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. 27308

Report of Test Aldena ALP.08.02.07 LP Yagi

for

DIXIE COLLEGE

New FM 91.3 MHz St. George, UT

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of an Aldena ALP.08.02.07 LP Yagi to meet the needs of New FM and to comply with the requirements of the FCC construction permit, file number BMPED-20081114ACY.

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-20081114ACY indicates that the Horizontal radiation component shall not exceed 0.360 kW at any azimuth and is restricted to the following values at the azimuths specified:

100 - 230 Degrees T: 0.011 kW

From Figure 1A, the maximum radiation of the Horizontal component occurs at 345 Degrees T to 350 Degrees T. At the restricted azimuth of 100 – 230 Degrees T the Horizontal component is 20 dB down from the maximum of 0.360 kW, or 0.004 kW.

The R.M.S. of the Horizontal component is 0.437. The total Horizontal power gain is 6.298. The R.M.S. of the Vertical component is 0.436. The total Vertical power gain is 4.658. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.501. The R.M.S. of the measured composite pattern is 0.469. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.426. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

The Aldena ALP.08.02.07 LP Yagi was mounted on a tower of precise scale to the 24" face tower at the New FM site. The Aldena ALP.08.02.07 LP Yagi was mounted at an angle of 45 degrees to produce the horizontal and vertical azimuth patterns shown in Figure 1. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20081114ACY, a single level of the Aldena ALP.08.02.07 LP Yagi 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 410.85 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.

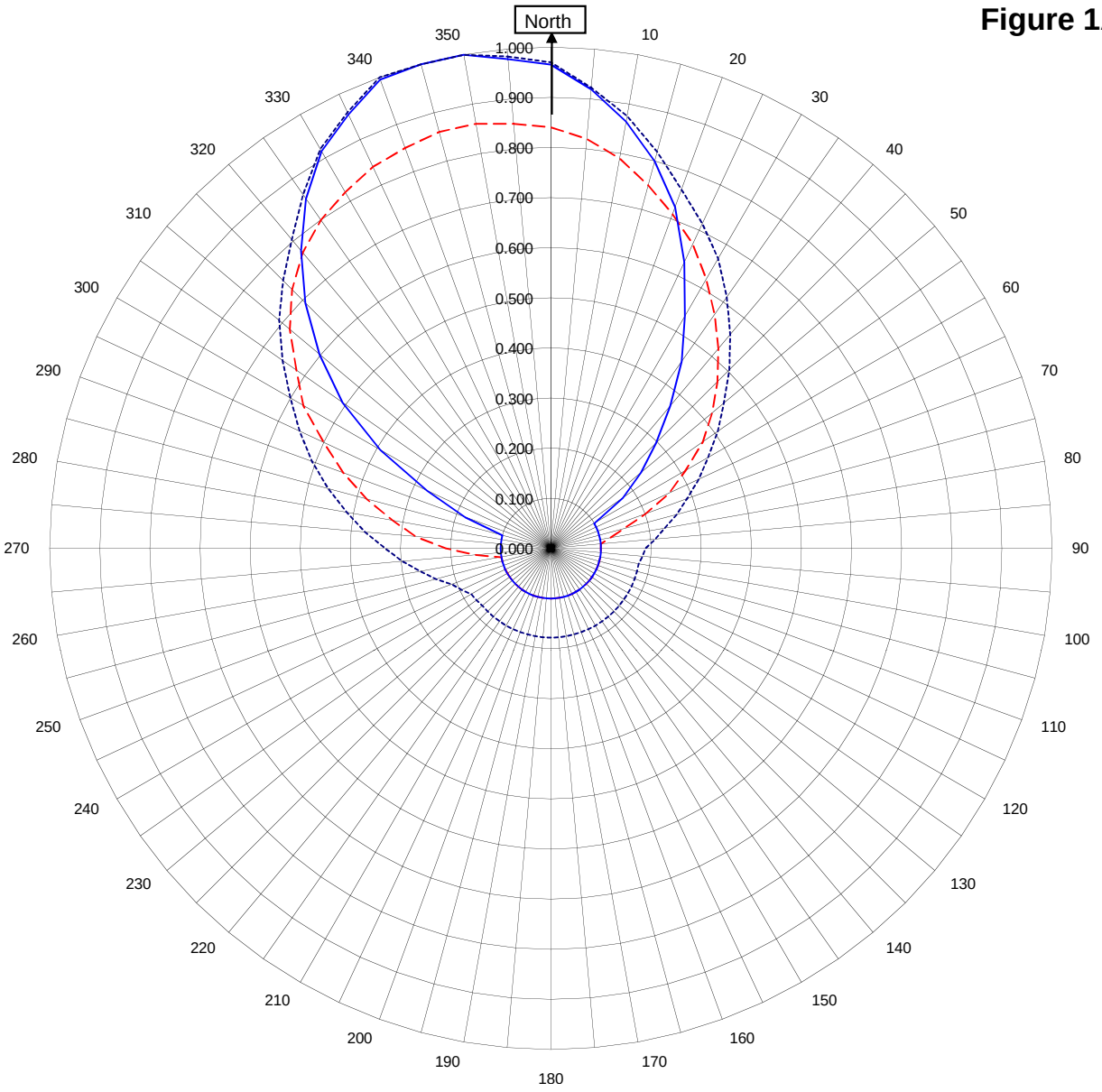
Respectfully submitted by:

Robert A. Surette
Director of Sales Engineering
S/O 27308
February 12, 2009

Shively Labs

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

Figure 1A



New FM St. George, UT

27308

February 12, 2009

Horizontal RMS	0.437
Vertical RMS	0.436
H/V Composite RMS	0.469
FCC Composite RMS	0.501

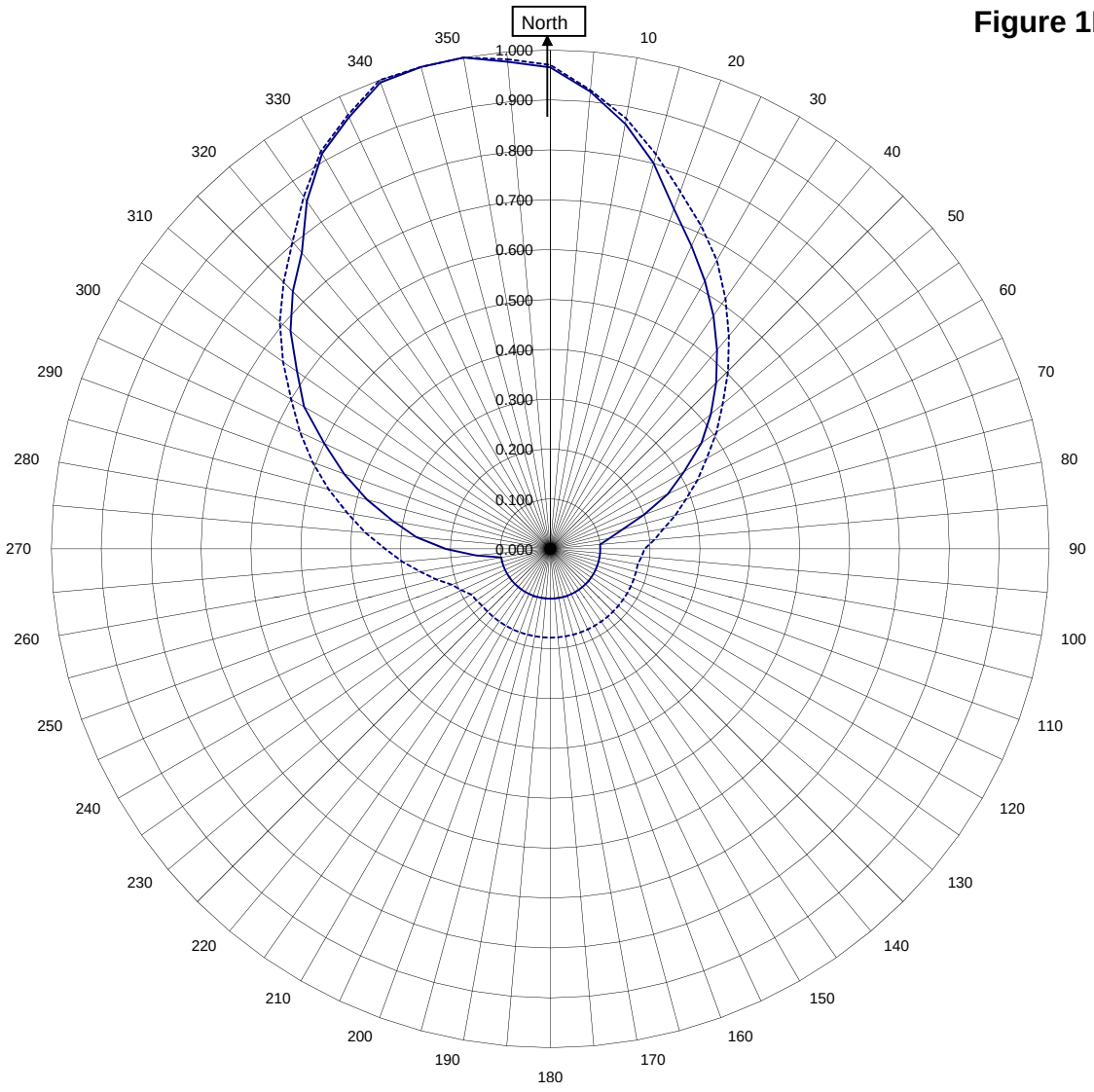
Frequency	91.3 / 410.85 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	ALP.08.02.07 Yagi Patt 02
Pattern Type	Directional Azimuth

Shively Labs

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

Figure 1B



New FM St. George, UT

27308

February 12, 2009

_____H/VComposite RMS	0.469
……..FCC Composite RMS	0.501

Frequency	91.3 / 410.85 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	ALP.08.02.07 Yagi Patt 02
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
New FM St. George, UT

Azimuth	Rel Field	Azimuth	Rel Field
0	0.965	180	0.100
10	0.865	190	0.100
20	0.725	200	0.100
30	0.535	210	0.100
40	0.370	220	0.100
45	0.297	225	0.100
50	0.235	230	0.100
60	0.100	240	0.100
70	0.100	250	0.100
80	0.100	260	0.100
90	0.100	270	0.100
100	0.100	280	0.100
110	0.100	290	0.181
120	0.100	300	0.392
130	0.100	310	0.602
135	0.100	315	0.692
140	0.100	320	0.775
150	0.100	330	0.915
160	0.100	340	0.995
170	0.100	350	1.000

Figure 1D

Tabulation of Vertical Azimuth Pattern
New FM St. George, UT

Azimuth	Rel Field	Azimuth	Rel Field
0	0.840	180	0.100
10	0.790	190	0.100
20	0.710	200	0.100
30	0.620	210	0.100
40	0.520	220	0.100
45	0.470	225	0.100
50	0.420	230	0.100
60	0.310	240	0.100
70	0.200	250	0.100
80	0.120	260	0.100
90	0.100	270	0.210
100	0.100	280	0.320
110	0.100	290	0.440
120	0.100	300	0.570
130	0.100	310	0.680
135	0.100	315	0.730
140	0.100	320	0.770
150	0.100	330	0.820
160	0.100	340	0.850
170	0.100	350	0.860

Figure 1E

Tabulation of Composite Azimuth Pattern
New FM St. George, UT

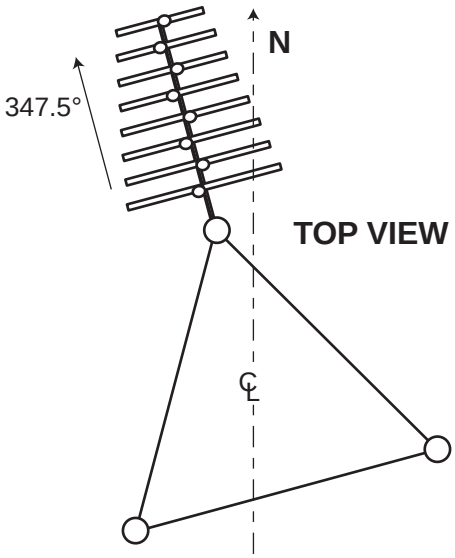
Azimuth	Rel Field	Azimuth	Rel Field
0	0.965	180	0.100
10	0.865	190	0.100
20	0.725	200	0.100
30	0.620	210	0.100
40	0.520	220	0.100
45	0.470	225	0.100
50	0.420	230	0.100
60	0.310	240	0.100
70	0.200	250	0.100
80	0.120	260	0.100
90	0.100	270	0.210
100	0.100	280	0.320
110	0.100	290	0.440
120	0.100	300	0.570
130	0.100	310	0.680
135	0.100	315	0.730
140	0.100	320	0.775
150	0.100	330	0.915
160	0.100	340	0.995
170	0.100	350	1.000

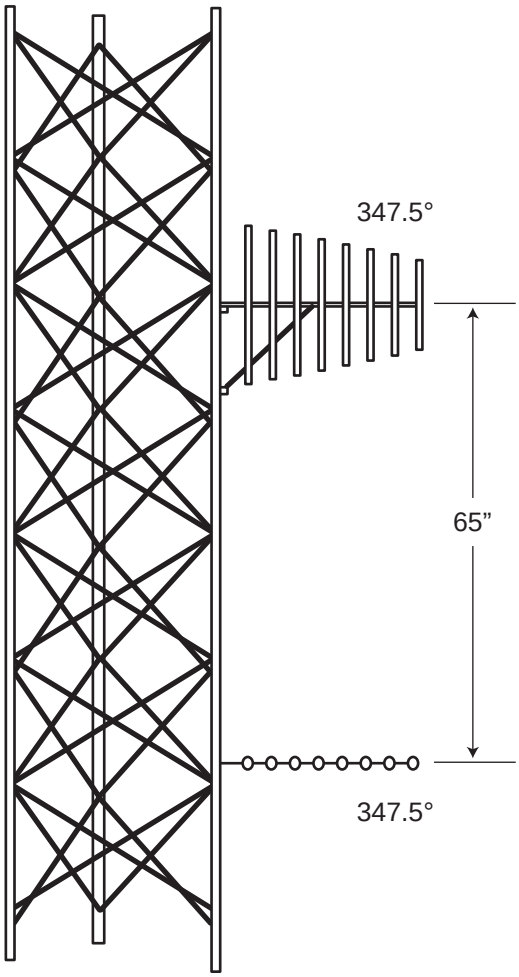
Figure 1F

Tabulation of FCC Directional Composite
New FM St. George, UT

Azimuth	Rel Field	Azimuth	Rel Field
0	0.970	180	0.178
10	0.876	190	0.178
20	0.762	200	0.178
30	0.668	210	0.178
40	0.557	220	0.178
50	0.451	230	0.178
60	0.362	240	0.183
70	0.289	250	0.210
80	0.230	260	0.264
90	0.189	270	0.331
100	0.178	280	0.413
110	0.178	290	0.507
120	0.178	300	0.600
130	0.178	310	0.708
140	0.178	320	0.804
150	0.178	330	0.920
160	0.178	340	1.000
170	0.178	350	1.000

REV NO	REVISION	DATE	APP'D
A	ADDED HORIZONTAL YAGI.	6/19/09	





ELEVATION VIEW

SHIVELY LABS

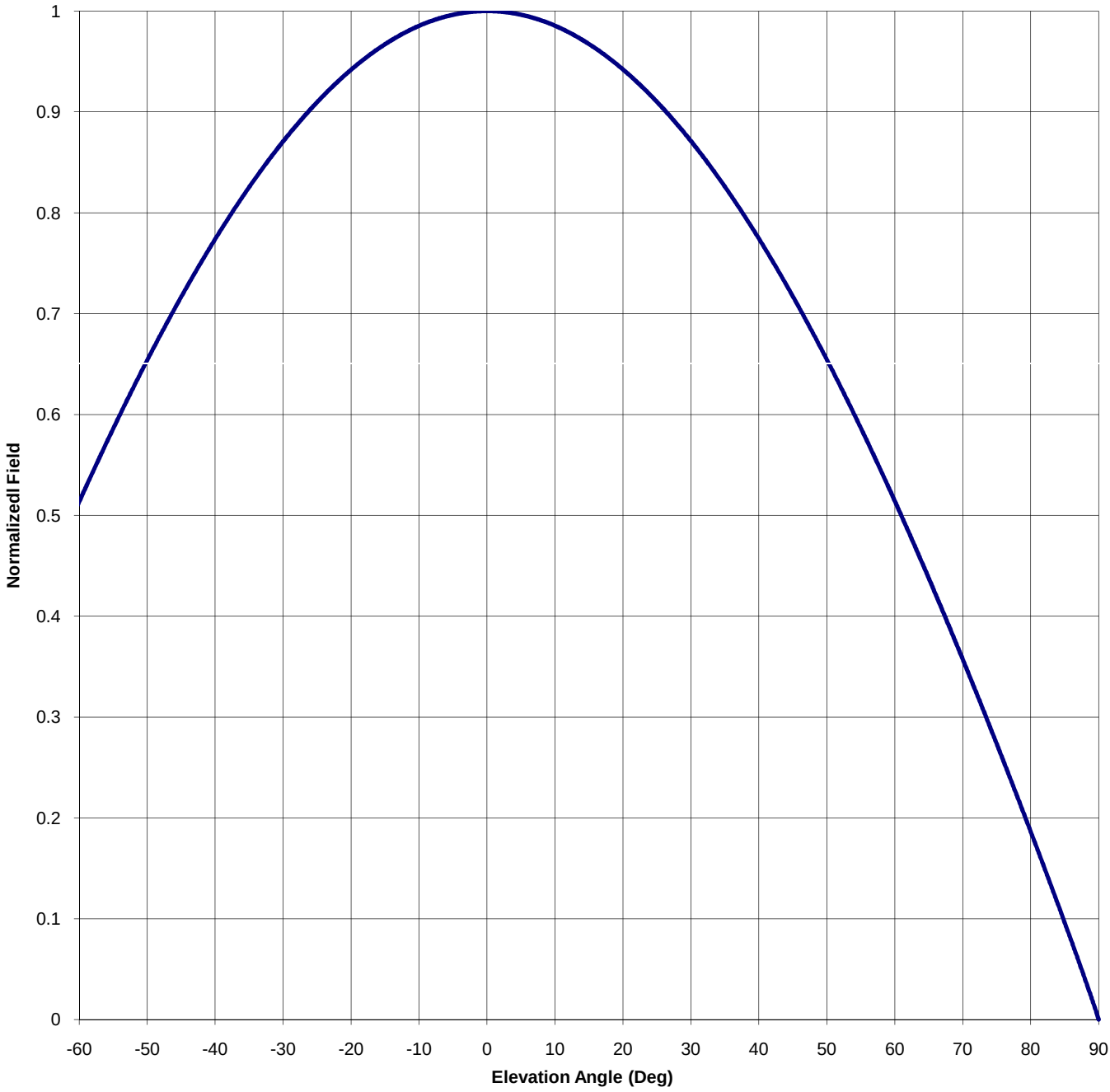
DIV. HOWELL LABS — BRIDGTON, MAINE USA

Figure 2, New FM, 91.3 MHz
Aldena A.L.P. 08.02.07 LP Yagi

SIZE	CODE IDENT NO.	DRAWING NO.	REV
A	22501	AGF090211-001	A

SCALE		SHEET
NONE	S/O 27308	1 of 1

Antenna Mfg.:	**Shively Labs**			**Date:**	**2/12/2009**
Antenna Type:	**Aldena ALP.08.02.07 LP Yagi**				
Station:	**New FM**	**Beam Tilt**	**0**		
Frequency:	**91.3**	**Gain (Max)**	**6.298**	**7.992**	**dB**
Channel #:	**202**	**Gain (Horizon)**	**6.298**	**7.992**	**dB**
Figure:	**3**				



Antenna Mfg.: Shively Labs **Date:** 2/12/2009

Antenna Type: Aldena ALP.08.02.07 LP Yagi

Station: New FM **Beam Tilt** 0

Frequency: 91.3 **Gain (Max)** 6.298 7.992 dB

Channel #: 202 **Gain (Horizon)** 6.298 7.992 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. 27308 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

New FM 91.3 MHz St. George, UT

Aldena ALP.08.02.07 LP Yagi

Elevation Gain of Antenna 1.2

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

H RMS	0.437	V RMS	0.436	H/V Ratio	1.002

Elevation Gain of Horizontal Component 1.203

Elevation Gain of Vertical Component 1.197

Horizontal Azimuth Gain equals $1/(RMS)^2$. 5.236

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 3.891

Max. Vertical 0.86

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

Total Horizontal Power Gain = **6.298**

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

Total Vertical Power Gain = **4.658**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

0.36	kW ERP	Divided by H Gain	6.298	equals	0.06	kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.057	kW	Times V Gain	4.658	equals	0.266	kW V ERP

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

(0.86)^2	Times	0.36	Equals	0.266	kW Vertical ERP

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