

Radio Station KXCI-FM
Channel 217 · 91.3 MHz
Tucson, Arizona

Application for Auxiliary Antenna License
Construction Permit BXPED-20130930BEE
Facility ID 22167

Formal Request for Program Test Authority

August 9, 2014

Stanley Broadcast Engineering
Surprise, Arizona 85374
623-215-9925

Radio Station KXCI-FM
Tucson, Arizona

List of Exhibits

<u>Document</u>	<u>Exhibit</u>
Affidavit	
Engineering Statement	1
Directional Antenna Proof of Performance	2
Surveyors Certification	3
System Gains and Losses	4
Radio Frequency Exposure Measurements	5

Affidavit

State of Arizona

) ss.

County of Maricopa

James S. Stanley being first duly sworn upon oath hereby deposes and states:

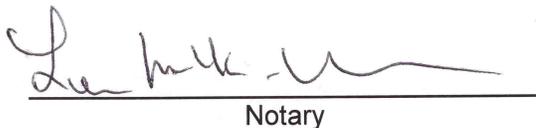
1. That he is a consulting engineer who practices in the field of Radio and Television engineering.
2. That he has been retained by The Foundation for Creative Broadcasting, Inc., licensee of station KXCI-FM Tucson, Arizona, for the purpose of supervising the installation of the KXCI auxiliary antenna system and, preparing this application with the associated engineering exhibits.
3. That he has been involved in technical developments pertaining to broadcast engineering for more than 40 years.
4. That he has over the course of time, prepared numerous other applications and exhibits of this type and, his qualifications are a matter of public record with your Commission.
5. That he has personally prepared and reviewed the documents and technical data contained herein and believes the information to be accurate and true to the best of his knowledge and belief.

Subscribed and sworn to before me on this 9th day of August, 2014.





Affiant



Notary

Affix seal here

Radio Station KXCI-FM
Tucson, Arizona

Engineering Statement of James S. Stanley

On October 24, 2013, KXCI was granted a construction permit for an auxiliary antenna system. The file number of the permit file number is BXPED-20130930BEE. The auxiliary antenna system is located at a tower site which will be shared with AM broadcast station KCEE. The Antenna structure registration number is 1009810.

At this time, construction of the auxiliary system is complete. Seven (7) Special operating conditions or restrictions were placed on the KXCI auxiliary antenna construction permit. The purpose of this report and attached exhibits is to demonstrate that all Special operating conditions or restrictions have been complied with.

The auxiliary antenna system is constructed utilizing a Shively 6810-2-SS-DA (EPA Type 6), two sections, 0.5 wavelength spacing; directional antenna system. This is the same antenna specified in the construction permit. Accordingly, the Proof of Performance report from the manufacturer is attached to this document as Exhibit 2. The report demonstrates that the antenna system complies with the specifications set forth in the construction permit.

Exhibit 3 of this report which is a certification from a registered surveyor, demonstrates that the antenna system is installed as specified by the manufacturer. The centerline of the antenna system is aligned on a bearing of 100° True.

Exhibit 4 of this report is a tabulation of system gains and losses as specified in the manufacturers Proof of Performance report. Exhibit 4 shows that a transmitter output power of 8 kilowatts is required to achieve the authorized effective radiated power in the main lobe of the directional antenna pattern which is 10.0 kilowatts ERP.

Exhibit 5 is a Radio Frequency Exposure survey of the facility and surrounding property which was made by Global RF Solutions of Chandler, Arizona. The site survey demonstrates that radio frequency exposure levels are well below the protection limits for either occupational (controlled) exposure or general public exposure (uncontrolled). Therefore, the KXCI auxiliary operation is excluded from further environmental consideration under 47 C.F.R. Section 1.1 306 of the Rules and Regulations. KXCI in coordination with other users of the site will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines

A separate application with FCC form 302AM was filed concurrent with this application; for AM station KCEE, requesting authority to return to direct measurement of power following completion of the construction.

We believe that the terms of the KXCI construction permit and special operating conditions have been complied with and therefore request program test authority for the KXCI auxiliary antenna system.

Sincerely,



James S. Stanley
Certified Professional Broadcast Engineer
No. 50725 Expires 01/01/2015

EXHIBIT 2

S.O. 31657
Report of Test 6810-2-SS(0.5)-DA
for
Foundation for Creative Broadcasting, Inc.
KXCI 91.3 MHz Tucson, AZ

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-2-SS(0.5)-DA to meet the needs of KXCI and to comply with the requirements of the FCC construction permit, file number BXPED-20130930BEE. 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 BXPED-20130930BEE indicates that the Horizontal radiation component shall not exceed 10.0 kW at any azimuth and is restricted to the following values at the azimuths specified:

290 - 300 Degrees True: 0.37 kilowatts

From Figure 1A, the maximum radiation of the Horizontal component occurs at 53 Degrees True to 106 Degrees True. At the restricted azimuth of 290 - 300 Degrees True the Horizontal component is 15.09 dB down from the maximum of 10.0 kW, or 0.31 kW

The R.M.S. of the Horizontal component is 0.720. The total Horizontal power gain is 1.393. The R.M.S. of the Vertical component is 0.698. The total Vertical power gain is 1.324. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.764. The R.M.S. of the measured composite pattern is 0.724. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.641. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-2-SS(0.5)-DA was mounted on a tower of precise scale to the 24" tower at the KXCI 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 BXPED-20130930BEE, a single level of the 6810-2-SS(0.5)-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.

Test Report 6810-2-SS(0.5)-DA

KXCI

Page Three

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 410.85 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:

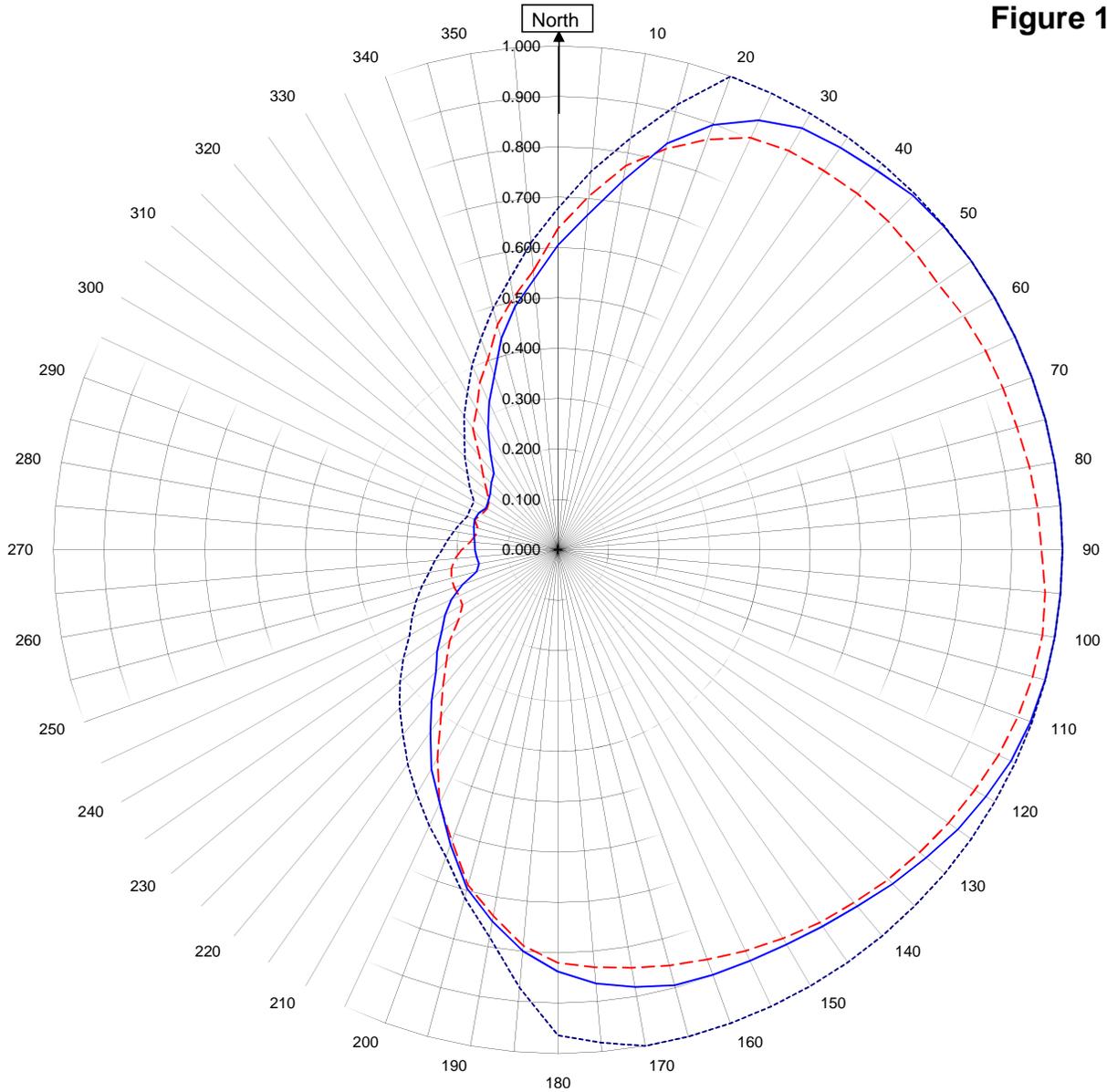


Robert A. Surette
Director of Sales Engineering
S/O 31657
April 23, 2014

Shively Labs

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

Figure 1A



KXCI TUCSON, AZ.

31657

April 23, 2014

— Horizontal RMS	0.720
- - - Vertical RMS	0.698
— H/V Composite RMS	0.724
..... FCC Composite RMS	0.764

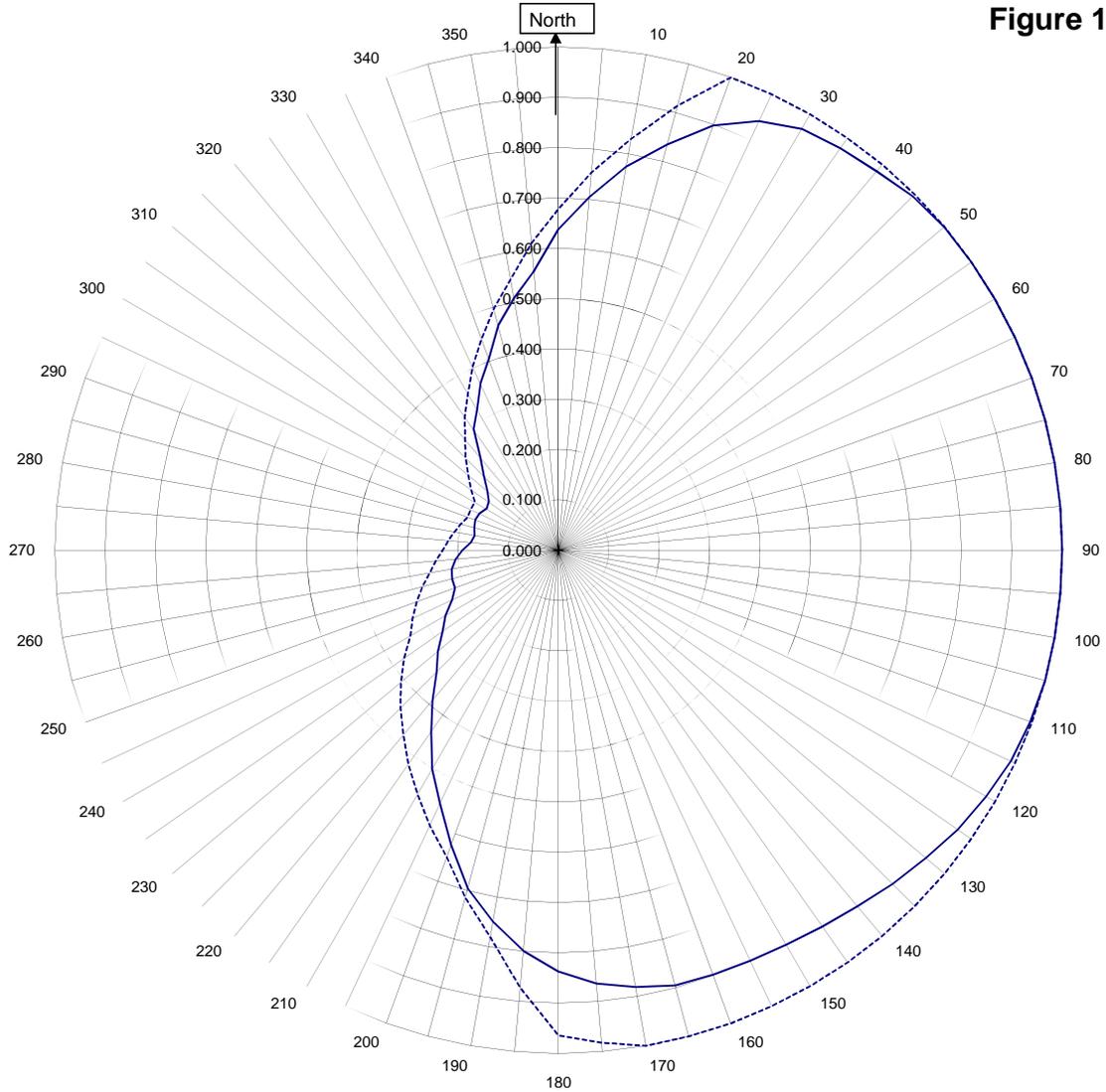
Frequency	91.3 / 410.85 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-2-SS(0.5)-DA
Pattern Type	Directional Azimuth

Shively Labs

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

Figure 1B



KXCI TUCSON, AZ.

31657
April 23, 2014

———H/V Composite RMS	0.724
.....FCC Composite RMS	0.764

Frequency	91.3 / 410.85 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-2-SS(0.5)-DA
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
KXCI TUCSON, AZ.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.605	180	0.837
10	0.745	190	0.749
20	0.898	200	0.623
30	0.967	210	0.502
40	0.983	220	0.390
45	0.995	225	0.342
50	0.999	230	0.313
60	1.000	240	0.259
70	1.000	250	0.202
80	1.000	260	0.159
90	1.000	270	0.165
100	1.000	280	0.169
110	0.997	290	0.176
120	0.979	300	0.165
130	0.952	310	0.175
135	0.938	315	0.187
140	0.923	320	0.198
150	0.904	330	0.278
160	0.897	340	0.369
170	0.881	350	0.490

Figure 1D

Tabulation of Vertical Azimuth Pattern
KXCI TUCSON, AZ.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.638	180	0.820
10	0.774	190	0.738
20	0.867	200	0.615
30	0.915	210	0.478
40	0.923	220	0.356
45	0.924	225	0.313
50	0.922	230	0.281
60	0.929	240	0.219
70	0.939	250	0.219
80	0.949	260	0.215
90	0.959	270	0.191
100	0.975	280	0.166
110	0.970	290	0.176
120	0.954	300	0.163
130	0.935	310	0.185
135	0.925	315	0.210
140	0.914	320	0.242
150	0.891	330	0.323
160	0.865	340	0.405
170	0.843	350	0.509

Figure 1E

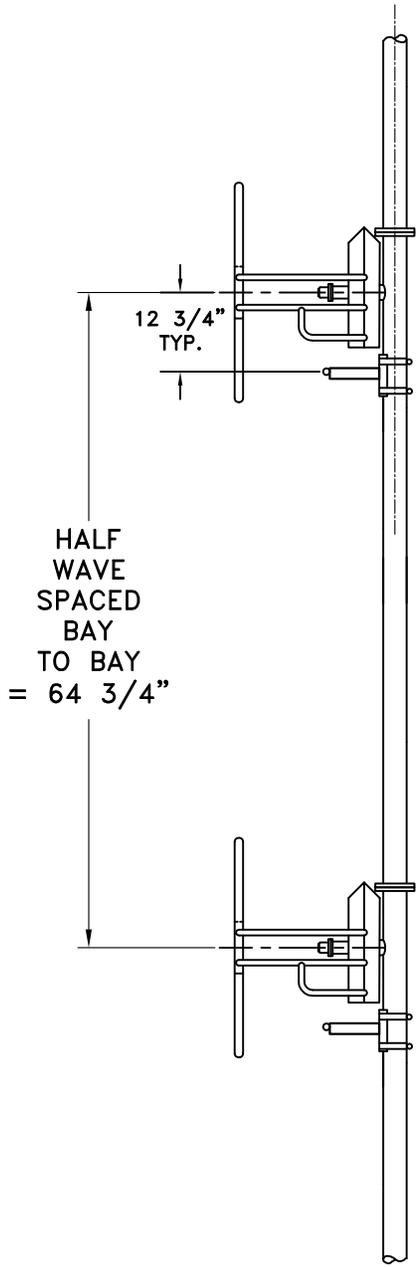
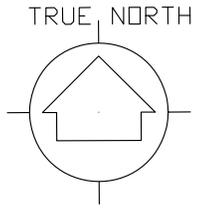
Tabulation of Composite Azimuth Pattern
KXCI TUCSON, AZ.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.638	180	0.837
10	0.774	190	0.749
20	0.898	200	0.623
30	0.967	210	0.502
40	0.983	220	0.390
45	0.995	225	0.342
50	0.999	230	0.313
60	1.000	240	0.259
70	1.000	250	0.219
80	1.000	260	0.215
90	1.000	270	0.191
100	1.000	280	0.169
110	0.997	290	0.176
120	0.979	300	0.165
130	0.952	310	0.185
135	0.938	315	0.210
140	0.923	320	0.242
150	0.904	330	0.323
160	0.897	340	0.405
170	0.881	350	0.509

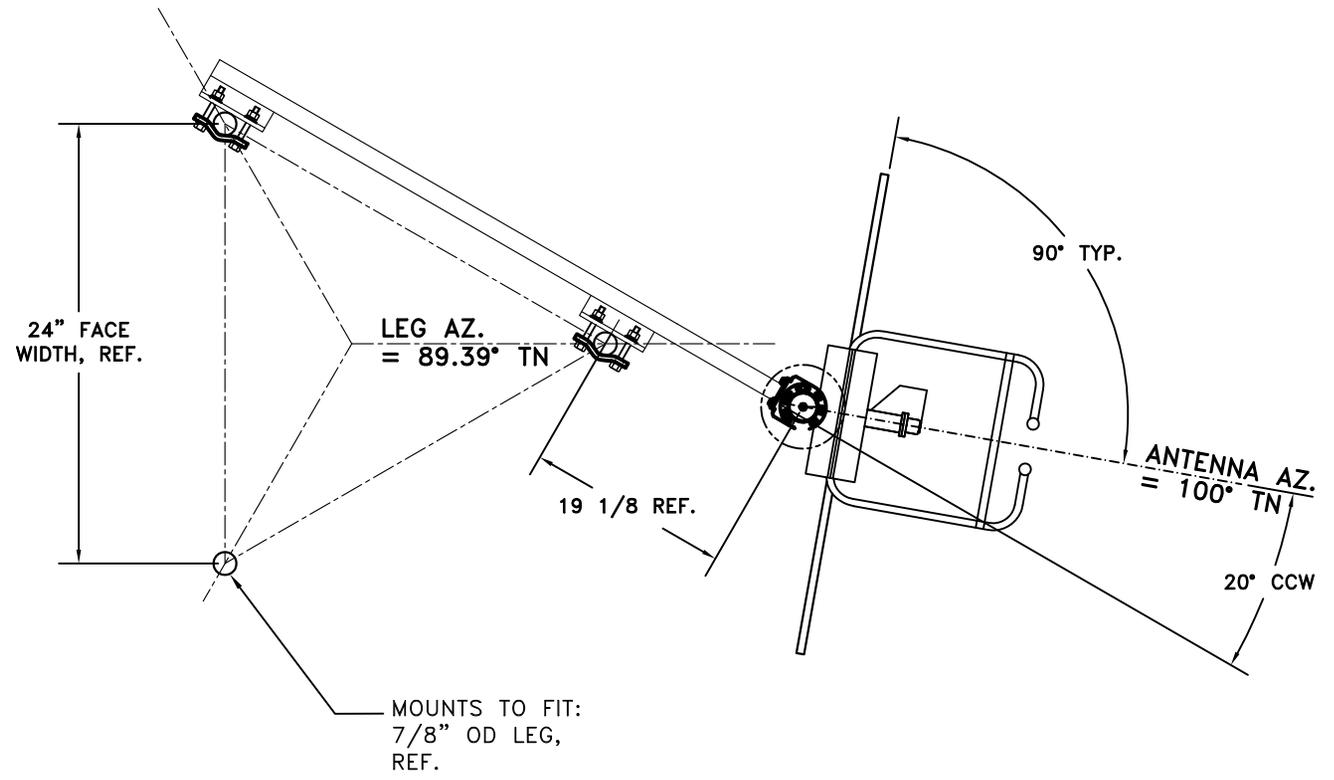
Figure 1F

Tabulation of FCC Directional Composite
KXCI TUCSON, AZ.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.678	180	0.964
10	0.830	190	0.781
20	1.000	200	0.649
30	1.000	210	0.560
40	1.000	220	0.479
50	1.000	230	0.409
60	1.000	240	0.340
70	1.000	250	0.300
80	1.000	260	0.260
90	1.000	270	0.230
100	1.000	280	0.210
110	1.000	290	0.192
120	1.000	300	0.192
130	1.000	310	0.234
140	1.000	320	0.289
150	1.000	330	0.360
160	1.000	340	0.447
170	1.000	350	0.547



SIDE VIEW



TOP VIEW
TOWER: 24" FACE

ANTENNA HEADING 100° TRUE NORTH

SHIVELY LABS			
A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE			
SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
31657	91.3	N.T.S.	ASP
			APPROVED BY:
			DAB
TITLE:			
MODEL-6810-2-SS-DIRECTIONAL ANTENNA			
DATE:		FIGURE 2	
4-28-14			

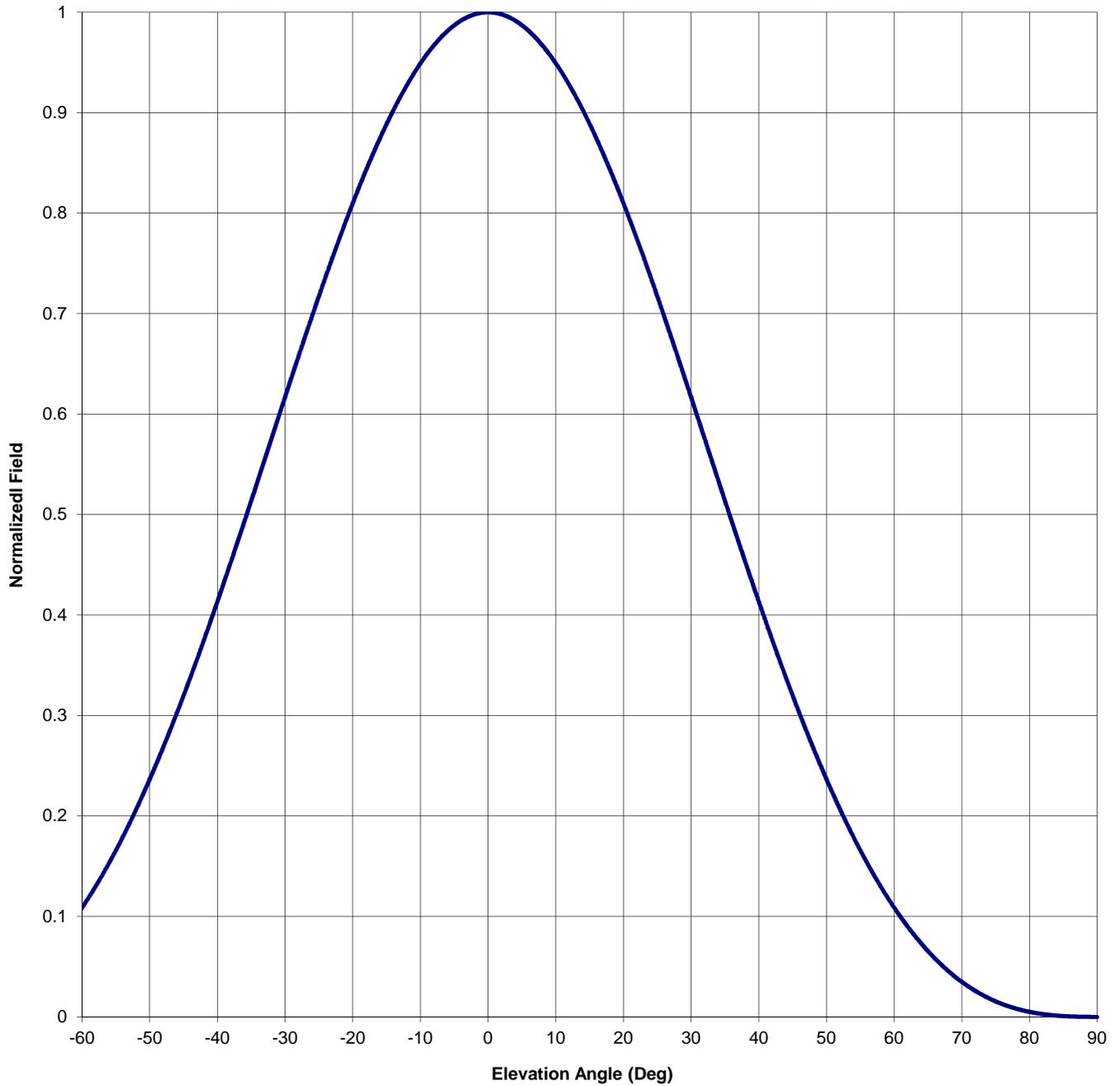
Antenna Mfg.: Shively Labs
Antenna Type: 6810-2-SS(0.5)-DA

Date: 4/22/2014

Station: KXCI
Frequency: 91.3
Channel #: 217

Beam Tilt	0	
Gain (Max)	1.393	1.439 dB
Gain (Horizon)	1.393	1.439 dB

Figure: Figure 3



Antenna Mfg.: Shively Labs
 Antenna Type: 6810-2-SS(0.5)-DA

Date: 4/22/2014

Station: KXCI
 Frequency: 91.3
 Channel #: 217

Beam Tilt 0
 Gain (Max) 1.393 1.439 dB
 Gain (Horizon) 1.393 1.439 dB

Figure: Figure 3

Angle of Depression (Deg)	Relative Field						
-90	0.000	-44	0.338	0	1.000	46	0.302
-89	0.000	-43	0.356	1	0.999	47	0.285
-88	0.000	-42	0.375	2	0.998	48	0.269
-87	0.000	-41	0.394	3	0.995	49	0.252
-86	0.001	-40	0.413	4	0.992	50	0.237
-85	0.001	-39	0.433	5	0.987	51	0.221
-84	0.001	-38	0.453	6	0.981	52	0.207
-83	0.002	-37	0.473	7	0.975	53	0.193
-82	0.003	-36	0.493	8	0.967	54	0.179
-81	0.004	-35	0.514	9	0.959	55	0.166
-80	0.005	-34	0.534	10	0.949	56	0.153
-79	0.007	-33	0.555	11	0.939	57	0.141
-78	0.008	-32	0.576	12	0.927	58	0.130
-77	0.010	-31	0.596	13	0.915	59	0.119
-76	0.013	-30	0.617	14	0.902	60	0.109
-75	0.015	-29	0.637	15	0.889	61	0.099
-74	0.019	-28	0.658	16	0.874	62	0.090
-73	0.022	-27	0.678	17	0.859	63	0.081
-72	0.026	-26	0.698	18	0.843	64	0.073
-71	0.030	-25	0.717	19	0.827	65	0.065
-70	0.035	-24	0.737	20	0.810	66	0.058
-69	0.040	-23	0.756	21	0.792	67	0.052
-68	0.046	-22	0.774	22	0.774	68	0.046
-67	0.052	-21	0.792	23	0.756	69	0.040
-66	0.058	-20	0.810	24	0.737	70	0.035
-65	0.065	-19	0.827	25	0.717	71	0.030
-64	0.073	-18	0.843	26	0.698	72	0.026
-63	0.081	-17	0.859	27	0.678	73	0.022
-62	0.090	-16	0.874	28	0.658	74	0.019
-61	0.099	-15	0.889	29	0.637	75	0.015
-60	0.109	-14	0.902	30	0.617	76	0.013
-59	0.119	-13	0.915	31	0.596	77	0.010
-58	0.130	-12	0.927	32	0.576	78	0.008
-57	0.141	-11	0.939	33	0.555	79	0.007
-56	0.153	-10	0.949	34	0.534	80	0.005
-55	0.166	-9	0.959	35	0.514	81	0.004
-54	0.179	-8	0.967	36	0.493	82	0.003
-53	0.193	-7	0.975	37	0.473	83	0.002
-52	0.207	-6	0.981	38	0.453	84	0.001
-51	0.221	-5	0.987	39	0.433	85	0.001
-50	0.237	-4	0.992	40	0.413	86	0.001
-49	0.252	-3	0.995	41	0.394	87	0.000
-48	0.269	-2	0.998	42	0.375	88	0.000
-47	0.285	-1	0.999	43	0.356	89	0.000
-46	0.302	0	1.000	44	0.338	90	0.000
-45	0.320			45	0.320		

VALIDATION OF TOTAL POWER GAIN CALCULATION

KXCI TUCSON, AZ.

MODEL 6810-2-SS(0.5)-DA

Elevation Gain of Antenna

0.7

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

H RMS 0.72009 V RMS 0.698096 H/V Ratio 1.032

Elevation Gain of Horizontal Component 0.722

Elevation Gain of Vertical Component 0.679

Horizontal Azimuth Gain equals $1/(\text{RMS})^2$. 1.929Vertical Azimuth Gain equals $1/(\text{RMS}/\text{Max Vert})^2$. 1.951

Max. Vertical 0.975

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

Total Horizontal Power Gain = 1.393

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

Total Vertical Power Gain = 1.324

ERP divided by Horizontal Power Gain equals Antenna Input Power

10.0 kW ERP Divided by H Gain 1.393 equals 7.181 kW H Antenna Input Power

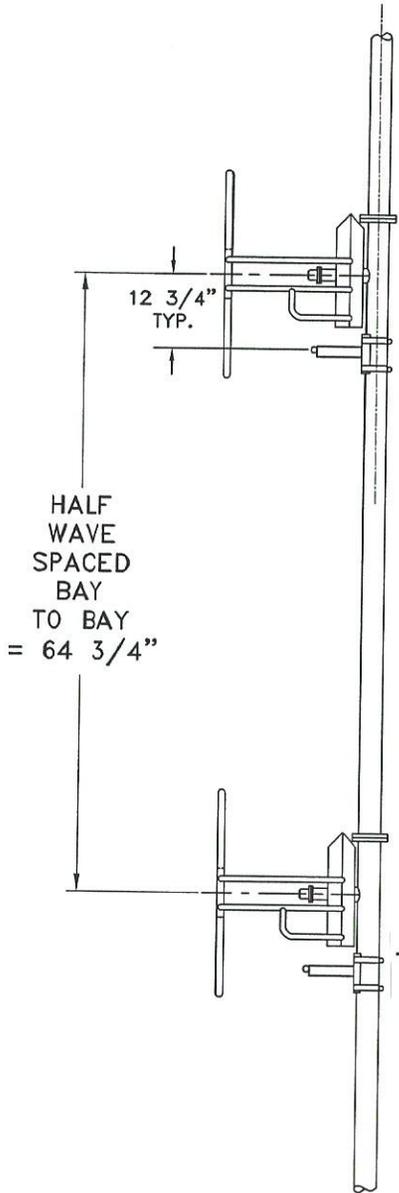
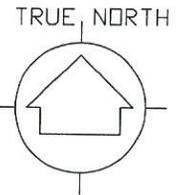
Antenna Input Power times Vertical Power Gain equals Vertical ERP

7.181 kW Times V Gain 1.324 equals 9.506 kW V ERP

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

 $(0.975)^2$ Times 10.00 Equals 9.506 kW Vertical ERP

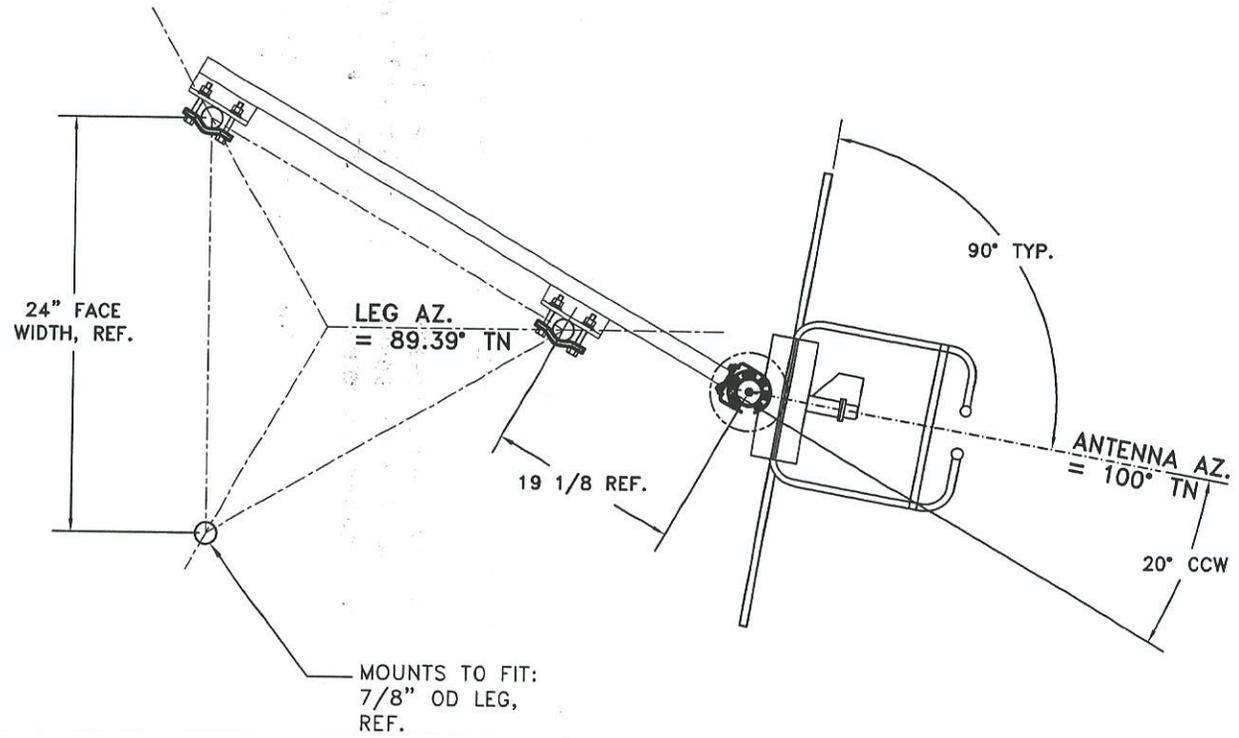
NOTE: Calculating the ERP of the Vertical Component by two methods validates the total power gain calculations



HALF WAVE SPACED BAY TO BAY = 64 3/4"

12 3/4" TYP.

SIDE VIEW



24" FACE WIDTH, REF.

LEG AZ. = 89.39° TN

19 1/8 REF.

90° TYP.

ANTENNA AZ. = 100° TN

20° CCW

MOUNTS TO FIT: 7/8" OD LEG, REF.

THE ANTENNA IS ALIGNED AS SPECIFIED

TOP VIEW
TOWER: 24" FACE



ANTENNA HEADING 100° TRUE NORTH

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE			
SHOP ORDER: 31657	FREQUENCY: 91.3	SCALE: N.T.S.	DRAWN BY: ASP
		APPROVED BY: DAB	
TITLE: MODEL-6810-2-SS-DIRECTIONAL ANTENNA			
DATE: 4-28-14	FIGURE 2		



Engineers • Land Surveyors • Environmental Scientists

Affidavit

State of Arizona
)ss.
County of Pima

Michael L. Demple being first duly sworn upon oath hereby deposes and states:

1. That he is a professional land surveyor in the State of Arizona; who practices in the field of Land Surveying. His registration number is RLS21762 which expires on September 30, 2014.
2. That he is the company president. That his office is located at 350 S. Williams Blvd. Tucson, Arizona.
3. That he has been retained by The Foundation for Creative Broadcasting, Inc., licensee of station KXCI-FM Tucson, Arizona, for the purpose of making measurements and preparing this report.
4. That he has personally prepared and reviewed the documents and survey data contained herein and believes the information to be accurate and true to the best of his knowledge and belief.

Subscribed and sworn to before me on this 7TH day of August, 2014.

Affiant



Notary



Engineers • Land Surveyors • Environmental Scientists

August 7, 2014

Stanley Broadcast Engineering, Inc.
14537 W. grand Ave #140
Surprise, AZ 85374

Attn: Jim Stanley

Re: KXCI Antenna Azimuth Bearing Report

Meridian Surveying has performed the field locations and verifications of the directional antenna for KXCI.

The following instruments were used for this survey. A Sokkia GRX1 – RTK GPS was used to establish three control points in proximity of the existing tower based upon True North observations. The control points were collected by static GPS observations.

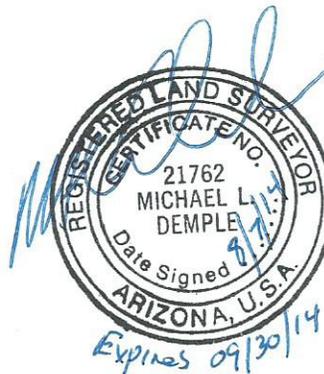
The initial survey required the field location of the existing tower legs, using a Leica TCR-407 reflectorless Total station. An exhibit drawing of the orientation of the tower was completed to provide for the mounting of the antenna.

A final field survey was conducted by locating the pivot point of the new antenna using the Leica TCR-407 Total Station and an antenna Azimuth of 100° True North baseline was set in the field. The centerline of the antenna was then observed and verified to be on the required 100° Azimuth.

Sincerely,

A handwritten signature in blue ink, appearing to read "Michael L. Demple".

Michael L. Demple, P.L.S.



Radio Station KXCI-FM
Tucson, Arizona

System Gain and Losses

Shively 6810-2-SS-DA (EPA Type 6),
two sections, 0.5 wavelength spacing

Total numerical horizontal power gain	1.393
Antenna input power required to achieve authorized effective radiated power	7.181 Kilowatts
Transmission line RFS HCA214-50J 2-1/4" air dielectric line, 90 meters in length	
Transmission line efficiency at 91.3 MHz	89.57%
	-0.469 dB
Authorized effective radiated power	10.0 kilowatts
Transmitter output power	8.0 kilowatts