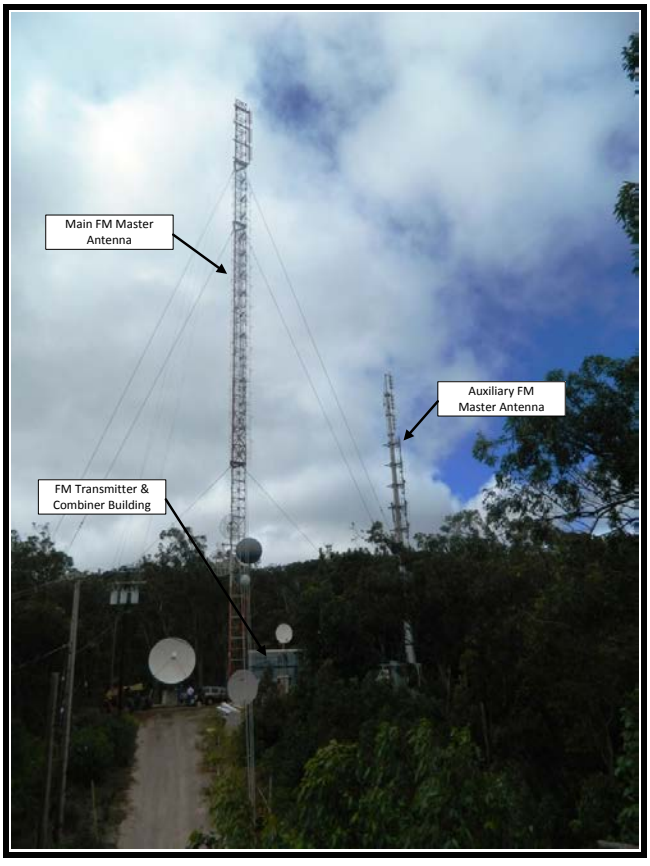
APPLICATION FOR LICENSE
AUXILIARY (STAND-BY) ANTENNA
STATIONS KGU-FM/KCCN-FM/KUCD/KHAI/KINE-FM/KPOI-FM/KKOL-FM
PALEHUA RIDGE, HAWAII

Technical Exhibit

This Technical Report was prepared on behalf of several radio stations located atop *Palehua Ridge* near Honolulu, Hawaii. These stations recently constructed adjacent to its main facility a new auxiliary FM antenna supporting structure and master panel antenna system. This technical exhibit supports the applications seeking to license these new auxiliary facilities (Form 302) pursuant to their respective underlying construction permits.



Picture 1. *Palehua Ridge* Transmitter Site.

Table 1 is a tabulation of the stations seeking auxiliary operation at the new facility.

CallSign / Frequency	FCC Construction Permit File Number	Maximum ERP	Transmitter Power Output
KGU-FM / 99.5 MHz	BXPH-20120822AAS	50 kW	3.6 kW
KCCN-FM / 100.3 MHz	BXPH-20120801AOT	50 kW	3.5 kW
KUCD(FM) / 101.9 MHz	BXPH-20120827ADK	50 kW	3.5 kW
KHAI(FM) / 103.5 MHz	BXPH-20120412AAE	2.2 kW	0.18 kW
KINE-FM / 105.1 MHz	BXPH-20120329AIN	50 kW	3.3 kW
KPOI-FM / 105.9 MHz	BXPH-20120817AAL	50 kW	3.5 kW
KKOL-FM / 107.9 MHz	BXPH-20120822AAT	50 kW	3.6 kW

Table 1. *Palehua Ridge* Auxiliary Facilities.

Installed Directional Antenna

The installed directional auxiliary antenna is a 7 level panel antenna that was formally part of the main antenna, a Shively 6014-14/1. The former main antenna that was incidentally also directly replaced is a 14 level panel. This former antenna was modified for 7 levels and is now identified by model number 6014-7/1-DA.

The antenna manufacturer, Shively Labs, has stated in a letter contained in Appendix A concerning the installed auxiliary antenna "*Seeing how this is a panel antenna system with only one panel per level, the azimuth patterns for all of the stations are unchanged even though the mounting structure is not the same as the original structure. Therefore, the original proofs-of-performances and supporting documentation as submitted to the FCC in support of their original applications for license, remain valid for this auxiliary antenna*." Therefore, based upon this certification, it is believed that no new proof-of-performance is necessary. Furthermore, as a convenience to the Commission, a research review was completed to obtain all the originals of the antenna proof-of-performances and

other documentation in support of those proofs. These documents are also contained in Appendix A.

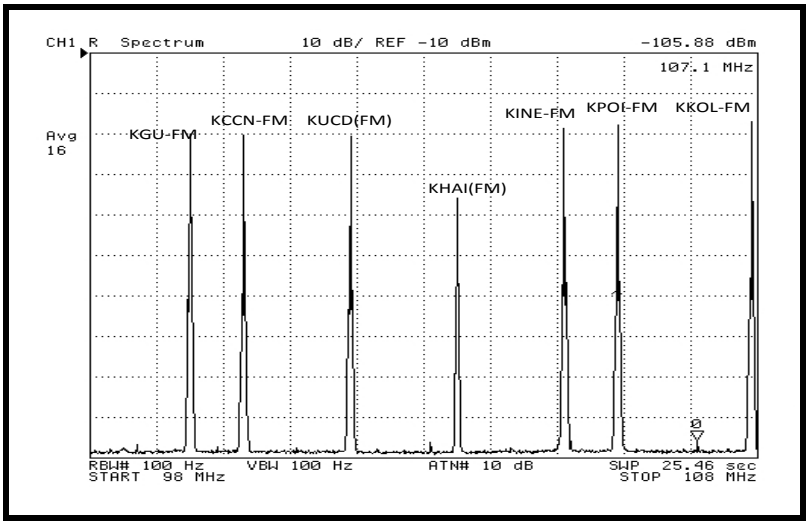
Appendix B is the required licensed surveyor affidavit that the auxiliary antenna is installed at the same orientation as the original. Appendix C is the required engineering certification that the antenna was installed pursuant to the manufacturer's direction.

Intermodulation Measurement Special Condition

The possible intermodulation products caused by the mixing of the subject FM stations into the combiner were measured by the undersigned. The equipment used for the measurements included a calibrated *HP 4395A Network/Spectrum/Impedance Analyzer* and *Trilithic Tuneable Bandpass Filter (5VFSS/110-5-50-CC).*

Both the unmodulated fundamental emissions and the predicted resulting possible intermodulation products were measured to ensure compliance with Section 73.317 of the Commission's Rules. All the stations were operating into the combiner and master auxiliary antenna system at the parameters (transmitter power output) with which they will eventually be licensed. Any possible intermodulation products occurring within the FM broadcast band were specifically analyzed. There is only one FM combiner at this facility. Therefore, the auxiliary antenna system uses the same combiner as the main antenna system.

Additionally, during the intermodulation tests, the spectrum analyzer was scanned for possible intermodulation products occurring outside the FM broadcast band, such as the 2nd harmonic of the fundamental emissions and the FAA aeronautical band. Any nearby full-service FM stations were off-the-air for these measurements to ensure no false intermodulation products were detected.



Picture 2. Sample Spectrum Plot at Combiner Output.

The results of the measurements are tabulated below:

Frequency (MHz)	Level Referenced to Carrier (dB)[1]
83.5	-83.4
84.3	-82.2
86.7	-83.1
87.5	-86.6
88.3	-84.1
89.1	-83.5
89.9	-84.2
90.7	-82.0
91.1	-83.3
91.5	-85.1
91.9	-84.4

[1] Most of the possible intermodulation measurements occurred at the noise floor of the spectrum analyzer.

Frequency (MHz)	Level Referenced to Carrier (dB)[1]
92.3	-90.4
92.7	-81.0
93.1	-86.3
93.5	-81.6
93.9	-84.1
94.3	-83.2
94.7	-86.2
95.1	-84.5
95.5	-86.7
95.9	-84.6
96.3	-81.6
96.7	-89.3
97.1	-85.6
97.5	-83.6
97.7	-89.5
97.9	-87.8
98.3	-83.7
98.7	-81.4
99.1	-81.7
99.9	-80.9
100.7	-81.1
101.1	-84.9
101.5	-80.8
102.3	-84.5
102.7	-87.1
103.1	-83.6
103.9	-80.8
104.3	-87.3
104.7	-82.3
105.5	-80.3
106.3	-85.2
106.7	-86.3
107.1	-87.2
107.5	-80.8
108.3	-81.6
108.7	-85.9
109.1	-80.2
109.5	-81.4
109.9	-81.4
110.3	-83.0
110.7	-81.9
111.1	-80.4
111.5	-89.7
111.9	-82.3
112.3	-84.7

Based upon these measurements, the aforementioned FM auxiliary transmission system located at *Palehua Ridge* is in compliance with Section 73.317 of the Commission's Rules.

FCC Monitoring Station & FAA Receiving Site Impacts

Each FM station has a maximum received field strength limit at the nearby *Wuipahu, Hawaii* FCC monitoring station. No field strength measurement was done by the undersigned at the monitoring station when the auxiliary facility was operational. However, the stations have operated over a 30 day period using this auxiliary facility with no reports of excessive field strength received at the FCC monitoring station. Furthermore, no reports of any other harmful interference occurring were received by the subject stations during that auxiliary facility operation.

Radiofrequency Electromagnetic Exposure

A ground level radiofrequency electromagnetic field exposure (RFR) survey was performed at the *Palehua Ridge* transmitter site. The purpose of these measurements was to measure the exposure occurring from the new auxiliary operation.[2] As discussed in further detail below, it appears that all the radiofrequency exposure measurements were below the Federal Communication Commission (FCC) controlled environment standard within the transmitter site compound except: (1) immediately around the new auxiliary FM supporting structure and (2) the guy wire base located along the compound access road. These locations that were measured above the FCC controlled environment standard are securely fenced prohibiting access when the auxiliary

[2] See OET Bulletin No. 65, Evaluating Compliance With FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, August, 1997.

antenna system is in operation. The area was measured employing a Narda RFR test set.[3]

Measurements were completed at ground level at and near the transmitter site compound. There are seven full-service FM stations and one full-service television station that operate from this site, including from the auxiliary supporting structure. Picture 3 is a photograph of the new auxiliary supporting structure and installed antennas.

Picture 3. *Palehua Ridge* Auxiliary Antenna.

[3] The Narda 8718 test set, serial number 1575, was last calibrated in April, 2012. The associated Narda 8742 Isotropic Shaped Electric Field Probe, serial number 3013, was last calibrated in May, 2012. The instrumentation indicated the measured exposure value as a percent of the standard. The measurements were obtained by averaging the electric fields existing in a vertical line from ground level to a point 6 feet above ground level.

The facilities were confirmed to be at their proper auxiliary operation power levels during the exposure measurements. All the measurements are with respect to the controlled environment standard. The compound can be classified as a controlled environment as a lockable gate controls access. Appropriate signage indicating the controlled environment designation is provided as shown below in Picture 4.

Picture 4. Access Gate to *Palehua Ridge* Compound.

Within the compound, when the auxiliary antenna is operational, one area exceeded the Commission's controlled environment standard at ground level. The area is located immediately around the new auxiliary FM supporting

structure. This area is securely fenced which prohibits entry when the auxiliary antenna is operational. This area is also marked with signage stating that no access is permitted when the auxiliary facility is in operation. Below is a picture showing the locations of the areas exceeding the controlled environment standard that is surrounded by the additional fence.

Picture 5. Additional Access Gate to Auxiliary Antenna Tower Base.

Charles A. Cooper

December 13, 2012

du Treil, Lundin & Rackley, Inc.
201 Fletcher Avenue
Sarasota, Florida 34237
941.329.6000

APPENDIX A

STATEMENT FROM DIRECTIONAL ANTENNA MANUFACTURER AND ORIGINAL DIRECTIONAL ANTENNA PROOF-OF-PERFORMANCE MATERIALS

Shively Labs®
a division of Howell Laboratories, Inc.

P. O. Box 389 Harrison Rd.,
Bridgton, Maine 04009 USA
(207) 647-3327
888-SHIVELY
Fax: (207) 647-8273
E-mail: sales@shively.com
Web site: www.shively.com

November 20, 2012

To whom it may concern;

In the summer of 1988 Shively Labs supplied a 6014-14/1 Shop Order 12003. This 14 level panel antenna system had only one panel per level for installation at the Palehua Tower Site.

During the summer of 2012 a direct replacement 6014-14/1, Shop Order 29946 was supplied to the same site because the tower structure had to be upgraded due to corrosion of the tower members. In order for the multiple stations to continue to broadcast during the upgrade of the tower and installation of the replacement panel antenna system, one half of the original panel antenna was removed from the tower and mounted on a pole to be used as an auxiliary antenna.

Seeing how this is a panel antenna system with only one panel per level, the azimuth patterns for all of the stations are unchanged even though the mounting structure is not the same as the original structure. Therefore, the original proofs-of-performances and supporting documentation as submitted to the FCC in support of their original applications for license, remain valid for this auxiliary antenna.

If you have any questions or need more information please do not hesitate to contact me.

Sincerely

Robert A. Surette

Director of Sales Engineering

Shively Labs, a division of Howell Laboratories, Inc.
BRIDGTON, MAINE 04009 (207) 647-3327 FAX (207) 647-8273

S.O. 18051
Report of Test 6014-14/1-DA
for
LOEW BROADCASTING CORPORATION
KORL HONOLULU,HI

OBJECTIVE:

The objectives of this test was to demonstrate the directional characteristics of a 6014-14/1-DA antenna to meet the needs of KORL and to comply with the requirements of the FCC construction permit, file number BMPH-960325IC.

RESULTS:

The measured azimuth pattern for the 6014-14/1-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Horizontal Polarization. Figure 1B shows the Tabulation of Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BMPH-960325IC indicates that the horizontal radiation component shall not exceed 100 kW at any azimuth and each component shall be restricted to the following values at the azimuths specified:

215 Degrees T: 0.64 kW
305 Degrees T: 0.36 kW

From Figure 1, the maximum radiation of the horizontal component occurs at 083 Degrees T to 088 Degrees T . At the restricted azimuth of 215 Degrees T the horizontal component is 21.93 dB down from the maximum of 100 kW, or 0.64 kW maximum.

Exhibit B
Directional Antenna Information
Manufacturer's Measured Data & Report
KORL (FM) Honolulu, Hawaii

At the restricted azimuth of 305 Degrees T, the horizontal component is 24.44 dB down from the maximum of 100 kW, or 0.36 kW.

The R.M.S. value of the horizontal component is 0.465 and the R.M.S. value of the vertical component is 0.465. The total horizontal power gain is 31.00. The total vertical power gain is 25.11. The R.M.S. of the composite pattern is 0.480, therefore the R.M.S. value of the measured pattern is within 85% of the composite pattern.

METHOD OF DIRECTIONALIZATION:

The 6014 bay was mounted on a tower of exact scale to a Stainless G-5 tower. The basic pattern characteristics of a signal panel antenna are shown in figure 1. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPH-960325IC, a single level of the 6014-14/1-DA antenna was set up on the Howell Laboratories scale model antenna pattern measuring range. A scale of 4.5:1 was used.

SUPERVISION:

The tests were carried out under the direction of Robert A. Surette, Manager of RF Engineering. Mr. Surette was graduated from Lowell Technological Institute, Lowell, Massachusetts in 1973 with the degree of Bachelor of Science in Electrical Engineering. He has been directly involved with both full size and scale model pattern measurements since 1974 as an RF Engineer with Shively Labs and with Dielectric Communications (a unit of General Signal). He is currently an Associate Member of the Association of Federal Communications Consulting Engineers and a Member of IEEE.

EQUIPMENT:

The scale model pattern range consists of a wooden rotating pedestal equipped with a position indicator. The scale model bay is placed on the top of this pedestal and is used in the transmission mode at approximately 20 feet above ground level. The receiving corner reflector is spaced 50 feet away from the rotating pedestal at the same level above ground as the transmitting model. The transmitting and receiving signals are carried to a control building by means of RG-9/U double shielded coax cable.

The control building is equipped with:

Hewlett Packard Model 8505 Network Analyzer
PC Based Controller
Hewlett Packard 7550A Graphics Plotter

The test equipment is calibrated to a MIL-STD 45662 system.

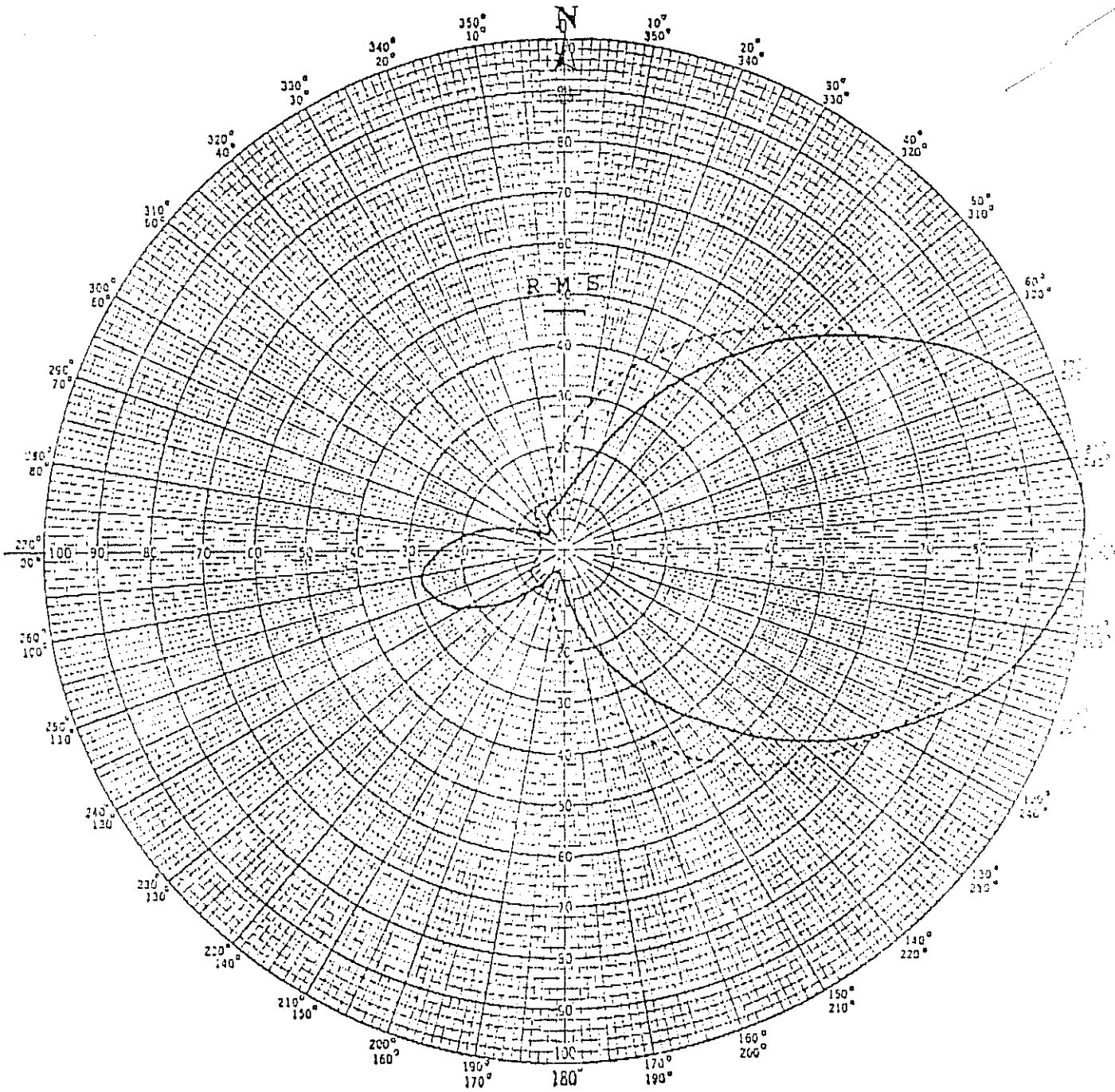
TEST PROCEDURES:

The corner reflector is mounted so that the horizontal and vertical azimuth patterns are measured independently by rotating the corner reflector by 90 degrees. The network analyzer was set to 447.75 MHz. Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding yields a scale reading of 50 from an unpadded reading of 100 in voltage. From the recorded patterns, the R.M.S. values are calculated and recorded as shown in Figure 1.

Respectfully submitted by:

Robert A. Surette
Manager of RF Engineering
S/O 18051
June 19, 1996

FIGURE 1



Shively Labs

PROJECT NAME KQRL-FM HONOLULU, HI

PROJECT NUMBER 18051 DATE 3/8/96

MODEL (X) FULL SCALE ( ) FREQUENCY 447.75/99.5 MHz

POLARIZATION HORIZ(___); VERT(---)

CURVE PLOTTED IN: VOLTAGE (X) POWER( ) DB( )

OBSERVER RAS

ANTENNA TYPE 6014-14/1-DA

PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS SEE FIGURE 2 FOR MECHANICAL DETAILS

Figure 1A

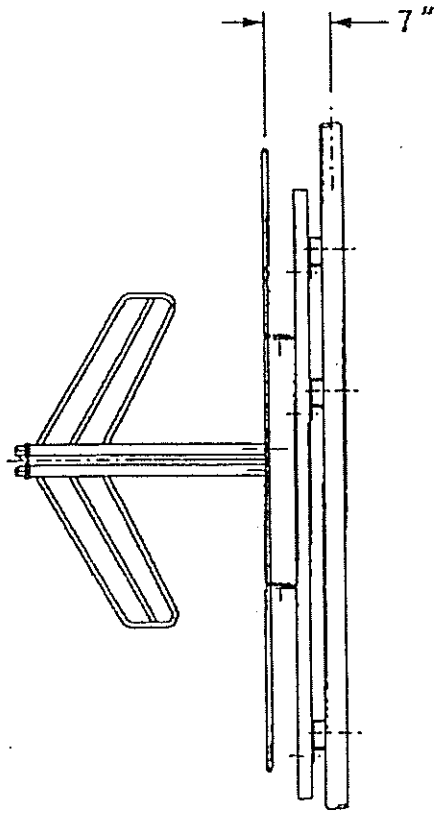
TABULATION OF HORIZONTAL POLARIZATION
KORL-FM HONOLULU, HI

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.100	180	0.070
10	0.140	190	0.040
20	0.210	200	0.040
30	0.345	210	0.080
40	0.495	220	0.115
45	0.570	225	0.150
50	0.650	230	0.180
60	0.800	240	0.235
70	0.935	250	0.270
80	0.980	260	0.285
90	0.995	270	0.245
100	0.940	280	0.180
110	0.850	290	0.110
120	0.720	300	0.060
130	0.595	310	0.035
135	0.530	315	0.040
140	0.470	320	0.050
150	0.340	330	0.080
160	0.240	340	0.085
170	0.150	350	0.085

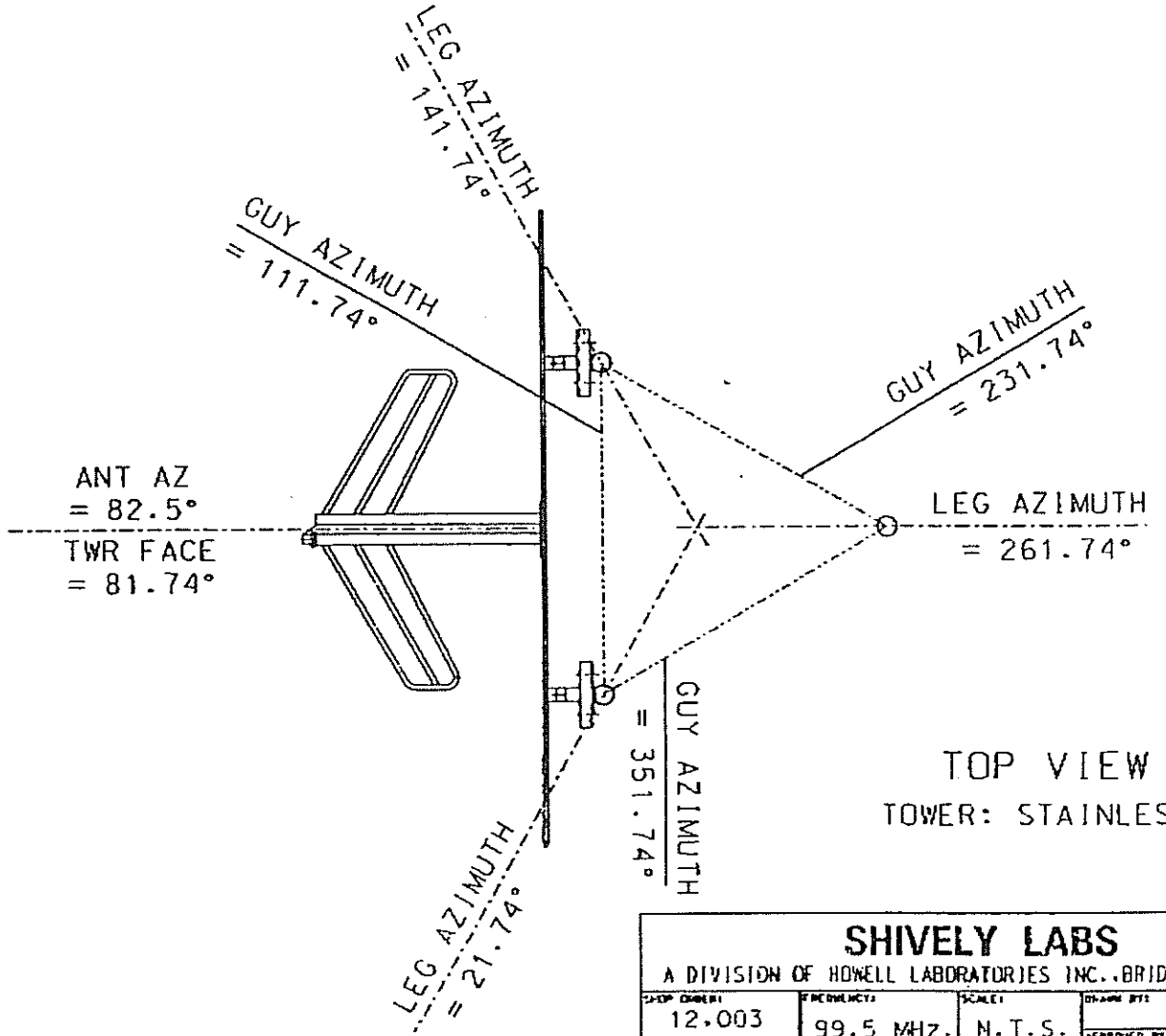
Figure 1B

TABULATION OF VERTICAL POLARIZATION
KORL-FM HONOLULU, HI

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.230	180	0.210
10	0.305	190	0.145
20	0.385	200	0.095
30	0.475	210	0.085
40	0.565	220	0.085
45	0.620	225	0.080
50	0.675	230	0.080
60	0.765	240	0.075
70	0.845	250	0.060
80	0.885	260	0.055
90	0.900	270	0.050
100	0.865	280	0.050
110	0.810	290	0.050
120	0.725	300	0.055
130	0.640	310	0.065
135	0.600	315	0.080
140	0.555	320	0.095
150	0.465	330	0.110
160	0.380	340	0.125
170	0.290	350	0.160



SIDE VIEW



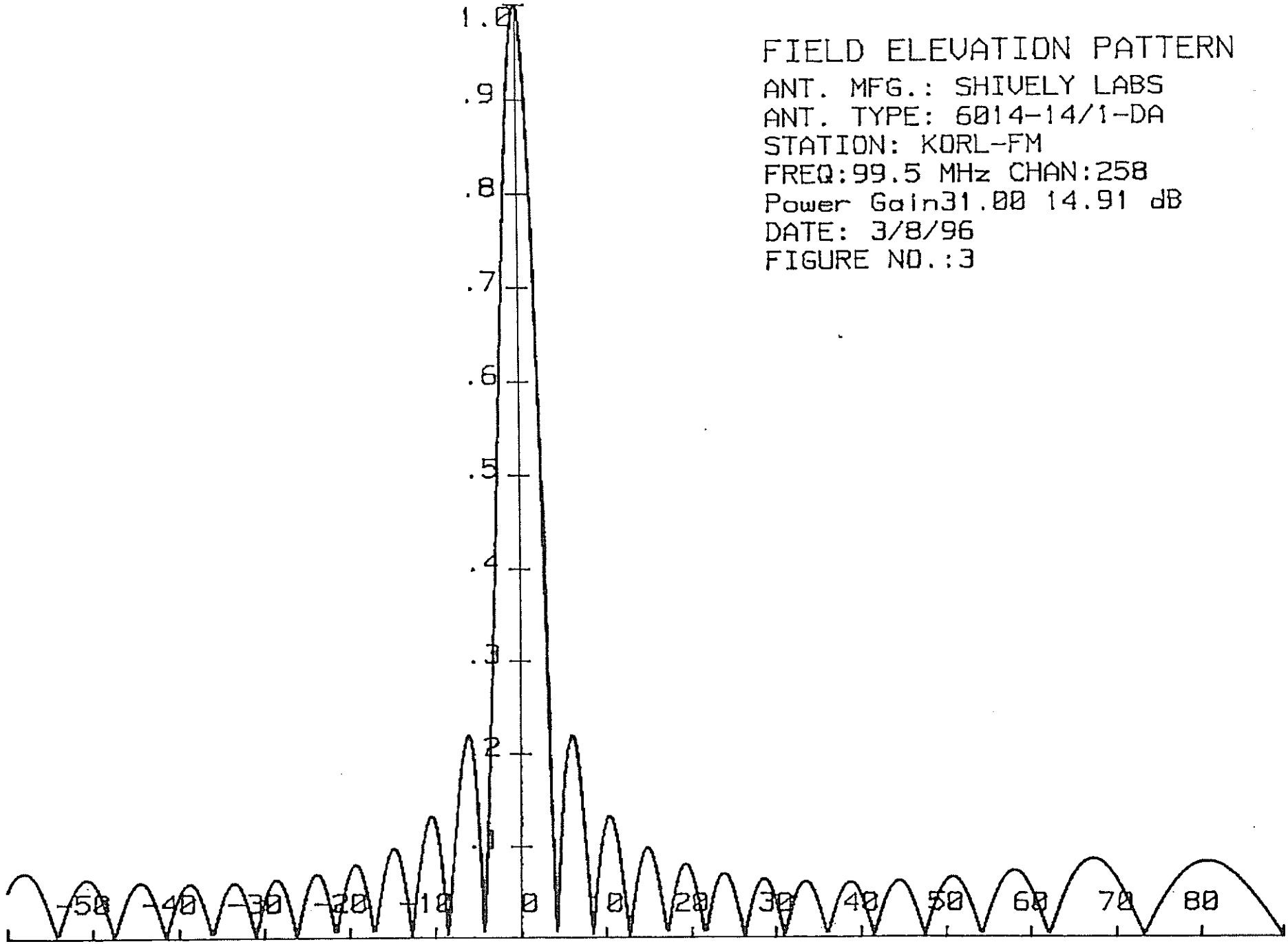
TOP VIEW
TOWER: STAINLESS G5

SHIVELY LABS
A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE

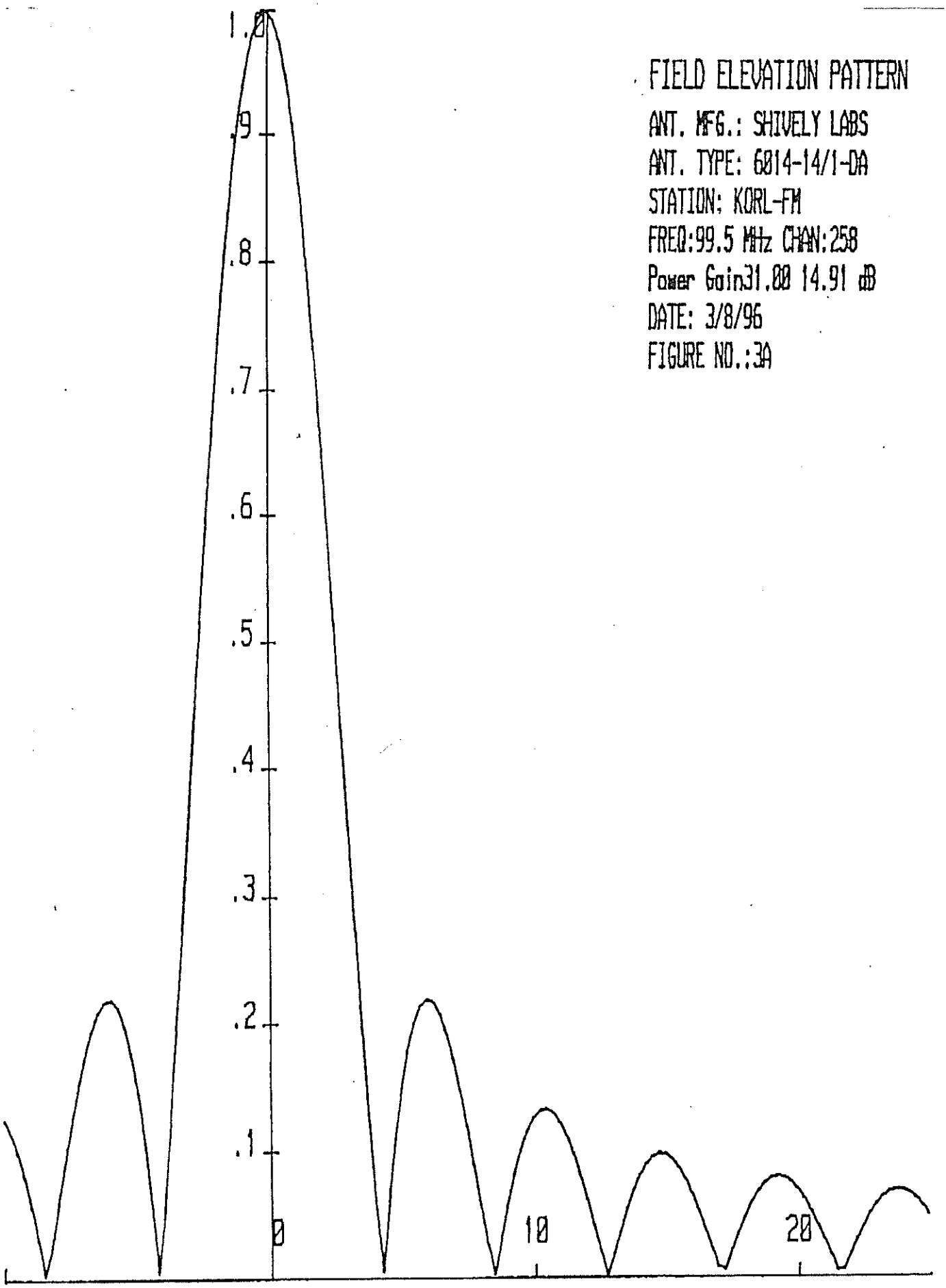
SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
12,003 HONOLULU, HI	99.5 MHz.	N.T.S.	PR
			APPROVED BY:

TITLE:
MODEL-6014-14/1-DIRECTIONAL ANTENNA

DATE:	
7-28-88	FIGURE 2



FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6014-14/1-DA
STATION: KORL-FM
FREQ:99.5 MHz CHAN:258
Power Gain31.00 14.91 dB
DATE: 3/8/96
FIGURE NO.:3



FIELD ELEVATION PATTERN

ANT. MFG.: SHIVELY LABS

ANT. TYPE: 6814-14/1-DA

STATION: KORL-FM

FREQ:99.5 MHz CHAN:258

Power Gain31.00 14.91 dB

DATE: 3/8/96

FIGURE NO.:3A

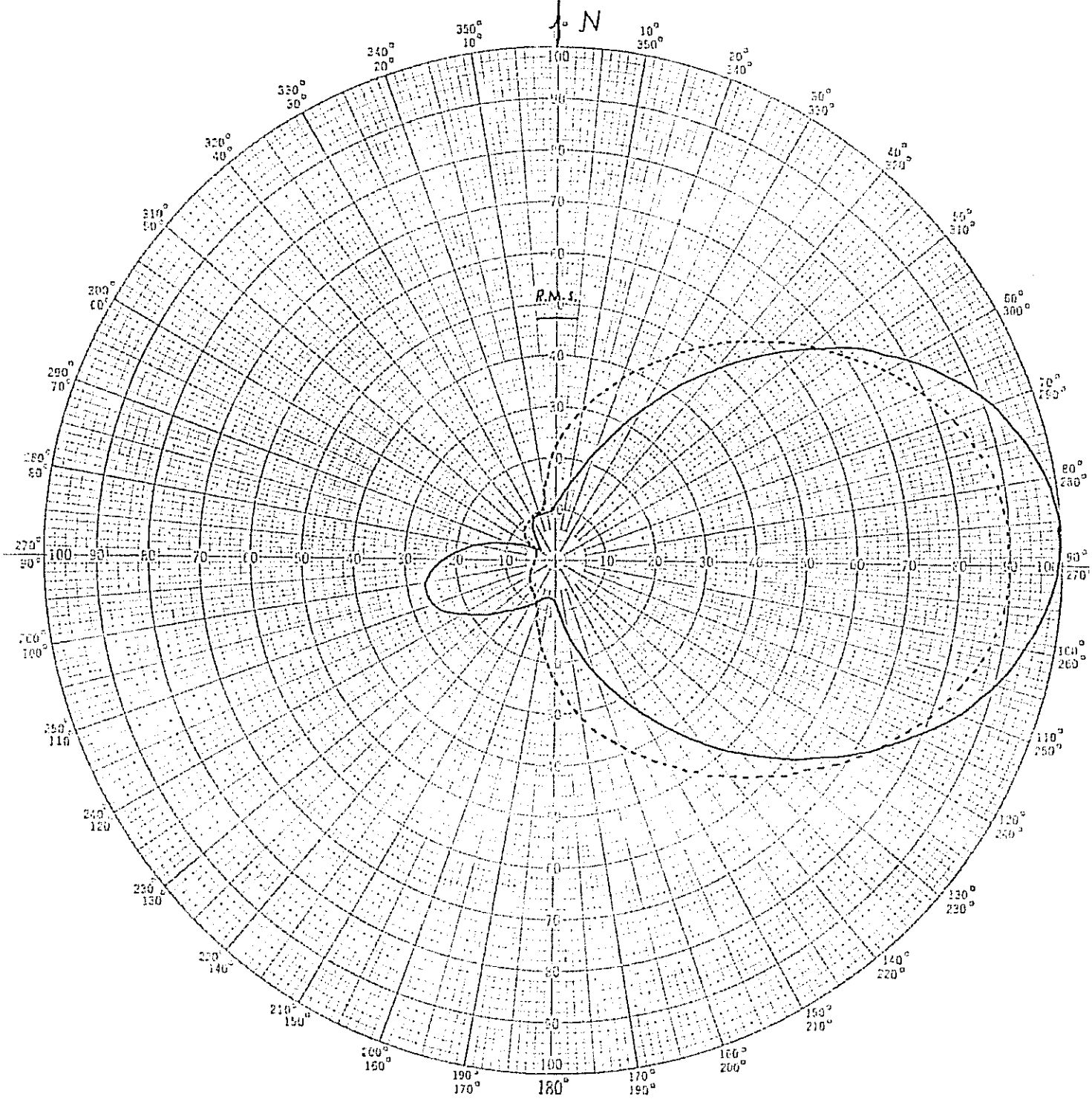
Shively Labs

PROJECT NAME Honolulu

PROJECT NUMBER 12,003 DATE 10-13-88

ANTENNA TYPE 6014-14/1-DA

PATTERN TYPE AZIMUTH



MODEL (X) FULL SCALE ( ) FREQUENCY 451.35/100.3

POLARIZATION HORIZ (———); VERT (----)

CURVE PLOTTED IN: VOLTAGE (X) POWER( ) DB( )

OBSERVER RAS-1

REMARKS: See Figure 2 for mechanical details.

Figure 1A

Tabulation of Horizontal Polarization

Frequency 100.3

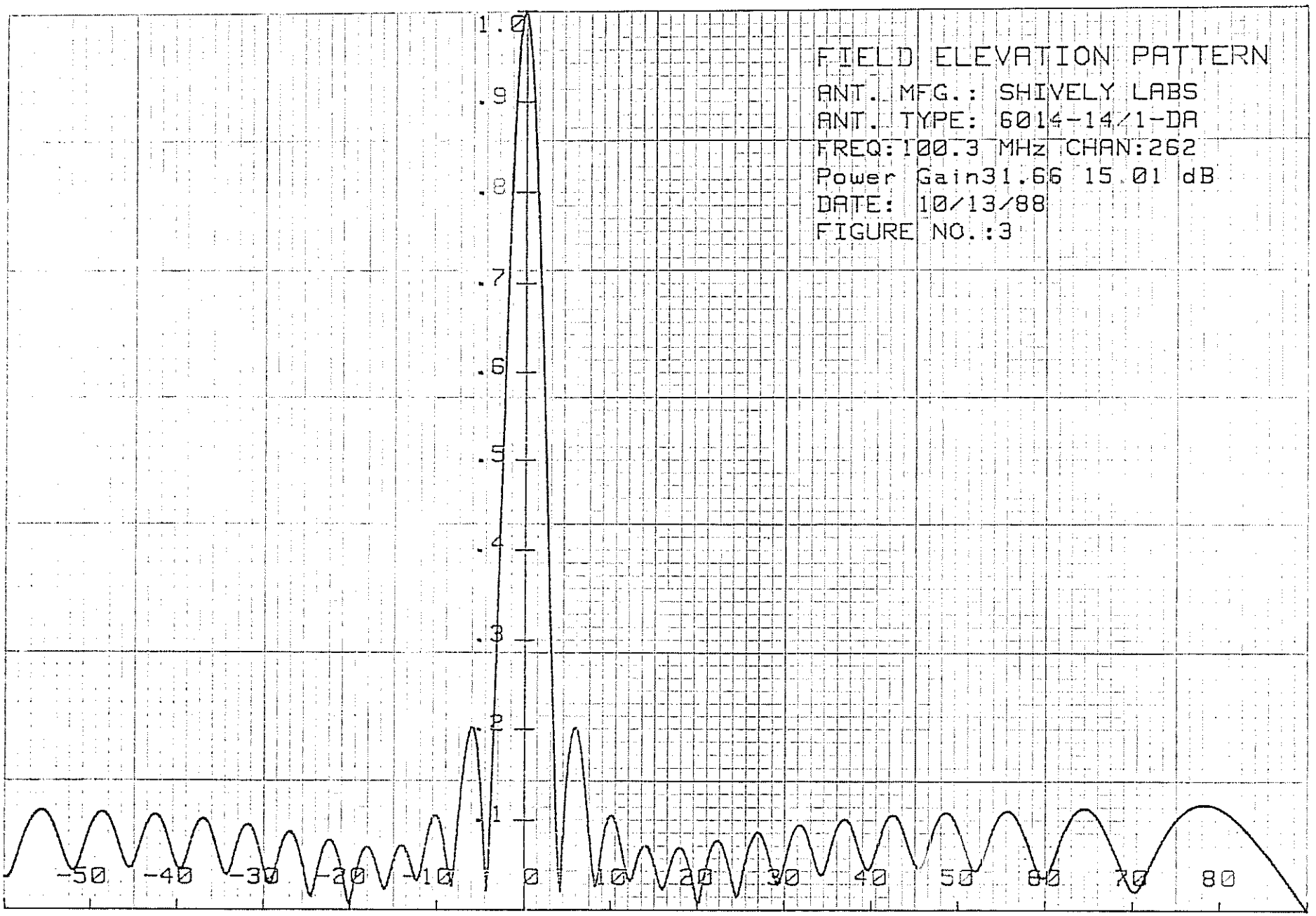
Degrees	Relative Field	Degrees	Relative Field
0	11.0	180	9.0
10	15.0	190	7.5
20	22.0	200	8.5
30	34.0	210	10.0
40	49.0	220	13.0
50	65.0	230	17.0
60	80.0	240	21.5
70	91.5	250	26.0
80	98.0	260	26.0
90	99.0	270	22.5
100	94.0	280	16.5
110	85.5	290	10.0
120	72.5	300	5.0
130	59.0	310	4.0
140	46.5	320	6.5
150	34.0	330	9.5
160	23.0	340	9.5
170	15.0	350	9.5

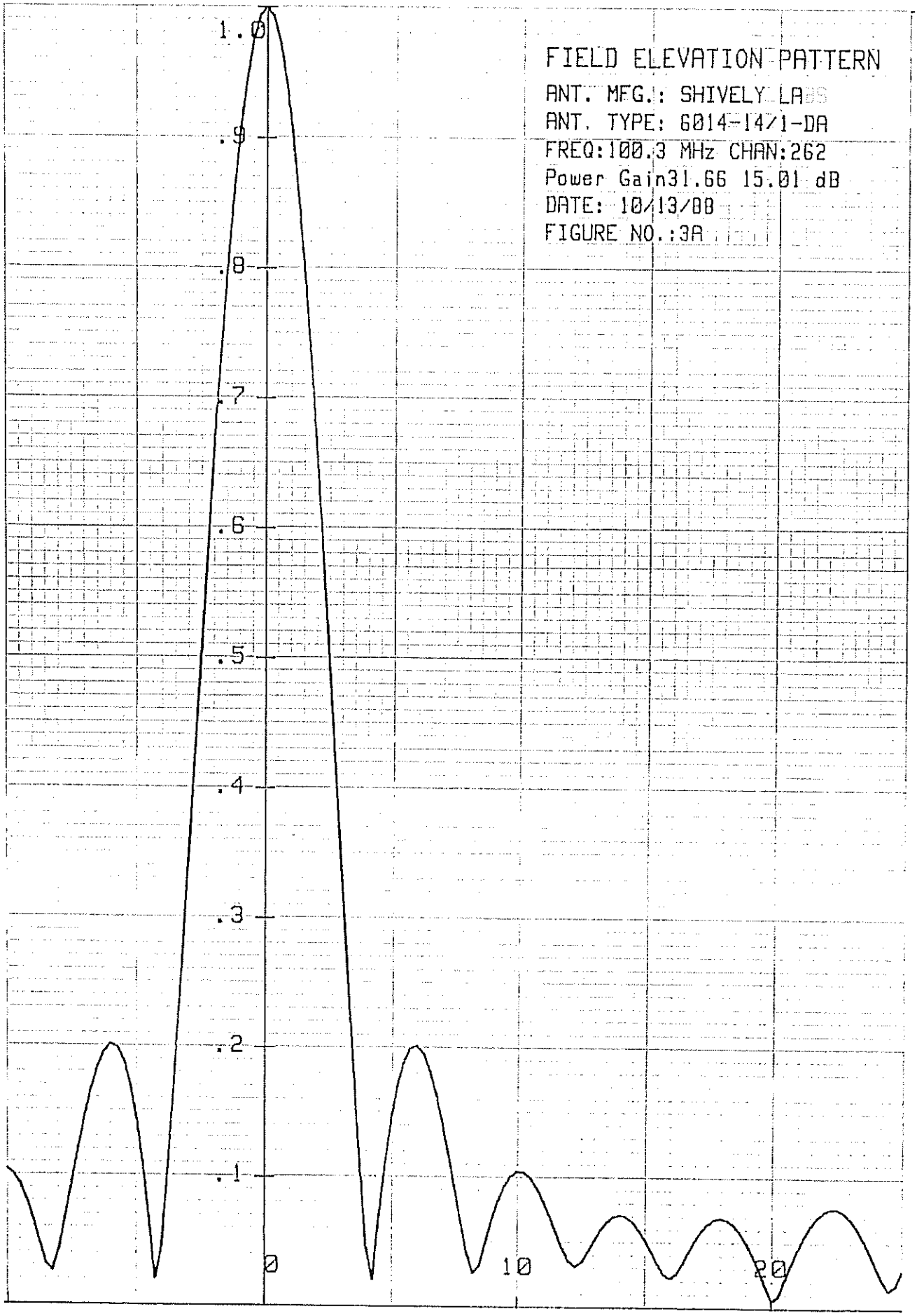
Figure 1B

Tabulation of Vertical Polarization

Frequency 100.3

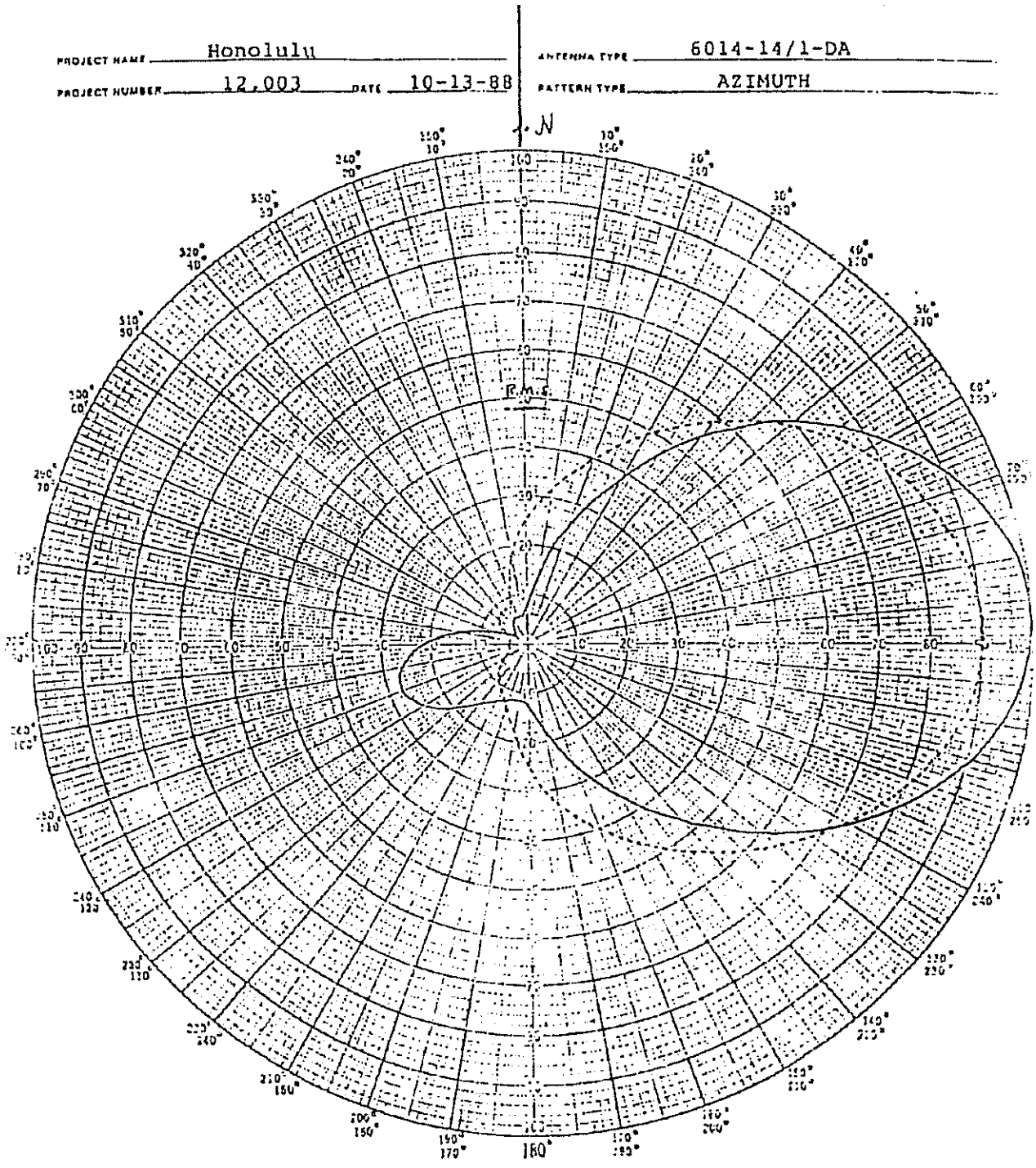
Degrees	Relative Field	Degrees	Relative Field
0	22.5	180	24.0
10	30.0	190	17.0
20	38.0	200	12.0
30	47.0	210	8.0
40	56.5	220	7.5
50	66.0	230	7.0
60	75.0	240	6.0
70	83.5	250	5.0
80	88.5	260	5.5
90	90.0	270	4.0
100	87.5	280	4.0
110	81.0	290	4.5
120	72.5	300	5.0
130	63.0	310	8.0
140	54.0	320	9.5
150	46.0	330	9.5
160	38.0	340	10.0
170	31.5	350	13.0


FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6014-14/1-DA
FREQ:100.3 MHz CHAN:262
Power Gain31.66 15.01 dB
DATE: 10/13/88
FIGURE NO.:3
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80


FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6014-14/1-DA
FREQ:100.3 MHz CHAN:262
Power Gain31.66 15.01 dB
DATE: 10/13/88
FIGURE NO.:3A
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
10
20

FM Station KUPU • 101.9 MHz, Channel 270C • Pearl City, Hawaii

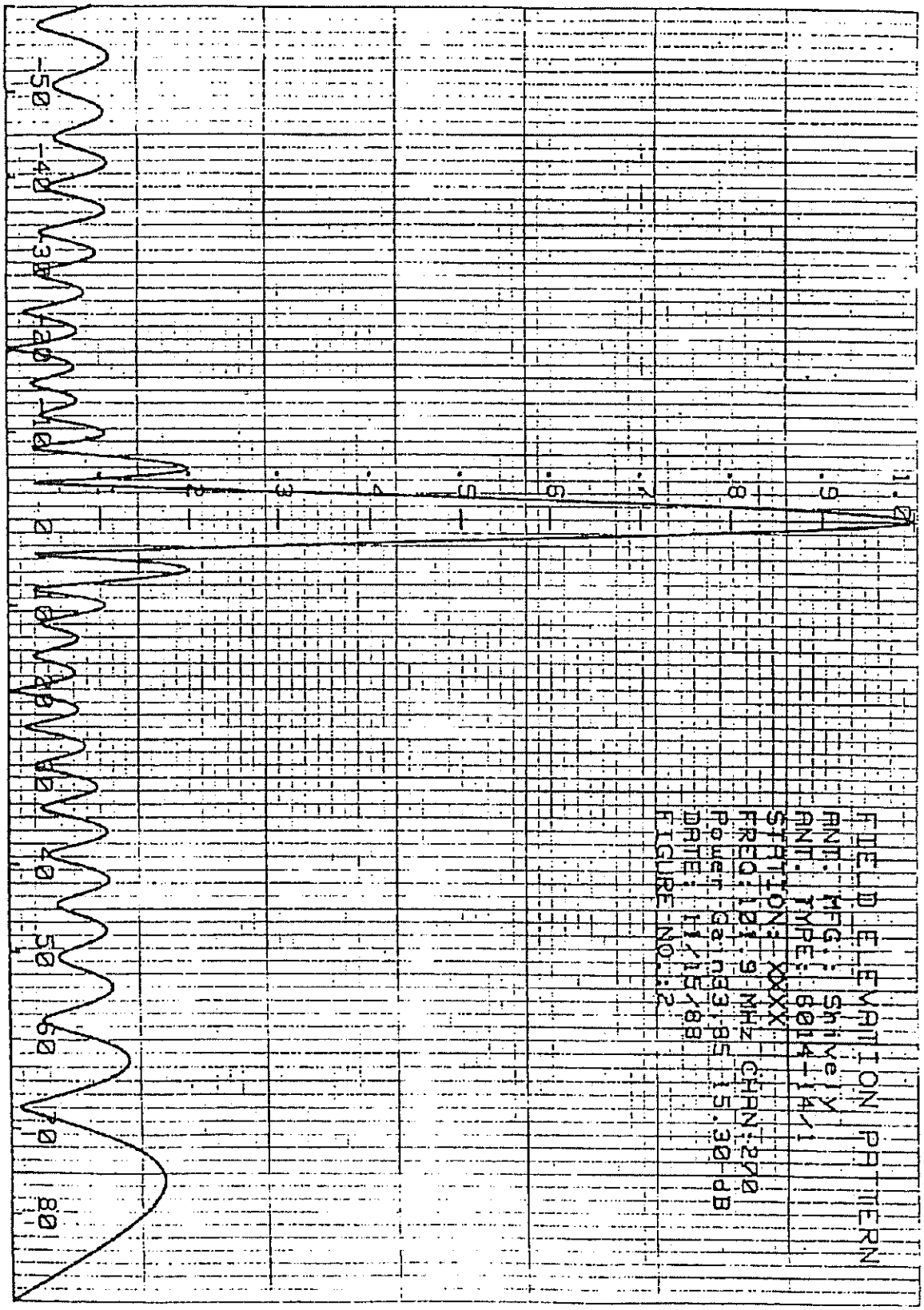
Azimuth Plane Radiation Pattern



(Manufacturer's data)

FM Station KUPU • 101.9 MHz, Channel 270C • Pearl City, Hawaii

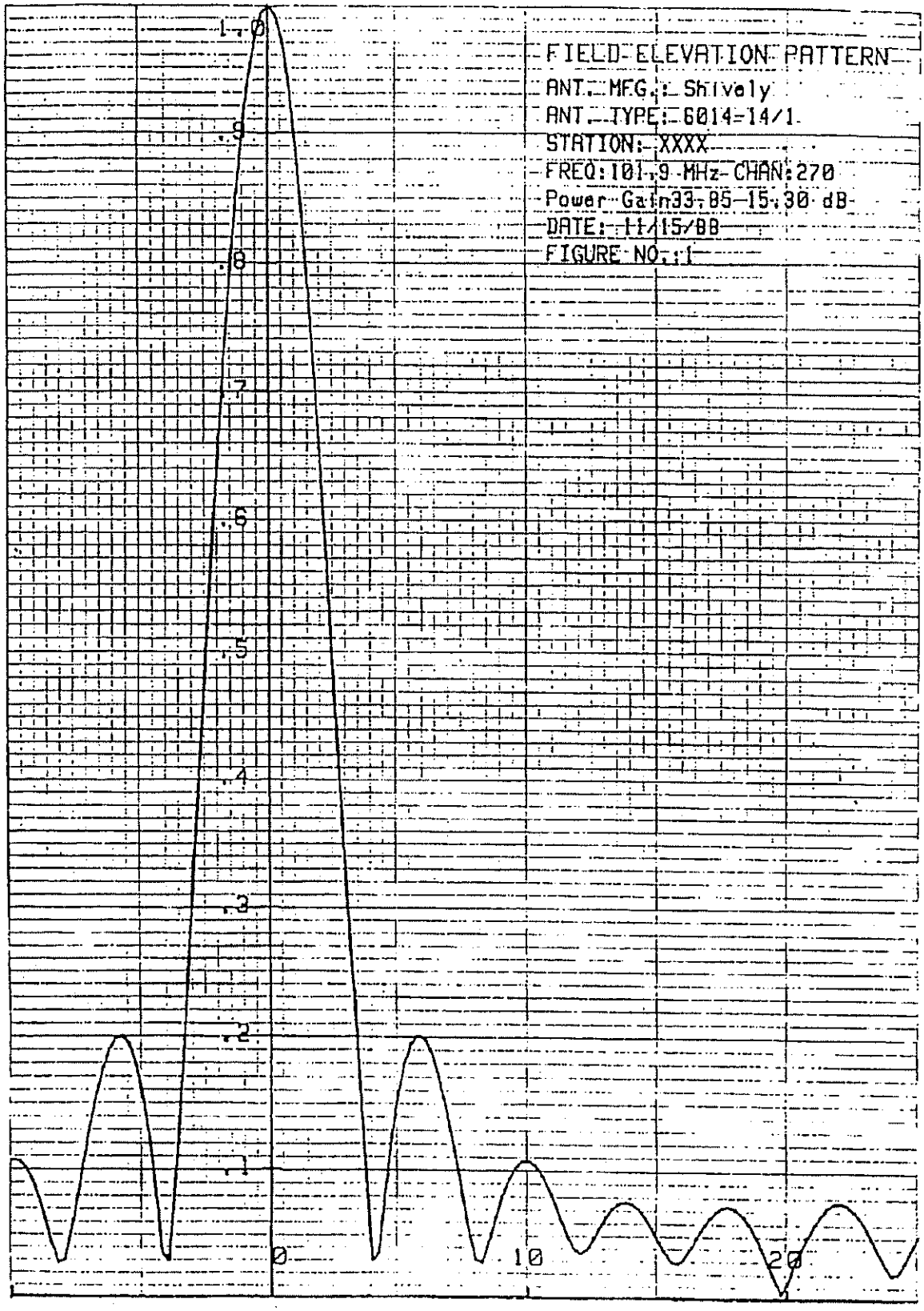
Elevation Plane Radiation Pattern



(Manufacturer's data)

FM Station KUPU • 101.9 MHz, Channel 270C • Pearl City, Hawaii

Elevation Plane Radiation Pattern



(Manufacturer's data)

Shively Labs
a division of Howell Laboratories,Inc.
- An Employee-Owned Company -

EXHIBIT 9B

P. O. Box 389 Harrison Rd.,
Bridgton, Maine 04009 USA
(207) 647-3327
888-SHIVELY
Fax: (207) 647-8273
E-mail: sales@shively.com
Web site: www.shively.com

S.O. 25449

Report of Test 6014-14/1-DA

For

KHAI 103.5 MHz Wahiawa, HI

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6014-14/1-DA to meet the needs of KHAI and to comply with the requirements of the FCC construction permit, file number BMPH-20060810AMO.

RESULTS:

The measured azimuth pattern for the 6014-14/1-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Horizontal Polarization. Figure 1B shows the Tabulation of the Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BMPH-20060810AMO indicates that the Horizontal radiation component shall not exceed 2.2 kW at any azimuth and is restricted to the following values at the azimuths specified:

180 - 350 Degrees T: 0.07 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 084 Degrees T to 098 Degrees T. At the restricted azimuth of 350 Degrees T the Horizontal component is 17.077dB down from the maximum of 2.2 kW, or 0.043 kW.

The R.M.S. of the Horizontal component is 0.463. The total Horizontal power gain is 37.790. The R.M.S. of the Vertical component is 0.463. The total Vertical power gain is 32.685. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.488. The R.M.S. of the measured composite pattern is 0.480. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.415. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6014-14/1-DA was mounted on a tower of precise scale to the Stainless G-5 Tower at the KHAI site. The spacing and azimuth angle of the antenna in reference to the tower were varied to achieve the horizontal pattern shown in Figure 1. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPH-20060810AMO, a single level of the 6014-14/1-DA was set up on the Howell Laboratories scale model antenna pattern measuring range. A scale of 4.5:1 was used.

SUPERVISION:

Mr. Surette was graduated from Lowell Technological Institute, Lowell, Massachusetts in 1973 with the degree of Bachelor of Science in Electrical Engineering. He has been directly involved with design and development of broadcast antennas, filter systems and RF transmission components since 1974, as an RF Engineer for six years with the original Shively Labs in Raymond, ME and for a short period of time with Dielectric Communications. He is currently an Associate Member of the AFCCE and a Senior Member of IEEE. He has authored a chapter on filters and combining systems for the latest edition of the CRC Electronics Handbook and for the 9th Edition of the NAB Handbook.

EQUIPMENT:

The scale model pattern range consists of a wooden rotating pedestal equipped with a position indicator. The scale model bay is placed on the top of this pedestal and is used in the transmission mode at approximately 20 feet above ground level. The receiving corner reflector is spaced 50 feet away from the rotating pedestal at the same level above ground as the transmitting model. The transmitting and receiving signals are carried to a control building by means of RG-9/U double shielded coax cable.

The control building is equipped with:

Hewlett Packard Model 8753 Network Analyzer
PC Based Controller
Hewlett Packard 7550A Graphics Plotter

The test equipment is calibrated to ANSI/NCSL Z540-1-1994.

TEST PROCEDURES:

The corner reflector is mounted so that the horizontal and vertical azimuth patterns are measured independently by rotating the corner reflector by 90 degrees. The network analyzer was set to 465.75 MHz. Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding yields a scale reading of 50 from an unpadded reading of 100 in voltage. From the recorded patterns, the R.M.S. values are calculated and recorded as shown in Figure 1.

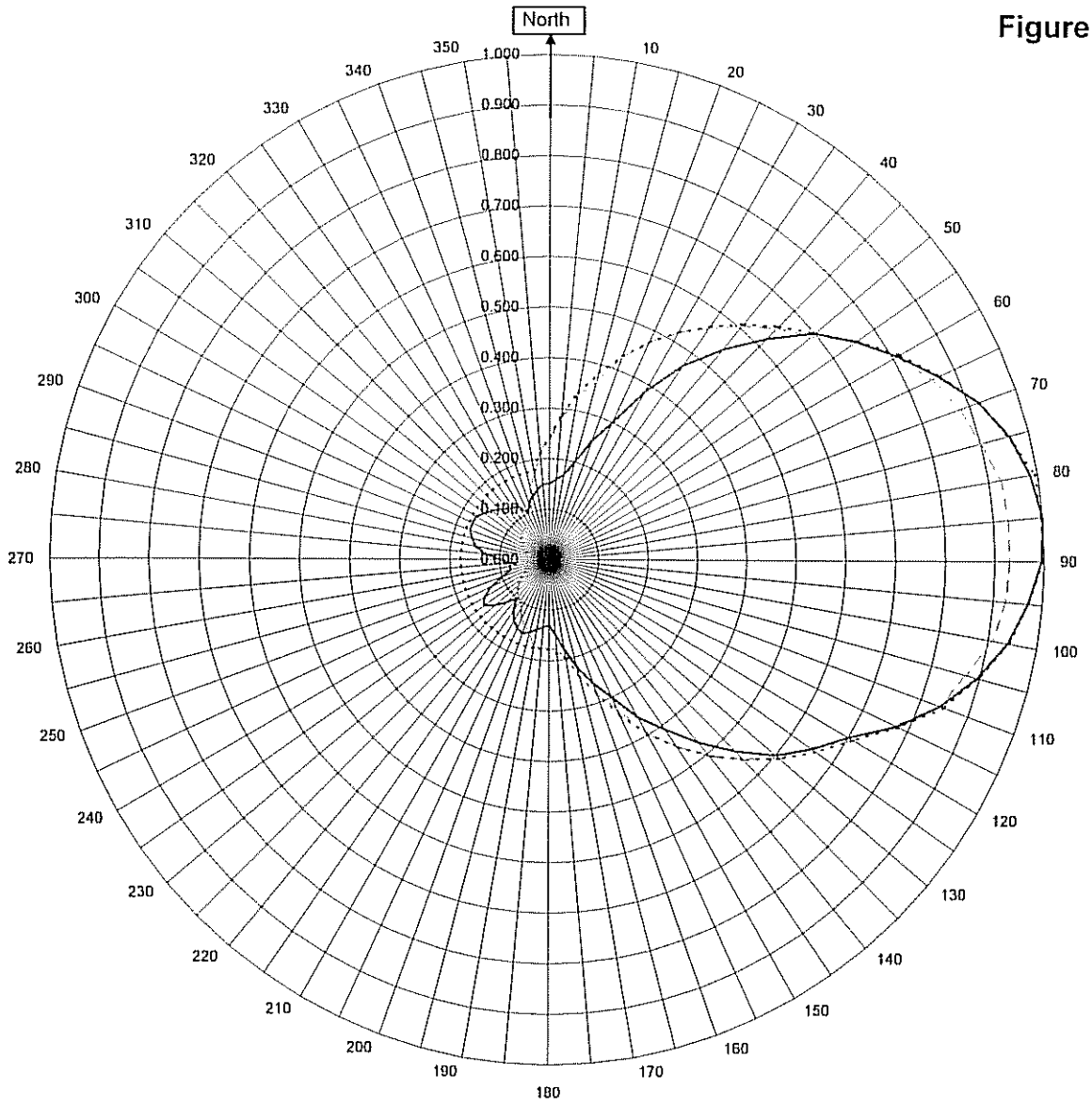
Respectfully submitted by:

Robert A. Surette
Director of Sales Engineering
S/O 25449

Shively Labs

Shively Labs, a division of Howell Laboratories, Inc. Bridgton, ME (207)647-3327

Figure 1



KHAI Wahiawa, HI

25449

February 6, 2007

Horizontal RMS	0.463
Vertical RMS	0.463
H/V Composite RMS	0.480
FCC Composite RMS	0.488

Frequency	103.5 / 465.75 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6014-14/1-DA
Pattern Type	Directional Azimuth

Figure 1a

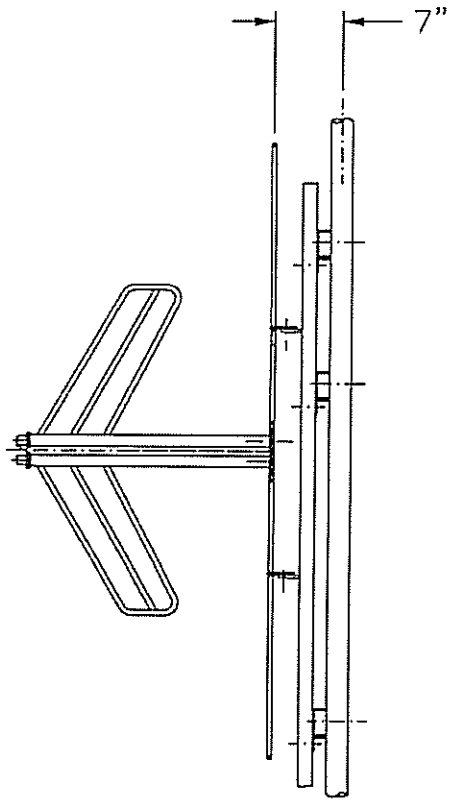
Tabulation of Horizontal Azimuth Pattern
KHAI Wahiawa, HI

Azimuth	Rel Field	Azimuth	Rel Field
0	0.150	180	0.130
10	0.170	190	0.140
20	0.250	200	0.155
30	0.385	210	0.140
40	0.545	220	0.100
45	0.620	225	0.120
50	0.700	230	0.140
60	0.810	240	0.150
70	0.920	250	0.100
80	0.985	260	0.080
90	0.995	270	0.100
100	0.940	280	0.150
110	0.840	290	0.170
120	0.700	300	0.170
130	0.600	310	0.150
135	0.535	315	0.140
140	0.470	320	0.130
150	0.360	330	0.120
160	0.260	340	0.120
170	0.180	350	0.140

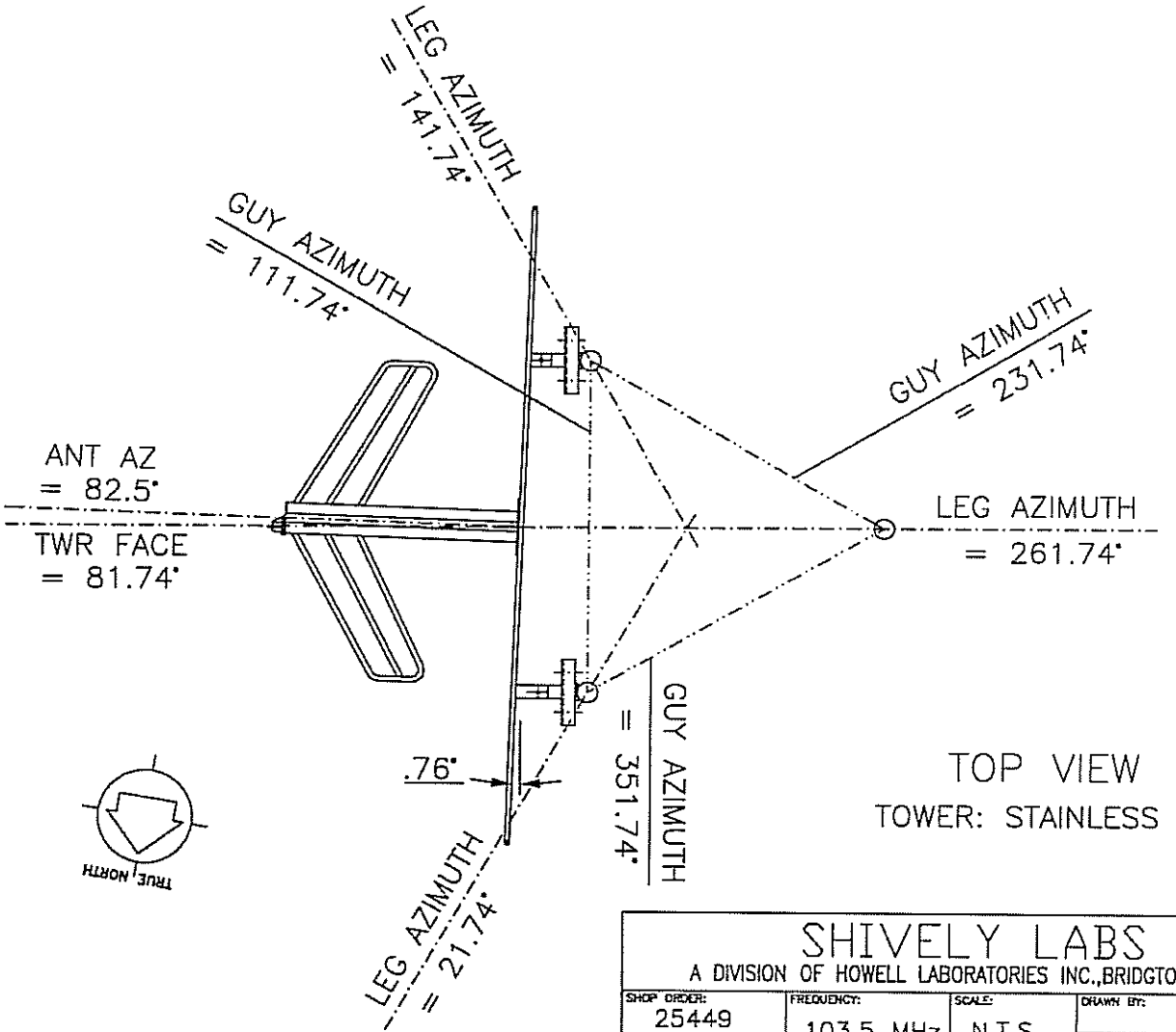
Figure 1b

Tabulation of Vertical Azimuth Pattern
KHAI Wahiawa, HI

Azimuth	Rel Field	Azimuth	Rel Field
0	0.240	180	0.175
10	0.330	190	0.175
20	0.425	200	0.140
30	0.520	210	0.110
40	0.605	220	0.095
45	0.650	225	0.090
50	0.690	230	0.080
60	0.810	240	0.060
70	0.880	250	0.045
80	0.925	260	0.040
90	0.930	270	0.040
100	0.910	280	0.040
110	0.840	290	0.050
120	0.710	300	0.060
130	0.610	310	0.075
135	0.555	315	0.075
140	0.505	320	0.080
150	0.395	330	0.080
160	0.280	340	0.100
170	0.195	350	0.170



SIDE VIEW



TOP VIEW
TOWER: STAINLESS G5

SHIVELY LABS
A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE

SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
25449 HONOLULU, HI	103.5 MHz.	N.T.S.	ASP
			APPROVED BY:

TITLE: MODEL-6014-14/1-DIRECTIONAL ANTENNA

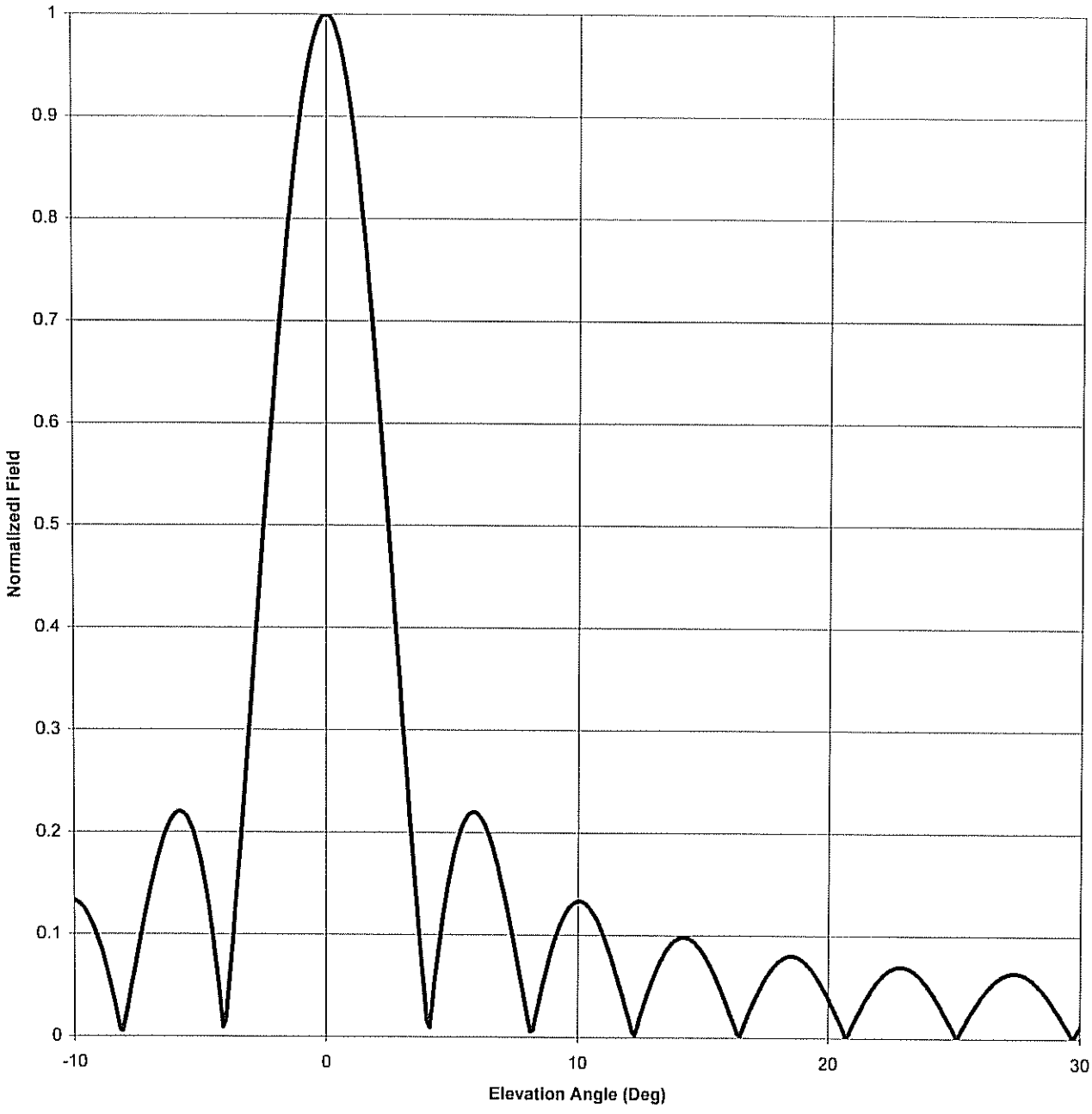
DATE: 2/6/07

FIGURE 2

Antenna Mfg.: Shively Labs
Antenna Type: 6014-14/1-DA
Station: KHAI
Frequency: 103.5
Channel #: 278
Figure: 3

Date: 2/6/2007

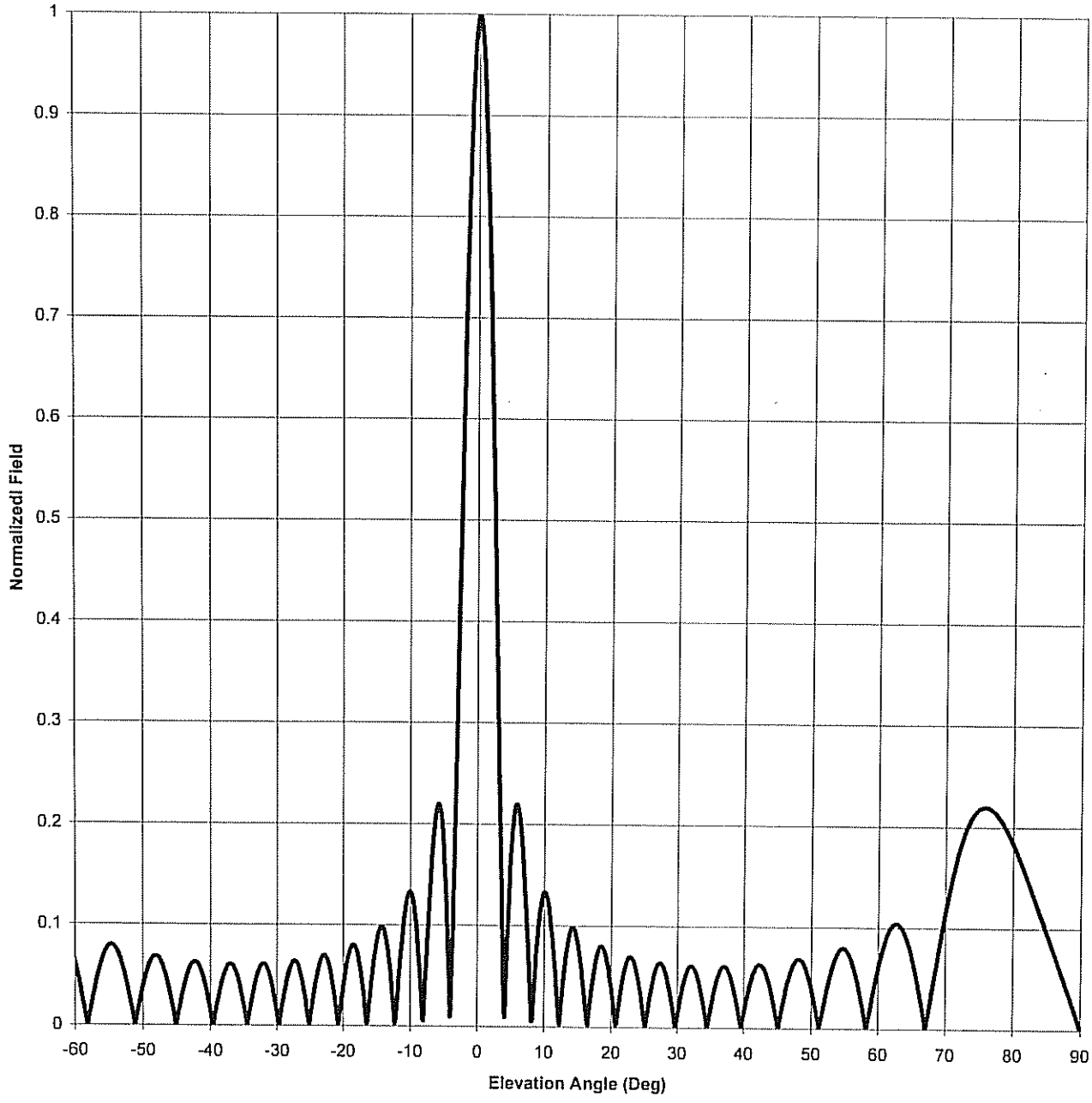
Beam Tilt	0	
Gain (Max)	37.790	15.774 dB
Gain (Horizon)	37.790	15.774 dB



Antenna Mfg.: Shively Labs
Antenna Type: 6014-14/1-DA
Station: KHAI
Frequency: 103.5
Channel #: 278
Figure: 3

Date: 2/6/2007

Beam Tilt	0	
Gain (Max)	37.790	15.774 dB
Gain (Horizon)	37.790	15.774 dB



Antenna Mfg.: Shively Labs
Antenna Type: 6014-14/1-DA
Station: KHAI
Frequency: 103.5
Channel #: 278
Figure: 3

Date: 2/6/2007

Beam Tilt	0	
Gain (Max)	37.790	15.774 dB
Gain (Horizon)	37.790	15.774 dB

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.000	-44	0.037	0	1.000	46	0.031
-89	0.020	-43	0.059	1	0.903	47	0.057
-88	0.039	-42	0.062	2	0.647	48	0.069
-87	0.058	-41	0.046	3	0.316	49	0.062
-86	0.077	-40	0.014	4	0.015	50	0.039
-85	0.095	-39	0.022	5	0.173	51	0.006
-84	0.114	-38	0.050	6	0.218	52	0.029
-83	0.133	-37	0.061	7	0.145	53	0.058
-82	0.151	-36	0.049	8	0.018	54	0.076
-81	0.168	-35	0.018	9	0.090	55	0.079
-80	0.183	-34	0.020	10	0.133	56	0.066
-79	0.197	-33	0.051	11	0.101	57	0.041
-78	0.208	-32	0.061	12	0.023	58	0.008
-77	0.216	-31	0.046	13	0.056	59	0.029
-76	0.220	-30	0.011	14	0.097	60	0.062
-75	0.218	-29	0.029	15	0.084	61	0.087
-74	0.210	-28	0.059	16	0.030	62	0.102
-73	0.196	-27	0.062	17	0.033	63	0.103
-72	0.176	-26	0.037	18	0.075	64	0.092
-71	0.149	-25	0.007	19	0.075	65	0.070
-70	0.116	-24	0.049	20	0.039	66	0.039
-69	0.078	-23	0.070	21	0.014	67	0.002
-68	0.038	-22	0.056	22	0.056	68	0.038
-67	0.002	-21	0.014	23	0.070	69	0.078
-66	0.039	-20	0.039	24	0.049	70	0.116
-65	0.070	-19	0.075	25	0.007	71	0.149
-64	0.092	-18	0.075	26	0.037	72	0.176
-63	0.103	-17	0.033	27	0.062	73	0.196
-62	0.102	-16	0.030	28	0.059	74	0.210
-61	0.087	-15	0.084	29	0.029	75	0.218
-60	0.062	-14	0.097	30	0.011	76	0.220
-59	0.029	-13	0.056	31	0.046	77	0.216
-58	0.008	-12	0.023	32	0.061	78	0.208
-57	0.041	-11	0.101	33	0.051	79	0.197
-56	0.066	-10	0.133	34	0.020	80	0.183
-55	0.079	-9	0.090	35	0.018	81	0.168
-54	0.076	-8	0.018	36	0.049	82	0.151
-53	0.058	-7	0.145	37	0.061	83	0.133
-52	0.029	-6	0.218	38	0.050	84	0.114
-51	0.006	-5	0.173	39	0.022	85	0.095
-50	0.039	-4	0.015	40	0.014	86	0.077
-49	0.062	-3	0.316	41	0.046	87	0.058
-48	0.069	-2	0.647	42	0.062	88	0.039
-47	0.057	-1	0.903	43	0.059	89	0.020
-46	0.031	0	1.000	44	0.037	90	0.000
-45	0.003			45	0.003		

S.O. 25449 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

KHAI Wahiawa

6014-14/1-DA

Elevation Gain of Antenna 8.101

The RMS values are calculated utilizing the data of a planimeter

Horizontal RMS value divided by the Vertical RMS value equals the Horiz. - Vert. Ratio

H RMS 0.463 V RMS 0.463 H/V Ratio 1.000

Elevation Gain of Horizontal Component 8.101

Elevation Gain of Vertical Component 8.101

Horizontal Azimuth Gain equals 1/(RMS)SQ. 4.665

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 4.035
Max. Vertical 0.93

***Total Horizontal Power Gain is the Elevation Gain Times the Azimuth Gain**

Total Horizontal Power Gain = **37.790**

***Total Vertical Power Gain is the Elevation Gain Times the Azimuth Gain**

Total Vertical Power Gain = **32.685**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

2.2 KW ERP Equals 0.058 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.058 KW Times 32.685 KW Equals 1.903 KW ERP

Maximum Value of the Vertical Component squared times the Maximum ERP equals the Vertical ERP

0.93 Equals 1.903 KW Vertical ERP

NOTE: Calculating the ERP of the Vertical Component by two methods validates the total power gain calculations

Shively Labs, a division of Howell Laboratories, Inc.
BRIDGTON, MAINE 04009 (207) 647-3327
TWX 710-223-8910 SHIVELY BRGT FAX (207) 647-8273

Report of Test 6014-14/1-DA
For
RLS Radio, Inc.
Honolulu, Hawaii

OBJECTIVES:

The objective of this test was to demonstrate the directional characteristics of a 6014-14/1-DA antenna to meet the needs of RLS Radio, Inc. and to meet the requirements of the FCC building permit, file number BPH-841114ML.

RESULTS:

The measured azimuth pattern for the 6014-14/1-DA is shown in Figure 1. Figure 1A shows the Tabulation of Horizontal Polarization. Figure 1B shows the Tabulation of Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3.

Construction permit file number BPH-841114ML indicates that the horizontal radiation component shall not exceed 100 kW at any azimuth, the vertical radiation component shall not exceed the maximum horizontal radiation component, and each component shall be restricted to the following values at the azimuths specified:

89 kW @ 100°T
3.6 kW @ 180°T

In addition, neither radiation component shall increase at a rate exceeding 11 dB per ten degrees from the azimuths of restricted radiation specified above nor exceed a maximum-minimum ratio of 33.979 dB. (This ratio exceeds the maximum-minimum ratio of 31.6 dB specified in the C.P. by 2.38 dB, thus giving more protection toward the FAA's receivers, QMK and QMKA. The sole purpose of this null is to provide protection for these sites.) The RMS of the vertically polarized radiation pattern shall not exceed that of the horizontally polarized radiation pattern. From Figure 1,

the maximum radiation of the horizontal component occurs at 82° to 91°. At the restricted azimuth of 100°, the horizontal component is 0.51 dB down from the maximum of 100 kW, or 88.9 kW. At the restricted azimuth of 180°, the horizontal component is 19.6 dB down from the maximum of 100 kW, or 1.1kW. The RMS value of the horizontal component is 48, and the RMS of the vertical component is 48. The total horizontal power gain is 32.73. The vertical power gain is 32.73.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BPH-841114ML, a single level of the 6014-14/1-DA antenna was set up on the Howell Laboratories scale model antenna pattern measuring range. A scale of 4.5:1 was used.

SUPERVISION:

The tests were carried out under the direction of Robert A. Surette, Manager of RF Engineering. Mr. Surette was graduated from Lowell Technological Institute, Lowell, Massachusetts in 1973 with the degree of Bachelor of Science in Electrical Engineering. He has been directly involved with both full size and scale model pattern measurements since 1974, as an RF Engineer with Shively Labs and with Dielectric Communications (a unit of General Signal) in Raymond, Maine. He is currently an Associate Member of the Association of Federal Communications Consulting Engineers and a Member of IEEE.

METHOD OF DIRECTIONALIZATION:

The 6014 radiator was mounted on a tower of exact scale to a Stainless G5. See Figure 2 for mechanical layout. See Figure 1 for the horizontal and vertical azimuth patterns.

EQUIPMENT:

The scale model pattern range consists of a wooden rotating pedestal equipped with a position indicator. The scale model bay is placed on the top of this pedestal and is used in the transmission mode at approximately 20 ft. above ground level. The receiving corner reflector is spaced 50 ft. away from the rotating pedestal at the same level above ground as the transmitting model. The transmitting and receiving signals are carried to a control building by means of RG-9/U double shielded coax cable. The control building is equipped with:

1. Wavetek synthesized signal generator Model 3510
2. AW/AAR-4 receiver with a CU-253/ALR frequency converter
3. Heathkit chart recorder modified to polar recorder

TEST PROCEDURES:

The corner reflector is mounted so that the horizontal and vertical azimuth patterns are measured independently by rotating the corner reflector by 90°. The oscillator was set to 472.95 MHz. The receiver was tuned to that frequency by maximizing the received output. Calibrated pads were used to check the linearity of the measuring system. For example, 6 dB padding yielded a scale reading 50 from an unpadded reading of 100 in voltage. From the recorded patterns, the RMS values are calculated and recorded as shown in Figure 1.

Respectfully submitted by,

Robert A. Surette
Manager of RF Engineering
S/O 12,003
October 24, 1988

Shively Labs

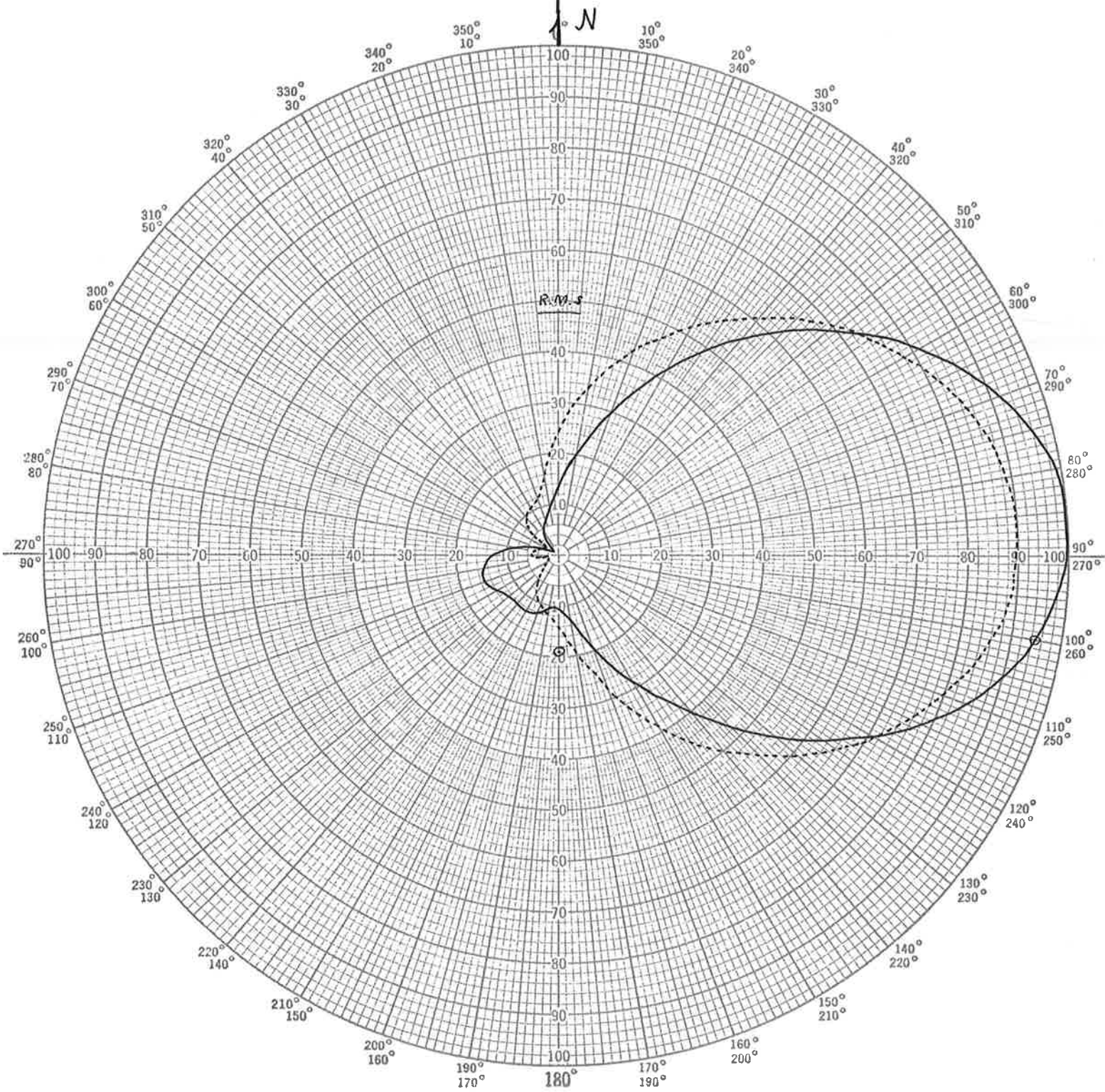
Figure 1

PROJECT NAME Honolulu, HI

PROJECT NUMBER 12003 DATE 8/26/88

ANTENNA TYPE 6014-14/1-DA

PATTERN TYPE Azimuth



MODEL (X) FULL SCALE ( ) FREQUENCY 472.95/105.1mHz

POLARIZATION Horiz(——); Vert (----)

CURVE PLOTTED IN: VOLTAGE (X) POWER( ) DB( )

OBSERVER RAS-1

REMARKS: See Figure 2 for mechanical details.

Figure 1A

Tabulation of Horizontal Polarization

From Figure 1

Degrees	Amp.	Degrees	Amp.
0	13.0	180	10.5
10	18.5	190	11.0
20	29.0	200	12.0
30	42.5	210	12.2
40	55.5	220	12.0
50	69.3	230	12.2
60	81.6	240	13.5
70	92.0	250	15.0
80	99.5	260	14.5
90	99.8	270	11.0
100	94.3	280	9.0
110	84.9	290	14.0
120	70.8	300	3.0
130	55.0	310	2.0
140	40.0	320	3.0
150	28.2	330	5.0
160	18.8	340	6.5
170	12.5	350	9.0

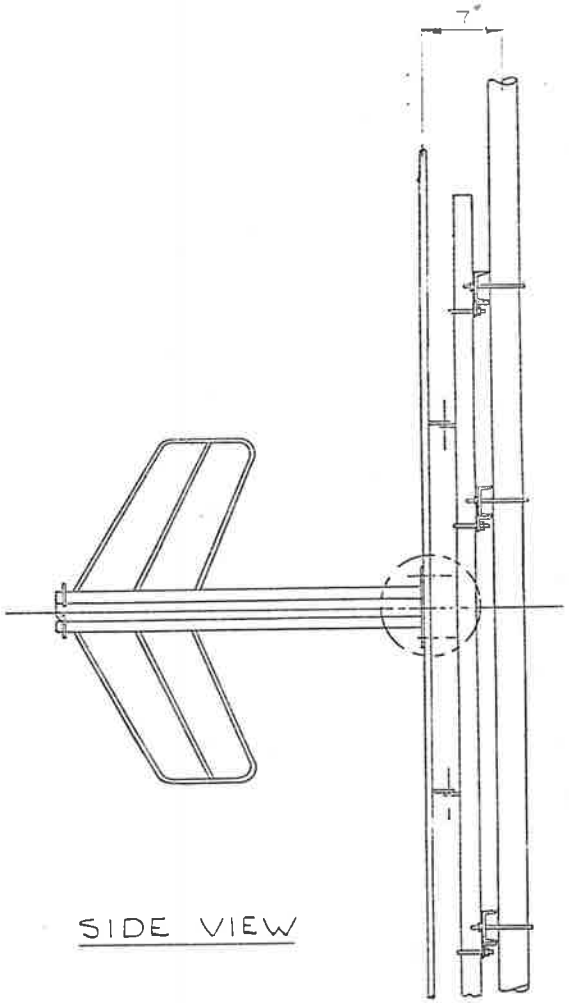
Figure 1B

Tabulation of Vertical Polarization

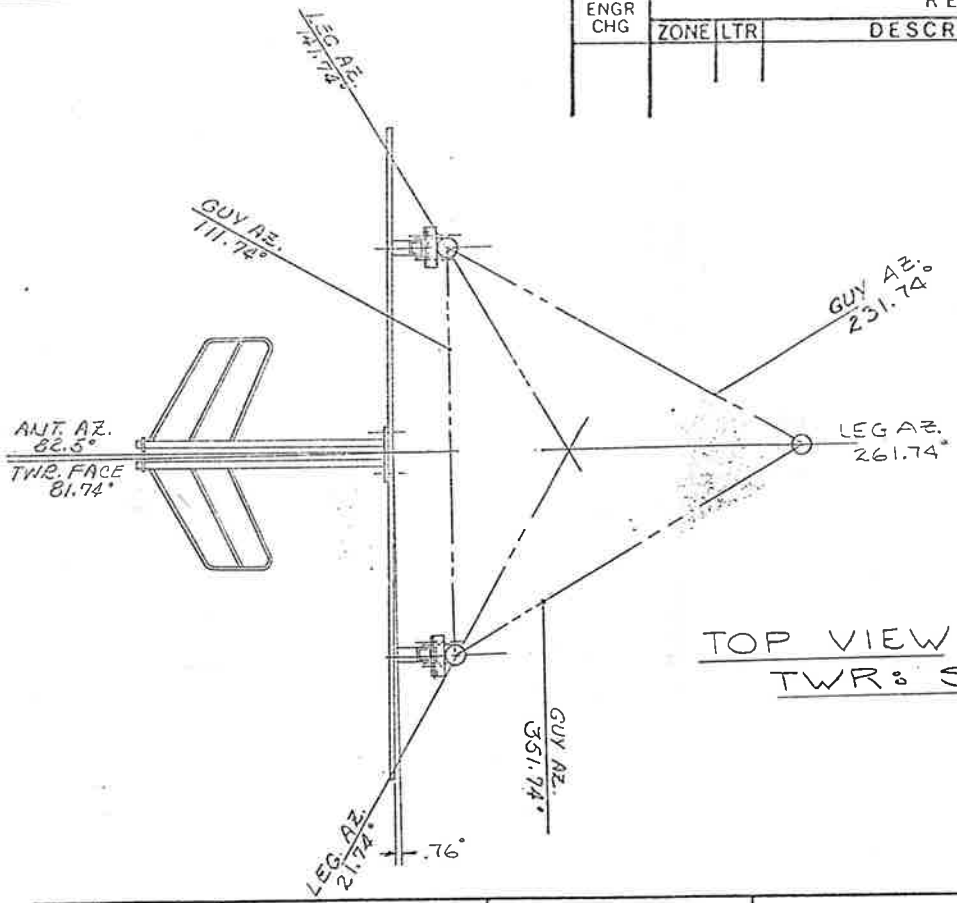
From Figure 1

Degrees	Amp.	Degrees	Amp.
0	24.3	180	15.0
10	33.5	190	12.2
20	42.9	200	10.5
30	52.0	210	8.0
40	61.0	220	5.5
50	70.0	230	4.0
60	77.5	240	3.0
70	84.6	250	2.0
80	88.9	260	3.0
90	89.9	270	5.0
100	87.0	280	4.5
110	79.8	290	4.0
120	71.0	300	3.0
130	61.0	310	6.0
140	50.5	320	8.9
150	39.7	330	10.5
160	28.0	340	11.9
170	19.8	350	16.0

ENGR CHG	REVISIONS				
	ZONE	LTR	DESCRIPTION	DATE	APPROVED



SIDE VIEW



TOP VIEW
TWR: STAINLESS G5

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	SPECIFICATION	ZONE	ITEM NO.
	← ASSY NO.	LIST OF PARTS					
NEXT ASSY		USED ON					
APPLICATION							

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONS ±
DECIMALS ±
ANGLES ±
SURFACE FINISH ✓
MATERIAL

CONTRACT NO.

DWG APPD	PR	
CHECKED		
DRAWN		

DESIGN ENGINEERING
REF SI 213 203

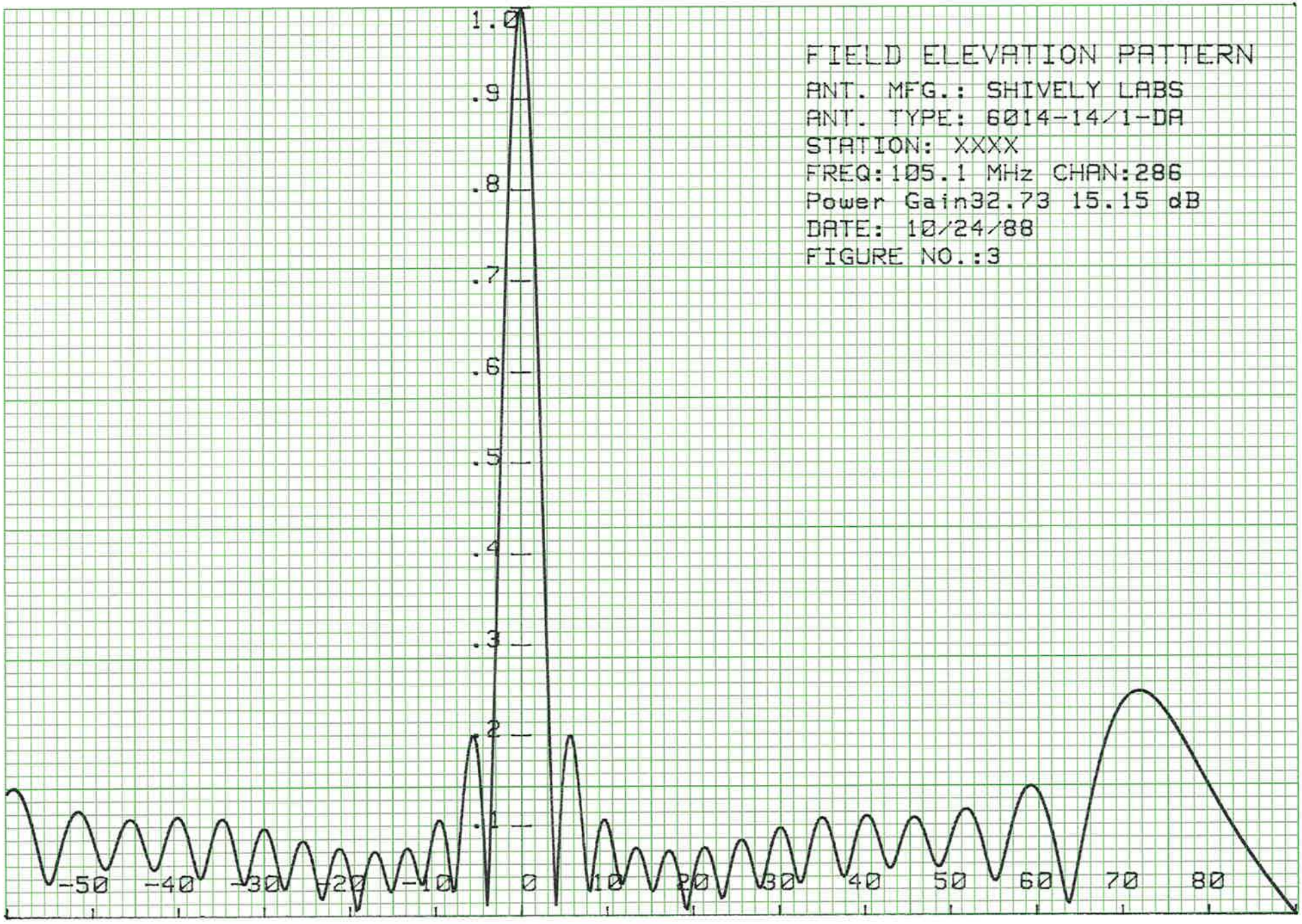
HOWELL LABORATORIES INC.
BRIDGTON, MAINE

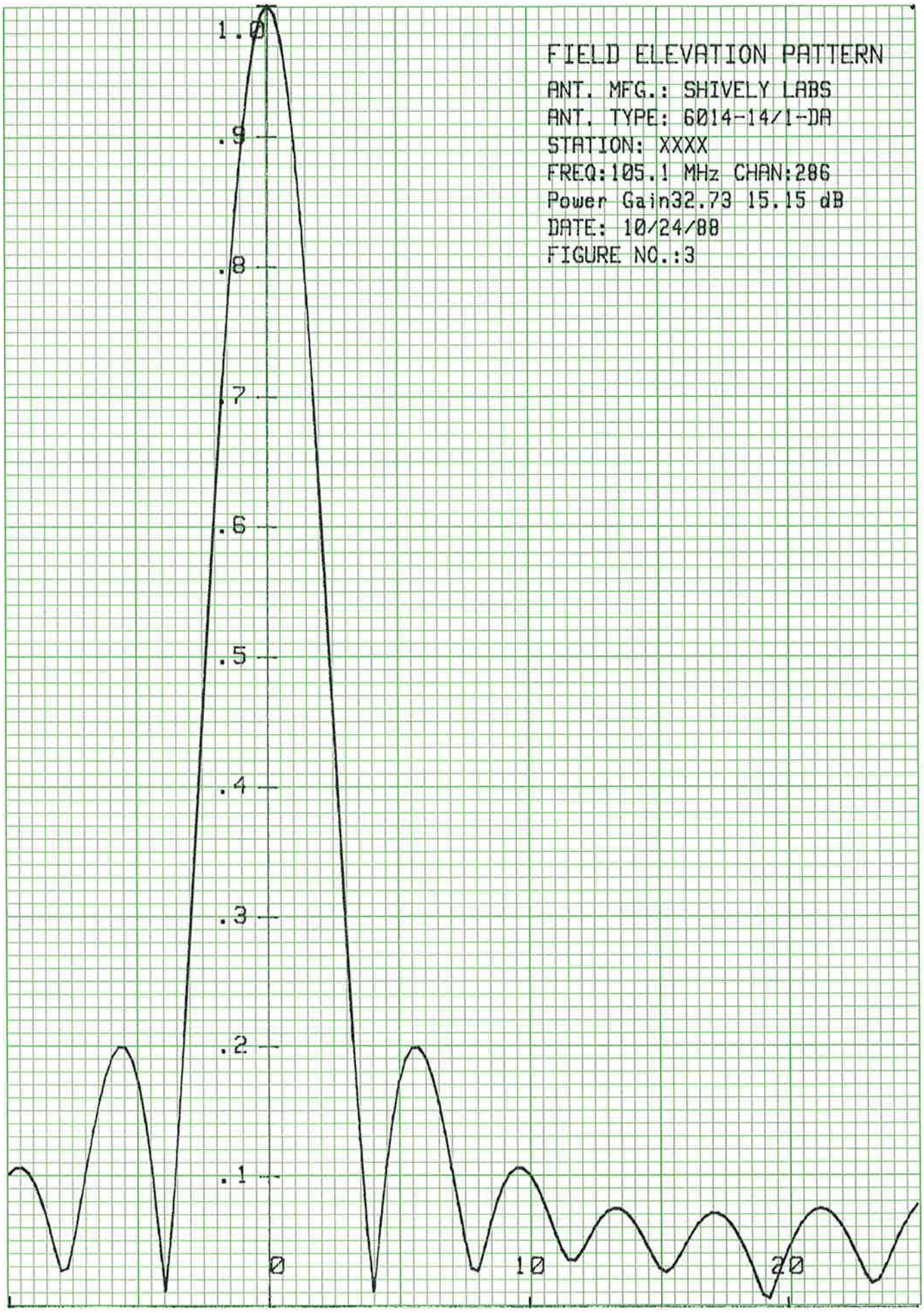
6014-14/1 DIRECTIONAL
HONOLULU, HI.

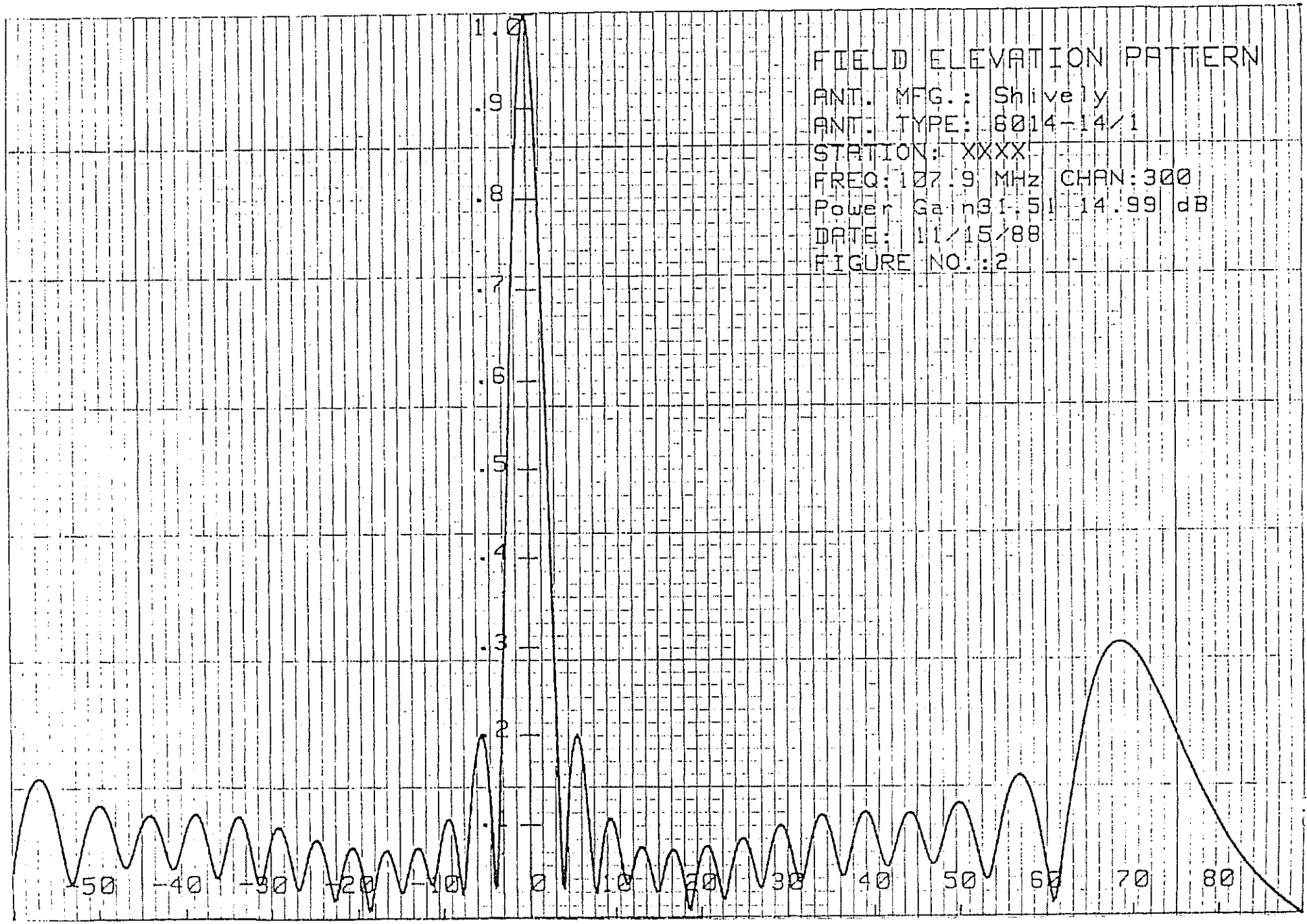
SIZE	CODE IDENT NO.	DRAWING NO.	REV
B	22501	FIG. 2	

SCALE | SHEET

138204





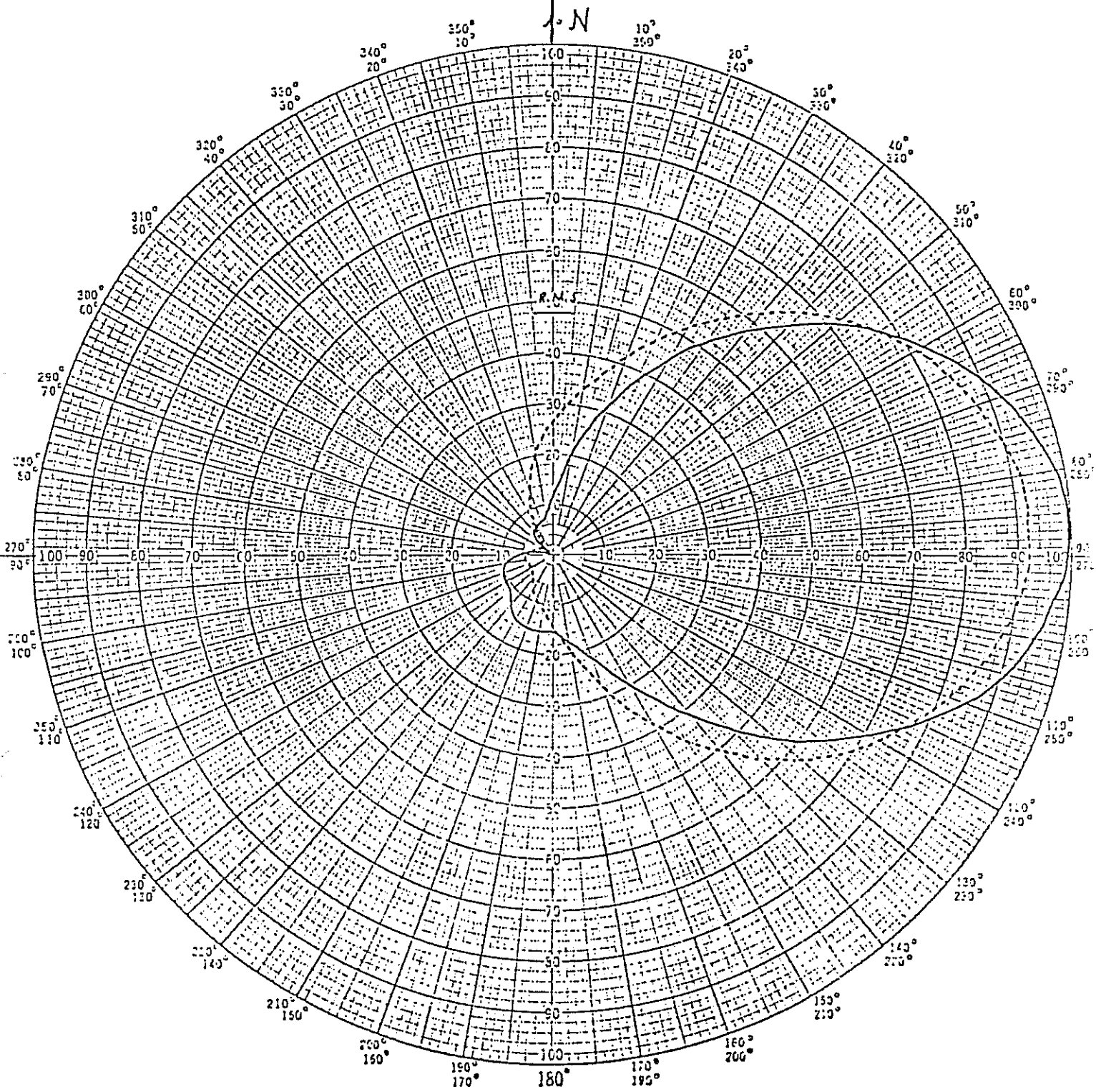

FIELD ELEVATION PATTERN
ANT. MFG.: Shively
ANT. TYPE: 6014-14/1
STATION: XXXX
FREQ: 107.9 MHz CHAN: 300
Power Gain 31.51 14.99 dB
DATE: 11/15/88
FIGURE NO.: 2
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80

PROJECT NAME Honolulu

PROJECT NUMBER 12,003 DATE 10-13-88

ANTENNA TYPE 6014-14/1-DA

PATTERN TYPE AZIMUTH



MODEL (X) FULL SCALE ( ) FREQUENCY 476.55/105.9

POLARIZATION HORIZ (———) ; VERT (- - - -)

CURVE PLOTTED IN: VOLTAGE (X) POWER ( ) DB ( )

OBSERVER RAS-3

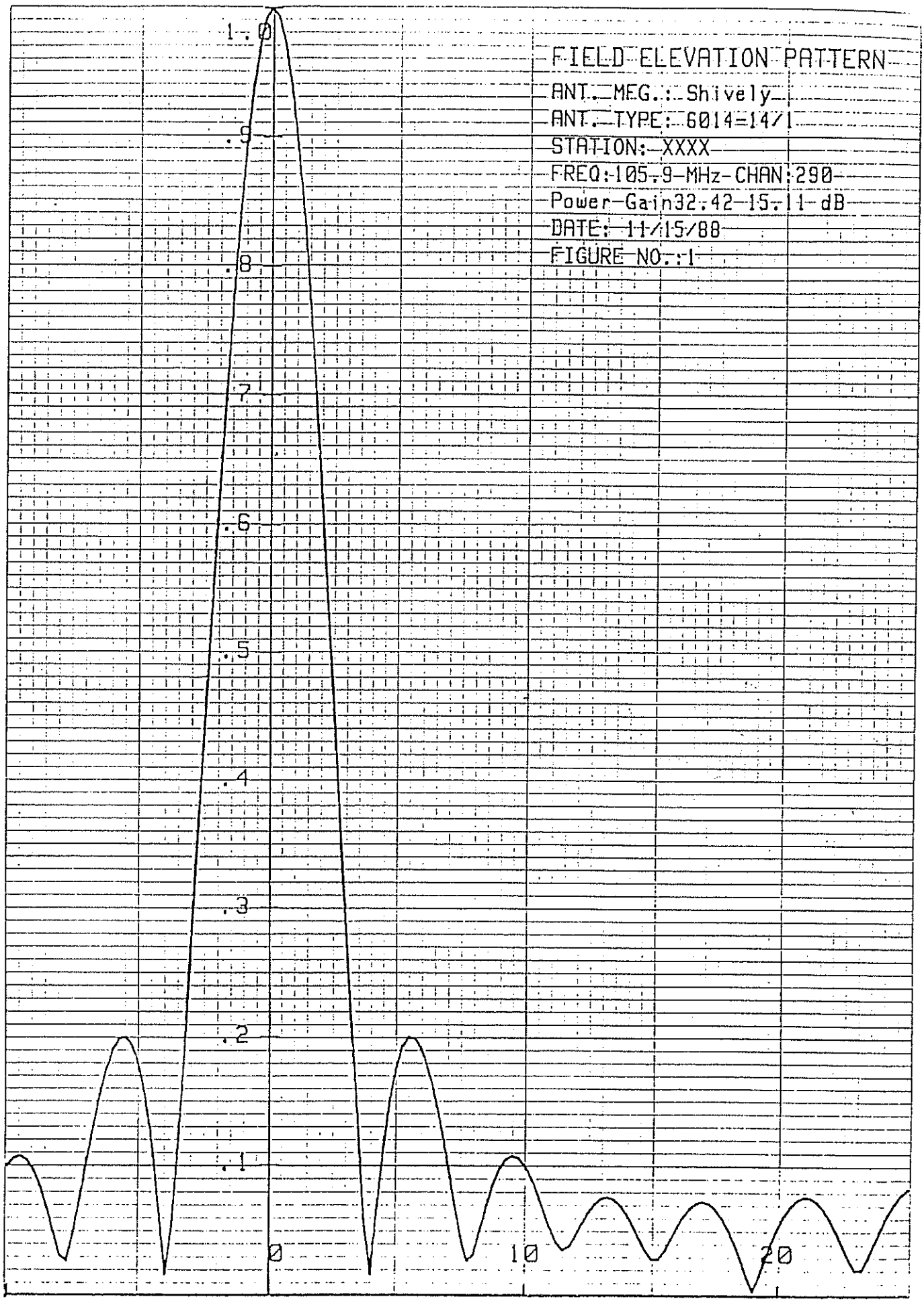
REMARKS: See Figure 2 for mechanical details.

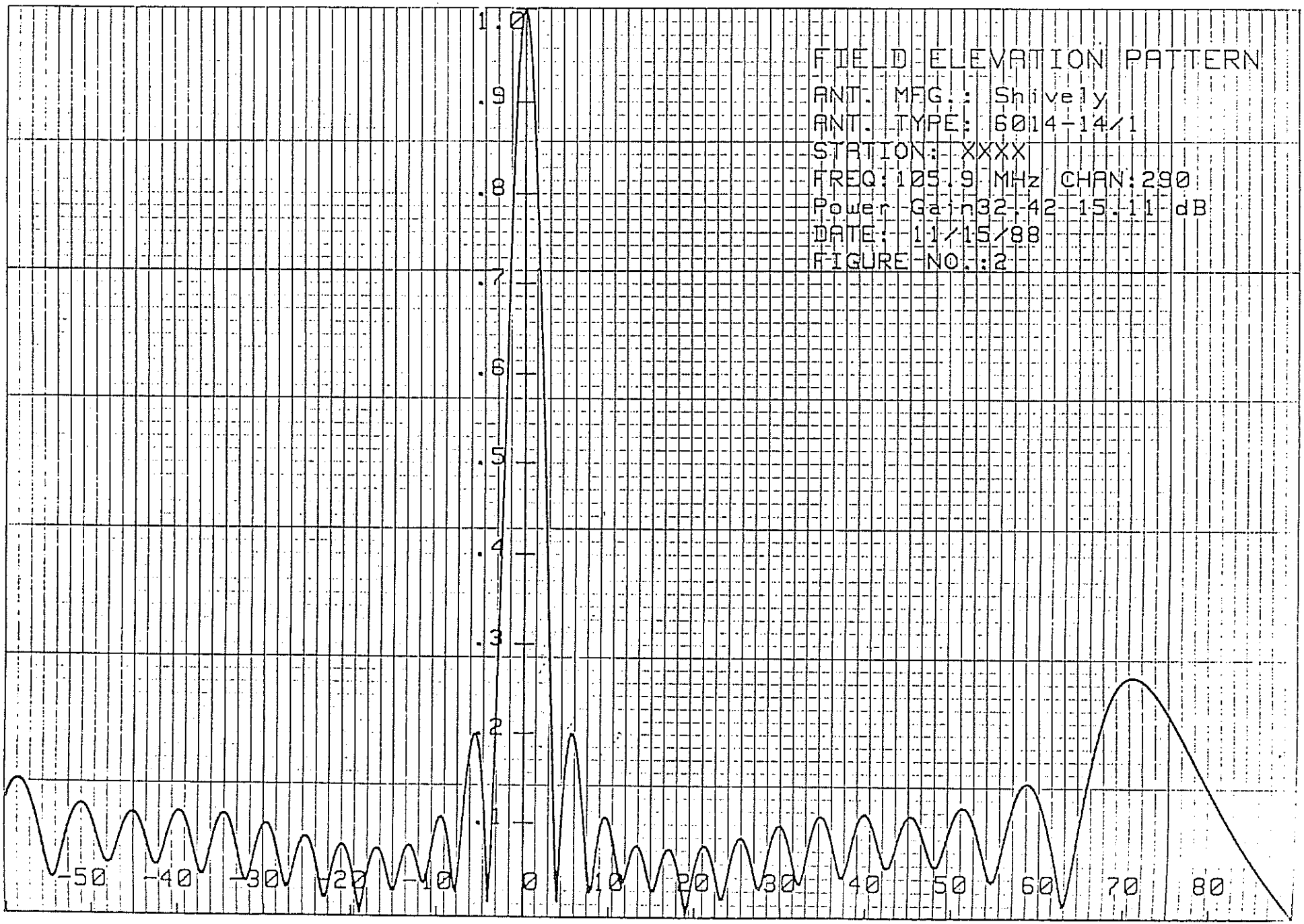
TABULATION OF HORIZONTAL POLARIZATION
KMKP-FM HONOLULU, HI

DEGREE	*RELATIVE FIELD*	*DEGREE*	*RELATIVE FIELD*
0	0.100	180	0.160
10	0.220	190	0.160
20	0.320	200	0.150
30	0.450	210	0.145
40	0.580	220	0.130
45	0.640	225	0.120
50	0.710	230	0.110
60	0.840	240	0.100
70	0.920	250	0.100
80	0.980	260	0.090
90	0.990	270	0.060
100	0.950	280	0.010
110	0.850	290	0.000
120	0.710	300	0.010
130	0.560	310	0.020
135	0.480	315	0.060
140	0.420	320	0.060
150	0.300	330	0.070
160	0.220	340	0.075
170	0.180	350	0.090

TABULATION OF VERTICAL POLARIZATION
KMKP-FM HONOLULU, HI

DEGREE	*RELATIVE FIELD*	*DEGREE*	*RELATIVE FIELD*
0	0.260	180	0.160
10	0.340	190	0.110
20	0.420	200	0.100
30	0.520	210	0.080
40	0.630	220	0.060
45	0.680	225	0.050
50	0.730	230	0.050
60	0.820	240	0.040
70	0.870	250	0.040
80	0.920	260	0.050
90	0.920	270	0.040
100	0.880	280	0.030
110	0.820	290	0.020
120	0.730	300	0.020
130	0.630	310	0.015
135	0.550	315	0.015
140	0.500	320	0.010
150	0.380	330	0.040
160	0.280	340	0.140
170	0.200	350	0.200


FIELD ELEVATION PATTERN
ANT. MFG.: Shively
ANT. TYPE: 6014=14/1
STATION: XXXX
FREQ: 105.9 MHz CHAN: 290
Power Gain 32.42-15.11 dB
DATE: 11/15/88
FIGURE NO.: 1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
10
20

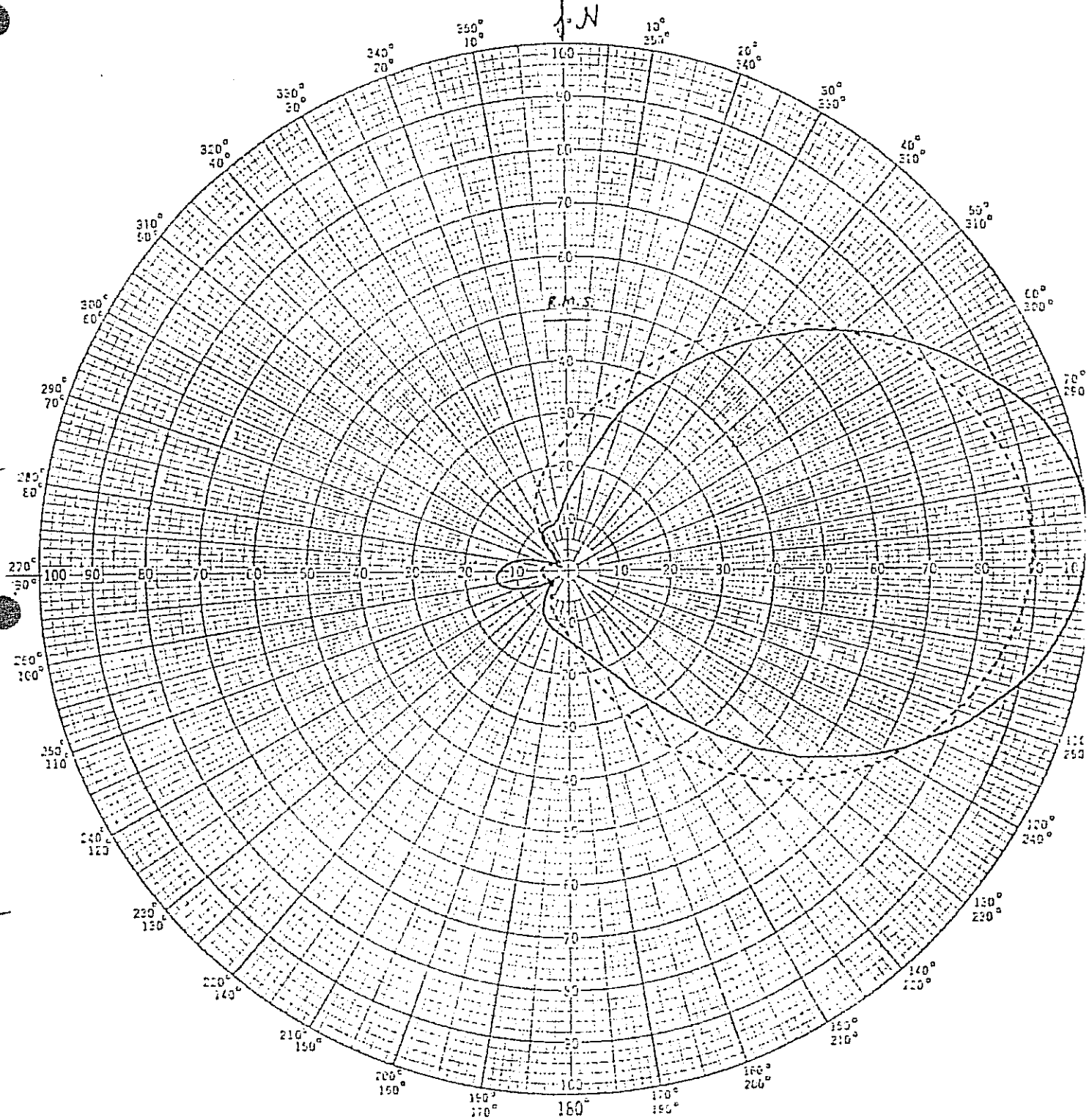

FIELD ELEVATION PATTERN
ANT. MFG.: Shively
ANT. TYPE: 6014-14/1
STATION: XXXX
FREQ: 105.9 MHz CHAN: 290
Power Gain 32.42 15.11 dB
DATE: 11/15/88
FIGURE NO.: 2
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80

PROJECT NAME Honolulu

PROJECT NUMBER 12,003 DATE 10-13-88

ANTENNA TYPE 6014-14/1-DA

PATTERN TYPE AZIMUTH



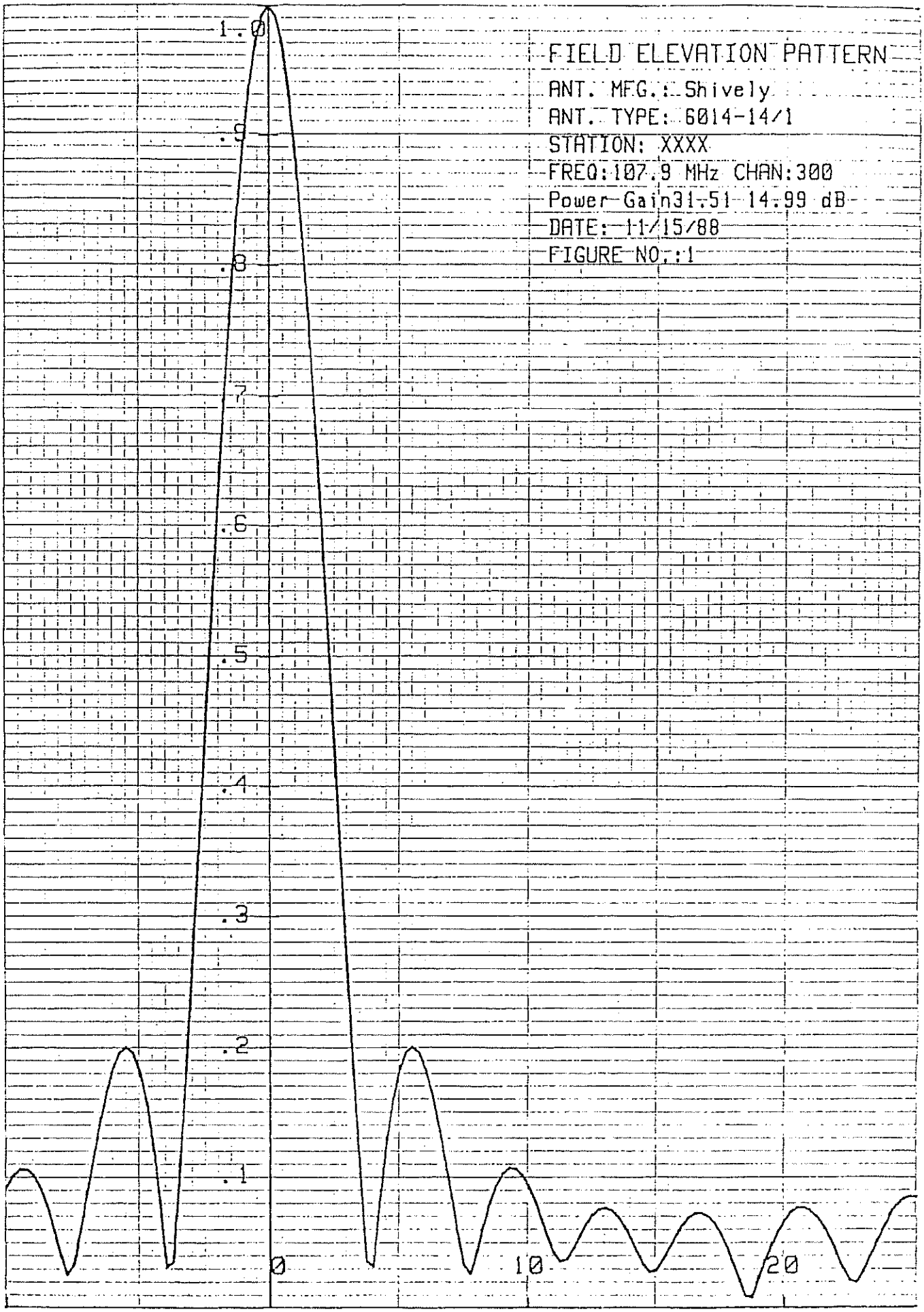
MODEL (X) FULL SCALE ( ) FREQUENCY 485.55/107.9

POLARIZATION HORIZ(———); VERT(----)

CURVE PLOTTED IN: VOLTAGE (X) POWER( ) DB( )

OBSERVER RAS-4

REMARKS See Figure 2 for mechanical details.


FIELD ELEVATION PATTERN
ANT. MFG.: Shively
ANT. TYPE: 6014-14/1
STATION: XXXX
FREQ:107.9 MHz CHAN:300
Power Gain31.51 14.99 dB
DATE: 11/15/88
FIGURE NO.:1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
10
20

APPENDIX B

LICENSED SURVEYOR AFFIDAVIT

ParEn, Inc. □ dba park engineering
Suite 1500, Pacific Park Plaza □ 711 Kapiolani Boulevard; Honolulu, Hawaii 96813 □ Telephone (808) 593-1676 □ FAX (808) 593-1607

December 10, 2012

Mr. Cris Caughill
Chief Engineer
Cox Radio Hawaii
900 Fort Street Mall, Suite 700
Honolulu, Hawaii 96813

Dear Mr. Caughill:

Subject: Palehua Survey
6014-7/1-DA Panel Antenna
At Honouliuli, Ewa, Oahu, Hawaii
Tax Map Key: (1)-9-2-05: 21

This is to inform you that on Monday, December 3, 2012, a survey crew under my supervision and direction conducted a field survey to verify the installation of the directional antennas on the tower. The directional antennas were found to be installed per the furnished plans, specifically that the orientation of the antennas are installed at an azimuth of 82.5° from true north with a degree of error of +/- 0.5°.

Reference is made to Field Book Number 3049, Page 63.

Sincerely yours,

ParEn, Inc.
dba PARK ENGINEERING

Wayne M. Teruya
Licensed Professional Surveyor
Certificate Number 6297

mac

Attachment

APPENDIX C

ENGINEERING AFFIDAVIT

November 14th, 2012

Engineering Affidavit

Under my supervision, the Shively (6014-07/1) 7 bay Directional Auxiliary Antenna was installed and adjusted to both the Manufacturer's and FCC's Specifications

Cris Caughill

Cris Caughill / Chief Engineer

Cox Radio Hawaii
900 Fort Street
Suite 700
Honolulu, HI 96813
(808)275-1000 ext. 1033