Shively Labs
a division of Howell Laboratories,Inc.

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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. 28269

Report of Test Aldena Log Periodic Array - Slant

for

CORNERSTONE COMMUNITY RADIO, INC.

WJWR 90.3 MHz Bloomington, IL

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of an Aldena Log Periodic Array - Slant to meet the needs of WJWR and to comply with the requirements of the FCC construction permit, file number BMPED-20091230ACN.

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-20091230ACN indicates that the Horizontal radiation component shall not exceed 18.0 kW at any azimuth and is restricted to the following values at the azimuths specified:

300 Degrees T: 1.40 kW

From Figure 1A, the maximum radiation of the Horizontal component occurs at 220 Degrees T. At the restricted azimuth of 300 Degrees T the Horizontal component is 14.89 dB down from the maximum of 18.0 kW, or 0.58 kW.

The R.M.S. of the Horizontal component is 0.477. The total Horizontal power gain is 5.185. The R.M.S. of the Vertical component is 0.465. The total Vertical power gain is 3.503. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.570. The R.M.S. of the measured composite pattern is 0.514. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.485. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the Aldena Log Periodic Array - Slant was mounted on a tower of precise scale to the Rohn SSV tower at the WJWR site. The spacing of the antenna to the tower was varied to achieve the horizontal and vertical patterns shown in Figure 1A. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20091230ACN, a single level of the Aldena Log Periodic Array – Slant 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 406.35 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.

Respectfully submitted by:

Robert A. Surette
Director of Sales Engineering
S/O 28269
August 18, 2010

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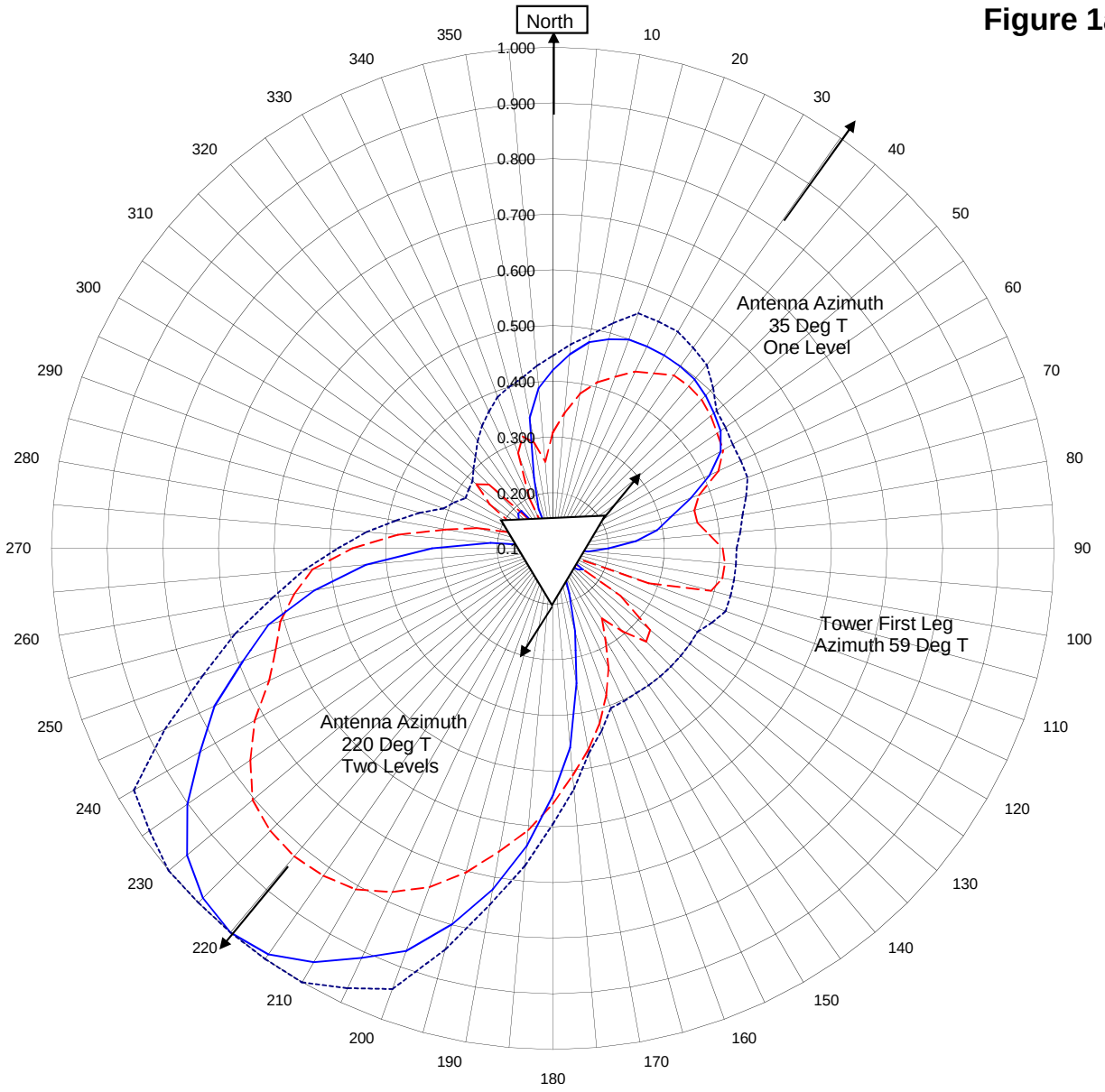
Figure 1a



WJWR Bloomington, IL

28269

August 23, 2010

Horizontal RMS	0.477
Vertical RMS	0.465
H/V Composite RMS	0.514
FCC Composite RMS	0.570

Frequency	90.3 / 406.35 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	Aldena Log Periodic Array-Slant
Pattern Type	Directional Azimuth

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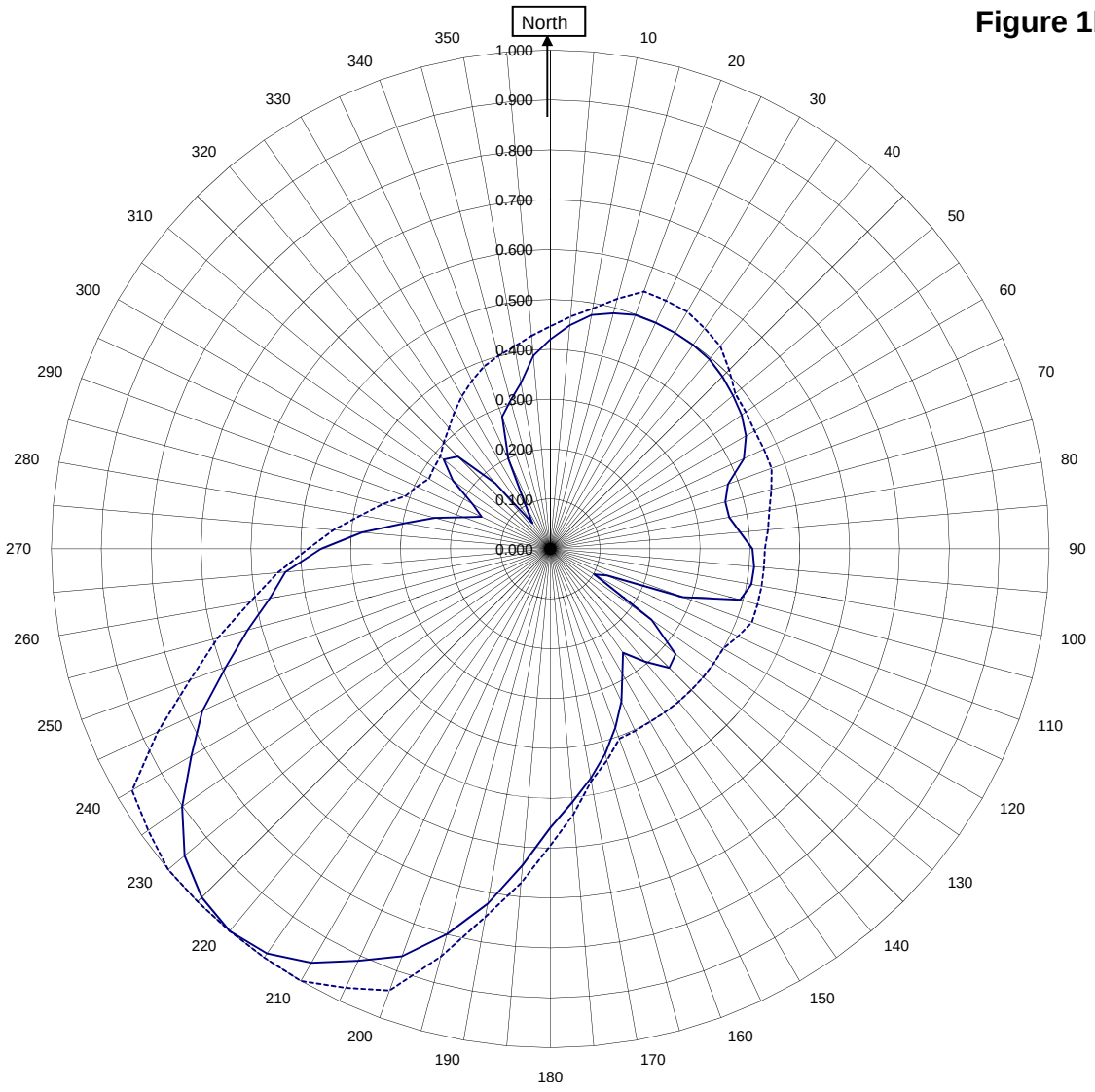
Figure 1b



WJWR Bloomington, IL

28269

August 23, 2010

_____H/VComposite RMS	0.514
……..FCC Composite RMS	0.570

Frequency	90.3 / 406.35 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	Aldena Log Periodic Array-Slant
Pattern Type	Directional H/V Composite

Figure 1c

Tabulation of Horizontal Azimuth Pattern
WJWR Bloomington, IL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.420	180	0.544
10	0.476	190	0.722
20	0.499	200	0.869
30	0.500	210	0.958
40	0.496	220	1.000
45	0.488	225	0.988
50	0.478	230	0.957
60	0.448	240	0.831
70	0.363	250	0.692
80	0.290	260	0.535
90	0.200	270	0.317
100	0.087	280	0.126
110	0.108	290	0.108
120	0.088	300	0.067
130	0.021	310	0.041
135	0.012	315	0.053
140	0.012	320	0.051
150	0.101	330	0.080
160	0.186	340	0.175
170	0.346	350	0.338

Figure 1d

Tabulation of Vertical Azimuth Pattern
WJWR Bloomington, IL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.308	180	0.559
10	0.382	190	0.652
20	0.428	200	0.747
30	0.463	210	0.807
40	0.480	220	0.822
45	0.478	225	0.817
50	0.470	230	0.803
60	0.453	240	0.718
70	0.379	250	0.629
80	0.364	260	0.571
90	0.405	270	0.460
100	0.409	280	0.296
110	0.283	290	0.185
120	0.102	300	0.180
130	0.328	310	0.279
135	0.337	315	0.262
140	0.295	320	0.172
150	0.289	330	0.095
160	0.381	340	0.282
170	0.467	350	0.293

Figure 1e

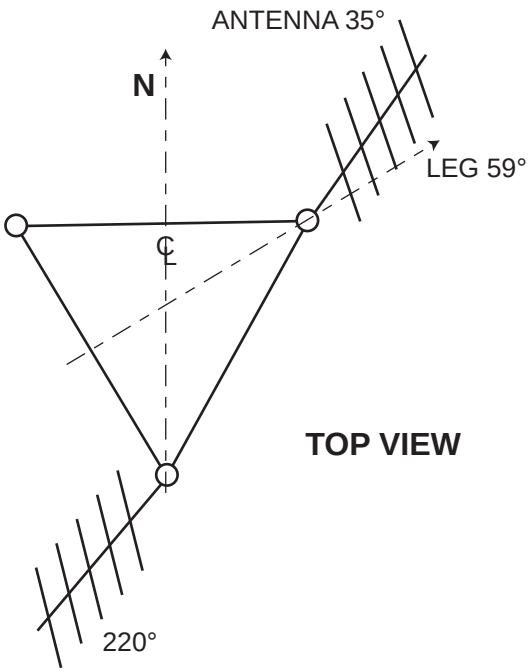
Tabulation of Composite Azimuth Pattern
WJWR Bloomington, IL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.420	180	0.559
10	0.476	190	0.722
20	0.499	200	0.869
30	0.500	210	0.958
40	0.496	220	1.000
45	0.488	225	0.988
50	0.478	230	0.957
60	0.453	240	0.831
70	0.379	250	0.692
80	0.364	260	0.571
90	0.405	270	0.460
100	0.409	280	0.296
110	0.283	290	0.185
120	0.102	300	0.180
130	0.328	310	0.279
135	0.337	315	0.262
140	0.295	320	0.172
150	0.289	330	0.095
160	0.381	340	0.282
170	0.467	350	0.338

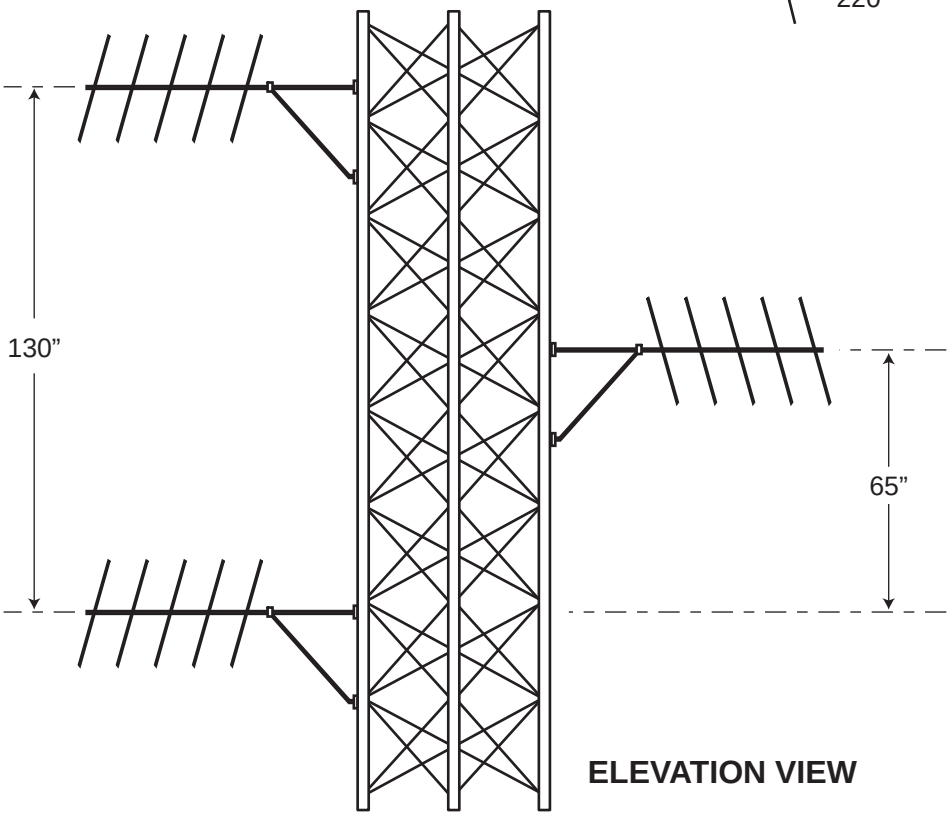
Figure 1f

Tabulation of FCC Directional Composite
WJWR Bloomington, IL

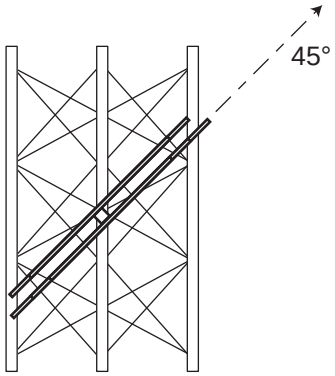
Azimuth	Rel Field	Azimuth	Rel Field
0	0.446	180	0.595
10	0.489	190	0.749
20	0.549	200	0.942
30	0.549	210	1.000
40	0.530	220	1.000
50	0.484	230	1.000
60	0.473	240	0.968
70	0.472	250	0.769
80	0.446	260	0.611
90	0.430	270	0.486
100	0.430	280	0.386
110	0.430	290	0.309
120	0.400	300	0.281
130	0.400	310	0.288
140	0.400	320	0.316
150	0.400	330	0.354
160	0.405	340	0.389
170	0.473	350	0.412



TOP VIEW



ELEVATION VIEW



FRONT VIEW

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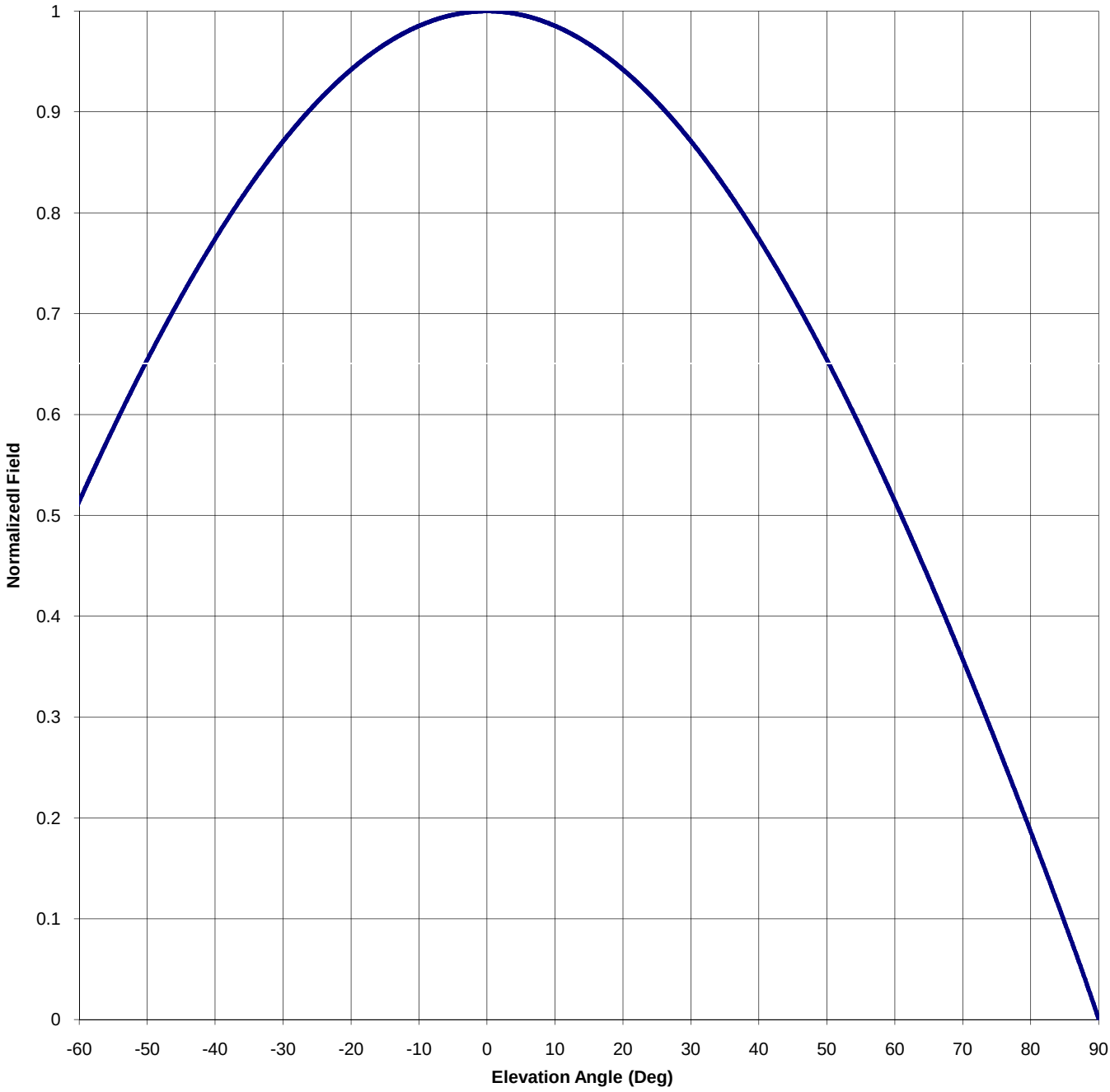
FIGURE 2, ALDENA LOG PERIODIC ARRAY, SLANT
CORNERSTONE COMMUNITY RADIO, INC.
WJWR, 90.3 MHz, BLOOMINGTON, IL

SIZE	CODE IDENT. NO.	DRAWING NO.	REV
A	26750	AGF100819-001	--

SCALE		SHEET
NONE	S/O 28269	1 OF 1

Antenna Mfg.:	**Shively Labs**			**Date: 8/23/2010**
Antenna Type:	**Aldena Log Periodic**			
Station:	**WJWR**	**Beam Tilt**	**0**	
Frequency:	**90.3**	**Gain (Max)**	**5.185**	**7.147 dB**
Channel #:	**212**	**Gain (Horizon)**	**5.185**	**7.147 dB**
Figure:	**3**			



Antenna Mfg.: Shively Labs
Antenna Type: Aldena Log Periodic
Station: WJWR
Frequency: 90.3
Channel #: 212
Figure: 3

Beam Tilt 0
Gain (Max) 5.185
Gain (Horizon) 5.185

Date: 8/23/2010
7.147 dB
7.147 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. 28269 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

WJWR 90.3 MHz Bloomington, IL

Aldena Log Periodic Array - Slant - One Level

Elevation Gain of Antenna 1.150

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

H RMS 0.477 V RMS 0.465 H/V Ratio 1.026

Elevation Gain of Horizontal Component 1.180

Elevation Gain of Vertical Component 1.121

Horizontal Azimuth Gain equals $1/(RMS)^2$. 4.395

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 3.125
Max. Vertical 0.822

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

Total Horizontal Power Gain = **5.185**

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

Total Vertical Power Gain = **3.503**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

18 kW ERP Divided by H Gain 5.185 equals 3.47 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

3.47 kW Times V Gain 3.503 equals 12.16 kW V ERP

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

(0.822)^2 Times 18.00 Equals 12.16 kW Vertical ERP

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