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Title GL-813 Oscillation Screen-Grid Current Tests

By

Tube Engineering Div.

Information prepared for _____

Tests made by _____

Information prepared by C. W. Bleichner, W. E. Brush

Countersigned by K. C. DeWalt

Date June 22, 1944

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22196

GL-813 OSCILLATION SCREEN-GRID CURRENT TESTS

Purpose:

It is the purpose of this data folder to establish a procedure for GL-813, 15 mc oscillation testing, to determine true screen grid current, and to outline a method for maintenance of factory oscillators. In view of a possible specification change, it was also desired to make a comparison of oscillator performance and screen grid current values at 300 and 400 screen volts.

Method:

Thirty representative tubes were chosen for the tests; of these twenty were GE tubes of recent manufacture, ten were National Union tubes. The four test oscillators were rewired, with due regard to lead lengths, grounding, and capacitance effects. Essentially, the following changes were made: the socket was mounted on a metal plate securely bolted to the chassis, the beam plate pin was directly grounded to this plate at the socket and this point considered true ground in the bypassing of screen and filament leads. The coils were changed to ten turns to improve circuit efficiency and allow a wider variation of control grid current by avoiding the necessity of large shunting capacitances across the grid condenser. Schematic and pictorial diagrams of the rewired oscillators are included in this report.

The determination of true screen grid current is made difficult at 15 mc by lead lengths, grounding problems, stray capacity effects, etc. To minimize these effects, it was suggested that oscillation tests be conducted at 100 KC on the Engineering general-purpose test set. Even at low frequencies we have to account for meter accuracies and personal reading errors. To minimize these effects, meter calibration of both engineering and factory sets was checked, and all data herein recorded was taken by the writers.

The thirty tubes were first run through the 100 KC test set. It was found that it was a simple matter to recheck values, and that no special attention had to be paid to lead lengths or tube placement. The socket used for the 100 KC tests was mounted on a metal plate; screen and filament bypassed to the beam plate pin which was grounded to the mounting plate and dc supply. The oscillators and tubes were now taken to the factory sets, where one oscillator at a time was checked in a factory supply. These data show the variation

between oscillators, since supplies and metering were the same in each case. A particular oscillator was then tested in each factory supply to show any position or supply variation. As a final check, the tubes were again tested at 100 KC.

Conclusions:

The tests indicate:

1. The maximum variation between oscillators should not exceed 15 ma. Actually, the average variation was much less.

2. Tubes having screen currents above 60 ma. will not check as well between oscillators as the lower screen current tubes. Thus, a better check may be obtained on all tubes and oscillators at the 500 volt conditions.

3. The four oscillators cross check very closely with the 100 KC data.

4. A comparison of one oscillator in the four supplies shows the oscillator test data to be relatively independent of supply and position.

Oscillators should be maintained to check with one another per the accompanying data. Standard tubes, serial numbers 3454, 1468, 1615, 96361, and 96257 have been supplied to Mr. Keuchle for this purpose. If additional checks are required, the Engineering Dept. will conduct tests for comparison on the 100 KC oscillator when requested.

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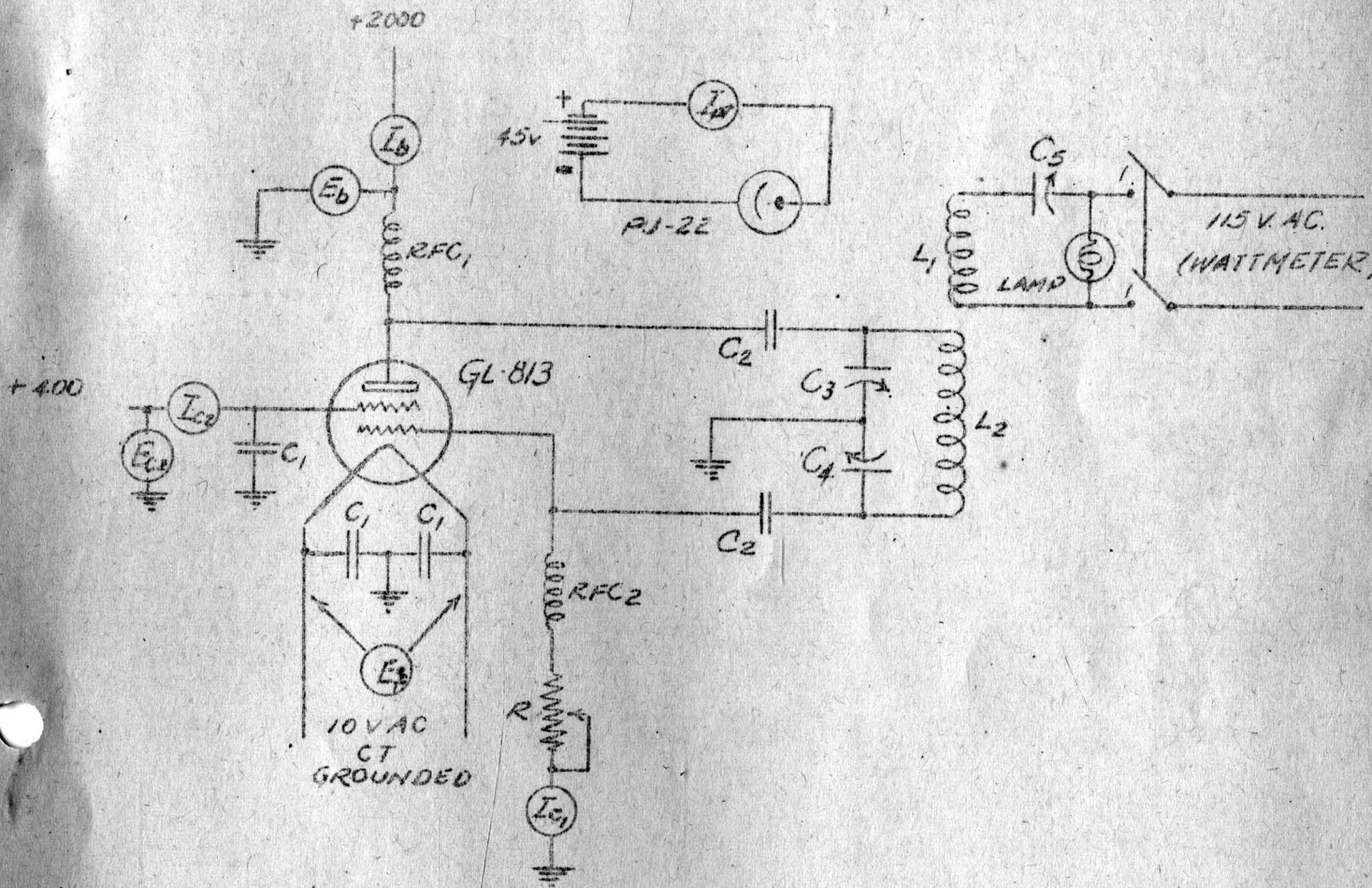
 WE Brush }
 CW Bleichner }

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 ENGINEERING
 TUBE DIVISION

Counter signed
KC DeWalt
June 23, 1944

GL-813 15 MC OSC.



- RFC₁ 5.5 MH Meissner 19-3022
- RFC₂ 2.5 MH Meissner 19-1998
- R 10,000 ohms adjustable Ohmite
- C₁ 0.01 ufd Aerovox Type 684
- C₂ 0.01 ufd Sangamo A-50 2500 wv.
- C₃ 70 uufdmvariable Johnson 70E30
- C₄ 325 uufd variable Hammarlund MC-325-M,
with 100 uufd vacuum capacitor in parallel
- C₅ 70 uufd variable Johnson 70E30
- Lamp Projection 200 watt
- L₁ 6 turns, 3/16" Copper tubing 2" long, 2 1/8" diam.
- L₂ 10 turns, 3/16" Copper tubing 3" long, 2 1/8" diam.

The beam-forming plate is grounded at the socket to the socket panel (thin metal sheet). The screen and filaments are bypassed from their socket pins to this point. The tank condenser rotors are connected to this point with a short, heavy conductor.

ENGINEERING 100 K.C. SET
 GL-813 TYPE TUBES

Regular Conditions

Special Conditions

Ser.#	Initial	Final	Initial	Final
	Tests	Tests		
	Ig2	Ig2	Ig2	Ig2
4527	58	58	59	58
3827	42	45	27	29
3838	46	45	27	30
4460	56	58	39	39
3965	51	51	35	36
3454	52	53	35	35
5108	45	43	30	27
6002	40	40	25	26
5950	53	53	36	36
3396	51	52	33	33
3389	43	43	27	28
2589	40	43	25	30
854	49	46	29	27
1468	47	47	31	31
691	57	58	37	37
1296	31	64	38	41
514	61	61	37	37
764	62	62	41	42
1571	62	64	40	44
1615	44	45	27	27
96102	40	40	28	28
96259	41	42	29	29
96351	30	32	17	18
96060	40	40	27	27
96257	38	38	23	24
96390	39	38	24	24
96270	36	37	24	25
95925	41	41	26	26
96781	22	22	13	12
96361	38	38	23	26

- Notes:
1. Regular conditions: $E_b=2000V$, $I_b=180MA$,
 $I_{g1}=12MA$, $E_{g2}=400V$
 2. Special Conditions: $E_b=2000V$, $I_b=180MA$,
 $I_{g1}=14MA$, $E_{g2}=300V$
 3. Initial 100 K.C. readings taken before tubes were tested in factory oscillators.
 4. Final 100 K.C. readings taken after tubes were tested in factory oscillators.

FACTORY OSCILLATOR #1
FACTORY SET CODE #5QY2
Position - NT2B Left
GL-813 Type Tubes

Regular Conditions

Special Conditions

<u>Ser.#</u>	<u>Ig2</u>	<u>Useful P.O.</u>	<u>Ig2</u>	<u>Useful P.O.</u>
4527	61	228	44	238
3827	46	235	30	238
3838	50	228	34	239
4460	61	235	44	243
3965	53	238	38	238
3454	55	230	38	235
5108	44	224	30	238
6002	40	235	27	243
5950	55	228	39	239
3396	54	235	38	243
3389	47	238	32	243
2589	46	228	32	238
854	50	235	30	240
1468	51	228	35	239
691	64	225	45	237
1296	71	209	50	216
514	70	225	45	235
764	73	223	52	228
1571	76	221	53	226
1615	49	216	33	237
96102	41	230	31	240
96259	45	230	31	240
96351	30	238	20	244
96060	42	223	29	240
96257	40	243	27	244
96390	41	230	26	235
96270	40	235	29	244
95925	47	223	31	235
96781	24	235	Can't load	
96361	42	235	29	244

Notes: Regular Conditions: Eb=2000V; Ib=180MA,
Ig1=12MA; Eg2=400V
Special Conditions: Eb=2000V; Ib=180MA,
Ig1=14MA; Eg2=300V.

FACTORY OSCILLATOR #2
FACTORY SET CODE #3QY2
FACTORY POSITION NL-2B LEFT
GL-313 Type Tubes

<u>Regular Conditions</u>			<u>Special Conditions</u>	
<u>Ser.#</u>	<u>Ig2</u>	<u>Useful P.O.</u>	<u>Ig2</u>	<u>Useful P.O.</u>
4527	60	235	43	246
3827	40	246	28	250
3838	40	245	29	250
4460	57	238	43	245
3965	52	238	39	245
3454	53	238	38	245
5108	41	242	30	245
6002	38	250	26	250
5950	54	235	37	243
3396	50	245	36	245
3389	45	245	29	246
2589	42	245	30	245
854	43	242	Can't load - 180 MA	
1468	48	235	32	242
691	61	238	40	242
1296	67	230	47	235
514	60	243	38	245
764	71	228	48	233
1571	74	230	51	233
1615	46	240	31	245
96102	40	245	27	250
96259	43	245	28	249
96351	26	250	19	249
96060	38	250	26	250
96257	35	250	23	250
96390	36	245	25	249
96270	37	250	25	252
95925	44	249	28	252
96781	20	252	Can't load 180 MA	
96361	40	249	26	252

Notes: Regular Conditions: Eb=2000V; Ib=180MA,
Ig1=12MA, Eg2=400V

Special Conditions: Eb=2000V; Ib=180MA,
Ig1=14MA, Eg2=300V.

FACTORY OSCILLATOR #3
FACTORY SMT CODE #3QY2
FACTORY POSITION #NT-2B LEFT
GL-8K5 Type Tubes

Regular Conditions

Special Conditions

<u>Ser.#</u>	<u>Ig2</u>	<u>Useful P.O.</u>	<u>Ig2</u>	<u>Useful P.O.</u>
4527	58	239	38	248
3827	43	240	26	247
3838	42	247	26	247
4460	56	240	39	247
3965	52	240	34	247
3454	52	244	36	250
5108	43	236	25	244
6002	40	247	26	250
5950	52	240	35	247
3396	50	247	33	250
3389	44	244	29	250
2589	43	240	28	247
854	46	240	27	244
1468	46	240	30	247
691	58	240	37	247
1296	65	225	43	240
514	61	240	38	247
764	66	229	45	244
1571	69	230	46	247
1615	44	240	28	247
96102	38	244	27	247
96259	43	240	28	247
96351	27	247	Can't adjust	
96060	37	240	26	247
96257	36	244	22	247
96390	37	240	23	244
96270	38	240	24	247
95925	42	240	27	247
96781	20	247	Can't adjust	
96361	38	244	24	247

Notes: Regular Conditions: $E_b=2000V$; $I_b=180MA$,
 $I_{g1}=12MA$, $E_{g2}=400V$

Special Conditions: $E_b=2000V$; $I_b=180MA$,
 $I_{g1}=14MA$, $E_{g2}=300V$

FACTORY OSCILLATOR #5
 FACTORY SET CODE #5013
 FACTORY POSITION #INT-2B RIGHT
 GL-813 Type Tubes

Regular Conditions

Special Conditions

<u>Ser.#</u>	<u>Ig2</u>	<u>Useful P.O.</u>	<u>Ig2</u>	<u>Useful P.O.</u>
4527	63	234	41	242
3827	47	234	27	239
3858	48	242	29	248
4460	60	234	41	242
3965	55	234	37	244
3454	56	237	37	244
5108	45	230	28	237
6002	43	239	23	245
5950	57	238	33	244
3396	53	239	35	244
3389	48	239	30	245
2589	46	234	31	238
854	48		23	242
1468	48	239	32	245
691	60	237	40	242
1296	69	218	46	230
514	70	230	43	242
764	69	230	45	242
1571	73	225	49	239
1615	48	234	29	238
96102	42	234	23	242
96259	46	234	30	239
96351	30	239	19	239
96060	41	237	28	237
96257	41	238	25	245
96390	40	234	25	238
96270	42	237	26	244
95925	47	230	23	242
96781	22	244	Can't adjust	
96361	40	239	26	244

Notes: Regular Conditions: Eb=2000V, Ib=180MA,
Igl=12MA, Eg2=400V

Special Conditions: Eb=2000V, Ib=180MA,
Igl=14MA, Eg2=300V

FACTORY OSCILLATOR #3
 FACTORY SET CODE #3ND2
 FACTORY POSITION #NT2A-LEFT
 GL-613 Type Tubes

<u>Regular Conditions</u>			<u>Special Conditions</u>	
<u>Ser. #</u>	<u>Ig2</u>	<u>Useful P.O.</u>	<u>Ig2</u>	<u>Useful P.O.</u>
4527	58	236	35	243
3827	41	240	24	243
3838	41	243	24	243
4460	56	239	37	243
3965	50	236	32	242
3454	50	243	32	243
5108	41	233	24	239
6002	38	240	21	243
5950	49	239	32	242
3396	49	240	29	243
3389	43	243	26	243
2589	41	237	25	240
854	40	243	Can't adjust	
1468	44	240	29	224
691	57	236	34	247
1296	64	223	40	232
514	62	237	34	243
764	64	232	40	242
1571	68	232	43	242
1615	42	237	25	243
96102	37	239	24	243
96259	40	239	26	242
96351	26	245	18	239
96060	36	240	24	239
96257	34	247	21	243
96390	35	239	22	235
96270	35	239	21	243
95925	41	239	23	243
96781	18	243	Can't adjust	
96361	36	243	22	247

Notes: Regular Conditions: Eb=2000V; Ib=180MA,
 Ig1=12MA, Eg2=400V

Special Conditions: Eb=2000V; Ib=180MA;
 Ig1=14MA, Eg2=300V.

FACTORY OSCILLATOR #3
 FACTORY SET CODE #3ND3
 FACTORY SET POSITION NT2A RIGHT
 6L813 Type Tubes

Regular Conditions

Special Conditions

<u>Ser.#</u>	<u>Ig2</u>	<u>Useful P.O.</u>	<u>Ig2</u>	<u>Useful P.O.</u>
4527	63	235	41	246
3827	46	240	28	246
3838	43	242	27	246
4460	61	240	41	246
3965	55	240	58	242
3454	57	240	37	246
5108	46	231	28	242
6002	40	242	25	248
5950	56	240	38	246
3396	55	242	36	246
3389	48	240	30	246
2589	46	242	30	246
854	50	240	27	242
1468	50	242	32	248
891	62	238	39	246
1296	70	227	46	235
514	66	235	37	246
764	70	225	47	242
1571	74	227	48	242
1615	48	238	29	242
96102	44	240	29	248
96259	48	240	30	248
96351	31	248	20	246
96060	42	242	28	242
96257	40	246	26	248
96390	41	240	25	242
96270	42	240	26	248
95925	48	240	28	250
96781	20	251	Can't adjust	
96361	44	242	27	250

Notes: Regular Conditions: Eb=2000V, Ib=180MA,
Ig1=12MA, Eg2=400V

Special Conditions: Eb=2000V, Ib=180MA,
Ig1=14MA, Eg2=300V.

FACTORY OSCILLATOR #4
 FACTORY SET CODE #3QY2
 FACTORY POSITION #NT-2B LEFT
 GL-815 Type Tubes

Regular Conditions

Special Conditions

<u>Ser.#</u>	<u>Ig2</u>	<u>Useful P.O.</u>	<u>Ig2</u>	<u>Useful P.O.</u>
4527	56	232	36	235
3827	42	235	24	245
3838	40	247	24	247
4460	57	232	38	235
3985	49	232	31	235
3454	50	230	32	232
5108	36	237	24	234
6002	39	240	24	245
5950	50	239	34	245
3396	48	232	30	235
3389	42	237	26	245
2589	40	237	25	245
854	40	238	Can't adjust	
1468	43	238	27	238
691	56	230	35	230
1296	63	222	42	228
514	56	230	34	235
764	65	220	43	245
1571	65	228	45	228
1615	44	228	25	228
96102	37	241	25	244
96259	40	239	26	242
96351	25	244	Can't adjust	
96060	34	244	25	244
96257	34	244	Can't adjust	
96390	35	241	21	243
96270	35	242	23	242
95925	39	233	25	237
96781	14	167	Can't adjust	
96361	36	239	23	242

Notes: Regular Conditions: Eb=2000V, Ib=180MA,
 Ig1=12MA, Eg2=400V

Special Conditions: Eb=2000V, Ib=180MA,
 Ig1=14MA, Eg2=300V