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S.O. 22838

Report of Test 6513-2-DA

for

AMERICAN FAMILY ASSOCIATION

WAKD 89.9 MHZ SHEFFIELD, AL

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6513-2-DA to meet the needs of WAKD and to comply with the requirements of the FCC construction permit, file number BMPED-20050823AAN.

RESULTS:

The measured azimuth pattern for the 6513-2-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BMPED-20050823AAN indicates that the Vertical radiation component shall not exceed 12.0 kW at any azimuth and is restricted to the following values at the azimuths specified:

20 Degrees T: 1.080 kW

From Figure 1, the maximum radiation of the Vertical component occurs at 216 Degrees T to 269 Degrees T. At the restricted azimuth of 20 Degrees T the Vertical component is 11.21 dB down from the maximum of 2.5 kW, or 0.908 kW.

The R.M.S. of the Vertical component is 0.760. The total Vertical power gain is 3.43. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.860. Therefore this Pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6513-2-DA was mounted on a tower of exact scale to a Rohn 25. The spacing of the antenna to the tower was varied to achieve the vertical pattern shown in Figure 1. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20050823AAN, a single level of the 6513-2-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

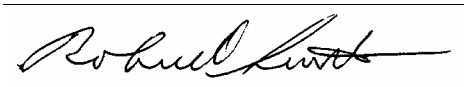
Hewlett Packard 7550A Graphics Plotter

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

TEST PROCEDURES:

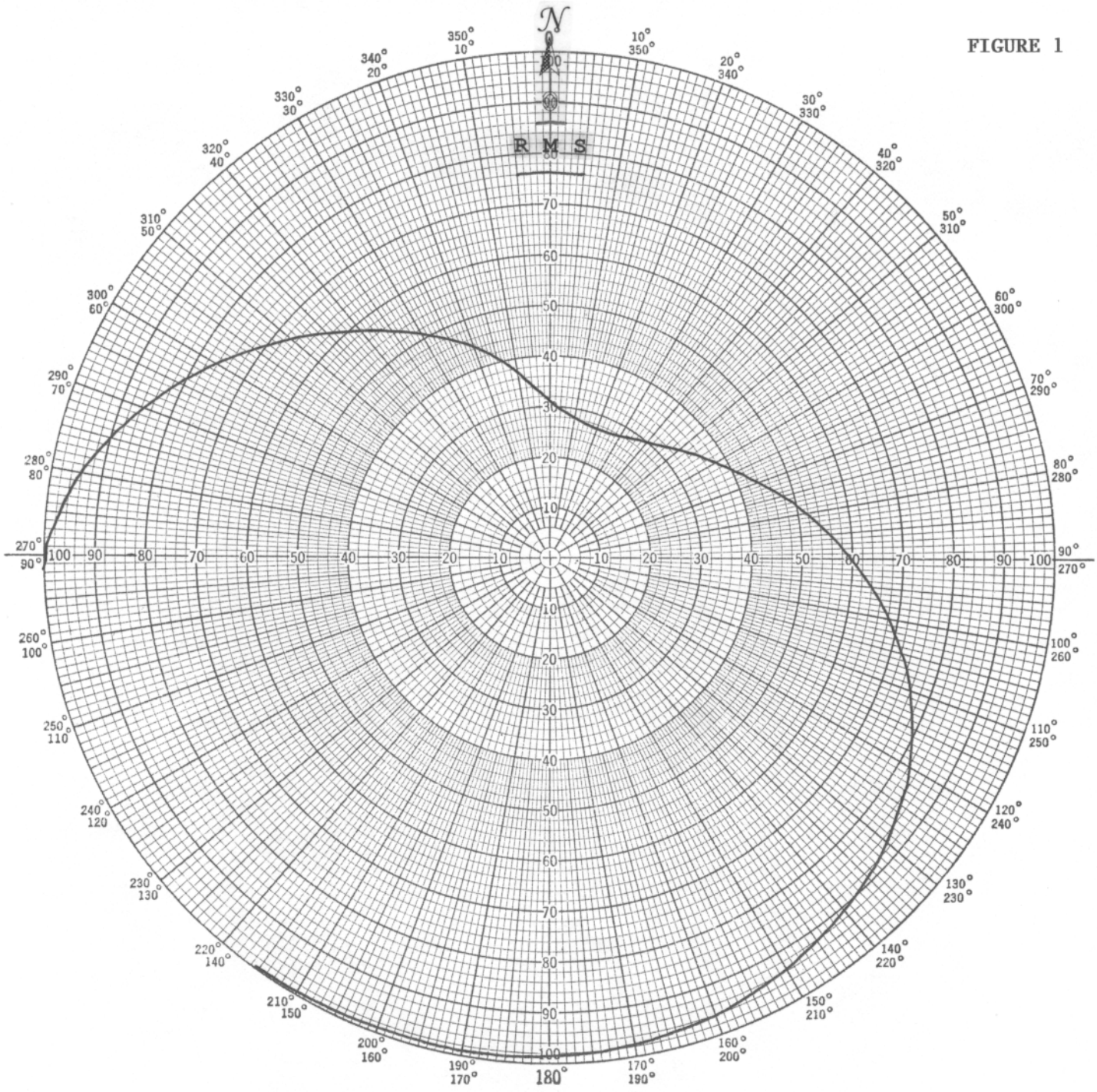
The corner reflector is mounted so that the horizontal and vertical azimuth patterns are measured independently by rotating the corner reflector by 90 degrees. The network analyzer was set to 404.55 MHz. Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding 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 22838
January 25, 2006

FIGURE 1



Shively Labs

PROJECT NAME WAKD SHEFFIELD, AL

PROJECT NUMBER 22838 DATE 1/29/03

MODEL (X) FULL SCALE ( ) FREQUENCY 404.55/89.9 MHz

POLARIZATION VERTICAL

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

OBSERVER RAS

ANTENNA TYPE 6513-2-DA

PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS: SEE FIGURE 2 FOR MECHANICAL DETAILS

Figure 1A

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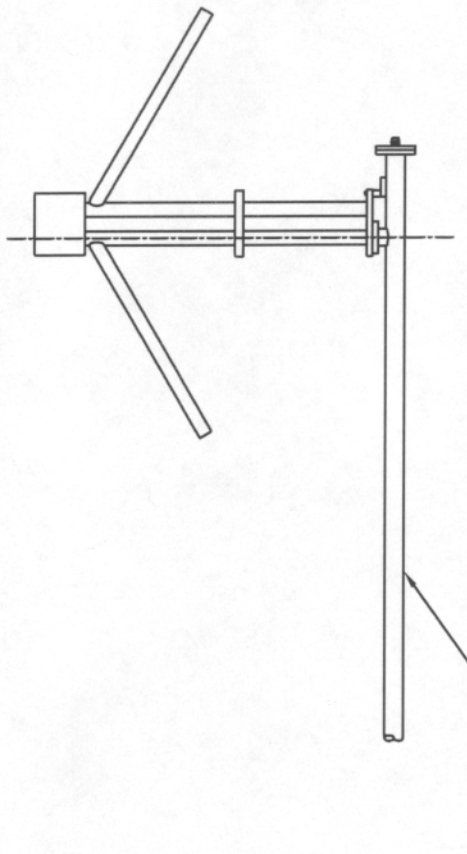
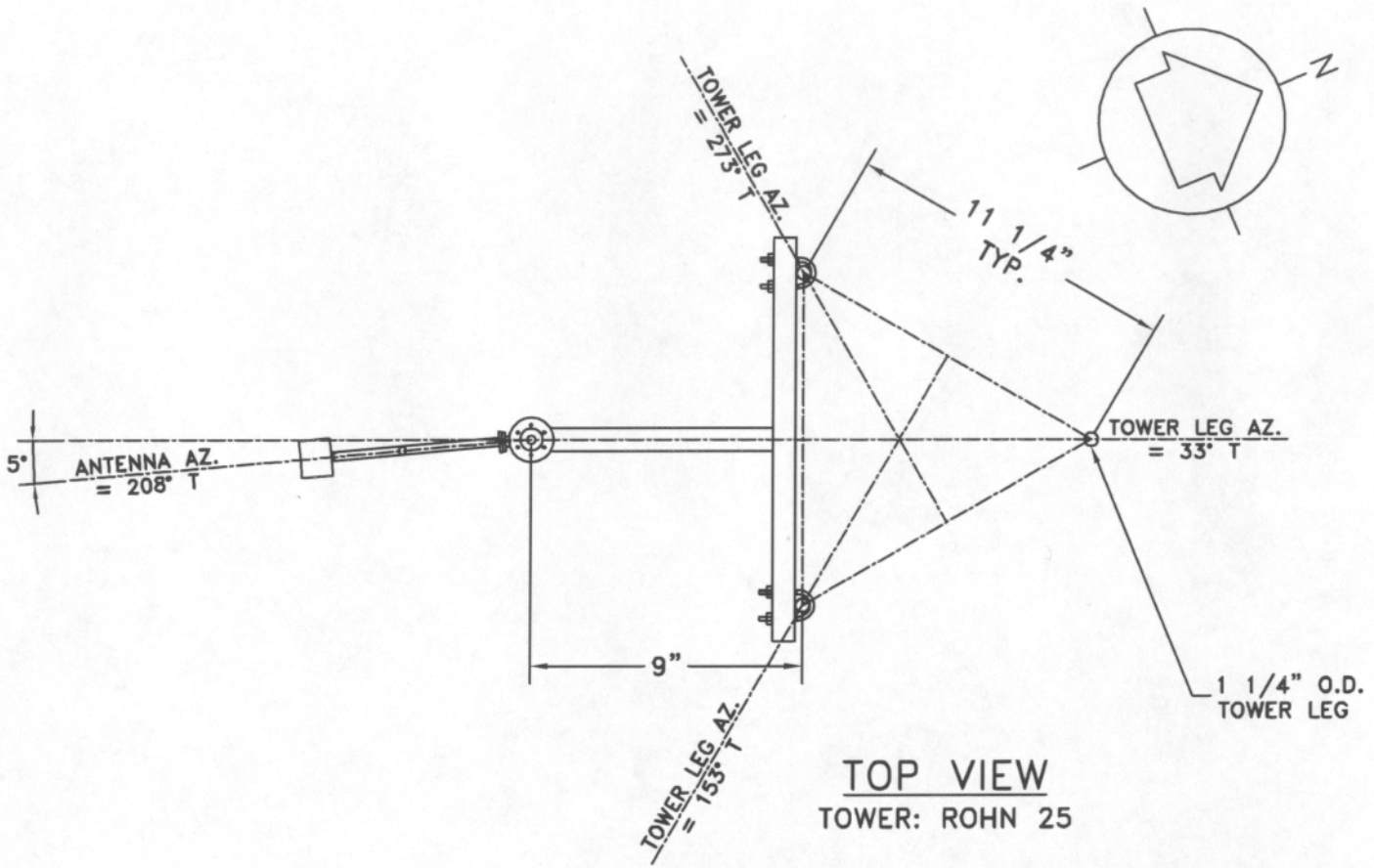
TABULATION OF VERTICAL POLARIZATION
WAKD SHEFFIELD, AL

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.315	180	0.985
10	0.280	190	0.990
20	0.275	200	0.990
30	0.280	210	0.995
40	0.300	220	1.000
45	0.315	225	1.000
50	0.330	230	1.000
60	0.380	240	1.000
70	0.440	250	1.000
80	0.515	260	1.000
90	0.595	270	0.995
100	0.680	280	0.940
110	0.760	290	0.855
120	0.820	300	0.765
130	0.870	310	0.670
135	0.890	315	0.630
140	0.905	320	0.585
150	0.940	330	0.510
160	0.960	340	0.445
170	0.975	350	0.370



ANTENNA FEEDLINE (REF.)

SIDE VIEW



TOP VIEW

TOWER: ROHN 25

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 22838	FREQUENCY: 89.9 MHz.	SCALE: N.T.S.	DRAWN BY: WS APPROVED BY:
TITLE: MODEL-6513-2-DIRECTIONAL ANTENNA			
DATE: 2/10/03	FIGURE 2		

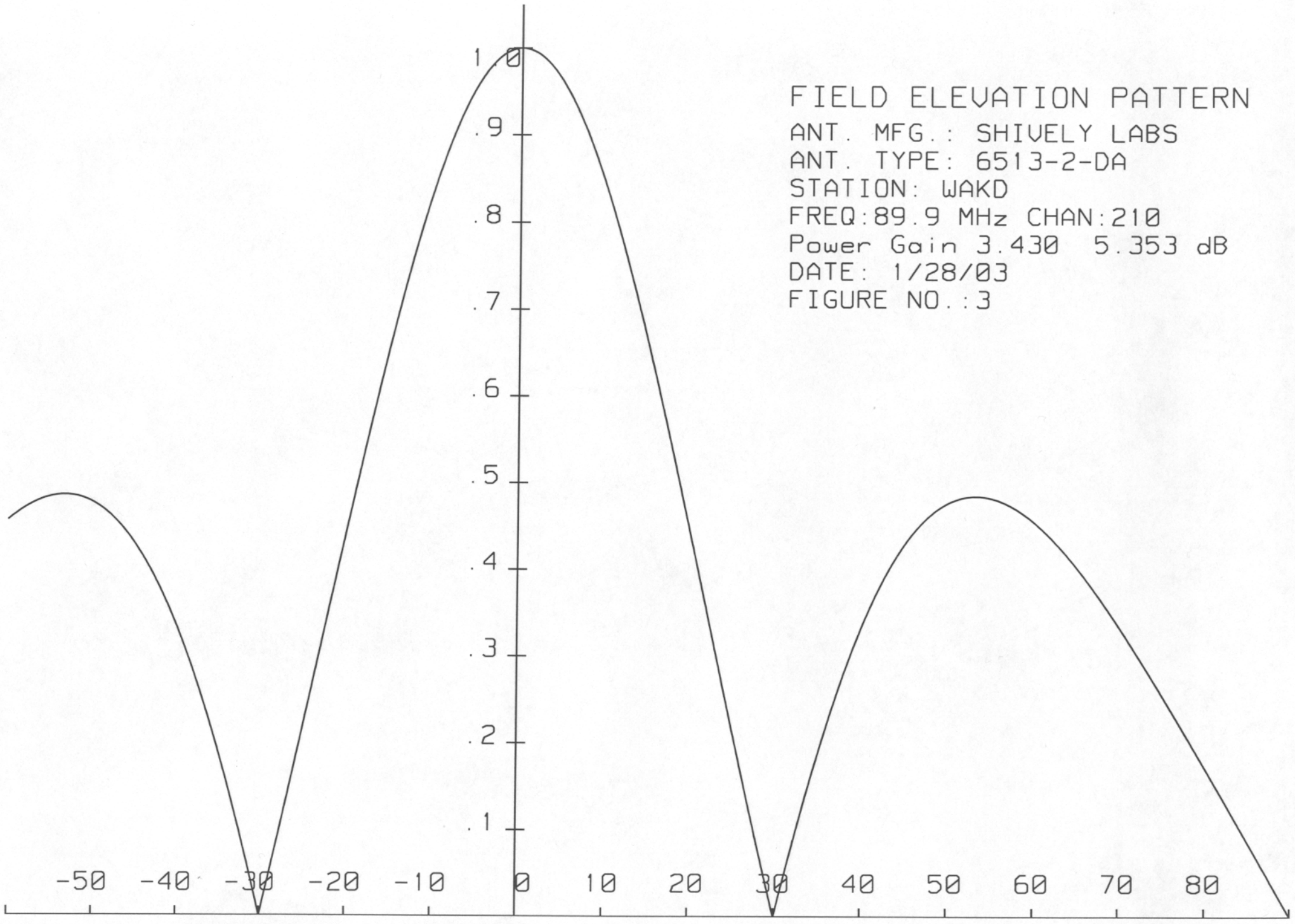

1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6513-2-DA
STATION: WAKD
FREQ:89.9 MHz CHAN:210
Power Gain 3.430 5.353 dB
DATE: 1/28/03
FIGURE NO.:3

FIGURE 4

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VALIDATION OF GAIN CALCULATION

WAKD SHEFFIELD, AL

MODEL 6513-2-DA

Elevation Gain of 6513-2-DA equals 1.98

The RMS values are calculated utilizing the data of a planimeter.

Vertical Azimuth Gain equals $1/(RMS)^2$
$1/(0.76)^2 = 1.731$

*** Total Vertical Gain is Elevation Gain times Azimuth Gain**
1.98 x 1.731 = 3.43

ERP divided by Vertical Gain equals Antenna Input Power
12 kW ÷ 3.43 = 3.499 kW