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S.O. 23493

Report of Test 6810-3R-SS-DA

for

CITADEL BROADCASTING COMPANY

WOGT 107.9 MHz EAST RIDGE, TN

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-3R-SS-DA to meet the needs of WOGT and to comply with the requirements of the FCC construction permit, file number BPH-20031230AAE.

RESULTS:

The measured azimuth pattern for the 6810-3R-SS-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 BPH-20031230AAE indicates that the Horizontal radiation component shall not exceed 25 kW at any azimuth and is restricted to the following values at the azimuths specified:

45 - 60 Degrees T: 1.563 Kw

From Figure 1, the maximum radiation of the Horizontal component occurs at 248 Degrees T to 274 Degrees T. At the restricted azimuth of 45 - 60 Degrees T the Horizontal component is 12.956 dB down from the maximum of 25 kW, or 1.266 kW.

The R.M.S. of the Horizontal component is 0.776. The total Horizontal power gain is 1.761. The R.M.S. of the Vertical component is 0.739. The total Vertical power gain is 1.726. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.846. Therefore this Pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-3R-SS-DA was mounted on a tower of exact scale to a World 24 inch tower. 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 complied with the FCC rules. See Figure 2 for mechanical details. A second model tower was placed the equivalent of 56 feet away at an angle of 330° true to demonstrate the distortion to the WOGT pattern. See Figure 1.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BPH-20031230AAE, a single level of the 6810-3R-SS-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.

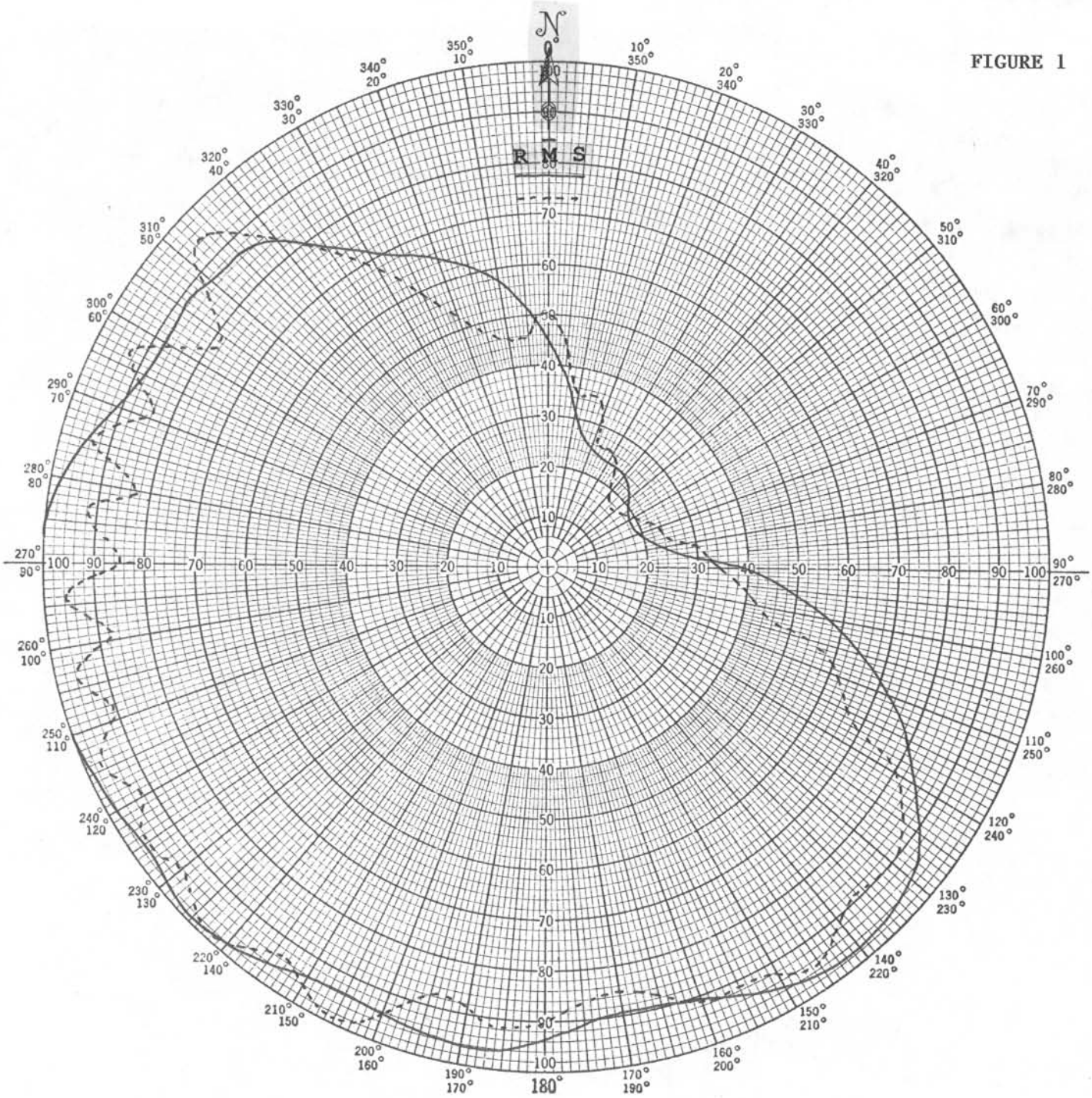
TEST PROCEDURES:

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 485.55 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
Manager of RF Engineering
S/O 23493
March 25, 2005

FIGURE 1



Shively Labs

PROJECT NAME WOGT EAST RIDGE, TN

PROJECT NUMBER 23493 DATE 3/24/05

MODEL (X) FULL SCALE ( ) FREQUENCY 485.55/107.9 MHz

POLARIZATION HORIZ (——); VERT (----)

CURVE PLOTTED IN: VOLTAGE (X) POWER( ) DB( )

OBSERVER RAS

ANTENNA TYPE 6810-3R-SS-DA

PATTERN TYPE DIRECTIONAL AZIMUTH

REMARKS: SEE FIGURE 2 FOR MECHANICAL DETAILS

Figure 1A

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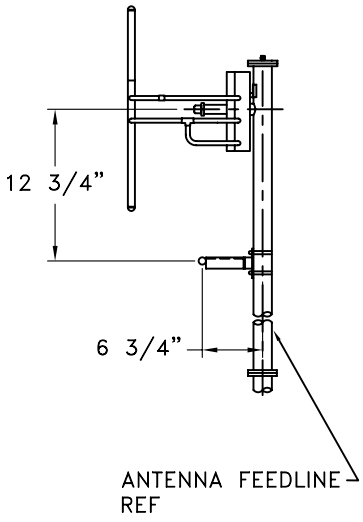
TABULATION OF HORIZONTAL POLARIZATION
WOGT EAST RIDGE, TN

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.450	180	0.940
10	0.310	190	0.960
20	0.250	200	0.945
30	0.240	210	0.940
40	0.235	220	0.980
45	0.225	225	0.990
50	0.210	230	0.980
60	0.185	240	0.980
70	0.190	250	1.000
80	0.230	260	1.000
90	0.390	270	1.000
100	0.570	280	0.980
110	0.725	290	0.910
120	0.850	300	0.880
130	0.950	310	0.875
135	0.970	315	0.870
140	0.975	320	0.840
150	0.955	330	0.720
160	0.905	340	0.650
170	0.895	350	0.575

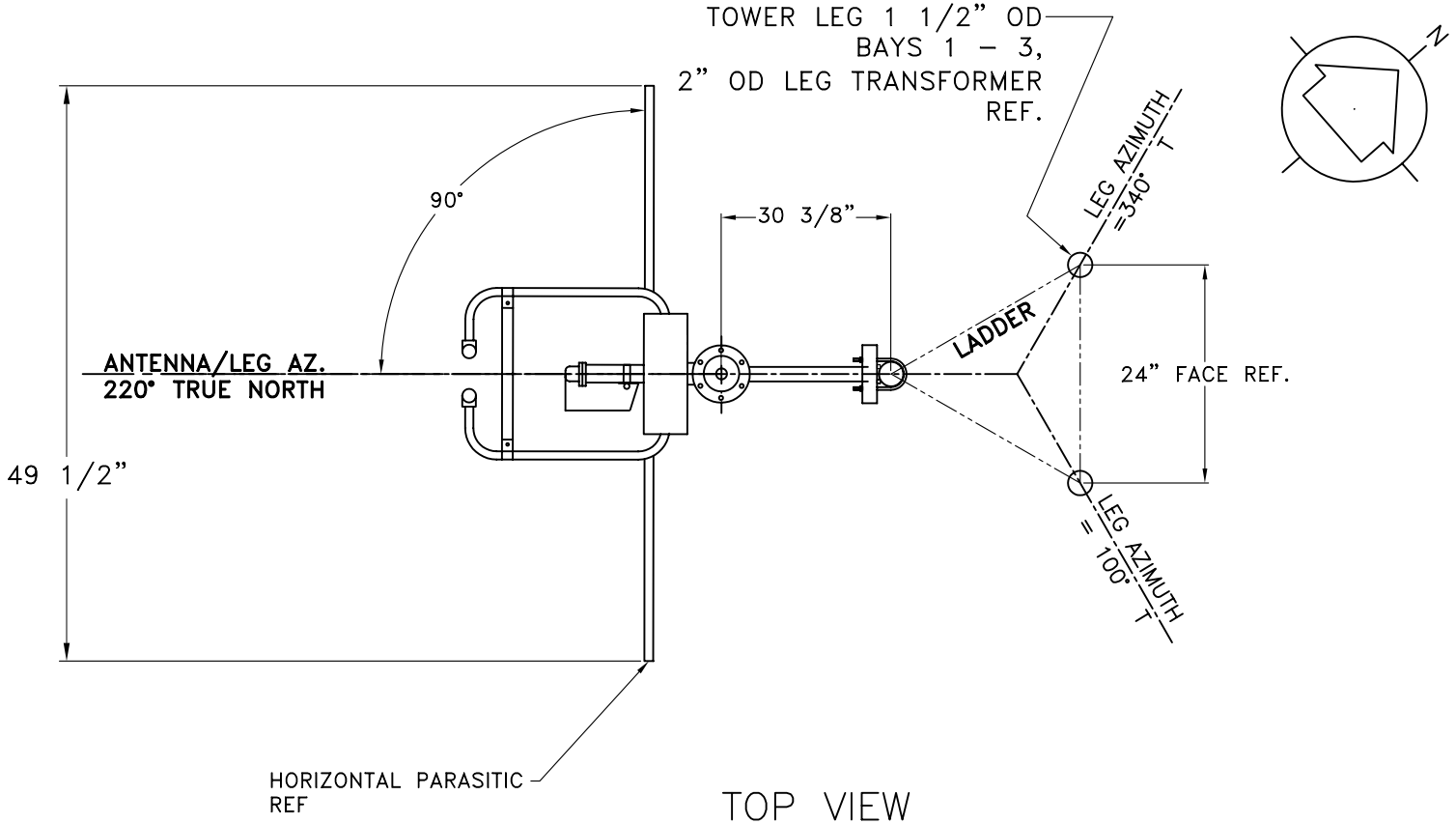
Figure 1B

S/O 23493
TABULATION OF VERTICAL POLARIZATION
WOGT EAST RIDGE, TN

DEGREE	RELATIVE FIELD	DEGREE	RELATIVE FIELD
0	0.500	180	0.900
10	0.345	190	0.885
20	0.320	200	0.940
30	0.260	210	0.960
40	0.190	220	0.980
45	0.170	225	0.975
50	0.170	230	0.940
60	0.200	240	0.920
70	0.235	250	0.920
80	0.280	260	0.890
90	0.340	270	0.850
100	0.425	280	0.830
110	0.620	290	0.845
120	0.800	300	0.860
130	0.900	310	0.910
135	0.895	315	0.930
140	0.910	320	0.840
150	0.925	330	0.680
160	0.910	340	0.530
170	0.855	350	0.460



SIDE VIEW

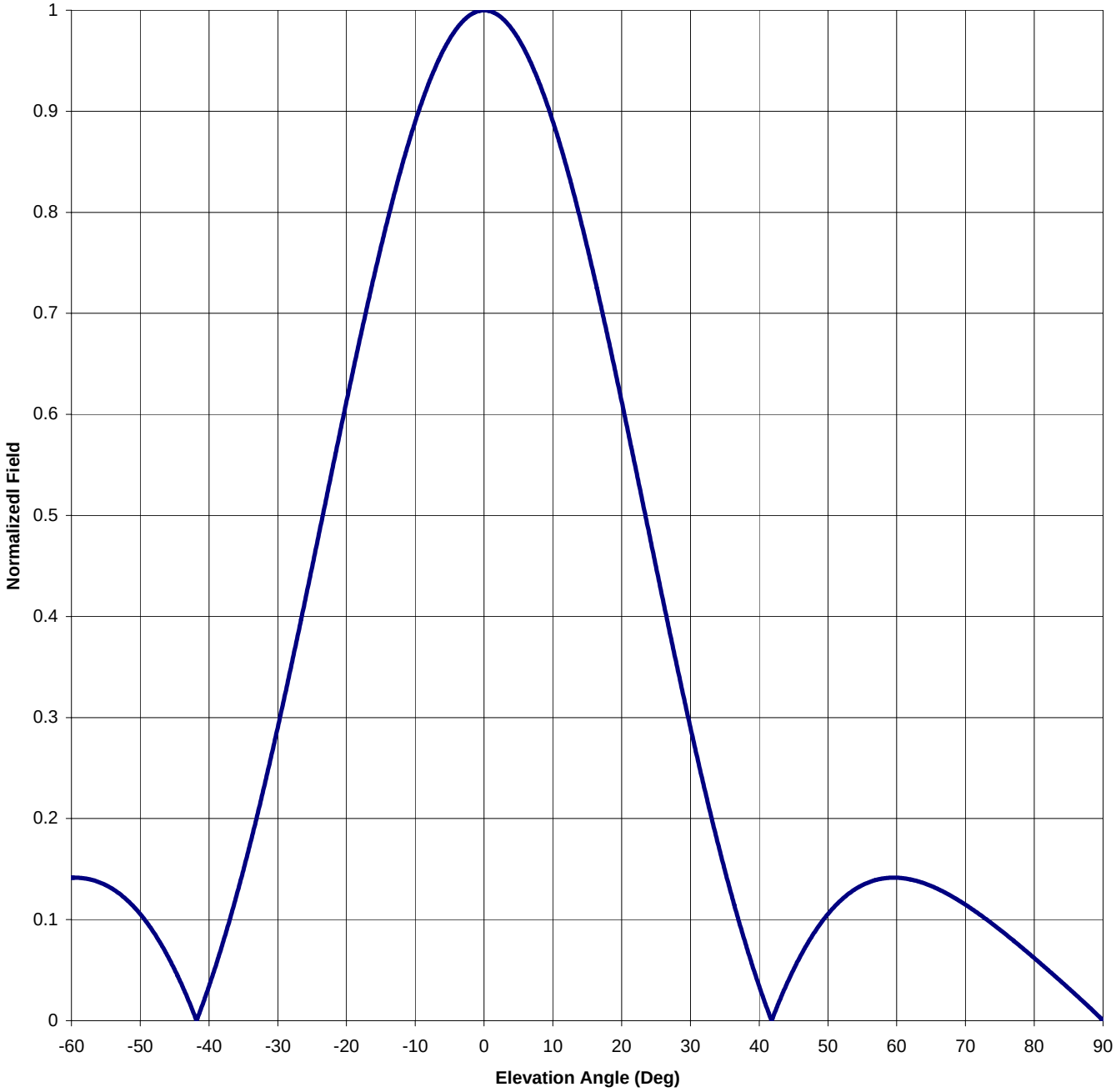


TOP VIEW

TOWER BY: WORLD
MODEL: 24–IN.

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 23493	FREQUENCY: 107.9 MHz.	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY:
MODEL: 6810–3R–SS–DIRECTIONAL ANTENNA			
DATE: 5–10–05	FIGURE 2		

Antenna Mfg.:	**Shively Labs**			**Date:**	**3/24/2005**
Antenna Type:	**6810-3R-SS-DA**				
Station:	**WOGT**	**Beam Tilt**	**0**		
Frequency:	**107.9**	**Gain (Max)**	**1.761**	**2.457**	**dB**
Channel #:	**300**	**Gain (Horizon)**	**1.761**	**2.457**	**dB**
Figure:	**3**				



Antenna Mfg.: Shively Labs **Date:** 3/24/2005

Antenna Type: 6810-3R-SS-DA

Station: WOGT **Beam Tilt** 0

Frequency: 107.9 **Gain (Max)** 1.761 2.457 dB

Channel #: 300 **Gain (Horizon)** 1.761 2.457 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	0.036	0	1.000	46	0.064
-89	0.007	-43	0.020	1	0.999	47	0.076
-88	0.013	-42	0.003	2	0.995	48	0.087
-87	0.020	-41	0.015	3	0.990	49	0.097
-86	0.026	-40	0.034	4	0.982	50	0.106
-85	0.032	-39	0.055	5	0.972	51	0.113
-84	0.038	-38	0.077	6	0.959	52	0.120
-83	0.044	-37	0.100	7	0.945	53	0.126
-82	0.050	-36	0.124	8	0.929	54	0.130
-81	0.056	-35	0.149	9	0.910	55	0.134
-80	0.062	-34	0.175	10	0.890	56	0.137
-79	0.068	-33	0.203	11	0.868	57	0.139
-78	0.073	-32	0.231	12	0.845	58	0.141
-77	0.079	-31	0.260	13	0.820	59	0.141
-76	0.085	-30	0.290	14	0.793	60	0.141
-75	0.090	-29	0.321	15	0.766	61	0.141
-74	0.095	-28	0.352	16	0.737	62	0.140
-73	0.100	-27	0.384	17	0.707	63	0.138
-72	0.105	-26	0.417	18	0.676	64	0.136
-71	0.110	-25	0.449	19	0.645	65	0.133
-70	0.115	-24	0.482	20	0.613	66	0.130
-69	0.119	-23	0.515	21	0.581	67	0.127
-68	0.123	-22	0.548	22	0.548	68	0.123
-67	0.127	-21	0.581	23	0.515	69	0.119
-66	0.130	-20	0.613	24	0.482	70	0.115
-65	0.133	-19	0.645	25	0.449	71	0.110
-64	0.136	-18	0.676	26	0.417	72	0.105
-63	0.138	-17	0.707	27	0.384	73	0.100
-62	0.140	-16	0.737	28	0.352	74	0.095
-61	0.141	-15	0.766	29	0.321	75	0.090
-60	0.141	-14	0.793	30	0.290	76	0.085
-59	0.141	-13	0.820	31	0.260	77	0.079
-58	0.141	-12	0.845	32	0.231	78	0.073
-57	0.139	-11	0.868	33	0.203	79	0.068
-56	0.137	-10	0.890	34	0.175	80	0.062
-55	0.134	-9	0.910	35	0.149	81	0.056
-54	0.130	-8	0.929	36	0.124	82	0.050
-53	0.126	-7	0.945	37	0.100	83	0.044
-52	0.120	-6	0.959	38	0.077	84	0.038
-51	0.113	-5	0.972	39	0.055	85	0.032
-50	0.106	-4	0.982	40	0.034	86	0.026
-49	0.097	-3	0.990	41	0.015	87	0.020
-48	0.087	-2	0.995	42	0.003	88	0.013
-47	0.076	-1	0.999	43	0.020	89	0.007
-46	0.064	0	1.000	44	0.036	90	0.000
-45	0.051			45	0.051		

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VALIDATION OF TOTAL POWER GAIN CALCULATION

WOGT East Ridge, TN

MODEL 6810-3R-SS-DA

Elevation Gain of Antenna 1.01

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 0.776 V RMS 0.739 H/V Ratio 1.050

Elevation Gain of Horizontal Component 1.061

Elevation Gain of Vertical Component 0.962

Horizontal Azimuth Gain equals 1/(RMS)SQ. 1.661

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 1.795
Max. Vertical 0.99

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

Total Horizontal Power Gain = **1.761**

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

Total Vertical Power Gain = **1.726**

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ERP divided by Horizontal Power Gain equals Antenna Input Power

25 KW ERP Equals 14.195 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

14.195 KW Times 1.726 KW Equals 24.503 KW ERP

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

0.99 Equals 24.503 KW Vertical ERP

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