Shively Labs
a division of Howell Laboratories, Inc.
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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. 19310

Report of Test 6810-3D-DA

for

THE UNIVERSITY OF A

WZIP AKRON, OH

OBJECTIVE:

The objectives of this test was to demonstrate the directional characteristics of a 6810-3D-DA to meet the needs of WZIP and to comply with the requirements of the FCC construction permit, file number BMPED-960709IC .

RESULTS:

The measured azimuth pattern for the 6810-3D-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 BPMED-960709IC indicates that the Horizontal radiation component shall not exceed 7.500 kW at any azimuth and is restricted to the following values at the azimuths specified:

315 Degrees T: 0.238 kW
320 Degrees T: 0.238 kW
330 Degrees T: 0.238 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 170 Degrees T to 225 Degrees T. At the restricted azimuth of 315 Degrees T the Horizontal component is 15.65 dB down from the maximum of 7.500 kW, or 0.204 kW.

At the restricted azimuth of 320 Degrees T, the Horizontal component is 16.19 dB down from the maximum of 7.500 kW, or 0.180 kW. At the restricted azimuth of 330 Degrees T, the Horizontal component is 16.48 dB down from the maximum of 7.500 kW, or 0.169 kW.

The R.M.S. value of the Horizontal component is 0.680. The total Horizontal power gain is 3.50. The R.M.S. value of the Vertical component is 0.650. The total Vertical power gain is 3.43.

METHOD OF DIRECTIONALIZATION:

The 6810 bay was mounted on a tower of exact scale to a Stainless Model G-7 tower. The spacing of the antenna to the tower was varied to achieve the vertical pattern shown in Figure 1. A horizontal parasitic element was placed directly under the bay. The position of this horizontal parasitic element was changed until the horizontal pattern shown in Figure 1 was achieved. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BPMED-960709IC , a single level of the 6810-3D-DA 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 MIL-STD-45662.

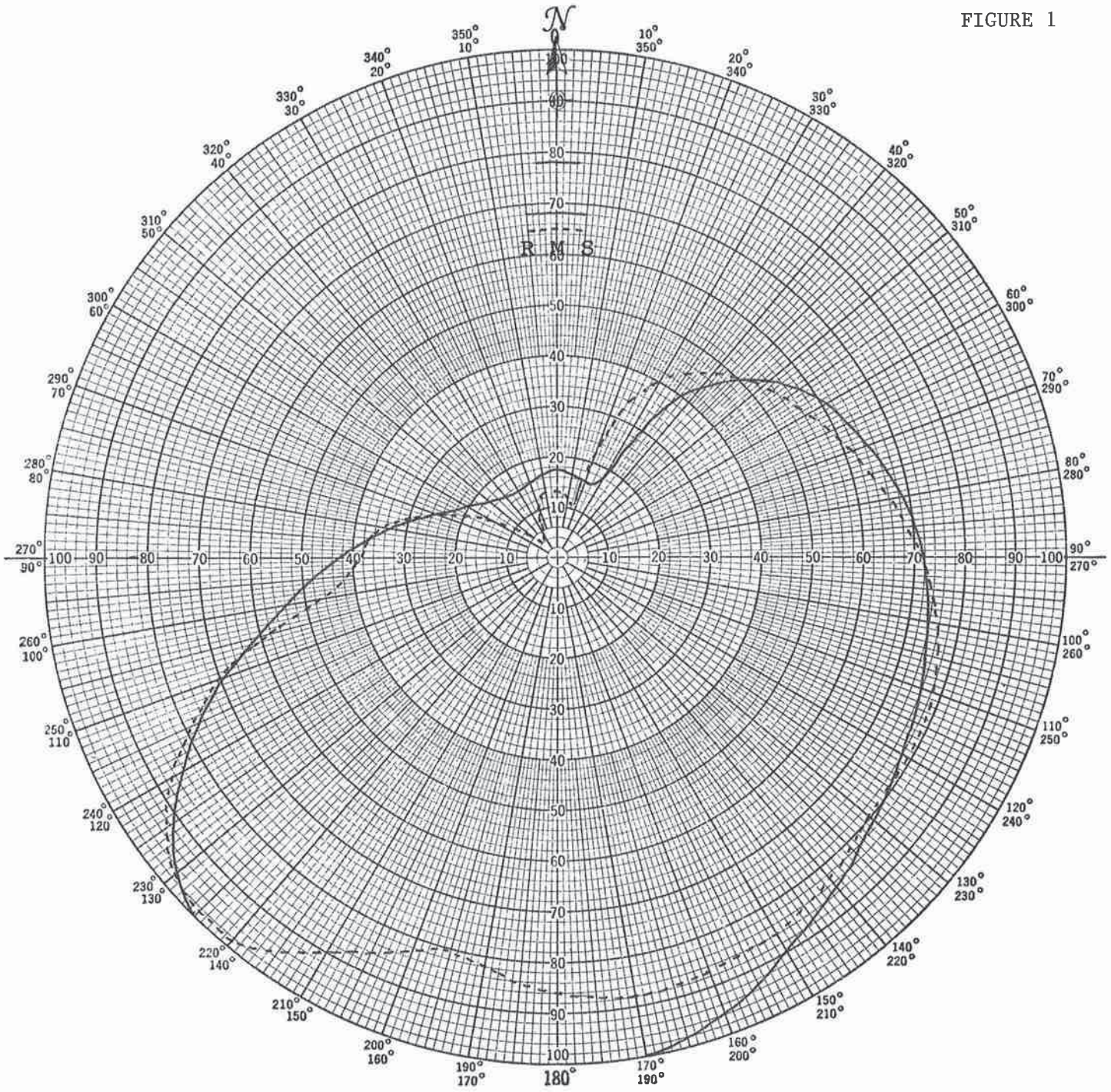
TEST PROCEDURES:

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 396.45 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 19310
September 19, 1997

FIGURE 1



Shively Labs

PROJECT NAME WZIP AKRON, OH

PROJECT NUMBER 19310 DATE 9/19/97

MODEL (X) FULL SCALE ( ) FREQUENCY 396.45/88.1 MHz

POLARIZATION HORIZ (——); VERT (----)

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

OBSERVER RAS

ANTENNA TYPE 6810-3D-DA

PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS: SEE FIGURE 2 FOR MECHANICAL DETAILS

Figure 1A

TABULATION OF HORIZONTAL POLARIZATION
WZIP AKRON, OH

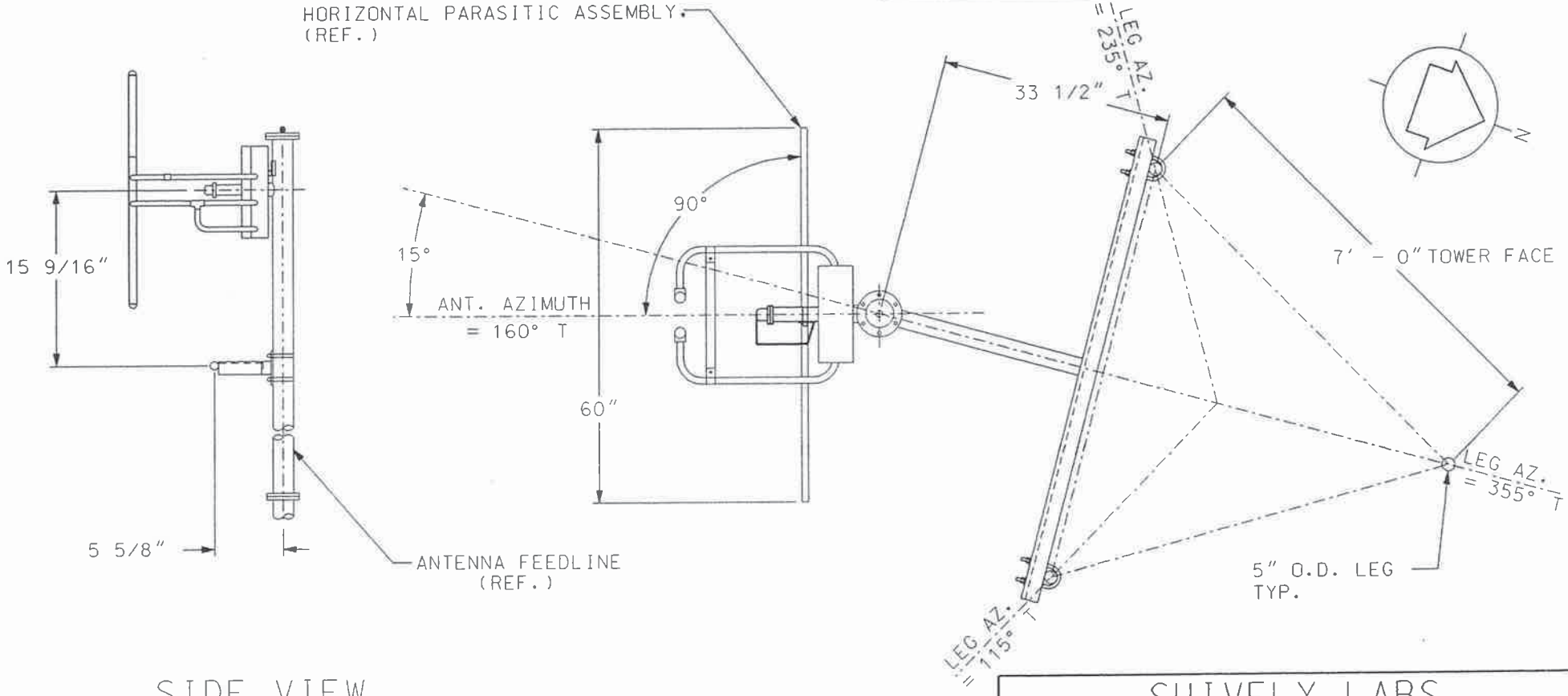
DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.175	180	1.000
10	0.165	190	1.000
20	0.160	200	1.000
30	0.200	210	1.000
40	0.435	220	1.000
45	0.500	225	1.000
50	0.540	230	0.970
60	0.610	240	0.840
70	0.645	250	0.695
80	0.685	260	0.540
90	0.715	270	0.430
100	0.740	280	0.330
110	0.760	290	0.250
120	0.780	300	0.205
130	0.810	310	0.170
135	0.835	315	0.165
140	0.850	320	0.155
150	0.900	330	0.150
160	0.960	340	0.155
170	1.000	350	0.165

Figure 1B

TABULATION OF VERTICAL POLARIZATION
WZIP AKRON, OH

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.130	180	0.860
10	0.120	190	0.820
20	0.220	200	0.825
30	0.400	210	0.900
40	0.480	220	0.990
45	0.500	225	0.990
50	0.525	230	0.970
60	0.565	240	0.870
70	0.610	250	0.700
80	0.660	260	0.475
90	0.715	270	0.385
100	0.755	280	0.350
110	0.785	290	0.250
120	0.795	300	0.140
130	0.800	310	0.006
135	0.810	315	0.004
140	0.825	320	0.004
150	0.860	330	0.006
160	0.870	340	0.100
170	0.880	350	0.130

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PARASITIC DISTANCE DOWN FROM BAY 15 9/16 WAS 12 3/4	6-14-88	DAB
	B	BAY ROTATED IN MOUNT 15° CCW PER S/O 19310, FIG. 2 REDRAWN ON CAD	9-17-97	DAB



SIDE VIEW

TOP VIEW

TOWER: STAINLESS G7

ORIGINAL S/O 10,744
S/O 12,200 REV. A

SHIVELY LABS

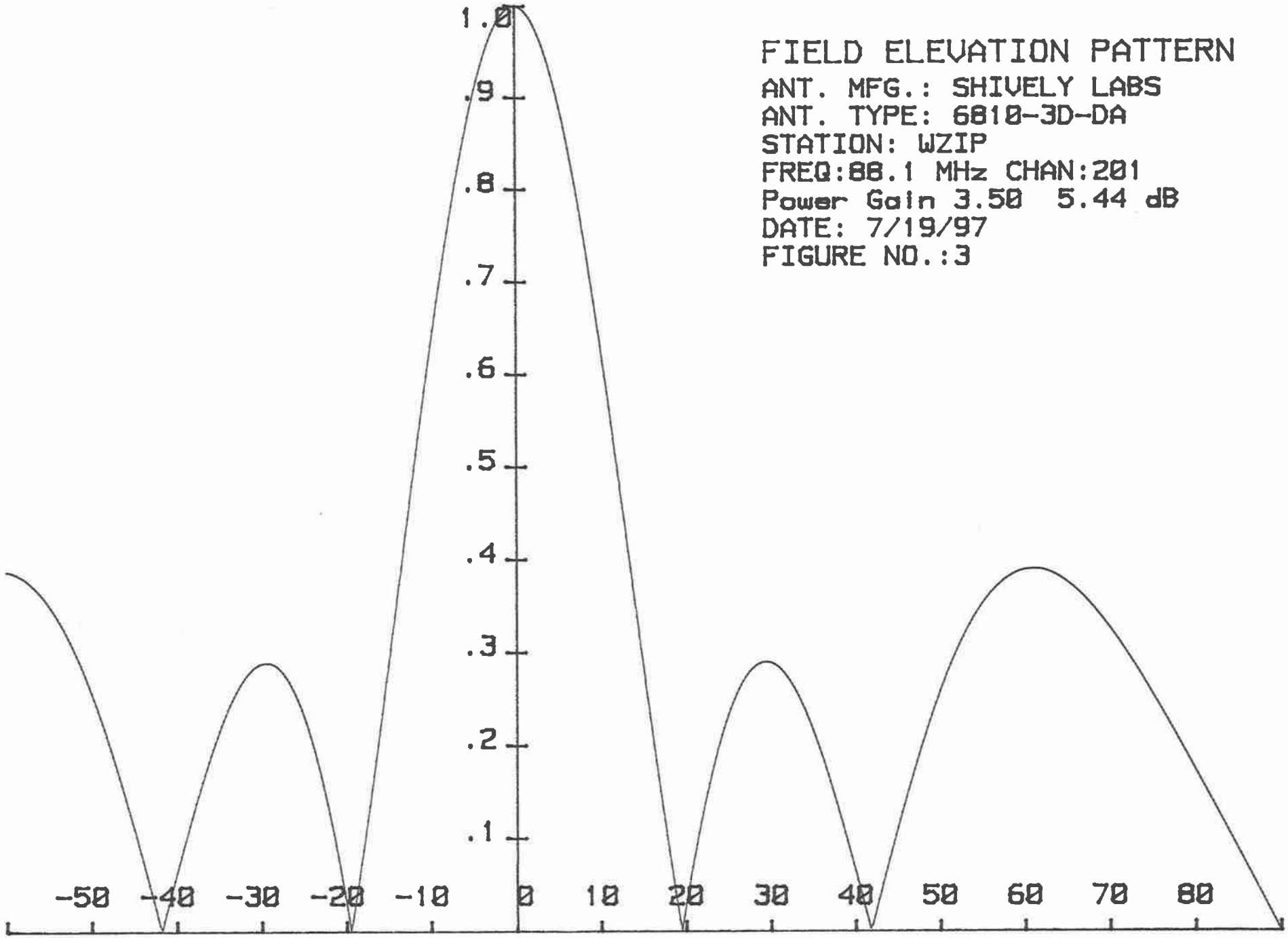
A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE

SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
19,310 REV B UNIV. OF AKRON, OH	88.1 MHz.	N.T.S.	LEWIS
			APPROVED BY:

TITLE:

MODEL-6810-3D-DIRECTIONAL ANTENNA
STATION: WZIP-FM

DATE:		REV.
09-16-97	FIGURE 2	B


FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6810-3D-DA
STATION: WZIP
FREQ:88.1 MHz CHAN:201
Power Gain 3.50 5.44 dB
DATE: 7/19/97
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