TRANSMITTING TUBE SECTION

In this section, data are given for certain RCA tubes mainly employed in radio transmitters and associated equipment.

Attention is directed to the general information found in the first few pages of this section. Following the Contents is the Index. This has been so arranged as to classify the various tubes by (1) use, and (2) power output. With this arrangement, it is easy to select the type best suited for the desired requirements.

The information following the Index is of pertinent value to the tube user. It is based on experience gained in the design, manufacture, and operation of transmitting tubes over a long period. By following this information, therefore, the user will obtain the most satisfactory operating performance from the various types.

Requests for further technical data on any RCA tube type should be addressed to the Commercial Engineering Section, RCA RADIOTRON DIVISION, RCA Manufacturing Company, Inc., Harrison, N. J.

TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

NOTE: The Max. Ratings shown in this Guide are given for Continuous Commercial Service. 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				
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				
15	400	15	2.5	1619
15	400	15	2.5	1619**
75	2000	75	5.0	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
250	3000	100	10.0	852
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
1125	3000	300	10.0	833-A*
1600	4000	400	10.0	•833-A**
2250	3000	750	11.0	851
10500	10000	3500	☆	891-R
12000	7500	5000	11.0	889
12000	8500	5000	11.0	889-R
12000	12500	4000	☆	892-R
20000	15000	5000	☆	891
20000	15000	7500	22.0	207
20000	15000	7500	☆	892
40000	10500	15000	12.6	880
40000	20000	20000	22.0	858
60000	20000	20000	☆	893, 893-R
100000	15000	50000	33.0	862
100000	15000	50000	☆	898

◆ Plate and Screen (total).
** Class AB, operation.
☆ See data pages for this type.
* Natural cooling.
** Forced-air cooling.

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TRANSMITTING TUBE GUIDE

FOR EQUIPMENT DESIGN ENGINEERS

(Continued from preceding page)

CLASS B AMPLIFIERS, A-F—(Continued)

(2) Beam Power Tubes

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	TYPE
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§

CLASS B AMPLIFIERS, R-F Telephony

(1) Triodes

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
13.5	450	15	2.5	6	843
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
75	1500	50	7.5	30	808
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
150	3000	100	10.0	30	852
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
400	2500	250	11.0	3	204-A
450	3000	300	10.0	30	833-A*
600	2500	400	11.0	3	849
600	4000	400	10.0	20	•833-A**
1100	2500	750	11.0	3	851
3750	7500	2500	11.0	50	846
5500	10000	3500	☆	1.6	891-R
6000	12500	4000	☆	1.6	892-R
7500	7500	5000	11.0	50	889
7500	8500	5000	11.0	25	889-R
10000	15000	6000	☆	1.6	891
15000	15000	10000	22.0	1.6	207
15000	15000	10000	☆	1.6	892
20000	20000	15000	22.0	1.6	858
32000	10500	20000	12.6	25	880
32000	20000	20000	☆	5	893, 893-R
100000	20000	75000	33.0	1.6	862
100000	20000	75000	☆	1.6	898

(2) Tetrodes

22.5	750	15	7.5	15	865
150	1250	100	10.0	15	850
150	3000	100	10.0	30	860

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
□ Push-Pull Type.
☆ See data pages for this type.
§ Class AB, operation.
* Natural 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 B AMPLIFIERS, R-F Telephony—(Continued)					
(2) Tetrodes—(Continued)					
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	150	•815□
30	400	20	12.6	150	•815□
37.5	600	25	6.3	60	•807, •1625
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
(5) Inductive-Output Tubes					
65Δ	2000Δ	50Δ	6.3	above 300	825
CLASS C AMPLIFIERS, R-F Telephony					
(1) Triodes, Plate Modulated					
14	350	10	2.5	6	843
21	350	10	7.5	6	841
30	350	13.5	2.5	45	1608
30	500	13.5	7.5	60	801-A
33	800	27	6.3	500	8012**
50	600	17.5	6.3	60	•809, •1623
50	800	27	6.3	500	•8025**
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	2000	67	10.0	30	852
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°
1250	3000	270	10.0	20	•833-A**
1800	2000	500	11.0	3	851
3000	6000	1660	11.0	50	846
6000	6000	3000	11.0	50	889
6000	6000	3000	11.0	25	889-R
8000	8000	4000	☆	1.6	891
8000	8500	2500	☆	1.6	891-R
10000	10000	2500	☆	1.6	892-R

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
□ Push-Pull Type.
☆ See data pages for this type.
Δ For collector.
° Natural 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)					
10000	10000	6600	22.0	1.6	207
10000	10000	6600	☆	1.6	892
12000	12000	10000	22.0	1.6	858
24000	12000	12000	☆	5	893, 893-R
36000	10500	12000	12.6	25	880
60000	12000	50000	33.0	1.6	862
60000	12000	50000	☆	1.6	898
(2) Triodes, Grid Modulated					
50	1000	40	6.3	500	8012••
60	1000	40	6.3	500	•8025••
65	1000	60	7.5	250	826
185	2000	125	10.0	30	•810
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‡
150	1000	70	10.0	15	850
170	2000	67	10.0	30	860
250	1600	85	10.0	20	803‡
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
(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	500	15	6.3	200	832□
22	500	15	12.6	200	832□
22	750	15	6.3	200	832-A□
22	750	15	12.6	200	832-A□
30	400	20	6.3	150	•815□
30	400	20	12.6	150	•815□
37.5	600	25	2.5	60	1624
60	500	40	6.3	200	829••, □
60	500	40	12.6	200	829••, □
75	1250	50	10.0	30	•814
105	1250	70	10.0	30	•828
150	2000	100	10.0	30	813

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

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FOR EQUIPMENT DESIGN ENGINEERS

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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					
20	325	10	2.5	45	1619
22	425	10	6.3	200	832□
22	425	10	12.6	200	832□
22	600	10	6.3	200	832-A□
22	600	10	12.6	200	832-A□
22	325	14	6.3	80	1614°
23	325	14	6.3	80	1614
37.5	500	16.5	2.5	60	1624
40	325	13.5	6.3	150	•815□
40	325	13.5	12.6	150	•815□
40	475	16.5	6.3	60	•807
40	475	16.5	12.6	60	•1625
90	425	28	6.3	200	829□, ••
90	425	28	12.6	200	829□, ••
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	8001
(9) Beam Power Tubes, Suppressor Modulated					
110	2000	75	5.0	75	8001
(10) Inductive-Output Tubes, Grid Modulated					
65△	2000△	50△	6.3	above 300	825
(11) Magnetrons					
5	1000	5	1.8	10 cmt	2J35
CLASS C AMPLIFIERS, R-F Telegraphy					
(1) Triodes					
6.25	250	5	12.6	30	1626
18	450	15	2.5	6	843
27	450	15	7.5	6	841
40	425	20	2.5	45	1608
42	600	20	7.5	60	801-A
50	1000	40	6.3	500	8012••
75	750	25	6.3	60	•809, •1623
75	1000	40	6.3	500	•8025••
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-B
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
300	3000	100	10.0	30	852
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

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
□ Push-Pull Type. † Approx. operating wavelength.
* With triode connection.
△ For collector.
•• Forced-air cooling.

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FOR EQUIPMENT DESIGN ENGINEERS

(Continued from preceding page)

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)					
690	2500	250	11.0	3	204-A
875	2500	400	11.0	3	849
1250	3000	300	10.0	30	833-A°
1800	4000	400	10.0	20	•833-A••
2500	2500	750	11.0	3	851
7500	7500	2500	11.0	50	846
15000	7500	5000	11.0	50	889
15000	10000	4000	☆	1.6	891-R
16000	8500	5000	11.0	25	889-R
18000	12000	6000	☆	1.6	891
18000	12500	4000	☆	1.6	892-R
30000	15000	10000	22.0	1.6	207
30000	15000	10000	☆	1.6	892
40000	20000	20000	22.0	1.6	858
60000	10500	20000	12.6	25	880
70000	20000	20000	☆	5	893, 893-R
200000	20000	100000	33.0	1.6	862
200000	20000	100000	☆	1.6	898
(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‡
220	1250	100	10.0	15	850
300	3000	100	10.0	30	860
350	2000	125	10.0	20	803‡
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
35	375	21	6.3	80	1614
36	500	15	6.3	200	832□
36	500	15	12.6	200	832□
36	750	15	6.3	200	832-A□
36	750	15	12.6	200	832-A□
54	600	25	2.5	60	1624
60	400	20	6.3	150	•815□
60	400	20	12.6	150	•815□
60	600	25	6.3	60	•807
60	600	25	12.6	60	•1625
120	500	40	6.3	200	829□, ••
120	500	40	12.6	200	829□, ••

• 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.
° Natural cooling.
•• Forced-air cooling.

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TRANSMITTING TUBE GUIDE

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(Continued from preceding page)

MAX. PLATE INPUT WATTS	MAX. PLATE VOLTS	MAX. PLATE DISSIPATION WATTS	FILAMENT VOLTS	MAX. FREQ.■ Mc.	TYPE
CLASS C AMPLIFIERS, R-F Telegraphy—(Continued)					
(4) Beam Power Tubes—(Continued)					
180	1250	50	10.0	30	•814
200	1250	70	10.0	30	•828
300	2000	75	5.0	75	8001
360	2000	100	10.0	30	813
(5) Inductive-Output Tubes					
100△	2000△	50△	6.3	above 300	825
(6) Magnetrons					
5	1000	5	1.8	10 cm†	2J35

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

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/866
1.25	5.0	5000 20–70° 10000 20–60°	5.0	872-A/872, 8008
2.5	10	20000 30–40°	5.0	869-B
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 rating.

MAX. AV. PLATE AMPERES	MAX. PEAK PLATE AMPERES	MAXIMUM PEAK INVERSE PLATE VOLTS	FILAMENT VOLTS	TYPE
RECTIFIERS				
(2) Half-Wave, High-Vacuum				
0.20	0.6	3500	10.0	217-A
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

• See NOTE on first page of this GUIDE.
■ For rated max. plate input and voltage.
□ Push-Pull Type.
△ For collector.
•• Forced-air cooling.
† Approx. operating wavelength.

LIST PRICES□
OF TRANSMITTING TYPES

- NOTICE -

The OPA requires us to call your attention to the following:

"The suggested retail price (or Fair Trade price) may be charged only by any one reselling this article (or for any article listed in this catalogue or price list or Fair Trade contract for which a retail price is suggested or minimum price is established), if the maximum price for that article as established by the person so reselling under the appropriate OPA regulation, is at least equal to the suggested retail (or Fair Trade) price."

Type	Price	Type	Price	Type	Price
2J35.....$	65.00	831.....$	▲	888.....$	▲
203-A.....	10.00	832.....	17.00	889.....	275.00
204-A.....	85.00	832-A.....	17.00	889-R...	425.00 / 375.00*
207.....	220.00	833-A.....	76.50	891.....	285.00
211.....	10.00	834.....	12.50	891-R...	410.00 / 360.00*
214.....	▲	835.....	16.00	892.....	285.00
217-A.....	20.00	836.....	11.50	892-R...	410.00 / 360.00*
217-C.....	20.00	837.....	2.80	893.....	750.00
218.....	▲	838.....	11.00	893-R...	1150.00 / 950.00*
219.....	▲	841.....	3.25	896.....	▲
800.....	10.00	842.....	3.25	898.....	1650.00
801-A.....	2.50	843.....	1.65	1608....	4.00
802.....	3.50	844.....	▲	1610....	2.00
803.....	25.00	845.....	10.00	1613....	1.55
804.....	15.00	846.....	260.00	1614....	2.80
805.....	13.50	848.....	▲	1616....	5.75
806.....	22.00	849.....	120.00	1619....	2.20
807.....	2.25	850.....	37.50	1623....	2.50
808.....	7.75	851.....	195.00	1624....	2.40
809.....	2.50	852.....	16.40	1625....	2.25
810.....	13.50	857-B.....	240.00	1626....	1.60
811.....	3.50	858.....	400.00	1627....	▲
812.....	3.50	860.....	21.50	1651....	▲
813.....	22.00	861.....	155.00	1652....	▲
814.....	17.50	862.....1650.00		8000....	13.50
815.....	4.50	863.....	▲	8001....	27.50
816.....	1.00	865.....	7.95	8003....	12.00
825.....	34.50	866-A/866	1.50	8005....	7.00
826.....	19.00	869-B....	125.00	8008....	8.50
827-R.....	135.00	870-A....	□□	8012....	19.00
828.....	17.50	871.....	▲	8025....	14.50
829.....	19.50	872-A/872	7.50		
~~823-A~~.....	~~19.50~~	880.....	850.00		
830-B.....	10.00	887.....	▲		

□ This price list applies only in the United States of America and is subject to change without notice.

▲ Discontinued type. Data sheets have been retained in book for reference purposes only.

□□ Price on request.

* This price applies when a new tube is purchased and a radiator in good condition is returned prepaid to the RCA VICTOR DIVISION, Radio Corporation of America, Harrison, N. J.

(continued on next page)

LIST PRICES
OF TRANSMITTING TYPES

(continued from preceding page)

INFORMATION ON PURCHASING ABOVE TYPES

Information as to where *RCA Transmitting Tubes* can be purchased may be obtained from our *district office* nearest you or from *Tube and Equipment Department, RCA VICTOR DIVISION, Radio Corporation of America, Camden, N. J.*

EXPLANATION OF NEW RATING SYSTEM FOR RCA AIR-COOLED TRANSMITTING TUBES

An entirely new system of ratings for RCA Air-Cooled Transmitting Tubes is now in effect. Instead of one set of maximum ratings for each tube type, two sets will be shown. These ratings are designated as CONTINUOUS COMMERCIAL SERVICE (CCS) and INTERMITTENT COMMERCIAL AND AMATEUR SERVICE (ICAS). These new ratings are shown on the Data sheets for the 811, 812, and 828. Sheets showing the new ratings for the 802, 804, 806, 807, 809, 810 and 814 will be made available as soon as possible.

The Continuous Commercial Service ratings are essentially the equivalent of former MAXIMUM RATINGS and are based on providing long tube life life and maximum reliability of tube operation. The ratings for Intermittent Commercial and Amateur Service are considerably higher than those for Continuous Commercial Service. They permit the use of much greater power input and provide a relatively large increase in useful power output. Tube life under these conditions, of course, is reduced. However, since there are numerous applications where the design factors of low initial cost, maximum power output, minimum size, and light weight are more important than extremely long tube life, the transmitter designer may very properly decide that a small tube operated with ICAS ratings better meets his requirements than a larger tube operated with CCS ratings. The new system of dual ratings recognizes these diversified design requirements.

TRANSMITTING TUBE RATINGS

The filament or heater voltage given on the DATA pages is a normal value unless otherwise stated. This means that transformers and/or resistances in the cathode circuit should be designed to operate the filament or heater at rated value for full-load operating conditions under average line-voltage conditions. Variations from this rated value due to line voltage fluctuation or other causes, should not exceed plus or minus 5%, unless otherwise specified.

In general, the filament of a transmitting tube may be operated with either a.c. or d.c. A.c. is usually employed unless d.c. is necessary from the standpoint of hum. With a-c operation, the grid return and the plate return should be connected to the mid-point of the filament-supply winding of the transformer. When d-c is used, the return leads should be connected to the negative filament terminal.

In case it is required to use d-c filament excitation on any filament type for which the data are given on an a-c basis, the grid-bias values as given on the respective DATA pages should be decreased by an amount approximately equal to one-half the rated filament voltage and be referred to the negative filament terminal instead of the mid-point (as in a-c operation).

In the rating of RCA transmitting tubes, certain values on the DATA pages are given as MAXIMUM. These are limiting values above which the serviceability of the tube will be impaired from the viewpoint of life and satisfactory performance. If these limiting values are not to be exceeded under the usual operating variations, it will be necessary to determine the amount of voltage fluctuation due to line-voltage variation, load variation, and manufacturing variation in the apparatus itself. Average design values must then be decided upon so that maximum ratings will never be exceeded under the usual operating conditions.

Each maximum rating must be considered in relation to all other maximum ratings, so that under no condition of operation will any maximum rating be exceeded. For example, consider a tube with the following maximum ratings for Class B r-f service: d-c plate voltage, 1250 max. volts; d-c plate current, 150 max. ma.; and plate input, 150 max. watts. From these maximum ratings, it is apparent that when the maximum plate voltage of 1250 volts is used, the plate current must be reduced so that the maximum plate-input rating of 150 watts is not exceeded. Likewise, and for the same reason, when the maximum plate current of 150 milliamperes is used, the plate voltage must be reduced.

The DATA pages also show *Typical Operation* values for each respective tube type in its recommended classes of op-

(continued on next page)

TRANSMITTING TUBE RATINGS

(continued from preceding page)

eration. These values must not be considered as ratings, in as much as the tube can be used under any suitable conditions within the Maximum Ratings to obtain the required output. The output value for any operating condition is an approximate tube output, i.e., tube input minus plate loss. Circuit losses must be subtracted from tube output in determining useful output. Output values are approximate and are not to be used as output ratings.

The typical values of d-c grid current and driving power shown for triodes and tetrodes in Class B r-f service and in Class C service are subject to wide variations 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 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 delivering considerably more than the required driving power.

The typical operating values have been given in order to show concisely some guiding information for the use of each type. Since any transmitting type may be used under widely different conditions within Maximum Ratings, we suggest that you write us before you proceed with the design of equipment.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

(continued from preceding page)

TUBE TYPE	OPERATING FREQUENCY *Megacycles*	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
811	60	100	100	100
	80	90	75	75
	100	83	60	60
812-A	30	100	100	100
	60	89	89	89
	80	70	70	70 ←
	100	55	55	55
813	30	100	100	100
	45	93	87	87
	60	88	75	75
	120	76	50	50
814	30	100	100	100
	50	90	80	80
	75	85	64	64
815	125	100	100	100
	175	85	80	80
	200	75	70	70
826	250	–	100	100 ←
	300	–	80	80
827-R	110	100	100	100
828	30	100	100	100
	50	90	80	80
	75	80	65	65
829-B	200	–	100	100
	250	–	89	89 ←
	–	–	–	–
830-B	15	100	100	100
	30	87	77	77
	60	74	54	54
832-A	200	100	100	100
	250	94	89	89
	–	–	–	–
833-A, with natural cooling				
	30	100	100	100
	50	98	90	90
	75	94	72	72
833-A, with forced-air cooling				
	20	100	100	100
	50	97	83	83
	75	93	65	65

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TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

(continued from preceding page)

TUBE TYPE	OPERATING FREQUENCY *Megacycles*	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
834	100 170 350	100 89 73	100 80 53	100 80 53
835	20 40 100	100 85 70	100 80 50	100 80 50
837	20 40 60	100 90 84	100 76 62	100 76 62
838	30 60 120	100 85 70	100 75 50	100 75 50
841 A 843	6 15 30	100 96 90	100 90 80	100 90 80
846	50 100 150	100 82 73	100 75 60	100 75 50
849	Same as for Type 204-A			
850	15 30 60	100 89 79	100 80 64	100 80 64
851	3 7 15	100 88 76	100 75 50	100 75 50
858	1.5 20 40	100 82 57	100 75 50	100 75 50
860	Same as for Type 838			
861	20 30 60	100 90 75	100 82 53	100 82 53
862-A	Same as for Type 898-A			

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TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

(continued from preceding page)

TUBE TYPE	OPERATING FREQUENCY Megacycles	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
865	15 30 60	100 90 78	100 78 55	100 78 55
880	 25 50 75 100	Voltage Input 100 100 80 9a 68 85 60 75	100 72 56 45	100 75 62 50
889-A	50 100 150	100 85 72	100 75 50	100 75 50
889R-A	 80 65 100	 100 85 72	 100 78 60	Volt. Input 100 100 87 73 65 50
891	1.6 7.5 20	100 82 72	100 75 65	100 75 50
891-R	1.6 7.5 20	100 83 7a	100 75 50	100 75 50
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	 5 20 80	Volt. Input 100 100 85 82 65 73	Volt. Input 100 100 80 75 6a 6a	Volt. Input 100 100 80 66 60 50
893A-R	 5 12 25	 100 86 7a	 100 81 65	Volt. Input 100 100 81 75 65 50
898-A	1.6	100 Not recommended for operation at frequencies above 1.6 megacycles.	100	100
1602	6	100 Not recommended for operation at frequencies above 6 megacycles.	100	100
1608	45 60 100	100 92 80	100 80 63	100 80 63
1613	20 60 —	— — —	100 82 —	100 82 —

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TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

(continued from preceding page)

TUBE TYPE	OPERATING FREQUENCY *Megacycles*	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
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
5592				*Volt. Input*
	50	–	–	100 100
	75	–	–	85 88
	108	–	–	65 67
→ 5618	100	–	100	100
→ 5671	10	–	100	100
	18	–	88	88
	25	–	80	80
8000	Same as for Type 810			
8001	See RE27/8001			
8003	30	100	100	100
	50	90	83	83
8005	60	100	100	100
	80	90	75	75
	100	83	60	60
8012-A and 8025-A	500	100	100	100
	600	80*	70*	70*

* Maximum permissible percentage of only maximum plate voltage; the maximum plate input may be 100% of its rated value.

→ Indicates a change.

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*	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
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			
520-B	2	100	100	100
	Not recommenced for operation at frequencies above 2 megacycles.			
800	60	100	100	100
	100	90	80	80
	180	79	55	55
801-A/ 801	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	100
	60	89	75	75
	130	78	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

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TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

(continued from preceding page)

TUBE TYPE	OPERATING FREQUENCY Megacycles	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
811 & 812	60	100	100	100
	80	90	75	75
	100	83	60	60
813	30	100	100	100
	45	93	87	87
	60	88	75	75
814	30	100	100	100
	50	90	80	80
	75	85	64	64
815	150	100	100	100
	200	85	80	80
	225	75	70	70
825	Recommended for operation at frequencies above 300 megacycles.			
826	250	100	100	100
	300	90	80	80
827-R	110	100	100	100
828	30	100	100	100
	50	90	80	80
	75	80	65	65
829 and 829-A	200	100	100	100
	250	94	89	89
	-	-	-	-
830-B	15	100	100	100
	30	87	77	77
	60	74	54	54
831	20	100	100	100
	30	90	82	82
	60	75	53	53
832 and 832-A	200	100	100	100
	250	94	89	89
	-	-	-	-
833-A, with natural cooling				
	30	100	100	100
	50	98	90	90
	75	94	72	72
833-A, with forced-air cooling (see data pages for this type)				
	20	100	100	100
	50	97	83	83
	75	93	65	65
834	100	100	100	100
	170	89	80	80
	350	73	53	53
835	20	100	100	100
	40	85	80	80
	100	70	50	50
837	20	100	100	100
	40	90	76	76
	60	84	62	62
838	30	100	100	100
	60	85	75	75
	120	70	50	50
841 & 843	6	100	100	100
	15	96	90	90
	30	90	80	80
844	15	100	100	100
	Not recommended for operation at frequencies above 15 megacycles.			

← Indicates a change.

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RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

(continued from preceding page)

TUBE TYPE	OPERATING FREQUENCY Megacycles	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
846	50 100 150	100 82 73	100 75 60	100 75 50
848	Same as for Type 891			
849	Same as for Type 204-A			
850	15 30 60	100 89 79	100 80 64	100 80 64
851	3 7 15	100 98 76	100 75 50	100 75 50
852	Same as for Type 838			
858	1.6 20 40	100 82 57	100 85 80	100 75 50
860	Same as for Type 838			
861	20 30 60	100 90 75	100 82 53	100 82 53
862	Same as for Type 898			
863	Same as for Type 892			
865	15 30 60	100 90 78	100 78 55	100 78 55
880	 25 50 75 100	Voltage / Input 100 / 100 80 / 98 68 / 85 60 / 75	 100 72 56 45	 100 75 62 50
887 & 888	225 250 275	100 100 100	100 95 90	100 95 90
889	50 100 150	100 85 72	100 75 50	100 75 50
889-R	 25 50 75 100	 100 87 80 74	 100 80 68 60	Volt. / Input 100 / 100 85 / 75 76 / 60 70 / 50
891	1.6 7.5 20	100 82 72	100 75 65	100 75 50
891-R	1.6 7.5 20	100 83 74	100 75 50	100 75 50
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	5 20 40	100 80 65	100 75 50	100 75 50

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TRANSMITTING TUBE RATINGS vs. OPERATING FREQUENCY

(continued from preceding page)

TUBE TYPE	OPERATING FREQUENCY Megacycles	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	
893-R				Volt.	Input
	5	100	100	100	100
	12	86	81	81	75
	25	78	65	65	50
898	1.6	100	100	100	
	Not recommended for operation at frequencies above 1.6 megacycles.				
1602	6	100	100	100	
	Not recommended for operation at frequencies above 6 megacycles.				
1608	45	100	100	100	
	60	92	80	80	
	100	80	63	63	
1610	20	-	100	100	
	60	-	82	82	
	-	-	-	-	
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	
1627	Same as for Type 810				
1652	1.5	100	100	100	
	5	-	75	75	
	10	-	50	50	
8000	Same as for Type 810				
8001	75	100	100	100	
	120	90	75	75	
	150	80	50	50	
8003	30	100	100	100	
	50	90	83	83	
8005	60	100	100	100	
	80	90	75	75	
	100	83	60	60	
→ 8012	500	100	100	100	
8025	600	77*	53*	63*	

* Maximum permissible percentage of only maximum plate voltage: the maximum plate input may be 100% of its rated value.

← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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
750	851
1000	846
2500	520-B 1652
5000	207▲ 848▲ 863▲ 891 892 892-R
10000	858
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	833 849
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 Nov. 13, 1939, Mimeo No.3782. Ratings apply only for tubes used in the last radio stage of standard broadcast transmitters and may not be applicable to any other service.

▲ Corrected classification as of Mar. 8, 1940.

■ Addition approved Jan. 30, 1940.

2J35
MAGNETRON

TRANSIT-TIME, SPLIT-PLATE TYPE WITH STABILIZING ELECTRODES AND INTERNAL CIRCUIT

Wavelength of 10 cm approx.

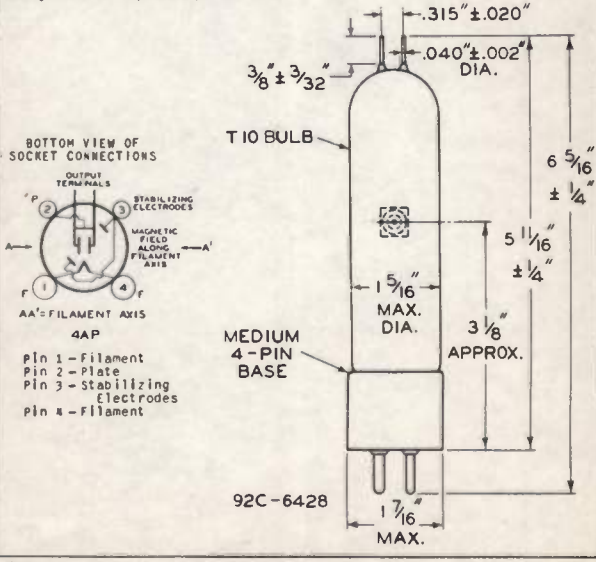
Filament	Tungsten	
Voltage	1.8	a-c or d-c volts
Current	2.0	amp.
Overall Length		6-5/16" ± 1/4"
Seated Height		5-11/16" ± 1/4"
Maximum Diameter		1-7/16"
Bulb		T-10
Base		Medium 4-Pin
Mounting Position		Any

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

D-C Plate Voltage		1000 max.	volts
D-C Stabilizing-Electrode Voltage		750 max.	volts
D-C Plate Current		5 max.	ma.
D-C Stabilizing-Electrode Current		13 max.	ma.
Typical Operation at 10 cm approx.:			
Filament Voltage *	1.8	1.8	volts
D-C Plate Voltage	900	1000	volts
D-C Stabilizing-Electrode Voltage	550	650	volts
D-C Plate Current	4	4	ma.
D-C Stabilizing-Electrode Current	6	10	ma.
Magnetic Field Intensity *	1300	1300	gausses
Power Output (approx.)	0.9	1	watt

* Adjusted for optimum performance.



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

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.

3C33

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.

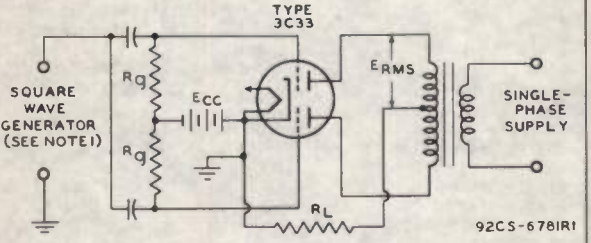
Maximum Circuit Values:

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 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.

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.

→ Indicates a change.

4X500A
POWER TETRODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Thoriated Tungster:		
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
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:

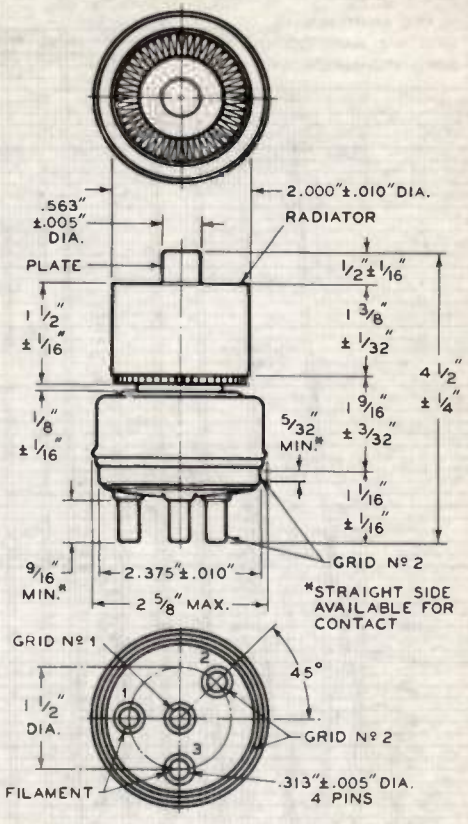
Values are for 4 tubes

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.

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

4X500A
POWER TETRODE

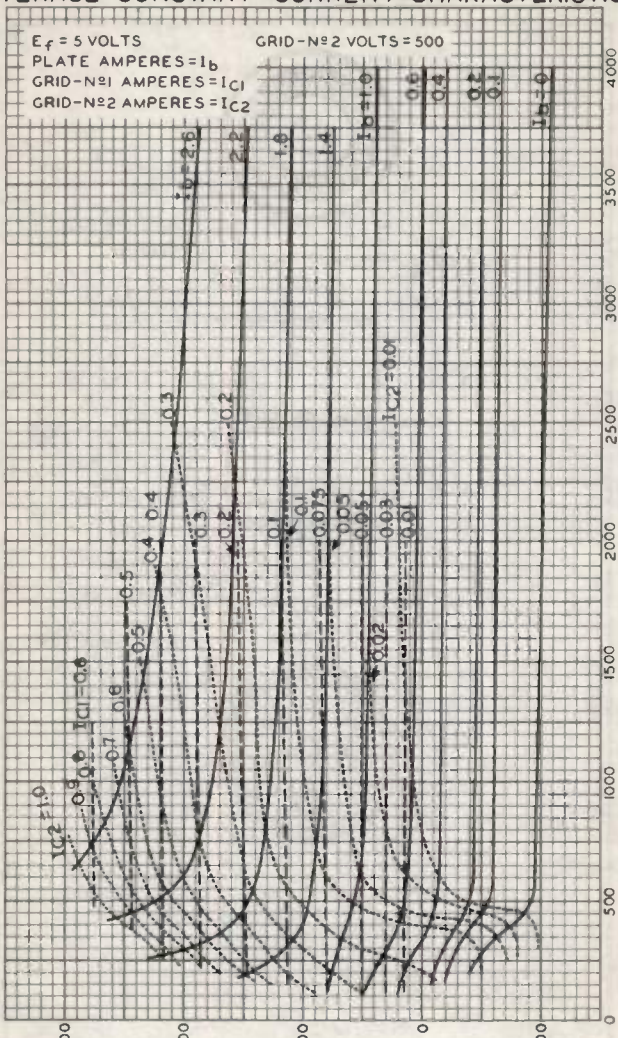


92CS-7028

4X500A

4X500A

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAY 20,1948 TUBE DEPARTMENT 92CM-6984

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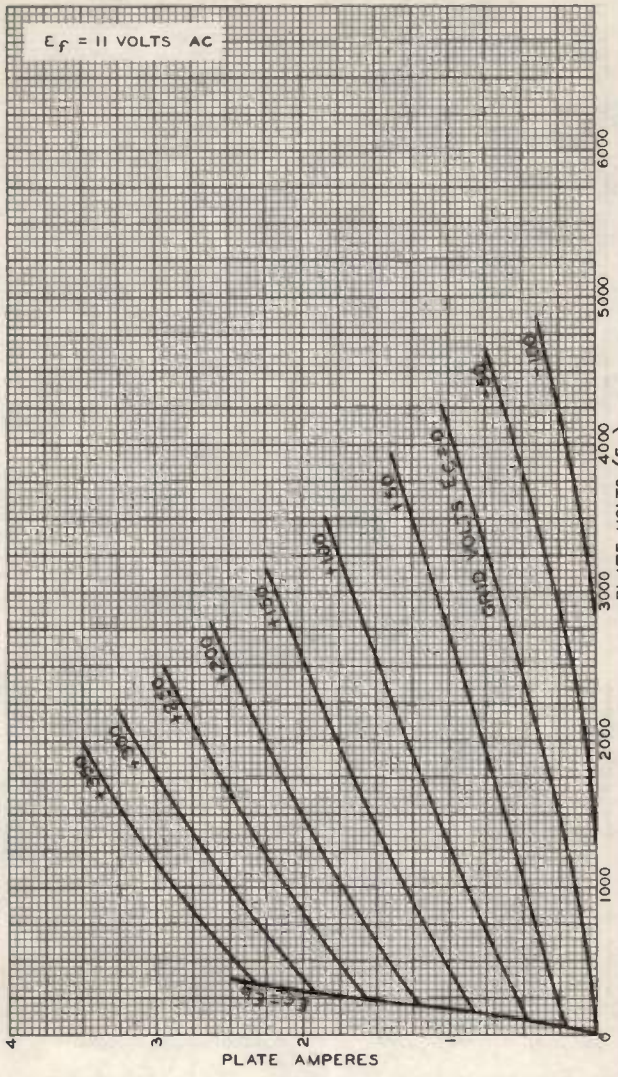
6C24

AVERAGE PLATE CHARACTERISTICS



MAY 10, 1948

TUBE DEPARTMENT
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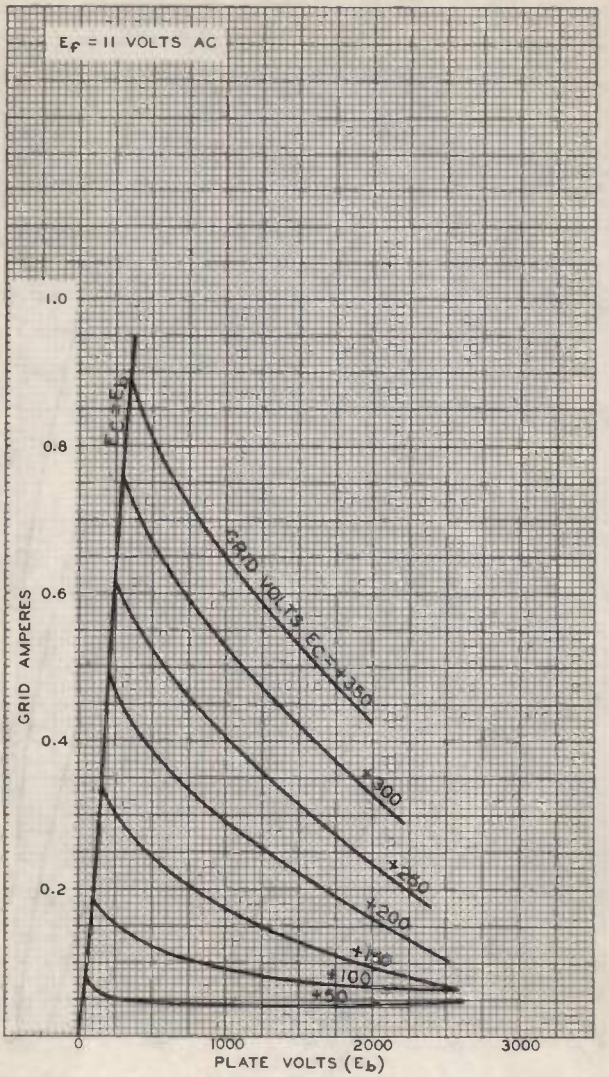
92CM-6593RI

RCA

6C24

TYPICAL CHARACTERISTICS



8D21
PUSH-PULL POWER TETRODE
WATER AND FORCED-AIR COOLED

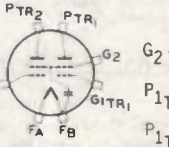
GENERAL DATA

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	25.5	μμf
Input.	6.5	μμf
Output	200	μμf
Internal Grid-No.2 Bypass Capacitor (Approx.). . .		

Mechanical:

Terminal Connections:



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

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

8D21
PUSH-PULL POWER TETRODE

DC Grid-No.1 Current:		
Synchronizing Level	0.050 max.	amp
Pedestal Level	0.010 max.	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.

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.

8D21

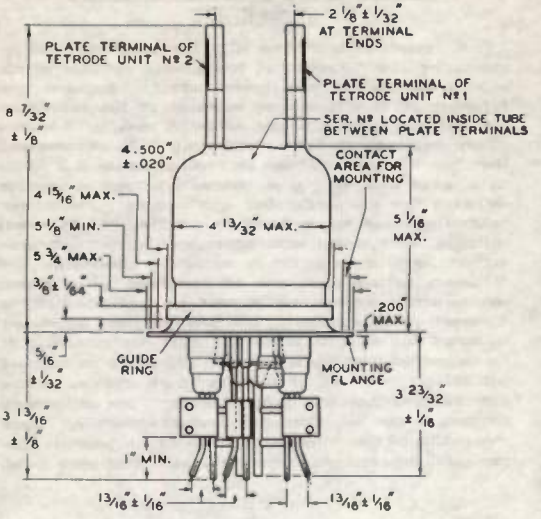
PUSH-PULL POWER TETRODE

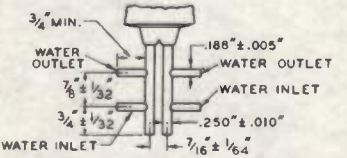
OPERATING INSTRUCTIONS FOR CONSERVING FILAMENT LIFE

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.

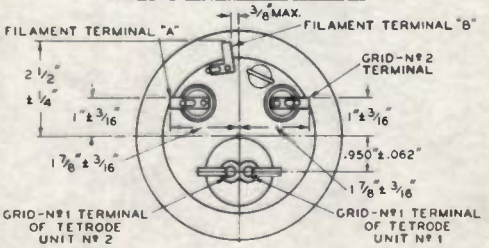
RCA

8D21
PUSH-PULL POWER TETRODE



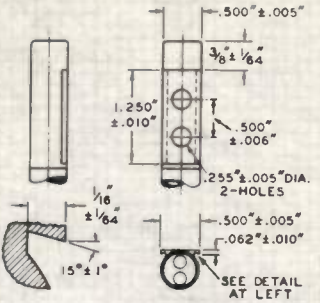


DETAIL OF GRID-No 1 TERMINALS

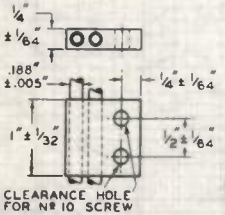


8D21
PUSH-PULL POWER TETRODE

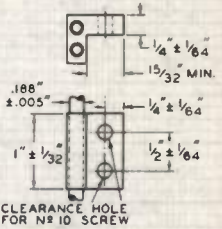
OUTLINE DETAILS



DETAIL OF PLATE TERMINALS



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

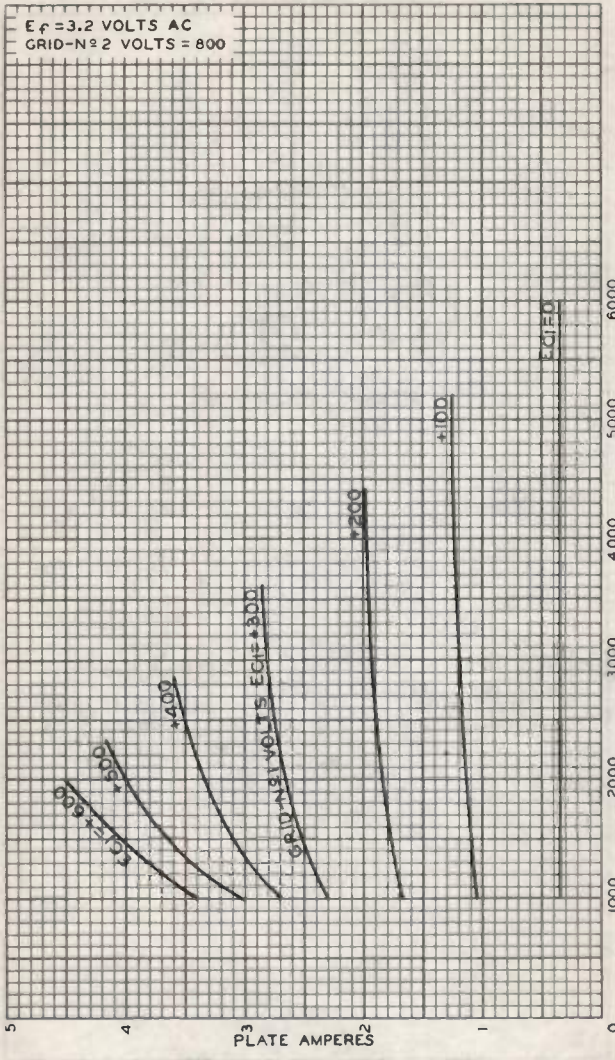


DETAIL OF FILAMENT
TERMINAL "B"

RCA

8D21

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



MAY 25, 1948 TUBE DEPARTMENT 92CM-6696R1

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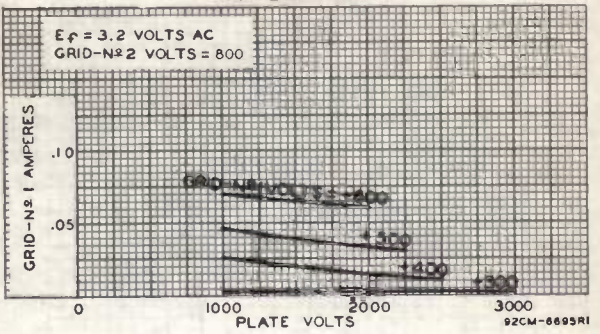
8D21

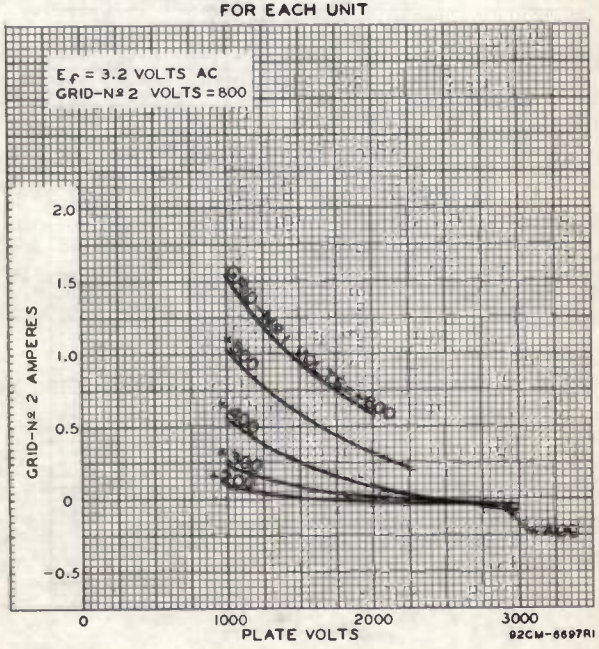
TYPICAL CHARACTERISTICS

FOR EACH UNIT

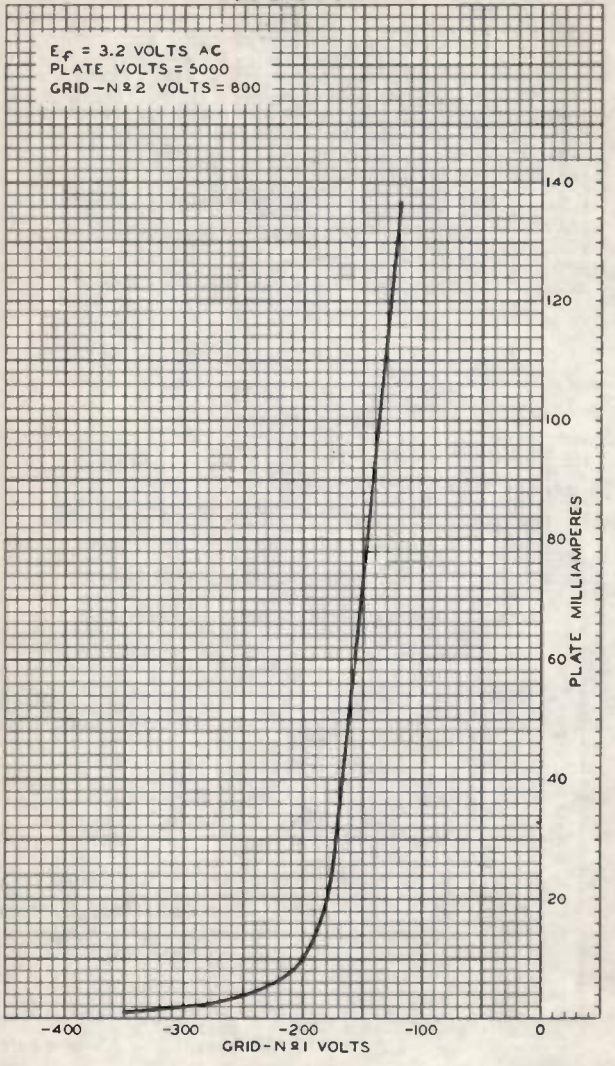


TYPICAL CHARACTERISTICS

FOR EACH UNIT



8D21
AVERAGE CHARACTERISTIC
FOR EACH UNIT



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 1-1/4" 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.

RCA

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.

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.

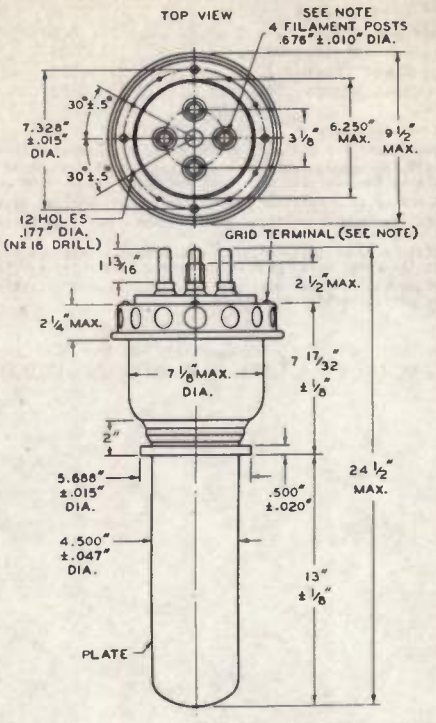
□ Subject to wide variations as explained under TUBE RATINGS in General Section.

□□ 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.

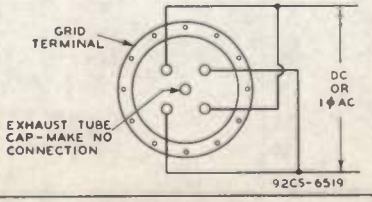
9C21
POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

92CM-6438R1

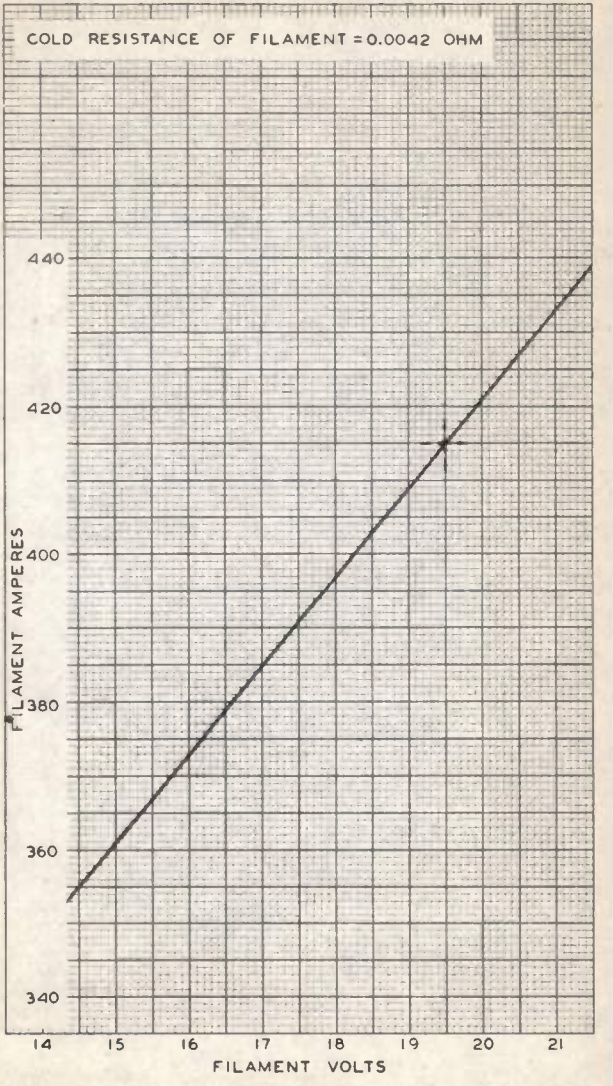
FILAMENT CONNECTIONS



92CS-6519

9C21

AVERAGE FILAMENT CHARACTERISTIC



DEC. 1, 1943

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6457

9C22
POWER TRIODE

FORCED-AIR-COOLED

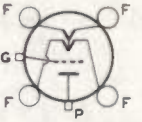
GENERAL DATA

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 1-1/8" 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

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.

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.

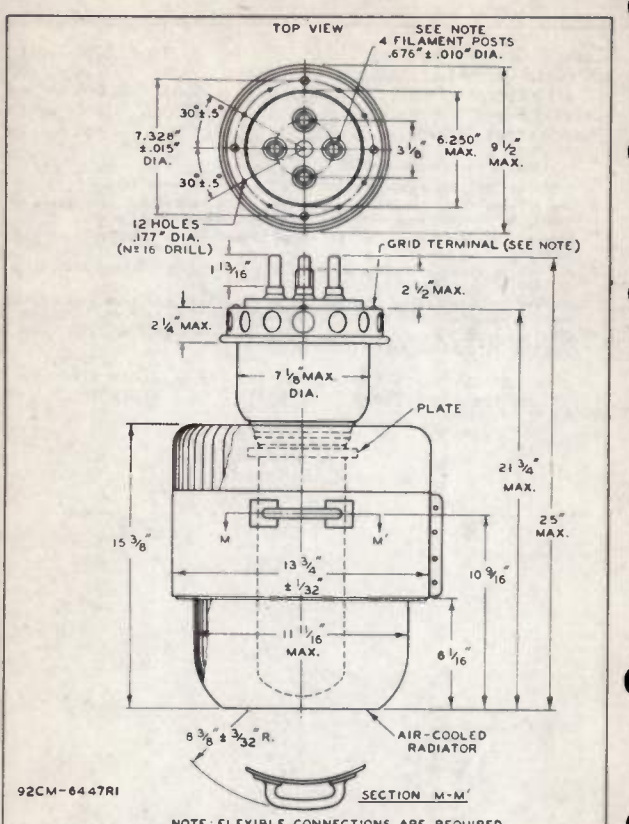
▲▲ Obtained from cathode resistor (230, 275), from grid resistor (1800, 2000) or by partial self-bias methods.

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

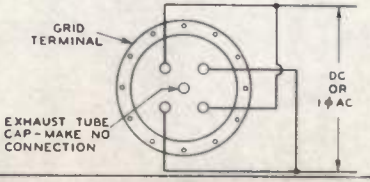
9C22

POWER TRIODE



NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

FILAMENT CONNECTIONS



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

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.

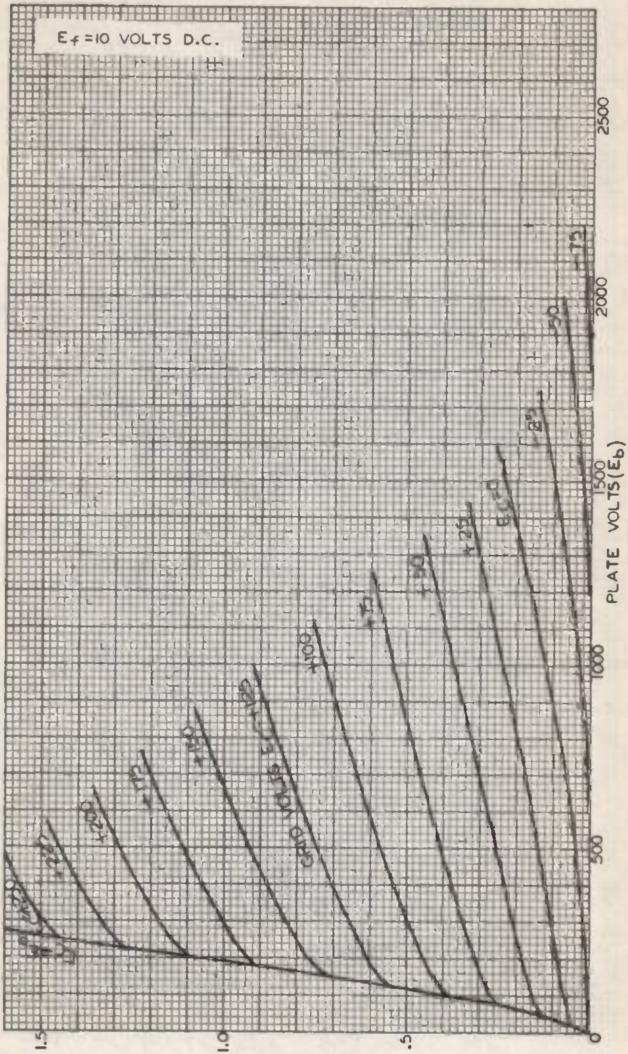
OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 203-A are the same as for the 211

← Indicates a change

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

203-A

AVERAGE PLATE CHARACTERISTICS



FEB. 27, 1934

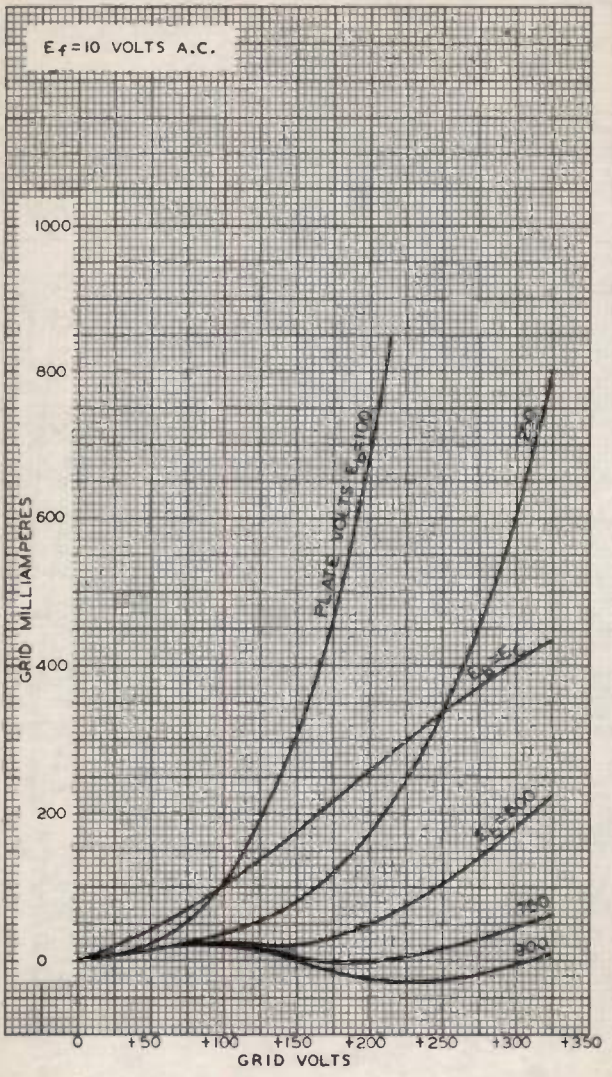
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

92S-5463

RCA

203-A

AVERAGE CHARACTERISTICS



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)

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

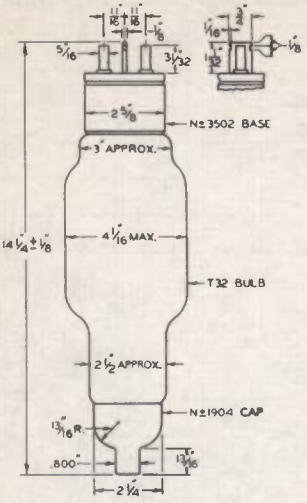
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

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

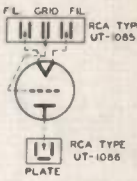
° At crest of audio-frequency cycle with modulation factor of 1.0.

For use of the 204-A at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

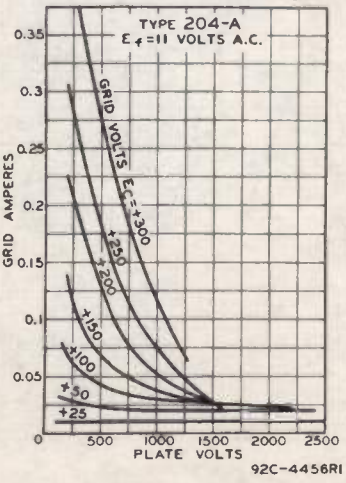
204-A
R-F POWER AMPLIFIER, OSCILLATOR CLASS B MODULATOR



TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



TYPICAL CHARACTERISTICS

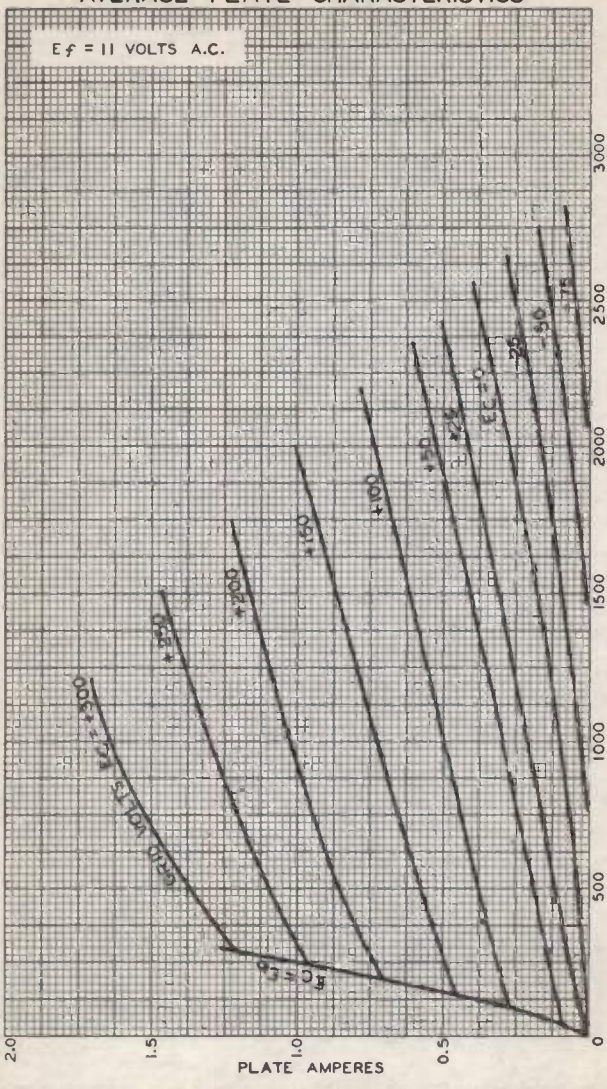


92C-4456RI

RCA

204-A

AVERAGE PLATE CHARACTERISTICS



207
POWER TRIODE
WATER COOLED

GENERAL DATA

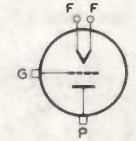
Electrical:

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.

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.

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.

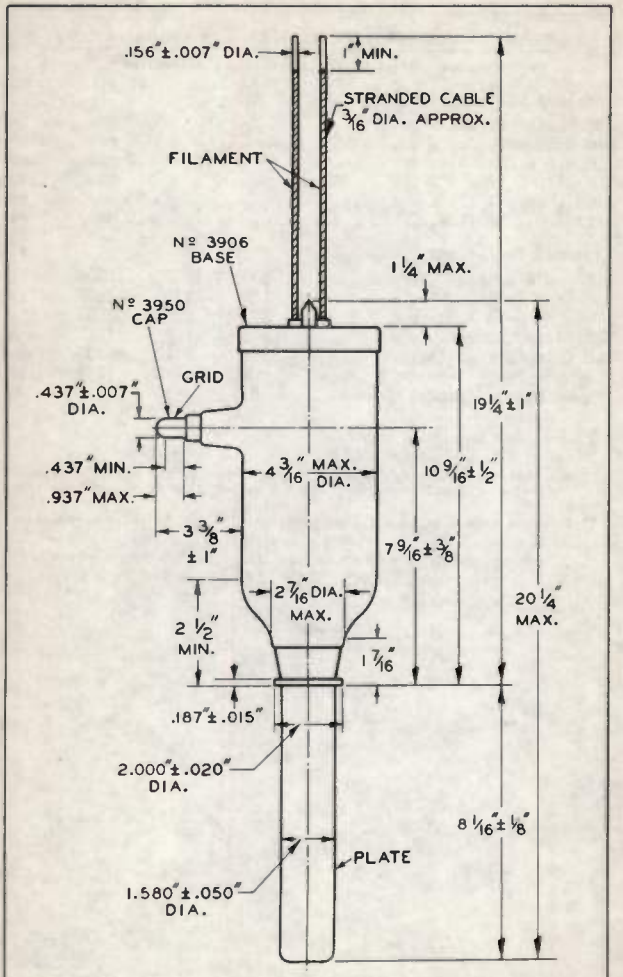
\# For ac filament supply.

□□ 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.

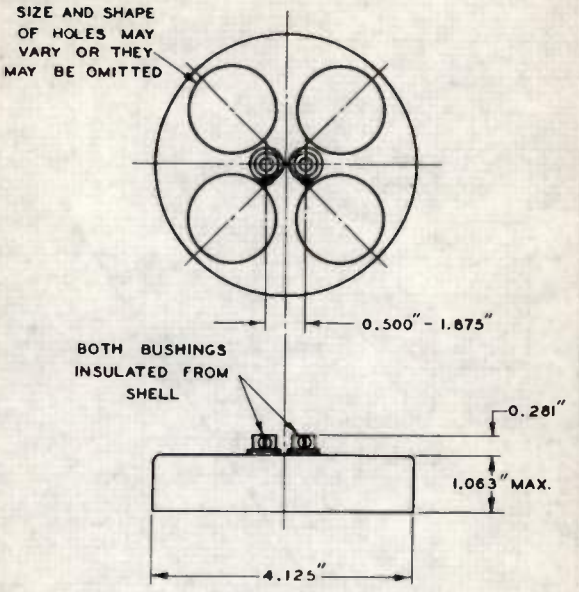
Data on operating frequencies for the 207 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

207
POWER TRIODE



207
POWER TRIODE

TERMINAL-SUPPORT SHELL
Nº 3906

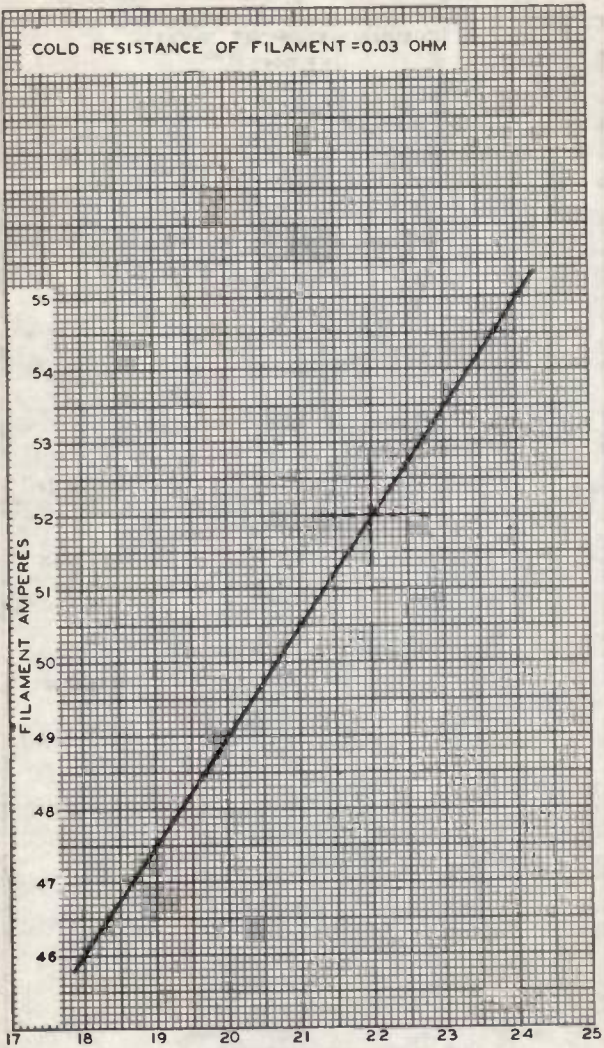


92CS-7020

RCA

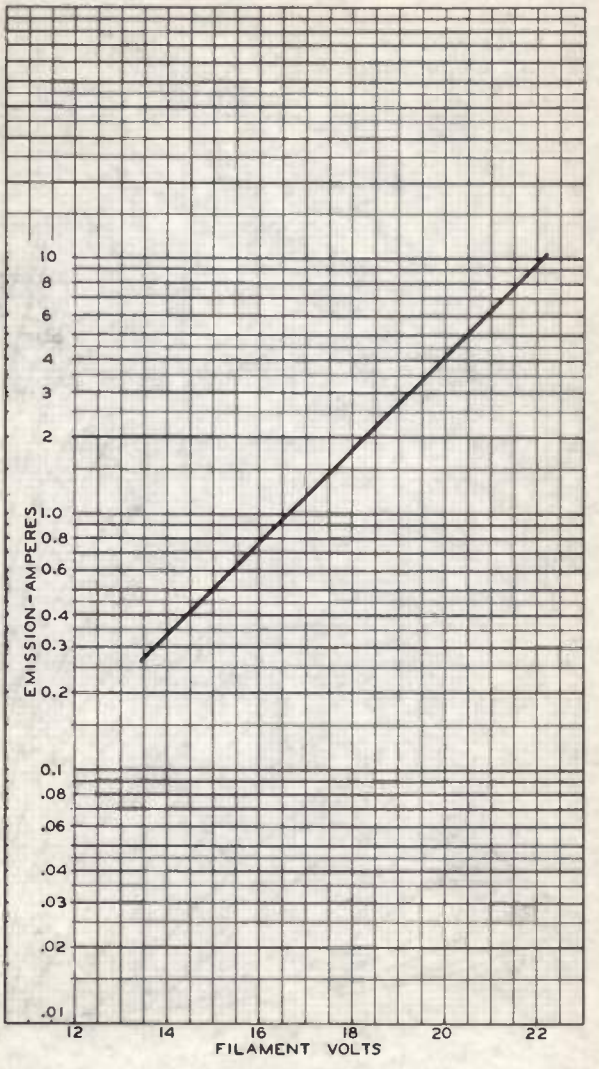
207

AVERAGE FILAMENT CHARACTERISTIC



207

AVERAGE FILAMENT-EMISSION CHARACTERISTIC



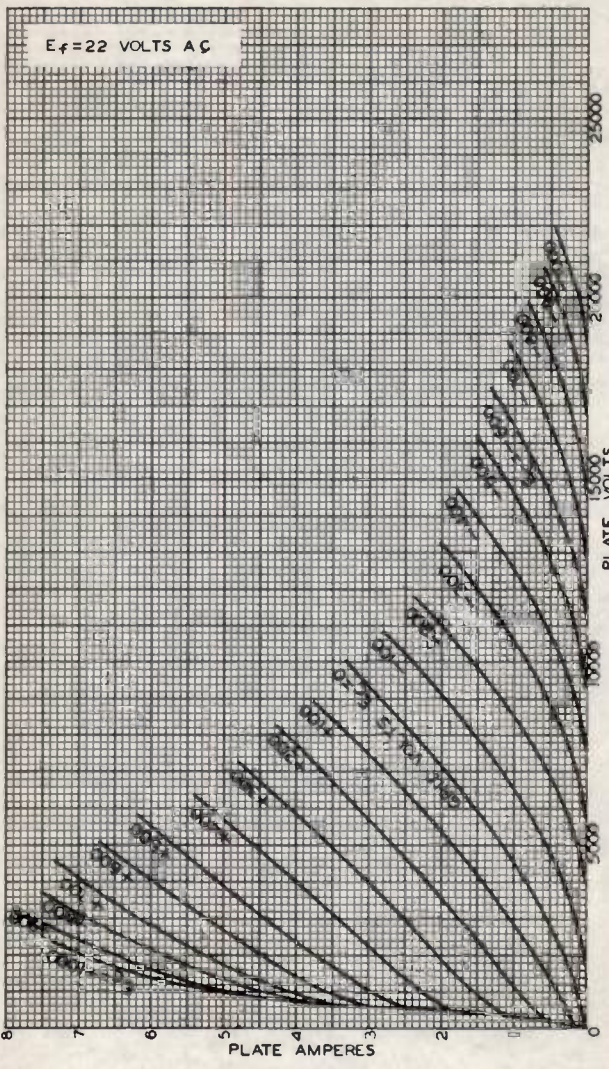
SEPT. 2,1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-4551

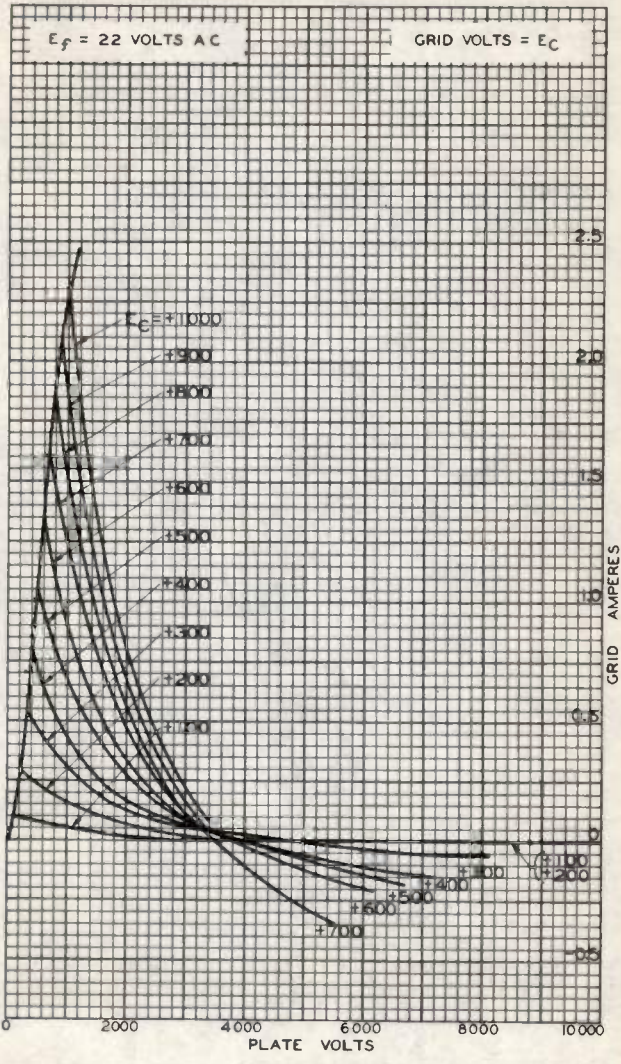
207

AVERAGE PLATE CHARACTERISTICS



207

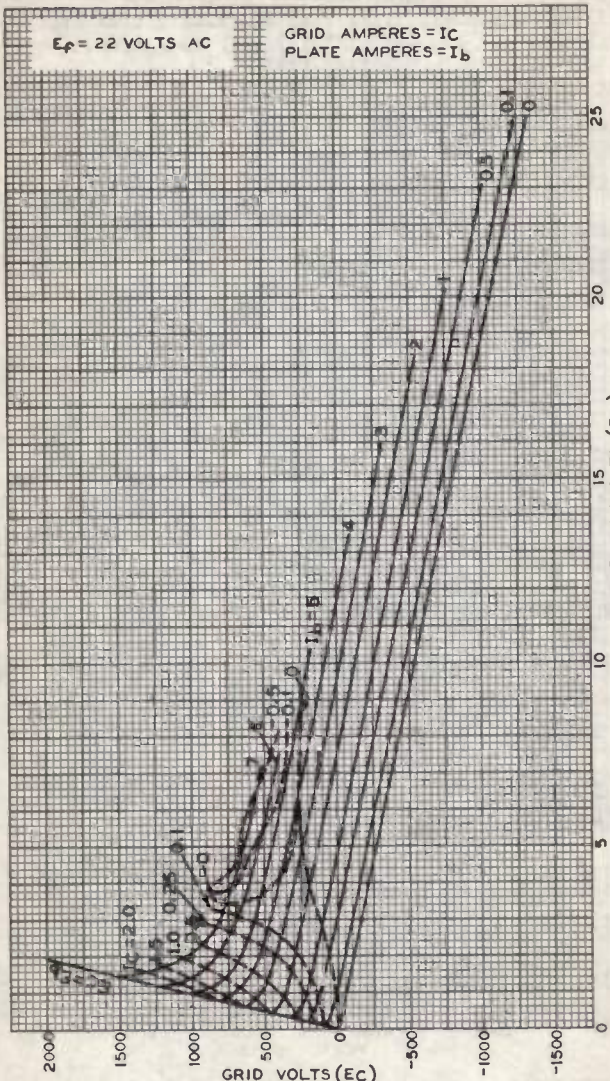
TYPICAL CHARACTERISTICS



RCA

207

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



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		7.5	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)

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 115% of the carrier conditions.

°, **: See next page.

(continued on next page)

211

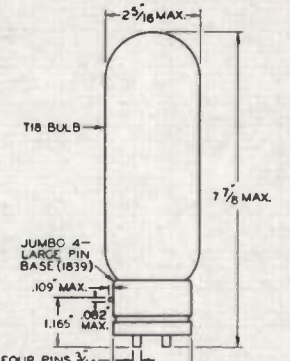
R-F POWER AMPLIFIER, OSCILLATOR, A-F POWER AMPLIFIER, MODULATOR

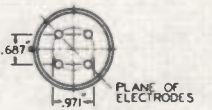
(continued from preceding page)

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

°° Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

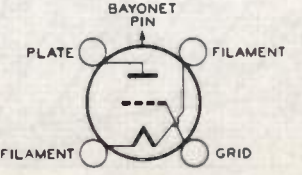
For use of the 211 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.





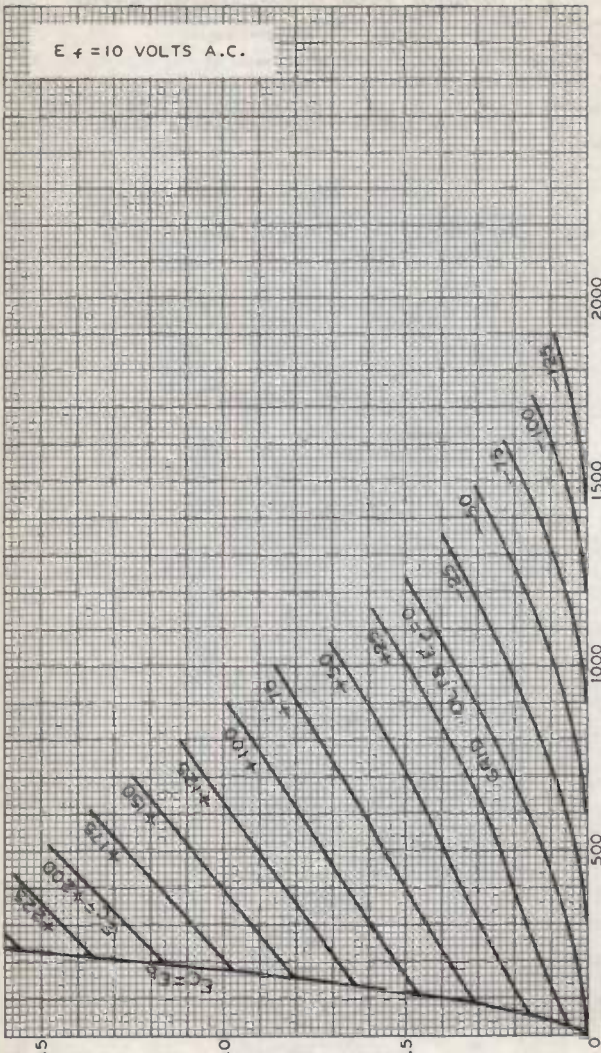
BOTTOM VIEW OF BASE

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



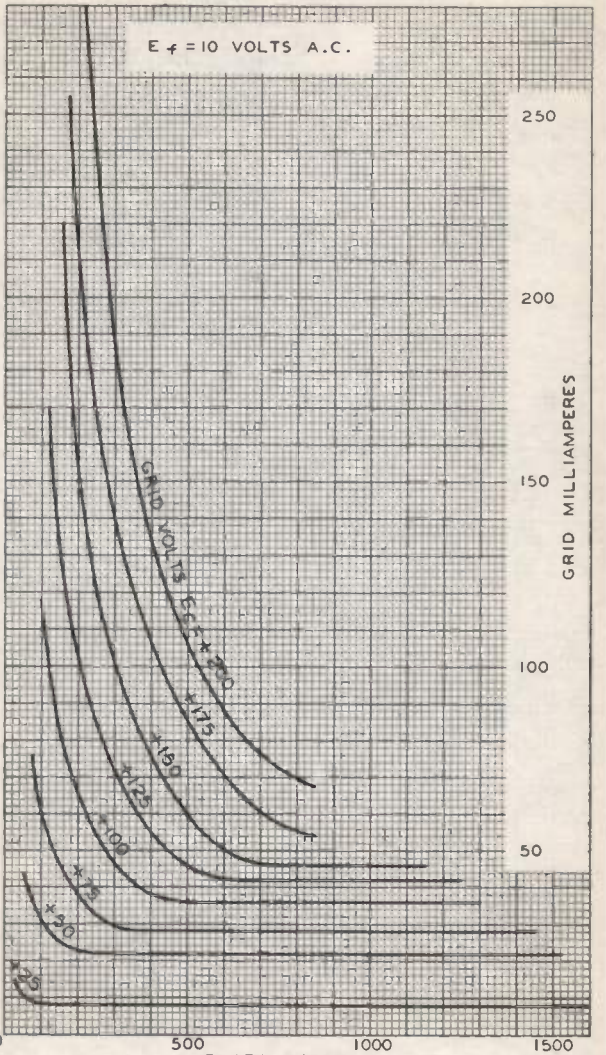
211

AVERAGE PLATE CHARACTERISTICS



211

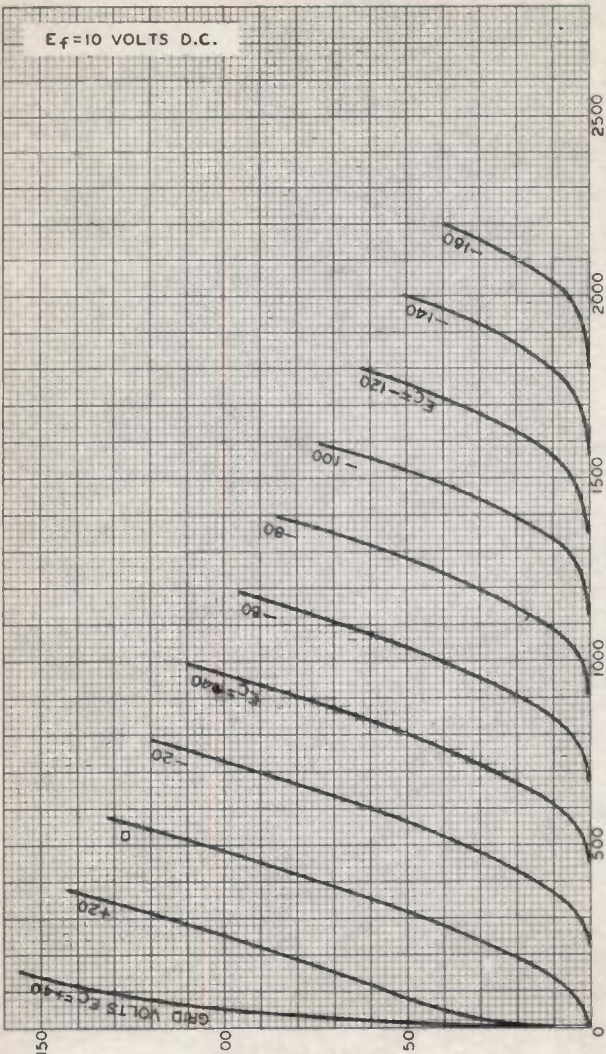
AVERAGE CHARACTERISTICS



211

211

AVERAGE PLATE CHARACTERISTICS



AUG. 7, 1931

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY INC.

925-5311RI

214
HALF-WAVE RECTIFIER
(WATER COOLED)

Filament*	Tungsten	
Voltage	22	a-c volts
Current	52	amp.
Maximum Overall Length		20-1/4"
Maximum Diameter		4-5/32"
Bulb		T-32
Base#		No. 3011
Water Jacket		UT-1285
Peak Inverse Voltage	50000 max.	volts
Peak Plate Current°	7.5 max.	amp.

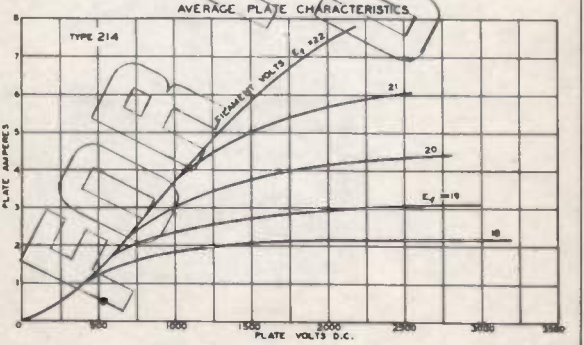
* The filament of the 214 should be allowed to come up to operating temperature before plate voltage is applied.

Base shell is connected within base to one filament lead.

° Operation at the maximum peak current rating of 7.5 amperes requires that precautions be taken to maintain exactly the rated filament voltage of 22 volts. When operating conditions are such, however, that the peak current is less than the full rated value, the regulation of the filament voltage need not be so exact. The permissible variation will depend on the magnitude of the peak current and will increase with decreased values of peak current. Table I shows the maximum operating range of filament voltage for several maximum values of peak plate current.

TABLE I

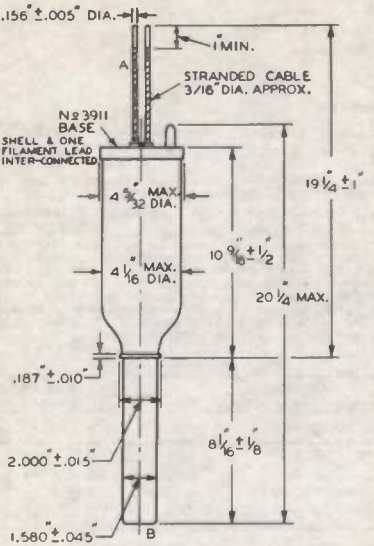
MAXIMUM PEAK PLATE CURRENT Amperes	MAXIMUM RANGE OF FILAMENT VOLTAGE Volts
7.5	22.0 exact
6.0	22.0 - 21.5
5.0	22.0 - 21.0
4.0	22.0 - 20.5



OFFICIAL
HAM BAND

214

HALF-WAVE RECTIFIER



TUBE SYMBOL
AND
TERMINAL CONNECTIONS

A - Filament
B - Plate

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

217-A

HALF-WAVE HIGH-VACUUM RECTIFIER

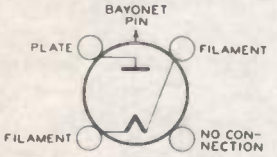
Filament	Thoriated Tungsten	
Voltage	10.0	a-c volts
Current	3.25	amp.
Maximum Overall Length		7-7/8"
Maximum Diameter		2-5/16"
Bulb		T-18
Base		Jumbo 4-Large Pin
RCA Socket		Type UT-541-A ←

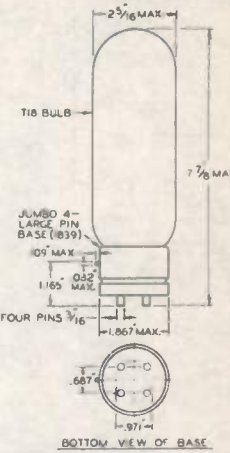
MAXIMUM RATINGS

Peak Inverse Voltage	3500 max. volts
Peak Plate Current	0.6 max. amp.

←Indicates a change.

TOP VIEW OF SOCKET CONNECTIONS



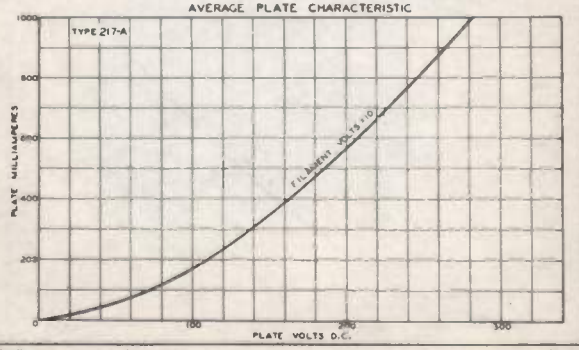


BOTTOM VIEW OF BASE

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

AVERAGE PLATE CHARACTERISTIC



217-C

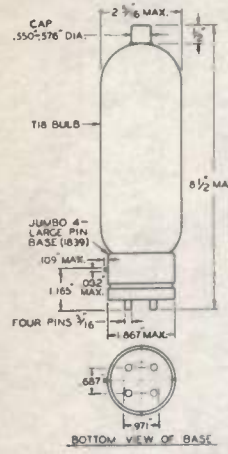
HALF-WAVE HIGH-VACUUM RECTIFIER

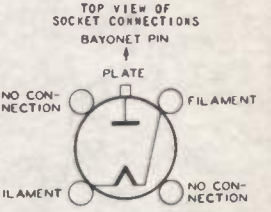
Filament	Thoriated Tungsten	
Voltage	10.0	a-c volts
Current	3.25	amp.
Maximum Overall Length		8-1/2"
Maximum Diameter		2-5/16"
Bulb		T-18
Cap		Medium Metal
Base		Jumbo 4-Large Pin
→ RCA Socket		Type UT-541-A

MAXIMUM RATINGS

Peak Inverse Voltage	7500 max. volts
Peak Plate Current	0.6 max. amp.

← Indicates a change.

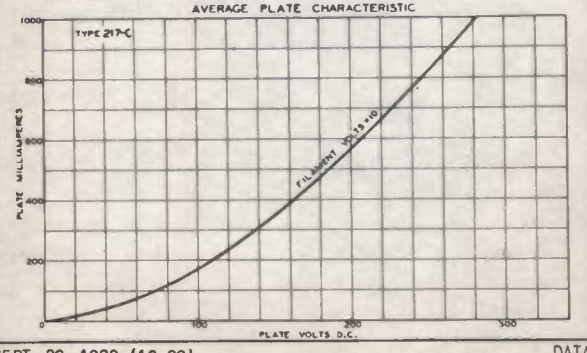




TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

AVERAGE PLATE CHARACTERISTIC



218

HALF-WAVE RECTIFIER

Filament*	Tungsten	
Voltage	11.0	a-c volts
Current	14.75	amp.
Overall Length		15-3/8" ± 1/8"
Maximum Diameter		5-1/16"
Bulb		GT-40
Cap		No. 1904
Base#		No. 5505
Peak Inverse Voltage	5000C max.	volts
Peak Plate Current°	0.75 max.	amp.

* The filament of the 218 should be allowed to come up to operating temperature before plate voltage is applied.

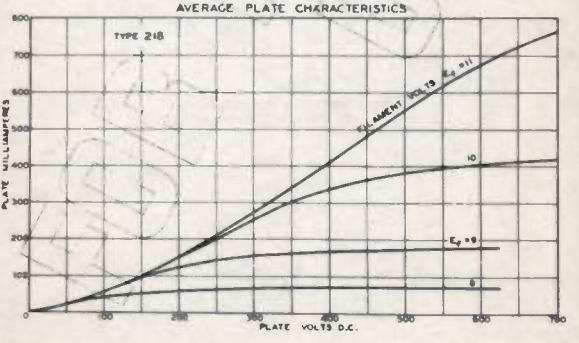
Base shell is connected within base to one filament lead.

° Operation at the maximum peak current rating of 0.75 ampere requires that precautions be taken to maintain exactly the filament voltage of 11 volts. When operating conditions are such, however, that the peak current is less than the full rated value, the regulation of the filament voltage need not be so exact. The permissible variation will depend on the magnitude of the peak current, and will increase with decreased values of peak current. Table I shows the maximum operating range of filament voltage for several maximum values of peak plate current.

TABLE I

MAXIMUM PEAK PLATE CURRENT Amperes	MAXIMUM RANGE OF FILAMENT VOLTAGE Volts
0.75	11.0 exact
0.60	11.0 - 10.75
0.50	11.0 - 10.5
0.40	11.0 - 10.25

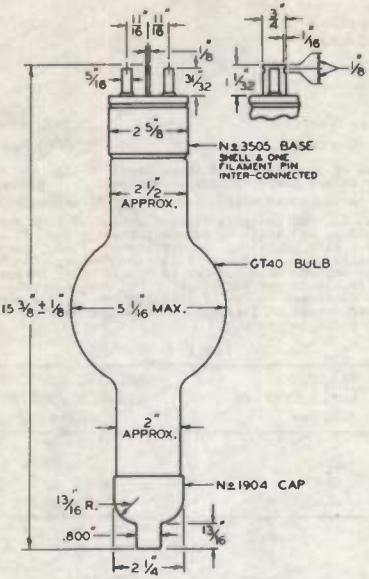
AVERAGE PLATE CHARACTERISTICS



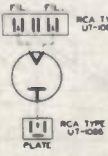
RCA MANUFACTURING COMPANY INC

218

HALF-WAVE RECTIFIER



TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

219

HALF-WAVE RECTIFIER

Filament*	Tungsten	
Voltage	22.0	a-c volts
Current	24.5	amp.
Overall Length		22-3/8" ± 3/16"
Maximum Diameter		6-1/8"
Bulb		T-9½
Cap		No. 3902
Base#		No. 5505
Peak Inverse Voltage	50000 max.	volts
Peak Plate Current°	2.5 max.	amp.

* The filament of the 219 should be allowed to come up to operating temperature before plate voltage is applied.

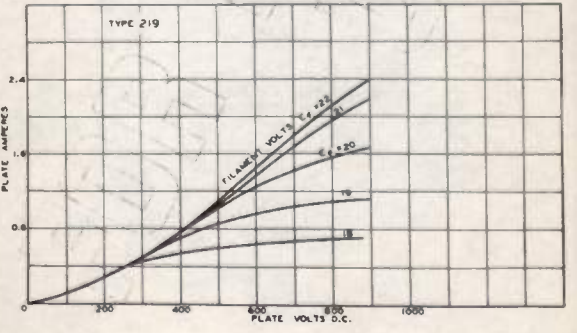
\# Base shell is connected within base to one filament lead.

° Operation at the maximum peak current rating of 2.5 amperes requires that precautions be taken to maintain exactly the filament voltage of 22 volts. When operating conditions are such, however, that the peak current is less than the full rated value, the regulation of the filament voltage need not be so exact. The permissible variation will depend on the magnitude of the peak current, and will increase with decreased values of peak current. Table I shows the maximum operating range of filament voltage for several maximum values of peak plate current.

TABLE I

MAXIMUM PEAK PLATE CURRENT Amperes	MAXIMUM RANGE OF FILAMENT VOLTAGE Volts
2.5	22.0 exact
2.0	22.0 - 21.5
1.7	22.0 - 21.0
1.4	22.0 - 20.5

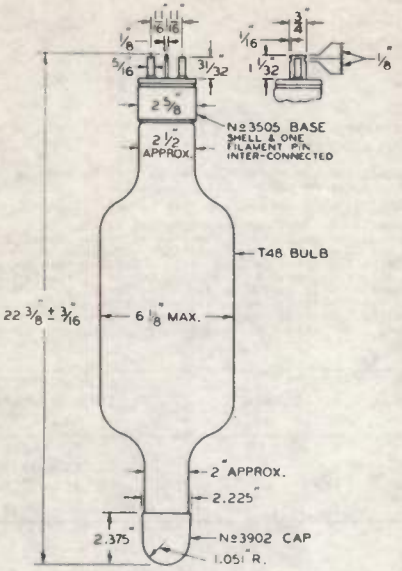
AVERAGE PLATE CHARACTERISTICS



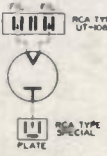
RCA MANUFACTURING COMPANY, INC.

219

HALF-WAVE RECTIFIER



TUBE SYMBOL & CONNECTIONS
TO END-MOUNTINGS



520-B

R-F POWER AMPLIFIER, OSCILLATOR
(WATER COOLED)

Filament	Tungsten	
Voltage	22	a-c or d-c volts
Current	34	amp.
Amplification Factor	17	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	27	μμf
Grid to Filament	18	μμf
Plate to Filament	2	μμf
Maximum Overall Length		16"
Maximum Radius		3"
Cap		Special
Water Jacket		Special

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.

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	0.6 max.	amp.
R-F Grid Current	4 max.	amp.
Plate Input	6 max.	kw
Plate Dissipation	5 max.	kw
Typical Operation:		
Filament Voltage	22	d-c volts
D-C Plate Voltage	7500	volts
D-C Plate Current	0.4	amp.
Power Output	1 approx.	kw

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	7500 max.	volts
D-C Grid Voltage	-1500 max.	volts
D-C Plate Current	0.6 max.	amp.
D-C Grid Current	0.15 max.	amp.
R-F Grid Current	4 max.	amp.
Plate Input	4.5 max.	kw
Plate Dissipation	3.3 max.	kw
Typical Operation:		
Filament Voltage	22	a-c volts
D-C Plate Voltage	6000	volts
D-C Plate Current	0.5	amp.
Power Output	2 approx.	kw

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	-1500 max.	volts

(continued on next page)

RCA RADIOTRON COMPANY, INC.

OFFICIAL

520-B

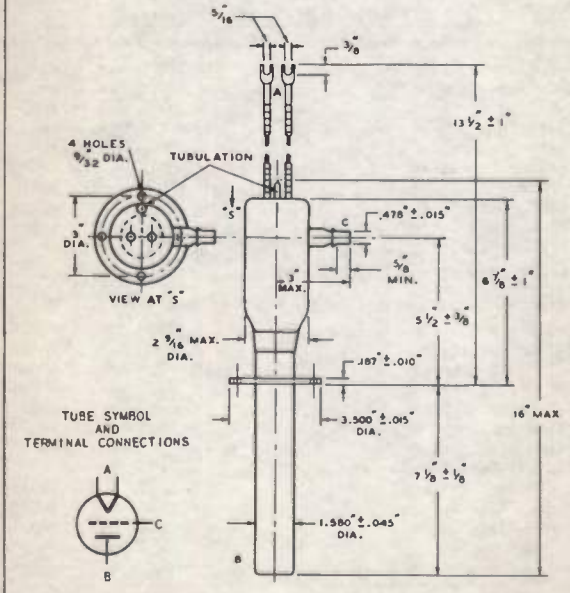
R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

D-C Plate Current	1.2 max.	amp.
D-C Grid Current	0.15 max.	amp.
R-F Grid Current	5 max.	amp.
Plate Input	12 max.	kw
Plate Dissipation	5 max.	kw
Typical Operation:		
Filament Voltage	22	a-c volts
D-C Plate Voltage	7500	volts
D-C Plate Current	1	amp.
Power Output	5 approx.	kw

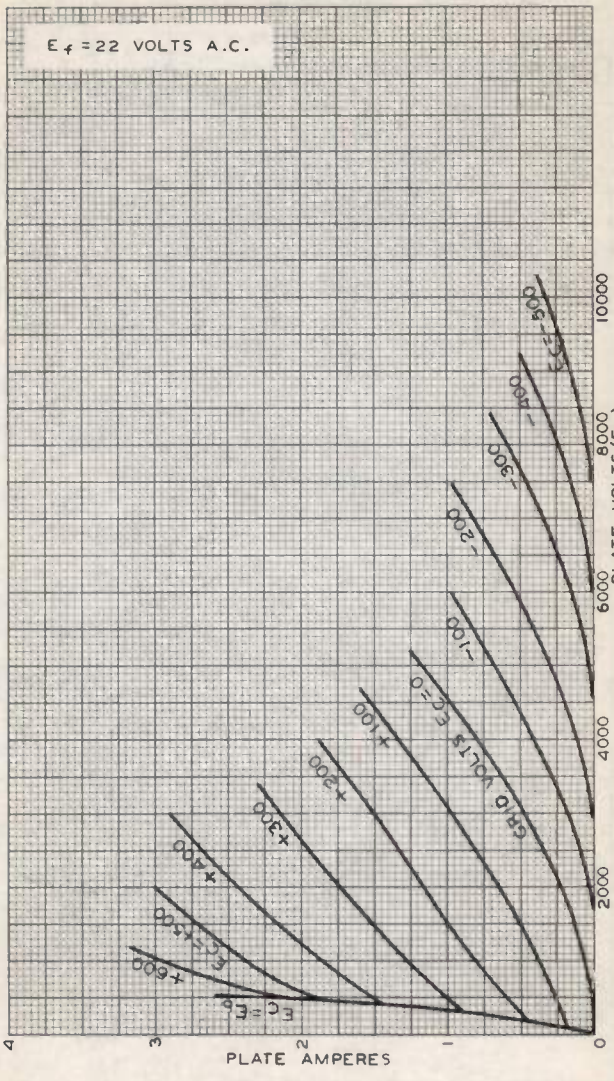
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

For use of the 520-B at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.



520-B

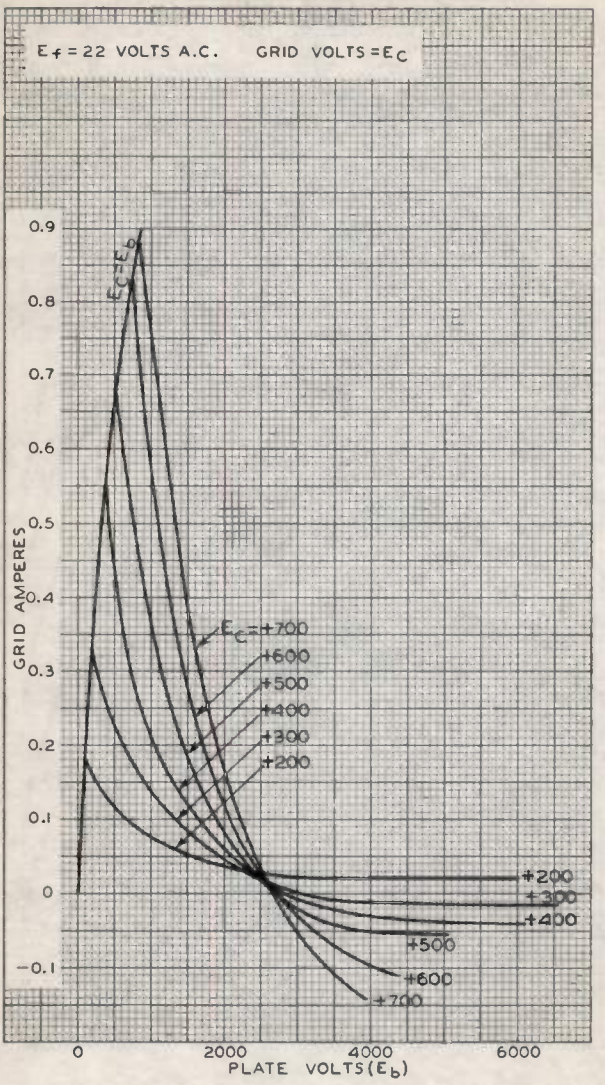
AVERAGE PLATE CHARACTERISTICS



RCA

520-B

TYPICAL CHARACTERISTICS



RCA MANUFACTURING COMPANY, INC.

800

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	15	
Direct Interelectrode Capacitances:		
Grid to Plate	2.5	μμf
Grid to Filament	2.75	μμf
Plate to Filament	2.75	μμf
Maximum Overall Length		6-3/8"
Maximum Diameter		2-11/16"
Bulb		S-21
Caps (two)		Small Metal
Base		Medium 4-Pin Bayonet

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 - 2 tubes:

Unless otherwise specified, values are for 2 tubes.

Filament Voltage	7.5	7.5	7.5	a-c volts
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-Sig. D-C Plate Cur.	26	28	30	ma.
Max-Sig. D-C Plate Cur.	210	160	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:			
Filament Voltage	7.5	7.5	a-c volts
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 ° **	3.6	3.3	approx. watts
Power Output	10	14	approx. watts

*, °, ** See next page.

800

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			80 max.	ma.
D-C Grid Current			25 max.	ma.
Plate Input			80 max.	watts
Plate Dissipation			23 max.	watts
Typical Operation:				
Filament Voltage	7.5	7.5	a-c	volts
D-C Plate Voltage	750	1000		volts
→ D-C Grid Voltage	-150□	-200□		volts
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:				
Filament Voltage	7.5	7.5	7.5 a-c	volts
D-C Plate Voltage	750	1000	1250	volts
D-C Grid Voltage	-100	-135	-175	volts
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

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

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

○ At crest of a-f cycle with modulation factor of 1.0

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS

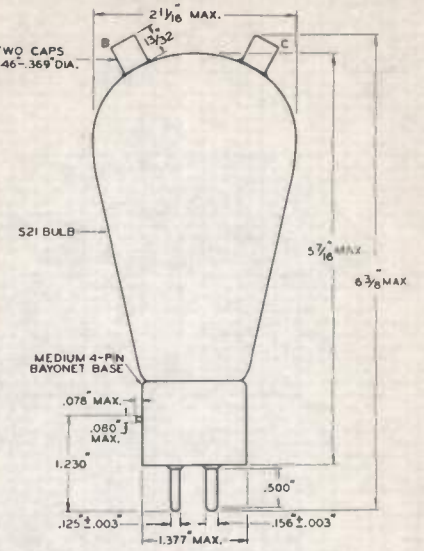
→ □ Preferably obtained by means of a combination of grid leak and either fixed- or self-bias.

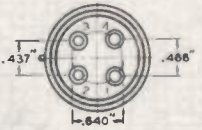
For use of the 800 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

← Indicates a change

800

R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

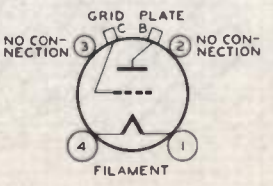




BOTTOM VIEW OF BASE

92S-4281R2

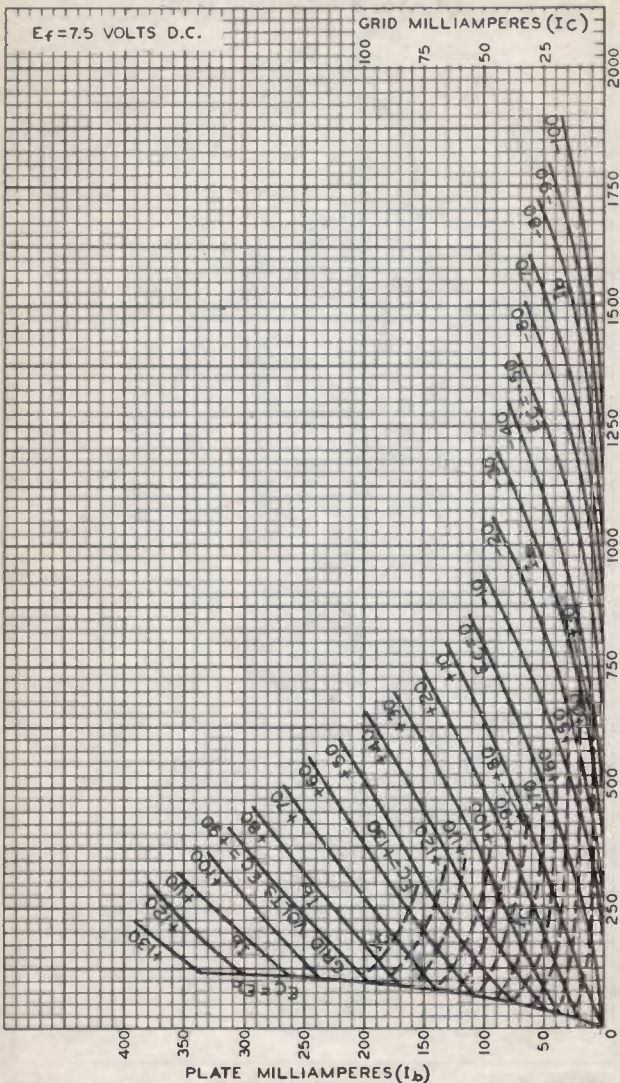
TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



800

800

AVERAGE PLATE CHARACTERISTICS



SEPT. 11, 1933

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

925-5368

AVERAGE TRANSFER CHARACTERISTICS WITH LOAD

800

FEB. 9, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

CE-5377R1

800

800

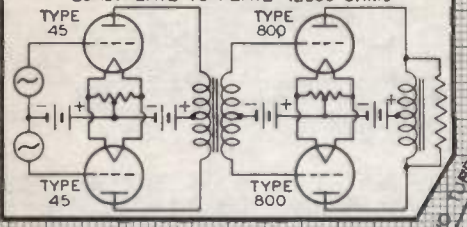
RCA

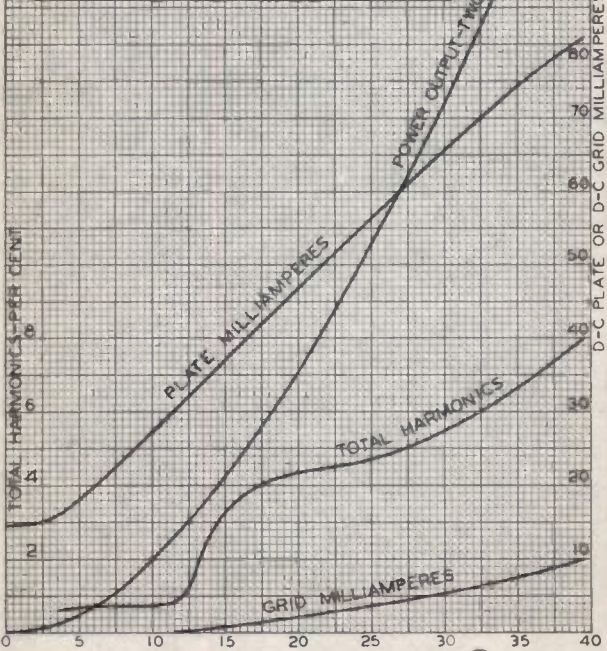
800

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





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,

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.

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** o	2.2	2.3	approx.watts
Power Output	6	7.5	approx.watts

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		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

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.

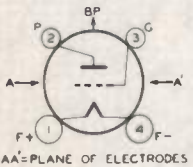
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

Δ 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

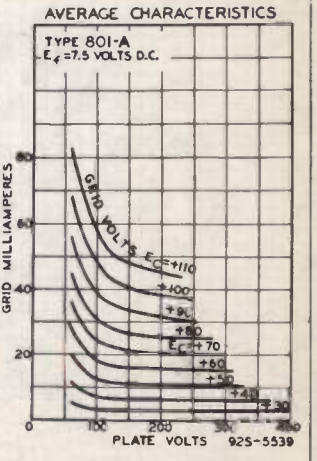


AA'=PLANE OF ELECTRODES

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Plane of plate vertical (on edge).

AVERAGE CHARACTERISTICS

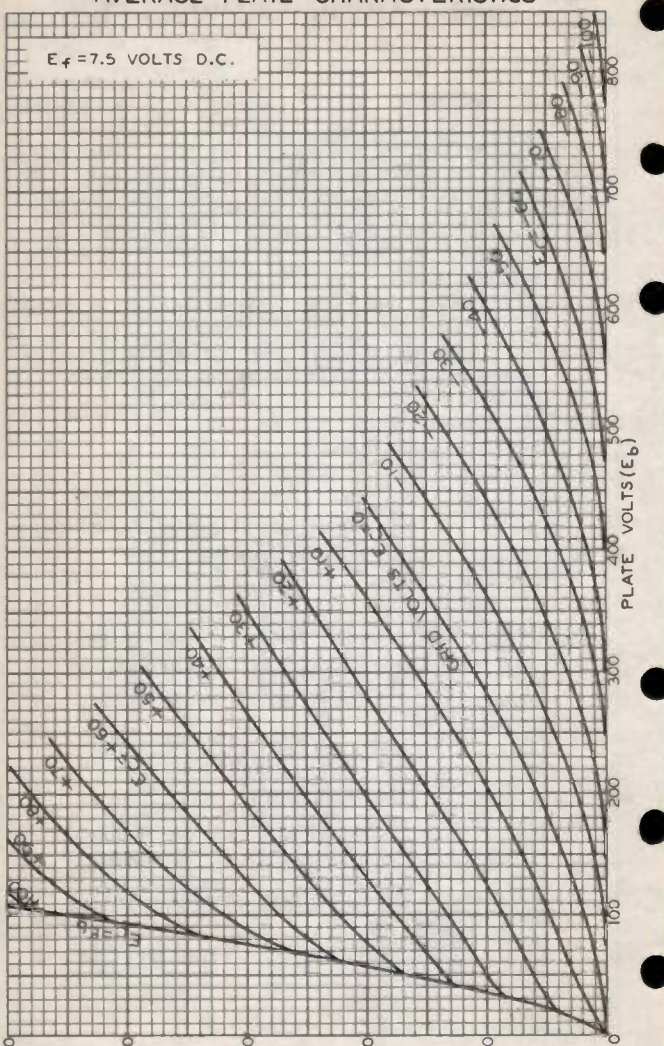


RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

801-A

801-A

AVERAGE PLATE CHARACTERISTICS



JULY 18, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925—5538

802

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.

802

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.) o	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	600	volts
D-C Sup'r Volt. (Grid #3)	-40	-53	-45	volts
D-C Screen Voltage△	8900	10700	14500	volts
D-C Grid Voltage □	-85	-90	-100	volts
	11000	18000	20000	ohms
Peak A-F Sup'r Volt.	40	53	65	volts
Peak R-F Grid Volt.	125	125	125	volts
Internal Shield*	–	–	–	
D-C Plate Current	18	20	22	ma.
D-C Screen Current	28	28	28	ma.
D-C Grid Cur. (Approx.)	7.5	5	4.5	ma.
Driving Power (Approx.)	0.9	0.6	0.5	watts
Power Output (Approx.)	2	3	3.5	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

*, ★, o: See next page.

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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.

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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

Petrode 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

* Connected to cathode at socket.

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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.

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R-F POWER AMPLIFIER PENTODE

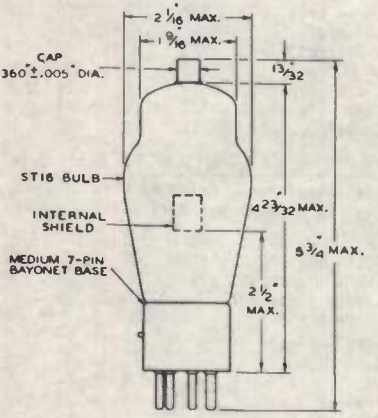
(continued from preceding page)

¤ Obtained from grid resistor (14000, 17000, 50000, 42000), by cathode resistor (1300, 1370, 1700, 1620) or from fixed supply.

HIGH-FREQUENCY OPERATION

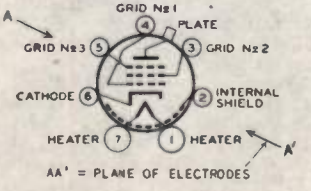
Maximum permissible percentage of maximum rated plate voltage and plate input

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-4364R5

TOP VIEW OF SOCKET CONNECTIONS



AA' = PLANE OF ELECTRODES

TUBE MOUNTING POSITION
VERTICAL or HORIZONTAL

RCA

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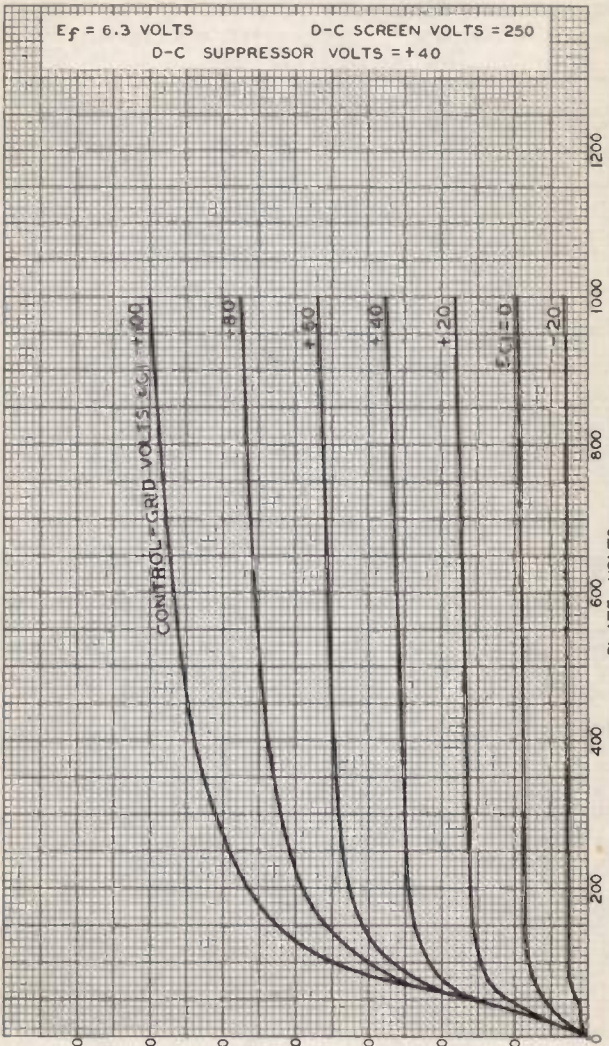
AVERAGE PLATE CHARACTERISTICS



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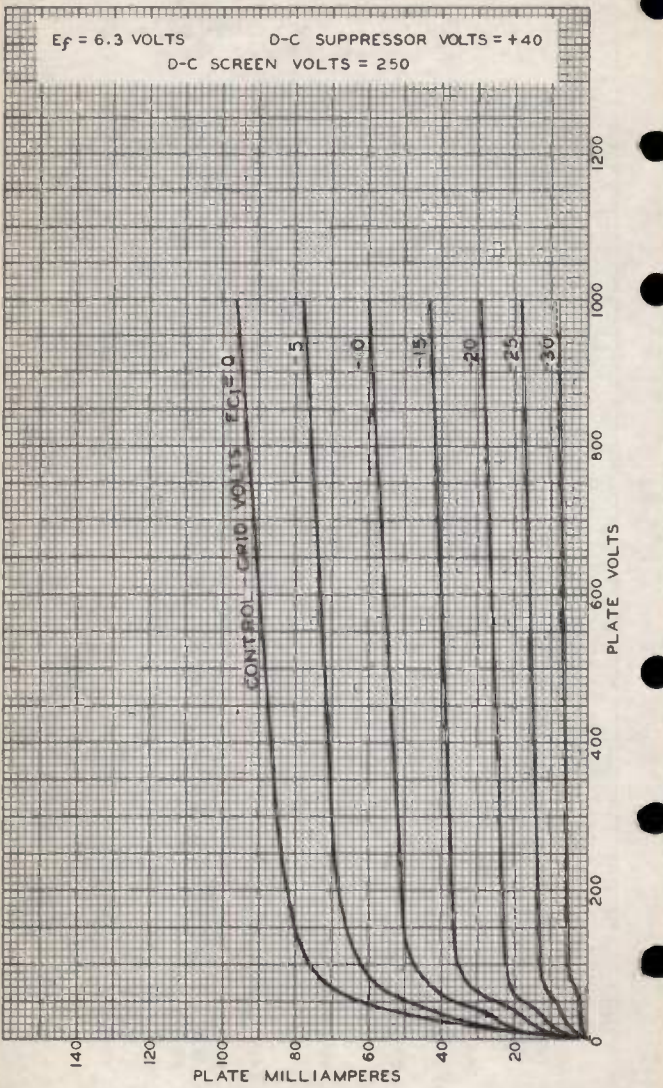
AVERAGE PLATE CHARACTERISTICS



MAY 11, 1936 RCA RADIOTRON DIVISION 92C-4612

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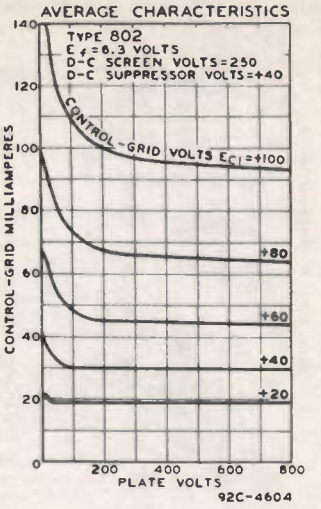
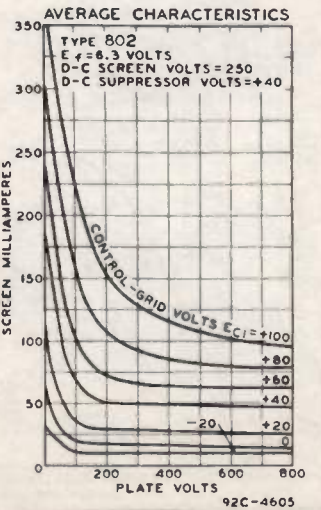
CHARACTERISTICS CURVES





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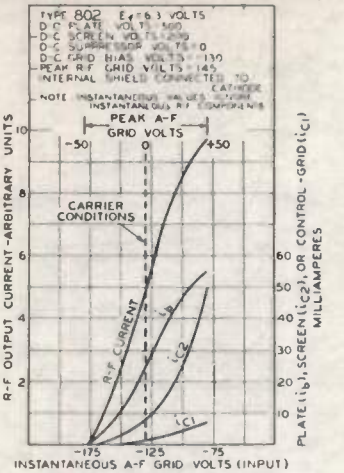
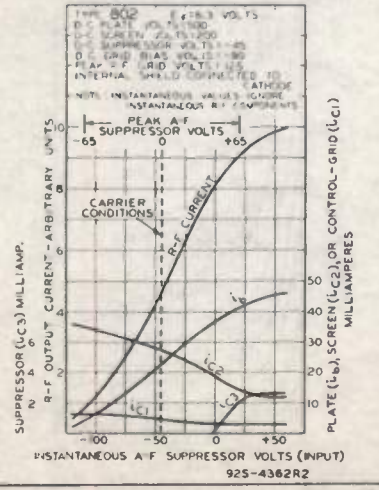
CHARACTERISTICS CURVES

CONTROL-GRID MODULATION CHARACTERISTICS



SUPPRESSOR MODULATION CHARACTERISTICS



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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	17.5	μμf
Output	29	μμf
Maximum Overall Length		9-3/8"
Maximum Diameter		2-9/16"
Bulb		T-20
Cap		Medium Metal
Base	Giant 5-Pin Ceramic, Bayonet	
RCA Socket		Type UT-102-A

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.

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
Plate Dissipation	125 max.	watts

← Indicates a change.

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RCA MANUFACTURING COMPANY INC

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

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 or grid-leak 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.
Plate Input	250	max.	watts

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

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 #	16000	20000	ohms
	400	500	volts
D-C Grid Voltage ▲	-80	-80	volts
	4000	4000	ohms
Peak R-F Grid Voltage	180	180	volts
D-C Plate Current	150	150	ma.
D-C Screen Current	55	55	ma.
D-C Grid Current	20	20	approx.ma.
Driving Power	4	4	approx.watts
Power Output	125	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.ma.
Power Output	125	155	approx.watts

\## Preferably from unmodulated plate-voltage supply through resistor.

▲ Obtained by grid-leak resistor 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
D-C Screen Voltage (Grid #2)	600 max.	volts

§ See next page.

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R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

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
	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

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 ■	3200	3300	3500		ohms
	-90	-90	-90		volts
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 by grid-leak resistor or other self- or fixed-bias method.

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

For use of the 803 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

← Indicates a change.

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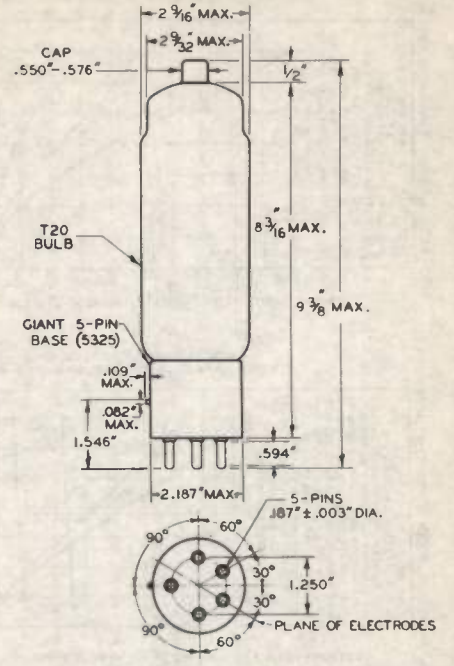
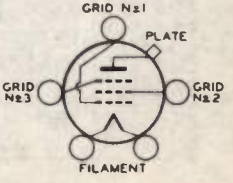
R-F POWER AMPLIFIER PENTODE



BOTTOM VIEW OF BASE

92C-4424R1

TUBE SYMBOL & TOP VIEW
OF
SOCKET CONNECTIONS



TUBE MOUNTING POSITION

VERTICAL: Base up or down.

R-F POWER AMPLIFIER PENTODE

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SEPT. 30, 1936

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4519R2, 4425R1 & 4426R1

OPERATION CHARACTERISTICS
CLASS B R-F AMPLIFIER

TYPE 803 E_f=10 VOLTS A.C.
D-C PLATE VOLTS = 2000
D-C SCREEN VOLTS = 600
D-C SUPPRESSOR VOLTS = +40
D-C GRID BIAS VOLTS = −40

TYPICAL CARRIER CONDITIONS

PLATE (i_b), SCREEN (i_{c2}), OR GRID (i_{c1}) MILLIAMPERES

R-F OUTPUT CURRENT (I_{r-f}) ARBITRARY UNITS

PEAK R-F GRID VOLTS (M)

92C-4519R2

SUPPRESSOR MODULATION CHARACTERISTICS

TYPE 803 E_f=10 VOLTS A.C.
D-C PLATE VOLTS = 2000
D-C SCREEN VOLTS = 2000 MINUS DROP IN SERIES SCREEN RESISTOR OF 35000 OHMS
D-C SUPPRESSOR VOLTS = −110
D-C GRID BIAS VOLTS = VALUE SUPPLIED BY 7000-OHM GRID LEAK
PEAK R-F GRID VOLTS = 170
NOTE INSTANTANEOUS VALUES IGNORE INSTANTANEOUS R-F COMPONENTS

PEAK A-F SUPPRESSOR VOLTS: −150, 0, +150

CARRIER CONDITIONS

R-F CURRENT

i_b, i_{c2}, i_{c3}, i_{c1}

PLATE (i_b), SCREEN (i_{c2}), OR GRID (i_{c1}) MILLIAMPERES

R-F OUTPUT CURRENT-ARBITRARY UNITS
SUPPRESSOR (i_{c3}) MILLIAMPERES

INSTANTANEOUS A-F SUPPRESSOR VOLTS (INPUT)

92C-4426R1

GRID MODULATION CHARACTERISTICS

TYPE 803 E_f=10 VOLTS A.C.
D-C PLATE VOLTS = 2000
D-C SCREEN VOLTS = 600
D-C SUPPRESSOR VOLTS = +40
D-C GRID BIAS VOLTS = −80
PEAK R-F GRID VOLTS = 100
NOTE INSTANTANEOUS VALUES IGNORE INSTANTANEOUS R-F COMPONENTS

PEAK A-F GRID VOLTS: −50, 0, +50

CARRIER CONDITIONS

R-F CURRENT

i_b, i_{c2}, i_{c1}

PLATE (i_b), SCREEN (i_{c2}), OR GRID (i_{c1}) MILLIAMPERES

R-F OUTPUT CURRENT-ARBITRARY UNITS

INSTANTANEOUS A-F GRID VOLTS (INPUT)

92C-4425R1

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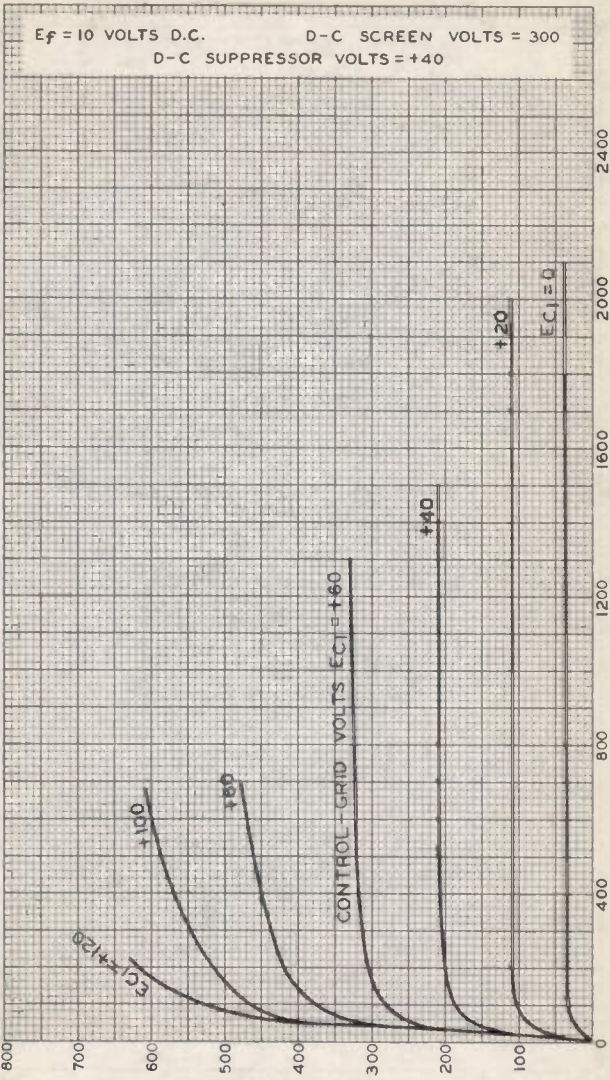
AVERAGE PLATE CHARACTERISTICS



MAR. 8, 1937

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92C-4749

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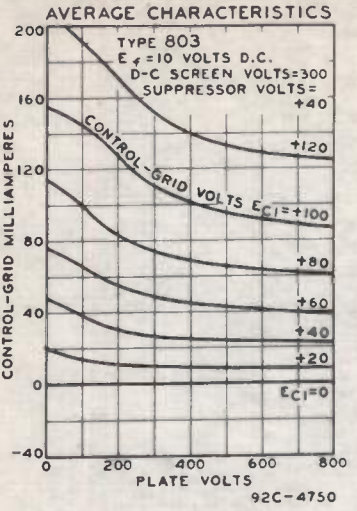
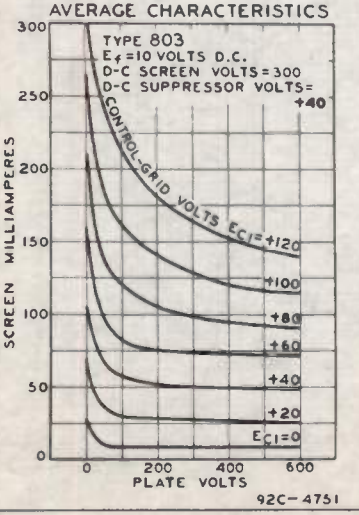
CHARACTERISTICS CURVES





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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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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	1250	1500	volts
D-C Suppressor Volt.	0	45	45	volts
D-C Screen Volt.	300	300	300	volts
D-C Grid Volt.	-115	-115	-130	volts
Peak R-F Grid Volt.	140	135	140	volts
Peak A-F Grid Volt.	35	35	40	volts
D-C Plate Current	45	45	50	ma.
D-C Screen Current	15	11	13.5	ma.
D-C Grid Cur. (Approx.)	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.

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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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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.

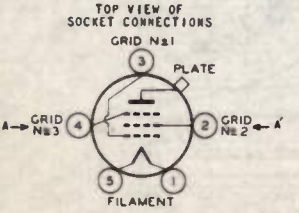
■ Obtained by grid resistor of value shown or by other self- or fixed-bias method.

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.

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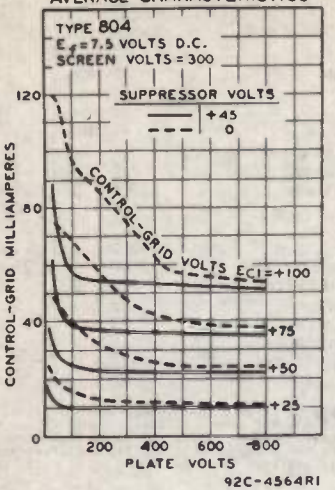
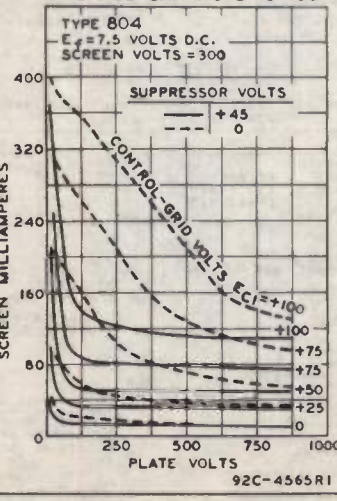
R-F POWER AMPLIFIER PENTODE

AVERAGE CHARACTERISTICS



92C-4564R1

AVERAGE CHARACTERISTICS



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AVERAGE PLATE CHARACTERISTICS

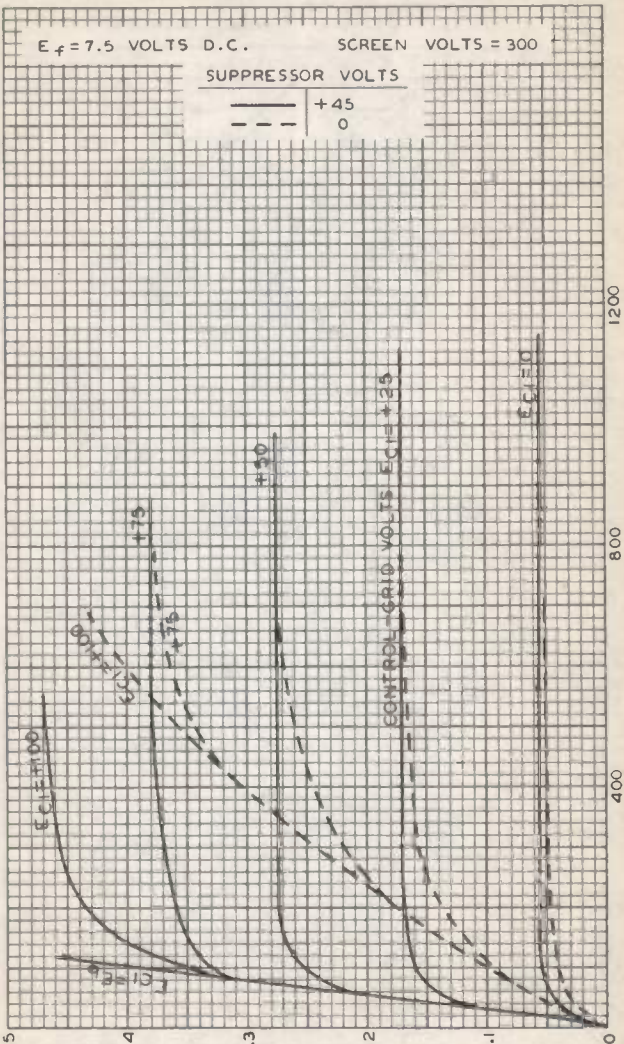

PLATE VOLTS (E_b)

DEC. 6, 1939

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92C-4562R1

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R-F POWER AMPLIFIER PENTODE

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RCA

FEB. 2, 1940

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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

92C-4568

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

92C-4567

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

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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)

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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.

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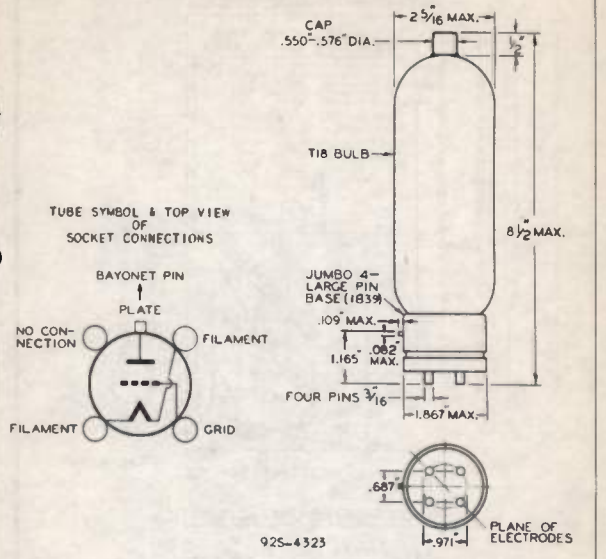
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)



FOR PLATE FAMILY, REFER TO CURVE
92C-4404 UNDER TYPE 838.

←Indicates a change

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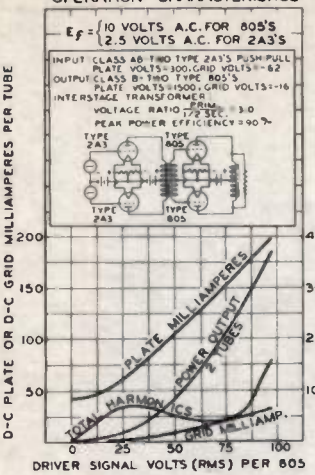
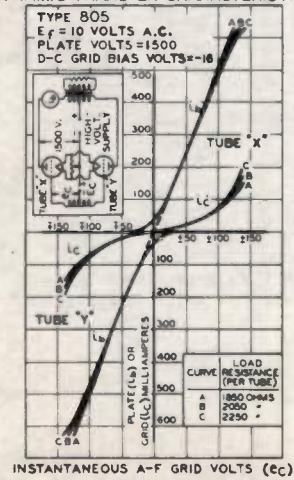
R-F POWER AMPLIFIER, OSCILLATOR CLASS B MODULATOR

OPERATION CHARACTERISTICS



DYNAMIC TRANSFER CHARACTERISTICS



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R-F POWER AMPLIFIER, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	5.0	a-c or d-c volts
Current	10	amp.
Amplification Factor	12.6	
Direct Interelectrode Capacitances:		
Grid to Plate	4.2	μμf
Grid to Filament	6.1	μμf
Plate to Filament	1.1	μμf
Maximum Overall Length		10"
Maximum Diameter		3-13/16"
Bulb		GT-30
Cap (Top)		Medium Metal Skirted
Cap (Side)		Medium Metal
Base		Jumbo 4-Large Pin
RCA Socket		Type UT-541-A

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 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.	835 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

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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.			300 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.

★ Obtained by grid resistor (16000, 20000, 24000, 12800), by cathode resistor (1800, 2300, 2700, 1730), or from fixed-bias source.

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R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

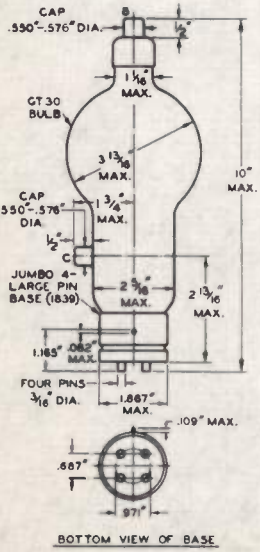
	CCS			ICAS	
Peak R-F Grid Volt.	640	755	870	930	volts
D-C Plate Current	195	195	195	300	ma.
D-C Grid Cur. (Approx.)**	25	25	25	40	ma.
Driving Power (Approx.)**	15	17	20	34	watts
Power Output (Approx.)	280	370	450	780	watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

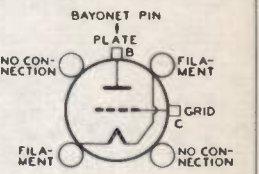
HIGH-FREQUENCY OPERATION

Maximum permissible percentage of maximum rated plate voltage and plate input

FREQUENCY (MC)	30	50	100
TELEPHONY {Class B	100	90	78
TELEPHONY {Class C, Plate-Mod.	100	80	50
TELEGRAPHY - Class C	100	80	50



BOTTOM VIEW OF BASE



TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

92C-4681R2

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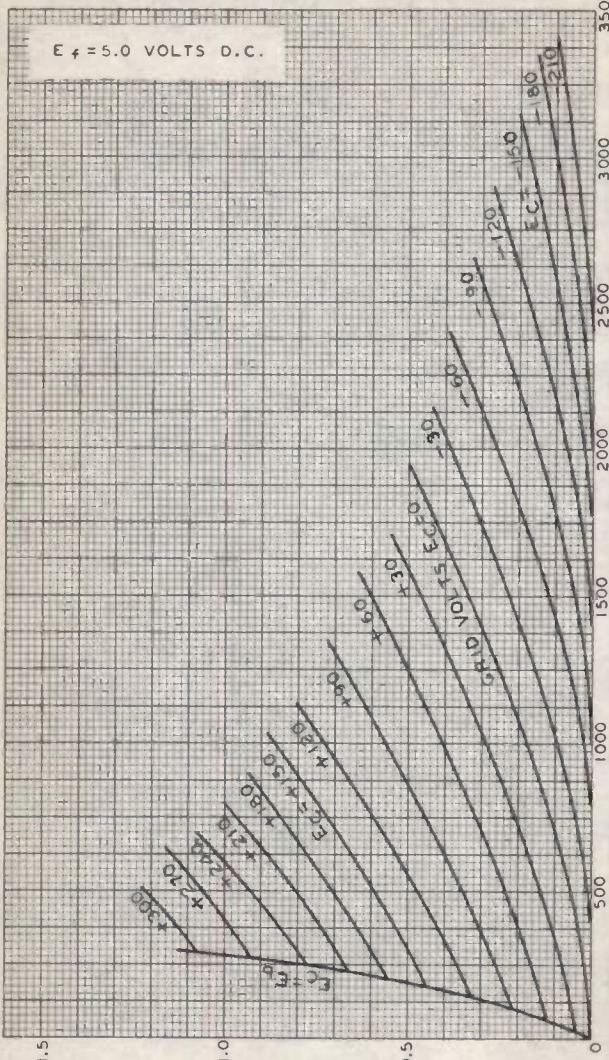
AVERAGE PLATE CHARACTERISTICS



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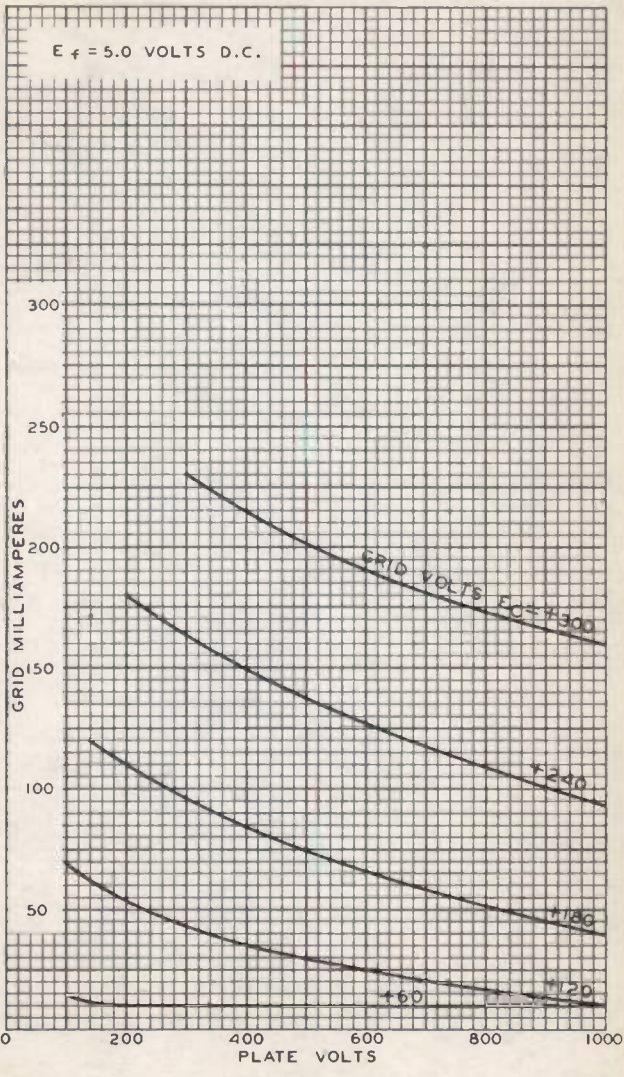
TYPICAL CHARACTERISTICS



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TRANSMITTING BEAM POWER AMPLIFIER

Heater•	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.9	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
Maximum Overall Length	5-3/4"	
Maximum Diameter	2-1/16"	
Bulb	ST-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

A-F POWER AMPLIFIER & MODULATOR - Class AB_2#

	CCS			ICAS	
D-C Plate Voltage	600 max.			750 max.	volts
D-C Screen Voltage (Grid #2)	300 max.			300 max.	volts
Max.-Signal D-C Plate Cur.•	120 max.			120 max.	ma.
Max.-Signal Plate Input•	60 max.			90 max.	watts
Screen Input•	3.5 max.			3.5 max.	watts
Plate Dissipation•	25 max.			30 max.	watts
Typical Operation: *Unless otherwise specified, values are for 2 tubes*					
D-C Plate Voltage	400	500	600	750	volts
D-C Screen Voltage	300	300	300	300	volts
D-C Grid Voltage (Fixed bias, Grid #1)	-25	-25	-30	-32	volts
Peak A-F Grid-to-Grid Voltage	78	78	78	92	volts ←
Zero-Sig. D-C Plate Cur.	100	100	60	60	ma.
Max.-Sig. D-C Plate Cur.	240	240	200	240	ma. ←
Zero-Sig. D-C Screen Cur.	5	5	5	5	ma. ←
Max.-Sig. D-C Screen Cur.	10	10	10	10	ma.
Load Resistance (Per tube)	800	1060	1600	1740	ohms ←
Effective Load Resistance (Plate to plate)	3200	4240	6400	6950	ohms ←
Peak Grid Input Power°	0.2	0.2	0.1	0.2	approx. watt ←
Max.-Sig. Power Output••	55	75	80	120	approx. watts ←

• In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts. Under the maximum plate and screen dissipation conditions, the heater voltage should not fluctuate so that it exceeds 7.0 volts.
• Averaged over any audio-frequency cycle of sine-wave form.
Subscript 2 indicates that grid current flows during some part of input cycle.
△ Registered trademark.
←Indicates a change.
°, °°: See next page.

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TRANSMITTING BEAM POWER AMPLIFIER

(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

	CCS	ICAS	
D-C Plate Voltage	600 max.	750 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	300 max.	volts
D-C Plate Current	80 max.	90 max.	ma.
Plate Input	37.5 max.	45 max.	watts
Screen Input	2.5 max.	2.5 max.	watts
Plate Dissipation	25 max.	30 max.	watts

Typical Operation:

D-C Plate Voltage	400	500	600	750	volts
D-C Screen Voltage	250	250	250	300	volts
D-C Grid Volt. (Grid #1) †	-25	-25	-25	-35	volts
Peak R-F Grid Voltage	30	30	20	27	volts
D-C Plate Current	75	75	62.5	60	ma.
D-C Screen Current	4	4	3	3	ma.
D-C Grid Cur. (Approx.)	0	0	0	0	ma.
Driving Power (Approx.) °°	0.25	0.25	0.2	0.12	watt
Power Output (Approx.)	9	12.5	12.5	15	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

	CCS	ICAS	
D-C Plate Voltage	475 max.	600 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	300 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	83 max.	100 max.	ma.
D-C Grid Current	5 max.	5 max.	ma.
Plate Input	40 max.	60 max.	watts
Screen Input	2.5 max.	2.5 max.	watts
Plate Dissipation	16.5 max.	25 max.	watts

Typical Operation:

D-C Plate Voltage	325	400	475	600	volts
D-C Screen Voltage ◊	225	225	225	275	volts
	20000	30000	50000	50000	ohms
D-C Grid Voltage ▲ †	-75	-80	-85	-90	volts
	25000	22800	21300	22500	ohms
Peak R-F Grid Voltage	90	95	110	115	volts
D-C Plate Current	80	80	83	100	ma.
D-C Screen Current	5	5.75	5	6.5	ma.

° Driver stage should be capable of supplying the grids of the class AB_2 stage with the specified peak values 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.

◊ Obtained preferably from modulated fixed supply, or from modulated plate supply through resistor of value shown.

▲ May be obtained from grid resistor (25000, 22800, 21300, 22500) although combination of either grid resistor and cathode resistor or grid resistor and fixed supply is recommended.

°° 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.

† See end of tabulation.

→ Indicates a change.

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TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

	CCS			ICAS	
D-C Grid Current (Approx.)	3	3.5	4	4	ma.
Driving Power (Approx.)	0.25	0.3	0.4	0.4	watt
Power Output (Approx.)	17.5	22.5	27.5	42.5	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

	CCS	ICAS	
D-C Plate Voltage	600 max.	750 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	300 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	100 max.	100 max.	ma.
D-C Grid Current	5 max.	5 max.	ma.
Plate Input	60 max.	75 max.	watts
Screen Input	3.5 max.	3.5 max.	watts
Plate Dissipation	25 max.	30 max.	watts

Typical Operation:

D-C Plate Voltage	400	500	600	750	volts
D-C Screen Voltage §	250	250	250	250	volts
	20000	42000	50000	85000	ohms
D-C Grid Voltage□ †	-45	-45	-45	-45	volts
	12800	12800	12800	12800	ohms
	410	410	410	410	ohms
Peak R-F Grid Voltage	65	65	65	65	volts
D-C Plate Current	100	100	100	100	ma.
D-C Screen Current	7.5	6	7	6	ma.
D-C Grid Cur. (Approx.)	3.5	3.5	3.5	3.5	ma.
Driving Power (Approx.)	0.2	0.2	0.2	0.2	watt
Power Output (Approx.)	25	30	40	50	watts

† The total effective grid-circuit resistance should not exceed 25000 ohms.

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 separate source, from a potentiometer, or from plate supply through a series resistor of value shown.

□ Obtained from fixed supply, by grid resistor (12800), by cathode resistor (410), or by combination methods.

Data on operating frequencies for the 807 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

← Indicates a change.

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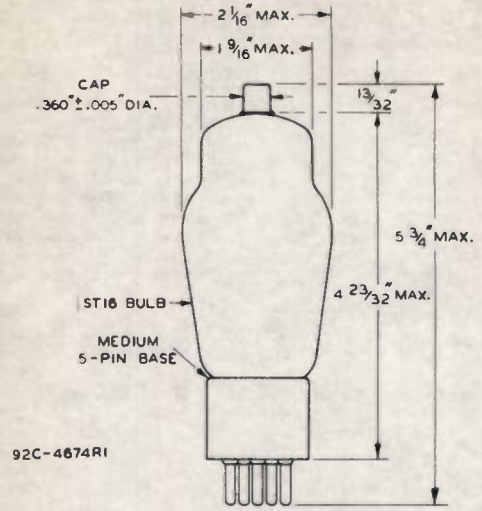
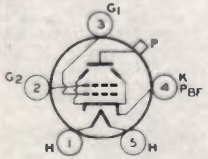
TRANSMITTING BEAM POWER AMPLIFIER



BOTTOM VIEW OF SOCKET CONNECTIONS



P – Plate
G_2 – Screen
G_1 – Grid
K^1 – Cathode
H – Heater
P_{BF} – Beam-Forming Plates

TUBE MOUNTING POSITION
VERTICAL or HORIZONTAL

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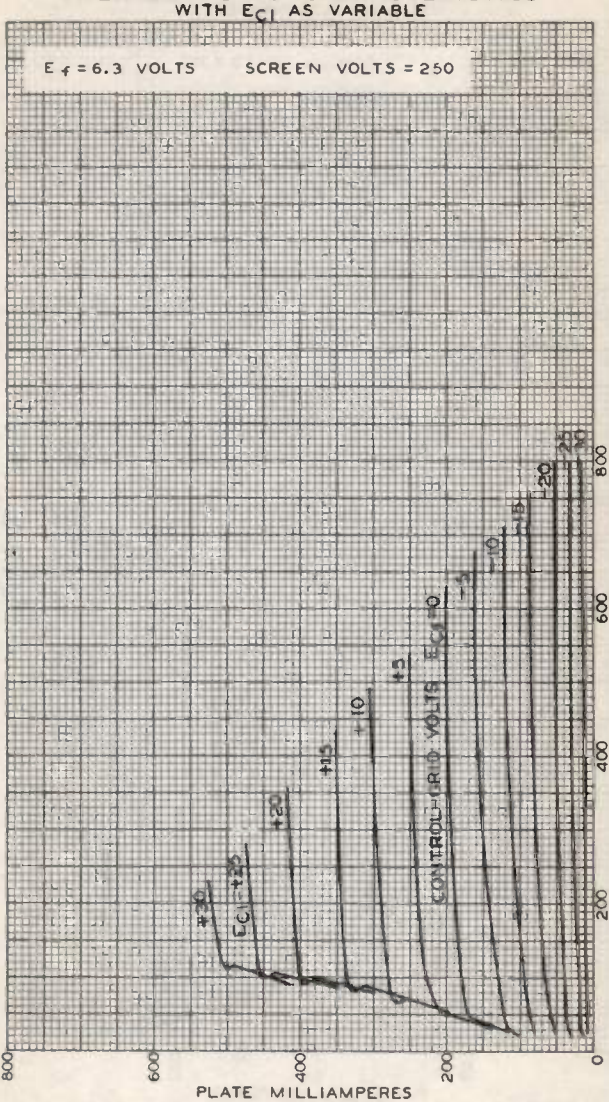
AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE



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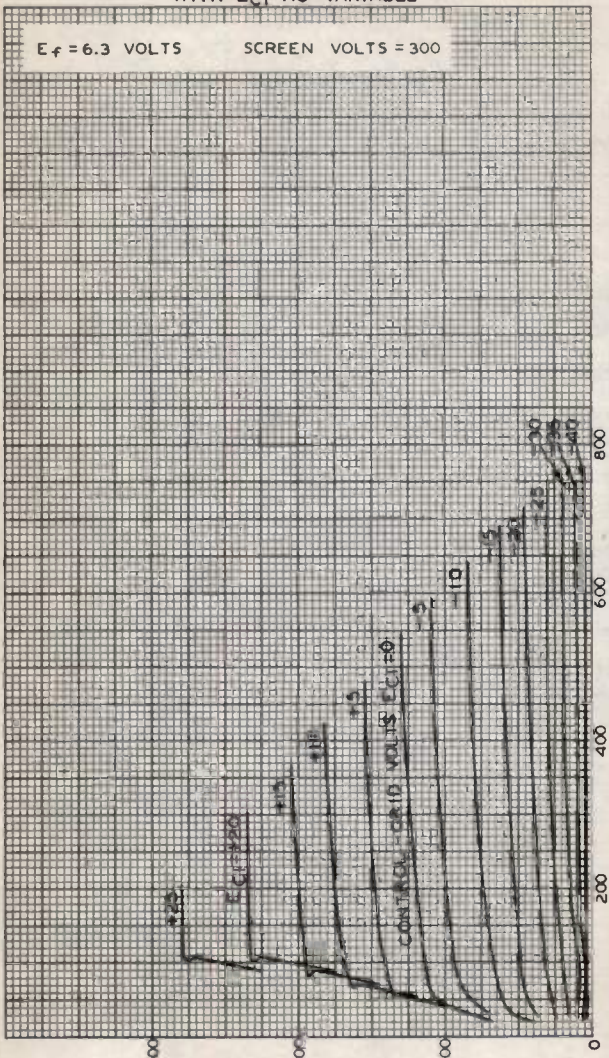
AVERAGE PLATE CHARACTERISTICS
WITH E_{c1} AS VARIABLE



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92C-4682R1

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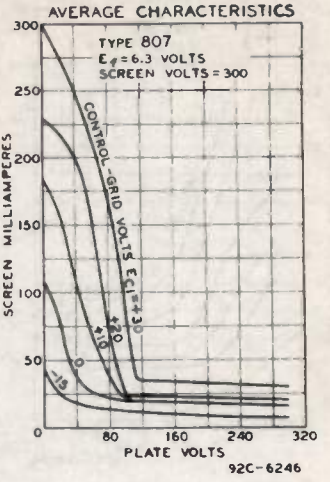
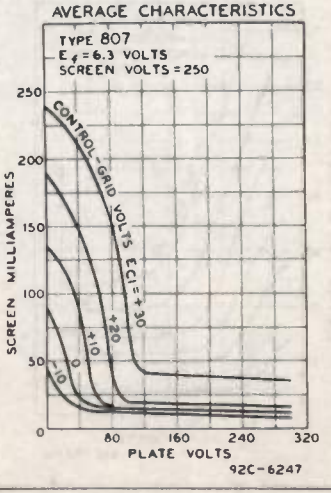
TRANSMITTING BEAM POWER AMPLIFIER





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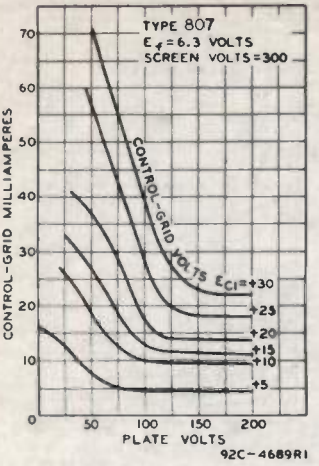
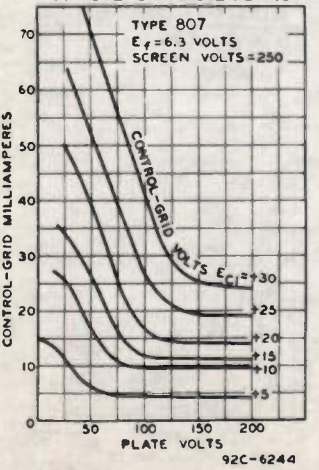
TRANSMITTING BEAM POWER AMPLIFIER

TYPICAL CHARACTERISTICS



92C-4689R1

TYPICAL CHARACTERISTICS



92C-6244

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R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	4	amp.
Amplification Factor	47	
Direct Interelectrode Capacitances:		
Grid to Plate	2.8	μμf ←
Grid to Filament	5.3	μμf ←
Plate to Filament	0.15	μμf ←
Maximum Overall Length		6-1/16"
Maximum Diameter		2-13/16"
Bulb		G-22
Cap (Top)		Medium Metal
Cap (Side)		Small Metal
Base		Medium 4-Pin Bayonet

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 *		150 max.	ma.
Max.-Signal Plate Input *		150 max.	watts
Plate Dissipation *		50 max.	watts
Typical Operation:			
Unless otherwise specified, values are for 2 tubes			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	1250	1500	volts
D-C Grid Voltage	-15	-25	volts
Peak A-F Grid-to-Grid Voltage	240	220	volts ←
Zero-Sig. D-C Plate Current	40	30	ma.
Max.-Sig. D-C Plate Current	230	190	ma.
Load Resistance (per tube)	3175	4575	ohms
Effective Load Res. (plate to plate)	12700	18300	ohms
Max.-Sig. Driving Power	7.8	4.8	approx. watts
Max.-Sig. Power Output	190	185	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		1500 max.	volts
D-C Plate Current		75 max.	ma.
Plate Input		75 max.	watts
Plate Dissipation		50 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5	a-c volts
D-C Plate Voltage	1250	1500	volts
D-C Grid Voltage	-30	-35	volts
Peak R-F Grid Voltage	65	60	volts
D-C Plate Current	55	45	ma.
D-C Grid Current **	1	1	approx. ma.
Driving Power ° **	3	2	approx. watts
Power Output	22	22	approx. watts

° ** 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, 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		-400 max.	volts
D-C Plate Current		125 max.	ma.
D-C Grid Current		35 max.	ma.
Plate Input		135 max.	watts
Plate Dissipation		35 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5 a-c	volts
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage	-210°	-225°°	volts
Peak R-F Grid Voltage	360	360	volts
D-C Plate Current	120	100	ma.
D-C Grid Current **	35	32 approx.	ma.
Driving Power **	11.5	10.5 approx.	watts
Power Output	85	105 approx.	watts

° Bias may also be obtained with 6000-ohm grid resistor.

°° Bias may also be obtained with 7000-ohm grid resistor.

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		-400 max.	volts
D-C Plate Current		150 max.	ma.
D-C Grid Current		35 max.	ma.
Plate Input		200 max.	watts
Plate Dissipation		50 max.	watts
Typical Operation:			
Filament Voltage	7.5	7.5 a-c	volts
D-C Plate Voltage	1250	1500	volts
D-C Grid Voltage	-150Δ	-200°°	volts
Peak R-F Grid Voltage	300	350	volts
D-C Plate Current	135	125	ma.
D-C Grid Current **	30	30 approx.	ma.
Driving Power **	8	9.5 approx.	watts
Power Output	120	140 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.

Δ Bias may also be obtained with 5000-ohm grid resistor.

°° Bias may also be obtained with 7000-ohm grid resistor.

For use of the 808 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

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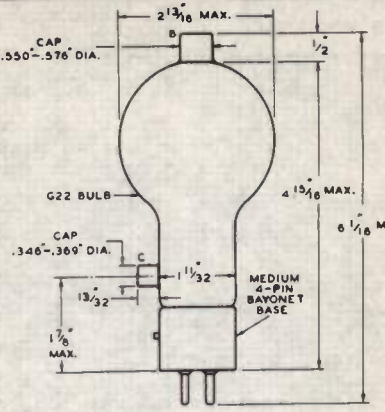
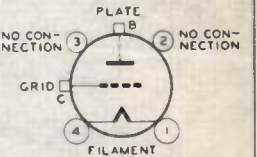
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR



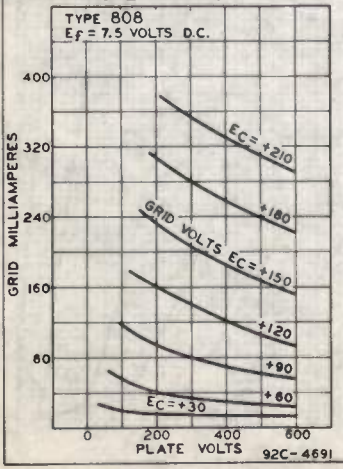
TOP VIEW OF SOCKET CONNECTIONS



TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

TYPICAL CHARACTERISTICS



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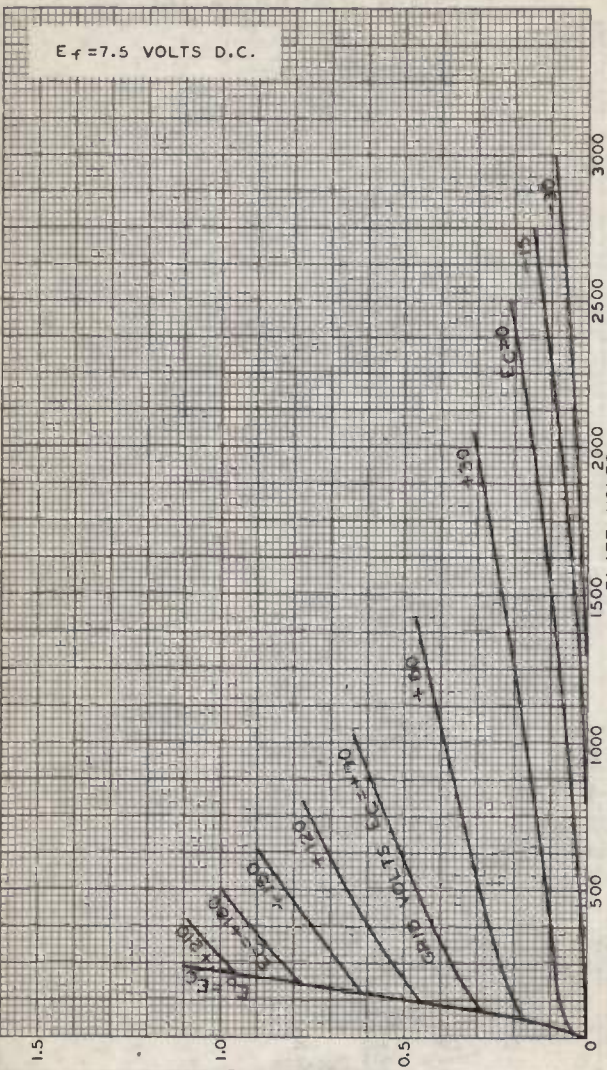
AVERAGE PLATE CHARACTERISTICS



OCT. 26, 1936

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

92C-4678

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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	50	
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, 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.-Sig. D-C Plate Cur.*	100 max.		100 max.	ma.
Max.-Sig. Plate Input*	75 max.		100 max.	watts
Plate Dissipation*	25 max.		30 max.	watts
Typical Operation:				
Unless otherwise specified, values are for 2 tubes				
Filament Voltage	6.3	6.3	6.3	a-c volts
D-C Plate Voltage	500	750	1000	volts
D-C Grid Voltage	0	-4.5	-10	volts
Peak A-F Grid-to-Grid Volt.	135	140	156	volts
Zero-Sig. D-C Plate Cur.	40	40	40	ma.
Max.-Sig. D-C Plate Cur.	200	200	200	ma.
Load Res. (Per tube)	1300	2100	2900	ohms
Effective Load Res. (Plate to plate)	5200	8400	11600	ohms
Max.-Sig. Driving Power (Approx.)	2.4	2.4	3.4	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.		60 max.	ma.
Plate Input	37.5 max.		45 max.	watts
Plate Dissipation	25 max.		30 max.	watts
Typical Operation:				
Filament Voltage	6.3	6.3	6.3	a-c volts
D-C Plate Voltage	500	750	1000	volts

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RCA MANUFACTURING COMPANY, INC.

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R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

	CCS		ICAS	
D-C Grid Voltage	-5	-10	-30	volts
Peak R-F Grid Volt.	35	40	60	volts
D-C Plate Current	50	50	45	ma.
D-C Grid Cur. (Approx.)**	6	5	4	ma.
Driving Power (Approx.)** °	1.4	1.5	1.5	watts
Power Output (Approx.)	7.5	12.5	15	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	35 max.		35 max.	ma.
Plate Input	50 max.		75 max.	watts
Plate Dissipation	17.5 max.		25 max.	watts
Typical Operation:				
Filament Voltage	6.3	6.3	6.3	a-c volts
D-C Plate Voltage	500	600	750	volts
D-C Grid Voltage §	-60	-60	-60	volts
	2000	2000	2000	ohms
Peak R-F Grid Volt.	135	135	150	volts
D-C Plate Current	83	83	100	ma.
D-C Grid Cur. (Approx.)**	32	32	32	ma.
Driving Power (Approx.)**	3.2	3.2	4.3	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	35 max.		35 max.	ma.
Plate Input	75 max.		100 max.	watts
Plate Dissipation	25 max.		30 max.	watts
Typical Operation:				
Filament Voltage	6.3	6.3	6.3	a-c volts
D-C Plate Voltage	500	750	1000	volts
D-C Grid Voltage ★	-50	-60	-75	volts
	2500	3000	3000	ohms
	420	500	600	ohms
Peak R-F Grid Volt.	135	140	160	volts

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 (2500, 3000), by cathode resistor (420, 500, 600), or from fixed bias source.

** See next page.

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R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

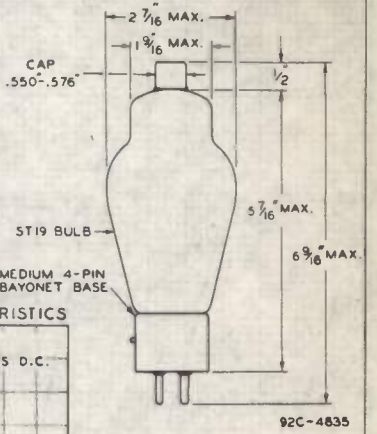
	CCS		ICAS	
D-C Plate Current	100	100	100	ma.
D-C Grid Cur. (Approx.)**	20	20	25	ma.
Driving Power (Approx.)**	2.5	2.5	3.8	watts
Power Output (Approx.)	35	55	75	watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

HIGH-FREQUENCY OPERATION

Maximum permissible percentage of maximum rated plate voltage and plate input

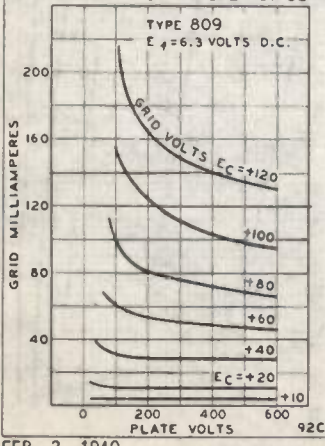
FREQUENCY (MC)	60	70	100
TELEPHONY Class B	100	93	80
TELEPHONY Class C, Plate-Mod.	100	88	60
TELEGRAPHY - Class C	100	88	60



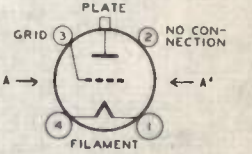
MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Plane of electrodes vertical.

AVERAGE CHARACTERISTICS



TOP VIEW OF SOCKET CONNECTIONS



AA' = PLANE OF ELECTRODES

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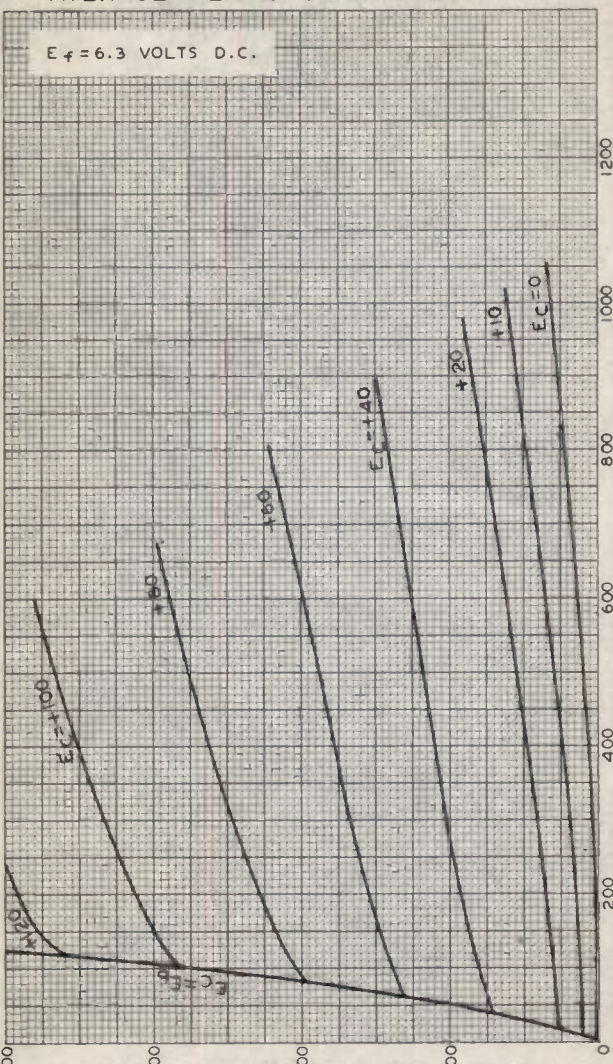
AVERAGE PLATE CHARACTERISTICS



OCT. 11, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

92C-4836

810

R-F POWER AMPLIFIER, MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c 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
Maximum Overall Length		9-1/16"
Maximum Radius		2-1/4"
Bulb		T-20
Cap (top)		Medium Metal, Skirted
Cap (side)		Medium Metal
Base		Jumbo 4-Large Pin
RCA Socket		Type UT-541-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	2000 max.		2250 max.	volts
Max.-Sig. D-C Plate Cur.*	250 max.		250 max.	ma.
Max.-Sig. Plate Input*	425 max.		510 max.	watts
Plate Dissipation*	125 max.		150 max.	watts
Typical Operation: *Unless otherwise specified, values are for 2 tubes*				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	1500	2000	2250	volts
D-C Grid Voltage	-30	-50	-60	volts
Peak A-F Grid-to-Grid Volt.	345	345	380	volts
Zero-Sig. D-C Plate Cur.	80	60	70	ma.
Max.-Sig. D-C Plate Cur.	500	420	450	ma.
Load Res. (Per tube)	1650	2750	2900	ohms
Effective Load Resistance (Plate to plate)	6600	11000	11600	ohms
Max.-Sig. Driving Power (Approx.)	12	10	13	watts
Max.-Sig. Power Output (Approx.)	510	590	725	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	2000 max.		2250 max.	volts
D-C Plate Current	185 max.		185 max.	ma.
Plate Input	185 max.		225 max.	watts
Plate Dissipation	125 max.		150 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts

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R-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

	CCS		ICAS	
D-C Plate Voltage	1500	2000	2250	volts
D-C Grid Voltage	-50	-65	-70	volts
Peak R-F Grid Volt.	110	100	100	volts
D-C Plate Current	115	93	100	ma.
D-C Grid Cur. (Approx.)**	2	2	2	ma.
Driving Power (Approx.)** ○	6	4	4	watts
Power Output (Approx.)	60	60	75	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	2000 max.		2250 max.	volts
D-C Grid Voltage	-500 max.		-500 max.	volts
D-C Plate Current	185 max.		185 max.	ma.
Plate Input	185 max.		225 max.	watts
Plate Dissipation	125 max.		150 max.	watts
Typical Operation:				
Filament Voltage	10	10	10 a-c	volts
D-C Plate Voltage	1500	2000	2250	volts
D-C Grid Voltage	-140	-140	-140	volts
Peak R-F Grid Volt.	175	160	180	volts
Peak A-F Grid Volt.	85	85	85	volts
D-C Plate Current	110	92	100	ma.
D-C Grid Cur. (Approx.)**	2	2	2	ma.
Driving Power (Approx.)** ○	5	4	4	watts
Power Output (Approx.)	60	60	75	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	1600 max.		1800 max.	volts
D-C Grid Voltage	-500 max.		-500 max.	volts
D-C Plate Current	210 max.		250 max.	ma.
D-C Grid Current	70 max.		70 max.	ma.
Plate Input	335 max.		450 max.	watts
Plate Dissipation	85 max.		125 max.	watts
Typical Operation:				
Filament Voltage	10	10	10 a-c	volts
D-C Plate Voltage	1250	1600	1800	volts
D-C Grid Voltage □	-200	-200	-200	volts
	4000	4000	4000	ohms
Peak R-F Grid Volt.	370	370	370	volts
D-C Plate Current	210	210	250	ma.
D-C Grid Cur. (Approx.)**	50	50	50	ma.
Driving Power (Approx.)	17	17	17	watts
Power Output (Approx.)	180	250	335	watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.
○ At crest of audio-frequency cycle with modulation factor of 1.0.
□ Obtained by grid resistor of value shown or by partial self-bias methods.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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R-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

	CCS		ICAS	
D-C Plate Voltage	2000 max.		2250 max.	volts
D-C Grid Voltage	-500 max.		-500 max.	volts
D-C Plate Current	250 max.		275 max.	ma.
D-C Grid Current	70 max.		70 max.	ma.
Plate Input	500 max.		620 max.	watts
Plate Dissipation	125 max.		150 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	1500	2000	2250	volts
D-C Grid Voltage★	-120	-160	-160	volts
	3000	4000	4000	ohms
	415	550	510	ohms
Peak R-F Grid Volt.	280	330	330	volts
D-C Plate Current	250	250	275	ma.
D-C Grid Cur. (Approx.)**	40	40	40	ma.
Driving Power (Approx.)	10	12	12	watts
Power Output (Approx.)	275	375	475	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 fixed supply, by grid resistor (3000, 4000), or by cathode resistor (415, 550, 510).

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

HIGH-FREQUENCY OPERATION

Maximum permissible percentage of maximum rated plate voltage and plate input

FREQUENCY (Mc)	30	60	100
TELEPHONY - Class C	100	88	80
TELEPHONY - Class C, Grid-Mod.	100	88	80
TELEPHONY - Class C, Plate-Mod.	100	70	50
TELEGRAPHY - Class C	100	70	50

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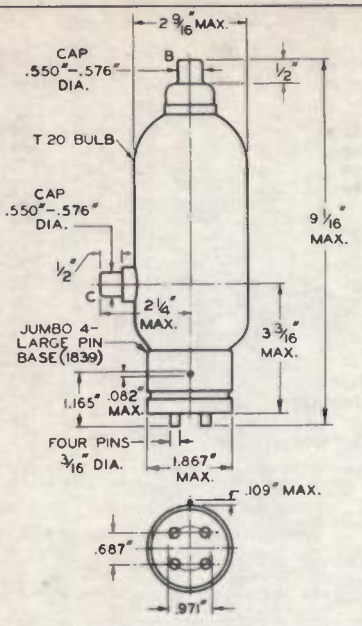
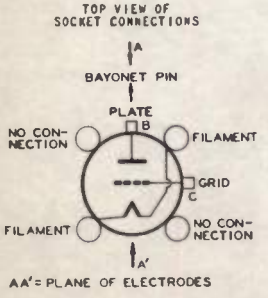
R-F POWER AMPLIFIER, MODULATOR



BOTTOM VIEW OF BASE

92C-4965



TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Plane of electrodes vertical.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

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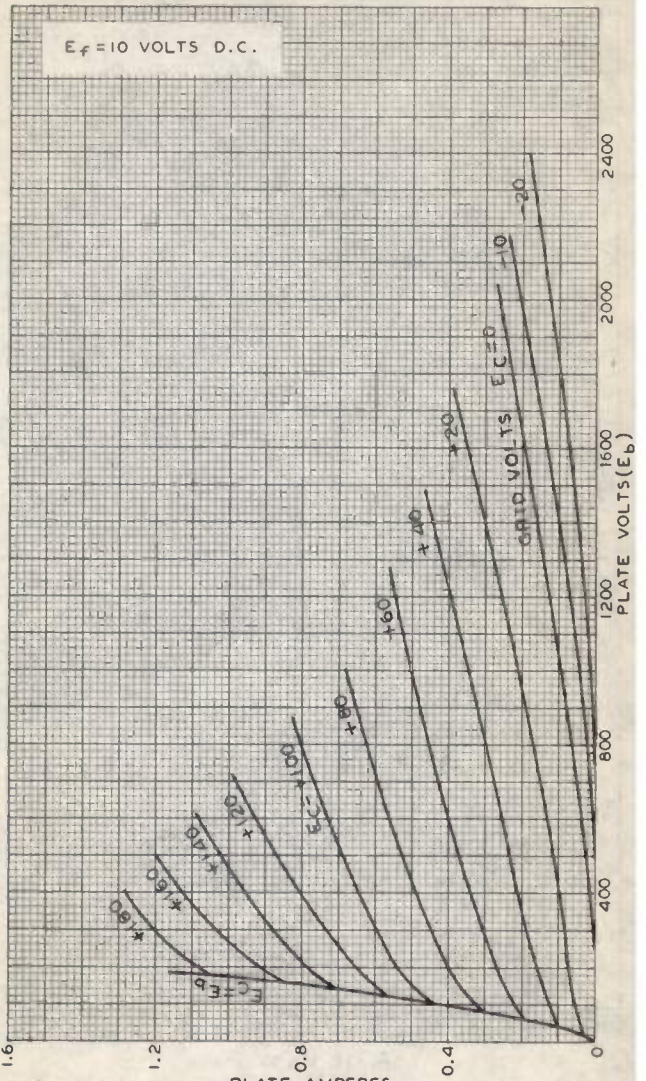
AVERAGE PLATE CHARACTERISTICS



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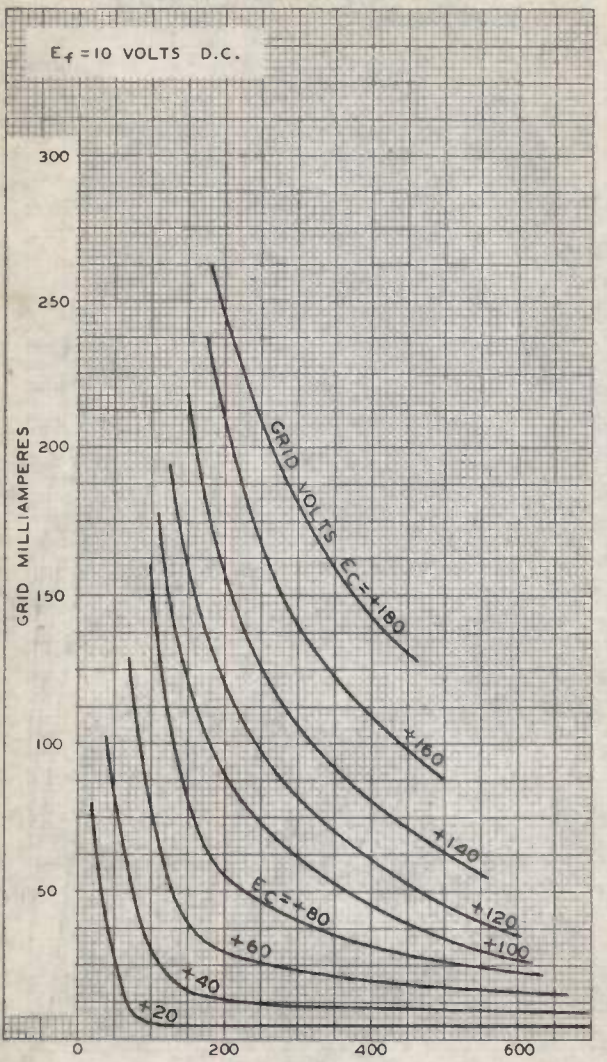
TYPICAL CHARACTERISTICS



RCA

811

TRANSMITTING TRIODE

Filament	Thoriated Tungsten	
Voltage	6.3	a-c or d-c 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
Maximum Overall Length		6-9/16"
Maximum Diameter		2-7/16"
Bulb		ST-19
Cap		Medium Metal
Base	Medium 4-Pin,"Micanol"	Bayonet
RCA Socket		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	1250 max.	1500 max.	volts
Max.-Sig. D-C Plate Current*	125 max.	125 max.	ma.
Max.-Sig. Plate Input*	125 max.	150 max.	watts
Plate Dissipation*	40 max.	50 max.	watts
Typical Operation:			
Unless otherwise specified, values are for 2 tubes			
D-C Plate Voltage	1250	1500	volts
D-C Grid Voltage #	0	-9	volts
Peak A-F Grid-to-Grid Volt.	140	160	volts
Zero-Sig. D-C Plate Current	48	20	ma.
Max.-Sig. D-C Plate Current	200	200	ma.
Max.-Sig. D-C Grid Current	38	38	ma.
Load Resistance (per tube)	3750	4500	ohms
Effective Load Resistance (plate to plate)	15000	18000	ohms
Max.-Sig. Driving Power	3.8 approx.	4.2 approx.	watts
Max.-Sig. Power Output	175 approx.	225 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

	CCS	ICAS	
D-C Plate Voltage	1250 max.	1500 max.	volts
D-C Plate Current	60 max.	60 max.	ma.
Plate Input	60 max.	75 max.	watts
Plate Dissipation	40 max.	50 max.	watts
Typical Operation:			
D-C Plate, Voltage	1250	1500	volts

See next page.

811

TRANSMITTING TRIODE

(continued from preceding page)

	CCS	ICAS	
D-C Grid Voltage #	0	-6	volts
Peak R-F Grid Voltage	26	35	volts
D-C Plate Current	48	50	ma.
D-C Grid Current**	6 approx.	6 approx.	ma.
Driving Power** ○	1 approx.	1.5 approx.	watts
Power Output	20 approx.	25 approx.	watts

○ At crest of a-f cycle with modulation factor of 1.0.
Grid voltages are given for either a-c or d-c filament operation. When a.c. is used, the circuit returns are made to the midpoint of the filament circuit. When d.c. is used, the returns are made to the negative filament terminal.

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 Grid Voltage	-200 max.	-200 max.	volts
D-C Plate Current	105 max.	125 max.	ma.
D-C Grid Current	50 max.	50 max.	ma.
Plate Input	105 max.	155 max.	watts
Plate Dissipation	27 max.	40 max.	watts
Typical Operation:			
D-C Plate Voltage	1000	1250	volts
D-C Grid Voltage □	-100	-125	volts
	2000	2500	ohms
Peak R-F Grid Voltage	195	230	volts
D-C Plate Current	105	125	ma.
D-C Grid Current**	50 approx.	50 approx.	ma.
Driving Power**	9 approx.	11 approx.	watts
Power Output	82 approx.	120 approx.	watts

□ Obtained preferably from grid leak of value shown, or combination of grid leak 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 ##

	CCS	ICAS	
D-C Plate Voltage	1250 max.	1500 max.	volts
D-C Grid Voltage	-200 max.	-200 max.	volts
D-C Plate Current	125 max.	150 max.	ma.
D-C Grid Current	50 max.	50 max.	ma.
Plate Input	155 max.	225 max.	watts
Plate Dissipation	40 max.	55 max.	watts
Typical Operation:			
D-C Plate Voltage	1250	1250	volts
D-C Grid Voltage ‡	-87.5	-113	volts
	2500	3200	ohms
	550	610	ohms

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, or grid resistor (2500, 3200), or by cathode resistor (550, 610).
** See next page.

DEC. 1, 1939 TENTATIVE DATA

811

TRANSMITTING TRIODE

(continued from preceding page)

	CCS	ICAS	
Peak R-F Grid Voltage	180	225	volts
D-C Plate Current	125	150	ma.
D-C Grid Current**	35 approx.	35 approx.	ma.
Driving Power**	7 approx.	8 approx.	watts
Power Output	115 approx.	170 approx.	watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

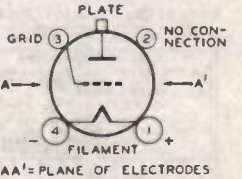
HIGH-FREQUENCY OPERATION

Maximum permissible percentage of maximum rated plate voltage and plate input.

FREQUENCY (MC)	60	80	100
TELEPHONY {Class B	100	90	83
TELEPHONY {Class C, Plate Mod.	100	75	60
TELEGRAPHY - Class C	100	75	60

OUTLINE DIMENSIONS for the 811 are the same as those for the 809.

TOP VIEW OF SOCKET CONNECTIONS



AA' = PLANE OF ELECTRODES

MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Plane of electrodes vertical.

RCA MANUFACTURING COMPANY, INC.

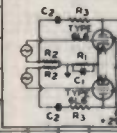
811

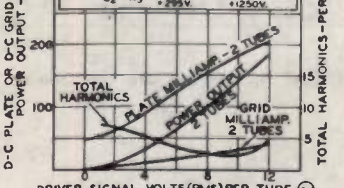
TRANSMITTING TRIODE

OPERATION CHARACTERISTICS

E_f = 6.3 VOLTS A.C. FOR 811'S AND 6L6'S

INPUT: CLASS AB1 - TWO TYPE 6L6'S IN INVERSE FEEDBACK CIRCUIT
PLATE-SUPPLY VOLTS = 300,
CATHODE-BIAS RESISTOR (R_1) = 150 OHMS,
R_2 = 20000 OHMS, R_3 = 0.1 MEG.,
C_1 = 20 μf, C_2 = 0.1 μF
INTERSTAGE TRANSFORMER (T):
VOLTAGE RATIO $\frac{\text{PRIM.}}{1/2 \text{ SEC.}}$ = 2.8
PEAK POWER EFF. = 85 %
OUTPUT: CLASS B - TWO TYPE 811'S
PLATE VOLTS = 1250, GRID VOLTS = 0
LOAD, PLATE-TO-PLATE = 15000 OHMS



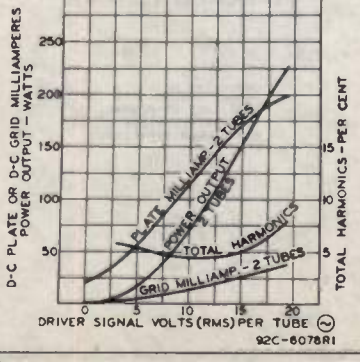


92C-6077R2

OPERATION CHARACTERISTICS

E_f = 6.3 VOLTS A.C. FOR 811'S AND 6L6'S

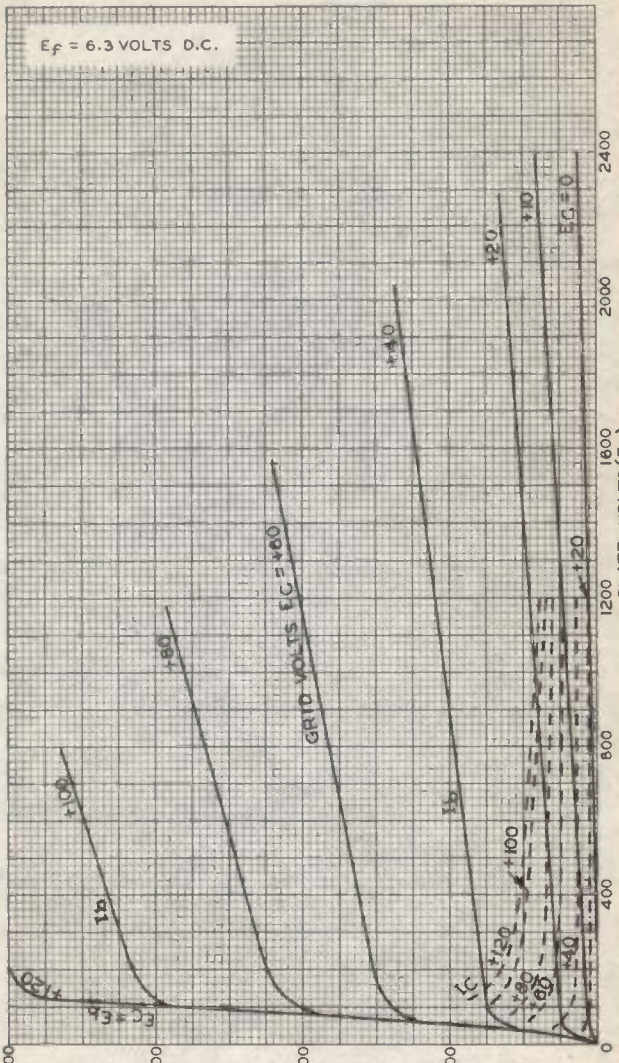
CIRCUIT CONDITIONS
INPUT: CLASS AB1 - SAME AS ON DRAWING 92C-6077R2 UNDER 811
INTERSTAGE TRANSFORMER (T):
VOLTAGE RATIO $\frac{\text{PRIM.}}{1/2 \text{ SEC.}}$ = 2.4
PEAK POWER EFFIENCY = 85 %
OUTPUT: CLASS B - TWO TYPE 811'S
PLATE VOLTS = 1500, GRID VOLTS = -9
LOAD, PLATE-TO-PLATE = 15000 OHMS



92C-6078R1

811

AVERAGE PLATE CHARACTERISTICS



SEPT. 11, 1939

RCA RADIOTRON DIVISION

92C-6075

812-A

812-A
POWER TRIODE

Supersedes type 812

GENERAL DATA

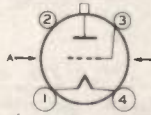
Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC or DC)	6.3 ± 0.3	volts
Current, with 6.3 volts on filament	4	amp
Amplification Factor	29	
Direct Interelectrode Capacitances:		
Grid to Plate	5.5	μμf
Grid to Filament	5.4	μμf
Plate to Filament	0.77	μμf

Mechanical:

Mounting Position	Vertical, base down; or Horizontal, with pins 1 and 4 in vertical plane
Overall Length	6-1/2" ± 5/32"
Seated Length	5-7/8" ± 5/32"
Maximum Diameter	2-7/16"
Bulb	ST-19
Cap	Medium, with Insulating Collar
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 CURRENT*	175 max.	175 max.	ma
MAX.-SIGNAL PLATE INPUT*	165 max.	235 max.	watts
PLATE DISSIPATION*	45 max.	65 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1250	1500	volts
DC Grid Voltage#	-40	-48	volts
Peak AF Grid-to-Grid Voltage	225	270	volts
Zero-Signal DC Plate Current	22	28	ma
Max.-Signal DC Plate Current	260	310	ma
Effective Load Resistance (plate-to-plate)	12200	13200	ohms
Max.-Signal Driving Power (Approx.)	3.5	5	watts
Max.-Signal Power Output (Approx.)	235	340	watts

* Averaged over any audio-frequency cycle of sine-wave form.
●, ●●, #: See next page.

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

812-A
POWER TRIODE

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	125 max.	150 max.	ma
DC GRID CURRENT	35 max.	35 max.	ma
PLATE INPUT	115 max.	175 max.	watts
PLATE DISSIPATION	30 max.	45 max.	watts

Typical Operation:

DC PLATE VOLTAGE	1000	1250	volts
DC Grid Voltage[•]	-110	-115	volts
	3400	3300	ohms
Peak RF Grid Voltage	220	240	volts
DC Plate Current	115	140	ma
DC Grid Current (Approx.)	33	35	ma
Driving Power (Approx.)	6.6	7.6	watts
Power Output (Approx.)	85	130	watts

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	175 max.	175 max.	ma
DC GRID CURRENT	35 max.	35 max.	ma
PLATE INPUT	175 max.	260 max.	watts
PLATE DISSIPATION	45 max.	65 max.	watts

Typical Operation:

DC Plate Voltage	1250	1500	volts
DC Grid Voltage[▲▲]	-90	-120	volts
	3000	4000	ohms
	530	590	ohms
Peak RF Grid Voltage	200	240	volts
DC Plate Current	140	173	ma
DC Grid Current (Approx.)	30	30	ma
Driving Power (Approx.)	5.4	6.5	watts
Power Output (Approx.)	130	190	watts

•, ••, #, ▲, ▲▲, □□: See next page.

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.

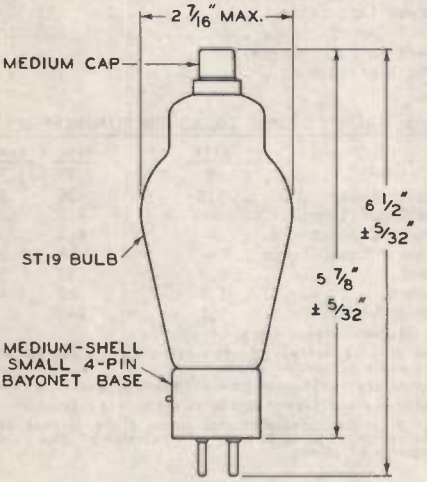
● See next page.

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.

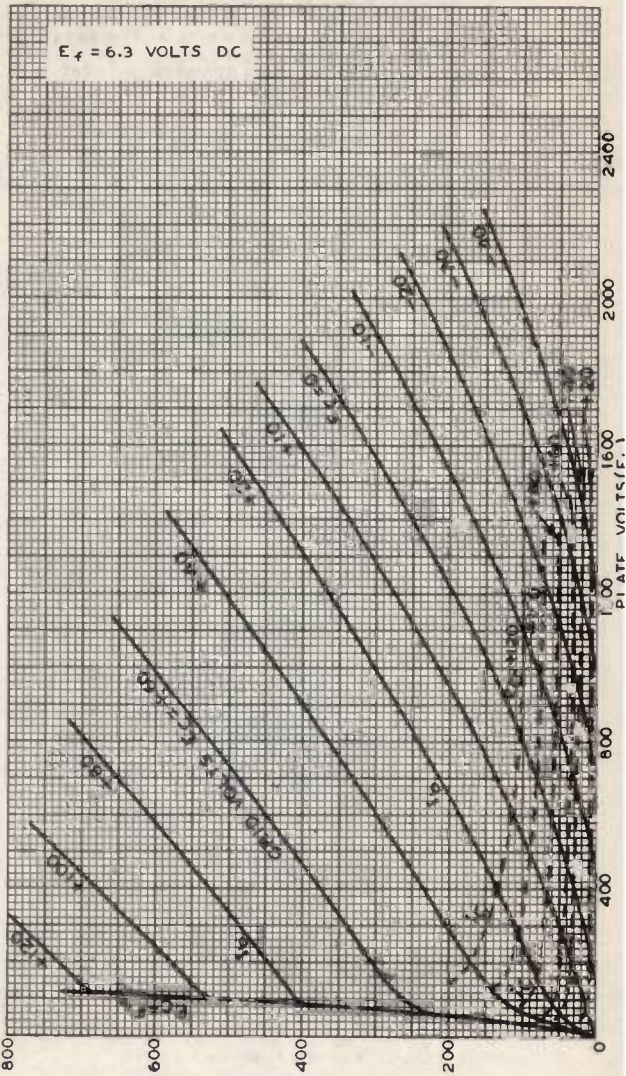
NOTE: When the 812-A is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. With a plate voltage of 1500 volts, a fixed bias of at least -45 volts should be used.

Data on operating frequencies for the 812-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY



92CS-6905

812-A
AVERAGE PLATE CHARACTERISTICS



MAY 13, 1948 TUBE DEPARTMENT 92CM-6074RI

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

812-A

OPERATION CHARACTERISTICS

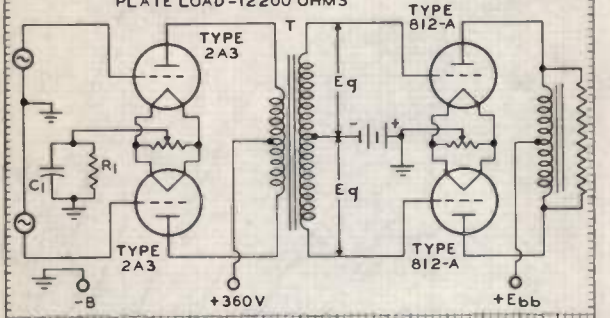
E_f = 6.3 VOLTS AC FOR 812-A's & 2.5 VOLTS AC FOR 2A3's

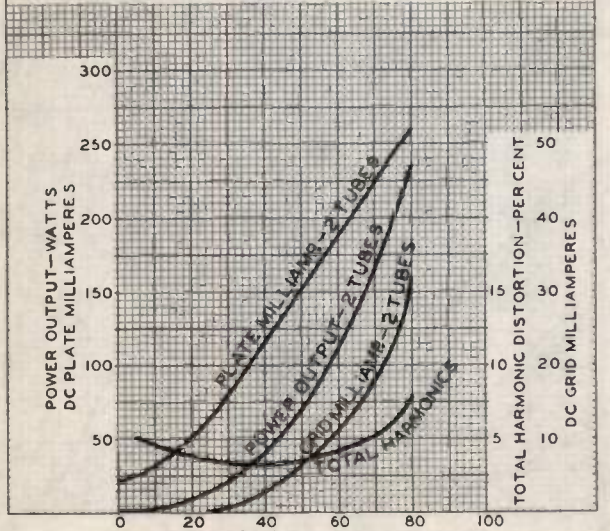
INPUT: CLASS AB_1 – TWO TYPE 2A3's; PLATE-SUPPLY VOLTS = 360; CATHODE-BIAS RESISTOR (R_1) = 780 OHMS; BYPASS CAPACITOR (C_1) = 80 μf

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

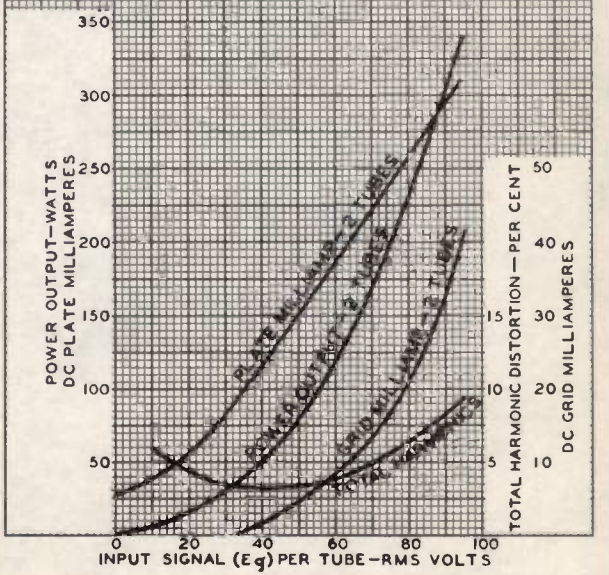




812-A

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



813

TRANSMITTING BEAM POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	10.0	a-c or d-c volts
Current	5	amp.
Transconductance for plate current of 50 ma.	3750 approx.	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate (with external shielding)	0.2 max.	μμf
Input	16.3	μμf
Output	14	μμf
Maximum Overall Length		7-1/2"
Maximum Diameter		2-9/16"
Bulb		T-20
Cap		Medium Metal
Base		Giant 7-Pin
RCA Socket (Type UT-104)		Stock No.9929

Maximum Ratings Are Absolute Values

MAXIMUM 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 factor of 1.0

	CCS	
D-C Plate Voltage	2000 max.	volts
D-C Screen Voltage (Grid #2)	400 max.	volts
D-C Plate Current	100 max.	ma.
Plate Input	150 max.	watts
Screen Input	15 max.	watts
Plate Dissipation	100 max.	watts
Typical Operation:		
D-C Plate Voltage	1500	2000 volts
D-C Screen Voltage	400	400 volts
D-C Grid Voltage (Grid #1)●	-60	-75 volts
Peak R-F Grid Voltage	70	80 volts
D-C Suppressor Voltage (Grid #3)*	0	0 volts
D-C Plate Current	100	75 ma.
D-C Screen Current	4	3 ma.
D-C Grid Current ●	-	- approx. ma.
Driving Power ○ ▲	-	- approx. watt
Power Output	50	50 approx. watts

● Usually negligible. Fixed supply or by-passed cathode-resistor bias recommended.
▲ Usually negligible. Never more than 2 watts.

GRID-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	2000 max.	volts
D-C Screen Voltage (Grid #2)	400 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	volts
D-C Plate Current	100 max.	ma.
Plate Input	150 max.	watts

●, *, ○: See end of tabulation. ← Indicates a change.

813

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

		CCS	
Screen Input		15 max.	watts
Plate Dissipation		100 max.	watts
Typical Operation:			
D-C Plate Voltage	1500	2000	volts
D-C Screen Voltage	400	400	volts
D-C Grid Voltage ®	-140	-120	volts
Peak R-F Grid Voltage	145	120	volts
Peak A-F Grid Voltage	60	60	volts
D-C Suppressor Voltage (Grid #3)	0	0	volts
D-C Plate Current	70	75	ma.
D-C Screen Current	3	3	ma.
D-C Grid Current ♦	-	- approx.	ma.
→ Driving Power ○ ▲	-	- approx.	watt
Power Output	40	50 approx.	watts

♦ Usually negligible. Fixed supply or unby-passed cathode-resistor bias recommended.

→ ▲ Usually negligible. R-f driving power never more than 2 watts; a-f power usually never more than 1 watt.

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		1600 max.	volts
D-C Screen Voltage (Grid #2)		400 max.	volts
D-C Grid Voltage (Grid #1)		-300 max.	volts
D-C Plate Current		150 max.	ma.
D-C Grid Current		25 max.	ma.
Plate Input		240 max.	watts
Screen Input		15 max.	watts
Plate Dissipation		67 max.	watts
Typical Operation:			
D-C Plate Voltage	1250	1600	volts
D-C Screen Voltage □	400	400	volts
D-C Grid Voltage † ®	-120	-130	volts
	30000	21600	ohms
Peak R-F Grid Voltage	195	210	volts
D-C Suppressor Voltage (Grid #3)*	0	0	volts
D-C Plate Current	150	150	ma.
D-C Screen Current	16	20	ma.
D-C Grid Current	4	6 approx.	ma.
Driving Power	0.7	1.2 approx.	watts
Power Output	135	175 approx.	watts

† Obtained by grid resistor of value shown or by combination of grid resistor with either fixed supply or cathode resistor. Total effective grid-circuit resistance should not exceed 30000 ohms.

□ Obtained from fixed supply, modulated simultaneously with plate voltage.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

	CCS	
D-C Plate Voltage	2000 max.	volts

○, ®, *, ##: See end of tabulation. ← Indicates a change.

813

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

			CCS	
D-C Screen Voltage (Grid #2)			400 max.	volts
D-C Grid Voltage (Grid #1)			-300 max.	volts
D-C Plate Current			180 max.	ma.
D-C Grid Current			25 max.	ma.
Plate Input			360 max.	watts
Screen Input			22 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation:				
D-C Plate Voltage	1250	1500	2000	volts
D-C Screen Voltage §	300	300	400	volts
	42000	60000	107000	ohms
D-C Grid Voltage *	-60	-70	-90	volts
	8500	11700	30000	ohms
	285	340	455	ohms ←
Peak R-F Grid Voltage	145	150	160	volts
D-C Suppressor Voltage (Grid #3)•	0	0	0	volts
D-C Plate Current	180	180	180	ma.
D-C Screen Current	23	20	15	ma.
D-C Grid Current	7	6	3 approx.	ma.
Driving Power	1	0.8	0.5 approx.	watt
Power Output	155	190	260 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 from fixed supply, by grid resistor (8500, 11700, 30000) or cathode resistor (285, 340, 455). If preceding stage is keyed, partial fixed bias is required. ←

§ 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 813 is employed as buffer amplifier and is not keyed. The screen voltage must not exceed 800 volts under key-up conditions. ←

• 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.

⊕ For a-c filament supply. If d.c. is used, the stated voltages should be decreased by one-half the filament voltage.

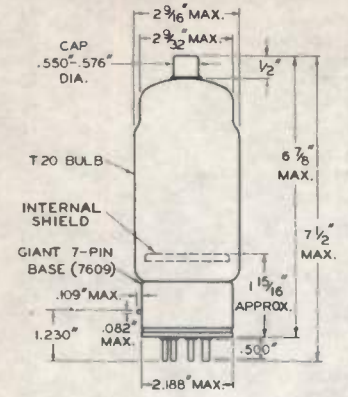
o At crest of audio-frequency cycle with modulation factor of 1.0.

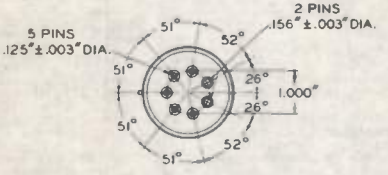
Data on operating frequencies for the 813 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY. ←

← Indicates a change.

813

TRANSMITTING BEAM POWER AMPLIFIER





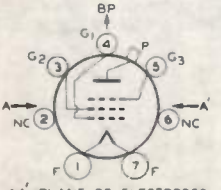
BOTTOM VIEW OF BASE

TUBE MOUNTING POSITION

VERTICAL: Base up or down.
HORIZONTAL: Plate in vertical plane (on edge).

92C-4963RI

BOTTOM VIEW OF SOCKET CONNECTIONS



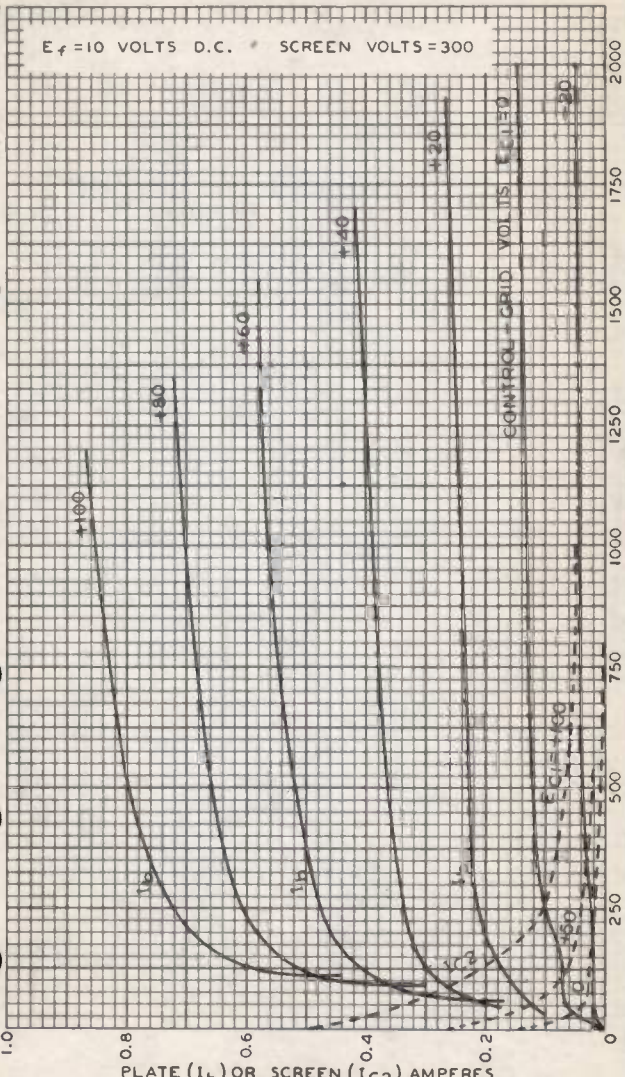
AA'=PLANE OF ELECTRODES

Pin 1 - Filament
Pin 2 - No Connection
Pin 3 - Grid No.2
Pin 4 - Grid No.1
Pin 5 - Grid No.3
Pin 6 - No Connection
Pin 7 - Filament
Cap - Plate

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

813

AVERAGE PLATE CHARACTERISTICS



SEPT. 13, 1938

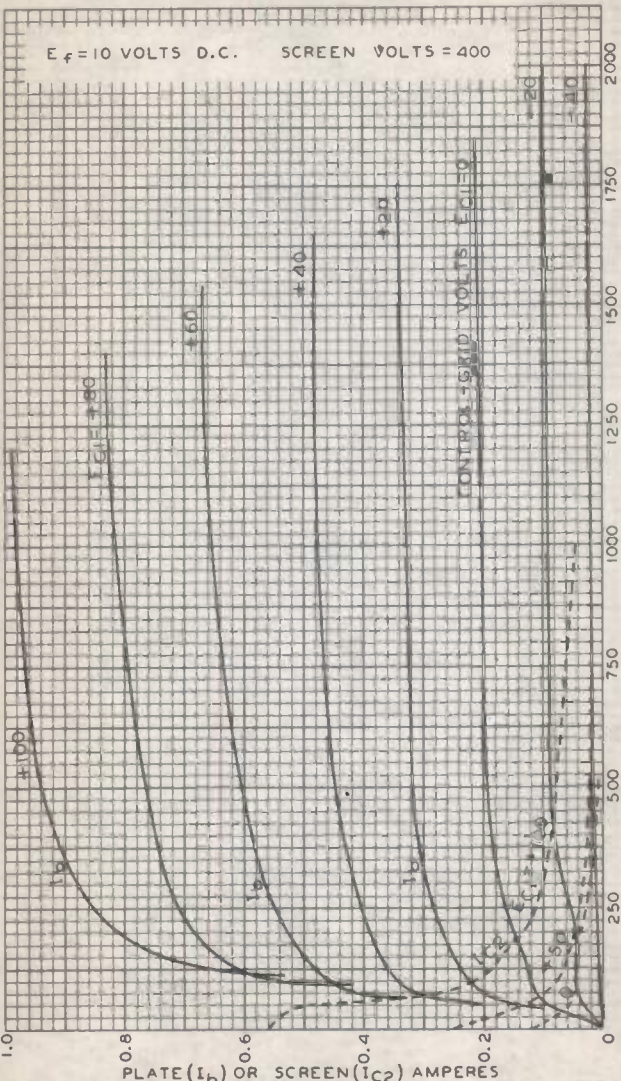
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4967

813

813

AVERAGE PLATE CHARACTERISTICS



SEPT. 14, 1938

RCA RADIOTRON DIVISION
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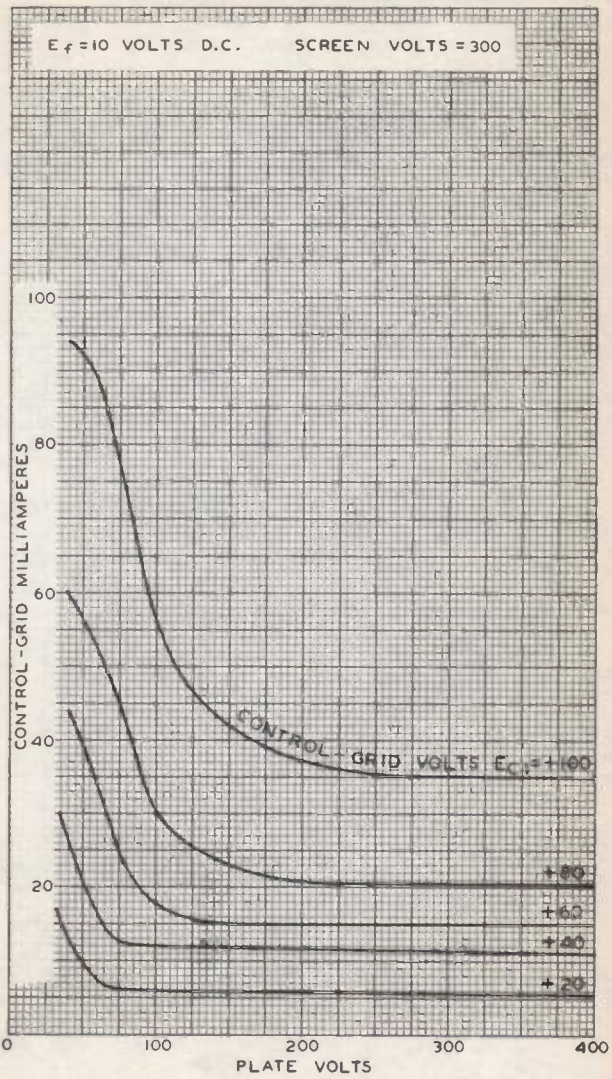
92C-4968

813

TYPICAL CHARACTERISTICS



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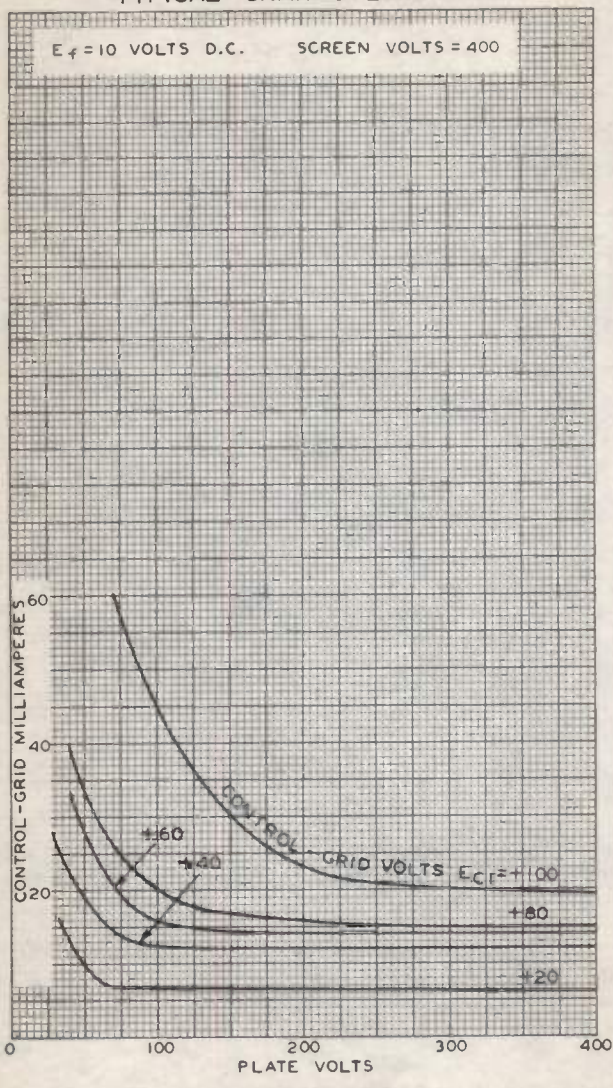
TYPICAL CHARACTERISTICS



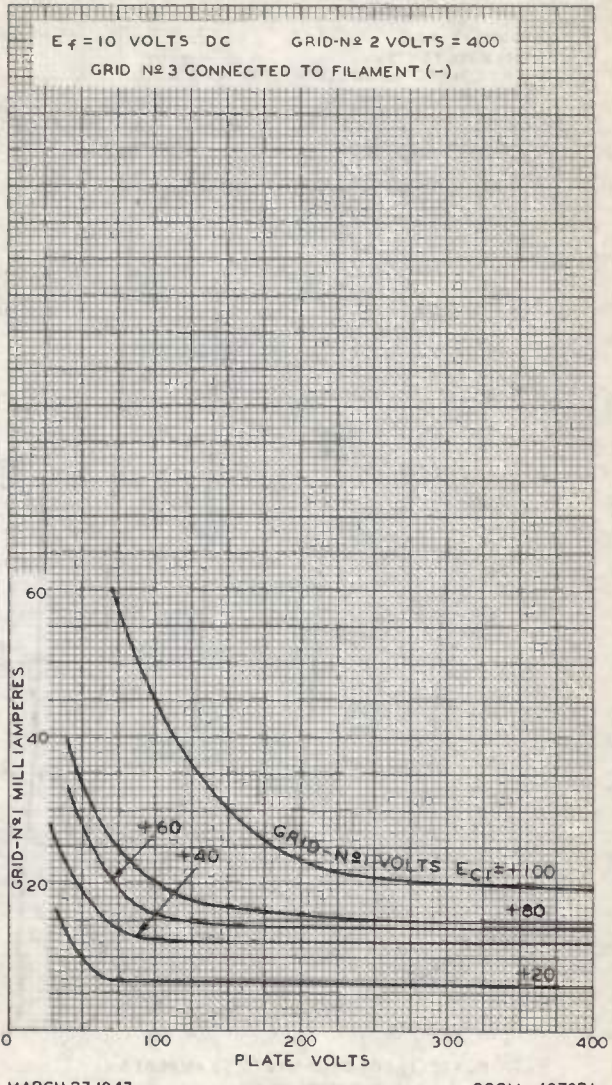
SEPT. 14, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4970

813

TYPICAL CHARACTERISTICS



MARCH 27, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

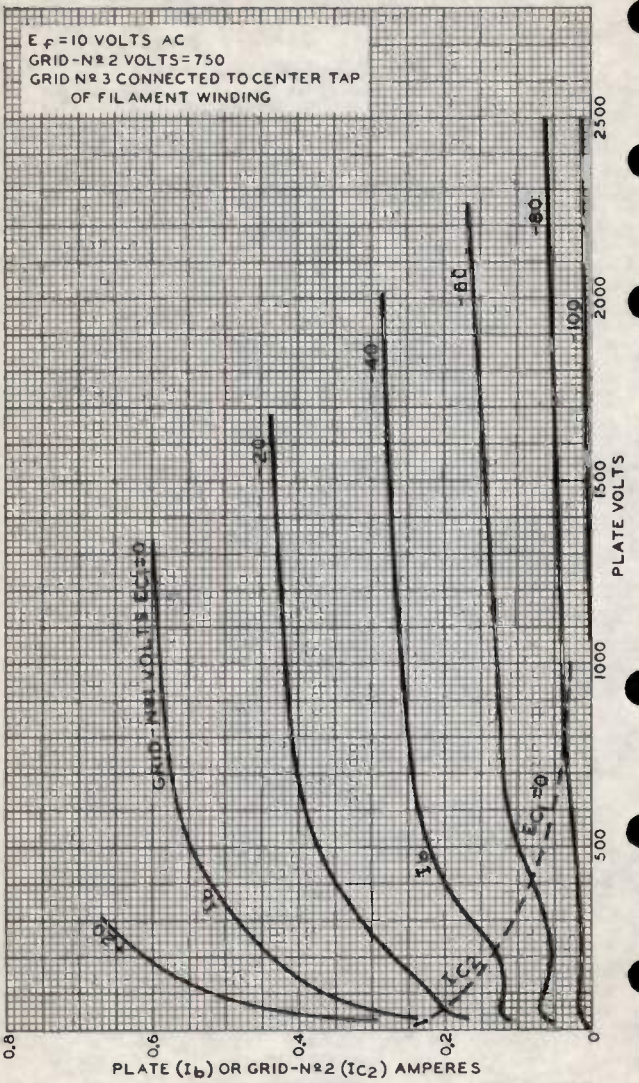
92CM-4970R1

813

RCA

813

AVERAGE PLATE CHARACTERISTICS



JAN. 27, 1948 TUBE DEPARTMENT 92CM-6926

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

814

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.

RCA MANUFACTURING COMPANY, INC.

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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.

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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	68
TELEGRAPHY - Class C	100	80	68

RCA MANUFACTURING COMPANY, INC.

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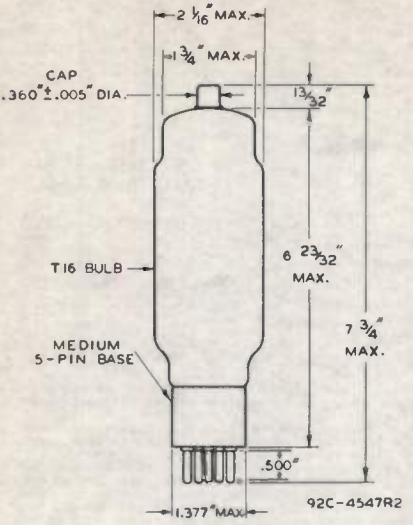
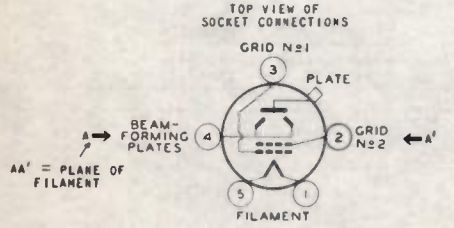
TRANSMITTING BEAM POWER AMPLIFIER





TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: Filament in vertical plane (on edge).

814

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AVERAGE PLATE CHARACTERISTICS
WITH E_{c1} AS VARIABLE

E_f = 10 VOLTS D.C. SCREEN VOLTS = 300
BEAM-FORMING-PLATE VOLTS = 0

CONTROL-GRID VOLTS E_{c1} = +120

E_{c1} = +100
+80
+60
+40
0
-20

PLATE VOLTS
0
200
400
600
800
1000
1200

PLATE MILLIAMPERES
800
600
400
200
0

NOV. 11, 1937
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.
92C-4845

814

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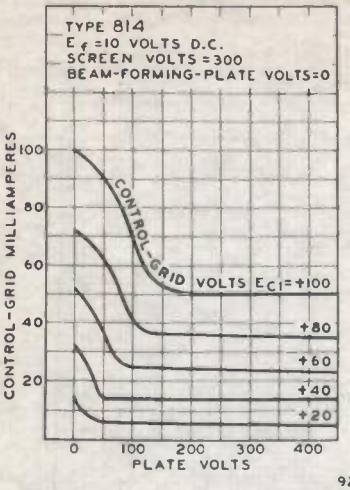
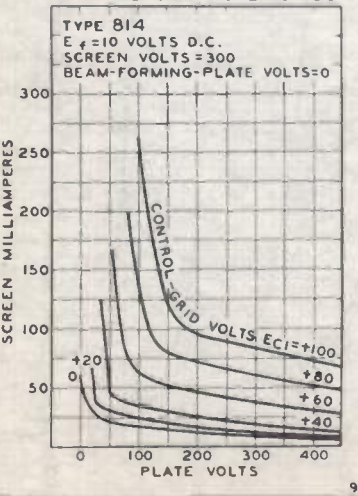
TRANSMITTING BEAM POWER AMPLIFIER

AVERAGE CHARACTERISTICS



92C-4846

AVERAGE CHARACTERISTICS



92C-4847

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.

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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.

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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.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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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.

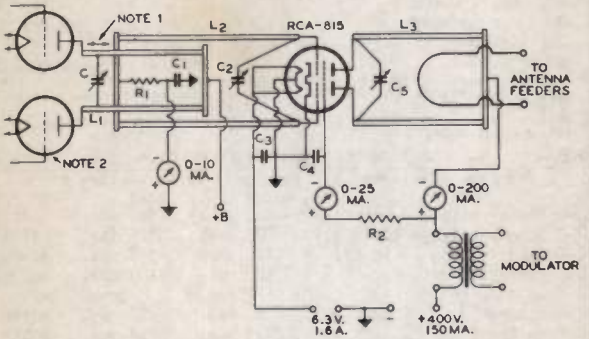
‡ In applications requiring the use of screen voltages above 135 volts, provision should be made for the adjustment of control-grid bias for each unit separately. The necessity for this adjustment at the lower screen voltages depends on the distortion requirements and on whether the plate-dissipation 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 C_1 C_3 C_4	See L_1 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

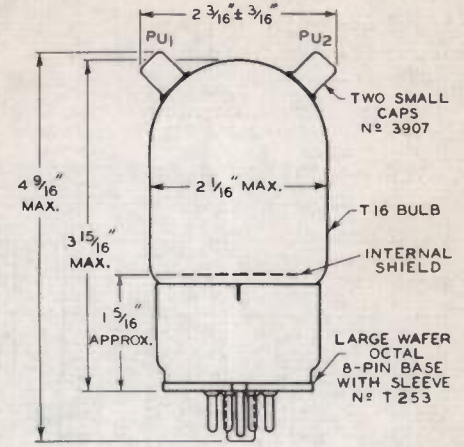
(1) The r-f driver stage should be able to deliver about one watt of useful r-f power, in order to insure ample grid excitation for the 815.
(2) Adjust coupling between L_1 and L_2 and tuning of C and C_2 for recommended d-c grid current of the 815.
(3) L_1 and L_2 should be effectively shielded from 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.

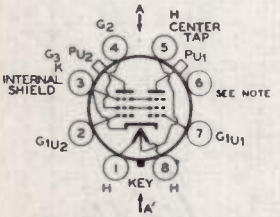
RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

815

PUSH-PULL R-F BEAM POWER AMPLIFIER



BOTTOM VIEW OF SOCKET CONNECTIONS



NOTE: TERMINALS 3 & 6 MUST BE CONNECTED TOGETHER

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

Pin 1 – Heater
Pin 2 – Grid No.1 of Unit No.2
Pin 3 – Cathode, Internal Shield, Grid No.3
Pin 4 – Screen
Pin 5 – Heater Center Tap
Pin 6 – See Note
Pin 7 – Grid No.1 of Unit No.1
Pin 8 – Heater

P_{U1} & P_{U2} – Plate Terminals of Units No.1 and No.2, respectively

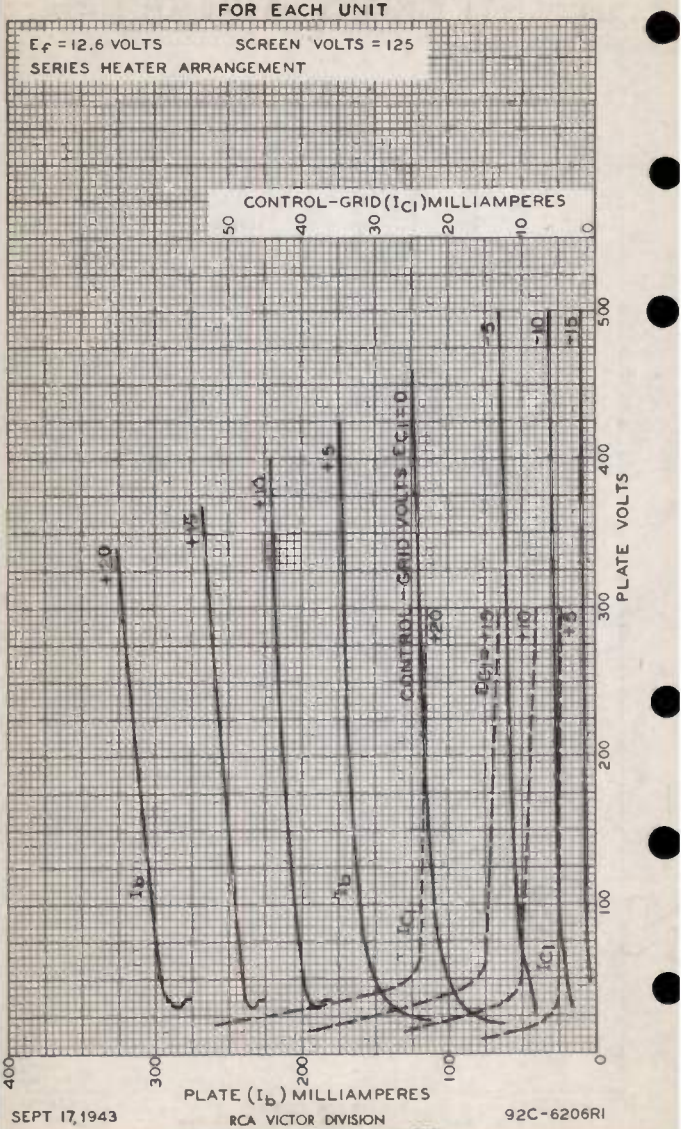
TUBE MOUNTING POSITION

Any

→ Indicates a change.

815

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



SEPT 17, 1943

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92C-6206RI

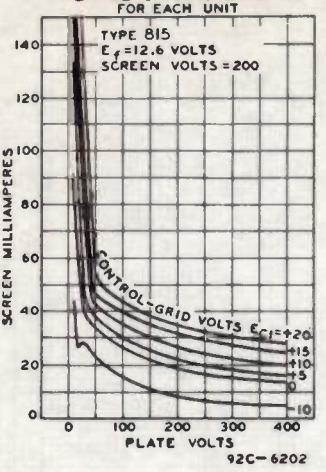
815

AVERAGE PLATE CHARACTERISTICS FOR EACH UNIT

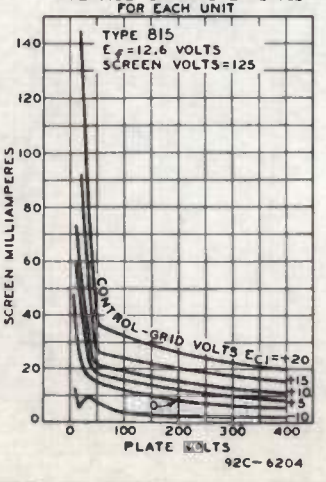
815

PUSH-PULL R-F BEAM POWER AMPLIFIER

AVERAGE CHARACTERISTICS
FOR EACH UNIT



AVERAGE CHARACTERISTICS
FOR EACH UNIT



RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

RCA

816

HALF-WAVE MERCURY-VAPOR RECTIFIER

GENERAL DATA

Electrical:

Filament, Coated:		
Voltage	2.5	ac volts
Current	2.0	amp
Heating Time	10	sec.
Tube Voltage Drop (Approx.)	15	volts

Mechanical:

Mounting Position	Vertical, Base Down
Overall Length	4-9/16" ± 1/8"
Seated Length	3-15/16" ± 1/8"
Maximum Diameter	1-9/16"
Bulb	ST-12
Cap	Small
Base	Small-Shell Small 4-Pin
Basing Designation for BOTTOM VIEW	4P

Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – No Connection
Pin 4 – Filament, Cathode Shield
Cap – Anode

HALF-WAVE RECTIFIER

Maximum Ratings, *Absolute Values*:•

COND.-MERCURY TEMP. RANGE	20 – 60	°C
PEAK INVERSE ANODE VOLTAGE	7500 max.	volts
PEAK ANODE CURRENT	500 max.	ma
AVERAGE ANODE CURRENT	125 max.	ma

• For supply frequency up to 150 cycles per second.

The table on the following page classifies suitable rectifier circuits for the 816 and shows their safe maximum input and maximum output operating conditions for a peak inverse voltage of 7500 volts. These values are based on a sine-wave input and the use of a suitable choke preceding any capacitor in the filter circuit.

RCA

816

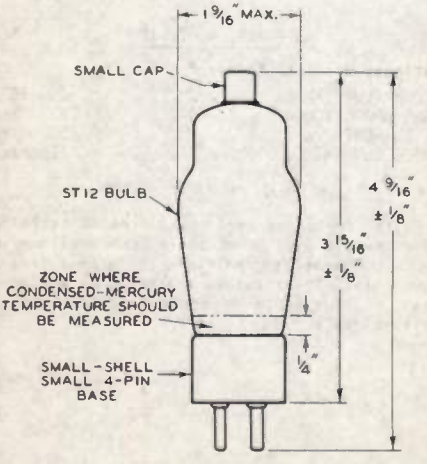
HALF-WAVE MERCURY-VAPOR RECTIFIER

CIRCUIT[□]	MAXIMUM AC INPUT VOLTS (RMS)*	APPROX. DC OUTPUT VOLTS TO FILTER*	MAXIMUM DC LOAD CURRENT amperes
SINGLE-PHASE FULL-WAVE (2 tubes) FIG. 1	5300 total	2390	0.25
SINGLE-PHASE FULL-WAVE (4 tubes) FIG. 2	5300 total	4780	0.25
THREE-PHASE HALF-WAVE FIG. 3	3050 per leg	3570	0.375
THREE-PHASE DOUBLE-Y PARALLEL FIG. 4	3050 per leg	3570	0.75
THREE-PHASE FULL-WAVE FIG. 5	3050 per leg	7140	0.375

□ For RECTIFIER CIRCUITS and RF FILTER CONSIDERATIONS refer to Type 872-A

* For maximum peak inverse voltage of 7500 volts.

NOTE: If the anode-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.



92CM-6277R2

825

INDUCTIVE-OUTPUT AMPLIFIER

Recommended for operation at frequencies above 300 megacycles

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.75	amp.
Starting - Heater current must never exceed 2 amperes, even momentarily.		
Transconductance for plate current of 50 ma.	5500	μmhos
Direct Interelectrode Capacitances:		
Grid No.1 to Grid No.2	1.8 max.	μμf
Grid No.1 to Cathode	3.2	μμf
Grid No.2 to Cathode	0.9	μμf
Maximum Overall Length	8-3/4"	
Maximum Diameter	2-1/16"	
Terminal Mounting	Special	

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 Collector Voltage	2000 max.	volts
D-C Grid No.4 Voltage	1500 max.	volts
D-C Grid No.3 Voltage	3600 max.	volts
D-C Grid No.2 Voltage	3600 max.	volts
D-C Grid No.1 Voltage	-50 max.	volts
D-C Collector Current	35 max.	ma.
Collector Input	65 max.	watts
Grid No.4 Input	7 max.	watts
Grid No.3 Input	5 max.	watts
Grid No.2 Input	7 max.	watts
Collector Dissipation	50 max.	watts
Typical Operation:**		
D-C Collector Voltage	1500	volts
D-C Grid No.4 Voltage	800	volts
D-C Grid No.3 Voltage	3600	volts
D-C Grid No.2 Voltage	3600	volts
D-C Grid No.1 Voltage	-25	volts
Peak R-F Grid No.1 Voltage	20	volts
D-C Collector Current	25	ma.
D-C Grid No.4 Current	1.0	ma.
D-C Grid No.3 Current	0.3	ma.
D-C Grid No.2 Current	0.5	ma.
Power Output	9 approx.	watts

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 Collector Voltage	2000 max.	volts
D-C Grid No.4 Voltage	1500 max.	volts
D-C Grid No.3 Voltage	3600 max.	volts
D-C Grid No.2 Voltage	3600 max.	volts
D-C Grid No.1 Voltage	-100 max.	volts
D-C Collector Current	32.5 max.	ma.
Collector Input	65 max.	watts
Grid No.4 Input	7 max.	watts

** See end of tabulation.

825

INDUCTIVE-OUTPUT AMPLIFIER

(continued from preceding page)

Grid No.3 Input	5 max.	watts
Grid No.2 Input	7 max.	watts
Collector Dissipation	50 max.	watts
Typical Operation:**		
D-C Collector Voltage	1500	volts
D-C Grid No.4 Voltage	800	volts
D-C Grid No.3 Voltage	3600	volts
D-C Grid No.2 Voltage	3600	volts
D-C Grid No.1 Voltage	-33	volts
Peak R-F Grid No.1 Voltage	30	volts
Peak A-F Grid No.1 Voltage	8	volts
D-C Collector Current	25	ma.
D-C Grid No.4 Current	1.0	ma.
D-C Grid No.3 Current	0.3	ma.
D-C Grid No.2 Current	0.5	ma.
Power Output	9 approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Collector Voltage	2000 max.	volts
D-C Grid No.4 Voltage	1500 max.	volts
D-C Grid No.3 Voltage	3600 max.	volts
D-C Grid No.2 Voltage	3600 max.	volts
D-C Grid No.1 Voltage	-100 max.	volts
D-C Collector Current	50 max.	ma.
D-C Grid No.1 Current	2.5 max.	ma.
Collector Input	100 max.	watts
Grid No.4 Input	7 max.	watts
Grid No.3 Input	5 max.	watts
Grid No.2 Input	7 max.	watts
Collector Dissipation	50 max.	watts
Grid No.1 Dissipation	0.15 max.	watt
Typical Operation:**		
D-C Collector Voltage	1500	volts
D-C Grid No.4 Voltage	800	volts
D-C Grid No.3 Voltage	3600	volts
D-C Grid No.2 Voltage	3600	volts
D-C Grid No.1 Voltage♦	-40	volts
	800 approx.	ohms
	18000	ohms
Peak R-F Grid Voltage	45	volts
D-C Collector Current	45	ma.
D-C Grid No.4 Current	2	ma.
D-C Grid No.3 Current	0.5	ma.
D-C Grid No.2 Current	1.0	ma.
D-C Grid No.1 Current	2.3 approx.	ma.
D-C Grid No.1 Dissipation	0.1 approx.	watt
Power Output	35 approx.	watts

** The focusing electromagnet is a double magnetic lens operated at approximately 1000 ampere turns; the gap spacings should be adjustable for best focus of the electron beam. Gap forming first magnetic lens should be approximately centered over grid No.2, the second should be centered over the space between grid No.2 and grid No.3.

##, ♦ : See next page.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

825

INDUCTIVE-OUTPUT AMPLIFIER

(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 conditions.

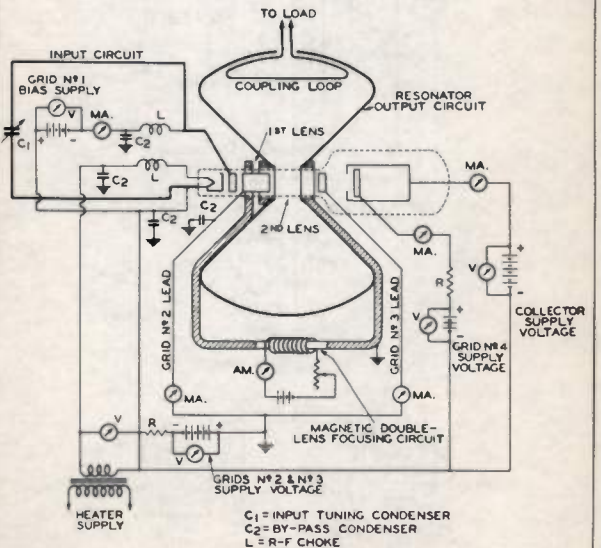
♦ May be obtained from fixed supply, cathode resistor (800) or grid resistor (18000) except when a preceding stage is keyed. In this case, sufficient fixed bias must be used to maintain the beam current at a low value.

NOTE: All high-voltage sources should have good voltage regulation. The following sequence of operations is strongly recommended when the 825 is placed in operation: be sure the magnetic circuit is functioning, be sure grid No.1 bias is connected, then apply voltages in this order: heater, collector, grid No.4, grid No.3, grid No.2, excitation.

R-F BY-PASSING

R-f by-passing of the heater supply, as well as the return circuits of grids No.1 and No.2 should be made to the cathode. R-f chokes placed close to the tube terminals of these electrodes is recommended. The cathode, grid No.1 and grid No.2 are each connected within the tube to two terminals to provide multiple contact. Use of both terminals to each of these electrodes is recommended in order to reduce lead inductance and resistance.

TYPICAL R-F AMPLIFIER CIRCUIT FOR TYPE 825



C_1 = INPUT TUNING CONDENSER
C_2 = BY-PASS CONDENSER
L = R-F CHOKE
R = PROTECTIVE RESISTOR

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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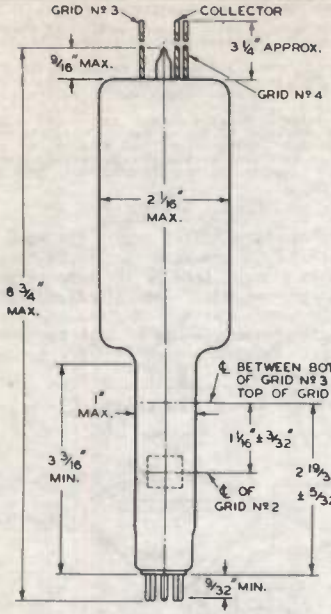
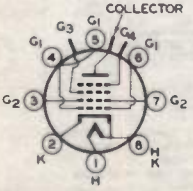
825

INDUCTIVE-OUTPUT AMPLIFIER



BOTTOM VIEW

BOTTOM VIEW OF SOCKET CONNECTIONS



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

TUBE MOUNTING POSITION
VERTICAL or HORIZONTAL

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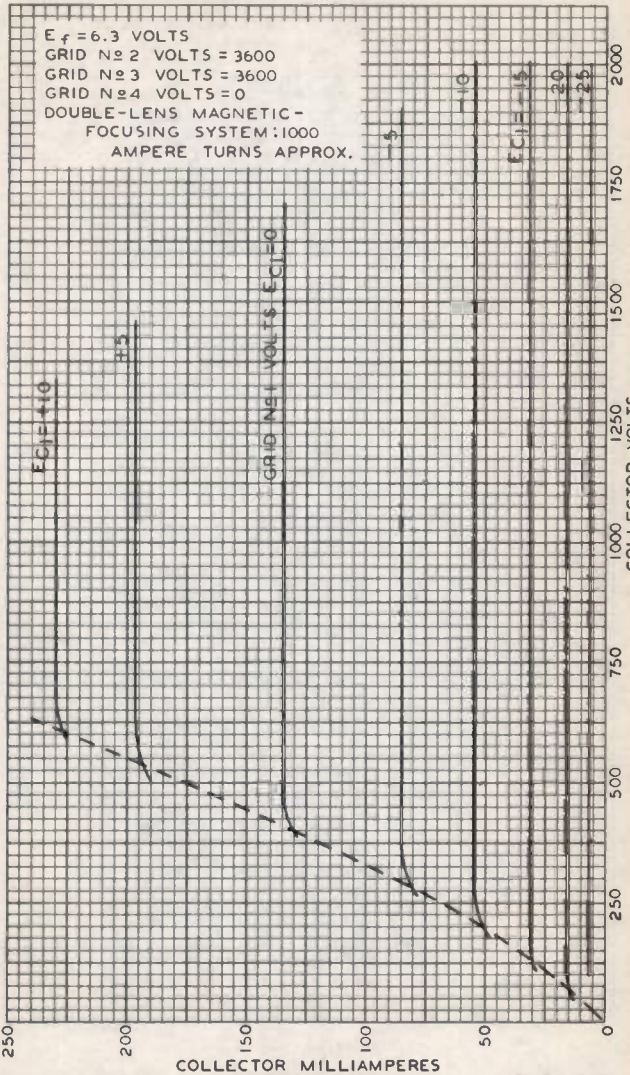
RCA

825

AVERAGE CHARACTERISTICS



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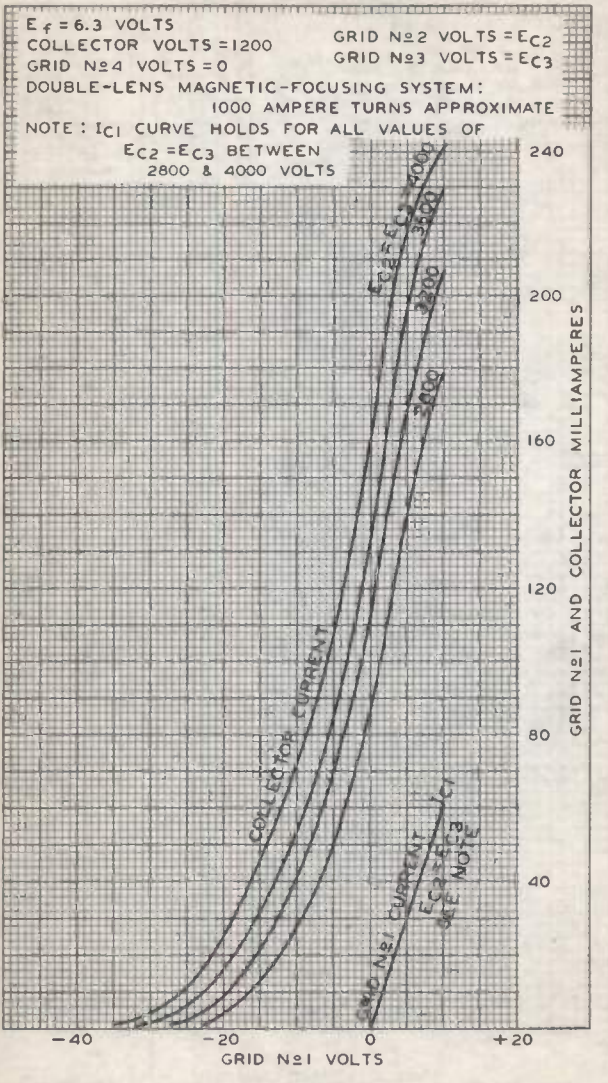
92C-6195

RCA

825

TYPICAL CHARACTERISTICS



826

TRANSMITTING TRIODE

For operation at maximum ratings up to 250 Mc

Filament †	Thoriated Tungsten	
Voltage	7.5	a-c or d-c volts
Current	4	amp.
Amplification Factor	31	
Direct Interelectrode Capacitances:		
Grid to Plate	2.9	μμf
Grid to Filament	3.7	μμf
Plate to Filament	1.4	μμf
Maximum Overall Length		3-11/16"
Maximum Diameter		2-3/8"
Bulb		T-16
RCA Socket		Type UT-106
Cooling		Forced Air

MAXIMUM CCS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

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	1000 max.	volts
D-C Plate Current	65 max.	ma.
Plate Input	65 max.	watts
Plate Dissipation	60 max.	watts
Typical Operation:		
D-C Plate Voltage	1000	volts
D-C Grid Voltage #	-50	volts
Peak R-F Grid Voltage	87	volts
D-C Plate Current	65	ma.
D-C Grid Current **	8.5 approx.	ma.
Driving Power ** o	3.7 approx.	watts
Power Output	22 approx.	watts

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

GRID-MODULATED R-F POWER AMPLIFIER - Class C Telegraphy

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

	CCS	
D-C Plate Voltage	1000 max.	volts
D-C Grid Voltage	-500 max.	volts
D-C Plate Current	65 max.	ma.
Plate Input	65 max.	watts
Plate Dissipation	60 max.	watts
Typical Operation:		
D-C Plate Voltage	1000	volts
D-C Grid Voltage □	-125	volts
Peak R-F Grid Voltage	165	volts
Peak A-F Grid Voltage	95	volts
D-C Plate Current	65	ma.
D-C Grid Current **	9.5 approx.	ma.
Driving Power ** o	8.2 approx.	watts
Power Output	25 approx.	watts

□ Obtained preferably from fixed supply.
o At crest of audio-frequency cycle with modulation factor of 1.0.
#, **, †: See end of tabulation.

826

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 factor of 1.0

	CCS		
D-C Plate Voltage	800	max.	volts
D-C Grid Voltage	-500	max.	volts
D-C Plate Current	95	max.	ma.
D-C Grid Current	40	max.	ma.
Plate Input	75	max.	watts
Plate Dissipation	40	max.	watts
Typical Operation:			
D-C Plate Voltage	800		volts
D-C Grid Voltage # ▲	-98		volts
	2800		ohms
Peak R-F Grid Voltage	198		volts
D-C Plate Current	94		ma.
D-C Grid Current **	35	approx.	ma.
Driving Power **	6.2	approx.	watts
Power Output	53	approx.	watts

▲ Obtained preferably from grid resistor of value shown or combination of grid resistor with either fixed supply or by-passed cathode resistor.

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

	CCS		
D-C Plate Voltage	1000	max.	volts
D-C Grid Voltage	-500	max.	volts
D-C Plate Current	125	max.	ma.
D-C Grid Current	35	max.	ma.
Plate Input	125	max.	watts
Plate Dissipation	60	max.	watts
Typical Operation:			
D-C Plate Voltage	1000		volts
D-C Grid Voltage ◊	-70		volts
	2000		ohms
	440		ohms
Peak R-F Grid Voltage	183		volts
D-C Plate Current	125		ma.
D-C Grid Current**	35	approx.	ma.
Driving Power **	5.8	approx.	watts
Power Output	86	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 from fixed supply (-70), grid resistor (2000), or cathode resistor (440). 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 1000 volts, a fixed bias of at least -7.5 volts should be used.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

† 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 condensers. 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. R-f by-passing of the grid- and plate-return circuits should be made to the center lead of the filament.

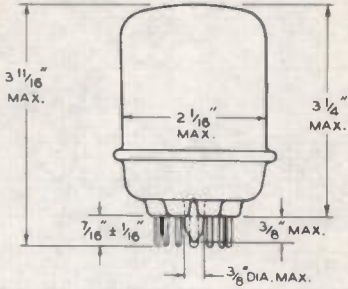
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

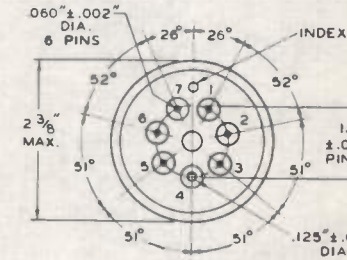
826

TRANSMITTING TRIODE

(continued from preceding page)

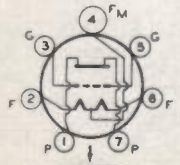
Data on operating frequencies for the 826 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY. Adequate shielding must be provided at the higher frequencies and forced-air cooling is necessary. At the ultra-high frequencies, push-pull operation is recommended and it is desirable to connect the two grid terminals and the two plate terminals together in order to reduce the respective lead inductances.





BOTTOM VIEW

BOTTOM VIEW OF SOCKET CONNECTIONS



Pin 1 – Plate
Pin 2 – Filament
Pin 3 – Grid
Pin 4 – Filament Mid-Tap
Pin 5 – Grid
Pin 6 – Filament
Pin 7 – Plate

TUBE MOUNTING POSITION

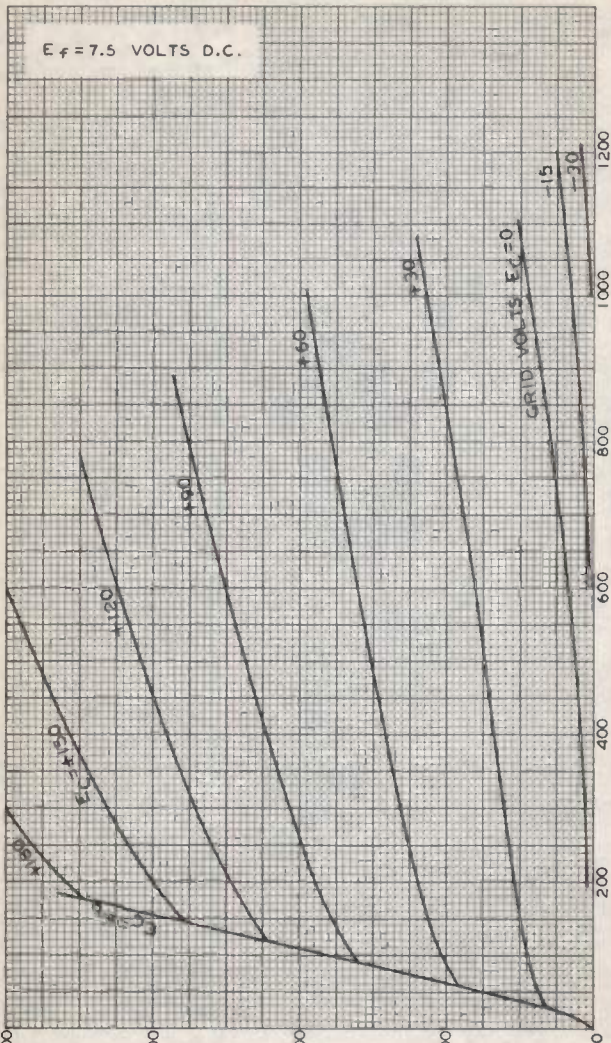
VERTICAL: Terminals up or down.
HORIZONTAL: No.

RCA MANUFACTURING COMPANY, INC.

826

826

AVERAGE PLATE CHARACTERISTICS



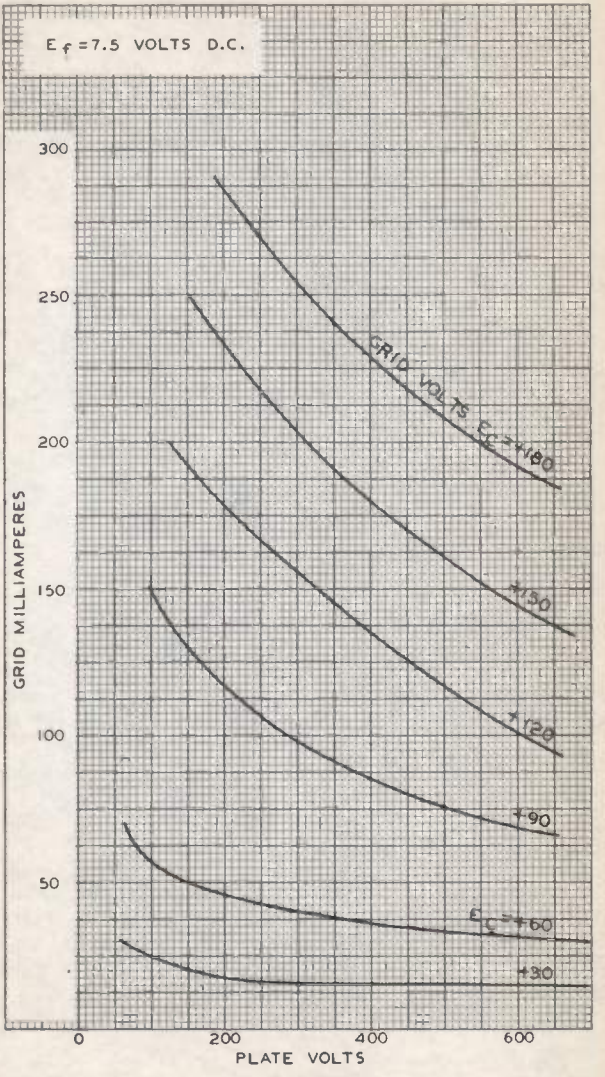
SEPT. 9, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6210

826

TYPICAL CHARACTERISTICS



RCA

827-R

TRANSMITTING BEAM POWER AMPLIFIER

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	5-7/8"	
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 with 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.

* With a-c filament supply.

827-R

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

		CCS	
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 leak of value shown or by combination of grid leak 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 RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

827-R

TRANSMITTING BEAM POWER AMPLIFIER

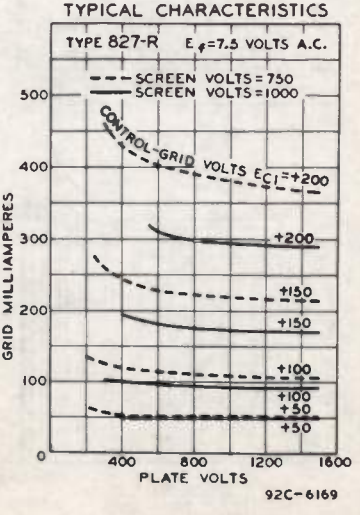
(continued from preceding page)

Typical Operation:		CCS	
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

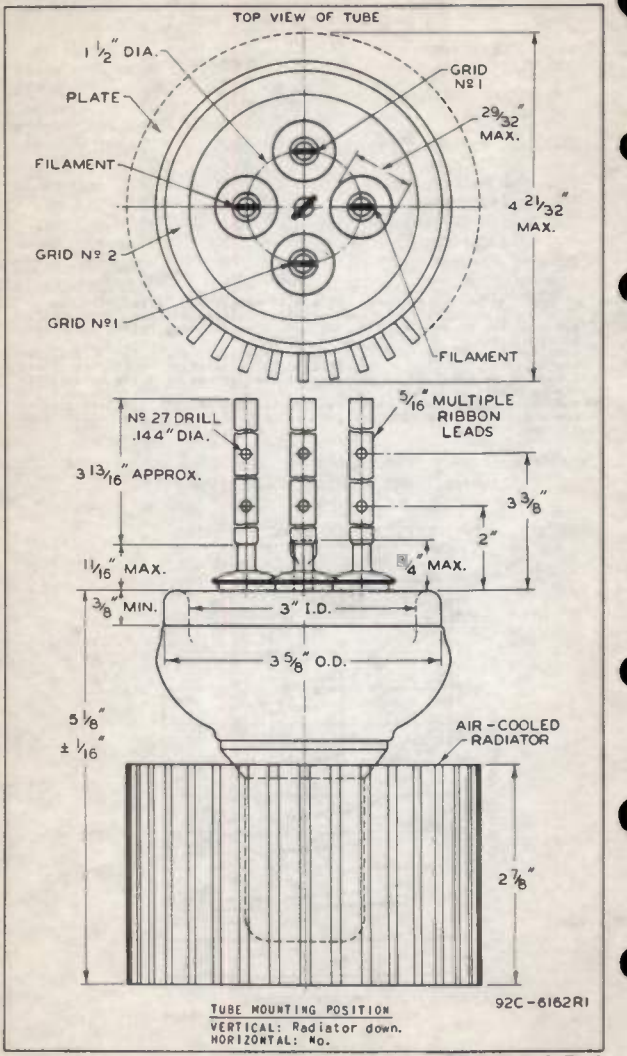
TYPICAL CHARACTERISTICS



827-R

827-R

TRANSMITTING BEAM POWER AMPLIFIER



TUBE MOUNTING POSITION

VERTICAL: Radiator down.
HORIZONTAL: No.

MARCH 15, 1941

TENTATIVE DATA 2

RCA RADIOTRON DIVISION
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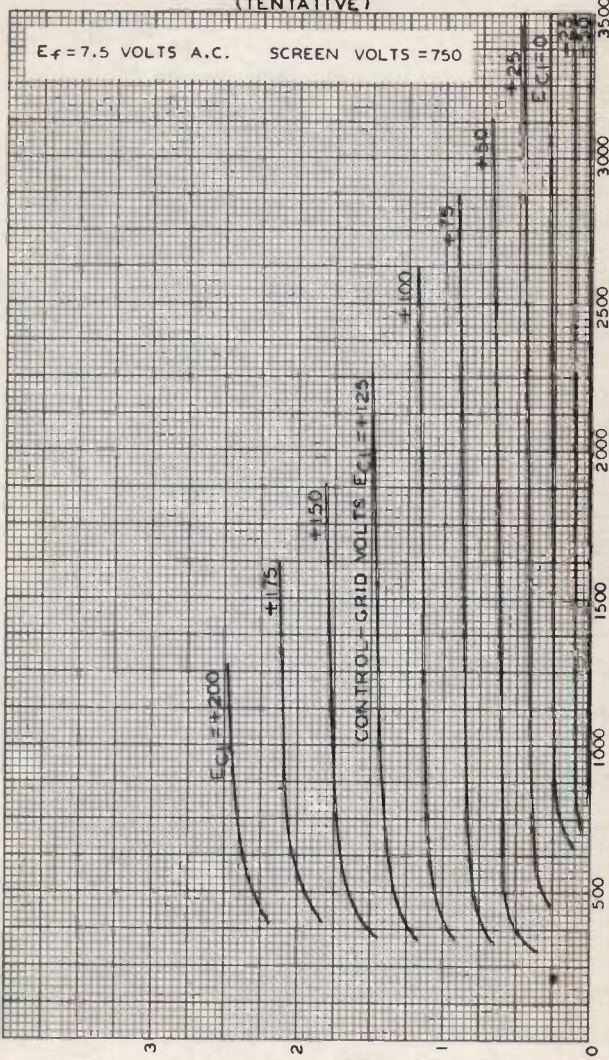
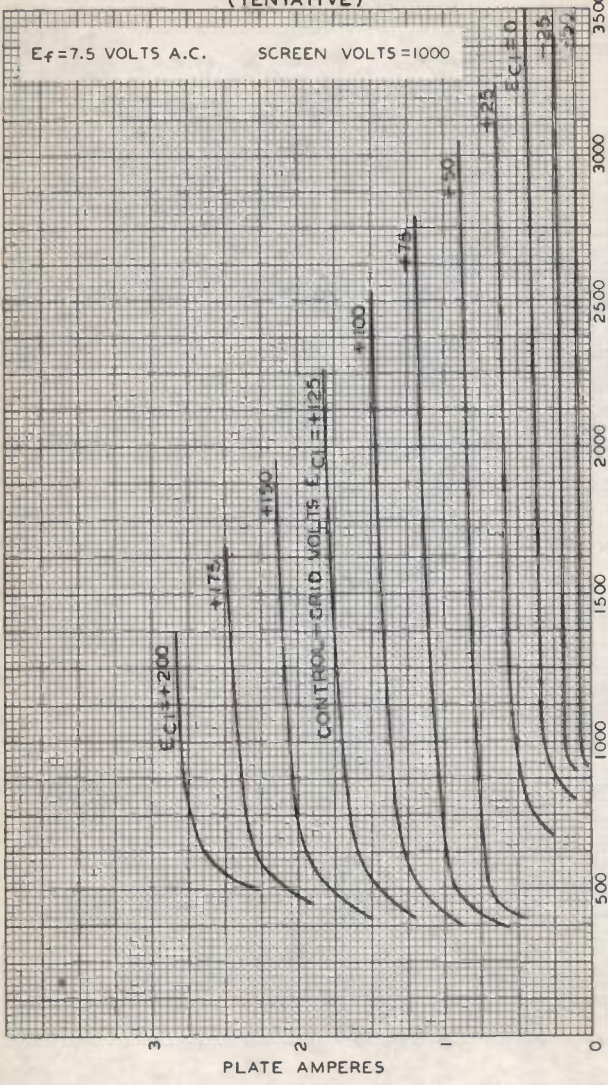
827-R
AVERAGE PLATE CHARACTERISTICS
(TENTATIVE)



827-R

827-R
AVERAGE PLATE CHARACTERISTICS
(TENTATIVE)



JUNE 5,1940 RCA RADIOTRON DIVISION RCA MANUFACTURING COMPANY, INC. 92C—6166

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TRANSMITTING BEAM POWER AMPLIFIER

GENERAL DATA

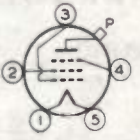
Electrical:

Filament, Thoriated Tungsten:		
Voltage	10 ± 0.5	ac or dc volts
Current	3.25	amp
Transconductance (Approx.) for plate current of 83 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.

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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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

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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.

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.

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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 475 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.

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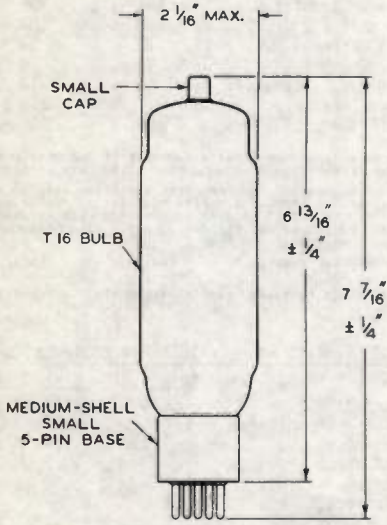
TRANSMITTING BEAM POWER AMPLIFIER

- 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

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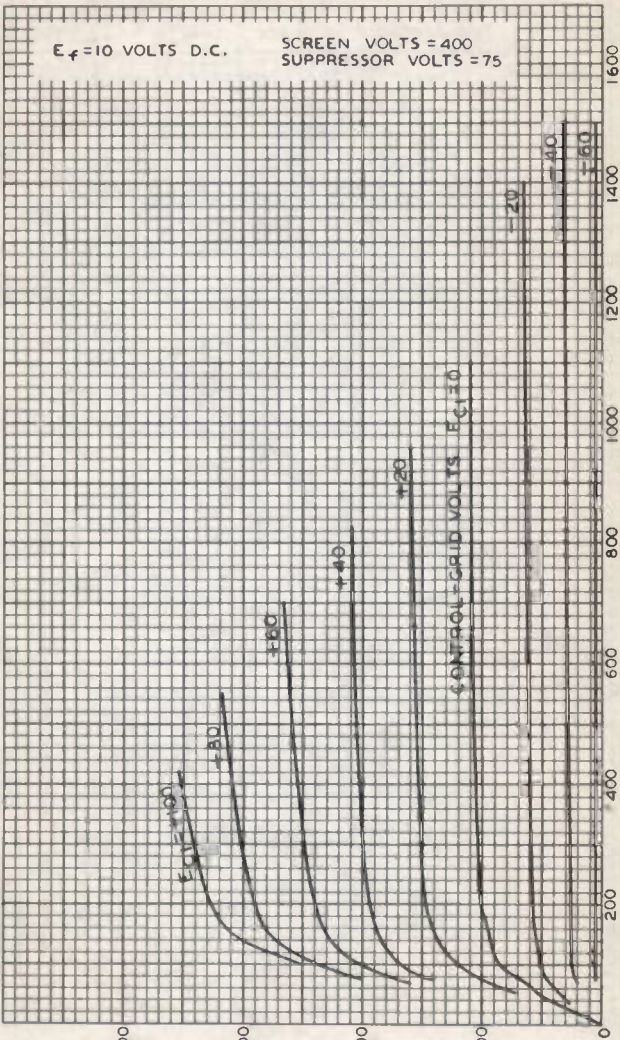
AVERAGE PLATE CHARACTERISTICS



SEPT. 28, 1939

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

92C—6080

828

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AVERAGE PLATE CHARACTERISTICS

SEPT. 14, 1939

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6081

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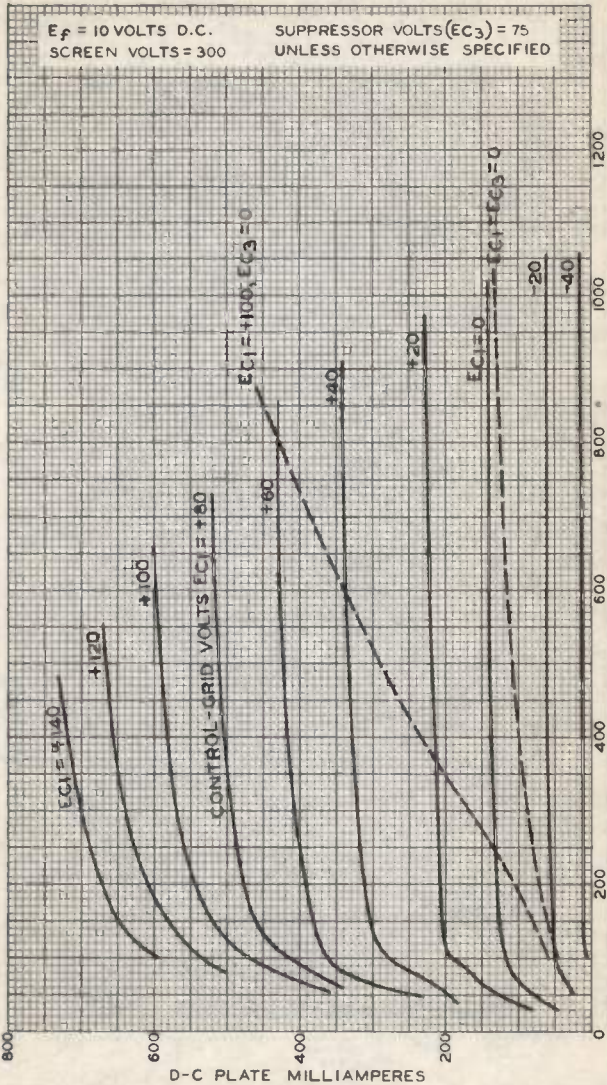
AVERAGE PLATE CHARACTERISTICS



SEPT. 14, 1939

RCA RADIOTRON DIVISION
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92C-6082

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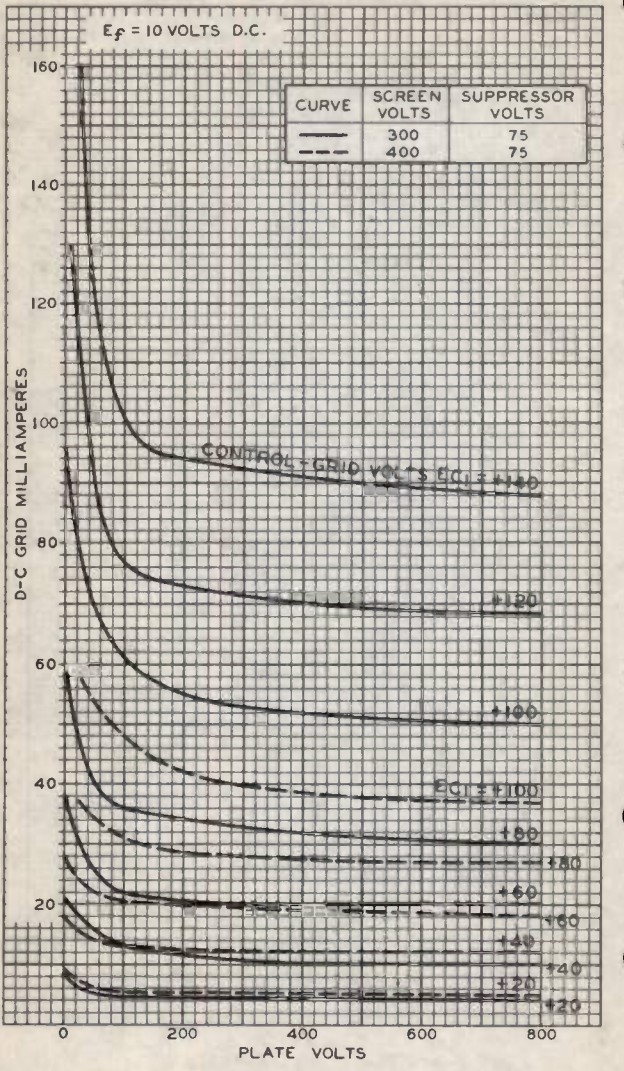
TYPICAL CHARACTERISTICS



Superseded by 829-B. Data to follow

829

PUSH-PULL R-F BEAM POWER AMPLIFIER

Unless otherwise specified, values are for both units

Heater	Coated Unipotential Cathodes▽		
Heater Arrangement	*Series*	*Parallel*	
Voltage †	12.6	6.3	a-c or d-c volts
Current	1.125	2.25	amp.
Transconductance, for plate current of 60 ma.	8500 approx.		μmhos
Grid-Screen Mu-Factor	7		
Direct Interelectrode Capacitances(each unit):			
Grid to Plate (with external shielding)	0.1 max.		μμf
Input	14.5		μμf
Output	7.0		μμf
Screen-Cathode Capacitance (including internal screen by-pass condenser)	65 approx.		μμf
Maximum Overall Length	4-5/16"		
Maximum Diameter	2-3/8"		
Bulb	T-16		
RCA Sockets: UT-106, recommended for freq. below 60 Mc	Stock No. 9934		
RCA Sockets: UT-107, recommended for freq. above 60 Mc	Stock No. 9935		
Cooling	Forced Air○		

▽ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should not exceed 100 volts.

† Should not deviate more than ± 10% from rated value.

○ Forced-air cooling is not required for the 829 in intermittent service where the "on" period of plate power application is ordinarily not more than 5 minutes, and where the "off" period is not less than the "on" period.

Maximum Ratings Are Absolute Values

MAXIMUM CCS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

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	
D-C Plate Voltage	500 max.	volts
D-C Screen Voltage (Grid #2)	225 max.	volts
D-C Grid Voltage (Grid #1)	-175 max.	volts
D-C Plate Current	120 max.	ma.
Plate Input	60 max.	watts
Screen Input	6 max.	watts
Plate Dissipation	40 max.	watts
Typical Operation (with modulation factor of 0.7):		
D-C Plate Voltage	500	volts
D-C Screen Voltage	200	volts
D-C Grid Voltage △ *	-38	volts
Peak R-F Grid-to-Grid Voltage	82	volts
Peak A-F Grid Voltage	17	volts
D-C Plate Current	120	ma.
D-C Screen Current	10	ma.
D-C Grid Current	2 approx.	ma.

* Preferably obtained from a fixed supply; or may also be obtained from an unby-passed (for audio frequencies) cathode resistor.

△ See next page.

← Indicates a change.

829

PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

	CCS	
Driving Power ◇ ○	0.5 approx.	watt
Power Output	23 approx.	watts

◇ Peak value of audio power generally never more than 0.15 watt.
○ At crest of a-f cycle with modulation factor specified.

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	
D-C Plate Voltage	425 max.	volts
D-C Screen Voltage (Grid #2)	225 max.	volts
D-C Grid Voltage (Grid #1)	-175 max.	volts
D-C Plate Current	212 max.	ma.
D-C Grid Current	15 max.	ma.
Plate Input	90 max.	watts
Screen Input	7 max.	watts
Plate Dissipation	28 max.	watts
Typical Operation:		
D-C Plate Voltage	425	volts
D-C Screen Voltage □	200	volts
	5400	ohms
D-C Grid Voltage § △	-60	volts
	5500	ohms
Peak R-F Grid-to-Grid Voltage	154	volts
D-C Plate Current	212	ma.
D-C Screen Current	35	ma.
D-C Grid Current	11 approx.	ma.
Driving Power	0.8 approx.	watt
Power Output	63 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 (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	
D-C Plate Voltage	500 max.	volts
D-C Screen Voltage (Grid #2)	225 max.	volts
D-C Grid Voltage (Grid #1)	-175 max.	volts
D-C Plate Current	240 max.	ma.
D-C Grid Current	15 max.	ma.
Plate Input	120 max.	watts
Screen Input	7 max.	watts
Plate Dissipation	40 max.	watts
Typical Operation:		
D-C Plate Voltage	500	volts
D-C Screen Voltage ▲	200	volts
	9300	ohms

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.

829

PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

	CCS	
D-C Grid Voltage ■ △	-45	volts
	160	ohms
	3750	ohms
Peak R-F Grid-to-Grid Voltage	124	volts
D-C Plate Current	240	ma.
D-C Screen Current	32	ma.
D-C Grid Current	12 approx.	ma.
Driving Power	0.7 approx.	watt
Power Output	83 approx.	watts

△ 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.

▲ 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 (3750), or cathode resistor (160).

Socket Connections, Mounting Position, Circuit, Outline and Curves for the 829 are the same as those shown for the 829-A. Shielding and by-pass considerations for the 829 are the same as those given under Type 832-A.

Data on operating frequencies for the 829 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

→ Indicates a change.

Withdrawn at request of Services

829-A

829-A

PUSH-PULL R-F BEAM POWER AMPLIFIER

Unless otherwise specified, values are for both units

Heater	Coated Unipotential Cathodes▽		
Heater Arrangement	*Series*	*Parallel*	
Voltage †	12.6	6.3	a-c or d-c volts
Current	1.125	2.25	amp.
Transconductance, for plate current of 60 ma.	8500 approx.		μmhos
Grid-Screen Mu-Factor	7		
Direct Interelectrode Capacitances (each unit):			
Grid-Plate		0.1 max.	μμf
Input		14.5	μμf
Output		7.0	μμf
Screen-Cathode Capacitance (Including internal screen by-pass condenser)		65 approx.	μμf
Maximum Overall Length			4-5/16"
Maximum Diameter			2-3/8"
Bulb			T-16
RCA Sockets: UT-106, recommended for freq. below 60 Mc			Stock No. 9934
RCA Sockets: UT-107, recommended for freq. above 60 Mc			Stock No. 9935
Cooling			Forced Air○

▽ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should not exceed 100 volts.

† Should not deviate more than ± 10% from rated value.

○ Forced-air cooling is not required for the 829-A in intermittent service where the "on" period of plate power application is ordinarily not more than 5 minutes, and where the "off" period is not less than the "on" period.

Maximum Ratings Are Absolute Values

MAXIMUM CCS RATINGS
with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

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	
D-C Plate Voltage	750 max.	volts
D-C Screen Voltage (Grid #2)	225 max.	volts
D-C Grid Voltage (Grid #1)	-175 max.	volts
D-C Plate Current	120 max.	ma.
Plate Input	60 max.	watts
Screen Input	6 max.	watts
Plate Dissipation	40 max.	watts

Typical Operation (with modulation factor of 0.7):

D-C Plate Voltage	500	750	volts
D-C Screen Voltage	200	200	volts
D-C Grid Voltage △*	-38	-55	volts
Peak R-F Grid-to-Grid Volt.	82	104	volts
Peak A-F Grid Voltage	17	15	volts
D-C Plate Current	120	80	ma.
D-C Screen Current	10	5	ma.
D-C Grid Current	2	0 approx.	ma.

*. Preferably obtained from a fixed supply; or may also be obtained from an unby-passed (for audio frequencies) cathode resistor.

△ See next page.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

829-A

PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

Driving Power ◊ o	0.5	0.7 approx.	watt
Power Output	23	24 approx.	watts

◊ Peak value of audio power generally never more than 0.15 watt.
o At crest of a-f cycle with modulation factor specified.

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	
D-C Plate Voltage		600 max.	volts
D-C Screen Voltage (Grid #2)		225 max.	volts
D-C Grid Voltage (Grid #1)		-175 max.	volts
D-C Plate Current		212 max.	ma.
D-C Grid Current		15 max.	ma.
Plate Input		90 max.	watts
Screen Input		7 max.	watts
Plate Dissipation		28 max.	watts
Typical Operation:			
D-C Plate Voltage	425	600	volts
D-C Screen Voltage □	200	200	volts
	6400	13300	ohms
D-C Grid Voltage § ^	-60	-70	volts
	5500	5800	ohms
Peak R-F Grid-to-Grid Volt.	154	172	volts
D-C Plate Current	212	150	ma.
D-C Screen Current	35	30	ma.
D-C Grid Current	11	12 approx.	ma.
Driving Power	0.8	0.9 approx.	watt
Power Output	63	70 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 (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	
D-C Plate Voltage		750 max.	volts
D-C Screen Voltage (Grid #2)		225 max.	volts
D-C Grid Voltage (Grid #1)		-175 max.	volts
D-C Plate Current		240 max.	ma.
D-C Grid Current		15 max.	ma.
Plate Input		120 max.	watts
Screen Input		7 max.	watts
Plate Dissipation		40 max.	watts
Typical Operation:			
D-C Plate Voltage	500	750	volts
D-C Screen Voltage ▲	200	200	volts
	9300	18300	ohms
D-C Grid Voltage ■ ^	-45	-55	volts
	3750	4600	ohms
	160	270	ohms

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.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

829-A

PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

Peak R-F Grid-to-Grid Volt.	124	140	volts
D-C Plate Current	240	160	ma.
D-C Screen Current	32	30	ma.
D-C Grid Current	12	12 approx.	ma.
Driving Power	0.7	0.8 approx.	watt
Power Output	83	87 approx.	watts

△ 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.

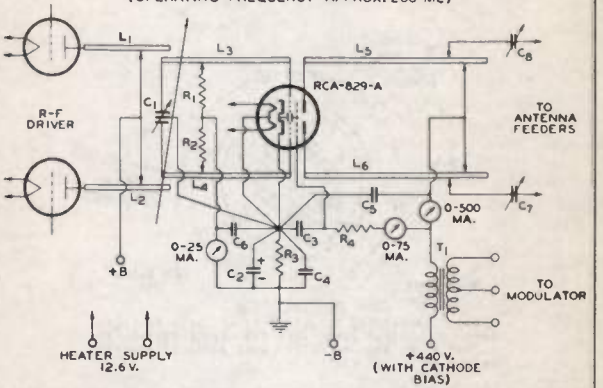
▲ Obtained from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown. The screen voltage must not exceed 600 volts under key-up conditions.

■ Obtained from a fixed supply, by grid resistor (3750, 4600), or cathode resistor (160, 270).

Data on operating frequencies for the 829-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

ULTRA-HIGH-FREQUENCY 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 = 1/8" 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.

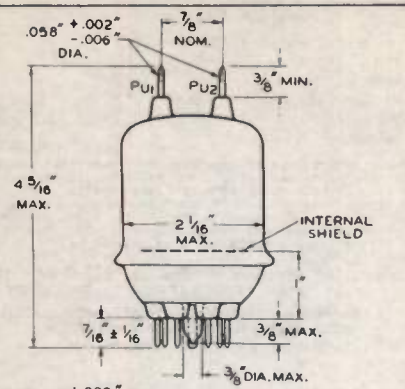
NOTE 2: GRID RESISTORS SHOULD BE ADJUSTED ON L_3L_4 AT VOLTAGE NODE.

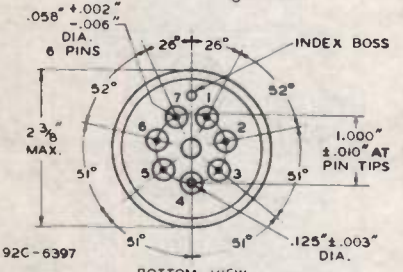
The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

Shielding and by-passing considerations for the 829-A are the same as those given under Type 832-A.

829-A

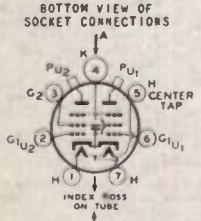
PUSH-PULL R-F BEAM POWER AMPLIFIER





BOTTOM VIEW

ANGULAR VARIATIONS BETWEEN PINS ARE HELD TO TOLERANCES SUCH THAT PINS WILL FIT GAUGE HAVING SIX 0.080" HOLES AND ONE 0.185" HOLE ARRANGED AT EXACT ANGLES ON 1.000" CIRCLE



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

Pin 1 – Heater
Pin 2 – Grid No.1 of Unit No.2
Pin 3 – Screen
Pin 4 – Cathode
Pin 5 – Heater Center Tap
Pin 6 – Grid No.1 of Unit No.1
Pin 7 – Heater
P_{U1} & P_{U2} – Plate Terminals of Units No.1 and No.2, respectively

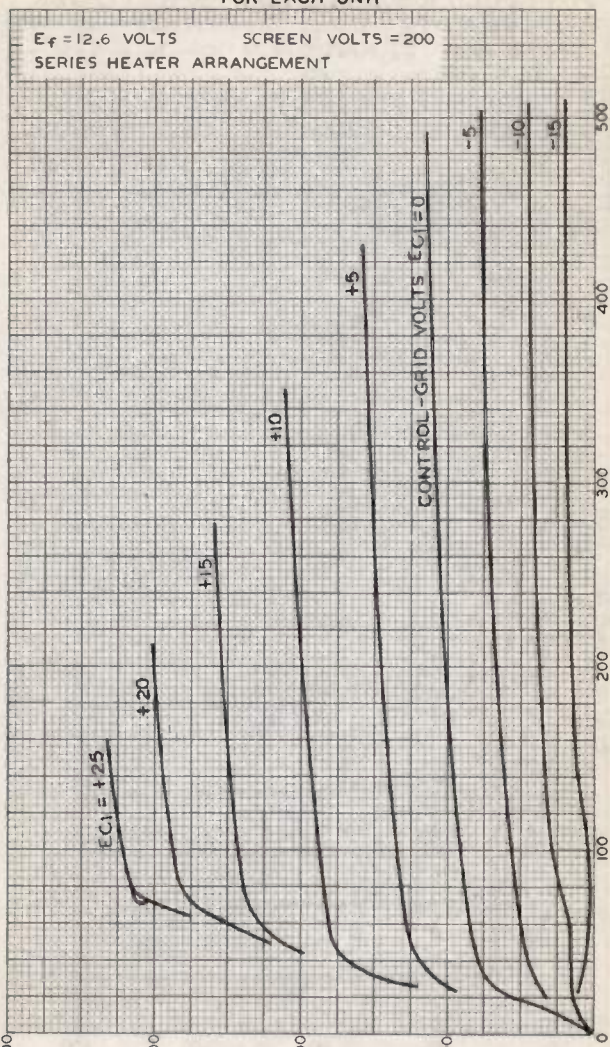
TUBE MOUNTING POSITION

VERTICAL: Plate terminals up or down.
HORIZONTAL: Plane of each plate vertical (on edge).

CONNECTIONS should never be soldered to the tube terminals.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

829-A
AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



AUG. 13, 1942

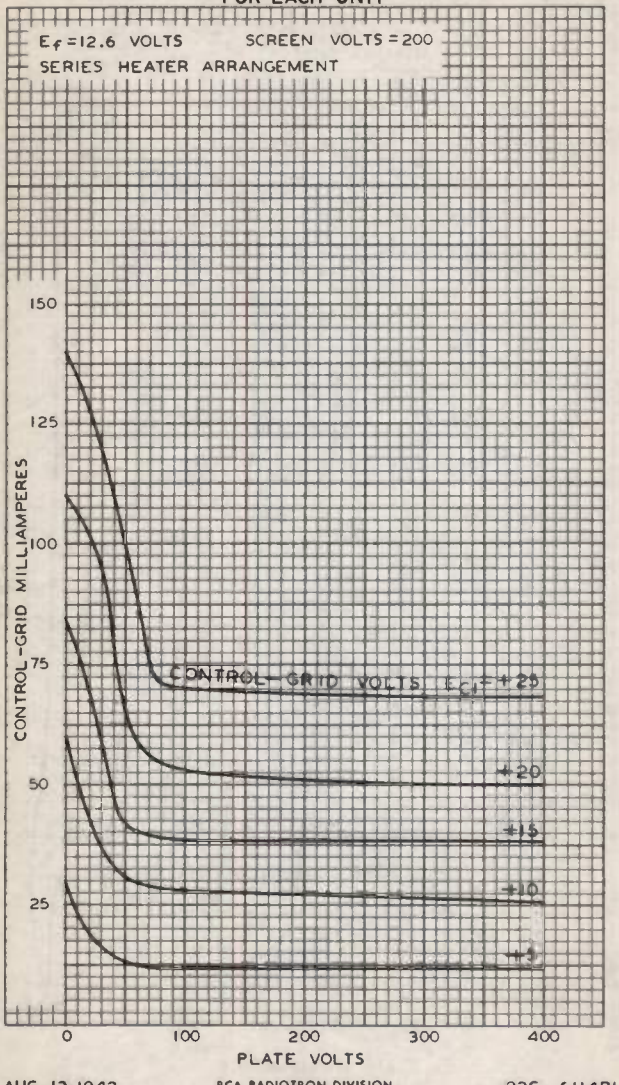
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6112R1

829-A

829-A

TYPICAL CHARACTERISTICS
FOR EACH UNIT



AUG. 13, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6114RI

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 A^A.

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.

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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.

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

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.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

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

829-B
PUSH-PULL RF BEAM POWER AMPLIFIER

SHIELDING and BYPASSING

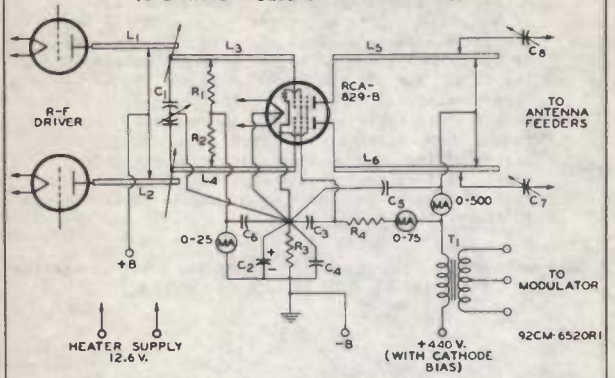
Shielding of the 829-B in an rf amplifier is required for stable operation. A convenient method of shielding is to mount the tube with one end through a hole in a metal plate so that the edge of the hole is close to the internal shield of the tube. Due to the importance, at the very-high frequencies, 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.

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.

830-B

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)

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.

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830-B
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

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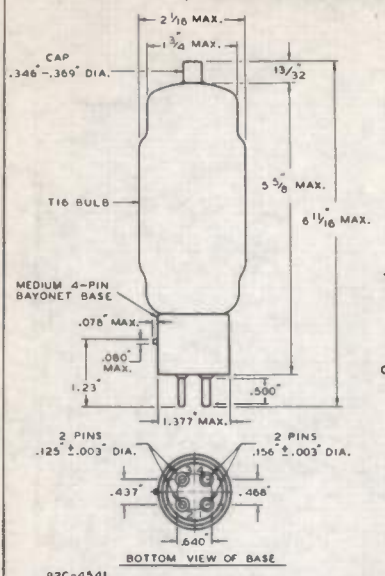
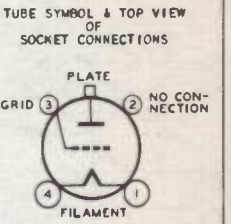
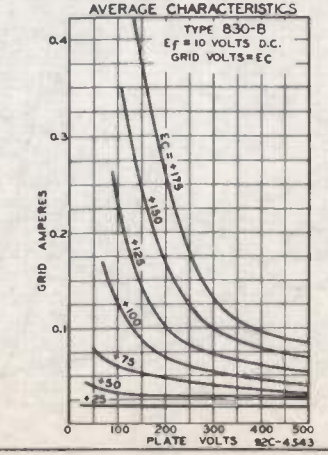
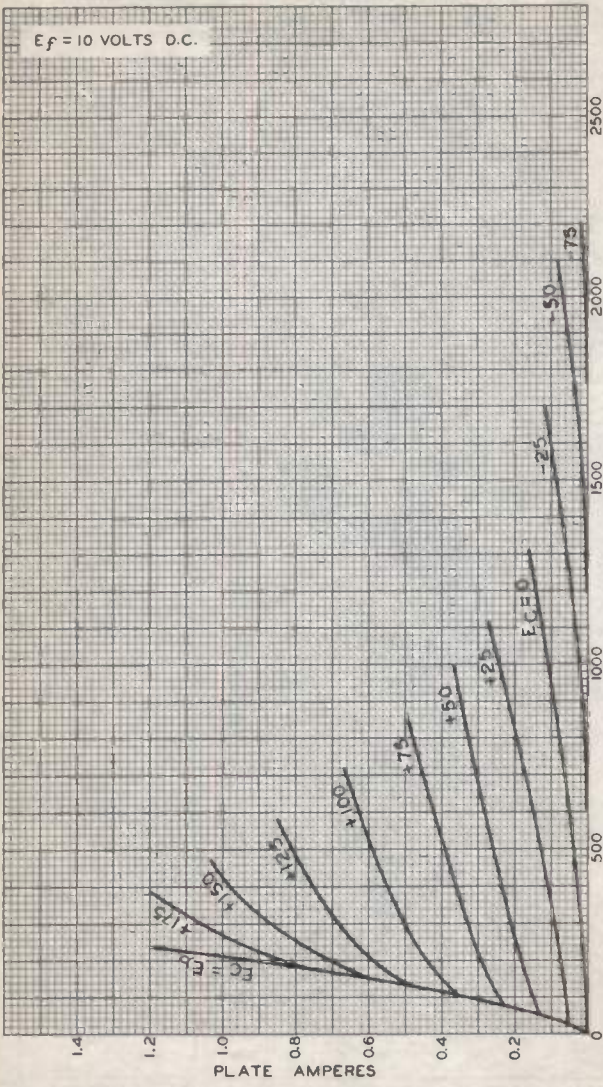






830-B

AVERAGE PLATE CHARACTERISTICS



RADIO MANUFACTURING COMPANY INC

831

OSCILLATOR, R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	11	a-c or d-c volts
Current	10	amp.
Amplification Factor	14.5	
Direct Interelectrode Capacitances:		
Grid to Plate	4.0	μμf
Grid to Filament	3.8	μμf
Plate to Filament	1.4	μμf
Overall Length		17-3/32" ± 1/8"
Maximum Radius		6-5/8"
Bulb		GT-56 with arm
Cap		No.3909
Base		No.3503

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

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		3500 max.	volts
D-C Plate Current		250 max.	ma.
Plate Input		600 max.	watts
Plate Dissipation		400 max.	watts
Typical Operation:			
Filament Voltage	11	11	a-c volts
D-C Plate Voltage	3000	3500	volts
D-C Grid Voltage	-185	-220	volts
D-C Plate Current	167	146	ma.
Power Output	150	160 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		3000 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
Plate Dissipation		270 max.	watts
Typical Operation:			
Filament Voltage	11	11	a-c volts
D-C Plate Voltage	2500	3000	volts
D-C Grid Voltage	-400	-500	volts
D-C Plate Current	225	200	ma.
D-C Grid Current *	70	60 approx.	ma.
Driving Power *	50	50 approx.	watts
Power Output	320	360 approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage	3500 max.	volts
D-C Grid Voltage	-1000 max.	volts ←

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.

831

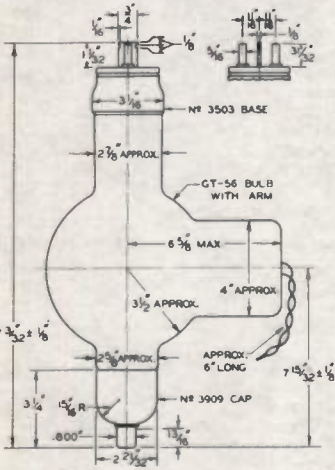
OSCILLATOR, R-F POWER AMPLIFIER

(continued from preceding page)

D-C Plate Current			350 max.	ma.
D-C Grid Current			75 max.	ma.
Plate Input			1200 max.	watts
Plate Dissipation			400 max.	watts
Typical Operation:				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	2000	3000	3500	volts
D-C Grid Voltage	-200	-300	-400	volts
D-C Plate Current	300	300	275	ma.
D-C Grid Current *	45	40	40	approx. ma.
Driving Power *	25	25	30	approx. watts
Power Output	325	540	590	approx. watts

* Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

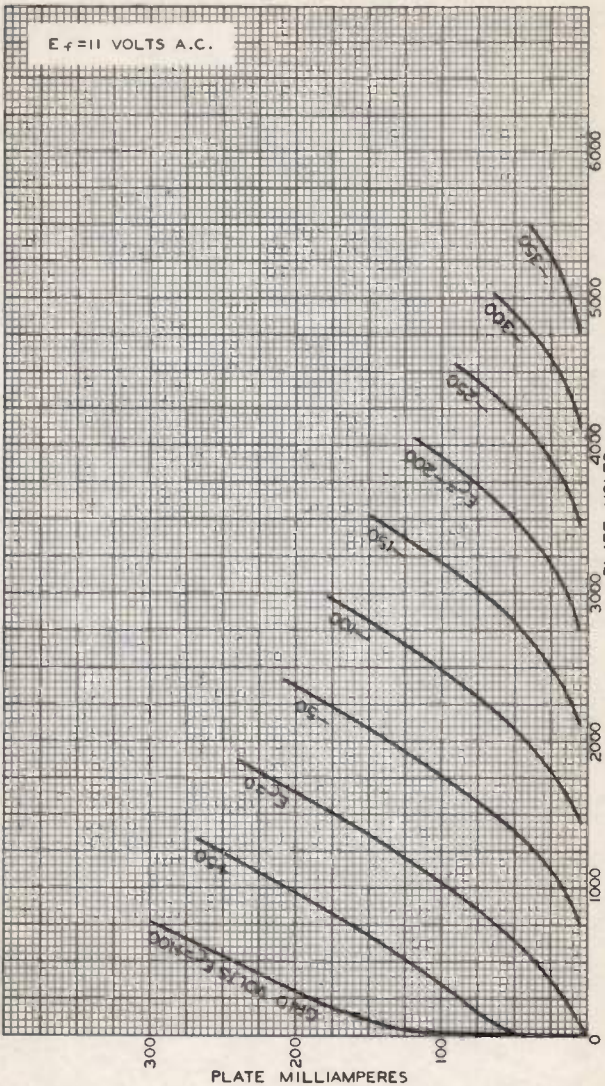
For use of the 831 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.



TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS

831

AVERAGE PLATE CHARACTERISTICS



SEPT. 1, 1932

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925-5492

RCA

832

PUSH-PULL R-F BEAM POWER AMPLIFIER

Unless otherwise specified, values are for both units

Heater	Coated Unipotential Cathodes ▽		
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 30 ma.	3500 approx.		μmhos
Grid-Screen Mu-Factor	7		

Direct Interelectrode Capacitances (each unit):		
Grid-Plate (with external shielding)	0.05 max.	μμf
Input	7.5	μμf
Output	3.8	μμf
Screen-Cathode Capacitance (Including internal screen by-pass condenser)	65 approx.	μμf
Maximum Overall Length	3-7/16"	
Maximum Diameter	2-3/8"	
Bulb	T-16	
RCA UT-106, recommended for freq. below 60 Mc	Stock No.9934	
Sockets UT-107, recommended for freq. above 60 Mc	Stock No.9935	

▽ In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts.
† Should not deviate more than ± 10% from rated value.

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

Maximum Ratings Are Absolute Values

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

D-C Plate Voltage	500 max.	volts
D-C Screen Voltage (Grid #2)	250 max.	volts
D-C Grid Voltage (Grid #1)	-100 max.	volts
D-C Plate Current	55 max.	ma.
Plate Input	22 max.	watts
Screen Input	3.4 max.	watts
Plate Dissipation	15 max.	watts

Typical Operation:

with modulation factor of:	0.7	0.8	
D-C Plate Voltage	400	500	volts
D-C Screen Voltage * △	250	200	volts
D-C Grid Voltage * △	-60	-55	volts
Peak R-F Grid-to-Grid Volt.	110	100	volts
Peak A-F Grid Voltage	1%	1%	volts
D-C Plate Current	55	55	ma.
D-C Screen Current	6	3	ma.
D-C Grid Current	0	0	approx. ma.
Driving Power ○	0.1	0.1	approx. watt
Power Output	7.6	8.0	approx. watts

* Preferably obtained from a fixed supply; or may also be obtained from an unby-passed (for audio frequencies) cathode resistor.
○ At crest of a-f cycle with modulation factor specified.

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

D-C Plate Voltage	425 max.	volts
D-C Screen Voltage (Grid #2)	250 max.	volts
D-C Grid Voltage (Grid #1)	-100 max.	volts
D-C Plate Current	68 max.	ma.
D-C Grid Current	6 max.	ma.

△ See next page.
→ indicates a change.

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PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

Plate Input		22 max.	watts
Screen Input		3.4 max.	watts
Plate Dissipation		10 max.	watts
Typical Operation:			
D-C Plate Voltage	325	425	volts
D-C Screen Voltage □	210	200	volts
	7700	14000	ohms
D-C Grid Voltage § △	-50	-60	volts
	21000	25000	ohms
Peak R-F Grid-to-Grid Volt.	100	140	volts
D-C Plate Current	68	52	ma.
D-C Screen Current	15	16	ma.
D-C Grid Current	2.4	2.4	approx. ma.
Driving Power	0.11	0.15	approx. watt
Power Output	12	16	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 (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 #

D-C Plate Voltage		500 max.	volts
D-C Screen Voltage (Grid #2)		250 max.	volts
D-C Grid Voltage (Grid #1)		-100 max.	volts
D-C Plate Current		90 max.	ma.
D-C Grid Current		6 max.	ma.
Plate Input		36 max.	watts
Screen Input		5 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
D-C Plate Voltage	400	500	volts
D-C Screen Voltage ▲	250	200	volts
	8300	21000	ohms
D-C Grid Voltage ■ △	-60	-65	volts
	20000	25000	ohms
	540	730	ohms
Peak R-F Grid-to-Grid Volt.	124	150	volts
D-C Plate Current	90	72	ma.
D-C Screen Current	18	14	ma.
D-C Grid Current	3	2.6	approx. ma.
Driving Power	0.18	0.18	approx. watt
Power Output	22	26	approx. watts

△ 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 the value shown.

■ The screen voltage must not exceed 600 volts under key-up conditions. Obtained from a fixed supply, by grid resistor (20000, 25000), or cathode resistor (540, 730).

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

SOCKET CONNECTIONS, MOUNTING POSITION, CIRCUIT, AND CURVES FOR THE 832 ARE THE SAME AS THOSE FOR THE 832-A. THE OUTLINE FOR THE 832 IS LIKE THAT FOR THE 832-A EXCEPT THAT TUBE LENGTH IS 3-7/16" MAX., SEATED HEIGHT IS 3-1/16" MAX., AND PLATE LEAD LENGTH IS 3/8" MIN. SHIELDING AND BY-PASS CONSIDERATIONS FOR THE 832 ARE THE SAME AS THOSE GIVEN UNDER TYPE 832-A.

Data on operating frequencies for the 832 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

← indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

832-A

PUSH-PULL R-F BEAM POWER AMPLIFIER

Unless otherwise specified, values are for both units

Heater	Coated Unipotential Cathodes ▽		
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 30 ma.	3500 approx.		μmhos
Grid-Screen Mu-Factor	7		
Direct Interelectrode Capacitances (each unit):			
Grid-Plate (with external shielding)	0.05 max.		μμf
Input	7.5		μμf
Output	3.8		μμf
Screen-Cathode Capacitance (Including internal screen by-pass condenser)	65 approx.		μμf
Maximum Overall Length			3-5/16"
Maximum Diameter			2-3/8"
Bulb			T-16
RCA Socket { UT-106, recommended for freq. below 60 Mc			Stock No. 9934
RCA Socket { UT-107, recommended for freq. above 60 Mc			Stock No. 9935

▽ In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts.
† Should not deviate more than ± 10% from rated value.

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

Maximum Ratings Are Absolute Values

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

D-C Plate Voltage	750 max.	volts
D-C Screen Voltage (Grid #2)	250 max.	volts
D-C Grid Voltage (Grid #1)	-100 max.	volts
D-C Plate Current	55 max.	ma.
Plate Input	22 max.	watts
Screen Input	3.4 max.	watts
Plate Dissipation	15 max.	watts

Typical Operation:

With modulation factor of:	0.8	0.9	
D-C Plate Voltage	500	750	volts
D-C Screen Voltage	200	200	volts
D-C Grid Voltage △ *	-55	-60	volts
Peak R-F Grid-to-Grid Volt.	100	100	volts
Peak A-F Grid Voltage	14	16	volts
D-C Plate Current	44	29	ma.
D-C Screen Current	3.0	2.0	ma.
D-C Grid Current	0	0 approx.	ma.
Driving Power °	0.1	0.1 approx.	watt
Power Output	8.0	8.5 approx.	watts

* Preferably obtained from a fixed supply; or may also be obtained from an unby-passed (for audio frequencies) cathode resistor.
° At crest of a-f cycle with modulation factor specified.

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

D-C Plate Voltage	600 max.	volts
D-C Screen Voltage (Grid #2)	250 max.	volts

△ See next page.

832-A

PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

D-C Grid Voltage (Grid #1)		-100 max.	volts
D-C Plate Current		68 max.	ma.
D-C Grid Current		6 max.	ma.
Plate Input		22 max.	watts
Screen Input		3.4 max.	watts
Plate Dissipation		10 max.	watts
Typical Operation:			
D-C Plate Voltage	425	600	volts
D-C Screen Voltage □	200	200	volts
	14000	25000	ohms
D-C Grid Voltage § △	-60	-65	volts
	25000	25000	ohms
Peak R-F Grid-to-Grid Volt.	140	150	volts
D-C Plate Current	52	36	ma.
D-C Screen Current	16	16	ma.
D-C Grid Current	2.4	2.6 approx.	ma.
Driving Power	0.15	0.16 approx.	watt
Power Output	16	17 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 (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 ♦

D-C Plate Voltage		750 max.	volts
D-C Screen Voltage (Grid #2)		250 max.	volts
D-C Grid Voltage (Grid #1)		-100 max.	volts
D-C Plate Current		90 max.	ma.
D-C Grid Current		6 max.	ma.
Plate Input		36 max.	watts
Screen Input		5 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
D-C Plate Voltage	500	750	volts
D-C Screen Voltage▲	200	200	volts
	21000	37000	ohms
D-C Grid Voltage ■ △	-65	-65	volts
	25000	23000	ohms
	730	1000	ohms
Peak R-F Grid-to-Grid Volt.	150	150	volts
D-C Plate Current	72	48	ma.
D-C Screen Current	14	15	ma.
D-C Grid Current	2.6	2.8 approx.	ma.
Driving Power	0.18	0.19 approx.	watt
Power Output	26	26 approx.	watts

△ 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.
♦ 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 fixed supply, by grid resistor (25000, 23000), or cathode resistor (730, 1000).
▲ See next page.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

832-A

PUSH-PULL R-F BEAM POWER AMPLIFIER

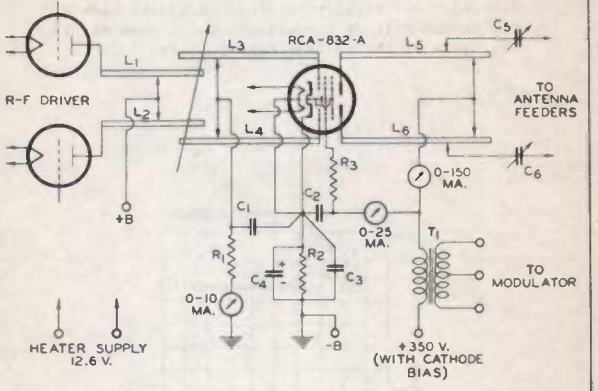
(continued from preceding page)

▲ 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.

Data on operating frequencies for the 832-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

ULTRA-HIGH-FREQUENCY PLATE-MODULATED PUSH-PULL R-F POWER AMPLIFIER

POWER OUTPUT 12 WATTS (APPROX.) AT 2 METERS



C_1, C_2, C_3 = 500 μμf
C_4 = 25 μf, 200 VOLTS
C_5, C_6 = 3 TO 35 μμf
R_1 = 10000 TO 20000 OHMS, 1 WATT
R_2 = 300 OHMS, 5 WATTS
R_3 = 7500 OHMS, 5 WATTS
L_1, L_2 = DIMENSIONS DEPENDENT ON TYPE OF DRIVER TUBE; APPROX. SAME AS L_5 L_6
L_3, L_4 = ¼" DIA. COPPER TUBING, APPROX. 10" LONG AND SPACED 1" BETWEEN CENTERS.
L_5, L_6 = ¼" DIA. COPPER TUBING, APPROX. 12" LONG AND SPACED 1" BETWEEN CENTERS.
T_1 = MODULATION TRANSFORMER

NOTE: ADJUST COUPLING OF L_1 L_2 AND L_3 L_4 FOR OPTIMUM GRID EXCITATION.

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

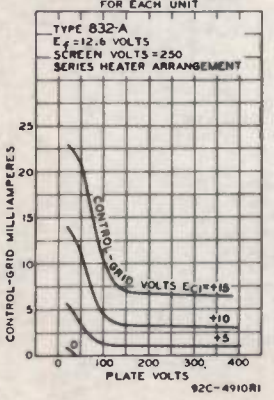
832-A
PUSH-PULL R-F BEAM POWER AMPLIFIER

(continued from preceding page)

SHIELDING and BY-PASSING

Shielding of the 832-A in an r-f 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, r-f by-passing must be accomplished close to the tube terminals. Ribbon leads acting as plates of the by-passing condensers are effective. All circuit returns should be made to the common cathode connection. R-f chokes may be advisable in the voltage-supply leads.

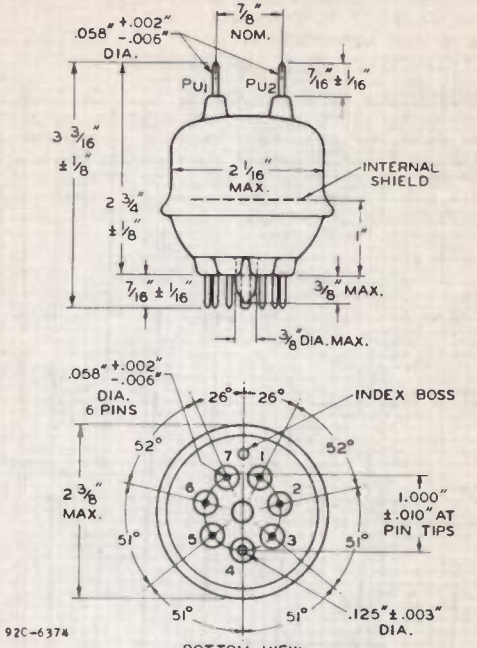
TYPICAL CHARACTERISTICS
FOR EACH UNIT



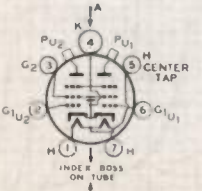
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

832-A

PUSH-PULL R-F BEAM POWER AMPLIFIER



ANGULAR VARIATIONS BETWEEN PINS ARE HELD TO TOLERANCES SUCH THAT PINS WILL FIT GAUGE HAVING SIX 0.080" HOLES AND ONE 0.145" HOLE ARRANGED AT EXACT ANGLES ON 1.000" CIRCLE



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

Pin 1 – Heater
Pin 2 – Grid No.1 of Unit No.2
Pin 3 – Screen
Pin 4 – Cathode
Pin 5 – Heater Center Tap
Pin 6 – Grid No.1 of Unit No.1
Pin 7 – Heater
Pins P_{U1} & P_{U2} – Plate Terminals of Units No.1 and No.2, respectively

TUBE MOUNTING POSITION

VERTICAL: Plate terminals up or down.
HORIZONTAL: Plane of each plate vertical (on edge).

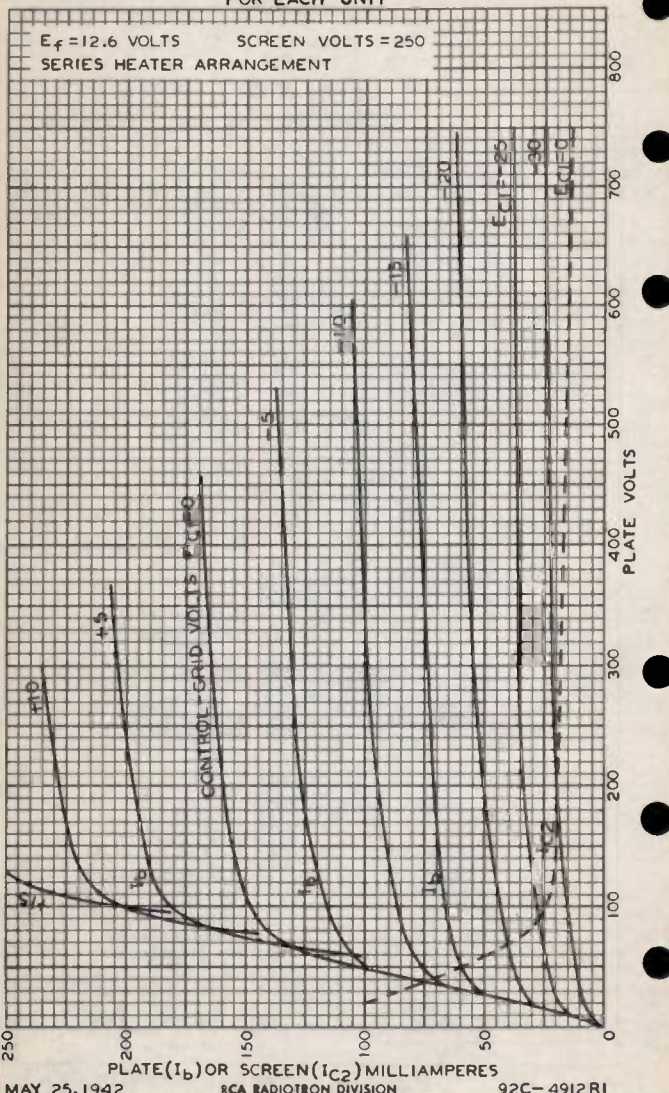
CONNECTIONS should never be soldered to the tube terminals.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

832-A

832-A

AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT



MAY 25, 1942 RCA RADIOTRON DIVISION RCA MANUFACTURING COMPANY, INC. 92C-4912R1

833-A
POWER TRIODE

GENERAL DATA

Electrical:

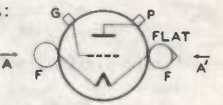
	Min.	Av.	Max.	
Filament, Thoriated Tungsten:				
Voltage (ac or dc)	9.5	10	10.5	volts
Current, with 10 volts on filament	9.4	10	10.6	amp
Amplification Factor, for grid voltage of -20 volts and plate current of 200 ma. . . .	31.5	35	38.5	
Direct Interelectrode Capacitances:				
Grid to Plate.	5.5	6.3	7.1	μμf
Grid to Filament	10.1	12.3	14.5	μμf
Plate to Filament.	6.4	8.5	10.6	μμf

Mechanical:

Terminal Connections:

F - Filament

G - Grid



P - Plate

AA'=PLANE OF ELECTRODES

Mounting Position. . . . . Vertical, with filament posts up or down; Horizontal, with plane of electrodes vertical (on edge)

Overall Length . . . . . 8-5/8" ± 3/16"

Maximum Diameter . . . . . 4-19/32"

Mounting Assembly . . . . . RCA Stock No.9928

Cooling: *Natural* or *Forced Air*, for which respective data are given under each class of service. *Natural Cooling* means that adequate free circulation of air around the tube is necessary. With *Forced Air*, 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.

AF POWER AMPLIFIER & MODULATOR - Class B

NATURAL COOLING

Maximum Ratings, *Absolute Values*:

	CCS•	ICAS••	
DC PLATE VOLTAGE	3000 max.	3300 max.	volts
MAX.-SIGNAL DC PLATE CUR.• .	500 max.	500 max.	ma
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

•, ••, •, #: See next page. ← Indicates a change.

833-A
POWER TRIODE

	CCS•	ICAS••	
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

Maximum Ratings, *Absolute Values*:

	CCS•	ICAS••	
DC PLATE VOLTAGE	4000 max.	4000 max.	volts
MAX.-SIGNAL DC PLATE CUR.*	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.

RF POWER AMPLIFIER - Class B 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	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

•, ••, #: See next page. → Indicates a change.

833-A
POWER TRIODE

	CCS●	ICAS●●	
DC Grid Current (Approx.)	2	2	ma
Driving Power (Approx.)▲	10	11	watts
Power Output (Approx.)	150	200	watts

FORCED-AIR COOLING

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
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

▲ At crest of audio-frequency cycle with modulation factor of 1.0.
\# 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

NATURAL COOLING

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
DC PLATE VOLTAGE	2500 max.	3000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	400 max.	400 max.	ma
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
	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

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

833-A
POWER TRIODE

FORCED-AIR COOLING

Maximum Ratings, *Absolute Values*:

	CCS[•]	*ICAS*[••]	
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
	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

[•] 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[□□]

NATURAL COOLING

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

	CCS[•]	*ICAS*[••]	
DC PLATE VOLTAGE	3000 max.	3300 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	1250 max.	1500 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts

→ **Typical Operation with Natural Cooling:**

DC Plate Voltage	3000	3000	3000	volts
DC Grid Voltage[▲▲]	-160	-200	-160	volts
	2300	3600	2300	ohms
	400	425	400	ohms
Peak RF Grid Voltage	310	360	310	volts
DC Plate Current	335	415	335	ma
DC Grid Current (Approx.)	70	55	70	ma
Driving Power (Approx.)	20	20	20	watts
Power Output (Approx.)	800	1000	800	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.

→ Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

833-A
POWER TRIODE

FORCED-AIR COOLING

Maximum Ratings, *Absolute Values*:

	CCS●	ICAS●●	
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
	2650	2400	ohms
	380	380	ohms
Peak RF Grid Voltage	375	415	volts
DC Plate Current	450	500	ma
DC Grid Current (Approx.)	75	95	ma
Driving Power (Approx.)	26	35	watts
Power Output (Approx.)	1440	1600	watts

CHARACTERISTICS RANGE VALUES

Filament Volts, 10

	Min.	Av.	Max.	
Grid Current■	160	270	380	ma
Plate Current■	490	650	810	ma
Plate Current■■	60	100	140	ma
Power Output▲	1150	–	–	watts

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

▲▲ Obtained from fixed supply, by grid resistor (2300, 3600, 2300, 2650, 2400) or by cathode resistor (400, 425, 400, 380, 380).

■ With dc plate voltage of 100 volts and dc grid voltage of +100 volts.

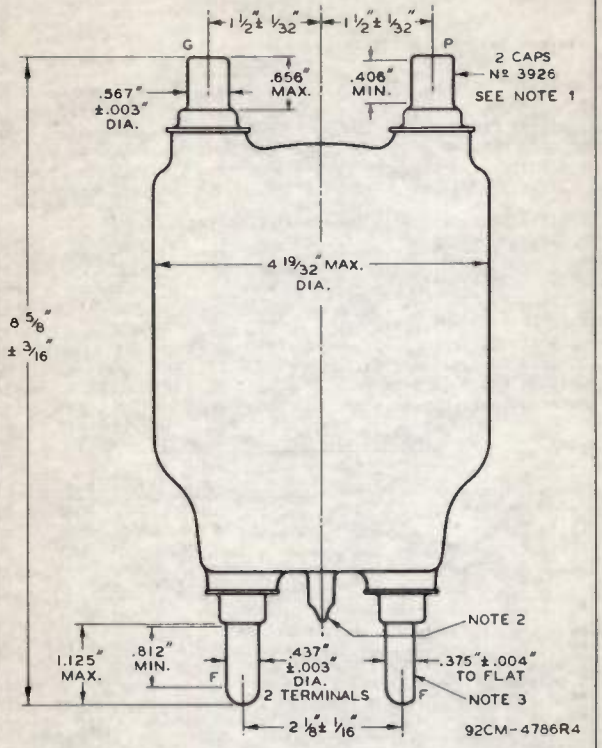
■■ With dc plate voltage of 2500 volts and dc grid voltage of -50 volts.

▲ With dc plate voltage of 4000 volts, plate current of 450 ma., grid current of 80 to 120 ma., grid resistor of 5000 ohms, and frequency of 15 MC.

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.

Data on operating frequencies for the 833-A are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

833-A
POWER TRIODE



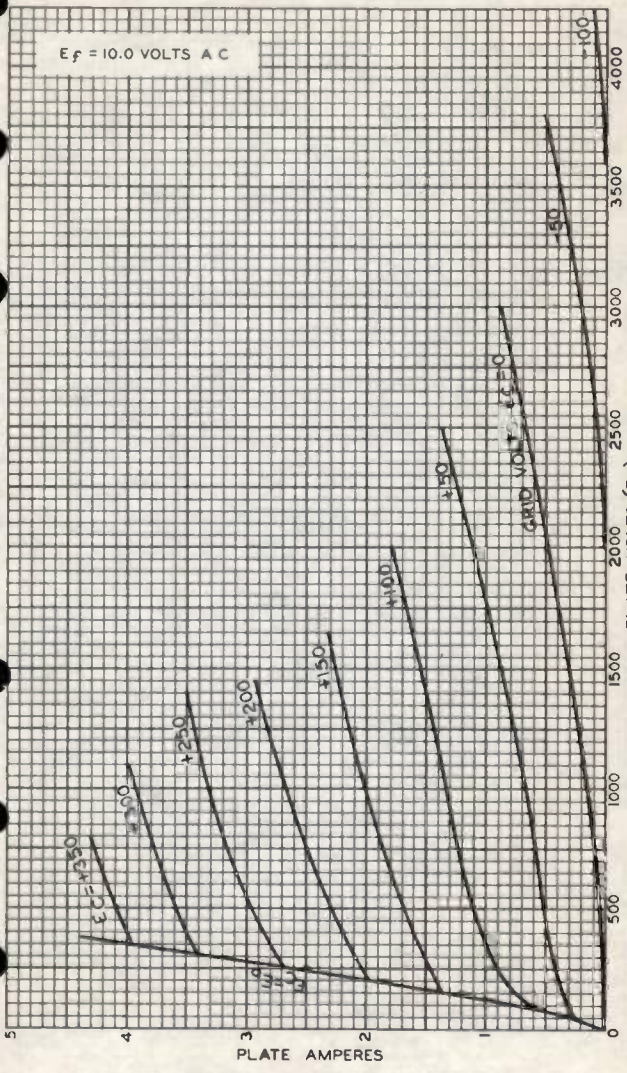
NOTE 1: THE ANGLE FORMED ON A PLANE NORMAL TO THE TUBE AXIS BY THE INTERSECTION OF THE PLANE DETERMINED BY THE AXES OF THE FILAMENT TERMINALS WITH THE PLANE DETERMINED BY THE AXES OF THE GRID AND PLATE CAPS IS NOT MORE THAN 5°.

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.

833-A

AVERAGE PLATE CHARACTERISTICS

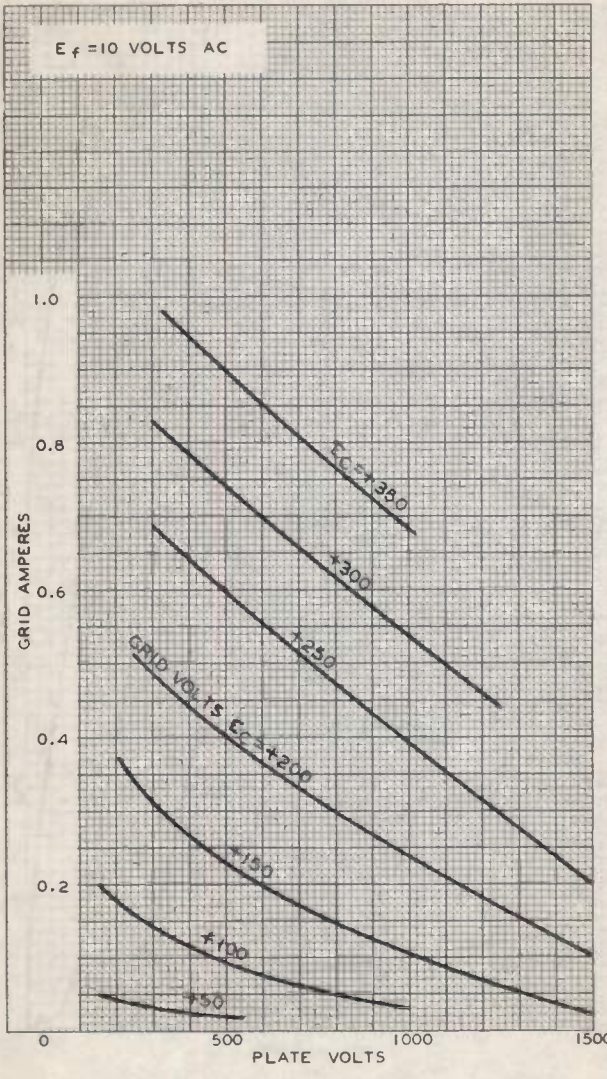


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

833-A

TYPICAL CHARACTERISTICS



RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

834

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 ° **	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	ohms
		-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.
° At crest of a-f cycle with modulation factor of 1.0.
**, #: See next page.

← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

834

R-F POWER AMPLIFIER

(continued from preceding page)

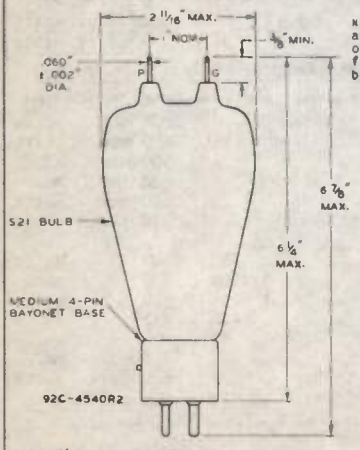
R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

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.

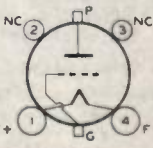


NOTE: Connections to tips P and G should be made by means of radiating connectors to which flexible circuit leads should be clamped.

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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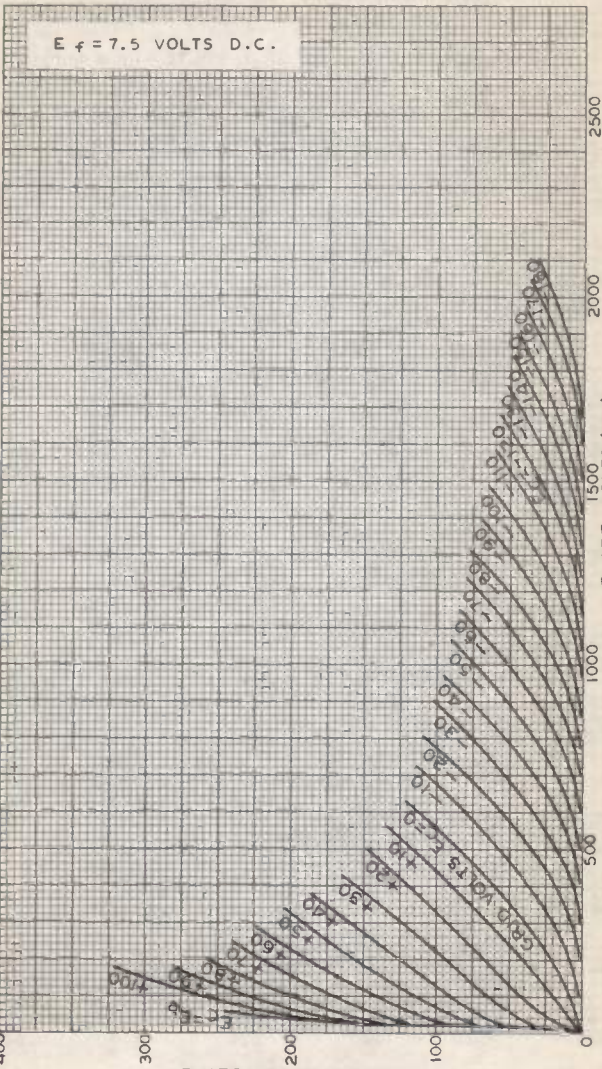
RCA MANUFACTURING COMPANY, INC

RCA

834

AVERAGE PLATE CHARACTERISTICS



JAN. 21, 1936

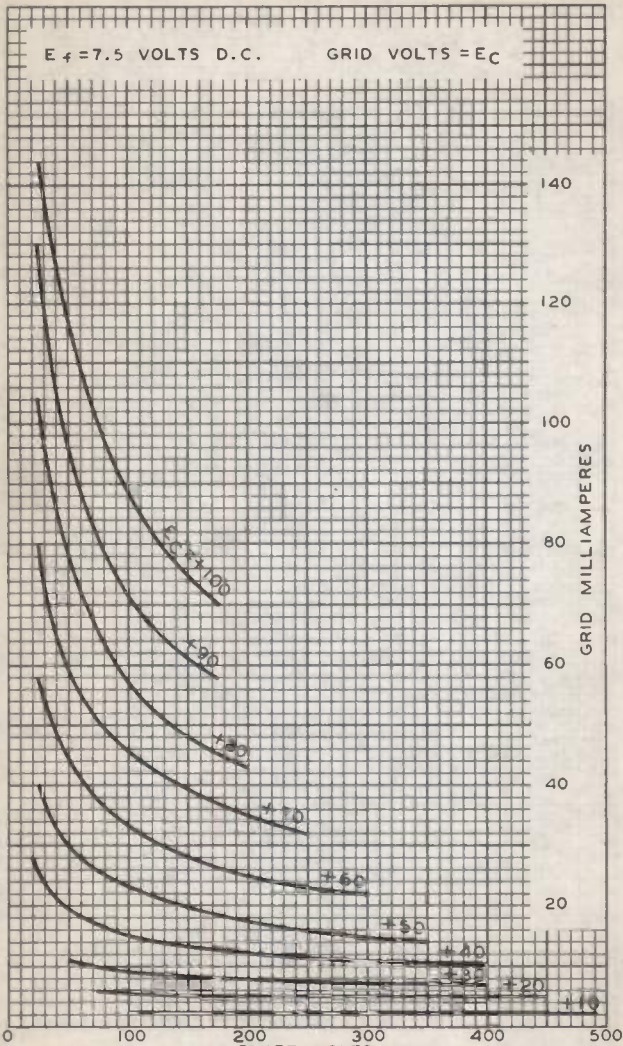
RCA RADIOTRON DIVISION

92C-4544

RCA

834

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.

FOR REVIEW

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.

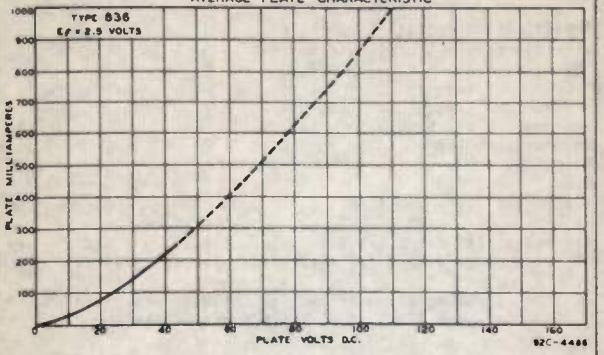
The 836 has two separate cathodes each of which is connected to its respective heater. Plate circuit return should be made to the center-tap of the heater transformer.

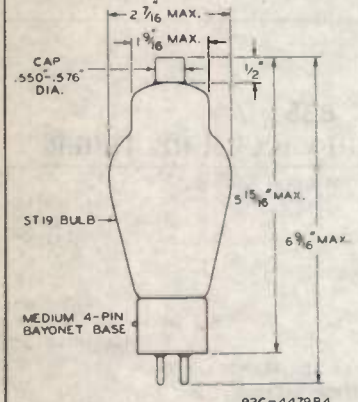
→ Indicates a change.

836

HALF-WAVE HIGH-VACUUM RECTIFIER

AVERAGE PLATE CHARACTERISTIC

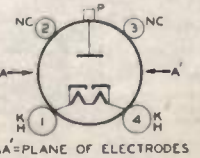




TUBE MOUNTING POSITION

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.

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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.

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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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RCA MANUFACTURING COMPANY INC

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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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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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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.

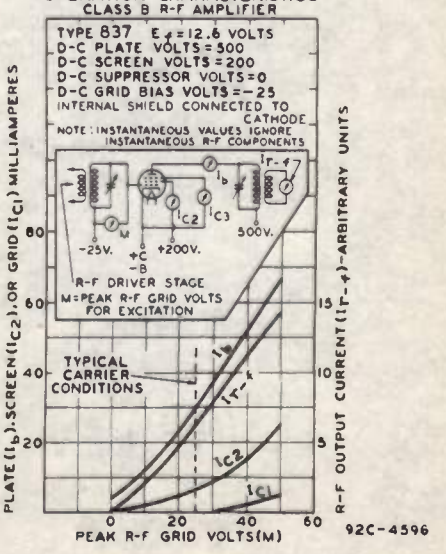
§ Maximum total effective grid circuit resistance should not exceed 25000 ohms.

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



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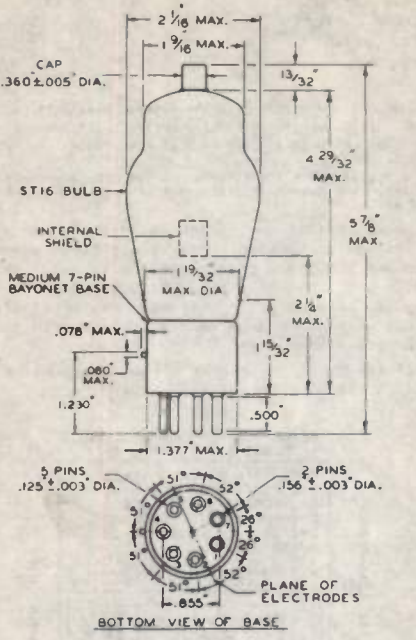
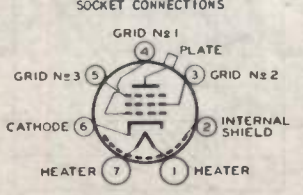
R-F POWER AMPLIFIER PENTODE



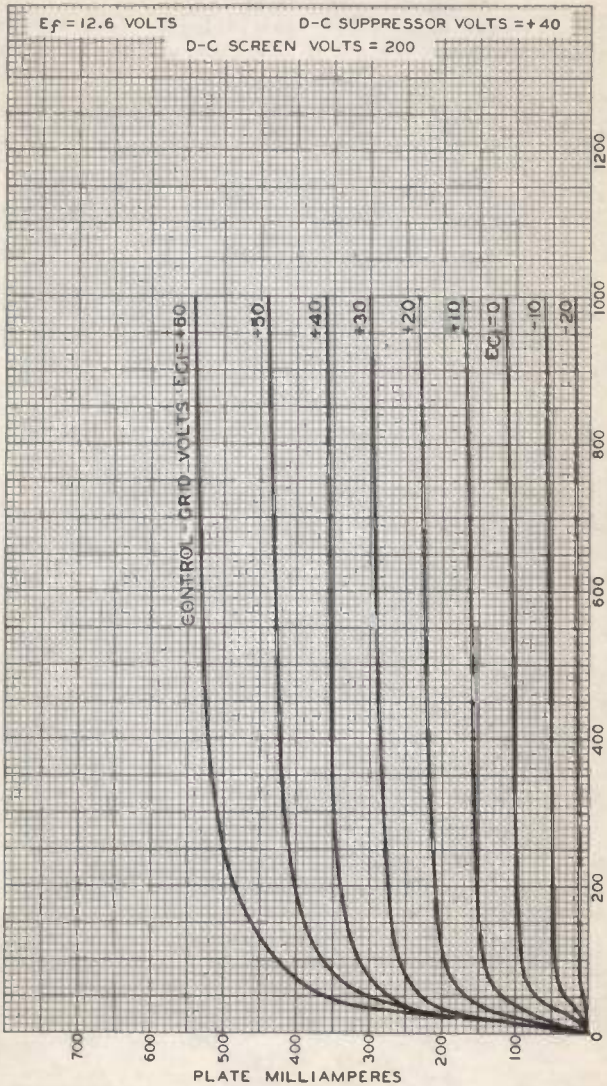


TUBE MOUNTING POSITION
VERTICAL OR HORIZONTAL

RCA

837

AVERAGE PLATE CHARACTERISTICS



MAR. 27, 1936

RCA RADIOTRON DIVISION

92C-4586

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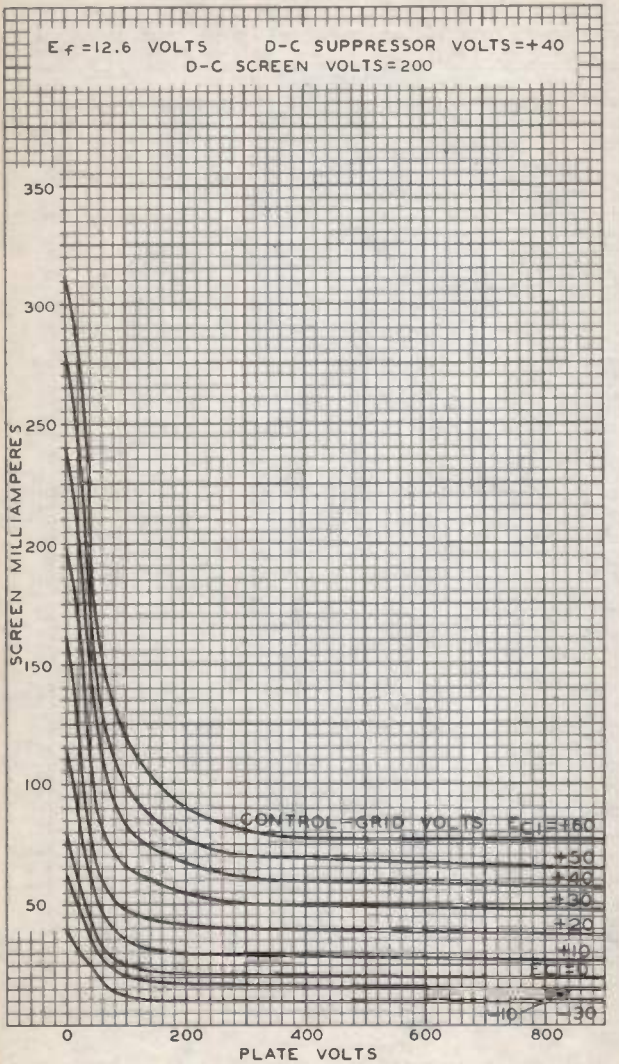
AVERAGE CHARACTERISTICS



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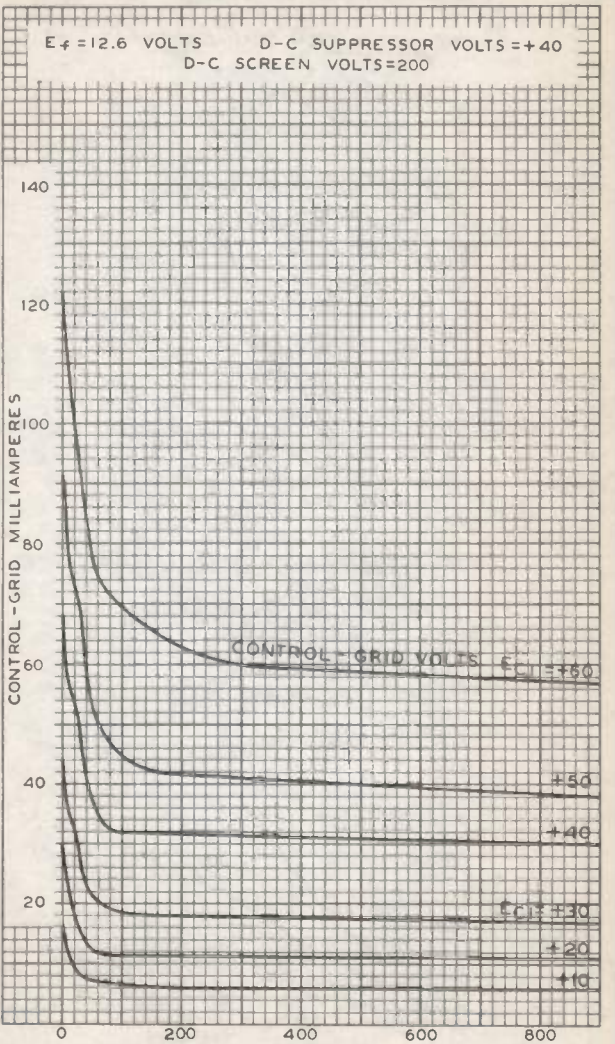
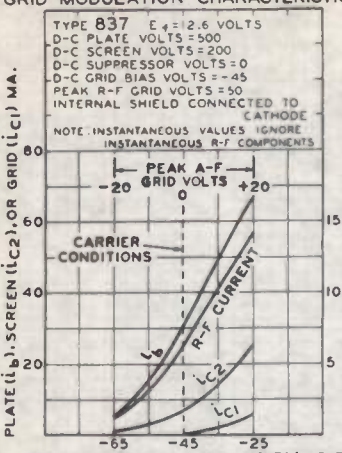
AVERAGE CHARACTERISTICS



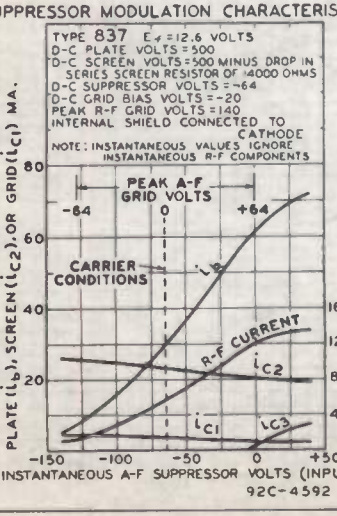
837

R-F POWER AMPLIFIER PENTODE

GRID MODULATION CHARACTERISTICS



SUPPRESSOR MODULATION CHARACTERISTICS



838
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

838

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

RCA

838

AVERAGE PLATE CHARACTERISTICS

APRIL 15, 1935

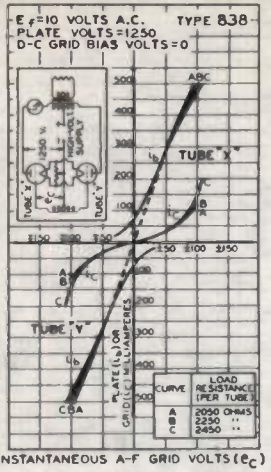
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4404

838

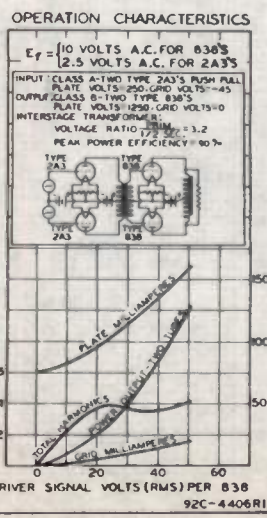
CHARACTERISTICS CURVES

DYNAMIC TRANSFER CHARACTERISTICS



92C-4407RI

OPERATION CHARACTERISTICS



92C-4406RI

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

841

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.

841

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

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

841
R-F POWER AMPLIFIER
A-F VOLTAGE AMPLIFIER

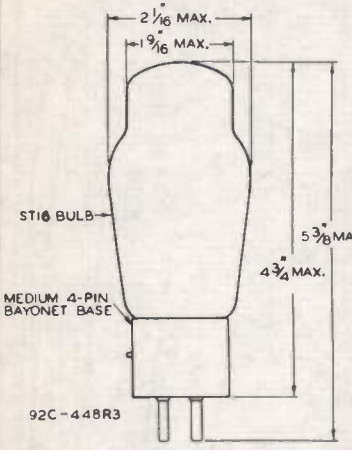
(continued from preceding page)

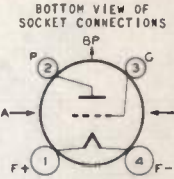
D-C Grid Current**	15	15	approx.ma.
Driving Power**	1.8	1.8	approx.watts
Power Output	11	15	approx.watts

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.





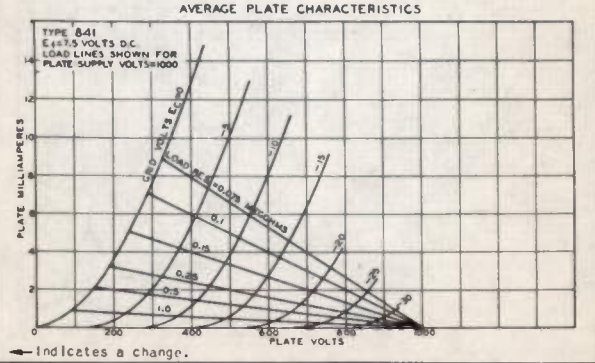
AA'=PLANE OF ELECTRODES

Pin 1 – Filament +
Pin 2 – Plate
Pin 3 – Grid
Pin 4 – Filament –
BP – Bayonet Pin

TUBE MOUNTING POSITION

VERTICAL: Base down
HORIZONTAL: Plate in vertical plane (on edge)

AVERAGE PLATE CHARACTERISTICS



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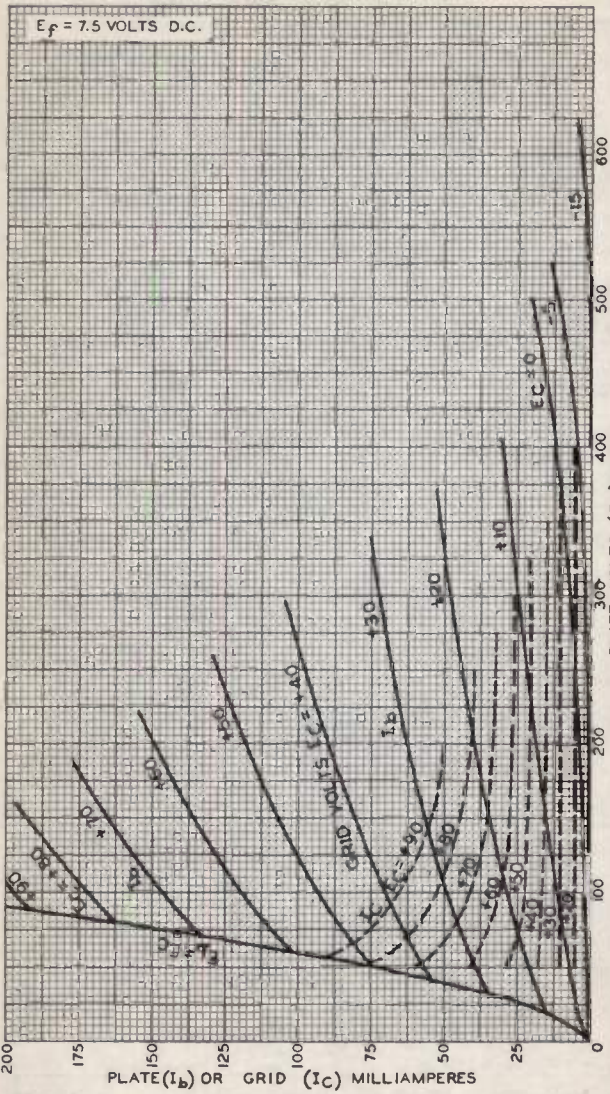
841

841

AVERAGE PLATE CHARACTERISTICS



FEB. 12, 1934

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

925-5454

RCA

842

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 MANUFACTURING COMPANY, INC.

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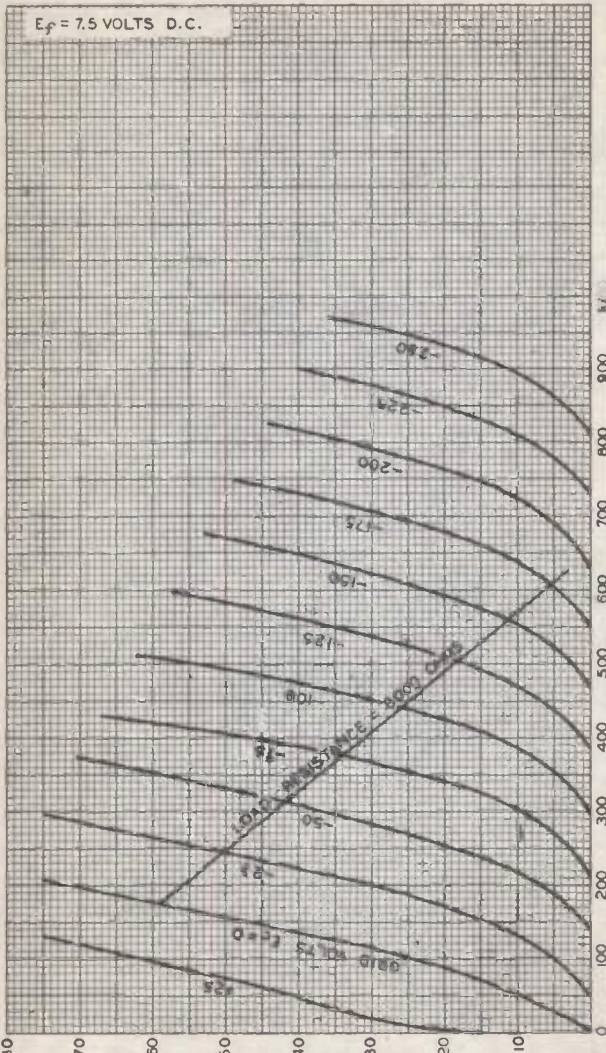
AVERAGE PLATE CHARACTERISTICS



843

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	-180	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.

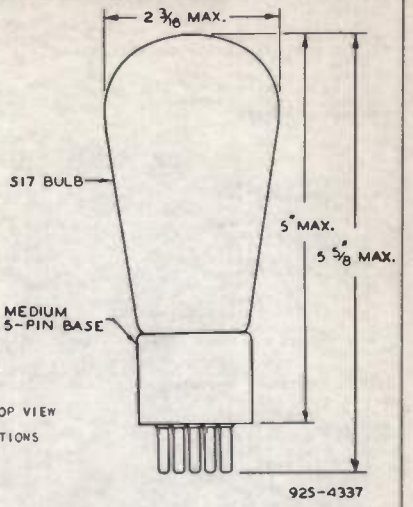
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

← Indicates a change.

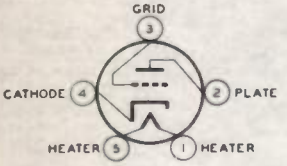
For use of the 843 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

843

R-F POWER AMPLIFIER, OSCILLATOR, A-F POWER AMPLIFIER

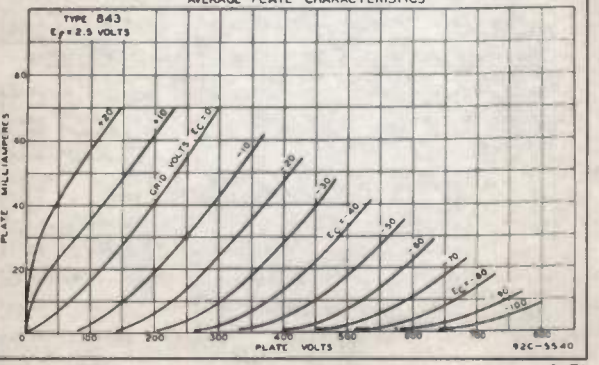


TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



TUBE MOUNTING POSITION
VERTICAL or HORIZONTAL

AVERAGE PLATE CHARACTERISTICS



RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

844

SCREEN GRID R-F POWER AMPLIFIER

Heater	Coated Unipotential Cathode *		
Voltage	2.5	a-c or d-c	volts
Current	2.5		amp. ←
Amplification Factor	75		
Transconductance for plate current of 13 ma.	600		μmhos
Direct Interelectrode Capacitances (approx.):			
Grid to Plate	0.15© maximum		μμf
Input	9.5		μμf
Output	7.5		μμf
Maximum Overall Length		5-27/32"	←
Maximum Diameter		2-1/16"	
Bulb		ST-16	
Cap		Medium Metal	
Base		Medium 5-Pin	

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		500 max.	volts
D-C Plate Current		25 max.	ma.
Screen Input		3 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
Heater Voltage *	2.5	2.5	volts
D-C Plate Voltage	400	500	volts
D-C Screen Voltage	180	180	volts
D-C Grid Voltage	-40	-40	volts
D-C Plate Current	20	20	ma.
Power Output	2.4	3	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		500 max.	volts
D-C Grid Voltage		-200 max.	volts ←
D-C Plate Current		25 max.	ma.
D-C Grid Current		5 max.	ma.
Screen Input		2 max.	watts
Plate Dissipation		10 max.	watts
Typical Operation:			
Heater Voltage *	2.5	2.5	volts
D-C Plate Voltage	400	500	volts
D-C Screen Voltage	125	150	volts
D-C Grid Voltage	-100	-100	volts
D-C Plate Current	20	20	ma.
Power Output	2	4	approx. watts

* See next page.

© With external shielding.

← Indicates a change.

844

SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation‡

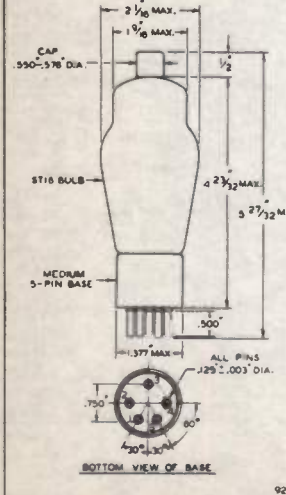
D-C Plate Voltage		500 max.	volts
→ D-C Grid Voltage		-200 max.	volts
D-C Plate Current		30 max.	ma.
D-C Grid Current		5 max.	ma.
Screen Input		3 max.	watts
Plate Dissipation		15 max.	watts
Typical Operation:			
Heater Voltage*	2.5	2.5	volts
D-C Plate Voltage	400	500	volts
D-C Screen Voltage	175	175	volts
D-C Grid Voltage	-125	-125	volts
D-C Plate Current	25	25	ma.
Power Output	6	9	approx. watts

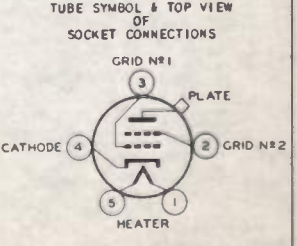
* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should not exceed 45 volts.

‡ 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.

For use of the 844 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.





92C-4356R1

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 A_1

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 AB_1 ←

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

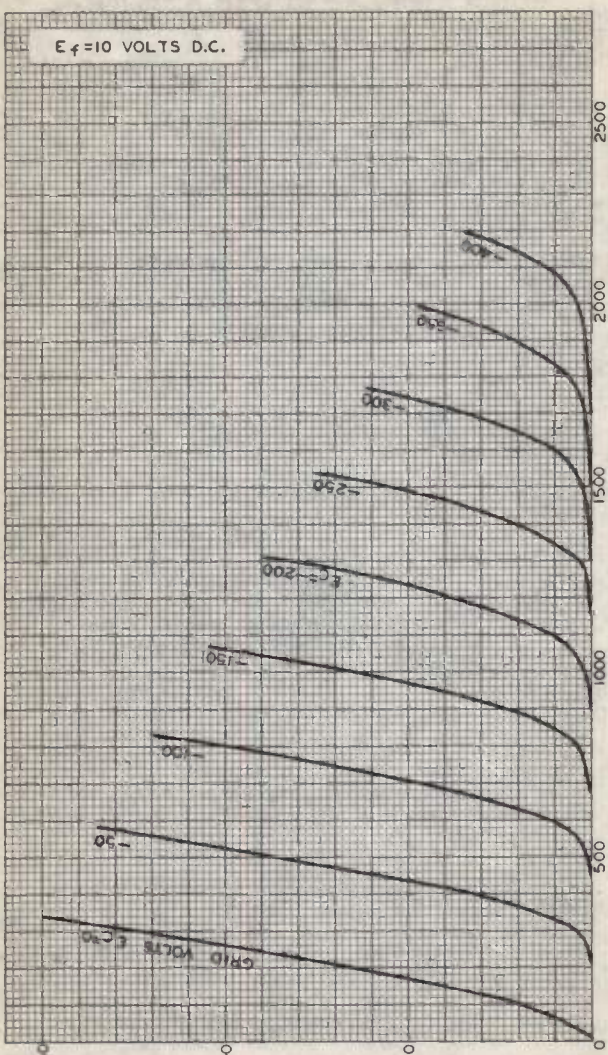
* With a-c filament supply.

OUTLINE DIMENSIONS, TUBE SYMBOL, and SOCKET CONNECTIONS for the 845 are the same as for the 211.

← Indicates a change.

845

AVERAGE PLATE CHARACTERISTICS



NOV. 1, 1933

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-5310

846

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)

846
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 \$

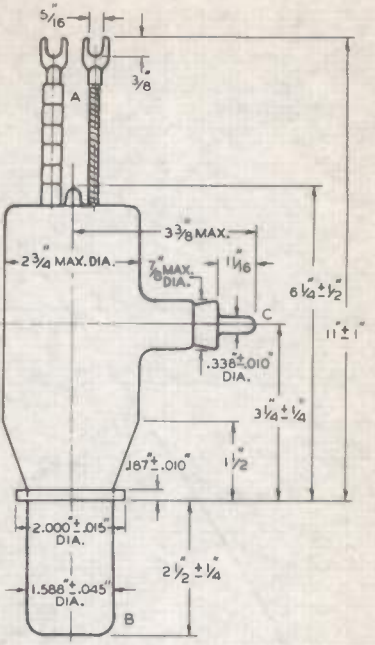
D-C Plate Voltage			7500 max.	volts
D-C Grid Voltage			-1000 max.	volts
D-C Plate Current			1.0 max.	amp.
D-C Grid Current			0.15 max.	amp.
R-F Grid Current			30 max.	amp.
Plate Input			7.5 max.	kw
Plate Dissipation			2.5 max.	kw
Typical Operation:				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	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.

846
OSCILLATOR, R-F POWER AMPLIFIER



TUBE SYMBOL AND TERMINAL CONNECTIONS

A – Filament
B – Plate
C – Grid

RCA

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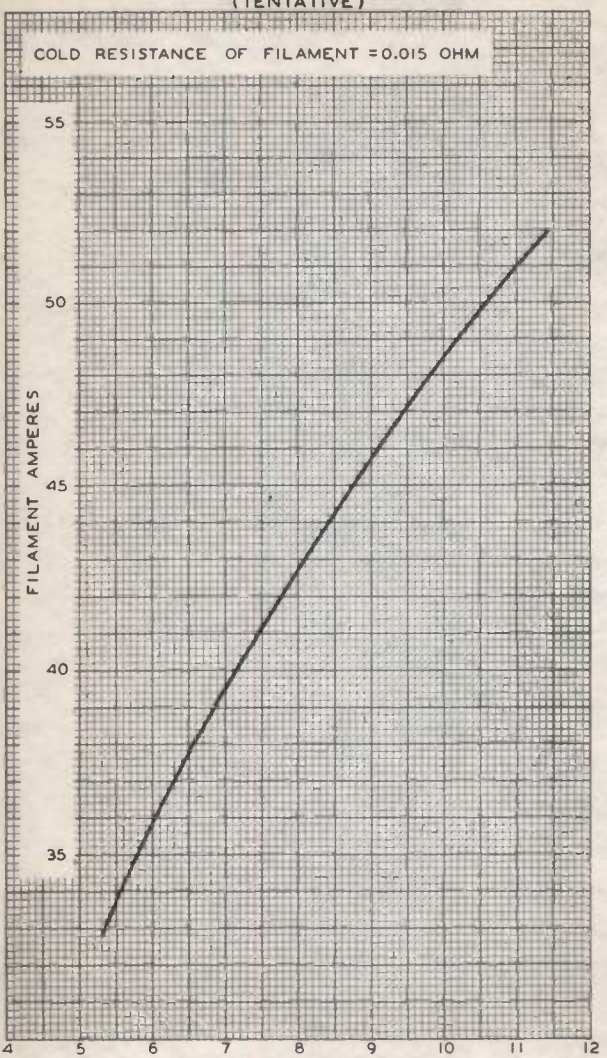
AVERAGE FILAMENT CHARACTERISTIC
(TENTATIVE)



RCA

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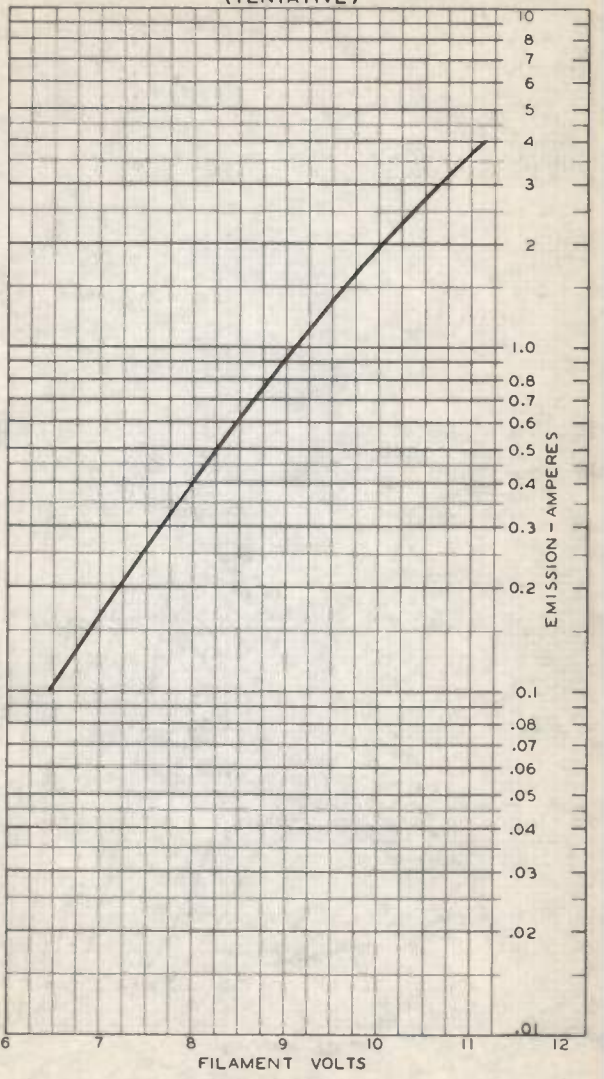
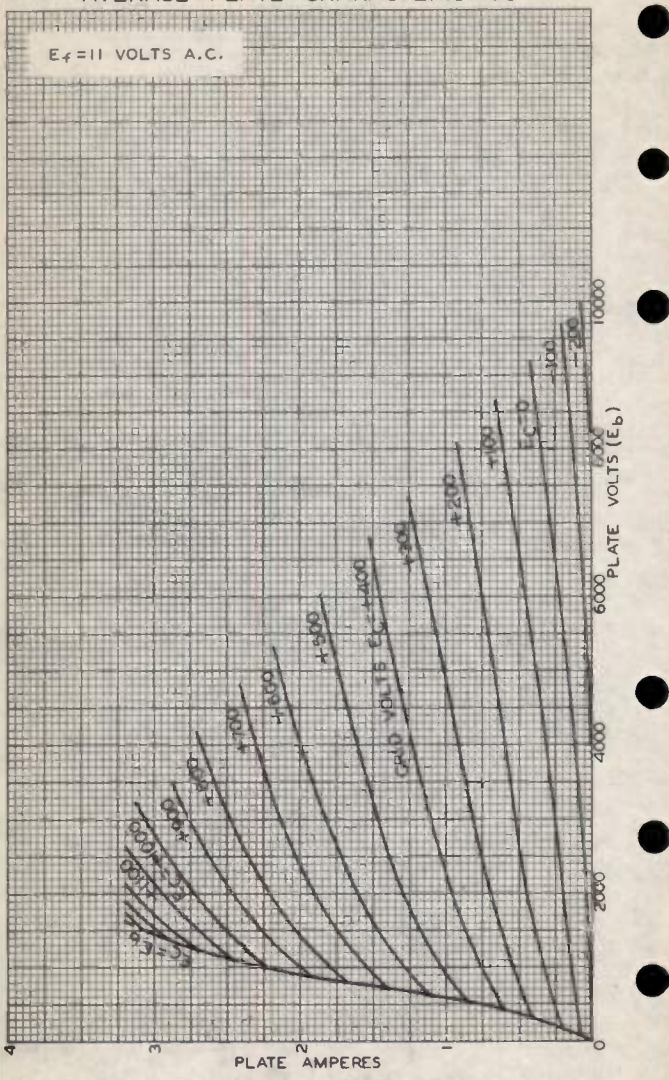
AVERAGE FILAMENT-EMISSION CHARACTERISTIC
(TENTATIVE)



DEC. 21, 1932 RCA RADIOTRON DIVISION 92C-4504

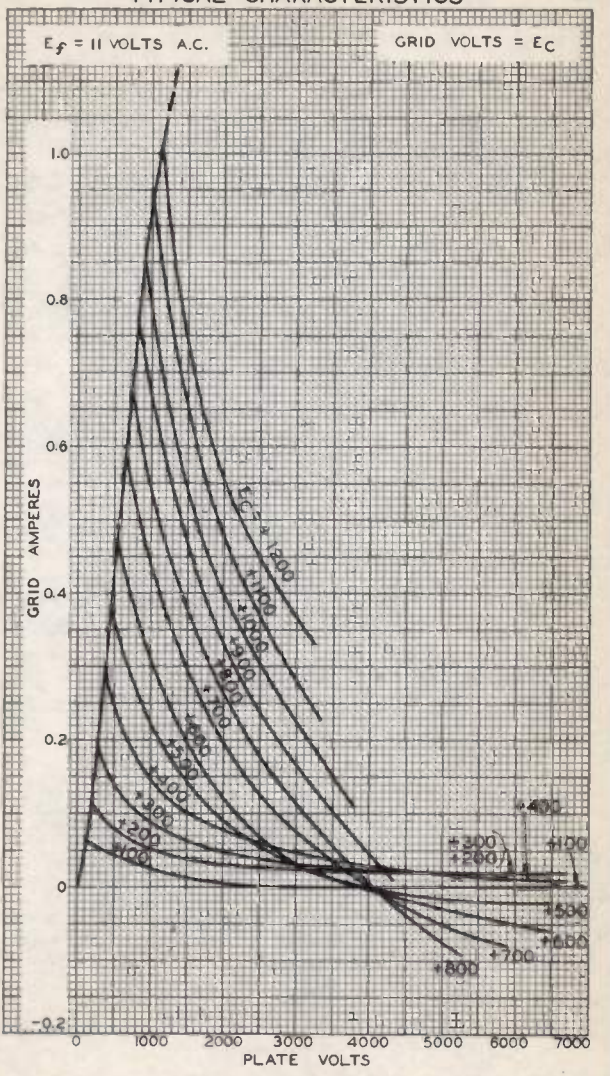
846

AVERAGE PLATE CHARACTERISTICS



846

TYPICAL CHARACTERISTICS



848

OSCILLATOR, R-F POWER AMPLIFIER, MODULATOR

(WATER COOLED)

Filament	Tungsten		
Voltage	22	a-c or d-c	volts
Current	52		amp.
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			20-1/4"
Maximum Radius			6-1/2"
Base			No.3906
Water Jacket			UT-1285-A

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

D-C Plate Voltage	12000 max.		volts
Plate Dissipation	7.5 max.		kw
Typical Operation:			
Filament Voltage	22	d-c	volts ←
D-C Plate Voltage	8000		volts
D-C Grid Voltage	-720		volts ←
Peak A-F Grid Voltage	800		volts
D-C Plate Current	0.9		amp.
Load Resistance	5200		ohms
U.P.O. (5% second harmonic)	2		kw

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

Filament Voltage	22	22	22	d-c volts
D-C Plate Voltage	6000	10000	12500	volts
D-C Grid Voltage	-700	-1200	-1360	volts
Peak A-F Grid-to-Grid Volt.	2400	3600	4760	volts
Zero-Signal D-C Plate Cur.	0.80	0.80	0.40	amp.
Max.-Signal D-C Plate Cur.	2.30	3.0	2.8	amp.
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. 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.
R-F Grid Current			24 max.	amp.
Plate Input			10 max.	kw
Plate Dissipation			6 max.	kw
Typical Operation:				
Filament Voltage	22	22	22	d-c volts
D-C Plate Voltage	6000	10000	14000	volts

←Indicates a change.

PRELIMINARY DRAFT

848

OSCILLATOR, R-F POWER AMPLIFIER, MODULATOR

(continued from preceding page)

D-C Grid Voltage	-700	-1230	-1750	volts
Peak R-F Grid Voltage	700	930	1100	volts
D-C Plate Current	0.70	0.80	0.55	amp.
Driving Power **	82	0	0	approx. watts
Power Output	1	2	2.27	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		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:			
Filament Voltage	22	22 a-c	volts
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 **	0.1	0.08	approx. amp.
Driving Power **	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 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
Typical Operation:			
Filament Voltage	22	22 a-c	volts
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 **	0.06	0.10	approx. amp.
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.

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 848 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

THE FILAMENT CHARACTERISTIC AND THE FILAMENT EMISSION CHARACTERISTIC FOR THE 848 ARE THE SAME AS FOR TYPE 207. FOR OUTLINE DIMENSIONS, BASE DIMENSIONS, TUBE SYMBOL, AND TERMINAL CONNECTIONS, REFER TO TYPE 207. REFER TO TYPE 891 FOR AVERAGE CHARACTERISTICS CURVES.

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.	0.55	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.

849

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.

849

MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

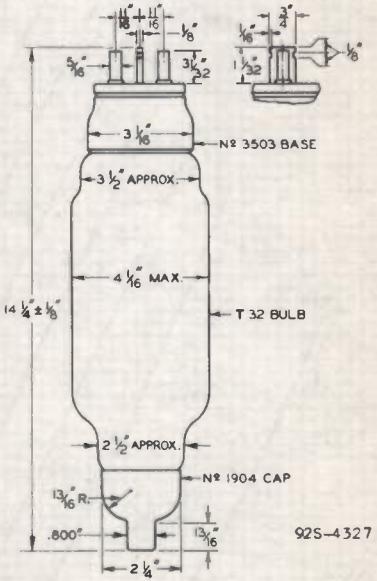
D-C Grid Current **	0.035	0.025	0.02	approx. amp.
Driving Power **	11	9	8	approx. watts
Power Output	300	425	560	approx. watts

△ 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.



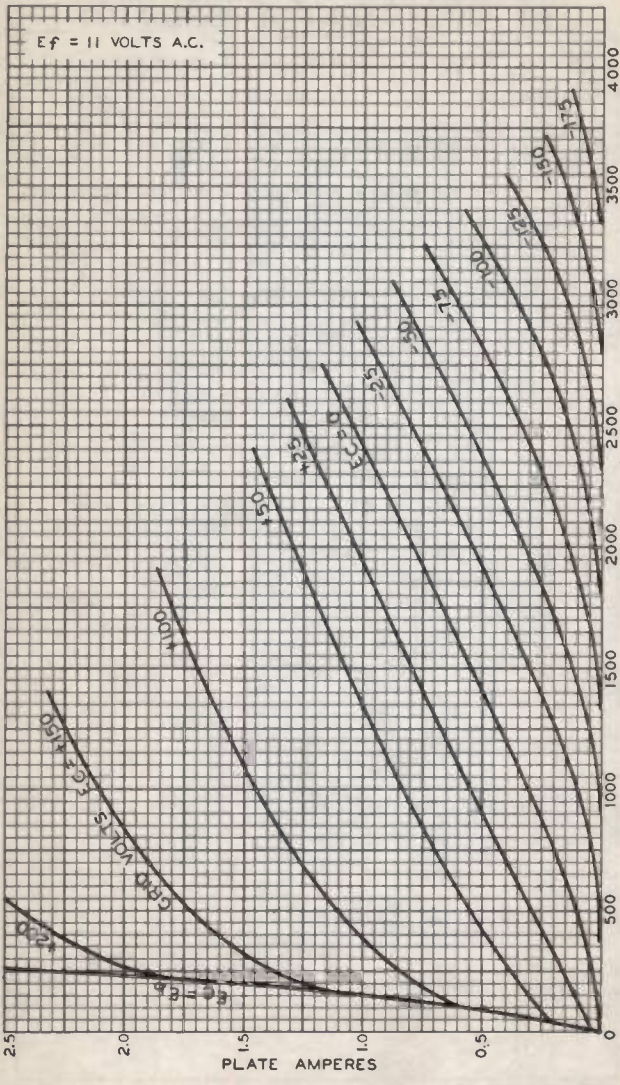
TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS

TUBE MOUNTING POSITION

VERTICAL: Filament base (large) up.
HORIZONTAL: Filament in vertical plane (on edge).

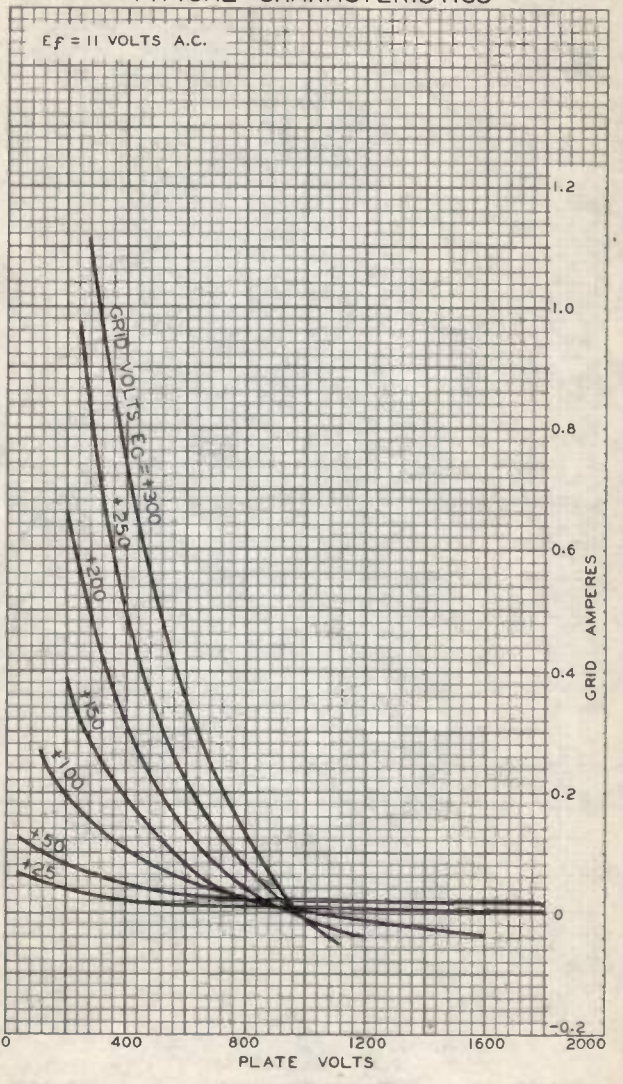
849

AVERAGE PLATE CHARACTERISTICS



JUNE 3, 1935 RCA RADIOTRON DIVISION RCA MANUFACTURING COMPANY, INC 92C-4460

TYPICAL CHARACTERISTICS

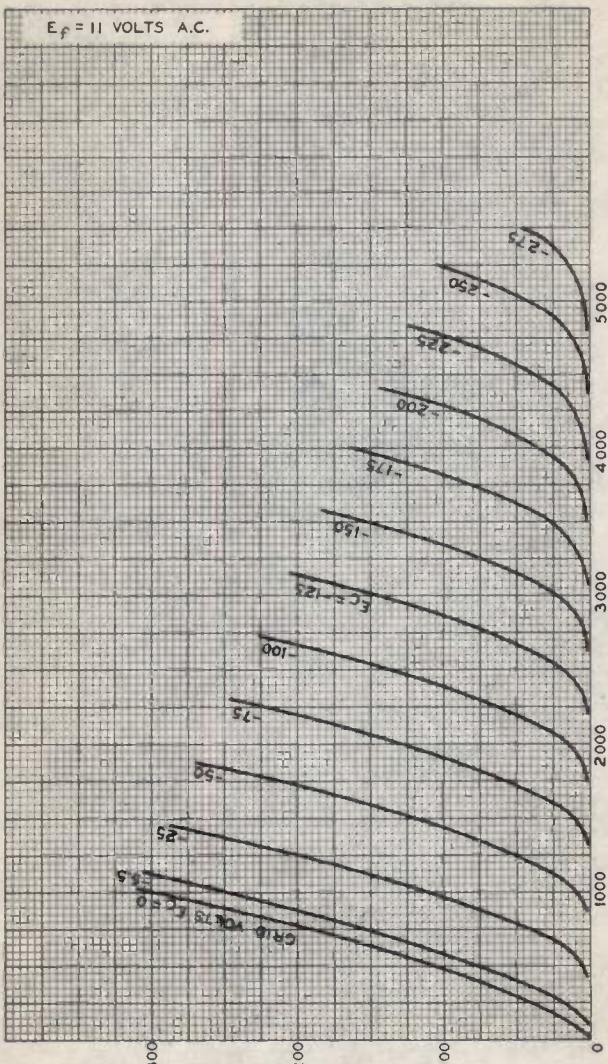


RCA MANUFACTURING COMPANY, INC.

849

849

AVERAGE PLATE CHARACTERISTICS



APRIL 24, 1928

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

925-5408

850

SCREEN GRID R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	550 approx.	
Mutual Conductance for plate current of 19.5 ma.	2750	μmhos
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	0.25# max.	μμf
Input	17	μμf
Output	25	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

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
Screen Input		10 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 Screen Voltage	175	175	volts
D-C Grid Voltage	-13	-13	volts
D-C Plate Current	100	110	ma.
Power Output	30	40	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		150 max.	ma.
D-C Grid Current		40 max.	ma.
R-F Grid Current		6 max.	amp.
Plate Input		150 max.	watts
Screen Input		7 max.	watts
Plate Dissipation		70 max.	watts
Typical Operation:			
Filament Voltage	10	10	a-c volts
D-C Plate Voltage	750	1000	volts
D-C Screen Voltage	125	140	volts
D-C Grid Voltage	-100	-100	volts
D-C Plate Current	140	125	ma.
D-C Gric Current *	40	40	approx. ma.
Driving Power *	10	10	approx. watts
Power Output	50	65	approx. watts

with external shielding. (continued on next page)

* See next page.

850

SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

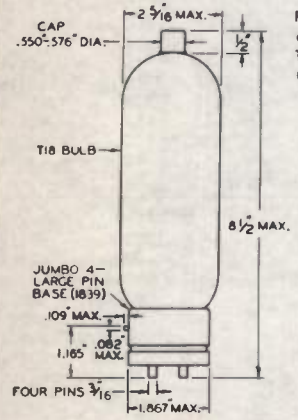
R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

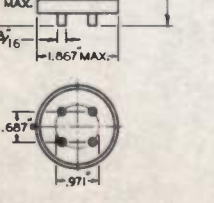
D-C Plate Voltage			1250 max.	volts
D-C Grid Voltage			-400 max.	volts
D-C Plate Current			175 max.	ma.
D-C Grid Current			40 max.	ma.
R-F Grid Current			7.5 max.	amp.
Plate Input			220 max.	watts
Screen Input			10 max.	watts
Plate Dissipation			100 max.	watts
Typical Operation:				
Filament Voltage	10	10	10	a-c volts
D-C Plate Voltage	750	1000	1250	volts
D-C Screen Voltage	175	175	175	volts
D-C Grid Voltage	-150	-150	-150	volts
D-C Plate Current	160	160	160	ma.
D-C Grid Current *	35	35	35	approx. ma.
Driving Power *	10	10	10	approx. watts
Power Output	55	100	130	approx. watts

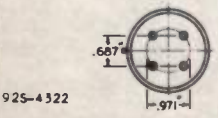
* Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

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 850 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.





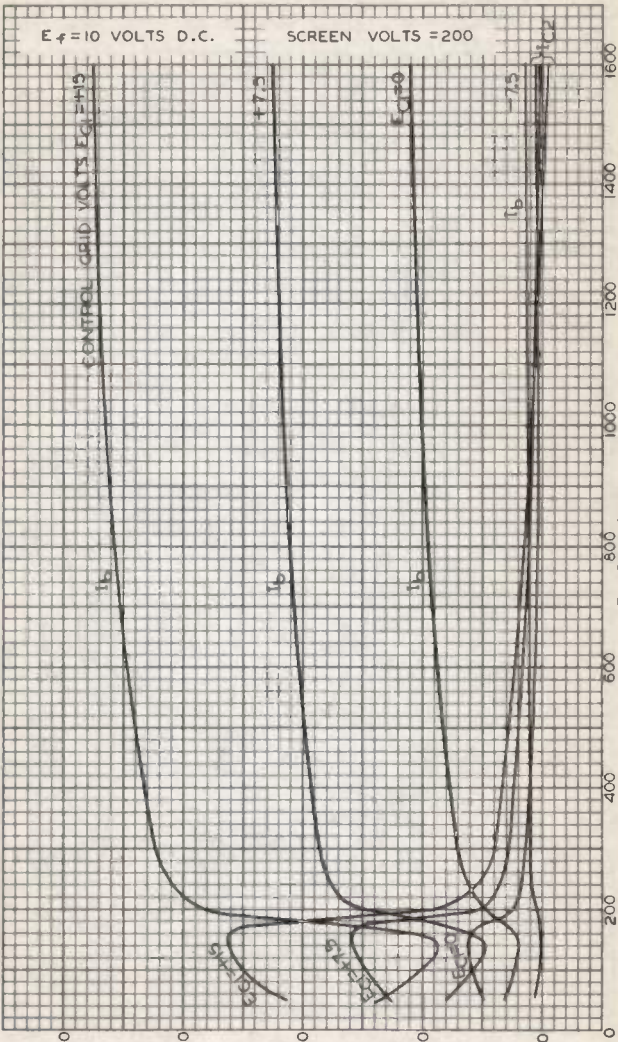
BOTTOM VIEW OF BASE

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

RCA

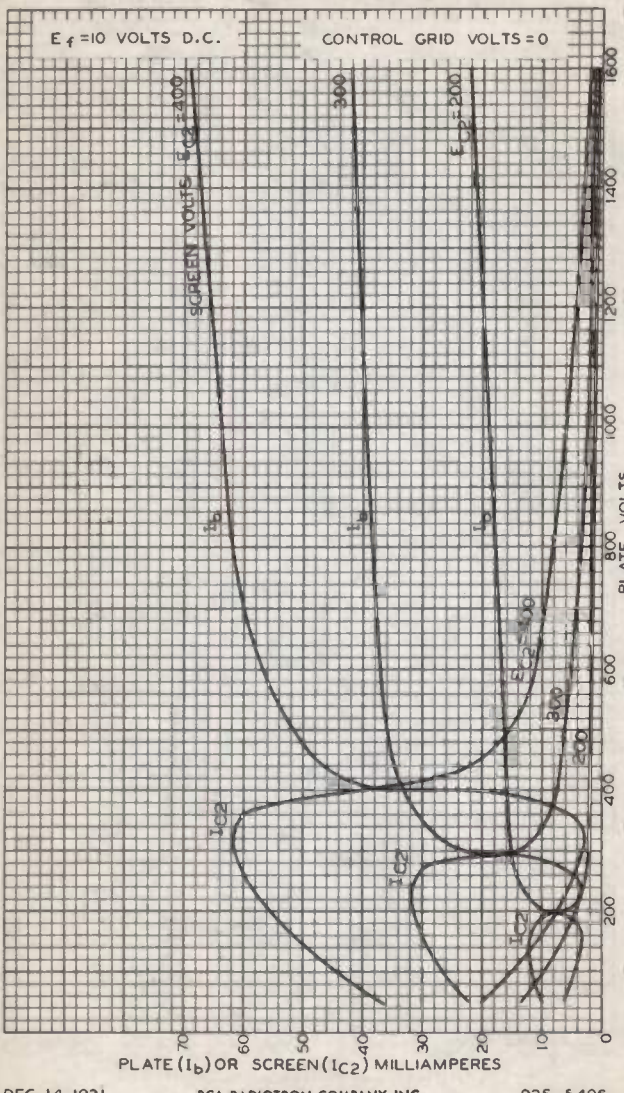
850

AVERAGE PLATE CHARACTERISTICS



850

AVERAGE PLATE CHARACTERISTICS



851

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

851

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

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MODULATOR, A-F POWER AMPLIFIER, R-F POWER AMPLIFIER, OSCILLATOR

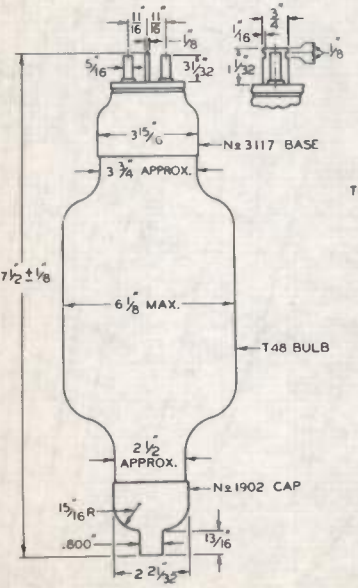
(continued from preceding page)

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

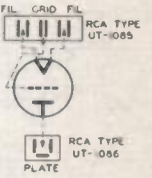
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

* 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.



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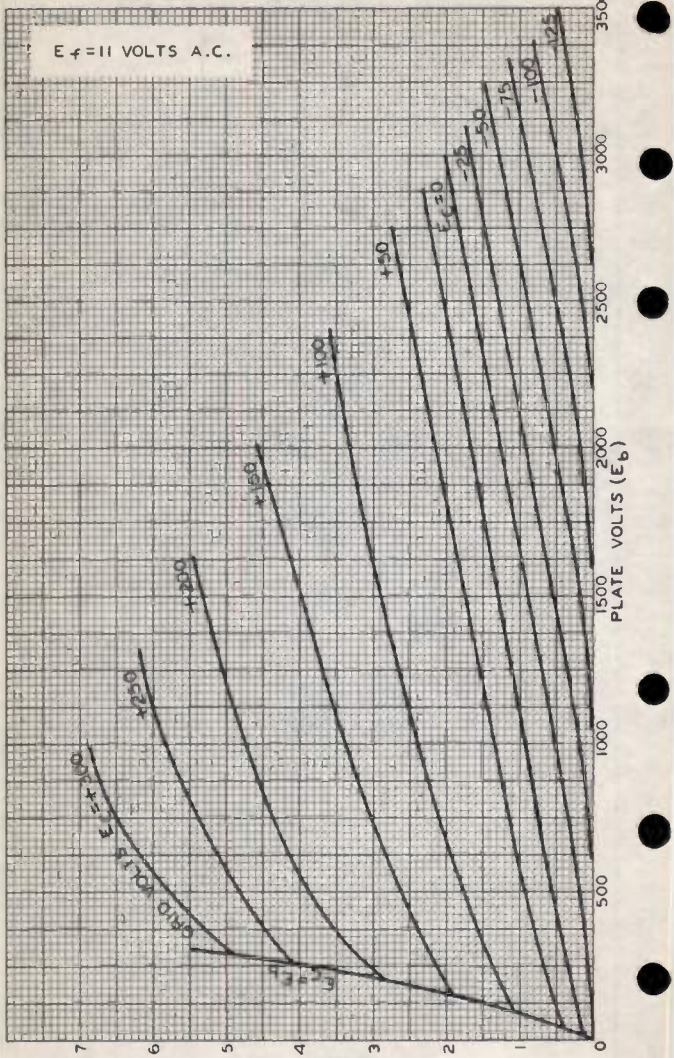
AVERAGE PLATE CHARACTERISTICS



JUNE 3, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4454

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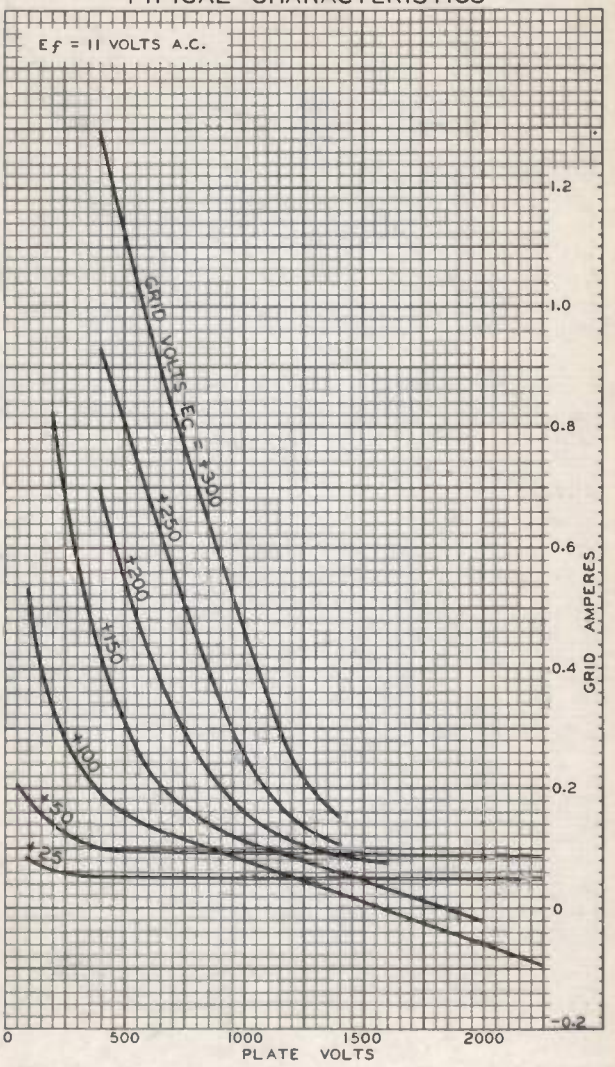
TYPICAL CHARACTERISTICS



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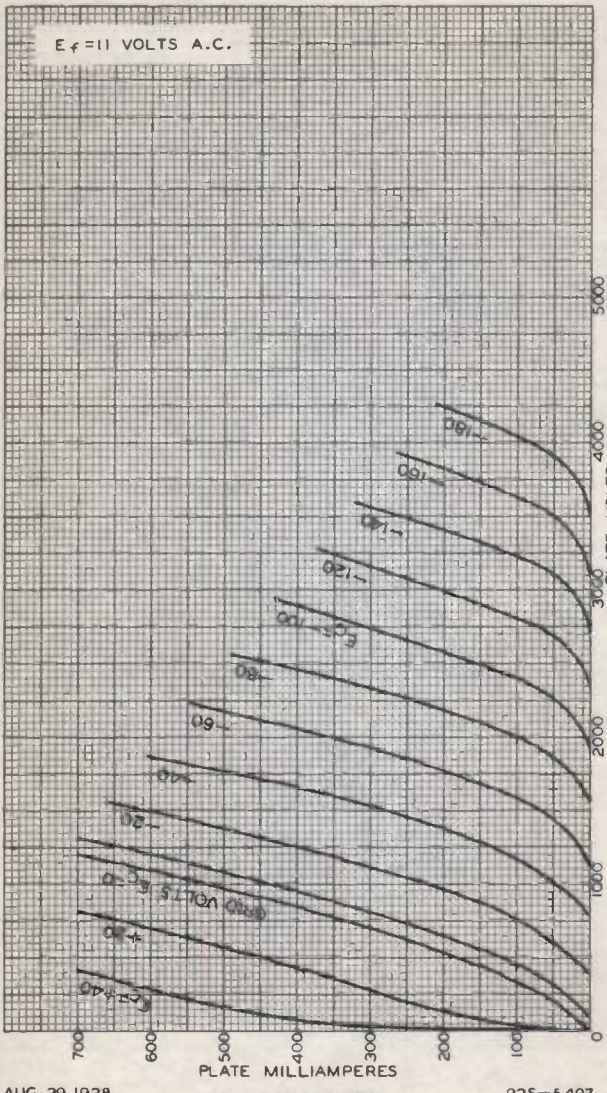
851

AVERAGE PLATE CHARACTERISTICS



AUG. 29, 1928

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

925—5497

852

R-F POWER AMPLIFIER, OSCILLATOR

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	2.6	μμf
Grid to Filament	1.9	μμf
Plate to Filament	1.0	μμf
Maximum Overall Length		8-3/4"
Maximum Radius		4-1/4"
Bulb		GT-30 with arm
Base		Medium 4-Pin Bayonet

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage		3000 max.	volts
Max.-Sig. D-C Plate Cur.*		100 max.	ma.
Max.-Sig. Plate Input*		250 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	2000	3000	volts
D-C Grid Voltage	-155	-250	volts
Peak A-F Grid Voltage	600	780	volts
Zero-Sig. D-C Plate Cur.	22	14	ma.
Max.-Sig. D-C Plate Cur.	180	160	ma.
Load Resistance (per tube)	5500	10250	ohms
Effective Load Res. (plate to plate)	22000	41000	ohms
Max.-Sig. Driving Power	3.5	3.5	approx. watts
Max.-Sig. Power Output	220	320	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		3000 max.	volts
D-C Plate Current		85 max.	ma.
R-F Grid Current		8.0 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	2000	3000	volts
D-C Grid Voltage	-155	-250	volts
Peak R-F Grid Voltage	200	225	volts
D-C Plate Current	60	43	ma.
D-C Grid Current **	1	0	approx. ma.
Driving Power ° **	10	7	approx. watts
° Power Output	30	40	approx. watts

° At crest of a-f cycle

** See next page. (continued on next page)

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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		2000	max.	volts
D-C Grid Voltage		-800	max.	volts
D-C Plate Current		85	max.	ma.
D-C Grid Current		40	max.	ma.
R-F Grid Current		8.0	max.	amp.
Plate Input		170	max.	watts
Plate Dissipation		67	max.	watts
Typical Operation:				
Filament Voltage	10	10	a-c	volts
D-C Plate Voltage	1500	2000		volts
D-C Grid Voltage	-400	-500		volts
Peak R-F Grid Voltage	650	750		volts
D-C Plate Current	70	67		ma.
D-C Grid Current **	30	30	approx.	ma.
Driving Power **	20	23	approx.	watts
Power Output	45	75	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down Conditions per tube without modulation#

D-C Plate Voltage		3000	max.	volts
D-C Grid Voltage		-800	max.	volts
D-C Plate Current		150	max.	ma.
D-C Grid Current		40	max.	ma.
R-F Grid Current		10	max.	amp.
Plate Input		300	max.	watts
Plate Dissipation		100	max.	watts
Typical Operation:				
Filament Voltage	10	10	a-c	volts
D-C Plate Voltage	2500	3000		volts
D-C Grid Voltage	-450	-600		volts
Peak R-F Grid Voltage	700	850		volts
D-C Plate Current	90	85		ma.
D-C Grid Current **	15	15	approx.	ma.
Driving Power **	10	12	approx.	watts
Power Output	135	165	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 852 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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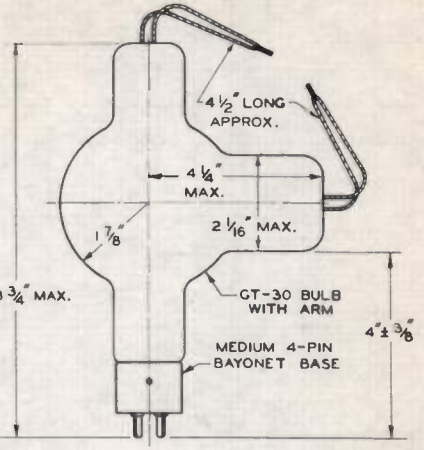
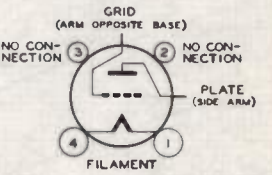
R-F POWER AMPLIFIER, OSCILLATOR



925-4318R2

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



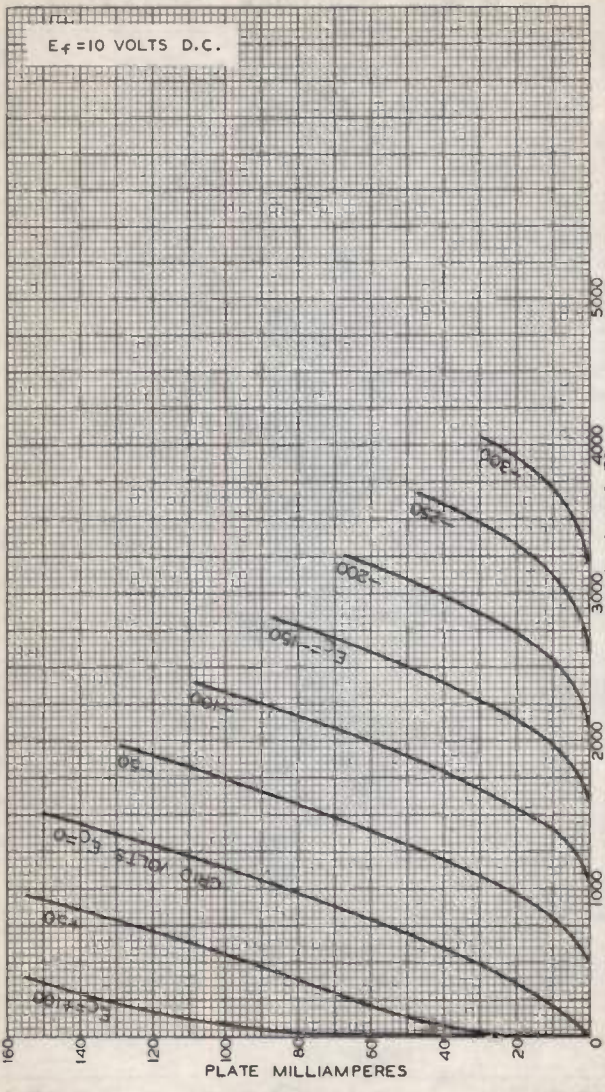
TUBE MOUNTING POSITION

VERTICAL: Base down
HORIZONTAL: NO

852

852

AVERAGE PLATE CHARACTERISTICS



MAR. 2, 1931

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

92S-582R3

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER

Filament *	Coated	
Voltage	5	a-c volts
Current	30	amp.
Overall Length		19-1/2" ± 3/8"
Maximum Diameter		7-1/8"
Bulb		GT-56
Cap		No.1904
Base #		No.3911
End Mountings		Special

Cooling — Forced air (5 cu. ft./min.) at 35°C from 1-inch nozzle located 1/2" above filament base will maintain condensed-mercury temperature of 40° at full load. ←

MAXIMUM RATINGS

Peak Inverse Voltage:

Supply Freq.	*Condensed Mercury Temperature Range*		
Up to 150~	25° - 60°C	10000 max.	volts
Up to 150~	30° - 40°C	22000 max.**	volts
Peak Plate Current		40 max.	amp.
Average Plate Current	Averaged over period of 30 sec.	10 max.	amp.
Peak Tube Voltage Drop		14 approx.	volts

* The filament should be allowed to come up to operating temperature before plate voltage is applied. For average conditions, the delay is approximately one minute.

\# Base shell is connected within base to one side of the filament (uninsulated side).

** For peak inverse voltages in excess of 10000 volts, temperature-regulated forced-air cooling must be employed.

For *Circuits*, refer to Type 872.

For *shielding and r-f filter circuits*, refer to Type 871.

The table below classifies suitable rectifier circuits for the 857-B and shows their safe maximum input and maximum output operating conditions for a peak inverse voltage of 22000 volts. The values are based on sine-wave input and the use of a suitable choke preceding any condenser in the filter circuit. If the 857-B is to be used under temperature conditions such that the peak inverse voltage is limited to 10000 volts, the a-c input voltage and d-c output voltage values in the table should be multiplied by a factor of 0.45 to give the maximum values for the 10000-volt conditions.

CIRCUIT	MAXIMUM A-C INPUT VOLTS (RMS) □	APPROX. D-C OUTPUT VOLTS TO FILTER	MAXIMUM D-C LOAD CURRENT amperes	
SINGLE-PHASE FULL-WAVE (2 tubes) FIG.1	7750 per tube	7000	20	←
SINGLE-PHASE FULL-WAVE (4 tubes) FIG.2	15500 total	14000	20	←
THREE-PHASE HALF-WAVE FIG.3	9000 per leg	10500	30	←
THREE-PHASE DOUBLE-Y PARALLEL FIG.4	9000 per leg	10500	60	←
THREE-PHASE FULL-WAVE FIG.5	9000 per leg	21000	30	←

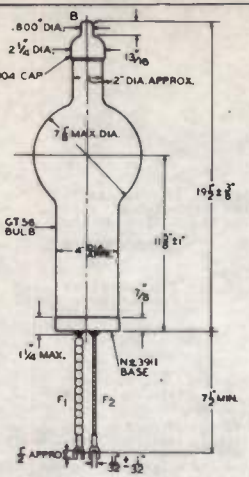
□ For maximum peak inverse voltage of 22000 volts. ← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

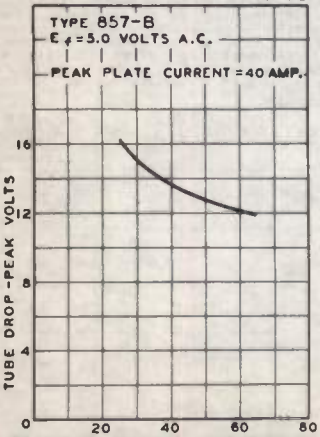
857-B

857-B

HALF-WAVE MERCURY-VAPOR RECTIFIER



AVERAGE CHARACTERISTIC



92C-4651

TUBE SYMBOL AND TERMINAL CONNECTIONS

B – PLATE
F_1 – FILAMENT
F_2 – FILAMENT (PLATE RETURN)

TUBE MOUNTING POSITION

VERTICAL: Filament base down.
HORIZONTAL: No.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

858

OSCILLATOR, R-F POWER AMPLIFIER

(WATER COOLED)

Filament	Tungsten	
Voltage	22	a-c or d-c volts
Current	52	amp.
Amplification Factor	42	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	18	μμf
Grid to Filament	16	μμf
Plate to Filament	2	μμf
Maximum Overall length		24-1/2"
Maximum Radius		7-1/2"
Base		None
Water Jacket		UT-1290

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	20000 max.	volts
Max-Signal D-C Plate Current*	2.0 max.	amp.
Max-Signal D-C Plate Input*	40 max.	kw
Plate Dissipation*	20 max.	kw
Typical Operation - 2 tubes:		
Unless otherwise specified, values are for 2 tubes.		
Filament Voltage	22	d-c volts
D-C Plate Voltage	12000	volts
D-C Grid Voltage	-140	volts
Peak A-F Grid-to-Grid Voltage	2600	volts
Zero-Signal D-C Plate Cur.	0.5	amp.
Max-Signal D-C Plate Cur.	3.6	amp.
Load Resistance (per tube)	1800	ohms
Effective Load Res. (plate to plate)	7200	ohms
Max-Signal Driving Power	115	approx. watts
Max-Signal Power Output	26.5	approx. kw

* 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			20000 max.	volts
D-C Plate Current			1.0 max.	amp.
R-F Grid Current			48 max.	amp.
Plate Input			20 max.	kw
Plate Dissipation			15 max.	kw
Typical Operation:				
Filament Voltage	22	22	22	d-c volts
D-C Plate Voltage	10000	14000	18000	volts
D-C Grid Voltage	-100	-200	-300	volts
Peak R-F Grid Voltage	400	575	725	volts
D-C Plate Current	0.5	0.7	0.9	amp.

(continued on next page)

858

OSCILLATOR, R-F POWER AMPLIFIER

(continued from preceding page)

Driving Power ** °	25	70	85	approx. watts
Power Output	1.5	3.3	5.6	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			12000 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.
R-F Grid Current			48 max.	amp.
Plate Input			12 max.	kw
Plate Dissipation			10 max.	kw
Typical Operation:				
Filament Voltage	22	22	22 a-c	volts
D-C Plate Voltage	8000	10000	12000	volts
D-C Grid Voltage	-900	-950	-1000	volts
Peak R-F Grid Voltage	1875	1950	1950	volts
D-C Plate Current	0.90	0.90	0.95	amp.
D-C Grid Current **	0.10	0.09	0.08	approx. amp.
Driving Power **	180	200	150	approx. watts
Power Output	5	6	8	approx. kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

*Key-down conditions per tube without modulation **

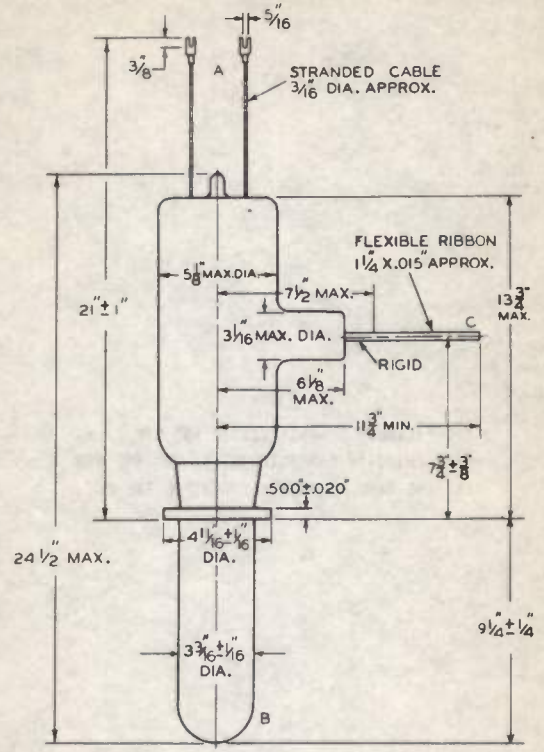
D-C Plate Voltage			20000 max.	volts
D-C Grid Voltage			-3000 max.	volts
D-C Plate Current			2.0 max.	amp.
D-C Grid Current			0.25 max.	amp.
R-F Grid Current			60 max.	amp.
Plate Input			40 max.	kw
Plate Dissipation			20 max.	kw
Typical Operation:				
Filament Voltage	22	22	22 a-c	volts
D-C Plate Voltage	10000	15000	18000	volts
D-C Grid Voltage	-1000	-1100	-1200	volts
Peak R-F Grid Voltage	2200	2500	2600	volts
D-C Plate Current	1.4	1.8	1.8	amp.
D-C Grid Current **	0.13	0.10	0.10	approx. amp.
Driving Power **	275	250	250	approx. watts
Power Output	9	18	22.4	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.

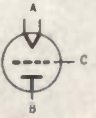
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

For use of the 858 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

858
OSCILLATOR
R-F POWER AMPLIFIER



TUBE SYMBOL
AND
TERMINAL CONNECTIONS



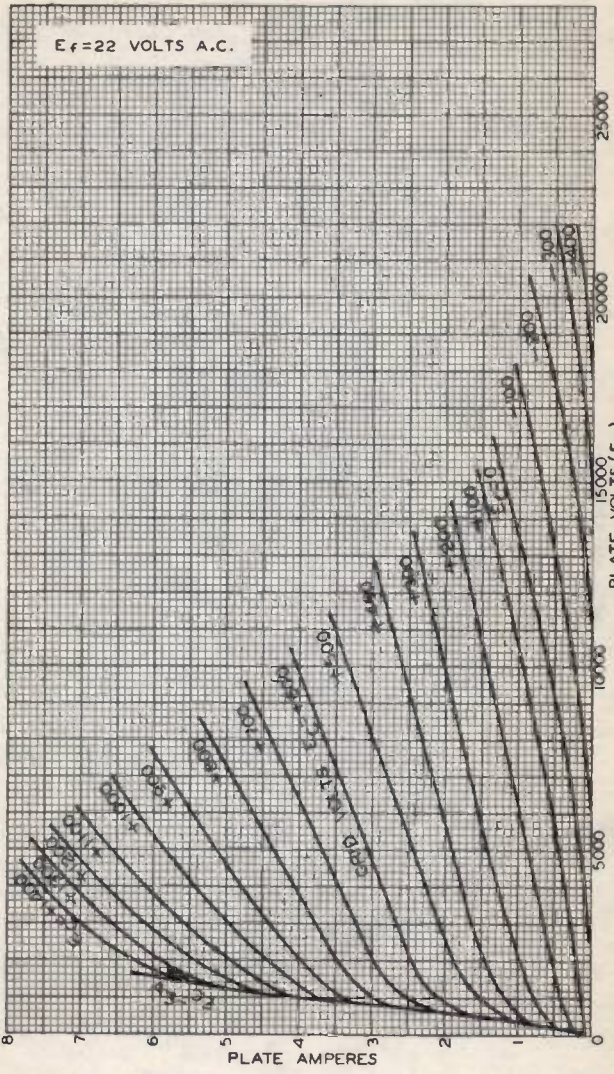
A – Filament
B – Plate
C – Grid

RCA MANUFACTURING COMPANY, INC.

858
OSCILLATOR, R-F POWER AMPLIFIER

THE FILAMENT CHARACTERISTIC AND THE FILAMENT EMISSION CHARACTERISTIC FOR THE 858 ARE THE SAME AS THOSE SHOWN FOR THE 207.

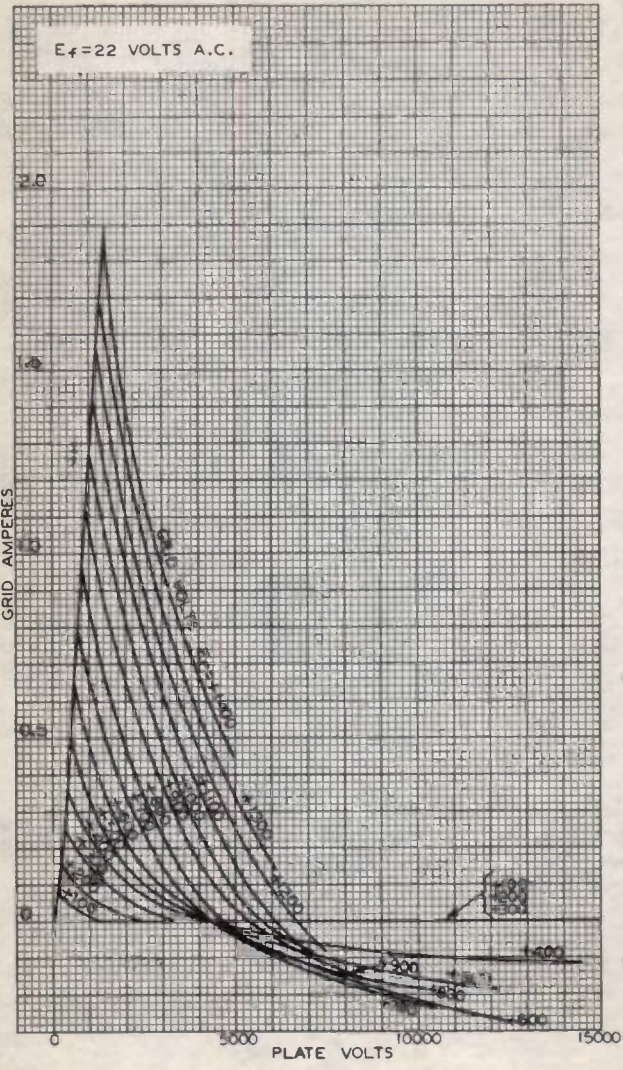
AVERAGE PLATE CHARACTERISTICS



RCA

858

TYPICAL CHARACTERISTICS



860

SCREEN GRID R-F POWER AMPLIFIER

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	3.25	amp.
Amplification Factor	200 approx.	
Transconductance for plate current of 50 ma.	1100	μmhos
Direct Interelectrode Capacitances:		
Grid to Plate	0.08* max.	μμf
Input	7.75	μμf
Output	7.5	μμf
Maximum Overall Length		8-3/4"
Maximum Radius		4-1/4"
Bulb		GT-30 with arm
Base		Medium 4-Pin Ceramic, Bayonet
RCA Socket		Type UR-542-A ←

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			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

□ Use of series screen resistor is not recommended.

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 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

* With external shielding.
▲ Obtained from modulated plate-voltage supply through resistor or from modulated fixed supply.
¶ Obtained by grid-leak resistor or by partial self-bias methods.
← Indicates a change.

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SCREEN GRID R-F POWER AMPLIFIER

(continued from preceding page)

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

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation#

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

\# 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.

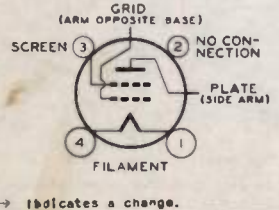
□ Use of series resistor is not recommended.

• Obtained by grid-leak resistor or other self- or fixed-bias method.

For use of the 860 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS for the 860 are the same as for the 852.

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



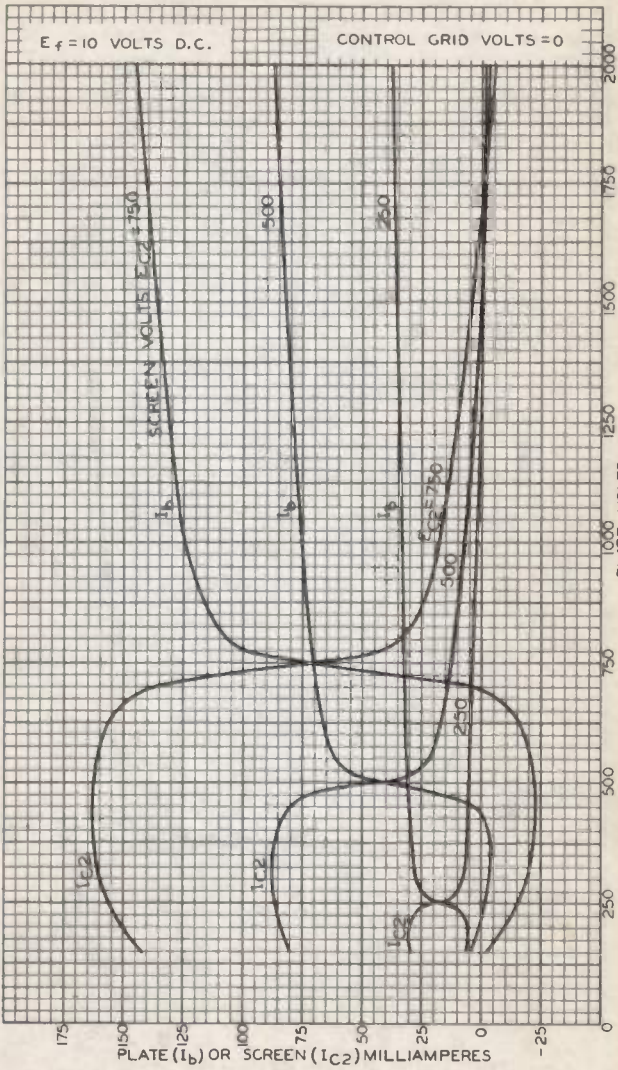
TUBE MOUNTING POSITION

VERTICAL: Base down
HORIZONTAL: NO

→ Indicates a change.

860

AVERAGE PLATE CHARACTERISTICS



RCA MANUFACTURING COMPANY, INC.

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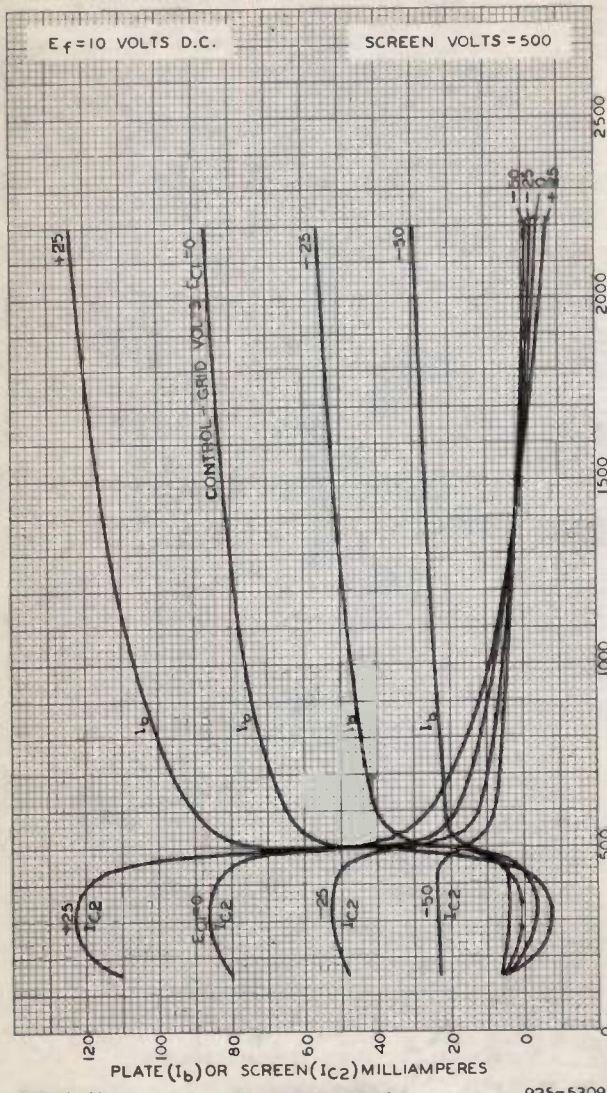
AVERAGE PLATE CHARACTERISTICS



RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

861

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.

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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.

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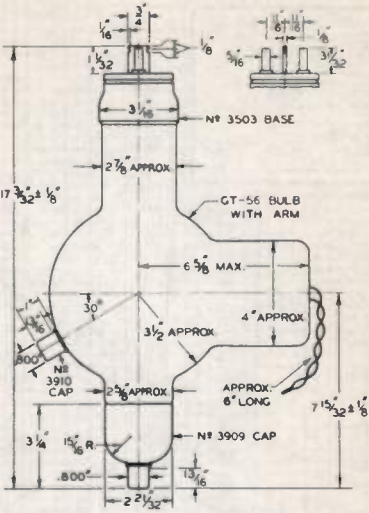
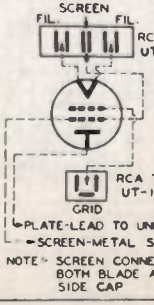
SCREEN GRID R-F POWER AMPLIFIER



92S-4324

TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



NOTE: SCREEN CONNECTION TO BOTH BLADE AND METAL SIDE CAP

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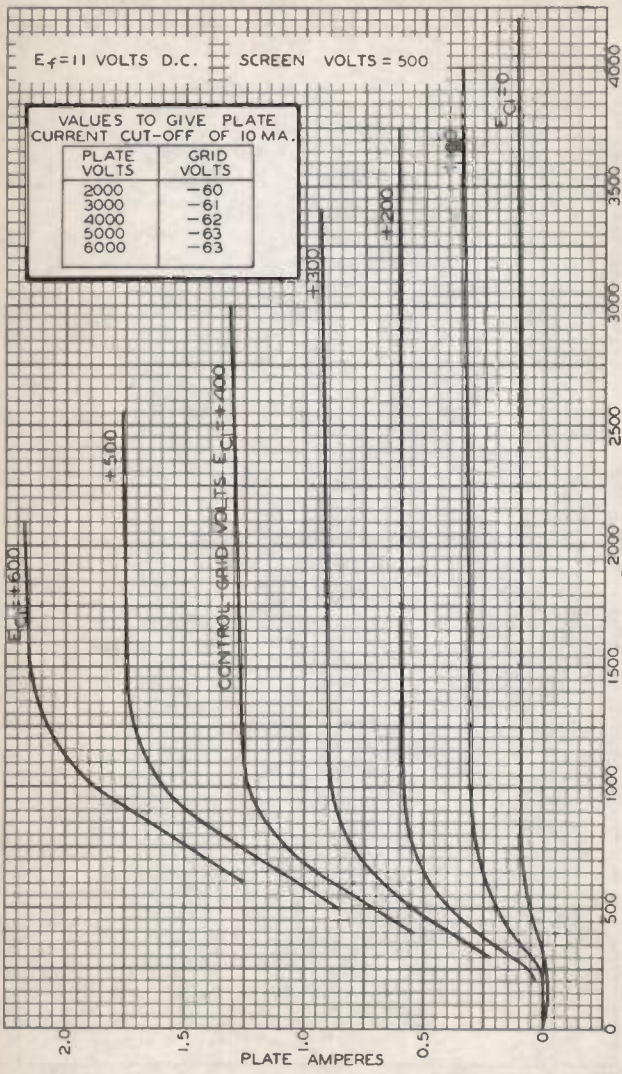
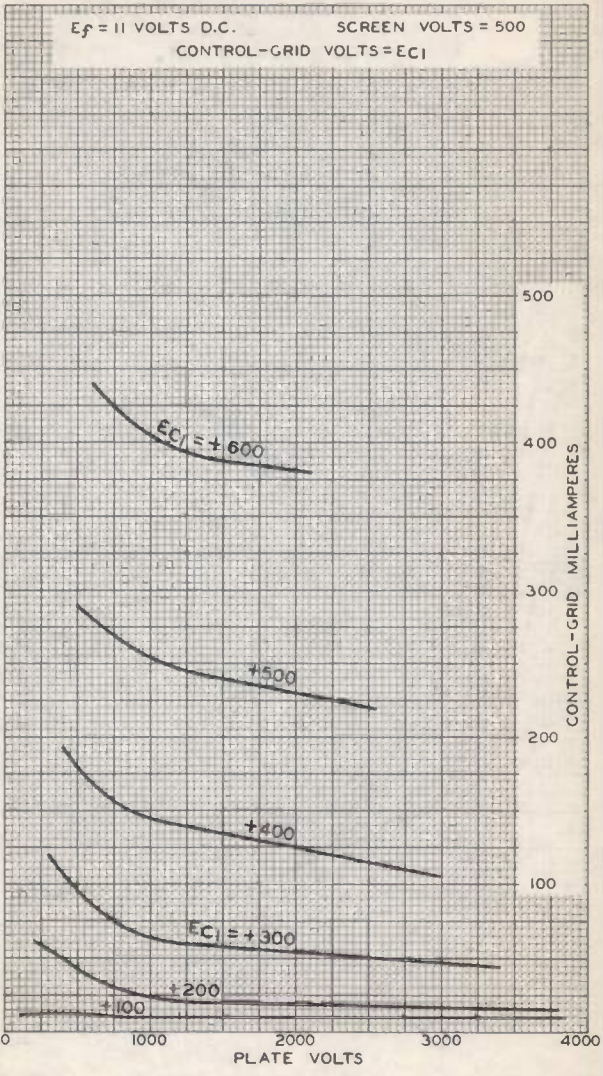
AVERAGE PLATE CHARACTERISTICS



861

AVERAGE CHARACTERISTICS



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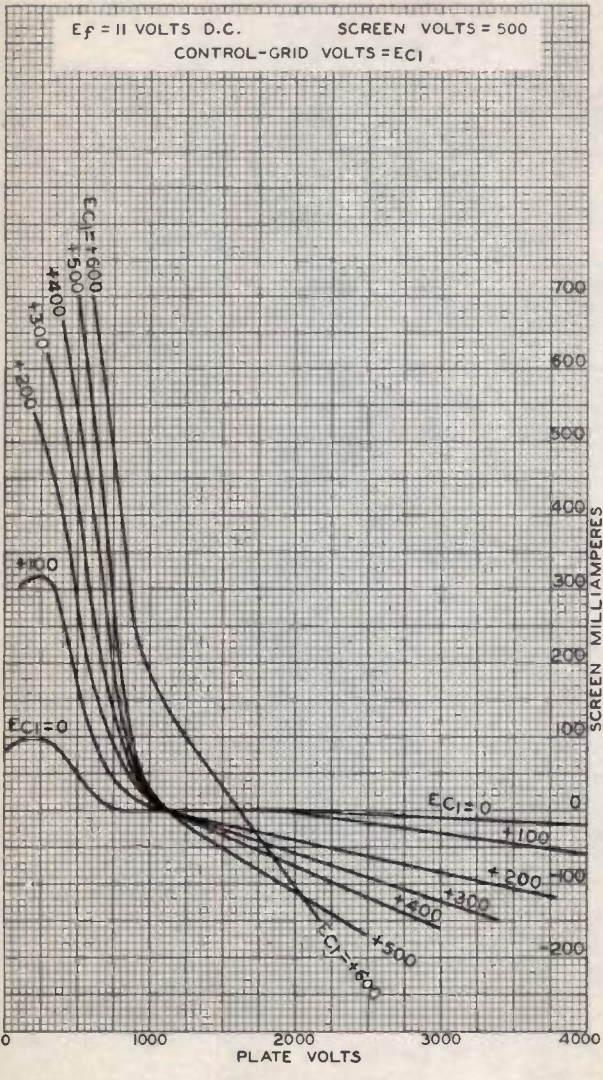
AVERAGE CHARACTERISTICS



RCA MANUFACTURING COMPANY, INC.

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OSCILLATOR, R-F POWER AMPLIFIER, CLASS B MODULATOR

(WATER & FORCED-AIR COOLED)

Filament	Tungsten	
Voltage	33	d-c volts
Current	207	amp.
Amplification Factor	48	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	75	μμf
Grid to Filament	52	μμf
Plate to Filament	2	μμf
Maximum Overall Length		6-3/8"
Maximum Radius		10"
Base (with nozzle for air-cooling of filament seal)		No. 3908
Water Jacket (with nozzle for air-cooling of bulb)		UT-1289

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.

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage	15000 max.	volts
Max-Signal D-C Plate Cur.*	7.5 max.	amp.
Max-Signal Plate Input*	100 max.	kw
Plate Dissipation*	50 max.	kw
Typical Operation - 2 tubes:		
Unless otherwise specified, values are for 2 tubes.		
Filament Voltage	33	d-c volts
D-C Plate Voltage	12000	volts
D-C Grid Voltage	0 approx.	volts
Peak A-F Grid-to-Grid Voltage	2000 approx.	volts
Zero-Signal D-C Plate Current	3	amp.
Max-Signal D-C Plate Current	13	amp.
Load Resistance (per tube)	450	ohms
Effective Load Resistance (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.

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			20000 max.	volts
D-C Plate Current			5.0 max.	amp.
R-F Grid Current			48 max.	amp.
Plate Input			100 max.	kw
Plate Dissipation			75 max.	kw
Typical Operation:				
Filament Voltage	33	33	33	d-c volts
D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage	-100	-150	-200	approx. volts
Peak R-F Grid Voltage°	1000	1250	1500	approx. volts

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

(continued on next page)

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OSCILLATOR, R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

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 fact. of 1.0

D-C Plate Voltage			12000 max.	volts
D-C Grid Voltage			-3000 max.	volts
D-C Plate Current			5.0 max.	amp.
D-C Grid Current			1.25 max.	amp.
R-F Grid Current			48 max.	amp.
Plate Input			60 max.	kw
Plate Dissipation			50 max.	kw
Typical Operation:				
Filament Voltage	33	33	33	d-c volts
D-C Plate Voltage	8000	10000	12000	volts
D-C Grid Voltage	-700	-750	-800	approx. volts
Peak R-F Grid Voltage	1700	1850	2000	approx. 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#

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			1.0 max.	amp.
R-F Grid Current			60 max.	amp.
Plate Input			200 max.	kw
Plate Dissipation			100 max.	kw
Typical Operation:				
Filament Voltage	33	33	33	d-c volts
D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage	-800	-900	-1000	approx. volts
Peak R-F Grid Voltage	2050	2300	2550	approx. 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	2.4	approx. kw
Power Output	50	75	100	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.

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

For use of the 862 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

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OSCILLATOR, R-F POWER AMPLIFIER, CLASS B MODULATOR

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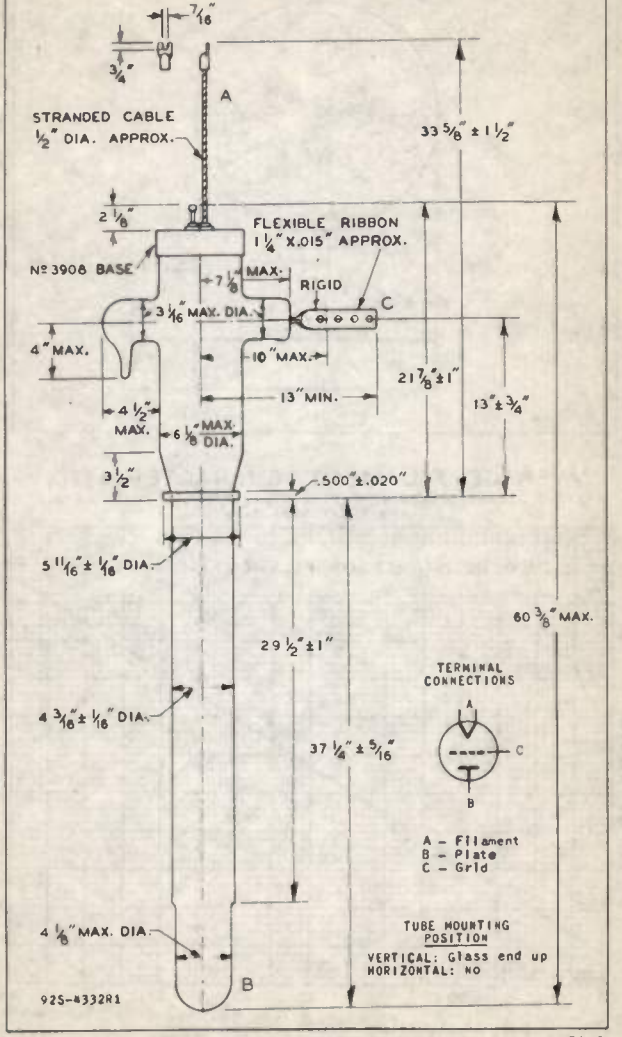

RCA MANUFACTURING COMPANY, INC.

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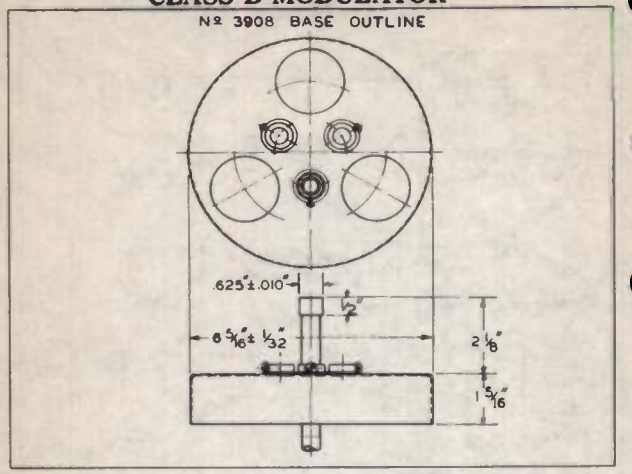
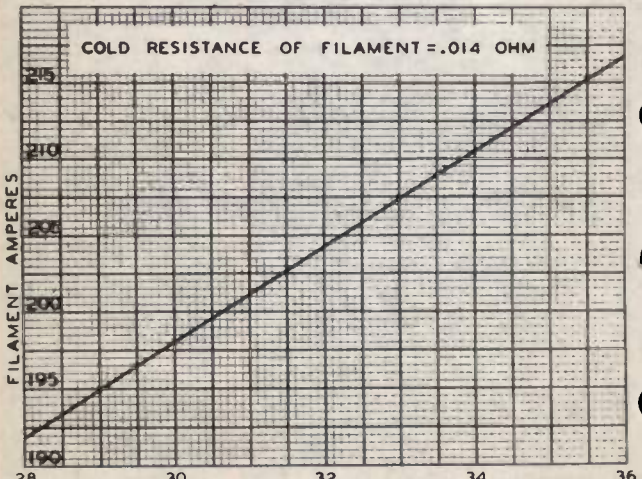
OSCILLATOR, R-F POWER AMPLIFIER. CLASS B MODULATOR



AVERAGE FILAMENT CHARACTERISTIC

AVERAGE FILAMENT EMISSION CHARACTERISTIC is same as that shown for Type 898.



JUNE 15, 1933 (4-39)

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

DATA 2

RCA

862

AVERAGE PLATE CHARACTERISTICS

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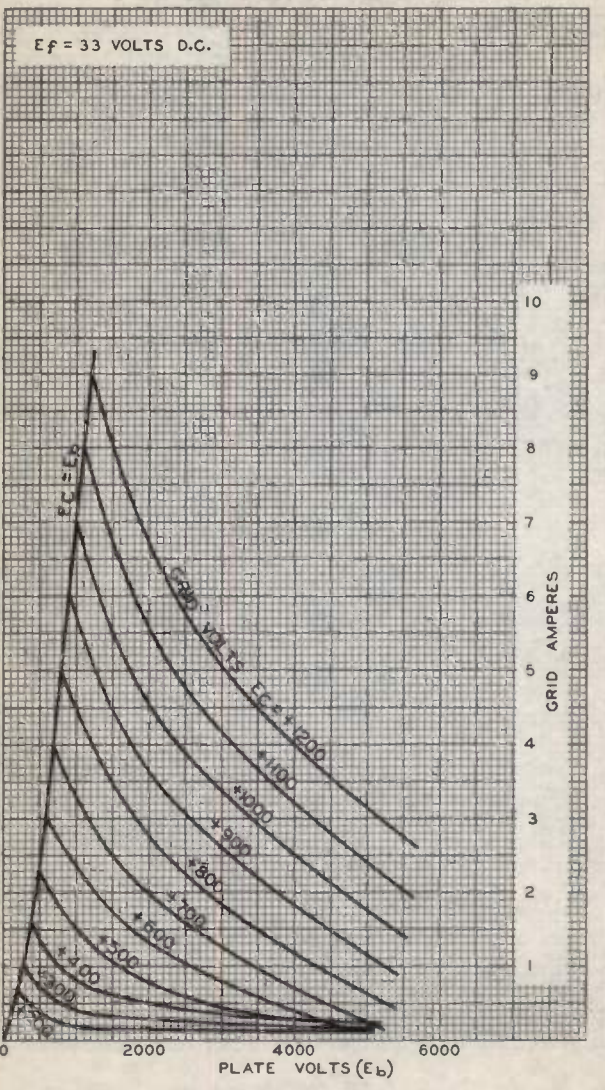
TYPICAL CHARACTERISTICS



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OSCILLATOR, R-F POWER AMPLIFIER, CLASS B MODULATOR

(WATER COOLED)

Filament	Tungsten	
Voltage	22	a-c or d-c volts
Current	52	amp.
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		20-1/4"
Maximum Radius		6-1/2"
Base		No.3906
Water Jacket		UT-1285-A

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 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				
Filament Voltage	22	22	22	d-c volts
D-C Plate Voltage	6000	10000	12500	volts
D-C Grid Voltage	0	-110	-130	volts
Peak A-F Grid-to-Grid Volt.	1200	1620	1530	volts
Zero-Signal D-C Plate Cur.	0.5	0.5	0.4	amp.
Max.-Signal 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.-Sig. Driving Power	415	525	420	approx.watts
Max.-Sig. 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.
R-F Grid Current			24 max.	amp.
Plate Input			15 max.	kw
Plate Dissipation			10 max.	kw
Typical Operation:				
Filament Voltage	22	22	22	d-c volts
D-C Plate Voltage	6000	10000	14000	volts
D-C Grid Voltage	0	-125	-210	volts
Peak R-F Grid Voltage	300	470	510	volts

OBSOLETE NOT RECOMMENDED

863

OSCILLATOR, R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

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.
R-F Grid Current			24 max.	amp.
Plate Input			10 max.	kw
Plate Dissipation			6.6 max.	kw
Typical Operation:				
Filament Voltage	22	22	22	a-c volts
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 **	0.185	0.175	0.115	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.
R-F Grid Current			30 max.	amp.
Plate Input			30 max.	kw
Plate Dissipation			10 max.	kw
Typical Operation:				
Filament Voltage	22	22	22	a-c volts
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

§ 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 863 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS, TUBE SYMBOL, TERMINAL CONNECTIONS, and **FILAMENT CHARACTERISTICS** for the 863 are the same as for the 207. For AVERAGE CHARACTERISTICS CURVES, refer to Type 892.

RCA

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)

RCA MANUFACTURING COMPANY, INC.

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

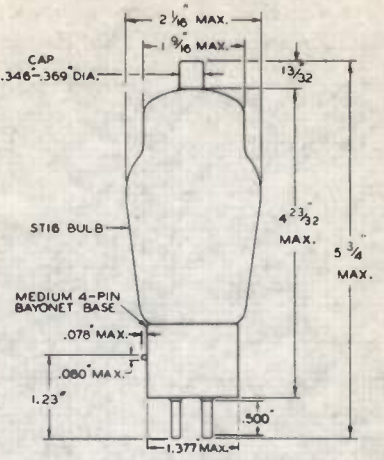
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

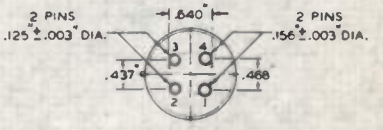
\# Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

For use of the 865 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs. FREQUENCY.

865

SCREEN GRID R-F POWER AMPLIFIER

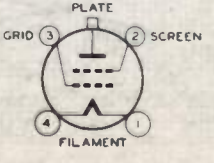




BOTTOM VIEW OF BASE

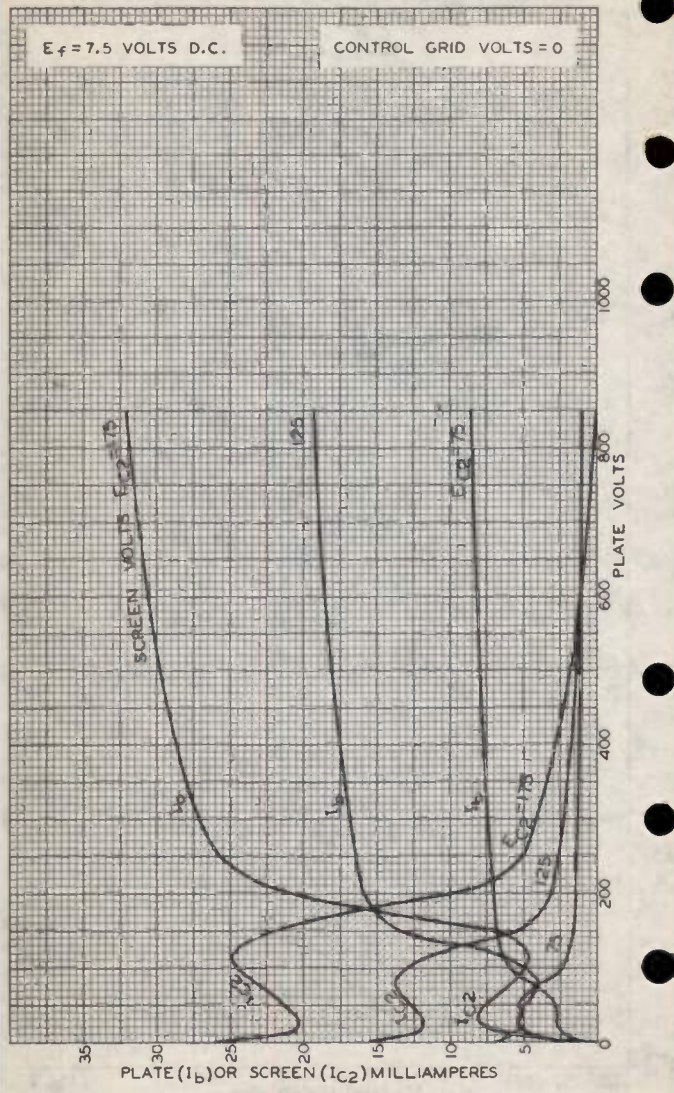
925-4272R3

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



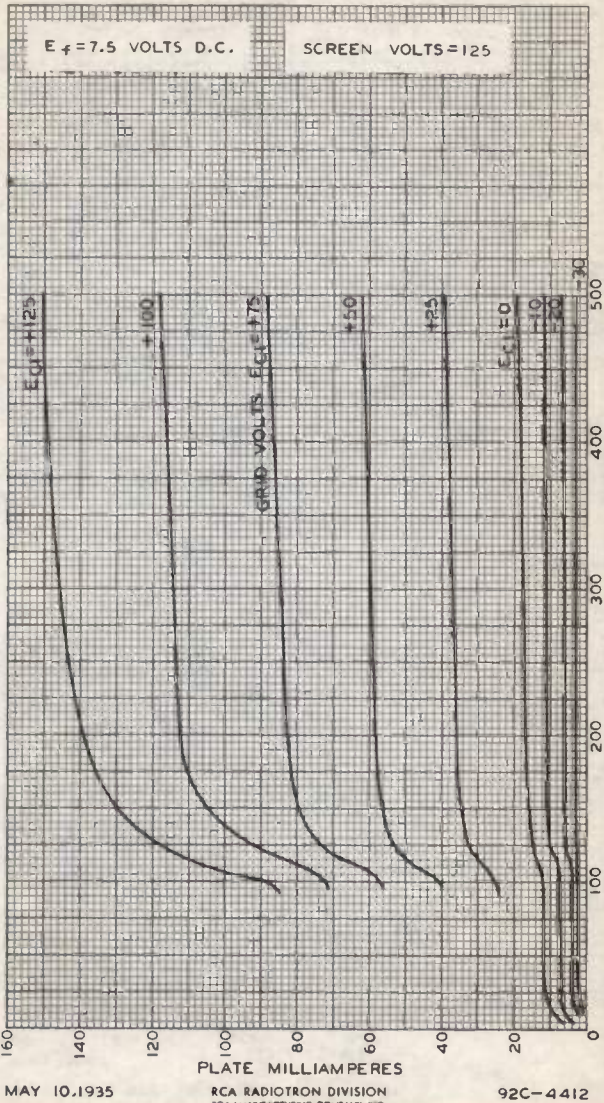
865

AVERAGE PLATE CHARACTERISTICS



865

AVERAGE PLATE CHARACTERISTICS



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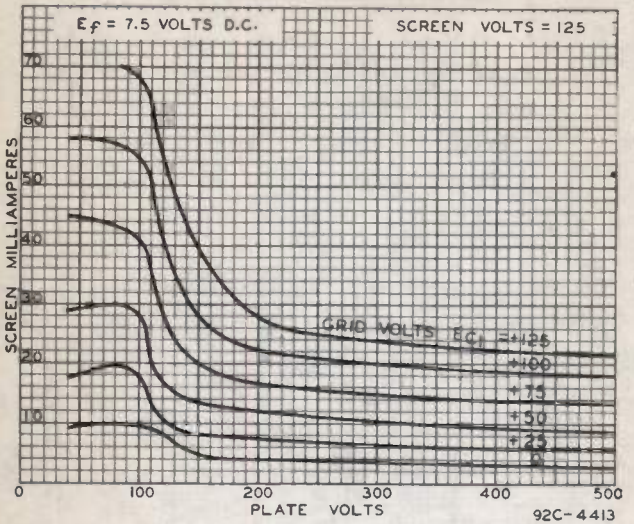
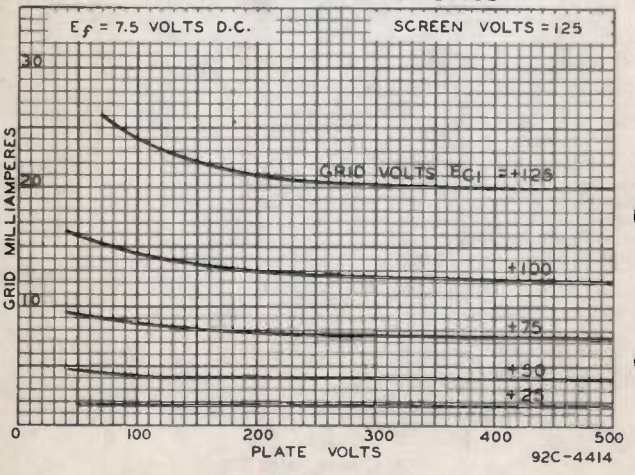
92C-4412

865

AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS



866-A
866

866-A/866

HALF-WAVE MERCURY VAPOR RECTIFIER

This type supersedes RCA Types 866 and 866-A

Filament*	Coated	
Voltage	2.5	a-c volts
Current	5.0	amp.
Maximum Overall Length		6-5/8"
Maximum Diameter		2-7/16"
Bulb		ST-19
Cap	Medium Metal, with Insulating Collar	
Base		Medium 4-Pin, Bayonet
RCA Socket		UR-542A

MAXIMUM RATINGS

Peak Inverse Voltage:	*Column I*	*Column II*	
For supply frequency up to 150~			
Cond. Mercury Temp. 25° to 60°C#	-	10000 max.	volts
Cond. Mercury Temp. 25° to 70°C#	200 max.	-	volts
For supply frequency up to 1000~			
Cond. Mercury Temp. 25° to 70°C#	-	5000 max.	volts
Peak Plate Current	2.0 max.	1.0 max.	amp.
Average Plate Current	0.5 max.	0.25 max.	amp.
Tube Voltage Drop (Approx.)	15	15	volts

* The filament of the 866-A/866 is partially shielded from the plate to permit operation from a power supply having a frequency up to 1000 cycles per second. The filament should be allowed to come up to operating temperature before plate voltage is applied. For average conditions, the delay is approximately 30 seconds.

\# Operation at 40° ± 5°C is recommended.

For *shielding* and *r-f filter circuits*, refer to Type 871.

NOTES ON COLUMN II

The table on the next page gives empirical values of choke inductance (L) and the condenser capacitance (C) for choke-input-to-filter circuits which will keep the peak plate current below the recommended maximum, provided the average d-c load current does not exceed the maximum load-current values shown. Values of (L) and (C) are based on a 60-cycle a-c voltage supply.

The capacitance (C) is small enough to prevent excessive surges when power is first applied to the circuit, and yet large enough to give adequate filtering. If the inductance (L) is increased, it is permissible to increase the capacitance in the same proportion. In a two-section filter with two inductances of unequal value, the larger inductance should be placed next to the rectifier tubes. With such an arrangement, the maximum value of each capacitance should be determined on the basis of the value of the inductance preceding it.

The circuits (see Type 872) of Figs. 1, 2, and 3 will give a ripple voltage less than 5% when used with a two-section filter having the minimum of inductance and the corresponding maximum of capacitance. The circuits of Figs. 4 and 5 will give a ripple voltage of less than 1%. For any of these circuits, better filtering may be obtained with the inductances larger than the minimum given in the table. For these larger inductances, the corresponding capacitances may be increased by the same percentage as the inductances to give still better results.

RCA MANUFACTURING COMPANY INC.

866-A/866

866-A/866

HALF-WAVE MERCURY VAPOR RECTIFIER

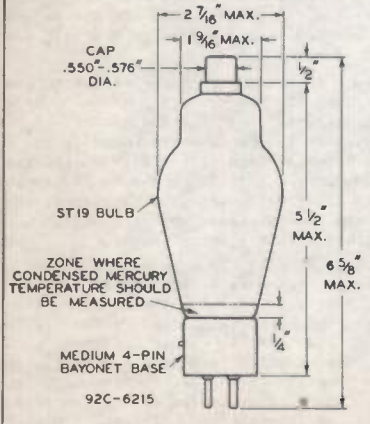
For Circuits, refer to Type 872.

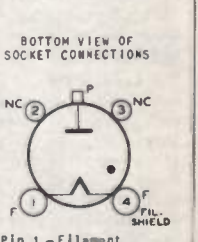
(continued from preceding page)

CIRCUIT	A-C INPUT VOLTS** (RMS)	MAX. D-C OUTPUT VOLTS TO FILTER	CHOKE INPUT ONE-SECTION FILTER MIN. CHOKE (L) henrys	CHOKE INPUT ONE-SECTION FILTER MAX. CONDENSER (C) µf	MAX. D-C LOAD CURRENT amperes
SINGLE-PHASE FULL-WAVE (2 tubes) FIG.1	3535 per tube	3180	8.0	1.25	0.5
	3000 " "	2700	6.8	1.5	0.5
	2000 " "	1800	4.5	2.1	0.5
	1500 " "	1350	3.4	2.8	0.5
SINGLE-PHASE FULL-WAVE (4 tubes) FIG.2	7070 total	6360	16.0	0.6	0.5
	6000 "	5400	13.5	0.7	0.5
	5000 "	4500	11.0	0.9	0.5
	4000 "	3600	8.9	1.1	0.5
THREE-PHASE HALF-WAVE FIG.3	4080 per leg	4780	3.2	1.4	0.75
	3000 " "	3510	2.2	2.0	0.75
	2000 " "	2340	1.4	3.0	0.75
	1500 " "	1750	1.1	4.0	0.75
THREE-PHASE DOUBLE-Y PARALLEL FIG.4	4080 per leg	4780	2.0	0.5	1.5
	3000 " "	3510	1.5	0.7	1.5
	2000 " "	2340	1.0	1.1	1.5
	1500 " "	1750	0.7	1.5	1.5
THREE-PHASE FULL-WAVE FIG.5	4080 per leg	9570	1.8	0.5	0.75
	3000 " "	7020	1.4	0.7	0.75
	2000 " "	4680	0.9	1.2	0.75
	1500 " "	3510	0.7	1.5	0.75
SINGLE-PHASE FULL-WAVE (2 tubes) FIG.1*	3535 per tube	3950	-	-	0.25
	3000 " "	3390	-	-	0.25
	2000 " "	2260	-	-	0.25
	1500 " "	1700	-	-	0.25

* With condenser input to filter.

** For use under the conditions of the 10000-volt peak inverse rating. If the 866-A/866 is to be used under frequency and/or temperature conditions such that the peak inverse voltage is limited to 5000 volts, the a-c input voltage and d-c output voltage values in the table should be multiplied by a factor of 0.5 to give new values for the 5000-volt conditions.





Pin 1 - Filament
Pin 2 - No Connection
Pin 3 - No Connection
Pin 4 - Filament
Cap - Plate
● - Gas Tube Type

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

RCA

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°

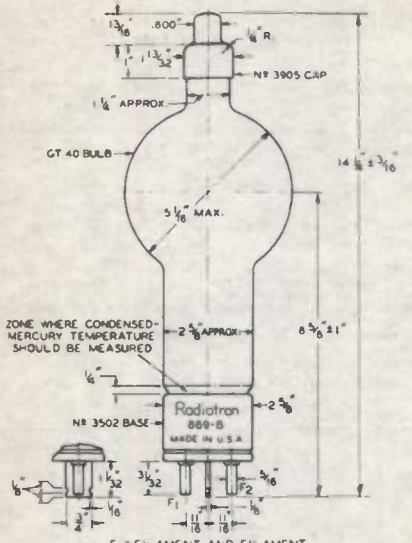
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

869-B

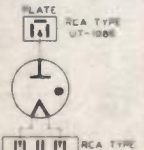
HALF-WAVE MERCURY-VAPOR RECTIFIER

(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.



TUBE SYMBOL & CONNECTIONS TO END-MOUNTINGS



TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

870-A

HALF-WAVE MERCURY-VAPOR RECTIFIER

The 870-A supersedes the Type 870

Heater	Coated Unipotential Cathode*	
Voltage	5	a-c volts
Current	65	amp.
Starting - The heater current must never exceed 2 times the normal value, even momentarily.		
Maximum Overall Length (Including Flexible Leads)		46-3/4"
Maximum Diameter		5-9/16"
Bulb (See *Outline Drawing*)		Metal Shell
Terminal Connections▲		See *Outline Drawing*

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS

Peak Inverse Plate Voltage:	
For Supply Frequency up to 150 ∿:	
*Cond.-Mercury Temp. 35° to 40°C**	16000 max. volts
*Cond.-Mercury Temp. 35° to 50°C**	7500 max. volts
Peak Plate Current	
For Supply Frequency above 25 ∿	450 max. amp.
Average Plate Current {Averaged over period of 60 sec. max.}	75 max. amp.
Surge Current for max. of 0.2 sec.	4500 max. amp.
Peak Tube Voltage Drop	10 volts
Cooling	Forced Air

* The cathode should be allowed to come up to operating temperature and the mercury vapor to reach operating pressure before plate voltage is applied. For average conditions, the delay is about 30 minutes.

▲ Metal shell is connected within the tube to the cathode lead.

● With forced-air ventilation. Recommended temperature of condensed mercury 35°C $^{+5^\circ}_{-0^\circ}$.

For *rectifier circuits*, and *r-f filter circuits*, refer to Type 872-A/872.

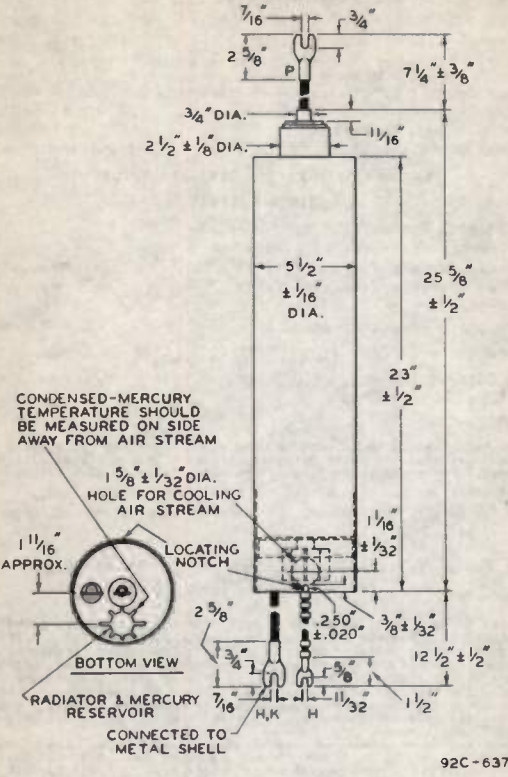
The table below classifies suitable rectifier circuits for the 870-A and shows their safe maximum input and maximum output operating conditions for a peak inverse voltage of 16000 volts. The values are based on sine-wave input and the use of a suitable choke preceding any condenser in the filter circuit. If the 870-A is to be used under temperature conditions such that the peak inverse voltage is limited to 7500 volts, the a-c input voltage and d-c output voltage values in the table should be multiplied by a factor of 0.47 to give the maximum values for the 7500-volt conditions.

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	5650 per tube	5100	150
SINGLE-PHASE FULL-WAVE (4 tubes) Fig. 2	11300 total	10200	150
THREE-PHASE HALF-WAVE Fig. 3	6540 per leg	7650	225
THREE-PHASE DOUBLE-Y PARALLEL Fig. 4	6540 per leg	7650	450
THREE-PHASE FULL-WAVE Fig. 5	6540 per leg	15300	225

● For maximum peak inverse voltage of 16000 volts.

870-A

HALF-WAVE MERCURY-VAPOR RECTIFIER



TUBE SYMBOL AND TERMINAL CONNECTIONS

P – Plate
H – Heater
K – Cathode
● – Gas Tube Type

NOTE: Special end-mountings are required.

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HALF-WAVE MERCURY-VAPOR RECTIFIER

Filament *	Coated	
Voltage	2.5	a-c volts
Current	2.0	amp.
Maximum Overall Length		4-1/2"
Maximum Diameter		1-3/16"
Bulb		T-9
Cap		Medium Metal
Base		Small 4-Pin

MAXIMUM RATINGS

Peak Inverse Voltage:

Supply Freq.	*Condensed Mercury Temp. Range*		
Up to 150 ~	10° - 60°C	5000 max.	volts
Peak Plate Current		0.5 max.	amp.
Average Plate Current		125 max.	ma.
Tube Voltage Drop		15 approx.	volts

* The filament of the 871 should be allowed to come up to operating temperature before plate voltage is applied. For average conditions, the delay is approximately 10 seconds.

Shielding and r-f filter circuits should be provided for the 871 if it is subjected during operation to high-voltage, high-frequency fields. These fields tend to produce breakdown effects in mercury vapor and are detrimental to tube life and performance. External shielding is employed when the tube is in proximity to high-voltage, high-frequency fields. R-F filters are employed to prevent damage caused by r-f currents which might otherwise be fed back into the rectifier tubes.

The table below classifies suitable rectifier circuits for the 871 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.

For Circuits, refer to 92S-4315 (page backing Type 872)

CIRCUIT	MAXIMUM A-C INPUT VOLTS (RMS)	APPROX. D-C OUTPUT VOLTS TO FILTER	MAXIMUM D-C LOAD CURRENT amperes
SINGLE-PHASE FULL-WAVE (2 tubes) FIG. 1	1750 per tube	1570	0.25
SINGLE-PHASE FULL-WAVE (4 tubes) FIG. 2	3500 total	3150	0.25
THREE-PHASE HALF-WAVE FIG. 3	2050 per leg	2400	0.375
THREE-PHASE DOUBLE-Y PARALLEL FIG. 4	2050 per leg	2400	0.75
THREE-PHASE FULL-WAVE FIG. 5	2050 per leg	4800	0.375

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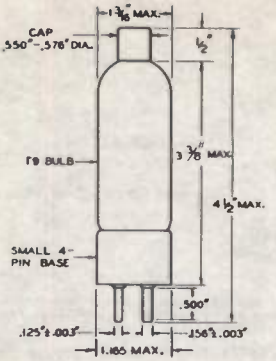
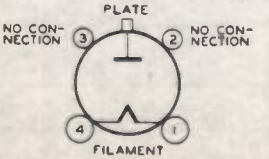
HALF-WAVE MERCURY-VAPOR RECTIFIER



BOTTOM VIEW OF BASE

925-4320R2

TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



872-A/872

HALF-WAVE MERCURY-VAPOR RECTIFIER

This Type Supersedes RCA Types 872 and 872-A

Filament*	Coated	
Voltage	5.0	a-c volts
Current	7.5	amp.
Maximum Overall Length		8-1/2"
Maximum Diameter		2-5/16"
Bulb		T-18
Cap	Medium Metal, with Insulating Collar	
Base °		Jumbo 4-Large Pin
RCA Socket (Type UT-541-A)		Stock No.9936

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS

Peak Inverse Voltage	
For Supply Frequency up to 150 ~	
Cond.-Mercury Temp. 20° to 60°C #	10000 max. volts
Cond.-Mercury Temp. 20° to 70°C #	5000 max. volts
Peak Plate Current	5 max. amp.
Average Plate Current	1.25 max. amp.
Tube Voltage Drop (Approx.)	10 volts

° Base shell is not connected within the base to either filament lead.

\# Operation at 40° ± 5°C is recommended.

* The filament of the 872-A/872 should be allowed to come up to operating temperature before plate voltage is applied. For average conditions the delay is approximately 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.

Shielding and *r-f filter circuits* should be isolated from the transmitter as much as possible in order to avoid the detrimental effects of magnetic and electrostatic fields. These fields tend to produce breakdown in the mercury vapor, are detrimental to tube life and make filtering difficult. External shielding should be used when the tubes are in proximity to these external fields. R-f filtering should be used when the tubes are affected by r-f voltages. When shields are used, special attention must be given to adequate ventilation and to the maintenance of normal condensed-mercury temperature.

The table below classifies suitable rectifier circuits for the 872-A/872 and shows their safe maximum input and maximum output operating conditions for a peak inverse voltage of 10000 volts. The values are based on sine-wave input and the use of a suitable choke preceding any condenser in the filter circuit. If the 872-A/872 is to be used under temperature conditions such that the peak inverse voltage is limited to 5000 volts, the a-c input voltage and d-c output voltage values in the table should be multiplied by a factor of 0.5 to give the maximum values for the 5000-volt conditions.

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	3535 per tube	3180	2.5
SINGLE-PHASE FULL-WAVE (4 tubes) Fig. 2	7070 total	6360	2.5
THREE-PHASE HALF-WAVE Fig. 3	4080 per leg	4780	3.75
THREE-PHASE DOUBLE-Y PARALLEL Fig. 5	4080 per leg	4780	7.5
THREE-PHASE FULL-WAVE Fig. 5	4080 per leg	9570	3.75

□ For maximum peak inverse voltage of 10000 volts.

CIRCUITS FOR HOT-CATHODE MERCURY-VAPOR RECTIFIER TUBES

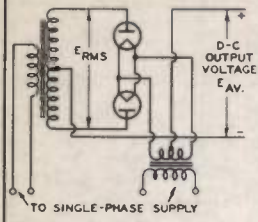


FIG. 1

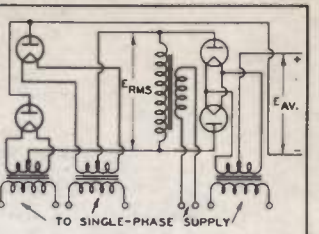


FIG. 2

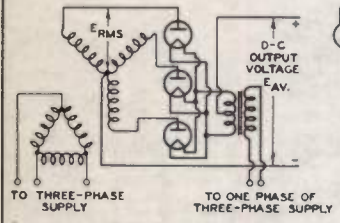


FIG. 3

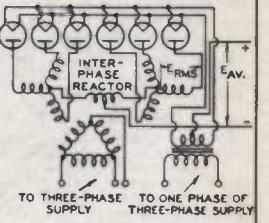


FIG. 4

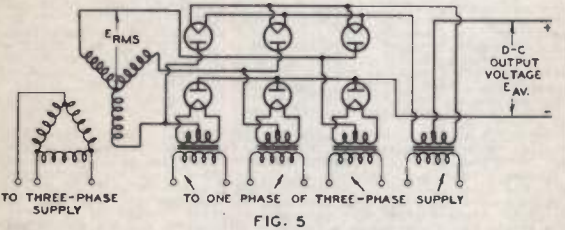


FIG. 5

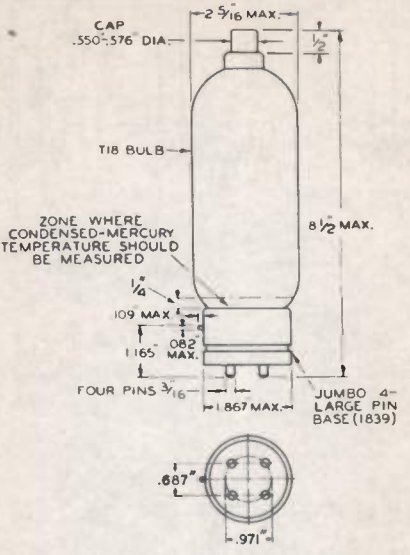
FIGURE	CIRCUIT	$E_{AVERAGE}$	$E_{INVERSE}$	$I_{AVERAGE}$
1	SINGLE-PHASE FULL-WAVE (2 TUBES)	$0.318\,E_{MAXIMUM}$ $0.450\,E_{RMS}$	$3.14\,E_{AVERAGE}$	$0.636\,I_{MAXIMUM}$
2	SINGLE-PHASE FULL-WAVE (4 TUBES)	$0.636\,E_{MAXIMUM}$ $0.900\,E_{RMS}$	$1.57\,E_{AVERAGE}$	$0.636\,I_{MAXIMUM}$
3	THREE-PHASE HALF-WAVE	$0.827\,E_{MAXIMUM}$ $1.170\,E_{RMS}$	$2.09\,E_{AVERAGE}$	$0.827\,I_{MAXIMUM}$
4	THREE-PHASE DOUBLE-Y PARALLEL	$0.827\,E_{MAXIMUM}$ $1.170\,E_{RMS}$	$2.09\,E_{AVERAGE}$	$1.91\,I_{MAXIMUM}$
5	THREE-PHASE FULL-WAVE	$1.65\,E_{MAXIMUM}$ $2.34\,E_{RMS}$	$1.045\,E_{AVERAGE}$	$0.955\,I_{MAXIMUM}$

CONDITIONS ASSUMED :-

(1) SINE-WAVE SUPPLY (2) BALANCED PHASE VOLTAGES (3) ZERO TUBE DROP (4) PURE RESISTANCE LOAD (5) NO FILTER USED

872-A/872

HALF-WAVE MERCURY-VAPOR RECTIFIER



BOTTOM VIEW OF BASE

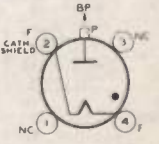
92C-6396

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

BOTTOM VIEW OF SOCKET CONNECTIONS

Pin 1 – No Connection
Pin 2 – Filament, Cathode Shield
Pin 3 – No Connection
Pin 4 – Filament
Cap – Plate
● – Gas Type Tube



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.

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 returned to the negative end of the filament.

** 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
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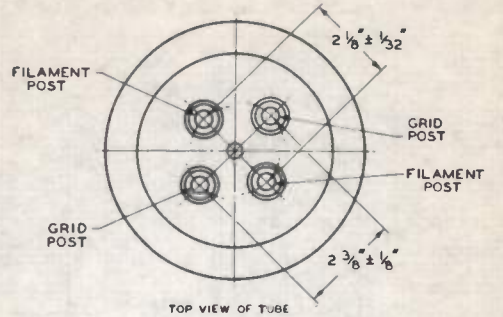
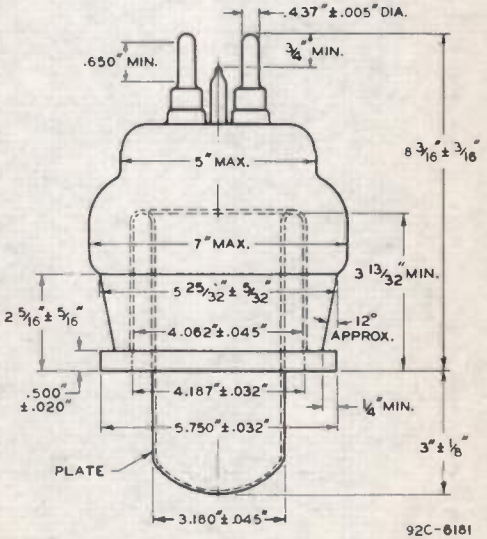
R-F POWER AMPLIFIER, CLASS B MODULATOR



TOP VIEW OF TUBE



TUBE MOUNTING POSITION

VERTICAL: Glass end up.
HORIZONTAL: No.

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880

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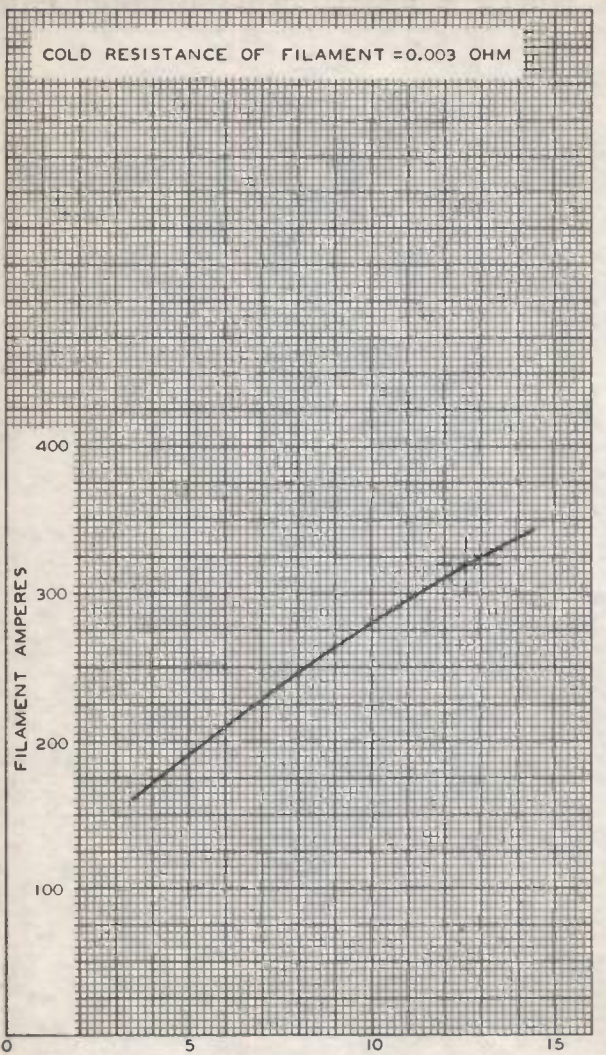
880

AVERAGE FILAMENT CHARACTERISTICS



JUNE 17, 1940

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RCA MANUFACTURING COMPANY, INC.

92C-6179

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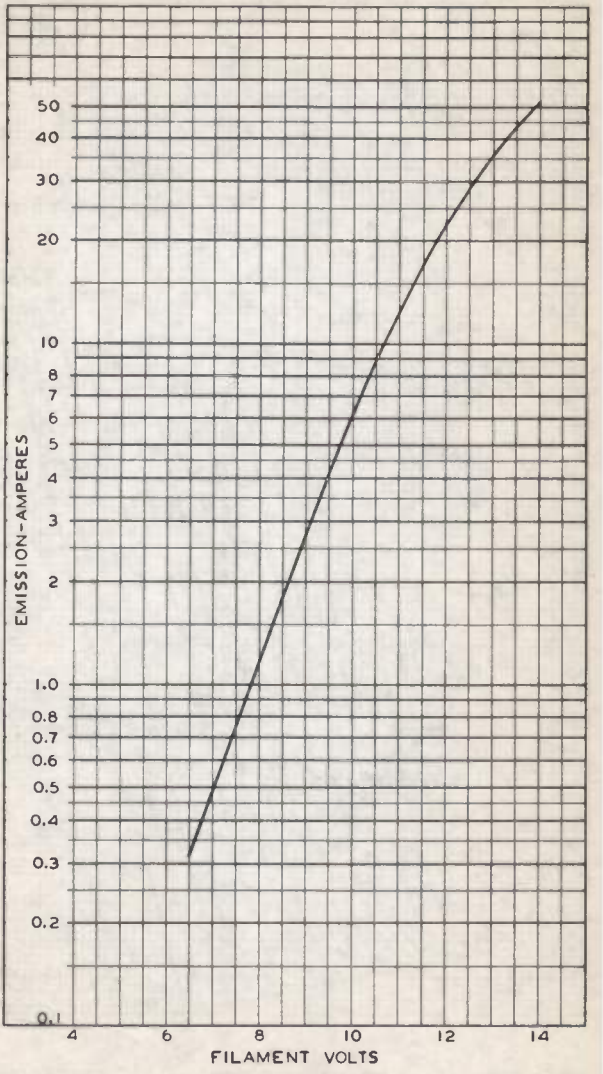
880

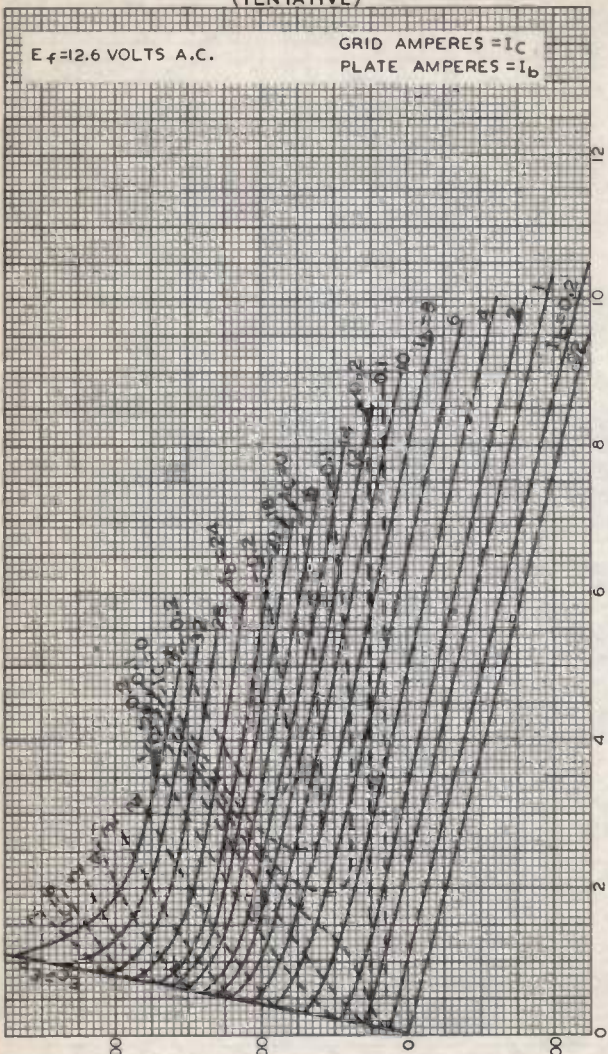
AVERAGE FILAMENT-EMISSION CHARACTERISTIC



880

880

AVERAGE CONSTANT-CURRENT CHARACTERISTICS
(TENTATIVE)



JUNE 17, 1940

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RCA MANUFACTURING COMPANY, INC.

92C-6178

887

R-F POWER AMPLIFIER, OSCILLATOR

(WATER & FORCED-AIR COOLED)

Filament	Tungsten		
Voltage	11		a-c or d-c volts
Current	24		amp.
Amplification Factor	10		
Direct Interelectrode Capacitances (approx.)♣:			
Grid to Plate	6.9		μμf
Grid to Filament	2.5		μμf
Plate to Filament	2.7		μμf
Maximum Overall Length			7-3/8"
Maximum Radius			2-1/16"
Water Jacket			Integral part of tube

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.

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		3000 max.	volts
D-C Plate Current		200 max.	ma.
Plate Input		600 max.	watts
Plate Dissipation		600 max.	watts
Typical Operation:			
Filament Voltage	11	11	a-c volts
D-C Plate Voltage	2500	3000	volts
D-C Grid Voltage	-250	-300	volts
Peak R-F Grid Voltage	290	320	volts
D-C Plate Current	200	200	ma.
D-C Grid Current **	2	1	approx.ma.
Driving Power ** o	45	50	approx.watts
Power Output	165	200	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		2000 max.	volts
D-C Grid Voltage		-500 max.	volts
D-C Plate Current		200 max.	ma.
D-C Grid Current		75 max.	ma.
Plate Input		400 max.	watts
Plate Dissipation		400 max.	watts
Typical Operation:			
Filament Voltage	11	11	a-c volts
D-C Plate Voltage	1500	2000	volts
D-C Grid Voltage	-450	-500	volts
Peak R-F Grid Voltage	800	850	volts
D-C Plate Current	200	200	ma.

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

** See next page.

♣ With grid shield and water jacket.

887

R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

D-C Grid Current **	50	50	approx.	ma.
Driving Power **	35	40	approx.	watts
Power Output	200	300	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage			3000 max.	volts
D-C Grid Voltage			-500 max.	volts
D-C Plate Current			400 max.	ma.
D-C Grid Current			75 max.	ma.
Plate Input			1200 max.	watts
Plate Dissipation			1000 max.	watts
Typical Operation:				
Filament Voltage	11	11	11	a-c volts
D-C Plate Voltage	2000	2500	3000	volts
D-C Grid Voltage	-400	-450	-500	volts
Peak R-F Grid Voltage	825	875	925	volts
D-C Plate Current	400	400	400	ma.
D-C Grid Current **	45	45	45	approx. ma.
Driving Power **	35	35	35	approx. watts
Power Output	450	625	800	approx. watts

** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

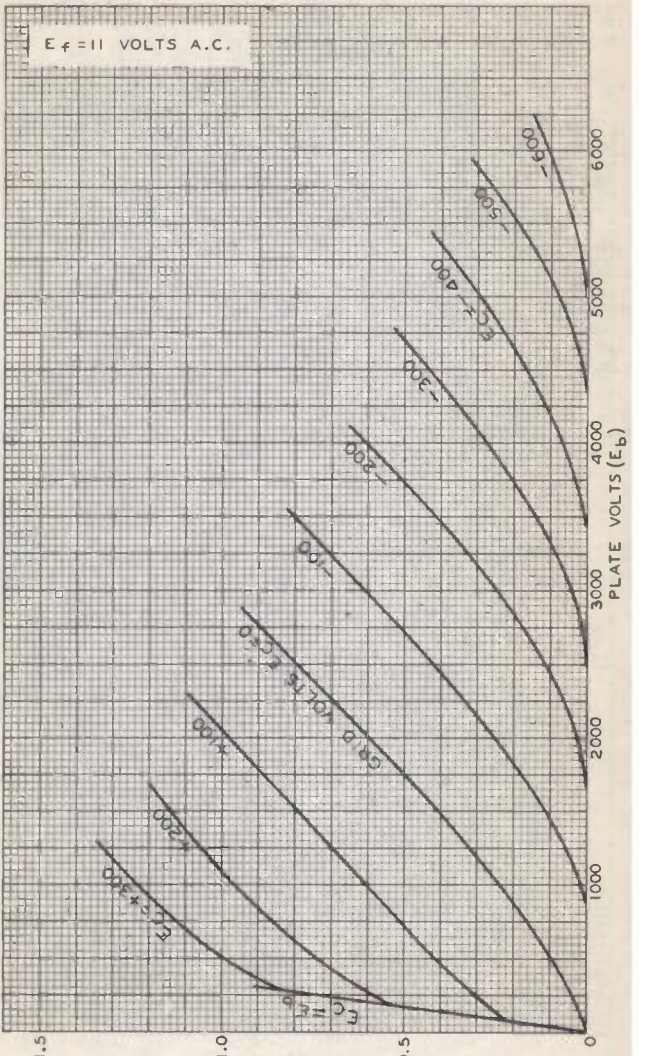
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

For use of the 887 at the higher frequencies, refer to curve 92C-4763 under Type 888 and sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS, TUBE SYMBOL, and MOUNTING for the 887 are the same as for the 888.

887

AVERAGE PLATE CHARACTERISTICS



MAY 11, 1937

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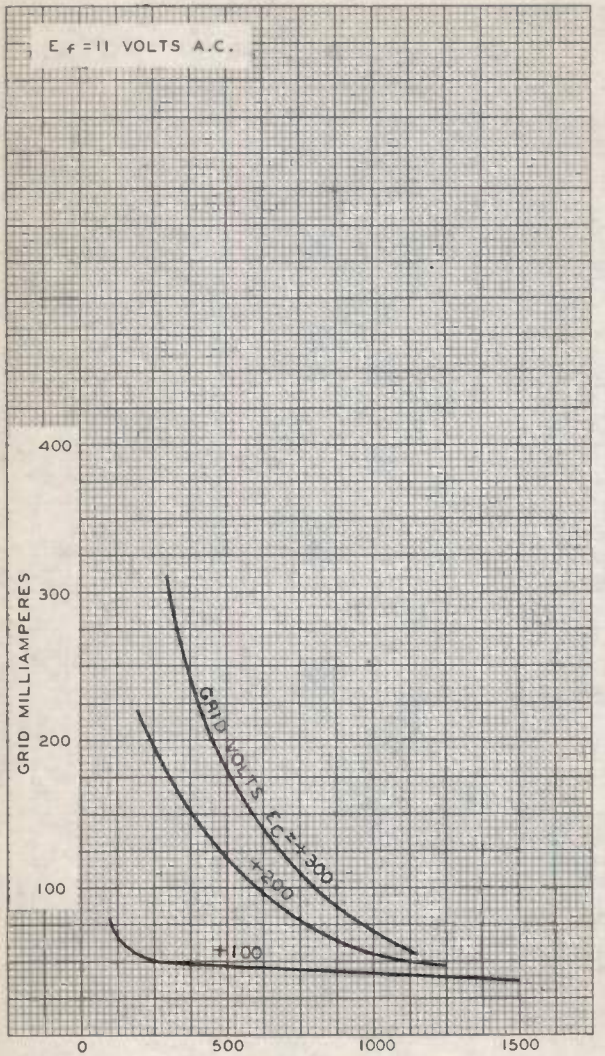
RCA MANUFACTURING COMPANY, INC.

92C-4757

887

TYPICAL CHARACTERISTICS



RCA

888

R-F POWER AMPLIFIER, OSCILLATOR

(WATER & FORCED-AIR COOLED)

Filament	Tungsten	
Voltage	11	a-c or d-c volts
Current	24	amp.
Amplification Factor	30	
Direct Interelectrode Capacitances (approx.)‡:		
Grid to Plate	7.8	μμf
Grid to Filament	2.8	μμf
Plate to Filament	2.5	μμf
Maximum Overall Length		7-3/8"
Maximum Radius		2-1/16"
Water Jacket		Integral part of tube

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.

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		3000 max.	volts
D-C Plate Current		200 max.	ma.
Plate Input		600 max.	watts
Plate Dissipation		600 max.	watts
Typical Operation:			
Filament Voltage	11	11	a-c volts
D-C Plate Voltage	2500	3000	volts
D-C Grid Voltage	-80	-100	volts
Peak R-F Grid Voltage	200	220	volts
D-C Plate Current	200	200	ma.
D-C Grid Current **	15	15	approx. ma.
Driving Power ** ○	45	50	approx. watts
Power Output	165	200	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		2000 max.	volts
D-C Grid Voltage		-500 max.	volts
D-C Plate Current		200 max.	ma.
D-C Grid Current		100 max.	ma.
Plate Input		400 max.	watts
Plate Dissipation		400 max.	watts
Typical Operation:			
Filament Voltage	11	11	a-c volts
D-C Plate Voltage	1500	2000	volts
D-C Grid Voltage	-300	-350	volts
Peak R-F Grid Voltage	600	650	volts
D-C Plate Current	200	200	ma.

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

** See next page.

‡ With grid shield and water jacket.

888

R-F POWER AMPLIFIER, OSCILLATOR

(continued from preceding page)

D-C Grid Current **	80	80	approx.	ma.
Driving Power **	40	40	approx.	watts
Power Output	200	300	approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage			3000	max.	volts
D-C Grid Voltage			-500	max.	volts
D-C Plate Current			400	max.	ma.
D-C Grid Current			100	max.	ma.
Plate Input			1200	max.	watts
Plate Dissipation			1000	max.	watts
Typical Operation:					
Filament Voltage	11	11	11	a-c	volts
D-C Plate Voltage	2000	2500	3000		volts
D-C Grid Voltage	-265	-280	-300		volts
Peak R-F Grid Voltage	625	640	650		volts
D-C Plate Current	400	400	400		ma.
D-C Grid Current **	80	80	80	approx.	ma.
Driving Power **	45	45	45	approx.	watts
Power Output	450	625	800	approx.	watts

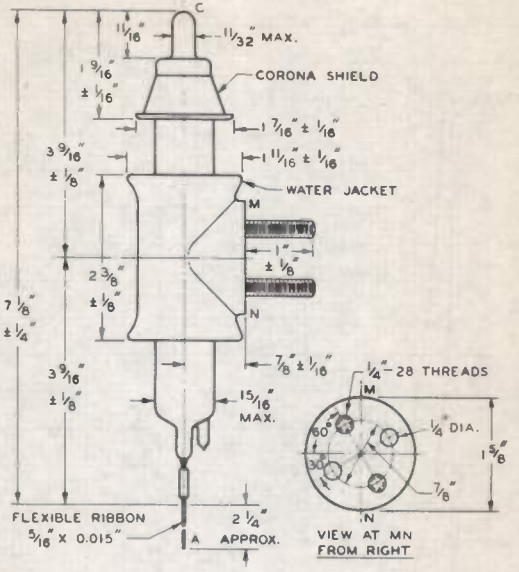
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

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 888 at the higher frequencies, refer to curve 92C-4763 under this type and sheet TRANS. TUBE RATINGS vs FREQUENCY.

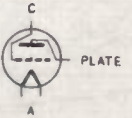
888

R-F POWER AMPLIFIER, OSCILLATOR



92C-4761R1

TUBE SYMBOL AND TERMINAL CONNECTIONS



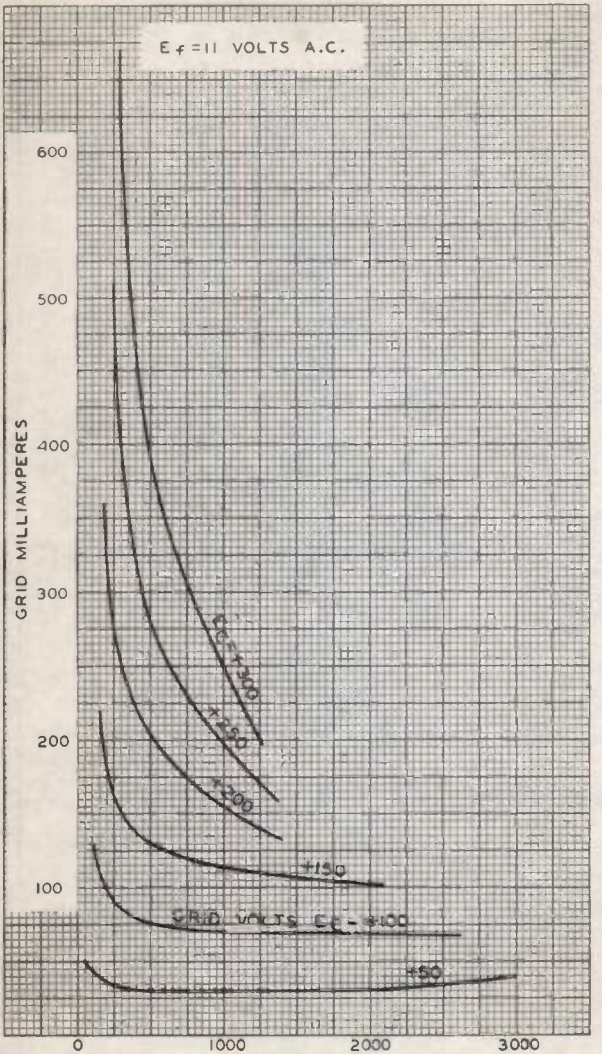
A-FILAMENT
C-GRID
PLATE CONNECTION TO WATER-JACKET MOUNTING

RCA MANUFACTURING COMPANY INC

888

888

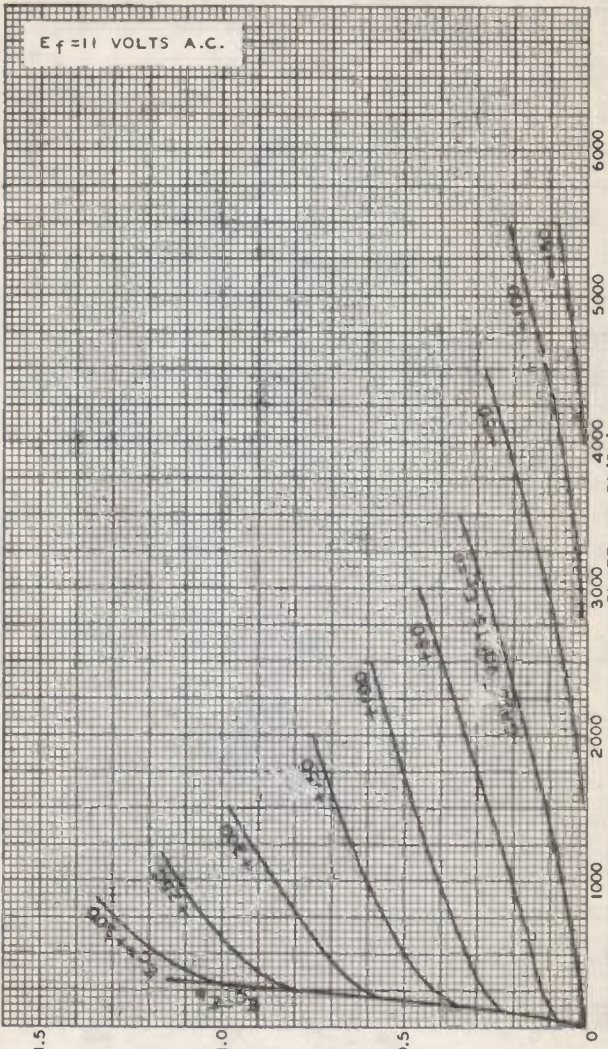
TYPICAL CHARACTERISTICS



RCA

888

AVERAGE PLATE CHARACTERISTICS



MAY 11, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4759

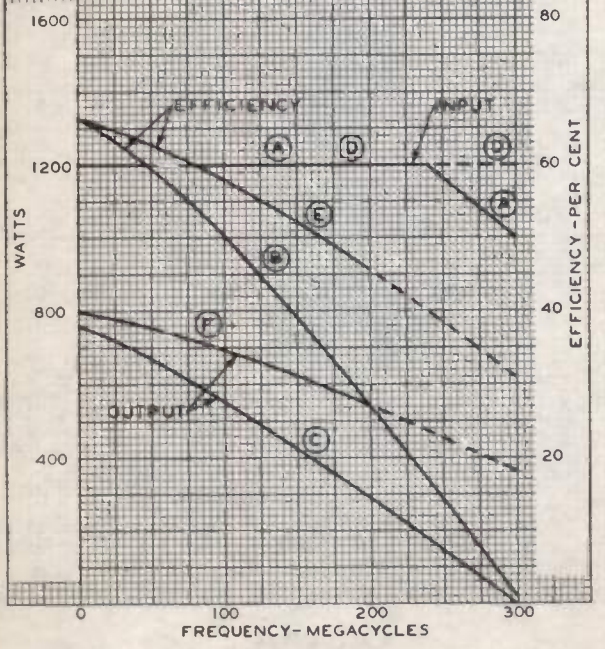
887
888

TYPES: 887, 888

FREQUENCY PERFORMANCE CHARACTERISTICS

UNMODULATED CLASS C AMPLIFIER & OSCILLATOR

CURVE	DESCRIPTION
A	OSCILLATOR INPUT
B	OSCILLATOR EFFICIENCY
C	OSCILLATOR OUTPUT = TUBE OUTPUT MINUS GRID DRIVING POWER
D	POWER AMPLIFIER INPUT
E	POWER AMPLIFIER EFFICIENCY
F	POWER AMPLIFIER OUTPUT = TUBE OUTPUT



MAY 18, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4763

RCA

889

R-F POWER AMPLIFIER, CLASS B MODULATOR

(WATER & FORCED-AIR COOLED)

Filament	Tungsten	
Voltage	11	a-c or d-c volts
Current	125	amp.
Starting—The filament current must never exceed 1-1/2 times the normal value, even momentarily.		
Amplification Factor	21	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	17.8	μμf
Grid to Filament	18.8	μμf
Plate to Filament	2.2	μμf
Maximum Overall Length		10-3/4"
Maximum Diameter		3-5/8"
Water Jacket		UT-4000

Cooling—water flow of 3 to 6 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 approximately 15 cu.ft./min. through 3-inch diameter nozzle directed at upper part of bulb is required to limit temperature of glass at hottest point to 150°C.

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

D-C Plate Voltage			7500 max.	volts
Max.-Signal D-C 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 2 tubes				
D-C Plate Voltage	5000	6000	7500	volts
D-C Grid Voltage	-180	-230	-300	volts
Peak A-F Grid-to-Grid Volt.	1460	1680	1700	volts
Zero-Sig. D-C Plate Cur.	0.4	0.4	0.4	amp.
Max.-Sig. D-C Plate Cur.	3.2	3.6	3.2	amp.
Load Resistance (per tube)	630	920	1250	ohms
Effective Load Resistance (plate to plate)	2520	3680	5000	ohms
Max.-Sig. Driving Power	170	180	150	approx. watts
Max.-Sig. Power Output	8.8	12	15	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			7500 max.	volts
D-C Plate Current			1.0 max.	amp.
Plate Input			7.5 max.	kw
Plate Dissipation			5 max.	kw
Typical Operation:				
D-C Plate Voltage		6000	7500	volts
D-C Grid Voltage		-250	-300	volts
Peak R-F Grid Voltage		920	1000	volts
D-C Plate Current		0.9	0.9	amp.
Driving Power°		95	80	approx. watts
Power Output		1.5	2	approx. kw

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

889

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 fact. of 1.0

D-C Plate Voltage			6000 max.	volts
D-C Grid Voltage			-1000 max.	volts
D-C Plate Current			1.0 max.	amp.
D-C Grid Current			0.25 max.	amp.
Plate Input			6 max.	kw
Plate Dissipation			3 max.	kw
Typical Operation:				
D-C Plate Voltage	5000	6000		volts
D-C Grid Voltage □	-800	-900		volts
	6700	9000		ohms
Peak R-F Grid Voltage	1300	1420		volts
D-C Plate Current	0.9	1.0		amp.
D-C Grid Current °°	0.12	0.1	approx.	amp.
Driving Power °°	155	140	approx.	watts
Power Output	2.75	4	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				2 max.	amp.
D-C Grid Current				0.25 max.	amp.
Plate Input				15 max.	kw
Plate Dissipation				5 max.	kw
Typical Operation:					
D-C Plate Voltage	5000	6000	7500		volts
D-C Grid Voltage □	-500	-600	-800		volts
	2600	2900	3300		ohms
Peak R-F Grid Voltage	1200	1460	1830		volts
D-C Plate Current	1.5	1.8	2		amp.
D-C Grid Current °°	0.19	0.21	0.24	approx.	amp.
Driving Power °°	220	290	400	approx.	watts
Power Output	5	7	10	approx.	kw

°° 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 leak of value shown or by other self- or fixed-bias methods.

Data on operating frequencies for the 889 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

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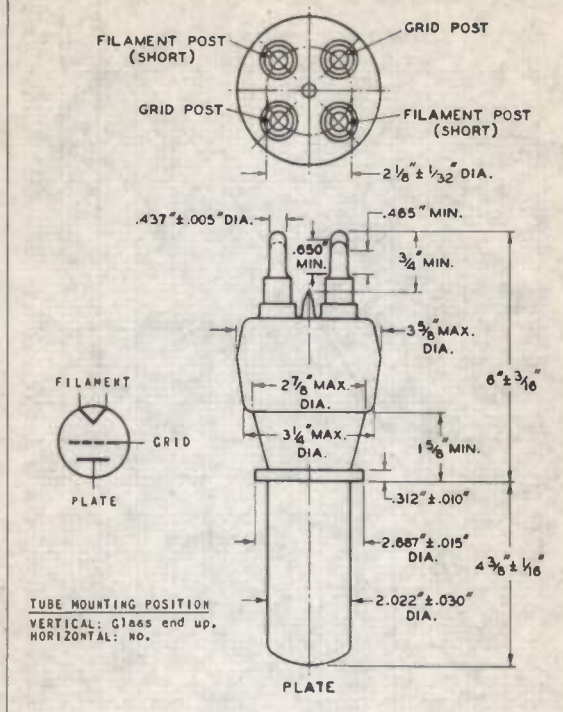
R-F POWER AMPLIFIER, CLASS B MODULATOR



TUBE MOUNTING POSITION

VERTICAL: Glass end up.
HORIZONTAL: No.

92C-6039

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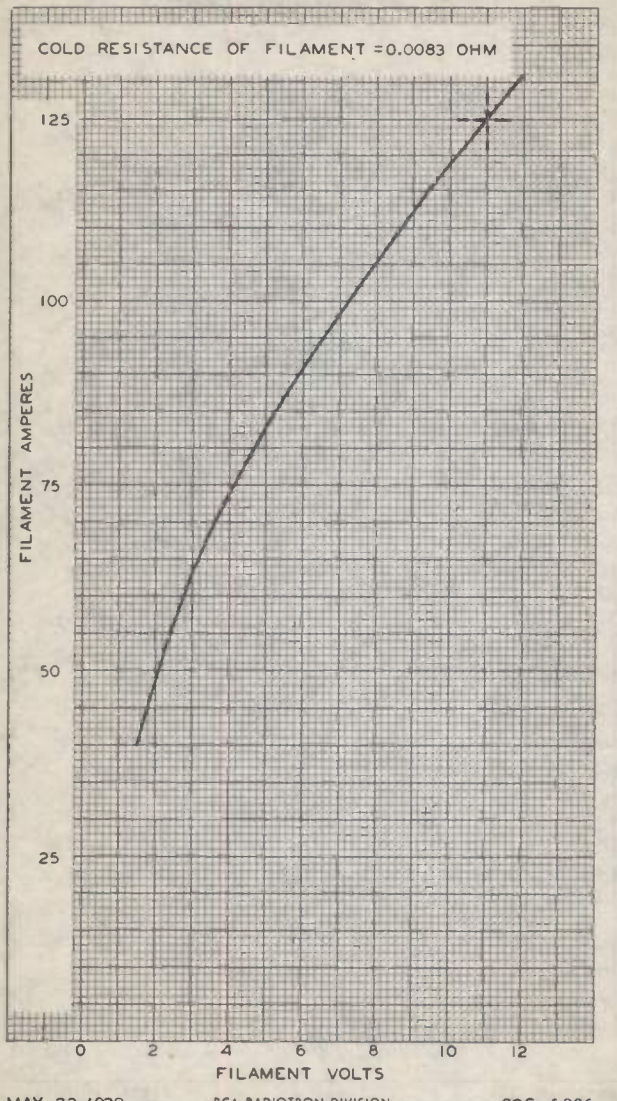
AVERAGE FILAMENT CHARACTERISTIC



MAY 22, 1939

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92C-6086

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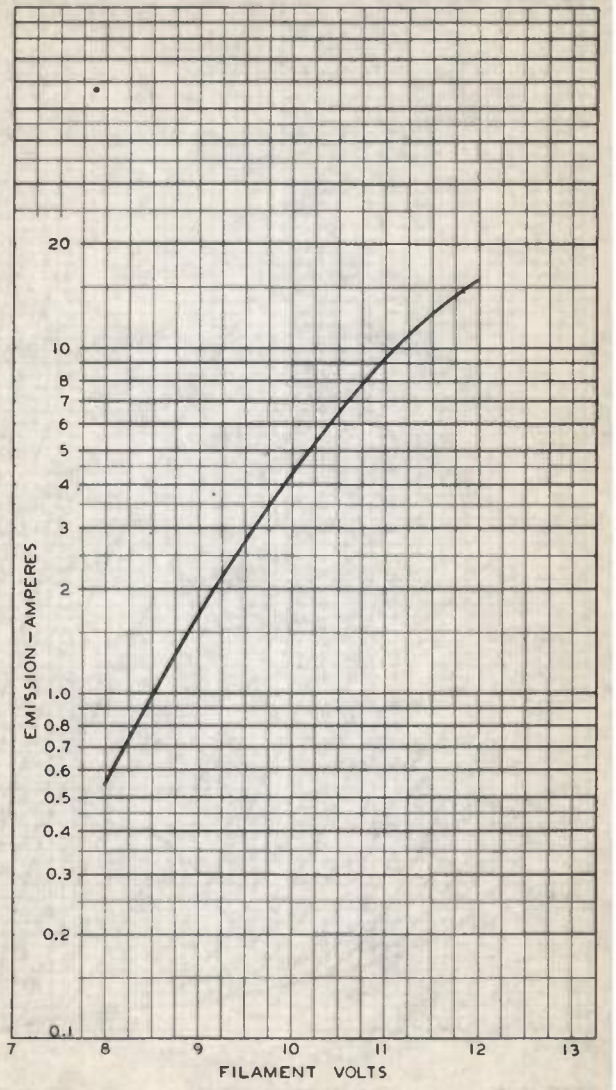
AVERAGE FILAMENT-EMISSION CHARACTERISTIC



MAY 22,1939

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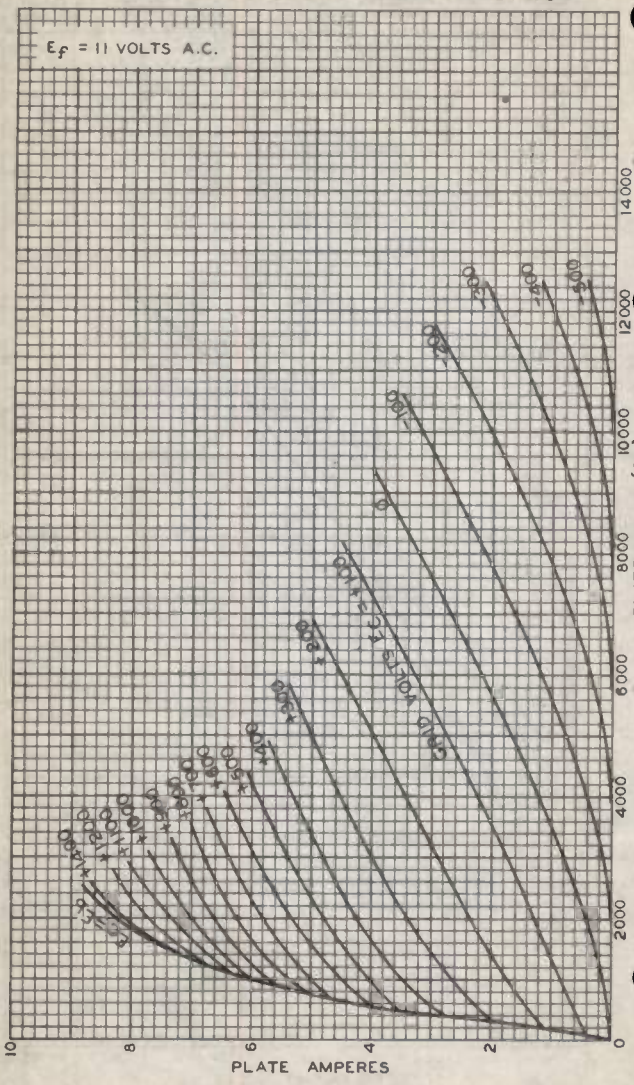
AVERAGE PLATE CHARACTERISTICS



JUNE 14, 1939

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92C-6063

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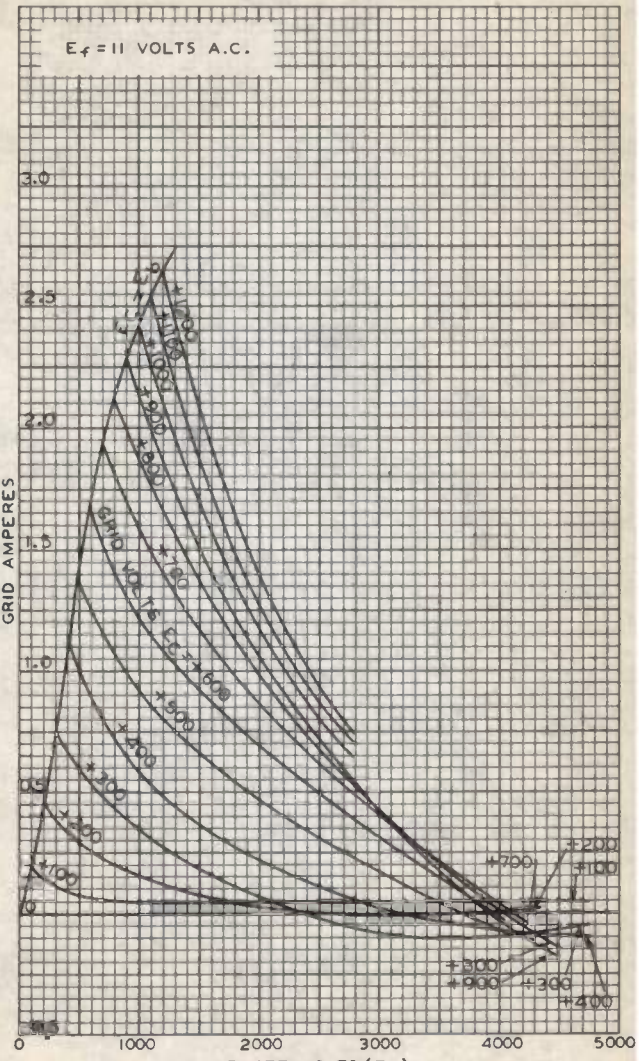
TYPICAL CHARACTERISTICS



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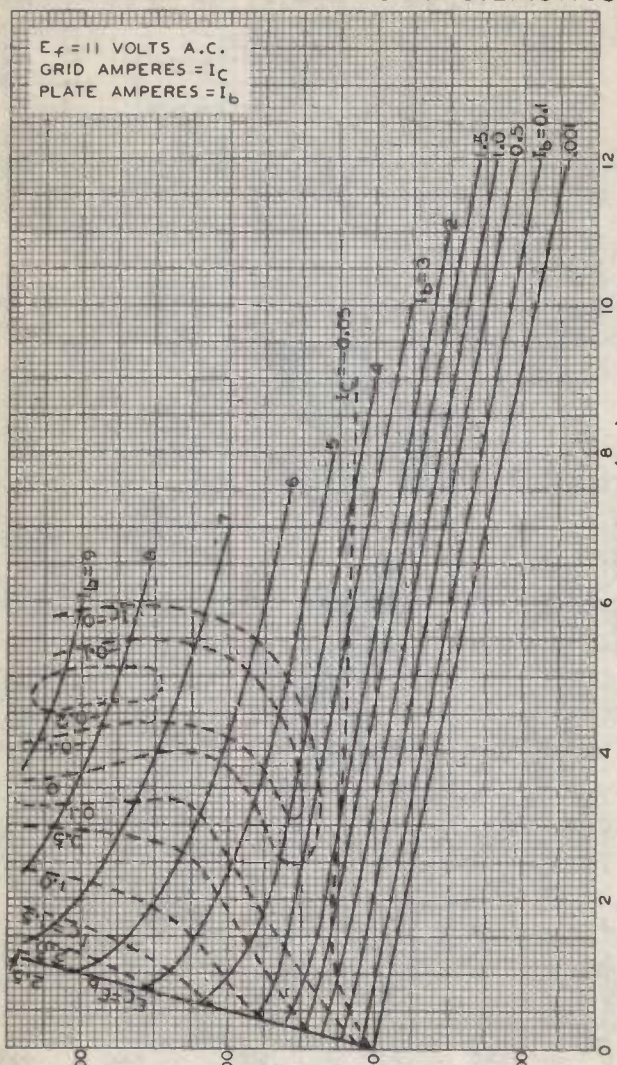
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



MAY 22, 1939

RCA RADIOTRON DIVISION
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92C-6088

889-R

R-F POWER AMPLIFIER, CLASS B MODULATOR

(FORCED-AIR COOLED)

Filament	Tungsten	
Voltage	11	a-c or d-c volts
Current	125	amp.

Starting - The filament current must never exceed 1-1/2 times the normal value, even momentarily.

Amplification Factor	21	
Direct Interelectrode Capacitances:		
Grid to Plate	20.7	μμf
Grid to Filament	19.5	μμf
Plate to Filament	2.5	μμf
Maximum Overall Length		11-3/4"
Maximum Radius		5-7/16"
Radiator		Integral part of tube
Mounting		UT-4304

Cooling - A vertical air flow of 500 cu. ft./min. should be delivered by a blower to the cooling radiator. Air flow must start before the application of any voltages. The temperature of the incoming air should not exceed 45°C. Cooling must be adequate to limit the glass temperature to not more than 150°C at the hottest part.

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 B

D-C Plate Voltage			8500 max.	volts
Max.-Signal D-C Plate Current*			2 max.	amp.
Max.-Signal Plate Input*			12 max.	kw
Plate Dissipation*			5 max.	kw
Radiator Temperature▲			180 max.	°C
Typical Operation:				
Unless otherwise specified, values are for 2 tubes				
D-C Plate Voltage	5000	6000	7500	volts
D-C Grid Voltage#	-180	-230	-300	volts
Peak A-F Grid-to-Grid Volt.	1460	1680	1700	volts
Zero-Sig. D-C Plate Current	0.4	0.4	0.4	amp.
Max.-Sig. D-C Plate Current	3.2	3.6	3.2	amp.
Load Resistance (per tube)	630	920	1250	ohms
Effective Load Resistance (plate to plate)	2520	3680	5000	ohms
Max.-Sig. Driving Power	170	180	150	approx. watts
Max.-Sig. Power Output	8.8	12	15	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 factor of 1.0

D-C Plate Voltage			8500 max.	volts
D-C Plate Current			1.0 max.	amp.
R-F Grid Current			48 max.	amp.
Plate Input			7.5 max.	kw
Plate Dissipation			5 max.	kw
Radiator Temperature▲			180 max.	°C
Typical Operation:				
D-C Plate Voltage		6000	7500	volts

▲, #: See end of tabulation.

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889-R

R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

D-C Grid Voltage#	-250	-300	volts
Peak R-F Grid Voltage	460	500	volts
D-C Plate Current	0.9	0.9	amp.
Driving Power** °	95	80 approx.	watts
Power Output	1.5	2 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

D-C Plate Voltage		6000 max.	volts
D-C Grid Voltage		-1000 max.	volts
D-C Plate Current		1.0 max.	amp.
D-C Grid Current		0.25 max.	amp.
R-F Grid Current		48 max.	amp.
Plate Input		6 max.	kw
Plate Dissipation		3 max.	kw
Radiator Temperature▲		180 max.	°C
Typical Operation:			
D-C Plate Voltage	5000	6000	volts
D-C Grid Voltage	-800	-900	volts
Peak R-F Grid Voltage	1300	1420	volts
D-C Plate Current	0.9	1.0	amp.
D-C Grid Current**	0.12	0.1 approx.	amp.
Driving Power**	155	140 approx.	watts
Power Output	2.75	4 approx.	kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C Plate Voltage			8500 max.	volts
D-C Grid Voltage			-1000 max.	volts
D-C Plate Current			2 max.	amp.
D-C Grid Current			0.25 max.	amp.
R-F Grid Current			60 max.	amp.
Plate Input			16 max.	kw
Plate Dissipation			5 max.	kw
Radiator Temperature▲			180 max.	°C
Typical Operation:				
D-C Plate Voltage	5000	6000	7500	volts
D-C Grid Voltage	-500	-600	-800	volts
Peak R-F Grid Voltage	1200	1460	1830	volts
D-C Plate Current	1.5	1.8	2	amp.
D-C Grid Current**	0.19	0.21	0.24 approx.	amp.
Driving Power**	220	290	400 approx.	watts
Power Output	5	7	10 approx.	kw

\# Grid voltages are given with respect to the midpoint 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.

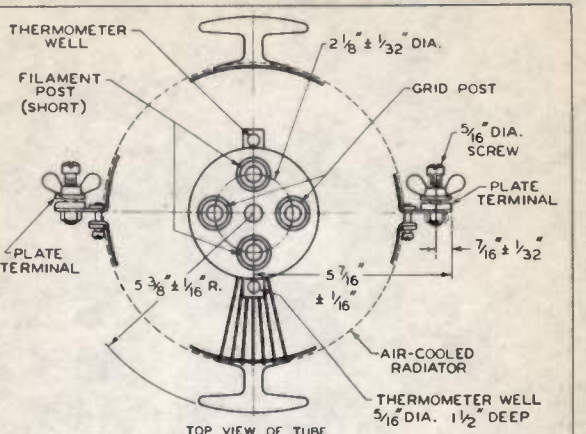
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

▲ Measured in thermometer well.

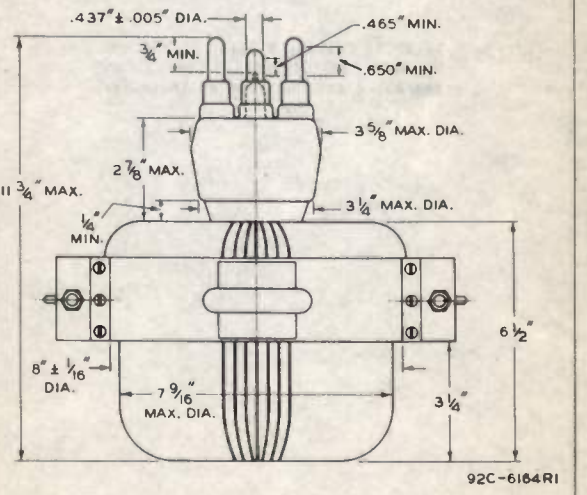
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions..

889-R

R-F POWER AMPLIFIER, CLASS B MODULATOR



TOP VIEW OF TUBE



92C-6184R1

TUBE MOUNTING POSITION

VERTICAL: Glass end up.
HORIZONTAL: No.

889-R

R-F POWER AMPLIFIER, CLASS B MODULATOR

FILAMENT CHARACTERISTICS CURVES and AVERAGE CHARACTERISTICS CURVES for the 889-R are the same as those for the 889.

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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.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°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.

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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.

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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

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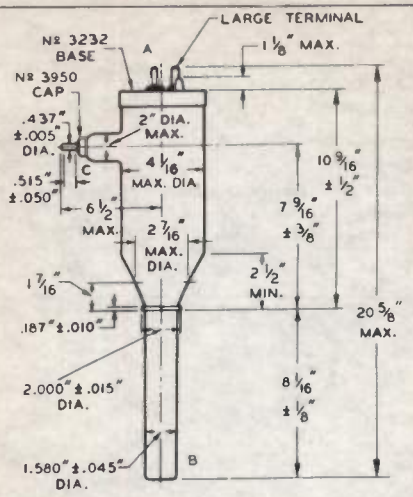
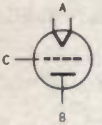
R-F POWER AMPLIFIER, MODULATOR



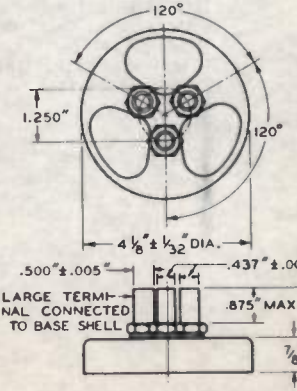
92C-4627RI

TUBE SYMBOL AND TERMINAL CONNECTIONS



A – FILAMENT
B – PLATE
C – GRID

Nº 3232 BASE OUTLINE



TUBE MOUNTING POSITION

VERTICAL: Glass end up
HORIZONTAL: NO

92C-4792

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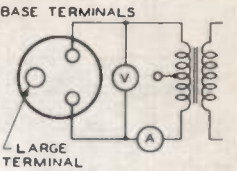
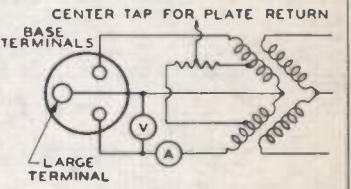
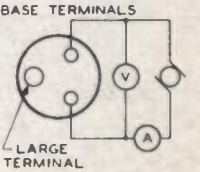
FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

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

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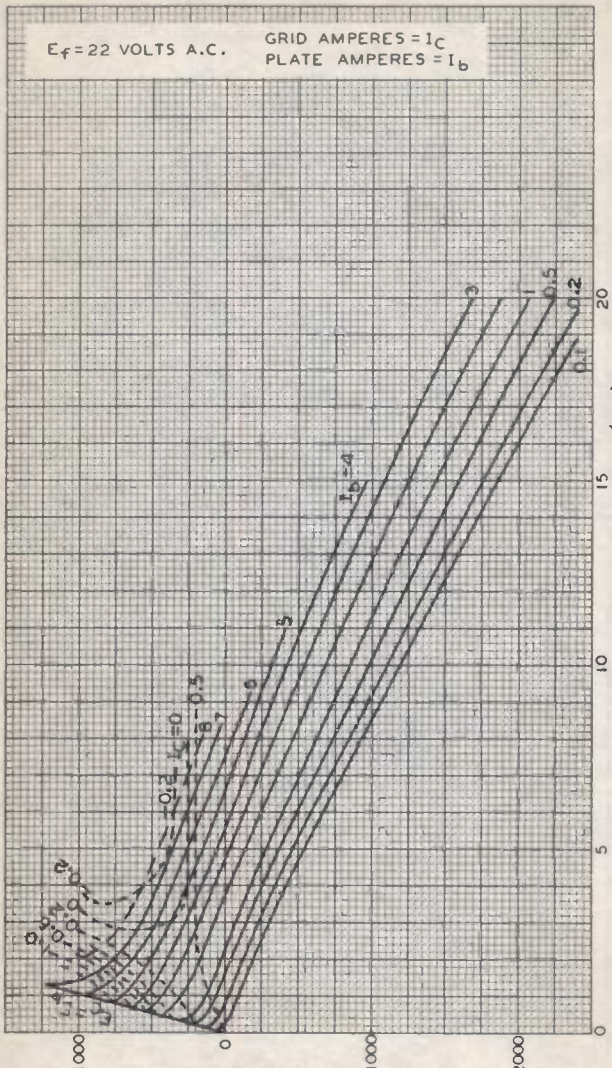
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



JAN. 25, 1940
92C-6134
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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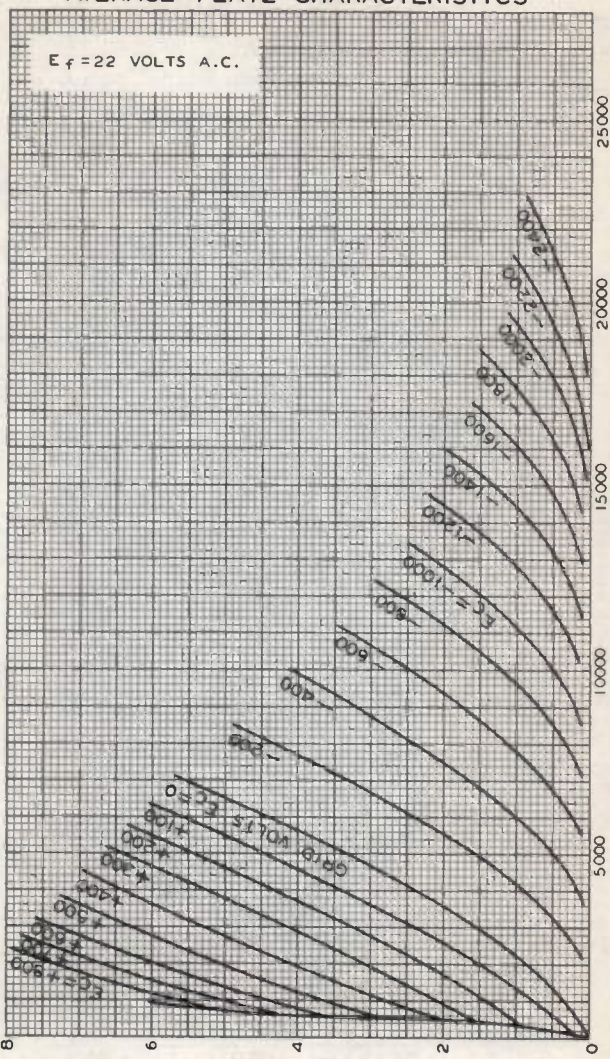
AVERAGE PLATE CHARACTERISTICS



JAN. 18, 1940

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92C-4643R1

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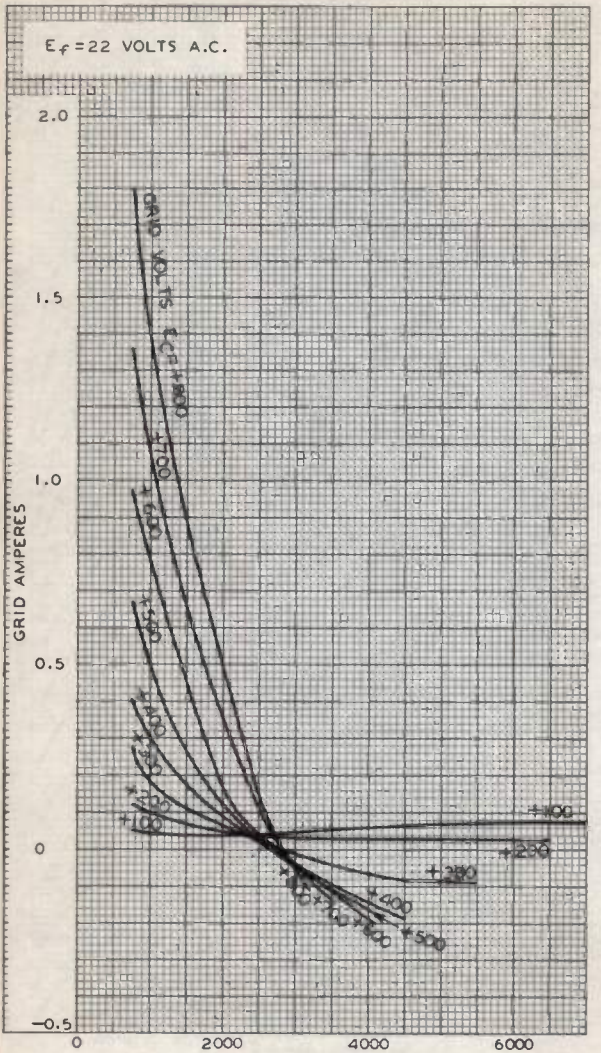
TYPICAL CHARACTERISTICS



RCA

891-R

R-F POWER AMPLIFIER, MODULATOR

(FORCED-AIR COOLED)

Filament	Tungsten, Two-Unit Type	
Excitation	1φ A.C., 2φ A.C., or D.C.	
See FILAMENT CONNECTIONS under Type 891.		
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	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
Mounting		Special
Cooling — Air flow (normal volume is 450 cfm) must be started before application of any voltages and continue for at least 10 minutes after removal of voltages. See table at end of tabulation.		

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 A₁

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	2300	ohms
Load Resistance	8600	ohms
U.P.O. (5s 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.

RCA

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.
R-F Grid Current		24 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.
R-F Grid Current	24 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 §	20000	approx. ohms
	-2000	volts
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 leak of value shown or by partial self-bias methods.
▲, *, **: See next page. ← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

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.
R-F Grid Current		30 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	19000	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	0.105	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 leak 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 TRANS. TUBE RATINGS.

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.

←Indicates a change.

Data on operating frequencies for the 891-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

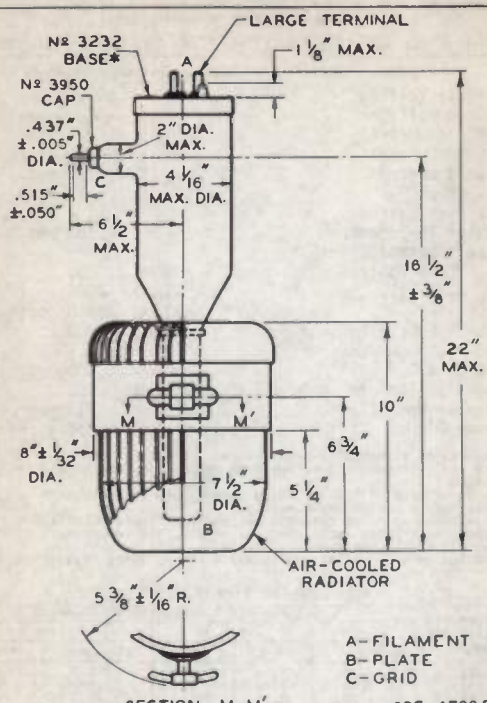
FILAMENT-EMISSION CHARACTERISTIC
is the same as that for Type 207

FILAMENT CHARACTERISTIC
is the same as that for Type 892

AVERAGE CHARACTERISTICS CURVES
are the same as those for Type 891

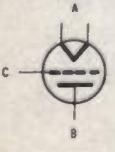
891-R

R-F POWER AMPLIFIER, MODULATOR



* FOR DIMENSIONS, SEE TYPE 891

TERMINAL CONNECTIONS



TUBE MOUNTING POSITION

VERTICAL: Glass end up.
HORIZONTAL: No.

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R-F POWER AMPLIFIER, CLASS B MODULATOR

(WATER COOLED)

Filament	Tungsten, Two-Unit Type	
Excitation	1φA.C., 2φA.C., or D.C.	
See FILAMENT CONNECTIONS under Type 891.		
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	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 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 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.
R-F Grid Current	24 max.	amp.
Plate Input	15 max.	kw
Plate Dissipation	10 max.	kw

← Indicates a change

892
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 [o] [oo]	65	50	30	approx. watts
Power Output	1	2.5	4	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			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.
R-F Grid Current			24 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 [oo]	0.185	0.175	0.115	approx. amp.
Driving Power [oo]	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[ss]

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.
R-F Grid Current			30 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 [oo]	0.18	0.18	0.18	approx. amp.
Driving Power [oo]	320	400	500	approx. watts
Power Output	6.5	10	14	approx. kw

[oo] Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.
[ss] 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.

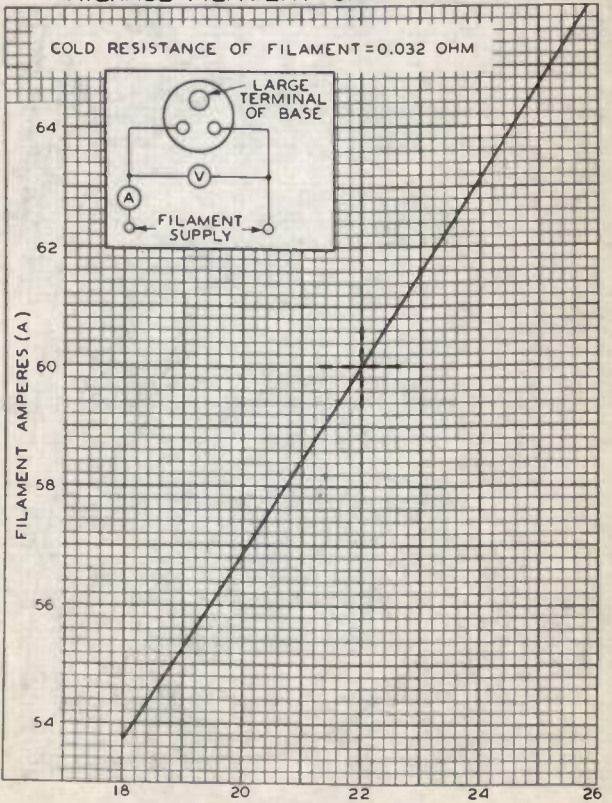
892
R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

OUTLINE 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



April 15, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

CE-4635
DATA 2

892

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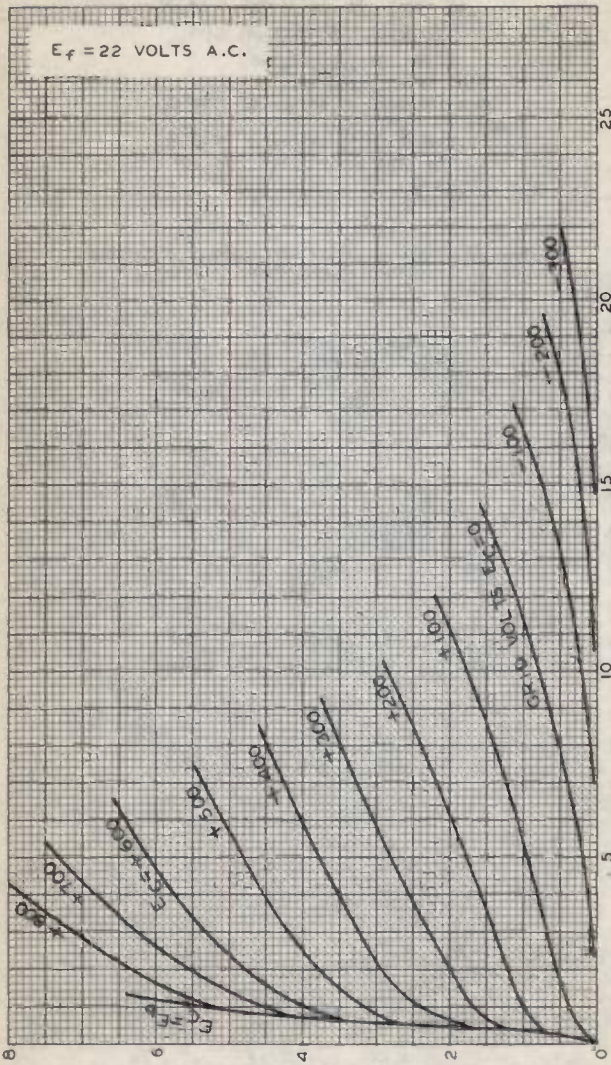
AVERAGE PLATE CHARACTERISTICS



FEB. 12, 1940

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92C-4641R1

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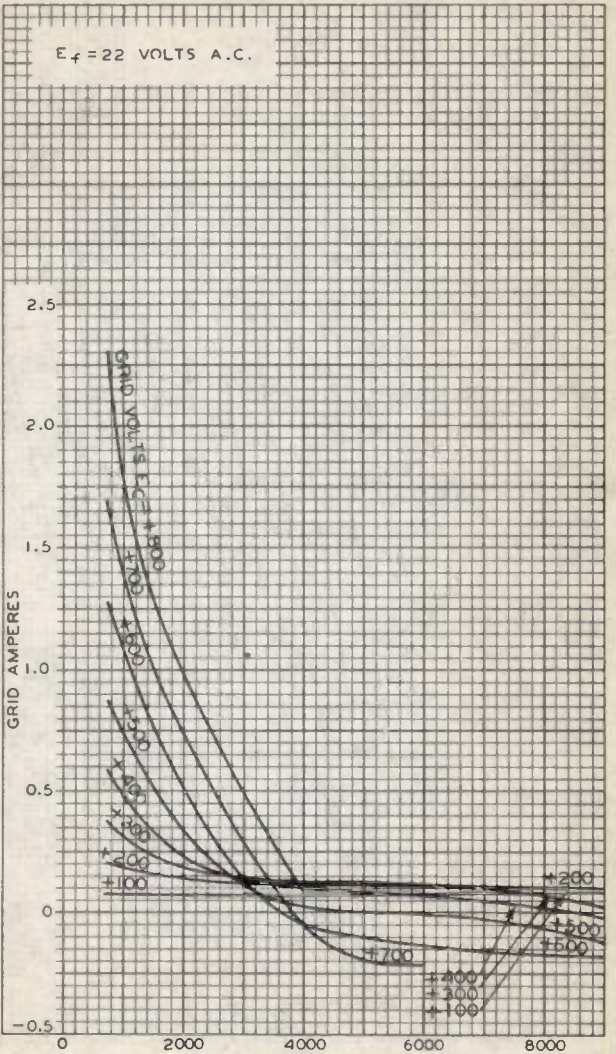
TYPICAL CHARACTERISTICS



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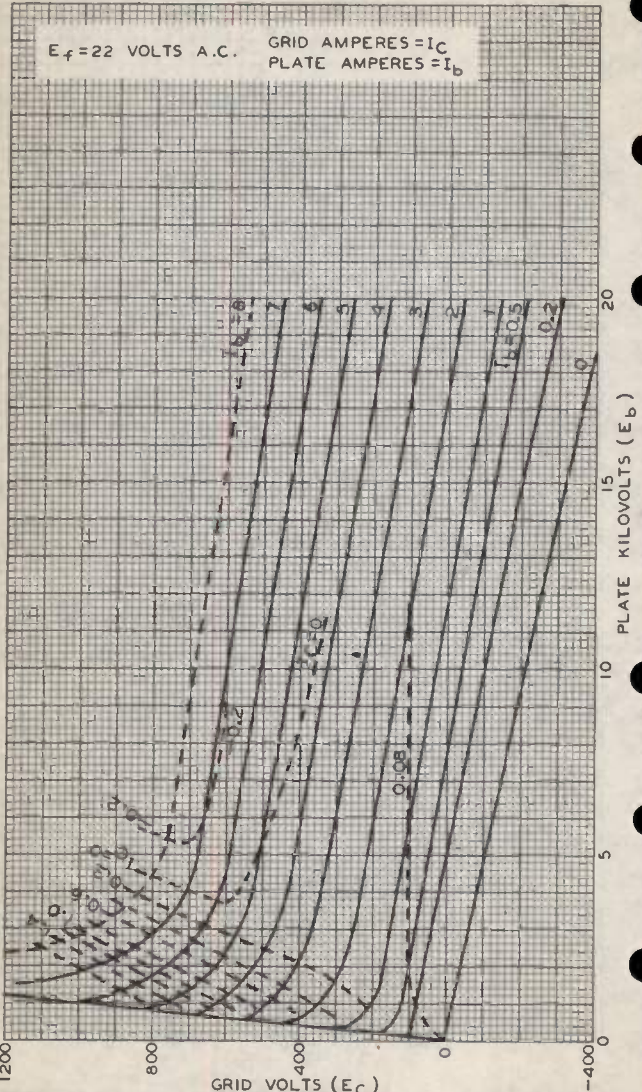
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB.14,1940

RCA RADIOTRON DIVISION

92C-6136

RCA MANUFACTURING COMPANY, INC.

892-R
R-F POWER AMPLIFIER, CLASS B MODULATOR
(FORCED-AIR COOLED)

Filament	Tungsten, Two-unit Type	
Excitation	1φA.C., 2φA.C., or D.C.	
See FILAMENT CONNECTION under Type 891.		
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	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
Mounting		Special
Cooling—Air flow (normal volume is 450 cfm) must be started before application of any voltages and continue for at least 10 minutes after removal of voltages. See table at end of tabulation.		

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 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	-90	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	1.1 max.	amp.

▲, *: See end of tabulation. ← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

892-R
R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

R-F Grid Current		24 max.	amp.
→ 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.
R-F Grid Current		24 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**	0.185	0.175	approx. amp.
→ Radiator Temperature ★	90	90	°C
Driving Power **	310	350	approx. watts
Power Output	3.5	5	approx. kw

§ Obtained by grid leak 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.
R-F Grid Current		30 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	volts
D-C Grid Voltage ¶	-1000	-1300	volts
	5600	7200	approx. ohms

¶ Obtained by grid leak of value shown or by other methods.

▲, ★, **, §§; See next page. → indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

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 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 explined on sheet TRANS. TUBE RATINGS.

COOLING REQUIREMENTS

Volume of Cooling Air	MAXIMUM PLATE DISSIPATION-Kilowatts			
	CLASS B		CLASS C	
cfm□	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

RCA MANUFACTURING COMPANY INC

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R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(WATER & FORCED-AIR COOLED)

Filament	Multistrand Tungsten		
Excitation	1, 3, or 6 Φ A.C.	D.C.	
Voltage per strand	10	10	volts
Current per terminal	61	61	amperes

(See FILAMENT CONNECTIONS under this type.)

· Starting The current per terminal should never exceed 120 amperes.

Amplification Factor	36	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	33	μμf
Grid to Filament	48	μμf
Plate to Filament	3.2	μμf
Maximum Overall Length		27-1/2"
Maximum Radius		6-1/2"
Cap		No.3935
Base (with nozzle for air-cooling of filament seal)		No.6628-A
Water Jacket		UT-1290-A

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.

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 B

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 two tubes

D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage °	-260	-350	-450	volts
Peak A-F Grid-to-Grid Volt.	1480	1560	1720	approx. volts
Zero-Sig. D-C Plate Cur.	0.8	0.8	0.8	amp.
Max.-Sig. D-C Plate Cur.	7	6	5.5	amp.
Load Resistance (per tube)	1000	1500	2000	ohms
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

* 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	20000 max.	volts
D-C Plate Current	2 max.	amp.
R-F Grid Current	48 max.	amp.
Plate Input	35 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
	165	225	170	ohms
Peak R-F Grid Voltage	700	790	900	approx. volts
D-C Plate Current	1.5	1.5	2.0	amp.

From fixed supply or cathode resistor of value shown.
° See end of tabulation.

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R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR

(continued from preceding page)

Driving Power °° □	130	150	200	approx. watts
Power Output	6	7.5	10	approx. kw

□ 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			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.
R-F Grid Current			48 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
	8000	5000	7100	ohms
Peak R-F Grid Voltage	1200	1280	1500	approx. volts
D-C Plate Current	1.5	2.0	2.0	amp.
D-C Grid Current °°	0.1	0.16	0.18	approx. amp.
Driving Power °°	120	210	210	approx. watts
Power Output	11	15	18	approx. kw

△ Obtained by grid-leak resistor 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			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.
R-F Grid Current			60 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
	210	235	260	ohms
	3100	3600	4800	ohms
Peak R-F Grid Voltage	1830	1520	1630	approx. 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

▽ Obtained by cathode resistor (210, 235, 260), grid resistor (3100, 3600, 4800) or by partial self-bias methods.
°° Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.
° With 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.

HIGH-FREQUENCY OPERATION

Maximum permissible percentage of maximum rated plate voltage and plate input.

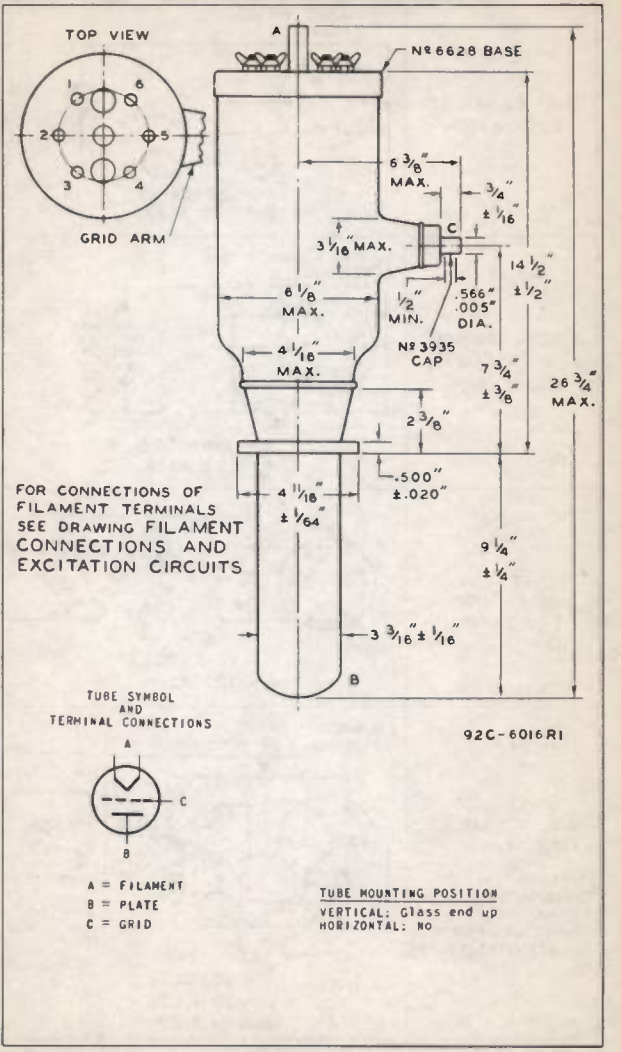
FREQUENCY (Mc)	5		20		40	
	Volt.,	Input	Volt.	Input	Volt.	Input
Telephony { Class B	100		85	77	60	65
Telephony { Class C	100		75	67	50	50
Telegraphy - Class C	100		75	71	50	43

Resonant frequency of tube alone = 55 Mc.

For BASE DIMENSIONS and AVERAGE FILAMENT-EMISSION CHARACTERISTICS, refer to Type 898.

893

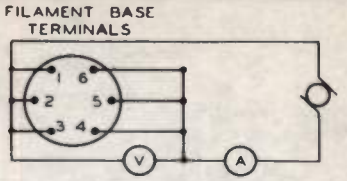
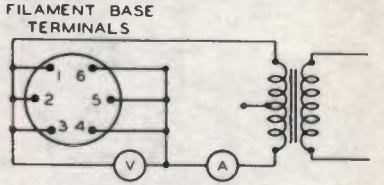
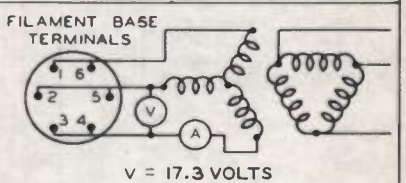
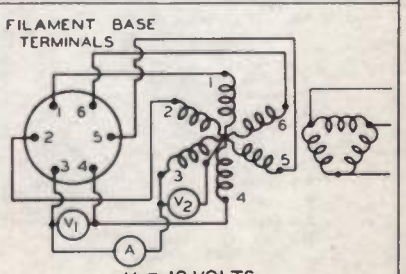
R-F POWER AMPLIFIER, OSCILLATOR, CLASS B MODULATOR



RCA MANUFACTURING COMPANY INC

893

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	 V_1 = 10 VOLTS V_2 = 10 VOLTS A = 61 AMP.

893-R

R-F POWER AMPLIFIER, CLASS B MODULATOR

(FORCED-AIR COOLED)

Filament	Multistrand Tungsten		
Excitation	1, 3, or 6 A.C.	D.C.	
Voltage per strand	10	* 10	volts
Current per terminal	61	61	amp.

(See FILAMENT CONNECTIONS under Type 893)

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
Maximum Overall Length		28-1/2"
Maximum Radius		8-3/4"
Cap		No. 3935
Base		No. 6628
Radiator		Integral part of tube
Mounting		Special

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.

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 B

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

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 Volt.	1480	1560	1720	volts
Zero-Sig. D-C Plate Current	0.8	0.8	0.8	amp.
Max.-Sig. D-C Plate Current	7	6	5.5	amp.
Radiator Temperature▲	160	155	150	°C
Load Resistance (per tube)	1000	1500	2000	ohms
Effective Load Resistance (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

* 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

D-C Plate Voltage	20000 max.	volts
D-C Plate Current	2 max.	amp.

▲, #: See end of tabulation.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

893-R

R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

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		amp.
Radiator Temperature▲	130	130	125		°C
Driving Power** °	130	150	200	approx.	watts
Power Output	6	7.5	10	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

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
	8000	5000	7100		ohms
Peak R-F Grid Voltage	1200	1280	1500		volts
D-C Plate Current	1.5	2	2		amp.
D-C Grid Current**	0.1	0.16	0.14	approx.	amp.
Radiator Temperature▲	90	95	100		°C
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 ##

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
	210	235	260		ohms
	3100	3600	4800		ohms
Peak R-F Grid Voltage	1430	1520	1630		volts
D-C Plate Current	3.5	3.5	3.6		amp.
D-C Grid Current**	0.26	0.25	0.21	approx.	amp.
Radiator Temperature▲	120	120	135		°C
Driving Power**	360	370	340	approx.	watts

▲, **, °, ##, □, ★: See end of tabulation.

893-R

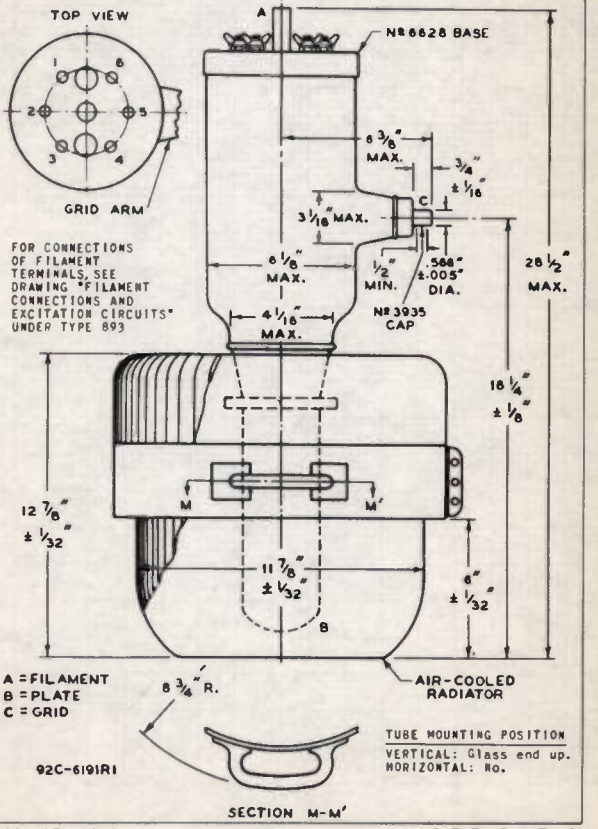
R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

Power Output	30	40	50 approx. kw

▲ Measured in thermometer well. # With a-c filament supply.
• Averaged over any audio-frequency cycle of sine-wave form.
◎ At crest of audio-frequency cycle with modulation factor of 1.0.
•• Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.
□ Obtained by grid resistor of value shown or by partial self-bias methods.
★ Obtained by grid resistor (3100, 3600, 4800), cathode resistor (210, 235, 260) or by other methods.
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-R are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



893-R

AVERAGE FILAMENT CHARACTERISTIC

893-R

JUNE 18, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

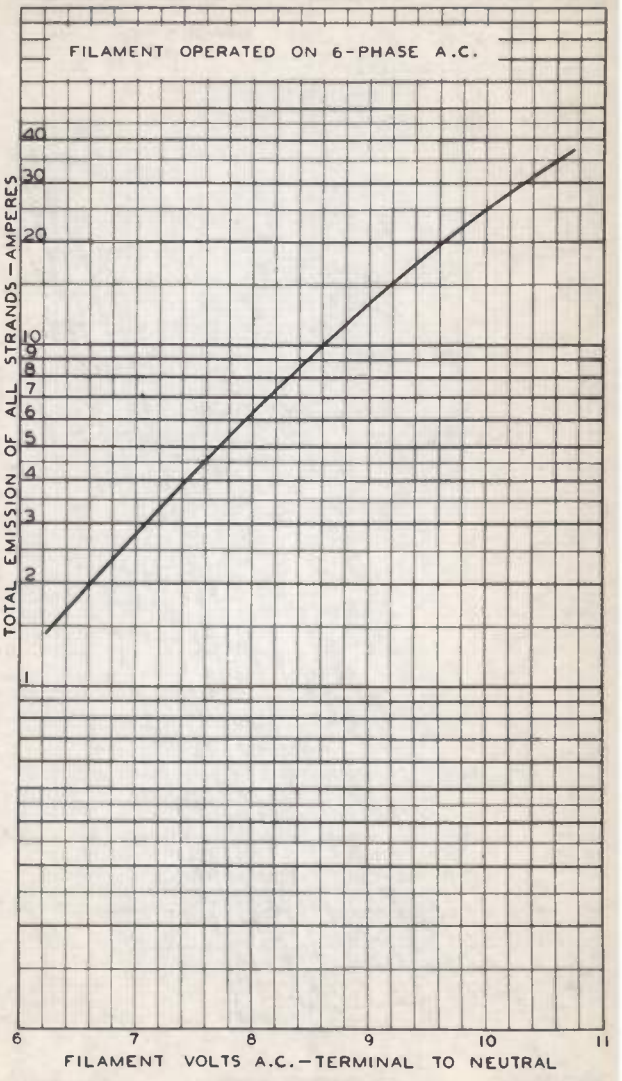
FILAMENT AMPERES PER TERMINAL

FILAMENT VOLTS A.C. – ANY TERMINAL TO NEUTRAL

92C-6184

893-R

AVERAGE FILAMENT-EMISSION CHARACTERISTI



JUNE 18,1940

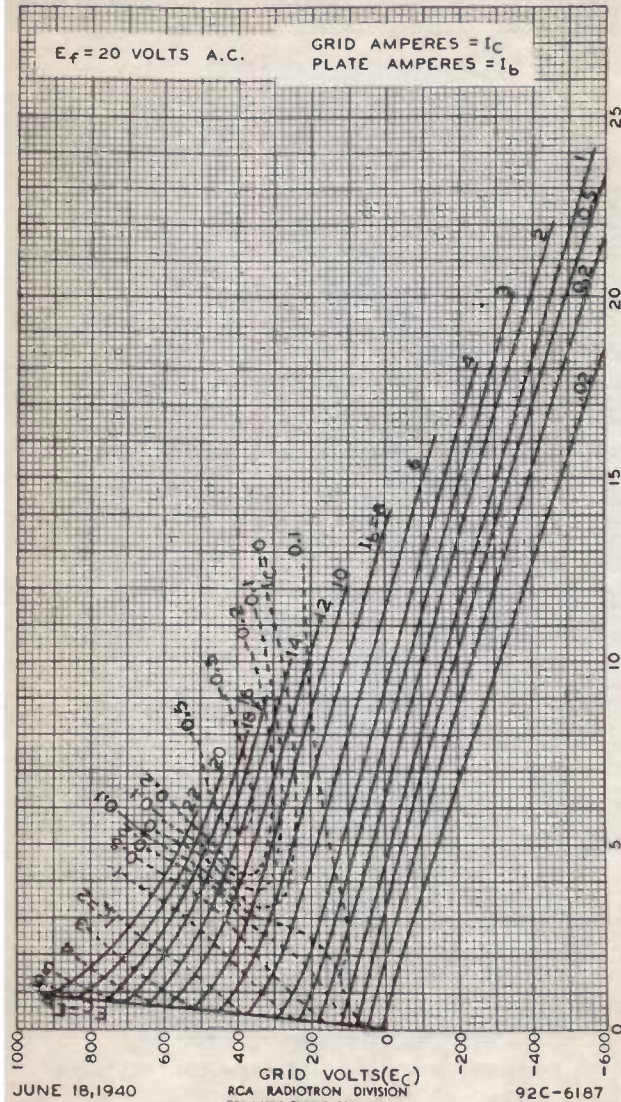
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

92C-6185

893-R

893-R

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



JUNE 18,1940

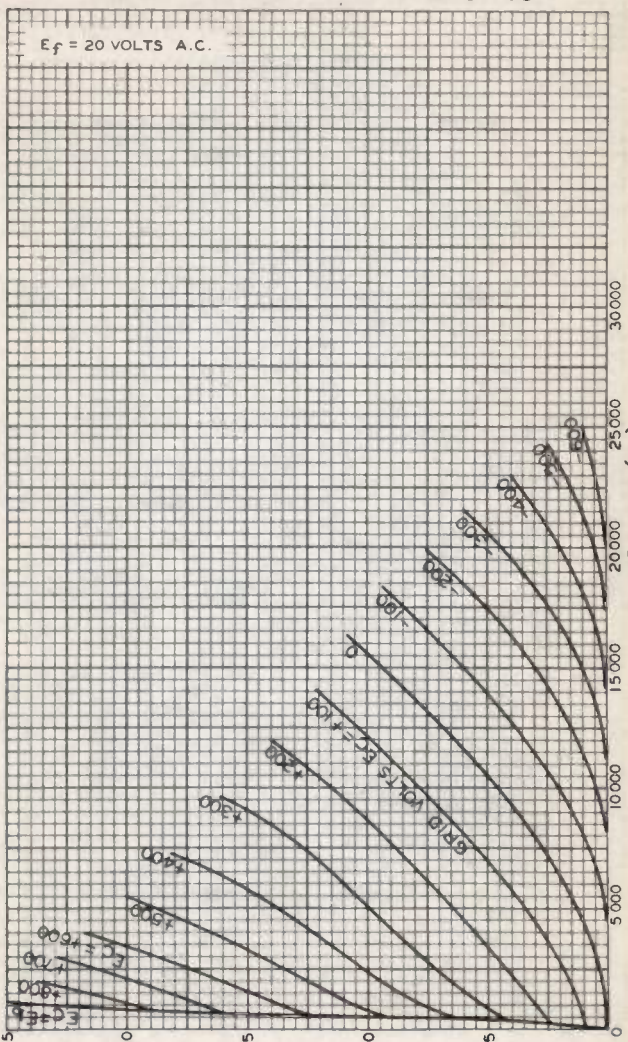
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6187

RCA

893-R

AVERAGE PLATE CHARACTERISTICS



JUNE 18, 1940

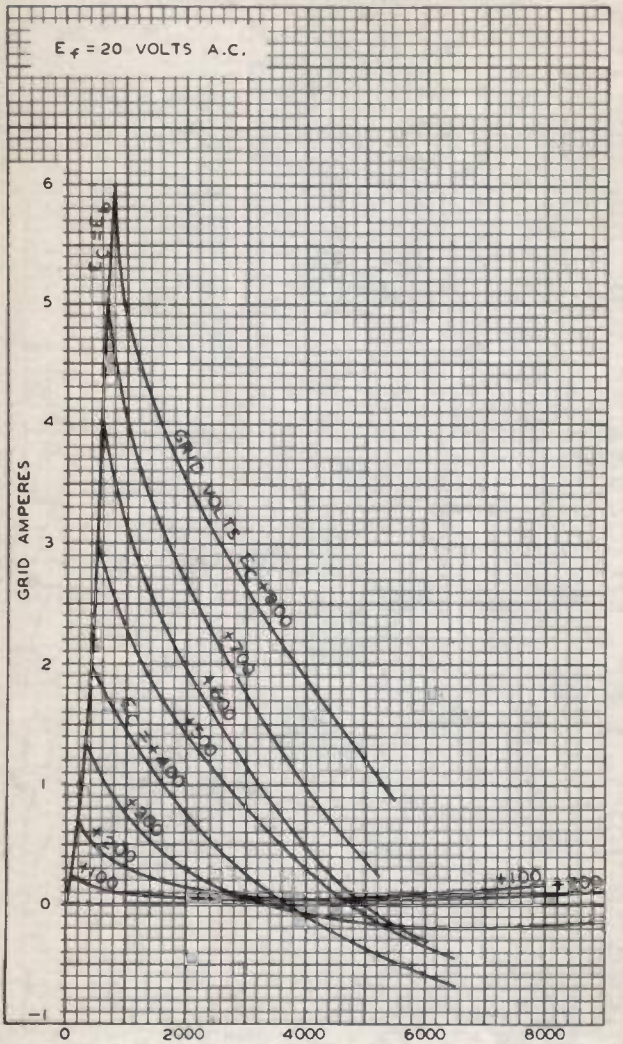
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6186

RCA

893-R

TYPICAL CHARACTERISTICS



JUNE 18, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6188

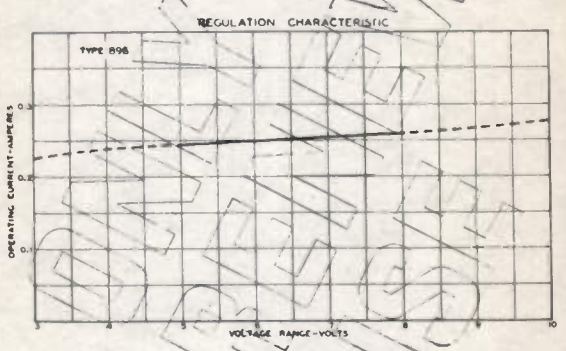
RCA

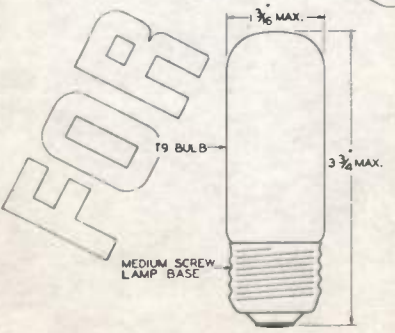
896

CURRENT REGULATOR
(BALLAST TUBE)

Filament	Tungsten	
Maximum Overall Length		3-3/4"
Maximum Diameter		1-3/16"
Bulb		T-9
Base		Medium Screw
Operating Conditions:		
Voltage Range	5 to 8	volts
Operating Current	0.25	amp.
Ambient Temperature	150 max.	°F.

NOTE: The 896 operates at high bulb temperatures. It must be surrounded by a metal ventilating enclosure for proper performance and protection against flying glass in case of bulb failure.





FOR INTERNAL USE

RCA RADIOTRON COMPANY, INC.

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R-F POWER AMPLIFIER, CLASS B MODULATOR

(WATER & FORCED-AIR COOLED)

Filament	Tungsten, Three-Section Type	
Excitation	1φA.C., 3φA.C., or D.C. (See EXCITATION CIRCUITS)	←
Voltage per section	33	volts
Current per section	70	amp.

(See FILAMENT CONNECTIONS under this type)

Starting The current per section should never exceed 105 amperes.

Amplification Factor (plate current = 3.0 amp.)	45	←
Direct Interelectrode Capacitances (approx.):		←
Grid to Plate	80	μμf
Grid to Filament	65	μμf
Plate to Filament	5	μμf
Maximum Overall Length	60 3/8"	
Maximum Radius	10"	
Base (with nozzle for air-cooling of filament seal)	No.6628	
Water Jacket (with nozzle for air-cooling of bulb)	Type UT-1289-A	←

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 10 minutes after removal of voltages to limit the glass temperature to 150°C at the hottest part.

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class B

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 °	-100	volts
Peak A-F Grid-to-Grid Voltage	2200	volts
Zero-Sig. D-C Plate Current	2.0	amp.
Max.-Sig. D-C Plate Current	13.0	amp.
Max.-Sig. Plate Input*	156	kw
Load Resistance (per tube)	500	ohms
Effective Load Res. (plate to plate)	2000	ohms
Max.-Sig. Driving Power	6 approx.	kw
Max.-Sig. Power Output	90 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 factor of 1.0

D-C Plate Voltage			20000 max.	volts
D-C Plate Current			5.0 max.	amp.
Plate Input			100 max.	kw
Plate Dissipation			75 max.	kw
Typical Operation:				
D-C Plate Voltage	12000	15000	18000	volts

° See next page. ← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

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R-F POWER AMPLIFIER, CLASS B MODULATOR

(continued from preceding page)

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

D-C Plate Voltage	12000 max.	volts
D-C Grid Voltage	-3000 max.	volts
D-C Plate Current	5.0 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	5.0	amp.
D-C Grid Current #	1 approx.	amp.
Driving Power #	2 approx.	kw
Power Output	45 approx.	kw

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation ##

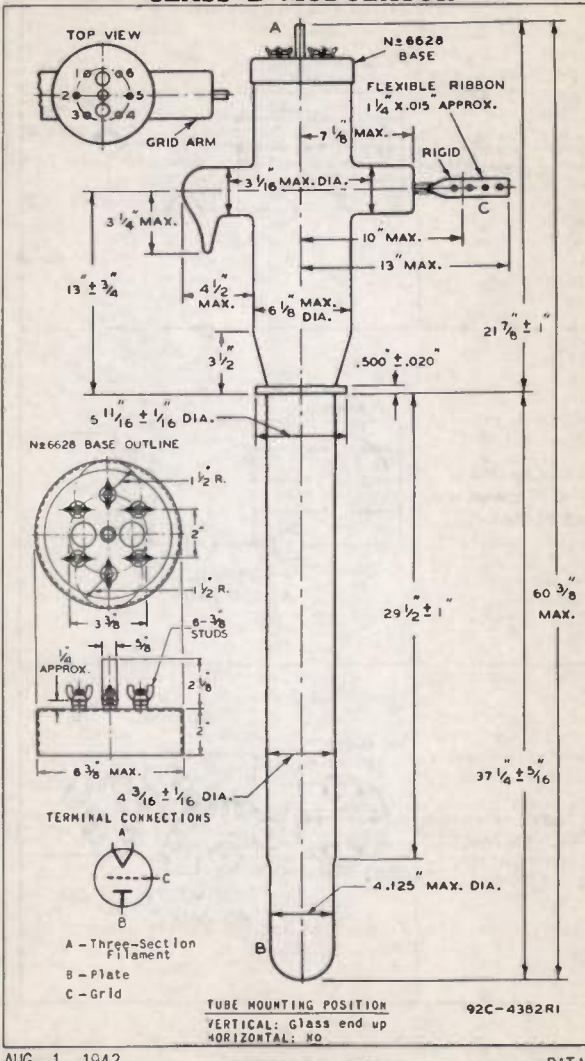
D-C Plate Voltage			20000 max.	volts
D-C Grid Voltage			-3000 max.	volts
D-C Plate Current			10 max.	amp.
D-C Grid Current			1.0 max.	amp.
Plate Input			200 max.	kw
Plate Dissipation			100 max.	kw
Typical Operation:				
D-C Plate Voltage	12000	15000	18000	volts
D-C Grid Voltage °	-800	-900	-1000	volts
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.
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 a-f cycle with Modulation Factor of 1.0.

Data on operating frequencies for the 898 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

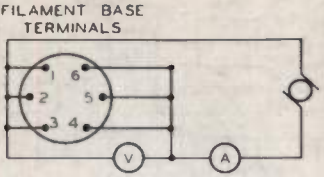
898
R-F POWER AMPLIFIER, CLASS B MODULATOR



898

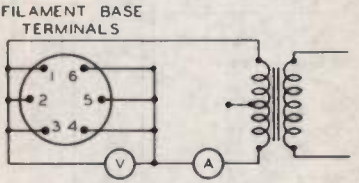
FILAMENT CONNECTIONS AND EXCITATION CIRCUITS

D-C FILAMENT EXCITATION



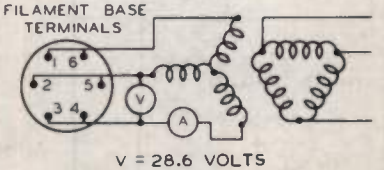
V = 33 VOLTS
A = 210 AMP.

SINGLE-PHASE A-C FILAMENT EXCITATION



V = 33 VOLTS
A = 210 AMP.

THREE-PHASE A-C FILAMENT EXCITATION

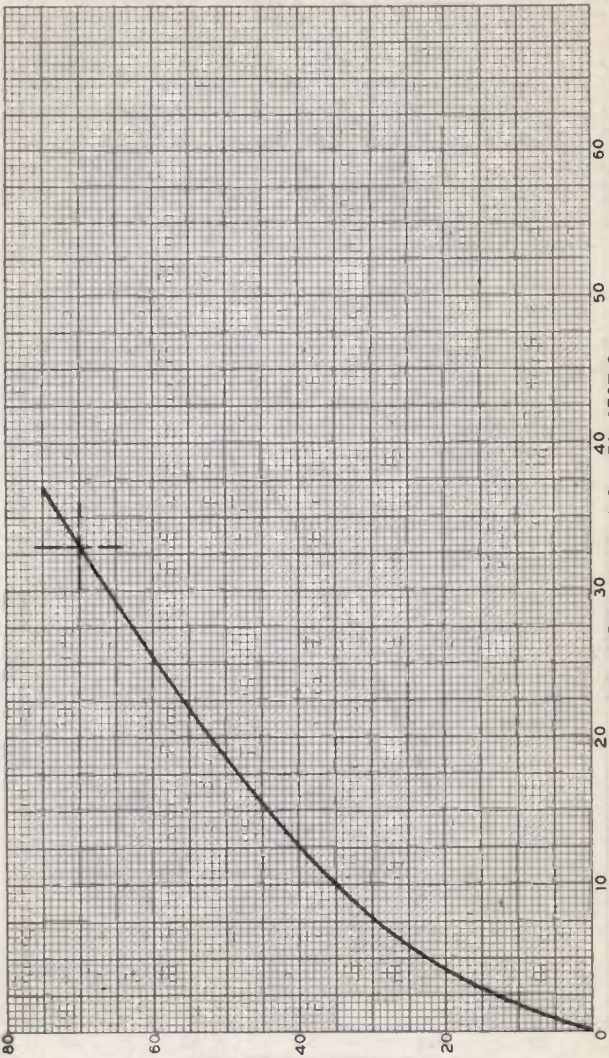


V = 28.6 VOLTS
A = 140 AMP.

RCA

898

AVERAGE FILAMENT CHARACTERISTIC



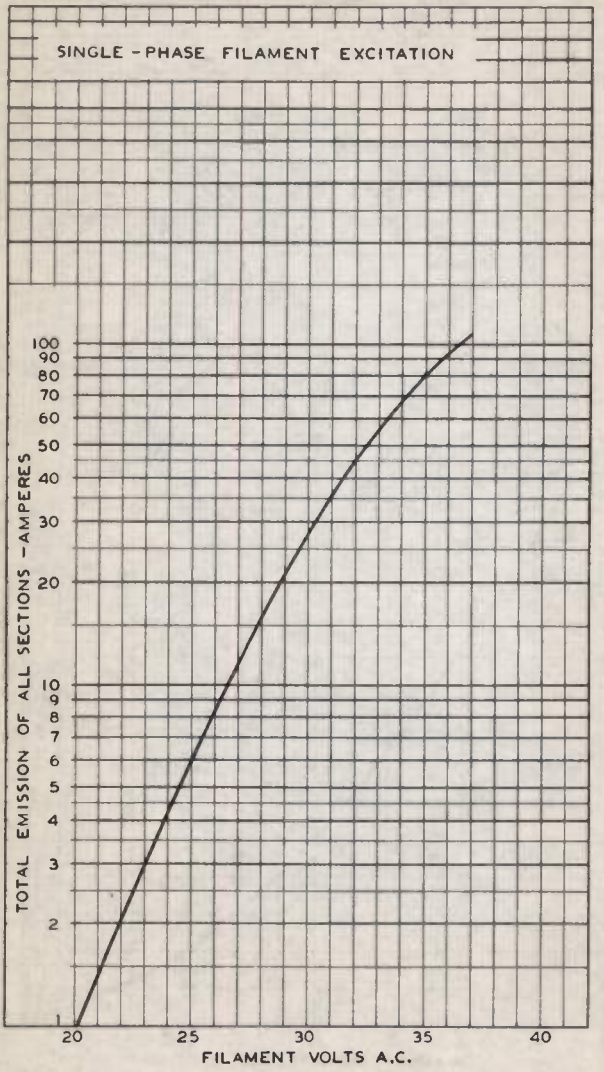
SEPT. 12, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4389RI

898

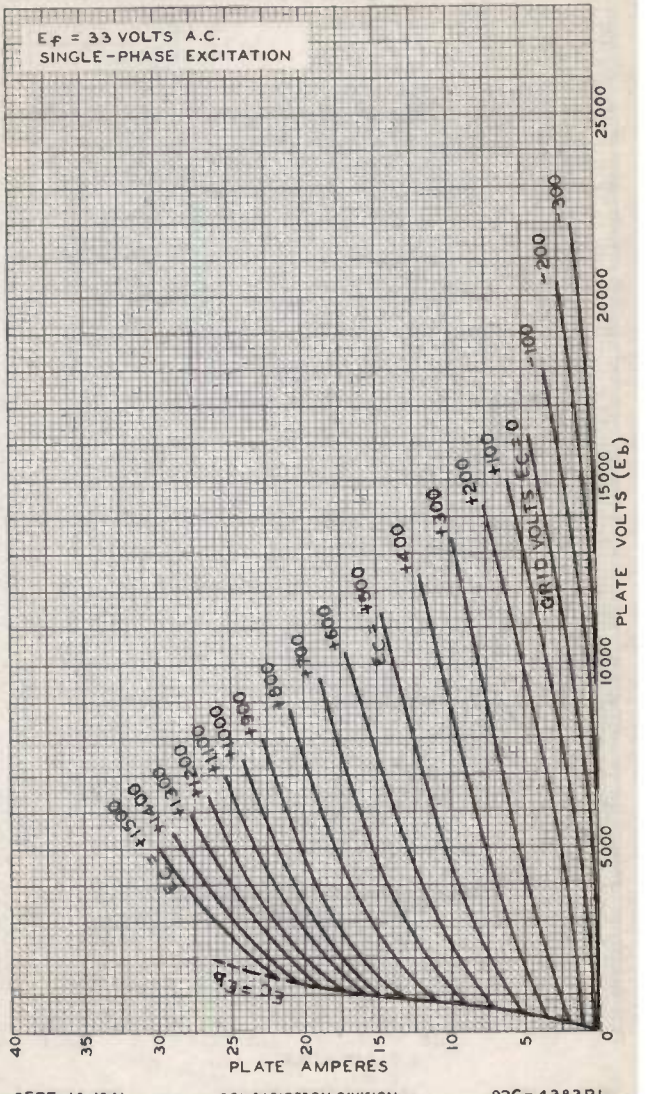
AVERAGE FILAMENT-EMISSION CHARACTERISTIC



RCA

898

AVERAGE PLATE CHARACTERISTICS



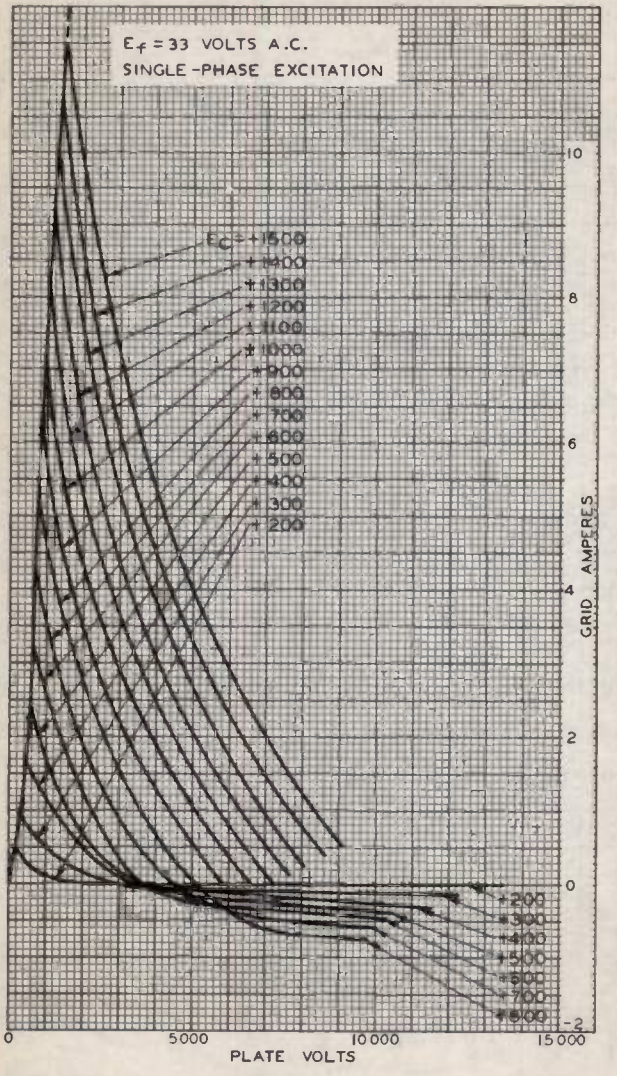
SEPT. 16, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

92C-4383R1

898

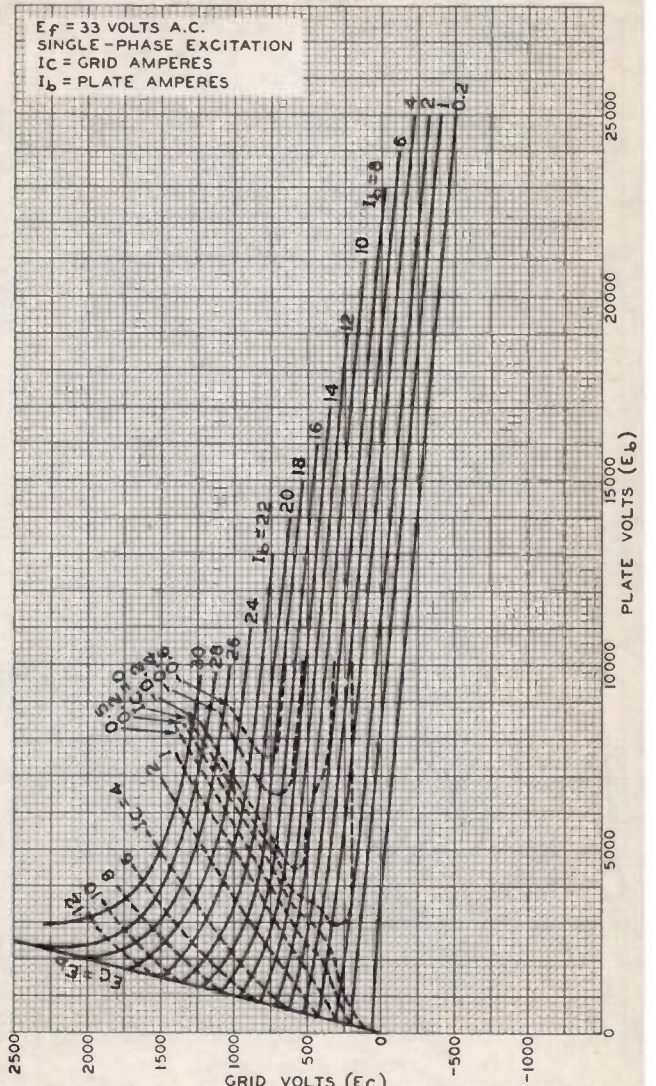
TYPICAL CHARACTERISTICS



RCA

898

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



AUG. 13, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

92C-6069R1

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	130	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.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

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	4000	ohms
	-80	-80	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	4500	ohms
	-85	-90	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.

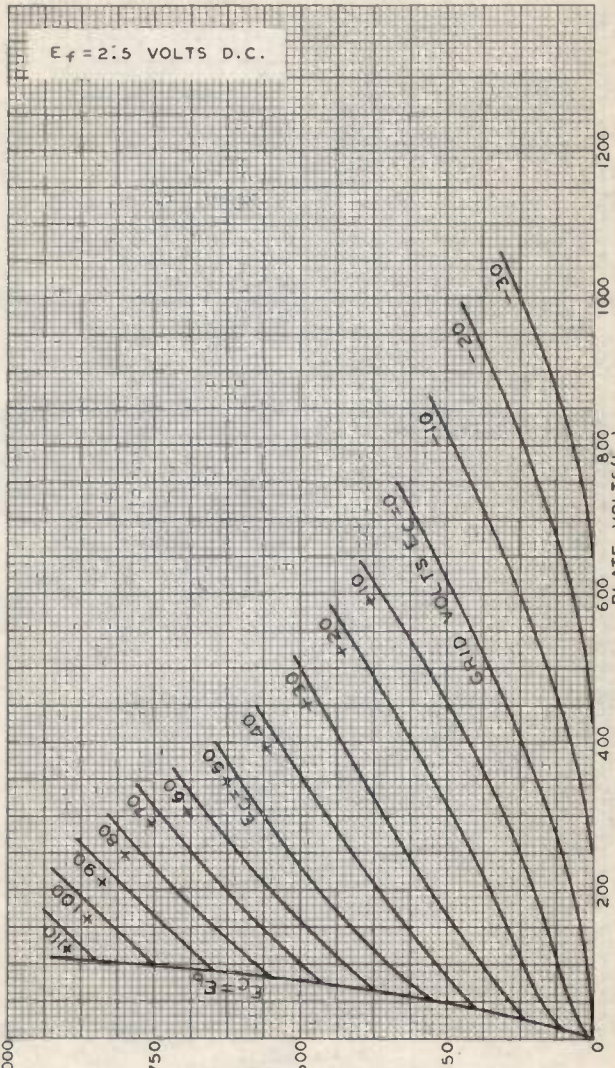
→ Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

RCA

1608

AVERAGE PLATE CHARACTERISTICS



FEB. 4, 1937

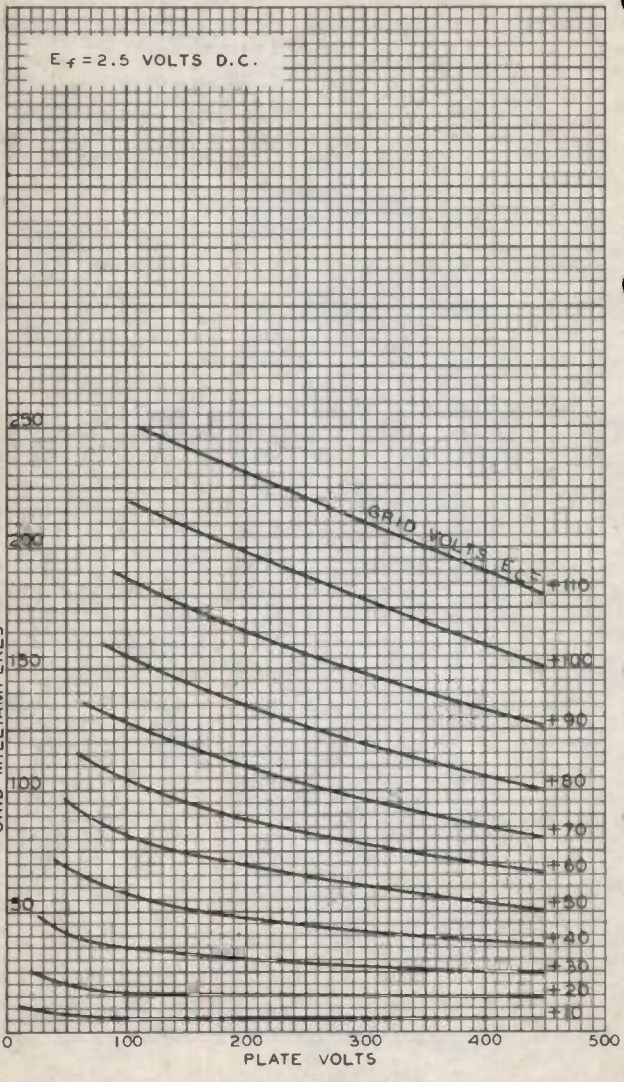
RCA RADIOTRON DIVISION

92C-4729

1608

1608

AVERAGE CHARACTERISTICS



FEB. 5, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4730

1610

CRYSTAL-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.

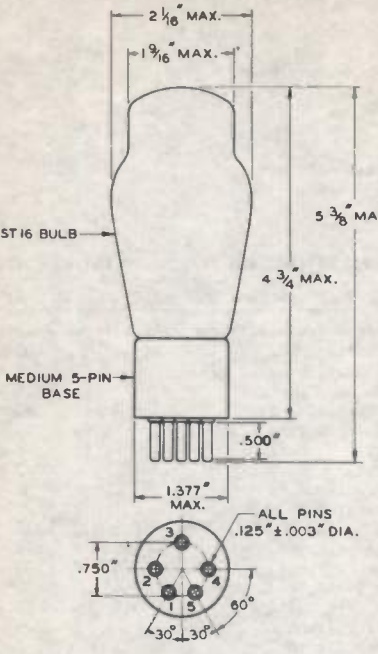
▲ Bias may also be obtained with 30000-ohm grid resistor.

For use of the 1610 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

1610

STAL-OSCILLATOR PENTODE

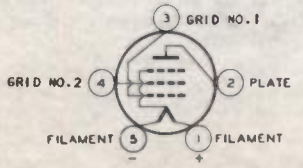
(continued from preceding page)



BOTTOM VIEW OF BASE

92C-4770

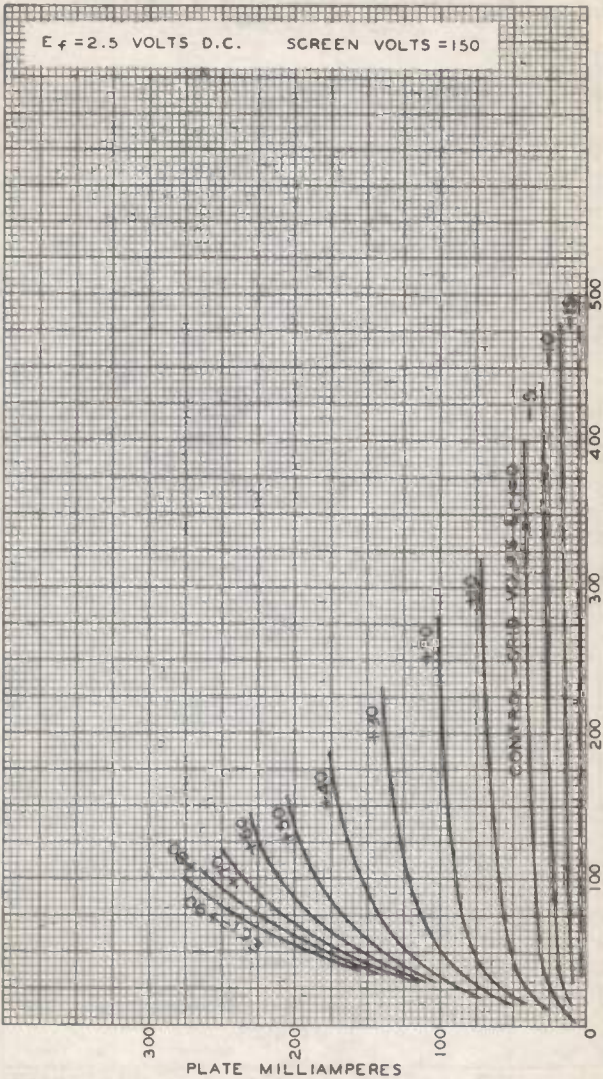
TUBE SYMBOL & TOP VIEW OF SOCKET CONNECTIONS



RCA MANUFACTURING COMPANY INC.

1610

AVERAGE PLATE CHARACTERISTICS



JUNE 8, 1937

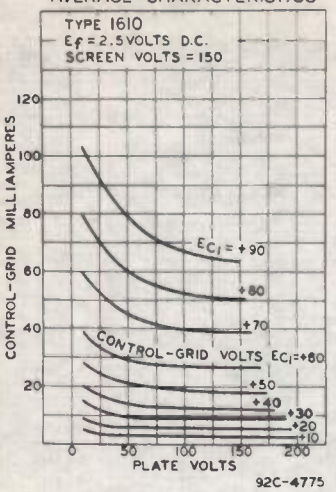
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4773

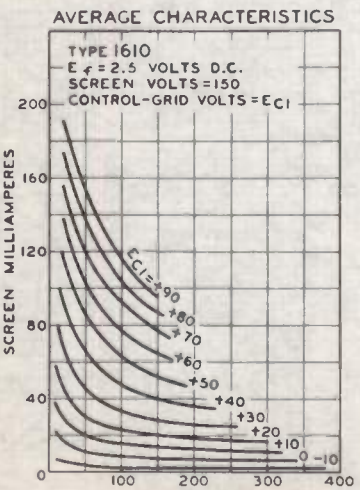
1610

CRYSTAL-OSCILLATOR PENTODE

AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS



RCA

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	0.5	μμf
Input	8.5	μμf
Output	11.5	μμf
Maximum Overall Length		3-1/4"
Maximum Diameter		1-5/16"
Bulb		Metal Shell, MT-8
Base		Small Wafer Octal 7-Pin

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
Typical Operation:		
D-C Plate Voltage	275	volts
D-C Screen Voltage△	200 volts / 10000 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 leak or by partial self-bias methods.
△ From modulated fixed supply or modulated plate-voltage supply through resistor.

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

See next page.

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

1613

R-F POWER AMPLIFIER PENTODE

(continued from preceding page)

Typical Operation:		
D-C Plate Voltage	350	volts
D-C Screen Voltage ■	200	volts
	20000	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

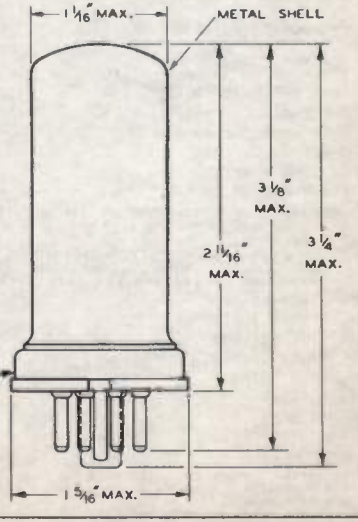
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
▲ Obtained by grid leak or other self- or fixed-bias method.
■ From fixed supply or plate-voltage supply through resistor.

For use of the 1613 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

TUBE SYMBOL & BOTTOM VIEW OF SOCKET CONNECTIONS

PIN 1 - SHELL
PIN 2 - HEATER
PIN 3 - PLATE
PIN 4 - SCREEN
PIN 5 - GRID
PIN 7 - HEATER
PIN 8 - CATHODE

TUBE MOUNTING POSITION
VERTICAL OR HORIZONTAL



1614

TRANSMITTING BEAM POWER AMPLIFIER

Heater *	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.9	amp.
Transconductance for plate current of 72 ma.	6050	μmhos
Direct Interelectrode Capacitances: ⊙		
Grid to Plate	0.4	μμf
Input	10	μμf
Output	12	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

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	325 max.	volts
D-C Screen Voltage	300 max.	volts
D-C Grid Voltage	-125 max.	volts
D-C Plate Current	70 max.	ma.
D-C Grid Current	5 max.	ma.
Plate Input	23 max.	watts
Screen Input	2.5 max.	watts
Plate Dissipation	14 max.	watts
Typical Operation:		
D-C Plate Voltage	325	volts
D-C Screen Voltage **	245	volts
	10000	ohms
D-C Grid Voltage	-40	volts
	20000	ohms
Peak R-F Grid Voltage	51	volts
D-C Plate Current	70	ma.
D-C Screen Current	8	ma.
D-C Grid Current	2 approx.	ma.
Driving Power	0.1 approx.	watt
Power Output	15 approx.	watts

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

Triode Connection - Screen tied to Plate

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

D-C Plate Voltage	325 max.	volts
D-C Grid Voltage	-125 max.	volts
D-C Plate Current	70 max.	ma.
D-C Grid Current	10 max.	ma.
Plate Input	23 max.	watts
Plate Dissipation	14 max.	watts

*, **, ⊙: See next page.

◄ Indicates a change.

1614

TRANSMITTING BEAM POWER AMPLIFIER

Typical Operation:		
D-C Plate Voltage	325	volts
D-C Grid Voltage △	−85	volts
	21000	ohms
Peak R-F Grid Voltage	102	volts
D-C Plate Current	65	ma.
D-C Grid Current	4 approx.	ma.
Driving Power	0.4 approx.	watt
Power Output	11.5 approx.	watts

△ Obtained from fixed supply, by grid resistor (21000), or by combination methods.

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage	375 max.	volts
D-C Screen Voltage	300 max.	volts
D-C Grid Voltage	−125 max.	volts
D-C Plate Current	110 max.	ma.
D-C Grid Current	5 max.	ma.
Plate Input	35 max.	watts
Screen Input	3.5 max.	watts
Plate Dissipation	21 max.	watts
Typical Operation:		
D-C Plate Voltage	375	volts
D-C Screen Voltage●	250	volts
	12500	ohms
D-C Grid Voltage▲	−40	volts
	435	ohms
	20000	ohms
Peak R-F Grid Voltage	51	volts
D-C Plate Current	80	ma.
D-C Screen Current	10	ma.
D-C Grid Current	2 approx.	ma.
Driving Power	0.1 approx.	watt
Power Output	21 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.

⊙ With shell connected to cathode.

** Preferably obtained from a separate source modulated with the plate supply, or obtained from the modulated plate-voltage supply through resistor of 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 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 cathode resistor (435), by grid resistor (20000), or by combination methods. When preceding stage is keyed, sufficient fixed bias must be used to maintain the plate current at a low value when the key is up.

← Indicates a change.

Data on operating frequencies for the 1614 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

SOCKET CONNECTIONS and MOUNTING POSITION are the same as for the 1613.

CURVES under Type 807 apply to the 1614 within the limitation of the maximum ratings.

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

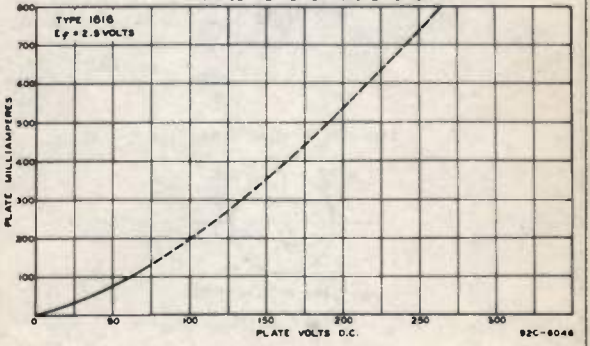
MAXIMUM RATINGS

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.

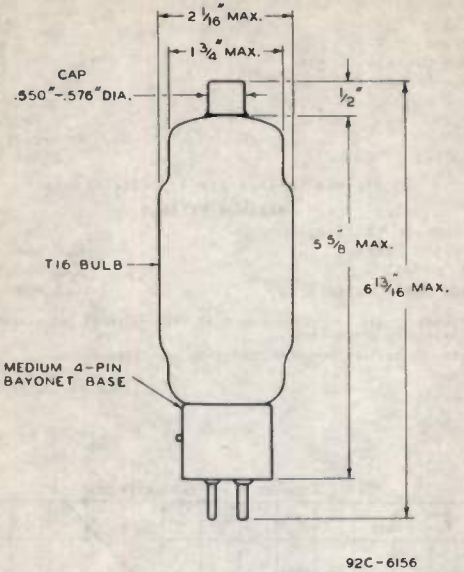
AVERAGE PLATE CHARACTERISTIC



◄ Indicates a change.

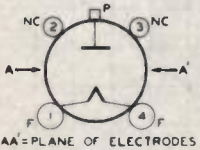
1616

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)

T619

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.

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	aprox.	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.

1619

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 1.0

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.

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

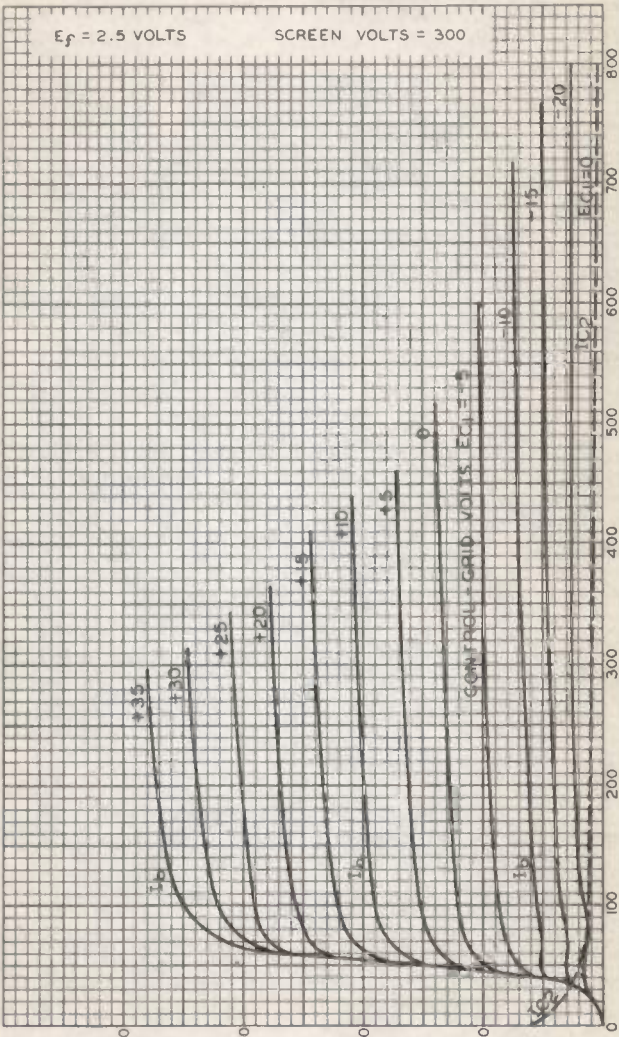
Pin 1 - Shell
Pin 2 - Filament
Pin 3 - Plate
Pin 4 - Grid No. 2
Pin 5 - Grid No. 1
Pin 7 - Filament
Pin 8 - Grid No. 3

→ Indicates a change

RCA

1619

AVERAGE PLATE CHARACTERISTICS



JUNE 15, 1938 RCA RADIOTRON DIVISION 92C-4931

1619

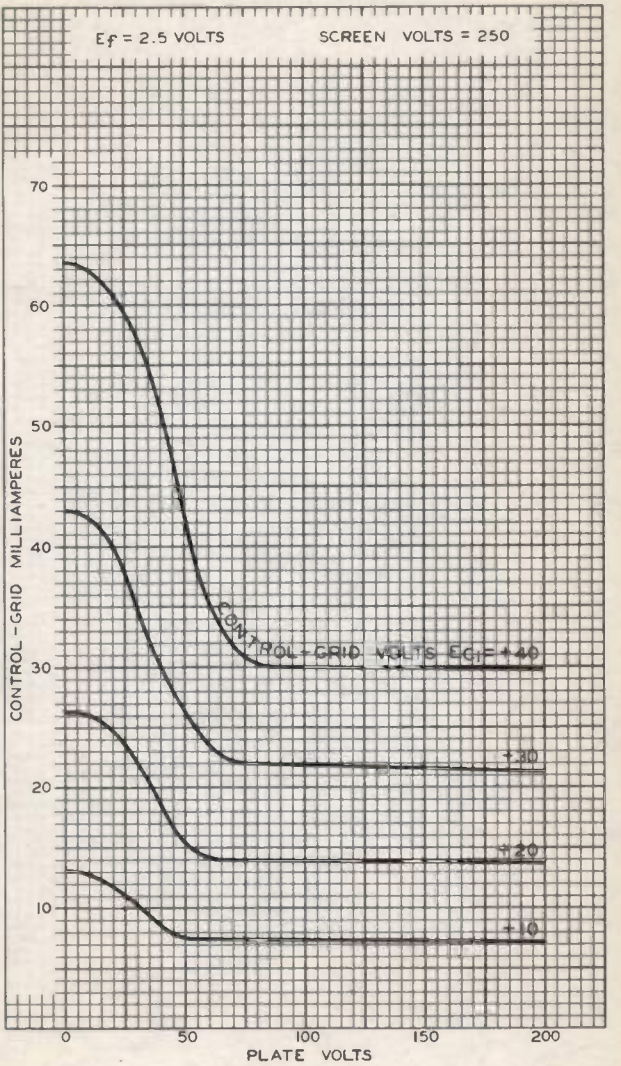
1619

AVERAGE PLATE CHARACTERISTICS

RCA

1619

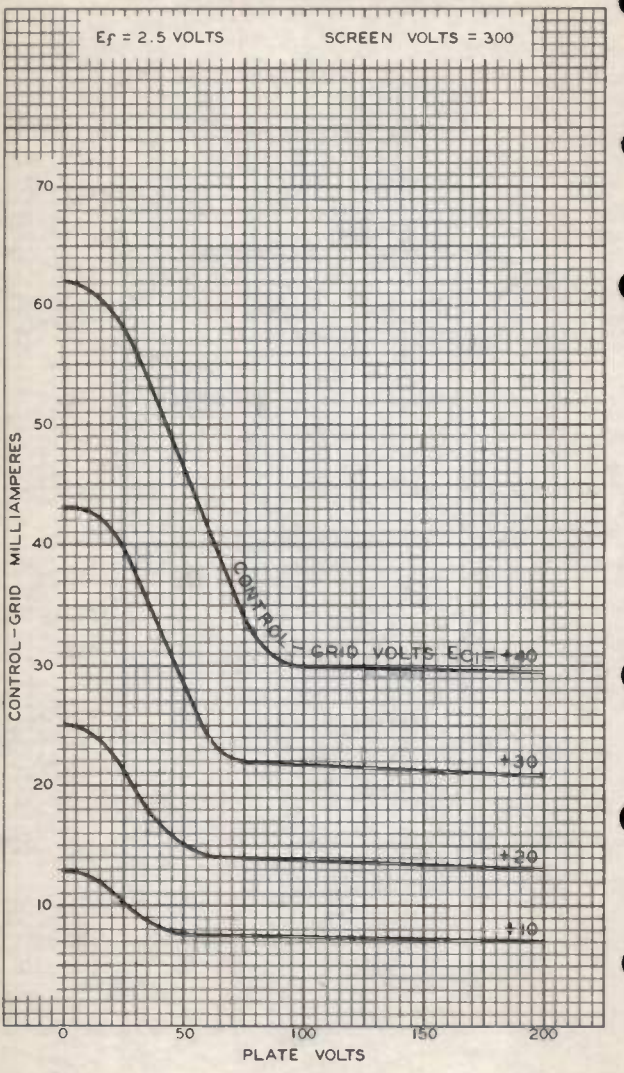
TYPICAL CHARACTERISTICS



1619

1619

TYPICAL CHARACTERISTICS



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.

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.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

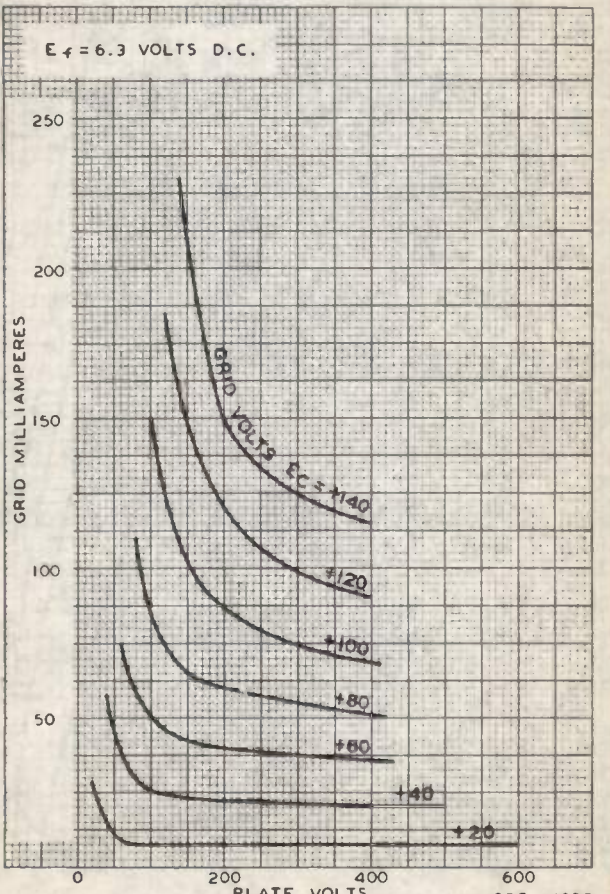
1623
R-F POWER AMPLIFIER, CLASS B MODULATOR

(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

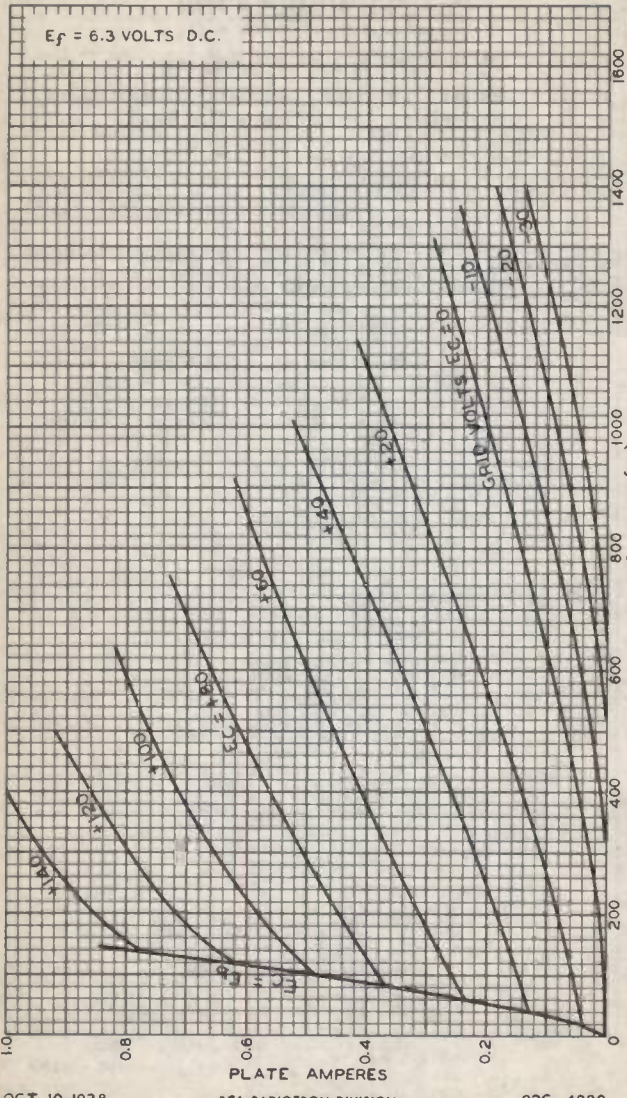


92C-4982

1623

1623

AVERAGE PLATE CHARACTERISTICS



OCT. 10, 1938

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4980

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		5-3/8"
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	42	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	1070	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 fdct. 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

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		8 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

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

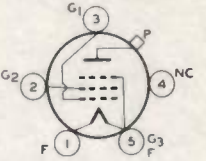
1624

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

1625

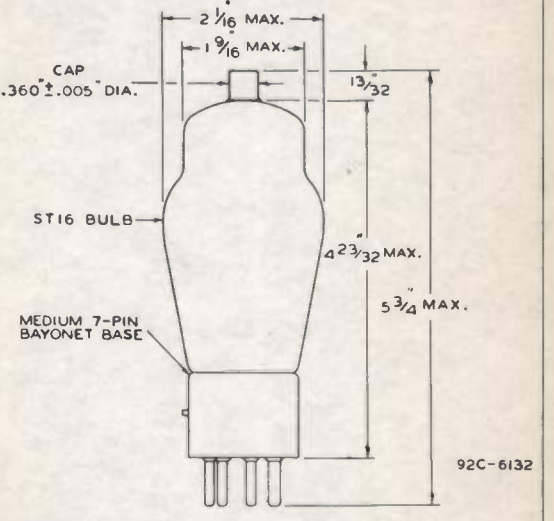
TRANSMITTING BEAM POWER AMPLIFIER

Heater[O]	Coated Unipotential Cathode	
Voltage	12.6	a-c or d-c volts
Current	0.45	amp.
Maximum Overall Length		5-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 7-Pin, MICANOL* Bayonet

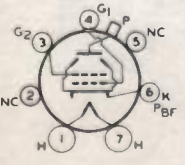
[O] In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts. Under the maximum plate and screen dissipation conditions, the heater voltage should not fluctuate so that it exceeds 14 volts.

* Registered trademark.

Except for the heater rating, the electrical characteristics of the 1625 are the same as those of the 807.



BOTTOM VIEW OF SOCKET CONNECTIONS



Pin 1 – Heater
Pin 2 – No Connection
Pin 3 – Screen
Pin 4 – Grid
Pin 5 – No Connection
Pin 6 – Cathode, Beam-Forming Plates
Pin 7 – Heater
Cap – Plate

TUBE MOUNTING POSITION
VERTICAL or HORIZONTAL

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

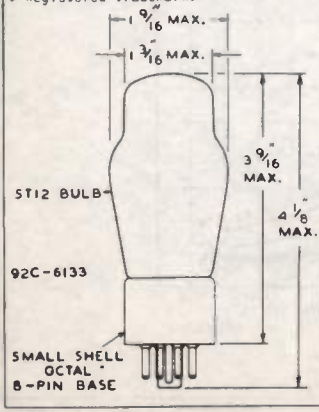
° In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

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.

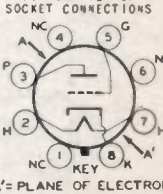
** Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

\# 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

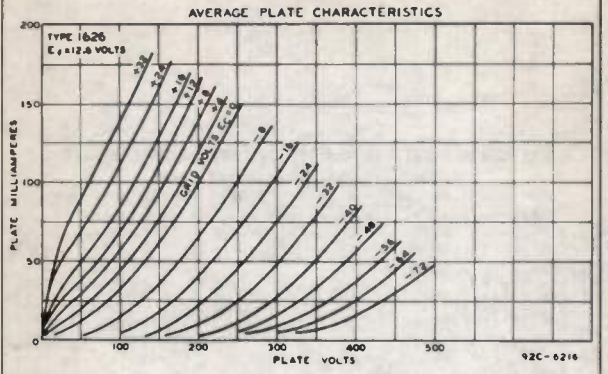
TUBE MOUNTING POSITION

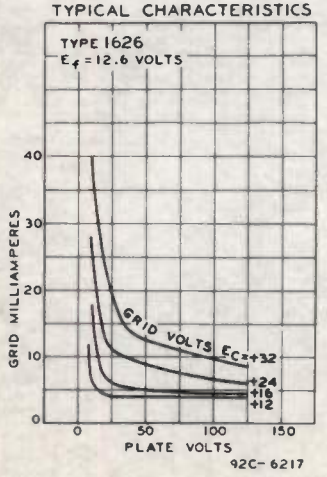
VERTICAL or HORIZONTAL

1626

1626

TRANSMITTING TRIODE





MARCH 15, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6216,
92C-6217

1627

R-F POWER AMPLIFIER, CLASS B MODULATOR

Filament	Thoriated Tungsten	
Voltage	5	a-c or d-c volts
Current	9	amp.

Except for the filament voltage and current, the electrical and physical characteristics of the 1627 are identical to those of the RCA-810. Data on operating frequencies for the 1627 are the same as those given for the RCA-810 on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

RCA

1651

HALF-WAVE RECTIFIER

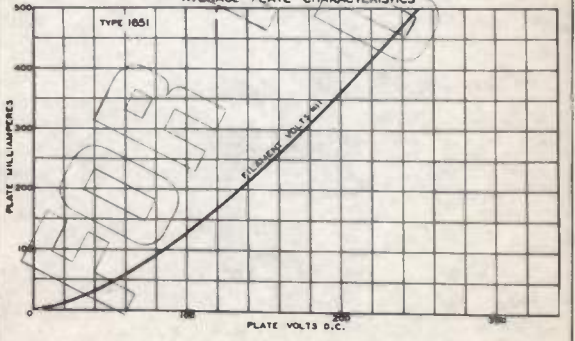
Filament*	Tungsten	
Voltage	11.0	a-c volts
Current	14.75	amp.
Overall Length		14-1/4" ± 1/8"
Maximum Diameter		4-5/16"
Bulb		T-32
Cap		No. 1904
Base#		No. 3502
Peak Inverse Voltage		11000 max. volts
Peak Plate Current		0.75 max. amp.

* The filament of the 1651 should be allowed to come up to operating temperature before plate voltage is applied.

Base shell is not connected within base to either filament lead.

ONLY RENEWAL EDITION

AVERAGE PLATE CHARACTERISTICS

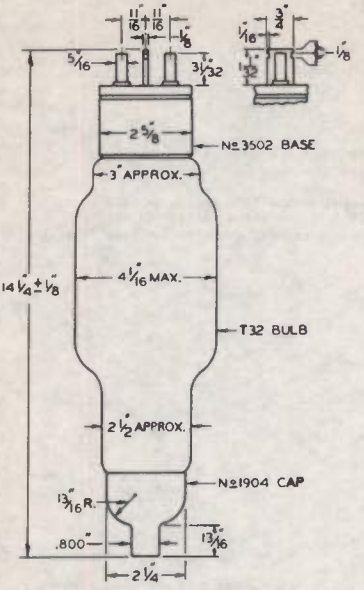


(continued on next page)

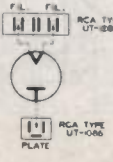
1651

HALF-WAVE RECTIFIER

(continued from preceding page)



TUBE SYMBOL & CONNECTIONS
TO END-MOUNTINGS



1652

OSCILLATOR, R-F POWER AMPLIFIER

(WATER COOLED)

Filament	Tungsten	
Voltage	14.5	a-c or d-c volts
Current	52	amp.
Amplification Factor	18	
Direct Interelectrode Capacitances (approx.):		
Grid to Plate	27	μμf
Grid to Filament	18	μμf
Plate to Filament	2	μμf
Maximum Overall Length		20-1/8"
Maximum Radius		6-1/2"
Base		No. 5906
Water Jacket		Type WT-1285-A

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			7500 max.	volts
D-C Plate Current			0.625 max.	amp.
R-F Grid Current			5.0 max.	amp.
Plate Input			4500 max.	watts
Plate Dissipation			3000 max.	watts
Typical Operation:				
D-C Plate Voltage	6000	6000	7500	volts
D-C Grid Voltage	-400	-475	-600	volts
D-C Plate Current	0.45	0.5	0.625	amp.
Power Output	750	1000	1600 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			6000 max.	volts
D-C Plate Current			0.625 max.	amp.
D-C Grid Current			0.075 max.	amp.
R-F Grid Current			3.0 max.	amp.
Plate Input			4000 max.	watts
Plate Dissipation			3000 max.	watts
Typical Operation:				
D-C Plate Voltage	5400		6000	volts
D-C Grid Voltage	-1000		-1150	volts
D-C Plate Current	0.625		0.625	amp.
Power Output	2250		2500 approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation \$

D-C Plate Voltage			7500 max.	volts
D-C Plate Current			1.25 max.	amp.
D-C Grid Current			0.075 max.	amp.
R-F Grid Current			5.0 max.	amp.
Plate Input			9400 max.	watts
Plate Dissipation			5000 max.	watts
Typical Operation:				
D-C Plate Voltage	5000	6000	7500	volts
D-C Grid Voltage	-1000	-1200	-1500	volts
D-C Plate Current	0.9	1.0	1.25	amp.
Power Output	3000	4000	6000 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.

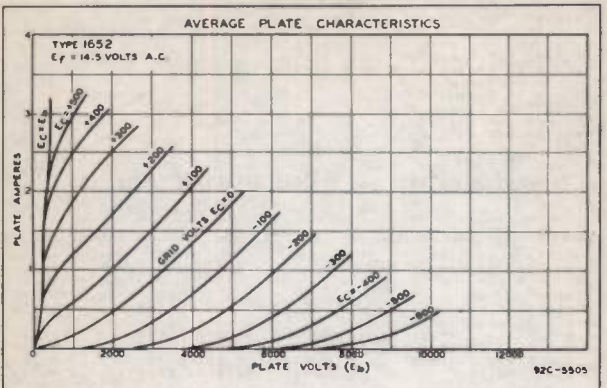
For use of the 1652 at the higher frequencies, refer to sheet TRANS. TUBE RATINGS vs FREQUENCY.

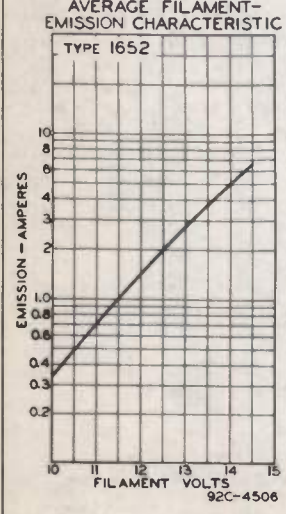
OUTLINE DIMENSIONS, BASE DIMENSIONS, TUBE SYMBOL, and TERMINAL CONNECTIONS for the 1652 are the same as for the 207.

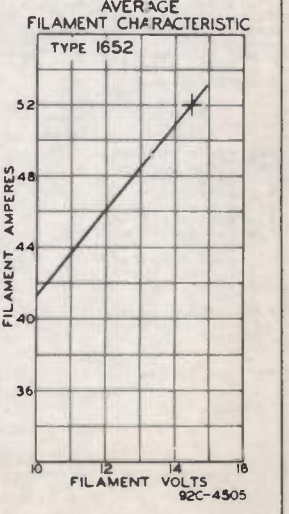
PRELIMINARY

1652

OSCILLATOR, R-F POWER AMPLIFIER







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, with heater volts = 5.0	–	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
Overall Length	6-3/4" ± 1/4"
Maximum Diameter	3"
Bulb	ST-23
Cap	Medium
Base	Medium-Shell Small 4-Pin, Bayonet
Basing Designation for BOTTOM VIEW	3W

Pin 1 – Heater
Pin 2 – Cathode (Anode Return)

Pin 3 – No Connection
Pin 4 – Heater, Cathode

Maximum Ratings, *Absolute Values:*

For frequencies up to 150 cycles

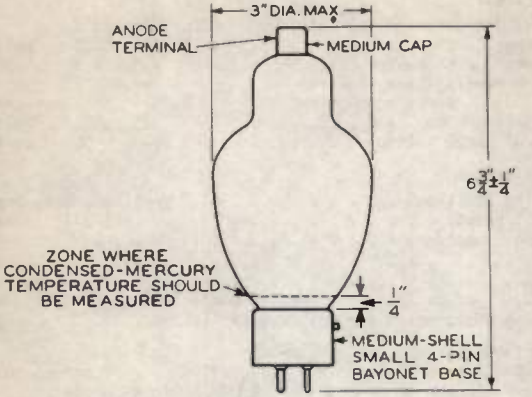
CONDENSED-MERCURY TEMPERATURE RANGE[□]	+30 to +80	+30 to +60	°C
PEAK INVERSE ANODE VOLTAGE	2000 max.	5000 max.	volts
CATHODE CURRENT:			
Peak	15 max.	15 max.	amp
Average[■]	2.5 max.	2.5 max.	amp
Surge, for duration of 0.1 sec. max.	200 max.	200 max.	amp

□ Recommended condensed-mercury temperature = 40°C.
■ Averaged over any interval of 15 sec. max.

← Indicates a change.

5558

HALF-WAVE MERCURY-VAPOR RECTIFIER



92CS-6701R1

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:°

Grid No.1 to Plate	0.24	μμf
Input	7.0	μμf
Output	5.0	μμf

° 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.

RCA

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.

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.

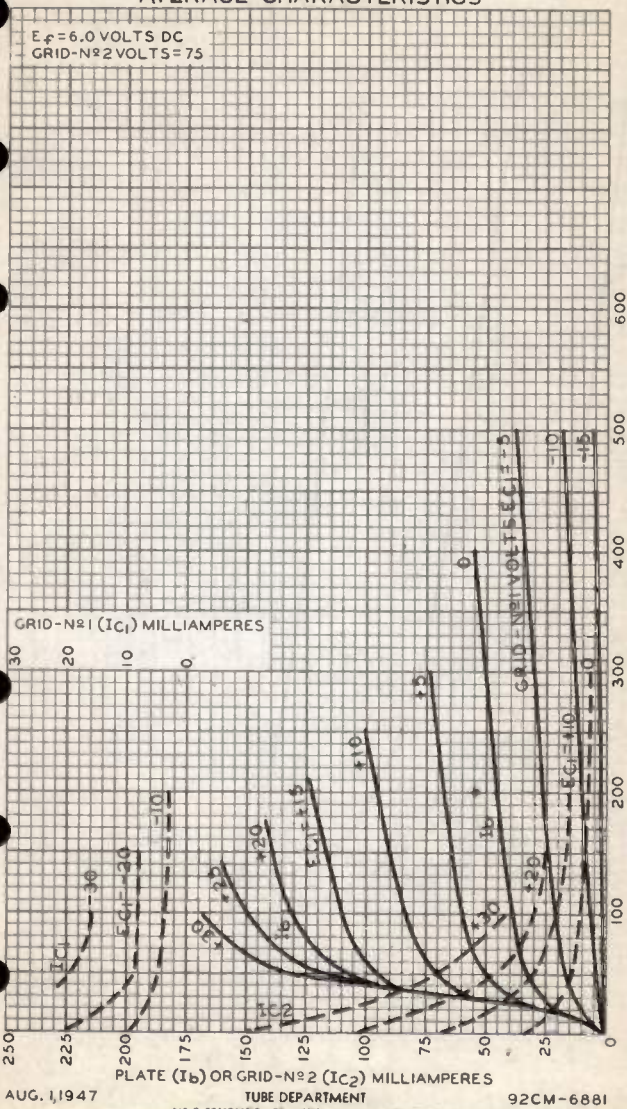
⊕ Filament may be connected in either parallel or series arrangement. With parallel connection, grid No.3 (pin No.4) is connected to pin No.5; for series operation, connect pin No.4 to pin No.1.

♦ Obtained from a fixed supply, or by a grid-No.1 resistor of value shown.

RCA

5618

AVERAGE CHARACTERISTICS



AUG. 1, 1947

TUBE DEPARTMENT

92CM-6881

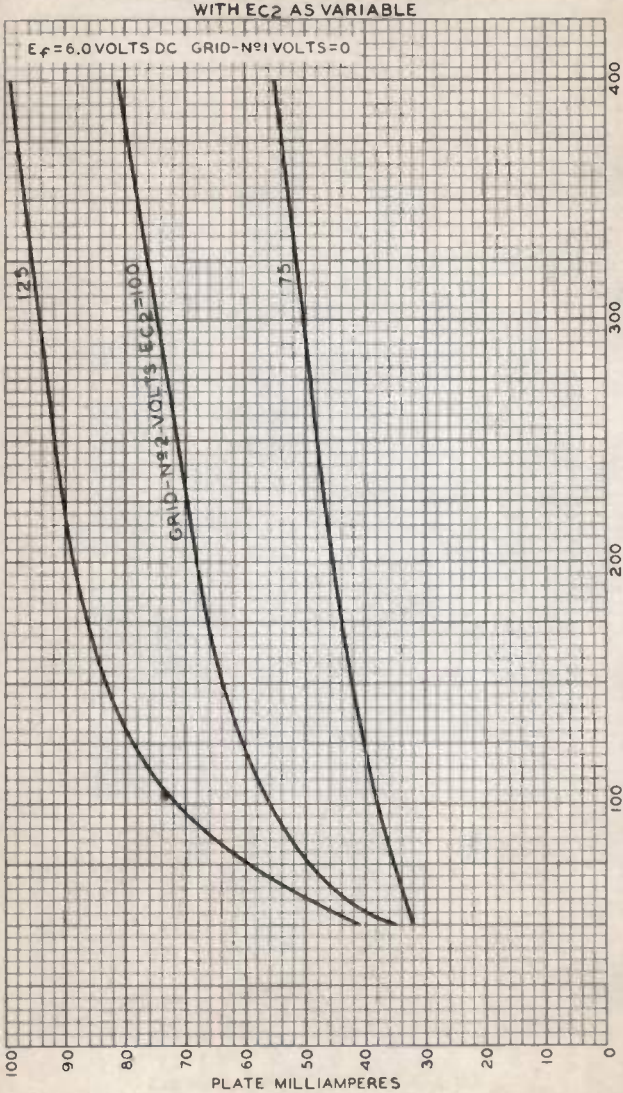
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5618

RCA

5618

AVERAGE PLATE CHARACTERISTICS
WITH EC2 AS VARIABLE



AUG. 12, 1947 TUBE DEPARTMENT 92CM-6882

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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:	The filament current should never exceed 425 amperes, even momentarily.	
Cold Resistance	0.005	ohms
Amplification Factor	39	

Direct Interlectrode 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.

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.

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

● Continuous Commercial Service.

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

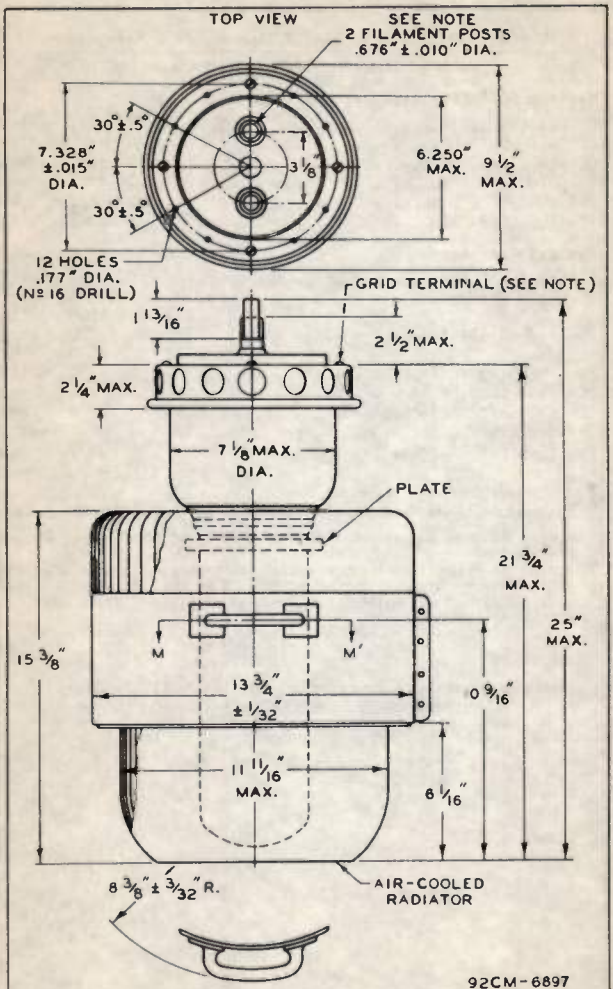
□ Subject to wide variations as explained on sheet TUBE RATINGS in General Section.

□□ 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.

5671
POWER TRIODE



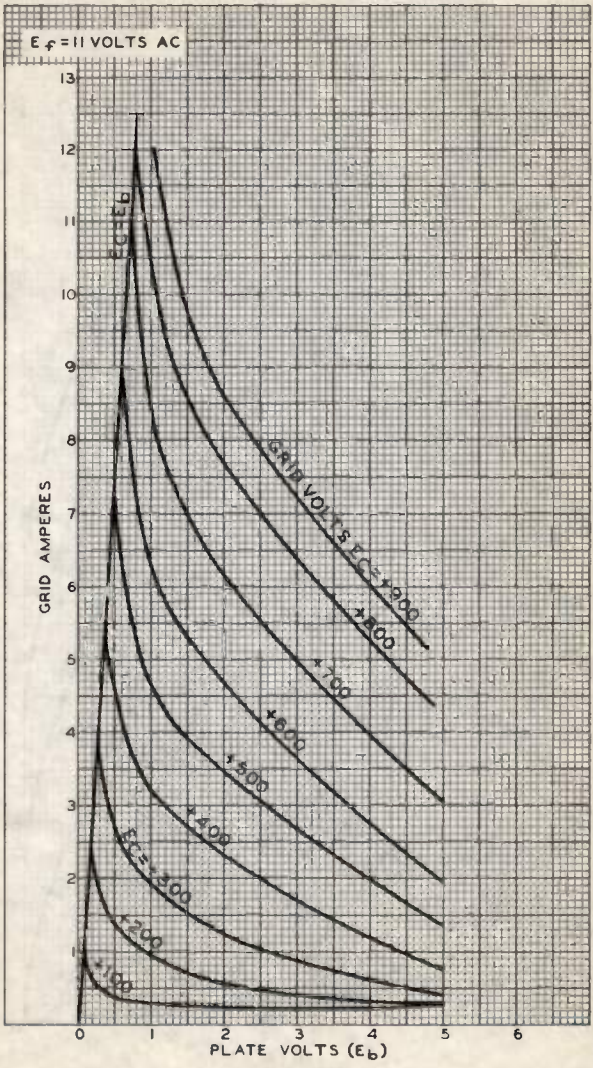
SECTION M-M'

NOTE: FLEXIBLE CONNECTIONS ARE REQUIRED.

RCA

5671

TYPICAL CHARACTERISTICS

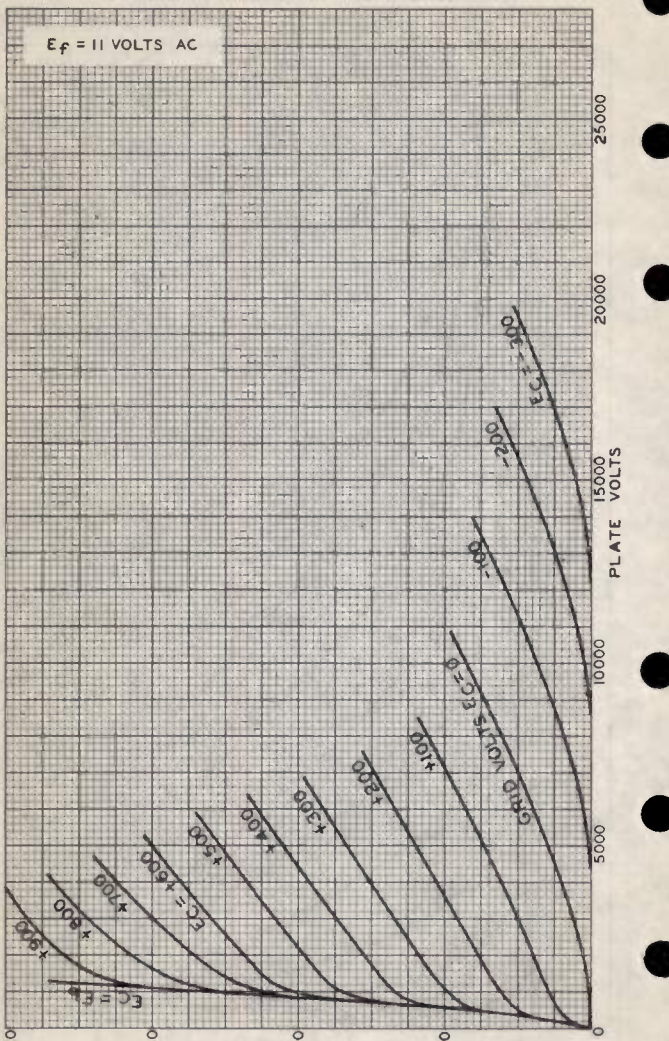


5671

RCA

5671

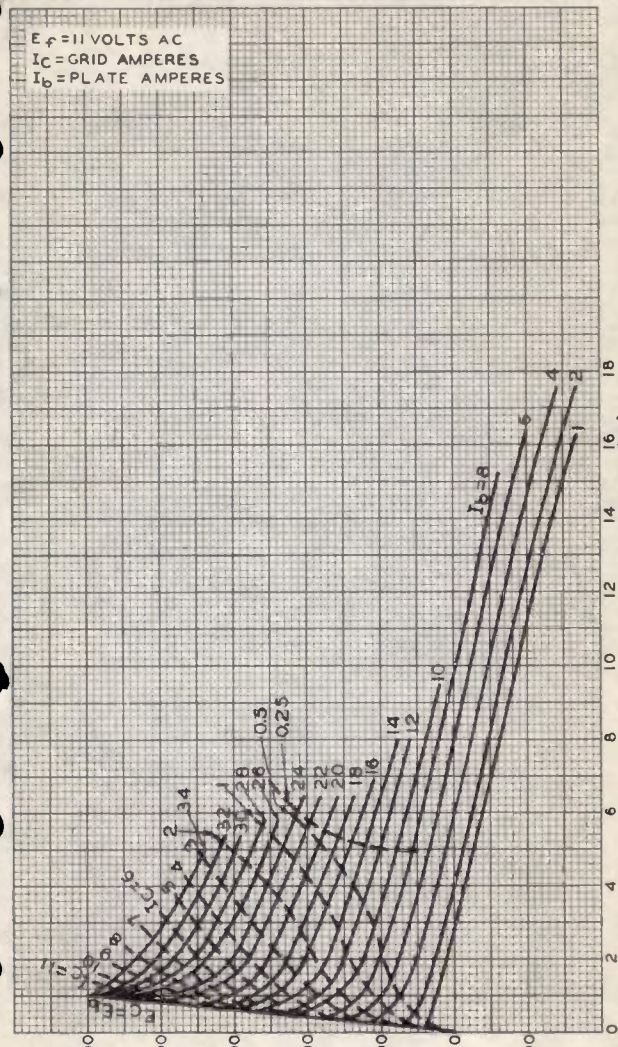
AVERAGE PLATE CHARACTERISTICS



RCA

5671

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



NOV. 19, 1947

TUBE DEPARTMENT

92CM-6909

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5713

POWER TRIODE

FORCED-AIR-COOLED, GROUNDED-GRID TYPE

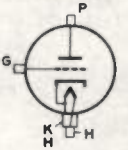
GENERAL DATA

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.

5713

5713
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.

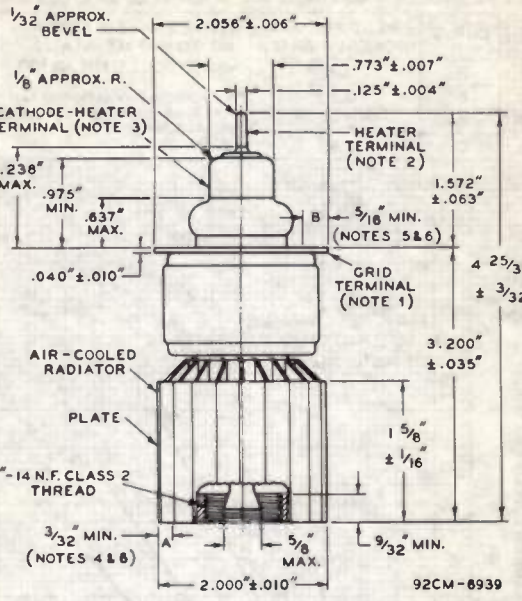
Required by tube and input circuit. A portion of this power appears in the load circuit.

* 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.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5713
POWER TRIODE



NOTE 1: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF GRID-TERMINAL FLANGE WITH RESPECT TO ℄ (AXIS) OF PLATE RADIATOR IS 0.040", 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 0.020".

NOTE 3: MAXIMUM ECCENTRICITY OF ℄ (AXIS) OF CATHODE-HEATER TERMINAL WITH RESPECT TO ℄ (AXIS) OF GRID-TERMINAL FLANGE IS 0.020".

NOTE 4: SURFACE OF ANNULAR AREA INDICATED BY "A" ON BOTTOM OF RADIATOR IS IN SAME PLANE WITHIN 0.005", AS DETERMINED BY GAUGE 1/16" WIDE AND 0.005" 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 0.008", 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 0.030" TO SURFACE OF ANNULAR AREA INDICATED BY "B" ON GRID-TERMINAL FLANGE.

RCA

5713

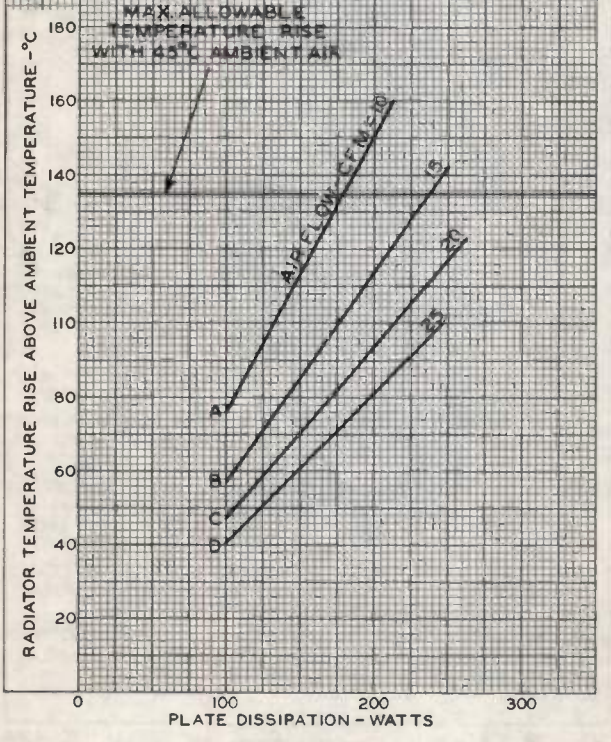
COOLING REQUIREMENTS

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

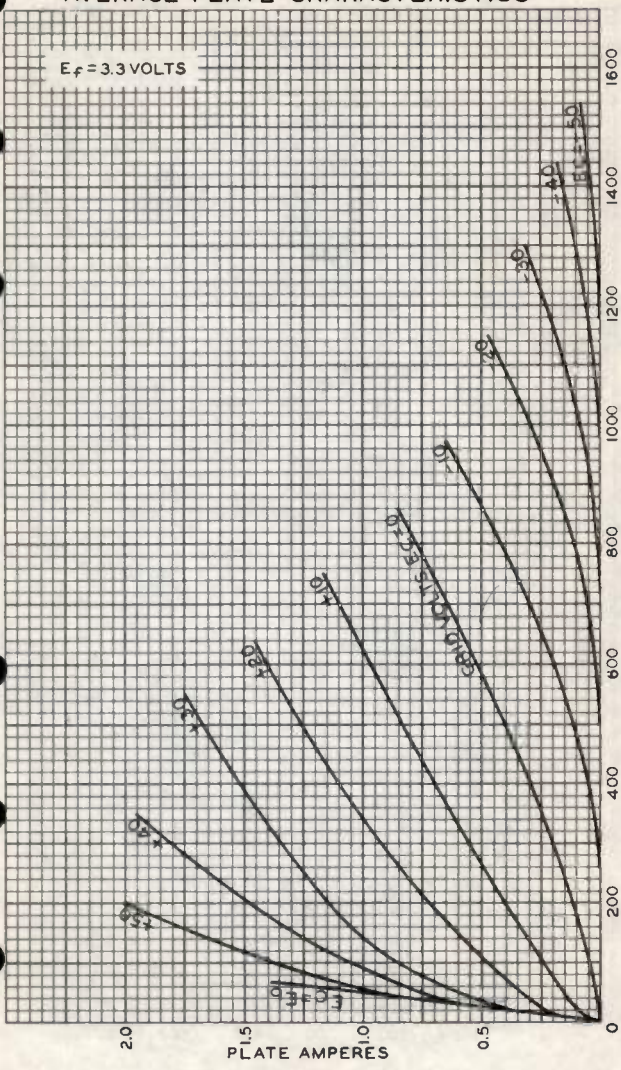
*NATIONAL ASSOCIATION OF FAN MFRS., GENERAL MOTORS BLDG., DETROIT, MICH.



RCA

5713

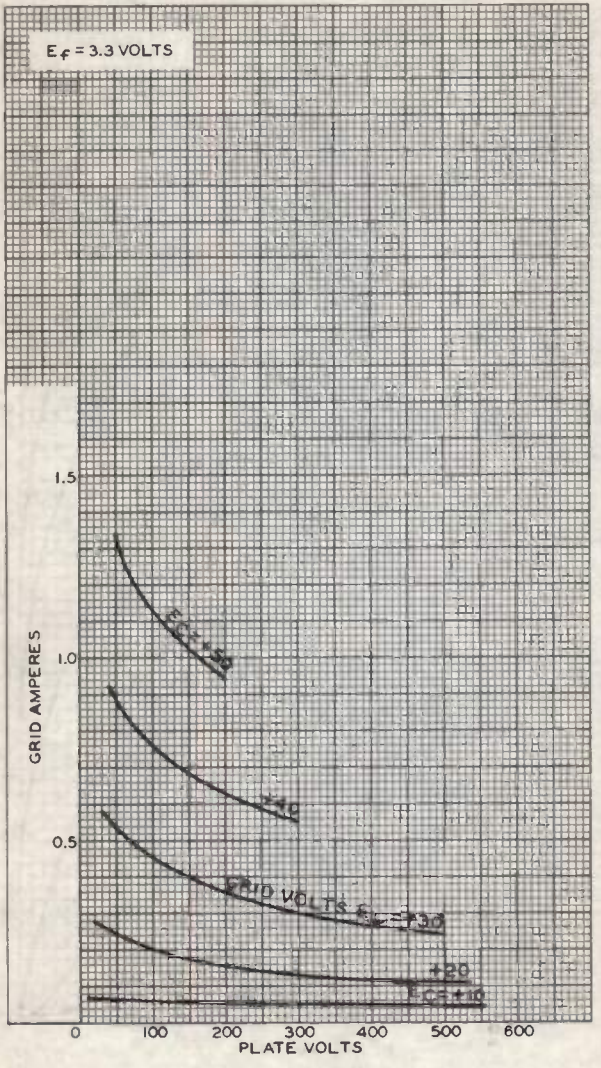
AVERAGE PLATE CHARACTERISTICS



RCA

5713

TYPICAL GRID CHARACTERISTICS



RCA

8000

OSCILLATOR, POWER AMPLIFIER, MODULATOR

Filament	Thoriated Tungsten	
Voltage	10	a-c or d-c volts
Current	4.5	amp.
Amplification Factor	16.5	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	6.4	μμf
Grid to Filament	5.0	μμf
Plate to Filament	3.3	μμf
Maximum Overall Length		9-1/16"
Maximum Radius		2-1/4"
Bulb		T-20
Cap (top)		Medium Metal, Skirted
Cap (side)		Medium Metal
Base		Jumbo 4-Large Pin
RCA Socket		UT-541A

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	2000 max.	2250 max.	volts
Max.-Sig. D-C Plate Current*	250 max.	250 max.	ma.
Max.-Sig. Plate Input*	425 max.	510 max.	watts
Plate Dissipation*	125 max.	150 max.	watts
Typical Operation:			
Unless otherwise specified, values are for 2 tubes			
D-C Plate Voltage	2000	2250	volts
D-C Grid Voltage #	-120	-130	volts
Peak A-F Grid-to-Grid Volt.	520	560	volts
Zero-Sig. D-C Plate Current	60	65	ma.
Max.-Sig. D-C Plate Current	425	450	ma.
Load Resistance (per tube)	2700	3000	ohms
Effective Load Resistance (plate to plate)	10800	12000	ohms
Max.-Sig. Driving Power	6.5	7.9 approx.	watts
Max.-Sig. Power Output	600	725 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	ICAS	
D-C Plate Voltage	2000 max.	2250 max.	volts
D-C Plate Current	185 max.	185 max.	ma.
Plate Input	190 max.	225 max.	watts
Plate Dissipation	125 max.	150 max.	watts
Typical Operation:			
D-C Plate Voltage	2000	2250	volts
D-C Grid Voltage #	-130	-145	volts
Peak R-F Grid Voltage	140	150	volts
D-C Plate Current	95	100	ma.
D-C Grid Current**	5	0 approx.	ma.

** See end of tabulation.

\# With a-c filament supply.

RCA MANUFACTURING COMPANY, INC.

8000

OSCILLATOR, POWER AMPLIFIER, MODULATOR

(continued from preceding page)

	CCS	ICAS	
Driving Power** ◇	4.8	5.4 approx.	watts
Power Output	65	75 approx.	watts

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

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

	CCS	ICAS	
D-C Plate Voltage	2000 max.	2250 max.	volts
D-C Grid Voltage	-500 max.	-500 max.	volts
D-C Plate Current	185 max.	185 max.	ma.
Plate Input	190 max.	225 max.	watts
Plate Dissipation	125 max.	150 max.	watts
Typical Operation:			
D-C Plate Voltage	2000	2250	volts
D-C Grid Voltage	-250	-265	volts
Peak R-F Grid Voltage	265	270	volts
Peak A-F Grid Voltage	120	115	volts
D-C Plate Current	95	100	ma.
D-C Grid Current**	0	0 approx.	ma.
Driving Power** ◇	4.3	2.5 approx.	watts
Power Output	65	75 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 factor of 1.0

	CCS	ICAS	
D-C Plate Voltage	1600 max.	1800 max.	volts
D-C Grid Voltage	-500 max.	-500 max.	volts
D-C Plate Current	210 max.	250 max.	ma.
D-C Grid Current	40 max.	40 max.	ma.
Plate Input	335 max.	450 max.	watts
Plate Dissipation	85 max.	125 max.	watts
Typical Operation:			
D-C Plate Voltage	1600	1800	volts
D-C Grid Voltage ◊	-300	-320	volts
	15000	16000	ohms
Peak R-F Grid Voltage	470	490	volts
D-C Plate Current	210	250	ma.
D-C Grid Current**	20	20 approx.	ma.
Driving Power**	8.5	8.8 approx.	watts
Power Output	250	335 approx.	watts

◊ Obtained by 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	ICAS	
D-C Plate Voltage	2000 max.	2250 max.	volts
D-C Grid Voltage	-500 max.	-500 max.	volts
D-C Plate Current	250 max.	275 max.	ma.
D-C Grid Current	40 max.	40 max.	ma.
Plate Input	500 max.	620 max.	watts
Plate Dissipation	125 max.	150 max.	watts
Typical Operation:			
D-C Plate Voltage	2000	2250	volts

**, ##: See end of tabulation.

8000

OSCILLATOR, POWER AMPLIFIER, MODULATOR

(continued from preceding page)

	CCS	ICAS	
D-C Grid Voltage □	-195	-210	volts
	8100	8400	ohms
	710	700	ohms
Peak R-F Grid Voltage	370	400	volts
D-C Plate Current	250	275	ma.
D-C Grid Current**	24	25	approx. ma.
Driving Power**	8	9	approx. watts
Power Output	375	475	approx. watts

□ Obtained from fixed supply, by grid resistor (8100, 8400), or by cathode resistor (710, 700).

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 plate voltage of 2250 volts, a fixed bias of at least -125 volts should be used.

OSCILLATOR - OPERATION WITH UNFILTERED PLATE SUPPLY

	Supply 1	Supply 2	
Plate Voltage	2500 max.	1800 max.	volts
D-C Grid Voltage	-200 max.	-300 max.	volts
D-C Plate Current	160 max.	225 max.	ma.
D-C Grid Current	25 max.	35 max.	ma.
Plate Input	450 max.	500 max.	watts
Plate Dissipation	125 max.	125 max.	watts
Typical Operation in push-pull circuit at 30 Mc:			
Unless otherwise specified, values are for 2 tubes			
Plate Voltage	2500 (RMS)	1800	volts
Grid Resistor	3500	5000	ohms
D-C Plate Current	320	450	ma.
D-C Grid Current	30	35	ma.
Power Output	650	700	approx. watts
Circuit Power Output (85% circuit efficiency)	550	600	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.

** 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.

Data on operating frequencies for the 8000 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

OUTLINE DIMENSIONS and SOCKET CONNECTIONS for the 8000 are the same as those for the 810.

TUBE MOUNTING POSITION

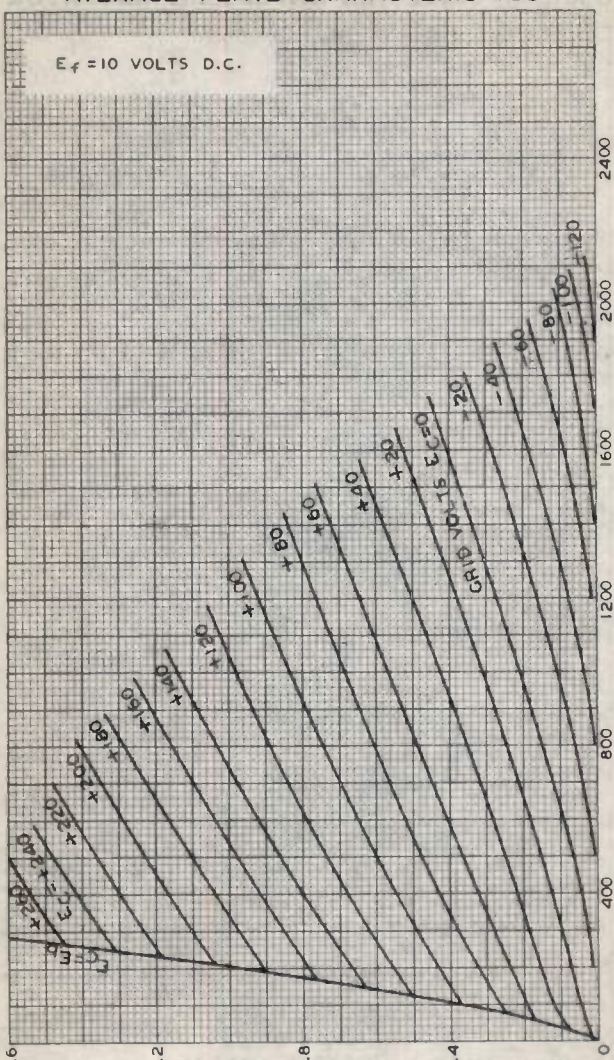
VERTICAL: Base Down
HORIZONTAL: Plane of filament vertical

→ Indicates a change.

8000

8000

AVERAGE PLATE CHARACTERISTICS

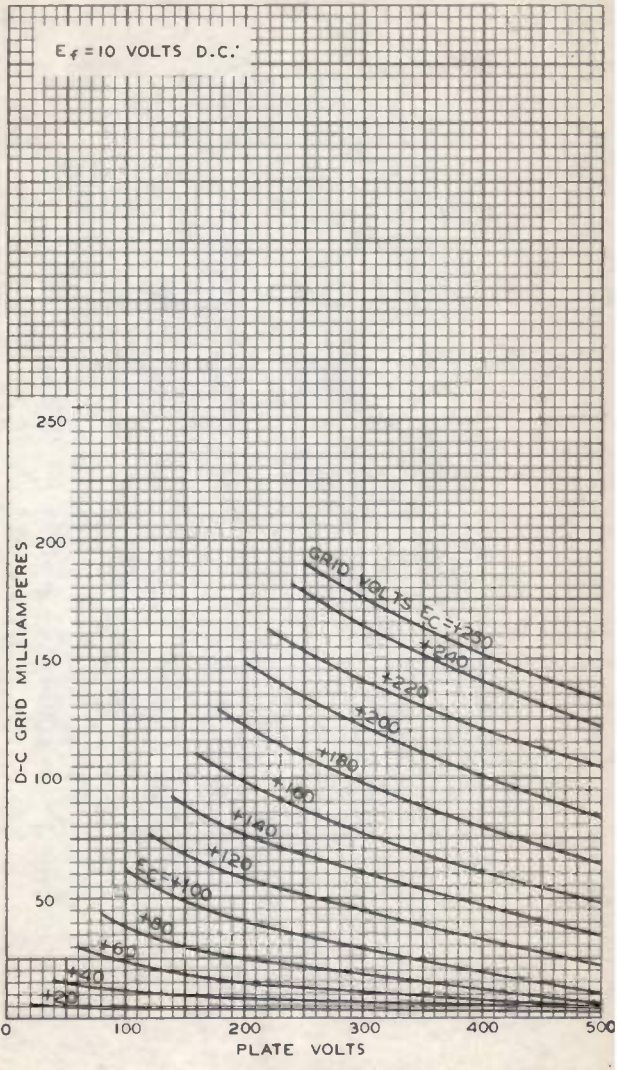


SEPT. 20, 1940 RCA RADIOTRON DIVISION RCA MANUFACTURING COMPANY, INC. 92C-6212

RCA

8000

TYPICAL CHARACTERISTICS



FEB. 12, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6213

RCA

8001

TRANSMITTING BEAM POWER AMPLIFIER

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 (With external shielding)	0.1 max.	μμf
Input	11	μμf
Output	5.5	μμf
Maximum Overall Length		6-7/8"
Maximum Diameter		2-11/16"
Bulb		T-21
Base	Giant 7-Pin Metal,	Bayonet
RCA Socket		UT-104

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

A-F POWER AMPLIFIER & MODULATOR - Class A

D-C Plate Voltage		2000 max.	volts
D-C Screen Voltage (Grid #2)		500 max.	volts
D-C Plate Current		150 max.	ma.
Plate Input		75 max.	watts
Screen Input		20 max.	watts
Plate Dissipation		75 max.	watts
Typical Operation:			
D-C Plate Voltage	500	1000	volts
D-C Suppressor Voltage (Grid #3)	0	0	volts
D-C Screen Voltage	500	300	volts
D-C Grid Voltage (Grid #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

* With a-c filament supply.

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		2000 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		100 max.	ma.
Plate Input		110 max.	watts
Screen Input		25 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	500	volts
	2000	2000	ohms

□ 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 500,000 ohms with cathode bias.

■ See next page.

8001

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

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	27	ma.
D-C Grid Current	8	3 approx.	ma.
Driving Power°	1.4	0.4 approx.	watts
Power Output	33	35 approx.	watts

° At crest of a-f cycle with modulation factor of 1.0. Obtained preferably from plate-voltage supply through series resistor of value shown.

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		1800 max.	volts
D-C Screen Voltage (Grid #2)		400 max.	volts
D-C Grid Voltage (Grid #1)		-500 max.	volts
D-C Plate Current		135 max.	ma.
D-C Grid Current		25 max.	ma.
Plate Input		240 max.	watts
Screen Input		16 max.	watts
Plate Dissipation		65 max.	watts
Typical Operation:			
D-C Plate Voltage	1500	1800	volts
D-C Suppressor Voltage (Grid #3)	60	60	volts
D-C Screen Voltage ##	400	400	volts
	100000	125000	ohms
D-C Grid Voltage△	-130	-130	volts
	16000	16000	ohms
	10000	10000	ohms
	300	300	ohms
Peak R-F Grid Voltage	235	235	volts
D-C Plate Current	135	135	ma.
D-C Screen Current	11	11	ma.
D-C Grid Current	8	8 approx.	ma.
Driving Power	1.7	1.7 approx.	watts
Power Output	143	178 approx.	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

D-C Plate Voltage	2000 max.	volts
D-C Screen Voltage (Grid #2)	500 max.	volts
D-C Grid Voltage (Grid #1)	-500 max.	volts
D-C Plate Current	150 max.	ma.
D-C Grid Current	25 max.	ma.
Plate Input	300 max.	watts

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

△ Obtained by fixed supply, grid resistor (16000), or combination of cathode resistor (300) and grid resistor (10000).

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

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

RCA

8001

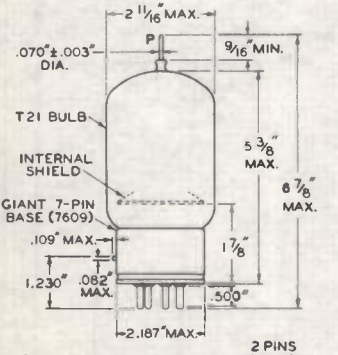
TRANSMITTING BEAM POWER AMPLIFIER

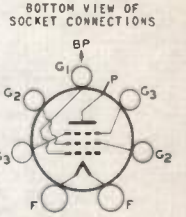
(continued from preceding page)

Screen Input		25 max.	watts
Plate Dissipation		75 max.	watts
Typical Operation:			
D-C Plate Voltage	1500	2000	volts
D-C Suppressor Voltage	60	60	volts
D-C Screen Voltage ◊	500	500	volts
	9000	13600	ohms
D-C Grid Voltage ♦	-200	-200	volts
	33000	33000	ohms
	1200	1200	ohms
Peak R-F Grid Voltage	255	255	volts
D-C Plate Current	150	150	ma.
D-C Screen Current	11	11	ma.
D-C Grid Current	6	6 approx.	ma.
Driving Power	1.4	1.4 approx.	watts
Power Output	170	230 approx.	watts

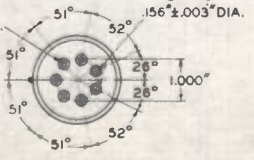
◊ Preferably obtained from a separate source or a voltage divider; series screen resistor of values shown should not be used except where the 8001 is employed as a buffer amplifier and is not keyed.

♦ Obtained from fixed supply, grid resistor (33000), or cathode resistor (1200). 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.





F – Filament
G_1 – Grid
G_2 – Screen
G_3 – Suppressor
P – Plate
BP – Bayonet Pin



BOTTOM VIEW OF BASE

TUBE MOUNTING POSITION

VERTICAL: Base up or down.

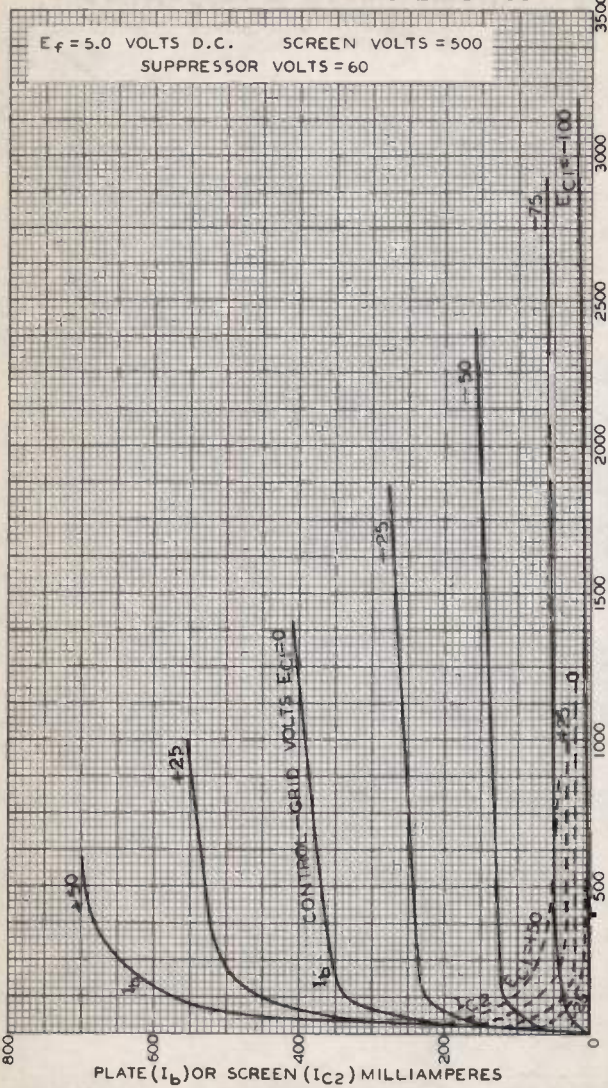
HORIZONTAL: No.

92C-6260

8001

8001

AVERAGE PLATE CHARACTERISTICS



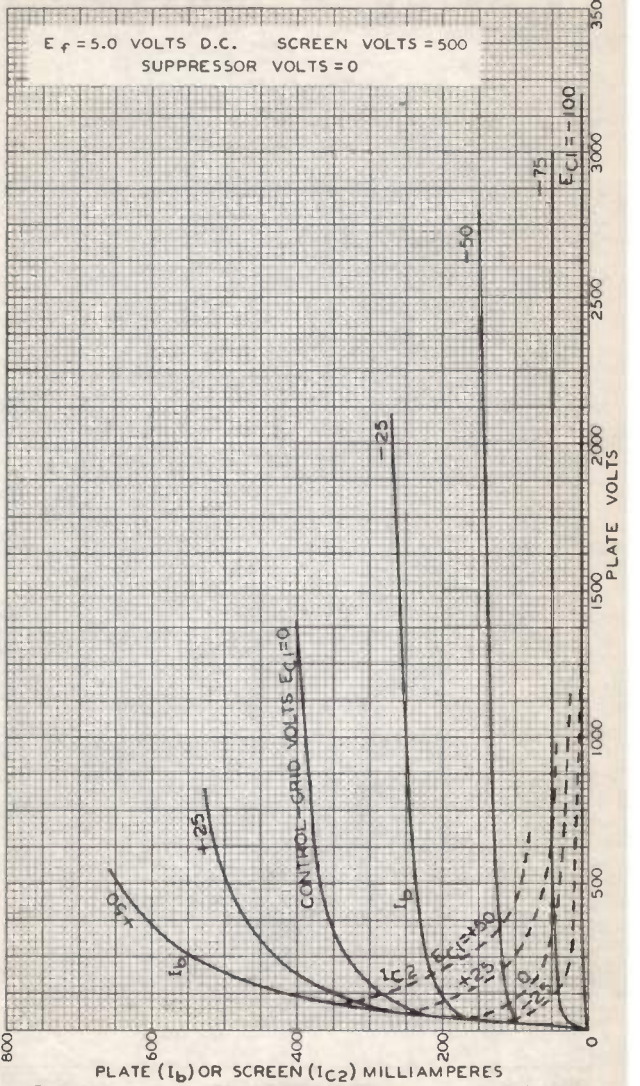
MAR. 4, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6259

8001

AVERAGE PLATE CHARACTERISTICS



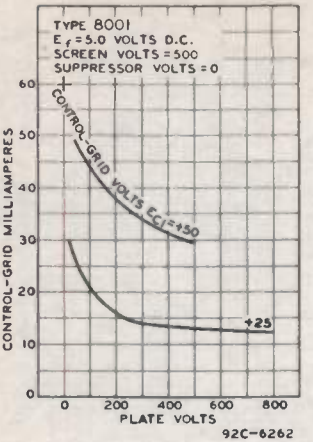
MAR. 5, 1941 RCA RADIOTRON DIVISION 92C-6261

RCA MANUFACTURING COMPANY INC.

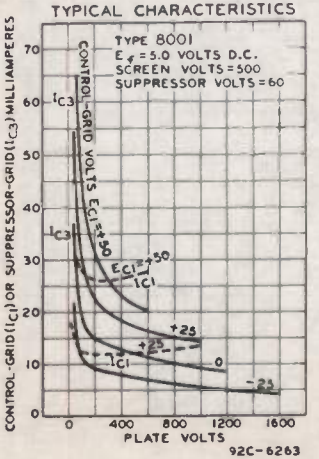
8001

TRANSMITTING BEAM POWER AMPLIFIER

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS



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.

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.

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.

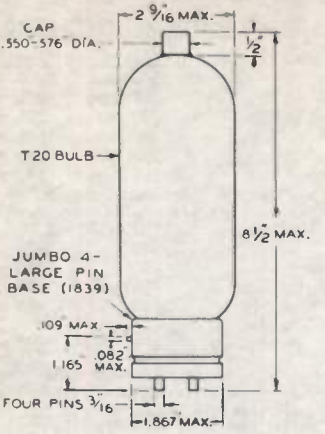
CURVES for the 8003 are the same as those for Type 211.

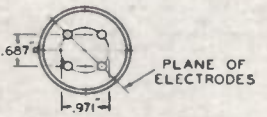
←Indicates a change.

RCA

8003

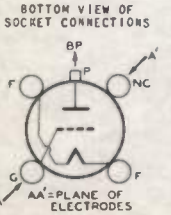
OSCILLATOR, POWER AMPLIFIER, MODULATOR





BOTTOM VIEW OF BASE

92C-6203



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).

8005
POWER TRIODE

GENERAL DATA

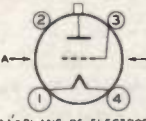
Electrical:

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



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 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.

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.

RCA

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.

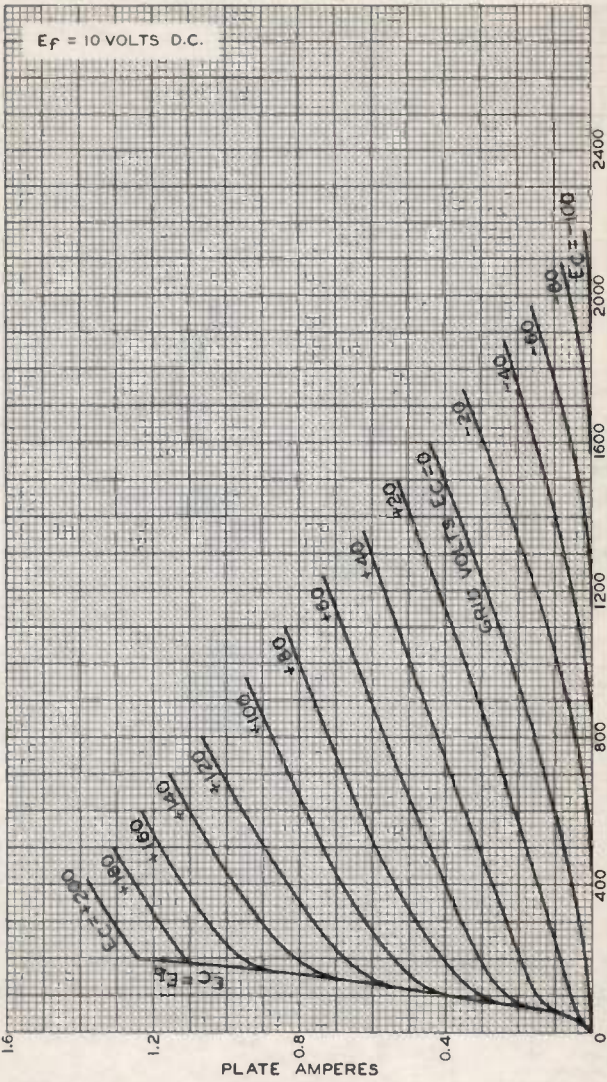
□□ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲ Obtained from fixed supply, by grid resistor (3800, 4000) or by cathode resistor (520, 560).

● See next page.

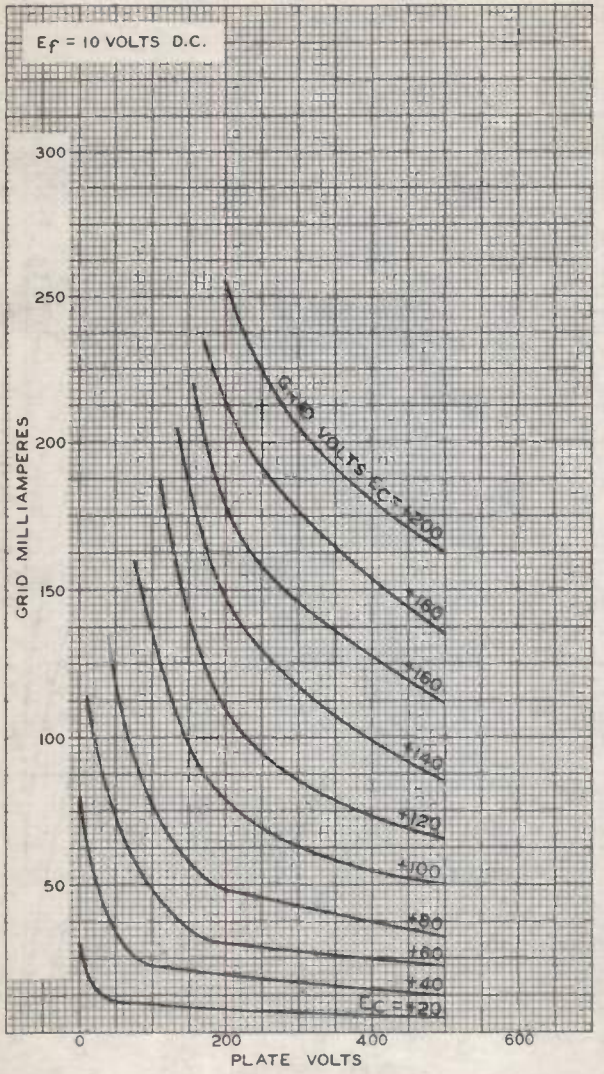
8005

AVERAGE PLATE CHARACTERISTICS



8005

TYPICAL CHARACTERISTICS

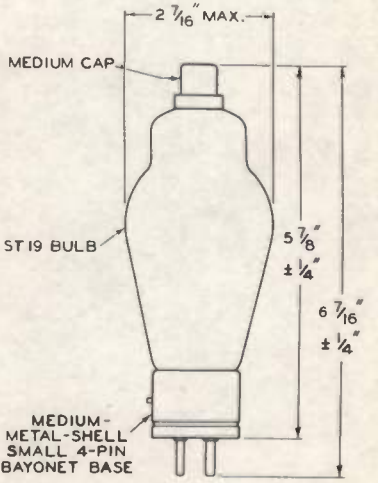


8005
POWER TRIODE

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.



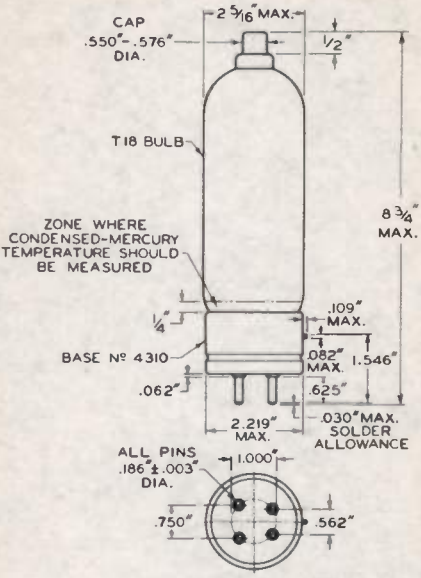
92CM-6283R2

8008

HALF-WAVE MERCURY-VAPOR RECTIFIER

The Type 8008 has the same maximum ratings and operating conditions as Type 872-A/872, but its physical dimensions and base are different.

RCA Socket — Stock No. 9917



BOTTOM VIEW OF BASE

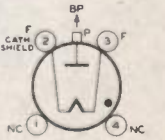
92C-6299

TUBE MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

BOTTOM VIEW OF SOCKET CONNECTIONS

Pin 1 – No Connection
Pin 2 – Filament, Cathode Shield
Pin 3 – Filament
Pin 4 – No Connection
Cap – Plate
● – Gas Type Tube



RCA

8012

U-H-F TRANSMITTING TRIODE

The 8012 supersedes the Type 1628.

Filament**	Thoriated Tungsten	
Voltage	6.3	a-c or d-c volts
Current	1.92	amp. ←
Amplification Factor	18	
Direct Interelectrode Capacitances:		
Grid to Plate	2.8	μμf
Grid to Filament	2.7	μμf
Plate to Filament	0.35	μμf
Maximum Overall Length Maximum Diameter	Refer to tube outline drawing	
Bulb		T-8
Terminal Connections		Special
Cooling		Forced Air◊ ←

Maximum Ratings Are Absolute Values

MAXIMUM CCS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

GRID-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	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▲	4.0 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

	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

**, *, ‡, ◊: See next page. ← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

8012

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

	CCS	
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

R-F POWER AMPLIFIER & OSCILLATOR – Class C Telegraphy

Key-down conditions per tube without modulation #

	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

‡ Obtained preferably from grid leak of value shown, or combination of grid leak with either fixed supply or suitably by-passed cathode resistor.

° Obtained from fixed supply, or grid resistor (4400), or by cathode resistor (1400). When the 8012 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.

* Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

** 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 condensers. 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.

→ ◊ Required when plate dissipation exceeds 75% of rated value.

→ Data on operating frequencies for the 8012 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

The 8012 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 has been designed to have an unusually high dissipation rating.

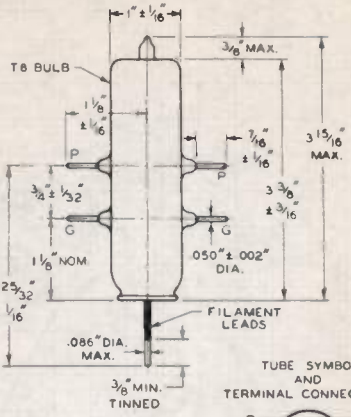
→ Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

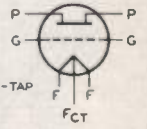
RCA

8012

U-H-F TRANSMITTING TRIODE



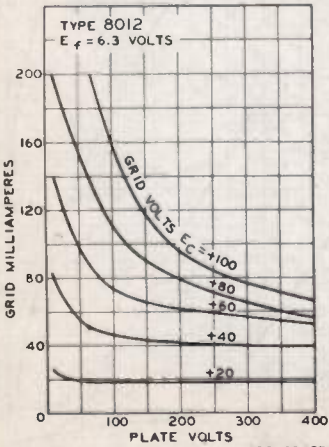
TUBE SYMBOL AND TERMINAL CONNECTIONS



P = PLATE
G = GRID
F = FILAMENT
F_{CT} = FILAMENT CENTER-TAP

92C-6343RI

TYPICAL CHARACTERISTICS



92C-6347RI

TUBE MOUNTING POSITION
Vertical only

→ Indicates a change.

8012

8012

AVERAGE PLATE CHARACTERISTICS

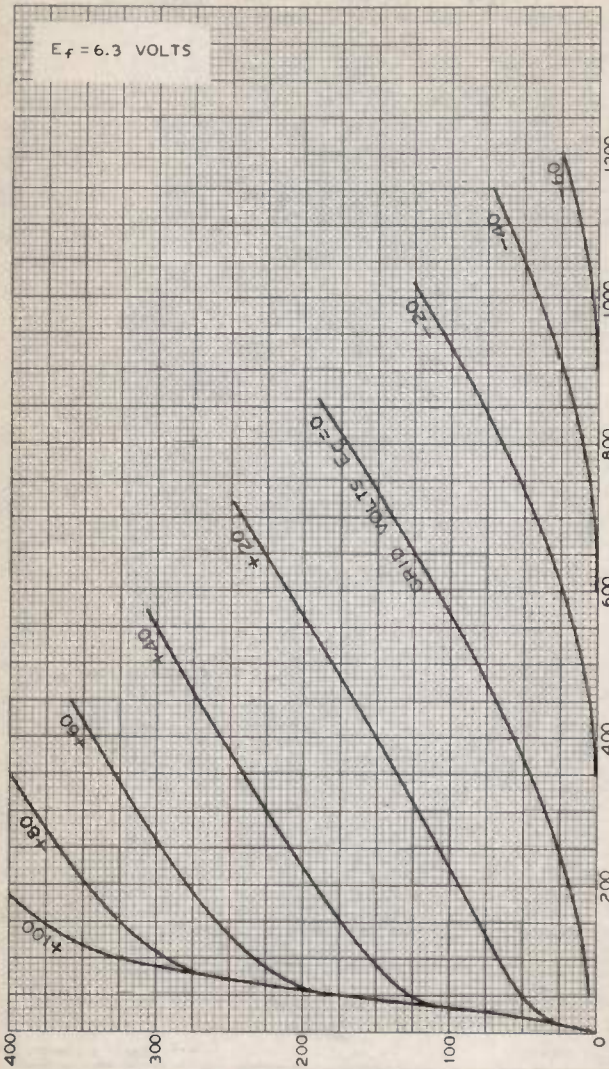


PLATE MILLIAMPERES

DEC. 18, 1941

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY INC.

92C-6346

8025

U-H-F TRANSMITTING TRIODE

Filament**	Thoriated Tungsten	
Voltage	6.3	a-c or d-c volts
Current	1.92	amp.
Amplification Factor	18	
Direct Interelectrode Capacitances:		
Grid to Plate	2.8	μμf
Grid to Filament	2.7	μμf
Plate to Filament	0.35	μμf
Maximum Overall Length		4-15/16"
Maximum Seated Height		4-5/16"
Maximum Radius		1-5/64"
Bulb		T-8
Caps (four)	Saddle Skirted Miniature, with Nub	
Base	Small 4-Pin, Micanol	

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 Ratings Are Absolute Values

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

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

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

	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
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

	Forced-Air Cooling CCS	*Natural Cooling ICAS*	
D-C Plate Voltage	800 max.	800 max.	volts

**, *: See next page.

8025

U-H-F TRANSMITTING TRIODE

(continued from preceding page)

	Forced-Air Cooling CCS	Natural Cooling ICAS	
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

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation #

	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
Typical Operation:			
D-C Plate Voltage	1000		volts
D-C Grid Voltage o	-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 condensers. 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 TRANS. TUBE RATINGS.

† Obtained preferably from grid resistor of value shown, or combination of grid resistor with either fixed supply or suitably by-passed 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.

o Obtained from fixed supply, or grid resistor (6400), or by cathode resistor (1400). When the 8025 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.

8025

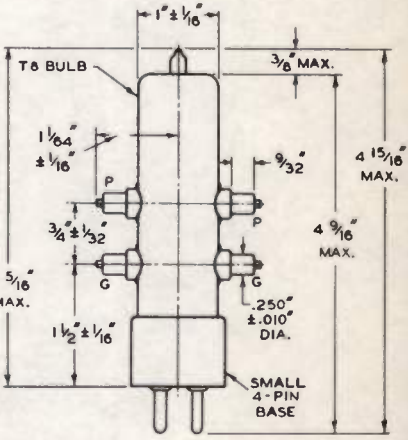
U-H-F TRANSMITTING TRIODE

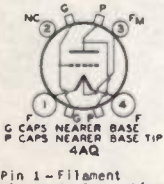
(continued from preceding page)

The 8025 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 has been designed to have an unusually high dissipation rating.

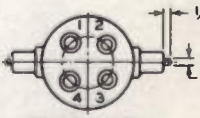
Data on operating frequencies for the 8025 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

Curves for the 8025 are the same as those for the 8012.





Pin 1 – Filament
Pin 2 – No Connection
Pin 3 – Filament Mid-Tap
Pin 4 – Filament



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 5° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

92C-6394

CATHODE-RAY TUBE SECTION

In this section, data are given for RCA Cathode-Ray Tubes which include types for oscillograph use; Monoscopes for testing the performance of television equipment; Kinescopes for television picture reproduction; and Iconoscopes and Orthicons for television camera pick-up.

Many of these types require a high-voltage, low-current, d-c supply. For this requirement, suitable rectifier tubes will be found in the Miscellaneous Tube Section. In this same section, data are given on gas-tubes designed for sweep-circuit use.

Requests for further technical data on any RCA tube type should be addressed to the Commercial Engineering Section, RCA Manufacturing Company, Inc., Harrison, N. J.

CLASSIFICATION CHART
FOR TYPES IN
CATHODE-RAY TUBE SECTION

When choosing tube types, the equipment designer should refer to the RCA PREFERRED TYPES LIST and its companion list - TYPES NOT RECOMMENDED for NEW EQUIPMENT DESIGN - both of which appear in the General Section.

KINESCOPES

Bulb Diam. Approx. In.	Max. Anode Voltage Rating* Volts	P-4 PHOSPHOR White Fluorescence Medium Persistence		
		Focusing Method	Deflection Method	TUBE TYPE
Direct-Viewing				
7	6000	Electrostatic	Electrostatic	7JP4
7	8000	Electrostatic	Electromagnetic	7DP4
9	7000	Electrostatic	Electromagnetic	9AP4
10	10000	Electromagnetic	Electromagnetic	10BP4
12	7000	Electrostatic	Electromagnetic	12AP4
Projection				
5	27000	Electrostatic	Electromagnetic	5TP4
View-Finder				
5	8000	Electromagnetic	Electromagnetic	5FP4-A

CAMERA TUBES

Major Use	Name	Image Size	TUBE TYPE
Outdoor Pickup	Image Orthicon	1.6" Diagonal	2P23
Studio Pickup	Image Orthicon	1.6" Diagonal	5655
Direct Pickup	Orthicon	1-3/4" x 2-5/16"	1840
Portable Camera	Iconoscope	2-3/16" x 2-7/8"	1848
Film Pickup	Iconoscope	3-9/16" x 4-3/4"	1850-A
Industrial & Laboratory	Iconoscope	1.4" Diagonal	5527

MONOSCOPE

5-Inch Magnetic-Deflection Type, Resolution Chart	2F21

OSCILLOGRAPH TUBES are classified on the following page.

* Design-Center Values.

CLASSIFICATION CHART
FOR TYPES IN
CATHODE-RAY TUBE SECTION

When choosing tube types, the equipment designer should refer to the RCA PREFERRED TYPES LIST and its companion list - TYPES NOT RECOMMENDED for NEW EQUIPMENT DESIGN - both of which appear in the General Section.

OSCILLOGRAPH TUBES

Bulb Diam. Approx. In.	Max. Anode Voltage Rating* Volts	TUBE TYPES WITH PHOSPHOR** P-1 Green Fluorescence Medium Persistence	P-5 Blue Fluorescence Very Short Persistence	P-7 Greenish-Yellow Phosphorescence Long Persistence	P-11 Blue Fluorescence Short Persistence
Electrostatic Deflection and Focus					
1	500	913	-	-	-
2	600	902-A	-	-	-
2	1000	2AP1-A	-	-	-
2	2500	2BP1	-	-	2BP11
3	1500	3AP1-A	908-A	-	-
3	2000	3BP1-A	-	-	-
3	2500	3KP1	-	-	-
5	2000	905-A	-	-	-
5	2000	5BP1-A	-	-	-
5	2000	5HP1-A	-	-	-
5	2500	5UP1	-	5UP7	5UP11
5	15000	912	-	-	-
9	7000	914-A	-	-	-
Post-Deflection Accelerator Types					
3	4000	-	-	3JP7	-
5	4000	5CP1-A	-	5CP7-A	5CP11-A
Electrostatic Focus - Electromagnetic Deflection					
7	8000	7CP1	-	-	-

* Design-Center Values.

** Tubes with Phosphor P-1 are particularly useful for general oscillographic applications in which recurrent wave phenomena are to be observed visually. A tube having Phosphor P-5 is especially useful in photographic applications involving film moving at high speeds. Tubes with Phosphor P-7 have an initial bluish fluorescence which is followed by the phosphorescence noted in the table. Types having this cascade (two-layer) phosphor are most useful where either low-speed, recurrent phenomena or medium-speed non-recurrent phenomena are to be observed. Phosphor P-11 is used in tubes for all photographic applications except those in which film moves at high speed. In addition, because of its unusually high brightness characteristic, the P-11 screen may be used for visual observation of phenomena.

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

CLASSIFICATION CHART OF CATHODE-RAY TUBES

TUBE CLASS	Nominal SCREEN DIAM. Inches	FLUORESCENCE	Max. OVERALL LENGTH Inches	HEATER POTENTIAL Volts	°Max. ANODE No.2 POTENTIAL Volts	*DEFLECTION FACTOR DJ_1 & DJ_2 Volts d.c./Inch/kv	TYPE NO.
OSCILLOGRAPH TUBES & KINESCOPES							
Electrostatic-Deflection Types:							
	1	Green	4-3/4	6.3	550	598	913
	2	Green	7-5/8	6.3	1100	230	2AP1
	2	Green	7-5/8	6.3	660	230	902
	3	Green	11-7/8	2.5	1650	76	3AP1
	3	White	11-7/8	2.5	1650	76	3AP4
	3	Green	10-1/4	6.3	2200	110.5	3BP1
	3	Green	10-3/16	6.3	2200	110.5	3EP1
	5	White	13-3/8	6.3	2200	74.7	5AP4
With Medium Persistence	5	Green	17-1/8	6.3	2200	42.4	5BP1
	5	White	17-1/8	6.3	2200	42.4	5BP4
	5	Green	17-1/8	6.3	2200	**46	5CP1
	5	White	17-1/8	6.3	2200	**46	5CP4
	5	Green	17-1/8	6.3	2200	42.4	5HP1
	5	White	17-1/8	6.3	2200	42.4	5HP4
	5	Green	16-7/8	2.5	2200	57.5	905
	9	Green	21-7/8	2.5	7700	40	914
	3	Bluish	11-7/8	2.5	1650	76	908
With Short Persistence	5	Bluish	16-7/8	2.5	2200	57.5	907
Electrostatic-Magnetic Deflection Types:							
	5	Green	16-5/8	2.5	5060	63.5	904
With Medium Persistence	9	Green	16-1/16	2.5	5500	37.5	9JP1
Magnetic-Deflection Types:							
With Medium Persistence	7	White	13-7/8	2.5	3850	-	7AP4
	7	Green	13-13/16	6.3	7700	-	7CP1
	9	White	21-3/8	2.5	7700	-	9AP4
	12	White	25-3/8	2.5	7700	-	12AP4
ICONOSCOPES For amateur use	Mosaic: 1-7/16" Diam.			6.3	660	-	1847
For portable cameras	Mosaic: 2-1/4"x 3"			6.3	1320	-	1848
For film pickup	Mosaic: 3-9/16"x 4-3/4"			6.3	1320	-	1849
For studio pickup	Mosaic: 3-9/16"x 4-3/4"			6.3	1320	-	1850
ORTHICONS: For film & studio pickup	Mosaic: 1-3/4"x 2-5/16"			6.3	330	-	1840
MONOSCOPES							
Electrostatic-Deflection Type	3" type, 175 lines approx.			2.5	1320	-	1898
Magnetic-Deflection Type	5" type, 500 lines approx.			2.5	1650	-	1899

*On basis of an anode No.2 potential of 1 kilovolt for all types to facilitate comparison of their respective deflection capabilities. To express the deflection factor of any type on the basis of its actual operating anode No.2 voltage, multiply the deflection factor given above for the type by its operating anode No.2 voltage in kilovolts.

**On basis of a 2 to 1 ratio between anode No.3 and anode No.2 voltage, respectively.

NOTE—The above classification does not include the discontinued types 909, 910, 1800, and 1801, nor the high-voltage type 912. Data sheets on these types, however, are included in this Section.

°Absolute Values.

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

LIST PRICES□
OF CATHODE-RAY TUBE TYPES

Type	Price	Type	Price
2AP1-A ♣	$ 9.50	5UP11	$ 20.00
2BP1	8.75	7CP1	24.00
2BP11	10.00	7DP4	◇
2F21	105.00	7JP4	◇
2P23	1200.00	9AP4/1804-P4 ♣	◇
3AP1-A ♣	13.00	10BP4	◇
3BP1-A	15.00	12AP4/1803-P4 ♣	◇
3JP7	18.75	902-A ♣	9.75
3KP1	13.25	905-A	45.00
5BP1-A ♣	20.50	908-A ♣	15.00
5CP1-A	21.00	912	155.00
5CP7-A	24.00	913 ♣	14.00
5CP11-A	25.50	914-A	85.00
5FP4-A	38.00	1840 ♣	1300.00
5HP1-A ♣	21.50	1848	500.00
5TP4	◇	1850-A	540.00
5UP1	15.50	5527	47.50
5UP7	18.50	5655	1300.00

□ This price list applies only in the United States of America and is subject to change without notice. All prices are exclusive of all Federal, State and local excise, sales, and similar taxes.

♣ Not recommended for new equipment design.

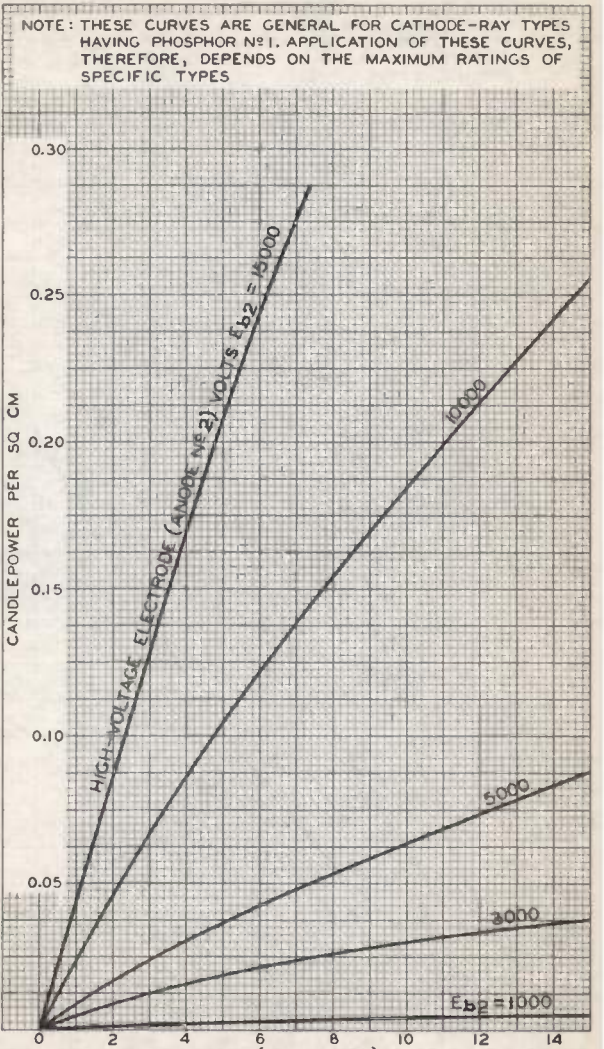
◇ Price for this type is shown on the Receiving Tube Price List.

INFORMATION ON PURCHASING ABOVE TYPES

Information as to where *RCA Cathode-Ray Tube Types* can be purchased may be obtained from our *regional office* nearest you or from *Tube Department, Radio Corporation of America, Harrison, N.J.*

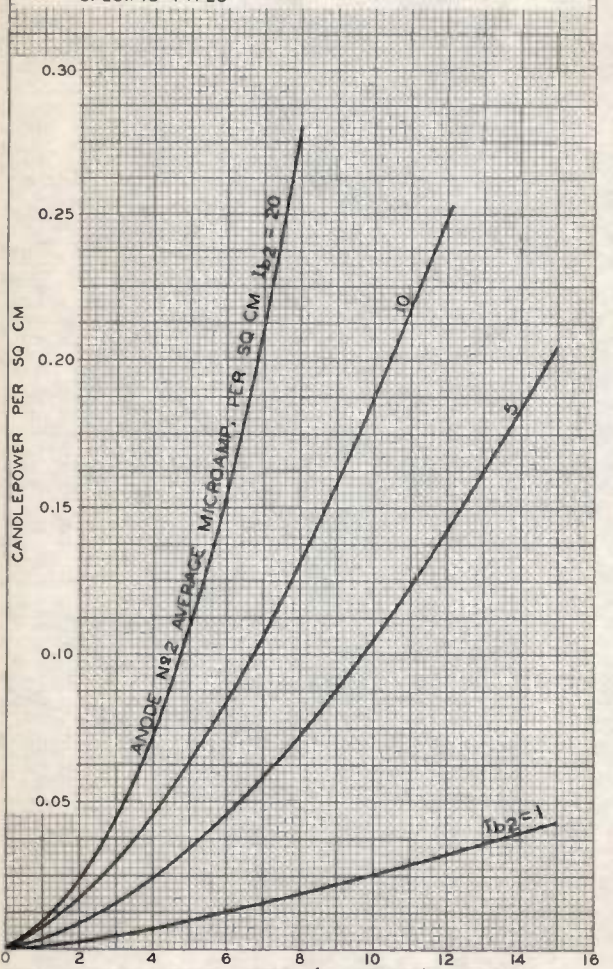
AVERAGE CHARACTERISTICS OF PHOSPHOR Nº 1

NOTE: THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR Nº 1. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE MAXIMUM RATINGS OF SPECIFIC TYPES

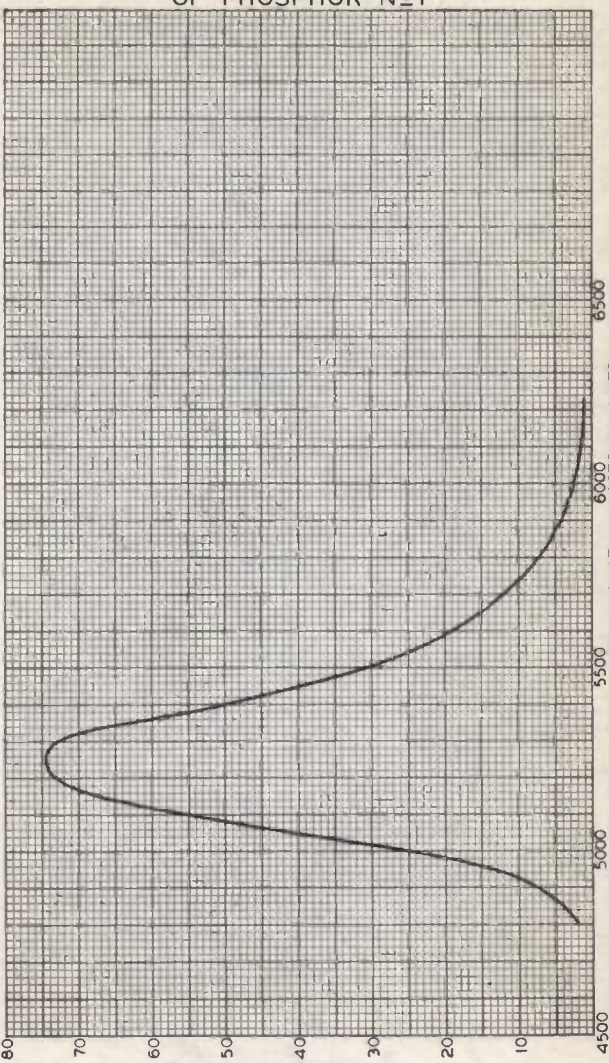


AVERAGE CHARACTERISTICS OF PHOSPHOR Nº 1

NOTE: THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR Nº1. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE MAXIMUM RATINGS OF SPECIFIC TYPES



SPECTRAL ENERGY CHARACTERISTIC OF PHOSPHOR No. 1

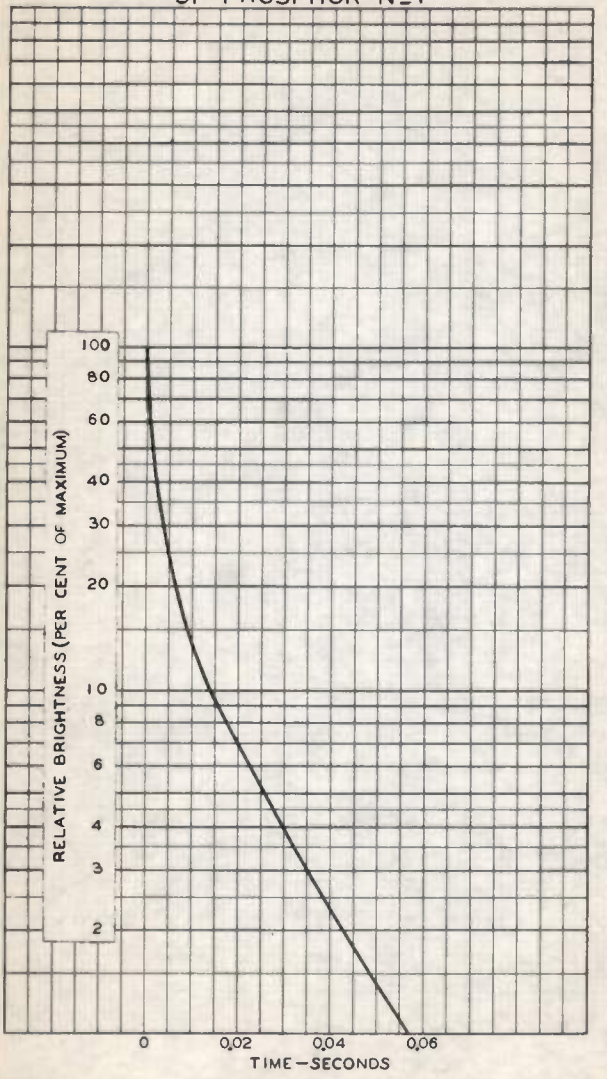


FEB. 28, 1936

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-5372

PERSISTENCE CHARACTERISTIC OF PHOSPHOR No. 1



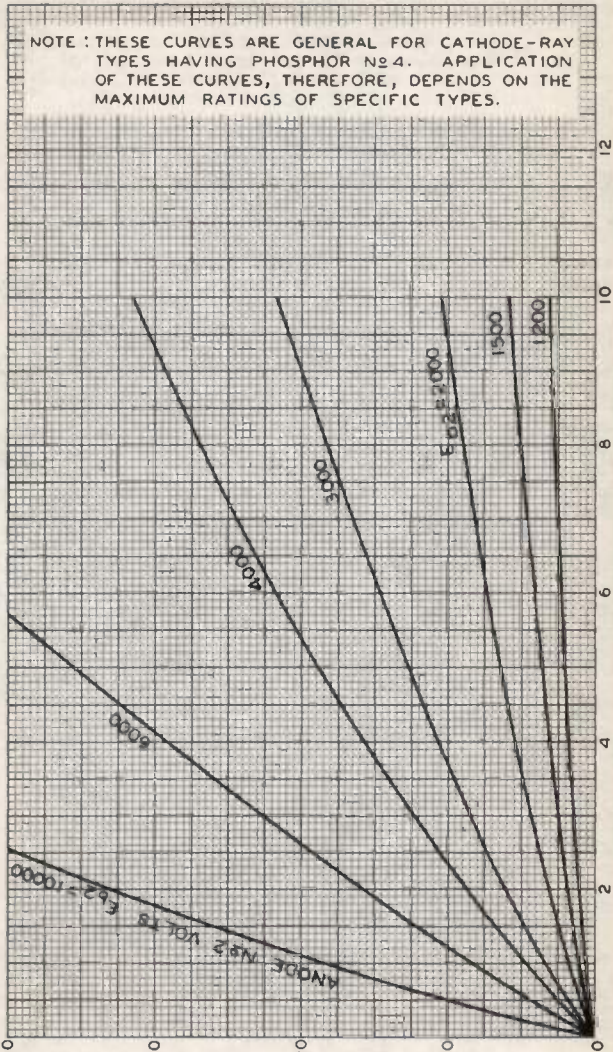
FEB. 28, 1936

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C—5380

AVERAGE CHARACTERISTICS OF PHOSPHOR №4

NOTE : THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR №4. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE MAXIMUM RATINGS OF SPECIFIC TYPES.



OCT. 5, 1938

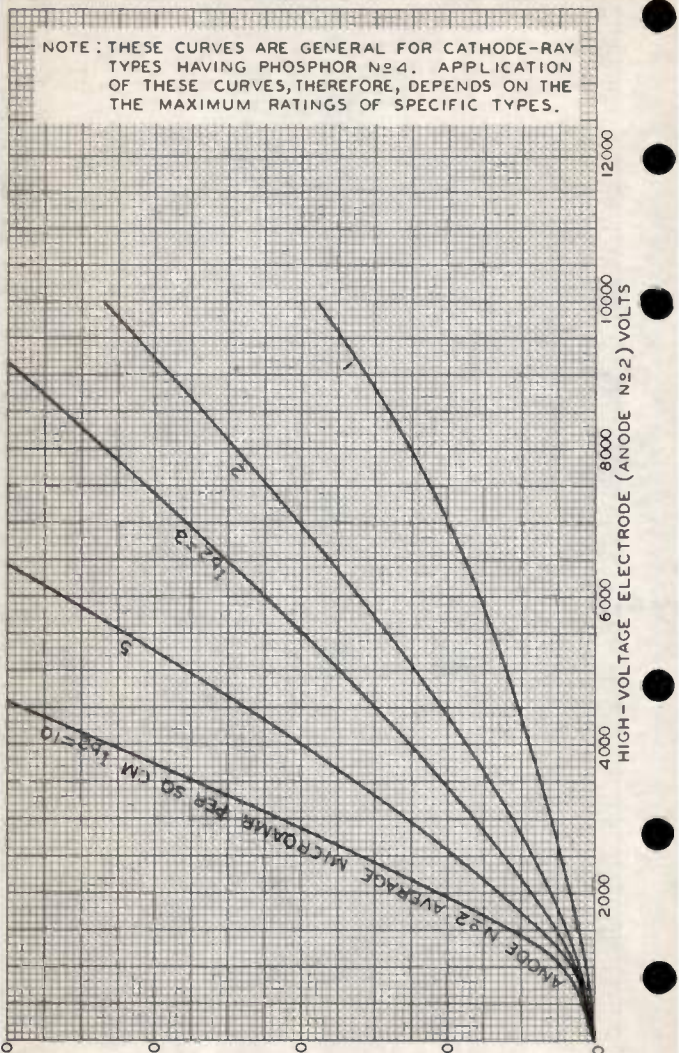
RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

92C-4979

AVERAGE CHARACTERISTICS OF PHOSPHOR №4

NOTE: THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR №4. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE THE MAXIMUM RATINGS OF SPECIFIC TYPES.



OCT. 5, 1938

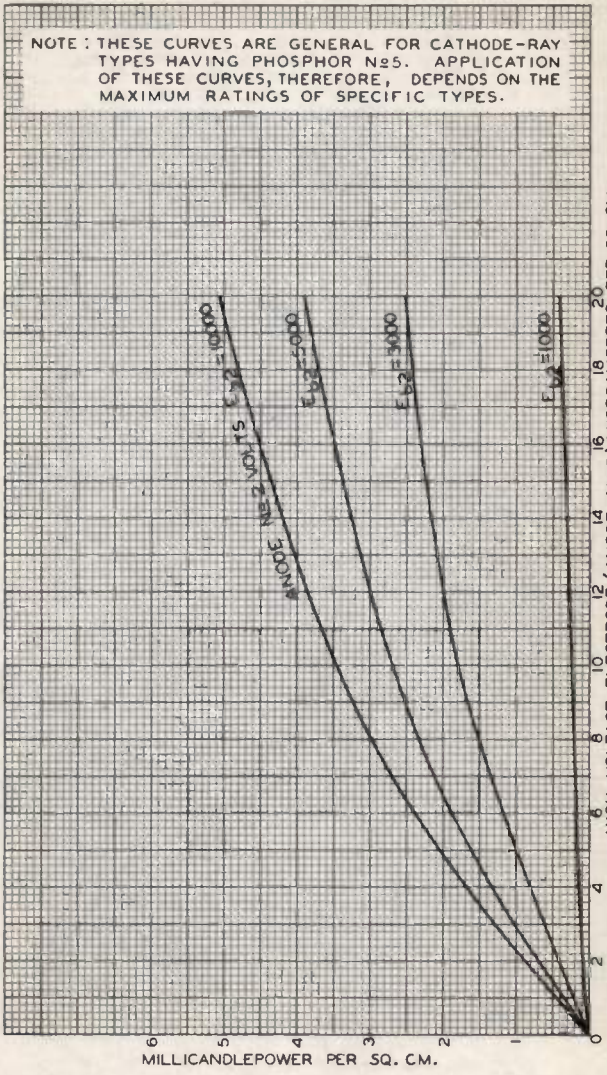
RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

92C-4978

AVERAGE CHARACTERISTICS OF PHOSPHOR №5

NOTE : THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR №5. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE MAXIMUM RATINGS OF SPECIFIC TYPES.



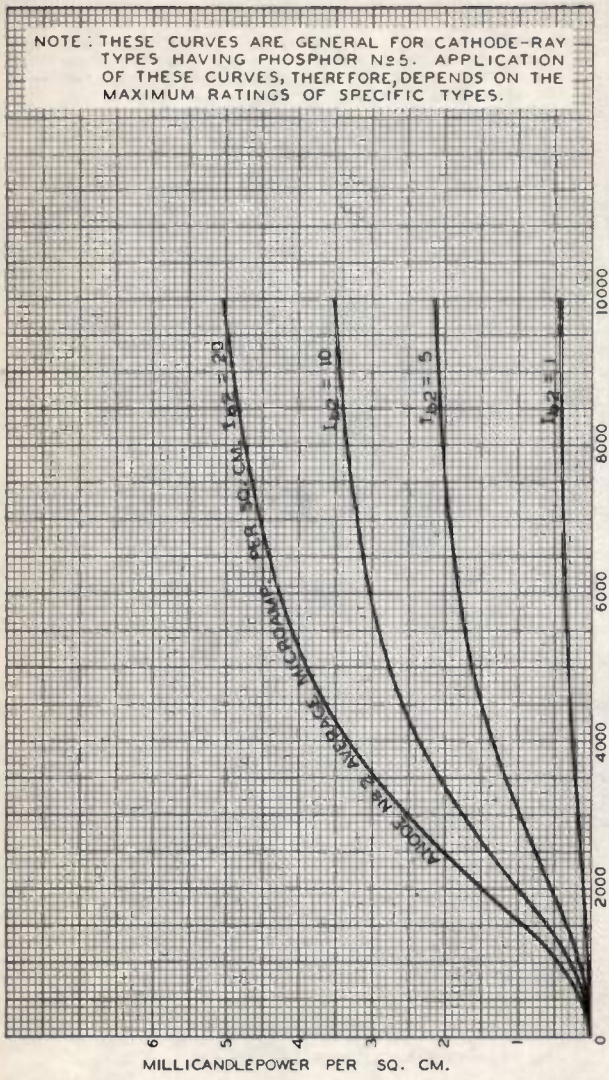
AUG. 21, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

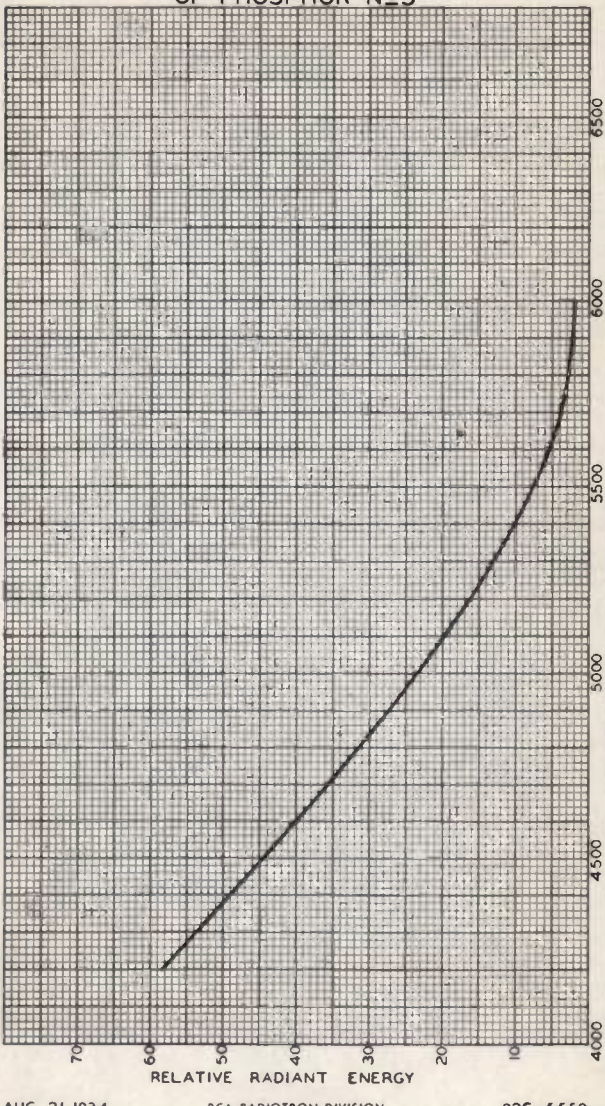
92C-5560

AVERAGE CHARACTERISTICS OF PHOSPHOR №5

NOTE: THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR №5. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE MAXIMUM RATINGS OF SPECIFIC TYPES.



SPECTRAL ENERGY CHARACTERISTIC OF PHOSPHOR No. 5



AUG. 21, 1934

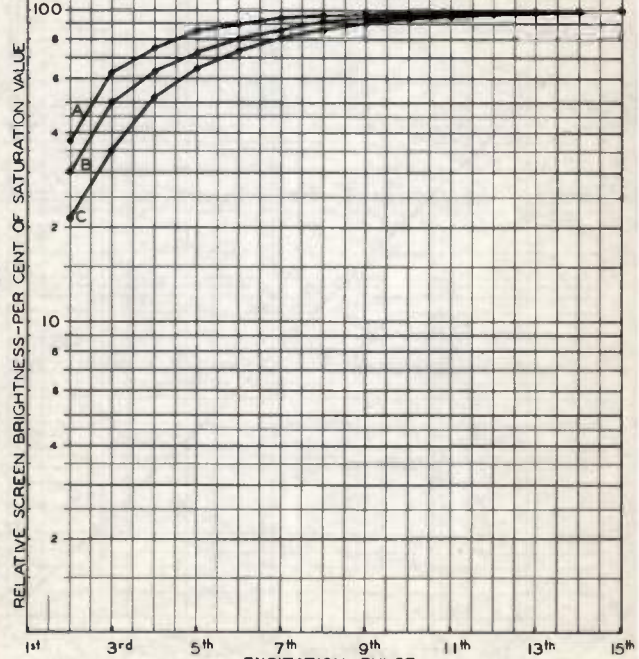
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-5559

BUILDUP OF PHOSPHOR Nº 7

SCANNING AREA: 7 x 7 CM
NUMBER OF LINES: 260 APPROX.
ANODE VOLTS = 9000
EXCITATION: PULSE OF 1/60 SEC. DURATION SUPPLIED TO GRID Nº 1 OF CATHODE-RAY TUBE AT 1 SEC. INTERVALS FOR EACH OF THE LOCI UNDER THE INDICATED CONDITIONS
BRIGHTNESS: MEASURED JUST BEFORE EACH EXCITATION PULSE

LOCUS	SCREEN MICROAMP/ SQ. CM.
A	3.0
B	1.5
C	0.75

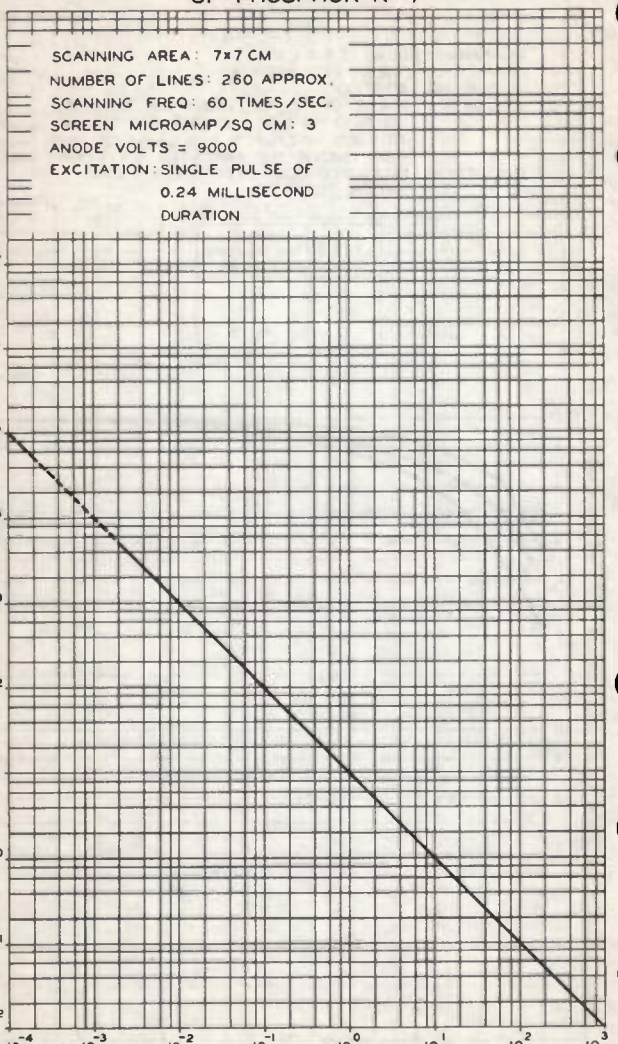


SEPT. 29, 1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7019RI

PERSISTENCE CHARACTERISTIC OF PHOSPHOR No. 7



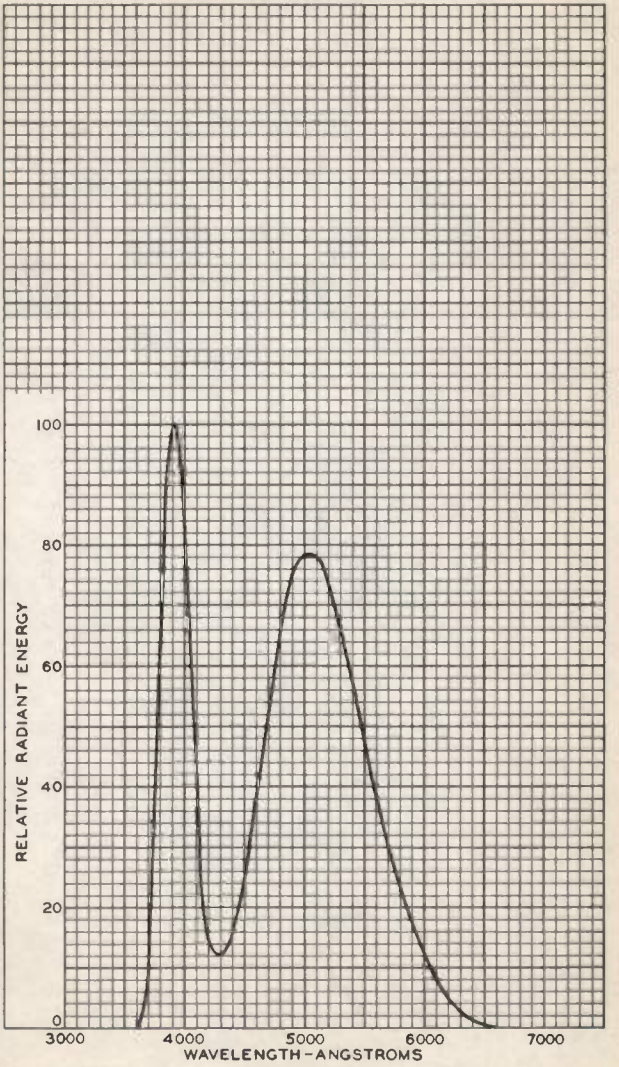
SEPT. 30, 1948

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7015R1

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR No. 15



DEC. 4, 1947 TUBE DEPARTMENT 92CM-6915

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

RCA

2AP1

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Focusing Method		Electrostatic
Deflection Method		Electrostatic

DJ_1 and DJ_2 (upper): nearest to screen
DJ_1 is on same side of tube as pin No.4
Electrodes DJ_3 and DJ_4 (lower): nearest to base
DJ_3 is on same side of tube as pin No.1

Phosphor	No.1
Fluorescence	Green
Persistence	Medium

Direct Interelectrode Capacitances (Approx.):

Control Electrode (Grid) to All Other Electrodes	8.0 μμf
Cathode to All Other Electrodes	5.5 μμf
DJ_1 to DJ_2	0.6 μμf
DJ_3 to DJ_4	1.1 μμf
DJ_1 to All Other Electrodes	8.5 μμf
DJ_1 to All Other Electrodes Except DJ_2	8.0 μμf
DJ_2 to All Other Electrodes Except DJ_1	4.6 μμf
DJ_3 to All Other Electrodes Except DJ_4	7.5 μμf
DJ_4 to All Other Electrodes Except DJ_3	3.6 μμf
Overall Length	7-7/16" ± 3/16"
Bulb Diameter at Screen End	2" ± 1/16"
Minimum Useful Diameter of Screen	1-3/4"
Base	Medium Magnal 11-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Absolute Values

Anode No.2 (High-Voltage Electrode) Voltage		1100 max.	volts
Anode No.1 (Focusing Electrode) Voltage		500 max.	volts
Grid (Control Electrode) Voltage		Never positive	
Peak Voltage Between Anode No.2 any Any Deflecting Electrode		660 max.	volts
D-C Heater-Cathode Potential •		125 max.	volts
Grid-Circuit Resistance		1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency		1.0 max.	megohm
Typical Operation:			
Anode No.2 Voltage*	500	1000	volts
Anode No.1 Voltage for Focus at 75% of Grid Voltage for Cut-Off (Approx.)**	125	250	volts
Grid Voltage for Cut-Off°	-30	-60	volts
Deflection Sensitivity:			
DJ_1 and DJ_2	0.220	0.110	mm/volt d.c.
DJ_3 and DJ_4	0.260	0.130	mm/volt d.c.
Deflection Factor:■			
DJ_1 and DJ_2	115	230	volts d.c/in.
DJ_3 and DJ_4	98	196	volts d.c/in.
■ Subject to variation of	±20	±20	per cent

•, *, **, °: See next page.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

2API

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

* With heater negative. Cathode should be connected to one side or to the mid-tap of the heater-transformer winding.
* Brilliance and definition decrease with decreasing anode No.2 voltages. In general, anode No.2 voltage should not be less than 500 volts.
** Individual tubes may require between +10% and −85% of these values with grid voltage between zero and cut-off.
o Visual extinction of a stationary focused spot. For cut-off, supply should be adjustable to ±50% of this value.

SPOT POSITION

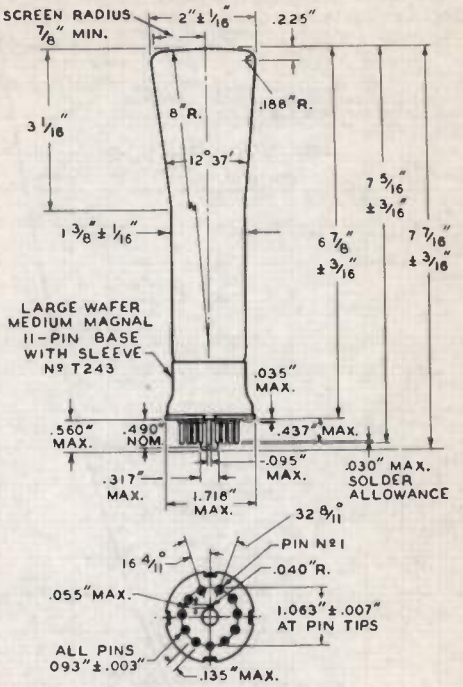
The undeflected focused spot will fall within a 10-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ_1 and DJ_2.

Suitable test conditions are: anode No.2 voltage, 1000 volts; anode No.1 voltage adjusted for focus; deflecting-electrode resistors, 1 megohm each, connected to anode No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, make the test with grid voltage near cut-off.

Characteristic Curves of phosphor No.1 are shown at the beginning of this section.

2API

HIGH-VACUUM CATHODE-RAY TUBE

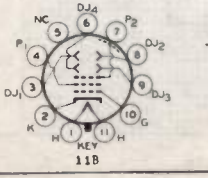


BOTTOM VIEW OF BASE

THE PLANE THROUGH THE TUBE AXIS AND PIN 1 MAY VARY FROM THE TRACE PRODUCED BY DJ_3 AND DJ_4 BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANGLE BETWEEN DJ_1–DJ_2 TRACE AND DJ_3–DJ_4 TRACE IS 90° ± 4°.

DJ_1 IS ON SAME SIDE OF TUBE AS PIN 4; DJ_3 ON SAME SIDE AS PIN 1.

TUBE MOUNTING POSITION: Any



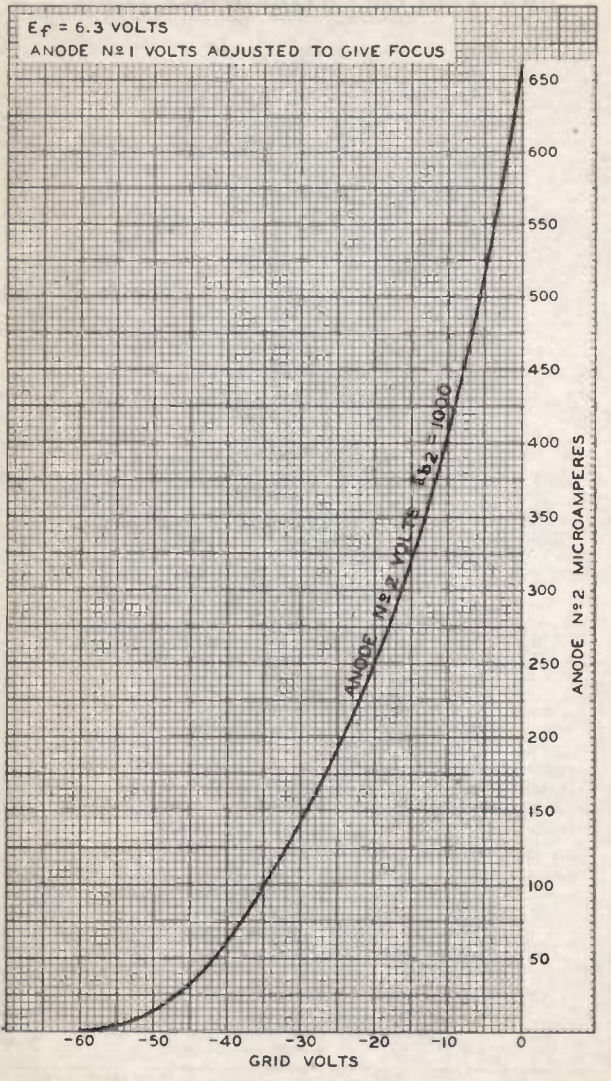
BOTTOM VIEW OF SOCKET CONNECTIONS

DJ_1, DJ_2, DJ_3, DJ_4 = Deflecting Electrodes
P_2 = Anode No.2
P^1 = Anode No.1
G^1 = Grid (Control Electrode)
H = Heater
K = Cathode
NC = No Connection

2API

2API

AVERAGE CHARACTERISTIC



JUNE 29, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC

92C-6410

2P23
IMAGE ORTHICON

MAGNETIC FOCUS--MAGNETIC DEFLECTION

DATA

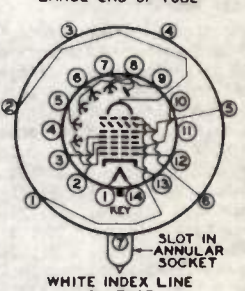
General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitance:		
Anode to All Other Electrodes	20	μμf
Photocathode Spectral Response		See Curve ←
Image Size (4 x 3 aspect ratio)		1.6" Diagonal
Focusing Method		Magnetic
Deflection Method		Magnetic
Overall Length		15-1/4" ± 1/4"
Greatest Diameter of Bulb		3" ± 1/16"
Minimum Deflecting-Coil Inside Diameter		2-1/8"
Deflecting-Coil Length		5" ←
Focusing-Coil Length		10" ←
Alignment-Coil Length		15/16" ←
Photocathode Distance Inside End of Focusing Coil		1/2" ←
Operating Position	Any except with diheptal base up and tube axis at angle of less than 20° from the vertical	
End Base	Small-Shell Diheptal 14-Pin	

Pin 1 - Heater
Pin 2 - Grid No.4
Pin 3 - Grid No.3
Pin 4 - Internal Connection--Do Not Use
Pin 5 - Dynode No.2
Pin 6 - Dynode No.4
Pin 7 - Anode
Pin 8 - Dynode No.5
Pin 9 - Dynode No.3
Pin 10 - Dynode No.1, Grid No.2
Pin 11 - Internal Connection--Do Not Use
Pin 12 - Grid No.1
Pin 13 - Cathode
Pin 14 - Heater

BOTTOM VIEW

DIRECTION OF LIGHT: PERPENDICULAR TO LARGE END OF TUBE



Shoulder Base	Jumbo Annular 7-Pin

Pin 1 - Grid No.6
Pin 2 - Photocathode
Pin 3 - Internal Connection--Do Not Use
Pin 4 - Internal Connection--Do Not Use
Pin 5 - Grid No.5
Pin 6 - Target
Pin 7 - Internal Connection--Do Not Use

← Indicates a change.

RCA

2P23
IMAGE ORTHICON

→ **Maximum Ratings, *Absolute Values*:**		
PHOTOCATHODE VOLTAGE	−550 max.	volts
PHOTOCATHODE ILLUMINATION	50 max.	ft-c
OPERATING TEMPERATURE OF ANY PART OF BULB	65 max.	°C
OPERATING TEMPERATURE OF BULB AT LARGE END OF TUBE (Target Section)	35 min.	°C
TEMPERATURE DIFFERENCE BETWEEN TARGET SECTION AND ANY PART OF BULB HOTTER THAN TARGET SECTION	5 max.	°C
GRID-No.6 VOLTAGE	−550 max.	volts
TARGET VOLTAGE:		
Positive value	50 max.	volts
Negative value	50 max.	volts
GRID-No.5 VOLTAGE	150 max.	volts
GRID-No.4 VOLTAGE	300 max.	volts
GRID-No.3 VOLTAGE	400 max.	volts
GRID-No.2 & DYNODE-No.1 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	10 max.	volts
ANODE-SUPPLY VOLTAGE●	1650 max.	volts
VOLTAGE PER MULTIPLIER STAGE	350 max.	volts

→ **Typical Operation:**		
Photocathode Voltage (Image Focus)	−300 to −500	volts
Grid-No.6 Voltage (Accelerator)— 80% of photocathode voltage*	−240 to −400	volts
Target Voltage●	0	volts
Grid-No.5 Voltage (Decelerator)●●	0 to 100	volts
Grid-No.4 Voltage (Beam Focus)	160 to 240	volts
Grid-No.3 Voltage#	225 to 330	volts
Grid-No.2 & Dynode-No.1 Voltage	300	volts
Grid-No.1 Voltage (For Picture Cutoff)	−15 to −85	volts
Dynode-No.2 Voltage	600	volts
Dynode-No.3 Voltage	880	volts
Dynode-No.4 Voltage	1160	volts
Dynode-No.5 Voltage	1450	volts
Anode Voltage	1500	volts
Anode Current	50	μamp
Target Temperature Range	35 to 60	°C
Ratio of Peak-to-Peak Highlight Video-Signal Current to RMS Noise Current (Approx.)	35	
Minimum Peak-to-Peak Blanking Voltage	10	volts
Field Strength at Center of Focusing Coil	75	gauss

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

2P23
IMAGE ORTHICON

Focusing-Coil Current (Approx.) for coil listed below)	75	ma
Deflecting-Coil Current (Approx. for assembly listed below):		
Horizontal (Peak to Peak).	625	ma
Vertical (Peak to Peak).	290	ma
Alignment-Coil Current (Approx. for coil listed below)	0 to 30	ma

Components:

Deflecting-Coil Assembly (Includes Keyed Jumbo Annular 7-Pin Socket). .	RCA Type No. 201D75
Focusing-Coil Assembly	RCA Type No. 202D75
Alignment-Coil Assembly.	RCA Type No. 204D75
Hor. Deflection Output Transformer . .	RCA Type No. 204T1
Ver. Deflection Output Transformer . .	RCA Type No. 204T2

● Ratio of dynode voltages is shown under Typical Operation.

* For best operation, this voltage should be adjustable within ± 25% of indicated value. For simplified equipment, this voltage can be fixed.

● Adjustable within ± 3 volts of indicated value, with blanking voltage off.

●● Taps at 0, 30, 60, and 90 volts are recommended. Set at voltage giving most uniform resolution and signal output over entire picture area.

Adjust to give the most uniformly shaded picture near maximum signal.

OPERATING NOTES

After the 2P23 has been inserted in its sockets and the voltages applied, allow it to warm up for 1/2 to 1 hour with the camera lens iris closed. Then, proceed with normal operating adjustments.

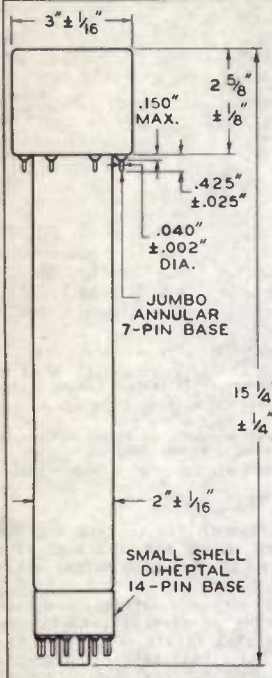
When the equipment design or operating conditions are such that the maximum temperature rating or maximum temperature difference will be exceeded, provision should be made to direct a blast of cooling air from the diheptal-base end of the tube along the entire length of the bulb surface, i.e., through the space between the bulb surface and the surrounding deflecting coil and its extension. For this purpose, a small blower is satisfactory, but it should run at low speed to prevent vibration of the 2P23 and the associated amplifier equipment. Unless vibration is prevented, distortion of the picture may occur. To keep the operating temperature of the large end of the tube from falling below 45°C, some form of controlled heating should be employed. Ordinarily, adequate heat will be supplied by the focusing coil, deflection coils, and associated amplifier tubes so that the temperature can be controlled by the amount of cooling air directed along the bulb surface.

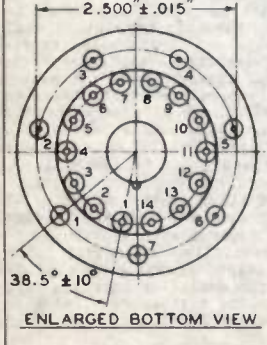
Resolution of better than 400 lines at the center of the picture can be produced by the 2P23 when the highlight illumination is above the knee of the typical signal-output curve for this type. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a video amplifier having a bandwidth of at least 5.5 megacycles. The maximum resolution obtainable is limited by the mesh-screen portion of the target.

← Indicates a change.

2P23

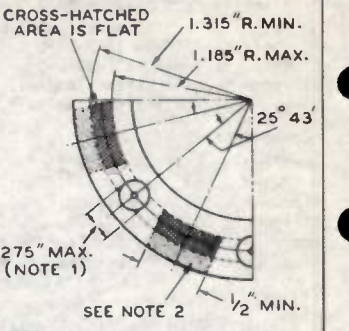
2P23
IMAGE ORTHICON





ENLARGED BOTTOM VIEW

DETAIL OF BOTTOM VIEW OF JUMBO ANNULAR BASE



NOTE 1: MEASURED AT DISTANCE OF 1/32" BELOW BOTTOM OF ANNULAR BASE.

NOTE 2: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL-BASE END OF TUBE BY 0.060" MAX.

ANNULAR BASE GAUGE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTOCATHODE CYLINDER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

a. SEVEN HOLES HAVING DIAMETER OF 0.065" ± 0.001" AND DEPTH OF 0.265" ± 0.001". HOLES ARE ENLARGED BY 45° TAPER TO DEPTH OF 0.047" AND ARE SPACED AT ANGLES OF 51°26' ± 5' ON CIRCLE DIAMETER OF 2.500" ± 0.001".

b. SIX STOPS HAVING HEIGHT OF 0.187" ± 0.001", CENTERED BETWEEN PIN HOLES, TO BEAR AGAINST FLAT AREAS OF BASE.

c. RIM EXTENDING OUT A MINIMUM OF 1/8" FROM 2-13/16" DIAMETER AND HAVING HEIGHT OF 0.126" ± 0.001".

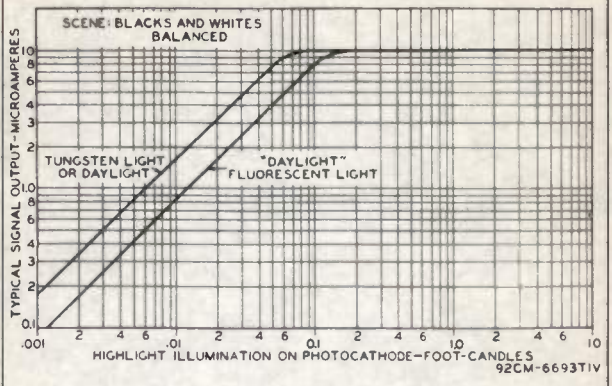
d. NECK-CYLINDER CLEARANCE HOLE HAVING DIAMETER OF 2.200" ± 0.001".

92CM-6685

2P23

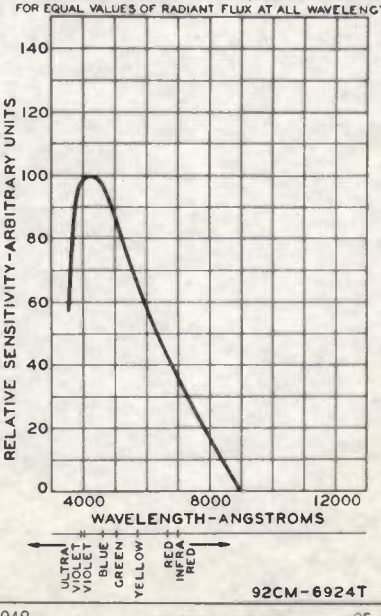
CHARACTERISTIC CURVES

TYPICAL SIGNAL OUTPUT



SPECTRAL SENSITIVITY CHARACTERISTIC

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



3AP1/906-P1, 3AP4/906-P4

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Focus		Electrostatic
Deflection		Electrostatic

Electrodes DJ_1 and DJ_2 (upper): nearest the screen
Electrodes DJ_3 and DJ_4 (lower): nearest the base
DJ_1 is on same side of tube as pins No.4 and No.5
DJ_3 is on same side of tube as pins No.2 and No.3

	3AP1	3AP4
Phosphor	No.1	No.4
Fluorescence	Green	White
Persistence	Medium	Medium

Direct Interelectrode Capacitances:	
Control Electrode (Grid) to All Other Electrodes	9.0 μμf
Deflecting Electrode DJ_1 to All Other Electrodes	8.5 μμf
Deflecting Electrode DJ_3 to All Other Electrodes	6.5 μμf
Overall Length	11-1/2" ± 3/8"
Diameter	3" ± 1/16"
Bulb	J-24
Base	Medium 7-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts

High-Voltage Electrode (Anode No.2) Volt.	1500 max.	volts
Focusing Electrode (Anode No.1) Volt.	1000 max.	volts
Control Electrode (Grid) Volt.	Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode	600 max.	volts
Grid Circuit Resistance	1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency	1.0 max.	megohm

Typical Operation:

Anode No.2 Volt.	600	800	1000	1200	1500	volts
Anode No.1 Volt.□	170	230	285	345	475	approx. volts
Grid Volt.○	Adjusted to give suitable luminous spot					
Deflection Sensitivity:						
Electrodes DJ_1 and DJ_2	0.55	0.41	0.33	0.27	0.22	mm/volt d.c.
Electrodes DJ_3 and DJ_4	0.58	0.44	0.35	0.29	0.23	mm/volt d.c.

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 400 volts for the 3AP1 and not less than 600 for the 3AP4.

NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor

(continued on next page)

□, ○: See next page. ← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

3AP1/906-P1, 3AP4/906-P4

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

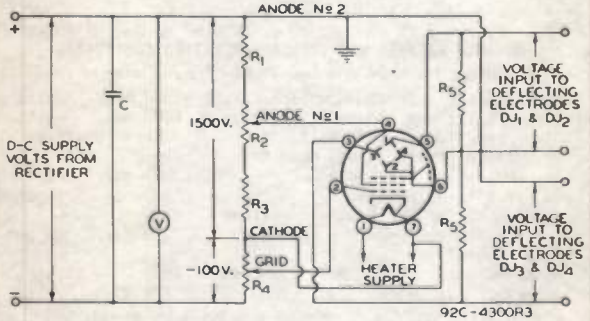
values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

□ Supply should be adjustable to ± 20% of the value shown.
o Approximately 20% of Anode No.1 voltage is required for current cut off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.

The basic physical and electrical characteristics of the 3AP1 and 3AP4 are also available in the Type 908 having a phosphor No.5.

Characteristic Curves of phosphor No.1 and No.4 are shown at the beginning of this section.

TYPICAL OSCILLOGRAPH CIRCUIT



C = FILTER CONDENSER 0.5 - 2.0 μf
R_1, R_2, R_3, R_4 = BLEEDER POTENTIOMETER
R_1 = 0.35 MEGOHM
R_2 = 0.20 MEGOHM
R_3 = 0.15 MEGOHM
R_4 = 0.05 MEGOHM
R_5 = SEE NOTE 2 AT END OF DATA
V = VOLTMETER

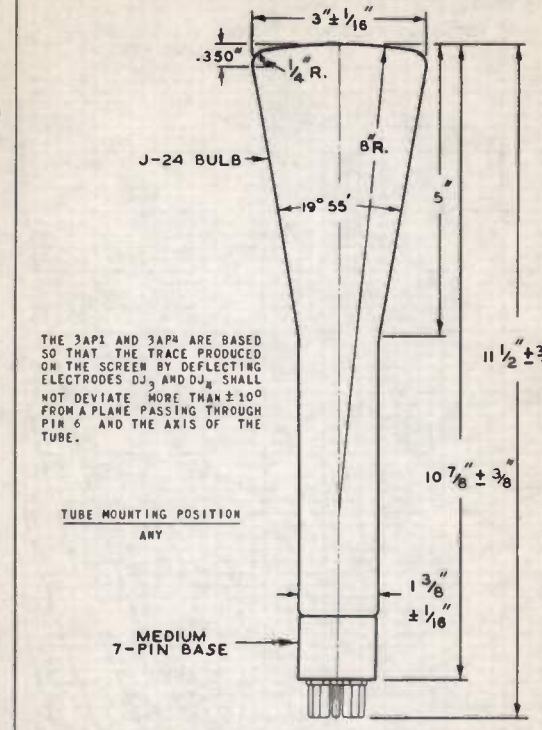
The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

◄ Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

3AP1/906-P1, 3AP4/906-P4

HIGH-VACUUM CATHODE-RAY TUBE



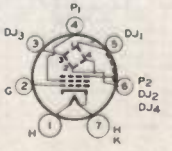
THE 3AP1 AND 3AP4 ARE BASED SO THAT THE TRACE PRODUCED ON THE SCREEN BY DEFLECTING ELECTRODES DJ_3 AND DJ_4 SHALL NOT DEVIATE MORE THAN ± 10° FROM A PLANE PASSING THROUGH PIN 6 AND THE AXIS OF THE TUBE.

TUBE MOUNTING POSITION

ANY

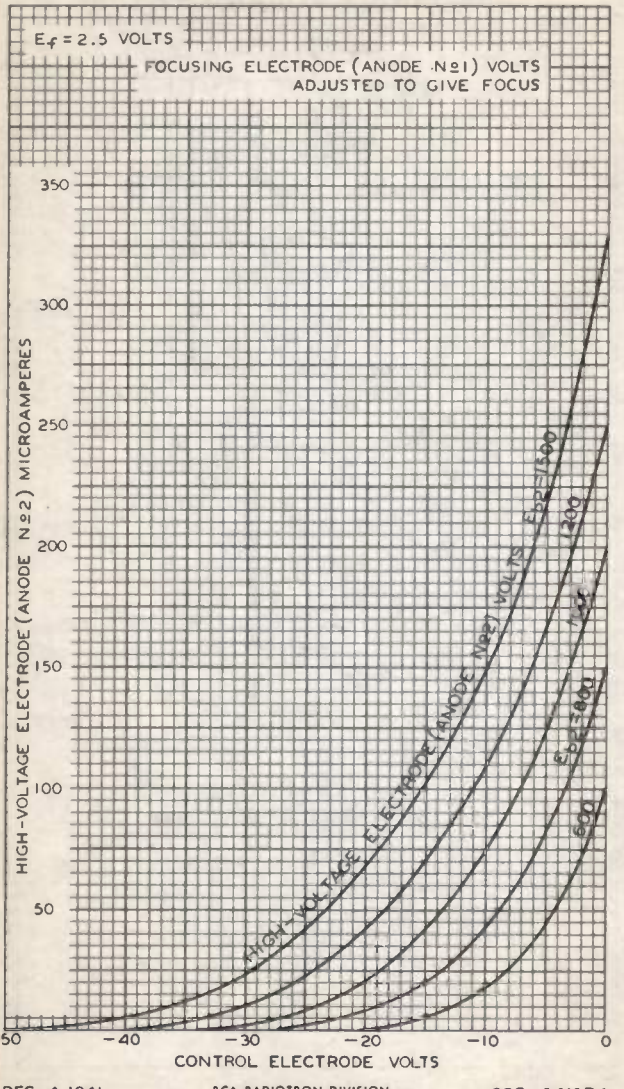
BOTTOM VIEW OF SOCKET CONNECTIONS

DJ_1 to DJ_4 = Deflection Electrodes
P_2 = Anode No.2
P_1 = Anode No.1
G = Control (Grid) Electrode
H = Heater
K = Cathode



3AP1, 3AP4

AVERAGE CHARACTERISTICS



3BP1

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode		
Voltage	6.3		a-c or d-c volts
Current	0.6		amp.
Focusing Method			Electrostatic
Deflection Method			Electrostatic
Electrodes DJ_1 and DJ_2 (upper): nearest to screen			
DJ_1 is on same side of tube as pin 5			
Electrodes DJ_3 and DJ_4 (lower): nearest to base			
DJ_2 is on same side of tube as pin 2			
Phosphor			No.1
Fluorescence			Green
Persistence			Medium
Direct Interelectrode Capacitances (Approx.):			
Grid to All Other Electrodes			8.0 μμf
Cathode to All Other Electrodes			7.0 μμf
DJ_1 to DJ_2			2.0 μμf
DJ_3 to DJ_4			2.0 μμf
DJ_1 to All Other Electrodes			9.0 μμf
DJ_3 to All Other Electrodes			7.0 μμf
DJ_1 to All Other Electrodes Except DJ_2			7.0 μμf
DJ_2 to All Other Electrodes Except DJ_1			7.0 μμf
DJ_3 to All Other Electrodes Except DJ_4			5.0 μμf
DJ_4 to All Other Electrodes Except DJ_3			6.0 μμf
Overall Length			10" ± 1/4"
Bulb Diameter at Screen End			3" ± 1/16"
Minimum Useful Screen Diameter			2-3/4"
Base			Medium Shell Diheptal 12-Pin

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Anode No.2 (High-Voltage Electrode) Voltage		2200 max.	volts
Anode No.1 (Focusing Electrode) Voltage		1100 max.	volts
Grid (Control Electrode) Voltage		Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode		550 max.	volts
D-C Heater-Cathode Potential*		125 max.	volts
Grid-Circuit Resistance		1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency		1.0 max.	megohm
Typical Operation:			
Anode No.2 Voltage **	1500	2000	volts
Anode No.1 Voltage for Focus at 75% of Grid Voltage for Cut-Off #	430	575	volts
Grid Voltage for Visual Cut-Off ##	-45	-60	volts
Deflection Sensitivity:			
DJ_1 and DJ_2	0.153	0.115	mm/volt d.c.
DJ_3 and DJ_4	0.207	0.155	mm/volt d.c.

*, **, #, ##: See next page.

3BP1

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

Deflection Factor:			
DJ_1 and DJ_2	166	221	volts d.c./in.
DJ_3 and DJ_4	123	164	volts d.c./in.
Values subject to variation of	±20	±20	per cent

* with heater negative. Cathode should be connected to the mid-tap or to one side of the heater transformer winding.

** Brilliance and definition decrease with decreasing anode No.2 voltage. In general, anode No.2 voltage should not be less than 1500 volts.

\# Individual tubes may require between +20% and − 35% of these values with grid voltage between zero and cut-off.

\#\# Visual extinction of stationary focused spot. Supply should be adjustable to ±50% of these values.

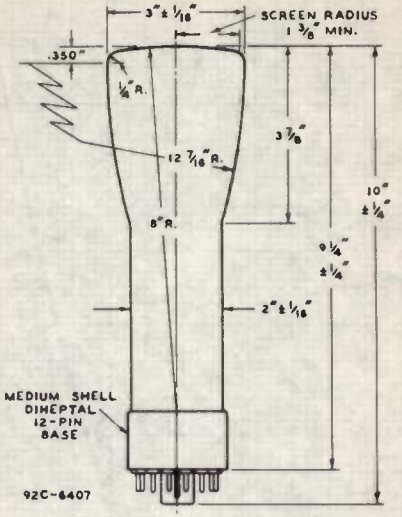
SPOT POSITION

The undeflected focused spot will fall within a 15-mm square centered at the geometric center of the tube face and having one side parallel with the trace produced by DJ_1 and DJ_2.

Suitable test conditions are: anode No.2 voltage, 2000 volts; anode No.1 voltage, adjusted for focus; deflecting-electrode resistors, 1 megohm each, connected to anode No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, make the test with the grid voltage near cut-off.

3BP1

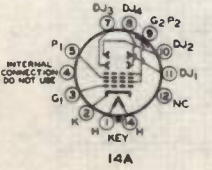
HIGH-VACUUM CATHODE-RAY TUBE



THE PLANE THROUGH THE TUBE AXIS AND PIN 5 MAY VARY FROM THE TRACE PRODUCED BY DJ_1 AND DJ_2 BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANGLE BETWEEN DJ_1-DJ_2 TRACE AND DJ_3-DJ_4 TRACE IS $90° \pm 4°$.

DJ_1 IS ON SAME SIDE OF TUBE AS PIN 5; DJ_3 ON SAME SIDE AS PIN 2.

TUBE MOUNTING POSITION: Any



BOTTOM VIEW OF SOCKET CONNECTIONS

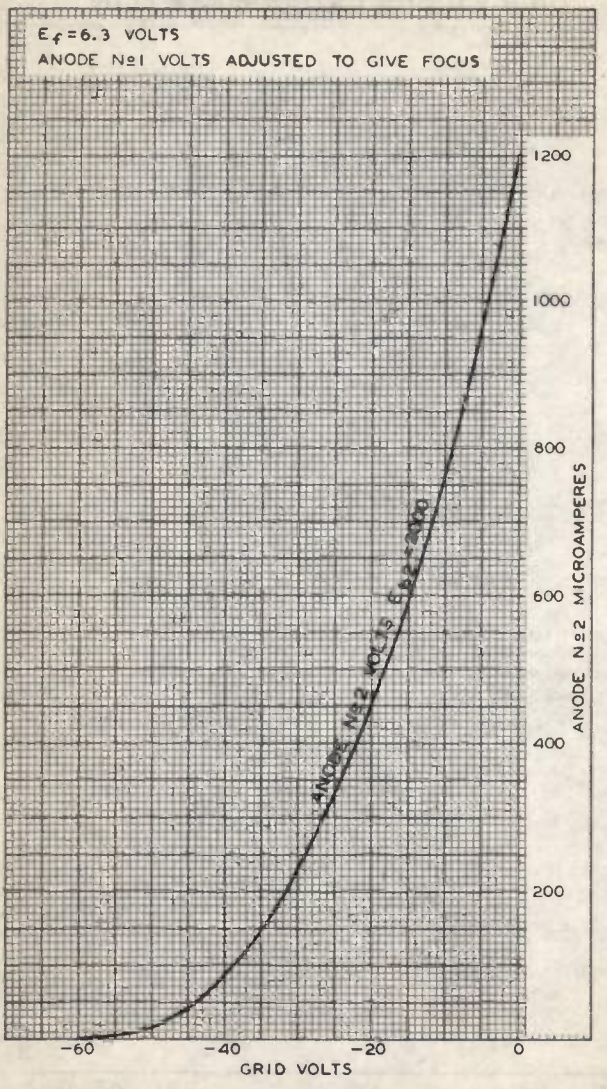
DJ_1, DJ_2, DJ_3, DJ_4 = Deflecting Electrodes

P_2 = Anode No.2
P^2 = Anode No.1
G^1_1 = Grid No.2
G^2_1 = Grid No.1
H^1 = Heater
K = Cathode
NC = No Connection

3BP1

3BP1

AVERAGE CHARACTERISTIC



JULY 17, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6412

3EP1/1806-P1

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Focusing Method		Electrostatic
Deflection Method		Electrostatic

Electrodes DJ_1 and DJ_2 (upper): nearest to screen
DJ_1 is on same side of tube as pin 4
Electrodes DJ_3 and DJ_4 (lower): nearest to base
DJ_3 is on same side of tube as pin 1

Phosphor	No. 1
Fluorescence	Green
Persistence	Medium

Direct Interelectrode Capacitances (Approx.):

Grid to All Other Electrodes	8.0 μμf
DJ_1 to DJ_2	1.0 μμf
DJ_3 to DJ_4	0.7 μμf
DJ_1 to All Other Electrodes	7.0 μμf
DJ_3 to All Other Electrodes	8.5 μμf
DJ_1 to All Other Electrodes Except DJ_2	6.0 μμf
DJ_2 to All Other Electrodes Except DJ_1	5.0 μμf
DJ_3 to All Other Electrodes Except DJ_4	8.5 μμf
DJ_4 to All Other Electrodes Except DJ_3	6.0 μμf

Overall Length	9-15/16" ± 1/4"
Bulb Diameter at Screen End	3" ± 1/16"
Minimum Useful Screen Diameter	2-3/4"
Base	Large Wafer Magnal 11-Pin, Sleeve

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Anode No.2 (High-Voltage Electrode) Voltage		2200 max.	volts
Anode No.1 (Focusing Electrode) Voltage		1100 max.	volts
Grid (Control Electrode) Voltage		Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode		550 max.	volts
Grid-Circuit Resistance		1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency		1.0 max.	megohm
Typical Operation:			
Anode No.2 Voltage **	1500	2000	volts
Anode No.1 Voltage for Focus at 75% of Grid Voltage for Cut-Off #	430	575	volts
Grid Voltage for Visual Cut-Off ##	-45	-60	volts
Deflection Sensitivity:			
DJ_1 and DJ_2	0.153	0.115	mm/volt d.c.
DJ_3 and DJ_4	0.205	0.154	mm/volt d.c.
Deflection Factor:△			
DJ_1 and DJ_2	165.5	221	volts d.c./in.
DJ_3 and DJ_4	124	165	volts d.c./in.
△Values subject to variation of	±20	±20	per cent

**, #, ##: See next page.

Dec. 1, 1942 TENTATIVE DATA

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

3EP1

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

** Brilliance and definition decrease with decreasing anode No.2 voltage. In general, anode No.2 voltage should not be less than 1500 volts.

Individual tubes may require between +20% and - 35% of these values with grid voltage between zero and cut-off.

Visual extinction of stationary focused spot. Supply should be adjustable to ±50% of these values.

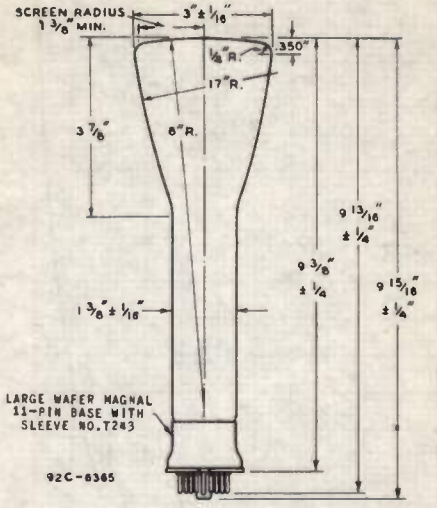
SPOT POSITION

The undeflected focused spot will fall within a 10-mm square centered at the geometric center of the tube face and having one side parallel with the trace produced by DJ_1 and DJ_2.

Suitable test conditions are: anode No.2 voltage, 2000 volts; anode No.1 voltage, adjusted for focus; deflecting-electrode resistors, 1 megohm each, connected to anode No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, make the test with the grid voltage near cut-off.

3EP1

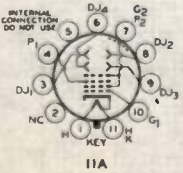
HIGH-VACUUM CATHODE-RAY TUBE



THE PLANE THROUGH THE TUBE AXIS AND PIN 1 MAY VARY FROM THE TRACE PRODUCED BY DJ_3 AND DJ_4 BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANGLE BETWEEN DJ_1–DJ_2 TRACE AND DJ_3–DJ_4 TRACE IS 90° ± 5°.

DJ_1 IS ON SAME SIDE OF TUBE AS PIN 4; DJ_3 ON SAME SIDE AS PIN 1.

TUBE MOUNTING POSITION: Any



11A

BOTTOM VIEW OF SOCKET CONNECTIONS

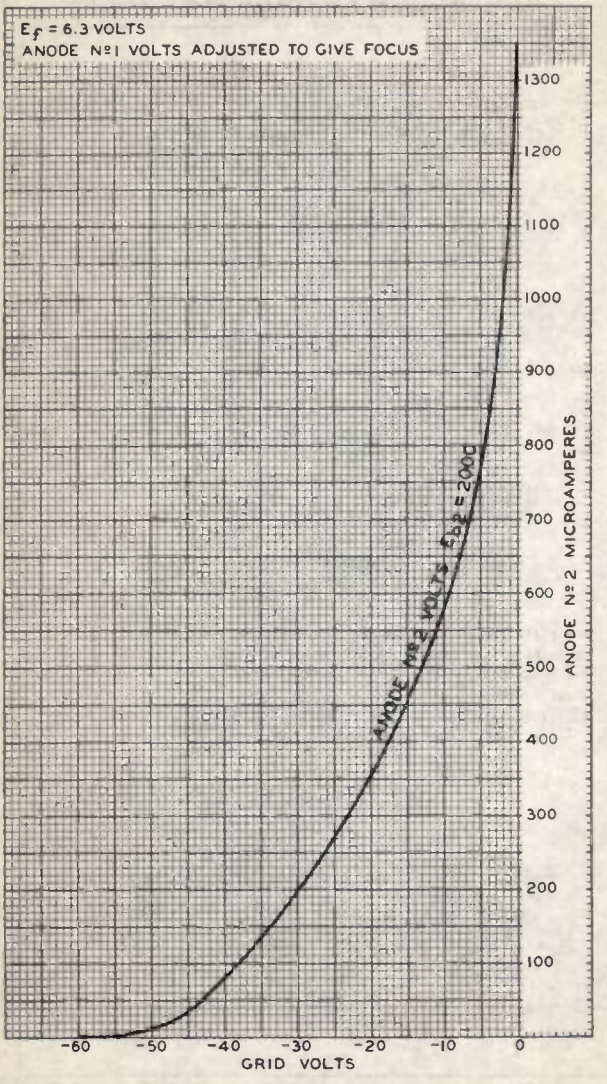
DJ_1, DJ_2, DJ_3, DJ_4 = Deflecting Electrodes
P_2 = Anode No.2
P_1 = Anode No.1
G_2 = Grid No.2
G_1 = Grid No.1
H^1 = Heater
K = Cathode
NC = No Connection

3EP1

RCA

3EP1

AVERAGE CHARACTERISTIC



JULY 18, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6413

5AP4/1805-P4

KINESCOPE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Focus		Electrostatic
Deflection		Electrostatic
Electrodes DJ_1 and DJ_2 (upper): nearest to screen		
Electrodes DJ_3 and DJ_4 (lower): nearest to base		
DJ_1 is on same side of tube as pins No.3 and No.5		
DJ_3 is on same side of tube as pins No.2 and No.11		
Phosphor		No.4
Fluorescence		White
Persistence		Medium
Direct Interelectrode Capacitances:		
Control Electrode (Grid) to All Other Electrodes		9 μμf
Deflecting Electrode DJ_1 to Deflecting Electrode DJ_2		0.8 μμf
Deflecting Electrode DJ_3 to Deflecting Electrode DJ_4		0.7 μμf
DJ_1 to All Other Electrodes		11.5 μμf
DJ_3 to All Other Electrodes		7 μμf
DJ_1 to All Other Electrodes Except DJ_2		10.5 μμf
DJ_2 to All Other Electrodes Except DJ_1		10 μμf
DJ_3 to All Other Electrodes Except DJ_4		5 μμf
DJ_4 to All Other Electrodes Except DJ_3		4 μμf
Overall Length		13" ± 3/8"
Diameter		5-1/4" ± 1/16"
Bulb		J-42
Base	Large Wafer Medium Magnal 11-Pin, Sleeve	

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts

High-Voltage Electrode (Anode No.2) Volt.		2000 max.	volts
Focusing Electrode (Anode No.1) Volt.		1000 max.	volts
Control Electrode (Grid) Volt.		Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode		500 max.	volts
Grid Circuit Resistance		1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at the Heater-Supply Frequency		1.0 max.	megohm
Typical Operation:			
Anode No.2 Voltage	1500	2000	volts
Anode No.1 Voltage □	430	575	approx. volts
Grid Voltage ○	Adjusted to give suitable luminous spot		
Grid Signal-Swing Voltage ▲	15	20	volts
Deflection Sensitivity:			
Electrodes DJ_1 & DJ_2	0.23	0.17	mm/volt d.c.
Electrodes DJ_3 & DJ_4	0.28	0.21	mm/volt d.c.

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general, the anode No.2 voltage should not be less than 1500 volts.

NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2

□, ○, ▲: See next page. (continued on next page) ← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

5AP4/1805-P4

KINESCOPE

(continued from preceding page)

by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No. 2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

□ Supply should be adjustable to ± 20% of the value shown.

o Approximately 15% of Anode No.1 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.

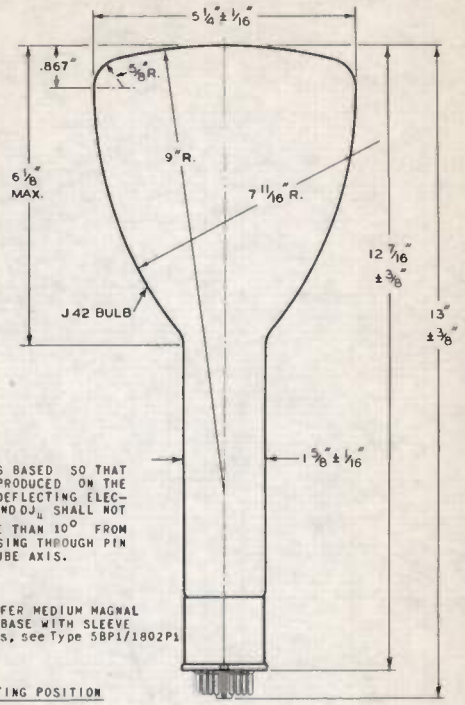
▲ Peak-to-peak value for good brilliance with good resolution. For greater brilliance, up to twice this voltage should be available.

Characteristic Curves of phosphor No.4 are shown at the beginning of this section.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

5AP4/1805-P4

KINESCOPE



THE 5AP4 IS BASED SO THAT THE TRACE PRODUCED ON THE SCREEN BY DEFLECTING ELECTRODES DJ_3 AND DJ_4 SHALL NOT DEVIATE MORE THAN 10° FROM A PLANE PASSING THROUGH PIN 1 AND THE TUBE AXIS.

LARGE WAFER MEDIUM MAGNAL 11-PIN BASE WITH SLEEVE
For dimensions, see Type 5BP1/1802P1

TUBE MOUNTING POSITION

ANY

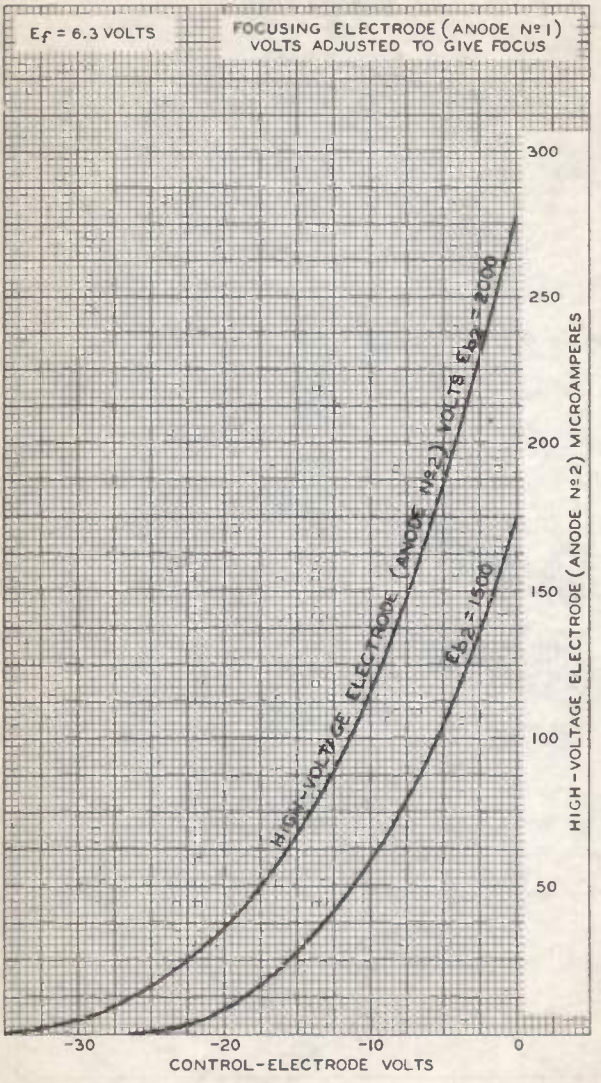
BOTTOM VIEW OF SOCKET CONNECTIONS

DJ_1 to DJ_4 = Deflecting Electrodes
P_2 = Anode No.2
P^2 = Anode No.1
G^1 = Control (Grid) Electrode
H = Heater
K = Cathode
NC = No Connection

5AP4

5AP4/1805-P4

AVERAGE CHARACTERISTICS



APRIL 28, 1939 RCA RADIOTRON DIVISION RCA MANUFACTURING COMPANY, INC. 92C-6043

5BP1/1802-P1, 5BP4/1802-P4

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Focus		Electrostatic
Deflection		Electrostatic

Electrodes DJ_1 and DJ_2 (upper): nearest to screen
Electrodes DJ_3 and DJ_4 (lower): nearest to base
DJ_1 is on same side of tube as pins No.3 & No.5
DJ_3 is on same side of tube as pins No.2 & No.11

	5BP1	5BP4
Phosphor	No.1	No.4
Fluorscence	Green	White
Persistence	Medium	Medium

Direct Interelectrode Capacitances:

Control Electrode (Grid) to All Other Electrodes	9.0 μμf
Deflecting Electrode DJ_1 to Deflecting Electrode DJ_2	1.2 μμf
Deflecting Electrode DJ_3 to Deflecting Electrode DJ_4	0.8 μμf
DJ_1 to All Other Electrodes	14 μμf
DJ_3 to All Other Electrodes	8.5 μμf
DJ_1 to All Other Electrodes Except DJ_2	13 μμf
DJ_2 to All Other Electrodes Except DJ_1	12 μμf
DJ_3 to All Other Electrodes Except DJ_4	8 μμf
DJ_4 to All Other Electrodes Except DJ_3	7 μμf

Overall Length	16-3/4" ± 3/8"
Diameter	5-1/4" $^{+1/16"}_{-3/32"}$
Bulb	J-42
Base	Large Water Magnal 11-Pin, Sleeve

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts

High-Voltage Electrode (Anode No.2) Volt.	2000 max.	volts
Focusing Electrode (Anode No.1) Voltage	1000 max.	volts
Control Electrode (Grid) Voltage	Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode	500 max.	volts
Grid Circuit Resistance	1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at the Heater-Supply Frequency	1.0 max.	megohm

Typical Operation:

	5BP1			5BP4	
Anode No.2 Voltage	1200	1500	2000	2000	volts
Anode No.1 Voltage□	250	310	425	425	approx. volts
Grid Voltage○	Adjusted to give suitable luminous spot				
Grid Voltage Swing	-	-	-	20▲	volts
Deflection Sensitivity:					
Electrodes DJ_1 & DJ_2	0.50	0.40	0.30	0.30	mm/volt d.c.
Electrodes DJ_3 & DJ_4	0.55	0.44	0.33	0.33	mm/volt d.c.

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 1200 volts for the 5BP1 and

□ ○ ▲: See next page. (continued on next page)

← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

5BP1/1802-P1, 5BP4/1802-P4

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

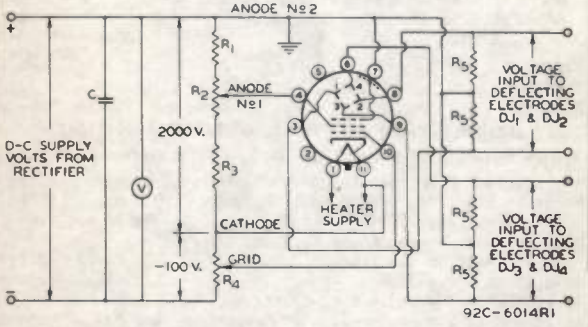
not less than 1500 volts for the 5BP4.

→ NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

→ □ Supply should be adjustably to ±20% of the value shown.
→ ○ Approximately 20% of Anode No.1 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.
→ ▲ Peak-to-peak value for good brilliance with good resoultion. For greater brilliance, up to twice this value should be available.

Characteristic Curves of phosphor No.1 and No.4 are shown at the beginning of this section.

TYPICAL OSCILLOGRAPH CIRCUIT



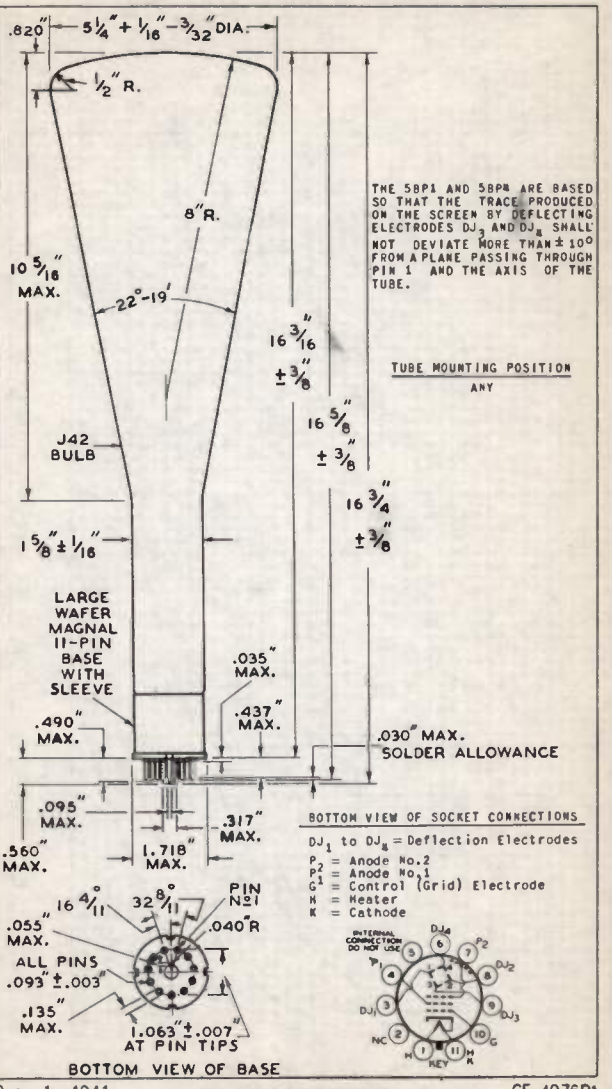
C = FILTER CONDENSER 0.5 - 2.0 μf
$R_1+R_2+R_3+R_4$ = BLEEDER POTENTIOMETER
R_1 = 0.65 MEGOHM
R_2 = 0.20 MEGOHM
R_3 = 0.175 MEGOHM
R_4 = 0.05 MEGOHM
R_5 = SEE NOTE 2 AT END OF DATA
V = VOLTMETER

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

→ Indicates a change.

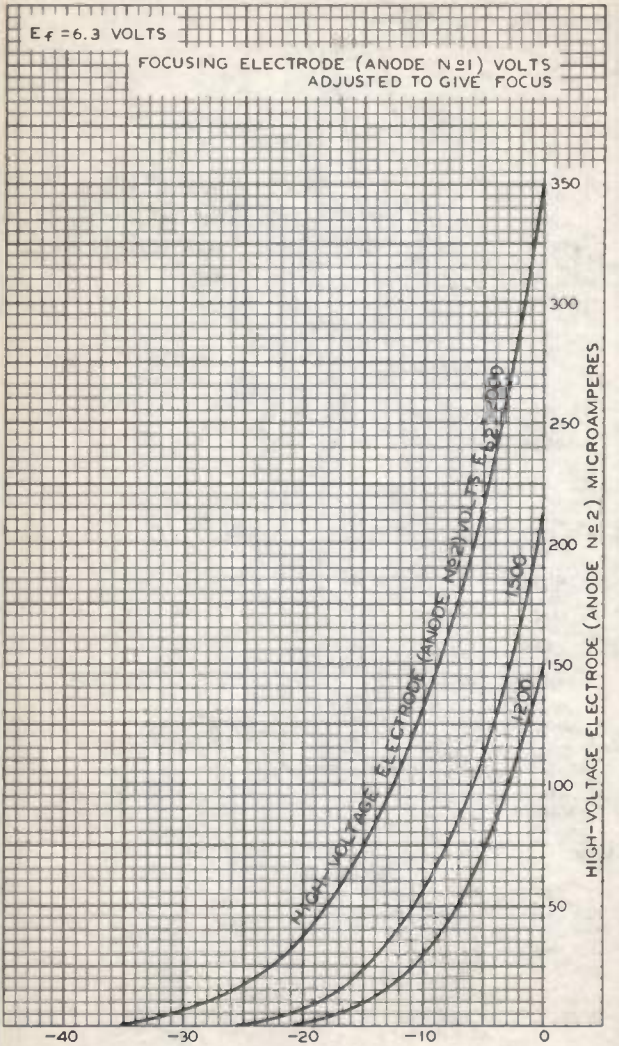
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

5BP1/1802-P1, 5BP4/1802-P4
HIGH-VACUUM CATHODE-RAY TUBE



5BP1, 5BP4

AVERAGE CHARACTERISTICS



5CP1, 5CP4

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Focusing Method		Electrostatic
Deflection Method		Electrostatic

Electrodes D_1 and D_2 (upper): nearest to screen
D_1 is on same side of tube as pin 5
Electrodes D_3 and D_4 (lower): nearest to base
D_3 is on same side of tube as pin 2

	5CP1	5CP4
Phosphor	No.1	No.4
Fluorescence	Green	White
Persistence	Medium	Medium

Direct Interelectrode Capacitances (Approx.):		
Grid to All Other Electrodes	8.0	μμf
Cathode to All Other Electrodes	8.0	μμf
D_1 to D_2	2.0	μμf
D_3 to D_4	2.0	μμf
D_1 to All Other Electrodes	9.0	μμf
D_3 to All Other Electrodes	7.0	μμf
D_1 to All Other Electrodes Except D_2	7.0	μμf
D_2 to All Other Electrodes Except D_1	7.0	μμf
D_3 to All Other Electrodes Except D_4	5.0	μμf
D_4 to All Other Electrodes Except D_3	6.0	μμf
Overall Length	16-3/4" ± 3/8"	
Bulb Diameter at Screen End	5-1/4" ± 3/32"	
Minimum Useful Screen Diameter	4-1/2"	
Bulb Side Terminal	Snap Terminal	
Base	Medium-Shell Diheptal 12-Pin	

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Absolute Values

Anode No.3 (Supplementary High-Voltage Electrode) Voltage			4400 max.	volts
Anode No.2 (High-Voltage Electrode) Voltage			2200 max.	volts
Anode No.1 (Focusing Electrode) Voltage			1100 max.	volts
Grid (Control Electrode) Voltage			Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode			550 max.	volts
D-C Heater-Cathode Potential*			125 max.	volts
Grid-Circuit Resistance			1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency			1.0 max.	megohm
Typical Operation:				
Anode No.3 Voltage△	2000	3000	4000	volts
Anode No.2 Voltage**	2000	1500	2000	volts
Anode No.1 Voltage for Focus At 75% of Grid Voltage for Cut-Off#	575	430	575	volts
Grid Voltage for Visual Cut-Off ##	-60	-45	-60	volts

*, **, △, #, ##: See next page.

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

5CP1, 5CP4

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

Deflection Sensitivity:				
DJ_1 and DJ_2	0.350	0.370	0.280	mm/volt d.c.
DJ_3 and DJ_4	0.390	0.450	0.340	mm/volt d.c.
Deflection Factor:△				
DJ_1 and DJ_2	73	69	92	volts d.c./in.
DJ_3 and DJ_4	64	56	74	volts d.c /in.
△values subject to variation of	±20	±20	±20	per cent

* With heater negative. Cathode should be connected to the mid-tap or to one side of the heater transformer winding.

** Brilliance and definition decrease with decreasing anode voltage. In general, anode No.2 voltage should not be less than 1500 volts. For high-velocity scanning, it is recommended that anode No.3 voltage be not less than 3000 volts.

Individual tubes may require between + 25% and − 30% of these values with grid voltage between zero and cut-off.

Visual extinction of stationary focused spot. Supply should be adjustable to ±50% of these values.

SPOT POSITION

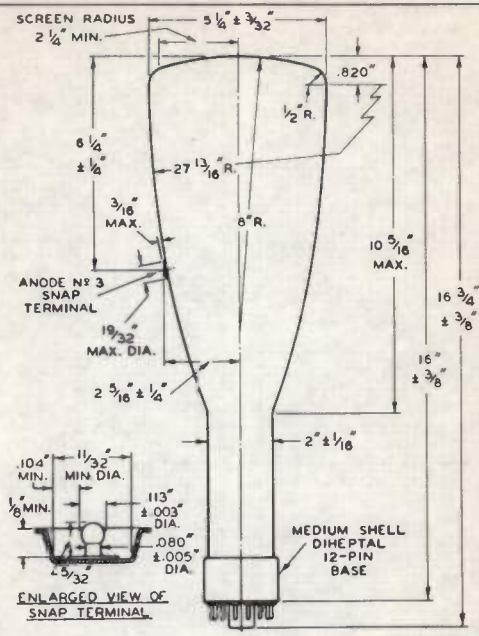
The undeflected focused spot will fall within a 25-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ_1 and DJ_2.

Suitable test conditions are: anode No.3 voltage, 8000 volts; anode No.2 voltage, 2000 volts; anode No.1 voltage, adjusted for focus; deflecting-electrode resistors, 1 megohm each, connected to anode No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, make the test with grid voltage near cut-off.

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

5CP1, 5CP4

HIGH-VACUUM CATHODE-RAY TUBE

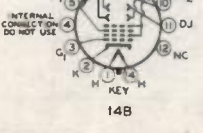


92C-6408

THE PLANE THROUGH THE TUBE AXIS AND EACH OF THE FOLLOWING ITEMS MAY VARY FROM THE TRACE PRODUCED BY DJ_1 AND DJ_2 BY THE FOLLOWING ANGULAR TOLERANCES (MEASURED ABOUT THE TUBE AXIS): PIN 5, 10°: SIDE TERMINAL (ON SAME SIDE AS PIN 5), 10°. ANGLE BETWEEN DJ_1–DJ_2 TRACE AND DJ_3–DJ_4 TRACE IS 90° ± 4°.

DJ_1 IS ON SAME SIDE OF TUBE AS PIN 5; DJ_3 ON SAME SIDE AS PIN 2.

TUBE MOUNTING POSITION: Any



14B

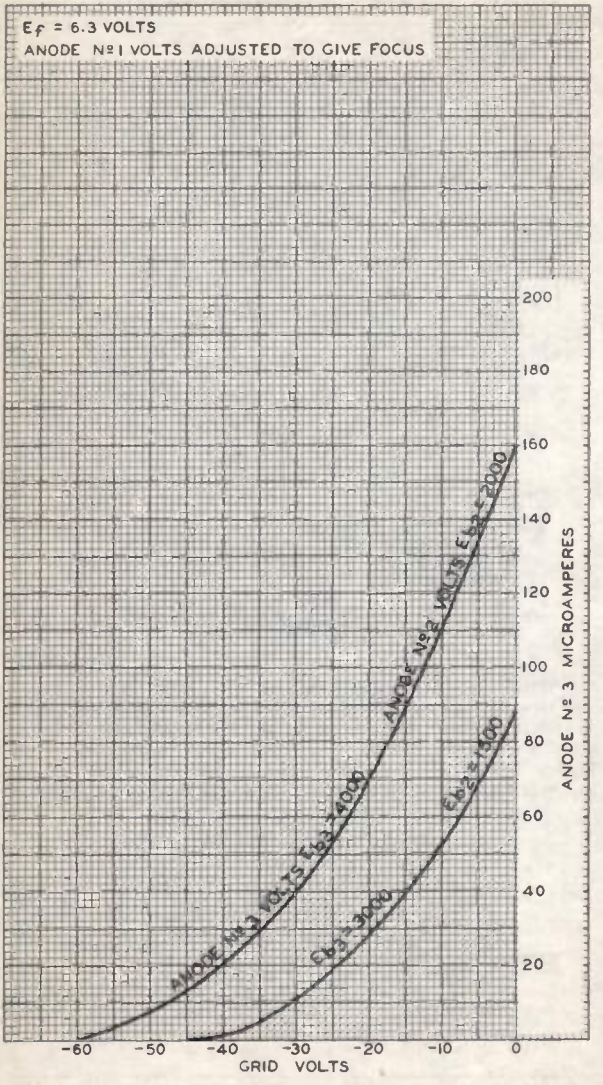
BOTTOM VIEW OF SOCKET CONNECTIONS

DJ_1, DJ_2, DJ_3, DJ_4 = Deflecting Electrodes
P_3 = Anode No.3
P_2 = Anode No.2
P_1 = Anode No.1
G_2 = Grid No.2
G_1 = Grid No.1
H = Heater
K = Cathode
NC = No Connection

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

5CP1, 5CP4

AVERAGE CHARACTERISTICS



5FP7-A

OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances (Approx.):	
Grid No.1 to All Other Electrodes	8.5 μμf
Grid No.2 to All Other Electrodes	7 μμf
Cathode to All Other Electrodes	5 μμf
Phosphor (For Curves, see front of this Section)	No.7
Fluorescence	Blue
Phosphorescence	Greenish-Yellow
Persistence of Phosphorescence	Long
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	53°
Overall Length	11-1/8" ± 3/8"
Greatest Diameter of Bulb	4-15/16" ± 3/32"
Minimum Useful Screen Diameter	4-1/4"
Mounting Position	Any
Cap	Recessed Small Ball
Base	Long Medium-Shell Octal 8-Pin

BOTTOM VIEW

Pin 1 - No Connection
Pin 2 - Heater
Pin 3 - Grid No.2
Pin 4 - No Connection
Pin 5 - Grid No.1
Pin 6 - No Connection
Pin 7 - Cathode
Pin 8 - Heater
Cap - Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE• VOLTAGE	8000 max.	volts
GRID-No.2 VOLTAGE	700 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value□	0 max.	volts
Positive peak value	2 max.	volts
PEAK GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage•	4000	7000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage Range○	-25 to -70	-25 to -70	volts
Focusing-Coil Current▲	75 to 102	99 to 135	ma
Spot Position	#	-	

•,□,*,○,▲,#: See next page.

5FP7-A

5FP7-A
OSCILLOGRAPH TUBE

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

Minimum Circuit Values:

When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows:

Grid-No.1-Circuit Resistance . . . . . 150 min. ohms
Grid-No.2-Circuit Resistance . . . . . 820 min. ohms
Anode-Circuit Resistance . . . . . 9100 min. ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

RCA Focusing Coil. . . . . RCA Type No. 202D1

● Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

□ At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode input power to 6 watts.

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 4000 volts.

○ For visual extinction of undeflected focused spot.

▲ For JETEC Focusing Coil No.106, or equivalent, with center line of air gap approximately 2-3/8" from reference line (see Outline Drawing), and total anode current of 200 microamperes.

The center of the undeflected, unfocused spot will fall within a circle having 9 mm radius concentric with the center of the tube face.

OUTLINE DIMENSIONS for Type 5FP7-A
are the same as those for Type 5FP4-A

AVERAGE CHARACTERISTIC CURVE
for Type 5FP7-A is the same as that shown for
Type 7BP7-A

5HP1, 5HP4

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
* Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Focusing Method		Electrostatic
Deflection Method		Electrostatic

Electrodes DJ_1 and DJ_2 (upper): nearest to screen
DJ_1 is on same side of tube as pin No.4
Electrodes DJ_3 and DJ_4 (lower): nearest to base
DJ_3 is on same side of tube as pin No.1

	5HP1	5HP4
Phosphor	No. 1	No. 4
Fluorescence	Green	White
Persistence	Medium	Medium

Direct Interelectrode Capacitances:

Control Electrode (Grid) to All Other Electrodes	9.5 μμf
DJ_1 to DJ_2	1.2 μμf
DJ_3 to DJ_4	0.65 μμf
DJ_1 to All Other Electrodes	9.0 μμf
DJ_3 to All Other Electrodes	12.0 μμf
DJ_1 to All Other Electrodes Except DJ_2	8.0 μμf
DJ_2 to All Other Electrodes Except DJ_1	6.5 μμf
DJ_3 to All Other Electrodes Except DJ_4	11.0 μμf
DJ_4 to All Other Electrodes Except DJ_3	8.0 μμf
Overall Length	16-3/4" ± 3/8"
Bulb Diameter at Screen End	5-1/4" $^{+1/16"}_{-3/32"}$
Base	Large Micanol-Wafer Medium Magnal 11-Pin Sleeve

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Absolute Values

Anode No.2 (High-Voltage Electrode) Voltage		2200 max.	volts
Anode No.1 (Focusing Electrode) Voltage		1100 max.	volts
Grid (Control Electrode) Voltage		Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode		550 max.	volts
Grid-Circuit Resistance		1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at the Heater-Supply Frequency		1.0 max.	megohm
Typical Operation:			
Anode No.2 Voltage *	1500	2000	volts
Anode No.1 Voltage for Focus at 75% of Grid Voltage for Cut-Off (Approx.)**	310	425	volts
Grid Voltage for Cut-Off°	-30	-40	volts
Deflection Sensitivity:			
DJ_1 and DJ_2	0.400	0.300	mm/volt d.c.
DJ_3 and DJ_4	0.440	0.330	mm/volt d.c.
Deflection Factor:■			
DJ_1 and DJ_2	63.5	84.8	volts d.c./in.
DJ_3 and DJ_4	57.8	77.0	volts d.c./in.
■Subject to variation of	±17	±17	per cent

*, **, °: See next page.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

5HP1, 5HP4

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

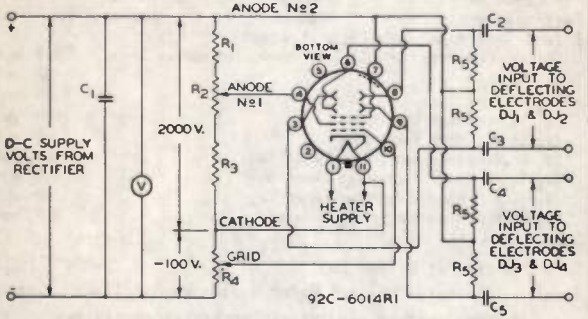
* Brilliance and definition decrease with decreasing anode No.2 voltages. In general, the anode No.2 voltage should not be less than 1500 volts.

** Supply should be adjustable to ±20% of this value.

° Visual extinction of a stationary focused spot. For cut-off supply should be adjustable to ±50% of this value.

Characteristic Curves of phosphor No.1 and No.4 are shown at the beginning of this section.

TYPICAL OSCILLOGRAPH CIRCUIT



C_1 = FILTER CONDENSER 0.5 TO 2.0 μf
C_2, C_3, C_4, C_5 = SEE NOTE 2
R_1 = 0.65 MEGOHM
R_2 = 0.20 MEGOHM
R_3 = 0.175 MEGOHM
R_4 = 0.05 MEGOHM
R_5 = SEE NOTES 1 & 2
V = VOLTMETER

NOTE 1: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

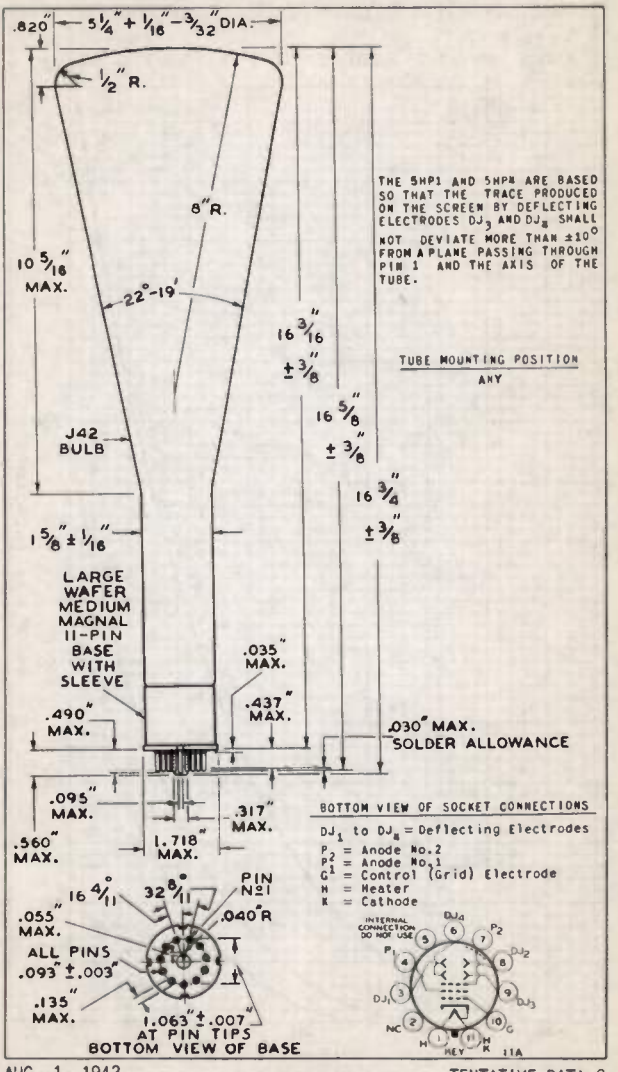
NOTE 2: When the cathode or the negative end of the cathode-ray high-voltage supply is grounded, blocking condensers C_2, C_3, C_4, and C_5 should have a high voltage rating. When anode No.2 is grounded, condensers C_2, C_3, C_4, and C_5 may be low-voltage condensers.

For d-c amplifier service, the deflecting electrodes should be coupled direct to the output of the amplifier by omitting the blocking condensers. In addition, it will usually be preferable to remove the associated deflecting electrode resistor in order to minimize the loading effect of the resistor on the d-c amplifier. With the resistor removed, it is essential, in order to minimize spot defocusing, that anode No.2 be returned to some point in the d-c amplifier circuit such that the potential difference between anode No.2 and the average voltage across the deflecting electrodes will be as low as possible.

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

5HP1, 5HP4

HIGH-VACUUM CATHODE-RAY TUBE



AUG. 1, 1942

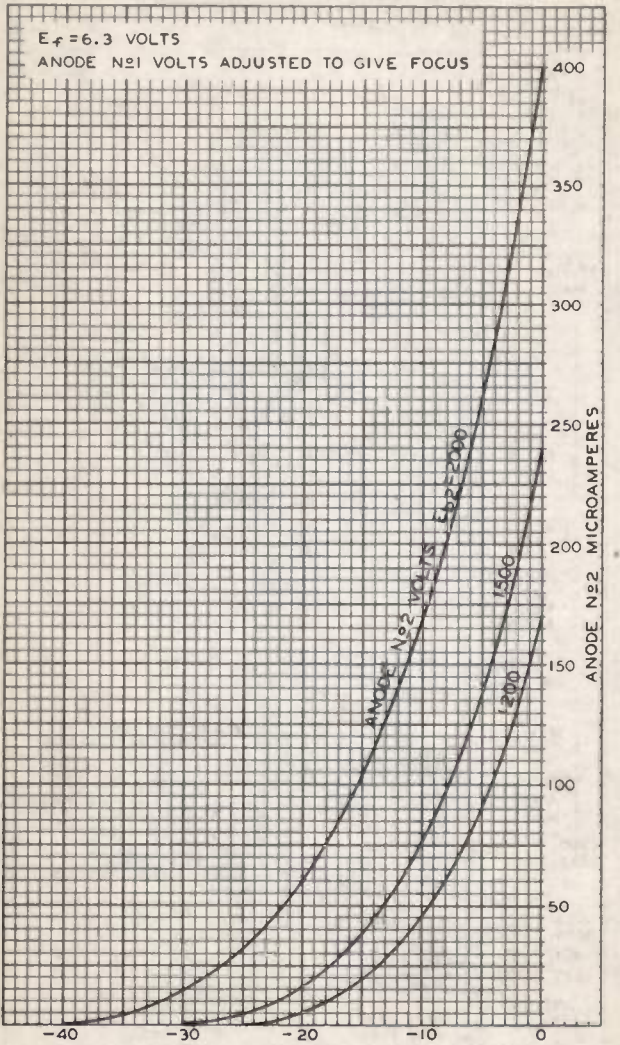
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

TENTATIVE DATA 2

5HP1
5HP4

5HP1, 5HP4

AVERAGE CHARACTERISTICS



MAY 19, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4984R2

5TP4
PROJECTION KINESCOPE

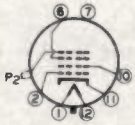
ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	7.5	μμf
Cathode to All Other Electrodes	5.0	μμf
External Conductive Coating to Anode No.2	500 max.	μμf
	100 min.	μμf
Phosphor (For Curves, see front of this Section)		No.4
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Medium
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Overall Length		11-3/4" ± 3/8"
Greatest Diameter of Bulb		5" ± 1/8"
Minimum Useful Screen Diameter		4-1/2"
Minimum Optical-Quality-Circle Diameter		4-1/4"
Mounting Position		Any
Cap		Recessed Small Cavity
Base		Small-Shell Duodecal 7-Pin
Basing Designation for BOTTOM VIEW		12C

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 6 – Anode No.1
Pin 7 – Internal Con. – Do Not Use



Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode No.2

Maximum Ratings, *Design-Center Values*:

ANODE-No.2 VOLTAGE	27000 max.	volts
ANODE-No.1 VOLTAGE	6000 max.	volts
GRID-No.2 VOLTAGE	350 max.	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
Negative bias value	150 max.	volts
Positive bias value	0 max.	volts ←
Positive peak value	2 max.	volts ←
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410 max.	volts ←
After equipment warm-up period	175 max.	volts ←
Heater positive with respect to cathode	10 max.	volts

Typical Operation:

Anode-No.2 Voltage*	27000	volts
Anode-No.1 Voltage for Focus when anode-No.2 current is 200 μa.	4320 to 5400	volts ←

* See next page.

← Indicates a change.

5TP4
PROJECTION KINESCOPE

Grid-No.2 Voltage**	200	volts
→ Grid-No.1 Voltage for Visual Cutoff°	-42 to -98	volts
Anode-No.2 Current	200	μa
→ Max. Anode-No.1 Current	65	μa
Max. Grid-No.2 Current	±15	μa

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms

→ **Minimum Circuit Values:**

When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows:

Grid-No.1-Circuit Resistance	180 min.	ohms
Grid-No.2-Circuit Resistance	390 min.	ohms
Anode-No.1-Circuit Resistance	6800 min.	ohms
Anode-No.2-Circuit Resistance	30000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

Deflection Yoke	RCA Type No.201D2
Horizontal Output Transformer (for use with two 6BG6-G's)	RCA Type No.211T2
Vertical Output Transformer	RCA Type No.204T2

* Brilliance and definition decrease with decreasing anode voltages. In general, anode No.2 voltage should not be less than 20000 volts.

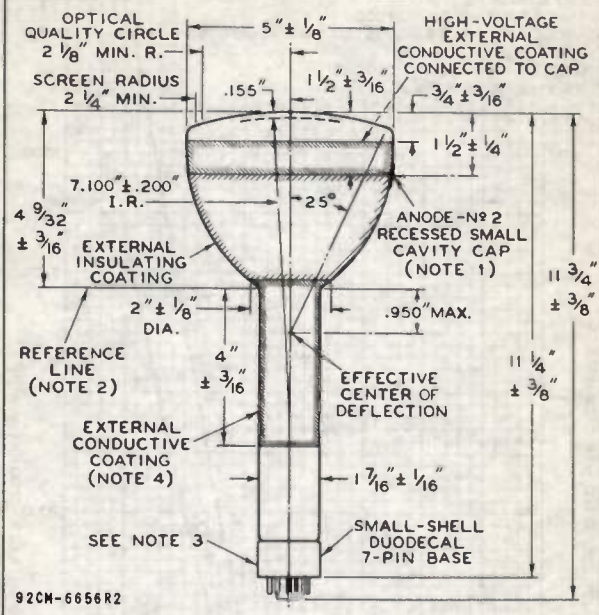
** Subject to variation of ±40% if it is desired to operate any tube at a grid-No.1 cutoff bias of -70 volts.

° Visual extinction of undeflected focused spot.

→ Indicates a change.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5TP4
PROJECTION KINESCOPE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No. 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE-No. 2 TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE-No. 2 TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No. 3.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" – .000" I.D. AND 2" LONG WILL REST ON BULB CONE.

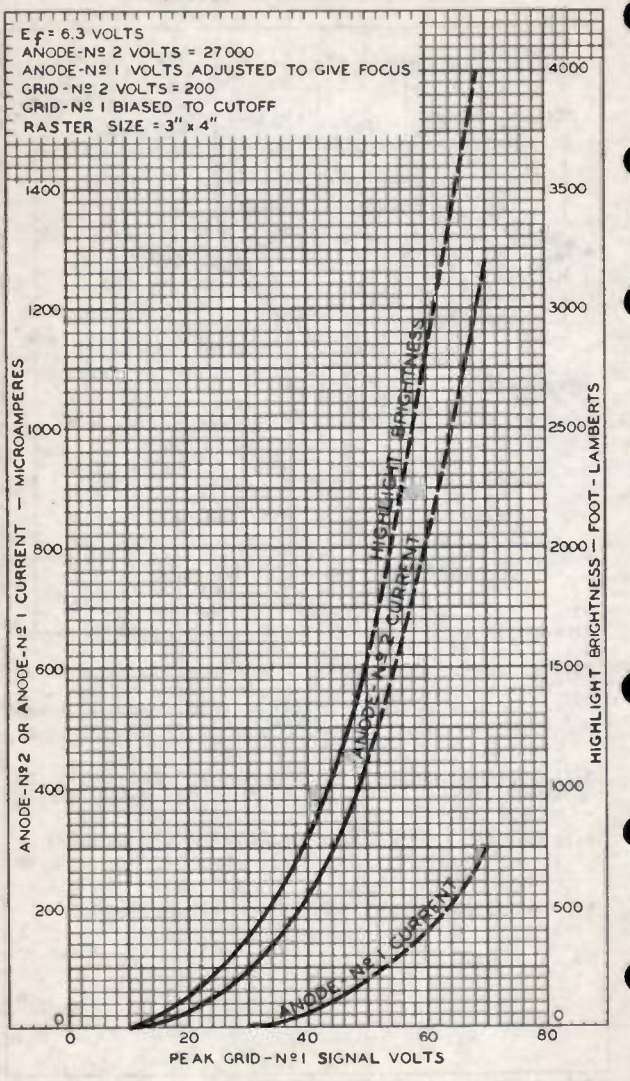
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY.

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

5TP4

5TP4

AVERAGE CHARACTERISTICS



FEB. 7, 1946

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92CM-6670

5WP15
FLYING-SPOT CATHODE-RAY TUBE

ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

For use in Flying-Spot Video-Signal Generators

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances:	
Grid No.1 to All Other Electrodes	7.5 μμf
Cathode to All Other Electrodes	5 μμf
External Conductive Coating to Anode No.2	500 max. μμf 100 min. μμf
Phosphor	No.15
Fluorescence:	
Visible Radiation	Blue-Green
Invisible Radiation	Near Ultraviolet
Phosphorescence:	
Persistence of Visible Radiation	Very Short
Persistence of Invisible Radiation	Extremely Short
Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angle (Approx.)	50°
Overall Length	11-7/16" ± 3/8"
Greatest Diameter of Bulb	5" ± 1/8"
Minimum Useful Screen Diameter	4-1/4"
Minimum Inside Diameter of Deflecting Coil	1.505"
Mounting Position	Any
Cap	Recessed Small Cavity
Base	Small-Shell Duodecal 7-Pin
Basing Designation for BOTTOM VIEW	12C

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 6 – Anode No.1
Pin 7 – Internal Con.– Do Not Use

Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode No.2

Maximum Ratings, *Design-Center Values*:

ANODE-No.2 VOLTAGE	27000 max.	volts
ANODE-No.1 VOLTAGE	6000 max.	volts
GRID-No.2 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	150 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410 max.	volts
After equipment warm-up period	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

5WP15

5WP15
FLYING-SPOT CATHODE-RAY TUBE

Typical Operation:

Anode-No.2 Voltage*	20000	volts
Anode-No.1 Voltage Range for Anode-No.2 Current of 150 μamp.	3000 to 3800	volts
Grid-No.2 Voltage**	200	volts
Grid-No.1 Voltage for Visual Cutoff°	-42 to -98	volts
Anode-No.2 Current	150	μamp
Max. Anode-No.1 Current	200	μamp
Grid-No.2 Current Range	-15 to +15	μamp

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms

Minimum Circuit Values:

When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows:

Grid-No.1-Circuit Resistance	180 min.	ohms
Grid-No.2-Circuit Resistance	390 min.	ohms
Anode-No.1-Circuit Resistance	6800 min.	ohms
Anode-No.2-Circuit Resistance	30000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

Deflecting Yoke	RCA Type No. 201D11

* Brilliance and definition decrease with decreasing anode voltages. In general, anode-No.2 voltage should not be less than 15000 volts.

** Subject to variation of ±40% when grid-No.1 voltage cutoff is desired at -70 volts.

° Visual extinction of undeflected focused spot.

OPERATING NOTES

Soft x-rays are produced when the 5WP15 is operated with an anode-No.2 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.

Resolution of better than 700 lines at the center of the reproduced picture can be produced by the 5WP15. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a video amplifier having a band-width of at least 10 megacycles.

The blue-green radiation decays hyperbolically to about 30 per cent of its initial value in 1.5 microseconds. The ultra-

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

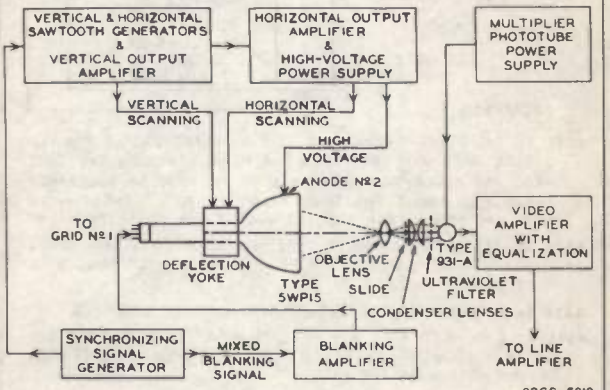
5WP15
FLYING-SPOT CATHODE-RAY TUBE

violet radiation has an equivalent exponential decay with a time constant less than 0.05 microsecond. The frequency response of the ultraviolet radiation is substantially constant for a range of 3 megacycles and then decreases exponentially toward zero at approximately 100 megacycles.

The P15 screen is more sensitive to heat than other standard types of phosphors. It shows a decrease in efficiency with increase in temperature. Use of forced air from a small blower directed against the face of the tube is, therefore, suggested to counteract the heating effect of the electron beam when optimum efficiency of the screen is desired at maximum anode-No. 2 current.

Operation of the 5WP15 results in gradual browning of the face. The rate of browning increases markedly with increase in anode-No. 2 voltage, is proportional to beam current, and is inversely proportional to the scanned area. The browning is most noticeable during initial operation; thereafter, a gradual increase in the amount of browning will be observed during the life of the tube.

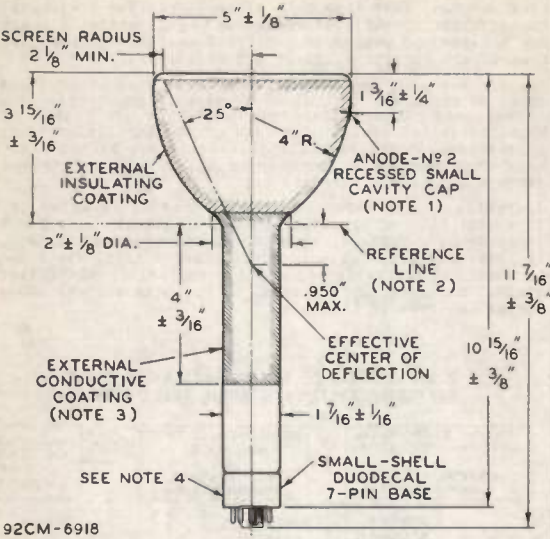
BLOCK DIAGRAM OF FLYING-SPOT VIDEO SIGNAL GENERATOR SYSTEM FOR SLIDE TRANSPARENCIES



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.

RCA

5WP15
FLYING-SPOT CATHODE-RAY TUBE



92CM-6918

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No. 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE-No. 2 TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE-No. 2 TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No. 3.

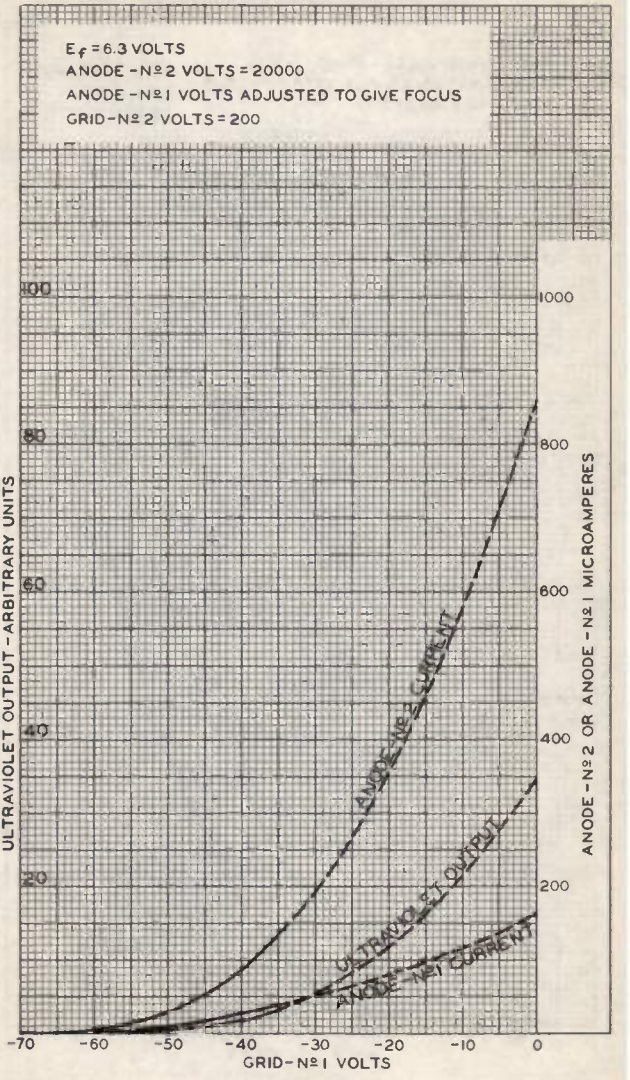
NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" − .000" AND 2" LONG WILL REST ON BULB CONE.

NOTE 3: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 4: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

5WP15

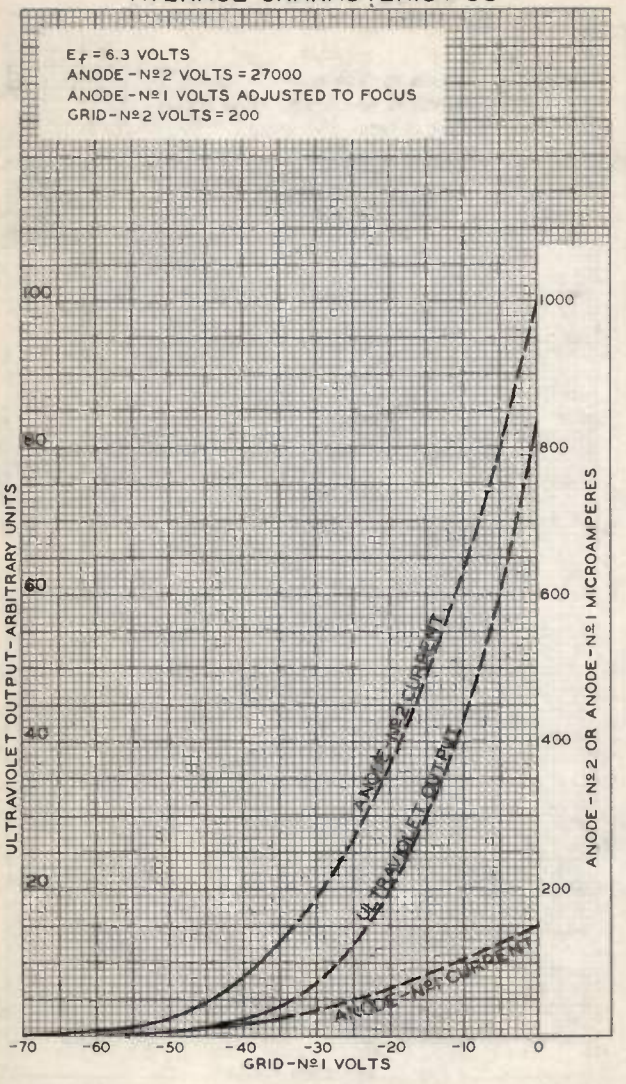
AVERAGE CHARACTERISTICS



5WP15

5WP15

AVERAGE CHARACTERISTICS



DEC. 8, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6917

KINESCOPE
7AP4

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Deflection		Magnetic
Phosphor		No.4
Fluorescence		White
Direct Interelectrode Capacitance:		
Grid to All Other Electrodes		12 max. μμf
Overall Length		13-1/2" ± 3/8"
Maximum Diameter		7-1/8"
Bulb		J-56
Base		Medium 5-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

High-Voltage Electrode (Anode #2) Voltage	3500 max.●	volts
Focusing Electrode (Anode #1) Voltage	1000 max.●	volts
Control Electrode (Grid) Voltage -	Never positive	
Fluorescent-Screen Input Power/sq cm◊	2.5 max.●	mw
Typical Operation:		
Heater Voltage	2.5	volts
Anode #2 Voltage	3500	volts
Anode #1 Voltage•	675 approx.	volts
Grid Voltage #○	Adjusted to give suitable luminous spot	
Grid Signal-Swing Voltage□	15	volts

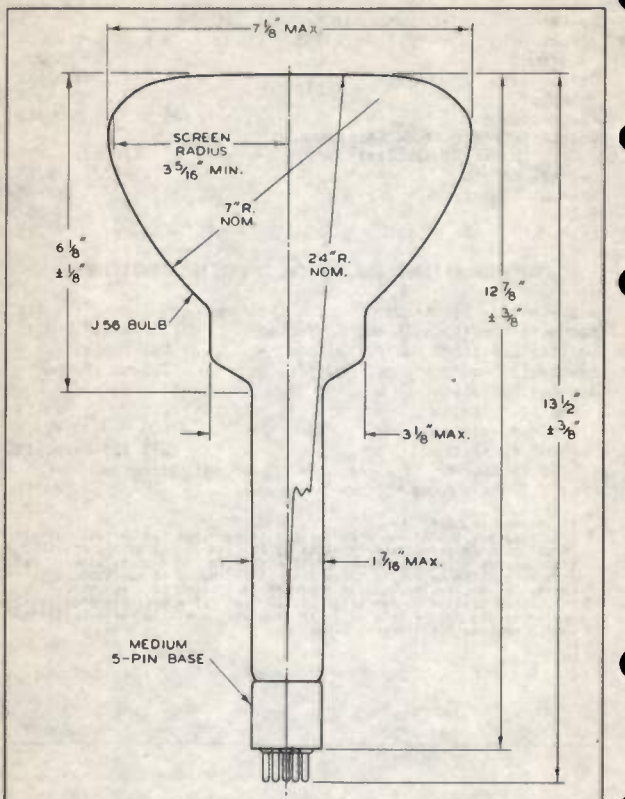
• Adjustable to ± 20%.
Approximately 10% of Anode #1 voltage is required for current cut-off if the maximum permissible resistance is used in the grid circuit.
□ Peak-to-peak value for good brilliance with good resolution. For greater brilliance, up to twice this value should be available.
○ Maximum grid-circuit resistance should be limited to 2 megohms.
◊ This value applies to the brightest portion of a stationary pattern. Approximately double this value is permissible with a moving pattern.
● Design maximum for 117-volt line.

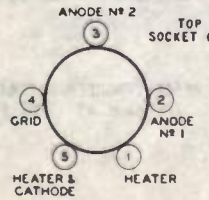
FLUORESCENT-SCREEN CHARACTERISTICS

CURVES FOR THE FLUORESCENT-SCREEN MATERIAL USED IN THE 7AP4 ARE THE SAME AS THOSE FOR TYPE 906-P4.

7AP4

KINESCOPE
7AP4





MOUNTING POSITION
NO RESTRICTIONS

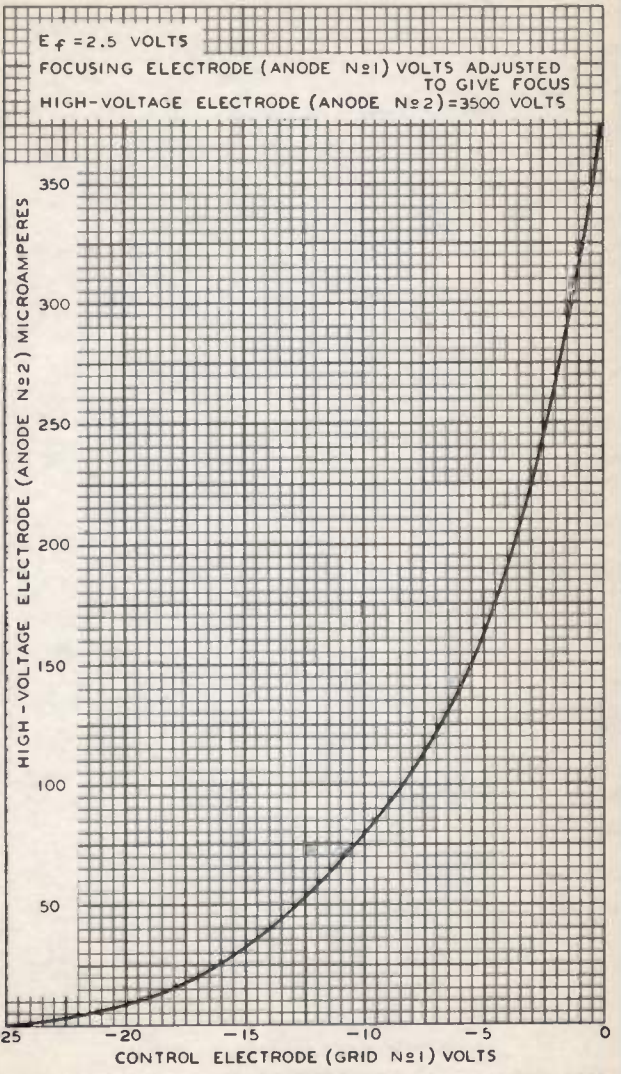
DEC. 1, 1939

CE-6040

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

7AP4

AVERAGE CHARACTERISTIC



7BP7-A

OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances (Approx.):	
Grid No.1 to All Other Electrodes	8.5 μμf
Grid No.2 to All Other Electrodes	7 μμf
Cathode to All Other Electrodes	5 μμf
Phosphor (For Curves, see front of this Section)	No.7
Fluorescence	Blue
Phosphorescence	Greenish-Yellow
Persistence of Phosphorescence	Long
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	53°
Overall Length	13-1/4" ± 3/8"
Greatest Diameter of Bulb	7" ± 1/8"
Maximum Useful Screen Diameter	6"
Mounting Position	Any
Cap	Recessed Small Ball
Base	Long Medium-Shell Octal 8-Pin

BOTTOM VIEW

Pin 1 – No Connection
Pin 2 – Heater
Pin 3 – Grid No.2
Pin 4 – No Connection
Pin 5 – Grid No.1
Pin 6 – No Connection
Pin 7 – Cathode
Pin 8 – Heater
Cap – Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE● VOLTAGE	8000 max.	volts
GRID-No.2 VOLTAGE	700 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value□	0 max.	volts
Positive peak value	2 max.	volts
PEAK GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage*	4000	7000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage Range○	-25 to -70	-25 to -70	volts
Focusing-Coil Current▲	75 to 102	99 to 135	ma
Spot Position	#	–	

●,□,*,○,▲,#: See next page.

7BP7-A
OSCILLOGRAPH TUBE

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms

Minimum Circuit Values:

When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows:

Grid-No.1-Circuit Resistance	150 min.	ohms
Grid-No.2-Circuit Resistance	820 min.	ohms
Anode-Circuit Resistance	9100 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

RCA Focusing Coil.	RCA Type No. 202D1

● Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

□ At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode input power to 6 watts.

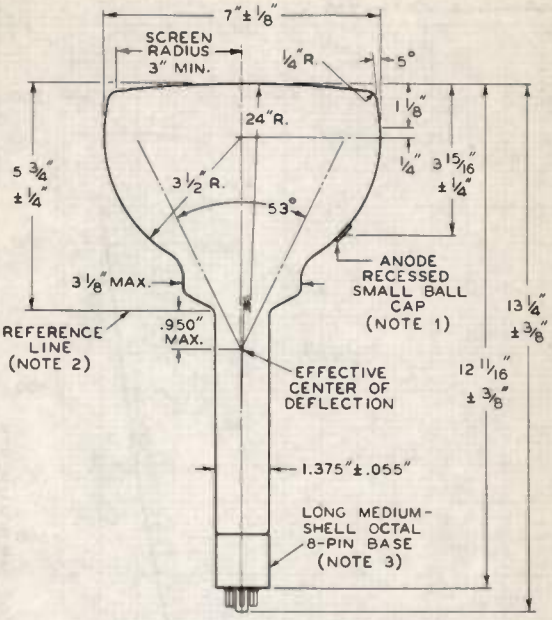
• Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 4000 volts.

○ For visual extinction of undeflected focused spot.

▲ For JETEC Focusing Coil No. 106, or equivalent, with center line of air gap approximately 2-3/4" from reference line (see Outline Drawing), and total anode current of 200 microamperes.

The center of the undeflected, unfocused spot will fall within a circle having 12 mm radius concentric with the center of the tube face.

7BP7-A
OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No. 5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE TERMINAL IS ON SAME SIDE OF TUBE AS PIN No. 5.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 1.430" + .003" – .000" I.D. AND 2" LONG WILL REST ON BULB CONE.

NOTE 3: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

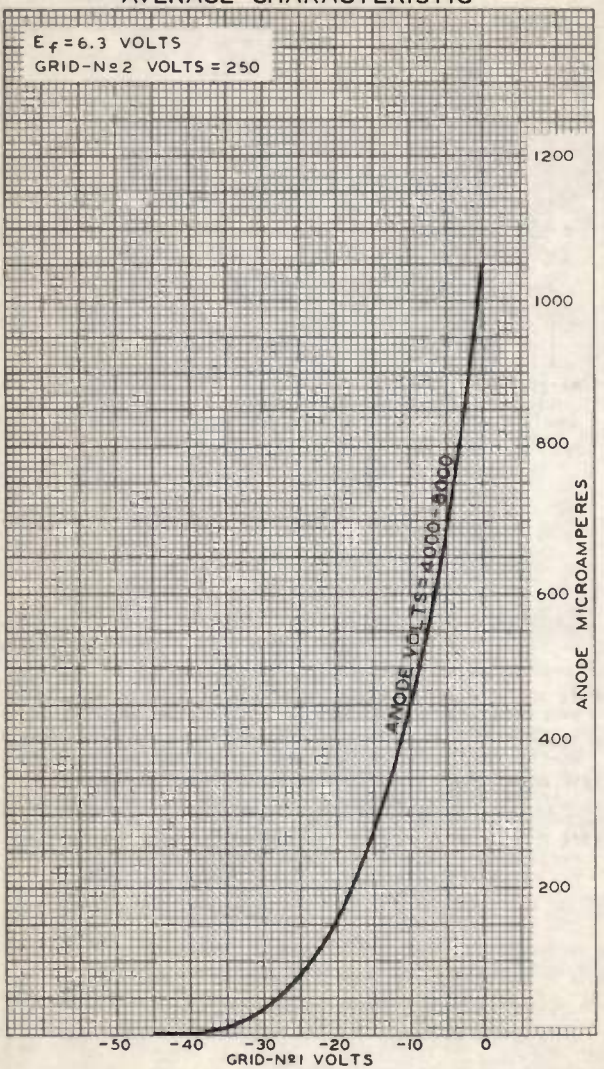
92CM-6367R3

/BP7-A

RCA

7BP7-A

AVERAGE CHARACTERISTIC



7CP1/1811-P1

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage ◇	6.3	a-c or d-c volts
Current	0.6	amp.
Focusing Method		Electrostatic
Deflection Method		Magnetic
Solid Deflection Angle		55 max. Degrees
Phosphor		No.1
Fluorescence		Green
Persistence		Medium
Direct Interelectrode Capacitances (Approx.):		
Control Electrode to All Other Electrodes		8 μμf
Cathode to All Other Electrodes		6.5 μμf
Overall Length		13-7/16" ± 3/8"
Bulb Diameter at Screen End		7" ± 1/8"
Minimum Useful Screen Diameter		6-1/2"
Bulb Side Terminal		Snap Terminal
Base		Long Medium-Shell Octal 8-Pin●
Deflection Yoke:		
Position		Flush with Bulb-Neck Reference Line (See *OUTLINE DRAWING*)
Working Length for 55° Angle Deflection		2 max. Inches

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Anode No.2 (High-Voltage Electrode) Voltage		7700 max.	volts
Anode No.1 (Focusing Electrode) Voltage		2200 max.	volts
Grid No.2 (Accelerating Electrode) Voltage		330 max.	volts
Grid No.1 (Control Electrode) Voltage		Never positive	
D-C Heater-to-Cathode Potential*		125 max.	volts
Grid No.1 Circuit Resistance		1.5 max.	megohms
Typical Operation:			
Anode No.2 Voltage **	4000	7000	volts
Anode No.1 Voltage for Focus at 75% of Grid Voltage for Cut-Off #	780	1365	volts
Grid No.2 Voltage	250	250	volts
Grid No.1 Voltage for Visual Cut-Off ##△	-45	-45	volts
△Values subject to variation of	±50	±50	per cent

* With heater negative. If the cathode is not connected directly to the heater, the heater-cathode potential should be kept as low as possible.
** Brilliance and definition decrease with decreasing anode No.2 voltage. In general, anode No.2 voltage should not be less than 4000 volts.
\# Individual tubes may require between -30 and + 20% of these values with grid voltage between zero and cut-off.
Visual extinction of stationary focused spot.
● Small wafer octal 8-pin base with flared sleeve is being used temporarily.
◇ Should not deviate more than ± 10% from rated value.

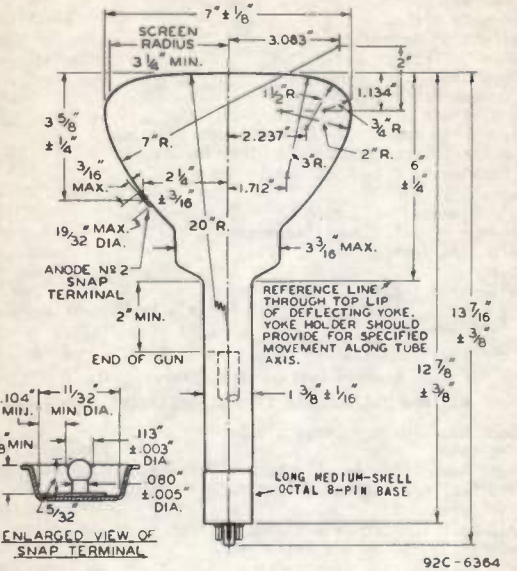
SPOT POSITION

The undeflected focused spot will fall within a circle of 15-mm radius concentric with the tube face.
Suitable test conditions are: anode No.2 voltage, 4000 volts; anode No.1 voltage adjusted for focus; grid No.2 voltage, 250 volts; the tube shielded from all extraneous fields. To avoid damage to the tube, make the test with grid No.1 voltage near cut-off. ◄ Indicates a change.

7CP1

HIGH-VACUUM CATHODE-RAY TUBE

Characteristics Curves of phosphor No.1 are shown at the beginning of this section.



THE PLANE THROUGH THE TUBE AXIS AND PIN 2 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE NO.2 TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE NO.2 TERMINAL IS ON SAME SIDE AS PIN 2.

TUBE MOUNTING POSITION: Any

6AZ

BOTTOM VIEW OF SOCKET CONNECTIONS

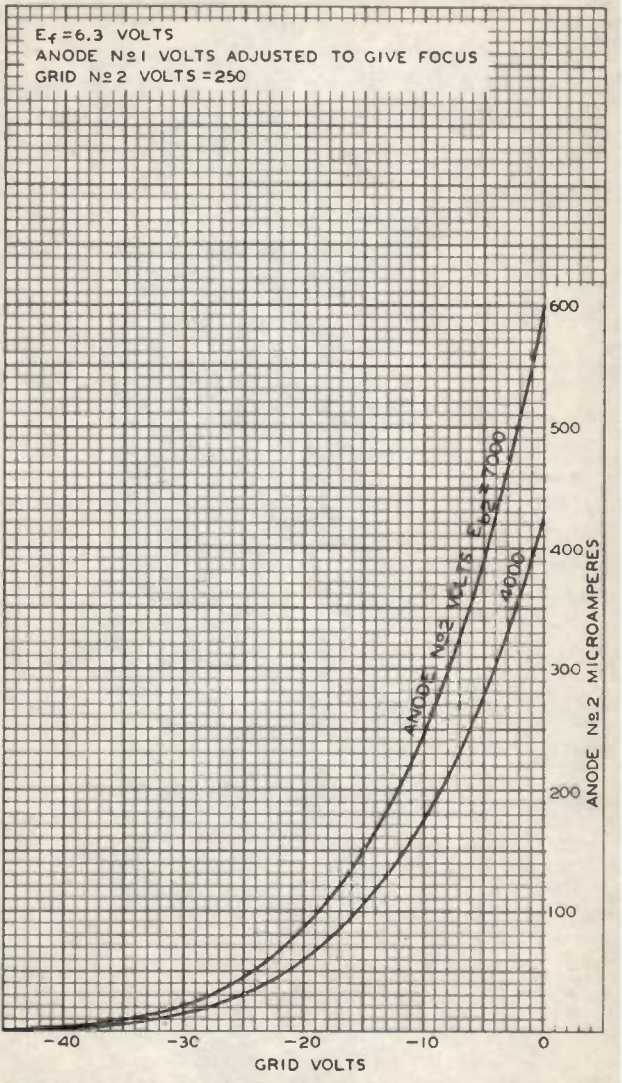
P_2 = Anode No.2
P_1 = Anode No.1
G_2 = Grid No.2
G_1 = Grid No.1
H = Heater
K = Cathode
NC = No Connection

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

RCA

7CP1

AVERAGE CHARACTERISTICS



7DP4

KINESCOPE

ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	6.5	μμf
Cathode to All Other Electrodes	5.0	μμf
External Conductive Coating to Anode No.2	1500 max. / 400 min.	μμf
Phosphor (For Curves, see front of this Section)		No.4
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Medium
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Ion Trap		Magnetic
External Coating		Conductive
Overall Length		14-1/16" ± 3/8"
Greatest Diameter of Bulb		7-3/16" ± 1/8"
Minimum Useful Screen Diameter		6"
Raster Size (Approx.)		4" x 5-1/2"
Mounting Position		Any
Cap		Recessed Small Cavity
Base		Small-Shell Duodecal 7-Pin

BOTTOM VIEW

Pin 1 – Heater
Pin 2 – Grid No.1
Pin 6 – Anode No.1
Pin 7 – Internal Con. – Do Not Use
Pin 10 – Grid No.2
Pin 11 – Cathode
Pin 12 – Heater
Cap – Anode No.2, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE-No.2 VOLTAGE■	8000 max. volts
ANODE-No.1 VOLTAGE	2400 max. volts
GRID-No.2 VOLTAGE	410 max. volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:	
Negative bias value	125 max. volts
Positive bias value	0 max. volts ←
Positive peak value	2 max. volts ←
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds	410 max. volts ←
After equipment warm-up period	125 max. volts
Heater positive with respect to cathode	125 max. volts

■ See next page.
← Indicates a change.

7DP4
KINESCOPE

Typical Operation:

Anode-No.2 Voltage*	6000	volts
→ Anode-No.1 Voltage for Focus°	1215 to 1645	volts
Grid-No.2 Voltage	250	volts
→ Grid-No.1 Voltage for Visual Cutoff**	-27 to -63	volts
Max. Anode-No.1 Current Range	-15 to +10	μamp

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms

→ **Minimum Circuit Values:**

When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows:

Grid-No.1-Circuit Resistance	150 min.	ohms
Grid-No.2-Circuit Resistance	470 min.	ohms
Anode-No.1-Circuit Resistance	2700 min.	ohms
Anode-No.2-Circuit Resistance	9100 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

Ion-Trap Magnet#	RCA Type No. 203D1
Deflection Yoke♠	RCA Type No. 201D1

■ Anode No.2 and grid No.3 which are connected together within tube are referred to herein as anode No.2.

* Brilliance and definition decrease with decreasing anode-No.2 voltage. In general, anode-No.2 voltage should not be less than 5000 volts.

° With the combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 12 foot-lamberts on a 4" x 5-1/2" picture area.

** Visual extinction of undeflected focused spot.

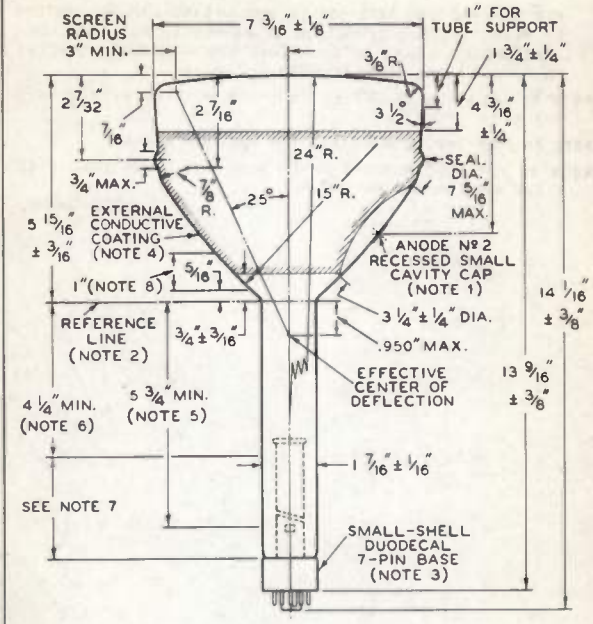
\# The dc current required by this magnet is approx. 70 ma. for the typical operating conditions shown.

♠ The horizontal deflecting-coil current required by this yoke to produce 5-1/2" picture width is approx. 410 ma. peak-to-peak under the typical operating conditions shown. The current varies directly as the square root of the anode-No.2 voltage.

→ Indicates a change.

RCA

7DP4
KINESCOPE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No. 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE No. 2 TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE No. 2 TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No. 3.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" – .000" I.D. AND 2" LONG WILL REST ON BULB CONE.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 5: DISTANCE TO INTERNAL POLE PIECES. PLANE THROUGH

7DP4
KINESCOPE

(continued from preceding page)

PIN No. 6 AND TUBE AXIS PASSES THROUGH LINE JOINING CENTERS OF POLE PIECES. DIRECTION OF PRINCIPAL FIELD OF ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO PIN No. 6 AND SOUTH POLE TO PIN No. 12.

NOTE 6: LOCATION OF DEFLECTING YOKE MUST BE WITHIN THIS SPACE.

NOTE 7: KEEP THIS SPACE CLEAR FOR ION-TRAP MAGNET.

NOTE 8: FOR TUBE SUPPORT WHICH MUST NOT COVER SPECIFIED CLEAR AREA AROUND ANODE CAP.

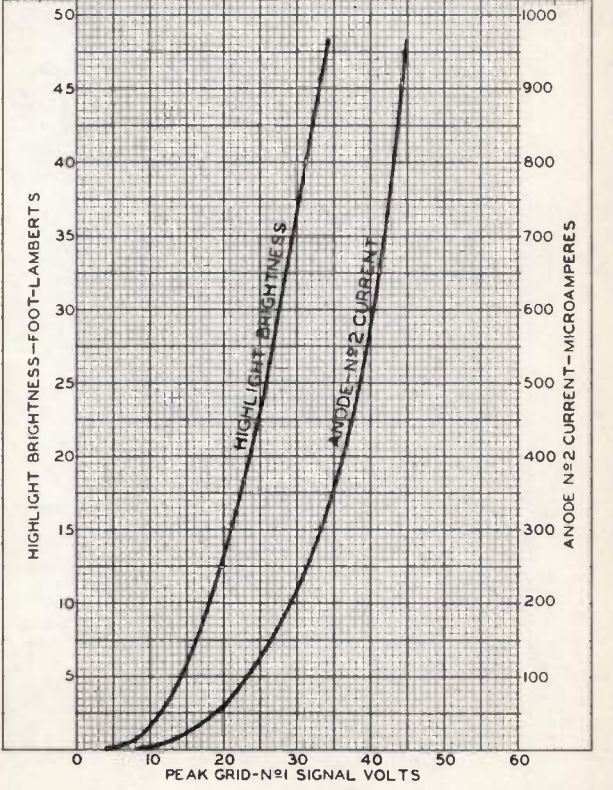
92CM-6664R1

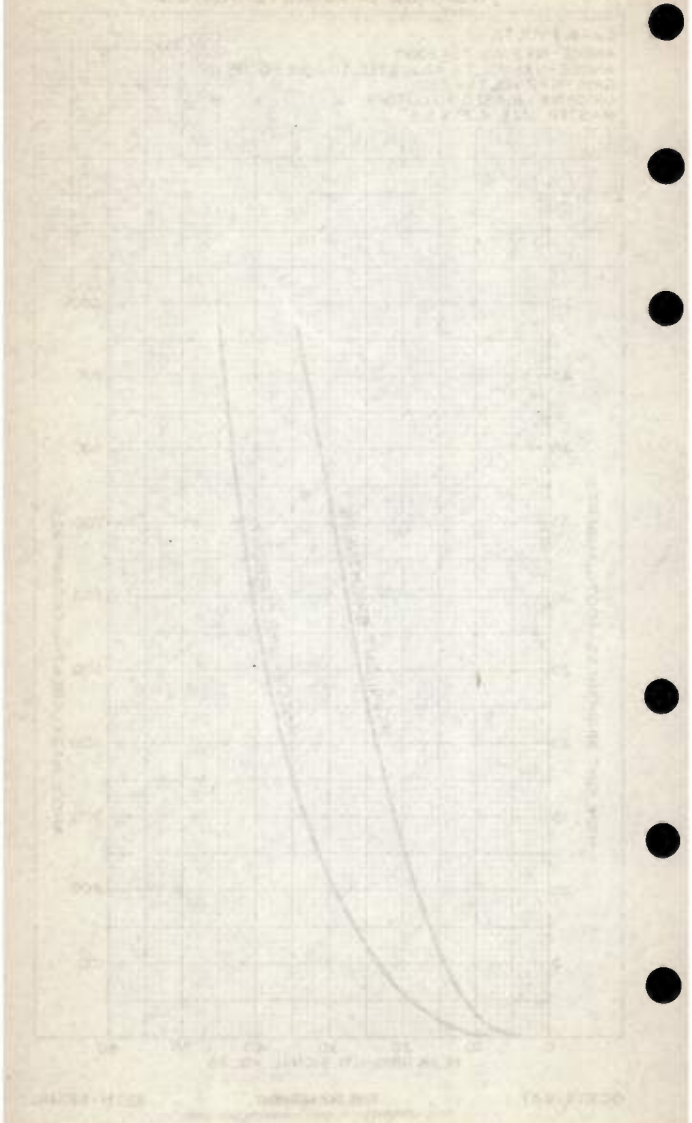
RCA

7DP4

AVERAGE CHARACTERISTICS

E_f = 6.3 VOLTS
ANODE-Nº 2 VOLTS = 6000
ANODE-Nº 1 VOLTS ADJUSTED TO GIVE FOCUS
GRID-Nº 2 VOLTS = 250
GRID-Nº 1 BIASED TO CUTOFF
RASTER SIZE 4.2" X 5.6"





9AP4/1804-P4

KINESCOPE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Focus		Electrostatic
Deflection		Magnetic ←
Phosphor		No.4
Fluorescence		White
Persistence		Medium ←
Direct Interelectrode Capacitance:		
Grid No.1 to All Other Electrodes		9 μμf ←
Overall Length		21" ± 3/8"
Diameter		9" ± 1/8" ←
Bulb		J-72
Cap		Medium Metal
Base		Medium 6-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts ←

High-Voltage Electrode (Anode No. 2) Volt.		7000 max.	volts
Focusing Electrode (Anode No.1) Volt.		2000 max.	volts ←
Accelerating Electrode (Grid No. 2) Volt.		250 max.	volts
Control Electrode (Grid No.1) Volt.		Never positive	
Fluorescent Screen Input Power/sq cm :			
Fixed Pattern		2.5 max.	mw ←
Moving Pattern		5.0 max.	mw ←
Grid Circuit Resistance		1.5 max.	megohms ←
Typical Operation:			
Cathode	{Should be connected to one side or to mid-tap of heater winding		
Anode No.2 Voltage	6000	7000	volts
Anode No.1 Voltage □	1225	1425	approx. volts
Grid No.2 Voltage	250	250	volts
Grid No.1 Voltage ○	Adjusted to give suitable luminous spot		
Grid No.1 Signal-Swing Volt. ▲	25	25	approx. volts ←

NOTE: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 5000 volts. ←

□ Supply should be adjustable to ± 20% of the value shown.
○ Approximately 35% of Grid No.2 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance. ←
▲ Peak-to-peak value for good brilliance with good resolution. For greater brilliance, up to twice this value should be available. ←

The Characteristic Curves for the 9AP4 are the same as those for the 12AP4.

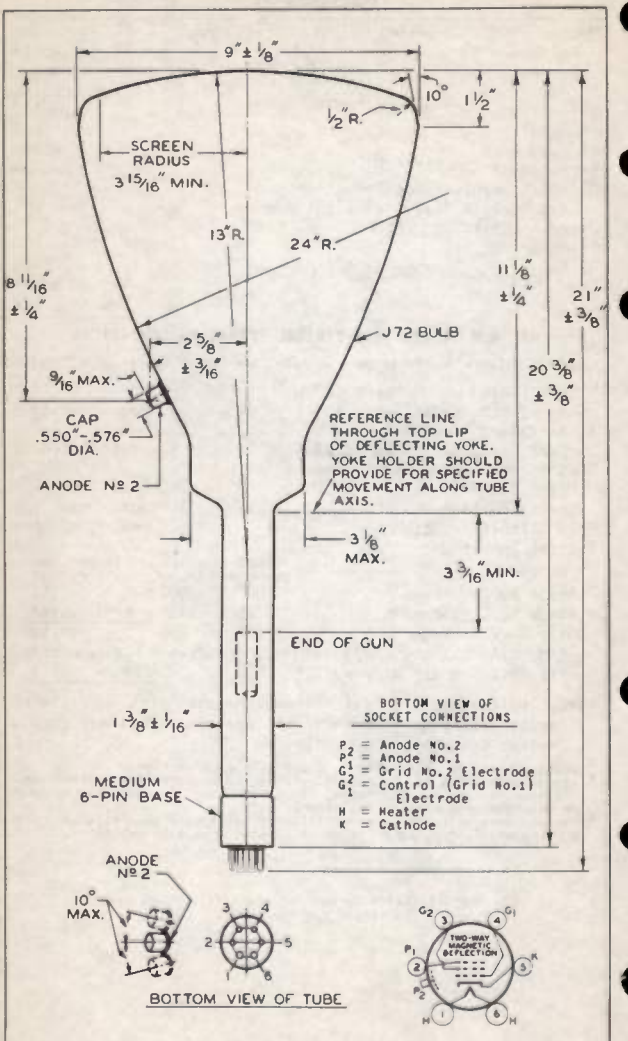
← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

9AP4

9AP4/1804-P4

KINESCOPE



Jan. 30, 1942

92C-6015R1

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

9JP1/1809-P1

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Focusing Method		Electrostatic
Deflection Method		Electrostatic and Magnetic
Electrode DJ_1 is on same side of tube as base pin 2		
Electrode DJ_2 is on same side of tube as base pin 6		
Phosphor		No.1
Fluorescence		Green
Persistence		Medium
Direct Interelectrode Capacitances:		
Control Electrode to All Other Electrodes		8 μμf
Deflecting Electrode DJ_1 to Deflecting Electrode DJ_2		1 μμf
Either Deflecting Electrode DJ_1 or DJ_2 to All Other Electrodes		3.6 μμf
Cathode to All Other Electrodes		8 μμf
Overall Length		15-11/16" ± 3/8"
Bulb Diameter at Screen End		9" ± 1/8"
Minimum Diameter of Screen		8"
Bulb Side Terminals		Snap Connectors
Base		Small Wafer Octal 8-Pin, Sleeve
Deflection Yoke:		
Position on Tube Neck		Lip Flush with Bulb Reference Line (see OUTLINE DRAWING)
Working Length for 55° Angle Deflection		2" max.

Maximum Ratings Are Design-Center Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Anode No.2 (High-Voltage Electrode) Voltage		5000 max.	volts
Anode No.1 (Focusing Electrode) Voltage		2000 max.	volts
Grid (Control Electroce) Voltage		Never positive	
Peak Voltage Between Anode No.2 and Either Deflecting Electrode		3000 max.	volts
D-C Heater-to-Cathode Potential		125 max.	volts
Grid-Circuit Resistance		1.5 max.	megohms
Typical Operation:			
Anode No.2 Voltage #	2500	5000	volts
Anode No.1 Voltage for Focus at 75% of Grid Voltage for Cut-Off (Approx.)*	785	1570	volts
Grid Voltage for Cut-Off** ##	-45	-90	volts
Deflection Sensitivity: Electrodes DJ_1 and DJ_2	0.272	0.136	mm/volt D.C.
Deflection Factor: Electrodes DJ_1 and DJ_2	93.8	187	volts D.C./in.

NOTE 1: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor

(continued on next page)

#, *, **, ##: See next page.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

9JP1

HIGH-VACUUM CATHODE-RAY TUBE

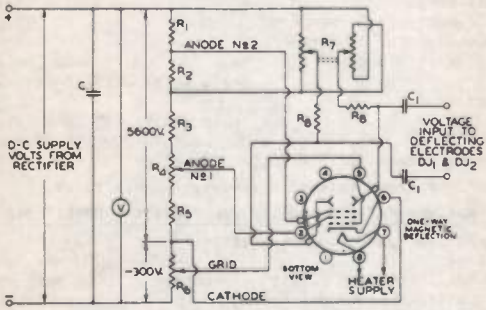
(continued from preceding page)

values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

\# Brilliance and definition decrease with decreasing anode No.2 voltage. In general, anode No.2 voltage should not be less than 2500 volts.
* Supply should be adjustable to ±20% of this value.
\#\# Supply should be adjustable to ±50% of this value.
** Visual extinction of a stationary focused spot.

Characteristic Curves of phosphor No.1 are shown at the beginning of this section.

TYPICAL OSCILLOGRAPH CIRCUIT



C = FILTER CONDENSER, 0.5 TO 2.0 μf
C_1 = SEE NOTE 2
R_1, R_2 = 0.4 MEGOHM
R_3 = 1.2 MEGOHMS
R_4 = 0.5-MEGOHM POTENTIOMETER
R_5 = 0.5 MEGOHM
R_6 = 0.15-MEGOHM POTENTIOMETER
R_7 = 1.5-MEGOHM (EACH SECTION) DUAL POTENTIOMETER FOR BEAM CENTERING
R_8 = POTENTIAL EQUALIZING RESISTORS. SEE NOTES 1 & 2

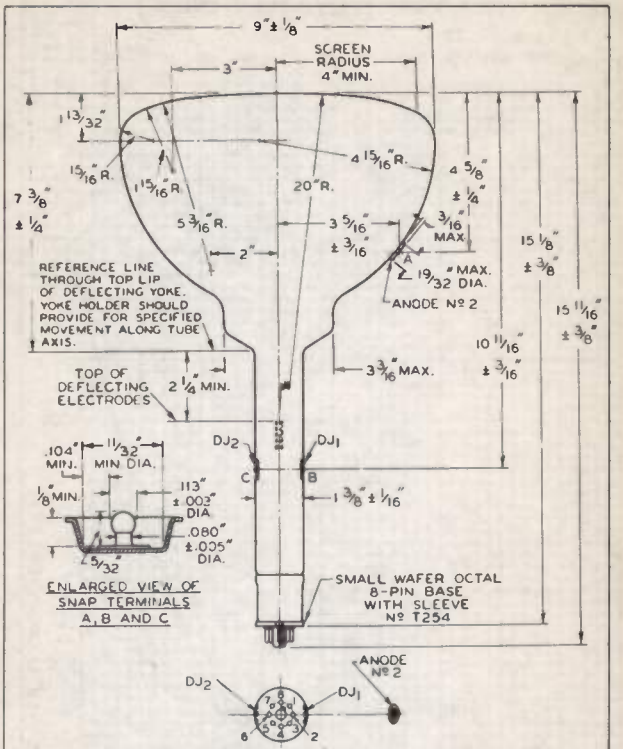
NOTE 2: When the cathode or the negative end of the cathode-ray high-voltage supply is grounded, blocking condensers C_1 should have a high voltage rating. When anode No.2 is grounded, condensers C_1 may be low-voltage condensers.

For d-c amplifier service, the deflecting electrodes should be coupled direct to the output of the amplifier by omitting the blocking condensers. In addition, it will usually be preferable to remove the associated deflecting electrode resistor in order to minimize the loading effect of the resistor on the d-c amplifier. With the resistor removed, it is essential, in order to minimize the spot defocusing, that anode No.2 be returned to some point in the d-c amplifier circuit such that the potential difference between anode No.2 and the average voltage across the deflecting electrodes will be as low as possible.

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

9JP1

HIGH-VACUUM CATHODE-RAY TUBE

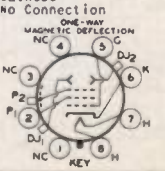


THE PLANE THROUGH THE TUBE AXIS AND EACH OF THE FOLLOWING ITEMS MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE NO. 2 TERMINAL BY THE ANGULAR TOLERANCES (MEASURED ABOUT THE TUBE AXIS) AS SHOWN:

ITEM	TOLERENCE
PIN NO. 2	± 9°
DJ_1	± 5°
DJ_2	± 13°
TRACE PRODUCED BY DJ_1 & DJ_2	± 7°

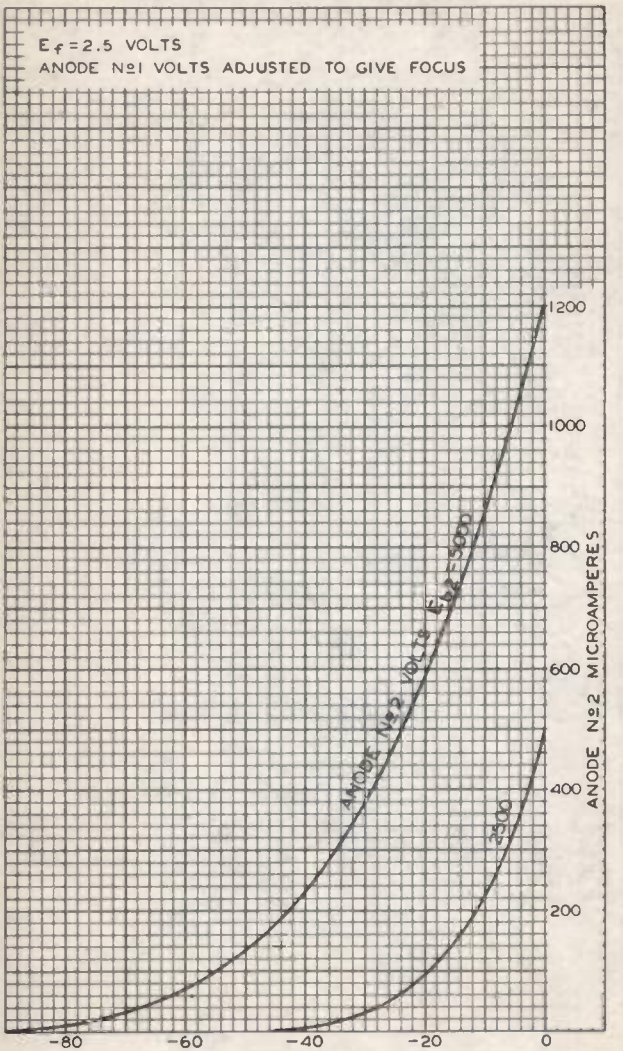
BOTTOM VIEW OF SOCKET CONNECTIONS

DJ_1, DJ_2 = Deflecting Electrodes
P_2 = Anode No. 2
P_1 = Anode No. 1
G_1 = Grid (Control Electrode)
H = Heater
K = Cathode
NC = No Connection



9JP1/1809-P1

AVERAGE CHARACTERISTICS



RCA

10BP4

KINESCOPE

MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	6.5	μμf
Cathode to All Other Electrodes	5.0	μμf
External Conductive Coating to Anode No.2	2500 max. 500 min.	μμf μμf
Phosphor (For Curves, see front of this Section)		No.4
Fluorescence and Phosphorescence		White
Persistence of Phosphorescence		Medium
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Ion Trap		Magnetic
External Coating		Conductive
Overall Length		17-5/8" ± 3/8"
Greatest Diameter of Bulb		10-1/2" ± 1/8"
Minimum Useful Screen Diameter		9"
Raster Size (Approx.)		6" x 8"
Mounting Position		Any
Cap		Recessed Small Cavity
Base		Small-Shell Duodecal 7-Pin

BOTTOM VIEW

Pin 1 - Heater
Pin 2 - Grid No.1
Pin 6 - No Connection
Pin 7 - No Connection

Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Cap - Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE VOLTAGE■	10000 max. volts
GRID-No.2 VOLTAGE	410 max. volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:	
Negative bias value	125 max. volts
Positive bias value	0 max. volts ←
Positive peak value	2 max. volts ←
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds	410 max. volts ←
After equipment warm-up period	125 max. volts
Heater positive with respect to cathode	125 max. volts

■ See next page.
← Indicates a change.

10BP4
KINESCOPE

→**Typical Operation:**

Anode Voltage*	9000	volts
Grid-No.2 Voltage	250	volts
Grid-No.1 Voltage○	-27 to -63	volts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms

→**Minimum Circuit Values:**

When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows:

Grid-No.1-Circuit Resistance	150 min.	ohms
Grid-No.2-Circuit Resistance	470 min.	ohms
Anode-Circuit Resistance	11000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

Ion-Trap Magnet#	RCA Type No.203D1
Deflection Yoke▲	RCA Type No.201D1
Focusing Coil##	RCA Type No.202D1

■ The anode and grid No.3 which are connected together within tube are referred to herein as anode.

* Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 8000 volts.

○ Visual extinction of undeflected focused spot.

\# The dc current required by this magnet is approx. 109 ma. for the typical operating conditions shown.

▲ The horizontal deflecting-coil current required by this yoke to produce 8" picture width is approx. 470 ma. peak-to-peak under the typical operating conditions shown. The current varies directly as the square root of the anode voltage.

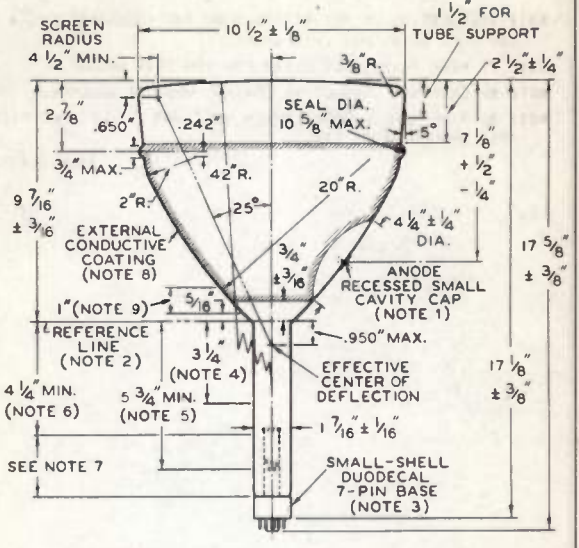
\## The dc current required by this coil is approx. 115 ma. for the typical operating conditions shown and using combined grid-No.1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 20 foot-lamberts on a 6" x 8" picture area. Distance from reference line (see Outline Drawing) to center line of air gap is approx. 3-1/8".

→Indicates a change.

RCA

10BP4

KINESCOPE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No. 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No. 3.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" - .000" I.D. AND 2" LONG WILL REST ON BULB CONE.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: APPROX. DISTANCE TO CENTER OF FOCUSING-COIL AIR GAP.

NOTE 5: DISTANCE TO INTERNAL POLE PIECES. PLANE THROUGH PIN No. 6 AND TUBE AXIS PASSES THROUGH LINE JOINING CENTERS OF POLE PIECES. DIRECTION OF PRINCIPAL FIELD OF ION-TRAP MAGNET SHOULD BE SUCH THAT NORTH POLE IS ADJACENT TO PIN No. 6 AND SOUTH POLE TO PIN No. 12.

10BP4
KINESCOPE

(continued from preceding page)

NOTE 6: LOCATION OF DEFLECTING YOKE AND FOCUSING-COIL AIR GAP MUST BE WITHIN THIS SPACE.

NOTE 7: KEEP THIS SPACE CLEAR FOR ION-TRAP MAGNET.

NOTE 8: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

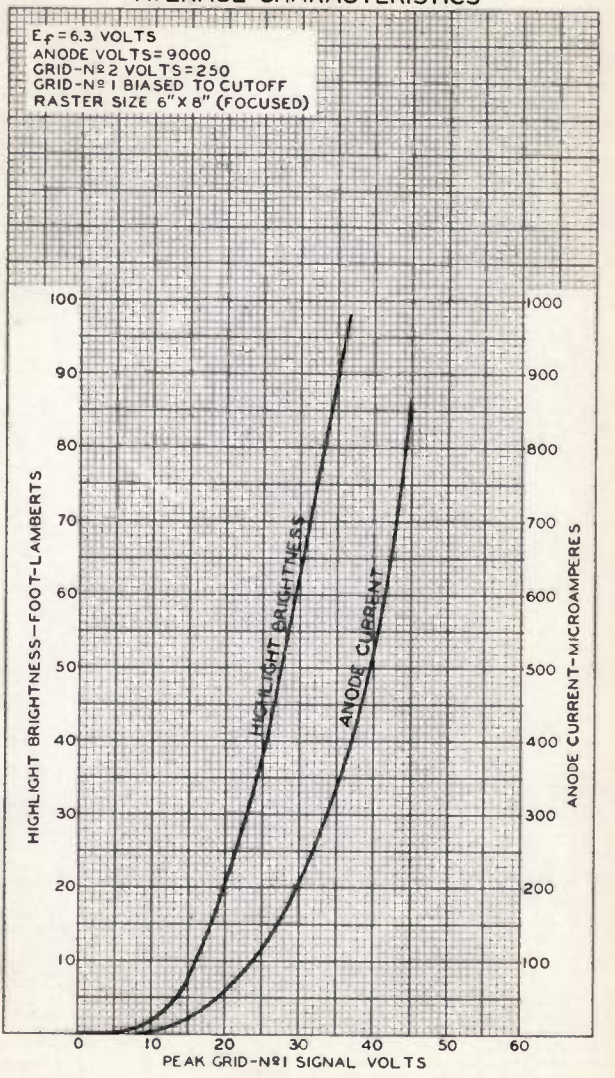
NOTE 9: FOR TUBE SUPPORT WHICH MUST NOT COVER SPECIFIED AREA AROUND ANODE CAP.

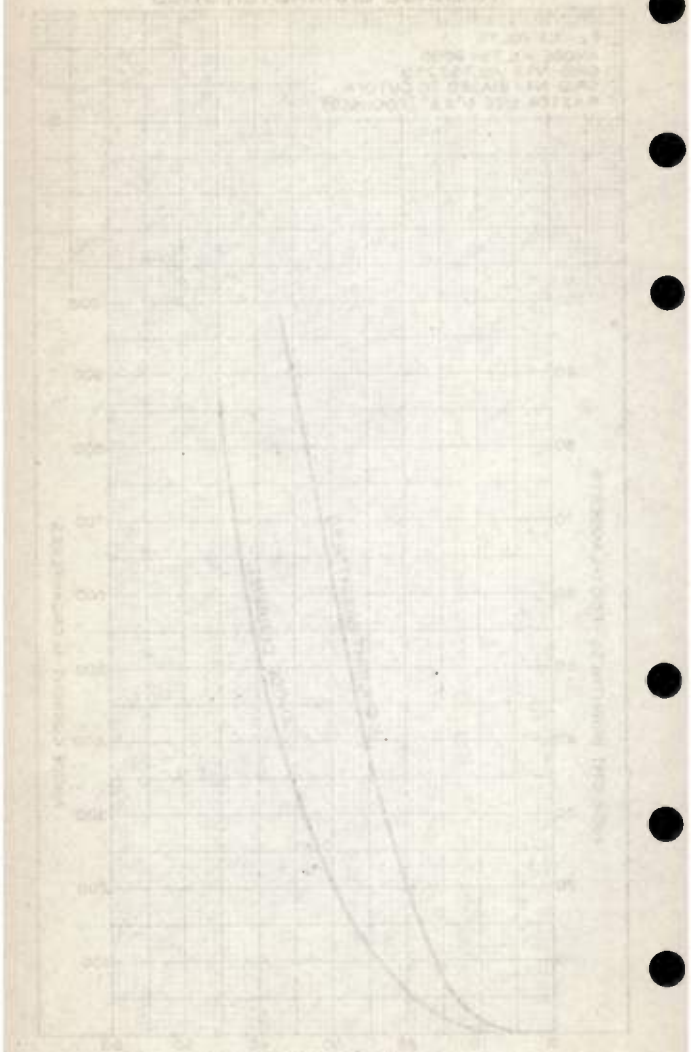
92CM-6663R2

RCA

10BP4

AVERAGE CHARACTERISTICS





10KP7
OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:	
Voltage	6.3 ac or dc volts
Current	0.6 amp
Direct Interelectrode Capacitances (Approx.):	
Grid No.1 to All Other Electrodes	6.5 μμf
Cathode to All Other Electrodes	5 μμf
Phosphor	No.7
Fluorescence	Blue
Phosphorescence	Greenish-Yellow
Persistence	Long
Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle (Approx.)	50°
Overall Length	17-5/8" ± 3/8"
Greatest Diameter of Bulb	10-1/2" ± 1/8"
Minimum Useful Screen Diameter	9"
Mounting Position	Any
Cap	Recessed Small Cavity
Base	Small-Shell Duodecal 7-Pin

BOTTOM VIEW

Pin 1 - Heater
Pin 2 - Grid No.1
Pin 6 - No Connection
Pin 7 - No Connection
Pin 10 - Grid No.2
Pin 11 - Cathode
Pin 12 - Heater
Cap - Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE● VOLTAGE	10000 max.	volts
GRID-No.2 VOLTAGE:		
Positive value (DC or Peak AC)	700 max.	volts
Negative value (DC or Peak AC)	180 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	180 max.	volts
Positive bias value□	0 max.	volts
Positive peak value	2 max.	volts
PEAK GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage*	7000	9000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage Range○	-27 to -63	-27 to -63	volts
Focusing Coil Cur. (Approx.)▲	93	105	ma
Spot Position	-	#	

●,□,*,○,▲,#: See next page.

10KP7
OSCILLOGRAPH TUBE

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

Minimum Circuit Values:

When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows:

Grid-No.1-Circuit Resistance	200 min.	ohms
Grid-No.2-Circuit Resistance	820 min.	ohms
Anode-Circuit Resistance	11000 min.	ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

RCA Focusing Coil. . . . . RCA Type No. 202D1

● Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

□ At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode input power to 6 watts.

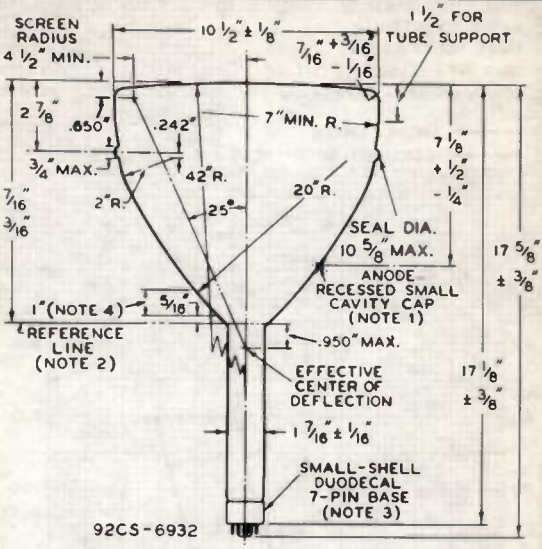
• Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 7000 volts.

○ For visual extinction of undeflected, focused spot.

▲ For JETEC Focusing Coil No.106, or equivalent, with center-line of air gap approximately 3-3/4" from reference line (see Outline Drawing), and total anode current of 200 microamperes.

The center of the undeflected, unfocused spot will fall within a circle having 18 mm radius concentric with the center of the tube face.

10KP7
OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION No. 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION No. 3.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE HINGED GAUGE 1.500" + .003" - .000" I.D. AND 2" LONG WILL REST ON BULB CONE.

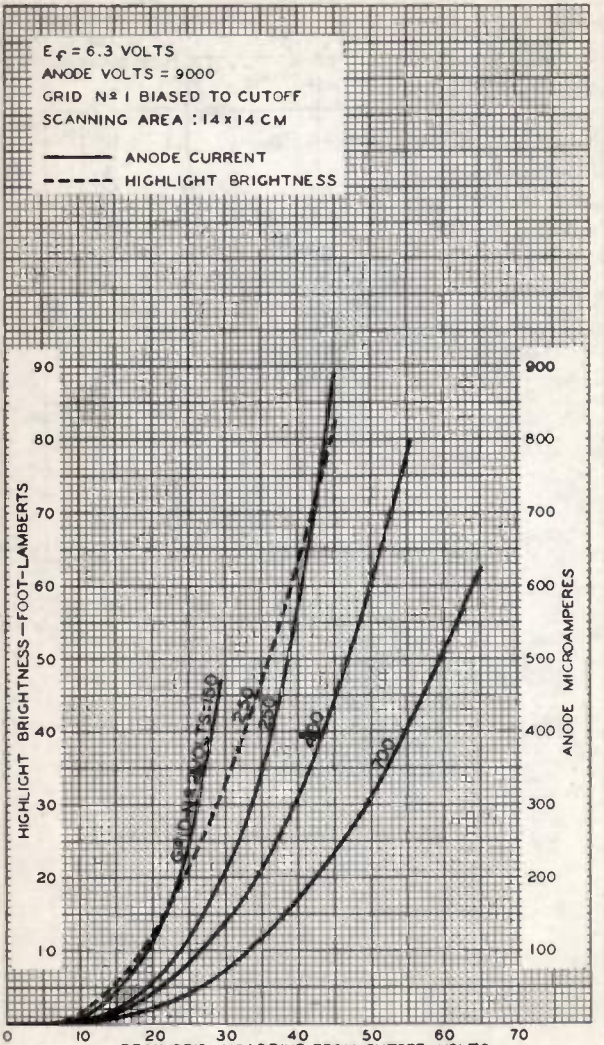
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

NOTE 4: FOR TUBE SUPPORT WHICH MUST BE KEPT AT LEAST 2" AWAY FROM ANODE CAP.

RCA

10KP7

AVERAGE GRID-DRIVE CHARACTERISTICS



SEPT. 28,1948

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7001RI

12AP4/1803-P4

KINESCOPE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Focus		Electrostatic
Deflection		Magnetic ←
Phosphor		No.4
Fluorescence		White
Persistence		Medium ←
Direct Interelectrode Capacitance:		
Grid No.1 to All Other Electrodes		9 μμf ←
Overall Length Maximum Diameter	Refer to drawings of tube and sleeve	
Bulb		J-96
Cap		Medium Metal
Base		Medium 6-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts ←

High-Voltage Electrode (Anode No. 2) Volt.	7000 max.		volts
Focusing Electrode (Anode No.1) Volt.	2000 max.		volts
Accelerating Electrode (Grid No.2) Volt.	250 max.		volts
Control Electrode (Grid No.1) Volt.	Never positive		
Fluorescent-Screen Input Power/sq cm:			
Fixed Pattern	2.5 max.		mw ←
Moving Pattern	5.0 max.		mw ←
Grid Circuit Resistance	1.5 max.		megohms ←
Typical Operation:			
Cathode	{Should be connected to one side or to mid-tap of heater winding		
Anode No. 2 Voltage	6000	7000	volts
Anode No. 1 Voltage □	1240	1460	approx. volts
Grid No. 2 Voltage	250	250	volts
Grid No. 1 Voltage ○	Adjusted to give suitable luminous spot		
Grid No. 1 Signal-Swing Volt. ▲	25	25	approx. volts ←

NOTE: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 6000 volts. ←

□ Supply should be adjustable to ± 20% of the value shown.

○ Approximately 35% of Grid No.2 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance. ←

▲ Peak-to-peak value for good brilliance with good resolution. For greater brilliance, up to twice this value should be available. ←

Characteristic Curves of phosphor No.4 are shown at the beginning of this section. ←

← Indicates a change.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

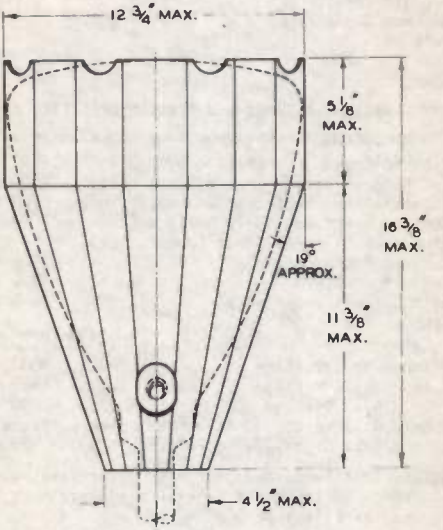
12AP4

12AP4/1803-P4

KINESCOPE

PROTECTIVE SLEEVE

DO NOT REMOVE SLEEVE
FROM KINESCOPE



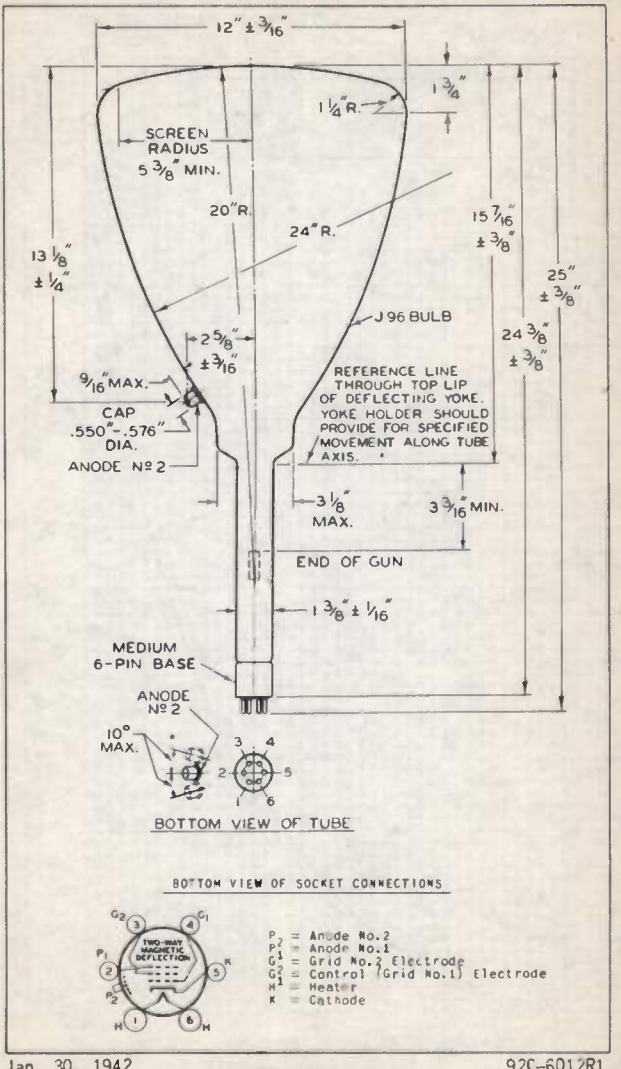
Jan. 30, 1942

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

920-6018

12AP4/1803-P4

KINESCOPE



BOTTOM VIEW OF TUBE

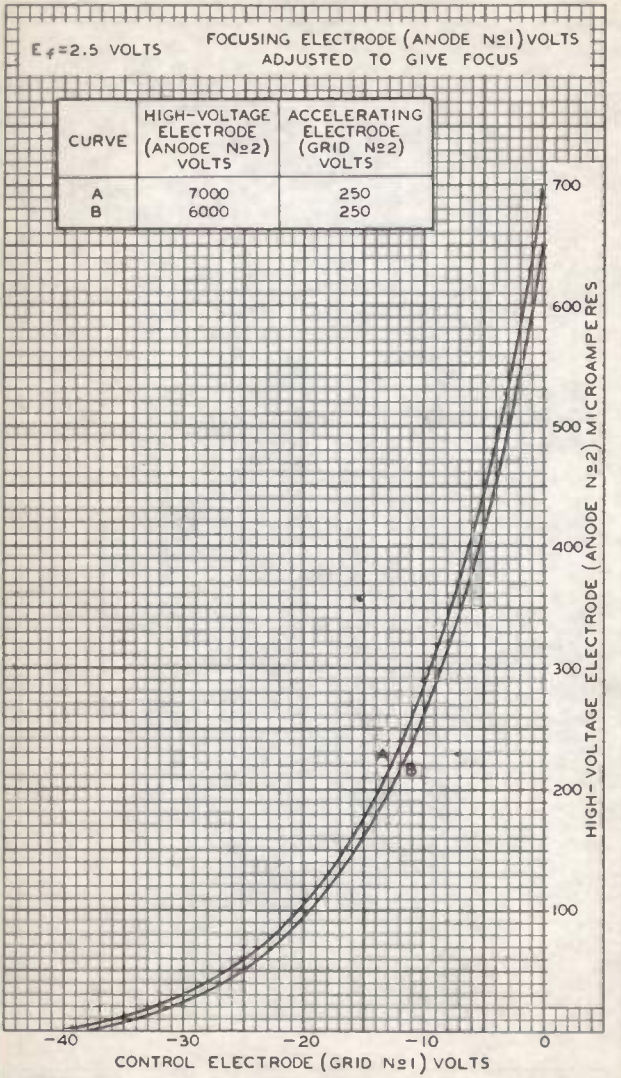
BOTTOM VIEW OF SOCKET CONNECTIONS

P_1 = Anode No.2
P_2 = Anode No.1
G_1 = Grid No.2 Electrode
G_2 = Control (Grid No.1) Electrode
H = Heater
K = Cathode

12AP4

12AP4/1803-P4

AVERAGE CHARACTERISTICS



12DP7-A

OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION

DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to All Other Electrodes	9	μμf
Grid No.2 to All Other Electrodes	7.5	μμf
Cathode to All Other Electrodes	6	μμf
Phosphor (For Curves, see front of this Section)		No.7
Fluorescence		Blue
Phosphorescence		Greenish-Yellow
Persistence of Phosphorescence		Long
Focusing Method		Magnetic
Deflection Method		Magnetic
Deflection Angle (Approx.)		50°
Overall Length		19-5/8" ± 1/2"
Greatest Diameter of Bulb		12" ± 3/16"
Minimum Useful Screen Diameter		10"
Mounting Position		Any
Cap		Medium
Base		Long Medium-Shell Octal 8-Pin

BOTTOM VIEW

Pin 1 - No Connection
Pin 2 - Heater
Pin 3 - Grid No.2
Pin 4 - No Connection
Pin 5 - Grid No.1
Pin 6 - No Connection
Pin 7 - Cathode
Pin 8 - Heater
Cap - Anode, Grid No.3

Maximum Ratings, *Design-Center Values*:

ANODE● VOLTAGE	10000 max.	volts
GRID-No.2 VOLTAGE	700 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value□	0 max.	volts
Positive peak value	2 max.	volts
PEAK GRID-No.1 DRIVE FROM CUTOFF	65 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	125 max.	volts

Typical Operation:

Anode Voltage•	4000	7000	volts
Grid-No.2 Voltage	250	250	volts
Grid-No.1 Voltage Range○	-25 to -70	-25 to -70	volts
Focusing-Coil Current▲	75 to 102	99 to 135	ma
Spot Position	#	-	

●,□,•,○,▲,#: See next page.

12DP7-A
OSCILLOGRAPH TUBE

Maximum Circuit Values:

Grid-No.1-Circuit Resistance . . . . . 1.5 max. megohms

Minimum Circuit Values:

When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows:

Grid-No.1-Circuit Resistance . . . . . 150 min. ohms
Grid-No.2-Circuit Resistance . . . . . 820 min. ohms
Anode-Circuit Resistance . . . . . 11000 min. ohms

The resistors used should be capable of withstanding the voltages involved.

Components:

RCA Focusing Coil. . . . . RCA Type No. 202D1

● Anode and grid No.3, which are connected together within tube, are referred to herein as anode.

□ At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode input power to 6 watts.

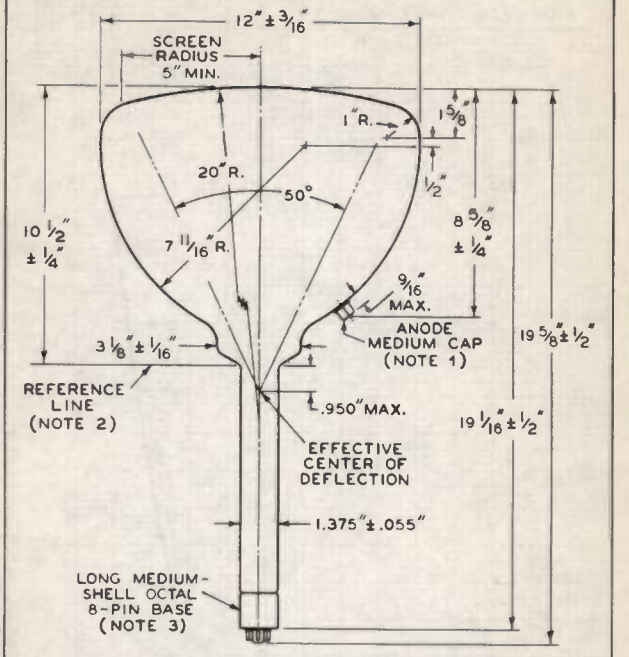
• Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 4000 volts.

○ For visual extinction of undeflected focused spot.

▲ For JETEC Focusing Coil No.106, or equivalent, with center line of air gap approximately 4-1/8" from reference line (see Outline Drawing), and total anode current of 200 microamperes.

The center of the undeflected, unfocused spot will fall within a circle having 20 mm radius concentric with the center of the tube face.

12DP7-A
OSCILLOGRAPH TUBE



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No. 5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE TERMINAL IS ON SAME SIDE OF TUBE AS PIN No. 5.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 1.430" + .003" – .000" I.D. AND 2" LONG WILL REST ON BULB CONE.

NOTE 3: ℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

92CM-6375R3

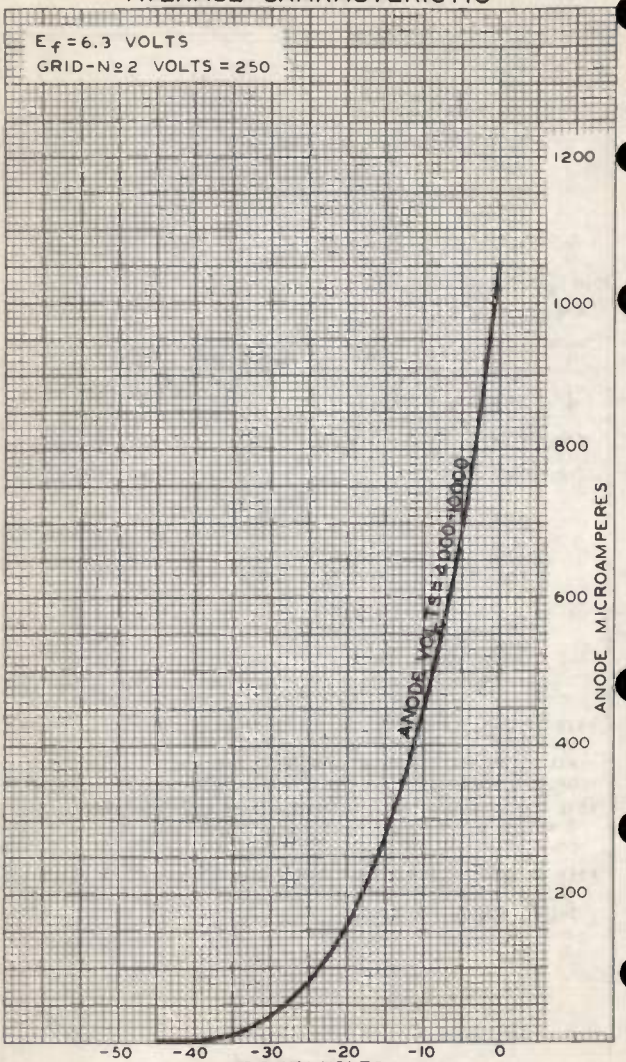
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

12DP7-A

RCA

12DP7-A

AVERAGE CHARACTERISTIC



MAR. 22, 1948 TUBE DEPARTMENT 92CM-6943

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

902

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Focus		Electrostatic
Deflection		Electrostatic
Electrodes DJ_1 and DJ_2 (upper): nearest to screen		
Electrodes DJ_3 and DJ_4 (lower): nearest to base		
DJ_1 is on same side of tube as pins No.2 and No.4		
DJ_3 is on same side of tube as pins No.2 and No.8		
Phosphor		No.1
Fluorescence		Green
Persistence		Medium
Direct Interelectrode Capacitances:		
Control Electrode (Grid No.1) to All Other Electrodes		7 μμf
Deflecting Electrode DJ_1 to Deflecting Electrode DJ_2		4 μμf
Deflecting Electrode DJ_3 to Deflecting Electrode DJ_4		2.5 μμf
Overall Length		7-7/16" ± 3/16"
Diameter		2 ± 1/16"
Bulb		J-16
Base		Medium Shell Octal 8-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts

High-Voltage Electrode (Anode No.2) Volt.		600 max.	volts
Focusing Electrode (Anode No.1) Volt.		300 max.	volts
Control Electrode (Grid No.1) Volt.		Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode		350 max.	volts
Grid Circuit Resistance		1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at the Heater-Supply Frequency		1.0 max.	megohm
Typical Operation:			
Anode No.2 Voltage	400	600	volts
Anode No.1 Voltage □	100	150	approx. volts
Grid No.1 Voltage ○	Adjusted to give suitable luminous spot		
Deflecting Sensitivity:			
Electrodes DJ_1 & DJ_2	0.28	0.19	mm/volt d.c.
Electrodes DJ_3 & DJ_4	0.33	0.22	mm/volt d.c.

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 400 volts.

NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

□, ○: See next page.

◄ Indicates a change.

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RCA MANUFACTURING COMPANY, INC.

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HIGH-VACUUM CATHODE-RAY TUBE

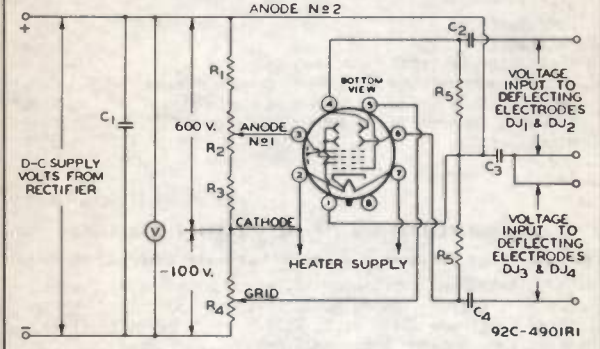
(continued from preceding page)

Supply should be adjustable to ± 25% of the value shown.

Approximately 20% of Anode No.1 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.

Characteristic Curves of phosphor No.1 are shown at the beginning of this section.

TYPICAL OSCILLOGRAPH CIRCUIT



C_1 = FILTER CONDENSER
C_2, C_3, C_4 = SEE NOTE 3
$R_1 + R_2 + R_3 + R_4$ = BLEEDER POTENTIOMETER
R_1 = 0.200 MEGOHM
R_2 = 0.050 MEGOHM
R_3 = 0.055 MEGOHM
R_4 = 0.050 MEGOHM
R_5 = SEE NOTE 2 AT END OF DATA
V = VOLTMETER

NOTE 3: When the cathode or the negative end of the cathode-ray high-voltage supply is grounded, blocking condensers C2, C3, and C4 should have a high voltage rating. When anode No.2 is grounded, C3 may be omitted and C2 and C4 may be low-voltage condensers.

For d-c amplifier service, the deflecting electrodes should be coupled direct to the output of the amplifier by omitting the blocking condensers. In addition, it will usually be preferably to remove the associated deflecting electrode resistor in order to minimize the loading effect of the resistor on the d-c amplifier. With the resistor removed, it is essential, in order to minimize spot defocusing, that anode No.2 be returned to some point in the d-c amplifier circuit such that the potential difference between anode No.2 and the average voltage across the deflecting electrodes will be as low as possible.

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

◄ Indicates a change.

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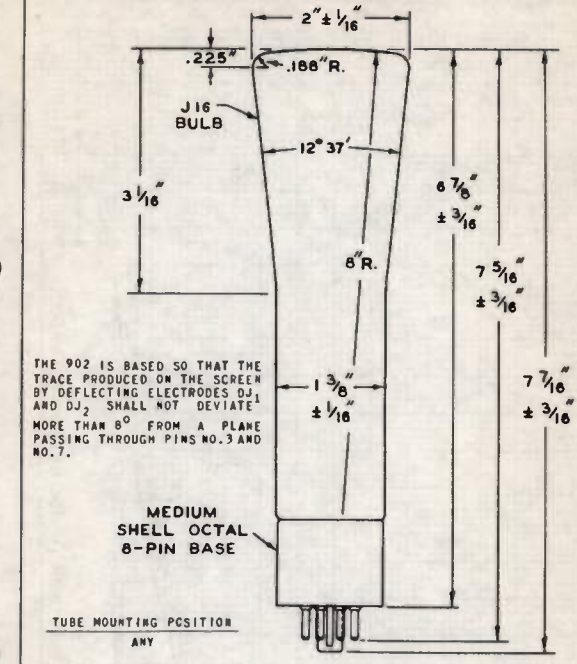
902

HIGH-VACUUM CATHODE-RAY TUBE



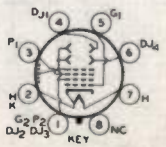
THE 902 IS BASED SO THAT THE TRACE PRODUCED ON THE SCREEN BY DEFLECTING ELECTRODES DJ_1 AND DJ_2 SHALL NOT DEVIATE MORE THAN 8° FROM A PLANE PASSING THROUGH PINS NO. 3 AND NO. 7.

TUBE MOUNTING POSITION

ANY

BOTTOM VIEW OF SOCKET CONNECTIONS

DJ_1 to DJ_4 = Deflecting Electrodes
P_2 = Anode No.2
P^1 = Anode No.1
G^1 = Grid No.2 Electrode
G^2 = Control (Grid No.1) Electrode
H^1 = Heater
K = Cathode
NC = No Connection



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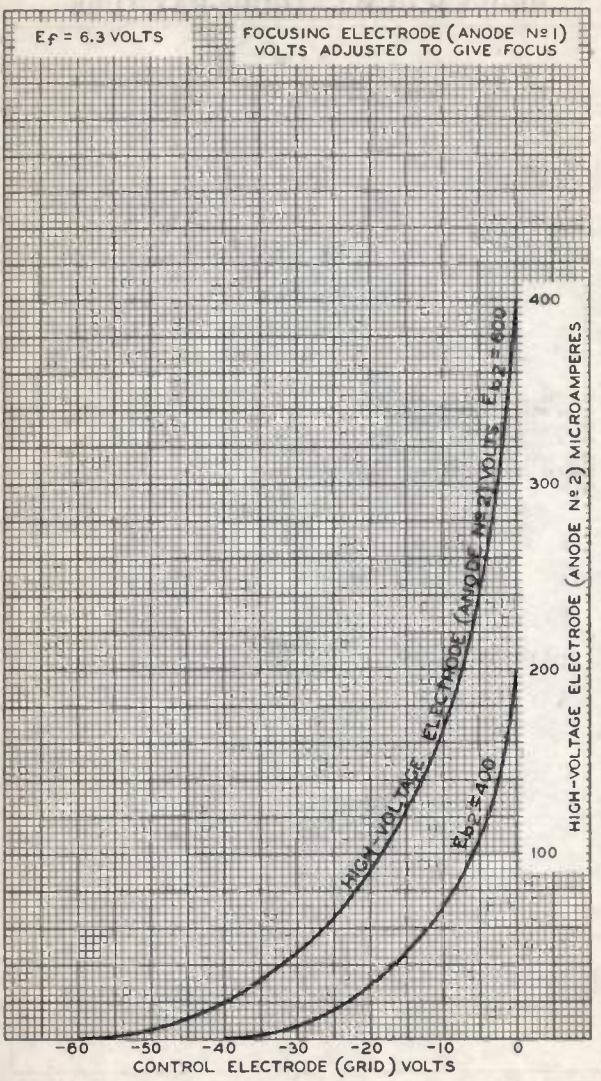
902

AVERAGE CHARACTERISTICS



904

HIGH-VACUUM CATHODE-RAY TUBE

ELECTROSTATIC-MAGNETIC TYPE

WITH 5" MEDIUM-PERSISTENCE SCREEN FOR OSCILLOGRAPHIC USE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No. 1
Pattern Color		Greenish
Direct Interelectrode Capacitances:		
Grid #1 to all other Electrodes		10 max. μμf
Deflecting Plate to Deflecting Plate		1 max. μμf
Overall Length		16-1/4" ± 3/8"
Maximum Diameter		5-1/16"
Bulb		J-40
Caps (Three)		Small Metal
Base		Medium 6-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

High-Voltage Electrode (Anode #2) Voltage			4600 max.	volts
Focusing Electrode (Anode #1) Voltage			1500 max.	volts
Accelerating Electrode (Grid #2) Voltage			250 max.	volts
Control Electrode (Grid #1) Voltage			Never positive	
Grid #1 Voltage for Current Cut-off *			-140 approx.	volts
Peak Voltage between Anode #2 and any deflecting plate			4000 max.	volts
Fluorescent-Screen Input Power/sq cm			10 max.	mw
Typical Operation:				
Heater Voltage	2.5	2.5	2.5	volts
Anode #2 Voltage	1000	3000	4600	volts
Anode #1 Voltage	210	630	970 approx.	volts
Grid #2 Voltage	100	100	250	volts
Grid #1 Voltage	Adjusted to give suitable luminous spot			
Deflection Sensitivity (Electrostatic)	0.40	0.13	0.09 mm/volt d.c.	←

* with maximum voltages applied to Grid #2, Anode #1, and Anode #2. ←

← indicates a change

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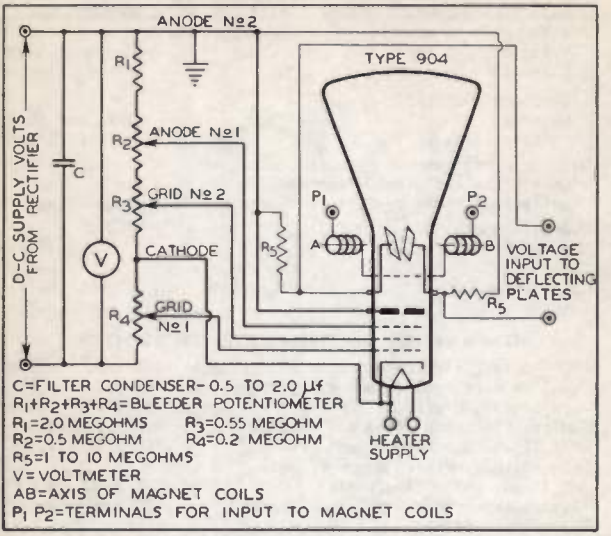
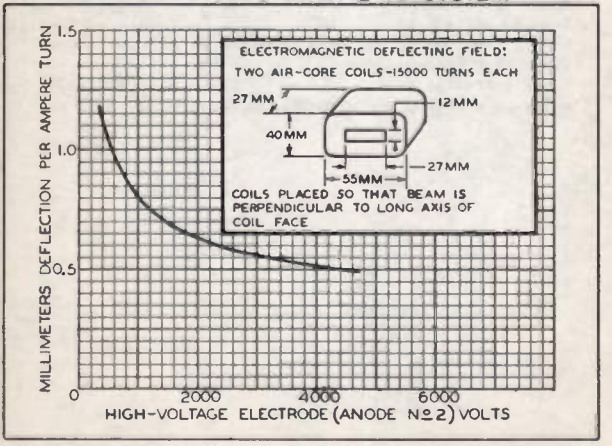
904

TYPICAL OSCILLOGRAPH CIRCUIT



C=FILTER CONDENSER- 0.5 TO 2.0 μf
$R_1+R_2+R_3+R_4$=BLEEDER POTENTIOMETER
R_1=2.0 MEGOHMS R_3=0.55 MEGOHM
R_2=0.5 MEGOHM R_4=0.2 MEGOHM
R_5=1 TO 10 MEGOHMS
V=VOLTMETER
AB=AXIS OF MAGNET COILS
P_1 P_2=TERMINALS FOR INPUT TO MAGNET COILS

DEFLECTION SENSITIVITY OF AN AIR-CORE MAGNETIC SYSTEM



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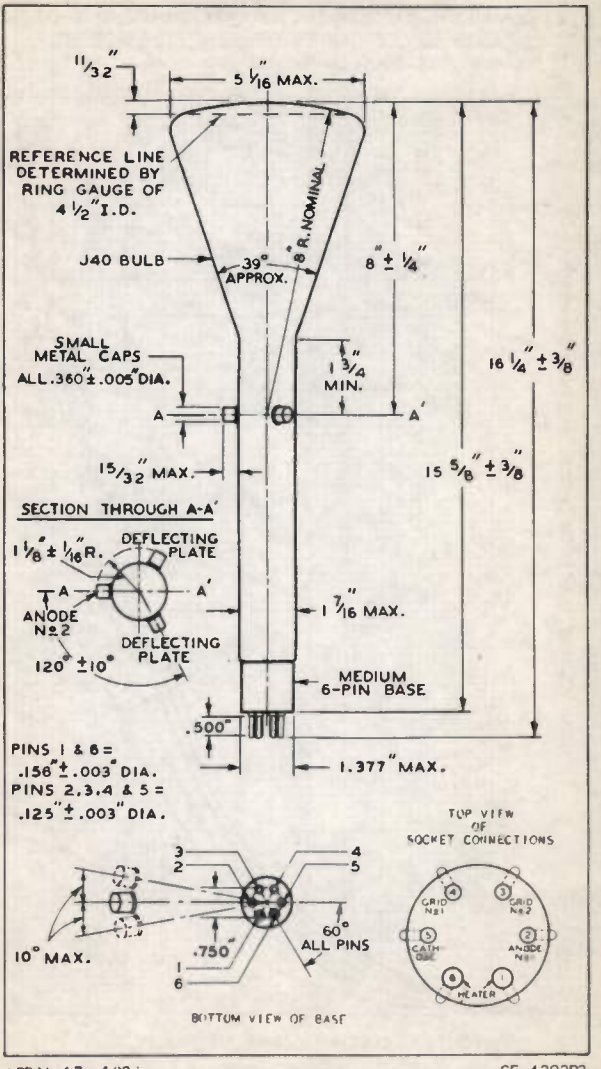
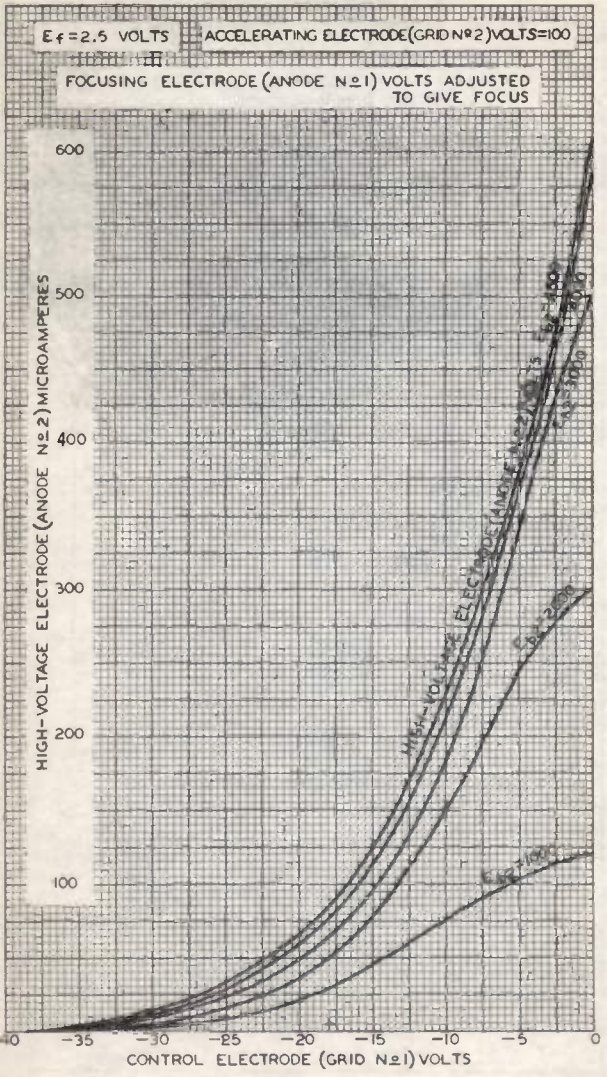
904

CATHODE-RAY TUBE



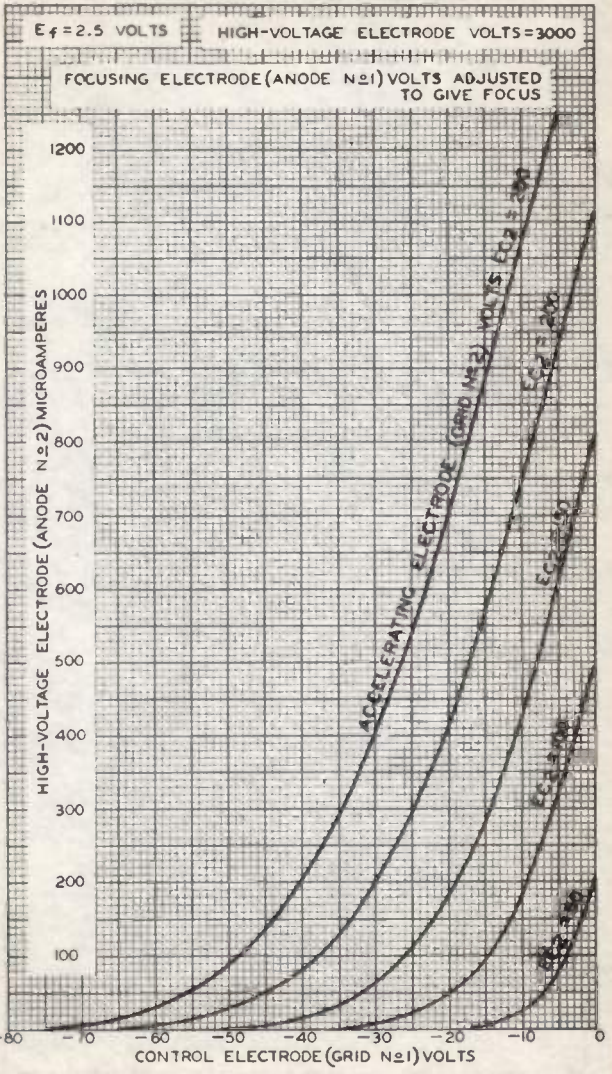
904

AVERAGE CHARACTERISTICS



904

AVERAGE CHARACTERISTICS



904

FLUORESCENT-SCREEN CHARACTERISTICS

CURVES FOR THE FLUORESCENT-SCREEN MATERIAL USED IN THE 904 ARE THE SAME AS THOSE FOR TYPE 903.

905

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage ◊	2.5	a-c or d-c volts
Current	2.1	amp.
Focusing Method		Electrostatic
Deflection Method		Electrostatic
Electrode DJ_1 and DJ_2 (upper): nearest to screen		
DJ_1 is on same side of tube as pin No.3		
Electrode DJ_3 and DJ_4 (lower): nearest to base		
DJ_3 is on same side of tube as pin No.2		
Phosphor		No.1
Fluorescence		Green
Persistence		Medium
Direct Interelectrode Capacitances (Approx.):		
Control Electrode (Grid) to All Other Electrodes		9.0 μμf
DJ_1 to DJ_2		2.0 μμf
DJ_3 to DJ_4		1.0 μμf
Overall Length		16-1/2" ± 3/8"
Bulb Diameter at Screen End		5-1/4" $^{+1/16"}_{-3/32"}$
Minimum Useful Screen Diameter		4-1/2" ←
Caps (four)		Small
Base		Medium 5-Pin, Micanol

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Anode No.2 (High-Voltage Electrode) Voltage		2200 max.	volts ←
Anode No.1 (Focusing Electrode) Voltage		660 max.	volts ←
Grid (Control Electrode) Voltage		Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode		1100 max.	volts ←
Grid-Circuit Resistance		1.5 max.	megohms
Typical Operation:			←
Anode No.2 Voltage	1500	2000	volts
Anode No.1 Voltage for Focus at 75% of Grid Voltage for Cut-Off #	338	450	volts
Grid Voltage for Visual Cut-Off ##	-26	-35	volts
Deflection Sensitivity:			
DJ_1 and DJ_2	0.295	0.221	mm/volt d.c.
DJ_3 and DJ_4	0.349	0.262	mm/volt d.c.
Deflection Factor:			
DJ_1 and DJ_2	86.2	115	volts d.c./in.
DJ_3 and DJ_4	72.7	97	volts d.c./in.
Subject to variation of	±20	±20	per cent

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 1500 volts. ←

NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting

◊, #, ## : See next page. (continued on next page)

← Indicates a change.

905

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

electrodes. The smaller the resistor values, the less the distortion for a given beam current.

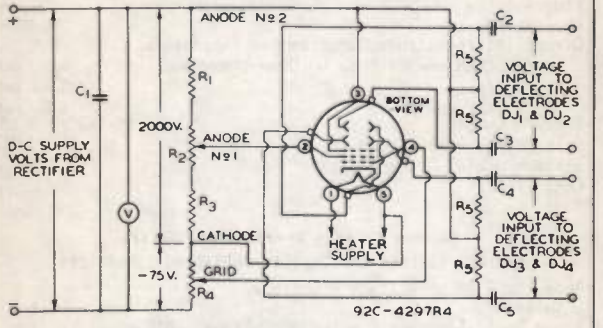
◇ Should not deviate more than ±10% from rated value.

\# Individual tubes may require between +25% and -30% of these values with grid voltage between zero and cut-off.

\## Visual extinction of stationary focused spot. Supply should be adjustable to ±50% of these values.

Characteristic Curves of phosphor No.1 are shown at the beginning of this section.

TYPICAL OSCILLOGRAPH CIRCUIT



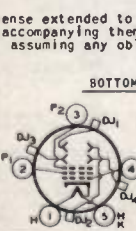
C = FILTER CONDENSER 0.5-2.0 μf
R_1 = 0.45 MEGOHM
R_2^1 = 0.10 MEGOHM
R_3^2 = 0.125 MEGOHM
R_4 = 0.025 MEGOHM
R_5 = SEE NOTE 2 AT END OF DATA
V = VOLTMETER

NOTE 3: When the cathode or the negative end of the cathode-ray high-voltage supply is grounded, blocking condensers C_2, C_3, C_4, and C_5 should have a high voltage rating. When anode No.2 is grounded, condensers C_2, C_3, C_4, and C_5 may be low-voltage condensers.

For d-c amplifier service, the deflecting electrodes should be coupled direct to the output of the amplifier by omitting the blocking condensers. In addition, it will usually be preferable to remove the associated deflecting electrode resistor in order to minimize the loading effect of the resistor on the d-c amplifier. With the resistor removed, it is essential, in order to minimize spot defocusing, that anode No.2 be returned to some point in the d-c amplifier circuit such that the potential difference between anode No.2 and the average voltage across the deflecting electrodes will be as low as possible.

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

BOTTOM VIEW OF SOCKET CONNECTIONS

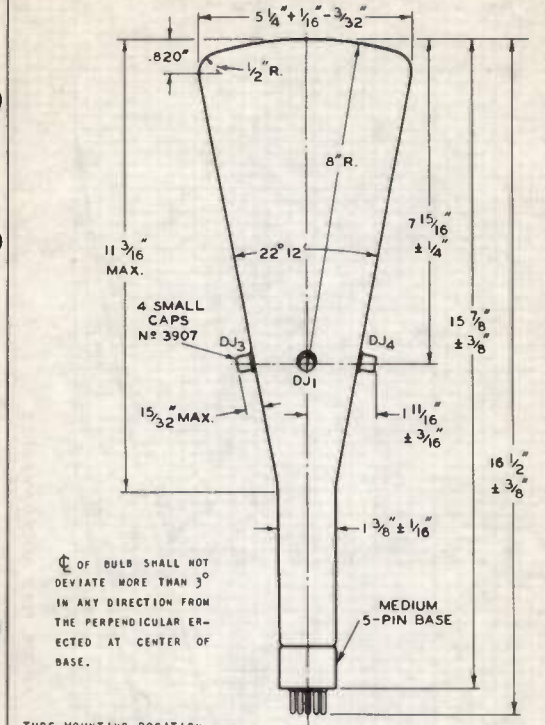


DJ_1 to DJ_4 = Deflecting Electrodes
P_2 = Anode No.2
P^1 = Anode No.1
G^1 = Control (Grid) Electrode
H = Heater
K = Cathode

◄ Indicates a change.

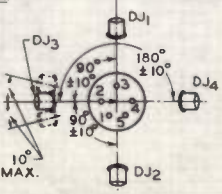
905

HIGH-VACUUM CATHODE-RAY TUBE



TUBE MOUNTING POSITION

Any



BOTTOM VIEW OF TUBE

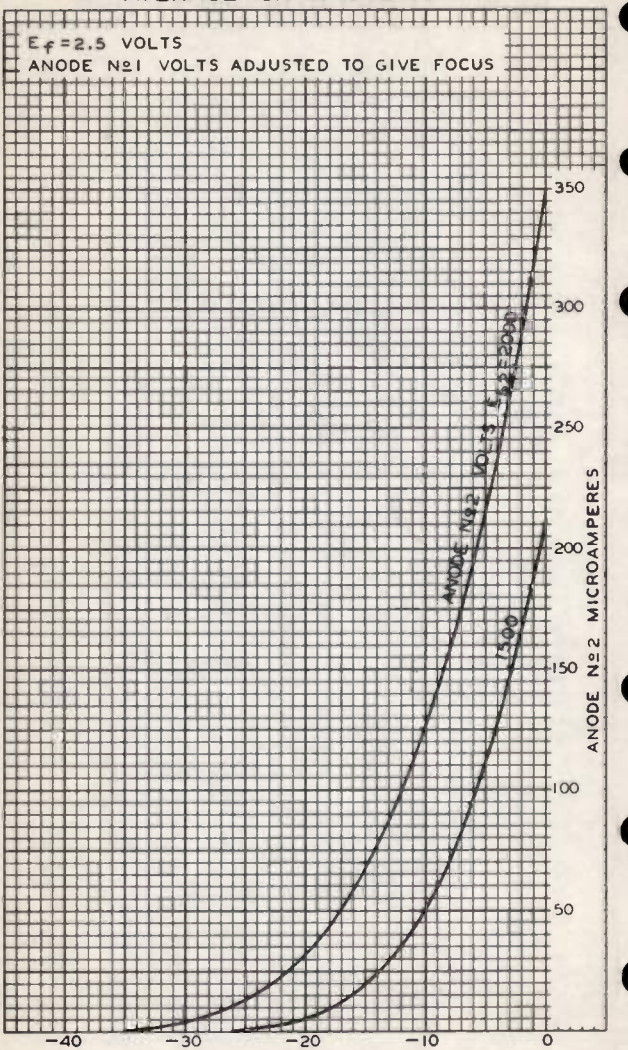
THE PLANE THROUGH THE TUBE AXIS AND PIN 3 MAY VARY FROM THE TRACE PRODUCED BY DJ_1 AND DJ_2 BY AN ANGULAR TOLERANCE (MEASURED) ABOUT THE TUBE AXIS) OF 10°: ANGLE BETWEEN DJ_1 AND DJ_2 TRACE AND DJ_3 AND DJ_4 TRACE IS 90° ± 6°.

92C-4283R7

◄ Indicates a change.

905

AVERAGE CHARACTERISTICS



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

907

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Phosphor		No.5
Fluorescence		Bluish
Persistence	Brightness negligible in less than 30 microseconds	

For further ratings, operating conditions, dimensions, connections, circuit, and average characteristic curve, refer to type 905. The 907 and 905 are identical except for the screen material.

Characteristic Curves of phosphor No.5 are shown at the beginning of this section.

908

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Focus		Electrostatic
Deflection		Electrostatic

Electrodes DJ_1 and DJ_2 (upper): nearest the screen
Electrodes DJ_3 and DJ_4 (lower): nearest the base
DJ_1 is on same side of tube as pins No.4 & No.5
DJ_3 is on same side of tube as pins No.2 & No.3

Phosphor	No.5
Fluorescence	Bluish
Persistence	Brightness negligible in less than 30 microseconds
Direct Interelectrode Capacitances:	
Control Electrode (Grid) to All Other Electrodes	9.0 μμf
Deflecting Electrode DJ_1 to All Other Electrodes	8.5 μμf
Deflecting Electrode DJ_3 to All Other Electrodes	6.5 μμf
Overall Length	11-1/2" ± 3/8"
Diameter	3" ± 1/16"
Bulb	J-24
Base	Medium 7-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts

High-Voltage Electrode (Anode No.2) Volt.	1500 max.	volts
Focusing Electrode (Anode No.1) Volt.	1000 max.	volts
Control Electrode (Grid) Volt.	Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode	600 max.	volts
Grid Circuit Resistance	1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at the Heater-Supply Frequency	1.0 max.	megohm

Typical Operation:

Anode No.2 Volt.	600	800	1000	1200	1500	volts
Anode No.1 Volt.□	170	230	285	345	475	approx. volts
Grid Volt.°	Adjusted to give suitable luminous spot					

(continued on next page)

□, °: See next page. ← Indicates a change.

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908

HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

Deflection Sensitivity:

Electrodes D_1 and D_2	0.55	0.41	0.33	0.27	0.22	mm/volt d.c.
Electrodes D_3 and D_4	0.58	0.44	0.35	0.29	0.23	mm/volt d.c.

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 600 volts.

NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

□ Supply should be adjustable to ± 20% of the value shown.

○ Approximately 20% of Anode No.1 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.

Characteristic Curves of phosphor No.5 are shown at the beginning of this section.

909

HIGH-VACUUM CATHODE-RAY TUBE

ELECTROSTATIC-DEFLECTION TYPE WITH 5" LONG-PERSISTENCE SCREEN FOR OSCILLOGRAPHIC USE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No.2
Pattern Color		Bluish White

For further ratings, operating conditions, dimensions, connections, circuit, and curve 92S-5409R1, refer to Type 905. The 909 and 905 are identical except for the screen material.

910

HIGH-VACUUM CATHODE-RAY TUBE

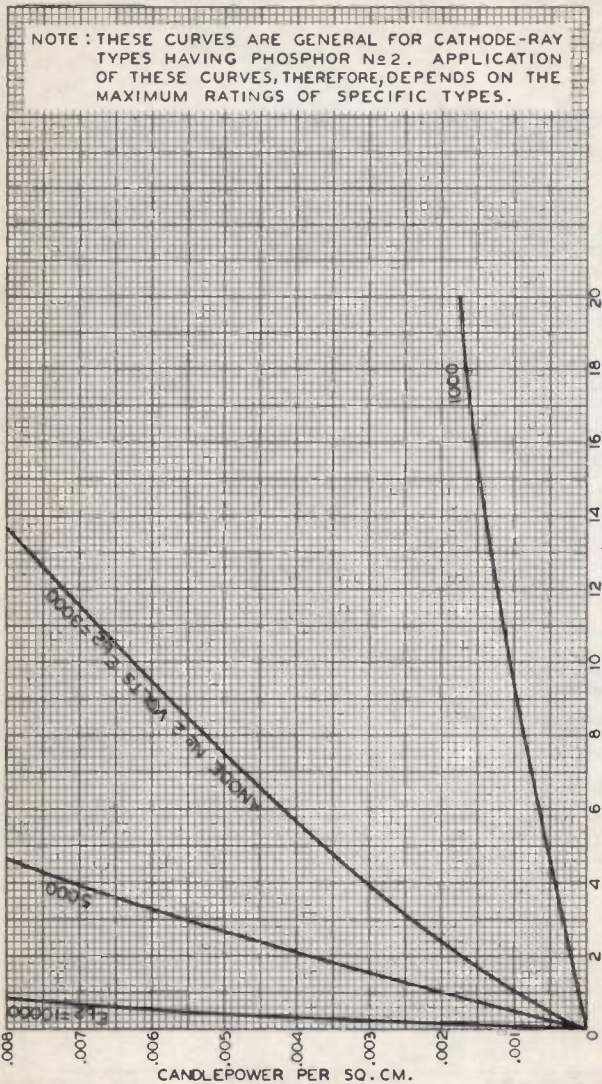
ELECTROSTATIC-DEFLECTION TYPE WITH 3" LONG-PERSISTENCE SCREEN FOR OSCILLOGRAPHIC USE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No.2
Pattern Color		Bluish White

For further ratings, operating conditions, and dimensions, refer to Type 908. See Type 906 for connections, circuit and Average Characteristics curve.

AVERAGE CHARACTERISTICS OF PHOSPHOR №2

NOTE: THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR №2. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE MAXIMUM RATINGS OF SPECIFIC TYPES.



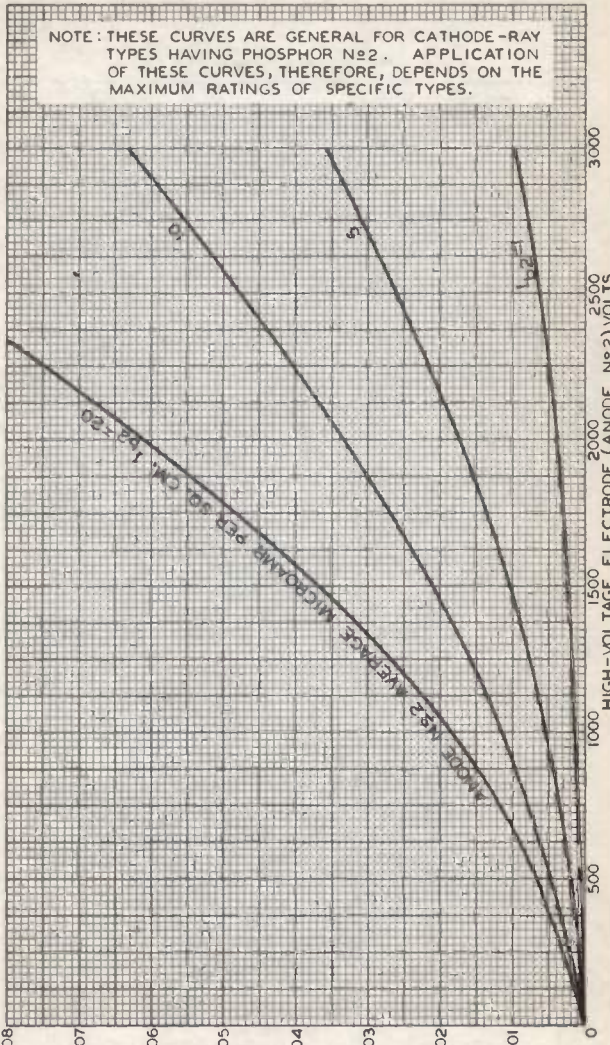
OCT. 14, 1935

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4498

TYPES: 909, 910

AVERAGE FLUORESCENT-SCREEN CHARACTERISTICS



OCT. 11, 1935

RCA RADIOTRON DIVISION

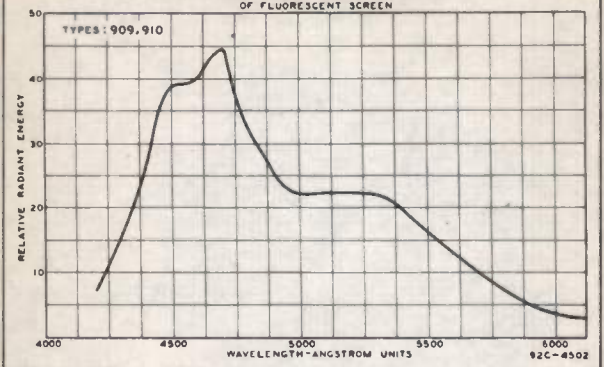
RCA MANUFACTURING COMPANY, INC.

92C-4495

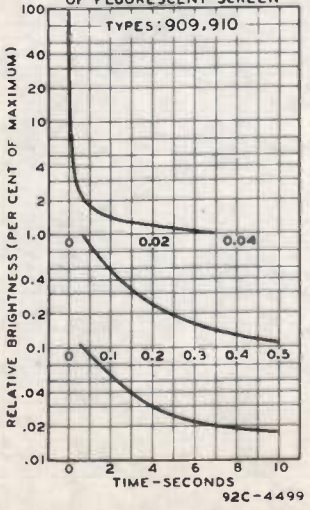
TYPES: 909, 910

CHARACTERISTICS CURVES

SPECTRAL ENERGY CHARACTERISTIC
OF FLUORESCENT SCREEN



PERSISTENCE CHARACTERISTIC
OF FLUORESCENT SCREEN



912

HIGH-VACUUM CATHODE-RAY TUBE

HIGH-INTENSITY ELECTROSTATIC-DEFLECTION TYPE
WITH 5" MEDIUM-PERSISTENCE SCREEN FOR OSCILLOGRAPHIC USE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No.1
Pattern Color		Greenish
Direct Interelectrode Capacitances:		
Grid to all other electrodes	14 max.	μμf
Deflecting Plate D_1 to Deflecting Plate D_2	3 max.	μμf
Deflecting Plate D_3 to Deflecting Plate D_4	1.5 max.	μμf
For plate identification, see next page.		
Overall Length		17-15/16 ± 3/8"
Maximum Diameter		5-5/16"
Bulb		J-42
Caps:		
Anode No.2		Medium Metal
Deflecting Plates (Four)		Small Metal
Base		Medium 5-Pin Ceramic

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

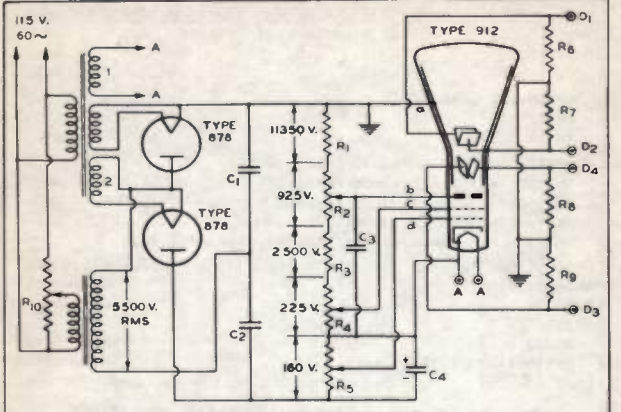
High-Voltage Electrode (Anode #2) Voltage	15000 max.	volts
Focusing Electrode (Anode #1) Voltage	4500 max.	volts
Accelerating Electrode (Grid #2) Voltage	250 max.	volts
Control Electrode (Grid #1) Voltage	Never positive	
Grid Voltage for Current Cut-off *	-125 approx.	volts
Peak Voltage Between Anode #2 and any deflecting plate	7000 max.	volts
Fluorescent-Screen Input Power/sq cm	10 max.	mw

Typical Operation:				
Heater Voltage	2.5	2.5	2.5	volts
Anode #2 Voltage	5000	10000	15000	volts
Anode #1 Voltage	1000	2000	3000 approx.	volts
Grid #2 Voltage	250	250	250	volts
Grid #1 Voltage	Adjusted to give suitable luminous spot			
Deflection Sensitivity:				
Plates D_1 and D_2	0.083	0.041	0.028	mm/volt d.c.
Plates D_3 and D_4	0.102	0.051	0.034	mm/volt d.c.

* With maximum voltages on Anode #1 and Grid #2.

912

TYPICAL OSCILLOGRAPH CIRCUIT USING THE 912 WITH VOLTAGE-DOUBLING POWER SUPPLY



C_1, C_2 = 0.5 μf, 10 000 V.	R_3 = 0.55 MEGOHM, 20-WATT	a = ANODE N°2
C_3 = 1.0 μf, 5000 V.	R_4 = 50 000 OHMS, 2-WATT	b = ANODE N°1
C_4 = 16 μf, 200 V.	R_5 = 35 000 OHMS, 2-WATT	c = GRID N°2
R_1 = 2.5 MEGOHMS, 75-WATT	R_6, R_7, R_8, R_9 = 2 TO 50 MEGOHMS	d = GRID N°1
R_2 = 0.2 MEGOHM, 10-WATT	R_{10} = 100 OHMS, 600-WATT	

NOTE: AS THE TOTAL VOLTAGE ACROSS THE BLEEDER IS REDUCED BY MEANS OF R_{10}, THE ELECTRODE VOLTAGES ARE REDUCED IN CORRECT PROPORTION, EXCEPT FOR GRID NO. 2 VOLTAGE. THIS MAY HAVE TO BE READJUSTED BY THE USE OF DIFFERENT VALUES FOR R_3 AND R_4, THEIR TOTAL RESISTANCE BEING KEPT THE SAME. CONDENSERS C_3 AND C_4 CAN BE OMITTED IF GRID-VOLTAGE SWITCHING (FOR HIGH-SPEED PHOTOGRAPHY) IS NOT CONTEMPLATED. FILAMENT WINDINGS NOS. 1 and 2 SHOULD BE INSULATED FOR 20000 VOLTS.

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92C-4621R1

FLUORESCENT-SCREEN CHARACTERISTICS

THE FLUORESCENT-SCREEN MATERIAL USED FOR THE 912 IS THE SAME AS THAT FOR TYPE 903. CURVES OF SPECTRAL ENERGY AND THE PERSISTENCE CHARACTERISTIC FOR THESE TYPES ARE SHOWN UNDER TYPE 903.

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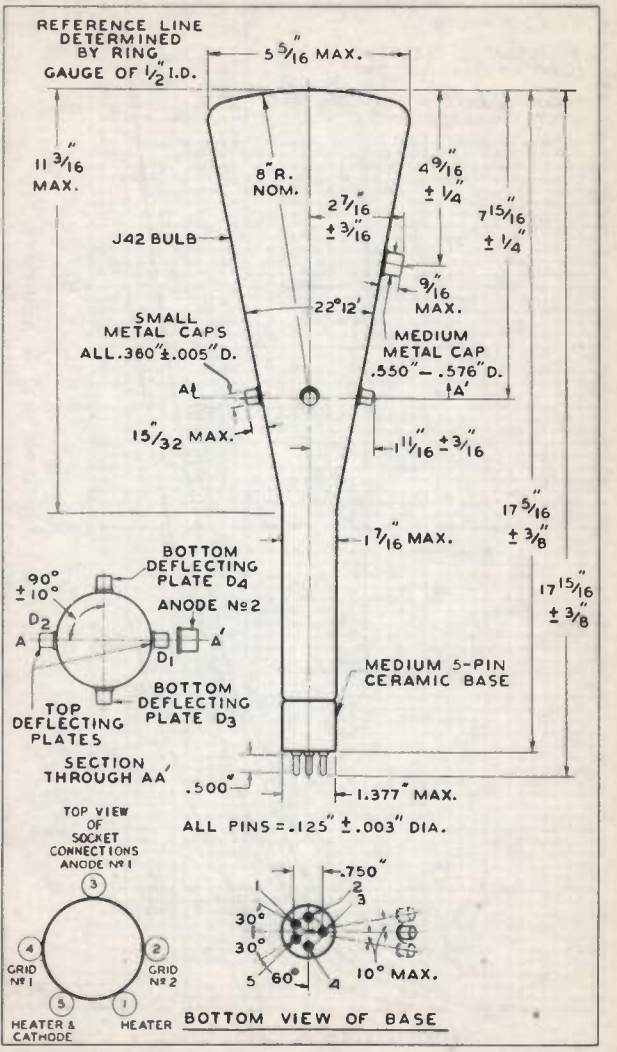
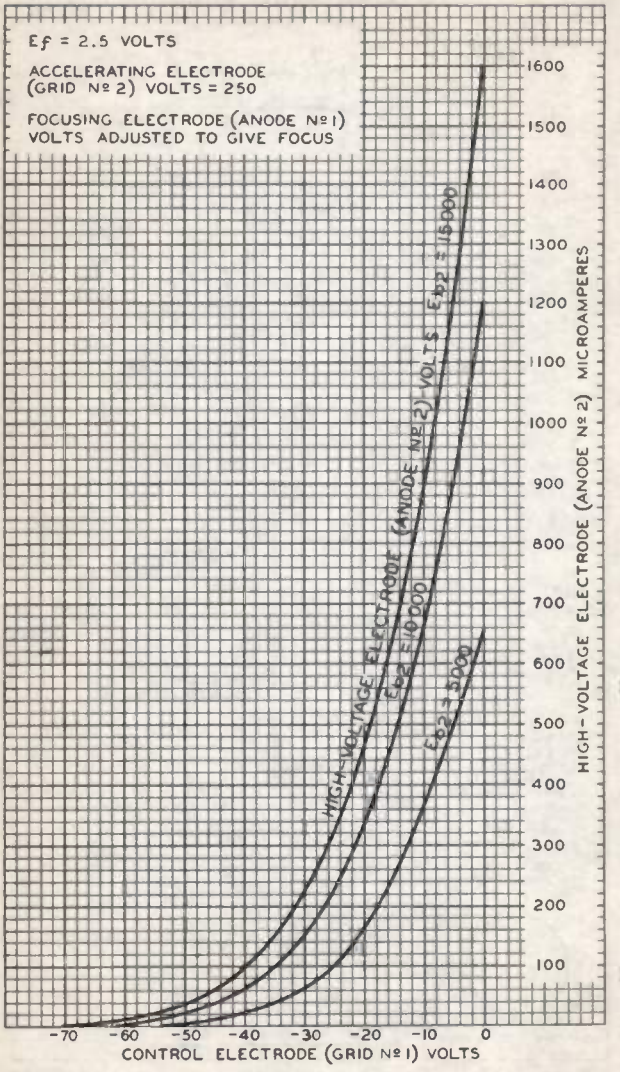
CATHODE-RAY TUBE



912

AVERAGE CHARACTERISTICS



913

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Focus		Electrostatic
Deflection		Electrostatic

Electrodes DJ_1 and DJ_2 (upper): nearest to screen
Electrodes DJ_3 and DJ_4 (lower): nearest to base
DJ_1 is on the same side of tube as pins No.2 and No.4
DJ_3 is on the same side of tube as pins No.2 and No.8

Phosphor	No.1
Fluorescence	Green
Persistence	Medium
Direct Interelectrode Capacitances:	
Control Electrode (Grid) to All Other Electrodes	8 μμf
Deflecting Electrode DJ_1 to Deflecting Electrode DJ_2	2.5 μμf
Deflecting Electrode DJ_3 to Deflecting Electrode DJ_4	2.5 μμf
Maximum Overall Length	4-3/4"
Maximum Diameter	1-5/8"
Bulb	Metal Shell, MT-10
Base	Small Wafer Octal 8-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings Are Based on a Line-Voltage Design Center of 117 Volts

High-Voltage Electrode (Anode No.2) Volt.		500 max.	volts
Focusing Electrode (Anode No.1) Volt.		200 max.	volts
Control Electrode (Grid) Volt.		Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode		250 max.	volts
Grid Circuit Resistance		1.5 max.	megohms
Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency		1.0 max.	megohm
Typical Operation:			
Anode No.2 Voltage	250	500	volts
Anode No.1 Voltage □	50	100	approx. volts
Grid Voltage ○	Adjusted to give suitable luminous spot		
Deflection Sensitivity:			
Electrodes DJ_1 & DJ_2	0.15	0.07	mm/volt d.c.
Electrodes DJ_3 & DJ_4	0.21	0.10	mm/volt d.c.

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 250 volts.

NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 10 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

□, ○: See next page.
◄ Indicates a change.

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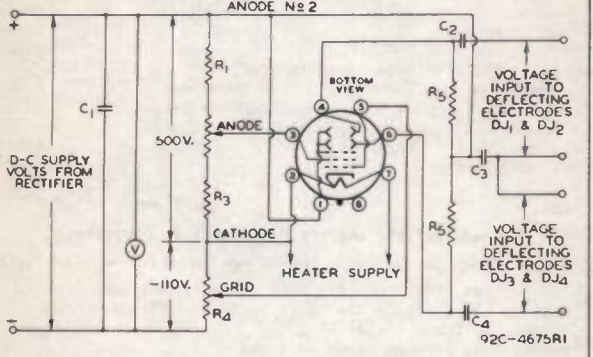
HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)

□ Supply should be adjustable to ± 30% of the value shown.
○ Approximately 80% of Anode No.1 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.

Characteristic Curves of phosphor No.1 are shown at the beginning of this section.

TYPICAL OSCILLOGRAPH CIRCUIT



C_1 = FILTER CONDENSER
C_2, C_3, C_4 = SEE NOTE 3
$R_1 + R_2 + R_3 + R_4$ = BLEEDER POTENTIOMETER
R_1 = 0.200 MEGOHM
R_2 = 0.050 MEGOHM
R_3 = 0.030 MEGOHM
R_3 = 0.050 MEGOHM
R_5 = SEE NOTE 2 AT END OF DATA
V = VOLTMETER

NOTE 3: When the cathode or the negative end of the cathode-ray high-voltage supply is grounded, blocking condensers C_2, C_3, and C_4 should have a high voltage rating. When anode No.2 is grounded, C_3 may be omitted and C_2 and C_4 may be low-voltage condensers.

For d-c amplifier service, the deflecting electrodes should be coupled direct to the output of the amplifier by omitting the blocking condensers. In addition, it will usually be preferably to remove the associated deflecting electrode resistor in order to minimize the loading effect of the resistor on the d-c amplifier. With the resistor removed, it is essential, in order to minimize spot defocusing, that anode No.2 be returned to some point in the d-c amplifier circuit such that the potential difference between anode No.2 and the average voltage across the deflecting electrodes will be as low as possible.

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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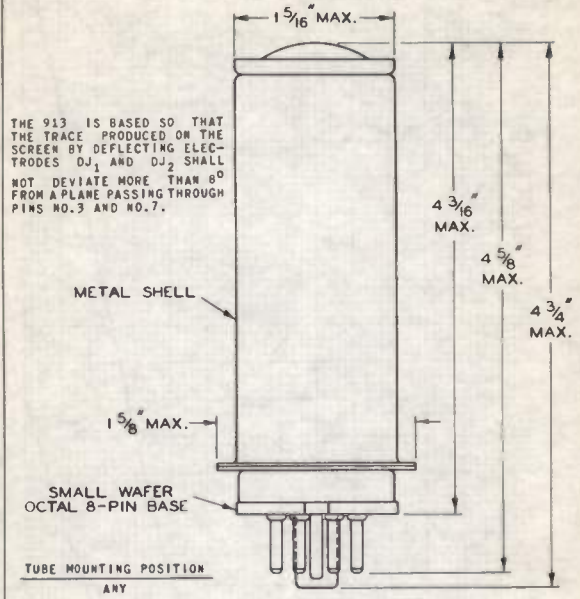
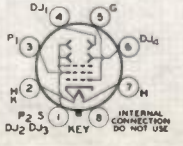
HIGH-VACUUM CATHODE-RAY TUBE



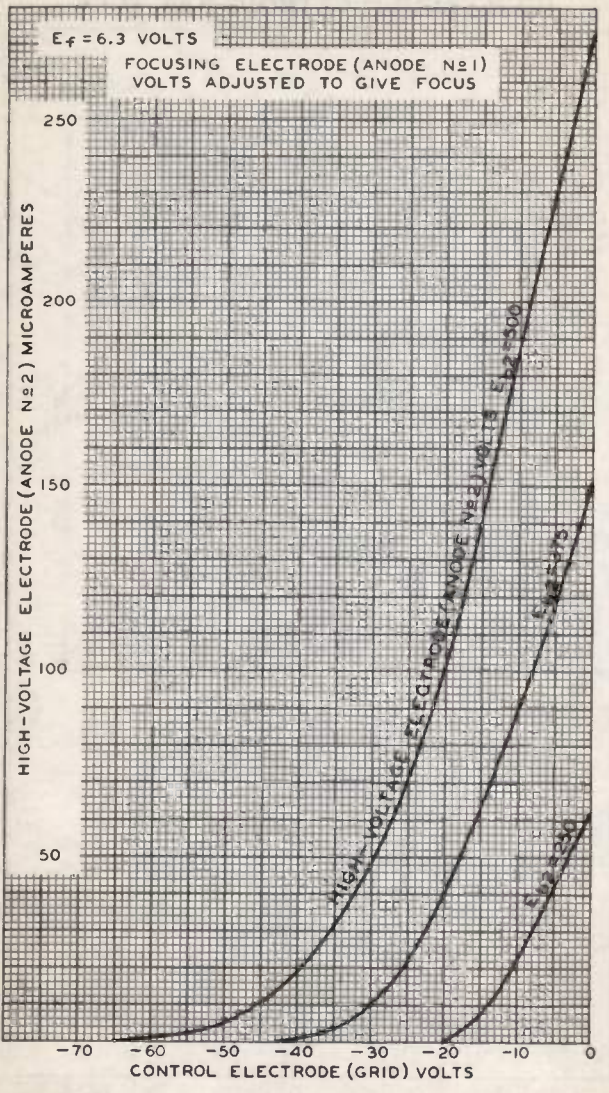
BOTTOM VIEW OF SOCKET CONNECTIONS

DJ_1 to DJ_4 = Deflecting Electrodes
P_2 = Anode No.2
P_1 = Anode No.1
G_2 = Grid No.2
G_1 = Control (Grid No.1) Electrodes
H = Heater
K = Cathode
S = Shell
NC = No Connection



913

AVERAGE CHARACTERISTICS



OCT. 20, 1936

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92C-4680

914

HIGH-VACUUM CATHODE-RAY TUBE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Focus		Electrostatic
Deflection		Electrostatic
Electrodes DJ_1 and DJ_2 (upper): nearest to screen		
Electrodes DJ_3 and DJ_4 (lower): nearest to base		
DJ_1 is on same side of tube as pin No.2		
DJ_3 is on same side of tube as pin No.1 & No.6		
Phosphor		No.1
Fluorescence		Green
Persistence		Medium
Direct Interelectrode Capacitances:		
Control Electrode (Grid No.1) to All Other Electrodes		10.5 μμf
Deflecting Electrode DJ_1 to Deflecting Electrode DJ_2		2.0 μμf
Deflecting Electrode DJ_3 to Deflecting Electrode DJ_4		1.0 μμf
Overall Length		21-1/2" ± 3/8"
Diameter		9-1/4" ± 1/8"
Bulb		J-74
Caps:		
Anode No.2		Medium Metal
Deflecting Electrodes (Four)		Small Metal
Base		Medium 6-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Maximum Ratings are Based on a Line-Voltage Design Center of 117 Volts

High-Voltage Electrode (Anode No.2) Volt.	7000 max.	volts
Focusing Electrode (Anode No.1) Volt.	1900 max.	volts
Accelerating Electrode (Grid No.2) Volt.	250 max.	volts
Control Electrode (Grid No.1) Volt.	Never positive	
Peak Voltage Between Anode No.2 and Any Deflecting Electrode	3000 max.	volts
Grid Circuit Resistance	1.5 max.	megohms

Typical Operation:▲

Anode No.2 Volt.	1500	2500	5000	7000	volts
Anode No.1 Volt.□	300	515	1030	1450	approx. volts
Grid No.2 Volt.	250	250	250	250	volts
Grid No.1 Volt.○	Adjusted to give suitable luminous spot				
Deflection Sensitivity:					
Electrodes DJ_1 and DJ_2	0.340	0.204	0.102	0.073	mm/volt d.c.
Electrodes DJ_3 and DJ_4	0.433	0.260	0.130	0.093	mm/volt d.c.

NOTE 1: Brilliance and definition decrease with decreasing anode voltages. In general the anode No.2 voltage should not be less than 1500 volts.

NOTE 2: The d-c potential of each deflecting electrode is maintained essentially equivalent to that of anode No.2 by connecting resistors having values not greater than 50 megohms between each deflecting electrode and anode No.2. This arrangement by suitable choice of resistor values minimizes pattern distortion and pattern drift

□, ▲, ○: See next page. (continued on next page) ← indicates a change.

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HIGH-VACUUM CATHODE-RAY TUBE

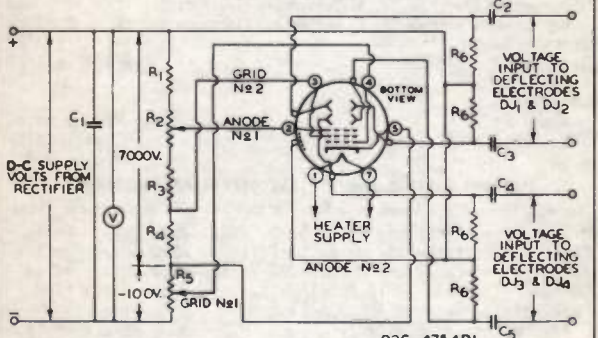
(continued from preceding page)

resulting from unbalanced potentials on the deflecting electrodes. The smaller the resistor values, the less the distortion for a given beam current.

▲ Cathode should be connected to one side or to mid-tap of heater winding.
□ Supply should be adjustable to ±20% of the value shown.
○ Approximately 80% of Grid No.2 voltage is required for current cut-off when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.

Characteristic Curves of phosphor No.1 are shown at the beginning of the section.

TYPICAL OSCILLOGRAPH CIRCUIT



C_1 = FILTER CONDENSER 0.5 to 2.0 μf
C_2, C_3, C_4, C_5 = SEE NOTE 3
$R_1 + R_2 + R_3 + R_4 + R_5$ = BLEEDER POTENTIOMETER
R_1 = 2.5 MEGOHMS
R_2 = 0.5 MEGOHM
R_3 = 0.375 MEGOHM
R_4 = 0.125 MEGOHM
R_5 = 0.050 MEGOHM
R_6 = SEE NOTE 2 AT END OF DATA
V = VOLTMETER

NOTE 3: When the cathode of the negative end of the cathode-ray high-voltage supply is grounded, blocking condensers C_2, C_3, C_4, and C_5 should have a high voltage rating. When anode No.2 is grounded, condensers C_2, C_3, C_4, and C_5 may be low-voltage condensers.

For d-c amplifier service, the deflecting electrodes should be coupled direct to the output of the amplifier by omitting the blocking condensers. In addition, it will usually be preferable to remove the associated deflecting electrode resistor in order to minimize the loading effect of the resistor on the d-c amplifier. With the resistor removed, it is essential, in order to minimize spot defocusing, that anode No.2 be returned to some point in the d-c amplifier circuit such that the potential difference between anode No.2 and the average voltage across the deflecting electrodes will be as low as possible.

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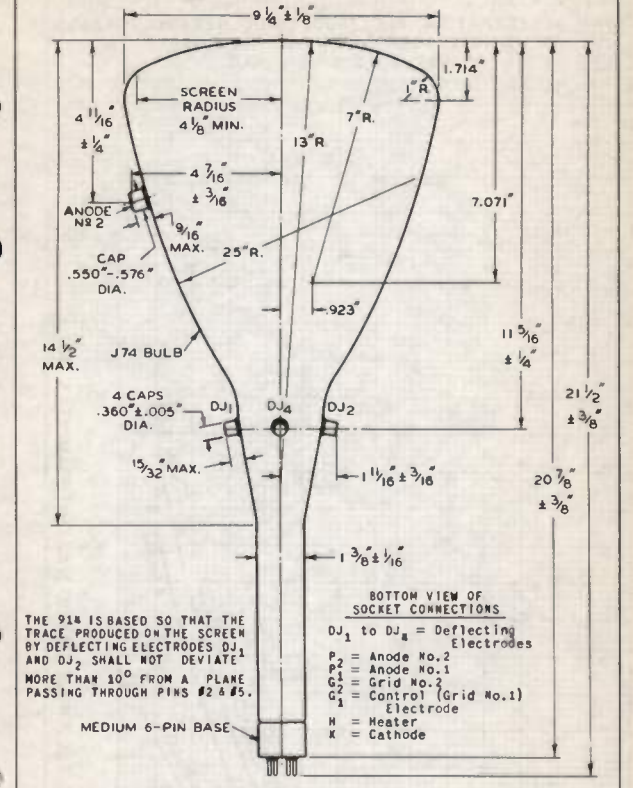
914

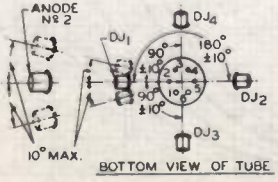
HIGH-VACUUM CATHODE-RAY TUBE



THE 914 IS BASED SO THAT THE TRACE PRODUCED ON THE SCREEN BY DEFLECTING ELECTRODES DJ_1 AND DJ_2 SHALL NOT DEVIATE MORE THAN 10° FROM A PLANE PASSING THROUGH PINS #2 & #5.

BOTTOM VIEW OF SOCKET CONNECTIONS

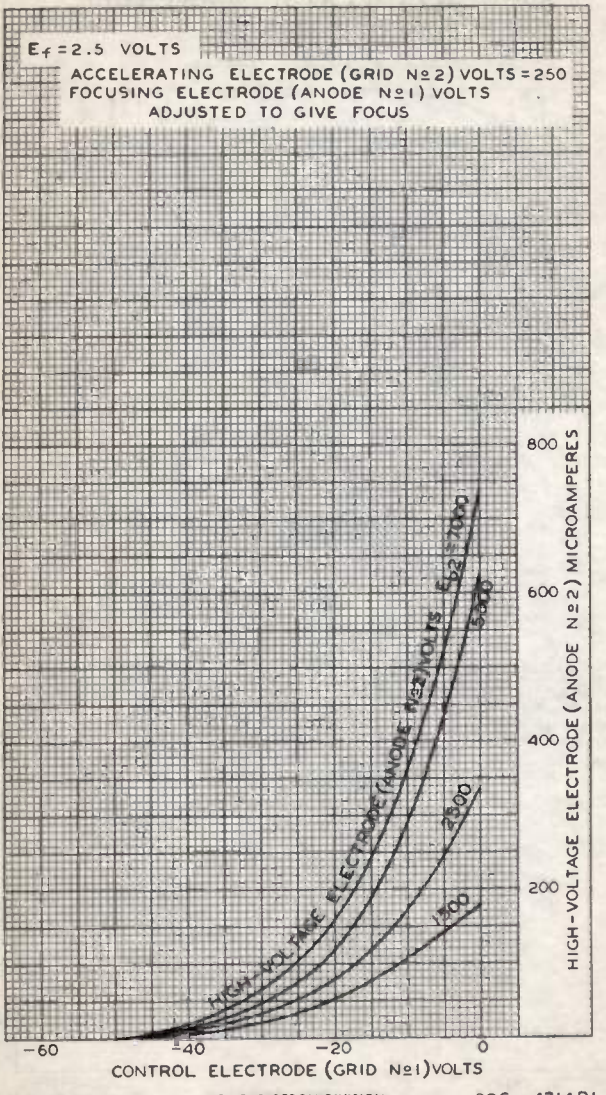
DJ_1 to DJ_4 = Deflecting Electrodes
P_2 = Anode No.2
P^1 = Anode No.1
G^1_1 = Grid No.2
G^2_1 = Control (Grid No.1) Electrode
H = Heater
K = Cathode



BOTTOM VIEW OF TUBE

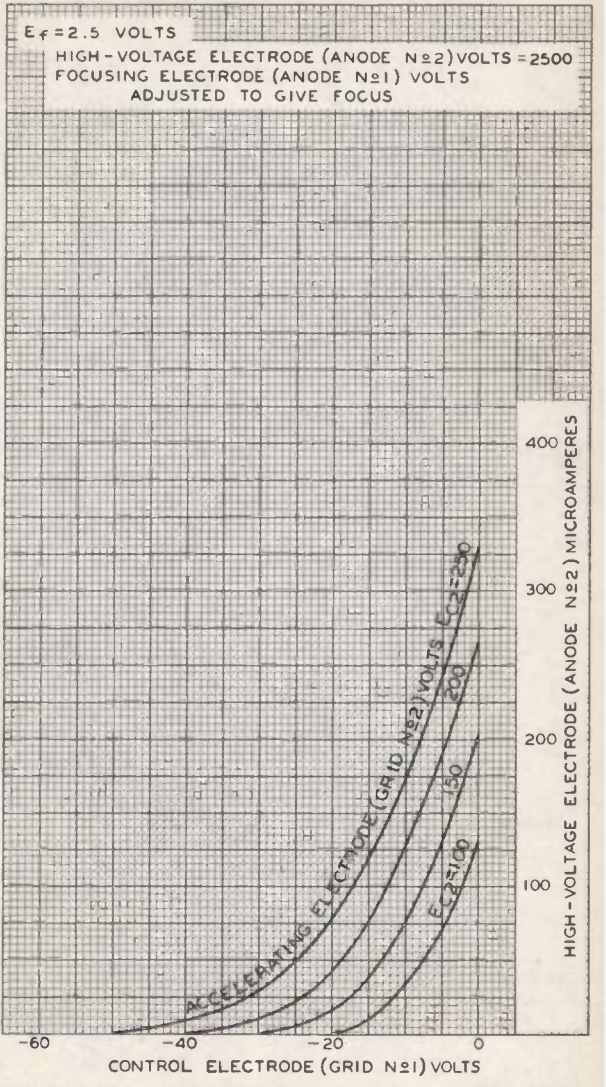
914

AVERAGE CHARACTERISTICS



914

AVERAGE CHARACTERISTICS



1800
KINESCOPE
ELECTROMAGNETIC-DEFLECTION TYPE
WITH 9" MEDIUM-PERSISTENCE SCREEN

Heater	Coated unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No.3
Color of Fluorescence		Yellow
Direct Interelectrode Capacitance:		
Grid No.1 to all other electrodes		12 max. μμf
Overall Length		21" ± 3/8"
Maximum Diameter		9-1/8"
Bulb		J-72
Cap		Medium Metal
Base		Medium 6-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

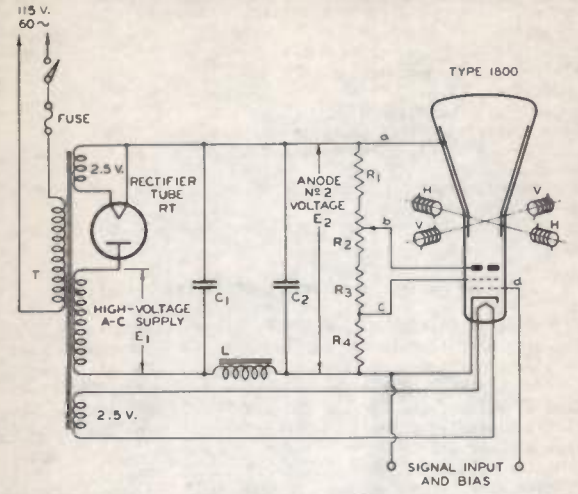
High-Voltage Electrode (Anode #2) Voltage			7000 max.	volts
Focusing Electrode (Anode #1) Voltage			2000 max.	volts
Accelerating Electrode (Grid #2) Voltage			250 max.	volts
Control Electrode (Grid #1) Voltage			Never positive	
Grid #1 Voltage for Current Cut-off *			-75 approx.	volts
Fluorescent-Screen Input Power/sq cm			10 max.	mw
Typical Operation:				
Heater Voltage	2.5	2.5	2.5	volts
Anode #2 Voltage	3000	4500	6000	volts
Anode #1 Voltage	625	925	1250	approx. volts
Grid #2 Voltage	200	250	250	volts
Grid #1 Voltage	Adjusted to give suitable luminous spot			
Grid #1 Signal-Swing Voltage**	20	25	25	approx. volts

* With 250 volts on Grid #2, and 1850 volts on Anode #1.

** Peak-to-peak value for optimum contrast.

1800

VOLTAGE-SUPPLY CIRCUIT



CIRCUIT COMPONENT	SPECIFICATIONS		
E_2	3000 VOLTS	4500 VOLTS	6000 VOLTS
C_1, C_2	0.03 μf, 3000 V.	0.03 μf, 4500 V.	0.03 μf, 6000 V.
R_1	5 MEGOHMS, 2 WATTS	5 MEGOHMS, 3 WATTS	5 MEGOHMS, 5 WATTS
*R_2	500000 OHMS, 1 WATT	500000 OHMS, 1 WATT	500000 OHMS, 1 WATT
R_3	300000 OHMS, 0.5 WATT	400000 OHMS, 1 WATT	500000 OHMS, 1 WATT
R_4	500000 OHMS, 0.5 WATT	400000 OHMS, 1 WATT	300000 OHMS, 1 WATT
E_1	2300 VOLTS RMS	3400 VOLTS RMS	4600 VOLTS RMS
RT	TYPE 879	TYPE 878	TYPE 878

a = ANODE Nº 2
b = ANODE Nº 1
c = GRID Nº 2
d = GRID Nº 1

L = 1000 HENRIES AT 1MA. D.C.
H = HORIZONTAL-DEFLECTING COILS
V = VERTICAL-DEFLECTING COILS
T = POWER TRANSFORMER

*POTENTIOMETER R_2 SHOULD BE ADJUSTED BY MEANS OF AN EXTENSION SHAFT OF INSULATION WHICH CAN WITHSTAND THE VOLTAGE E_2. IF THE RANGE OF VOLTAGE SUPPLIED BY R_2 DOES NOT INCLUDE THE VALUE FOR FOCUS, THE RESISTANCE OF R_3 SHOULD BE CHANGED.

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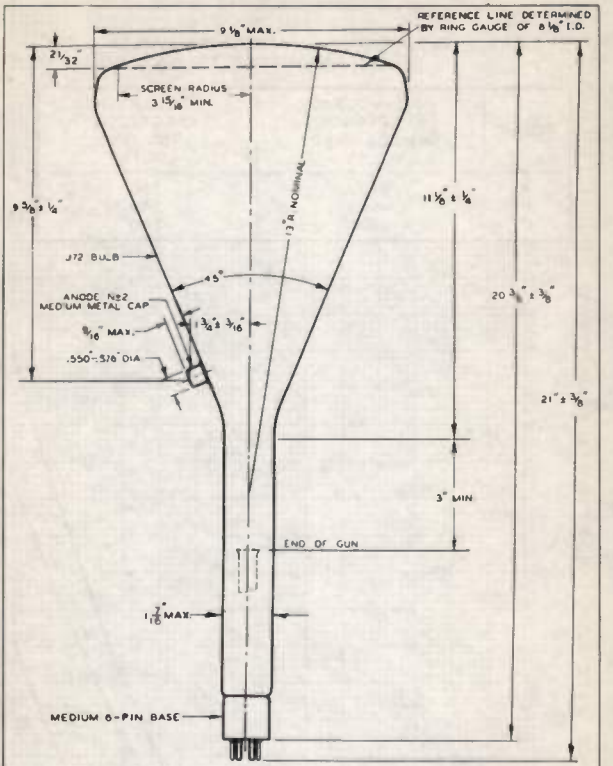
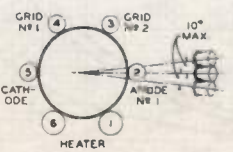
KINESCOPE



TOP VIEW OF SOCKET CONNECTIONS



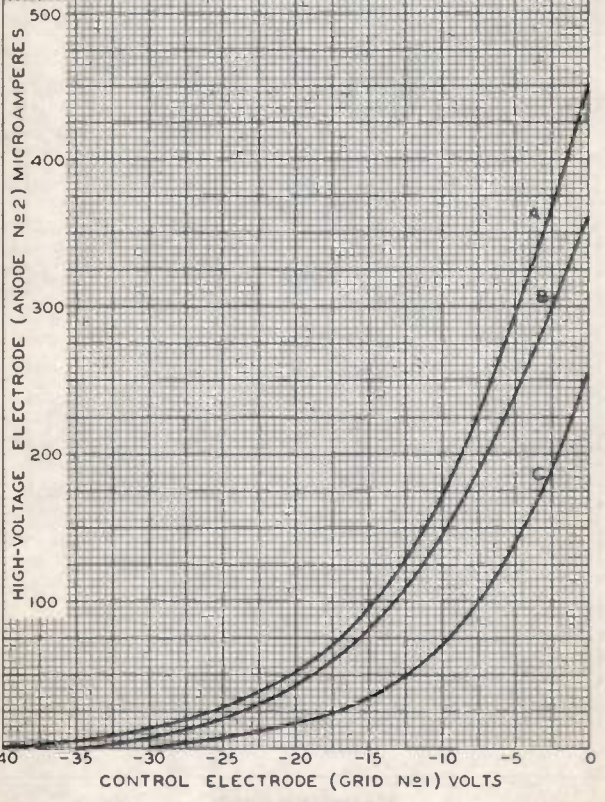
1800

AVERAGE CHARACTERISTICS

E_f = 2.5 VOLTS

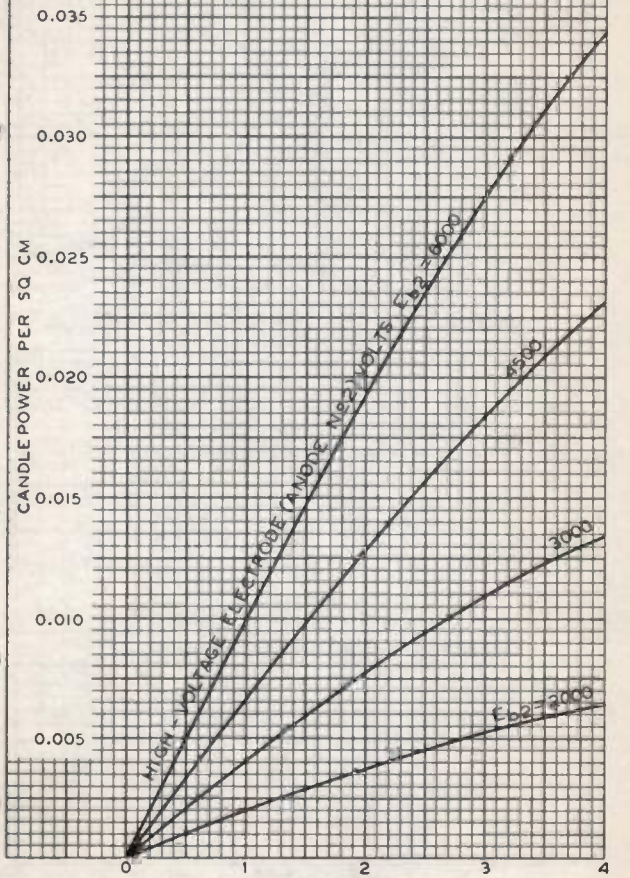
FOCUSING ELECTRODE (ANODE №1) VOLTS ADJUSTED TO GIVE FOCUS

CURVE	HIGH-VOLTAGE ELECTRODE (ANODE №2) VOLTS	ACCELERATING ELECTRODE (GRID №2) VOLTS
A	6000	250
B	4500	250
C	3000	200



AVERAGE CHARACTERISTICS OF PHOSPHOR №3

NOTE : THESE CURVES ARE GENERAL FOR CATHODE-RAY TYPES HAVING PHOSPHOR №3. APPLICATION OF THESE CURVES, THEREFORE, DEPENDS ON THE MAXIMUM RATINGS OF SPECIFIC TYPES



SEPT. 29, 1937

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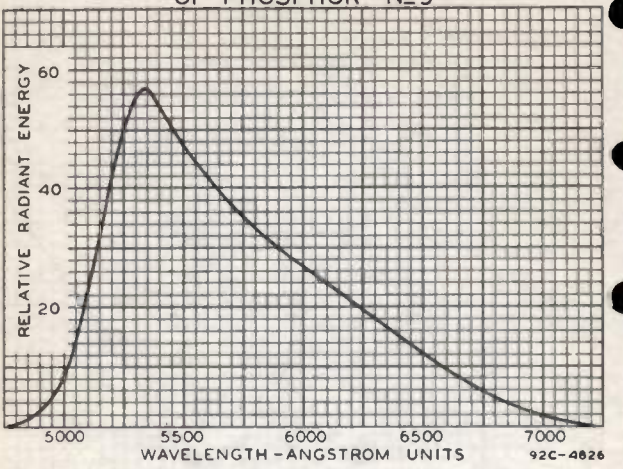
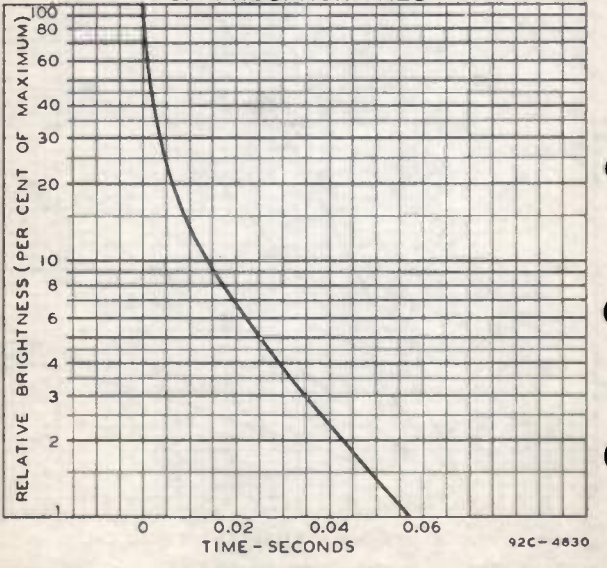
RCA MANUFACTURING COMPANY INC.

92C-4828

SPECTRAL ENERGY CHARACTERISTIC OF PHOSPHOR №3



PERSISTENCE CHARACTERISTIC OF PHOSPHOR №3



OCT. 4, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4831

1801
KINESCOPE
ELECTROMAGNETIC-DEFLECTION TYPE
WITH 5" MEDIUM-PERSISTENCE SCREEN

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Fluorescent Screen:		
Material		Phosphor No.3
Color of Fluorescence		Yellow
Direct Interelectrode Capacitance:		
Grid No.1 to all other electrodes		12 max. μμf
Overall Length		15-3/4" ± 3/8"
Maximum Diameter		5-1/16"
Bulb		J-40
Cap		Medium Metal
Base		Medium 5-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

High-Voltage Electrode (Anode #2) Voltage	3000 max.	volts
Focusing Electrode (Anode #1) Voltage	1000 max.	volts
Control Electrode (Grid) Voltage	Never positive	
Grid Voltage For Current Cut-off *	-35 approx.	volts
Fluorescent-Screen Input Power/sq cm	10 max.	mw
Typical Operation:		
Heater Voltage	2.5	2.5 volts
Anode #2 Voltage	2500	3000 volts
Anode #1 Voltage	375	450 approx. volts
Grid Voltage	Adjusted to give suitable luminous spot	
Grid Signal-Swing Voltage **	15	20 approx. volts

* With 450 volts applied to anode No.1.

** Peak-to-peak value for optimum contrast.

FLUORESCENT-SCREEN CHARACTERISTICS

THE FLUORESCENT-SCREEN MATERIAL USED FOR THE 1801 IS THE SAME AS THAT FOR TYPE 1800. CURVES OF FLUORESCENT-SCREEN CHARACTERISTICS FOR THESE TYPES ARE SHOWN UNDER TYPE 1800.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1801

VOLTAGE-SUPPLY CIRCUIT

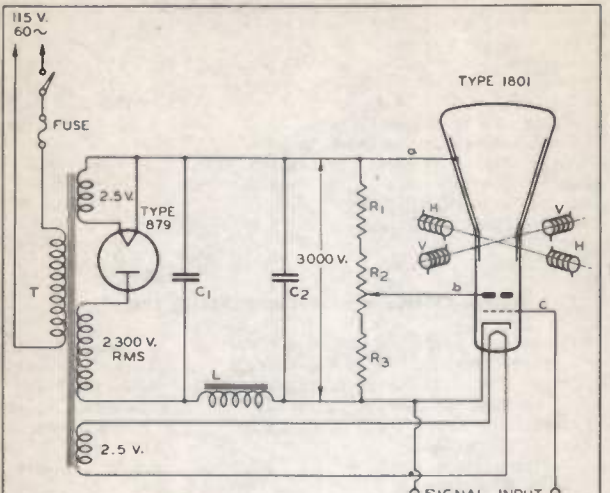


FIG. 1

a = ANODE Nº 2
b = ANODE Nº 1
c = GRID
H = HORIZONTAL-DEFLECTING COILS
V = VERTICAL-DEFLECTING COILS
T = POWER TRANSFORMER

C_1 = 0.025 μf, 3000 VOLTS
C_2 = 0.05 μf, 3000 VOLTS
L = 1000 HENRIES AT 1MA. D.C.
R_1 = 3 MEGOHMS, 3 WATTS
*R_2 = 500000 OHMS, 0.5 WATT
R_3 = 250000 OHMS, 0.5 WATT

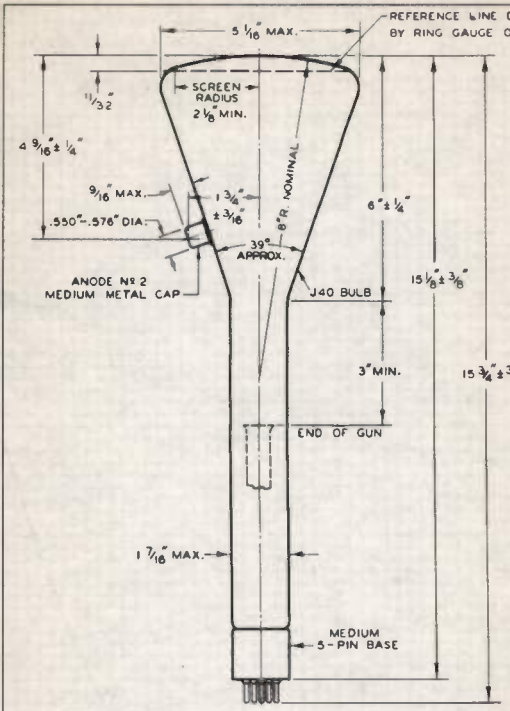
*POTENTIOMETER R_2 SHOULD BE ADJUSTED BY MEANS OF AN EXTENSION SHAFT OF INSULATION WHICH CAN WITHSTAND 3000 VOLTS. IF THE RANGE OF VOLTAGE SUPPLIED BY R_2 DOES NOT INCLUDE THE VALUE FOR FOCUS, THE RESISTANCE OF R_3 SHOULD BE CHANGED.

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

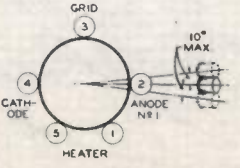
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

1801

KINESCOPE



TOP VIEW OF SOCKET CONNECTIONS



APRIL 20, 1938

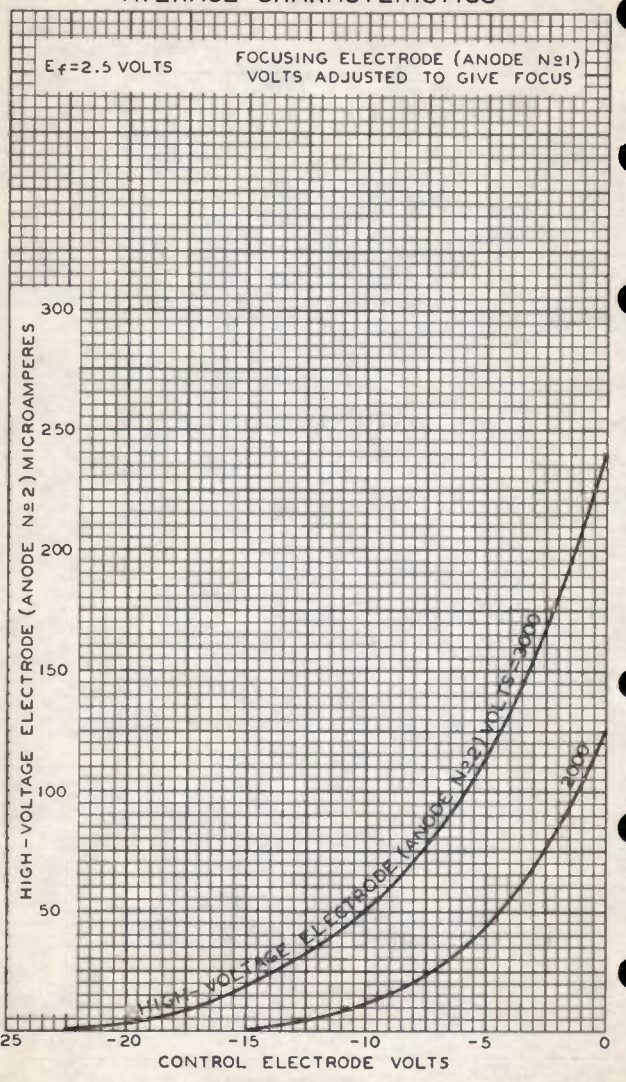
CE-4822

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

RCA

1801

AVERAGE CHARACTERISTICS



OCT. 1, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4829

1840
ORTHICON

For use in direct and film-pickup cameras

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Deflection		Electrostatic-Magnetic
Type of Pickup		Direct or from film
Direct Interelectrode Capacitance:□		
Signal Plate and Mask Electrode to All Other Electrodes		7 μμf
Grid No.1 to All Other Electrodes		8.5 μμf
Dimensions		See *Outline Drawing*
Caps (Four, one not used)		Skirted Miniature
Base		Small Shell Octal 8-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Anode Voltage	300 max.■	volts
Accelerating Electrode (Grid No.2) Voltage	300 max.■	volts
D-C Potential of Deflecting Plates	300 max.■	volts
Rotator Electrode Voltage	300 max.●	volts
Grid No.1 Voltage for Beam Current Cut-Off	-40 approx.	volts
Ambient Temperature	40 max.	°C
Typical Operation:		
Heater Voltage	6.3	volts
Anode Voltage	250	volts
Grid No.2 Voltage	225	volts
Grid No.1 Voltage #	Adjust for best output	
Range of Grid No.1 Supply Voltage	-70 to +50*	volts
Average D-C Deflecting-Plate Voltage	225	volts
Rotator Electrode Voltage	100 approx.	volts
Mask Electrode Voltage	-3	volts
Focusing Flux Density	70 approx.	gausses
Vertical-Deflecting Flux Density (peak-to-peak value)	25 approx.	gausses
Horizontal-Deflecting Voltage (peak-to-peak value)	160	volts
Blanking Signal (peak-to-peak value)	100	volts

● When resistance between grid and bias supply is 10000 ohms.
□ With no external shielding.
■ Design maximum for 117-volt line.
Grid No.1 voltage should be adjusted so that the beam current is not much larger than that required to discharge the mosaic. Beam current is nearly equal to the peak-to-peak signal output current when the most brightly illuminated portion of mosaic is just being discharged; therefore, it can be measured by measuring the maximum peak-to-peak signal output voltage across a known load impedance.

NOTE: The beam current should not exceed 1 microampere for any considerable time.

A practical value of signal-plate load impedance is in the order of 0.1 to 0.5 megohm. With low values of load resistance, gain and signal output-to-noise ratio are low. With high values, gain and signal output-to-noise ratio are increased. In either case, the low video frequencies are over-emphasized and must be equalized by a video stage having low low-frequency gain.

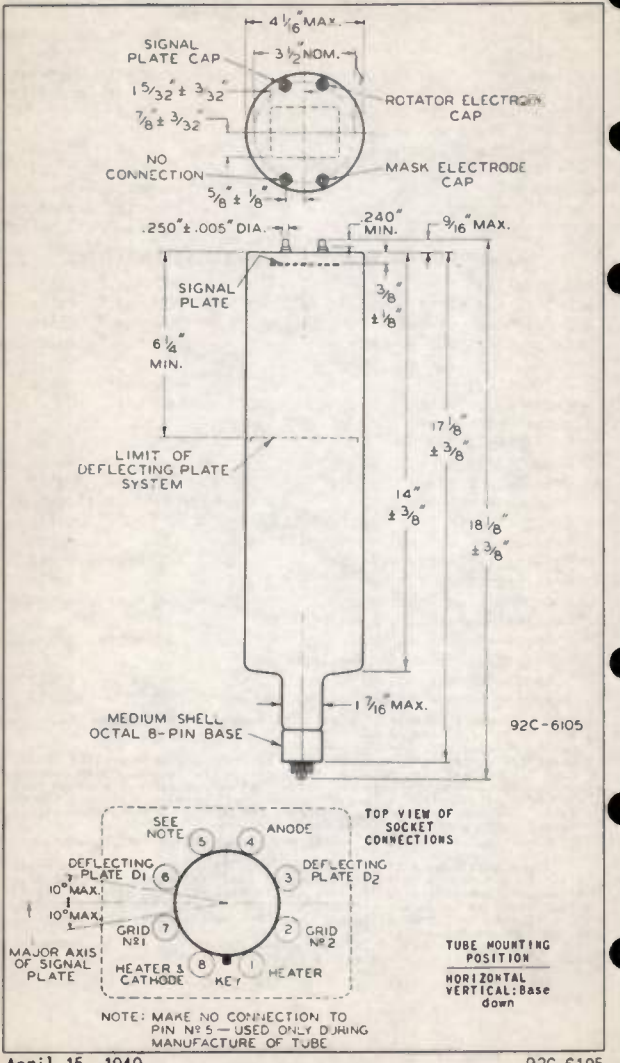
A practical value of signal output current is 0.3 microampere. This value can be obtained with a highlight illumination level on the mosaic in the order of 3 to 5 foot-candles.

The spectral sensitivity of the 1840 is adjusted for use with incandescent light.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC

1840

ORTHICON



NOTE: MAKE NO CONNECTION TO PIN N° 5 — USED ONLY DURING MANUFACTURE OF TUBE

April 15, 1940

92C-6105

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

1847

ICONOSCOPE

TWO-INCH ELECTROSTATIC-DEFLECTION TYPE

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Deflection		Electrostatic
Type of Pickup		Direct
Direct Interelectrode Capacitances:		
Control Electrode to All Other Electrodes	7	μμf
Deflecting Electrode No.1 to All Other Electrodes	6	μμf
Deflecting Electrode No.3 to All Other Electrodes	5	μμf
Signal-Electrode Terminal to All Other Electrodes°	11	μμf
Signal Electrode to Signal-Electrode Terminal	50	μμf
Dimensions		See *Outline Drawing*
Bulb		J-16
Base		Medium Shell Octal 8-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Voltages are specified with respect to cathode

Anode No.2, Grid No.2, & Collector Voltage	600 max.□	volts
Focusing Electrode (Anode No.1) Voltage	200 max.□	volts
Control Electrode (Grid No.1) Voltage	Never positive	
Peak Voltage Between Anode No.2 and Any Free Deflecting Electrode	350 max.□	volts
D-C Resistance Between Grid No.1 and Cathode	1 max.	megohm
Ambient Temperature	50 max.	°C
Typical Operation:		
Heater Voltage	6.3	volts
Anode No.2, Grid No.2, & Collector Voltage	600	volts
Anode No.1 Voltage^	150 approx.	volts
Grid No.1 Voltage*	Adjust for best picture	
Horizontal Deflecting Volt. (DJ_3-DJ_4)**	200	volts
Vertical Deflecting Volt. (DJ_1-DJ_2)**	225	volts

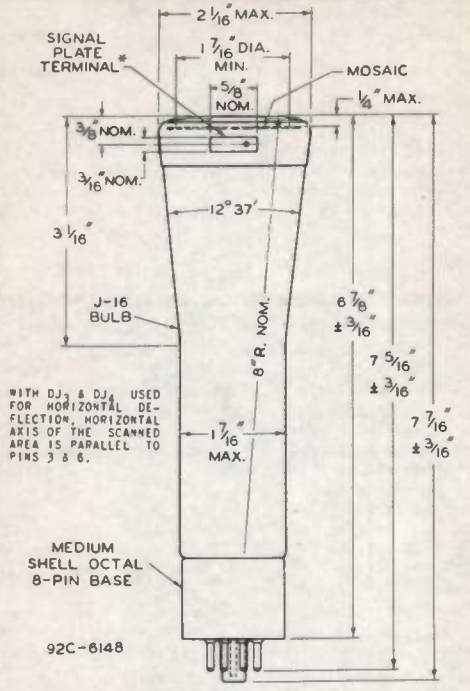
□ Design maximum for 117-volt line.
* A negative value of approximately 20% of Anode No.2 voltage is required for current cut-off.
^ Anode No.1 supply voltage should be adjustable within 25%.
** Peak-to-peak value required for scanning full mosaic diameter.
° With external shield.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

RCA

1847

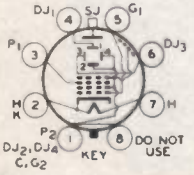
ICONOSCOPE



WITH DJ_3 & DJ_4 USED FOR HORIZONTAL DEFLECTION, HORIZONTAL AXIS OF THE SCANNED AREA IS PARALLEL TO PINS 3 & 6.

* LOCATED ON SAME SIDE OF BULB AS PINS 4 & 5

BOTTOM VIEW OF SOCKET CONNECTIONS



TUBE MOUNTING POSITION

HORIZONTAL
VERTICAL: Base down.

DJ_1 & DJ_2: Nearest Face Plate
DJ_3 & DJ_4: Nearest Base
DJ_1 Is On Same Side Of Tube As Pins 4 & 5
DJ_3 Is On Same Side Of Tube As Pins 2 & 3
C – Collector
DJ – Deflecting Electrode
G_1 – Grid No.1
G_2 – Grid No.2
H – Heater
K – Cathode
P_1 – Anode No.1
P_2 – Anode No.2
SJ – Signal Electrode

1848
ICONOSCOPE

For use in portable television cameras

Heater	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.6	amp.
Deflection		Magnetic
Type of Pickup		Direct
Direct Interelectrode Capacitance:		
Signal Plate to Collector & Anode No.2 (with external shielding)		10 approx. μμf
Control Grid to All Other Electrodes		12 max. μμf
Dimensions		See *Outline Drawing*
Caps (two)		Small Metal
Base		Dwarf Metal Shell Octal 8-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

High-Voltage Electrode (Anode No.2) & Collector Voltage	1200 max.■	volts
Accelerating Electrode (Grid No.2) Voltage	1200 max.■	volts
Focusing Electrode (Anode No.1) Voltage	400 max.■	volts
Control Electrode (Grid No.1) Voltage	Never Positive	
Grid No.1 Volt. for Current Cut-Off	-50 approx.	volts
Anode No.2 & Collector Current •	0.5 max.■	μamp.
Ambient Temperature	40 max.	°C
Typical Operation:		
Heater Voltage °	6.3	volts
Anode No.2 & Collector Voltage	1000	volts
Grid No.2 Voltage	1000	volts
Anode No.1 Voltage ●	300 approx.	volts
Grid No.1 Voltage ▲ #	-40 approx.	volts
Anode No.2 & Collector Current •	0.1 approx.	μamp.

■ Design maximum for 117-volt line.
° When this current is measured, the mosaic should not be illuminated. The cathode should be connected to one side or, preferably, to the mid-tap of the heater winding.
▲ Should be adjusted and set at largest negative value which will provide sufficient video output.
Maximum d-c resistance in the grid circuit should not exceed 1 megohm.
● Should be adjusted and set at value giving best focus.

NOTE: Signal plate-to-collector impedance is a function of bias light, image brilliance, and beam current, and is in the order of a few megohms for normal operation. Normal beam current is in the order of 0.25 microampere.

The signal-plate resistive load should be approximately one-tenth of the signal plate-to-collector impedance if constant signal output without phase shift is required in all frequencies of the picture signal.

A practical design value of signal-plate load impedance is in the order of 0.1 to 0.5 megohm. With low values of load resistance, gain and signal output-to-noise ratio are low. With high values, gain and signal output-to-noise ratio are increased. In either case, the low video frequencies are over-emphasized and must be equalized by a video stage having low low-frequency gain.

Signal output current varies with beam current, illumination level, and bias lighting, but is in the order of 0.15 microampere peak to peak. Good operation can be obtained with a highlight illumination level on the mosaic in the order of 7 foot-candles.

The spectral sensitivity of the 1848 is adjusted for outdoor pickup.

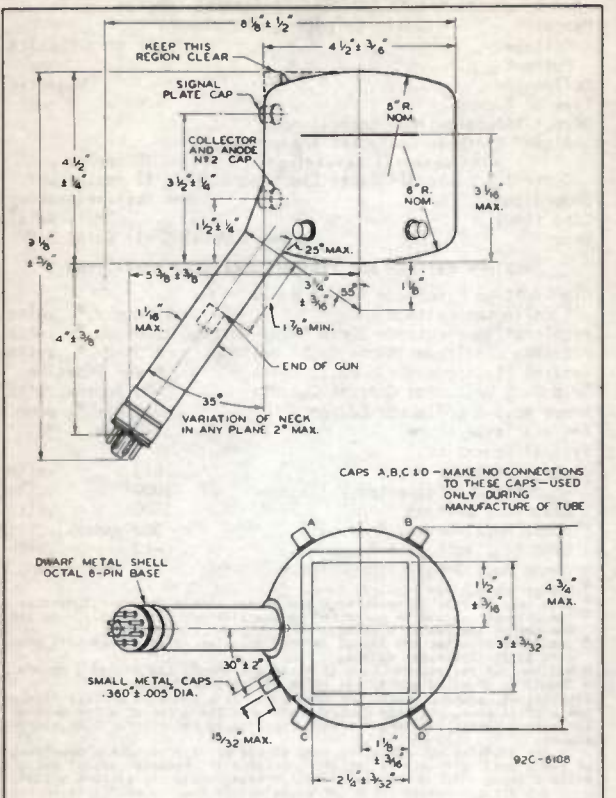
The d-c resistance in the signal-plate circuit should be limited to one megohm.

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

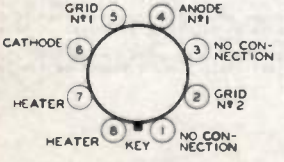
RCA

1848

ICONOSCOPE



TOP VIEW OF SOCKET CONNECTIONS



TUBE MOUNTING POSITION

HORIZONTAL
VERTICAL: Base down

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1849, 1850
ICONOSCOPES

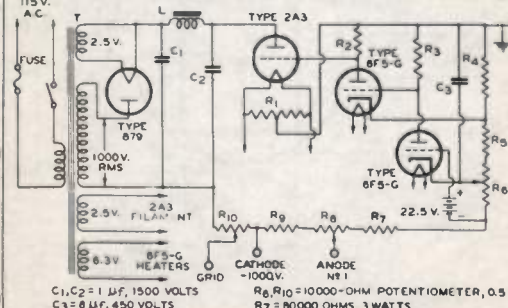
Heater	Coated Unipotential Cathode		
Voltage	6.3		a-c or d-c volts
Current	0.6		amp.
Deflection			Electromagnetic
	1849	*1850*	
Type of Pickup	Film	Direct	
Direct Interelectrode Capacitance:			
Signal Plate to Collector (with external shielding)		10 approx.	μμf
Dimensions		See *Outline Drawing*	
Caps (two)		Medium Metal	
Base		Medium 6-Pin, Ceramic	

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

High-Voltage Electrode (Anode No. 2) Voltage	1200 max.	volts
Collector Voltage	1200 max.	volts
Focusing Electrode (Anode No. 1) Voltage	450 max.	volts
Control Electrode (Grid) Voltage	Never positive	
Grid Voltage for Current Cut-Off	-30 approx.	volts
Collector Current *	0.25 max.	μamp.
Ambient Temperature	40 max.	°C
Typical Operation:		
Heater Voltage °	6.3	volts
Anode No.2 Voltage	1000	volts
Collector Voltage	1000	volts
Anode No.1 Voltage	360	volts
Grid Voltage ▲ #	-25 approx.	volts
Collector Current *	0.05 to 0.1 approx.	μamp.

* When collector-current measurements are made, the mosaic should not be illuminated. Allowance should be made for leakage currents.
▲ Adjust bias for minimum (most negative) value for satisfactory signal.
\# Maximum resistance in the grid circuit should not exceed 1 megohm.
° The cathode should be connected to one side or, preferably, to the midtap of the heater winding.

REGULATED HIGH-VOLTAGE SUPPLY FOR ICONOSCOPE

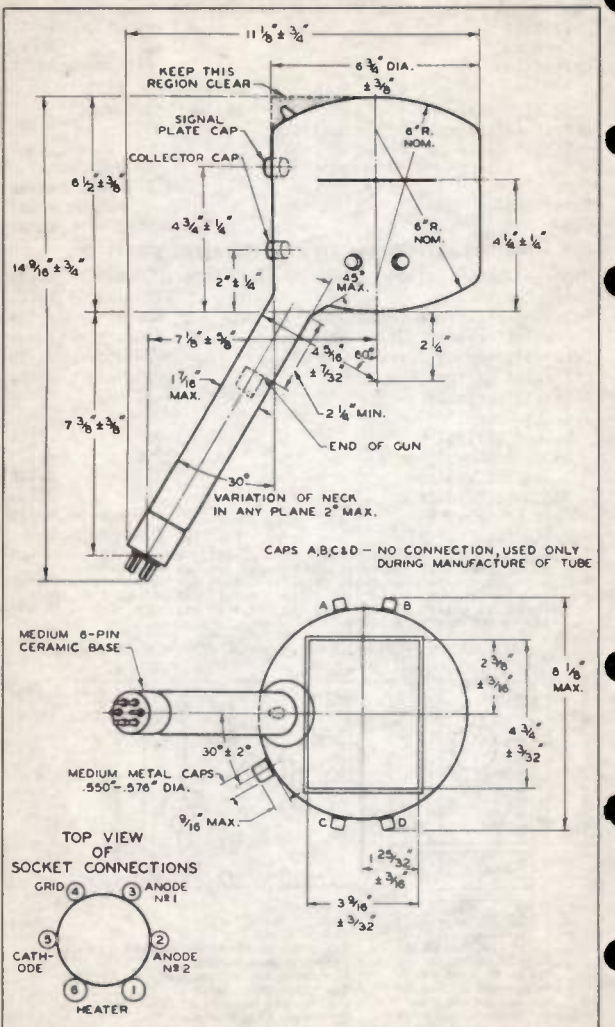


C1, C2 = 1 μf, 1500 VOLTS
C3 = 8 μf, 450 VOLTS
R1 = 20-50 OHMS, C.T.
R2, R3 = 0.25 MEGOHM, 1 WATT
R4 = 40000 OHMS, 2 WATTS
R5 = 10000 OHMS, 0.5 WATT
R6, R10 = 10000-OHM POTENTIOMETER, 0.5 WATT
R7 = 80000 OHMS, 3 WATTS
R8 = 30000-OHM POTENTIOMETER, 1 WATT
R9 = 30000 OHMS, 1 WATT
L = 100-200 HENRIES AT 10 MA. D.C.
T = POWER TRANSFORMER

NOTE: POTENTIOMETERS R6, R8 AND R10 SHOULD BE ADJUSTED BY MEANS OF EXTENSION SHAFTS OF INSULATION WHICH CAN WITHSTAND 1000 VOLTS.

1849
1850

1849, 1850
ICONOSCOPES



APRIL 3, 1939

920-4891R1

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

RCA

1898

MONOSCOPE

3" ELECTROSTATIC-DEFLECTION TYPE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Pattern:		
Type		Girl's Head
Diameter		2-5/8"
Direct Interelectrode Capacitances:□		
Pattern Electrode to Anode #1	2.5	μμf
Deflecting Plate D_1 to All Other Electrodes	15	μμf
Deflecting Plate D_2 to All Other Electrodes	15.5	μμf
Grid to All Other Electrodes	11.6	μμf
Overall Length		11-7/8" ± 3/8"
Maximum Diameter		3-1/16"
Bulb		J-24
Cap		Skirted Miniature - Style A
Base		Medium 7-Pin

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

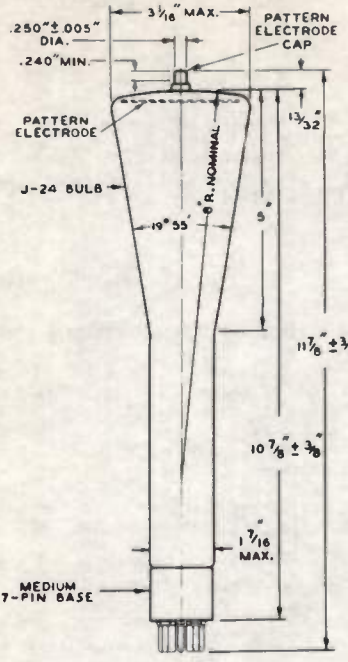
Pattern Electrode Voltage			1300 max.●	volts
Focusing Electrode #2 (Anode #2) Voltage			1200 max.●	volts
Focusing Electrode #1 (Anode #1) Voltage			500 max.●	volts
Control Electrode (Grid) Voltage			Never positive	
Pattern Electrode Dissipation/sq cm			1 max.●	mw
D-C Resistance between:				
Cathode and Grid			1 max.	megohm
Cathode and Deflecting Plate D_1			5 max.	megohm
Cathode and Deflecting Plate D_3			5 max.	megohm
Typical Operation:				
Heater Voltage	2.5	2.5	2.5	volts
Pattern Electrode Voltage	750	950	1150	volts
Anode #2 Voltage	800	1000	1200	volts
Anode #1 Voltage	240	300	360	approx. volts
Grid Voltage	Adjusted to give suitable resolution and signal amplitude			
Grid Voltage for Current Cut-off	-50	-60	-70	approx. volts
Vertical-Deflection Volt., # on Deflecting Plates $D_1 - D_2$	125	155	185	volts
Horizontal-Deflection Volt., # on Deflecting Plates $D_3 - D_4$	135	170	200	volts
Internal Resistance between Anode #2 & Pattern Electrode	Greater than 1			megohm
Beam Current*	1	2	.3	approx. μamp.
Pattern Electrode Signal Current, peak-to-peak value	1	2	3	approx. μamp.

□ Without external shielding.
● Design maximum for 117-volt line.
Peak-to-peak values of deflection voltages required for scanning largest rectangle having 4 : 3 aspect ratio and contained in pattern electrode.
* Determined by measurement of current to pattern electrode when operated 25-30 volts positive with respect to Anode #2.

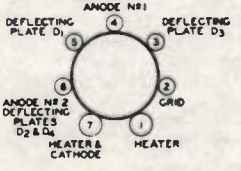
1898

1898

MONOSCOPE



TOP VIEW OF SOCKET CONNECTIONS



MOUNTING POSITION
NO RESTRICTIONS

DEC. 1, 1939

CE-6068

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

1899

MONOSCOPE

5" ELECTROMAGNETIC-DEFLECTION TYPE

Heater	Coated Unipotential Cathode	
Voltage	2.5	a-c or d-c volts
Current	2.1	amp.
Pattern:		
Type	See *Pattern* under this tube type	
Dimensions	2-1/4" High X 3-1/16" Wide	
Calibration	Up to 500 lines	
Direct Interelectrode Capacitance:		
Pattern Electrode to Collector (without external shielding)	6 approx.	μμf
Overall Length	13-13/16" ± 3/8"	
Maximum Diameter	5-1/16"	
Bulb	J-40	
Caps (two)	Medium Metal	
Base	Medium 6-Pin	

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

Pattern Electrode Voltage		1700 max.	volts
Collector Voltage		1700 max.	volts
Focusing Electrode #2 (Anode #2) Voltage		1500 max.	volts
Focusing Electrode #1 (Anode #1) Voltage		750 max.	volts
Control Electrode (Grid) Voltage		Never positive	
Grid Voltage for Current Cut-off		-60 max.	volts
Typical Operation: #			
Heater Voltage	2.5	2.5	volts
Pattern Electrode Voltage	1000	1500	volts
Collector Voltage	1050	1700	approx. volts
Anode #2 Voltage	1000	1500	volts
Anode #2 Voltage	260	390	approx. volts
Grid Voltage	Adjusted to give suitable resolution and signal amplitude		
Internal Resistance between Collector & Pattern Electrode	Greater than 1		megohm
Beam Current *	2	4	approx. μamp.
Pattern Electrode Signal Current, peak-to-peak value	1.5	2.5	approx. μamp.
Beam Resolution Capability **	500	500	lines

* Determined by measurement of current to Collector with Pattern Electrode terminal disconnected.

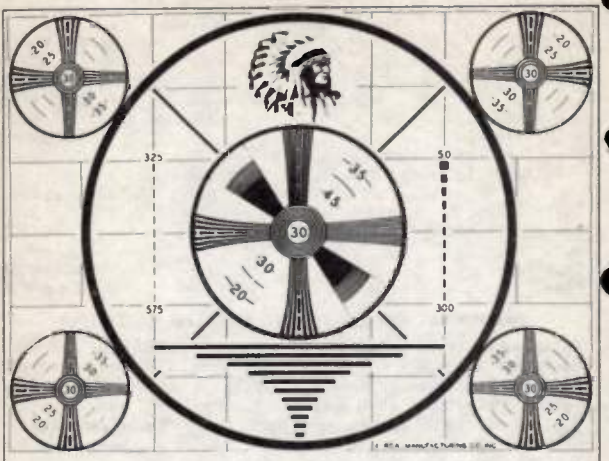
** with full scanning.

\# Deflection must be maintained at all times. When scanned area is less than 1/4 of the pattern area, operation must be limited to five minutes as a maximum.

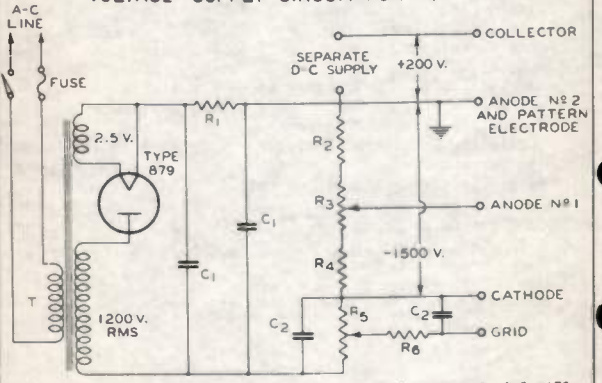
1899

1899

PATTERN



VOLTAGE-SUPPLY CIRCUIT FOR RCA-1899



C_1 = 2 μf, 1600 VOLTS
C_2 = 1 μf, 50 VOLTS
T = POWER TRANSFORMER
R_1 = 0.25 MEGOHM, 0.5 WATT
R_2 = 5 MEGOHMS, 0.5 WATT
* R_3 = 0.5 MEGOHM, 0.5 WATT
R_4 = 1.5 MEGOHMS, 0.5 WATT
* R_5 = 0.25 MEGOHM, 0.5 WATT
R_6 = 0.1 MEGOHM, 0.5 WATT

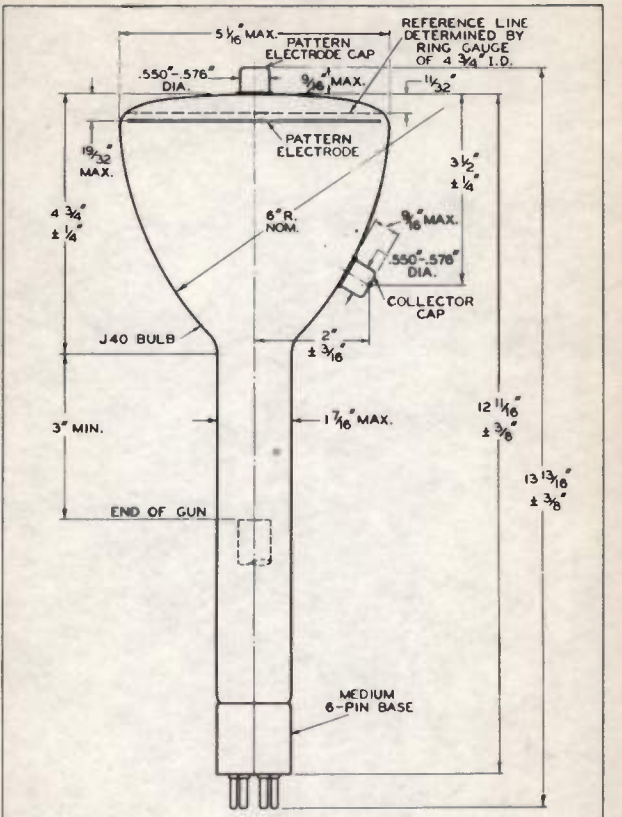
* Potentiometers R_3 and R_5 should be adjusted by means of extension shafts of insulation which can withstand 1600 volts.

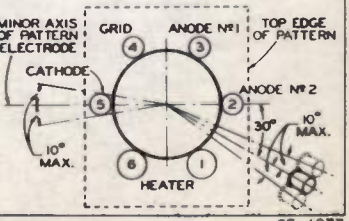
The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

RCA

1899

MONOSCOPE





TOP VIEW OF SOCKET CONNECTIONS AND ORIENTATION OF PATTERN ELECTRODE WITH RESPECT TO BASE PINS

DEC. 20, 1938

CE-4977

RCA RADIOTRON DIVISION

RCA MANUFACTURING COMPANY, INC.

5655

IMAGE ORTHICON

MAGNETIC FOCUS—MAGNETIC DEFLECTION

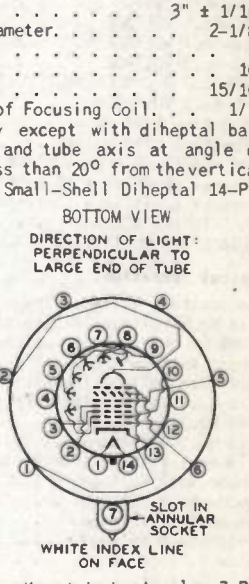
DATA

General:

Heater, for Unipotential Cathode:		
Voltage	6.3 ± 10%	ac or dc volts
Current	0.6	amp
Direct Interelectrode Capacitance:		
Anode to All Other Electrodes	20	μμf
Photocathode Spectral Response		See Curve
Image Size (4 x 3 aspect ratio)		1/6" Diagonal
Focusing Method		Magnetic
Deflection Method		Magnetic
Overall Length		15-1/4" ± 1/4"
Greatest Diameter of Bulb		3" ± 1/16"
Minimum Deflecting-Coil Inside Diameter		2-1/8"
Deflecting-Coil Length		5"
Focusing-Coil Length		10"
Alignment-Coil Length		15/16"
Photocathode Distance Inside End of Focusing Coil		1/2"
Operating Position		Any except with diheptal base up and tube axis at angle of less than 20° from the vertical
End Base		Small-Shell Diheptal 14-Pin

Pin 1 – Heater
Pin 2 – Grid No.4
Pin 3 – Grid No.3
Pin 4 – Internal Connection—Do Not Use
Pin 5 – Dynode No.2
Pin 6 – Dynode No.4
Pin 7 – Anode
Pin 8 – Dynode No.5
Pin 9 – Dynode No.3
Pin 10 – Dynode No.1, Grid No.2
Pin 11 – Internal Connection—Do Not Use
Pin 12 – Grid No.1
Pin 13 – Cathode
Pin 14 – Heater

BOTTOM VIEW



Shoulder Base		Keyed Jumbo Annular 7-Pin

Pin 1 – Grid No.6
Pin 2 – Photocathode
Pin 3 – Internal Connection—Do Not Use
Pin 4 – Internal Connection—Do Not Use
Pin 5 – Grid No.5
Pin 6 – Target
Pin 7 – Internal Connection—Do Not Use

5655

5655
IMAGE ORTHICON

Maximum Ratings, *Absolute Values*:		
PHOTOCATHODE VOLTAGE	-550 max.	volts
PHOTOCATHODE ILLUMINATION	50 max.	ft-c
OPERATING TEMPERATURE OF ANY PART OF BULB	65 max.	°C
OPERATING TEMPERATURE OF BULB AT LARGE END OF TUBE (Target Section)	45 min.	°C
TEMPERATURE DIFFERENCE BETWEEN TARGET SECTION AND ANY PART OF BULB HOTTER THAN TARGET SECTION	5 max.	°C
GRID-No.6 VOLTAGE	-550 max.	volts
TARGET VOLTAGE:		
Positive value	50 max.	volts
Negative value	50 max.	volts
GRID-No.5 VOLTAGE	150 max.	volts
GRID-No.4 VOLTAGE	300 max.	volts
GRID-No.3 VOLTAGE	400 max.	volts
GRID-No.2 & DYNODE-No.1 VOLTAGE	350 max.	volts
GRID-No.1 VOLTAGE:		
Negative bias value	125 max.	volts
Positive bias value	0 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	125 max.	volts
Heater positive with respect to cathode	10 max.	volts
ANODE-SUPPLY VOLTAGE*	1500 max.	volts
VOLTAGE PER MULTIPLIER STAGE	350 max.	volts

Typical Operation:		
Photocathode Voltage (Image Focus)	-300 to -500	volts
Grid-No.6 Voltage (Accelerator)—80% of photocathode voltage	-240 to -400	volts
Target Voltage*	0	volts
Grid-No.5 Voltage (Decelerator)**	0 to 100	volts
Grid-No.4 Voltage (Beam Focus)	160 to 240	volts
Grid-No.3 Voltage##	225 to 330	volts
Grid-No.2 & Dynode-No.1 Voltage	300	volts
Grid-No.1 Voltage (For Picture Cutoff)	-35 to -100	volts
Dynode-No.2 Voltage	600	volts
Dynode-No.3 Voltage	800	volts
Dynode-No.4 Voltage	1000	volts
Dynode-No.5 Voltage	1200	volts
Anode Voltage	1250	volts
Anode Current	100	μa
Target Temperature Range	45 to 60	°C
Ratio of Peak-to-Peak Highlight Video-Signal Current to RMS Noise Current (Approx.)	70	
Minimum Peak-to-Peak Blanking Voltage	10	volts
Field Strength at Center of Focusing Coil	75	gauss

*, **, ##: See next page.

5655
IMAGE ORTHICON

Focusing-Coil Current (Approx. for coil listed below)	75	ma
Deflecting-Coil Current (Approx. for assembly listed below):		
Horizontal (Peak to Peak).	625	ma
Vertical (Peak to Peak).	290	ma
Alignment-Coil Current (Approx. for coil listed below)	0 to 30	ma

Components:

Deflecting-Coil Assembly (Includes Keyed Jumbo Annular 7-Pin Socket). .	RCA Type No. 201D75
Focusing-Coil Assembly	RCA Type No. 202D75
Alignment-Coil Assembly	RCA Type No. 204D75
Hor. Deflection Output Transformer . .	RCA Type No. 204T1
Ver. Deflection Output Transformer . .	RCA Type No. 204T2

⊕ Ratio of dynode voltages is shown under Typical Operation.

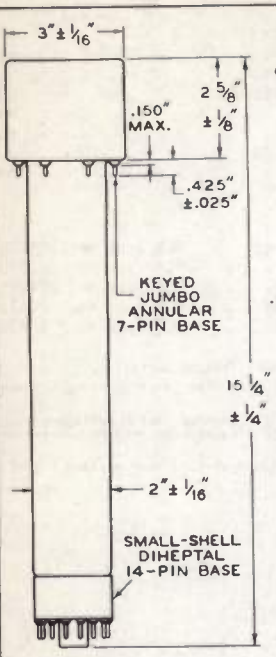
● Adjustable within ± 3 volts of indicated value, with blanking voltage off.

●● Taps at 0, 30, 60, and 90 volts are recommended. Set at voltage giving most uniform resolution and most uniform background shading over entire picture area.

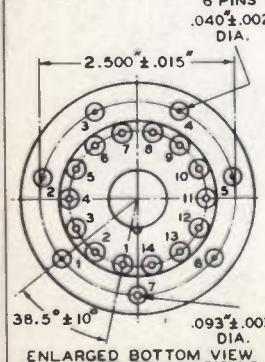
Adjust to give the most uniformly shaded picture near maximum signal.

5655

5655
IMAGE ORTHICON

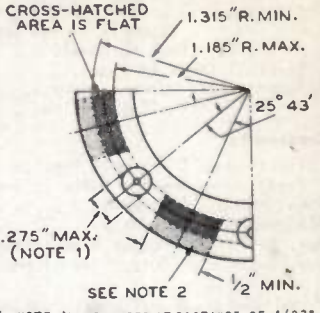


92CM-6878



ENLARGED BOTTOM VIEW

DETAIL OF BOTTOM VIEW OF KEYED JUMBO ANNULAR BASE



NOTE 1: MEASURED AT DISTANCE OF 1/32" BELOW BOTTOM OF ANNULAR BASE.

NOTE 2: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL-BASE END OF TUBE BY 0.060" MAX.

KEYED ANNULAR BASE GAUGE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTOCATHODE CYLINDER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

a. SIX HOLES HAVING DIAMETER OF 0.065" ± 0.001" AND ONE HOLE HAVING DIAMETER OF 0.150" ± 0.001". ALL HOLES HAVE DEPTH OF 0.265" ± 0.001". THE SIX 0.065" HOLES ARE ENLARGED BY 45° TAPER TO DEPTH OF 0.087". ALL HOLES ARE SPACED AT ANGLES OF 51°26' ± 5' ON CIRCLE DIAMETER OF 2.500" ± 0.001".

b. SIX STOPS HAVING HEIGHT OF 0.187" ± 0.001", CENTERED BETWEEN PIN HOLES, TO BEAR AGAINST FLAT AREAS OF BASE.

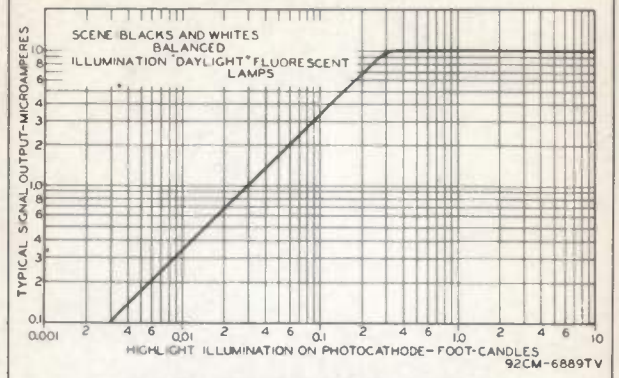
c. RIM EXTENDING OUT A MINIMUM OF 1/8" FROM 2-13/16" DIAMETER AND HAVING HEIGHT OF 0.126" ± 0.001".

d. NECK-CYLINDER CLEARANCE HOLE HAVING DIAMETER OF 2.200" ± 0.001".

5655

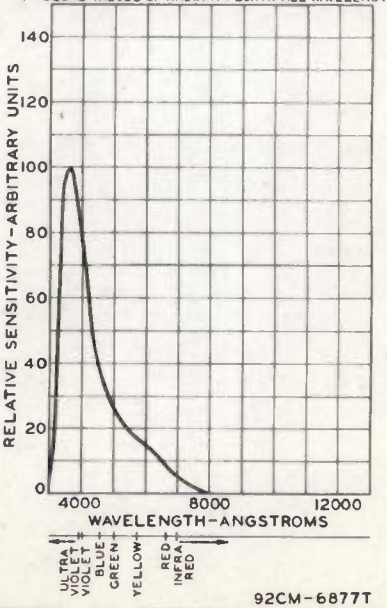
CHARACTERISTIC CURVES

TYPICAL SIGNAL OUTPUT



SPECTRAL SENSITIVITY CHARACTERISTIC

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



PHOTOTUBE SECTION

In this section, data are given for RCA Phototubes which are of two principal groups - gas types and vacuum types. In general, gas types are used in sound reproduction, but because of their high sensitivity, they are also used in many relay applications. The vacuum types are of primary interest to the designer of light-operated relays and light-measuring equipment.

RCA Phototubes include a number of constructions to meet varied equipment requirements and several photosurfaces having different spectral response characteristics.

Requests for further technical data on any RCA tube type should be addressed to the Commercial Engineering Section, RCA Manufacturing Company, Inc., Harrison, N. J.

LIST PRICES□
OF PHOTOTUBE TYPES

- NOTICE -

The OPA requires us to call your attention to the following:

"The suggested retail price (or Fair Trade price) may be charged only by any one reselling this article (or for any article listed in this catalogue or price list or Fair Trade contract for which a retail price is suggested or minimum price is established), if the maximum price for that article as established by the person so reselling under the appropriate OPA regulation, is at least equal to the suggested retail (or Fair Trade) price."

Type	*Price*	
868	$ 3.70	
917	3.40	
918	2.30	
919	~~3.35~~	2.75
920	2.70	
921	2.00	
922	2.00	
923	1.25	
924	2.00	
925	2.00	
926	3.00	
927	~~3.70~~	2.40
928	2.00	
929	3.00	
930	2.00	
931	12.00	
934	2.90	
935	18.00	

□ This price list applies only in the United States of America and is subject to change without notice.

INFORMATION ON PURCHASING ABOVE TYPES

Information as to where *RCA Phototube Types* can be purchased may be obtained from our *district office* nearest you or from *Tube and Equipment Department, RCA VICTOR DIVISION, Radio Corporation of America, Camden, N.J.*

PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS

GENERAL CONSIDERATIONS

The range of luminous-sensitivity limits given for a phototube on the data sheets of this Section is that which the tube will display when operated under low-current conditions.

If the tube is to be operated under conditions approaching its maximum-current rating, the equipment design should provide for a wider sensitivity range having a minimum value equal to one-half of that shown for low-current operation. The sensitivity of a phototube under such high-current conditions is dependent upon the tube type, as follows:

1. **Single-Unit and Twin Phototubes**

   a. **Gas Types:** For high-current operation, and particularly in applications in which the type is subjected to these higher values continuously, a drop in sensitivity below the values for low-current operation may be expected, the extent of the drop being affected by the severity of the operating conditions. After a period of idleness, a gas phototube usually recovers most of its initial sensitivity.

   b. **Vacuum Types:** Unlike gas phototubes, this class of phototubes shows negligible drop in sensitivity values for different degrees of illumination and over long periods of use.

2. **Multiplier Phototubes**

   Although RCA Multiplier Phototubes are vacuum types, a drop in sensitivity is to be expected from this class of phototubes when operated at high anode-current values. The extent of the drop is affected by the nature and severity of the operating conditions to which the tube is subjected. After a period of idleness, the multiplier phototube usually recovers a substantial percentage of this loss of sensitivity.

   Multiplier-phototube-sensitivity values are dependent on the respective amplifications of each dynode stage. Hence, large variations in sensitivity can be expected between individual tubes of a given type. The overall amplification of a multiplier phototube is equal to the average amplification per stage raised to the 9th power. Thus, very small variations in amplification per stage produce very large changes in overall tube amplification.

   Because these overall changes are very large, it is advisable for designers to provide adequate adjustment of the supply voltage per stage so as to be able to adjust the amplification of individual tubes to the desired design value. It is suggested that an overall voltage-adjustment range of at least 2 to 1 be provided. When the output current can be controlled by change in the illumination of the photocathode of the multiplier phototube, the required range of adjustment in the voltage per stage can be reduced.

(continued on next page)

PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS

SENSITIVITY MEASUREMENTS

The luminous-sensitivity values shown on the data pages of this Section are measured according to the following procedures:

1. **Single-Unit and Twin Phototubes**

   a. **Gas Types:** The light source consists of a Mazda projection lamp operating at a filament color temperature of 2870°K. For the 0-cycle measurements, a light input of 0.1 lumen is used, unless otherwise specified. For the 5000- and 10000-cycle measurements, the light input is varied sinusoidally about a mean value of 0.015 lumen from zero to a maximum of twice the mean. For all measurements, a dc anode-supply voltage of 90 volts and a 1.0-megohm load resistor are employed. Under these conditions, the effect of tube capacitance is negligible.

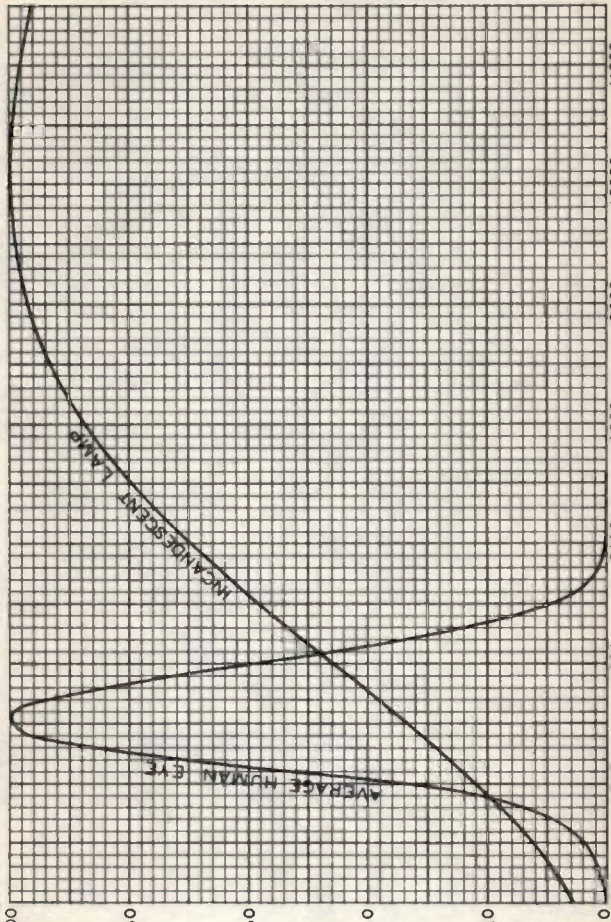
   b. **Vacuum Types:** The light source consists of a Mazda projection lamp operating at a filament color temperature of 2870°K. A steady light input of 0.1 lumen is used, unless otherwise specified, together with a dc anode-supply voltage of 250 volts and a 1-megohm load resistor.

2. **Multiplier Phototubes**

   The light source consists of a Mazda projection lamp operating at a filament color temperature of 2870°K. A light flux of 10 microlumens from a rectangular aperture approximately 0.8" long and 0.2" wide is projected normal to the tube axis in the direction noted on the basing diagram and outline. The load resistor has a value of 0.1 megohm. The applied voltages are specified on the individual data sheets.

SPECTRAL CHARACTERISTIC OF HUMAN EYE & OF TUNGSTEN LAMP AT COLOR TEMPERATURE OF 2870 °K

EYE CURVE IS ON BASIS OF EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



RELATIVE ENERGY DISTRIBUTION OF LAMP-ARBITRARY UNITS

RELATIVE SENSITIVITY OF EYE-ARBITRARY UNITS

OCT. 20, 1947

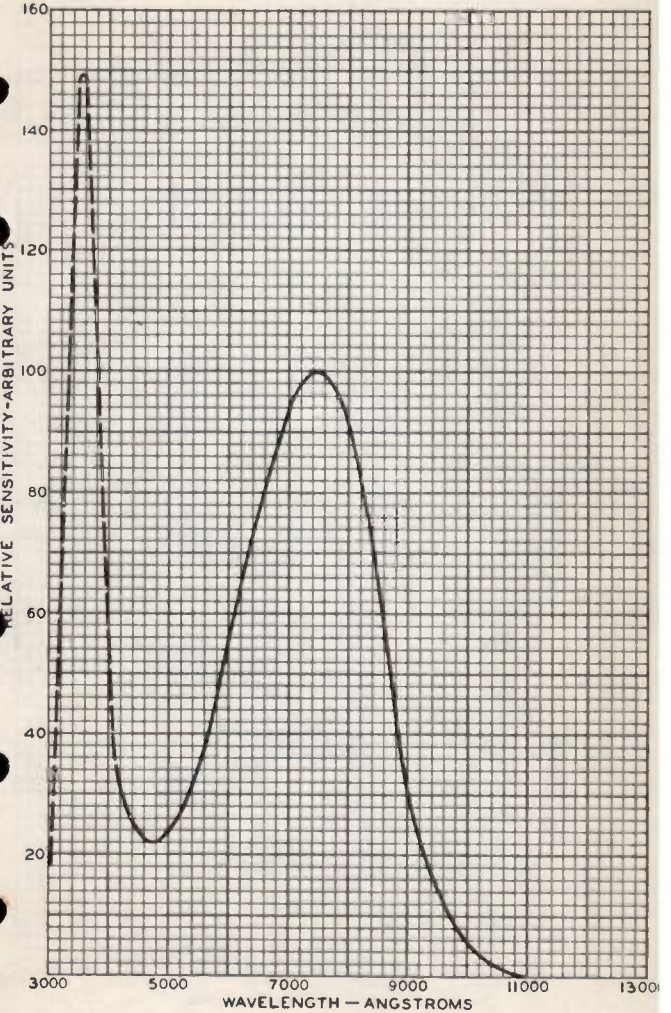
TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6435R1

SPECTRAL SENSITIVITY CHARACTERISTIC OF S1 PHOTOSURFACE IN LIME-GLASS BULB

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



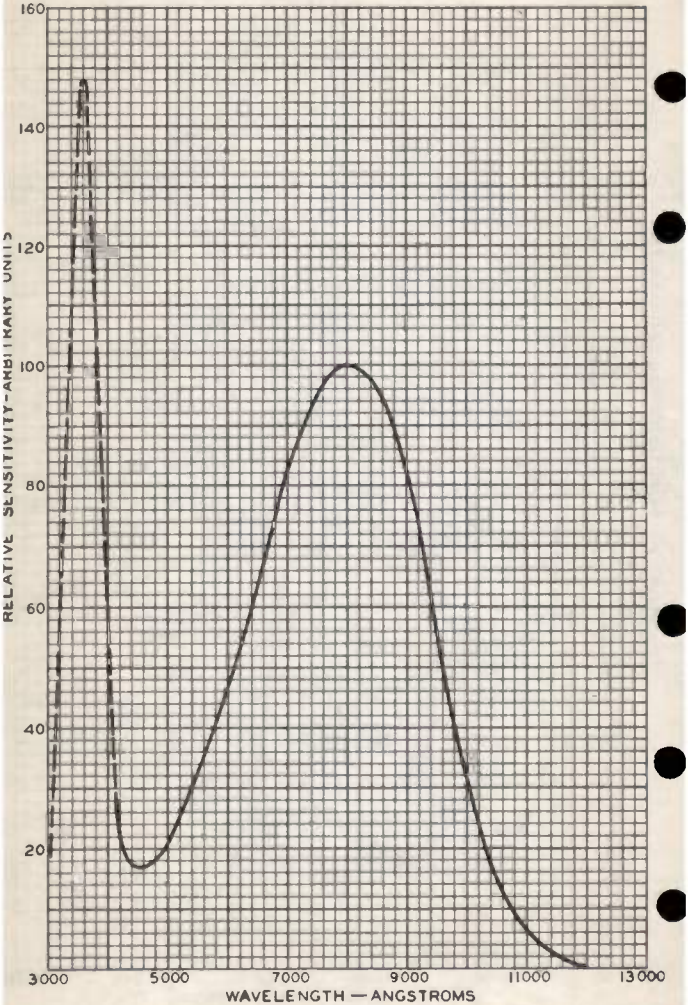
FEB. 18, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6055R4

SPECTRAL SENSITIVITY CHARACTERISTIC OF S2 PHOTOSURFACE IN LIME-GLASS BULB

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



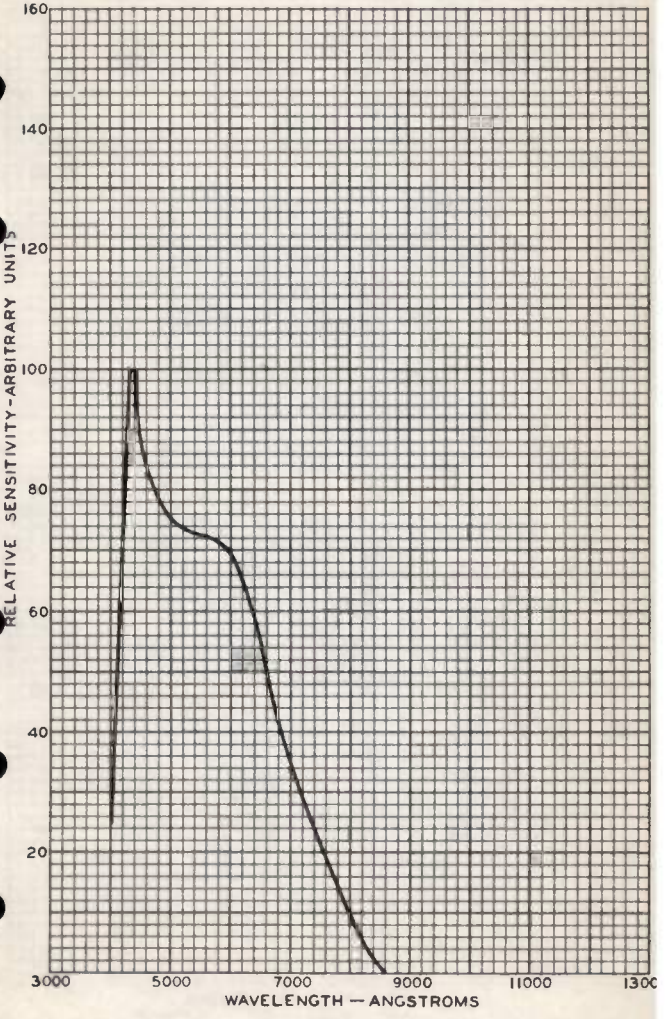
FEB. 18, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6056R3

SPECTRAL SENSITIVITY CHARACTERISTIC OF S3 PHOTOSURFACE IN LIME-GLASS BULB

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



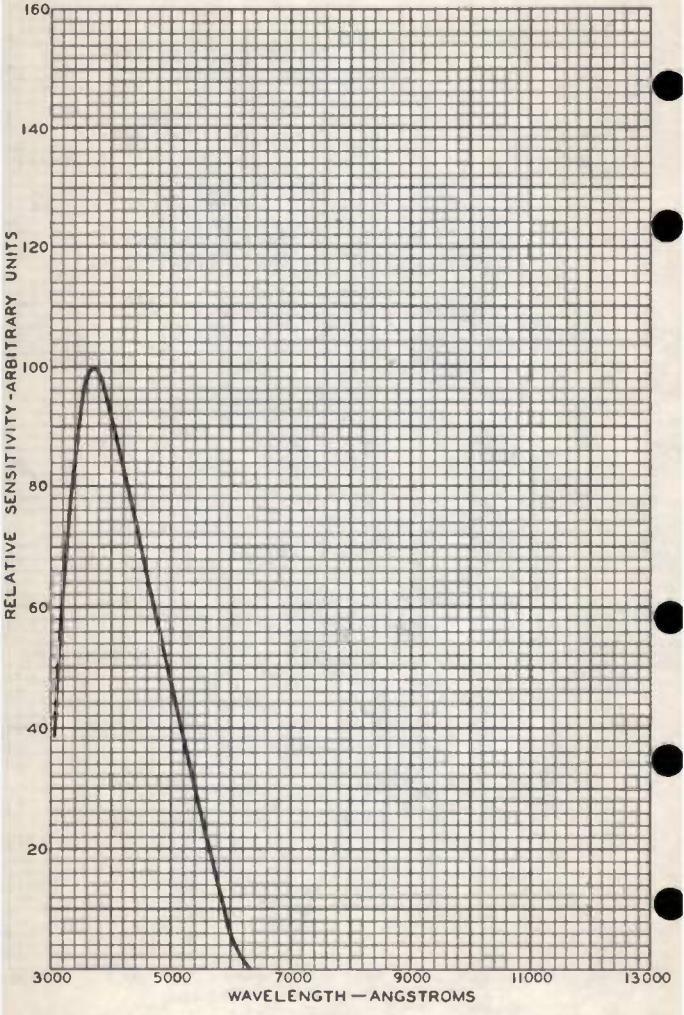
FEB. 18, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6057R3

SPECTRAL SENSITIVITY CHARACTERISTIC OF S4 PHOTOSURFACE IN LIME-GLASS BULB

FOR EQUAL VALUES OF RADIANT FLUX AT ALL WAVELENGTHS



FEB. 18, 1943

RCA VICTOR DIVISION
RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6152R4

1P21
MULTIPLIER PHOTOTUBE
9-STAGE TYPE with S-4 RESPONSE

For applications involving very low light levels◆

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 angstroms ←
Cathode:	
Minimum Projected Length*	15/16"
Minimum Projected Width*	5/16"
Direct Interelectrode Capacitances:	
Anode to Dynode No.9	4 μμf
Anode to All Other Electrodes	6.5 μμf
Maximum Overall Length	3-11/16"
Maximum Seated Length	3-1/8"
Seated Length to Center of Cathode	1-15/16" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Submagnal 11-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	11K

Pin 1 – Dynode No.1
Pin 2 – Dynode No.2
Pin 3 – Dynode No.3
Pin 4 – Dynode No.4
Pin 5 – Dynode No.5
Pin 6 – Dynode No.6

DIRECTION OF LIGHT

Pin 7 – Dynode No.7
Pin 8 – Dynode No.8
Pin 9 – Dynode No.9
Pin 10 – Anode
Pin 11 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 and ANODE (DC or Peak AC)	250 max.	volts
PEAK ANODE CURRENT	1 max.	ma ←
AVERAGE ANODE CURRENT○	0.1 max.	ma ←
AMBIENT TEMPERATURE	75 max.	°C

Characteristics: ←

With 100 volts per dynode stage and 100 volts between dynode No.9 and anode●

	Min.	Av.	Max.	
Anode Dark Current#●	–	–	0.1	μamp
Sensitivity:				
At 4000 Angstroms	–	37000	–	μamp/μwatt
Luminous▲	10	40	–	amp/lumen
Current Amplification■	–	2000000	–	
Luminous Detectivity★	3×10^{-12}	–	–	lumen

◆ For the more usual applications, the 931-A is recommended.

⊕ The use of about 50 volts between dynode No.9 and anode will give improved operating stability without sacrifice in sensitivity as explained in note under Type 931-A.

* On plane perpendicular to indicated direction of incident light.

□ ○ #, ● ▲ ■ ★: See next page.

← Indicates a change.

RCA

1P21

MULTIPLIER PHOTOTUBE

→ **Characteristics:**

With 75 volts per dynode stage and 50 volts between dynode No.9 and anode

	Av.	
Sensitivity:		
At 4000 Angstroms.	5600	μamp/μwatt
Luminous▲.	6	amp/lumen
Current Amplification■	300000	

□ Referred to cathode.

○ Averaged over any interval of 30 seconds maximum.

Dark current due to thermionic emission and ion feedback may be reduced by the use of refrigerants.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and MEASUREMENTS" at the front of this Section.

■ Ratio of anode sensitivity to cathode sensitivity.

▲ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: 100 volts per stage, 25°C tube temperature, bandwidth of 1 cycle per second, tungsten light source at 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OUTLINE DIMENSIONS for Type 1P21
are the same as those for Type 931-A

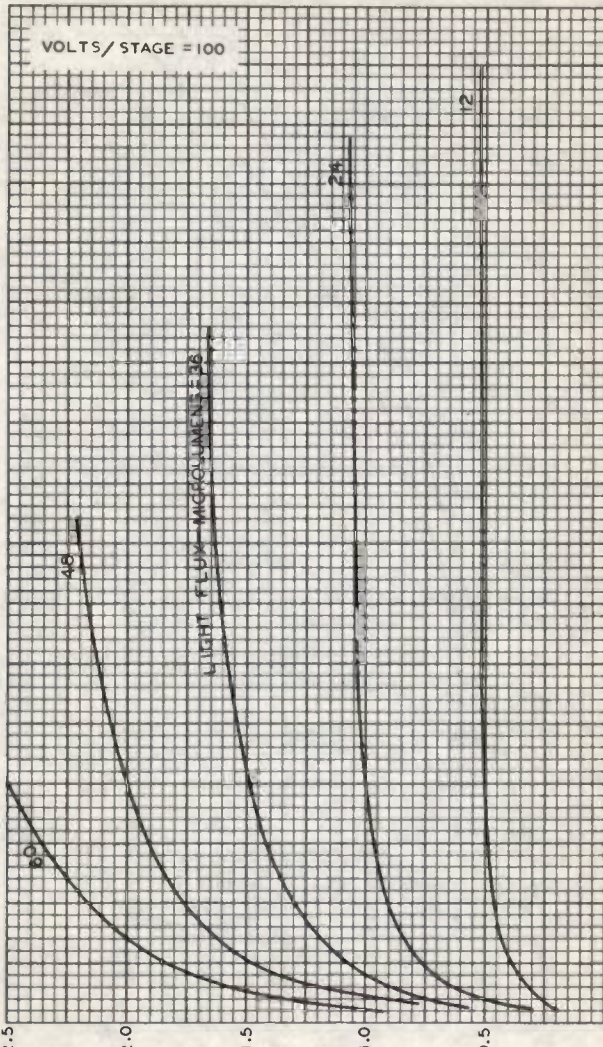
SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section

→ Indicates a change.

RCA

IP21

AVERAGE ANODE CHARACTERISTICS



MAR. 12, 1948

TUBE DEPARTMENT

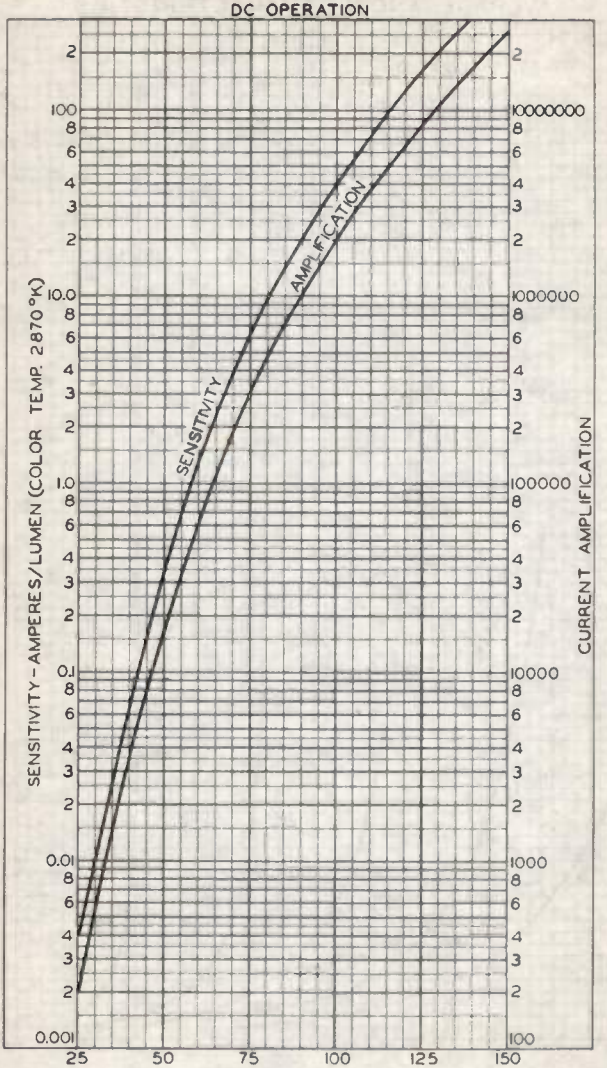
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6456R2

RCA

1P21

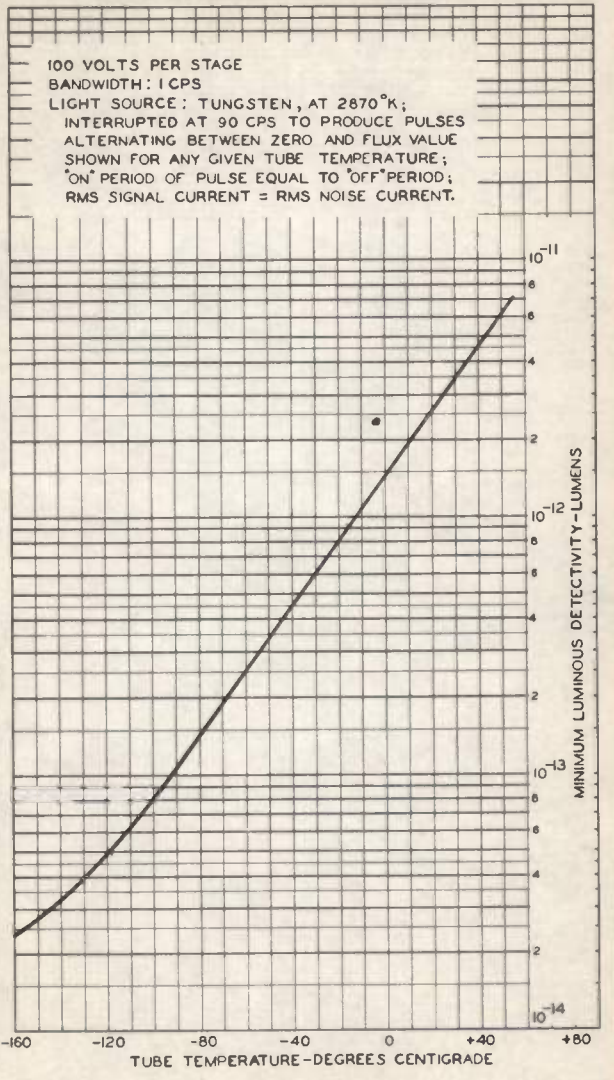
AVERAGE CHARACTERISTICS
DC OPERATION



RCA

IP21

DETECTIVITY CHARACTERISTIC



RCA

IP22

MULTIPLIER PHOTOTUBE

9-STAGE TYPE WITH S-8 RESPONSE

DATA

General:

Spectral Response	S-8
Wavelength of Maximum Response	4200 ± 500 angstroms ←
Cathode:	
Minimum Projected Length"	15/16"
Minimum Projected Width*	5/16"
Direct Interelectrode Capacitances:	
Anode to Dynode No. 9	4 μμf
Anode to All Other Electrodes	6.5 μμf
Maximum Overall Length	3-11/16"
Maximum Seated Length	3-1/8"
Seated Length to Center of Cathode	1-15/16" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Submagnal 11-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	11K

Pin 1- Dynode No.1
Pin 2- Dynode No.2
Pin 3- Dynode No.3
Pin 4- Dynode No.4
Pin 5- Dynode No.5
Pin 6- Dynode No.6

DIRECTION OF LIGHT

Pin 7- Dynode No.7
Pin 8- Dynode No.8
Pin 9- Dynode No.9
Pin 10- Anode
Pin 11- Cathode

Maximum Ratings, *Absolute Values:*

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 and ANODE (DC or peak AC)	250 max.	volts
PEAK ANODE CURRENT	10 max.	ma ←
AVERAGE ANODE CURRENT○	1 max.	ma ←
AMBIENT TEMPERATURE	50 max.	°C

Characteristics: ←

With 100 volts per dynode stage and 100 volts between dynode No.9 and anode●

	Min.	Av.	Max.	
Anode Dark Current#●	–	–	0.25	μamp
Sensitivity:				
At 4200 Angstroms	–	370	–	μamp/μwatt
Luminous▲	0.115	0.6	50	amp/lumen
Current Amplification■	–	200000	–	
Luminous Detectivity★	1×10^{-10}	–	–	lumen

● The use of about 50 volts between dynode No.9 and anode will give improved operating stability without sacrifice in sensitivity as explained in note under Type 931-A.

* On plane perpendicular to indicated direction of incident light.

□ Referred to cathode.

○, #, ●, ▲, ■, ★: See next page. ← Indicates a change.

1P22
MULTIPLIER PHOTOTUBE

→ **Characteristics:**

With 75 volts per dynode stage and 50 volts between dynode No.9 and anode

	Av.	
Sensitivity:		
At 4200 Angstroms.	55	μamp/μwatt
Luminous▲	0.09	amp/lumen
Current Amplification■	30000	

° Averaged over any interval of 30 seconds maximum.

ǂ Dark current due to thermionic emission and ion feedback may be reduced by the use of refrigerants.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS" at the front of this Section.

■ Ratio of anode sensitivity to cathode sensitivity.

✎ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: 100 volts per stage, 25°C tube temperature, bandwidth of 1 cycle per second, tungsten light source at 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

OUTLINE DIMENSIONS for Type 1P22
are the same as those for Type 931-A

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-8 Response
is shown at the front of this Section

→ Indicates a change.

RCA

IP22

AVERAGE ANODE CHARACTERISTICS

MAR. 12, 1948

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6585R1

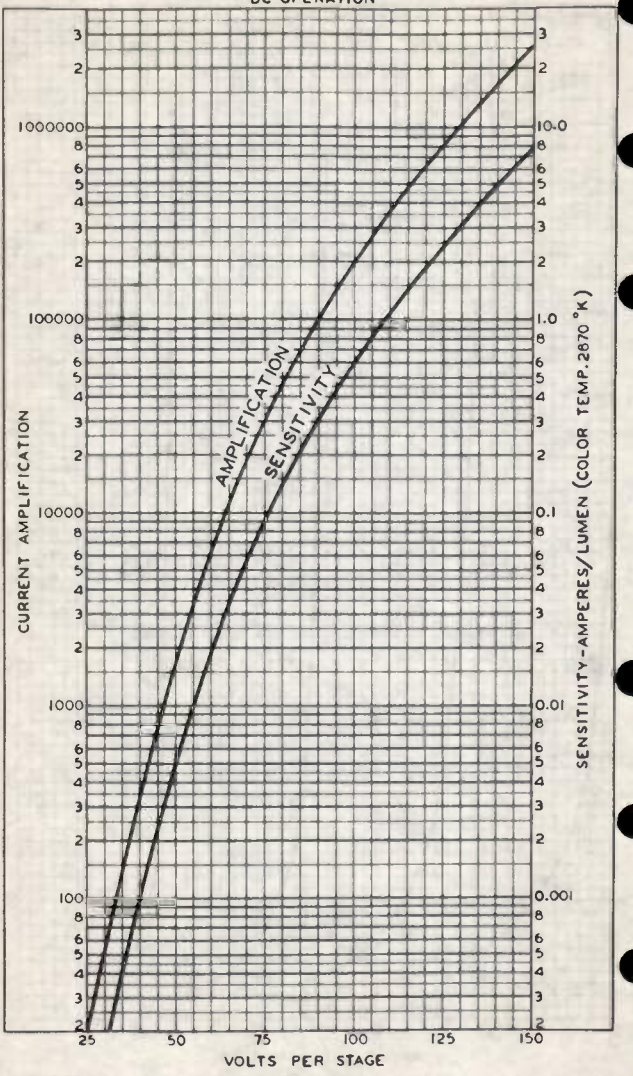
1P22

RCA

1P22

AVERAGE CHARACTERISTIC

DC OPERATION



JUNE 15, 1945

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6586

IP28

MULTIPLIER PHOTOTUBE

9-STAGE TYPE WITH S-5 RESPONSE

DATA

General:

Spectral Response	S-5
Wavelength of Maximum Response	3400 ± 500 angstroms ←
Cathode:	
Minimum Projected Length*	15/16"
Minimum Projected Width*	5/16"
Direct Interelectrode Capacitances:	
Anode to Dynode No.9	4 μμf
Anode to All Other Electrodes	6.5 μμf
Maximum Overall Length	3-11/16"
Maximum Seated Length	3-1/8"
Seated Length to Center of Cathode	1-15/16" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Submagnal 11-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	11K

Pin 1- Dynode No.1
Pin 2- Dynode No.2
Pin 3- Dynode No.3
Pin 4- Dynode No.4
Pin 5- Dynode No.5
Pin 6- Dynode No.6

DIRECTION OF LIGHT

Pin 7- Dynode No.7
Pin 8- Dynode No.8
Pin 9- Dynode No.9
Pin 10- Anode
Pin 11- Cathode

Maximum Ratings, *Absolute Values:*

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 and ANODE (DC or Peak AC)	250 max.	volts
PEAK ANODE CURRENT	5 max.	ma ←
AVERAGE ANODE CURRENT○	0.5 max.	ma ←
AMBIENT TEMPERATURE	75 max.	°C

Characteristics: ←

With 100 volts per dynode stage and 100 volts between dynode No.9 and anode⊕

	Min.	Av.	Max.	
Anode Dark Current#●	–	–	0.25	μamp
Sensitivity:				
At 3400 Angstroms	–	5665	–	μamp/μwatt
Luminous▲	0.45	5	300	amp/lumen
Current Amplification■	–	250000	–	
Luminous Detectivity▲	1×10^{-11}	–	–	lumen
Ultraviolet Detectivity●●	1.5×10^{-14}	–	–	watt

⊕ The use of about 50 volts between dynode No.9 and anode will give improved operating stability without sacrifice in sensitivity, as explained in note under Type 931-A.

* On plane perpendicular to indicated direction of incident light.

#,○,●,▲,■,◆,□,●●: See next page.

← Indicates a change.

1P28
MULTIPLIER PHOTOTUBE

→ **Characteristics:**

With 75 volts per dynode stage
and 50 volts between dynode No.9 and anode

	Av.	
Sensitivity:		
At 3400 Angstroms ▲	850	μamp/μwatt
Luminous ▲	0.75	amp/lumen
Current Amplification ■	37500	

○ Averaged over any interval of 30 seconds maximum.

Dark current due to thermionic emission and ion feedback may be reduced by the use of refrigerants.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY AND SENSITIVITY MEASUREMENTS" at the front of this Section.

■ Ratio of anode sensitivity to cathode sensitivity.

□ Referred to cathode.

▲ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: 100 volts per stage, 25°C tube temperature, bandwidth of 1 cycle per second, tungsten light source at 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

●● Conditions same as for (▲) except that use is made of a monochromatic source having radiation at 2537 angstroms.

OUTLINE DIMENSIONS for Type 1P28
are the same as those for Type 931-A

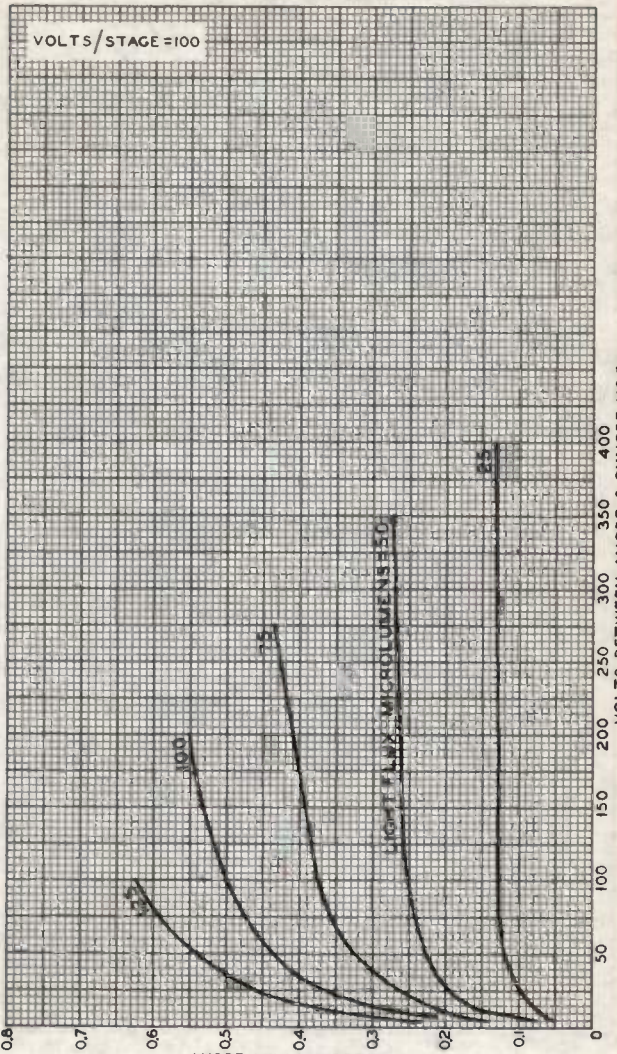
SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-5 Response
is shown at the front of this Section

→ Indicates a change.

RCA

IP28

AVERAGE ANODE CHARACTERISTICS



NOV. 14, 1947

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

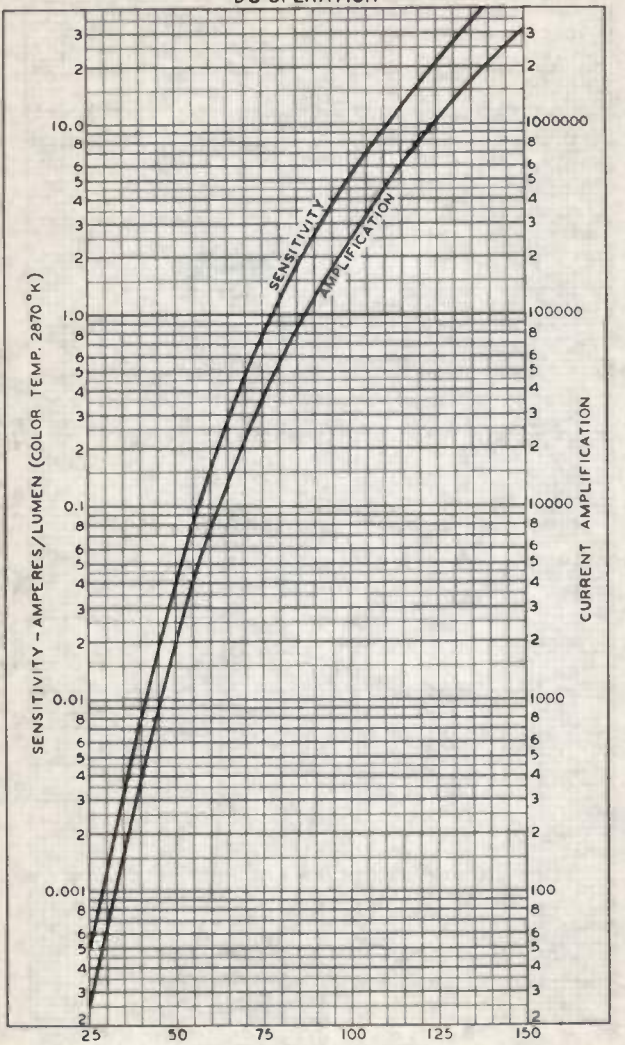
92CM-6632R1

RCA

IP28

AVERAGE CHARACTERISTICS

DC OPERATION



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

IP42

VACUUM PHOTOTUBE

END TYPE WITH S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 angstroms
Cathode:	
Shape	Circular
Window Area	0.030 sq. in.
Minimum Diameter	0.19"
Direct Interelectrode Capacitance	1.2 μμf
Overall Length	1-11/32" ± 1/16"
Maximum Diameter	1/4"
Bulb	T-2
Mounting Position	Any

TERMINAL CONNECTIONS

Small End: Anode

Large End: Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	180 max.	volts
PEAK CATHODE CURRENT	1.5 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT[O]	0.4 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	Av.	Max.	
Dark Current at 180 Volts	–	–	0.005	μamp ←
Sensitivity:				
At 4000 Angstroms	–	0.020	–	μamp/μwatt
Luminous[▲]	13	25	50	μamp/lumen

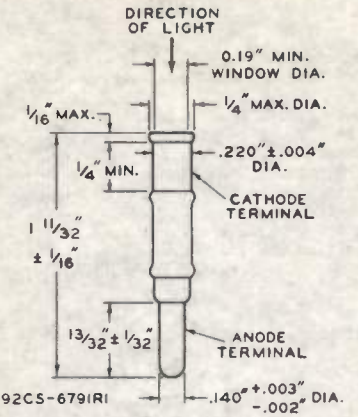
[O] Averaged over any interval of 30 seconds maximum.

[▲] Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and SENSITIVITY MEASUREMENTS", at the front of this Section, except that the anode supply is 180 volts and the light flux is 0.015 lumen. ←

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section

←Indicates a change.

1P42
VACUUM PHOTOTUBE



NOTE: WHEN TUBE IS ROTATED ABOUT THE LONGITUDINAL AXIS OF ITS CATHODE TERMINAL, NO PART OF THE ANODE TERMINAL WILL FALL OUTSIDE OF CIRCLE 0.241" DIA. CONCENTRIC WITH THE LONGITUDINAL AXIS OF THE CATHODE TERMINAL.

868

GAS PHOTOTUBE

Cathode	Semi-cylindrical
Photosurface	S1
Window Area	1.0 sq. in. ←
Direct Interelectrode Capacitance	3.0 μμf ←
Maximum Overall Length	4-1/8"
Maximum Seated Height	3-1/2"
Maximum Diameter	1-3/16"
Bulb (lime glass)	T-8
Base	Tapered Small 4-Pin
Pin 1 - No Connection	Pin 3 - No Connection
Pin 2 - Anode (+)	Pin 4 - Cathode (-)
Mounting Position	Any

BOTTOM VIEW

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	90 max.	volts
Anode Current•	20 max.	μamp.
Ambient Temperature	100 max.	°C ←
Luminous Sensitivity:*		←
At 0 cycles	90	μamp./lumen
At 5000 cycles	77	μamp./lumen
At 10000 cycles	67	μamp./lumen
Sensitivity at 7500 Angstroms	0.0105	μamp./μwatt ←
Gas Amplification Factor	Not over 8	←
D-C Resistance of Load:		←
With anode-supply voltage of 75 volts or less		
For d-c currents above 3.5 μamp.	0.1 min.	megohm
For d-c currents below 3.5 μamp.	No Minimum	
With anode-supply voltage of 90 volts		
For d-c currents above 2 μamp.	2.5 min.	megohms
For d-c currents below 2 μamp.	0.1 min.	megohm

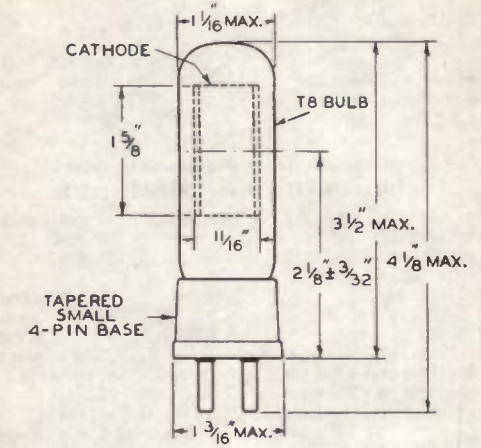
• On basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

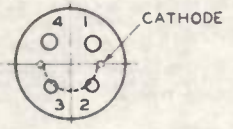
Spectral Sensitivity Characteristic of S1 Photosurface in lime-glass bulb is shown at beginning of this section.

← Indicates a change.

868

GAS PHOTOTUBE





925-470R3

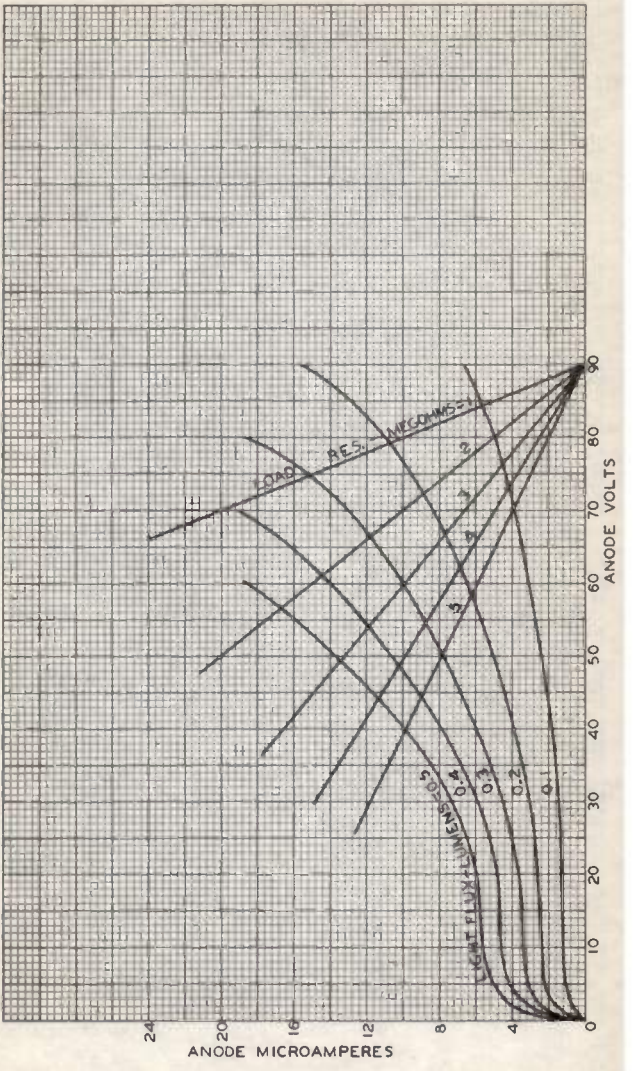
BOTTOM VIEW

→ Indicates a change.

RCA

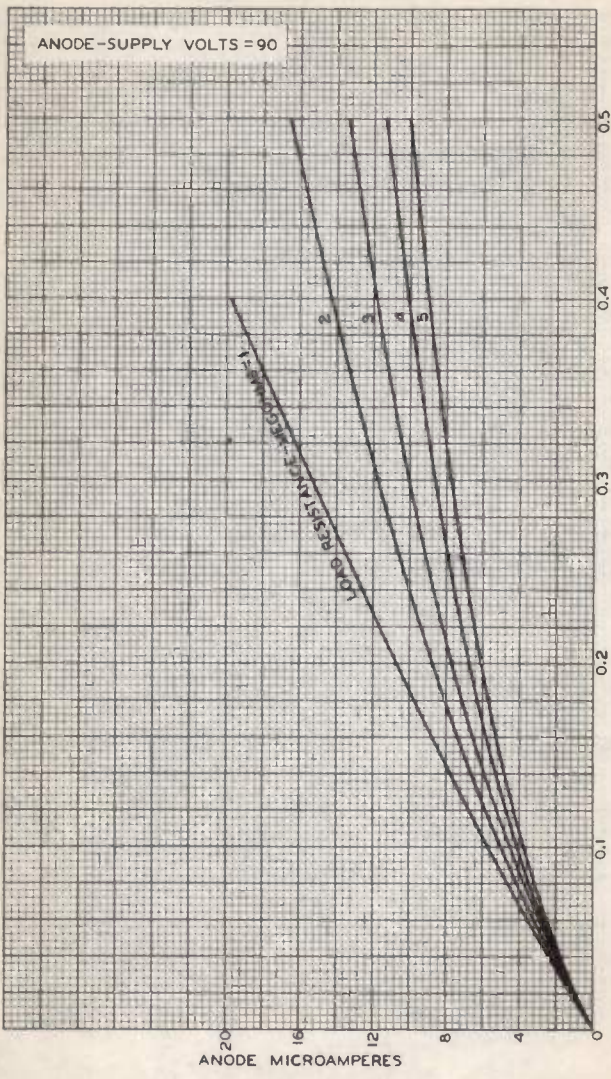
868

AVERAGE ANODE CHARACTERISTICS



868

AVERAGE CHARACTERISTICS



DEC. 14, 1934

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

925-5216RI

917

HIGH-VACUUM PHOTOTUBE

WITH ANODE TERMINAL CAP

Cathode	Semi-cylindrical
Photosurface	S2
Window Area	1.0 sq.in. ←
Direct Interelectrode Capacitance	2.0 μμf ←
Maximum Overall Length	4-3/16" to 4-7/16"
Maximum Seated Height	3-9/16" to 3-13/16"
Maximum Diameter	1-3/16"
Bulb (lime glass)	T-8
Cap	Small Metal
Base	Tapered Small 4-Pin
Pin 1 - No Connection	Pin 4 - Cathode (-)
Pin 2 - No Connection	Cap - Anode (+)
Pin 3 - No Connection	
Mounting Position	Any

BOTTOM VIEW

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	500 max.	volts
Anode Current●	30 max.	μamp.
Ambient Temperature	100 max.	°C ←
Luminous Sensitivity*	20	μamp./lumen
Sensitivity at 8000 Angstroms	0.0020	μamp./μwatt
D-C Resistance of Load:		
With anode-supply voltage of 250 volts	1 min.	megohm
With anode-supply voltage of 500 volts	10 min.	megohms

● On the basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

OUTLINE DIMENSIONS
for the 917 are the same as those for the 919.

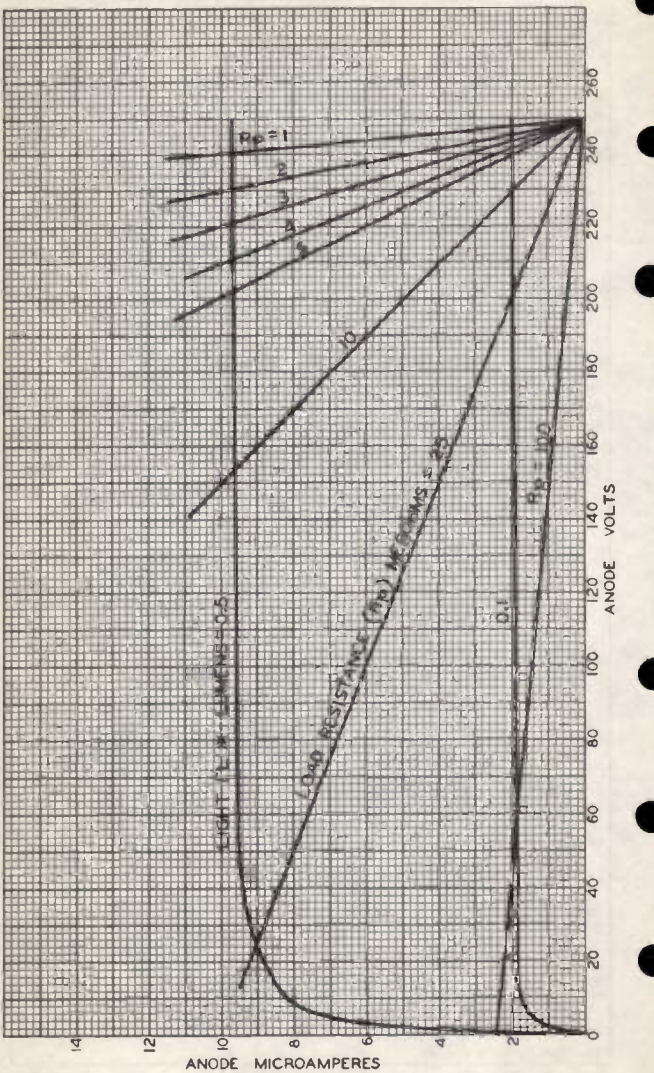
Spectral Sensitivity Characteristic of S2 Photosurface in lime-glass bulb is shown at beginning of this section.

← Indicates a change.

RCA

917

AVERAGE ANODE CHARACTERISTICS



918

GAS PHOTOTUBE

Cathode	Semi-cylindrical
Photosurface	S2
Window Area	1 sq. in.
Direct Interelectrode Capacitance	3.0 μμf
Maximum Overall Length	4-1/8"
Maximum Seated Height	3-1/2"
Maximum Diameter	1-3/16"
Bulb (lime glass)	T-8
Base	Tapered Small 4-Pin
Pin 1-No Connection	Pin 3-No Connection
Pin 2-Anode (+)	Pin 4-Cathode (-)
Mounting Position	Any

BOTTOM VIEW

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	90 max.	volts
Anode Current•	20 max.	μamp.
Ambient Temperature	100 max.	°C
Luminous Sensitivity:*		
At 0 cycles	150	μamp./lumen
At 5000 cycles	120	μamp./lumen
At 10000 cycles	105	μamp./lumen
Sensitivity at 8000 Angstroms	0.0145	μamp./μwatt
Gas Amplification Factor	Not over 10.5	
D-C Resistance of Load:		
With anode-supply voltage of 75 volts or less		
For d-c currents above 3.5 μamp.	0.1 min.	megohm
For d-c currents below 3.5 μamp.	No Minimum	
With anode-supply voltage of 90 volts		
For d-c currents above 2.0 μamp.	4.0 min.	megohms
For d-c currents below 2.0 μamp.	1.0 min.	megohm

• On the basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

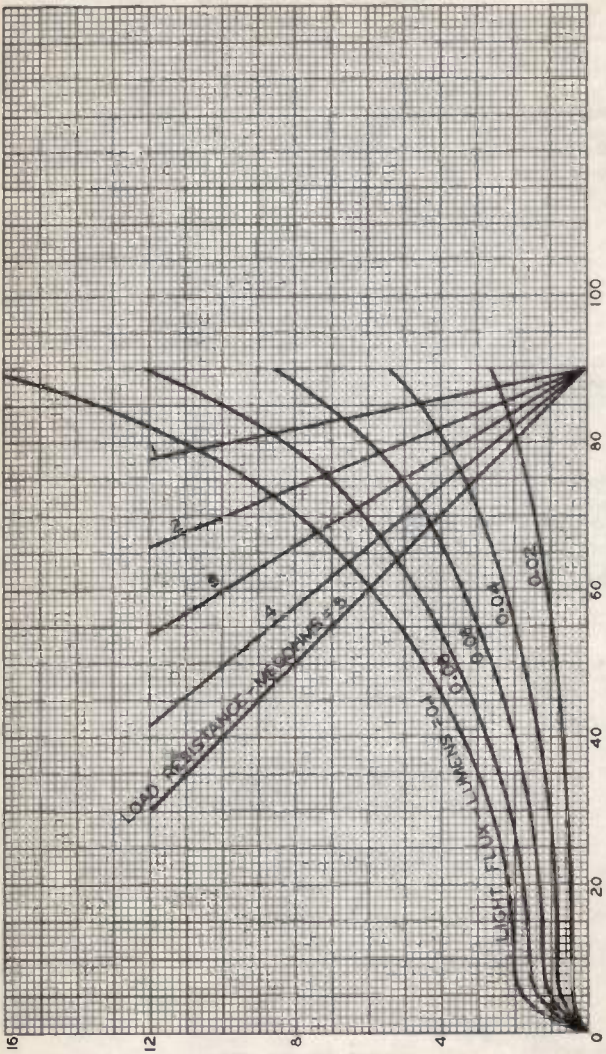
OUTLINE DIMENSIONS
for the 918 are the same as those for the 868.

Spectral Sensitivity Characteristic of S2 Photosurface in lime-glass bulb is shown at beginning of this section.

→← Indicates a change.

918

AVERAGE ANODE CHARACTERISTICS



919

HIGH-VACUUM PHOTOTUBE

WITH CATHODE TERMINAL CAP

Cathode	Semi-cylindrical
Photosurface	S2
Window Area	1.0 sq.in. ←
Direct Interelectrode Capacitances	2.0 μμf ←
Overall Length	4-3/16" to 4-7/16"
Seated Height	3-9/16" to 3-13/16"
Maximum Diameter	1-3/16"
Bulb (lime glass)	T-8
Cap	Small Metal
Base	Tapered Small 4-Pin
Pin 1-No Connection	Pin 4-No Connection
Pin 2-Anode (+)	Cap -Cathode (-)
Pin 3-No Connection	
Mounting Position	Any

BOTTOM VIEW

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	500 max.	volts
Anode Current•	30 max.	μamp.
Ambient Temperature	100 max.	°C ←
Luminous Sensitivity*	20	μamp./lumen
Sensitivity at 8000 Angstroms	0.0020	μamp./μwatt
D-C Resistance of Load:		
With anode-supply voltage of 250 volts	1 min.	megohm
With anode-supply voltage of 500 volts	10 min.	megohms

• On the basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

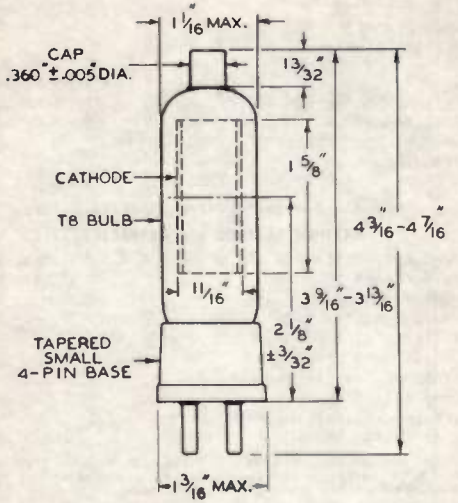
CURVES
for the 919 are the same as those for the 917.

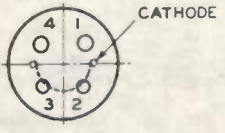
Spectral Sensitivity Characteristic of S2 Photosurface in lime-glass bulb is shown at beginning of this section.

← Indicates a change.

919

HIGH-VACUUM PHOTOTUBE





92C-4359R3

BOTTOM VIEW

→ Indicates a change.

920

TWIN PHOTOTUBE

GAS TYPE

Cathodes	Quarter-cylindrical, caesium-coated
Cathode Window Area (Each unit)	0.31 sq. in.
Direct Interelectrode Capacitances:	
Anode to Cathode (Each unit)	1.5 μμf
Between Cathodes	1.6 μμf
Between Anodes	0.35 μμf
Maximum Overall Length	4"
Maximum Diameter	1-3/16"
Bulb	T-9
Base	Small 4-pin

MAXIMUM RATINGS and CHARACTERISTICS

All values are for each unit

Anode-Supply Voltage (D.C. or Peak A.C.)	90 max.	volts
Ambient Temperature	50 max.	°C
Sensitivity: *		
At 100 cycles	75	μamp./lumen
At 1000 cycles	70	μamp./lumen
At 5000 cycles	63	μamp./lumen
Gas Amplification Factor **	Not over 10	
D-C Resistance of Load:		

With anode-supply voltage of 90 volts

For d-c currents { greater than 2.5 μamp. — 4 min. megohms
{ less than 2.5 μamp. — No minimum

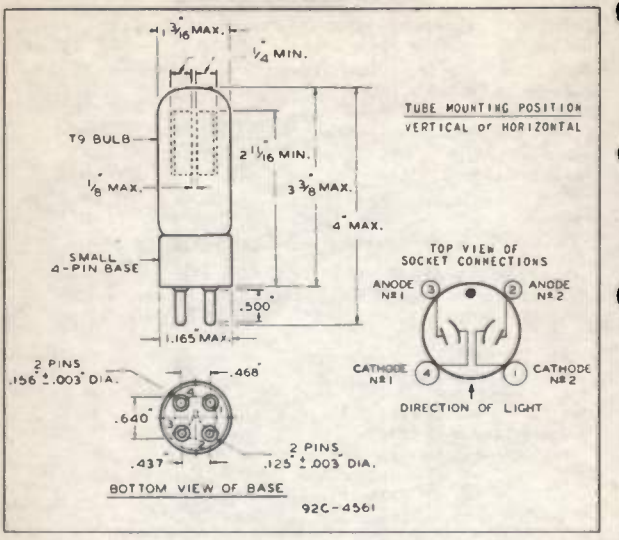
* Sensitivity is measured with a light input varied sinusoidally about a mean value from zero to a maximum of twice the mean. The sensitivity values shown are the ratios of the amplitude of variation in the current output to the amplitude of variation in the light input. The method of sensitivity measurement used is based on the approximation that sensitivity at 100 cycles is equal to sensitivity at 0 cycles. The measurements were made with a 90-volt supply, a 1-megohm load, and a mean light input of 0.015 lumen. The light source was a Mazda projection lamp operated at a filament color temperature of 2870 degrees Kelvin. The effect of interelectrode capacitance was made negligible. ←

** Gas Amplification Factor is given as a ratio of sensitivity at maximum anode voltage to sensitivity at a voltage sufficiently low (approximately 25 volts) to eliminate gas ionization effects.

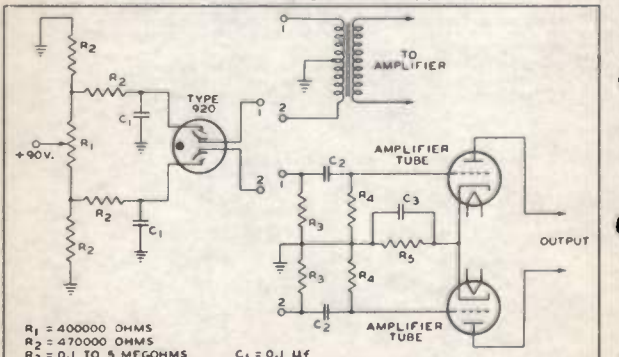
Indicates a change.

920

TWIN PHOTOTUBE



TYPICAL CIRCUIT FOR THE 920 WITH EITHER TRANSFORMER OR RESISTANCE COUPLING FOR SOUND-ON-FILM REPRODUCTION



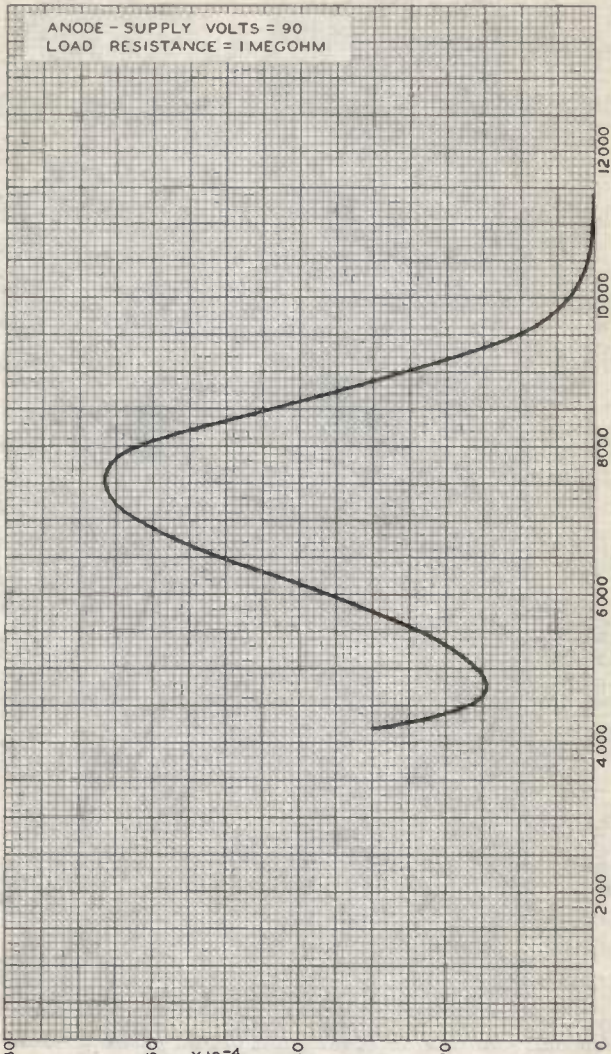
R_1 = 400000 OHMS
R_2 = 470000 OHMS
R_3 = 0.1 TO 5 MEGOHMS
R_4 = 1.0 TO 5 MEGOHMS
R_5 = SELF-BIAS RESISTOR
C_1 = 0.1 μf
C_2 = 0.1 TO 1.0 μf
C_3 = BY-PASS CONDENSER

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

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

920

SPECTRAL SENSITIVITY CHARACTERISTICS



MAY 21, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

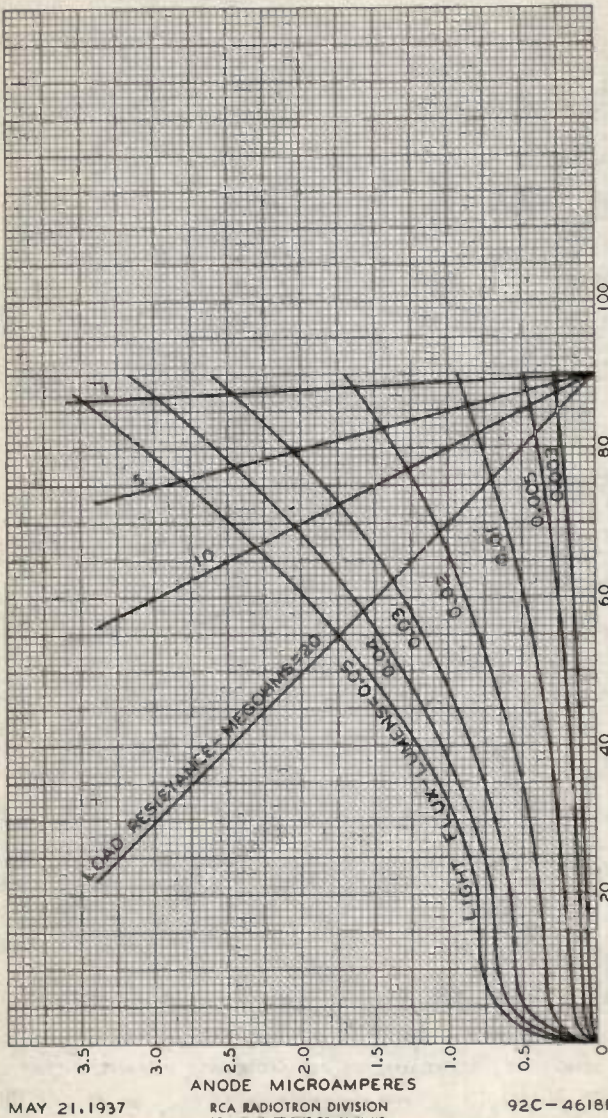
92C-4617R1

920

RCA

920

AVERAGE ANODE CHARACTERISTICS



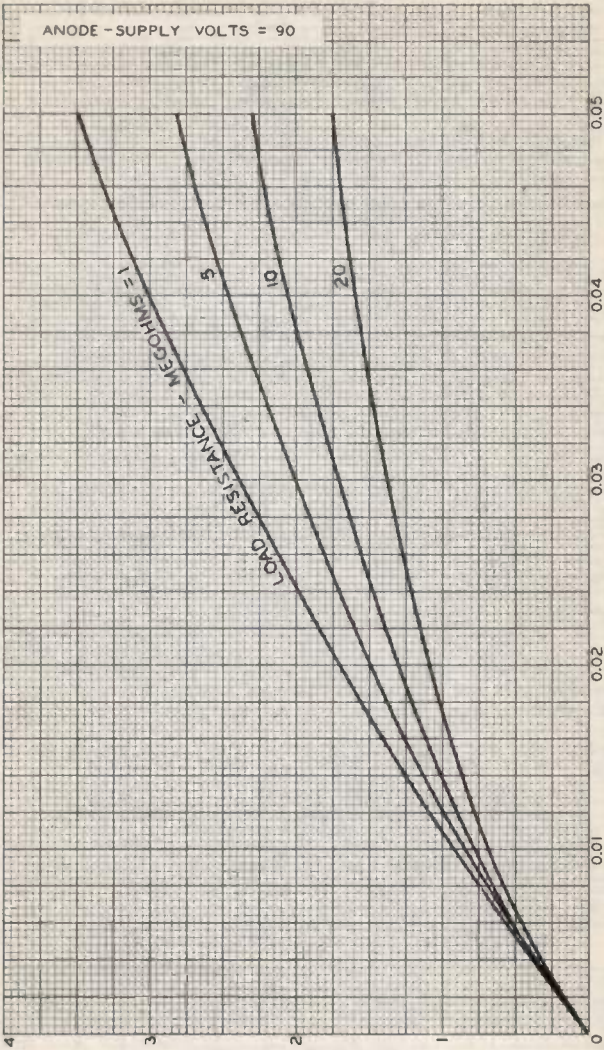
MAY 21, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4618R1

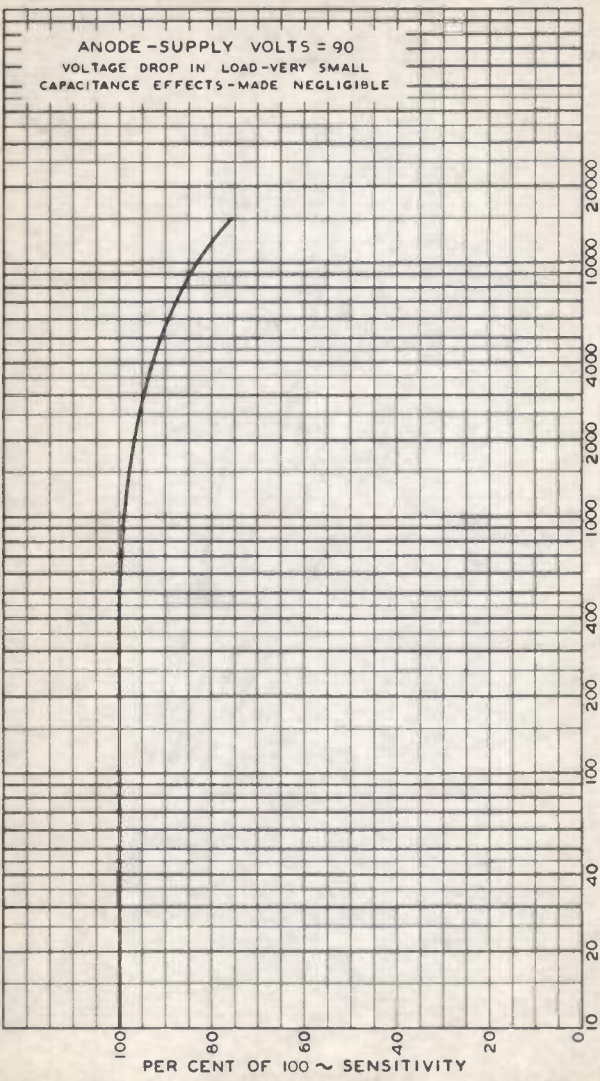
920

AVERAGE CHARACTERISTICS



920

AVERAGE SENSITIVITY CHARACTERISTIC



NOV. 26, 1937

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY INC.

92C-4823

921
GAS PHOTOTUBE

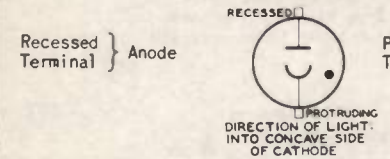
CARTRIDGE TYPE WITH S-1 RESPONSE

DATA

General:

Spectral Response	S-1
Wavelength of Maximum Response	8000 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	7/8"
Minimum Projected Width*	1/2"
Direct Interelectrode Capacitance	1.0 μμf
Overall Length	1-21/32" ± 1/16"
Seated Length	1-13/32" ± 1/32"
Length, Cathode Center to plane A-A' (See Outline)	11/16" ± 1/16"
Maximum Diameter	0.890"
Mounting Position	Any
Terminal Caps	See Outline

BOTTOM VIEW



Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	90 max.	volts
PEAK CATHODE CURRENT	10 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	3 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	Av.	Max.	
Dark Current at 90 Volts	–	–	0.1	μamp
Sensitivity:				
At 8000 Angstroms	–	0.0135	–	μamp/μwatt
Luminous:▲				
At 0 Cycles	75	135	205	μamp/lumen
At 5000 Cycles	–	119	–	μamp/lumen
At 10000 Cycles	–	108	–	μamp/lumen
Gas Amplification Factor	–	–	10	

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 70 volts.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and SENSITIVITY MEASUREMENTS", at the front of this Section.

← Indicates a change.

921
GAS PHOTOTUBE

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 70 volts or less:

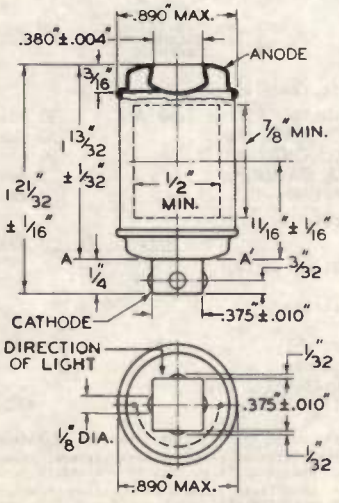
For dc currents { above 3 μamp . . . 0.1 . . . megohm
below 3 μamp . . . No Minimum

With anode-supply voltage of 90 volts:

For dc currents { above 2 μamp . . . 2.5 . . . megohms
below 2 μamp . . . 0.1 . . . megohm

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-1 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the front of this Section

AVERAGE ANODE CHARACTERISTICS
of Type 921 are the same
as those shown under Type 930



CATHODE-END VIEW

92CM-4789R4

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

922

HIGH-VACUUM PHOTOTUBE

CARTRIDGE TYPE

Cathode	Semi-cylindrical	
Photosurface		S2
Window Area		0.4 sq. in.
Direct Interlectrode Capacitance		0.5 μμf
Overall Length		1-21/32 ± 1/16"
Maximum Diameter		15/16"
Bulb		Lime glass
Terminal Connections (see outline drawing)		Special
Terminal Mounting		RCA Stock No. 9926
Mounting Position		Any

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	500 max.	volts
Anode Current●	30 max.	μamp.
Ambient Temperature	100 max.	°C
Luminous Sensitivity*	20	μamp./lumen
Sensitivity at 8000 Angstroms	0.0020	μamp./μwatt
D-C Resistance of Load:		
With Anode-supply voltage of 250 volts	1 min.	megohm
With anode-supply voltage of 500 volts	10 min.	megohms

● On the basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

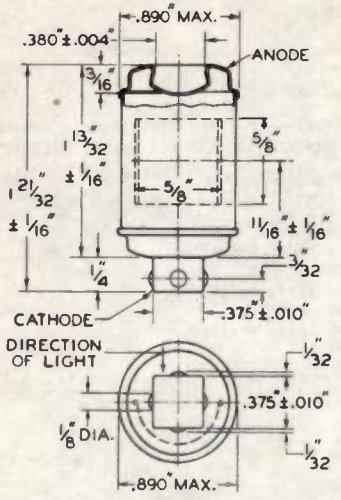
CURVES
for the 922 are the same as those for the 917.

Spectral Sensitivity Characteristic of S2 Photosurface in lime-glass bulb is shown at beginning of this section.

→ Indicates a change.

922

HIGH-VACUUM PHOTOTUBE



CATHODE-END VIEW

92C-4818R1

← Indicates a change.

923

GAS PHOTOTUBE

Cathode	Semi-cylindrical
Photosurface	S2
Window Area	0.4 sq.in.
Direct Interelectrode Capacitance	2 μμf
Maximum Overall Length	3-9/16"
Maximum Seated Height	2-15/16"
Maximum Diameter	1-3/16"
Bulb (lime glass)	T-9
Base	Small 4-Pin
Pin 1-No Connection	Pin 3-No Connection
Pin 2-Anode (+)	Pin 4-Cathode (-)
Mounting Position	Any

BOTTOM VIEW

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	90 max.	volts
Anode Current●	20 max.	μamp.
Ambient Temperature	100 max.	°C
Luminous Sensitivity:*		
At 0 cycles	135	μamp./lumen
At 5000 cycles	111	μamp./lumen
At 10000 cycles	101	μamp./lumen
Sensitivity at 8000 Angstroms	0.0130	μamp./μwatt
Gas Amplification Factor	Not over 10	
D-C Resistance of Load:		
With anode-supply voltage of 75 volts or less		
For d-c currents above 3.5 μamp.	0.1 min.	megohm
For d-c currents below 3.5 μamp.	No Minimum	
With anode-supply voltage of 90 volts		
For d-c currents above 2 μamp.	4 min.	megohms
For d-c currents below 2 μamp.	1 min.	megohm

● On the basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

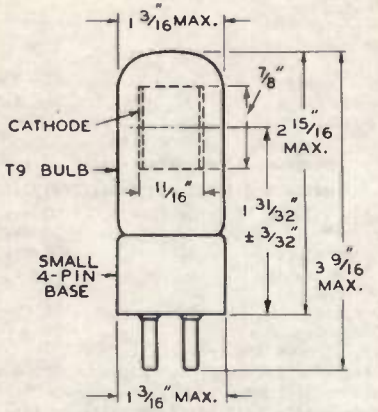
CURVES
for the 923 are the same as those for the 930.

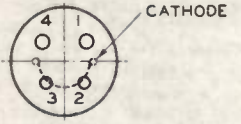
Spectral Sensitivity Characteristic of S2 Photosurface in lime-glass bulb is shown at beginning of this section.

← Indicates a change.

923

GAS PHOTOTUBE





BOTTOM VIEW

92C-4788R2

← Indicates a change.

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

924

GAS PHOTOTUBE

END TYPE FOR RELAY SERVICE

Cathode	Circular
Photosurface	S1
Window Area	0.2 sq.in.
Direct Interelectrode Capacitance	2.6 μμf
Maximum Overall Length	2-3/16"
Maximum Diameter	13/16"
Bulb (lime glass)	T-6
Base	Intermediate Screw
Terminal Connections (see outline drawing)	
Mounting Position	Any

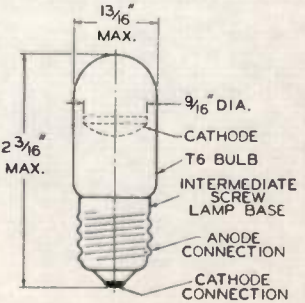
Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C or Peak A.C.)	90 max.	volts
Anode Current•	15 max.	μamp.
Ambient Temperature	100 max.	°C
Luminous Sensitivity:		
At 0 cycles	55	μamp./lumen
At 5000 cycles	Less than 55	μamp./lumen
At 10000 cycles	Less than 55	μamp./lumen
Sensitivity at 7500 Angstroms	0.0065	μamp./μwatt
Gas Amplification Factor	Not over 8.5	
D-C Resistance of Load:		
With anode-supply voltage of 75 volts or less		
For d-c currents above 3.5 μamp.	0.1 min.	megohm
For d-c currents below 3.5 μamp.	No Minimum	
With anode-supply voltage of 90 volts		
For d-c currents above 2 μamp.	2.5 min.	megohms
For d-c currents below 2 μamp.	0.1 min.	megohm

• On the basis of the use of a sensitive cathode area 1/2" in diameter.

Spectral Sensitivity Characteristic of S1 Photosurface in lime-glass bulb is shown at beginning of this section.



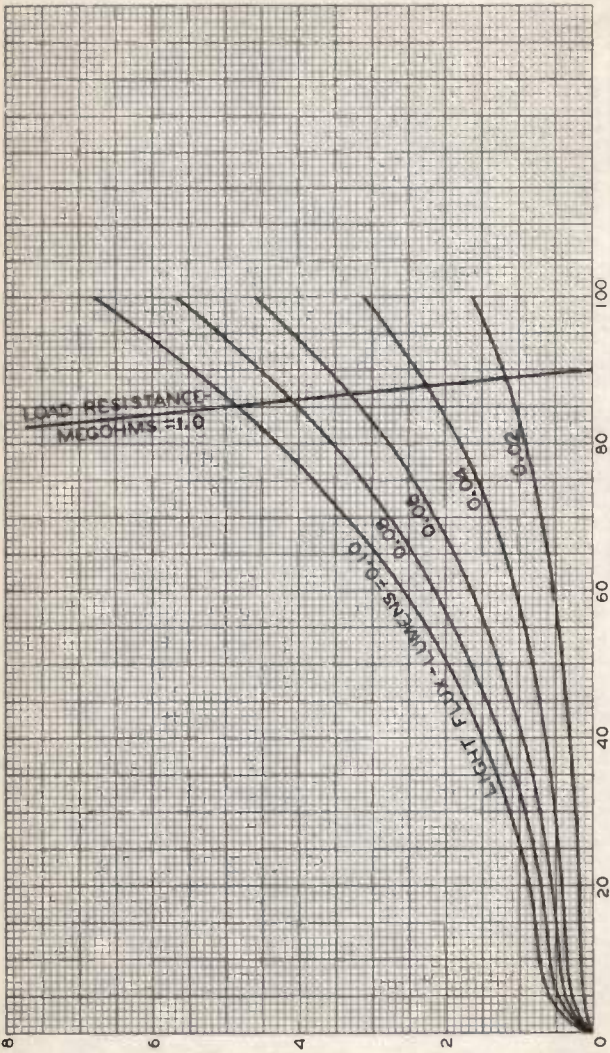
→ Indicates a change.

92C-6042R1

924

924

AVERAGE ANODE CHARACTERISTICS



RCA

925

HIGH-VACUUM PHOTOTUBE

SHORT TYPE

Cathode	Semi-cylindrical
Photosurface	S1
Window Area	0.4 sq. in.
Direct Interelectrode Capacitances	1.0 μμf
Maximum Overall Length	2-5/8"
Maximum Seated Height	2-1/16" ←
Maximum Diameter	1-5/16"
Bulb (lime glass)	T-9
Base	Intermed. Sh. Octal 5-Pin
Pin 1-No Connection	Pin 7-No Connection
Pin 2-No Connection	Pin 8-Cathode (-)
Pin 4-Anode (+)	
Mounting Position	Any

BOTTOM VIEW

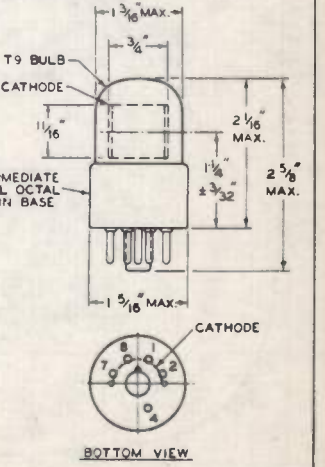
Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	250 max.	volts
Anode Current●	20 max.	μamp.
Ambient Temperature	100 max.	°C ←
Luminous Sensitivity*	15	μamp./lumen ←
Sensitivity at 7500 Angstroms	0.0020	μamp./μwatt ←
D-C Resistance of Load:		
With anode-supply voltage of 250 volts	1 min.	megohm

● On the basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

Spectral Sensitivity Characteristic of S1 Photosurface in lime-glass bulb is shown at the beginning of this section.

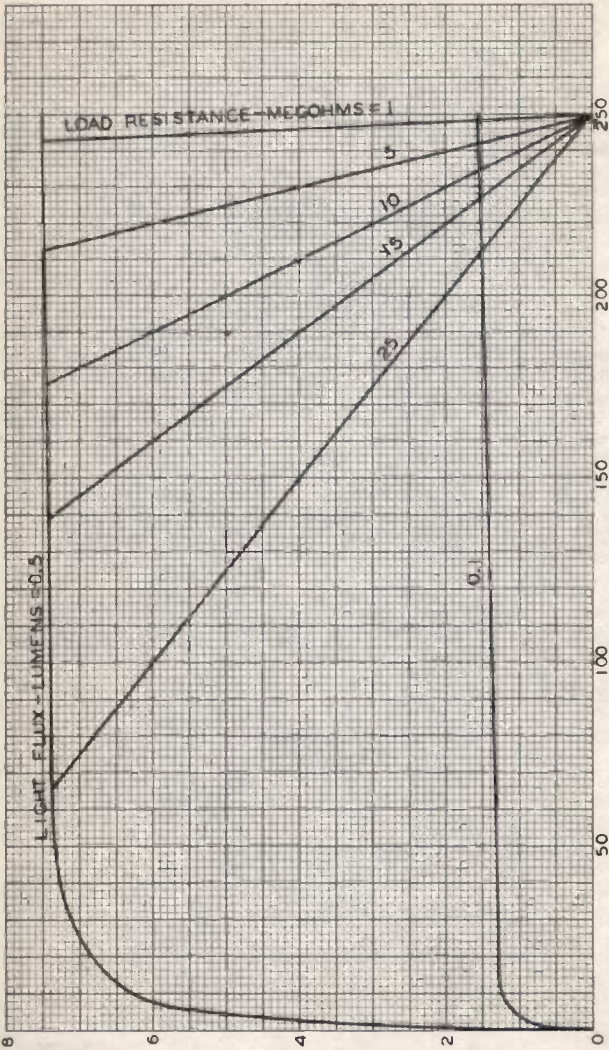


← Indicates a change.

92C-6054

925

AVERAGE ANODE CHARACTERISTICS



RCA

926

VACUUM PHOTOTUBE

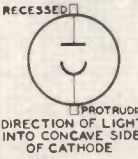
CARTRIDGE TYPE WITH S-3 RESPONSE

DATA

General:

Spectral Response	S-3
Wavelength of Maximum Response	4200 ± 1000 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	7/8"
Minimum Projected Width*	1/2"
Direct Interelectrode Capacitance	1 μμf
Overall Length	1-21/32" ± 1/16"
Seated Length	1-13/32" ± 1/32"
Length, Cathode Center to plane A-A' (See Outline)	11/16" ± 1/16"
Maximum Diameter	0.890"
Mounting Position	Any
Terminal Caps	See Outline

BOTTOM VIEW



Recessed Terminal } Anode

Protruding Terminal } Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	500 max.	volts
PEAK CATHODE CURRENT	15 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	5 max.	μamp
AMBIENT TEMPERATURE	100 max.	°C

Characteristics:

	Min.	Av.	Max.	
Dark Current at 250 Volts	–	–	0.005	μamp
Sensitivity:				
At 4200 Angstroms	–	0.0016	–	μamp/μwatt
Luminous▲	4	6.5	15	μamp/lumen ←

* On plane perpendicular to indicated direction of incident light.

° Averaged over any interval of 30 seconds maximum.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and SENSITIVITY MEASUREMENTS" at the front of this Section.

OUTLINE DIMENSIONS for Type 926 are the same as those for Type 921 ←

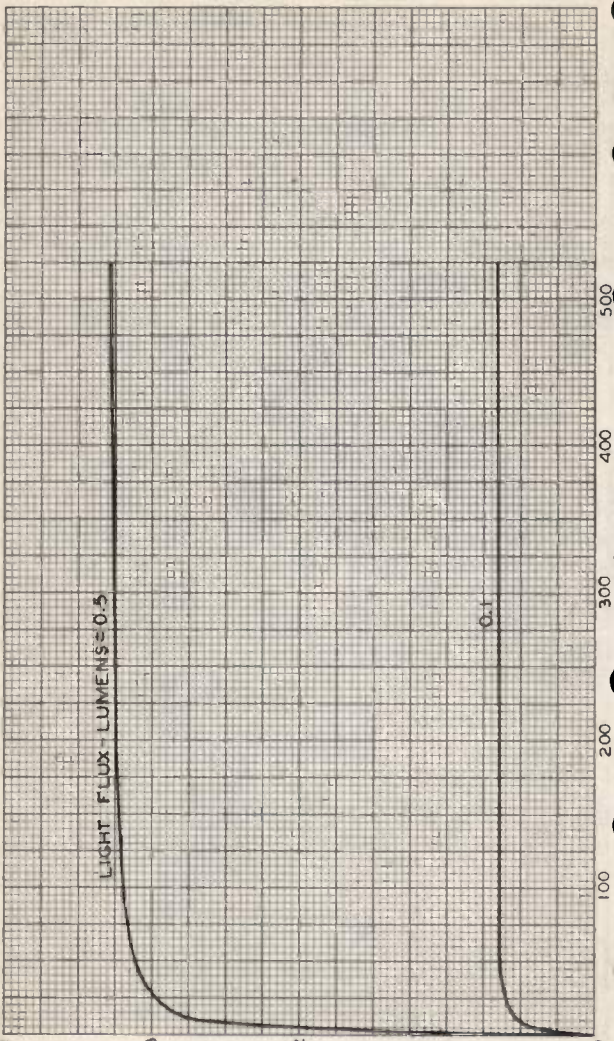
SPECTRAL-SENSITIVITY CHARACTERISTIC of Phototube having S-3 Response is shown at the front of this Section

← Indicates a change.

926

926

AVERAGE ANODE CHARACTERISTICS



AUG. 4, 1947

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM – 6209RI

927

GAS PHOTOTUBE

Cathode	Semi-cylindrical
Photosurface	S1
Window Area	0.4 sq.in.
Direct Interelectrode Capacitance	2.0 μμf
Maximum Overall Length	2-15/32"
Maximum Seated Height	2"
Maximum Diameter	23/32" ←
Bulb (lime glass)	T-5-1/2
Base	Peewee 3-Pin
Pin 1-No Connection	
Pin 2-Anode (+)	Pin 3-Cathode (-)
Mounting Position	Any

BOTTOM VIEW

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	90 max.	volts
Anode Current●	2 max.	μamp.
Ambient Temperature	100 max.	°C ←
Luminous Sensitivity:*		←
At 0 cycles	125	μamp./lumen
At 5000 cycles	110	μamp./lumen
At 10000 cycles	100	μamp./lumen
Sensitivity at 7500 Angstroms	0.0150	μamp./μwatt ←
Gas Amplification Factor	Not over 10	
D-C Resistance of Load:		←
With anode-supply voltage of 75 volts or less		
For d-c current below 2.0 μamp.	No Minimum	
With anode-supply voltage of 90 volts		
For d-c current below 2 μamp.	0.1 min.	megohm

● On the basis of the use of a rectangular sensitive cathode area 17 mm by 7.5 mm.

* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

OUTLINE DIMENSIONS
for the 927 are the same as those for the 934.

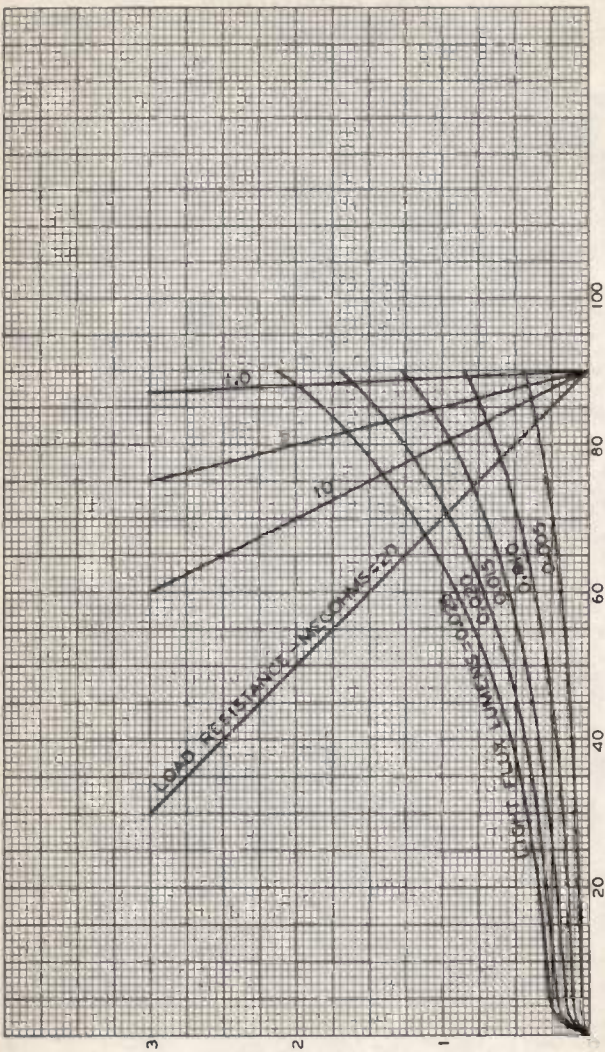
Spectral Sensitivity Characteristic of S1 Photosurface in lime-glass bulb is shown at beginning of of this section.

← Indicates a change.

927

927

AVERAGE ANODE CHARACTERISTICS



FEB. 26, 1941

RCA VICTOR DIVISION

RADIO CORPORATION OF AMERICA HARRISON, NEW JERSEY

92C-6258

928

GAS PHOTOTUBE

NON-DIRECTIONAL TYPE

Cathode	Cylindrical Mesh
Photosurface	S1
Window Area	0.7 sq. in. ←
Direct Interelectrode Capacitance	3.0 µµf ←
Maximum Overall Length	3-9/16"
Maximum Seated Height	2-15/16"
Maximum Diameter	1-3/16"
Bulb (lime glass)	T-9
Base	Small 4-Pin
Pin 1-No Connection	Pin 3-No Connection
Pin 2-Anode (+)	Pin 4-Cathode (-)
Mounting Position	Any

BOTTOM VIEW

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	90 max.	volts
Anode Current●	15 max.	µamp.
Ambient Temperature	100 max.	°C
Luminous Sensitivity:*		
At 0 cycles	65	µamp./lumen
At 5000 cycles	Less than 65	µamp./lumen
At 10000 cycles	Less than 65	µamp./lumen
Sensitivity at 7500 Angstroms	0.0075	µamp./µwatt ←
Gas Amplification Factor	Not over 10	
D-C Resistance of Load:		←
With anode-supply voltage of 75 volts or less		
For d-c currents above 3.5 µamp.	0.1 min.	megohm
For d-c currents below 3.5 µamp.	No Minimum	
With anode-supply voltage of 90 volts		
For d-c currents above 2 µamp	4 min.	megohms
For d-c currents below 2 µamp	1 min.	megohm

● On the basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

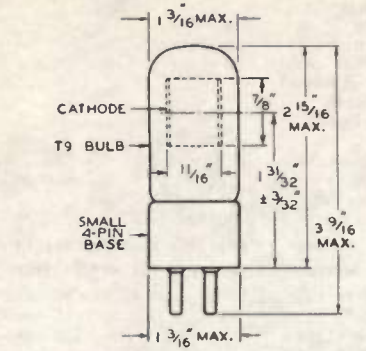
Spectral Sensitivity Characteristic of S1 Photosurface in lime-glass bulb is shown at beginning of this section.

← Indicates a change.

928

928

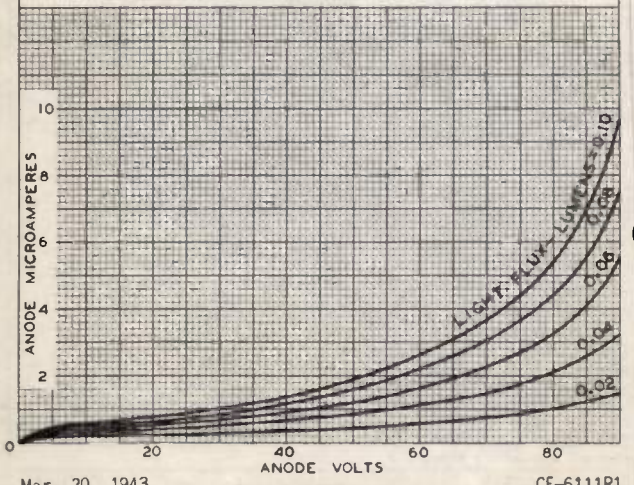
GAS PHOTOTUBE



92C-6111R1

BOTTOM VIEW

AVERAGE ANODE CHARACTERISTICS



Mar. 20, 1943

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

CE-6111R1
CE-6117

929

HIGH-VACUUM PHOTOTUBE

Cathode	Semi-cylindrical
Photosurface	S4
Window Area	0.6 sq. in.
Direct Interelectrode Capacitance	2.6 μμf
Maximum Overall Length	3-1/16"
Maximum Seated Height	2-1/2"
Maximum Diameter	1-5/16"
Bulb (lime glass)	T-9
Base	Intermed. Sh. Octal 5-Pin
Pin 1-No Connection	Pin 7-No Connection
Pin 2-No Connection	Pin 8-Cathode (-)
Pin 4-Anode (+)	
Mounting Position	Any

BOTTOM VIEW

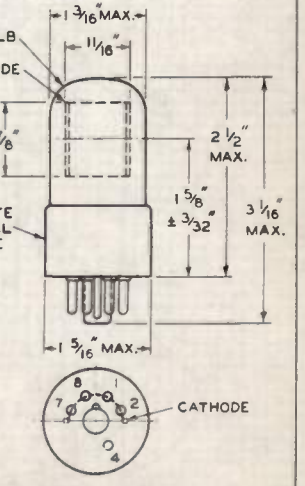
Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	250 max.	volts
Anode Current●	20 max.	μamp.
Ambient Temperature	50 max	°C
Luminous Sensitivity*	45	μamp./lumen
Sensitivity at 3750 Angstroms	0.040	μamp./μwatt
D-C Resistance of Load:	1 min.	megohm

● On the basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

Spectral Sensitivity Characteristic of S4 Photosurface in lime-glass bulb is shown at the beginning of this section.



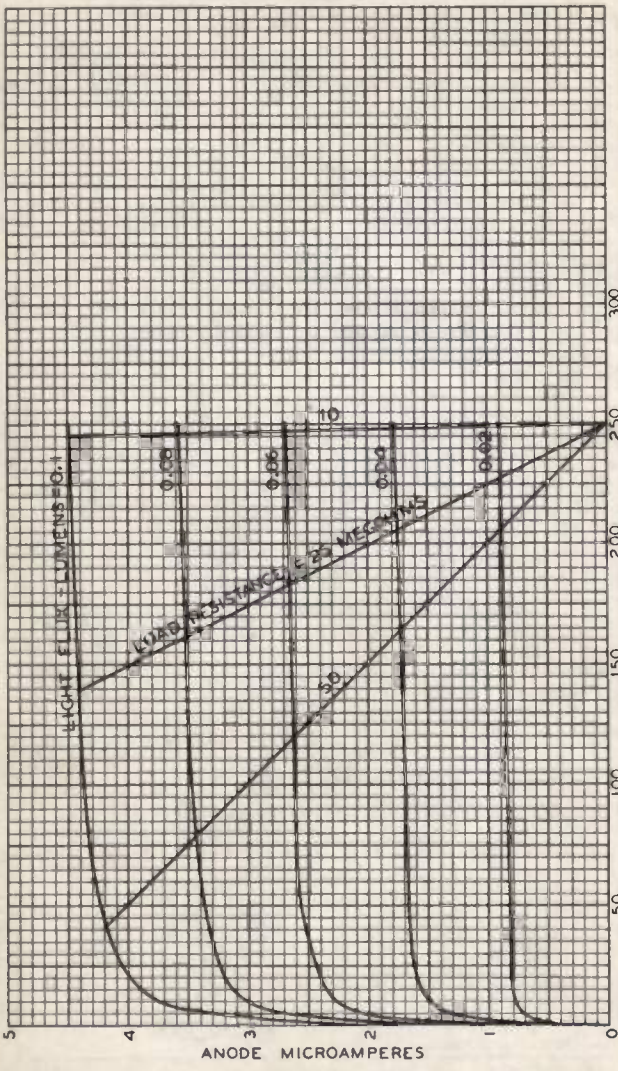
92C-6137

BOTTOM VIEW

→ Indicates a change.

929

AVERAGE ANODE CHARACTERISTICS



930

GAS PHOTOTUBE

Cathode	Semi-cylindrical
Photosurface	S2
Window Area	0.6 sq in.
Direct Interelectrode Capacitance	2.6 μμf
Maximum Overall Length	3-1/16"
Maximum Seated Height	2-1/2"
Maximum Diameter	1-5/16"
Bulb (lime glass)	T-9
Base	Intermed. Sh. Octal 5-Pin
Pin 1-No Connection	Pin 7-No Connection
Pin 2-No Connection	Pin 8-Cathode (-)
Pin 4-Anode (+)	
Mounting Position	Any

BOTTOM VIEW

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage (D.C. or Peak A.C.)	90 max.	volts
Anode Current●	20 max.	μamp.
Ambient Temperature	100 max.	°C
Luminous Sensitivity:*		
At 0 cycles	135	μamp./lumen
At 5000 cycles	111	μamp./lumen
At 10000 cycles	101	μamp./lumen
Sensitivity at 8000 Angstroms	0.0130	μamp./μwatt
Gas Amplification Factor	Not over 10	

D-C Resistance of Load:

With anode-supply voltage of 75 volts or less

For d-c currents above 3.5 μamp.	0.1 min.	megohm
For d-c currents below 3.5 μamp.	No Minimum	

With anode-supply voltage of 90 volts

For d-c currents above 2 μamp.	4 min.	megohms
For d-c currents below 2 μamp.	1 min.	megohm

● On the basis of the use of a sensitive cathode area 1/2" in diameter.
* Subject to variations as explained on sheet PHOTOTUBE SENSITIVITY MEASUREMENTS in the front of this section.

OUTLINE DIMENSIONS
for the 930 are the same as those for the 929.

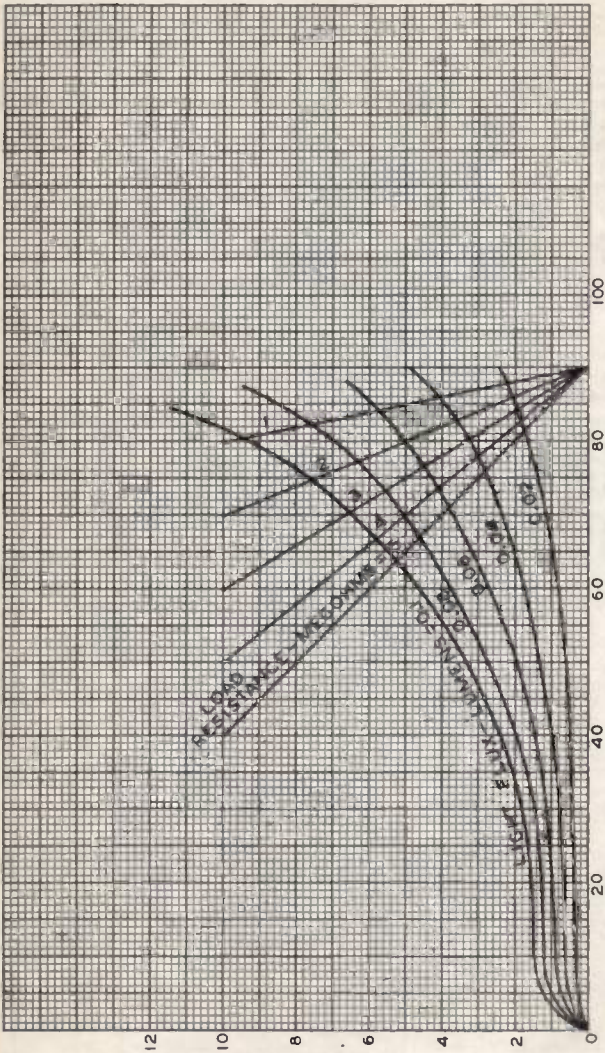
Spectral Sensitivity Characteristic of S2 Photosurface in lime-glass bulb is shown at beginning of this section.

→← Indicates a change.

930

930

AVERAGE ANODE CHARACTERISTICS



AUG. 16, 1937

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

92C-4806

931

MULTIPLIER PHOTOTUBE

9-STAGE ELECTRICALLY FOCUSED TYPE

Cathode	
Photosurface	S4
Window Area	0.25 sq. in.
Direct Interelectrode Capacitances (Approx.):	
Anode to Dynode No.9	3.5 μμf
Anode to All Other Electrodes	6.5 μμf
Maximum Overall Length	3-11/16"
Maximum Seated Height	3-1/8"
Maximum Diameter	1-5/16"
Bulb (lime glass)	T-9
Base	Small Shell Submagnal 11-Pin
RCA Socket	Stock No. 9915 ←

Maximum Ratings Are Absolute Values

MAXIMUM RATINGS and CHARACTERISTICS

Anode-Supply Voltage*		1250 max.	volts**
Voltage Between Dynode No. 9 and Anode		400 max.	volts**
Anode Current		2.5 max.	ma.
Anode Dissipation		0.5 max.	watt
Ambient Temperature		50 max.	°C
Sensitivity at 3750 Angstroms		532	μamp./μwatt
Typical Operation:			
Voltage per Stage	100	125	volts
Sensitivity □ ○	0.6	2.3	amp./lumen
Amplification ▲ ○	60000	230000	

* Referred to cathode.

** D.C. or Peak A.C.

□ For conditions where a Mazda Projection Lamp operated at a filament color temperature of 2870°K is used as a light source. The method employed for determining sensitivity made capacitance effects negligible. A light flux of 0.001 lumen and a 0.01-megohm load were used. ←

○ On basis of lighted cathode area of approximately 7 sq. mm. (3 mm in diameter).

▲ Ratio of anode sensitivity to cathode sensitivity.

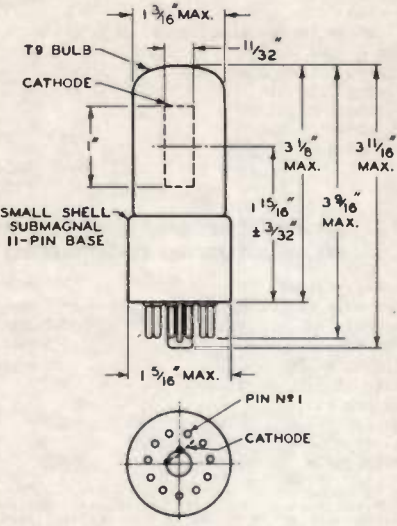
NOTE: The RCA-931 is a high-vacuum phototube in which the photocurrent produced at a light sensitive cathode is multiplied many times by secondary emission occuring at successive dynodes within the tube. The resultant output current is a linear function of the exciting illumination under normal operating conditions. Since secondary emission occurs almost instantaneously, frequency response of the 931 is flat up to frequencies at which transit time becomes a limiting factor.

Spectral Sensitivity Characteristic of S4 Photosurface in lime-glass bulb is shown at the beginning of this section.

← Indicates a change.

931

MULTIPLIER PHOTOTUBE

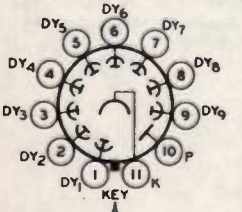


BOTTOM VIEW

℄ OF BULB SHALL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

92C-6284R1

BOTTOM VIEW OF SOCKET CONNECTIONS



DY_1 to DY_9 – Dynodes No.1 to No.9
P – Anode
K – Cathode

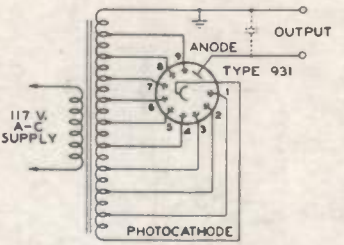
TUBE MOUNTING POSITION
Any

→ Indicates a change.

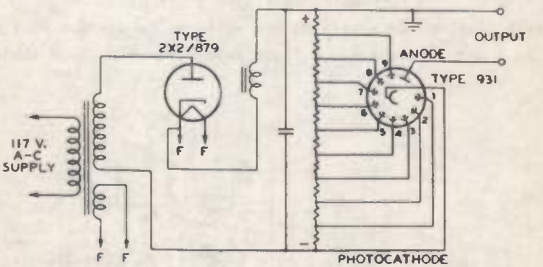
931

TYPICAL CIRCUITS

A-C POWER-SUPPLY CIRCUIT
with uniformly tapped transformer



HALF-WAVE POWER-SUPPLY CIRCUIT
with bleeder for supplying d-c voltages



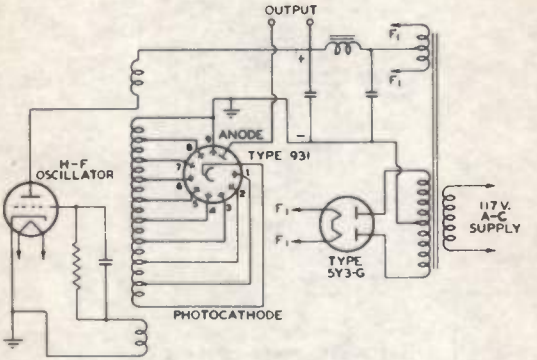
The license extended to the purchaser of tubes appears in the License notice accompanying them. Information contained herein is furnished without assuming any obligations.

931

TYPICAL CIRCUITS

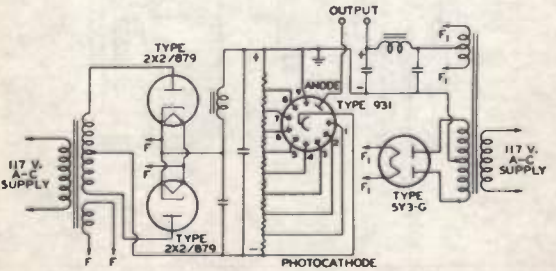
CIRCUIT USING H-F OSCILLATOR

for supplying a-c voltages to dynodes No.1 to No.9 and separate d-c voltage supply for the anode stage



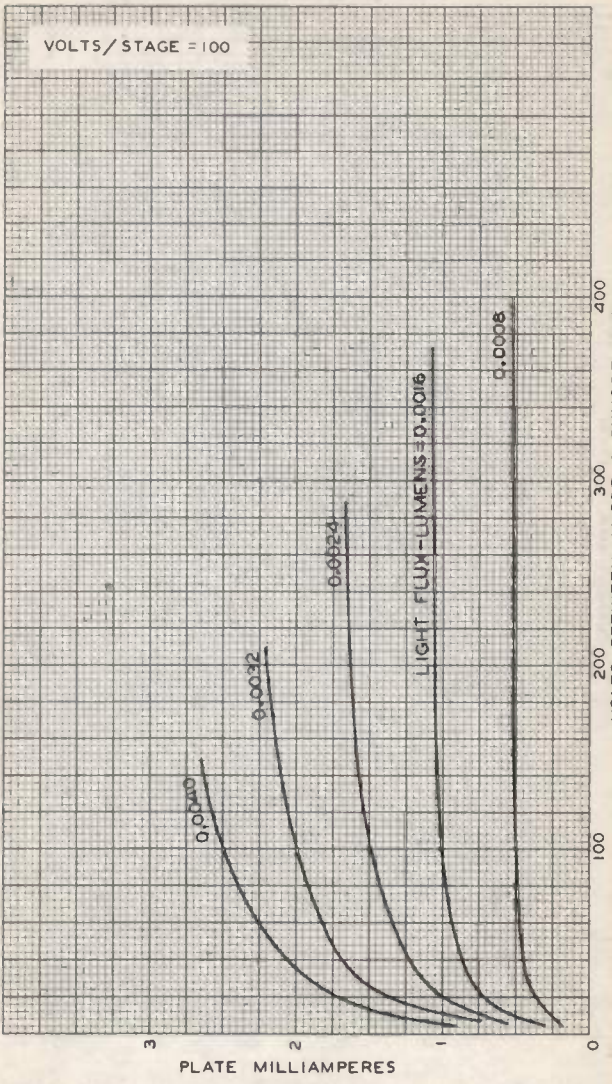
FULL-WAVE POWER-SUPPLY CIRCUIT

with bleeder for supplying d-c voltages to dynodes No.1 to No.9 and separate d-c voltage supply for the anode stage



931

AVERAGE ANODE CHARACTERISTICS



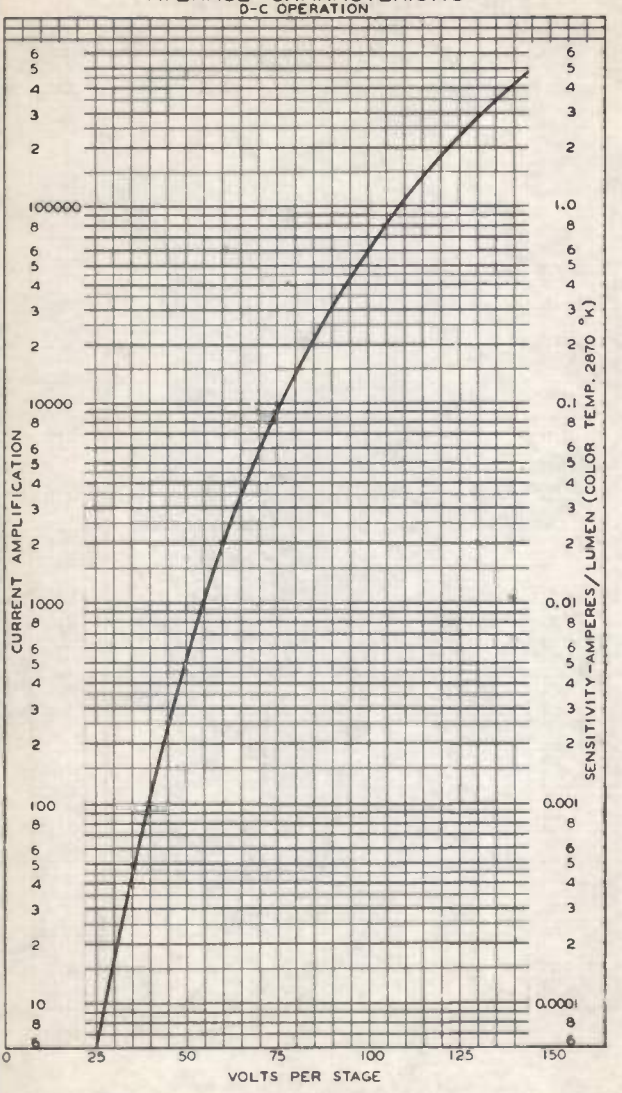
MARCH 24, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6268

931

AVERAGE CHARACTERISTIC
D-C OPERATION



MARCH 26,1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6269

RCA

931-A
MULTIPLIER PHOTOTUBE

9-STAGE TYPE with S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 angstroms ←
Cathode:	
Minimum Projected Length*	15/16"
Minimum Projected Width*	5/16"
Direct Interelectrode Capacitances:	
Anode to Dynode No.9	4 μμf
Anode to All Other Electrodes	6.5 μμf
Maximum Overall Length	3-11/16"
Maximum Seated Length	3-1/8"
Seated Length to Center of Cathode	1-15/16" ± 3/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Mounting Position	Any
Base	Small-Shell Submagnal 11-Pin, Non-Hygroscopic
Basing Designation for BOTTOM VIEW	11K

Pin 1 – Dynode No.1
Pin 2 – Dynode No.2
Pin 3 – Dynode No.3
Pin 4 – Dynode No.4
Pin 5 – Dynode No.5
Pin 6 – Dynode No.6

Pin 7 – Dynode No.7
Pin 8 – Dynode No.8
Pin 9 – Dynode No.9
Pin 10 – Anode
Pin 11 – Cathode

Maximum Ratings, *Absolute Values*:

ANODE-SUPPLY VOLTAGE (DC or Peak AC)□	1250 max.	volts
SUPPLY VOLTAGE BETWEEN DYNODE No.9 and ANODE (DC or Peak AC)	250 max.	volts
PEAK ANODE CURRENT	10 max.	ma ←
AVERAGE ANODE CURRENT○	1 max.	ma ←
AMBIENT TEMPERATURE	75 max.	°C

Characteristics: ←

With 100 volts per dynode stage and 100 volts between dynode No.9 and anode●

	Min.	Av.	Max.	
Anode Dark Current#●	–	–	0.25	μamp
Sensitivity:				
At 4000 Angstroms	–	9300	–	μamp/μwatt
Luminous▲	* 4.5	10	300	amp/lumen
Current Amplification■	–	1000000	–	
Luminous Detectivity★	1×10^{-11}	–	–	lumen

* On plane perpendicular to indicated direction of incident light.
□ Referred to cathode.
○ Averaged over any interval of 30 seconds maximum.
●,▲,■,●,#,★: See next page. ← Indicates a change.

931-A
MULTIPLIER PHOTOTUBE

→**Characteristics:**

With 75 volts per dynode stage and 50 volts between dynode No.9 and anode

	Av.	
Sensitivity:		
At 4000 Angstroms.	1400	μamp/μwatt
Luminous▲.	1.5	amp/lumen
Current Amplification■	150000	

* Dark current due to thermionic emission and ion feedback may be reduced by the use of refrigerants.

● For maximum signal-to-noise ratio, operation below 1000 volts is recommended.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and SENSITIVITY MEASUREMENTS" at the front of this Section.

■ Ratio of anode sensitivity to cathode sensitivity.

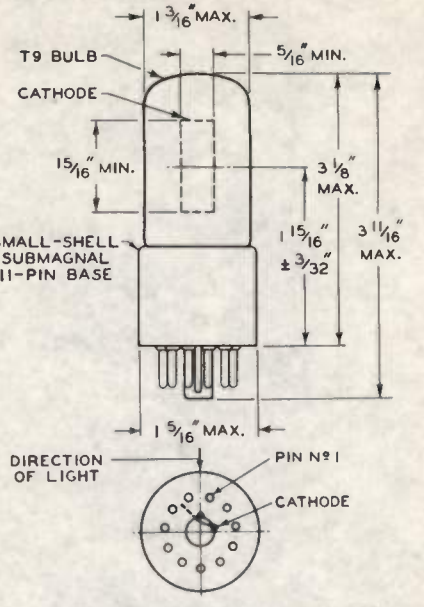
★ Defined as the value where the rms output current is equal to the rms noise current determined under the following conditions: 100 volts per stage, 25°C tube temperature, bandwidth of 1 cycle per second, tungsten light source at 2870°K interrupted at a low audio frequency to produce incident radiation pulses alternating between zero and the value stated. The "on" period of the pulse is equal to the "off" period. The output current is measured through a filter which passes only the fundamental frequency of the pulses.

● The successive stages of a multiplier phototube are operated at voltages increasing in equal steps from the photocathode to the 9th dynode, and are generally chosen as 75 to 100 volts per stage. The voltage between dynode No.9 and the anode should be kept as low as will permit of operation at a point just giving anode-current saturation. This point on the anode characteristic curves corresponds to a voltage of about 50 volts. Low operating voltage between dynode No.9 and anode reduces the dark current due to leakage paths and also reduces the ion bombardment of the dynodes. As a result, the operating stability of a multiplier phototube is greatly improved without sacrifice in sensitivity. It is to be noted that the supply voltage required to give an operating voltage of 50 volts between dynode No.9 and anode will, of course, be contingent on the load impedance used and the desired signal output voltage.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
is shown at the front of this Section

→ Indicates a change.

931-A
MULTIPLIER PHOTOTUBE



BOTTOM VIEW 92CM-6264R2

℄ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

RCA

934

VACUUM PHOTOTUBE

Cathode	Semi-cylindrical
Photosurface	S4
Window Area	0.4 sq. in.
Direct Interelectrode Capacitance	1.5 μμf
Maximum Overall Length	2-15/32"
Maximum Seated Height	2"
Maximum Diameter	23/32"
Bulb	T-5-1/2
Base	Peewee 3-Pin
Pin 1 - No Connection	Pin 3 - Cathode
Pin 2 - Anode	
Mounting Position	Any

BOTTOM VIEW

MAXIMUM RATINGS

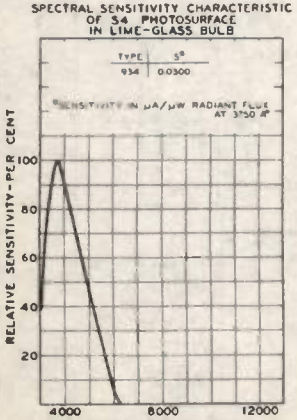
Maximum Ratings Are Absolute Values

Anode-Supply Voltage (D.C. or Peak A.C.)	250 max.	volts
Anode Current°	10 max.	μamp.
Ambient Temperature	50 max.	°C
Sensitivity ◊	30	μamp./lumen
D-C Resistance of Load:		
For 250-volt anode-supply voltage	1 min.	megohm

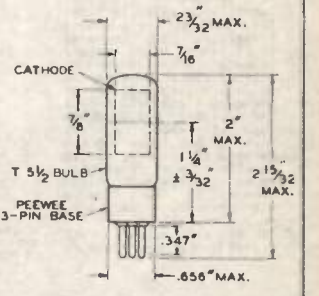
° On basis of the use of a rectangular sensitive cathode area 17 mm by 7.5 mm.

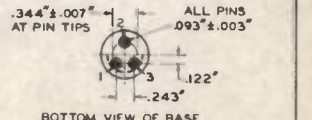
◊ Sensitivity value is given for conditions where a Mazda Projection Lamp operated at a filament color temperature of 2870°K is used as a light source. The method of determining sensitivity employed a 250-volt supply and included a 1.0-megohm load resistance. A light flux of 0.1 lumen on the cathode was used to excite the 93a. With daylight, value is several times higher; to light from a high-pressure mercury arc, many times higher.

SPECTRAL SENSITIVITY CHARACTERISTIC OF S4 PHOTOSURFACE IN LIME-GLASS BULB



92C-6152R3





BOTTOM VIEW OF BASE

92C-6053R1

Dec. 1, 1942

TENTATIVE DATA

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

935

935

VACUUM PHOTOTUBE

ULTRAVIOLET-SENSITIVE TYPE

Cathode	Semi-cylindrical
Photosurface	S4
Window Area	0.9 sq. in.
Direct Interelectrode Capacitance	0.6 μμf
Overall Length	4" to 4-1/4"
Seated Height	3-7/16" to 3-11/16"
Maximum Diameter	1-5/16"
Bulb - Special Glass	T-9
Cap	Skirted Miniature
Base	Intermed. Sh. Octal 5-Pin
Pin 1 - No Connection	Pin 7 - No Connection
Pin 2 - No Connection	Pin 8 - Cathode
Pin 4 - No Connection	Cap - Anode
Mounting Position	Any

BOTTOM VIEW

MAXIMUM RATINGS

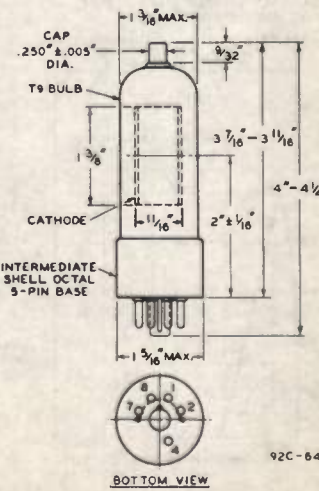
Maximum Ratings Are Absolute Values

Anode-Supply Voltage (D.C. or Peak A.C.)	250 max.	volts
Anode Current●	20 max.	μamp.
Ambient Temperature	50 max.	°C
Sensitivity ◊	30	μamp./lumen
Sensitivity at 2537 Angstroms▲	0.02 approx.	μamp./μwatt
D-C Resistance of Load:		
For 250-volt anode-supply voltage	1 min.	megohm

● On basis of the use of a sensitive cathode area 1/2" in diameter.

◊ Sensitivity value is given for conditions where a Mazda Projection Lamp operated at a filament color temperature of 2870°K is used as a light source. The method of determining sensitivity employed a 250-volt supply and included a 1.0-megohm load resistance. A light flux of 0.1 lumen on the cathode was used to excite the 935. With daylight, value is several times higher; to light from a high-pressure mercury arc, many times higher.

▲ The 935 will respond in the region down to about 2000 A°.



BOTTOM VIEW

Dec. 1, 1942

TENTATIVE DATA

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

RCA

5582

GAS PHOTOTUBE

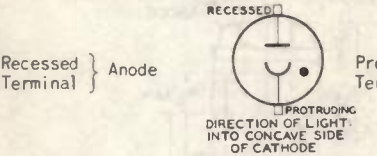
CARTRIDGE TYPE WITH S-4 RESPONSE

DATA

General:

Spectral Response	S-4
Wavelength of Maximum Response	4000 ± 500 Angstroms
Cathode:	
Shape	Semi-Cylindrical
Minimum Projected Length*	5/8"
Minimum Projected Width*	1/2"
Direct Interelectrode Capacitance	1.0 μμf
Overall Length	1-21/32" ± 1/16"
Length, Cathode Center to plane A-A' (See Outline)	11/16" ± 1/16"
Maximum Diameter	0.890"
Mounting Position	Any
Terminal Caps	See Outline

BOTTOM VIEW



Maximum Ratings, *Absolute Values:*

ANODE-SUPPLY VOLTAGE (DC or Peak AC)	100 max.	volts
PEAK CATHODE CURRENT	10 max.	μamp
PEAK CATHODE-CURRENT DENSITY	100 max.	μamp/sq. in.
AVERAGE CATHODE CURRENT°	2 max.	μamp
AMBIENT TEMPERATURE	75 max.	°C

Characteristics:

	Min.	Av.	Max.	
Dark Current at 90 Volts	–	–	0.050	μamp
Sensitivity:				
At 4000 Angstroms	–	0.11	–	μamp/μwatt
Luminous:▲				
At 0 Cycles	80	120	175	μamp/lumen
At 5000 Cycles	–	110	–	μamp/lumen
At 10000 Cycles	–	96	–	μamp/lumen
Gas Amplification Factor	–	–	5.5	

Minimum Circuit Values:

DC Load Resistance:

With anode-supply voltage of 80 volts or less

For dc currents	above 3 μamp	0.1	megohm
	below 3 μamp	No Minimum	

With anode-supply voltage of 100 volts

For dc currents	above 1 μamp	2.5	megohms
	below 1 μamp	0.1	megohm

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

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

5582

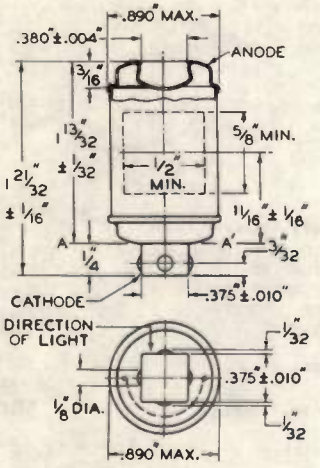
GAS PHOTOTUBE

• On plane perpendicular to indicated direction of incident light.

O Averaged over any interval of 30 seconds maximum. Average current may be doubled when anode-supply voltage is limited to 80 volts.

▲ Measured under conditions specified on sheet "PHOTOTUBE SENSITIVITY and SENSITIVITY MEASUREMENTS" at the front of this Section.

SPECTRAL-SENSITIVITY CHARACTERISTIC
of Phototube having S-4 Response
and
FREQUENCY-RESPONSE CHARACTERISTICS
of Gas Phototubes
are shown at the front of this Section



CATHODE-END VIEW

92CM-4818R2