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S.O. 26757

Report of Test 6810-4-DA

for

MAGIC BROADCASTING ALABAMA LICENSING LLC

WLDA 100.5 MHz Slocomb, AL

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-4-DA to meet the needs of WLDA and to comply with the requirements of the FCC construction permit, file number BMPH-20071026AAY.

RESULTS:

The measured azimuth pattern for the 6810-4-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Horizontal Polarization. Figure 1B shows the Tabulation of the Vertical Polarization. Figure 1C shows the Tabulation of the FCC Composite Pattern. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BMPH-20071026AAY indicates that the Horizontal radiation component shall not exceed 16.5 kW at any azimuth and is restricted to the following values at the azimuths specified:

70 - 90 Degrees T: 10.5 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 335 Degrees T to 353 Degrees T. At the restricted azimuth of 70 - 90 Degrees T the Horizontal component is 1.99 dB down from the maximum of 16.5 kW, or 10.4 kW.

The R.M.S. of the Horizontal component is 0.766. The total Horizontal power gain is 3.646. The R.M.S. of the Vertical component is 0.759. The total Vertical power gain is 3.632. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.980. The R.M.S. of the measured composite pattern is 0.834. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.833. 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 42-inch face tower at the WLDA site. The spacing of the antenna to the tower was varied to achieve the vertical pattern shown in Figure 1. 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 1 was achieved. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPH-20071026AAY, a single level of the 6810-4-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^{th} and 10^{th} 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 452.25 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 1.

Respectfully submitted by:

Robert A. Surette
Director of Sales Engineering
S/O 26757
August 1, 2008

Shively Labs

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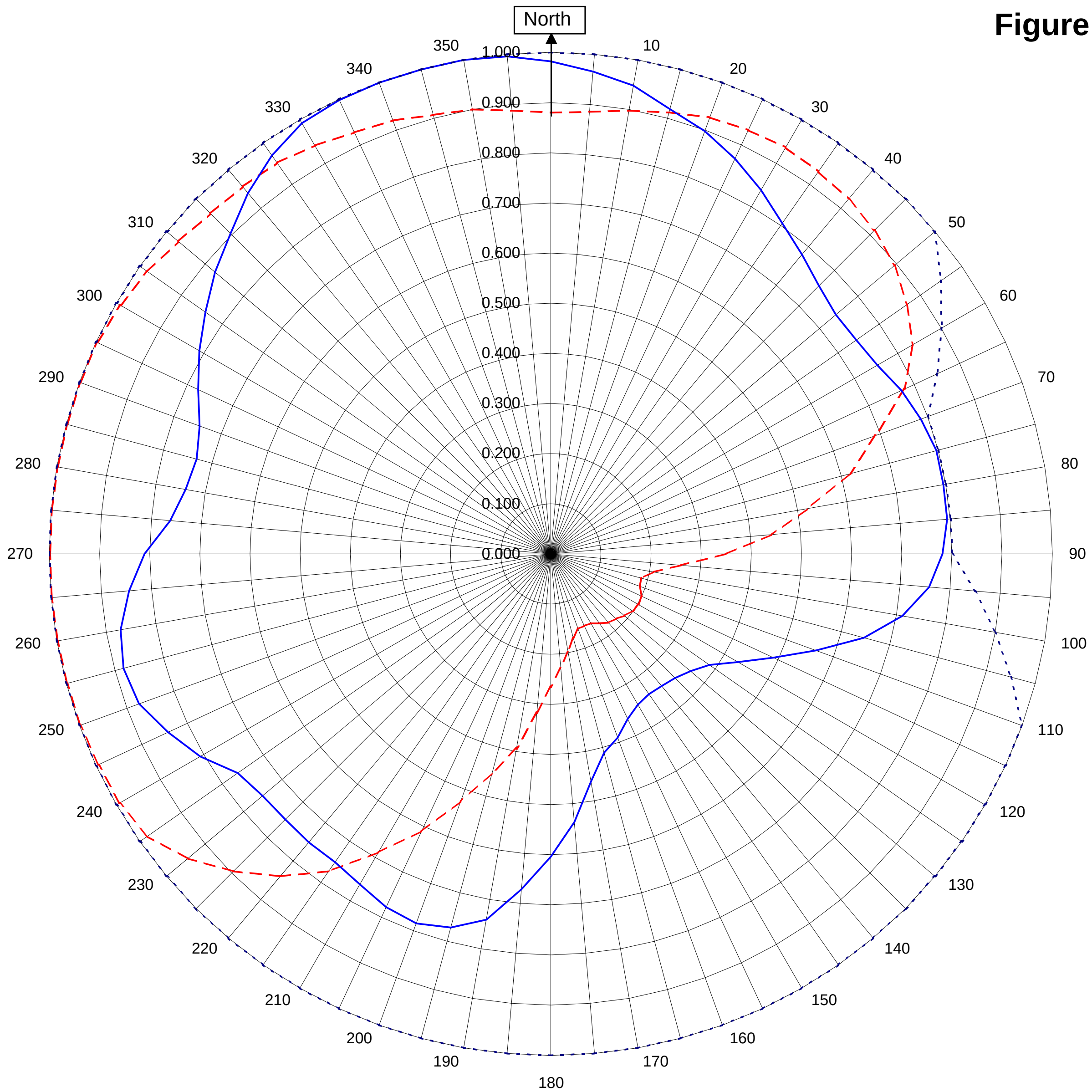
Figure 1



WLDA Slocomb, AL

26757

August 1, 2008

Horizontal RMS	0.766
Vertical RMS	0.759
H/V Composite RMS	0.834
...............FCC Composite RMS	0.980

Frequency	100.5 / 452.25 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-4-DA
Pattern Type	Directional Azimuth

Figure 1a

Tabulation of Horizontal Azimuth Pattern 18
WLDA Slocomb, AL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.982	180	0.604
10	0.948	190	0.740
20	0.897	200	0.784
30	0.838	210	0.761
40	0.779	220	0.751
45	0.756	225	0.749
50	0.742	230	0.750
60	0.752	240	0.807
70	0.785	250	0.874
80	0.795	260	0.871
90	0.781	270	0.810
100	0.712	280	0.739
110	0.563	290	0.745
120	0.431	300	0.809
130	0.364	310	0.874
135	0.350	315	0.903
140	0.344	320	0.939
150	0.347	330	0.992
160	0.390	340	1.000
170	0.461	350	1.000

Figure 1b

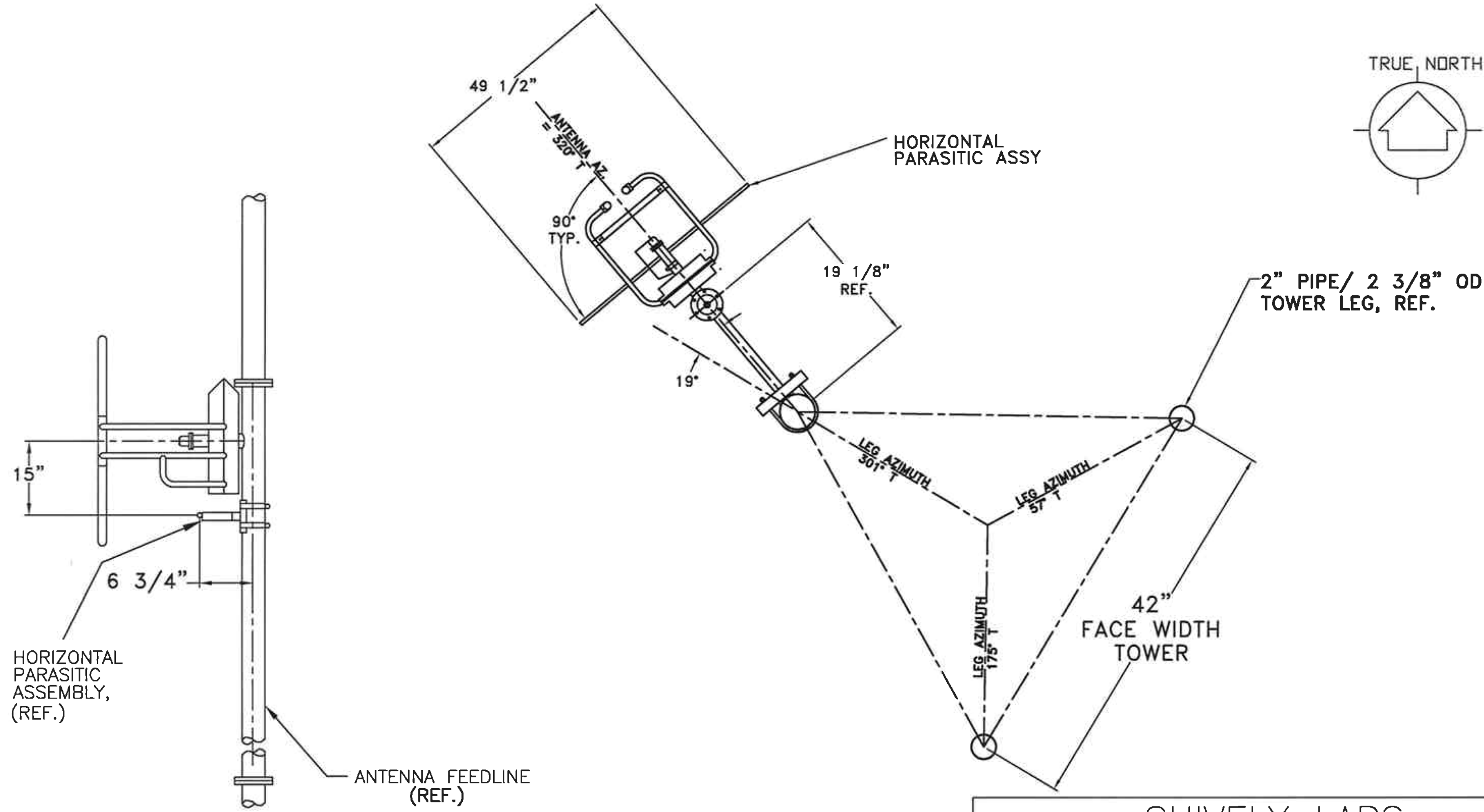
Tabulation of Vertical Azimuth Pattern 18
WLDA Slocomb, AL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.880	180	0.265
10	0.897	190	0.394
20	0.926	200	0.525
30	0.936	210	0.687
40	0.924	220	0.839
45	0.912	225	0.895
50	0.895	230	0.945
60	0.833	240	0.993
70	0.689	250	0.998
80	0.520	260	0.998
90	0.349	270	0.998
100	0.208	280	0.998
110	0.189	290	0.998
120	0.202	300	0.991
130	0.192	310	0.969
135	0.183	315	0.960
140	0.179	320	0.956
150	0.160	330	0.940
160	0.159	340	0.919
170	0.198	350	0.900

Figure 1c

Tabulation of FCC Directional Composite
WLDA Slocomb, AL

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	0.900	240	1.000
70	0.800	250	1.000
80	0.800	260	1.000
90	0.800	270	1.000
100	0.900	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	1.000
170	1.000	350	1.000



SIDE VIEW

TOP VIEW

TOWER: WALKER ENGINEERING

ANTENNA HEADING 320° TRUE NORTH

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 26757	FREQUENCY: 100.5 MHz.	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY: DAB
TITLE: MODEL–6810–4–DIRECTIONAL ANTENNA			
DATE: 8/11/08	FIGURE 2		

Antenna Mfg.:	**Shively Labs**			**Date:**	**8/1/2008**
Antenna Type:	**6810-4-DA**				
Station:	**WLDA**	**Beam Tilt**	**0**		
Frequency:	**100.5**	**Gain (Max)**	**3.646**	**5.618**	**dB**
Channel #:	**263**	**Gain (Horizon)**	**3.646**	**5.618**	**dB**
Figure:	**3**				

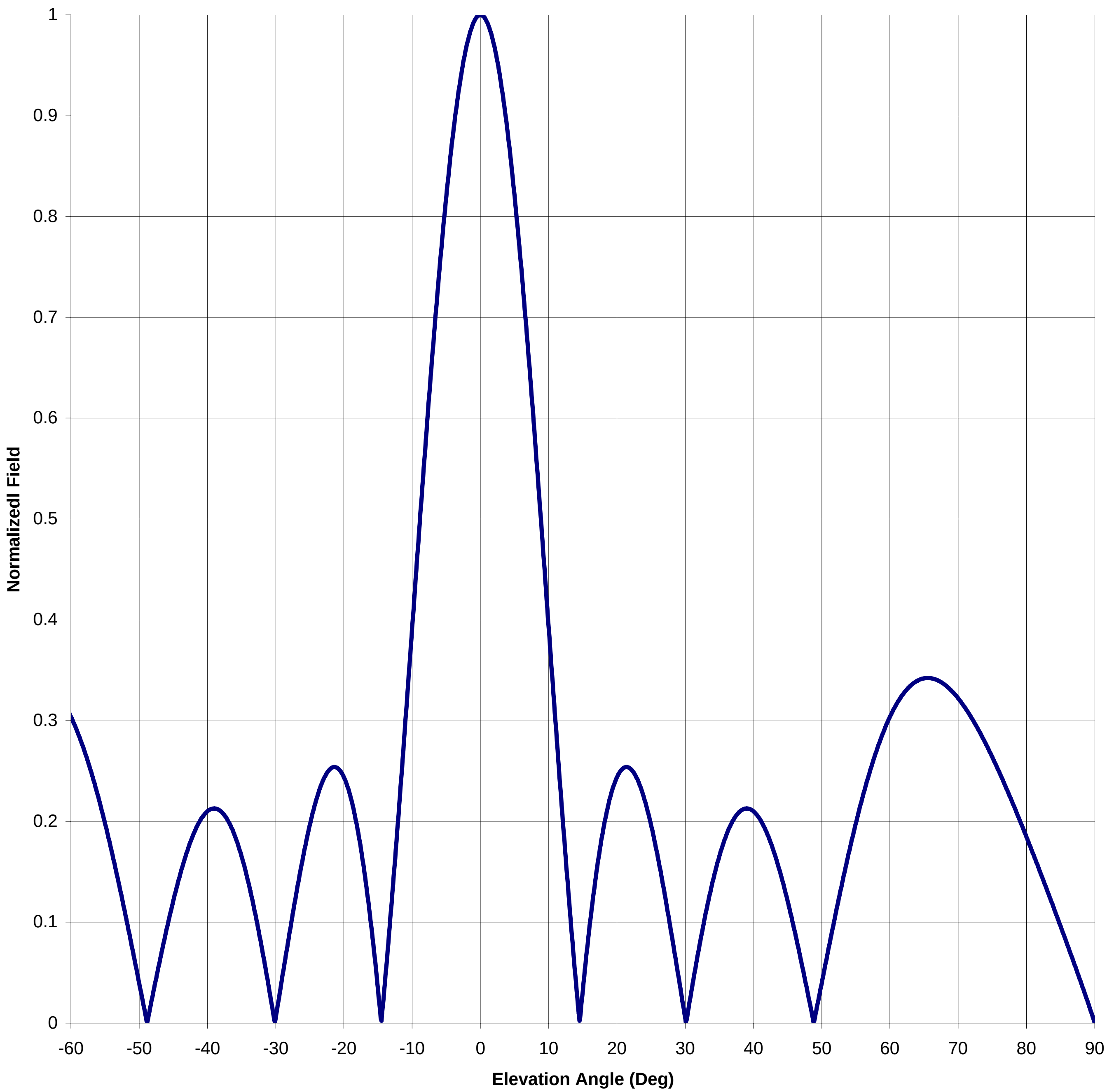


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Figure:	**3**				

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	0.092
-89	0.021	-43	0.170	1	0.992	47	0.061
-88	0.040	-42	0.188	2	0.970	48	0.028
-87	0.059	-41	0.202	3	0.933	49	0.006
-86	0.078	-40	0.210	4	0.883	50	0.040
-85	0.096	-39	0.213	5	0.820	51	0.074
-84	0.114	-38	0.210	6	0.747	52	0.107
-83	0.132	-37	0.201	7	0.666	53	0.139
-82	0.150	-36	0.186	8	0.578	54	0.170
-81	0.167	-35	0.166	9	0.486	55	0.198
-80	0.185	-34	0.140	10	0.392	56	0.224
-79	0.201	-33	0.109	11	0.299	57	0.248
-78	0.218	-32	0.074	12	0.207	58	0.270
-77	0.234	-31	0.035	13	0.120	59	0.288
-76	0.249	-30	0.005	14	0.040	60	0.304
-75	0.264	-29	0.047	15	0.033	61	0.317
-74	0.278	-28	0.088	16	0.096	62	0.327
-73	0.290	-27	0.128	17	0.150	63	0.335
-72	0.302	-26	0.164	18	0.192	64	0.340
-71	0.313	-25	0.196	19	0.224	65	0.342
-70	0.322	-24	0.223	20	0.244	66	0.342
-69	0.330	-23	0.242	21	0.253	67	0.340
-68	0.336	-22	0.252	22	0.252	68	0.336
-67	0.340	-21	0.253	23	0.242	69	0.330
-66	0.342	-20	0.244	24	0.223	70	0.322
-65	0.342	-19	0.224	25	0.196	71	0.313
-64	0.340	-18	0.192	26	0.164	72	0.302
-63	0.335	-17	0.150	27	0.128	73	0.290
-62	0.327	-16	0.096	28	0.088	74	0.278
-61	0.317	-15	0.033	29	0.047	75	0.264
-60	0.304	-14	0.040	30	0.005	76	0.249
-59	0.288	-13	0.120	31	0.035	77	0.234
-58	0.270	-12	0.207	32	0.074	78	0.218
-57	0.248	-11	0.299	33	0.109	79	0.201
-56	0.224	-10	0.392	34	0.140	80	0.185
-55	0.198	-9	0.486	35	0.166	81	0.167
-54	0.170	-8	0.578	36	0.186	82	0.150
-53	0.139	-7	0.666	37	0.201	83	0.132
-52	0.107	-6	0.747	38	0.210	84	0.114
-51	0.074	-5	0.820	39	0.213	85	0.096
-50	0.040	-4	0.883	40	0.210	86	0.078
-49	0.006	-3	0.933	41	0.202	87	0.059
-48	0.028	-2	0.970	42	0.188	88	0.040
-47	0.061	-1	0.992	43	0.170	89	0.021
-46	0.092	0	1.000	44	0.147	90	0.000
-45	0.121			45	0.121		

S.O. 26757 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

WLDA 100.5 MHz Slocomb, AL

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 0.766 V RMS 0.759 H/V Ratio 1.009

Elevation Gain of Horizontal Component 2.140

Elevation Gain of Vertical Component 2.101

Horizontal Azimuth Gain equals $1/(RMS)^2$. 1.704

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 1.729
Max. Vertical 0.998

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

Total Horizontal Power Gain = **3.646**

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

Total Vertical Power Gain = **3.632**

==

ERP divided by Horizontal Power Gain equals Antenna Input Power

16.5 kW ERP Divided by H Gain 3.646 equals 4.53 kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

4.525 kW Times V Gain 3.632 equals 16.434 kW V ERP

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

(0.998)^2 Times 16.50 Equals 16.434 kW Vertical ERP

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