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S.O. 24470

Report of Test 6810-2R-DA

for

NASSAU BROADCASTING III, LLC

WFNK (Aux) 107.5 MHz LEWISTON, ME

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-2R-DA to meet the needs of WFNK (Aux) and to comply with the requirements of the FCC construction permit, file number BXPH-20060711AAM.

RESULTS:

The measured azimuth pattern for the 6810-2R-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 BXPH-20060711AAM indicates that the Horizontal radiation component shall not exceed 15.5 kW at any azimuth and is restricted to the following values at the azimuths specified:

230-250 Degrees T: 0.490 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 078 Degrees T to 095 Degrees T. At the restricted azimuth of 230-250 Degrees T the Vertical component is 16.48 dB down from the maximum of 15.5 kW, or 0.349 kW.

The R.M.S. of the Horizontal component is 0.657. The total Horizontal power gain is 2.354. The R.M.S. of the Vertical component is 0.640. The total Vertical power gain is 2.308. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.704. The R.M.S. of the measured composite pattern is 0.667. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.598. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-2R-DA was mounted on a tower of exact scale to the 10 foot face tower at the WFNK (Aux) 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 BXPH-20060711AAM, a single level of the 6810-2R-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 483.75 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.

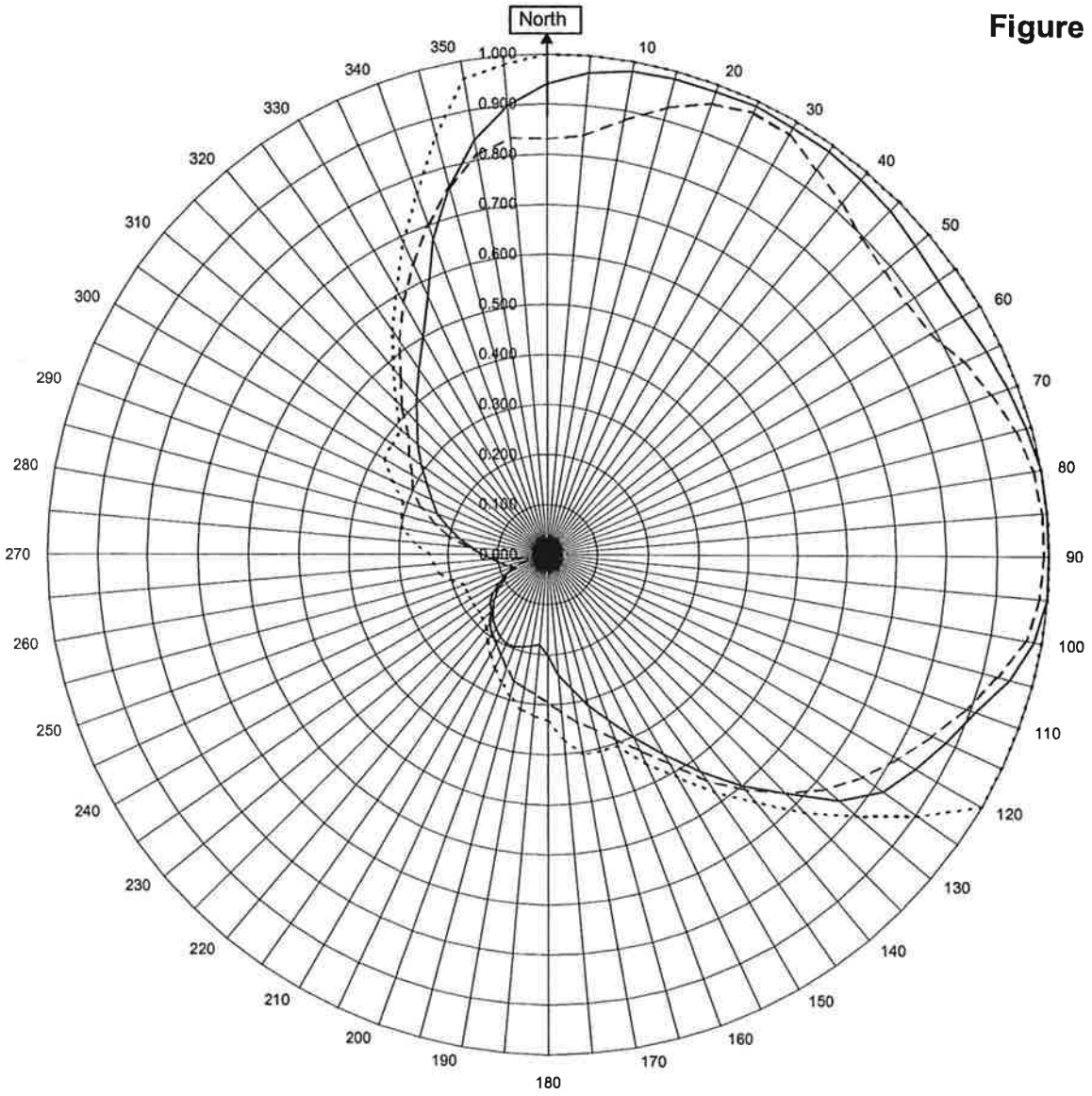
Respectfully submitted by:

Robert A. Surette
Director of Sales Engineering
S/O 24470
November 2, 2007

Shively Labs

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

Figure 1



WFNK Aux Lewiston, ME

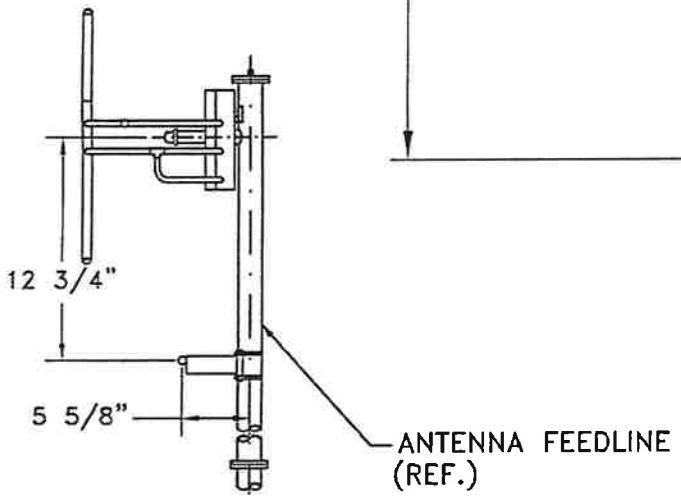
24470

November 2, 2007

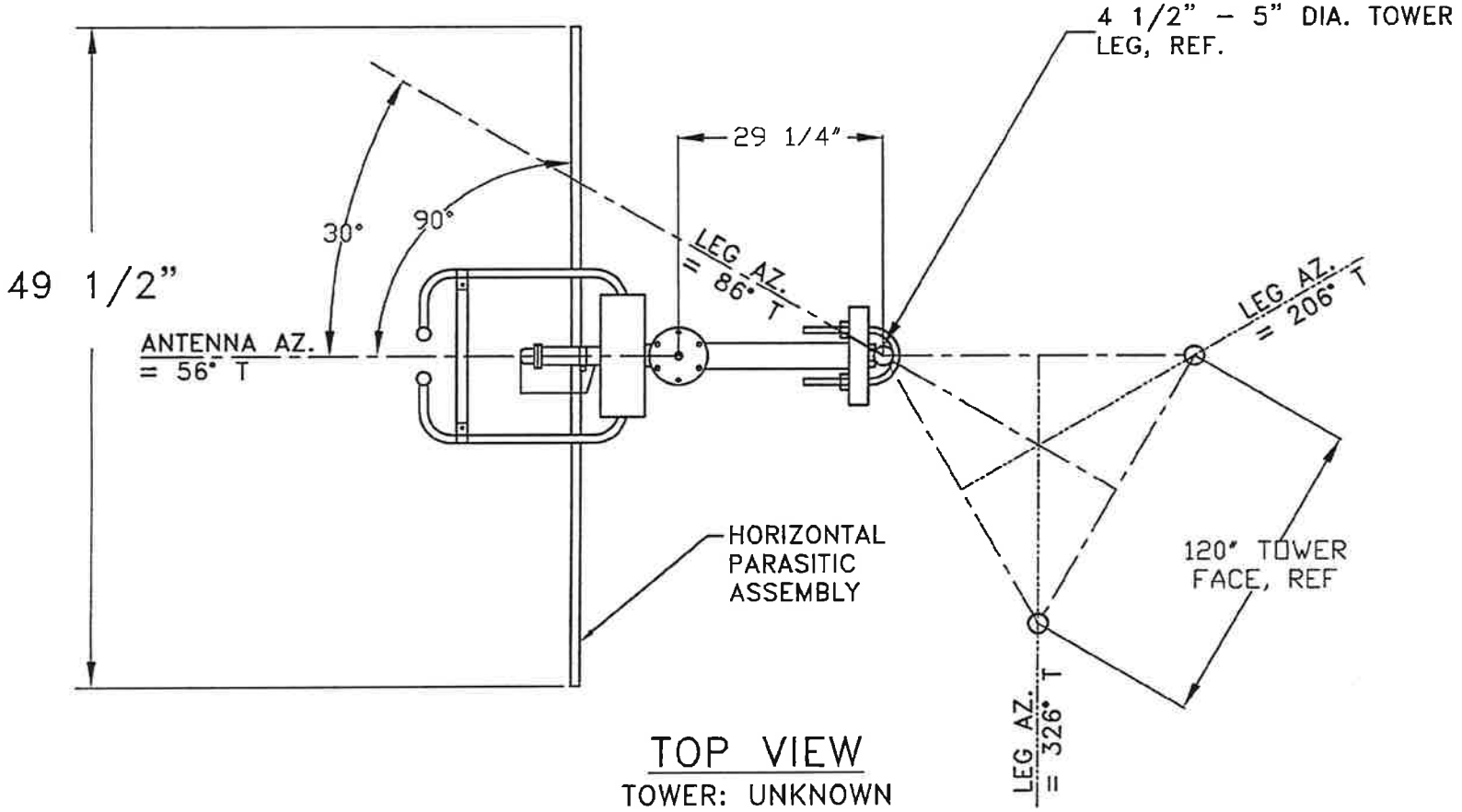
_____Horizontal RMS	0.657
- - - - - - - - - Vertical RMS	0.640
H/V Composite RMS	0.667
.....FCC Composite RMS	0.704

Frequency	107.5 / 483.75 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

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



SIDE VIEW



TOP VIEW
TOWER: UNKNOWN

ANTENNA HEADING: 56° TRUE NORTH

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: NEW:25527 OLD:24470C	FREQUENCY: 107.5	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY: DAB
TITLE: MODEL–6810–2R–DIRECTIONAL ANTENNA			
DATE: 10/30/07	FIGURE 2		

Figure 1a

Tabulation of Horizontal Azimuth Pattern
WFNK Aux Lewiston, ME

Azimuth	Rel Field	Azimuth	Rel Field
0	0.940	180	0.200
10	0.980	190	0.185
20	0.985	200	0.195
30	0.985	210	0.190
40	0.980	220	0.170
45	0.975	225	0.155
50	0.965	230	0.140
60	0.960	240	0.100
70	0.980	250	0.070
80	1.000	260	0.095
90	1.000	270	0.130
100	0.985	280	0.180
110	0.910	290	0.235
120	0.850	300	0.280
130	0.760	310	0.340
135	0.670	315	0.370
140	0.600	320	0.410
150	0.460	330	0.500
160	0.350	340	0.670
170	0.270	350	0.840

Figure 1b

Tabulation of Vertical Azimuth Pattern
WFNK Aux Lewiston, ME

Azimuth	Rel Field	Azimuth	Rel Field
0	0.830	180	0.295
10	0.880	190	0.270
20	0.960	200	0.240
30	0.970	210	0.205
40	0.920	220	0.180
45	0.895	225	0.160
50	0.885	230	0.150
60	0.890	240	0.110
70	0.945	250	0.060
80	0.985	260	0.040
90	0.990	270	0.130
100	0.970	280	0.200
110	0.890	290	0.270
120	0.810	300	0.315
130	0.725	310	0.365
135	0.670	315	0.415
140	0.610	320	0.460
150	0.480	330	0.580
160	0.390	340	0.700
170	0.340	350	0.810

Figure 1c

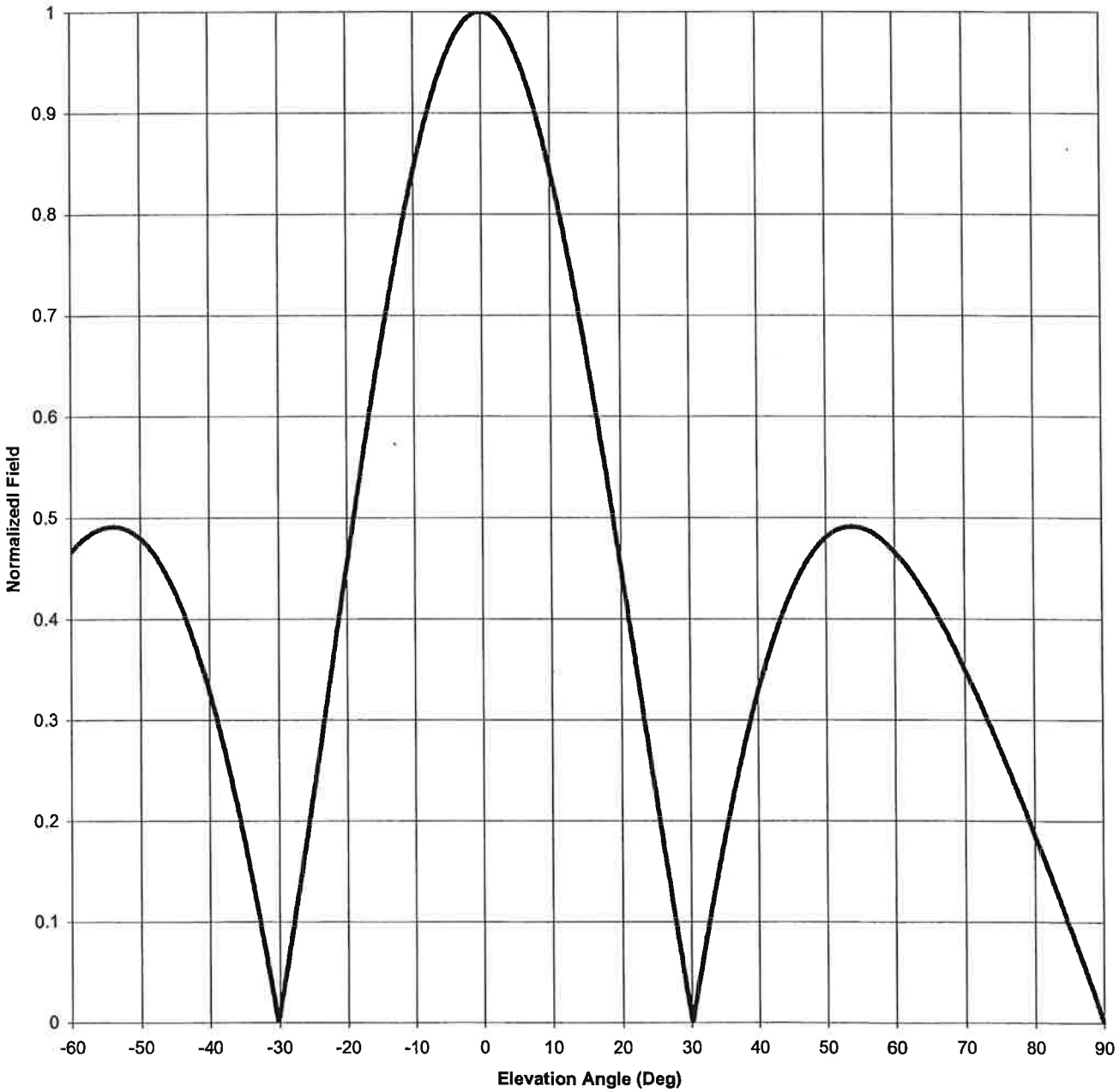
Tabulation of FCC Directional Composite
WFNK Aux Lewiston, ME

Azimuth	Rel Field	Azimuth	Rel Field
0	1.000	180	0.332
10	1.000	190	0.313
20	1.000	200	0.270
30	1.000	210	0.230
40	1.000	220	0.190
50	1.000	230	0.178
60	1.000	240	0.178
70	1.000	250	0.178
80	1.000	260	0.220
90	1.000	270	0.237
100	1.000	280	0.298
110	1.000	290	0.310
120	1.000	300	0.381
130	0.809	310	0.385
140	0.643	320	0.484
150	0.511	330	0.609
160	0.406	340	0.766
170	0.405	350	0.964

Antenna Mfg.: Shively Labs
Antenna Type: 6810-2R-DA
Station: WFNK (Aux)
Frequency: 107.5
Channel #: 298
Figure: 3

Date: 11/2/2007

Beam Tilt	0	
Gain (Max)	2.354	3.718 dB
Gain (Horizon)	2.354	3.718 dB



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Beam Tilt	**0**	
Gain (Max)	**2.354**	**3.718 dB**
Gain (Horizon)	**2.354**	**3.718 dB**

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	0.412	0	1.000	46	0.442
-89	0.021	-43	0.394	1	0.998	47	0.454
-88	0.040	-42	0.374	2	0.993	48	0.465
-87	0.059	-41	0.352	3	0.985	49	0.473
-86	0.078	-40	0.329	4	0.974	50	0.480
-85	0.096	-39	0.303	5	0.960	51	0.485
-84	0.114	-38	0.276	6	0.942	52	0.489
-83	0.132	-37	0.246	7	0.922	53	0.491
-82	0.150	-36	0.215	8	0.898	54	0.491
-81	0.168	-35	0.182	9	0.872	55	0.490
-80	0.186	-34	0.147	10	0.844	56	0.488
-79	0.203	-33	0.111	11	0.813	57	0.484
-78	0.221	-32	0.073	12	0.779	58	0.479
-77	0.238	-31	0.034	13	0.744	59	0.473
-76	0.255	-30	0.007	14	0.707	60	0.466
-75	0.271	-29	0.049	15	0.668	61	0.458
-74	0.288	-28	0.091	16	0.627	62	0.449
-73	0.304	-27	0.135	17	0.585	63	0.439
-72	0.319	-26	0.180	18	0.542	64	0.428
-71	0.335	-25	0.225	19	0.498	65	0.417
-70	0.350	-24	0.270	20	0.453	66	0.405
-69	0.364	-23	0.316	21	0.408	67	0.392
-68	0.378	-22	0.362	22	0.362	68	0.378
-67	0.392	-21	0.408	23	0.316	69	0.364
-66	0.405	-20	0.453	24	0.270	70	0.350
-65	0.417	-19	0.498	25	0.225	71	0.335
-64	0.428	-18	0.542	26	0.180	72	0.319
-63	0.439	-17	0.585	27	0.135	73	0.304
-62	0.449	-16	0.627	28	0.091	74	0.288
-61	0.458	-15	0.668	29	0.049	75	0.271
-60	0.466	-14	0.707	30	0.007	76	0.255
-59	0.473	-13	0.744	31	0.034	77	0.238
-58	0.479	-12	0.779	32	0.073	78	0.221
-57	0.484	-11	0.813	33	0.111	79	0.203
-56	0.488	-10	0.844	34	0.147	80	0.186
-55	0.490	-9	0.872	35	0.182	81	0.168
-54	0.491	-8	0.898	36	0.215	82	0.150
-53	0.491	-7	0.922	37	0.246	83	0.132
-52	0.489	-6	0.942	38	0.276	84	0.114
-51	0.485	-5	0.960	39	0.303	85	0.096
-50	0.480	-4	0.974	40	0.329	86	0.078
-49	0.473	-3	0.985	41	0.352	87	0.059
-48	0.465	-2	0.993	42	0.374	88	0.040
-47	0.454	-1	0.998	43	0.394	89	0.021
-46	0.442	0	1.000	44	0.412	90	0.000
-45	0.428			45	0.428		

S.O. 24470 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

WFNK (Aux) 107.5 MHz LEWISTON, ME

MODEL 6810-2R-DA

Elevation Gain of Antenna 0.99

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 0.657 V RMS 0.64 H/V Ratio 1.027

Elevation Gain of Horizontal Component 1.016

Elevation Gain of Vertical Component 0.964

Horizontal Azimuth Gain equals 1/(RMS)SQ. 2.317

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 2.393
Max. Vertical 0.99

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

Total Horizontal Power Gain = **2.354**

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

Total Vertical Power Gain = **2.308**

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ERP divided by Horizontal Power Gain equals Antenna Input Power

15.5 KW ERP Equals 6.583 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

6.583 KW Times 2.308 KW Equals 15.192 KW ERP

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

0.99 Equals 15.192 KW Vertical ERP

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