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S.O. 23980

Report of Test 6810-5-DA

for

SALT & LIGHT COMMUNICATIONS, INC.

WSQH 91.7 MHz FOREST, MS

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-5-DA to meet the needs of WSQH and to comply with the requirements of the FCC construction permit, file number BMPED-20030115AAY.

RESULTS:

The measured azimuth pattern for the 6810-5-DA is shown in Figure 1. Figure 1A shows the Tabulation of the Horizontal Polarization. Figure 1B shows the Tabulation of the Vertical Polarization. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BMPED-20030115AAY indicates that the Horizontal radiation component shall not exceed 15 kW at any azimuth and is restricted to the following values at the azimuths specified:

180 Degrees T: 1.26 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 348 Degrees T to 026 Degrees T. At the restricted azimuth of 180 Degrees T the Horizontal component is 12.217 dB down from the maximum of 15 kW, or 0.90 kW.

The R.M.S. of the Horizontal component is 0.779. The total Horizontal power gain is 4.666. The R.M.S. of the Vertical component is 0.751. The total Vertical power gain is 4.574. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.830. The R.M.S. of the measured composite pattern is 0.792. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.705. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-5-DA was mounted on a tower of exact scale to an Allied-24 tower at the WSQH 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 BMPED-20030115AAY, a single level of the 6810-5-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 Edition 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 412.65 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
Manager of RF Engineering
S/O 23980
July 29, 2005

Shively Labs

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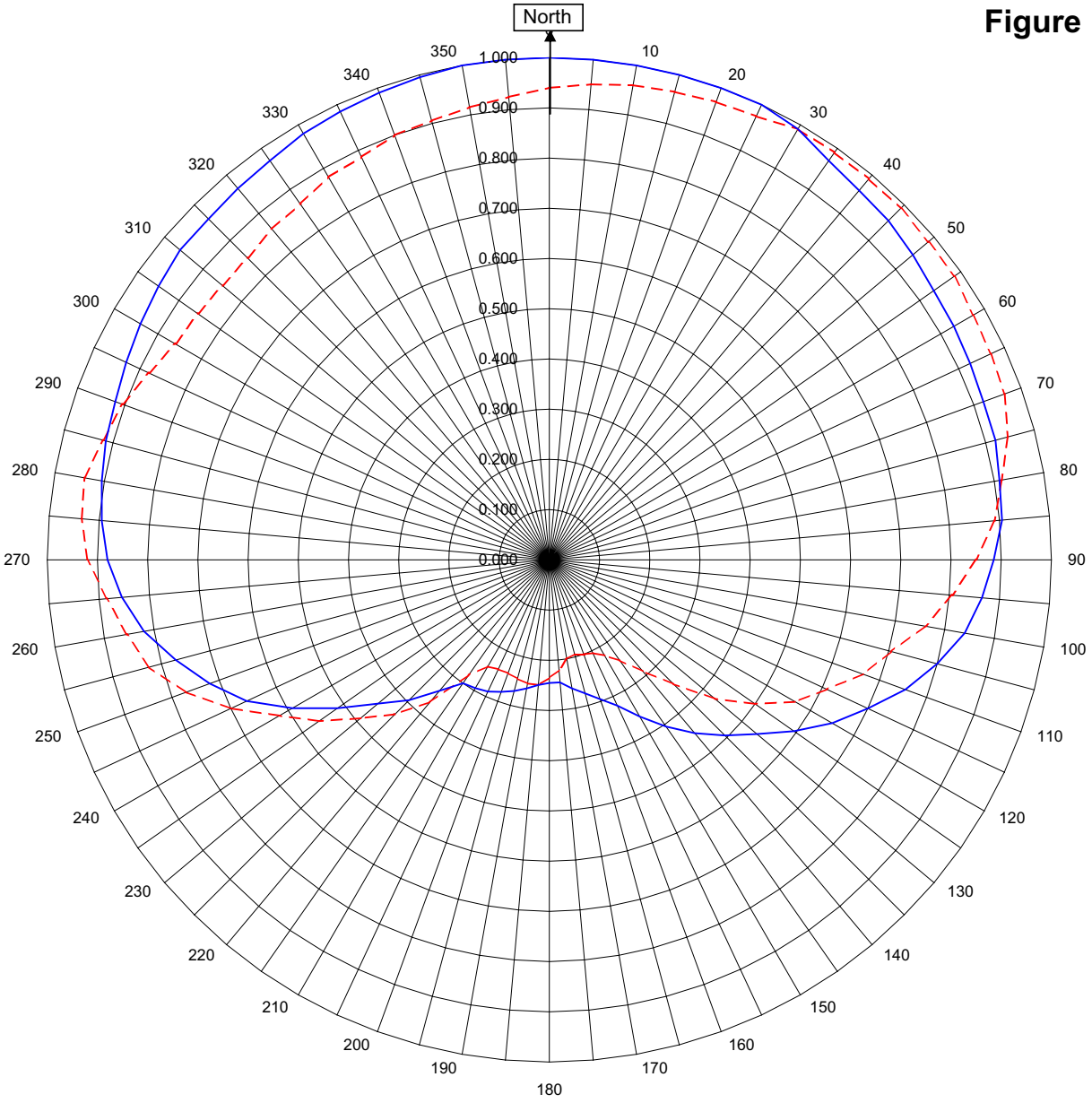
Figure 1



WSQH FOREST, MS

23980

July 27, 2005

_____Horizontal RMS	0.779
_ _ _ _ _ _ _ _ Vertical RMS	0.751
H/V Composite RMS	0.792

Frequency	91.7 / 412.65 mHz
Plot	Relative Field
Scale	4.5 : 1

Antenna Model	6810-5-DA
Pattern Type	Directional Azimuth

See Figure 2 for Mechanical Details

Figure 1a

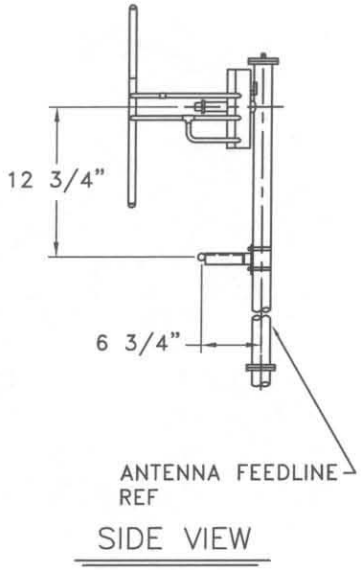
Tabulation of Horizontal Azimuth Pattern
WSQH FOREST, MS

Azimuth	Rel Field	Azimuth	Rel Field
0	1.000	180	0.245
10	1.000	190	0.260
20	1.000	200	0.280
30	0.990	210	0.295
40	0.960	220	0.340
45	0.955	225	0.395
50	0.945	230	0.445
60	0.930	240	0.590
70	0.920	250	0.720
80	0.910	260	0.820
90	0.885	270	0.880
100	0.840	280	0.905
110	0.755	290	0.920
120	0.650	300	0.940
130	0.540	310	0.960
135	0.495	315	0.960
140	0.450	320	0.965
150	0.360	330	0.980
160	0.295	340	0.990
170	0.260	350	1.000

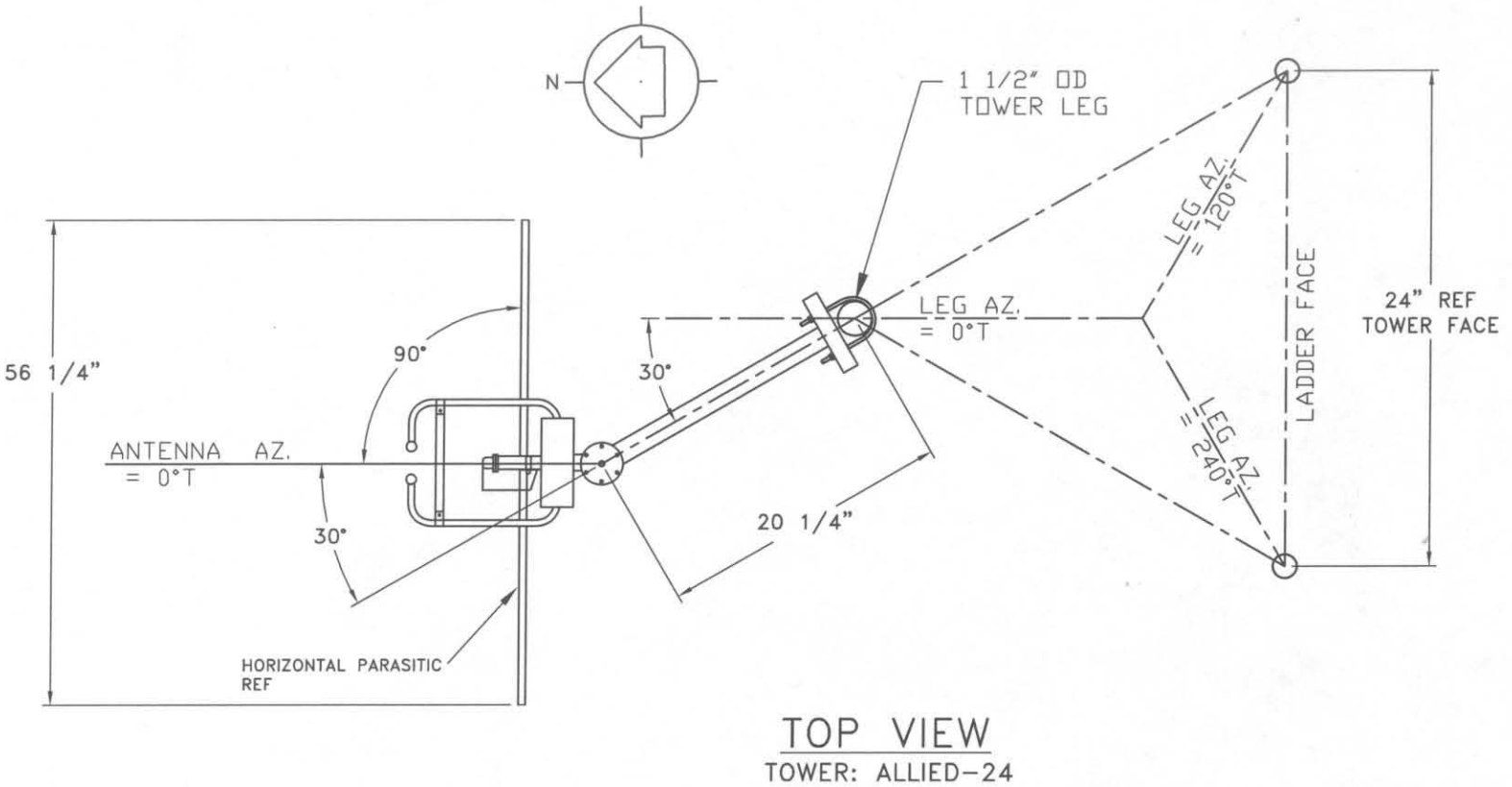
Figure 1b

Tabulation of Vertical Azimuth Pattern
WSQH FOREST, MS

Azimuth	Rel Field	Azimuth	Rel Field
0	0.940	180	0.235
10	0.960	190	0.250
20	0.970	200	0.240
30	0.990	210	0.245
40	0.990	220	0.370
45	0.990	225	0.435
50	0.985	230	0.490
60	0.975	240	0.620
70	0.965	250	0.770
80	0.915	260	0.855
90	0.850	270	0.920
100	0.760	280	0.940
110	0.665	290	0.905
120	0.565	300	0.860
130	0.430	310	0.850
135	0.350	315	0.850
140	0.290	320	0.860
150	0.220	330	0.880
160	0.200	340	0.900
170	0.200	350	0.915



SIDE VIEW



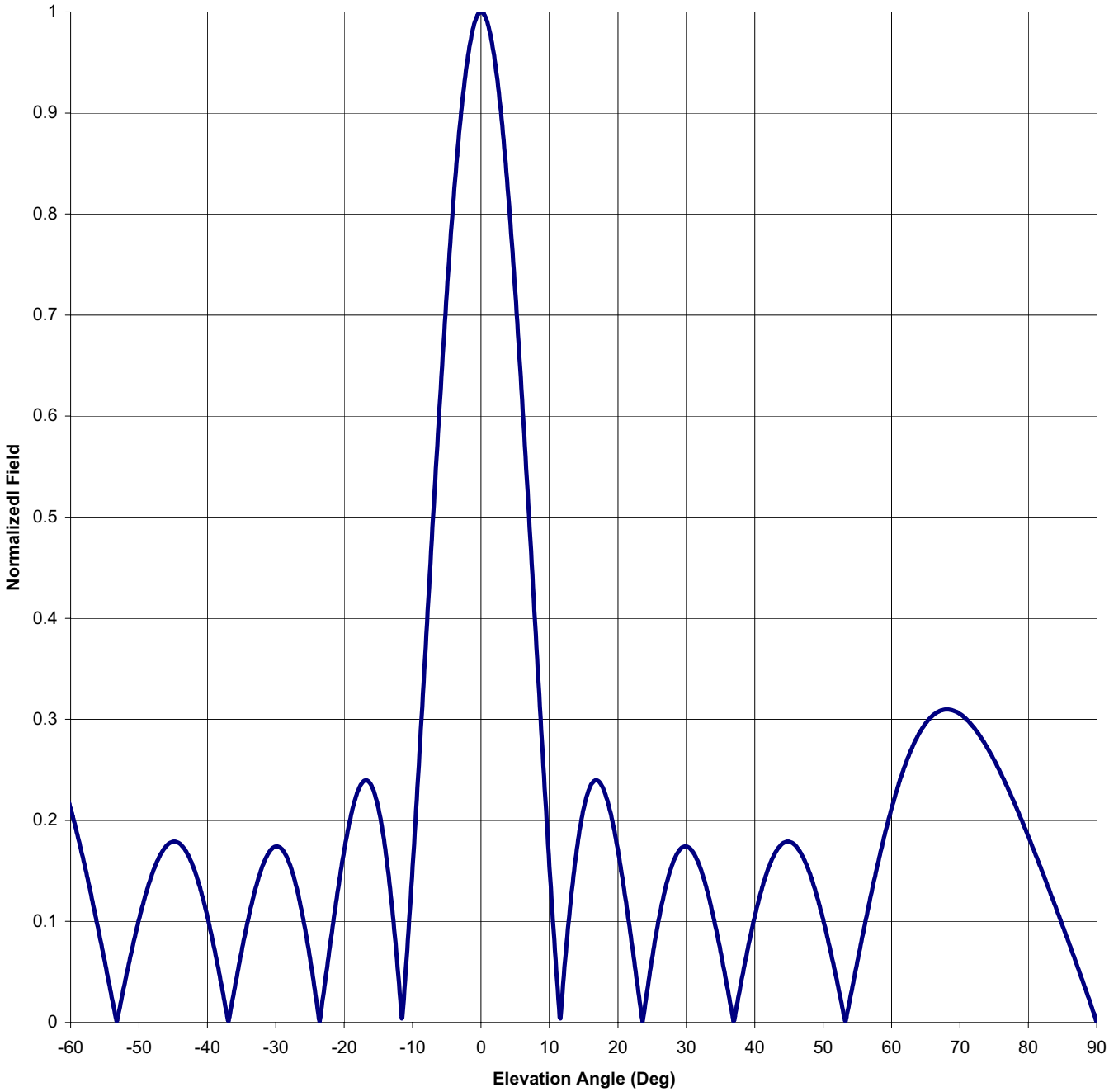
TOP VIEW

TOWER: ALLIED-24

ANTENNA HEADING: 0° TRUE NORTH

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 23980	FREQUENCY: 91.7 MHz.	SCALE: N.T.S.	DRAWN BY: AMG APPROVED BY:
MODEL: 6810-5-DIRECTIONAL ANTENNA			
DATE: 7/13/05	FIGURE 2		

Antenna Mfg.:	**Shively Labs**			**Date: 7/27/2005**
Antenna Type:	**6810-5-DA**			
Station:	**WSQH**	**Beam Tilt**	**0**	
Frequency:	**91.7**	**Gain (Max)**	**4.666**	**6.689 dB**
Channel #:	**219**	**Gain (Horizon)**	**4.666**	**6.689 dB**
Figure:	**3**			



Antenna Mfg.: Shively Labs **Date:** 7/29/2005

Antenna Type: 6810-5-DA

Station: WSQH **Beam Tilt** 0

Frequency: 91.7 **Gain (Max)** 4.666 6.689 dB

Channel #: 219 **Gain (Horizon)** 4.666 6.689 dB

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	0.177	0	1.000	46	0.175
-89	0.021	-43	0.168	1	0.988	47	0.164
-88	0.040	-42	0.153	2	0.952	48	0.148
-87	0.059	-41	0.131	3	0.894	49	0.127
-86	0.078	-40	0.105	4	0.817	50	0.102
-85	0.096	-39	0.073	5	0.723	51	0.073
-84	0.114	-38	0.039	6	0.616	52	0.042
-83	0.132	-37	0.002	7	0.502	53	0.009
-82	0.150	-36	0.035	8	0.384	54	0.025
-81	0.167	-35	0.071	9	0.266	55	0.060
-80	0.184	-34	0.104	10	0.155	56	0.094
-79	0.201	-33	0.132	11	0.052	57	0.126
-78	0.217	-32	0.154	12	0.038	58	0.157
-77	0.232	-31	0.168	13	0.113	59	0.186
-76	0.246	-30	0.174	14	0.171	60	0.212
-75	0.260	-29	0.171	15	0.212	61	0.235
-74	0.272	-28	0.157	16	0.234	62	0.255
-73	0.283	-27	0.134	17	0.239	63	0.272
-72	0.292	-26	0.103	18	0.229	64	0.286
-71	0.300	-25	0.063	19	0.205	65	0.296
-70	0.305	-24	0.018	20	0.171	66	0.304
-69	0.309	-23	0.030	21	0.128	67	0.308
-68	0.310	-22	0.080	22	0.080	68	0.310
-67	0.308	-21	0.128	23	0.030	69	0.309
-66	0.304	-20	0.171	24	0.018	70	0.305
-65	0.296	-19	0.205	25	0.063	71	0.300
-64	0.286	-18	0.229	26	0.103	72	0.292
-63	0.272	-17	0.239	27	0.134	73	0.283
-62	0.255	-16	0.234	28	0.157	74	0.272
-61	0.235	-15	0.212	29	0.171	75	0.260
-60	0.212	-14	0.171	30	0.174	76	0.246
-59	0.186	-13	0.113	31	0.168	77	0.232
-58	0.157	-12	0.038	32	0.154	78	0.217
-57	0.126	-11	0.052	33	0.132	79	0.201
-56	0.094	-10	0.155	34	0.104	80	0.184
-55	0.060	-9	0.266	35	0.071	81	0.167
-54	0.025	-8	0.384	36	0.035	82	0.150
-53	0.009	-7	0.502	37	0.002	83	0.132
-52	0.042	-6	0.616	38	0.039	84	0.114
-51	0.073	-5	0.723	39	0.073	85	0.096
-50	0.102	-4	0.817	40	0.105	86	0.078
-49	0.127	-3	0.894	41	0.131	87	0.059
-48	0.148	-2	0.952	42	0.153	88	0.040
-47	0.164	-1	0.988	43	0.168	89	0.021
-46	0.175	0	1.000	44	0.177	90	0.000
-45	0.179			45	0.179		

S.O. 23980 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

WSQH Forest, MS

6810-5-DA

Elevation Gain of Antenna 2.73

The RMS values are calculated utilizing the data of a planimeter

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

H RMS 0.779 V RMS 0.751 H/V Ratio 1.037

Elevation Gain of Horizontal Component 2.832

Elevation Gain of Vertical Component 2.632

Horizontal Azimuth Gain equals 1/(RMS)SQ. 1.648

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 1.738
Max. Vertical 0.99

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

Total Horizontal Power Gain = **4.666**

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

Total Vertical Power Gain = **4.574**

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ERP divided by Horizontal Power Gain equals Antenna Input Power

15 KW ERP Equals 3.214 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

3.214 KW Times 4.574 KW Equals 14.702 KW ERP

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

0.99 Equals 14.702 KW Vertical ERP

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