Shively Labs
a division of Howell Laboratories,Inc.

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

APPENDIX A
ANTENNA PATTERN CERTIFICATION BY MANUFACTURER

KORL-FM (was KLHI-FM) - CH. 266C - Waianae, HI (Oahu) - July 2007

S.O. 25669

Report of Test 6014-14/1-DA

for

PACIFIC RADIO GROUP, INC.

KLHI-FM 101.1 MHz Waianae, HI

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6014-14/1-DA to meet the needs of KLHI-FM and to comply with the requirements of the FCC construction permit, file number BPH-20060124AMJ.

RESULTS:

The measured azimuth pattern for the 6014-14/1-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 BPH-20060124AMJ indicates that the Horizontal radiation component shall not exceed 100.0 kW at any azimuth and is restricted to the following values at the azimuths specified:

220 - 320 Degrees T: 4.0 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 084 Degrees T to 086 Degrees T. At the restricted azimuth of 220 - 320 Degrees T the Horizontal component is 14.7 dB down from the maximum of 100.0 kW, or 3.4 kW.

The R.M.S. of the Horizontal component is 0.465. The total Horizontal power gain is 32.049. The R.M.S. of the Vertical component is 0.463. The total Vertical power gain is 25.960. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.530. The R.M.S. of the measured composite pattern is 0.492. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.451. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

The 6014-14/1-DA was mounted on a tower of precise scale to a Pi-Rod self-supported tower. The placement of the antenna on the tower was defined by the out-rigged poles used to mount the antenna on the Easterly leg so that the antenna was pointed at an azimuth bearing of 85 degrees. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BPH-20060124AMJ, a single level of the 6014-14/1-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 Edition 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 454.95 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.

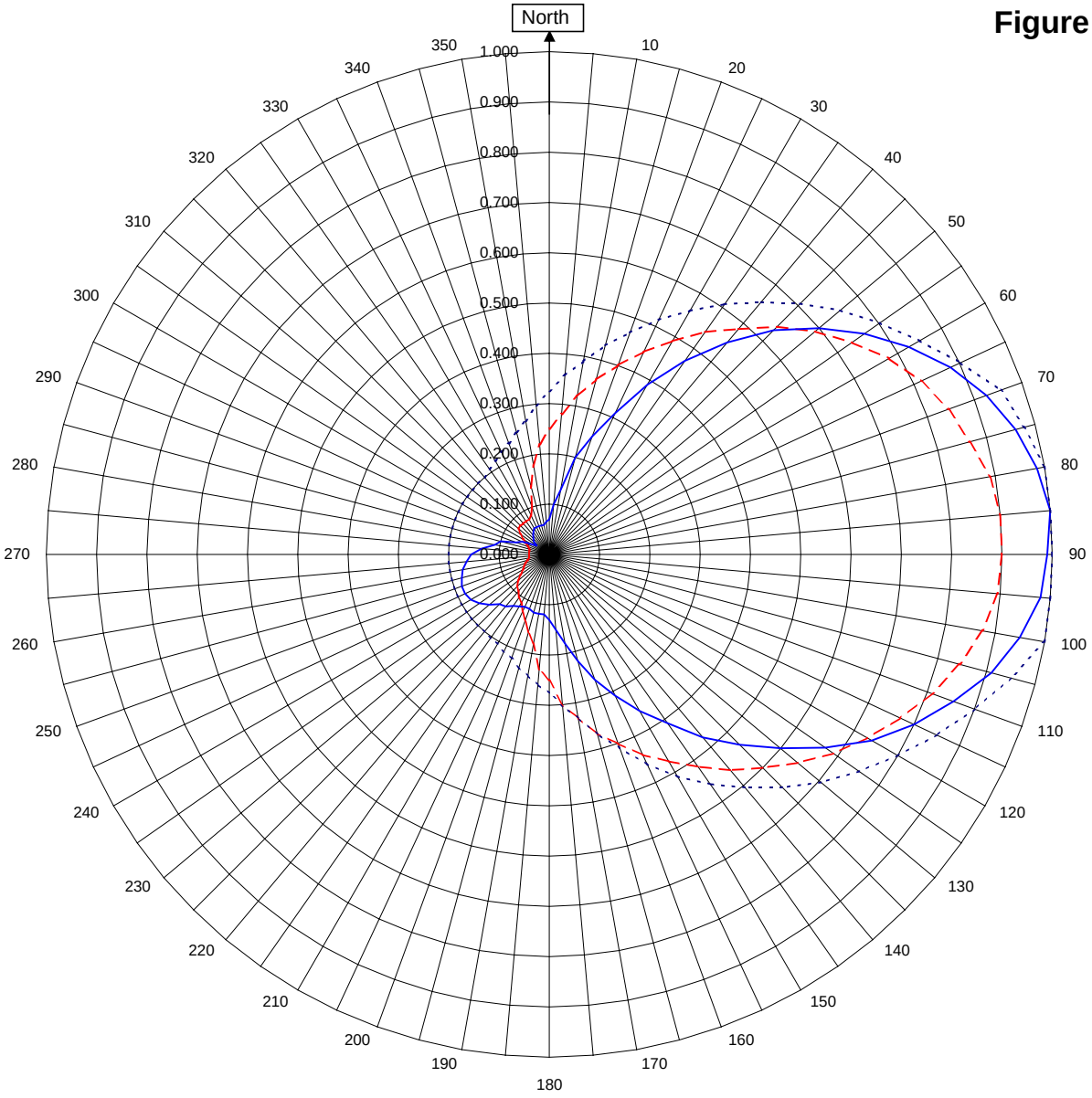
Respectfully submitted by:

Robert A. Surette
Director of Sales Engineering
S/O 25669
May 25, 2007

Shively Labs

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

Figure 1



KLHI-FM Waianae, HI

25669

May 25, 2007

_____Horizontal RMS	0.465
_ _ _ _ _ _ _ _ _ Vertical RMS	0.463
H/V Composite RMS	0.492
.....FCC Composite RMS	0.530

Frequency	101.1 / 454.95 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6014-14/1-DA
Pattern Type	Directional Azimuth

Figure 1a

Tabulation of Horizontal Azimuth Pattern
KLHI-FM Waianae, HI

Azimuth	Rel Field	Azimuth	Rel Field
0	0.070	180	0.130
10	0.130	190	0.120
20	0.250	200	0.115
30	0.390	210	0.120
40	0.550	220	0.135
45	0.630	225	0.140
50	0.700	230	0.155
60	0.825	240	0.180
70	0.925	250	0.185
80	0.985	260	0.175
90	0.990	270	0.155
100	0.950	280	0.110
110	0.855	290	0.070
120	0.740	300	0.040
130	0.600	310	0.040
135	0.535	315	0.045
140	0.475	320	0.050
150	0.360	330	0.060
160	0.265	340	0.060
170	0.180	350	0.060

Figure 1b

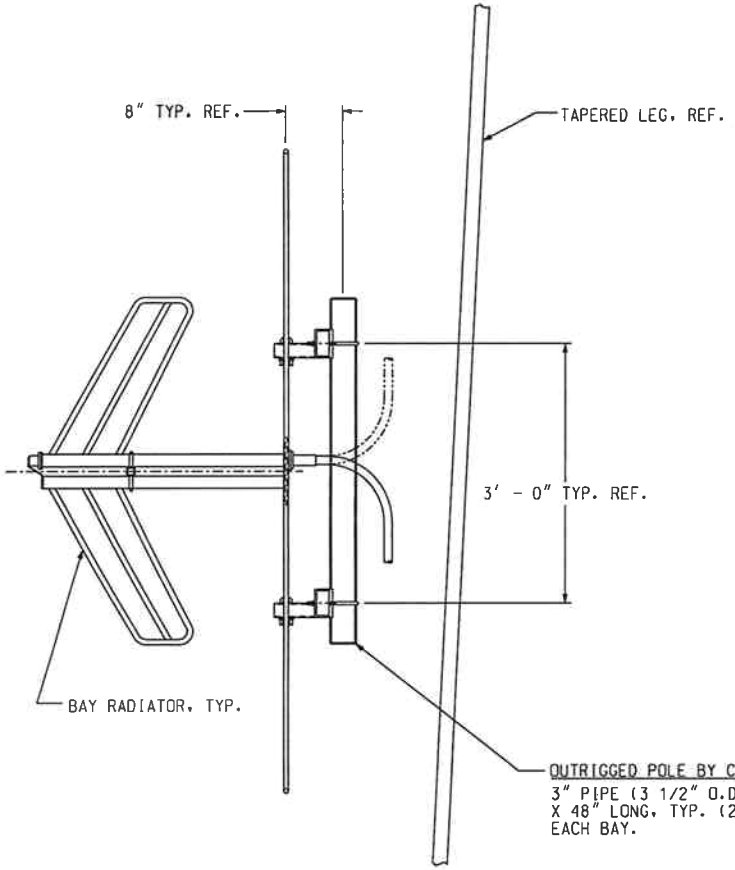
Tabulation of Vertical Azimuth Pattern
KLHI-FM Waianae, HI

Azimuth	Rel Field	Azimuth	Rel Field
0	0.250	180	0.250
10	0.320	190	0.180
20	0.400	200	0.140
30	0.490	210	0.110
40	0.585	220	0.095
45	0.640	225	0.090
50	0.690	230	0.080
60	0.780	240	0.060
70	0.845	250	0.050
80	0.890	260	0.040
90	0.900	270	0.040
100	0.875	280	0.040
110	0.810	290	0.045
120	0.730	300	0.060
130	0.645	310	0.080
135	0.600	315	0.080
140	0.560	320	0.080
150	0.475	330	0.080
160	0.400	340	0.100
170	0.330	350	0.180

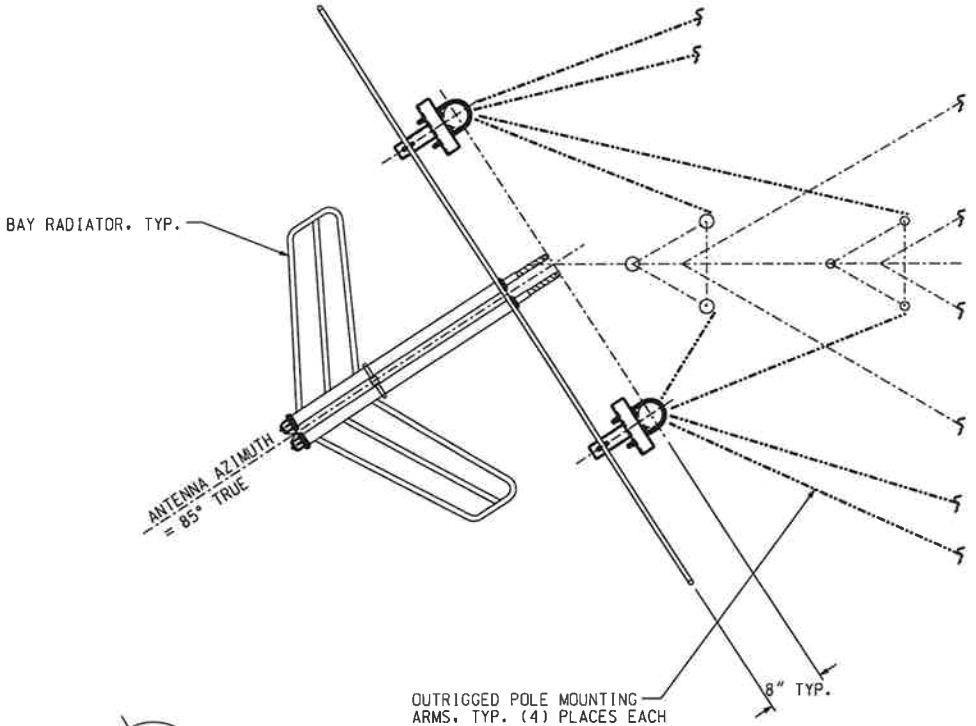
Figure 1c

Tabulation of FCC Directional Composite
KLHI-FM Waianae, HI

Azimuth	Rel Field	Azimuth	Rel Field
0	0.325	180	0.275
10	0.390	190	0.245
20	0.470	200	0.220
30	0.560	210	0.205
40	0.655	220	0.200
50	0.755	230	0.200
60	0.850	240	0.200
70	0.955	250	0.200
80	1.000	260	0.200
90	1.000	270	0.200
100	1.000	280	0.200
110	0.900	290	0.200
120	0.800	300	0.200
130	0.705	310	0.200
140	0.605	320	0.200
150	0.510	330	0.215
160	0.410	340	0.235
170	0.330	350	0.270



SIDE VIEW



TOP VIEW

TOWER MAKE: PI-ROD, SELF-SUPPORTING
8' FACE WIDTH (STRAIGHT SECTION) TO
12' FACE WIDTH (TAPERED SECTION) IN
APPERATURE OF ANTENNA

SHIVELY LABS

A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE

SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
NEW 25669 ORIG.18,221 20372	93.1 / 95.5 MHz 97.5 / 101.1 MHz HONOLULU, HI	N.T.S.	ASP APPROVED BY:

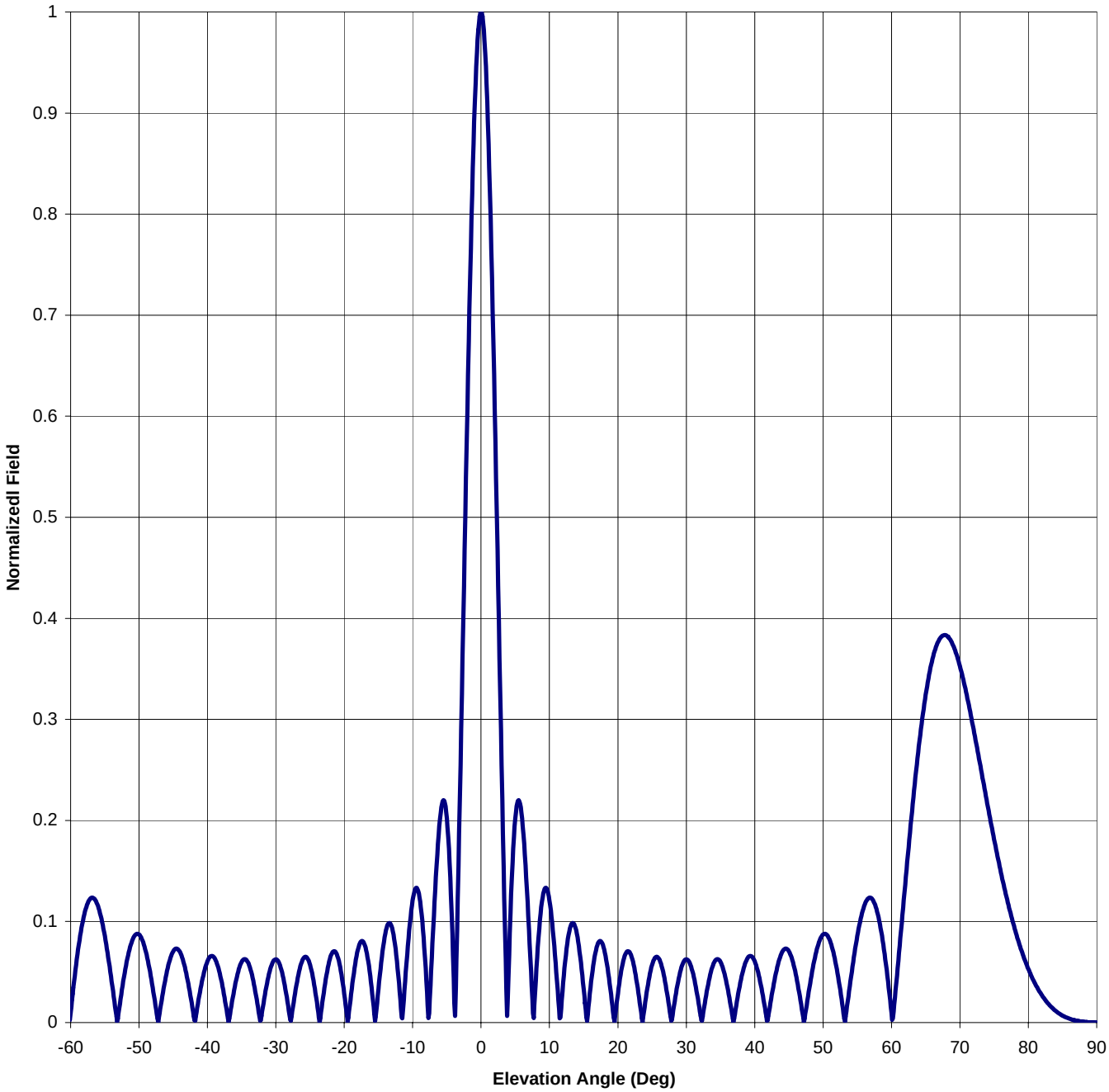
TITLE:

MODEL-6014-14/1-(BROADBAND) DIRECTIONAL ANTENNA

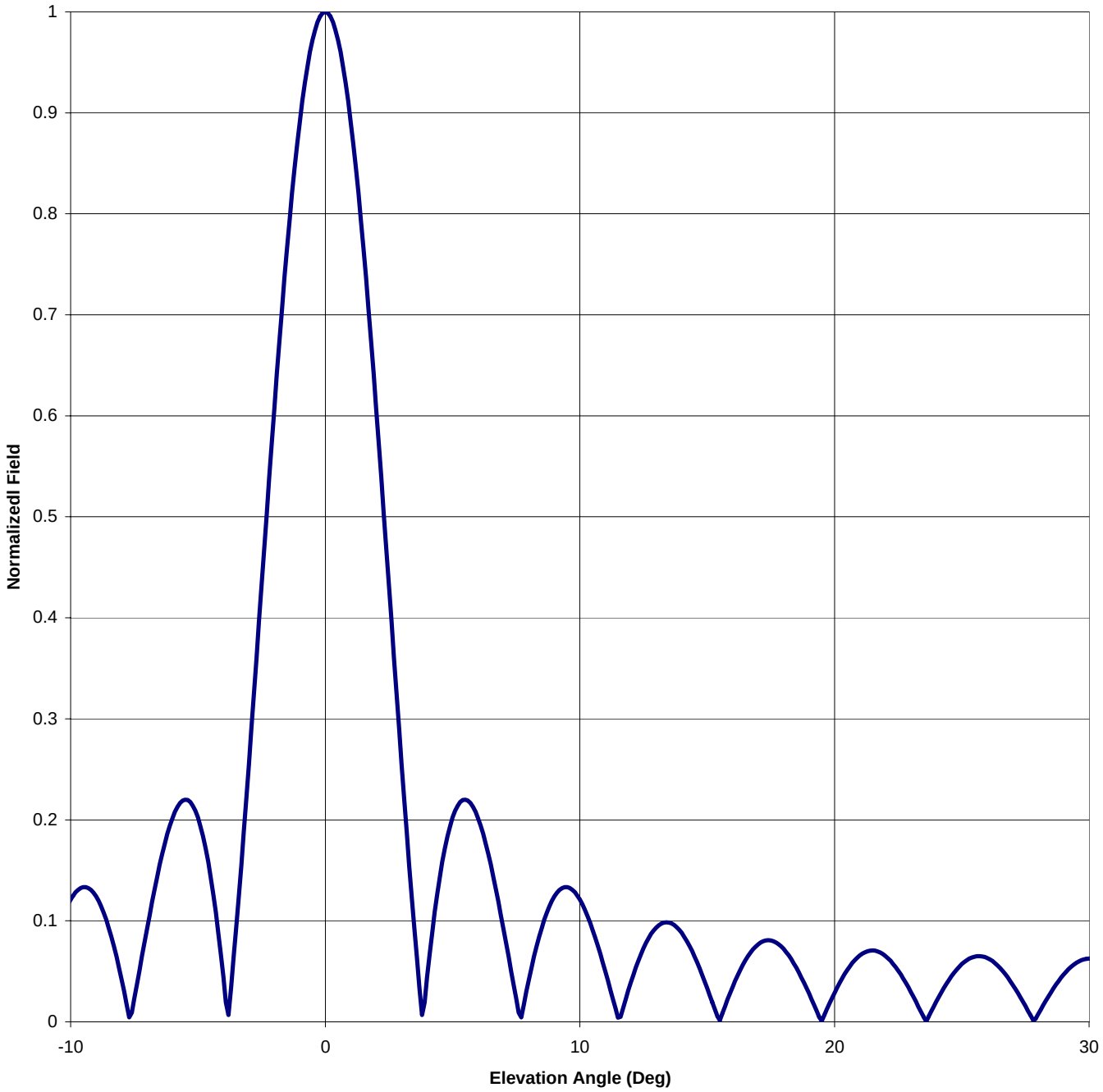
DATE: 5/22/07

FIGURE 2

Antenna Mfg.:	**Shively Labs**			**Date:**	**5/25/2007**
Antenna Type:	**6014-14/1-DA**				
Station:	**KLHI-FM**	**Beam Tilt**	**0**		
Frequency:	**101.1**	**Gain (Max)**	**32.049**	**15.058**	**dB**
Channel #:	**266**	**Gain (Horizon)**	**32.049**	**15.058**	**dB**
Figure:	**3**				



Antenna Mfg.:	**Shively Labs**			**Date:**	**5/25/2007**
Antenna Type:	**6014-14/1-DA**				
Station:	**KLHI-FM**	**Beam Tilt**	**0**		
Frequency:	**101.1**	**Gain (Max)**	**32.049**	**15.058**	**dB**
Channel #:	**266**	**Gain (Horizon)**	**32.049**	**15.058**	**dB**
Figure:	**3**				



Antenna Mfg.: Shively Labs **Date:** 5/25/2007

Antenna Type: 6014-14/1-DA

Station: KLHI-FM **Beam Tilt** 0

Frequency: 101.1 **Gain (Max)** 32.049 15.058 dB

Channel #: 266 **Gain (Horizon)** 32.049 15.058 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	0.070	0	1.000	46	0.048
-89	0.000	-43	0.046	1	0.892	47	0.009
-88	0.001	-42	0.007	2	0.608	48	0.034
-87	0.002	-41	0.034	3	0.255	49	0.070
-86	0.004	-40	0.061	4	0.044	50	0.087
-85	0.007	-39	0.064	5	0.202	51	0.081
-84	0.012	-38	0.043	6	0.202	52	0.053
-83	0.018	-37	0.004	7	0.092	53	0.009
-82	0.027	-36	0.036	8	0.042	54	0.041
-81	0.038	-35	0.060	9	0.124	55	0.085
-80	0.053	-34	0.058	10	0.121	56	0.115
-79	0.071	-33	0.031	11	0.050	57	0.123
-78	0.093	-32	0.011	12	0.039	58	0.107
-77	0.119	-31	0.048	13	0.093	59	0.068
-76	0.149	-30	0.063	14	0.088	60	0.009
-75	0.181	-29	0.047	15	0.033	61	0.061
-74	0.217	-28	0.007	16	0.035	62	0.136
-73	0.254	-27	0.037	17	0.077	63	0.209
-72	0.290	-26	0.063	18	0.072	64	0.273
-71	0.324	-25	0.057	19	0.028	65	0.324
-70	0.353	-24	0.020	20	0.029	66	0.360
-69	0.373	-23	0.030	21	0.066	67	0.379
-68	0.383	-22	0.065	22	0.065	68	0.383
-67	0.379	-21	0.066	23	0.030	69	0.373
-66	0.360	-20	0.029	24	0.020	70	0.353
-65	0.324	-19	0.028	25	0.057	71	0.324
-64	0.273	-18	0.072	26	0.063	72	0.290
-63	0.209	-17	0.077	27	0.037	73	0.254
-62	0.136	-16	0.035	28	0.007	74	0.217
-61	0.061	-15	0.033	29	0.047	75	0.181
-60	0.009	-14	0.088	30	0.063	76	0.149
-59	0.068	-13	0.093	31	0.048	77	0.119
-58	0.107	-12	0.039	32	0.011	78	0.093
-57	0.123	-11	0.050	33	0.031	79	0.071
-56	0.115	-10	0.121	34	0.058	80	0.053
-55	0.085	-9	0.124	35	0.060	81	0.038
-54	0.041	-8	0.042	36	0.036	82	0.027
-53	0.009	-7	0.092	37	0.004	83	0.018
-52	0.053	-6	0.202	38	0.043	84	0.012
-51	0.081	-5	0.202	39	0.064	85	0.007
-50	0.087	-4	0.044	40	0.061	86	0.004
-49	0.070	-3	0.255	41	0.034	87	0.002
-48	0.034	-2	0.608	42	0.007	88	0.001
-47	0.009	-1	0.892	43	0.046	89	0.000
-46	0.048	0	1.000	44	0.070	90	0.000
-45	0.071			45	0.071		

S.O. 25669 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

KLHI-FM Waianae, HI

6014-14/1-DA

Elevation Gain of Antenna 6.9

The RMS values are calculated utilizing the data of a planimeter

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

H RMS 0.465 V RMS 0.463 H/V Ratio 1.004

Elevation Gain of Horizontal Component 6.930

Elevation Gain of Vertical Component 6.870

Horizontal Azimuth Gain equals 1/(RMS)SQ. 4.625

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 3.779
Max. Vertical 0.9

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

Total Horizontal Power Gain = **32.049**

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

Total Vertical Power Gain = **25.960**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

100 KW ERP Equals 3.120 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

3.120 KW Times 25.960 KW Equals 81.000 KW ERP

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

0.9 Equals 81.000 KW Vertical ERP

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