



A SUBSIDIARY OF COMTECH TELECOMMUNICATIONS CORP.

TECHNICAL REPORT #752-A
FCC PATTERN DATA

REPORT OF PATTERN AND GAIN TESTS
18-FOOT "OFFSAT" ANTENNA

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18-FOOT "OFFSAT" ANTENNA

COMTECH ANTENNA CORPORATION
3100 COMMUNICATIONS ROAD
ST. CLOUD, FLORIDA 32679

May, 1984

COMTECH ANTENNA SYSTEMS, INC.

WARRANTY POLICY

Each standard catalog product manufactured by CASI is warranted to meet all published specifications and to be free from defects in material and workmanship. The company's liability under this warranty is limited to servicing or adjusting equipment and/or replacement of defective parts of any equipment returned to the factory, freight paid by buyer, within a period of three years for reflectors, feeds and mounts and one year for actuators and electronic components, from date of shipment from the factory, unless a shorter period is specified. Equipment showing damage by misuse, or abnormal conditions of operation, shall be excluded from this warranty.

Items manufactured by others and not made an integral part of equipment of CASI's manufacture shall carry the original manufacturer's warranty.

Products manufactured by CASI, to customer's specifications, are warranted to be free of defects in material and workmanship and shall conform to all specifications made a part of the contract or purchase order. Inspection and acceptance shall be conclusive as to fulfilling this warranty, except as to latent defects, fraud, or such gross mistakes as to amount to fraud, providing, however that all claims made or to be made for any reason must be made in writing one year of shipment from CASI's plant. The responsibility of CASI under this warranty shall be limited to repair or replacement if defective work or parts returned to CASI, with transportation charges CASI's plant and return paid by buyer. SINCE CASI HAS NO CONTROL OVER CONDITIONS OF USE, NO WARRANTY IS MADE OR IMPLIED AS TO SUITABILITY FOR CUSTOMER'S INTENDED USE, BEYOND SUCH PERFORMANCE SPECIFICATIONS AS ARE MADE A PART OF THE PURCHASE ORDER.

Equipment shipped F.O.B. CASI's plant shall become the property of buyer upon delivery to and receipt from carrier. Damage in shipment should be handled by the buyer directly with the carrier by immediately requesting carrier's inspection upon evidence fro damage in shipment. DO NOT RETURN ANY CASI PRODUCT TO FACTORY UNTIL SHIPPING INSTRUCTIONS ARE RECEIVED.

COMTECH ANTENNA SYSTEMS, INC.

WARRANTY POLICY
(continued)

For shipment of equipment to our Service Department, please use the following procedures so that we may provide fast, efficient service.

Please phone (407) 892-6111 to obtain a Return Material Authorization (RMA) number and shipping instructions. It is imperative that you obtain a RMA number for ALL returns as our Receiving Department will refuse delivery of equipment without the number clearly displayed on the outside of the shipping carton.

TERMS AND CONDITIONS:

Payment Terms - Net 30 days (with approval credit)

F.O.B. Point - St. Cloud, Florida.

Returns and Restocking

1. No returns will be accepted unless identified by RMA number obtained from CASI authorized Sales or Customer Service Personnel.
2. Returns must be prepaid.
3. A 20 percent restocking charge will be applied to items returned for credit. No credit will be issued for special items, or items in buyer's possession more than six months.
4. Prices subject to change without notice.

MAILING/SHIPPING ADDRESS:
COMTECH ANTENNA SYSTEMS, INC.
3100 COMMUNICATIONS ROAD
ST. CLOUD, FLORIDA 34769

M/F: RMA # _____

**FCC PATTERN DATA
REPORT OF PATTERN AND GAIN TESTS
18-FOOT "OFFSAT" ANTENNA**

INTRODUCTION

This report summarizes results of radiation pattern and gain tests performed on an 18-foot wide "Offsat" reflector in the 3.7 - 4.2 GHz and 5.925 - 6.425 GHz frequency bands.

DESCRIPTION OF TEST ARTICLE

The antenna under test was an asymmetrical parabolic reflector with the following properties:

| | |
|-------------------|--|
| Aperture Size | - 18-feet by 8-feet |
| Focal Length | - 75.78" |
| Type | - Section of paraboloid |
| Feed Type | - Asymmetrical horn, prime focus |
| Polarization | - Linear, orthogonal transmit/receive ports |
| Focus | - Edge offset fed from bottom centerline |
| Aperture Blockage | - None |
| Surface Tolerance | - 0.025" RMS, maximum |

TESTS PERFORMED

The following tests were performed on the test article:

- a) Radiation patterns in the hour angle (wide) and declination (narrow) planes at four frequencies (3.7, 4.2, 5.925 and 6.425 GHz and for vertical and horizontal polarizations using both feed ports.
- b) Gain data.

SPECIFICATIONS

The antenna was designed to meet all of the specifications for antenna sidelobe performance as required by FCC "Report and Order" in CC Docket 81-704, FCC 83-184 as it effects the requirements of FCC Rule Part 25.209.

In addition, the antenna was configured to have a receive band gain of +42.0 dBi at midband in the receive port and +45.9 dBi gain at midband in the transmit port.

TEST PROCEDURE

1a The antenna under test was placed on an antenna positioner at the Comtech Antenna Corporation test facility in St. Cloud, FL. The positioner was the elevation-over azimuth type permitting 360° patterns to be recorded in the azimuth plane. The antenna was mounted so that the declination or the hour angle plane could be oriented into the azimuth plane. The positioner was located atop a 75-foot high tower.

1 The transmitting source was located one mile away and consisted of a 6-foot diameter parabolic reflector antenna with a dual polarized feed which was capable of remote rotation for polarization adjustments. It was fed from a signal which was monitored for stability at the source location.

The 6-foot antenna was located on the tower at approximately a 75-foot height. Probing measurements had been done on the test range to assure uniformity of the field at the receiving location.

o d Linearity checks of the equipment were done by the insertion of precision attenuators at the transmit site.

The received signal was detected by a Scientific-Atlanta precision receiver, Model 1710, and displayed on a rectangular chart recorder, S/A Model 1520.

Gain data were recorded by the comparison method using a Scientific-Atlanta Model SGH-5.85 standard gain horn located on the edge of the reflector under test. A precision attenuator was employed for these tests to minimize the dynamic range of the measurement. These gain data found to be reproducible to a tolerance of about ± 0.3 dB.

TEST DATA

Refer to the following copies of a sampling of range patterns (#'s 9, 10, 11, 35, 36, and 37). These patterns show conformance at both ends of the frequency band and are representative of all patterns recorded.

In order to show beamwidth data and near-in sidelobe levels accurately, all radiation patterns have been taken twice, with two angular scales for clarity. The 60° scale patterns show the antenna response over an angular span of about 24° while the 360° scale patterns show a complete 360° angular sector.

All 360° patterns show a sharp backlobe near the 180° position. The lobe is caused by reflections from a tall radio tower located approximately 1/2 mile behind the test range and its presence has been disregarded in the evaluations of the patterns.

TABLE I - SUMMARY OF ELECTRICAL TEST DATA - 18-FOOT "OFFSAT" ANTENNA

| Frequency GHz | Pol. | Peak Gain dBi (± 0.3 dB) | BEAMWIDTHS($^{\circ}$) | | | |
|------------------|------|----------------------------------|--------------------------|-------|---------------------|-------|
| | | | Declination Plane | | Hour Angle Plane | |
| | | | 3 dB | 15 dB | 3 dB | 15 dB |
| 3.70 | V-V | 41.0 | 2.33 | 4.57 | 1.03 | 2.10 |
| | H-H | | 2.20 | 4.23 | 1.00 | 1.93 |
| 3.95 | V-V | 42.0 | | | | |
| 4.20 | V-V | 42.7 | 2.00 | 4.30 | 0.93 | 1.90 |
| | H-H | | 1.97 | 3.87 | 0.90 | 1.80 |
| 5.925 | V-V | 45.4 | 1.60 | 3.07 | 0.73 | 1.49 |
| | H-H | | 1.60 | 3.17 | 0.66 | 1.37 |
| 6.175 | V-V | 45.9 | | | | |
| 6.425 | V-V | 46.2 | 1.59 | 3.07 | 0.75 | 1.53 |
| | H-H | | 1.57 | 3.10 | 0.61 | 1.30 |

FIGURE 41

RADIATION PATTERN ENVELOPE
18-FOOT "OFFSAT" ANTENNA
RECEIVE FREQUENCY BAND
3.7-4.2 GHz

_____ ENVELOPE FOR V-V or H-H POL.

PEAK GAIN 42.0 dBi at 3.95 GHz

----- ENVELOPE FOR V-H or H-V POL.

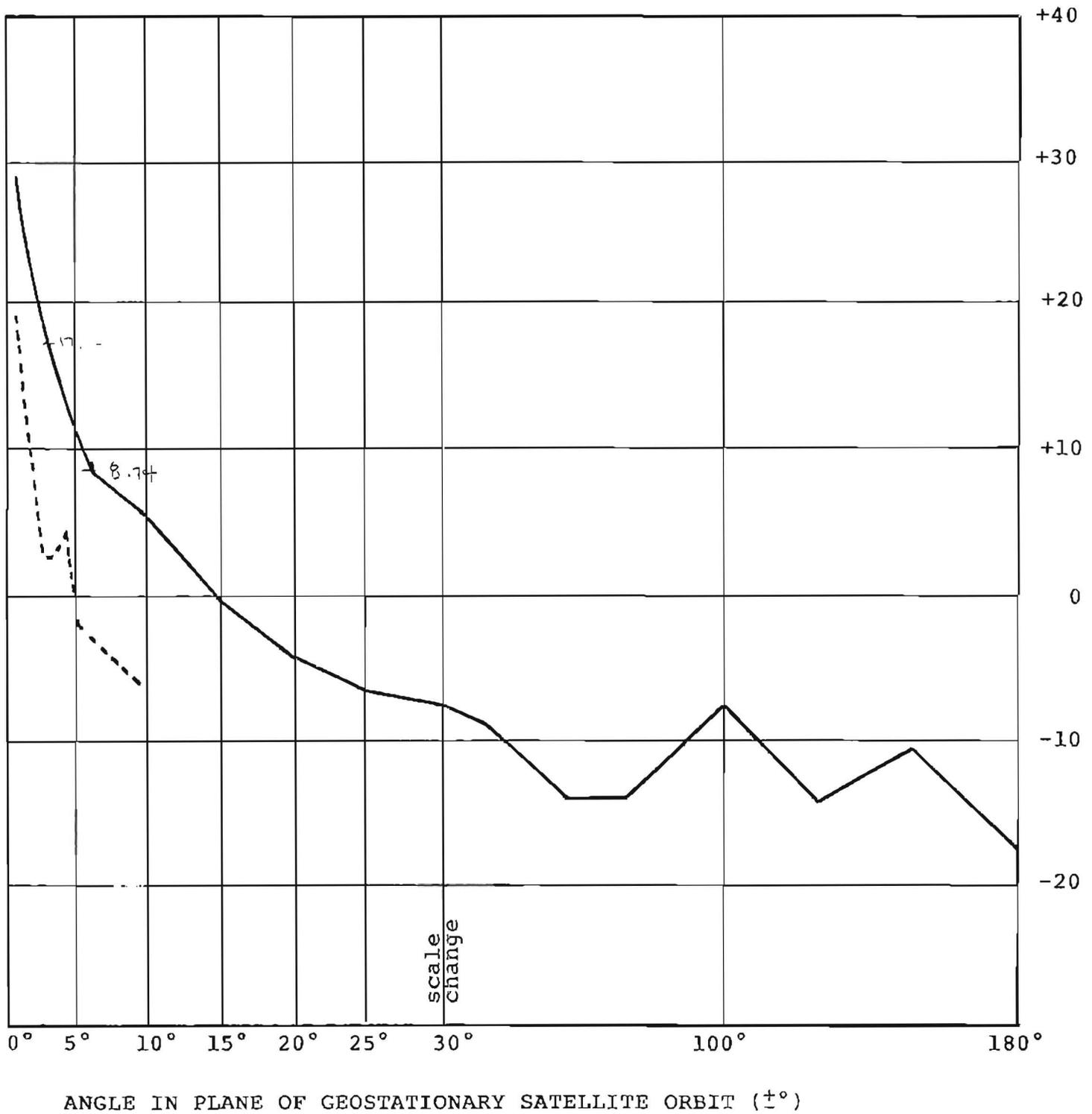


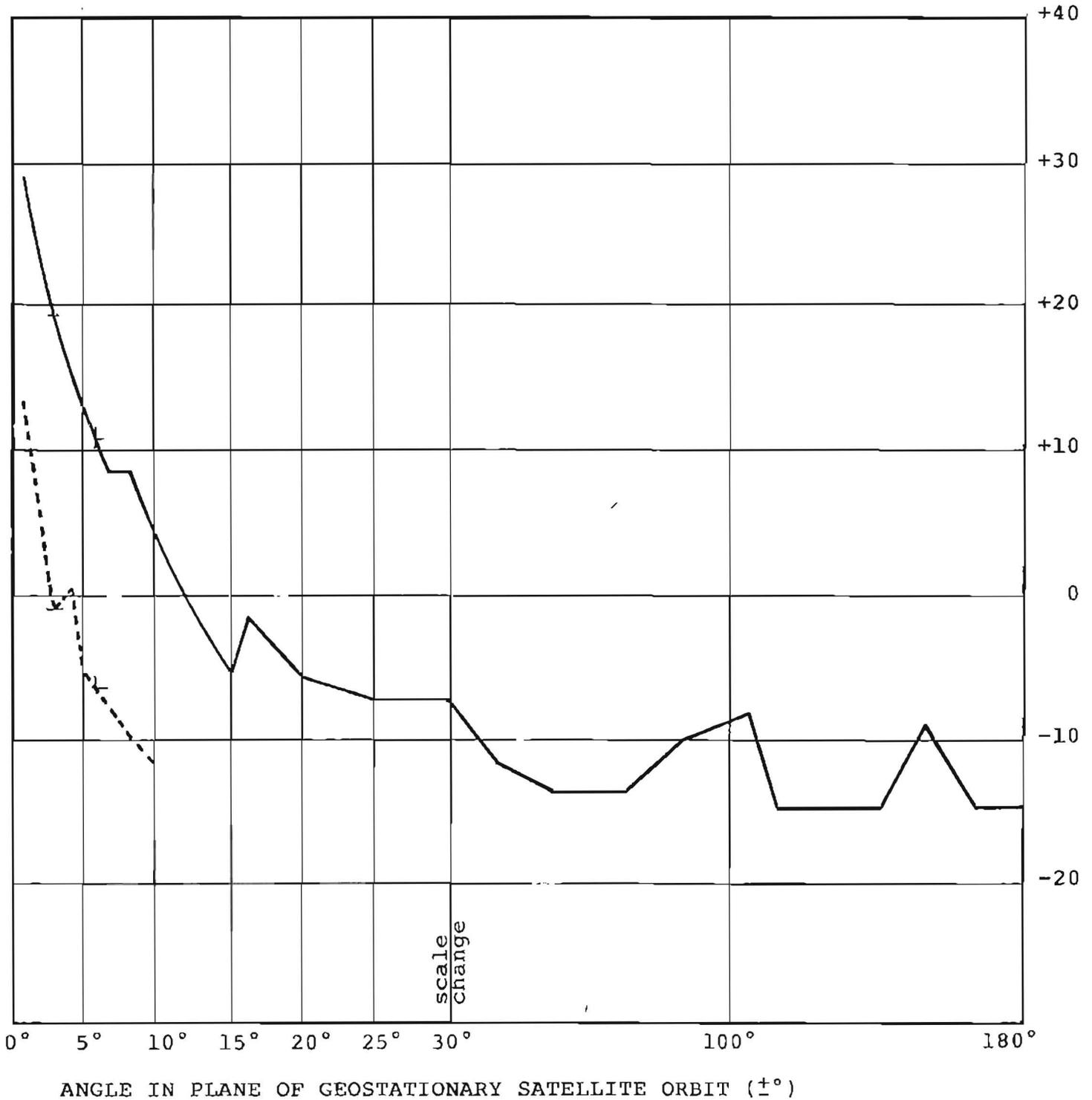
FIGURE 42

RADIATION PATTERN ENVELOPE
18-FOOT "OFFSAT" ANTENNA
TRANSMIT FREQUENCY BAND
5.925-6.425 GHz

_____ ENVELOPE FOR V-V or H-H POL.

PEAK GAIN 45.9 dBi at 6.175 GHz

----- ENVELOPE FOR V-H or H-V POL.



RELATIVE POWER ONE WAY (db)

RELATIVE POWER ONE WAY (db)

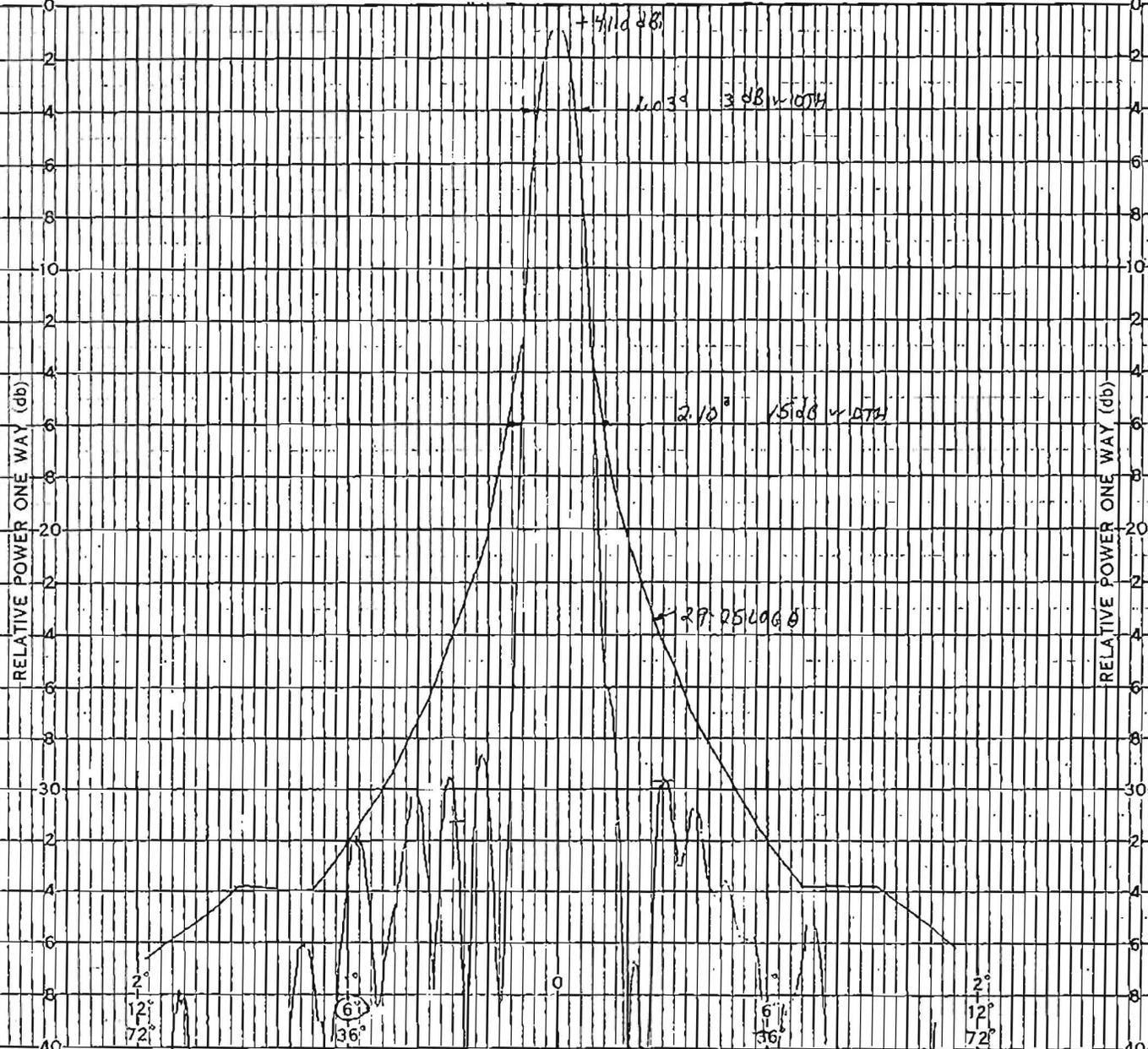
PRINTED IN U.S.A.

ANGLE

CHART NO. 171

SCIENTIFIC AT

PATTERN NO. 9 MAY 1971
 PROJECT 18' OFFSAT
 ENGRS.
 REMARKS 3.7 GHz
 V-V POL.
 H.A. PLANE



+4.11 dB

2.10° 15 dB width

27.25 dB

6°

3°
18°
108°

2°
12°
72°

6°
36°

0

6°
36°

2°
12°
72°

3°
18°
108°

4°
24°
144°

PATTERN NO. 10 DATE 7 15
 PROJECT
 ENGRS. 18' OFFSAT
 REMARKS 3.7GHZ
 V-H POL'N
 DEC. PLANE

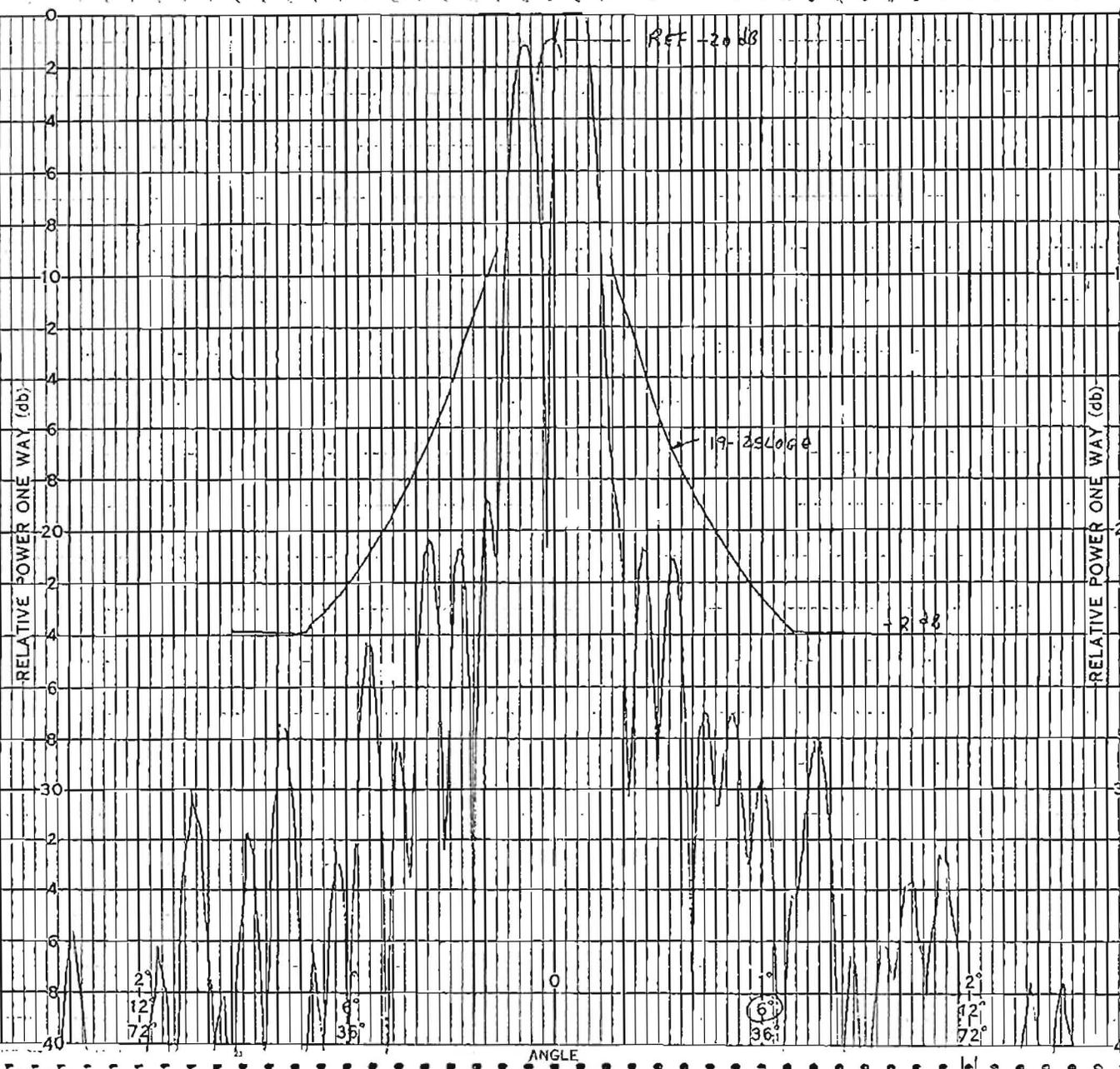
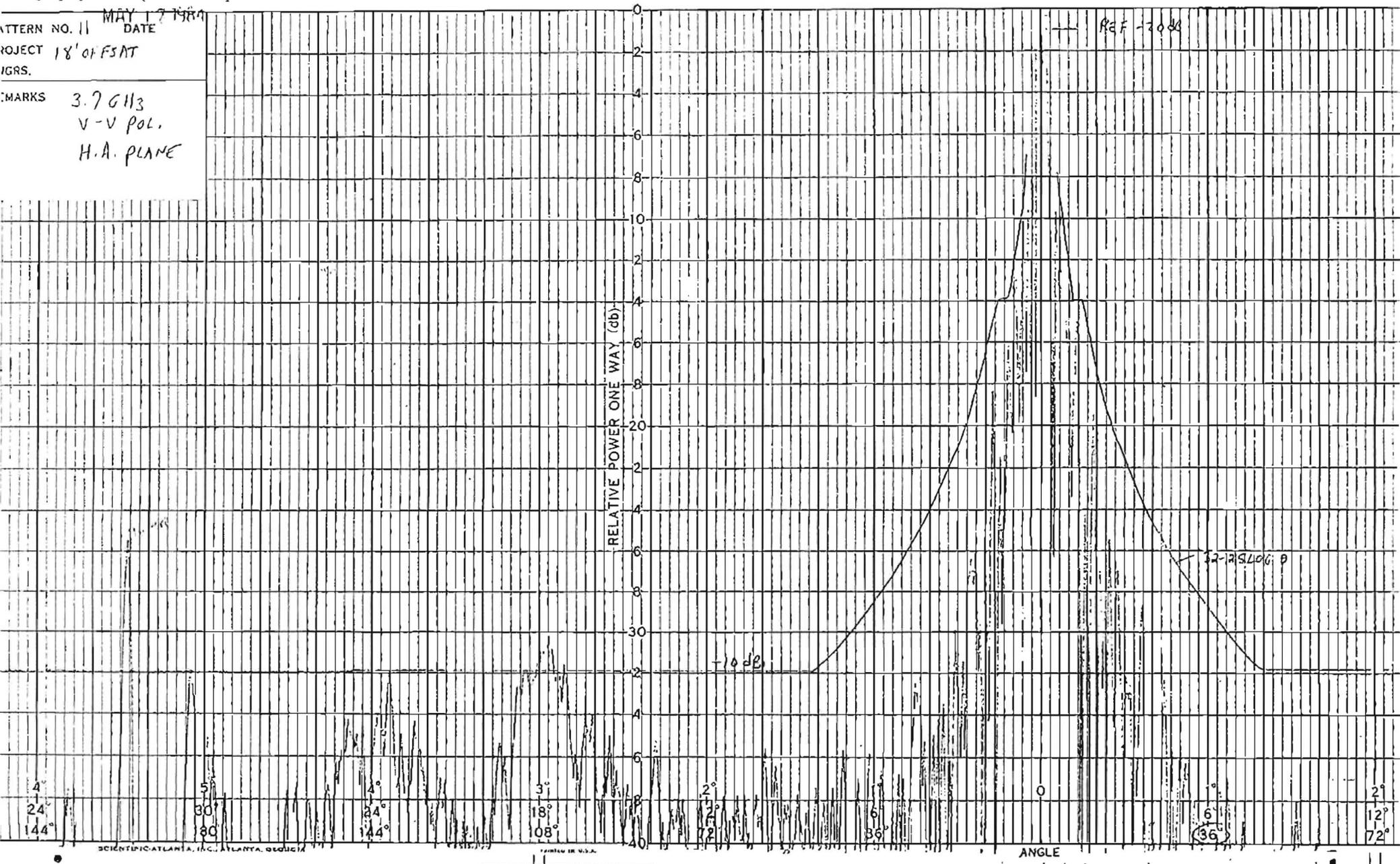


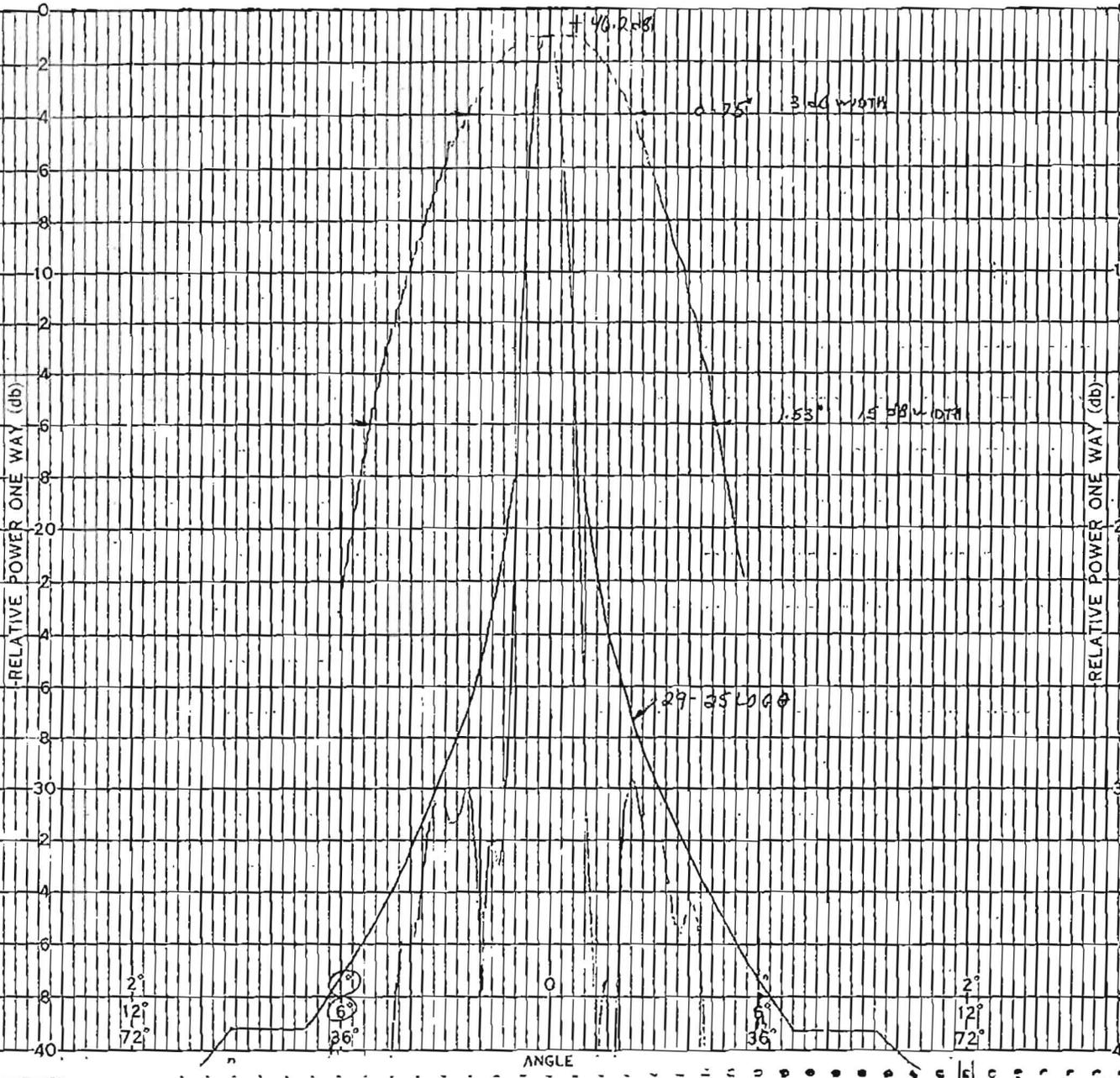
CHART NO. 121

SCIENTIFIC ATLANTIC

PATTERN NO. 11 DATE MAY 17 1959
 PROJECT 18' of FSAT
 MARKS 3.7 GHz
 V-V POL.
 H.A. PLANE



PATTERN NO. 35 DATE
 PROJECT MAY 17 1984
 ENGRS. 18' OFFSAT
 REMARKS 6.425 GHz
 V-V POL
 H. A. PLANE



3° 2° 3° 4°
 18° 12° 18° 24°
 108° 72° 108° 144°
 36° 72° 36° 72°

CHART NO. 121

SCIENT

101

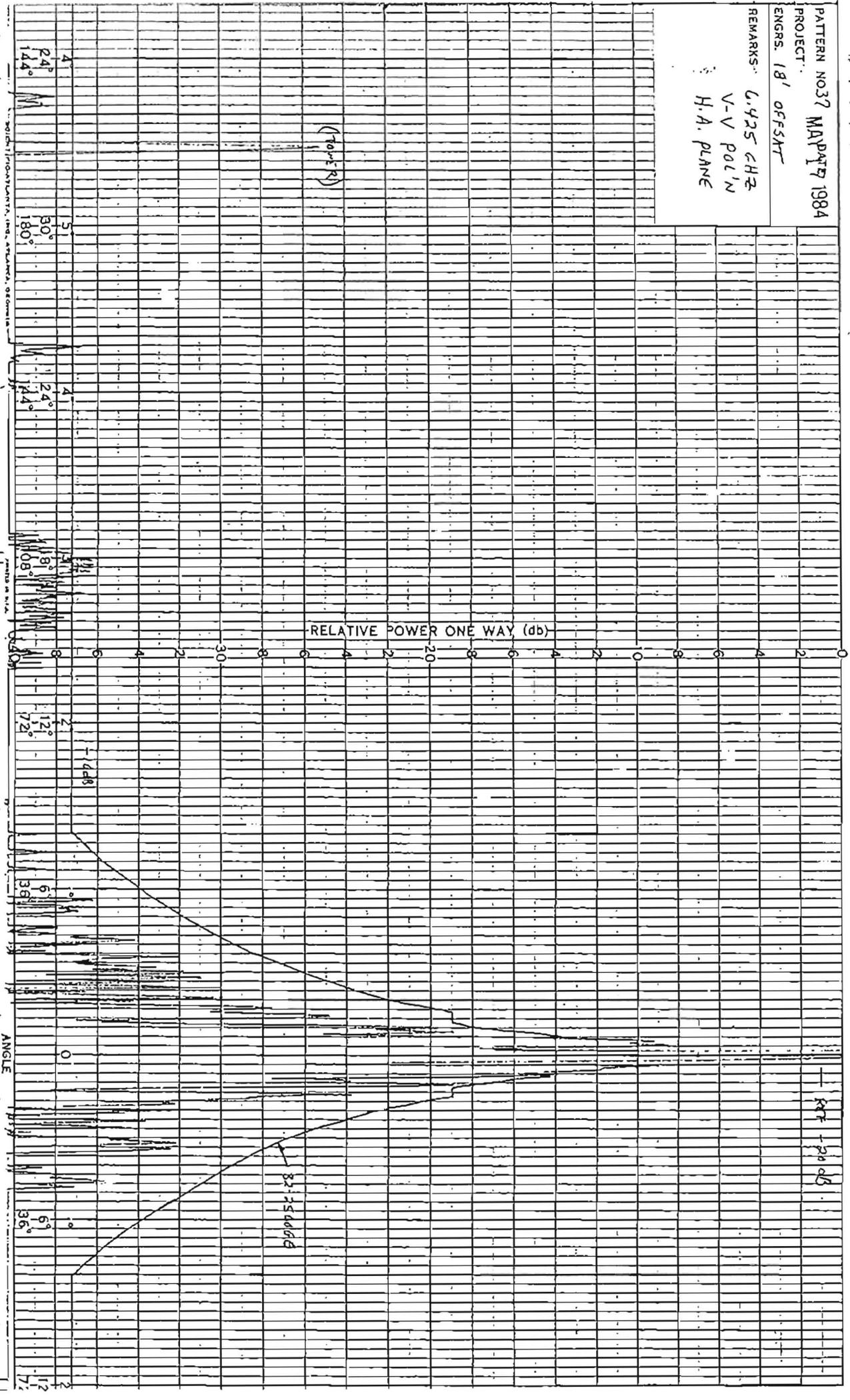
PATTERN NO37 MAP DATE 1984

PROJECT
ENGRS. 18' OFFSHORE

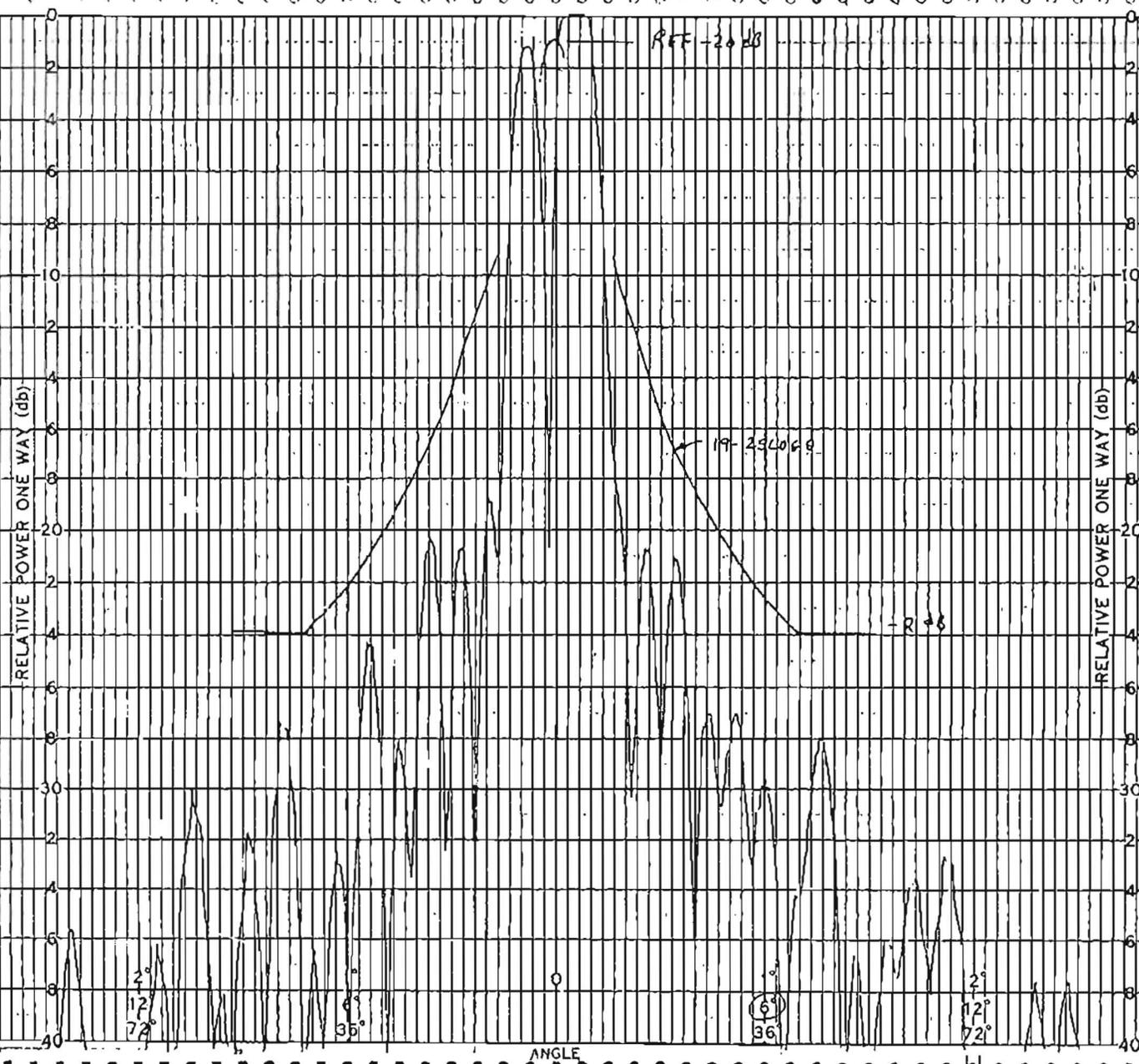
REMARKS:
U.425 CHZ
V-V POL'N
H.A. PLANE

(170° ± 2°)

RELATIVE POWER ONE WAY (db)

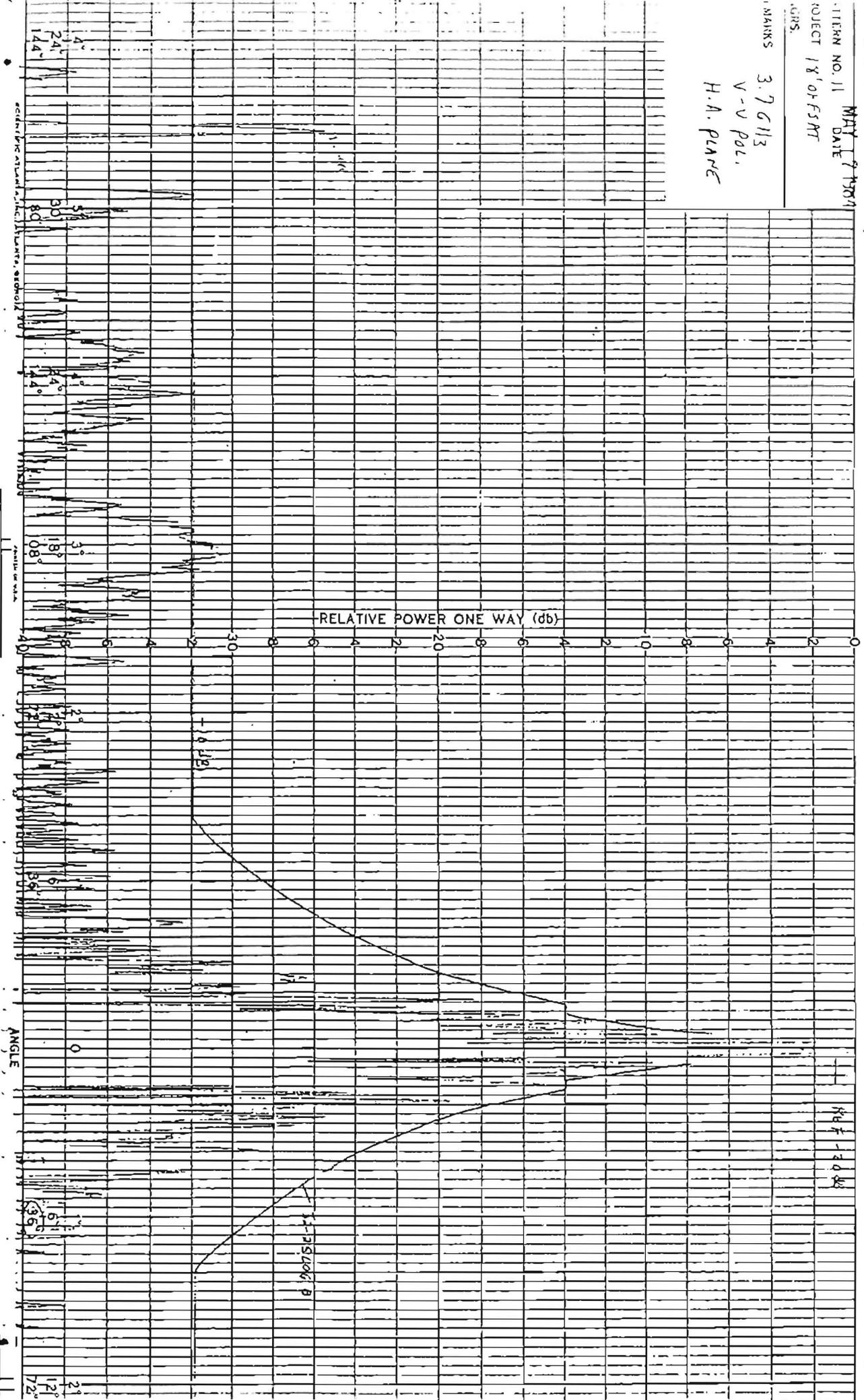


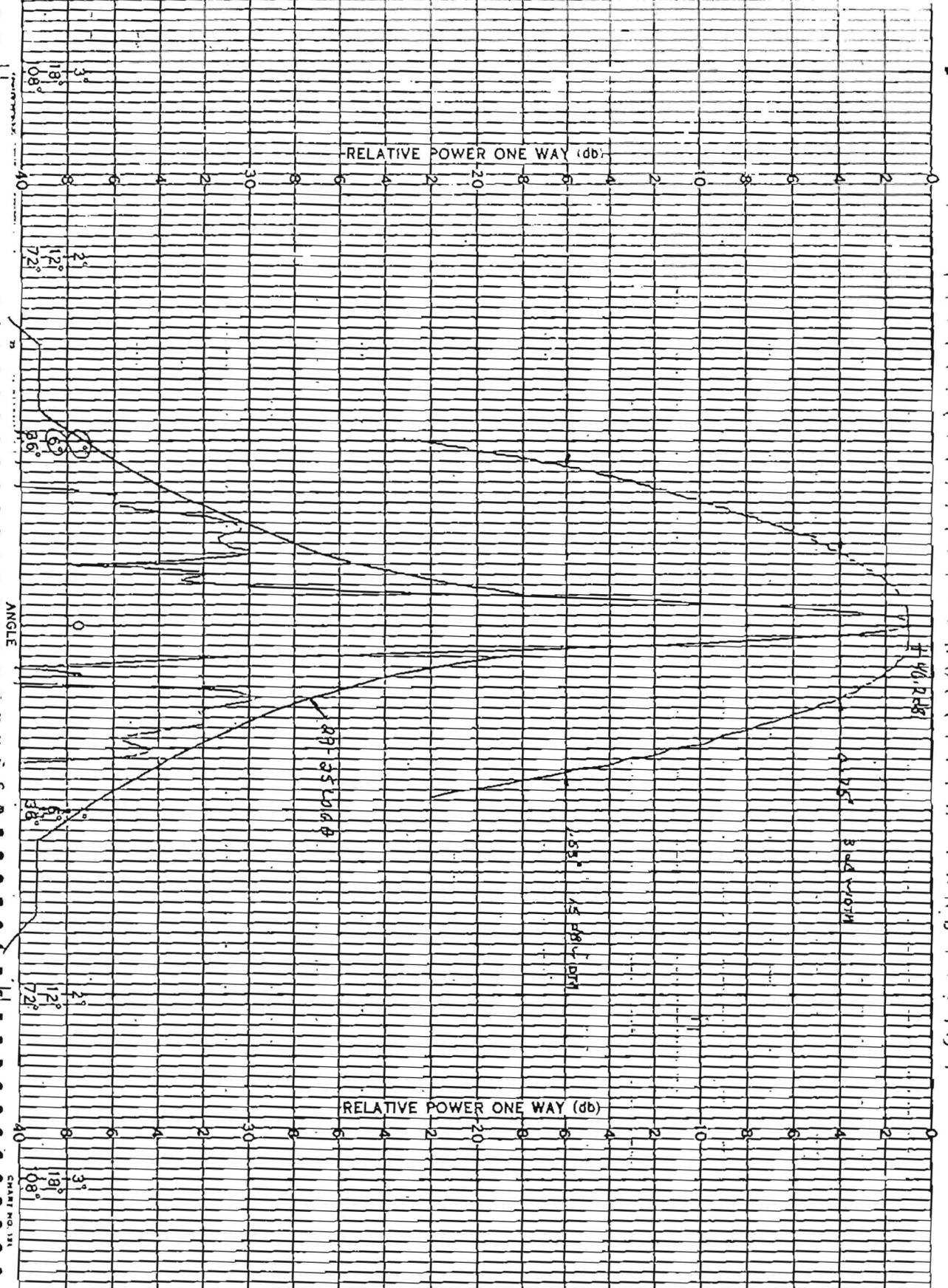
PATTERN NO. 10 MAY 1971
 PROJECT
 ENGRS. 18' OFFSAT
 REMARKS 3.7 GHz
 V-H Pol
 DEC. PLANE



ITEM NO. 11
PROJECT 18' OF 55 AT
GRS.
DATE MAY 19 1954

MARKS 3.7 G113
V-V POL.
H.A. PLANE





PATTERN NO. 35 DATE
 PROJECT MAY 17 1988
 ENGRS. 18' OFTSAT

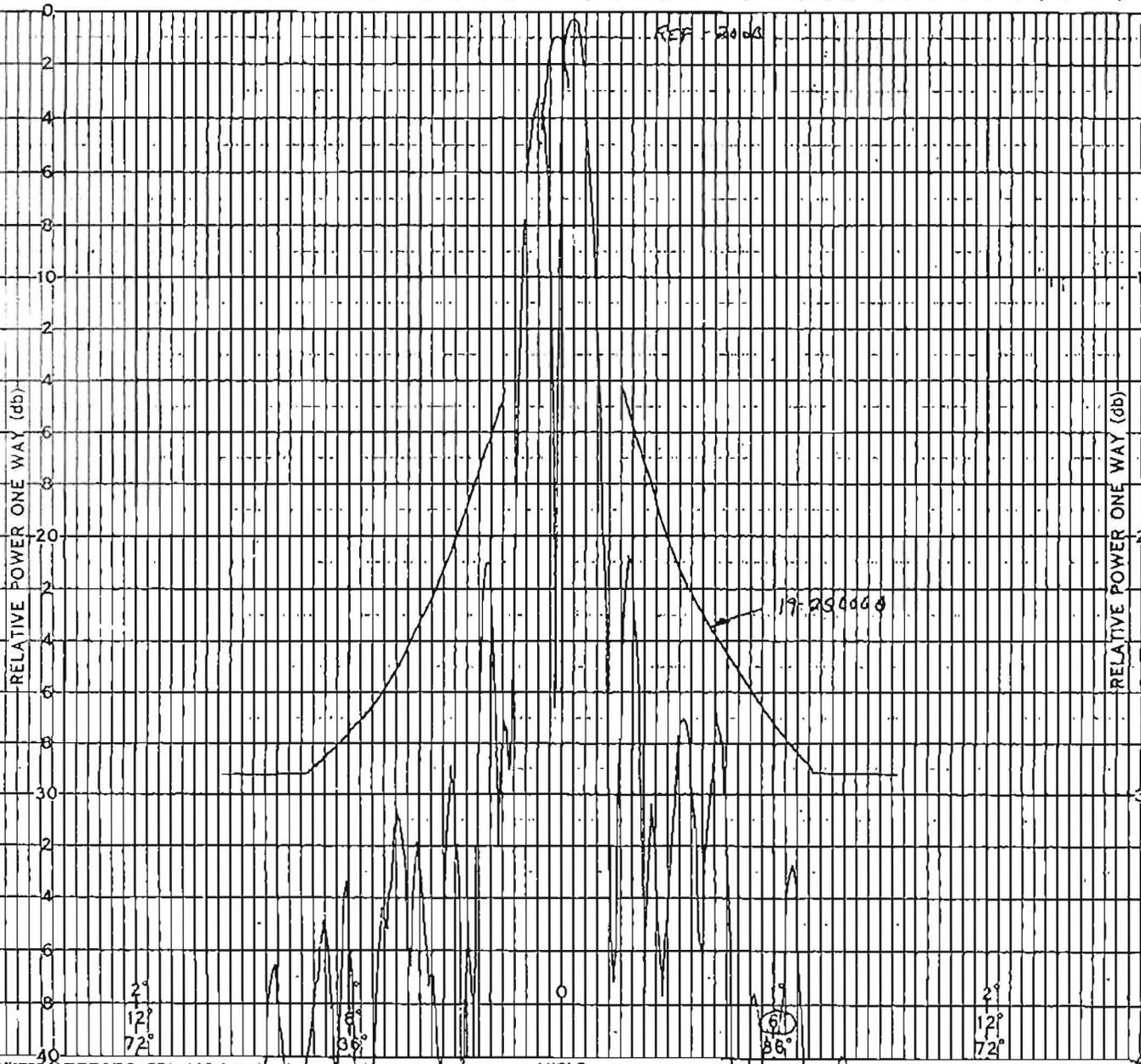
REMARKS
 G-425 GH3
 V-V POL
 H. A. PLANE

CHART NO. 181

PATTERN NO. 36 DATE
 PROJECT MAY 17
 ENGRS. 18' OFFSAT
 REMARKS 6.425 GHz
 V-H POL.
 H.A. PLANE

RELATIVE POWER ONE WAY (db)

RELATIVE POWER ONE WAY (db)



3°
18°
08°

2°
12°
72°

6°
36°

3°
18°
08°

2°
12°
72°

3°
18°
08°

4°
24°
44°

ANGLE

CHART NO. 121

SCIENTIFIC

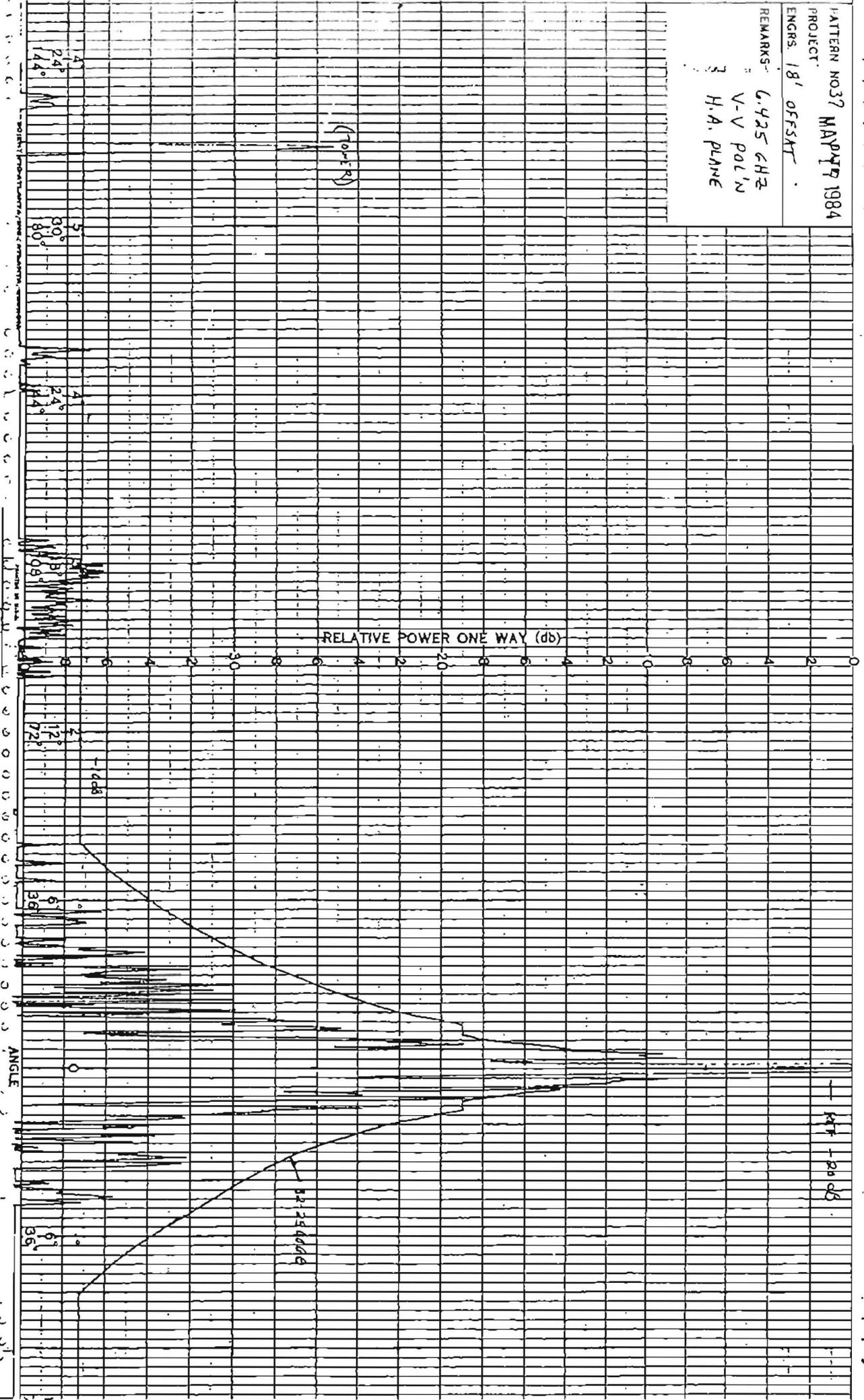
PATTERN NO37 MAPY19 1984

PROJECT:
ENGRS. 18' OFFSHORE

REMARKS:
1. 6.425 GHz
2. V-V POL'N
3. H.A. PLANE

(TO-18)

RELATIVE POWER ONE WAY (db)

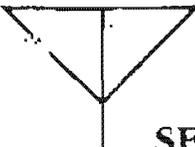


KIT -25 db

-10 db

-10 db

155 King St.
Cohasset, MA 02025
(617) 383-9722
TELEFX 467224



SEAVEY ENGINEERING ASSOCIATES, INC.

ANTENNA DESIGN AND DEVELOPMENT

June 21, 1984

Mr. Glenn Higgins
COMTECH ANTENNA CORPORATION
3100 Communications Road
P.O. Box 428
St. Cloud, Florida
32769

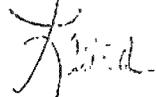
Dear Glenn:

Enclosed please find multiple copies of the six (6) patterns that you requested (Figure 9,10,11,35,36&37) of our Report #8339-700 Offsat Feed.

I am sending multiple copies because they are all taken at different lightnesses on the Xerox machine, I figured this way you could pick out what you considered to be the best for reproducing.

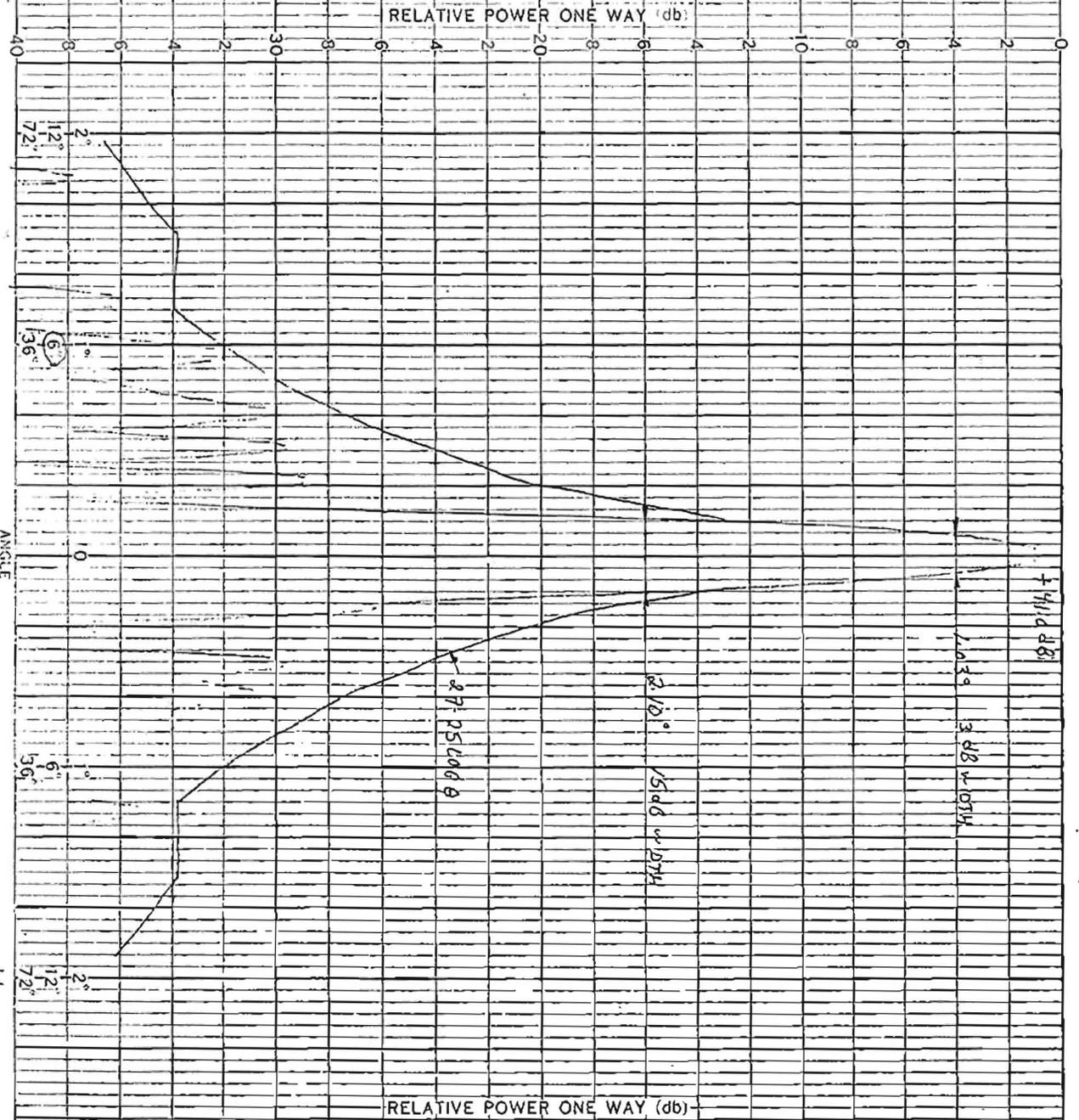
If they should not prove to be acceptable please feel free to contact me and we'll try again.

Sincerely,



Laura J. Houghton
Bookkeeper

LJH/ljh



PATTERN NO. 9 MPTAF, K
 PROJECT 18 OFFSAT
 ENGRS.

REMARKS 376H2
 V-V pol.
 H.A. PLANC

3° 18° 108°

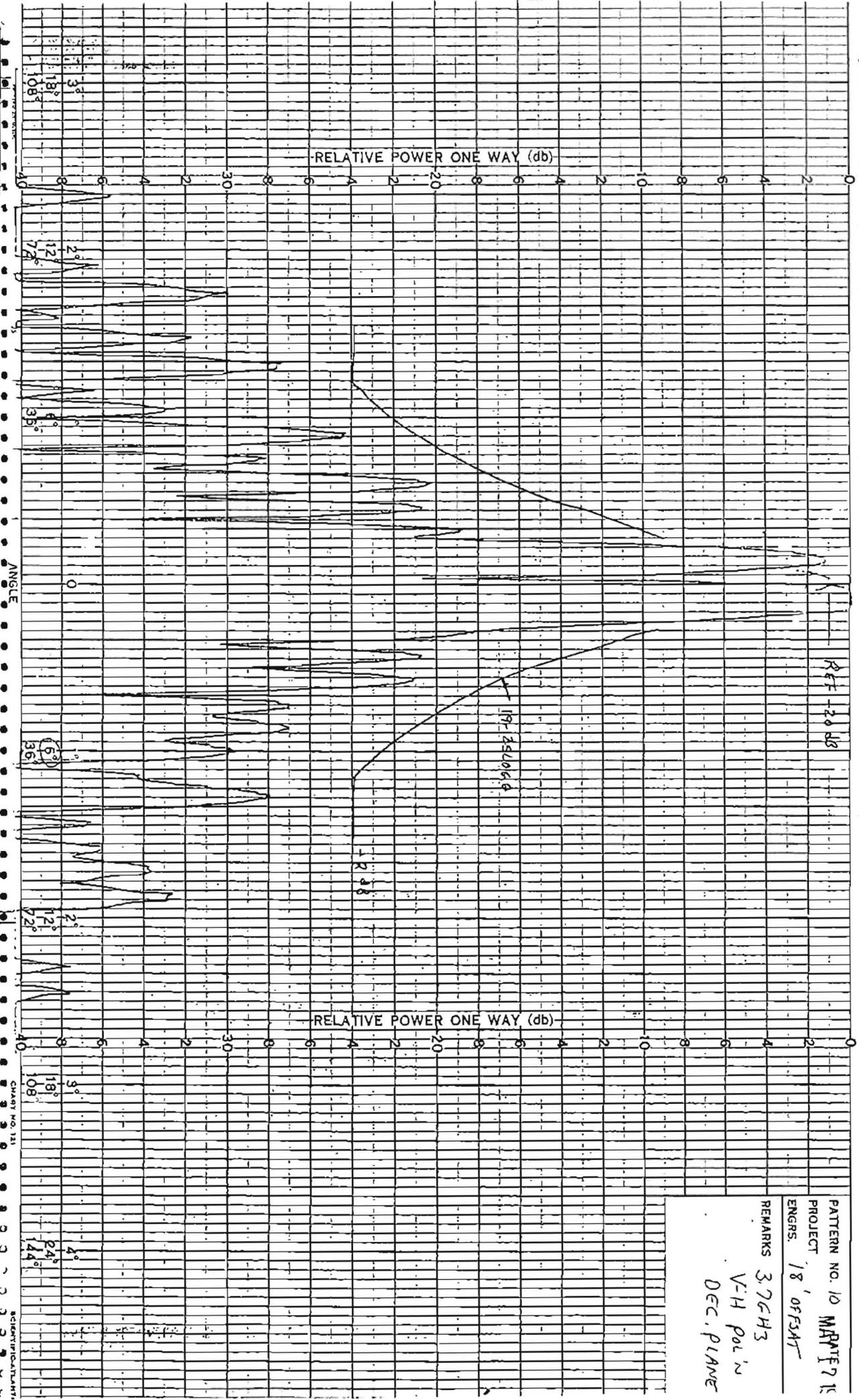
2° 12° 72°

6° 36°

2° 12° 72°

3° 18° 108°

4° 24° 144°



REF - 20 dB

19° 25/06 dB

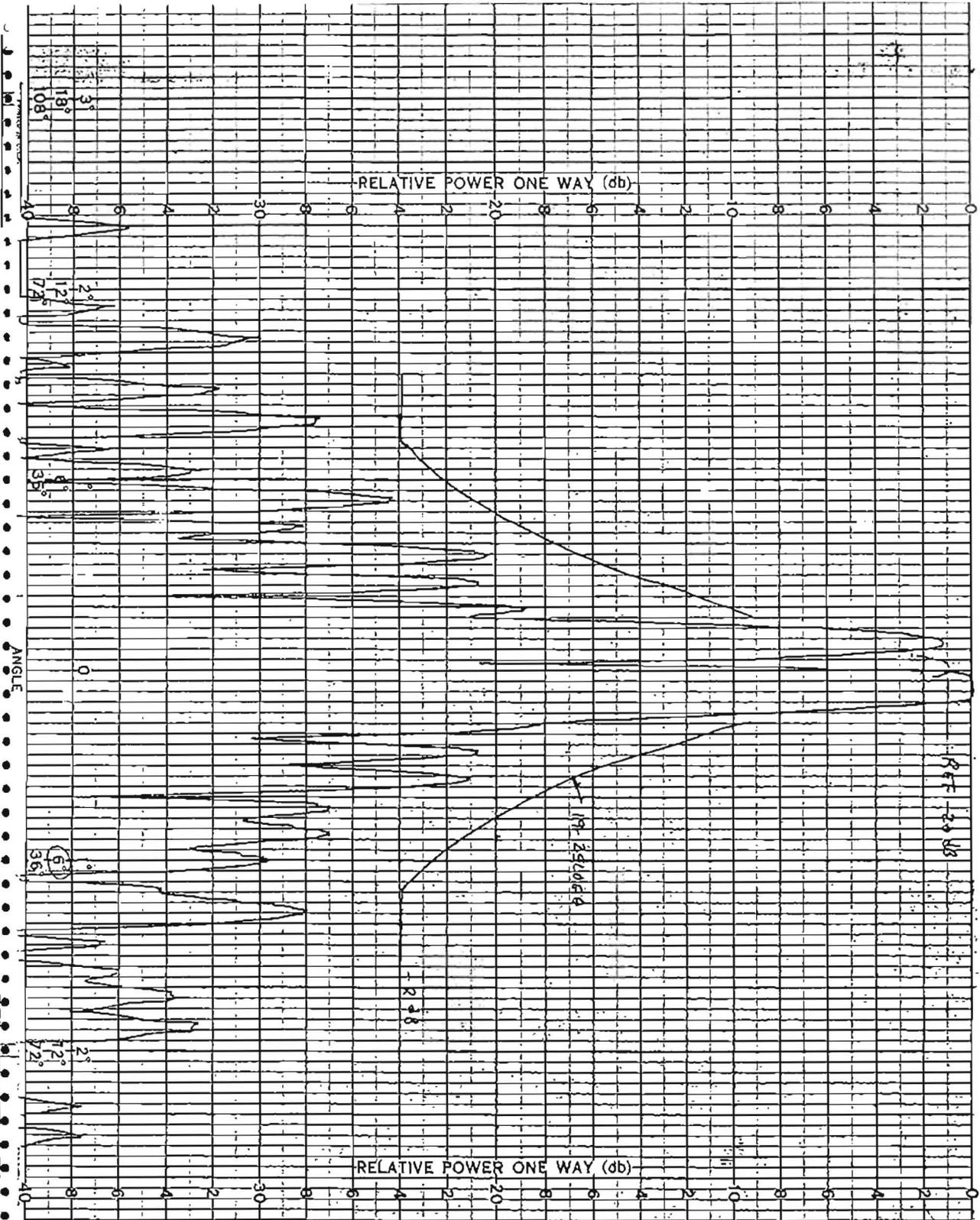
2 dB

PATTERN NO. 10 MPT 7 K
 PROJECT 18' OFFSAT
 ENGRS.

REMARKS 3.7 GHz
 V-H pol in
 DEC. PLANE

CHART NO. 131

REVISIONS



PATTERN NO. 10 MAR 1971
 PROJECT 18 OFSANT
 ENGRS.

REMARKS 3.76M3
 V-H pol'n
 DEC PLANE

CHART NO. 151
 COMMUNICATIONS

RELATIVE POWER ONE WAY (db)

RELATIVE POWER ONE WAY (db)

ANGLE

PATTERN NO. 35 DATE
 PROJECT MAY 17 1984
 ENGRS. 18' OFFSAT
 REMARKS 6.425 GHz
 V-V POL
 H. A. PLANE

+146.2dB

2.25° 13 dB WIDTH

7.53° 15 dB WIDTH

27-25 LOG θ

3°
18°
108°

2°
12°
72°

6°
36°

6°
36°

2°
12°
72°

3°
18°
108°

4°
24°
144°

CHART NO. 131

SCIENT

PATTERN NO 37 MAPPAT 1984

PROJECT 1
ENGRS. 18' OFFSAT

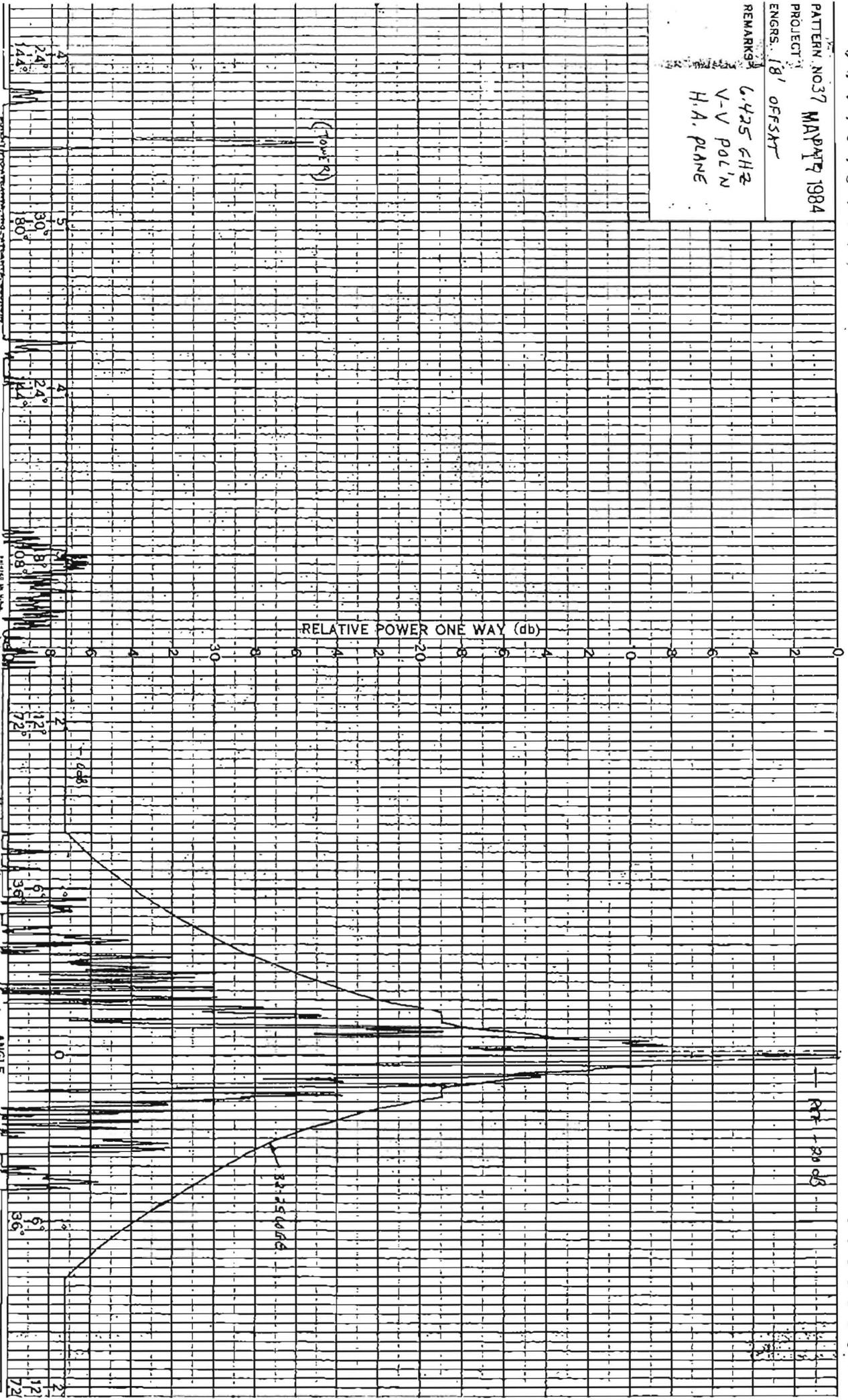
REMARKS
6.425 GHz
V-V POLIN
H.A. PLANE

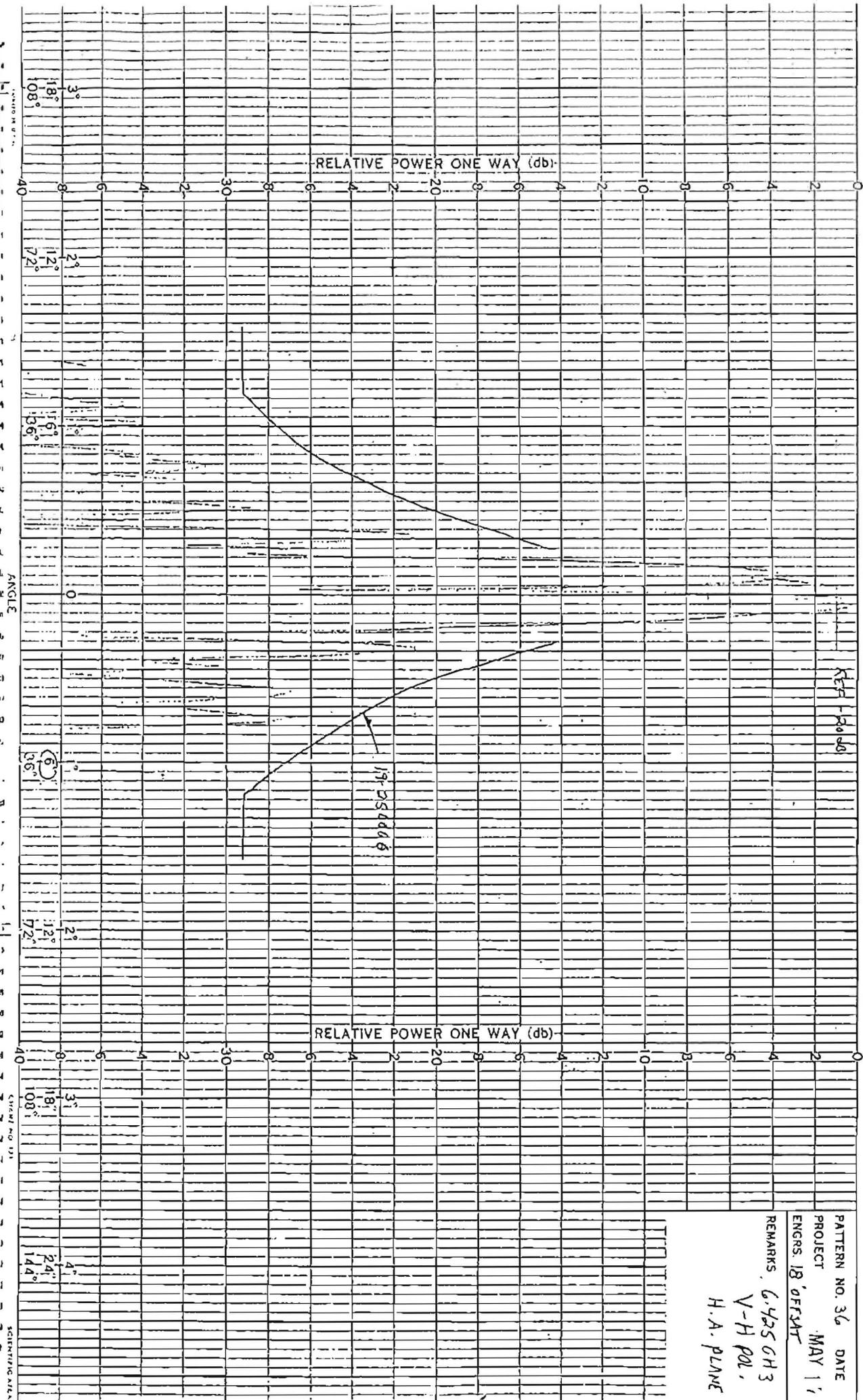
(Total)

RELATIVE POWER ONE WAY (db)

ATT - 20 dB

32.25 dB





REF - 200 200

PATTERN NO. 36 DATE
 PROJECT MAY 11
 ENGRS. 18 OFFSHORE

REMARKS: 6.425 GHz
 V-H POL.
 H.A. PLANE