17/9/56

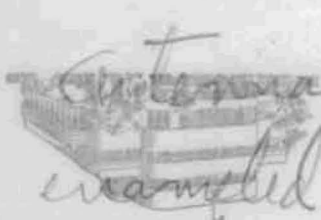
Design of Antenna Primary.

Frequency range 140 - 200 KC.
Range of Tuning condenser 350 pf.
Total maximum capacity 700 pf.
Inductance 1850 μh.
Coil 2¼" dia, 3⅜" long, $l/d = 1.5$, $L/d = 821$
n = 255 turns wire .0132" diameter.
say 3" of .0118" wire = 254 turns

actual coil 2⅞" long, 243 turns
Later added 22 turns to outside and making 265 turns 3⅛" long.
This necessary because of reduction of inductance by primary + shield opening 3½" dia.

140 KC	700 ~~pf~~ pf	86 Q
170 KC	441 pf	115 Q
200 KC	316 pf.	129 Q

$C_0 = \frac{350 - 4.82.5}{3} = 6.7$ pf.



Antenna winding 15T ½" long
enamelled wire .932" dia.
Spacing ⅛" between windings.

See Revision of 13/6/57 on back of blue sheet

13/6/57

added 15T making a total of 315T

400 92.2 330T { 140KC 159 pf 120 Q
3688 4 { 200KC 71 pf 145 Q
31.2368

3 | 31.2368

10.4 pf. 320T { 140KC 165 pf 119 Q
C_o = { 200KC 73.5 pf 142 Q

300T { 140KC 180 pf. 120 Q
{ 200KC 81 pf. 148 Q

3 5/8" long .0118 wire
Antenna ~~coil~~ Coil.
Secondary

13/9/56

Low Frequency R.F. Coils.

436 Turns enamelled wire .0118" over enamel wound. .0113" copper
on 3" dia tube 5.2" long.

Freq	Cap.	Q
140 kc	191 pf	135
170	123 pf	161
200	88 pf	174

$C_0 = \frac{250 - 4.57.2}{3} = 7.1$ pf

Performance in Air

$L_0 = \frac{1}{(6.28 \cdot .14 \cdot 10^6)^2 \cdot 198 \cdot 10^{-12}} = \frac{1}{153} = 6.54$ mh.

250.0
228.8
21.2
3

16/9/56

Oscillator Coil Design

See Terman, page ~~650-651~~ $= f_0$

R.F. frequency range .140 to .200 MC

Max R.F. capacity = 200 pf, $= C_0$

F_1 F_2 F_3

Tracking frequencies .145, .170, .195 MC

Trimmer across Tuning condenser.

$a = .510$, $b^2 = .08605$, $c^3 = .004805$

$d = 1.010$, $l^2 = .1643$, $f_0 = .250$ MC

$m^2 = .6557$, $n^2 = .02310$, $L = 6450\,\mu h$

$C_2 = 146$ pf in series pad.

$C_3 = 23.8$ pf shunt pad

$L_1 = 1882\,\mu h$

actual coil 405 turns

4 1/16" long, 1 7/16" dia,

1850 μh at 1000 cps.

Tickler 1" long, 100 turns.

Coil design.

Let $l = 3"$, $d = 1.5"$; $\frac{l}{d} = 2$

Let $L = 1882\,\mu h$, $\frac{L}{d} = 1255$

$n = 345$ turns, wire .0087" dia.

Let $l = 4\frac{1}{2}"$, $d = 1.5"$; $\frac{l}{d} = 3$

$n = 410$ turns, wire .0100" dia

Let $l = 3\frac{3}{4}"$, $l/d = 2.5$

$n = 375$ turns wire .0100" dia.

wind on 385 turns .0095" wire

Oscillator:

Series pad 146 pf.

Lowest oscillator frequency, 250+140 = 390 Kc.

$X_c = \frac{1}{6.28 \cdot .39 \cdot 10^6 \cdot 146 \cdot 10^{-12}} = \frac{10^6}{358} = 2800\ \Omega$

Proposed choke to B+ 9 mh.

$X_L = 6.28 \cdot .39 \cdot 10^6 \cdot 9 \cdot 10^{-3} = 22000\ \Omega$

should be considerably larger.

1450 uh + 200 pfd $10^2 = \frac{1}{LC} = \frac{1}{1.85 \cdot 10^{-3} \cdot .2 \cdot 10^{-9}} = \frac{10^{12}}{.37}$

$(6.28 f_{mc})^2 = 2.70$ $f_{mc} = \sqrt{\frac{2.7}{39.4}} = \sqrt{.0685} = 262$ kc for 200 pf

370 kc for 146 pf.

9.8 = 576 Kc less 250 = 326

2.5 = = 395 Kc less 250 = 145

472 Kc less 250 = 222 Kc

1.5 V 5.6 = 386 Kc less 250 = 136 Kc

.125 V 200 pf 9.7 = 445 Kc less 250 = 195

$x_L 2 = 386$ Kc $\times 03$

203 Kc ÷ 250 = 453 = 4.3

144 Kc ÷ 250 = 394 = 2.4

435 Kc / 250 / 185 Kc

600 / 250 / 350

286 Turns, .015 wire over enamel.

Freq	Cap	Q	Cap	Q
60	~~460~~	~~98~~	439	93
~~80~~	251	~~79~~	240	70
~~100~~	155	~~57~~	147	55
120	101	~~47~~	96	45
~~140~~			69	36
160			47	31
180			34	26
194			27	24

Primary of Transformer from Mixer to filter

$$C_D = \frac{439 - 4.96}{3} = 18.3\ pf$$

$$L = \frac{1}{(6.28 \cdot .063\cdot 10^6)^2 \cdot 457\cdot 10^{-12}} = \frac{1}{65} = 15.3\ mh.$$

$$C = \frac{1}{\omega^2 L} = \frac{1}{(6.28\cdot .25\cdot 10^6)^2\ 15.3\cdot 10^{-3}} = \frac{65\cdot 10^{-12}}{2.46}$$

$= 25.4\ pf$ to resonate at 250KC

$18.3\ pf$ in coil,

$7.1\ pf$ for circuit

Concentric Air trimmers 1.5 – 22 pf range