29/10/64

Coil 4.03" dia, 0.29" long, 10 turns 0.025" enamelled wire close wound. One coat of collodion lacquer.

MC	pf	Q	R
1.6	454	98	2.2 Ω
2.3	214	100	3.1
3.2	105	96	4.5

$C_0 = \frac{454 - 4 \cdot 105}{3} = \frac{34}{3} = 11\ pf$

$L_0 = 1/(6.28 \cdot 1.6)^2 \cdot 465 = 10^{-6}/.047$

$= 21.3\ \mu h$

$R = \frac{6.28 \cdot 21.3\ MC}{Q} = 134 \frac{MC}{Q}$

at 2.3 mc

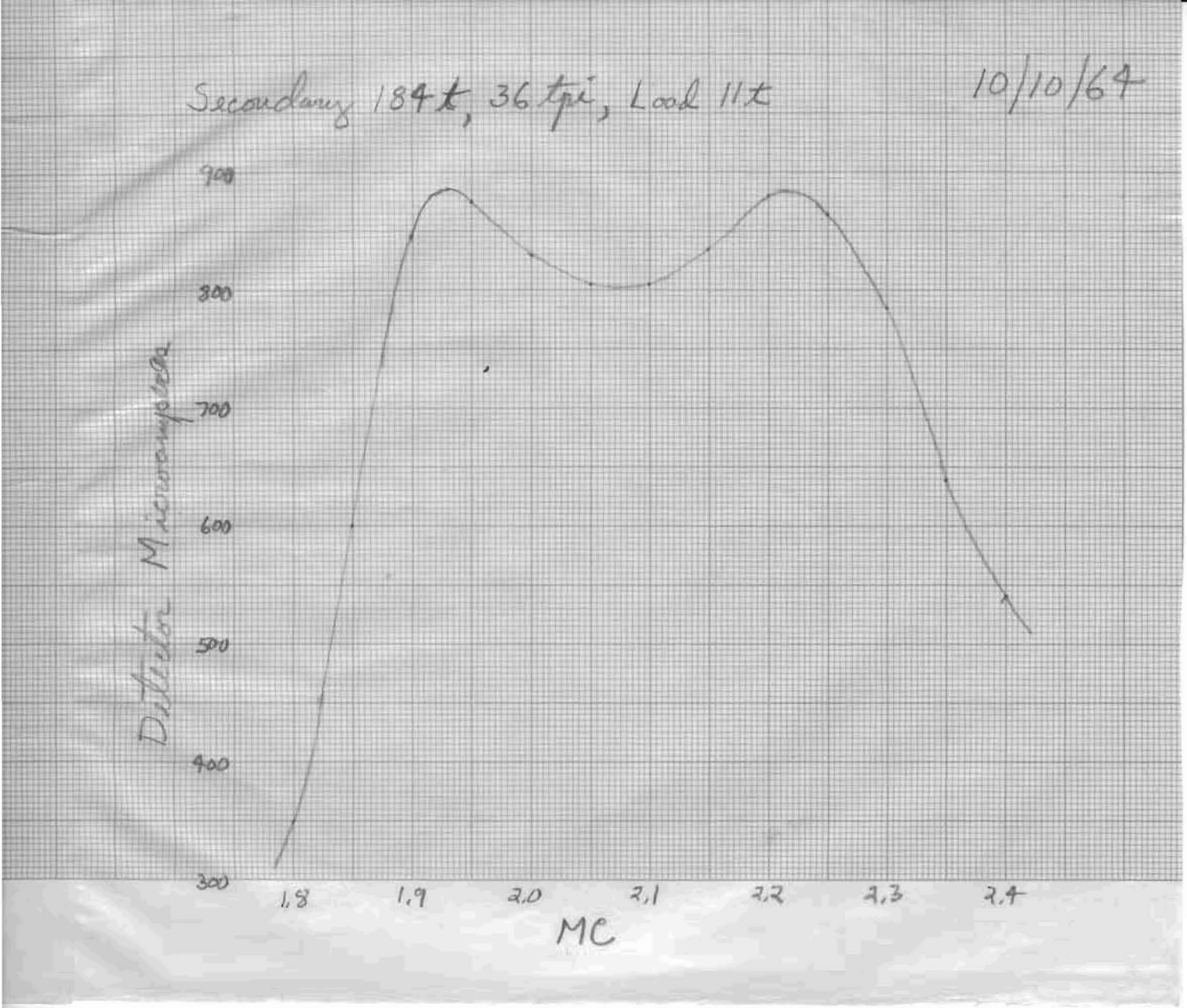
$X_L = 6.28 \cdot 2.3 \cdot 21.3 = 308$ ohms,

$X_C = 10^6/6.28 \cdot 2.3 \cdot 11 = 10^6/159 = 6{,}300$ ohms.

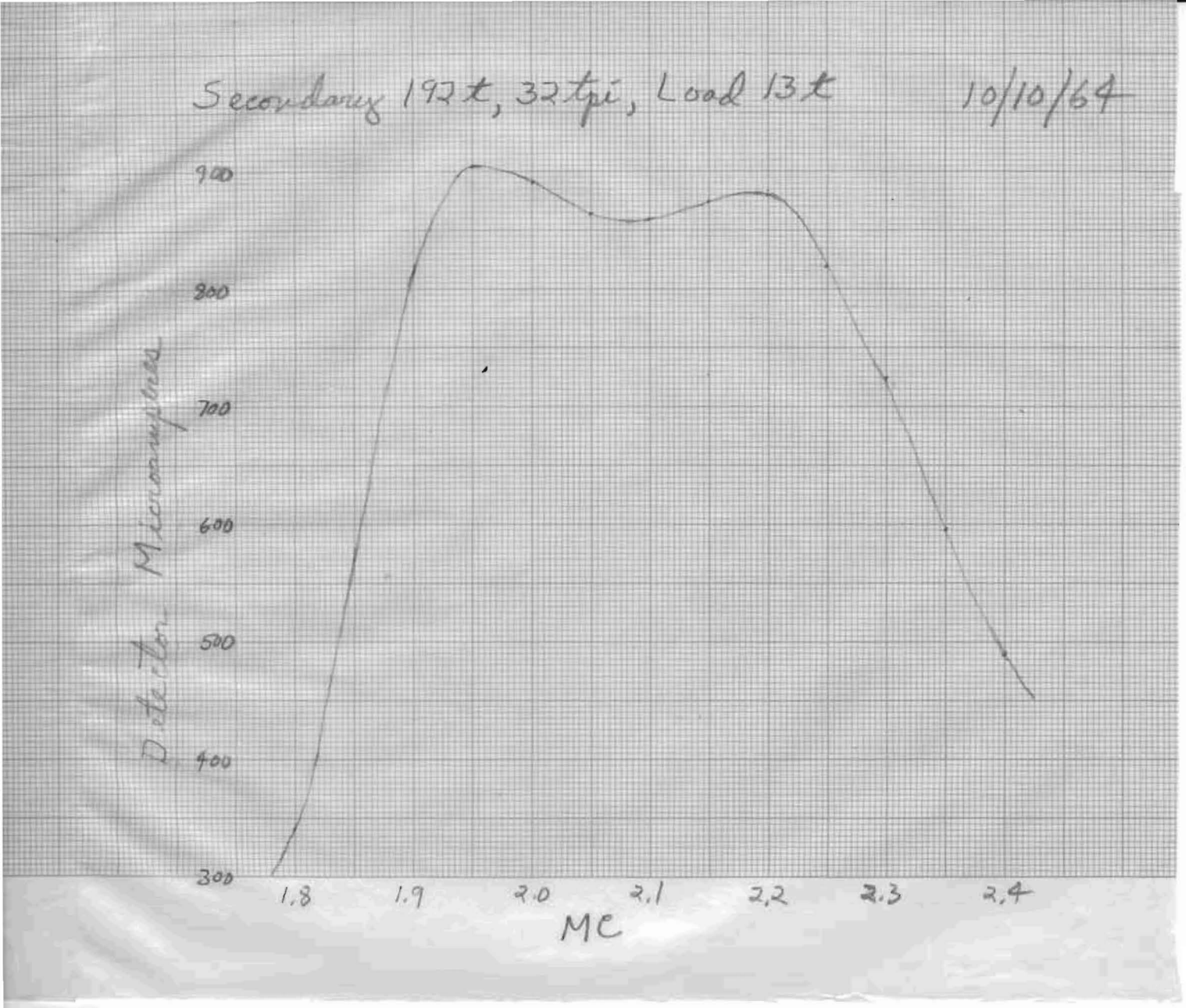
$X_C \gg X_L$, so coil will be a good primary.

Secondary 184 t, 36 tpi, Load 11 t

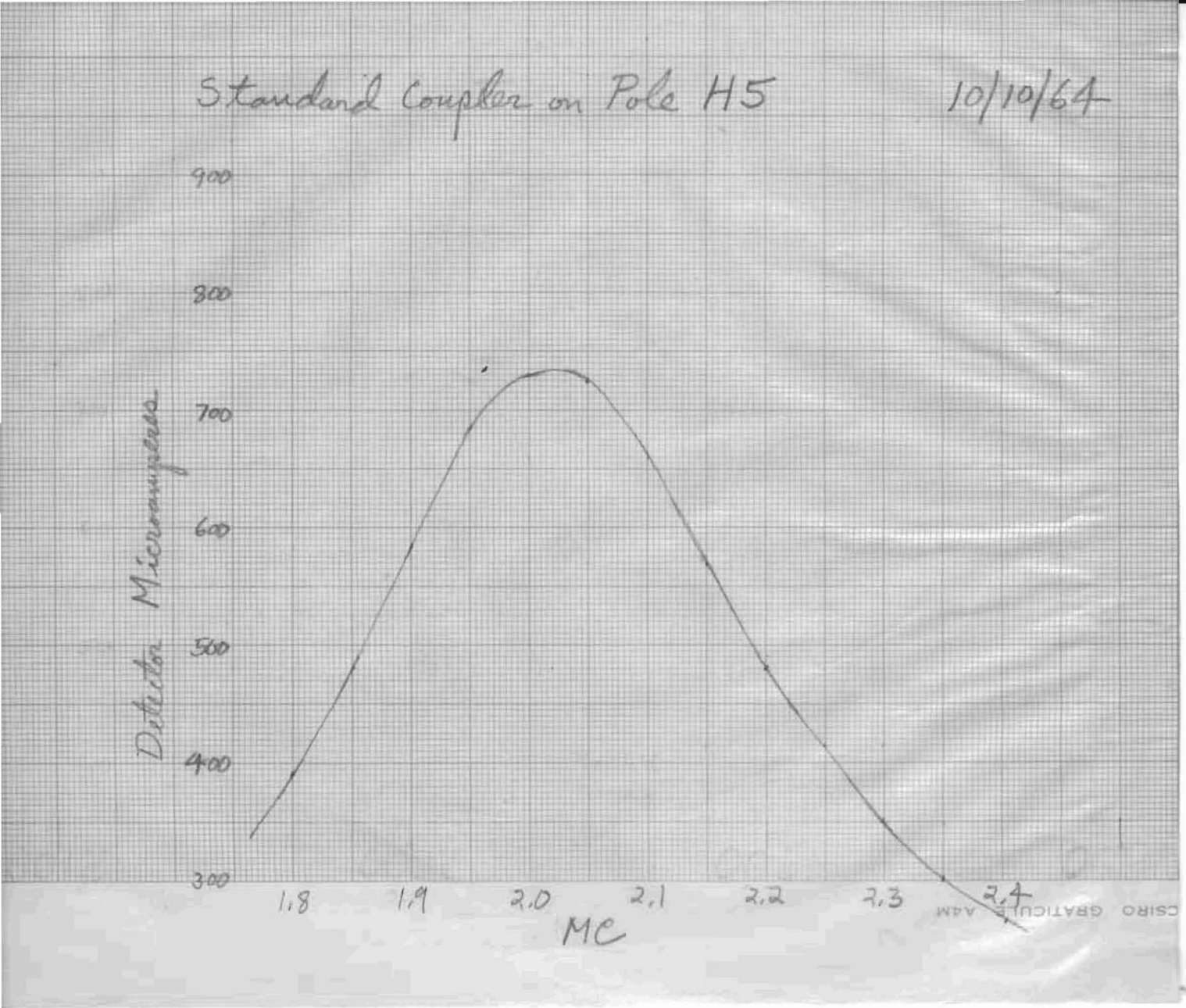
10/10/64



Secondary 192t, 32tpi, Load 13t 10/10/64



Standard Coupler on Pole H5 10/10/64



Comparison of Antenna Couplers.

10/10/64

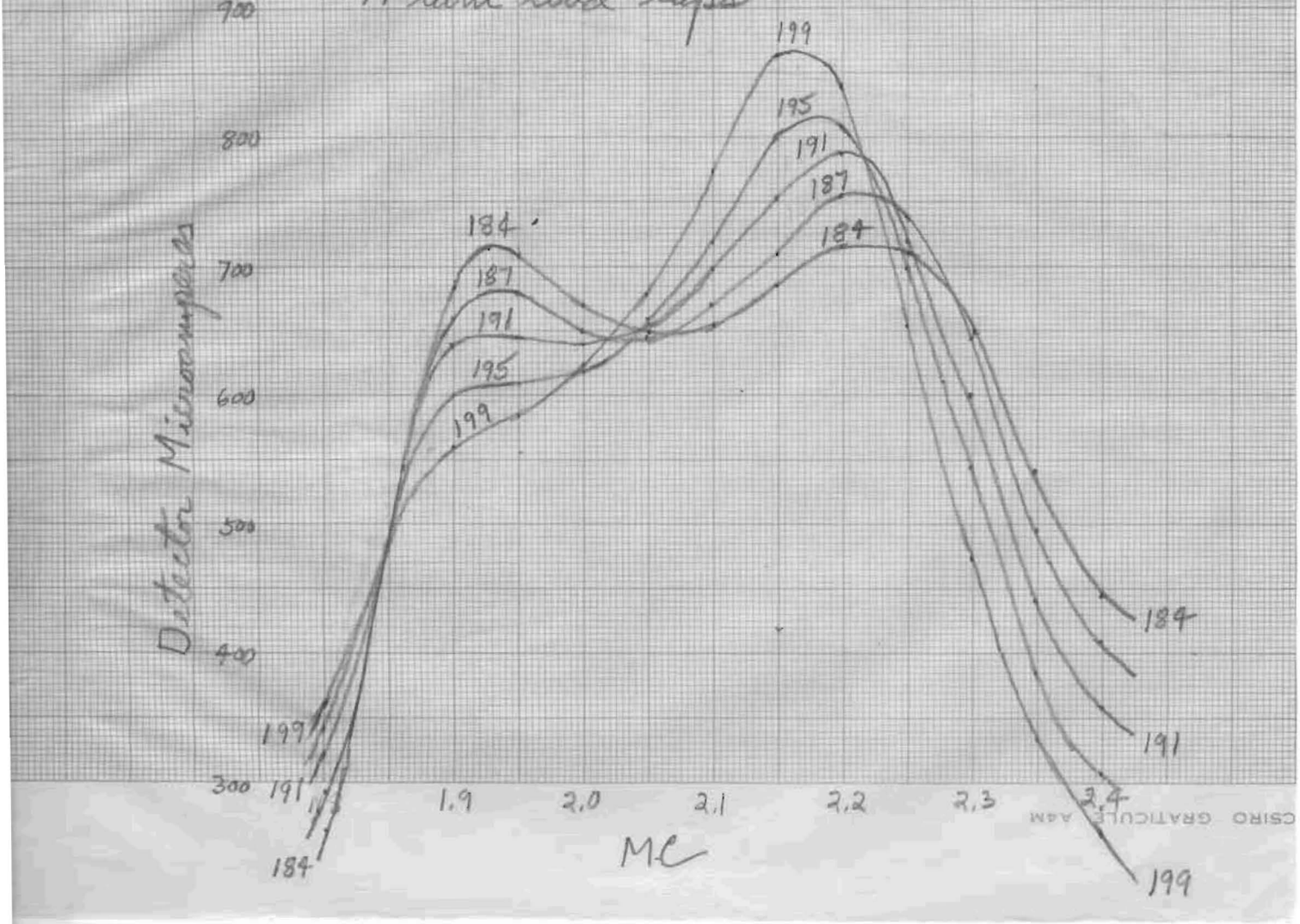
Generator coil current 1.25 amperes.
Detector on high scale. Calibration 9/10/64.

Primary	5 4t, 22 tpi, 1.65" d.		Standard
Secondary	192t	184t	Box on
4.015" d	32 tpi	36 tpi	Pole H5
Load	13t	11t.	
MC.	Detector microamperes.		
1.80	340	350	390
1.85	570	600	480
1.90	815	845	585
1.95	905	143 885 875	685
2.00	890	830	730
2.05	865	805	725
2.10	860	805	660
2.15	875	835	570
2.20	880	880	480
2.25	820	865	415
2.30	725	785	350
2.35	595	640	300
2.40	490	540	270

all have 3 DB attenuators

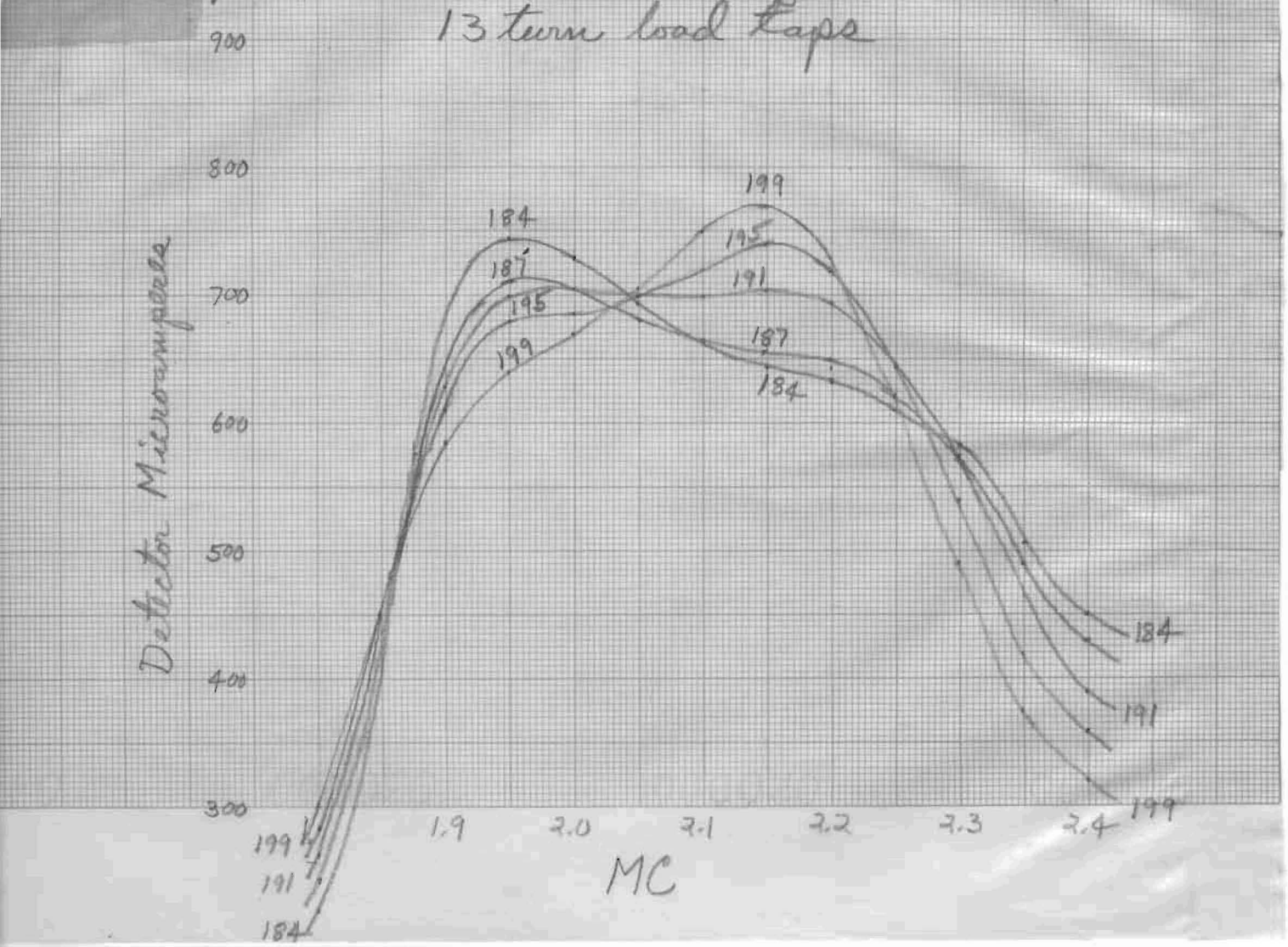
Response versus Secondary turns 7/10/64

11 turn load taps



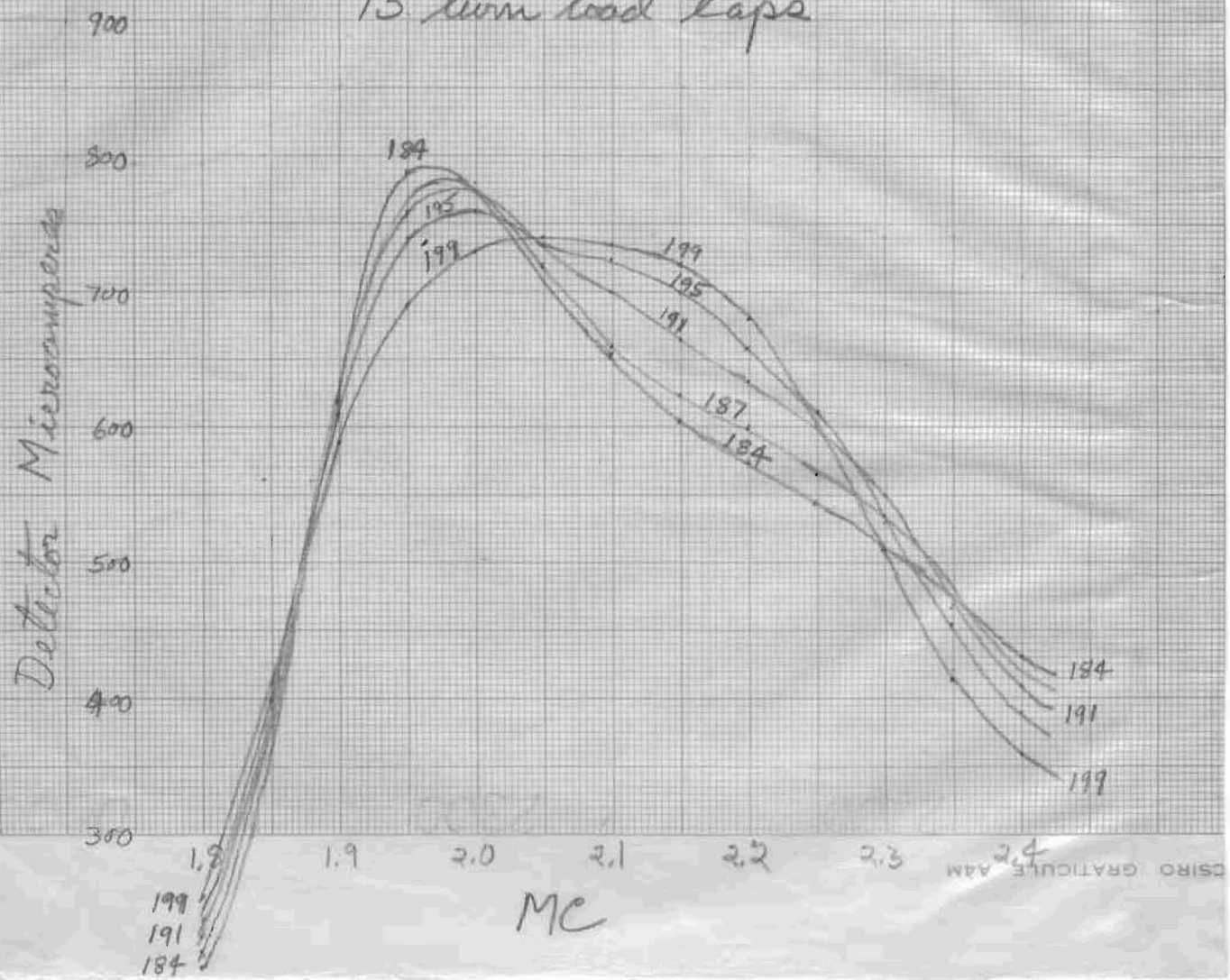
Response versus Secondary turns 7/10/64

13 turn load taps



Response versus Secondary turns 7/10/64

15 turn load tape



Small Antenna Coupler

7/10/64

Primary	54 turns			54 turns					
Secondary	199 turns			195 turns			191 turns		
Load	11	13	15	11	13	15	11	13	15
MC	Output via 11.5 v detector scale, 1.25 amps coil current,								
1.80	360	300	270	340	285	255	320	285	240
1.85	500	450	410	505	450	400	515	440	395
1.90	560	585	590	600	610	610	640	630	620
1,95	585	640	690	610	680	740	645	700	760
2,00	625	670	730	620	685	760	640	705	775
2,05	680	705	740	660	700	745	655	700	740
2,10	775	750	735	720	720	725	700	700	700
2,15	865	770	720	800	740	700	755	705	665
2,20	840	730	680	810	720	660	790	695	635
2,25	655	620	600	700	645	610	720	645	600
2,30	475	490	510	545	540	535	600	575	550
2,35	335	375	415	385	420	455	440	465	470
2,40	270	320	360	310	360	390	360	390	410

Secondary 199 turns, 0,016" dia wire, 36 tpi, 5½" long, 4" dia, spacing = 0,028" gap = 0,012"

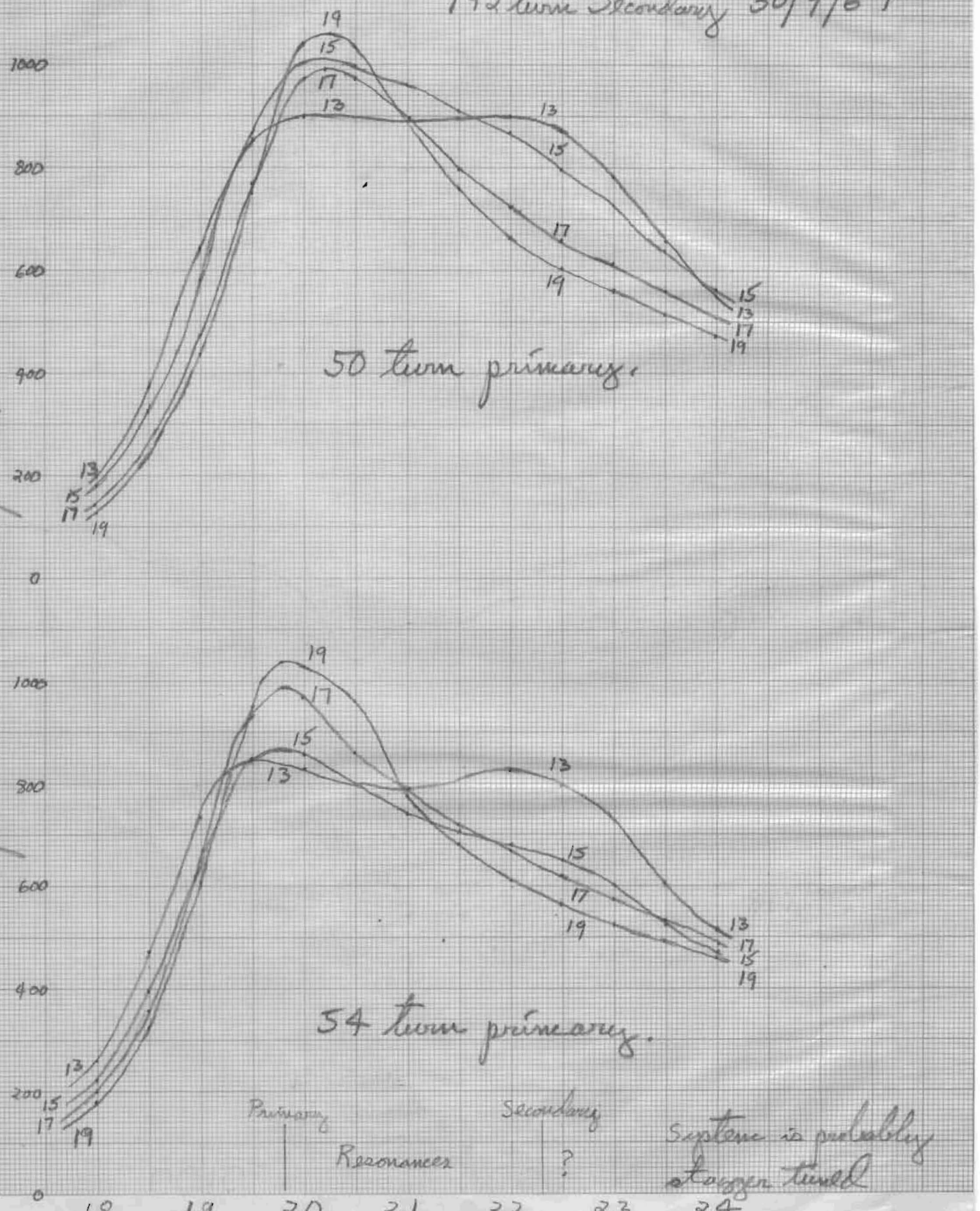
Primary same as 30/9/64, 54 turns

Secondary.	54 turns			54 turns		
Load	187 turns			184 turns		
MC	11	13	15	11	13	15
1·80	285	260	220	280	240	220
1·85	485	425	380	485	410	360
1·90	660	625	610 193	685 715	640	610
1·95	680	710	760	710	745	790
2·00	650	705	770	670	730	780
2·05	645	680	720	650	695	720
2·1	670	665	660	655	665	655
2·15	710	655	625	685	645	605
2·2	755	650	600	715	625	575
2·25	740	620	565	710	615	545
2·3	695	570	530	650	580	570
2·35	495	490	470	540	505	465
2·4	410	430	420	445	450	430

This is nearly the exact result predicted by the calculations of 14/9/64

Small Antenna Coupler Response versus load taps.

192 turn Secondary 30/9/64



30/9/64

Small Antenna Coupler, 552 ohm 3DB Attenuator

Primary	54 turns				50 turns				7/10/64 54 turns	
Secondary	192 Turns				192 Turns				192 turns	
Load	19T	15T	13T	17T	13	15	17	19	13	15
MC	Output ma 5.2 volt scale with 0.75 amps in								8.5V Detector 1.25a coils.	
1.80	180	210	260	200	200	185	145	130	380	345
1.85	325	395	475	360	375	330	260	245	630	565
1.9	610	650	735	650	645	585	480	440	905	875
1.95	950	845	850	925	855	870	770	750	1000	1070
2.0	1.93 1040 1030	855	830	1.93 965 965	900	1005	975	1045	970	1060
2.05	910	800	795	860	890	2.02 1000	990 975	2.03 1060 1035	945	1000
2.1	775	740	790	790	890	960	895	890	940	950
2.15	680	705	810	720	900	910	800	760	950	900
2.2	610	680	825	670	900	870	725	665	960	870
2.25	565	650	800	620	875	800	660	605	925	820
2.3	525	600	730	575	785	730	615	560	830	760
2.35	495	530	605	535	660	640	560	515	690	670
2.4	460	470	515	490	550	565	510	475	600	605

Secondary 192 turns, 0.016" dia wire, 32 tpi, 6" long, 4" dia; Spacing = 0.031", gap = 0.015"

Primary 1.65" dia, 0.025" dia wire, 22.4 tpi, length 2.41" & 2.26", Spacing 0.045", gap = 0.020"

The 54 turn primary gives a dip centered on 2.08 mc. This dip will be closely the inverse of peak due to power line transformers in series which these are all tuned to 2.08 mc

(over)

If secondary diameter is increased from 4" to $4\frac{1}{8}$" the turns will be about $\frac{4}{4.125}$ 192 = 186. Load taps probably at 11 Still 32 tpi.

25/9/64

By 25/4/64 a primary of 44 μh 1.67" dia, 5.3" long, 62 turns
Secondary 124 turns, 10.3" long, 6.18" dia
Pri Dia / Sec. Dia = 0.27, Pri length / Sec length = .51
Too narrow Load taps 9 turns ÷ 7.3%
Bandwidth 0.2 mc, 2.15 mc center

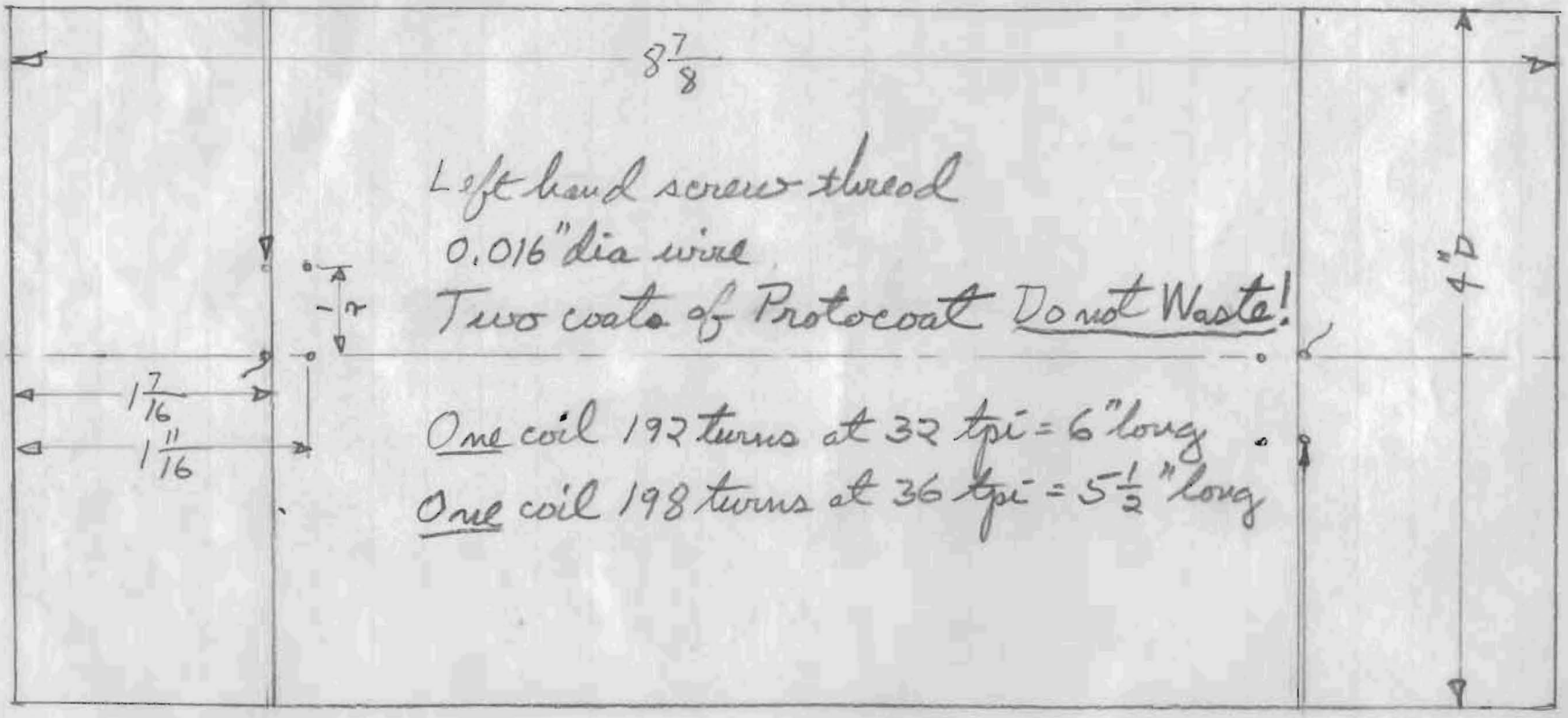
By 30/3/64 Primary 45 μh, 3.31" dia, 3.31" long, 28 turns
Secondary 120 turns, 10" long, 6.18" dia.
Pri Dia / Sec Dia = 0.53 Pri length / sec length = .33
Too wide. Load taps 13 turns = 10.8%
Bandwidth 0.4 mc, 2.28 mc center

Apparently a (primary diameter)/(secondary diameter) = 0.40
and load taps about 9% will give a
bandwidth of 0.3 mc on 2.10 mc center.
When secondary 4" dia the primary should be 1.6" dia.
(Primary length)/(secondary length) = .42
.42 × 6" = 2.5" long. and 45 μh.
Secondary 184 turns × 9% = 17 turns,
actual coil 192 turns start. Load taps 13, 15, 17, 19 turns.

Primary

Assume 50 μh, L/d = 50/1.65 = 30.3
" l = 2.5", l/d = 2.5/1.65 = 1.52
Then n = 49 turns, say 50
50/2.5 = 20 tpi. . Pitch = 0.05"
Wire length = 50 × 1.65π/12 = 22 feet.
Actual coil 54 turns 2.41" long, 1.65" dia, 0.025" wire
22.4 tpi
C_o = 3 pf, L_o = 61.6 μh
R = 3.8 ohms at 2.1 mc

Secondary Coils



Left hand screw thread
0.016" dia wire
Two coats of Protocoat Do not Waste!

One coil 192 turns at 32 tpi = 6" long
One coil 198 turns at 36 tpi = 5 1/2" long

Return this drawing

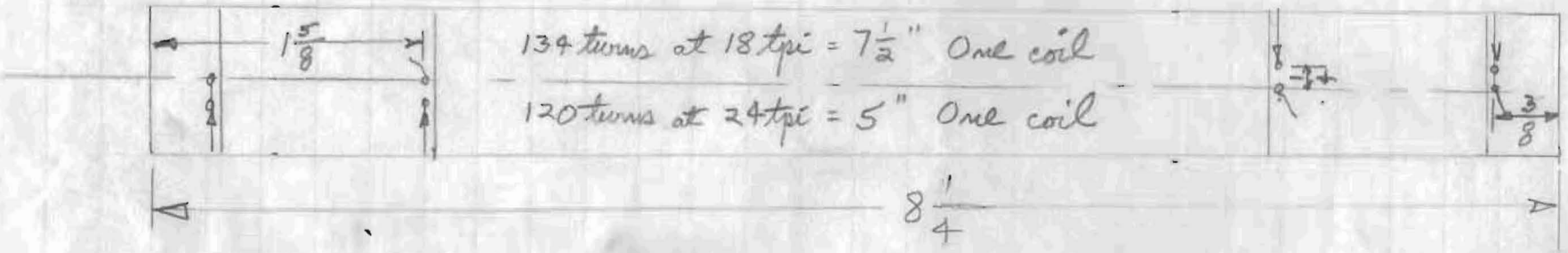
Grote Reber
15/9/64

Obsolete

Primary Coils

Long coil $C_o = 1.5\,pf$, $L_o = 47\,\mu h$, $R_o = 4.5\,\Omega$ @ 2.2 mc

Short coil $C_o = 2.0\,pf$, $L_o = 53\,\mu h$, $R_o = 4.8\,\Omega$ @ 2.2 mc.



Right hand screw thread

0.025" wire

Two coats of Protocoat

Return this drawing

Grote Reber

14/9/64

Small Single Band Coupler 14/9/64

Frequency band 1.95 to 2.25 mc
Center frequency $F_L = 2.10$ mc
Can 8" diameter, 9" long.
Secondary 4" diameter, 5" long, $l/d = 1.25$
$F_H/F_L = 2.73$, $K = 1.22$
$N = 1880/K\,l\,F_L = 1880/1.22 \cdot 4 \cdot 2.1 = 1880/10.24 = 184$
tpi $= 184/5 = 37$, say 36
ws $= 1/2 \cdot 36 = .0138$", say .015"
Have coils made 6"x32 tpi = 192 turns and $5\frac{1}{2}$"x36 tpi = 198 turns

on Pole H5

Present Antennas with 62 ohm Primary 14/9/64

Frequency MC	Primary ohms		Antenna ohms		Resultant ohms	Δ ohms
1.7	+662		−2080		−1418	758
1.8	700		1360		660	470
1.9	740	770	930	766	−190 +4	243
2.0	778		725		+ 53	209
2.1	817		555		262	144
2.2	856		450		406	138
2.3	896		352		544	130
2.4	934		260		674	129
2.5	973		170		803	128
2.6	1011		−80		931	130
2.7	1051		+10		1061	134
2.8	1090		105		1195	

1.98

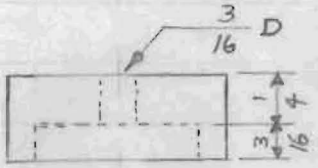
Each input bushing has 2.2 pf to case. at 2.1 mc this is $X_c = 1/6.28 \cdot 2.1 \cdot 10^6 \cdot 2.2 \cdot 10^{-12} = 10^6/29 = 34{,}500$ ohms which is Very large compared to 555/2 = 278 ohms.

Each output bushing has 4.0 pf to case. at 2.1 mc this is $X_c = 1/6.28 \cdot 2.1 \cdot 10^6 \cdot 4.0 \cdot 10^{-12} = 10^6/52.75 = 19{,}000$ ohms which is very large compared to 552 (line impedance)/2 = 276 ohms.

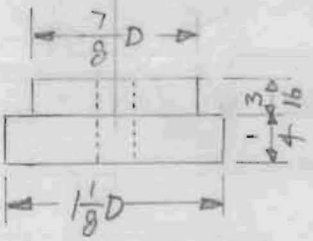
Primary capacity = 3.0 pf. at 2.1 mc, $X_c = 25{,}300$ ohms end to end which is very large compared to 555 ohms antenna resistance

Plastic Insulators

CAP



BASE



Make two of each from material supplied.

Grote Reber
14/9/64

Return this drawing