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S.O. 30683

Report of Test 6810-12R-BB-BT(0.5)-DA

for

Tejas Broadcasting LTD., LLP

KLTG 96.5 MHz Corpus Christi, TX

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-12R-BB-BT(0.5)-DA to meet the needs of KLTG and to comply with the requirements of the FCC construction permit, file number BPH-20121106ABU. 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 BPH-20121106ABU indicates that the Horizontal radiation component shall not exceed 100.00 kW at any azimuth and is restricted to the following values at the azimuths specified:

0 - 10 Degrees True: 32.00 kilowatts
20 Degrees True: 50.00 kilowatts
40 - 50 Degrees True: 25.00 kilowatts
60 Degrees True: 28.00 kilowatts

From Figure 1A, the maximum radiation of the Horizontal component occurs at 239 Degrees True to 243 Degrees True. At the restricted azimuth of 0 - 10 Degrees True the Horizontal component is 7.702 dB down from the maximum of 100.00 kW, or 16.97 kW, at the restricted azimuth of 20 Degrees True the Horizontal component is 7.681 dB down from the maximum of 100.00 kW, or 17.06 kW, At the restricted azimuth of 40 - 50 Degrees True the Horizontal component is 8.995 dB down from the maximum of 100.00 kW, or 12.60 kW and at the restricted azimuth of 60 Degrees True the Horizontal component is 8.850 dB down from the maximum of 100.00 kW, or 13.03 kW.

The R.M.S. of the Horizontal component is 0.741. The total Horizontal power gain is 12.894. The R.M.S. of the Vertical component is 0.705. The total Vertical power gain is 12.535. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.904. The R.M.S. of the measured composite pattern is 0.782. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.768. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-12R-BB-BT(0.5)-DA was mounted on a tower of precise scale to the Allied 5 ft. face tower at the KLTG 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 BPH-20121106ABU, a single level of the 6810-12R-BB-BT(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.
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 434.25 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 30683
May 10, 2013

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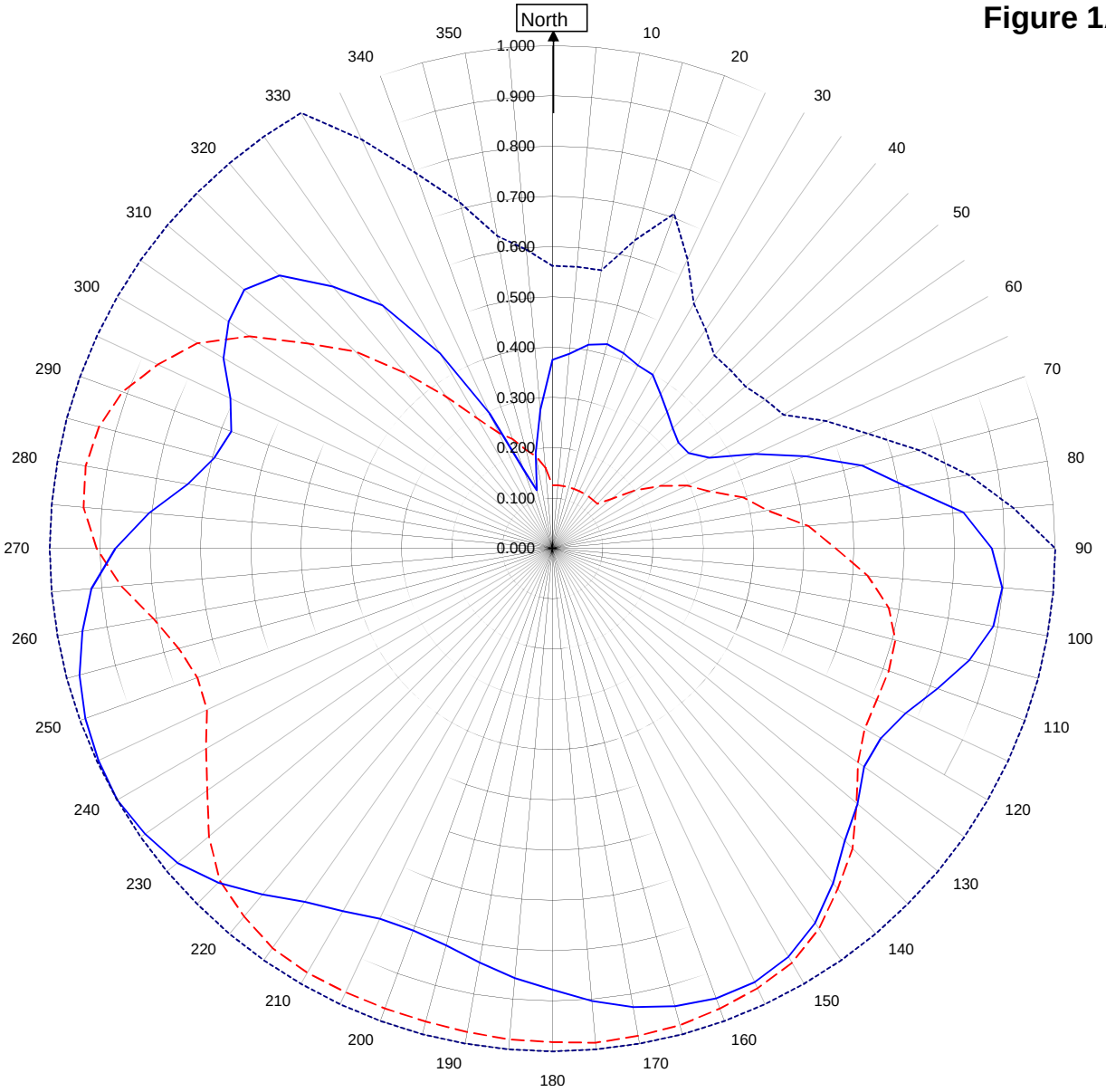
Figure 1A



KLTG CORPUS CHRISTI, TX.

30683

May 10, 2013

Horizontal RMS	0.741
Vertical RMS	0.705
H/V Composite RMS	0.782
FCC Composite RMS	0.904

Frequency	96.5 / 434.25 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-12R-BB-CF-BT-DA
Pattern Type	Directional Azimuth

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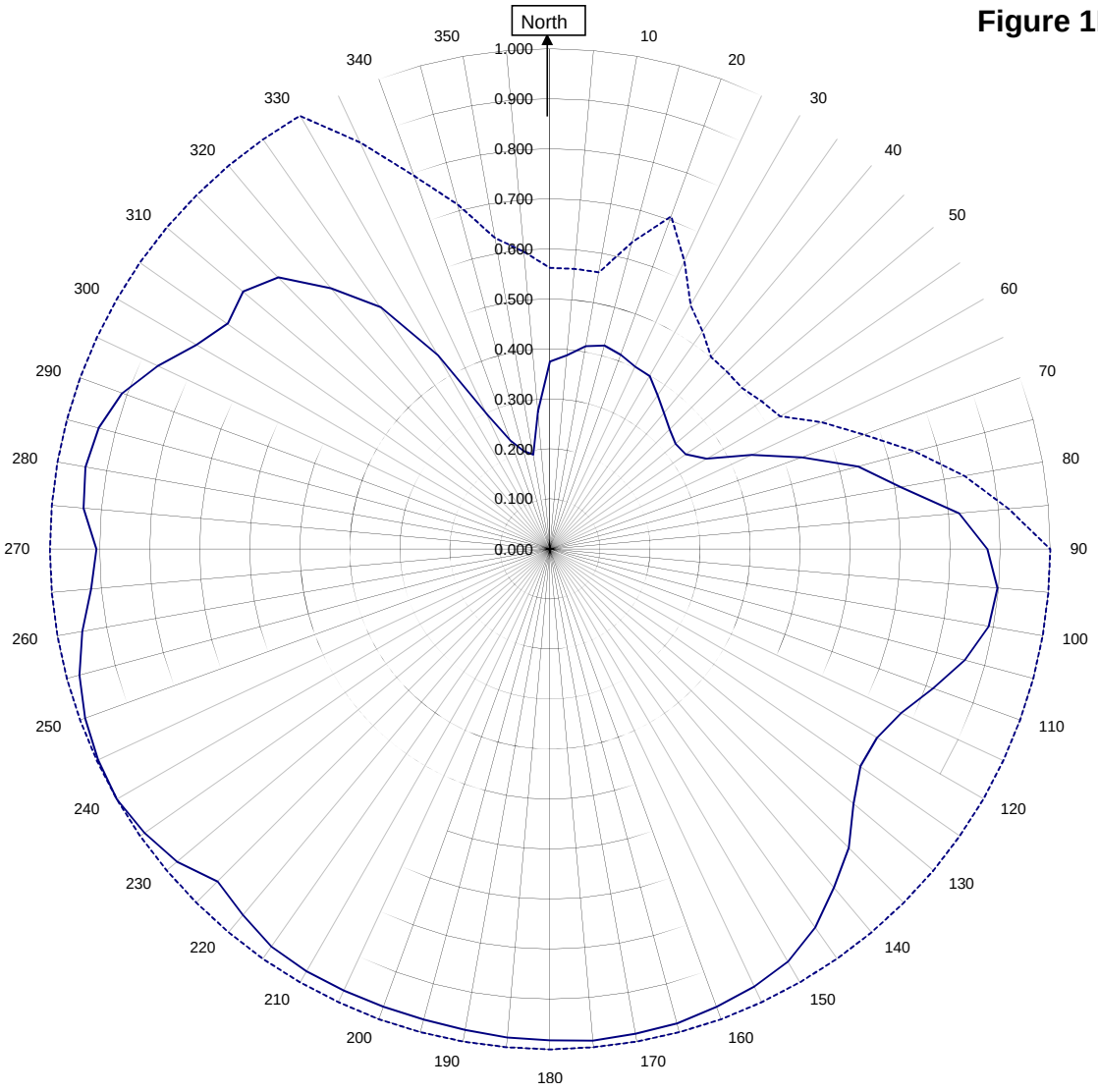
Figure 1B



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May 10, 2013

_____H/VComposite RMS	0.782
……FCC Composite RMS	0.904

Frequency	96.5 / 434.25 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-12R-BB-CF-BT-DA
Pattern Type	Directional H/V Composite

Figure 1C

Tabulation of Horizontal Azimuth Pattern
KLTG CORPUS CHRISTI, TX.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.375	180	0.878
10	0.412	190	0.836
20	0.413	200	0.809
30	0.398	210	0.833
40	0.355	220	0.898
45	0.338	225	0.940
50	0.327	230	0.973
60	0.361	240	1.000
70	0.536	250	0.989
80	0.713	260	0.950
90	0.874	270	0.869
100	0.890	280	0.736
110	0.815	290	0.680
120	0.755	300	0.756
130	0.792	310	0.801
135	0.822	315	0.768
140	0.869	320	0.680
150	0.938	330	0.448
160	0.952	340	0.166
170	0.926	350	0.192

Figure 1D

Tabulation of Vertical Azimuth Pattern
KLTG CORPUS CHRISTI, TX.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.126	180	0.982
10	0.126	190	0.976
20	0.126	200	0.974
30	0.126	210	0.974
40	0.126	220	0.955
45	0.126	225	0.936
50	0.152	230	0.892
60	0.249	240	0.796
70	0.331	250	0.751
80	0.435	260	0.805
90	0.563	270	0.907
100	0.679	280	0.943
110	0.712	290	0.910
120	0.717	300	0.816
130	0.790	310	0.634
135	0.844	315	0.553
140	0.883	320	0.455
150	0.952	330	0.299
160	0.974	340	0.231
170	0.984	350	0.185

Figure 1E

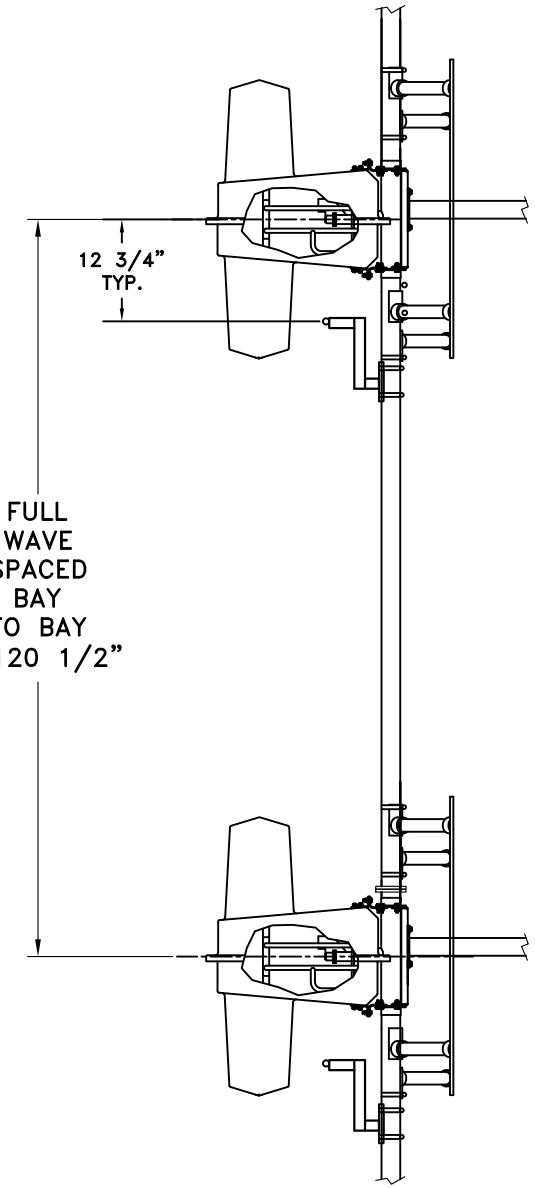
Tabulation of Composite Azimuth Pattern
KLTG CORPUS CHRISTI, TX.

Azimuth	Rel Field	Azimuth	Rel Field
0	0.375	180	0.982
10	0.412	190	0.976
20	0.413	200	0.974
30	0.398	210	0.974
40	0.355	220	0.955
45	0.338	225	0.940
50	0.327	230	0.973
60	0.361	240	1.000
70	0.536	250	0.989
80	0.713	260	0.950
90	0.874	270	0.907
100	0.890	280	0.943
110	0.815	290	0.910
120	0.755	300	0.816
130	0.792	310	0.801
135	0.844	315	0.768
140	0.883	320	0.680
150	0.952	330	0.448
160	0.974	340	0.231
170	0.984	350	0.192

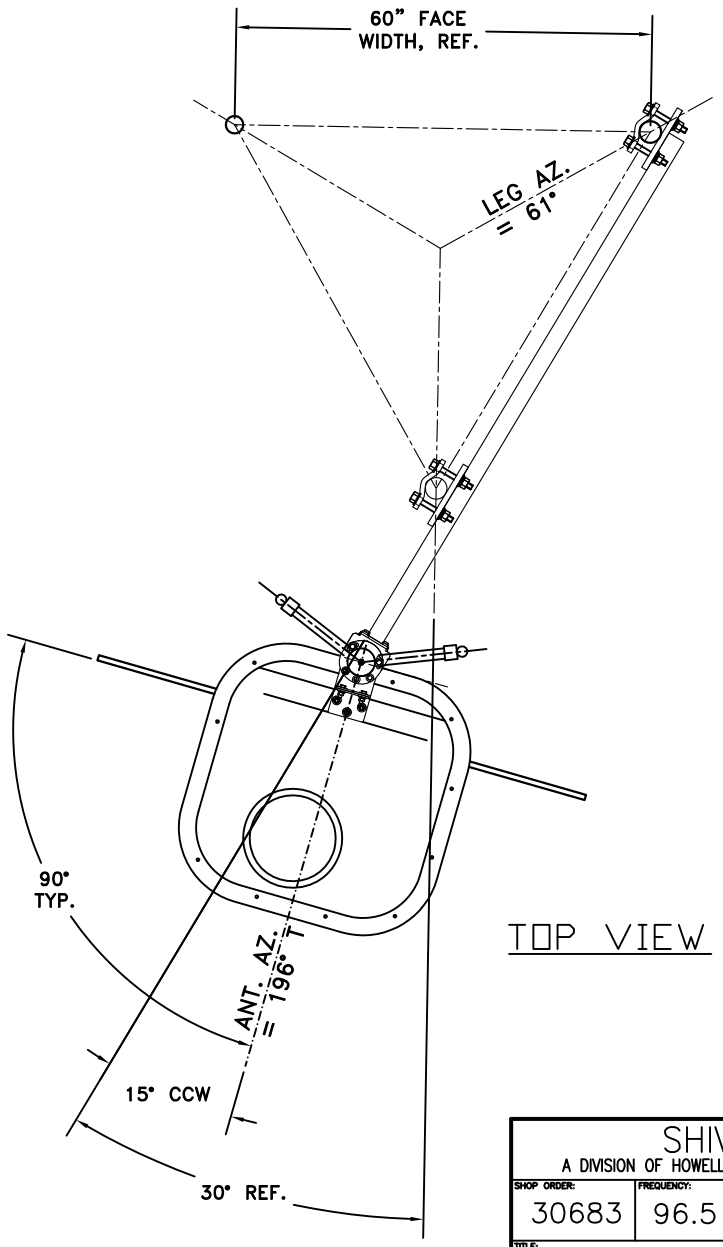
Figure 1F

Tabulation of FCC Directional Composite
KLTG CORPUS CHRISTI, TX.

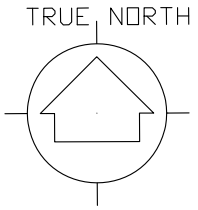
Azimuth	Rel Field	Azimuth	Rel Field
0	0.562	180	1.000
10	0.562	190	1.000
20	0.708	200	1.000
30	0.562	210	1.000
40	0.501	220	1.000
50	0.501	230	1.000
60	0.531	240	1.000
70	0.668	250	1.000
80	0.841	260	1.000
90	1.000	270	1.000
100	1.000	280	1.000
110	1.000	290	1.000
120	1.000	300	1.000
130	1.000	310	1.000
140	1.000	320	1.000
150	1.000	330	1.000
160	1.000	340	0.794
170	1.000	350	0.631



SIDE VIEW



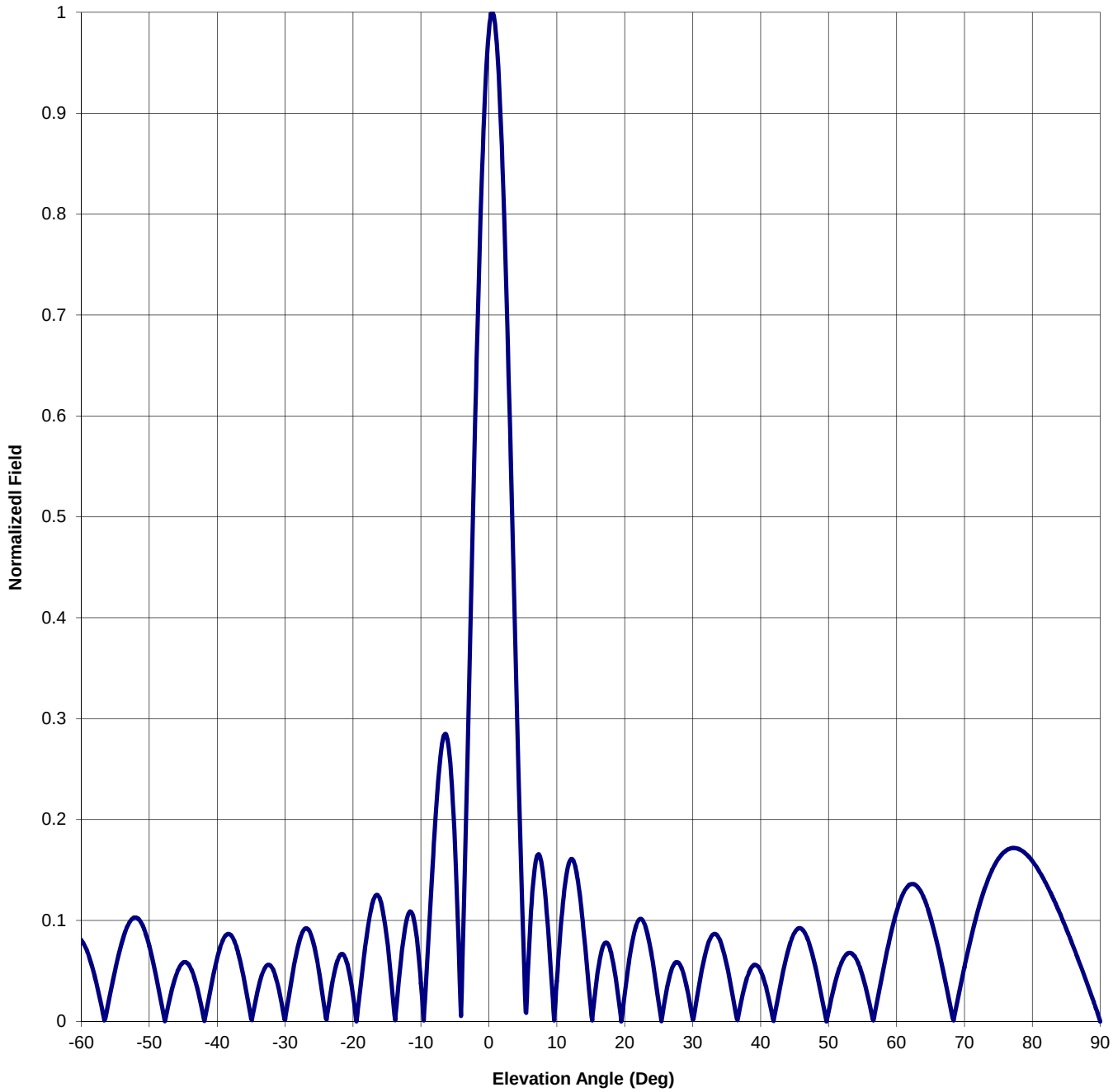
TOP VIEW



ANTENNA HEADING 196° TRUE NORTH

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 30683	FREQUENCY: 96.5	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY: DAB
TITLE: MODEL-6810BB-12R-BT-DIRECTIONAL ANTENNA			
DATE: 6-12-13	FIGURE 2		

Antenna Mfg.:	**Shively Labs**			**Date:**	**5/9/2013**
Antenna Type:	**6810-12R-BB-BT=DA**				
Station:	**KLTG**	**Beam Tilt**	**0.5**		
Frequency:	**97.4**	**Gain (Max)**	**12.894**	**11.104**	**dB**
Channel #:	**247.5**	**Gain (Horizon)**	**12.437**	**10.947**	**dB**
Figure:	**Figure 3**				



Antenna Mfg.: Shively Labs **Date:** 5/9/2013

Antenna Type: 6810-12R-BB-BT=DA

Station: KLTG **Beam Tilt** 0.5

Frequency: 97.4 **Gain (Max)** 12.894 11.104 dB

Channel #: 247.5 **Gain (Horizon)** 12.437 10.947 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	0.054	0	0.982	46	0.092
-89	0.020	-43	0.035	1	0.982	47	0.080
-88	0.039	-42	0.004	2	0.848	48	0.056
-87	0.058	-41	0.031	3	0.614	49	0.024
-86	0.077	-40	0.063	4	0.341	50	0.010
-85	0.096	-39	0.083	5	0.091	51	0.039
-84	0.114	-38	0.086	6	0.085	52	0.060
-83	0.133	-37	0.070	7	0.162	53	0.068
-82	0.150	-36	0.040	8	0.145	54	0.063
-81	0.167	-35	0.002	9	0.063	55	0.045
-80	0.184	-34	0.032	10	0.040	56	0.018
-79	0.198	-33	0.053	11	0.124	57	0.015
-78	0.211	-32	0.054	12	0.160	58	0.049
-77	0.220	-31	0.034	13	0.144	59	0.082
-76	0.227	-30	0.002	14	0.086	60	0.109
-75	0.230	-29	0.043	15	0.013	61	0.127
-74	0.228	-28	0.077	16	0.048	62	0.136
-73	0.221	-27	0.092	17	0.077	63	0.134
-72	0.209	-26	0.082	18	0.068	64	0.123
-71	0.191	-25	0.049	19	0.027	65	0.103
-70	0.167	-24	0.003	20	0.028	66	0.077
-69	0.139	-23	0.040	21	0.075	67	0.046
-68	0.106	-22	0.065	22	0.100	68	0.013
-67	0.071	-21	0.060	23	0.095	69	0.021
-66	0.034	-20	0.026	24	0.064	70	0.054
-65	0.001	-19	0.029	25	0.018	71	0.084
-64	0.032	-18	0.085	26	0.025	72	0.110
-63	0.058	-17	0.120	27	0.053	73	0.132
-62	0.076	-16	0.121	28	0.057	74	0.149
-61	0.083	-15	0.081	29	0.038	75	0.161
-60	0.080	-14	0.014	30	0.002	76	0.169
-59	0.067	-13	0.058	31	0.038	77	0.172
-58	0.044	-12	0.104	32	0.071	78	0.171
-57	0.014	-11	0.100	33	0.086	79	0.166
-56	0.019	-10	0.038	34	0.081	80	0.159
-55	0.052	-9	0.069	35	0.057	81	0.149
-54	0.079	-8	0.187	36	0.021	82	0.137
-53	0.097	-7	0.270	37	0.015	83	0.123
-52	0.103	-6	0.275	38	0.043	84	0.108
-51	0.095	-5	0.175	39	0.056	85	0.092
-50	0.075	-4	0.030	40	0.050	86	0.075
-49	0.045	-3	0.307	41	0.028	87	0.057
-48	0.011	-2	0.600	42	0.004	88	0.039
-47	0.022	-1	0.844	43	0.039	89	0.020
-46	0.047	0	0.982	44	0.069	90	0.000
-45	0.058			45	0.088		

S.O. 30683 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

KLTG CORPUS CHRISTI, TX.

MODEL 6810-12R-BB-CF-BT-DA

Elevation Gain of Antenna 6.734

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

H RMS 0.741099 V RMS 0.704713 H/V Ratio 1.052

Elevation Gain of Horizontal Component 7.082

Elevation Gain of Vertical Component 6.403

Horizontal Azimuth Gain equals $1/(RMS)^2$. 1.821

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 1.958

Max. Vertical 0.986

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

Total Horizontal Power Gain = **12.894**

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

Total Vertical Power Gain = **12.535**

==========

ERP divided by Horizontal Power Gain equals Antenna Input Power

100 kW ERP Divided by H Gain 12.894 equals 7.756 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

7.756 kW Times V Gain 12.535 equals 97.220 kW V ERP

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

(0.986)^2 Times 100.00 Equals 97.220 kW Vertical ERP

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