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TECHNICAL REPORT DTR-R-13

CANADA

DEPARTMENT OF COMMUNICATIONS  
OTTAWA

SPECTRUM INTERFERENCE SURVEY  
PROPOSED TELESAT EARTH STATION  
GRAND BEACH, MANITOBA

TK  
6553  
G732  
1970

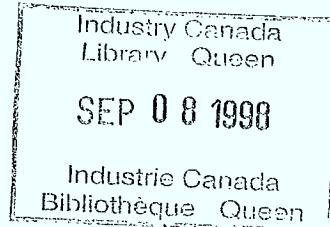
TELECOMMUNICATIONS REGULATION BRANCH  
RADIO AUTHORIZATION AND ENFORCEMENT DIVISION



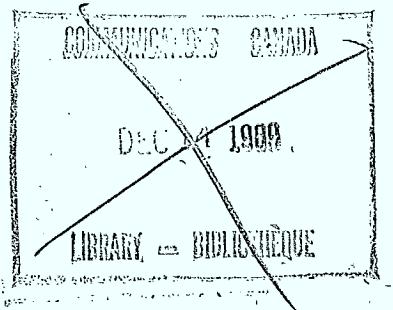
DEPARTMENT OF COMMUNICATIONS  
OTTAWA

TECHNICAL REPORT DTR-R 1970

D.O.C.  
RESOURCE CENTRE  
WINNIPEG



(1) / SPECTRUM INTERFERENCE SURVEY (2)  
PROPOSED TELESAT EARTH STATION  
GRAND BEACH, MANITOBA



TK  
6563  
6732  
1970

DD 9246974  
DL 9250280

GRAND BEACH EARTH STATION

SPECTRUM INTERFERENCE SURVEY

Measurements conducted by the Department of Communications,  
Regulations Engineering Laboratory  
for the Radio Authorization and Enforcement Division  
and for Telesat Canada on August 25-27, 1970.

Measurements conducted and  
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1. Air photo of Grand Beach test sites
2. Ground photo of test site 1
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4. Log periodic test antenna
5. Field intensity meter EMA910
6. Field intensity meter NM62A

## 1.0 INTRODUCTION

- 1.1 General As the space services and terrestrial microwave systems share the same frequency bands it is essential to insure that mutual compatibility exists where such services propose to operate within interference range of each other. A standard method of calculating potential interference exists, however, on-site measurements are essential to validate theoretical studies and to ascertain if any unknown sources of interference can be detected.
- 1.2 Purpose of Investigation The Telecommunications Regulations Branch of D.O.C. and Telesat Canada as a co-operative effort conducted a survey of the frequency spectrum in the vicinity of Grand Beach, Manitoba, where a proposed earth station is to be located. The earth station will be receiving in the band 3700 to 4200 MHz and transmitting in the 5925 to 6425 MHz band (if necessary).

Frequency measurements are required at this proposed site to determine the extent and levels of emissions that might be present from different microwave transmitters in the above frequency bands, and the electromagnetic radiation from high voltage power lines. This information is essential for our System Co-ordination group in the study of system compatibility and to validate calculations done by Telesat/DOC.

As radar transmitters are capable of radiating high levels of spurious or harmonic emissions in the 4 or 6 GHz bands, it is necessary to determine what actual radiations are present.

## 2.0 CONCLUSIONS

- 2.1 Spectrum Search Test Site #1 At test site #1 no microwave signals were detected in the frequency ranges 3.7 - 4.2 or 5.925 - 6.425 MHz. Particular attention was given to azimuths 157° (Beausejour MTS), 185° (Steinbach MTS), 220° (Petersfield CP), 234° (Gunton CP) and 245° (Woodlands CP) which are microwave sites within the earth station co-ordination zone in the 4 and 6 GHz bands. No signals were detected throughout this range noting that the Field Intensity Meter Sensitivity was -110 dBm. The test antenna gain is 21 dBi which results in a minimum detectable signal level of -131 dBm.
- 2.2 Radar Emissions Test Site #1 Radar fundamental signals were detected from defense radars located at Beausejour and Gypsumville, Man. in both "L" and "S" bands but no spurious emissions were detected either in the 4 and 6 GHz bands.
- The Winnipeg Airport and Airways Surveillance Radar or the Airport Surveillance Radar were not detected either at fundamental or harmonic frequencies.
- Neither power line or ignition interference was detected throughout the 4 or 6 GHz frequency ranges.
- 2.3 Spectrum Search Test Site #2 At test site #2 microwave signals were detected from CP stations at Stony and Gunton in the 5.925 - 6.425 GHz bands. This test site was located at the highest elevation in the area

resulting in near line-of-sight conditions. The test site is at least 100 feet higher than the proposed earth station at the Grand Beach Provincial Park. For this reason it is concluded that earth station transmissions in the 6 GHz band should not be of major consequence to the existing CP microwave route based on co-ordination data for the Grand Beach earth station. Tests over a longer period would be useful to establish the long term interference possibilities.

- 2.4 Radar Emissions Test Site #2 Radar fundamental signals were also detected from defense radars at Beausejour, Gimili, Gypsumville and the DOT airport radar at Winnipeg. Spurious signals were detected at 4040 and 4100 MHz from the Beausejour (Bl7) search radar and at 4025 MHz from an unidentified radar (Bl6) suspected to be the Gimili DND station. Further analysis and discussions will be necessary to insure that spurious radar emissions are not of consequence to sensitive earth station receiving frequencies in the 4 GHz range.

3.0 DETAILED TEST REPORT

- 3.1 Test Equipment Used See General Information - Instruments, appendix F61 - Antenna characteristics appendix F59 & F60 - TWT characteristics appendix F58.
- 3.2 Topographical Location The proposed Satellite Earth Station is to be located at Grand Beach, Man. which is approximately 70 miles north-east of Winnipeg, Man. (Figure A).
- 3.3 Topographical Environmental Data The area of measurement was in the Grand Beach Provincial Park adjacent to highway 59. This parkland is heavily forested with evergreens 30-40 feet above ground.
- 3.4 Measurement Locations Site #1 was approximately 800 feet from highway 59 at an elevation of 800 feet. The general terrain was heavily forested with evergreen trees approximately 30-40 feet above ground level.

Site #2 was the highest ground in the area and approximately 100 feet above the proposed earth station location. The land was lightly forested with numerous gravel beds in proximity. Unobstructed view of Lake Winnipeg and in other directions was possible.

FIG. A

GRAND BEACH EARTH STATION

Scale: 4 miles to 1 inch  
Contour intervals 100'

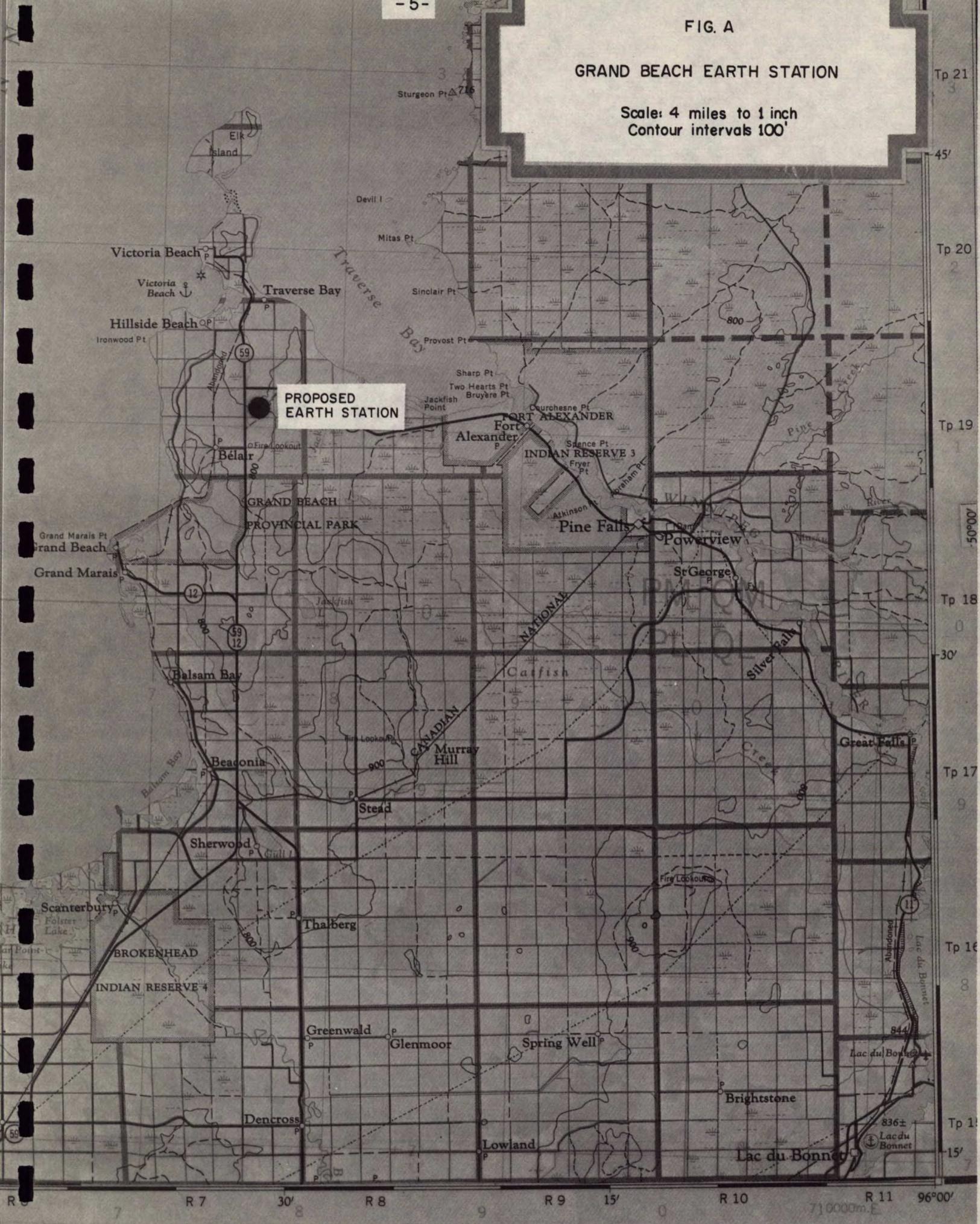
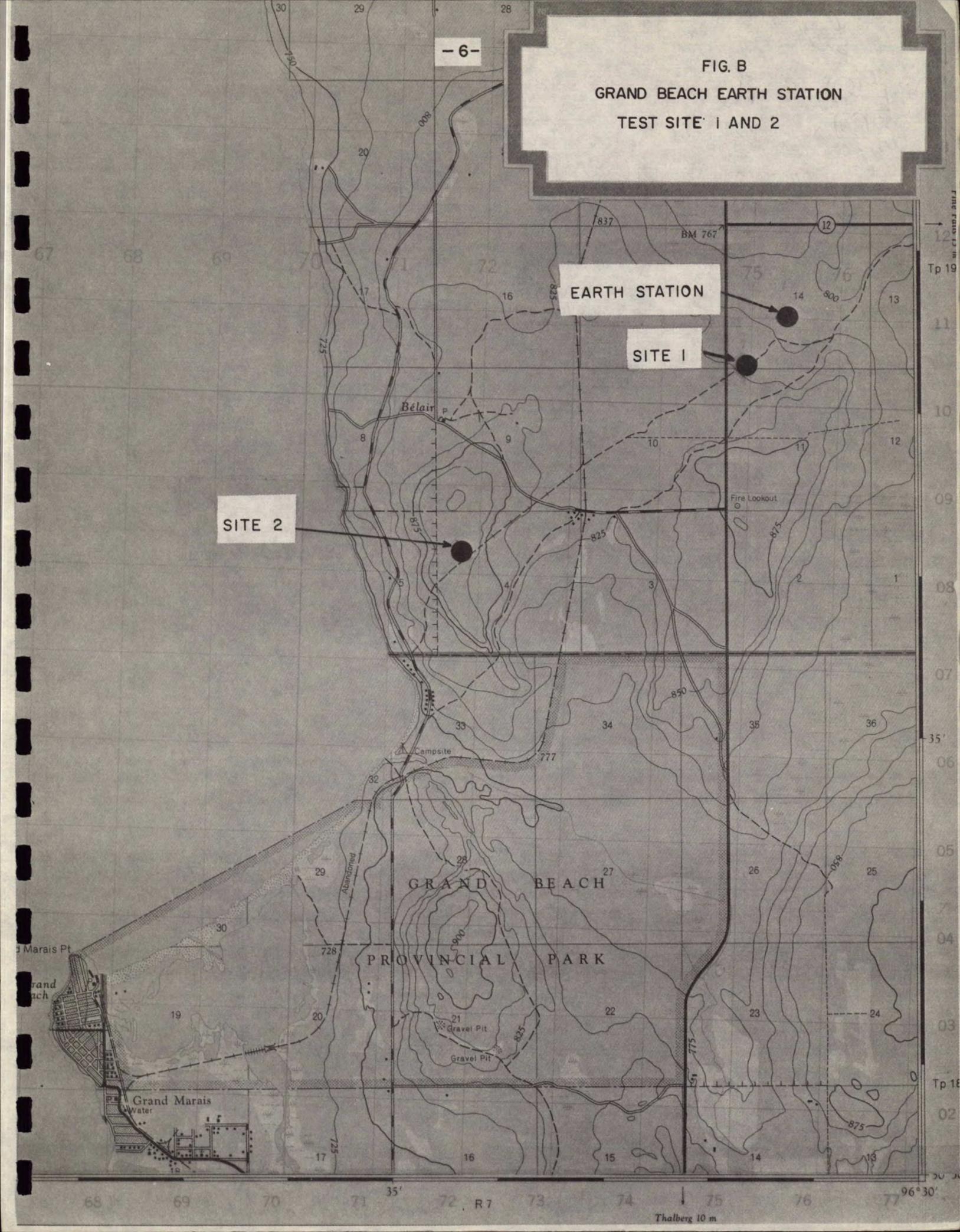


FIG. B  
GRAND BEACH EARTH STATION  
TEST SITE 1 AND 2

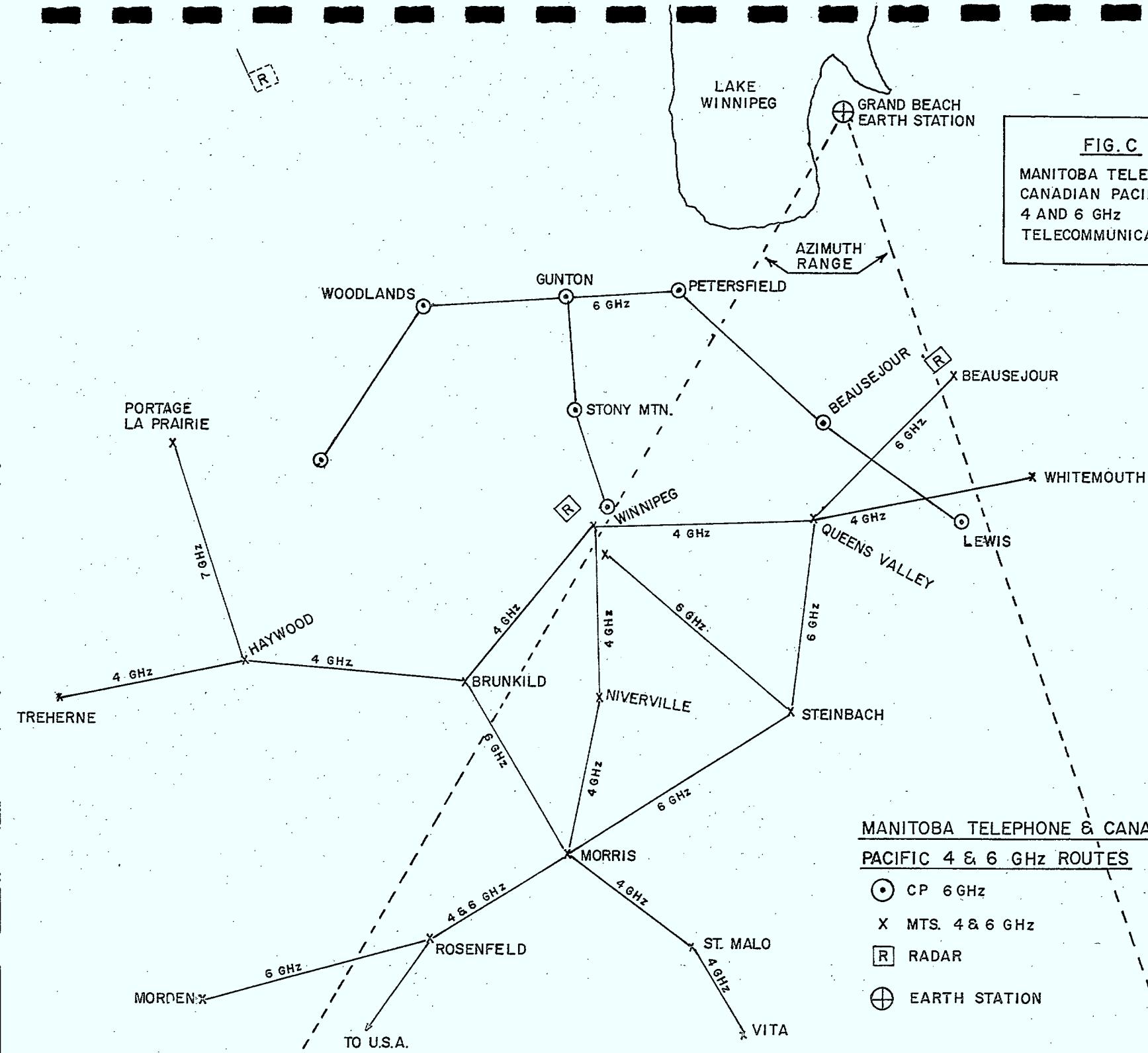


#### 4.0 GENERAL SYSTEM INFORMATION

- 4.1 Systems The systems under test (Figure C) were the various military radar transmitters, Airport and Airways Surveillance radars, weather surveillance radars, Secondary radars, Tacan, microwave communications systems, power lines and ignition noise particularly in the 70 MHz range. The Canadian Pacific Telecommunications 6 GHz microwave system was closely monitored to determine if signals could be detected at the proposed earth station. Manitoba Telephone's 4 GHz sites were also closely monitored to establish if interference was possible.
- 4.2 Scope of the Tests The tests were conducted to check for any detectable signals and to measure absolute levels of transmissions in the microwave bands 3.700 to 4.200 GHz, 5.925 to 6.425 GHz and power line radiation or other signals in the band 70 MHz  $\pm$  20 MHz.
- 4.3 Month and Year of Measurement The tests began on August 25 and were completed on August 26, 1970.
- 4.4 Limitations of Equipment As can be seen from the X - Y plots there is a variation in the spectrum recordings which is attributed to the shift in the local oscillator of the FIM or in the X - Y amplifier. There is some play in the telescoping sections of the antenna mast plus the readout on the rotary control indicator which is accurate only to approximately  $\pm 2^\circ$ . These factors should not have any significant effect on the measurement accuracy but are mentioned to explain this situation.

R  
FIG. C

MANITOBA TELEPHONE &  
CANADIAN PACIFIC  
4 AND 6 GHz  
TELECOMMUNICATIONS ROUTES



## 5.0 SPECIFIC EARTH STATION INFORMATION

- 5.1 Function The Grand Beach, Man., earth station is to serve as a Network TV site in the Canadian Domestic Communication Satellite System. As a NTV site, it will be equipped initially for reception of two network television channels. Future expansion will be possible including the capability to transmit where necessary. The channel switching functions will be remotely controlled from the Master Control station at Allan Park, Ontario.
- 5.2 Characteristics Characteristics of proposed Communication Satellite Earth Station at Grand Beach are shown in Appendix G62-67 Table 1 and Figures 1, 2, 3, 4 attached.

## 6.0 TEST METHOD AND RESULTS

6.1 The following tests were conducted:

Test #1. Microwave signal search measurements 1-10 GHz.

Test #2. Radar surveillance measurements 4 and 6 GHz bands.

Test #3. Power line and ignition interference measurements.

6.2 Test #1. Prior to making measurements the equipment was calibrated according to the following procedures:

The signal generator was fed to the FIM via the input cabling and the TWT (see appendix F57). Frequency markers were plotted manually on the X - Y plotter every 50 MHz between 3.8 and 4.25 GHz. Next the X-Y plotter was calibrated in 5 dB increments starting at -105 dBm and at each of the above frequency markers. With the input cable terminated an X - Y plot was obtained showing the noise level of the FIM from 3.8 to 4.25 GHz.

With the equipment calibrated as above X - Y plots were made of the spectrum in the 4 or 6 GHz bands in the appropriate polarization mode. Starting at 0° true North and every 20° thereafter (log periodic beamwidth 10°) the spectrum was automatically scanned on the FIM for the bands concerned. (See X-Y plots for results).

The same procedure was used to calibrate in the 4 & 6 GHz frequency ranges and a spectrum recording was done in a particular azimuth where a radar or microwave site was located.

6.3 Test #2. For the power line radiation tests the dipole antenna was mounted on top of the mobile laboratory and oriented towards the power line for maximum readings.

During the above tests power line radiation and automobile ignition noise was barely detected but was not measured as significant interference.

6.4 Test #3. In checking for radar emissions in the 4 & 6 GHz bands the same procedures as outlined previously were used. Specific frequency ranges in the 3.7 - 4.2 and 5.925 - 6.425 GHz bands were manually scanned with the test receiving antenna oriented towards known radar sites.

**APPENDIX A**

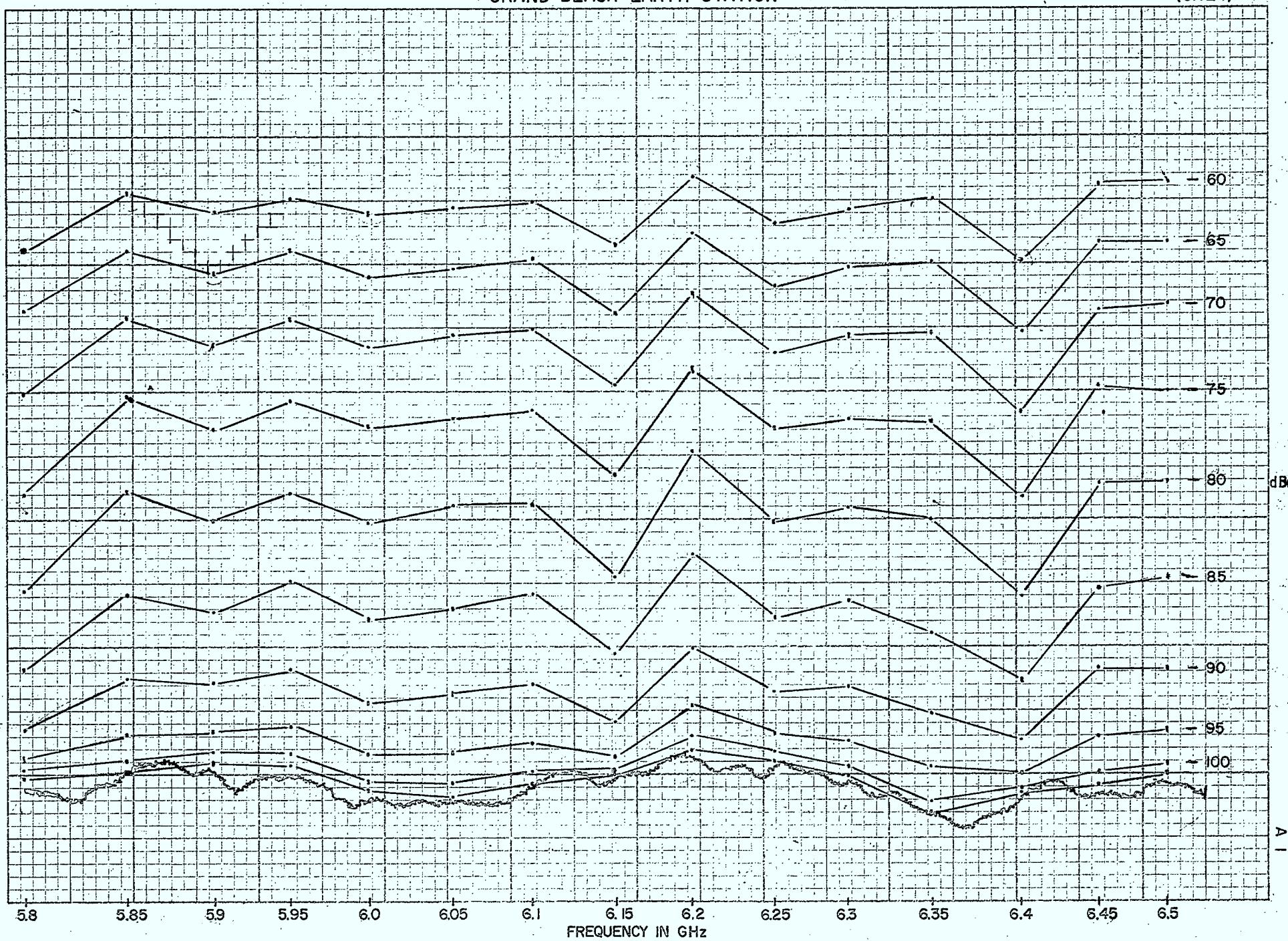
**(site #1)**

**X-Y PLOTS OF FREQUENCY RANGE 5.925 - 6.425 GHz**

- |                    |  |
|--------------------|--|
| <b>Appendix A1</b> | Equipment calibration chart indicating measurement sensitivity |
| <b>Appendix A2</b> | Recording of azimuth 185° towards MTS Steinbech site           |
| <b>Appendix A3</b> | Recording of azimuth 157° towards MTS Beausejour site          |
| <b>Appendix A4</b> | Recording of azimuth 245° towards CP Woodlands site            |
| <b>Appendix A5</b> | Recording of azimuth 234° towards CP Gunton site               |
| <b>Appendix A6</b> | Recording of azimuth 219° towards CP Petersfield site          |

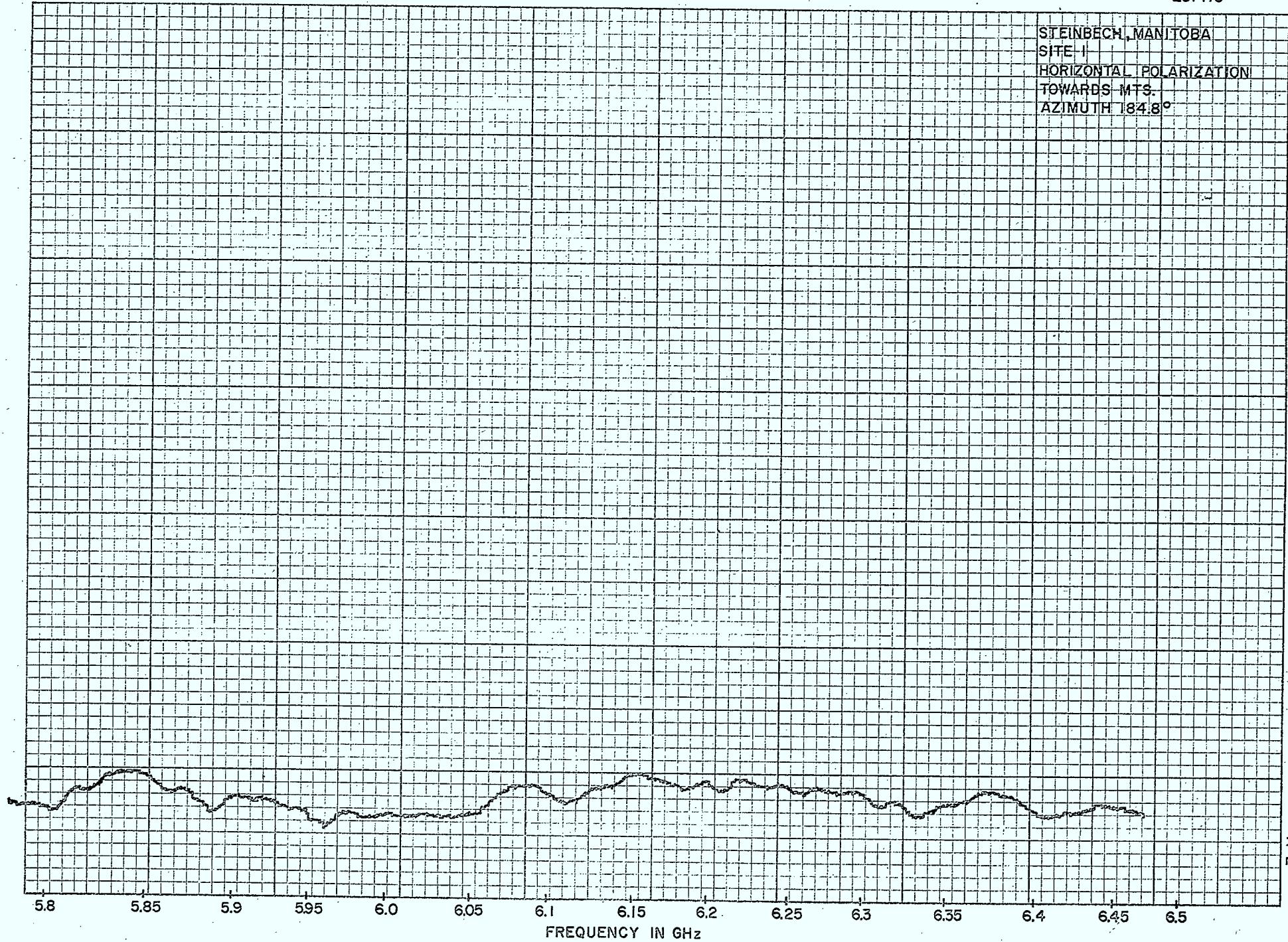
CALIBRATION CHART, HORIZONTAL POLARIZATION  
GRAND BEACH EARTH STATION

25/8/70  
(SITE 1)



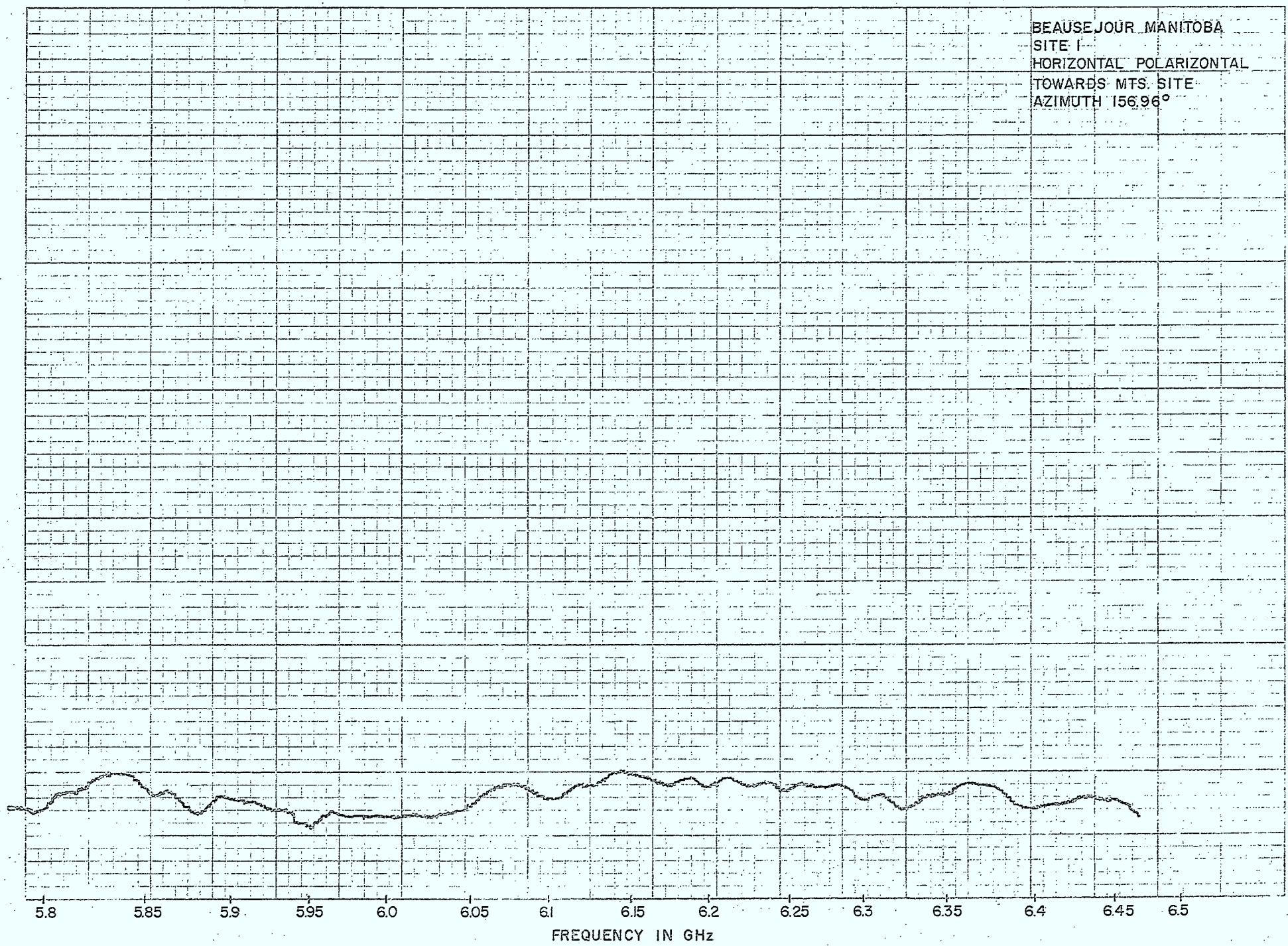
251418

STEINBECH, MANITOBA  
SITE I  
HORIZONTAL POLARIZATION  
TOWARDS MTS.  
AZIMUTH 184.8°



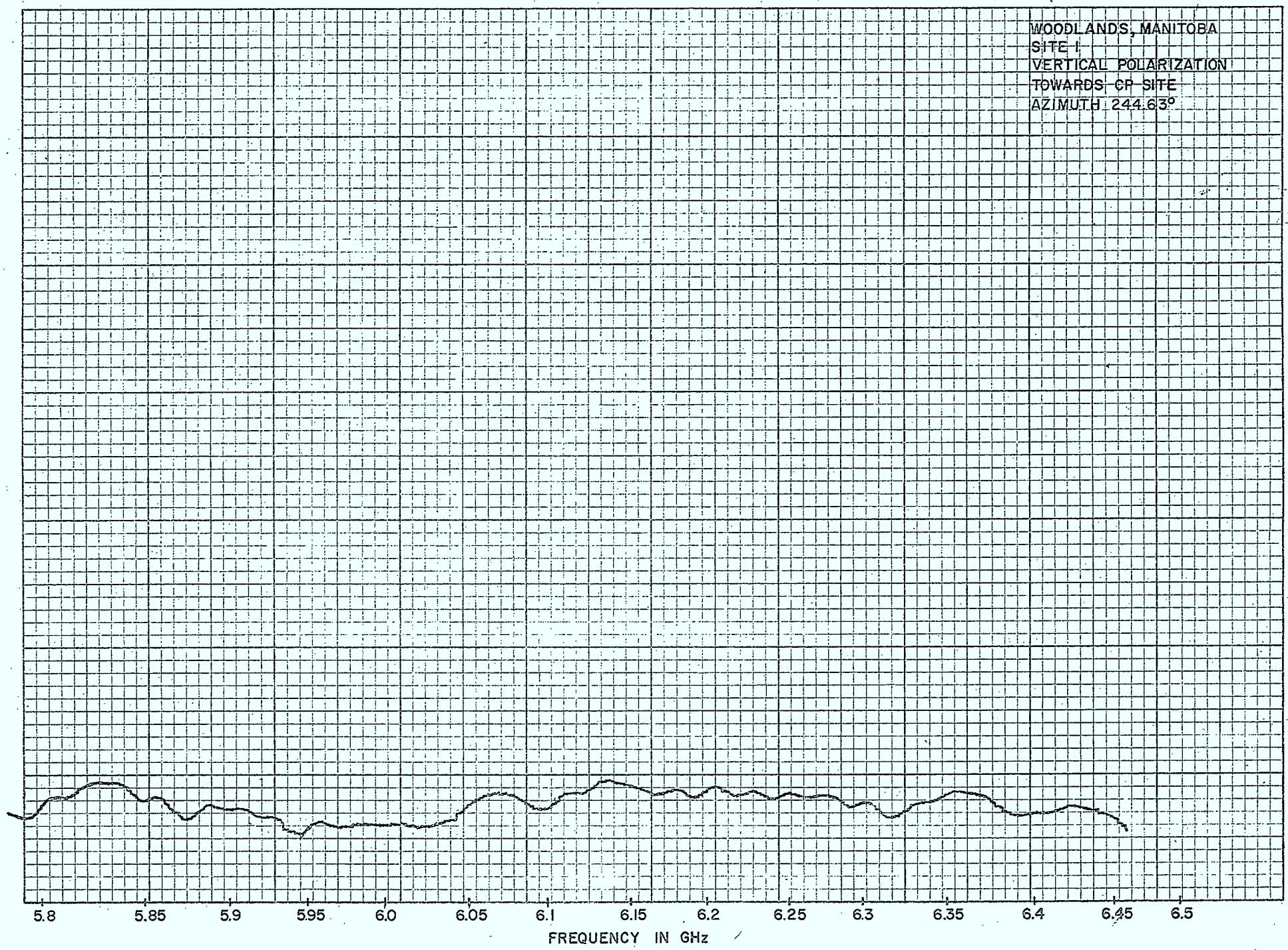
251430

BEAÜSE JOUR MANITOBA  
SITE I  
HORIZONTAL POLARIZANTAL  
TOWARDS MTS. SITE  
AZIMUTH 156.96°



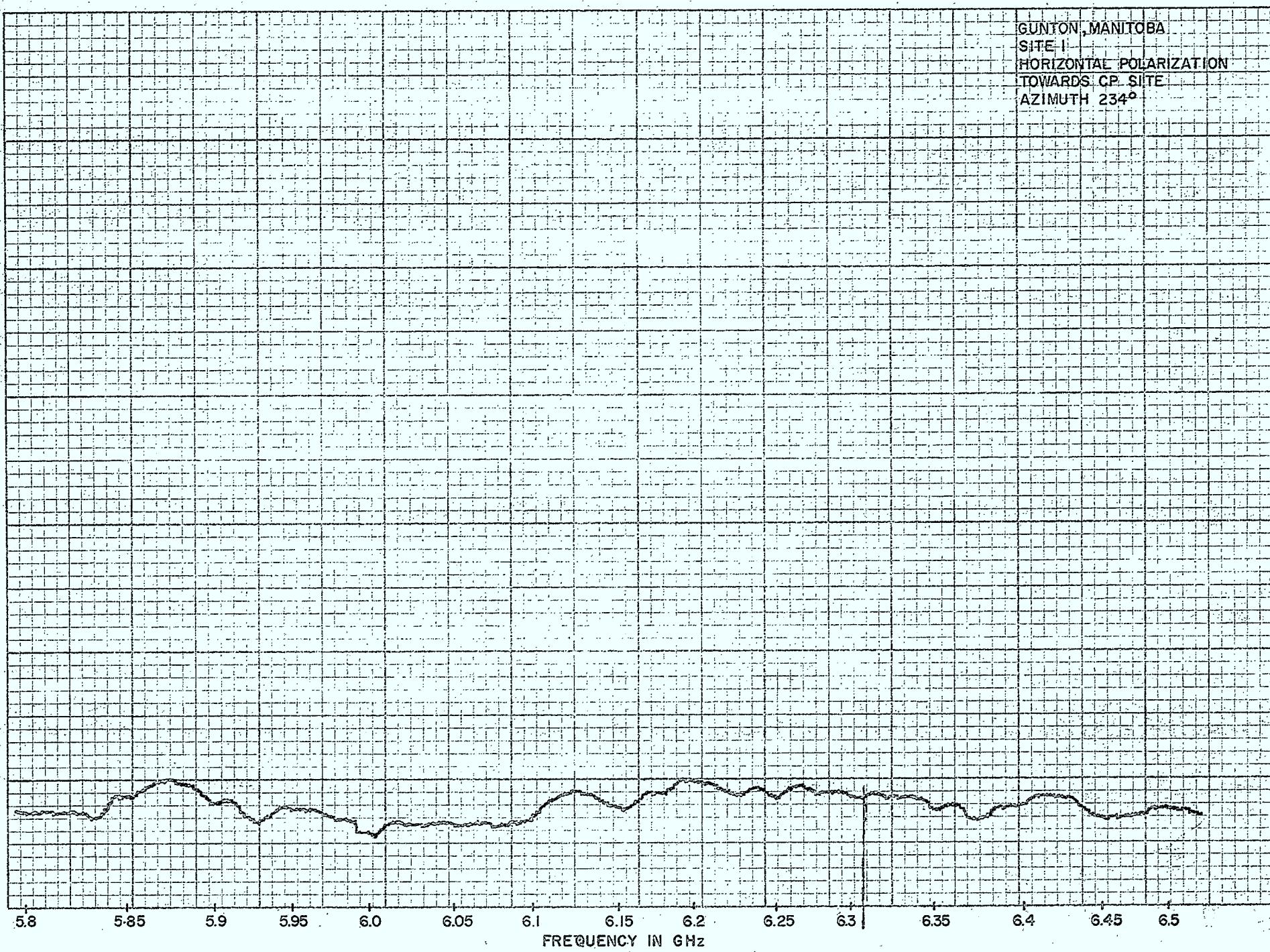
251448

WOODLANDS, MANITOBA  
SITE I  
VERTICAL POLARIZATION  
TOWARDS CP-SITE  
AZIMUTH 244.6 $^{\circ}$



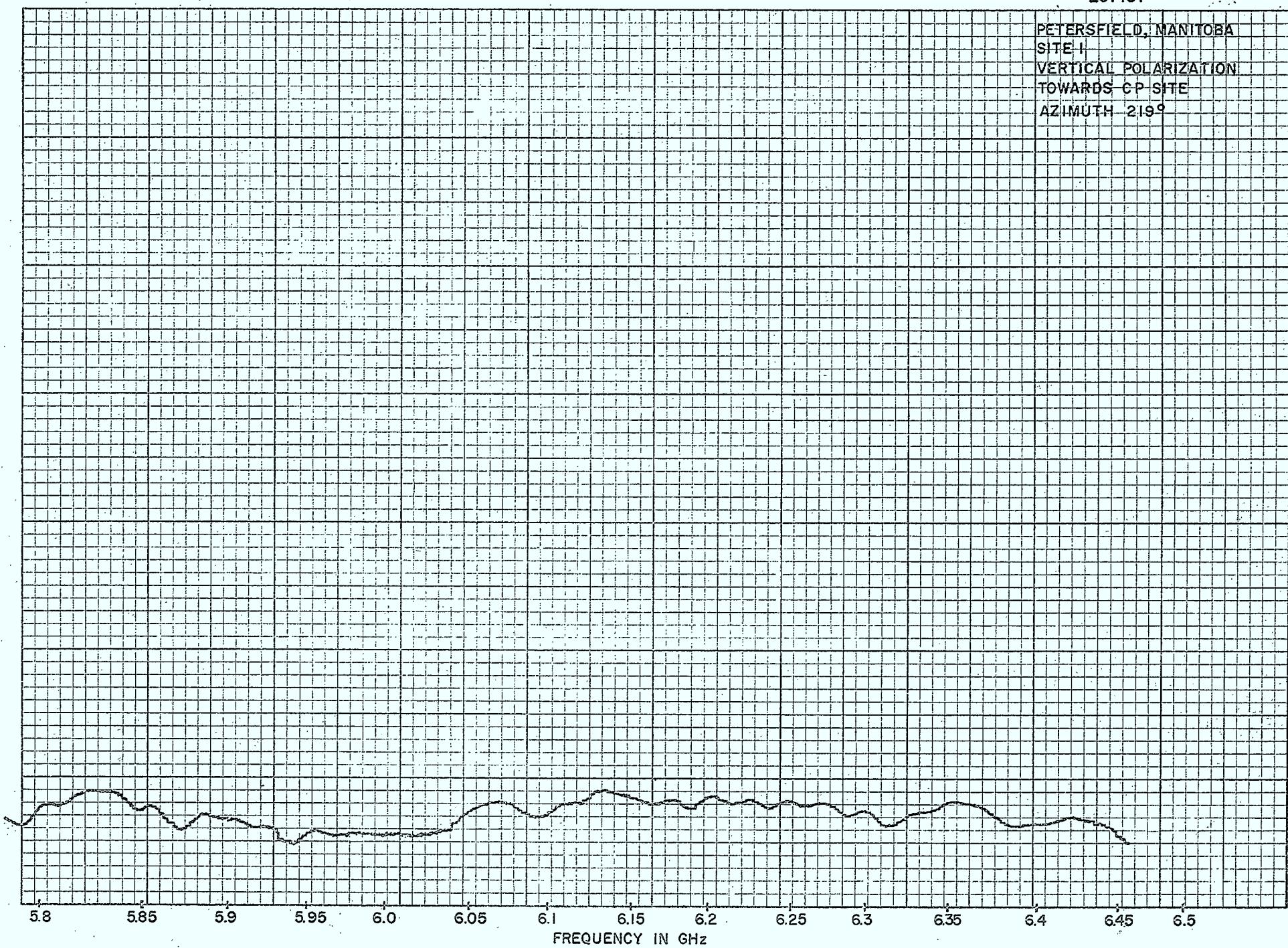
251400

GUNTON, MANITOBA  
SITE I  
HORIZONTAL POLARIZATION  
TOWARDS CP SITE  
AZIMUTH 234°



251457

PETERSFIELD, MANITOBA  
SITE I  
VERTICAL POLARIZATION  
TOWARDS CP SITE  
AZIMUTH 219°



APPENDIX B  
(site 2)

X-Y Plots of Frequency Range 3.5 - 4.2 GHz

APPENDIX 7

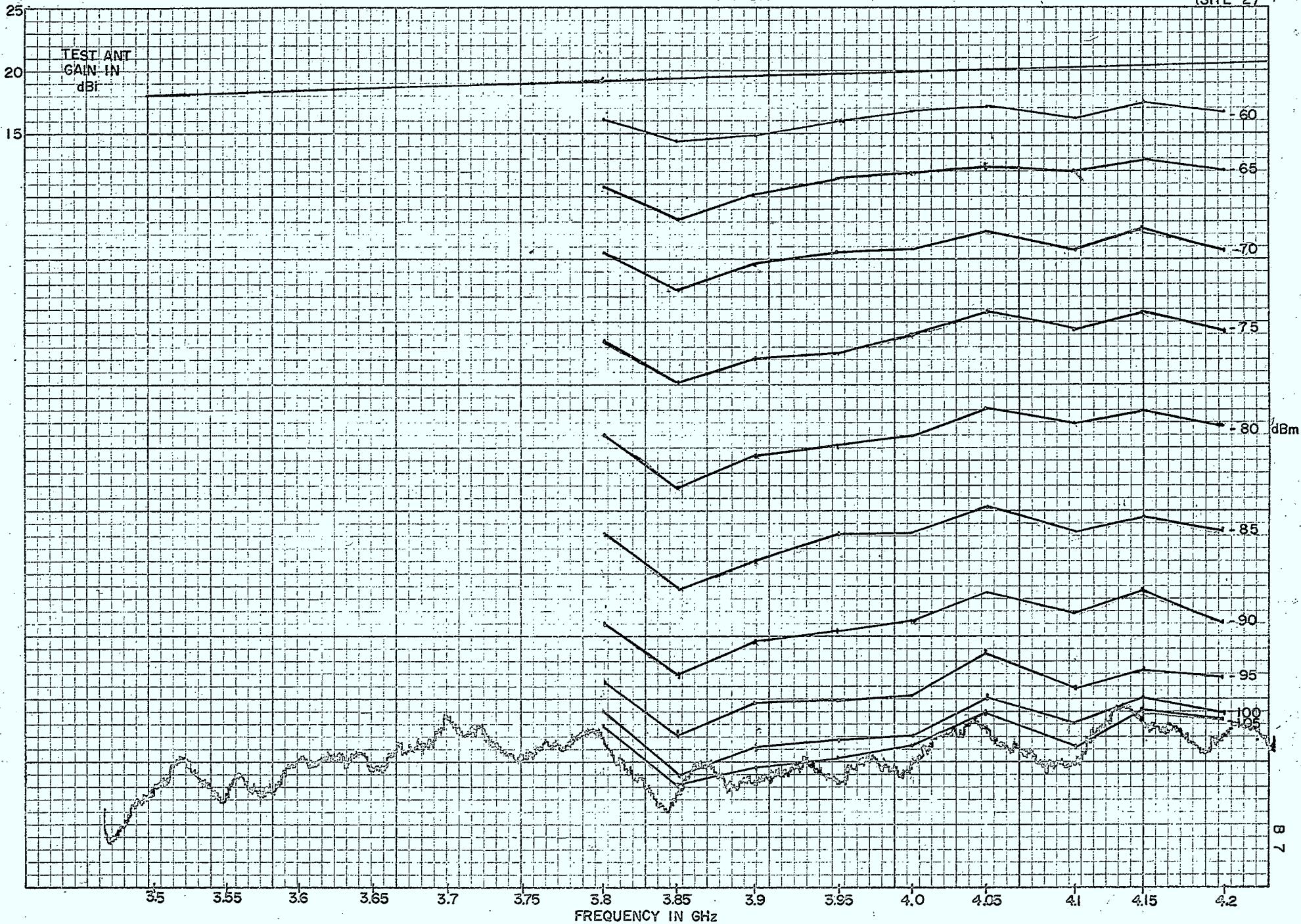
Equipment calibration chart  
indicating measurement sensitivity

APPENDICES 8 - 25

X-Y plots of azimuths 0-360°  
every 20°

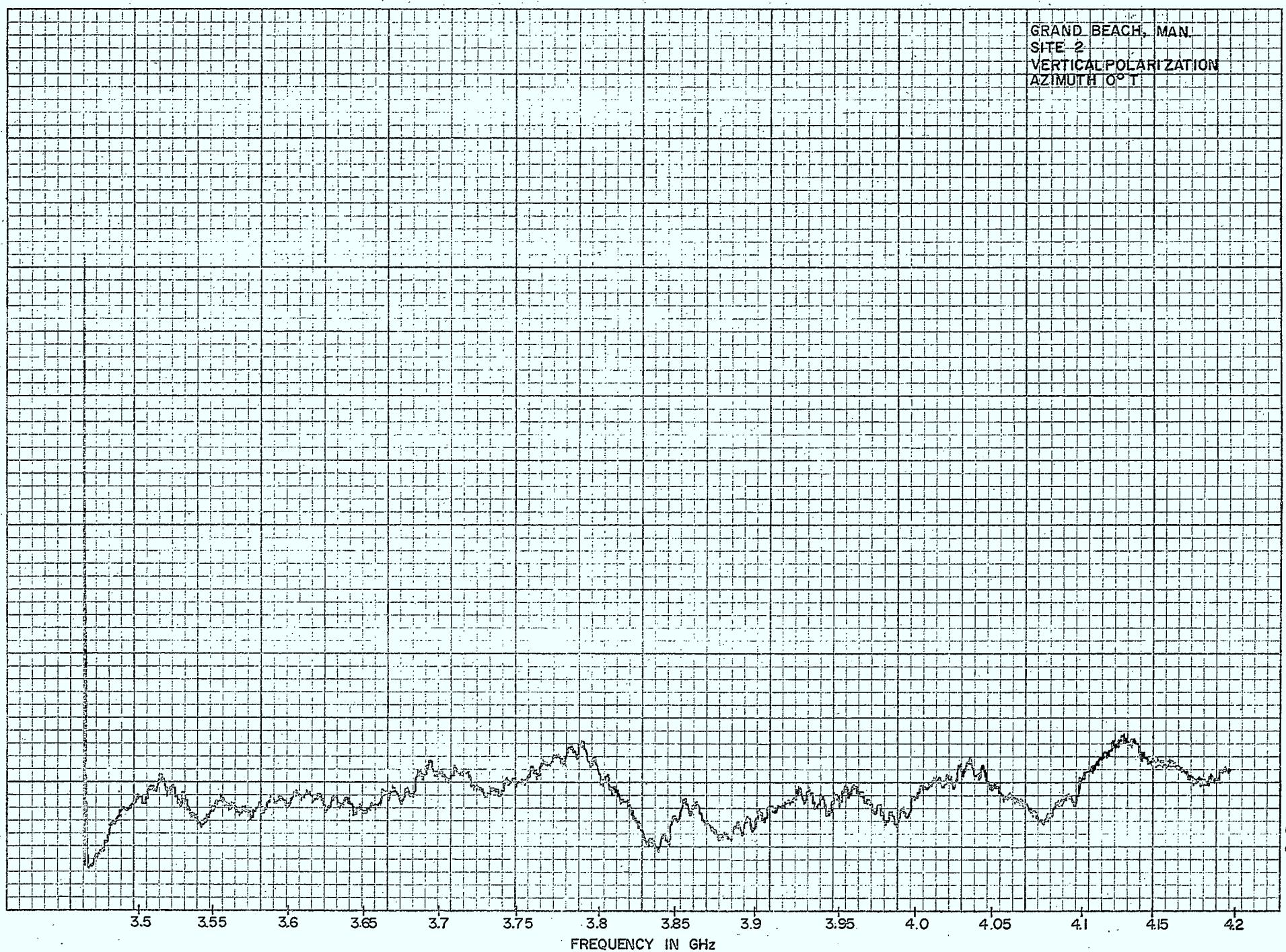
CALIBRATION CHART, VERTICAL POLARIZATION  
GRAND BEACH EARTH STATION

261630  
(SITE 2)



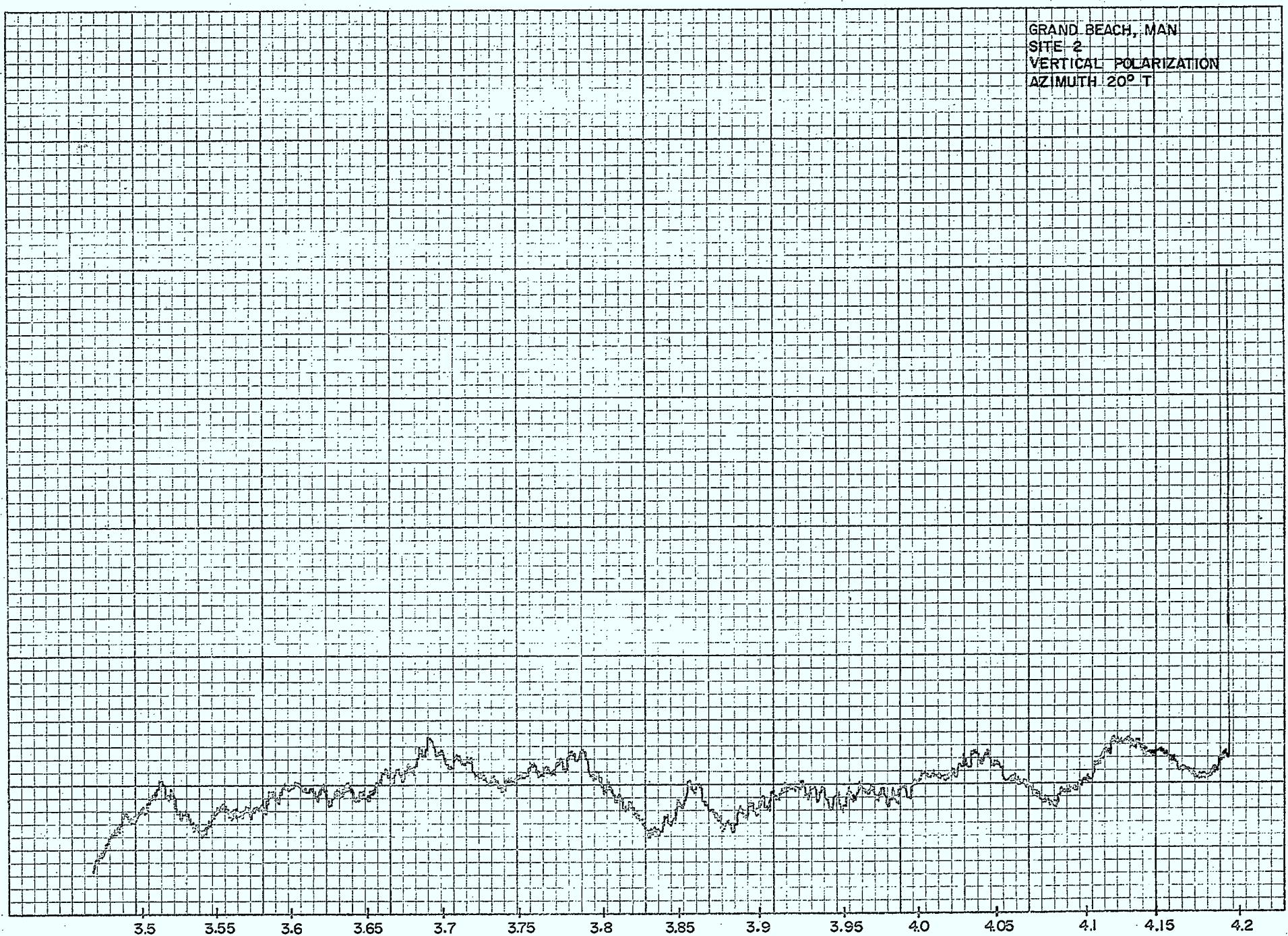
261721

GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 0° T



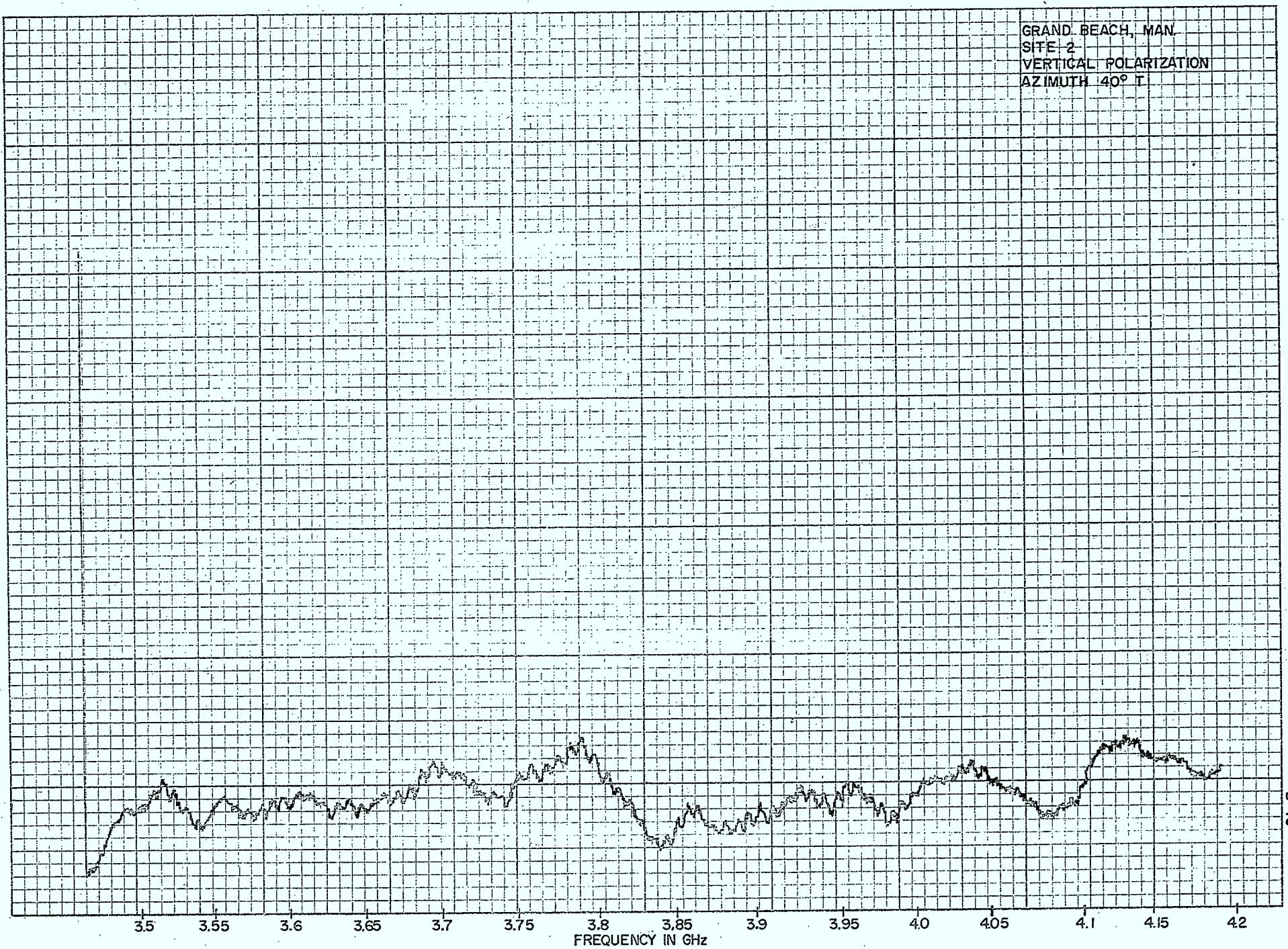
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GRAND BEACH, MAN  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 20° T



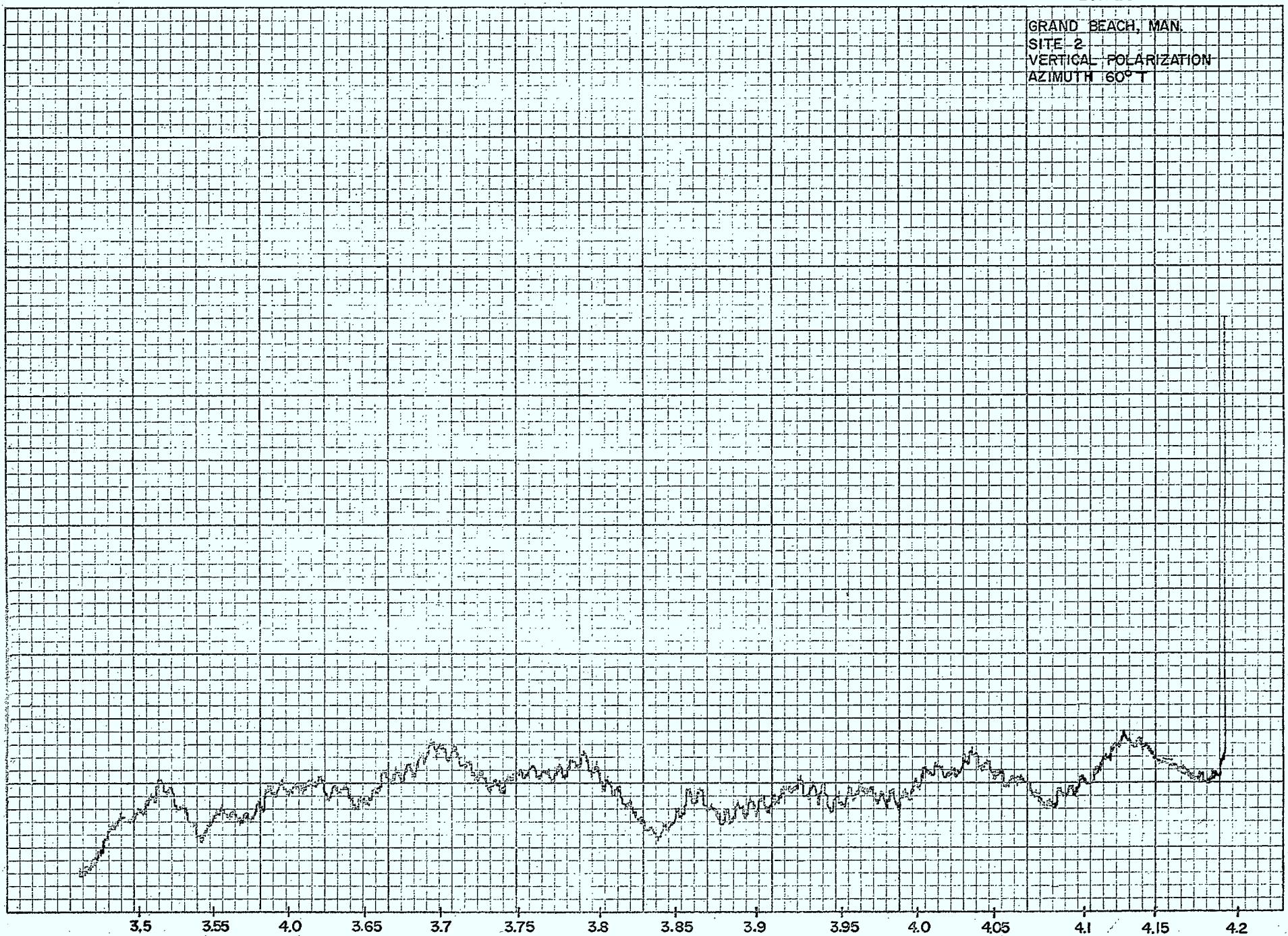
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GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 40° T



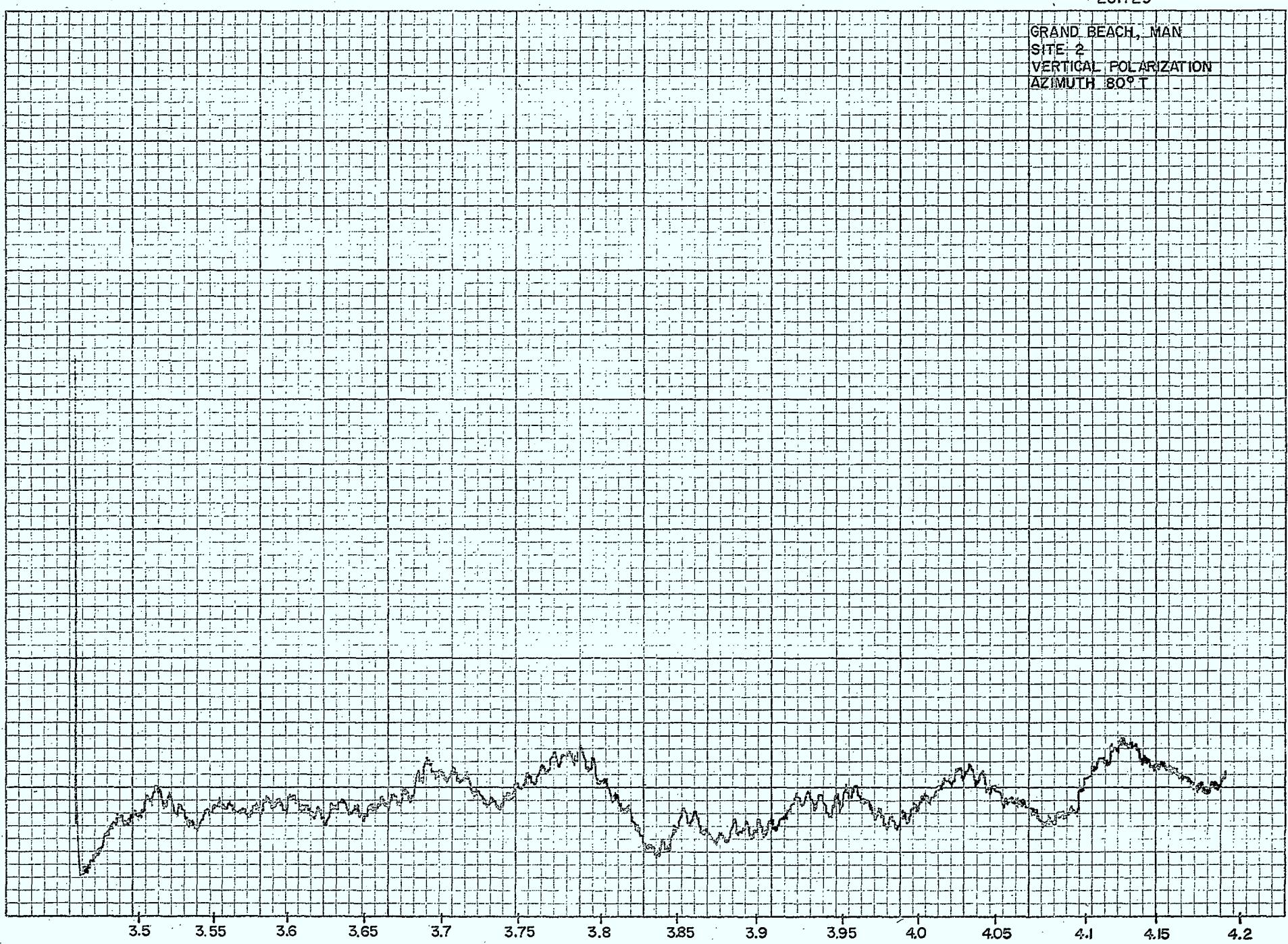
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GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 60° T



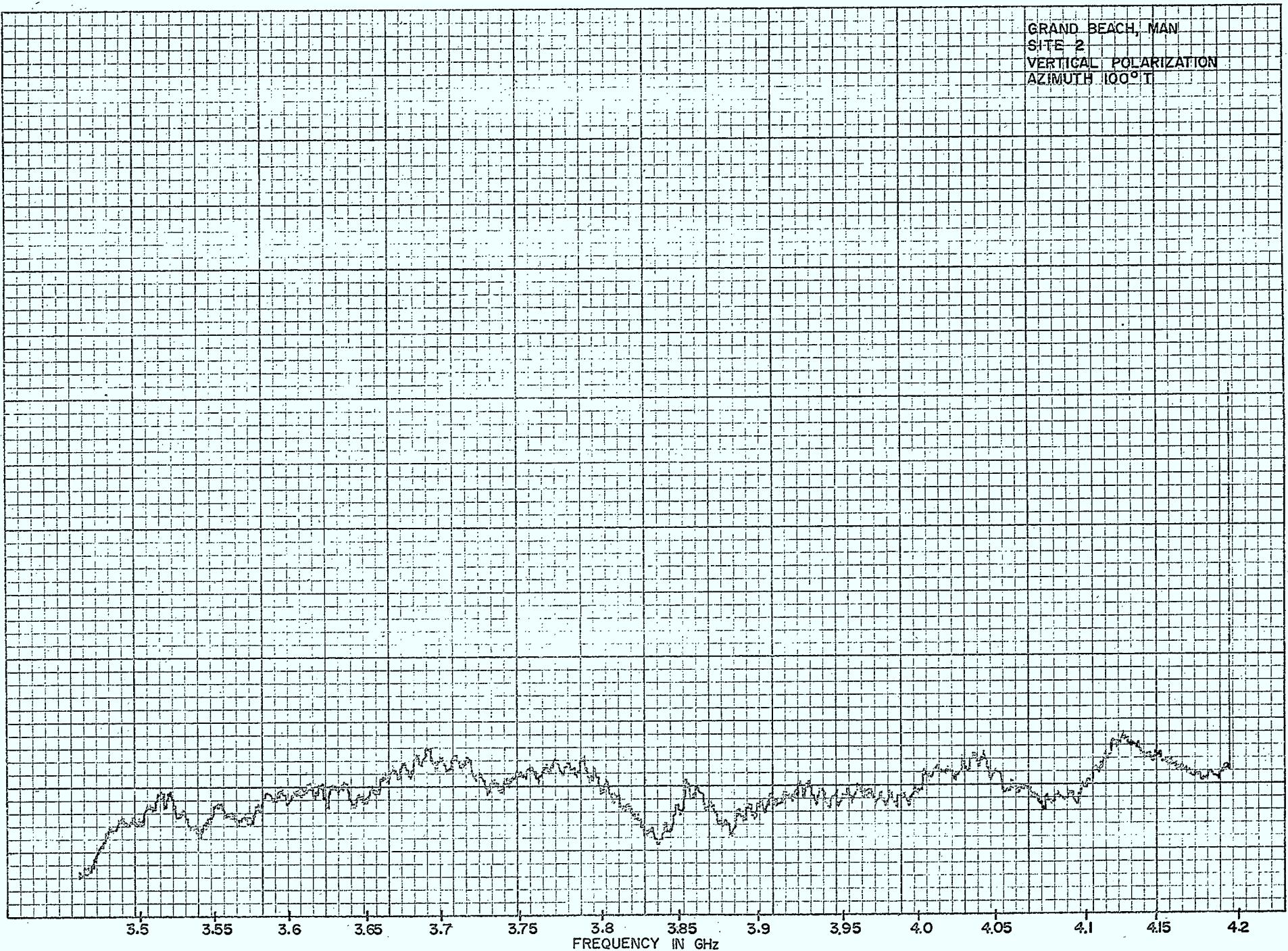
261729

GRAND BEACH, MICH  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 80° T



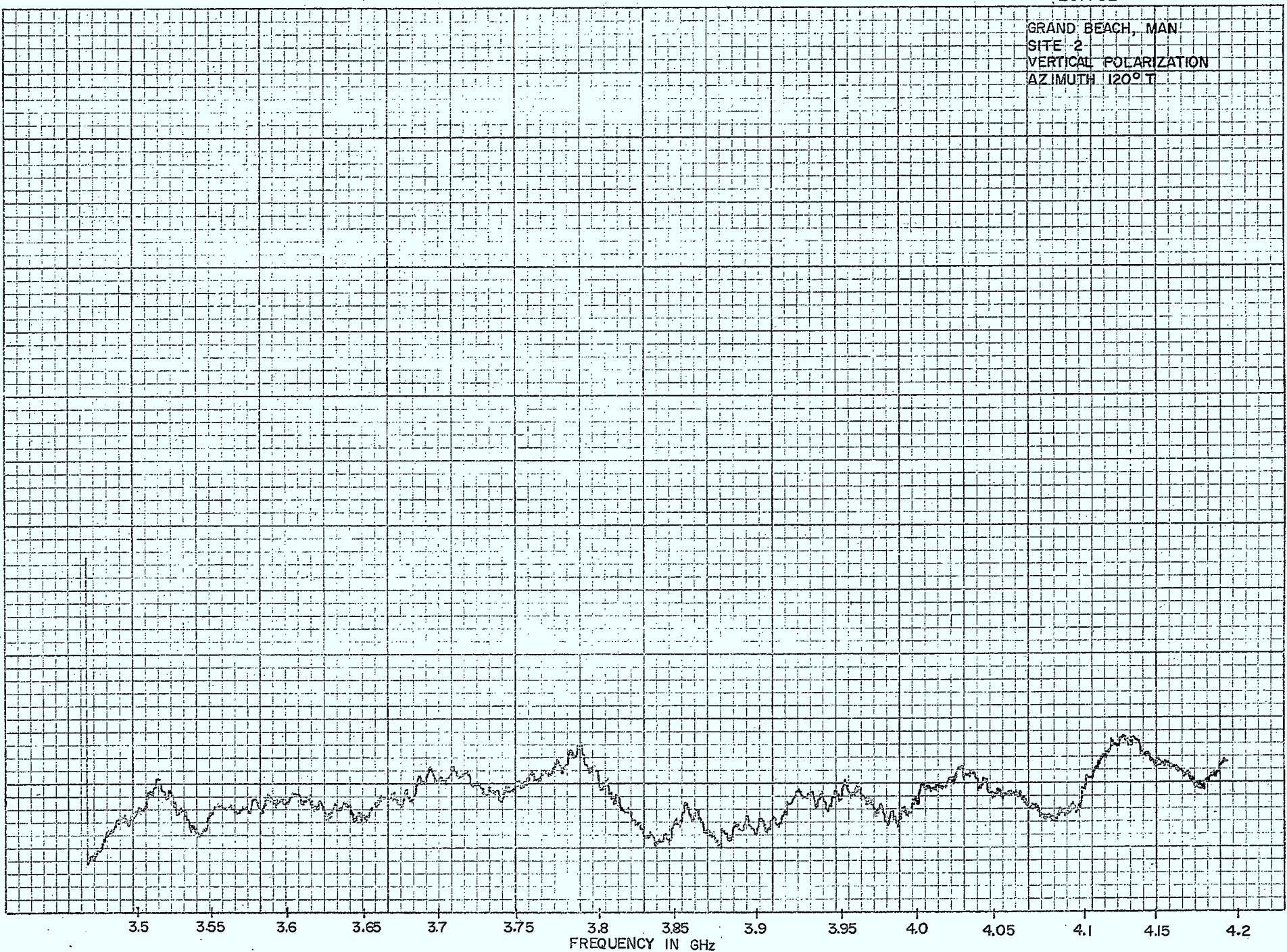
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GRAND BEACH, MAN  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH  $100^{\circ}$  T



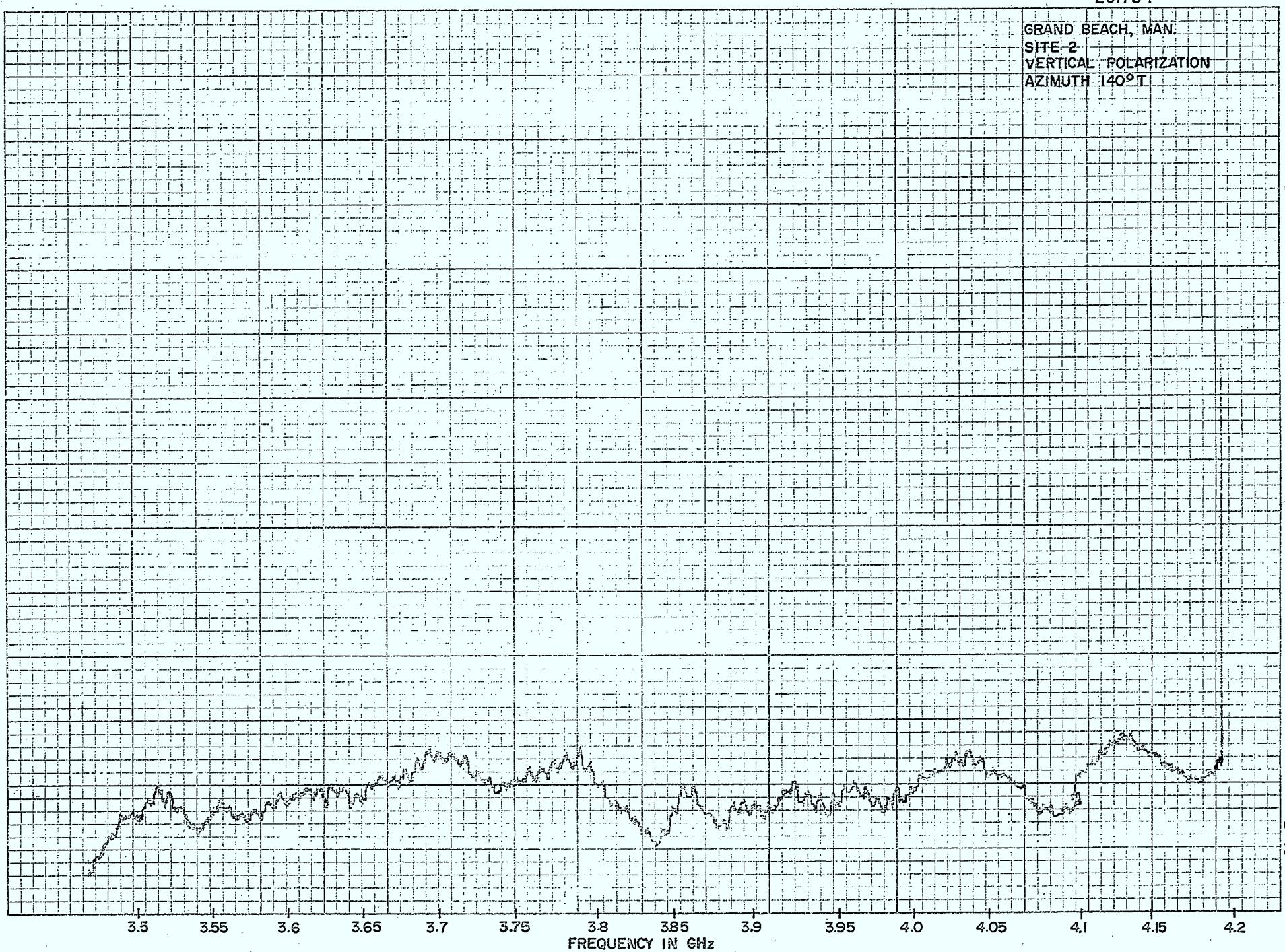
261732

GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 120° T.



261734

GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 140° IT



261657

GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 260° T

SPURIOUS  
RADAR  
SIGNAL

-90dBm

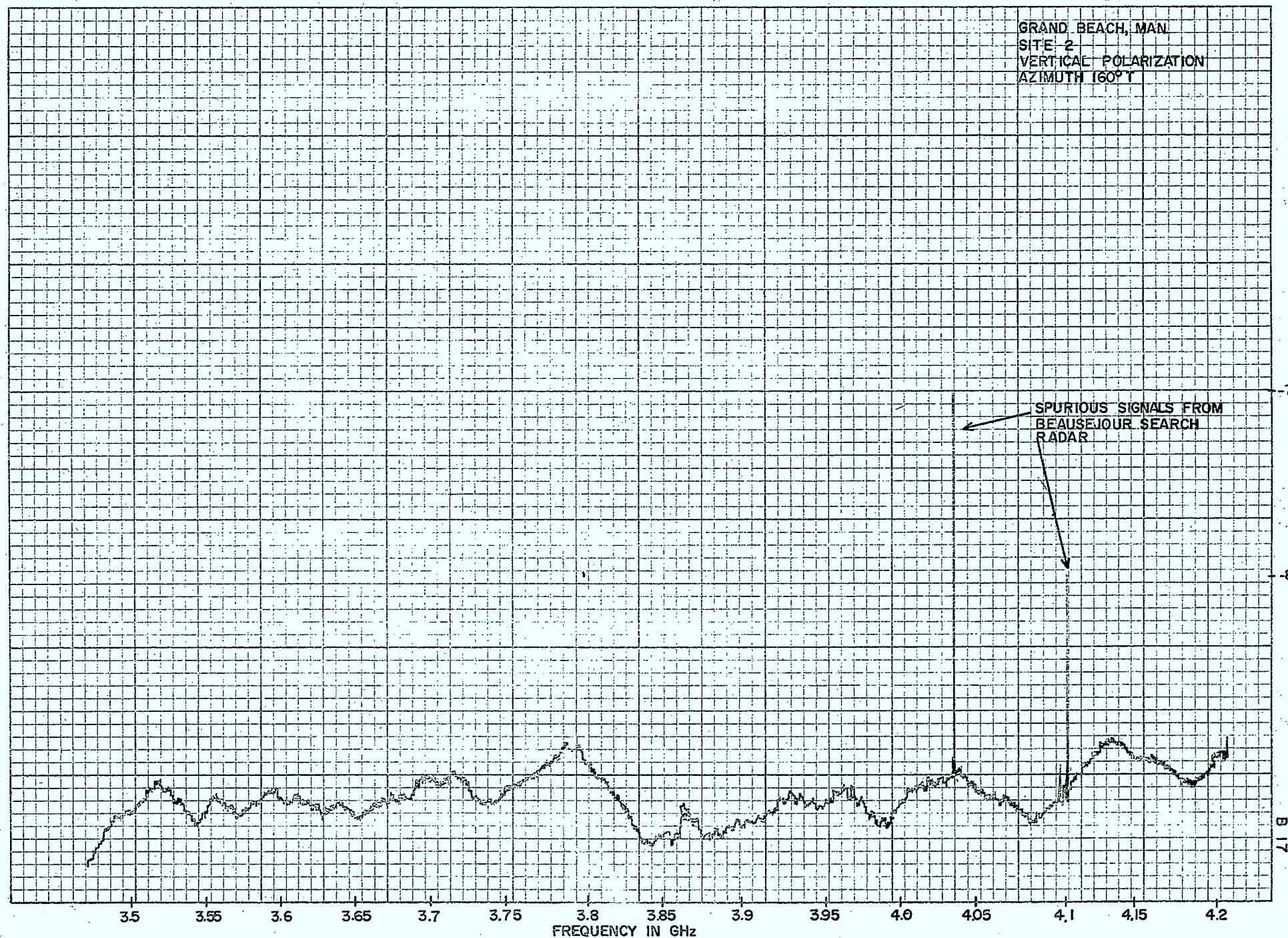
dB

FREQUENCY IN GHz.

3.5 3.55 3.6 3.65 3.7 3.75 3.8 3.85 3.9 3.95 4.0 4.05 4.1 4.15 4.2

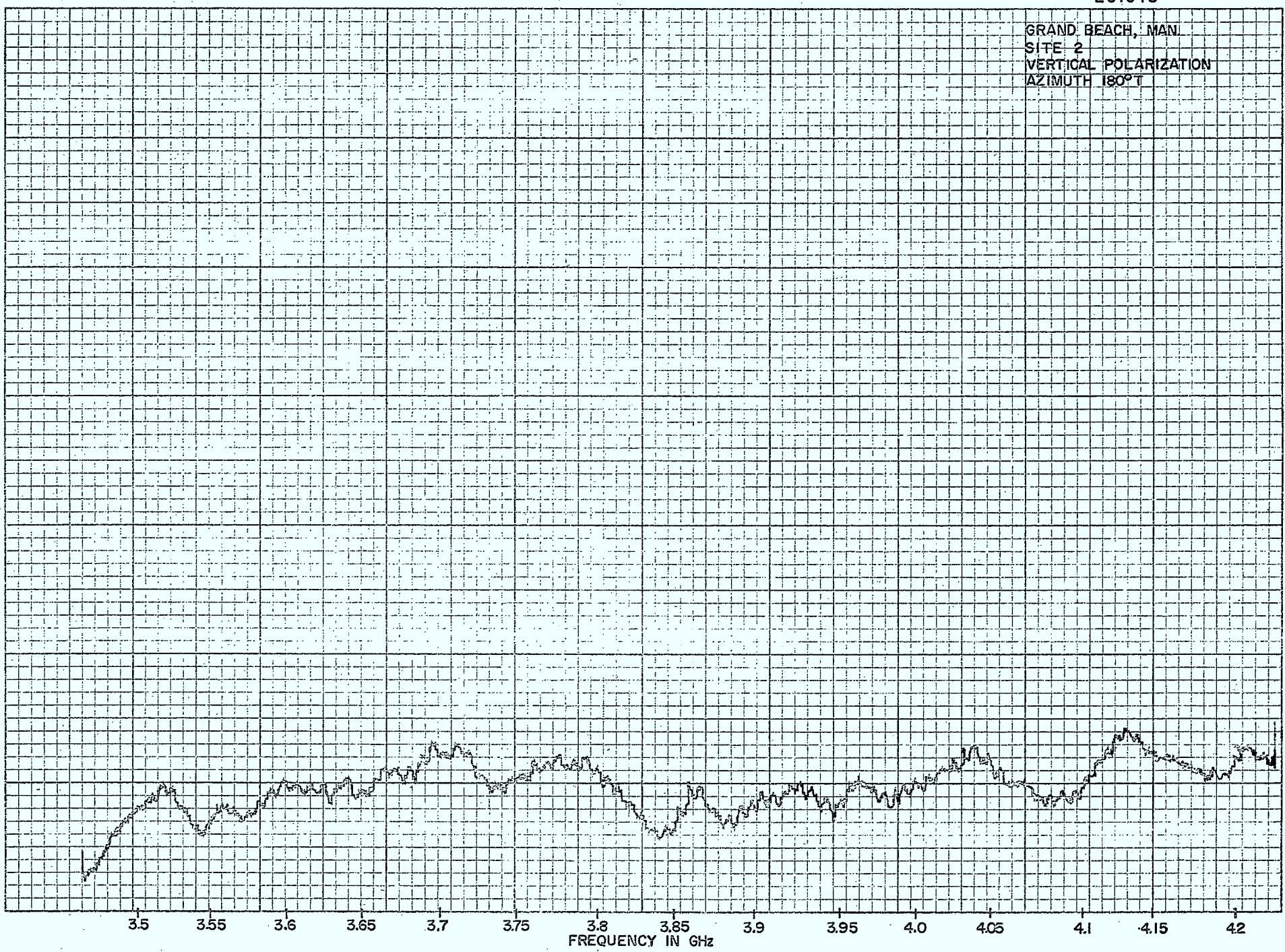
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GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 160° T



261648

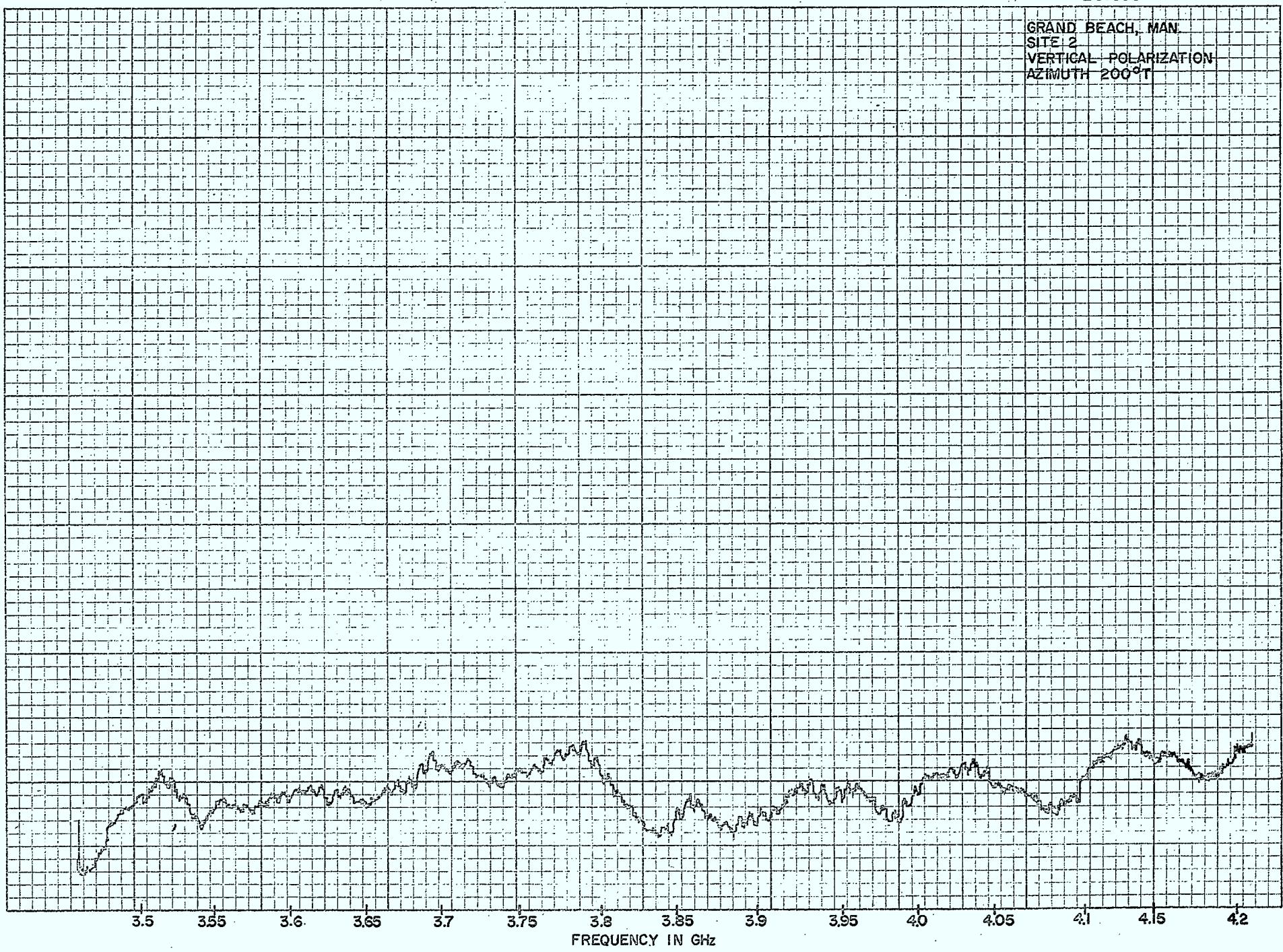
GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 180°



B18

261650

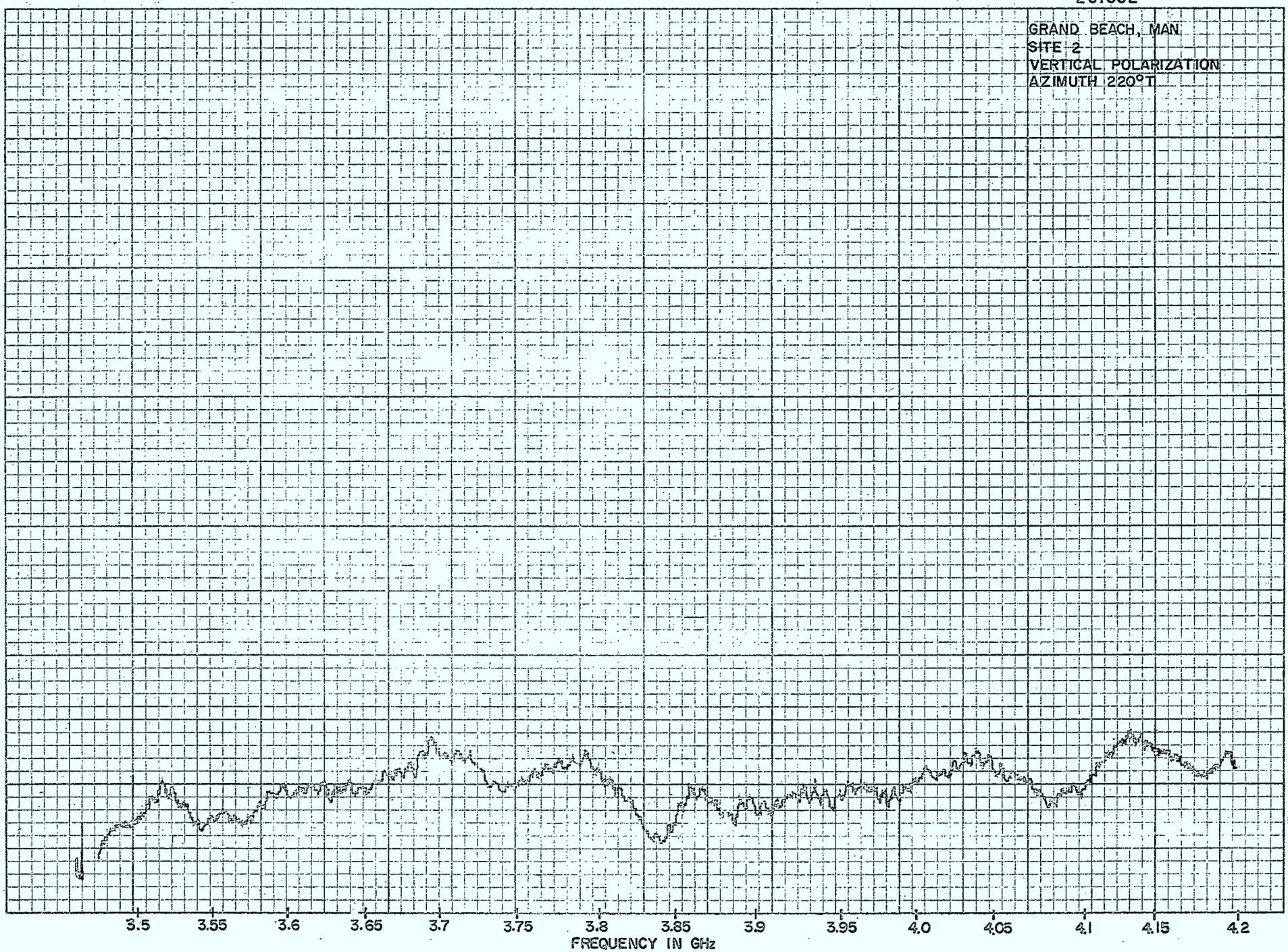
GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 200° T



B19

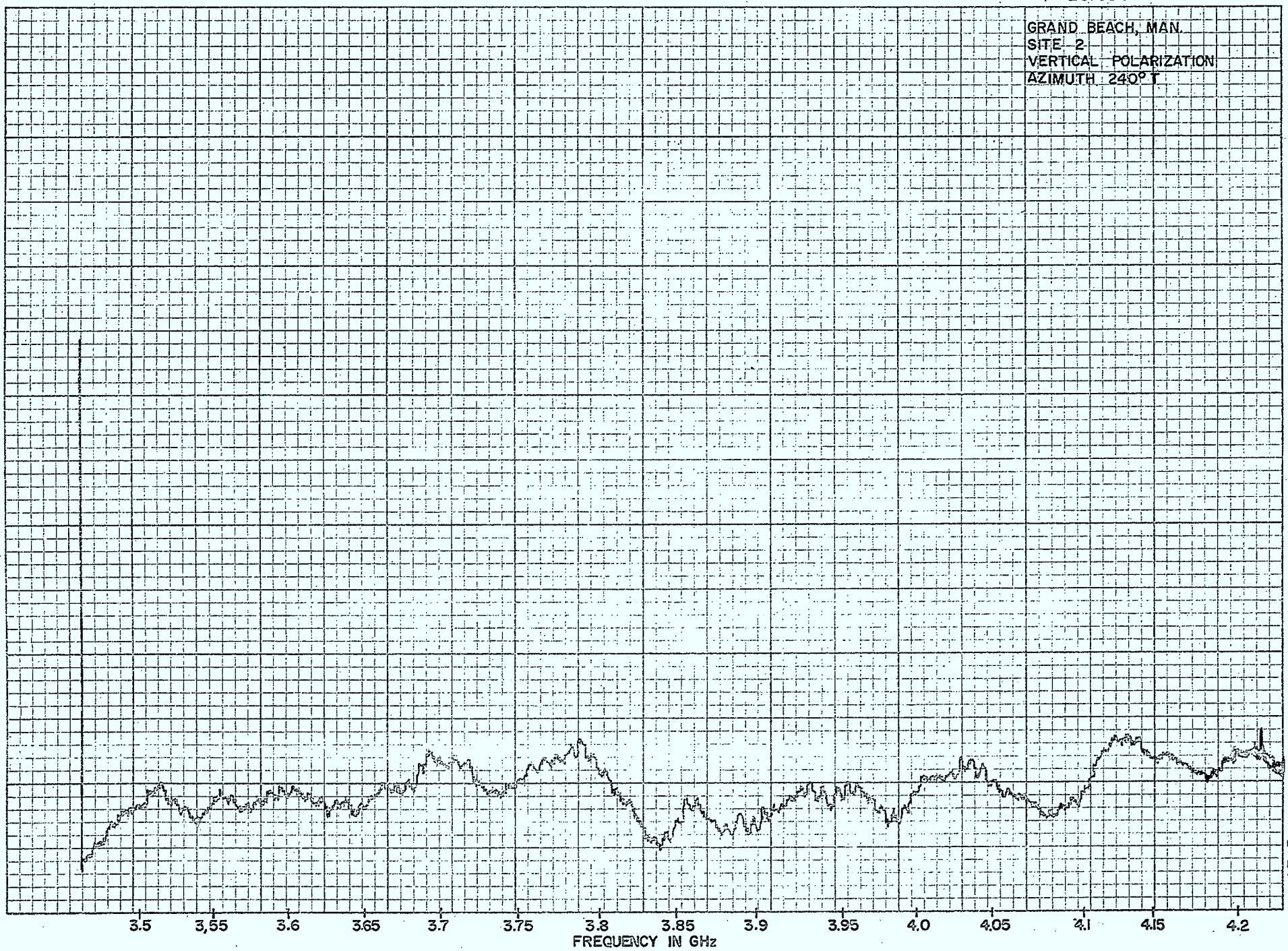
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GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 220° T



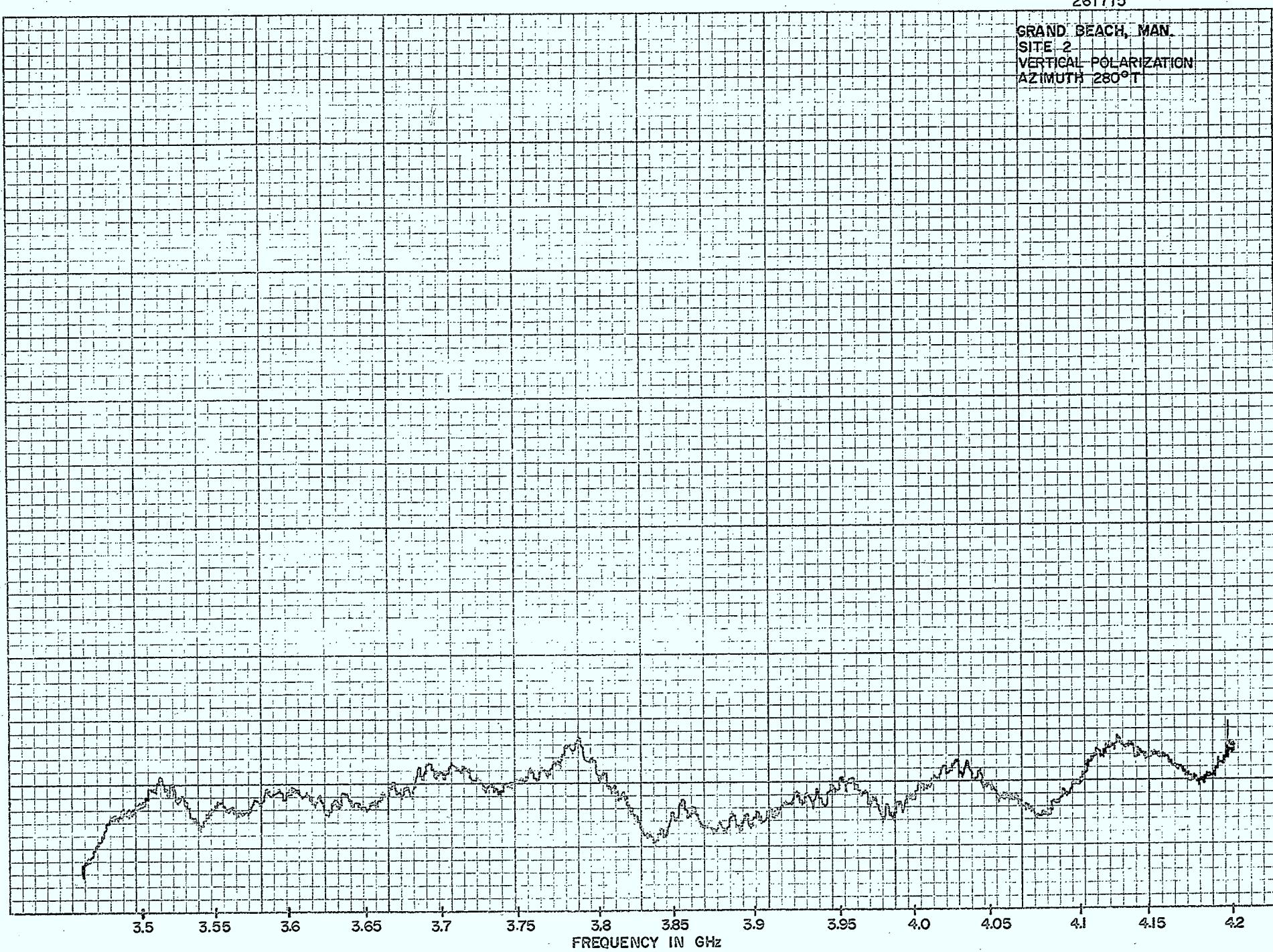
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GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 240° T



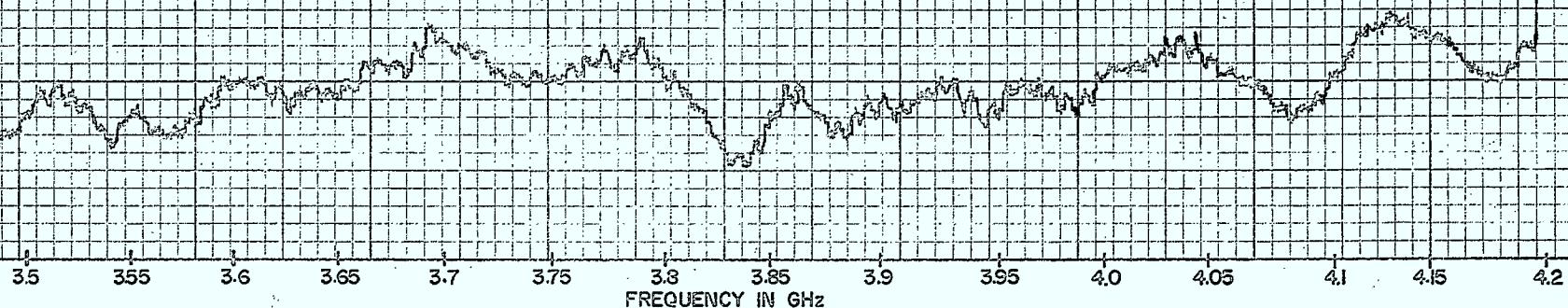
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GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 280° T



261716

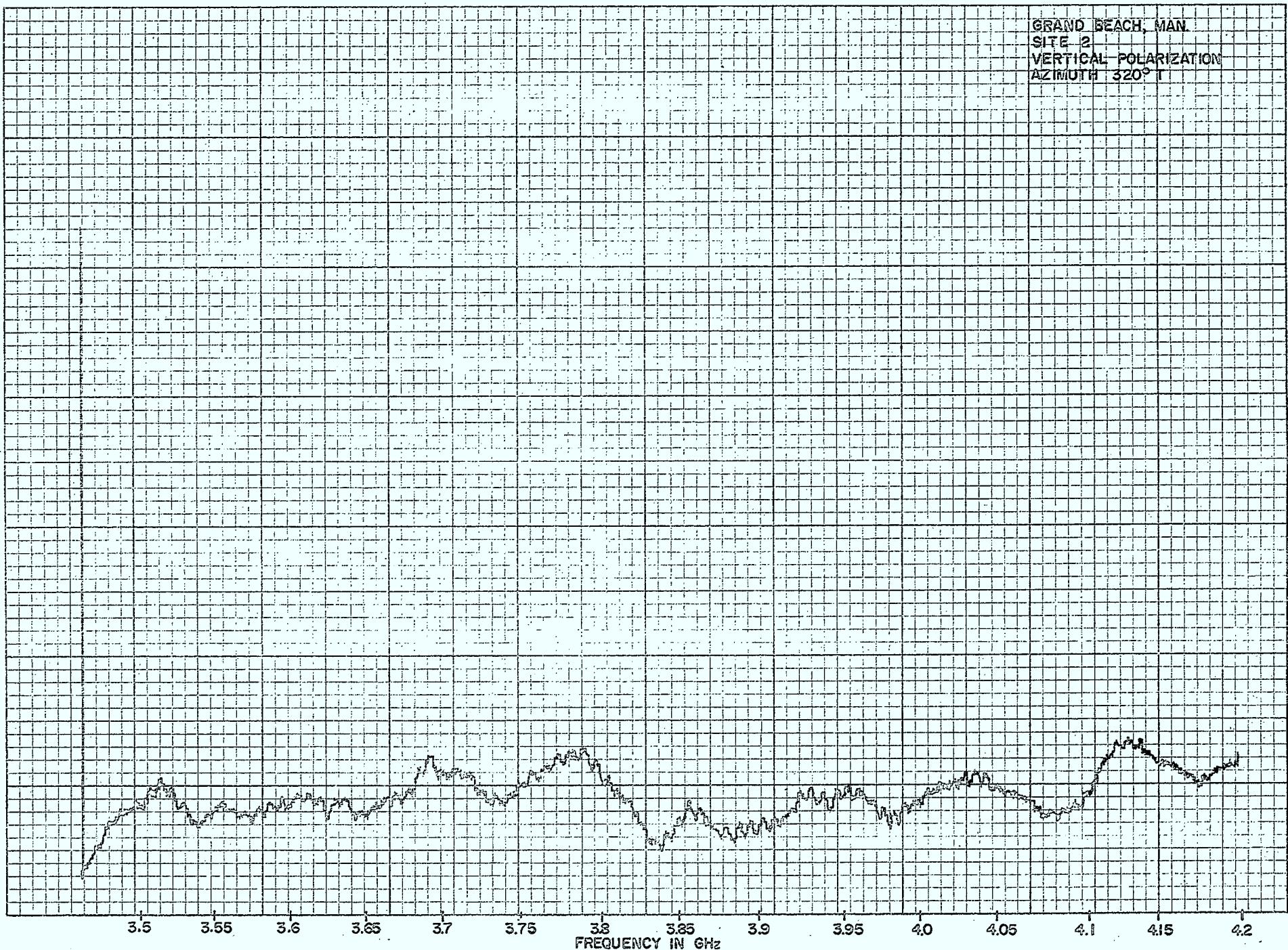
GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH  $300^{\circ}$  T



B 23

261718

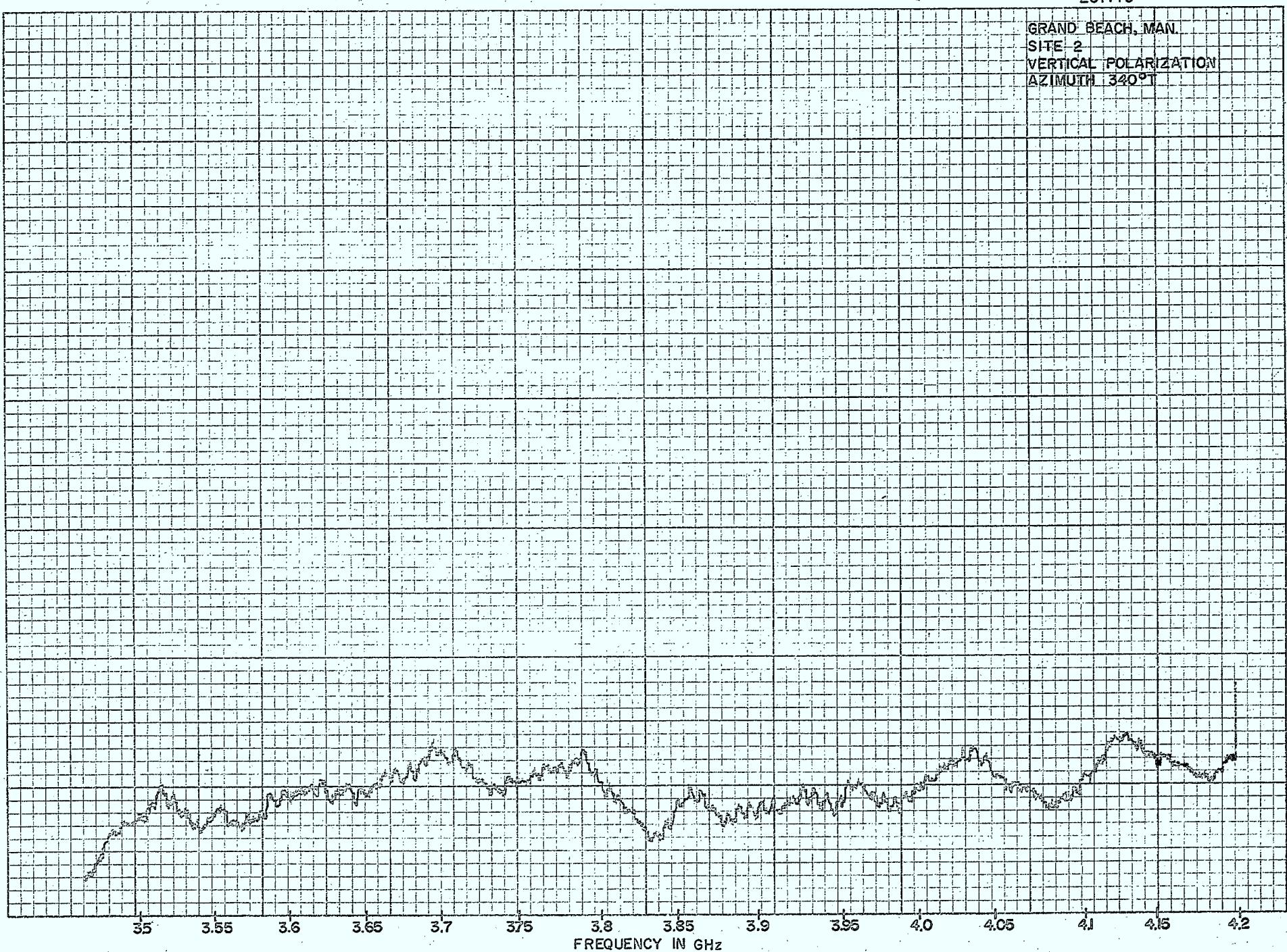
GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 320° T



B 24

261719

GRAND BEACH, MAN.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 340°T



APPENDIX C

(site 2)

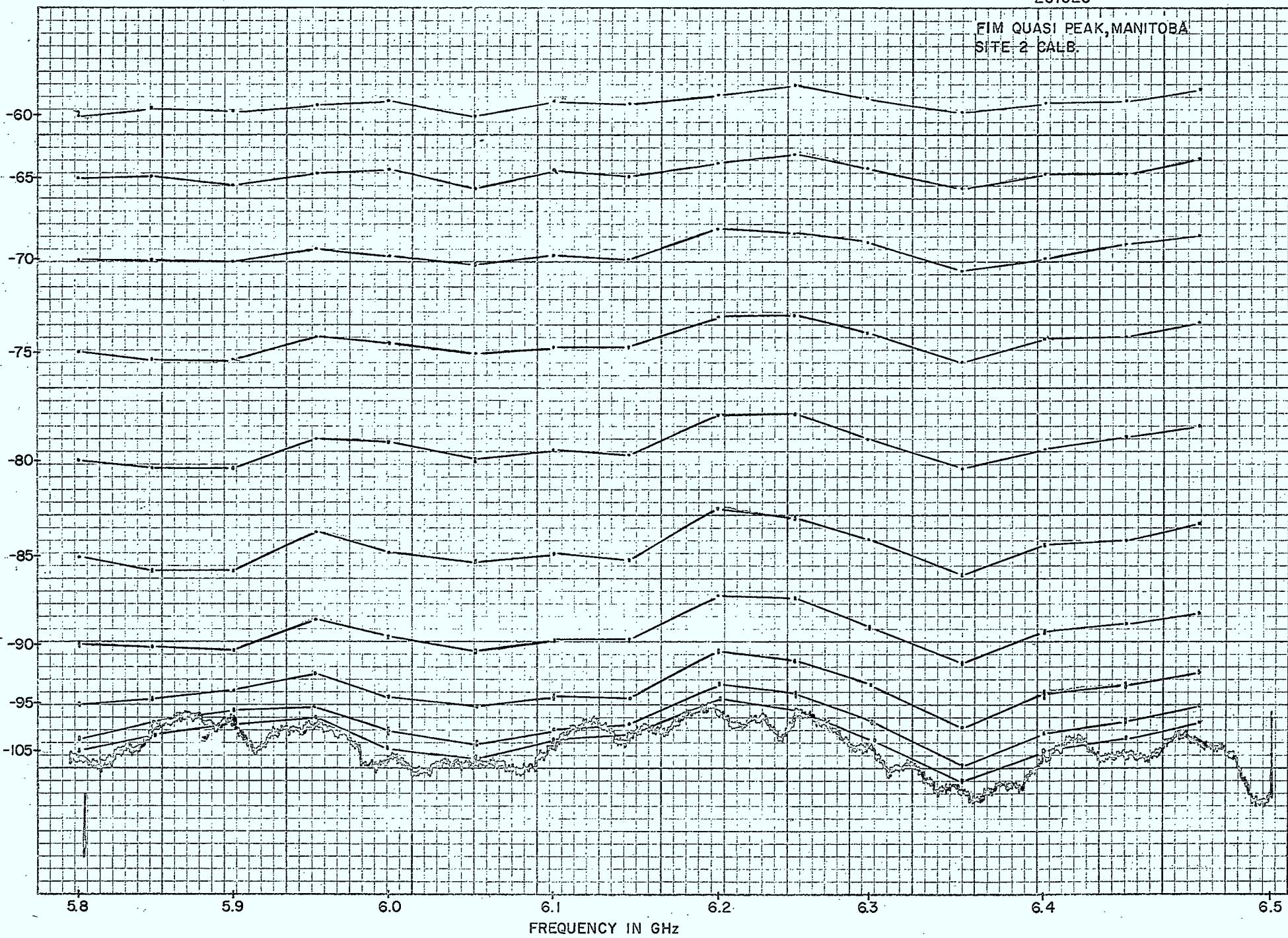
X-Y Plots of Frequency Range 5.8 - 6.5 GHz

APPENDIX C27 Equipment calibration chart  
indicating measurement sensitivity

APPENDICES 28-46 X-Y plots of azimuths 0-360°  
every 20°

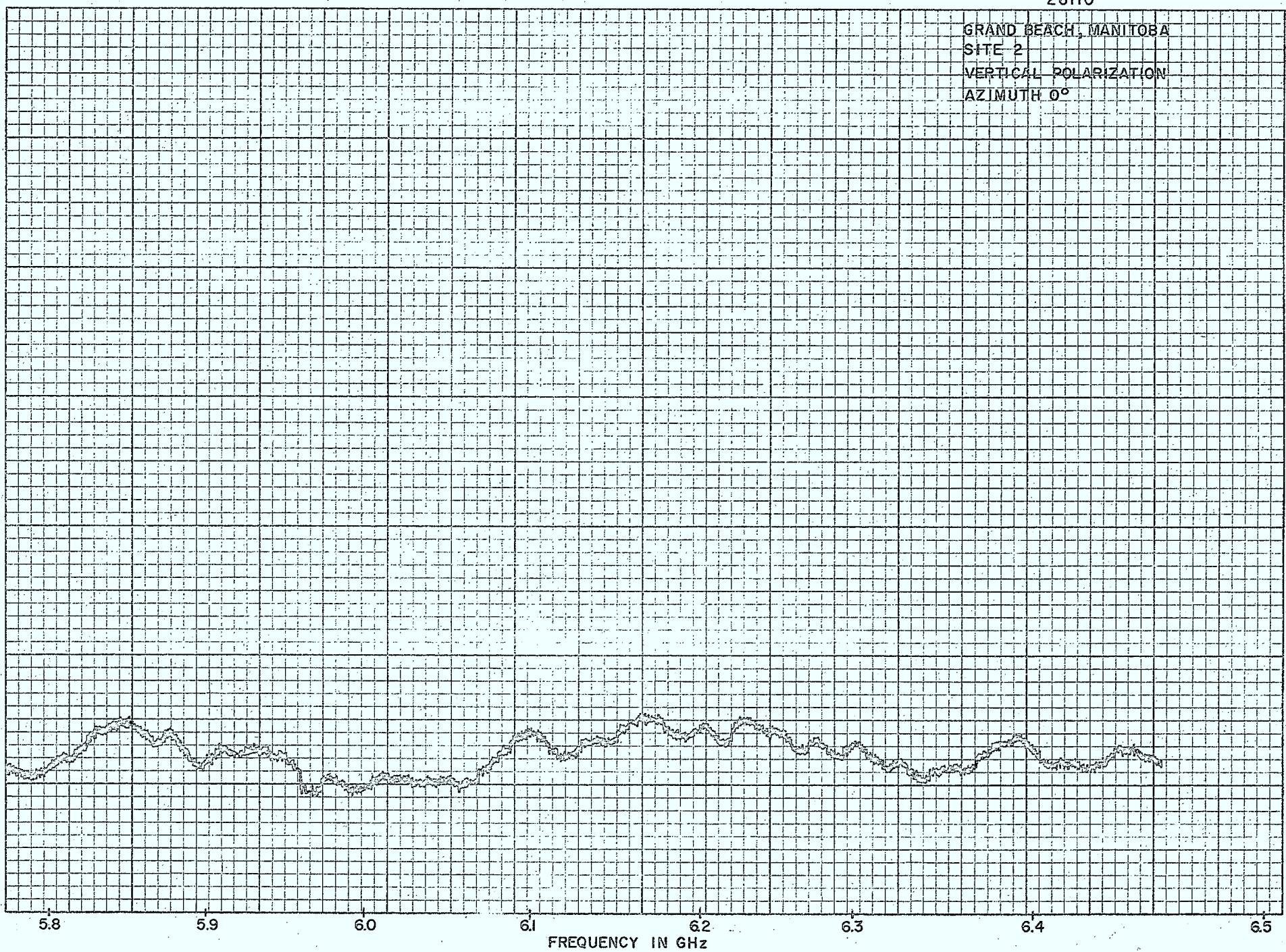
261520

FIM QUASI PEAK, MANITOBA  
SITE 2 CALB



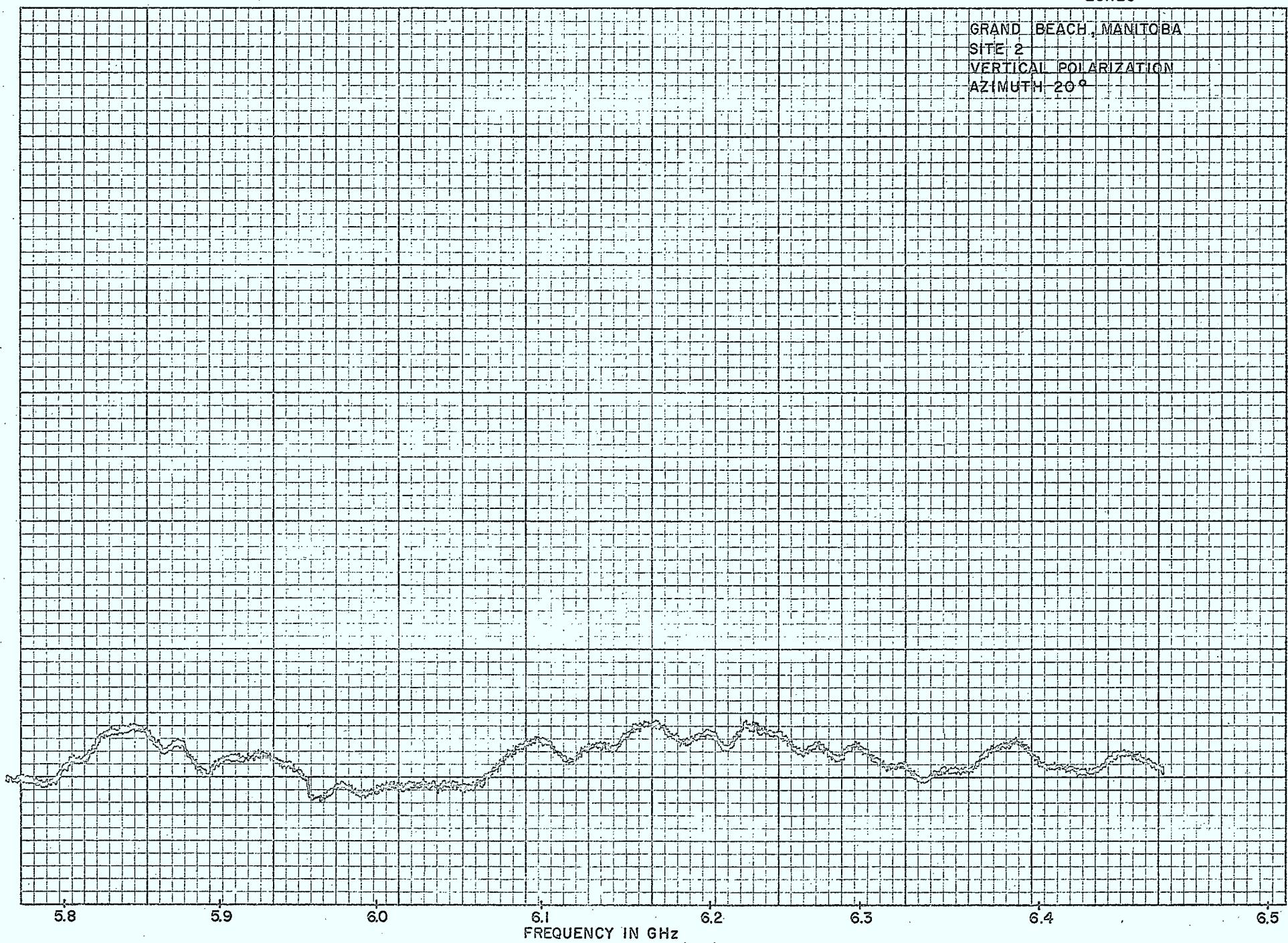
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GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 0°



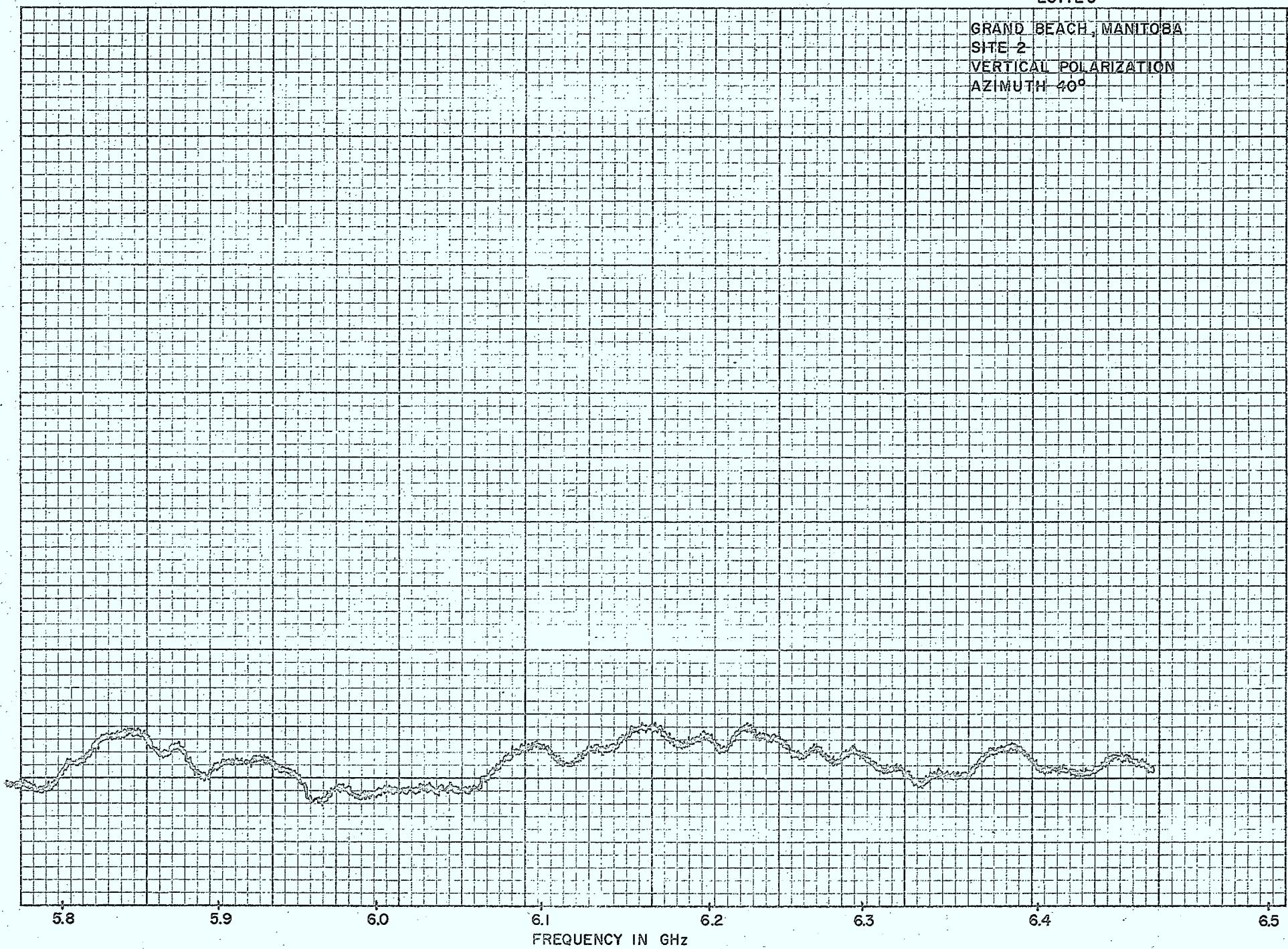
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GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 20°



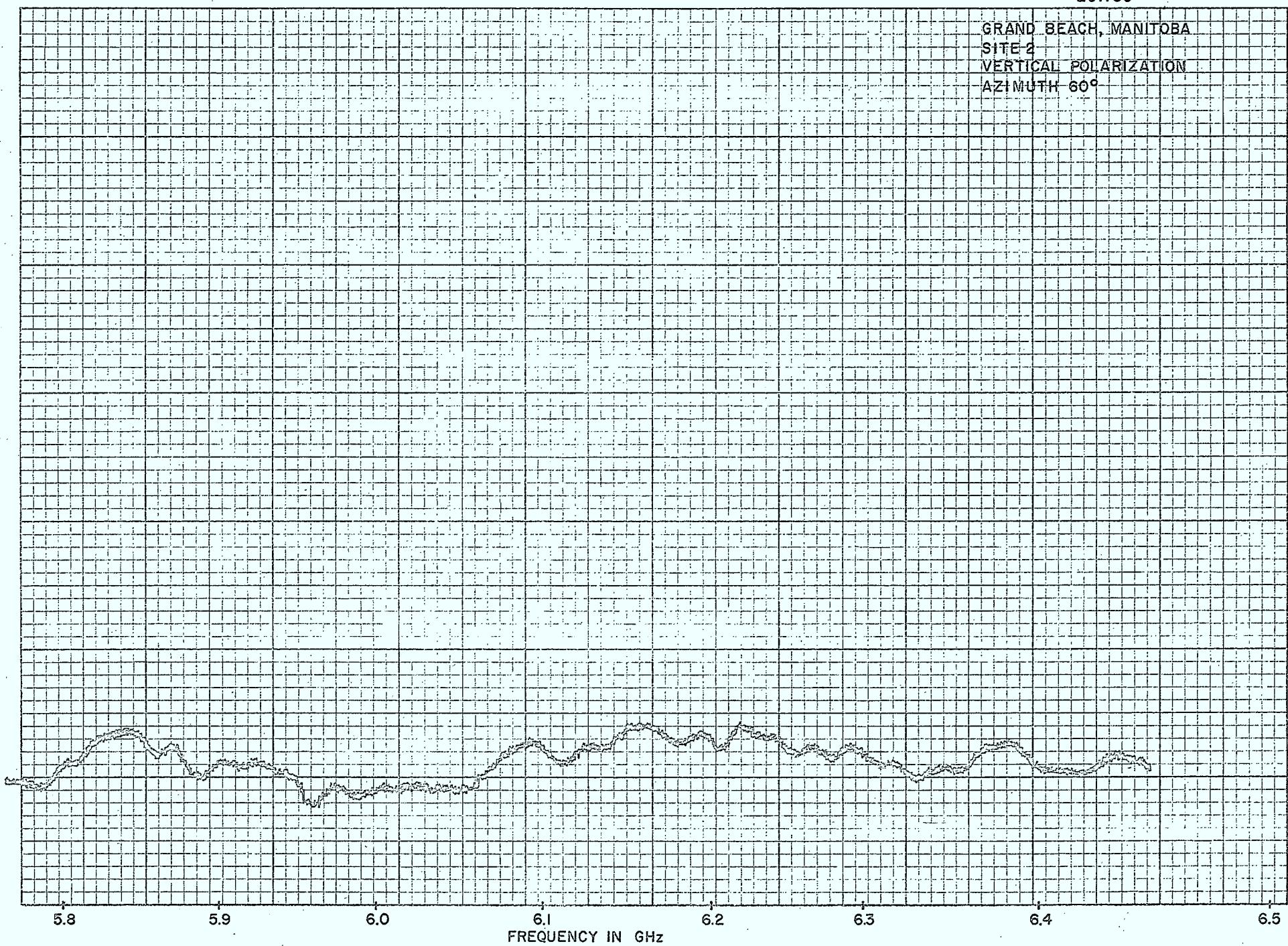
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GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH  $40^\circ$

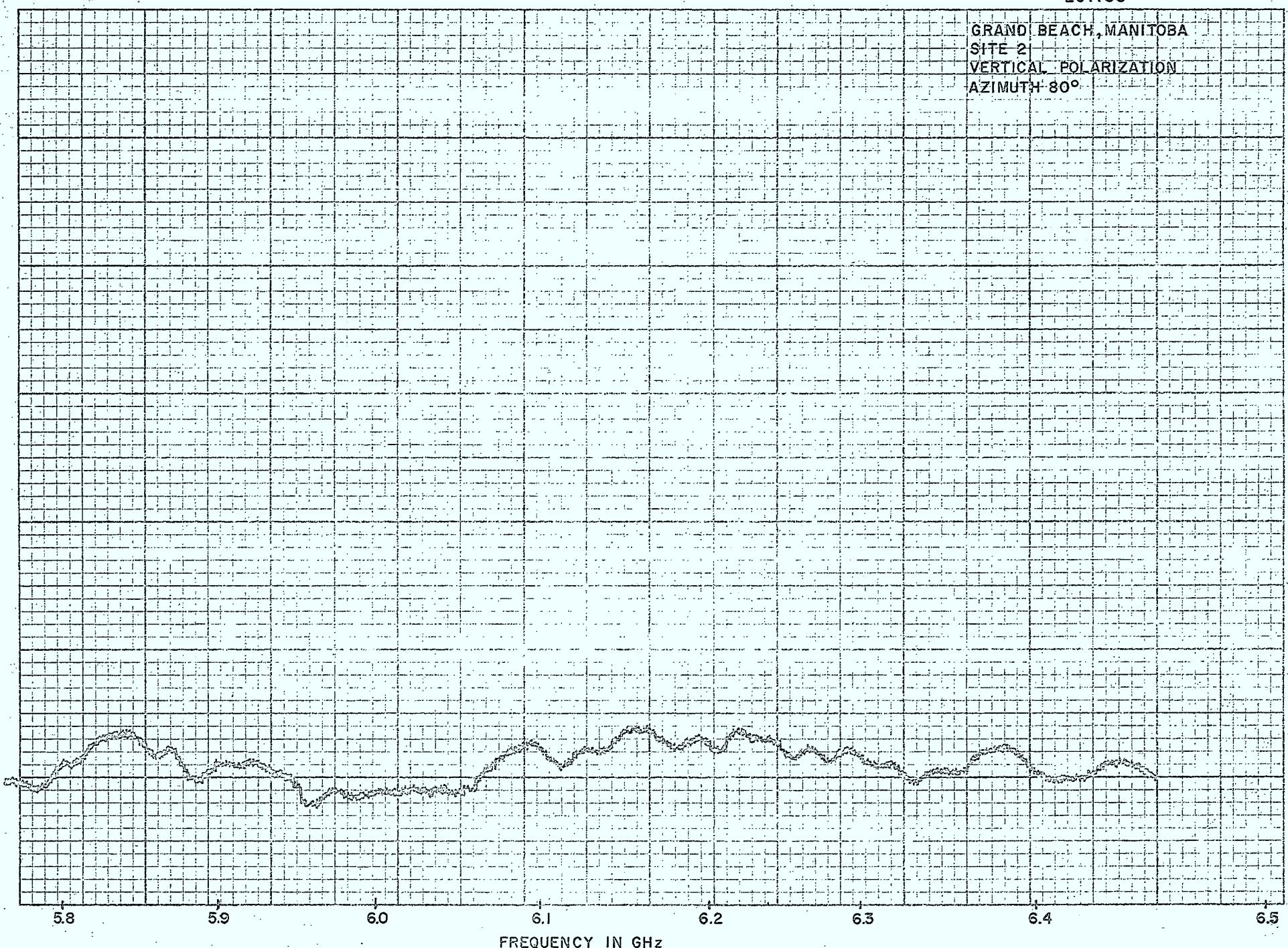


261130

GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 60°



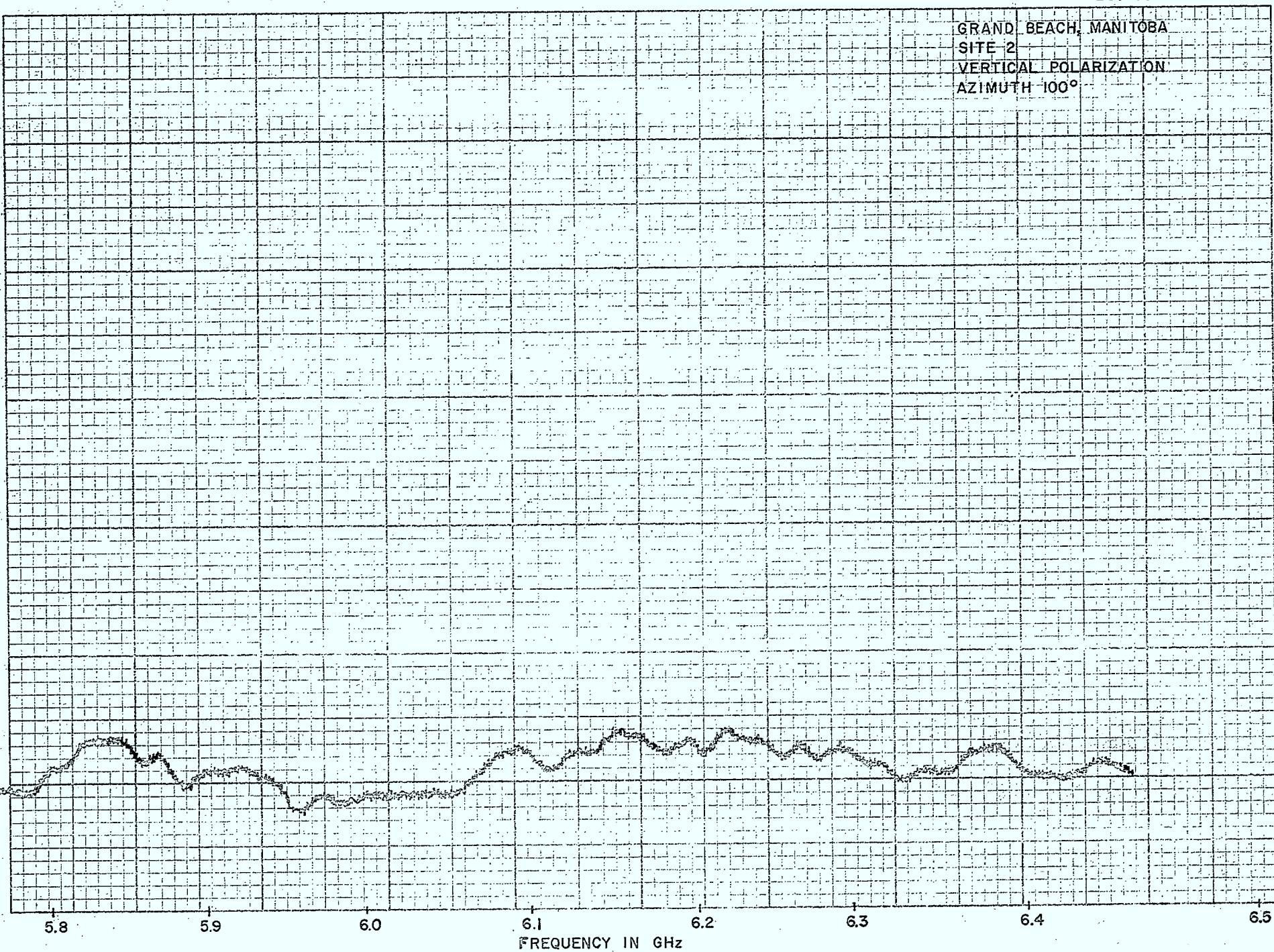
261135

GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 80°

C 32

261140

GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 100°



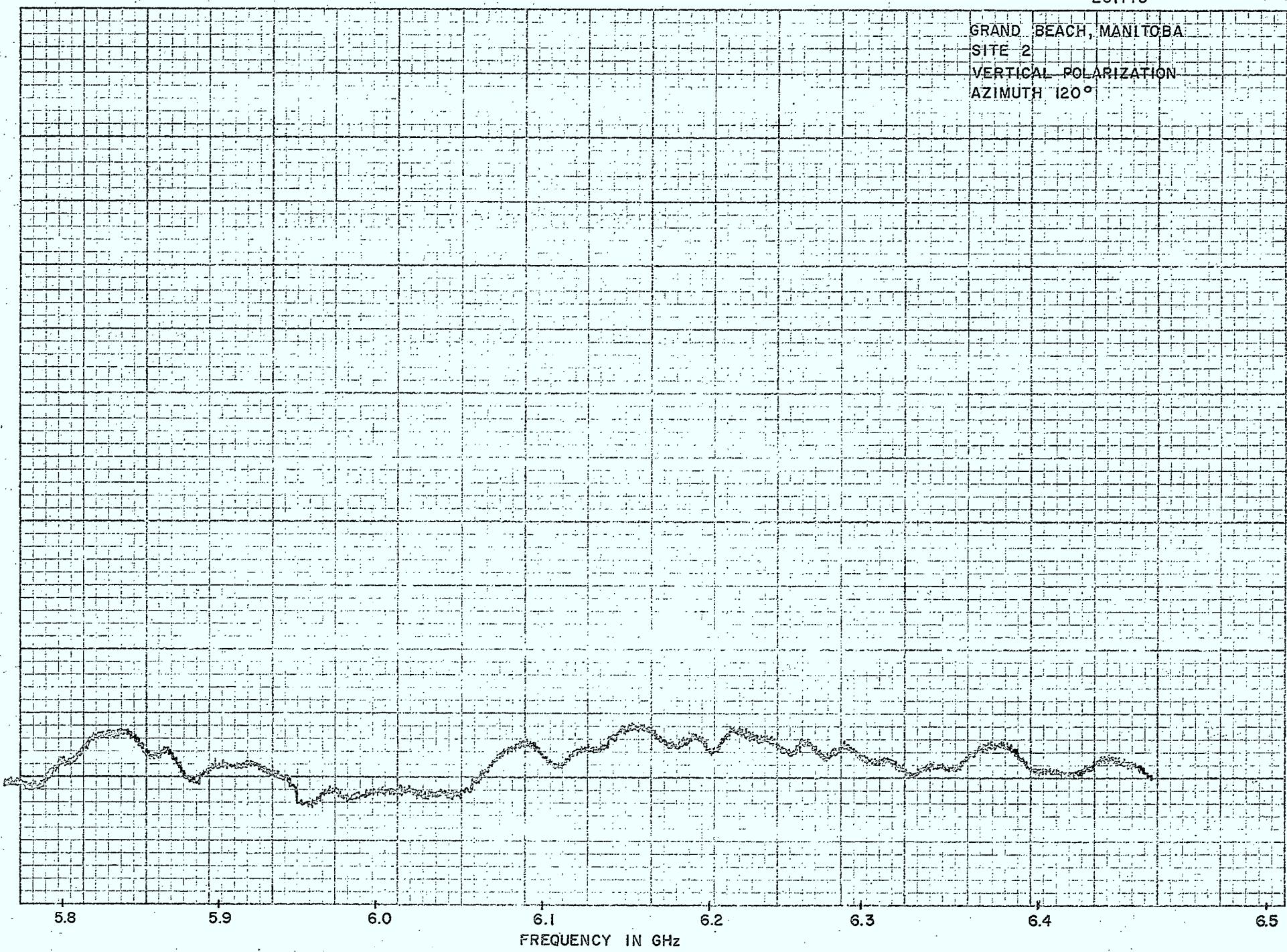
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GRAND BEACH, MANITOBA

SITE 2

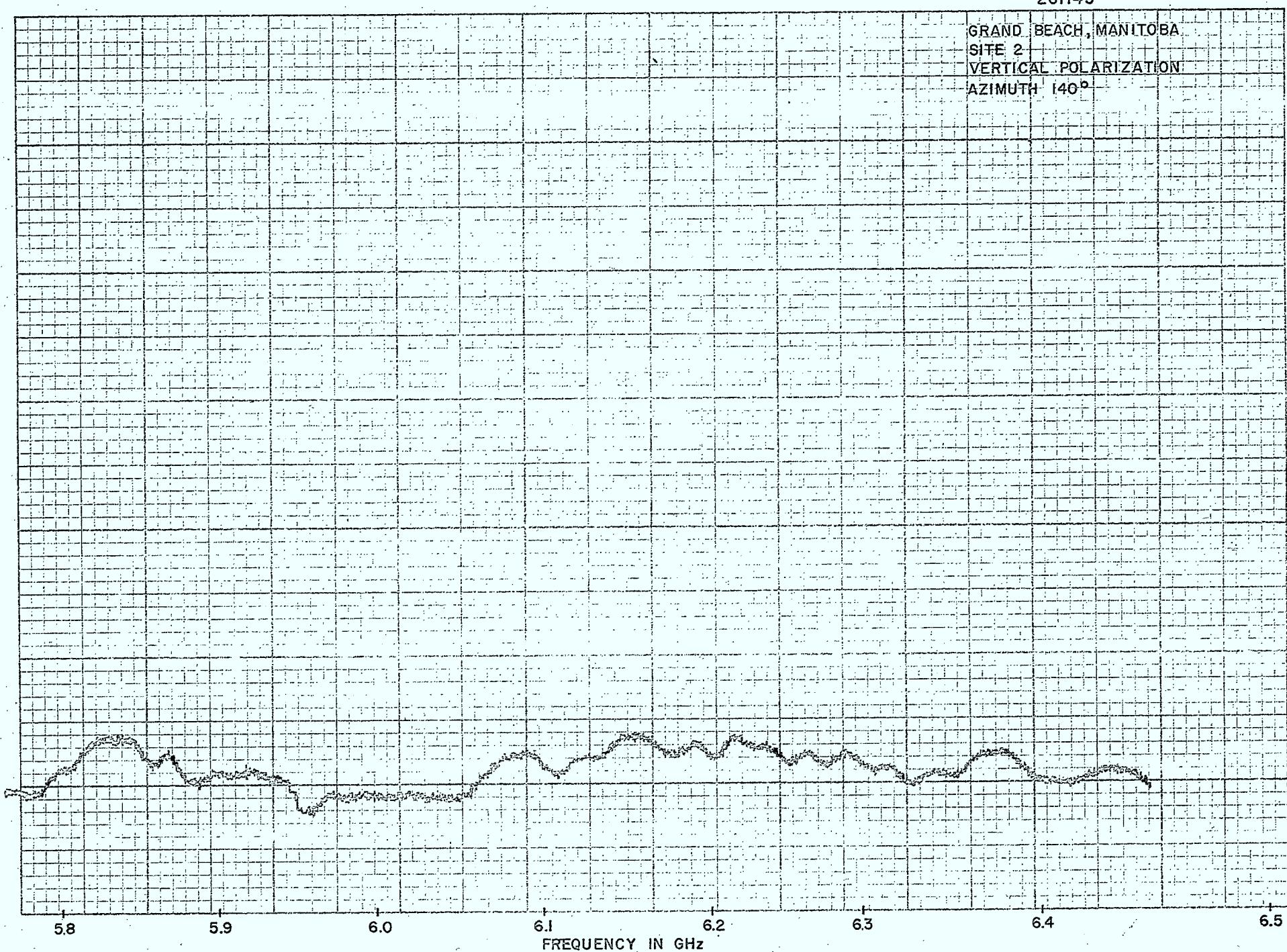
VERTICAL POLARIZATION

AZIMUTH 120°



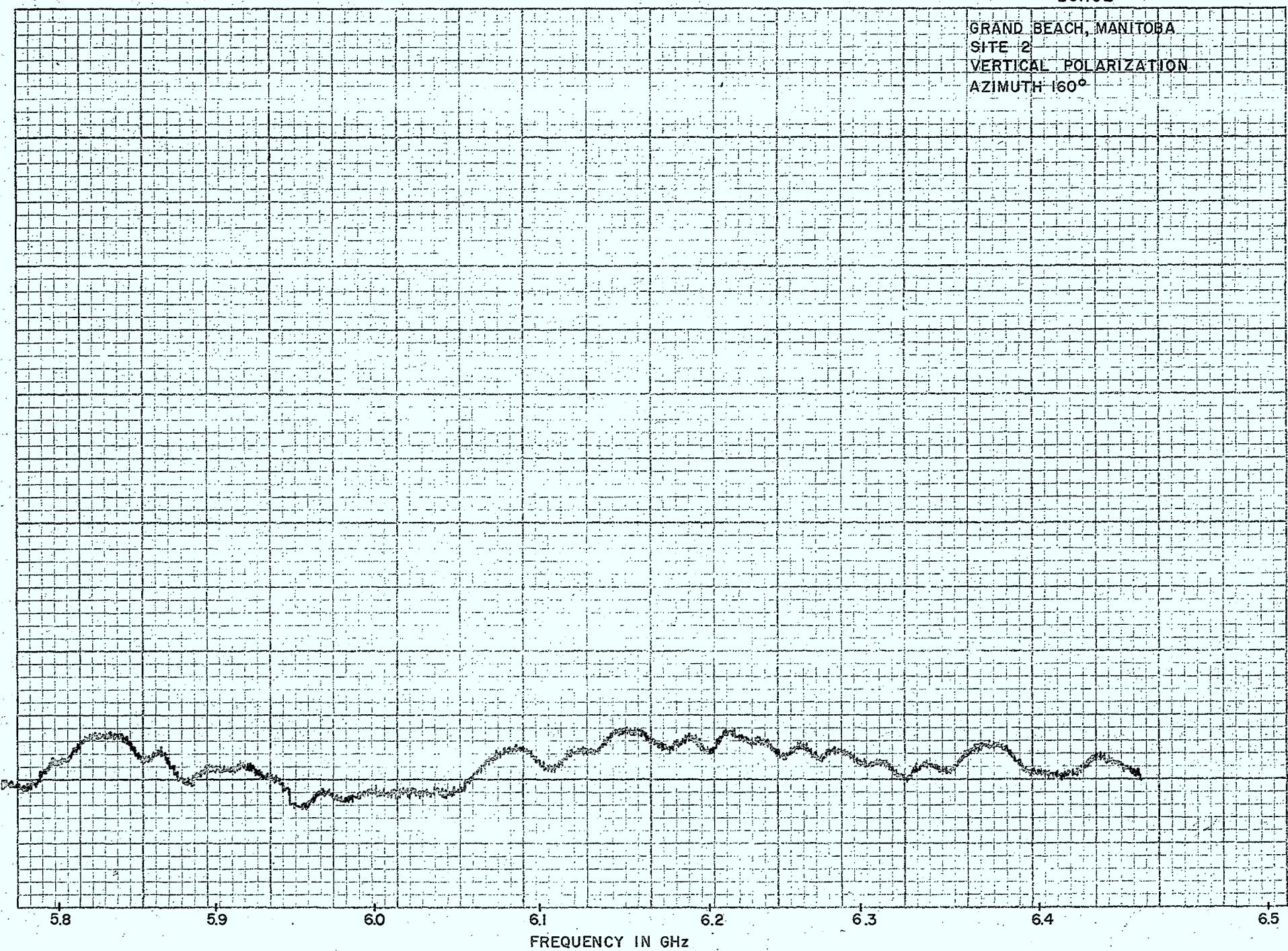
261145

GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 140°



261152

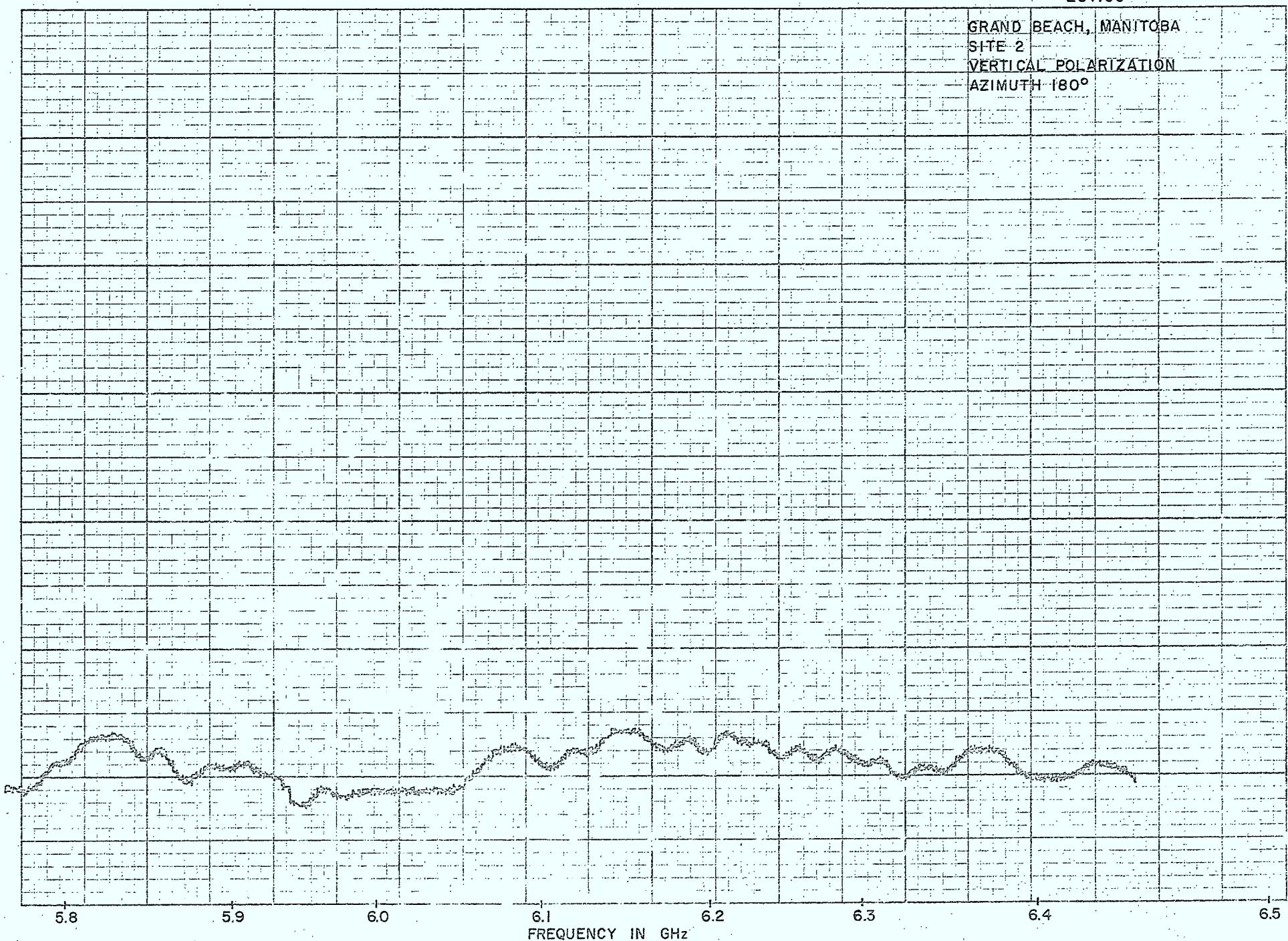
GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 160°



HEWLETT-PACKARD/MOSELEY DIVISION  
9270-1005  
FOR USE ON AUTOGRAPH RECORDERS  
10 UNITS/DIVISION

261155

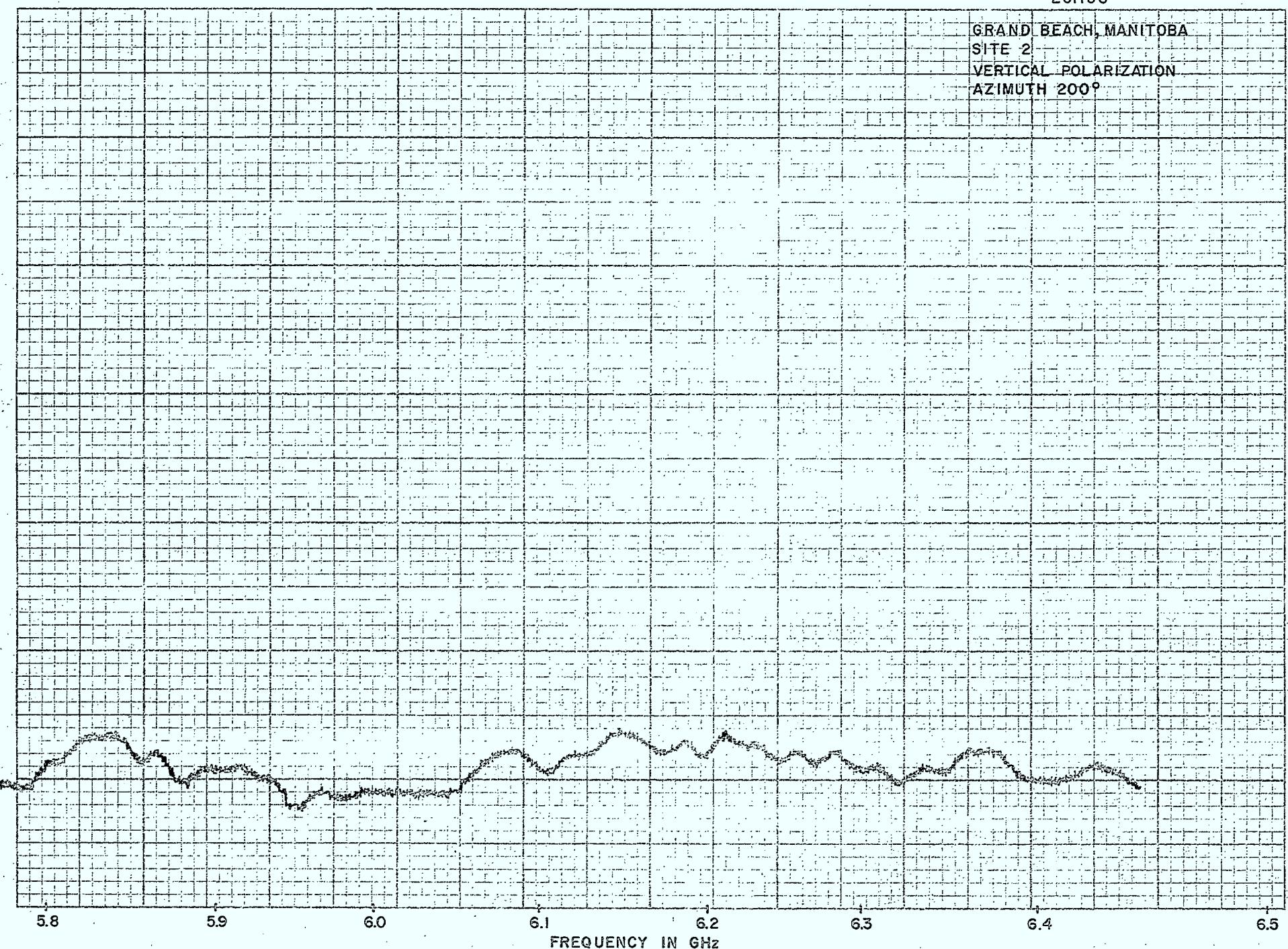
GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 180°



HEWLETT-PACKARD/MOSELEY DIVISION  
9270-1006  
FOR USE ON AUTOGRAPH RECORDERS  
10 UNITS/DIVISION

261158

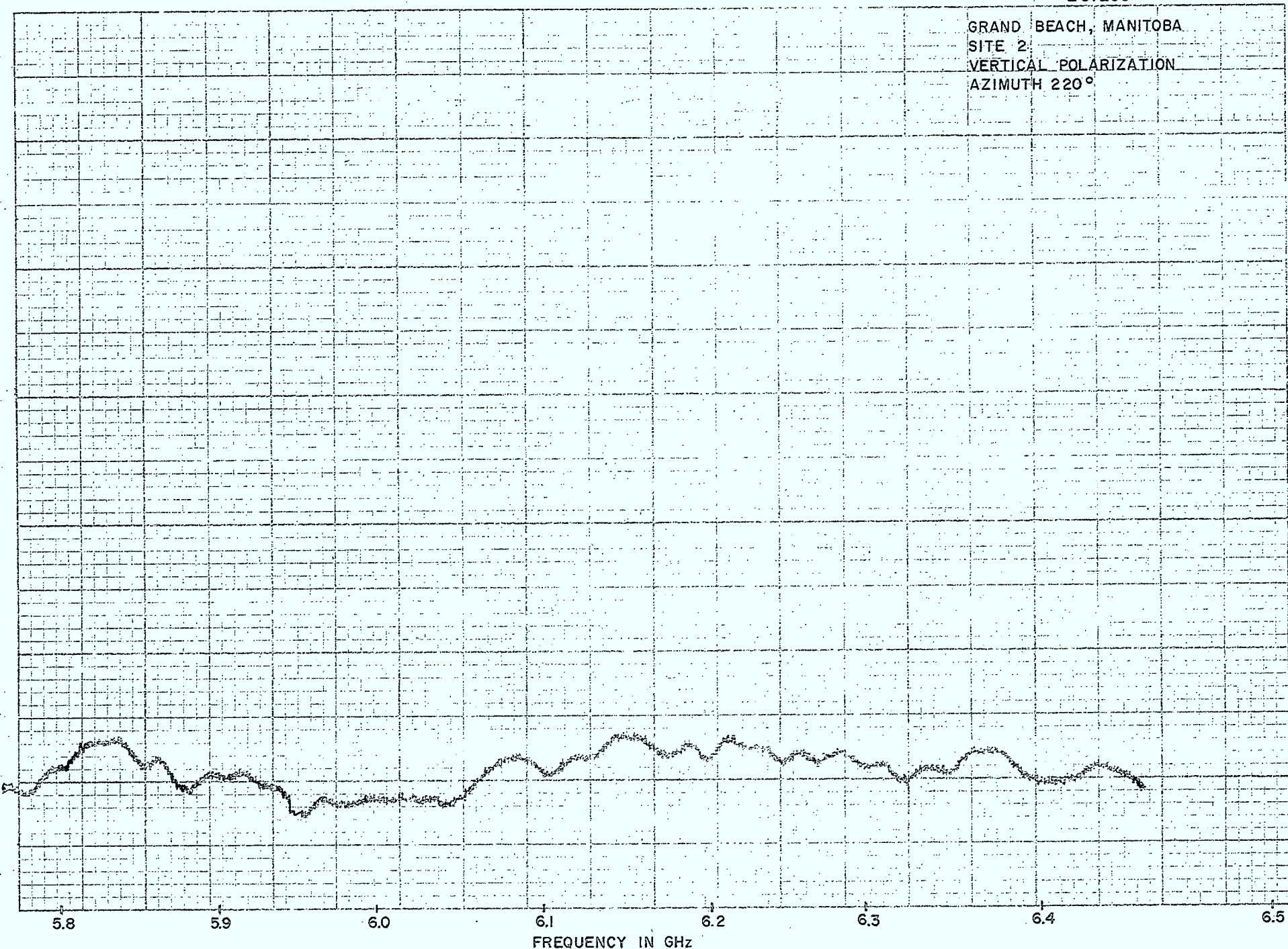
GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 200°



C 38

261203

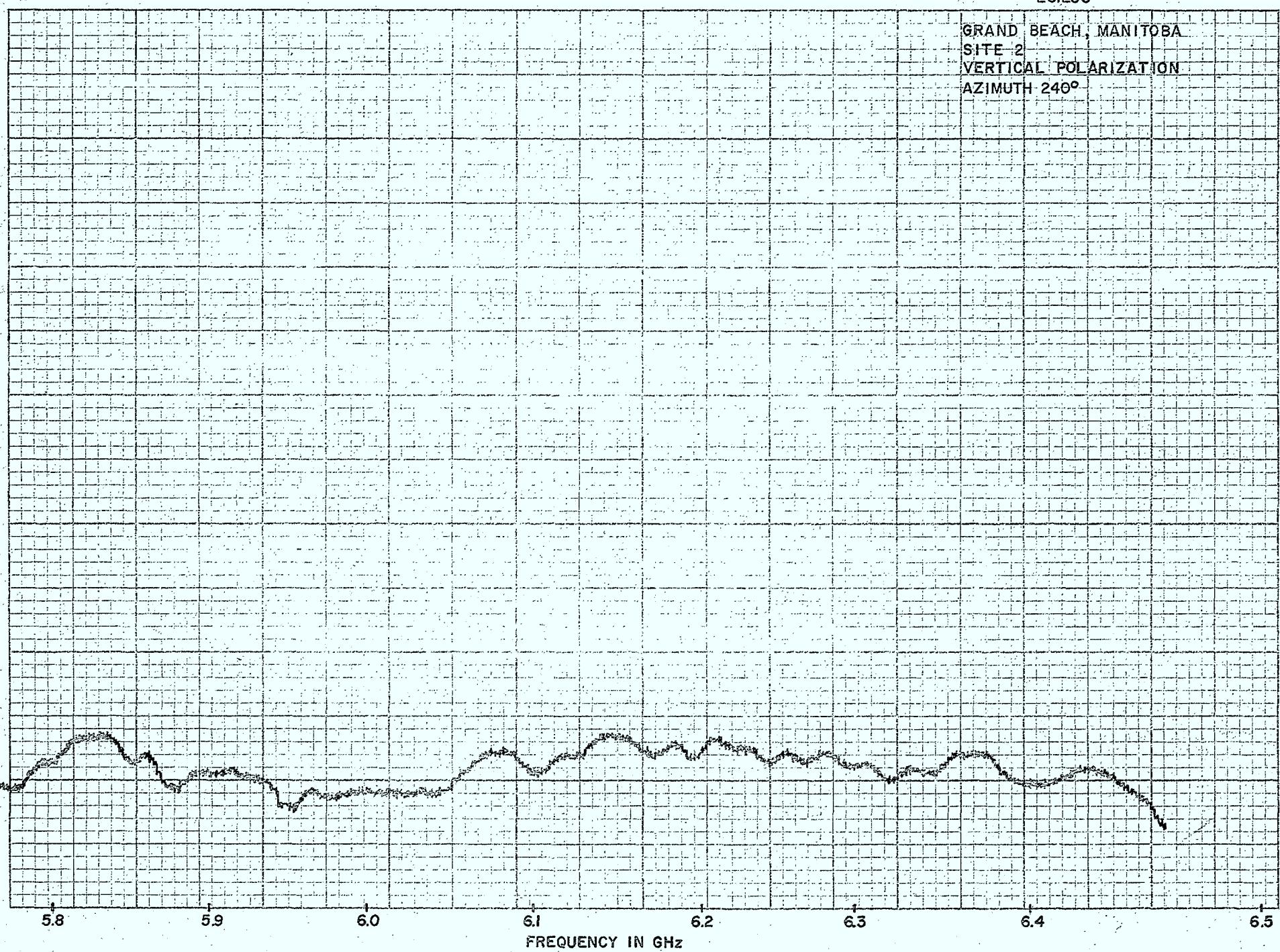
GRAND BEACH, MANITOBA.  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 220°



9270-1006  
FOR USE ON AUTOGRAPH RECORDERS  
10 UNITS/DIVISION

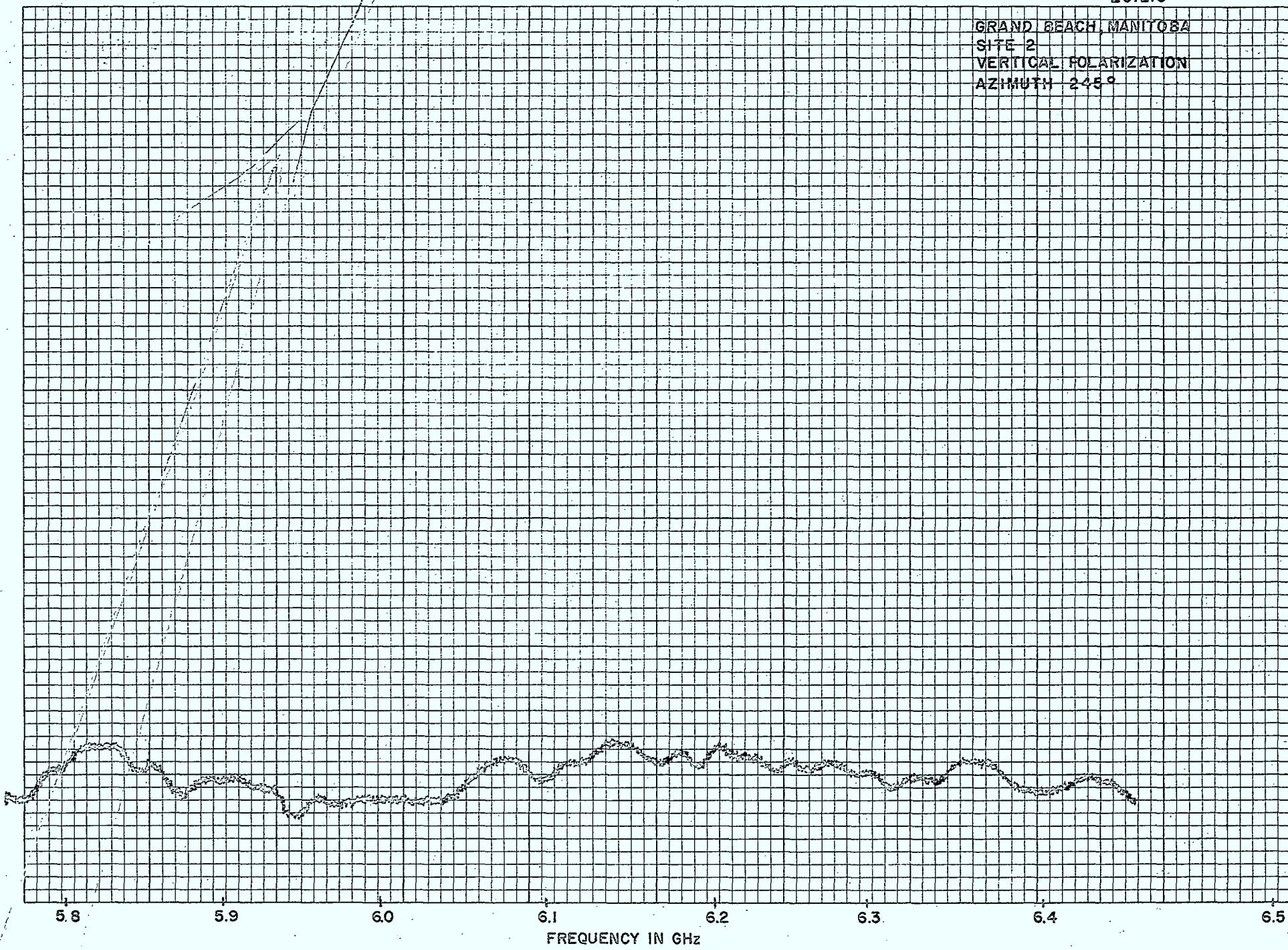
261206

GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 240°



261215

GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 245°



HEWLETT PACKARD MODEL DIVISION

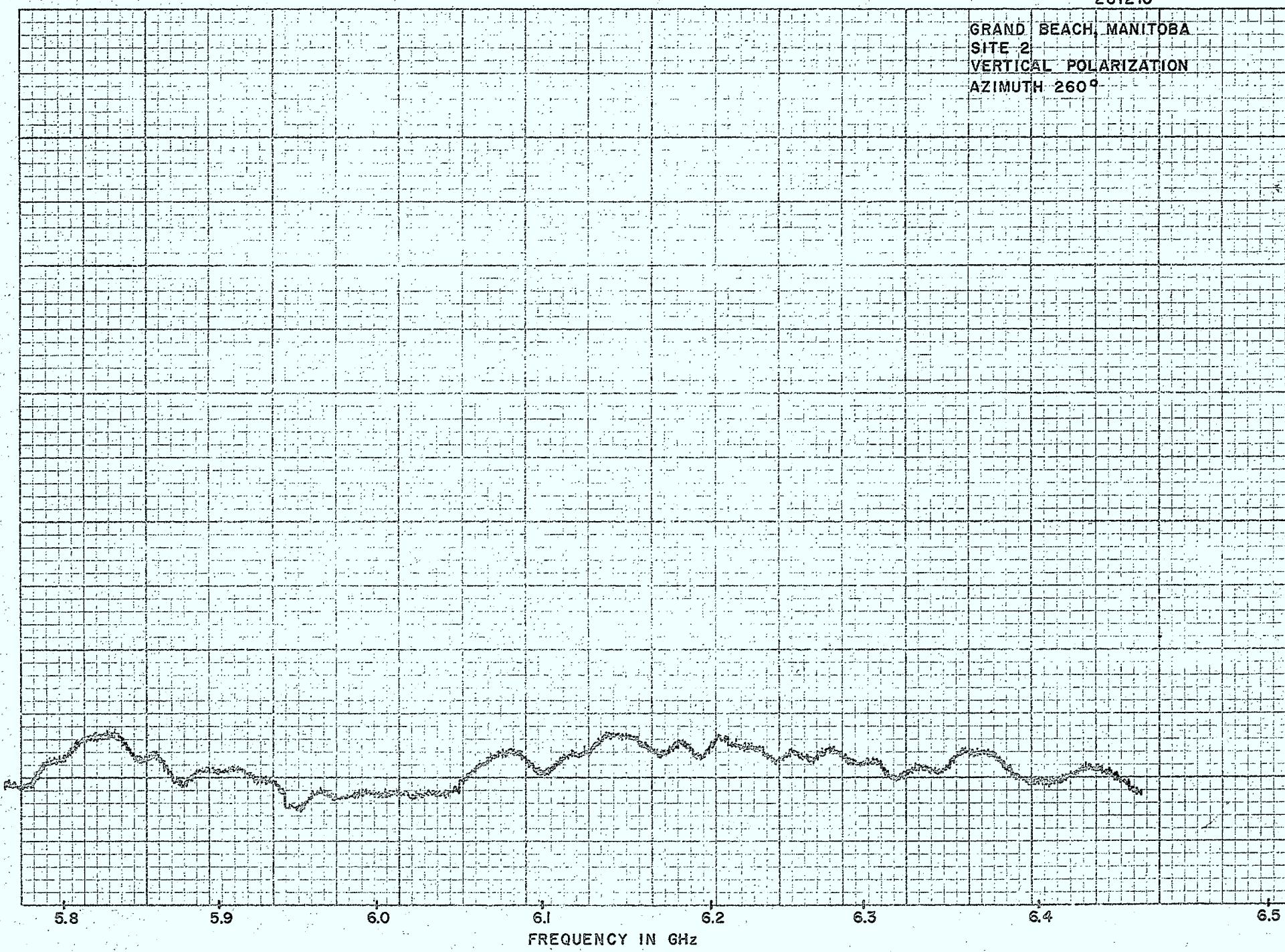
9270-1006

FOR USE ON AUTOGRAPH RECORDERS

10 UNITS/DIVISION

261210

GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 260°



C 42

HEWLETT-PACKARD/MCSELEY DIVISION

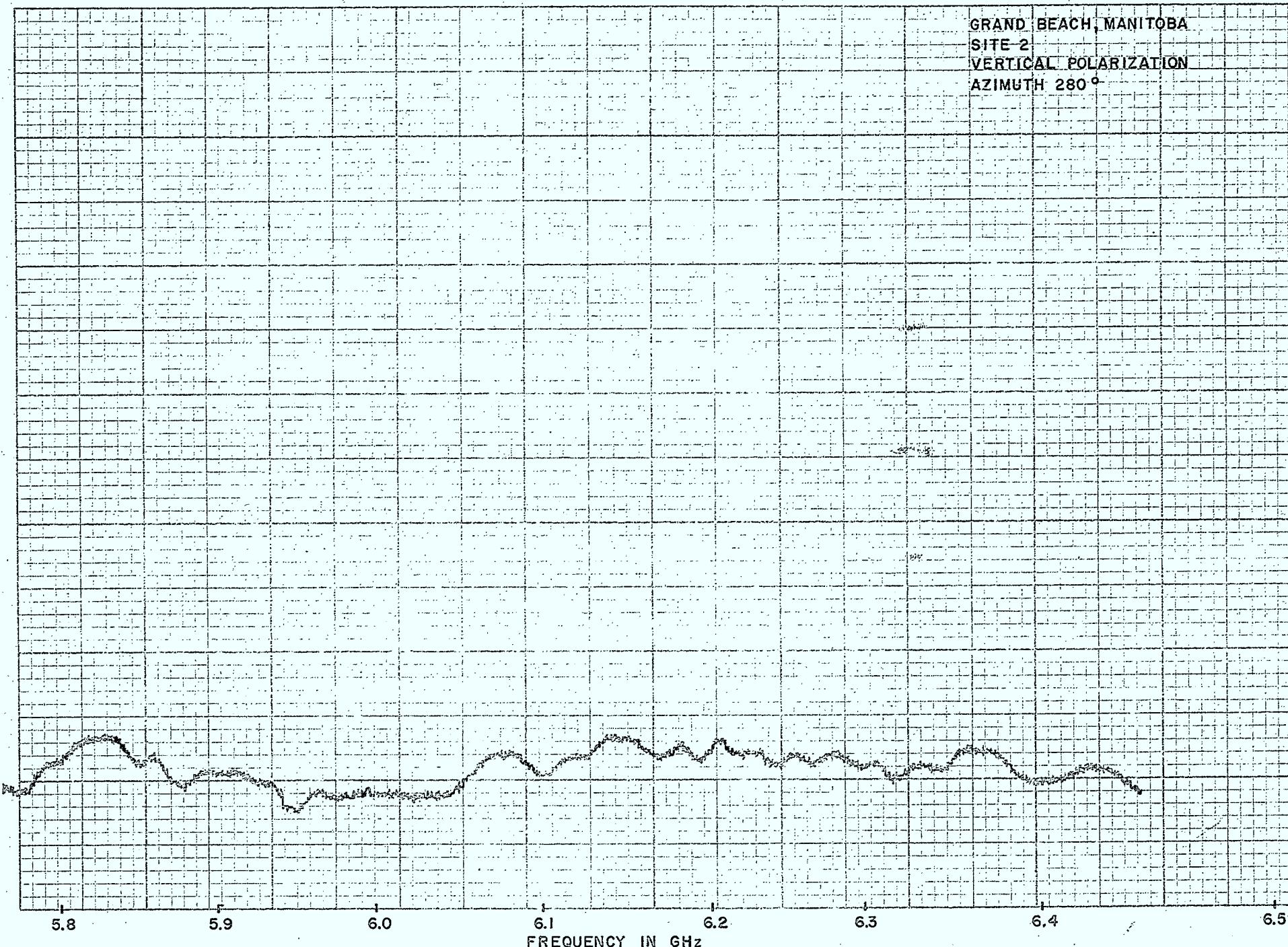
9270-1006

FOR USE ON AUTOGRAPH RECORDERS.

10 UNITS/DIVISION

261215

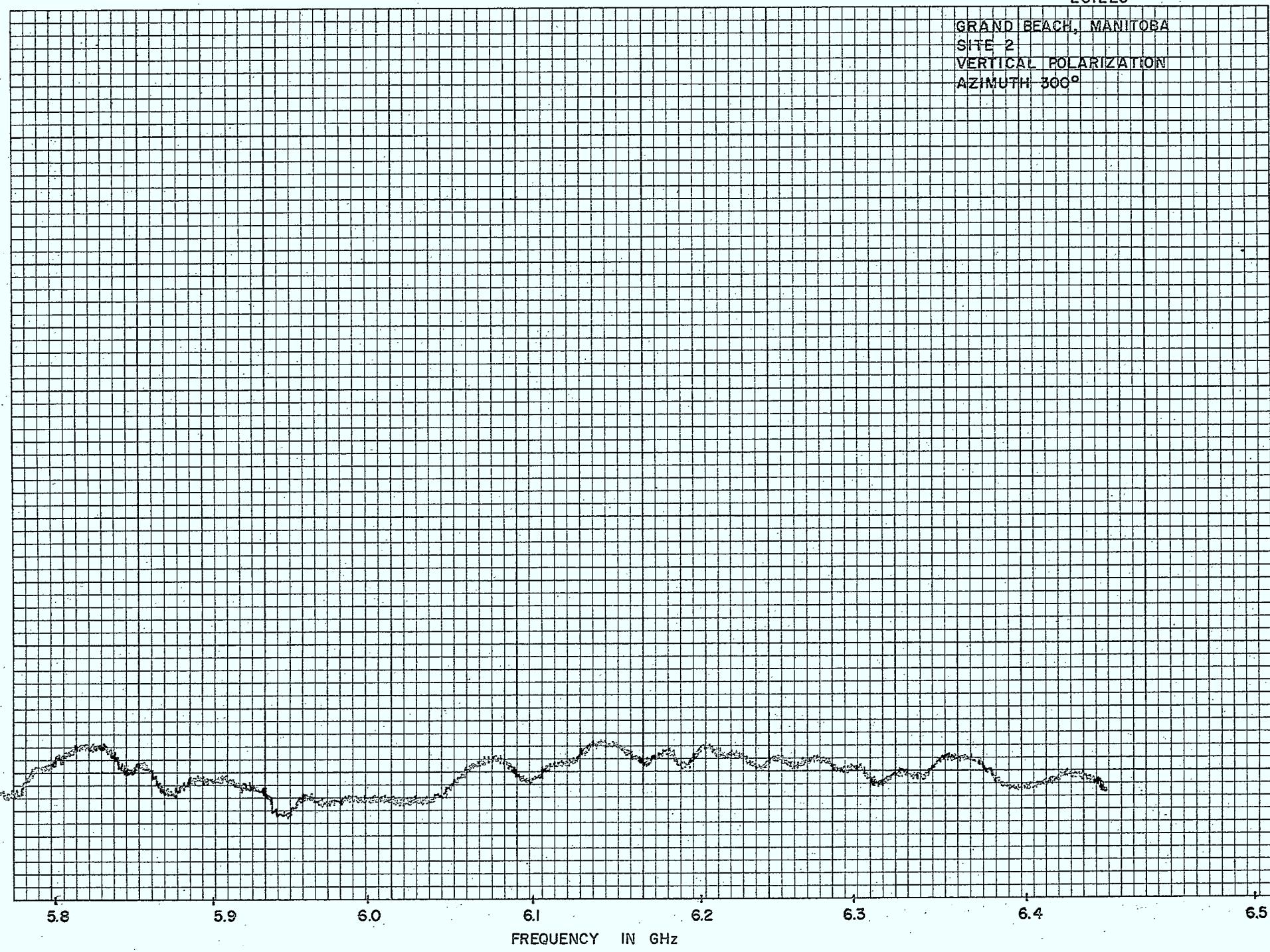
GRAND BEACH, MANITOBA  
SITE-2  
VERTICAL POLARIZATION  
AZIMUTH 280°



C 43

261223

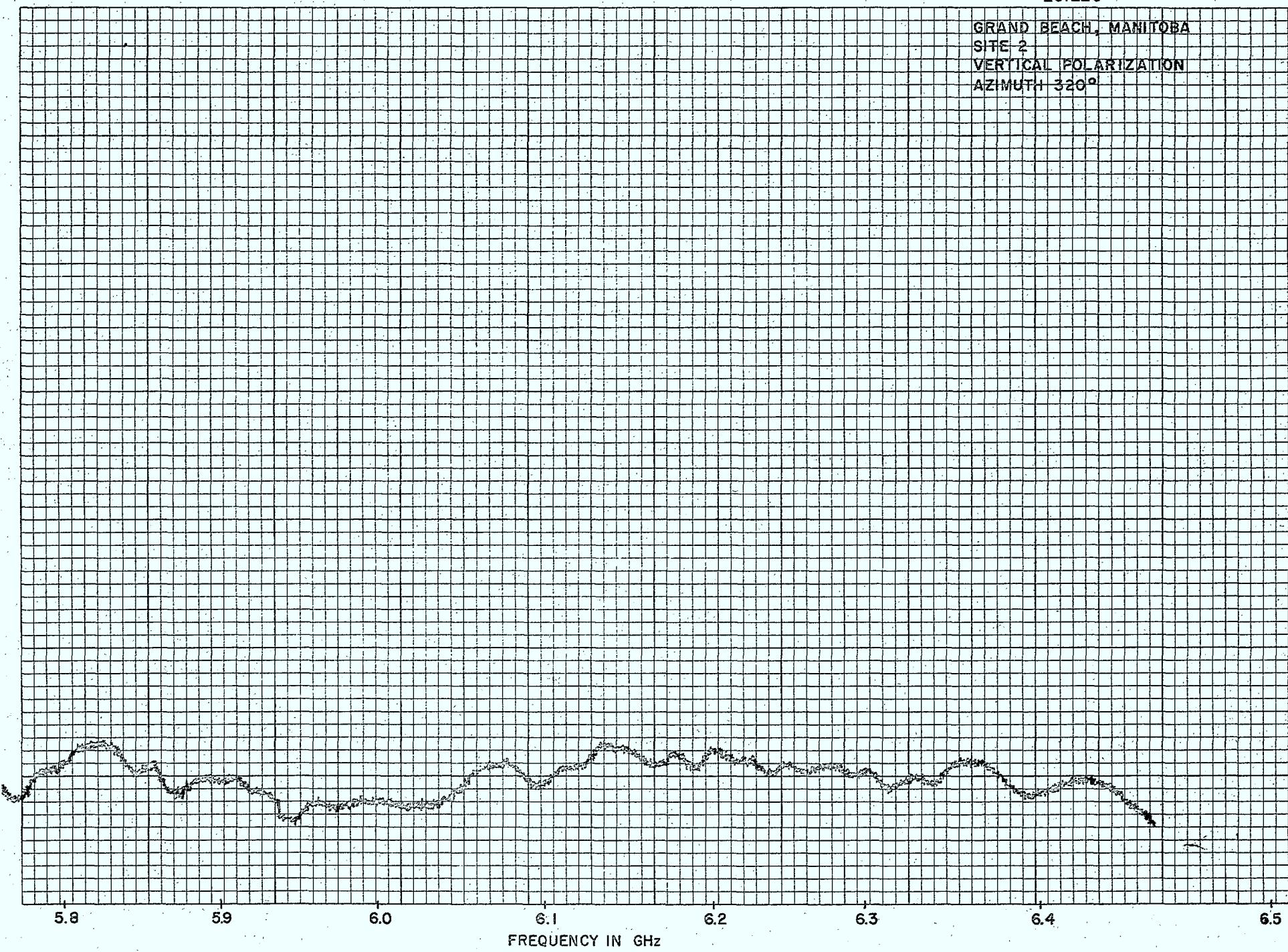
GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 300°



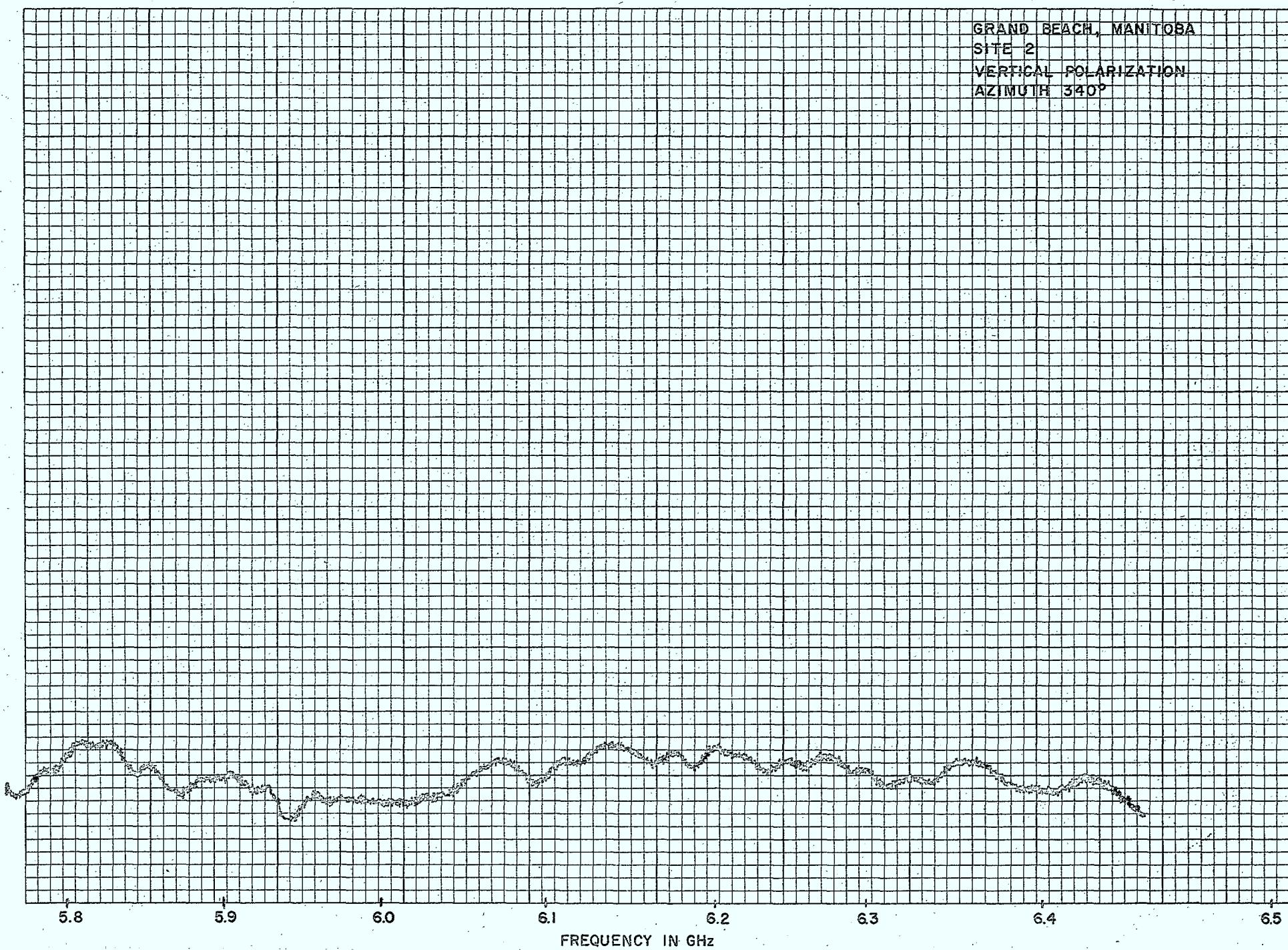
C 44

261226

GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 320°



GRAND BEACH, MANITOBA  
SITE 2  
VERTICAL POLARIZATION  
AZIMUTH 340°



APPENDIX D  
(site 2)

X-Y plots of signals received and specific azimuth

Appendix D47

X-Y plot of signals received  
from Gunton CP site 234° hori-  
zontal polarization

Appendix D48

X-Y plot of signals received  
from Stony on opposite polar-  
ization

Appendix D49

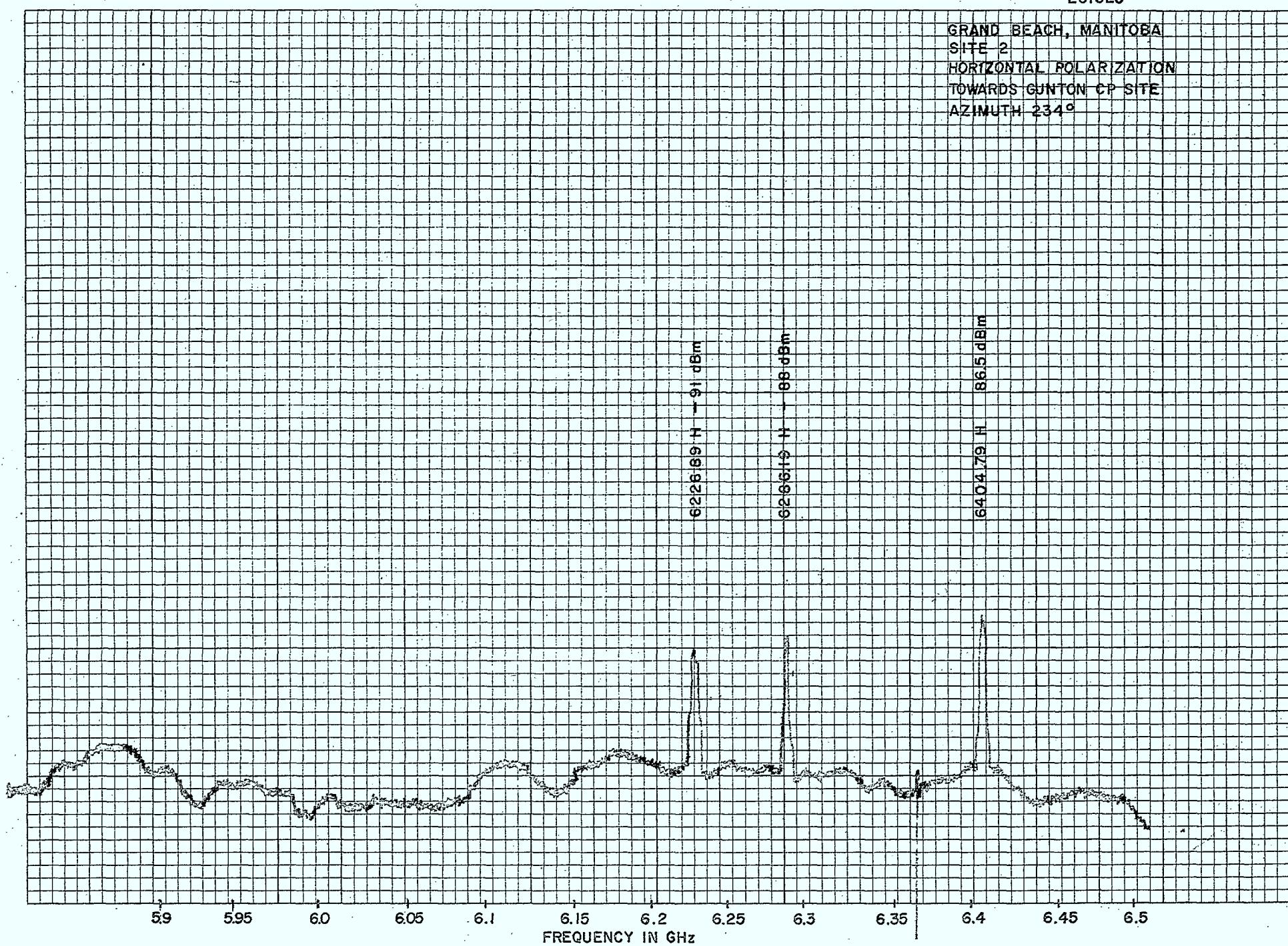
X-Y plot of signals received  
from Gunton on opposite  
polarization

Appendix D50

X-Y plot of signals received  
from Stony on horizontal  
polarization

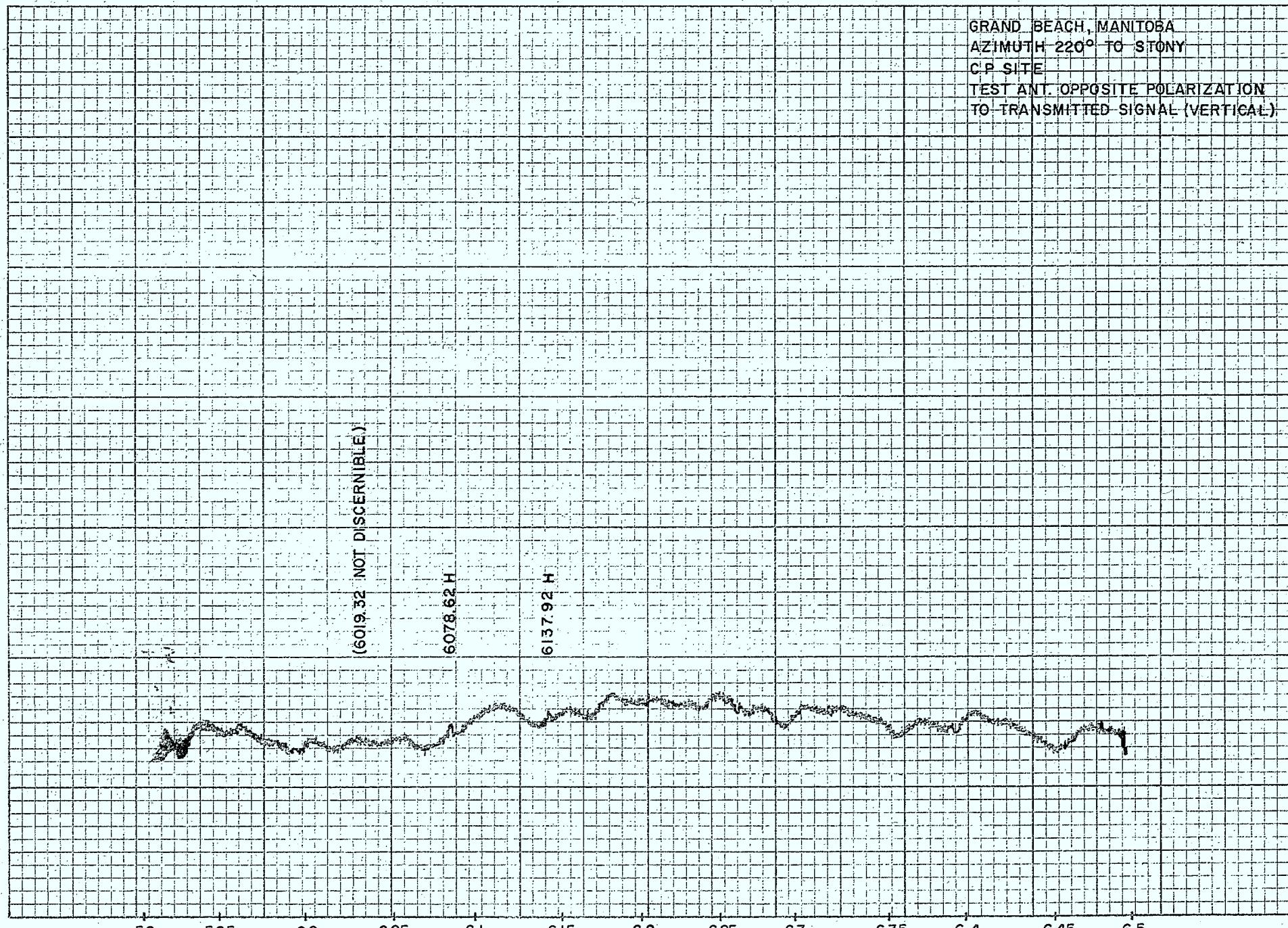
261520

GRAND BEACH, MANITOBA  
SITE 2  
HORIZONTAL POLARIZATION  
TOWARDS GUNTON CP SITE  
AZIMUTH  $234^{\circ}$



261816 EDT

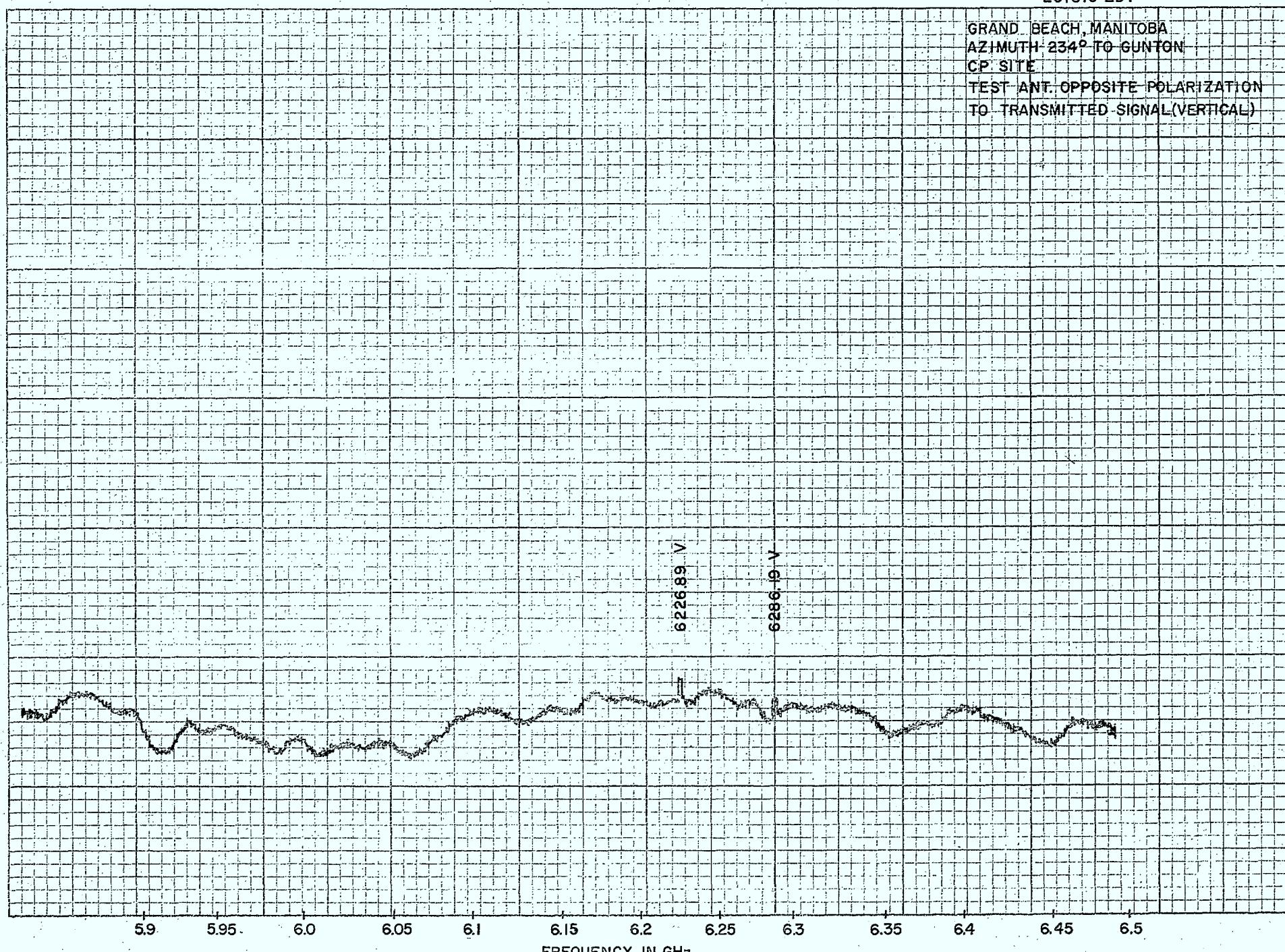
GRAND BEACH, MANITOBA  
AZIMUTH 220° TO STONY  
C.P. SITE  
TEST ANT. OPPOSITE POLARIZATION  
TO TRANSMITTED SIGNAL (VERTICAL)



261819 EDT

GRAND BEACH, MANITOBA  
AZIMUTH 234° TO GUNTON  
CP SITE

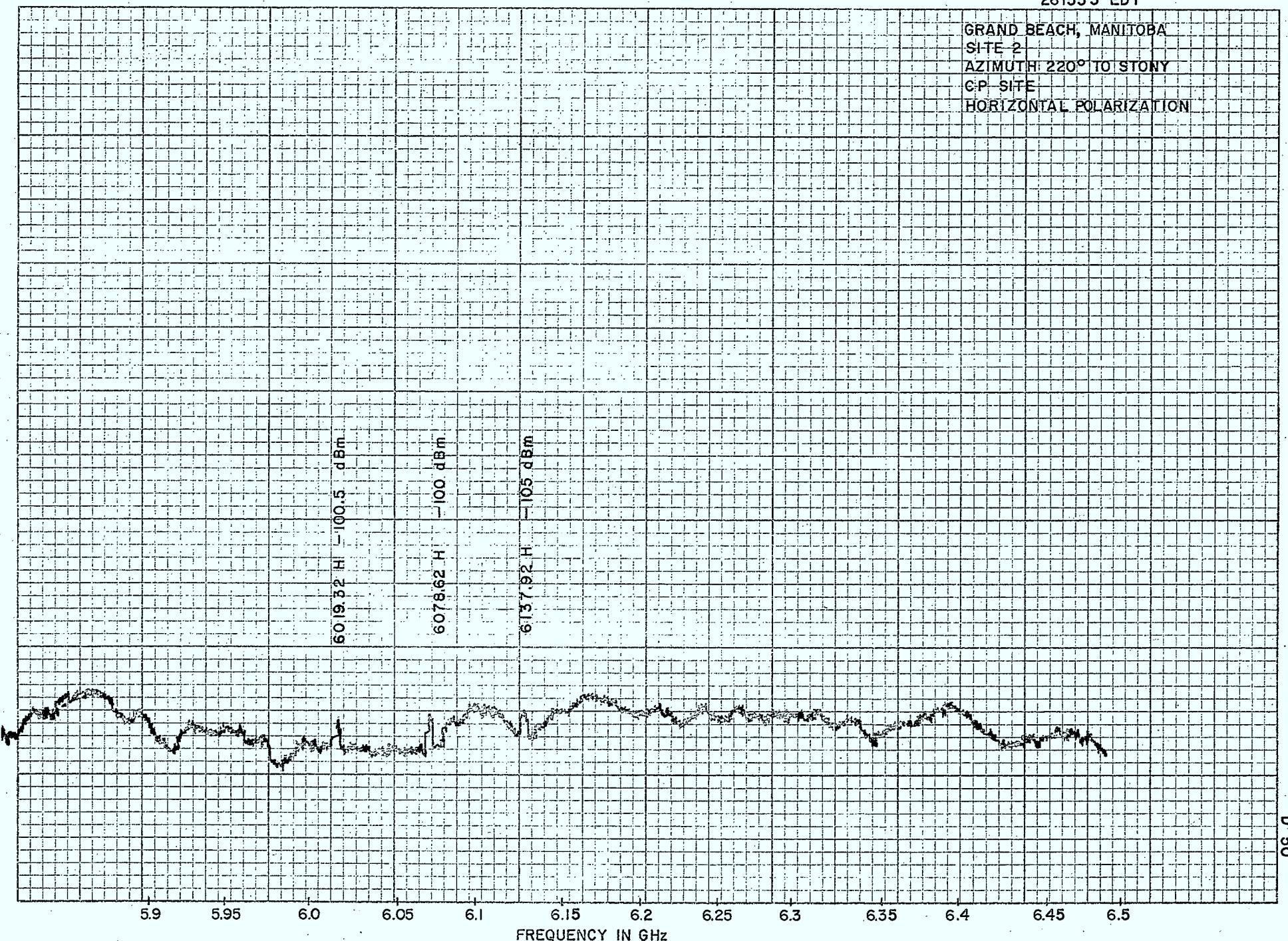
TEST ANT. OPPOSITE POLARIZATION  
TO TRANSMITTED SIGNAL(VERTICAL)



K 10 X 10 TO THE INCH 45 0780  
1/4 X 10 INCHES LATE 19 3.5  
KEUFFEL & FISHER CO.

261555 EDT

GRAND BEACH, MANITOBA  
SITE 2  
AZIMUTH 220° TO STONY  
C.P. SITE  
HORIZONTAL POLARIZATION



APPENDIX E

APPENDICES E51-52 area frequency listing

50 - 51° Latitude

96 - 99° Longitude

**JOB.21** **AREA FREQUENCY LISTING**  
**MAIN**
**BOOK 053**
**DEPARTMENT OF COMMUNICATIONS**  
**FREQUENCY ASSIGNMENTS**

ASSIGNED FREQUENCY	DATE ASSIGNED DAY MO. YR.	CALL SIGN	NAME OF TX. STATION	REGN. PROV.	GEOGRAPHICAL CO-ORDINATES		RECEPTION POINT(S)	NO. OF MBL UNITS	CLASS AND NATURE	NECESSARY BANDWIDTH AND TYPE OF EMISSION	TX. RF PWR OUTPUT	EIIRP dBw	AZIM.	dB GAIN	ANT. NO.
21205000070668CFY234SELKIRK	3M500836	965334	TEULON		FXCP	17230F9	2.0	310	35	2					
21205000070668CFY236SLAURENT	3M502745	975815	ERIKSDAL		FXCP	17230F9	2.0	348	35	1					
21205000070668CFY238ASHERN	3M511215	982615	STEEP RCK		FXCP	17230F9	2.0	311	35	2					
21205000070668CFY239S MARTIN	3M514250	983450	TAN CK		FXCP	17230F9	2.0	340	35	2					
21350000070668CFY234SELKIRK	3M500836	965334	WINNPGSO		FXCP	18500F9	2.0	202	35	1					
21350000070668CFY236SLAURENT	3M502745	975815	TEULON		FXCP	17230F9	2.0	100	35	2					
21350000070668CFY238ASHERN	3M511215	982615	ERIKSDAL		FXCP	17230F9	2.0	148	35	1					
21350000070668CFY239S MARTIN	3M514250	983450	STEEP RCK		FXCP	17230F9	2.0	201	35	1					
21480000270262CFY21 NEEPAWA	3M501316	992830	WOODSIDE		FXCP	12600F35910.0		95	35	1					
21480000270262CFY210ERICKSON	3M503242	995600	TREMAINE		FXCP	12600F35910.0		179	35	1					
21627500270262CFY21 NEEPAWA	3M501316	992830	TREMAINE		FXCP	12600F35910.0		252	35	2					
21627500270262CFY210ERICKSON	3M503242	995600	MOON L		FXCP	12600F35910.0		347	35	2					
21785000070668CFY234SELKIRK	3M500836	965334	TEULON		FXCP	17000F9	2.0	310	35	2					
21785000070668CFY236SLAURENT	3M502745	975815	ERIKSDAL		FXCP	17000F9	2.0	348	35	1					
21785000070668CFY238ASHERN	3M511215	982615	STEEP RCK		FXCP	17000F9	2.0	311	35	2					
21785000070668CFY239S MARTIN	3M514250	983450	TAN CK		FXCP	17000F9	2.0	340	35	1					
22365000070668CFY234SELKIRK	3M500836	965334	TEULON		FXCP	17230F9	2.0	310	35	2					
22365000070668CFY236SLAURENT	3M502745	975815	ERIKSDAL		FXCP	17230F9	2.0	348	35	1					
22365000070668CFY238ASHERN	3M511215	982615	STEEP RCK		FXCP	17230F9	2.0	311	35	2					
22365000070668CFY239S MARTIN	3M514250	983450	TAN CK		FXCP	17230F9	2.0	340	35	1					
22510000070668CFY234SELKIRK	3M500836	965334	WINNPGSO		FXCP	18500F9	2.0	202	35	1					
22510000070668CFY236SLAURENT	3M502745	975815	TEULON		FXCP	17230F9	2.0	100	35	2					
22510000070668CFY238ASHERN	3M511215	982615	ERIKSDAL		FXCP	17230F9	2.0	148	35	1					
22510000070668CFY239S MARTIN	3M514250	983450	STEEP RCK		FXCP	17230F9	2.0	201	35	1					
22660000270262CFY21 NEEPAWA	3M501316	992830	WOODSIDE		FXCP	12600F35910.0		95	35	1					
22660000270262CFY210ERICKSON	3M503242	995600	TREMAINE		FXCP	12600F35910.0		179	35	1					
22807500270262CFY21 NEEPAWA	3M501316	992830	TREMAINE		FXCP	12600F35910.0		252	35	2					
22807500270262CFY210ERICKSON	3M503242	995600	MOON L		FXCP	12600F35910.0		347	35	2					
37300000310367CFY231MINNEDOS	3M501307	995015	BRANDON		FXCP	18315F9	9.0		41	2					
38100000310367CFY231MINNEDOS	3M501307	995015	BRANDON		FXCP	18315F9	9.0		41	2					
59303750091064CHB913STONYMTN	3M500442	971545	GUNTON		FXCP	17000F9	5.0	1	43	2					
59600300150763CHB913STONYMTN	3M500442	971545	GUNTON	150763	WINNIPEG										
59748500091064CHB850PE TR SFLD	3M501805	965618	BEAUSEJR		FXCP	23700F9	5.0	1	43	1					
150763			GUNTON		FXCP	23700F9	5.0	155	43	2					
59748500150763CHB852WOODLND	3M501618	974010	FORTIER		FXCP	17000F9	5.0	133	43	2					
59748500150763CHB854FULTON	3M500630	982215	GLADSTON		FXCP	17000F9	5.0	266	43	1					
59748500150763CHB856POLONIA	3M502300	993633	RACKHAM		FXCP	17000F9	5.0	208	43	2					
60193300150763CHB913STONYMTN	3M500442	971545	WINNIPEG	150763	GUNTON										
60341500150763CHB850PE TR SFLD	3M501805	965618	BEAUSEJR		FXCP	23700F9	5.0	155	43	2					
60341500150763CHB852WOODLND	3M501618	974010	GUNTON		FXCP	17000F9	5.0	1	43	1					

JOB. 21  
MAIN

## AREA FREQUENCY LISTING

BOOK 053

ASSIGNED FREQUENCY	DATE ASSIGNED		CALL SIGN	NAME OF TX. STATION	REGN. PROV.	GEOGRAPHICAL CO-ORDINATES		RECEPTION POINT(S)	NO. OF MBL. UNITS	CLASS AND NATURE	NECESSARY BANDWIDTH AND TYPE OF EMISSION	TX. RF PWR. OUTPUT	E(I)RP dBW	ANTENNA		
	DAY	MO.	YR.			LAT.	LONG.							AZIM.	dB. GAIN	Elevation
60341500150763CH8854FULTON	3M500630	982215FORTIER								FXCP17000F9	5.0	116	43	1		
60341500150763CH8856POLONIA	3M502300	993633GLADSTON								FXCP17000F9	5.0	113	43	1		
60736300150763CH8912STONYMTN	3M500442	971545GUNTON								FXCP23700F9	5.0	1	43	1		
150763		WINNIPEG								FXCP23700F9	5.0	155	43	2		
60934500150763CH8850PE	TR.SFLD3M501805	965618GUNTON								FXCP17000F9	5.0	266	43	1		
60934500150763CH8852WOODLNDS	3M501618	974010FORTIER								FXCP17000F9	5.0	209	43	2		
60934500150763CH8854FULTON	3M500630	982215GLADSTON								FXCP17000F9	5.0	285	43	2		
60934500150763CH8856POLONIA	3M502300	993633RACKHAM								FXCP17000F9	5.0	303	43	2		
61379300150763CH8913STONYMTN	3M500442	971545WINNIPEG								FXCP23700F9	5.0	155	43	2		
150763		GUNTON								FXCP23700F9	5.0	1	43	1		
61527500150763CH8850PE	TR.SFLD3M501805	965618BEAUSEJR								FXCP17000F9	5.0	133	43	2		
61527500150763CH8852WOODLNDS	3M501618	974010GUNTON								FXCP17000F9	5.0	88	43	2		
61527500150763CH8854FULTON	3M500630	982215FORTIER								FXCP17000F9	5.0	116	43	1		
61527500150763CH8856POLONIA	3M502300	993633GLADSTON								FXCP17000F9	5.0	113	43	1		
61972000051062CFY224BEAUSEJR	3M500819	961159QUENSVLY								FXCP13300F039	1.0	222	44	1		
62120700150763CH8851GUNTON	3M501705	971540STONYMTN								FXCP23700F9	5.0	180	43	1		
62268900150763CH8849BEAUSEJR	3M500253	963118PETRSFLD								FXCP17000F9	5.0	314	43	2		
091064		LEWIS								FXCP17000F9	5.0	123	43	1		
62268900091064CH8851GUNTON	3M501705	971540PETRSFLD								FXCP17000F9	5.0	85	43	1		
150763		WOODLNDS								FXCP17000F9	5.0	267	43	2		
62268900150763CH8855GLADSTON	3M501246	985950POLONIA								FXCP17000F9	5.0	294	43	1		
62713700150763CH8851GUNTON	3M501705	971540STONYMTN								FXCP23700F9	5.0	160	43	1		
62861900150763CH8849BEAUSEJR	3M500253	963118LEWIS								FXCP17000F9	5.0	123	43	1		
62861900150763CH8851GUNTON	3M501705	971540PETRSFLD								FXCP17000F9	5.0	85	43	1		
62861900150763CH8855GLADSTON	3M501246	985950FULTON								FXCP17000F9	5.0	104	43	2		
63159000051062CFY224BEAUSEJR	3M500819	961159QUENSVLY								FXCP13300F039	1.0	222	44	1		
63306700150763CH8851GUNTON	3M501705	971540STONYMTN								FXCP23700F9	5.0	180	43	1		
63454900150763CH8849BEAUSEJR	3M500253	963118PETRSFLD								FXCP17000F9	5.0	314	43	2		
63454900150763CH8851GUNTON	3M501705	971540WOODLNDS								FXCP17000F9	5.0	267	43	2		
63454900150763CH8855GLADSTON	3M501246	985950POLONIA								FXCP17000F9	5.0	294	43	1		
63899700150763CH8851GUNTON	3M501705	971540STONYMTN								FXCP23700F9	5.0	180	43	1		
64047900150763CH8849BEAUSEJR	3M500253	963118LEWIS								FXCP17000F9	5.0	123	43	1		
64047900150763CH8851GUNTON	3M501705	971540PETRSFLD								FXCP17000F9	5.0	85	43	1		
64047900150762CH8855GLADSTON	3M501246	985950FULTON								FXCP17000F9	5.0	104	43	2		
65850000251065XOJ52	PARKDALE3M500432	970251TRANSCON								FXCV10000F9		3929169	40	2		
68550000251065XOJ52	PARKDALE3M500432	970251ROSSER								FXCV10000F9		3929217	40	1		

NOTES PRINTED FOR THIS JOBNUMBER

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APPENDIX E

Appendices E53 - 56

area frequency listings

49 - 50° Latitude

96 - 99° Longitude

DEPARTMENT OF COMMUNICATIONS  
FREQUENCY ASSIGNMENTS

JOB. 21 AREA FREQUENCY LISTING

BOOK 054

ASSIGNED FREQUENCY	DATE ASSIGNED DAY MO YR	CALL SIGN	NAME OF TX. STATION	REG PRO	GEOGRAPHICAL CO-ORDINATES		RECEPTION POINT(S)	NO. OF MBL UNITS	CLASS AND NATURE	NECESSARY BANDWIDTH AND TYPE OF EMISSION	TX. RF PWR OUTPUT	EIRP dbw	ANTI	
					LAT.	LONG.							AZIM.	BB GAIN
22365000060566CFY217	STEINBCH3	M493122	963956HADSHVLL						FXCP6070F9	2.0	74	34	2	
22365000070668CFY232	WINNIPEG3	M495123	970920WINNPGSO						FXCP18500F9	2.0	154	34	2	
22660000110761CFY220PR	TGLPRR3	M495820	981722ELIE						FXCP12600F359	10.0	109	35	1	
22807500270262CFY220PR	TGLPRR3	M495820	981722WOODSTDE						FXCP12600F359	10.0	305	35	2	
22807500110761CFY507	WINNIPEG3	M495220	970904ELIE						FXCP12600F359	10.0	269	35	2	
29000000110866VE9KL	WINNIPEG3	M495326	971219TEST						EXCV16000PO	150				
37100000160567CFY40	PELICAN3	M491818	992701PILOTMND						FXCP18315F9	10.0	102	41	1	
37100000160567CFY47	DRLNGFRD3	M491151	982233MYRTLE						FXCP18315F9	10.0	82	41	2	
37100000050457CFY503	GLENBORO3	M493411	991650TREHERNE						FXCP20000F359	1.0	84	39	2	
020562			BRNDNHLS						FXCP20000F9	1.0	283	37		
37100000050457CFY505	HAYWOOD	3M493946	981127BRUNKILD						FXCP20000F359	1.0	98	39	1	
020562			TREHERNE						FXCP20000F9	1.0	260	37	1	
37100000140857CFY507	WINNIPEG3	M495220	970904NIVERVLL						FXCP20000F359	1.0	173	39	2	
050457			QUENSVLY						FXCP20000F359	1.0	89	39	2	
020562			BRUNKILD						FXCP20000F9	1.0	224	37	2	
37100000140857CFY513	MORIS	3M492125	971635ROSENFLD						FXCP20000F359	1.0	215	39	1	
130569			S MALO						FXCP18315F9	10.0	107	39	1	
37100000130569CFY528	VITA	3M490609	963240PINEY						FXCP18315F9	10.0	97	41	2	
37500000160567CFY43	PILOTMND3	M491330	985308DRLNGFRD						FXCP18315F9	10.0	274	41	1	
37500000160567CFY50	MYRTLE	3M491525	974220MORIS						FXCP18315F9	10.0	70	41	2	
37500000050457CFY502	BRNDNHLS3	M494000	995738GLENBORO						FXCP20000F359	1.0	102	39	1	
050457			BRANDON						FXCP20000F359	1.0	183	37	1	
020562			GRISWOLD						FXCP20000F9	1.0	286	37	2	
37500000020562CFY504	TREHERNE3	M493621	984155GLENBORO						FXCP20000F9	1.0	264	37	1	
050457			HAYWOOD						FXCP20000F359	1.0	80	39	1	
37500000050457CFY506	BRUNKILD3	M493612	973307WINNIPEG						FXCP20000F359	1.0	44	39	1	
020562			HAYWOOD						FXCP20000F9	1.0	279	37	2	
37500000020562CFY508	QUENSVL3	M495238	963404WINNIPEG						FXCP20000F9	1.0	269	37	1	
050457			WHITEHORN						FXCP20000F359	1.0	78	39	2	
37500000140857CFY512	NIVERVLL3	M493344	970934MORIS						FXCP20000F359	1.0	211	39	2	
37500000140857CFY514	ROSENFLD3	M491042	972827OLGA						FXCP20000F359	1.0	218	39	1	
37500000130569CFY527	S MALO	3M491619	965119VITA						FXCP18315F9	10.0	130	39	1	
37500000130569CFY529	PINEY	3M490706	960121MIDDLEBR						FXCP18315F9	10.0	105	41	2	
37900000160567CFY40	PELICAN3	M491818	992701PILOTMND						FXCP18315F9	10.0	102	41	1	
37900000160567CFY47	DRLNGFRD3	M491151	982233MYRTLE						FXCP18315F9	10.0	82	41	2	
37900000050457CFY503	GLENBORO3	M493411	991650TREHERNE						FXCP20000F359	1.0	84	39	2	
37900000050457CFY505	HAYWOOD	3M493946	981127BRUNKILD						FXCP20000F359	1.0	98	39	1	
37900000140857CFY507	WINNIPEG3	M495220	970904NIVERVLL						FXCP20000F359	1.0	73	39	2	
070258			QUENSVLY						FXCP20000F359	1.0	89	39	2	
37900000140857CFY513	MORIS	3M492125	971635ROSENFLD						FXCP20000F359	1.0	215	39	1	
130569			S MALO						FXCP18315F9	10.0	107	39	1	
37900000130569CFY528	VITA	3M490609	963240PINEY						FXCP18315F9	10.0	87	41	2	
38300000160567CFY43	PILOTMND3	M491330	985308DRLNGFRD						FXCP18315F9	10.0	274	41	1	
38300000160567CFY50	MYRTLE	3M491525	974220MORIS						FXCP18315F9	10.0	70	41	2	
38300000050457CFY502	BRNDNHLS3	M494000	995738GLENBORO						FXCP20000F359	1.0	102	39	1	
050457			BRANDON						FXCP20000F359	1.0	183	37	2	
38300000050457CFY505	HAYWOOD	3M493621	984155HAYWOOD						FXCP20000F359	1.0	80	39	1	
38300000050457CFY506	BRUNKIL303	M493612	973307WINNIPEG						FXCP20000F359	1.0	44	39	1	
38300000070258CFY508	QUENSVL3	M495238	963404WHITEHORN						FXCP20000F359	1.0	78	39	2	
38300000140857CFY512	MORIS	3M493344	970934MORIS						FXCP20000F359	1.0	211	39	2	

OB. 21 AIN	AREA FREQUENCY LISTING							DEPARTMENT OF COMMUNICATIONS FREQUENCY ASSIGNMENTS								
	DATE ASSIGNED		CALL SIGN	NAME OF TX. STATION	REG. PROV.	GEOGRAPHICAL CO-ORDINATES		RECEPTION POINT(S)	NO. OF MBL UNITS	CLASS AND NATURE	NECESSARY BANDWIDTH AND TYPE OF EMISSION	TX. RF PWR. OUTPUT	EIRP dBW	ANTI		
	DAY	MO.	YR.			LAT.	LONG.							AZIM.	dB GAIN	POLE
8300000140857CFY514R0SENFLD3M491042						9728270LGA				FXCP20000F359	1.0	218	39	1		
38300000130569CFY527S	MALO	3M491619				965119VITA				FXCP18315F9	10.0	130	39	1		
8300000130569CFY529PINEY		3M490706				960121MIDDLEBR				FXCP18315F9	10.0	105	41	2		
8700000050457CFY503GLENBORO3M493411						991650TREHERNE				FXCP20000F359	1.0	84	39	2		
3870000050457CFY505HAYWOOD		3M493946				981127BRUNKILD				FXCP20000F359	1.0	98	39	1		
8700000050457CFY507WINNIPEG3M495220						970904QUEENSVLY				FXCP20000F359	1.0	89	39	2		
39100000190669	BRNDNHLS3M495053					995651BRANDON				FRCP						
3910000050457CFY502BRNDNHLS3M494000						995738GLENBORG				FXCP20000F359	1.0	102	39	1		
9100000190669CFY502BRNDNHLS3M493958						995765BRANDON				FXCP17000F9	10.0	3	38	1		
3910000050457CFY504TREHERNE3M493621						984155HAYWOOD				FXCP20000F359	1.0	80	39	1		
3910000050457CFY506BRUNKILD3M493612						973307WINNIPEG				FXCP20000F359	1.0	44	39	1		
9100000050457CFY508QUEENSVLY3M495238						963404WINNIPEG				FXCP20000F359	1.0	70	39	2		
3970000050457CFY502RNDNHLS3M494000						995738GRISWOLD				FXCP20000F359	1.0	286	39	2		
3970000050457CFY504TREHERNE3M493621						984155GLENBORO				FXCP20000F359	1.0	264	39	2		
9700000050457CFY506BRUNKILD3M493612						973307HAYWOOD				FXCP20000F359	1.0	279	39	2		
9700000050457CFY508QUEENSVLY3M495238						963404WINNIPEG				FXCP20000F359	1.0	269	39	1		
3970000140857CFY512NIVERVLL3M493344						970534WINNIPEG				FXCP20000F359	1.0	353	39	1		
9700000140857CFY514R0SENFLD3M491042						972827MORIS				FXCP20000F359	1.0	35	39	2		
4010000050457CFY503GLENBORO3M493411						991650BRNDNHLS				FXCP20000F359	1.0	283	39	1		
4010000050457CFY505HAYWOOD		3M493946				981127TREHERNE				FXCP20000F359	1.0	260	39	1		
0100000050457CFY507WINNIPEG3M495220						970904BRUNKILD				FXCP20000F359	1.0	224	39	2		
0100000140857CFY513MORIS		3M492125				971635NIVERVLL				FXCP20000F359	1.0	31	39	1		
10300000160567CFY40_PELICAN3M491818						992701801SSEVN				FXCP18315F9	10.0	258	41	2		
10300000160567CFY47_DRLNGFRD3M491151						982233PILOTMND				FXCP18315F9	10.0	274	39	1		
4030000160567CFY513MORIS		3M492125				971635MYRTLE				FXCP18315F9	10.0	289	39	2		
4030000130569CFY528VITA		3M490609				963240S_MALO				FXCP18315F9	10.0	310	41	1		
1050000020562CFY502RNDNHLS3M494000						995738GLENBORG				FXCP20000F9	1.0	103	37	2		
070258						GRISWOLD				FXCP20000F359	1.0	286	39	2		
1050000020562CFY504TREHERNE3M493621						984155HAYWOOD				FXCP20000F9	1.0	80	37	1		
050457						GLENBORG				FXCP20000F359	1.0	264	39	2		
1050000020562CFY506BRUNKILD3M493612						973307WINNIPEG				FXCP20000F9	1.0	44	37	2		
050457						HAYWOOD				FXCP20000F359	1.0	279	39	2		
1050000070258CFY508QUEENSVLY3M495238						963404WINNIPEG				FXCP20000F359	1.0	269	39	1		
10500000140857CFY512NIVERVLL3M493344						970534WINNIPEG				FXCP20000F359	1.0	353	39	1		
40500000140857CFY514R0SENFLD3M491042						972827MORIS				FXCP20000F359	1.0	35	39	2		
10700000160567CFY43_PILOTMND3M491330						985308PELICANL				FXCP18315F9	10.0	282	41	1		
10700000160567CFY50_MYRTLE		3M491525				974220DRLNGFRD				FXCP18315F9	10.0	262	41	2		
40700000130569CFY527S_MALO		3M491619				965119MORIS				FXCP18315F9	10.0	287	41	1		
10700000120569CFY529PINEY		3M490706				960121VITA				FXCP18315F9	10.0	260	39	2		
4090000050457CFY503GLENBORO3M493411						991650RNDNHLS				FXCP20000F359	1.0	283	39	1		
020562						TREHERNE				FXCP20000F9	1.0	84	37	1		
1090000050457CFY505HAYWOOD		3M493946				981127TREHERNE				FXCP20000F359	1.0	260	39	1		
020562						BRUNKILD				FXCP20000F9	1.0	99	37	2		
1090000050457CFY507WINNIPEG3M495220						970904BRUNKILD				FXCP20000F359	1.0	224	39	2		
1090000050457CFY511SRANDON		3M495053				995651BRNDNHLS				FXCP20000F359	1.0	183	39	2		
10900000140857CFY513MORIS		3M492125				971635NIVERVLL				FXCP20000F359	1.0	31	39	1		
11100000160567CFY40_PELICAN3M491818						992701801SSEVN				FXCP18315F9	10.0	258	41	2		
1100000160567CFY47_DRLNGFRD3M491151						982233PILOTMND				FXCP18315F9	10.0	274	39	1		

DEPARTMENT OF COMMUNICATIONS  
FREQUENCY ASSIGNMENTS

JOB. 21 MAIN	AREA FREQUENCY LISTING							BOOK 094								
	ASSIGNED FREQUENCY	DATE ASSIGNED		CALL SIGN	NAME OR TX. STATION	GEOGRAPHICAL CO-ORDINATES		RECEPTION POINT(S)	NO. OF MBL. UNITS	CLASS AND NATURE	NECESSARY BANDWIDTH AND TYPE OF EMISSION	TX. RF PWR. dBrw	EIRP dBrw	ANT AZIM.	dB GAIN	PO
		DAY	MO.			RGN PROV	LAT.									
41100000160567CFY513MORIS	3M492125	971635	MYRTLE							FXCP18315F9	10.0	289	39	2		
41100000130569CFY520VITA	3M490609	963240	S. MALO							FXCP18315F9	10.0	310	31	1		
41300000050457CFY502BRNDNHL	3M494000	995700	GATIS HOLLOW							FXCP20000F359	1.0	286	39	2		
41300000050457CFY504TREHERNE	3M493621	984155	GLENBORO							FXCP20000F359	1.0	264	39	2		
41300000050457CFY506BRUNKILD	3M493612	973507	HAYWOOD							FXCP20000F359	1.0	279	39	2		
41300000020562CFY508QUENSVL	3M495238	963404	WINNIPEG							FXCP20000F9	1.0	79	37	1		
41300000020562CFY508QUENSVL	3M495238	963404	WINNIPEG							FXCP20000F359	1.0	260	39	2		
41300000160567CFY43 PILOTMND	3M491330	985308	PELICAN							FXCP18315F9	10.0	282	41	2		
41500000160567CFY50 MYRTLE	3M491525	976220	DRLNGFRD							FXCP18315F9	10.0	262	41	2		
41500000130569CFY527S. MALO	3M491619	965119	MORIS							FXCP18315F9	10.0	287	41	1		
41500000130569CFY529VNEY	3M490706	960121	VITA							FXCP18315F9	10.0	268	39	2		
41700000050457CFY503GLENBORO	3M493411	991650	BRNDNHL S							FXCP20000F359	1.0	283	39	1		
41700000050457CFY505HAYWOOD	3M493936	981127	TREHERNE							FXCP20000F359	1.0	260	39	1		
41700000050457CFY507WINNIP	3M495220	970904	BRUNKILD							FXCP20000F359	1.0	224	39	1		
41700000050457CFY511BRANDON	3M495053	995651	BRNDNHL S							FXCP20000F9	1.0	89	37	1		
41700000050457CFY511BRANDON	3M495053	995651	BRNDNHL S							FXCP20000F359	1.0	183	39	2		
54500000010464 WNPGRPT3	3M495430	971452	WSRC-CRC						1FX PO	X350		44				
59378000110761CFY220PR TGLPRR	3M495820	981722	HAYWOOD							FXCP7500F359	1.0	168	40	1		
59378000070961CFY221MORDEN	3M491132	980604	ROSENFLD							FXCP7500F9	1.0	92	34			
59452000051062CFY508QUENSVL	3M495240	963415	BEAUSEJR							FXCP13300F039	1.0	42	42	1		
59452000051062CFY513MORIS	3M492125	971635	STEINBCH							FXCP13300F039	1.0	68	44	1		
59452000080164CFY513MORIS	3M492129	971634	BRUNKILD							FXCP17710F9	1.0	324	45	2		
59526000030861CFY221MORDEN	3M491132	980604	HAYWOOD							FXCP7500F359	1.0	353	42	1		
59748000051062CFY508QUENSVL	3M495230	963415	STEINBCH							FXCP13300F039	1.0	290	40	1		
59748000051062CFY513MORIS	3M492125	971635	ROSENFLD							FXCP13300F039	1.0	216	43	1		
59748500090567CFY502BRNDNHL	3M494000	995738	001SSEVN							FXCP17000F9	1.0	188	42	1		
59748500150763CHB848LEWIS	3M495250	960730	BEAUSJUR							FXCP17000F9	5.0	303	43	1		
59748500150763CHB848LEWIS	3M495250	960730	RENNIE							FXCP17000F9	5.0	95	44	1		
60341500150763CHB848LEWIS	3M495250	960730	RENNIE							FXCP17000F9	5.0	95	43	1		
60342000221062CFY507WINNIP	3M495220	960904	STEINBCH							FXCP13300F039	1.0	138	44	1		
60564000110761CFY220PR TGLPRR	3M495820	981722	HAYWOOD							FXCP7500F359	1.0	168	40	1		
60564000070961CFY221MORDEN	3M491132	980604	ROSENFLD							FXCP7500F9	1.0	92	44	1		
60638000051062CFY508QUENSVL	3M495240	963415	BEAUSEJR							FXCP13300F039	1.0	42	42	1		
60638000051062CFY513MORIS	3M492125	971635	STEINBCH							FXCP13300F039	1.0	68	44	1		
60638000080164CFY513MORIS	3M492129	971634	BRUNKILD							FXCP17710F9	1.0	324	45	2		
60722000030861CFY221MORDEN	3M491132	980604	HAYWOOD							FXCP7500F359	1.0	353	42	1		
60934500090567CFY502BRNDNHL	3M494000	995738	001SSEVN							FXCP17000F9	1.0	188	42	1		
60934500150763CHB848LEWIS	3M495250	960730	BEAUSJUR							FXCP17000F9	5.0	303	43	1		
60935000051062CFY508QUENSVL	3M495240	963415	STEINBCH							FXCP13300F039	1.0	190	40	1		
60935000051062CFY513MORIS	3M492125	971635	ROSENFLD							FXCP13300F039	1.0	216	43	1		

DEPARTMENT OF COMMUNICATIONS  
 FREQUENCY ASSIGNMENTS

JOB.21 AREA FREQUENCY LISTING

BOOK 054

ASSIGNED FREQUENCY	DATE ASSIGNED		CALL SIGN	NAME OF TX STATION	GEOGRAPHICAL CO-ORDINATES		RECEPTION POINT(S)	NO. OF MBL UNITS	CLASS AND NATURE	NECESSARY BANDWIDTH AND TYPE OF EMISSION	TX. RF PWR OUTPUT	E(I)RP dBW	ANT	
	DAY	MO.			REG.	PROV.							AZIM.	dB GAIN
61527500150763CHB048LEWIS	3M495250	960730RENNIE	FXCP17000F9	5.0	95	43	1							
61528000221062CFY507WINNipeg3M495220	960904STEINBCH	FXCP13300F039	1.0	138	44	1								
61024150091064CHB931WINNipeg3M495325	970920STONYMTN	FXCP17000F9	5.0	339	43	1								
61098000030861CFY505HAYWOOD 3M493946	981127PRTGLPRR	FXCP7500F359	1.0	348	43	1								
61098000030861CFY514ROSENFLO3M491042	972827MORDEN	FXCP7500F359	1.0	273	42									
61972000091062CFY217STEINBCH3M493122	963956MORIS	FXCP13300F039	1.0	248	43	1								
61972000080164CFY506BRUNKILD3M493617	973310MORIS	FXCP17710F9	1.0	143	45	2								
62047000030861CFY505HAYWOOD 3M493946	981127MORDEN	FXCP7500F359	1.0	173	43	1								
62120700150763CHB914WINNipeg3M495406	970756STONYMTN	FXCP23700F9	5.0	335	43	2								
62268900150763CHB853FORTIER 3M495803	975458FULTON	FXCP17000F9	5.0	295	43	1								
62269000051062CFY217STEINBCH3M493122	963956QUEENSLY	FXCP13300F039	1.0	10	43	1								
62269000051062CFY514ROSENFLO3M491042	972827MORIS OLGA	FXCP13300F039	1.0	36	43	1								
62713700150763CHB914WINNipeg3M495406	970756STONYMTN	FXCP23700F9	5.0	335	43	2								
62861900150763CHB853FORTIER 3M495803	975458WOODLNDs	FXCP17000F9	5.0	27	43	2								
62862000221062CFY217STEINBCH3M493122	963956WINNipeg	FXCP13300F039	1.0	318	43	1								
63084000030861CFY505HAYWOOD 3M493946	981127PRTGLPRR	FXCP7500F359	1.0	348	43	1								
63084000030861CFY514ROSENFLO3M491042	972827MORDEN	FXCP7500F359	1.0	273	42	1								
63159000091062CFY217STEINBCH3M493122	963956MORIS	FXCP13300F039	1.0	248	43	1								
63159000080164CFY506BRUNKILD3M493617	973310MORIS	FXCP17710F9	1.0	143	45	2								
63233000030861CFY505HAYWOOD 3M493946	981127MORDEN	FXCP7500F359	1.0	173	43	1								
63306700150763CHB914WINNipeg3M495406	970756STONYMTN	FXCP23700F9	5.0	335	43	2								
63454900150763CHB853FORTIER 3M495803	975458FULTON	FXCP17000F9	5.0	295	43	1								
63455000051062CFY217STEINBCH3M493122	963956QUEENSLY	FXCP13300F039	1.0	10	43	1								
63455000051062CFY514ROSENFLO3M491042	972827MORIS OLGA	FXCP13300F039	1.0	36	43	1								
63899700150763CHB914WINNipeg3M495406	970756STONYMTN	FXCP23700F9	5.0	335	43	2								
64047900150763CHB853FORTIER 3M495803	975458WOODLNDs	FXCP17000F9	5.0	27	43	2								
64048000221062CFY217STEINBCH3M493122	963956WINNipeg	FXCP13300F039	1.0	318	43	1								
65850000110363XOM41 S VITAL 3M495029	970248WINNipeg	FXCV10000F9	1.0	280	36	2								
65030000110363XOM44 KIRKFIL 3M495354	971952MCPHLLPS	FXCV10000F9	1.0	78	40	1								
66150000110363XOM39 ROSSER 3M495842	970945MCPHLLPS	FXCV10000F9	1.0	184	30	2								
66150000110363XOM41 S VITAL 3M495029	970248TRANSCON	FXCV10000F9	1.0	24	36	1								
66150000110363XOM44 KIRKFIL 3M495354	971952SO W T	FXCV10000F9	1.0	196	40	1								

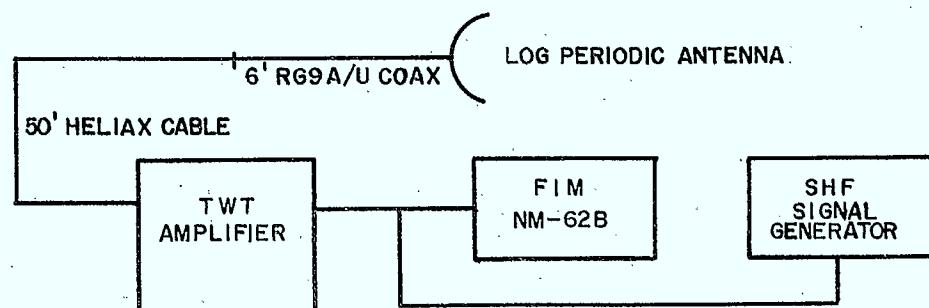
APPENDIX F

- |              |                                   |
|--------------|-----------------------------------|
| Appendix F57 | Measurement of FIM sensitivity    |
| Appendix F58 | TWT Amplifier                     |
| Appendix F59 | Test antenna effective area       |
| Appendix F60 | Test antenna characteristics      |
| Appendix F61 | General information (instruments) |

## APPENDIX F57

MEASUREMENT OF FIM SENSITIVITY

## Block Diagram

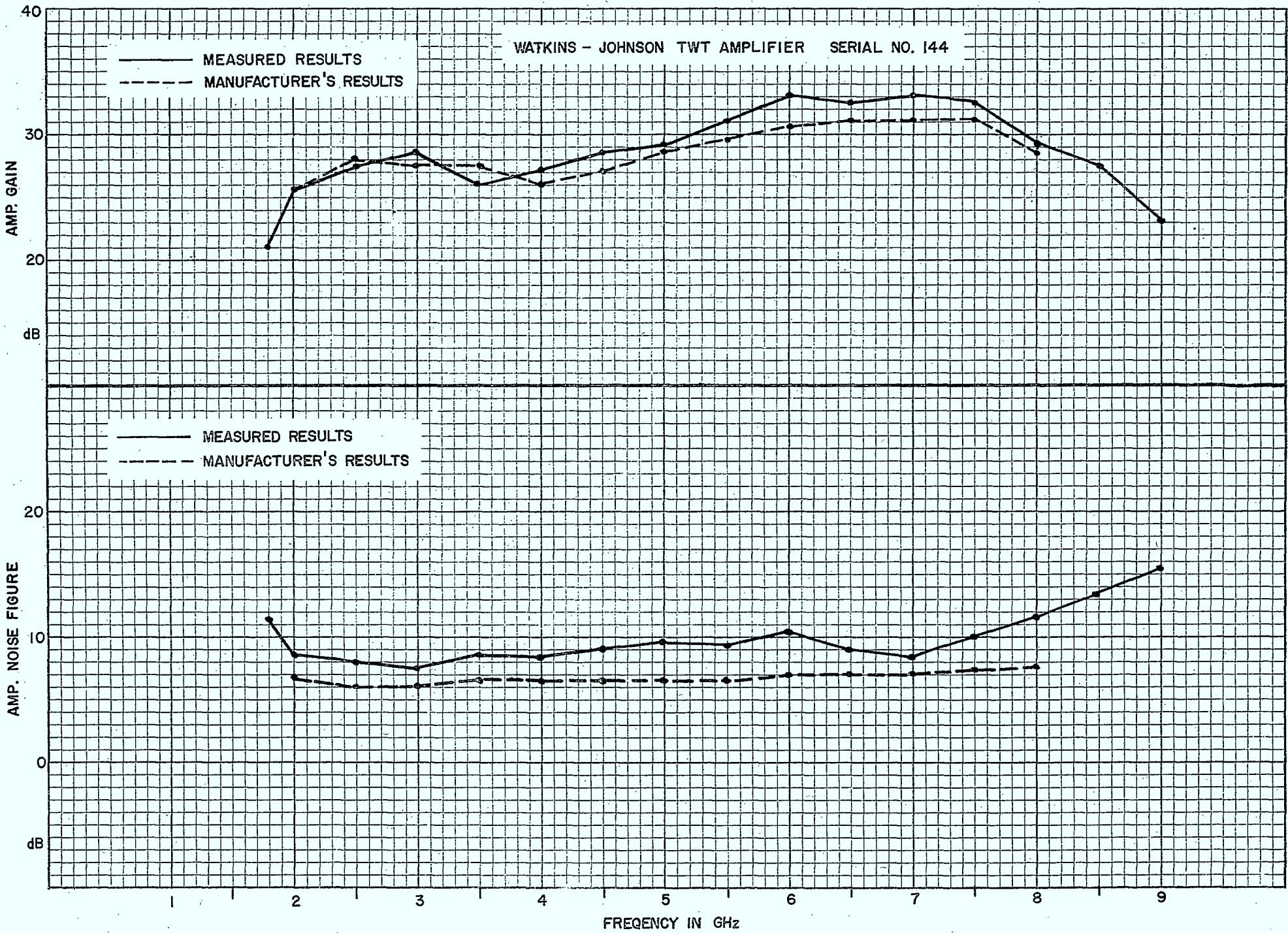
Method of Measurement

The equipment was calibrated in the following manner:

- i) the generator signal was fed to the FIM, first without the TWT amplifier, then with it in the circuit and the MDS (minimum discernible signal) noted.
- ii) the input cable was then disconnected at the antenna and the signal generator signal fed to the FIM via the input cable and TWT amplifiers and the MDS noted as before.
- iii) the FIM sensitivity at the input to the log periodic antenna is determined after adding the antenna gain. Test results are listed below.

Table of Results

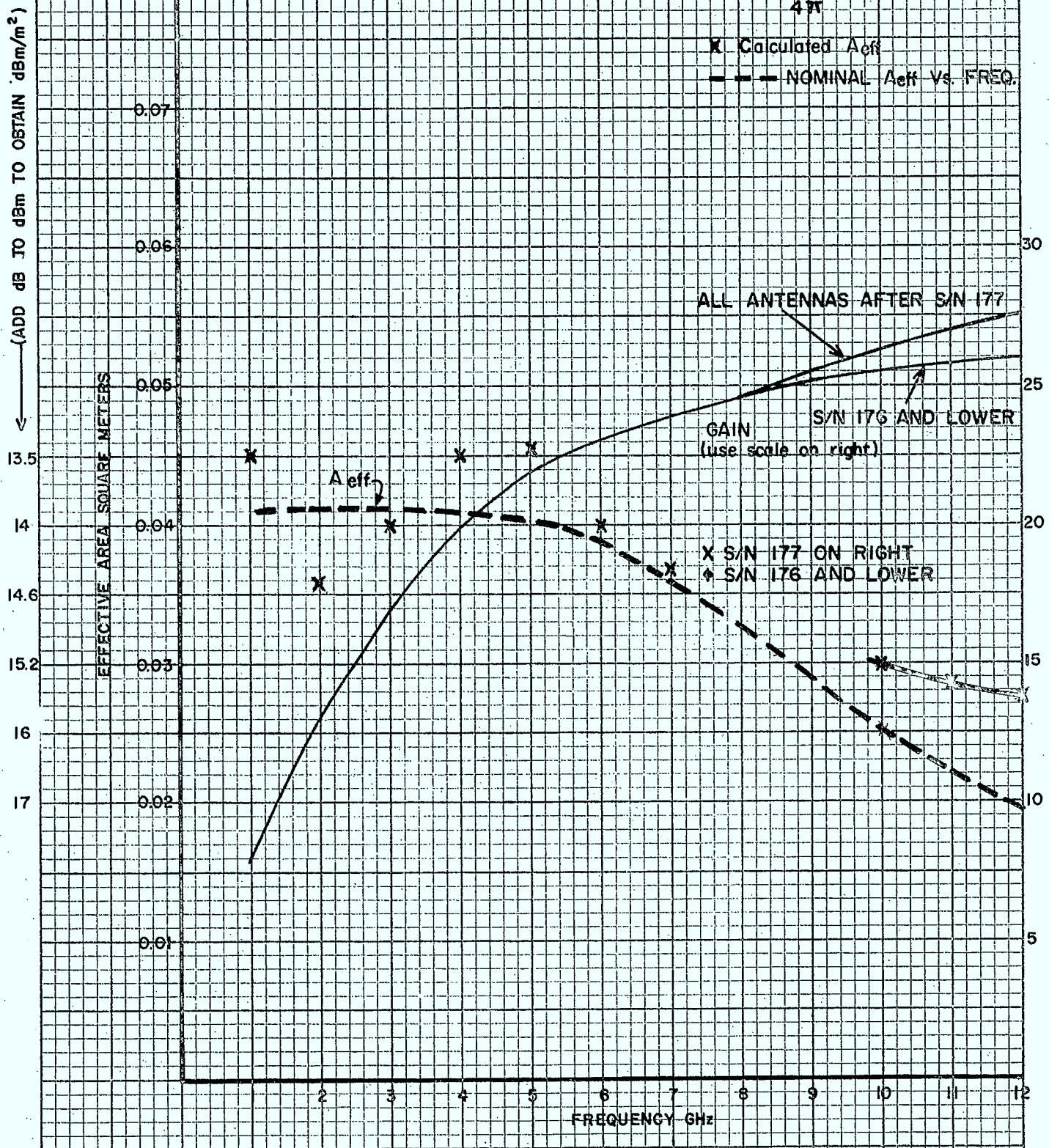
FIM Dial Freq. GHz	SIGNAL		Antenna Gain in dBi	System Sensitivity in dBm
	Generator input without TWT	with TWT		
3.8	-91 dBm	-113 dBm	19	-132
4.2	-89 "	-113 "	21	-134
4.3	-83 "	-109 "	21	-130



## STODDART LOG PERIODIC ANTENNA

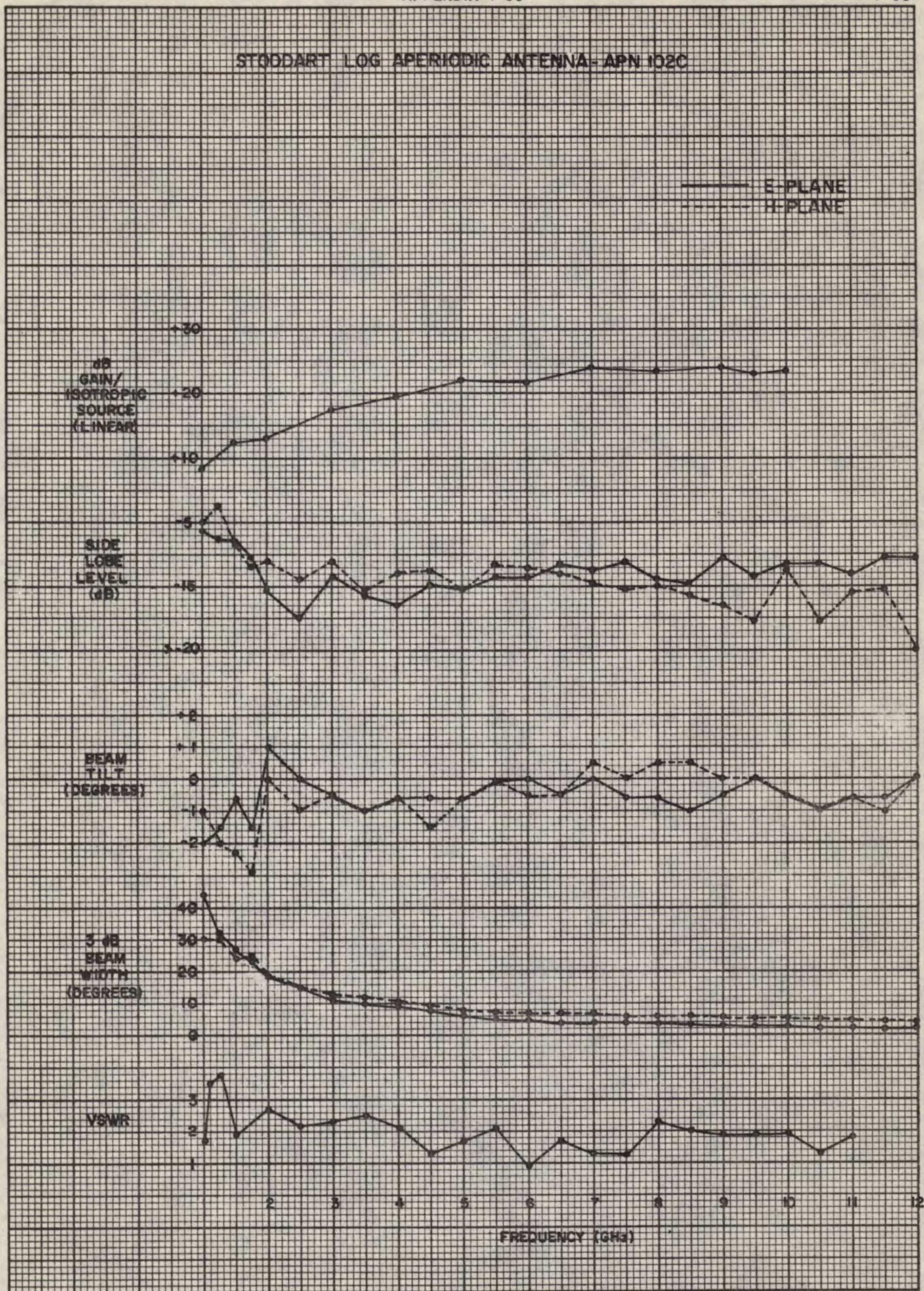
Effective Area and Gain

$$A_{\text{eff}} = \frac{G \lambda^2}{4 \pi}$$

X Calculated A<sub>eff</sub>— Nominal A<sub>eff</sub> vs. FREQ.

46 0867  
5 X 5 TO 1/2 INCH  
7 X 10 IN. • ALBANESE®  
MADE IN U.S.A.  
KEUFFEL & ESSER CO.

## STODDRAT LOG APERIODIC ANTENNA-APN 102C



KKE 10 X 10 TO 1/2 INCH  
7 X 10 IN. • ALBANEE®  
MADE IN U.S.A.  
KEUFFEL & ESSER CO.

General InformationInstruments

Type of Instruments	Manufacturer	Model Number	Serial Number	REL Number	Date of Calibration
Log Periodic Antenna	Stoddart	APN101A	299	F1161	
50 feet Heliax Cable	Andrews	HJ2-50			
Low-Noise Amplifier	Watkins-Johnson	WJ-343	144	A207	
Field Intensity Meter	Stoddart	NM-62B	560-13	F116	April 13/70
Field Intensity Meter	EMC Instrumentation	EMA-910	123-111	F130	Factory
Field Intensity Meter	Stoddart	NM-30A	66AD79	F123A	May 25/70
Head phones	Benaudi			P702	
X - Y Recorder	Mosely	7030A	325	R304	
SHF Signal Generator	Hewlett Packard	618B	951-1489	G222	April 1/70
Mobile Laboratory	D.O.C.				
6' Co-Ax	Amphenol	RG214/U		G222	
6' Co-Ax	Amphenol	RG9A/U		G210A	
16' Co-Ax	Amphenol	RG9A/U			

**APPENDIX G**

**Appendices G 62-67**

**Earth Stations Characteristics**

TECHNICAL CHARACTERISTICS  
OF  
GRAND BEACH MANITOBA  
EARTH STATION FOR  
INTERNATIONAL COORDINATION

TABLE 1.CHARACTERISTICS OF PROPOSED NETWORK QUALITYTV EARTH STATION AT GRAND BEACH

Name of Station	Grand Beach, Manitoba
Latitude	50° 37' 30"
Longitude	96° 31' 20"
Nature of Service	Space Service
Class of Station	Communication-Satellite Earth Station
Transmit Frequency Band	5925-6425 MHz
Receive Frequency Band	3700-4200 MHz
Transmit & Receive Freq.Plan	Fig. 1 Attached
Operating Company	Telesat Canada
Ground Elevation AMSL	785 ft.
Horizon Profile at Site	Fig. 2 Attached
Communications Antenna Characteristics	
a) Antenna Diameter	≥ 35ft.
b) Antenna Height AMSL	815 ft.
c) Minimum Main Beam Antenna Gain	54.0 at 5925 ft 51.0 at 3700 ft
d) Azimuthal Range	110°/250°
e) Minimum Operating Elevation Angle	12° Minimum
f) Gain in Direction of Horizon	Fig. 3 Attached
g) Maximum Gain in Direction of Horizon	5dB
h) Off-Axis Gain	As per CCIR S.G. IV Draft Recommendation L.2.f. (IV).

TABLE I (Cont'd)

## Transmission Characteristics for any R.F. Channel

- a) Main Beam EIRP (Clear weather) : 83 dBW.
- b) Max. Power/4 KHz Input to Antenna 7 dBW/4 KHz

## Reception Characteristics for any R.F. Channel

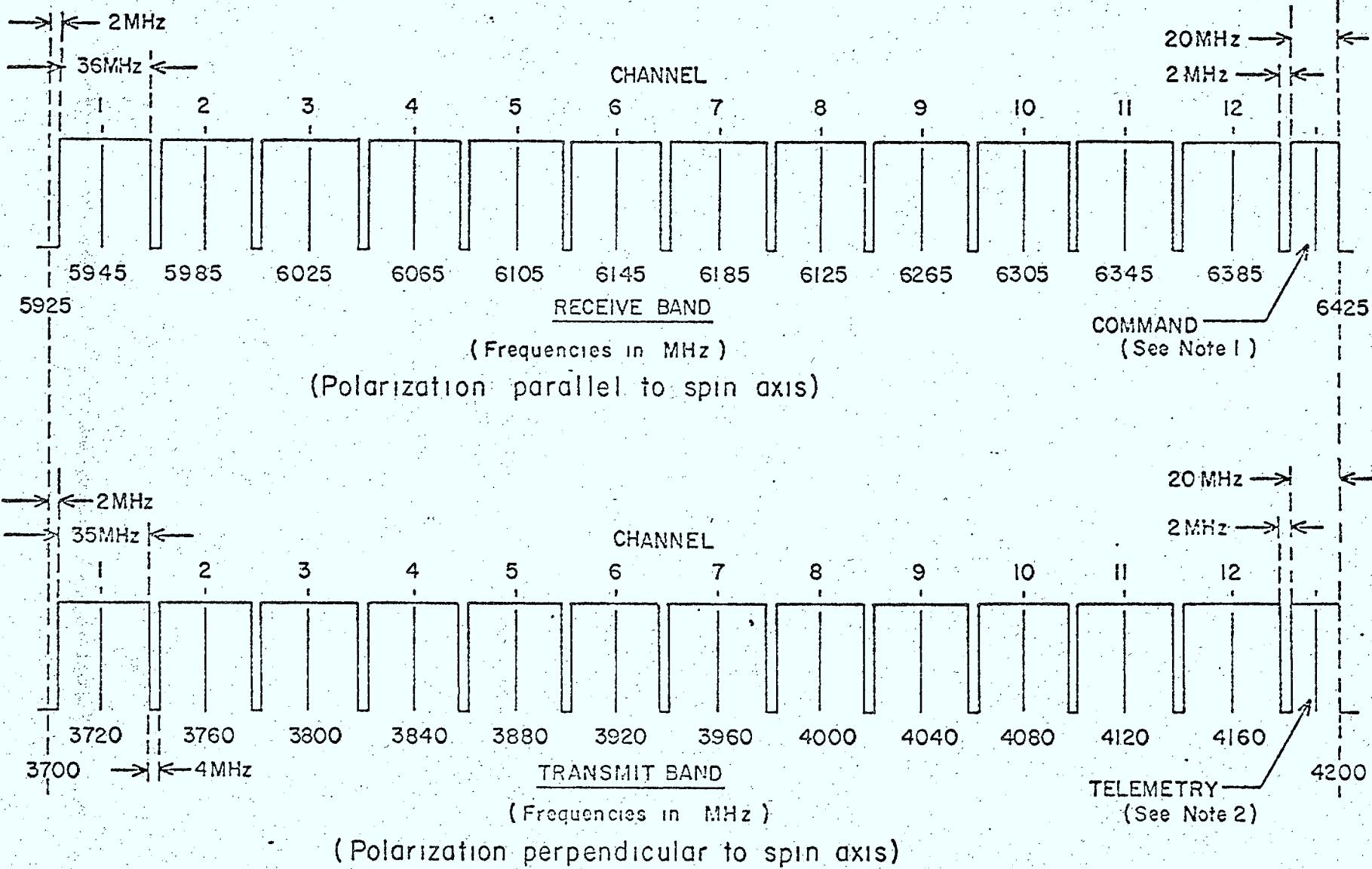
- a) Overall receiving system noise temperature (clear weather, 12° elevation angle) 160° K
- b) Minimum clear weather G/T 29 dB/K
- c) Useable R.F. Channel bandwidth 36 MHz
- d) Minimum Received Signal Level (clear weather) -113.0 dBW
- e) Maximum interfering carrier power level at input of low noise paramp. per exposure, not to be exceeded for more than 0.01% of the worst month -131 dBW

FIG. 1 DOMESTIC SYSTEM FREQUENCY PLAN

FIG. 2 HORIZON PROFILE AT GRAND BEACH, MANITOBA

FIG. 3 ANTENNA GAIN IN DIRECTION OF HORIZON VS. AZIMUTH AT GRAND BEACH, MANITOBA

FIG. 4 COORDINATION CONTOURS FOR PROPOSED TELESAT EARTH STATION AT GRAND BEACH, MANITOBA



Note 1 - Command polarization will be perpendicular to spin axis when using omni antenna.

Note 2 - Telemetry polarization will be parallel to spin axis when using omni antenna.

FIGURE 1. FREQUENCY AND POLARIZATION PLAN

FIG. 2

HORIZON PROFILE AT GRAND BEACH

From an antenna height 30' above ground level

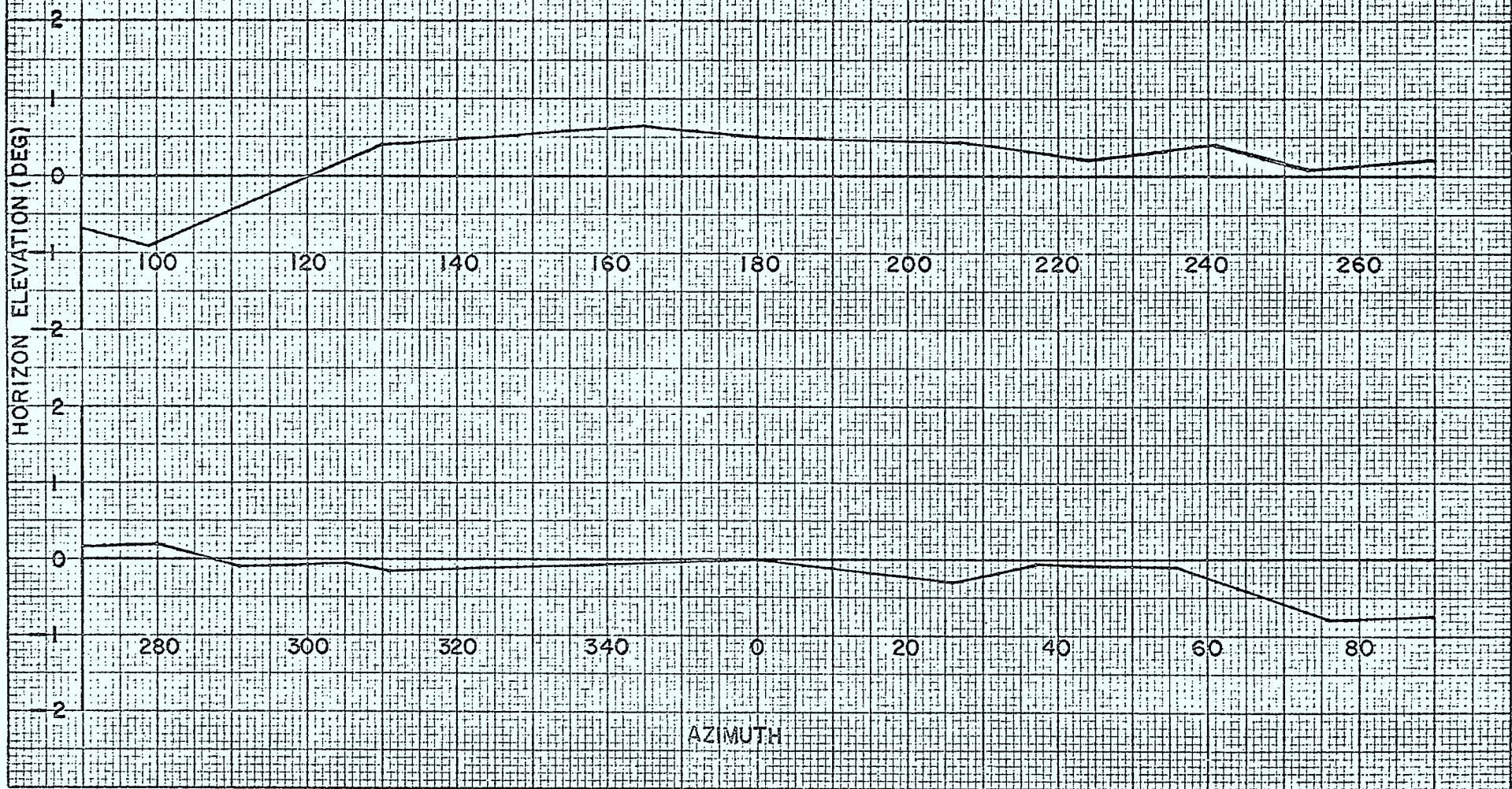
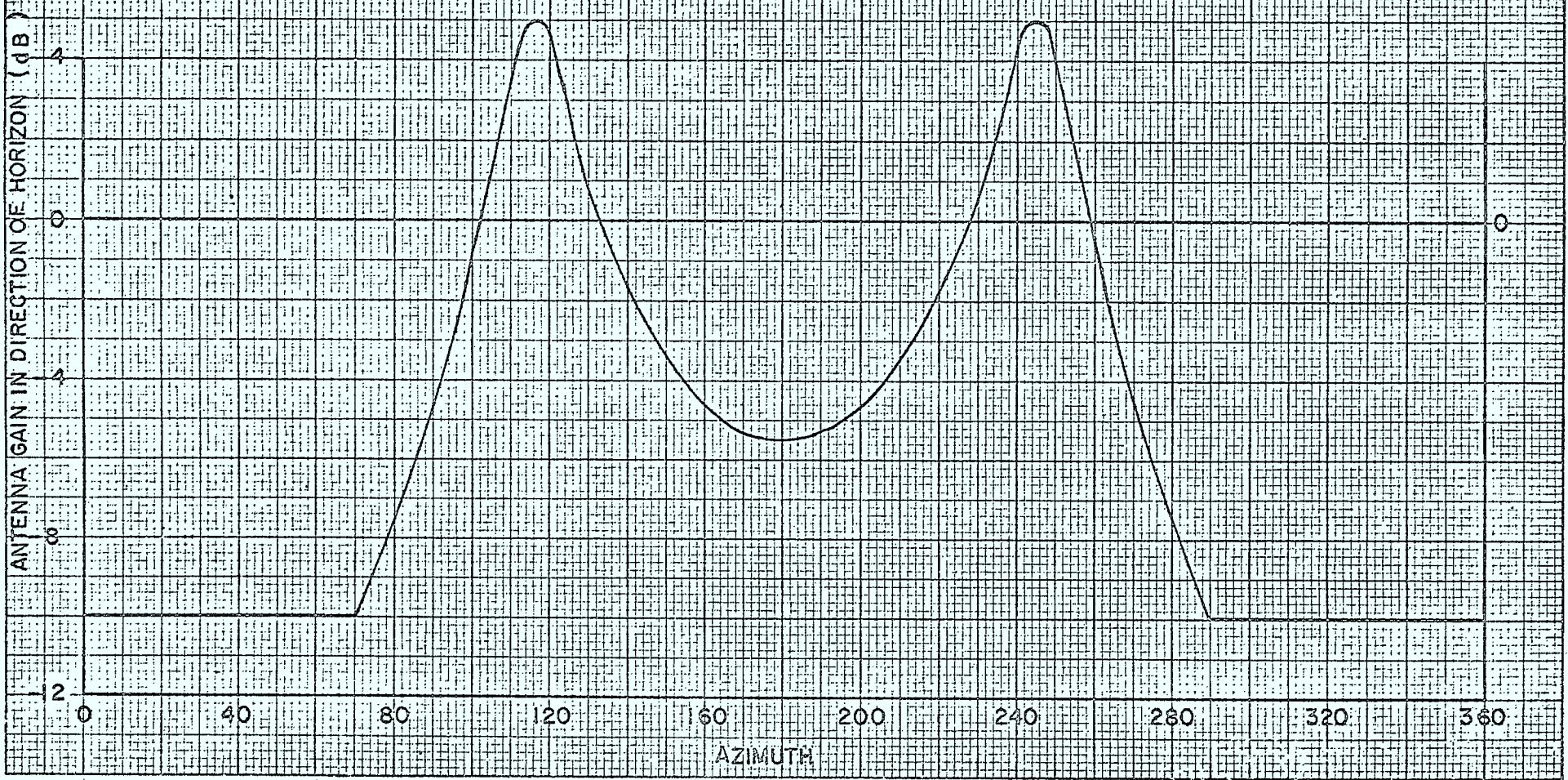


FIG. 3 ANTENNA GAIN IN DIRECTION OF HORIZON  
AT GRAND BEACH



## GRAND BEACH, MANITOBA

LAT  $50^{\circ} 37' 30''$   
 LONG  $96^{\circ} 31' 20''$   
 ELEV 785 ft A.M.S.L.

## LEGEND

— 4 GHz CONTOUR  
 - - - 6 GHz CONTOUR

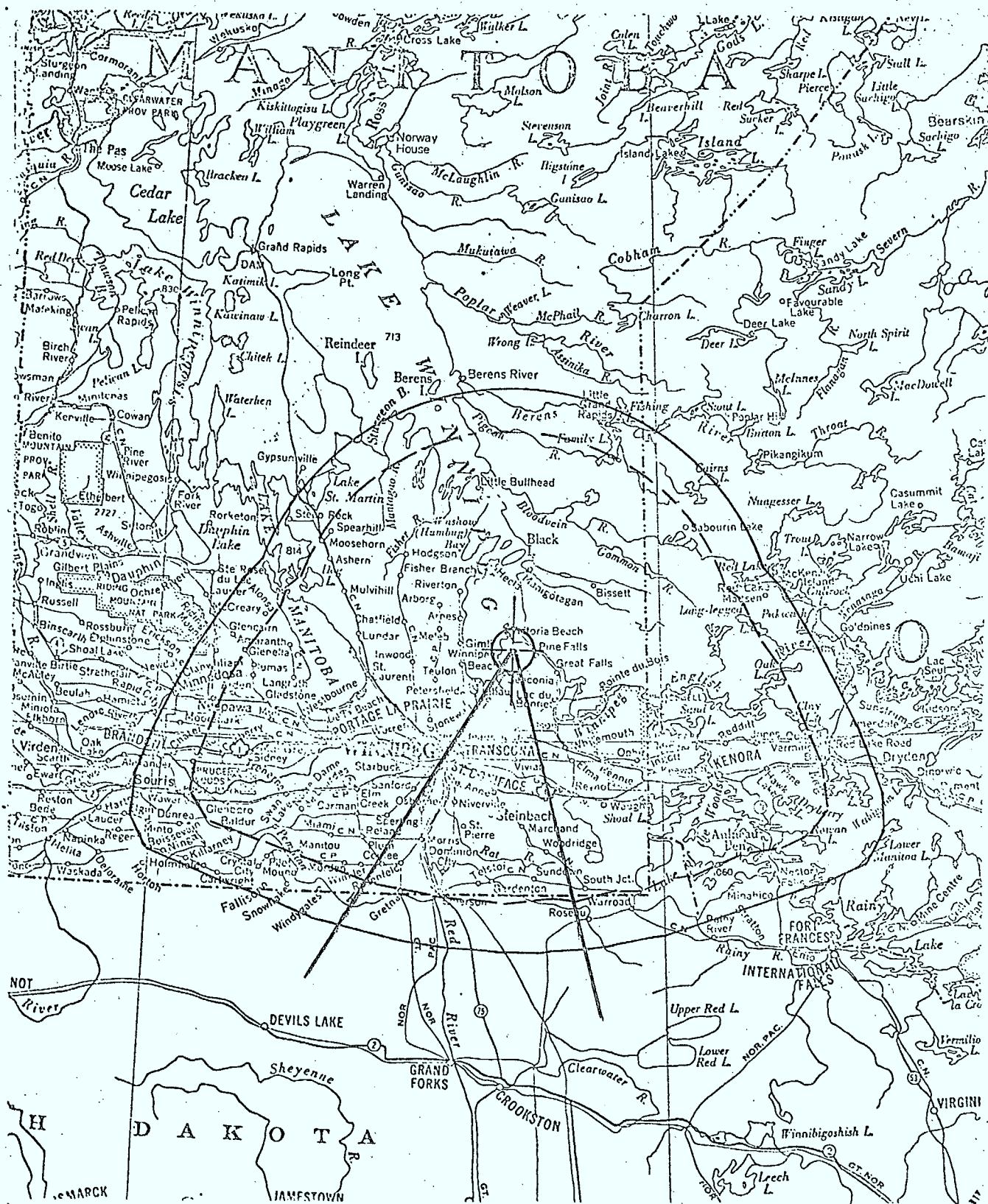


FIG 4

COORDINATION CONTOURS FOR PROPOSED  
 TELESAT CANADA EARTH STATION AT GRAND  
 BEACH, MANITOBA CANADA

PHOTOGRAPHS

1. Air photo Grand Beach Earth Station test sites.
2. Ground photo of test site #1
3. Ground photo of test site #2
4. Log-periodic test antenna.
5. Field intensity meter EMA-910.
6. Field intensity meter NM62-A.

PHOTO I

AIR PHOTO GRAND BEACH  
EARTH STATION TEST SITES

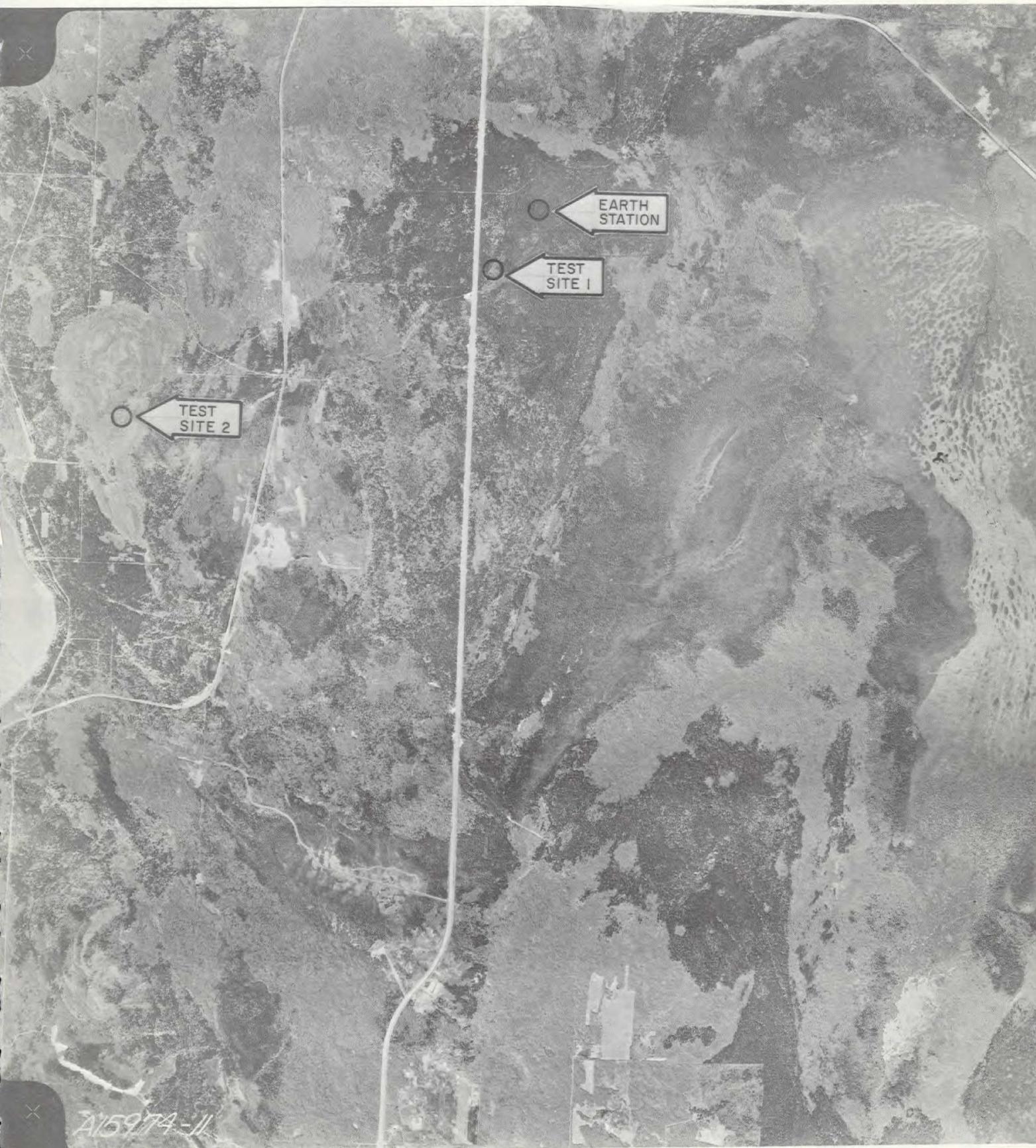


PHOTO 2  
GROUND PHOTO OF TEST SITE No. I



PHOTO 3  
GROUND PHOTO OF TEST SITE No. 2  
WITH TEST ANTENNA IN PLACE

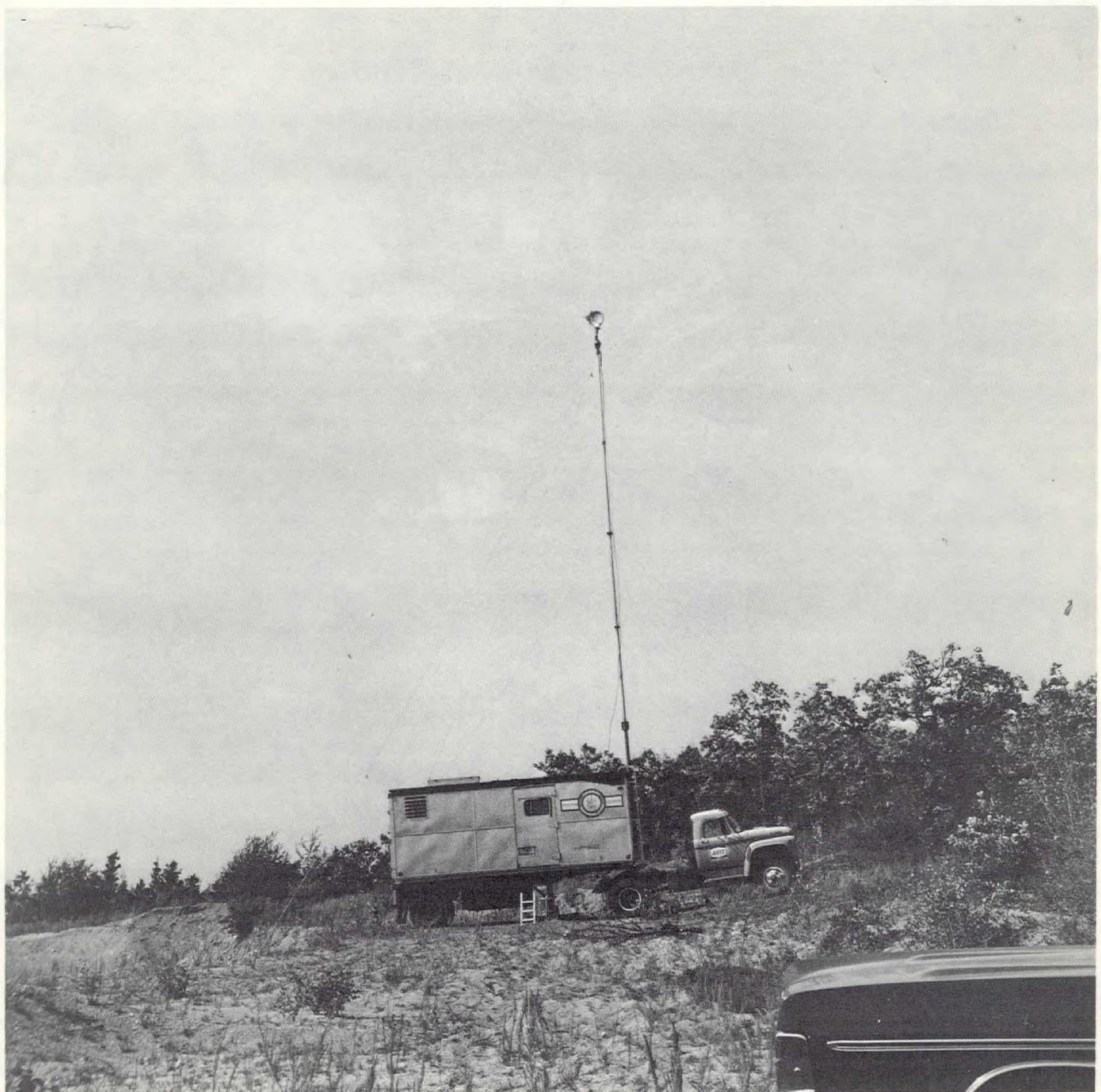


PHOTO 4

PHOTO 4  
LOG PERIODIC  
TEST ANTENNA

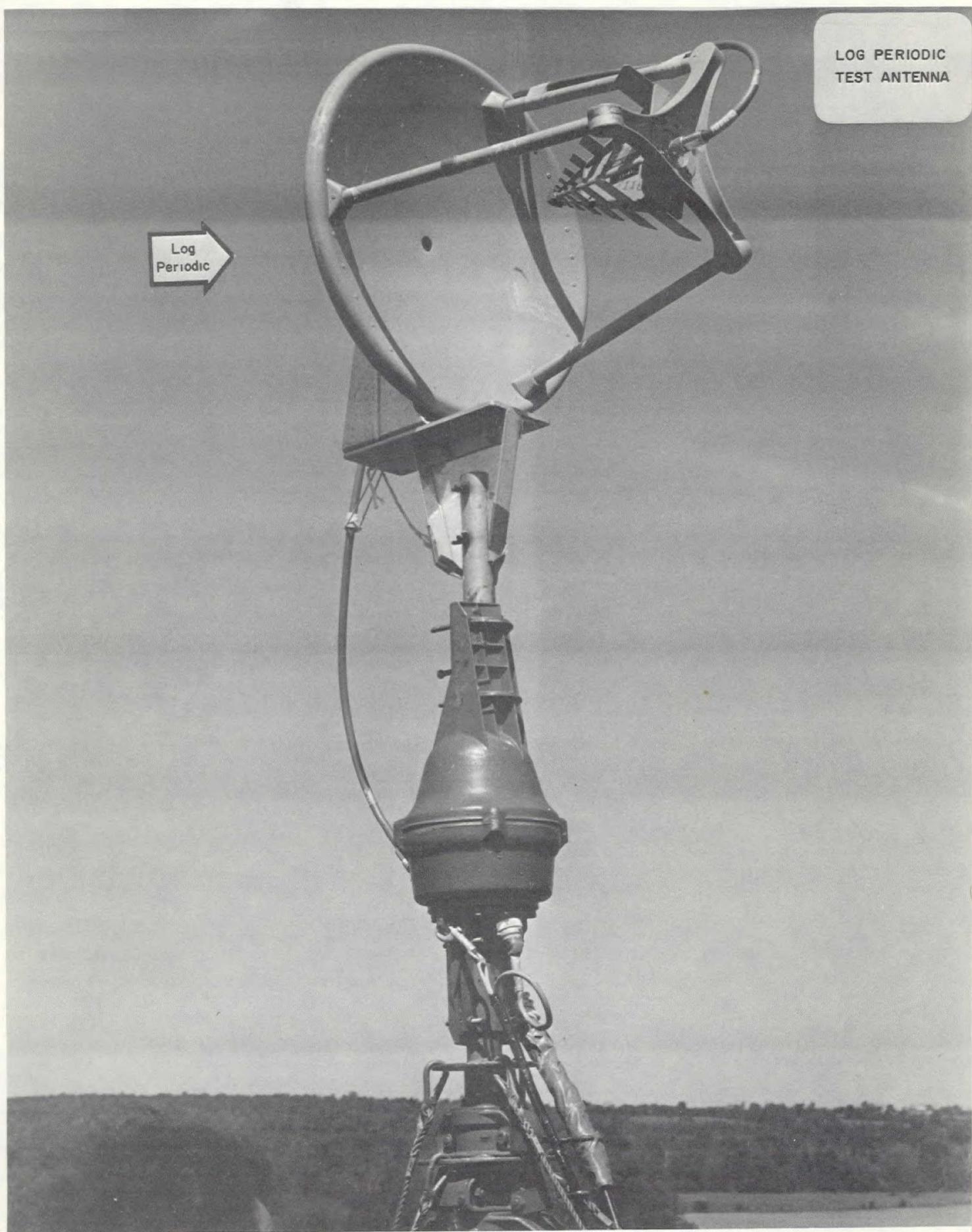
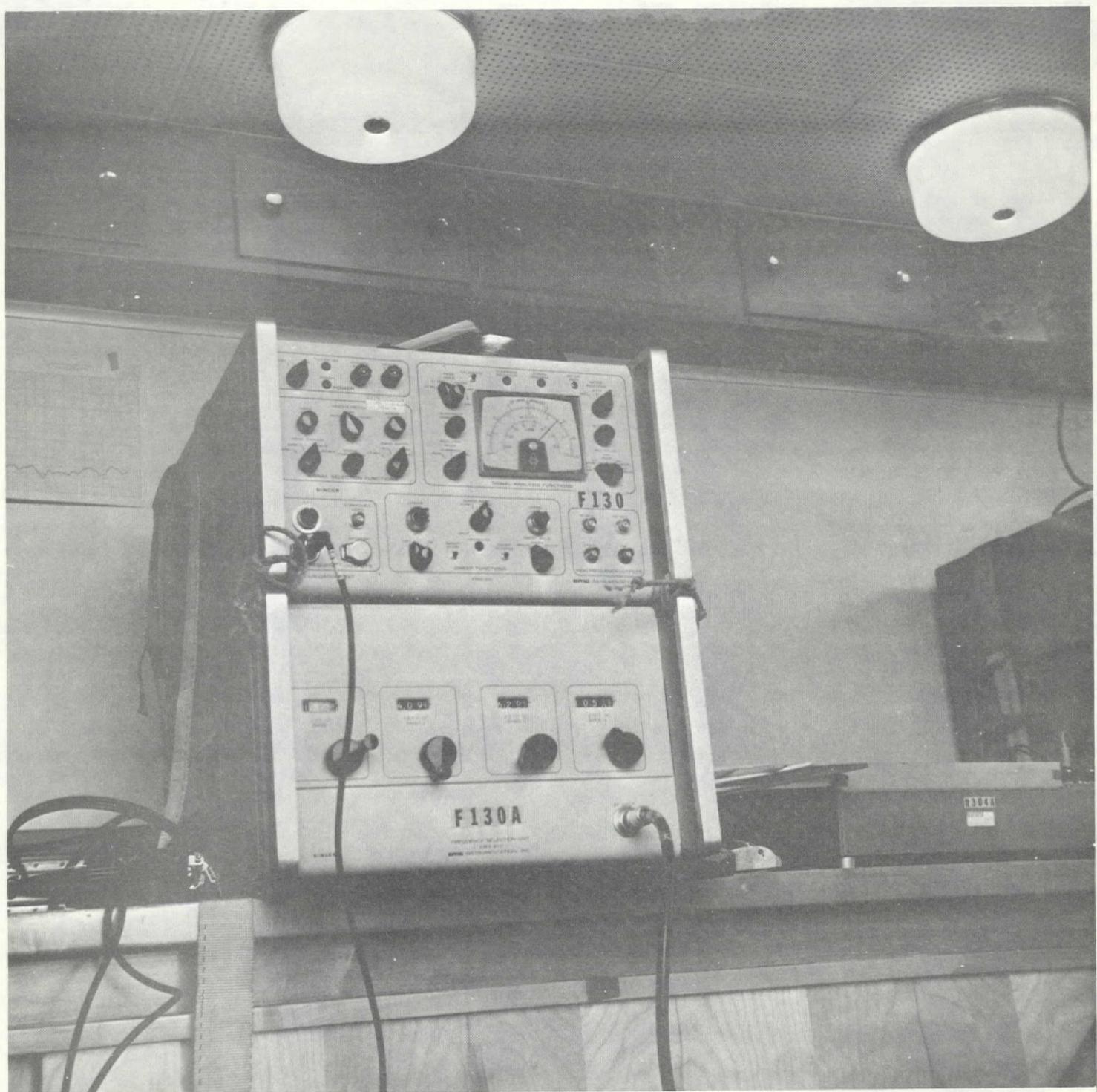


PHOTO 5  
FIELD INTENSITY METER EMA-910



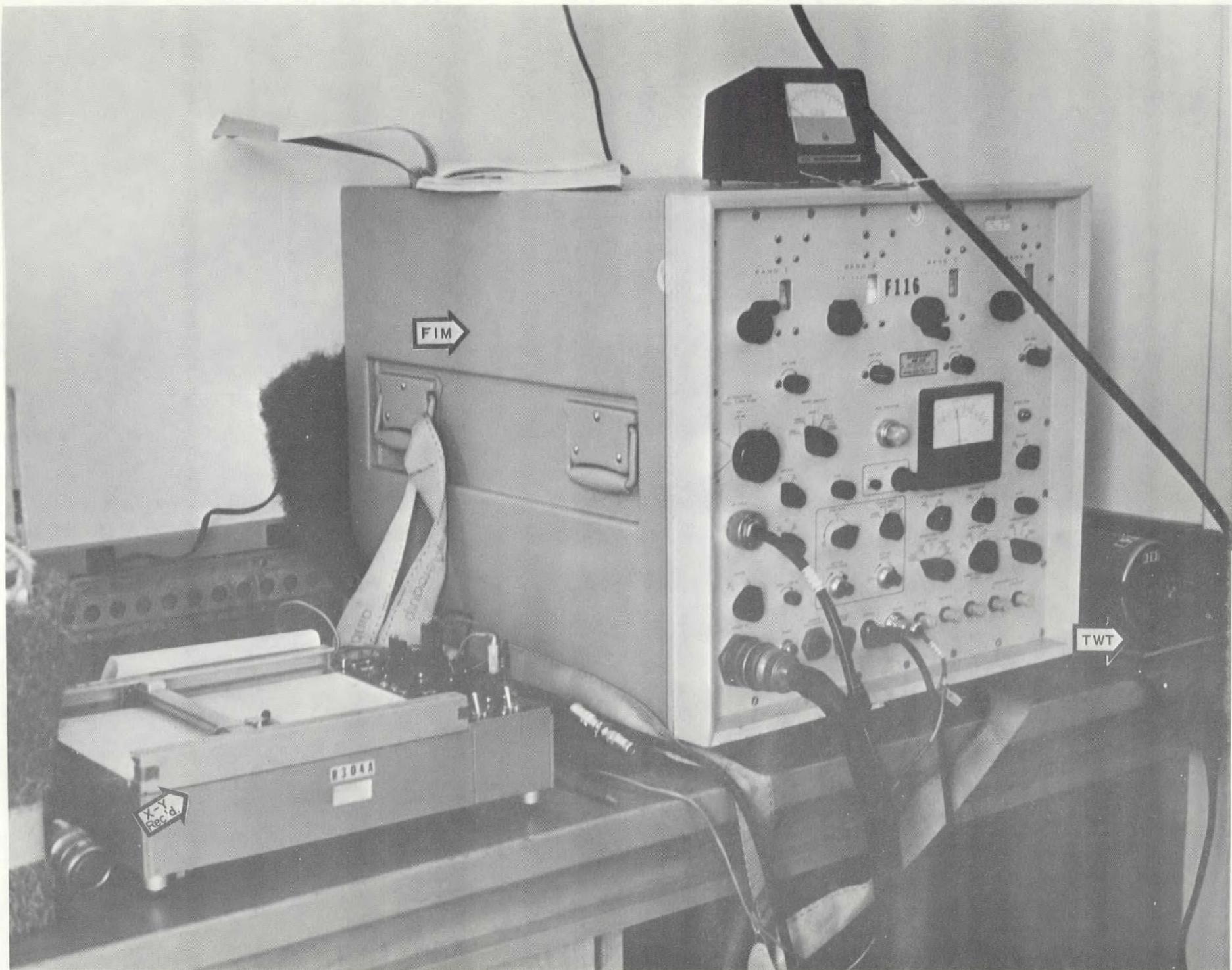


PHOTO 6  
FIELD INTENSITY METER NM 62 A

CACC / CCAC



94939

SPECTRUM INTERFERENCE SUVEY :  
PROPOSED TELSAT EARTH STATION, GRAND  
BEACH, MANITOBA

TK  
6553  
G732  
1970

DATE DUE

