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S.O. 21,827

Report of Test 6513-1-DA

for

SAMFORD UNIVERSITY

WVSU-FM BIRMINGHAM, AL

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6513-1-DA to meet the needs of WVSU-FM and to comply with the requirements of the FCC construction permit, file number BMPED-20000113AAT.

RESULTS:

The measured azimuth pattern for the 6513-1-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-20000113AAT indicates that the Vertical radiation component shall not exceed 0.5 kW at any azimuth and is restricted to the following values at the azimuths specified:

0 Degrees T: 0.016 kW

From Figure 1, the maximum radiation of the Vertical component occurs at 121 Degrees T to 145 Degrees T and at 219 Degrees T to 254 Degrees T. At the restricted azimuth of 0 Degrees T the Vertical component is 17.077 dB down from the maximum of 0.5 kW, or 0.010 kW.

The R.M.S. of the Vertical component is 0.770. The total Vertical power gain is 1.552. See Figure Four for calculations. The R.M.S. of the FCC composite pattern is 0.810. Therefore this Pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6513-1-DA antenna was mounted on a tower of exact scale to a Rohn self-supporting 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 BMPED-20000113AAT, a single level of the 6513-1-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 pedesta equipped with a position indicator. The scale model bay is placed o the top of this pedestal and is used in the transmission mode a approximately 20 feet above ground level. The receiving corne reflector is spaced 50 feet away from the rotating pedestal at the sam level above ground as the transmitting model. The transmitting an receiving signals are carried to a control building by means of RG-9/ 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 vertica azimuth patterns are measured independently by rotating the corne reflector by 90 degrees. The network analyzer was set to 409.95 MHz Calibrated pads are used to check the linearity of the measurin system. For example, 6 dB padding yields a scale reading of 50 from a unpadded reading of 100 in voltage. From the recorded patterns, th R.M.S. values are calculated and recorded as shown in Figure 1.

Respectfully submitted by:

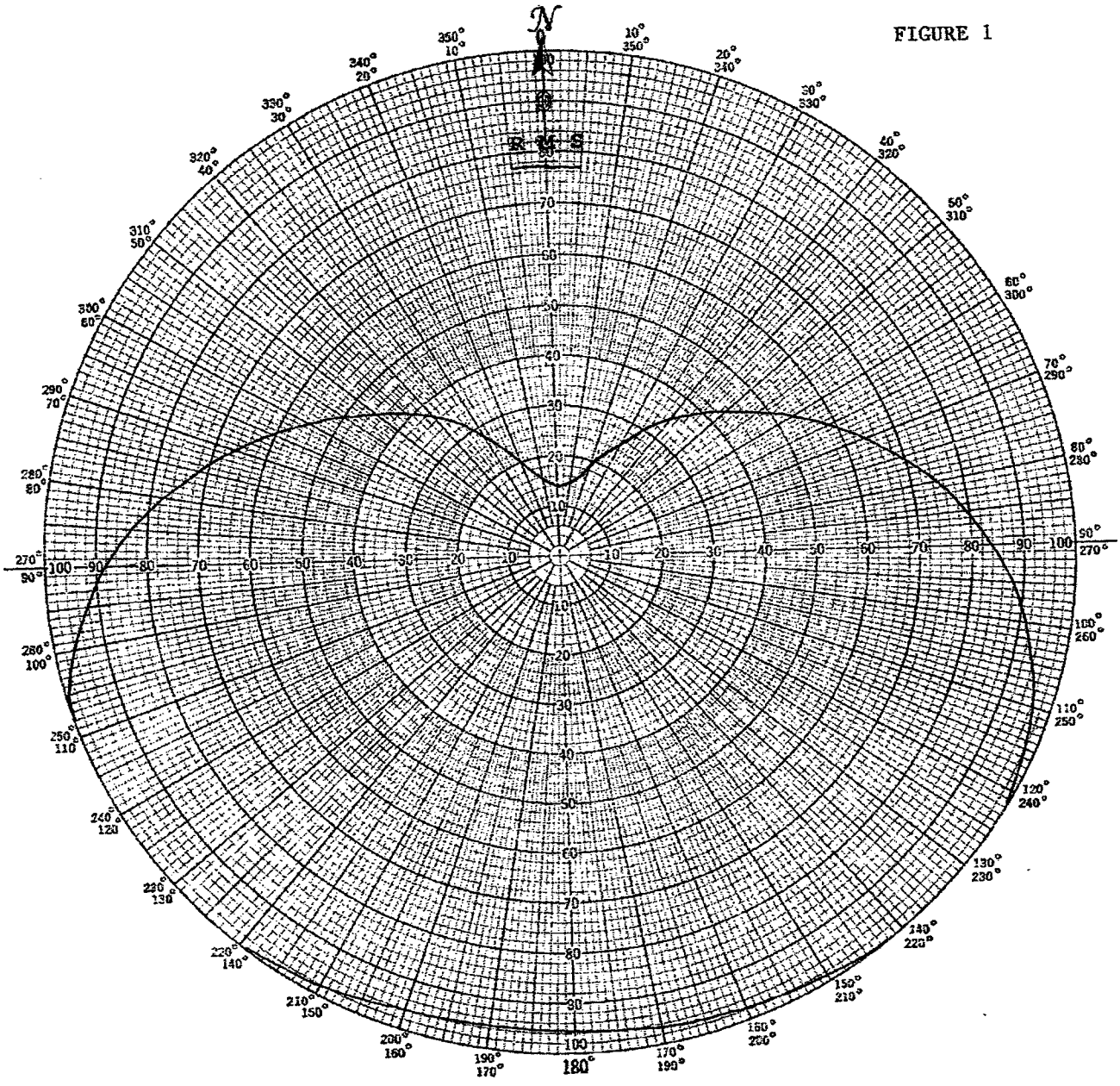
Robert A. Surette
Manager of RF Engineering
S/O 21,827
April 9, 2001

Figure 1A

S/O 21,827
TABULATION OF VERTICAL POLARIZATION
WVSU-FM BIRMINGHAM, AL

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.140	180	0.955
10	0.145	190	0.955
20	0.190	200	0.960
30	0.250	210	0.980
40	0.350	220	1.000
45	0.390	225	1.000
50	0.430	230	1.000
60	0.535	240	1.000
70	0.640	250	1.000
80	0.750	260	0.960
90	0.835	270	0.880
100	0.910	280	0.775
110	0.960	290	0.660
120	0.995	300	0.555
130	1.000	310	0.455
135	1.000	315	0.410
140	1.000	320	0.370
150	0.990	330	0.280
160	0.980	340	0.200
170	0.965	350	0.160

FIGURE 1



Shively Labs

PROJECT NAME WVSU-FM BIRMINGHAM, AL

PROJECT NUMBER 21,827 DATE 4/6/01

MODEL (X) FULL SCALE ( ) FREQUENCY 409.95/91.1 MHz

POLARIZATION VERTICAL

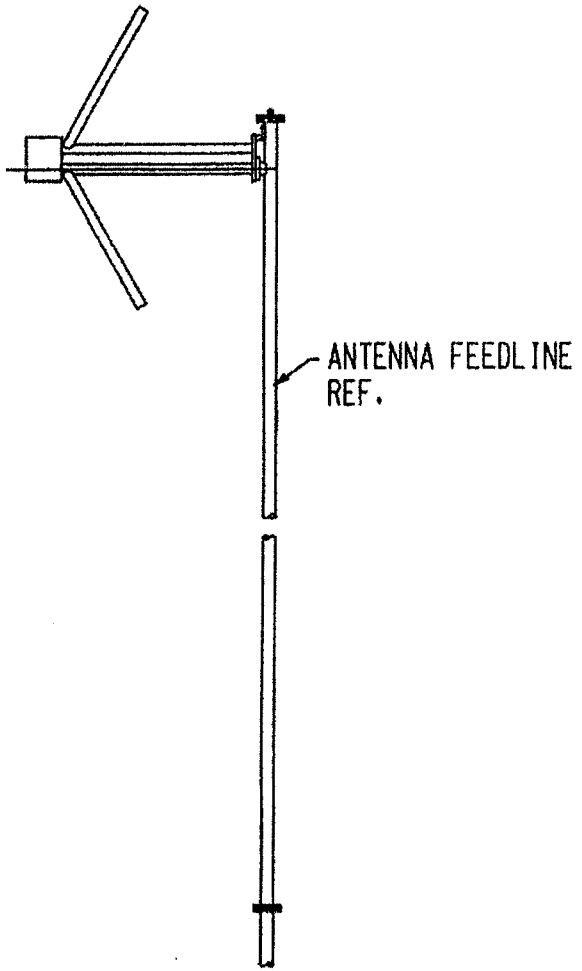
CURVE PLOTTED IN: VOLTAGE (X) POWER( ) DB( )

OBSERVER RAS

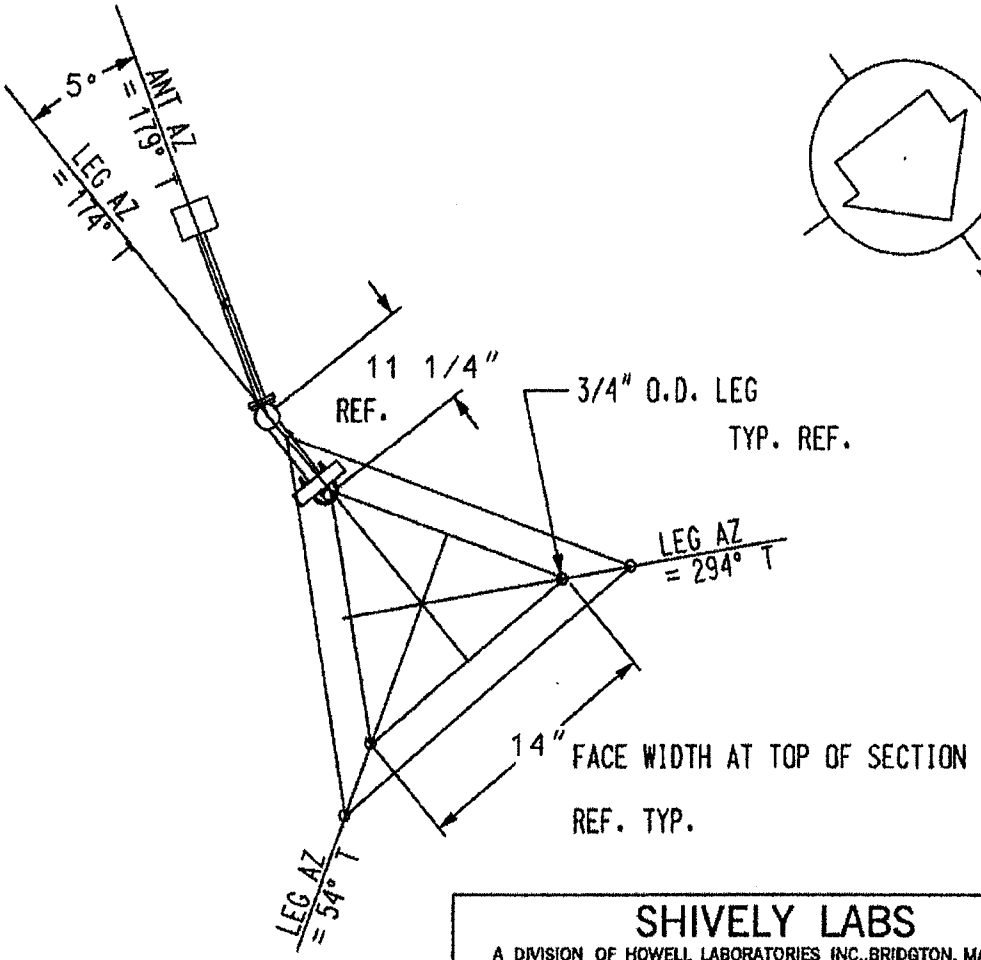
ANTENNA TYPE 6513-1-DA

PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS: SEE FIGURE 2 FOR MECHANICAL DETAILS



SIDE VIEW



TOP VIEW

TOWER: ROHN SELF SUPPORTING SECTION

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE, USA			
SHOP ORDER# 21,827	FREQUENCY# 91.1 MHz.	SCALE# N.T.S.	DRAWN BY# RNC APPROVED BY#
TITLE# MODEL 6513-1-DIRECTIONAL ANTENNA FM STATION			
DATE# 4/5/01	FIGURE 2		

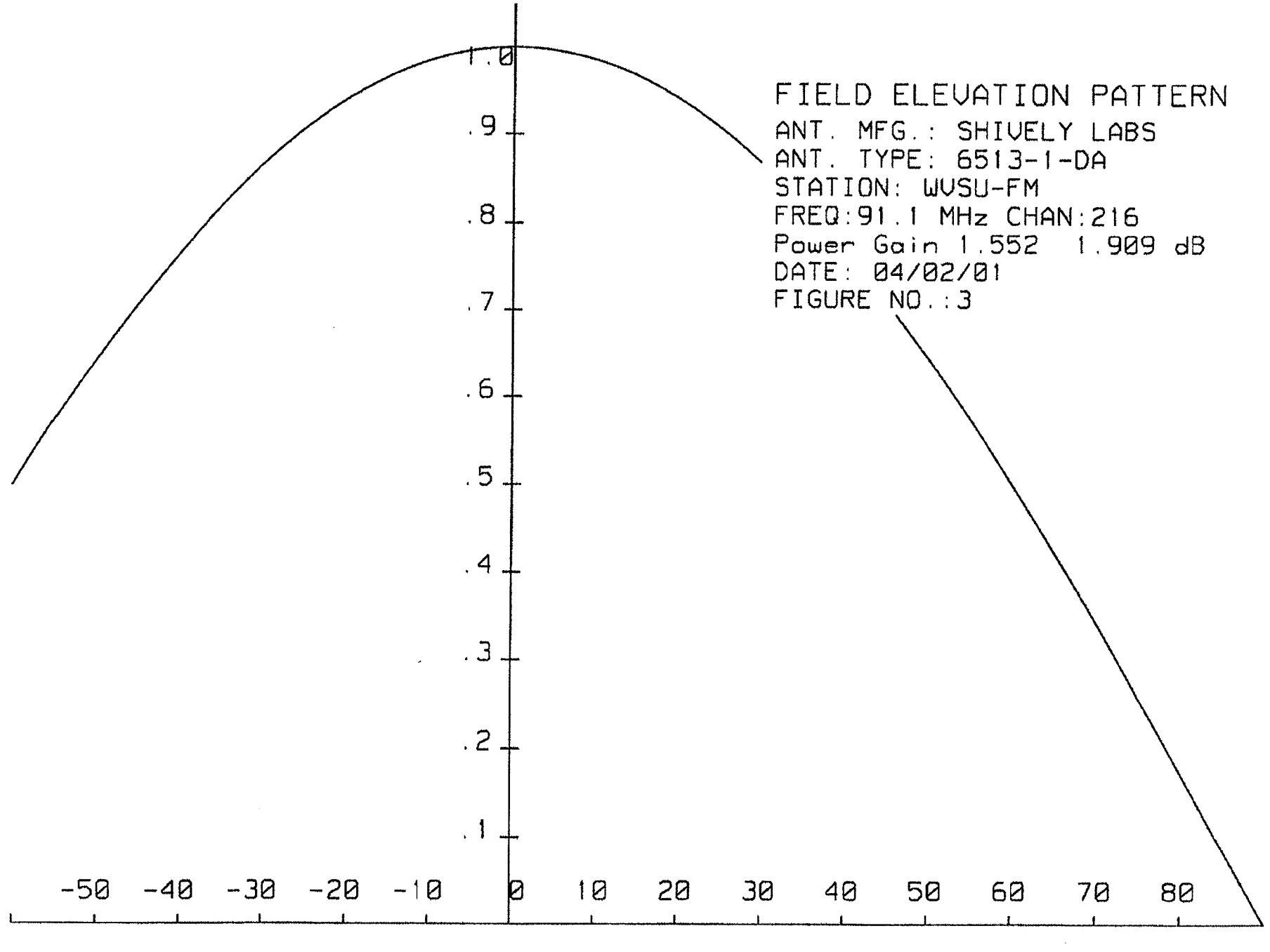

FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6513-1-DA
STATION: WVSU-FM
FREQ:91.1 MHz CHAN:216
Power Gain 1.552 1.909 dB
DATE: 04/02/01
FIGURE NO.:3
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80

FIGURE 4

S.O. 21,827

VALIDATION OF GAIN CALCULATION

WVSU-FM BIRMINGHAM, AL

MODEL 6513-1-DA

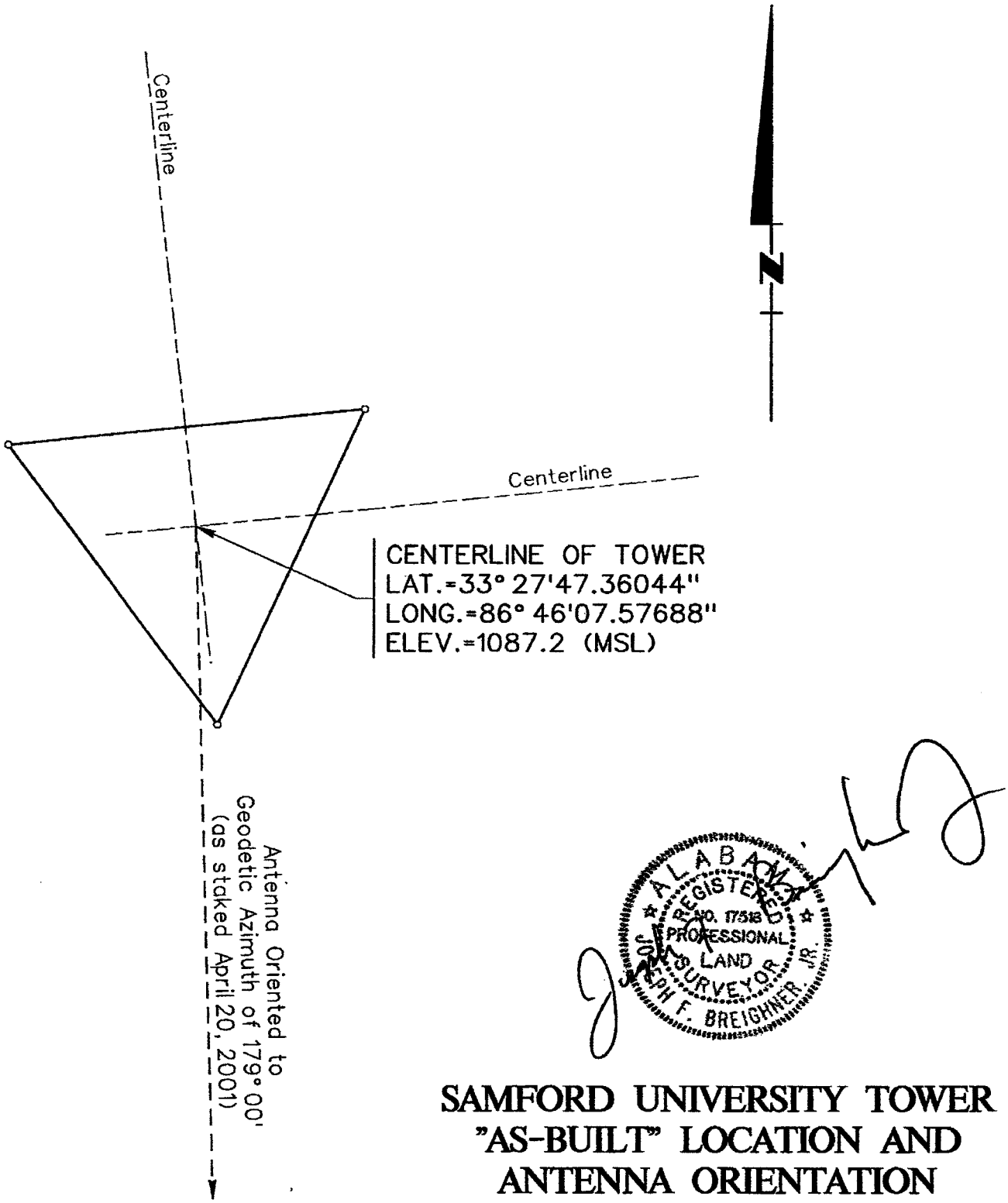
Elevation Gain of 6513-1-DA equals 0.92

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

Elevation Gain of Vertical Component equals
0.92

Vertical Azimuth Gain equals $1/(RMS)^2$
$1/(0.770)^2 = 1.687$

*** Total Vertical Gain is Elevation Gain times Azimuth Gain**
0.92 x 1.687 = 1.552



ALABAMA
REGISTERED
NO. 17518
PROFESSIONAL
LAND
SURVEYOR
JOSEPH F. BREIGHNER, JR.

SAMFORD UNIVERSITY TOWER "AS-BUILT" LOCATION AND ANTENNA ORIENTATION

PREPARED BY:
WALTER SCHOEL ENGINEERING COMPANY, INC.
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