

TECHNICAL EXHIBIT  
APPLICATION FOR LICENSE  
RADIO STATION KZTS(FM)  
CAMMACK VILLAGE, ARKANSAS  
CH 266A 0.85 KW (MAX-DA) 267 M

Technical Statement

This Technical Exhibit, of which this statement is part, was prepared on behalf of radio station KZTS(FM) on Channel 266A at Cammack Village, Arkansas. KZTS(FM) has authorization for a new transmitter site with an antenna height above terrain (HAAT) to 267 meters and its effective radiated power to 0.85 kilowatts (kW) employing a directional antenna.<sup>1</sup> By this instant application, program test authority and station licensure is requested.

The Attachments contain the required directional antenna Proof-of-Performance, licensed surveyor affidavit and qualified engineer affidavit.

Charles A. Cooper

March 4, 2010

du Treil, Lundin & Rackley, Inc.  
201 Fletcher Avenue  
Sarasota, Florida 34237  
941.329.6000

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<sup>1</sup> See FCC Construction Permit BMPH-20100121AFB.

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RADIO STATION KZTS(FM)  
CAMMACK VILLAGE, ARKANSAS  
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KZTS(FM) RF Transmission System Specifications

Description	System
Transmitter Power Output (0.7 kW):	-1.6 dBk
<i>Andrew</i> Transmission Line Loss (HJ5-50A) 205 feet:	0.9 dB
<i>Shively 6810-2R-SS-DA</i> Antenna Gain (1.5 Power Gain):	1.8 dB
Maximum Effective Radiated Power (0.85 kW):	-0.7 dBk

# **ATTACHMENT A**

DIRECTIONAL ANTENNA  
PROOF-OF-PERFORMANCE

## S.O. 27902

### Report of Test 6810-2R-SS-DA

for

**Flinn Broadcasting Corporation**

**KZTS 101.1 MHz Cammack Village, AR**

#### **OBJECTIVE:**

The objective of this test was to demonstrate the directional characteristics of a 6810-2R-SS-DA to meet the needs of KZTS and to comply with the requirements of the FCC construction permit, file number BMPH-20100121AFB.

#### **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 BMPH-20100121AFB indicates that the Horizontal radiation component shall not exceed 0.850 kW at any azimuth and is restricted to the following values at the azimuths specified:

240 Degrees T through 340 Degrees: 0.255 kW

From Figure 1A, the maximum radiation of the Horizontal component occurs at 99 Degrees T to 110 Degrees T. At the restricted azimuths of 240 - 340 Degrees T the maximum component is the Horizontal component which is 7.79 dB down from the maximum ERP of 0.850 kW, or 0.141 kW.

The R.M.S. of the Horizontal component is 0.682. The total Horizontal power gain is 1.503. The R.M.S. of the Vertical component is 0.683. The total Vertical power gain is 1.348. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.857. The R.M.S. of the measured composite pattern is 0.729. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.728. 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-DA was mounted on a tower of precise scale to the Stainless G-7 tower at the KZTS 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 BMPH-20100121AFB, a single level of the 6810-2R-SS-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 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 unpadding 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

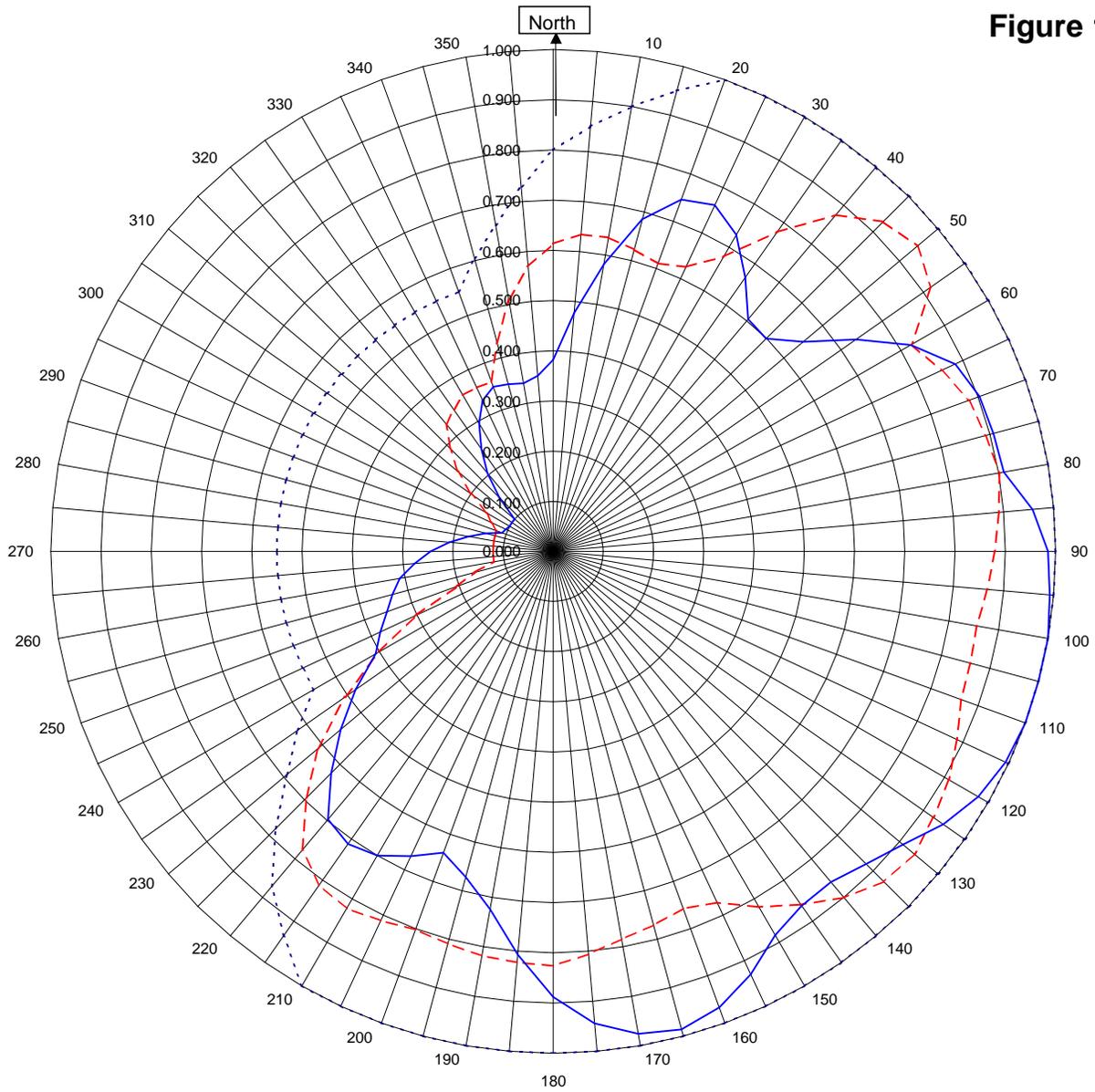
S/O 27902

Date January 05, 2010

# Shively Labs

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

Figure 1a



## KZTS Cammack Village, AR

27902

November 23, 2009

Horizontal RMS	0.682
Vertical RMS	0.683
H/V Composite RMS	0.729
FCC Composite RMS	0.857

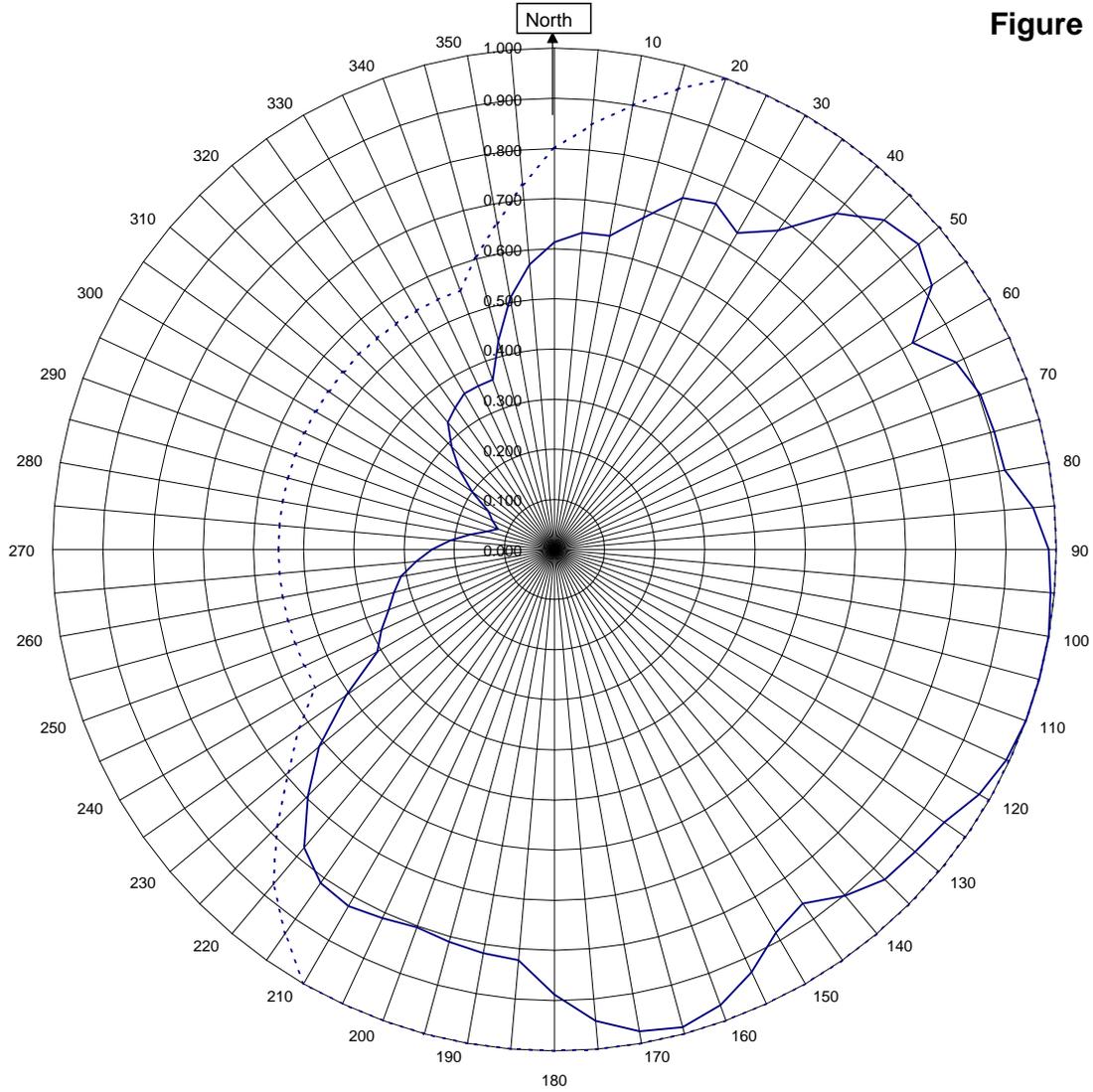
Frequency	101.1 / 454.95 MHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

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

# Shively Labs

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

Figure 1b



## KZTS Cammack Village, A

27902  
November 23, 2009

—————H/V Composite RMS	0.729
.....FCC Composite RMS	0.857

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

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

Figure 1c

Tabulation of Horizontal Azimuth Pattern  
KZTS Cammack Village, AR

Azimuth	Rel Field	Azimuth	Rel Field
0	0.382	180	0.888
10	0.581	190	0.724
20	0.746	200	0.639
30	0.729	210	0.700
40	0.604	220	0.697
45	0.600	225	0.625
50	0.650	230	0.552
60	0.822	240	0.408
70	0.903	250	0.352
80	0.911	260	0.310
90	0.985	270	0.244
100	1.000	280	0.171
110	1.000	290	0.108
120	0.977	300	0.100
130	0.909	310	0.100
135	0.881	315	0.152
140	0.860	320	0.203
150	0.883	330	0.295
160	0.967	340	0.349
170	0.976	350	0.340

Figure 1d

Tabulation of Vertical Azimuth Pattern  
KZTS Cammack Village, AR

Azimuth	Rel Field	Azimuth	Rel Field
0	0.613	180	0.826
10	0.635	190	0.818
20	0.611	200	0.802
30	0.678	210	0.821
40	0.875	220	0.776
45	0.929	225	0.694
50	0.947	230	0.612
60	0.824	240	0.400
70	0.881	250	0.204
80	0.902	260	0.120
90	0.879	270	0.120
100	0.856	280	0.120
110	0.864	290	0.120
120	0.910	300	0.152
130	0.938	310	0.248
135	0.931	315	0.290
140	0.901	320	0.331
150	0.818	330	0.359
160	0.757	340	0.360
170	0.785	350	0.509

Figure 1e

Tabulation of Composite Azimuth Pattern  
KZTS Cammack Village, AR

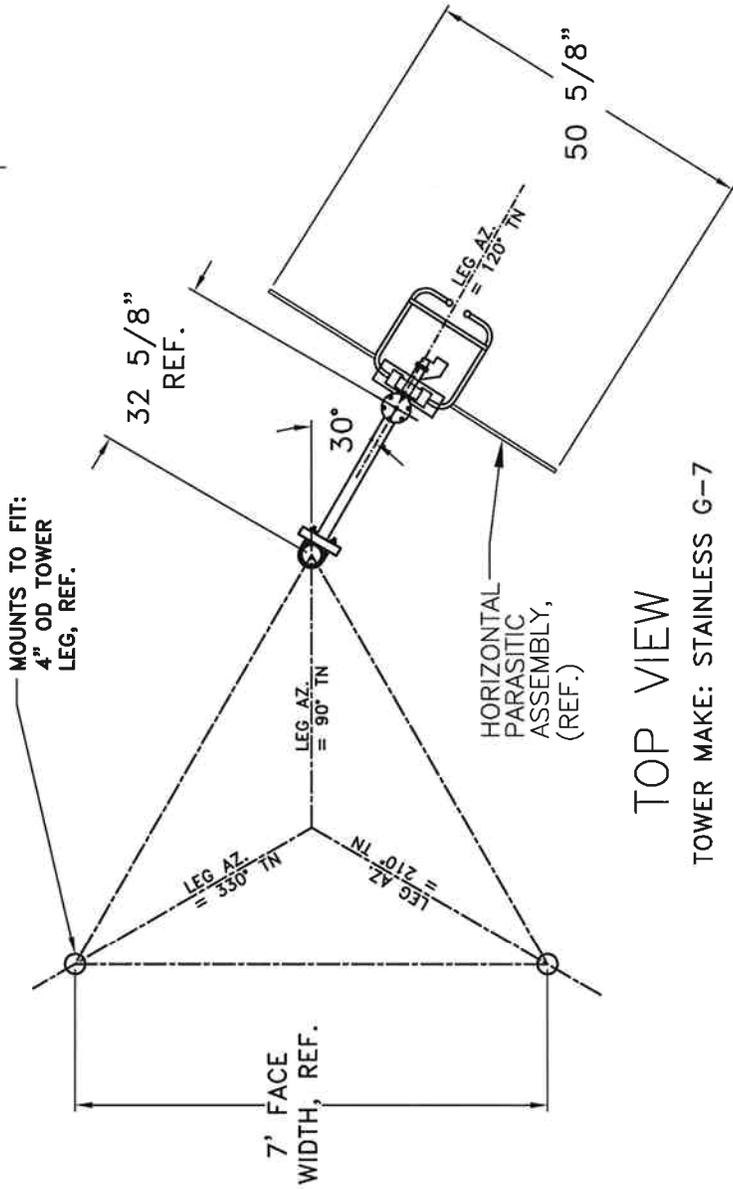
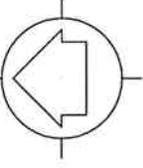
Azimuth	Rel Field	Azimuth	Rel Field
0	0.613	180	0.888
10	0.635	190	0.818
20	0.746	200	0.802
30	0.729	210	0.821
40	0.875	220	0.776
45	0.929	225	0.694
50	0.947	230	0.612
60	0.824	240	0.408
70	0.903	250	0.352
80	0.911	260	0.310
90	0.985	270	0.244
100	1.000	280	0.171
110	1.000	290	0.120
120	0.977	300	0.152
130	0.938	310	0.248
135	0.931	315	0.290
140	0.901	320	0.331
150	0.883	330	0.359
160	0.967	340	0.360
170	0.976	350	0.509

Figure 1f

Tabulation of FCC Directional Composite  
KZTS Cammack Village, AR

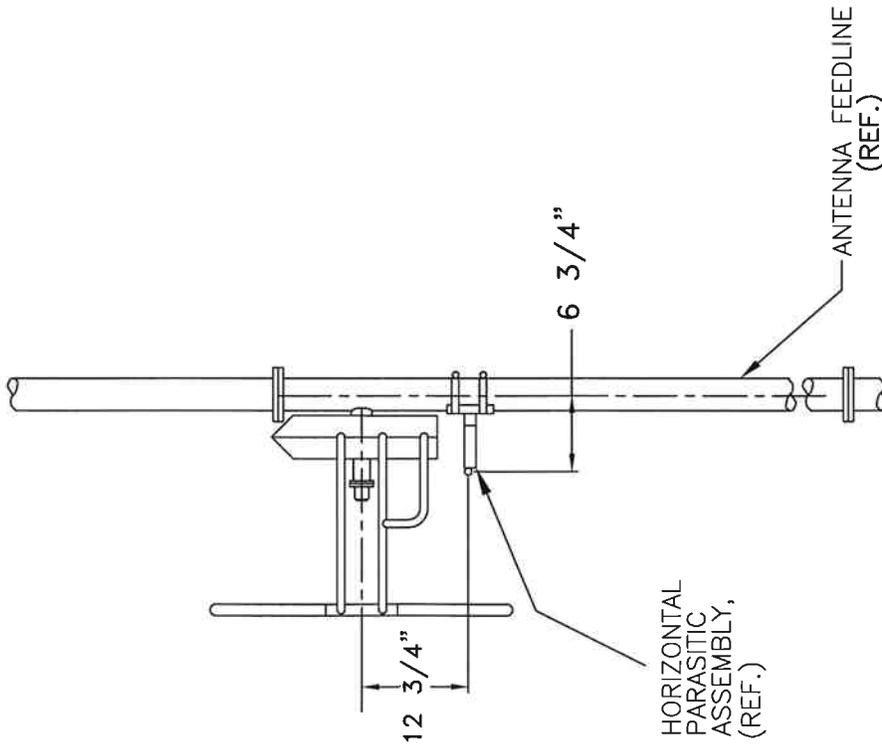
Azimuth	Rel Field	Azimuth	Rel Field
0	0.800	180	1.000
10	0.900	190	1.000
20	1.000	200	1.000
30	1.000	210	1.000
40	1.000	220	0.871
50	1.000	230	0.692
60	1.000	240	0.550
70	1.000	250	0.550
80	1.000	260	0.550
90	1.000	270	0.550
100	1.000	280	0.550
110	1.000	290	0.550
120	1.000	300	0.550
130	1.000	310	0.550
140	1.000	320	0.550
150	1.000	330	0.550
160	1.000	340	0.550
170	1.000	350	0.660

TRUE, NORTH



### TOP VIEW

TOWER MAKE: STAINLESS G-7



### SIDE VIEW

<b>SHIVELY LABS</b>		SCALE:	DRAWN BY:
A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE		N.T.S.	ASP
SHOP ORDER:	FREQUENCY:	APPROVED BY:	
27902	101.1 MHz.	DAB	
TITLE:			
MODEL-6810-2R-SS-DIRECTIONAL ANTENNA			
DATE:			
12/8/09			

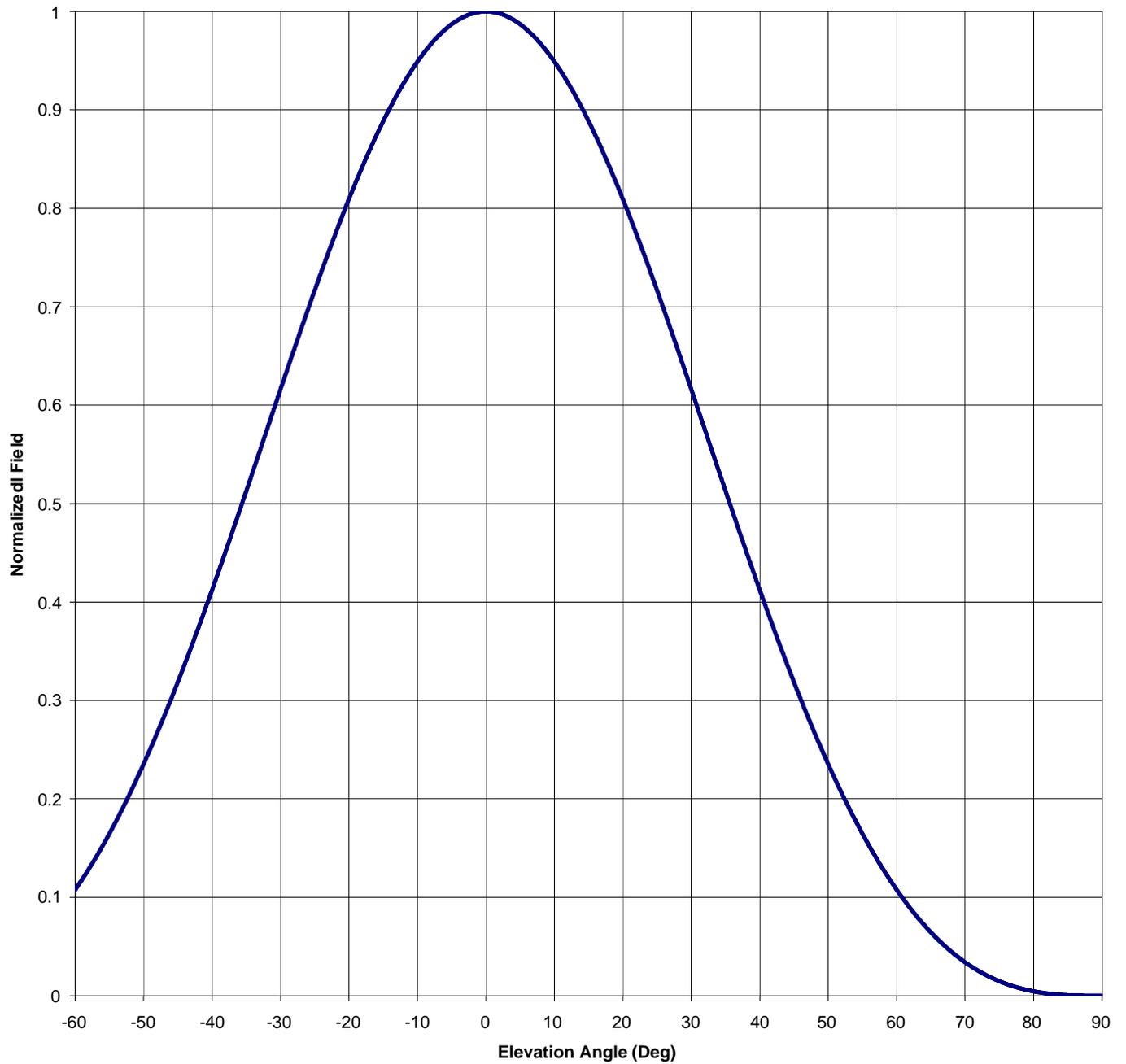
# FIGURE 2

ANTENNA HEADING 120° TRUE NORTH

Antenna Mfg.: Shively Labs  
Antenna Type: 6810-2R-SS-DA  
Station: KZTS  
Frequency: 101.1  
Channel #: 266  
Figure: FIGURE 3

Date: 12/29/2009

Beam Til	0	
Gain (Max)	1.503	1.770 dB
Gain (Horizon)	1.503	1.770 dB



Antenna Mfg.: Shively Labs  
 Antenna Type: 6810-2R-SS-DA

Date: 12/29/2009

Station: KZTS  
 Frequency: 101.1  
 Channel #: 266

Beam Tilt 0  
 Gain (Max) 1.503  
 Gain (Horizon) 1.503

1.770 dB  
 1.770 dB

Figure: FIGURE 3

Angle of Depression (Deg)	Relative Field						
-90	0.000	-44	0.337	0	1.000	46	0.301
-89	0.000	-43	0.355	1	0.999	47	0.284
-88	0.000	-42	0.374	2	0.998	48	0.267
-87	0.000	-41	0.393	3	0.995	49	0.251
-86	0.000	-40	0.412	4	0.992	50	0.235
-85	0.001	-39	0.432	5	0.987	51	0.220
-84	0.001	-38	0.452	6	0.981	52	0.205
-83	0.002	-37	0.472	7	0.975	53	0.191
-82	0.002	-36	0.492	8	0.967	54	0.178
-81	0.003	-35	0.513	9	0.959	55	0.165
-80	0.005	-34	0.533	10	0.949	56	0.152
-79	0.006	-33	0.554	11	0.939	57	0.140
-78	0.008	-32	0.575	12	0.927	58	0.129
-77	0.010	-31	0.595	13	0.915	59	0.118
-76	0.012	-30	0.616	14	0.902	60	0.108
-75	0.015	-29	0.637	15	0.888	61	0.098
-74	0.018	-28	0.657	16	0.874	62	0.089
-73	0.021	-27	0.677	17	0.859	63	0.080
-72	0.025	-26	0.697	18	0.843	64	0.072
-71	0.029	-25	0.717	19	0.826	65	0.064
-70	0.034	-24	0.736	20	0.809	66	0.057
-69	0.039	-23	0.755	21	0.792	67	0.051
-68	0.045	-22	0.774	22	0.774	68	0.045
-67	0.051	-21	0.792	23	0.755	69	0.039
-66	0.057	-20	0.809	24	0.736	70	0.034
-65	0.064	-19	0.826	25	0.717	71	0.029
-64	0.072	-18	0.843	26	0.697	72	0.025
-63	0.080	-17	0.859	27	0.677	73	0.021
-62	0.089	-16	0.874	28	0.657	74	0.018
-61	0.098	-15	0.888	29	0.637	75	0.015
-60	0.108	-14	0.902	30	0.616	76	0.012
-59	0.118	-13	0.915	31	0.595	77	0.010
-58	0.129	-12	0.927	32	0.575	78	0.008
-57	0.140	-11	0.939	33	0.554	79	0.006
-56	0.152	-10	0.949	34	0.533	80	0.005
-55	0.165	-9	0.959	35	0.513	81	0.003
-54	0.178	-8	0.967	36	0.492	82	0.002
-53	0.191	-7	0.975	37	0.472	83	0.002
-52	0.205	-6	0.981	38	0.452	84	0.001
-51	0.220	-5	0.987	39	0.432	85	0.001
-50	0.235	-4	0.992	40	0.412	86	0.000
-49	0.251	-3	0.995	41	0.393	87	0.000
-48	0.267	-2	0.998	42	0.374	88	0.000
-47	0.284	-1	0.999	43	0.355	89	0.000
-46	0.301	0	1.000	44	0.337	90	0.000
-45	0.319			45	0.319		

## VALIDATION OF TOTAL POWER GAIN CALCULATION

KZTS Cammack Village, AR

Model 6810-2R-SS-DA Pattern 04

Elevation Gain of Antenna

0.700

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

H RMS	0.682	V RMS	0.683	H/V Ratio	0.999
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Elevation Gain of Horizontal Component 0.699

Elevation Gain of Vertical Component 0.701

Horizontal Azimuth Gain equals  $1/(\text{RMS})^2$ . 2.150Vertical Azimuth Gain equals  $1/(\text{RMS}/\text{Max Vert})^2$ . 1.922

Max. Vertical 0.947

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

Total Horizontal Power Gain = 1.503

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

Total Vertical Power Gain = 1.348

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 ERP divided by Horizontal Power Gain equals Antenna Input Power

0.9	kW ERP	Divided by H Gain	1.503	equals	0.60	kW H Antenna Input Power
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Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.60	kW	Times V Gain	1.348	equals	0.81	kW V ERP
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Maximum Value of the Vertical Component squared times the Maximum ERP equals the Vertical ERP

$(0.947)^2$	Times	0.90	Equals	0.81	kW Vertical ERP
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NOTE: Calculating the ERP of the Vertical Component by two methods validates the total power gain calculations

**ATTACHMENT B**

LICENSED SURVEYOR AFFIDAVIT

# CENTRAL ARKANSAS ENGINEERING, PLLC

1012 Autumn Rd., Suite 2  
Little Rock, Arkansas 72211  
Office: 501-227-4459  
Fax: 501-227-3820  
E-Mail: [CAENGR@SBCGLOBAL.NET](mailto:CAENGR@SBCGLOBAL.NET)

March 3, 2010

Mr. Bernie O'Brien c/o Finn Broadcasting  
6080 Mt. Moriah Rd.  
Memphis, TN 38115

RE: Flinn Broadcasting Tower Site in Little Rock, Arkansas

Dear Mr. O'Brien:

On March 3, 2010 Central Arkansas Engineering PLLC dispatched a survey crew to verify the installation of a directional antenna tower site located in west Little Rock, Arkansas on Gordon Road for radio station KZTS FCC Tower Registration File Number BMPH-20100121AFB. The antenna was found to be installed as per the furnished Shively antenna plans, specifically with the antenna element oriented at an azimuth of 120 degrees from true north.

Sincerely yours,



Raymond Hickey, P.E. (AR 7730)



**ATTACHMENT C**

ENGINEERING AFFIDAVIT

**March 3, 2010**

**AFFIDAVIT**

**Under my supervision, the KZTS, Cammack Village, AR, Shively 6810 directional antenna was installed and adjusted, to the manufacturer's and FCC's specifications.**

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**James B. O'Brien**

**PO Box 1043  
1 Ridge St.  
Chatham, VA 24531  
731-695-1714**

**Qualifications are on file and a matter of public record.**