

S.O. 25970

Report of Test 6810-6R-DA

for

JACOR BROADCASTING OF COLORADO, INC.

KPAW 107.9 MHz Fort Collins, CO

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-6R-DA to meet the needs of KPAW and to comply with the requirements of the FCC construction permit, file number BPH-20030602ACS.

RESULTS:

The measured azimuth pattern for the 6810-6R-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-20030602ACS indicates that the Horizontal radiation component shall not exceed 100 kW at any azimuth and is restricted to the following values at the azimuths specified:

50 Degrees T: 16.0 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 170 Degrees T to 175 Degrees T, at 255 Degrees T to 265 Degrees T and at 320 Degrees T to 328 Degrees T. At the restricted azimuth of 50 Degrees T the Horizontal component is 8.4 dB down from the maximum of 100 kW, or 14.4 kW.

The R.M.S. of the Horizontal component is 0.740. The total Horizontal power gain is 6.105. The R.M.S. of the Vertical component is 0.726. The total Vertical power gain is 5.337. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.925. The R.M.S. of the measured composite pattern is 0.786. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.786. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-6R-DA was mounted on a tower of precise scale to the ERI 42" face tower at the KPAW site. The spacing of the antenna to the tower was varied to achieve the horizontal and vertical patterns shown in Figure 1. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BPH-20030602ACS, a single level of the 6810-6R-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 485.55 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 unpadding 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:

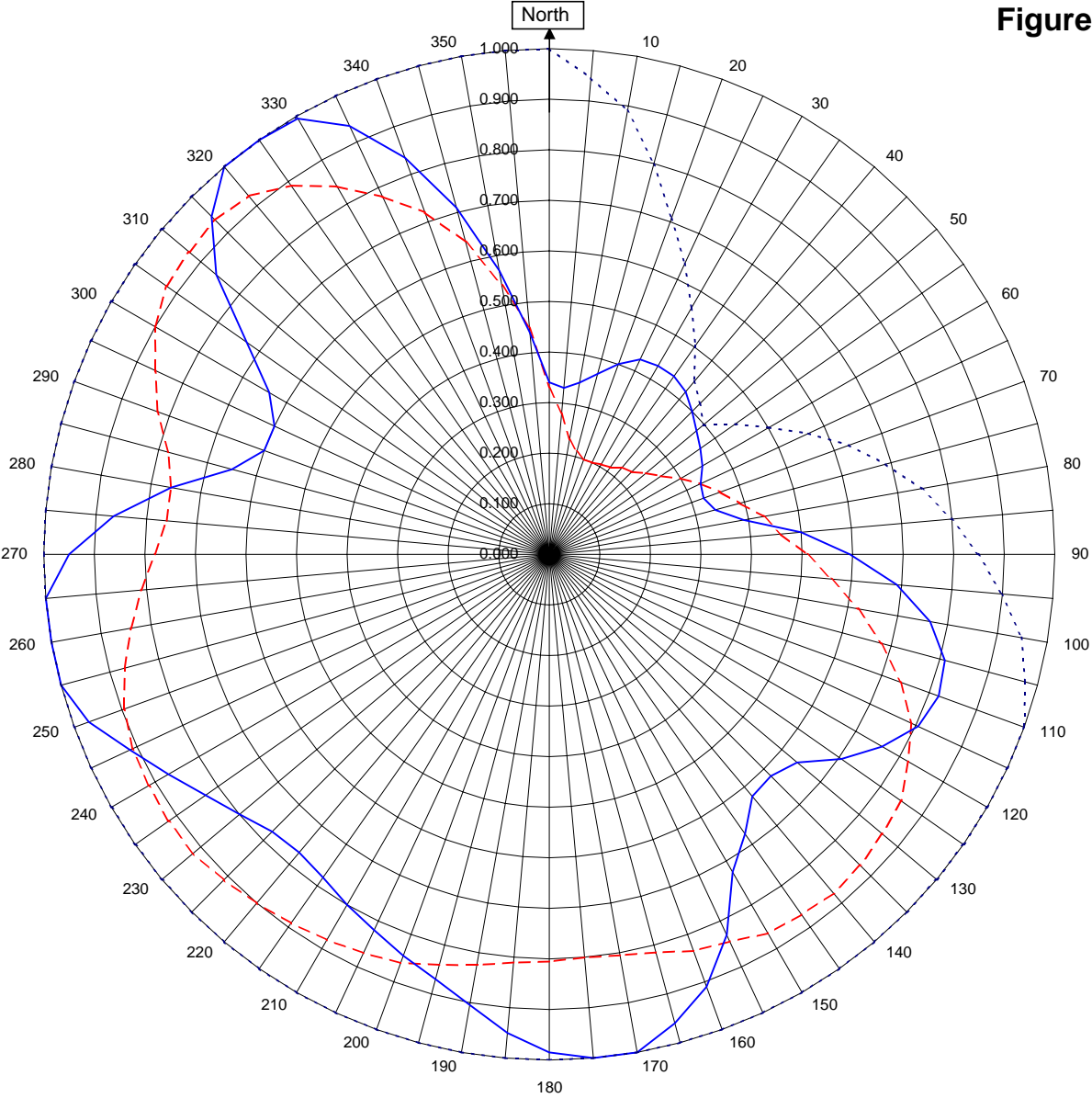


Robert A. Surette
Director of Sales Engineering
S/O 25970
November 8, 2007

Shively Labs

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

Figure 1



KPAW Ft. Collins, CO

25970

November 8, 2007

Horizontal RMS	0.740	Frequency	107.9 / 485.55 MHz
Vertical RMS	0.726	Plot	Relative Field
H/V Composite RMS	0.786	Scale	4.5 : 1
FCC Composite RMS	0.925	See Figure 2 for Mechanical Details	

Antenna Model	6810-6R-DA
Pattern Type	Directional Azimuth

Figure 1a

Tabulation of Horizontal Azimuth Pattern
KPAW Ft. Collins, CO

Azimuth	Rel Field	Azimuth	Rel Field
0	0.340	180	0.985
10	0.345	190	0.905
20	0.400	200	0.845
30	0.430	210	0.800
40	0.420	220	0.770
45	0.400	225	0.775
50	0.380	230	0.800
60	0.350	240	0.870
70	0.325	250	0.970
80	0.390	260	1.000
90	0.595	270	0.950
100	0.765	280	0.760
110	0.820	290	0.600
120	0.760	300	0.640
130	0.640	310	0.860
135	0.620	315	0.945
140	0.625	320	1.000
150	0.725	330	0.995
160	0.910	340	0.835
170	1.000	350	0.570

Figure 1b

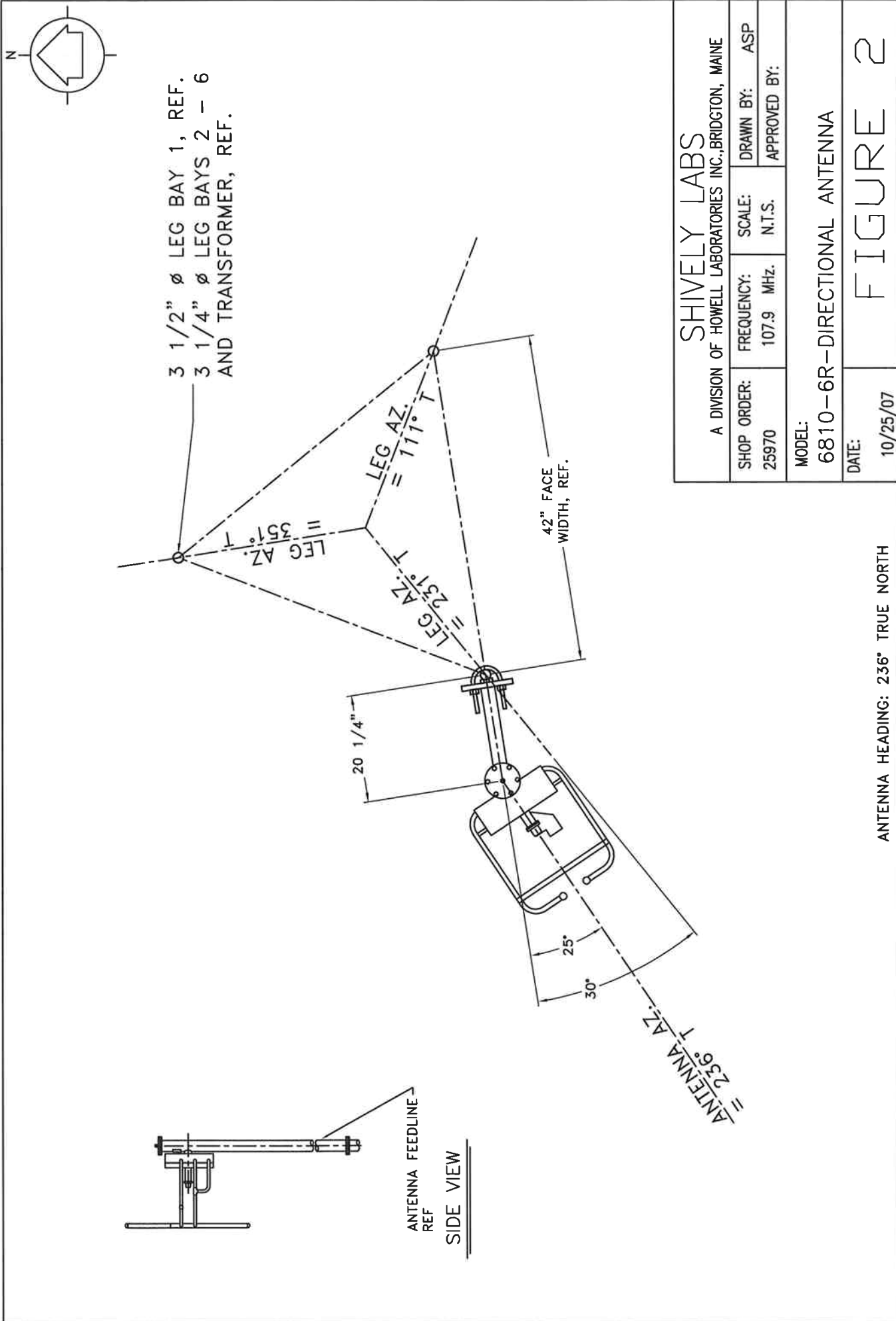
Tabulation of Vertical Azimuth Pattern
KPAW Ft. Collins, CO

Azimuth	Rel Field	Azimuth	Rel Field
0	0.330	180	0.805
10	0.230	190	0.825
20	0.200	200	0.860
30	0.205	210	0.880
40	0.225	220	0.900
45	0.230	225	0.910
50	0.250	230	0.920
60	0.300	240	0.915
70	0.360	250	0.895
80	0.430	260	0.840
90	0.510	270	0.780
100	0.620	280	0.760
110	0.740	290	0.825
120	0.820	300	0.900
130	0.860	310	0.930
135	0.870	315	0.935
140	0.875	320	0.925
150	0.865	330	0.840
160	0.835	340	0.720
170	0.805	350	0.540

Figure 1c

Tabulation of FCC Directional Composite
KPAW Ft. Collins, CO

Azimuth	Rel Field	Azimuth	Rel Field
0	1.000	180	1.000
10	0.891	190	1.000
20	0.707	200	1.000
30	0.562	210	1.000
40	0.446	220	1.000
50	0.398	230	1.000
60	0.501	240	1.000
70	0.630	250	1.000
80	0.748	260	1.000
90	0.848	270	1.000
100	0.949	280	1.000
110	1.000	290	1.000
120	1.000	300	1.000
130	1.000	310	1.000
140	1.000	320	1.000
150	1.000	330	1.000
160	1.000	340	1.000
170	1.000	350	1.000



Antenna Mfg.: Shively Labs
Antenna Type: 6810-6R-DA

Date: 11/8/2007

Station: KPAW

Frequency: 107.9

Channel #: 300

Figure: 3

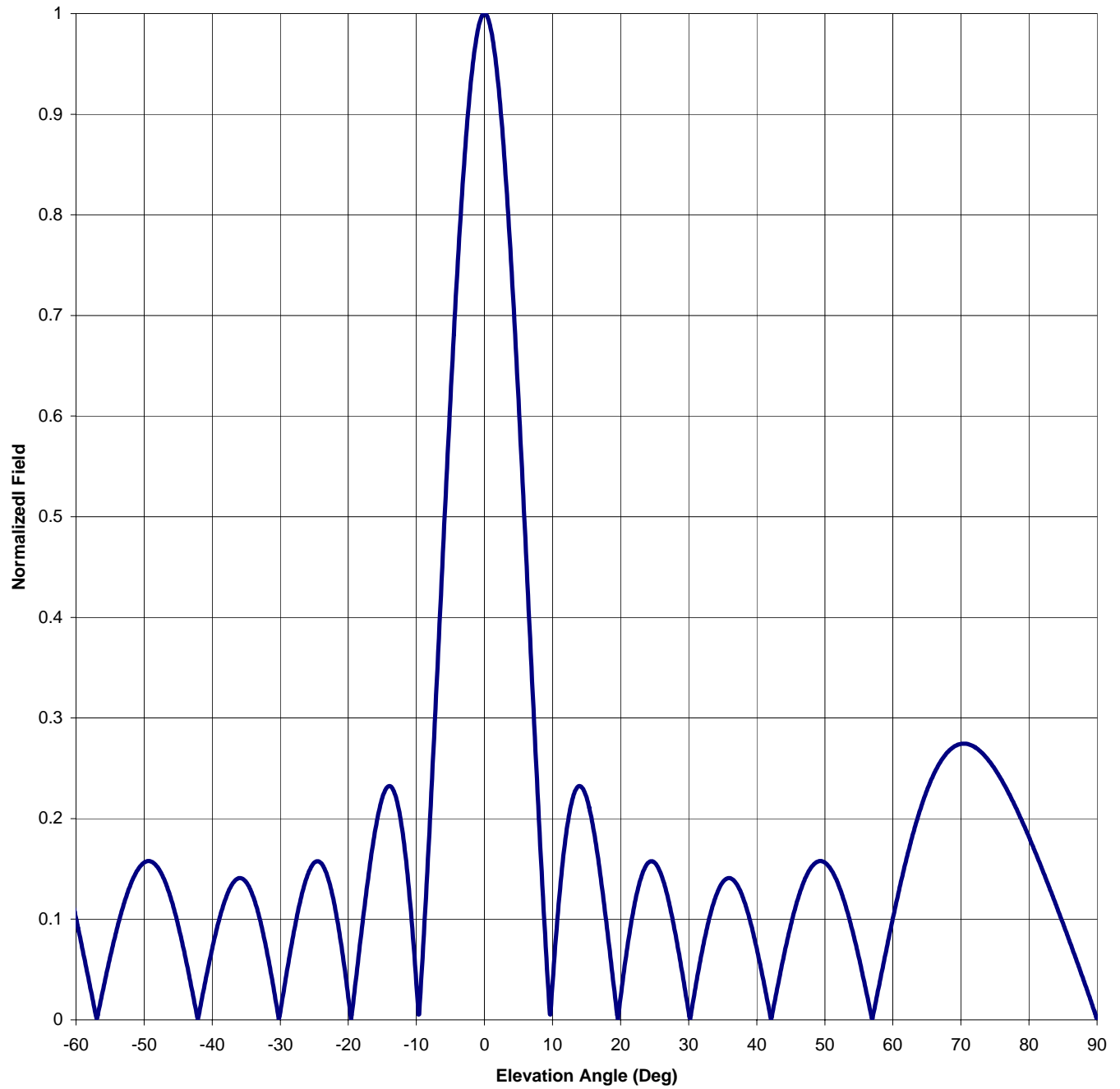
Beam Tilt 0

Gain (Max) 6.105

Gain (Horizon) 6.105

7.857 dB

7.857 dB



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7.857 dB
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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	0.064	0	1.000	46	0.119
-89	0.020	-43	0.031	1	0.983	47	0.139
-88	0.040	-42	0.004	2	0.932	48	0.151
-87	0.059	-41	0.038	3	0.850	49	0.157
-86	0.077	-40	0.071	4	0.743	50	0.156
-85	0.096	-39	0.099	5	0.616	51	0.148
-84	0.114	-38	0.121	6	0.479	52	0.134
-83	0.131	-37	0.135	7	0.337	53	0.115
-82	0.149	-36	0.141	8	0.199	54	0.090
-81	0.165	-35	0.137	9	0.073	55	0.062
-80	0.182	-34	0.123	10	0.036	56	0.031
-79	0.197	-33	0.100	11	0.123	57	0.002
-78	0.212	-32	0.069	12	0.185	58	0.035
-77	0.226	-31	0.032	13	0.221	59	0.068
-76	0.238	-30	0.008	14	0.232	60	0.101
-75	0.249	-29	0.049	15	0.221	61	0.132
-74	0.258	-28	0.087	16	0.190	62	0.160
-73	0.266	-27	0.120	17	0.145	63	0.186
-72	0.271	-26	0.144	18	0.091	64	0.209
-71	0.274	-25	0.156	19	0.034	65	0.228
-70	0.274	-24	0.156	20	0.023	66	0.244
-69	0.272	-23	0.141	21	0.073	67	0.257
-68	0.266	-22	0.113	22	0.113	68	0.266
-67	0.257	-21	0.073	23	0.141	69	0.272
-66	0.244	-20	0.023	24	0.156	70	0.274
-65	0.228	-19	0.034	25	0.156	71	0.274
-64	0.209	-18	0.091	26	0.144	72	0.271
-63	0.186	-17	0.145	27	0.120	73	0.266
-62	0.160	-16	0.190	28	0.087	74	0.258
-61	0.132	-15	0.221	29	0.049	75	0.249
-60	0.101	-14	0.232	30	0.008	76	0.238
-59	0.068	-13	0.221	31	0.032	77	0.226
-58	0.035	-12	0.185	32	0.069	78	0.212
-57	0.002	-11	0.123	33	0.100	79	0.197
-56	0.031	-10	0.036	34	0.123	80	0.182
-55	0.062	-9	0.073	35	0.137	81	0.165
-54	0.090	-8	0.199	36	0.141	82	0.149
-53	0.115	-7	0.337	37	0.135	83	0.131
-52	0.134	-6	0.479	38	0.121	84	0.114
-51	0.148	-5	0.616	39	0.099	85	0.096
-50	0.156	-4	0.743	40	0.071	86	0.077
-49	0.157	-3	0.850	41	0.038	87	0.059
-48	0.151	-2	0.932	42	0.004	88	0.040
-47	0.139	-1	0.983	43	0.031	89	0.020
-46	0.119	0	1.000	44	0.064	90	0.000
-45	0.094			45	0.094		

VALIDATION OF TOTAL POWER GAIN CALCULATION

KPAW 107.9 MHz FORT COLLINS, CO

MODEL 6810-6R-DA

Elevation Gain of Antenna 3.28

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

H RMS	0.74	V RMS	0.726	H/V Ratio	1.019
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Elevation Gain of Horizontal Component 3.343

Elevation Gain of Vertical Component 3.218

Horizontal Azimuth Gain equals 1/(RMS)SQ. 1.826

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 1.659

Max. Vertical 0.935

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

Total Horizontal Power Gain = 6.105

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

Total Vertical Power Gain = 5.337

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ERP divided by Horizontal Power Gain equals Antenna Input Power

100 KW ERP Equals 16.379 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

16.379 KW Times 5.337 KW Equals 87.423 KW ERP

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

0.935 Equals 87.423 KW Vertical ERP

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