

S.O. 24121

Report of Test 6810-3-DA

for

JO-AL BROADCASTING, INC.

KTOY 104.7 MHz TEXARKANA, AR

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-3-DA to meet the needs of KTOY and to comply with the requirements of the FCC construction permit, file number BPH-20050304ABU.

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. The calculated elevation pattern of the antenna is shown in Figure 3. Construction permit file number BPH-20050304ABU indicates that the Horizontal radiation component shall not exceed 3.10 kW at any azimuth and is restricted to the following values at the azimuths specified:

60 Degrees T: 1.45 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 180 Degrees T to 215 Degrees T. At the restricted azimuth of 60 Degrees T the Horizontal component is 4.15 dB down from the maximum of 3.10 kW, or 1.19 kW.

The R.M.S. of the Horizontal component is 0.770. The total Horizontal power gain is 2.760. The R.M.S. of the Vertical component is 0.733. The total Vertical power gain is 2.705. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.962. The R.M.S. of the measured composite pattern is 0.825. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.818. 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 exact scale to a 36 inch face tower at the KTOY 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-20050304ABU, 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 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 471.15 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 unpadding 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:

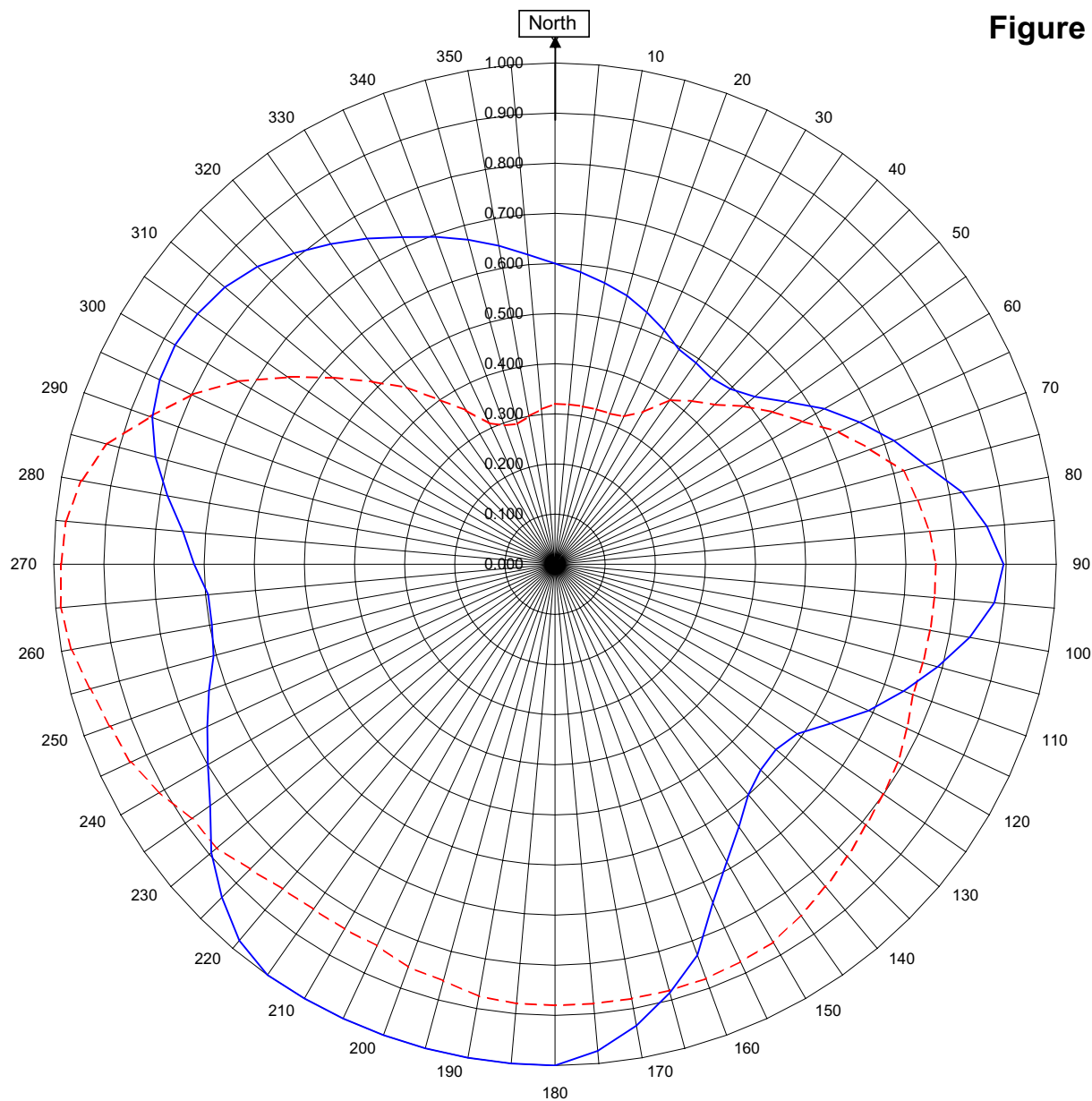
A handwritten signature in blue ink, appearing to read "Robert A. Surette", with a long horizontal flourish extending to the right.

Robert A. Surette
Manager of RF Engineering
S/O 24121
October 5, 2005

Shively Labs

Shively Labs, a division of Howell Laboratories, Inc. Bridgton, ME (207)647-3327

Figure 1



KTOY Texarkana, AR

24121
August 31, 2005

Horizontal RMS	0.770
Vertical RMS	0.733
H/V Composite RMS	0.825

Frequency	104.7 / 471.15 mHz
Plot	Relative Field
Scale	4.5 : 1

Antenna Model	6810-3-DA
Pattern Type	Directional Azimuth

See Figure 2 for Mechanical Details

Figure 1a

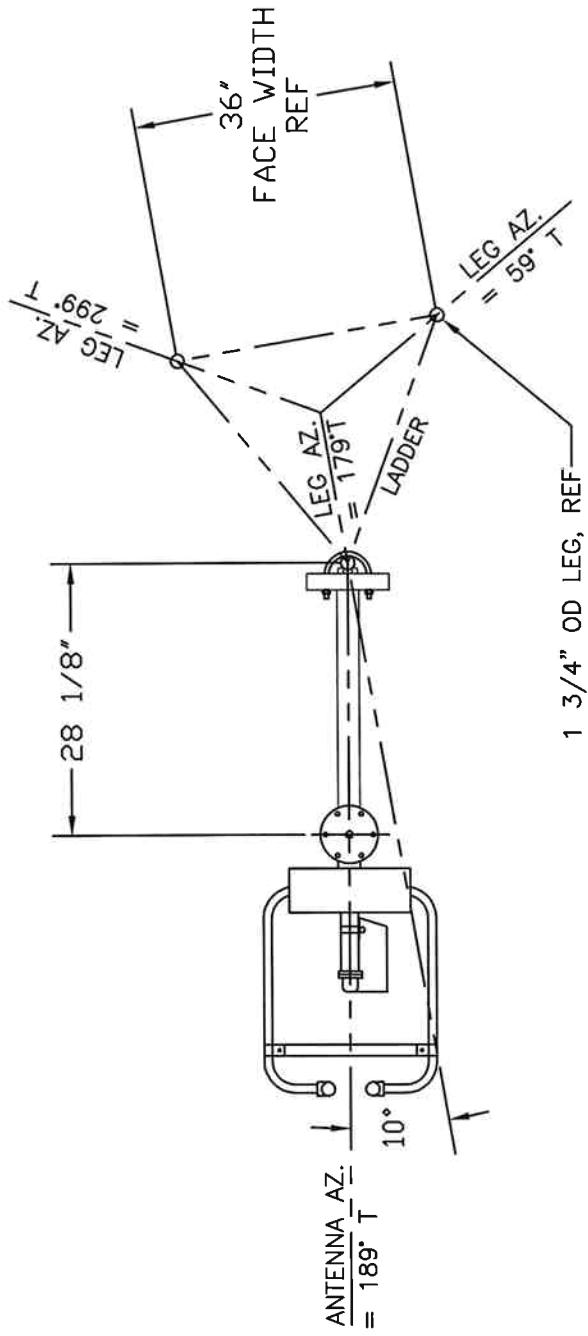
Tabulation of Horizontal Azimuth Pattern
KTOY Texarkana, AR

Azimuth	Rel Field	Azimuth	Rel Field
0	0.600	180	1.000
10	0.570	190	1.000
20	0.535	200	1.000
30	0.495	210	1.000
40	0.485	220	0.980
45	0.495	225	0.940
50	0.520	230	0.895
60	0.620	240	0.800
70	0.712	250	0.735
80	0.825	260	0.695
90	0.895	270	0.720
100	0.840	280	0.785
110	0.740	290	0.855
120	0.635	300	0.875
130	0.575	310	0.860
135	0.580	315	0.840
140	0.600	320	0.810
150	0.685	330	0.750
160	0.830	340	0.695
170	0.935	350	0.645

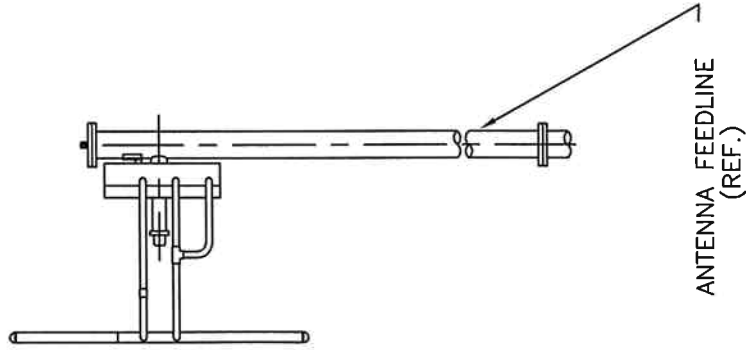
Figure 1b

Tabulation of Vertical Azimuth Pattern
KTOY Texarkana, AR

Azimuth Rel Field		Azimuth Rel Field	
0	0.320	180	0.880
10	0.320	190	0.875
20	0.320	200	0.855
30	0.350	210	0.840
40	0.425	220	0.845
45	0.450	225	0.860
50	0.490	230	0.880
60	0.570	240	0.910
70	0.670	250	0.945
80	0.735	260	0.980
90	0.760	270	0.985
100	0.760	280	0.960
110	0.760	290	0.860
120	0.790	300	0.730
130	0.810	310	0.580
135	0.825	315	0.515
140	0.840	320	0.460
150	0.870	330	0.355
160	0.880	340	0.295
170	0.880	350	0.300



TOP VIEW



SIDE VIEW

SHIVELY LABS

A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE

SHOP ORDER:	FREQUENCY:	SCALE:	DRAWN BY:
24121	104.7 MHz.	N.T.S.	AMG
			APPROVED BY:

MODEL:

6810-3-DIRECTIONAL ANTENNA

DATE:

9/30/05

ANTENNA HEADING: 189° TRUE NORTH

FIGURE 2

Antenna Mfg.: Shively Labs

Antenna Type: 6810-3-DA

Station: KTOY

Frequency: 104.7

Channel #: 284

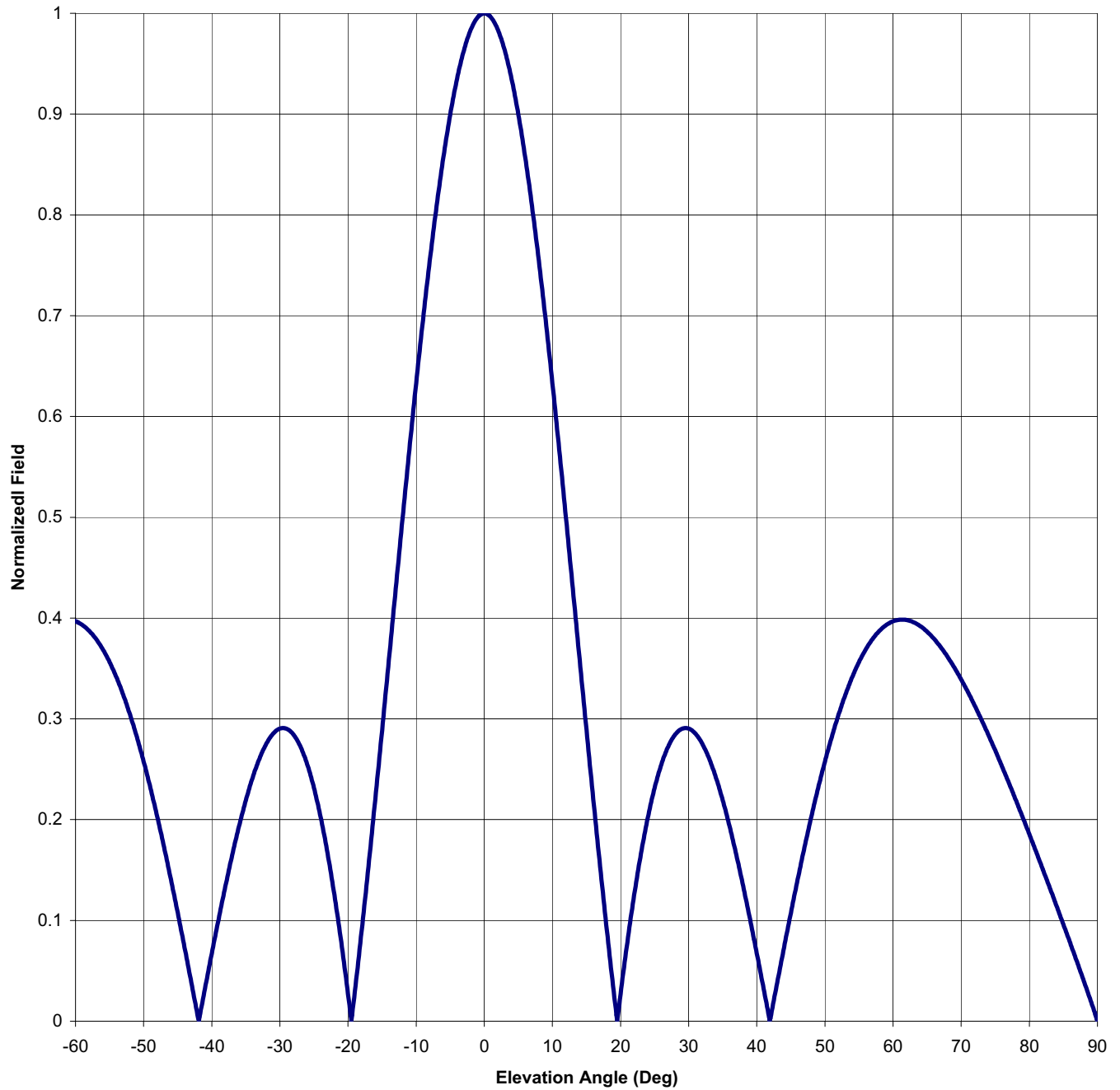
Figure: 3

Date: 10/5/2005

Beam Tilt 0

Gain (Max) 2.760 4.409 dB

Gain (Horizon) 2.760 4.409 dB



Antenna Mfg.: Shively Labs

Date: 10/5/2005

Antenna Type: 6810-3-DA

Station: KTOY

Beam Tilt 0

Frequency: 104.7

Gain (Max) 2.760

4.409 dB

Channel #: 284

Gain (Horizon) 2.760

4.409 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	0.073	0	1.000	46	0.141
-89	0.021	-43	0.038	1	0.996	47	0.173
-88	0.040	-42	0.003	2	0.984	48	0.203
-87	0.059	-41	0.032	3	0.963	49	0.231
-86	0.078	-40	0.067	4	0.935	50	0.258
-85	0.096	-39	0.101	5	0.900	51	0.282
-84	0.114	-38	0.134	6	0.857	52	0.304
-83	0.132	-37	0.165	7	0.809	53	0.324
-82	0.150	-36	0.193	8	0.755	54	0.341
-81	0.168	-35	0.219	9	0.696	55	0.356
-80	0.186	-34	0.242	10	0.633	56	0.369
-79	0.203	-33	0.261	11	0.567	57	0.379
-78	0.220	-32	0.275	12	0.499	58	0.387
-77	0.236	-31	0.285	13	0.429	59	0.393
-76	0.253	-30	0.290	14	0.359	60	0.397
-75	0.269	-29	0.290	15	0.289	61	0.398
-74	0.284	-28	0.284	16	0.220	62	0.398
-73	0.299	-27	0.273	17	0.154	63	0.396
-72	0.313	-26	0.255	18	0.090	64	0.392
-71	0.326	-25	0.231	19	0.029	65	0.386
-70	0.339	-24	0.202	20	0.027	66	0.379
-69	0.351	-23	0.166	21	0.079	67	0.371
-68	0.362	-22	0.125	22	0.125	68	0.362
-67	0.371	-21	0.079	23	0.166	69	0.351
-66	0.379	-20	0.027	24	0.202	70	0.339
-65	0.386	-19	0.029	25	0.231	71	0.326
-64	0.392	-18	0.090	26	0.255	72	0.313
-63	0.396	-17	0.154	27	0.273	73	0.299
-62	0.398	-16	0.220	28	0.284	74	0.284
-61	0.398	-15	0.289	29	0.290	75	0.269
-60	0.397	-14	0.359	30	0.290	76	0.253
-59	0.393	-13	0.429	31	0.285	77	0.236
-58	0.387	-12	0.499	32	0.275	78	0.220
-57	0.379	-11	0.567	33	0.261	79	0.203
-56	0.369	-10	0.633	34	0.242	80	0.186
-55	0.356	-9	0.696	35	0.219	81	0.168
-54	0.341	-8	0.755	36	0.193	82	0.150
-53	0.324	-7	0.809	37	0.165	83	0.132
-52	0.304	-6	0.857	38	0.134	84	0.114
-51	0.282	-5	0.900	39	0.101	85	0.096
-50	0.258	-4	0.935	40	0.067	86	0.078
-49	0.231	-3	0.963	41	0.032	87	0.059
-48	0.203	-2	0.984	42	0.003	88	0.040
-47	0.173	-1	0.996	43	0.038	89	0.021
-46	0.141	0	1.000	44	0.073	90	0.000
-45	0.108			45	0.108		

VALIDATION OF TOTAL POWER GAIN CALCULATION

KTOY 104.7 MHz TEXARKANA, AR

MODEL 6810-3-DA

Elevation Gain of Antenna 1.558

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 0.77 V RMS 0.733 H/V Ratio 1.050

Elevation Gain of Horizontal Component 1.637

Elevation Gain of Vertical Component 1.483

Horizontal Azimuth Gain equals 1/(RMS)SQ. 1.687

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 1.824

Max. Vertical 0.99

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

Total Horizontal Power Gain = 2.760

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

Total Vertical Power Gain = 2.705

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ERP divided by Horizontal Power Gain equals Antenna Input Power

3.1 KW ERP Equals 1.123 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

1.123 KW Times 2.705 KW Equals 3.038 KW ERP

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

0.99 Equals 3.038 KW Vertical ERP

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