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S.O. 28926

Report of Test 6018V-1/1

for

Baraga Broadcasting., Inc.

WTCY 88.3 MHz Greilickville, MI

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6018V-1/1 to meet the needs of WTCY and to comply with the requirements of the FCC construction permit, file number BMPED-20110215ACK. This test characterizes only the radiation characteristics of the antenna when mounted on the tower as described. It does not represent or imply any guarantee of specific coverage which can be influenced by factors beyond the scope of this test.

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 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-20110215ACK indicates that the Vertical radiation component shall not exceed 7.0 kW at any azimuth and is restricted to the following values at the azimuths specified:

250 Degrees True clockwise through 50 degrees True: 0.225 kW

From Figure 1A, the maximum radiation of the Vertical component occurs at 147 Degrees T to 152 Degrees T. At the restricted azimuth of 250 Degrees True clockwise through 50 degrees True, the Vertical component is 15.39 dB down from the maximum of 7.0 kW, or 0.202 kW.

The R.M.S. of the Vertical component is 0.435. The total Vertical power gain is 5.338. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.478. The R.M.S. of the measured composite pattern is 0.435. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.406. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6018V-1/1 was mounted on a tower of precise scale to the tower at the WTCY site. The spacing of the antenna to the tower was varied 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-20110215ACK, a single level of the 6018-1/1 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 397.35 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. All testing is carried out in strict accordance with procedures approved under ISO 9001:2008.

Respectfully submitted by:

Robert A. Surette
Director of Sales Engineering
S/O 28926
April 4, 2011

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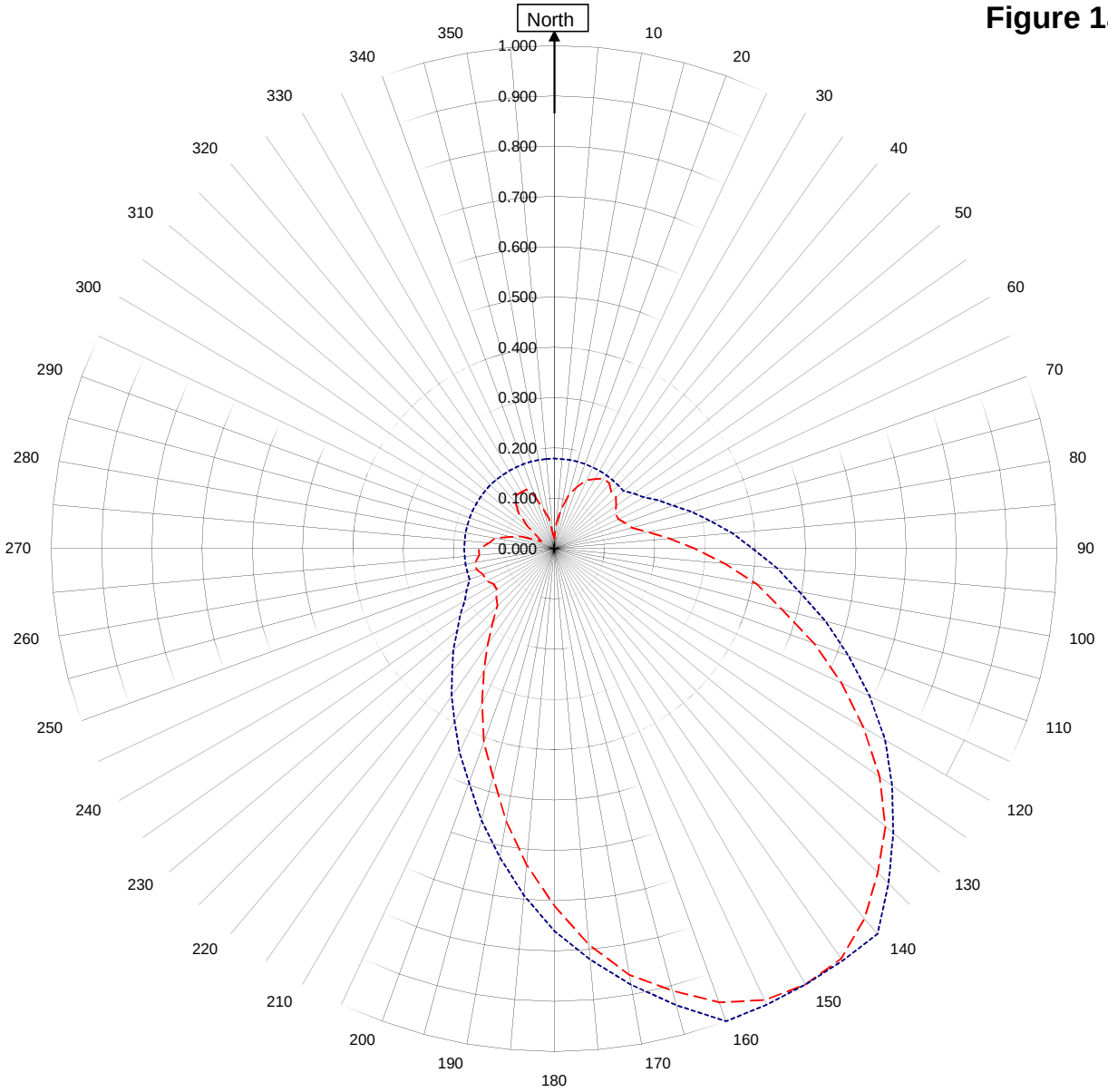
Figure 1a



WTCY Greilickville, MI

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Horizontal RMS	0.000
Vertical RMS	0.435
H/V Composite RMS	0.435
FCC Composite RMS	0.478

Frequency	88.3 / 397.35 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6018V 1/1
Pattern Type	Directional Azimuth

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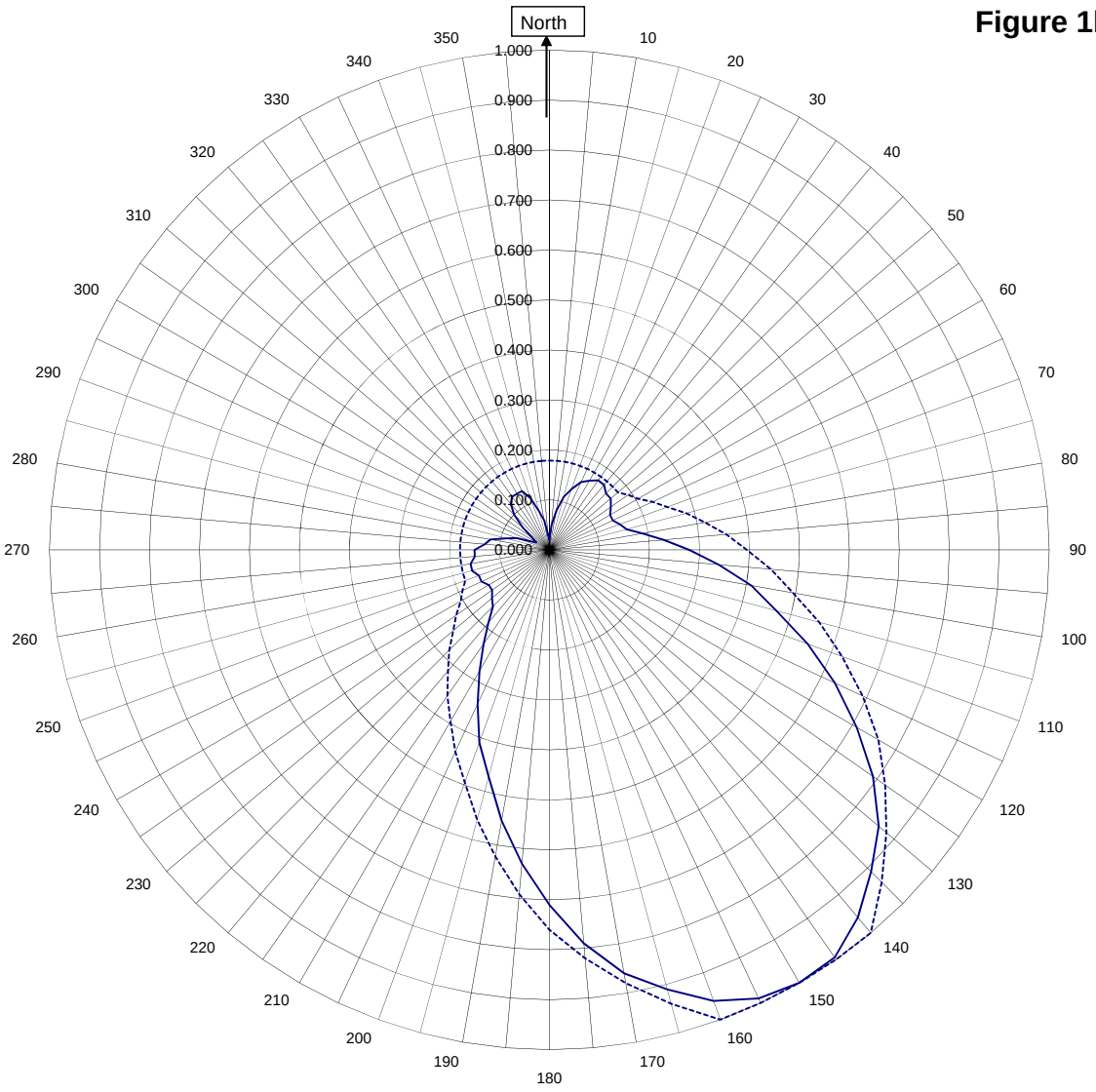
Figure 1b



WTCY Greilickville, MI

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April 4, 2011

_____H/VComposite RMS	0.435
……..FCC Composite RMS	0.478

Frequency	88.3 / 397.35 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6018V 1/1
Pattern Type	Directional H/V Composite

Figure 1d

Tabulation of Vertical Azimuth Pattern
WTCY Greilickville, MI

Azimuth	Rel Field	Azimuth	Rel Field
0	0.020	180	0.710
10	0.080	190	0.550
20	0.130	200	0.410
30	0.160	210	0.280
40	0.170	220	0.190
45	0.160	225	0.160
50	0.160	230	0.150
60	0.140	240	0.140
70	0.150	250	0.150
80	0.190	260	0.160
90	0.280	270	0.150
100	0.410	280	0.120
110	0.550	290	0.070
120	0.710	300	0.030
130	0.860	310	0.070
135	0.910	315	0.100
140	0.960	320	0.120
150	1.000	330	0.130
160	0.960	340	0.110
170	0.860	350	0.060

Figure 1e

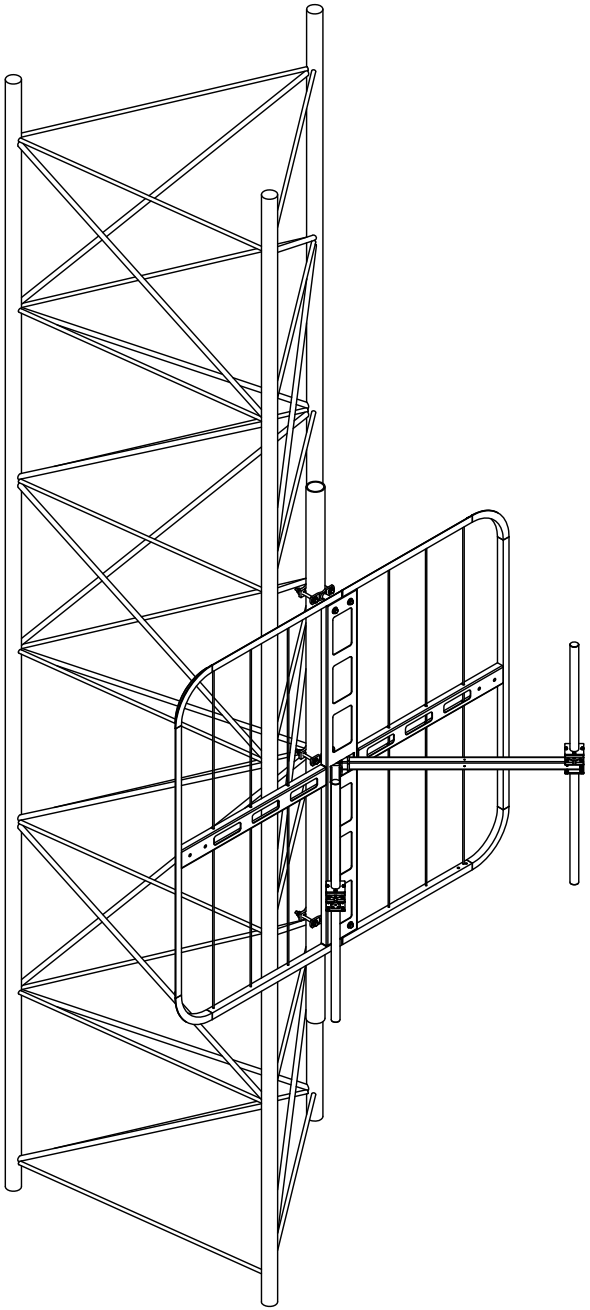
Tabulation of Composite Azimuth Pattern
WTCY Greilickville, MI

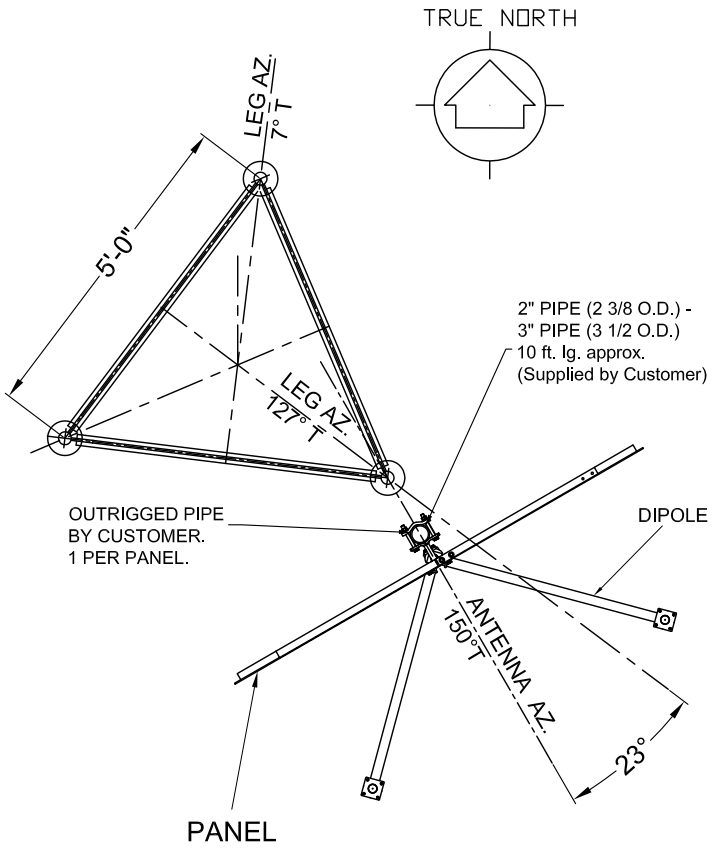
Azimuth	Rel Field	Azimuth	Rel Field
0	0.020	180	0.710
10	0.080	190	0.550
20	0.130	200	0.410
30	0.160	210	0.280
40	0.170	220	0.190
45	0.160	225	0.160
50	0.160	230	0.150
60	0.140	240	0.140
70	0.150	250	0.150
80	0.190	260	0.160
90	0.280	270	0.150
100	0.410	280	0.120
110	0.550	290	0.070
120	0.710	300	0.030
130	0.860	310	0.070
135	0.910	315	0.100
140	0.960	320	0.120
150	1.000	330	0.130
160	0.960	340	0.110
170	0.860	350	0.060

Figure 1f

Tabulation of FCC Directional Composite
WTCY Greilickville, MI

Azimuth	Rel Field	Azimuth	Rel Field
0	0.179	180	0.760
10	0.179	190	0.623
20	0.179	200	0.495
30	0.179	210	0.396
40	0.179	220	0.316
50	0.179	230	0.251
60	0.205	240	0.205
70	0.251	250	0.179
80	0.316	260	0.179
90	0.395	270	0.179
100	0.495	280	0.179
110	0.623	290	0.179
120	0.760	300	0.179
130	0.880	310	0.179
140	1.000	320	0.179
150	1.000	330	0.179
160	1.000	340	0.179
170	0.880	350	0.179

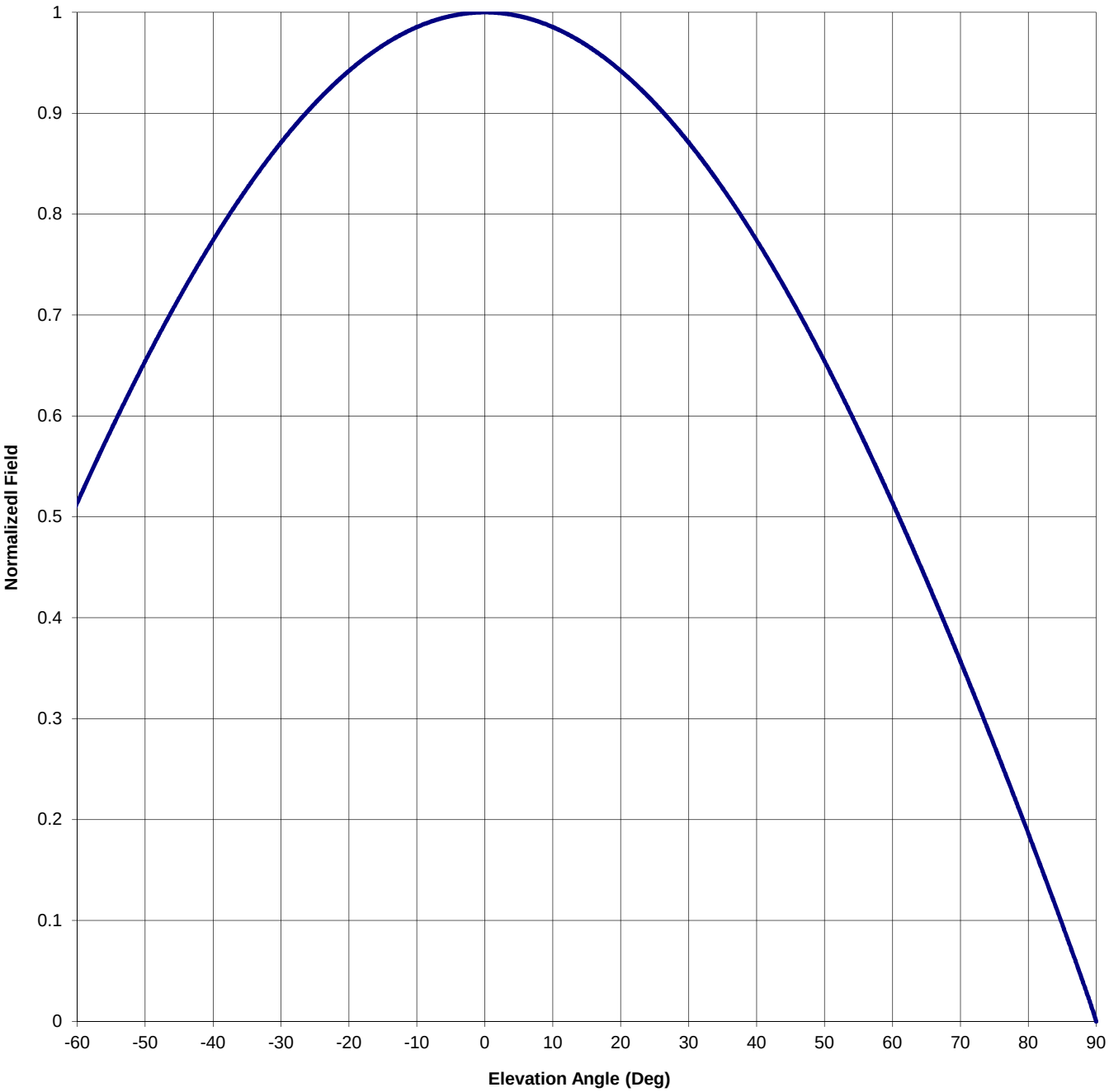




TOP VIEW LAYOUT
TOWER 5 ft. face @ C/L RAD.

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 28926	FREQUENCY: 88.3 MHz	SCALE: N.T.S.	DRAWN BY: DAB APPROVED BY: ASP
TITLE: MODEL-6018V-1/1 DIRECTIONAL ANTENNA			
DATE: 4–4–11	FIGURE 2		

Antenna Mfg.:	**Shively Labs**			**Date: 4/4/2011**
Antenna Type:	**6018V 1/1**			
Station:	**WTCY**	**Beam Tilt**	**0**	
Frequency:	**88.3**	**Gain (Max)**	**5.338**	**7.274 dB**
Channel #:	**202**	**Gain (Horizon)**	**5.338**	**7.274 dB**
Figure:	**Figure 3**			



Antenna Mfg.: Shively Labs **Date:** 4/4/2011

Antenna Type: 6018V 1/1

Station: WTCY **Beam Tilt** 0

Frequency: 88.3 **Gain (Max)** 5.338 7.274 dB

Channel #: 202 **Gain (Horizon)** 5.338 7.274 dB

Figure: 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		

Gain Budget

Call Letters:	WTCY		
Frequency:	88.3	MHz	
Transmission Line:			
Line Attenuation / 100':	0.184	dB	
Line Length:	436.0	ft.	
Antenna Model:			
ERP:	4.40	kW	
# Bays:	1		
Spacing:	1		
Antenna Length:	0	in.	0.0 ft.
Antenna Power Gain:	5.3380		
Antenna Input Power:	0.824	kW	
Additional Insertion Losses:	0.4	dB	
Total Attenuation:	1.202	dB	
Line Efficiency:	75.8	%	
TPO:	1.087	kW	

Conversion of dB to Rel Pwr: 10^(dB Gain/10)