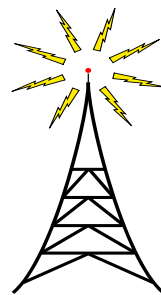




D Squared Broadcast Technologies, Inc.  
P.O. Box 48  
Madison, GA 30650



## **EXHIBIT EE-1**

**SUPPORTING FCC FORM 302-FM**

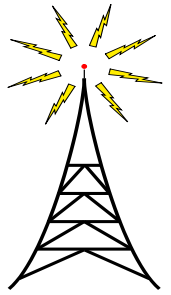
**WRGC-FM**

**Milledgeville, GA**

**February 10, 2011**



D Squared Broadcast Technologies, Inc.  
P.O. Box 48  
Madison, GA 30650



## **EXHIBIT EE-1**

### **Contents**

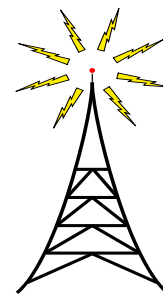
**Broadcast Engineer's Affidavit**

**Land Surveyor's Affidavit**

**Antenna Proof of Performance**



D Squared Broadcast Technologies, Inc.  
P.O. Box 48  
Madison, GA 30650



## ENGINEER'S STATEMENT

Daniel L. Davis deposes and says:

That he prepared the attached exhibit and that all work contained in that exhibit is true of his knowledge and belief, and as to such statements made on belief, they are believed to be true.

That he currently holds a F.C.C. General Class Radiotelephone License and had held a FCC First Class Radiotelephone License for ten years prior to receiving the General Class License in 1985. He also holds Professional Broadcast Engineer certification through the Society of Broadcast Engineers, and has been a member of the SBE since 1983.

That he received the degree of Master of Education from the University of Georgia in 1978, and that his undergraduate program of study was strong in Mathematics and Physics.

That he has been involved in the technical aspects of broadcasting since 1975, and has performed design, installation, project management, troubleshooting, and maintenance on broadcast facilities, including compliance measurements in connection with this work.

This statement certifies that I oversaw the assembly and installation of the WRGC directional antenna. The installation contractor, *United Tower Service*, followed the antenna manufacturer's installation instructions and drawings. All elements were positioned precisely, using factory provided alignment marks and numbering. *The antenna azimuth was certified by a licensed land surveyor, of Cranston Engineering Group*, as indicated elsewhere in this exhibit.

---

Daniel L. Davis, CPBE 02/10/11  
FCC Lic. No. PG-6-14509  
SBE CPBE No. 50651  
GA Lic. No. LVU-003485



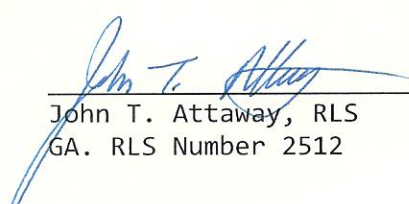
**Cranston Engineering Group, P.C.**  
ENGINEERS - PLANNERS - SURVEYORS

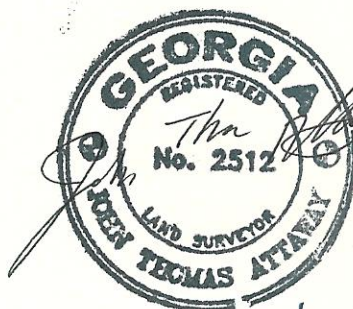
452 ELLIS STREET, AUGUSTA, GEORGIA 30901  
POST OFFICE BOX 2546, AUGUSTA, GEORGIA 30903  
TELEPHONE 706-722-1588  
FACSIMILE 706-722-8379  
mail@cranstonengineering.com

THOMAS H. ROBERTSON, PE, AICP, RLS  
JAMES B. CRANFORD, JR., PE  
DENNIS J. WELCH, PE

J. CRAIG CRANSTON, PE, RLS  
(RETIRED)

I, John T. Attaway, am a duly registered surveyor in the state of Georgia, and do hereby certify to the best of my knowledge, information, and belief that the FM antenna designated as "Georgia College & State University, WRGC-FM, 88.3 MHz, located in Milledgeville, GA" was setup and affixed to the existing tower under my supervision. The FM antenna was set at an azimuth of 285° (relative to True North), and an elevation of 784' above mean sea level (NAVD 1988) within the tolerances given to us by Daniel L. Davis, CPBE.

  
\_\_\_\_\_  
John T. Attaway, RLS  
GA. RLS Number 2512



2/8/11

**S.O. 28439**

**Report of Test 6810-3R-DA**

**for**

**GEORGIA COLLEGE & STATE UNIVERSITY**

**WRGC-FM 88.3 MHz Milledgeville, GA**

**OBJECTIVE:**

The objective of this test was to demonstrate the directional characteristics of a 6810-3R-DA to meet the needs of WRGC-FM and to comply with the requirements of the FCC construction permit, file number BNPED-20071018AOO.

**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 BNPED-20071018AOO indicates that the Horizontal radiation component shall not exceed 4.8 kW at any azimuth and is restricted to the following values at the azimuths specified:

70 - 90 Degrees T: 0.150 kW

From Figure 1A, the maximum radiation of the Horizontal component occurs at 225 Degrees T to 315 Degrees T. At the restricted azimuth of 70 - 90 Degrees T the Horizontal component is 15.39 dB down from the maximum of 4.8 kW, or 0.139 kW.

The R.M.S. of the Horizontal component is 0.675. The total Horizontal power gain is 3.609. The R.M.S. of the Vertical component is 0.640. The total Vertical power gain is 3.257. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.704. The R.M.S. of the measured composite pattern is 0.679. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.598. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

#### **METHOD OF DIRECTIONALIZATION:**

One bay of the 6810-3R-DA was mounted on a tower of precise scale to the Rohn 36-inch face tower at the WRGC-FM 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 BNPED-20071018AOO, a single level of the 6810-3R-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 9<sup>th</sup> and 10<sup>th</sup> 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 397.35 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:

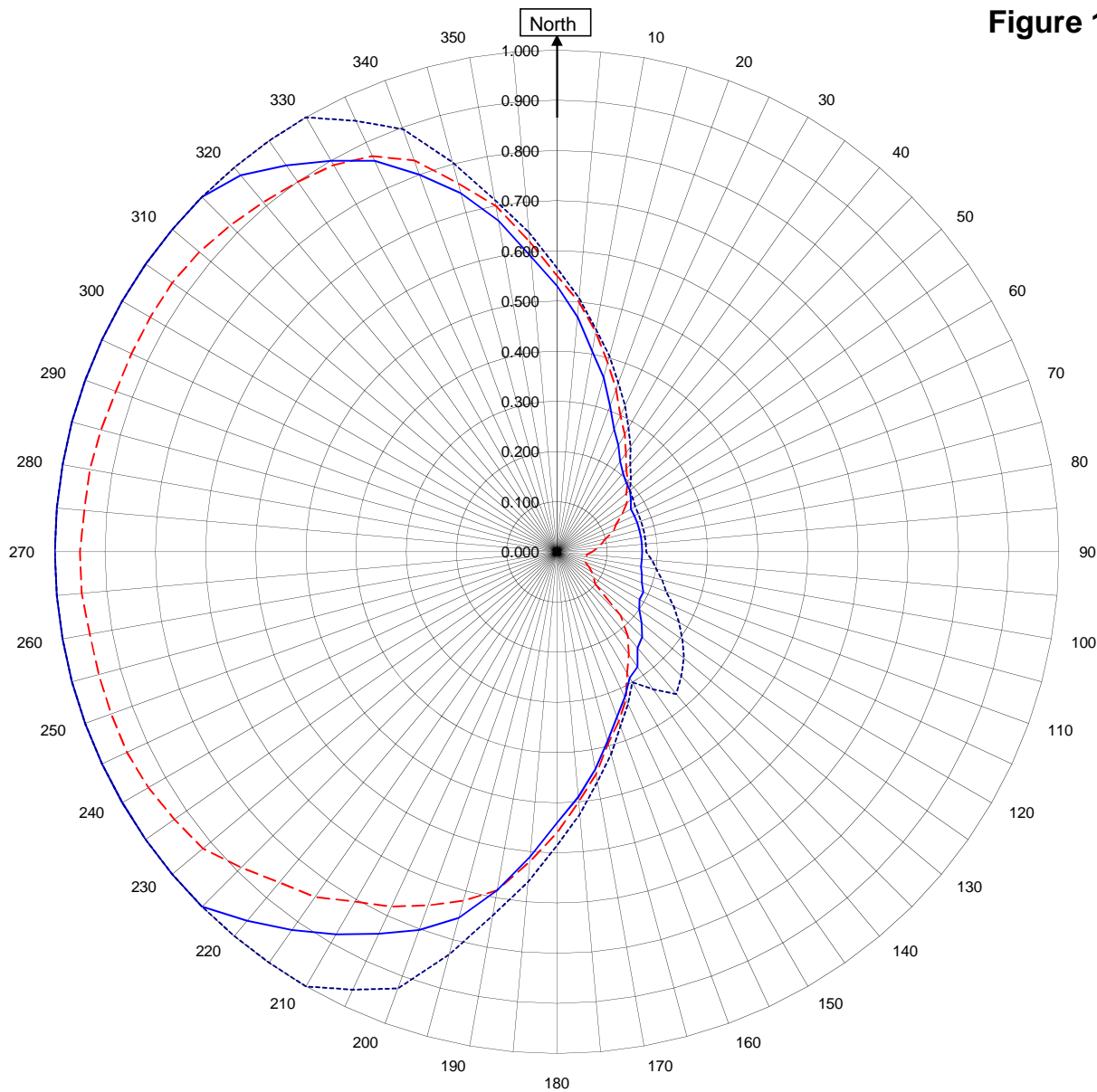


Robert A. Surette  
Director of Sales Engineering  
S/O 28439  
September 15, 2010

# Shively Labs

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

Figure 1a



## WRGC-FM Milledgeville, GA

28439  
September 20, 2010

Horizontal RMS	0.675	Frequency	88.3 / 397.35 MHz
Vertical RMS	0.640	Plot	Relative Field
H/V Composite RMS	0.679	Scale	4.5 : 1
FCC Composite RMS	0.704	See Figure 2 for Mechanical Details	

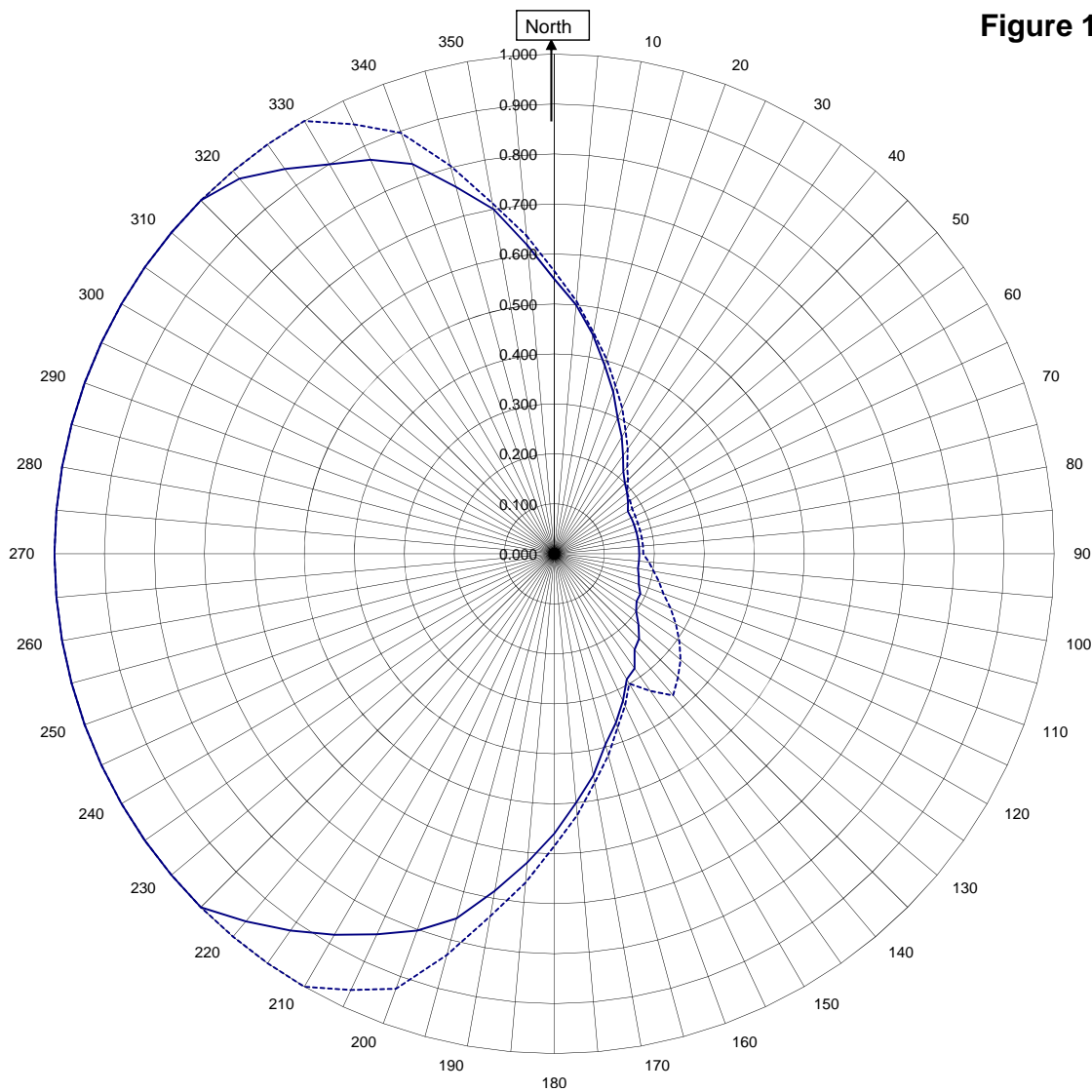
Antenna Model	6810-3R-DA
Pattern Type	Directional Azimuth



# Shively Labs

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

Figure 1b



## WRGC-FM Milledgeville, GA

28439  
September 20, 2010

—————H/V Composite RMS	0.679
.....FCC Composite RMS	0.704

Frequency	88.3 / 397.35 MHz
Plot	Relative Field
Scale	4.5 : 1
See Figure 2 for Mechanical Details	

Antenna Model	6810-3R-DA
Pattern Type	Directional H/V Composite

Figure 1c

Tabulation of Horizontal Azimuth Pattern  
WRGC-FM Milledgeville, GA

Azimuth	Rel Field	Azimuth	Rel Field
0	0.530	180	0.540
10	0.405	190	0.685
20	0.310	200	0.802
30	0.245	210	0.880
40	0.205	220	0.960
45	0.195	225	1.000
50	0.190	230	1.000
60	0.170	240	1.000
70	0.170	250	1.000
80	0.170	260	1.000
90	0.170	270	1.000
100	0.170	280	1.000
110	0.180	290	1.000
120	0.190	300	1.000
130	0.220	310	1.000
135	0.240	315	1.000
140	0.250	320	0.980
150	0.290	330	0.900
160	0.350	340	0.800
170	0.440	350	0.670

Figure 1d

Tabulation of Vertical Azimuth Pattern  
WRGC-FM Milledgeville, GA

Azimuth	Rel Field	Azimuth	Rel Field
0	0.550	180	0.560
10	0.445	190	0.685
20	0.345	200	0.750
30	0.270	210	0.805
40	0.215	220	0.860
45	0.200	225	0.890
50	0.180	230	0.920
60	0.150	240	0.940
70	0.120	250	0.945
80	0.090	260	0.945
90	0.070	270	0.950
100	0.060	280	0.945
110	0.060	290	0.935
120	0.080	300	0.935
130	0.100	310	0.930
135	0.180	315	0.920
140	0.220	320	0.910
150	0.280	330	0.890
160	0.360	340	0.830
170	0.450	350	0.700

Figure 1e

Tabulation of Composite Azimuth Pattern  
WRGC-FM Milledgeville, GA

Azimuth	Rel Field	Azimuth	Rel Field
0	0.550	180	0.560
10	0.445	190	0.685
20	0.345	200	0.802
30	0.270	210	0.880
40	0.215	220	0.960
45	0.200	225	1.000
50	0.190	230	1.000
60	0.170	240	1.000
70	0.170	250	1.000
80	0.170	260	1.000
90	0.170	270	1.000
100	0.170	280	1.000
110	0.180	290	1.000
120	0.190	300	1.000
130	0.220	310	1.000
135	0.240	315	1.000
140	0.250	320	0.980
150	0.290	330	0.900
160	0.360	340	0.830
170	0.450	350	0.700

Figure 1f

Tabulation of FCC Directional Composite  
WRGC-FM Milledgeville, GA

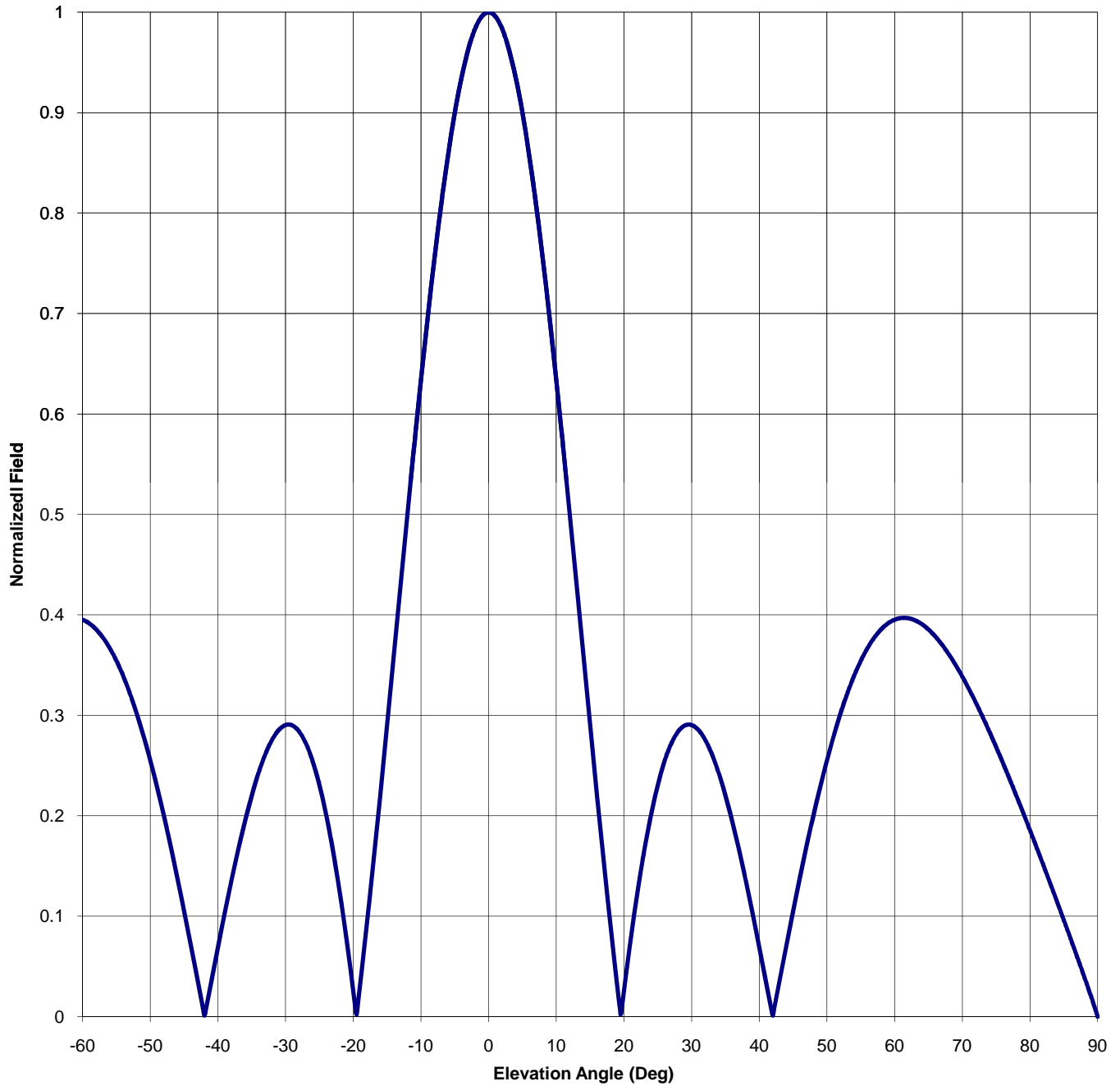
Azimuth	Rel Field	Azimuth	Rel Field
0	0.566	180	0.585
10	0.450	190	0.736
20	0.358	200	0.926
30	0.285	210	1.000
40	0.227	220	1.000
50	0.190	230	1.000
60	0.180	240	1.000
70	0.178	250	1.000
80	0.178	260	1.000
90	0.178	270	1.000
100	0.202	280	1.000
110	0.232	290	1.000
120	0.281	300	1.000
130	0.330	310	1.000
140	0.370	320	1.000
150	0.300	330	1.000
160	0.370	340	0.896
170	0.465	350	0.712



Antenna Mfg.: Shively Labs  
Antenna Type: 6810-3R-DA  
Station: WRGC-FM  
Frequency: 88.3  
Channel #: 202  
Figure: 3

Date: 9/20/2010

Beam Tilt	0	
Gain (Max)	3.609	5.574 dB
Gain (Horizon)	3.609	5.574 dB



Antenna Mfg.: Shively Labs  
 Antenna Type: 6810-3R-DA  
 Station: WRGC-FM  
 Frequency: 88.3  
 Channel #: 202  
 Figure: 3

Date: 9/20/2010

Beam Tilt 0  
 Gain (Max) 3.609 5.574 dB  
 Gain (Horizon) 3.609 5.574 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	0.071	0	1.000	46	0.138
-89	0.021	-43	0.036	1	0.996	47	0.170
-88	0.040	-42	0.001	2	0.984	48	0.201
-87	0.059	-41	0.034	3	0.963	49	0.229
-86	0.078	-40	0.069	4	0.935	50	0.255
-85	0.096	-39	0.103	5	0.900	51	0.280
-84	0.114	-38	0.135	6	0.858	52	0.302
-83	0.132	-37	0.166	7	0.809	53	0.322
-82	0.150	-36	0.195	8	0.755	54	0.339
-81	0.168	-35	0.220	9	0.696	55	0.354
-80	0.185	-34	0.243	10	0.634	56	0.367
-79	0.203	-33	0.261	11	0.568	57	0.377
-78	0.220	-32	0.276	12	0.500	58	0.386
-77	0.236	-31	0.285	13	0.430	59	0.392
-76	0.252	-30	0.290	14	0.360	60	0.395
-75	0.268	-29	0.290	15	0.290	61	0.397
-74	0.284	-28	0.284	16	0.221	62	0.397
-73	0.298	-27	0.272	17	0.155	63	0.395
-72	0.312	-26	0.254	18	0.091	64	0.391
-71	0.326	-25	0.231	19	0.031	65	0.385
-70	0.338	-24	0.201	20	0.026	66	0.379
-69	0.350	-23	0.165	21	0.077	67	0.370
-68	0.361	-22	0.124	22	0.124	68	0.361
-67	0.370	-21	0.077	23	0.165	69	0.350
-66	0.379	-20	0.026	24	0.201	70	0.338
-65	0.385	-19	0.031	25	0.231	71	0.326
-64	0.391	-18	0.091	26	0.254	72	0.312
-63	0.395	-17	0.155	27	0.272	73	0.298
-62	0.397	-16	0.221	28	0.284	74	0.284
-61	0.397	-15	0.290	29	0.290	75	0.268
-60	0.395	-14	0.360	30	0.290	76	0.252
-59	0.392	-13	0.430	31	0.285	77	0.236
-58	0.386	-12	0.500	32	0.276	78	0.220
-57	0.377	-11	0.568	33	0.261	79	0.203
-56	0.367	-10	0.634	34	0.243	80	0.185
-55	0.354	-9	0.696	35	0.220	81	0.168
-54	0.339	-8	0.755	36	0.195	82	0.150
-53	0.322	-7	0.809	37	0.166	83	0.132
-52	0.302	-6	0.858	38	0.135	84	0.114
-51	0.280	-5	0.900	39	0.103	85	0.096
-50	0.255	-4	0.935	40	0.069	86	0.078
-49	0.229	-3	0.963	41	0.034	87	0.059
-48	0.201	-2	0.984	42	0.001	88	0.040
-47	0.170	-1	0.996	43	0.036	89	0.021
-46	0.138	0	1.000	44	0.071	90	0.000
-45	0.105			45	0.105		



## VALIDATION OF TOTAL POWER GAIN CALCULATION

WRGC-FM 88.3 MHz Milledgeville, GA

Model 6810-3R-DA

Elevation Gain of Antenna

1.559

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

H RMS

0.675

V RMS

0.64

H/V Ratio

1.055

Elevation Gain of Horizontal Component

1.644

Elevation Gain of Vertical Component

1.478

Horizontal Azimuth Gain equals  $1/(\text{RMS})^2$ .

2.195

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

2.203

Max. Vertical

0.95

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

Total Horizontal Power Gain =

3.609

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

Total Vertical Power Gain =

3.257

ERP divided by Horizontal Power Gain equals Antenna Input Power

4.8

kW ERP

Divided by H Gain

3.609

equals

1.33

kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

1.33

kW

Times V Gain

3.257

equals

4.33

kW V ERP

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

 $(0.95)^2$ 

Times

4.80

Equals

4.33

kW Vertical ERP

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