

Shively Labs

a division of Howell Laboratories, Inc.

- An Employee-Owned Company -

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. 22896

Report of Test 6510-2-DA

for

EASTERN KENTUCKY UNIVERSITY

WEKF 88.5 MHz CORBIN, KY

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6510-2-DA to meet the needs of WEKF and to comply with the requirements of the FCC construction permit, file number BPED-19990114ME.

RESULTS:

The measured azimuth pattern for the 6510-2-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 BPED-19990114ME indicates that the Vertical radiation component shall not exceed 21 kW at any azimuth and is restricted to the following values at the azimuths specified:

310 Degrees T: 4.482 kW

From Figure 1, the maximum radiation of the Vertical component occurs at 026 Degrees T to 046 Degrees T. At the restricted azimuth of 310 Degrees T the Vertical component is 8.64 dB down from the maximum of 21 kW, or 2.875 kW.

Test Report 6510-2-DA
WEKF
Page Two

The R.M.S. of the Vertical component is 0.710. The total Vertical power gain is 3.928. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.760. Therefore this Pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6510-2-DA was mounted on a tower of exact scale to a Grasis R-24 tower. 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 BPED-19990114ME, a single level of the 6510-2-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.

Test Report 6510-2-DA
WEKF
Page Three

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/NCSS Z540-1-1994.

TEST PROCEDURES:

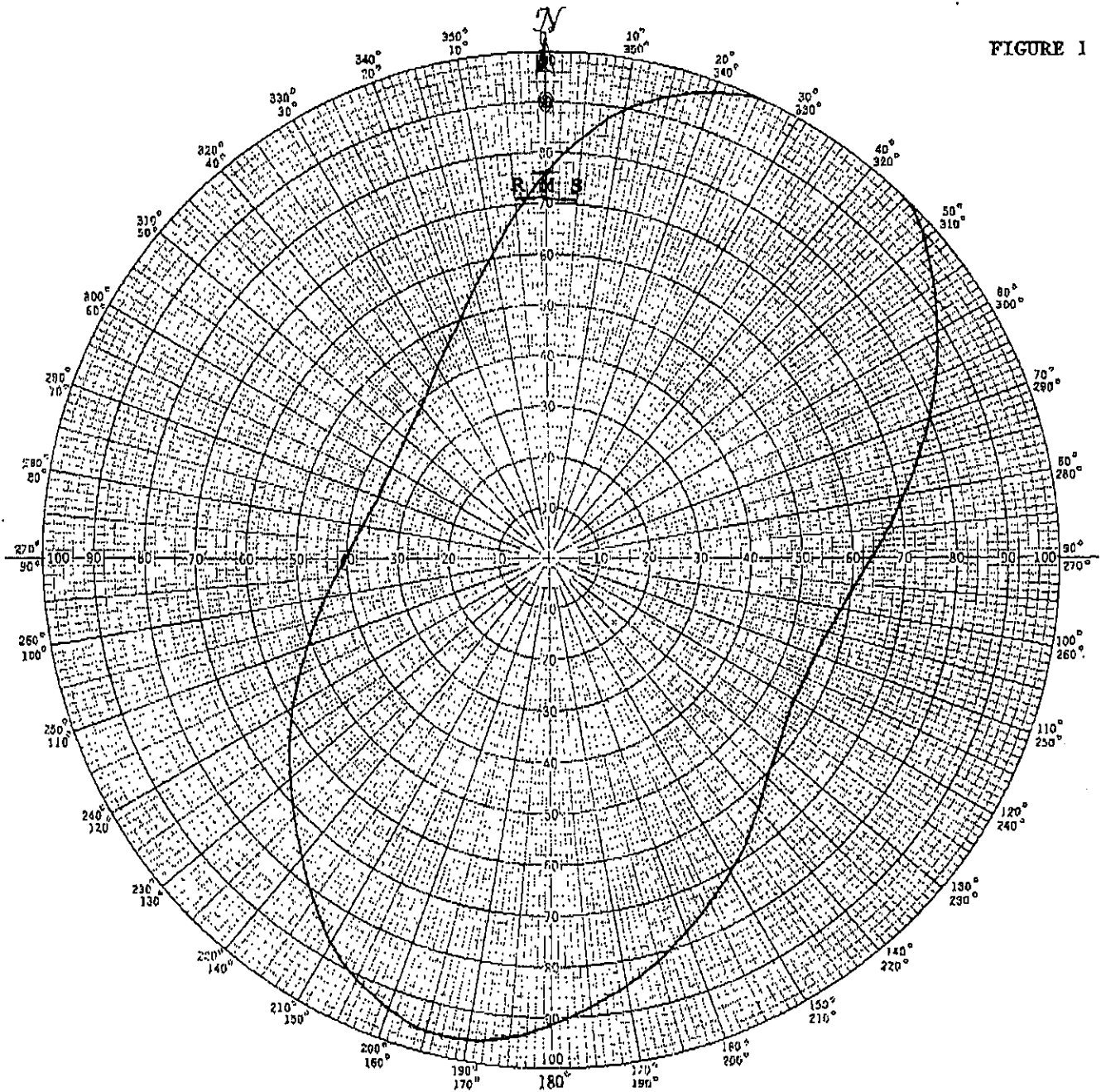
The corner reflector is mounted so that the horizontal and vertical azimuth patterns are measured independently by rotating the corner reflector by 90 degrees. The network analyzer was set to 398.25 MHz. Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding 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 22896
April 15, 2003

FIGURE 1



Shively Labs

PROJECT NAME WEKU CORBIN, KY
 PROJECT NUMBER 22896 DATE 3/13/03
 MODEL (☒) FULL SCALE () FREQUENCY 398.25/88.5 MHz
 POLARIZATION VERTICAL
 CURVE PLOTTED IN: VOLTAGE (☒) POWER () DBI ()
 OBSERVER RAS

ANTENNA TYPE 6510-2-DA
 PATTERN TYPE DIRECTIONAL AZIMUTH
 REMARKS: SEE FIGURE 2 FOR MECHANICAL
DETAILS

Figure 1A

S/O 22896
TABULATION OF VERTICAL POLARIZATION
WEKF CORBIN, KY

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.760	180	0.915
10	0.895	190	0.960
20	0.975	200	0.940
30	1.000	210	0.870
40	1.000	220	0.765
45	1.000	225	0.715
50	0.970	230	0.670
60	0.885	240	0.590
70	0.800	250	0.510
80	0.710	260	0.450
90	0.635	270	0.400
100	0.585	280	0.375
110	0.560	290	0.360
120	0.560	300	0.360
130	0.585	310	0.370
135	0.605	315	0.380
140	0.640	320	0.390
150	0.710	330	0.435
160	0.775	340	0.500
170	0.850	350	0.610

FIELD ELEVATION PATTERN

ANT. MFG.: SHIVELY LABS

ANT. TYPE: 6510-2-DA

STATION: WEKF

FREQ: 88.5 MHz CHAN: 203

Power Gain 3.928 5.942 dB

DATE: 3/11/03

FIGURE NO.: 3

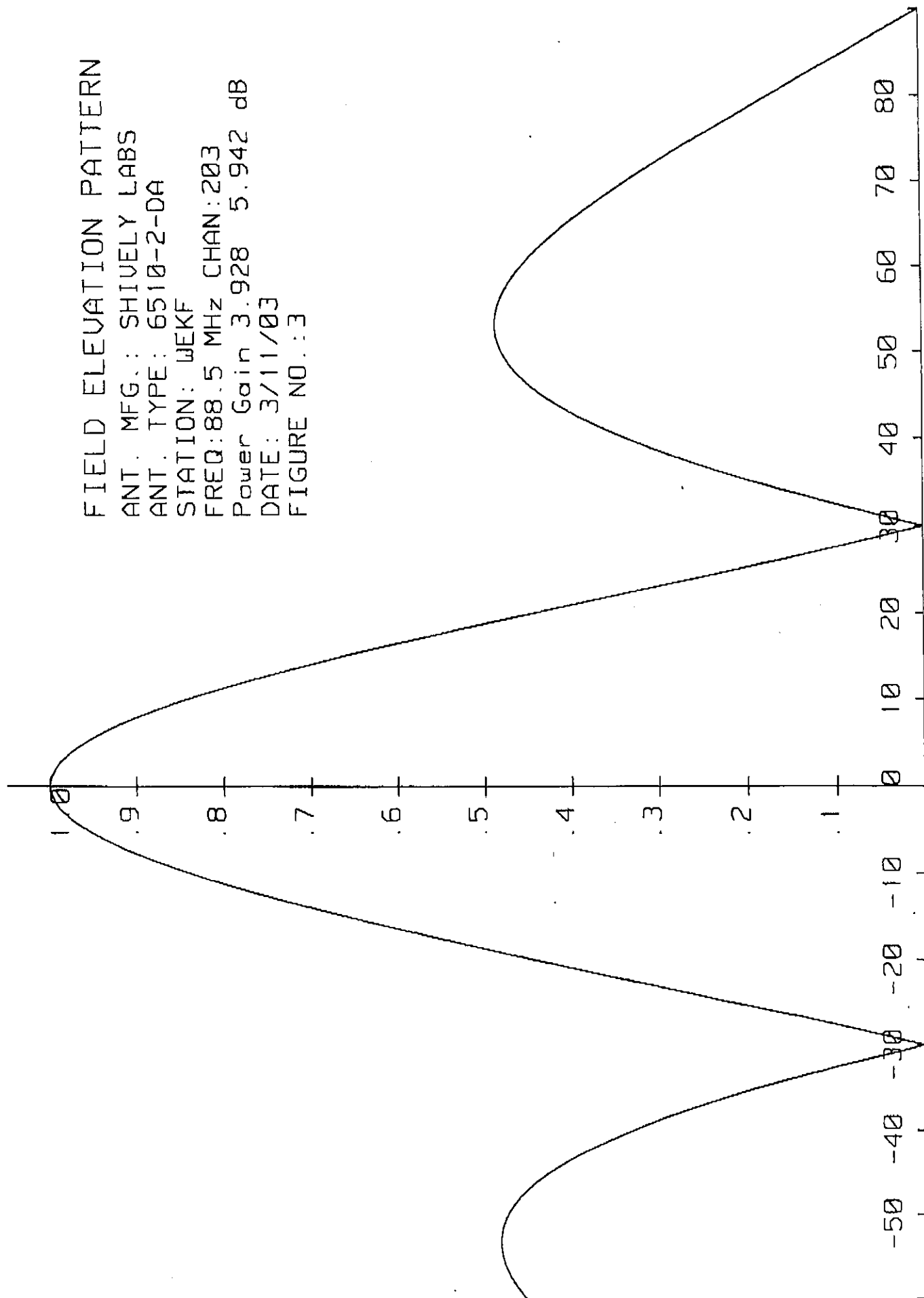


FIGURE 4

S.O. 22896

VALIDATION OF GAIN CALCULATION

WEKF CORBIN, KY

MODEL 6510-2-DA

Elevation Gain of 6510-2-DA equals 1.98

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

Vertical Azimuth Gain equals $1/(\text{RMS})^2$

$$1/(0.710)^2 = 1.984$$

* Total Vertical Gain is Elevation Gain times Azimuth Gain
 $1.98 \times 1.984 = 3.928$

ERP divided by Vertical Gain equals Antenna Input Power
 $21.0 \text{ kW} \div 3.928 = 5.35 \text{ kW}$

