F

RADIO MANUFACTURERS ASSOCIATION

SUITE 701-4 AMERICAN BUILDING
1317 F STREET, N. W.
WASHINGTON, D. C.

August 1st, 1934.

SUB-COMMITTEE ON TUBE NUMBERING

DAVID GRIMES, CHAIRMAN
75 VARICK STREET
NEW YORK, N. Y.

Mr. E. A. Coffin,
Hytron Corp.,
23-27 New Derby St.,
Salem, Mass.

RMA Tube Standardization
Release #6.

Dear Mr. Coffin:

In order to effect closer cooperation between manufacturers of radio receiving tubes in respect to the center values of the tube characteristics, the RMA Sub-committee on Tube Numbering is inaugurating a survey of the average center values found in test production in certain types of tubes.

A number of manufacturers have already expressed their willingness to cooperate fully in this, and your own cooperation will be appreciated.

The enclosed sheets are intended to be filled in with the averaged results of your production testing for the last two weeks of production for each type. When a sufficient number have been returned filled in, it is intended to release the averages to those taking part, using code designations to conceal the identities of the several sources. There will of course be no release of the number of tests made, but this information is desired in order to make up grand averages for each type for the whole industry.

It is desired to include the 6A7 in the list of tube types to be covered at this time, but as the testing of this type is not yet entirely standardized it is omitted from the blank form and instead, reports on the production tests made can be sent in on a separate sheet attached to the form when returned. This information will be correlated and released in the same manner as with the other types, if it is possible to do so without disclosing the source of information.

It is hoped that this survey will be conducted monthly on tube types that are of prime interest to the industry at the time, and your close cooperation is therefore requested.

Very truly yours,

E. I. A.
REGISTRATION
FILE

Chairman
Tube Numbering

ctjlg

Please return to:
Dave Grimes, WA
Tube Numbering
75 Varick Street,
New York, N. Y.

AMPLIFIERS

Type	No. Avg'd (*)	Operating Voltages					Averaged Results								
		Ef	Eb	Ec2	Ec1 [a]	Ec1 [b]	If	Ib [a]	Ib [b]	Ic2	Gm [a]	Gm [b]	Rp	P.O.	
76		6.3	250		-13.5										
77		6.3	250	100	- 3	- 7									
78		6.3	250	100	- 3	-42.5									
6C6		6.3	250	100	- 3	- 7									
6D6		6.3	250	100	- 3	-42.5									
75		6.3	250		- 2										
41		6.3	250	250	-18										
42		6.3	250	250	-16.5										Load=7000 ohms (Pentode Con.)
42		6.3	250		-20										Load=3000 ohms (Triode Con.)
2A5		6.3	250	250	-16.5										Load=7000 ohms (Pentode Con.)
2A5		6.3	250		-20										Load=3000 ohms (Triode Con.)
85		6.3	250		-20										
6F7		6.3	250	100	- 3	-35									Pentode
6F7		6.3	100		- 3										Triode

* For making up grand averages. Will be held confidential.

Issued through the
David Grimes, RMA
Tube Laboratory,
New York, N. Y.

RECTIFIERS

Type	No. Avg'd (*)	Operating Conditions					Averaged Results				
		E_f	E_p	C_1	Load	E_{dc}	I_f	I_L	I_s [1]	I_s [2]	
80		5.0	350	4μ	2000	40					
84		6.3	350	4μ	8000	40					

* For making up grand averages. Will be held confidential.

E_p = volts r.m.s. each plate. C_1 = Load bypass condenser. I_L = Load current

I_s = emission current each plate seperately with E_{dc} applied.

Radio Valve Co —

Please return to:
David Grimes, RMA
Tube Numbering,
75 Varick Street,
New York, N. Y.

AMPLIFIERS

Type	No. Avg'd (*)	Operating Voltages						Averaged Results								
		Ef	Eb	Ec2	Ec1 a	Ec1 b		If	Ib a	Ib b	Ic2	Gm a	Gm b	Rp	P.O.	
76	50	6.3	250		-13.5			.30	4.92			1890	9860	9860		
77	50	6.3	250	100	- 3	- 7		.303	2.57		.60	1260		12000		
78	160	6.3	250	100	- 3	-42.5		.302	6.02		.138	1360		92400		
606	60	6.3	250	100	- 3	- 7		.305	2.0		.33	1195				
6D6	110	6.3	250	100	- 3	-42.5		.301	2.71		.154	1474	1459	2000		
75	80	6.3	250		- 2			.299	.71			974		11800		
41	100	6.3	250	250	-18			.404	32.6		.591	2128		86200		
42	120	6.3	250	250	-16.5			.672	31.9		.520	2660		111000		Load=7000 ohms (Pentode Con.)
42		6.3	250		-20											Load=3000 ohms (Triode Con.)
2A5	60	6.3	250	250	-16.5			.772	32.6		.505	2611		107100		Load=7000 ohms (Pentode Con.)
2A5		6.3	250		-20											Load=3000 ohms (Triode Con.)
85	40	6.3	250		-20			.31	6.71			1017		8840		
6F7		6.3	250	100	- 3	-35		.31	6.71			1017		8840		Pentode
6F7		6.3	100		- 3											Triode

* For making up grand averages. Will be held confidential.

Please return to:
David Grimes, RMA
75 Varick Street,
New York, N. Y.

RECTIFIERS

Type	No. Avg'd (*)	Operating Conditions					Averaged Results				
		E_f	E_p	C_1	Load	E_{dc}	I_f	I_L	I_s I	I_s 2	
80	120	5.0	350	4μ	2000	40	2.06	141	159	161	
84	140	6.3	350	4μ	8000	40	.50	609	107	116	

* For making up grand averages. Will be held confidential.

E_p = volts r.m.s. each plate. C_1 = Load bypass condenser. I_L = Load current

I_s = emission current each plate separately with E_{dc} applied.

Please return to:
David Grimes, NWL
Tube Numbering,
75 Varick Street,
New York, N. Y.

Rectifiers

AMPLIFIERS

Type	No. Avg'd (*)	Operating Voltages					Averaged Results								
		E_f	E_b	E_{c2}	E_{c1} [a]	E_{c1} [b]	I_f	I_b [a]	I_b [b]	I_{c2}	G_m [a]	G_m [b]	R_p	P.O.	
76		6.3	250		-13.5										
77		6.3	250	100	- 3	- 7	.305	2.3	28	.53	1173		2.57		
78		6.3	250	100	- 3	-42.5	.307	7.5		1.80	1444	3	.74		
6C6		6.3	250	100	- 3	- 7	.311	2.5	25	.61	1142		2.56		
6D6		6.3	250	100	- 3	-42.5	.315	8.3		2.0	1589	8	.75		
75		6.3	250		- 2		.306	.84			1006		.103		
41		6.3	250	250	-18		.41	26.3		6.5	2472			3032	
42		6.3	250	250	-16.5		.70	33.2		6.2	2470			2683	Load=7000 ohms (Pentode Con.)
42		6.3	250		-20										Load=3000 ohms (Triode Con.)
2A5		6.3	250	250	-16.5		2.02	31.1		5.4	2551			2605	Load=7000 ohms (Pentode Con.)
2A5		6.3	250		-20										Load=3000 ohms (Triode Con.)
85		6.3	250		-20		.209	5.9			1238		2600		
6F7		6.3	250	100	- 2	-35	.318	6.8		1.6	1071	11	.85		Pentode
6F7		6.3	100		- 2		.318	2.5			516		15500		Triode
6A7		6.3	250	Sc2-5 100	Sc8 250	Ec1 -6.0	Eg4 -3.0	If .311	Ib 5.2	Isg 4.4	Rp .20	Gm1-F 985	Ic2 6.1	Gm1-S 1055	

* For making up grand averages. Will be held confidential.

Please return to:
David Grimes, RMA
Tech Oper Trng,
New York, N.Y.

RECTIFIERS

Type	No. Avg'd (*)	Operating Conditions					Averaged Results				
		E_f	E_p	C_1	Load	E_{dc}	I_f	I_L	I_s [1]	I_s [2]	
80		5.0	300 ~~650~~	4μ	2000	80 40	2.10	127	185	190 140	(both plates together)
84		6.3	350	4μ	8000	75 ~~125~~	.48	53	73	72	

* For making up grand averages. Will be held confidential.

E_p = volts r.m.s. each plate. C_1 = Load bypass condenser. I_L = Load current

I_s = emission current each plate separately with E_{dc} applied.

Please return to:
Dept. Tube Eng.
Tube Number
73 Varick Street,
New York, N. Y.

Spencer

AMPLIFIERS

Type	No. Avg'd (*)	Operating Voltages					Averaged Results								
		E_f	E_b	E_{c2}	E_{c1} [a]	E_{c1} [b]	I_f	I_b [a]	I_b [b]	I_{c2}	G_m [a]	G_m [b]	R_p	P.O.	
76		6.3	250		-13.5										
77	50	6.3	250	100	- 3	- 7	.302	2.1		.66	1230		4 meg		
78	100	6.3	250	100	- 3	-42.5	.298	8.2		1.75	1630		.7 meg.		
6C6	50	6.3	250	100	- 3	- 7	.298	1.9		.42	1440		2 meg		
6D6	50	6.3	250	100	- 3	-42.5	.302	9.8		1.96	1960		8 meg		
75	50	6.3	250		-2		.290	1.2			1280				
41	50	6.3	250	250	-18		.399	27.1		3.4	2320				
42	50	6.3	250	250	-16.5		.373	37.0		4.9	2500				Load=7000 ohms (Pentode Con.)
42		6.3	250		-20										Load=3000 ohms (Triode Con.)
2A5		6.3	250	250	-16.5										Load=7000 ohms (Pentode Con.)
2A5		6.3	250		-20										Load=3000 ohms (Triode Con.)
85	50	6.3	250		-20		.262	8.4			1080				
6F7		6.3	250	100	- 3	-35									Pentode
6F7		6.3	100		- 3										Triode

* For making up grand averages. Will be held confidential.

Please return to:
David Grimes, RMA
75 Varick Street,
New York, N. Y.

RECTIFIERS

Type	No. Avg'd (*)	Operating Conditions					Averaged Results				
		E_f	E_p	C_1	Load	E_{dc}	I_f	I_L	I_s	I_s^2	
80	500	5.0	350	4μ	2000	40	1.91				
84	~~500~~ 50	6.3	350	4μ	8000	40	.56				

* For making up grand averages. Will be held confidential.

E_p = volts r.m.s. each plate. C_1 = Load bypass condenser. I_L = Load current

I_s = emission current each plate separately with E_{dc} applied.

Please return to:
David Driscoll,
Tube Numbering,
75 Varick Street,
New York, N. Y.

Drisc

AMPLIFIERS

Type	No. Avg'd (*)	Operating Voltages					Averaged Results								
		E_f	E_b	E_{c2}	E_{c1} [a]	E_{c1} [b]	I_f	I_b [a]	I_b [b]	I_{c2}	G_m [a]	G_m [b]	R_p	P.O.	
76	300	6.3	250		-13.5		.306	5.5			1400		9580		
77	500	6.3	250	100	- 3	- 7	.306	1.9		0.3	1820		2,500,000		
78	500	6.3	250	100	- 3	-42.5	305	6.4		1.4	1575		818,000		
6C6	1000	6.3	250	100	- 3	- 7	304	2.0		0.4	1300		2,300,000		
6D6	1000	6.3	250	100	- 3	-42.5	307	7.3		1.7	1700		730,000		
75	300	6.3	250		- 2		304	0.7			1050		95,000		
41	500	6.3	250	250	-18		.410	30.0		5.0	2100		69,900		
42	2500	6.3	250	250	-16.5		650	34.0		6.2	2500		70,000		Load=7000 ohms (Pentode Con.)
42		6.3	250		-20										Load=3000 ohms (Triode Con.)
2A5	3000	6.3	250	250	-16.5		1.50	34.0		5.1	2550		67,000		Load=7000 ohms (Pentode Con.)
2A5		6.3	250		-20										Load=3000 ohms (Triode Con.)
85	200	6.3	250		-20		.310	7.0			1100		8,000		
6F7	500	6.3	250	100	- 3	-35	301	7.0		1.8	1170		700,000		Pentode
6F7		6.3	100		- 3			2.9			460		15,000		Triode

* For making up grand averages. Will be held confidential.

Please return to:
David Grimes, RMA
75 Varick Street,
New York, N. Y.

RECTIFIERS

Type	No. Avg'd (*)	Operating Conditions					Averaged Results				
		E_f	E_p	C_1	Load	E_{dc}	I_f	I_L	I_s [1]	I_s [2]	
80	3000	5.0	350	4μ	2000	80 ~~40~~	2.00	125	145	150	
84	800	6.3	350	4μ	8000	20 ~~40~~	.508	53	88	84	

* For making up grand averages. Will be held confidential.

E_p = volts r.m.s. each plate. C_1 = Load bypass condenser. I_L = Load current

I_s = emission current each plate separately with E_{dc} applied.

Please return to:
David Grames, RMA
Mr. Hugh Wise
73 Varick Street,
New York, N. Y.

Dung Sol

AMPLIFIERS

Type	No. Avg'd (*)	Operating Voltages						Averaged Results									
		Ef	Eb	Ec2	Ec1 a	Ec1 b		If	Ib a	Ib b	Ic2	Gm a	gm b	Rp	P.O.		
76		6.3	250		-13.5			.244	5.6	micro. amp.		1452		9.160			
77	14	6.3	250	100	- 3	- 7		.300	2.04	3.5	.6	1242	6.4	Exceeds 1.5 megohm			
78		6.3	250	100	- 3	-42.5		.304	6.8	22.0	4.7	1115	4.7	1.5 Exceeds 1.5 megohm			
6C6		6.3	250	100	- 3	- 7		.297	1.66	2	.42	1325	3				
6D6	12	6.3	250	100	- 3	-42.5		.305	5.4	14.3	2.01	1578	13.4	6.530			
75		6.3	250		- 2			.299	.88			1207		7.520			
41	12	6.3	250	250	-18			.305	31.7		5.58	2137		7.400			
42		6.3	250	250	-16.5			.307	31.1		5.38	2263		5.200			Load=7000 ohms (Pentode Con.)
42		6.3	250		-20				21.2			2258		3.030			Load=3000 ohms (Triode Con.)
2A5		6.3	250	250	-16.5			.183	30.6		5.27	2180		5.200			Load=7000 ohms (Pentode Con.)
2A5	12	6.3	250		-20				27.4			2206		3.148			Load=3000 ohms (Triode Con.)
85		6.3	250		-20			.312	9.0			1120		7.350			
6F7	12	6.3	250	100	- 3	-35		.272	6.86	46	1.71	1132	14	5.120			Pentode
6F7	12	6.3	100		- 3				3.78			500		14.800			Triode

* For making up grand averages. Will be held confidential.

Please return to:
David Grimes, RMA
75 Varick Street,
New York, N. Y.

RECTIFIERS

Type	No. Avg'd (*)	Operating Conditions					Averaged Results				
		E_f	E_p	C_1	Load	E_{dc}	I_f	I_L	I_s [1]	I_s [2]	
80		5.0	350	4μ	2000	40					
84		6.3	350	4μ	8000	40					

* For making up grand averages. Will be held confidential.

E_p = volts r.m.s. each plate. C_1 = Load bypass condenser. I_L = Load current

I_s = emission current each plate separately with E_{dc} applied,

RMA.

Tung-Sol Radio Tubes

Characteristic Uniformity Check

Type T.S. 6A7 Date 8/22/34

Regular Production Tubes.

	No	Mu	Rp	Gm	Igas	Ip	Isg	Iof	If
Detch	1		152,000	795		4.8	3.7		
	2		222,000	770		4.6	3.05		
	3		245,000	735		4.35	3.34		
	4		330,000	575		3.98	3.		
	5		367,000	410		3.95	3.1		
	6		415,000	740		4.13	3.		
	7		333,000	610		3.9	3.		
	8		400,000	630		4.6	3.05		
	9		299,000	575		4.57	3.		
	10		341,500	645		4.43	3.25		
Ave.			268,650	675		4.38	3.07		
	Tube # 6A7		@ OSCILLATOR.						
Det	1		88,500			5.00			
	2		79,500			4.32			
	3		81,000			4.97			
	4		88,000			4.90			
	5		86,000			4.61			
	6		75,000			4.72			
	7		75,500			3.97			
	8		94,000			3.87			
	9		78,500			4.44			
	10		80,500			4.62			
Ave.			83,960			4.65			

Voltages.

E_p - 250 Volts E_{g2} - 250 Volts

E_{g1} - -3 " E_{g1} - -6 Volts

E_{g3+5} - 100 "

Ken-Rad

Please return to:
David Grimes, RMA
Tube Numbering,
75 Varick Street,
New York, N.Y.

AMPLIFIERS

Type	No. Avg'd (*)	Operating Voltages						Averaged Results								
		E_f	E_b	E_{c2}	E_{c1} [a]	E_{c1} [b]		I_f	I_b [a]	I_b [b]	I_{c2}	G_m [a]	G_m [b]	R_p	P.O.	
76	100	6.3	250		-12.5			.306	4.8			1490		8850		
77	100	6.3	250	100	- 3	-9 ~~-7~~		.300	1.99	.00	.42	1185	---	2554M		
78	100	6.3	250	125 ~~100~~	- 3	-45 ~~-33.5~~		.295	10.2	---	2.82	1682	15.5	489M		
6C6	100	6.3	250	100	- 3	-9.7 ~~- 7~~		.307	2.41	.00	.64	1260	---	2680M		
6D6	100	6.3	250	100	- 3	-40.0 ~~-33.5~~		.302	8.95		1.76	1685	15.0	649M		
75	100	6.3	250		- 2			.300	.86			1028		100500		
41	100	6.3	250	250	-18			.413	29.8		4.90	2425		86500	3.26	
42	100	6.3	250	250	-16.5			.693	33.2		5.50	2680		67000	3.35	Load=7000 ohms (Pentode Con.)
42		6.3	250		-20											Load=3000 ohms (Triode Con.)
2A5	100	6.3	250	250	-16.5			2.02	33.8		5.57	2825		67500	3.51	Load=7000 ohms (Pentode Con.)
2A5		6.3	250		-20											Load=3000 ohms (Triode Con.)
85	100	6.3	250		-20			.304	6.82			1016		7880		
6F7	100	6.3	250	100	- 3	-47.5 ~~-33~~		.284	6.06	.00	1.56	1186	---	103500		Pentode
6F7	100	6.3	100		- 3			.284	3.63			558		14800		Triode

* For making up grand averages. Will be held confidential.

Please return to:
Mr. Chas. Rai
75 Varick St.
New York, N. Y.

RECTIFIERS

Type	No. Avg'd (*)	Operating Conditions					Averaged Results				
		E_f	E_p	C_1	Load	E_{dc}	I_f	I_L	I_{s_1}	I_{s_2}	
80	100	5.0	500 350	1μ 4μ	2700 2000	80 40	1.98	155	161	167	
84	100	6.3	350	.25μ 4μ	7000 8000	80 40	.541	48.5	124	127	

* For making up grand averages. Will be held confidential.

E_p = volts r.m.s. each plate. C_1 = Load bypass condenser. I_L = Load current

I_s = emission current each plate separately with E_{dc} applied.

August 9 1934

Type 6A7

Tested at $E_f = 6.3$ $E_{c1} = -3$ $E_{c2} = 250$ (20000 ohms)

$E_{c3} = 100$ $E_p = 250$ $E_{c4} = -3$

No tested	100
I_f	.321
I_{c2}	4.58
I_{c3}	6.63
I_B	7.44

Transconductances

G_1-G_2	575
G4-P	907
G_1-P	665
G_{mo} (oscillating G4-P)	548

Conversion conductance 509

Cut-off (E_{G4} volts for $I_p = .00$) 61

Please return to:
David Grimes, RMA
Tube Numbering,
75 Varick Street,
New York, N. Y.

AMPLIFIERS

Type	No. Avg'd (*)	Operating Voltages					Averaged Results								
		Ec	Eb	Eo2	Ec1 [a]	Ec1 [b]	Ifa.	Ib/14 [a]	Ib [b]	Io2	Gm [a]	Gm [b]	Rp	P.O.	
76	48	6.3	250		-13.5		.305	4.3			1400				
77	96	6.3	250	100	- 3	- 7	.305	2.1			1300				
78	96	6.3	250	100	- 3	-42.5	.305	6.9			1550				
606	48	6.3	250	100	- 3	- 7	.305	2.1			1275				
606	48	6.3	250	100	- 3	-42.5	.305	8.4			1400				
75	48	6.3	250		- 2		.313	1.1			1100				
41	25	6.3	250	250	-18		.410	32.0			2000				
42	25	6.3	250	250	-16.5		.690	32.0			1950				Load=7000 ohms (Pentode Con.)
42	25	6.3	250		-20		.690	29.0			1950				Load=3000 ohms (Triode Con.)
245	25	6.3	250	250	-16.5		1.8	34.0			2300				Load=7000 ohms (Pentode Con.)
245	25	6.3	250		-20		1.8	30.0			2350				Load=3000 ohms (Triode Con.)
85	48	6.3	250		-20		.310	7.8			1050				
677	48	6.3	250	100	- 3	-35	.305	7.9			1150				Pentode
677	48	6.3	100		- 3		.305	3.0			450				Triode

* For making up grand averages. Will be held confidential.

Please return to:
David Grimes, RMA
75 Varick Street,
New York, N. Y.

RECTIFIERS

Type	No. Avg'd (*)	Operating Conditions					Averaged Results				
		E_f	E_p	C_1	Load	E_{dc}	I_f	I_L	I_s	I_s^2	
80	100	5.0	350	4μ	2000	40	1.9	110	115	115	
84	12	6.3	350	4μ	8000	40	.405	50	50	50	

* For making up grand averages. Will be held confidential.

E_p = volts r.m.s. each plate. C_1 = Load bypass condenser. I_L = Load current

I_s = emission current each plate separately with E_{dc} applied.

Please return to:
David Grieser, RMA
Tube Engineering
75 Varick Street,
New York, N. Y.

Amplifiers

AMPLIFIERS

Type	No. Avg'd (*)	Operating Voltages					Averaged Results							
		E_f	E_b	E_{c2}	E_{c1} [a]	E_{c1} [b]	$I_{f_{avg}}$	$I_{b_{max}}$ [a]	$I_{b_{min}}$ [b]	I_{c2}	$G_{m_{max}}$ [a]	$G_{m_{min}}$ [b]	$R_{p_{avg}}$ [a]	P.O.	
76		6.3	250		-13.5										
77	100	6.3	250	100	- 3	- 7	.298	2.42	.013	.66	1272		1380		
78	100	6.3	250	100	- 3	35 ~~-40~~	.297	7.51	69.8	3.77	1447	2.0	752		
6C6	40	6.3	250	100	- 3	- 7	.317	2.09	.009	.49	1235		2710		
6D6	100	6.3	250	100	- 3	-42.5	.312	8.26	.086	2.00	1545	2.0			
75	100	6.3	250		- 2		.310	.93			1122		86.1		
41	100	6.3	250	180 ~~250~~	-13.5 ~~-18~~		.402	19.07		3.06	1803		79.0		
42	90	6.3	250	250	-16.5		.710	33.3		3.63	2402		71.5		Load=7000 ohms (Pentode Con.)
42		6.3	250		-20										Load=3000 ohms (Triode Con.)
2A5	60	6.3	250	250	-16.5		1.74	33.2		5.72	2226		73.4		Load=7000 ohms (Pentode Con.)
2A5		6.3	250		-20										Load=3000 ohms (Triode Con.)
85	30	6.3	250		-20		.310	7.91			1073		7.70		
6F7	90	6.3	250	100	- 3	-35	.293	7.23	.183	1.87	1065	18.68	733		Pentode
6F7		6.3	100		- 3			3.66			523		15		Triode

* For making up grand averages. Will be held confidential.

Please return to:
David Grieg, RMA
75 Varick Street,
New York, N. Y.

RECTIFIERS

Type	No. Avg'd (*)	Operating Conditions					Averaged Results				
		E_f	E_p	C_1	Load	E_{dc}	I_f	I_L	I_s [1]	I_s [2]	
80	100	5.0	120 ~~350~~	4μ	0 ~~2000~~	4Ω	2.01		54.4	52.1	Voltage required for current of 120 m.a. is recorded.
84	100	6.3	225 ~~350~~	4μ	4500 ~~8000~~	4Ω	.596	47.7	8 drop 14.10	3 drop 14.2	

* For making up grand averages. Will be held confidential.

E_p = volts r.m.s. each plate. C_1 = Load bypass condenser. I_L = Load current

I_s = emission current each plate separately with E_{dc} applied.

Tube Type 76
$E_b = 250$ $E_{g2} = -13.5$

	I_f	I_b	G_m	$R_p \times 10^3$
	310	2.40	1380	10.40
	299	2.30	1313	9.15
	303	2.30	1400	9.38
	302	2.30	1400	----
	302	2.15	1414	9.16
	304	1.60	1290	8.85
High	310	2.50	1489	10.40
Low	294	1.50	1290	8.85
Average	304	1.86	1424	9.42
Bogey	300	2.00	1450	9.50

Tube Type 77
$E_b = 250$ $E_{g2} = 100$ $E_{g1} = -3$

	I_f	I_b	I_{g2}	G_m	$R_p \times 10^3$
	298	2.10	.68	1393	1.38
	290	1.79	.62	1185	2.55
	301	2.10	----	1300	----
	304	2.30	.50	1380	1.92
	300	2.04	.46	1282	(31.5)
	304	1.90	.50	1320	2.50
	305	2.30	.53	1373	2.47
	300	2.04	.50	1242	(31.5)
	302	2.10	.46	1290	4.0
High	306	2.50	.66	1380	4.0
Low	298	1.90	.30	1173	1.38
Average	303	2.10	.50	1265	2.75
Bogey	300	2.30	.50	1250	(31.5)

Tube Type 78
$E_b = 250$ $E_{g2} = 100$ $E_{g1} = -3$

	I_f	I_b	I_{g2}	G_m	$R_p \times 10^3$
	298	2.20	.68	1390	2.50
	307	2.40	.61	1362	2.48
	311	2.26	.61	1422	2.58
	317	2.30	.49	1371	2.71
	318	2.16	----	1375	----
	319	1.90	.18	1210	2.00
	319	2.04	.30	1362	(31.5)
	317	1.64	.12	1373	(31.5)
	312	2.30	.60	1390	2.10
High	317	2.50	.64	1400	2.71
Low	297	1.64	.10	1223	1.38
Average	301	2.12	.51	1390	2.40
Bogey	300	2.00	.50	1225	(31.5)

Tube Type 79
$E_b = 250$ $E_{g2} = 100$ $E_{g1} = -18$

	I_f	I_b	I_{g2}	G_m	$R_p \times 10^3$	μ_c
	298	3.23	1.50	1400	10.40	2.48
	294	7.40	1.79	1240	760	----
	303	5.79	1.60	1277	620	----
	293	10.20	2.22	1682	649 (1)	----
	298	7.07	1.64	1404	825	3.04 (2)
	304	6.90	1.70	1415	825	3.03
	303	6.40	----	1220	710	----
	307	7.30	1.80	1400	738	----
	297	7.31	1.77	1447	738	3.26
	305	6.40	1.66	1374	818	----
High	307	7.31	1.80	1630	910	3.26
Low	294	6.20	1.40	1215	700	2.48
Average	301	7.30	1.71	1288	802	3.04
Bogey	300	7.00	1.70	1250	800	3.40

Note: (1) At 125 volts screen -- not included in averages.

Tube Type 80
$E_b = 250$ $E_{g2} = 100$ $E_{g1} = -3$

	I_f	I_b	I_{g2}	G_m	$R_p \times 10^3$
	1.78	8.20	.45	1530	980
	294	7.40	1.79	1240	760
	303	5.79	1.60	1277	620
	293	10.20	2.22	1682	649 (1)
	298	7.07	1.64	1404	825
	304	6.90	1.70	1415	825
	303	6.40	----	1220	710
	307	7.30	1.80	1400	738
	297	7.31	1.77	1447	738
	305	6.40	1.66	1374	818
High	307	7.31	1.80	1630	910
Low	294	6.20	1.40	1215	700
Average	301	7.30	1.71	1288	802
Bogey	300	7.00	1.70	1250	800

Tube Type 81
$E_b = 250$ $E_{g2} = 100$ $E_{g1} = -3$

	I_f	I_b	I_{g2}	G_m	$R_p \times 10^3$	μ_c
	1.78	8.20	.45	1530	980	2.48
	294	7.40	1.79	1240	760	----
	303	5.79	1.60	1277	620	----
	293	10.20	2.22	1682	649 (1)	----
	298	7.07	1.64	1404	825	3.04 (2)
	304	6.90	1.70	1415	825	3.03
	303	6.40	----	1220	710	----
	307	7.30	1.80	1400	738	----
	297	7.31	1.77	1447	738	3.26
	305	6.40	1.66	1374	818	----
High	307	7.31	1.80	1630	910	3.26
Low	294	6.20	1.40	1215	700	2.48
Average	301	7.30	1.71	1288	802	3.04
Bogey	300	7.00	1.70	1250	800	3.40

Tube Type 82
$E_b = 250$ $E_{g2} = 250$ $E_{g1} = -18$

	I_f	I_b	I_{g2}	G_m	$R_p \times 10^3$	μ_c
	-108	33.3	1.10	1435	80.8	2.48
	-102	19.07	3.04	1863	79.0	---- (1)
	-110	30.0	5.30	2160	69.5	----
	-096	32.4	5.71	2301	----	3.04 (2)
	-110	34.5	6.30	2472	----	3.03
	-099	27.1	5.40	2310	----	----
	-110	32.0	----	2000	----	----
	-113	29.8	4.90	2495	86.5	3.26
	-108	31.7	5.28	2523	74.4	----
High	113	34.3	6.90	2472	86.5	3.26
Low	087	27.1	3.40	1920	69.5	2.48
Average	104	31.1	4.93	2196	77.5	3.04
Bogey	100	32.0	5.50	2250	68.0	3.40

Notes: (1) at 180 and -13.5
(2) at 250 and -18.5
Above not included in averages.

Tube Type 245

$E_p = 250$ $E_{g2} = 150$ $E_{g1} = 16.5$

	I_f	I_b	I_{g1}	G_m	$R_p \times 10^3$	P.O.
	1.90	31.0	5.10	3559	67.0	----
	2.02	31.2	5.40	2551	----	2.48
	1.87	31.1	5.35	2416	----	3.32
	1.83	30.6	5.25	2589	68.0	----
	1.74	33.5	5.73	2326	73.6	----
	2.02	33.8	5.97	2623	67.3	3.31
	1.80	34.0	----	2350	----	----
	1.74	36.2	7.50	2540	81.0	4.23
High	2.02	36.2	7.50	3560	88.0	4.23
Low	1.87	30.6	5.10	2350	67.0	2.48
Average	1.84	33.0	5.70	2448	76.0	3.42
Bogey	1.75	31.0	6.50	2500	100.0	5.00

Tube Type 80

$E_p = 350$ volts rms $C_1 = 4\mu f$ 2000 ohms $E_{g2} = 40$ volts

I_f	I_1	I_{g1}	I_{g2}	
1.90	110.0	163	153	
1.98	125.0	161	147	(1)
2.00	135.0	163	156	(2)
2.10	137.0	163	190	(3)
1.96	141.0	162	154	
2.23	126.2	164	146	
1.99	135.0	----	----	

Notes: (1) At 500 volts rms, 4μfd and 2700 ohms, 80 volts D.C.

(2) At 500 volts rms, 4μfd and 2000 ohms, 80 volts D.C.

(3) At 500 volts rms, 4μfd and 2000 ohms, 80 volts D.C.

Tube Type 85

$E_p = 250$ $E_{g1} = -20$

	I_f	I_b	G_m	$R_p \times 10^3$
	316	7.85	1250	----
	305	7.83	1250	7.59
	312	8.00	1130	7.33
	295	7.58	1021	7.82
	304	6.83	1018	7.88
	316	7.00	1100	8.00
	310	7.91	1073	7.70
	282	8.10	1080	----
	303	7.90	1300	7.10
	309	5.90	1238	8.60
High	312	9.00	1250	8.60
Low	282	5.90	1018	7.10
Average	304	7.69	1117	7.75
Bogey	300	8.00	1100	7.50

Tube Type 84

$E_p = 350$ volts rms $C_1 = 4\mu f$ 8000 ohms $E_{g2} = 40$ volts

I_f	I_1	I_{g1}	I_{g2}	
.308	33.0	82	81	(1)
.478	50.0	----	----	
.475	50.0	50	50	
.511	48.5	121	127	(2)
.515	61.3	91	96	
.480	53.0	73	72	(3)

Notes: (1) At 350 volts rms, 4.0 μfd and 6000 ohms, 20 volts D.C.

(2) At 350 volts rms, 0.25 μfd and 7000 ohms, 30 volts D.C.

(3) At 350 volts rms, 4.0 μfd and 8000 ohms, 25 volts D.C.

Tube Type 677

$E_p = 250$ $E_{g2} = 100$ $E_{g1} = -3$ $E_p = 100$ $E_{g1} = -3$

	I_f	I_b	PEZTOUR I_{g2}	G_m	$R_p \times 10^3$	I_b	TRIODE I_{g2}	$R_p \times 10^3$
	290	6.94	1.91	1035	811	3.78	590	16.8
	293	7.75	1.87	1065	939	3.65	523	15.0
	303	7.90	----	1150	----	3.00	490	----
	293	6.00	1.60	990	810	2.90	486	17.3
	281	6.06	1.56	1186	1033	3.63	599	16.8
	301	7.00	1.80	1170	790	2.90	480	15.0
	318	6.80	1.60	1071	830	3.10	516	15.5
	297	6.75	1.81	1061	810	3.27	527	----
High	318	7.90	1.87	1186	1033	3.78	599	17.3
Low	281	6.06	1.56	990	790	2.90	527	16.8
Aver.	298	6.89	1.73	1094	821	3.33	477	15.4
Bogey	300	6.50	1.50	1100	830	3.10	450	17.8