

# Meter Calibration

1/3/63

3 Volt Scale			
True	Ind.	$\Delta$	Corr.
0	0	.10	0
.1	.10	.10	0
.2	.20	.10	0
.3	.30	.10	0
.4	.40	.10	0
.5	.50	.10	0
.6	.60	.10	0
.7	.70	.10	0
.8	.80	.09	0
.9	.89	.10	+0.01
1.0	.99	.11	+0.01
1.1	1.10	.10	0
1.2	1.20	.11	0
1.3	1.31	.09	-0.01
1.4	1.40	.10	0
1.5	1.50	.11	0
1.6	1.61	.11	-0.01
1.7	1.72	.09	-0.02
1.8	1.81	.09	-0.01
1.9	1.90	.10	0
2.0	2.00	.11	0
2.1	2.11	.10	-0.01
2.2	2.21	.09	-0.01
2.3	2.30	.10	0
2.4	2.40	.10	0
2.5	2.50	.10	0
2.6	2.60	.09	0
2.7	2.69	.09	+0.01
2.8	2.78	.08	+0.02
2.9	2.86	.09	+0.04
3.0	2.95	.08	+0.05
3.1	3.03		+0.07

30 Volt Scale			
True	Ind.	$\Delta$	Corr.
0	0		0
1	1.0		
2	2.0		
3	3.0		
4	4.0		
5	5.0		
6	6.0		
7	7.0		
8	8.0		
9	9.0		
10	10.0		
11	11.0		
12	12.0		
13	13.0		
14	14.0		
15	15.0		
16	16.0		
17	17.0		
18	18.1		
19	19.0		
20	20.0		
21	21.0		
22	22.0		
23	23.0		
24	24.0		
25	24.9		
26	25.8		
27	26.7		
28	27.6		
29	28.5		
30	29.4		

22/1/63

1st I.F. Stage Performance

Input to 1st I.F. grid.

Output 2nd I.F. grid, 0.2 volts VTVM

Frequency Kc	Input mv	Gain db
170	50	11.2
200	15.9	21.2
220	6.5	28.9
228	5.8	29.9
240	6.4	29.1
250	7.0	28.3
260	7.2	28.0
270	6.7	28.7
280	6.2	29.3
285	6.0	29.6
300	7.4	27.8
350	28	16.2

Measured  
Gain

22/1/63

2nd I.F. Stage Performance

Input at 2nd I.F. grid,

Output 2v DC at Audio Cable Receptacle

Frequency Kc	Input mv	Gain db
170	290	18.4
200	70	29.1
215	45	32.9
220	48	32.4
230	57	30.9
240	66	29.6
250	59	30.6
260	54	31.4
270	49	32.2
277	46	32.8
280	48	32.4
300	72	28.9
350	280	17.1

When General Radio's signal generator is set at 0.20V output at 250KC or 2100KC, the Hewlett Packard vacuum tube voltmeter indicates 0.22 volt. Thus 0.8 db must be subtracted from apparent gain to obtain true gain.

(over)

22/1/55

Transformer characteristics are on back of  
 obsolete data sheet 16/3/62. These still hold.

Output 2V DC at A when Cells Discharge

Frequency Kc	Input mv	Gain db
150	500	18.7
200	70	1.95
212	42	9.88
230	40	4.88
250	27	9.08
270	40	2.98
280	27	2.98
290	24	2.16
300	27	2.16
310	24	2.16
320	27	2.16
330	24	2.16
340	27	2.16
350	24	2.16
360	27	2.16
370	24	2.16
380	27	2.16
390	24	2.16
400	27	2.16
410	24	2.16
420	27	2.16
430	24	2.16
440	27	2.16
450	24	2.16
460	27	2.16
470	24	2.16
480	27	2.16
490	24	2.16
500	27	2.16
510	24	2.16
520	27	2.16
530	24	2.16
540	27	2.16
550	24	2.16
560	27	2.16
570	24	2.16
580	27	2.16
590	24	2.16
600	27	2.16
610	24	2.16
620	27	2.16
630	24	2.16
640	27	2.16
650	24	2.16
660	27	2.16
670	24	2.16
680	27	2.16
690	24	2.16
700	27	2.16
710	24	2.16
720	27	2.16
730	24	2.16
740	27	2.16
750	24	2.16
760	27	2.16
770	24	2.16
780	27	2.16
790	24	2.16
800	27	2.16
810	24	2.16
820	27	2.16
830	24	2.16
840	27	2.16
850	24	2.16
860	27	2.16
870	24	2.16
880	27	2.16
890	24	2.16
900	27	2.16
910	24	2.16
920	27	2.16
930	24	2.16
940	27	2.16
950	24	2.16
960	27	2.16
970	24	2.16
980	27	2.16
990	24	2.16
1000	27	2.16

W. J. ...  
 output at 250K or 500K, ...  
 ...  
 ...

22/1/63

1st + 2nd I.F. Stages Performance

Input 1st I.F. grid.

Output 2v DC at Audio Cable Receptacle

Frequency ke	Input mv	Gain db	1st I.F. Gain db
170	20.	40.0	21.6
200	2.0	60.0	30.9
220	.58	70.7	38.3
230	.64	69.9	39.0
240	.81	67.8	38.2
250	.81	67.8	37.2
260	.74	68.6	37.2
270	.63	70.0	37.8
280	.54	71.4	39.0
300	1.09	65.3	36.4
350	14.7	42.7	25.6

Computed  
Gain10 DB error  
somewhere

22/1/63

Filter Output Coupler Performance

Input 10K $\Omega$  dummy to Coupler Primary.  
 Output 1st. I.F. grid 0.2 volts VTVM

Frequency KC	Input mv	Gain db.
170	135	2.6
200	82	6.9
220	77	7.5
230	76	7.6
240	76	7.6
250	79	7.3
260	81	7.0
270	87	6.4
280	94	5.7
300	116	3.9
350	205	-1.0

Measured  
Gain

22/1/63

Filter Output Coupler & I.F. PerformanceInput 10K $\Omega$  dummy to Coupler Primary.

Output 2v D.C. at Audio Cable Receptacle

Frequency KC	Input mv	Gain db	Output Coupler Gain db
170	18.8	40.5	0.5
200	1.06	65.5	5.5
220	.26	77.7	7.0
224	.25	78.1	—
230	.28	77.1	7.2
240	.36	74.9	7.1
250	.36	74.9	7.1
260	.32	75.9	7.3
270	.28	77.1	7.1
277	.25	78.1	—
280	.26	77.7	6.4
300	.62	70.2	4.9
350	13.2	43.6	0.9 Computed Gain

Input to I.F. Cable receptacle, 10K $\Omega$  dummy, 250KC, 1.70mv

=13.5db

10/1/63

Performance at input terminal of 1.F. chassis.

Freq KC	Input mv	Gain DB
170	89	27.0
200	5.0	52.0
223	1.20	64.4
230	1.32	63.6
240	1.68	61.5
245	1.75	61.2
250	1.70	61.4
260	1.50	62.5
270	1.29	63.8
277	1.20	64.4
300	2.8	57.1
350	54	31.4

Two matched 1.F. tubes

$E_B = 161$  volts.

$E_R = 18.0$  volts.

$E_{G1} = -1.94V$  (blue leads)

$E_{G2} = -1.75V$  (white leads)

$I_K = 2.63$  ma total

Input 10,000- $\Omega$  series resistance,

Output 2 volts and 100,000 ohms

attenuator 0

Bandwidth 50KC

Cathode resistance =  $R_K = 15,000$  ohms.

This data is closely equal to that of 22/1/63



22/1/63

Filter Input Coupler Performance

Input at Mixer Grid

Output I.F. Cable receptacle, 10K $\Omega$ , 0.2 volts VTVM

Oscillator tube removed.

Frequency kc	Input mw	Gain db
170	78	7.3
200	40	13.2
220	29	15.9
230	26	16.9
240	24	17.6
250	22	18.3
260	21	18.7
270	22	18.3
280	23	18.0
300	27	16.6
350	51	11.0

Measured  
Gain

22/1/63

Overall I.F. Performance

Input at Mixer grid

Output 2v DC at Audio Cable Receptacle

Oscillator tube removed.

Frequency Kc	Input uv	Gain db	Filter Input Coupled Gain db	Mixer Grid to 1st I.F. Grid Gain db
170	18000	40.9	13.9	0.9
200	510	71.9	18.9	11.9
220	85	87.4	23.2	16.7
224	81	87.9	—	—
230	86	87.3	23.7	17.4
240	116	84.7	23.1	16.9
250	119	84.5	23.1	16.7
260	109	85.3	22.9	16.7
270	91	86.8	23.2	16.8
278	81	87.9	—	—
280	82	87.7	23.5	16.3
300	180	80.9	24.2	15.6
350	6500	49.7	19.6	7.0
			computed Gain.	Including 13.5 db attenuation
			7DB error somewhere	

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Converter Performance

Input at Mixer Grid

Output 2w DC at Audio Cable Receptacle

Frequency dial at 50.0

Frequency KC	Input w	Gain db	Conversion Loss db
2000	38000	34.4	
2050	2200	59.2	
2080	186	80.6	
2096	113	85.0	2.9
2120	157	82.1	2.4
2140	142	83.0	-
2152	111	85.1	2.8
2160	142	83.0	
2180	1020	65.8	
2200	14800	42.6	

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## R.F. Stage Performance

Input at R.F. Grid.

Output at Mixer Grid, 0.2 volts. VTVM

Frequency Dial at 50.0

Frequency KC	Input mv	Gain db
2050	192	-0.5
2080	46	11.9
2100	12.4	23.3
2120	16.6	20.8
2137	8.6	26.5
2140	11.1	24.3
2160	61	9.5
2180	153	1.6
2200	270	-3.4

measured  
Gain

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R.F. plus I.F. performance

Input at R.F. Grid.

Output 2v DC at Audio Cable Receptacle

Frequency dial 50.0

Frequency Kc	Input mV	Gain db	R.F. Gain db
2000	190	20.4	-14.0
2050	3.0	56.5	-2.9
2080	86 $\mu$ v	87.3	6.7
2100	14.8	102.6	17.6
2108	10.1	105.9	-
2120	14.4	102.9	20.8
2142	10.4	105.7	22.7
2160	32	95.9	12.9
2180	62 mV	70.2	4.4
2200	18.8	40.5	-2.1

Computed  
Gain

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# Overall Performance

Input at Receiver Test 27.2 summer

Output 2V DC at Audio Cable Receptacle

Frequency dial 50

Includes 30B input pad

Frequency KC	Input	Gain db.	Antenna Gain db.
2000	> 200 mV	< 20.0	
2020	330	15.6	-19.2
2050	9.1 mV	46.8	-9.7
2080	109 $\mu$ V	85.3	-2.0
2100	6.8	109.4	6.8
2108	3.4	115.4	9.5
2120	4.2	113.6	10.7
2140	3.3	115.6	9.9
2160	21 $\mu$ V	99.6	3.7
2180	1.8 mV	60.9	-9.3
2200	77	28.3	-12.2 Computed

0.6 volts internal receiver fluctuation voltage.

(over)

When bandwidth switch is set at 6KC, the background fluctuations are 0.4 volt. An input of 1.78  $\mu$ w produces standard 2v DC output. Overall gain = 121 db including 3db input pad loss. Frequency 2125 kc; General Radio signal generator.

The Marconi signal generator has very closely the same output calibration. However its frequency calibration is 10KC lower at 2100KC.

500	0.05	1000	0.005
1000	0.1	2000	0.01
2000	0.2	3000	0.015
3000	0.3	4000	0.02
4000	0.4	5000	0.025
5000	0.5	6000	0.03
6000	0.6	7000	0.035
7000	0.7	8000	0.04
8000	0.8	9000	0.045
9000	0.9	10000	0.05

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# Overall Noise Characteristics

Input at Receiver Test, 27- $\Omega$  dummy  
Output 2V DC at Audio Cable Receptacle

Freq. Dial	10			50			90		
	Freq KC	Input mv	Gain db	Freq KC	Input mv	Gain db	Freq KC	Input mv	Gain db
1870	6.8	109.4		2103	4.7	112.6	2316	4.1	113.8
1873	4.8	112.4		2110	3.3	115.6	2320	2.9	116.8
1880	5.9	110.6		2122	4.2	113.6	2330	3.2	115.9
1892	4.8	112.4		2140	3.3	115.6	2345	2.9	116.8
1900	6.8	109.4		2150	4.7	112.6	2362	4.1	113.8

Dips db  
KC band  
at 30B

1.8

2.0

0.9

30

47

46



More accurately with better source meter drawing only  $20 \mu\text{a}$

Reference +18V  $R_X = 5K\Omega$ ,  $R_{SG} = 24.5K\Omega$

$E_B$ volts	153	162	171	180	189
$E_G$ volts	-0.40	-0.90	-1.45	-2.00	-2.55
$I_X$ ma	3.68	3.78	3.89	4.00	4.11
$E_{SG}$ volts	94	97	101	106	110
$I_{SG}$ ma	2.41	2.65	2.86	3.02	3.22
Output	1.03	1.10	1.11	1.09	1.07
$I_p$ ma	1.27	1.13	1.03	0.98	0.89

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Maxwell tube # 4

3/1/63

Reference +18V

$E_B$	150	159	168	177	186
	$R_K = 7.5K\Omega$ $R_{SG} = 43K\Omega$				
$E_G$	+0.62		-0.27		-1.13
$I_K$	2.32ma		2.44ma		2.55ma
$E_{SG}$	88.95		102		110
$I_{SG}$	1.11		1.05		1.00
Output	.95		1.05		1.00

$R_K = 5K\Omega$   $R_{SG} = 21K\Omega$

$E_G$	-0.35	-1.45	-2.60
$I_K$	3.67ma	3.89ma	4.12ma
$E_{SG}$ volts	117	128	139
$I_{SG}$	1.57ma (1.07)	1.90ma (1.40)	2.24 (1.74)
Output	1.02	1.11	1.05

Meter on screen circuit has  $200K\Omega$ , so about

$100V/200K\Omega = 0.5ma$  go thru this meter and must be subtracted from apparent  $I_{SG}$ .

The RCA tube manual says 1A7 total cathode current = 2.5ma normal + 4.0ma maximum, so a  $5K\Omega$  cathode resistor is satisfactory.

(over)

Mixer tube #4 31/1/63  
Gain Regulation versus Mixer Voltages

$E_B$	150	159	168	177	186
	$R_K = 10K\Omega, R_{SG} = 75K\Omega$				
$E_G$	+1.43		+0.72		+0.02
$I_K$	1.66 ma		1.73 ma		1.80 ma
$E_{SG}$	79		84		90
$I_{SG}$					
Output	.83		.95		.96
	Screen resistor slightly too high				

	$R_K = 12.5K\Omega, R_{SG} = 89K\Omega$				
$E_G$	+1.36		+0.74		+0.05
$I_K$					
$E_{SG}$	72		78		83
$I_{SG}$					
Output	.83		.91		.85

	$R_K = 15K\Omega, R_{SG} = 109K\Omega$				
$E_G$	+1.65		+1.05		+0.43
$I_K$					
$E_{SG}$	65		70		75
$I_{SG}$					
Output	.80		.85		.80