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S.O. 25953

Report of Test 6810-1R-DA

for

STROH COMMUNICATIONS CORP.

WHWT 103.5 MHz NEW HOPE, AL

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-1R-DA to meet the needs of WHWT and to comply with the requirements of the FCC construction permit, file number BMPH-20070614ABE.

RESULTS:

The measured azimuth pattern for the 6810-1R-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Horizontal Polarization. Figure 1B shows the Tabulation of the Vertical Polarization. Figure 1C shows the Tabulation of the FCC Composite Pattern. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BMPH-20070614ABE indicates that the Horizontal radiation component shall not exceed 0.290 kW at any azimuth and is restricted to the following values at the azimuths specified:

280 Degrees T: 0.150 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 087 Degrees T to 095 Degrees T and at 135 Degrees T. At the restricted azimuth of 280 Degrees T the Horizontal component is 3.809 dB down from the maximum of 0.290 kW, or 0.121 kW.

The R.M.S. of the Horizontal component is 0.744. The total Horizontal power gain is 0.850. The R.M.S. of the Vertical component is 0.727. The total Vertical power gain is 0.842. See Figure 4 for calculations.

AMENDED FCC COMPOSITE PATTERN:

The R.M.S. of the measured composite pattern is 0.764. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.816. Therefore the measured pattern does not comply with the FCC requirement of 73.316(c)(ix)(A). In accordance with 73.1690(c)(2)(ii) an amended composite pattern with an R.M.S. value of 0.897 is attached as Figure 5. Figure 5A shows the tabulations of the amended composite pattern. This new composite pattern allows the above measured pattern to comply with the FCC requirement of 73.316(c)(ix)(A).

METHOD OF DIRECTIONALIZATION:

The 6810-1R-DA was mounted on a tower of precise scale to the 7 foot face tower at the WHWT site. The spacing of the antenna to the tower was varied to achieve the vertical pattern shown in Figure 1. A horizontal parasitic element was placed directly under the bay. The position of this horizontal parasitic element was changed until the horizontal pattern shown in Figure 1 was achieved. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPH-20070614ABE, a single level of the 6810-1R-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 465.75 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
Director of Sales Engineering
S/O 25953
January 8, 2008

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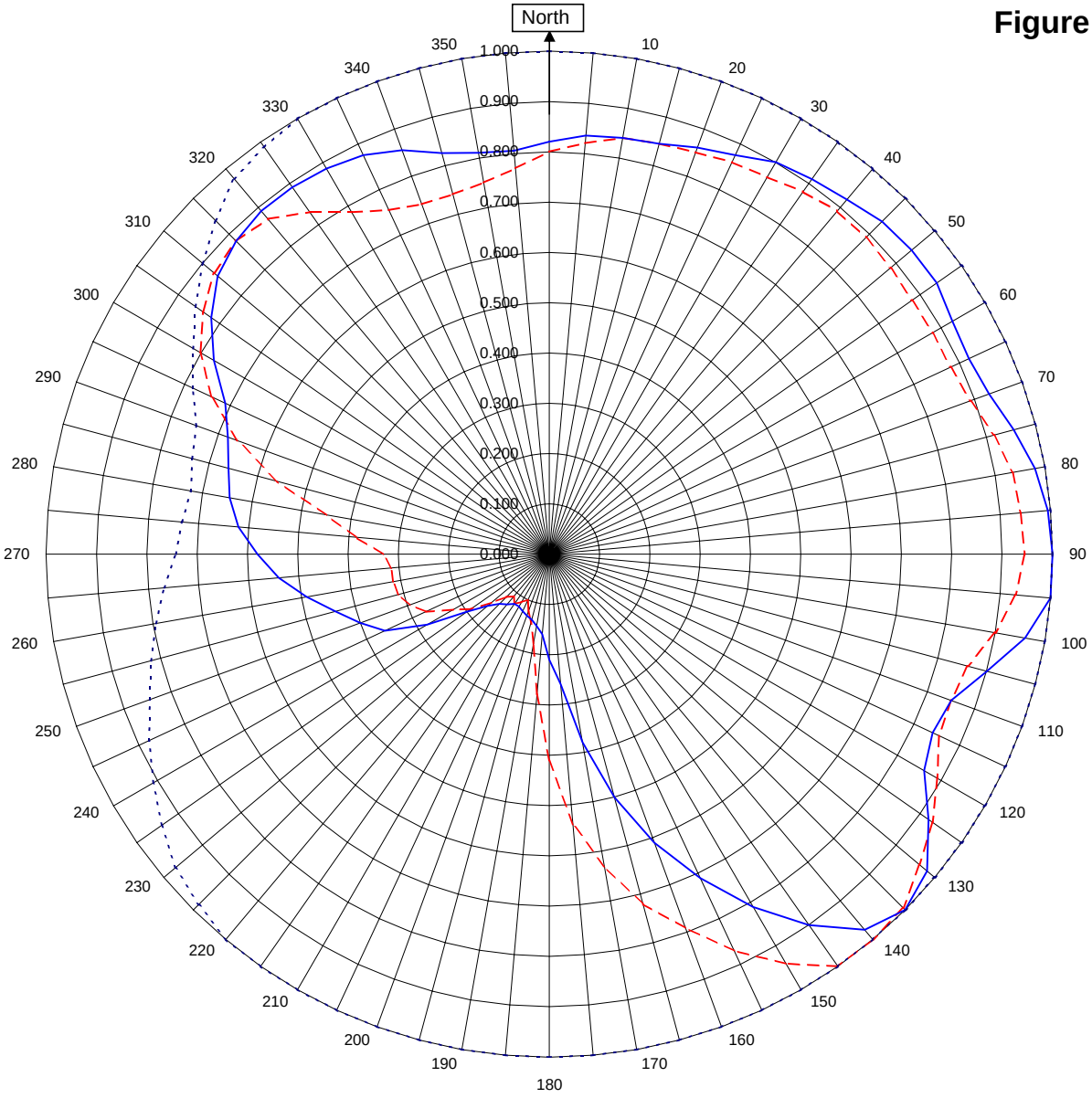
Figure 1



WHWT New Hope, AL

25953

January 8, 2008

Horizontal RMS	0.744
Vertical RMS	0.727
H/V Composite RMS	0.764
FCC Composite RMS	0.960

Frequency	103.5 / 465.75 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

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

Figure 1a

Tabulation of Horizontal Azimuth Pattern
WHWT New Hope, AL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.820	180	0.210
10	0.840	190	0.145
20	0.860	200	0.130
30	0.900	210	0.120
40	0.920	220	0.130
45	0.935	225	0.140
50	0.940	230	0.160
60	0.925	240	0.280
70	0.930	250	0.400
80	0.980	260	0.490
90	1.000	270	0.580
100	0.960	280	0.645
110	0.850	290	0.680
120	0.860	300	0.770
130	0.980	310	0.860
135	1.000	315	0.880
140	0.975	320	0.890
150	0.810	330	0.885
160	0.610	340	0.855
170	0.380	350	0.810

Figure 1b

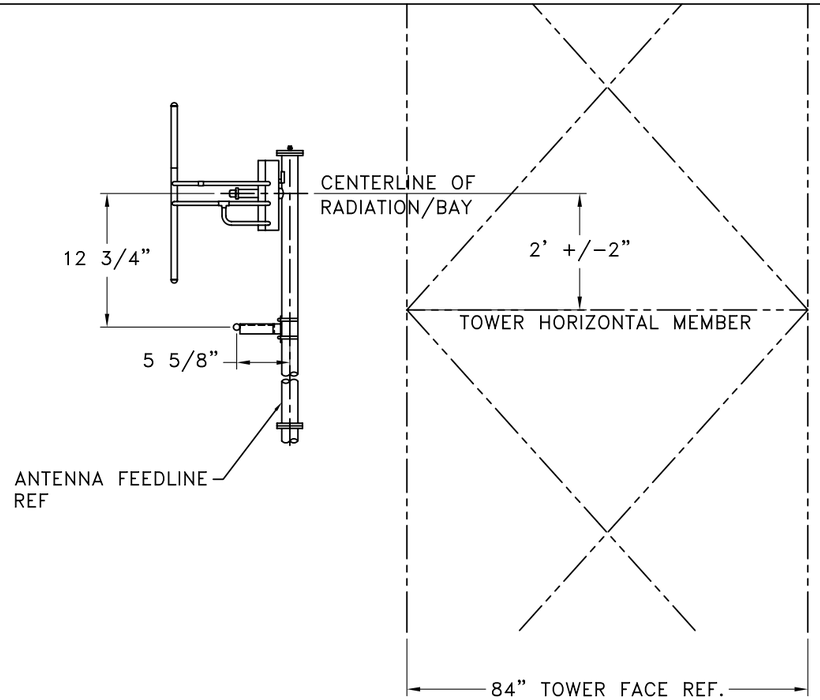
Tabulation of Vertical Azimuth Pattern
WHWT New Hope, AL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.800	180	0.410
10	0.840	190	0.180
20	0.850	200	0.120
30	0.865	210	0.110
40	0.890	220	0.110
45	0.890	225	0.120
50	0.885	230	0.150
60	0.880	240	0.220
70	0.890	250	0.295
80	0.935	260	0.315
90	0.945	270	0.330
100	0.900	280	0.450
110	0.850	290	0.660
120	0.890	300	0.800
130	0.960	310	0.870
135	0.995	315	0.880
140	1.000	320	0.870
150	0.940	330	0.785
160	0.790	340	0.740
170	0.630	350	0.750

Figure 1c

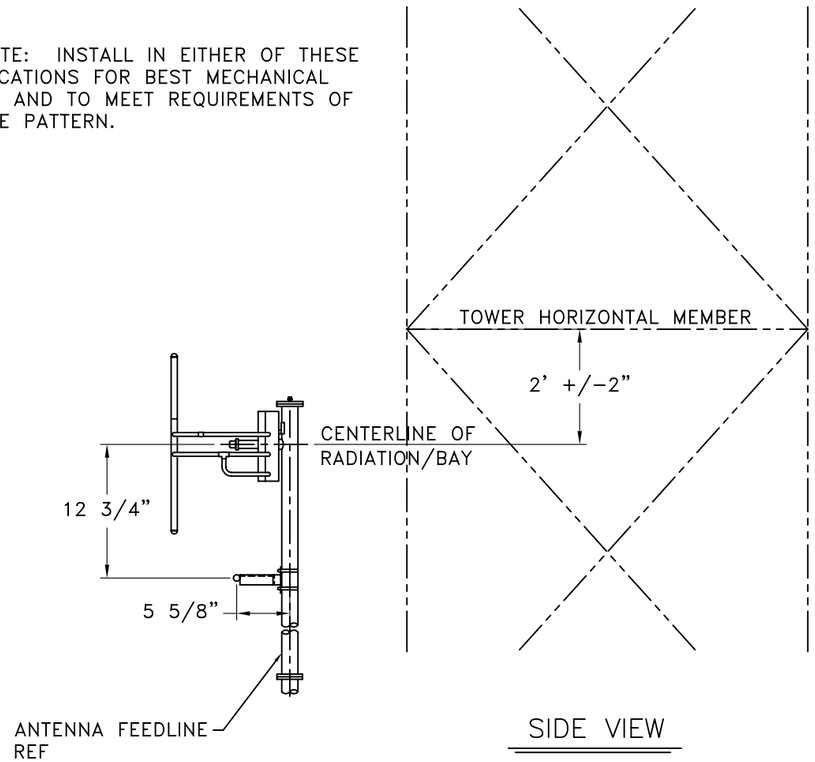
Tabulation of FCC Directional Composite
WHWT New Hope, AL

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	0.970
60	1.000	240	0.909
70	1.000	250	0.845
80	1.000	260	0.794
90	1.000	270	0.742
100	1.000	280	0.723
110	1.000	290	0.746
120	1.000	300	0.817
130	1.000	310	0.899
140	1.000	320	0.975
150	1.000	330	1.000
160	1.000	340	1.000
170	1.000	350	1.000



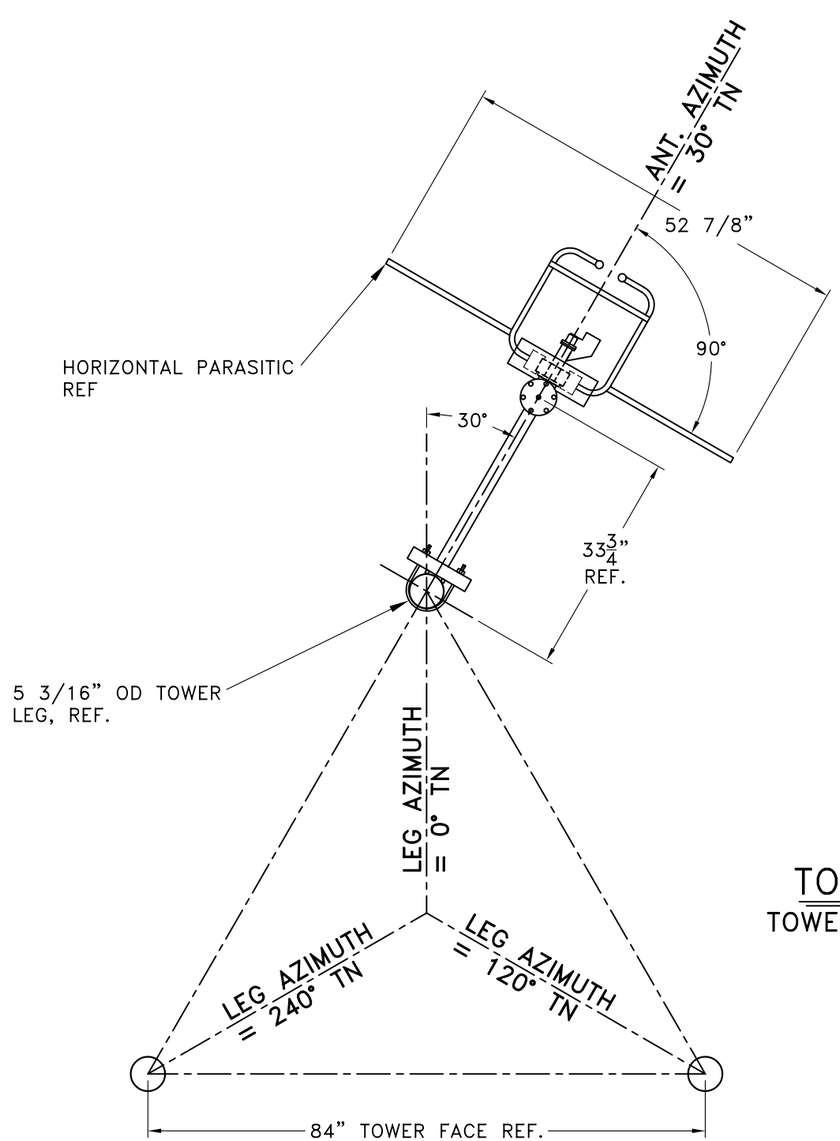
ABOVE HORIZONTAL MEMBER MOUNTING

NOTE: INSTALL IN EITHER OF THESE LOCATIONS FOR BEST MECHANICAL FIT AND TO MEET REQUIREMENTS OF THE PATTERN.



SIDE VIEW

BELOW HORIZONTAL MEMBER MOUNTING



TOP VIEW
TOWER: STAINLESS G7

ANTENNA HEADING: 30° TRUE NORTH

SHIVELY LABS
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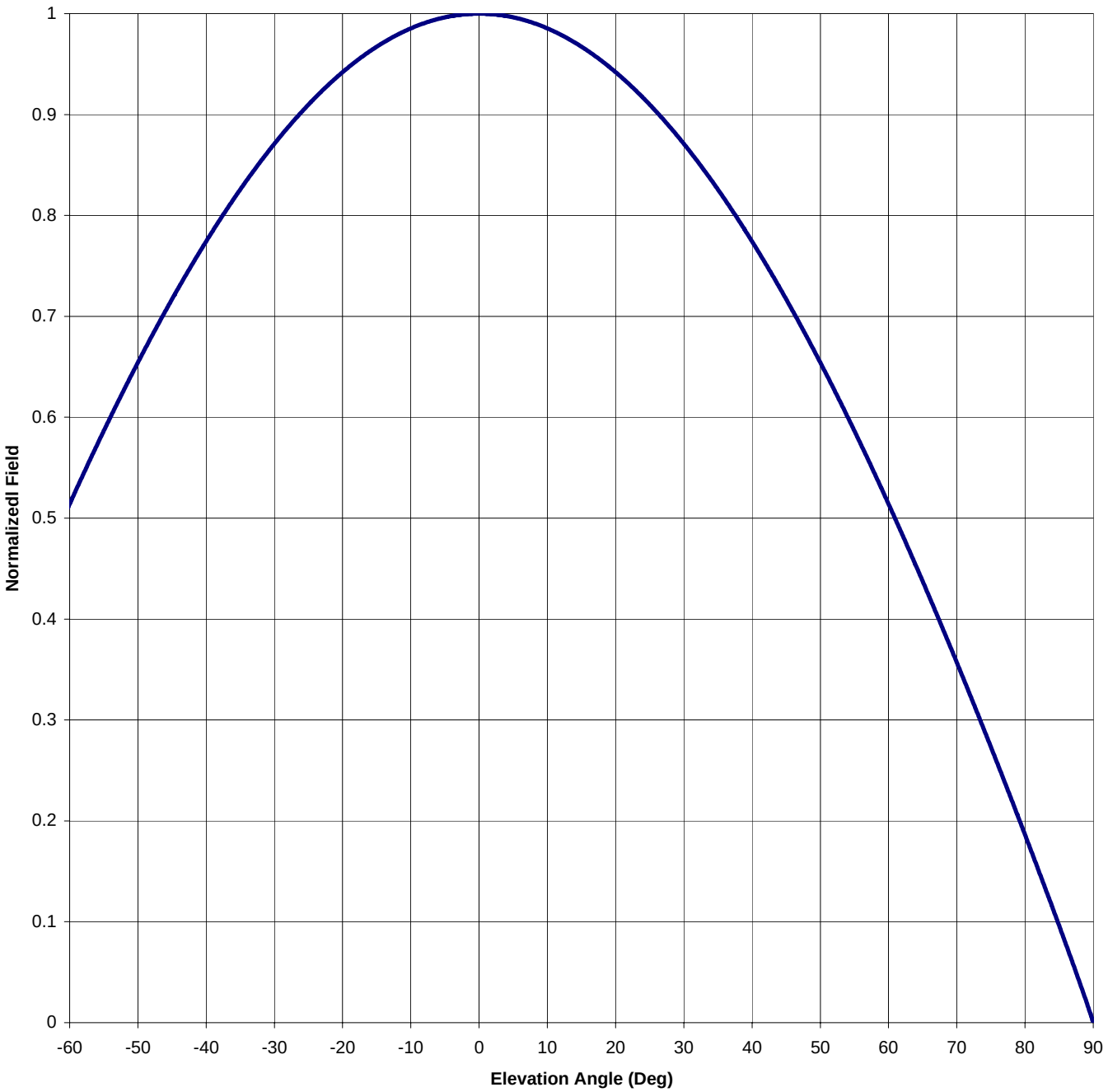
SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY: ASP
25953	103.5 MHz.	N.T.S.	APPROVED BY:

MODEL:
6810-1R-DIRECTIONAL ANTENNA

DATE: 1/8/08

FIGURE 2

Antenna Mfg.:	**Shively Labs**				**Date: 1/8/2008**
Antenna Type:	**6810-1R-DA**				
Station:	**NEW FM**	**Beam Tilt**	**0**		
Frequency:	**103.5**	**Gain (Max)**	**0.821**	**-0.855**	**dB**
Channel #:	**278**	**Gain (Horizon)**	**0.821**	**-0.855**	**dB**
Figure:	**3**				



Antenna Mfg.: Shively Labs
Antenna Type: 6810-1R-DA
Station: NEW FM
Frequency: 103.5
Channel #: 278
Figure: 3

Date: 1/8/2008

Beam Tilt	**0**	
Gain (Max)	**0.821**	**-0.855 dB**
Gain (Horizon)	**0.821**	**-0.855 dB**

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. 25953 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

NEW FM 103.5 MHz NEW HOPE, AL

MODEL 6810-1R-DA

Elevation Gain of Antenna 0.46

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

H RMS 0.744 V RMS 0.727 H/V Ratio 1.023

Elevation Gain of Horizontal Component 0.471

Elevation Gain of Vertical Component 0.449

Horizontal Azimuth Gain equals 1/(RMS)SQ. 1.807

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 1.873
Max. Vertical 0.995

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

Total Horizontal Power Gain = **0.850**

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

Total Vertical Power Gain = **0.842**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

0.29 KW ERP Equals 0.341 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.341 KW Times 0.842 KW Equals 0.287 KW ERP

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

0.995 Equals 0.287 KW Vertical ERP

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

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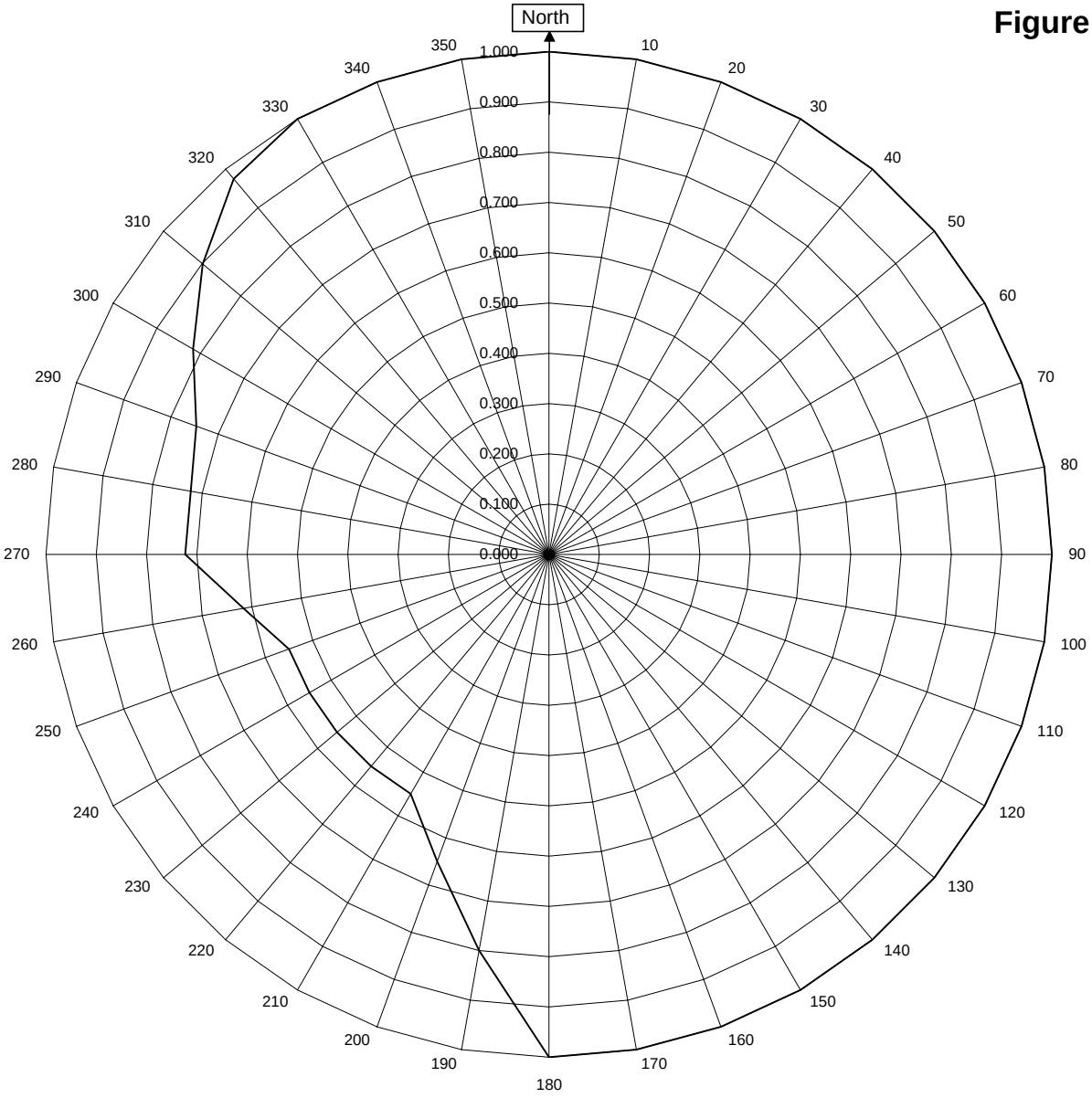
Figure 5



WHWT New Hope, AL

25953

January 8, 2008

Amended Composite RMS	0.897
85% Amended Composite RMS	0.763

Frequency	103.5 / 465.75 mHz
Plot	Relative Field

Antenna Model	6810-1R-DA
Pattern Type	Amended FCC Composite

Figure 5a

Tabulation of Amended Composite Pattern
WHWT New Hope, AL

Azimuth	Rel Field	Azimuth	Rel Field
0	1.000	180	1.000
10	1.000	190	0.800
20	1.000	200	0.650
30	1.000	210	0.550
40	1.000	220	0.550
45	1.000	225	0.772
50	1.000	230	0.550
60	1.000	240	0.550
70	1.000	250	0.550
80	1.000	260	0.617
90	1.000	270	0.723
100	1.000	280	0.723
110	1.000	290	0.746
120	1.000	300	0.817
130	1.000	310	0.899
135	0.772	315	0.937
140	1.000	320	0.975
150	1.000	330	1.000
160	1.000	340	1.000
170	1.000	350	1.000