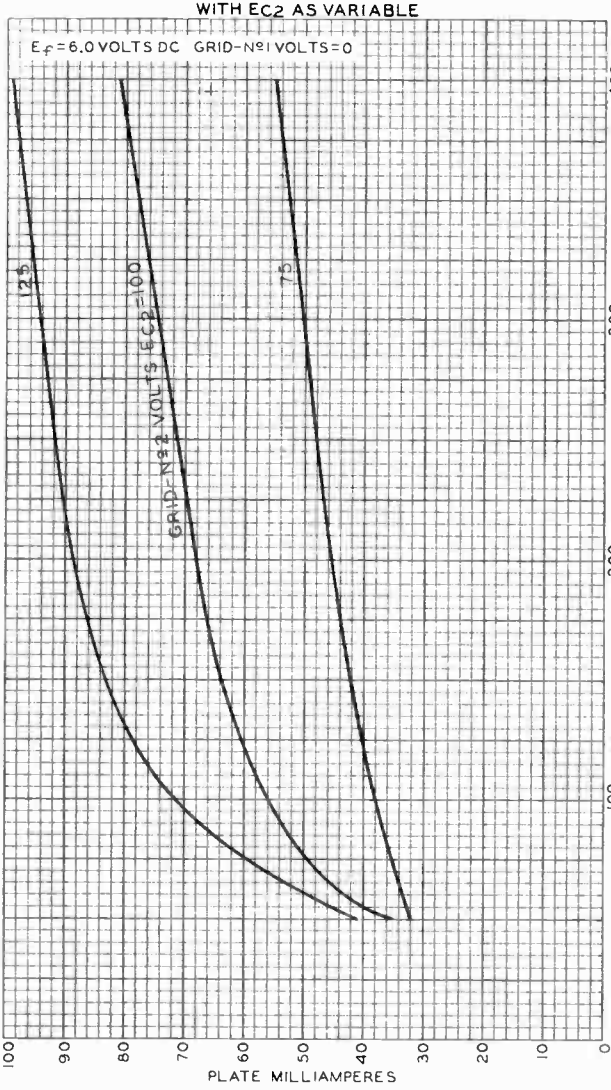
Howard Radio History

5618

RCA

5618

AVERAGE PLATE CHARACTERISTICS
WITH E_{C2} AS VARIABLE



AUG. 12, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6882

World Radio History

5671
POWER TRIODE

FORCED-AIR COOLED

GENERAL DATA

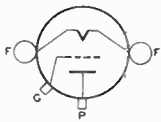
Electrical:

Filament, Multistrand Thoriated Tungsten:			
Excitation	Single Phase AC or DC		
Voltage	11▲		ac or dc volts
Current	285		amp
Starting Current:	It is not necessary to provide means for limiting filament starting current on this type. Full rated filament voltage can be applied safely to the cold filament.		←
Cold Resistance	0.005		ohms
Minimum Heating Time	15		seconds
Amplification Factor	39		
Direct Interelectrode Capacitances (Approx.):			
Grid to Plate	52		μμf
Grid to Filament	88		μμf
Plate to Filament	1.5		μμf

Mechanical:

Terminal Connections:

F – Filament
G – Grid–Flange Terminal



P – Radiator–Cooled Plate Terminal

Mounting Position	Vertical, Filament End Up
Maximum Overall Length	25"
Maximum Diameter	16-15/16"
Radiator	Integral Part of Tube
Air Jacket	RCA MI-28190

Air Flow:

Through Radiator – The specified air flow for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower vertically upward through the radiator before and during the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Plate Dissipation	15	20	25	kw
Air Flow	1100	1450	1800	cfm
Static Pressure	0.85	1.5	2.2	in. of water

To Filament Seals — 10 min. cfm

The specified air flow should be directed from a 1-1/4" diameter nozzle into the filament header before and during the application of any voltages in order to limit the temperature of the filament seals to the maximum value.

Input Air Temperature (To Radiator)	45 max.	°C
Radiator Temperature (Measured at core, upper end, away from incoming air)	180 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate)	165 max.	°C

▲ When the 5671 is operated at less than maximum ratings, the filament voltage may be reduced, the amount depending on operating conditions. The filament voltage range is from 9.75 volts to 11.5 volts.

← Indicates a change.

World Radio History

RCA

5671
POWER TRIODE

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	15000	max.	volts
MAX.-SIGNAL DC PLATE CUR.*	6	max.	amp
MAX.-SIGNAL PLATE INPUT*	90	max.	kw
PLATE DISSIPATION*	25	max.	kw

Typical Operation:

Values are for 2 tubes

Filament Voltage	10	11	volts
DC Plate Voltage	10200	15000	volts
DC Grid Voltage	-220	-320	volts
Peak AF Grid-to-Grid Voltage	900	1600	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.8	10	amp
Effective Load Resistance (Plate-to-plate)	3600	3320	ohms
Max.-Signal Driving Power (Approx.)#	120	600	watts
Max.-Signal Power Output (Approx.)	37	100	kw

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500	max.	volts
DC GRID VOLTAGE	-2000	max.	volts
DC PLATE CURRENT	4.5	max.	amp
DC GRID CURRENT	1	max.	amp
PLATE INPUT	55	max.	kw
PLATE DISSIPATION	17	max.	kw

Typical Operation:

Filament Voltage	10	11	volts
DC Plate Voltage	10200	12500	volts
DC Grid Voltage®	-1500	-1500	volts
	2100	1500	ohms
Peak RF Grid Voltage	2070	2180	volts
DC Plate Current	3.3	4	amp
DC Grid Current (Approx.)□	0.72	1	amp
Driving Power (Approx.)□	1350	1960	watts
Power Output (Approx.)	28	40	kw

●, ®, □: See next page.

World Radio History

5671
POWER TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	15000	max.	volts
DC GRID VOLTAGE	-2000	max.	volts
DC PLATE CURRENT	8	max.	amp
DC GRID CURRENT	1	max.	amp
PLATE INPUT	100	max.	kw
PLATE DISSIPATION	25	max.	kw

Typical Operation:

Filament Voltage	10	11	volts
DC Plate Voltage	12500	15000	volts
DC Grid Voltage▲	-1250	-1500	volts
	190	225	ohms
	1300	1500	ohms
Peak RF Grid Voltage	1970	2270	volts
DC Plate Current	5.8	6	amp
DC Grid Current (Approx.)□	0.95	1	amp
Driving Power (Approx.)□	1700	2040	watts
Power Output (Approx.)	55	70	kw

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	265	305	amp
Amplification Factor	1,2	34	44	
Grid-Plate Capacitance	–	45	59	μμf
Grid-Filament Capacitance	–	72	104	μμf
Plate-Filament Capacitance	–	1.1	1.9	μμf
Plate Voltage	1,3	3600	4600	volts
Plate Voltage	1,4	7000	9000	volts
Grid Voltage	1,5	-310	-490	volts
Grid Voltage	1,6	–	1100	volts
Peak Cathode Current	7	50	–	amp
Grid Current	1,6	–	9.5	amp
Useful Power Output	1,8	59000	–	watts ←

Note 1: With 11 volts ac on filament.

Note 2: With dc grid voltage of -50 volts and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 3: With dc grid voltage of 0 volts, and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 4: With dc grid voltage of -100 volts, and dc plate voltage adjusted to give dc plate current of 2 amp.

Note 5: With dc plate voltage of 15000 volts, and dc grid voltage adjusted to give dc plate current of 50 ma.

Note 6: With dc plate voltage of 2600 volts, and instantaneous grid voltage adjusted to give instantaneous plate current of 35 amp.

●, ⊕, □, □□, ▲: See next page.

←Indicates a change.

World Radio History

5671

POWER TRIODE

Note 7: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 8: In self-excited oscillator circuit and with dc plate voltage of 15000 volts, dc plate current of 6.6 amp., dc grid current of 0.8 to 1.0 amp., grid resistor of 1000 ± 10% ohms, and frequency of 1.6 megacycles per second.

● Continuous Commercial Service.

✱ Obtained by grid resistor of value shown or by partial self-bias methods.

□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

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

▲ Obtained by cathode resistor (190, 225), grid resistor, (1300, 1500), or partial self-bias methods.

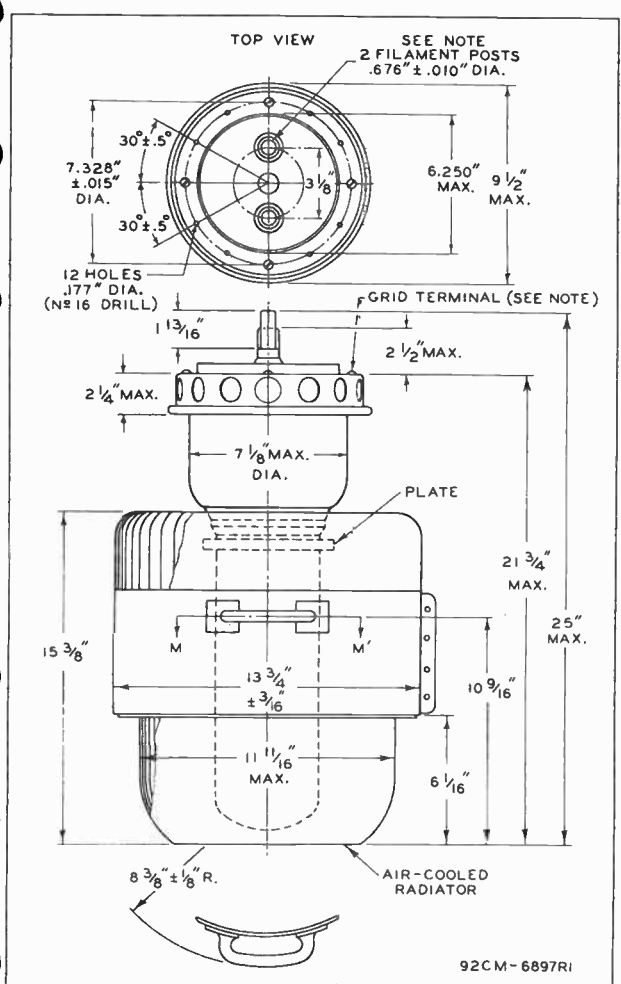
Data on operating frequencies for the 5671 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5671

POWER TRIODE



SECTION M-M'

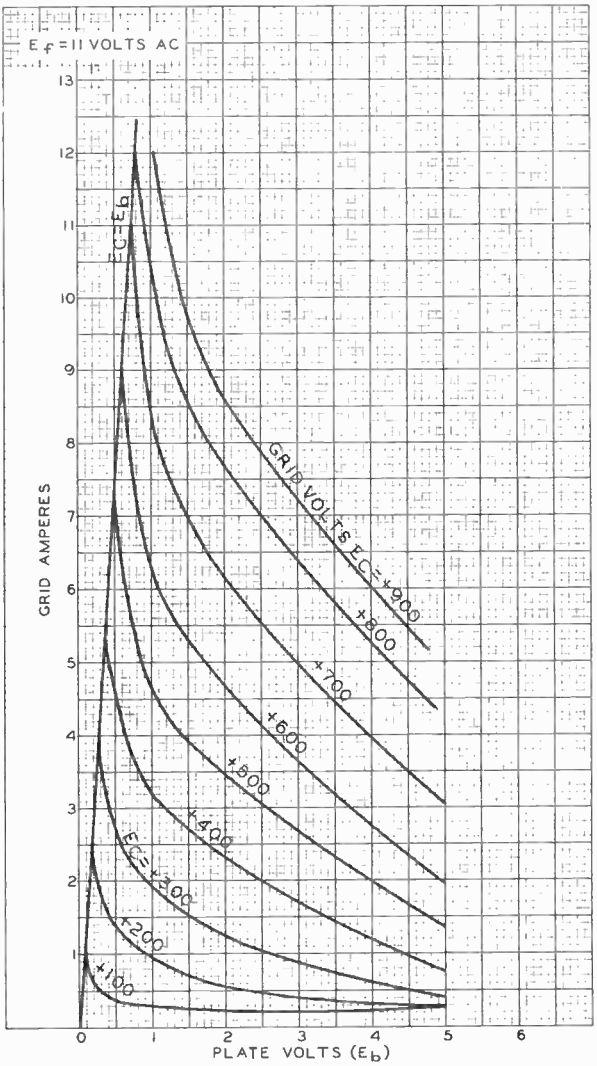
NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

World Radio History

RCA

5671

TYPICAL CHARACTERISTICS

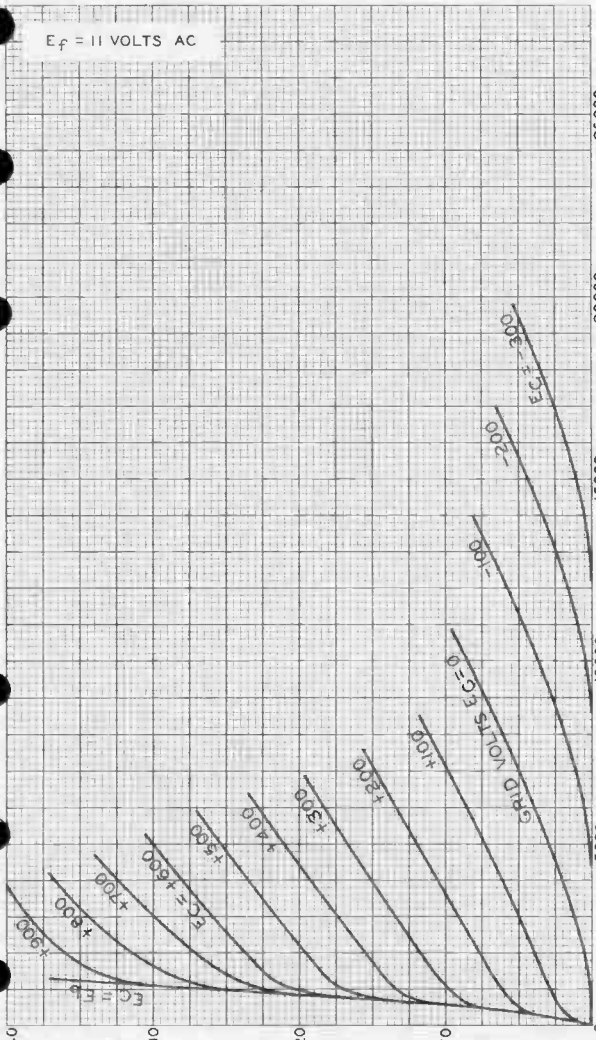


World Radio History

RCA

5671

AVERAGE PLATE CHARACTERISTICS



NOV. 5, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6899

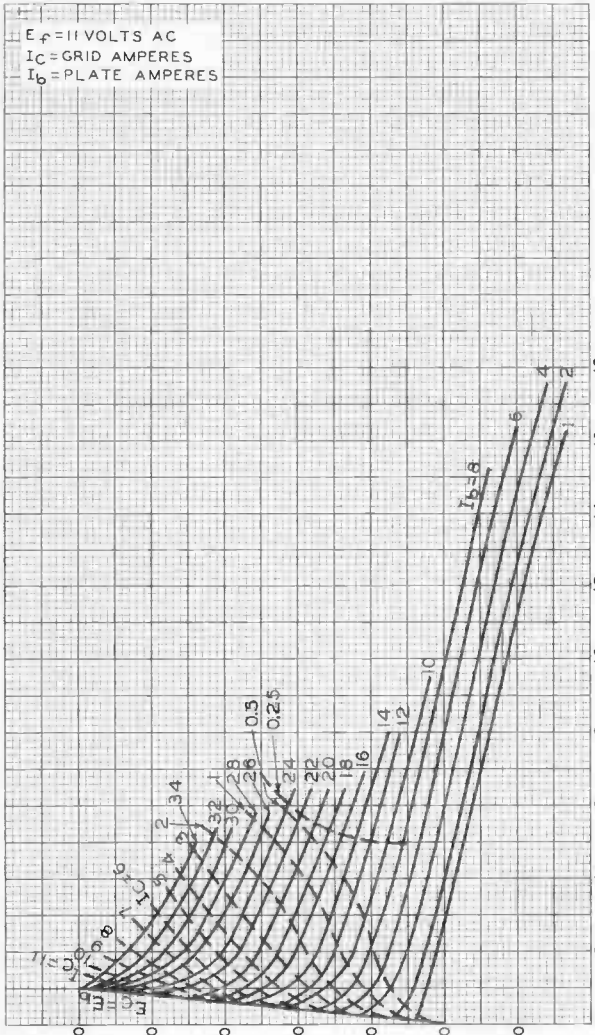
World Radio History

5671

RCA

5671

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



NOV. 19, 1947

TUBE DEPARTMENT

92CM-6909

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

Medium-Mu Triode

GLASS-METAL PENCIL TYPE

FAST WARM-UP TIME — STURDY COAXIAL-ELECTRODE STRUCTURE

For Cathode-Drive Applications with Full Input up to 1700 Mc and with Reduced Input up to 3000 Mc, and at Altitudes up to 100,000 Feet

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at heater volts = 6.3	0.135	amp
Amplification Factor	20	
Transconductance, for dc plate ma. = 24, dc plate volts = 135	6200	μmhos
Direct Interelectrode Capacitances:[a]		
Grid to plate	1.4	pf ←
Grid to cathode	2.4	pf ←
Plate to cathode	0.09 max.	pf

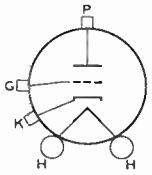
Mechanical:

Operating Position . . . . . Any

Dimensions . . . . . See *Dimensional Outline*

Socket for Heater Pins . . . . . Grayhill No.22-3[b], Cinch 54A16325[c], or equivalent

Terminal Connections (See *Dimensional Outline*):



H – Heater
K – Cathode

G – Grid
P – Plate

Thermal:

Plate-Seal Temperature	175 max.	°C

RF POWER AMPLIFIER AND OSCILLATOR — Class C Telegraphy ←

Key-down conditions per tube without amplitude modulation[d]

Maximum CCS[e] Ratings, *Absolute-Maximum Values:*

For altitudes up to 100,000 feet and frequencies up to 1700 Mc

DC PLATE VOLTAGE	300 max.	volts
DC GRID VOLTAGE	-90 max.	volts
DC CATHODE CURRENT	30 max.	ma

← Indicates a change.

World Radio History

DC GRID CURRENT	8 max.	ma
PLATE INPUT	5 max.	watts
PLATE DISSIPATION[f]	5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical CCS[e] Operation:

As oscillator in cathode-drive circuit

At frequency of	*1700*	*3000*	*Mc*
DC Plate-to-Grid Voltage	128	151.5	volts
DC Cathode-to-Grid Voltage	8	1.5	volts
From a grid resistor of	2000	5000	ohms
DC Plate Current	25	29	ma
DC Grid Current (Approx.)	4	0.3	ma
Useful Power Output (Approx.)	475	50	mw

Maximum Circuit Values:

Grid-Circuit Resistance	0.1 max.	megohm

[a] Without external shield.

[b] Grayhill, Inc., 561 Hillgrove Ave., LeGrange, Illinois.

[c] Cinch Manufacturing Company, 1026 South Homan Avenue, Chicago, Illinois.

[d] 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.

[e] Continuous Commercial Service.

[f] In applications where the plate dissipation exceeds 2.5 watts, it is important that a large area of contact be provided between the plate cylinder and the connector to provide adequate heat conduction.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.125	0.145	amp
Direct Interelectrode Capacitances:				
Grid to plate	–	1.2	1.6	pf
Grid to cathode	–	2.0	2.6	pf
Plate to cathode	–	–	0.09	pf
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,2	–	100	μa
Heater positive with respect to cathode	1,2	–	100	μa
Leakage Resistance:				
From grid to plate and cathode connected together	1,3	25	–	megohms
From plate to grid and cathode connected together	1,4	25	–	megohms
Reverse Grid Current	1,5	–	1	μa
Emission Voltage	6	–	14	volts
Amplification Factor	1,7	15	25	
Transconductance	1,7	5100	7700	μmhos

World Radio History

Plate Current (1)	1,7	17	31	ma
Plate Current (2)	1,8	–	100	μa
Power Output.	1,9	300	–	mw

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

Note 2: With 100 volts dc between heater and cathode.

Note 3: With grid 100 volts negative with respect to plate and cathode which are connected together.

Note 4: With plate 300 volts negative with respect to grid and cathode which are connected together.

Note 5: With dc plate voltage of 150 volts, dc grid voltage of −2 volts, grid resistor of 0.1 megohm.

Note 6: 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 7: With dc plate-supply voltage of 135 volts, cathode resistor of 68 ohms, and cathode bypass capacitor of 1000 μf.

Note 8: With dc plate voltage of 120 volts and dc grid voltage of −25 volts.

Note 9: With dc plate voltage of 120 volts, grid resistor adjusted to give a dc plate current of 25 milliamperes in a cavity-type oscillator operating at 1700 ± 5 Mc.

SPECIAL TESTS AND PERFORMANCE DATA

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 150 volts, grid voltage of −2.5 volts, and plate load resistor of 10,000 ohms. The tubes are vibrated in a plane perpendicular to the tube axis at 25 cps at an acceleration of 2.5 g. The rms output voltage across the plate load resistor as a result of vibration of the tube will not exceed 100 millivolts.

High-Frequency Vibration Performance:

This test (similar to MIL-E-1D, paragraph 4.9.19.2) is performed on a sample lot of tubes every 90 days. The tube is vibrated perpendicular to its axis, with no voltages applied to the tube. Vibration frequency is 40 to 60 cps and acceleration is 10 g. At the end of this test, tubes will meet the following limits:

Heater-Cathode Leakage Current. . . . . 100 max. μa
For conditions shown under *Characteristics Range Values Notes 1,2.*

Low-Frequency Vibration (rms) . . . . . 100 max. mv
For conditions shown above under *Low-Frequency Vibration Performance.*

Transconductance. . . . . 5100 min. μmhos
For conditions shown under *Characteristics Range Values Notes 1,7.*

Plate Current (2) . . . . . 100 max. μa
For conditions shown under *Characteristics Range Values Notes 1,8.*

World Radio History

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-I-D, Amendment 5.

Glass Seal Fracture Tests:

Fracture tests are performed on a sample lot of tubes every 90 days.

1. Tubes are placed on supports spaced 15/16" ± 1/64" apart with the grid flange centered between these supports. Tubes will withstand gradual application, perpendicular to the tube axis, of a force of 30 pounds upon the grid flange without causing fracture of the glass insulation.

2. Tubes are held by clamping to the cathode cylinder. Tubes will withstand gradual application of a torque of 12.5 inch-pounds upon the plate terminal without causing fracture of the glass insulation.

Dynamic Life Performance:

This test (similar to MIL-E-ID, paragraph 4.11.3.2) is performed on a sample lot of tubes from each production run to insure high quality of rf performance. Each tube is life-tested in a cavity-type oscillator at 500 ± 15 Mc under the following conditions:

Heater voltage of 6.3 volts, plate-supply voltage of 300 volts, cathode resistor is adjusted to give a dc plate current of 30 ma and value is recorded. 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 limit:

Power Output. . . . . 0.2 min. watt
For conditions shown under *Characteristics Range Values Notes 1,9.*

OPERATING CONSIDERATIONS

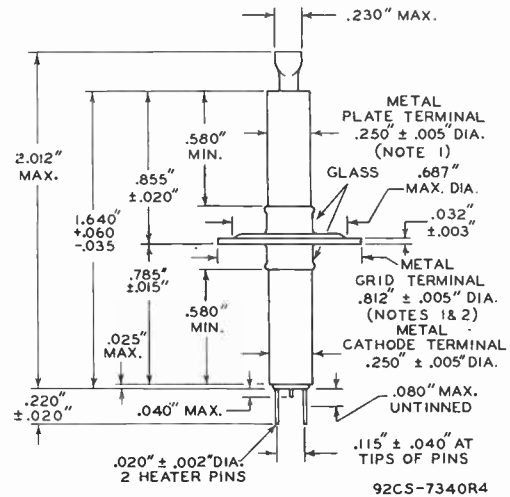
The *mounting* for this type in coaxial-line, parallel-line, or lumped circuits may support the tube securely by any one of the three terminals. Connections to the other two terminals must be made by contacts with flexible leads.

The *mounting* for this type in cavity-type circuits should preferably support the tube by the grid flange which should make firm contact to the cavity surface.

World Radio History

The *heater* pins of this type should not be soldered to circuit elements. The heat of the soldering operation may crack the glass seals of the heater pins and damage the tube.

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.

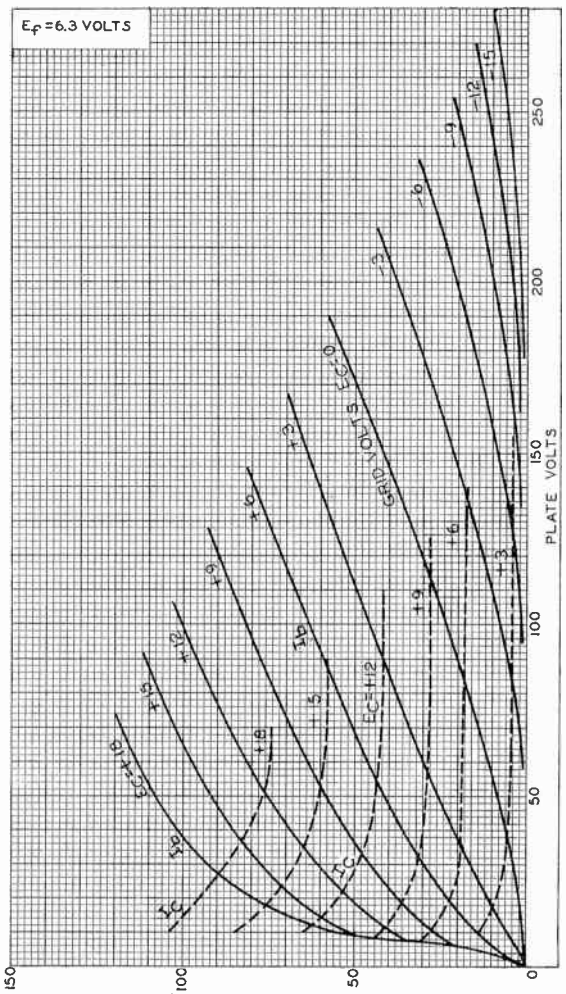


NOTE 1: MAXIMUM ECCENTRICITY OF CENTER LINE (AXIS) OF PLATE TERMINAL OR GRID-TERMINAL FLANGE WITH RESPECT TO THE CENTER LINE (AXIS) OF THE CATHODE TERMINAL IS 0.010".

NOTE 2: TILT OF GRID-TERMINAL FLANGE WITH RESPECT TO ROTATIONAL AXIS OF CATHODE TERMINAL IS OETERMINEO BY CHUCKING THE CATHODE TERMINAL, ROTATING THE TUBE, ANO GAUGING THE TOTAL TRAVEL DISTANCE OF THE GRID-TERMINAL FLANGE PARALLEL TO THE AXIS AT A POINT APPROXIMATELY 0.020" INWARD FROM 'TS EDGE FOR ONE COMPLETE ROTATION. THE TOTAL TRAVEL DISTANCE WILL NOT EXCEED 0.020".

World Radio History

AVERAGE CHARACTERISTICS



92CM-7343

World Radio History

RCA

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UHF MEDIUM-MU TRIODE

"PENCIL TYPE" FOR GROUNDED-GRID SERVICE

GENERAL DATA

Electrical:

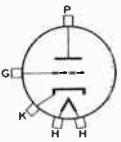
Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.135	amp
Direct Interelectrode Capacitances:		
Grid to Plate	1.3	μμf
Grid to Cathode	2.3	μμf
Plate to Cathode	0.09 max.	μμf

Characteristics, Class A_1 Amplifier:

Plate Voltage	135	volts
Cathode-Bias Resistor	68	ohms
Amplification Factor	20	
Plate Resistance	3225	ohms
Transconductance	6200	μmhos
Plate Current	24	ma

Mechanical:

Terminal Connections:



H – Heater
K – Cathode
G – Grid
P – Plate

Mounting Position . . . . . Any
Dimensions . . . . . See Outline Drawing

RF POWER AMPLIFIER & OSCILLATOR – Class C

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE	165 max.	volts
DC GRID VOLTAGE	-90 max.	volts
DC CATHODE CURRENT	30 max.	ma
DC GRID CURRENT	8 max.	ma
PLATE INPUT	5 max.	watts
PLATE DISSIPATION*	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
PLATE-SEAL TEMPERATURE	175 max.	°C

Typical Operation as Grounded-Grid Oscillator at 1700 Mc:*

DC Plate Voltage	120	volts
DC Grid Voltage	-8	volts
From a grid resistor of	2000	ohms

* In applications where the plate dissipation exceeds 2.5 watts, it is important that a large area of contact be provided between the plate cylinder and its lead connector to provide adequate heat conduction.

* At 3000 Mc, and with full ratings, a useful output of approximately 50 milliwatts may be obtained.

World Radio History

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UHF MEDIUM-MU TRIODE

DC Plate Current	25	ma
DC Grid Current (Approx.)	4	ma
Power Output (Approx.)	475	mw

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.125	0.145	amp
Grid-to-Plate Capacitance	-	1.1	1.5	μμf
Grid-to-Cathode Capacitance	-	2.0	2.6	μμf
Plate-to-Cathode Capacitance	-	-	0.09	μμf

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

INSTALLATION NOTES

Connections to the cathode cylinder, grid disk, 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.

World Radio History

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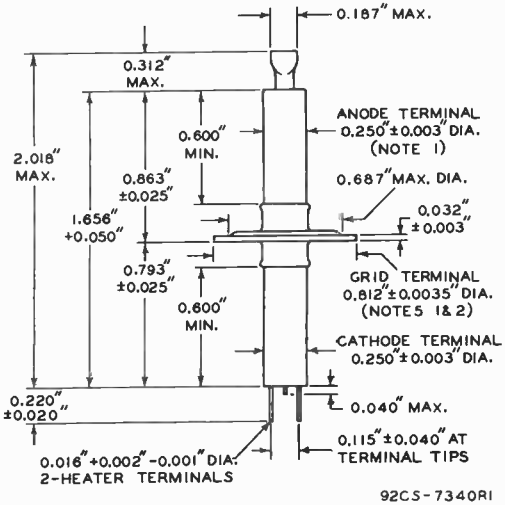
UHF MEDIUM-MU TRIODE



NOTE 1: MAX. ECCENTRICITY OF ℄ (AXIS) OF ANODE TERMINAL OR GRID-TERMINAL FLANGE WITH RESPECT TO THE ℄ (AXIS) OF THE CATHODE TERMINAL IS 0.008".

NOTE 2: TILT OF GRID-TERMINAL FLANGE WITH RESPECT TO ROTATIONAL AXIS OF CATHODE TERMINAL IS DETERMINED BY CHUCKING THE CATHODE TERMINAL, ROTATING THE TUBE, AND GAUGING THE TOTAL TRAVEL DISTANCE OF THE GRID-TERMINAL FLANGE PARALLEL TO THE AXIS AT A POINT APPROXIMATELY 0.020" INWARD FROM ITS EDGE FOR ONE COMPLETE ROTATION. THE TOTAL TRAVEL DISTANCE WILL NOT EXCEED 0.020".

World Radio History

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RCA

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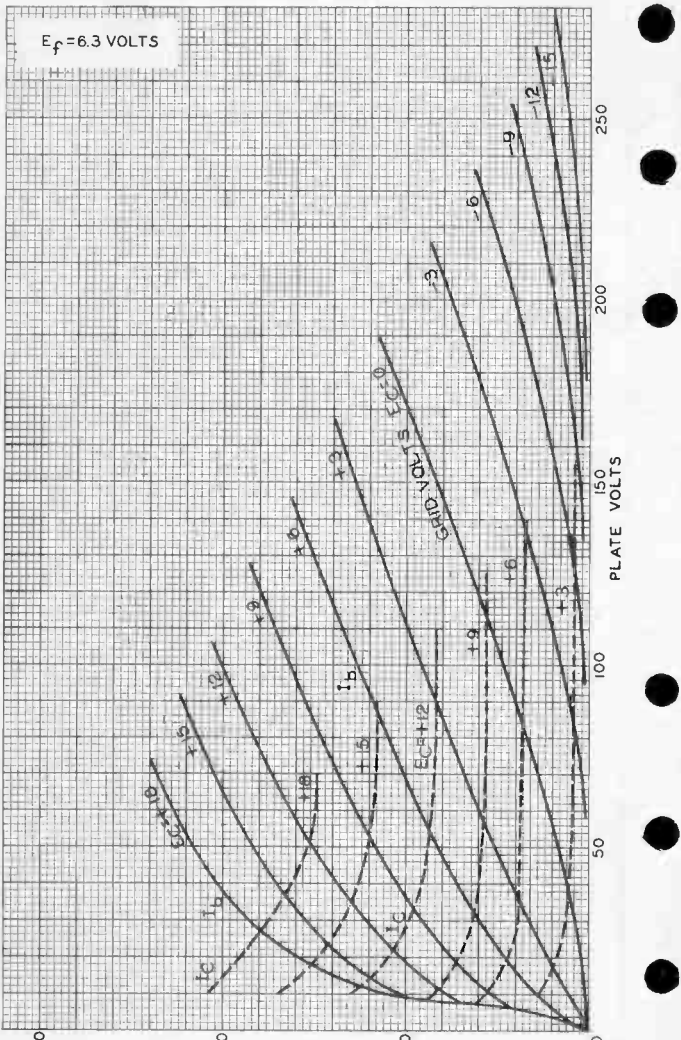
AVERAGE PLATE CHARACTERISTICS



AUG. 23, 1949

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7343

5713

POWER TRIODE

FORCED-AIR-COOLED, GROUNDED-GRID TYPE

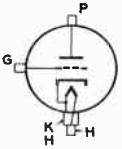
GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	3.3 ± 0.2	ac or dc volts
Current	11.5	amp
Minimum Heating Time▲	2	minutes
Amplification Factor	25	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	10.3	μμf
Grid to Cathode	26	μμf
Plate to Cathode	0.5	μμf

Mechanical:

Terminal Connections:



H: Heater
G: Grid Terminal (Flange)
K: Cathode
P: Plate Terminal (Radiator)

Mounting Position	Vertical, with radiator up or down
Overall Length	4-25/32" ± 3/32"
Greatest Diameter	2.056" ± 0.006"
Radiator	Integral Part of Tube

Air Flow:

Through Radiator — The specified air flow for various plate dissipations, as indicated in the tabulation below, should be delivered through the radiator toward the bulb before and during the application of any voltages.

Plate Dissipation	150	200	250	watts
Air Flow	9	13	18	cfm
Static Pressure	0.14	0.27	0.45	in. of water

Incoming Air Temperature	45 max.	°C
Radiator Temperature (measured on the core at end away from incoming air)	180 max.	°C
Glass Temperature	180 max.	°C
Grid-Terminal Temperature	140 max.	°C

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy

Key-down conditions per tube without modulation

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	1500 max.	volts
DC GRID VOLTAGE	−250 max.	volts
DC PLATE CURRENT	300 max.	ma
DC GRID CURRENT	50 max.	ma
PLATE INPUT	450 max.	watts
PLATE DISSIPATION	250 max.	watts

▲ With 3.3 volts on heater. This time may be shortened by increasing the heater voltage during the interval required for the cathode to reach normal operating temperature. Increasing the heater voltage to 4 volts reduces the heating time to 1 minute, while 5 volts reduces it to 40 seconds. After this heating interval, the heater voltage must be reduced to 3.3 volts.

● Continuous Commercial Service.

World Radio History

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POWER TRIODE

Typical Operation in Grounded-Cathode Circuit:

DC Plate Voltage	1500	volts
DC Grid Voltage*	-175	volts
	510	ohms
Peak RF Grid Voltage	210	volts
DC Plate Current	300	ma
DC Grid Current (Approx.)	40	ma
Driving Power (Approx.)	8	watts
Power Output (Approx.)	290	watts

Typical Operation in Grounded-Grid Circuit at 220 Mc:

Same values as for Grounded-Cathode Circuit with the following exceptions:

Driving Power (Approx.)#	65	watts
Power Output (Approx.)	325	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	10.8	12.2	amp
Amplification Factor	1,2	19	29	
Grid-Plate Capacitance	-	9	11.6	μμf
Grid-Cathode Capacitance	-	23	29	μμf
Plate-Cathode Capacitance	-	0.39	0.65	μμf
Grid Voltage	1,3	-	-90	volts
Grid Voltage	1,4	-41	-70	volts
Peak Cathode Current	1,5	40	-	amp
Power Output	1,6	290	-	watts

Note 1: Heater volts = 3.3.

Note 2: With 1000 volts on plate, and plate ma. = 150.

Note 3: With 1500 volts on plate and plate ma. = 20.

Note 4: With 1500 volts on plate and plate ma. = 150.

Note 5: Represents maximum usable cathode current (plate current plus grid current) for tube, for any condition of operation.

Note 6: With 1500 volts on plate, plate ma. = 350, grid ma. = 50 to 60, grid resistor of 4000 ± 10% ohms, and frequency of 20 Mc.

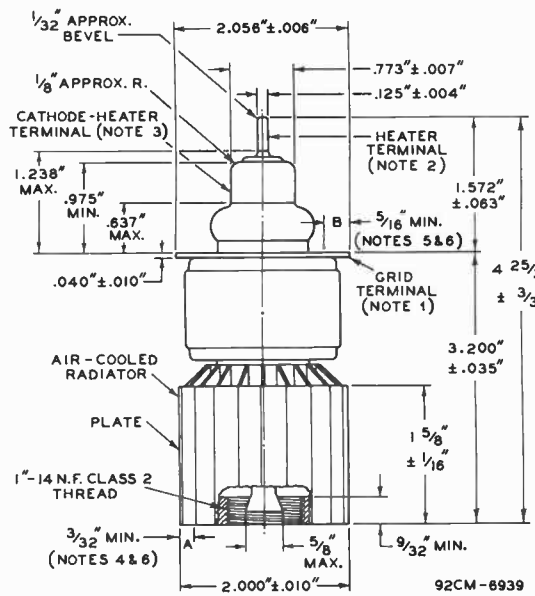
Required by tube and input circuit. A portion of this power appears in the load circuit.

* Obtained from fixed supply or from a cathode resistor of value shown.

Data on operating frequencies for the 5713 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

5713
POWER TRIODE



NOTE 1: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF GRID-TERMINAL FLANGE WITH RESPECT TO ℄ (AXIS) OF PLATE RADIATOR IS 0.D4D", MEASURED WITHIN 1/32" OF BOTTOM OF RADIATOR.

NOTE 2: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF HEATER TERMINAL WITH RESPECT TO ℄ (AXIS) OF CATHODE-HEATER TERMINAL IS D.D20".

NOTE 3: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF CATHODE-HEATER TERMINAL WITH RESPECT TO ℄ (AXIS) OF GRID-TERMINAL FLANGE IS D.020".

NOTE 4: SURFACE OF ANNULAR AREA INDICATED BY "A" ON BOTTOM OF RADIATOR IS IN SAME PLANE WITHIN D.D05", AS DETERMINED BY GAUGE 1/16" WIDE AND 0.DD5" THICK. THIS GAUGE WILL NOT ENTER MORE THAN 1/16" WITH BOTTOM OF RADIATOR RESTING ON FLAT PLATE.

NOTE 5: SURFACE OF ANNULAR AREA INDICATED BY "B" ON GRID-TERMINAL FLANGE IS IN SAME PLANE WITHIN D.DDB", AS DETERMINED BY GAUGE METHOD DESCRIBED IN NOTE 4.

NOTE 6: SURFACE OF ANNULAR AREA INDICATED BY "A" ON BOTTOM OF RADIATOR IS PARALLEL WITHIN 0.03D" TO SURFACE OF ANNULAR AREA INDICATED BY "B" ON GRID-TERMINAL FLANGE.

World Radio History

RCA

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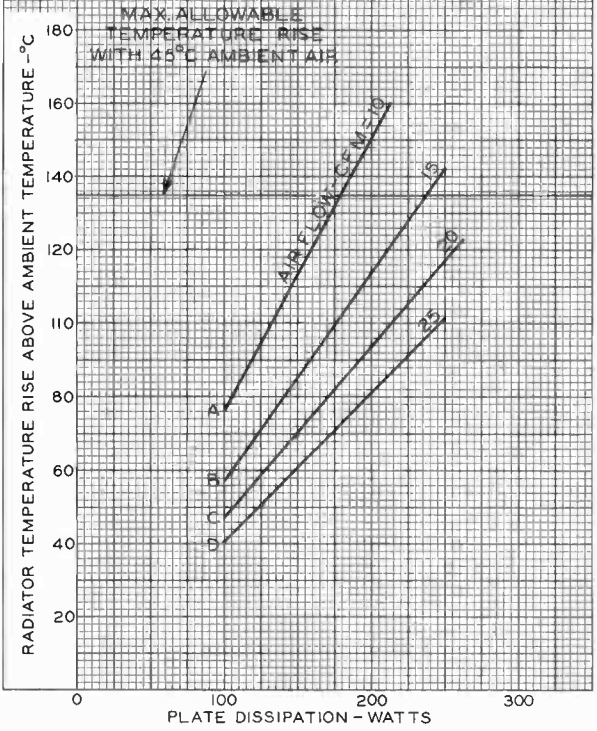
COOLING REQUIREMENTS

E_f = 3.3 VOLTS MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	0.17
B	0.33
C	0.55
D	0.82

CURVES TAKEN ACCORDING TO NAFM* STANDARDS - BULLETIN Nº 103

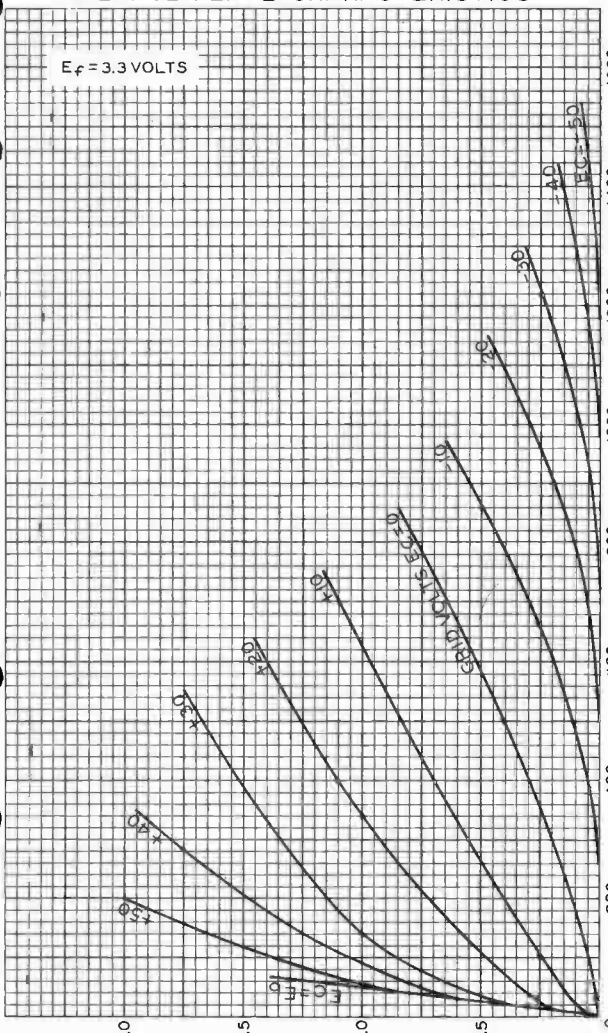
*NATIONAL ASSOCIATION OF FAN MFRS., GENERAL MOTORS BLDG., DETROIT, MICH.



RCA

5713

AVERAGE PLATE CHARACTERISTICS



MAR. 18, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6942

World Radio History

RCA

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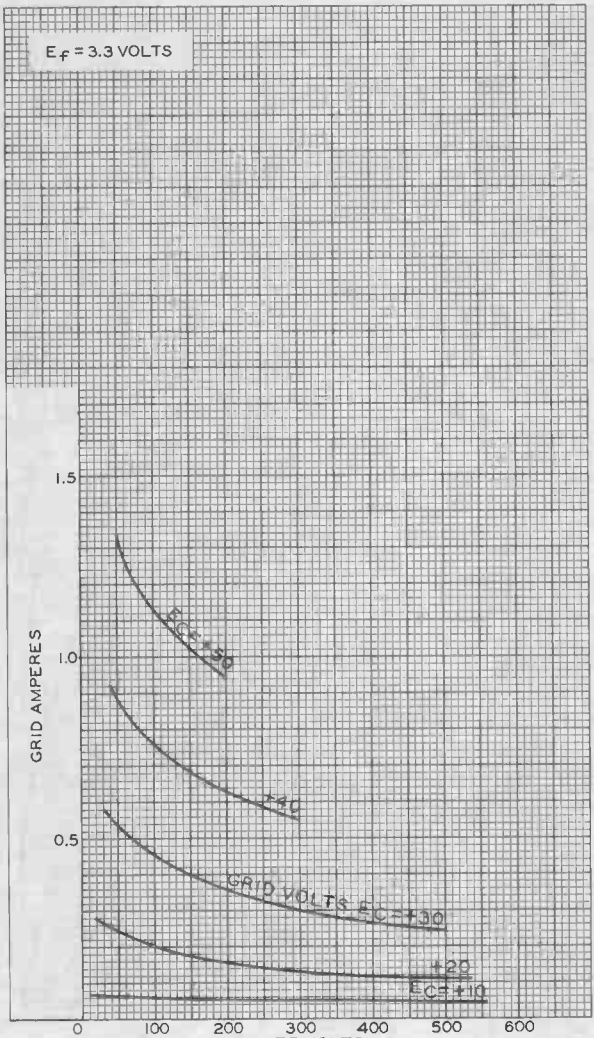
TYPICAL GRID CHARACTERISTICS



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5762/7C24
POWER TRIODE

FORCED-AIR COOLED, RF GROUNDED-GRID TYPE

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

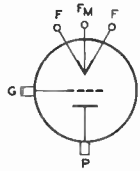
Voltage	12.6 ± 0.6	ac or dc volts
Current	29	amp
Starting Current:	The filament current must never exceed 175 amperes, even momentarily	
Cold Resistance	0.052	ohm
Amplification Factor	29	

Direct Interelectrode Capacitances:

Grid to Plate	18.5	μμf
Grid to Filament	19	μμf
Plate to Filament	0.5	μμf

Mechanical:

Terminal Connections:



F – Filament

FM – Filament Mid-Tap

G – Grid Terminal (Flange)

P – Plate Terminal (Radiator)

Mounting Position . . . . Vertical, filament end up or down

Maximum Overall Length (Excluding flexible leads) . . 7-1/8"

Maximum Diameter . . . . . 4-11/16"

Radiator . . . . . Integral Part of Tube

Air Flow:

Through Radiator:

The specified flow of incoming air at a temperature of 45°C for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower through the radiator before and during the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Percentage of Max. Rated Plate Dissipation for Each Class of Service.	100	80	60	per cent
Minimum Air Flow	190	125	75	cfm
Static Pressure	1.21	0.58	0.26	in. of water

To Header and Filament Seals . . . . . 10 min. cfm

The specified air flow from a 1"-diameter nozzle should be directed into the filament header before and during the application of any voltages in order to limit the temperature of the filament seals and the grid seal to their maximum value.

Incoming Air Temperature	45 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air).	180 max.	°C
Bulb Temperature (At hottest part)	180 max.	°C
Seal Temperature: Filament, Grid, and Plate	180 max.	°C

World Radio History

5762

5762/7C24
POWER TRIODE

Fittings:

For use with 5762/7C24 when operated at frequencies up to about 60 Mc. At higher frequencies, cavity-type circuits with special built-in fittings are utilized.

Air Jacket	RCA-229F1
Air Manifold	RCA-230F1
Bracelet	RCA-231F1

AF POWER AMPLIFIER & MODULATOR--Class B

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	6200 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	1.5 max.	amp
MAX.-SIGNAL PLATE INPUT*	8700 max.	watts
PLATE DISSIPATION*	3000 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	4700	volts
DC Grid Voltage	-200	volts
Peak AF Grid-to-Grid Voltage	900	volts
Zero-Signal DC Plate Current	0.3	amp
Max.-Signal DC Plate Current	2.8	amp
Effective Load Resistance (Plate to plate)	3640	ohms
Max.-Signal Driving Power (Approx.)	195	watts
Max.-Signal Power Output (Approx.)	8800	watts

RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions unless otherwise specified

Maximum CCS● Ratings, *Absolute Values*:

	54 to 216 Mc	
DC PLATE VOLTAGE	3700 max.	volts
DC PLATE CURRENT	1.9 max.	amp
DC GRID CURRENT (Pedestal Level)	0.225 max.	amp
PLATE INPUT	6500 max.	watts
PLATE DISSIPATION	3000 max.	watts

Typical Operation in RF Grounded-Grid Circuit:

Bandwidth▲ of	*10 Mc*	*8.5 Mc*	
DC Plate Voltage	3000	3200	volts
DC Grid Voltage	-105	-110	volts
Peak RF Grid Voltage:			
Synchronizing Level	380	435	volts
Pedestal Level	290	310	volts
DC Plate Current:			
Synchronizing Level	1.8	1.8	amp
Pedestal Level	1.36	1.35	amp

* Averaged over any audio-frequency cycle of sine-wave form.

●,▲,: See next page.

World Radio History

5762/7C24

POWER TRIODE

	Bandwidth▲ of 10 Mc	*8.5 Mc*	
DC Grid Current:			
Synchronizing Level.	0.265	0.400	amp
Pedestal Level.	0.115	0.130	amp
Driving Power (Approx.):#			
Synchronizing Level.	625	770	watts
Power Output (Approx.):			
Synchronizing Level.	3150	4000	watts
Pedestal Level	1800	2300	watts

GRID-MODULATED RF POWER AMPLIFIER--Class C Television Service

Synchronizing-level conditions unless otherwise specified

Maximum CCS● Ratings, *Absolute Values*:

	54 to 216 Mc	
DC PLATE VOLTAGE	3700 max.	volts
DC GRID VOLTAGE (White Level).	−800 max.	volts
DC PLATE CURRENT	1.9 max.	amp
DC GRID CURRENT (Pedestal Level)	0.225 max.	amp
PLATE INPUT.	6500 max.	watts
PLATE DISSIPATION.	3000 max.	watts

Typical Operation in RF Grounded-Grid Circuit:

	Bandwidth▲ of 8.5 Mc	
DC Plate Voltage	3200	volts
DC Grid Voltage:		
Synchronizing Level.	−110	volts
Pedestal Level	−220	volts
White Level.	−520	volts
Peak RF Grid Voltage	435	volts
DC Plate Current:		
Synchronizing Level.	1.8	amp
Pedestal Level	1.25	amp
DC Grid Current (Approx.):		
Synchronizing Level.	0.400	amp
Pedestal Level	0.130	amp
Driving Power (Approx.):#		
Synchronizing Level.	770	watts
Power Output (Approx.):		
Synchronizing Level.	4000	watts
Pedestal Level	2300	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values*:□

DC PLATE VOLTAGE	5000 max.	volts

▲ Computed between half-power points and based on tube output capacitance only.

Computed value to supply grid losses and feed-through power. Additional power will be required to supply circuit losses.

●, □, See next page.

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POWER TRIODE

DC GRID VOLTAGE**	−1000 max.	volts
DC PLATE CURRENT	1 max.	amp
DC GRID CURRENT**	0.3 max.	amp
PLATE INPUT	5000 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Operation in Grounded-Filament Circuit:

	Up to 30 Mc	*At 110 Mc*	
DC Plate Voltage	4700	4000	volts
DC Grid Voltage	−400	−350	volts
From a grid resistor of	1425	1460	ohms
Peak RF Grid Voltage°	675	600	volts
DC Plate Current	0.96	0.93	amp
DC Grid Current (Approx.)□□	0.28	0.24	amp
Driving Power (Approx.)□□	170	130	watts
Power Output (Approx.)	3700	2800	watts

Typical Operation in RF Grounded-Grid Circuit:

DC Plate Voltage	4700	4000	volts
DC Grid Voltage	−400	−350	volts
From a grid resistor of	1425	1460	ohms
Peak RF Grid Voltage	675	600	volts
DC Plate Current	0.96	0.93	amp
DC Grid Current (Approx.)□□	0.28	0.24	amp
Driving Power (Approx.)□□	720	600	watts
Power Output (Approx.)	4200	3200	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy▲▲
and
RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values*:□

DC PLATE VOLTAGE	6200 max.	volts
DC GRID VOLTAGE**	−1000 max.	volts
DC PLATE CURRENT	1.4 max.	amp
DC GRID CURRENT**	0.3 max.	amp
PLATE INPUT	8700 max.	watts
PLATE DISSIPATION	3000 max.	watts

Typical Operation in Grounded-Filament Circuit:

	Up to 30 Mc	
DC Plate Voltage	6000	volts
DC Grid Voltage:		
From a fixed supply of	−550	volts
From a grid resistor of	1900	ohms
From a cathode resistor of	360	ohms

° Driver modulated approximately 30%.

□ Carrier power of driver modulated 100%.

▲▲ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, □, **, □□: See next page.

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	Up to 30 Mc	
Peak RF Grid Voltage	875	volts
DC Plate Current	1.25	amp
DC Grid Current (Approx.)□□	0.290	amp
Driving Power (Approx.)□□	225	watts
Power Output (Approx.)	6000	watts

Typical Operation in RF Grounded-Grid Circuit:

	Up to 30 Mc	At 110 Mc	At 220 Mc	
DC Plate Voltage	6000	5000	3000	volts
DC Grid Voltage:				
From a fixed supply of	−550	−1000	−160	volts
From a grid resistor of	1900	4100	670	ohms
From a cathode resistor of	360	740	110	ohms
Peak RF Grid Voltage	875	1350	410	volts
DC Plate Current	1.25	1.1	1.25	amp
DC Grid Current (Approx.)□□	0.290	0.245	0.240	amp
Driving Power (Approx.)□□	1225	1680	510	watts
Power Output (Approx.)	7000	5500	2650	watts

SELF-RECTIFYING OSCILLATOR or AMPLIFIER--Class C

Maximum CCS● Ratings, *Absolute Values*:□

AC PLATE VOLTAGE (RMS)	7000 max.	volts
DC GRID VOLTAGE**	−300 max.	volts
DC PLATE CURRENT	0.635 max.	amp
DC GRID CURRENT**	0.135 max.	amp
PLATE INPUT†	4900 max.	watts
PLATE DISSIPATION	3000 max.	watts

Typical Operation

AC Plate Voltage (RMS)	6600	volts
DC Grid Voltage	−127	volts
DC Plate Current	0.625	amp
DC Grid Current (Approx.)□□	0.105	amp
Driving Power (Approx.) ♦ □□	60	watts
Power Output (Approx.)	3350	watts

AMPLIFIER or OSCILLATOR--Class C

With separate, rectified, unfiltered, single-phase, full-wave plate supply

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	5600 max.	volts

† Plate input is 1.11 times the product of the ac voltage (rms) and the dc plate current.

♦ From a self-rectified driver.

□ These ratings hold for operation up to 30 Mc. For ratings at higher frequencies, see RATINGS vs FREQUENCY on next sheet.

●, **, □□: See next page.

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POWER TRIODE

DC GRID VOLTAGE**	−600 max.	volts
DC PLATE CURRENT	1.25 max.	amp
DC GRID CURRENT**	0.270 max.	amp
PLATE INPUT ††	8600 max.	watts
PLATE DISSIPATION	3000 max.	watts

Typical Operation:

DC Plate Voltage	5000	volts
DC Grid Voltage	−260	volts
DC Plate Current	1.2	amp
DC Grid Current (Approx.)□□	0.260	amp
Driving Power (Approx.)♦ □□	150	watts
Power Output (Approx.)	5650	watts

♦ Continuous Commercial Service.

** See RATINGS vs FREQUENCY—*Max. Permissible Percentage of Max. Rated DC Grid Voltage and DC Grid Current* on next page.

□□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

†† Plate input is 1.23 times the product of the dc plate voltage and the dc plate current.

♦ From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	27	31	amp
Amplification Factor	1,2	25	33	
Grid-Plate Capacitance	–	16.5	20.5	μμf
Grid-Filament Capacitance	–	15.5	22.5	μμf
Plate-Filament Capacitance	–	0.38	0.62	μμf
Grid Voltage	1,3	−125	−190	volts
Plate Voltage	1,4	1350	1750	volts
Plate Voltage	1,5	2600	3400	volts
Peak Cathode Current	6	10	–	amp
Useful Power Output	1,7	3	–	kw

Note 1: With 12.6 volts rms on filament.

Note 2: With dc grid voltage of −25 volts measured from center tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

Note 3: With dc plate voltage of 4000 volts, and dc grid voltage adjusted to give dc plate current of 0.05 ampere.

Note 4: With dc grid voltage of 0 volts measured from center tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

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POWER TRIODE

Note 5: With dc grid voltage of −50 volts measured from center tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

Note 6: Designers should limit the maximum useable cathode current (plate current and grid current) to this value under any condition of operation.

Note 7: In a self-excited, coaxial, oscillator circuit and with dc plate voltage of 5000 volts, dc plate current of 1.1 amperes, grid resistor of 1500 ± 10% ohms, dc grid current of 0.250 to 0.300 ampere, and frequency of 110 Mc.

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	30	110	220		Mc
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE AND PLATE INPUT:					
Class B Television Service	Full Ratings—54 to 216 Mc				
Class C Television Service	Full Ratings—54 to 216 Mc				
Class C Telephony, Plate-Modulated	100	84	52		%
Class C Telegraphy and FM Telephony	100	84	52		%
Class C Amplifier or Oscillator, Self-Rectifying	100	84	52		%
Class C Amplifier or Oscillator with Separate, Rectified, Unfiltered Plate Supply	100	84	52		%
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED DC GRID VOLTAGE AND DC GRID CURRENT:					
Class B Television Service	Full Ratings—54 to 216 Mc				
Class C Television Service	Full Ratings—54 to 216 Mc				
			Volt.	*Cur.*	
Class C Telephony, Plate-Modulated	100	100	60	83	%
Class C Telegraphy and FM Telephony	100	100	60	83	%
Class C Amplifier or Oscillator, Self-Rectifying	100	100	60	83	%
Class C Amplifier or Oscillator with Separate, Rectified, Unfiltered Plate Supply	100	100	60	83	%

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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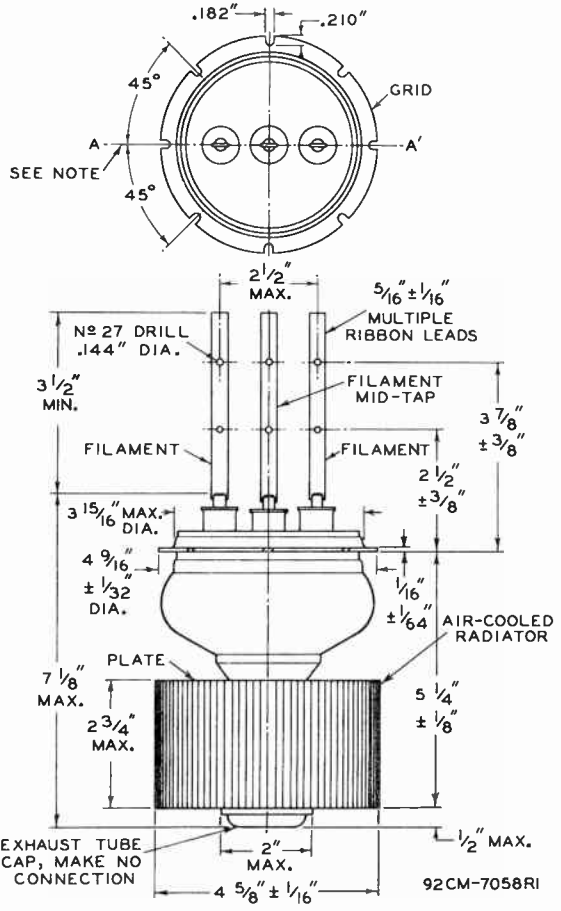
POWER TRIODE



NOTE: PLANE OF FILAMENT LEADS WILL NOT DEVIATE MORE THAN 3-1/2° FROM PLANE PASSING THROUGH AA' NORMAL TO GRID FLANGE.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

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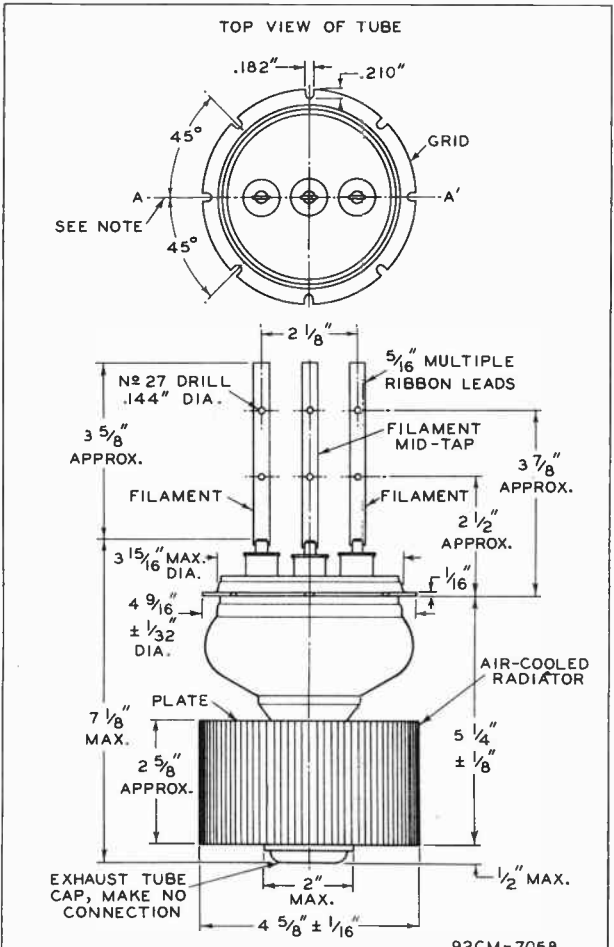
POWER TRIODE



NOTE: PLANE OF FILAMENT LEADS WILL NOT DEVIATE MORE THAN 3-1/2° FROM PLANE PASSING THROUGH AA' NORMAL TO GRID FLANGE.

World Radio History

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RCA

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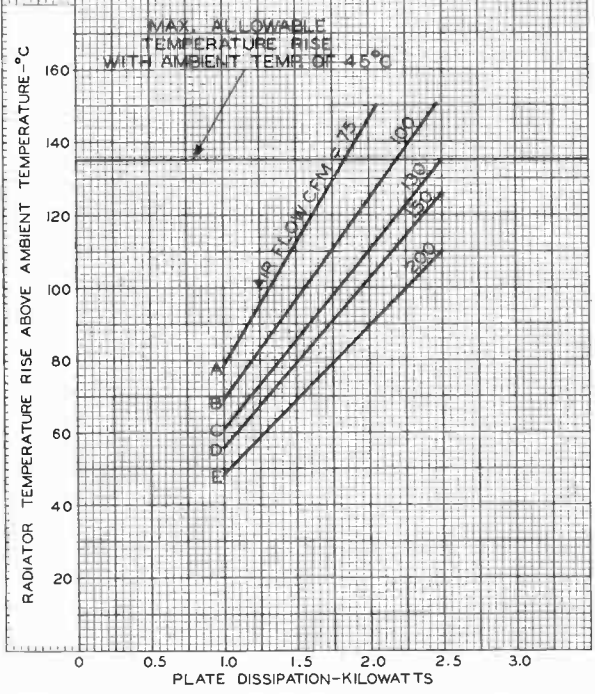
COOLING REQUIREMENTS

E_f = 12.6 VOLTS AC MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP INCHES OF WATER
A	0.26
B	0.40
C	0.61
D	0.80
E	1.34

CURVES TAKEN ACCORDING TO NAFM * STANDARDS — BULLETIN Nº 103

*NATIONAL ASSOCIATION OF FAN MFRS., GENERAL MOTORS BLDG. DETROIT, MICH.



World Radio History

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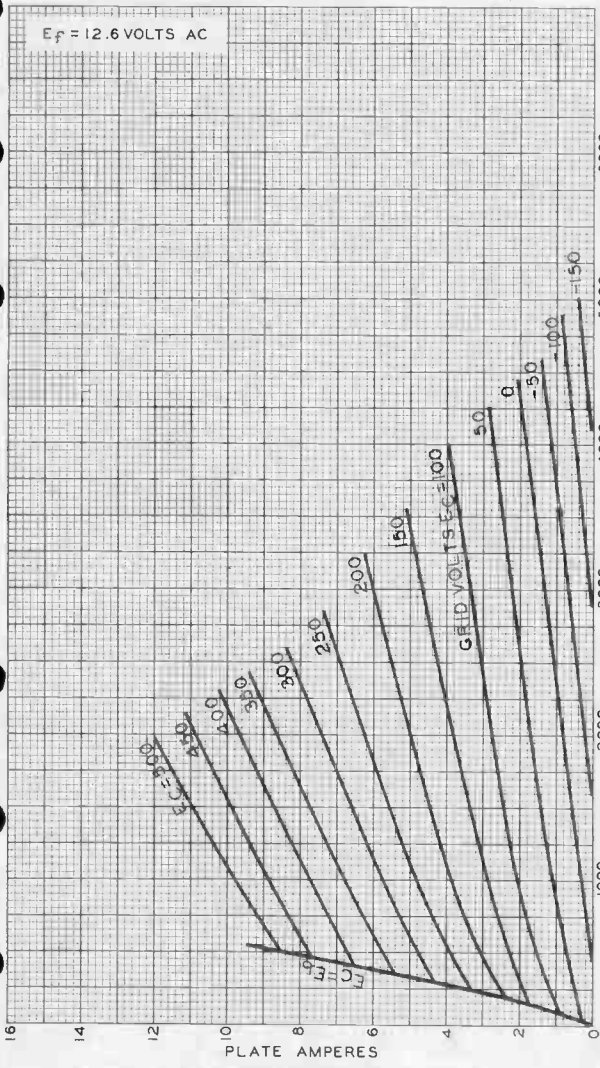
AVERAGE PLATE CHARACTERISTICS



SEPT. 24, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7079

World Radio History

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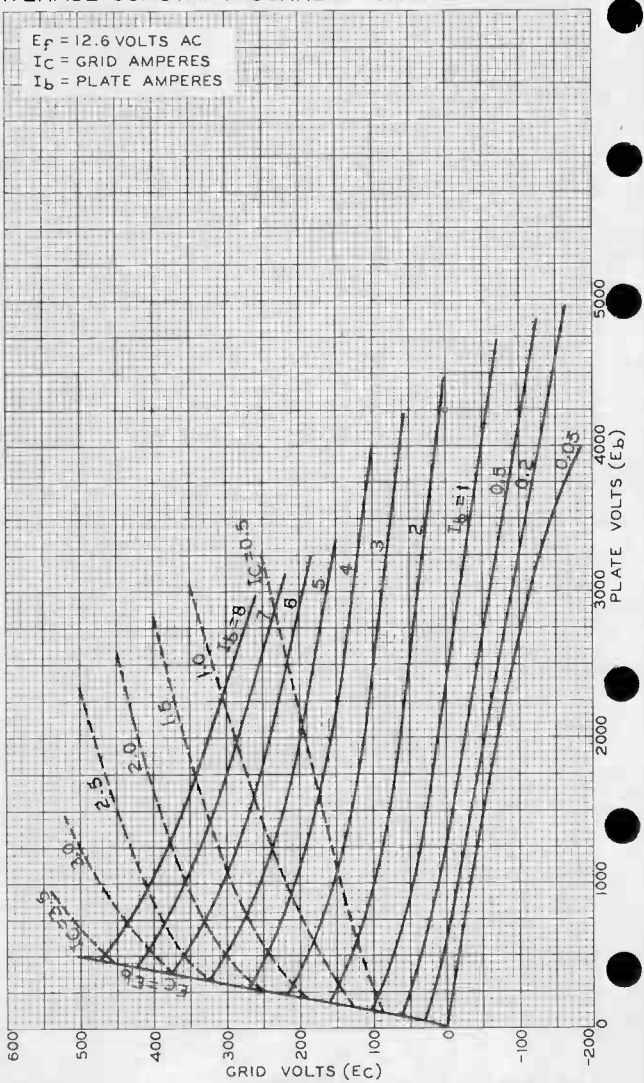
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History

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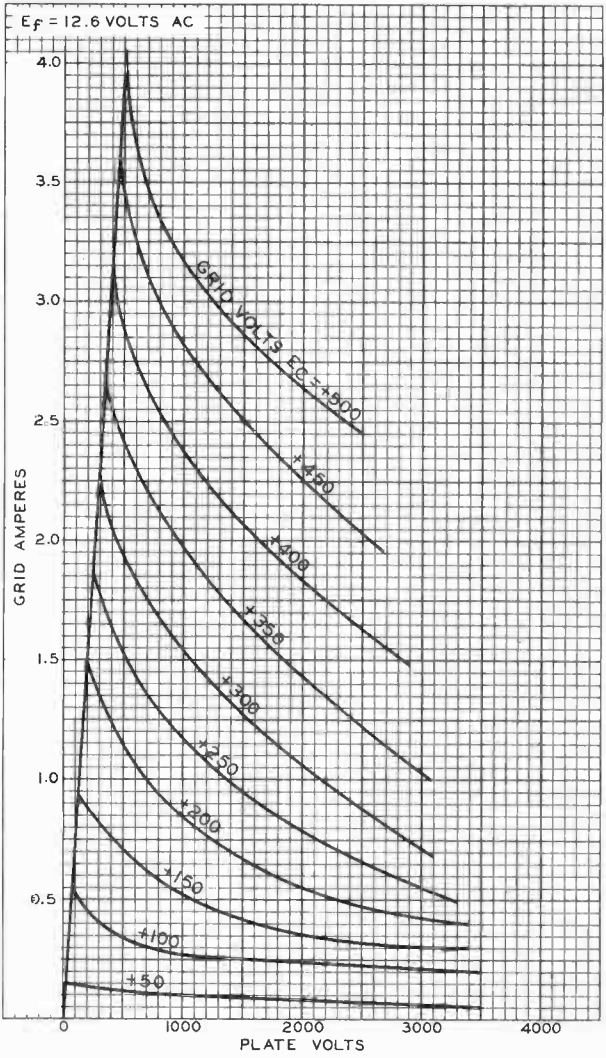
TYPICAL GRID CHARACTERISTICS



SEPT. 29, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7081

World Radio History

5762A

Power Triode

THORIATED-TUNGSTEN FILAMENT — COAXIAL-ELECTRODE STRUCTURE
FORCED-AIR COOLED — 4 KW PLATE DISSIPATION
INTEGRAL RADIATOR

For VHF Service in Television and CW Applications at Frequencies up to 220 Mc. The 5762A is Unilaterally Interchangeable with the 5762/7C24.

GENERAL DATA

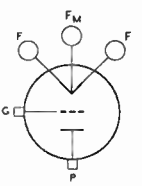
Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC or DC)	12.6 ± 0.6	volts
Current at 12.6 volts	29	amperes
Starting current: The filament current must never exceed 175 amperes, even momentarily		
Cold resistance	0.052	ohm
Amplification Factor	29	
Direct Interelectrode Capacitances:		
Grid to plate	18	μμf
Grid to filament	19	μμf
Plate to filament	0.5	μμf

Mechanical:

Operating Position	Vertical, either end up
Maximum Overall Length (Excluding flexible leads)	7-1/8"
Maximum Diameter	4-11/16"
Radiator	Integral part of tube
Weight	6-1/4 lbs

Terminal Connections (See *Dimensional Outline*):



F – Filament
F_M – Filament Mid-Tap
G – Grid
P – Plate

Thermal:

Air Flow:

Through Radiator— The specified flow of incoming air at a temperature of 45° C for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower through the radiator before and during the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Percentage of maximum rated plate dissipation for each class of service	100	80	60	per cent

World Radio History

Minimum air flow	300	214	125	cfm
Static pressure	2.9	1.47	0.58	in. of water

To Header and Filament Seals . . . . . 10 min. cfm
The specified air flow from a 1"-diameter nozzle should be directed into the filament header before and during the application of any voltages in order to limit the temperature of the filament seals and the grid seal to their maximum value.

Incoming Air Temperature	45 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air)	180 max.	°C
Bulb Temperature (At hottest part)	180 max.	°C
Seal Temperature:		
Filament, grid, and plate	180 max.	°C

AF POWER AMPLIFIER & MODULATOR — Class B

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	6200 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[b]	1.5 max.	amp
MAX.-SIGNAL PLATE INPUT[b]	8700 max.	watts
PLATE DISSIPATION[b]	4000 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	4700	volts
DC Grid Voltage	−200	volts
Peak AF Grid-to-Grid Voltage	900	volts
Zero-Signal DC Plate Current	0.3	amp
Max.-Signal DC Plate Current	2.8	amp
Effective Load Resistance (Plate to plate)	3640	ohms
Max.-Signal Driving Power (Approx.)	195	watts
Max.-Signal Power Output (Approx.)	8800	watts

RF POWER AMPLIFIER — Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

	54 to 215 Mc	
DC PLATE VOLTAGE	4500 max.	volts
DC PLATE CURRENT	2.0 max.	amp
DC GRID CURRENT (Pedestal level)	0.325 max.	amp
PLATE INPUT	9000 max.	watts
PLATE DISSIPATION	4000 max.	watts

Typical Operation in Cathode-Drive Circuit:

Bandwidth[c] of	*10*	*8.5*	*6*	*Mc*
DC Plate Voltage	3000	3200	4300	volts
DC Grid Voltage	−105	−110	−150	volts

World Radio History

Peak RF Grid Voltage:				
Synchronizing level	380	435	500	volts
Pedestal level.	290	310	355	volts
DC Plate Current:				
Synchronizing level	1.8	1.8	2.0	amp
Pedestal level.	1.36	1.35	1.5	amp
DC Grid Current:				
Synchronizing level	0.265	0.400	0.439	amp
Pedestal level.	0.115	0.130	0.118	amp
Driving Power (Approx.):[d]				
Synchronizing level	625	770	983	watts
Power Output (Approx.):				
Synchronizing level	3150	4000	6350	watts
Pedestal level.	1800	2300	3590	watts

GRID-MODULATED RF POWER AMPLIFIER
Class C Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE.	3700 max.	volts
DC GRID VOLTAGE (White level)	-800 max.	volts
DC PLATE CURRENT.	1.9 max.	amp
DC GRID CURRENT (Pedestal level).	0.225 max.	amp
PLATE INPUT	6500 max.	watts
PLATE DISSIPATION	4000 max.	watts

Typical Operation in Cathode-Drive Circuit:

Bandwidth[c] of	*8.5*	*Mc*
DC Plate Voltage.	3200	volts
DC Grid Voltage:		
Synchronizing level	-110	volts
Pedestal level.	-220	volts
White level	-520	volts
Peak RF Grid Voltage.	435	volts
DC Plate Current:		
Synchronizing level	1.8	amp
Pedestal level.	1.25	amp
DC Gric Current (Approx.):		
Synchronizing level	0.400	amp
Pedestal level.	0.130	amp
Driving Power (Approx.):[d]		
Synchronizing level	770	watts
Power Output (Approx.):		
Synchronizing level	4000	watts
Pedestal level.	2300	watts

World Radio History

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

	Up to 30 Mc[e]	
DC PLATE VOLTAGE	5000 max.	volts
DC GRID VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	1.0 max.	amp
DC GRID CURRENT	0.3 max.	amp
PLATE INPUT	5000 max.	watts
PLATE DISSIPATION	2700 max.	watts

Typical Operation in Grid-Drive Circuit:

	Up to 30 Mc	*At 110 Mc*	
DC Plate Voltage	4700	4000	volts
DC Grid Voltage	-400	-350	volts
From a grid resistor of	1425	1460	ohms
Peak RF Grid Voltage[f]	675	600	volts
DC Plate Current	0.96	0.93	amp
DC Grid Current (Approx.)	0.28	0.24	amp
Driving Power (Approx.)	170	130	watts
Power Output (Approx.)	3700	2800	watts

Typical Operation in Cathode-Drive Circuit:

	Up to 30 Mc	*At 110 Mc*	
DC Plate Voltage	4700	4000	volts
DC Grid Voltage	-400	-350	volts
From a grid resistor of	1425	1460	ohms
Peak RF Grid Voltage	675	600	volts
DC Plate Current	0.96	0.93	amp
DC Grid Current (Approx.)	0.28	0.24	amp
Driving Power (Approx.)[g]	720	600	watts
Power Output (Approx.)	4200	3200	watts

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

	Up to 30 Mc[e]	
DC PLATE VOLTAGE	6200 max.	volts
DC GRID VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	1.4 max.	amp
DC GRID CURRENT	0.3 max.	amp
PLATE INPUT	8700 max.	watts
PLATE DISSIPATION	4000 max.	watts

World Radio History

Typical Operation in Grid-Drive Circuit:

	Up to 30 Mc	
DC Plate Voltage	6000	volts
DC Grid Voltage:		
From a fixed supply of	-550	volts
From a grid resistor of	1900	ohms
From a cathode resistor of	360	ohms
Peak RF Grid Voltage	875	volts
DC Plate Current	1.25	amp
DC Grid Current (Approx.)	0.290	amp
Driving Power (Approx.)	225	watts
Power Output (Approx.)	6000	watts

Typical Operation in Cathode-Drive Circuit:

	Up to 30 Mc	*At 110 Mc*	*At 220 Mc*	
DC Plate Voltage	6000	5000	4300	volts
DC Grid Voltage:				
From a fixed supply of	-550	-1000	-200	volts
From a grid resistor of	1900	4100	807	ohms
From a cathode resistor of	360	740	134	ohms
Peak RF Grid Voltage	875	1350	432	volts
DC Plate Current	1.25	1.1	1.25	amp
DC Grid Current (Approx.)	0.290	0.245	0.25	amp
Driving Power (Approx.)	1225	1680	542	watts
Power Output (Approx.)	7000	5500	4000	watts

SELF-RECTIFYING OSCILLATOR or AMPLIFIER — Class C

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

	Up to 30 Mc[e]	
AC PLATE VOLTAGE (RMS)	7000 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	0.635 max.	amp
DC GRID CURRENT	0.135 max.	amp
PLATE INPUT[h]	4900 max.	watts
PLATE DISSIPATION	4000 max.	watts

Typical Operation:

AC Plate Voltage (RMS)	6600	volts
DC Grid Voltage	-127	volts
DC Plate Current	0.625	amp
DC Grid Current (Approx.)	0.105	amp
Driving Power (Approx.)[j]	60	watts
Power Output (Approx.)	3350	watts

World Radio History

5762A

AMPLIFIER or OSCILLATOR — Class C

With separate, rectified, unfiltered, single-phase, full-wave plate supply

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

	Up to 30 Mc[e]	
DC PLATE VOLTAGE	5600 max.	volts
DC GRID VOLTAGE	-600 max.	volts
DC PLATE CURRENT	1.25 max.	amp
DC GRID CURRENT	0.270 max.	amp
PLATE INPUT[k]	8600 max.	watts
PLATE DISSIPATION	4000 max.	watts

Typical Operation:

DC Plate Voltage	5000	volts
DC Grid Voltage	-260	volts
DC Plate Current	1.2	amp
DC Grid Current (Approx.)	0.260	amp
Driving Power (Approx.)[m]	150	watts
Power Output (Approx.)	5650	watts

[a] Continuous Commercial Service.

[b] Averaged over any audio-frequency cycle of sine-wave form.

[c] Computed between half-power points in a single-tuned circuit and based on tube output capacitance only.

[d] The driver stage is required to supply tube losses and rf-circuit losses. It should be designed to provide an excess of power above the indicated values to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

[e] For operation at higher frequencies, see accompanying *Maximum-Ratings-vs-Operating-Frequency* Chart.

[f] Driver modulated approximately 30%.

[g] Carrier power of driver modulated 100%.

[h] Plate input is 1.11 times the product of the ac voltage (rms) and the dc plate current.

[j] From a self-rectified driver.

[k] Plate input is 1.23 times the product of the dc plate voltage and the dc plate current.

[m] From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	27	31	amp
Amplification Factor	1,2	25	33	
Direct Interelectrode Capacitances:				
Grid to plate	-	16.5	20.5	μμf
Grid to filament	-	15.5	22.5	μμf
Plate to filament	-	0.38	0.62	μμf
Grid Voltage	1,3	-125	-190	volts
Plate Voltage	1,4	1350	1750	volts
Plate Voltage	1,5	2600	3400	volts
Peak Cathode Current	6	10	-	amp
Useful Power Output	1,7	3	-	kw

World Radio History

Note 1: With 12.6 volts rms on filament.

Note 2: With dc grid voltage of −25 volts measured from center-tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

Note 3: With dc plate voltage of 4000 volts, and dc grid voltage adjusted to give dc plate current of 0.05 ampere.

Note 4: With dc grid voltage of 0 volts measured from center-tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

Note 5: With dc grid voltage of −50 volts measured from center-tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

Note 6: Designers should limit the maximum useable cathode current (plate current and grid current) to this value under any condition of operation.

Note 7: In a self-excited, coaxial, oscillator circuit and with dc plate voltage of 5000 volts, dc plate current of 1.1 amperes, grid resistor of 1500 ± 10% ohms, dc grid current of 0.250 to 0.300 ampere, and frequency of 110 Mc.

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	30	110	220	Mc
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B Television	Full Ratings — 54 to 216 Mc			
Class C Television	Full Ratings — 54 to 216 Mc			
Class C Telephony, Plate-Modulated	100	84	72	%
Class C Telegraphy and FM Telephony	100	84	72	%
Class C Amplifier or Oscillator, Self-Rectifying	100	84	72	%
Class C Amplifier or Oscillator with Separate, Rectified, Unfiltered Plate Supply	100	84	72	%
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED DC GRID VOLTAGE AND DC GRID CURRENT:				
Class B Television	Full Ratings — 54 to 216 Mc			
Class C Television	Full Ratings — 54 to 216 Mc			
			Voltage	*Current*
Class C Telephony Plate-Modulated	100	100	60	83 %

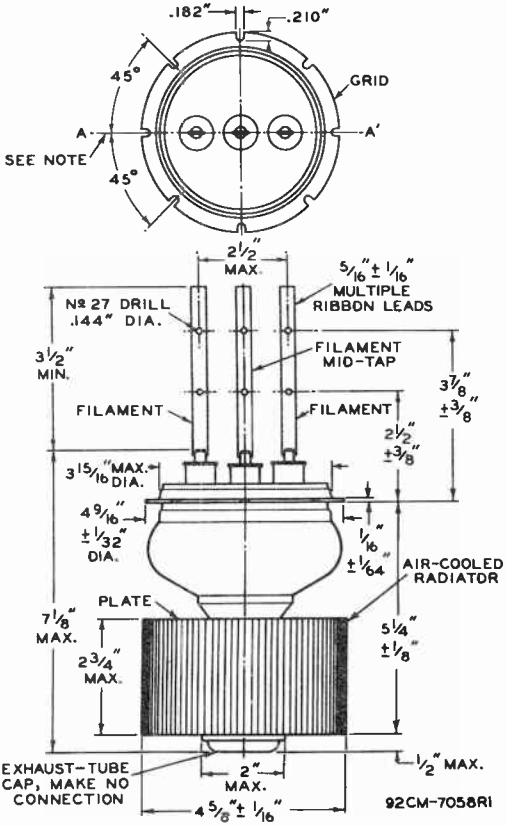
World Radio History

FREQUENCY	30	110	220		Mc
			Voltage	*Current*	
Class C Telegraphy, and FM Telephony	100	100	60	83	%
Class C Amplifier or Oscillator, Self Rectifying	100	100	60	83	%
Class C Amplifier or Oscillator with Separate, Rectified, Unfiltered Plate Supply	100	100	60	83	%

FOR ADDITIONAL INFORMATION ON THIS TYPE, WRITE FOR TECHNICAL BULLETIN AVAILABLE FROM:

Commercial Engineering
Electron Tube Division
RCA
Harrison, New Jersey

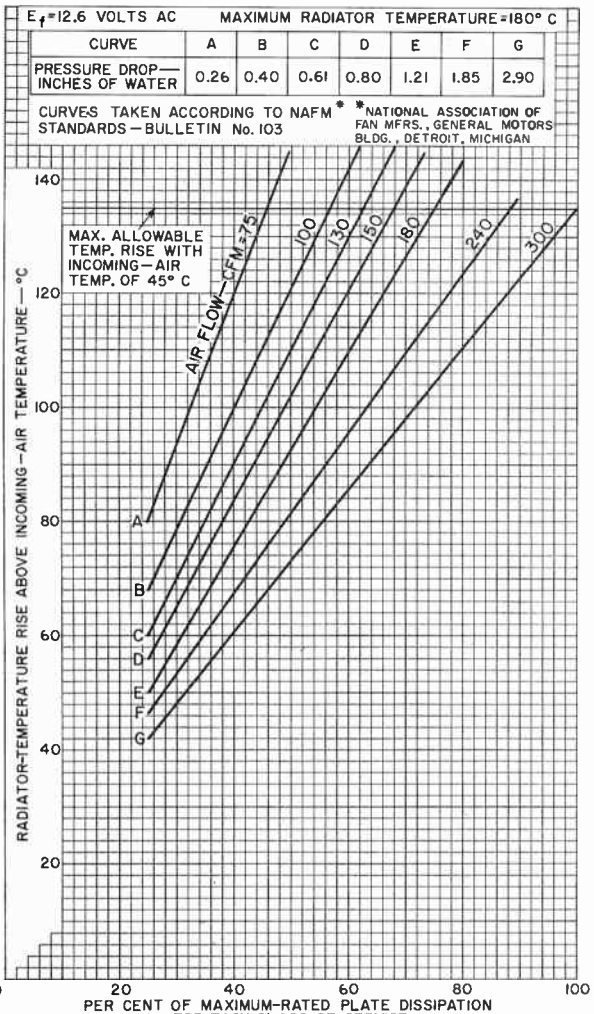
World Radio History



NOTE: PLANE OF FILAMENT LEADS WILL NOT DEVIATE MORE THAN 3-1/2° FROM PLANE PASSING THROUGH AA' NORMAL TO GRID FLANGE.

World Radio History

TYPICAL COOLING REQUIREMENTS



92CM-11091

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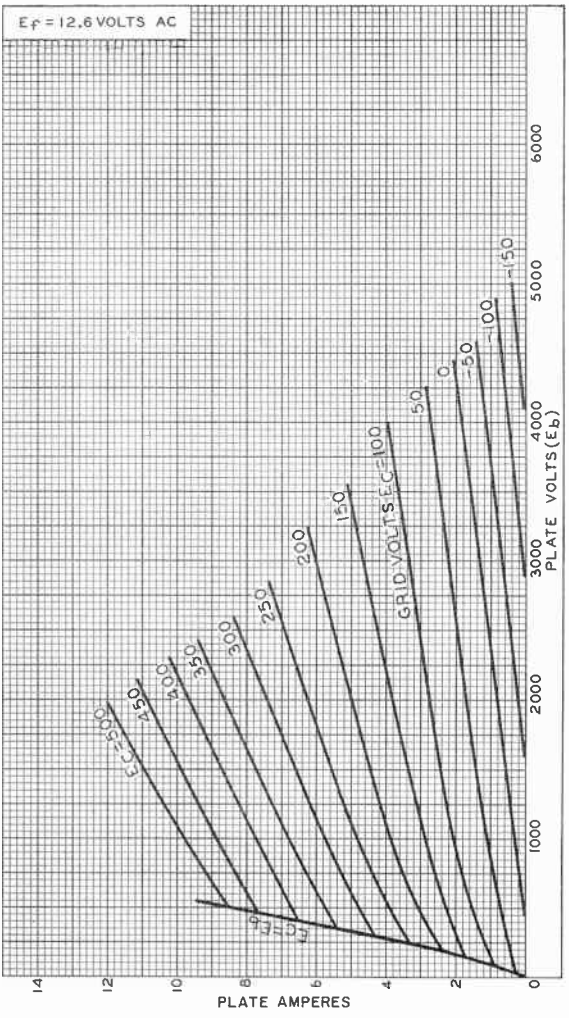
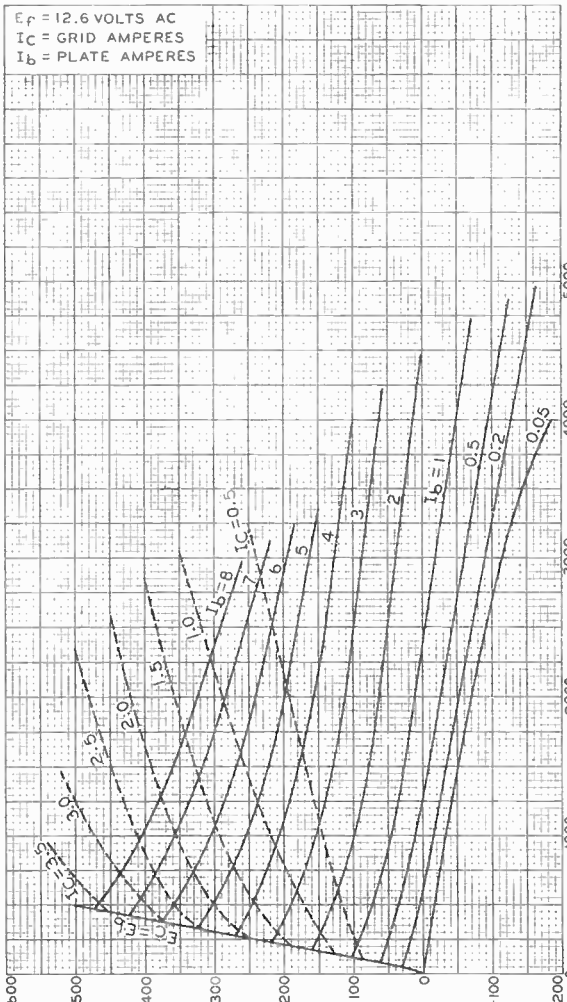
AVERAGE PLATE CHARACTERISTICS



92CM-7079

5762A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

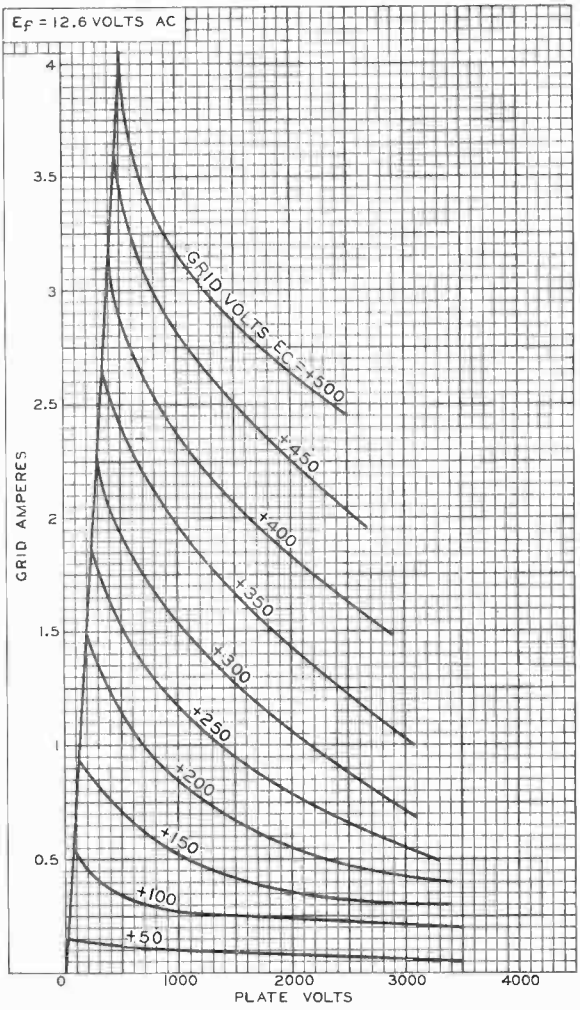


92CM-7082

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

World Radio History

TYPICAL CHARACTERISTICS



92CM-7081

World Radio History

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VHF BEAM POWER TUBE

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.0 ± 10%	ac or dc volts
Current	0.75	amp
Transconductance for plate current of 45 ma.	7000	μmhos
Mu-Factor, Grid No.2 to Grid No.1	16	
Direct Interelectrode Capacitances:[D]		
Grid No.1 to Plate	0.3 max.	μμf
Input	9.5	μμf
Output	4.5	μμf

[D] With no external shield.

Mechanical:

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

Pin 1 - Plate
Pin 2 - No Connection
Pin 3 - Grid No.3
Pin 4 - Heater
Pin 5 - Heater
Pin 6 - Grid No.2
Pin 7 - Cathode
Pin 8 - Grid No.1
Pin 9 - Grid No.1

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*	*CCS*[•]	*ICAS*[••]	
DC PLATE VOLTAGE	250 max.	300 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLTAGE	0 max.	0 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	40 max.	50 max.	ma
DC GRID-No.2 CURRENT	15 max.	15 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT	10 max.	15 max.	watts
GRID-No.2 INPUT	1.5 max.	1.5 max.	watts
PLATE DISSIPATION	8 max.	12 max.	watts

•,••: See next page.

World Radio History

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VHF BEAM POWER TUBE

	CCS●	*ICAS*●●	
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) .	250 max.	250 max.	°C
Typical Operation up to 30 Mc:			
DC Plate Voltage	250	300	
Grid No.3	Connected to cathode at socket		
DC Grid-No.2 Voltage♦ . . .	250	250	volts
DC Grid-No.1 Voltage★ . . .	-39	-42.5	volts
From a grid resistor of	39000	18000	ohms
Peak RF Grid-No.1 Voltage .	46.5	53.5	volts
DC Plate Current	40	50	ma
DC Grid-No.2 Current	5.6	6	ma
DC Grid-No.1 Current (Approx.) . . .	1	2.4	ma
Driving Power (Approx.) . .	0.05	0.15	watt
→ Useful Power Output (Approx.)	6.4■	10■	watts
Maximum Circuit Values (CCS or ICAS Conditions):			
Grid-No.1-Circuit Resistance	0.1 max.		megohm

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□ and RF POWER AMPLIFIER--Class C FM Telephony

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	300 max.	350 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLTAGE	0 max.	0 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-125 max.	-125 max.	volts
DC PLATE CURRENT	50 max.	50 max.	ma
DC GRID-No.2 CURRENT	15 max.	15 max.	ma
DC GRID-No.1 CURRENT	5 max.	5 max.	ma
PLATE INPUT	15 max.	17 max.	watts

♦ Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

★ Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

□ Key down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, ●●, ■: See next page. → Indicates a change

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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VHF BEAM POWER TUBE

	CCS●	ICAS●●	
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	12 max.	13.5 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). .	250 max.	250 max.	°C
Typical Operation up to 30 Mc:			
DC Plate Voltage	300	350	volts
Grid No.3	Connected to cathode at socket		
DC Grid-No.2 Voltage	250	250	volts
DC Grid-No.1 Voltage◉	-28.5	-28.5	volts
From a grid resistor of . .	18000	18000	ohms
Peak RF Grid-No.1 Voltage . .	37.5	37	volts
DC Plate Current	50	48.5	ma
DC Grid-No.2 Current	6.6	6.2	ma
DC Grid-No.1 Current (Approx.)	1.6	1.6	ma
Driving Power (Approx.) . . .	0.1	0.1	watt
Useful Power Output (Approx.)	10.3■	12■	watts ←
Typical Operation at 50 Mc:			
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◉	-60	–	volts
From a grid resistor of . .	22000	–	ohms
Peak RF Grid-No.1 Voltage . .	80	–	volts
DC Plate Current	50	–	ma
DC Grid-No.2 Current	5	–	ma
DC Grid-No.1 Current (Approx.)	3	–	ma
Driving Power (Approx.) . . .	0.35	–	watt
Useful Power Output (Approx.)	7■	–	watts ←

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance	0.1 max.	megohm

FREQUENCY MULTIPLIER

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	300 max.	volts
DC GRID-No.3 (SUPPRESSOR) VOLTAGE	0 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-125 max.	volts
DC PLATE CURRENT	50 max.	ma

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

◉,■: See next page.

← Indicates a change

World Radio History

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VHF BEAM POWER TUBE

DC GRID-No.2 CURRENT	15 max.	ma
DC GRID-No.1 CURRENT	5 max.	ma
PLATE INPUT	15 max.	watts
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)	250 max.	°C

Typical Operation:	*Doubler to 175 Mc*	*Tripler to 175 Mc*	
DC Plate Voltage	300	300	volts
Grid No.3	Connected to cathode at socket		
DC Grid-No.2 Voltage	*	*	volts
DC Grid-No.1 Voltage®	-75	-100	volts
From grid resistor of	75000	100000	ohms
Peak RF Grid-No.1 Voltage	95	120	volts
DC Plate Current	40	35	ma
DC Grid-No.2 Current	4	5	ma
DC Grid-No.1 Current (Approx.)	1	1	ma
Driving Power (Approx.)	0.6	0.6	watt
Useful Power Output (Approx.)	2.1■	1.3■	watts

Maximum Circuit Values (For maximum rated conditions):

→ Grid-No.1-Circuit Resistance	0.1 max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.69	0.81	amp
Grid No.1-Plate Capacitance	2	–	0.3	μμf
Input Capacitance	2	8.0	11.0	μμf
Output Capacitance	2	3.8	5.2	μμf
Transconductance	1,3	5100	8900	μmhos
Plate Current	1,3	33	57	ma
Grid-No.2 Current	1,3	–	10	ma
Reverse Grid-No.1 Current	1,4	–	2	μamp

NOTE 1: With 6 volts ac or dc on heater.

NOTE 2: With no external shield.

NOTE 3: With dc plate voltage of 250 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage of -7.5 volts.

NOTE 4: With dc plate voltage of 250 volts, dc grid-No.2 voltage of 250 volts, dc grid-No.1 voltage of -7.5 volts, and grid-No.1-circuit resistance of 0.1 megohm.

® Obtained from a fixed supply, or by a grid-No.1 resistor of value shown.

■ This value of useful power is measured at load of output circuit.

Data on Operating Freouencies for the 5763 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

→ Indicates a change

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

Radiomuseum.org

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AVERAGE CHARACTERISTICS

E_f=6.0 VOLTS DC
GRID-№2 VOLTS=250
GRID-№3 VOLTS=0

JAN.12,1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7160

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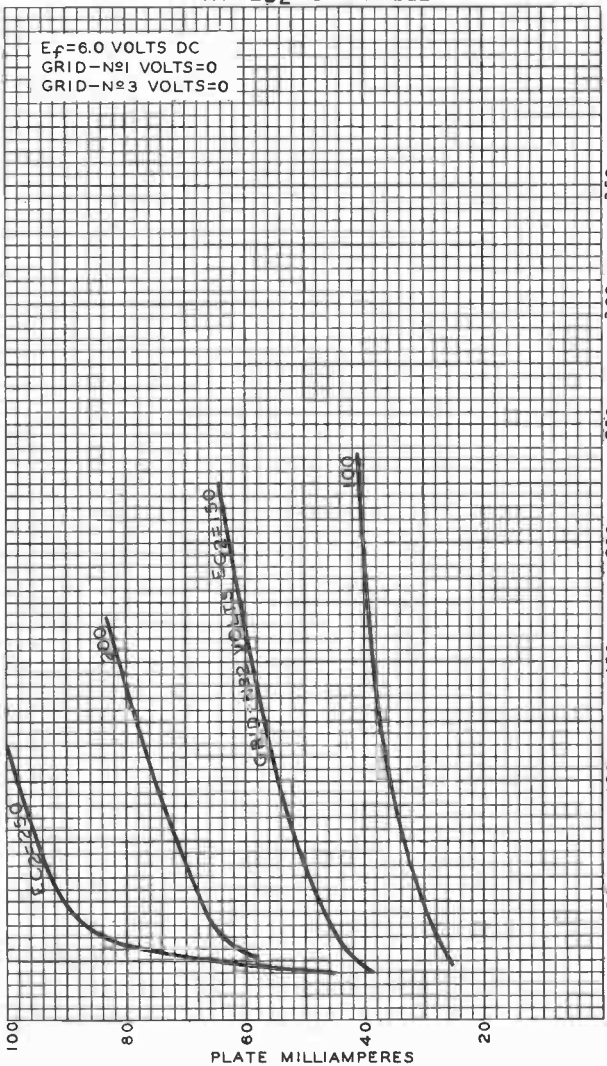
AVERAGE PLATE CHARACTERISTICS
WITH E_{C2} AS VARIABLE



JAN.10,1949

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7159

World Radio History

Power Triode

WATER AND FORCED-AIR COOLED — **GROUNDED-GRID TYPE**

GENERAL DATA

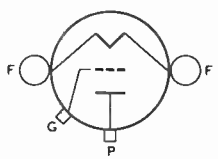
Electrical:

Filament, Multistrand Thoriated-Tungsten:		
Voltage (AC or DC)	11 ± 0.6	volts
Current at filament volts = 11	285	amp
Starting Current:	It is not necessary to provide means for limiting filament starting current on this type. Full rated filament voltage can be applied safely to the cold filament.	
Minimum Heating Time	15	sec
Amplification Factor	40	
Direct Interelectrode Capacitances (Approx.):		
Grid to plate	53	pf
Grid to filament	89	pf
Plate to filament	1.2	pf

Mechanical:

Operating Position . . . . . Vertical, filament end up
Maximum Overall Length . . . . . 24-1/2"
Maximum Diameter . . . . . 9-1/2"
Terminal Diagram (See *Dimensional Outline*):

F – Filament
G – Grid



P – Plate

Thermal:

Water Flow . . . . . 20 to 25 gpm
The specified water flow must start before the application of any voltages, and may be removed simultaneously with the filament and plate power.

Air Flow:
To plate seal and bulb:
At frequencies below 1.7 Mc . . . . . Natural
At frequencies above 1.7 Mc . . . . . Up to 250 cfm
Adequate forced-air cooling should be provided to limit the temperature of the plate seal and bulb to their specified maximum values. The amount of air flow required will increase with the operating frequency. The cooling air should start before the application of any voltages and should be distributed uniformly around the plate seal by means of a suitable air manifold and an air deflector. The air flow may be removed simultaneously with filament and plate power.

← Indicates a change.

World Radio History

To filament seals and grid seal . . . . . 10 min. cfm

The specified air flow should be directed vertically from a 1-1/4" diameter nozzle into the filament heater before and during the application of any voltages. It may be removed simultaneously with filament and plate power.

Outlet Water Temperature.	70 max.	°C
Bulb Temperature.	180 max.	°C
Seal Temperature (Filament, grid, and plate) .	165 max.	°C

AF POWER AMPLIFIER & MODULATOR — Class B

Maximum CCS[a] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE.	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[b]	6 max.	amp
Max.-SIGNAL PLATE INPUT[b].	90 max.	kw
PLATE DISSIPATION[b].	50 max.	kw

Typical Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage.	10200	15000	volts
DC Grid Voltage	-220	-320	volts
Peak AF Grid-to-Grid Voltage.	900	1560	volts
Zero-Signal DC Plate Current.	0.6	0.6	amp
Max.-Signal DC Plate Current.	5.8	12	amp
Effective Load Resistance (Plate to plate).	3600	2640	ohms
Max.-Sig. Driving Power (Approx.)[c]. .	120	688	watts
Max.-Sig. Power Output (Approx.). . .	37	117	kw

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE.	12500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT.	5.0 max.	amp
DC GRID CURRENT.	1.25 max.	amp
PLATE INPUT	60 max.	kw
PLATE DISSIPATION	33 max.	kw

Typical Operation:

DC Plate Voltage.	10200	12500	volts
DC Grid Voltage:[d]			
From a fixed-supply	-1500	-1500	volts
From a grid resistor of 2100 ohms. .	-1500	-	volts
From a grid resistor of 1400 ohms. .	-	-1500	volts
Peak RF Grid Voltage.	2070	2180	volts
DC Plate Current.	3.3	4.5	amp
DC Grid Current (Approx.)[e].	0.72	1.1	amp
Driving Power (Approx.)[e].	1350	2160	watts
Power Output (Approx.).	28	45	kw

World Radio History

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[f]

Maximum CCS Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	17000 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	9 max.	amp
DC GRID CURRENT	1.25 max.	amp
PLATE INPUT	150 max.	kw
PLATE DISSIPATION	50 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage:[g]			
From a fixed supply	-900	-1450	volts
From a cathode resistor of 125 ohms.	-900	-	volts
From a cathode resistor of 150 ohms.	-	-1450	volts
From a grid resistor of 750 ohms.	-900	-	volts
From a grid resistor of 1320 ohms	-	-1450	volts
Peak RF Grid Voltage	1600	2375	volts
DC Plate Current	6	8.5	amp
DC Grid Current (Approx.)[e]	1.2	1.1	amp
Driving Power (Approx.)[e]	1700	2300	watts
Power Output (Approx.)[e]	65	105	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)[e]	6250	11200	watts
Power Output	70	114	kw

[a] Continuous Commercial Service.

[b] Averaged over any audio-frequency cycle of sine-wave form.

[c] The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

[d] Obtained from a fixed supply, grid resistor, or a combination of both.

[e] For effect of load resistance on grid current and driving power, refer to TUBE RATINGS-*Grid Current and Driving Power* in the General Section.

[f] Key-down conditions per tube without amplitude modulation. 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.

[g] Obtained from a fixed supply, a cathode resistor, a grid resistor, or from a combination of a fixed supply and self-bias.

CHARACTERISTICS RANGE VALUES

	Note	*Min.*	*Max.*	
Filament Current	1	265	305	amp
Amplification Factor	1,2	35	45	←
Grid-Plate Capacitance	-	47	59	pf
Grid-Filament Capacitance	-	74	104	pf
Plate-Filament Capacitance	-	0.8	1.6	pf
Grid Voltage	1,3	-310	-490	volts
Plate Voltage	1,4	7100	9100	volts ←
Plate Voltage	1,5	3600	4600	volts
Peak Cathode Current	1,6	50	-	amp
Useful Power Output	1,7	80	-	kw ←

←Indicates a change.

World Radio History

Note 1: With 11 volts ac on filament.

Note 2: With dc grid voltage of -50 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 3: With dc plate voltage of 15000 volts, and with grid voltage adjusted to give dc plate current of 0.05 ampere.

Note 4: With dc grid voltage of -100 volts, and with plate voltage adjusted to give a dc plate current of 2 amperes.

Note 5: With dc grid voltage of 0 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 6: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

→ Note 7: With dc plate voltage of 17000 volts, dc plate current of 8.8 amperes, dc grid current of 1.05 to 1.25 amperes, grid resistor of 1600 ± 10% ohms, and frequency of 1.6 Mc.

MAXIMUM RATINGS vs OPERATING FREQUENCY

OPERATING FREQUENCY Mc	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED PLATE VOLTAGE & PLATE INPUT	
	TELEPHONY	TELEGRAPHY
	Class C Plate-Modulated	Class C Unmodulated
20	100	100
27	88	88
35	77	77

CURVES
shown under Type 5671
also apply to the 5770

→ Indicates a change.

World Radio History

RCA

5770

POWER TRIODE

WATER & FORCED-AIR COOLED, GROUNDED-GRID TYPE

GENERAL DATA

Electrical:

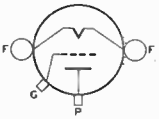
Filament, Multistrand Thoriated-Tungsten:

Excitation . . . Single Phase AC or DC		
Voltage.	11 ± 0.6	ac or dc volts
Current.	285	amp
Starting Current:	It is not necessary to provide means for limiting filament starting current on this type. Full rated filament voltage can be applied safely to the cold filament.	←
Cold Resistance.	0.005	ohm
Minimum Heating Time . .	15	seconds
Amplification Factor . . .	39	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate.	53	μμf
Grid to Filament	89	μμf
Plate to Filament. . . .	1.2	μμf

Mechanical:

Terminal Connections:

F - Filament
G - Grid-Flange Terminal



P - Water-Cooled Plate Terminal

Mounting Position.	Vertical, Filament End Up
Maximum Overall Length	24-1/2"
Maximum Diameter	9-1/2"
Water Flow	20 to 25 gpm

The specified water flow must start before the application of any voltages, and may be removed simultaneously with the filament and plate power.

Air Flow:

To Plate Seal and Bulb:

At frequencies below 1.7 Mc.	Natural
At frequencies above 1.7 Mc.	Up to 250 cfm

Adequate forced-air cooling should be provided to limit the temperature of the plate seal and bulb to their specified maximum values. The amount of air flow required will increase with the operating frequency. The cooling air should start before the application of any voltages and should be distributed uniformly around the plate seal by means of a suitable air manifold and an air deflector. The air flow may be removed simultaneously with filament and plate power.

To Filament Seals and Grid Seal. . . . . 10 min. cfm

The specified air flow should be directed vertically from a 1-1/4" diameter nozzle into the filament header before and during the application of any voltages. It may be removed simultaneously with filament and plate power.

Outlet Water Temperature	70 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate) . .	165 max.	°C

← Indicates a change.

World Radio History

5770

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POWER TRIODE

Components:

Water Jacket	RCA MI-19460
Gasket	RCA MI-27001
Air Manifold	RCA MI-19482-1
Air Deflector	RCA MI-19482-2
Filament Connector (2 required)	RCA MI-19481
Corona Shield	RCA MI-27008
Felt Pad (for corona shield)	RCA MI-27009
Porcelain Insulator	RCA MI-27002
Mounting Clamp	RCA MI-27003
Filament Transformer	RCA-212T1
Current Limiting Reactor	RCA-204R1

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	15000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	6 max.	amp
MAX.-SIGNAL PLATE INPUT*	90 max.	kw
PLATE DISSIPATION*	50 max.	kw

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	10200	15000	volts
DC Grid Voltage	-220	-320	volts
Peak AF Grid-to-Grid Voltage	900	1560	volts
Zero-Signal DC Plate Current	0.6	0.6	amp
Max.-Signal DC Plate Current	5.8	12	amp
Effective Load Resistance (Plate-to-plate)	3600	2640	ohms
Max.-Sig. Driving Power (Approx.)#	120	688	watts
Max.-Sig. Power Output (Approx.)	37	117	kw

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	-2000 max.	volts
DC PLATE CURRENT	5.0 max.	amp
DC GRID CURRENT	1.25 max.	amp
PLATE INPUT	60 max.	kw
PLATE DISSIPATION	33 max.	kw

Typical Operation:

DC Plate Voltage	10200	12500	volts
DC Grid Voltage®	-1500	-1500	volts
	2100	1400	ohms

®, ®: See next page.

World Radio History

RCA

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POWER TRIODE

Peak RF Grid Voltage	2070	2180	volts
DC Plate Current	3.3	4.5	amp
DC Grid Current (Approx.)□	0.72	1.1	amp
Driving Power (Approx.)□	1350	2160	watts
Power Output (Approx.)	28	45	kw

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	17000 max.	volts
DC GRID VOLTAGE	−2000 max.	volts
DC PLATE CURRENT	9 max.	amp
DC GRID CURRENT	1.25 max.	amp
PLATE INPUT	150 max.	kw
PLATE DISSIPATION	50 max.	kw

Typical Operation in Grounded-Filament Circuit:

DC Plate Voltage	14000	17000	volts
DC Grid Voltage▲▲	−900	−1450	volts
	125	150	ohms
	750	1320	ohms
Peak RF Grid Voltage	1600	2375	volts
DC Plate Current	6	8.5	amp
DC Grid Current (Approx.)□	1.2	1.1	amp
Driving Power (Approx.)□	1700	2300	watts
Power Output (Approx.)	65	105	kw

Typical Operation in Grounded-Grid Circuit:

Same values as for Grounded-Filament Circuit with the following exceptions:

Driving Power (Approx.)□	6250	11200	watts
Power Output	70	114	kw

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

● Obtained by grid resistor (2100, 1400) or by partial self-bias methods.

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

▲▲ Obtained from cathode resistor (125, 150) or grid resistor (750, 1320) or by partial self-bias methods.

• Continuous Commercial Service.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	265	305	amp
Amplification Factor	1,2	34	44	
Grid-Plate Capacitance	–	47	59	μμf
Grid-Filament Capacitance	–	74	104	μμf
Plate-Filament Capacitance	–	0.8	1.6	μμf
Grid Voltage	1,3	−310	−490	volts
Plate Voltage	1,4	7000	9000	volts

World Radio History

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POWER TRIODE

	Note	Min.	Max.	
Plate Voltage.	1,5	3600	4600	volts
Peak Cathode Current	1,6	50	–	amp
Useful Power Output, ...	1,7	85	–	kw

Note 1: With 11.0 volts ac on filament.

Note 2: With dc grid voltage of −50 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 3: With dc plate voltage of 15000 volts, and with grid voltage adjusted to give dc plate current of 0.05 ampere.

Note 4: With dc grid voltage of −100 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 5: With dc grid voltage of 0 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 6: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

Note 7: With dc plate voltage of 17000 volts, dc plate current of 8.5 amperes, dc grid current of 1.0 to 1.25 amperes, grid resistor of 1600 ± 10% ohms, and frequency of 1.5 Mc.

Data on operating frequencies for the 5770 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

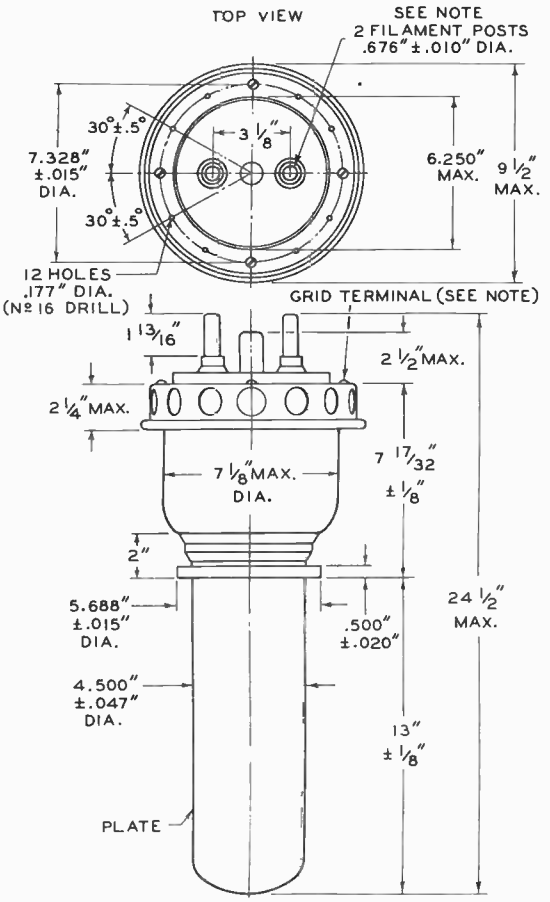
CURVES
for the 5770 are the same
as those for Type 5671

World Radio History

RCA

5770

POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-7070

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

World Radio History

RCA
5771

POWER TRIODE

WATER & FORCED-AIR COOLED

GENERAL DATA

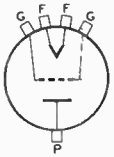
Electrical:

Filament, Multistrand Thoriated-Tungsten:		
Excitation	Single Phase AC or DC	
Voltage	7.5 ± 0.4	ac or dc volts
Current	170	amp
Starting Current: The filament current should never exceed 800 amperes, even momentarily.		
Cold Resistance	0.0055	ohm
Minimum Heating Time	15	seconds
Amplification Factor	20	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	24.5	μμf
Grid to Filament	47	μμf
Plate to Filament	3	μμf

Mechanical:

Terminal Connections:

F – Filament
G – Grid
P – Water-Cooled Plate



Grid terminals are spaced diametrically wider than filament terminals.

Mounting Position	Vertical, Filament End Up	
Maximum Overall Length	11-5/16"	
Maximum Diameter	7"	
Water Flow	12 to 20	gpm

The specified water flow must start before application of any voltages, and may be removed simultaneously with the filament and plate power.

Air Flow	20 min.	cfm

The specified air flow should be directed vertically from a 3"-diameter nozzle onto the top portion of the bulb before and during the application of any voltages.

Outlet Water Temperature	70 max.	°C
Bulb Temperature	180 max.	°C
Seal Temperature (Filament, grid, plate)	165 max.	°C

Components:

Water Jacket	RCA MI-19461
Jacket Wrench	RCA MI-19436
Gasket	RCA MI-7441
Terminal-Post Chuck Connector (4 required)	RCA MI-19466
Chuck Wrench (2 required)	RCA MI-19424
Filament Transformer	RCA-203T1

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS• Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500 max.	volts

•: See next page.

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POWER TRIODE

MAX.-SIGNAL DC PLATE CURRENT*	5 max.	amp
MAX.-SIGNAL PLATE INPUT*	45 max.	kw
PLATE DISSIPATION*	22.5 max.	kw

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	12500	volts
DC Grid Voltage	-600	volts
Peak AF Grid-to-Grid Voltage	1900	volts
Zero-Signal DC Plate Current	1	amp
Max.-Signal DC Plate Current	6.4	amp
Effective Load Resistance (Plate-to-plate)	4400	ohms
Max.-Signal Driving Power (Approx.)#	430	watts
Max.-Signal Power Output (Approx.)	55	kw

* Averaged over any audio-frequency cycle of sine-wave form.

\# The driving stage should have good regulation and should be capable of supplying considerably more than the specified driving power.

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	12500 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT	33 max.	kw
PLATE DISSIPATION	22.5 max.	kw

Typical Operation:

DC Plate Voltage	12500	volts
DC Grid Voltage	-625	volts
Peak RF Grid Voltage	625	volts
DC Plate Current	2.4	amp
DC Grid Current□	0	amp
Driving Power (Approx.)■□	1070	watts
Power Output (Approx.)	12	kw

■ At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	10000 max.	volts
DC GRID VOLTAGE	-1600 max.	volts
DC PLATE CURRENT	4 max.	amp
DC GRID CURRENT	0.8 max.	amp
PLATE INPUT	40 max.	kw
PLATE DISSIPATION	15 max.	kw

●□: See next page.

World Radio History

RCA

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POWER TRIODE

Typical Operation:

DC Plate Voltage	10000	volts
DC Grid Voltage®	−840	volts
	1075	ohms
Peak RF Grid Voltage	1440	volts
DC Plate Current	3.8	amp
DC Grid Current (Approx.)□	0.78	amp
Driving Power (Approx.)□	1010	watts
Power Output (Approx.)	29	kw

® Obtained by grid resistor of value shown or by partial self-bias methods.

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation□□

Maximum CCS® Ratings, *Absolute Values:*

	1.5 to 25 Mc	*Below 1.6 Mc*	
DC PLATE VOLTAGE	12500 max.	15000 max.	volts
DC GRID VOLTAGE	−1600 max.	−1600 max.	volts
DC PLATE CURRENT	6 max.	6 max.	amp
DC GRID CURRENT	0.8 max.	0.8 max.	amp
PLATE INPUT	60 max.	60 max.	kw
PLATE DISSIPATION	22.5 max.	22.5 max.	kw

Typical Operation:

DC Plate Voltage	10000	10000	12500	15000	volts
DC Grid Voltage▲▲	−720	−770	−630	−990	volts
	140	115	115	185	ohms
	1040	1000	840	1240	ohms
Peak RF Grid Voltage	1290	1440	1230	1620	volts
DC Plate Current	4.5	6	4.8	4.5	amp
DC Grid Current (Approx.)□	0.69	0.77	0.75	0.8	amp
Driving Power (Approx.)□	800	1000	1050	1160	watts
Power Output (Approx.)	33	40	44	53	kw

® Continuous Commercial Service.

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

□ For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

▲▲ Obtained from cathode resistor (140, 115, 115, 185), or grid resistor (1040, 1000, 840, 1240) or by partial self-bias methods.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	160	180	amp
Amplification Factor	1,2	17	23	

World Radio History

RCA

5771

POWER TRIODE

	Note	Min.	Max.	
Grid–Plate Capacitance	–	20	28	μμf
Grid–Filament Capacitance. . .	–	39	55	μμf
Plate–Filament Capacitance . .	–	2.3	3.7	μμf
Plate Voltage.	1,3	5300	7900	volts
Plate Voltage.	1,4	2100	3100	volts
Peak Cathode Current	1,5	35	–	amp
Useful Power Output.	1,6	33	–	kw

Note 1: With 7.5 volts ac on filament.

Note 2: With dc grid voltage of – 100 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 3: With dc grid voltage of – 200 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 4: With dc grid voltage of 0 volts, and with plate voltage adjusted to give dc plate current of 2 amperes.

Note 5: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

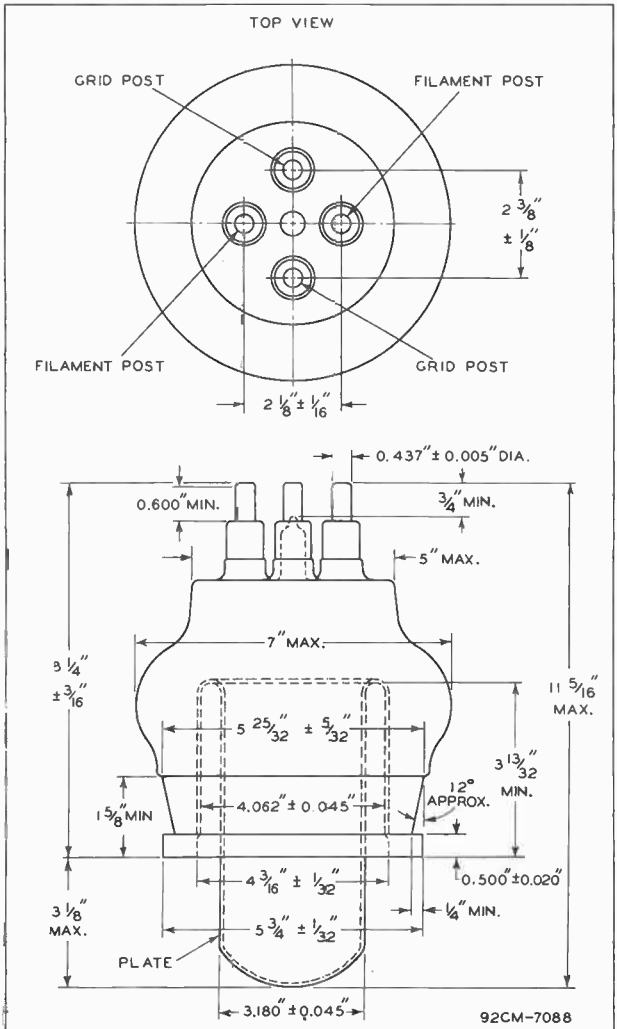
Note 6: With dc plate voltage of 12500 volts, dc plate current of 4.8 amperes, dc grid current of 0.6 to 0.9 ampere, grid resistor of 1600 ± 10% ohms, and frequency of 22 Mc.

Data on operating frequencies for the 5771 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

World Radio History

5771

POWER TRIODE



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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RCA

5771

AVERAGE PLATE CHARACTERISTICS

OCTOBER 28,1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7106

World Radio History

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RCA

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AVERAGE CONSTANT-CURRENT CHARACTERISTICS

E_f = 7.5 VOLTS AC
I_C = GRID AMPERES
I_b = PLATE AMPERES

PLATE KILOVOLTS (E_b)

GRID VOLTS (E_C)

OCTOBER 18, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7098

World Radio History

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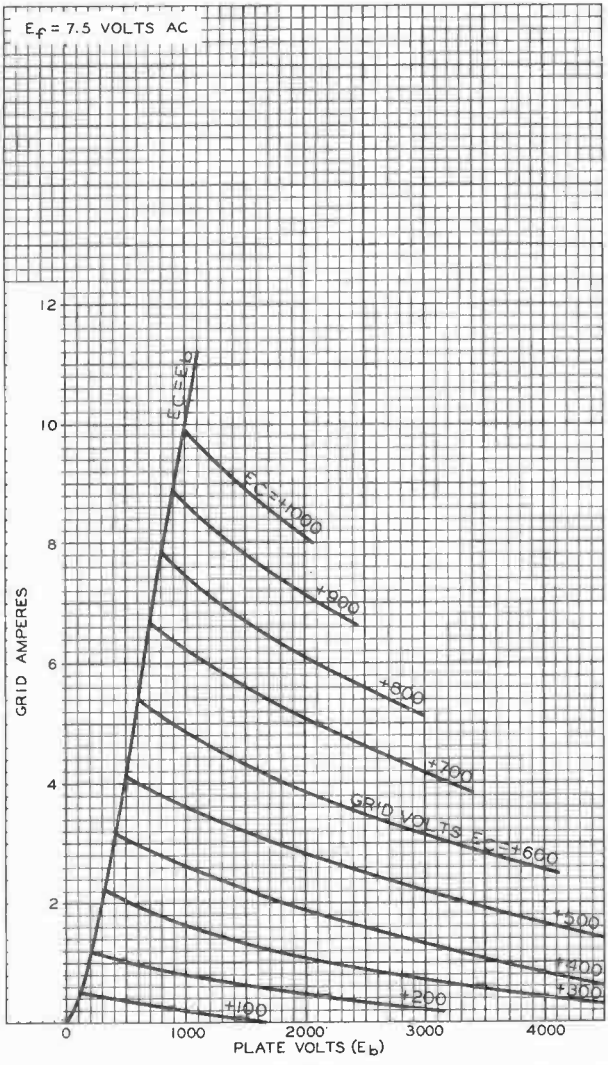
5771

TYPICAL CHARACTERISTICS



5786
POWER TRIODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Thoriated-Tungsten:

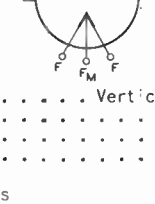
Voltage	11 ± 0.6	ac or dc volts
Current	12.5	amp
Starting current: The filament current must never exceed a value of 50 amperes, even momentarily.		
Cold resistance	0.13	ohm
Amplification Factor for grid-No.1 volts = -25 and plate ma. = 200	32	
Direct Interelectrode Capacitances:		
Grid to plate	5.3	μμf
Grid to filament	4.7	μμf
Plate to filament	3.8	μμf

Mechanical:

Terminal Connections:

F – Filament

F_M – Filament Mid-Tap



G – Grid Terminal (Opposite Filament Leads)

P – Radiator-Cooled Plate

Mounting Position	Vertical, grid end up or down
Overall Length	9-3/8" ± 1/4"
Maximum Diameter	2.895"
Radiator	Integral part of tube

Air Flow:

To radiator and seals for maximum rated conditions . 140 min. cfm

Sufficient air must be delivered by a blower to the radiator and seals so that the maximum radiator and seal temperatures will not be exceeded. Air flow must start before the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Incoming Air Temperature	45 max.	°C
Radiator Temperature (Measured at core at sufficient number of places to insure that rating is not exceeded)	180 max.	°C
Seal Temperature:		
Grid and plate	165 max.	°C
Filament	220 max.	°C
Weight (Approx.)	1.6	lbs

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum CCS• Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	500 max.	ma
MAX.-SIGNAL PLATE INPUT*	1500 max.	watts
PLATE DISSIPATION*	600 max.	watts

•,*: See next page.

← Indicates a change

5786

5786

POWER TRIODE

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	3000	volts
DC Grid Voltage#	-95	volts
Peak AF Grid-to-Grid Voltage	470	volts
Zero-Signal DC Plate Current	75	ma
Max.-Signal DC Plate Current	800	ma
Effective Load Resistance (Plate-to-plate)	8600	ohms
Max.-Signal Driving Power (Approx.)	30	watts
Max.-Signal Power Output (Approx.)	1640	watts

* Averaged over any audio-frequency cycle of sine-wave form.

Grid voltage is given with respect to mid-point of filament operated on ac or dc.

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	2500 max.	volts
DC GRID VOLTAGE	-500 max.	volts
DC PLATE CURRENT	400 max.	ma
DC GRID CURRENT	150 max.	ma
PLATE INPUT	1000 max.	watts
PLATE DISSIPATION	400 max.	watts

Typical Operation:

DC Plate Voltage	2500	volts
DC Grid Voltage®	-350	volts
	2600	ohms
Peak RF Grid Voltage	620	volts
DC Plate Current	400	ma
DC Grid Current (Approx.)□	135	ma
Driving Power (Approx.)□	75	watts
Power Output (Approx.)	810	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without amplitude modulation□□

Maximum CCS® Ratings, *Absolute Values*:

DC PLATE VOLTAGE	3000 max.	volts
DC GRID VOLTAGE	-500 max.	volts
DC PLATE CURRENT	500 max.	ma
DC GRID CURRENT	150 max.	ma
PLATE INPUT	1500 max.	watts
PLATE DISSIPATION	600 max.	watts

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

•, ⊕, □: See next page.

5786

POWER TRIODE

Typical Operation as RF Power Amplifier:

DC Plate Voltage	3000	volts
DC Grid Voltage▲▲	−200	volts
	2200	ohms
	330	ohms
Peak RF Grid Voltage	450	volts
DC Plate Current	500	ma
DC Grid Current (Approx.)□	90	ma
Driving Power (Approx.)□	36	watts
Power Output (Approx.)	1000	watts

Typical Operation as Oscillator at 160 Mc:

DC Plate Voltage	3000	volts
DC Grid Voltage †	−225	volts
	2000	ohms
	380	ohms
Peak RF Grid Voltage	475	volts
DC Plate Current	500	ma
DC Grid Current (Approx.)□	90	ma
Power Output (Approx.)	1000	watts
Useful Power Output (Approx.)— 85% circuit efficiency	850	watts

▲▲ Obtained from fixed supply, by grid resistor (2200) or by cathode resistor (330).

† Obtained from fixed supply, by grid resistor (2000) or by cathode resistor (380).

SELF-RECTIFYING OSCILLATOR or AMPLIFIER—Class C

Maximum CCS● Ratings, *Absolute Values*:

RMS PLATE VOLTAGE	4250 max.	volts
DC GRID VOLTAGE	−300 max.	volts
DC PLATE CURRENT	320 max.	ma
DC GRID CURRENT	85 max.	ma
PLATE INPUT	1500 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation:

RMS Plate Voltage	4250	volts
DC Grid Voltage⊕	−115	volts
	1500	ohms
DC Plate Current	320	ma
DC Grid Current□	77	ma
Driving Power (Approx.)■□	46	watts
Power Output (Approx.)	1050	watts

■ From a self-rectifying driver.

●□⊕: See next page.

World Radio History

5786

5786

POWER TRIODE

AMPLIFIER or OSCILLATOR—Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

Maximum CCS[●] Ratings, *Absolute Values*:

DC PLATE VOLTAGE	2700 max.	volts
DC GRID VOLTAGE	−300 max.	volts
DC PLATE CURRENT	450 max.	ma
DC GRID CURRENT	120 max.	ma
PLATE INPUT	1500 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation:

DC Plate Voltage	2700	volts
DC Grid Voltage[⊕]	−180	volts
	1530	ohms
DC Plate Current	450	ma
DC Grid Current (Approx.)[□]	118	ma
Driving Power (Approx.)[▲,□]	57	watts
Power Output (Approx.)	1150	watts

[●] Continuous Commercial Service.

[□] For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—*Grid Current and Driving Power* in the General Section.

[⊕] Obtained by grid resistor of value shown or by partial self-bias methods.

[▲] From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	11.7	13.3	amp
Amplification Factor	1,2	27	33	
Grid-Plate Capacitance	–	4.8	5.8	μμf
Grid-Filament Capacitance	–	3.6	4.8	μμf
Plate-Filament Capacitance	–	2.8	4.0	μμf
Plate Voltage	1,3	1030	1350	volts
Plate Voltage	1,4	2400	3000	volts
Grid Voltage	1,5	–	−130	volts
Peak Cathode Current	1,6	6	–	amp
Useful Power Output	1,7	800	–	watts

Note 1: With 11 volts ac on filament

Note 2: With dc grid voltage of −25 volts, and plate voltage adjusted to give dc plate current of 200 ma.

Note 3: With dc grid voltage of 0 volts, and plate voltage adjusted to give dc plate current of 200 ma.

Note 4: With dc grid voltage of −50 volts, and plate voltage adjusted to give dc plate current of 200 ma.

Note 5: With dc plate voltage of 3000 volts, and grid voltage adjusted to give a dc plate current of 1 ma.

Note 6: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.

World Radio History

POWER TRIODE

Note 7: With dc plate voltage of 3000 volts, dc plate current of 500 ma., dc grid current of 80 to 120 ma., grid resistor of 2000 ± 10% ohms, and frequency of 160 Mc.

Data on operating frequencies for the 5786 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

OPERATING NOTES

The quantity of air necessary for adequate cooling of the 5786 will depend on the power input to the tube, as well as on the efficiency and frequency at which the tube is operated. When the 5786 is operated with full power input at the maximum rated frequency of 160 megacycles, and with the circuit adjusted for tube operation at the maximum plate-dissipation rating, sufficient cooling will be provided by a blower such as the Fasco No.50749. This blower is made by F.A. Smith Mfg. Co., Inc., Rochester 2, N.Y. It has an outlet area of approximately 6.25 square inches and is capable of supplying 140 cubic feet of air per minute, free delivery.

Provision must be made to direct part of the air from the blower to the filament and grid seals. For this purpose, a blower duct similar to that shown on the following sheet is suggested. Also sketched is a semi-circular air deflector which is useful in providing adequate cooling to the side of the grid seal away from the incoming air stream.

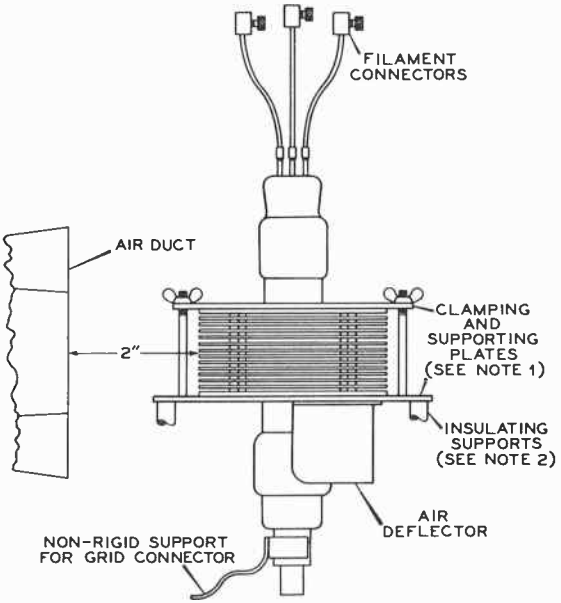
Depending on the type of application in which the 5786 is used, the required quantity of cooling air and the method employed for directing this air to the radiator and seals will vary considerably. It is recommended, therefore, that operating temperatures be measured in each application to make certain that maximum temperature ratings are not exceeded.

World Radio History

5786

POWER TRIODE

SUGGESTED MOUNTING



92CM-7080RI

NOTE 1: SUPPORTING PLATE AND CLAMPING PLATE HAVE HOLES LARGE ENOUGH TO PERMIT PASSAGE OF THE GLASS BULBS OF THE TUBE.

NOTE 2: TWO OR MORE INSULATORS MAY BE USED. INSULATORS MUST BE PLACED SO AS TO NOT INTEREFERE WITH AIR FLOW ONTO GRID TERMINAL.

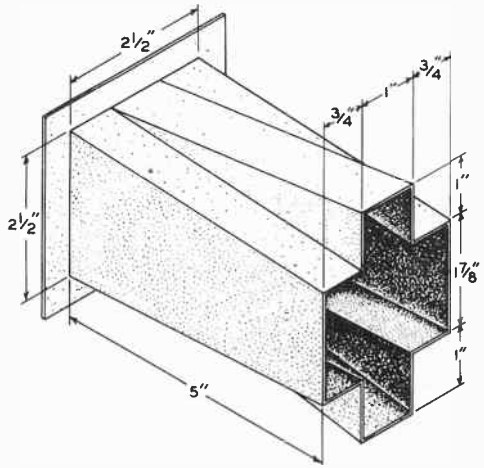
World Radio History

RCA

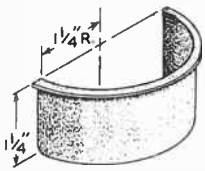
5786

POWER TRIODE

AIR DUCT



AIR DEFLECTOR



92CS-7117

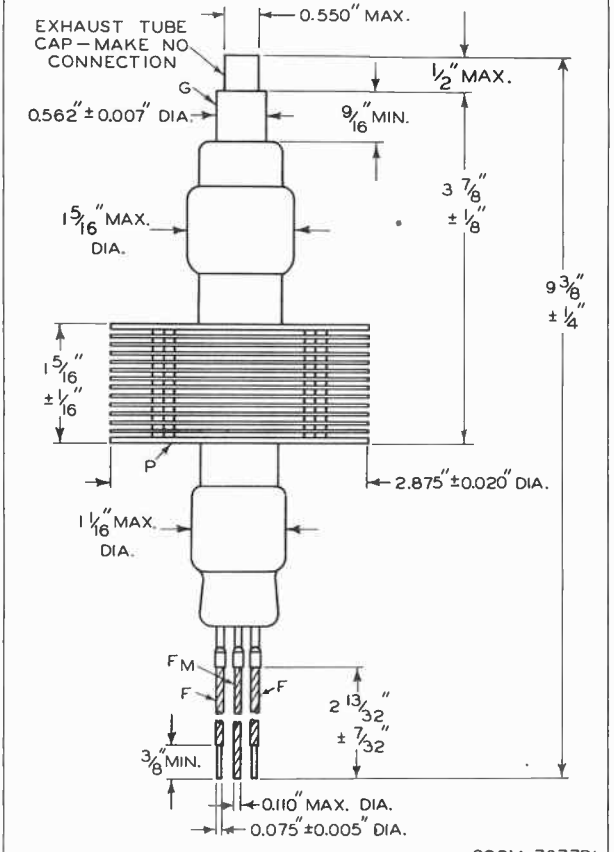
World Radio History

5786

RCA

5786

POWER TRIODE



World Radio History

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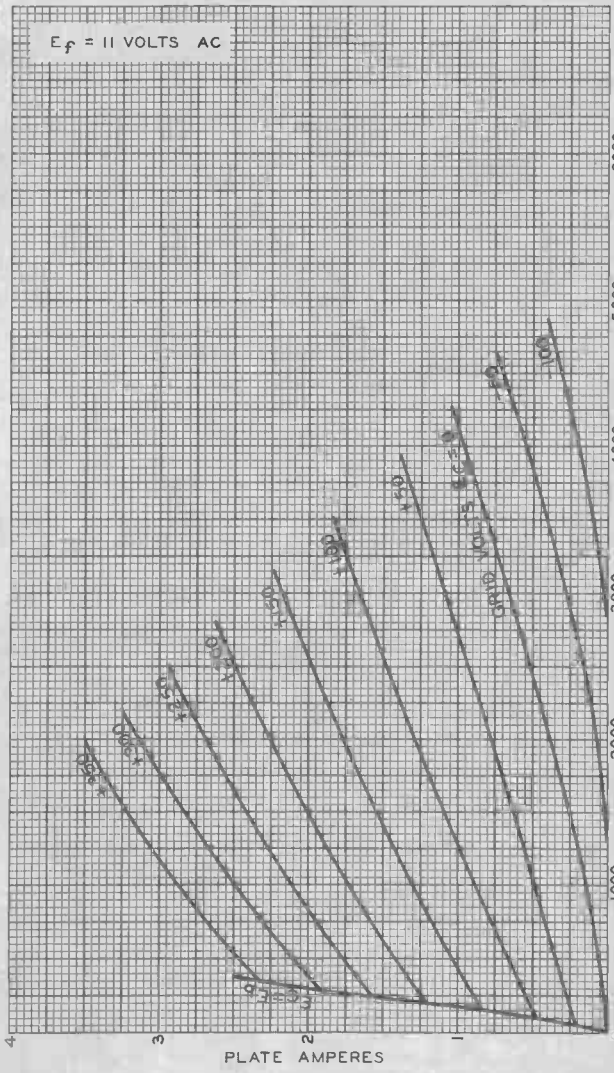
5786

AVERAGE PLATE CHARACTERISTICS



MAY 10, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6593RI

5786

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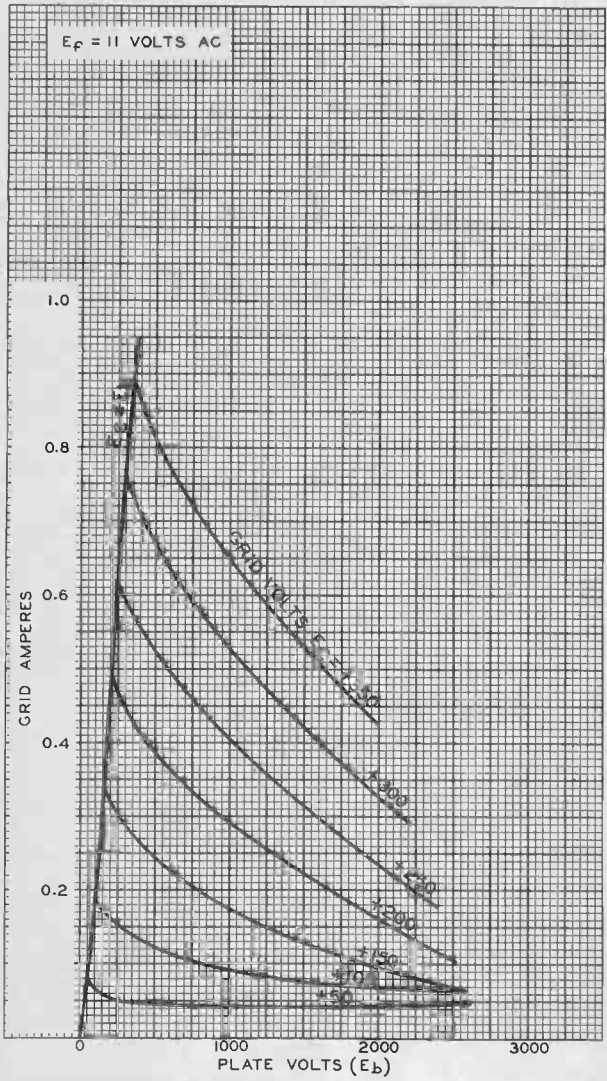
5786

TYPICAL CHARACTERISTICS



SEPT. 5, 1945

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6594

5794

FIXED-TUNED OSCILLATOR TRIODE

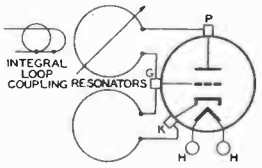
"PENCIL TYPE" WITH INTEGRAL RESONATORS
For radiosonde service at 1680 Mc

The 5794 is the same as the 6562 except for the following items:

Mechanical:

Dimensions . . . . . *See Dimensional Outline*
Terminal Connections *(See Dimensional Outline):*

H – Heater
K – Cathode



G – Grid
P – Plate

OPERATING CONSIDERATIONS

The *flexible heater leads* of the 5794 are usually soldered to the circuit elements. Soldering of these connections should not be made closer than 3/4" from the end of the tube. If this precaution is not followed, the heat of the soldering operation may crack the glass seals of the leads and damage the tube. Under no circumstances should any of the electrodes be soldered to the circuit elements. Connections to the electrodes should be made by spring contact only.

The 5794 should be supported by a suitable clamp around the metal shell either above or below the frequency-adjustment screw. It is essential, however, that the pressure exerted on the shell by the clamp be held to a minimum because excessive pressure can distort the reasonators and result in a change of frequency.

The *plate and cathode connections* should have flexible leads which will accommodate variations in the relative positions of the plate and cathode terminals in individual tubes.

The 5794 may be mechanically tuned by adjustment of the frequency-adjustment screw located on the metal shell of the tube. A clockwise rotation of the frequency-adjustment screw will decrease the frequency, while a counter-clockwise rotation will increase the frequency. The range of adjustment provided by the screw is ±12 megacycles.

← Indicates a change.

World Radio History

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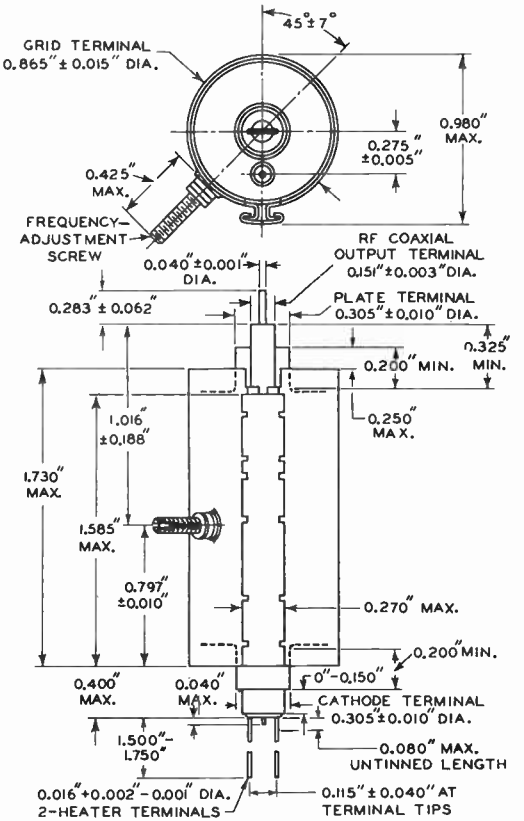
5794

FIXED-TUNED OSCILLATOR TRIODE



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5825

HALF-WAVE VACUUM RECTIFIER

GENERAL DATA

Electrical:

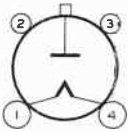
Filament, Thoriated Tungsten:		
Voltage	1.6	ac volts
Current	1.25	amp
Direct Interelectrode Capacitance:[o]		
Plate to Filament	2.2	μμf
Tube Voltage Drop at maximum peak plate current	1750	volts

[o] With no external shield.

Mechanical:

Mounting Position	Any
Overall Length	5-11/16" ± 5/32"
Seated Length	5-1/6" ± 5/32"
Maximum Diameter	2-1/16"
Bulb	ST-16
Cap	Medium
Base	Medium-Shell Small 4-Pin
Basing Designation for BOTTOM VIEW	4P

Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – No Connection



Pin 4 – Filament, Internal Shield
Cap – Plate

HALF-WAVE RECTIFIER

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

For supply frequencies up to 250 kc

PEAK INVERSE PLATE VOLTAGE	60000 max.	volts
PEAK PLATE CURRENT	40 max.	ma
AVERAGE PLATE CURRENT	2 max.	ma
HOT-SWITCHING TRANSIENT CURRENT for duration of 0.1 sec. max.	100 max.	ma
PLATE DISSIPATION	3.5 max.	watts
BULB TEMPERATURE	80 max.	°C

Typical Operation at 70 kc in Half-Wave Circuit with Capacitor-Input to Filter:

AC Plate-Supply Voltage (RMS)	21200	volts
Filter-Input Capacitor	350	μμf
Effective Plate-Supply Impedance	120000	ohms
DC Output Current	2	ma
DC Output Voltage at Input to Filter (Approx.):		
At half-load current (1 ma)	28000	volts
At full-load current (2 ma)	26700	volts
Voltage Regulation (Approx.):		
Half-load to full-load current	1300	volts

World Radio History

5825

5825

HALF-WAVE VACUUM RECTIFIER

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	1.15	1.35	amp
Plate-Filament Capacitance	-	2.14	2.26	μμf

Note: With 1.6 volts dc on filament.

OPERATING NOTES

When the filament is supplied from an rf power source which is at a high dc potential above ground, adjustment of the filament voltage by direct measurement is usually impractical. However, a simple method utilizing visual comparison of filament temperatures can be used for adjustment of filament power. The color temperature of the filament operating from an rf power source may be checked visually by observing in a darkened room the reflection of the incandescent filament upon the surface of the internal shield. A visual comparison of this color temperature with that obtained when the filament of another 5825 is operated from a dc or low-frequency ac supply of 1.6 volts, provides a convenient means for adjusting the amount of rf excitation to produce 1.6 volts (rms) at the filament terminals.

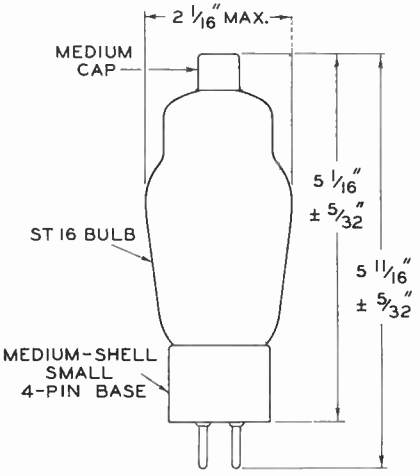
The filament must never under any condition of operation be allowed to reach a temperature higher than that caused by operating the filament on dc or low-frequency ac at a voltage of 1.68 volts. Operation at higher temperatures will cause impaired performance of the tube. During circuit adjustment, however, it is permissible to allow the filament voltage to rise to 2 volts for the brief interval required to make the adjustment.

Soft x-rays are produced when the 5825 is operated at a plate voltage above approximately 20000 volts. These rays can constitute a health hazard unless the tube is adequately shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equipment design.

World Radio History

5825

HALF-WAVE VACUUM RECTIFIER

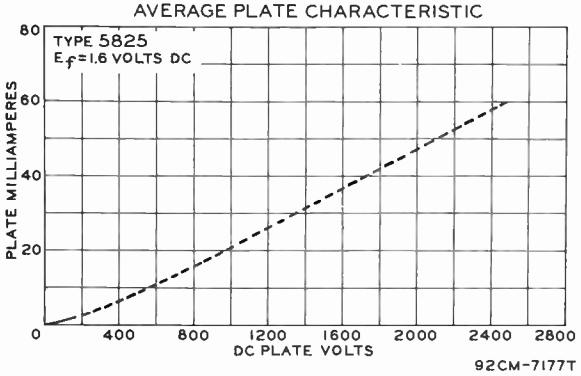


92CS-7176

World Radio History

5825

HALF-WAVE VACUUM RECTIFIER



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

5894

TWIN BEAM POWER TUBE

Useful at Frequencies up to 500 Mc

Unless Otherwise Specified, Values are on a Per-Tube Basis

GENERAL DATA

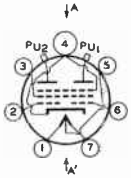
Electrical:

Heater for Unipotential Cathode:			
Heater arrangement	*Series*	*Parallel*	
Voltage	12.6 ± 10%	6.3 ± 10%	ac or dc volts
Current	0.9	1.8	amp
Mu-Factor, Grid No.2 to (Grid No.1 (Each Unit) for dc plate volts = 600, dc grid-No.2 volts = 250, and dc plate ma = 40		8.2	
Direct Interelectrode Capacitances (Each Unit):[o]			
Grid No.1 to plate		0.8 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		3.4	μμf

Mechanical:

Mounting Position:	
Vertical	Base up or down
Horizontal	Plate terminals in horizontal plane
Maximum Overall Length	4-5/16"
Seated Length	3-11/16" ± 3/16"
Maximum Diameter	1-15/16"
Bulb	T-14
Bulb Terminals (Two)	*See Dimensional Outline*
Weight (Approx.)	2.3 oz
Base	Small-Wafer Septar 7-Pin (JETEC No.E7-21)

BOTTOM VIEW



Pin 1 – Heater
Pin 2 – Grid No.1 of Unit No.2
Pin 3 – Grid No.2
Pin 4 – Cathode, Grid No.3, Internal Shield
Pin 5 – Heater Mid-Tap
Pin 6 – Grid No.1 of Unit No.1
Pin 7 – Heater
Pu_1 – Plate of Unit No.1
Pu_2 – Plate of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

Plate-Seal Temperature	200 max.	°C

[o] Without external shield.

World Radio History

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TWIN BEAM POWER TUBE

Base-Seal Temperature		180 max.	°C

Cooling: Free circulation of air around the tube is required. In addition, some forced-air cooling will generally be required to prevent exceeding the specified maximum bulb temperature.

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS● Ratings, *Absolute Values*:

DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	200 max.	ma
MAX.-SIGNAL PLATE INPUT*	120 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	7 max.	watts
PLATE DISSIPATION*	40 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 CCS● Operation:

DC Plate Voltage	450	600	volts
DC Grid-No.2 Voltage▲	250	250	volts
DC Grid-No.1 Voltage:			
From fixed-bias source	-23	-25	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	53	53	volts
DC Plate Current:			
Zero-signal value	67	35	ma
Max.-signal value	200	168	ma
DC Grid-No.2 Current:			
Zero-signal value	8	4	ma
Max.-signal value	26	27	ma
DC Grid-No.1 Current:			
Max.-signal value	2.3	1.6	ma
Effective Load Resistance (Plate to plate)	4400	8000	ohms
Max.-Signal Driving Power (Approx.)♦	0.2	0.2	watt
Max.-Signal Power Output (Approx.)♦	60	70	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:▲		
With fixed bias	50000 max.	ohms
With cathode bias	Not recommended	

* Averaged over any audio-frequency cycle of sine-wave form.

▲ Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

●, ♦: See next page.

World Radio History

5894

TWIN BEAM POWER TUBE

PLATE-MODULATED PUSH-PULL RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values*:

For max. plate voltage and max. plate input above 250 Mc, see Rating Chart I

DC PLATE VOLTAGE	450 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	volts
DC PLATE CURRENT	160 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT	72 max.	watts
GRID-No.2 INPUT	4.5 max.	watts
PLATE DISSIPATION	27 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 CCS® Operation:

	Up to 250 Mc	*At 470 Mc*	
DC Plate Voltage	450	380	volts
DC Grid-No.2 Voltage (Approx.)♦	250	250	volts
From an adjustable series resistor having a max. value of	20000	30000	ohms
DC Grid-No.1 Voltage*	-100	-60	volts
From a grid-No.1 resistor of	20000	15000	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage	120	-	volts
DC Plate Current	150	160	ma
DC Grid-No.2 Current (Approx.)	16	8	ma
DC Grid-No.1 Current (Approx.)	5	4	ma

♦ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class B stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the class B stage should be held at a low value. For this purpose, the use of transformer coupling is recommended. In no case, however, should the total dc grid-No.1-circuit resistance exceed 50000 ohms.

♦ Obtained preferable 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 completed.

* Obtained from a grid-No.1 resistor of value shown or by partial self-bias method. A combination of grid-No.1 resistor and fixed supply has the advantage not only of protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

●: See next page.

World Radio History

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TWIN BEAM POWER TUBE

	Up to 250 Mc	*At 470 Mc*	
Driver Power Output (Approx.)	0.6	13	watts
Useful Power Output (Approx.)●●	50	35	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance‡	50000 max.	ohms

PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy□ and PUSH-PULL RF POWER AMPLIFIER - Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values*:

For max. plate voltage and max. plate input above 250 Mc, see Rating Chart II

DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	volts
DC PLATE CURRENT	220 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT	120 max.	watts
GRID-No.2 INPUT	7 max.	watts
PLATE DISSIPATION	40 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 CCS● Operation:

	Up to 250 Mc	*At 470 Mc*		
DC Plate Voltage	600	400	500	volts
DC Grid-No.2 Voltage (Approx.)⊕	250	250	250	volts
From an adjustable series resistor having a max. value of	33000	22000	47000	ohms
DC Grid-No.1 Voltage■	-80	-38	-60	volts
From a grid-No.1 resistor of	39000	24000	30000	ohms
From cathode resistor of	360	180	300	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage	200	-	-	volts
DC Plate Current	200	220	200	ma

□ 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.

●, ●●, ‡, ⊕, ■: See next page.

World Radio History

RCA

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TWIN BEAM POWER TUBE

	Up to 250 Mc	*At 470 Mc*		
DC Grid-No.2 Current (Approx.)	16	12	8	ma
DC Grid-No.1 Current (Approx.)	2	3	4	ma
Driver Power Output (Approx.)	4	5	13	watts
Useful Power Output (Approx.)••	85	43	55	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance‡	50000 max.	ohms

FREQUENCY TRIPLER - Class C

Maximum CCS• Ratings, *Absolute Values*:

For max. plate voltage and max. plate input above 250 Mc, see Rating Chart III

DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	volts
DC PLATE CURRENT	160 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT	80 max.	watts
GRID-No.2 INPUT	7 max.	watts
PLATE DISSIPATION	40 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 CCS• Operation as Tripler:

	Up to 150 Mc		*To 225 Mc*	*To 462 Mc*		
DC Plate Voltage	400	500	400	400	400	volts
DC Grid-No.2 Voltage (Approx.)⊕	250	250	250	220	220	volts
From an adjustable series resistor having max. value of	16000	39000	20000	56000	56000	ohms

• Continuous Commercial Service.

⊕ Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 5894 is used in a circuit which is not keyed. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are completed.

••, ‡, ▪: See next page.

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TWIN BEAM POWER TUBE

	Up to 150 Mc	To 225 Mc	To 462 Mc		
DC Grid-No.1 Voltage■	-150	-150	-150	-150	-175 volts
From a grid-No.1 resistor of. . .	30000	24000	50000	36000	36000 ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage.	360	360	360	-	- volts
DC Plate Current . .	146	120	130	130	140 ma
DC Grid-No.2 Current (Approx.).	16	10	20	5	5 ma
DC Grid-No.1 Current (Approx.).	5	6	3	4	5 ma
Driver Power Output (Approx.).	0.9	1	0.5	4	8 watts
Useful Power Output (Approx.)●●. . . .	18	20	12	13	16 watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance‡. . . . . 50000 max. ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current:				
Series connection	1	0.8	1	amp
Parallel connection	2	1.6	2	amp
Mu-Factor, Grid No.2 to Grid No.1 (Each Unit)	2,3	7	9.3	
Direct Interelectrode Capacitances (Each Unit):				
Grid No.1 to plate.	4	-	0.08	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater.	4	9.4	11.6	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater	4	2.6	3.7	μμf

Note 1: With 12.6 volts ac on heater.

Note 2: With 6.3 volts ac on heater.

Note 3: With dc plate voltage of 600 volts, dc grid-No.2 voltage of 250 volts, and dc plate current of 40 ma.

Note 4: Without external shield.

●● This value of useful power output is measured at load of output circuit.

‡ When grid No.1 is driven positive, the total dc grid-No.1-circuit resistance should not exceed the specified value of 50000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

■ Obtained from a fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

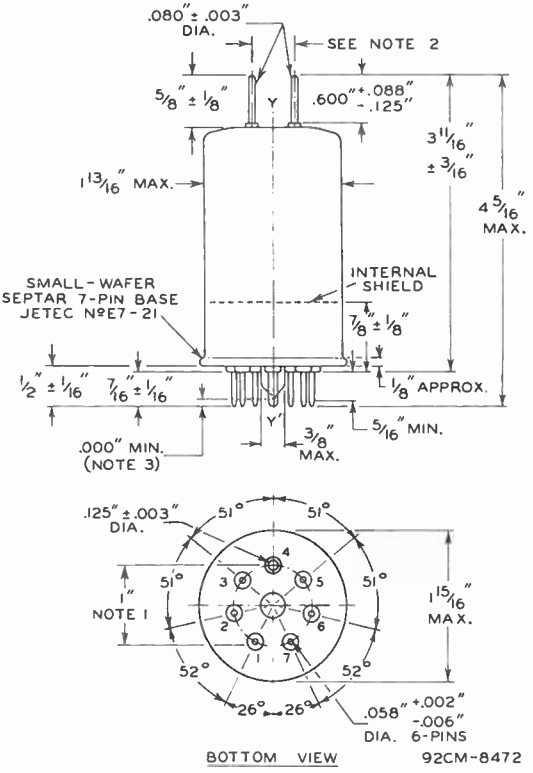
World Radio History

5894

TWIN BEAM POWER TUBE

OPERATING CONSIDERATIONS

Shielding of the 5894 in rf service is required for stable operation. A convenient method of shielding is to mount the socket approximately 7/8" beneath a hole in the chassis plate so that when the 5894 is inserted in the socket, the internal shield (see *Dimensional Outline*) of the tube will be close to the edge of the hole and in the same plane as the chassis plate. This arrangement provides an effective shield to isolate the grid-No.1 circuits from the plate circuits.



World Radio History

RCA

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TWIN BEAM POWER TUBE

THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 3/8" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES D.0800" ± 0.0005" AND ONE HOLE 0.1450" ± D.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ± 5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE D.500" ± D.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

NOTE 2: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING THICKNESS OF 3/8" AND HAVING TWO HOLES D.140" ± D.0005" WHOSE CENTERS ARE LOCATED AT A DISTANCE OF D.275" ± D.001" FROM THE AXIS YY' AND WHOSE AXES ARE PARALLEL TO YY'. THE PLANE THROUGH THESE AXES WILL BE 90° ± 5' FROM THE PLANE THROUGH YY' AND PIN No.4.

NOTE 3: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

World Radio History

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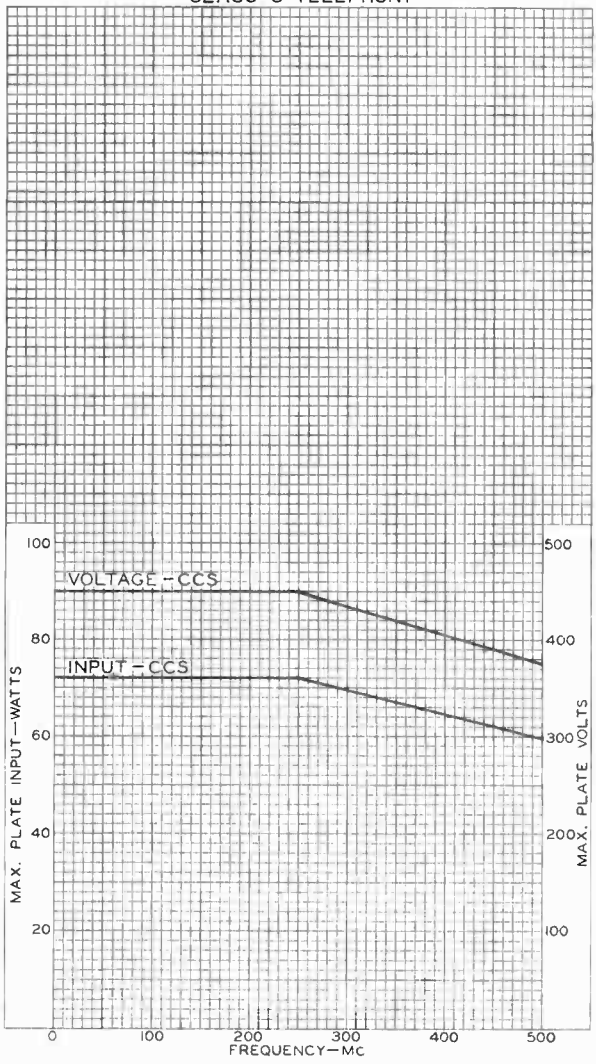
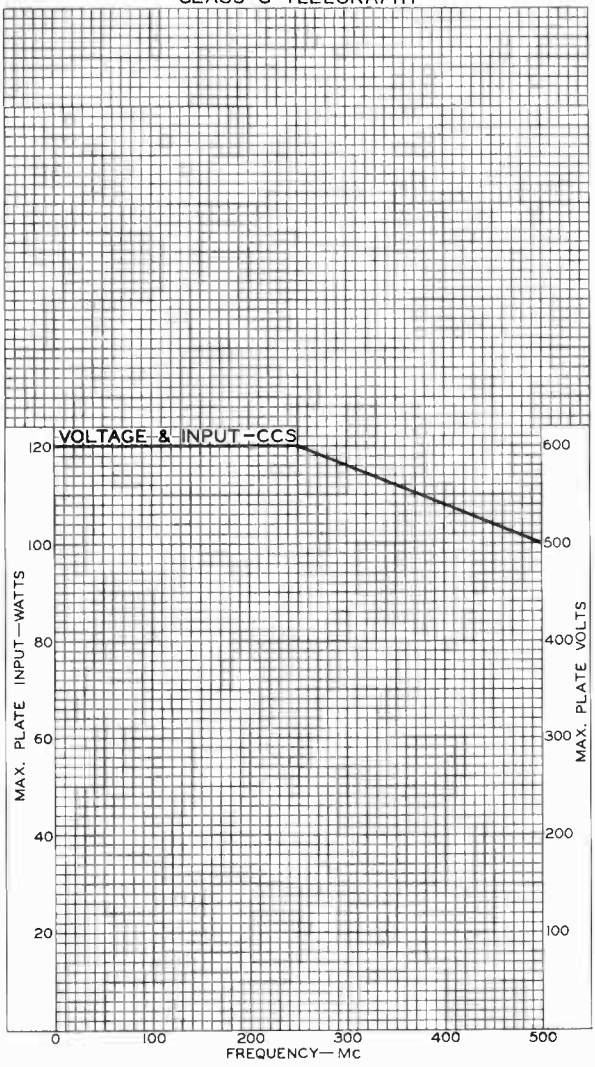
RATING CHART I
CLASS C TELEPHONY



5894

RATING CHART II
CLASS C TELEGRAPHY



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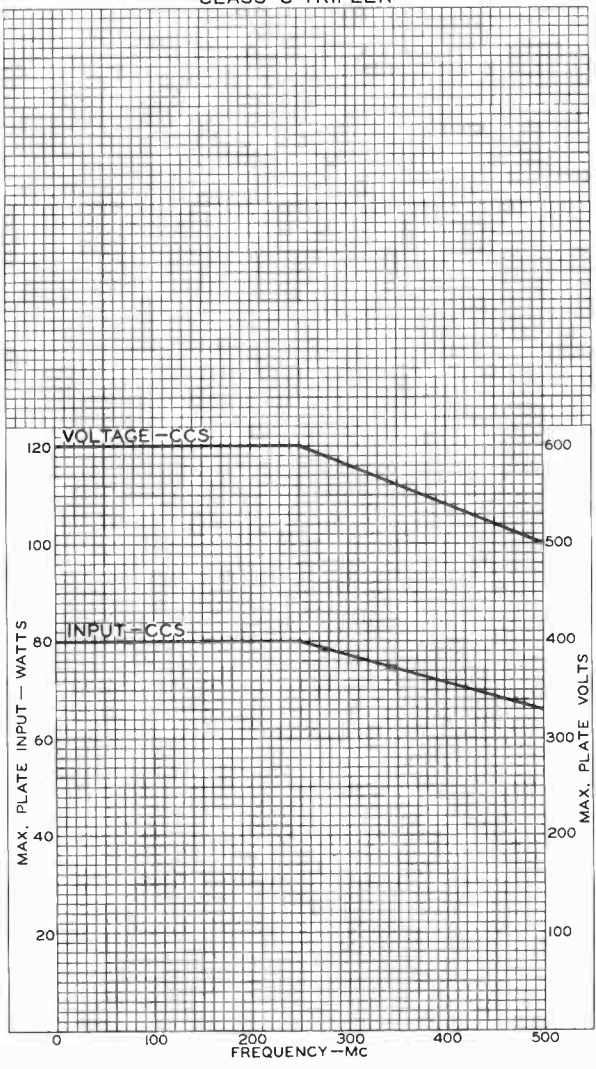
RATING CHART III
CLASS C TRIPLER



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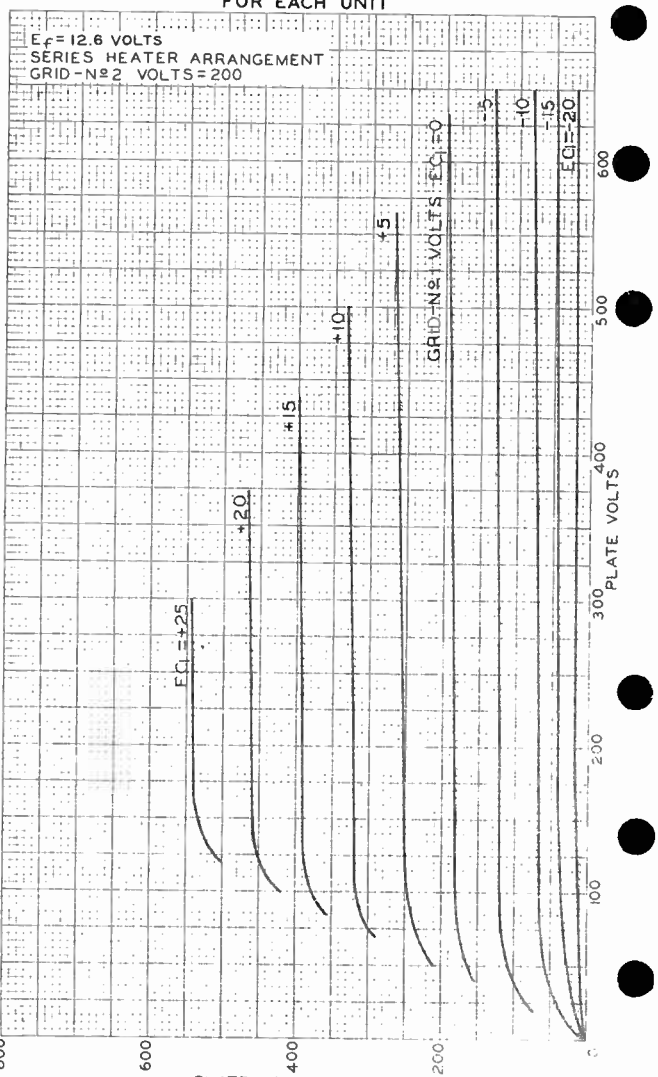
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



NOV. 5, 1954

TUBE DIVISION

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92CM-5474

World Radio History

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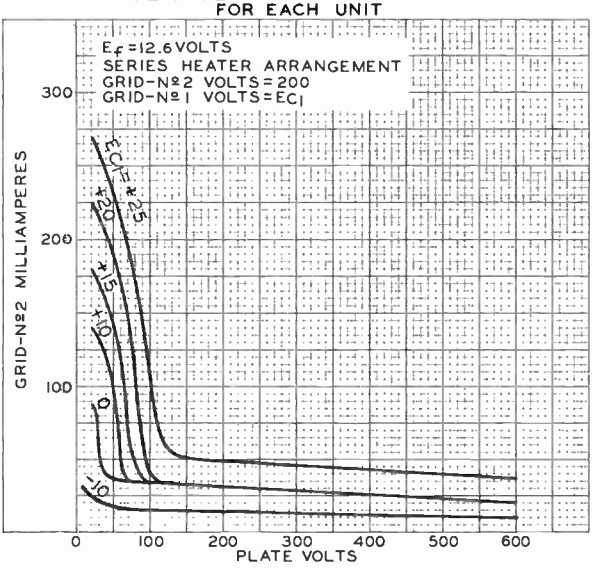
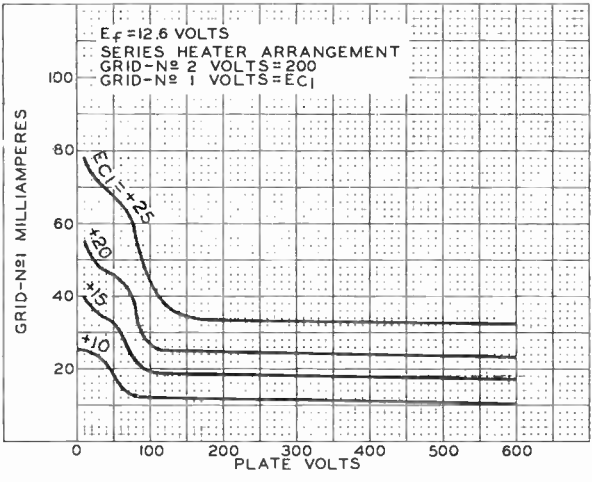
AVERAGE CHARACTERISTICS
FOR EACH UNIT





World Radio History

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AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT

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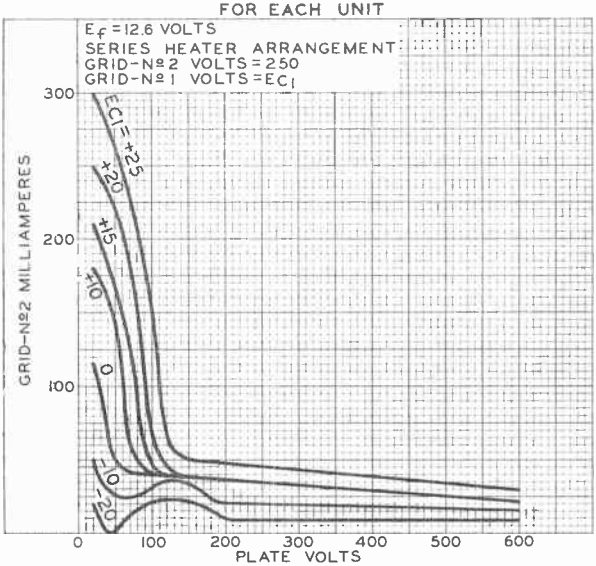
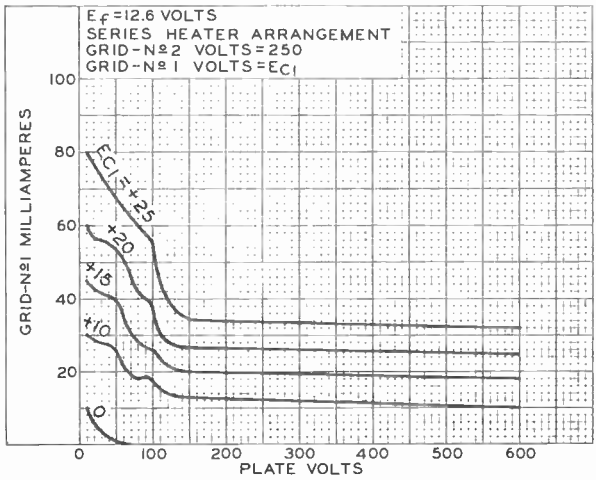
AVERAGE CHARACTERISTICS
FOR EACH UNIT





World Radio History

World Radio History

RCA

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POWER TRIODE

FORCED-AIR COOLED, GROUNDED-GRID TYPE

For μhf plate-pulsed oscillator and amplifier service

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	3.4	amp
Minimum Heating Time	1	minute
Amplification Factor	27	
Direct Interelectrode Capacitances:		
Grid to Plate	6	μμf
Grid to Cathode	11	μμf
Plate to Cathode[o]	0.32 max.	μμf

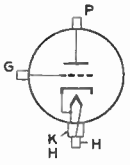
[o] with external shield connected to grid.

Mechanical:

Terminal Connections:

H – Heater Pin Terminal

K & H – Cathode and Heater Cylindrical Terminal



G – Grid Cylindrical Terminal

P – Plate Contact Surface on Plate Ring

Mounting Position	Vertical, with radiator up or down
Overall Length	3-5/16" ± 3/32"
Maximum Diameter	1.750" ± 0.010"
Radiator	Integral Part of Tube
Mounting	Special

Air Flow:

The specified air flow for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower onto the respective terminals and seals, and through the radiator before and during the application of any voltages. Heater power, plate power, and air may be removed simultaneously.

Plate Dissipation	150	200	250	watts
Min. Air Flow	5.7	10	16	cfm
Static Pressure	0.16	0.4	0.85	in. of water

The above flow and pressure values are for condition with radiator temperature held constant at 135°C rise above ambient temperature. The air flow must be adequate to limit the temperature of the radiator, grid terminal, cathode terminal, and seals to their respective maximum values.

Radiator Temperature (Measured on core at end adjacent to plate ring)	180 max.	°C
Grid-Terminal Temperature	150 max.	°C
Cathode-Terminal Temperature	150 max.	°C
Seal Temperature (Plate, grid, and cathode)	150 max.	°C

(continued on next page)

World Radio History

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POWER TRIODE

PLATE-PULSED OSCILLATOR & AMPLIFIER—Class C

Maximum Ratings, *Absolute Values*:

For a maximum pulse duration of 5 microseconds*

PEAK POSITIVE-PULSE PLATE-SUPPLY VOLTAGE	7500 max.	volts
PEAK NEGATIVE-PULSE GRID-BIAS VOLTAGE	600 max.	volts
PEAK PLATE CURRENT FROM PULSE SUPPLY	4.5 max.	amp
PEAK RECTIFIED GRID CURRENT	1.0 max.	amp
DC PLATE CURRENT	0.045 max.	amp
DC GRID CURRENT	0.010 max.	amp
PLATE DISSIPATION	250 max.	watts

Typical Operation with Rectangular Wave Shape in Oscillator Circuit at 1250 Mc:

*With duty factor** of 0.01*

Peak Positive-Pulse Plate-Supply Voltage	5500	7500	volts
Peak Negative-Pulse Grid-Bias Voltage	375	500	volts
Cathode Resistor▲	100	100	ohms
Peak RF Grid Voltage	625	850	volts
Peak Plate Current From Pulse Supply	3.5	4.5	amp
Peak Rectified Grid Current	0.25	0.5	amp
DC Plate Current	0.035	0.045	amp
DC Grid Current	0.0025	0.005	amp
Useful Power Output at Peak of Pulse■ (Approx.)	8000	14000	watts

* Pulse duration is defined as the time interval between the two points on the pulse at which the instantaneous value is 70% of the peak value. The peak value is defined as the maximum value of a smooth curve through the average of the fluctuations over the top portion of the pulse. The magnitude of any spike on the plate voltage pulse should not exceed a value of 8500 volts with respect to cathode and its duration should not exceed 0.5 microsecond measured at the peak-pulse-value level.

** Duty factor is the product of pulse duration and repetition rate. For variable pulse durations and pulse repetition rates, the duty factor is defined as the ratio of time "on" to total elapsed time in any 500-microsecond interval.

▲ It is recommended that the entire bias be obtained from a cathode resistor. In certain applications, partial grid-resistor bias may be used.

■ The power output at peak of pulse is obtained from the average power output using the duty factor of the peak power output pulse. This procedure is necessary since the power output pulse duty factor may be less than the applied voltage pulse duty factor because of a delay in the start of rf power output.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

5946

POWER TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Min.	
Heater Current	1	3.05	3.75	amp
Amplification Factor	1,2	20	34	
Grid-Plate Capacitance . . .	-	5.5	6.5	μμf
Grid-Cathode Capacitance . .	-	9.6	12.4	μμf
Plate-Cathode Capacitance. .	3	-	0.32	μμf
Plate Voltage.	1,4	550	810	volts
Plate Voltage.	1,5	750	1150	volts
Grid Voltage	1,6	-	-125	volts
Peak Cathode Current	1,7	12	-	amp
Useful Power Output at Peak of Pulse	1,8	12	-	kw

Note 1: With 6.3 volts on heater.

Note 2: With dc grid voltage of -15 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 3: With external shield connected to grid terminal.

Note 4: With dc grid voltage of -10 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 5: With dc grid voltage of -20 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 6: With dc plate voltage of 1250 volts, and dc grid voltage adjusted to give dc plate current of 1.0 milliampere.

Note 7: Represents the maximum value of cathode current (plate current and grid current) for the tube under any condition of operation.

Note 8: With peak positive-pulse plate-supply voltage of 7500 volts, cathode-bias resistor of 100 ± 10% ohms, peak plate current from pulse supply of 4.5 amperes, peak rectified grid current of 0.5 ampere, duty factor of 0.01, and frequency of 1250 Mc.

Data on operating frecuencies for the 5946 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

Outline Drawing and Mounting Arrangement for the 5946 are the same as for Type 5588

OPERATING NOTES

Rated heater voltage should be applied for at least one minute to allow the cathode to reach normal operating temperature before voltages are applied to the other electrodes. In circuits where the plate is grounded and the negative pulse is applied to the cathode, the heater supply must be insulated to withstand the peak positive-pulse plate-supply voltage, and it should also present a minimum amount of capacitance loading to the pulse-supply source.

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AVERAGE CHARACTERISTICS

OCT. 17, 1950

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7555

6146

Beam Power Tube

HIGH POWER SENSITIVITY
90 WATTS CW INPUT (ICAS) UP TO 60 Mc
60 WATTS CW INPUT (ICAS) AT 175 Mc

GENERAL DATA

Electrical:

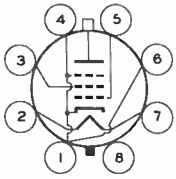
Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at heater volts = 6.3	1.25	amp
Transconductance, for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 100	7000	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 100	4.5	
Direct Interelectrode Capacitances:[a]		
Grid No.1 to plate	0.24 max.	pf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater	13.0	pf
Plate to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater	8.5	pf

Mechanical:

Operating Position	Any
Maximum Overall Length	3-13/16"
Seated Length	3-1/8" ± 1/8"
Maximum Diameter	1-23/32"
Weight (Approx.)	2.3 oz
Bulb	T12
Cap	Small (JEDEC No.C1-1)

Bases (Alternates):
- Large-Wafer Octal with Sleeve:
  8-Pin (JEDEC Group 1, No.B8-86)
- Large-Wafer with External Barriers and Sleeve:
  8-Pin (JEDEC Group 1, No.B8-98)

Basing Designation for BOTTOM VIEW: 7CK



Pin 1 - Cathode, Grid No.3, Internal Shield
Pin 2 - Heater
Pin 3 - Grid No.2
Pin 4 - Same as Pin 1
Pin 5 - Grid No.1
Pin 6 - Same as Pin 1
Pin 7 - Heater
Pin 8 - Base Sleeve
Cap - Plate

→ Indicates a change.

World Radio History

AF POWER AMPLIFIER & MODULATOR — Class AB_1[b]

Maximum Ratings, *Absolute-Maximum Values:*

	CCS[c]	*ICAS*[d]	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[e]	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT[e]	60 max.	85 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT[e]	3 max.	3 max.	watts
PLATE DISSIPATION[e]	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	220 max.	°C

Typical CCS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage[f]	190	185	180	volts
DC Grid-No.1 Voltage:				
From fixed-bias source	-40	-40	-45	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage[g]	80	80	90	volts
Zero-Signal DC Plate Current	63	57	26	ma
Max.-Signal DC Plate Current	228	215	200	ma
Zero-Signal DC Grid-No.2 Current	2.5	2	1	ma
Max.-Signal DC Grid-No.2 Current	25	25	23	ma
Effective Load Resistance (Plate to plate)	4000	5500	7000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	watts
Max.-Signal Power Output (Approx.)	55	70	82	watts

Typical ICAS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage	600	750	volts
DC Grid-No.2 Voltage[f]	200	195	volts
DC Grid-No.1 Voltage:			
From fixed-bias source	-50	-50	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage[g]	100	100	volts
Zero-Signal DC Plate Current	28	23	ma
Max.-Signal DC Plate Current	229	220	ma
Zero-Signal DC Grid-No.2 Current	1	1	ma
Max.-Signal DC Grid-No.2 Current	27	26	ma
Effective Load Resistance (Plate to plate)	6000	8000	ohms
Max.-Signal Driving Power (Approx.)	0	0	watts
Max.-Signal Power Output (Approx.)	95	120	watts

World Radio History

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance under any condition:[h]	
With fixed bias	0.1 max. megohm
With cathode bias	Not recommended

AF POWER AMPLIFIER & MODULATOR — Class AB_1[b]

Triode Connection—Grid No.2 Connected to Plate

	CCS	ICAS	
Maximum Ratings, *Absolute-Maximum Values:*			
DC PLATE VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[e]	90 max.	90 max.	ma
MAX.-SIGNAL PLATE INPUT[e]	35 max.	35 max.	watts
PLATE DISSIPATION[e]	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	220 max.	°C

Typical Push-Pull Operation:

	Values are for 2 tubes			
DC Plate Voltage	250	400	400	volts
DC Grid-No.1 Voltage	-50	-100	-100	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage[g]	100	200	200	volts
Zero-Signal DC Plate Current	120	40	40	ma
Max.-Signal DC Plate Current	125	100	100	ma
Effective Load Resistance (Plate-to-plate)	5000	8000	8000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	watts
Max.-Signal Power Output (Approx.)	10	22	22	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance under any condition:[h]	
With fixed bias	0.1 max. megohm
With cathode bias	0.5 max. megohm

AF POWER AMPLIFIER & MODULATOR — Class AB_2[j]

Maximum Ratings, *Absolute-Maximum Values:*

	CCS	ICAS	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[e]	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT[e]	62.5 max.	90 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT[e]	3 max.	3 max.	watts
PLATE DISSIPATION[e]	20 max.	25 max.	watts

World Radio History

6146

	CCS	ICAS	
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	135 max.	135 max.	volts
Heater positive with respect to cathode.	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface). . . .	220 max.	220 max.	°C

Typical CCS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage.	400	500	600 volts
DC Grid-No.2 Voltage[f]	175	175	165 volts
DC Grid-No.1 Voltage:			
→ From fixed-bias source. . . .	-41	-44	-44 volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	95	102	97 volts
Zero-Signal DC Plate Current. .	33	27	22 ma
Max.-Signal DC Plate Current. .	232	242	207 ma
Zero-Signal DC Grid-No.2 Current	1.1	0.7	0.6 ma
Max.-Signal DC Grid-No.2 Current	18	18	17 ma
Max.-Signal DC Grid-No.1 Current	1.6	1.9	1.1 ma
Effective Load Resistance (Plate to plate).	3700	4600	6800 ohms
Max.-Signal Driving Power (Approx.)[k].	0.2	0.3	0.2 watt
Max.-Signal Power Output (Approx.)	62	83	90 watts

Typical ICAS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage.	600	750	volts
DC Grid-No.2 Voltage[f]	190	165	volts
DC Grid-No.1 Voltage:			
From fixed-bias source.	-48	-46	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage. .	109	108	volts
Zero-Signal DC Plate Current.	28	22	ma
Max.-Signal DC Plate Current.	270	240	ma
Zero-Signal DC Grid-No.2 Current. . . .	1.2	0.3	ma
Max.-Signal DC Grid-No.2 Current. . . .	20	20	ma
Max.-Signal DC Grid-No.1 Current. . . .	2	2.6	ma
Effective Load Resistance (Plate to plate).	5000	7400	ohms
→ Max.-Signal Driving Power (Approx.)[k]. . .	0.3	0.4	watt
Max.-Signal Power Output (Approx.). . . .	113	131	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:[m]		
With fixed bias	30000 max.	ohms
With cathode bias	Not recommended	

→ indicates a change.

World Radio History

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1 and at frequencies up to 60 Mc

	CCS	ICAS	
Maximum Ratings, *Absolute-Maximum Values:*			
For maximum plate voltage and maximum plate input above 60 Mc, see Rating Chart 1			
DC PLATE VOLTAGE	480 max.	600 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 VOLTAGE	−150 max.	−150 max.	volts
DC PLATE CURRENT	117 max.	125 max.	ma
DC GRID-No.1 CURRENT	3.5 max.	4 max.	ma
PLATE INPUT	45 max.	67.5 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	13.3 max.	16.7 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	220 max.	°C
Typical Operation:			
DC Plate Voltage	400	475	600	volts
DC Grid-No.2 Voltage:[n]				
From a grid-No.2 series resistor of:				
33000 ohms	150	–	–	volts
51000 ohms	–	135	–	volts
56000 ohms	–	–	150	volts
DC Grid-No.1 Voltage:[p]				
From a grid-No.1 resistor of 27000 ohms	−87	−77	−87	volts
Peak RF Grid-No.1 Voltage	107	95	107	volts
DC Plate Current	112	94	112	ma
DC Grid-No.2 Current	7.8	6.4	7.8	ma
DC Grid-No.1 Current (Approx.)	3.4	2.8	3.4	ma
Driving Power (Approx.)	0.4	0.3	0.4	watt
Power Output (Approx.)	32	34	52	watts
Maximum Circuit Values (CCS or ICAS):				
Grid-No.1-Circuit Resistance[q]			30000 max.	ohms

World Radio History

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[r] and RF POWER AMPLIFIER — Class C FM Telephony

	CCS	ICAS	
Maximum Ratings, *Absolute-Maximum Values:*			
At frequencies up to 60 Mc. For maximum plate voltage and maximum plate input above 60 Mc, see Rating Chart II.			
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 VOLTAGE	-150 max.	-150 max.	volts
DC PLATE CURRENT	140 max.	150 max.	ma
DC GRID-No.1 CURRENT	3.5 max.	4 max.	ma
PLATE INPUT	67.5 max.	90 max.	watts
GRID-No.2 INPUT	3 max.	3 max.	watts
PLATE DISSIPATION	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	220 max.	°C

Typical Operation:

	As amplifier up to 60 Mc				
DC Plate Voltage	500	600	600	750	volts
DC Grid-No.2 Voltage:[s]					
From a grid-No.2 series resistor of:					
36000 ohms	170	-	-	-	volts
51000 ohms	-	150	-	-	volts
43000 ohms	-	-	180	-	volts
56000 ohms	-	-	-	160	volts
DC Grid-No.1 Voltage:[t]					
From a grid-No.1 resistor of:					
27000 ohms	-66	-	-	-	volts
20000 ohms	-	-58	-	-62	volts
24000 ohms	-	-	-71	-	volts
From cathode resistor of:					
430 ohms	-	-	-71	-	volts
470 ohms	-66	-58	-	-62	volts
Peak RF Grid-No.1 Voltage	84	73	91	79	volts
DC Plate Current	135	112	150	120	ma
DC Grid-No.2 Current	9	9	10	11	ma
DC Grid-No.1 Current (Approx.)	2.5	2.8	2.8	3.1	ma
Driving Power (Approx.)	0.2	0.2	0.3	0.2	watt
Power Output (Approx.)	48	52	66	70	watts

Typical Operation:

	As amplifier up to 175 Mc		
DC Plate Voltage	320	400	volts

World Radio History

DC Grid-No.2 Voltage:[s]			
From grid-No.2 series resistor of:			
13000 ohms.	180	–	volts
20000 ohms.	–	190	volts
DC Grid-No.1 Voltage:[t]			
From a grid-No.1 resistor of:			
27000 ohms.	-51	–	volts
24000 ohms.	–	-54	volts
From cathode resistor of			
330 ohms.	-51	-54	volts
Peak RF Grid-No.1 Voltage . . .	64	68	volts
DC Plate Current.	140	150	ma
DC Grid-No.2 Current.	10	10.4	ma
DC Grid-No.1 Current (Approx.).	2	2.2	ma
Driving Power (Approx.)	3	3	watts
Power Output (Approx.).	25	35	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1 Circuit Resistance[q]	30000 max.	ohms

[a] Without external shield.

[b] Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

[c] Continuous Commercial Service.

[d] Intermittent Commercial and Amateur Service.

[e] Averaged over any audio-frequency cycle of sine-wave form.

[f] Obtained preferably from a separate source or from the plate-voltage supply with a voltage divider.

[g] The driver stage should be capable of supplying the No.1 grids of the class AB_1 stage with the specified driving voltage at low distortion.

[h] 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.

[j] Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

[k] Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage.

[m] 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. In no case, however, should the total dc grid-No.1-circuit resistance exceed 30000 ohms when the 6146 is operated at maximum ratings. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

[n] Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

[p] Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

[q] When grid No.1 is driven positive and the 6146 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

[r] 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.

[s] Obtained preferably from separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 6146 is used in a cir-

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cuit which is not keyed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.

† Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

CHARACTERISTICS RANGE VALUES

	Note	Min.	Max.	
Heater Current	1	1.175	1.325	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.24	pf
Grid-No.1 to cathode & grid No.3 & internal shield, base sleeve, grid No.2, and heater	2	12.0	15.0	pf
Plate to cathode & grid No.3 & internal shield, base sleeve, grid No.2, and heater	2	7.3	9.5	pf
Plate Current	3	46	94	ma
Grid-No.2 Current	3	–	5.5	ma
Dynamic Grid-No.2 Current	4	3	21	ma
Useful Power Output	4	47	–	watts

Note 1: With 6.3 volts ac on heater.

Note 2: Without external shield.

Note 3: With rated ac heater voltage, dc plate volts = 300, dc grid-No.2 volts = 200, and dc grid-No.1 volts = −33.

Note 4: In a single-tube, self-excited oscillator circuit, and with rated ac heater voltage, dc plate volts = 600, dc grid-No.2 volts = 180, grid-No.1 resistor (ohms) = 30000 ± 10%, dc plate ma. = 100 to 112, dc grid-No.1 ma. = 2 to 2.5, and frequency (Mc) = 15.

MAXIMUM RATINGS vs OPERATING FREQUENCY

OPERATING FREQUENCY Mc	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED PLATE VOLTAGE & PLATE INPUT			
	TELEPHONY		TELEGRAPHY	
	Class C Plate-Modulated		Class C Unmodulated	
	Voltage	*Input*	*Voltage*	*Input*
60	100	100	100	100
80	84	92	84	92
125	65	78	65	78
150	58	72	58	72
160	56	70	56	70
175	53	67	53	67

→ indicates a change.

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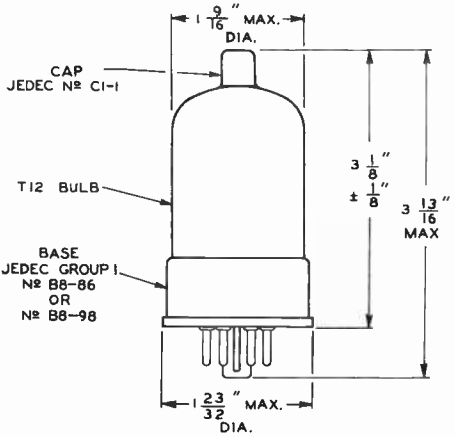
OPERATING CONSIDERATIONS

During standby periods in intermittent operation, it is recommended that the heater voltage be maintained at normal operating value when the period is less than 15 minutes, and that it be reduced to 80 per cent of normal when the period is between 15 minutes and 2 hours. For longer periods, the heater voltage should be turned off.

The maximum-rated plate and grid-No.2 voltages of this tube are extremely dangerous. Great care should be taken during the adjustment of circuits. The tube and its associated apparatus, especially all parts which may be at high potential above ground, should be housed in a protective enclosure. The protective housing should be designed with interlocks so that personnel can not possibly come in contact with any high-potential point in the electrical system. The interlock devices should function to break the primary circuit of the high-voltage supplies when any gate or door on the protective housing is opened, and should prevent the closing of the primary circuit until the door is again locked.



92CS-7700R4

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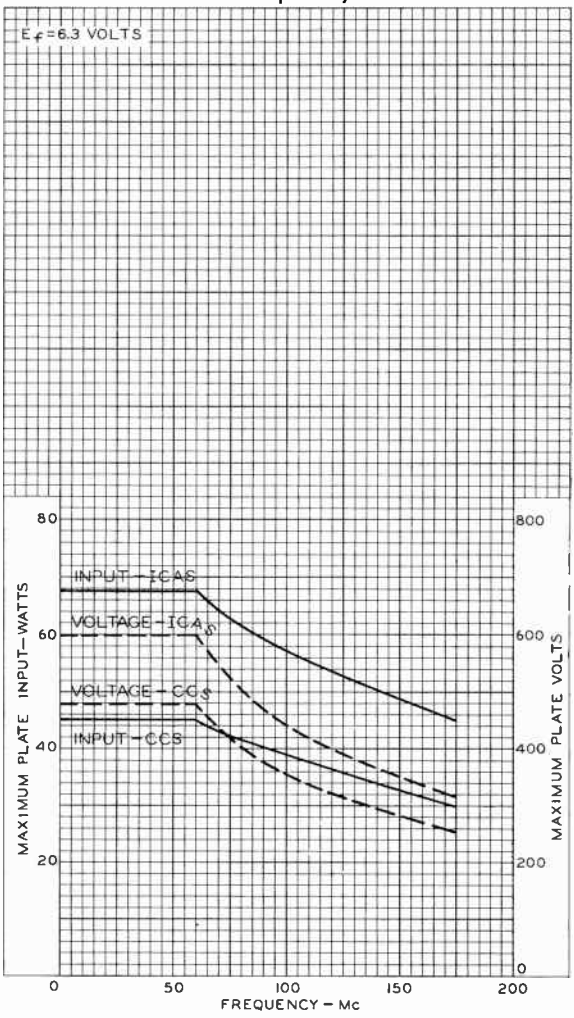
RATING CHART I
Class C Telephony Service



92CM-7712RI

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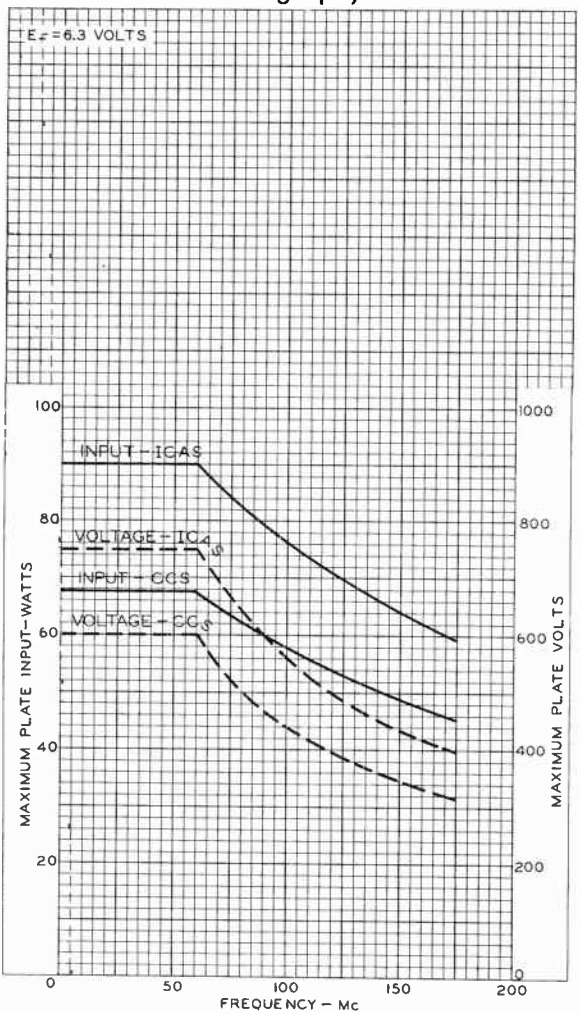
Class C Telegraphy Service



92CM-7709RI

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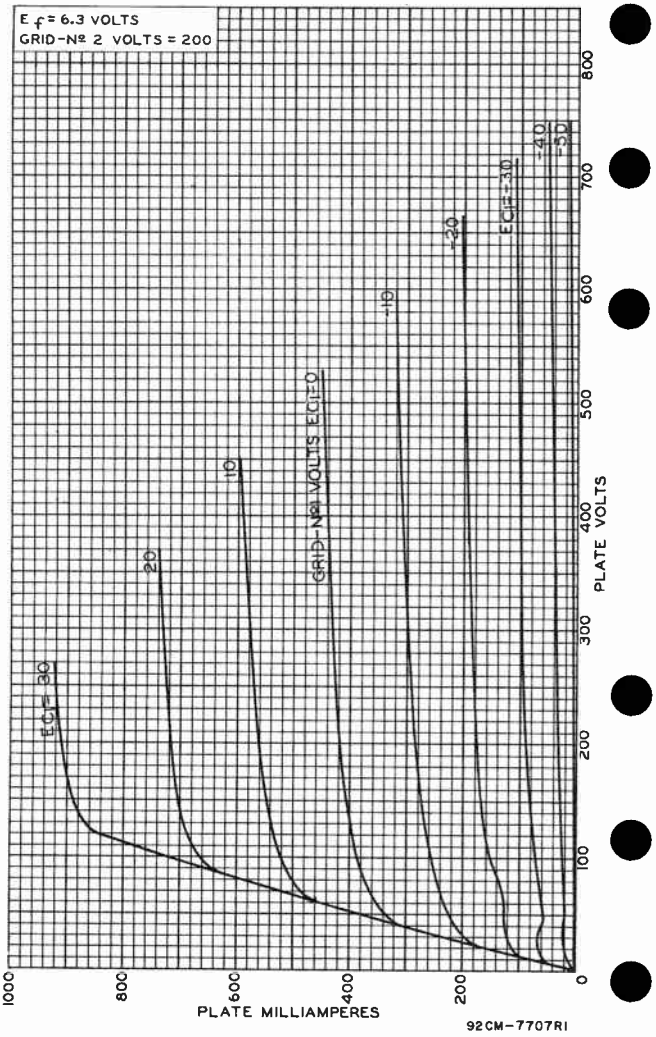
TYPICAL PLATE CHARACTERISTICS



92CM-7707RI

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

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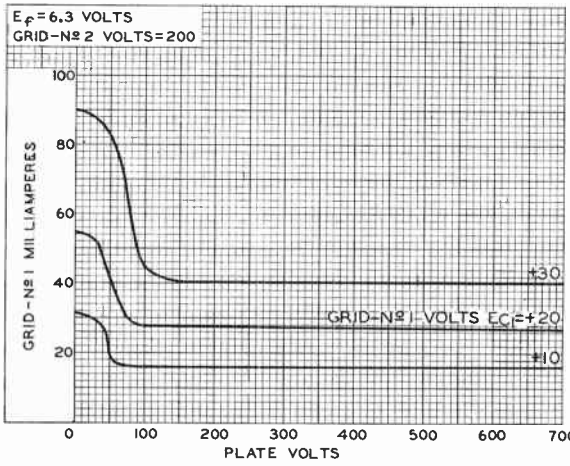
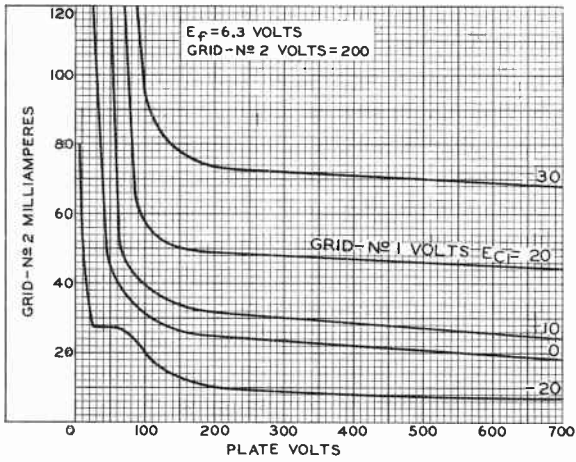
TYPICAL CHARACTERISTICS



92CS-9617



92CS-9618

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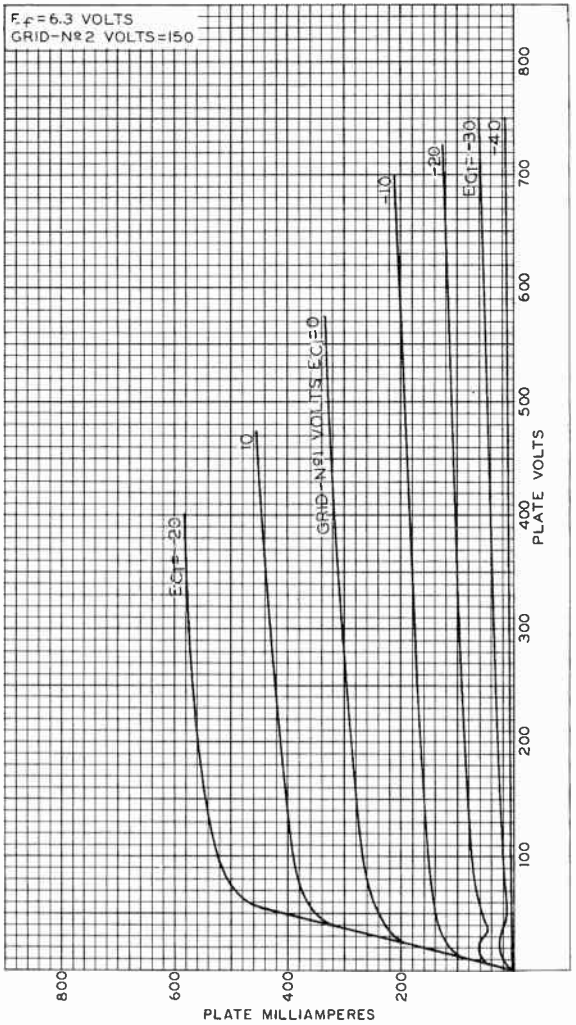
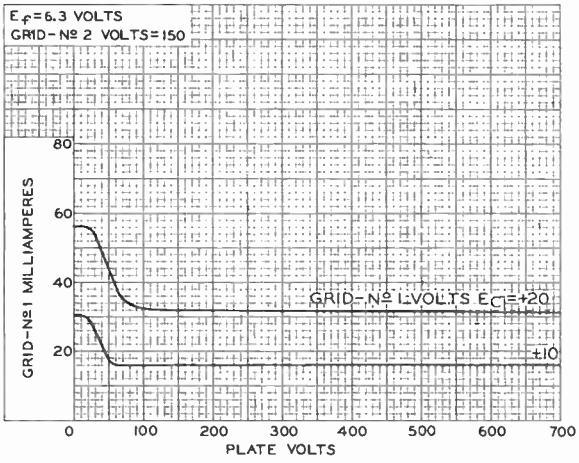
TYPICAL PLATE CHARACTERISTICS

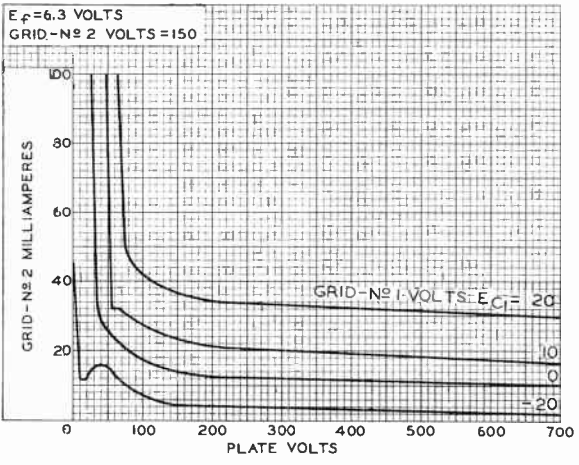


92CM-8145

TYPICAL CHARACTERISTICS



92CS-9619



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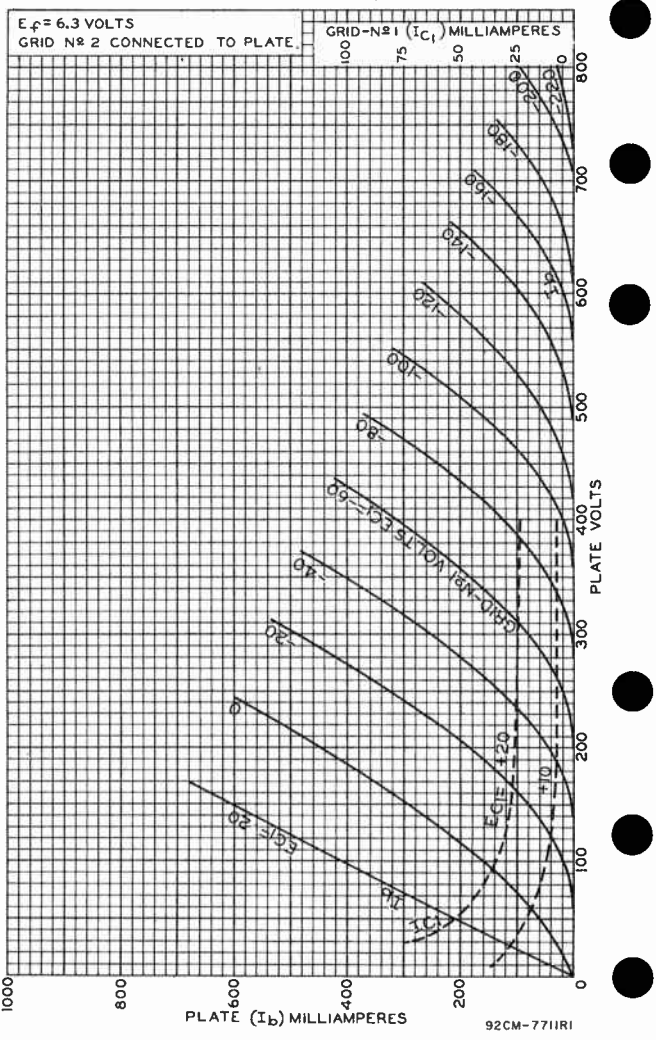
TYPICAL CHARACTERISTICS
Triode Connection



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VHF BEAM POWER TUBE

GENERAL DATA

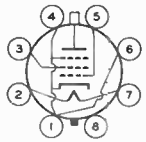
Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	1.25	amp
Transconductance, for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 100	7000	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 100	4.5	
Direct Interelectrode Capacitances:*		
Grid No.1 to Plate	0.22 max.	μμf
Input	13.5	μμf
Output	8.5	μμf

Mechanical:

Mounting Position	Any
Overall Length	3-11/16" ± 1/8"
Seated Length	3-1/8" ± 1/8"
Maximum Diameter	1-23/32"
Bulb	T-12
Cap	Small (JETEC No.C1-1)
Base	Large-Micanol-Wafer Octal 8-Pin with Sleeve (JETEC No.B8-86)

BOTTOM VIEW



Pin 1 - Cathode, Grid No.3, Internal Shield
Pin 2 - Heater
Pin 3 - Grid No.2
Pin 4 - Same as Pin 1
Pin 5 - Grid No.1
Pin 6 - Same as Pin 1
Pin 7 - Heater
Pin 8 - Base Sleeve
Cap - Plate

Bulb Temperature (At hottest point) . . . . . 220 max. °C

AF POWER AMPLIFIER & MODULATOR--Class AB_1†

Triode Connection--Grid No.2 Connected to Plate

	CCS*	ICAS**	
Maximum Ratings, *Absolute Values*:			
DC PLATE VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	90 max.	90 max.	ma
MAX.-SIGNAL PLATE INPUT**	35 max.	35 max.	watts
PLATE DISSIPATION**	20 max.	25 max.	watts

* With no external shielding and base sleeve connected to ground.

†, *, **, **: See next page.

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VHF BEAM POWER TUBE

	CCS●	ICAS●●	
PEAK HEATER–CATHODE VOLTAGE:			
Heater negative with respect to cathode . . .	135 max.	135 max.	volts
Heater positive with respect to cathode . . .	135 max.	135 max.	volts

→ **Typical Operation:**

Values are for 2 tubes				
DC Plate Voltage	250	400	400	volts
DC Grid–No.1 Voltage	–50	–100	–100	volts
Peak AF Grid–No.1–to–Grid–No.1 Voltage○	100	200	200	volts
Zero–Signal DC Plate Current.	120	40	40	ma
Max.–Signal DC Plate Current.	125	100	100	ma
Effective Load Resistance (Plate to plate)	5000	8000	8000	ohms
Max.–Signal Driving Power (Approx.).	0	0	0	watts
Max.–Signal Power Output (Approx.)	10	22	22	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid–No.1–Circuit Resistance:○○		
With fixed bias.	0.1 max.	megohm
With cathode bias.	0.5 max.	megohm

AF POWER AMPLIFIER & MODULATOR--Class AB_1†

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID–No.2 (SCREEN) VOLTAGE.	250 max.	250 max.	volts
MAX.–SIGNAL DC PLATE CURRENT**.	125 max.	135 max.	ma
MAX.–SIGNAL PLATE INPUT**. .	60 max.	85 max.	watts
MAX.–SIGNAL GRID–No.2 INPUT**	3 max.	3 max.	watts
PLATE DISSIPATION**.	20 max.	25 max.	watts

† Subscript 1 indicates that grid–No.1 current does not flow during any part of the input cycle.

○ The driver stage should be capable of supplying the No.1 grids of the class AB_1 stage with the specified driving voltage at low distortion.

●, ●●, **, ○○: See next page. → Indicates a change

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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VHF BEAM POWER TUBE

	CCS●	ICAS●●	
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

Typical CCS Operation: ←

Values are for 2 tubes

DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage▲	190	185	180	volts
DC Grid-No.1(Control-Grid)Voltage:				
With fixed-bias source	-40	-40	-45	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	80	80	90	volts
Zero-Signal DC Plate Current . . .	63	57	26	ma
Max.-Signal DC Plate Current . . .	228	215	200	ma
Zero-Signal DC Grid-No.2 Current .	2.5	2	1	ma
Max.-Signal DC Grid-No.2 Current .	25	25	23	ma
Effective Load Resistance (Plate to plate)	4000	5500	7000	ohms
Max.-Signal Driving Power (Approx.).	0	0	0	watts
Max.-Signal Power Output (Approx.)	55	70	82	watts

Typical ICAS Operation: ←

Values are for 2 tubes

DC Plate Voltage	600	750	volts
DC Grid-No.2 Voltage▲	200	195	volts
DC Grid-No.1 (Control-Grid) Voltage:			
From fixed-bias source	-50	-50	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	100	100	volts
Zero-Signal DC Plate Current	28	23	ma
Max.-Signal DC Plate Current	229	220	ma
Zero-Signal DC Grid-No.2 Current . . .	1	1	ma
Max.-Signal DC Grid-No.2 Current . . .	27	26	ma
Effective Load Resistance (Plate to plate)	6000	8000	ohms
Max.-Signal Driving Power (Approx.) .	0	0	watts
Max.-Signal Power Output (Approx.) . .	95	120	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance:○○	
With fixed bias.	0.1 max. megohm
With cathode bias.	Not recommended

●, ●●, **, ○○, ▲: See next page. ← Indicates a change

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VHF BEAM POWER TUBE

AF POWER AMPLIFIER & MODULATOR--Class AB_2#

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE. . .	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**. . .	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT**. .	62.5 max.	90 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT**. . .	3 max.	3 max.	watts
PLATE DISSIPATION**.	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode. . .	135 max.	135 max.	volts
Heater positive with respect to cathode. . .	135 max.	135 max.	volts

→ **Typical CCS Operation:**

Values are for 2 tubes

DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage▲	175	175	165	volts
DC Grid-No.1 (Control-Grid) Voltage:				
From fixed-bias source	41	44	44	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	95	102	97	volts
Zero-Signal DC Plate Current . . .	33	27	22	ma
Max.-Signal DC Plate Current . . .	232	242	207	ma
Zero-Signal DC Grid-No.2 Current .	1.1	0.7	0.6	ma
Max.-Signal DC Grid-No.2 Current .	18	18	17	ma
Max.-Signal DC Grid-No.1 Current .	1.6	1.9	1.1	ma
Effective Load Resistance (Plate to plate).	3700	4600	6800	ohms
Max.-Signal Driving Power (Approx.)◆	0.2	0.3	0.2	watt
Max.-Signal Power Output (Approx.)	62	83	90	watts

** Averaged over any audio-frequency cycle of sine-wave form.

∞ 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. When grid No.1 is operated in the negative region with fixed bias, the dc grid-No.1-circuit resistance should not exceed the specified value of 0.1 megohm. For higher values of dc grid-No.1-circuit resistance, cathode bias is required. Under no circumstances should the total dc grid-No.1-circuit resistance exceed the specified value of 0.5 megohm.

Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

●, ●●, ▲, ◆: See next page. → Indicates a change

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VHF BEAM POWER TUBE

Typical ICAS Operation: ←

Values are for 2 tubes

DC Plate Voltage	600	750	volts
DC Grid-No.2 Voltage▲	190	165	volts
DC Grid-No.1 (Control-Grid) Voltage: *From fixed-bias source*	−48	−46	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	109	108	volts
Zero-Signal DC Plate Current	28	22	ma
Max.-Signal DC Plate Current	270	240	ma
Zero-Signal DC Grid-No.2 Current	1.2	0.3	ma
Max.-Signal DC Grid-No.2 Current	20	20	ma
Max.-Signal DC Grid-No.1 Current	2	2.6	ma
Effective Load Resistance (Plate to plate)	5000	7400	ohms
Max.-Signal Driving Power (Approx.)♦	0.03	0.04	watt
Max.-Signal Power Output (Approx.)	113	131	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance:♦	
With fixed bias	30000 max. ohms
With cathode bias	Not recommended

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:	*CCS*●	*ICAS*●●	
DC PLATE VOLTAGE	480 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	−150 max.	−150 max.	volts
DC PLATE CURRENT	117 max.	125 max.	ma
DC GRID-No.1 CURRENT	3.5 max.	4.0 max.	ma
PLATE INPUT	45 max.	67.5 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	13.3 max.	16.7 max.	watts

▲ Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

♦ 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. In no case, however, should the total dc grid-No.1-circuit resistance exceed 30000 ohms when the 6146 is operated at maximum ratings. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

●, ●●: See next page. ← Indicates a change

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VHF BEAM POWER TUBE

	CCS●		ICAS●●		
PEAK HEATER-CATHODE VOLTAGE:					
Heater negative with respect to cathode .	135 max.		135 max.		volts
Heater positive with respect to cathode .	135 max.		135 max.		volts
Typical Operation:					
DC Plate Voltage	400	475	600		volts
DC Grid-No.2 Voltage♦. .	150	135	150		volts
From a series resistor of. .	33000	51000	56000		ohms
DC Grid-No.1 Voltage★. .	-87	-77	-87		volts
From a grid resistor of	27000	27000	27000		ohms
Peak RF Grid-No.1 Voltage	107	95	107		volts
DC Plate Current	112	94	112		ma
DC Grid-No.2 Current . .	7.8	6.4	7.8		ma
DC Grid-No.1 Current (Approx.). .	3.4	2.8	3.4		ma
Driving Power (Approx.).	0.4	0.3	0.4		watt
Power Output (Approx.) .	32	34	52		watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance‡.	30000 max.	ohms

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□
and
RF POWER AMPLIFIER--Class C FM Telephony

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values*:			
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE. .	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. .	-150 max.	-150 max.	volts
DC PLATE CURRENT	140 max.	150 max.	ma
DC GRID-No.1 CURRENT . .	3.5 max.	4.0 max.	ma
PLATE INPUT.	67.5 max.	90 max.	watts
GRID-No.2 INPUT.	3 max.	3 max.	watts
PLATE DISSIPATION. . . .	20 max.	25 max.	watts

♦ Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

★ Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

□ 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.

●, ●●, ‡: See next page. → Indicates a change

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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VHF BEAM POWER TUBE

	CCS●		ICAS●●		
PEAK HEATER-CATHODE VOLTAGE:					
Heater negative with respect to cathode	135 max.		135 max.		volts
Heater positive with respect to cathode	135 max.		135 max.		volts
Typical Operation as Amplifier up to 60 Mc: ←					
DC Plate Voltage	500	600	600	750	volts
DC Grid-No.2 Voltage●●	170	150	180	160	volts
From a series resistor of	36000	51000	43000	56000	ohms
DC Grid-No.1 Voltage■	-66	-58	-71	-62	volts
From a grid-No.1 resistor of	27000	20000	24000	20000	ohms
From a cathode resistor of	470	470	430	470	ohms
Peak RF Grid-No.1 Voltage	84	73	91	79	volts
DC Plate Current	135	112	150	120	ma
DC Grid-No.2 Current	9	9	10	11	ma
DC Grid-No.1 Current (Approx.)	2.5	2.8	2.8	3.1	ma
Driving Power (Approx.)	0.2	0.2	0.3	0.2	watt
Power Output (Approx.)	48	52	66	70	watts

Typical Operation as Amplifier at 175 Mc: ←			
DC Plate Voltage	320	400	volts
DC Grid-No.2 Voltage●●	180	190	volts
From a series resistor of	13000	20000	ohms
DC Grid-No.1 Voltage■	-51	-54	volts
From a grid resistor of	27000	24000	ohms
From a cathode resistor of	330	330	ohms
Peak RF Grid-No.1 Voltage	64	68	volts
DC Plate Current	140	150	ma
DC Grid-No.2 Current	10	10.4	ma
DC Grid-No.1 Current (Approx.)	2	2.2	ma
Driving Power (Approx.)	3	3	watts
Power Output (Approx.)	25	35	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

●● Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 6146 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.

■ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

‡: See next page.

← Indicates a change

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6146

VHF BEAM POWER TUBE

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance‡	30000 max.	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	1.175	1.325	amp
Grid-No.1-to-Plate Capacitance.	2	–	0.22	μμf
Input Capacitance.	2	11.1	15.9	μμf
Output Capacitance	2	6.4	10.6	μμf
→ Plate Current.	3	46	94	ma
→ Grid-No.2 Current.	3	–	5.5	ma
→ Useful Power Output.	4	47	–	watts

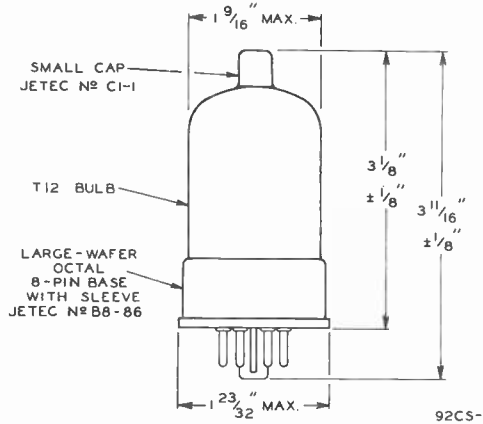
Note 1: With 6.3 volts ac on heater.

Note 2: With no external shield. Base sleeve (pin No.8) is grounded.

Note 3: With 6.3 volts ac on heater, dc plate voltage of 300 volts, dc grid-No.2 voltage of 200 volts, and dc grid-No.1 voltage of -33 volts.

Note 4: In a single-tube self-excited oscillator circuit, and with 6.3 volts ac on heater, dc plate voltage of 600 volts, dc grid-No.2 voltage of 180 volts, grid-No.1 resistor of 0.030 ± 10% megohm, max. dc plate current of 100 ma. to 112 ma., dc grid-No.1 current of 2 to 2.5 ma., and frequency of 15 Mc.

‡ When grid No.1 is driven positive and the 6146 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.



→ Indicates a change.

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World Radio History

RCA

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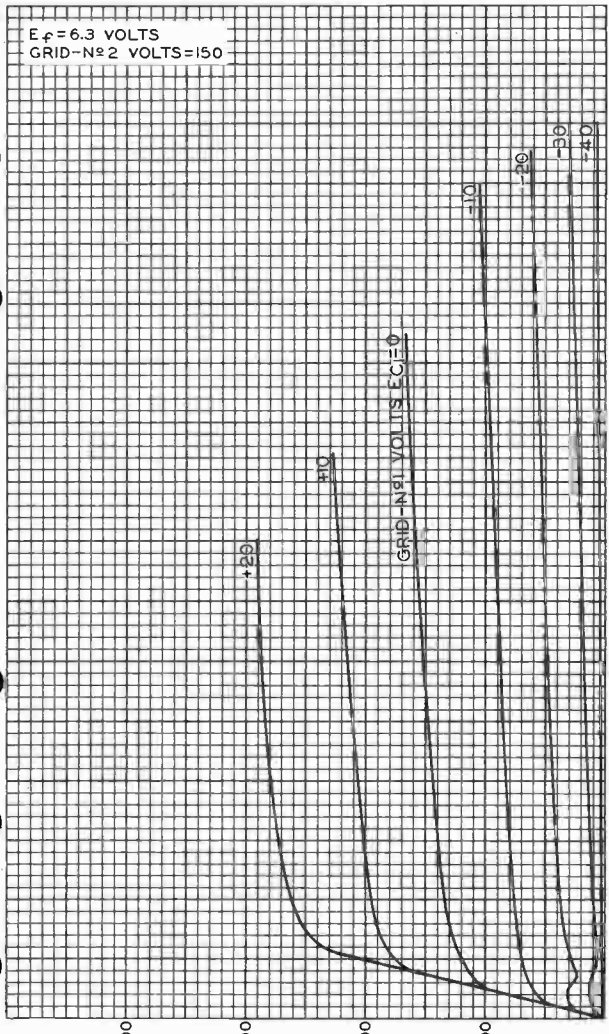
AVERAGE PLATE CHARACTERISTICS



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World Radio History

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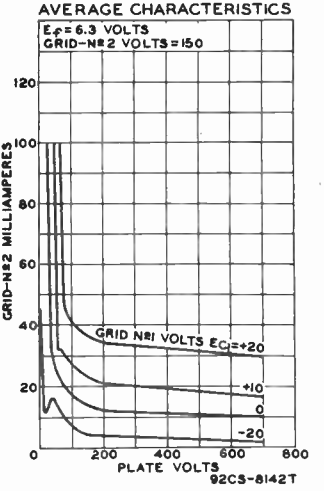
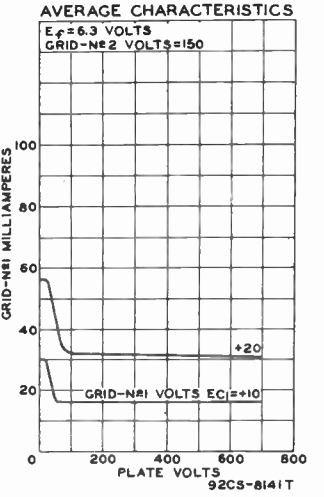
CHARACTERISTICS CURVES





World Radio History

RCA

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AVERAGE PLATE CHARACTERISTICS WITH E_{C1} AS VARIABLE

JAN. 7, 1954

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World Radio History

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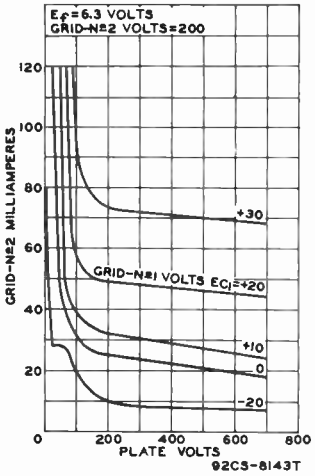
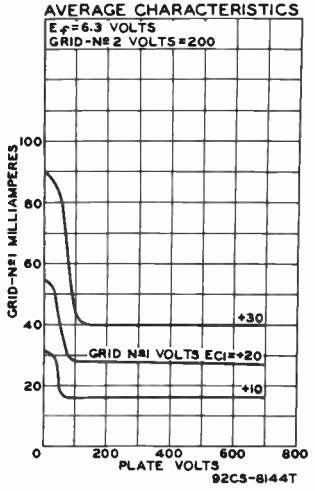
CHARACTERISTICS CURVES

AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS



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World Radio History

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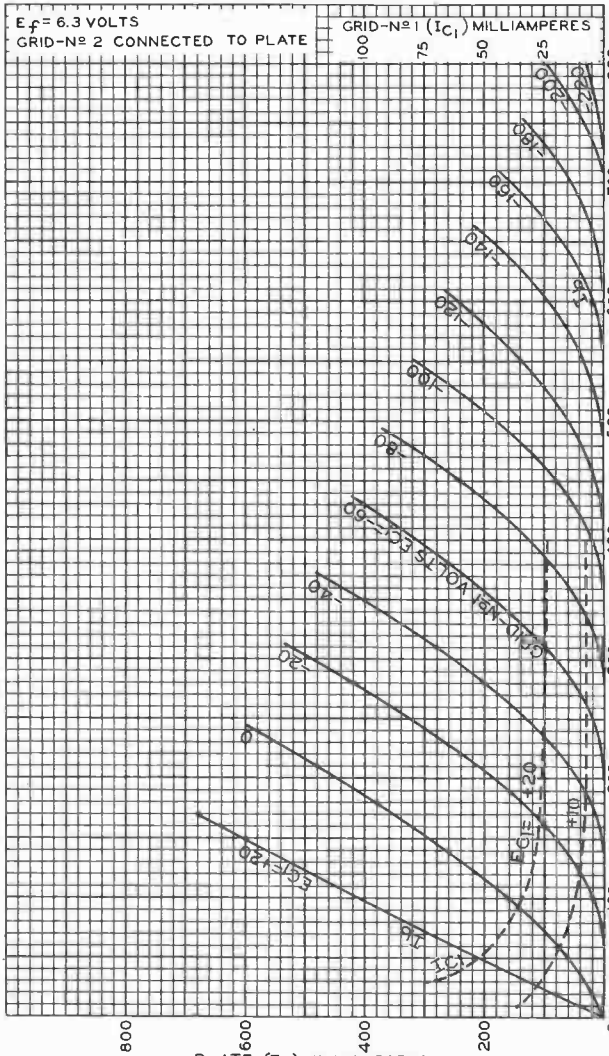
AVERAGE CHARACTERISTICS
TRIODE CONNECTION



JAN. 7, 1954

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World Radio History

6146

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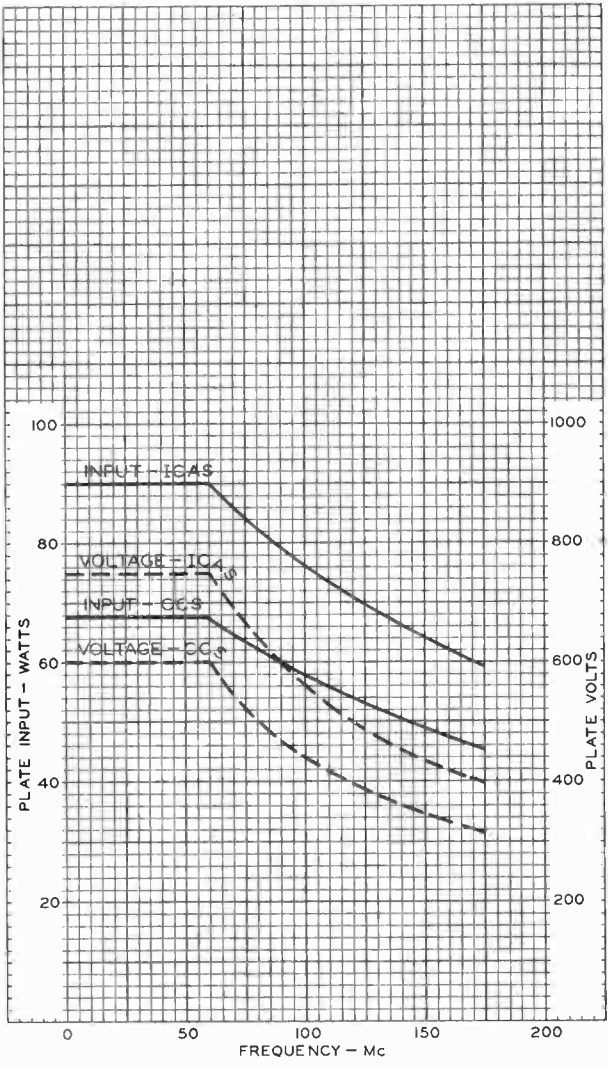
MAXIMUM RATINGS vs OPERATING FREQUENCY

CLASS C TELEGRAPHY



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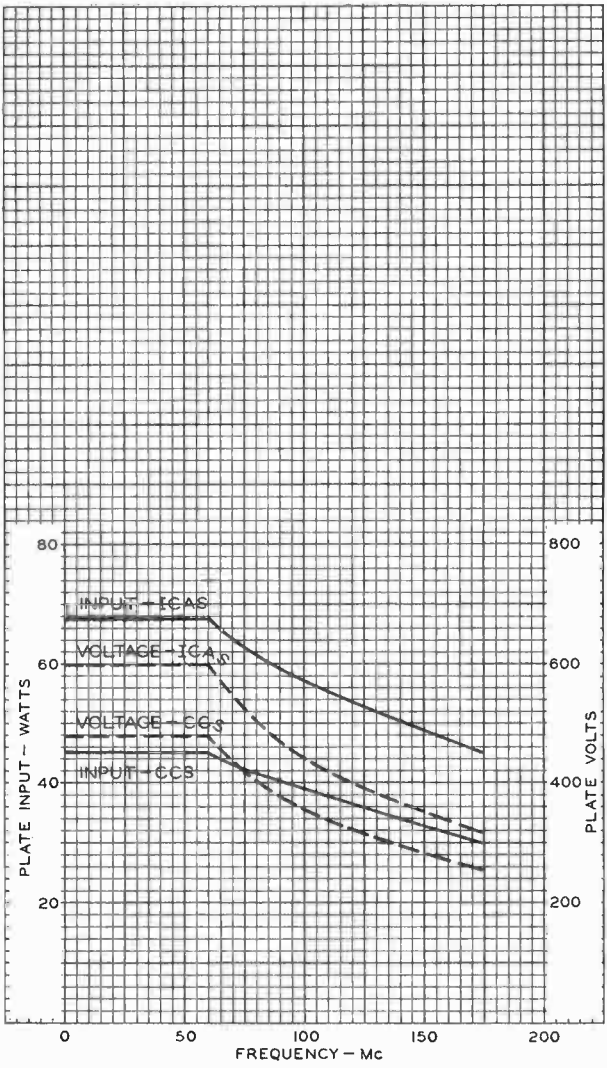
MAXIMUM RATINGS vs OPERATING FREQUENCY

CLASS C TELEPHONY



World Radio History

6155/4-125A

BEAM POWER TUBE

FORCED-AIR COOLED

Useful with full input up to 120 Mc
and with reduced input up to 200 Mc

GENERAL DATA

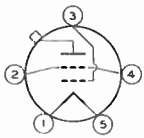
Electrical:

Filament, Thoriated Tungsten:		
Voltage	5.0 ± 5%	ac or dc volts
Current at 5.0 volts	6.5	amp
Mu-Factor, Grid No.2 to Grid No.1, for plate volts = 3000, grid-No.2 volts = 400, and plate ma. = 50	6.2	
Direct Interelectrode Capacitances:		
Grid No.1 to plate	0.07 max.	μμf
Grid No.1 to filament and grid No.2	11	μμf
Plate to filament and grid No.2	3	μμf

Mechanical:

Operating Position	Vertical, base down or up
Maximum Overall Length	5-3/32"
Seated Length	4-3/16" ± 1/4"
Maximum Diameter	2-7/16"
Weight (Approx.)	3 oz
Cap	Skirted Small
Base	Special-Button Giant 5-Pin
Basing Designation for BOTTOM VIEW	5BK

Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1
Pin 4 - Grid No.2
Pin 5 - Filament
Cap - Plate



Forced-Air Cooling . . . . . 5 cfm

Under any condition of operation, adequate cooling of the bulb must be provided to limit the seal temperatures to their specified maximum values. At frequencies above 50 Mc, special attention should be given to adequate cooling of the bulb and seals. The use of a heat-radiating plate connector is recommended.

Seal Temperature:		
Plate	220 max.	°C
Grid-No.2, grid-No.1, and filament	180 max.	°C

AF POWER AMPLIFIER & MODULATOR — Class AB_1 ⊕

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts

⊕,●: see next page.

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

World Radio History

6155/4-125A

BEAM POWER TUBE

MAX.-SIGNAL DC PLATE CURRENT*			225 max.	ma
MAX.-SIGNAL PLATE INPUT*			350 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*			20 max.	watts
PLATE DISSIPATION*			125 max.	watts

Typical CCS Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.2 Voltage⊕	600	600	600	volts
DC Grid-No.1 Voltage★	-94	-95	-97	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	185	186	190	volts
Zero-Signal DC Plate Current	64	60	60	ma
Max.-Signal DC Plate Current	218	222	216	ma
Zero-Signal DC Grid-No.2 Current	0.3	0.2	0.2	ma
Max.-Signal DC Grid-No.2 Current	27	24	26	ma
Effective Load Resistance (Plate to plate)	12000	17600	25000	ohms
Max.-Signal Driving Power	0	0	0	watts
Max.-Signal Power Output (Approx.)	170	260	345	watts

AF POWER AMPLIFIER & MODULATOR — Class AB_2◆

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	225 max.	ma
MAX.-SIGNAL PLATE INPUT*	500 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	20 max.	watts
PLATE DISSIPATION*	125 max.	watts

Typical CCS Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	volts
DC Grid-No.2 Voltage⊕	350	350	350	volts
DC Grid-No.1 Voltage**	-48	-50	-51	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	330	296	240	volts
Zero-Signal DC Plate Current	60	60	60	ma
Max.-Signal DC Plate Current	455	395	302	ma
Zero-Signal DC Grid-No.2 Current	0.5	0.3	0.2	ma
Max.-Signal DC Grid-No.2 Current	84	64	36	ma
Effective Load Resistance (Plate to plate)	7200	12000	20000	ohms
Max.-Signal Driving Power (Approx.)●●	4.8	3.2	1.8	watts
Max.-Signal Power Output (Approx.)	455	550	550	watts

◆, ●, *, ⊕, ★, ♦, **, ●●: See next page.

World Radio History

6155/4-125A

BEAM POWER TUBE

RF POWER AMPLIFIER — Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
DC PLATE CURRENT	135 max.	ma
PLATE INPUT	200 max.	watts
GRID-No.2 INPUT	14 max.	watts
PLATE DISSIPATION	125 max.	watts

Typical CCS Operation:

DC Plate Voltage	2000	2500	3000	volts
DC Grid-No.2 Voltage	350	350	350	volts
DC Grid-No.1 (Control-Grid) Voltage	-50	-50	-50	volts
Peak RF Grid-No.1 Voltage	65	55	50	volts
DC Plate Current	83	70	60	ma
DC Grid-No.2 Current	1.5	1	1	ma
DC Grid-No.1 Current (Approx.)	1.5	0	0	ma
Driving Power (Approx.)●●	0.52	0.44	0.45	watt
Power Output (Approx.)	54	55	58	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2500 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	200 max.	ma
DC GRID-No.1 CURRENT	15 max.	ma
PLATE INPUT	415 max.	watts
GRID-No.2 INPUT	20 max.	watts
PLATE DISSIPATION	83 max.	watts

Typical CCS Operation:

DC Plate Voltage	2000	2500	volts
DC Grid-No.2 Voltage▲	350	350	volts
DC Grid-No.1 Voltage	-220	-210	volts
Peak AF Grid-No.2 Voltage (100% modulation)	300	300	volts
Peak RF Grid-No.1 Voltage	390	380	volts
DC Plate Current	150	152	ma
DC Grid-No.2 Current	33	30	ma
DC Grid-No.1 Current (Approx.)	5	4.5	ma
Driving Power (Approx.)	2	1.7	watts
Power Output (Approx.)	225	300	watts

●, ●●, ▲, ▲▲, ◆, ◆◆, ★, ★★, ⊕, ⊕⊕, ▲: See next page.

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

World Radio History

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BEAM POWER TUBE

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy♦
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	225 max.	ma
DC GRID-No.1 CURRENT	15 max.	ma
PLATE INPUT	625 max.	watts
GRID-No.2 INPUT	20 max.	watts
PLATE DISSIPATION	125 max.	watts

Typical CCS Operation:

DC Plate Voltage	2000	2500	3000	volts
DC Grid-No.2 Voltage	350	350	350	volts
DC Grid-No.1 Voltage	-100	-150	-150	volts
Peak RF Grid-No.1 Voltage	260	330	300	volts
DC Plate Current	200	200	167	ma
DC Grid-No.2 Current	50	40	30	ma
DC Grid-No.1 Current (Approx.)	9	9	6.5	ma
Driving Power (Approx.)	2.4	3	2	watts
Power Output (Approx.)	275	375	375	watts

♁ 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 from a fixed supply.

★ Total effective grid-No.1-circuit resistance should not exceed 0.15 megohm.

♦ Subscript 2 indicates that grid-No.1 current flows during some part of input cycle.

** Obtained from fixed supply having dc resistance not exceeding 250 ohms.

●● Driver stage should be capable of supplying the No.1 grids of the class AB_2 stage with the specified driving power at low distortion. The effective resistance per grid-No.1 circuit of the AB_2 stage should be held at a low value.

⊕⊕ At crest of audio-frequency cycle with modulation factor of 1.0.

▲ Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor.

♦ 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.

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World Radio History

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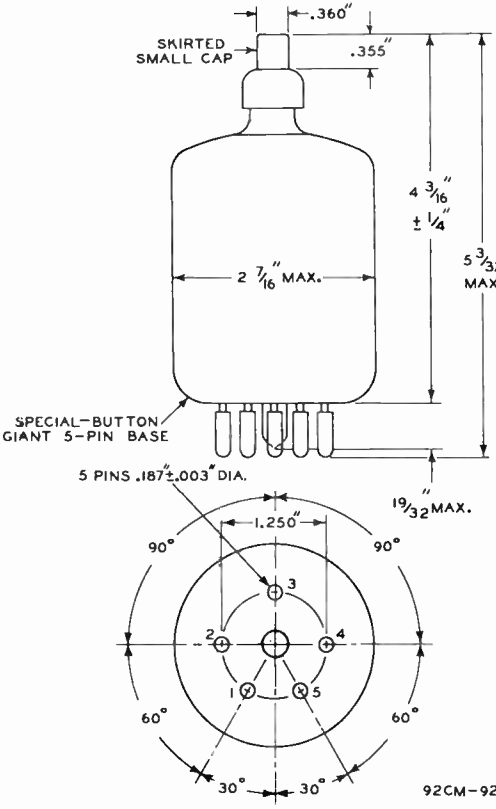
BEAM POWER TUBE

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	120		170		200		Mc
MAX.-PERMISSIBLE PERCENTAGE OF MAX.-RATED PLATE VOLTAGE OR PLATE INPUT:	*Voltage*	*Input*	*Voltage*	*Input*	*Voltage*	*Input*	
Class B telephony	100	100	90	95	70	75	%
Class C telephony	100	100	90	90	67	70	%
Class C telegraphy	100	100	75	90	67	70	%



World Radio History

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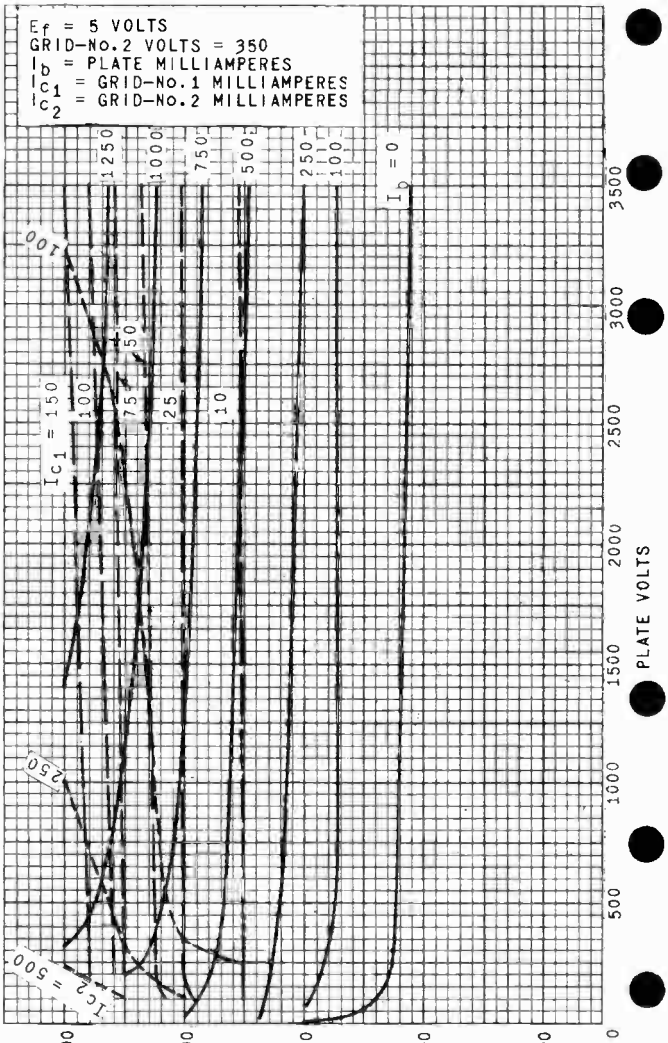
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



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

92CS-9269

World Radio History

6156/4-250A

BEAM POWER TUBE

FORCED-AIR COOLED

Useful with full input up to 75 Mc and with reduced input up to 120 Mc

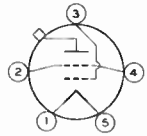
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	5.0	ac or dc volts
Current at 5.0 volts	14.1	amp
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 3000, grid-No.2 volts = 500, and plate ma. = 100	5.1	
Direct Interelectrode Capacitances:		
Grid No.1 to plate	0.14 max.	μμf
Grid No.1 to filament and grid No.2	13	μμf
Plate to filament and grid No.2	4.6	μμf

Mechanical:

Operating Position	Vertical, base down or up
Maximum Overall Length	5-29/32"
Seated Length	5" ± 1/4"
Maximum Diameter	3-7/16"
Weight (Approx.)	6 oz
Cap	Small
Base	Special-Button Giant 5-Pin
Basing Designation for BOTTOM VIEW	58K



Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1
Pin 4 - Grid No.2, Internal Shield
Pin 5 - Filament Cap - Plate

Forced-Air Cooling	5 cfm	

Under any condition of operation, adequate cooling of the bulb must be provided to limit the seal temperatures to their specified maximum values. At frequencies above 30 Mc, special attention should be given to adequate cooling of the bulb and seals. The use of a heat-radiating plate connector is recommended.

Seal Temperature:		
Plate	220 max.	°C
Grid No.2, grid No.1, and filament	180 max.	°C

AF POWER AMPLIFIER & MODULATOR — Class AB_1♦

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts

♦,●: See next page.

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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BEAM POWER TUBE

MAX.-SIGNAL DC PLATE CURRENT*				350 max.	ma
MAX.-SIGNAL PLATE INPUT*				750 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*				35 max.	watts
PLATE DISSIPATION*				250 max.	watts

Typical CCS Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage□	500	500	500	500	volts
DC Grid-No.1 Voltage▲	-85	-88	-91	-94	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	167	173	178	184	volts
Zero-Signal DC Plate Current .	100	100	100	100	ma
Max.-Signal DC Plate Current .	300	300	310	310	ma
Effective Load Resistance (Plate to plate)	10000	14500	18000	22000	ohms
Max.-Signal Driving Power. . .	0	0	0	0	watts
Max.-Signal Power Output (Approx.).	265	390	510	635	watts

AF POWER AMPLIFIER & MODULATOR — Class AB_2⊕

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	350 max.	ma
MAX.-SIGNAL PLATE INPUT*	1000 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	35 max.	watts
PLATE DISSIPATION*	250 max.	watts

Typical CCS Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage□	300	300	300	300	volts
DC Grid-No.1 Voltage**	-45	-49	-51	-55	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	323	328	306	280	volts
Zero-Signal DC Plate Current .	100	100	100	100	ma
Max.-Signal DC Plate Current .	694	694	624	550	ma
Zero-Signal DC Grid-No.2 Current.	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current.	116	110	88	69	ma
Effective Load Resistance (Plate to plate)	4550	6600	9200	14000	ohms
Max.-Signal Driving Power (Approx.)○○.	8	8	5.8	3.8	watts
Max.-Signal Power Output (Approx.).	660	975	1140	1240	watts

●, *, □, ▲, ⊕, **, ○○: See next page.

ELECTRON TUBE DIVISION
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World Radio History

6156/4-250A

BEAM POWER TUBE

RF POWER AMPLIFIER — Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS• Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
DC PLATE CURRENT	210 max.	ma
PLATE INPUT	400 max.	watts
GRID-No.2 INPUT	23 max.	watts
PLATE DISSIPATION	250 max.	watts

Typical CCS Operation:

DC Plate Voltage	2500	3500	4000	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 (Control-Grid) Voltage	-84	-90	-100	volts
Peak RF Grid-No.1 Voltage	66	61	55.5	volts
DC Plate Current	150	125	94	ma
DC Grid-No.2 Current	0	0	0	ma
DC Grid-No.1 Current (Approx.)	0	0	0	ma
Driving Power (Approx.)*	0.75	0.25	0.06	watt
Power Output (Approx.)	125	125	126	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS• Ratings, *Absolute Values:*

DC PLATE VOLTAGE	3200 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	275 max.	ma
DC GRID-No.1 CURRENT	20 max.	ma
PLATE INPUT	825 max.	watts
GRID-No.2 INPUT	35 max.	watts
PLATE DISSIPATION	165 max.	watts

Typical CCS Operation:

DC Plate Voltage	2500	3000	volts
DC Grid-No.2 Voltage†	400	400	volts
DC Grid-No.1 Voltage	-200	-310	volts
Peak AF Grid-No.2 Voltage (For 100% modulation)	350	350	volts
Peak RF Grid-No.1 Voltage	326	484	volts
DC Plate Current	200	225	ma
DC Grid-No.2 Current	30	30	ma
DC Grid-No.1 Current (Approx.)	9	9	ma
Driving Power (Approx.)	3	4.4	watts
Power Output (Approx.)	375	510	watts

♦,●,*,□,▲,⊕,**,○○,★,†: See next page.

World Radio History

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BEAM POWER TUBE

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy♦ and RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	350 max.	ma
DC GRID-No.1 CURRENT	20 max.	ma
PLATE INPUT	1250 max.	watts
GRID-No.2 INPUT	35 max.	watts
PLATE DISSIPATION	250 max.	watts

Typical CCS Operation:

DC Plate Voltage	2500	3000	4000	volts
DC Grid-No.2 Voltage	500	500	500	volts
DC Grid-No.1 Voltage	-150	-180	-225	volts
Peak RF Grid-No.1 Voltage	264	327	374	volts
DC Plate Current	300	345	312	ma
DC Grid-No.2 Current	60	60	45	ma
DC Grid-No.1 Current (Approx.)	9	10	9	ma
Driving Power (Approx.)	2.4	3.3	3.4	watts
Power Output (Approx.)	575	800	1000	watts

♦ 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 from a fixed supply.

▲ Total effective grid-No.1-circuit resistance should not exceed 0.25 megohm.

♣ Subscript 2 indicates that grid-No.1 current flows during some part of input cycle.

** Obtained from fixed supply having a dc resistance not exceeding 250 ohms.

○○ Driver stage should be capable of supplying the No.1 grids of the class AB_2 stage with the specified driving power at low distortion. The effective resistance per grid-No.1 circuit of the AB_2 stage should be held at a low value.

★ At crest of audio-frequency cycle with modulation factor of 1.0.

† Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor.

♦ 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.

6156/4-250A

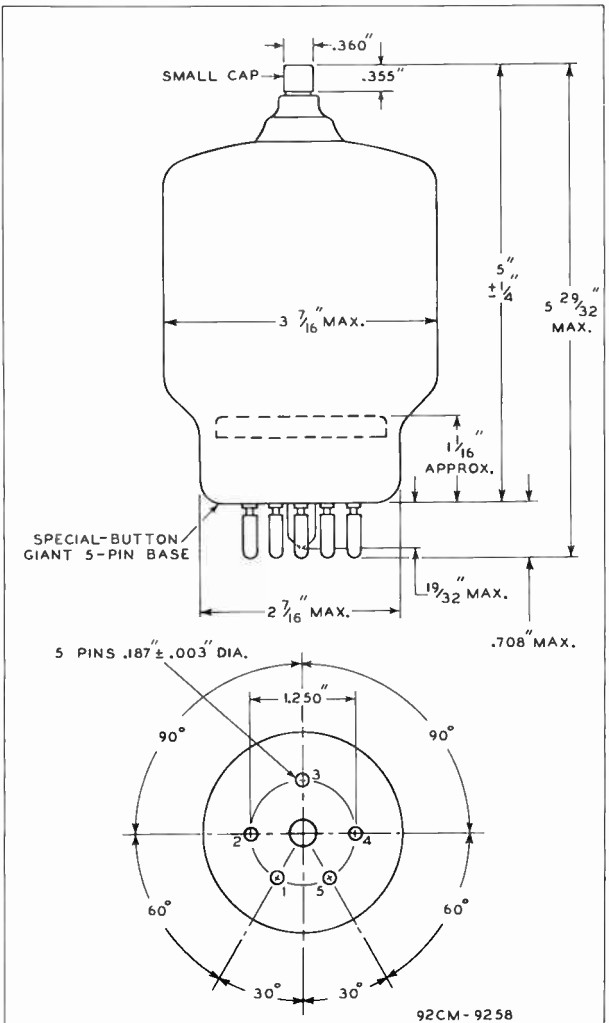
BEAM POWER TUBE

MAXIMUM RATINGS vs OPERATING FREQUENCY				
FREQUENCY	75	100	120	Mc
MAX.-PERMISSIBLE PERCENTAGE OF MAX.-RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B telephony	100	80	60	%
Class C telephony	100	80	60	%
Class C telegraphy	100	80	60	%

World Radio History

6156/4-250A

BEAM POWER TUBE



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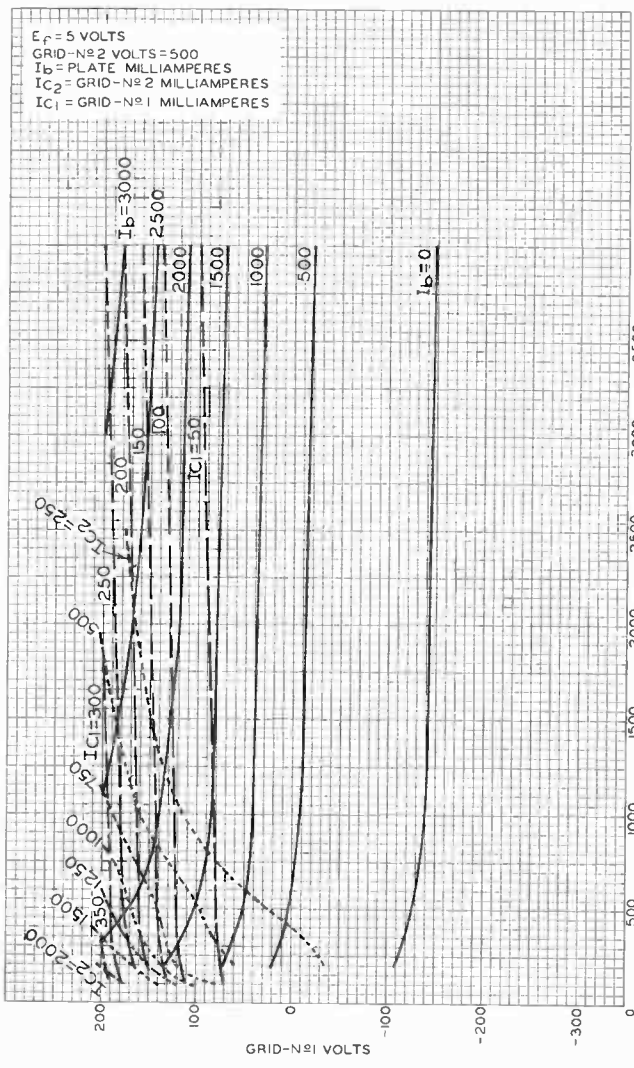
RCA

6156/4-250A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



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92CL-9264

World Radio History

World Radio History

Beam Power Tube

HIGH POWER SENSITIVITY

90 WATTS CW INPUT (ICAS) UP TO 60 Mc
60 WATTS CW INPUT (ICAS) AT 175 Mc

The 6159 is the same as the 6146 except for the following items:

Heater, for Unipotential Cathode:		
Voltage (AC or DC).	26.5 ± 10%	volts
Current at heater volts = 26.5. . . .	0.3	amp

CHARACTERISTICS RANGE VALUES

	Note	*Min.*	*Max.*	
Heater Current.	1	0.280	0.320	amp

Note 1: With 26.5 volts ac on heater.

World Radio History

World Radio History

6161

POWER TRIODE

FORCED-AIR COOLED

Useful with full input up to 900 Mc
and with reduced input up to 2000 Mc

The 6161 supersedes type 5588 for new equipment design.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage*	6.3 av.	ac or dc volts
	6.9 max.	ac or dc volts
Current at 6.3 volts	3.4	amp
Minimum heating time at 6.3 volts	1	minute
Amplification Factor for grid volts = −15, and plate ma. = 250	25	
Direct Interelectrode Capacitances:		
Grid to plate§	6	μμf
Grid to cathode and heater§	11	μμf
Plate to cathode and heater°	0.19	μμf

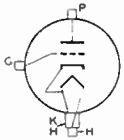
Mechanical:

Operating Position	Any
Overall Length	3-5/16" ± 3/32"
Greatest Diameter	1.750" ± 0.010"
Weight (Approx.)	8 oz
Radiator	Integral part of tube
Mounting	Special

Terminal Connections *(See Dimensional Outline)*:

G – Grid

H – Heater



K – Cathode

P – Plate

Air Flow:

The specified air flow for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower onto the respective terminals and seals, and through the radiator before and during the application of any voltages. Heater power, plate power, and air may be removed simultaneously.

Percentage of maximum-rated plate dissipation for each class of service	100	80	60	%
Minimum air flow	16	10	5.7	cfm
Static pressure	0.85	0.4	0.16	in. of water

*, §, °: See next page.

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POWER TRIODE

The above flow and pressure values are for condition with radiator temperature held constant at 135° C rise above incoming-air temperature. The air flow must be adequate to limit the temperature of the radiator, grid terminal, cathode terminal, and seals to their respective maximum values.

Radiator Temperature (Measured on core at end adjacent to plate flange)	180 max.	°C
Grid-Terminal Temperature	150 max.	°C
Cathode-Terminal Temperature	150 max.	°C
Seal Temperature (Plate, grid, and cathode)	150 max.	°C

RF POWER AMPLIFIER — Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS• Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1600 max.	volts
DC PLATE CURRENT	0.350 max.	amp
→ DC GRID CURRENT:		
Negative value	0.010 max.	amp
Positive value	0.100 max.	amp
PLATE INPUT	560 max.	watts
PLATE DISSIPATION	250 max.	watts

Typical Operation in Cathode-Drive Circuit at 600 Mc:

	Bandwidth♦ of 6 Mc	
DC Plate-to-Grid Voltage	1600	volts
DC Cathode-to-Grid Voltage	100	volts
Peak RF Cathode-to-Grid Voltage:		
Synchronizing level	130	volts
Pedestal level	117	volts
DC Plate Current:		
Synchronizing level	0.350	amp
Pedestal level	0.285	amp
DC Grid Current (Approx.):		
Synchronizing level	0.040	amp
Pedestal level	0.013	amp
Driver Power Output (Approx.):♣		
Synchronizing level	65#	watts
Pedestal level	40	watts
Output-Circuit Efficiency (Approx.)	89	%
Useful Power Output (Approx.):		
Synchronizing level	325••	watts
Pedestal level	195••	watts

Typical Operation in Cathode-Drive Circuit at 900 Mc:

	Bandwidth♦ of 6 Mc	
DC Plate-to-Grid Voltage	1600	volts
DC Cathode-to-Grid Voltage	100	volts

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POWER TRIODE

Peak RF Cathode-to-Grid Voltage:		
Synchronizing level	135	volts
Pedestal level	120	volts
DC Plate Current:		
Synchronizing level	0.350	amp
Pedestal level	0.280	amp
DC Grid Current (Approx.):		
Synchronizing level	0.030	amp
Pedestal level	0.010	amp
Driver Power Output (Approx.):♣		
Synchronizing level	75⊕	watts
Pedestal level	45	watts
Output-Circuit Efficiency (Approx.)	65	%
Useful Power Output (Approx.):		
Synchronizing level	230●●	watts
Pedestal level	135●●	watts

BIAS-MODULATED RF POWER AMPLIFIER
Class C Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS® Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	1600 max.	volts
DC GRID VOLTAGE (White level)	-300 max.	volts
DC PLATE CURRENT	0.350 max.	amp
DC GRID CURRENT:		
Negative value	0.010 max.	amp
Positive value	0.100 max.	amp
PLATE INPUT	560 max.	watts
PLATE DISSIPATION	250 max.	watts

Typical Operation in Cathode-Drive Circuit at 600 Mc:

	Bandwidth♦ of 6 Mc	
DC Plate-to-Grid Voltage	1600	volts
DC Cathode-to-Grid Voltage:		
Synchronizing level	100	volts
Pedestal level	150	volts
White level	230	volts
Peak RF Cathode-to-Grid Voltage	130	volts
DC Plate Current:		
Synchronizing level	0.350	amp
Pedestal level	0.250	amp
DC Grid Current (Approx.):		
Synchronizing level	0.040	amp
Pedestal level	0.013	amp
Driver Power Output (Approx.):♣		
Synchronizing level	65#	watts
Output-Circuit Efficiency (Approx.)	89	%
Useful Power Output (Approx.):		
Synchronizing level	325●●	watts
Pedestal level	195●●	watts

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POWER TRIODE

Typical Operation in Cathode-Drive Circuit at 900 Mc:

	Bandwidth† of 6 Mc	
DC Plate-to-Grid Voltage	1600	volts
DC Cathode-to-Grid Voltage:		
Synchronizing level	100	volts
Pedestal level	150	volts
White level	230	volts
Peak RF Cathode-to-Grid Voltage	135	volts
DC Plate Current:		
Synchronizing level	0.350	amp
Pedestal level	0.250	amp
DC Grid Current (Approx.):		
Synchronizing level	0.030	amp
Pedestal level	0.010	amp
Driver Power Output (Approx.):✣		
Synchronizing level	75⊕	watts
Output-Circuit Efficiency (Approx.)	65	%
Useful Power Output (Approx.):		
Synchronizing level	230●●	watts
Pedestal level	135●●	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS• Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1300 max.	volts
DC GRID VOLTAGE	−300 max.	volts
DC PLATE CURRENT	0.210 max.	amp
→ DC GRID CURRENT	*See Rating Chart*	
PLATE INPUT	270 max.	watts
PLATE DISSIPATION	167 max.	watts

Typical Operation in Cathode-Drive Circuit at 600 Mc:

DC Plate-to-Grid Voltage	1400	volts
DC Cathode-to-Grid Voltage	150	volts
Peak RF Cathode-to-Grid Voltage	200	volts
DC Plate Current	0.210	amp
DC Grid Current (Approx.)	0.070	amp
Driver Power Output (Approx.)✣■	70**	watts
Output-Circuit Efficiency (Approx.)	80	%
Useful Power Output (Approx.)	180●●	watts

Typical Operation in Cathode-Drive Circuit at 900 Mc:

DC Plate-to-Grid Voltage	1400	volts
DC Cathode-to-Grid Voltage	150	volts
Peak RF Cathode-to-Grid Voltage	200	volts
DC Plate Current	0.210	amp
DC Grid Current (Approx.)	0.070	amp
Driver Power Output (Approx.)✣■	75⊕	watts

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World Radio History

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POWER TRIODE

Output-Circuit Efficiency (Approx.). . .	60	%
Useful Power Output (Approx.).	120●●	watts

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy□ and RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1600 max.	volts
DC GRID VOLTAGE.	-300 max.	volts
DC PLATE CURRENT	0.250 max.	amp
DC GRID CURRENT.	*See Rating Chart*	←
PLATE INPUT.	400 max.	watts
PLATE DISSIPATION.	250 max.	watts

Typical Operation as Amplifier in Cathode-Drive Circuit at 600 Mc:

DC Plate-to-Grid Voltage	1650	volts
DC Cathode-to-Grid Voltage:		
From fixed supply of	150	volts
From cathode resistor of	500	ohms
Peak RF Cathode-to-Grid Voltage. . . .	200	volts
DC Plate Current	0.250	amp
DC Grid Current (Approx.).	0.050	amp
Driver Power Output (Approx.)✱	75▲	watts
Output-Circuit Efficiency (Approx.). . .	82	%
Useful Power Output (Approx.).	270●●	watts

Typical Operation as Amplifier in Cathode-Drive Circuit at 900 Mc:

DC Plate-to-Grid-Voltage	1650	volts
DC Cathode-to-Grid Voltage:		
From fixed supply of	150	volts
From cathode resistor of	575	ohms
Peak RF Cathode-to-Grid Voltage. . . .	200	volts
DC Plate Current	0.250	amp
DC Grid Current (Approx.).	0.010	amp
Driver Power Output (Approx.)✱	80†	watts
Output-Circuit Efficiency (Approx.). . .	60	%
Useful Power Output (Approx.).	180●●	watts

FREQUENCY MULTIPLIER — Class C

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1600 max.	volts
DC GRID VOLTAGE.	-300 max.	volts
DC PLATE CURRENT	0.250 max.	amp
DC GRID CURRENT.	*See Rating Chart*	←
PLATE INPUT.	400 max.	watts
PLATE DISSIPATION.	250 max.	watts

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POWER TRIODE

Typical Operation in Cathode-Drive Circuit:

	Doubler to 600 Mc	*Doubler to 900 Mc*	
DC Plate-to-Grid Voltage. .	1760	1675	volts
DC Cathode-to-Grid Voltage:			
From fixed supply of. . .	260	175	volts
From cathode resistor of.	860	645	ohms
Peak RF Cathode-to-Grid Voltage.	300	300	volts
DC Plate Current.	0.250	0.250	amp
DC Grid Current (Approx.) .	0.050	0.021	amp
Driver Power Output (Approx.)#.	125	100	watts
Output-Circuit Efficiency (Approx.)	90	80	%
Useful Power Output (Approx.)	180●●	140●●	watts

→ **CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

	Note	*Min.*	*Max.*	
Heater Current.	1	3.05	3.75	amp
Amplification Factor.	1,2	18	32	
Direct Interelectrode Capacitances:				
Grid to plate	–	5.6	6.6	μμf
Grid to cathode and heater. . .	–	10.5	12.5	μμf
Plate to cathode and heater . .	3	0.12	0.26	μμf
Plate Voltage	1,4	500	850	volts
Plate Voltage	1,5	690	1140	volts
Grid Voltage.	1,6	–	-165	volts
Peak Cathode Current.	1,7	3.2	–	amp
Useful Power Output	1,8	225	–	watts

Note 1: With 6.3 volts ac on heater.

Note 2: With dc grid volts = -15, and dc plate voltage adjusted to give dc plate current of 250 ma.

Note 3: With external shield, as described under (○), connected to grid terminal.

Note 4: With dc grid volts = -10, and dc plate voltage adjusted to give dc plate current of 250 ma.

Note 5: With dc grid volts = -20, and dc plate voltage adjusted to give dc plate current of 250 ma.

Note 6: With dc plate volts = 1600, and dc grid voltage adjusted to give dc plate current of 1 ma.

Note 7: Designers should limit the maximum useable cathode current (plate current and grid current) to this value under any condition of operation.

Note 8: In a self-excited oscillator circuit with dc plate volts = 1600, dc plate ma. = 250, dc grid ma. = 50 to 75, grid resistor (ohms) = 2000 ± 10%, and frequency (Mc) = 15.

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World Radio History

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POWER TRIODE

* Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

§ Without external shield.

○ With external flat shield 7-1/2" min. diameter located in plane of the grid terminal and perpendicular to axis of tube. Shield is connected to grid terminal.

● Continuous Commercial Service.

† Computed between half-power points and based on tube output capacitance only.

♣ The driver stage is required to supply tube losses, rf-circuit losses, and rf power added to plate input. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

\# This value includes 24 watts of circuit loss and 36 watts added to plate input.

●● This value of useful power is measured at load of output circuit having indicated efficiency.

⊕ This value includes 28 watts of circuit loss and 40 watts added to plate input.

■ In cathode-drive, plate-modulated class C rf power amplifier service, the 6161 can be modulated 100% if the rf driver stage is also modulated 100% simultaneously. Care should be taken to insure that the driver-modulation and amplifier-modulation voltages are exactly in phase.

** This value includes 18 watts of circuit loss and 40 watts added to plate input.

⊕ This value includes 23 watts of circuit loss and 40 watts added to plate input.

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲ This value includes 18 watts of circuit loss and 45 watts added to plate input.

† This value includes 23 watts of circuit loss and 45 watts added to plate input.

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	900	1200	1400	1650	2000	Mc
MAX.-PERMISSIBLE PERCENTAGE OF MAX.-RATED PLATE VOLTAGE AND PLATE INPUT:						
Class B television	100	80	71	62.5	62.5	%
Class C television, biased-modulated	100	80	71	62.5	62.5	%
Class C telephony, plate-modulated	100	80	71	62.5	62.5	%
Class C telegraphy	100	80	71	62.5	62.5	%
Class C FM telephony	100	80	71	62.5	62.5	%

World Radio History

RCA

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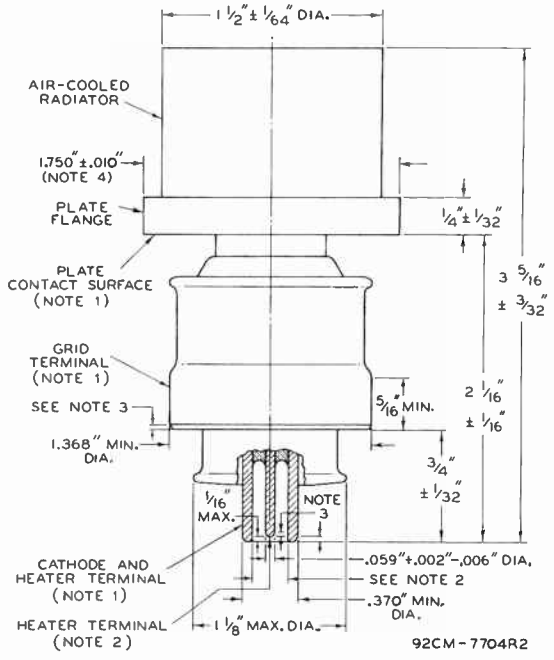
POWER TRIODE

OPERATING CONSIDERATIONS

In *tuning a cathode-drive rf amplifier*, it must be remembered that variations in the load on the output stage will produce corresponding variations in the load on the driving stage. This effect will be noticed by the simultaneous increase in plate currents of both the output and driving stages.

During *standby periods* of less than 15 minutes, it is recommended that the heater voltage be reduced to 80% of normal to conserve life; for longer standby periods, the heater power should be turned off.



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World Radio History

NOTE 1: WITH THE CYLINDRICAL SURFACES OF ITS GRID AND CATHODE TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1. THE FOUR CYLINDRICAL HOLES H_1, H_2, H_3, and H_4 HAVE AXES COINCIDENT WITH.N 0.0005", LENGTHS DETERMINED FROM THE DIMENSIONAL OUTLINE, AND SUCCESSIVELY SMALLER DIAMETERS AS SHOWN IN THE SKETCH.

THE PLATE FLANGE WILL BE ENTIRELY ENGAGED BY HOLE H_1, AND THE CONTACT SURFACE OF THE PLATE FLANGE WILL SEAT ON THE SHOULDER BETWEEN HOLES H_1 AND H_2. THE PLANE SURFACE OF THIS SHOULDER IS $90^{\circ} \pm 2'$ TO THE AXES OF THE HOLES. SEATING 'S DETERMINED BY FAILURE OF A 0.005"-THICKNESS GAUGE, 1/8" WIDE, TO ENTER MORE THAN 1/16" BETWEEN THE SHOULDER SURFACE AND THE PLATE CONTACT SURFACE.

WITH THE TUBE PROPERLY SEATED AS DESCRIBED ABOVE, THE GRID TERMINAL WILL BE ENTIRELY ENGAGED BY HOLE H_3, AND THE CATHODE TERMINAL WILL BE ENGAGED BY HOLE H_4 TO A DEPTH OF AT LEAST 1/4".

NOTE 2: CONCENTRICITY OF THE HEATER TERMINAL WITH RESPECT TO THE CATHODE TERMINAL 'S DETERMINED BY A GAUGE AS SHOWN IN SKETCH G_2. THE CYLINDRICAL HOLE H_5 AND THE ANNULAR HOLE H_6 HAVE AXES COINCIDENT WITHIN 0.0005". THE CATHODE TERMINAL AND THE HEATER TERMINAL WILL ENTER THIS GAUGE TO A DEPTH OF 3/8".

NOTE 3: MAY BE ROUNDED OR BEVELED NOT TO EXCEED 1/16".

NOTE 4: THE AVERAGE OF THE MINIMUM DIAMETER AND THAT MEASURED 90° FROM THE MINIMUM WILL BE WITHIN THE SPECIFIED RANGE, AND THE DIFFERENCE BETWEEN THESE TWO MEASUREMENTS WILL NOT EXCEED .010".

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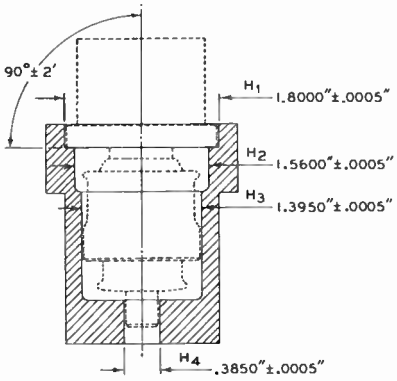
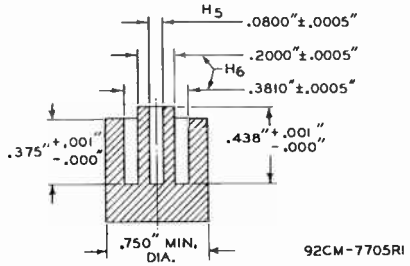
POWER TRIODE

SKETCH G_1



SKETCH G_2

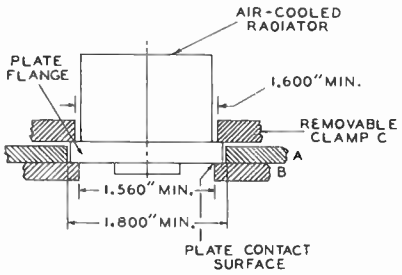


World Radio History

6161

POWER TRIODE

MOUNTING ARRANGEMENT FOR USE WITH
COAXIAL-LINE-OR CAVITY CIRCUITS



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World Radio History

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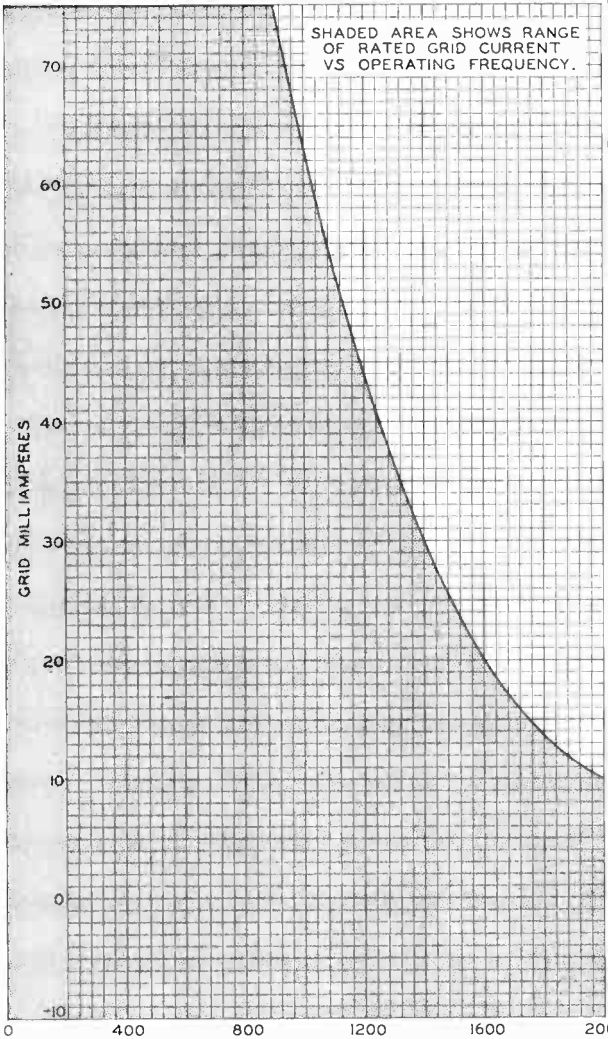
RATING CHART



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92CM-8321

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6161

AVERAGE CHARACTERISTICS

ELECTRON TUBE DIVISION 92CL-7771RI

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World Radio History

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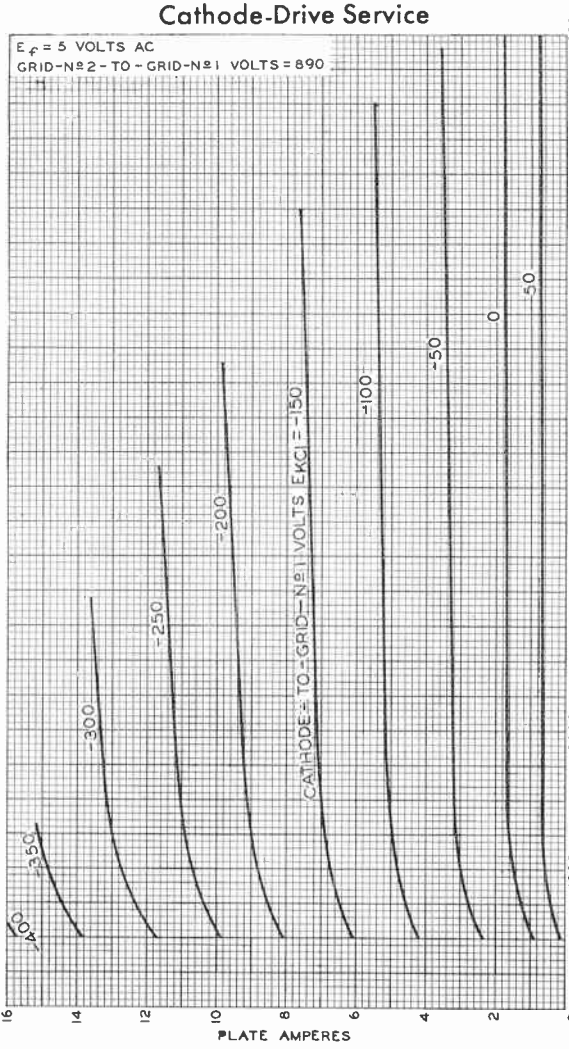
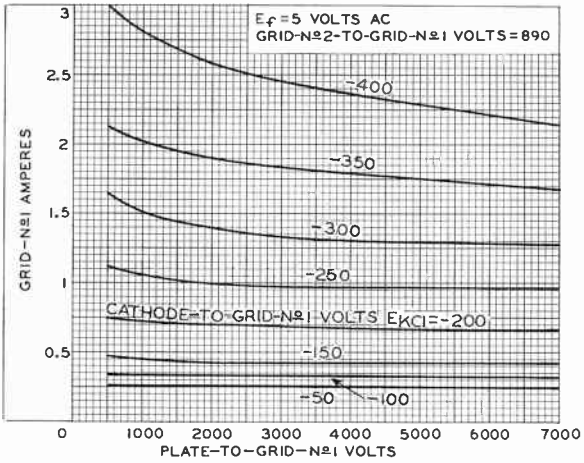
AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Service



92CM-7750R1

World Radio History

AVERAGE CHARACTERISTICS
Cathode-Drive Service



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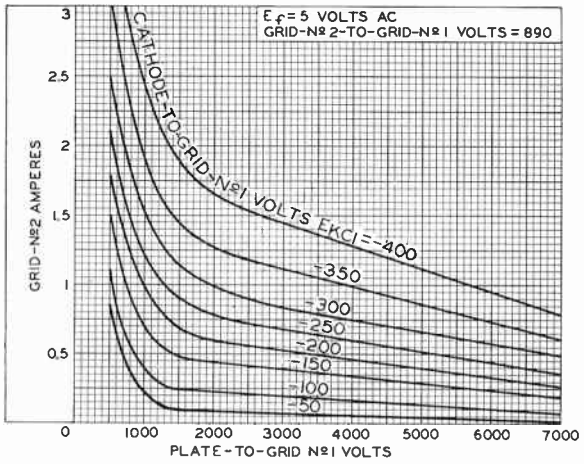


92CS-7752R3

World Radio History

Beam Power Tube

FORCED-AIR COOLED — COAXIAL-ELECTRODE STRUCTURE
THORIATED-TUNGSTEN FILAMENT — INTEGRAL RADIATOR
10-KW PLATE DISSIPATION IN CW OR TV SERVICE UP TO 220 Mc

GENERAL DATA

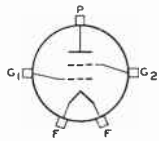
Electrical:

Filament, Multistrand Thoriated Tungsten:			
Voltage (AC or DC)[a]	5	± 5%	volts
Current at 5 volts	181		amp
Minimum heating time	15		sec
Cold resistance	0.0038		ohm
Mu Factor, Grid No.2 to Grid No.1 for plate volts = 2000, grid-No.2 volts = 1000, and plate amperes = 2	10		
Direct Interelectrode Capacitances:			
Grid No.1 to plate[b]	0.6	max.	μμf
Grid No.1 to filament	42		μμf
Plate to filament[b]	0.08	max.	μμf
Grid No.1 to grid No.2	60		μμf
Grid No.2 to plate	24		μμf

Mechanical:

Operating Position	Vertical, filament end up or down
Maximum Overall Length	11.63"
Maximum Diameter	6.38"
Weight (Approx.)	15 lbs
Radiator	Integral part of tube

Terminal Connections (See *Dimensional Outline*):



G_1 - Grid No.1
G_2 - Grid No.2

P - Plate
F - Filament

Air Flow:

Through radiator—The specified flow of incoming air at a temperature of 45° C for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower through the radiator before and during the application of any voltages. The air should enter the radiator at its plate-terminal end (See *Dimensional Outline*). Filament power, plate power, grid-No.2 power, and air flow may be removed simultaneously.

Percentage of maximum-rated plate dissipation for each class of service	100	80	60	%
Minimum air flow	350	270	200	cfm
Static pressure	3	2.1	1.3	in. of water

← Indicates a change.

World Radio History

To grid-No.2 terminal	50 min.	cfm
To grid-No.1 terminal and filament terminals	50 min.	cfm
Incoming-Air Temperature	45 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air)	180 max.	°C
Glass Temperature (At hottest point)	180 max.	°C
Seal Temperature:		
Filament, grid No.1, grid No.2, and plate	180 max.	°C

RF POWER AMPLIFIER — Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

(Voltages are referred to cathode unless otherwise specified)

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE	6000[d] max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	2000 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT	22000[d] max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	10000 max.	watts
GRID-No.1 (CONTROL-GRID) DISSIPATION	300 max.	watts

→ **Typical Operation in Grid-Drive Circuit at 216 Mc:**

	Bandwidth[e] of 8.5 Mc	
DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage	-130	volts
Peak RF Grid-No.1 Voltage:		
Synchronizing level	375	volts
Pedestal level	290	volts
DC Plate Current:		
Synchronizing level	3.45	amp
Pedestal level	2.6	amp
DC Grid-No.2 Current (Pedestal level)	0.207	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.175	amp
Pedestal level	0.085	amp
Driver Power Output (Approx.):[f]		
Synchronizing level	800[g]	watts
Pedestal level	450	watts
Useful Power Output (Approx.):		
Synchronizing level	12000	watts
Pedestal level	6800	watts

→ **Typical Operation in Cathode-Drive Circuit at 216 Mc:**

	Bandwidth[e] of 8.5 Mc	
DC Plate-to-Grid-No.1 Voltage	5885	volts
DC Grid-No.2-to-Grid-No.1 Voltage	885	volts

→ Indicates a change.

World Radio History

DC Cathode-to-Grid-No.1 Voltage	85	volts
Peak RF Cathode-to-Grid-No.1 Voltage:		
Synchronizing level	330	volts
Pedestal level	260	volts
DC Plate Current:		
Synchronizing level	3.45	amp
Pedestal level	2.6	amp
DC Grid-No.2 Current (Pedestal level)	0.152	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.202	amp
Pedestal level	0.11	amp
Driver Power Output (Approx.):[h]		
Synchronizing level	1300[j]	watts
Pedestal level	700	watts
Useful Power Output (Approx.):		
Synchronizing level	12000	watts
Pedestal level	6800	watts

GRID-MODULATED RF POWER AMPLIFIER
Class C Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

	54 to 216 Mc		
DC PLATE VOLTAGE	6000	max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	2000	max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE (White level)	-1000	max.	volts
DC PLATE CURRENT	4	max.	amp
PLATE INPUT	22000	max.	watts
GRID-No.2 INPUT	400	max.	watts
PLATE DISSIPATION	10000	max.	watts
GRID-No.1 DISSIPATION	300	max.	watts

Typical Operation in Grid-Drive Circuit at 216 Mc: ←

	Bandwidth[e] of 8.5 Mc	
DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage:		
Synchronizing level	-130	volts
Pedestal level	-195	volts
White level	-350	volts
Peak RF Grid-No.1 Voltage	375	volts
DC Plate Current:		
Synchronizing level	3.45	amp
Pedestal level	2.42	amp
DC Grid-No.2 Current (Pedestal level)	0.148	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.175	amp
Pedestal level	0.095	amp

←Indicates a change.

World Radio History

	Bandwidth[e] of 8.5 Mc	
Driver Power Output (Approx.):[f]		
Synchronizing level	800[g]	watts
Pedestal level	425	watts
Useful Power Output (Approx.):		
Synchronizing level	12000	watts
Pedestal level	6800	watts

LINEAR RF POWER AMPLIFIER

Single-Sideband Suppressed-Carrier Service

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

	Up to 60 Mc		
DC PLATE VOLTAGE	6900	max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	2000	max.	volts
MAX.-SIGNAL DC PLATE CURRENT	2.75	max.	amp
MAX.-SIGNAL DC GRID-No.1 (CONTROL-GRID) CURRENT	0.6	max.	amp
MAX.-SIGNAL PLATE INPUT	18000	max.	watts
MAX.-SIGNAL GRID-No.2 INPUT	400	max.	watts
PLATE DISSIPATION	10000	max.	watts

Typical CCS Class AB_1 and AB_2 "Single-Tone" Operation at 60 Mc:[k]

	Class AB_1	*Class AB_2*	
DC Plate Voltage	6900	6500	volts
DC Grid-No.2 Voltage	1200	1200	volts
DC Grid-No.1 Voltage[m]	−125	−125	volts
Zero-Signal DC Plate Current	0.2	0.2	amp
Zero-Signal DC Grid-No.2 Current	0	0	amp
Effective RF Load Resistance	5400	1200	ohms
Max.-Signal DC Plate Current	0.675	2.75	amp
Max.-Signal DC Grid-No.2 Current	0.035	0.26	amp
Max.-Signal DC Grid-No.1 Current	0	0.08	amp
Max.-Signal Peak RF Grid-No.1 Voltage	125	305	volts
Max.-Signal Driving Power (Approx.)	0	25	watts
Max.-Signal Power Output (Approx.)	2920	10600	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*[n]

DC PLATE VOLTAGE	5000	max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	2000	max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	−1000	max.	volts
DC PLATE CURRENT	2	max.	amp
DC GRID-No.1 CURRENT	0.6	max.	amp
PLATE INPUT	10000	max.	watts
GRID-No.2 INPUT	270	max.	watts
PLATE DISSIPATION	6600	max.	watts

→ Indicates a change.

World Radio History

Typical Operation in Grid-Drive Circuit: ←

	Up to 60 Mc	
DC Plate Voltage	4700	volts
DC Grid-No.2 Voltage (Modulated 100%)[p]	800	volts
DC Grid-No.1 Voltage[r]	-280	volts
Peak RF Grid-No.1 Voltage	485	volts
DC Plate Current	1.56	amp
DC Grid-No.2 Current	0.217	amp
DC Grid-No.1 Current (Approx.)	0.15	amp
Driver Power Output (Approx.)[f]	180[s]	watts
Useful Power Output (Approx.)	5500	watts

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[t]
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*[n] ←

DC PLATE VOLTAGE	6900	max.	volts
DC GRID-No.2 VOLTAGE	2000	max.	volts
DC GRID-No.1 VOLTAGE	-1000	max.	volts
DC PLATE CURRENT	2.75	max.	amp
DC GRID-No.1 CURRENT	0.6	max.	amp
PLATE INPUT	18000	max.	watts
GRID-No.2 INPUT	400	max.	watts
PLATE DISSIPATION	10000	max.	watts

Typical Operation in Grid-Drive Circuit: ←

	Up to 60 Mc	*At 216 Mc*		
DC Plate Voltage	6400	5800	5800	volts
DC Grid-No.2 Voltage[u]	1200	1200	1200	volts
DC Grid-No.1 Voltage[v]	-310	-130	-175	volts
Peak RF Grid-No.1 Voltage	560	230	370	volts
DC Plate Current	2.75	1.8	2.6	amp
DC Grid-No.2 Current	0.3	0.1	0.267	amp
DC Grid-No.1 Current (Approx.)	0.14	0.05	0.11	amp
Driver Power Output (Approx.)[f]	75	300[w]	750[x]	watts
Useful Power Output (Approx.)	11600	6000	9000	watts

[a] Full rated filament voltage can be applied safely to the cold filament. It is not necessary to provide means for limiting the filament starting current.

[b] With external, flat, metal shield 12" square having center hole 4-5/16" diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2.

[c] Continuous Commercial Service.

[d] For operation on VHF television channels 2 through 6, DC plate voltage may be increased to 6400 max. volts and plate input may be increased to 24000 maximum watts provided all other ratings are net.

[e] Computed between half-power points and based on tube output capacitance only.

[f] The 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 value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

[g] This value includes 700 watts of rf circuit loss at 216 Mc.

← Indicates a change.

World Radio History

h The driver stage is required to supply tube losses, rf circuit losses, and rf power added to plate circuit. The driver stage should be designed as indicated under (f).

j This value includes 300 watts of rf circuit loss at 216 Mc, and 900 watts added to plate circuit.

k "Single-Tone Modulation" operation refers to that class of amplifier service in which the grid-No.1 input consists of a monofrequency rf signal having constant amplitude. This signal is produced in a single-sideband suppressed-carrier system when a single audio frequency of constant amplitude is applied to the input of the system.

m Adjusted to give indicated zero-signal plate current.

n These ratings hold for operation up to 60 Mc; for ratings at higher frequencies, see *Maximum Ratings vs Operating Frequency* table.

p Obtained preferably from a separate source.

r Obtained preferably from a combination of 365-ohm grid-No.1 resistor and -170-volt fixed bias.

s This value includes 50 watts of rf circuit loss at 30 Mc.

t Key-down conditions per tube without amplitude modulation. 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.

u Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6166 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 2000 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

v Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

w This value includes 270 watts of rf circuit loss.

x This value includes 675 watts of rf circuit loss.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current.	1	172	190	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate.	2	-	0.6	μμf
Grid No.1 to filament	3	39	47	μμf
Grid No.1 to grid No.2.	3	52	64	μμf
Grid No.2 to plate.	3	21.2	25.8	μμf
Plate to filament	2	-	0.08	μμf
DC Grid-No.1 Voltage.	1,4	-	-225	volts
Peak Grid-No.1 Current.	1,5	-	1.5	amp
Peak Grid-No.1 Voltage.	1,5	-	315	volts

Note 1: With 5 volts ac or dc on filament.

Note 2: With external, flat, metal shield 12" square having center hole 4-5/16" diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2. All other electrodes are grounded.

Note 3: Without shield and all other electrodes grounded.

Note 4: With dc plate voltage of 6000 volts, dc grid-No.2 voltage of 1200 volts, and dc plate current of 20 ma.

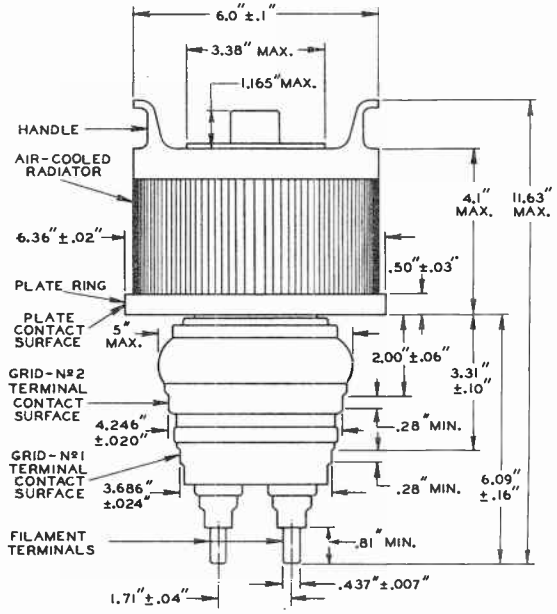
Note 5: With dc plate voltage of 1500 volts, dc grid-No.2 voltage of 1200 volts, and instantaneous grid-No.1 voltage adjusted to give peak plate current of 11 amp.

→ Indicates a change.

World Radio History

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	60	220	Mc
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM-RATED PLATE VOLTAGE AND PLATE INPUT:			
Class AB Single-Sideband Suppressed-Carrier Service	100	90	%
Class B Television Service	Full Ratings—54 to 216 Mc		
Class C Television Service	Full Ratings—54 to 216 Mc		
Class C Telephony, Plate-Modulated	100	90	%
Class C Telegraphy and FM Telephony	100	90	%



92CM-7716R2

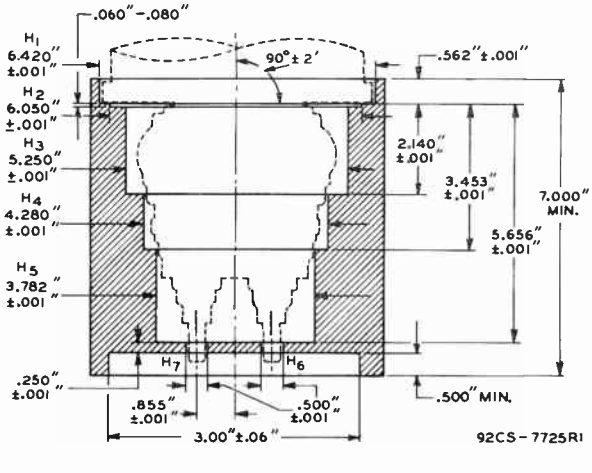
← Indicates a change.

World Radio History

WITH THE CYLINDRICAL SURFACES OF THE GRID-No. 2 TERMINAL, GRID-No. 1 TERMINAL AND THE FILAMENT TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1. THE FIVE CYLINDRICAL HOLES H_1, H_2, H_3, H_4, AND H_5 HAVE AXES THAT ARE COINCIDENT WITHIN 0.001" AND HAVE SUCCESSIVELY SMALLER DIAMETERS AS SHOWN. THE CENTER HOLES H_6 AND H_7 ARE LOCATED ON A DIAMETER WITHIN ± 0.001" AND THEIR AXES ARE PARALLEL TO THE AXES OF H_1, H_2, H_3, H_4, AND H_5 WITHIN 0° ± 2'.

THE PLATE RING WILL BE ENTIRELY ENGAGED BY HOLE H_1 AND WILL SEAT ON THE SHOULDER BETWEEN H_1 AND H_2. THE PLANE SURFACE OF THIS SHOULDER IS AT RIGHT ANGLES TO THE AXES OF THE HOLES WITHIN 0° ± 2'. SEATING IS DETERMINED BY FAILURE OF A 0.020" THICKNESS GAUGE TO ENTER MORE THAN 1/16" BETWEEN SHOULDER SURFACE AND PLATE RING. SLOTS ARE PROVIDED TO PERMIT THIS MEASUREMENT.

SKETCH G_1



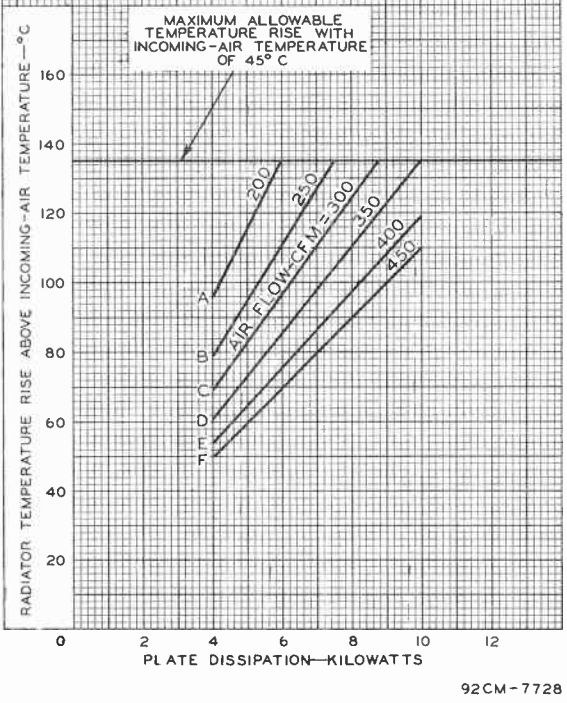
World Radio History

COOLING REQUIREMENTS

E_f = 5 VOLTS AC
MAXIMUM RADIATOR TEMPERATURE=180° C

CURVE	PRESSURE DROP—INCHES OF WATER	CURVES TAKEN ACCORDING TO NAFM* STANDARDS — BULLETIN Nº 103
A	1.3	
B	1.8	
C	2.4	
D	3	
E	3.7	
F	4.5	

*NATIONAL ASSOCIATION OF FAN MFGS., GENERAL MOTORS BLDG., DETROIT, MICH.



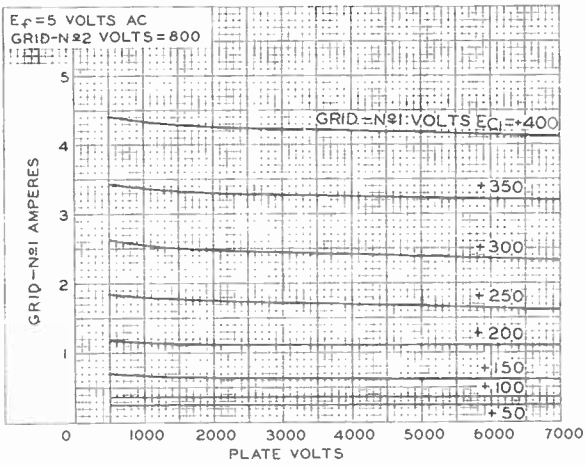
92CM-7728

World Radio History

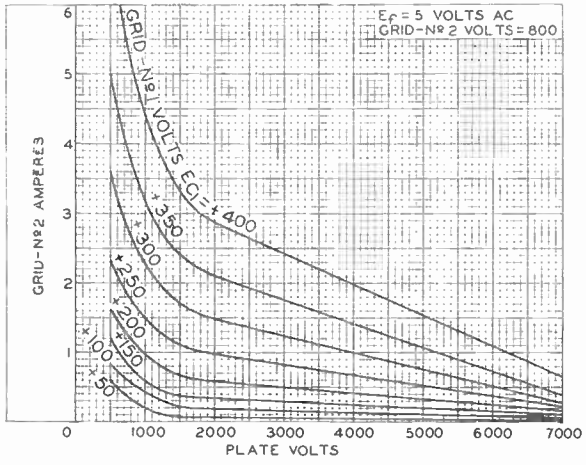
AVERAGE PLATE CHARACTERISTICS

92CM-7736RI

AVERAGE CHARACTERISTICS



92CS-7744RI

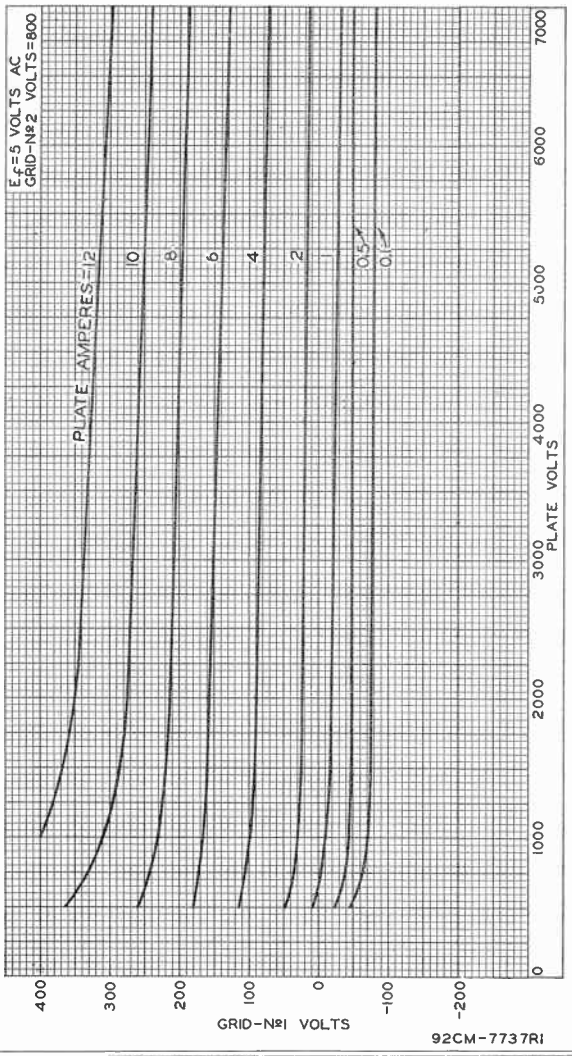


92CS-7743RI

World Radio History

6166

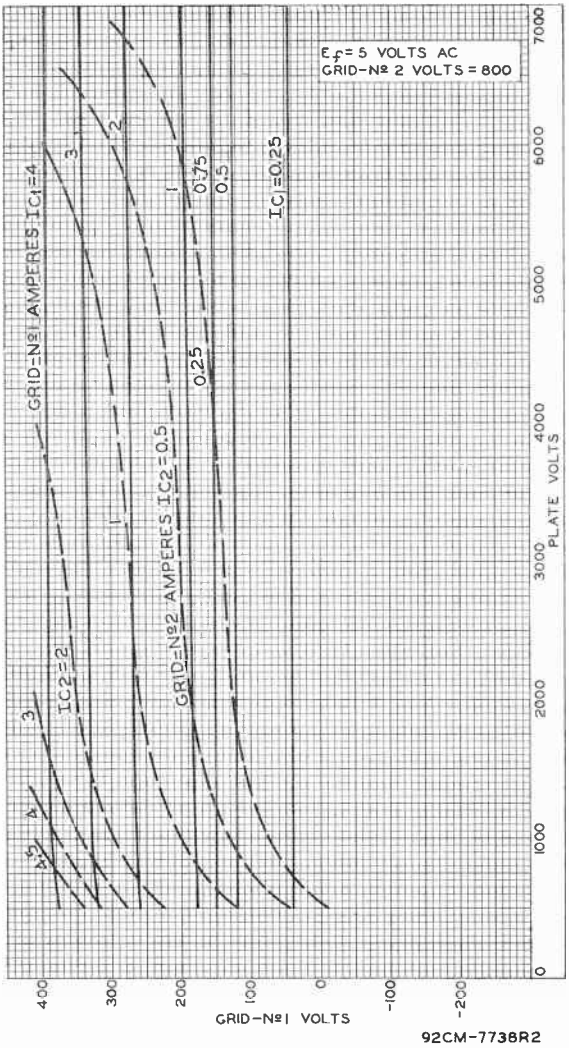
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



92CM-7737R1

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

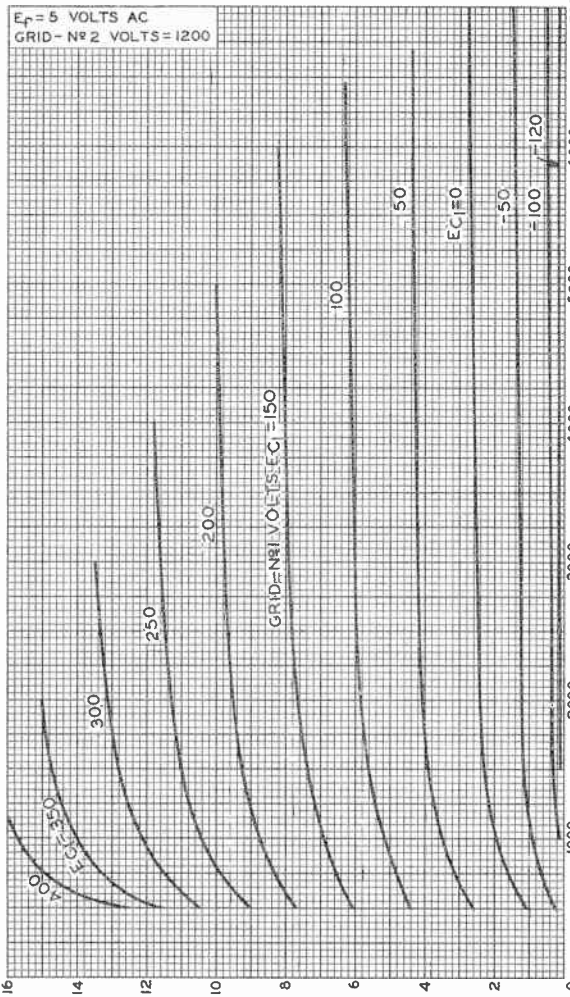
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



92CM-7738R2

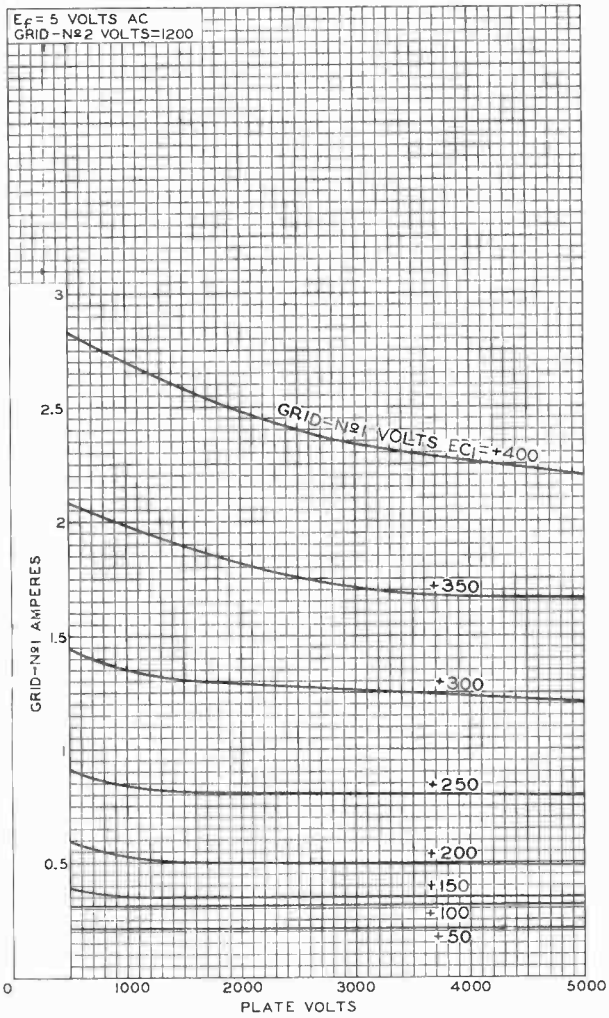
World Radio History

AVERAGE PLATE CHARACTERISTICS



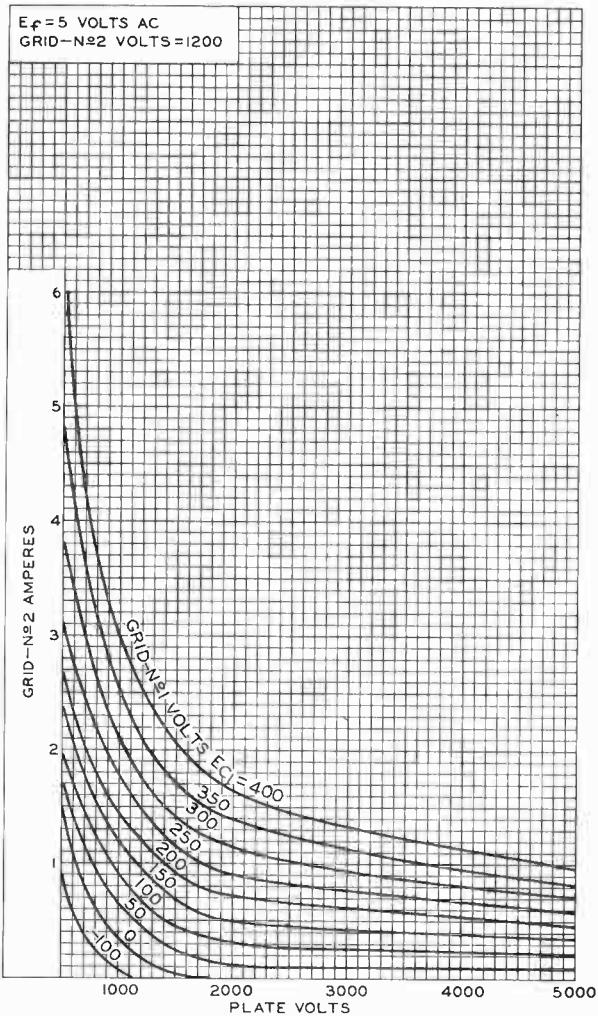
92CM-7735RI

AVERAGE CHARACTERISTICS



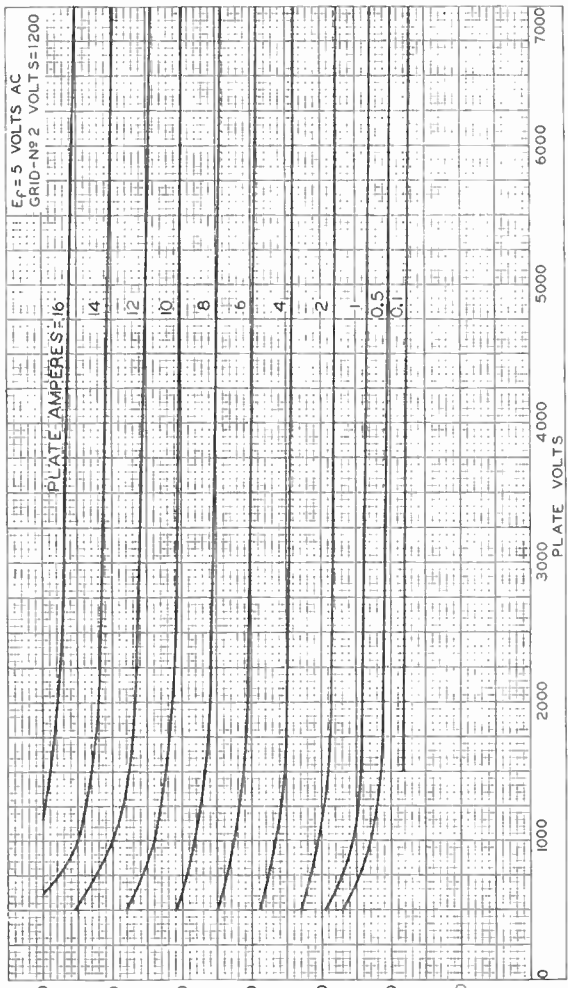
92CM-7740R2

AVERAGE CHARACTERISTICS



92CM—7739RI

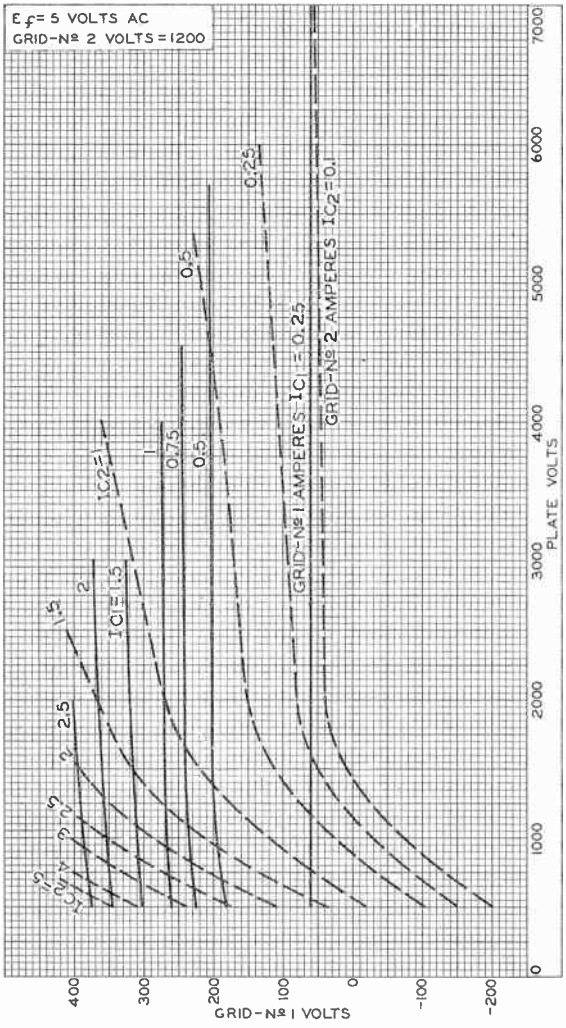
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



92CM-7733RI

World Radio History

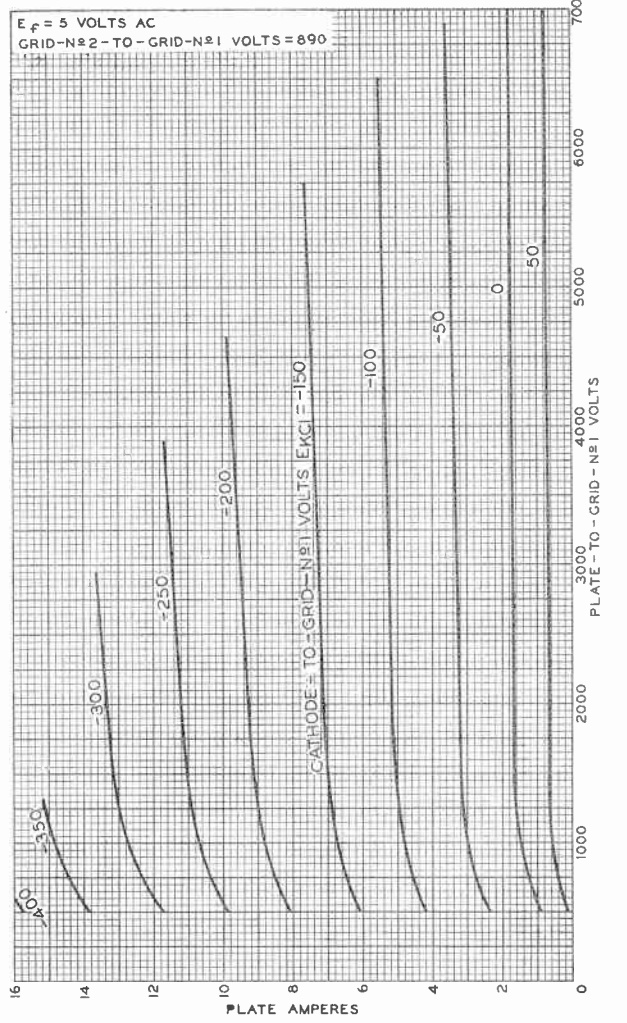
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



92CM-7730R2

World Radio History

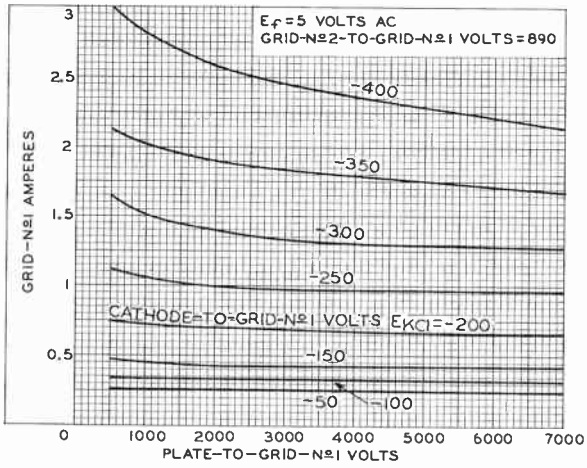
AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Service



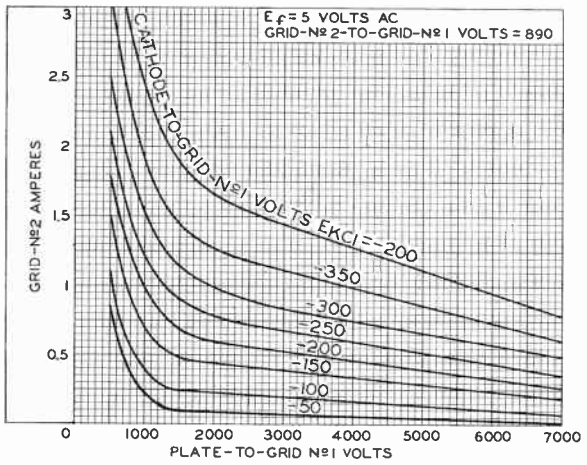
92CM-7750RI

World Radio History

AVERAGE CHARACTERISTICS
Cathode-Drive Service



92CS-7746R1



92CS-7752R2

World Radio History

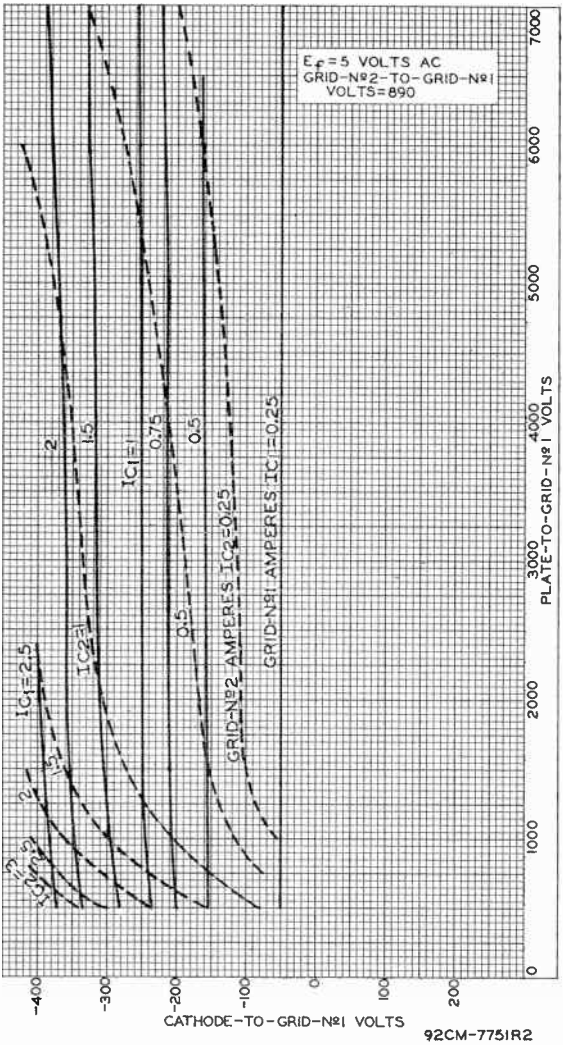
AVERAGE CONSTANT-CURRENT CHARACTERISTICS
Cathode-Drive Service

92CM-7749RI

World Radio History

6166

AVERAGE CONSTANT-CURRENT CHARACTERISTICS
Cathode-Drive Service



92CM-7751R2

6166A/7007

Beam Power Tube

FORCED-AIR COOLED
CERAMIC-METAL SEALS — COAXIAL-ELECTRODE STRUCTURE
THORIATED-TUNGSTEN FILAMENT — INTEGRAL RADIATOR
12-KW PLATE DISSIPATION IN CW OR TV SERVICE UP TO 220 Mc

GENERAL DATA

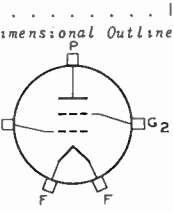
Electrical:

Filament, Multistrand Thoriated Tungsten:		
Voltage (AC or DC)▲	5 ± 5%	volts
Current at heater volts = 5	174	amp ←
Minimum heating time	15	sec
Cold resistance	0.0038	ohm
Mu Factor, Grid No.2 to Grid No.1 for plate volts = 2000, grid-No.2 volts = 1000, and plate amperes = 2	10	
Direct Interelectrode Capacitances:		
Grid No.1 to plate●	0.6 max.	pf
Grid No.1 to filament	42	pf
Plate to filament●	0.08 max.	pf
Grid No.1 to grid No.2	60	pf
Grid No.2 to plate	24	pf

Mechanical:

Operating Position	Vertical, filament end up or down
Maximum Overall Length	11.50"
Maximum Diameter	6.38"
Weight (Approx.)	15 lbs
Radiator	Integral part of tube

Terminal Diagram (See *Dimensional Outline*):



G_1 – Grid No.1
G_2 – Grid No.2

P – Plate
F – Filament

Thermal:

Air Flow:

Through radiator—The specified flow of incoming air at a temperature of 45° C for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower through the radiator before and during the application of any voltages. The air should enter the radiator at its plate-terminal end (See *Dimensional Outline*). Filament power, plate power, grid-No.2 power, and air flow may be removed simultaneously.

Percentage of maximum-rated plate dissipation for each class of service	100	83	67	50	%
Minimum air flow	550	350	230	175	cfm
Static pressure	6.6	3	1.6	1	in. of water

← Indicates a change.

World Radio History

To grid-No.2 terminal	50 min.	cfm
To grid-No.1 terminal and filament terminals	50 min.	cfm
Incoming-Air Temperature	50 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air)	180 max.	°C
Terminal Temperature: Filament, grid No.1, grid No.2, and plate	180 max.	°C

RF POWER AMPLIFIER — Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

(Voltages are referred to cathode unless otherwise specified)

Maximum CCS* Ratings, *Absolute-Maximum Values:*

	Up to 220 Mc	
DC PLATE VOLTAGE	7500 max.	volts
DC GRID-No.2 VOLTAGE	2000 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT	24000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	12000 max.	watts
GRID-No.1 DISSIPATION	300 max.	watts

Typical Operation in Grid-Drive Circuit at 216 Mc:

	Bandwidth of 8.5 Mc	
DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage	-130	volts
Peak RF Grid-No.1 Voltage:		
Synchronizing level	375	volts
Pedestal level	290	volts
DC Plate Current:		
Synchronizing level	3.45	amp
Pedestal level	2.6	amp
DC Grid-No.2 Current (Pedestal Level)	0.207	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.175	amp
Pedestal level	0.085	amp
Driver Power Output (Approx.):		
Synchronizing level	800	watts
Pedestal level	450	watts
Useful Power Output (Approx.):		
Synchronizing level	12000	watts
Pedestal level	6800	watts

Typical Operation in Cathode-Drive Circuit at 216 Mc:

	Bandwidth of 8.5 Mc	
DC Plate-to-Grid-No.1 Voltage	6400	volts
DC Grid-No.2-to-Grid-No.1 Voltage	800	volts
DC Cathode-to-Grid-No.1 Voltage	90	volts

World Radio History

Peak RF Grid-No.1 Voltage	550	volts
DC Plate Current	1.8	amp
DC Grid-No.2 Current	0.16	amp
DC Grid-No.1 Current (Approx.)	0.18	amp
Driver Power Output (Approx.)♦	125‡	watts
Useful Power Output (Approx.)	6000	watts

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy§ and RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS★ Ratings, *Absolute-Maximum Values:*

	Up to 220 Mc	
DC PLATE VOLTAGE	7500 max.	volts
DC GRID-No.2 VOLTAGE	2000 max.	volts
DC GRID-No.1 VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	3 max.	amp
DC GRID-No.1 CURRENT	0.6 max.	amp
PLATE INPUT	20000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	12000 max.	watts

Typical Operation in Grid-Drive Circuit:

	At 60 Mc	*At 216 Mc*	
DC Plate Voltage	6600	7000	volts
DC Grid-No.2 Voltage□	1200	1200	volts
DC Grid-No.1 Voltage◇	-310	-310	volts
Peak RF Grid-No.1 Voltage	560	560	volts
DC Plate Current	2.75	2.75	amp
DC Grid-No.2 Current	0.3	0.3	amp
DC Grid-No.1 Current (Approx.)	0.14	0.14	amp
Driver Power Output (Approx.)♦	95▽	750▲▲	watts
Useful Power Output (Approx.)	12000	10000	watts

▲ Full rated filament voltage can be applied safely to the cold filament. It is not necessary to provide means for limiting the filament starting current.

● With external flat metal shield 12" square having center hole 4-5/16" diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2.

★ Continuous Commercial Service.

♦ Computed between half-power points and based on tube output capacitance only.

‡ The 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 value to take care of variations in line-voltages, in components, in initial tube characteristics, and in tube characteristics during life.

♠ This value includes 700 watts of rf-circuit loss at 216 Mc.

♣ The driver stage is required to supply tube losses, rf-circuit losses, and rf power added to plate circuit. The driver stage should be designed as indicated in footnote (♦).

● This value includes 470 watts of rf-circuit loss at 216 Mc and 1030 watts added to plate circuit.

"Single-Tone" operation refers to that class of amplifier service in which the grid-No.1 input consists of a monofrequency rf signal having constant amplitude. This signal is produced in a single-sideband suppressed-carrier system when a single audio frequency of constant amplitude is applied to the input of the system.

World Radio History

* Adjusted to give indicated zero-signal plate current.

⊕ Obtained preferably from a separate source.

† Obtained preferably from a combination of 365-ohm grid-No.1 resistor and -170-volt fixed bias.

‡ This value includes 25 watts of rf-circuit loss.

§ Key-down conditions per tube without amplitude modulation. 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.

□ Obtained preferably from a separate source, or from the plate supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6166A/7007 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 2000 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

◊ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

▽ This value includes 20 watts of rf-circuit loss.

▲▲ This value includes 675 watts of rf-circuit loss.

CHARACTERISTICS RANGE VALUES

	Note	Min.	Max.	
→ Filament Current.	1	165	183	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate.	2	–	0.6	pf
Grid No.1 to filament	3	39	47	pf
Grid No.1 to grid No.2.	3	52	64	pf
Grid No.2 to plate.	3	21.2	25.8	pf
Plate to filament	2	–	0.08	pf
DC Grid-No.1 Voltage.	1,4	–	-225	volts
Peak Grid-No.1 Current.	1,5	–	1.5	amp
Peak Grid-No.1 Voltage.	1,5	–	315	volts

Note 1: With 5 volts ac or dc on filament.

Note 2: With external, flat, metal shield 12" square having center hole 4-5/16" diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid-No.2. All other electrodes are grounded.

Note 3: Without shield and all other electrodes grounded.

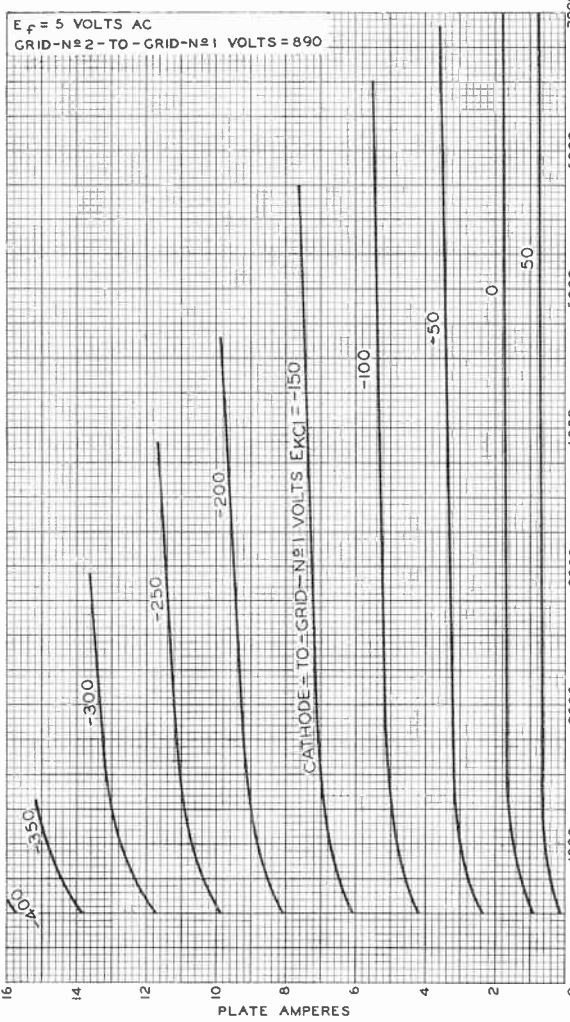
Note 4: With dc plate voltage of 6000 volts, dc grid-No.2 voltage of 1200 volts, and dc plate current of 20 ma.

Note 5: With dc plate voltage of 1500 volts, dc grid-No.2 voltage of 1200 volts, and instantaneous grid-No.1 voltage adjusted to give peak plate current of 11 amp.

→ Indicates a change.

World Radio History

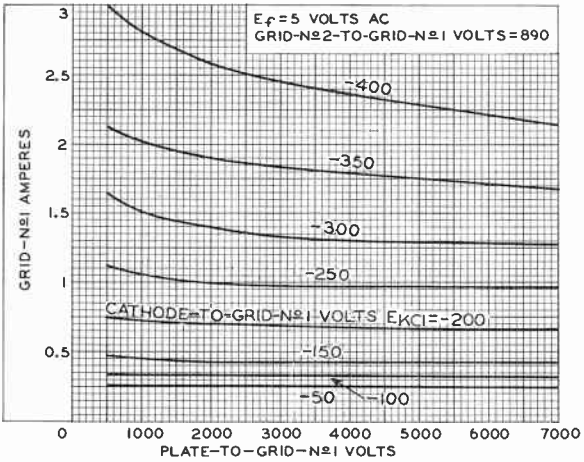
AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Service



92CM-7750R1

World Radio History

AVERAGE CHARACTERISTICS
Cathode-Drive Service



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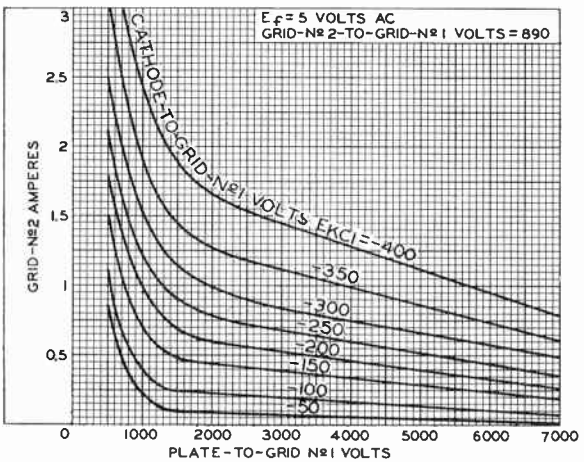
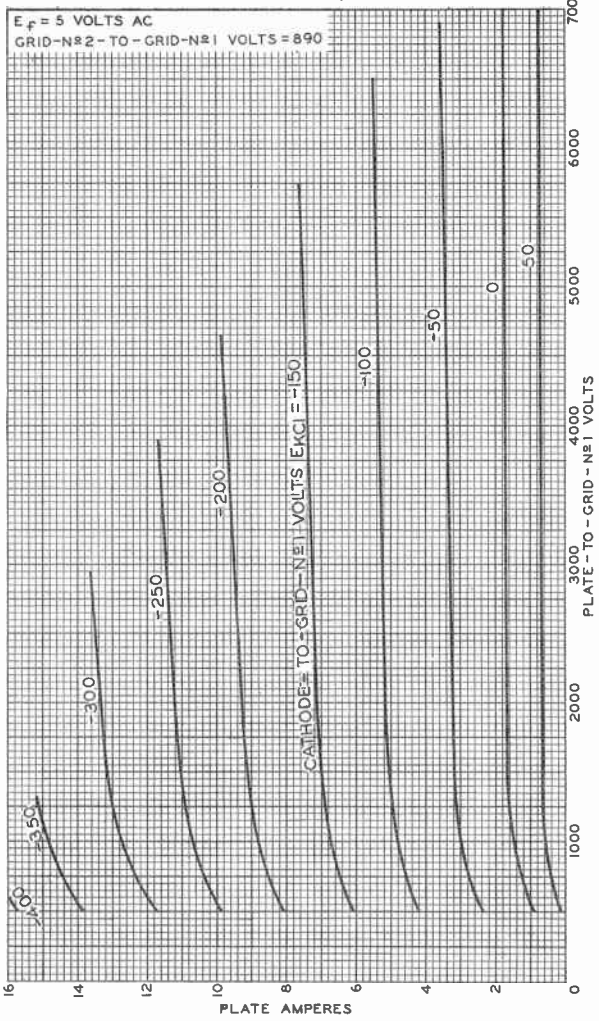


92CS-7752R3

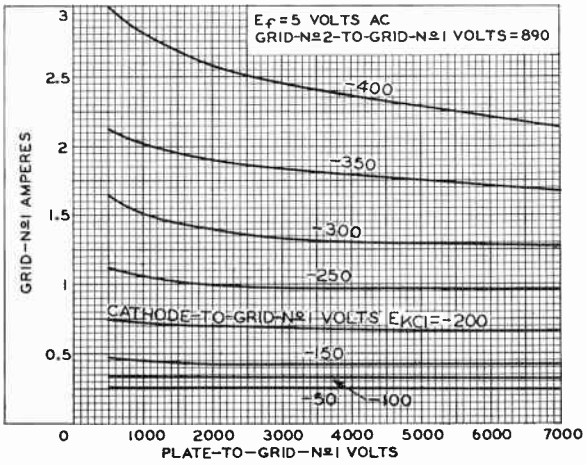
World Radio History

AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Service



92CM-7750RI

AVERAGE CHARACTERISTICS
Cathode-Drive Service



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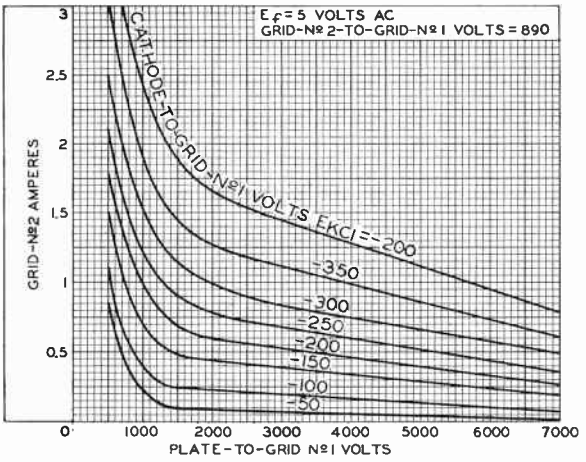


92CS-7752R2

Radio Radio History

6166
VHF POWER TETRODE
FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage*	5.0 ± 5%	ac or dc volts
Current at 5 volts	181	amp
Minimum heating time	15	sec
Cold Resistance	0.0038	ohm
Mu Factor, Grid No.2 to Grid No.1 for plate volts = 2000, grid-No.2 volts = 1000, and plate amperes = 2.	10	
Direct Interelectrode Capacitances:		
Grid No.1 to plate**	0.6 max.	μμf
Grid No.1 to filament	42	μμf
Plate to filament**	0.08 max.	μμf
Grid No.1 to grid No.2	60	μμf
Grid No.2 to plate	24	μμf

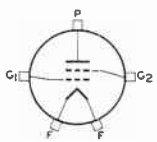
Mechanical:

Operating Position	Vertical, filament end up or down
Maximum Overall Length	11-5/8"
Maximum Diameter	6-13/32"
Weight (Approx.)	15 lbs
Radiator	Integral part of tube

Terminal Connections *(See Dimensional Outline)*:

G_1 - Grid No.1

G_2 - Grid No.2



P - Plate

F - Filament

Air Flow:

Through Radiator--The specified flow of incoming air at a temperature of 45 °C for various plate dissipations, as indicated in the following tabulation, should be delivered by a blower through the radiator before and during the application of any voltages. The air should enter the radiator at its plate-contact-surface end *(See Dimensional Outline)*. Filament power, plate power, and air flow may be removed simultaneously.

Percentage of maximum rated plate dissipation for each class of service	100	80	60	%
Minimum air flow	350	270	200	cfm
Static pressure	3	2.1	1.3	in. of water

* Full rated filament voltage can be applied safely to the cold filament. It is not necessary to provide means for limiting the filament starting current.

**: See next page.

← indicates a change.

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VHF POWER TETRODE

To Grid-No.2 Terminal:		
Plate-ring end	§§	
Grid-No.1-terminal end	50 min.	cfm
To Grid-No.1 Terminal and Filament Seals	50 min.	cfm
Incoming-Air Temperature	45 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air)	180 max.	°C
Glass Temperature (At hottest part)	180 max.	°C
Seal Temperature:		
Filament, grid No.1, grid No.2, and plate	180 max.	°C

Fittings:

Filament Connector (2 required)	RCA-216F1
Connector Wrench (2 required)	RCA-212F1

RF POWER AMPLIFIER -- Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

(Voltages are referred to cathode unless otherwise speicfied)

Maximum CCS● Ratings, *Absolute Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE	6000§ max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	2000 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT	22000§ max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	10000 max.	watts
GRID-No.1 (CONTROL-GRID) DISSIPATION	300 max.	watts

Typical Operation in Grid-Drive Circuit:

	Bandwidth▲ of 8.5 Mc	
DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage	-130	volts
Peak RF Grid-No.1 Voltage:		
Synchronizing level	375	volts
Pedestal level	290	volts
DC Plate Current:		
Synchronizing level	3.45	amp
Pedestal level	2.60	amp

** With external flat metal shield 12" square having center hole 4-5/16" diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2.

§§ A sufficient quantity of the air flow to the radiator should be directed onto the plate end of the grid-No.2 terminal so that its temperature does not exceed the specified value.

§ For operation on VHF television channels 2 through 6, dc plate voltage may be increased to 6400 volts maximum and plate input may be increased to 24,000 watts maximum provided all other ratings are met.

●,▲: See next page.

World Radio History

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VHF POWER TETRODE

DC Grid-No.2 Current (Pedestal Level).	0.207	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level.	0.175	amp
Pedestal level	0.085	amp
Driver Power Output (Approx.):♦		
Synchronizing level.	800#	watts
Pedestal level	450	watts
Power Output (Approx.):		
Synchronizing level.	12000	watts
Pedestal level	6800	watts

Typical Operation in Cathode-Drive Circuit:

	Bandwidth▲ of 8.5 Mc	
DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	800	volts
DC Cathode-to-Grid-No.1 Voltage. . . .	85	volts
Peak RF Cathode-to-Grid-No.1 Voltage:		
Synchronizing level.	330	volts
Pedestal level	260	volts
DC Plate Current:		
Synchronizing level.	3.45	amp
Pedestal level	2.60	amp
DC Grid-No.2 Current (Pedestal Level).	0.152	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level.	0.202	amp
Pedestal level	0.110	amp
Driver Power Output (Approx.):♣		
Synchronizing level.	1300##	watts
Pedestal level	700	watts
Power Output (Approx.):		
Synchronizing level.	12000	watts
Pedestal level	6800	watts

GRID-MODULATED RF POWER AMPLIFIER --
Class C Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS● Ratings, ***Absolute Values:***

	54 to 216 Mc	
DC PLATE VOLTAGE	6000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE . .	2000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE (White Level).	-1000 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT.	22000 max.	watts

♣ The driver stage is required to supply tube losses, rf-circuit losses, and rf power added to plate circuit. The driver stage should be designed as indicated under (♦).

This value includes 300 watts of rf-circuit loss at 216 Mc, and 900 watts added to plate circuit.

●,▲,♦,#: See next page. ←indicates a change.

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World Radio History

RCA

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VHF POWER TETRODE

GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	10000 max.	watts
GRID-No.1 DISSIPATION	300 max.	watts

Typical Operation in Grid-Drive Circuit:

	Bandwidth▲ of 8.5 Mc	
DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage:		
Synchronizing level	-130	volts
Pedestal level	-195	volts
White level	-350	volts
Peak RF Grid-No.1 Voltage	375	volts
DC Plate Current:		
Synchronizing level	3.45	amp
Pedestal level	2.42	amp
DC Grid-No.2 Current (Pedestal Level)	0.148	amp
→ DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.175	amp
Pedestal level	0.095	amp
Driver Power Output (Approx.):♦		
Synchronizing level	800#	watts
Power Output (Approx.):		
Synchronizing level	12000	watts
Pedestal level	6800	watts

PLATE-MODULATED RF POWER AMPLIFIER -- Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*†

DC PLATE VOLTAGE	5000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	2000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	2 max.	amp
DC GRID-No.1 CURRENT	0.6 max.	amp
PLATE INPUT	10000 max.	watts
GRID-No.2 INPUT	270 max.	watts
PLATE DISSIPATION	6600 max.	watts

Typical Operation in Grid-Drive Circuit:

	Up to 30 Mc	
DC Plate Voltage	4700	volts
DC Grid-No.2 Voltage (Modulated 100%)♦	800	volts
DC Grid-No.1 Voltage*	-280	volts
Peak RF Grid-No.1 Voltage	485	volts
DC Plate Current	1.56	amp

▲ Computed between half-power points and based on tube output capacitance only.

This value includes 700 watts of rf-circuit loss at 216 Mc.

●,♦,†,♦,*: See next page. → Indicates a change.

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VHF POWER TETRODE

DC Grid-No.2 Current	0.217	amp
DC Grid-No.1 Current (Approx.)	0.150	amp ←
Driver Power Output (Approx.)	180⊕	watts
Power Output (Approx.)	5500	watts

RF POWER AMPLIFIER & OSCILLATOR -- Class C Telegraphy□ and RF POWER AMPLIFIER -- Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*†

DC PLATE VOLTAGE	6600 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	2000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	2.75 max.	amp
DC GRID-No.1 CURRENT	0.6 max.	amp
PLATE INPUT	18000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	10000 max.	watts

Typical Operation in Grid-Drive Circuit:

	At 216 Mc		
DC Plate Voltage	5800	5800	volts
DC Grid-No.2 Voltage●●	1200	1200	volts
DC Grid-No.1 Voltage▲▲	-130	-175	volts
Peak RF Grid-No.1 Voltage	230	370	volts
DC Plate Current	1.8	2.6	amp
DC Grid-No.2 Current	0.1	0.267	amp
DC Grid-No.1 Current (Approx.)	0.05	0.110	amp ←
Driver Power Output (Apprcx.)♦	300■	750⊕	watts
Power Output (Approx.)	6000	9000	watts

● Continuous Commercial Service.

♦ The 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 value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

† These ratings hold for operation up to 30 Mc; for ratings at higher frequencies, see Maximum Ratings vs Frequency Table.

♦ Obtained preferably from a separate source.

★ Obtained preferably from a combination of 365-ohm grid-No.1 resistor and -170-volt fixed bias.

⊕ This value includes 50 watts of rf-circuit loss at 30 Mc.

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●● Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6166 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 2000 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

▲▲ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

■ This value includes 270 watts of rf-circuit loss.

⊕ This value includes 675 watts of rf-circuit loss.

← Indicates a change.

World Radio History

RCA

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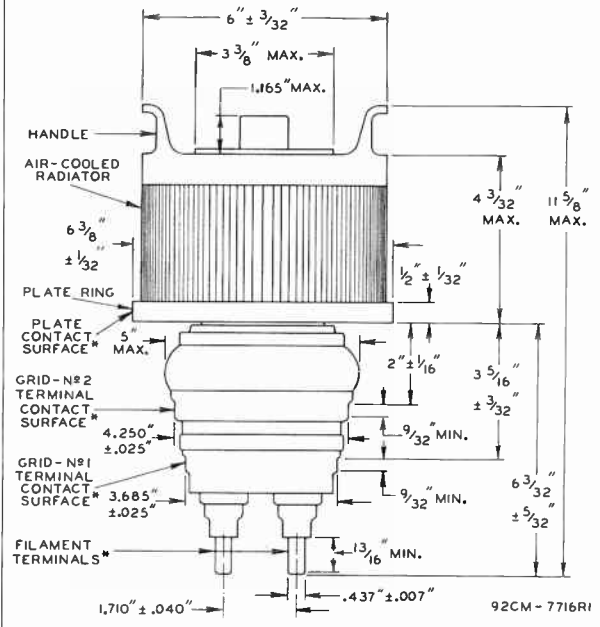
VHF POWER TETRODE

MAXIMUM RATINGS vs OPERATING FREQUENCY			
FREQUENCY	30	220	Mc
MAX. PERMISSIBLE PERCENTAGE OF MAX. RATED PLATE VOLTAGE AND PLATE INPUT:			
Class B Television Service	Full Ratings—54 to 216 Mc		
Class C Television Service	Full Ratings—54 to 216 Mc		
Class C Telephony, Plate-Modulated	100	90	%
Class C Telegraphy and FM Telephony	100	90	%



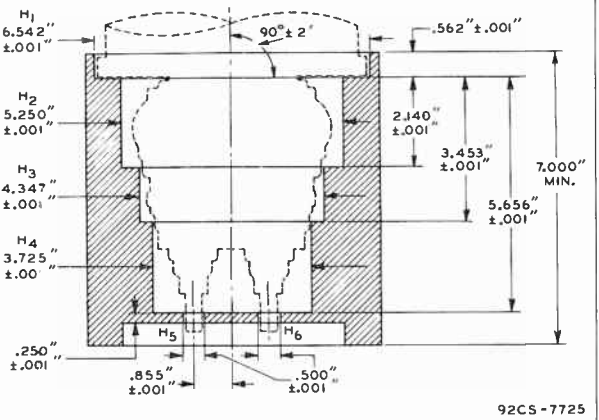
* WITH THE CYLINDRICAL SURFACES OF THE PLATE RING, GRID-NO.2 TERMINAL, GRID-NO.1 TERMINAL, AND FILAMENT TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1. PROPER ENTRY OF THE TUBE IN THE GAUGE IS OBTAINED WHEN THE PLATE RING IS ENTIRELY ENGAGED BY HOLE H_1.

MOUSER ELECTRONICS

6166

VHF POWER TETRODE

SKETCH G_1



92CS-7725

THE FOUR CYLINDRICAL HOLES H_1, H_2, H_3, AND H_4 HAVE AXES COINCIDENT WITHIN 0.001". THE HOLES H_5 AND H_6 HAVE AXES PARALLEL TO THE AXES OF H_1, H_2, H_3, AND H_4, WITHIN $0^\circ \pm 2'$.

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

World Radio History

6166

6166

COOLING REQUIREMENTS

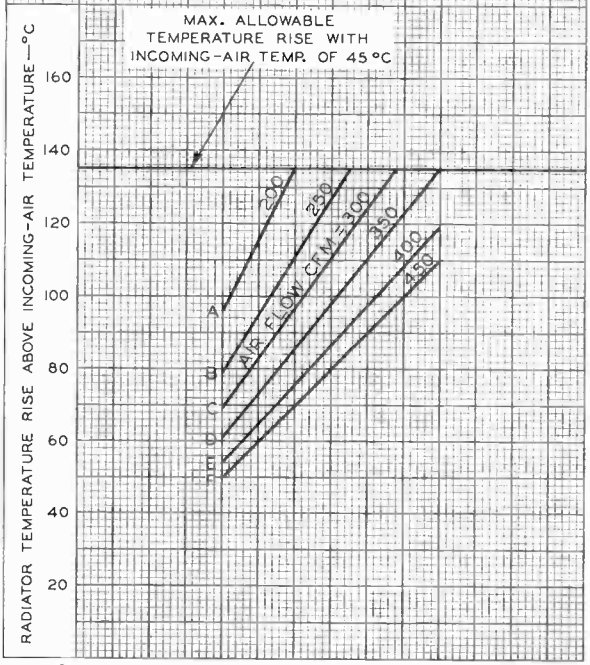
E_f = 5.0 VOLTS AC

MAXIMUM RADIATOR TEMPERATURE = 180°C

CURVE	PRESSURE DROP—INCHES OF WATER
A	1.3
B	1.8
C	2.4
D	3.0
E	3.7
F	4.5

CURVES TAKEN ACCORDING TO NAFM* STANDARDS — BULLETIN Nº 103

*NATIONAL ASSOCIATION OF FAN MFGS., GENERAL MOTORS BLDG., DETROIT, MICH.



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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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World Radio History

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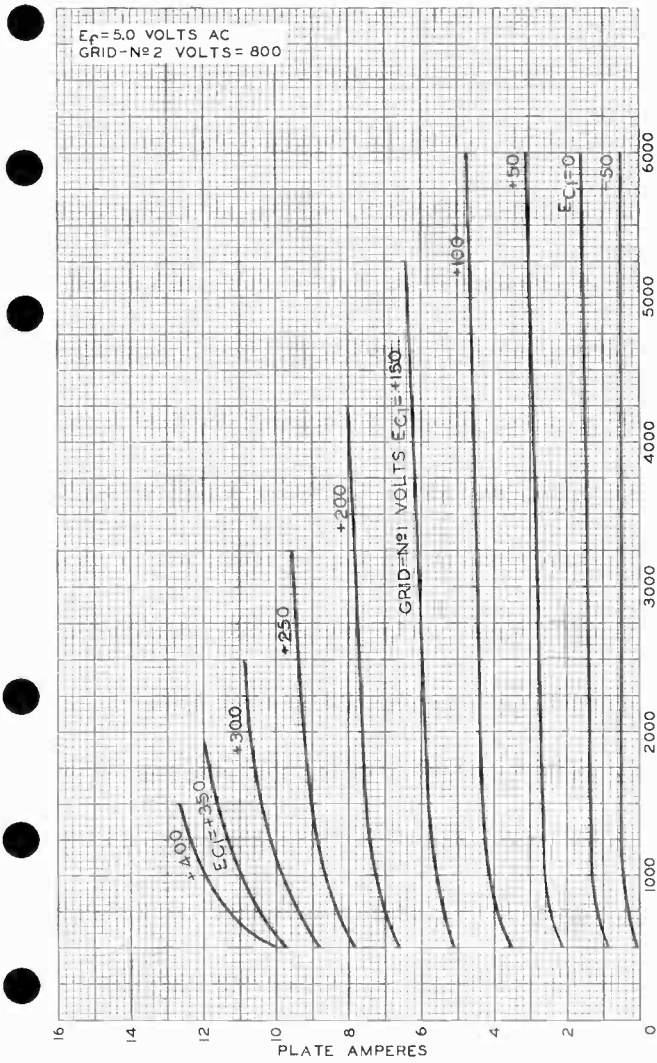
AVERAGE PLATE CHARACTERISTICS



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

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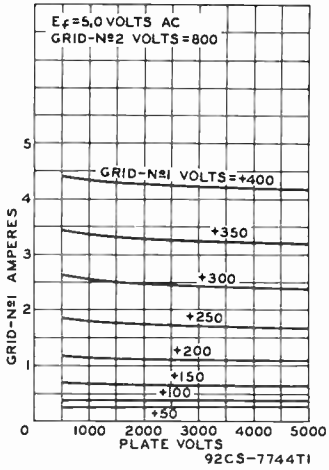
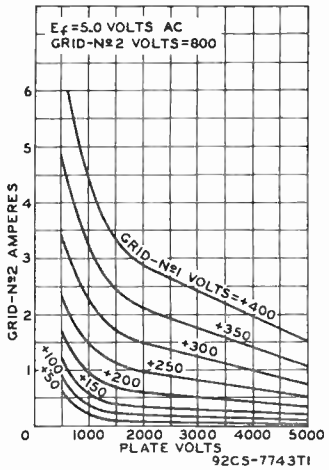
World Radio History

6166

AVERAGE CHARACTERISTICS





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

World Radio History

RCA

6166

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

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

92CM-7737

World Radio History

RCA

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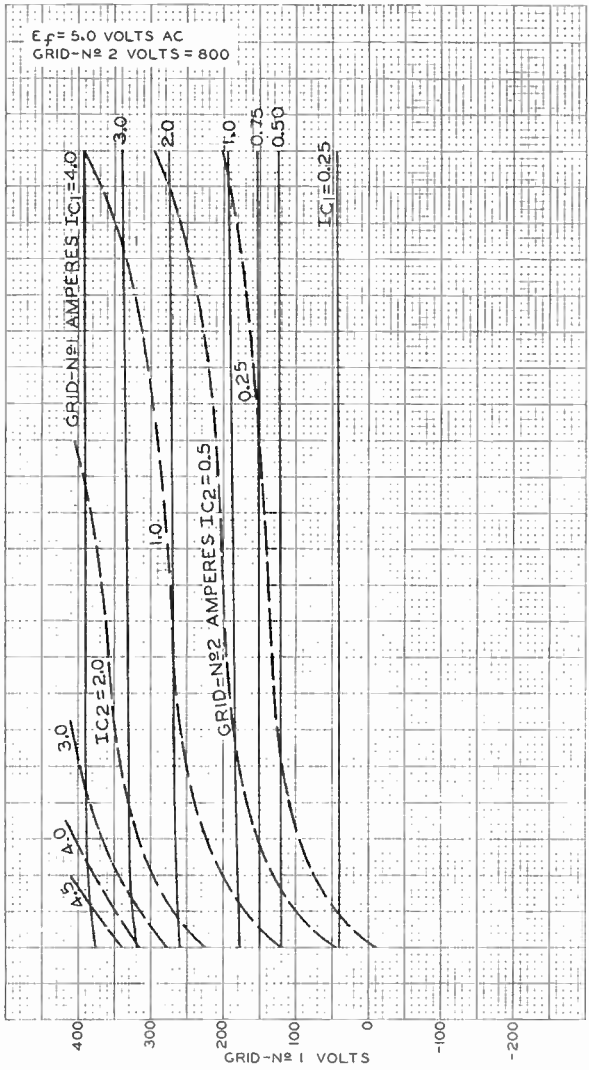
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



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

92CM-7738R1

World Radio History

RCA

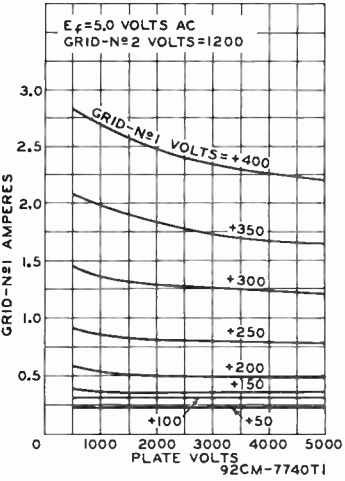
6166

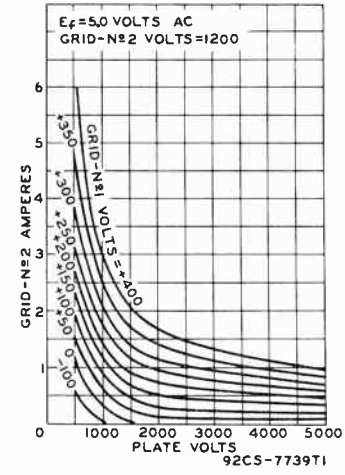
AVERAGE PLATE CHARACTERISTICS

Vacuumtubes.net

6166

AVERAGE CHARACTERISTICS





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World Radio History

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AVERAGE CONSTANT-CURRENT CHARACTERISTICS

92CM-7733

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

World Radio History

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AVERAGE CONSTANT-CURRENT CHARACTERISTICS

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

92CM-7730RI

World Radio History

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AVERAGE PLATE CHARACTERISTICS

CATHODE-DRIVE OPERATION

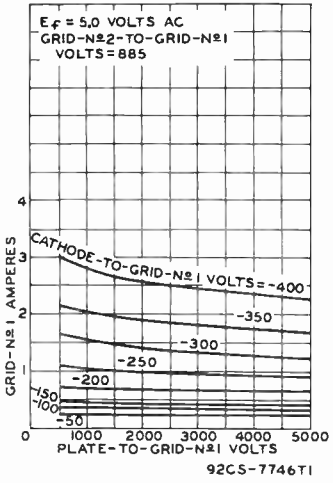
ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

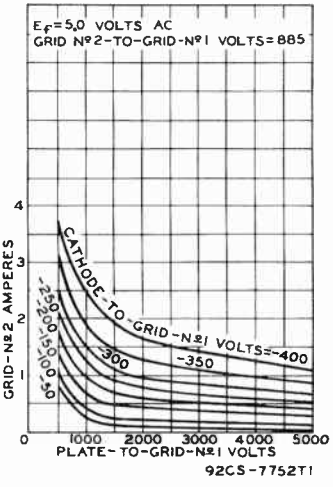
92CM-7750

World Radio History

6166

AVERAGE CHARACTERISTICS
CATHODE-DRIVE OPERATION





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

World Radio History

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6166

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

CATHODE-DRIVE OPERATION

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

92CM-7749

World Radio History

RCA

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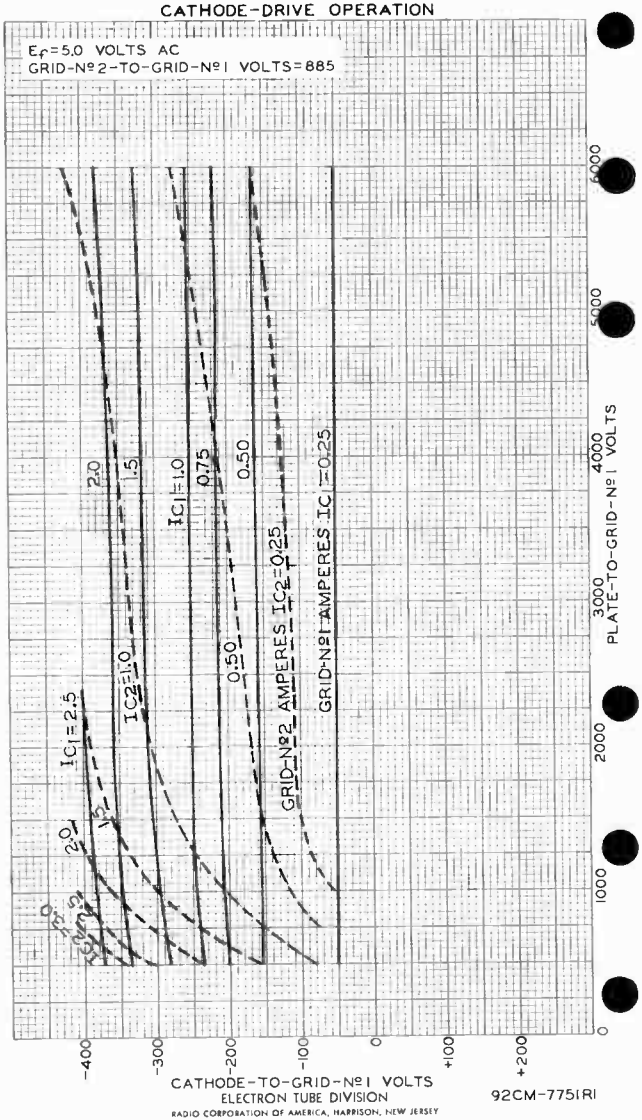
AVERAGE CONSTANT-CURRENT CHARACTERISTICS

CATHODE-DRIVE OPERATION



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

92CM-7751RI

World Radio History

6166-A/7007

Beam Power Tube

FORCED-AIR COOLED
CERAMIC-METAL SEALS — COAXIAL-ELECTRODE STRUCTURE
THORIATED-TUNGSTEN FILAMENT — INTEGRAL RADIATOR
12-KW PLATE DISSIPATION IN CW OR TV SERVICE UP TO 220 Mc

GENERAL DATA

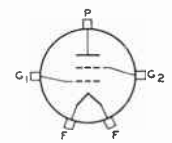
Electrical:

Filament, Multistrand Thoriated Tungsten:		
Voltage (AC or DC)[A]	5 ± 5%	volts
Current at 5 volts	181	amp
Minimum heating time	15	sec
Cold resistance	0.0038	ohm
Mu Factor, Grid No.2 to Grid No.1 for plate volts = 2000, grid-No.2 volts = 1000, and plate amperes = 2	10	
Direct Interelectrode Capacitances:		
Grid No.1 to plate[B]	0.6 max.	μμf
Grid No.1 to filament	42	μμf
Plate to filament[B]	0.08 max.	μμf
Grid No.1 to grid No.2	60	μμf
Grid No.2 to plate	24	μμf

Mechanical:

Operating Position	Vertical, filament end up or down
Maximum Overall Length	11.50"
Maximum Diameter	6.38"
Weight (Approx.)	15 lbs
Radiator	Integral part of tube

Terminal Connections *(See Dimensional Outline)*:



G_1 – Grid No.1
G_2 – Grid No.2

P – Plate
F – Filament

Air Flow:

Through radiator—The specified flow of incoming air at a temperature of 45° C for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower through the radiator before and during the application of any voltages. The air should enter the radiator at its plate-terminal end (See *Dimensional Outline*). Filament power, plate power, grid-No.2 power, and air flow may be removed simultaneously.

Percentage of maximum-rated plate dissipation for each class of service	100	83	67	50	%
Minimum air flow	550	350	230	175	cfm
Static pressure	6.6	3	1.6	1	in. of water

World Radio History

To grid-No.2 terminal	50 min.	cfm
To grid-No.1 terminal and filament terminals	50 min.	cfm
Incoming-Air Temperature	50 max.	°C
Radiator Temperature (Measured on the core at end away from incoming air)	180 max.	°C
Terminal Temperature: Filament, grid No.1, grid No.2, and plate	180 max.	°C

RF POWER AMPLIFIER — Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

(Voltages are referred to cathode unless otherwise specified)

Maximum CCS* Ratings, *Absolute-Maximum Values:*

	Up to 220 Mc	
DC PLATE VOLTAGE	7500 max.	volts
DC GRID-No.2 VOLTAGE	2000 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT	24000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	12000 max.	watts
GRID-No.1 DISSIPATION	300 max.	watts

Typical Operation in Grid-Drive Circuit at 216 Mc:

	Bandwidth♦ of 8.5 Mc	
DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage	−130	volts
Peak RF Grid-No.1 Voltage:		
Synchronizing level	375	volts
Pedestal level	290	volts
DC Plate Current:		
Synchronizing level	3.45	amp
Pedestal level	2.6	amp
DC Grid-No.2 Current (Pedestal Level)	0.207	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.175	amp
Pedestal level	0.085	amp
Driver Power Output (Approx.):♦		
Synchronizing level	800♦	watts
Pedestal level	450	watts
Useful Power Output (Approx.):		
Synchronizing level	12000	watts
Pedestal level	6800	watts

Typical Operation in Cathode-Drive Circuit at 216 Mc:

	Bandwidth♦ of 8.5 Mc	
DC Plate-to-Grid-No.1 Voltage	6400	volts
DC Grid-No.2-to-Grid-No.1 Voltage	800	volts
DC Cathode-to-Grid-No.1 Voltage	90	volts

World Radio History

Peak RF Cathode-to-Grid-No.1 Voltage:		
Synchronizing level	360	volts
Pedestal level	285	volts
DC Plate Current:		
Synchronizing level	3.65	amp
Pedestal level	2.75	amp
DC Grid-No.2 Current (Pedestal Level)	0.175	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.24	amp
Pedestal level	0.16	amp
Driver Power Output (Approx.)*:		
Synchronizing level	1500®	watts
Pedestal level	850	watts
Useful Power Output (Approx.):		
Synchronizing level	14000	watts
Pedestal level	7900	watts

GRID-MODULATED RF POWER AMPLIFIER
Class C Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS* Ratings, *Absolute-Maximum Values:*

	Up to 220 Mc	
DC PLATE VOLTAGE	7500 max.	volts
DC GRID-No.2 VOLTAGE	2000 max.	volts
DC GRID-No.1 VOLTAGE (White Level)	-1000 max.	volts
DC PLATE CURRENT	4 max.	amp
PLATE INPUT	24000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	12000 max.	watts
GRID-No.1 DISSIPATION	300 max.	watts

Typical Operation in Grid-Drive Circuit at 216 Mc:

	Bandwidth♦ of 8.5 Mc	
DC Plate Voltage	5800	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage:		
Synchronizing level	-130	volts
Pedestal level	-195	volts
White level	-350	volts
Peak RF Grid-No.1 Voltage	375	volts
DC Plate Current:		
Synchronizing level	3.45	amp
Pedestal level	2.42	amp
DC Grid-No.2 Current (Pedestal Level)	0.148	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.175	amp
Pedestal level	0.095	amp
Driver Power Output (Approx.):♦		
Synchronizing level	800♦	watts
Pedestal level	425	watts

World Radio History

	Bandwidth♦ of 8.5 Mc	
Useful Power Output (Approx.):		
Synchronizing level	12000	watts
Pedestal level	6800	watts

LINEAR RF POWER AMPLIFIER

Single-Sideband Suppressed-Carrier Service

Maximum CCS* Ratings, ***Absolute-Maximum Values:***

	Up to 220 Mc	
DC PLATE VOLTAGE	7500 max.	volts
DC GRID-No.2 VOLTAGE	2000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT	2.8 max.	amp
MAX.-SIGNAL DC GRID-No.1 CURRENT	0.6 max.	amp
MAX.-SIGNAL PLATE INPUT	20000 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	12000 max.	watts

Typical CCS Class AB_2 "Single-Tone" Operation at 60 Mc:#

DC Plate Voltage	7000	volts
DC Grid-No.2 Voltage	1200	volts
DC Grid-No.1 Voltage*	−125	volts
Zero-Signal DC Plate Current	0.200	amp
Zero-Signal DC Grid-No.2 Current	0	amp
Effective RF Load Resistance	1350	ohms
Max.-Signal DC Plate Current	2.750	amp
Max.-Signal DC Grid-No.2 Current	0.26	amp
Max.-Signal DC Grid-No.1 Current	0.080	amp
Max.-Signal Peak RF Grid-No.1 Voltage	305	volts
Max.-Signal Driving Power (Approx.)	25	watts
Max.-Signal Power Output (Approx.)	12000	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS* Ratings, ***Absolute-Maximum Values:***

	Up to 220 Mc	
DC PLATE VOLTAGE	5500 max.	volts
DC GRID-No.2 VOLTAGE	2000 max.	volts
DC GRID-No.1 VOLTAGE	−1000 max.	volts
DC PLATE CURRENT	2 max.	amp
DC GRID-No.1 CURRENT	0.6 max.	amp
PLATE INPUT	10000 max.	watts
GRID-No.2 INPUT	270 max.	watts
PLATE DISSIPATION	8000 max.	watts

Typical Operation in Grid-Drive Circuit:

	At 60 Mc	
DC Plate Voltage	4800	volts
DC Grid-No.2 Voltage (Modulated 100%)♣	800	volts
DC Grid-No.1 Voltage†	−300	volts

World Radio History

Peak RF Grid-No.1 Voltage	550	volts
DC Plate Current	1.8	amp
DC Grid-No.2 Current	0.16	amp
DC Grid-No.1 Current (Approx.)	0.18	amp
Driver Power Output (Approx.)♦	125‡	watts
Useful Power Output (Approx.)	6000	watts

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy§ and RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS* Ratings, *Absolute-Maximum Values:*

	Up to 220 Mc	
DC PLATE VOLTAGE	7500 max.	volts
DC GRID-No.2 VOLTAGE	2000 max.	volts
DC GRID-No.1 VOLTAGE	-1000 max.	volts
DC PLATE CURRENT	3 max.	amp
DC GRID-No.1 CURRENT	0.6 max.	amp
PLATE INPUT	20000 max.	watts
GRID-No.2 INPUT	400 max.	watts
PLATE DISSIPATION	12000 max.	watts

Typical Operation in Grid-Drive Circuit:

	At 60 Mc	*At 216 Mc*	
DC Plate Voltage	6600	7000	volts
DC Grid-No.2 Voltage□	1200	1200	volts
DC Grid-No.1 Voltage◊	-310	-310	volts
Peak RF Grid-No.1 Voltage	560	560	volts
DC Plate Current	2.75	2.75	amp
DC Grid-No.2 Current	0.3	0.3	amp
DC Grid-No.1 Current (Approx.)	0.14	0.14	amp
Driver Power Output (Approx.)♦	95▽	750▲▲	watts
Useful Power Output (Approx.)	12000	10000	watts

▲ Full rated filament voltage can be applied safely to the cold filament. It is not necessary to provide means for limiting the filament starting current.

● With external flat metal shield 12" square having center hole 4-5/16" diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2.

★ Continuous Commercial Service.

♦ Computed between half-power points and based on tube output capacitance only.

‡ The 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 value to take care of variations in line-voltages, in components, in initial tube characteristics, and in tube characteristics during life.

♠ This value includes 700 watts of rf-circuit loss at 216 Mc.

♣ The driver stage is required to supply tube losses, rf-circuit losses, and rf power added to plate circuit. The driver stage should be designed as indicated in footnote (♦).

⊕ This value includes 470 watts of rf-circuit loss at 216 Mc and 1030 watts added to plate circuit.

§ "Single-Tone" operation refers to that class of amplifier service in which the grid-No.1 input consists of a monofrequency rf signal having constant amplitude. This signal is produced in a single-sideband suppressed-carrier system when a single audio frequency of constant amplitude is applied to the input of the system.

World Radio History

* Adjusted to give indicated zero-signal plate current.

⊕ Obtained preferably from a separate source.

† Obtained preferably from a combination of 365-ohm grid-No.1 resistor and −170-volt fixed bias.

‡ This value includes 25 watts of rf-circuit loss.

§ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

□ Obtained preferably from a separate source, or from the plate supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6166-A/7007 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 2000 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

◇ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

▽ This value includes 20 watts of rf-circuit loss.

▲▲ This value includes 675 watts of rf-circuit loss.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current.	1	172	190	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate.	2	–	0.6	μμf
Grid No.1 to filament	3	39	47	μμf
Grid No.1 to grid No.2.	3	52	64	μμf
Grid No.2 to plate.	3	21.2	25.8	μμf
Plate to filament	2	–	0.08	μμf
DC Grid-No.1 Voltage.	1,4	–	-225	volts
Peak Grid-No.1 Current.	1,5	–	1.5	amp
Peak Grid-No.1 Voltage.	1,5	–	315	volts

Note 1: With 5 volts ac or dc on filament.

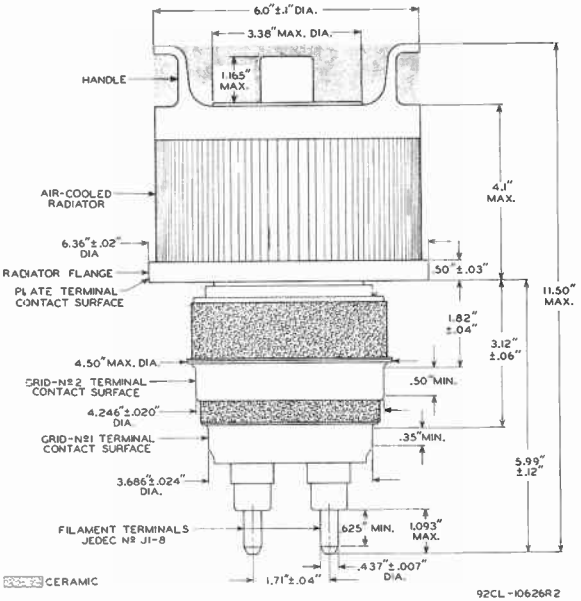
Note 2: With external, flat, metal shield 12" square having center hole 4-5/16" diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid-No.2. All other electrodes are grounded.

Note 3: Without shield and all other electrodes grounded.

Note 4: With dc plate voltage of 6000 volts, dc grid-No.2 voltage of 1200 volts, and dc plate current of 20 ma.

Note 5: With dc plate voltage of 1500 volts, dc grid-No.2 voltage of 1200 volts, and instantaneous grid-No.1 voltage adjusted to give peak plate current of 11 amp.

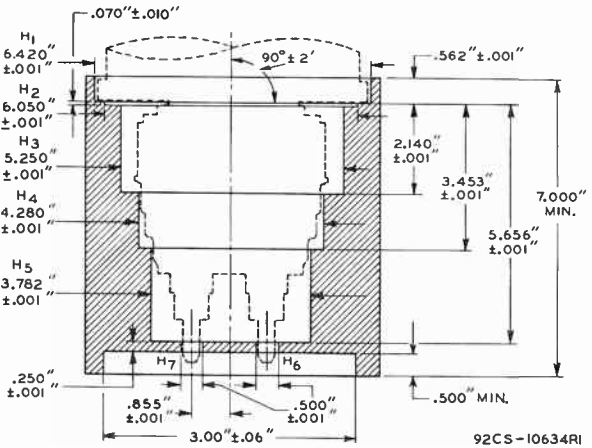
World Radio History



NOTE: WITH THE CYLINDRICAL SURFACES OF THE PLATE TERMINAL, GRID-No.2 TERMINAL, GRID-No.1 TERMINAL, AND FILAMENT TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1. PROPER ENTRY OF THE TUBE IN THE GAUGE IS OBTAINED WHEN THE PLATE TERMINAL IS ENTIRELY ENGAGED BY HOLE H_1 AND WILL SEAT ON THE SHOULDER BETWEEN H_1 AND H_2. THE PLANE SURFACE OF THIS SHOULDER IS AT RIGHT ANGLES TO THE AXES OF THE HOLES WITHIN $D^{o} \pm 2'$. SEATING IS DETERMINED BY FAILURE OF A 0.020"-THICKNESS GAUGE TO ENTER MORE THAN 1/16" BETWEEN SHOULDER SURFACE AND PLATE TERMINAL. SLOTS ARE PROVIDED TO PERMIT THIS MEASUREMENT. KEEP ALL STIPPLED REGIONS CLEAR. DO NOT ALLOW CONTACTS OR CIRCUIT COMPONENTS TO PROTRUDE INTO THESE ANNULAR VOLUMES.

World Radio History

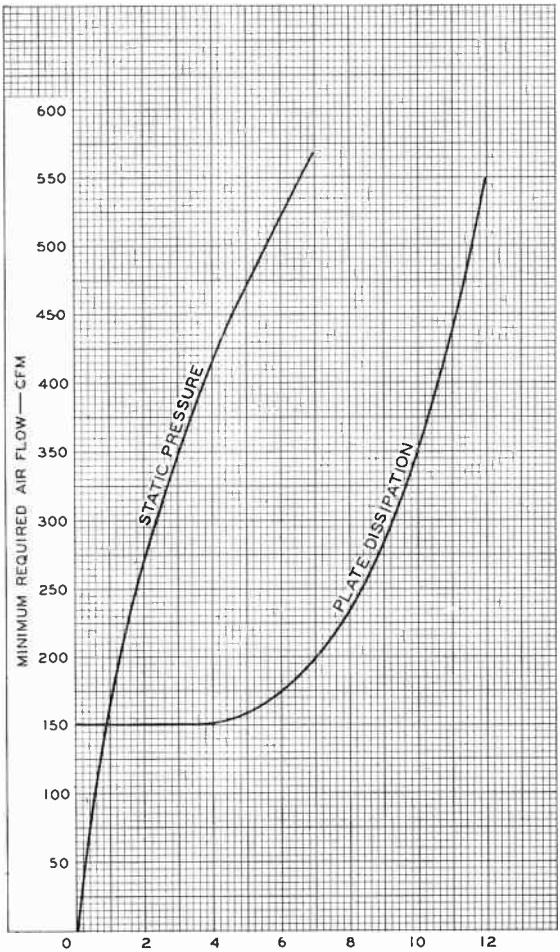
SKETCH G_1



NOTE: THE FIVE CYLINDRICAL HOLES H_1, H_2, H_3, H_4 AND H_5 HAVE AXES COINCIDENT WITHIN 0.001". THE HOLES H_6 AND H_7 HAVE AXES PARALLEL TO THE AXES OF H_1, H_2, H_3, H_4 AND H_5 WITHIN $0^{\circ} \pm 2'$.

World Radio History

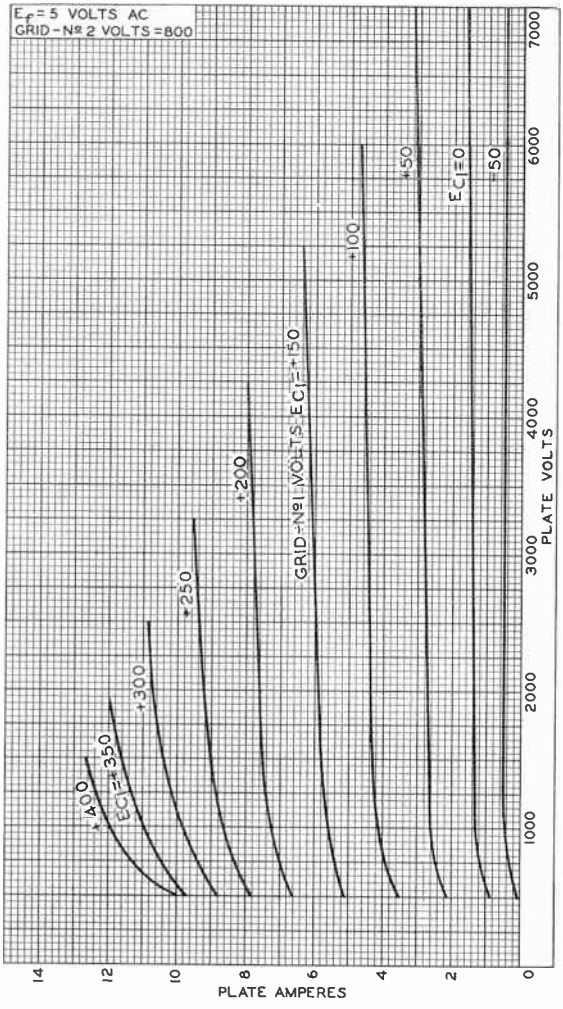
COOLING REQUIREMENTS



92CM-10785

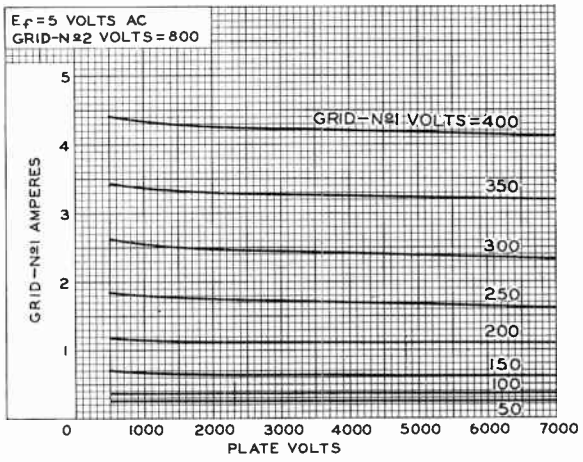
World Radio History

AVERAGE PLATE CHARACTERISTICS

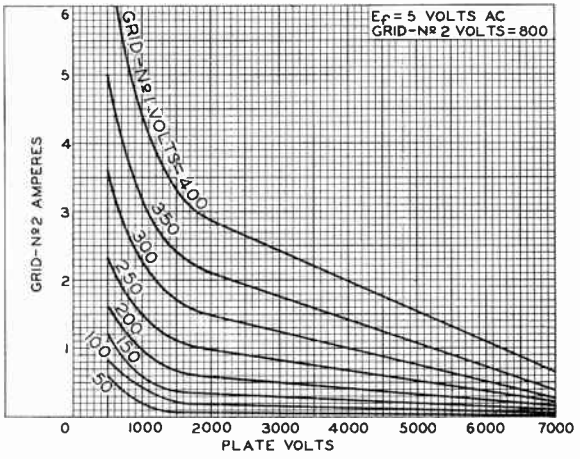


92CM-7736RI

AVERAGE CHARACTERISTICS



92CS-7744RI

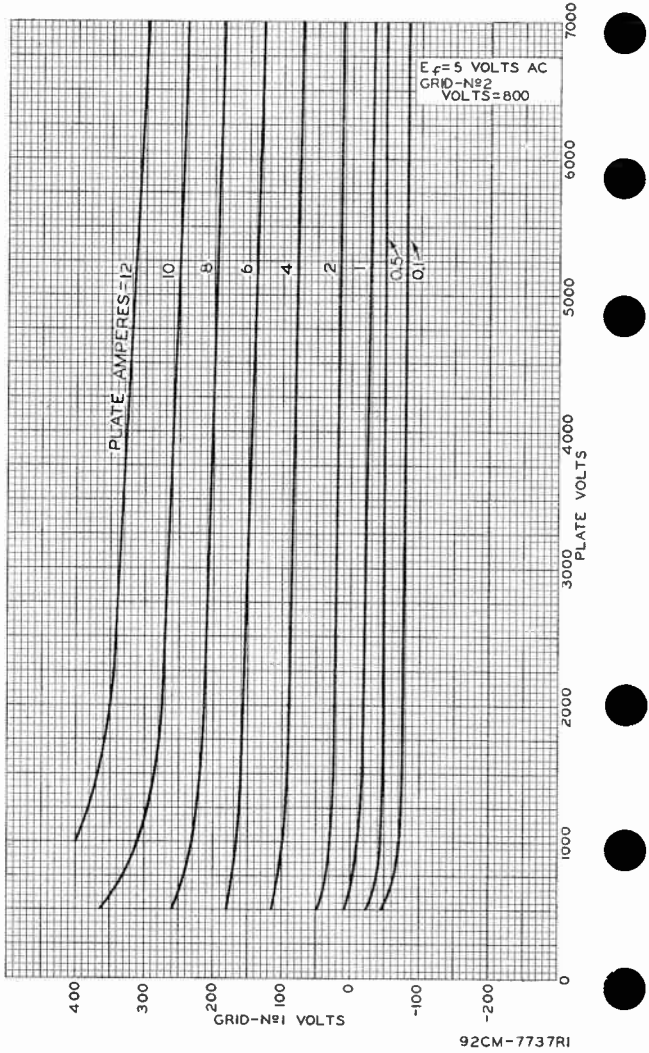


92CS-7743RI

World Radio History

6166-A/7007

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

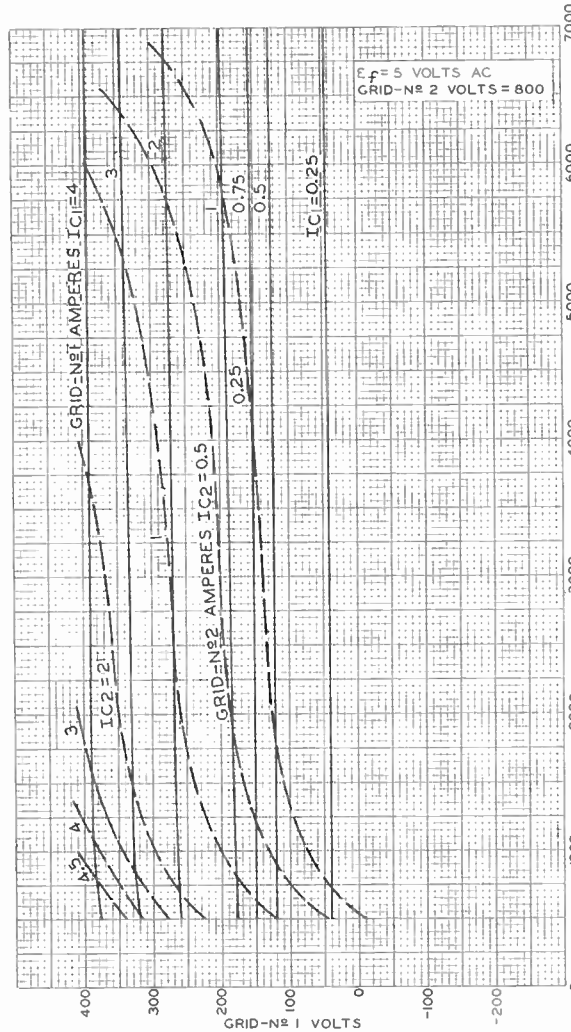


92CM-7737RI

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

World Radio History

AVERAGE CONSTANT-CURRENT CHARACTERISTICS

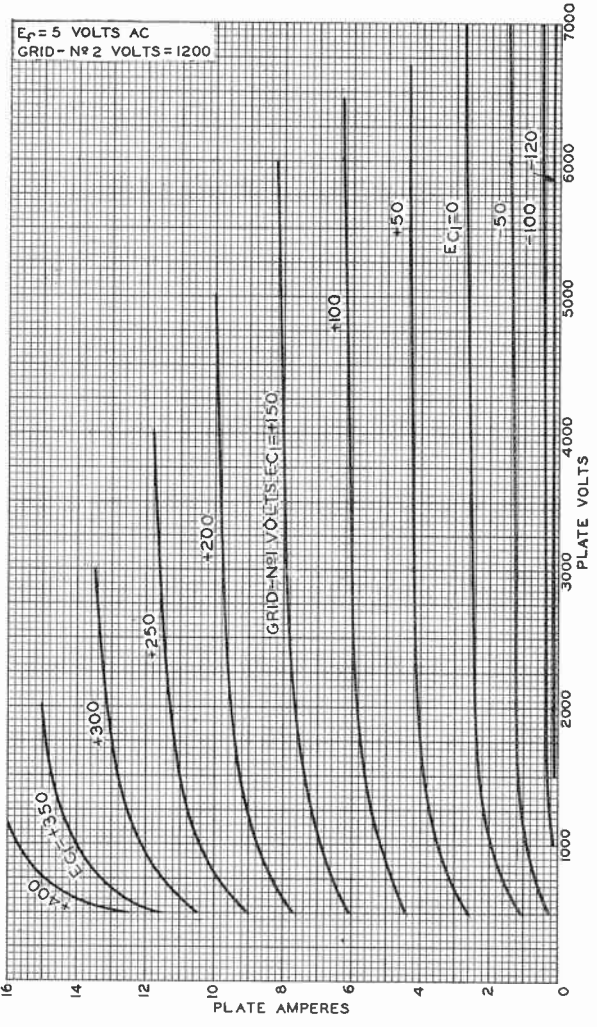


92CM-7738R2

World Radio History

6166-A/7007

AVERAGE PLATE CHARACTERISTICS

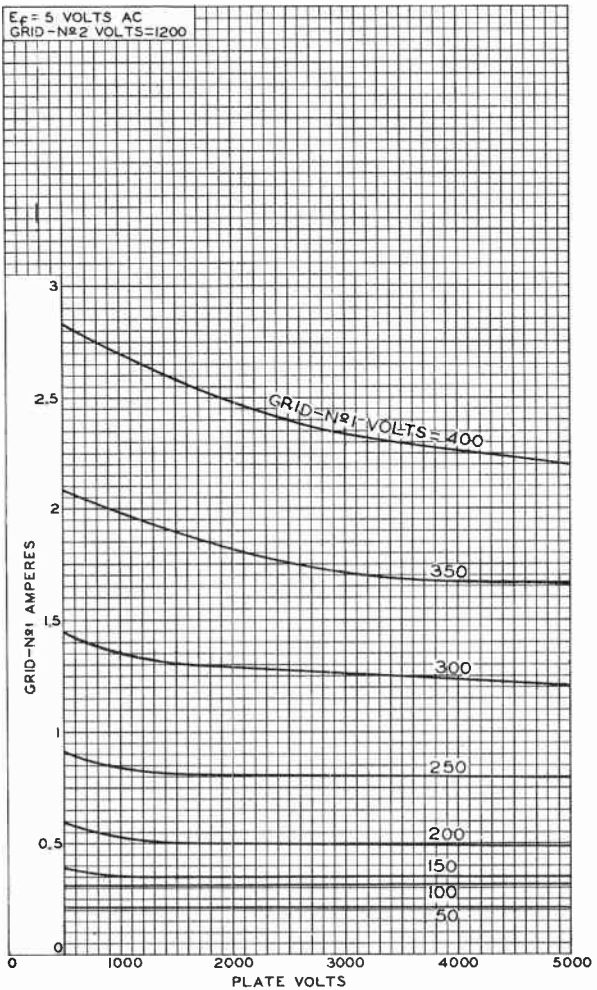


92CM-7735RI

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

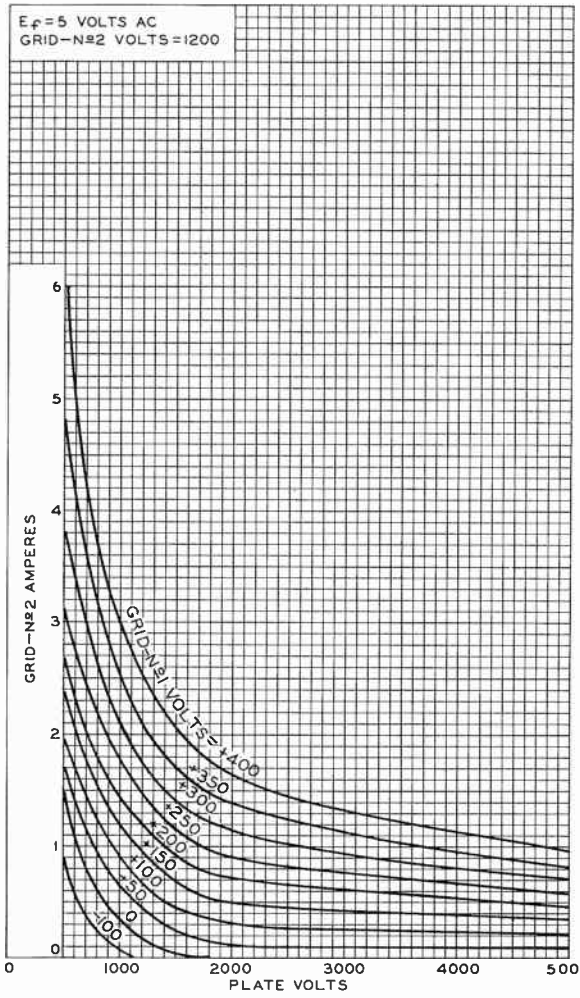
World Radio History

AVERAGE CHARACTERISTICS



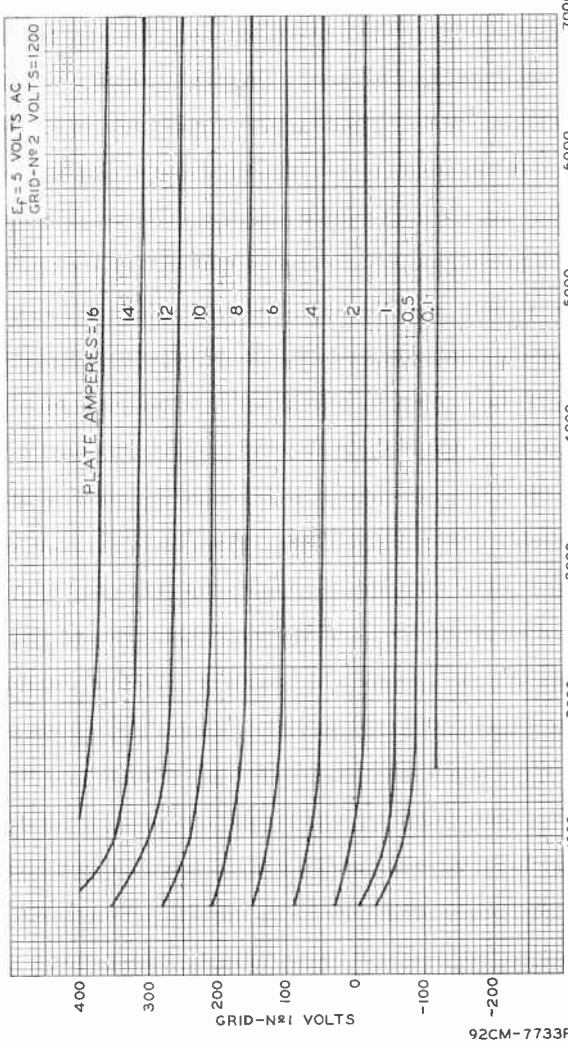
92CM-7740R2

AVERAGE CHARACTERISTICS



92CM-7739RI

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



World Radio History

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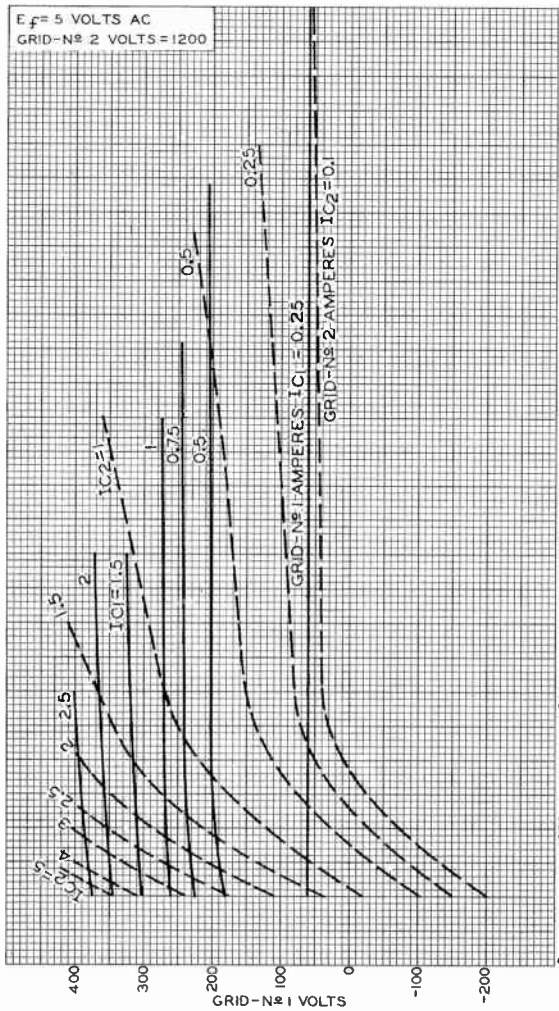
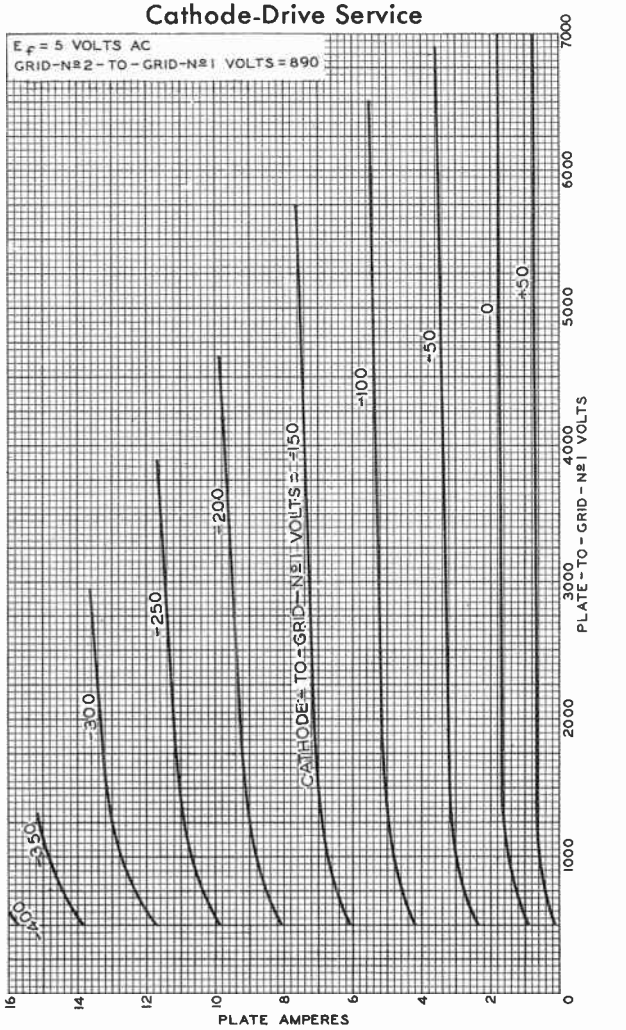
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



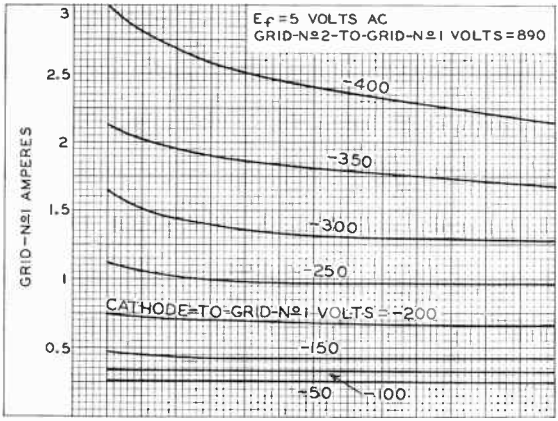
92CM-7730RI

AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Service

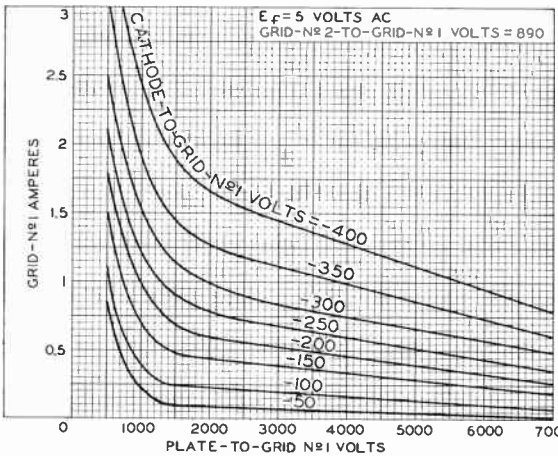


92CM-7750RI

AVERAGE CHARACTERISTICS
Cathode-Drive Service



92CS-7746R1



92CS-7752R1

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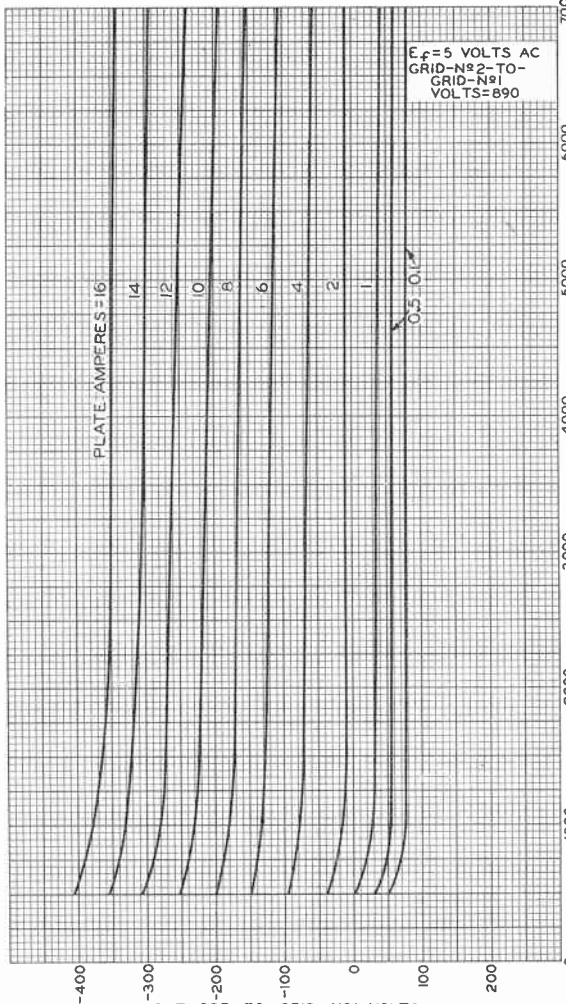
AVERAGE CONSTANT-CURRENT CHARACTERISTICS
Cathode-Drive Service



92CM-7749RI

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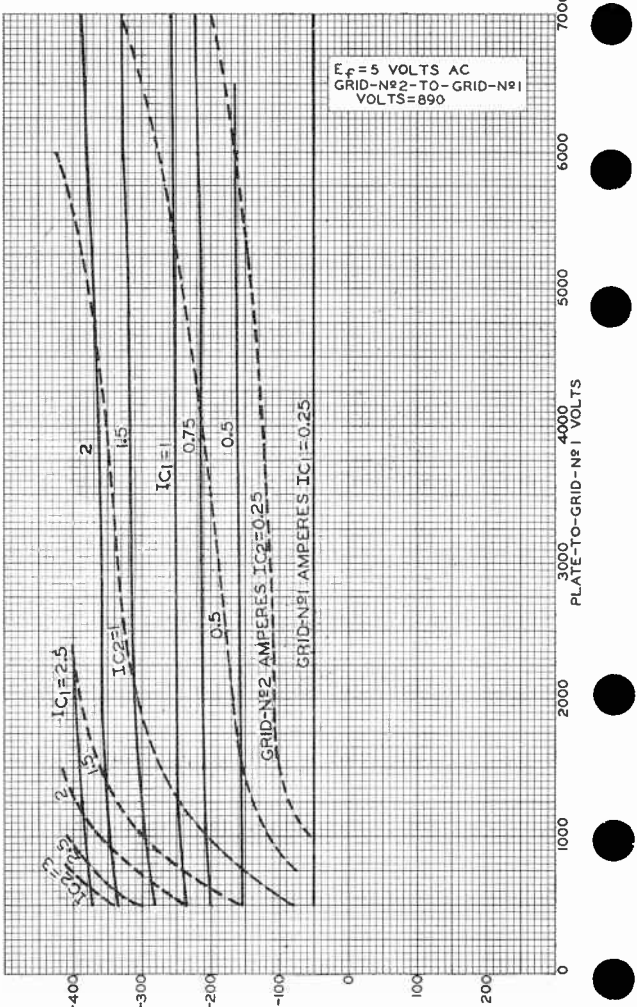
AVERAGE CONSTANT-CURRENT CHARACTERISTICS
Cathode-Drive Service



92CM-7751R2

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BEAM POWER TUBE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage*	120 max.	ac or dc volts ←
Current at 120 volts	1.6	amp
Minimum heating time at 117 volts	5	minutes ←
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 1000, grid-No.2 volts = 400, and plate amperes = 1	7	←
Direct Interelectrode Capacitances:		←
Grid No.1 to plate**	0.40 max.	μμf
Grid No.1 to cathode & heater	46	μμf
Plate to cathode & heater**,***	0.10 max.	μμf
Grid No.1 to grid No.2	50	μμf
Grid No.2 to plate	22	μμf
Grid No.2 to cathode & heater***	4.4 max.	μμf

Mechanical:

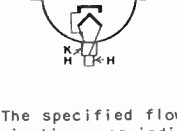
Mounting Position	Vertical, cathode end up or down
Maximum Overall Length	7-1/4" ←
Greatest Diameter	5" ± 1/32"
Weight (Approx.)	5 lbs ←
Radiator	Integral part of tube

Terminal Connections *(See Dimensional Outline)*:

G_1 – Grid No.1

G_2 – Grid No.2

H – Heater



K – Cathode

P – Plate

Air Flow:

Through Radiator--The specified flow of incoming air for various plate dissipations, as indicated in the following tabulation, should be delivered by a blower through the radiator in either direction before and during the application of any voltages. In this tabulation, the flow and pressure values are for condition with radiator-temperature rise held constant at 135 °C above incoming-air temperature. Under any condition, the air flow must be ade-

* Because the cathode is subjected to considerable back bombardment as the frequency is increased, with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

** With external flat metal shield having a diameter of 8" and center hole approximately 3-7/16" in diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid-No.2 terminal.

*** Same as (**) except that center hole has diameter of approximately 3", and shield is connected to grid-No.1 terminal.

← Indicates a change.

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Radiomuseum

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BEAM POWER TUBE

quate to limit the temperature of the radiator to its specified maximum value. Heater power, plate power, and air flow may be removed simultaneously.

Percentage of maximum rated plate dissipation for each class of service	100	75	50	%
Minimum air flow	75	50	30	cfm
Static pressure	0.56	0.25	0.10	in. of water

To Grid-No.2 Terminal--A sufficient quantity of air should be delivered to this terminal so that its temperature does not exceed the specified maximum value.

To Grid-No.1 Terminal, Cathode Terminal, and Heater Pin--An air flow of about 20 cfm from a 1"-diameter nozzle at a distance of 1/2" from the heater pin should be directed onto the cathode terminal and heater pin, and then over the grid-No.1 terminal. The quantity of air should be sufficient so that the temperature of the cathode, heater, and grid-No.1 seals does not exceed the specified maximum value.

Radiator Temperature (Measured on core at end adjacent to plate-terminal flange)	180 max.	°C
Seal and Terminal Temperature: Cathode, heater, grid No.1, grid No.2, and plate	180 max.	°C

RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	500 max.	volts
DC PLATE CURRENT	1.75 max.	amp
DC GRID-No.1 (CONTROL-GRID) CURRENT	0.2 max.	amp
PLATE INPUT	3500 max.	watts
GRID-No.2 INPUT	40 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Operation in Cathode-Drive Circuit at 900 Mc:

	Bandwidth▲ of 8 Mc	
Air Flow Through Radiator:		
Minimum, with incoming air at 45 °C.	*60*	*cfm*
Static pressure	*0.36*	*in. of water*
DC Plate-to-Grid-No.1 Voltage	1875	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage	75	volts
Peak RF Cathode-to-Grid-No.1 Voltage:		
Synchronizing level	120	volts
Pedestal level	90	volts

●,▲: See next page.

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BEAM POWER TUBE

DC Plate Current:		
Synchronizing level	1.7	amp
Pedestal level	1.3	amp
DC Grid-No.2 Current (Pedestal Level)	−0.025	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.075	amp
Pedestal level	0.020	amp
Driver Power Output (Approx.):♣		
Synchronizing level	200	watts
Pedestal level	115	watts
Output-Circuit Efficiency (Approx.)	75	%
Useful Power Output (Approx.):		
Synchronzing level	1200●●	watts
Pedestal level	675●●	watts

BIAS-MODULATED RF POWER AMPLIFIER--Class C Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	500 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE (White Level)	−300 max.	volts
DC PLATE CURRENT	1.75 max.	amp
DC GRID-No.1 CURRENT	0.2 max.	amp
PLATE INPUT	3500 max.	watts
GRID-No.2 INPUT	40 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Grid-Bias-Modulated Operation in Cathode-Drive Circuit at 900 Mc:

Bandwidth▲ of 8 Mc

Air Flow Through Radiator:		
Minimum, with incoming air at 45 °C	*60*	*cfm*
Static pressure	*0.36*	*in. of water*
DC Plate-to-Grid-No.1 Voltage	1875	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage:		
Synchronizing level	75	volts
Pedestal level	105	volts
White level	230	volts
Peak RF Cathode-to-Grid-No.1 Voltage	120	volts
DC Plate Current:		
Synchronizing level	1.7	amp
Pedestal level	1.2	amp
DC Grid-No.2 Current (Pedestal Level)	−0.025	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.075	amp
Pedestal level	0.020	amp

●,▲,♣,●●: See next page.

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BEAM POWER TUBE

Driver Power Output (Approx.):‡		
Synchronizing level	200	watts
Output-Circuit Efficiency (Approx.)	75	%
Useful Power Output (Approx.):		
Synchronizing level	1200●●	watts
Pedestal level	675●●	watts

Typical Cathode-Bias-Modulated Operation in Cathode-Drive Circuit at 900 Mc:

Bandwidth▲ of 8 Mc

Air Flow Through Radiator:		
Minimum, with incoming air at 45 °C.	*60*	*cfm*
Static pressure	*0.36*	*in. of water*
DC Plate-to-Grid-No.1 Voltage	1875	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage:		
Synchronizing level	75	volts
Pedestal level	105	volts
White level	210	volts
Peak RF Cathode-to-Grid No.1 Voltage	120	volts
DC Plate Current:		
Synchronizing level	1.7	amp
Pedestal level	1.2	amp
DC Grid-No.2 Current (Pedestal Level)	-0.025	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0.075	amp
Pedestal level	0.020	amp
Driver Power Output (Approx.):‡		
Synchronizing level	200	watts
Output-Circuit Efficiency (Approx.)	75	%
Useful Power Output (Approx.):		
Synchronizing level	1200●●	watts
Pedestal level	675●●	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1600 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	volts
DC PLATE CURRENT	1.05 max.	amp
DC GRID-No.1 CURRENT	0.2 max.	amp
PLATE INPUT	1650 max.	watts
GRID-No.2 INPUT	25 max.	watts
PLATE DISSIPATION	1300 max.	watts

▲ Measured between half-power points.

●, ‡, ●●: See next page.

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BEAM POWER TUBE

Typical Operation in Cathode-Drive Circuit at 400 Mc:

Air Flow Through Radiator:		
Minimum, with incoming air at 45 °C	40	cfm
Static pressure	0.16	in. of water
DC Plate-to-Grid-No.1 Voltage	1775	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage	175	volts
Peak RF Cathode-to-Grid-No.1 Voltage	210	volts
DC Plate Current	1	amp
DC Grid-No.2 Current	0.065	amp
DC Grid-No.1 Current (Approx.)	0.045	amp
Driver Power Output (Approx.)♣#	250	watts
Output-Circuit Efficiency (Approx.)	90	%
Useful Power Output (Approx.)	950●●	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□
and
RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	500 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	−300 max.	volts
DC PLATE CURRENT	1.25 max.	amp
DC GRID-No.1 CURRENT	0.2 max.	amp
PLATE INPUT	2500 max.	watts
GRID-No.2 INPUT	40 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Operation in FM Service with Cathode-Drive Circuit at 900 Mc:

Air Flow Through Radiator:		
Minimum, with incoming air at 45 °C	30	cfm
Static pressure	0.09	in. of water
DC Plate-to-Grid-No.1 Voltage	1910	volts
DC Grid-No.2-to-Grid-No.1 Voltage†	550	volts
DC Cathode-to-Grid-No.1 Voltage††	110	volts
Peak RF Cathode-to-Grid-No.1 Voltage	120	volts
DC Plate Current	0.9	amp
DC Grid-No.2 Current	0.05	amp
DC Grid-No.1 Current (Approx.)	0.015	amp
Driver Power Output (Approx.)♣	150	watts
Output-Circuit Efficiency (Approx.)	70	%
Useful Power Output (Approx.)	600●●	watts

● Continuous Commercial Service.

♣ The driver stage is required to supply tube losses, rf-circuit losses, and rf power added to the plate input. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

●●,#,□,†,††: See next page.

World Radio History

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BEAM POWER TUBE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	1.5	1.7	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate**	-	-	0.40	μμf
Grid No.1 to cathode & heater	-	42.5	49.5	μμf
Plate to cathode & heater**,***	-	-	0.10	μμf
Grid No.1 to grid No.2	-	47	57	μμf
Grid No.2 to plate	-	20.5	24.5	μμf
Grid No.2 to cathode & heater***	-	-	4.4	μμf
Mu-Factor, Grid No.2 to Grid-No.1	1,2	2.5	11.5	
Grid-No.1 Voltage	1,3	-50	-140	volts
Peak Cathode Current	1,4	12	-	amp

Note 1: With 120 volts ac on heater.

Note 2: With dc plate volts = 1000; dc grid-No.2 volts = 400; and dc grid-No.1 voltage adjusted to produce a dc plate current of 1.0 ampere.

Note 3: With dc plate volts = 1750; dc grid-No.2 volts = 500; and dc grid-No.1 voltage adjusted to produce a dc plate current of 0.1 ampere.

Note 4: Designers should limit the maximum usable cathode current (Plate current plus grid-No.2 current plus grid-No.1 current) to this value under any condition of operation.

** With external flat metal shield having a diameter of 8" and center hole approximately 3-7/16" in diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid-No.2 terminal.

*** Same as (**) except that center hole has diameter of approximately 3", and shield is connected to grid-No.1 terminal.

\# In cathode-drive, plate-modulated, class C rf power amplifier service, the 6181 can be modulated 100% if the rf driver stage is also modulated 100% simultaneously. Care should be taken to insure that the driver-modulation and amplifier-modulation voltages are exactly in phase.

●● This value of useful power is measured at load of output circuit having indicated efficiency.

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

† Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6181 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 500 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

†† Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

→ Indicates a change.

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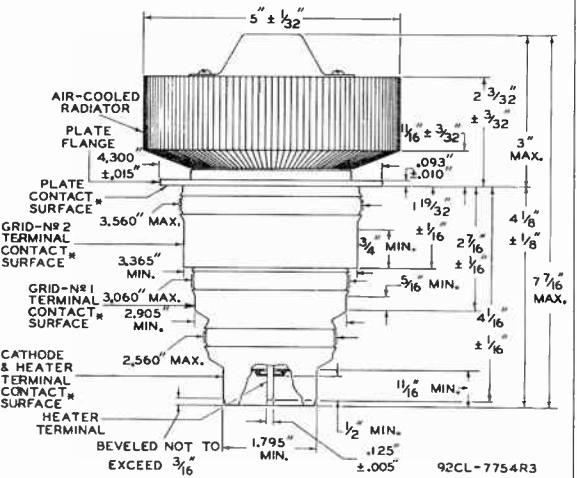
BEAM POWER TUBE



* WITH THE CYLINDRICAL SURFACES OF THE PLATE FLANGE, GRID-No. 2 TERMINAL, GRID-No. 1 TERMINAL, CATHODE TERMINAL, AND HEATER-PIN TERMINAL CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1. PROPER ENTRY OF THE TUBE IN THE GAUGE IS OBTAINED WHEN THE PLATE FLANGE IS SEATED ON THE SHOULDER BETWEEN HOLES H_1 AND H_2. SEATING IS DETERMINED BY FAILURE OF A .010" THICKNESS GAUGE 1/8" WIDE TO ENTER MORE THAN 1/16" BETWEEN SHOULDER SURFACE AND PLATE FLANGE. SLOTS ARE PROVIDED TO PERMIT THIS MEASUREMENT TO BE MADE.

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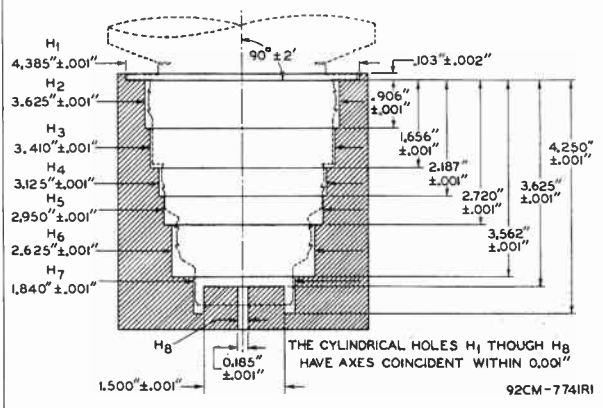
BEAM POWER TUBE

SKETCH G_1



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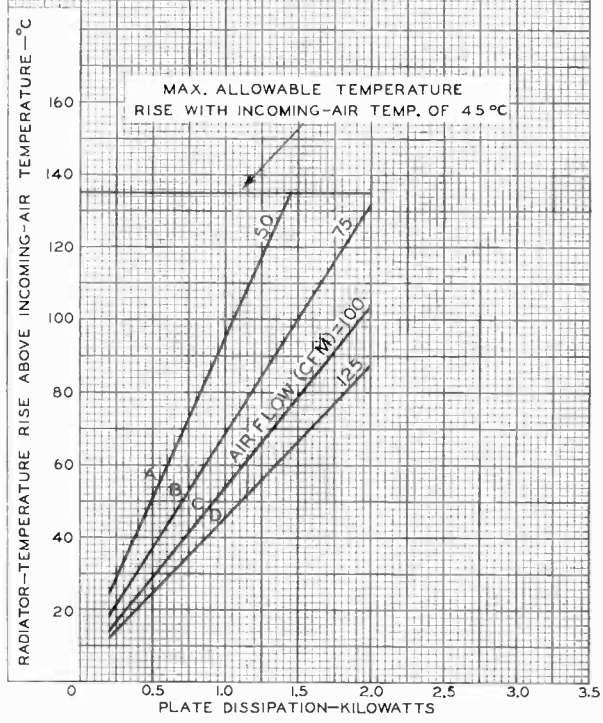
COOLING REQUIREMENTS

E_f = 120 VOLTS
MAXIMUM RADIATOR TEMPERATURE = 180 °C

CURVE	PRESSURE DROP—INCHES OF WATER
A	0.25
B	0.56
C	1.00
D	1.55



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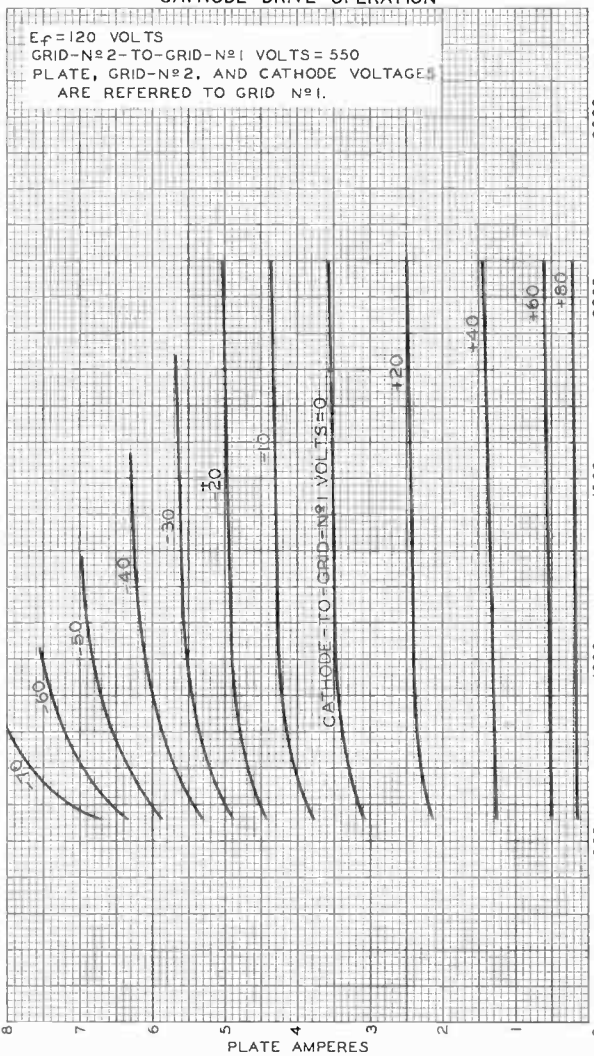
AVERAGE PLATE CHARACTERISTICS

CATHODE-DRIVE OPERATION



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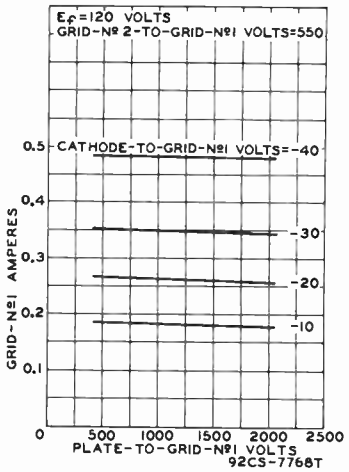
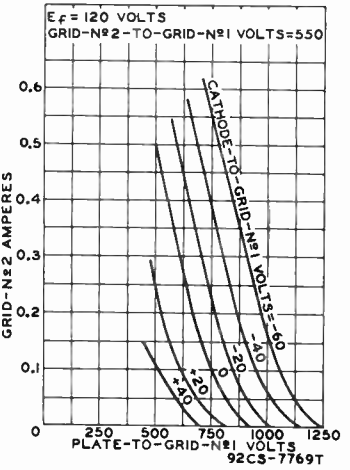
AVERAGE CHARACTERISTICS
CATHODE-DRIVE OPERATION





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AVERAGE CONSTANT-CURRENT CHARACTERISTICS

CATHODE-DRIVE OPERATION

E_f = 120 VOLTS
GRID-№2-TO-GRID-№1 VOLTS = 550
I_b = PLATE AMPERES
I_{C_1} = GRID-№1 AMPERES
I_{C_2} = GRID-№2 AMPERES

ELECTRON TUBE DIVISION
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UHF MEDIUM-MU TRIODE

"PENCIL TYPE" WITH EXTERNAL PLATE RADIATOR

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC):		
Under Transmitting Conditions	6.0 ± 10%	volts
Under Standby Conditions	6.3 max.	volts
Current at 6.0 Volts	0.280	amp
Amplification Factor	27	
Transconductance, for dc plate current of 27 milliamperes and dc plate voltage of 200 volts	7000	μmhos

Direct Interelectrode Capacitances:

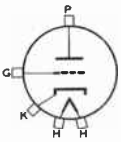
	With External Shield▲	*Without External Shield*	
Grid to Plate	1.5	1.7	μμf
Grid to Cathode	–	2.9	μμf
Plate to Cathode	–	0.08 max.	μμf

Mechanical:

Terminal Connections:

H: Heater

K: Cathode Cylinder (Adjacent to heater lead terminals)



G: Grid Flange (Between glass sections)

P: Plate Cylinder (With integral radiator)

Mounting Position	Any
Dimensions and Terminal Connections	See Dimensional Outline
Radiator	Integral part of tube

Cooling:

In many applications, the 6263 does not require forced-air cooling. The radiator in combination with a connector having adequate heat conduction capability will generally provide adequate cooling under conditions of free circulation of air. The cooling must be sufficient to limit the plate-seal temperature to 175°C. When conditions do not provide adequate circulation of air, provision should be made to direct a blast of cooling air from a small blower through the radiator fins. The quantity of air should be sufficient to limit the plate-seal temperature to 175°C. See curves.

Incoming Air Temperature	40 max.	°C
Plate-Seal Temperature (Measured on Plate Seal)	175 max.	°C
Weight (Approx.)	24 grams (0.85 oz)	
Socket for Heater Leads	Cinch No.54A16325, or equivalent	

▲ A flat plate shield 1-1/4" diameter located parallel to the plane of the grid flange and midway between the grid flange and the radiator plate terminal. The shield is tied to the cathode.

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UHF MEDIUM-MU TRIODE

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without amplitude modulation**

	CCS#	ICAS##	
Maximum Ratings, *Absolute Values:*			
*For Pressures down to 46 mm of Hg***			
DC PLATE VOLTAGE	330 max.	400 max.	volts
DC GRID VOLTAGE	-100 max.	-100 max.	volts
DC PLATE CURRENT	40 max.	55 max.	ma
DC GRID CURRENT	25 max.	25 max.	ma
DC CATHODE CURRENT	55 max.	70 max.	ma
PLATE INPUT	13 max.	22 max.	watts
PLATE DISSIPATION	8 max.	13 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	90 max.	90 max.	volts
Heater positive with respect to cathode	90 max.	90 max.	volts
Typical Operation as Oscillator in Cathode-Drive Circuit at 500 Mc:			
DC Plate Voltage	300	350	volts
DC Grid Voltage□	-30	-35	volts
DC Plate Current	35	40	ma
DC Grid Current (Approx.)	11	14	ma
Useful Power Output (Approx.)	5●	7●	watts
Typical Operation as RF Power Amplifier in Cathode-Drive Circuit at 500 Mc:			
DC Plate Voltage	300	350	volts
DC Grid Voltage□	-48	-58	volts
DC Plate Current	35	40	ma
DC Grid Current (Approx.)	13	15	ma
Driver Power Output (Approx.)	2.2	3	watts
Useful Power Output (Approx.)	7●	10●	watts
Maximum Circuit Values (CCS or ICAS Conditions):			
Grid-Circuit Resistance	0.1 max.		megohm

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS#	ICAS##	
Maximum Ratings, *Absolute Values:*			
*For Pressures down to 46 mm of Hg***			
DC PLATE VOLTAGE	275 max.	300 max.	volts

* 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.

#, ##, **, □, ●: See next page.

World Radio History

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UHF MEDIUM-MU TRIODE

DC GRID VOLTAGE	−100 max.	−100 max.	volts
DC PLATE CURRENT	33 max.	46 max.	ma
DC GRID CURRENT	25 max.	25 max.	ma
DC CATHODE CURRENT	50 max.	60 max.	ma
PLATE INPUT	.9 max.	15 max.	watts
PLATE DISSIPATION	5.5 max.	9 max.	watts
PEAK HEATER–CATHODE VOLTAGE:			
Heater negative with respect to cathode	90 max.	90 max.	volts
Heater positive with respect to cathode	90 max.	90 max.	volts
Typical Operation in Cathode-Drive Circuit at 500 Mc:			
DC Plate Voltage	275	320	volts
DC Grid Voltage□	−42	−52	volts
DC Plate Current	35	35	ma
DC Grid Current (Approx.)	13	12	ma
Driver Power Output (Approx.)	2	2.4	watts
Useful Power Output (Approx.)	6.7●	8●	watts
Maximum Circuit Values (CCS or ICAS Conditions):			
Grid-Circuit Resistance	0.1 max.		megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.260	0.300	amp
Grid-to-Plate Capacitance	–	1.45	1.95	μμf
Grid-to-Cathode Capacitance	–	2.45	3.35	μμf
Plate-to-Cathode Capacitance	–	–	0.08	μμf
Plate Current	1,2	18	36	ma
Transconductance	1,2	5600	8400	μmhos
Useful Power Output	3,4	6.5	–	watts

Note 1: With 6.0 volts ac or dc on heater.

Note 2: With dc plate voltage of 200 volts, cathode resistor of 100 ± 1% ohms, and cathode bypass capacitor of 1000 μf.

Note 3: With 5.4 volts ac or dc on heater.

Note 4: With dc plate voltage of 350 volts, grid resistor adjusted to give a dc plate current of 50 milliamperes in a cavity-type oscillator operating at 500 megacycles per second and having an efficiency of about 75 per cent.

** Corresponds to altitude of about 60000 feet.

* Continuous Commercial Service.

** Intermittent Commercial and Amateur Service.

□ From a grid resistor, or from a suitable combination of grid resistor and fixed supply or grid resistor and cathode resistor.

● This value of useful power is measured at load of output circuit having an efficiency of about 75 per cent.

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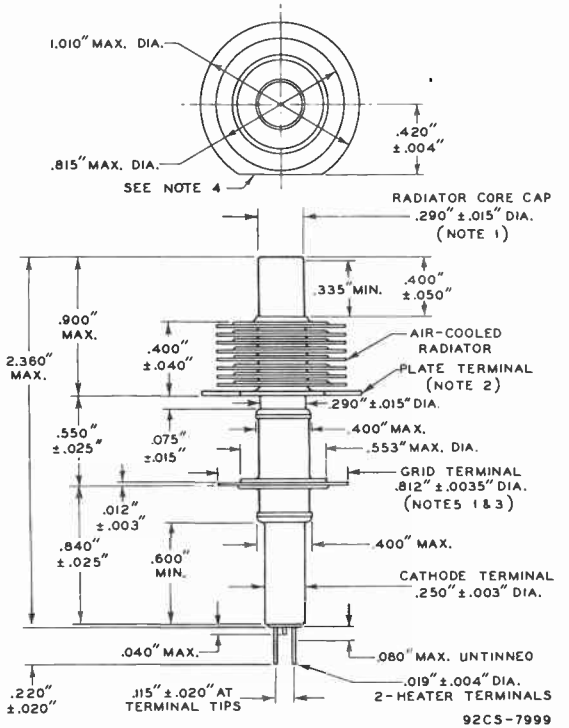
UHF MEDIUM-MU TRIODE

OPERATING FREQUENCY

The 6263 can be operated as an rf power amplifier and oscillator with full ratings at frequencies up to 500 megacycles per second and with reduced ratings at frequencies as high as 1700 megacycles per second.



NOTE 1: MAX. ECCENTRICITY OF ℄ (AXIS) OF RADIATOR-CORE CAP OR GRID-TERMINAL FLANGE WITH RESPECT TO THE ℄ (AXIS) OF THE CATHODE TERMINAL IS 0.015".

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UHF MEDIUM-MU TRIODE

NOTE 2: TILT OF PLATE-TERMINAL FIN OF RADIATOR WITH RESPECT TO ROTATIONAL AXIS OF CATHODE CYLINDER IS DETERMINED BY CHUCKING THE CATHODE TERMINAL, ROTATING THE TUBE, AND GAUGING THE TOTAL TRAVEL DISTANCE OF THE PLATE-TERMINAL FIN PARALLEL TO THE AXIS AT A POINT APPROXIMATELY 0.020" INWARD FROM THE STRAIGHT EDGE OF THE PLATE-TERMINAL FIN FOR ONE COMPLETE ROTATION. THE TOTAL TRAVEL DISTANCE WILL NOT EXCEED 0.035".

NOTE 3: TILT OF GRID-TERMINAL FLANGE WITH RESPECT TO ROTATIONAL AXIS OF CATHODE TERMINAL IS DETERMINED BY CHUCKING THE CATHODE TERMINAL, ROTATING THE TUBE, AND GAUGING THE TOTAL TRAVEL DISTANCE OF THE GRID-TERMINAL FLANGE PARALLEL TO THE AXIS AT A POINT APPROXIMATELY 0.020" INWARD FROM ITS EDGE FOR ONE COMPLETE ROTATION. THE TOTAL TRAVEL DISTANCE WILL NOT EXCEED 0.025".

NOTE 4: THE STRAIGHT EDGE ON THE PERIMETER OF THE LARGE FIN (PLATE TERMINAL) IS PARALLEL TO A PLANE THROUGH THE CENTERS OF THE HEATER LEADS AT THEIR SEALS WITHIN 15°.

World Radio History

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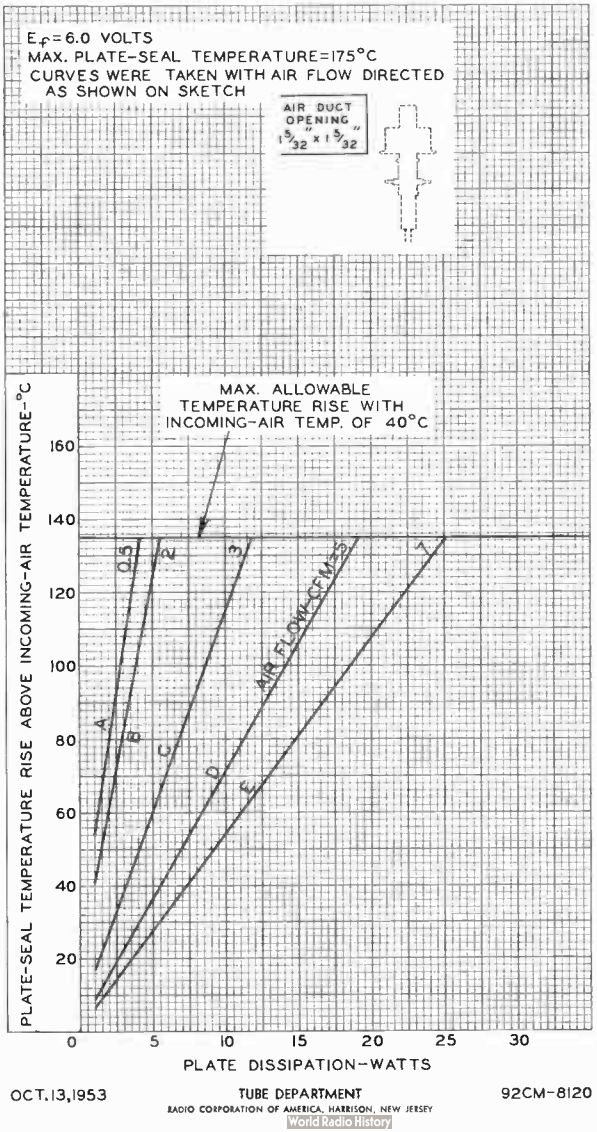
COOLING REQUIREMENTS



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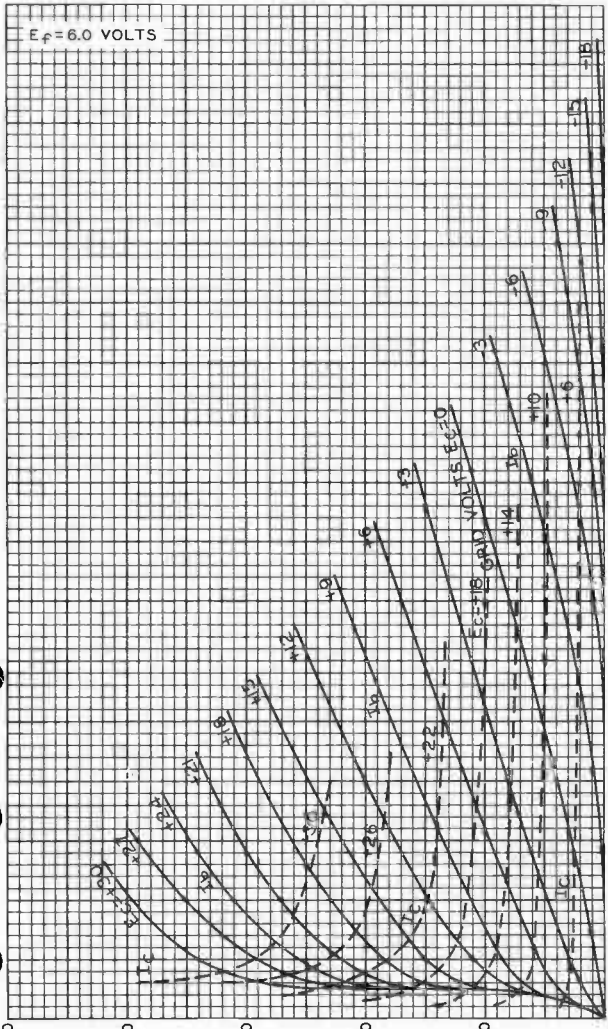
AVERAGE PLATE CHARACTERISTICS



OCT. 7, 1953

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8103

World Radio History

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AVERAGE CONSTANT-CURRENT CHARACTERISTICS

E_f=6.0 VOLTS
I_c=GRID MILLIAMPERES
I_b=PLATE MILLIAMPERES

I_b=200
160
120
100
80
60
40
20
10
0

I_c=120
80
60
40
20
10

PLATE VOLTS (E_b)
500
400
300
200
100

GRID VOLTS (E_c)
50
40
30
20
10
0
-10
-20
-30

OCT. 7, 1953

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8104

World Radio History

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UHF MEDIUM-MU TRIODE

"PENCIL TYPE" WITH EXTERNAL PLATE RADIATOR

GENERAL DATA

Electrical:

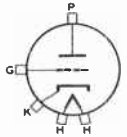
Heater, for Unipotential Cathode:			
Voltage (AC or DC):			
Under Transmitting Conditions		6.0 ± 10%	volts
Under Standby Conditions		6.3 max.	volts
Current at 6.0 volts		0.280	amp
Amplification Factor		40	
Transconductance, for dc plate current of 18.5 milliamperes and dc plate voltage of 200 volts		6800	μmhos
Direct Interelectrode Capacitances:	*With External Shield▲*	*Without External Shield*	
Grid to Plate	1.5	1.75	μμf
Grid to Cathode	–	2.95	μμf
Plate to Cathode	–	0.07 max.	μμf

Mechanical:

Terminal Connections:

H: Heater

K: Cathode Cylinder (Adjacent to heater-lead terminals)



G: Grid Flange (Between glass sections)

P: Plate Cylinder (With integral radiator)

Mounting Position	Any
Dimensions and Terminal Connections	See Dimensional Outline
Radiator	Integral part of tube

Cooling:

In many applications, the 6264 does not require forced-air cooling. The radiator in combination with a connector having adequate heat conduction capability will generally provide adequate cooling under conditions of free circulation of air. The cooling must be sufficient to limit the plate-seal temperature to 175°C. When conditions do not provide adequate circulation of air, provision should be made to direct a blast of cooling air from a small blower through the radiator fins. The quantity of air should be sufficient to limit the plate-seal temperature to 175°C. See curves.

Incoming Air Temperature	40 max.	°C
Plate-Seal Temperature (Measured on Plate Seal)	175 max.	°C
Weight (Approx.)	24 grams (0.85 oz)	
Socket for Heater Leads . .	Cinch No.54A16325. or equivalent	

▲ A flat plate shield 1-1/4" diameter located parallel to the plane of the grid flange and midway between the grid flange and the radiator plate terminal. The shield is tied to the cathode.

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UHF MEDIUM-MU TRIODE

RF POWER AMPLIFIER AND OSCILLATOR--Class C Telegraphy

*Key-down conditions per tube without amplitude modulation**

	CCS#	ICAS##	
Maximum Ratings, *Absolute Values:*			
*For Pressures Down to 46 mm of Hg***			
DC PLATE VOLTAGE	330 max.	400 max.	volts
DC GRID VOLTAGE	-100 max.	-100 max.	volts
DC PLATE CURRENT	40 max.	50 max.	ma
DC GRID CURRENT	25 max.	25 max.	ma
DC CATHODE CURRENT	55 max.	70 max.	ma
PLATE INPUT	13 max.	22 max.	watts
PLATE DISSIPATION	8 max.	13 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	90 max.	90 max.	volts
Heater positive with respect to cathode	90 max.	90 max.	volts
Typical Operation as Oscillator in Cathode-Drive Circuit at 500 Mc:			
DC Plate Voltage	300	350	volts
DC Grid Voltage†	-25	-30	volts
DC Plate Current	35	35	ma
DC Grid Current (Approx.)	11	13	ma
Useful Power Output (Approx.)	5•	6•	watts
Typical Operation as RF Power Amplifier in Cathode-Drive Circuit at 500 Mc:			
DC Plate Voltage	300	350	volts
DC Grid Voltage†	-42	-45	volts
DC Plate Current	35	40	ma
DC Grid Current (Approx.)	13	15	ma
Driver Power Output (Approx.)	2.4	3	watts
Useful Power Output (Approx.)	7.5•	10•	watts
Maximum Circuit Values (CCS or ICAS Conditions):			
Grid-Circuit Resistance	0.1 max.		megohm

FREQUENCY MULTIPLIER

	CCS#	ICAS##	
Maximum Ratings, *Absolute Values:*			
*For Pressures Down to 46 mm of Hg***			
DC PLATE VOLTAGE	300 max.	350 max.	volts

* 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.

#,##,**,†,•: See next page.

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UHF MEDIUM-MU TRIODE

DC GRID VOLTAGE	-125 max.	-140 max.	volts
DC PLATE CURRENT	33 max.	45 max.	ma
DC GRID CURRENT	15 max.	15 max.	ma
DC CATHODE CURRENT	45 max.	55 max.	ma
PLATE INPUT	9.9 max.	15.8 max.	watts
PLATE DISSIPATION	6 max.	9.5 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	90 max.	90 max.	volts
Heater positive with respect to cathode	90 max.	90 max.	volts

Typical Operation as Tripler to 510 Mc in Cathode-Drive Circuit:

DC Plate Voltage	300	350	volts
DC Grid Voltage†	-110	-122	volts
DC Plate Current	26	36.5	ma
DC Grid Current (Approx.)	4.1	5.8	ma
Driver Power Output (Approx.)	2.75	4.5	watts
Useful Power Output (Approx.)	2.1●	3.4●	watts

Maximum Circuit Values (CCS or ICAS Conditions):

Grid-Circuit Resistance	0.1 max.	megohm

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.260	0.300	ma
Grid-to-Plate Capacitance	-	1.50	2.0	μμf
Grid-to-Cathode Capacitance	-	2.50	3.40	μμf
Plate-to-Cathode Capacitance	-	-	0.07	μμf
Plate Current	1,2	13	24	ma
Transconductance	1,2	5400	8200	μmhos
Useful Power Output	3,4	6.5	-	watts

Note 1: With 6.0 volts ac or dc on heater.

Note 2: With dc plate voltage of 200 volts, cathode resistor of 100 ± 1% ohms, and cathode bypass capacitor of 1000 μf.

Note 3: With 5.4 volts ac or dc on heater.

Note 4: With plate voltage of 350 volts, grid resistor adjusted to give a dc plate current of 50 milliamperes in a cavity-type oscillator operating at 500 megacycles per second and having an efficiency of about 75 per cent.

* Corresponds to altitude of about 60000 feet.

‡ Continuous Commercial Service.

‡‡ Intermittent Commercial and Amateur Service.

● This value of useful power is measured at load of output circuit having an efficiency of about 75 per cent.

† From a grid resistor, or from a suitable combination of grid resistor and fixed supply or grid resistor and cathode resistor.

World Radio History

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UHF MEDIUM-MU TRIODE

Outline Drawing and
Cooling-Requirement Curves for the 6264
are the same as shown for Type 6263

OPERATING FREQUENCY

The 6264 can be operated as a frequency multiplier and as an rf power amplifier and oscillator with full ratings at frequencies up to 500 megacycles per second and with reduced ratings at frequencies as high as 1700 megacycles per second.

World Radio History

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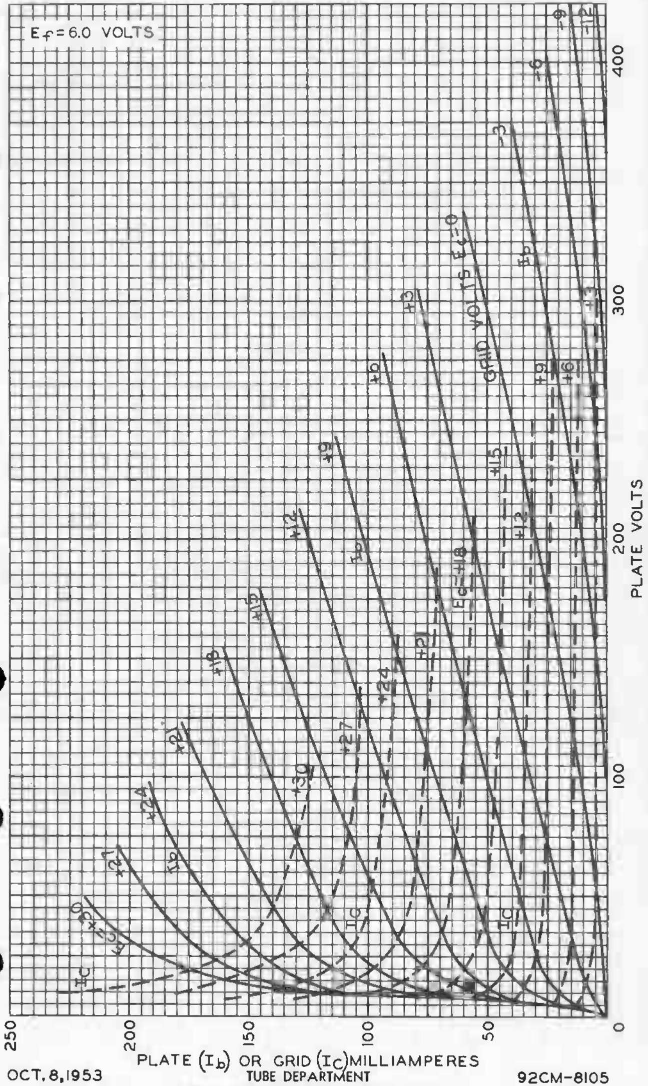
AVERAGE PLATE CHARACTERISTICS



OCT. 8, 1953

92CM-8105

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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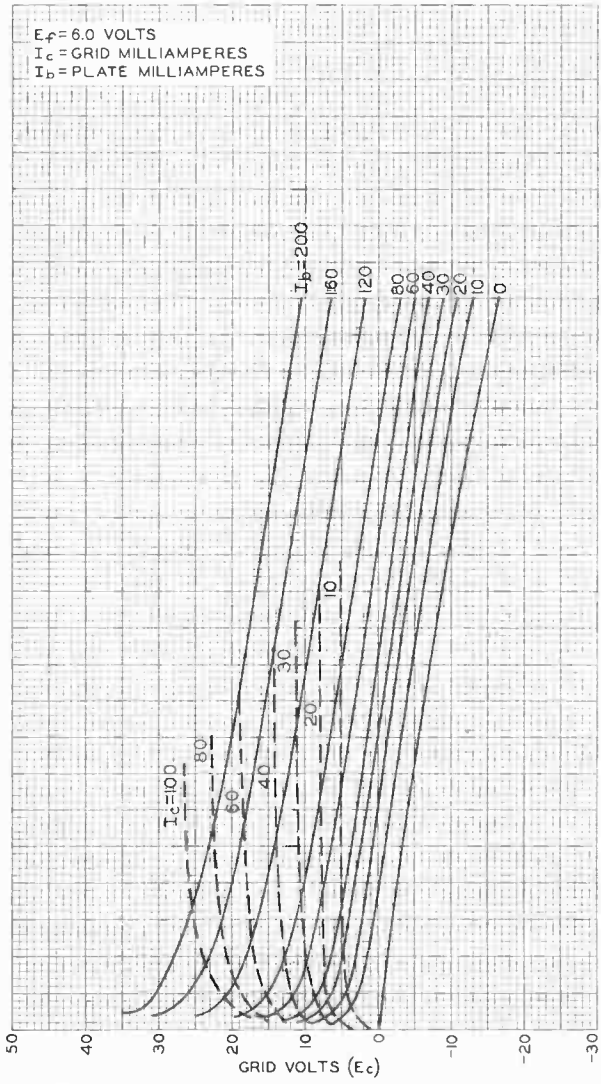
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



OCT. 8, 1953

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8106

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POWER TRIODE

LIQUID AND FORCED-AIR COOLED

Full Input at Frequencies Up to 2000 Mc

GENERAL DATA

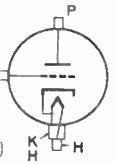
Electrical:

Heater, for Unipotential Cathode:

Voltage*	6.3 av. / 6.9 max.	ac or dc volts / volts
Current	3.4	amp
Minimum heating time	1	minute
Amplification Factor	27	
Direct Interelectrode Capacitances:		
Grid to plate	6	μμf
Grid to cathode	11	μμf
Plate to cathode®	0.22	μμf

Mechanical:

Terminal Connections:



H – Heater Terminals (Center Pin at Cathode End & Cath. Terminal)

K – Cathode Terminal (End Opposite Pipes)

G – Grid Terminal (Between Plate Flange and Cath. Terminal)

P – Plate Terminal (Plate Flange)

Mounting Position	Any
Overall Length	4-3/16" ± 3/32"
Greatest Diameter	1.750" ± 0.010"
Cooling Jacket	Integral part of tube
Mounting	Special

Air Cooling:

Forced-air cooling of the grid terminal, cathode terminal, and glass envelope is required. The air flow must start with the application of any voltages, and be adequate to limit the temperature of the grid terminal, cathode terminal, and glass envelope to their respective maximum values. Heater power, plate power, and air flow may be removed simultaneously.

Liquid Cooling:

Liquid cooling of the plate is required. The liquid flow must start before the application of any voltages. Interlocking of the liquid flow with all power supplies is recommended to prevent tube damage in case of failure of adequate liquid flow. Suitable coolants are: Distilled Water, Butyl Carbitol, Ethylene Glycol, Monsanto OS45 (High Temperature Hydraulic Fluid), and Dow Corning No.200 Fluid.

Liquid-coolant pressure	60 max.	psi
Water flow required:		
With plate dissipation of 300 watts	0.25 min.	gpm
With plate dissipation of 600 watts	0.4 min.	gpm

® With external flat shield 7-1/2" minimum diameter located in plane of the grid terminal and perpendicular to axis of tube. Shield is connected to grid terminal.

*: See next page.

World Radio History

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POWER TRIODE

Water flow obtained:		
With pressure drop of 0.5 psi	0.25 min.	gpm
With pressure drop of 2.0 psi	0.4 min.	gpm
Outlet water temperature	70 max.	°C

For coolants other than water, the flow required, the pressure drop, and the outlet coolant temperature will depend on the characteristics of the coolant.

Plate Temperature (Measured on side of plate flange opposite the pipes and at junction of flange with tube body)	180 max.	°C
Grid-Terminal Temperature	200 max.	°C
Cathode-Terminal Temperature	200 max.	°C
Glass-Envelope Temperature	175 max.	°C
Weight (Approx.)	8	ounces

AF POWER AMPLIFIER & MODULATOR--Class A

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1500 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	400 max.	ma
DC GRID CURRENT	75 max.	ma
PLATE INPUT	600 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation (Class A_1):

DC Plate Voltage	1000	1500	volts
DC Grid Voltage	-25	-40	volts
Peak AF Grid Voltage	20	35	volts
DC Plate Current	200	250	ma
Load Resistance	1350	1550	ohms
Power Output♦	20	60	watts

PLATE-MODULATED RF POWER AMP.--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1200 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	335 max.	ma
DC GRID CURRENT	See Rating Chart	
PLATE INPUT	400 max.	watts
PLATE DISSIPATION	400 max.	watts

♦ Values are based on maximum power output disregarding distortion.

•,•: See next page.

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POWER TRIODE

Typical Operation:

In Cathode-Drive Circuit at	*600 Mc*	*1000 Mc*	
Heater Voltage*.	5.7	4.5	volts
DC Plate-to-Grid Voltage . . .	1340	1315	volts
DC Cathode-to-Grid Voltage . .	140	115	volts
From cathode resistor of▲. .	380	330	ohms
Peak RF Cathode-to-Grid Voltage	200	175	volts
DC Plate Current	335	335	ma
DC Grid Current (Approx.). . .	35	15	ma
Driver Power Output (Approx.)●■	70	76	watts
Output-Circuit Efficiency (Approx.). .	80	60	per cent
Useful Power Output (Approx.).	250○○	190○○	watts

In Cathode-Drive Circuit at	*1100 Mc*	*1500 Mc*	
Heater Voltage*.	4.5	4.5	volts
DC Plate-to-Grid Voltage . . .	1290	1280	volts
DC Cathode-to-Grid Voltage . .	90	80	volts
From cathode resistor of▲. .	260	235	ohms
Peak RF Cathode-to-Grid Voltage	145	130	volts
DC Plate Current	335	335	ma
DC Grid Current (Approx.). . .	12	4	ma
Driver Power Output (Approx.)●■	80	53	watts
Output-Circuit Efficiency (Approx.). .	55	50	per cent
Useful Power Output (Approx.).	160○○	100○○	watts

RF POWER AMPLIFIER & OSC.--Class C Telegraphy□ and RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1500 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	400 max.	ma
DC GRID CURRENT	See Rating Chart	
PLATE INPUT	600 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation:

As Amplifier in Cathode-Drive Circuit at	*600 Mc*	*1000 Mc*	
Heater Voltage*.	5.7	4.5	volts
DC Plate-to-Grid Voltage . . .	1640	1615	volts

■ In cathode-drive, plate-modulated class C rf power amplifier service, the 6383 can be modulated 100% if the rf driver stage is also modulated 100% simultaneously. Care should be taken to insure that the driver-modulation and amplifier-modulation voltages are exactly in phase.

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

*, ●, ▲, ◆, ○○: See next page.

World Radio History

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POWER TRIODE

	600 Mc	1000 Mc	
DC Cathode-to-Grid Voltage . .	140	115	volts
From cathode resistor of▲. .	315	275	ohms
Peak RF Cathode-to-Grid Voltage	210	185	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.). . .	25	20	ma
Driver Power Output (Approx.)●	90	95	watts
Output-Circuit Efficiency (Approx.). .	80	60	per cent
Useful Power Output (Approx.).	380○○	285○○	watts
As Amplifier in Cathode-Drive Circuit at	***1100 Mc***	***1500 Mc***	
Heater Voltage*.	4.5	4.5	volts
DC Plate-to-Grid Voltage . . .	1590	1580	volts
DC Cathode-to-Grid Voltage . .	90	80	volts
From cathode resistor of▲. .	220	200	ohms
Peak RF Cathode-to-Grid Voltage	155	140	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.). . .	15	5	ma
Driver Power Output (Approx.)●	80	85	watts
Output-Circuit Efficiency (Approx.). .	55	50	per cent
Useful Power Output (Approx.).	240○○	150○○	watts
As Oscillator in Cathode-Drive Circuit at	***600 Mc***	***1000 Mc***	
Heater Voltage*.	5.7	4.5	volts
DC Plate-to-Grid Voltage . . .	1640	1615	volts
DC Cathode-to-Grid Voltage . .	140	115	volts
From cathode resistor of▲. .	315	275	ohms
Peak RF Cathode-to-Grid Voltage	175	140	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.). . .	45	20	ma
Output-Circuit Efficiency (Approx.). .	80	60	per cent
Useful Power Output (Approx.).	280○○	190○○	watts
As Oscillator in Cathode-Drive Circuit at	***1100 Mc***	***1500 Mc***	
Heater Voltage*.	4.5	4.5	volts
DC Plate-to-Grid Voltage . . .	1590	1580	volts
DC Cathode-to-Grid Voltage . .	90	80	volts
From cathode resistor of▲. .	220	200	ohms
Peak RF Cathode-to-Grid Voltage	120	110	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.). . .	15	5	ma
Output-Circuit Efficiency (Approx.). .	55	50	per cent
Useful Power Output (Approx.).	150○○	60○○	watts

*,●,▲,◆,○○: See next page.

World Radio History

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POWER TRIODE

FREQUENCY MULTIPLIER--Class C

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1500 max.	volts
DC GRID VOLTAGE	-300 max.	volts
DC PLATE CURRENT	400 max.	ma
DC GRID CURRENT	See Rating Chart	
PLATE INPUT	600 max.	watts
PLATE DISSIPATION	600 max.	watts

Typical Operation in Cathode-Drive Circuit:

	Doubler to 600 Mc	*Doubler to 900 Mc*	
DC Plate-to-Grid Voltage	1760	1675	volts
DC Cathode-to-Grid Voltage	260	175	volts
From cathode resistor of▲	570	415	ohms
Peak RF Cathode-to-Grid Voltage	300	215	volts
DC Plate Current	400	400	ma
DC Grid Current (Approx.)	55	25	ma
Driver Power Output (Approx.)®	195	160	watts
Output-Circuit Efficiency (Approx.)	80	60	per cent
Useful Power Output (Approx.)	280°°	225°°	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	3.05	3.75	amp
Amplification Factor	1,2	20	34	
Grid-Plate Capacitance	-	5.5	6.5	μμf
Grid-Cathode Capacitance	-	9.6	12.4	μμf
Plate-Cathode Capacitance	3	0.12	0.32	μμf
Plate Voltage (1)	1,4	550	810	volts
Plate Voltage (2)	1,5	750	1150	volts
Grid Voltage	1,6	-	-165	volts
Peak Cathode Current	1,7	9	-	amp
Useful Power Output	8,9	140	-	watts

Note 1: With 6.3 volts ac on heater.

Note 2: With dc grid voltage of -15 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 3: With external shield as described under (®).

Note 4: With dc grid voltage of -10 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 5: With dc grid voltage of -20 volts, and dc plate voltage adjusted to give dc plate current of 250 milliamperes.

Note 6: With dc plate voltage of 1500 volts, and dc grid voltage adjusted to give dc plate current of 1.0 milliampere.

*,●,▲,®,°°: See next page.

World Radio History

RCA

6383

POWER TRIODE

Note 7: Designers should limit the maximum useable cathode current (plate current and grid current) to this value under any condition of operation.

Note 8: With 4.5 volts ac on heater.

Note 9: In a self-excited, cathode-drive oscillator circuit and with dc plate-to-grid voltage of 1570 to 1625 volts (in all cases, plate-to-cathode voltage is 1500 volts), dc plate current of 400 ma., dc grid current of -10 to +50 ma., cathode-to-grid voltage of 70 to 125 volts, and frequency of 1100 Mc.

* Operation should always be started with a heater voltage of 6.3 volts. Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced in accord with the following table to prevent overheating the cathode and resultant short life.

Approx. Frequency Range Mc	*Heater Volts*
Up to 550-600	6.3
550 to 750-800	5.7
750 to 975-1025	5.1
975 and above	4.5

● Continuous Commercial Service.

▲ At frequencies below 600 Mc, it is permissible to use a combination of grid and cathode resistors, but the use of a grid resistor alone is not recommended. At frequencies above 600 Mc where the value of grid current may be small, only cathode bias is recommended.

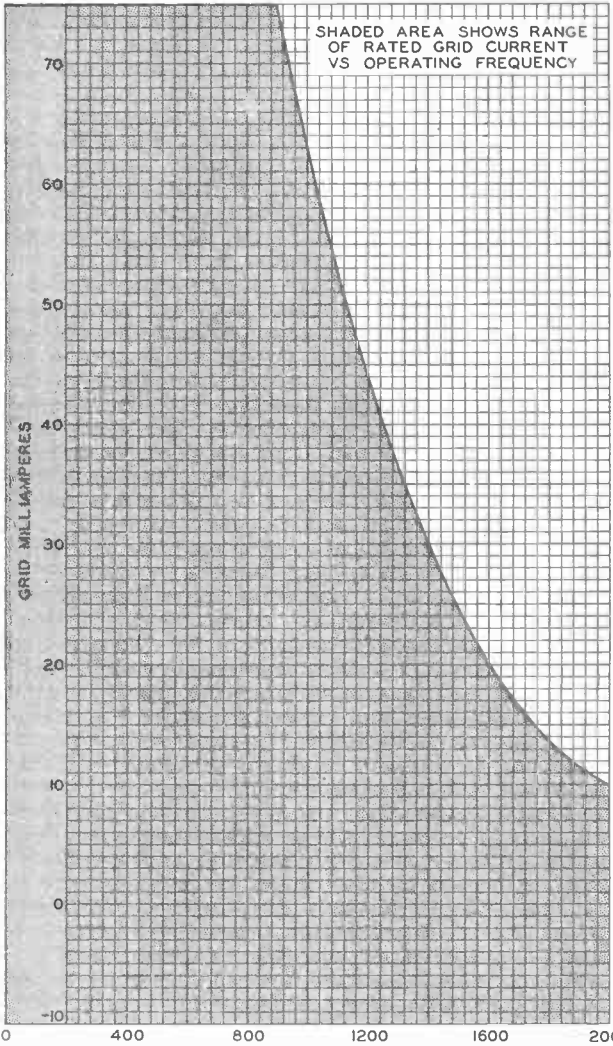
✱ The driver stage is required to supply tube losses, rf circuit losses, and rf power added to plate input. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

oo This value of useful power is measured at load of output circuit having indicated efficiency.

World Radio History

6383

RATING CHART



APRIL 20, 1954

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8321

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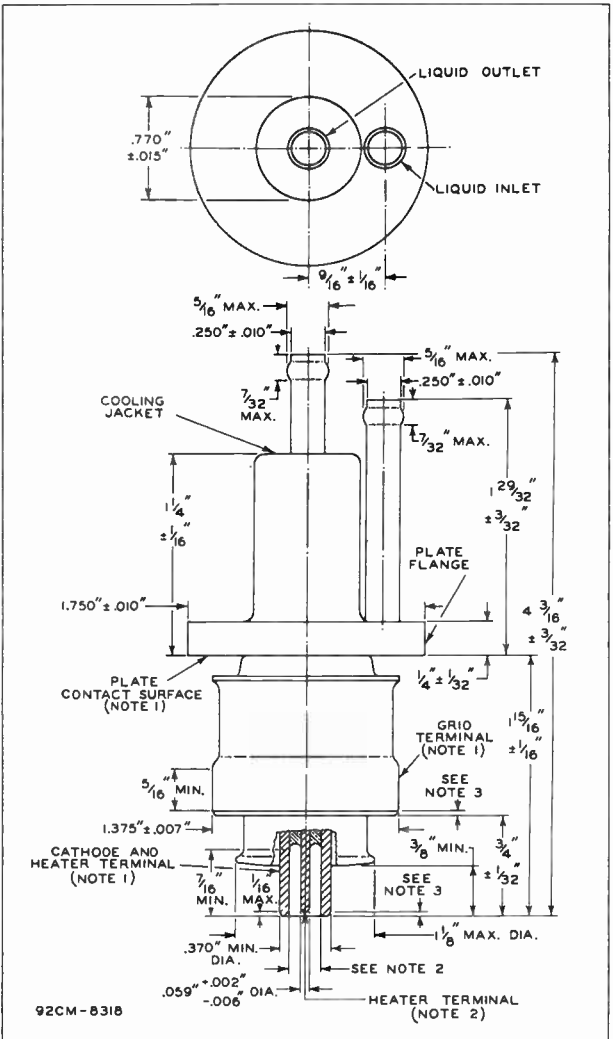
POWER TRIODE



World Radio History

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POWER TRIODE

NOTE 1: WITH THE CYLINDRICAL SURFACES OF ITS GRID AND CATHODE TERMINALS CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1. THE FOUR CYLINDRICAL HOLES H_1, H_2, H_3, and H_4 HAVE AXES COINCIDENT WITHIN 0.0005", LENGTHS DETERMINED FROM THE DIMENSIONAL OUTLINE, AND SUCCESSIVELY SMALLER DIAMETERS AS SHOWN IN THE SKETCH.

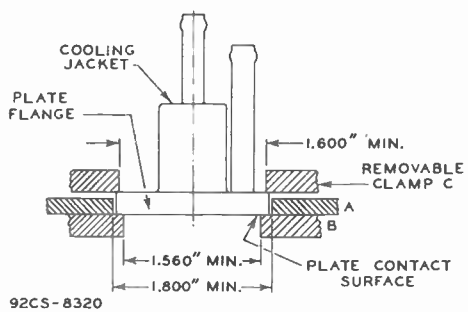
THE PLATE FLANGE WILL BE ENTIRELY ENGAGED BY HOLE H_1, AND CONTACT SURFACE OF THE PLATE FLANGE WILL SEAT ON THE SHOULDER BETWEEN HOLES H_1 AND H_2. THE PLANE SURFACE OF THIS SHOULDER IS $90^{\circ} \pm 2'$ TO THE AXES OF THE HOLES. SEATING IS DETERMINED BY FAILURE OF A 0.005" THICKNESS GAUGE, 1/8" WIDE, TO ENTER MORE THAN 1/16" BETWEEN THIS SHOULDER SURFACE AND THE PLATE CONTACT SURFACE.

WITH THE TUBE PROPERLY SEATED AS DESCRIBED ABOVE, THE GRID TERMINAL WILL BE ENTIRELY ENGAGED BY HOLE H_3, AND THE CATHODE TERMINAL WILL BE ENGAGED BY HOLE H_4 TO A DEPTH OF AT LEAST 1/4".

NOTE 2: CONCENTRICITY OF THE HEATER TERMINAL WITH RESPECT TO THE CATHODE TERMINAL IS DETERMINED BY A GAUGE AS SHOWN IN SKETCH G_2. THE CYLINDRICAL HOLE H_5 AND THE ANNULAR HOLE H_6 HAVE AXES COINCIDENT WITHIN 0.0005". THE CATHODE TERMINAL AND THE HEATER TERMINAL WILL ENTER THIS GAUGE TO A DEPTH OF 3/8".

NOTE 3: MAY BE ROUNDED OR BEVELED NOT TO EXCEED 1/16".

Mounting Arrangement for Use with Coaxial-Line or Cavity Circuits



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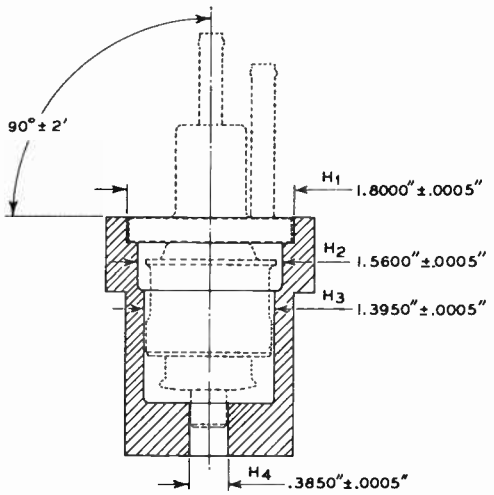
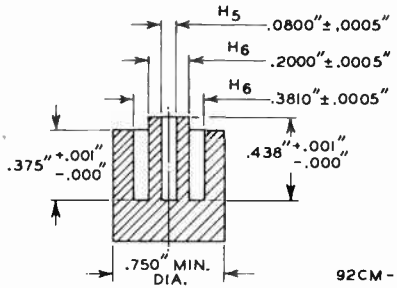
POWER TRIODE

Sketch G_1



Sketch G_2



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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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AVERAGE CHARACTERISTICS

APRIL 26, 1954 TUBE DIVISION 92CL-7771RI
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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6417

VHF BEAM POWER TUBE

9 PIN MINIATURE TYPE

Heater, for Unipotential Cathode:

Voltage	12.6 ± 10%	ac or dc volts
Current	0.375	amp

Except for heater rating, the 6417 is the same as the 5763.

With 12.6 volts on heater of the 6417, the minimum heater current is 0.345 ampere and the maximum heater current is 0.405 ampere.

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World Radio History

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UHF BEAM POWER TUBE

WATER-COOLED ELECTRODES

GENERAL DATA

Electrical:

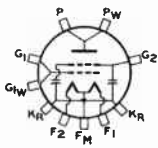
Filament*, 2-Section Multi-strand Thoriated Tungsten:

Voltage per section (AC or DC)	1.35 av. / 1.50 max.	volts
Current per section at 1.35 volts	1000	amp
Starting current per section	Must never exceed 1500 amperes, even momentarily	
Cold resistance per section	0.0002	ohm
Minimum heating time	10	seconds
Supply circuits	See Circuits	
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 3000, grid-No.2 volts = 800, and plate amperes = 4	6	
Direct Interelectrode Capacitances:		
Grid No.1 to plate	0.1 max.	μμf
Input	335	μμf
Output	30	μμf
Internal Bypass Capacitors between Grid No.2 and Cathode (Total)	15000	μμf

Mechanical:

Terminal Connections:

F_1 – Fil. Sect. No.1 & Water Conn.
F_2 – Fil. Sect. No.2 & Water Conn.
G_1 – RF Grid-No.1 Term. Contact Surface
$G1_W$ – DC Grid-No.1 & Water Conn.
G_2 – DC Grid-No.2 & Water Conn.



For location of respective terminals, see Dimensional Outline

K_R – RF Cath. Term. Contact Surface For Circuit Returns
F_M – Common Point of Fil. Sections & Water Conn.
P – RF Plate Term. Contact Surface
P_W – DC Plate & Water Conn.

Mounting Position	Tube axis vertical, with plate terminal either up or down
Overall Length	7-11/32" + 3/8" – 1/2"
Maximum Diameter	11-3/8"

Air Cooling:

Forced-air cooling of the ceramic bushing at the grid-No.1 seal and at the plate seal is required only if the temperature of the ceramic bushing at either seal exceeds the specified maximum value of 150°C. Under such conditions, provision should be made for blowing air at the ceramic bushings through suitable openings in the coaxial-cylinder cavity circuit.

*: See Operating Notes on conserving filament life.

World Radio History

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UHF BEAM POWER TUBE

Water Cooling:

Water cooling of the filament-section blocks, rf cathode terminals, grid-No.1 block, grid-No.2 block, and plate is required. The water flow must start before application of any voltage and preferably should continue for several seconds after removal of all voltages. Interlocking of the water flow through each of the cooled elements with all power supplies is recommended to prevent tube damage in case of failure of adequate water flow.

Water Flow:

	Min. gpm	*Typical* gpm	*Pressure Drop*● psi
To Filament-Section-No.1 Block	0.5	0.5	2
		1.2	11
To Filament-Section-No.2 Block	0.5	0.5	2
		1.2	11
To Filament Mid-Tap Block	0.5	0.5	2
		1.2	10
To Grid-No.1 Block	0.5	0.5	1
		1.2	6
To Grid-No.2 Block	0.5	0.5	3
		1.2	15
To Plate:			
For plate dissipation of 10 kw	4.5	–	3.5
For plate dissipation of 15 kw	7.5	–	8.5
For plate dissipation of 20 kw	11	–	16
For plate dissipation of 26 kw	14	–	25

Gauge Pressure at Any Inlet	70 max.	psi
Ceramic Bushing Temperature	150 max.	°C
Outlet Water Temperature (Any outlet)	70 max.	°C
Weight (Approx.)	25	lbs

RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions per tube unless otherwise indicated

Maximum CCS● Ratings, *Absolute Values:*

	Up to 1000 Mc	
DC PLATE VOLTAGE	7000 max.	volts
DC PLATE-SUPPLY VOLTAGE	8000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
DC GRID-No.2-SUPPLY VOLTAGE	1100 max.	volts

● Directly across cooled element for the indicated flow.

●: See next page.

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UHF BEAM POWER TUBE

DC PLATE CURRENT	7 max.	amp
DC GRID-No.1 (CONTROL-GRID) CURRENT	0.5 max.	amp
PLATE INPUT	49000 max.	watts
GRID-No.2 INPUT (Pedestal Level)	600 max.	watts
PLATE DISSIPATION	26000 max.	watts

Typical Operation:	*At 500 Mc*	*At 900 Mc*	
Bandwidth▲ of	7	7	*Mc*
DC Plate Voltage	6000	6500	volts
DC Grid-No.2 Voltage	950	950	volts
DC Grid-No.1 Voltage	-140	-140	volts
Peak RF Grid-No.1 Voltage:			
Synchronizing level	160	160	volts
Pedestal level	100	100	volts
DC Plate Current:			
Synchronizing level	6.9	6.8	amp
Pedestal level	5.3	5.2	amp
DC Grid-No.2 Current:			
Synchronizing level	0.75	0.6	amp
Pedestal level	0.35	0.3	amp
DC Grid-No.1 Current (Approx.):			
Synchronizing level	0.13	0.1	amp
Pedestal level	0	0	amp
Driver Power Output (Approx.):♣			
Synchronizing level	600	1000	watts
Pedestal level	350	560	watts
Output-Circuit Efficiency (Approx.)	85	80	per cent
Useful Power Output (Approx.):			
Synchronizing level	15000●●	12000●●	watts
Pedestal level	8400●●	6700●●	watts

PLATE-MODULATED RF POWER AMP.--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, *Absolute Values:*

	Up to 1000 Mc	
DC PLATE VOLTAGE	4500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
PEAK GRID-No.2 VOLTAGE (DC + AC Component)	1200 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	volts
DC PLATE CURRENT	4.5 max.	amp
DC GRID-No.1 CURRENT	1 max.	amp
PLATE INPUT	22500 max.	watts

▲ Between the half-power points as measured in the output circuit.

●, ♣, ●●: See next page.

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UHF BEAM POWER TUBE

GRID-No.2 INPUT		400 max.	volts
PLATE DISSIPATION		16500 max.	watts

Typical Operation:	*At 400 Mc*	*At 900 Mc*	
DC Plate Voltage	4000	4250	volts
DC Grid-No.2 Voltage♦	600	600	volts
DC Grid-No.1 Voltage	-200	-200	volts
Peak RF Grid-No.1 Voltage	210	210	volts
DC Plate Current	4.25	4	amp
DC Grid-No.2 Current	0.65	0.6	amp
DC Grid-No.1 Current (Approx.)	0.3	0.2	amp
Driver Power Output (Approx.)♣	700	1000	watts
Output-Circuit Efficiency (Approx.)	80	75	per cent
Useful Power Output (Approx.)	7250••	4500••	watts

RF POWER AMPLIFIER--Class C Telegraphy□
and
RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS• Ratings, *Absolute Values:*

	Up to 1000 Mc	
DC PLATE VOLTAGE	7000 max.	volts
DC PLATE-SUPPLY VOLTAGE	8000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	1000 max.	volts
DC GRID-No.2-SUPPLY VOLTAGE	1100 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	volts
DC PLATE CURRENT	6.5 max.	amp
DC GRID-No.1 CURRENT	0.5 max.	amp
PLATE INPUT	45500 max.	watts
GRID-No.2 INPUT	600 max.	watts
PLATE DISSIPATION	26000 max.	watts

Typical Operation:	*At 400 Mc*	*At 900 Mc*	
DC Plate Voltage	6500	6500	volts
DC Grid-No.2 Voltage†	800	800	volts
DC Grid-No.1 Voltage††	-140	-140	volts
Peak RF Grid-No.1 Voltage	160	160	volts
DC Plate Current	6	6.3	amp
DC Grid-No.2 Current	0.5	0.4	amp
DC Grid-No.1 Current (Approx.)	0.2	0.15	amp
Driver Power Output (Approx.)♣	400	800	watts
Output- Circuit Efficiency (Approx.)	85	77	per cent
Useful Power Output (Approx.)	14000••	11000••	watts

• Continuous Commercial Service.

♦ Obtained preferably from a separate source.

□,••,♣,†,††: See next page.

World Radio History

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UHF BEAM POWER TUBE

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

♣ The 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 value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

●● This value of useful power is measured at load of output circuit having indicated efficiency.

† Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6448 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 1100 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

†† Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current per Section	1	900	1100	amp
Filament Current per Section	2	960	1160	amp
Grid-No.1 Voltage	1,3	–	-160	volts
Useful Power Output	1,4	11000	–	watts
Power Gain	1,4,5	10	–	

Note 1: With 1.35 volts ac per section.

Note 2: With 1.5 volts ac per section.

Note 3: With 2-phase excitation of the filament sections, dc plate voltage of 6500 volts, dc grid-No.2 voltage of 800 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 0.5 ampere.

Note 4: With 2-phase excitation of the filament sections. In rf power amplifier circuit having bandwidth of 7 Mc as defined by the half-power points and with dc plate voltage of 7000 volts, dc grid-No.2 voltage of 800 volts, dc grid-No.1 voltage of -130 volts, drive adjusted to give dc plate current of 6.75 amperes, and frequency of 900 Mc.

Note 5: With driving power measured at input to input-cavity circuit fed by transmission line having voltage-standing-wave ratio not greater than 2. Power gain is ratio of useful power output to driving power.

OPERATING NOTES

Instructions for conserving filament life of the 6448 and for the use of high-speed electronic protective devices with it are given in the technical bulletin. A copy of the technical bulletin for the 6448 will be supplied on request to Commercial Engineering, RCA, Harrison, N.J.

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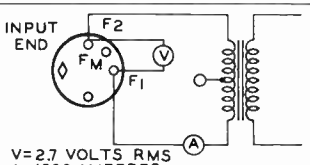
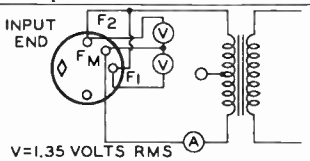
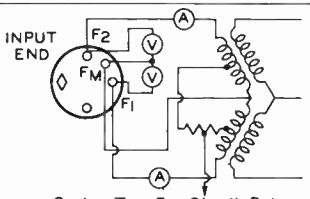
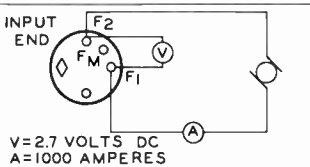
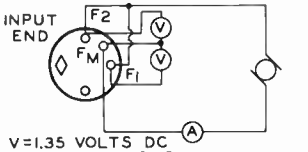
FILAMENT-SUPPLY CIRCUITS

WITH SINGLE-PHASE AC EXCITATION	SECTIONS IN SERIES	 V=2.7 VOLTS RMS A=1000 AMPERES
	SECTIONS IN PARALLEL	 V=1.35 VOLTS RMS A=2000 AMPERES
WITH TWO-PHASE (QUARTER PHASE) AC EXCITATION		 Center Tap For Circuit Returns V=1.35 VOLTS RMS A=1000 AMPERES
WITH DC EXCITATION	SECTIONS IN SERIES	 V=2.7 VOLTS DC A=1000 AMPERES
	SECTIONS IN PARALLEL	 V=1.35 VOLTS DC A=2000 AMPERES

F_1 = FILAMENT SECTION Nº1
F_2 = FILAMENT SECTION Nº2
F_M = COMMON POINT OF FILAMENT SECTIONS

92CM-8249

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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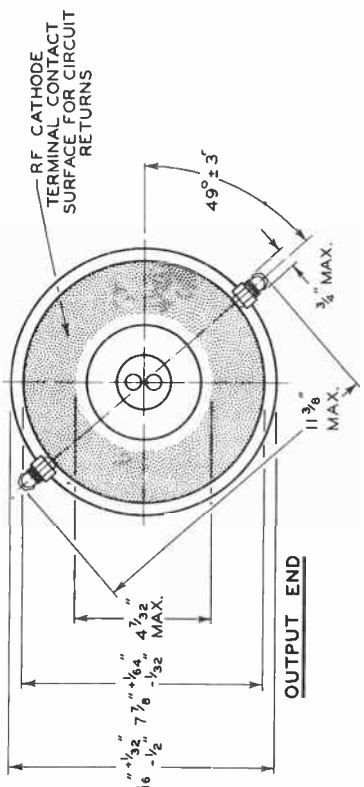
UHF BEAM POWER TUBE



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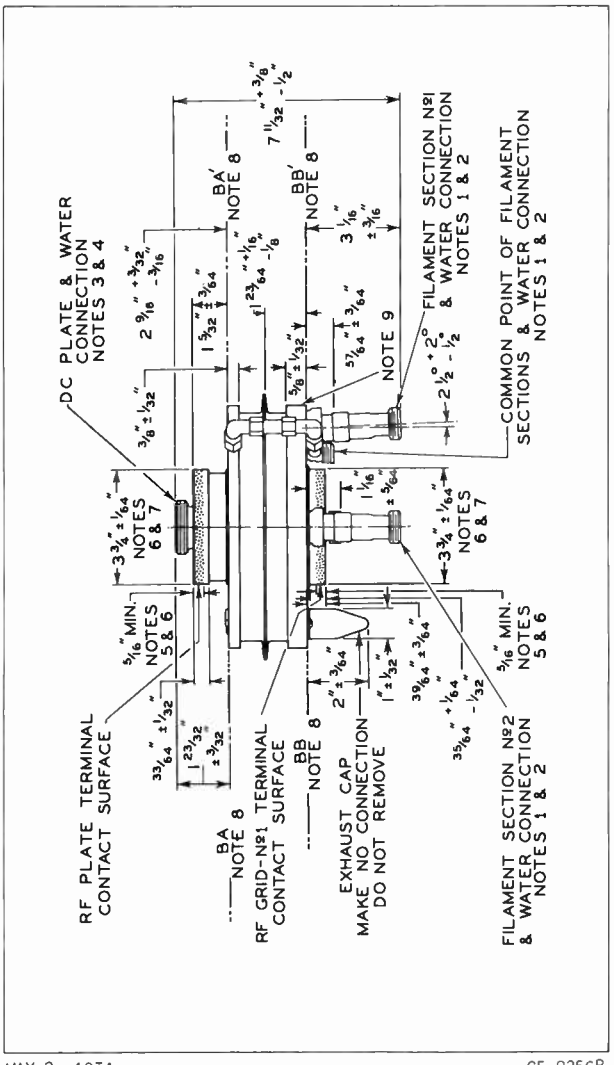
UHF BEAM POWER TUBE



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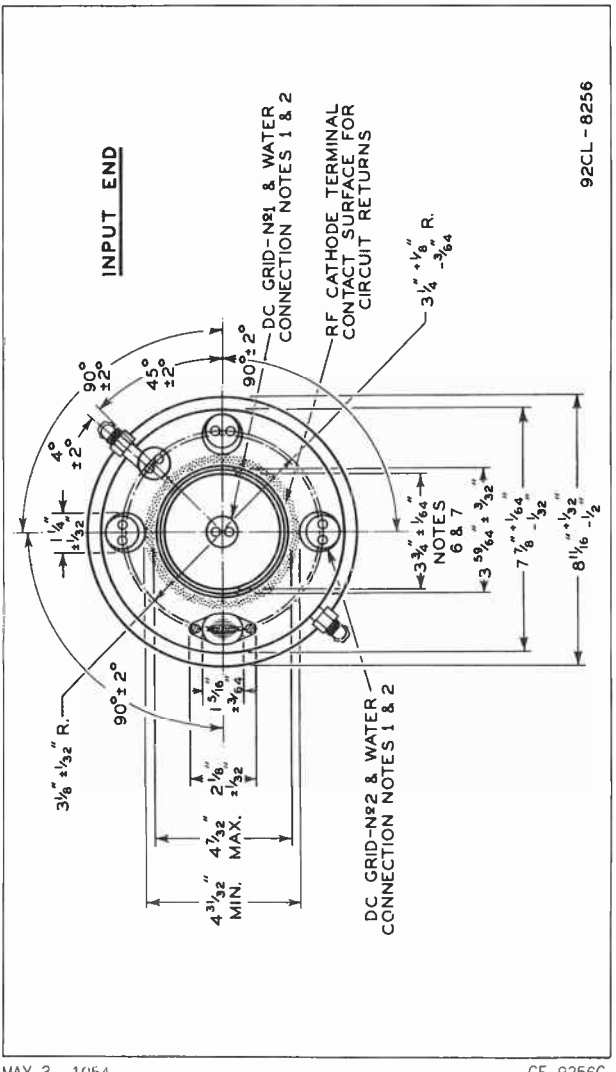
UHF BEAM POWER TUBE



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UHF BEAM POWER TUBE

NOTE 1: WATER CONNECTIONS FOR FILAMENT SECTIONS NO.1 AND NO.2, COMMON POINT OF FILAMENT SECTIONS, GRID NO.1, AND GRID NO.2 HAVE 1" -16 AMERICAN STANDARD THREAD, FREE FIT (CLASS 2), 3/8" LONG, AND 2 HOLES 0.257" - D.27D" DIAMETER SPACED 7/16" ON CENTERS.

NOTE 2: THE HOLES IN THE INDICATED WATER CONNECTIONS OF NOTE 1 WILL ACCEPT THE PINS OF THE PLUG-AND-CYLINDER COMBINATION GAUGE SHOWN IN SKETCH G_1.

NOTE 3: WATER CONNECTION FOR THE PLATE HAS 1-3/4"-16 AMERICAN STANDARD THREAD, FREE FIT (CLASS 2), 3/8" LONG, AND 2 HOLES D.5D8"-D.522" DIAMETER SPACED 11/16" ON CENTERS.

NOTE 4: THE HOLES IN THE PLATE WATER CONNECTION WILL ACCEPT THE PINS OF THE PLUG-AND-CYLINDER COMBINATION GAUGE SHOWN IN SKETCH G_2.

NOTE 5: CONTACT LENGTH OF CIRCUIT CONNECTOR IS 5/16" MAX.

NOTE 6: THIS DIAMETER DIMENSION IS HELD ONLY OVER A LENGTH OF 5/16"; OVER REMAINDER OF LENGTH, THE DIAMETER MAY INCREASE TO 3-7/8" MAX.

NOTE 7: THE AXIS OF THE RF PLATE CONTACT SURFACE IS COINCIDENT WITH THE AXIS OF THE RF GRID-No.1 CONTACT SURFACE WITHIN 3/32".

NOTE 8: THE CONTACT SURFACES 8A-8A' AND 8B-8B' ARE PARALLEL WITHIN 1/16".

NOTE 9: SERIAL NUMBER IS LOCATED ON THIS SURFACE BETWEEN DC GRID-NO.2 AND FILAMENT SECTION No.1 CONNECTIONS.

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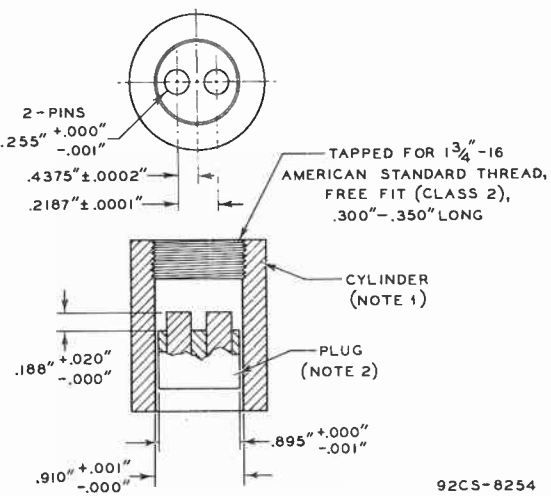
UHF BEAM POWER TUBE

GAUGE SKETCH G_1



NOTE 1: TAPPED SECTION OF CYLINDER MUST BE CONCENTRIC WITH UNTAPPED SECTION OF CYLINDER WITHIN .002".

NOTE 2: PLUG SIDES & PIN SIDES MUST BE PARALLEL WITHIN .001".

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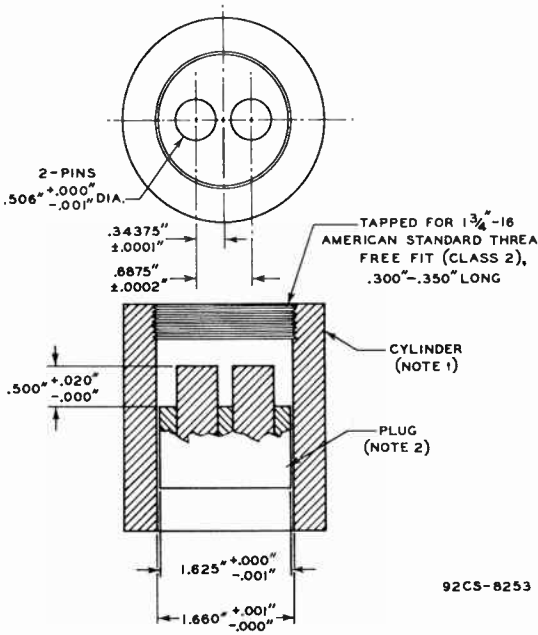
UHF BEAM POWER TUBE

GAUGE SKETCH G_2



NOTE 1: TAPPED SECTION OF CYLINDER MUST BE CONCENTRIC WITH UNTAPPED SECTION OF CYLINDER WITHIN .002".

NOTE 2: PLUG SIDES & PIN SIDES MUST BE PARALLEL WITHIN .001".

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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AVERAGE CONSTANT-CURRENT CHARACTERISTICS

FEB. 24,1954

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8252

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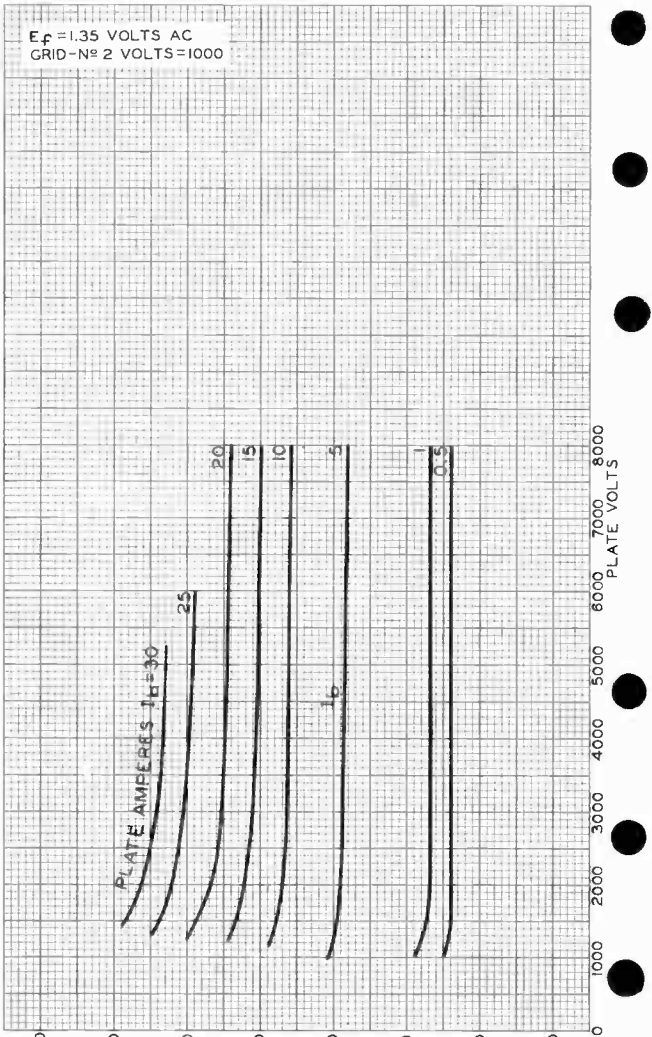
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB. 24, 1954

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8255

Marconi Division

RCA

6448

AVERAGE PLATE CHARACTERISTICS

FEB. 18, 1954

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8247

World Radio History

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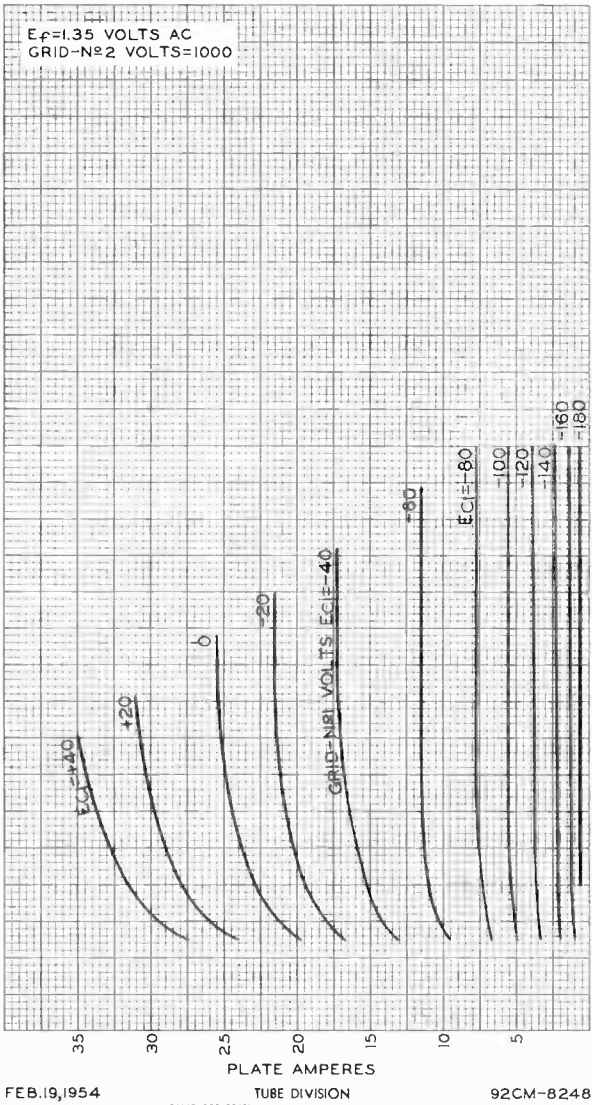
AVERAGE PLATE CHARACTERISTICS



FEB.19,1954 TUBE DIVISION 92CM-8248

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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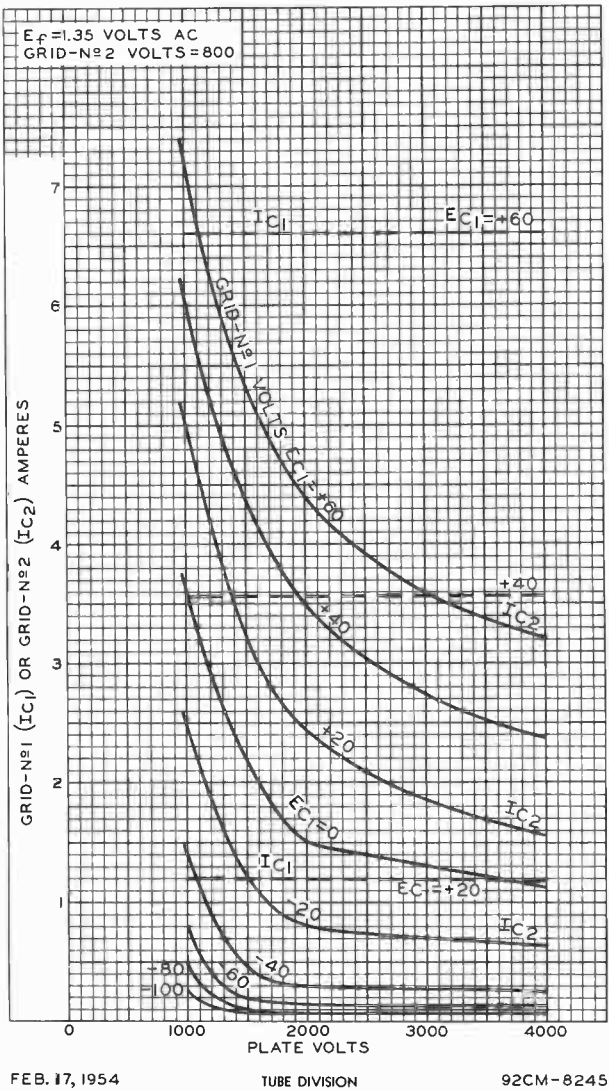
6448

AVERAGE CHARACTERISTICS



6448

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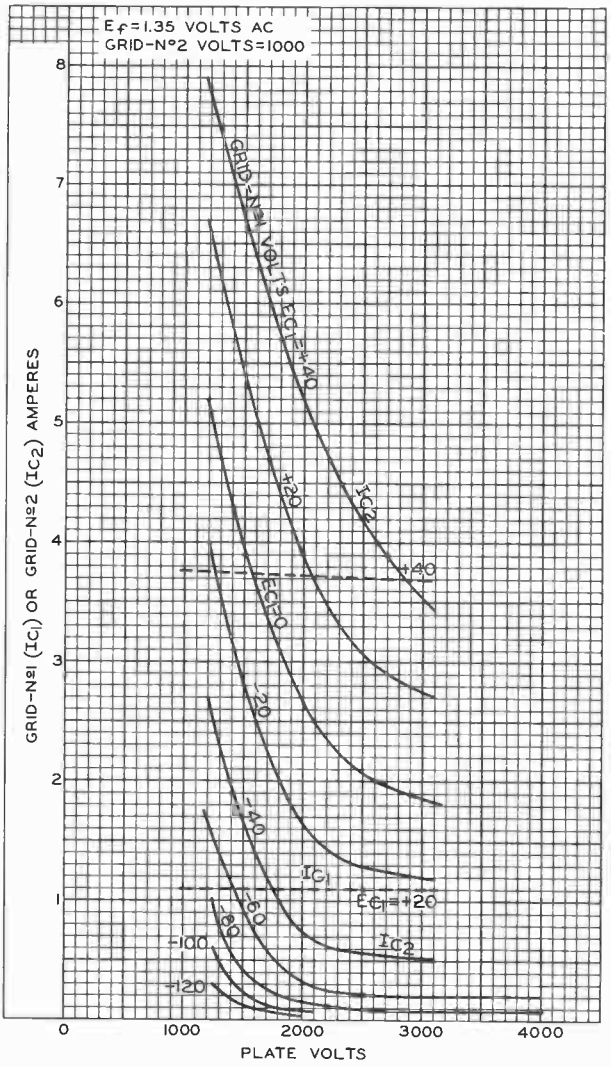
AVERAGE CHARACTERISTICS



World Radio History

RCA

6521

MAGNETRON

FORCED-AIR COOLED

Fixed Frequency: 5400 ± 20 Mc

GENERAL DATA

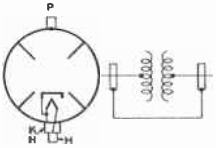
Electrical:

Heater, for Unipotential Cathode:

Voltage	10 ± 10%	ac or dc volts
Current	3.2	amp
Starting current: The maximum instantaneous starting current must never exceed 12 amperes, even momentarily.		
Minimum Cathode Heating Time	5	minutes
Frequency	5400 ± 20	Mc
Maximum Frequency Pulling at VSWR of 1.5/1	10	Mc
Maximum Frequency Change with Anode Temperature Change (After warmup)	0.15	Mc/°C

Mechanical:

Dimensions and Terminal Connections: *See Dimensional Outline*



H – Heater
K – Cathode
P – Anode

Connector (For heater terminal and heater-cathode terminal) . . . Ucinite* No. 115364 with built-in capacitor, or equivalent

Mounting Position . . . Any

Air Flow:

To Pins—An air stream should be directed along the cooling fins toward the body of the tube. The stream may be obtained from a rectangular nozzle about 3" x 1-1/2" located so that the plane through the 3" side is parallel with the plane of a cooling fin and so that the nozzle is centered on the body of the tube. Adequate flow should be provided so that the temperature of the anode block does not exceed 150°C.

To Heater-Cathode Terminal—Adequate flow should be provided to maintain the temperature of the heater-cathode terminal below 165°C.

Weight (Approx.) . . . 11-1/2 lbs

PULSED OSCILLATOR SERVICE

Maximum and Minimum Ratings, *Absolute Values*:

For Duty Cycle of 0.001 max.

PEAK ANODE VOLTAGE	16 max.	kv
PEAK ANODE CURRENT	16 max. 10 min.	amp amp
PEAK POWER INPUT●	256 max.	kw

* Manufactured by Ucinite Division of United-Carr Fastener Corporation, Newtonville 60, Massachusetts.

● For atmospheric pressures greater than 40 centimeters of mercury at 25°C. Operation at pressures lower than 40 centimeters of mercury (altitudes higher than 16000 feet) may result in arcover with consequent damage to the tube.

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MAGNETRON

AVERAGE POWER INPUT	0.256 max.	kw
PULSE DURATION	2.2 max.	μsec
OPERATION TIME IN ANY 100-MICROSECOND INTERVAL	5 max.	μsec
RATE OF RISE OF VOLTAGE PULSE	120 max. 80 min.	kv/μsec kv/μsec
ANODE BLOCK TEMPERATURE	150 max.	°C
HEATER-CATHODE TERMINAL TEMPERATURE	165 max.	°C
LOAD VOLTAGE STANDING-WAVE RATIO	1.5 max.	

Typical Operation▲ with Load Voltage Standing-Wave Ratio Equal To or Less Than 1.05

With Duty Cycle of 0.0008

Heater Voltage	*See Operating Considerations*	
Magnetic Field	Supplied by permanent magnet integral with tube	
Peak Anode Voltage (Approx.)	15	kv
Peak Anode Current	13.5	amp
Pulse Repetition Rate	400	cps
Pulse Duration	2	μsec
Maximum RF Bandwidth	1.5	Mc
Peak Power Output	85	kw

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	2.8	3.6	amp
Peak Anode Voltage	2	14	16	kv
Peak Power Output	2,3	75	–	kw
Pulses Missing From Total	2,4	–	0.25	%

Note 1: With 10.0 volts ac on heater.

Note 2: With peak anode current of 13.5 amperes, and heater voltage reduced to 9.1 volts.

Note 3: With peak anode voltage of approximately 15 kilovolts, anode block temperature of approximately 100°C, and maximum VSWR equal to or less than 1.05.

Note 4: Pulses are considered to be missing if the energy level at the operating frequency is less than 70 per cent of the normal value at a VSWR of 1.5, and with VSWR phase adjusted to produce maximum instability.

OPERATING CONSIDERATIONS

The *waveguide output flange* is designed for use with a standard 1" x 2" rectangular waveguide such as that designated by RETMA as WR 187, or that having the JAN designation RG-49/U, and mates with flanges such as Airtron■ No.854626 or equivalent.

▲ It is essential that the input circuit be designed so that if arcing occurs the energy per pulse delivered to the tube cannot greatly exceed the normal energy per pulse. To satisfy this requirement, it is recommended that pulsers of the discharging-network type be used.

■ Manufactured by Airtron, Inc., Linden, N. J.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6521

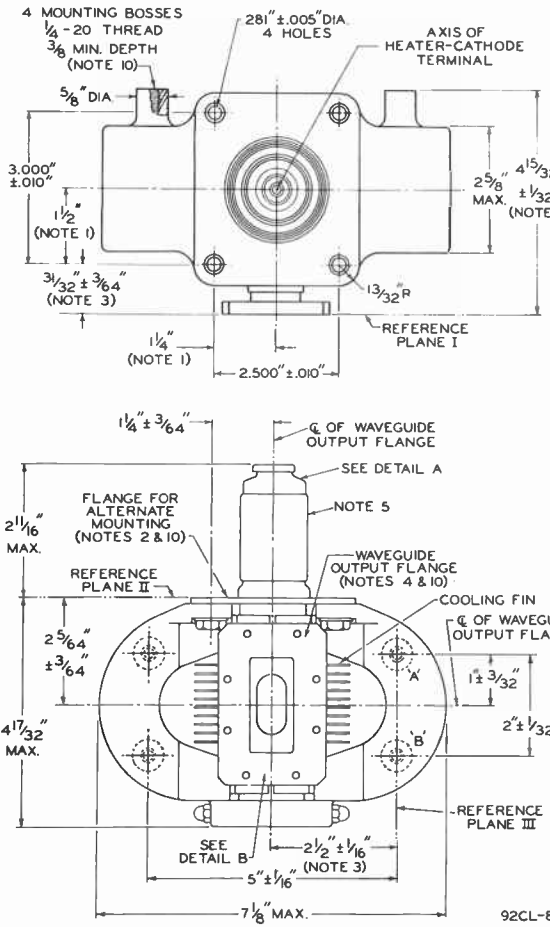
MAGNETRON

As soon as the 6521 begins to oscillate, the *heater voltage* should be reduced to 9.1 volts when it is operated under the typical operating conditions shown in the tabulated data. For other operating conditions, the heater voltage (E_f) should be reduced depending on the average power input (P_i) to the tube as follows:

P_i (watts)	E_f (volts)
up to 90	10.0
90 to 130	9.9
130 to 180	9.5
180 to 220	9.1
220 to 256	8.9

World Radio History

6521
MAGNETRON



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

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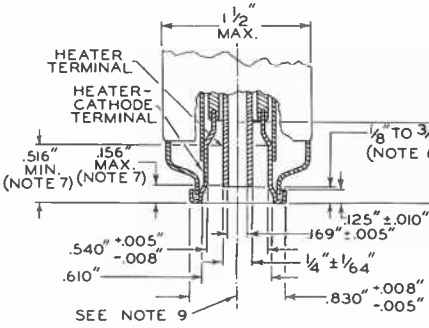
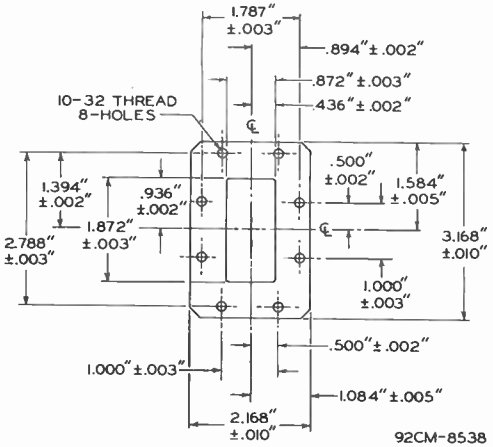
MAGNETRON

DETAIL A



DETAIL B



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Reference plane *I* is defined as that plane against which the waveguide output flange abuts.

Reference plane *II* is defined as that plane perpendicular to reference plane *I* and touching the surface of the flange for alternate mounting.

Reference plane *III* is defined as that plane perpendicular to reference plane *I* and passing through the exact centers of holes 'A' and 'B'.

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MAGNETRON

NOTE 1: The axis of the heater-cathode terminal will be within the confines of a cylinder whose radius is 3/64" and whose axis is perpendicular to reference plane *II* at the specified location.

NOTE 2: When resting on a smooth surface, this flange surface shall have a flatness such that a 0.050" thickness gauge 1/8" wide shall not enter between the two surfaces, and it shall be perpendicular to reference plane *I* within ± 2°.

NOTE 3: The tolerances include angular as well as lateral deviations.

NOTE 4: With the waveguide output flange resting on a plane surface, a 0.005" thickness gauge 1/8" wide shall not enter between the two surfaces.

NOTE 5: No part of the tube support fastened to the flange for alternate mounting should extend within the surface of a cylinder whose radius is 3/4" and whose axis is perpendicular to reference plane *II* at the specified location.

NOTE 6: These dimensions define extremities of the 0.169" internal diameter of the cylindrical heater terminal.

NOTE 7: These dimensions define extremities of the 0.540" internal diameter of the cylindrical heater-cathode terminal.

NOTE 8: No part of the connector device for the heater and heater-cathode terminals should bear against the underside of this lip.

NOTE 9: The heater terminal and heater-cathode terminal are concentric within 0.010".

NOTE 10: Connection to the anode may be made through the mounting bosses, the flange for alternate mounting, or the waveguide output flange.

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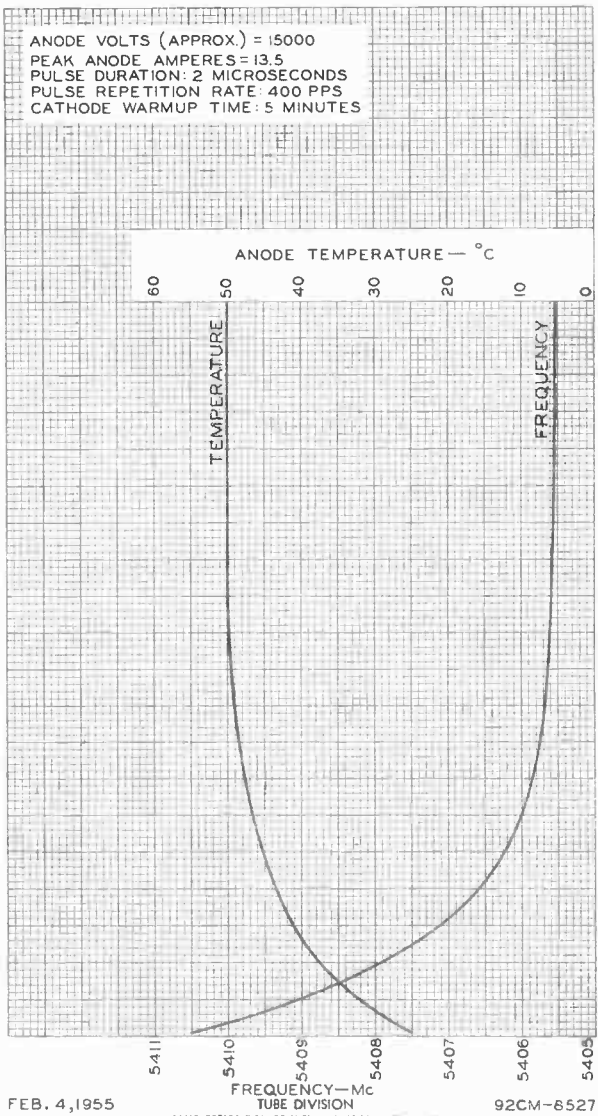
TYPICAL STABILIZATION CHARACTERISTICS



FEB. 4, 1955

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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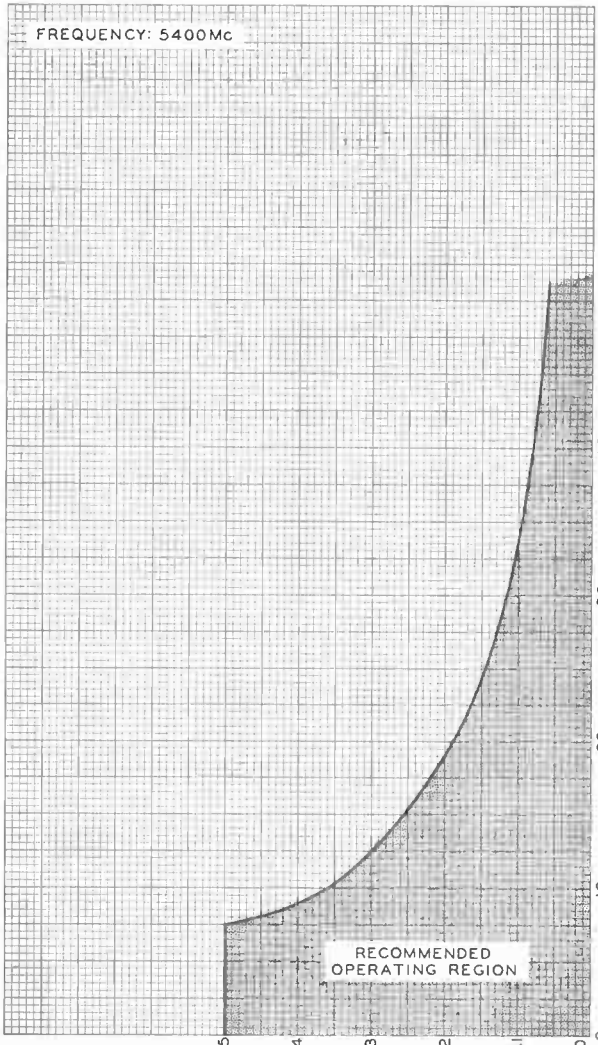
OPERATING REGION



FEB. 4, 1955

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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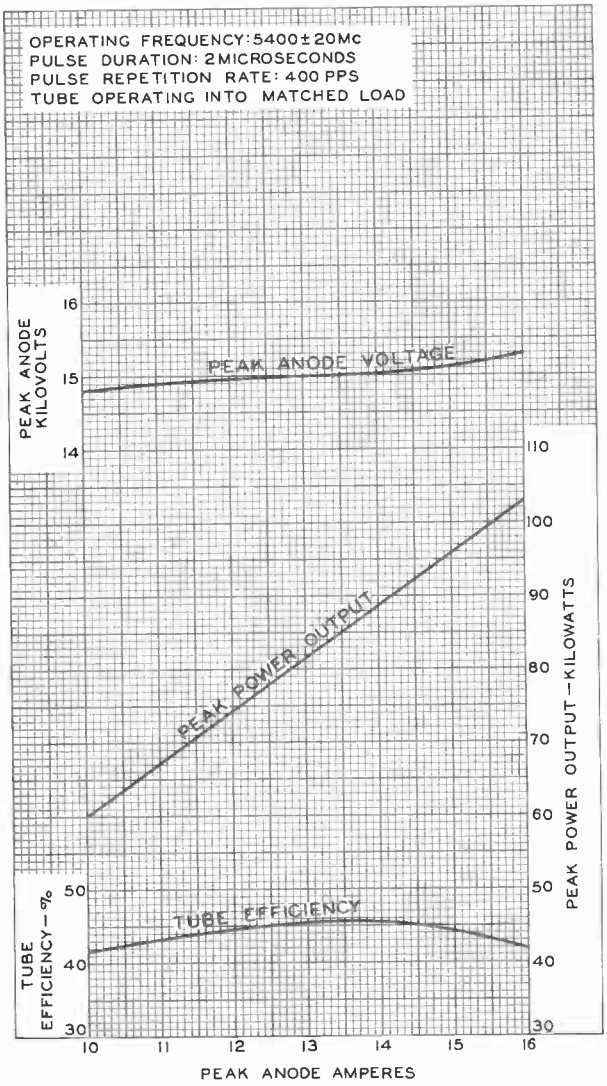
PERFORMANCE CHART



FEB. 8, 1955

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8533

World Radio History

World Radio History

6524

TWIN BEAM POWER TUBE

Useful at frequencies up to 470 Mc

Unless Otherwise Specified, Values are on a Per-Tube Basis

GENERAL DATA

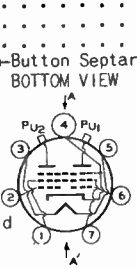
Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	1.25	amp
Transconductance▲ for dc plate volts = 200, dc grid-No.2 volts = 200, and dc plate ma. = 50	4500	μmhos
Mu-Factor, Grid No.2 to Grid No.1▲ for dc plate volts = 200, dc grid-No.2 volts = 200, and dc plate ma. = 50	8.5	
Direct Interelectrode Capacitances:▲*		
Grid No.1 to plate	0.11 max.	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2 (pins 1 & 7), and heater	7	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2 (pins 1 & 7), and heater	3.4	μμf

Mechanical:

Mounting Position	Any
Maximum Overall Length	3-9/16"
Seated Length	3" ± 1/8"
Maximum Diameter	1-11/16" ←
Bulb	*See Dimensional Outline* ←
Bulb Terminals (Two)	*See Dimensional Outline*
Weight (Approx.)	3 oz
Base	Medium-Button Septar 7-Pin (JETEC No.E7-20)

BOTTOM VIEW



Pin 1 - Grid No.2
Pin 2 - Grid No.1 of Unit No.2
Pin 3 - Heater
Pin 4 - Cathode, Grid No.3, Internal Shield
Pin 5 - Heater
Pin 6 - Grid No.1 of Unit No.1
Pin 7 - Grid No.2
Pu_1 - Plate of Unit No.1
Pu_2 - Plate of Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND AA'

Bulb Temperature (At hottest point)	210 max.	°C

Cooling: Free circulation of air around the tube is required. In addition, some forced-air cooling will generally be required to prevent exceeding the specified maximum bulb temperature.

▲ Each unit.
* With no external shield.

← Indicates a change.

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TWIN BEAM POWER TUBE

AF POWER AMPLIFIER & MODULATOR — Class AB_2†

	CCS°	ICAS°°	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.2 SUPPLY VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT**	150 max.	150 max.	ma
MAX.-SIGNAL PLATE INPUT**	70 max.	85 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT**	3 max.	3 max.	watts
PLATE DISSIPATION**	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
Typical CCS Operation:			
DC Plate Voltage	400	500	volts
DC Grid-No.2 Voltage▲▲	200	200	volts
DC Grid-No.1 (Control-Grid) Voltage:			
From fixed-bias source	-23	-26	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	72	70	volts
DC Plate Current:			
Zero-signal value	25	20	ma
Max.-signal value	145	116	ma
DC Grid-No.2 Current:			
Zero-signal value	0.1	0.1	ma
Max.-signal value	10	10	ma
DC Grid-No.1 Current:			
Max.-signal value	2.4	2.6	ma
Effective Load Resistance (Plate to plate)	7100	11100	ohms
Max.-Signal Driving Power (Approx.)◆	0.1	0.1	watt
Max.-Signal Power Output (Approx.)	39	40	watts
Typical ICAS Operation:			
DC Plate Voltage	500	600	volts
DC Grid-No.2 Voltage▲▲	200	200	volts
DC Grid-No.1 (Control-Grid) Voltage:			
From fixed-bias source	-25	-26	volts

† Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

** Averaged over any audio-frequency cycle of sine-wave form.

°, °°, ▲▲, ◆: See next page.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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TWIN BEAM POWER TUBE

Typical ICAS Operation (Cont'd):

Peak AF Grid-No.1-to-Grid-No.1 Voltage	76	76	volts
DC Plate Current:			
Zero-signal value	25	21	ma
Max.-Signal value	145	135	ma
DC Grid-No.2 Current:			
Zero-signal value	0.1	0.1	ma
Max.-signal value	10	13	ma
DC Grid-No.1 Current:			
Max.-signal value	2.9	3.3	ma
Effective Load Resistance (Plate to plate)	8900	11400	ohms
Max.-Signal Driving Power (Approx.)♦	0.1	0.1	watt
Max.-Signal Power Output (Approx.)	50	57	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:♦	
With fixed bias	30000 max. ohms
With cathode bias	Not recommended

PLATE-MODULATED PUSH-PULL RF POWER AMP. — Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*

For max. plate voltage and max. plate input above 100 Mc, see Rating Chart I

	CCS°	ICAS°°	
DC PLATE VOLTAGE	400 max.	500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.2 SUPPLY VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	125 max.	125 max.	ma
DC GRID-No.1 CURRENT	4 max.	4 max.	ma
PLATE INPUT	45 max.	55 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	13.5 max.	16.7 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

▲▲ Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

♦ 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. In no case, however, should the total dc grid-No.1-circuit resistance exceed 30000 ohms.

°,°°: See next page.

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TWIN BEAM POWER TUBE

	CCS°	ICAS°°	
Typical Operation up to 100 Mc:			
DC Plate Voltage	400	500	volts
DC Grid-No.2 Voltage (Approx.)♦	200	200	volts
From an adjustable series resistor having max. value of	45000	45000■	ohms
DC Grid-No.1 Voltage★	-61	-61	volts
From combination employing grid resistor of	6200	6200	ohms
with fixed bias of	-45	-45	volts
DC Plate Current	100	100	ma
DC Grid-No.2 Current (Approx.)	7	7	ma
DC Grid-No.1 Current (Approx.)	2.5	2.5	ma
Driving Power (Approx.)	0.2	0.2	watt
Power Output (Approx.)⊕	31	40	watts
Typical Operation at 462 Mc:			
DC Plate Voltage	300	300	volts
DC Grid-No.2 Voltage (Approx.)♦	200	240	volts
From an adjustable series resistor having max. value of	45000	25000	ohms
DC Grid-No.1 Voltage★	-60	-60	volts
From combination employing grid resistor of	15000	15000	ohms
with fixed bias of	-45	-45	volts
DC Plate Current	75	95	ma
DC Grid-No.2 Current (Approx.)	4	5.5	ma
DC Grid-No.1 Current (Approx.)	1	1	ma
Driver Power Output (Approx.)	7	7	watts
Useful Power Output (Approx.)●●	9	12	watts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance‡	30000 max.	30000 max.	ohms

PUSH-PULL RF POWER AMP. & OSCILLATOR--Class C Telegraphy□
and
PUSH-PULL RF POWER AMPLIFIER--Class C FM Telephony

Maximum Ratings, *Absolute Values*:	CCS°	ICAS°°	
For max. plate voltage and max. plate input above 100 Mc, see Rating Chart II			
DC PLATE VOLTAGE	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	300 max.	300 max.	volts

♦ 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 completed.

★ Obtained 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.

°, °°, ■, ⊕, ●●, ‡, □: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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TWIN BEAM POWER TUBE

	CCS°	ICAS°°	
DC GRID-No.2 SUPPLY VOLTAGE . .	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	150 max.	150 max.	ma
DC GRID-No.1 CURRENT	4 max.	4 max.	ma
PLATE INPUT	70 max.	85 max.	watts
GRID-No.2 INPUT	3 max.	3 max.	watts
PLATE DISSIPATION	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
Typical Operation up to 100 Mc:			
DC Plate Voltage	500	600	volts
DC Grid-No.2 Voltage (Approx.)⊕.	200	200	volts
From an adjustable series resistor having max. value of . .	40000◪	40000◪	ohms
DC Grid-No.1 Voltage■.	-44	-44	volts
From grid resistor of	12000	12000	ohms
From cathode resistor of . . .	330	330	ohms
DC Plate Current	120	120	ma
DC Grid-No.2 Current (Approx.) .	8	8	ma
DC Grid-No.1 Current (Approx.) .	3.7	3.7	ma
Driving Power (Approx.)	0.2	0.2	watt
Power Output (Approx.)⊕⊕	46	56	watts
Typical Operation as Amplifier at 462 Mc:⊷			
DC Plate Voltage	300	300	volts
DC Grid-No.2 Voltage (Approx.)⊕.	200	250	volts
From an adjustable series resistor having max. value of .	60000	20000	ohms
DC Grid-No.1 Voltage■	-31	-38	volts
From grid resistor of	12000	12000	ohms
From cathode resistor of . . .	240	240	ohms
DC Plate Current	120	150	ma
DC Grid-No.2 Current (Approx.) .	3	6	ma
DC Grid-No.1 Current (Approx.) .	2.6	3.2	ma

⊕ At 100 Mc, useful power output measured at load of output circuit is approximately 29 watts CCS and 36 watts ICAS.

■ 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.

◪ Connected to a 400-volt tap on suitable voltage divider across the plate-supply voltage.

⊕⊕ At 100 Mc, useful power output measured at load of output circuit is approximately 43 watts CCS and 52 watts ICAS.

⊷ Typical operation as an oscillator at 462 Mc is the same as that shown for amplifier service except that the useful power output measured at load of output circuit is approximately 9 watts CCS and 13 watts ICAS.

°, °°, ‡, ●●, ◪, ■: See next page.

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TWIN BEAM POWER TUBE

	CCS°	ICAS°°	
Driver Power Output (Approx.) . .	7	7	watts
Useful Power Output (Approx.)●●.	16	20	watts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance‡. .	30000	30000 max.	ohms

FREQUENCY TRIPLER — Class C

	CCS°	ICAS°°	
Maximum Ratings, *Absolute Values:*			
For max. plate voltage and max. plate input above 100 Mc, see Rating Chart III			
DC PLATE VOLTAGE	400 max.	400 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE .	300 max.	300 max.	volts
DC GRID-No.2 SUPPLY VOLTAGE . .	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	100 max.	115 max.	ma
DC GRID-No.1 CURRENT	4 max.	4 max.	ma
PLATE INPUT	36 max.	45 max.	watts
GRID-No.2 INPUT	3 max.	3 max.	watts
PLATE DISSIPATION	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
Typical Operation as Tripler to 462 Mc:			
DC Plate Voltage	300	300	volts
DC Grid-No.2 Voltage (Approx.)●.	220	250	volts
From an adjustable series resistor having max. value of .	30000	20000	ohms
DC Grid-No.1 Voltage■.	-148	-148	volts
From grid resistor of	51000	51000	ohms
DC Plate Current	90	110	ma
DC Grid-No.2 Current (Approx.) .	5	6.5	ma
DC Grid-No.1 Current (Approx.)	2.9	2.9	ma

‡ When grid No.1 is driven positive, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

● Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 6524 is used in a circuit which is not keyed. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are completed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.

■ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

°, °°, ●●: See next page.

World Radio History

6524

TWIN BEAM POWER TUBE

	CCS°	ICAS°°	
Driver Power Output (Approx.) .	4	4	watts
Useful Power Output (Approx.)•• .	7	8.5	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance‡‡ .	60000 max.	60000 max.	ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	1.175	1.325	amp
Mu-Factor, Grid No.2 to Grid No.1 (Each Unit) . . .	1,2	7	10	
Direct Interelectrode Capacitances (Each Unit):				
Grid No.1 to plate	3	-	0.11	μμf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2 (pins 1 & 7), and heater	3	5.8	8.2	μμf
Plate to cathode & grid No.3 & internal shield, grid No.2 (pins 1 & 7), and heater	3	2.6	4.2	μμf

Note 1: With 6.3 volts ac on heater.

Note 2: With dc plate voltage of 200 volts, dc grid-No.2 voltage of 200 volts, and dc plate current of 50 ma.

Note 3: With no external shield.

° Continuous Commercial Service.

°° Intermittent Commercial and Amateur Service.

•• This value of useful power is measured at load of output circuit.

‡‡ When grid No.1 is driven positive, the total dc grid-No.1-circuit resistance should not exceed the specified value of 60000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

OPERATING CONSIDERATIONS

Shielding of the 6524 in rf service is required for stable operation. A convenient method of shielding is to mount the socket approximately 5/8" beneath a hole in the chassis plate so that when the 6524 is inserted in the socket, the internal shield (see *Dimensional Outline*) of the tube will be close to the edge of the hole and in the same plane as the chassis plate. This arrangement provides an effective shield to isolate the grid-No.1 circuits from the plate circuits.

← Indicates a change.

World Radio History

RCA

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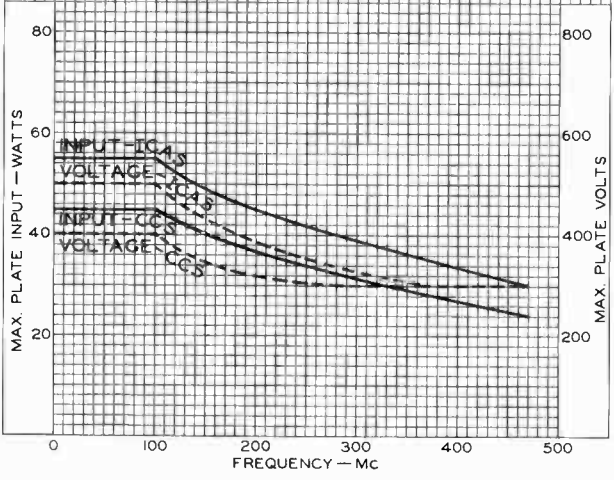
RATING CHART I
CLASS C TELEPHONY



RCA

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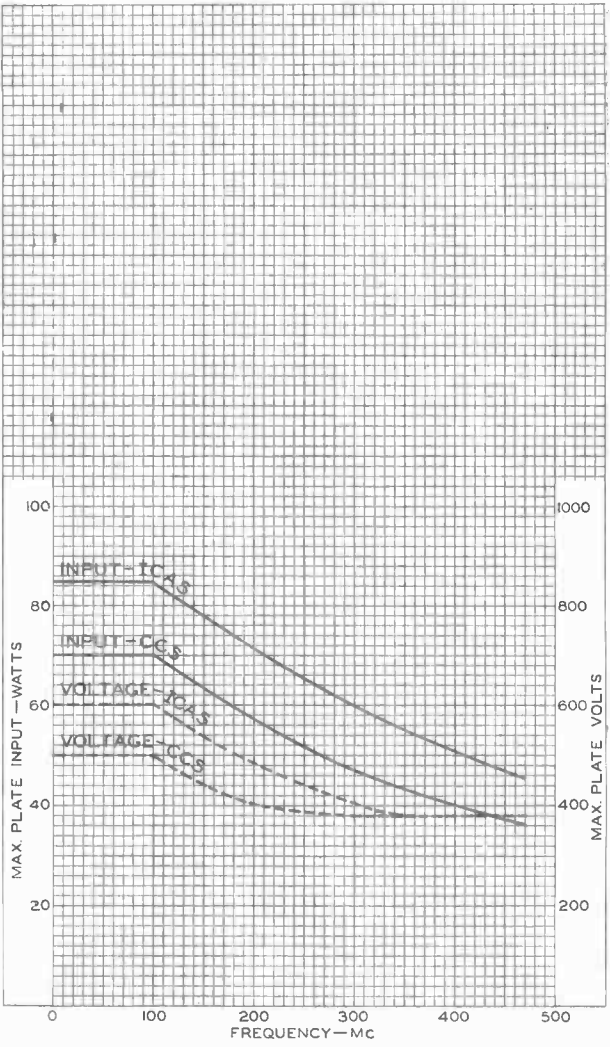
RATING CHART II
CLASS C TELEGRAPHY



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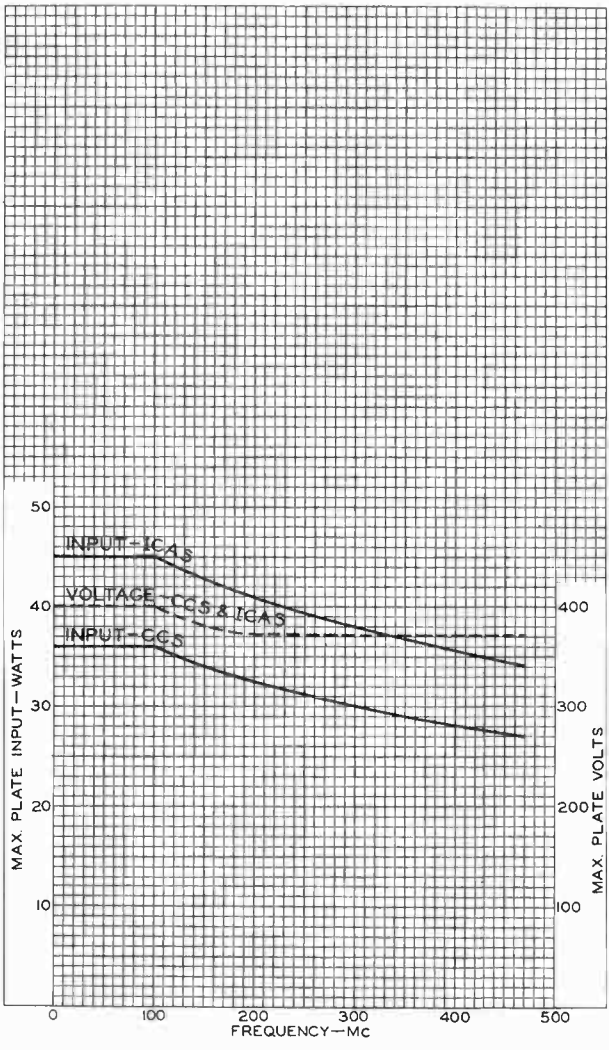
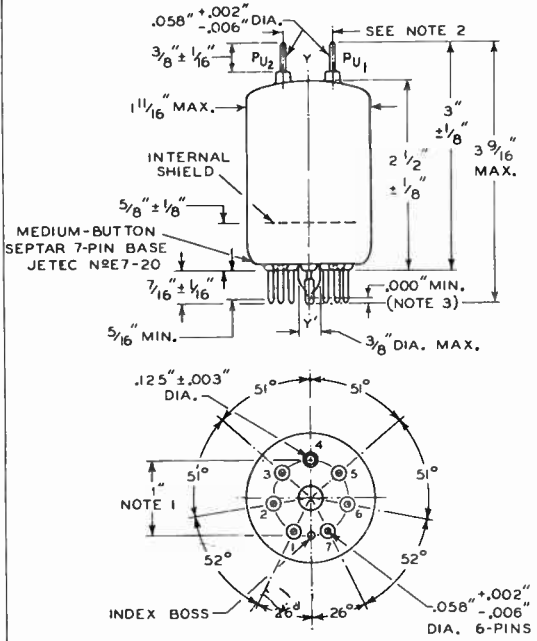
RATING CHART III

CLASS C TRIPLER



6524

TWIN BEAM POWER TUBE



THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

For Notes, see next page.

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TWIN BEAM POWER TUBE

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ± 5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY'.

NOTE 2: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING MINIMUM THICKNESS OF 0.375" AND HAVING TWO HOLES 0.1200" ± 0.0005" WHOSE CENTERS ARE LOCATED AT A DISTANCE OF 0.343" ± 0.001" FROM THE AXIS YY' AND WHOSE AXES ARE PARALLEL TO YY'. THE PLANE THROUGH THESE AXES WILL BE 90° ± 5' FROM THE PLANE THROUGH YY' AND PIN No.4.

NOTE 3: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

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AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT

E_f = 6.3 VOLTS
GRID-№2 VOLTS = 150

JULY 15, 1954

TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8350

World Radio History

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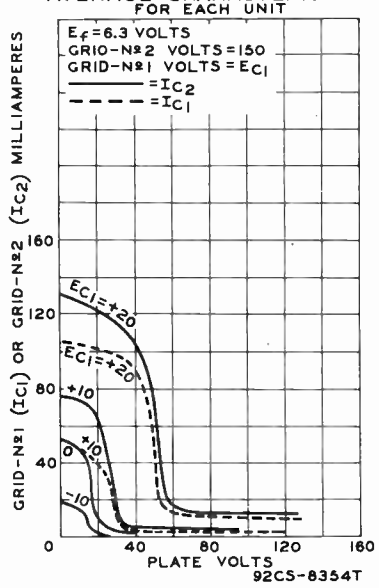
CHARACTERISTICS CURVES

AVERAGE CHARACTERISTICS
FOR EACH UNIT



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AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT

E_f = 6.3 VOLTS
GRID-№2 VOLTS = 200

+20
+10
0
-10
-20
-30

GRID-№1 VOLTS

E_{C1}=+20
I_b
+10
E_{C1}=0
-10
E_{C1}=-20
-30
I_b

PLATE VOLTS
0
100
200
300
400
500
600

PLATE (I_b) MILLIAMPERES
400
300
200
100
0

JULY 12, 1954

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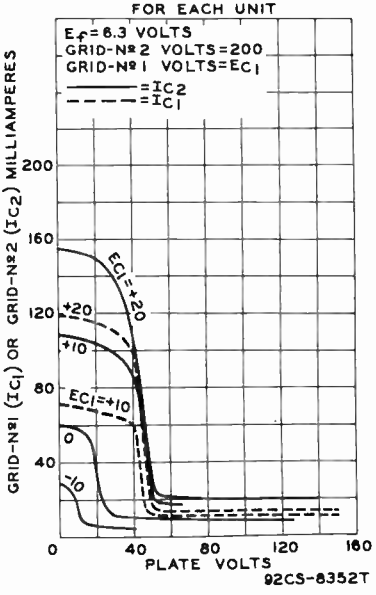
CHARACTERISTICS CURVES

AVERAGE CHARACTERISTICS
FOR EACH UNIT



World Radio History

RCA

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AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT

E_f = 6.3 VOLTS
GRID-№2 VOLTS = 250

+20
+10
GRID-№1 VOLTS, E_{C1}=0
-10
-20
E_{C1}=-30
I_b

PLATE VOLTS
0
100
200
300
400
500
600

400
300
200
100
PLATE (I_b) MILLIAMPERES

JULY 15, 1954

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92CM-8351

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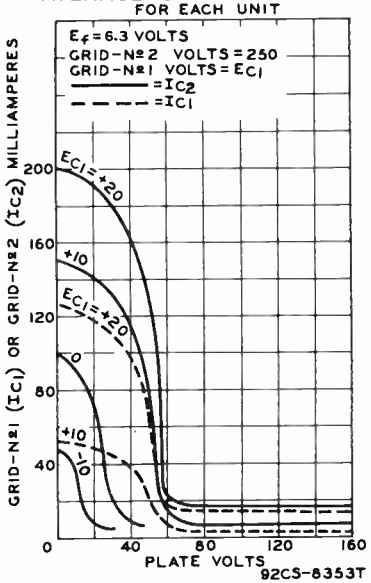
CHARACTERISTICS CURVES

AVERAGE CHARACTERISTICS
FOR EACH UNIT



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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

6562

FIXED-TUNED OSCILLATOR TRIODE

"PENCIL TYPE" WITH INTEGRAL RESONATORS

For radiosonde service at 1680 Mc

GENERAL DATA

Electrical:

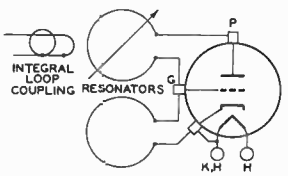
Heater, for Unipotential Cathode:		
Voltage range*	5.2 to 6.6	ac or dc volts
Current at 6.0 volts	0.160	amp
Frequency (Approx.)	1680	Mc
Frequency Adjustment Range	±12▲	Mc
RF Coaxial Output Terminal:		
Characteristic impedance (Approx.)	50	ohms

Mechanical:

Mounting Position	Any
Dimensions	*See Dimensional Outline*
Resonators (Two)	Integral Part of Tube
Terminal Connections *(See Dimensional Outline)*:	

H – Heater

K – Cathode



G – Grid

P – Plate

FIXED-TUNED OSCILLATOR SERVICE

Maximum Ratings, *Absolute Values:*

DC PLATE VOLTAGE	120 max.	volts
DC PLATE CURRENT	34 max.	ma
DC GRID CURRENT	8 max.	ma
PLATE INPUT	4 max.	watts
PLATE DISSIPATION	3.6 max.	watts
PEAK HEATER-CATHODE VOLTAGE	0 max.	volts
AMBIENT-TEMPERATURE RANGE	-55 to +75	°C

Operating Frequency Drift:

Maximum Frequency Drift:

For heater voltage range of 5.2 to 6.6 volts, plate voltage range of 95 to 117 volts, and ambient-temperature range of +22° to −40°C	+4 to −1	Mc

* This range of heater voltage is for radiosonde applications in which the heater is supplied from batteries and in which the equipment design requirements of minimum size, light weight, and high efficiency are the primary considerations even though the average life expectancy of the 6562 in such service is only a few hours.

▲ As supplied, tubes are adjusted to 1680 ±4 megacycles.

TUBE DIVISION
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FIXED-TUNED OSCILLATOR TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Av.	Max.	
Heater Current.	1	0.135	0.148	0.157	amp
Power Output.	2,4	–	600	–	mw
Power Output.	3,4	300	–	–	mw

Note 1: With 5.2 volts ac on heater.

Note 2: With ac heater voltage of 6.6 volts, dc plate voltage of 117 volts, frequency of 1680 megacycles per second and grid resistor chosen within the range of 1300 to 1800 ohms. The choice of grid resistor should be such that for any individual tube, the dc plate current must not exceed 34 milliamperes, and when this value of grid resistor is used in the test of Note 3, a minimum power output of 300 milliwatts is obtained.

Note 3: With ac heater voltage of 5.2 volts, dc plate voltage of 95 volts, frequency of 1680 megacycles per second, and grid resistor chosen within the range of 1300 to 1800 ohms. The choice of grid resistor to give a minimum power output of 300 milliwatts for any individual tube must be such that when this same resistor value is used in the test of Note 2 the dc plate current will not exceed 34 milliamperes.

Note 4: Measured with a coaxial-type load having an impedance of approximately 50 ohms and adjusted for a maximum voltage standing-wave ratio of 1.1.

OPERATING CONSIDERATIONS

The *flexible heater leads* of the 6562 are usually soldered to the circuit elements. Soldering of these connections should not be made closer than 3/4" from the end of the tube (excluding cathode tab). If this precaution is not followed, the heat of the soldering operation may crack the glass seals of the leads and damage the tube. Under no circumstances should any of the electrodes be soldered to the circuit elements. Connections to the electrodes should be made by spring contact only.

The 6562 should be supported by a suitable clamp around the metal shell either above or below the frequency-adjustment screw. It is essential, however, that the pressure exerted on the shell by the clamp be held to a minimum because excessive pressure can distort the resonators and result in a change of frequency.

The *plate connection* should have a flexible lead which will accomodate variations in the relative position of the plate terminal in individual tubes.

The 6562 may be mechanically tuned by adjustment of the frequency-adjustment screw located on the metal shell of the tube. A clockwise rotation of the frequency-adjustment screw will decrease the frequency, while a counter-clockwise rotation will increase the frequency. The range of adjustment provided by the screw is ±12 megacycles.

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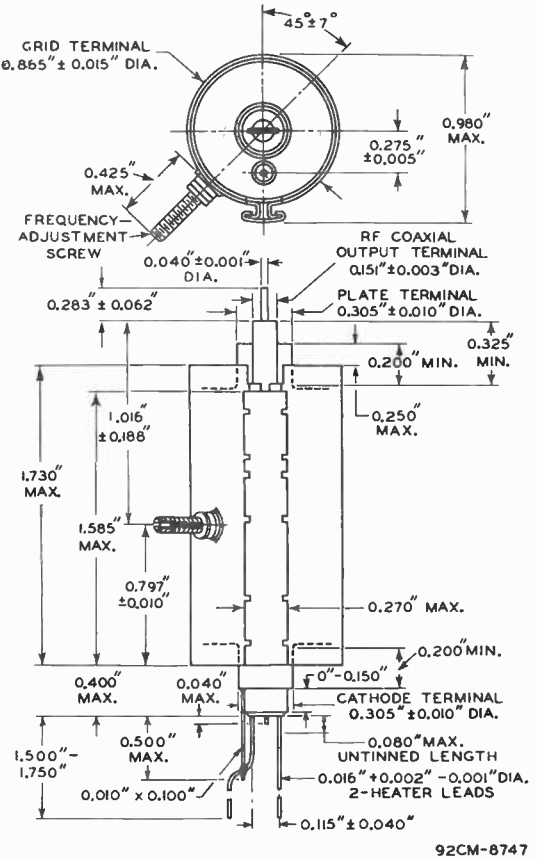
FIXED-TUNED OSCILLATOR TRIODE



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World Radio History

World Radio History

6806

BEAM POWER TUBE

WATER-COOLED ELECTRODES

Useful at frequencies up to 1000 Mc

GENERAL DATA

Electrical:

Filament*, 2-Section Multi-strand Thoriated Tungsten:		
Voltage per section (AC or DC)	1.30 min.° / 1.35 typical / 1.50 max.	volts
Current per section at 1.35 volts	915	amp
Starting current per section	Must never exceed 1500 amperes, even momentarily	
Cold resistance per section	0.0002	ohm
Minimum heating time	30	seconds
Supply circuits	See Circuits	
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 9000, grid-No.2 volts = 1000, and plate amperes = 4.3	8.2	
Direct Interelectrode Capacitances:		
Grid No.1 to plate	0.06 max.	μμf
Grid No.1 to filament & grid No.2	355	μμf
Plate to filament & grid No.2	27	μμf
Internal Bypass Capacitors between Grid No.2 and Cathode (Total)	15000	μμf

Mechanical:

Terminal Connections:

F_1 – Fil. Sect. No.1 & Water Conn.
F_2 – Fil. Sect. No.2 & Water Conn.
G_1 – RF Grid-No.1 Term. Contact Surface
$G1_W$ – DC Grid-No.1 & Water Conn.
G_2 – DC Grid-No.2 & Water Conn.

For location of respective terminals, see Dimensional Outline

K_R – RF Cath. Term. Contact Surface For Circuit Returns
F_M – Common Point of Fil. Sections & Water Conn.
P – RF Plate Term. Contact Surface
P_W – DC Plate & Water Conn.

Mounting Position	Tube axis vertical, with plate terminal either up or down
Overall Length	7-11/32" + 3/8" – 1/2"
Maximum Diameter	11-3/8"

Air Cooling:

Forced-air cooling of the ceramic bushing at the grid-No.1 seal and at the plate seal is required only if the temperature of the ceramic bushing at either seal exceeds the specified maximum value of 150°C. Under such con-

* See *Operating Considerations* on conserving filament life.

° Minimum operating value. During standby periods, the filament voltage may be reduced to 1.08 volts.

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6806

BEAM POWER TUBE

ditions, provision should be made for blowing air at the ceramic bushings through suitable openings in the coaxial-cylinder cavity circuit.

Water Cooling:

Water cooling of the filament-section blocks, RF cathode terminals, grid-No.1 block, grid-No.2 block, and plate is required. The water flow must start before application of any voltage and preferably should continue for several seconds after removal of all voltages. Interlocking of the water flow through each of the cooled elements with all power supplies is recommended to prevent tube damage in case of failure of adequate water flow.

Water Flow:

	Absolute Min. Flow gpm	*Typical Flow* gpm	*Pressure Drop*[*] *for Typical Flow* psi
To filament-section-No.1 block.	0.5	0.8 to 1.2	7 to 14
To filament-section-No.2 block.	0.5	0.8 to 1.2	7 to 14
To filament mid-tap block	0.5	0.8 to 1.2	5 to 9
To grid-No.1 block. .	0.5	0.8 to 1.2	3 to 7
To grid- No.2 block .	0.5	0.8 to 1.2	6 to 13
To plate in direction shown on *Dimensional Outline:*			
For plate dissipation to 16 kw .	12	14	25 av. / 31 max.
For plate dissipation of 20 kw .	14	16	32 av. / 40 max.
For plate dissipation of 32 kw .	20	22	60 av. / 75 max.

Gauge Pressure at Any Inlet Except Anode Inlet	70 max.	psi
Gauge Pressure at Anode Inlet	100 max.	psi
Ceramic Bushing Temperature	150 max.	°C
Outlet Water Temperature (Any outlet) . . .	70 max.	°C
Weight (Approx.).	28	lbs

RF POWER AMPLIFIER--Class AB Single-Sideband Service

Maximum CCS[●] Ratings, *Absolute Values:*	*Up to 1000 Mc*	
DC PLATE VOLTAGE.	9000 max.	volts
DC PLATE-SUPPLY VOLTAGE	10000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE.	1250 max.	volts
DC GRID-No.2-SUPPLY VOLTAGE	1350 max.	volts

[*] Directly across cooled element for the indicated typical flow.

●: See next page.

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BEAM POWER TUBE

MAX.-SIGNAL DC PLATE CURRENT	7 max.	amp
MAX.-SIGNAL PLATE INPUT	60000 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT	750 max.	watts
PLATE DISSIPATION	35000 max.	watts

Typical Operation:	*At 550 Mc*⊕	
DC Plate Voltage	8000	volts
DC Grid-No.2 Voltage♦	1200	volts
DC Grid-No.1 (Control-Grid) Voltage	-115	volts
Zero-Signal DC Plate Current	2.5	amp
Max.-Signal DC Plate Current	6	amp
Zero-Signal DC Grid-No.2 Current (Approx.)	0.15	amp
Max.-Signal DC Grid-No.2 Current (Approx.)	0.35	amp
Max.-Signal DC Grid-No.1 Current (Approx.)	0	amp
Max.-Signal Driver Power Output (Approx.)♦	90	watts
Output-Circuit Efficiency (Approx.)	90	%
Max.-Signal Useful Power Output (Approx.)	15000●●	watts

RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions per tube unless otherwise indicated

Maximum CCS⊕ Ratings, *Absolute Values:*	*Up to 1000 Mc*	
DC PLATE VOLTAGE	9000 max.	volts
DC PLATE-SUPPLY VOLTAGE	10000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	1100 max.	volts
DC GRID-No.2 SUPPLY VOLTAGE	1200 max.	volts
DC PLATE CURRENT	8.25 max.	amp
DC GRID-No.1 (CONTROL-GRID) CURRENT	0.5 max.	amp
PLATE INPUT	70000 max.	watts
GRID-No.2 INPUT (For black picture★)	750 max.	watts
PLATE DISSIPATION (For black picture★)	36000 max.	watts

Typical Operation:	*At 550 Mc*⊕	*At 750 Mc*	
Bandwidth▲ of	7	7	*Mc*
DC Plate Voltage	8500	8000	volts
DC Grid-No.2 Voltage	1000	1000	volts
DC Grid-No.1 Voltage	-140	-140	volts
Peak RF Grid-No.1 Voltage:			
Synchronizing level	180	180	volts
Blanking level	140	140	volts
DC Plate Current:			
Synchronizing level	8	7.8	amp
Blanking level	5.8	5.6	amp
DC Grid-No.2 Current (Approx.):			
Synchronizing level	0.75	0.75	amp
Blanking level	0.55	0.55	amp

⊕ In the vicinity of 550 Mc, it may be necessary to provide means for balancing out a circumferential $TE_{1,1}$ mode.

●, ♦, ★, ●●, ★, ▲: See next page.

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BEAM POWER TUBE

DC Grid-No.1 Current (Approx.):			
Synchronizing level.	0.4	0.35	amp
Blanking level	0.15	0.13	amp
Driver Power Output (Approx.):‡			
Synchronizing level.	800#	1000##	watts
Blanking level	450	550	watts
Output-Circuit Efficiency (Approx.).	90	85	%
Useful Power Output (Approx.):			
Synchronizing level.	28000●●	17000●●	watts
Blanking level	16000●●	9500●●	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0 unless otherwise indicated

Maximum CCS● Ratings, *Absolute Values:*	*Up to 1000 Mc*	
DC PLATE VOLTAGE	5500 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	1000 max.	volts
PEAK GRID-No.2 VOLTAGE (DC + Max. Modulation Swing).	1350 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . . .	-250 max.	volts
DC PLATE CURRENT	4.5 max.	amp
DC GRID-No.1 CURRENT	1 max.	amp
PLATE INPUT.	25000 max.	watts
GRID-No.2 INPUT	500 max.	watts
PLATE DISSIPATION.	17000 max.	watts

Typical Operation:▲▲	*At 400 Mc*	
DC Plate Voltage	5000	volts
DC Grid-No.2 Voltage●	800	volts
DC Grid-No.1 Voltage	-180	volts
Peak RF Grid-No.1 Voltage.	210	volts
DC Plate Current	4.25	amp
DC Grid-No.2 Current (Approx.)	0.4	amp
DC Grid-No.1 Current (Approx.)★★.	0.1	amp
Driver Power Output (Approx.)★★.	300	watts
Output-Circuit Efficiency (Approx.). . . .	90	%
Useful Power Output (Approx.).	10000●●	watts

● Obtained preferably from a separate source.

‡ The driver stage is required to supply tube losses, rf circuit losses, and rf "swamping power" losses. "Swamping" may be required in practical circuit design to obtain the desired input-circuit bandwidth. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

★ Continuous blanking level + sync pulses.

▲ Between the half-power points as measured in the output circuit.

●, ●●, #, ##, ▲▲, ★★: See next page.

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6806

BEAM POWER TUBE

RF POWER AMPLIFIER--Class C Telegraphy[□] and RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS[•] Ratings, *Absolute Values:*	*Up to 1000 Mc*	
DC PLATE VOLTAGE	9000 max.	volts
DC PLATE-SUPPLY VOLTAGE	10000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	1050 max.	volts
DC GRID-No.2 SUPPLY VOLTAGE	1150 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-250 max.	volts
DC PLATE CURRENT	7 max.	amp
DC GRID-No.1 CURRENT	0.5 max.	amp
PLATE INPUT	60000 max.	watts
GRID-No.2 INPUT	700 max.	watts
PLATE DISSIPATION	35000 max.	watts

Typical Operation:	*At 400 Mc*	*At 900 Mc*	
DC Plate Voltage	8500	7500	volts
DC Grid-No.2 Voltage[††]	1000	1000	volts
DC Grid-No.1 Voltage[††]	-150	-150	volts
Peak RF Grid-No.1 Voltage	210	210	volts
DC Plate Current	5.75	6.8	amp
DC Grid-No.2 Current (Approx.)	0.65	0.55	amp
DC Grid-No.1 Current (Approx.)	0.25	0.25	amp
Drive Power Output (Approx.)[##]	300	750	watts
Output-Circuit Efficiency (Approx.)	90	80	%
Useful Power Output (Approx.)	25000[••]	13500[••]	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current per Section	1	850	1050	amp
Filament Current per Section	2	890	1110	amp
Difference in Filament Current Between Sections	1	-	60	amp
Difference in Filament Current Between Sections	2	-	70	amp
Grid-No.1 Voltage	1,3	-	-180	volts
Useful Power Output:				
Class B Television Service--Synchronizing-level conditions	1,4	27000	-	watts
Class C Telegraphy--Key-down conditions	1,5	22000	-	watts
Power Gain	1,4,5,6	40	-	

• Continuous Commercial Service.

•• This value of useful power is measured at load of output circuit having indicated efficiency.

This value includes 300 watts of rf "swamping power".

This value includes 100 watts of rf "swamping power".

▲▲,■■,□,†,††: See next page.

TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History

6806

BEAM POWER TUBE

Note 1: With 1.35 volts rms per filament section.

Note 2: With 1.5 volts rms per filament section.

Note 3: With 2-phase excitation of the filament sections, dc plate voltage of 8500 volts, dc grid-No.2 voltage of 1000 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 0.25 ampere.

Note 4: With 2-phase excitation of the filament sections. In rf power amplifier circuit having a bandwidth of 7 Mc as defined by the half power points and with dc plate voltage of 8750 volts, dc grid-No.2 voltage of 1000 volts, dc grid-No.1 voltage adjusted to give a zero-signal dc plate current of 0.25 ampere, drive adjusted to give synchronizing-level dc plate current of 8 amperes, and frequency of 550 Mc.

Note 5: With 2-phase excitation of the filament sections. In rf power amplifier circuit, and with dc plate voltage of 8500 volts, dc grid-No.2 voltage of 1000 volts, dc grid-No.1 voltage adjusted to give a zero-signal dc plate current of 0.25 ampere, drive adjusted to give dc plate current of 7 amperes, and frequency of 550 Mc.

Note 6: With driving power measured at input to input-cavity circuit fed by transmission line having voltage standing-wave ratio not greater than 1.5. Power gain is ratio of useful power output to driving power.

▲▲ For 100% modulation of plate voltage, and 50% modulation of grid-No.2 voltage.

‡‡ The 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 value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

□ Key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

† Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6806 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 1150 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.

†† Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

OPERATING CONSIDERATIONS

Instructions for conserving filament life of the 6806 and for the use of high-speed electronic protective devices with it are given in the technical bulletin for the 6806. A copy of this technical bulletin will be supplied on request to Commercial Engineering, RCA, Harrison, N.J.

World Radio History

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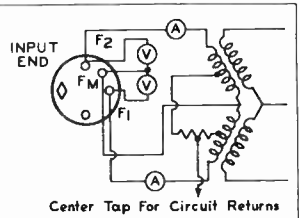
FILAMENT-EXCITATION CIRCUITS

I. SECTIONS EXCITED SEPARATELY

WITH TWO-PHASE (QUARTER PHASE) AC EXCITATION



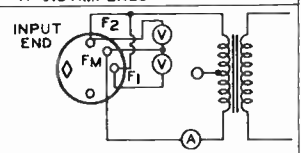
Center Tap For Circuit Returns

TYPICAL

V=1.35 VOLTS RMS
A=915 AMPERES

II. SECTIONS EXCITED IN PARALLEL

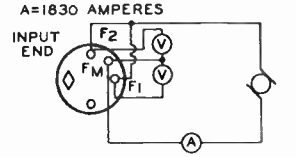
a. WITH SINGLE-PHASE AC EXCITATION



TYPICAL

V=1.35 VOLTS RMS
A=1830 AMPERES

b. WITH DC EXCITATION



TYPICAL

V=1.35 VOLTS DC
A=1830 AMPERES

F_1 = FILAMENT SECTION Nº1
F_2 = FILAMENT SECTION Nº2
F_M = COMMON POINT OF FILAMENT SECTIONS

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BEAM POWER TUBE

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CE-8640A

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8-56

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TUBE DIVISION

CE-8840B

RCA

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BEAM POWER TUBE

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BEAM POWER TUBE

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BEAM POWER TUBE

NOTE 1: WATER CONNECTIONS FOR FILAMENT SECTIONS No.1 AND No.2, COMMON POINT OF FILAMENT SECTIONS, GRID No.1, AND GRID No.2 HAVE 1"-16 UNIFIED SPECIAL THREAD, CLASS 2A, 3/8" LONG, AND 2 HOLES 0.258"-0.270" DIAMETER SPACED 7/16" ON CENTERS.

NOTE 2: THE HOLES IN THE INDICATED WATER CONNECTIONS OF NOTE 1 WILL ACCEPT THE PINS OF THE PLUG-AND-CYLINDER COMBINATION GAUGE SHOWN IN SKETCH G1.

NOTE 3: WATER CONNECTION FOR THE PLATE HAS 1-3/4"-16 UNIFIED EXTRA FINE SPECIAL THREAD, CLASS 2A, 3/8" LONG, AND 2 HOLES 0.508"-0.522" DIAMETER SPACED 11/16" ON CENTERS.

NOTE 4: THE HOLES IN THE PLATE WATER CONNECTION WILL ACCEPT THE PINS OF THE PLUG-AND-CYLINDER COMBINATION GAUGE SHOWN IN SKETCH G2.

NOTE 5: CONTACT LENGTH OF CIRCUIT CONNECTOR IS 5/16" MAX.

NOTE 6: THIS DIAMETER DIMENSION IS HELD ONLY OVER A LENGTH OF 5/16"; OVER REMAINDER OF LENGTH, THE DIAMETER MAY INCREASE TO 3-7/8" MAX. ON OUTPUT END, THE DIAMETER OF THE CERAMIC RIBS WILL NOT EXCEED 3-7/8".

NOTE 7: THE AXIS OF THE RF PLATE CONTACT SURFACE IS COINCIDENT WITH THE AXIS OF THE RF GRID-No.1 CONTACT SURFACE WITHIN 3/32".

NOTE 8: THE CONTACT SURFACES 8A-8A' AND 8B-8B' ARE PARALLEL WITHIN 1/16".

NOTE 9: SERIAL NUMBER IS LOCATED ON THIS SURFACE BETWEEN DC GRID-No.2 AND FILAMENT-SECTION No.1 CONNECTIONS.

NOTE 10: TO PREVENT EXCESS STRESS ON GLASS SEAL, A 15/16" OPEN END WRENCH MUST BE USED TO PERMIT GRIPPING THE TERMINAL WHEN REMOVING OR TIGHTENING THE WATER CONNECTORS.

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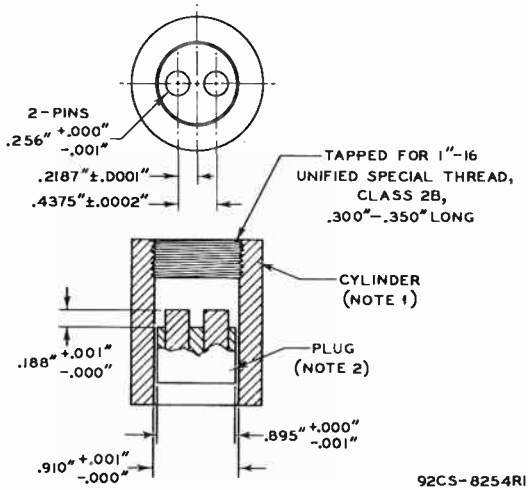
BEAM POWER TUBE

GAUGE SKETCH G_1



NOTE 1: TAPPED SECTION OF CYLINDER MUST BE CONCENTRIC WITH UNTAPPED SECTION OF CYLINDER WITHIN .002".

NOTE 2: PLUG SIDES & PIN SIDES MUST BE PARALLEL WITHIN .001".

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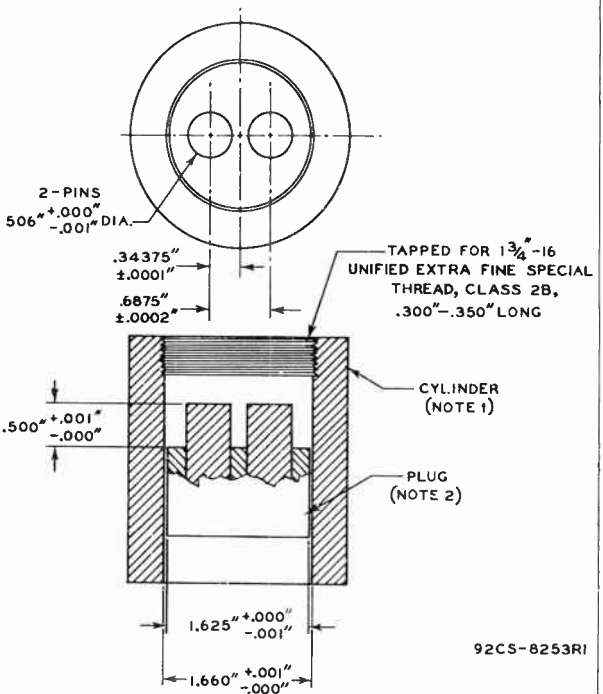
BEAM POWER TUBE

GAUGE SKETCH G_2



NOTE 1: TAPPED SECTION OF CYLINDER MUST BE CONCENTRIC WITH UNTAPPED SECTION OF CYLINDER WITHIN .002".

NOTE 2: PLUG SIDES & PIN SIDES MUST BE PARALLEL WITHIN .001".

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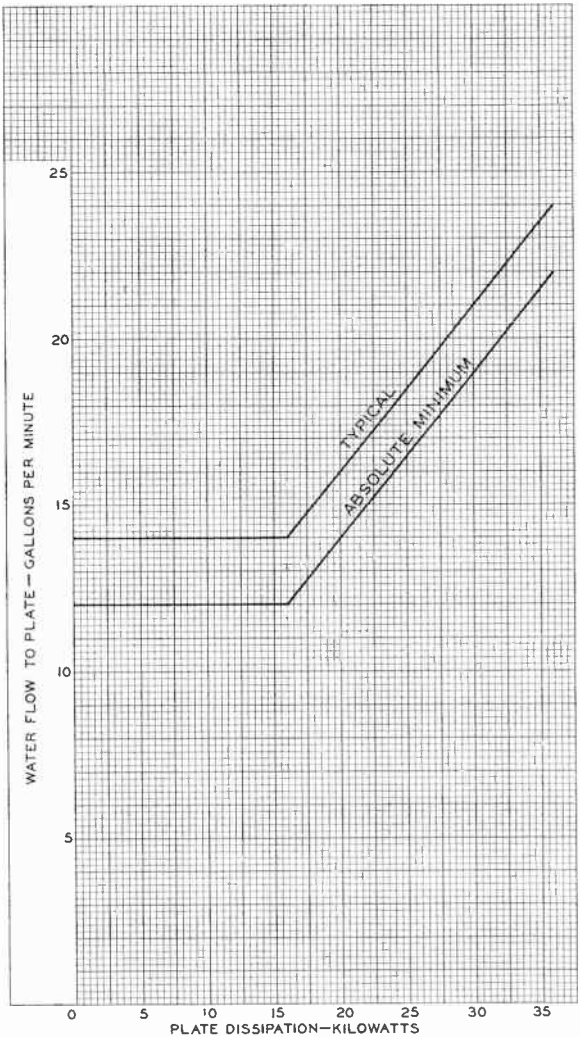
PLATE COOLING REQUIREMENTS



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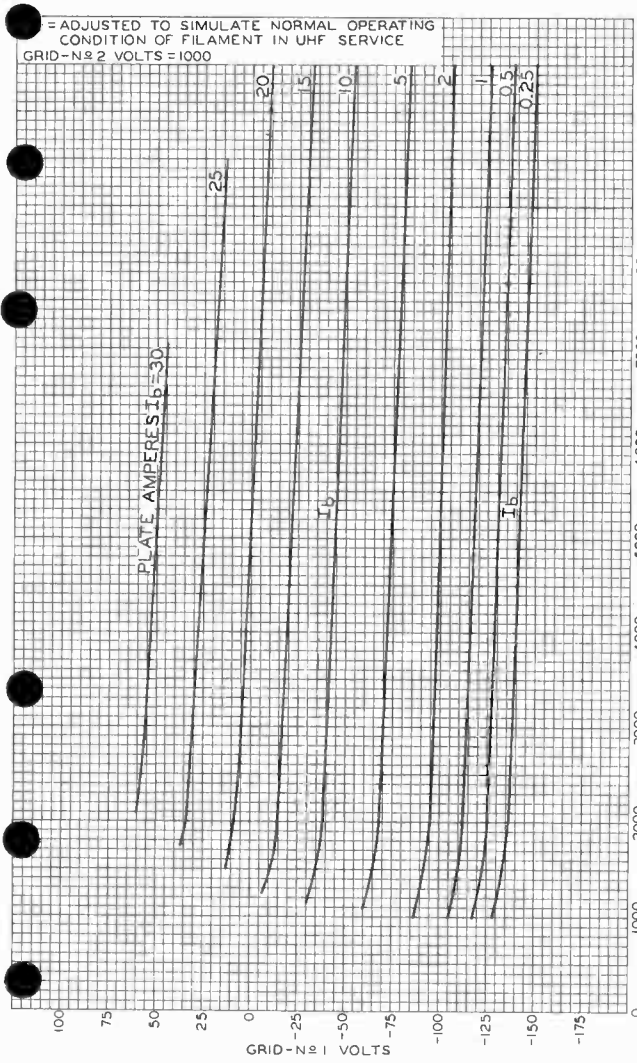
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



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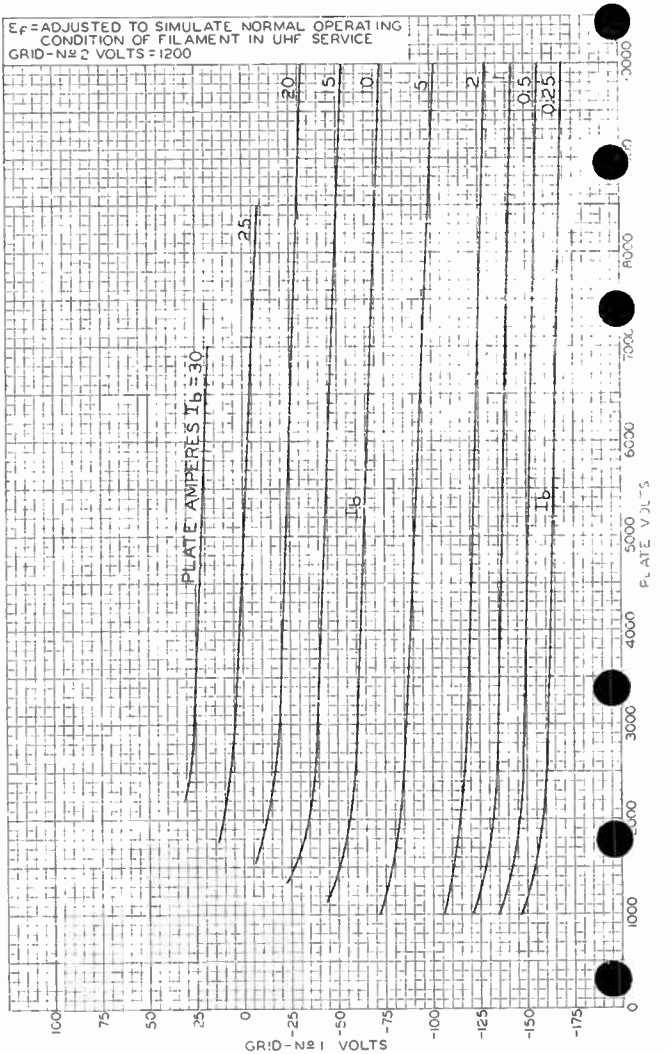
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



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92CL-8902

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AVERAGE PLATE CHARACTERISTICS

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92CM-8899

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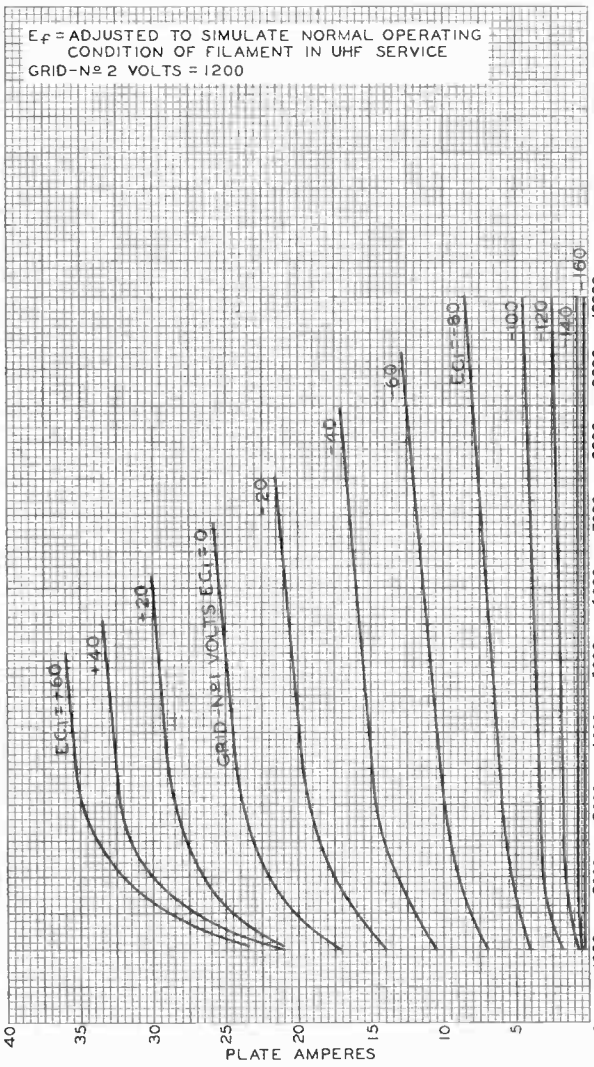
AVERAGE PLATE CHARACTERISTICS



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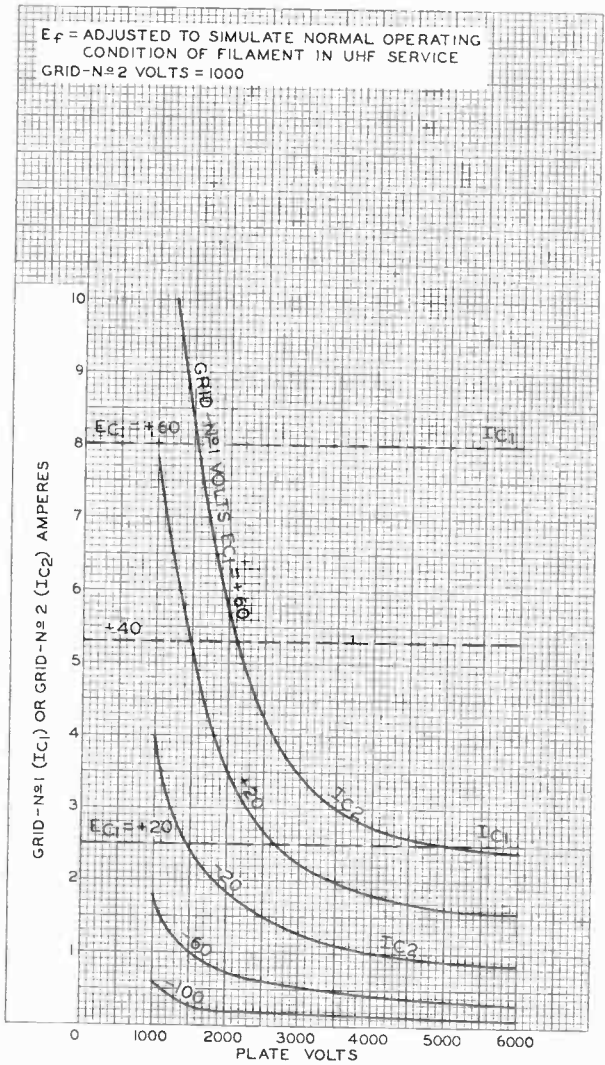
AVERAGE CHARACTERISTICS



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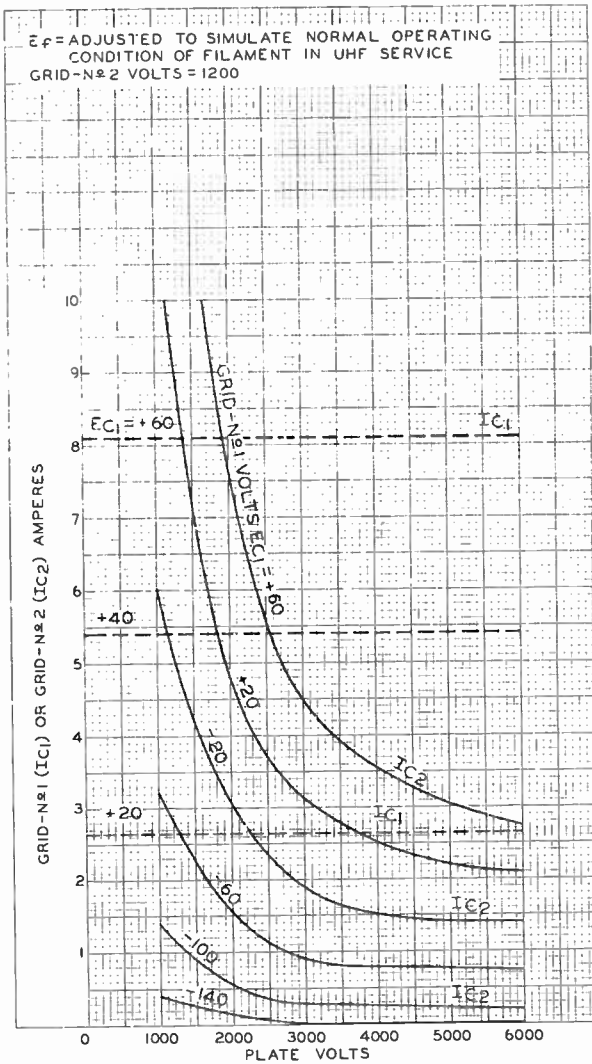
AVERAGE CHARACTERISTICS



World Radio History

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BEAM POWER TUBE

FORCED-AIR COOLED

Useful at frequencies up to 2000 Mc

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage§	6.3 ± 10%	ac or dc volts
Current	2.1	amp
Minimum heating time	60	sec
Mu-Factor, Grid No.2 to Grid No.1, for plate volts = 1000, grid-No.2 volts = 300, and plate ma. = 100	16	
Direct Interelectrode Capacitances:		
Grid No.1 to plate*	0.085 max.	μμf
Grid No.1 to cathode & heater	14	μμf
Plate to cathode & heater*,**	0.015 max.	μμf
Grid No.1 to grid No.2	17	μμf
Grid No.2 to plate	6	μμf
Grid No.2 to cathode & heater**	0.5 max.	μμf

Mechanical:

Mounting Position	Any
Overall Length	1.885" + 0.070" - 0.080"
Greatest Diameter	1.250" ± 0.015"
Weight (Approx.)	2 oz
Radiator	Integral part of tube

Terminal Connections *(See Dimensional Outline)*:

G_1 – Grid No.1

G_2 – Grid No.2

H – Heater

K – Cathode

P – Plate

Air Flow:

Through Radiator--Adequate air flow to limit the plate-seal temperature to 250 °C should be delivered by a blower through the radiator before and during the application of plate, grid-No.2, and grid-No.1 voltages. Typical values of air flow directed through the radiator without cowling and with cowling versus plate dissipation are shown in the accompanying *Typical Cooling Requirements* curves. Plate power, grid-No.2 power, and

§ Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

* With external flat metal shield having diameter of 6" and center hole 1" in diameter. Shield is located in plane of grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid-No.2 terminal.

** With external flat metal shield having diameter of 6" and center hole 3/4" in diameter. Shield is located in plane of grid-No.1 terminal, perpendicular to the tube axis, and is connected to grid-No.1 terminal.

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BEAM POWER TUBE

air flow may be removed simultaneously.

To Grid-No.2, Grid-No.1, Cathode, and Heater Seals--A sufficient quantity of air should be delivered to these seals to prevent their temperature from exceeding the specified maximum value of 250 °C.

During Standby Operation--Cooling air is not normally required when only heater voltage is applied to the tube.

Seal Temperature (Plate, Grid No.2, Grid No.1, Cathode, and Heater)	250 max.	°C

AF POWER AMPLIFIER & MODULATOR - Class AB_1†

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT★	180 max.	ma
MAX.-SIGNAL PLATE INPUT★	180 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT★	4.5 max.	watts
PLATE DISSIPATION★	115 max.	watts

Typical CCS Operation:

Values are for 2 tubes

DC Plate Voltage	650	850	volts
DC Grid-No.2 Voltage▲	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage: From fixed-bias source	-15	-15	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage○	30	30	volts
Zero-Signal DC Plate Current	80	80	ma
Max.-Signal DC Plate Current	200	200	ma
Zero-Signal DC Grid-No.2 Current	0	0	ma
Max.-Signal DC Grid-No.2 Current	20	20	ma
Effective Load Resistance (Plate to plate)	4330	7000	ohms
Max.-Signal Driving Power (Approx.)	0	0	watts
Max.-Signal Power Output (Approx.)	50	80	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance under Any Condition:○○		
With fixed bias	30000 max.	ohms
With cathode bias	Not recommended	

† Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

○ The driver stage should be capable of supplying the No.1 grids of the class AB_1 stage with the specified driving voltage at low distortion.

○○ The resistance introduced into the grid-No.1 circuit by the input coupling should be held to a low value. In no case should it exceed the specified maximum value. Transformer-or impedance-coupling devices are recommended.

●,★,▲: See next page.

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BEAM POWER TUBE

AF POWER AMPLIFIER & MODULATOR - Class AB_2#

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT★	180 max.	ma
MAX.-SIGNAL DC GRID-No.1 (CONTROL-GRID) CURRENT★	30 max.	ma
MAX.-SIGNAL PLATE INPUT★	180 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT★	4.5 max.	watts
PLATE DISSIPATION★	115 max.	watts

Typical CCS Operation:

Values are for 2 tubes

DC Plate Voltage	650	850	volts
DC Grid-No.2 Voltage▲	300	300	volts
DC GRID-No.1 VOLTAGE: From fixed-bias source	-15	-15	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	46	46	volts
Zero-Signal DC Plate Current	80	80	ma
Max.-Signal DC Plate Current	355	355	ma
Zero-Signal DC Grid-No.2 Current	0	0	ma
Max.-Signal DC Grid-No.2 Current	25	25	ma
Max.-Signal DC Grid-No.1 Current	15	15	ma
Effective Load Resistance (Plate to plate)	2450	3960	ohms
Max.-Signal Driving Power (Approx.)♦	0.3	0.3	watt
Max.-Signal Power Output (Approx.)	85	140	watts

LINEAR RF POWER AMPLIFIER
Single-Sideband Suppressed-Carrier Service

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT	180 max.	ma
MAX.-SIGNAL DC GRID-No.1 (CONTROL-GRID) CURRENT	30 max.	ma
MAX.-SIGNAL PLATE INPUT	180 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT	4.5 max.	watts
PLATE DISSIPATION	115 max.	watts

★ Averaged over any audio-frequency cycle of sine-wave form.

\# Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

♦ 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.

●,▲: See next page.

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BEAM POWER TUBE

Typical CCS Class AB_1 "Single-Tone" Operation:♦

	Up to 60 Mc		
DC Plate Voltage	650	850	volts
DC Grid-No.2 Voltage▲	300	300	volts
DC Grid-No.1 Voltage	-15	-15	volts
Zero-Signal DC Plate Current	40	40	ma
Zero-Signal DC Grid-No.2 Current	0	0	ma
Effective RF Load Resistance	2165	3500	ohms
Max.-Signal DC Plate Current	100	100	ma
Max.-Signal DC Grid-No.2 Current	10	10	ma
Max.-Signal DC Grid-No.1 Current	0	0	ma
Max.-Signal Peak RF Grid-No.1 Voltage	15	15	volts
Max.-Signal Driving Power (Approx.)	0	0	watts
Max.-Signal Power Output (Approx.)	25	40	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance under Any Condition:

With fixed bias	30000 max.	ohms
With cathode bias	Not recommended	

PLATE-MODULATED RF POWER AMPLIFIER -- Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	800 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-100 max.	volts
DC PLATE CURRENT	150 max.	ma
DC GRID-No.1 CURRENT	30 max.	ma
PLATE INPUT	120 max.	watts
GRID-No.2 INPUT	3 max.	watts
PLATE DISSIPATION	75 max.	watts

Typical CCS Operation:

	At 400 Mc		
DC Plate Voltage	400	700	volts
DC Grid-No.2 Voltage●●	200	250	volts
DC Grid-No.1 Voltage★★	-20	-50	volts
DC Plate Current	100	130	ma
DC Grid-No.2 Current	5	10	ma
DC Grid-No.1 Current	5	10	ma
Driver Power Output (Approx.)■	2	3	watts
Useful Power Output (Approx.)	16	45	watts

▲ Preferably obtained from a fixed supply.

♦ "Single-Tone" operation refers to that class of amplifier service in which the grid-No.1 input consists of a monofrequency rf signal having constant amplitude. This signal is produced in a single-sideband suppressed-carrier system when a single audio frequency of constant amplitude is applied to the input of the system.

●, ●●, ★★, ■: See next page.

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BEAM POWER TUBE

Maximum Circuit Values:

Grid-No.1-Circuit Resistance under Any Condition	30000‡ max.	ohms

RF POWER AMPLIFIER & OSCILLATOR -- Class C Telegraphy□
and
RF POWER AMPLIFIER -- Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	1000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-100 max.	volts
DC PLATE CURRENT	180 max.	ma
DC GRID-No.1 CURRENT	30 max.	ma
PLATE INPUT	180 max.	watts
GRID-No.2 INPUT	4.5 max.	watts
PLATE DISSIPATION	115 max.	watts

Typical CCS Operation:

	At 400 Mc		*At 1200 Mc*	
DC Plate Voltage	400	900	900	volts
DC Grid-No.2 Voltage⊛	200	300	300	volts
DC Grid-No.1 Voltage⊛⊛	-35	-30	-22	volts
DC Plate Current	150	170	170	ma
DC Grid-No.2 Current	5	1	1	ma
DC Grid-No.1 Current	3	10	4	ma
Driver Power Output (Approx.)■	3	3	5	watts
Useful Power Output (Approx.)	23	80	40	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance under Any Condition	30000‡ max.	ohms

● Continuous Commercial Service.

⊛⊛ Obtained preferably from a separate source modulated along with the plate supply.

★★ Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

■ The driver stage is required to supply tube losses and rf-circuit losses. It should be designed to provide an excess of power above the indicated values to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

‡ If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

⊛ Obtained preferably from a fixed supply, or from the plate-supply voltage with a voltage divider.

⊛⊛ Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

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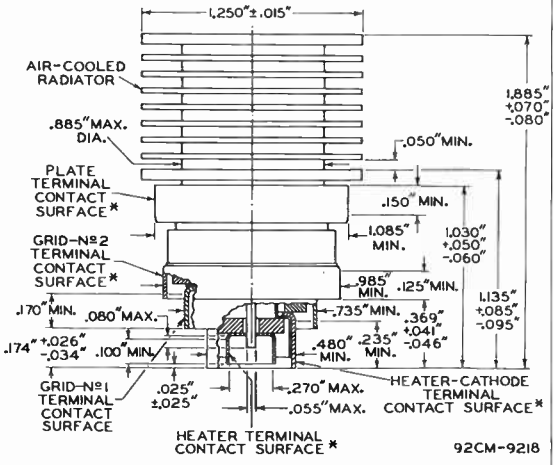

* WITH THE CYLINDRICAL SURFACES OF THE PLATE TERMINAL, GRID-No. 2 TERMINAL, GRID-No. 1 TERMINAL, HEATER-CATHODE TERMINAL, AND HEATER TERMINAL CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1. THE TUBE IS PROPERLY SEATED IN THE GAUGE WHEN A 0.010" THICKNESS GAUGE 1/8" WIDE WILL NOT ENTER BETWEEN THE HEATER-CATHODE TERMINAL AND THE BOTTOM SURFACE OF H_4. THE GAUGE IS PROVIDED WITH A SLOT TO PERMIT MAKING MEASUREMENT OF SEATING OF HEATER-CATHODE TERMINAL ON BOTTOM OF HOLE H_4.

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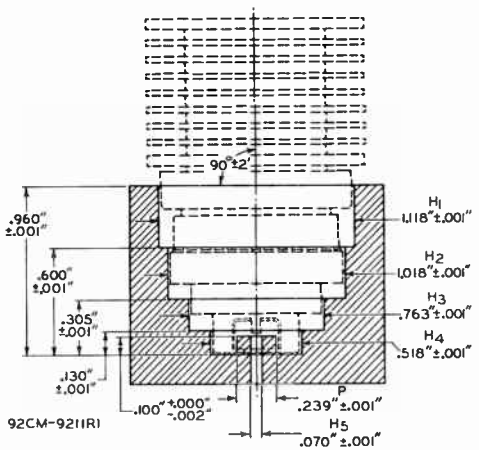
BEAM POWER TUBE

SKETCH G_1



THE AXES OF THE CYLINDRICAL HOLES H_1 THROUGH H_5 AND THE AXIS OF POST P ARE COINCIDENT WITHIN 0.001".

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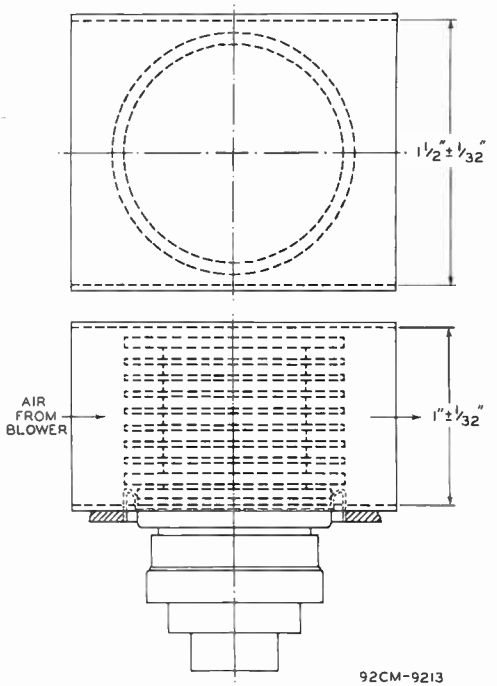
BEAM POWER TUBE

RECOMMENDED COWLING
FOR DIRECTING AIR FLOW THROUGH RADIATOR



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

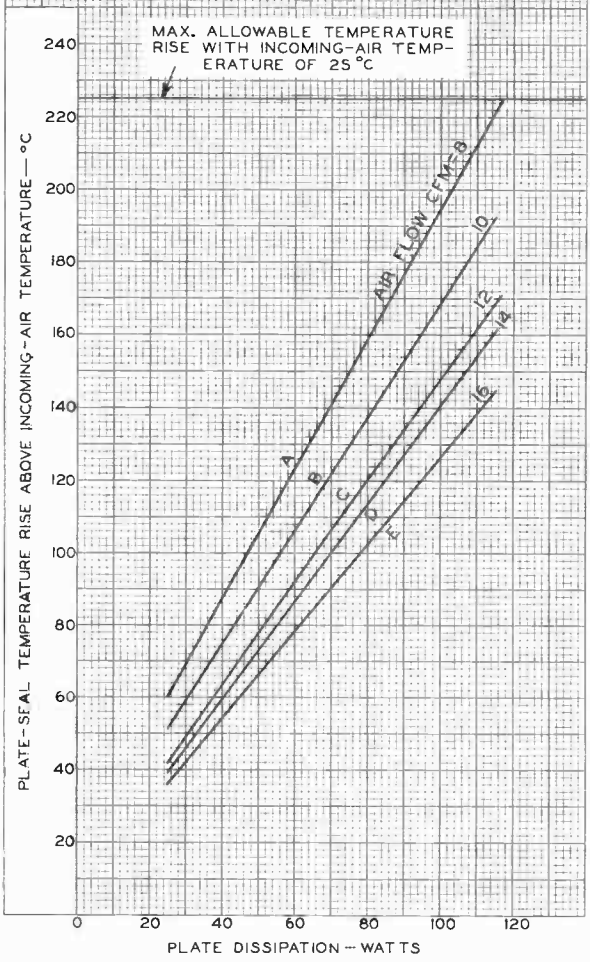
World Radio History

RCA

6816

TYPICAL COOLING REQUIREMENTS
WITH COWLING

AIR FLOW DIRECTED THROUGH RADIATOR WITH COWLING AS SHOWN IN ACCOMPANYING DIAGRAM.	CURVE	PRESSURE DROP—INCHES OF WATER
	A,B,C,D,E	LESS THAN 0.1



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

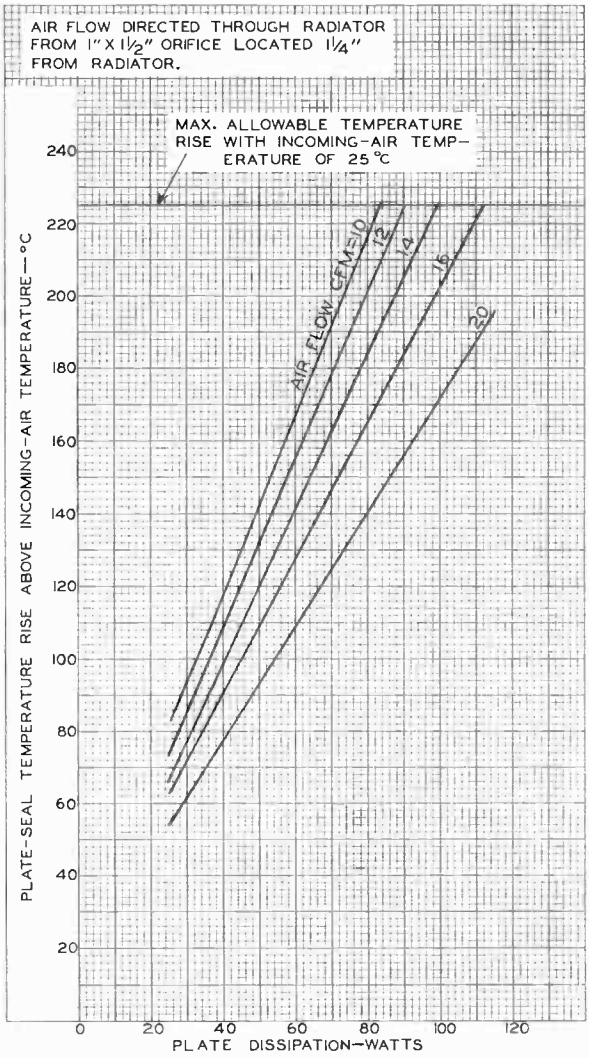
92CM-9219

World Radio History

RCA

6816

TYPICAL COOLING REQUIREMENTS
WITHOUT COWLING

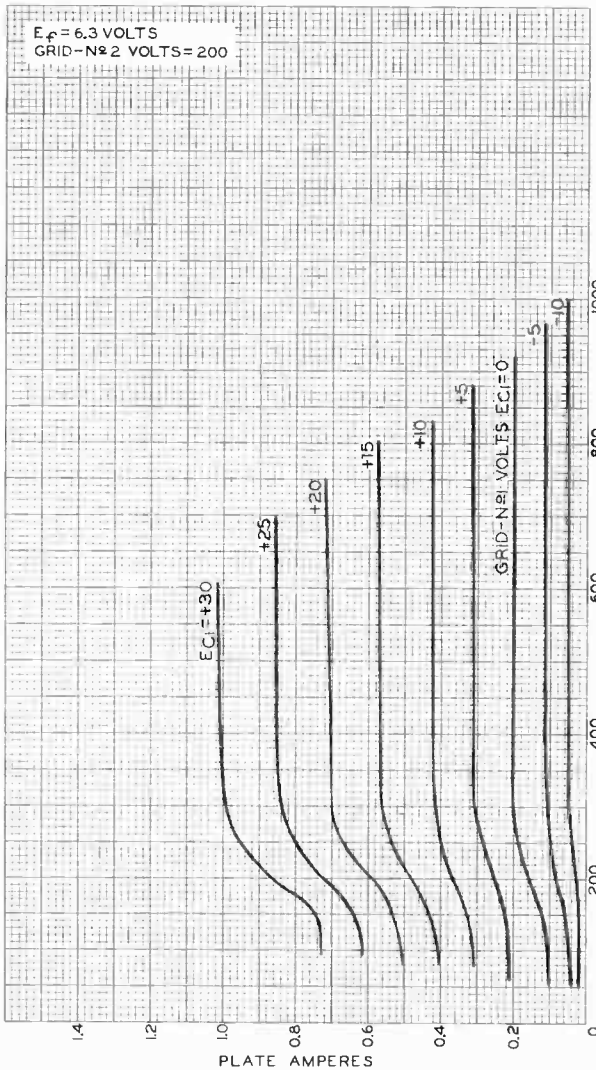


World Radio History

RCA

6816

TYPICAL PLATE CHARACTERISTICS



ELECTRON TUBE DIVISION
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92CM-9228

World Radio History

6816

RCA

6816

TYPICAL PLATE CHARACTERISTICS

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

92CM-9222

World Radio History

6816

RCA

6816

TYPICAL CONSTANT-CURRENT CHARACTERISTICS

E_f=6.3 VOLTS
GRID-№2 VOLTS=200
I_{C_2}=GRID-№2 MA.

PLATE VOLTS

0 200 400 600 800 1000

GRID-№1 VOLTS

+40 +20 0 -20 -40

I_b=1
5
10
20
50
100
I_b=200
400
600
800
1000

PLATE MA. I_b=1000

GRID-№1 MA.I_C=300

200
100
50
I_{C_2}=75

92CM-9233

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

World Radio History

6816

RCA

6816

TYPICAL CONSTANT-CURRENT CHARACTERISTICS

E_f=6.3 VOLTS
GRID-№2 VOLTS=300
I_{C1}=GRID-№1 MA.
I_{C2}=GRID-№2 MA.

PLATE MA. I_b=1200
1000
800
600
400
200
100
50
20
10
5
I_b=1

I_{C1}=200
100
I_{C1}=50
25
15
10
5
2
I_{C2}=20

PLATE VOLTS
0
200
400
600
800
1000

GRID-№1 VOLTS
+40
+20
0
-20
-40

92CM-9232

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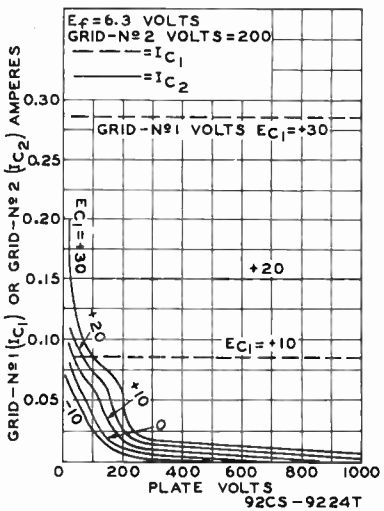
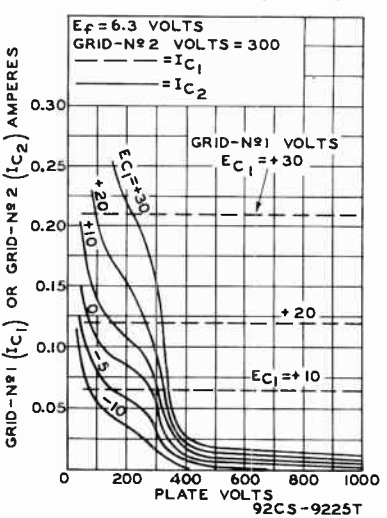
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

6816

TYPICAL CHARACTERISTICS





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

CE-9224T
-9225T

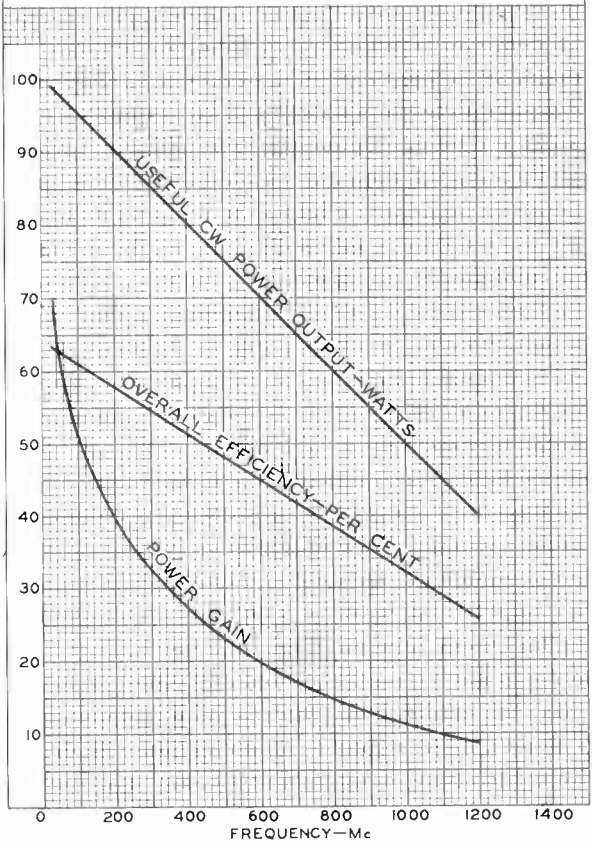
RCA

6816

TYPICAL PERFORMANCE CHARACTERISTICS

IN CLASS C TELEGRAPHY OR CLASS C FM TELEPHONY AMPLIFIER SERVICE

E_f = ADJUSTED TO SIMULATE NORMAL OPERATING CONDITIONS OF HEATER IN UHF SERVICE
PLATE VOLTS = 900
GRID-№2 VOLTS = 300
PLATE AMPERES = 0.170
OVERALL EFFICIENCY = USEFUL POWER OUTPUT IN LOAD DIVIDED BY DC PLATE INPUT
POWER GAIN = USEFUL POWER OUTPUT IN LOAD DIVIDED BY DRIVER POWER OUTPUT



6850

TWIN BEAM POWER TUBE

Useful at frequencies up to 470 Mc

The 6850 is the same as the 6524 except for the following items:

Heater, for Unipotential Cathode:
Voltage. . . . . 12.6 ± 10% . . . ac or dc volts
Current. . . . . 0.625 . . . . . .amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.588	0.663	amp

Note 1: With 12.6 volts ac on heater.

World Radio History

World Radio History

6861

TRAVELING-WAVE TUBE

LOW-NOISE AMPLIFIER TYPE

Useful over frequency range of 2700 to 3500 Mc

GENERAL DATA

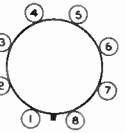
Electrical:

Heater, for Unipotential Cathode:		
Voltage	5	ac or dc volts
Current at 5 volts	0.65	amp
Starting current:	The maximum instantaneous starting current must never exceed 4 amperes, even momentarily.	
Minimum Cathode Heating Time	1	minute
Frequency Range	2700 to 3500	Mc
Cold Insertion Loss	80	db

Mechanical:

Mounting Position	Any
Maximum Overall Length	19-3/8"
Metal-Shell Diameter	1.375" ± 0.005"
Weight (Approx.)	1-1/2 lbs
Collector-Terminal Connector	Birnbach No.406 Banana Jack
RF Connectors:	
Input terminal	Type N UG-18/U Plug
Output terminal	Type N UG-18/U Plug
Base	Octal 8-Pin

BOTTOM VIEW



Pin 1 – Grid No.1
Pin 2 – No Connection
Pin 3 – Helix
Pin 4 – Grid No.4
Pin 5 – Grid No.3
Pin 6 – Grid No.2
Pin 7 – Heater
Pin 8 – Heater, Cathode

Maximum and Minimum Ratings, *Absolute Values:*

DC COLLECTOR VOLTAGE	500 max.	volts
DC HELIX VOLTAGE	500 max.	volts
DC GRID-No.4 VOLTAGE	500 max.	volts
DC GRID-No.3 VOLTAGE	300 max.	volts
DC GRID-No.2 VOLTAGE	75 max.	volts
DC GRID-No.1 VOLTAGE	20 max.	volts
DC COLLECTOR CURRENT	1000 max.	μamp
DC HELIX CURRENT	10 max.▲	μamp
MAGNETIC FIELD STRENGTH	400 min.●	gauss
PEAK RF POWER INPUT	250 max.	watts
AVERAGE RF POWER INPUT	1 max.	watt
METAL-SHELL TEMPERATURE (At hottest point)	175 max.	°C

▲ During alignment of the tube in the magnetic-focusing field, the helix current may exceed this value for short periods, but should never exceed 50 μamp.

● This value of field strength will focus the electron beam, but noise figure will not be optimum.

TUBE DIVISION
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TENTATIVE DATA

World Radio History

6861

TRAVELING-WAVE TUBE

Typical Operation at 3100 Mc:		
DC Collector Voltage	400	volts
DC Helix Voltage	375	volts
DC Grid-No.4 Voltage	200	volts
DC Grid-No.3 Voltage	40	volts
DC Grid-No.2 Voltage (Approx.)	20	volts
DC Grid-No.1 Voltage	0	volts
DC Collector Current	150	μamp
DC Helix Current	0.5	μamp
DC Grid-No.4 Current DC Grid-No.3 Current DC Grid-No.2 Current DC Grid-No.1 Current	each less than 1	μamp
Magnetic Field Strength†	525 ± 5%	gausses
Gain (Low level)	25	db
Power Output (Saturated)	1.0	mw
Noise Figure	6.5	db

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.45	0.85	amp
Input VSWR (Non-operating)	2	–	1.7	
Output VSWR (Non-operating)	2	–	2.0	
DC Helix Voltage	3	350	390	volts
DC Grid-No.4 Voltage	3	160	250	volts
DC Grid-No.3 Voltage	3	30	50	volts
Saturated Power Output	3	0.25	–	mw
Gain	3	20	–	db
Noise Figure	3	–	7.0	db

Note 1: With heater voltage of 5.0 volts.

Note 2: Measured at specified connector over the frequency range of 2700 to 3500 Mc.

Note 3: Adjusted for optimum noise figure with a magnetic field of 525 gausses, signal frequency of 3100 Mc, and heater voltage of 5 volts.

OPERATING CONSIDERATIONS

The *magnetic field* required for focusing the electron beam of the 6861 may be obtained from a solenoid or permanent magnet capable of providing a uniform field of 525 gausses over the length of the tube axis starting 2 inches from the groove near the base end of the metal shell and continuing for at least 9 inches along the tube axis.

† For RCA Solenoid, Developmental No. J-2006.

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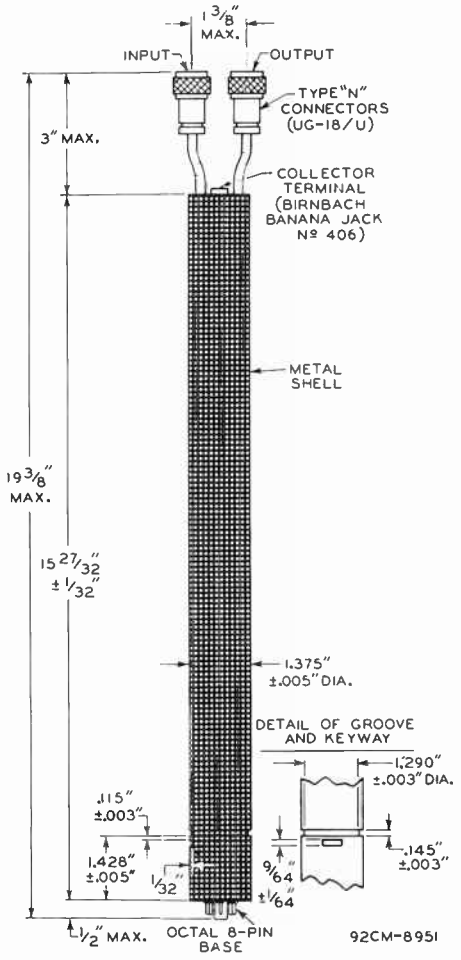
World Radio History

6861

TRAVELING-WAVE TUBE



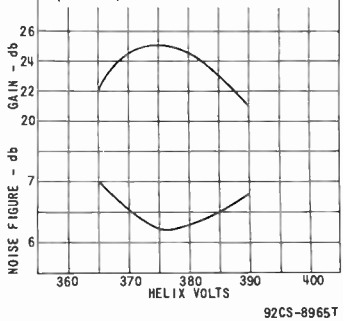
TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History

6861

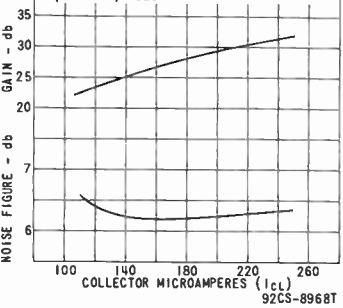
NOISE-FIGURE CHARACTERISTICS

E_f = 5 VOLTS
COLLECTOR VOLTS = 400
GRID-No.4 VOLTS = 200
GRID-No.3 VOLTS = 40
GRID-No.2 VOLTS ADJUSTED TO GIVE COLLECTOR MICROAMPERES = 150
GRID No.1 CONNECTED TO CATHODE AT SOCKET
SIGNAL FREQUENCY (Mc) = 3100
FIELD STRENGTH ALONG HELIX AXIS (GAUSSES) = 525



92CS-8965T

E_f = 5 VOLTS
COLLECTOR VOLTS = 400
HELIX VOLTS, GRID-No.4 VOLTS, GRID-No.3 VOLTS } ADJUSTED TO GIVE MINIMUM NOISE
GRID-No.2 VOLTS ADJUSTED TO GIVE INDICATED I_{CL}
GRID No.1 CONNECTED TO CATHODE AT SOCKET
SIGNAL FREQUENCY (Mc) = 3100
FIELD STRENGTH ALONG HELIX AXIS (GAUSSES) = 525



92CS-8968T

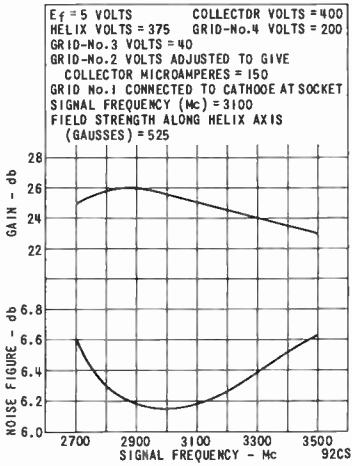
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

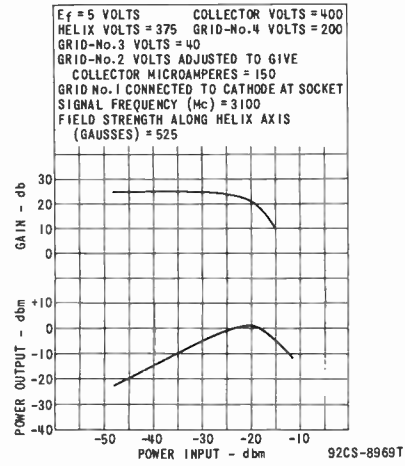
6861

TRAVELING-WAVE TUBE

NOISE-FIGURE CHARACTERISTICS



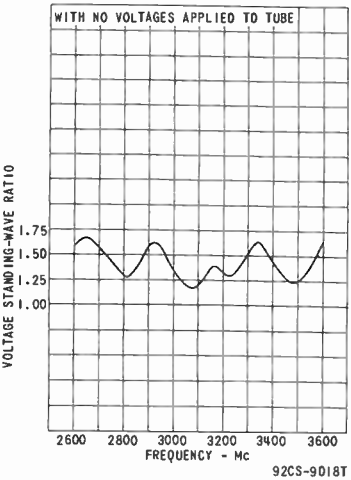
SATURATION CHARACTERISTICS



World Radio History

6861

INPUT-MATCHING CHARACTERISTIC



TUBE DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

World Radio History

Beam Power Tube

HIGH POWER SENSITIVITY
90 WATTS CW INPUT (ICAS) UP TO 60 Mc
60 WATTS CW INPUT (ICAS) AT 175 Mc

The 6883 is the same as the 6146 except for the following items:

Electrical:

Heater, for Unipotential Cathode:
Voltage (AC or DC). . . . . 12.6 ± 10% volts
Current at heater volts = 12.6. . . . 0.625 amp

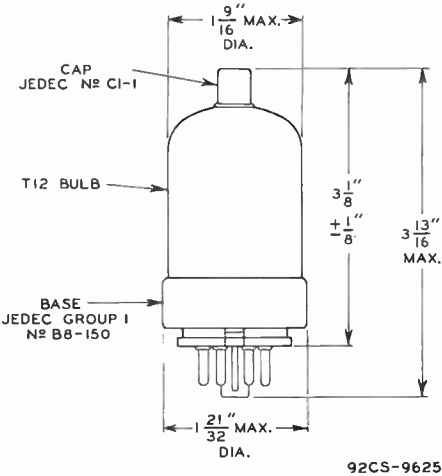
Mechanical:

Maximum Diameter. . . . . 1-21/32"
Base. . . . . Small-Wafer Octal 8-Pin with Sleeve (JEDEC No. B8-150)

CHARACTERISTICS RANGE VALUES

	Note	Min.	Max.	
Heater Current.	1	0.588	0.663	amp

Note 1: With 12.6 volts ac on heater.



92CS-9625R4

← Indicates a change.

World Radio History

World Radio History

6883

BEAM POWER TUBE

Useful at frequencies up to 175 Mc

The 6883 is the same as the 6146 except for the following items:

Heater, for Unipotential Cathode:

Voltage	12.6 ± 10%	ac or dc volts
Current	0.625	amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.558	0.663	amp

Note 1: With 12.6 volts on heater.

World Radio History

World Radio History

6884

BEAM POWER TUBE

FORCED-AIR COOLED

Useful at frequencies up to 2000 Mc

The 6884 is the same as the 6816 except for the following items:

Heater, for Unipotential Cathode:

Voltage§	26.5 ± 10%	ac or dc volts
Current	0.52	amp

§ Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

World Radio History

World Radio History

Beam Power Tube

Useful with Full Input up to 125 Mc
and with Reduced Input up to 175 Mc

The 6893 is the same as the 2E26 except for the following items: ←

Heater, for Unipotential Cathode:

Voltage (AC or DC)	12.6 ± 10%	volts
Current at heater volts = 12.6	0.4	amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.37	0.43	amp
Useful Power Output	4	18	–	watts

Note 1: With 12.6 volts ac on heater.

Note 4: In a single-tube self-excited oscillator circuit, and with heater volts = 12.6 ac, dc plate volts = 500, dc grid-No.2 volts = 200, grid-No.1 resistor (megohms) = 0.015 ± 10%, dc plate ma. = 60 maximum, dc grid-No.1 ma. = 1.8 to 2.2, and frequency (Mc) = 15.

← Indicates a change.

World Radio History

World Radio History

6893

BEAM POWER TUBE

Useful with full input up to 125 Mc
and with reduced input up to 175 Mc

The 6893 is identical with the 2E26 except for the following items, but otherwise has the same technical data exclusive of IMS conditions:

Heater, for Unipotential Cathode:
Voltage. . . . . 12.6 ± 10% . . . . ac or dc volts
Current. . . . . 0.4 . . . . . amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.37	0.43	amp

Note 1: With 12.6 volts ac on heater.

World Radio History

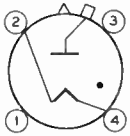
Half-Wave Mercury-Vapor Rectifier

The 6894 is the same as the 6895 except for the following items:

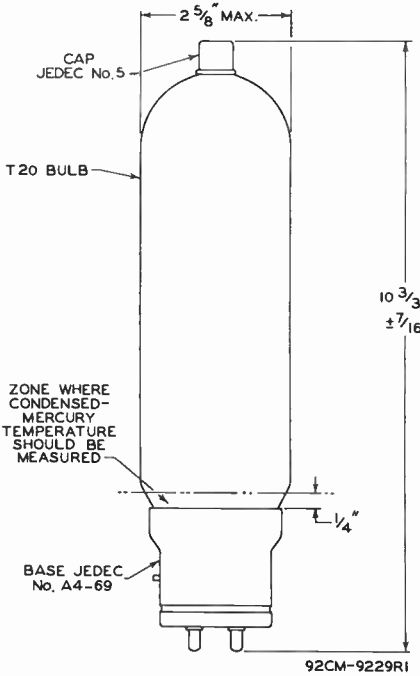
Mechanical:

Overall Length. . . . . 10-3/32" ± 7/16"
Socket. . . . . Johnson No. 123-211, or equivalent
Base. . . . . Skirted Medium-Metal-Shell Jumbo 4-Pin with Bayonet (JEDEC No. A4-69)
Basing Designation on BOTTOM VIEW. 4AT

Pin 1 – No Internal Connection
Pin 2 – Filament, Cathode Shield



Pin 3 – No Internal Connection
Pin 4 – Filament
Cap – Anode



→ Indicates a change.

World Radio History

World Radio History

6894

HALF-WAVE MERCURY-VAPOR RECTIFIER

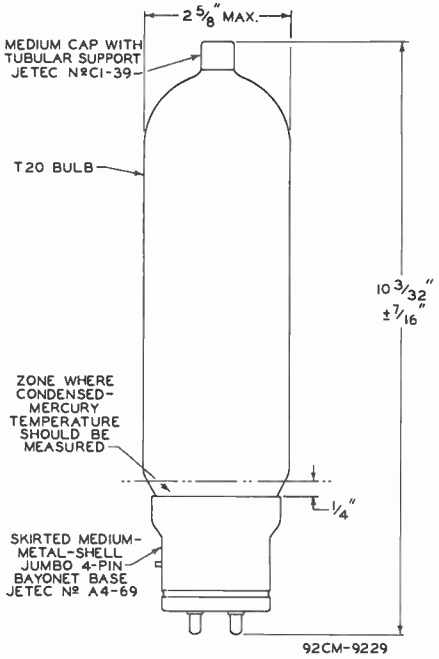
The 6894 is the same as the 6895 except for the following items:

Mechanical:

Overall Length. . . . . 10-3/32" ± 7/16"
Socket. . . . . Johnson No.123-211, or equivalent
Base. . . . . .Skirted Medium-Metal-Shell Jumbo 4-Pin with Bayonet (JETEC No.A4-69)
Basing Designation for BOTTOM VIEW. 4AT

Pin 1 – No Connection
Pin 2 – Filament, Cathode Shield

Pin 3 – No Connection
Pin 4 – Filament Cap – Anode



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

World Radio History

Half-Wave Mercury-Vapor Rectifier

GENERAL DATA

Electrical:

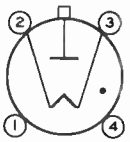
Filament, Coated:
- Voltage (AC). . . . . 5.0 ± 5% volts
- Current at filament volts = 5.0 . . . . . 10 amp
- Minimum heating time at rated voltage . . . 30 sec

Peak Tube Voltage Drop. . . .See *Characteristics Range Values*

Mechanical:

Operating Position. . . . . Vertical, base down
Maximum Overall Length. . . . . 10-13/32"
Seated Length . . . . . 9-7/32" ± 7/16"
Maximum Diameter. . . . . 2-5/8"
Weight (Approx.). . . . . 9 oz
Bulb. T20
Cap . . . . . .Medium (JEDEC No.C1-5) ←
Cap Connector . . . . . .Millen No.36011, or equivalent
Socket. . . . . Johnson No.123-206, or equivalent
Base. . . . . Large-Shell Super-Jumbo 4-Pin with Bayonet (JEDEC No.A4-88), or Large-Metal-Shell Super-Jumbo 4-Pin with Bayonet (JEDEC No.A4-18)
Basing Designation for BOTTOM VIEW. 2P

Pin 1 - No Internal Connection
Pin 2 - Filament, Cathode Shield



Pin 3 - Filament
Pin 4 - No Internal Connection
Cap - Anode

Temperature Control:

Heating—When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling—When the operating conditions are such that the maximum value of the operating condensed-mercury-temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.):
- No load[a]. . . . . 13 °C
- Full load[b]. . . . . 18.5 °C

← Indicates a change.

World Radio History

HALF-WAVE RECTIFIER — In Phase Operation[c]

Maximum Ratings, *Absolute-Maximum Values:*

For supply frequency of 60 cps

	Operating Condensed-Mercury-Temperature Range			
	20 to 60 °C	20 to 55 °C	20 to 50 °C	
PEAK INVERSE ANODE VOLTAGE. .	10000 max.	15000 max.	20000 max.	volts
ANODE CURRENT:				
Peak	8.3 max.	8.3 max.	8.3 max.	amp
Average[d]	1.8 max.	1.8 max.	1.8 max.	amp
Fault, for duration of 0.1 second max.	100 max.	100 max.	100 max.	amp

HALF-WAVE RECTIFIER — Quadrature Operation[e]

Maximum Ratings, *Absolute-Maximum Values:*

For supply frequency of 60 cps

	Operating Condensed-Mercury-Temperature Range			
	20 to 60 °C	20 to 55 °C	20 to 50 °C	
PEAK INVERSE ANODE VOLTAGE. .	10000 max.	15000 max.	20000 max.	volts
ANODE CURRENT:				
Peak	11.5 max.	11.5 max.	11.5 max.	amp
Average[d]	2.5 max.	2.5 max.	2.5 max.	amp
Fault, for duration of 0.1 second max.	100 max.	100 max.	100 max.	amp

[a] With 4.75 volts rms on filament, and no heat-conserving enclosure.

[b] With 5.25 volts rms on filament, quadrature operation, average anode amperes = 2.5, and no heat-conserving enclosure.

[c] Filament voltage in phase with anode voltage.

[d] Averaged over any period of 20 seconds maximum.

[e] Filament voltage out of phase (60° to 120°) with anode voltage.

CHARACTERISTICS RANGE VALUES[f] FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current.	1	9	11	amp
Critical Anode Voltage.	2	10	100	volts
Peak Tube Voltage Drop.	3	–	25	volts

Note 1: With 5 volts rms on filament.

Note 2: With 5 volts rms on filament, and condensed-mercury temperature of 20° C.

Note 3: With 5 volts rms on filament, condensed-mercury temperature of 35 ± 5° C, peak anode current of 11.5 amperes provided by half-cycle pulse from a 60-cps sine wave and recurring approximately once per second. Tube drop is measured by an oscilloscope connected between anode and center-tap of filament transformer.

[f] Throughout tube life.

World Radio History

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}		MAX. DC OUTPUT KW TO FILTER P_{dc}	
			Resistive Load	*Inductive Load*	*Resistive Load*	*Inductive Load*
Fig. 1 **Half-Wave** **Single-Phase** In-Phase Operation	14000[g]	6300	1.8		11.5	
	10600[h]	4700	1.8		8.5	
	7000[j]	3200	1.8		5.5	
Fig. 2 **Full-Wave** **Single-Phase** In-Phase Operation	7000[g]	6300	3.6		23	
	5300[h]	4700	3.6		17	
	3500[j]	3200	3.6		11	
Fig. 3 **Series** **S ngle-Phase** In-Phase Operation	14000[g]	12700	3.6		46	
	10600[h]	9500	3.6		34	
	7000[j]	6300	3.6		22	
Fig. 4 **Half-Wave** **Three-Phase** In-Phase Operation	8100[g]	9500	5.4		51	
	6100[h]	7100	5.4		38	
	4000[j]	4700	5.4		25	
Fig. 5 **Parallel** **Three-Phase** Quadrature Operation	8100[g]	9500	15.0		143	
	6100[h]	7100	15.0		106	
	4000[j]	4700	15.0		71	
Fig. 6 **Series** **Three-Phase** Quadrature Operation	8100[g]	19000	7.5		143	
	6100[h]	14200	7.5		106	
	4000[j]	9500	7.5		71	
Fig. 7 **Half-Wave** **Four-Phase** Quadrature Operation	7000[g]	9000	10	10	90	90
	5300[h]	6700	10	10	67	67
	3500[j]	4500	10	10	45	45
Fig. 8 **Half-Wave** **Six-Phase** Quadrature Operation	7000[g]	9500	11	11.5	105	110
	5300[h]	7100	11	11.5	78	81
	3500[j]	4700	11	11.5	52	55

[g] For maximum peak inverse anode voltage of 20000 volts, and condensed-mercury-temperature range of 20 to 50° C.

[h] For maximum peak inverse anode voltage of 15000 volts, and condensed-mercury-temperature range of 20 to 55° C.

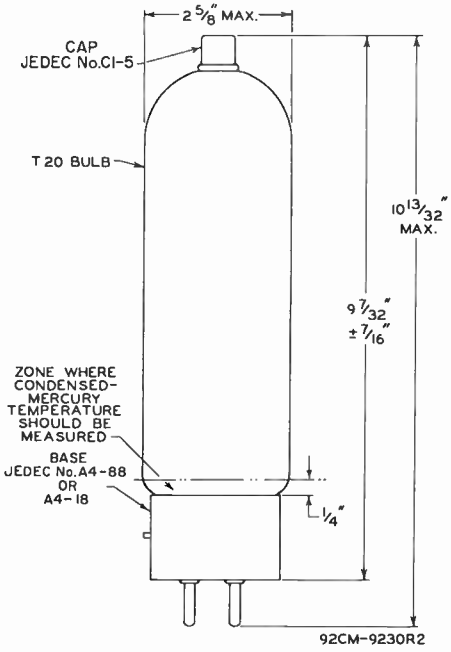
[j] For maximum peak inverse anode voltage of 10000 volts, and condensed-mercury-temperature range of 20 to 60° C.

World Radio History

OPERATING CONSIDERATIONS

X rays are produced when the 6895 is operated with a peak inverse anode voltage above 16,000 volts (absolute value). These rays can constitute a health hazard unless the tube is adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure that it provides the required protection to the operator.

Shields and rf filter circuits should be provided for the 6895 if it is subjected to extraneous high-frequency fields during operation. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. When shields are used, special attention must be given to providing adequate ventilation and to maintaining normal condensed-mercury temperature. Radio-frequency filters are employed to prevent damage caused by rf currents which might otherwise be fed back into the rectifier tubes.



World Radio History

6895

HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

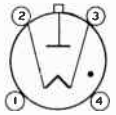
Electrical:

Filament, Coated:		
Voltage	5	ac volts
Current at 5 volts	10	amp
Minimum heating time at rated voltage	30	sec
Peak Tube Voltage Drop	*See Characteristics Range Values*	

Mechanical:

Mounting Position	Vertical, base down
Maximum Overall Length	10-13/32"
Seated Length	9-7/32" ± 7/16"
Maximum Diameter	2-5/8"
Weight (Approx.)	9 oz
Bulb	T20
Cap	Medium with Tubular Support (JETEC No.C1-39)
Cap Connector	Millen No.36011, or equivalent
Socket	Johnson No.123-206, or equivalent
Base	Large-Shell Super-Jumbo 4-Pin with Bayonet (JETEC No.A4-88), or Large-Metal-Shell Super-Jumbo 4-Pin with Bayonet (JETEC No.A4-18)
Basing Designation for BOTTOM VIEW	2P

Pin 1 – No Connection
Pin 2 – Filament, Cathode Shield



Pin 3 – Filament
Pin 4 – No Connection
Cap – Anode

Temperature Control:

Heating--When the ambient temperature is so low that the normal rise of condensed-mercury temperature above the ambient temperature will not bring the condensed-mercury temperature up to the minimum value of the operating ranges specified under *Maximum Ratings*, some form of heat-conserving enclosure or auxiliary heater will be required.

Cooling--When the operating conditions are such that the maximum value of the operating condensed-mercury-temperature range is exceeded, provision should be made for forced-air cooling sufficient to prevent exceeding the maximum value.

Temperature Rise of Condensed Mercury to Equilibrium Above Ambient Temperature (Approx.):

No load*	13	°C
Full load▲	18.5	°C

* With 4.75 volts rms on filament, and no heat-conserving enclosure.

▲ With 5.25 volts rms on filament, quadrature operation, average cathode amperes = 2.5, and no heat-conserving enclosure.

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RCA

6895

HALF-WAVE MERCURY-VAPOR RECTIFIER

HALF-WAVE RECTIFIER — In-Phase Operation•

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury-Temperature Range			
	20 to 60 °C	20 to 55 °C	20 to 50 °C	
PEAK INVERSE ANODE VOLTAGE.	10000 max.	15000 max.	20000 max.	volts
ANODE CURRENT:				
Peak	8.3 max.	8.3 max.	8.3 max.	amp
Average★ . . .	1.8 max.	1.8 max.	1.8 max.	amp
Fault, for duration of 0.1 second max.	100 max.	100 max.	100 max.	amp

HALF-WAVE RECTIFIER — Quadrature Operation■

Maximum Ratings, *Absolute Values: For supply frequency of 60 cps*

	Operating Condensed-Mercury-Temperature Range			
	20 to 60 °C	20 to 55 °C	20 to 50 °C	
PEAK INVERSE ANODE VOLTAGE.	10000 max.	15000 max.	20000 max.	volts
ANODE CURRENT:				
Peak	11.5 max.	11.5 max.	11.5 max.	amp
Average★ . . .	2.5 max.	2.5 max.	2.5 max.	amp
Fault, for duration of 0.1 second max.	100 max.	100 max.	100 max.	amp

CHARACTERISTICS RANGE VALUES# FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	9	11	amp
Critical Anode Voltage	2	10	100	volts
Peak Tube Voltage Drop	3	–	25	volts

Note 1: With 5 volts rms on filament.

Note 2: With 5 volts rms on filament, and condensed-mercury temperature of 20 °C.

Note 3: With 5 volts rms on filament, condensed-mercury temperature of 35 ± 5 °C, peak anode current of 11.5 amperes provided by half-cycle pulse from a 60-cps sine wave and recurring approximately once per second. Tube drop is measured by an oscilloscope connected between anode and center-tap of filament transformer.

• Filament voltage in phase with anode voltage.

★ Averaged over any period of 20 seconds maximum.

■ Filament voltage out of phase (60° to 120°) with anode voltage.

Throughout tube life.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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HALF-WAVE MERCURY-VAPOR RECTIFIER

For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER E_{av}	MAX. DC OUTPUT AMPERES I_{av}		MAX. DC OUTPUT KW TO FILTER P_{dc}	
			Resistive Load	*Inductive Load*	*Resistive Load*	*Inductive Load*
Fig. 1 Half-Wave Single-Phase In-Phase Operation	14000□ 10600▲ 7000*	6300 4700 3200	1.8 1.8 1.8		11.5 8.5 5.5	
Fig. 2 Full-Wave Single-Phase In-Phase Operation	7000□ 5300▲ 3500*	6300 4700 3200	3.6 3.6 3.6		23 17 11	
Fig. 3 Series Single-Phase In-Phase Operation	14000□ 10600▲ 7000*	12700 9500 6300	3.6 3.6 3.6		46 34 22	
Fig. 4 Half-Wave Three-Phase In-Phase Operation	8100□ 6100▲ 4000*	9500 7100 4700	5.4 5.4 5.4		51 38 25	
Fig. 5 Parallel Three-Phase Quadrature Operation	8100□ 6100▲ 4000*	9500 7100 4700	15.0 15.0 15.0		143 106 71	
Fig. 6 Series Three-Phase Quadrature Operation	8100□ 6100▲ 4000*	19000 14200 9500	7.5 7.5 7.5		143 106 71	
Fig. 7 Half-Wave Four-Phase Quadrature Operation	7000□ 5300▲ 3500*	9000 6700 4500	10 10 10	10 10 10	90 67 45	90 67 45
Fig. 8 Half-Wave Six-Phase Quadrature Operation	7000□ 5300▲ 3500*	9500 7100 4700	11 11 11	11.5 11.5 11.5	105 78 52	110 81 55

□ For maximum peak inverse anode voltage of 20000 volts, and condensed-mercury-temperature range of 20 to 50 °C.

▲ For maximum peak inverse anode voltage of 15000 volts, and condensed-mercury-temperature range of 20 to 55 °C.

* For maximum peak inverse anode voltage of 10000 volts, and condensed-mercury-temperature range of 20 to 60 °C.

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HALF-WAVE MERCURY-VAPOR RECTIFIER

OPERATING CONSIDERATIONS

X rays are produced when the 6895 is operated with a peak inverse anode voltage above 16,000 volts (absolute value). These rays can constitute a health hazard unless the tube is adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure that it provides the required protection to the operator.

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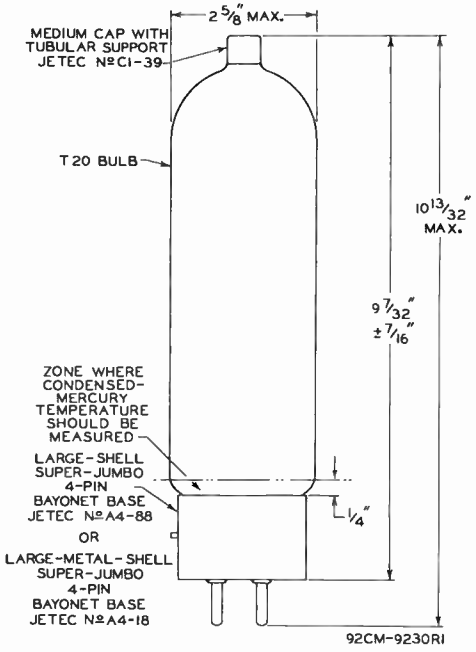

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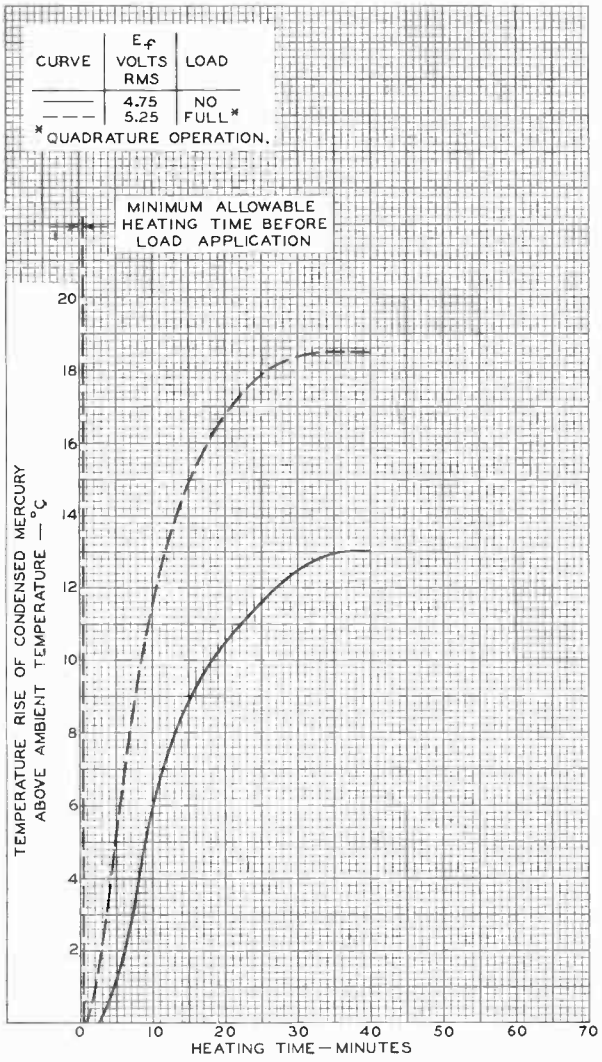
RATE OF RISE OF COND.-MERCURY TEMPERATURE



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92CM-9217

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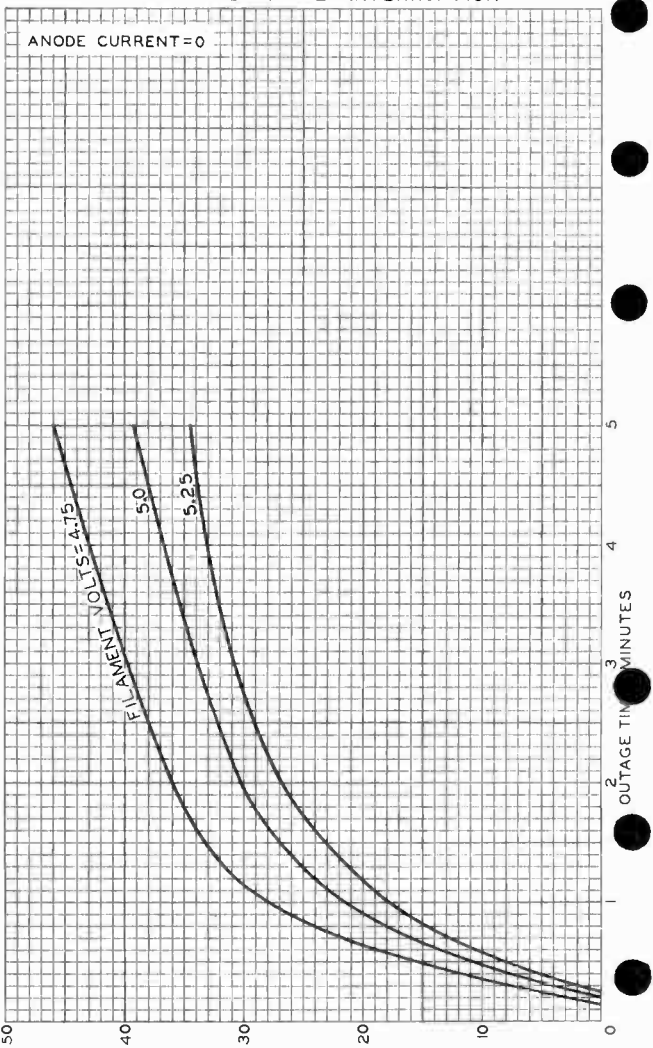
RCA

6895

FILAMENT REHEATING TIME REQUIRED
AFTER POWER-SUPPLY INTERRUPTION



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92CM-8300

6897

Power Triode

FORCED-AIR COOLED

For Cathode-Drive Applications at Frequencies up to 2900 Mc

GENERAL DATA

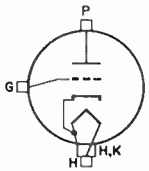
Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)[a]	6.3 ± 10%	volts
Current at 6.3 volts	1.05	amp
Minimum heating time	1	min
Amplification Factor	95	
Transconductance, for dc plate volts = 600 and dc plate ma. = 75.	24800	μmhos
Direct Interelectrode Capacitances (Approx.):[b]		
Grid to plate	2	μμf
Grid to cathode	6.5	μμf
Plate to cathode	0.024	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-3/4"
Diameter	1-1/4" ± 1/64"
Mounting	Only plate flange to be used as socket stop and clamping surface
Weight (Approx.)	2 oz
Radiator	Integral part of tube

Terminal Diagram (See *Dimensional Outline*):



P – Plate

G – Grid

K – Cathode

H – Heater

Thermal:

Air Flow:

Through radiator—Adequate air flow should be delivered by a blower during the application of any voltages.

To plate, grid, cathode, and heater seals—A sufficient quantity of air should be delivered to these seals to prevent their temperature from exceeding the specified maximum value.

Seal Temperature (Plate, grid, cathode, and heater)	250 max.	°C
Recommended Air-Flow Cowling	157-JAN	
Recommended Air Flow on Plate Radiator at sea level with incoming-air temperature (°C) = 25 plate dissipation (watts) = 100.	12.5	cfm

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PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

For frequencies up to 2500 Mc

DC PLATE VOLTAGE	600[d]	max.	volts
GRID VOLTAGE:			
Negative-bias value	150	max.	volts
Peak-negative-rf value	400	max.	volts
Peak-positive-rf value	30	max.	volts
DC GRID CURRENT	50	max.	ma
DC CATHODE CURRENT	100	max.	ma
PLATE DISSIPATION	70	max.	watts
GRID DISSIPATION	2	max.	watts

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[e]

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

For frequencies up to 2500 Mc

DC PLATE VOLTAGE	1000	max.	volts
GRID VOLTAGE:			
Negative-bias value	150	max.	volts
Peak-negative-rf value	400	max.	volts
Peak-positive-rf value	30	max.	volts
DC GRID CURRENT	50	max.	ma
DC CATHODE CURRENT	125	max.	ma
PLATE DISSIPATION	100	max.	watts
GRID DISSIPATION	2	max.	watts

[a] Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

[b] With external shield.

[c] Continuous Commercial Service.

[d] For modulation factors less than 1, a higher dc plate voltage may be used provided the sum of the peak-positive audio voltage and the dc plate voltage does not exceed 1200 volts.

[e] Key-down conditions per tube without amplitude modulation. 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.

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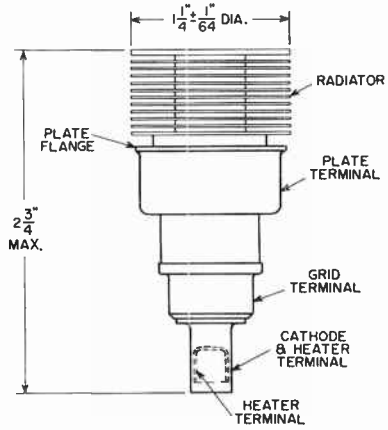

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6952

Beam Power Tube

CERAMIC-METAL SEALS
LIQUID COOLED
MATRIX-TYPE FILAMENT
INTEGRAL COOLANT DUCTS
COAXIAL-ELECTRODE STRUCTURE
2000 KW PEAK POWER OUTPUT IN SHORT-PULSE SERVICE AT 425 Mc

For Grid-Driven, Plate-Pulsed Amplifier Applications at Frequencies from 174 to 600 Mc

GENERAL DATA

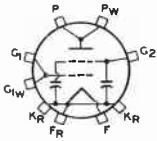
Electrical:

	Min.	Typical	Max.	
Filament[a], Multistrand, Matrix-Type, Oxide-Coated:				
Excitation			60 or 400 cps AC, or DC	
Voltage, with 60 cps AC or DC excitation	–	0.95	1.00	volt
Voltage, with 400 cps AC excitation	–	1.00	1.05	volts
Current at either typical filament voltage	460	–	530	amp
Time to reach normal operating temperature after application of full operating voltage	90	–	–	sec
Mu-Factor, Grid No.2 to Grid No.1			7	
Direct Interelectrode Capacitances:				
Grid No.1 to plate			0.15 max.	μμf
Grid No.1 to filament and grid No.2			500	μμf
Plate to filament and grid No.2			36	μμf
Internal bypass capacitors between grid No.2 and cathode (Approx. total)			18000	μμf

Mechanical:

Operating Position	Tube axis vertical, with plate terminal either up or down
Overall Length	8.62" ± 0.31"
Maximum Diameter	11.25"
Weight (Approx.)	38 lbs

Terminal Connections (See *Dimensional Outline*):



World Radio History

F – Insulated Filament Terminal and Coolant Connection
F_R – Uninsulated Filament Terminal for DC Circuit Returns and Coolant Connection
G_1 – RF Grid-No.1 Terminal Contact Surface
$G1_W$ – DC Grid-No.1 and Coolant Connection
G_2 – DC Grid-No.2 and Coolant Connection
K_R – RF Cathode Terminal Contact Surface for Circuit Returns
P – RF Plate Terminal Contact Surface
P_W – DC Plate and Coolant Connection

LIQUID COOLING

Liquid cooling of the filament block, dc cathode block, grid-No.1 block, grid-No.2 block, and plate is required. When tube operation under low ambient temperatures is required, the recommended coolant is inert liquid FC75[b], but ethylene glycol mixed with water in the proportion of 60% ethylene glycol to 40% water by weight can be used. When the environmental temperature is above 0° C, the coolant may be water. The liquid flow must start before application of any voltages and preferably should continue for several seconds after removal of all voltages. Interlocking of the liquid flow through each of the cooled elements with all power supplies is recommended to prevent tube damage in case of failure of adequate liquid flow.

With Water:

Flow:

	Absolute Min. Flow gpm	*Typical Flow* gpm	*Max. Pressure Differential[c] for Typical Flow* psi
Through filament block	0.5	0.8	8
Through dc cathode block	0.5	0.8	8
Through grid-No.1 block	0.5	0.8	6
Through grid-No.2 block	0.5	0.8	8
Through plate in direction shown on *Dimensional Outline:*			
For plate dissipation up to 3 kw (Average)	5	7	5
For plate dissipation of 8 kw (Average)	8	10	10
Gauge Pressure at Any Inlet			100 max. psi
External Gas Pressure (Absolute)[d]			60 max.[e] psi

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Plate-Water-Column Resistance at 25° C.	10 min.	megohms
Outlet-Water Temperature (Any outlet)	70 max.	°C
Metal-Surface Temperature	100 max.	°C
Ceramic-Bushing Temperature	150 max.	°C
Storage Temperature[f]	-65 min.	°C

With Inert Liquid FC75:

Flow:

	Absolute Min. Flow gpm	*Typical Flow* gpm	*Max. Pressure[g] Differential for Typical Flow* psi	
With Outlet Liquid Temperature of	-	-	30	°C
Through filament block	1.0	1.2	20	
Through dc cathode block	1.0	1.2	20	
Through grid-No.1 block	1.0	1.2	14	
Through grid-No.2 block	1.0	1.2	20	
Through plate in direction shown on *Dimensional Outline:*				
For plate dissipation up to 3 kw (Average)	10	12	20	
For plate dissipation of 8 kw (Average)	20	24	80	

Gauge Pressure at Any Inlet	100 max.	psi
External Gas Pressure (Absolute)[d]	60 max.[e]	psi
Metal-Surface Temperature	100 max.	°C
Ceramic-Bushing Temperature	150 max.	°C
Outlet-Liquid FC75 Temperature (Any outlet)	70 max.	°C
Storage Temperature with Liquid FC75 in Coolant Courses	-65 min.	°C
Liquic FC75 Temperature for Tube Operation	-25 min.	°C

With Ethylene-Glycol-Water Solution:

Flow:

	Absolute Min. Flow gpm	*Typical Flow* gpm	*Max. Pressure[g] Differential for Typical Flow* psi
Through filament block	1.0	1.2	18

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Through dc cathode block	1.0	1.2	18	
Through grid-No.1 block	1.0	1.2	12	
Through grid-No.2 block	1.0	1.2	18	
Through plate in direction shown on *Dimensional Outline:*				
For plate dissipation up to 3 kw (Average)	6	8	7	
For plate dissipation of 8 kw (Average)	16	18	40	
Gauge Pressure at Any Inlet			100 max.	psi
External Gas Pressure (Absolute)[d]			60 max.[e]	psi
Metal-Surface Temperature			100 max.	°C
Ceramic-Bushing Temperature			150 max.	°C
Outlet-Solution Temperature (Any outlet)			60 max.	°C
Min. Plate-Solution-Column Resistance at 25° C			10 min.	megohms
Storage Temperature with Solution in Coolant Courses			-45 min.	°C
Solution Temperature for Tube Operation			-20 min.	°C

PLATE-PULSED RF POWER AMPLIFIER — Class B[h]

Maximum Ratings, *Absolute-Maximum Values:*

For frequencies from 74 to 600 Mc, and maximum "on" time[j] of 20 microseconds during any 4000-microsecond interval[k]

PEAK POSITIVE-PULSE PLATE SUPPLY VOLTAGE[m]	55000 max.	volts
PEAK POSITIVE-PULSE GRID-No.2 SUPPLY VOLTAGE[n]	2200 max.	volts
PEAK NEGATIVE GRID-No.1 VOLTAGE	400 max.	volts
PEAK PLATE CURRENT FROM PULSE SUPPLY	80 max.	amp
PEAK GRID-No.2 CURRENT	15 max.	amp
PEAK RECTIFIED GRID-No.1 CURRENT	15 max.	amp
DC PLATE CURRENT	0.320 max.	amp
DC GRID-No.2 CURRENT	0.060 max.	amp
DC GRID No.1 CURRENT	0.060 max.	amp
PLATE INPUT (Average)	16000 max.	watts
PLATE DISSIPATION (Average)	8000 max.	watts

Typical Operation:

At frequency of 225 Mc with rectangular-waveshape pulses, duty factor[p] of 0.003, and pulse duration of 10 microseconds

Peak Positive-Pulse Plate Supply Voltage[m]	27500	volts

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Peak Positive-Pulse Grid-No.2 Supply Voltage (Approx.)	1700	volts
Peak Negative-Pulse Grid-No.1 Voltage	275	volts
Peak Plate Current from Pulse Supply	50	amp
Peak Grid-No.2 Current from Pulse Supply (Approx.)	6	amp
Peak Rectified Grid-No.1 Current (Approx.)	6	amp
DC Plate Current	0.150	amp
DC Grid-No.2 Current (Approx.)	0.018	amp
DC Grid-No.1 Current (Approx.)	0.018	amp
Peak Driver Power Output (Approx.)	7500	watts
Useful Power Output at Peak of Pulse (Approx.)	750000	watts

At frequency of 425 Mc with rectangular-waveshape pulses, duty factor[p] of 0.004, and pulse duration of 13 microseconds

Peak Positive-Pulse Plate Supply Voltage[m]	50000	volts
Peak Positive-Pulse Grid-No.2 Supply Voltage (Approx.)	1800	volts
Peak Negative Grid-No.1 Voltage	325	volts
Peak Plate Current from Pulse Supply	75	amp
Peak Grid-No.2 Current from Pulse Supply (Approx.)	8	amp
Peak Rectified Grid-No.1 Current (Approx.)	10	amp
DC Plate Current	0.300	amp
DC Grid-No.2 Current (Approx.)	0.032	amp
DC Grid-No.1 Current (Approx.)	0.040	amp
Peak Driver Power Output (Approx.)	20000	watts
Useful Power Output at Peak of Pulse (Approx.)	2000000	watts

[a] Tube life can be conserved by operating the filament at the lowest power that will enable the tube to provide the desired power output. To determine filament power, it is necessary that both filament current and filament voltage be monitored. For accurate filament-voltage readings, measurement should be made at the respective coolant connections on the tube side of the threads. This procedure is essential to measure accurately the filament voltage. Meters should be adequately shielded from extraneous magnetic fields which may affect the reading. The indicated maximum filament voltage provides emission in excess of any requirements within tube ratings. Therefore, the filament power must be reduced to a value that will give adequate but not excessive emission for any particular application. It is recommended that the filament-voltage supply be continuously adjustable between 70% and 100% of the maximum filament-voltage rating. Good regulation of the filament power supply is economically advantageous from the viewpoint of tube life.

[b] Made by the Fluorochemical Division, Minnesota Mining and Manufacturing Co., 900 Bush Avenue, St. Paul 6, Minnesota.

[c] Directly across cooled element.

[d] Absolute pressure is the sum of the atmospheric pressure and gauge pressure.

[e] This pressure is related to the output-cavity pressurization as required to prevent corona or external flash-over.

[f] Water-cooled ducts must be free of water before storage or shipment of the tube to prevent damage from freezing.

[g] Directly across cooled element at coolant connection for the indicated typical flow.

[h] In class B operation, the peak negative grid-No.1 voltage is between 1/5 and 1/8 of the peak positive-pulse grid-No.2 voltage.

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j *"ON" time* is defined as the sum of the durations of all the individual pulses which occur during the interval of 2000 microseconds. *Pulse duration* is defined as the time interval between the two points on the pulse at which the instantaneous value is 50% of the peak value. The *peak value* is defined as the maximum value of a smooth curve through the average of the fluctuations over the top portion of the pulse.

k Requests for information on operation of the 6952 with longer pulse durations or at other frequencies will be welcomed.

m The magnitude of any spike on the plate voltage pulse should not exceed its peak value by more than 4000 volts and the duration of any spike when measured at the peak-value level should not exceed 10% of the maximum "On" time. In the absence of rf output voltage, the peak pulse supply voltage may exceed 55,000 volts for no more than 10 consecutive pulses, but under no circumstances should the instantaneous value of the pulse supply voltage exceed 60,000 volts. The output cavity must be pressurized as required to prevent corona or external flash-over at the ceramic bushing.

n The magnitude of any spike on the grid-No.2 voltage pulse should not exceed its peak value by more than 250 volts and the duration of any spike when measured at the peak-value level should not exceed 10% of the maximum "On" time.

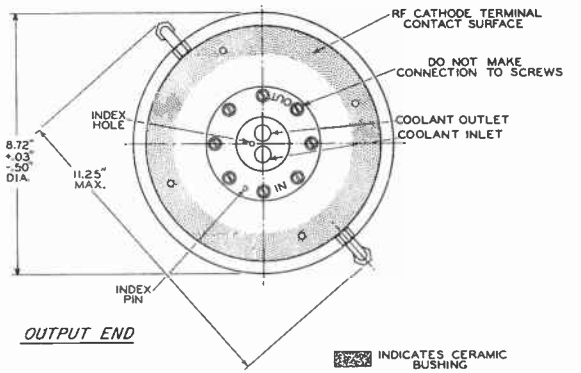
p Duty factor is the product of the pulse duration and pulse-repetition rate.

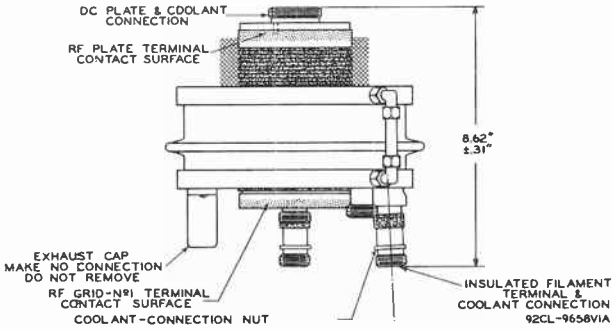
FOR ADDITIONAL INFORMATION ON THIS TYPE, WRITE FOR TECHNICAL BULLETIN AVAILABLE FROM:

Commercial Engineering
Electron Tube Division
RCA
Harrison, New Jersey

World Radio History

SIMPLIFIED DIMENSIONAL OUTLINE[r]





[r] A detailed Dimensional Outline and associated Gauge Drawings are given in the Technical Bulletin available upon request.

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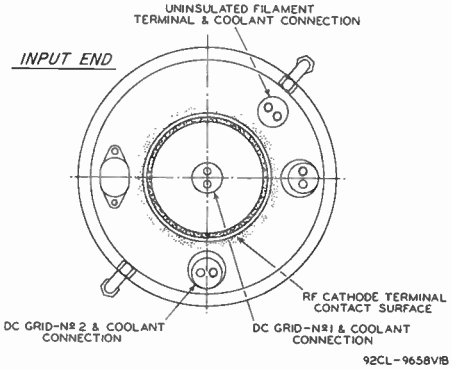


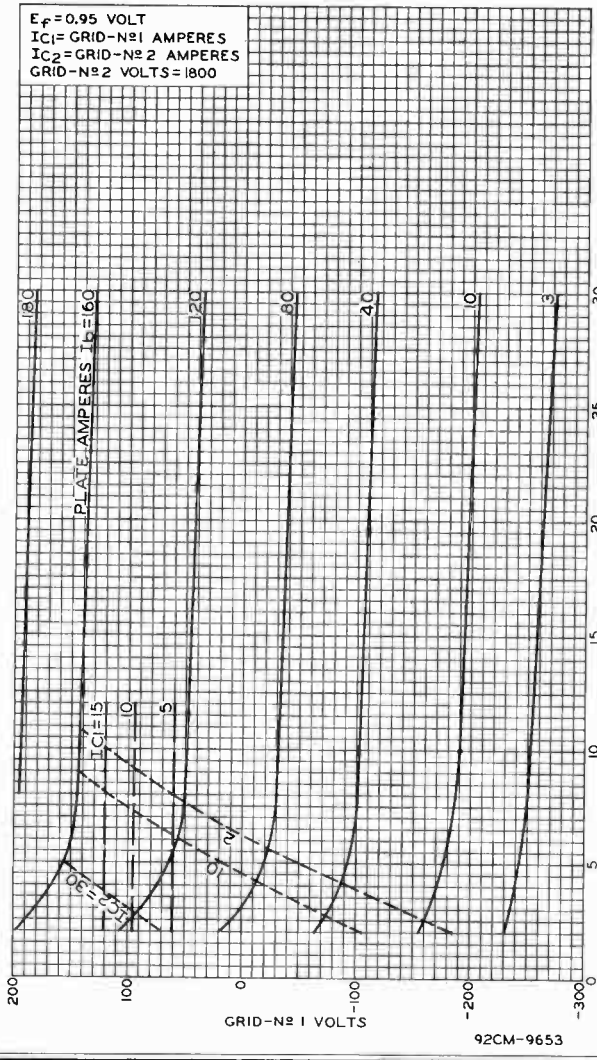
World Radio History

TYPICAL
CONSTANT-CURRENT CHARACTERISTICS

92CM-9649

6952

TYPICAL CONSTANT-CURRENT CHARACTERISTICS



92CM-9653

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

7034/4X150A

BEAM POWER TUBE

FORCED-AIR COOLED

Useful at frequencies up to 500 Mc

GENERAL DATA

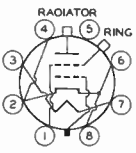
Electrical:

Heater, for Unipotential Cathode:		
Voltage§	6.0 ± 10%	ac or dc volts
Current at 6.0 volts	2.6	amp
Minimum heating time	30	sec
Mu-Factor, Grid No.2 to Grid No.1, for grid-No.2 volts = 300 and grid-No.2 ma. = 50	5	
Direct Interelectrode Capacitances:○		
Grid No.1 to plate	0.03	μμf
Grid No.1 to cathode, grid No.2, and heater	16	μμf
Plate to cathode, grid No.2, and heater	4.4	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-15/32"
Maximum Seated Length	1.910"
Maximum Diameter	1.635"
Weight (Approx.)	4 oz
Radiator	Integral part of tube
Socket	Air-System Socket, such as SK-600 Air-System Socket□, insulated cathode terminals, and SK-606 Air Chimney□; or SK-610 Air-System Socket□, grounded cathode terminals, and SK-606 Air Chimney□
Base	Special 8-Pin

BOTTOM VIEW



Pin 1 – Grid No.2★
Pin 2 – Cathode
Pin 3 – Heater
Pin 4 – Cathode
Pin 5 – Internal Connection — Do Not Use
Pin 6 – Cathode
Pin 7 – Heater
Pin 8 – Cathode
Base Index Plug – Grid No.1
Radiator – Plate
Ring Terminal■ – Grid No.2

Air Flow:

Through Indicated Air-System Socket—This fitting directs the air over the base seals; past the grid-No.2 seal, glass envelope, and plate seal; and through the radiator to provide effective cooling with minimum air flow. When the tube is operated at maximum plate dissipation for each class of service, a minimum air flow of 5.6 cfm through the system is required. The corresponding pressure drop is 0.45 inch of water. These requirements are for operation at sea level and at an ambient temperature of 20° C. At higher altitudes and ambient temperatures,

§,○,□,★,■: See next page.

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the air flow must be increased to maintain the respective seal temperatures and the plate temperature within maximum ratings.

Without Air-System Socket--If an air-system socket is not used, it is essential that adequate cooling air be directed over the base seals, past the envelope, and through the radiator. Under these conditions and with the tube operating at maximum plate dissipation for each class of service, a minimum air flow of 5.3 cfm must pass through the radiator. The corresponding pressure drop is 0.28 inch of water. These requirements are for operation at sea level and at an ambient temperature of 20° C. At higher altitudes and ambient temperatures, the air flow must be increased to maintain the respective seal temperatures and the plate temperature within maximum ratings.

Plate Temperature (Measured on base end of plate surface at junction with fins). . .	250 max.	°C
Temperature of Plate Seal.	200 max.	°C
Temperature of Base Seals and Grid-No.2 Seal	175 max.	°C

AF POWER AMPLIFIER & MODULATOR — Class AB$_1$♦

Maximum CCS® Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	250 max.	ma
PLATE DISSIPATION*	250 max.	watts
GRID-No.2 DISSIPATION*	12 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode. .	150 max.	volts
Heater positive with respect to cathode. .	150 max.	volts

Typical CCS Operation:

Values are for 2 tubes

DC Plate Voltage	800	1000	1500	2000	volts
DC Grid-No.2 Voltage . . .	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage.	-40	-43	-50	-50	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	80	86	100	100	volts
Zero-Signal DC Plate Current.	210	165	100	100	ma
Max.-Signal DC Plate Current.	435	450	456	470	ma
Zero-Signal DC Grid-No.2 Current.	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current.	76	52	42	36	ma

§,°,□,★,■,♦,●,*: See next page.

ELECTRON TUBE DIVISION
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BEAM POWER TUBE

Effective Load Resistance (Plate to plate)	4400	4250	6570	8760	ohms
Max.-Signal Driving Power (Approx.).	0	0	0	0	watts
Max.-Signal Power Output (Approx.).	170	230	400	580	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance (Per tube). .	0.1 max.	megohm

AF POWER AMPLIFIER & MODULATOR — Class AB_2#

Maximum CCS● Ratings, *Absolute Values:*

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	250 max.	ma
PLATE DISSIPATION*	250 max.	watts
GRID-No.2 DISSIPATION*	12 max.	watts
GRID-No.1 (CONTROL-GRID) DISSIPATION . . .	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

Typical CCS Operation:

Values are for 2 tubes

DC Plate Voltage	800	1000	1500	2000	volts
DC Grid-No.2 Voltage . . .	300	300	300	300	volts
DC Grid-No.1 Voltage . . .	-40	-45	-50	-50	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	90	98	106	106	volts
Zero-Signal DC Plate Current.	210	166	100	100	ma
Max.-Signal DC Plate Current.	500	493	500	500	ma
Zero-Signal DC Grid-No.2 Current.	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current.	80	58	46	36	ma
Effective Load Resistance (Plate to plate)	3140	3950	5970	8100	ohms
Max.-Signal Driving Power (Approx.).	0.15	0.15	0.2	0.2	watt
Max.-Signal Power Output (Approx.).	215	270	440	630	watts

RF POWER AMPLIFIER — Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS● Ratings, *Absolute Values:*

	54 to 216 Mc	
DC PLATE VOLTAGE	1250 max.	volts

§,○,□,★,■,♦,●,▪,*,#: See next page.

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BEAM POWER TUBE

	54 to 216 Mc	
DC GRID-No.2 (SCREEN-GRID) VOLTAGE.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-250 max.	volts
DC PLATE CURRENT (AVERAGE)®	250 max.	ma
PLATE DISSIPATION	250 max.	watts
GRID-No.2 DISSIPATION	12 max.	watts
GRID-No.1 DISSIPATION	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

Typical CCS Operation (With bandwidth of 5 Mc):

DC Plate Voltage.	750	1000	1250	volts
DC Grid-No.2 Voltage.	300	300	300	volts
DC Grid-No.1 Voltage.	-60	-65	-70	volts
Peak RF Grid-No.1 Voltage:				
Synchronizing level	85	95	100	volts
Pedestal level.	65	70	75	volts
DC Plate Current:				
Synchronizing level	335	330	305	ma
Pedestal level.	245	240	230	ma
DC Grid-No.2 Current:				
Synchronizing level	50	45	45	ma
Pedestal level.	20	15	10	ma
DC Grid-No.1 Current:				
Synchronizing level	15	20	25	ma
Pedestal level.	4	4	4	ma
Driver Power Output (Approx.):				
Synchronizing level	7	8	9	watts
Pedestal level.	4.25	4.7	5.5	watts
Useful Power Output (Approx.):				
Synchronizing level	135	200	250	watts
Pedestal level.	75	110	140	watts

LINEAR RF POWER AMPLIFIER
Single-Sideband Suppressed-Carrier Service

Maximum CCS® Ratings, *Absolute Values:*

	Up to 150 Mc	*Up to 500 Mc*	
DC PLATE VOLTAGE.	2000 max.	1250 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT. .	250 max.	250 max.	ma
PLATE DISSIPATION	250 max.	250 max.	watts
GRID-No.2 DISSIPATION	12 max.	12 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	150 max.	150 max.	volts
Heater positive with respect to cathode.	150 max.	150 max.	volts

§,○,□,★,■,◆,●,▪,#,◉,▲: See next page.

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BEAM POWER TUBE

Typical CCS Class AB_1 "Single-Tone" Operation up to 150 Mc:♦♦					
DC Plate Voltage	800	1000	1500	2000	volts
DC Grid-No.2 Voltage‡	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage	-40	-43	-50	-50	volts
Zero-Signal DC Plate Current	52	42	28	21	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	0	ma
Effective RF Load Resistance	1625	2125	3285	4380	ohms
Max.-Signal DC Plate Current	211	223	228	235	ma
Max.-Signal DC Grid-No.2 Current	20	13	11	9	ma
Max.-Signal Peak RF Grid-No.1 Voltage	40	43	50	50	volts
Max.-Signal Driving Power (Approx.)	0	0	0	0	watts
Max.-Signal Power Output (Approx.)	85	115	200	290	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance under Any Condition:
- With fixed bias . . . . . 25000 max. ohms
- With cathode bias . . . . . Not recommended

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum CCS® Ratings, *Absolute Values:*

	Up to 150 Mc	*150 to 500 Mc*	
DC PLATE VOLTAGE	1600 max.	1000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-250 max.	-250 max.	volts
DC PLATE CURRENT	200 max.	200 max.	ma
PLATE DISSIPATION	165 max.	165 max.	watts
GRID-No.2 DISSIPATION	10 max.	10 max.	watts
GRID-No.1 DISSIPATION	2 max.	2 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	150 max.	150 max.	volts
Heater positive with respect to cathode	150 max.	150 max.	volts

§,○,□,★,■,♦,●,▪,#,⊕,♦,♦♦,‡: See next page.

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BEAM POWER TUBE

Typical CCS Operation at Frequencies up to 150 Mc:

DC Plate Voltage	1200	1600	volts
DC Grid-No.2 Voltage (Modulated approx. 55%)▲	250	250	volts
DC Grid-No.1 Voltage**	-118	-118	volts
Peak AF Grid-No.2 Voltage (For 100% modulation)	180	200	volts
Peak RF Grid-No.1 Voltage	136	136	volts
DC Plate Current	200	200	ma
DC Grid-No.2 Current	23	23	ma
DC Grid-No.1 Current (Approx.)	5	5	ma
Driving Power (Approx.)	2	3	watts
Power Output (Approx.)	160	230	watts

Typical CCS Operation at 165 Mc:

DC Plate Voltage	400	600	800	1000	volts
DC Grid-No.2 Voltage (Modulated approx. 55%)▲	250	250	250	250	volts
DC Grid-No.1 Voltage	-90	-95	-100	-105	volts
Peak AF Grid-No.2 Voltage (For 100% modulation)	140	150	160	170	volts
Peak RF Grid-No.1 Voltage	110	120	120	125	volts
DC Plate Current	200	200	200	200	ma
DC Grid-No.2 Current	40	35	25	20	ma
DC Grid-No.1 Current (Approx.)	7	8	10	15	ma
Driving Power (Approx.)	1	1	1.5	2	watts
Power Output (Approx.)	55	80	100	140	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance under Any Condition . . . . 25000 max. ohms

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy†
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS● Ratings, *Absolute Values:*

	Up to 150 Mc	*150 to 500 Mc*	
DC PLATE VOLTAGE	2000 max.	1250 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	300 max.	300 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-250 max.	-250 max.	volts
DC PLATE CURRENT	250 max.	250 max.	ma
PLATE DISSIPATION	250 max.	250 max.	watts
GRID-No.2 DISSIPATION	12 max.	12 max.	watts
GRID-No.1 DISSIPATION	2 max.	2 max.	watts

§,○,□,★,■,◆,●,*,#,⊛,♦,♦♦,‡,▲,**,†: See next page.

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BEAM POWER TUBE

PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	150 max.	150 max.	volts
Heater positive with respect to cathode	150 max.	150 max.	volts

Typical CCS Operation at Frequencies up to 150 Mc:

DC Plate Voltage	1500	2000	volts
DC Grid-No.2 Voltage	250	250	volts
DC Grid-No.1 Voltage	-88	-88	volts
Peak RF Grid-No.1 Voltage.	110	110	volts
DC Plate Current	250	250	ma
DC Grid-No.2 Current	24	24	ma
DC Grid-No.1 Current (Approx.) . . .	8	8	ma
Driving Power (Approx.).	1.5	2.5	watts
Power Output (Approx.)	260	370	watts

Typical CCS Operation at 165 Mc:

DC Plate Voltage	600	750	1000	1250	volts
DC Grid-No.2 Voltage	250	250	250	250	volts
DC Grid-No.1 Voltage	-75	-80	-80	-90	volts
Peak RF Grid-No.1 Voltage. . .	91	96	95	106	volts
DC Plate Current	200	200	200	200	ma
DC Grid-No.2 Current	37	37	31	20	ma
DC Grid-No.1 Current (Approx.).	11	11	10	11	ma
Driving Power (Approx.). . . .	1	1	1	1.2	watts
Power Output (Approx.)	85	110	150	195	watts

Typical CCS Operation at Frequency of 500 Mc with Coaxial Cavity:

DC Plate Voltage	600	800	1000	1250	volts
DC Grid-No.2 Voltage	250	250	250	280	volts
DC Grid-No.1 Voltage	-110	-110	-110	-115	volts
DC Plate Current	170	200	200	200	ma
DC Grid-No.2 Current	6	7	7	5	ma
DC Grid-No.1 Current (Approx.).	6	10	10	10	ma
Driver Power Output (Approx.)♦	15	20	25	30	watts
Useful Power Output (Approx.).	50	95	120	140	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance under Any Condition.	25000 max.	ohms

§,○,□,★,■,♦,●,*,#,⊕,♠,♠♠,‡,▲,▲▲,†: See next page.

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RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	2.3	2.9	amp
Direct Interelectrode Capacitances:°				
Grid No.1 to plate	-	-	0.05	μμf
Grid No.1 to cathode, grid No.2, and heater	-	14.5	17	μμf
Plate to cathode, grid No.2, and heater	-	4	4.8	μμf
Grid-No.1 Voltage	1,2,3,4	-34	-46	volts
Grid-No.2 Current	1,2,3,4	-5	3	ma
Mu-Factor, Grid No.2 to Grid No.1	1,3,4,5	4	6	
Power Output	3,4,6	100	-	watts

Note 1: With 6.0 volts on heater.

Note 2: With dc plate volts = 1000, dc grid-No.2 volts = 300, and grid-No.1 voltage adjusted to give plate current of 150 milliamperes.

Note 3: With forced-air cooling as specified under GENERAL DATA for Air-System Socket.

Note 4: Heater voltage must be applied for at least 30 seconds before application of other voltages.

Note 5: With dc grid-No.2 volts = 300 and grid-No.2 milliamperes = 50.

Note 6: With heater volts = 5.5, dc plate volts = 1000, dc grid-No.2 volts = 250, dc grid-No.1 volts = -90, maximum dc grid-No.1 milliamperes = 20, grid-No.1 signal voltage adjusted to give dc plate current of 200 milliamperes, and a frequency of 475 Mc.

§ Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

° With cylindrical shield having inside diameter of 1-13/16" completely surrounding radiator, and insulated from the top and sides of it by a 1/16" thickness of insulating material; and with a cylindrical shield having inside diameter of 1.460" and length of 5/16" surrounding the grid-No.2 ring terminal and insulated from it. Both shields are connected to ground.

□ Available from Eitel-McCullough, Inc., San Bruno, Calif.

★ For use at lower frequencies.

■ For use at higher frequencies.

♦ 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.

Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

⊕ Averaged over any frame.

♦ The 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, in components, in initial tube characteristics, and in tube characteristics during life.

♦♦, ‡, ▲, ▲▲, †: See next page.

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‡‡ "Single-Tone" operation refers to that class of amplifier service in which the grid-No.2 input consists of a monofrequency rf signal having constant amplitude. This signal is produced in a single-sideband suppressed-carrier system when a single audio frequency of constant amplitude is applied to the input of the system.

‡ Preferably obtained from a fixed supply.

▲ The dc grid-No.2 voltage must be modulated approximately 55% in phase with the plate modulation in order to obtain 100% modulation of the 703%. The use of a series grid-No.2 resistor or reactor may not give satisfactory performance and is therefore not recommended.

▲▲ Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

† 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.

SPECIAL PERFORMANCE DATA

Interelectrode Leakage:

This test is destructive and is performed on a sample lot of tubes from each production run under the following conditions: ac heater volts = 6.6, no voltage on other elements, and specified forced-air cooling for Air-System Socket. At the end of 500 hours, with tube at 25° C, and with no voltage applied to heater, the minimum resistance between indicated electrodes as measured with a 500-volt Megger-type ohmmeter having an internal impedance of 2.5 megohms, will be:

Grid No.1 and Grid No.2	10 min.	megohms
Grid No.1 and Cathode	10 min.	megohms
Grid No.2 and Cathode	10 min.	megohms

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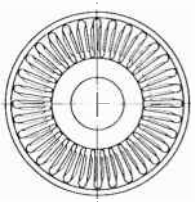

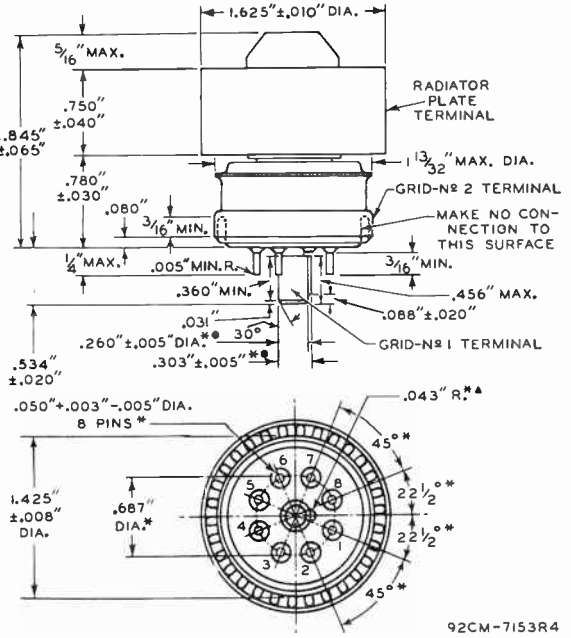

GRID-No. 1 PLUG DIMENSIONS ARE MEASURED BY THE USE OF THE SERIES OF GAUGES SHOWN IN SKETCHES G_1 AND G_2. IN THE FOLLOWING INSTRUCTIONS FOR THE USE OF THESE GAUGES, "GO" INDICATES THAT THE ENTIRE GRID-No. 1 PLUG KEY WILL ENTER THE GAUGE; AND "NO-GO" INDICATES THAT THE GRID-No. 1 PLUG

▲,●,*: See next page.

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KEY WILL NOT ENTER THE GAUGE MORE THAN 1/16". INSTRUCTIONS FOR THE USE OF THE GAUGES FOLLOW:

▲ GAUGES G_1-1, G_1-2, G_1-3, AND G_1-4:

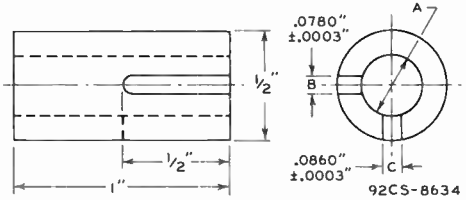
USING ONLY SLOT C, TRY THESE GAUGES IN NUMERICAL ORDER UNTIL ONE IS FOUND THAT WILL ACCEPT THE ENTIRE GRID-No.1 PLUG. USING THE FIRST GAUGE THUS FOUND, IT WILL NOT BE POSSIBLE TO INSERT THE GRID-No.1 PLUG IN SLOT B.

● GAUGES, G_2-1, G_2-2, AND G_2-3:

THE GRID-No.1 PLUG WILL BE REJECTED BY GAUGES G_2-1 AND G_2-2, BUT WILL BE ACCEPTED BY GAUGE G_2-3.

* BASE-PIN POSITIONS ARE HELD TO TOLERANCES SUCH THAT THE ENTIRE LENGTH OF THE PINS WILL, WITHOUT UNDUE FORCE, PASS INTO AND DISENGAGE FROM THE FLAT-PLATE GAUGE SHOWN IN SKETCH G_3.

GAUGE SKETCH G_1



Gauge	Dimension A
G_1-1	.2575" + .0000" − .0005"
G_1-2	.2600" + .0000" − .0005"
G_1-3	.2625" + .0000" − .0005"
G_1-4	.2650" + .0000" − .0005"

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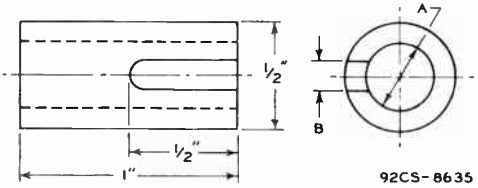
GAUGE SKETCH G_2



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Gauge	Dimension	
	A	B
G_2-1	.2550" $^{+\ .0000"}_{-\ .0005"}$	.125"
G_2-2	.2980" $^{+\ .0000"}_{-\ .0005"}$	none
G_2-3	.3080" $^{+\ .0000"}_{-\ .0005"}$	none

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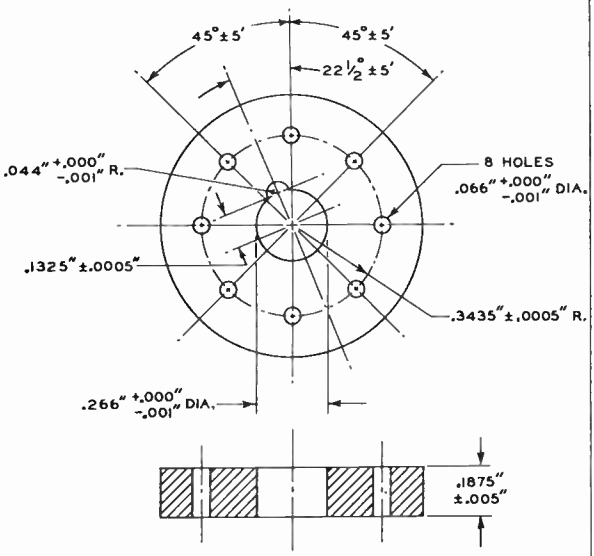
GAUGE SKETCH G_3



TOLERANCES ARE NOT CUMULATIVE

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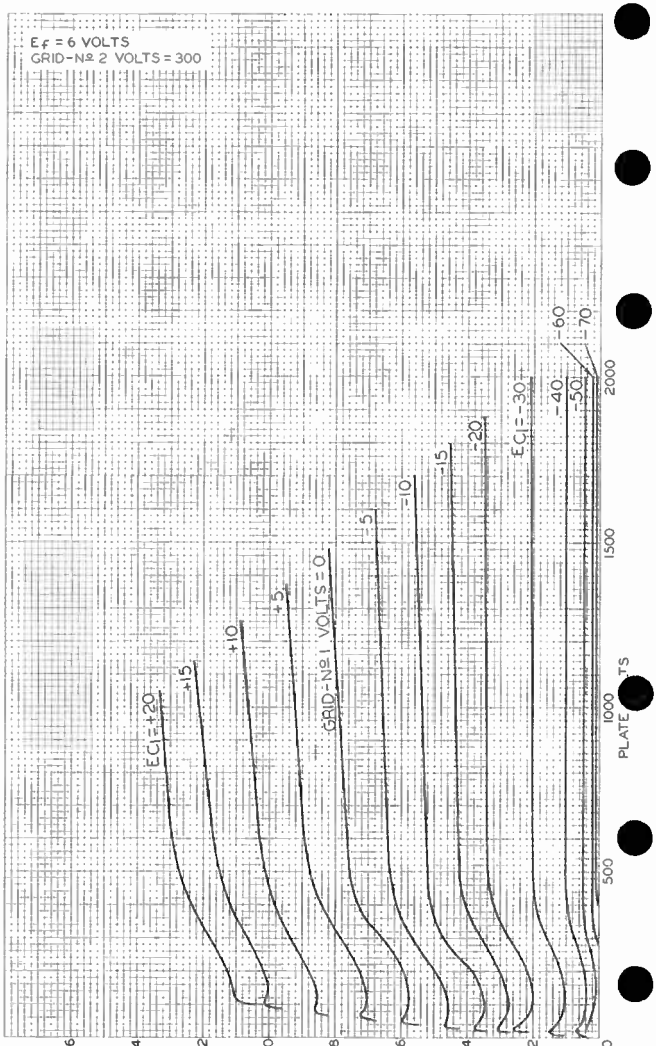
AVERAGE PLATE CHARACTERISTICS



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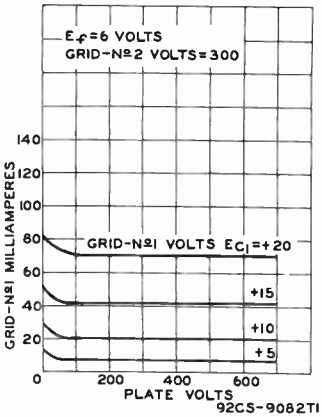
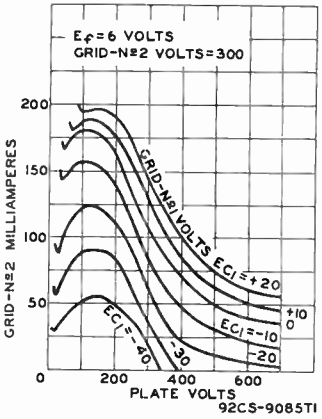
TYPICAL CHARACTERISTICS





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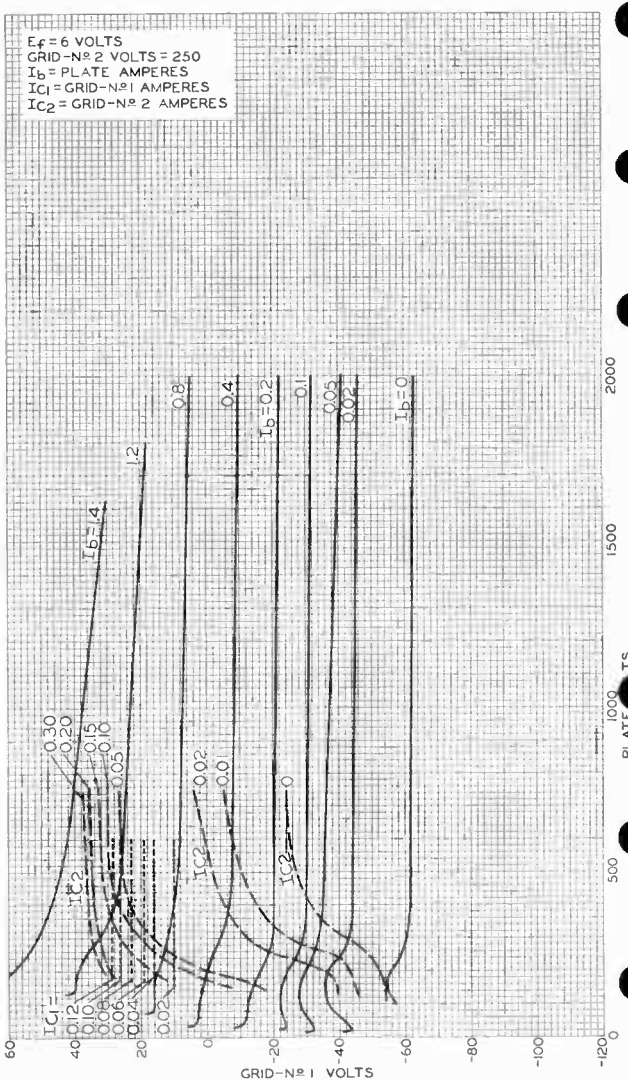
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



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7035/4X150D
BEAM POWER TUBE

FORCED-AIR COOLED

Useful at frequencies up to 500 Mc

The 7035/4X150D is the same as the 7034/4X150A except for the following items:

Heater, for Unipotential Cathode:

Voltage§	26.5 ± 10%	ac or dc volts
Current at 26.5 volts	0.58	amp

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.50	0.62	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	-	0.05	μμf
Grid No.1 to cathode, grid No.2, and heater	2	14.5	17	μμf
Plate to cathode, grid No.2, and heater	2	4	4.8	μμf
Grid-No.1 Voltage	1,3,4,5	-34	-46	volts
Grid-No.2 Current	1,3,4,5	-5	3	ma
Mu-Factor, Grid No.2 to Grid No.1	1,4,5,6	.4	6	
Power Output	4,5,7	100	-	watts

Note 1: With 26.5 volts on heater.

Note 2: With cylindrical shield having inside diameter of 1-13/16" completely surrounding radiator, and insulated from the top and sides of it by a 1/16" thickness of insulating material; and with a cylindrical shield having inside diameter of 1.460" and length of 5/16" surrounding the grid-No.2 ring terminal and insulated from it. Both shields are connected to ground.

Note 3: With dc plate volts = 1000, dc grid-No.2 volts = 300, and grid-No.1 voltage adjusted to give plate current of 150 milliamperes.

Note 4: With forced-air cooling as specified under GENERAL DATA for Air-System Socket for type 7034/4X150A.

Note 5: Heater voltage must be applied for at least 30 seconds before application of other voltages.

Note 6: With dc grid-No.2 volts = 300 and grid-No.2 milliamperes = 50.

Note 7: With heater volts = 24.5, dc plate volts = 1000, dc grid-No.2 volts = 250, dc grid-No.1 volts = -90, maximum dc grid-No.1 milliamperes = 20, grid-No.1 signal voltage adjusted to give dc plate current of 200 milliamperes, and a frequency of 475 Mc.

§ Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

SPECIAL PERFORMANCE DATA

Interelectrode Leakage:

This test is destructive and is performed on a sample lot of tubes from each production run under the following conditions: ac heater volts = 29.1, no voltage on other elements, and specified forced-air cooling for Air-System Socket. At the

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BEAM POWER TUBE

end of 500 hours, with tube at 25° C, and with no voltage applied to heater, the minimum resistance between indicated electrodes as measured with a 500-volt Megger-type ohmmeter having an internal impedance of 2.5 megohms, will be:

Grid No.1 and grid No.2.	10 min.	megohms
Grid No.1 and cathode.	10 min.	megohms
Grid No.2 and cathode.	10 min.	megohms

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BEAM POWER TUBE

FORCED-AIR COOLED AT MAXIMUM RATINGS

500 Watts CW Input (ICAS) up to 60 Mc
335 Watts CW Input (ICAS) at 175 Mc

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current at 6.3 volts	3.2	amp
Transconductance (Approx.) for plate volts = 300, grid-No.2 volts = 300, and plate ma. = 250.	10000	μmhos
Mu-Factor, Grid No.2 to Grid No.1, for plate volts = 300, grid-No.2 volts = 300, and plate ma. = 250	7	
Direct Interelectrode Capacitances:[○]		
Grid No.1 to plate[®]	0.5	μμf
Grid No.1 to grid No.2 & internal shield[®]	9	μμf
Grid No.1 to cathode and heater[®]	9	μμf
Grid No.2 & internal shield to plate[®]	9	μμf
Grid No.2 & internal shield to cathode and heater[®]	2.8	μμf
Plate to cathode and heater[®]	1.8	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	5"
Seated Length	4.44" ± 0.08"
Maximum Diameter	2.56"
Weight (Approx.)	6 oz
Socket	Johnson Nos. 122-247■ or 122-248■, or equivalent
Base	Jumbo-Button Septar 7-Pin (JETEC No.E7-46)

BOTTOM VIEW

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

Pin 5 – Grid No.2, Internal Shield
Pin 6 – Grid No.1
Pin 7 – Grid No.2, Internal Shield
P – Plate

Cooling--Free circulation of air around the tube is required. Under operating conditions at maximum ratings, some forced-air cooling will be required from a small fan to prevent exceeding the specified maximum bulb temperature.

Bulb Temperature (At hottest point)	250 max.	°C

■ The separate shield rings furnished with these sockets should be discarded since these rings do not accommodate the 7094.

○,®: See next page.

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BEAM POWER TUBE

AF POWER AMPLIFIER & MODULATOR — Class AB_1 ♦

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	1500 max.	2000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT□	350 max.	350 max.	ma
MAX.-SIGNAL PLATE INPUT□	300 max.	400 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT□	20 max.	20 max.	watts
PLATE DISSIPATION□	100 max.	125 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
Typical Operation:			
Values are for 2 tubes			
DC Plate Voltage	1500	2000	volts
DC Grid-No.2 Voltage§	400	400	volts
DC Grid-No.1 (Control-Grid) Voltage**	-50	-50	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	88	88	volts
Zero-Signal DC Plate Current	60	60	ma
Max.-Signal DC Plate Current	400	400	ma
Max.-Signal DC Grid-No.2 Current	70	70	ma
Effective Load Resistance (Plate to plate)	8700	12000	ohms
Max.-Signal Driving Power (Approx.)	0	0	watts
Max.-Signal Power Output (Approx.)	410	560	watts

LINEAR RF POWER AMPLIFIER — Class AB_1
Single-Sideband Suppressed-Carrier Service

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values up to 60 Mc:*			
DC PLATE VOLTAGE	1500 max.	2000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT	350 max.	350 max.	ma
MAX.-SIGNAL PLATE INPUT	300 max.	400 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT	20 max.	20 max.	watts
PLATE DISSIPATION	100 max.	125 max.	watts

○, ⊕, ♦, ●, ●●, □, §, **: See next page.

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BEAM POWER TUBE

PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
Typical Operation for "Single-Tone Modulation" at 60 Mc: ◆◆			
DC Plate Voltage	1500	2000	volts
DC Grid-No.2 Voltage§	400	400	volts
DC Grid-No.1 (Control-Grid) Voltage**	−50	−50	volts
Max.-Signal Peak RF Grid-No.1 Voltage	44	44	volts
Zero-Signal DC Plate Current	30	30	ma
Max.-Signal DC Plate Current	200	200	ma
Max.-Signal Grid-No.2 Current	35	35	ma
Effective RF Load Resistance	4350	6000	ohms
Max.-Signal Driver Power Output (Approx.)	4	4	watts
Output-Circuit Efficiency (Approx.)	90	90	%
Max.-Signal Useful Power Output (Approx.)	185◆	250◆	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
For maximum plate voltage and maximum plate input above 60 Mc, see Rating Chart I			
DC PLATE VOLTAGE	1000 max.	1200 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	−300 max.	−300 max.	volts
DC PLATE CURRENT	280 max.	280 max.	ma
DC GRID-No.1 CURRENT	25 max.	30 max.	ma
PLATE INPUT	250 max.	335 max.	watts
GRID-No.2 INPUT	13.5 max.	13.5 max.	watts
PLATE DISSIPATION	67 max.	83 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts

○, ●, ◆, ●●, □, §, **, ◆◆, ◆: See next page.

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BEAM POWER TUBE

Typical Operation at 60 Mc:			
DC Plate Voltage	1000	1200	volts
DC Grid-No.2 Voltage▲	400	400	volts
DC Grid-No.1 Voltage★	−130	−130	volts
Peak RF Grid-No.1 Voltage	145	150	volts
DC Plate Current	250	275	ma
DC Grid-No.2 Current	20	20	ma
DC Grid-No.1 Current (Approx.)	5	5	ma
Driver Power Output (Approx.)❀▲▲	5	5	watts
Output-Circuit Efficiency (Approx.)	90	90	%
Useful Power Output (Approx.)	165⊕	240⊕	watts
Typical Operation at 175 Mc:			
DC Plate Voltage	700	820	volts
DC Grid-No.2 Voltage▲	400	400	volts
DC Grid-No.1 Voltage★	−130	−130	volts
DC Plate Current	250	275	ma
DC Grid-No.2 Current	8	8	ma
DC Grid-No.1 Current (Approx.)	6	6	ma
Driver Power Output (Approx.)▲▲	8	8	watts
Output-Circuit Efficiency (Approx.)	85	85	%
Useful Power Output (Approx.)	105⊕	135⊕	watts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance‡	30000 max.	30000 max.	ohms

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy†
and
RF POWER AMPLIFIER — Class C FM Telephony

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
For maximum plate voltage and maximum plate input above 60 Mc, see Rating Chart II			
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	−300 max.	−300 max.	volts
DC PLATE CURRENT	340 max.	340 max.	ma
DC GRID-No.1 CURRENT	25 max.	30 max.	ma
PLATE INPUT	375 max.	500 max.	watts
GRID-No.2 INPUT	20 max.	20 max.	watts
PLATE DISSIPATION	100 max.	125 max.	watts

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BEAM POWER TUBE

PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cathode.	135 max.		135 max.	volts
Heater positive with respect to cathode.	135 max.		135 max.	volts
Typical Operation at 60 Mc:				
DC Plate Voltage.	1000	1250	1500	volts
DC Grid-No.2 Voltage□□.	400	400	400	volts
DC Grid-No.1 Voltage⊕⊕.	-100	-100	-100	volts
Peak RF Grid-No.1 Voltage	125	120	125	volts
DC Plate Current.	330	300	330	ma
DC Grid-No.2 Current.	20	18	20	ma
DC Grid-No.1 Current (Approx.)	5	5	5	ma
Driver Power Output (Approx.)♦▲▲.	4	4	4	watts
Output-Circuit Efficiency (Approx.)	90	90	90	%
Useful Power Output (Approx.)	215⊕	255⊕	340⊕	watts
Typical Operation at 175 Mc:				
DC Plate Voltage.	665	875	1000	volts
DC Grid-No.2 Voltage□□.	400	400	400	volts
DC Grid-No.1 Voltage⊕⊕.	-100	-100	-100	volts
DC Plate Current.	335	300	335	ma
DC Grid-No.2 Current.	8	7	8	ma
DC Grid-No.1 Current (Approx.)	5	5	5	ma
Driver Power Output (Approx.)▲▲	8	7	8	watts
Output-Circuit Efficiency (Approx.)	85	85	85	%
Useful Power Output (Approx.)	130⊕	170⊕	215⊕	watts
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance‡	30000 max.			ohms

° Without external shield.
⊕ All other elements are connected to ground.
♦ Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.
● Continuous commercial service.
●● Intermittent commercial and Amateur service.
□ Averaged over any audio-frequency cycle of sine-wave form.
§ Obtained preferably from a fixed supply.
** Obtained from a fixed supply.

♦,⊕,▲,★,♦,▲▲,‡,†,□□,⊕⊕: See next page.

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‡‡ "Single-Tone Modulation" operation refers to that class of amplifier service in which the grid-No.1 input consists of a monofrequency rf signal having constant amplitude. This signal is produced in a single-sideband suppressed-carrier system when a single audio frequency of constant amplitude is applied to the input of the system.

⌖ This value of useful power is measured at load of output circuit having indicated efficiency.

▲ 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.

★ 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 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.

✱ Indicated values are for operation at 60 Mc. Less driver power output is required at frequencies below 60 Mc.

▲▲ 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, in components, in initial tube characteristics, and in tube characteristics during life.

‡ When grid No.1 is driven positive, the total dc grid-No.1-circuit resistance should not exceed the specified maximum value of 30,000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

† Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

□ 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. Grid-No.2 voltage must not exceed 500 volts under key-up conditions.

⊛⊛ Obtained from a grid-No.1 resistor, or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

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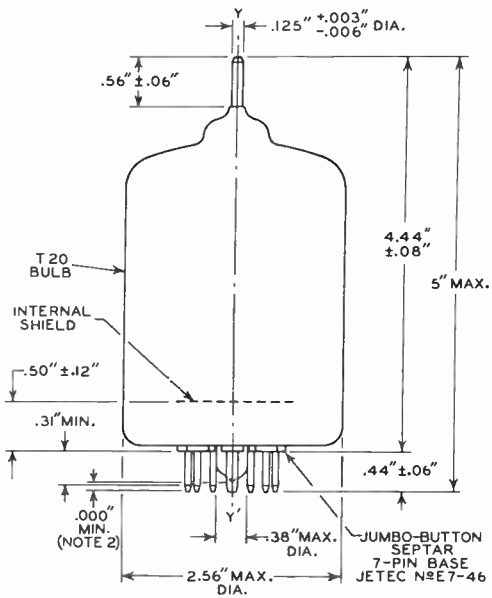

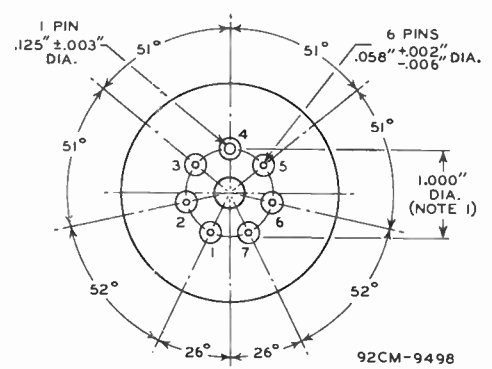

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BEAM POWER TUBE

THE REFERENCE AXIS Y–Y' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1:

NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF 0.375" A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES 0.0800" ± 0.0005" AND ONE HOLE 0.1450" ± 0.0005" ARRANGED ON A 1.0000" ± 0.0005" DIAMETER CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF ± 5' FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE 0.500" ± 0.010" CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS Y–Y'.

NOTE 2: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.

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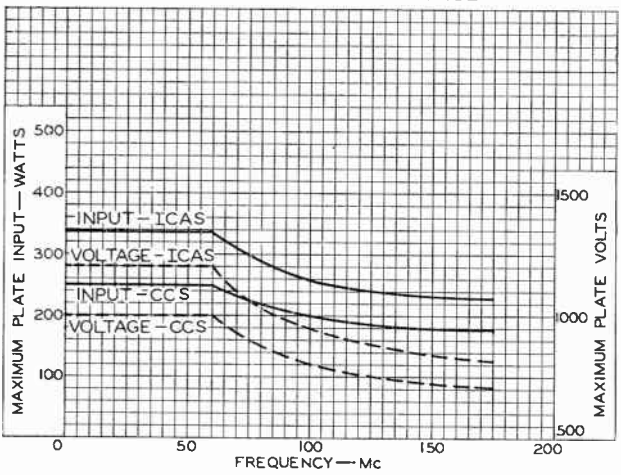
RATING CHART I
CLASS C TELEPHONY SERVICE



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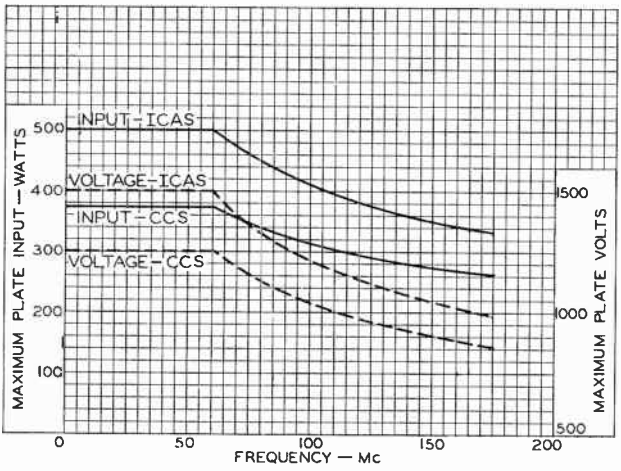
RATING CHART II
CLASS C TELEGRAPHY SERVICE



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TYPICAL PLATE CHARACTERISTICS

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TYPICAL PLATE CHARACTERISTICS

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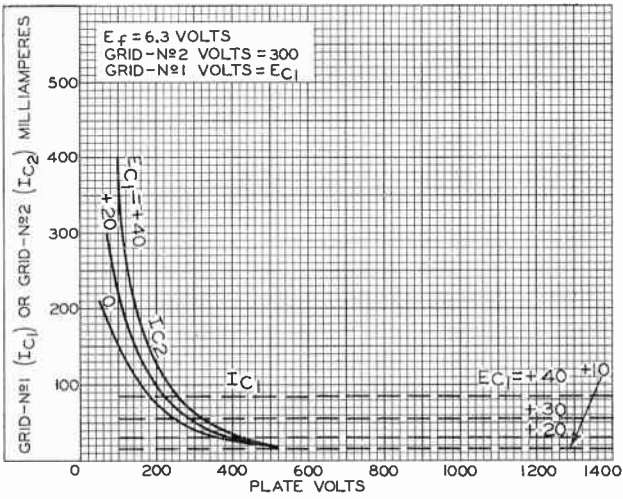
TYPICAL CHARACTERISTICS



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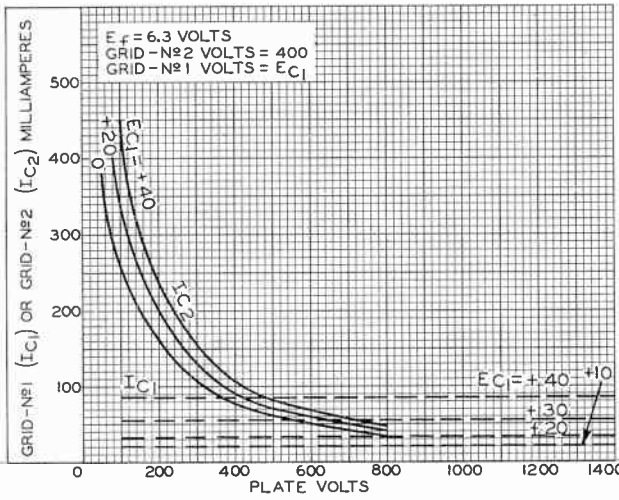

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AVERAGE CONSTANT-CURRENT CHARACTERISTICS

E_f=6.3 VOLTS
GRID-№2 VOLTS=400
I_b=PLATE AMPERES
I_{C_1}=GRID-№1 AMPERES
I_{C_2}=GRID-№2 AMPERES

PLATE VOLTS
0 250 500 750 1000 1250 1500 1750

I_b=1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.1

I_{C_1}=
0.09
0.06
0.03
0.02
0
-50
-100
-150

I_{C_2}=0.3
0.2
0.15
0.1
0.08
0.07
0.06
0.05

GRID-№1 VOLTS
100 50 0 -50 -100 -150

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

92CM-9512

World Radio History

World Radio History

Magnetron

TUNABLE TYPE

FORCED-AIR COOLED — INTEGRAL MAGNET

For Pulsed-Oscillator Applications at Frequencies between 8500 and 9600 Mc

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	13.75 ± 10%	volts
Current at heater volts = 13.75	3.15	amp
Starting current	Must never exceed 12 amperes, even momentarily	
Minimum Cathode Heating Time	2.5	minutes
Frequency	8500 to 9600	Mc
Maximum Frequency Pulling at VSWR of 1.5	15	Mc

Mechanical:

Operating Position . . . . . Any

Dimensions . . . . . See *Dimensional Outline*

Air Flow:

To Fins--An air stream should be directed along the cooling fins toward the body of the tube. Adequate flow should be provided so that the temperature of the anode block does not exceed 150° C.

To Heater-Cathode Terminal--Adequate flow should be provided to maintain the temperature of the heater-cathode terminal below 165° C.

Waveguide Output Flange . . . . . Mates with Modified JAN UG-52A/U Flange

Heater & Heater-Cathode Connector with built-in capacitor . . . . . Jettron No. 9000-C[a], or Ucinite No. 115364[b]

Tuning Shaft with Associated Calibrated Indicator:

Revolutions (Approx.) to cover full range of 8500 to 9600 Mc 8-1/2

Maximum torque (Absolute) at tuning-range stops . . . . . 200 oz-in.

Typical torque between -55° and +150° C (Approx.) . . . . . 50 oz-in.

Weight (Approx.) . . . . . 12 lbs

PULSED OSCILLATOR

Maximum and Minimum Ratings, *Absolute-Maximum Values:*

For duty factor up to 0.0011 maximum

PEAK ANODE VOLTAGE	23 max.	kv
PEAK ANODE CURRENT	27.5 max.	amp
PEAK POWER INPUT[c]	630 max.	kw
AVERAGE POWER INPUT	0.63 max.	kw
PULSE DURATION	2.6 max.	μsec

World Radio History

RATE OF RISE OF VOLTAGE PULSE	200 max. 70 min.	kv/μsec kv/μsec
ANODE-BLOCK TEMPERATURE	150 max.	°C
HEATER-CATHODE-TERMINAL TEMPERATURE	165 max.	°C
LOAD-VOLTAGE STANDING-WAVE RATIO	1.5 max.	

Typical Operation:[d]

With load-voltage standing-wave ratio equal to or less than 1.05, except as noted, and with duty factor of 0.001

Heater Voltage	See *Operating Considerations*		
Peak Anode Voltage	22	22	kv
Peak Anode Current	27.5	27.5	amp
Pulse-Repetition Rate	400	4000	pps
Pulse Duration	2.5	0.25	μsec
RF Bandwidth with worst phasing of 1.5 VSWR	0.5	5	Mc
Side Lobes with worst phasing of 1.5 VSWR	8	10	db
Pulling Figure at VSWR of 1.5	10	10	Mc
Pushing Figure	0.2	0.2	Mc/amp
Thermal Factor for any 30° range of anode-block temperature between −55° C and 150° C	0.2	0.2	Mc/°C
Servo-Drive-Shaft Torque	6	6	oz-in.
Frequency Deviation due to tuning backlash	8	8	Mc
Peak Power Output (Approx.)	230	230	kw

[a] Manufactured by Jettron Products, Hanover, New Jersey.

[b] Manufactured by Ucinite Division of United-Carr Fastener Corporation, Newtonville 60, Massachusetts.

[c] For atmospheric pressure greater than 600 millimeters of mercury in the vicinity of the heater-cathode stem. Operation at pressures lower than 600 millimeters of mercury may result in arc-over across the stem with consequent damage to the tube. The waveguide must always be pressurized to a minimum of 15 psi absolute to prevent arcing, especially when there is a mismatched load. Arcing in the waveguide due to lack of pressure can damage the tube.

[d] It is essential that the input circuit be designed so that if arcing occurs the energy per pulse delivered to the tube cannot greatly exceed the normal energy per pulse. To satisfy this requirement, it is recommended that pulsers of the discharging-network type be used.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	2.9	3.3	amp
Peak Anode Voltage	2	20	23	kv
Peak Power Output	3	200	–	kw
Pulses Missing from Total	4,5	–	0.25	%

Note 1: With 13.75 volts ac or dc on heater.

Note 2: With peak anode current of 27.5 amperes. For heater voltage, see *Operating Considerations*.

Note 3: With peak anode current of 27.5 amperes corresponding to a peak anode voltage in the order of 22 kv, anode-block temperature of 115° C approx., pulse duration of 2.5 microseconds, and maximum load-voltage standing-wave ratio equal to or less than 1.05. For heater voltage, see *Operating Considerations*.

World Radio History

Note 4: Pulses are considered to be missing if the energy level at the operating frequency is less than 70 per cent of the normal value.

Note 5: With peak anode current of 27.5 amperes corresponding to a peak anode voltage in the order of 22 kv, anode-block temperature of 115° C approx., pulse duration of 0.25 microsecond, and load-voltage standing-wave ratio of 1.5 adjusted in phase to produce maximum instability. For heater voltage, see *Operating Considerations*.

OPERATING CONSIDERATIONS

The *high voltage at which the 7111 is operated is very dangerous.* Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltage. Precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

Fastening the JAN RG-51/U waveguide to the waveguide output flange of the tube is accomplished in the following manner. A JAN UG-52A/U choke flange or equivalent should be modified by drilling out the screw threads from the four mounting holes in the choke flange using a No. 15 drill. This operation will permit four size 8-32 bolts inserted through the flange mounting holes to engage the threaded waveguide output flange of the tube.

Cooling of the anode block is accomplished by directing a separate stream of clean air through each set of cooling fins toward the anode block. The two streams are provided from two 3/4"-diameter ducts placed 1/2" to 3/4" from the fins.

After the *heater voltage* is raised gradually to its rated value of 13.75 volts, allow the cathode to warm up for at least 2-1/2 minutes to make sure that the cathode reaches operating temperature. When the cathode has reached full operating temperature, high-voltage pulses, negative with respect to anode (ground), can be applied to the heater-cathode terminal. As soon as the high-voltage pulses are applied, the heater voltage (E_f) should preferably be reduced in accordance with the following formula, depending on the average power input (P_i) to the tube:

$$P_i \text{ up to } 450 \text{ watts: } E_f = 13.75 \left(1 - \frac{P_i}{450}\right) \text{ volts}$$

$$P_i \text{ greater than } 450 \text{ watts: } E_f = 0 \text{ volts}$$

In those cases where this type is used as replacement for the fixed-frequency type 4J50, it is permissible to apply the following formula which is specified for reducing the heater voltage on the 4J50.

$$P_i \text{ up to } 100 \text{ watts: } E_f = 13.75 \text{ volts}$$

$$P_i \text{ greater than } 100 \text{ watts: } E_f = 14 \left(1 - \frac{P_i}{1120}\right) \text{ volts}$$

World Radio History

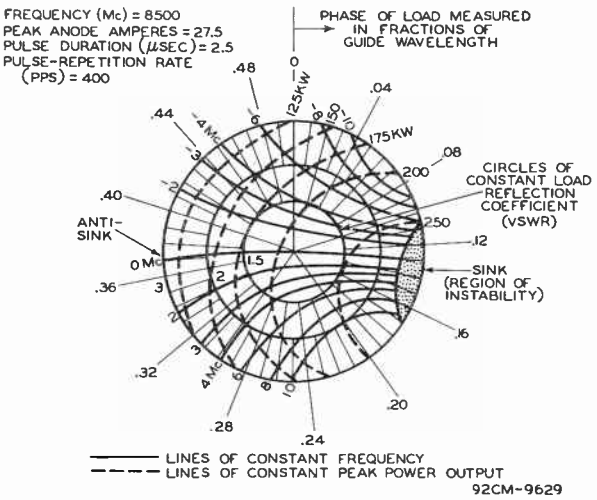
For *standby operation*, during which the high-voltage pulses are not applied to the tube, the heater voltage should be restored to 13.75 volts.

Tuning is accomplished by pushing in on the knurled tuning knob and turning it until the desired setting of the calibrated indicator is reached. Releasing the knob allows a spring to disengage it from the tuning mechanism. The design of the 7111 provides an essentially constant operating frequency without requiring a positive mechanical lock even though the tube is subjected to vibration.

For precise tuning adjustment, the final indicator setting should be approached using the same direction of rotation of the tuning shaft. There is little frequency drift after changing tuner setting.

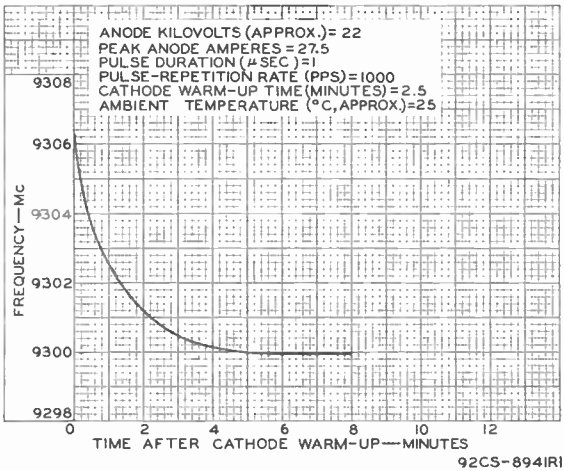
Our engineers are ready to assist you in circuit applications of the RCA-7111. For further information, write to Commercial Engineering, RCA, Harrison, New Jersey, giving complete details as to the proposed service.

RIEKE DIAGRAM



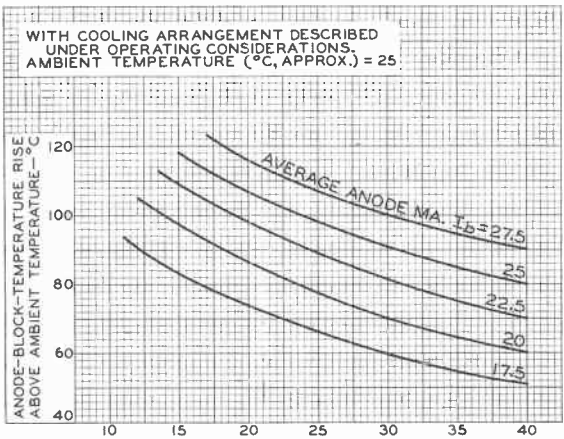
World Radio History

TYPICAL STABILIZATION CHARACTERISTIC



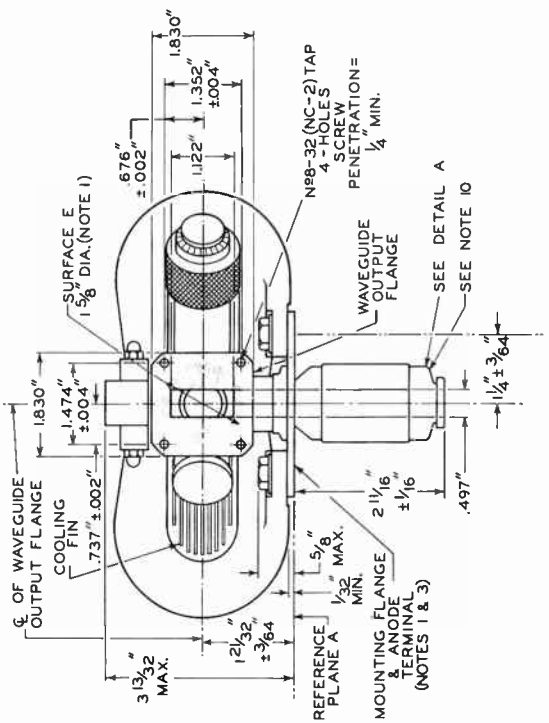
92CS-8941RI

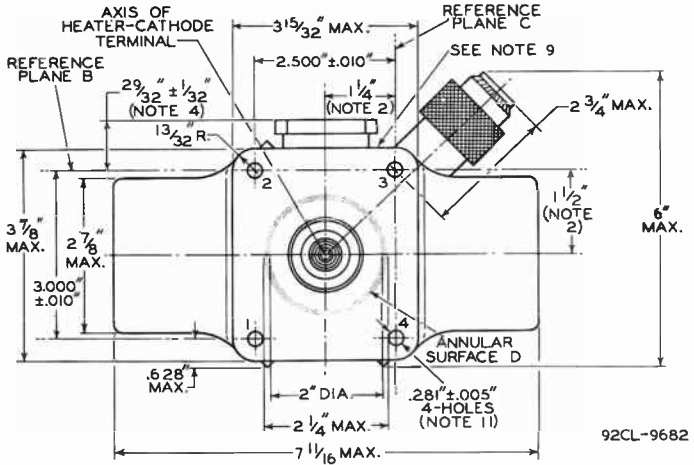
TYPICAL COOLING REQUIREMENTS



92CS-9688RI

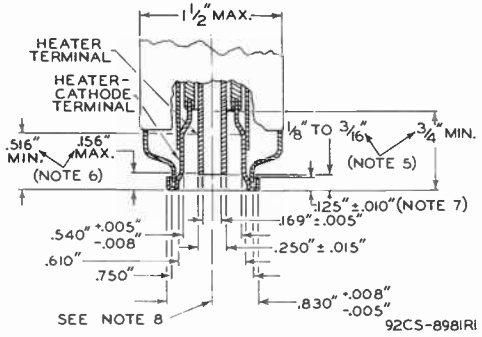
World Radio History


1.830"
1.352" ±.004"
.676" ±.002"
1.122"
№8-32 (NC-2) TAP 4-HOLES SCREW PENETRATION = ¼" MIN.
SURFACE E 1⅝" DIA. (NOTE 1)
WAVEGUIDE OUTPUT FLANGE
SEE DETAIL A
SEE NOTE 10
1¼" ± 3/64
1.830"
1.474" ±.004"
.737" ±.002"
℄ OF WAVEGUIDE OUTPUT FLANGE
COOLING FIN
3 13/32" MAX.
12 1/32" ± 3/64"
REFERENCE PLANE A
5/8" MAX.
1/32" MIN.
MOUNTING FLANGE & ANODE TERMINAL (NOTES 1 & 3)
2 1/16" ± 1/16"
.497"



World Radio History

DETAIL A



REFERENCE PLANE A IS DEFINED AS THE PLANE THROUGH THAT PORTION OF THE MOUNTING FLANGE DESIGNATED AS ANNULAR SURFACE D.

REFERENCE PLANE B IS DEFINED AS THE PLANE WHICH IS PERPENDICULAR TO PLANE A AND PASSES THROUGH THE EXACT CENTERS OF MOUNTING-FLANGE HOLES 2 AND 3.

REFERENCE PLANE C IS DEFINED AS THE PLANE WHICH IS PERPENDICULAR TO PLANE A AND PLANE B AND PASSES THROUGH THE EXACT CENTERS OF MOUNTING-FLANGE HOLES 3 AND 4.

NOTE 1: SURFACE E OF THE WAVEGUIDE OUTPUT FLANGE AND THE ENTIRE SURFACE OF THE MOUNTING FLANGE ARE MADE SO THAT THEY MAY BE USED TO PROVIDE A HERMETIC SEAL.

NOTE 2: THE AXIS OF THE HEATER-CATHODE TERMINAL WILL BE WITHIN THE CONFINES OF A CYLINDER WHOSE RADIUS IS 3/64" AND WHOSE AXIS IS PERPENDICULAR TO REFERENCE PLANE A AT THE SPECIFIED LOCATION.

NOTE 3: ALL POINTS ON THE MOUNTING FLANGE WILL LIE WITHIN 0.015" ABOVE OR BELOW REFERENCE PLANE A.

NOTE 4: THE LIMITS INCLUDE ANGULAR AS WELL AS LATERAL DEVIATIONS.

NOTE 5: THESE DIMENSIONS DEFINE EXTREMITIES OF THE 0.169" INTERNAL DIAMETER OF THE CYLINDRICAL HEATER TERMINAL.

NOTE 6: THESE DIMENSIONS DEFINE EXTREMITIES OF THE 0.540" INTERNAL DIAMETER OF THE CYLINDRICAL HEATER-CATHODE TERMINAL.

NOTE 7: NO PART OF THE CONNECTOR DEVICE FOR THE HEATER AND HEATER-CATHODE TERMINALS SHOULD BEAR AGAINST THE UNDERSIDE OF THIS LIP.

NOTE 8: THE HEATER TERMINAL AND THE HEATER-CATHODE TERMINAL ARE CONCENTRIC WITHIN 0.010".

NOTE 9: ANODE TEMPERATURE MEASURED AT JUNCTION OF WAVEGUIDE AND ANODE BLOCK.

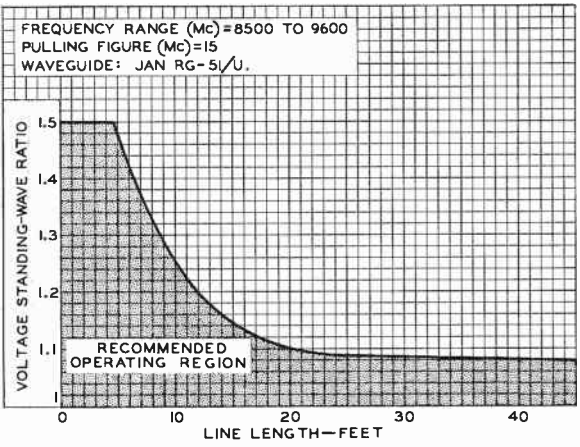
Radio Museum

NOTE 10: CATHODE TEMPERATURE MEASURED HERE.

NOTE 11: THE ENDS OF THE MOUNTING STUDS MUST NOT PENETRATE THROUGH THE MOUNTING HOLES MORE THAN 1-3/32" FROM THE MOUNTING-FLANGE SURFACE.

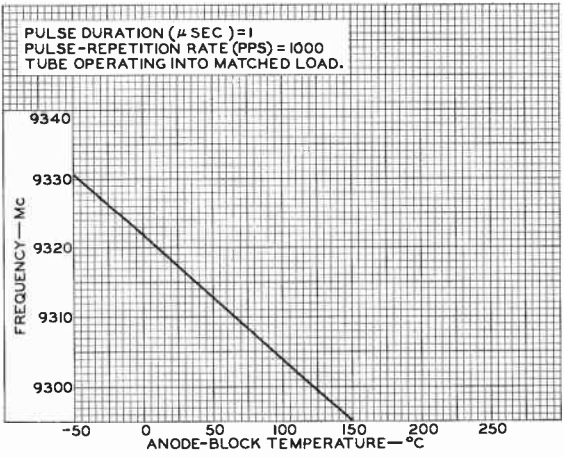
World Radio History

EFFECT OF LENGTH OF TRANSMISSION LINE BETWEEN OUTPUT FLANGE AND LOAD ON ALLOWABLE VOLTAGE STANDING-WAVE RATIO



92CS-9469RI

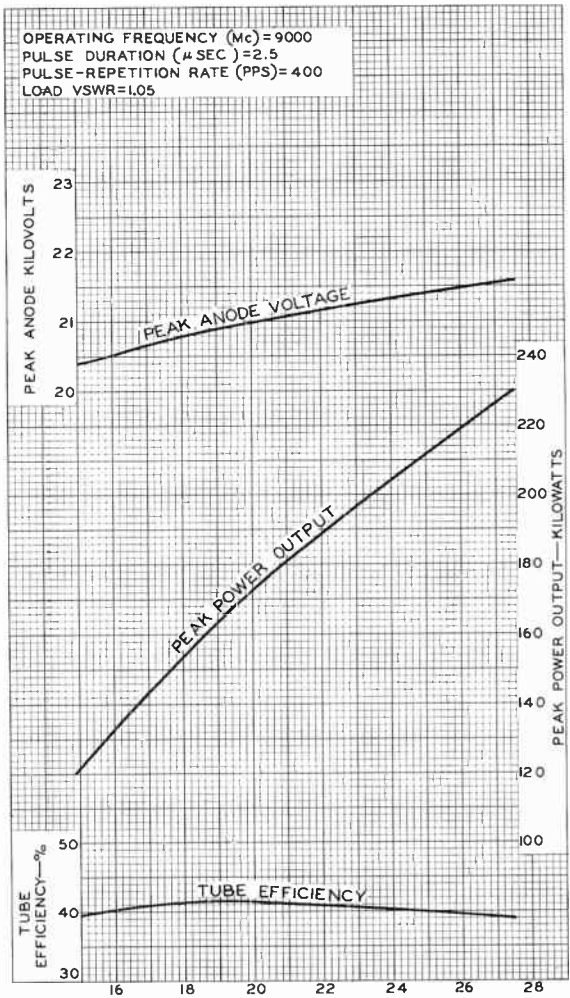
TYPICAL THERMAL-FACTOR CHARACTERISTIC



92CS-9285RI

World Radio History

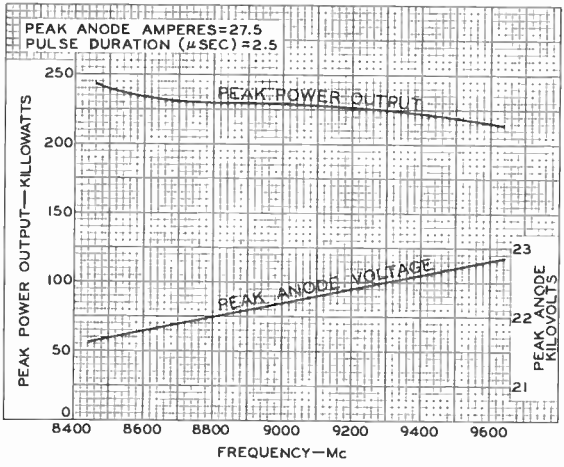
TYPICAL PERFORMANCE CHARACTERISTICS



92CM-9468RI

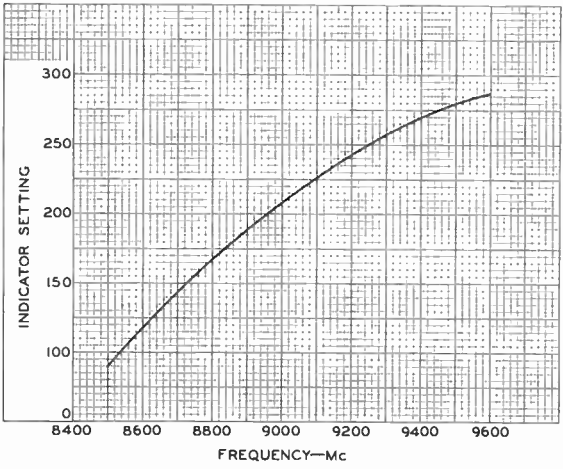
World Radio History

TYPICAL PERFORMANCE CHARACTERISTICS



92CS-9690

REPRESENTATIVE TUNING CHARACTERISTIC



92CS-9691

World Radio History

7247

Dual Triode

With High-Mu Unit and Medium-Mu Unit

9-PIN MINIATURE TYPE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

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

Direct Interelectrode Capacitances (Approx.):

	Without External Shield	*With External Shield*[a]	
Unit No.1:			
Grid to plate	1.7	1.7	μμf
Grid to cathode and heater	1.6	1.8	μμf
Plate to cathode and heater	0.37	2.2	μμf
Unit No.2:			
Grid to plate	1.4	1.4	μμf
Grid to cathode and heater	1.8	2	μμf
Plate to cathode and heater	0.33	1.6	μμf

Equivalent-Noise and Hum Voltage (Referenced to Grid):

Values are for Unit No.1

Average Value (RMS) . . . . . 1.8 microvolts

Measured in "true rms" units under the following conditions: heater volts = 6.3 ac (parallel connection), center-tap of heater transformer connected to ground, dc plate supply volts = 250, plate load resistor (megohms) = 0.1, cathode resistor (ohms) = 2700, cathode-bypass capacitor (μf) = 100, grid resistor (ohms) = 0, and amplifier covering frequency range between 25 and 10,000 cps.

Maximum Value (RMS) . . . . . 7 microvolts

Measured in "true rms" units under the same conditions as for "Average Value" except that the cathode resistor is untypassed, and grid resistor (megohms) = 0.05.

Characteristics, Class A_1 Amplifier:

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

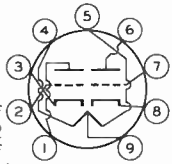
World Radio History

7247

Mechanical:

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

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



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

AMPLIFIER— Class A_1

Maximum Ratings, *Design-Maximum Values:*

	Unit No.1	*Unit No.2*	
PLATE VOLTAGE.	330 max.	330 max.	volts
GRID VOLTAGE:			
Negative-bias value.	55 max.	55 max.	volts
Positive-bias value.	0 max.	0 max.	volts
CATHODE CURRENT.	-	22 max.	ma
PLATE DISSIPATION.	1.2 max.	3 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200 max.	200 max.	volts
Heater positive with respect to cathode	200[b] max.	200[b] max.	volts

Maximum Circuit Values:

	Unit No.1	*Unit No.2*	
Grid-Circuit Resistance:			
For fixed-bias operation . .	15 max.	0.5 max.	megohms
For cathode-bias operation .	-	1 max.	megohm

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

World Radio History

Medium-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	2.2	μμf
Grid to cathode, shell, and heater	4.2	μμf
Plate to cathode, shell, and heater	1.6	μμf
Plate to cathode	0.26	μμf
Heater to cathode	1.4	μμf

Characteristics, Class A_1 Amplifier: ←

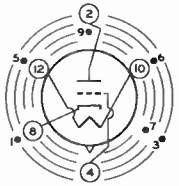
Plate Supply Voltage	–	–	75	volts
Plate Voltage	26.5	40	–	volts
Grid Supply Voltage	0	0	0	volts
Cathode Resistor	–	–	100	ohms
Amplification Factor	31	35	35	
Grid-Circuit Resistance	0.5	0.5	–	megohm
Plate Resistance (Approx.)	4400	3200	3000	ohms
Transconductance	7000	11000	11500	μmhos
Plate Current	2.8	6.8	10.5	ma
Grid Voltage (Approx.) for plate μa = 10.	–	–	-7	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 MT4 ←

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

← Indicates a change.

World Radio History

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	4 max.	volts
GRID CURRENT	2 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	1.8	2.6	μμf
Grid to cathode, shell, and heater	2	3.8	4.6	μμf
Plate to cathode, shell, and heater	2	1.4	1.8	μμf
Heater to cathode	2	1.1	1.7	μμf
Plate to cathode	2	0.2	0.32	μμf
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	40	
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,7	–	5	μa
Heater positive with respect to cathode	1,7	–	5	μa

→ Indicates a change.

World Radio History

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, cathode resistor = 100 ohms, and cathode-bypass capacitor = 1000 μf.

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.

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 nominal heater voltage only, and subjected for 48 hours to 2.5-g vibrational acceleration at 60 cycles per second in the X1 position. At the end of this test, tubes are criticized for the same characteristics and end-point values as in the Shock Rating Test described above.

Variable-Frequency Vibration Performance: ←

This test is performed on a sample lot of tubes from each production run. The tube is operated under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate-load resistor of 2000 ohms. 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

←Indicates a change.

World Radio History

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 across the plate-load resistor in excess of: (1) 25 millivolts from 50 to 6000 cps, and (2) 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 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 (1). A tube is rejected if its transconductance after 2 or 20 hours of operation has changed more than 10 per cent from the 0-hour value.

100-Hour Life Performance:

This test is performed on a sample lot of tubes from each production run to insure a low percentage of early-hour inoperatives. Tubes are operated for 100 hours at maximum-rated plate dissipation, and then subjected to the Shorts and Continuity Test previously described. Tubes must then show a transconductance of not less than 7500 micromhos under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1).

→ Indicates a change.

World Radio History

1000-Hour Conduction Life Performance:

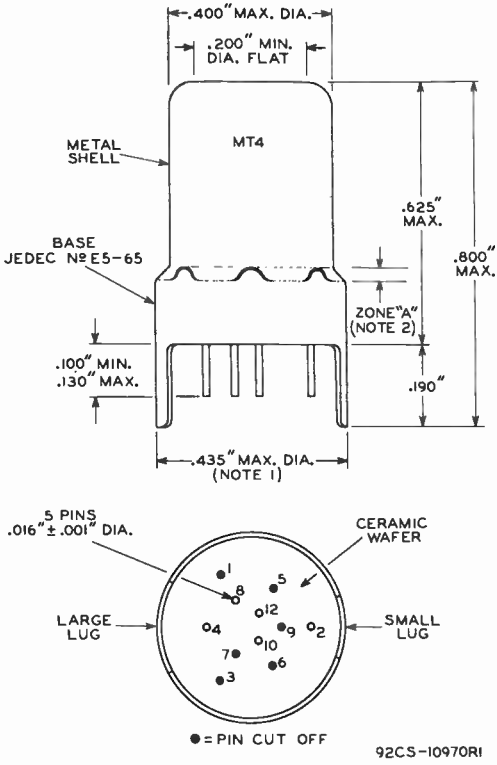
This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation[d], and then criticized for inoperatives, reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, the average change in transconductance of the lot from the 0-hour value for Transconductance (1) specified in CHARACTERISTICS RANGE VALUES, must not exceed 15 per cent at 500 hours, and 20 per cent at 1000 hours.

1000-Hour Standby Life Performance:

This test is performed on a sample lot of tubes from each production run. The tubes are operated for 1000 hours with only heater voltage applied. Tubes are criticized for inter-electrode leakage, reverse grid current, change in trans-conductance 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 F30C-57T.

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

World Radio History

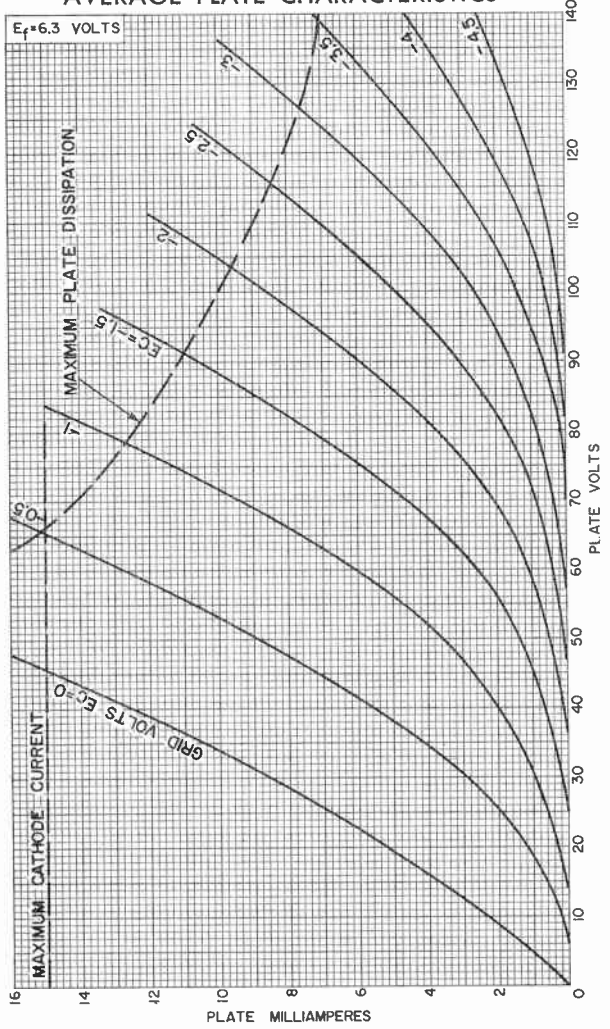


NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

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

World Radio History

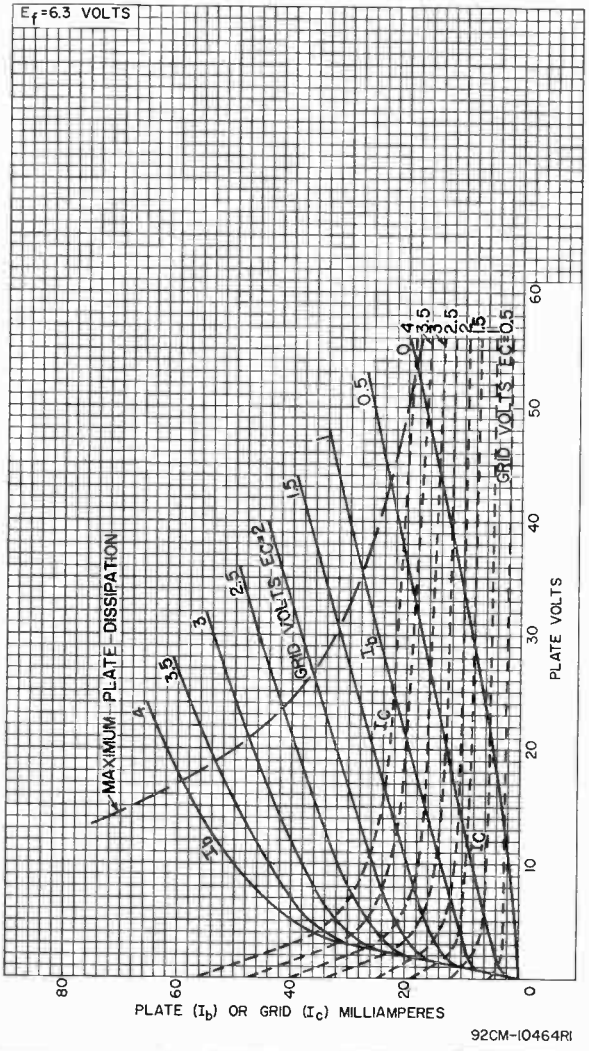
AVERAGE PLATE CHARACTERISTICS



92CM-10460RI

World Radio History

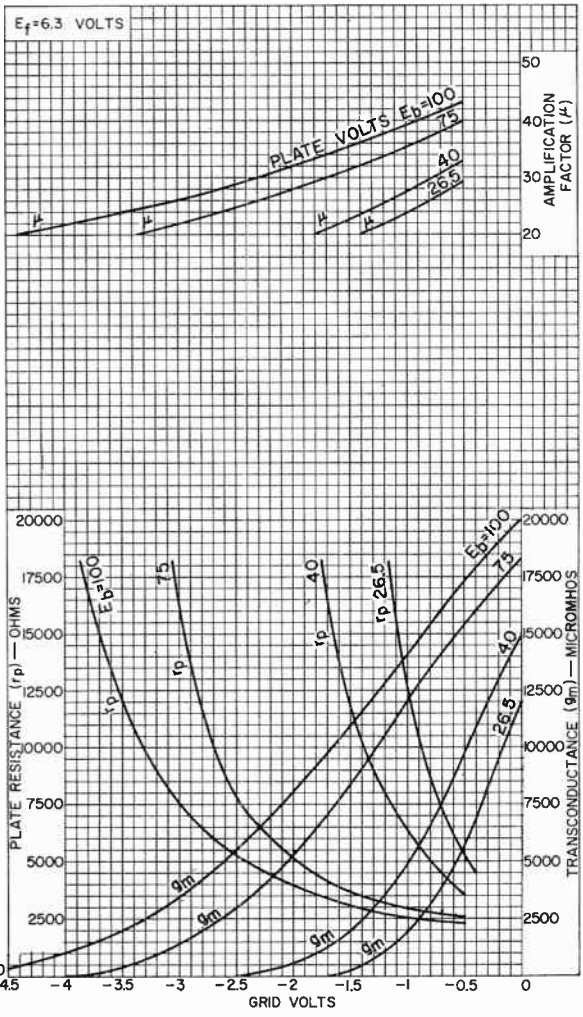
AVERAGE CHARACTERISTICS



92CM-10464RI

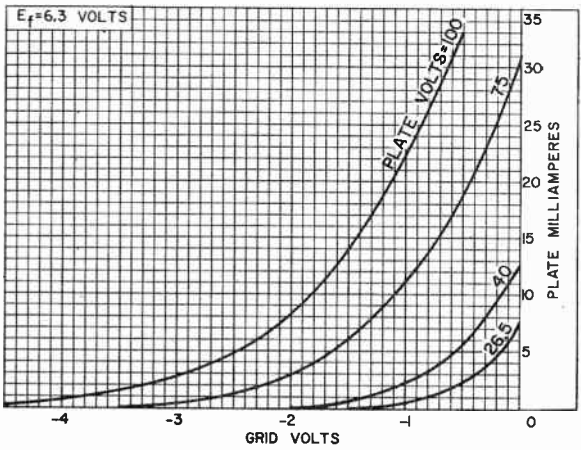
World Radio History

AVERAGE CHARACTERISTICS



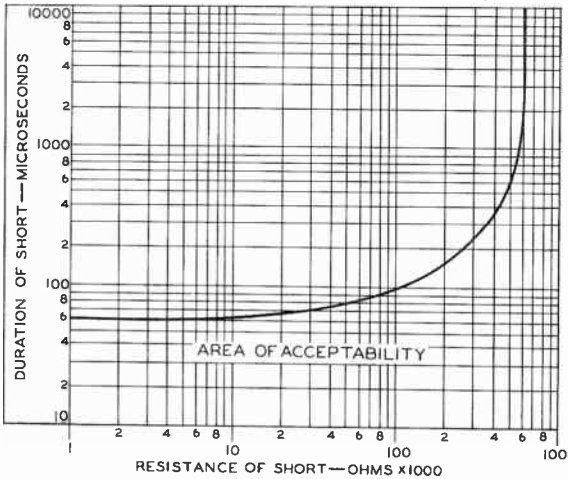
92CM-10964

AVERAGE CHARACTERISTICS



92CS-1046IRI

SHORTS-TEST ACCEPTANCE LIMITS



92CS-10465

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.

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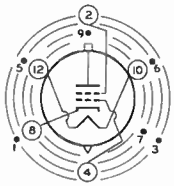
Basing Designation for BOTTOM VIEW. 12AS

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.

World Radio History

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.

World Radio History

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.

World Radio History

Early-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that tubes are properly stabilized. In this test, tubes are operated for 20 hours at maximum-rated plate dissipation. After 2 hours of operation and again after 20 hours of operation, tubes are checked for transconductance under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1). A tube is rejected if its transconductance after 2 or 20 hours of operation has changed more than 10 per cent from the 0-hour value.

100-Hour Life Performance:

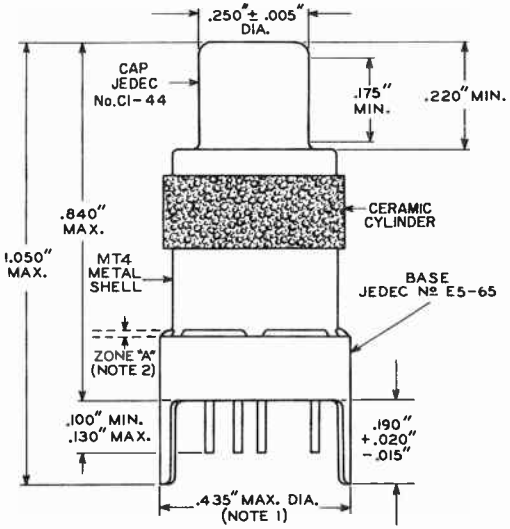
This test is performed on a sample lot of tubes from each production run to insure a low percentage of early-hour inoperatives. Tubes are operated for 100 hours at maximum-rated plate dissipation, and then subjected to the *Shorts and Continuity* Test previously described. Tubes must then show a transconductance of not less than 7500 micromhos under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1).

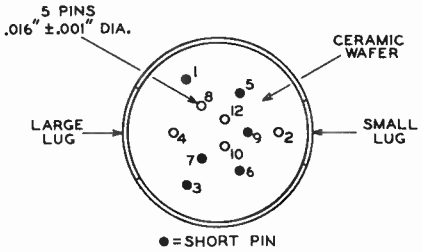
1000-Hour Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation, and then criticized for inoperatives, reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, the average change in transconductance of the lot from the 0-hour value for Transconductance (1) specified in CHARACTERISTICS RANGE VALUES, must not exceed 20 per cent at 500 hours, and 25 per cent at 1000 hours.

[c] Specifications for tapper supplied on request.

World Radio History





92CS-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.

World Radio History

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Sharp-Cutoff Tetrode

NUVISTOR TYPE

For Industrial Applications

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.15	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to plate	0.01	μμf
Grid No.1 to cathode, grid No.2, shell, and heater	6.5	μμf
Plate to cathode, grid No.2, shell, and heater	1.4	μμf
Heater to cathode	1.4	μμf

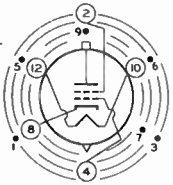
Characteristics, Class A_1 Amplifier:

Plate Supply Voltage	125	volts
Grid-No.2 Supply Voltage	50	volts
Cathode Resistor	68	ohms
Plate Resistance (Approx.)	0.2	megohm
Transconductance	10600	μmhos
Plate Current	10	ma
Grid-No.2 Current	2.7	ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-4.5	volts

Mechanical:

Operating Position	Any
Maximum Overall Length	1.050"
Maximum Seated Length	0.840"
Maximum Diameter	0.440"
Weight (Approx.)	1/10 oz
Envelope	Metal Shell MT4 and Ceramic Cylinder
Cap	Skirted Miniature (JEDEC No.C1-44)
Socket	Cinch Mfg. Corp. No.133 65 10 001, or equivalent
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)
Basing Designation for BOTTOM VIEW	12AS

Pin 1[a] – Internal Connection—Do Not Use
Pin 2 – Grid No.2
Pin 3 – Same as Pin 1
Pin 4 – Grid No.1
Pin 5 – Same as Pin 1



INDEX = LARGE LUG
• = PIN CUT OFF

Pin 6 – Same as Pin 1
Pin 7 – Same as Pin 1
Pin 8 – Cathode
Pin 9 – Same as Pin 1
Pin 10 – Heater
Pin 12 – Heater
Cap – Plate

World Radio History

INDUSTRIAL SERVICE

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

PLATE SUPPLY VOLTAGE	330 max.	volts
PLATE VOLTAGE	250 max.	volts
GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	330 max.	volts
GRID-No.2 VOLTAGE	110 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value	55 max.	volts
Peak-positive value	2 max.	volts
CATHODE CURRENT	20 max.	ma
GRID-No.1 CURRENT	2 max.	ma
GRID-No.2 INPUT	0.2 max.	watt
PLATE DISSIPATION	2.2 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance:[b]		
For fixed-bias operation	0.5 max.	megohm
For cathode-bias operation	1 max.	megohm

[a] Pin 1 is cut off close to ceramic wafer.

[b] For operation at metal-shell temperatures up to 150° C.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.14	0.16	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	0.009	0.011	μμf
Grid No.1 to cathode, grid No.2, shell, and heater	2	6	7	μμf
Plate to cathode, grid No.2, shell, and heater	2	1.2	1.6	μμf
Heater to cathode	2	1.1	1.7	μμf
Plate Current (1)	1,3	8.5	11.5	ma
Plate Current (2)	1,4	–	50	μa
Grid-No.2 Current	1,3	1.8	3.6	ma
Transconductance (1)	1,3	9000	12200	μmhos
Transconductance (2)	3,5	8000	–	μmhos
Transconductance Change: Difference between Transconductance (1) and Transconductance (2), expressed in per cent of Transconductance (1)	–	–	20	%
Reverse Grid Current	1,6	–	0.1	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,8	–	5	μa
Heater positive with respect to cathode	1,8	–	5	μa

World Radio History

Leakage Resistance:				
Between grid No.2 and all other electrodes tied together.	1,7	500	–	megohms
Between grid No.1 and all other electrodes tied together.	1,9	500	–	megohms
Between plate and all other electrodes tied together. . .	1,9	500	–	megohms

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

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 125, grid-No.2 supply volts = 50, cathode resistor = 68 ohms, and cathode-bypass capacitor = 1000 μf.

Note 4: With dc plate volts = 125, dc grid-No.2 volts = 50, dc grid-No.1 volts = -6, and metal shell connected to ground.

Note 5: With 5.7 volts ac or dc on heater.

Note 6: With dc plate volts = 200, dc grid-No.2 volts = 70, dc grid-No.1 supply volts = -1.6, grid-No.1 resistor = 0.5 megohm, and metal shell connected to ground.

Note 7: With grid No.2 100 volts negative with respect to all other electrodes tied together.

Note 8: With 100 volts dc applied between heater and cathode.

Note 9: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 10: With plate 300 volts negative with respect to all other electrodes tied together.

SPECIAL RATINGS & PERFORMANCE DATA

Shock Rating:

Impact Acceleration . . . . . 1000 max. g

This test is performed on a sample lot of tubes from each production run to determine ability of tube to withstand the specified impact acceleration. Tubes are held rigid in four different positions in a Navy Type, High-impact (flyweight) Shock Machine and are subjected to 20 blows at the specified maximum impact acceleration. At the end of this test, tubes are criticized for change in transconductance, reverse grid current, and heater-cathode leakage current, and are then subjected to the Variable-Frequency Vibration Test described below.

Fatigue Rating:

Vibrational Acceleration. . . . . 2.5 max. g

This test is performed on a sample lot of tubes to determine ability of tube to withstand the specified vibrational acceleration. Tubes are rigidly mounted, supplied with rated heater voltage only, and subjected for 48 hours to 2.5-g vibrational acceleration at 60 cycles per second in a direction perpendicular to the longitudinal axis of the tube. At the end of this test, tubes are criticized for the same characteristics and end-point values as in the Shock Rating Test described above.

World Radio History

Variable-Frequency Vibration Performance:

This test is performed on a sample lot of tubes from each production run. The tube is operated under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a plate-load resistor of 2000 ohms. During operation, tube is vibrated in a direction perpendicular to the longitudinal axis of the tube through the frequency range from 50 to 15,000 cycles per second with a constant vibrational acceleration of 1 g. During the test, tube will not show an rms output voltage across the plate-load resistor in excess of: (1) 35 millivolts from 50 to 6000 cps, (2) 500 millivolts from 6000 to 15,000 cps.

Low-Pressure Voltage-Breakdown Test:

The test is performed on a sample lot of tubes from each production run. In this test, tubes are operated with 240 rms volts applied between plate and all other electrodes and will not break down or show evidence of corona when subjected to air pressures equivalent to altitudes of up to 100,000 feet.

Heater Cycling:

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

This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 7.5 cycled one minute on and two minutes off; heater 100 volts negative with respect to cathode; grid No.1, grid No.2, plate, and metal shell connected to ground. At the end of this test, tubes are tested for open heaters and heater-cathode shorts.

Shorts and Continuity:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-10, Ammendent 2, Paragraph 4.7.7, except that tapping is done by hand with a soft rubber tapper[c]. See accompanying *Shorts-Test Acceptance-Limits* curve. Tubes are criticized for permanent or temporary shorts and open circuits.

Early-Hour Stability Life Performance:

This test is performed on a sample lot of tubes from each production run to insure that tubes are properly stabilized. In this test, tubes are operated for 20 hours at maximum-rated plate dissipation. After 2 hours of operation and again after 20 hours of operation, tubes are checked for transconductance under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1). A tube is rejected if its transconductance after 2 or 20 hours of operation has changed more than 10 per cent from the 0-hour value.

World Radio History

100-Hour Life Performance:

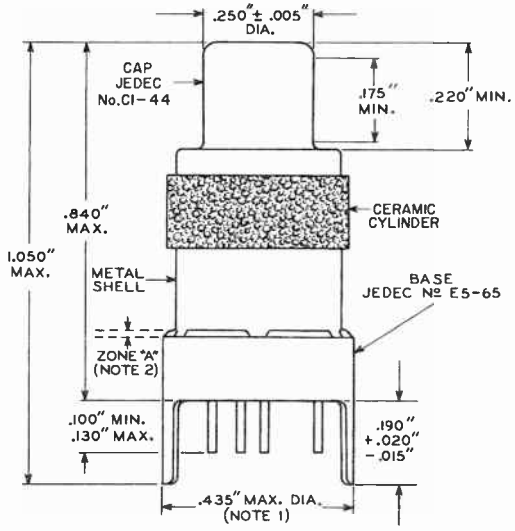
This test is performed on a sample lot of tubes from each production run to insure a low percentage of early-hour inoperatives. Tubes are operated for 100 hours at maximum-rated plate dissipation, and then subjected to the *Shorts and Continuity* Test previously described. Tubes must then show a transconductance of not less than 7500 micromhos under the conditions specified in CHARACTERISTICS RANGE VALUES for Transconductance (1).

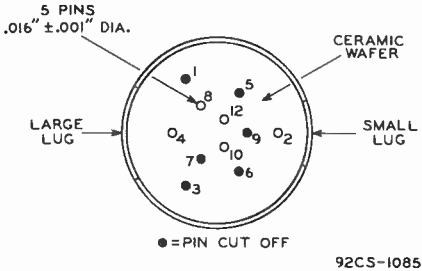
1000-Hour Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and guard against epidemic failures due to excessive changes in any of the characteristics indicated below. In this test, tubes are operated for 1000 hours at maximum-rated plate dissipation, and then criticized for inoperatives, reverse grid current, heater-cathode leakage current, and leakage resistance. In addition, the average change in transconductance of the lot from the 0-hour value for Transconductance (1) specified in CHARACTERISTICS RANGE VALUES, must not exceed 20 per cent at 500 hours, and 25 per cent at 1000 hours.

[c] Specifications for tapper supplied on request.

World Radio History





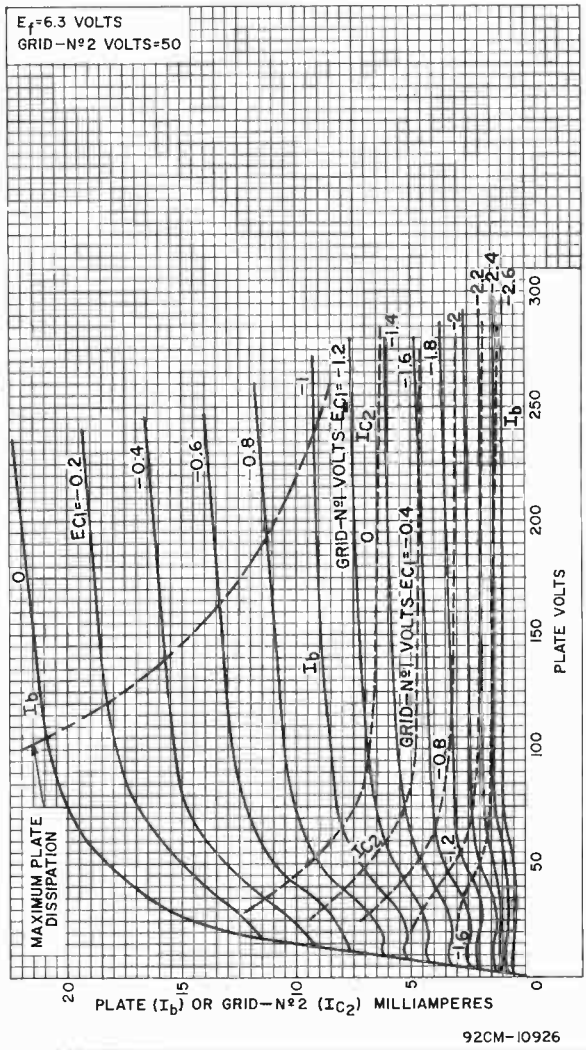
92CS-10852R1

NOTE 1: MAXIMUM OUTSIDE DIAMETER OF D.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

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

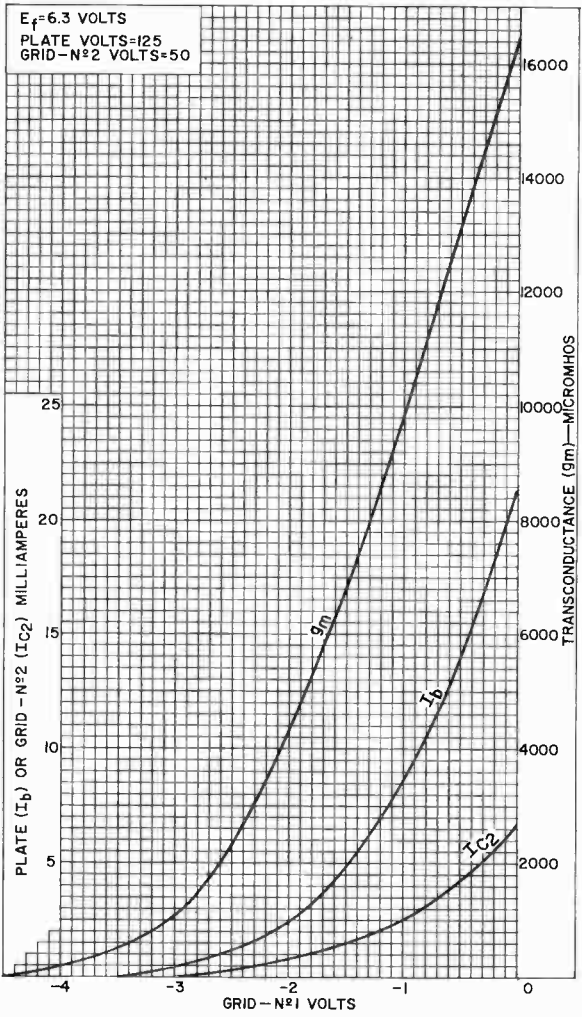
World Radio History

AVERAGE CHARACTERISTICS



92CM-10926

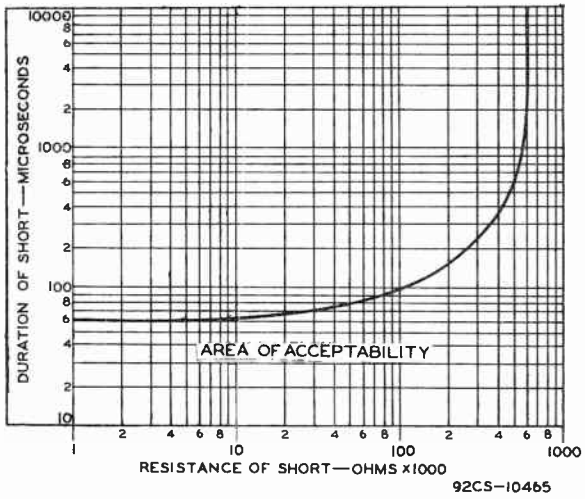
AVERAGE CHARACTERISTICS



92CM-10927

World Radio History

SHORTS-TEST ACCEPTANCE LIMITS



World Radio History

World Radio History

Beam Power Tube

CERAMIC-METAL SEALS
"ONE-PIECE" ELECTRODE DESIGN
CONDUCTION COOLED
COAXIAL-ELECTRODE STRUCTURE

52.5-WATTS CW INPUT
27-WATTS CW OUTPUT AT 400 Mc
15-WATTS CW OUTPUT AT 1200 Mc
3.2-WATTS CW OUTPUT AT 3000 Mc

UNIPOTENTIAL CATHODE

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)[a]	12.6 ± 10%	volts
Current at 12.6 volts	0.5	amp
Minimum heating time	40	sec
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 250, grid-No.2 volts = 250, and plate ma. = 35	30	
Direct Interelectrode Capacitances:[b]		
Grid No.1 to plate	0.025 max.	μμf
Grid No.1 to cathode & heater	9.5	μμf
Plate to cathode & heater	0.004 max.	μμf
Grid No.1 to grid No.2	17	μμf
Grid No.2 to plate	2.2	μμf
Grid No.2 to cathode & heater	0.18 max.	μμf

Mechanical:

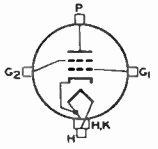
Operating Position	Any
Maximum Overall Length	1.195"
Greatest Diameter (See *Dimensional Outline*)	0.740"
Weight (Approx.)	0.5 oz

Terminal Connections (See *Dimensional Outline*):

G_1 – Grid-No.1–Terminal Contact Surface

G_2 – Grid-No.2–Terminal Contact Surface

H – Heater–Terminal Contact Surface



H,K – Heater– & Cathode–Terminal Contact Surface

P – Plate–Terminal Contact Surface

Thermal:

Terminal Temperature (Plate, grid No.2, grid No.1, cathode, and heater)	250 max.	°C

Cooling, Conduction:

The plate terminal must be thermally coupled to a constant-temperature device (heat sink—solid or liquid) to limit the plate terminal to the specified maximum value of 250° C. The grid-No.2, grid-No.1, cathode, and heater terminals may also require coupling to the heat sink to limit their respective terminal temperature to the specified maximum value of 250° C.

World Radio History

7801

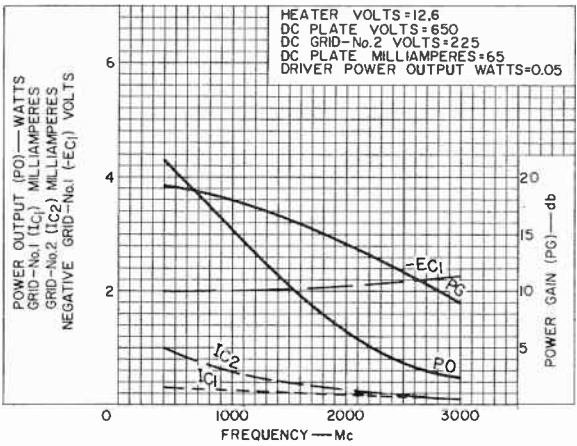
RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy
and
RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	750	max.	volts
DC GRID-No.2 VOLTAGE	250	max.	volts
DC GRID-No.1 VOLTAGE	-100	max.	volts
DC PLATE CURRENT	70	max.	ma
DC GRID-No.1 CURRENT	15	max.	ma
PLATE INPUT	52.5	max.	watts
GRID-No.2 INPUT	2	max.	watts
PLATE DISSIPATION[d]			

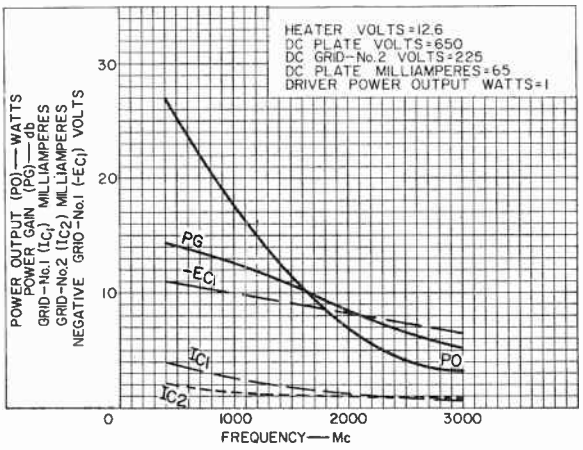
Typical CCS Operation in Cathode-Drive Circuit:

Shown Graphically in the following three Charts 92CS-10945, -10944, and -10942

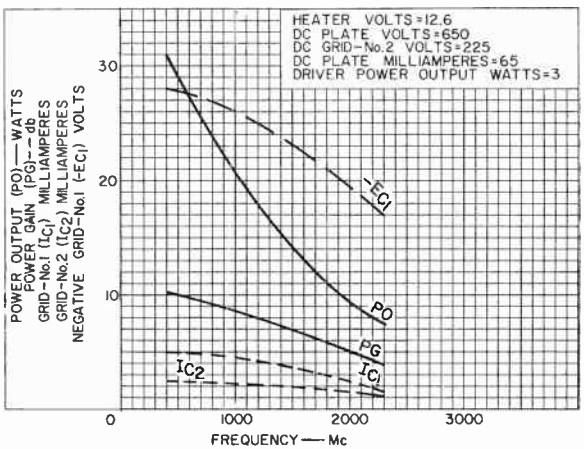


92CS-10945

World Radio History



92CS-10944



92CS-10942

7801

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

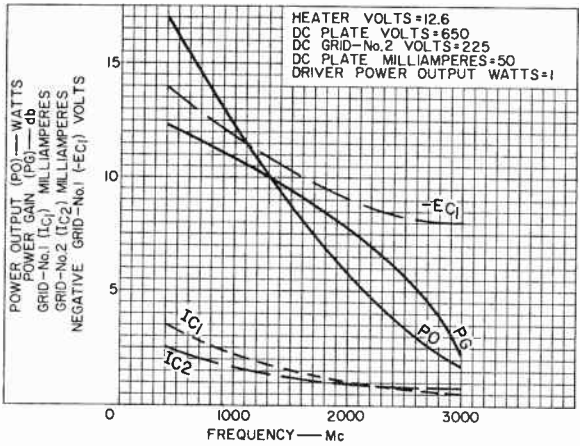
Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	750	max.	volts
DC GRID-No.2 VOLTAGE	250	max.	volts
DC GRID-No.1 VOLTAGE	-100	max.	volts
DC PLATE CURRENT	60	max.	ma
DC GRID-No.1 CURRENT	15	max.	ma
PLATE INPUT	45	max.	watts
GRID-No.2 INPUT	2	max.	watts
PLATE DISSIPATION	$_d$		

Typical CCS Operation in Cathode-Drive Circuit:

Shown Graphically in the following Chart 92CS-10943



92CS-10943

AF POWER AMPLIFIER & MODULATOR and LINEAR RF POWER AMPLIFIER
Single-Sideband Suppressed-Carrier Service

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	750	max.	volts
DC GRID-No.2 VOLTAGE	250	max.	volts
MAX.-SIGNAL DC PLATE CURRENT[e]	70	max.	ma
MAX.-SIGNAL DC GRID-No.1 CURRENT[e]	15	max.	ma
MAX.-SIGNAL PLATE INPUT[e]	52.5	max.	watts

World Radio History

MAX.-SIGNAL GRID-No.2 INPUT[e]	2	max.	watts
PLATE DISSIPATION[e]	[d]		

RF POWER AMPLIFIER — Class B Telephony

Maximum CCS[c] Ratings, *Absolute-Maximum Values:*

DC PLATE VOLTAGE	750	max.	volts
DC GRID-No.2 VOLTAGE	250	max.	volts
DC PLATE CURRENT	35	max.	ma
DC GRID-No.1 CURRENT	8	max.	ma
PLATE INPUT	52.5	max.	watts
GRID-No.2 INPUT	2	max.	watts
PLATE DISSIPATION	[d]		

Maximum Circuit Values:

Grid-No.1-Circuit Resistance under any condition	30000	max.[f]	ohms

[a] Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

[b] Measured with special shield adapter.

[c] Continuous Commercial Service.

[d] Maximum plate dissipation is a function of the maximum plate input, efficiency of the class of service, and the effectiveness of the cooling system. See *Cooling, Conduction* under *General Data*, and also *Cooling Considerations*.

[e] Averaged over any audio-frequency cycle of sine-wave form for *AF Power Amplifier & Modulator Service*.

[f] If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.44	0.54	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.025	μμf
Grid No.1 to cathode & heater	2	8.5	10.3	μμf
Plate to cathode & heater	2	–	0.004	μμf
Grid No.1 to grid No.2	2	14	20.6	μμf
Grid No.2 to plate	2	2.1	2.5	μμf
Grid No.2 to cathode & heater	2	–	0.18	μμf
Grid-No.1 Voltage	1,3	-1	-10	volts
Grid-No.1 Cutoff Voltage	1,4	–	-25	volts
Grid-No.2 Current	1,3	-3	2	ma
Positive Grid-No.1 Voltage	1,5	0	14	volts
Transconductance	1,6	7500	–	μmhos

Note 1: With 12.6 volts ac or dc on heater.

Note 2: Measured with special shield adapter.

Note 3: With dc plate voltage of 750 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 35 ma.

Note 4: With dc plate voltage of 750 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 1 ma.

World Radio History

Note 5: With dc plate voltage of 300 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage of -100 volts. Rectangular pulses, pulse duration of 4500 to 5000 microseconds and pulse-repetition frequency of 10 to 12 pps. The positive-pulse grid-No.1 voltage is adjusted to give a plate current of 300 ma. at leading edge of pulse.

Note 6: With dc plate voltage of 300 volts, dc grid-No.2 voltage of 150 volts, dc grid-No.1 voltage adjusted to give a dc plate current of 35 ma.

COOLING CONSIDERATIONS

The conduction-cooling system consists, in general, of a constant-temperature device (heat sink) and suitable heat-flow path (coupling) between the heat sink and tube. Careful consideration should be given to the design of a heat-flow path through a coupling device having high thermal conductivity.

Thermal conductivity[9] may be calculated from the equation:

$$K = \frac{W}{A \frac{(T_2 - T_1)}{L}} \qquad (1)$$

where:

- K = thermal conductivity of the material
- W = power transfer in watts
- A = area measured at right angles to the direction of the flow of heat in square inches
- T_1, T_2 = temperature in degrees Centigrade of planes or surfaces under consideration
- L = length of heat path in inches through coupling material to produce temperature gradient

[9] Thermal conductivity is defined as the time rate of transfer of heat by conduction, through unit thickness, across unit area for unit difference of temperature. It is measured in watts per square inch for a thickness of one inch and a difference of temperature of 1° C.

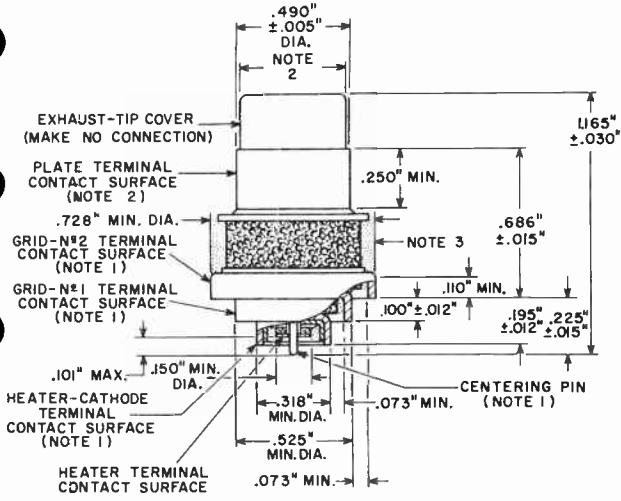
For a given system Equation (1) must be integrated to consider changes in area (A) dependent on the coupling configuration and changes in thermal conductivity (K) dependent on various coupling materials and interfaces. Equation (1) may now be reduced to the following:

$$K_S = \frac{W_P}{T_2 - T_1} \qquad (2)$$

where:

- K_S = thermal conductance of the system
- W_P = maximum permissible plate dissipation in watts
- T_2 = temperature in degrees Centigrade at tube terminal
- T_1 = temperature in degrees Centigrade of heat sink

World Radio History



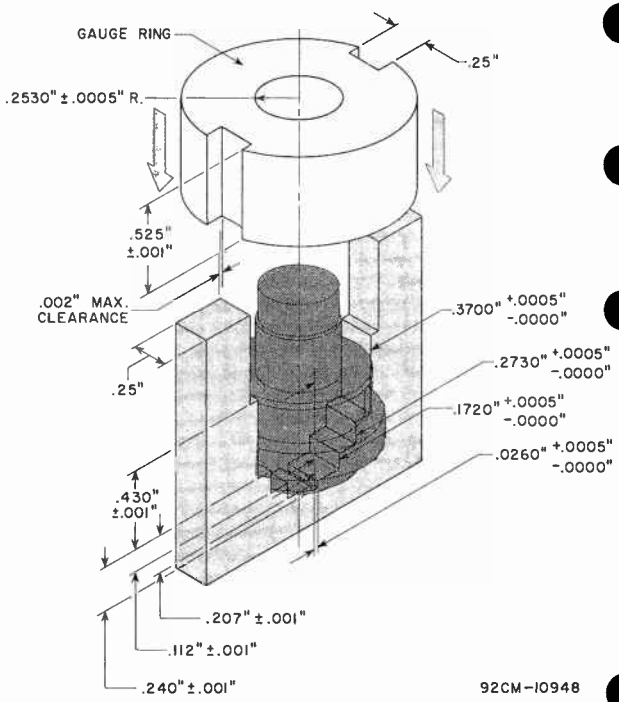
NOTE 1: WITH THE CYLINDRICAL SURFACES OF THE GRID-No.2 TERMINAL, GRID-No.1 TERMINAL, HEATER-CATHODE TERMINAL, AND CENTERING PIN CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G_1.

NOTE 2: WITH THE TUBE SEATED IN GAUGE AND WITH THE PLATE TERMINAL CLEAN, SMOOTH, AND FREE OF BURRS, THE GAUGE RING WILL SLIP OVER PLATE TERMINAL SHOWN IN SKETCH G_1 AND NOT EXTEND ABOVE GAUGE. THE TUBE WILL ROTATE 360° FREELY AND WILL NOT EXTEND ABOVE GAUGE RING.

NOTE 3: KEEP ALL STIPPLED REGIONS CLEAR. DO NOT ALLOW CONTACTS OR CIRCUIT COMPONENTS TO PROTRUDE INTO THESE ANNULAR VOLUMES.

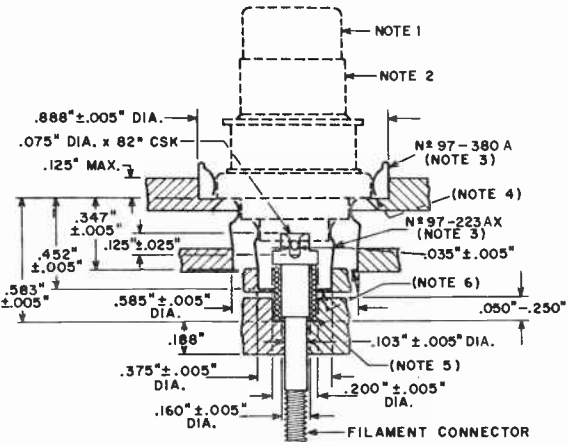
World Radio History

SKETCH G_1



World Radio History

SUGGESTED MOUNTING ARRANGEMENT & LAYOUT OF ASSOCIATED CONTACTS



NOTE 1: MAKE NO CONNECTION.

NOTE 2: IF A CLAMP IS USED, IT MUST BE ADJUSTABLE IN A PLANE NORMAL TO THE MAJOR TUBE AXIS TO COMPENSATE FOR VARIATIONS IN CONCENTRICITY BETWEEN THE PLATE TERMINAL AND THE REMAINING CONTACT TERMINALS.

NOTE 3: MADE BY INSTRUMENTS SPECIALTIES COMPANY, LITTLE FALLS, NEW JERSEY.

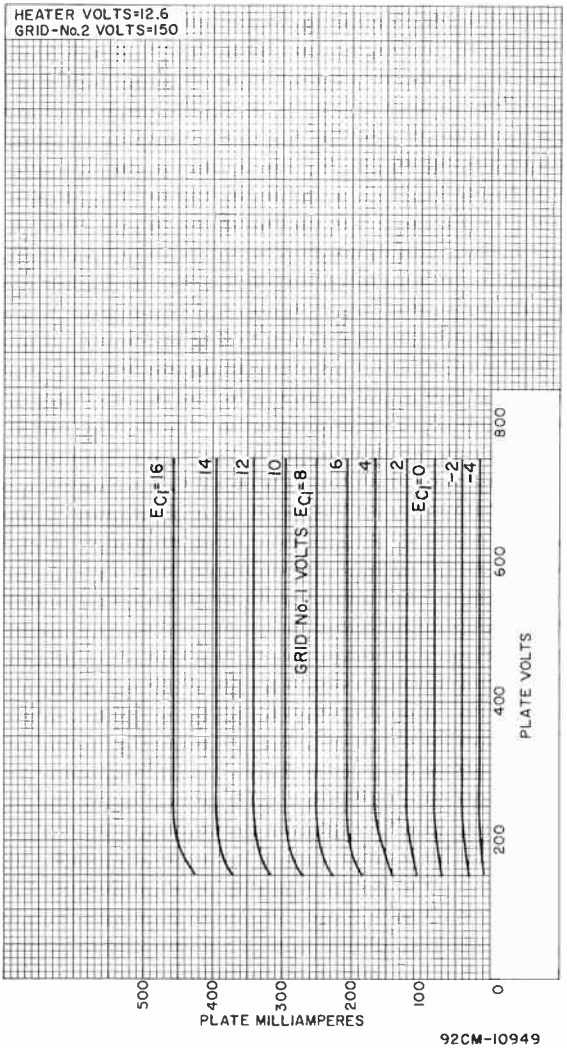
NOTE 4: SEAT TUBE SUCH THAT GRID-No.2 TERMINAL EDGE MAKES A POSITIVE STOP ON SHOULDER.

NOTE 5: SPRING IS 0.600 INCH IN LENGTH AND 30 TURNS PER INCH OF 0.015-INCH-DIAMETER STEEL MUSIC WIRE.

NOTE 6: FINGER STOCK TO SEAT ON 0.013-INCH LIP.

World Radio History

TYPICAL PLATE CHARACTERISTICS



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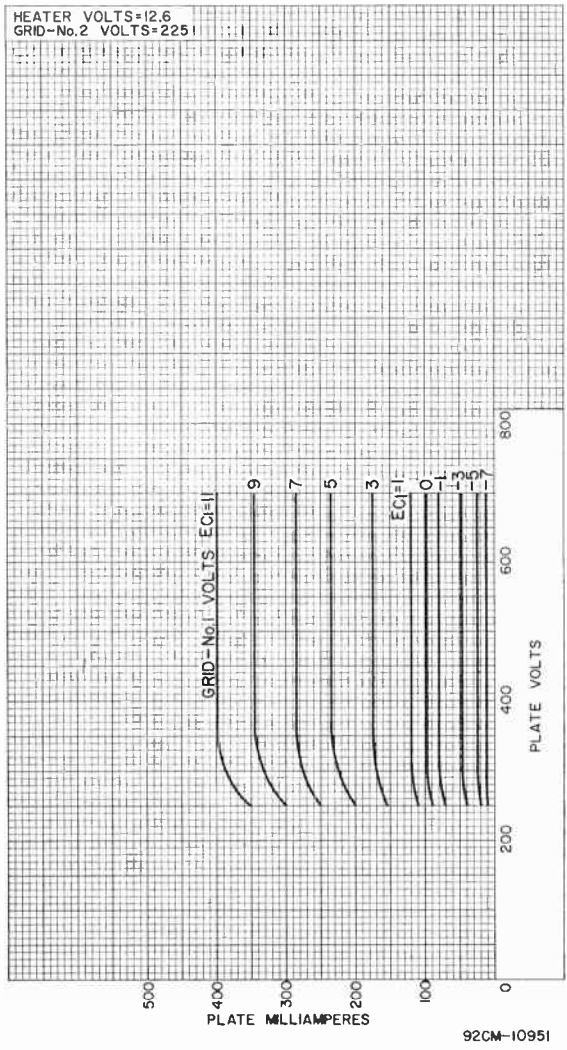
World Radio History

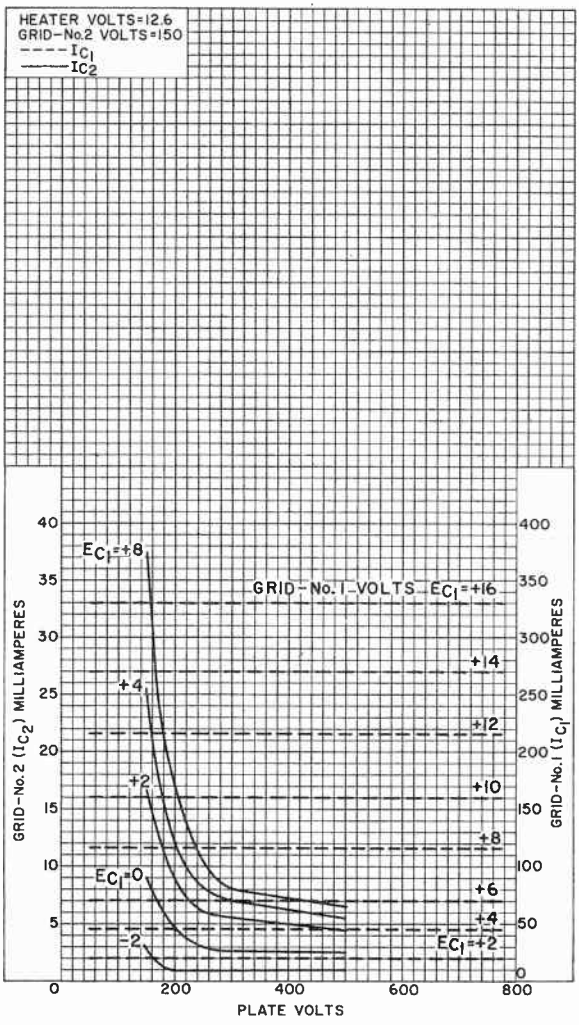
TYPICAL PLATE CHARACTERISTICS



92CM-10951

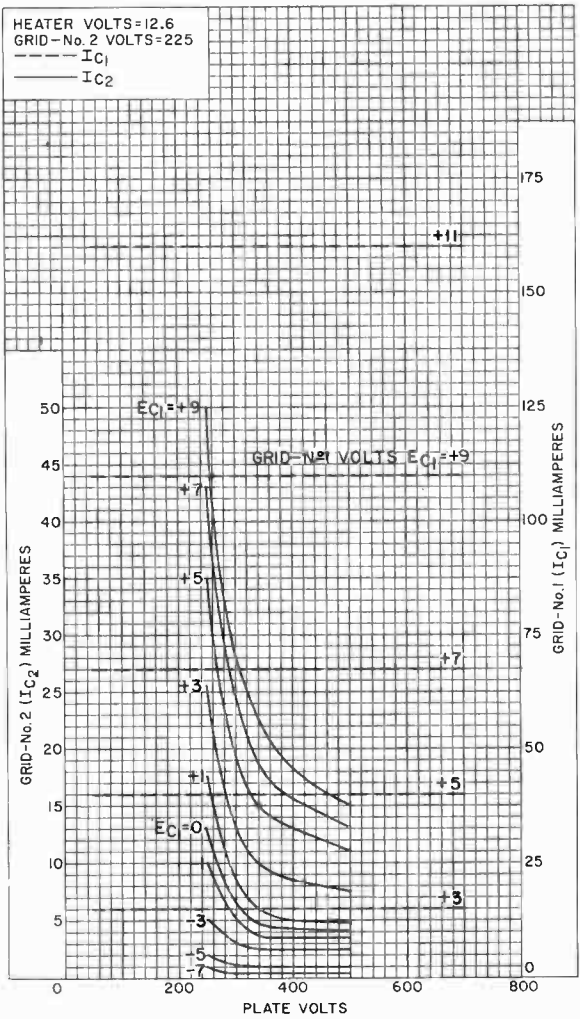
World Radio History

TYPICAL CHARACTERISTICS



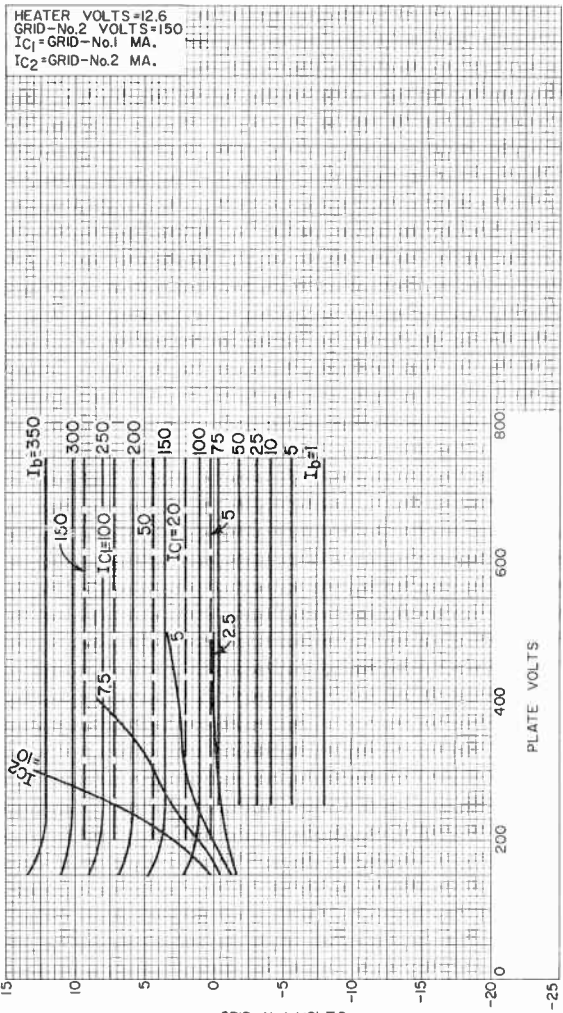
92CM-10950

TYPICAL CHARACTERISTICS



92CM-10954

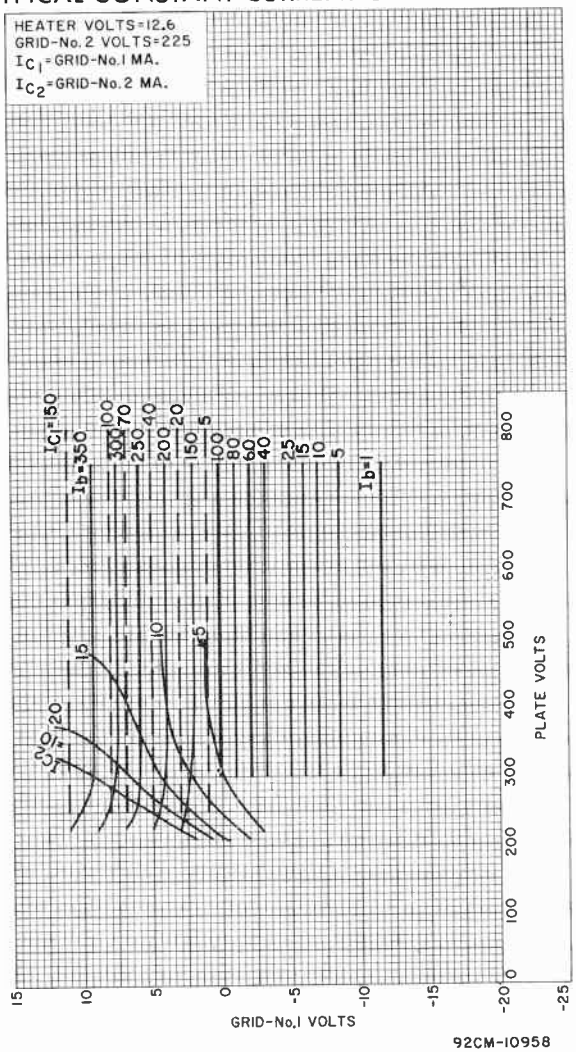
TYPICAL CONSTANT-CURRENT CHARACTERISTICS



92CM-10952

World Radio History

TYPICAL CONSTANT-CURRENT CHARACTERISTICS



92CM-10958

World Radio History

Power Pentode

NOVAR TYPE

For High-Fidelity Audio-Amplifier Applications

GENERAL DATA

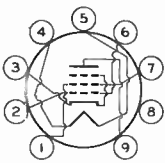
Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.8	amp
Direct Interelectrode Capacitances (Approx.):[a]		
Grid No.1 to plate	0.15	μμf
Grid No.1 to cathode & grid No.3, grid No.2, and heater	11	μμf
Plate to cathode & grid No.3, grid No.2, and heater	4.4	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	3.24"
Maximum Seated Length	2.86"
Length, Base Seat to Bulb Top (Excluding tip)	2.30" ± 0.09"
Diameter	1.062" to 1.188"
Bulb	T9
Socket	Cinch Mfg. Corp. No.149 19 00 24, or equivalent
Base	Small-Button Novar 9-Pin (JEDEC No.E9-75)
Basing Designation for BOTTOM VIEW	9NZ

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



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

AF POWER AMPLIFIER — Class A_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	550	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	440	max.	volts
CATHODE CURRENT	90	max.	ma
GRID-No.2 INPUT	3.3[b]	max.	watts
PLATE DISSIPATION	19	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[c]	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	240	max.	°C

Typical Operation and Characteristics:

Plate Voltage	300	volts
Grid-No.2 Voltage	300	volts

World Radio History

Grid-No.1 (Control-Grid) Voltage	−10		volts
Peak AF Grid-No.1 Voltage	10		volts
Zero-Signal Plate Current	60		ma
Max.-Signal Plate Current	75		ma
Zero-Signal Grid-No.2 Current	8		ma
Max.-Signal Grid-No.2 Current	15		ma
Plate Resistance (Approx.)	29000		ohms
Transconductance	10200		μmhos
Effective Load Resistance	3000		ohms
Total Harmonic Distortion	13		%
Max.-Signal Power Output	11		watts

Maximum-Circuit Values:

Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.3	max.	megohm
For cathode-bias operation	1	max.	megohm

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Maximum Ratings, *Design-Maximum Values:*

PLATE VOLTAGE	550	max.	volts
GRID-No.2 (SCREEN-GRID) VOLTAGE	440	max.	volts
CATHODE CURRENT	90	max.	ma
GRID-No.2 INPUT	3.3[b]	max.	watts
PLATE DISSIPATION	19	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	200	max.	volts
Heater positive with respect to cathode	200[c]	max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	240	max.	°C

Typical Operation:

Values are for 2 tubes

	Fixed Bias					Cathode Bias	
Plate Supply Voltage	300	350	400	450	450	450	volts
Grid-No.2 Supply Voltage	300	350	350	350	400	400	volts
Grid-No.1 Voltage	−12.5	−15.5	−16	−16.5	−21	−	volts
Cathode Resistor (Common to both cathodes)	−	−	−	−	−	170	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage	25	31	32	33	42	31	volts
Zero-Signal Plate Current	74	72	64	60	40	86	ma
Max.-Signal Plate Current	116	130	135	142	145	94	ma
Zero-Signal Grid-No.2 Current	10	9.5	8	7.2	5	10	ma
Max.-Signal Grid-No.2 Current	28	32	28	26	30	20	ma

World Radio History

Effective Load Resistance (Plate to plate)	6600	6600	6600	6600	6600	10000	ohms
Total Harmonic Distortion	5	2.5	2	2.5	5	2	%
Max.-Signal Power Output	24	30	34	38	44	28	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.3 max.	megohm
For cathode-bias operation	1 max.	megohm

PUSH-PULL AF POWER AMPLIFIER — Class AB_1

Grid No.2 of each tube connected to tap on plate winding of output transformer

Maximum Ratings, *Design-Maximum Values:*

PLATE AND GRID-No.2 (SCREEN-GRID) SUPPLY VOLTAGE	440 max.	volts
DC CATHODE CURRENT	90 max.	ma
GRID-No.2 INPUT	3.3[b] max.	watts
PLATE DISSIPATION	19 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200[c] max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	240 max.	°C

Typical Operation:

Values are for 2 tubes

	Fixed Bias	*Cathode Bias*	
Plate Supply Voltage	400	425	volts
Grid-No.2 Supply Voltage	[d]	[d]	volts
Grid-No.1 Voltage	-20.5	-	volts
Cathode Resistor (Common to both cathodes)	-	185	ohms
Peak AF Grid-No.1-to-Grid-No.1 Voltage	41	42	volts
Zero-Signal Plate Current	60	88	ma
Max.-Signal Plate Current	115	100	ma
Zero-Signal Grid-No.2 Current	8	12	ma
Max.-Signal Grid-No.2 Current	18	16	ma
Effective Load Resistance (Plate to plate)	6600	6600	ohms
Total Harmonic Distortion	2.5	3.5	%
Max.-Signal Power Output	23	21	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For fixed-bias operation	0.3 max.	megohm
For cathode-bias operation	1 max.	megohm

World Radio History

[a] Without external shield.

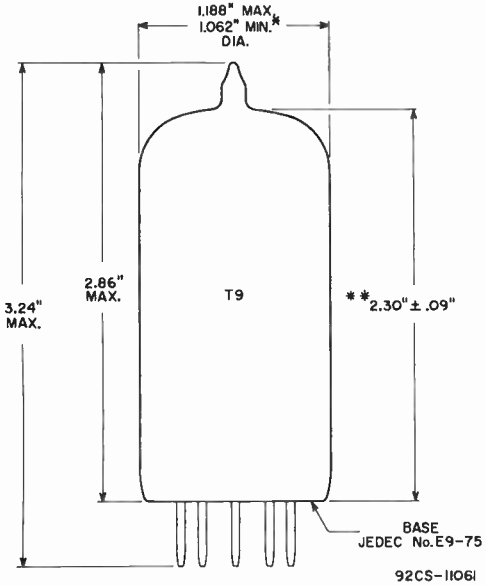
[b] Grid-No.2 input may reach 6 watts during peak levels of speech and music signals.

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

[d] Obtained from taps on the primary winding of the output transformer. The taps are located on each side of the center-tap (B+) so as to supply 50 per cent of the plate signal voltage to the grid No.2 of each output tube.

OPERATING CONSIDERATIONS

The *bulb* becomes hot during operation. To insure adequate cooling, it is essential that free circulation of air be provided.

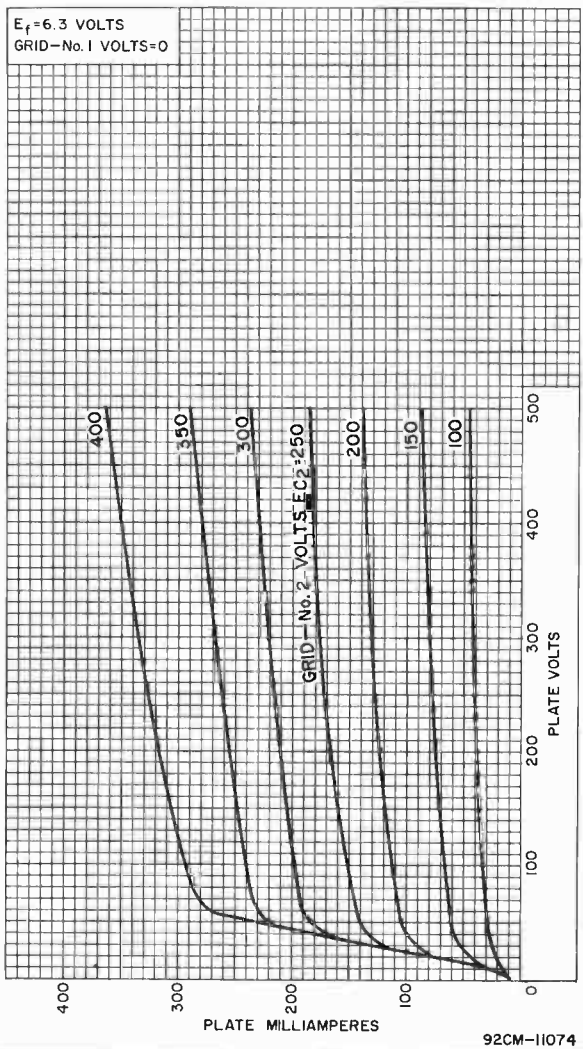


* APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.

** MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY A RING GAUGE OF 0.600" INSIDE DIAMETER.

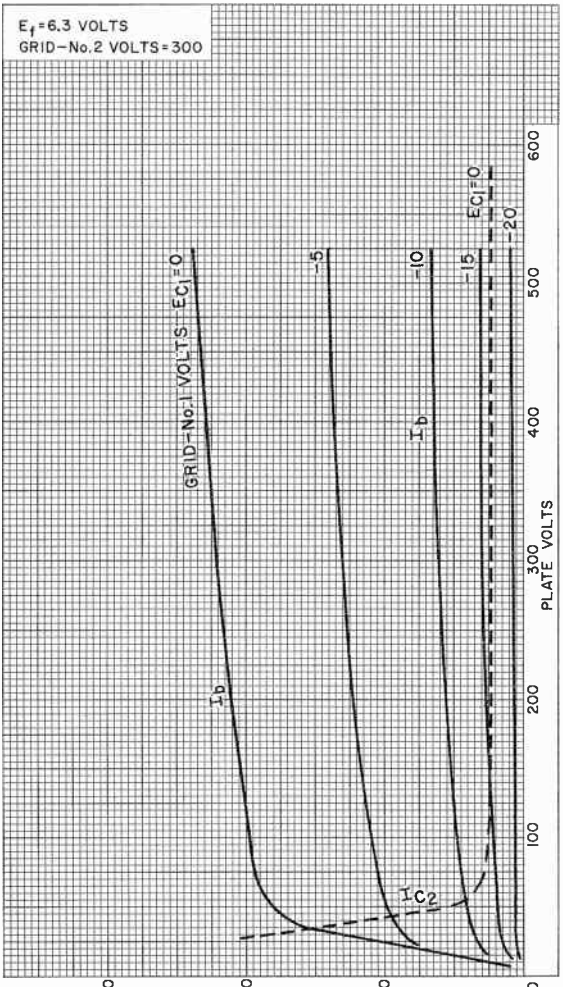
World Radio History

AVERAGE PLATE CHARACTERISTICS



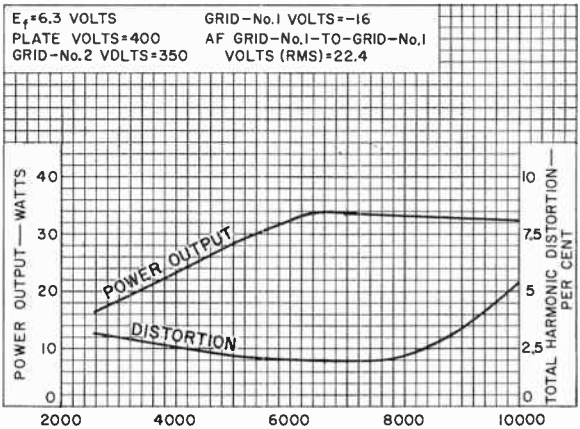
92CM-11074

AVERAGE CHARACTERISTICS



92CM-11075

OPERATION CHARACTERISTICS
Push-Pull Class AB_1



92CS-11077

World Radio History

World Radio History

7870

Beam Power Tube

CERAMIC-METAL SEALS
"ONE-PIECE" ELECTRODE DESIGN
CONDUCTION COOLED
COAXIAL-ELECTRODE STRUCTURE

52.5-WATTS CW INPUT
27-WATTS CW OUTPUT AT 400 Mc
15-WATTS CW OUTPUT AT 1200 Mc
3.2-WATTS CW OUTPUT AT 3000 Mc

UNIPOTENTIAL CATHODE

The 7870 is the same as the 7801 except for the following items:

Heater, for Unipotential Cathode:

Voltage (AC or DC)[a]	6.3 ± 10%	volts
Current at 6.3 volts	1	amp

[a] Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Heater Current	1	0.44	0.54	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.025	μμf
Grid No.1 to cathode & heater	2	8.5	10.3	μμf
Plate to cathode & heater	2	–	0.004	μμf
Grid No.1 to grid No.2	2	14	20.6	μμf
Grid No.2 to plate	2	2.1	2.5	μμf
Grid No.2 to cathode & heater	2	–	0.18	μμf
Grid-No.1 Voltage	1,3	-1	-10	volts
Grid-No.1 Cutoff Voltage	1,4	–	-25	volts
Grid-No.2 Current	1,3	-3	2	ma
Positive Grid-No.1 Voltage	1,5	0	14	volts
Transconductance	1,6	7500	–	μmhos

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

Note 2: Measured with special shield adapter.

Note 3: With dc plate voltage of 750 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 35 ma.

Note 4: With dc plate voltage of 750 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 1 ma.

Note 5: With dc plate voltage of 300 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage of -100 volts. Rectangular pulses, pulse duration of 4500 to 5000 microseconds and pulse-repetition frequency of 10 to 12 pps. The positive-pulse grid-No.1 voltage is adjusted to give a plate current of 300 ma. at leading edge of pulse.

Note 6: With dc plate voltage of 300 volts, dc grid-No.2 voltage of 150 volts, dc grid-No.1 voltage adjusted to give a dc plate current of 35 ma.

World Radio History

World Radio History

8000

POWER TRIODE

Useful with full input up to 30 Mc and with reduced input up to 100 Mc

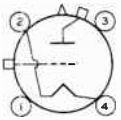
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	10 ± 5%	ac or dc volts
Current at 10 volts	4.5	amp
Amplification Factor, for grid volts = −95 and plate ma. = 54	16.5	
Direct Interelectrode Capacitances:		
Grid to plate	6.4	μμf
Grid to filament	5	μμf
Plate to filament	3.3	μμf

Mechanical:

Mounting Position	Vertical, base down, or Horizontal with pins 1 & 2 in vertical plane
Overall Length	8-1/2" ± 1/4"
Maximum Radius (Including side cap)	2-1/8" ± 1/8"
Weight (Approx.)	8 oz ←
Bulb	T-20
Top Cap	Skirted Medium (JETEC No.C1-14) ←
Side Cap	Medium (JETEC No.C1-5) ←
Base	Medium-Metal-Shell Jumbo 4-Pin with Bayonet (JETEC No.A4-29) ←
Basing Designation for BOTTOM VIEW	2N ←



Pin 1 – No Connection
Pin 2 – Filament
Pin 3 – Same as Pin 1
Pin 4 – Filament
Top Cap – Plate
Side Cap – Grid

AF POWER AMPLIFIER & MODULATOR – Class B

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	2500 max.	2750 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	250 max.	250 max.	ma
MAX.-SIGNAL PLATE INPUT*	425 max.	510 max.	watts
PLATE DISSIPATION*	125 max.	175 max.	watts
Typical Operation:			
Values are for 2 tubes			
DC Plate Voltage	2000	2250	volts
DC Grid Voltage	−120	−130	volts
Peak AF Grid-to-Grid Voltage	520	560	volts
Zero-Signal DC Plate Current	60	65	ma

* Averaged over any audio-frequency cycle of sine-wave form.

●, ●●: See next page.] ← indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

8000

POWER TRIODE

	CCS●	ICAS●●	
Max.-Signal DC Plate Current	425	450	ma
Effective Load Resistance (Plate to plate)	10800	12000	ohms
Max.-Signal Driving Power (Approx.)	6.5	7.9	watts
Max.-Signal Power Output (Approx.)	600	725	watts

RF POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC PLATE CURRENT	185 max.	185 max.	ma
PLATE INPUT	190 max.	225 max.	watts
PLATE DISSIPATION	125 max.	175 max.	watts
Typical Operation:			
→ DC Plate Voltage	2000	2250	volts
DC Grid Voltage	-130	-145	volts
Peak RF Grid Voltage	140	150	volts
DC Plate Current	95	100	ma
DC Grid Current (Approx.)	0.5	0	ma
Driving Power (Approx.)	4.8	5.4	watts
Power Output (Approx.)	65	75	watts

GRID-MODULATED RF POWER AMPLIFIER -- Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	185 max.	185 max.	ma
PLATE INPUT	190 max.	225 max.	watts
PLATE DISSIPATION	125 max.	175 max.	watts
Typical Operation:			
DC Plate Voltage	2000	2250	volts
DC Grid Voltage	-250	-265	volts
Peak RF Grid Voltage	265	270	volts
Peak AF Grid Voltage	120	115	volts
DC Plate Current	95	100	ma
DC Grid Current (Approx.)	0	0	ma
Driving Power (Approx.)▲	4.3	2.5	watts
Power Output (Approx.)	65	75	watts

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

●, ●●: See next page. → Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

8000

POWER TRIODE

PLATE-MODULATED RF POWER AMPLIFIER -- Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	1600 max.	2000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	210 max.	250 max.	ma
DC GRID CURRENT	40 max.	45 max.	ma
PLATE INPUT	335 max.	500 max.	watts
PLATE DISSIPATION	85 max.	125 max.	watts
Typical Operation:			
DC Plate Voltage	1600	2000	volts
DC Grid Voltage⊕	-300	-370	volts
From grid resistor of	15000	10000	ohms
Peak RF Grid Voltage	470	630	volts
DC Plate Current	210	250	ma
DC Grid Current (Approx.)	20	37	ma
Driving Power (Approx.)	8.5	20	watts
Power Output (Approx.)	250	380	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy□ and RF POWER AMPLIFIER - Class C FM Telephony

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	250 max.	300 max.	ma
DC GRID CURRENT	40 max.	45 max.	ma
PLATE INPUT	500 max.	750 max.	watts
PLATE DISSIPATION	125 max.	175 max.	watts
Typical Operation:			
DC Plate Voltage	2000	2500	volts
DC Grid Voltage:			
From fixed supply of	-195	-240	volts
From grid resistor of	8200	6200	ohms ←
From cathode resistor of	680	680	ohms ←
Peak RF Grid Voltage	370	480	volts
DC Plate Current	250	300	ma
DC Grid Current (Approx.)	24	40	ma
Driving Power (Approx.)	8	18	watts
Power Output (Approx.)	375	575	watts

●● Intermittent Commercial and Amateur Service.

⊕ Obtained from fixed supply, by grid resistor, by cathode resistor, or by combination methods.

●, □: See next page.

← Indicates a change.

MUSEUM ELECTRONICS

8000

POWER TRIODE

NOTE: When the 8000 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 2500 volts a fixed bias of at least -140 volts should be used.

OSCILLATOR - Class C

Operation with Unfiltered Plate Supply

	Supply 1■	*Supply 2*♦	
Maximum CCS● Ratings, *Absolute Values:*			
RMS PLATE VOLTAGE	2500 max.	–	volts
DC PLATE VOLTAGE	–	1800 max.	volts
DC GRID VOLTAGE	-200 max.	-300 max.	volts
DC PLATE CURRENT	160 max.	225 max.	ma
DC GRID CURRENT	25 max.	35 max.	ma
PLATE INPUT	450 max.	500 max.	watts
PLATE DISSIPATION	125 max.	125 max.	watts
Typical Push-Pull Operation at 30 Mc:			
	Values are for 2 tubes		
RMS Plate Voltage	2500	–	volts
DC Plate Voltage	–	1800	volts
→ Grid Resistor§	3300	4700	ohms
DC Plate Current	320	450	ma
DC Grid Current	30	35	ma
Power Output (Approx.)	650	700	watts
Output-Circuit Efficiency (Approx.)	85	85	%
Useful Power Output (Approx.)	550♦	600♦	watts

● Continuous Commercial Service.

□ 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.

■ Self-rectified ac supply.

♦ Separate rectified (no filter), single-phase, full-wave plate supply.

§ The 8000 can be biased by any convenient method, but the use of a grid resistor is preferred because the bias is automatically varied as the load on the circuit varies. In those applications where grid current and grid voltage may vary widely because of fluctuating loads, it is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full load to one-half of the corresponding maximum values. This operating condition permits grid-voltage values to rise from zero load to twice their full-load values, and usually provides adequate leeway.

♦ This value of useful power is measured at load of output circuit having the indicated efficiency.

→ indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

8000

POWER TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current	1	4.2	4.8	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	5.6	7.2	μμf
Grid to filament	2	4.1	5.9	μμf
Plate to filament	2	2.4	4.2	μμf
Amplication Factor	1,3	14.8	18.2	
Grid Current	1,4	55	95	ma
Plate Current (1)	1,4	300	500	ma
Plate Current (2)	1,5	33	75	ma
Power Output	1,6	425	–	watts

Note 1: With 10 volts ac on filament.

Note 2: Without external shield.

Note 3: With grid volts = -95, and dc plate voltage adjusted to give dc plate current of 54 ma.

Note 4: With dc plate volts = 100, and dc grid volts = +100.

Note 5: With dc plate volts = 2000, and dc grid volts = -95.

Note 6: In self-excited oscillator circuit, and with dc plate volts = 2250, dc plate ma. = 275, dc grid ma. = 35 to 45, grid resistor (ohms) = 8200, and frequency (Mc) = 15.

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	30	60	100	Mc
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B Telephony	100	88	80	%
Class C Plate-Modulated Telephony	100	70	50	%
Class C Telegraphy	100	70	50	%

OPERATING CONSIDERATIONS

The *plate* of the 8000 shows a barely perceptible red color when the tube is operated at maximum CCS ratings and a cherry-red color at maximum ICAS ratings.

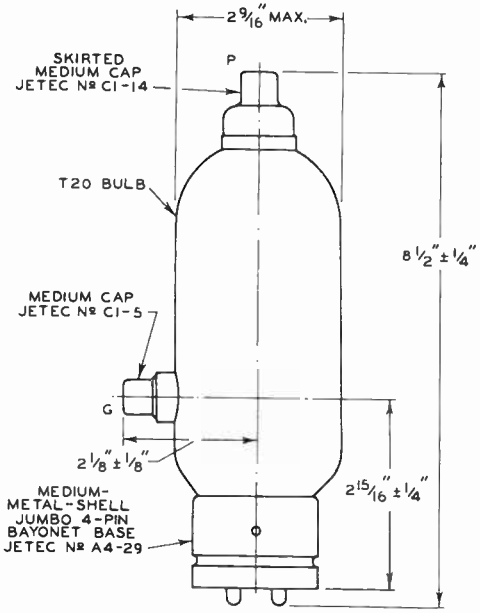
← indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

8000

POWER TRIODE



TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

RCA

8000

8000

AVERAGE PLATE CHARACTERISTICS

E_f = 10 VOLTS D.C.

PLATE VOLTS (E_b)

2400
2000
1600
1200
800
400
0

GRID VOLTS

+120
+100
+80
+60
+40
+20
0
-20
-40
-60
-80
-100
-120

1.6
1.2
0.8
0.4
0

D-C PLATE AMPERES

SEPT. 20, 1940

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

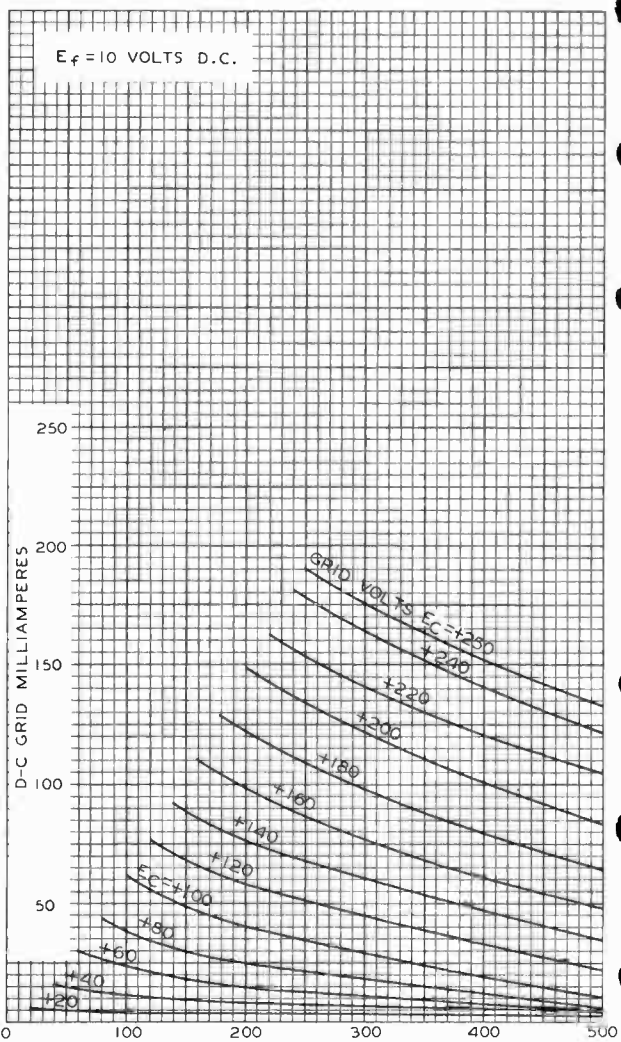
92CM-6212

World Radio History

RCA

8000

TYPICAL CHARACTERISTICS



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA
8003

OSCILLATOR, POWER AMPLIFIER, MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	12	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	11.7	μμf
Grid to Filament	5.8	μμf
Plate to Filament	3.4	μμf
Maximum Overall Length		8-1/2"
Maximum Diameter		2-9/16"
Bulb		T-20
Cap		Medium Metal
Base		Jumbo 4-Large Pin

MAXIMUM CCS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

A-F POWER AMPLIFIER & MODULATOR - Class B

	CCS	
D-C Plate Voltage	1350 max.	volts
Max.-Signal D-C Plate Current*	250 max.	ma.
Max.-Signal Plate Input*	330 max.	watts
Plate Dissipation*	100 max.	watts
Typical Operation:		
Unless otherwise specified, values are for 2 tubes		
D-C Plate Voltage	1350	volts
D-C Grid Voltage#	-100	volts
Peak A-F Grid-to-Grid Voltage	480	volts
Zero-Sig. D-C Plate Current	40	ma.
Max.-Sig. D-C Plate Current	490	ma.
Load Resistance (per tube)	1500	ohms
Effective Load Resistance (plate to plate)	6000	ohms
Max.-Sig. Driving Power	10.5 approx.	watts
Max.-Sig. Power Output	460 approx.	watts

* Averaged over any audio-frequency cycle of sine-wave form.

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS	
D-C Plate Voltage	1350 max.	volts
D-C Plate Current	150 max.	ma.
Plate Input	150 max.	watts
Plate Dissipation	100 max.	watts
Typical Operation:		
D-C Plate Voltage	1350	volts
D-C Grid Voltage#	-110	volts
Peak R-F Grid Voltage	135	volts
D-C Plate Current	110	ma.
D-C Grid Current**	1.5 approx.	ma.
Driving Power** °	8 approx.	watts
Power Output	50 approx.	watts

° At crest of audio-frequency cycle with modulation factor of 1.0.
With a-c filament supply.
**: See end of tabulation.

World Radio History

8003

OSCILLATOR, POWER AMPLIFIER, MODULATOR

(continued from preceding page)

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	CCS	
D-C Plate Voltage	1100 max.	volts
D-C Grid Voltage	-400 max.	volts
D-C Plate Current	200 max.	ma.
D-C Grid Current	50 max.	ma.
Plate Input	220 max.	watts
Plate Dissipation	67 max.	watts
Typical Operation:		
D-C Plate Voltage	1100	volts
D-C Grid Voltage △	-260	volts
	6500	ohms
Peak R-F Grid Voltage	430	volts
D-C Plate Current	200	ma.
D-C Grid Current**	40 approx.	ma.
Driving Power**	15 approx.	watts
Power Output	167 approx.	watts

△ Obtained from grid resistor of value shown or by combination methods.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

	CCS	
D-C Plate Voltage	1350 max.	volts
D-C Grid Voltage	-400 max.	volts
D-C Plate Current	250 max.	ma.
D-C Grid Current	50 max.	ma.
Plate Input	330 max.	watts
Plate Dissipation	100 max.	watts
Typical Operation:		
D-C Plate Voltage	1350	volts
D-C Grid Voltage ◊	-175	volts ←
	5000	ohms
	625	ohms ←
Peak R-F Grid Voltage	350	volts
D-C Plate Current	245	ma.
D-C Grid Current**	35 approx.	ma.
Driving Power**	11 approx.	watts
Power Output	250 approx.	watts

◊ Obtained from fixed supply, by grid resistor (5000) or by cathode resistor (630).

NOTE: When the 8003 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1350 volts, a fixed bias at least -85 volts should be used.

**, ##: See end of tabulation.

← Indicates a change.

World Radio History

8003

OSCILLATOR, POWER AMPLIFIER, MODULATOR

(continued from preceding page)

OSCILLATOR - OPERATION WITH UNFILTERED PLATE SUPPLY

	Supply 1	Supply 2	
Plate Voltage	1500 max.	1200 max.	volts
D-C Grid Voltage	-200 max.	-250 max.	volts
D-C Plate Current	200 max.	225 max.	ma.
D-C Grid Current	30 max.	45 max.	ma.
Plate Input	330 max.	330 max.	watts
Plate Dissipation	100 max.	100 max.	watts
Typical Operation in push-pull circuit at 25 Mc:			
Unless otherwise specified, values are for 2 tubes			
Plate Voltage	1500 (RMS)	1200	volts
Grid Resistor	2000	3000	ohms
D-C Plate Current	400	450	ma.
D-C Grid Current	35	45	ma.
Power Output	500	450 approx.	watts
Circuit Power Output (85% circuit efficiency)	425	380 approx.	watts

1 Self-rectified a-c supply. (Plate voltages are RMS values.)

2 Separate rectified (no filter) single-phase, full-wave plate supply.

For applications where grid current and grid voltage may vary widely because of fluctuating loads. It is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full-load to one-half of the corresponding maximum values. This operating condition permits grid-current and grid voltage values to rise for zero-load to twice their full-load values, and usually provides adequate leeway.

Data on operating frequencies for the 8003 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

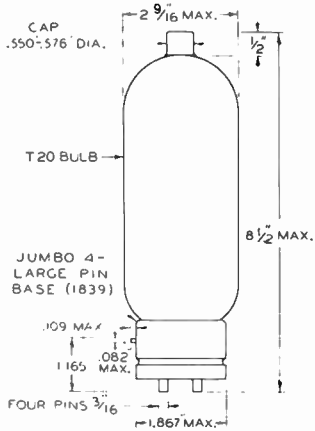
CURVES for the 8003 are the same as those for Type 211.

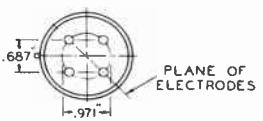
← Indicates a change.

World Radio History

8003

OSCILLATOR, POWER AMPLIFIER, MODULATOR

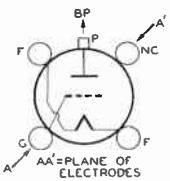




BOTTOM VIEW OF BASE

92C-6203

BOTTOM VIEW OF
SOCKET CONNECTIONS



F - Filament
G - Grid
P - Plate
NC - No Connection
BP - Bayonet Pin

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: With plane of electrodes vertical (on edge).

World Radio History

8005
POWER TRIODE

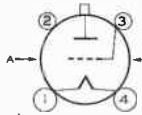
GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC or DC)	10 ± 0.5	volts
Current, with 10 volts on filament	3.25	amp
Amplification Factor	20	
Direct Interelectrode Capacitances:		
Grid to Plate	5	μμf
Grid to Filament	6.4	μμf
Plate to Filament	1	μμf

Mechanical:

Mounting Position	Vertical, Base down; or Horizontal, with pins 2 and 3 in vertical plane
Overall Length	6-7/16" ± 1/4"
Seated Length	5-7/8" ± 1/4"
Diameter	2-7/16"
Bulb	ST-19
Cap	Medium, with Insulating Collar
Base	Medium-Metal-Shell Small 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	3G



Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – Grid
Pin 4 – Filament
Cap – Plate

AA'=PLANE OF ELECTRODES

AF POWER AMPLIFIER & MODULATOR – Class B

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	200 max.	200 max.	ma
MAX.-SIGNAL PLATE INPUT*	225 max.	250 max.	watts
PLATE DISSIPATION*	75 max.	85 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1250	1500	volts
DC Grid Voltage#	-55	-67.5	volts ←
Peak AF Grid-to-Grid Voltage	290	330	volts ←
Zero-Signal DC Plate Current	40	40	ma
Max.-Signal DC Plate Current	320	330	ma ←
Effective Load Resistance (plate-to-plate)	8000	9800	ohms
Max.-Signal Driving Power (Approx.)	4	5.5	watts ←
Max.-Signal Power Output (Approx.)	250	330	watts ←

* Averaged over any audio-frequency cycle of sine-wave form.
●, ●●, #: See next page. ← Indicates a change.

Powered by World Radio History

8005
POWER TRIODE

RF POWER AMPLIFIER – Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC PLATE CURRENT	100 max.	100 max.	ma
PLATE INPUT	110 max.	125 max.	watts
PLATE DISSIPATION	75 max.	85 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	volts
DC Grid Voltage#	-65	-80	volts
Peak RF Grid Voltage	85	90	volts
DC Plate Current	85	83	ma
DC Grid Current (Approx.)	2	1	ma
Driving Power (Approx.)▲	5.5	5	watts
Power Output (Approx.)	40	45	watts

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED RF POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	CCS●	*ICAS*●●	
DC PLATE VOLTAGE	1000 max.	1250 max.	volts
DC GRID VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	160 max.	200 max.	ma
DC GRID CURRENT	45 max.	45 max.	ma
PLATE INPUT	160 max.	240 max.	watts
PLATE DISSIPATION	50 max.	75 max.	watts

Typical Operation:

DC Plate Voltage	1000	1250	volts
DC Grid Voltage●	-195	-195	volts
	7000	7000	ohms
Peak RF Grid Voltage	350	350	volts
DC Plate Current	160	190	ma
DC Grid Current (Approx.)	28	28	ma
Driving Power (Approx.)	9	9	watts
Power Output (Approx.)	115	170	watts

●, ●●, #, ●: See next page.

8005
POWER TRIODE

RF POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation[□□]

Maximum Ratings, *Absolute Values*:

	CCS[●]	ICAS[●●]	
DC PLATE VOLTAGE	1250 max.	1500 max.	volts
DC GRID VOLTAGE	-200 max.	-200 max.	volts
DC PLATE CURRENT	200 max.	200 max.	ma
DC GRID CURRENT	45 max.	45 max.	ma
PLATE INPUT	240 max.	300 max.	watts
PLATE DISSIPATION	75 max.	85 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	volts
DC Grid Voltage[▲▲]	-115	-130	volts
	3800	4000	ohms
	520	560	ohms
Peak RF Grid Voltage	240	255	volts
DC Plate Current	190	200	ma
DC Grid Current (Approx.)	30	32	ma
Driving Power (Approx.)	6.5	7.5	watts
Power Output (Approx.)	170	220	watts

SELF-RECTIFYING OSCILLATOR or AMPLIFIER – Class C

Maximum Ratings, *Absolute Values*:

	CCS[●]	
AC PLATE VOLTAGE (RMS)	1750 max.	volts
DC GRID VOLTAGE	-125 max.	volts
DC PLATE CURRENT	125 max.	ma
DC GRID CURRENT	25 max.	ma
PLATE INPUT	240 max.	watts
PLATE DISSIPATION	75 max.	watts

Typical Operation in Push-Pull Circuit at 50 Mc:

Values are for 2 tubes

AC Plate Voltage (RMS)	1750	volts
Grid Resistor[■]	2000	ohms
DC Plate Current	250	ma
DC Grid Current (at full load)	35	ma
Power Output (Approx.)	330	watts
Useful Power Output (Approx.)– 75% circuit efficiency	250	watts ←

●, ●●, #, ■, □□, ▲▲, ◆: See next page.
← Indicates a change.

World Radio History

8005
POWER TRIODE

AMPLIFIER or OSCILLATOR – Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

Maximum Ratings, *Absolute Values*:

	CCS●	
DC PLATE VOLTAGE	1125 max.	volts
DC GRID VOLTAGE	−125 max.	volts
DC PLATE CURRENT	180 max.	ma
DC GRID CURRENT	40 max.	ma
PLATE INPUT	240 max.	watts
PLATE DISSIPATION	75 max.	watts

→ **Typical Operation in Push-Pull Circuit at 27 Mc:**

Values are for 2 tubes

DC Plate Voltage	1100	volts
Grid Resistor▲	2000	ohms
DC Plate Current	360	ma
DC Grid Current	40	ma
Power Output (Approx.)	330	watts
Circuit Power Output (Approx.)– 85% circuit efficiency	280	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	3.1	3.4	amp
Amplification Factor	1,2	18	22	
Grid-Plate Capacitance	–	4.3	5.7	μμf
Grid-Filament Capacitance	–	5.3	7.5	μμf
Plate-Filament Capacitance	–	0.75	1.25	μμf
Grid Current	1,3	–	98	ma
Plate Current	1,4	30	70	ma
Useful Power Output	1,5	425	–	watts

Note 1: DC filament voltage = 10 volts.

Note 2: With dc grid voltage of −50 volts and plate voltage adjusted to give plate current of 50 ma.

Note 3: With dc plate voltage of 200 volts and dc grid voltage of +100 volts.

Note 4: With dc plate voltage of 1500 volts and dc grid voltage of −55 volts.

Note 5: With dc plate voltage of 2250 volts, plate current of 275 ma., grid current of 35 to 46 ma., grid resistor of 8000 ohms and frequency of 15 Mc.

● Continuous Commercial Service. → Indicates a change.

●● Intermittent Commercial and Amateur Service.

\# For ac filament supply.

● Obtained by grid resistor of value shown or by partial self-bias methods.

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

▲ Obtained from fixed supply, by grid resistor (3800,4000) or by cathode resistor (520,560).

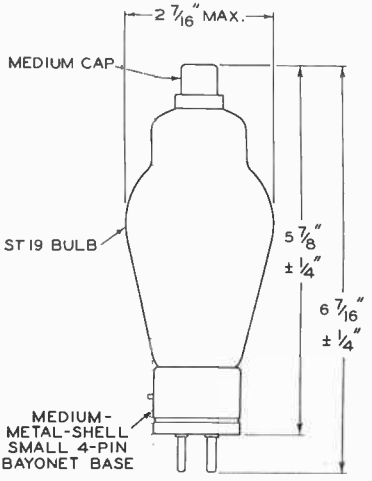
● See next page.

8005
POWER TRIODE

The 8005 can be biased by any convenient method, but the use of a grid resistor is preferred because the bias is automatically varied as the load on the circuit varies. In those applications where grid current and grid voltage may vary widely because of fluctuating loads, it is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full-load to one-half of the corresponding maximum values. This operating condition permits grid-current and grid-voltage values to rise from zero load to twice their full-load values, and usually provides adequate leeway.

NOTE: When the 8005 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 1500 volts, a fixed bias of at least -50 volts should be used.

Data on operating frequencies for the 8005 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



92CM-6283R2

World Radio History

World Radio History

8005

AVERAGE PLATE CHARACTERISTICS

8005

E_f = 10 VOLTS D.C.

PLATE VOLTS (E_b)

0 400 800 1200 1600 2000 2400

GRID VOLTS E_C=0

E_C=-100 -80 -60 -40 -20 +20 +40 +60 +80 +100 +120 +140 +160 +180 E_C=+200

E_C=E_b

PLATE AMPERES

0 0.4 0.8 1.2 1.6

APRIL 30, 1941

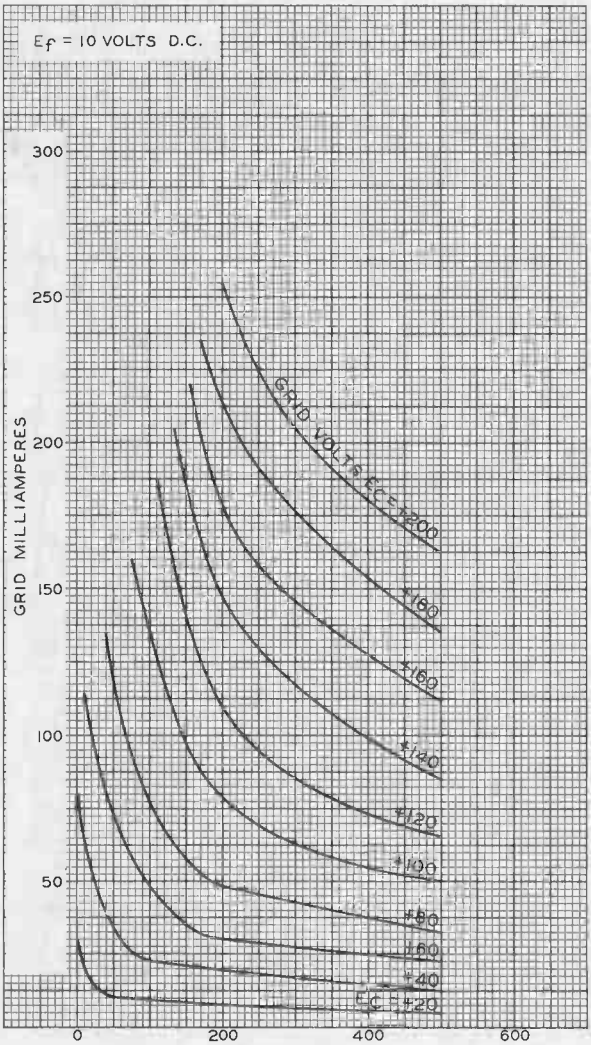
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6279

World Radio History

8005

TYPICAL CHARACTERISTICS



8008

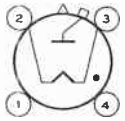
HALF-WAVE MERCURY-VAPOR RECTIFIER

The 8008 is the same as the 872-A except for the following items:

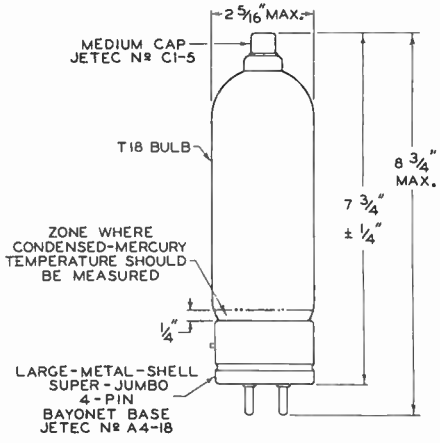
Mechanical:

Maximum Overall Length	8-3/4"
Seated Length	7-3/4" ± 1/4" ←
Weight (Approx.)	6.8 oz ←
Base	Large-Metal-Shell Super-Jumbo 4-Pin with Bayonet (JETEC No. A4-18) ←
Basing Designation for BOTTOM VIEW	2P ←

Pin 1 – No Connection
Pin 2 – Filament, Cathode Shield



Pin 3 – Filament
Pin 4 – No Connection
Cap – Anode



← Indicates a change.

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

World Radio History

8012-A

U-H-F TRANSMITTING TRIODE

The 8012-A supersedes the Type 8012.

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:**		
Voltage	6.3	ac or dc volts
Current	1.92	amp.
Amplification Factor	18	
Direct Interelectrode Capacitances:		
Grid to Plate	2.5	μμf
Grid to Filament	2.7	μμf
Plate to Filament	0.4	μμf

Mechanical:

Mounting Position. . . . . Vertical Only

Cooling – *Forced-Air Cooling* is required when plate dissipation exceeds 75% of the rated value.

Maximum Overall Length (Excluding Flexible Leads). . 3-15/16"

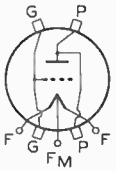
Greatest Radius. . . . . 1-1/8" ± 1/16"

Bulb T-8

Terminal Connections . . . . . *See Outline Drawing*

F – Filament
F_M – Filament Mid-Tap

G – Grid
P – Plate



G TERMINALS NEARER FILAMENT LEADS
P TERMINALS NEARER BULB TIP

GRID-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values:*	CCS*	
D-C PLATE VOLTAGE	1000 max.	volts
D-C GRID VOLTAGE	-200 max.	volts
D-C PLATE CURRENT	65 max.	ma.
PLATE INPUT	50 max.	watts
PLATE DISSIPATION	40 max.	watts

Typical Operation:

D-C Plate Voltage	1000	volts
D-C Grid Voltage □	-135	volts
	2500	ohms
Peak R-F Grid Voltage	155	volts
Peak A-F Grid Voltage	65	volts
D-C Plate Current	50	ma.
D-C Grid Current *	4 approx.	ma.
Driving Power *▲	3.5 approx.	watts
Power Output	20 approx.	watts

□, ▲: See next page. ■, *, **: See end of tabulation.

World Radio History

8012-A

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

□ Obtained from fixed supply or by cathode resistor of value shown.

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:	CCS ■	
D-C PLATE VOLTAGE	800 max.	volts
D-C GRID VOLTAGE	−200 max.	volts
D-C PLATE CURRENT	65 max.	ma.
D-C GRID CURRENT	20 max.	ma.
PLATE INPUT	33 max.	watts
PLATE DISSIPATION	27 max.	watts

Typical Operation:		
D-C Plate Voltage	800	volts
D-C Grid Voltage ‡	−105	volts
	10000	ohms
Peak R-F Grid Voltage	145	volts
D-C Plate Current	40	ma.
D-C Grid Current*	10.5	approx. ma.
Driving Power*	1.4	approx. watts
Power Output	22	approx. watts

‡ Obtained preferably from grid resistor of value shown, or combination of grid resistor with either fixed supply or suitably by-passed cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation #

Maximum Ratings, *Absolute Values*:	CCS ■	
D-C PLATE VOLTAGE	1000 max.	volts
D-C GRID VOLTAGE	−200 max.	volts
D-C PLATE CURRENT	80 max.	ma.
D-C GRID CURRENT	20 max.	ma.
PLATE INPUT	50 max.	watts
PLATE DISSIPATION	40 max.	watts

Typical Operation:		
D-C Plate Voltage	1000	volts
D-C Grid Voltage ○	−90	volts
	6400	ohms
	1400	ohms
Peak R-F Grid Voltage	130	volts
D-C Plate Current	50	ma.
D-C Grid Current *	14	approx. ma.
Driving Power *	1.6	approx. watts
Power Output	35	approx. watts

#, ○, *: See next page.

■ CCS = Continuous Commercial Service.

World Radio History

8012-A

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

o Obtained from fixed supply, or grid resistor (6400), or by cathode resistor (1400). When the 8012-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1000 volts a fixed bias of at least -40 volts should be used.

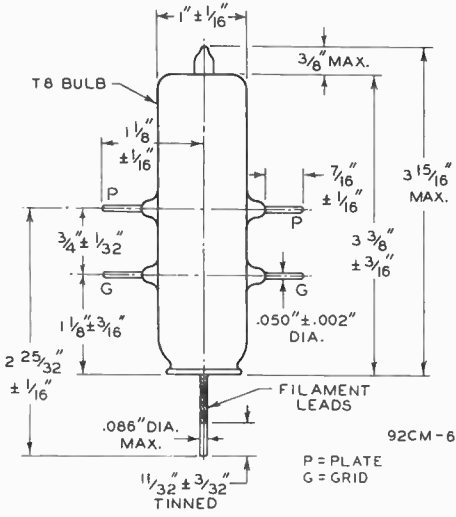
** The filament is center-tapped and the center lead is brought out of the tube. With this design, it is possible to minimize the effect of filament lead inductance by connecting all three filament leads in parallel through r-f by-pass capacitors. The center-lead of this parallel connection should not be returned directly to the center-tap of the filament-transformer winding or to ground, although it may be by-passed to either of these points if desired.

* Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

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

The 8012-A may be operated with maximum ratings at frequencies up to 500 megacycles but as the frequency is raised, the efficiency and power output fall off. At 600 megacycles an efficiency of about 35% can be expected. Since the efficiency at 600 megacycles is relatively low, the plate of the 8012-A has been designed to have an unusually high dissipation rating.

Data on operating frequencies for the 8012-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



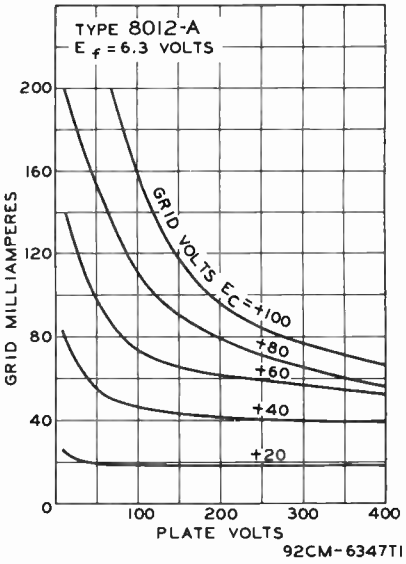
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

8012-A

U-H-F TRANSMITTING TRIODE

TYPICAL CHARACTERISTICS



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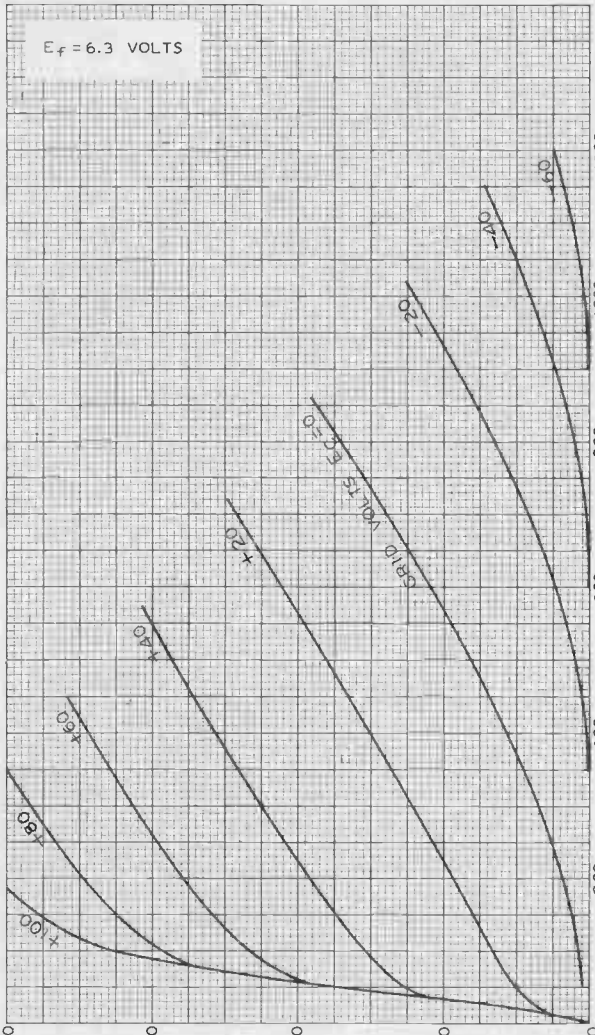
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

8012-A

AVERAGE PLATE CHARACTERISTICS



DEC. 1, 1943

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6346

World Radio History

World Radio History

8013-A

HALF-WAVE VACUUM RECTIFIER

GENERAL DATA

Electrical:

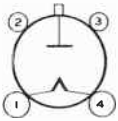
Filament, Thoriated Tungsten:

	Min.	Av.	Max.	
Voltage	2.37	2.50	2.63	ac volts
Current at 2.50 volts	4.7	5.0	5.3	amp

Mechanical:

Mounting Position	Any, preferably vertical with base down
Maximum Overall Length	6-1/16"
Seated Length	5-9/32" ± 5/32"
Maximum Diameter	2-1/16"
Weight (Approx.)	2.9 oz
Bulb	ST-16
Cap	Skirted Medium with Rolled Edge (JETEC No. C1-19)
Base	Medium-Shell Small 4-Pin (JETEC No. A4-9)
Basing Designation for BOTTOM VIEW	4P

Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – No Connection
Pin 4 – Filament
Cap – Plate



HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values:*

PEAK PLATE VOLTAGE:			
Forward	40000▲	max.	volts
Inverse	40000▲	max.	volts
PLATE CURRENT:			
Peak	150	max.	ma
Average	20	max.	ma
Fault	500	max.	ma
PLATE DISSIPATION	12	max.	watts

OPERATING CONSIDERATIONS

Filament and *plate voltage* may be applied simultaneously to the 8013-A.

The *bulb* of the 8013-A should be cleaned regularly. Accumulation of dust or other foreign matter on the bulb will cause leakage and, as a result, probably tube failure.

X-rays are produced during normal operation of the 8013-A. These rays can constitute a health hazard unless the tube is adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure it provides the required protection to the operator.

▲This value may be increased to 55000 volts when the 8013-A is immersed in oil.

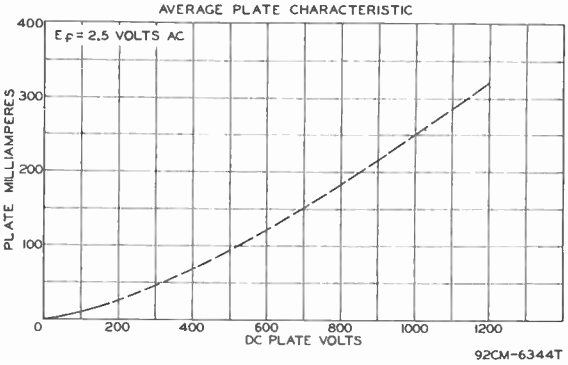
← Indicates a change.

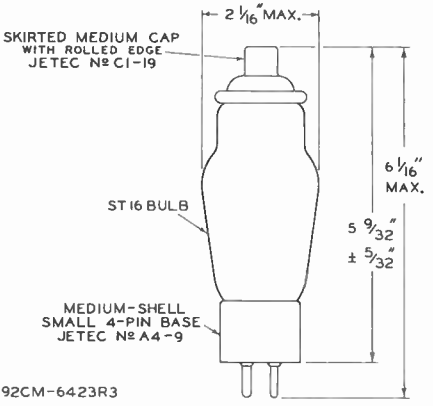
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

World Radio History

8013-A

HALF-WAVE VACUUM RECTIFIER





World Radio History

8014-A

TRANSMITTING TRIODE

FORCED-AIR COOLED

Intended especially for pulsed operation

GENERAL DATA

Electrical:

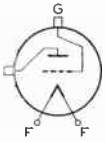
Filament, Thoriated Tungsten:		
Voltage	15.0	ac volts
Current	14.5	amp
Starting Current:	The filament current must never exceed, even momentarily, a value of 30 amperes	
Peak Filament Emission	50 (approx.)	amp
Amplification Factor	30	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	4.4	μμf
Grid to Filament	4.6	μμf
Plate to Filament	3.2	μμf

Mechanical:

Terminal Connections:

F – Filament

G – Grid Cap Terminal



P – Plate Terminal (Air-Cooled Radiator)

Mounting Position	Vertical only, Filament or Grid End Up
Overall Length	8-17/32" ± 3/16"
Diameter	1-7/8" ± 1/32"
Radiator	Integral Part of Tube

Cooling: Air should be delivered in sufficient quantity to the radiator to limit the temperature of the radiator to the rated maximum value. In addition, a small amount of cooling air is required on the filament. Air-flow must start before the application of any voltages.

Maximum Ratings, *Absolute Values*:

DC PLATE VOLTAGE#	13500 max.	volts
DC GRID VOLTAGE	-3000 max.	volts
PLATE DISSIPATION	400 max.	watts
RADIATOR TEMPERATURE▲	180 max.	°C

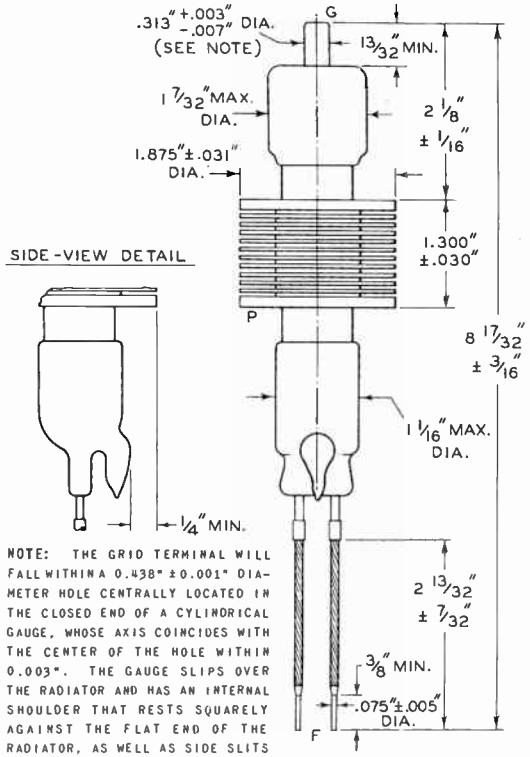
The maximum value of filter capacitor permitted directly at the tube and its rf circuit is 1.0 μf. A series resistance of at least 15000 ohms must be used between this capacitor and the high-voltage supply.

▲ Measured outside of air blast on outer fin of radiator near plate.

World Radio History

RCA

8014-A
TRANSMITTING TRIODE



NOTE: THE GRID TERMINAL WILL FALL WITHIN A 0.438" ± 0.001" DIAMETER HOLE CENTRALLY LOCATED IN THE CLOSED END OF A CYLINDRICAL GAUGE, WHOSE AXIS COINCIDES WITH THE CENTER OF THE HOLE WITHIN 0.003". THE GAUGE SLIPS OVER THE RADIATOR AND HAS AN INTERNAL SHOULDER THAT RESTS SQUARELY AGAINST THE FLAT END OF THE RADIATOR, AS WELL AS SIDE SLITS EXTENDING APPROXIMATELY 1/2" ABOVE THE INTERNAL SHOULDER TO INSURE SPRING FIT OVER THE RADIATOR. THE INNER SURFACE OF THE CLOSED END OF THE GAUGE IS 1.812" + 0.010" - 0.000" FROM THE SHOULDER SURFACE WHICH RESTS AGAINST THE FLAT END OF THE RADIATOR. THE CLOSED END OF THE GAUGE IS 0.438" ± 0.010" THICK.

92CM-6363R1

World Radio History

8020

HALF-WAVE HIGH-VACUUM RECTIFIER

DATA

Electrical:

Filament, Thoriated Tungsten:		
Voltage	5	volts
Current	5.5-6.5	amp
Direct Interelectrode Capacitance:		
Anode to Filament	1.4	μμf
Tube Voltage Drop at 100 ma.	200	volts

Mechanical:

Mounting Position	Vertical, Base Down
Overall Length	7-1/2" ± 1/2"
Maximum Diameter	2-5/16"
Bulb	T-18
Cap	Medium
Base	Medium 4-Pin, Bayonet

RECTIFIER SERVICE

Maximum Ratings, Absolute Values:

PEAK INVERSE ANODE VOLTAGE	40000 max.	volts
PEAK ANODE CURRENT	750 max.	ma.
AVERAGE ANODE CURRENT	100 max.	ma.

SURGE-LIMITING DIODE SERVICE

Maximum Ratings, Absolute Values:

FILAMENT VOLTAGE	5.8 max.	volts
PEAK FORWARD ANODE VOLTAGE	12500 max.	volts
AVERAGE ANODE DISSIPATION	75 max.	watts

Typical Operation:

Filament Voltage	5.5	volts
Peak Forward Anode Voltage	10000	volts
Minimum Peak Anode Current	2	amp

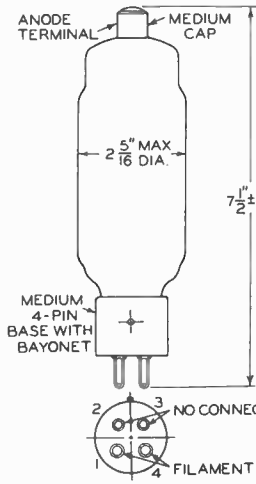
World Radio History

8020

RCA

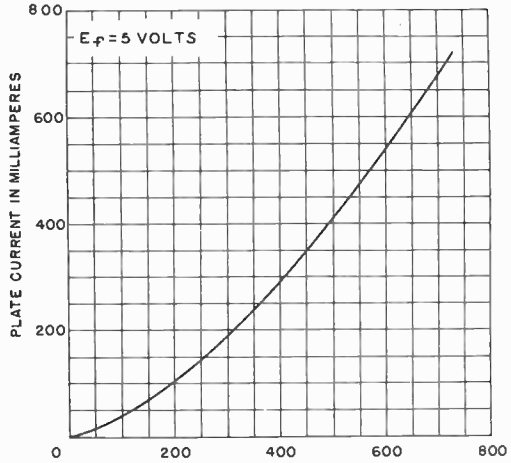
8020

HALF-WAVE HIGH-VACUUM RECTIFIER



92CS-6721

PLATE CHARACTERISTICS



92CS-6708

MAY 1, 1946

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CE-6721-6708

World Radio History

8025-A

U-H-F TRANSMITTING TRIODE

The 8025-A supersedes the Type 8025.

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:**		
Voltage	6.3	ac or dc volts
Current	1.92	amp.
Amplification Factor	18	
Direct Interelectrode Capacitances:		
Grid to Plate	3.0	μμf
Grid to Filament	2.7	μμf
Plate to Filament	0.4	μμf

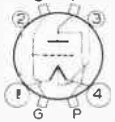
Mechanical:

Mounting Position. . . . . Vertical Only: Base up or down

Cooling—Requirements are indicated under MAXIMUM RATINGS for each class of service. *Natural Cooling* means that adequate free circulation of air around the tube is necessary. When *Forced-Air Cooling* is required, an air flow from a fan should be directed on the bulb.

Maximum Overall Length	4-15/16"
Maximum Seated Length	4-5/16"
Greatest Radius	1-1/64" ± 1/16"
Bulb	T-8
Caps (Four)	Saddle Skirted Miniature, with Nub
Base	Small 4-Pin, Micanol
Basing Designation for BOTTOM VIEW	3M

Pin 1 – Filament
Pin 2 – No Con.
Pin 3 – Filament Mid-Tap
Pin 4 – Filament
G – Grid
P – Plate



G CAPS. NEARER BASE
P CAPS. NEARER BULB TIP

GRID-MODULATED R-F POWER AMPLIFIER – Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings, *Absolute Values*:

	Forced-Air Cooling CCS▲	*Natural Cooling* ICAS▲	
D-C PLATE VOLTAGE	1000 max.	1000 max.	volts
D-C GRID VOLTAGE	-200 max.	-200 max.	volts
D-C PLATE CURRENT	65 max.	65 max.	ma.
PLATE INPUT	60 max.	50 max.	watts
PLATE DISSIPATION	40 max.	30 max.	watts

Typical Operation:

D-C Plate Voltage	1000	volts
D-C Grid Voltage□	-135	volts
	2500	ohms

□: See next page. ▲,**: See end of tabulation.

World Radio History

8025-A

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

Peak R-F Grid Voltage	155	volts
Peak A-F Grid Voltage	65	volts
D-C Plate Current	50	ma.
D-C Grid Current*	4 approx.	ma.
Driving Power ■ *	3.5 approx.	watts
Power Output	20 approx.	watts

□ Obtained from fixed supply or by cathode resistor of value shown.
■ At crest of audio-frequency cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

Maximum Ratings. *Absolute Values*:

	Forced-Air Cooling CCS ▲	*Natural Cooling ICAS* ▲	
D-C PLATE VOLTAGE	800 max.	800 max.	volts
D-C GRID VOLTAGE	-200 max.	-200 max.	volts
D-C PLATE CURRENT	65 max.	65 max.	ma.
D-C GRID CURRENT	20 max.	20 max.	ma.
PLATE INPUT	50 max.	33 max.	watts
PLATE DISSIPATION	27 max.	20 max.	watts

Typical Operation:

D-C Plate Voltage	800	volts
D-C Grid Voltage ‡	-105	volts
	10000	ohms
Peak R-F Grid Voltage	145	volts
D-C Plate Current	40	ma.
D-C Grid Current*	10.5 approx.	ma.
Driving Power*	1.4 approx.	watts
Power Output	22 approx.	watts

‡ Obtained preferably from grid resistor of value shown, or combination of grid resistor with either fixed supply or suitably by-passed cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

Maximum Ratings, *Absolute Values*:

	Forced-Air Cooling CCS ▲	*Natural Cooling ICAS* ▲	
D-C PLATE VOLTAGE	1000 max.	1000 max.	volts
D-C GRID VOLTAGE	-200 max.	-200 max.	volts
D-C PLATE CURRENT	80 max.	80 max.	ma.
D-C GRID CURRENT	20 max.	20 max.	ma.
PLATE INPUT	75 max.	50 max.	watts
PLATE DISSIPATION	40 max.	30 max.	watts

#, ▲, *; See end of tabulation.

World Radio History

8025-A

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

Typical Operation:

D-C Plate Voltage	1000	volts
D-C Grid Voltage °	−90	volts
	6400	ohms
	1400	ohms
Peak R-F Grid Voltage	130	volts
D-C Plate Current	50	ma.
D-C Grid Current*	14 approx.	ma.
Driving Power *	1.6 approx.	watts
Power Output	35 approx.	watts

** The filament is center-tapped and the center lead is brought out to the No.3 pin. With this design, it is possible to minimize the effect of filament lead inductance by connecting all three filament leads in parallel through r-f by-pass capacitors. The center-lead of this parallel connection should not be returned directly to the center-tap of the filament-transformer winding or to ground, although it may be by-passed to either of these points if desired.

▲ CCS = Continuous Commercial Service; ICAS = Intermittent Commercial and Amateur Service.

* Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

° Obtained from fixed supply, or grid resistor (6400), or by cathode resistor (1400). When the 8025-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With plate voltage of 1000 volts a fixed bias of at least −40 volts should be used.

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

The 8025-A may be operated with maximum ratings at frequencies up to 500 megacycles, but as the frequency is raised, the efficiency and power output fall off. At 600 megacycles an efficiency of about 35% can be expected. Since the efficiency at 600 megacycles is relatively low, the plate of the 8025-A has been designed to have an unusually high dissipation rating.

Data on operating frequencies for the 8025-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

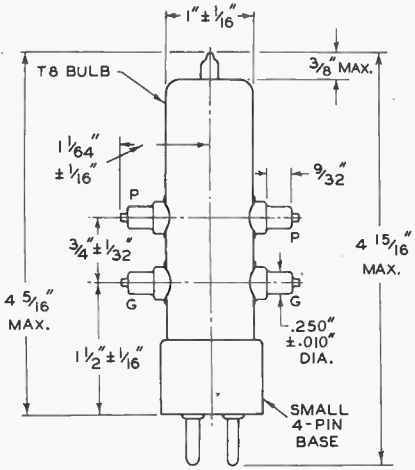
Curves for the 8025-A are the same as those for the 8012-A.

World Radio History

8025-A

8025-A

U-H-F TRANSMITTING TRIODE



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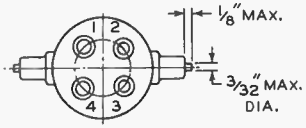

BOTTOM VIEW

℄ OF EACH CAP SHALL NOT DEVIATE MORE THAN 3° FROM PLANE NORMAL TO THE PLANE OF PINS NO. 1 & NO. 4 AND PASSING THROUGH CENTER OF BOTTOM OF BASE.

℄ OF BULB SHALL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

World Radio History

World Radio History

World Radio History