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S.O. 30293

Report of Test 6810-2R-SS(0.9)-DA

for

All Classical Public Media, Inc.

KQOC 88.1 MHz Gleneden Beach, OR

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-2R-SS(0.9)-DA to meet the needs of KQOC and to comply with the requirements of the FCC construction permit, file number BPED-20120815AAE. 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 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 BPED-20120815AAE indicates that the Horizontal radiation component shall not exceed 6.5 kW at any azimuth and is restricted to the following values at the azimuths specified:

80 degrees True through 90 degrees True: 1.30 kilowatts

170 degrees True through 190 degrees True: 0.205 kilowatts.

From Figure 1A, the maximum radiation of the Horizontal component occurs at 298 Degrees T to 346 Degrees T. At the restricted azimuth of 80 degrees True through 90 degrees True the Horizontal component is 7.959 dB down from the maximum of 6.5 kW, or 1.04 kW and at the restricted azimuth of 170 degrees True through 190 degrees True the Vertical component is 15.650 dB down from the maximum of 6.5 kW, or 0.177 kW.

The R.M.S. of the Horizontal component is 0.675. The total Horizontal power gain is 2.284. The R.M.S. of the Vertical component is 0.655. The total Vertical power gain is 2.243. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.727. The R.M.S. of the measured composite pattern is 0.679. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.678 Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-2R-SS(0.9)-DA was mounted on a tower of precise scale to the Rohn 55 tower at the KQOC site. The spacing of the antenna to the tower was varied to achieve the vertical pattern shown in Figure 1A. 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 1A was achieved. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BPED-20120815AAE, a single level of the 6810-2R-SS(0.9)-DA was set up on the Shively Labs 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

All testing is carried out in strict accordance with approved procedures under our ISO9001:2008.

TEST PROCEDURES:

The receiving antenna system is mounted so that the horizontal and vertical azimuth patterns are measured independently. The network analyzer was set to 396.45 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 30293
November 6, 2012

Shively Labs

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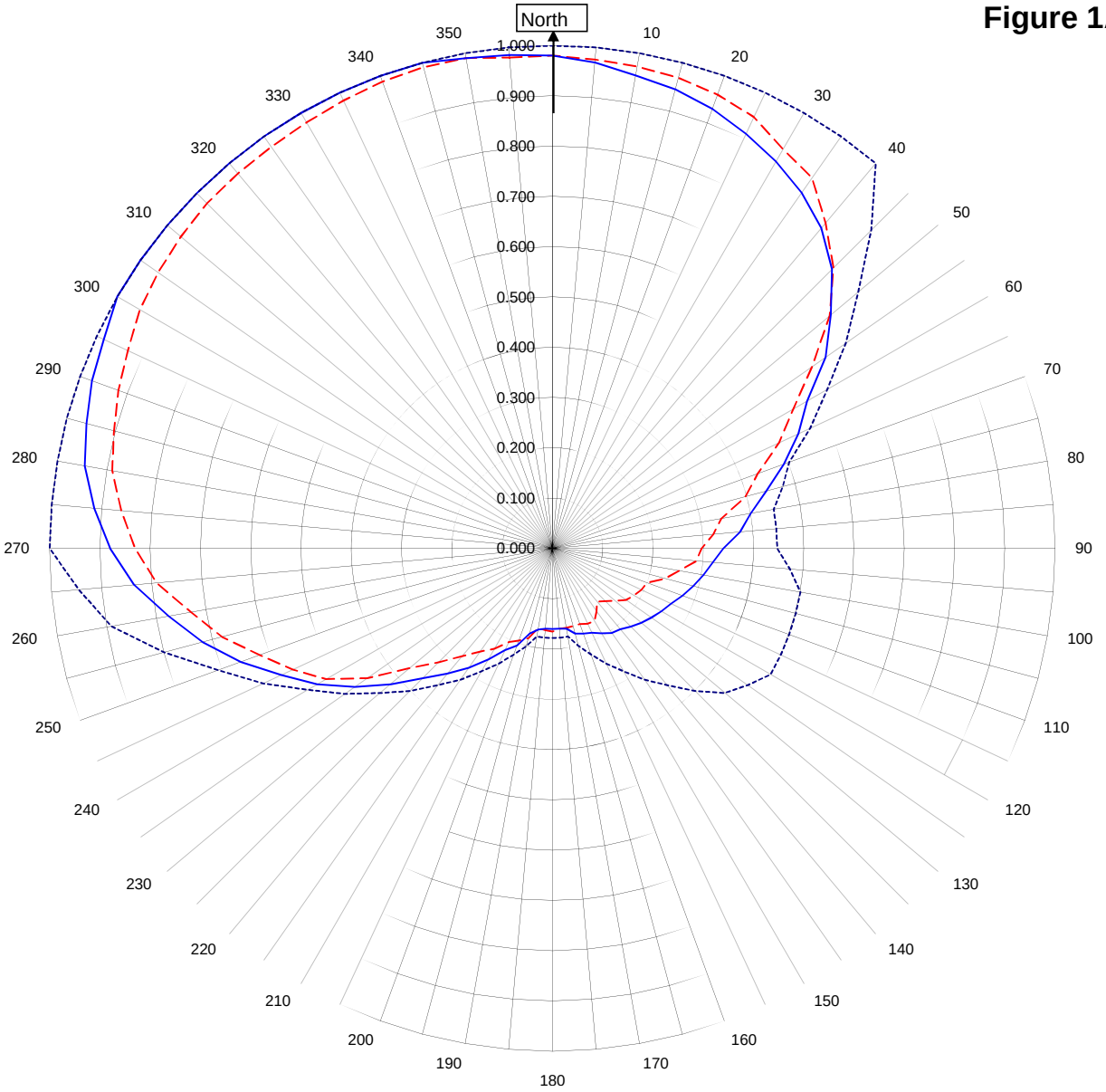
Figure 1A



KQOC Gleneden Beach, OR

30293

November 6, 2012

Horizontal RMS	0.675
Vertical RMS	0.655
H/V Composite RMS	0.679
FCC Composite RMS	0.727

Frequency	88.1 / 396.45 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-2R-SS(0.9)-DA
Pattern Type	Directional Azimuth

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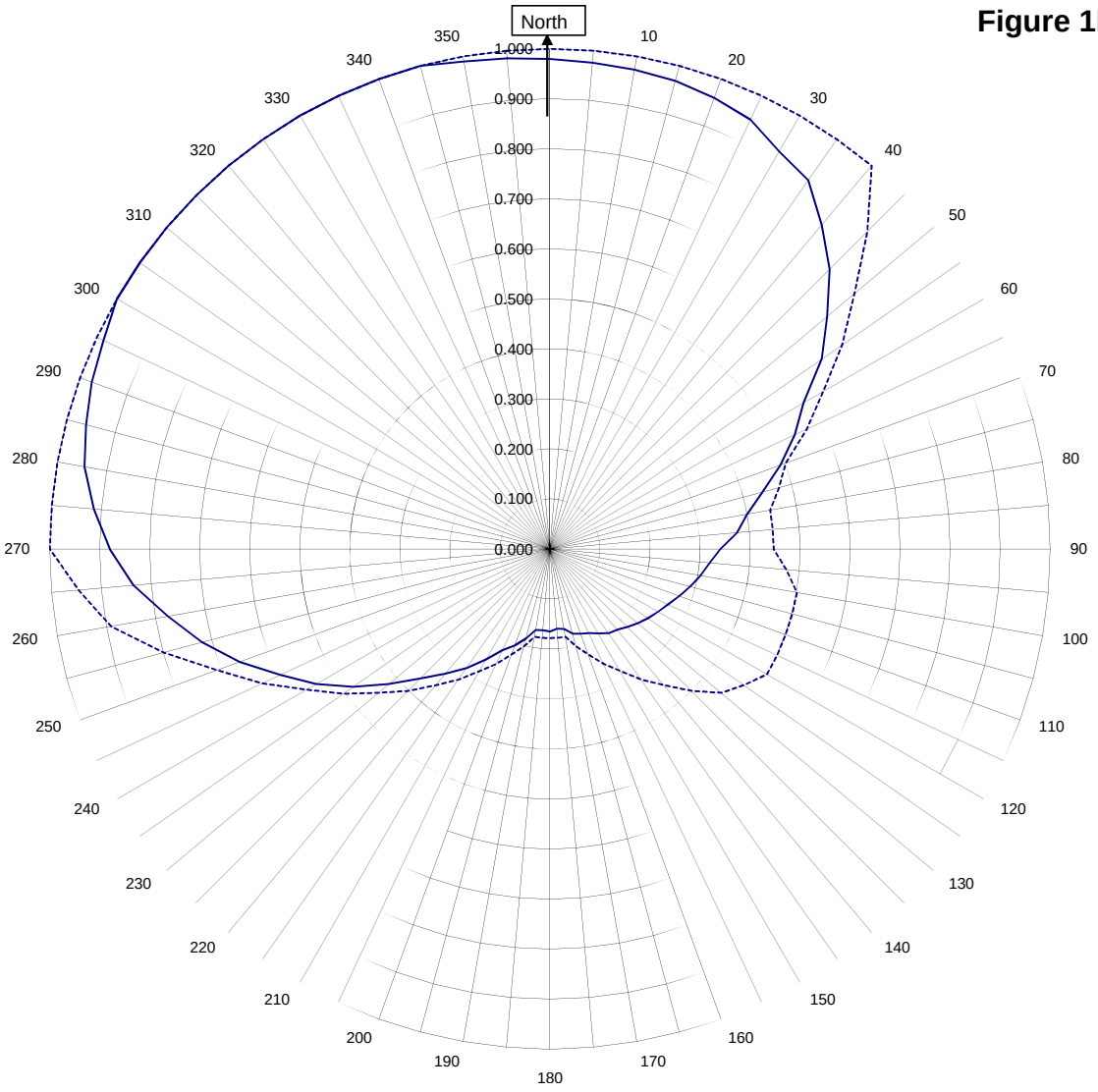
Figure 1B



KQOC Gleneden Beach, OR

30293

November 6, 2012

_____H/VComposite RMS	0.679
……FCC Composite RMS	0.727

Frequency	88.1 / 396.45 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-2R-SS(0.9)-DA
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
KQOC Gleneden Beach, OR

Azimuth	Rel Field	Azimuth	Rel Field
0	0.980	180	0.160
10	0.955	190	0.164
20	0.930	200	0.205
30	0.889	210	0.255
40	0.832	220	0.325
45	0.786	225	0.365
50	0.723	230	0.420
60	0.585	240	0.540
70	0.490	250	0.660
80	0.400	260	0.775
90	0.340	270	0.880
100	0.305	280	0.945
110	0.275	290	0.975
120	0.250	300	1.000
130	0.230	310	1.000
135	0.220	315	1.000
140	0.210	320	1.000
150	0.195	330	1.000
160	0.180	340	1.000
170	0.162	350	0.990

Figure 1D

Tabulation of Vertical Azimuth Pattern
KQOC Gleneden Beach, OR

Azimuth	Rel Field	Azimuth	Rel Field
0	0.980	180	0.165
10	0.973	190	0.161
20	0.960	200	0.195
30	0.917	210	0.230
40	0.845	220	0.280
45	0.790	225	0.320
50	0.720	230	0.370
60	0.553	240	0.520
70	0.435	250	0.620
80	0.341	260	0.730
90	0.297	270	0.830
100	0.256	280	0.889
110	0.200	290	0.919
120	0.187	300	0.948
130	0.162	310	0.965
135	0.148	315	0.971
140	0.138	320	0.973
150	0.167	330	0.978
160	0.160	340	0.988
170	0.160	350	0.990

Figure 1E

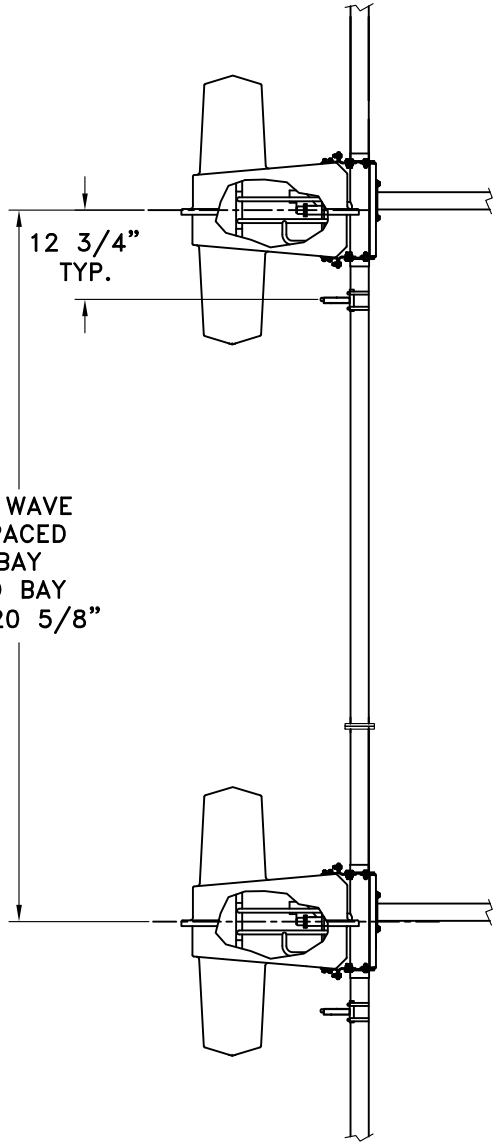
Tabulation of Composite Azimuth Pattern
KQOC Gleneden Beach, OR

Azimuth	Rel Field	Azimuth	Rel Field
0	0.980	180	0.165
10	0.973	190	0.164
20	0.960	200	0.205
30	0.917	210	0.255
40	0.845	220	0.325
45	0.790	225	0.365
50	0.723	230	0.420
60	0.585	240	0.540
70	0.490	250	0.660
80	0.400	260	0.775
90	0.340	270	0.880
100	0.305	280	0.945
110	0.275	290	0.975
120	0.250	300	1.000
130	0.230	310	1.000
135	0.220	315	1.000
140	0.210	320	1.000
150	0.195	330	1.000
160	0.180	340	1.000
170	0.162	350	0.990

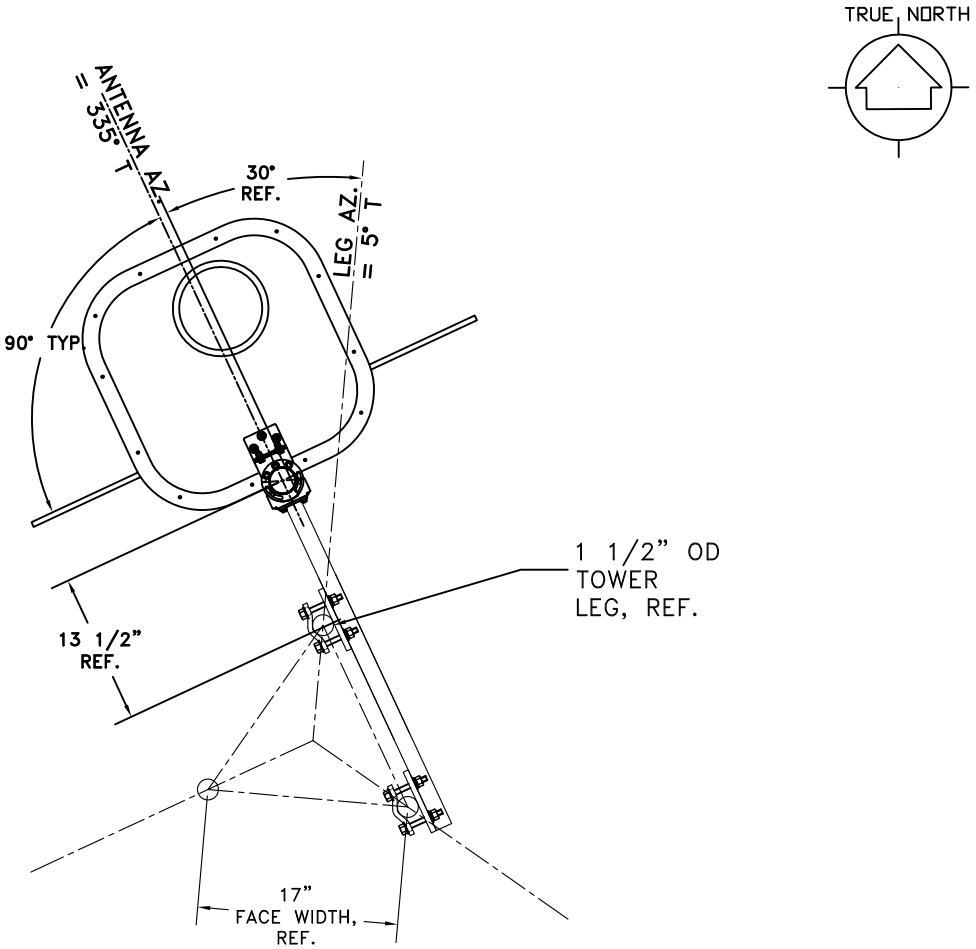
Figure 1F

Tabulation of FCC Directional Composite
KQOC Gleneden Beach, OR

Azimuth	Rel Field	Azimuth	Rel Field
0	1.000	180	0.178
10	1.000	190	0.178
20	1.000	200	0.224
30	1.000	210	0.282
40	1.000	220	0.355
50	0.794	230	0.447
60	0.631	240	0.562
70	0.501	250	0.708
80	0.447	260	0.891
90	0.447	270	1.000
100	0.501	280	1.000
110	0.501	290	1.000
120	0.501	300	1.000
130	0.447	310	1.000
140	0.355	320	1.000
150	0.282	330	1.000
160	0.224	340	1.000
170	0.178	350	1.000



SIDE VIEW



TOP VIEW

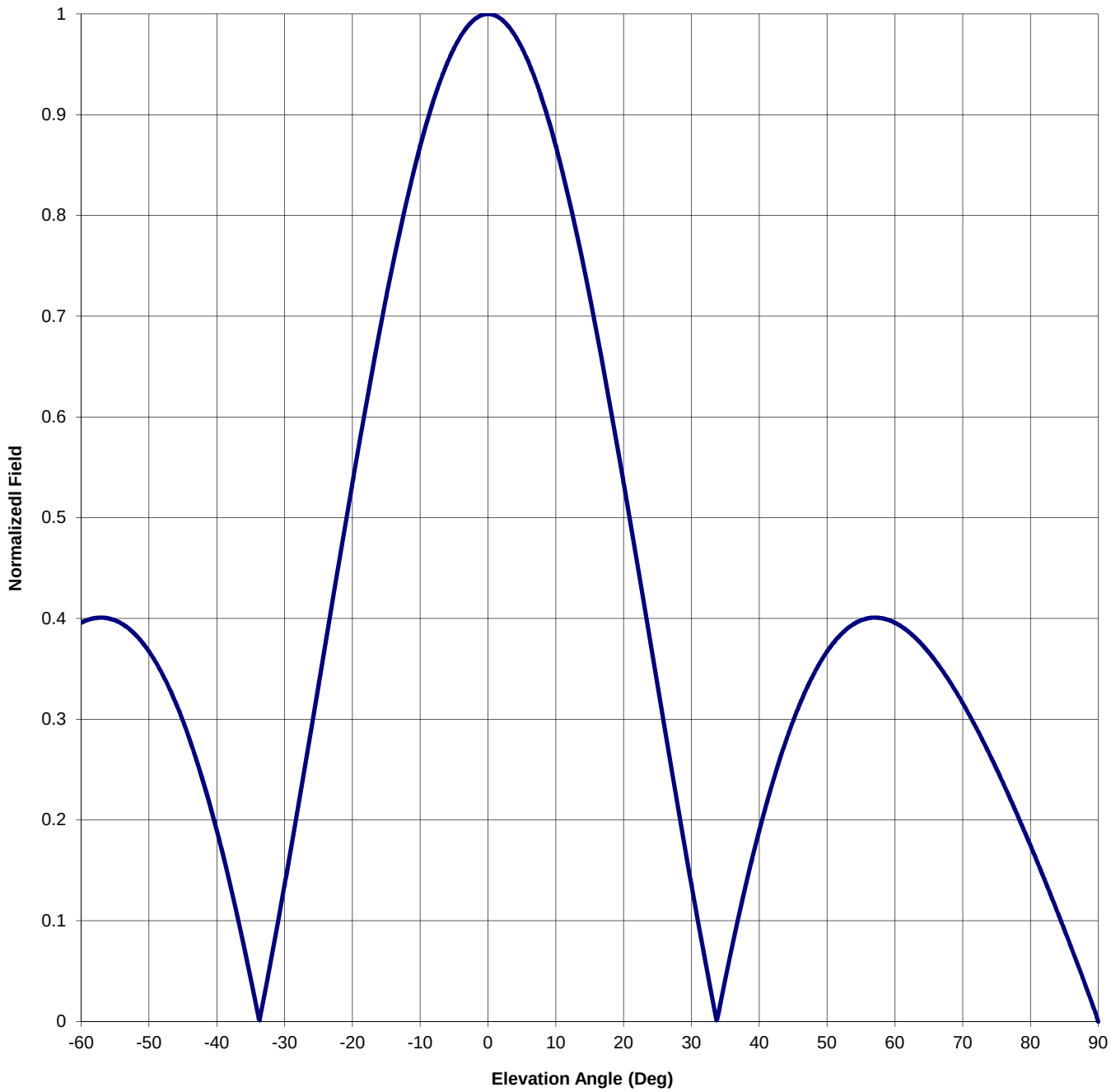
TOWER MAKE:

ROHN 55, 17" FACE

ANTENNA HEADING 335° TRUE NORTH

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 30293	FREQUENCY: 88.1	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY: DAB
TITLE: MODEL-6810-2R-.9SS-DIRECTIONAL ANTENNA			
DATE: 10-18-12	FIGURE 2		

Antenna Mfg.:	**Shively Labs**			**Date:**	**11/6/2012**
Antenna Type:	**6810-2R-SS(0.9)-DA**				
Station:	**KQOC**	**Beam Tilt**	**0**		
Frequency:	**88.1**	**Gain (Max)**	**2.284**	**3.587**	**dB**
Channel #:	**201**	**Gain (Horizon)**	**2.284**	**3.587**	**dB**
Figure:	**Figure 3**				



Antenna Mfg.: Shively Labs **Date:** 11/6/2012

Antenna Type: 6810-2R-SS(0.9)-DA

Station: KQOC **Beam Tilt** 0

Frequency: 88.1 **Gain (Max)** 2.284 3.587 dB

Channel #: 201 **Gain (Horizon)** 2.284 3.587 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	0.280	0	1.000	46	0.315
-89	0.020	-43	0.260	1	0.999	47	0.331
-88	0.038	-42	0.238	2	0.995	48	0.345
-87	0.056	-41	0.215	3	0.988	49	0.357
-86	0.074	-40	0.190	4	0.978	50	0.367
-85	0.091	-39	0.163	5	0.966	51	0.376
-84	0.108	-38	0.135	6	0.952	52	0.384
-83	0.125	-37	0.106	7	0.934	53	0.390
-82	0.142	-36	0.075	8	0.915	54	0.395
-81	0.158	-35	0.043	9	0.893	55	0.398
-80	0.175	-34	0.009	10	0.869	56	0.400
-79	0.190	-33	0.026	11	0.843	57	0.401
-78	0.206	-32	0.061	12	0.815	58	0.400
-77	0.221	-31	0.098	13	0.784	59	0.399
-76	0.236	-30	0.136	14	0.753	60	0.396
-75	0.251	-29	0.174	15	0.719	61	0.392
-74	0.265	-28	0.213	16	0.685	62	0.387
-73	0.278	-27	0.253	17	0.649	63	0.381
-72	0.291	-26	0.293	18	0.612	64	0.374
-71	0.304	-25	0.334	19	0.573	65	0.366
-70	0.316	-24	0.374	20	0.535	66	0.358
-69	0.328	-23	0.415	21	0.495	67	0.348
-68	0.338	-22	0.455	22	0.455	68	0.338
-67	0.348	-21	0.495	23	0.415	69	0.328
-66	0.358	-20	0.535	24	0.374	70	0.316
-65	0.366	-19	0.573	25	0.334	71	0.304
-64	0.374	-18	0.612	26	0.293	72	0.291
-63	0.381	-17	0.649	27	0.253	73	0.278
-62	0.387	-16	0.685	28	0.213	74	0.265
-61	0.392	-15	0.719	29	0.174	75	0.251
-60	0.396	-14	0.753	30	0.136	76	0.236
-59	0.399	-13	0.784	31	0.098	77	0.221
-58	0.400	-12	0.815	32	0.061	78	0.206
-57	0.401	-11	0.843	33	0.026	79	0.190
-56	0.400	-10	0.869	34	0.009	80	0.175
-55	0.398	-9	0.893	35	0.043	81	0.158
-54	0.395	-8	0.915	36	0.075	82	0.142
-53	0.390	-7	0.934	37	0.106	83	0.125
-52	0.384	-6	0.952	38	0.135	84	0.108
-51	0.376	-5	0.966	39	0.163	85	0.091
-50	0.367	-4	0.978	40	0.190	86	0.074
-49	0.357	-3	0.988	41	0.215	87	0.056
-48	0.345	-2	0.995	42	0.238	88	0.038
-47	0.331	-1	0.999	43	0.260	89	0.020
-46	0.315	0	1.000	44	0.280	90	0.000
-45	0.298			45	0.298		

S.O. 30293 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

KQOC Gleneden Beach, OR

MODEL 6810-2R-SS(0.9)-DA

Elevation Gain of Antenna 1.01

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

H RMS 0.674946 V RMS 0.655201 H/V Ratio 1.030

Elevation Gain of Horizontal Component 1.040

Elevation Gain of Vertical Component 0.980

Horizontal Azimuth Gain equals $1/(RMS)^2$. 2.195

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 2.288

Max. Vertical 0.991

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

Total Horizontal Power Gain = **2.284**

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

Total Vertical Power Gain = **2.243**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

6.5 kW ERP Divided by H Gain 2.284 equals 2.846 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

2.846 kW Times V Gain 2.243 equals 6.384 kW V ERP

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

(0.991)^2 Times 6.50 Equals 6.384 kW Vertical ERP

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