

CHAPTER III

EXPERIMENT SET UP AND MEASUREMENTS

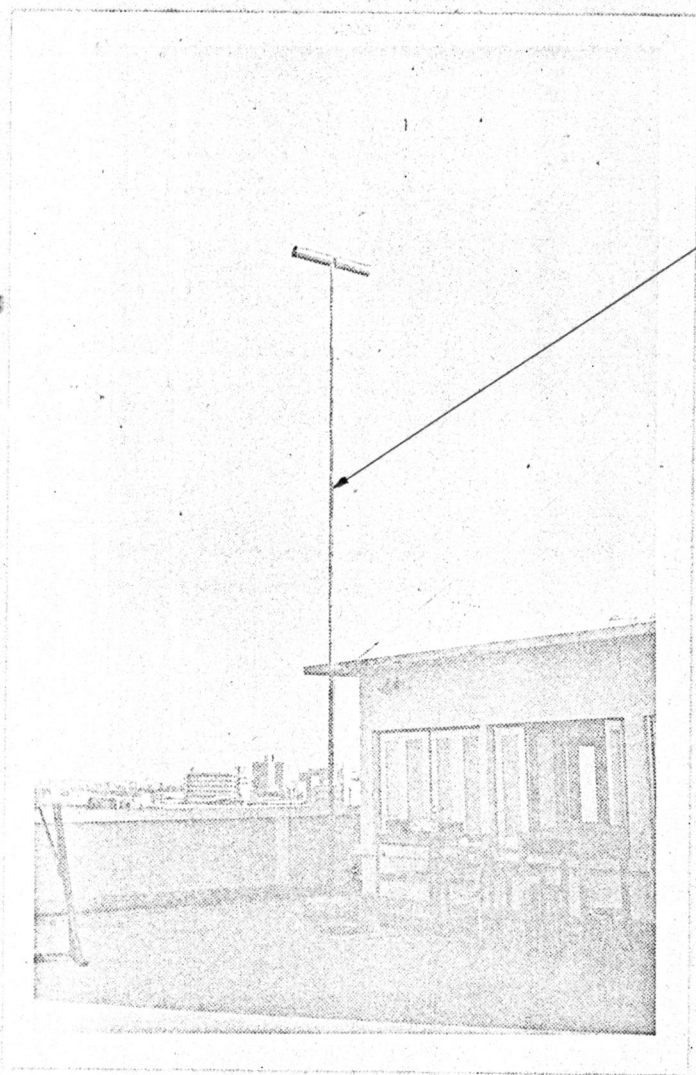
The Instruments use in the experiments are as follow :

1. A center-fed hollow cylindrical antenna. It is made of brass with 100 centimeters long and 16 centimeters in diameter. Six rings are welded to it in order that it can be tightened to the bar on the top of a ten meter long bamboo (see fig. 7)
2. A ten meter long bamboo for installing the antenna (see fig. 7)
3. An iron pole with concrete base. It is used with the bamboo so that the bamboo can be rotated around (see fig. 10)
4. A scale in degree which is attached to the iron pole (see fig. 10)
5. A pointer. It is attached to the bamboo to indicate degree when the antenna is rotated around (see fig. 7, 10)
6. A balun. It is consist of two coils and two variable capacitors connected as a tank circuit. The two capacitors can be varied by two adjusting screws, and one of the two coils can be moved upward and downward so that the mutual inductance and conpling coefficient can be varied. It is designed and constructed for matching the antenna and source in order that as much power as possible can be transfered to the antenna from source (see fig. 9)
7. An unit regulated power supply type 1201-B (see fig. 11)
8. An unit oscillator type 1208-B range : 65-500 MHz. (see fig. 11)
9. A r-f 815 amplifier range : 10-500 MHz. It is used to strengthen the sending power (see fig. 11)

10. A feed through wattmeter (wattmeter model 43 serial 47664). It is used to indicate that how much power is sent out and how much is reflected. (see fig. 11)
11. Coaxial lines and other wire use to connect instruments.
12. A field strength meter. (Prestel type MC 16) It is use with an antenna to measure the field strength from the sending antenna (see fig. 12)

In these experiments, the receiving antenna is kept stationary while the sending antenna (the hollow cylindrical antenna) is rotated from 0° to 360° and the radiation fields are measured at 5° interval.

The measurements made at the predesigned frequencies were performed on the top floor of the five-story building at the department of Electrical Engineering. Due to the difficulties of having other signals from other source at nearby frequencies, the measurements were made after midnight through daybreak when the space is mostly clear of other signals. The data obtained from the measurements are recorded in the following tables.



Ten Meter Long Bamboo

Fig. 7 The Hollow Cylindrical Antenna at the Top
of a Bamboo Pole.

Center-fed Hollow Cylindrical Antenna

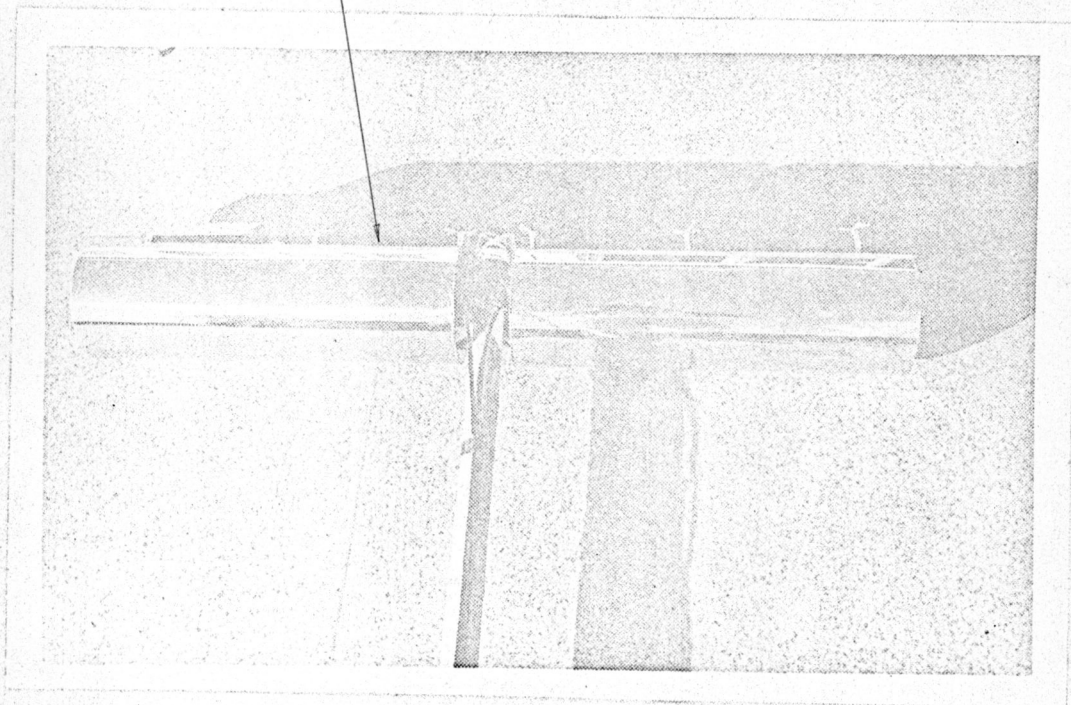


Fig. 8 Installation and Feeding to the Antenna

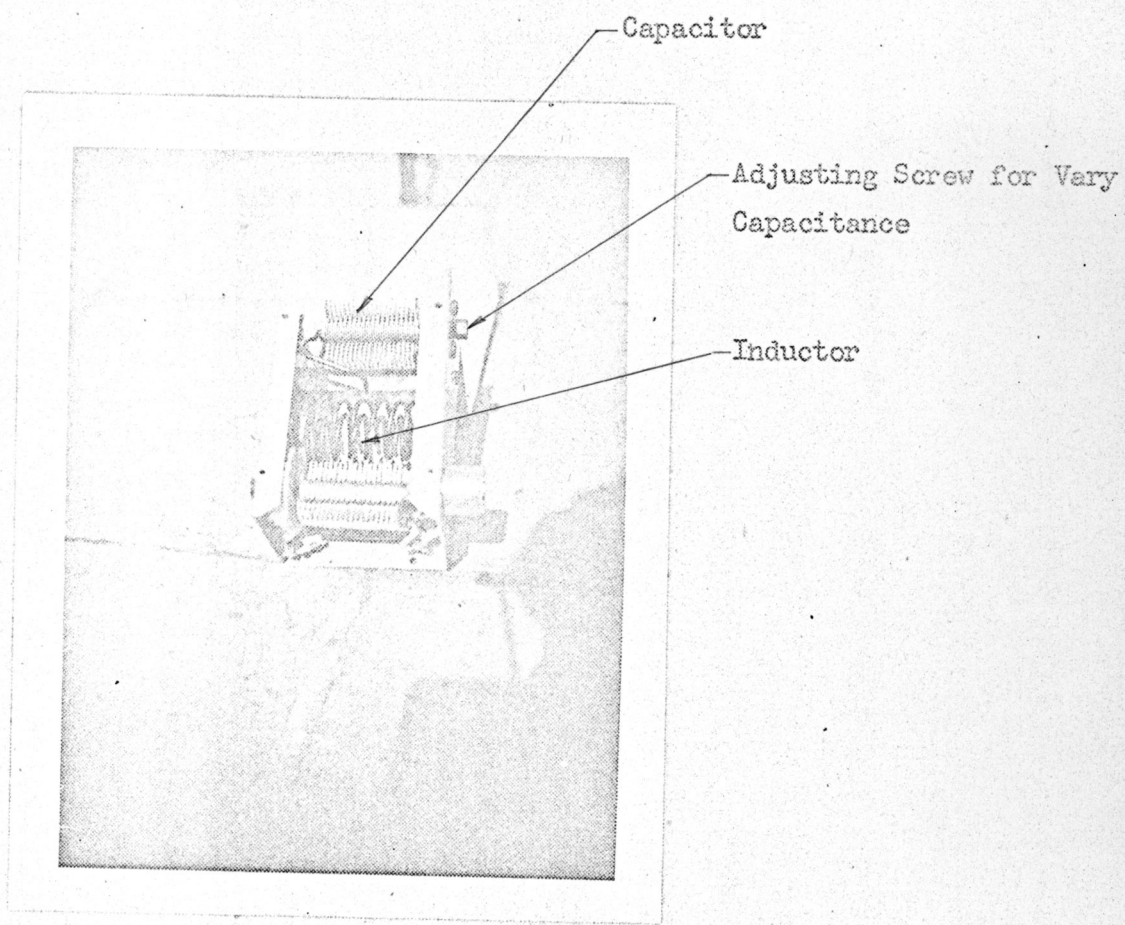


Fig. 9 The Balun

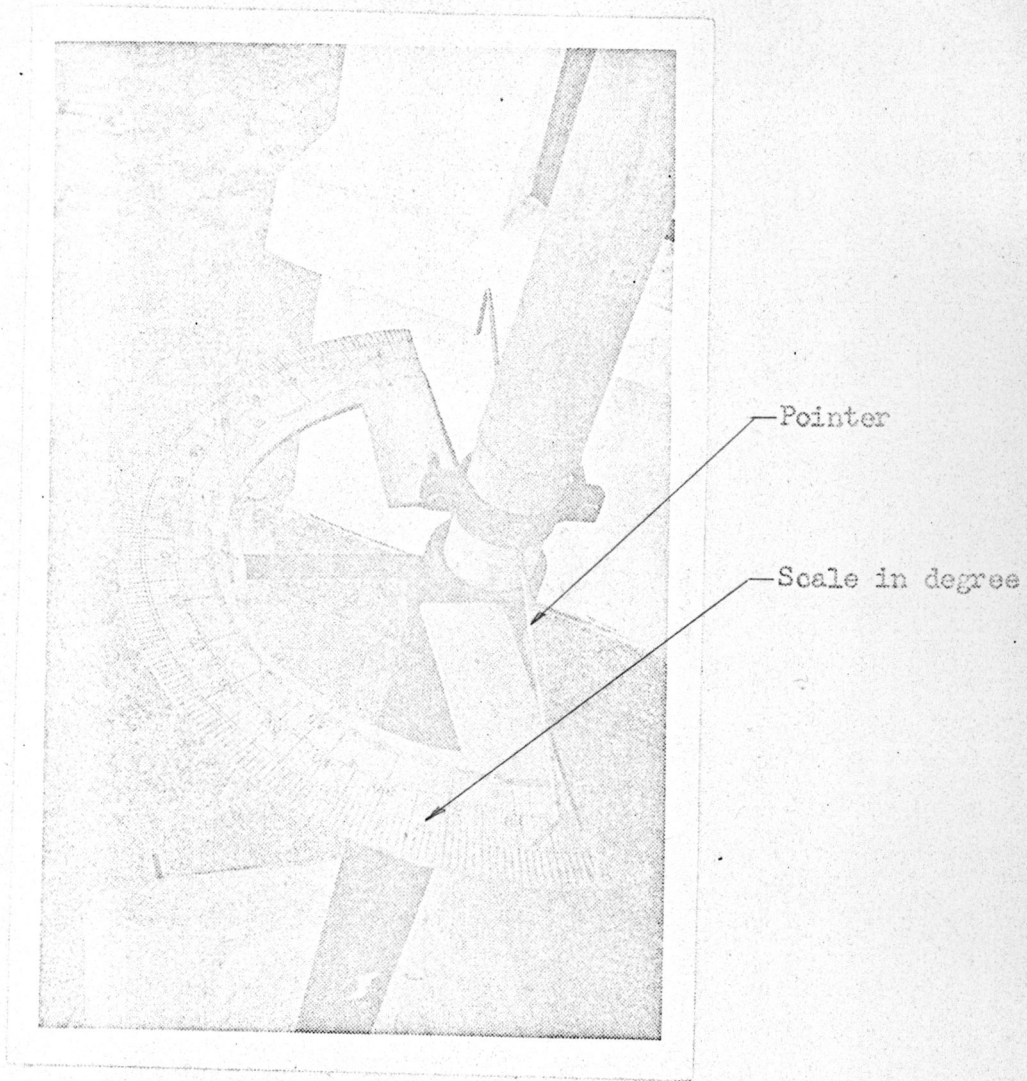


Fig. 10 The Rotation Indicator Showing Scale in Degrees

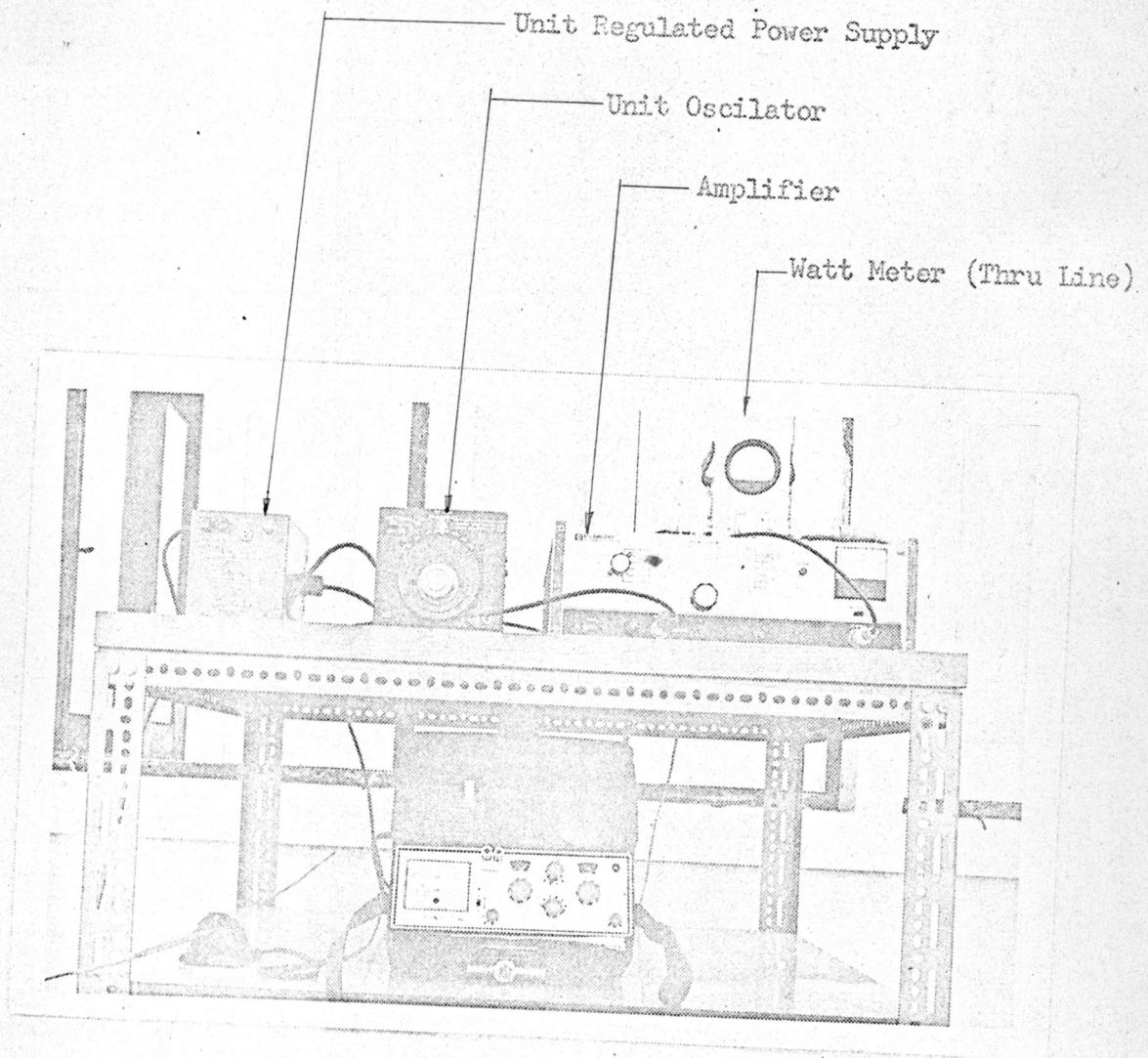


Fig. 11 The Transmitting Equipment in Their Places

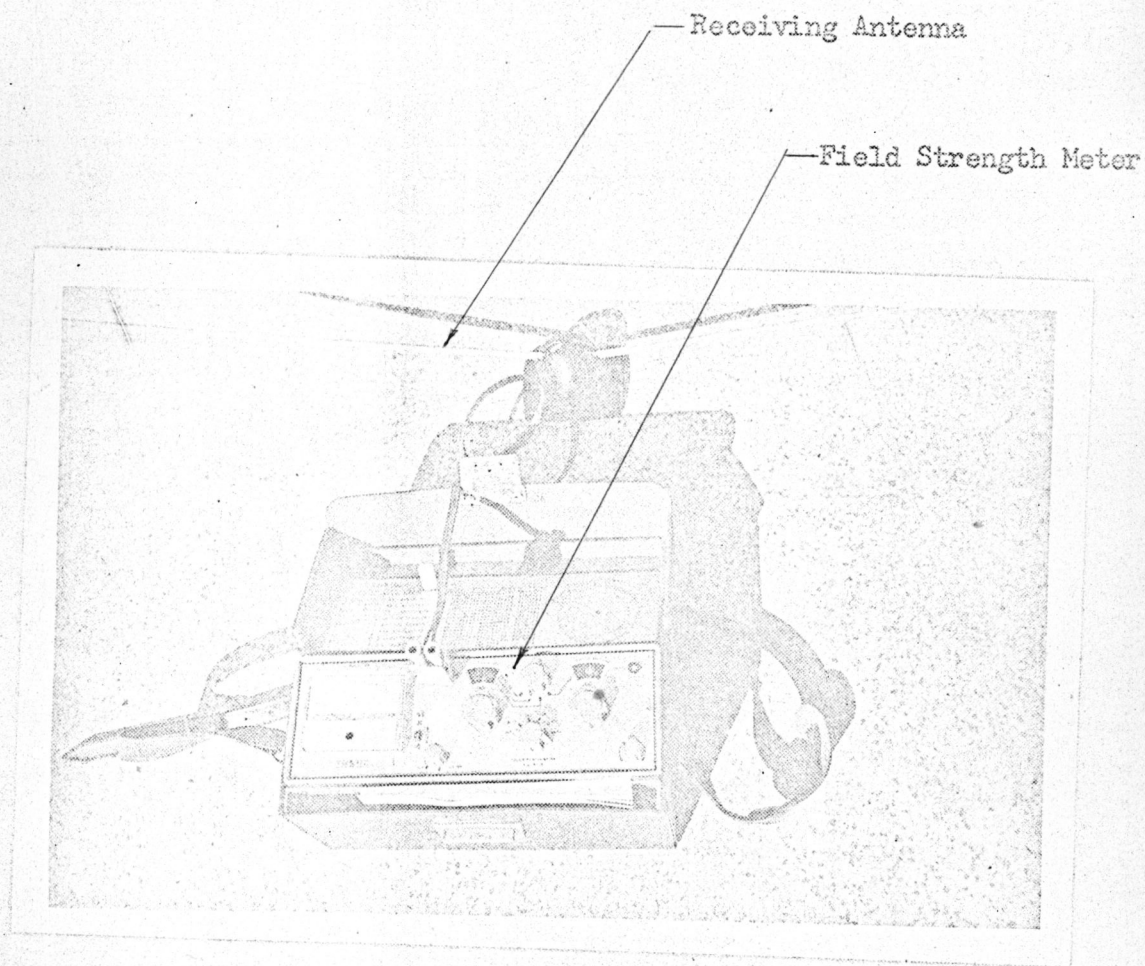


Fig. 12 The Field Strength Meter with the Receiving Antenna.

A. Field Pattern of the Hollow Cylindrical Antenna from Experiments
at Frequency = 150 MHz.

FREQUENCY = 150 MHZ.

SENDING POWER = 0.8 WATTS

REFLECTION = 0.1 WATTS

DEGREES	FIELD STRENGTH(μ V)				NORMALIZED VALUE
	1	2	3	AVERAGE	
0	10	12	10	11	0.06
5	10	12	12	11	0.06
10	12	15	13	13	0.07
15	15	15	16	15	0.08
20	18	20	20	19	0.10
25	30	30	28	29	0.15
30	40	40	38	39	0.20
35	50	50	50	50	0.26
40	62	62	60	61	0.31
45	72	72	70	71	0.37
50	89	90	89	89	0.46
55	110	110	105	108	0.56
60	130	130	125	128	0.66
65	140	140	138	139	0.72
70	156	158	155	156	0.80
75	168	170	168	169	0.87
80	178	180	178	179	0.92
85	190	190	188	189	0.97
90	192	193	190	192	0.99
95	190	190	190	190	0.98

FREQUENCY = 150 MHZ.

SENDING POWER = 0.8 WATTS

REFLECTION = 0.1 WATTS



DEGREES	FIELD STRENGTH(μ V)				NORMALIZED VALUE
	1	2	3	AVERAGE	
100	185	185	180	183	0.94
105	182	182	178	181	0.93
110	180	180	172	177	0.91
115	172	172	168	171	0.88
120	160	160	160	160	0.82
125	155	155	152	154	0.79
130	140	140	138	139	0.72
135	128	130	125	128	0.66
140	115	115	110	113	0.58
145	100	100	100	100	0.52
150	84	85	82	84	0.43
155	70	70	68	69	0.36
160	55	55	55	55	0.28
165	40	40	38	39	0.20
170	30	30	30	30	0.15
175	16	20	15	17	0.09
180	12	15	12	13	0.07
185	15	20	15	17	0.09
190	30	30	30	30	0.15
195	40	42	40	41	0.21

FREQUENCY = 150 MHZ.

SENDING POWER = 0.8 WATTS

REFLECTION = 0.1 WATTS

DEGREES	FIELD STRENGTH(μ V)				NORMALIZED VALUE
	1	2	3	AVERAGE	
200	55	55	52	54	0.28
205	70	70	68	69	0.36
210	85	85	82	84	0.43
215	100	100	95	98	0.51
220	110	110	105	108	0.56
225	120	120	118	119	0.61
230	130	130	128	129	0.66
235	140	140	138	139	0.72
240	155	155	152	154	0.79
245	160	162	162	161	0.83
250	175	175	172	174	0.90
255	182	180	180	181	0.93
260	190	190	190	190	0.98
265	192	192	192	192	0.99
270	195	195	193	194	1.00
275	190	192	190	191	0.98
280	185	185	185	185	0.95
285	172	175	175	174	0.90
290	170	170	168	169	0.87
295	165	165	162	164	0.85

FREQUENCY = 150 MHZ.

SENDING POWER = 0.8 WATTS

REFLECTION = 0.1 WATTS



DEGREES	FIELD STRENGTH(MV)				NORMALIZED VALUE
	1	2	3	AVERAGE	
300	150	150	148	149	0.77
305	140	140	138	139	0.72
310	126	125	125	125	0.64
315	110	115	108	111	0.57
320	98	100	95	98	0.51
325	80	85	80	82	0.42
330	68	70	68	69	0.36
335	55	58	55	56	0.29
340	40	40	40	40	0.21
345	25	25	25	25	0.13
350	15	20	15	17	0.09
355	11	15	15	14	0.07
360	11	12	10	11	0.06

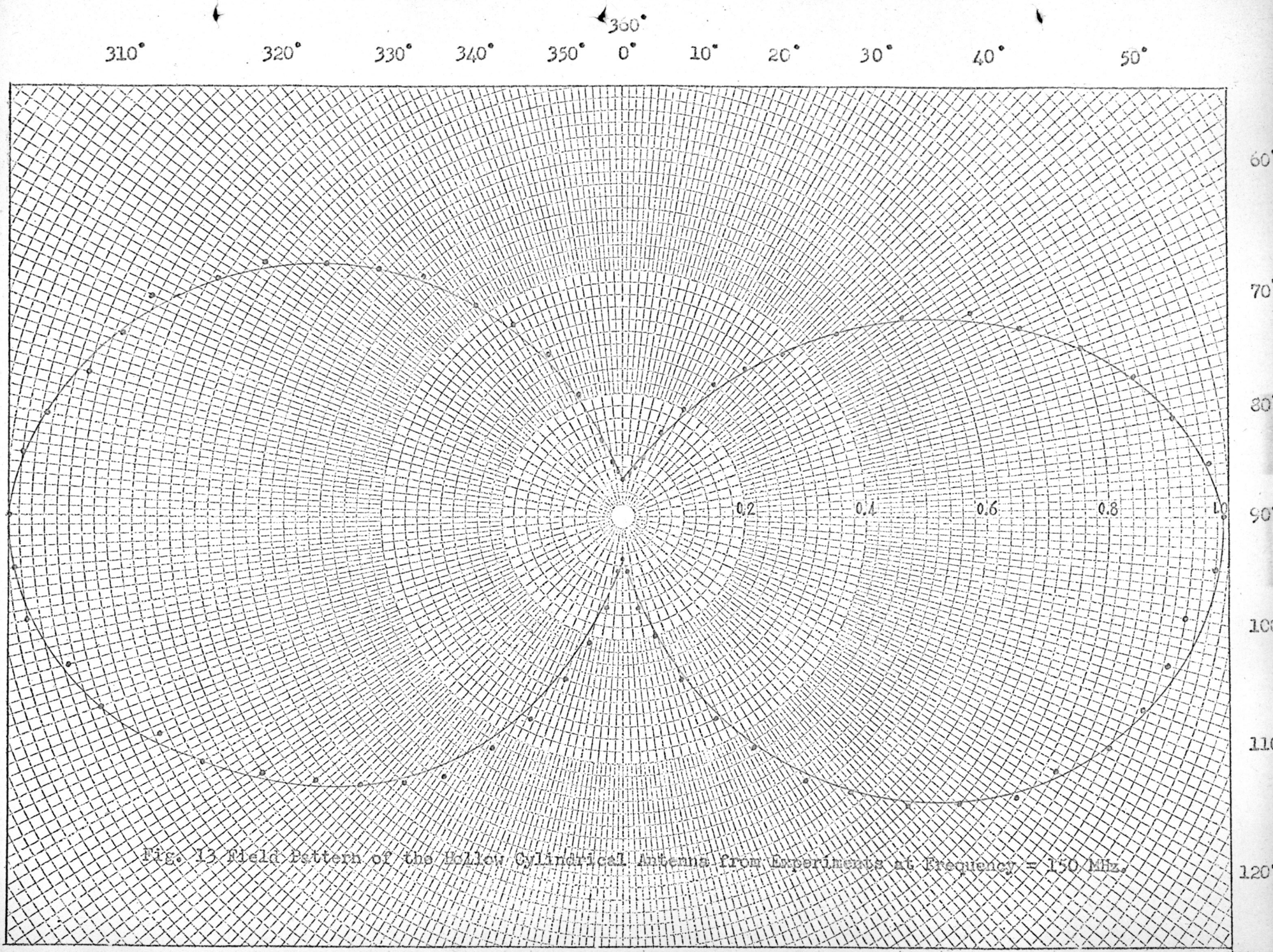


Fig. 13 Field Pattern of the Hollow Cylindrical Antenna from Experiments at Frequency = 150 MHz.

60°
70°
80°
90°
100°
110°
120°
55

B. Field Pattern of a Hollow Cylindrical Antenna from Experiments
at Frequency = 126 MHz.

FREQUENCY = 126 MHZ.

SENDING POWER = 0.98 WATTS

REFLECTION = 0.18 WATTS

DEGREES	FIELD STRENGTH(μ V)				NORMALIZED VALUE
	1	2	3	AVERAGE	
0	30	32	32	31	0.25
5	30	33	32	32	0.26
10	32	35	33	33	0.27
15	32	38	35	35	0.28
20	35	40	38	38	0.31
25	40	45	40	42	0.34
30	42	50	45	46	0.37
35	48	55	50	51	0.41
40	55	62	55	57	0.46
45	60	70	65	65	0.52
50	70	80	73	74	0.60
55	80	88	82	83	0.67
60	88	92	92	91	0.73
65	98	100	100	99	0.80
70	102	105	108	105	0.85
75	105	110	112	109	0.88
80	112	115	115	114	0.92
85	115	118	118	117	0.94
90	118	121	120	120	0.97
95	115	120	118	118	0.95

FREQUENCY = 126 MHZ.

SENDING POWER = 0.98 WATTS

REFLECTION = 0.18 WATTS

DEGREES	FIELD STRENGTH (μ V)				NORMALIZED VALUE
	1	2	3	AVERAGE	
100	112	115	115	114	0.92
105	110	113	112	112	0.90
110	108	110	110	109	0.88
115	102	105	108	105	0.85
120	95	100	100	98	0.79
125	90	95	95	93	0.75
130	85	90	88	88	0.71
135	75	80	80	78	0.63
140	68	74	72	71	0.57
145	62	68	62	64	0.52
150	52	58	58	56	0.45
155	48	50	50	49	0.40
160	40	45	45	43	0.35
165	38	40	38	39	0.31
170	35	38	35	36	0.29
175	32	35	32	33	0.27
180	30	33	30	31	0.25
185	32	35	32	33	0.27
190	33	37	33	34	0.27
195	35	38	35	36	0.29

FREQUENCY = 126 MHZ.

SENDING POWER = 0.98 WATTS

REFLECTION = 0.18 WATTS

DEGREES	FIELD STRENGTH(μ V)				NORMALIZED VALUE
	1	2	3	AVERAGE	
200	38	42	38	39	0.31
205	42	46	45	44	0.35
210	48	52	50	50	0.40
215	55	60	56	57	0.46
220	62	68	63	64	0.52
225	70	75	72	72	0.58
230	78	81	80	80	0.65
235	80	88	88	85	0.69
240	88	95	92	92	0.74
245	95	102	100	99	0.80
250	102	107	107	105	0.85
255	110	112	112	111	0.90
260	115	118	118	117	0.94
265	118	121	122	120	0.97
270	122	125	125	124	1.00
275	121	124	123	123	0.99
280	118	122	120	120	0.97
285	115	121	120	119	0.96
290	115	120	118	118	0.95
295	110	112	112	111	0.90

FREQUENCY = 126 MHZ.

SENDING POWER = 0.98 WATTS

REFLECTION = 0.18 WATTS



DEGREES	FIELD STRENGTH(μ V)				NORMALIZED VALUE
	1	2	3	AVERAGE	
300	102	106	108	105	0.85
305	95	100	100	98	0.79
310	85	92	90	89	0.72
315	80	86	82	83	0.67
320	70	78	75	74	0.60
325	65	70	70	68	0.55
330	60	62	62	61	0.49
335	50	55	55	53	0.43
340	48	50	50	49	0.40
345	40	42	41	41	0.33
350	35	38	35	36	0.29
355	32	34	32	33	0.27
360	30	33	32	32	0.26

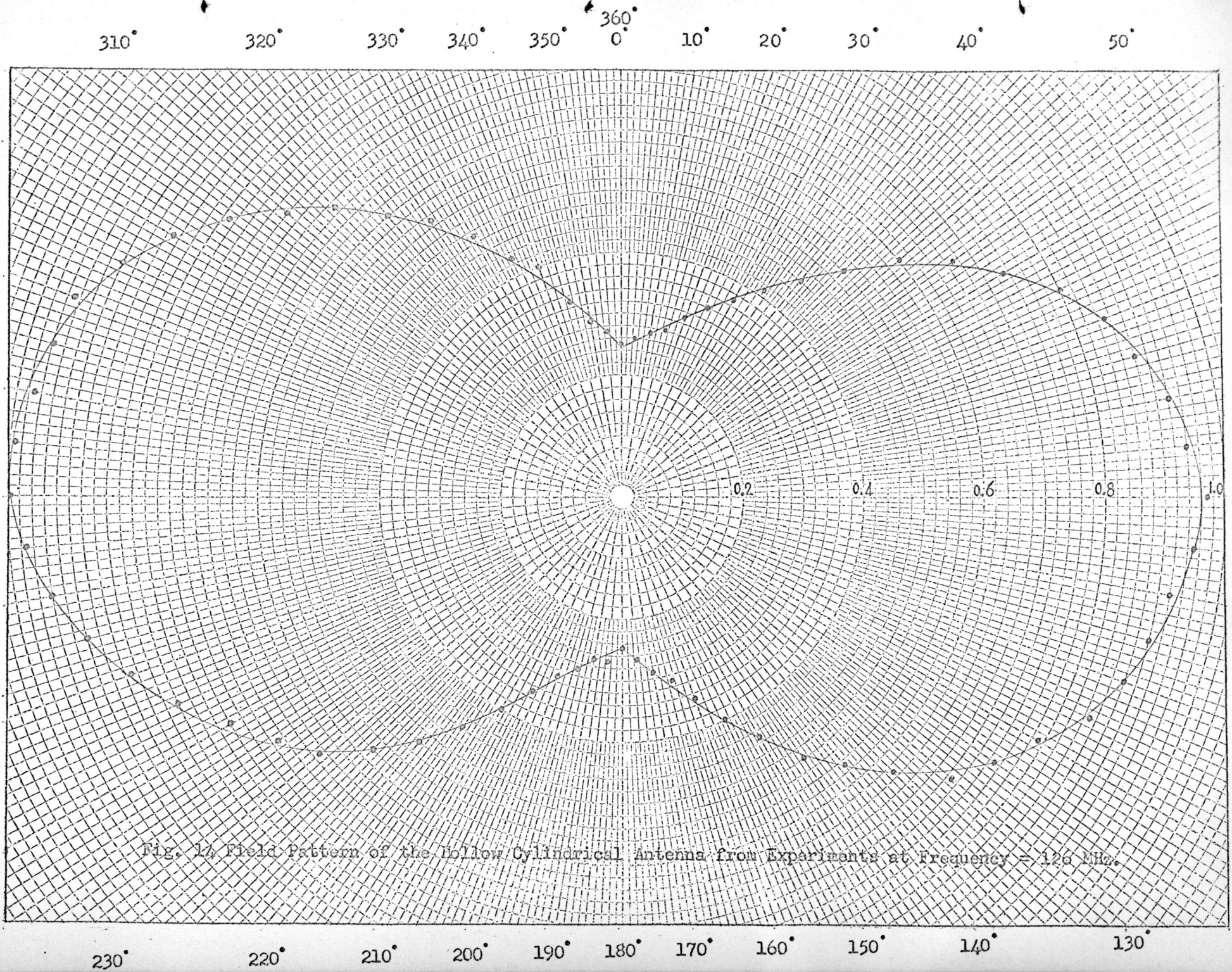


Fig. 14 Field Pattern of the Hollow Cylindrical Antenna from Experiments at Frequency = 126 MHz.