

S.O. 24417

Report of Test 6810-2R-SS-DA

for

FAITH COMMUNICATIONS CORP.

KSQS 91.7 MHz RIRIE, ID

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-2R-SS-DA to meet the needs of KSQS and to comply with the requirements of the FCC construction permit, file number BMPED-20050711ABK.

RESULTS:

The measured azimuth pattern for the 6810-2R-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 BMPED-20050711ABK indicates that the Horizontal radiation component shall not exceed 0.250 kW at any azimuth and is restricted to the following values at the azimuths specified:

0 - 10 Degrees T: 0.0497 kW
30 Degrees T: 0.115 kW
330 Degrees T: 0.138 kW
350 Degrees T: 0.550 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 208 Degrees T to 263 Degrees T. At the restricted azimuth of 0 - 10 Degrees T the Vertical component is 7.432 dB down from the maximum of 0.250 kW, or 0.045 kW. At the restricted azimuth of 30 Degrees T the Vertical component is 4.365 dB down from the maximum of 0.250 kW, or 0.092 kW. At the restricted azimuth of 330 Degrees T the Horizontal component is 5.934 dB down from the maximum of 0.250 kW, or 0.064 kW. At the restricted azimuth of 350 Degrees T the Horizontal component is 7.639 dB down from the maximum of 0.250 kW, or 0.043 kW.

The R.M.S. of the Horizontal component is 0.829. The total Horizontal power gain is 1.089. The R.M.S. of the Vertical component is 0.784. The total Vertical power gain is 1.068. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.925. The R.M.S. of the measured composite pattern is 0.849. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.786. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-2R-SS-DA was mounted on a tower of exact scale to a Magnum 24 tower at the KSQS site. The spacing of the antenna to the tower was varied and vertical parasitic elements were attached to the interbay feedline 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-20050711ABK, a single level of the 6810-2R-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 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 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:

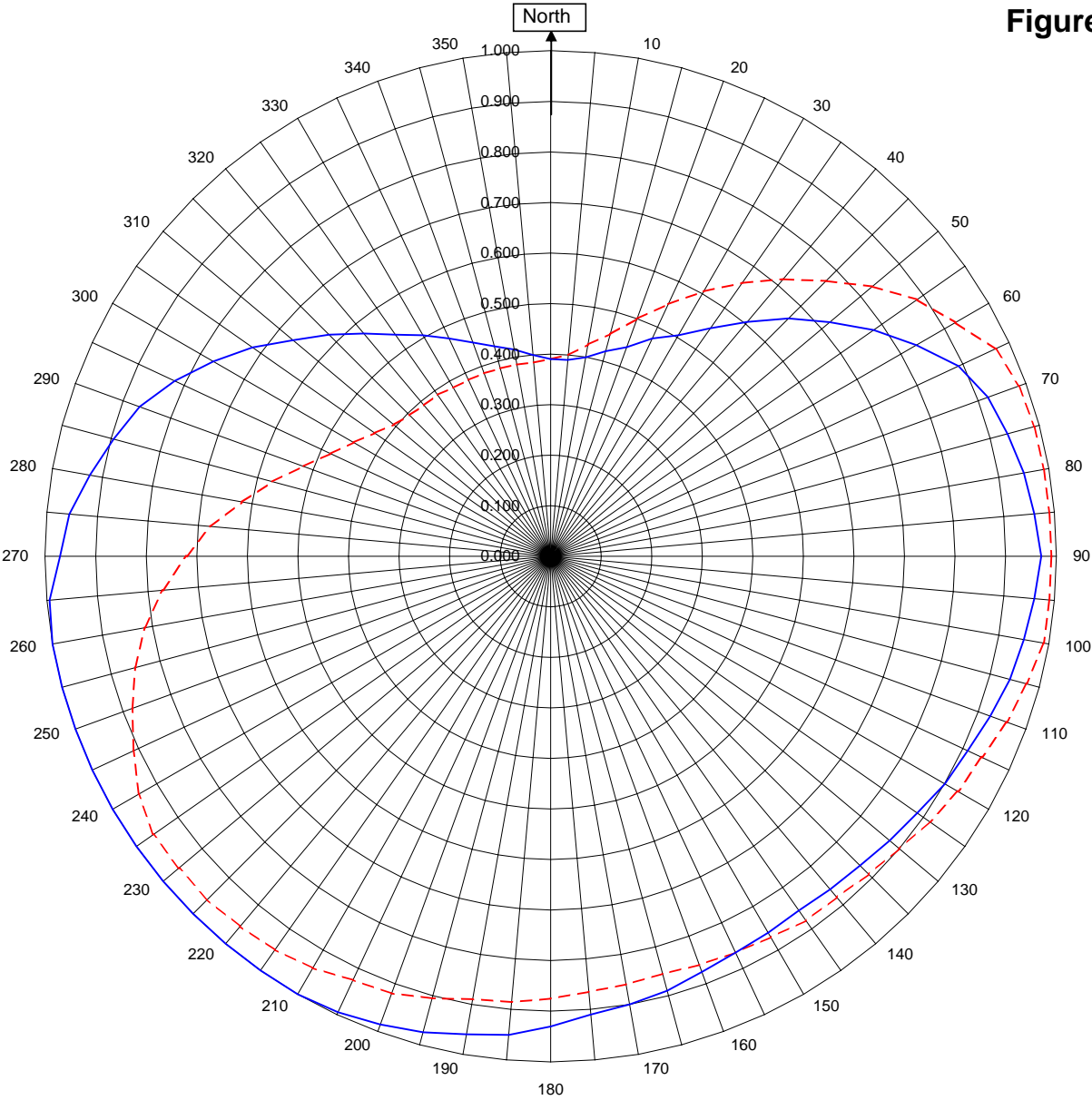
A handwritten signature in blue ink, appearing to read "Robert A. Surette", with a long horizontal flourish extending to the right.

Robert A. Surette
Manager of RF Engineering
S/O 24417
March 13, 2006

Shively Labs

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

Figure 1



KSQS
RIRIE, ID
24417
March 13, 2006

Horizontal RMS	0.829	Frequency	91.7 / 412.65 mHz
Vertical RMS	0.784	Plot	Relative Field
H/V Composite RMS	0.849	Scale	4.5 : 1

Antenna Model	6810-2R-SS-DA
Pattern Type	Directional Azimuth

See Figure 2 for Mechanical Details

Figure 1a

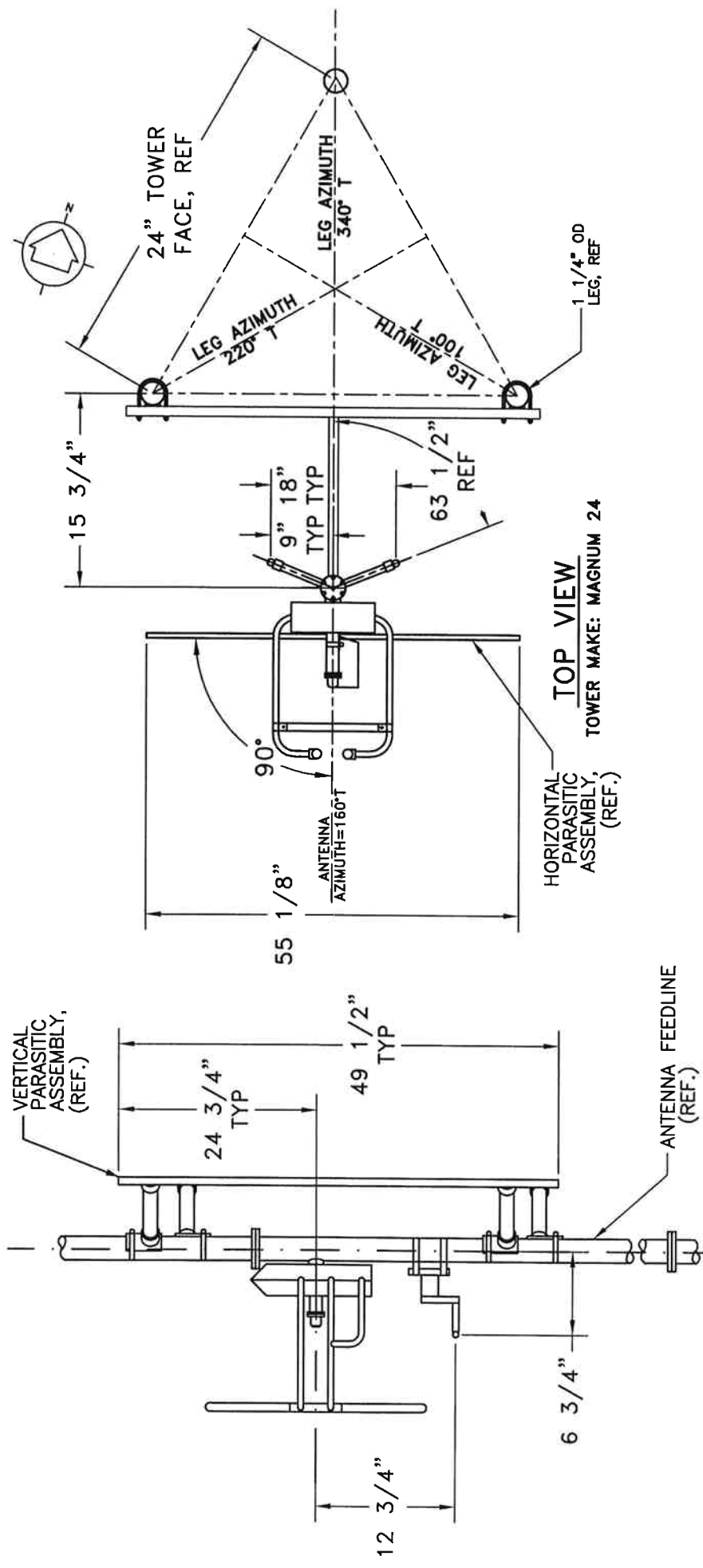
Tabulation of Horizontal Azimuth Pattern
KSQS RIRIE, ID

Azimuth	Rel Field	Azimuth	Rel Field
0	0.390	180	0.930
10	0.400	190	0.960
20	0.440	200	0.985
30	0.505	210	1.000
40	0.605	220	1.000
45	0.665	225	1.000
50	0.720	230	1.000
60	0.835	240	1.000
70	0.920	250	1.000
80	0.950	260	1.000
90	0.970	270	0.970
100	0.950	280	0.925
110	0.925	290	0.865
120	0.900	300	0.770
130	0.875	310	0.665
135	0.865	315	0.620
140	0.860	320	0.575
150	0.860	330	0.505
160	0.875	340	0.450
170	0.900	350	0.415

Figure 1b

Tabulation of Vertical Azimuth Pattern
KSQS RIRIE, ID

Azimuth	Rel Field	Azimuth	Rel Field
0	0.390	180	0.875
10	0.425	190	0.890
20	0.500	200	0.920
30	0.605	210	0.940
40	0.715	220	0.955
45	0.770	225	0.960
50	0.830	230	0.960
60	0.925	240	0.940
70	0.985	250	0.880
80	0.990	260	0.815
90	0.990	270	0.720
100	0.990	280	0.620
110	0.960	290	0.520
120	0.930	300	0.450
130	0.900	310	0.405
135	0.890	315	0.395
140	0.880	320	0.390
150	0.870	330	0.385
160	0.860	340	0.385
170	0.860	350	0.385



SHIVELY LABS			
A DIVISION OF HOWELL LABORATORIES INC., BRIDGTON, MAINE			
SHOP ORDER	FREQUENCY	SCALE	DRAWN BY:
24417	91.7	N.T.S.	LRA
TITLE:			APPROVED BY:
MODEL-6810-2R-SS-DIRECTIONAL ANTENNA			ASR

ANTENNA HEADING 160° TRUE NORTH

FIGURE 2

DATE: 03/03/06

Antenna Mfg.: Shively Labs
Antenna Type: 6810-2R-SS-DA

Date: 3/13/2006

Station: KSQS

Frequency: 91.7

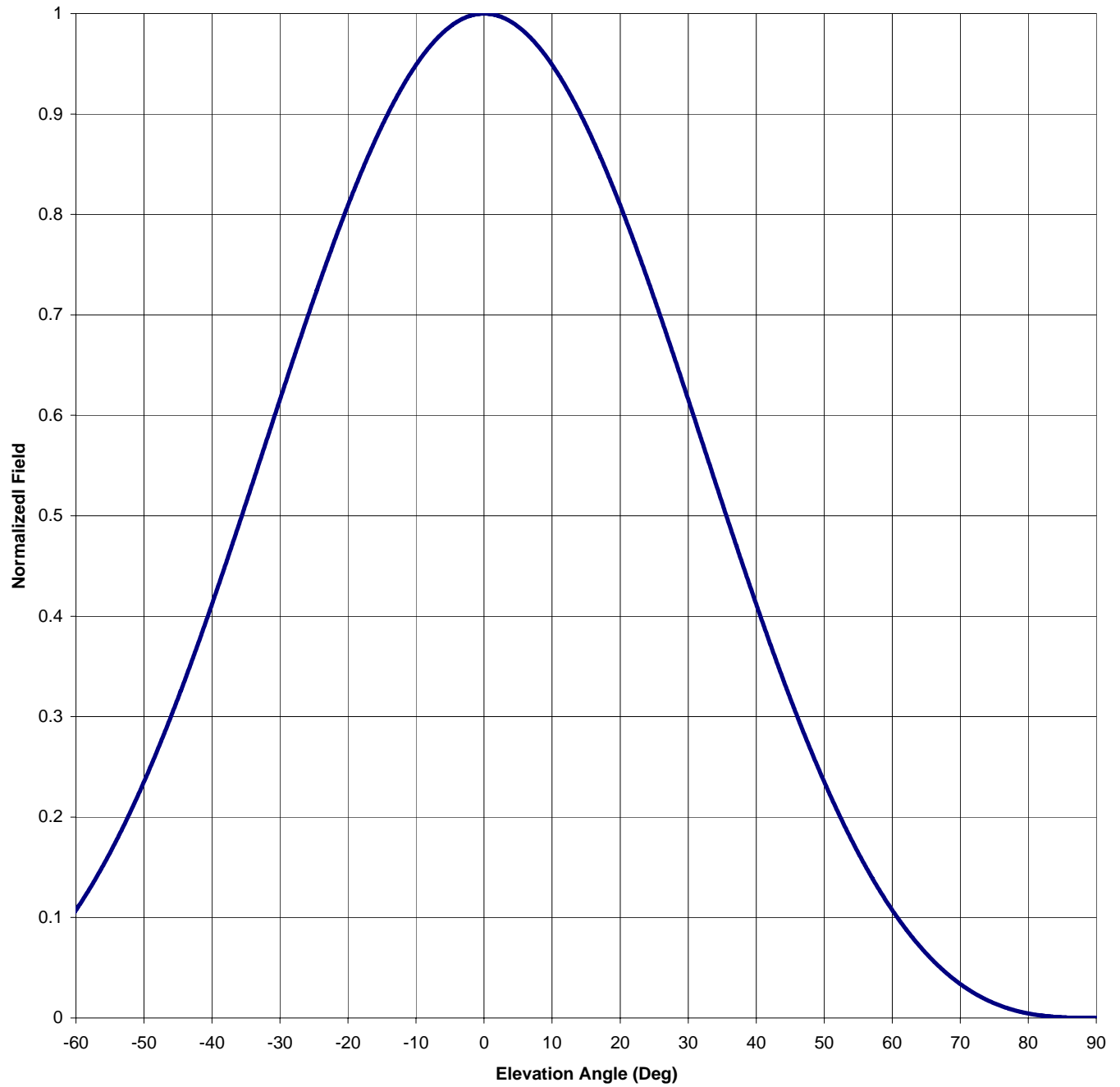
Channel #: 219

Figure: 3

Beam Tilt 0

Gain (Max) 1.089 0.371 dB

Gain (Horizon) 1.089 0.371 dB



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Antenna Type: 6810-2R-SS-DA

Date: 3/13/2006

Station: KSQS

Beam Tilt 0

Frequency: 91.7

Gain (Max) 1.089

0.371 dB

Channel #: 219

Gain (Horizon) 1.089

0.371 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	0.336	0	1.000	46	0.301
-89	0.000	-43	0.355	1	0.999	47	0.284
-88	0.000	-42	0.374	2	0.998	48	0.267
-87	0.000	-41	0.393	3	0.995	49	0.251
-86	0.000	-40	0.412	4	0.992	50	0.235
-85	0.001	-39	0.432	5	0.987	51	0.220
-84	0.001	-38	0.452	6	0.981	52	0.205
-83	0.002	-37	0.472	7	0.975	53	0.191
-82	0.002	-36	0.492	8	0.967	54	0.177
-81	0.003	-35	0.513	9	0.958	55	0.164
-80	0.004	-34	0.533	10	0.949	56	0.152
-79	0.006	-33	0.554	11	0.939	57	0.140
-78	0.008	-32	0.575	12	0.927	58	0.129
-77	0.010	-31	0.595	13	0.915	59	0.118
-76	0.012	-30	0.616	14	0.902	60	0.107
-75	0.015	-29	0.636	15	0.888	61	0.098
-74	0.018	-28	0.657	16	0.874	62	0.089
-73	0.021	-27	0.677	17	0.859	63	0.080
-72	0.025	-26	0.697	18	0.843	64	0.072
-71	0.029	-25	0.717	19	0.826	65	0.064
-70	0.034	-24	0.736	20	0.809	66	0.057
-69	0.039	-23	0.755	21	0.792	67	0.051
-68	0.045	-22	0.774	22	0.774	68	0.045
-67	0.051	-21	0.792	23	0.755	69	0.039
-66	0.057	-20	0.809	24	0.736	70	0.034
-65	0.064	-19	0.826	25	0.717	71	0.029
-64	0.072	-18	0.843	26	0.697	72	0.025
-63	0.080	-17	0.859	27	0.677	73	0.021
-62	0.089	-16	0.874	28	0.657	74	0.018
-61	0.098	-15	0.888	29	0.636	75	0.015
-60	0.107	-14	0.902	30	0.616	76	0.012
-59	0.118	-13	0.915	31	0.595	77	0.010
-58	0.129	-12	0.927	32	0.575	78	0.008
-57	0.140	-11	0.939	33	0.554	79	0.006
-56	0.152	-10	0.949	34	0.533	80	0.004
-55	0.164	-9	0.958	35	0.513	81	0.003
-54	0.177	-8	0.967	36	0.492	82	0.002
-53	0.191	-7	0.975	37	0.472	83	0.002
-52	0.205	-6	0.981	38	0.452	84	0.001
-51	0.220	-5	0.987	39	0.432	85	0.001
-50	0.235	-4	0.992	40	0.412	86	0.000
-49	0.251	-3	0.995	41	0.393	87	0.000
-48	0.267	-2	0.998	42	0.374	88	0.000
-47	0.284	-1	0.999	43	0.355	89	0.000
-46	0.301	0	1.000	44	0.336	90	0.000
-45	0.318			45	0.318		

VALIDATION OF TOTAL POWER GAIN CALCULATION

KSQS 91.7 MHz Ririe, ID

6810-2R-SS-DA

Elevation Gain of Antenna 0.708

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 0.829 V RMS 0.784 H/V Ratio 1.057

Elevation Gain of Horizontal Component 0.749

Elevation Gain of Vertical Component 0.670

Horizontal Azimuth Gain equals $1/(\text{RMS})^2$. 1.455Vertical Azimuth Gain equals $1/(\text{RMS}/\text{Max Vert})^2$. 1.595

Max. Vertical 0.99

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

Total Horizontal Power Gain = 1.089

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

Total Vertical Power Gain = 1.068

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ERP divided by Horizontal Power Gain equals Antenna Input Power

0.25 KW ERP Equals 0.229 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.229 KW Times 1.068 KW Equals 0.245 KW ERP

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

0.99 Equals 0.245 KW Vertical ERP

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