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S.O. 26738

Report of Test 6810-3-DA

for

SSR COMMUNICATIONS, INC.

WYAB 103.9 MHz Flora, MS

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-3-DA to meet the needs of WYAB and to comply with the requirements of the FCC construction permit, file number BPH-20070222ABD.

RESULTS:

The measured azimuth pattern for the 6810-3-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 BPH-20070222ABD indicates that the Horizontal radiation component shall not exceed 6 kW at any azimuth and is restricted to the following values at the azimuths specified:

350 Degrees T: 0.660 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 204 Degrees T to 236 Degrees T. At the restricted azimuth of 350 Degrees T the Horizontal component is 11.601 dB down from the maximum of 6 kW, or 0.415 kW.

The R.M.S. of the Horizontal component is 0.746. The total Horizontal power gain is 2.793. The R.M.S. of the Vertical component is 0.744. The total Vertical power gain is 2.737. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.871. The R.M.S. of the measured composite pattern is 0.784. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.740. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-3-DA was mounted on a tower of precise scale to the J-Crow-18 tower at the WYAB 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 BPH-20070222ABD, a single level of the 6810-3-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 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

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 467.55 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 26738
August 1, 2008

Shively Labs

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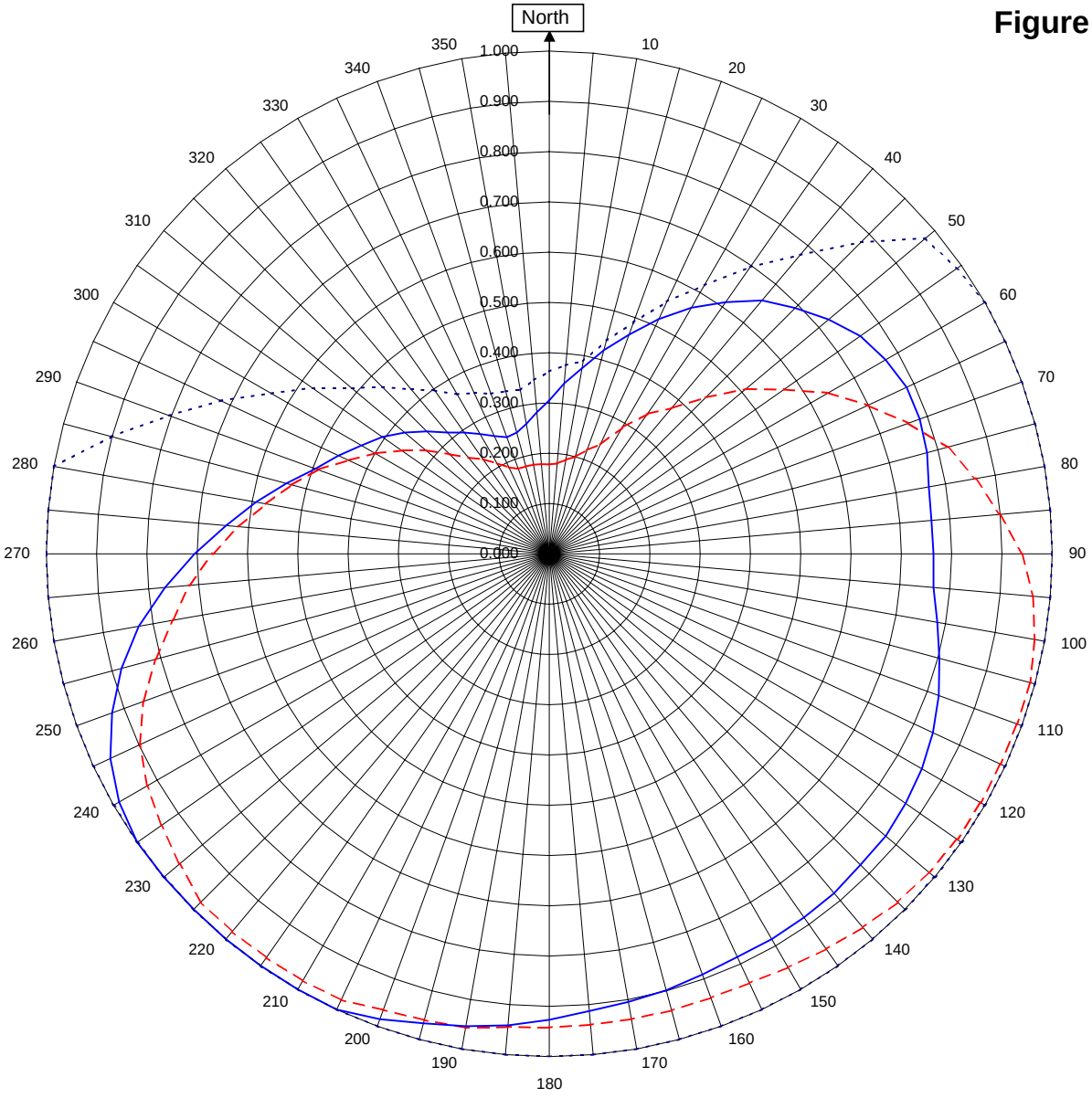
Figure 1



WYAB Flora, MS

26738

August 1, 2008

Horizontal RMS	0.746
Vertical RMS	0.744
H/V Composite RMS	0.784
FCC Composite RMS	0.871

Frequency	103.9 / 467.55 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-3-DA Pattern 08-A
Pattern Type	Directional Azimuth

Figure 1a

Tabulation of Horizontal Azimuth Pattern
WYAB Flora, MS

Azimuth	Rel Field	Azimuth	Rel Field
0	0.305	180	0.927
10	0.375	190	0.954
20	0.464	200	0.985
30	0.565	210	1.000
40	0.658	220	1.000
45	0.691	225	1.000
50	0.725	230	1.000
60	0.772	240	0.987
70	0.784	250	0.925
80	0.766	260	0.829
90	0.764	270	0.705
100	0.783	280	0.592
110	0.824	290	0.495
120	0.855	300	0.431
130	0.873	310	0.375
135	0.875	315	0.345
140	0.881	320	0.315
150	0.885	330	0.275
160	0.890	340	0.247
170	0.905	350	0.263

Figure 1b

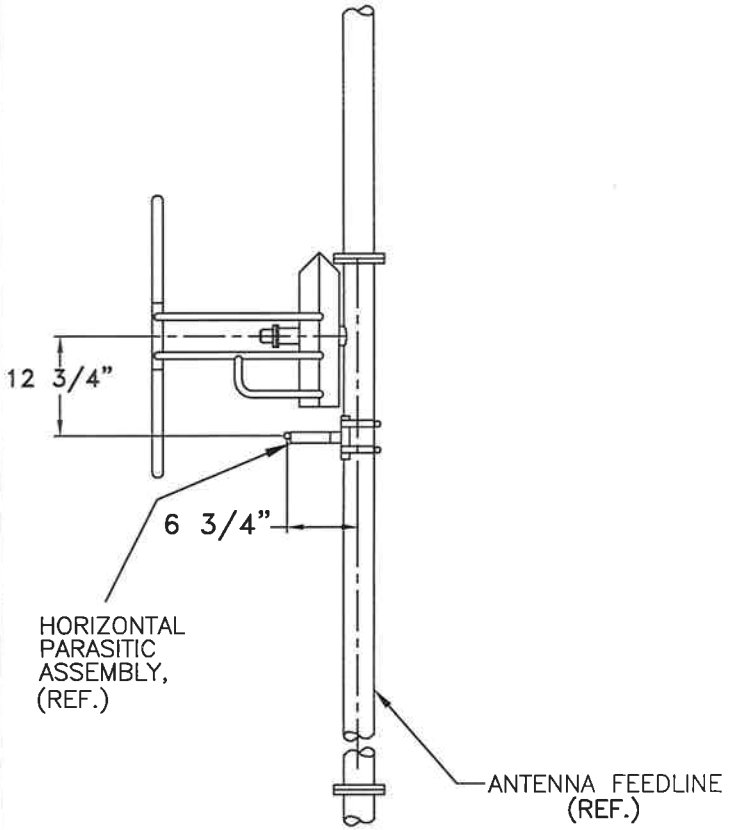
Tabulation of Vertical Azimuth Pattern
WYAB Flora, MS

Azimuth	Rel Field	Azimuth	Rel Field
0	0.178	180	0.942
10	0.190	190	0.957
20	0.220	200	0.965
30	0.290	210	0.980
40	0.378	220	0.980
45	0.440	225	0.979
50	0.510	230	0.960
60	0.640	240	0.923
70	0.760	250	0.859
80	0.860	260	0.760
90	0.940	270	0.670
100	0.980	280	0.572
110	0.990	290	0.490
120	0.990	300	0.400
130	0.985	310	0.320
135	0.980	315	0.280
140	0.970	320	0.250
150	0.950	330	0.208
160	0.940	340	0.180
170	0.940	350	0.180

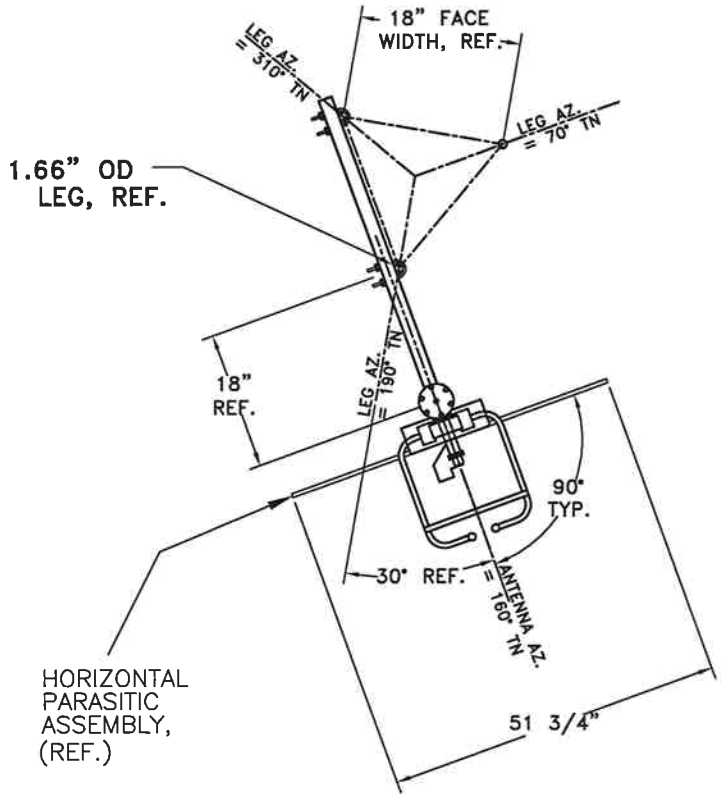
Figure 1c

Tabulation of FCC Directional Composite
WYAB Flora, MS

Azimuth	Rel Field	Azimuth	Rel Field
0	0.363	180	1.000
10	0.389	190	1.000
20	0.490	200	1.000
30	0.617	210	1.000
40	0.776	220	1.000
50	0.977	230	1.000
60	1.000	240	1.000
70	1.000	250	1.000
80	1.000	260	1.000
90	1.000	270	1.000
100	1.000	280	1.000
110	1.000	290	0.804
120	1.000	300	0.638
130	1.000	310	0.513
140	1.000	320	0.427
150	1.000	330	0.367
160	1.000	340	0.339
170	1.000	350	0.331

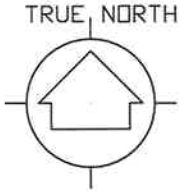


SIDE VIEW



TOP VIEW

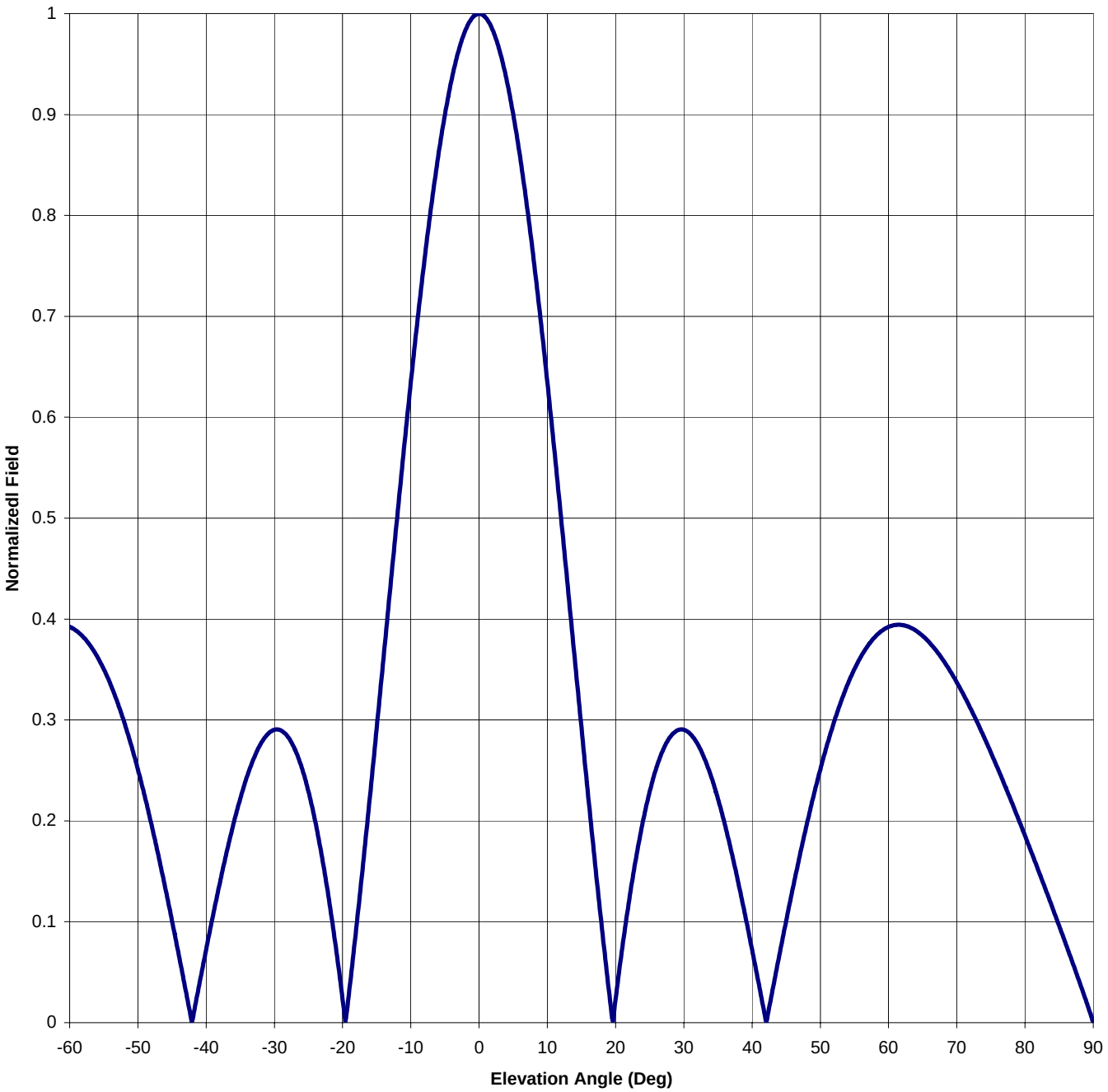
TOWER: J-CROW 18



ANTENNA HEADING 160° TRUE NORTH

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 26738	FREQUENCY: 103.9 MHz.	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY: DAB
TITLE: MODEL-6810-3-DIRECTIONAL ANTENNA			
DATE: 7/31/08	FIGURE 2		

Antenna Mfg.:	**Shively Labs**			**Date: 8/1/2008**
Antenna Type:	**6810-3-DA**			
Station:	**WYAB**	**Beam Tilt**	**0**	
Frequency:	**103.9**	**Gain (Max)**	**2.793**	**4.461 dB**
Channel #:	**280**	**Gain (Horizon)**	**2.793**	**4.461 dB**
Figure:	**3**			



Antenna Mfg.: Shively Labs
Antenna Type: 6810-3-DA
Station: WYAB
Frequency: 103.9
Channel #: 280
Figure: 3

Beam Tilt 0
Gain (Max) 2.793 **4.461 dB**
Gain (Horizon) 2.793 **4.461 dB**

Date: 8/1/2008

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	0.067	0	1.000	46	0.134
-89	0.021	-43	0.032	1	0.996	47	0.166
-88	0.040	-42	0.003	2	0.984	48	0.196
-87	0.059	-41	0.038	3	0.963	49	0.224
-86	0.078	-40	0.072	4	0.935	50	0.251
-85	0.096	-39	0.106	5	0.900	51	0.275
-84	0.114	-38	0.138	6	0.858	52	0.298
-83	0.132	-37	0.169	7	0.810	53	0.318
-82	0.150	-36	0.197	8	0.756	54	0.335
-81	0.168	-35	0.222	9	0.698	55	0.350
-80	0.185	-34	0.244	10	0.635	56	0.363
-79	0.202	-33	0.262	11	0.569	57	0.374
-78	0.219	-32	0.276	12	0.501	58	0.382
-77	0.236	-31	0.286	13	0.432	59	0.388
-76	0.252	-30	0.290	14	0.362	60	0.392
-75	0.268	-29	0.289	15	0.292	61	0.394
-74	0.283	-28	0.283	16	0.224	62	0.394
-73	0.298	-27	0.271	17	0.157	63	0.392
-72	0.312	-26	0.253	18	0.094	64	0.389
-71	0.325	-25	0.229	19	0.033	65	0.383
-70	0.337	-24	0.199	20	0.023	66	0.377
-69	0.349	-23	0.163	21	0.075	67	0.369
-68	0.359	-22	0.122	22	0.122	68	0.359
-67	0.369	-21	0.075	23	0.163	69	0.349
-66	0.377	-20	0.023	24	0.199	70	0.337
-65	0.383	-19	0.033	25	0.229	71	0.325
-64	0.389	-18	0.094	26	0.253	72	0.312
-63	0.392	-17	0.157	27	0.271	73	0.298
-62	0.394	-16	0.224	28	0.283	74	0.283
-61	0.394	-15	0.292	29	0.289	75	0.268
-60	0.392	-14	0.362	30	0.290	76	0.252
-59	0.388	-13	0.432	31	0.286	77	0.236
-58	0.382	-12	0.501	32	0.276	78	0.219
-57	0.374	-11	0.569	33	0.262	79	0.202
-56	0.363	-10	0.635	34	0.244	80	0.185
-55	0.350	-9	0.698	35	0.222	81	0.168
-54	0.335	-8	0.756	36	0.197	82	0.150
-53	0.318	-7	0.810	37	0.169	83	0.132
-52	0.298	-6	0.858	38	0.138	84	0.114
-51	0.275	-5	0.900	39	0.106	85	0.096
-50	0.251	-4	0.935	40	0.072	86	0.078
-49	0.224	-3	0.963	41	0.038	87	0.059
-48	0.196	-2	0.984	42	0.003	88	0.040
-47	0.166	-1	0.996	43	0.032	89	0.021
-46	0.134	0	1.000	44	0.067	90	0.000
-45	0.101			45	0.101		

S.O. 26738 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

WYAB 103.9 MHz Flora, MS

Model 6810-3-DA

Elevation Gain of Antenna 1.55

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

H RMS	0.746	V RMS	0.744	H/V Ratio	1.003

Elevation Gain of Horizontal Component 1.554

Elevation Gain of Vertical Component 1.546

Horizontal Azimuth Gain equals $1/(RMS)^2$. 1.797

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$. 1.771

Max. Vertical 0.99

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

Total Horizontal Power Gain = **2.793**

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

Total Vertical Power Gain = **2.737**

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ERP divided by Horizontal Power Gain equals Antenna Input Power

6	kW ERP	Divided by H Gain	2.793	equals	2.15	kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

2.148	kW	Times V Gain	2.737	equals	5.881	kW V ERP

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

(0.99)^2	Times	6.00	Equals	5.881	kW Vertical ERP

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