 25X1

[redacted]

7 April 1959

[redacted] 25X1

Attention: [redacted] 25X1

Subject: Contract No. RD-128, Task Order 3, Work Order 3
[redacted] 25X1

Gentlemen:

Enclosed are three (3) copies and one (1) reproducible of Report On Reflex Slot Antenna Measurement Program. It is assumed that submission of this material concludes [redacted] contractual obligation on subject task. 25X1

It is further assumed that the Government Furnished Property associated with this job will be hand-carried from [redacted] by a representative of your activity. 25X1

Very truly yours,

[redacted] 25X1

Contract Administrator

ATE:jfb

SECRET

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.Code, Sections 793 and 794. The transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law. (Par. 14g. AR 380-5)

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JUST 22 NEXT REV 2010 AUTH: HR 10-2

CONTROL NUMBER
CA3-29-1

[redacted] 25X1

REPORT ON REFLEX SLOT ANTENNA MEASUREMENT PROGRAM

TASK ORDER 3

[redacted] 25X1

Submitted by

[redacted] 25X1

TABLE OF CONTENTS

I INTRODUCTION

The purpose of this job was to obtain gain and pattern measurements of a Government furnished experimental antenna, over the frequency range of 100 to 10,000 megacycles.

II GENERAL

The gain of the test antenna without its amplifier was determined over a range of frequencies from 100 to 10,000 megacycles at 200 megacycle intervals. This gain of the test antenna over an isotropic source was determined by comparing the gain of the test antenna with a standard gain antenna. For the range of frequencies from 100 to 1000 megacycles dipole antennas were used as the standard gain antenna and from 1,000 to 10,000 megacycles standard gain horns were used for comparison. Since the test antenna developed its greatest gain at frequencies of 2400, 5200, 7400, and 9600 megacycles, a total of 24 antenna patterns were taken at these frequencies. Six patterns were taken at each frequency, three for three positions in the E plane and three for the three positions in the H plane.

A relative gain for the test antenna with respect to a standard gain horn was determined with the test amplifier in the circuit for each antenna. This gain was found at 200 mc intervals from 4200 to 8200 megacycles.

III PROCEDURE FOR MEASUREMENTS

1. Antenna Gain Measurements Without Amplifier

The test antenna and standard gain antenna were placed side by side and a IN415E crystal was placed in the detector of the standard gain antenna. The signal from the standard gain antenna was registered on the standing wave indicator and the detector was tuned for a maximum signal. Then the signal source was adjusted until the standing wave indicator was zeroed on the thirty db scale. The standard gain antenna was disconnected from the standing wave indicator and the crystal was removed from the detector mount of the standard antenna and placed in the test antenna (the polarity of the crystal being observed at all times). Then the test antenna was connected to the standing wave indicator and the relative gain in decibels was observed and data recorded for each position shown in figures one, two, and three. Care was taken to assure constant power output from the signal source once the indicator was zeroed on the 30 db scale. Throughout this procedure a single IN415E crystal was used in both the test antenna and standard gain antenna. This procedure was repeated at 200 mc intervals over the test range of frequencies.

2. Antenna Gain Measurements With Amplifier

This procedure was identical to the case without the amplifier except the test amplifier was added to the circuit between the standard gain, or test antenna, and the standing wave indicator. The standing wave indicator was zeroed on the 20 db scale instead of the 30 db scale, since the amplifier raised the noise level along with the received signal approximately 10 db.

3. Antenna Patterns

Three azimuth patterns were taken in the H plane by orienting the test antenna as shown in figures one, two, and three and rotating the test antenna in the plane where θ remains constant at 90 degrees, φ varies from zero to 360 degrees.

Three elevation patterns were taken in the E plane by orienting the test antenna as shown in figures one, four, and five and rotating the test antenna in the plane where φ takes on the two values of zero or 180 degrees and θ varies from zero to 360 degrees. The transmitting antenna transmitted E_θ polarization for all patterns.

The above procedure was repeated for the four frequencies of greatest gain yielding a total of twenty four patterns.

IV DATA

The data is arranged in the order shown in the Table of Contents.

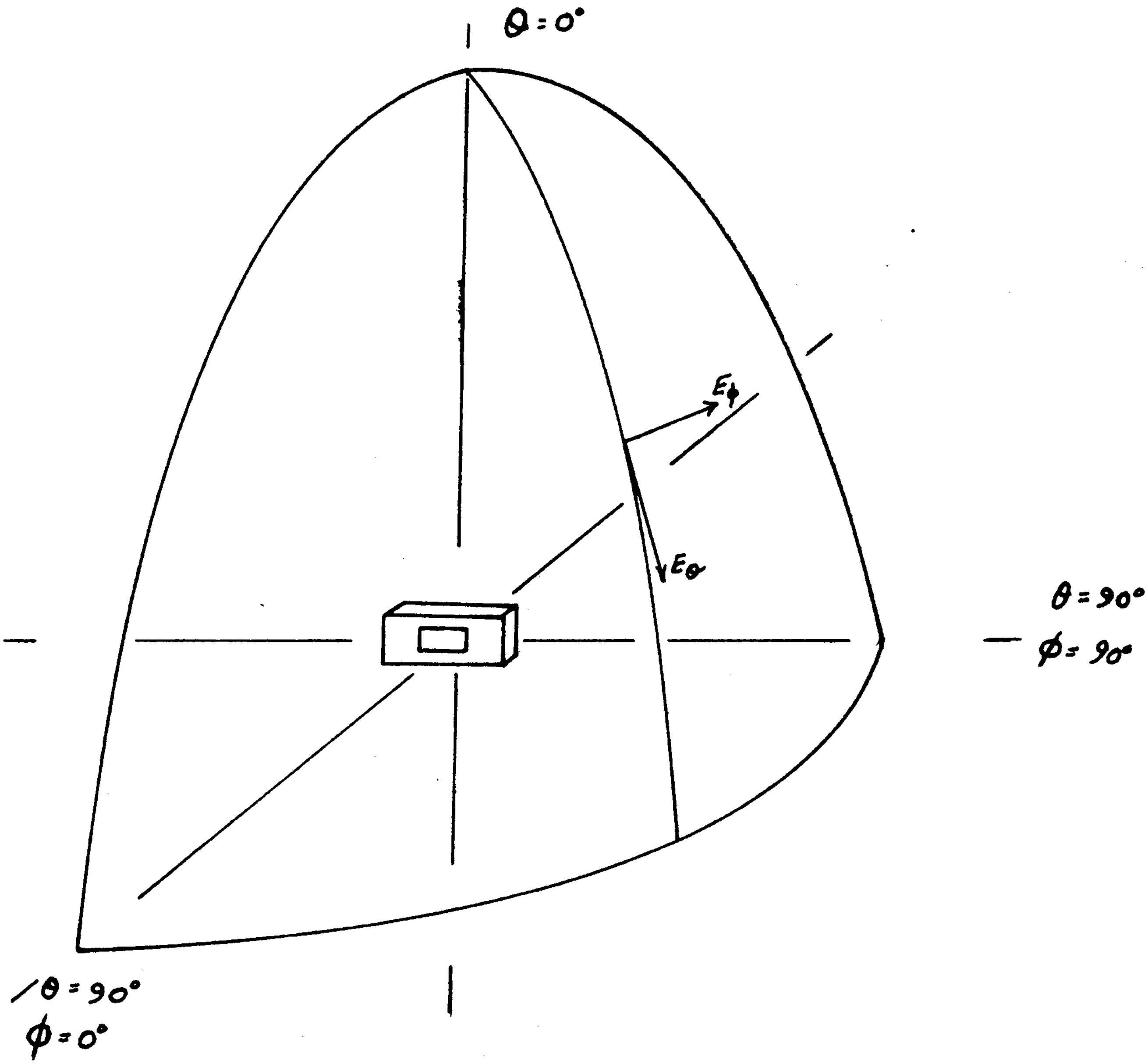
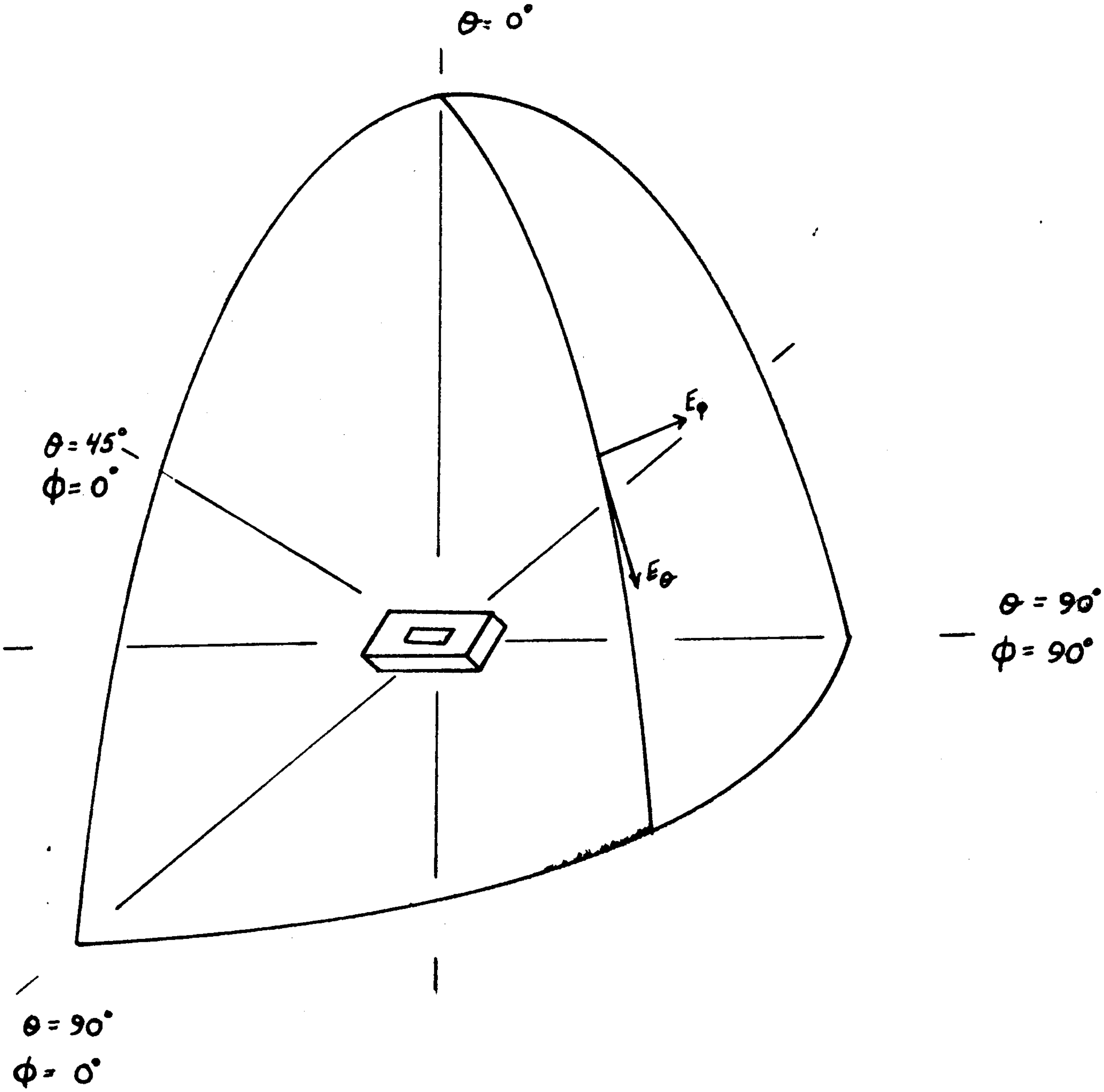


FIGURE #1

25X1

TEST ANTENNA ORIENTATION
MARCH 10, 1959



25X1

FIGURE #2

TEST ANTENNA ORIENTATION
MARCH 10, 1959

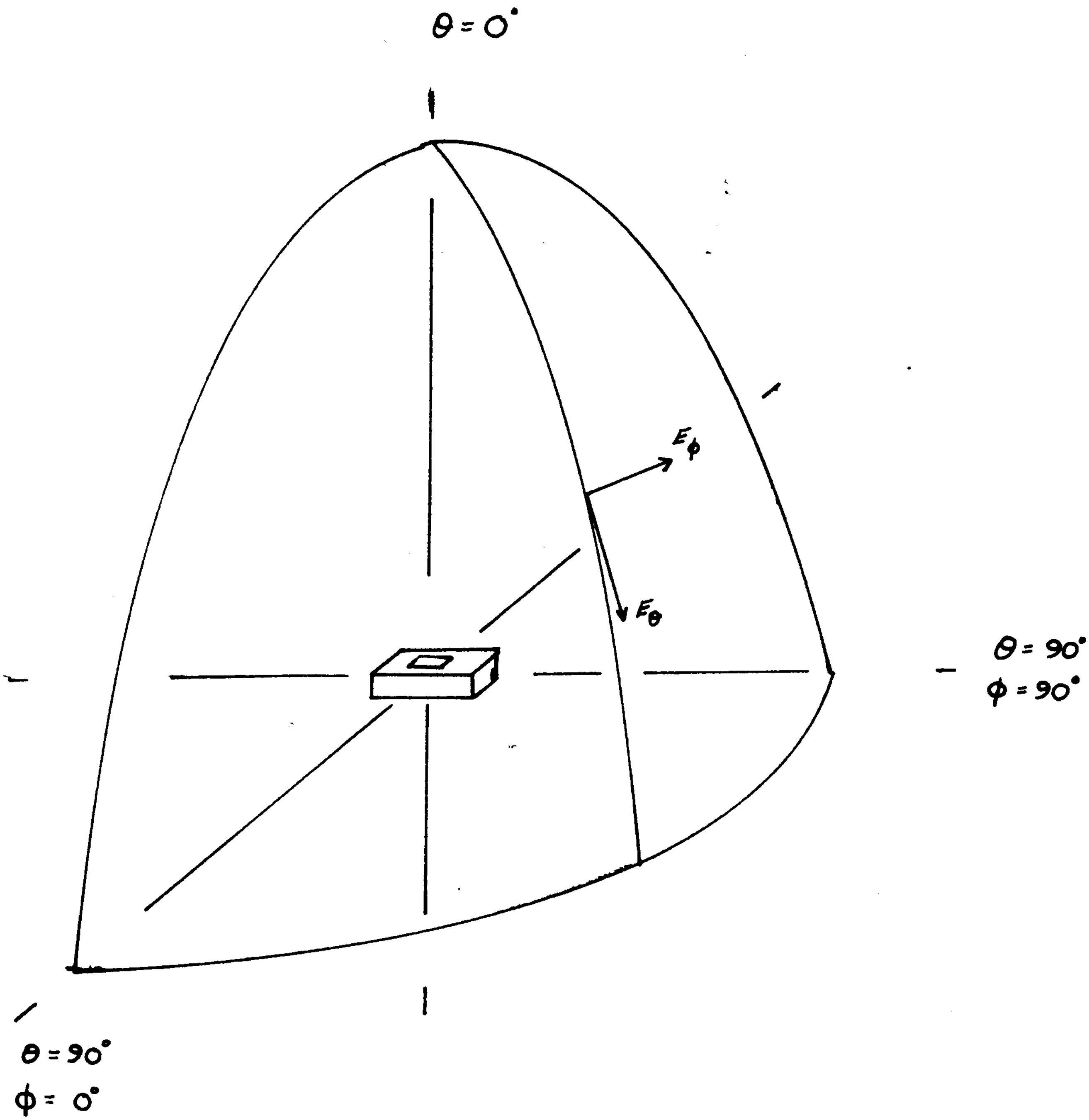


FIGURE #3

25X1

TEST ANTENNA ORIENTATION
MARCH 10, 1959

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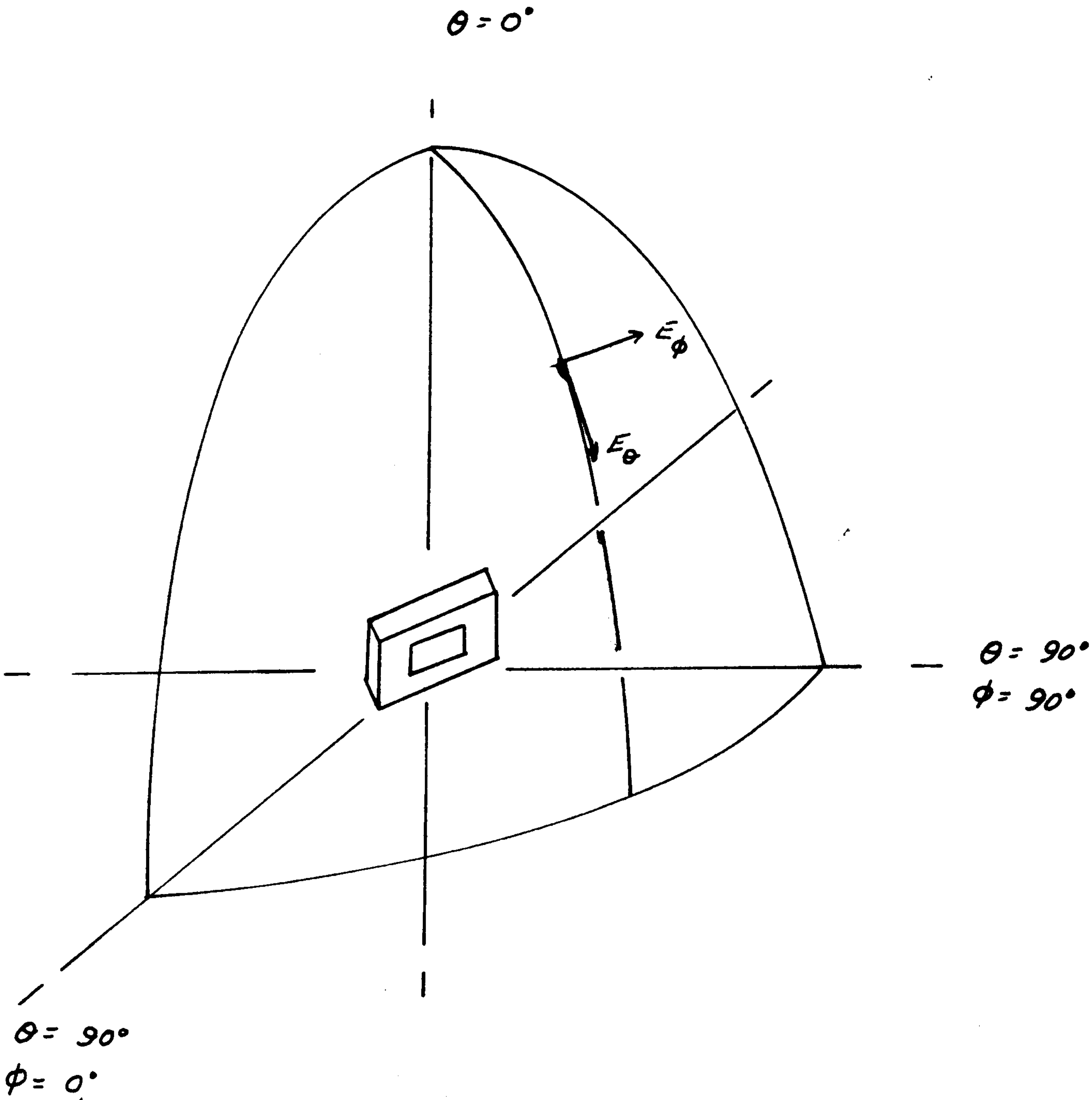


FIGURE # 4

25X1

TEST ANTENNA ORIENTATION
MARCH 11, 1959

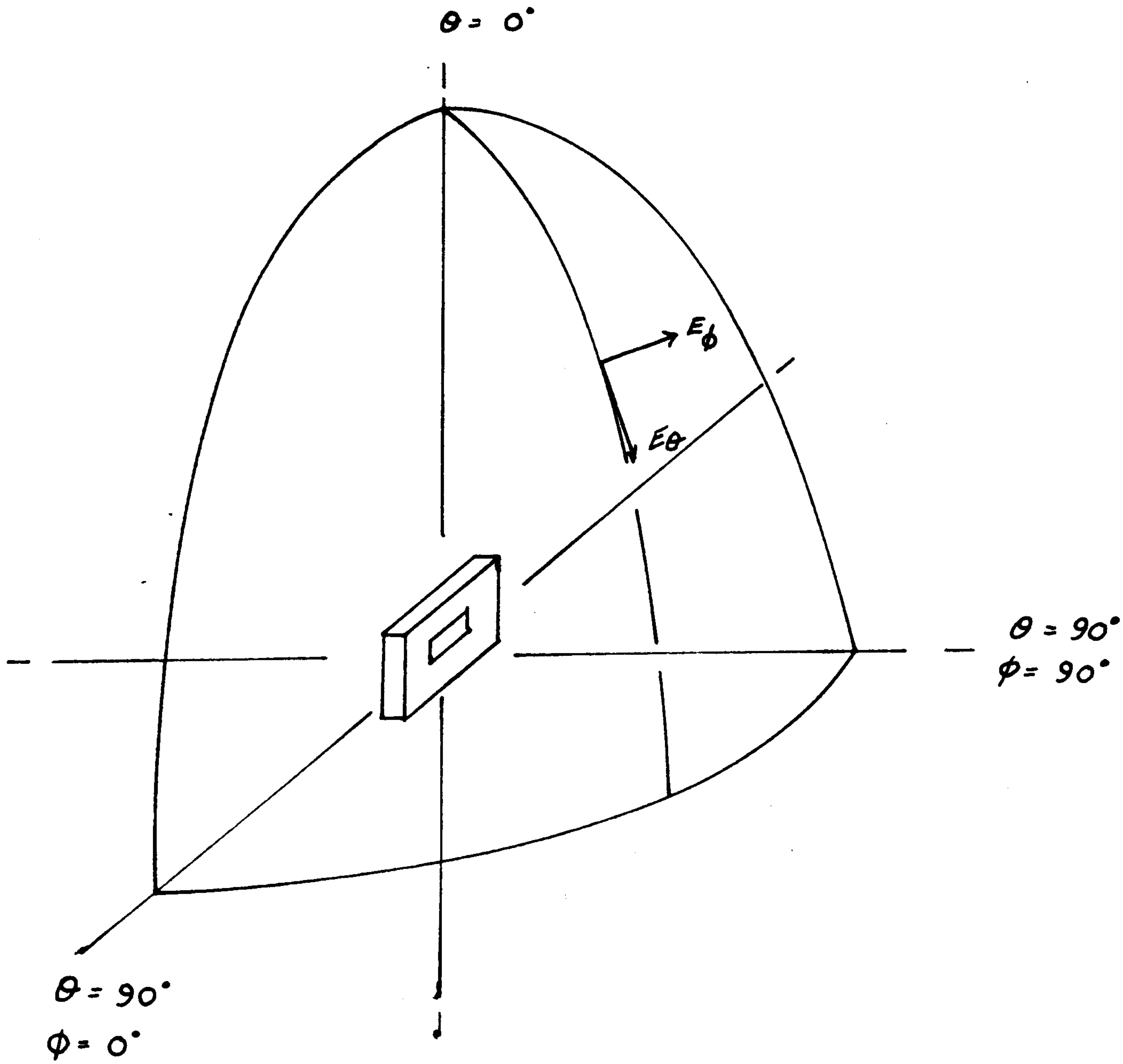


FIGURE # 5

25X1

TEST ANTENNA ORIENTATION
MARCH 11, 1959

GAIN DATA

[redacted] 25X1

Frequency - All frequencies are recorded in megacycles per second.

Gain - The gain recorded in positions one, two, and three is gain over an isotropic source in decibels.

Position -
No. 1 - see figure No. 1
No. 2 - see figure No. 2
No. 3 - see figure No. 3

GAIN DATA

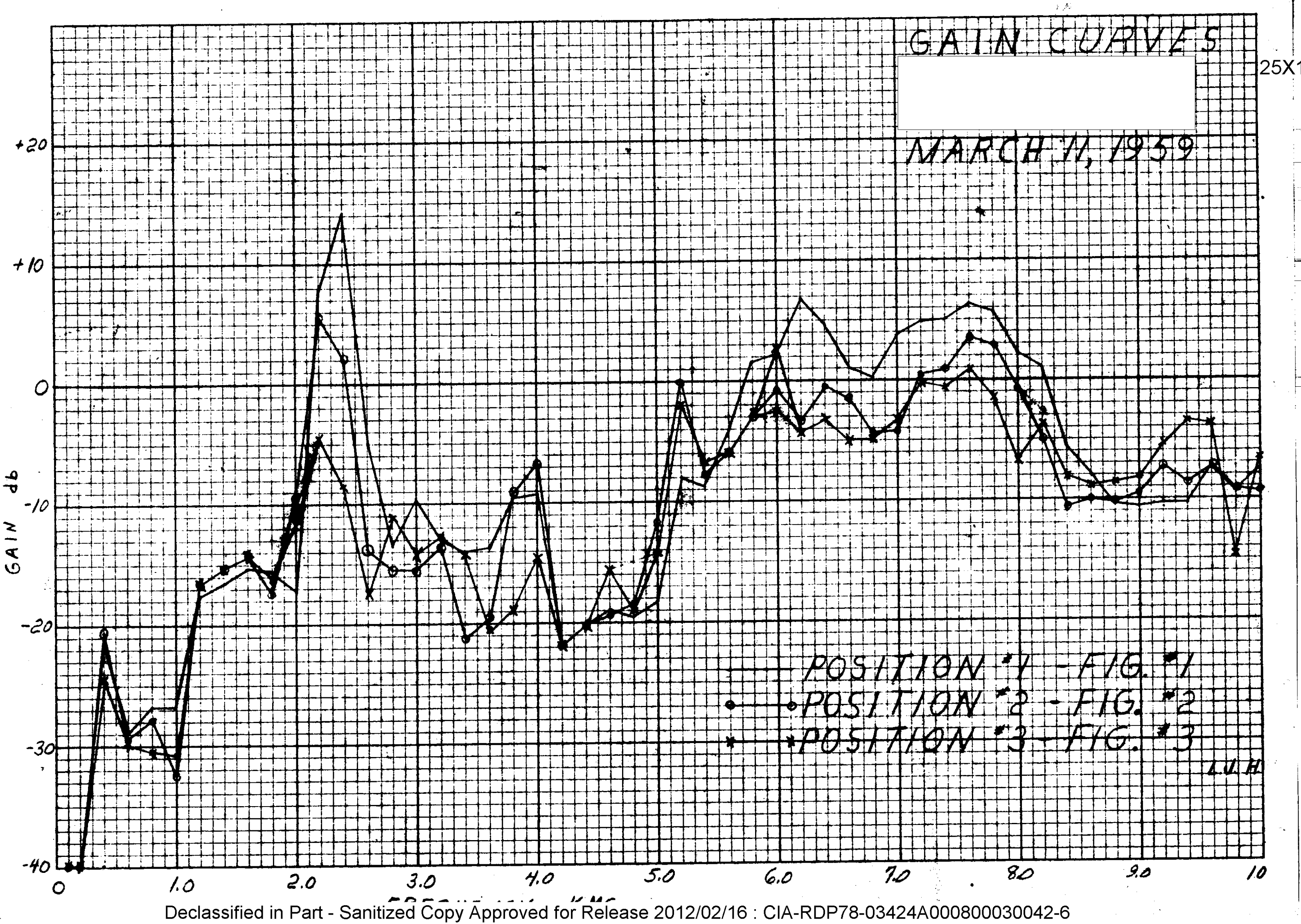
Job R1001.08

Frequency	Position No. 1	Position No. 2	Position No. 3
100	-40	-40	-40
200	-40	-40	-40
400	-21.3	-20.7	-24.4
600	-28.9	-29.4	-29.9
800	-26.9	-27.9	-30.4
1000	-26.9	-32.4	-30.9
1200	-17.6	-16.6	-16.6
1400	-16.5	-15.3	-15.4
1600	-15.2	-14.2	-14.2
1800	-15.4	-17.3	-15.9
2000	-17.2	- 9.5	-11.2
2200	+ 7.7	+ 5.5	- 4.5
2400	+14.1	+ 2.0	- 8.5
2600	- 4.95	-13.85	-17.45
2800	-13.4	-15.6	-11.1
3000	- 9.63	-15.53	-14.13
3200	-13.17	-13.67	-12.97
3400	-14.1	-21.2	-14.2
3600	-13.74	-19.64	-20.74
3800	- 9.77	- 9.27	-18.97
4000	- 9.3	- 6.8	-14.6
4200	-21.8	-21.8	-21.8
4400	-20.1	-20.1	-20.1
4600	-18.8	-19.3	-15.6
4800	-19.5	-18.5	-19.0
5000	-18.2	-11.7	-14.2
5200	- 8.0	0	- 2.0

GAIN DATA

Job E1001.08

Frequency	Position No. 1	Position No. 2	Position No. 3
5400	- 8.8	- 7.8	- 6.8
5600	- 4.0	- 5.9	- 5.9
5800	+ 1.5	- 3.0	- 3.0
6000	+ 2.1	- 0.9	+ 2.6
6200	+ 6.8	- 3.2	- 4.2
6400	+ 4.4	- 0.6	- 3.1
6600	+ 1.0	- 1.5	- 5.0
6800	+ 0.2	- 4.3	- 4.8
7000	+ 3.8	- 4.2	- 3.2
7200	+ 4.9	+ 0.4	- 0.1
7400	+ 5.0	+ 0.9	- 0.7
7600	+ 6.2	+ 3.3	+ 0.9
7800	+ 5.7	+ 2.8	- 1.4
8000	+ 2.1	- 0.9	- 6.8
8200	+ 1.0	- 2.7	- 3.7
8400	- 5.6	-10.6	- 8.1
8600	- 7.9	-10.0	- 8.9
8800	-10.6	-10.2	- 8.6
9000	-10.7	- 9.7	- 8.1
9200	-10.3	- 7.1	- 5.3
9400	-10.3	- 8.7	- 3.4
9600	- 7.3	- 7.3	- 3.6
9800	- 9.4	- 9.2	-14.6
10000	- 7.7	- 9.4	- 6.7



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RELATIVE GAIN DATA

[redacted] 25X1

Frequency - All frequencies are recorded in megacycles per second.

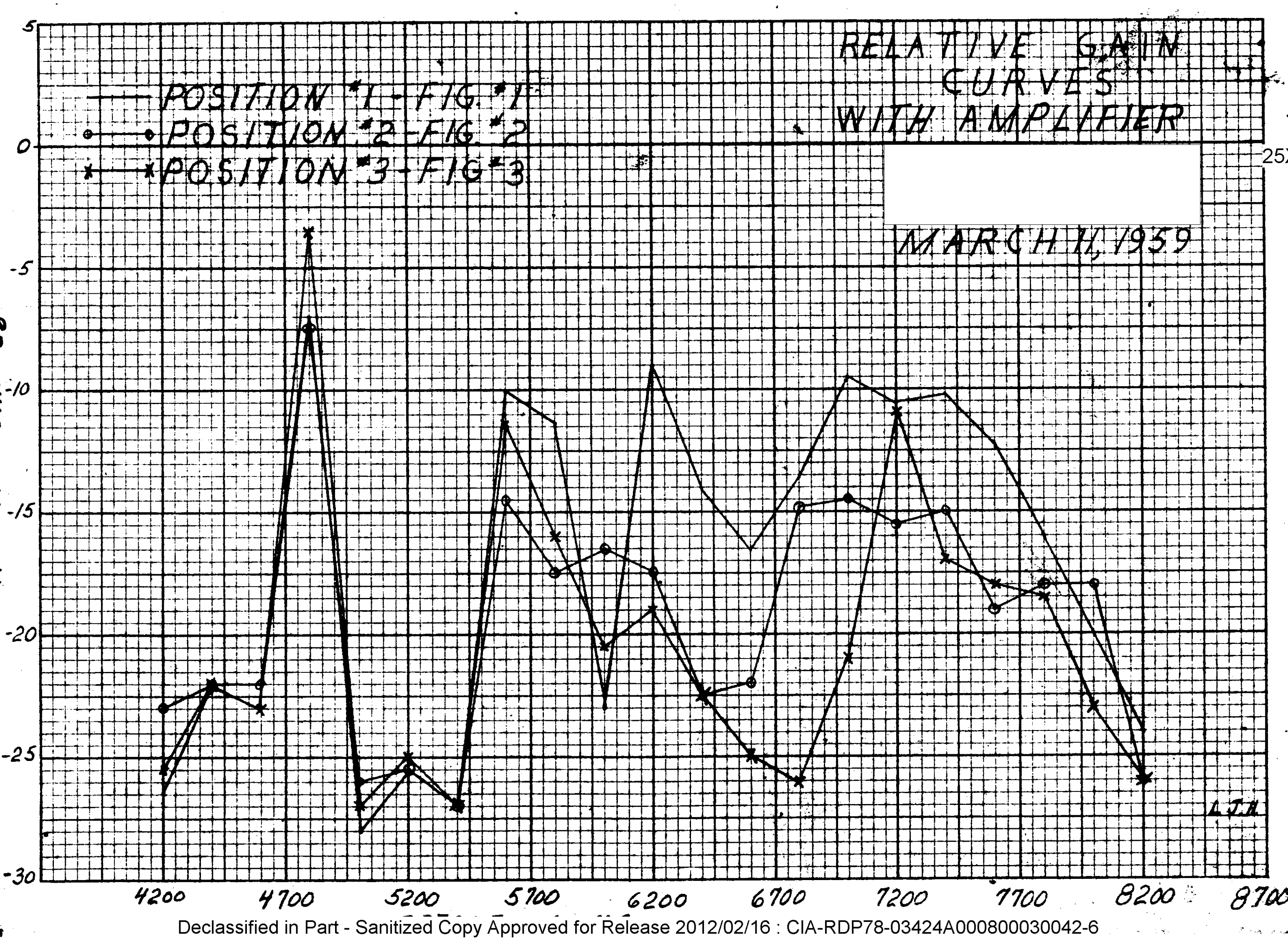
Gain - The tabulated gain values recorded in decibels represents the difference in gain between the test antenna with amplifier and the standard gain antenna with amplifier.

Positions
No. 1 - see figure No. 1
No. 2 - see figure No. 2
No. 3 - see figure No. 3

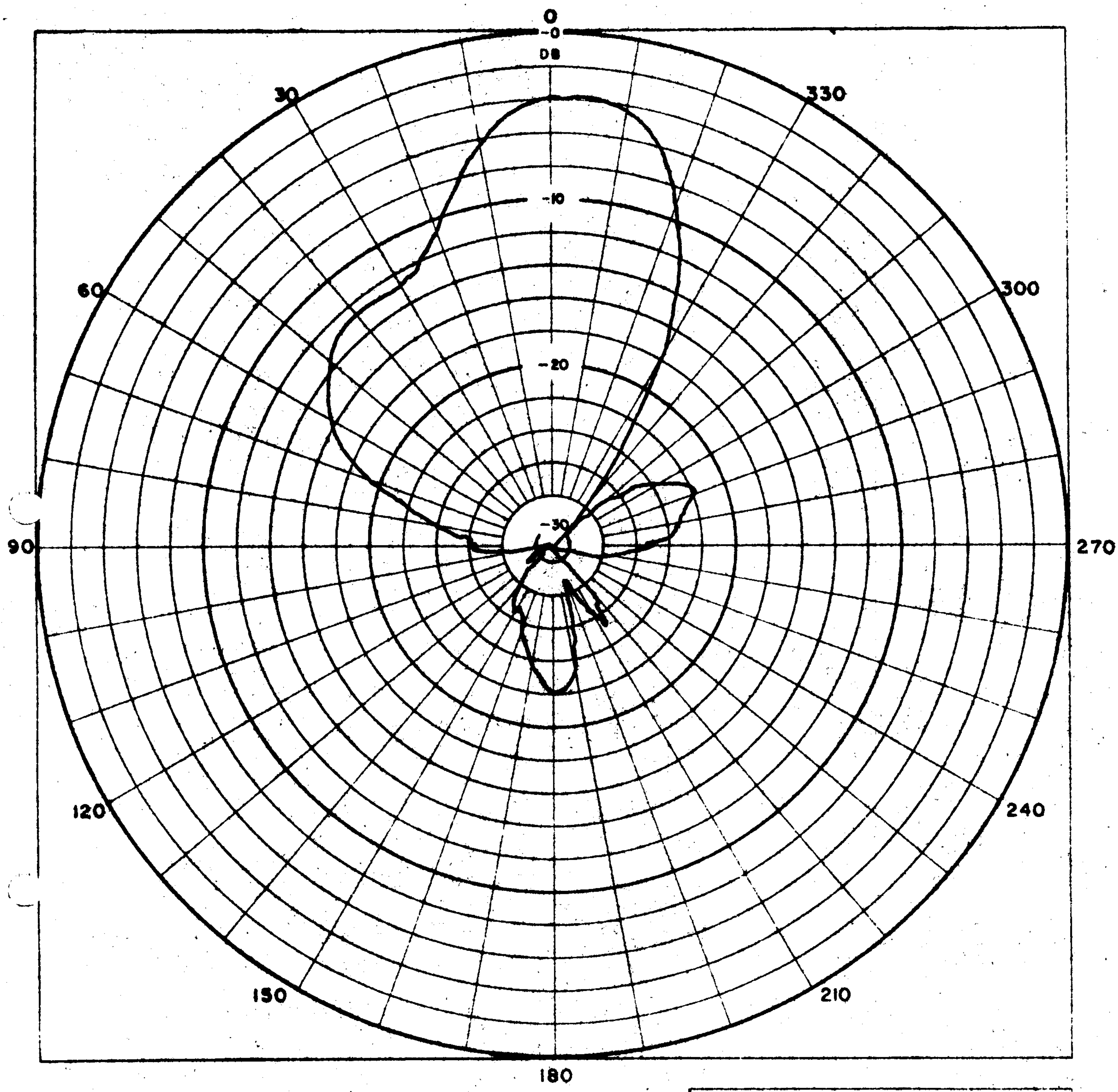
* Indicates region of noise (the testing signal was removed but recording instrument indicated a reading)

RELATIVE GAIN DATA

Frequency	Position No. 1	Position No. 2	Position No. 3
4200	-26.5 *	-23.0	-25.5 *
4400	-22.0 *	-22.0 *	-22.0 *
4600	-22.0 *	-22.0 *	-23.0 *
4800	- 7.0	- 7.5	- 3.5
5000	-28.0 *	-26.0 *	-27.0
5200	-25.5 *	-25.5 *	-25.0 *
5400	-27.0 *	-27.0 *	-27.0 *
5600	-10.0	-14.5	-11.4
5800	-11.3	-17.5	-16.0
6000	-23.0	-16.5	-20.5
6200	- 9.0	-17.5	-19.0
6400	-14.0	-22.5	-22.5
6600	-16.6	-22.0	-25.0 *
6800	-13.6	-14.7	-26.0 *
7000	- 9.5	-14.5	-21.0
7200	-10.6	-15.5	-10.9
7400	-10.2	-15.0	-17.0
7600	-12.2	-19.0	-18.0
7800	-16.0	-18.0	-18.5
8000	-20.0	-18.0	-23.0
8200	-24.0 *	-26.0 *	-26.0 *


RELATIVE GAIN CURVES WITH AMPLIFIER
MARCH 11, 1959
POSITION #1 - FIG #1
POSITION #2 - FIG #2
POSITION #3 - FIG #3
RELATIVE GAIN db
5
0
-5
-10
-15
-20
-25
-30
4200
4700
5200
5700
6200
6700
7200
7700
8200
8700
LJH

25X1



25X1

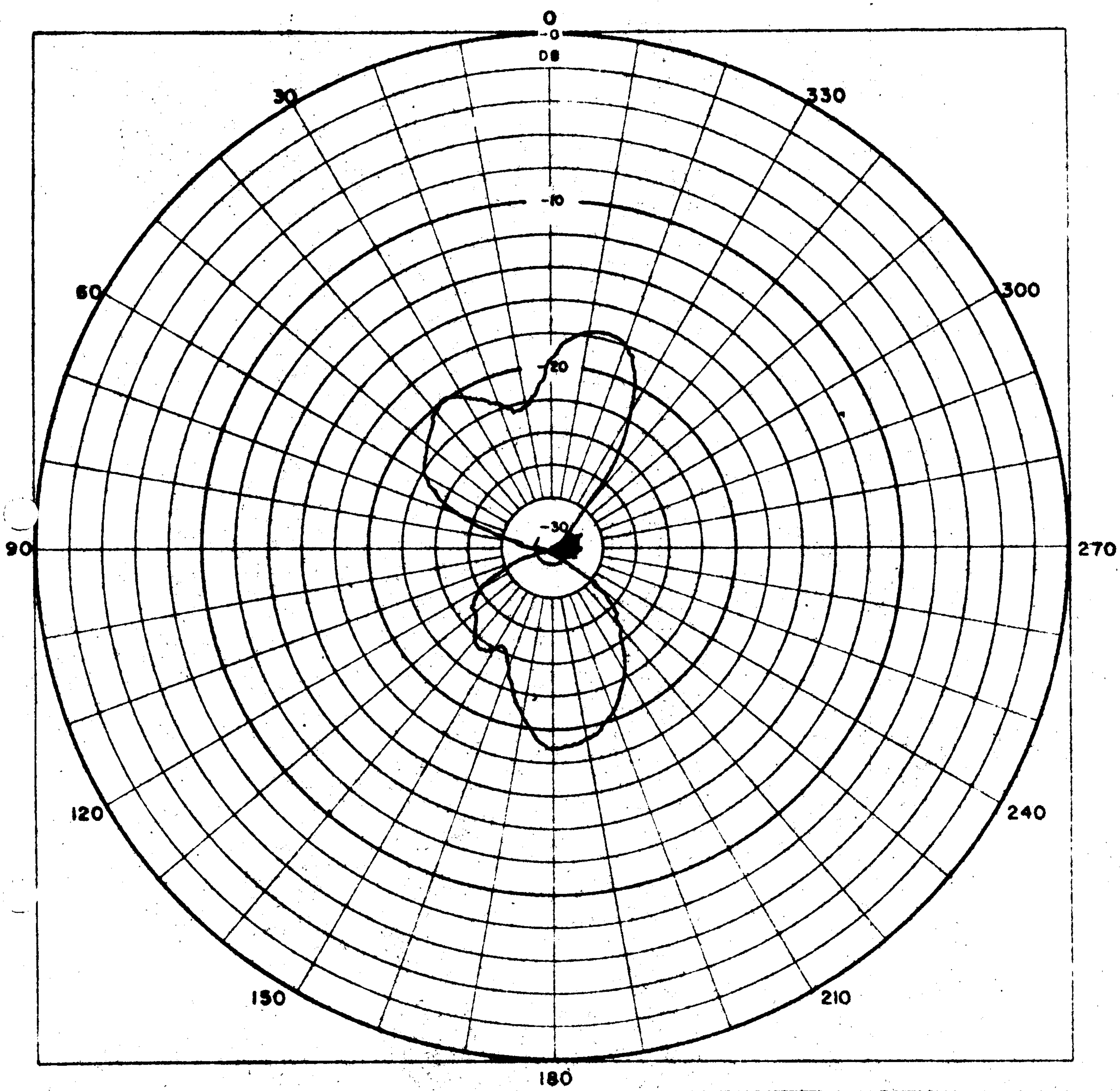
NO. 1 DATE MAR. 4, 1959

Eθ ✓ Eφ

θ = 90° φ = VAR

FREQUENCY 2400 MC

25X1



NC. 25X1

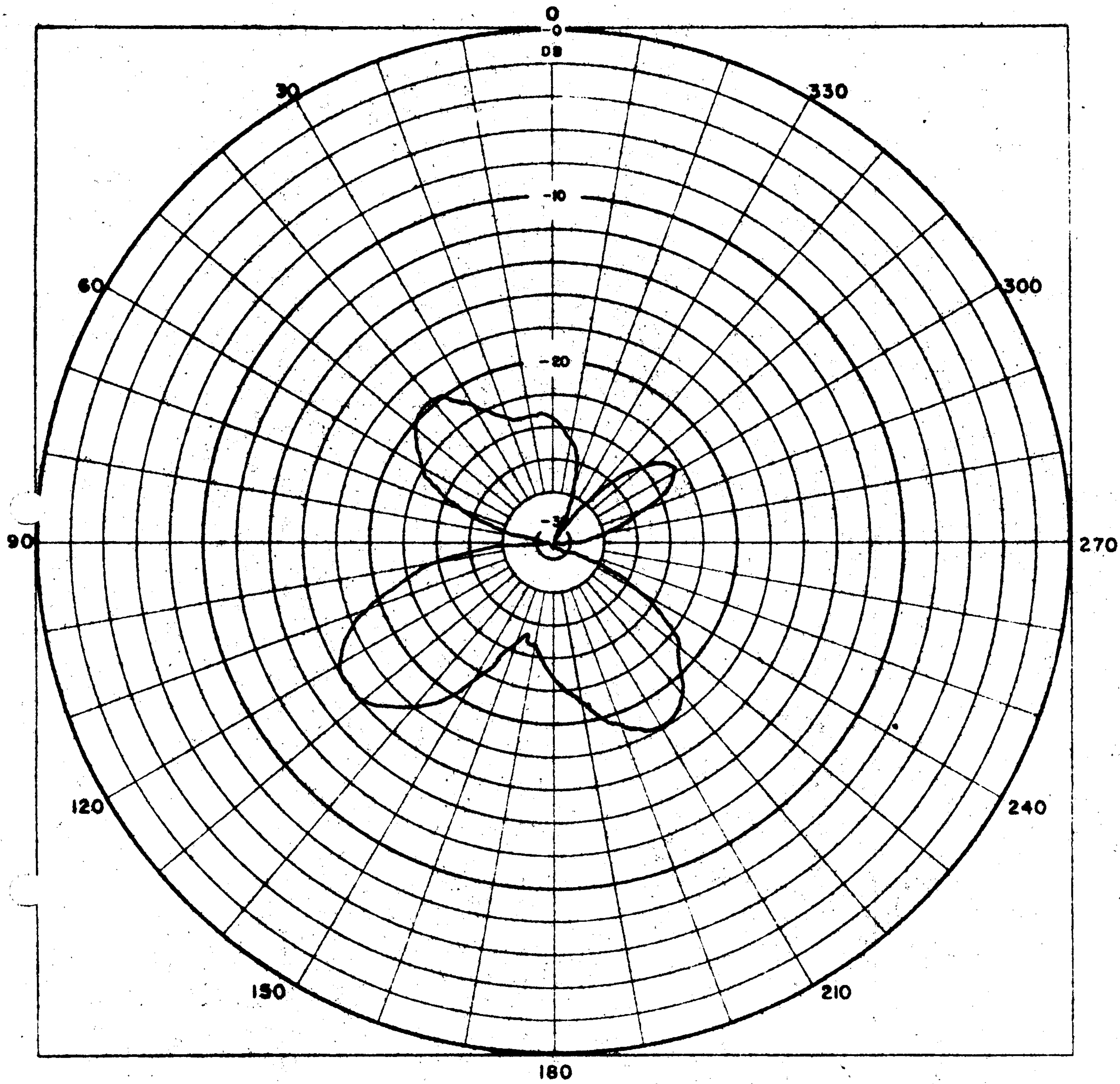
NO. 2 DATE MAR. 4, 1959

E θ ✓ E φ

θ = 45° φ = VAR.

FREQUENCY 2400 MC

25X1



25X1

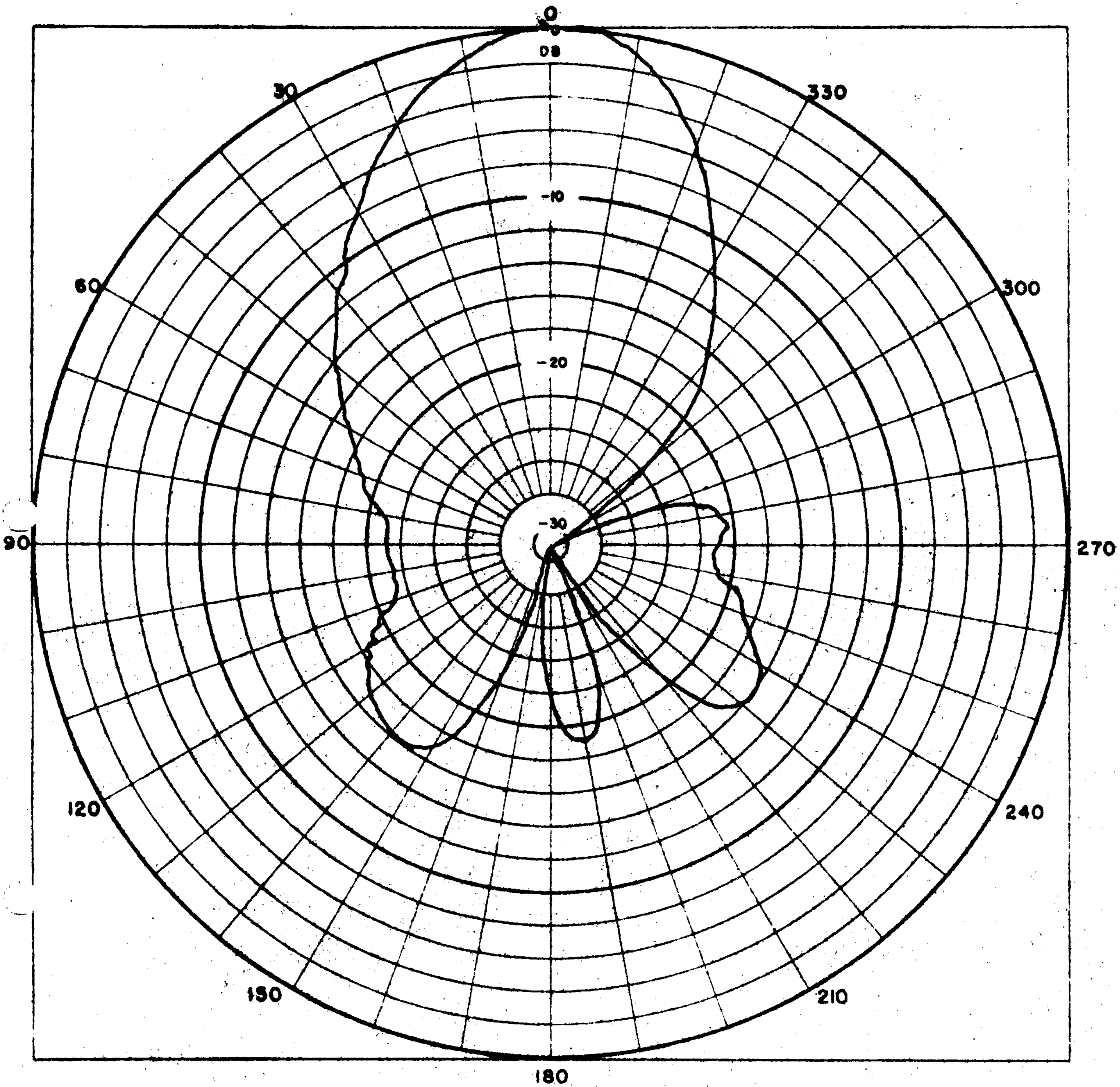
NO. 3 DATE MAR. 4, 1959

E θ ✓ E φ

θ = 0° φ = VAR.

FREQUENCY 2400 MC

25X1



25X1

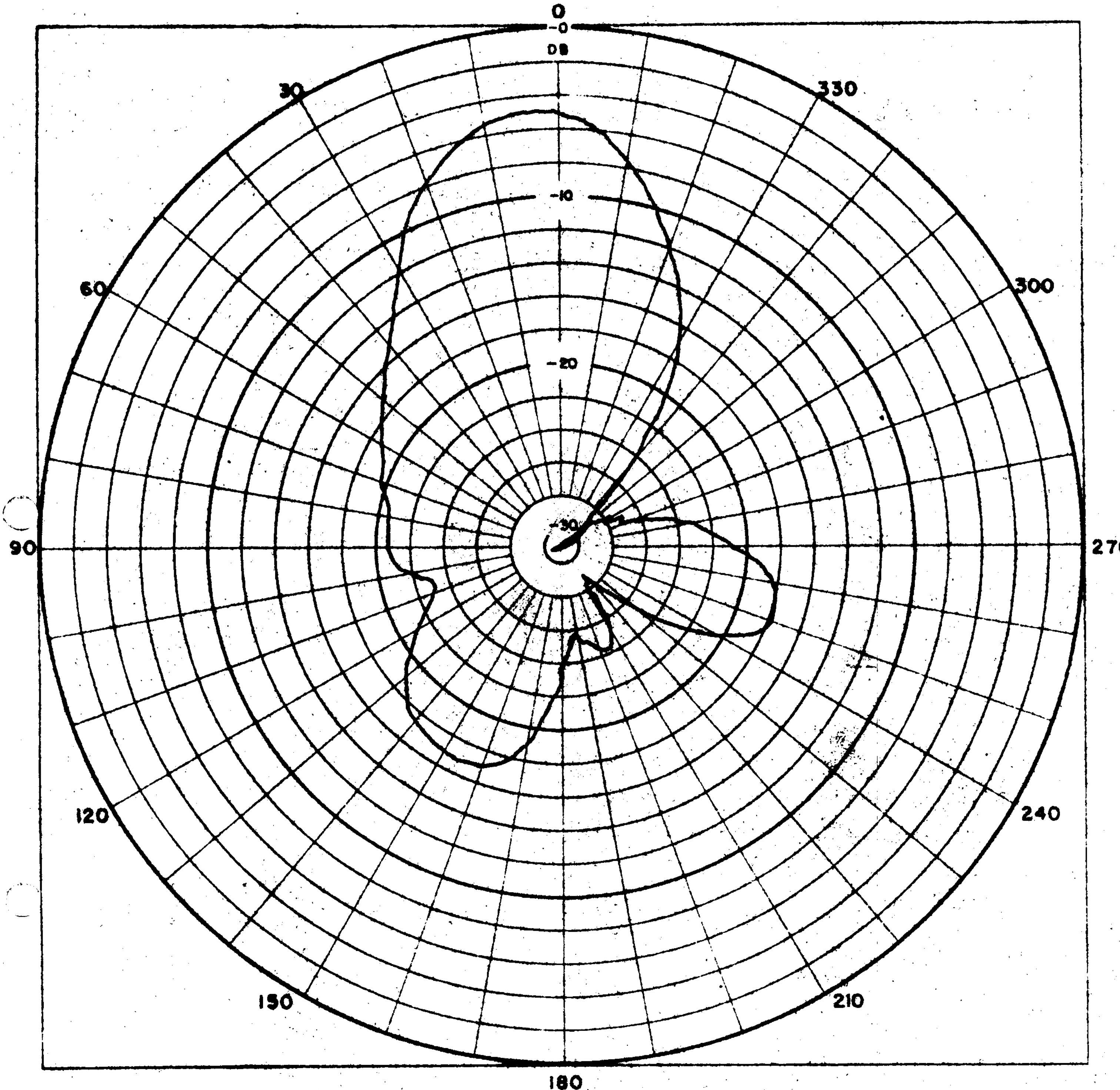
NO. 4 DATE MAR. 4, 1959

E θ ✓ E φ

θ = VAR. φ = 0°

FREQUENCY 2400 MC

25X1



25X1

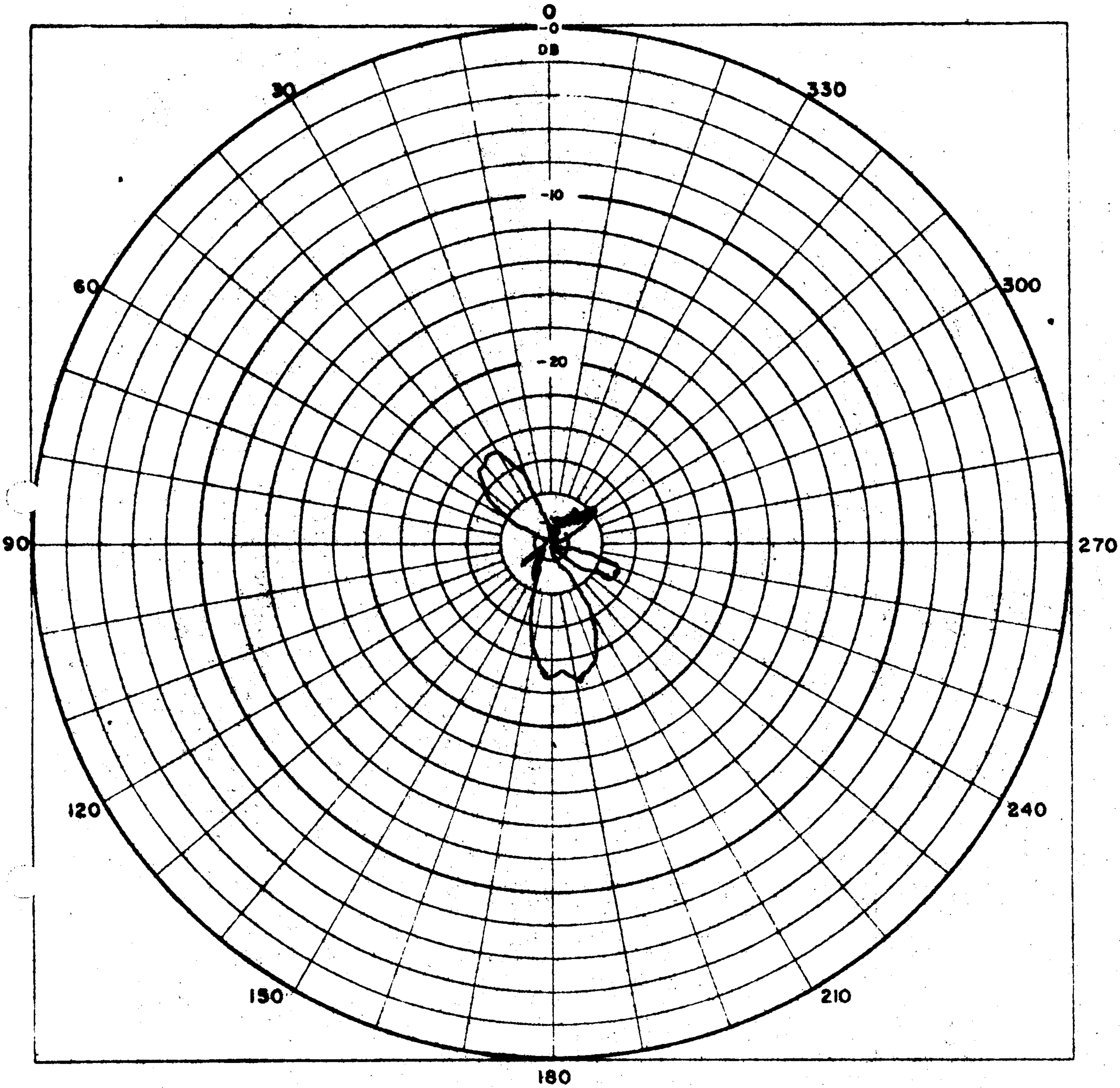
NO. 5 DATE MAR. 4, 1959

E θ ✓ E φ

θ = VAR φ = 45°

FREQUENCY 2400 MC

25X1



[redacted] 25X1

NO. 6 DATE MAR. 4, 1959

E θ ✓ E φ

θ = VAR. φ = 90°

FREQUENCY 2400 MC

[redacted] 25X1

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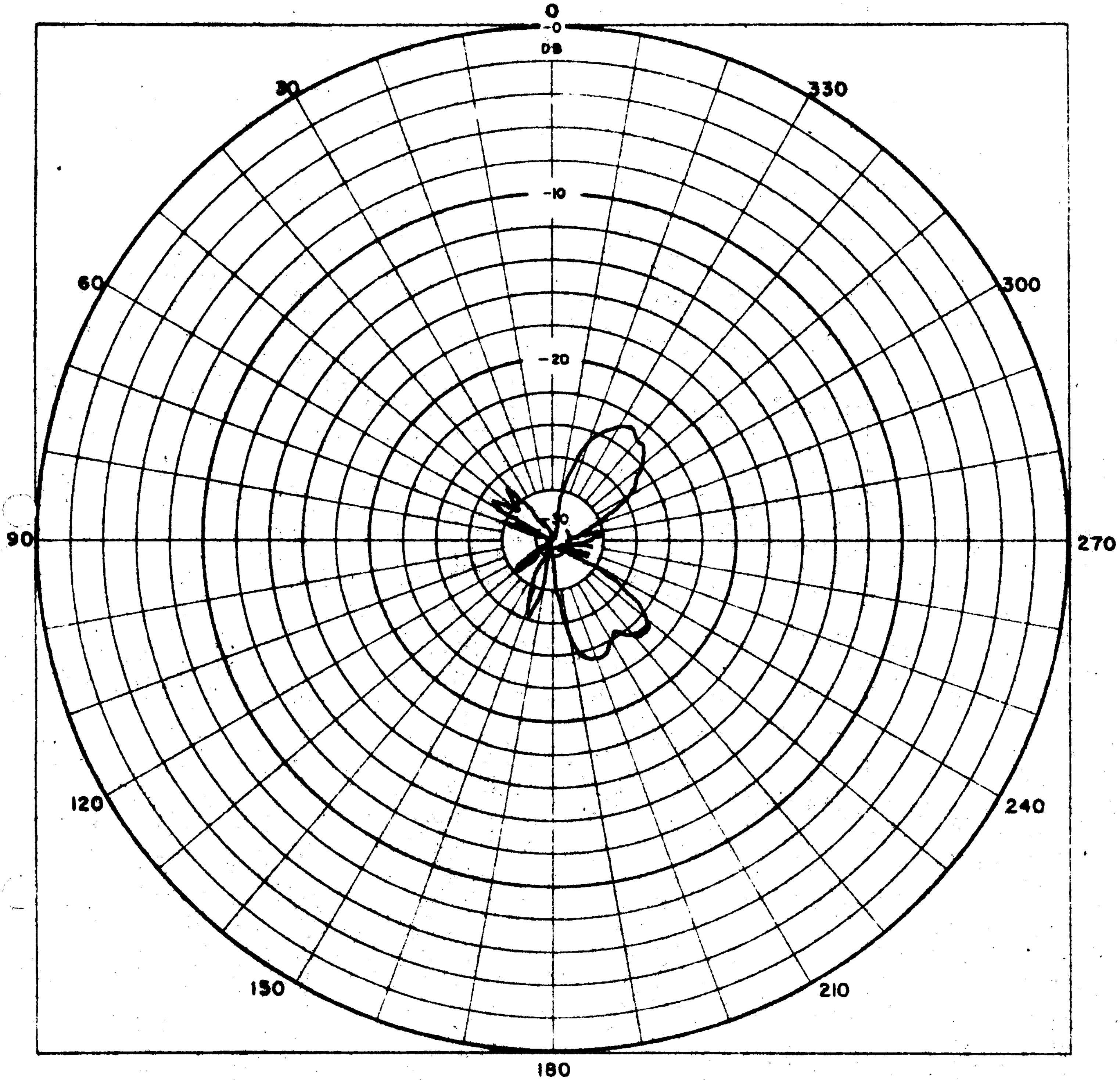


25X1

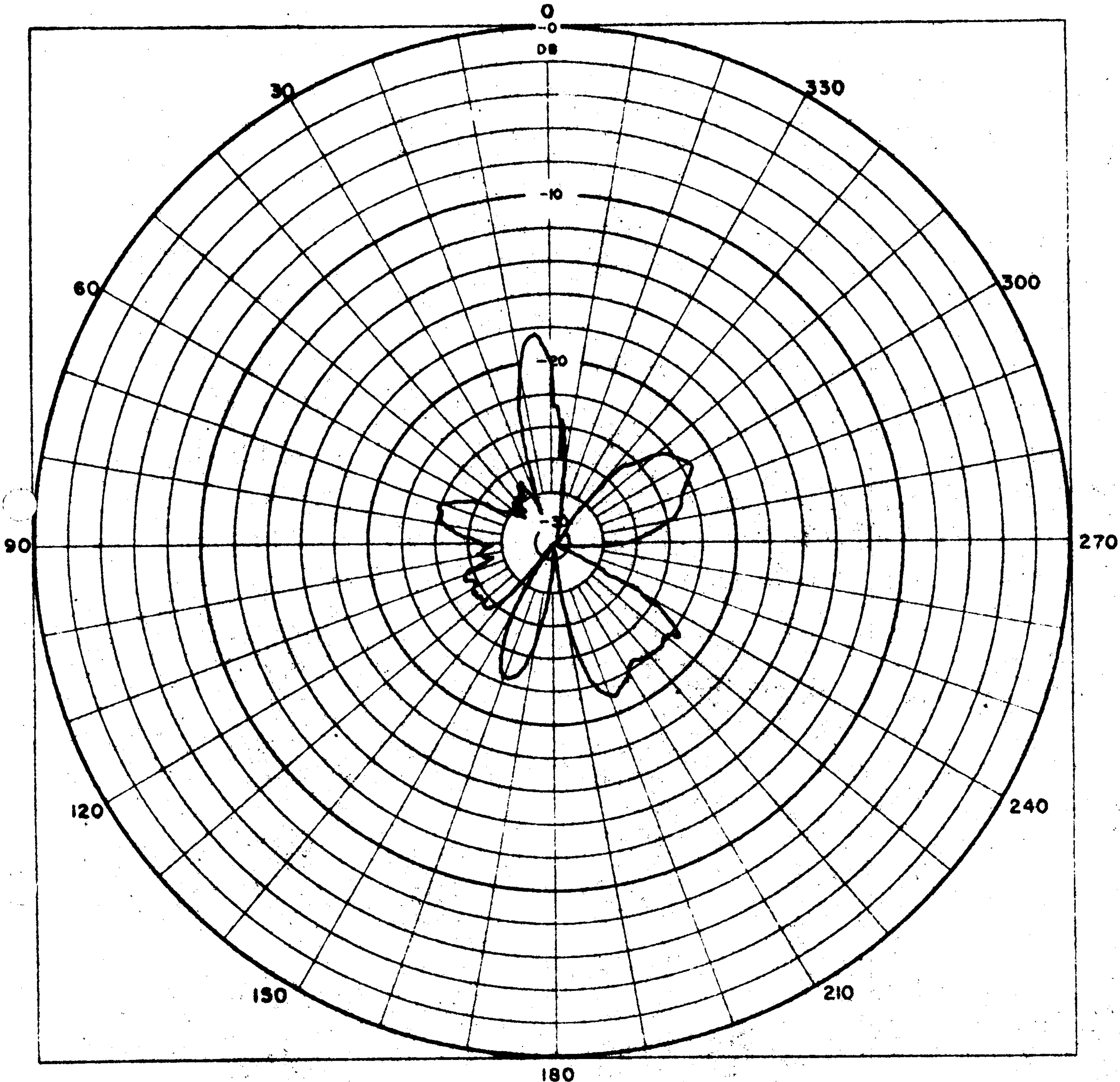
NO. 7 DATE MAR. 3, 1959

E θ ✓ E ϕ

$\theta = 90°$ ϕ = VAR.

FREQUENCY 5200 MC

25X1



25X1

NO. 8 DATE MAR. 3, 1959

E θ ✓ E φ

θ = 45° φ = VAR.

FREQUENCY 5200 MC

25X1

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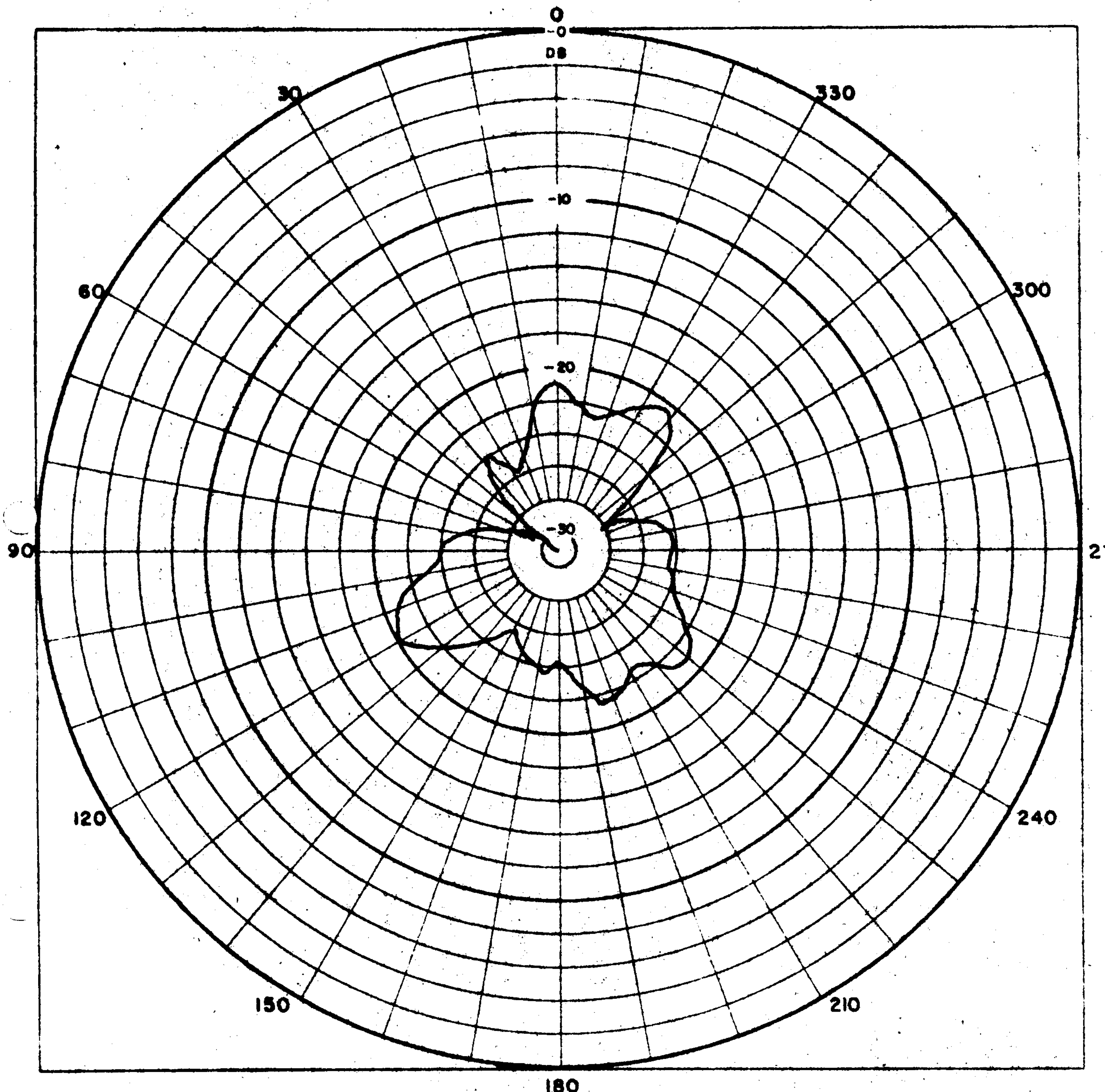


25X1

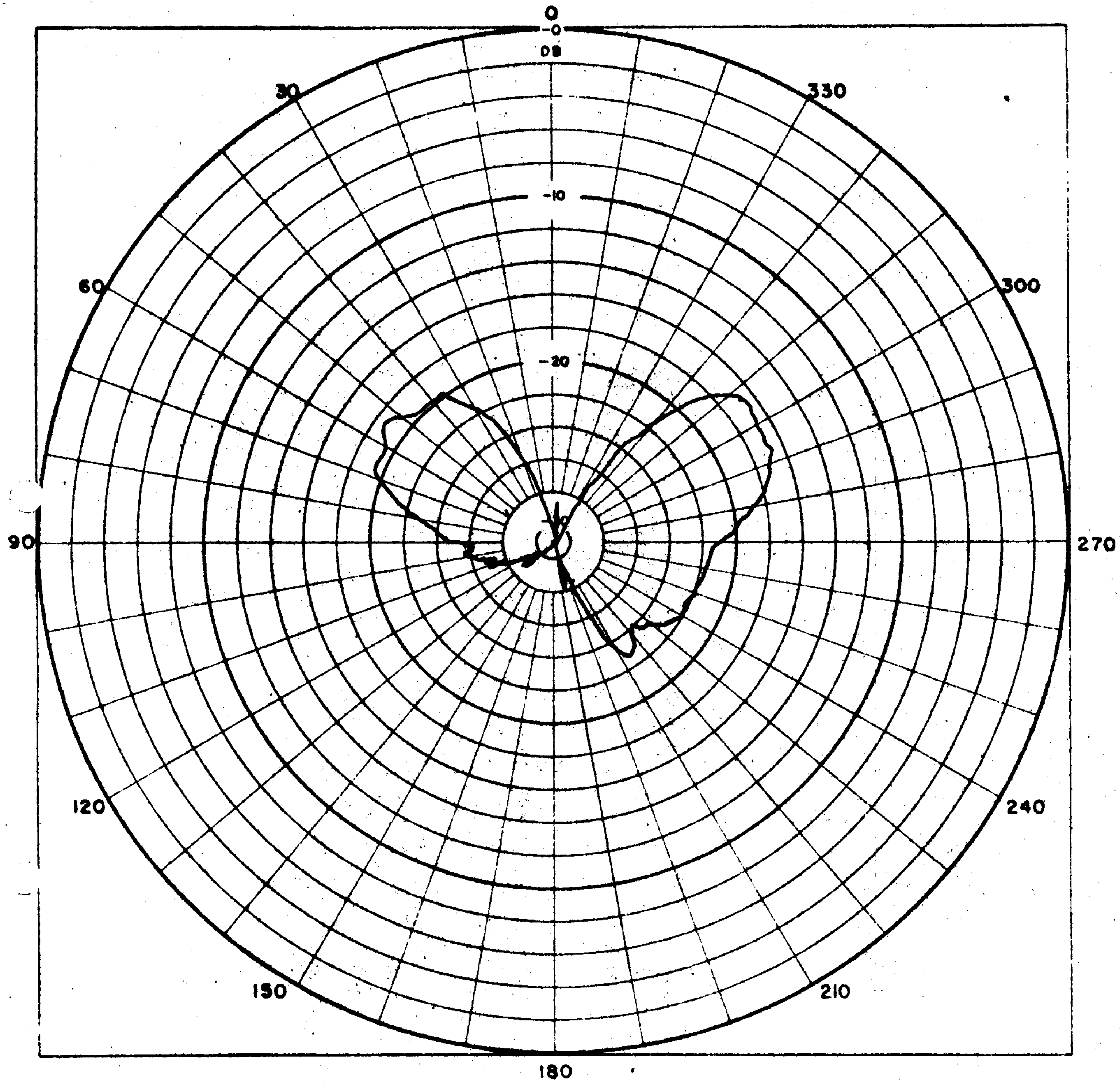
NO. 9 DATE MAR. 3, 1959

E θ ✓ E ϕ

θ = 0° ϕ = VAR.

FREQUENCY 5200 MC.

25X1



25X1

NO. 10 DATE MAR. 3, 1959

E θ ✓ E φ

θ = VAR φ = 0°

FREQUENCY 5200 MC

25X1

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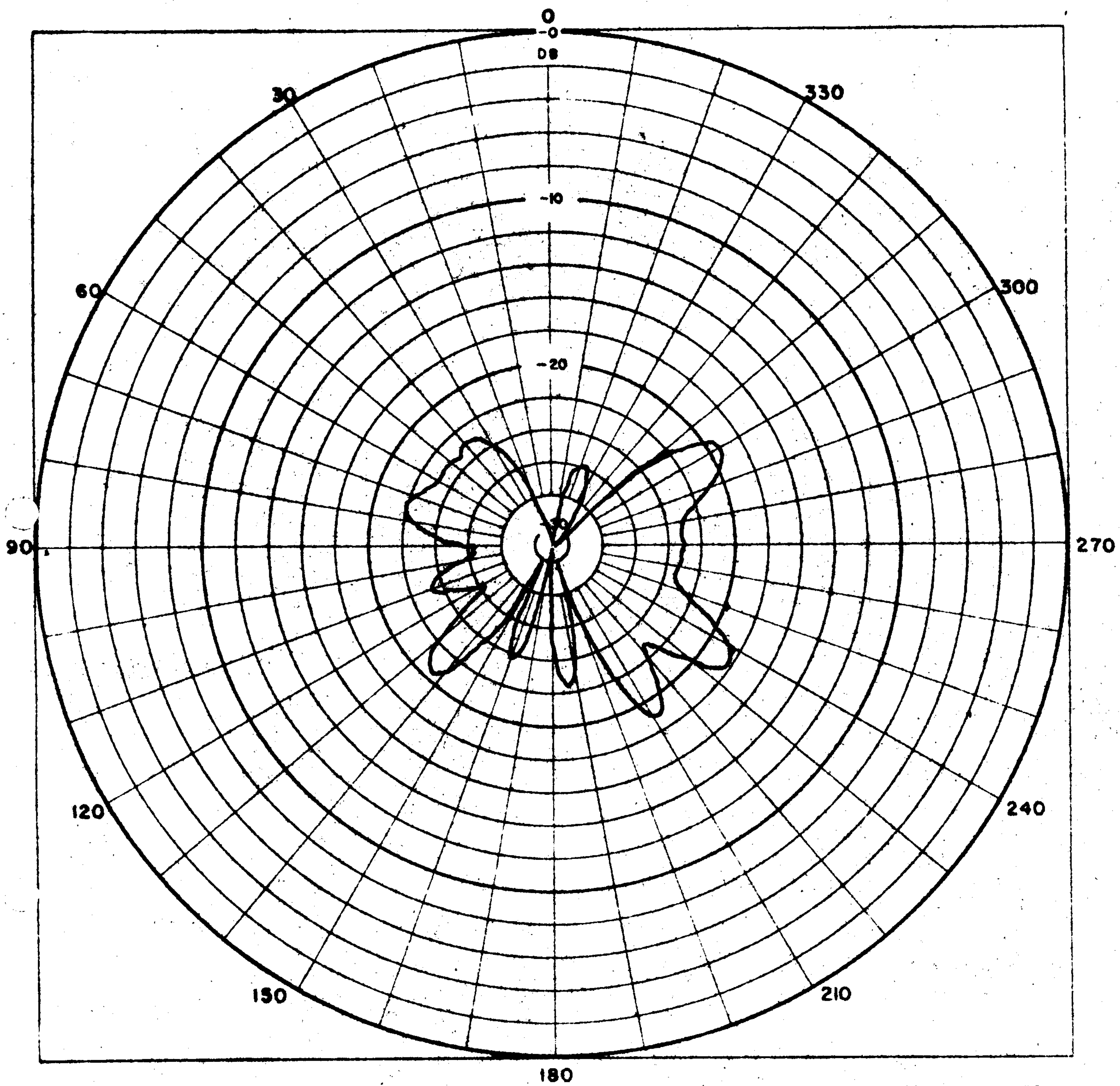


25X1

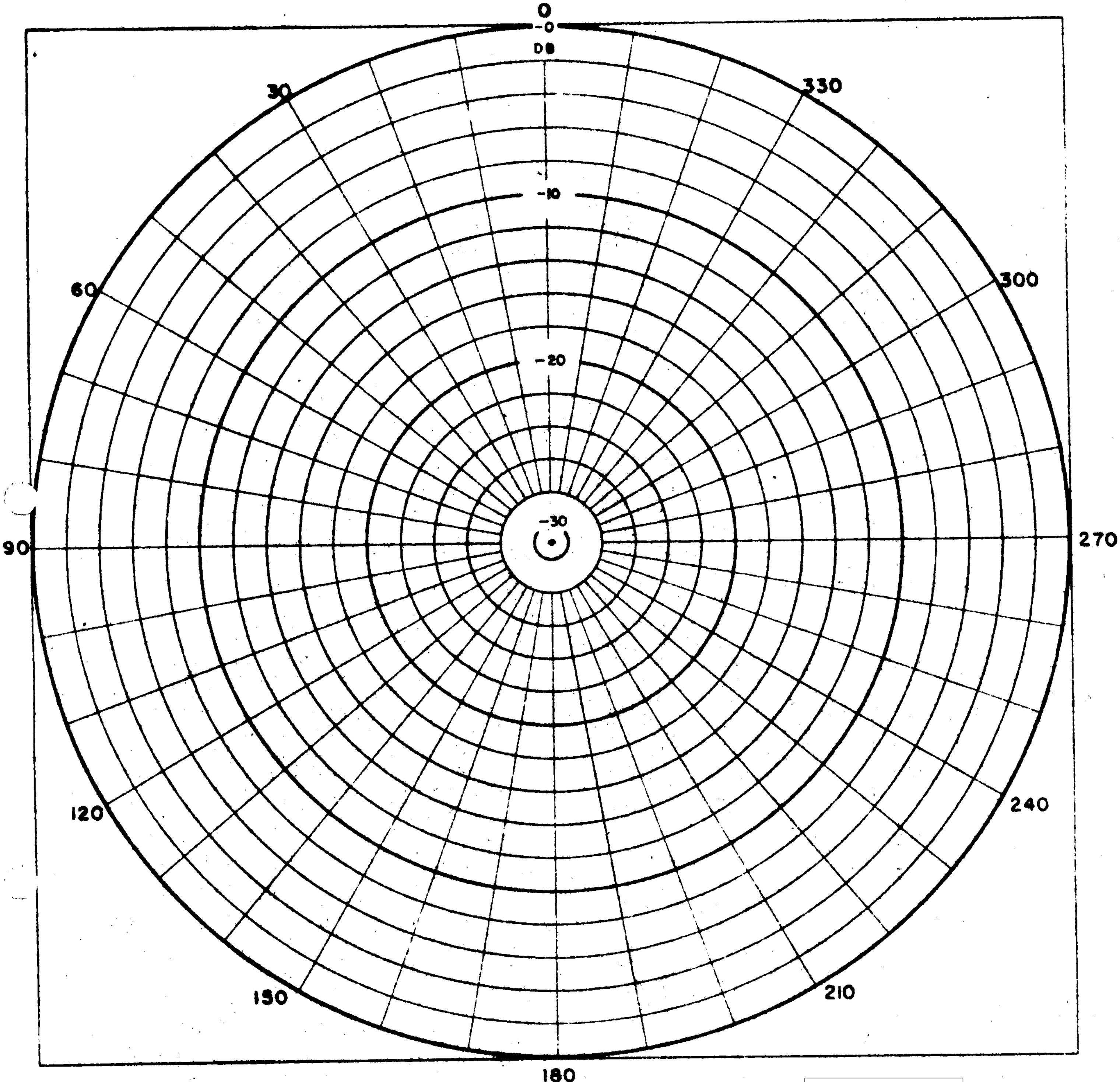
NO. *11* DATE *MAR. 3, 1959*

E θ ✓ E φ

θ = *VAR* φ = *45°*

FREQUENCY *5200 MC*

25X1



25X1

NO. 12 DATE MAR. 3, 1959

E θ ✓ E φ

θ = VAR φ = 90°

FREQUENCY 5200 MC

25X1

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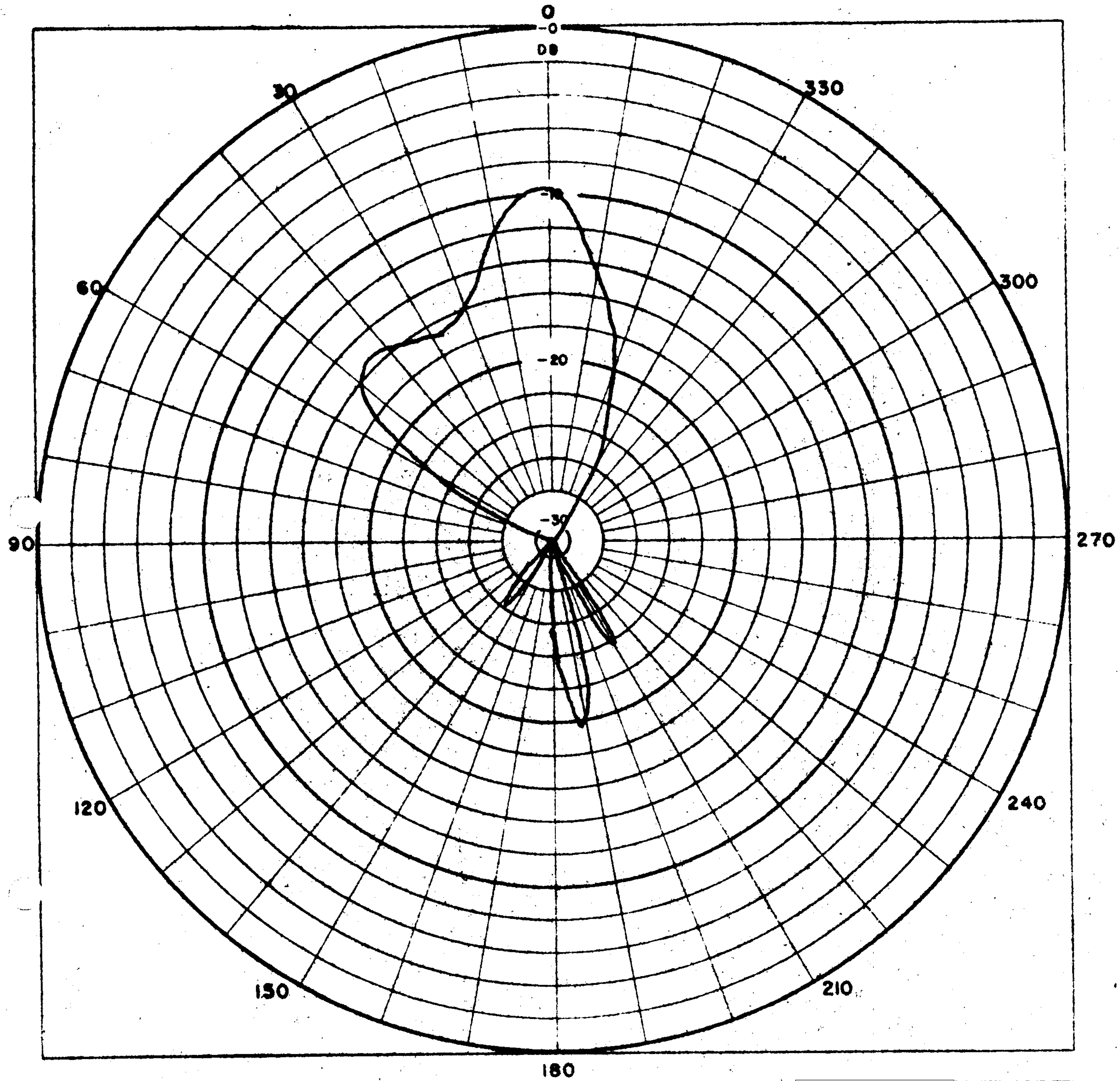

25X1

NO. 13 DATE MAR. 2, 1959

E θ ✓ E φ

θ = 90° φ = VAR

FREQUENCY 7400 MC

25X1

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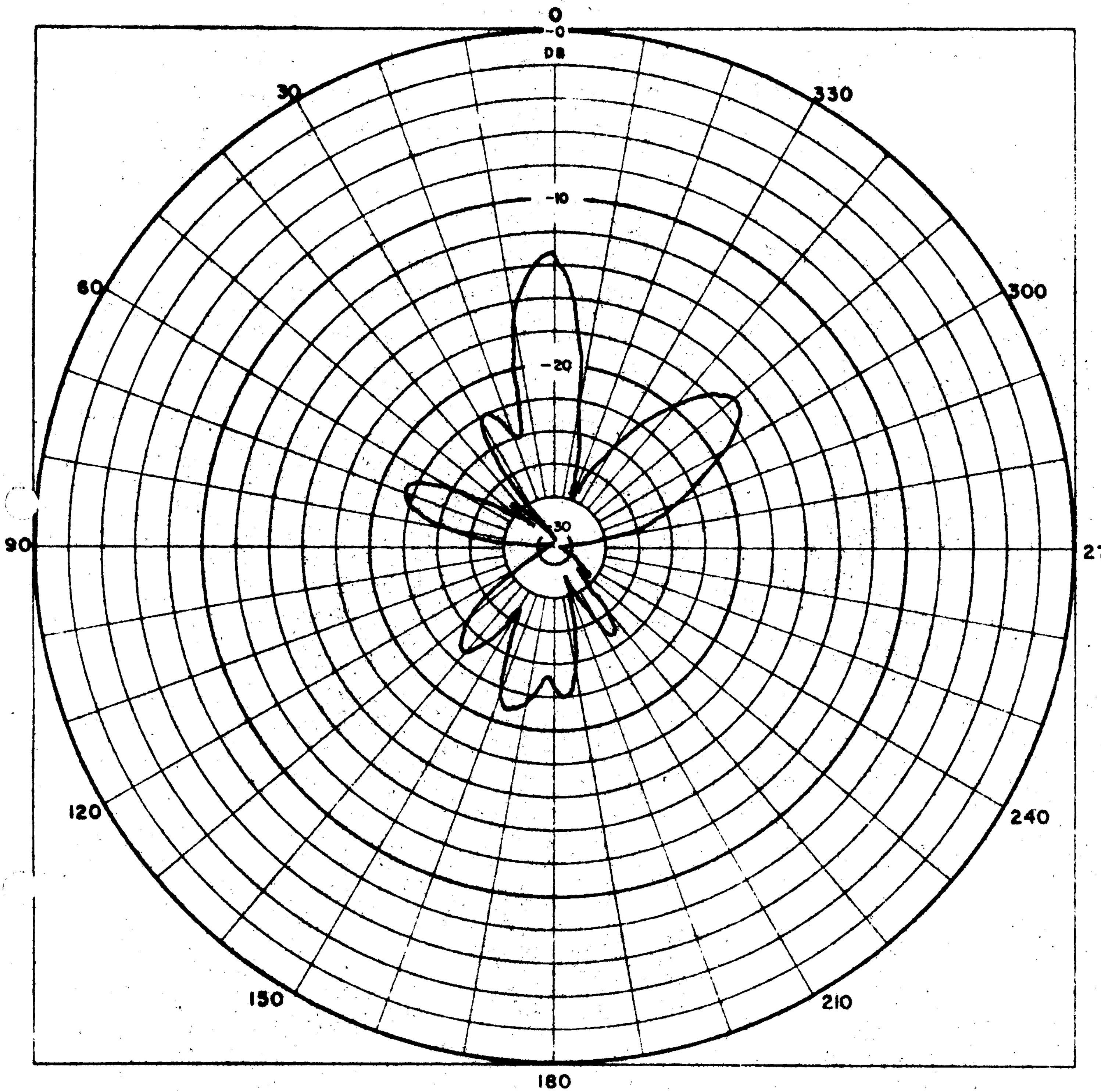


25X1

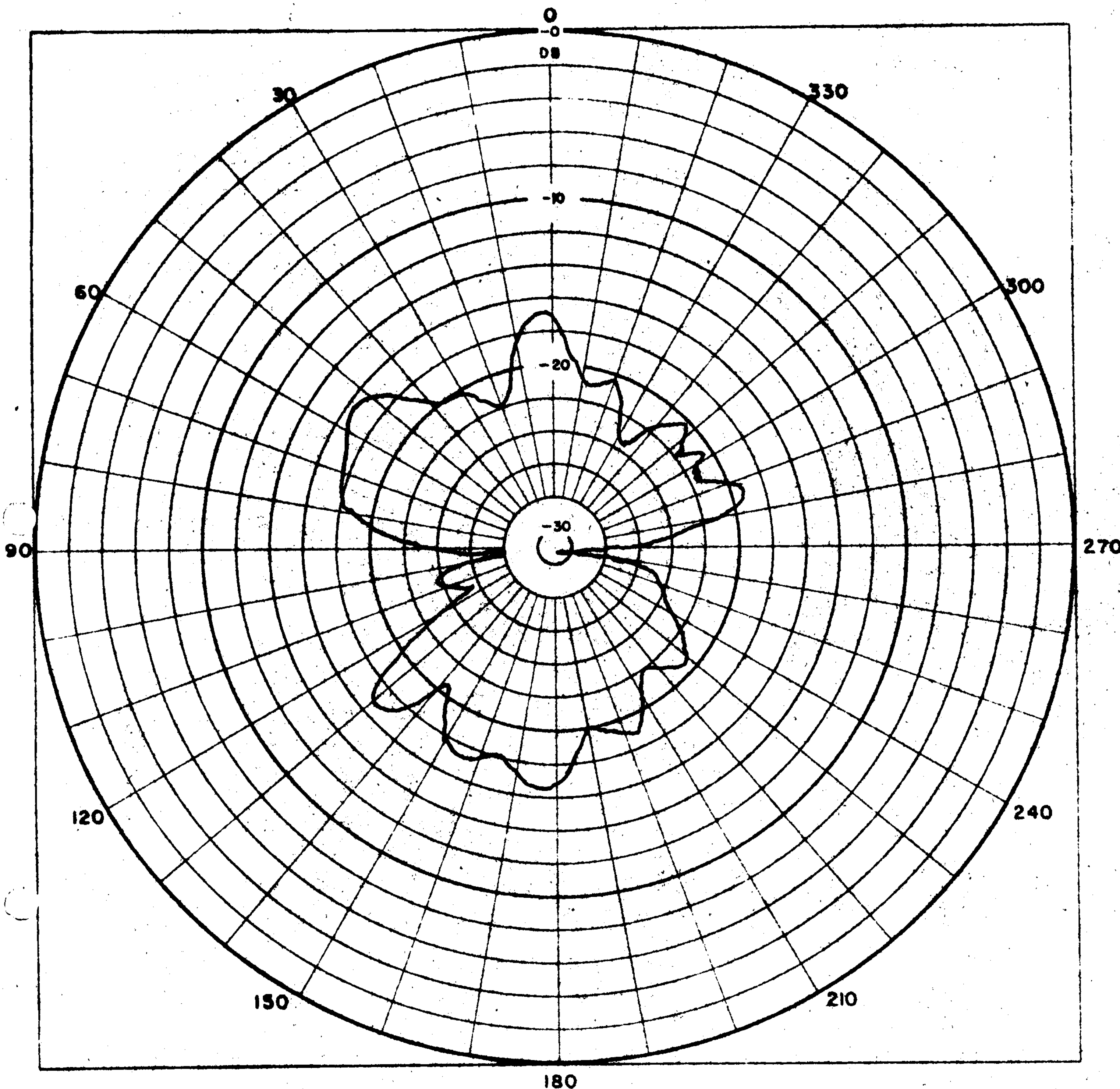
NO. 14 DATE MAR. 2, 1959

E θ ✓ E ϕ

θ = 45° ϕ = VAR

FREQUENCY 7400 MC

25X1



25X1

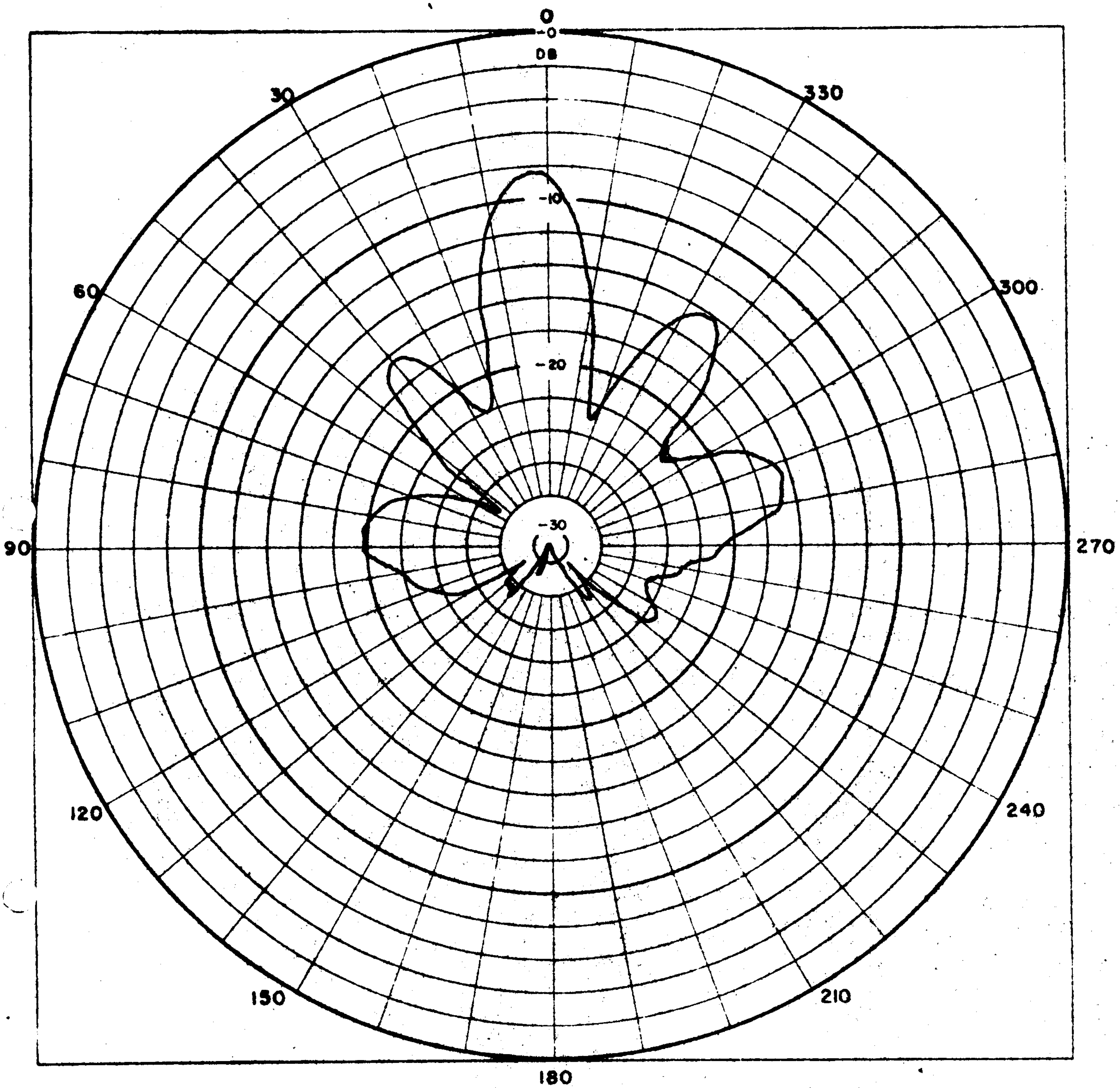
NO. 15 DATE MAR. 2, 1959

E θ ✓ E φ

θ = 0° φ = VAR

FREQUENCY 7400 MC

25X1



[redacted] 25X1

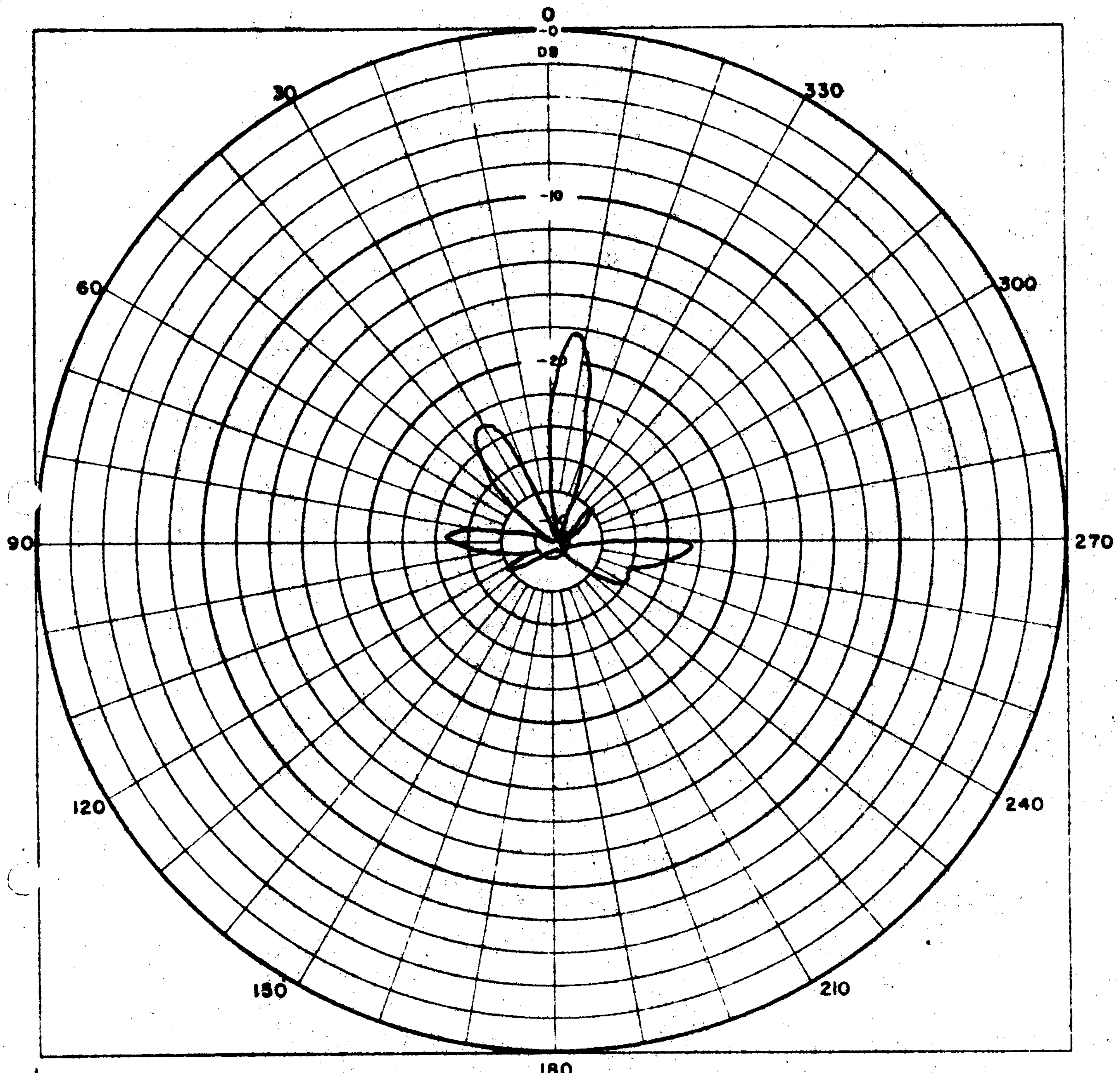
NO. 16 DATE MAR. 2,1959

E θ ✓ E ϕ

θ = VAR ϕ = 0°

FREQUENCY 7400 MC

[redacted] 25X1



25X1

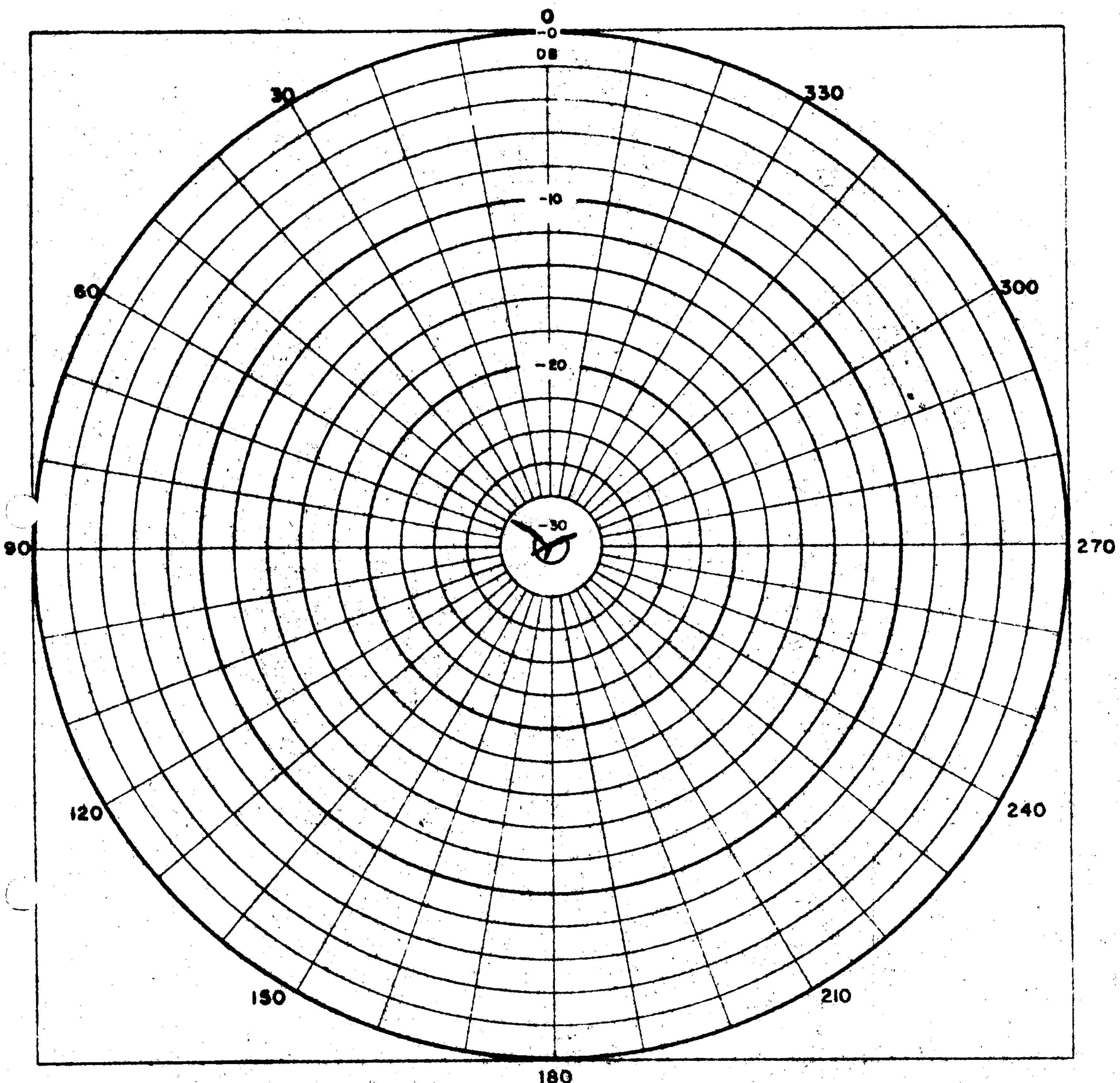
NO. 17 DATE MAR. 2, 1969

E θ ✓ E ϕ

θ = VAR. ϕ = 45°

FREQUENCY 7400 MC

25X1



25X1

NO. *18* DATE *MAR. 2, 1959*

E θ ✓ E φ

θ = *VAR.* φ = *90°*

FREQUENCY *7400 MC*

25X1

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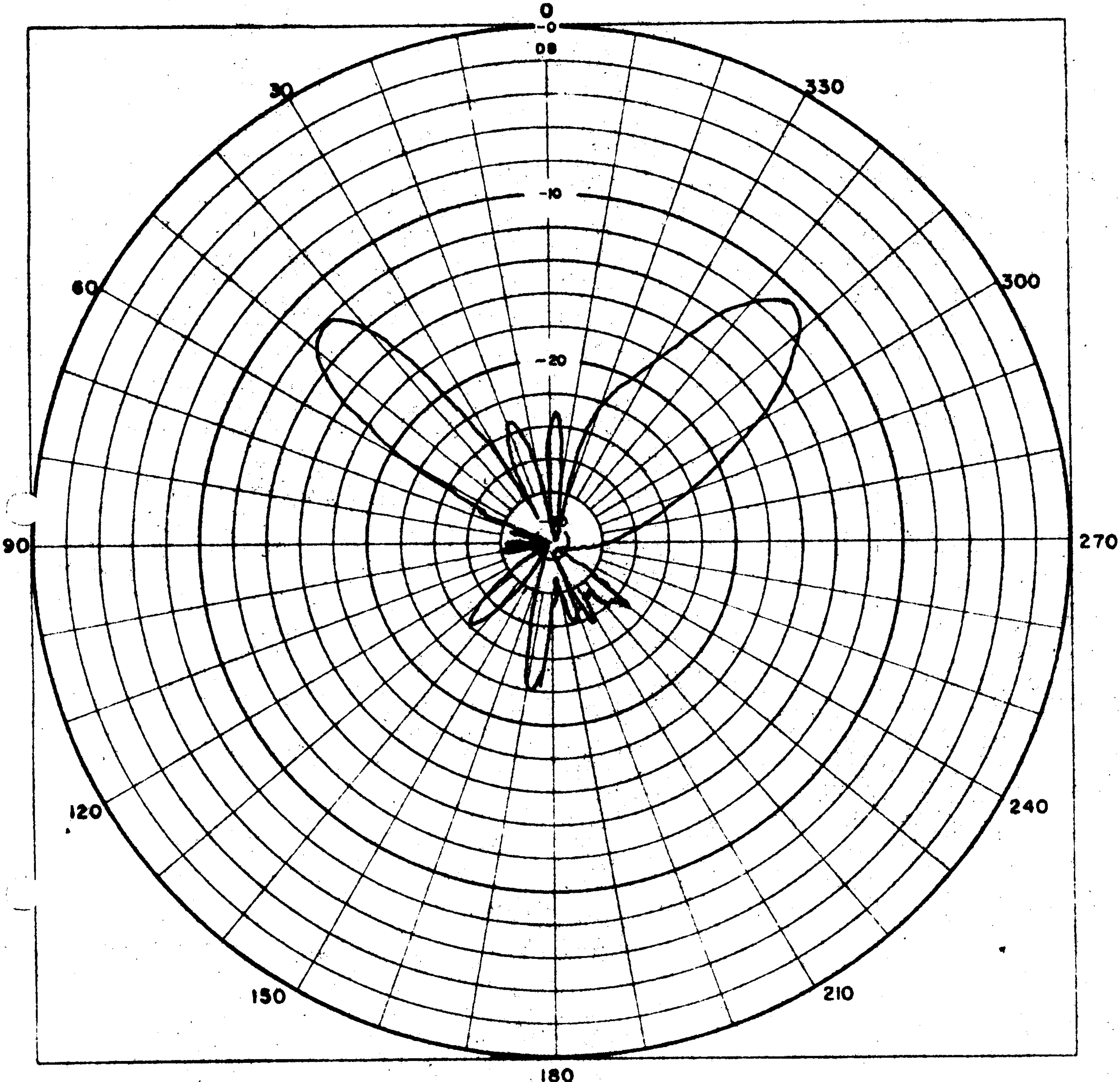

[redacted] 25X1

NO. 19 DATE MAR. 3, 1959

E θ ✓ E φ

θ = 90° φ = VAR

FREQUENCY 9600 MC

[redacted] 25X1

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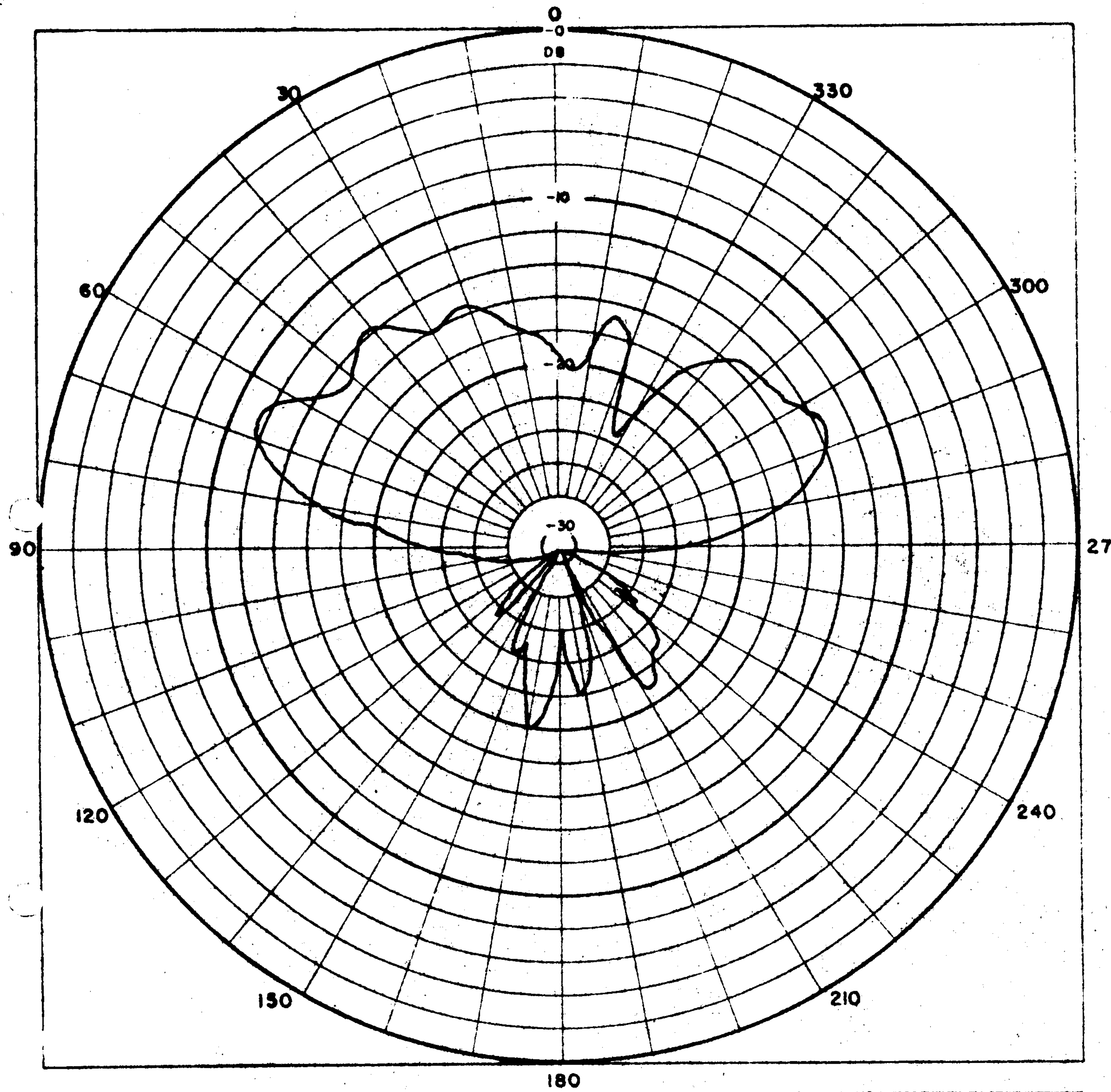

25X1

NO. 20 DATE MAR. 3, 1959

E θ ✓ E ϕ

θ = 45° ϕ = VAR.

FREQUENCY 9600 Mc.

25X1

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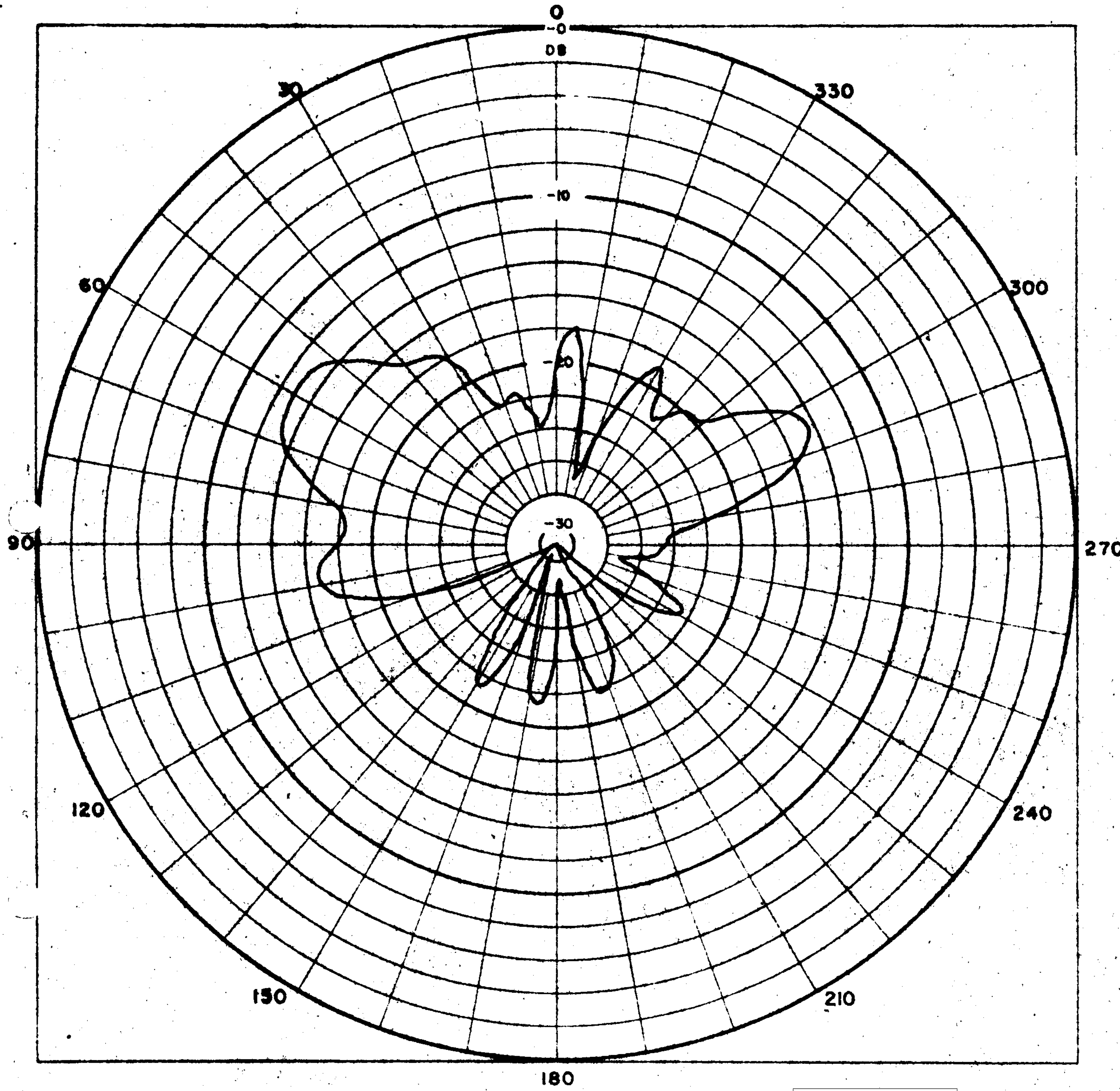


25X1

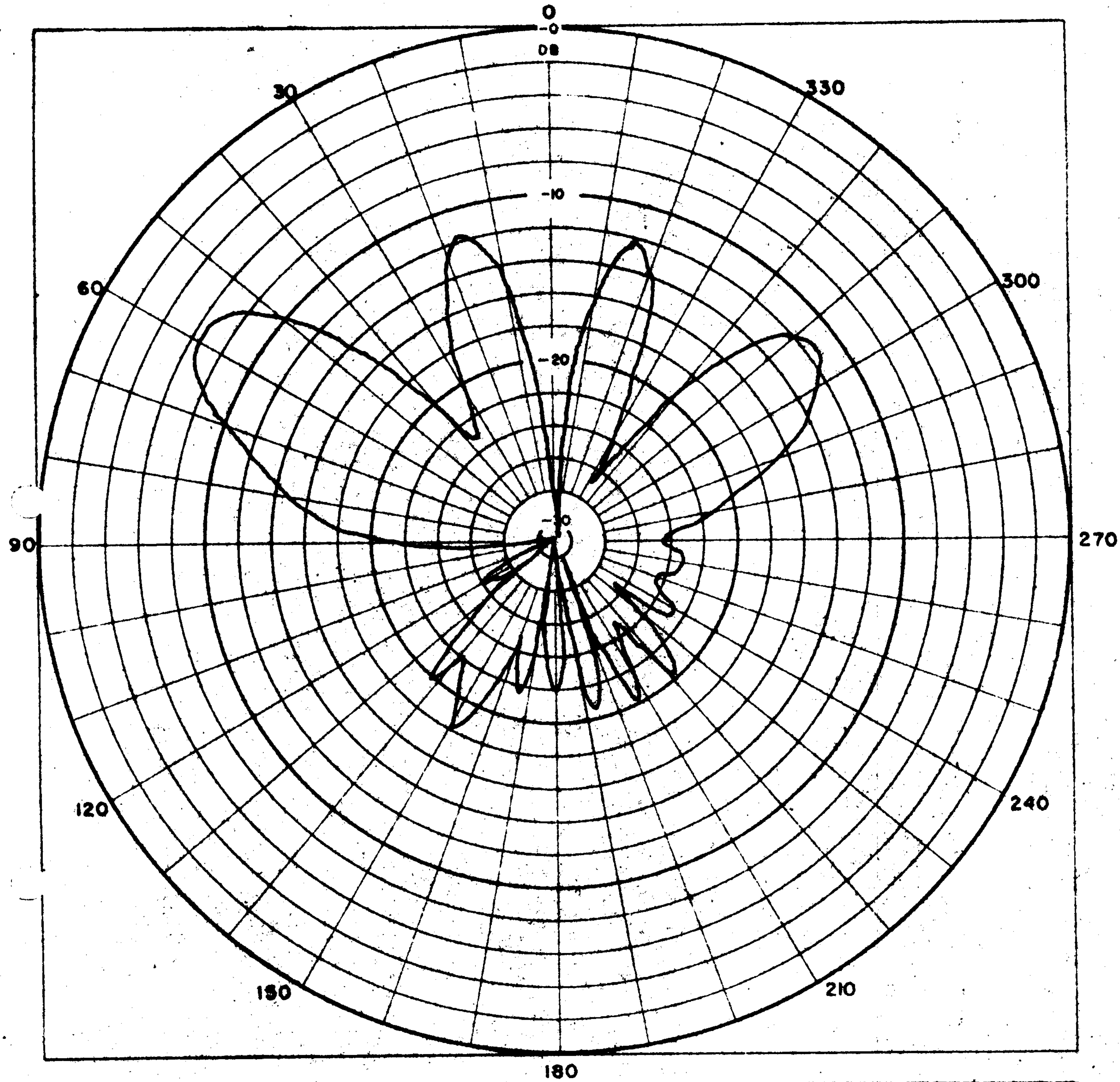
NO. 21 DATE MAR. 3, 1959

E θ ✓ E φ

θ = 0° φ = VAR

FREQUENCY 9600 MC

25X1



25X1

NO. 22 DATE MAR. 3, 1959

E θ ✓ E φ

θ = VAR φ = 0°

FREQUENCY 9600 MC

25X1

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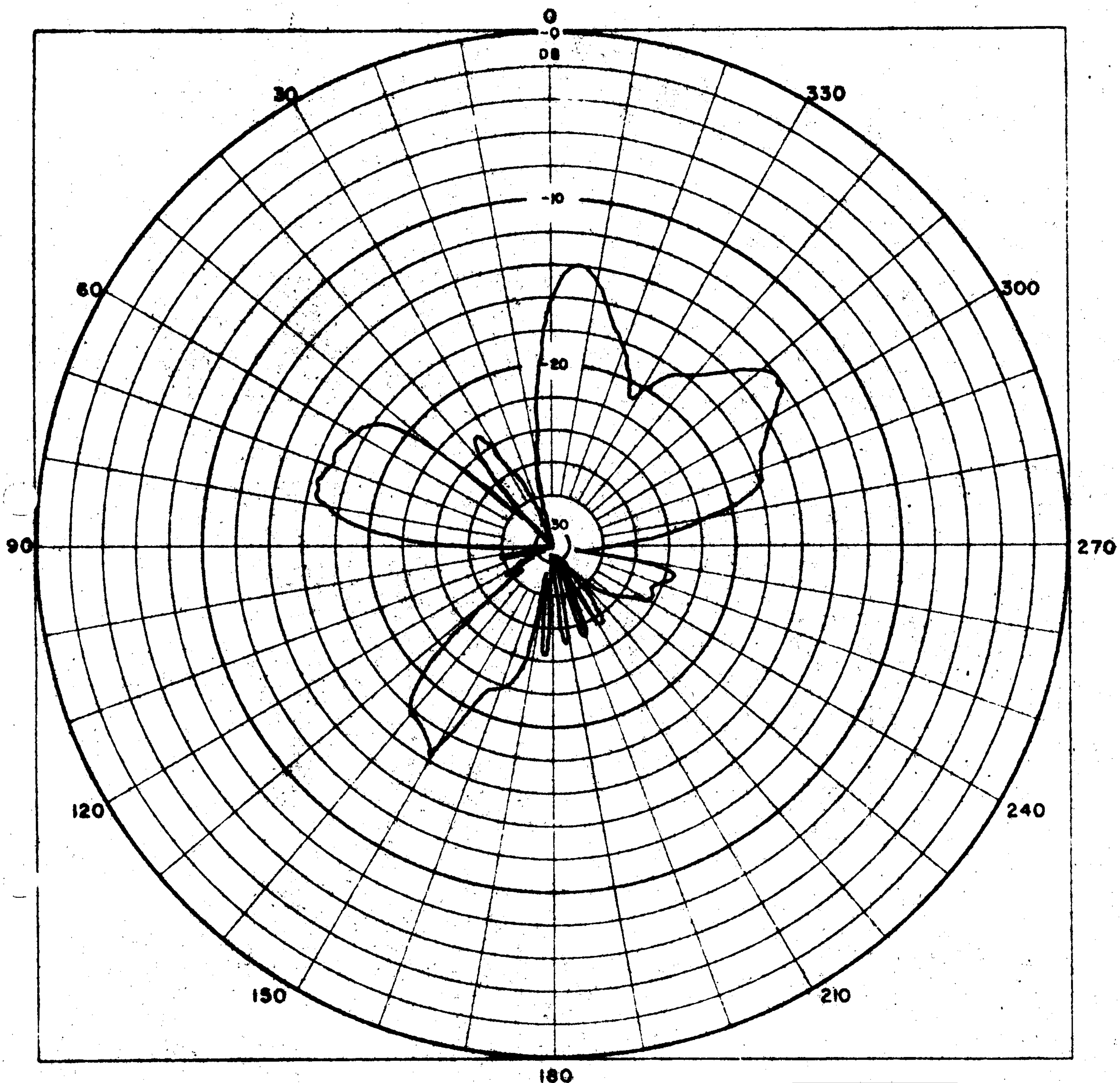

25X1

NO. 23 DATE MAR. 3, 1963

E θ ✓ E φ

θ = VAR φ = 45°

FREQUENCY 9600 MC

25X1

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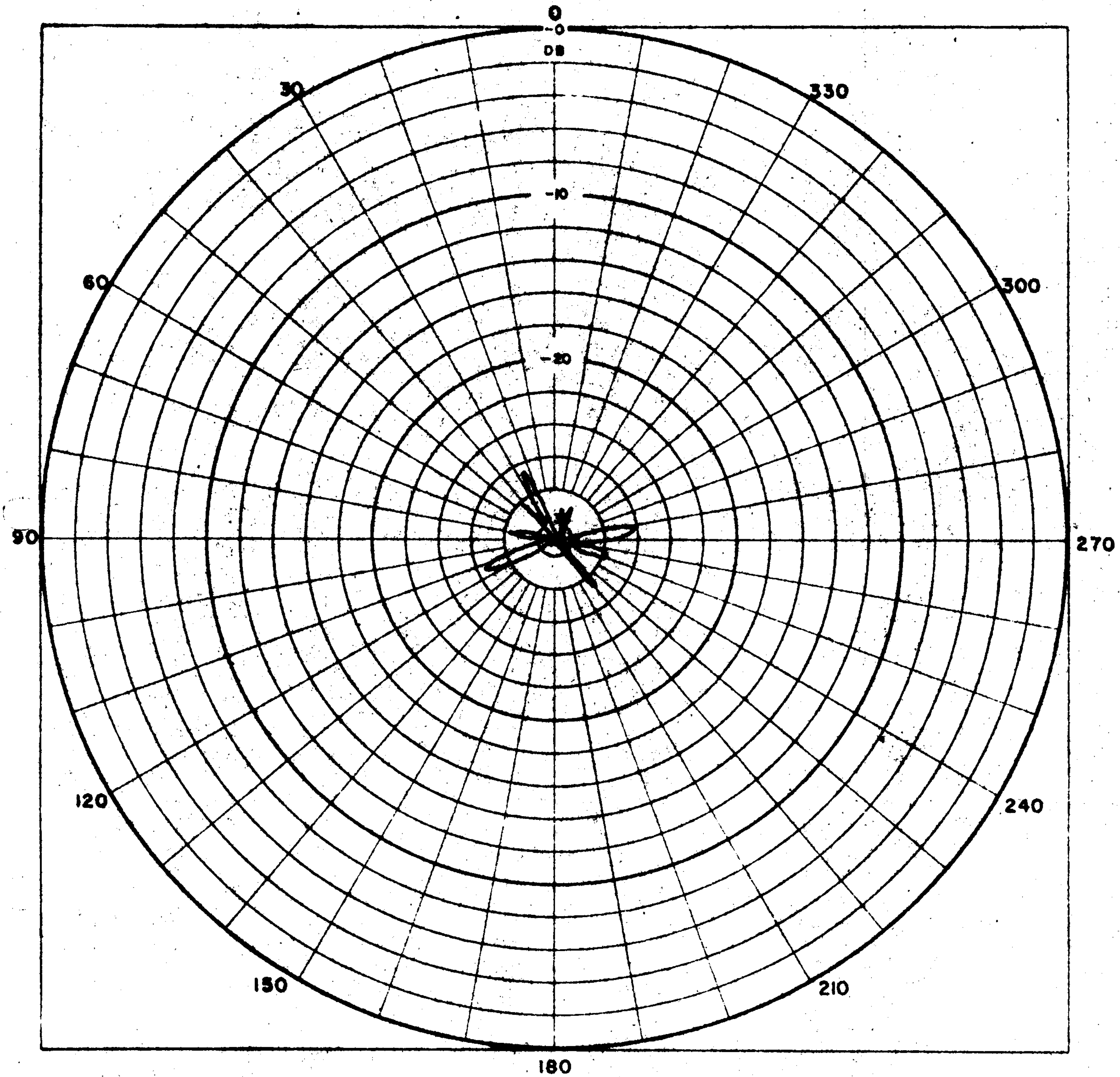

25X1

NO. 24 DATE MAR. 3,1959

E θ ✓ E φ

θ = VAR φ = 90°

FREQUENCY 9600 MC

25X1

 25X1

CONFIDENTIAL SECRET

[redacted]

9 March 1959

accepted 20 mar

W.O.-4

[redacted] 25X1

Attention: [redacted] 25X1

Subject: (Proposal for Receiving Antenna)

Enclosure: (1) One (1) copy [redacted] Terms and Conditions 25X1
(2) Three (3) copies detailed cost breakdown
(3) One (1) copy [redacted] Technical Proposal 25X1

Gentlemen:

In compliance with a recent request of the addressee's representative, there is forwarded herewith [redacted] technical and cost plus fixed fee proposal in the amount of $24,397.03, including fixed fee. A detailed cost breakdown of this amount is furnished as enclosure (2). It is estimated that the antennas can be delivered within fifty-five (55) days following receipt of a fully executed contract as well as authorization for 500 hours of overtime premium pay for the labor categories indicated on enclosure (2). 25X1

It is understood that your requirements are for a group of antennas with the following general specifications: 1.1 - 2.2, 2.2 - 4.3, 4.3 - 7.35, 7.35 - 10.75

Case I - Azimuth Coverage - 270°
Frequency - 1-2 kmc; 2-4 kmc; 4-8 kmc; 8-10 kmc
Polarization - Horizontal
Output - 50 ohm coaxial line (Type N connector)
Size - Maximum height - 23.6 inches

Case II - Azimuth Coverage - uni-directional
Frequency - 550 to 1100 mc
Polarization - Horizontal
Output - 50 ohm coaxial line (Type N connector)
Size - Maximum height - 23.6 inches

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CONTROL NUMBER
CA3-66-1

[redacted] 25X1

To: [redacted] 9 March 1959 25X1

In addition, this antenna shall be rotatable by means of a motor driven pedestal, operated by remote control, and the pedestal shall be connected to a remote azimuth indicator by a Synchro generator and follows arrangement. The available power source is 115 volts, 400 cycle, A.C. 28 volts D.C. is also available.

An additional identical pedestal, control box and indicator, less antenna, is also required.

Case III - Azimuth Coverage - 270°
Frequency - 550 - 1100 mc
Polarization - horizontal
Output - 50 ohm coaxial line (Type N connector)
Size - Maximum height - 23.6 inches

Case IV - Azimuth Coverage - omnidirectional
Frequency - 50 to 100 mc; 125-250 mc
Polarization - Vertical
Output - 50 ohm coaxial line (Type N connector)
Size - Maximum height - 23.6 inches

By mutual agreement, azimuth coverage is defined as the beamwidth of the free space pattern of the antenna at nominal 6 db points. The relative power level could vary from 3 db to 10 db at the edges of the coverage region and still be acceptable. Where necessary, coverage may be obtained by the use of two or more antennas and the appropriate sector selected externally. (Switching not supplied by [redacted] 25X1

Elevation coverage is not specified. It is understood that general coverage from horizon up is intended.

Minimum electrical tests to determine proper operation of each antenna are to be made. This would, in general, include pattern, gain and VSWR measurements at the ends and center of each frequency band. No environmental tests are to be performed.

Because of the extreme urgency of the requirement, the antennas to be delivered are engineering models. There are no special materials or finishes required. The antennas are to be fabricated from engineering sketches, and no drawings or reports are to be delivered. One reproducible copy of pertinent test data will be supplied.

Submitted as enclosure (3) is [redacted] technical proposal outlining the anticipated method of accomplishing the proposed work. 25X1

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To: [redacted] 9 March 1959 25X1

This proposal may be considered firm for a period of ninety (90) days from the date of this letter.

In the event [redacted] is awarded this particular procurement, it is essential that the terms and conditions as outlined in enclosure (1) be given serious consideration in the preparation of a contract. 25X1

We appreciate the opportunity of submitting this proposal, and in the event any additional information is desired, please advise.

Very truly yours,

[redacted] 25X1

Contract Administrator

ATE:jfb

10-2

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Case I

An antenna receiver group is required which will provide 270 degree azimuth coverage and above horizon elevation coverage over a 1 to 10 kmc frequency range. This frequency range shall be broken into four convenient bands i. e. 1 to 2 kmc, 2 to 4 kmc, 4 to 8 kmc, and 8 to 10 kmc. The polarization of these antennas shall be horizontal and the antenna shall terminate in a 50 ohm coaxial line.

An antenna particularly suited to these requirements is the T-fed slot. This device is essentially a coaxially fed waveguide slot. It differs from the waveguide slot, however, in that it is fed through an impedance matching conductor within the slot and makes the antenna operable over a 2:1 band. The radiation pattern is left unchanged by this modification. A slot radiator can be expected to provide wide coverage in the plane of the narrow dimension. T-fed slots having a narrow aperture dimension of $.20\lambda$ and a wide aperture dimension of $.62\lambda$ provide minimum coverages of 135 degrees at the 3 db points in azimuth and from 50 to 70 degrees at the 3 db points in elevation. Since the electric vectors are directed across the narrow aperture of this antenna, it will be receptive to horizontal polarization in this position. Two such antennas in the same plane with an angular separation of 135 degrees should provide the required 270 degrees coverage over a 2:1 frequency band.

The largest single antenna will operate from 1 to 2 kmc and be 7.416 inches high, 2.460 inches wide, and 2.410 inches in depth. The antenna operating from 2 to 4 kmc would be 3.764 inches high, 1.282 inches wide and 1.232 inches deep. The T-fed slot designed to operate from 4 to 8 kmc measure 1.929 inches in height, 0.690 inches in width, and 0.650 inches in depth. The smallest of the slots, operating at from 8 to 10 kmc would be 1.018 inches high, 0.396 inches wide, and 0.346 inches deep. These figures assume a maximum waveguide thickness of .050 inches.

These antenna pairs will then be stacked vertically with an overall height of not less than 13.480 inches, well below the maximum allowable height of 23.6 inches.

Each antenna will be fitted with Type N receptacles. This group would then consist of 4 stacked pairs of T-fed slot antennas which would provide horizontally polarized 270 degree radiation coverage over the frequencies from 1 to 10 kmc. The approximate configuration of this array is shown in Figure 1A.

Case II

An antenna is required here which will give unidirectional coverage from 550 to 1100 mc. It is to be receptive to horizontal polarization and terminate in a 50 ohm line. The entire configuration should be rotatable.

Because of ready familiarity with its design and the ease of its construction, [redacted] proposes the sleeve dipole antenna as one which will meet the above 25X1 specifications. The sleeve dipole is an antenna which produces a doughnut shaped pattern concentric with the axis of the radiating element. It is, therefore, omnidirectional in one plane and two-lobed, in the familiar "figure-eight" pattern, in the orthogonal plane. Blocking out of one-half of the figure eight will be accomplished by locating a reflecting plate approximately one-quarter wavelength behind the radiating elements. The sleeve configuration on the dipole is basically a balun which converts the unbalanced coaxial line to a balanced line thereby providing the impedance characteristics for broad band operation. A dipole with balun will be constructed with maximum dimensions of approximately 10 inches in width by 1 inch in height by 6 inches in depth. These dimensions do not include the reflecting plate. This plate will be designed to produce symmetrical field patterns with minimum side lobing. Its size will be well within the maximum allowable height. The dipole will be terminated in a Type N receptacle and will provide a better than 2:1 match to 50 ohm line over the desired frequency band. The antenna will be receptive to horizontal polarization.

The antenna will be mounted on a motor-driven rotating pedestal. The drive motor will operate from a 115 volt, 400 cycle, A. C. source and will be reversible. Limit switches will be provided to allow a maximum of 370 degree of rotation. A synchro generator, also 115 volt, 400 cycle, will be incorporated in the pedestal. A remote control box with switches to control the rotation of the pedestal will be provided. This control box will also incorporate a synchro follower and position indicator dial to indicate the antenna orientation. Fifty feet of interconnecting cable will be provided between the control box and pedestal.

The approximate configuration of this antenna and pedestal are shown in Figure 2. A duplicate pedestal and control box, less antenna, will also be provided.

The sleeve dipole with plate reflector permits an unusually rugged mechanical construction with a minimum of conflict between electrical and mechanical design. Its broadband impedance characteristics and desirable radiation patterns well qualify the proposed antenna type as one which is suitable for the above application.

Case III

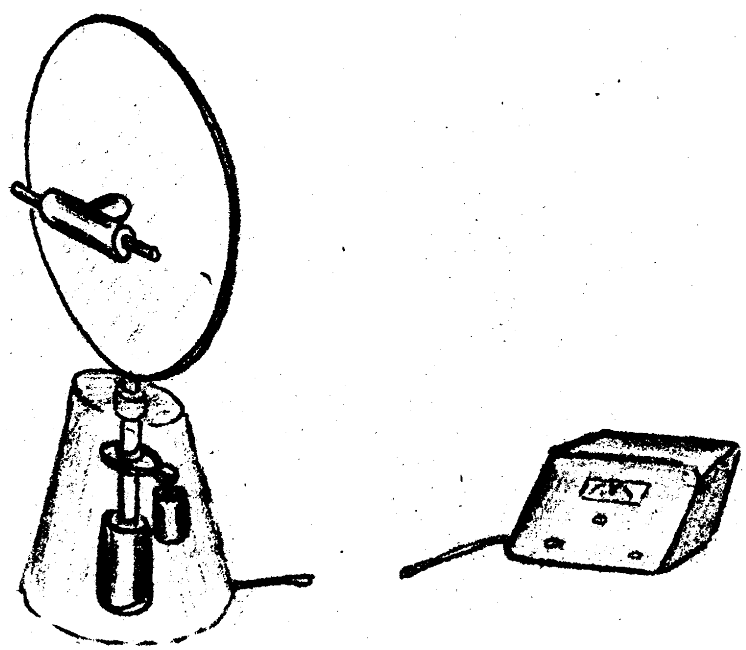
The functional requirements in this case are exactly as those stated for Case I save the frequency of operation which is 550 to 1100 mc.

As in Case I, [redacted] proposes utilization of the T-fed slot pair oriented to 25X1
provide illumination over a 270 degree sector of the azimuth plane. Due to the longer operating wavelengths of Case III, the T-fed slots will have dimensions approximately twice those of the largest slots in Case I. Each slot will be 14.732 inches high, 2.464 inches wide, and 2.414 inches deep. The Type N receptacle on each slot will add approximately .734 inches to the total width of each antenna. These dimensions assume the use of .050 inch waveguide material. The antennas for Case III will be separate from those as outlined for Case I.

Case IV

The antennas required here are to provide omnidirectional azimuthal coverage in two bands i. e., from 50 to 100 mc, and from 125 to 250 mc. They are to be receptive to vertical polarization and terminate in a 50 ohm coaxial line.

Most omnidirectional radiators such as discones, quarter-wave stubs, and dipoles that would apply here have a serious size disadvantage. They would greatly exceed the minimum allowable height. An antenna which does have the omnidirectional properties of the above, is vertically polarized and is still within the minimum height is a coaxially fed bow-tie shaped stub. The stub, since it is bow-tie shaped, has a height of only one-eighth wavelength. One of these antennas on a ground plane will give the coverage desired in each band. The larger one, operating at the lower frequencies, will be approximately 20 inches high. It will be cut from a copper clad teflon material and fed coaxially, the inner conductor connected to the stub and the outer conductor connected to the ground plane. Similarly, the antenna operating in the 125 and 250 mc range will stand approximately nine inches tall on its ground plane and be constructed of the same material. Both antennas will be outfitted with Type N receptacles. The teflon will be mounted securely onto the ground plane and provide a solid support for the conducting portion of the stub. The approximate configuration of this type antenna is shown in Figure 1B.



DIPOLE REFLECTOR ANTENNA WITH ROTATOR AND INDICATOR

25X1

Figure 2

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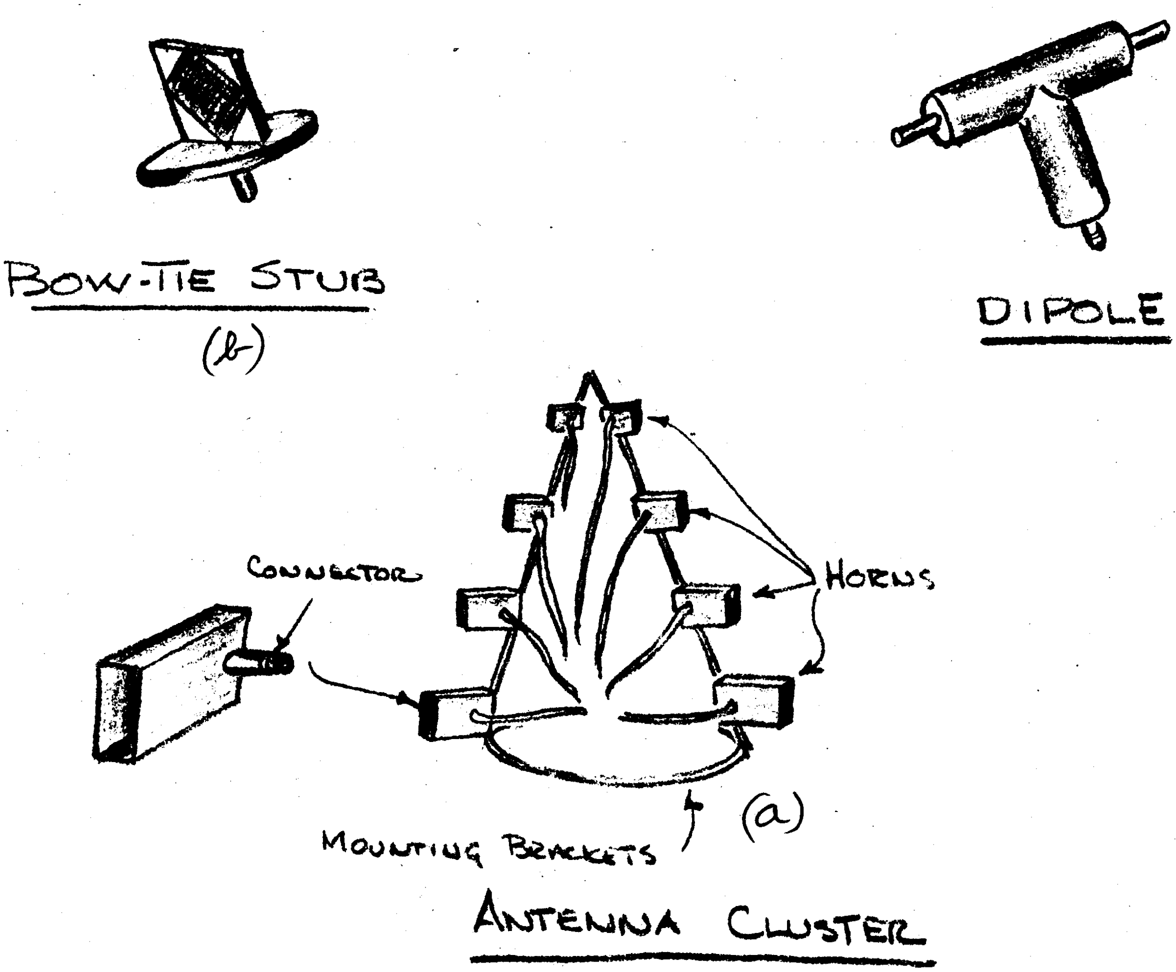

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Figure 1

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TERMS AND CONDITIONS

[redacted]

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The estimates for direct labor in our cost breakdowns are based on average hourly rates taken from our latest bi-weekly pay period and in those cases where the work will be performed beyond a six (6) month period, we have included in our detailed cost breakdowns an estimated amount to cover anticipated labor increases which we expect to experience during the life of the proposed contract. This is based on our past experience since June 1954.

It is not anticipated at this time that additional employees will be required to perform the work outlined in the applicable specifications to this project.

We represent that we have not employed or retained any company or person other than a bona fide full time employee to solicit or secure this contract, and have not paid or agreed to pay any company or person any fee, commission, percentage, or brokerage fee contingent upon or resulting from the award of this contract.

We do not anticipate subcontracting any of the engineering and development work involved in this proposal.

All of our cost-plus-fixed fee contracts with the Government are amended on a calendar year basis to incorporate the fixed overhead rate negotiated with the Navy Department. The Navy Contract Audit Division is the cognizant Government auditing agency for our Company. The current negotiated overhead rate article in ASPR is satisfactory; however, it is suggested that the following paragraph be incorporated into the schedule of the contract.

> "For billing purposes, the overhead rates acceptable to the Contracting Officer or his authorized representative will be applicable subject to adjustment and conformity with the ASPR clause entitled 'Negotiated Overhead Rates.' The first period as contemplated by Para. B of the Clause entitled 'Negotiated Overhead Rates,' will end 31 December 1959 and subsequent periods will be succeeding calendar year periods or such other period as may be mutually agreed to."

We wish to advise that our travel policies were revised and approved by the Government as of December 1958. It is imperative that the contract make provision for subsistence and travel as direct charges as follows:

[redacted]

25X1

"The cost of necessary travel and subsistence will be reimbursed to the Contractor at actual cost or on a per diem basis consistent with the Contractor's standard policy for the labor category concerned, provided that, such expense is chargeable directly to this contract in accordance with the Contractor's established method of distributing such expenses.

No cash discount is offered for prompt payment. Our terms are net 30 days.

In the event an award is made to [redacted] it is assumed that the contract will carry a Defense Order Rating, together with a CMP allotment for critical materials. 25X1

Unless otherwise stipulated in our proposal letter covering this procurement, we do not anticipate the procurement of additional facilities, machine tools, capital equipment, test equipment, etc., in order to perform this work, which will be charged against any contract resulting from this procurement.

The prices quoted in this proposal do not include any state, local sales, use or other taxes, but do include all applicable Federal taxes, including Federal excise taxes and other applicable state and local taxes in effect at the date of this proposal.

It is not anticipated that any royalties will be paid for the use of inventions or as fees for technical services or engineering assistance.

Financing in the form of advanced payments and/or loans will not be required.

This proposal is submitted on the basis of the contractor's being reimbursed 100% of costs incurred. In the event this particular procurement falls within the requirements of ASPR 3-404.3(d), where interim payments will not exceed 80% of the costs incurred by the contractor, we reserve the right to revise upward the percentage of fixed fee indicated in this proposal. In this connection your attention is invited to paragraph (d) of ASPR 3-404.3 which states in part, "Application of this policy need not affect the method of payment of the fee, but the extent of the contractor's capital investment in the performance of the contract will be taken into consideration in fixing the amount of fee or profit."

If this proposal is submitted on the basis of any form or type of fixed price, it is imperative that any resulting contract include the standard ASPR provision for progress payments in the amount of 70% of actual costs incurred.

In the event of a conflict between the terms and conditions contained herein and [redacted] proposal letter, the contents of the proposal letter will take precedence. 25X1

25X1

[redacted]