

"Home Grown Cargo Cults", by C. E. Gulliver
 Discovery, May 1962, p 54

4/1/62

Overall Response at Antenna

600 Ω dummy, 2V output, 50KC band switch
 Ant dial 39, Rec dial 47 100K Ω load on R.F. stage

KC mV dB

2000 198K

2020 24K

2040 2.1K

2060 78

2080 12.6

2100 14.1

2120 16.6 ^{Dip} 3.4 db.

2140 15.3

2135 12.6

2160 620

2180 35K

Bandwidth too great.

Dip too deep.

Should reduce bandwidth

of R.F. stage by

decoupling and raising
 load resistance.

Image ratio > 80dB

I.F. " > 100dB

Dip too great.

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Power Plugs from Front 1.F. chassis

+2V

1st 1.F.
-6V

0

1st 1.F. +6V

0 +6V 2nd 1.F.

0

0

+168

+12V

0
-6V.
2nd
1.F.

~~$X = \frac{1}{2\pi f C} = \frac{1}{6.28 \cdot 25 \cdot 10^6 \cdot 3 \cdot 10^6} = 0.45$~~

45V reference
batteries

R_G	I_P	E_G
30K	1.5ma	+0.05
35K	1.3ma	+0.05
40K	1.1ma	0.55

$E_B = +165V$

22 1/2 V reference
batteries

1st 1.F.

0.6ma -2.4V

18.5V reference

I_P	E_G	R_G
0.70ma	-2.45	30K
0.55	-2.75	40K

1.3ma -1.45V 15K

use this

1.0ma	-2.0V	25K
	-0.6V	10K

+28V reference

R_G	I_P	E_G	$E_B = +165V$
20K	1.5ma	-1.7V	

25K 1.2ma -2.0V + 2nd 1.F. (white filaments)

10K 2.8ma +0.3V

12.5K 2.3ma -0.5V 1st 1.F. (blue filaments)

15K 1.9ma -0.9V

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I.F. Amplifier Performance

Input Kc	2nd I.F. Grid.		1st I.F. Grid.		Total DB	Filter Output		Total DB
	mv	DB	mv	DB*		mv	DB*	
170	260	17.7	22	11.5	39.2	15.6	3.0	42.2
200	77	28.3	2.0	31.7	60.0	.92	6.7	66.7
220	51	31.9	.56	39.1	71.0	.24	7.4	78.4
230	58	30.7	.67	38.8	69.5	.30	7.0	76.5
240	69	29.2	.87	38.0	67.2	.40	6.8	74.0
250	65	29.7	.87	37.5	67.2	.39	7.0	74.2
260	58	30.7	.78	37.5	68.2	.34	7.2	75.4
270	53	31.5	.64	38.4	69.9	.28	7.2	77.1
280	50	32.0	.55	39.2	71.2	.24	7.2	78.4
300	74	28.6	1.18	36.0	64.6	.60	5.9	70.5
350	305	16.3	16.8	25.2	41.5	11.8	3.1	44.6

* computed

1/8" spacing between
cores Pri. to Sec.
330 K Ω load on Sec
Clippers dynamic
resistance about 1 meg.

10K Ω dummy
220K Ω load on Sec.

Output 2 volts D.C., 100K Ω load, Triplett meter

2 volts from signal generator applied to output stage diode shows
1.90 volts on Triplett meter. Only 5% = 0.4 DB correction over.

Filter input coil is in R.F. chassis,

o.c. not running

Input KC	Mixer mv	Grid DB	Total DB*	o.c. not running		
				Mixer mv	Grid mv	Grid mv
170	235	2.1	46.3	280	340	325
200	91	10.4	77.1	108	135	120
220	60	14.0	92.4	70	87	76
230	56	14.6	91.1	65	76	68
240	55	14.7	88.7	62	76	69
250	55	14.7	88.9	63	82	71
260	56	14.6	90.0	64	85	74
270	58	14.3	91.4	66	88	78
280	62	13.7	92.1	67	88	79
300	76	11.9	82.4	70	91	80
350	149	6.1	50.7	102	113	100
450				245	315	280

Output at jack on chassis o.c. not running
 Output at end of cable between chassis, o.c. running
 Output at end of cable

Output 0.3V AC, 10K Ω load to filter input.

Signal generator and output meter read exactly same at 0.30V AC, 250KC, so there is no correction factor.

	single core	plus slugs
Start	35 mch	60 mch
-30T	24 mch	40 mch
-20T	19 mch	30 mch

Primary

 7 P_i lit_g

Range now about 21 mch to 33 mch with
 core about $\frac{1}{8}$ " extended from open end, a total
 of 50 turns were taken from each P_i of a new
 coil made by Broadway Coil Co in 1954

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Should get data on this coil as well as
 1st 1.F. coil which now has $\frac{1}{8}$ " gap between
 cores.

37, 6 mhz

$$\begin{array}{r} 306 \quad 72 \\ 298 \\ \hline 3 \overline{) 18} = 6.0 \text{ pf.} \end{array}$$

$$L = 1 / (6.28 \cdot 1 \cdot 10^6)^2 \cdot 78 \cdot 10^{-12} = 1 / 30.8 = 32.5 \text{ mhz}$$

Filter Input Coupler on bottom of R.F. Chassis.

~~$$\begin{array}{r} 461 \quad 113 \quad 325 \\ 452 \\ \hline 3 \overline{) 9} = 3 \text{ pf.} \end{array}$$~~

$$\begin{array}{r} 456 \quad 107 \\ 428 \\ \hline 3 \overline{) 28} \\ 9.3 \text{ pf.} \end{array} \quad L = 1 / (6.28 \cdot 0.75 \cdot 10^6)^2 \cdot 465 \cdot 10^{-12} = 1 / 103.2 = 9.7 \text{ mhz}$$

pf Q R 22/5/62
 100KC 345 119 38 Secondary of
 200KC 80.5 150 60 Filter input
 250KC 49.8 133 85 Coupler.
 $C_0 = \frac{345 - 322}{3} = \frac{23}{3} = 7.6 \text{ pf}$
 $R = 6.28 \text{ KC} \cdot 2 / 3 = 45.2 \text{ K}\Omega$
 $L_0 = 1 / (6.28 \cdot 1)^2 \cdot 353 = 7.2 \text{ mhz}$
 Two P. $\frac{49.8}{7.6} = 6.5$
 C to resonate at 250 KC
 $= 56.1 \text{ pf.}$

~~$$\begin{array}{r} 369 \quad 87 \quad 460 \quad 109.5 \\ 348 \quad \cdot \quad 437 \\ \hline 3 \overline{) 21} \quad 3 \overline{) 23} \\ 7.0 \text{ pf.} \quad 7.6 \text{ pf.} \end{array}$$~~

2'512	5'41	9'16	17'10	6'6
2'512	-143	10'1	7'10	1'7
1'38	5'27	10'4	5'9	3'74
1'4	4'8	10'4	5'9	3'74
7'7	1	18'6	5'9	1'7
	18'6			

Mixer output Trans. with the 10 turns added.

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Pri	KE	pf	Q	R	
	50	42.5	125	60	$C_0 = \frac{421-400}{3} = \frac{21}{3} = 7.0 \text{ pf}$
	100	100	154	97	$L = 1/.394 \cdot 107 = 23.7 \text{ mh}$
	180	26.8	105	255	$R = \frac{6.28 \text{ KC} \cdot 23.7}{Q} = \frac{149 \text{ KC}}{Q}$
					C to resonate at 250 KC 17.1 pf.

Sec, Probably 1 strand broken. See data of 22/5/62

Pri	KE	pf	Q	R	
	80	463	105	40	$C_0 = \frac{463-428}{3} = \frac{35}{3} = 11.7 \text{ pf}$
	160	107	133	63	$L = 1/(6.28 \cdot 16 \cdot 10^3) \cdot 118.7 = 8.3 \text{ mh}$
	250	38.2	91	145	$R = 6.28 \text{ KC} \cdot 8.3/Q = 52.1 \text{ KC}/Q$
	290	?	70	316	C to resonate at 250 KC 48.9 pf.

Pri + Sec.

Pri	KE	pf	Q	R	
	50	290	119	108	$C_0 = \frac{240-216}{3} = \frac{24}{3} = 8.0 \text{ pf}$
	100	54.0	115	224	$L = 1/.394 \cdot 62 = 40.9 \text{ mh}$
	139	?	91	393	$R = 6.28 \text{ KC} \cdot 40.9/Q = 257 \text{ KC}/Q$

Pri - Sec.

Pri	KE	pf	Q	R	
	50	422	85	87	$C_0 = \frac{422-391}{3} = \frac{33}{3} = 11 \text{ pf}$
	100	97.3	113	131	$L = 1/.394 \cdot 108.3 = 23.5 \text{ mh}$
	174	?	84	307	$R = 6.28 \text{ KC} \cdot 23.5/Q = 148 \text{ KC}/Q$

$$M = 17.4/4 = 4.35 \text{ mh}, K = 4.35 / (23.7 \cdot 83)^{1/2} = 4.35/114 = .31$$

Mixer Output Coil

March 3/1/62

Cable between chassis 11.2 pf at 2.7 mc,
 Input to mixer grid 0.20 V

Filter Input Coupler,

220 KC 250 KC 280 KC
 Output Volts 10KΩ load



add 10 turns

like this

→ .80V .91 .85

Output 0.2 V

KC	input mV	Gain DB	input mV	DB Gain
150	300		300	
180	136		140	
200	76		73	
220	49		45	
240	42		42	
250	41		42	
260	42		45	
280	44		47	
300	48		47	
350	71		62	
400	116		114	
500	230		260	

oscillator tube
 removed.

Output at Panel.

Output
 at end
 of interchassis
 cable.

(over)

I.F. Chassis

For 2 volts output at 220 + 280 KC

Requires:

at 1st I.F. grid $610 \mu\text{v} = 0.61 \text{ mV}$

at input to Gridcoupler $270 \mu\text{v} = 0.27 \text{ mV}$

at input to Chassis terminal $= 1.36 \text{ mV}$

Plate current of both I.F.s = 2.2 ma,

$E_B = 165 \text{ V}$ $E_C = 12.0 \text{ V}$

$E_{G1} = 2.9 \text{ V}$ $E_{G2} = 2.4 \text{ V}$

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1st I.F. transformer

Pri, $\frac{1}{8}$ " gap between fixed cores Pri to Sec,

KE	pf	Q	R
50	341	161	57
100	81	192	96
167	?	155	198

$C_0 = \frac{341 - 4.81}{3} = \frac{341 - 329}{3} = \frac{12}{3} = 4 \text{ pf}$
 $L_0 = \frac{1}{(6.28 \cdot 1 \cdot 10^6)^2 \cdot 86.7 \cdot 10^{-12}} = \frac{1}{34.1} = 29.3 \text{ mH}$
 $R = \frac{\omega L}{Q} = \frac{6.28 \cdot \text{KC} \cdot 29.3}{Q} = \frac{184 \text{ KC}}{Q}$

Sec,

50	341	166	55
100	81	200	92
166	?	159	192

$C_0 = 341 - 5.7 \text{ pf}$
 $L = 29.3$
 $R = \frac{184 \text{ KC}}{Q}$

Pri + Sec

50	201	141	109
100	46.3	152	203
132	?	149	274

$$C_0 = \frac{201 - 4.463}{3} = \frac{201 - 185.2}{3} = \frac{15.8}{3} = 5.3 \text{ pf}$$

$$L_0 = \frac{1}{(394 \cdot 51.6)^2} = 49.2 \text{ mH}$$

$$R = \frac{6.28 \text{ KC} \cdot 49.2}{Q} = \frac{309 \text{ KC}}{Q}$$

Pri + Sec

50	142	167	129
100	31.2	129	335?
108	?	138	338

$$C_0 = \frac{142 - 4.312}{3} = \frac{142 - 18.8}{3} = \frac{117.2}{3} = 39.1 \text{ pf}$$

$$L_0 = \frac{1}{(394 \cdot 36.9)^2} = 68.8 \text{ mH}$$

$$R = \frac{6.28 \text{ KC} \cdot 68.8}{Q} = \frac{432 \text{ KC}}{Q}$$

$$M = \frac{68.8}{49.2}$$

$$K = \frac{4.9}{39.3} = .167$$

$$4 \overline{) 19.6}$$

4.9 mH

C To resonate at 250 KC

Pri, 13.9 pf

Sec, 13.9 pf

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2V output of 1.F	input mixer	grid	output
220 KC	125	.161	51
250	192	.255	45
280	125	.161	43

144 148 164
 240 240 240
 144 154 143

input at chassis
 1.F. term
 Mixer Grid
 0.2V output at chassis
 at mixer grid

Series condenser on secondary of mixer output trans
 now 50 pf fixed + 13 pf variable = 69 pf total approx.

0.2V output	input mixer grid	output
220 KC	51 mv	55 mv.
250	45	43
280	43	41

Output at end of cable between chassis
 at output term of R.F. chassis

At 2110 KC the sensitivity is about
 35 ~~mv~~ at mixer grid for 2V output.
 6.5 ma total B+ current.
 6 μ v at antenna with 600 Ω dummy, 1.6 KC band.

Reference 13.1V 250Kc
Maxer Performance

R_K	at Output class volts	E_g volts	I_K ma
10	.460	-.28	1.94
11	.445	-.76	1.71
12	.442	-1.20	1.61
13	.420	-1.60	1.52
14	.425	-1.96	1.43
*15	.455	-2.30	1.36
16	.458	-2.72	1.30
17	.440	-2.92	1.24
18	.418	-3.30	1.19
19	.400	-3.58	1.14
20	.385	-3.80	1.10
21	.380	-4.03	1.06

0.2V input at grid.

* Use this condition

Different tubes
require R_K between
13K + 18K for
nominal but not
critical. 11/1/63

Brown battery leads are mixer filament
Clean " " " " R.T. " "

Watts at output
Watts at input
Efficiency
Voltage