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S.O. 31339

Report of Test 6810-4-DA

for

Colonias Unidas

KXJT 88.3 MHz Rio Grande City, TX

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-4-DA to meet the needs of KXJT and to comply with the requirements of the FCC construction permit, file number BNPED-20071019AWT. 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 BNPED-20071019AWT indicates that the Horizontal radiation component shall not exceed 3.5 kW at any azimuth and is restricted to the following values at the azimuths specified:

90 - 110 Degrees True: 1.48 kilowatts

MEMBER: NAB BROADCASTERS · SOCIETY OF BROADCAST ENGINEERS · NRB NATIONAL RELIGIOUS BROADCASTERS · TAB TEXAS ASSOCIATION OF BROADCASTERS · NTA NATIONAL TRANSLATOR ASSOCIATION

From Figure 1A, the maximum radiation of the Horizontal component occurs at 218 Degrees True to 2335 Degrees True. At the restricted azimuth of 90 - 110 Degrees True the Horizontal component is 3.972 dB down from the maximum of 3.5 kW, or 1.40 kW

The R.M.S. of the Horizontal component is 0.794. The total Horizontal power gain is 3.537. The R.M.S. of the Vertical component is .0754. The total Vertical power gain is 3.502. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.963. The R.M.S. of the measured composite pattern is 0.822. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.819 Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-4-DA was mounted on a tower of precise scale to the 24" tower at the KXJT 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-20071019AWT, a single level of the 6810-4-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 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 31339
December 6, 2013

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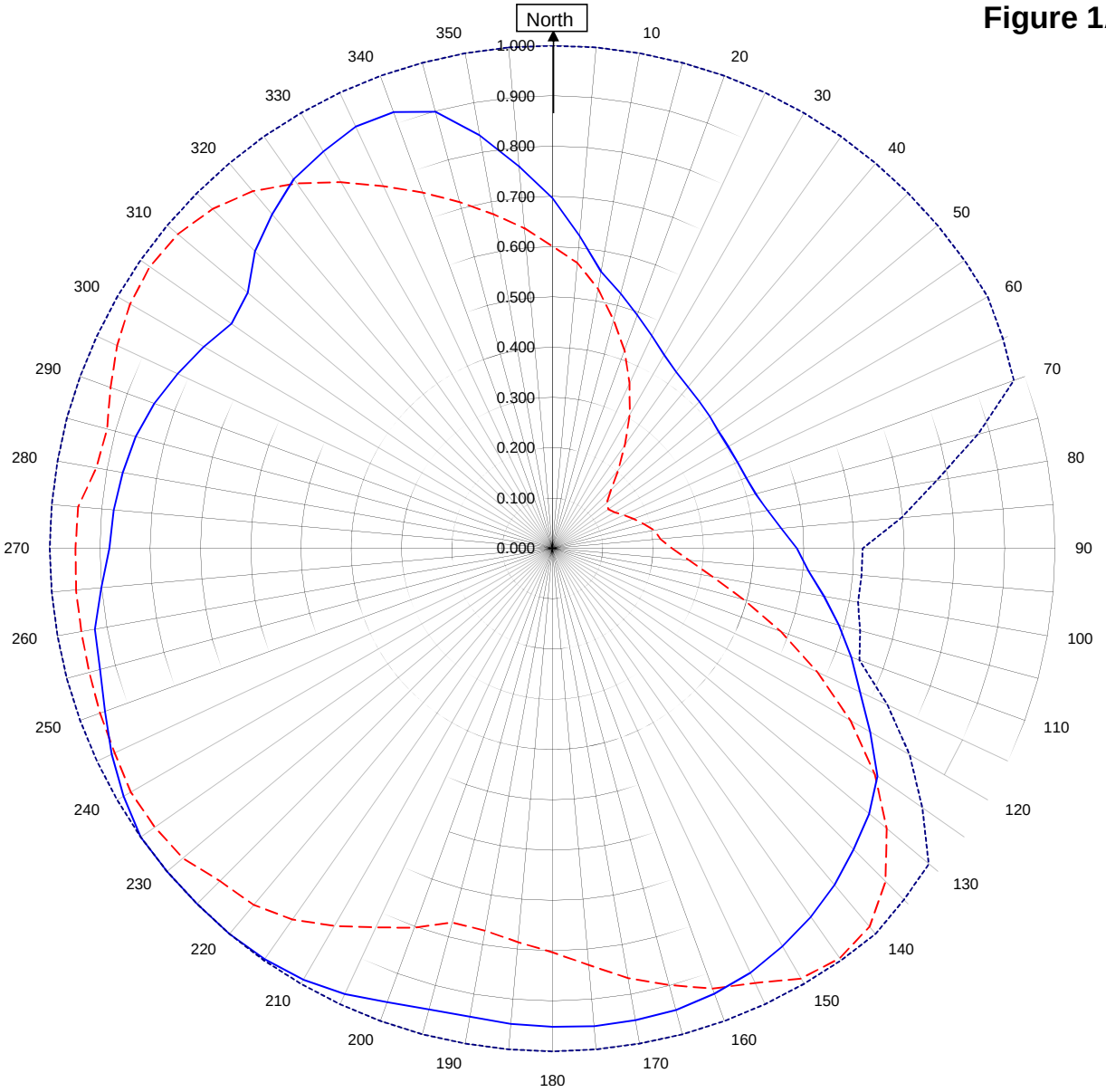
Figure 1A



KXJT RIO GRANDE CITY, TX.

31339

December 6, 2013

Horizontal RMS	0.794
Vertical RMS	0.754
H/V Composite RMS	0.822
FCC Composite RMS	0.963

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

Antenna Model	6810-4-DA
Pattern Type	Directional Azimuth

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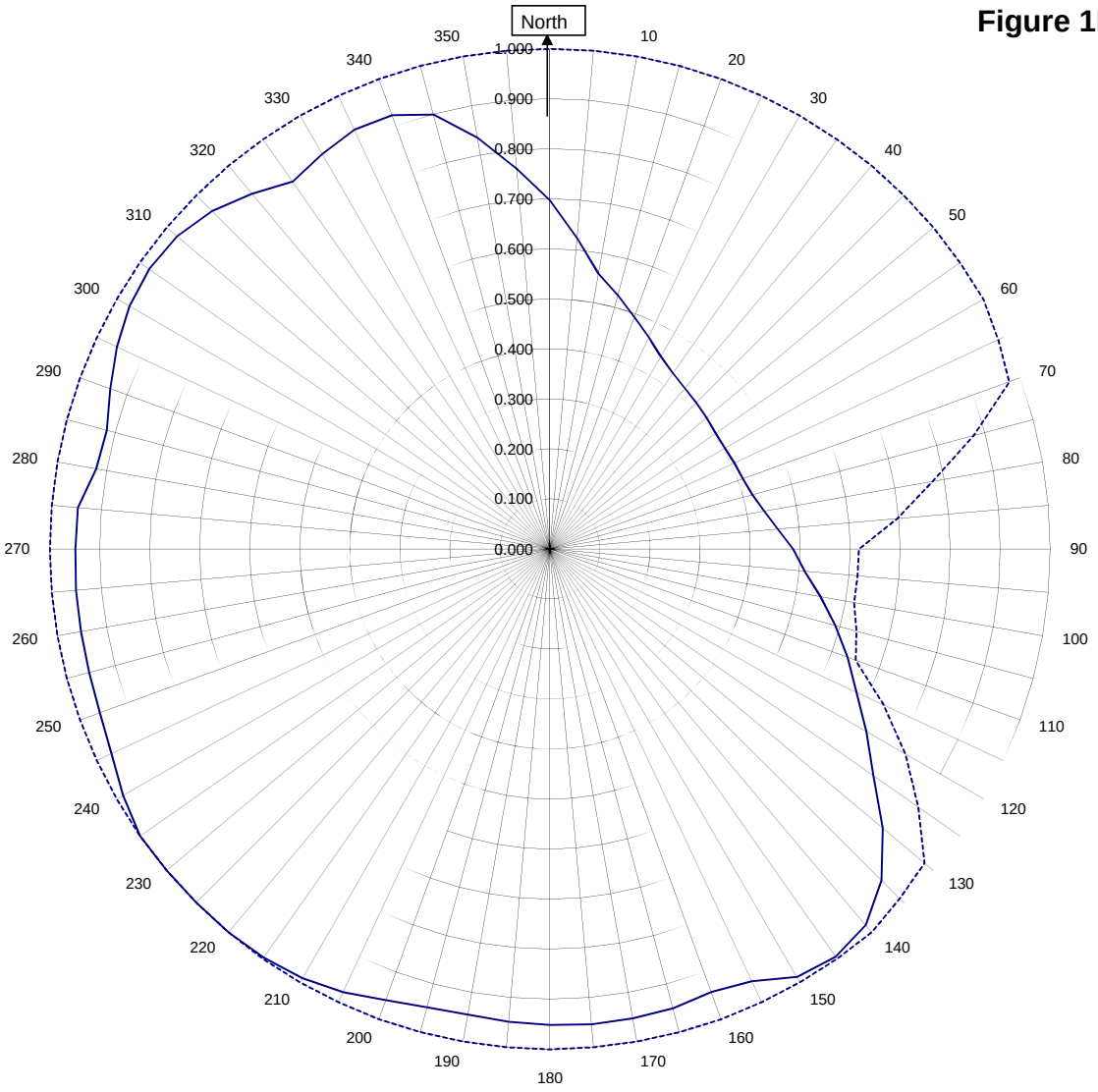
Figure 1B



KXJT RIO GRANDE CITY,

31339

December 6, 2013

_____H/VComposite RMS	0.822
……FCC Composite RMS	0.963

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

Antenna Model	6810-4-DA
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
KXJT RIO GRANDE CITY, TX.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.697	180	0.951
10	0.559	190	0.945
20	0.493	200	0.960
30	0.444	210	0.990
40	0.419	220	1.000
45	0.413	225	1.000
50	0.409	230	1.000
60	0.404	240	0.985
70	0.410	250	0.948
80	0.435	260	0.924
90	0.486	270	0.881
100	0.549	280	0.868
110	0.633	290	0.843
120	0.730	300	0.801
130	0.822	310	0.792
135	0.847	315	0.837
140	0.873	320	0.868
150	0.914	330	0.912
160	0.942	340	0.923
170	0.952	350	0.835

Figure 1D

Tabulation of Vertical Azimuth Pattern
KXJT RIO GRANDE CITY, TX.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.601	180	0.803
10	0.524	190	0.772
20	0.419	200	0.802
30	0.307	210	0.867
40	0.203	220	0.925
45	0.165	225	0.935
50	0.140	230	0.959
60	0.143	240	0.969
70	0.172	250	0.958
80	0.206	260	0.952
90	0.238	270	0.949
100	0.324	280	0.922
110	0.484	290	0.936
120	0.684	300	0.971
130	0.868	310	0.973
135	0.937	315	0.955
140	0.981	320	0.927
150	0.988	330	0.841
160	0.931	340	0.753
170	0.868	350	0.675

Figure 1E

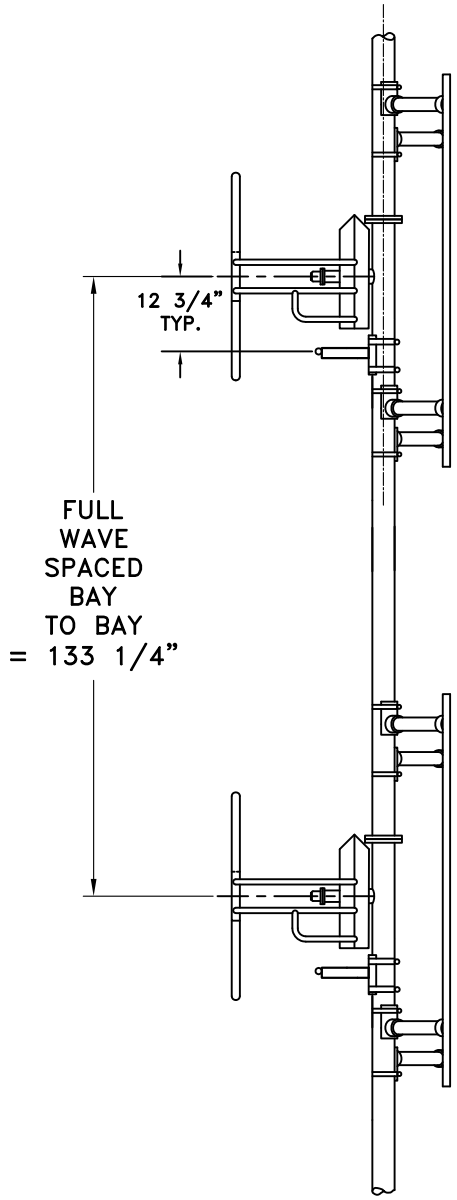
Tabulation of Composite Azimuth Pattern
KXJT RIO GRANDE CITY, TX.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.697	180	0.951
10	0.559	190	0.945
20	0.493	200	0.960
30	0.444	210	0.990
40	0.419	220	1.000
45	0.413	225	1.000
50	0.409	230	1.000
60	0.404	240	0.985
70	0.410	250	0.958
80	0.435	260	0.952
90	0.486	270	0.949
100	0.549	280	0.922
110	0.633	290	0.936
120	0.730	300	0.971
130	0.868	310	0.973
135	0.937	315	0.955
140	0.981	320	0.927
150	0.988	330	0.912
160	0.942	340	0.923
170	0.952	350	0.835

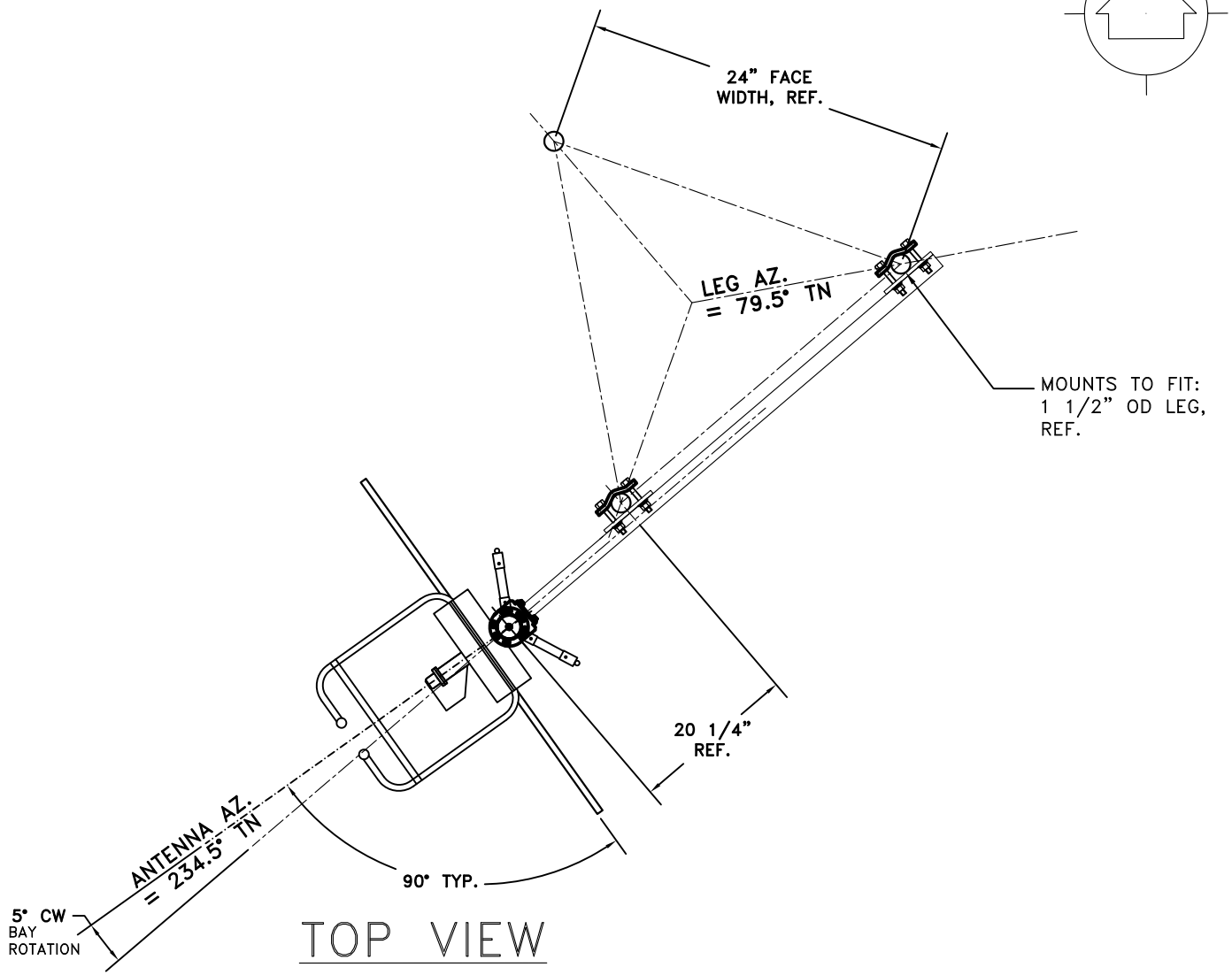
Figure 1F

Tabulation of FCC Directional Composite
KXJT RIO GRANDE CITY, TX.

Azimuth	Rel Field	Azimuth	Rel Field
0	1.000	180	1.000
10	1.000	190	1.000
20	1.000	200	1.000
30	1.000	210	1.000
40	1.000	220	1.000
50	1.000	230	1.000
60	1.000	240	1.000
70	0.977	250	1.000
80	0.776	260	1.000
90	0.617	270	1.000
100	0.617	280	1.000
110	0.650	290	1.000
120	0.820	300	1.000
130	0.977	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



SIDE VIEW



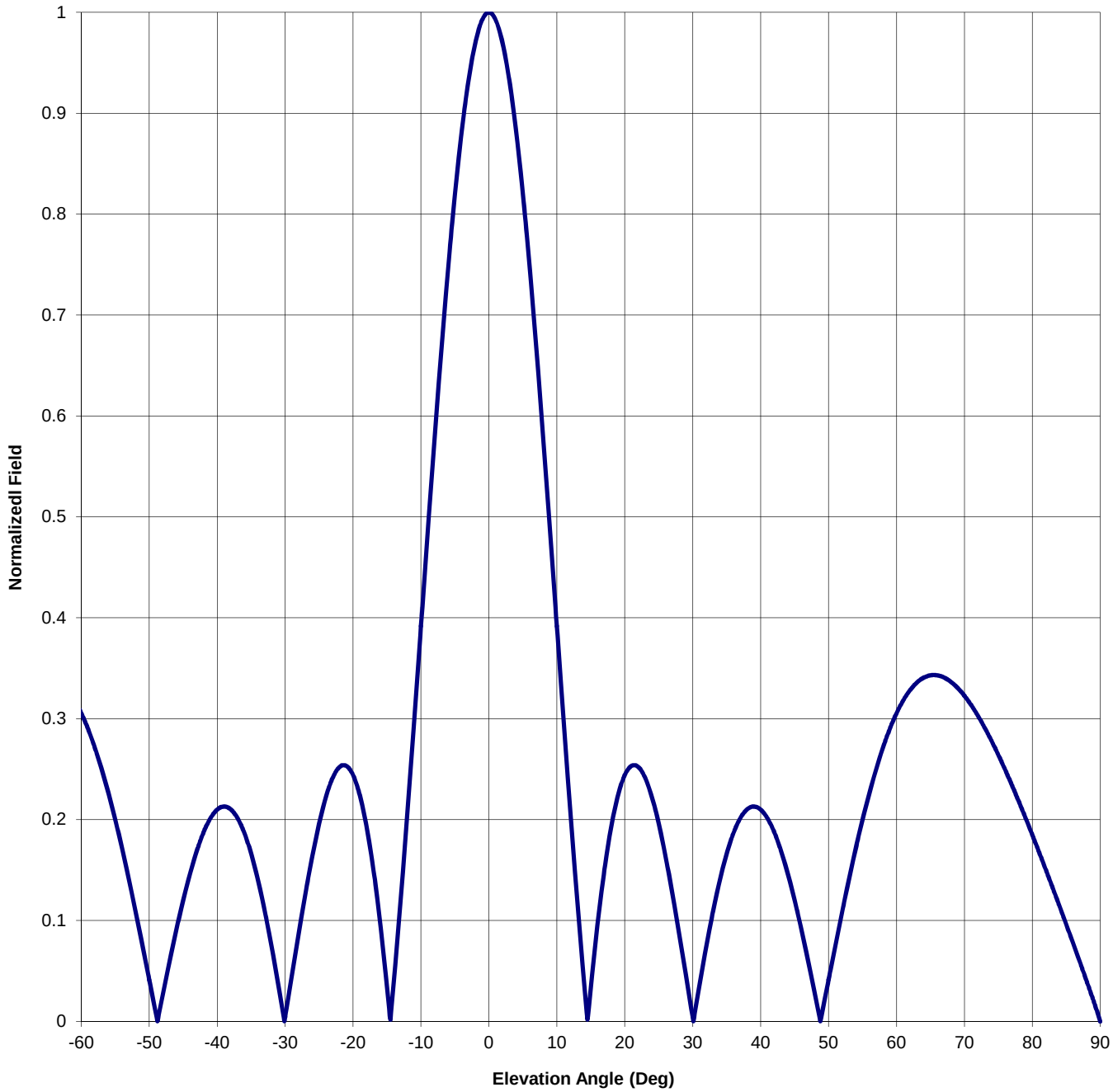
TOP VIEW

TOWER MAKE: UNKNOWN 24"

ANTENNA HEADING 234.5° TRUE NORTH

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 31339	FREQUENCY: 88.3	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY: DAB
TITLE: MODEL-6810-4-DIRECTIONAL ANTENNA			
DATE: 12-5-13	FIGURE 2		

Antenna Mfg.:	**Shively Labs**			**Date:**	**12/5/2013**
Antenna Type:	**6810-4-DA**				
Station:	**KXJT**	**Beam Tilt**	**0**		
Frequency:	**88.3**	**Gain (Max)**	**3.537**	**5.486**	**dB**
Channel #:	**202**	**Gain (Horizon)**	**3.537**	**5.486**	**dB**
Figure:	**Figure 3**				



Antenna Mfg.: Shively Labs **Date:** 12/5/2013

Antenna Type: 6810-4-DA

Station: KXJT **Beam Tilt** 0

Frequency: 88.3 **Gain (Max)** 3.537 5.486 dB

Channel #: 202 **Gain (Horizon)** 3.537 5.486 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	0.147	0	1.000	46	0.091
-89	0.021	-43	0.169	1	0.992	47	0.060
-88	0.040	-42	0.188	2	0.970	48	0.027
-87	0.059	-41	0.201	3	0.933	49	0.007
-86	0.078	-40	0.210	4	0.882	50	0.041
-85	0.096	-39	0.213	5	0.820	51	0.075
-84	0.114	-38	0.210	6	0.747	52	0.109
-83	0.132	-37	0.201	7	0.666	53	0.141
-82	0.150	-36	0.187	8	0.578	54	0.171
-81	0.168	-35	0.166	9	0.486	55	0.200
-80	0.185	-34	0.140	10	0.392	56	0.226
-79	0.202	-33	0.109	11	0.298	57	0.250
-78	0.218	-32	0.075	12	0.207	58	0.271
-77	0.234	-31	0.036	13	0.120	59	0.290
-76	0.249	-30	0.004	14	0.039	60	0.305
-75	0.264	-29	0.046	15	0.034	61	0.318
-74	0.278	-28	0.087	16	0.097	62	0.328
-73	0.291	-27	0.127	17	0.150	63	0.336
-72	0.303	-26	0.164	18	0.193	64	0.341
-71	0.313	-25	0.196	19	0.224	65	0.343
-70	0.323	-24	0.222	20	0.244	66	0.343
-69	0.331	-23	0.241	21	0.253	67	0.341
-68	0.337	-22	0.252	22	0.252	68	0.337
-67	0.341	-21	0.253	23	0.241	69	0.331
-66	0.343	-20	0.244	24	0.222	70	0.323
-65	0.343	-19	0.224	25	0.196	71	0.313
-64	0.341	-18	0.193	26	0.164	72	0.303
-63	0.336	-17	0.150	27	0.127	73	0.291
-62	0.328	-16	0.097	28	0.087	74	0.278
-61	0.318	-15	0.034	29	0.046	75	0.264
-60	0.305	-14	0.039	30	0.004	76	0.249
-59	0.290	-13	0.120	31	0.036	77	0.234
-58	0.271	-12	0.207	32	0.075	78	0.218
-57	0.250	-11	0.298	33	0.109	79	0.202
-56	0.226	-10	0.392	34	0.140	80	0.185
-55	0.200	-9	0.486	35	0.166	81	0.168
-54	0.171	-8	0.578	36	0.187	82	0.150
-53	0.141	-7	0.666	37	0.201	83	0.132
-52	0.109	-6	0.747	38	0.210	84	0.114
-51	0.075	-5	0.820	39	0.213	85	0.096
-50	0.041	-4	0.882	40	0.210	86	0.078
-49	0.007	-3	0.933	41	0.201	87	0.059
-48	0.027	-2	0.970	42	0.188	88	0.040
-47	0.060	-1	0.992	43	0.169	89	0.021
-46	0.091	0	1.000	44	0.147	90	0.000
-45	0.120			45	0.120		

S.O. 31339 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

KXJT RIO GRANDE CITY, TX.

MODEL 6810-4-DA

Elevation Gain of Antenna 2.12

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

H RMS 0.794476 V RMS 0.754354 H/V Ratio 1.053

Elevation Gain of Horizontal Component 2.233

Elevation Gain of Vertical Component 2.013

Horizontal Azimuth Gain equals $1/(RMS)^2$. 1.584

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 1.740

Max. Vertical 0.995

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

Total Horizontal Power Gain = **3.537**

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

Total Vertical Power Gain = **3.502**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

3.5 kW ERP Divided by H Gain 3.537 equals 0.989 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.989 kW Times V Gain 3.502 equals 3.465 kW V ERP

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

(0.995)^2 Times 3.50 Equals 3.465 kW Vertical ERP

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