

# Antenna Characteristics

# Antenna Test Pole H5, Third Mode

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## Series coils

Turns n	length inches	Grid Divs Divisions	Meters MC	$\frac{l}{d}$	$\frac{L}{l}$	L microh.	$X_L$ ohms.	also 15/4/64
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• 3.31" dia, 8.33 tpi, 0.057" wire

100	12.0	3.6	1.69	3.62	62	205	2180	16T, 1.81, 7.42, 2.55, .547, 6.5, 317
88	10.6	3.8	1.72	3.20	54	179	1930	8T, 0.84, 8.50, 2.55, .254, 7.4, 8.0, 128
76	9.1	4.0	1.76	2.75	46	152	1680	
64	7.7	4.2	1.79	2.32	37	123	1380	
52	6.24	4.6	1.85	1.88	29	96	1120	
42	5.04	5.0	1.92	1.52	22	73	880	
32	3.84	5.6	2.02	1.16	16	53	670	
28	3.36	6.0	2.09	1.02	13.5	45	590	

+ 3.96" dia, 7 tpi, 0.080" wire

100	14.3	3.55	1.68	3.61	62	246	2590
84	12.0	3.65	1.70	3.03	51	202	2150
74	10.6	3.80	1.72	2.68	44	174	1880
64	9.1	4.00	1.76	2.30	37	147	1630
54	7.7	4.25	1.80	1.94	30	119	1340
44	6.28	4.55	1.84	1.59	24	95	1100
38	5.42	4.95	1.91	1.37	19	75	900
32	4.56	5.35	1.97	1.15	16	63	780
28	4.00	5.70	2.03	1.01	14	55.5	710
24	3.43	6.05	2.09	.87	11	43.5	570
20	2.86	6.60	2.20	.72	8.5	33.7	460

x 5.33" dia, 5.74 tpi, 0.080" wire

56	9.8	3.75	1.71	1.84	34	181	1950
50	8.7	3.90	1.74	1.63	30	160	1750
44	7.7	4.10	1.77	1.45	26	138	1530
38	6.6	4.30	1.81	1.24	22	117	1330
32	5.6	4.65	1.86	1.05	17	91	1060

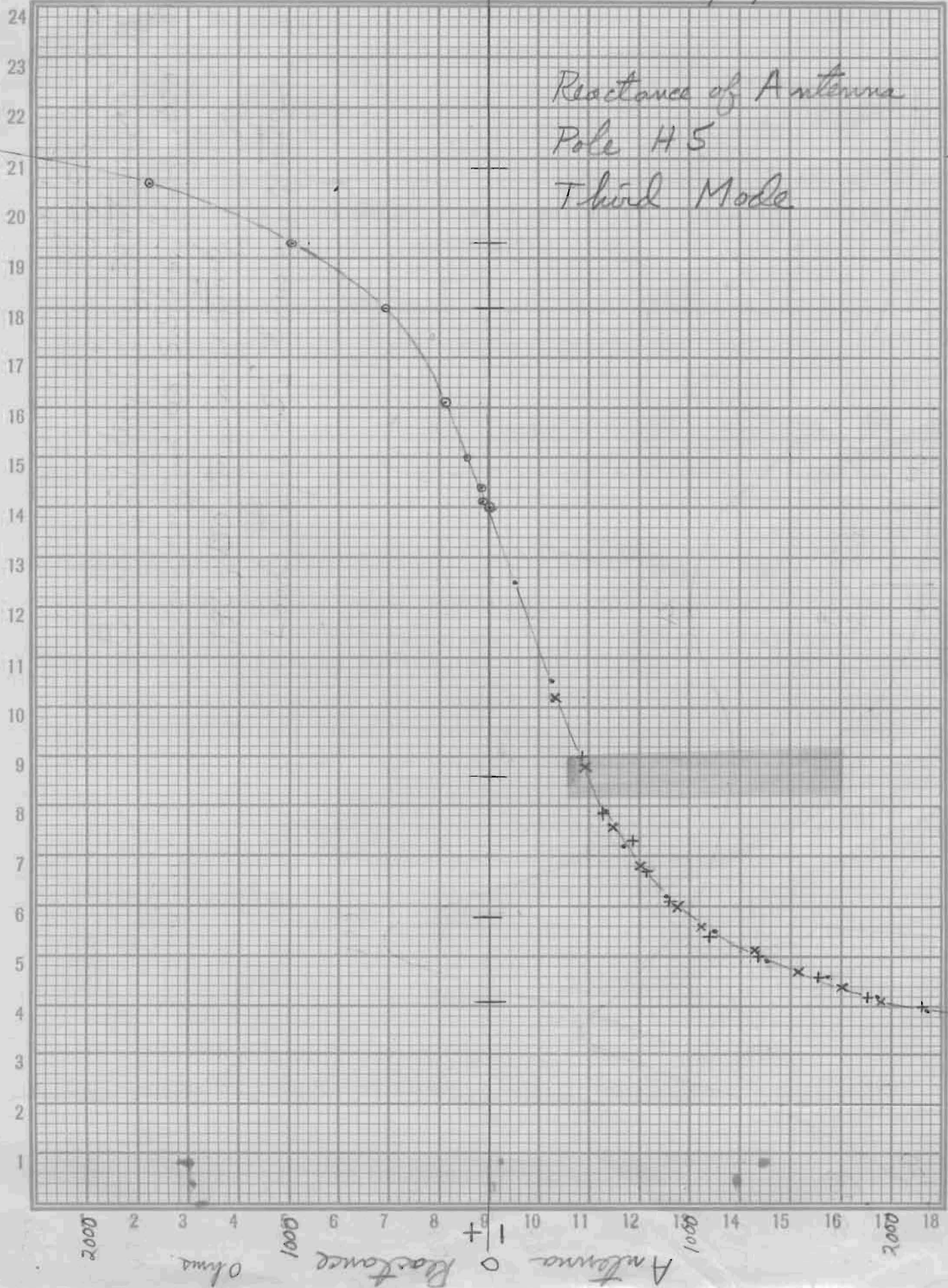
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Loading coils 13 turns, 3.31" diameter, 1.63" long,  $\frac{L}{d} = .493$   
 $L/d = 4.4$ ,  $L = 4.4 \times 3.31 = 14.6$  or say 15 microhenries each.

8/4/64 Reduced 3.31" dia primary to 12 turns 1.44" long  
 $\frac{L}{d} = .435$ ,  $L/d =$   $L =$   $X =$  at 2550 KC

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Reactance of Antenna  
Pole H5  
Third Mode



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## Antenna Test Pole #5, Third Mode

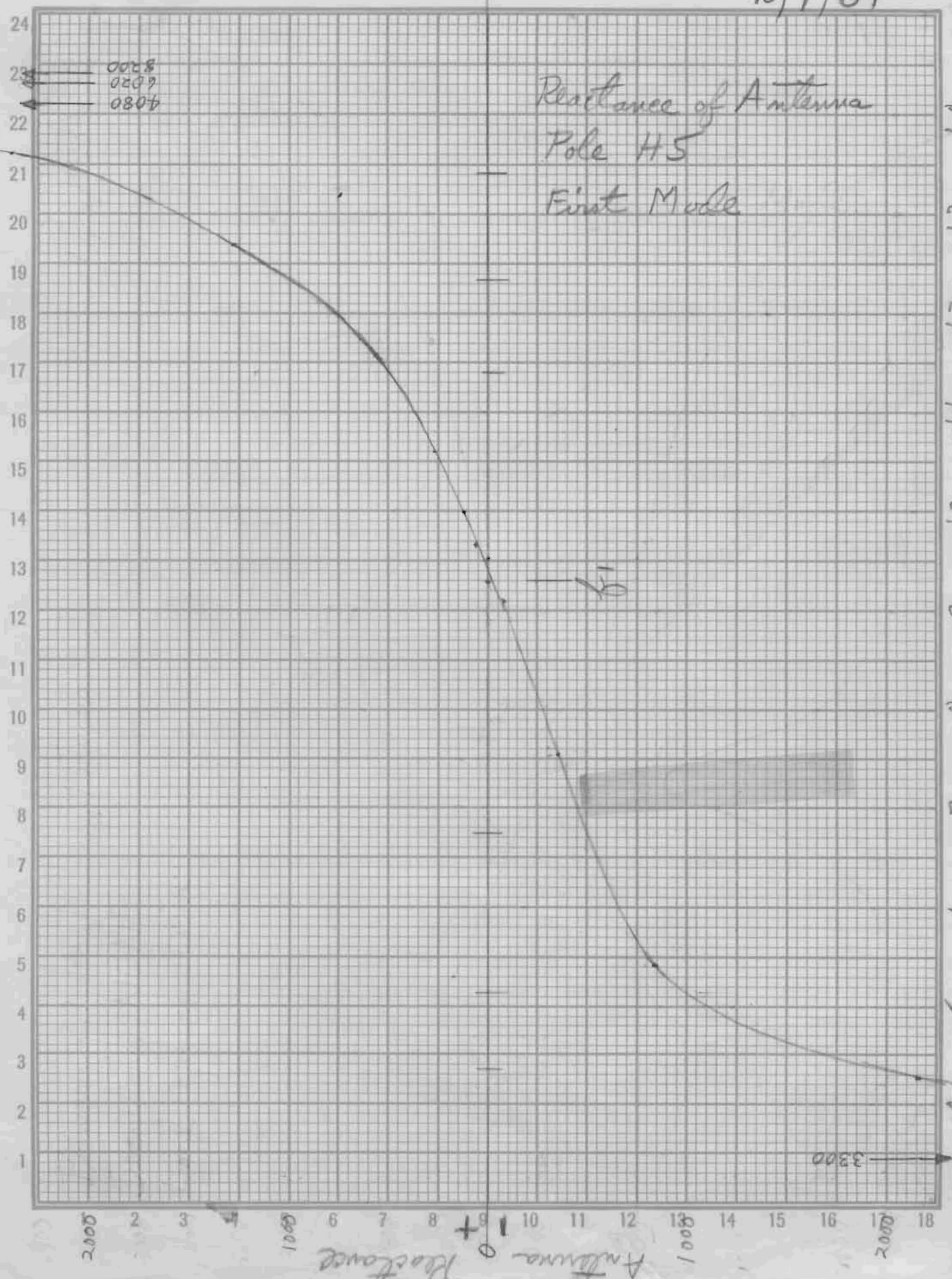
Two Series capacitors, each @ Points	Dial Divisions	Frequency megacycles	Reactance ohms
infinite		2.70	0
5000		2.71	24
2600		2.74	44
1100		2.80	104
490		2.91	224
199		3.10	516
99		3.23	994
56		3.35	1696
37		3.41	2520

		center	geometric mean
Bandwidth at $\pm 500$ ohms	$3.10 \pm 2.16 =$	2.58	2.59
Bandwidth at $\pm 1000$ ohms	$3.23 \pm 1.88 =$	2.56	2.47
Bandwidth at $\pm 2000$ ohms	$3.38 \pm 1.71 =$	<u>2.55</u>	<u>2.40</u>
Computed zero reactance	2.61 mc average =	2.56	2.49
Observed zero reactance		2.70	

Reactance in ohms	Bandwidth	
	MC	%
$\pm 500$	.94	36
$\pm 1000$	1.35	53
$\pm 2000$	1.67	66



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Reactance of Antenna  
Pole H5  
First Mode

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# Antenna Test Pole H5, Fundamental Mode

Series Element    Dial Div. #46702    Frequency megacycles    Reactance Ohms

Two series capacitors, each

27 pf	5.03	1.44	-8200
37	4.95	1.43	6020
56	4.80	1.41	4080
99	4.40	1.36	2360
199	3.68	1.27	1260
490	2.63	1.16	560
1100	1.62	1.06	274
2600	0.97	1.00	122
5000	0.62	.967	-66
infinite	0.20	.930	0

Coil Inductance Dial Div. Number microhenries new coil

Series Coil

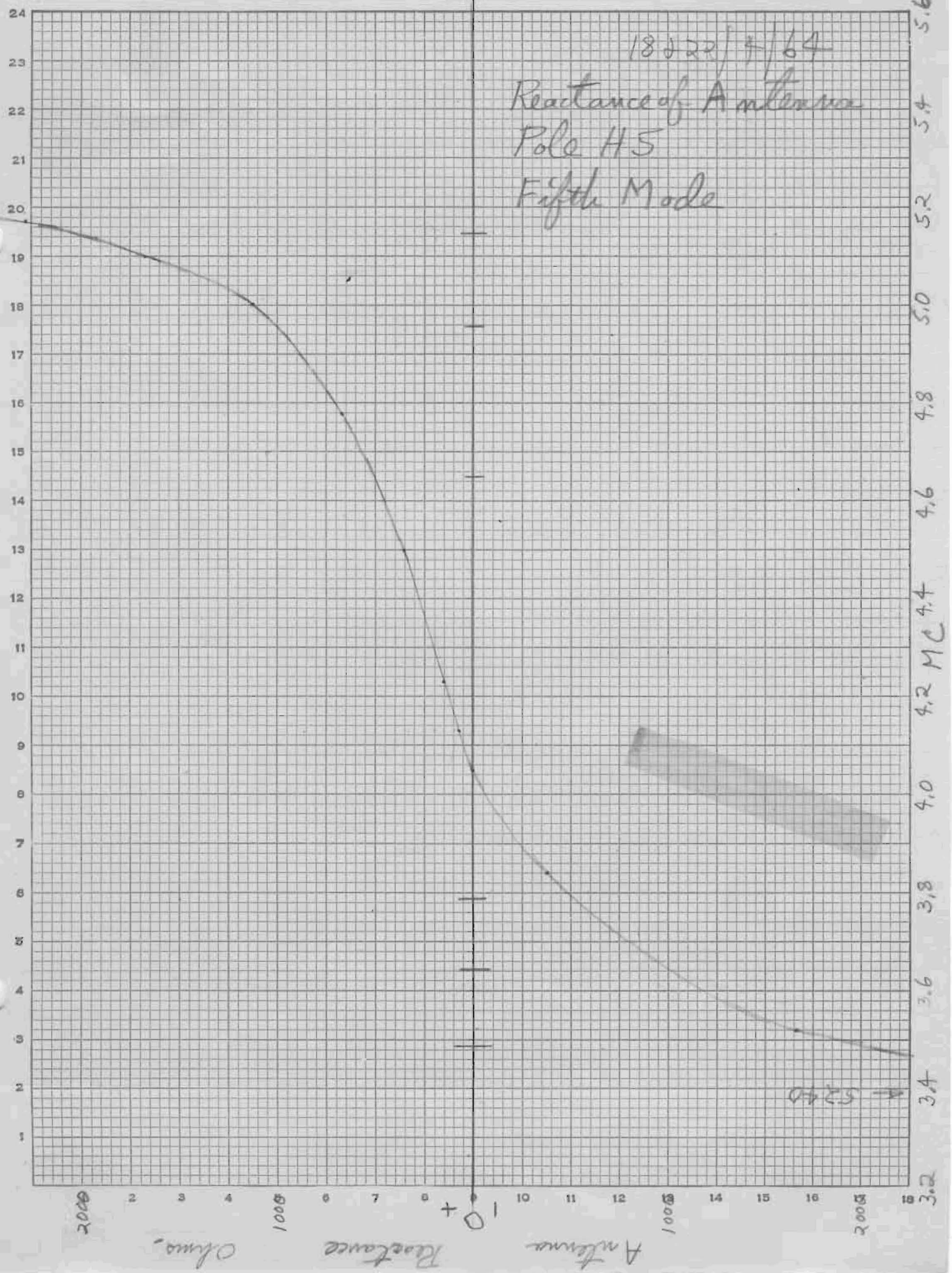
none	0	4.83 b	.951	0
8	14	4.30 b	.910	+80
6	75	2.20 b	.753	354
3	246	5.80 a	.591	836
2	802	2.75 a	.427	2150
1	1510	< 0 a	< .347	< 3290

Reactance in ohms	Bandwidth MC %
± 500	.465 51
± 1000	.720 82
± 2000	.905 102

geometric mean

Bandwidth at ± 500 ohms reactance  $1.140 + 0.675 = 0.908$  center .878  
 Bandwidth at ± 1000 ohms reactance  $1.235 + 0.515 = 0.875$  .798  
 Bandwidth at ± 2000 ohms reactance  $1.340 + 0.435 = 0.888$  .764  
 Computed zero reactance 0.870 mc average = 0.890 .813  
 Observed zero reactance 0.940

18J22/7/64  
 Reactance of Antenna  
 Pole H5  
 Fifth Mode





# Antenna Test Pole H5, Fifth Mode

18+22/4/64

Series Element	Dial Divisions	Frequency megacycles	Reactance Ohms
Two series capacitors, each	27pf	5.17	-2280
	37	5.10	1686
	56	5.08	1136
	99	4.78	672
	199	4.50	356
	490	4.23	154
	1100	4.13	-70
	$\infty$	4.05	0

## Inductance microhenries

Series Coil	Inductance	Dial Divisions	Frequency	Reactance	Bandwidth	MC %
15.5	230d	3.84	+374			
75	1.97d	3.52	1655			
246	1.60d	3.39	5240			

Bandwidth at	reactance	center	geometric mean	Bandwidth	MC %
$\pm 500 \Omega$	4.55 - 3.79 =	4.17	4.15	.76	18
" $\pm 1000 \Omega$	" 4.96 - 3.64 =	4.30	4.25	1.32	31
" $\pm 2000 \Omega$	" 5.15 - 3.99 =	4.32	4.24	1.66	38
Computed zero reactance	4.35 mc. average	=	4.26	4.21	
Observed zero reactance			4.05		

Poles are 440 feet apart

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Antenna wire cut length	284 feet
Double lock at fastenings $4" + 2 \times 4" =$	- 1 foot
Effective length	283 feet.

Two wires = 566 feet = 172.5 meters

First resonant mode $\lambda =$	345 meters	, $f_1 =$	0.870.	} computed.
Third " "	115 "	, $f_3 =$	2.610	
Fifth " "	69 "	, $f_5 =$	4.350	
Seventh " "	49.3 "	, $f_7 =$	6.090	

Poles are 440 feet apart.

Distance from bolt at top to nick at bottom 65 feet.

$$f_c / 0.85 = 1.320$$

$$f_c = 1.320 f_1 \quad \lambda_c = 300 / f_c$$

101 turn length =  $\pi d$

102 wire length =  $\lambda_c / 2 = 150 / f_c$

103 turns = wire length / length per turn =  $(150 / f_c) / \pi d = 150 / \pi d f_c$

104

105

106

107

$$f_1 = 0.85 \text{ mc} \quad \frac{328 \cdot 150}{1.61} / f_c =$$

108

1.61 ft per turn

109

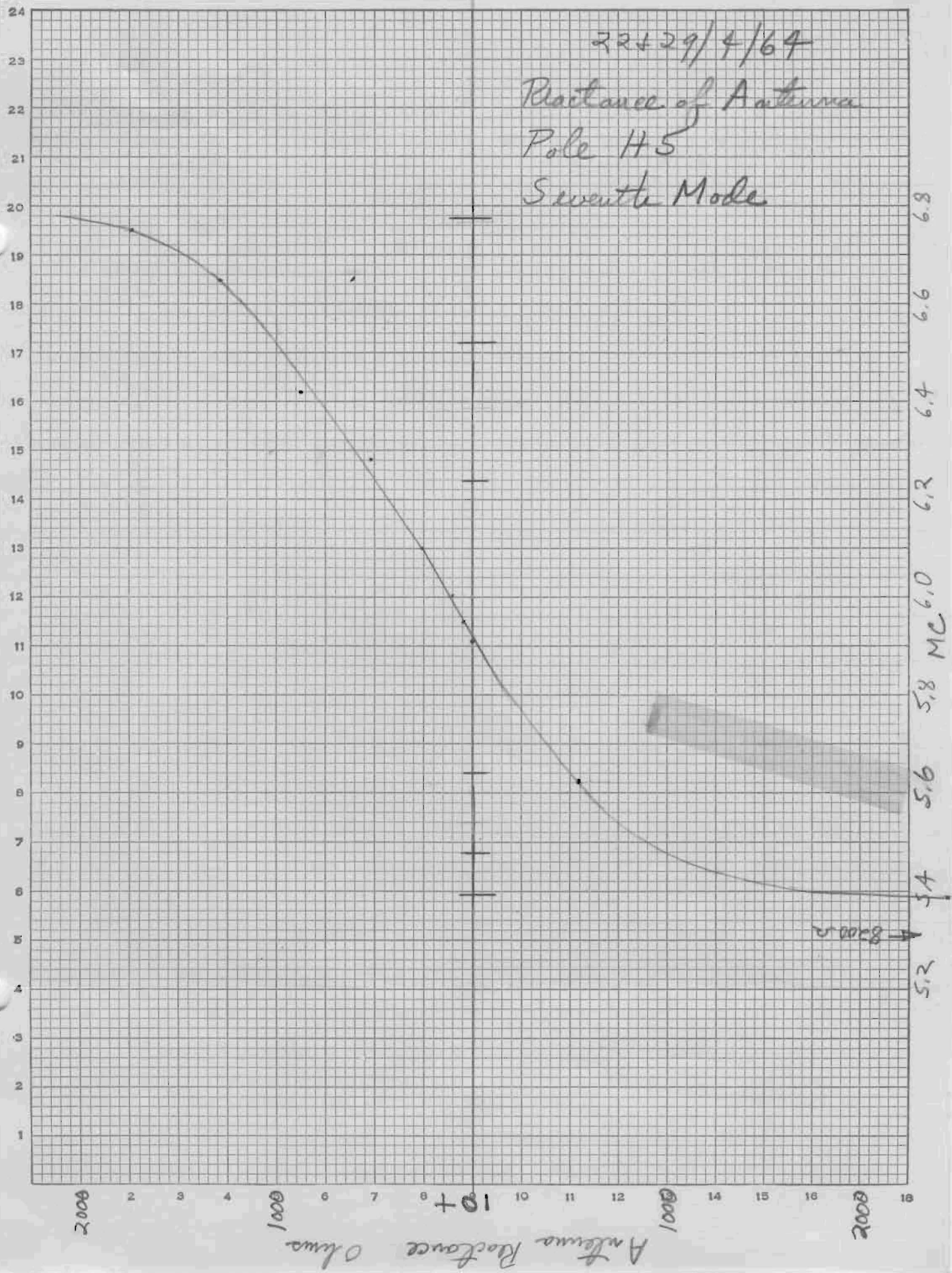
110

111

112

113

22+29/4/64  
 Reactance of Antenna  
 Pole H5  
 Seventh Mode



8000

8000 10+ 8000 8000



# Antenna Test Pole H5, Seventh Mode

Series Element	Dial Divisions	Frequency megacycles	Reactance Ohms
Two series capacitors each	27	6.75	-1745
	37	6.65	1294
	56	6.42	886
	99	6.28	512
	199	6.10	263
	490	6.00	108
	1100	5.95	48
	$\infty$	5.91	0

## Inductance microhenries

Series Coil	Inductance	Frequency	Reactance
15.5	6.85d	5.62	+548
75	6.38d	5.39	2540
246	6.22d	5.31	8200

	center	geometric mean	Bandwidth MC	%
Bandwidth at $\pm 500 \Omega$ reactance	6.24 - 5.64 = 5.94	5.93	.60	10
" " $\pm 1000 \Omega$ "	6.52 - 5.48 = 6.00	5.98	1.04	17
" " $\pm 2000 \Omega$ "	6.77 - 5.39 = 6.08	6.04	1.38	23
Computed zero reactance	6.09 mc.	Average = 6.01	5.98	
Observed zero reactance		5.91		