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. 27333

Report of Test 6810-1D-DA

for

RIVER BROADCASTING, INC.

WGMY 88.1 MHz Montgomery, NY

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-1D-DA to meet the needs of WGMY and to comply with the requirements of the FCC construction permit, file number BMPED-20090218AEF.

RESULTS:

The following Figures are the results of the measurements from our pattern range:

Figure 1A - Measured Azimuth Pattern with the FCC Composite
Figure 1B - Measured Composite Azimuth Pattern with the FCC Composite
Figure 1C - Tabulation of the Horizontal Polarization for the Measured Azimuth Pattern
Figure 1D - Tabulation of the Vertical Polarization for the Measured Azimuth Pattern
Figure 1E - Tabulation of the Measured Composite Azimuth Pattern
Figure 1F - Tabulation of the FCC Composite

The calculated elevation pattern of the antenna is shown in Figure 3.

Construction permit file number BMPED-20090218AEF indicates that the Horizontal radiation component shall not exceed 1.15 kW at any azimuth and is restricted to the following values at the azimuths specified:

110 Degrees T: 0.550 kW

310 Degrees T through 320 Degrees T: 0.530 kW

From Figure 1A, the maximum radiation of the Horizontal component occurs at 025 Degrees T to 055 Degrees T and at 205 Degrees T to 237 Degrees T. At the restricted azimuth of 110 Degrees T the Horizontal component is 3.22 dB down from the maximum of 1.15 kW, or 0.548 kW. At the restricted azimuth of 310 Degrees T through 320 Degrees T the Horizontal component is 3.35 dB down from the maximum of 1.15 kW, or 0.530 kW.

The R.M.S. of the Horizontal component is 0.852. The total Horizontal power gain is 0.670. The R.M.S. of the Vertical component is 0.806. The total Vertical power gain is 0.617. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.931. The R.M.S. of the measured composite pattern is 0.853. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.791. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

The 6810-1D-DA was mounted on a pole of precise scale to the out-rigged pole on a 20" x 20" wooden pole at the WGMY site. The spacing of the antenna to the pole was varied to achieve the horizontal pattern shown in Figure 1A. A vertical parasitic element was attached to the interbay feedline to achieve the vertical pattern shown in Figure 1A. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20090218AEF, a single level of the 6810-1D-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 and 10th Editions 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 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 1A.

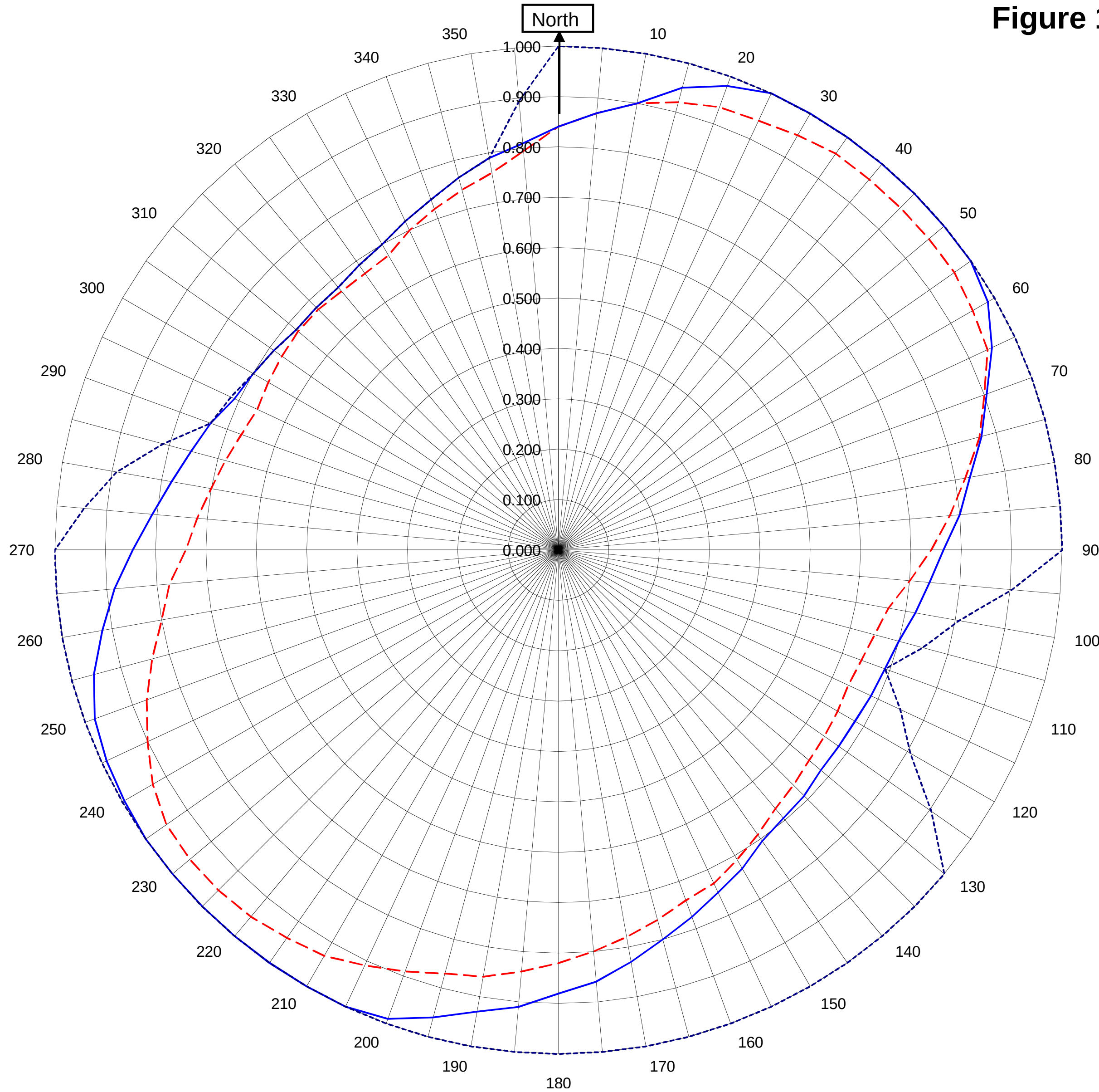
Respectfully submitted by:

Robert A. Surette
Director of Sales Engineering
S/O 27333
March 3, 2009

Shively Labs

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

Figure 1A



WGMY Montgomery, NY

27333

March 3, 2009

____________Horizontal RMS	0.852
_ _ _ _ _ _ _ _ _ Vertical RMS	0.806
H/V Composite RMS	0.853
...............FCC Composite RMS	0.931

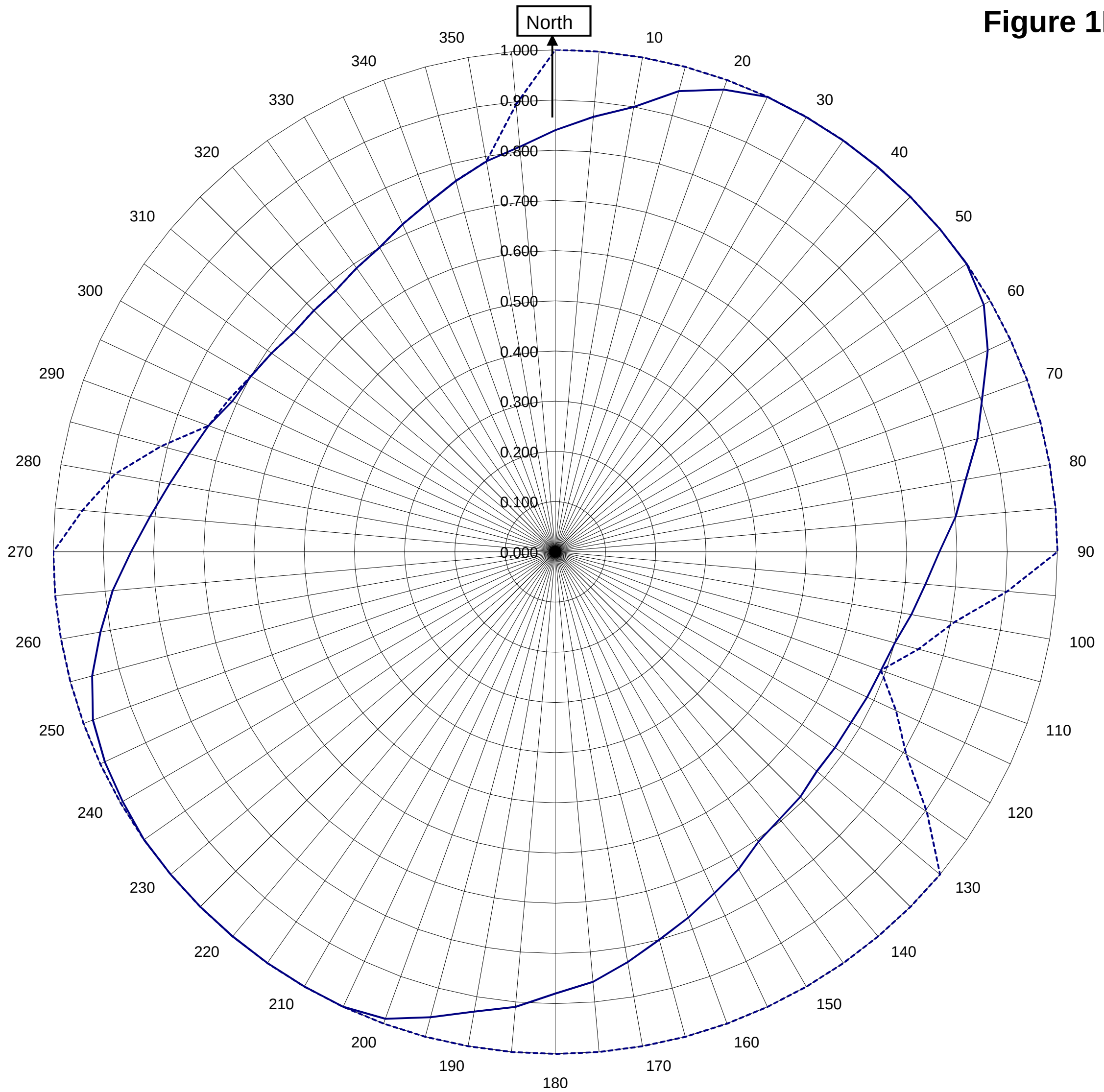
Frequency	88.1 / 396.45 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-1D-DA
Pattern Type	Directional Azimuth

Shively Labs

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

Figure 1B



WGMY Montgomery, NY

27333
March 3, 2009

__________H/VComposite RMS	0.853
……………FCC Composite RMS	0.931

Frequency	88.1 / 396.45 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-1D-DA
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
WGMY Montgomery, NY

Azimuth	Rel Field	Azimuth	Rel Field
0	0.840	180	0.880
10	0.900	190	0.930
20	0.980	200	0.990
30	1.000	210	1.000
40	1.000	220	1.000
45	1.000	225	1.000
50	1.000	230	1.000
60	0.985	240	0.995
70	0.905	250	0.980
80	0.830	260	0.920
90	0.765	270	0.845
100	0.720	280	0.780
110	0.690	290	0.735
120	0.680	300	0.700
130	0.680	310	0.680
135	0.690	315	0.680
140	0.695	320	0.680
150	0.730	330	0.700
160	0.775	340	0.740
170	0.830	350	0.790

Figure 1D

Tabulation of Vertical Azimuth Pattern
WGMY Montgomery, NY

Azimuth	Rel Field	Azimuth	Rel Field
0	0.840	180	0.820
10	0.900	190	0.860
20	0.935	200	0.890
30	0.950	210	0.930
40	0.960	220	0.950
45	0.960	225	0.955
50	0.960	230	0.955
60	0.950	240	0.930
70	0.900	250	0.870
80	0.820	260	0.800
90	0.740	270	0.740
100	0.665	280	0.700
110	0.640	290	0.670
120	0.640	300	0.665
130	0.650	310	0.675
135	0.660	315	0.675
140	0.670	320	0.670
150	0.710	330	0.675
160	0.740	340	0.720
170	0.780	350	0.760

Figure 1E

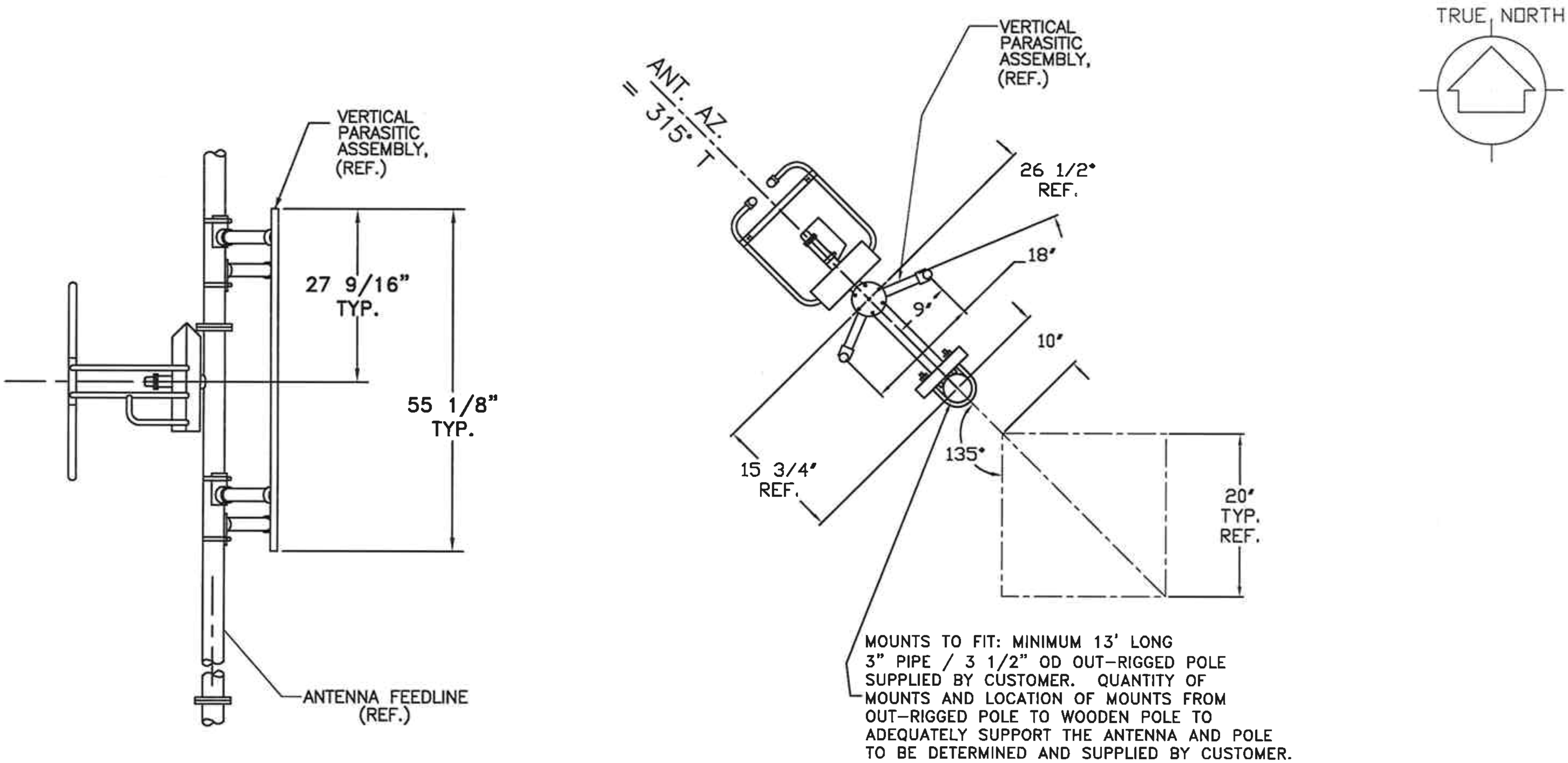
Tabulation of Composite Azimuth Pattern
WGMY Montgomery, NY

Azimuth	Rel Field	Azimuth	Rel Field
0	0.840	180	0.880
10	0.900	190	0.930
20	0.980	200	0.990
30	1.000	210	1.000
40	1.000	220	1.000
45	1.000	225	1.000
50	0.905	230	1.000
60	0.985	240	0.995
70	0.905	250	0.980
80	0.830	260	0.920
90	0.765	270	0.845
100	0.720	280	0.780
110	0.690	290	0.735
120	0.680	300	0.700
130	0.680	310	0.680
135	0.690	315	0.680
140	0.695	320	0.680
150	0.730	330	0.700
160	0.775	340	0.740
170	0.830	350	0.790

Figure 1F

Tabulation of FCC Directional Composite
WGMY Montgomery, NY

Azimuth	Rel Field	Azimuth	Rel Field
0	1.000	180	1.000
10	1.000	190	1.000
20	1.000	200	1.000
30	1.000	210	1.000
40	1.000	220	1.000
50	1.000	230	1.000
60	1.000	240	1.000
70	1.000	250	1.000
80	1.000	260	1.000
90	1.000	270	1.000
100	0.807	280	0.891
110	0.690	290	0.735
120	0.807	300	0.700
130	1.000	310	0.680
140	1.000	320	0.680
150	1.000	330	0.700
160	1.000	340	0.740
170	1.000	350	0.790



SIDE VIEW

TOP VIEW

TOWER MAKE: OUT-RIGGED POLE ON A 20" x 20" WOODEN POLE

ANTENNA HEADING 315° TRUE NORTH

SHIVELY LABS

A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE

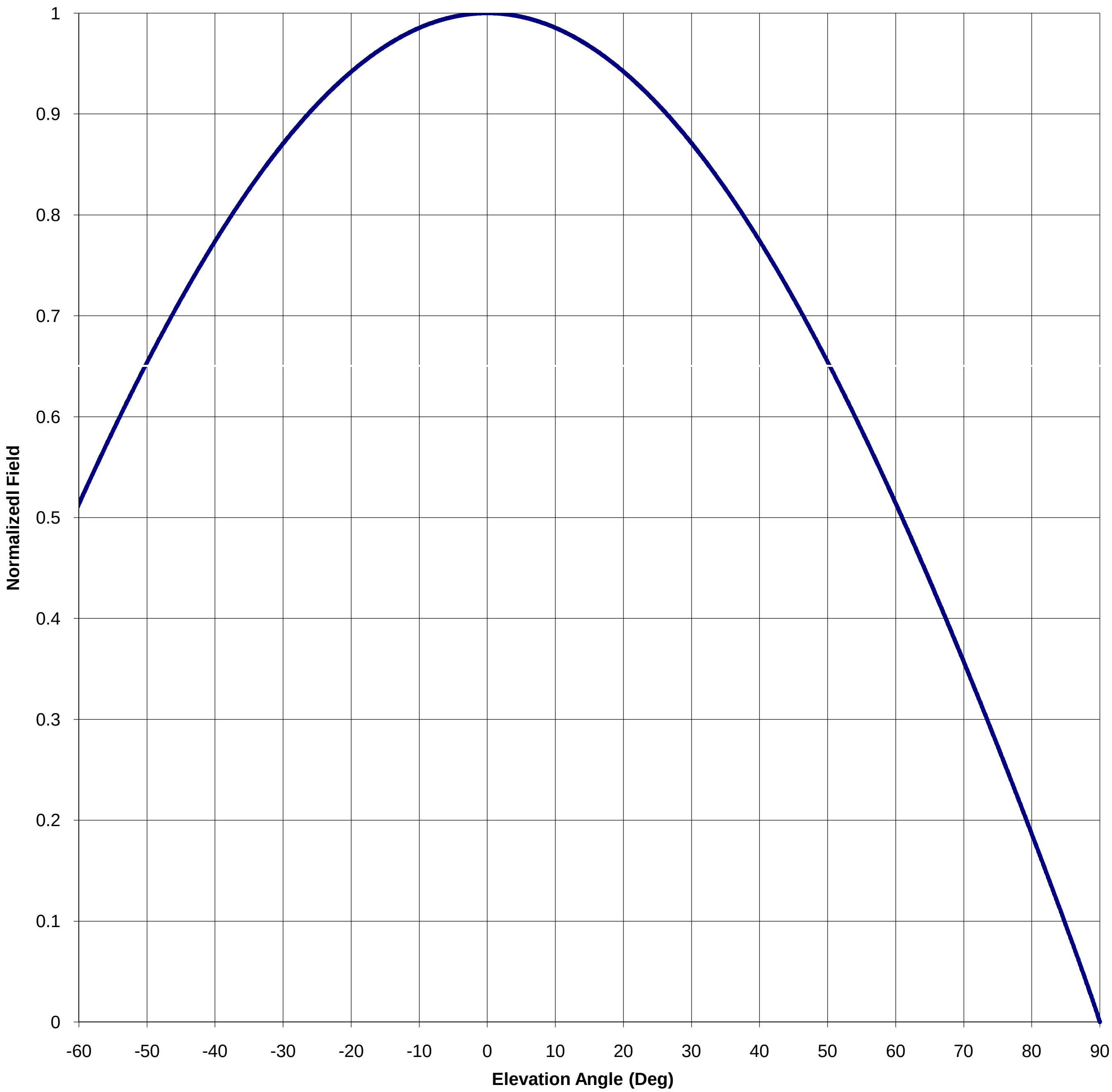
SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:	APPROVED BY:
27333A	88.1	N.T.S.	ASP	DAB

TITLE: MODEL-6810-1D-DIRECTIONAL ANTENNA

DATE: 2/18/09

FIGURE 2

Antenna Mfg.:	**Shively Labs**				**Date:**	**3/3/2009**
Antenna Type:	**6810-1D-DA**					
Station:	**WGMY**	**Beam Tilt**	**0**			
Frequency:	**88.1**	**Gain (Max)**	**0.670**	**-1.738**	**dB**	
Channel #:	**202**	**Gain (Horizon)**	**0.670**	**-1.738**	**dB**	
Figure:	**3**					



Antenna Mfg.:	**Shively Labs**			**Date:**	**3/3/2009**
Antenna Type:	**6810-1D-DA**				
Station:	**WGMY**	**Beam Tilt**	**0**		
Frequency:	**88.1**	**Gain (Max)**	**0.670**	**-1.738**	**dB**
Channel #:	**202**	**Gain (Horizon)**	**0.670**	**-1.738**	**dB**
Figure:	**3**				

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	0.729	0	1.000	46	0.705
-89	0.021	-43	0.741	1	1.000	47	0.693
-88	0.040	-42	0.752	2	0.999	48	0.680
-87	0.059	-41	0.763	3	0.999	49	0.667
-86	0.078	-40	0.774	4	0.998	50	0.654
-85	0.096	-39	0.785	5	0.996	51	0.641
-84	0.114	-38	0.796	6	0.995	52	0.628
-83	0.133	-37	0.806	7	0.993	53	0.614
-82	0.151	-36	0.816	8	0.991	54	0.600
-81	0.168	-35	0.826	9	0.988	55	0.586
-80	0.186	-34	0.835	10	0.985	56	0.572
-79	0.204	-33	0.845	11	0.982	57	0.558
-78	0.221	-32	0.854	12	0.979	58	0.544
-77	0.239	-31	0.862	13	0.975	59	0.529
-76	0.256	-30	0.871	14	0.971	60	0.514
-75	0.273	-29	0.879	15	0.967	61	0.499
-74	0.290	-28	0.887	16	0.963	62	0.484
-73	0.307	-27	0.895	17	0.958	63	0.469
-72	0.324	-26	0.903	18	0.953	64	0.453
-71	0.341	-25	0.910	19	0.948	65	0.437
-70	0.357	-24	0.917	20	0.942	66	0.422
-69	0.373	-23	0.924	21	0.936	67	0.406
-68	0.390	-22	0.930	22	0.930	68	0.390
-67	0.406	-21	0.936	23	0.924	69	0.373
-66	0.422	-20	0.942	24	0.917	70	0.357
-65	0.437	-19	0.948	25	0.910	71	0.341
-64	0.453	-18	0.953	26	0.903	72	0.324
-63	0.469	-17	0.958	27	0.895	73	0.307
-62	0.484	-16	0.963	28	0.887	74	0.290
-61	0.499	-15	0.967	29	0.879	75	0.273
-60	0.514	-14	0.971	30	0.871	76	0.256
-59	0.529	-13	0.975	31	0.862	77	0.239
-58	0.544	-12	0.979	32	0.854	78	0.221
-57	0.558	-11	0.982	33	0.845	79	0.204
-56	0.572	-10	0.985	34	0.835	80	0.186
-55	0.586	-9	0.988	35	0.826	81	0.168
-54	0.600	-8	0.991	36	0.816	82	0.151
-53	0.614	-7	0.993	37	0.806	83	0.133
-52	0.628	-6	0.995	38	0.796	84	0.114
-51	0.641	-5	0.996	39	0.785	85	0.096
-50	0.654	-4	0.998	40	0.774	86	0.078
-49	0.667	-3	0.999	41	0.763	87	0.059
-48	0.680	-2	0.999	42	0.752	88	0.040
-47	0.693	-1	1.000	43	0.741	89	0.021
-46	0.705	0	1.000	44	0.729	90	0.000
-45	0.717			45	0.717		

S.O. 27333 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

WGMY 88.1 MHz Montgomery, NY

6810-1D-DA

Elevation Gain of Antenna 0.46

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

H RMS 0.852 V RMS 0.806 H/V Ratio 1.057

Elevation Gain of Horizontal Component 0.486

Elevation Gain of Vertical Component 0.435

Horizontal Azimuth Gain equals $1/(RMS)^2$. 1.378

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 1.419
Max. Vertical 0.96

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

Total Horizontal Power Gain = **0.670**

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

Total Vertical Power Gain = **0.617**

==

ERP divided by Horizontal Power Gain equals Antenna Input Power

1.15 kW ERP Times H Gain 0.670 equals 1.72 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

1.72 kW Times V Gain 0.617 equals 1.06 kW V ERP

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

(0.96)^2 Times 1.15 Equals 1.06 kW Vertical ERP

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