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S.O. 26180

Report of Test 6810-4R-DA

for

CONNOISSEUR MEDIA, LLC

New FM 102.7 MHz Box Elder, SD

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a 6810-4R-DA to meet the needs of New FM and to comply with the requirements of the FCC construction permit, file number BMPH-20071026ACW.

RESULTS:

The measured azimuth pattern for the 6810-4R-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 BMPH-20071026ACW indicates that the Horizontal radiation component shall not exceed 50 kW at any azimuth and is restricted to the following values at the azimuths specified:

120 Degrees T: 13 kW

From Figure 1, the maximum radiation of the Horizontal component occurs at 305 Degrees T to 311 Degrees T. At the restricted azimuth of 120 Degrees T the Horizontal component is 9 dB down from the maximum of 50 kW, or 6 kW.

The R.M.S. of the Horizontal component is 0.762. The total Horizontal power gain is 3.710. The R.M.S. of the Vertical component is 0.750. The total Vertical power gain is 3.673. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.949. The R.M.S. of the measured composite pattern is 0.808. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.807. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One bay of the 6810-4R-DA was mounted on a tower of precise scale to the Cooper Welding & Fab 5' face tower at the New FM 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 BMPH-20071026ACW, a single level of the 6810-4R-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 and 10th Editions 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 462.15 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 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 26180
December 7, 2007

Shively Labs

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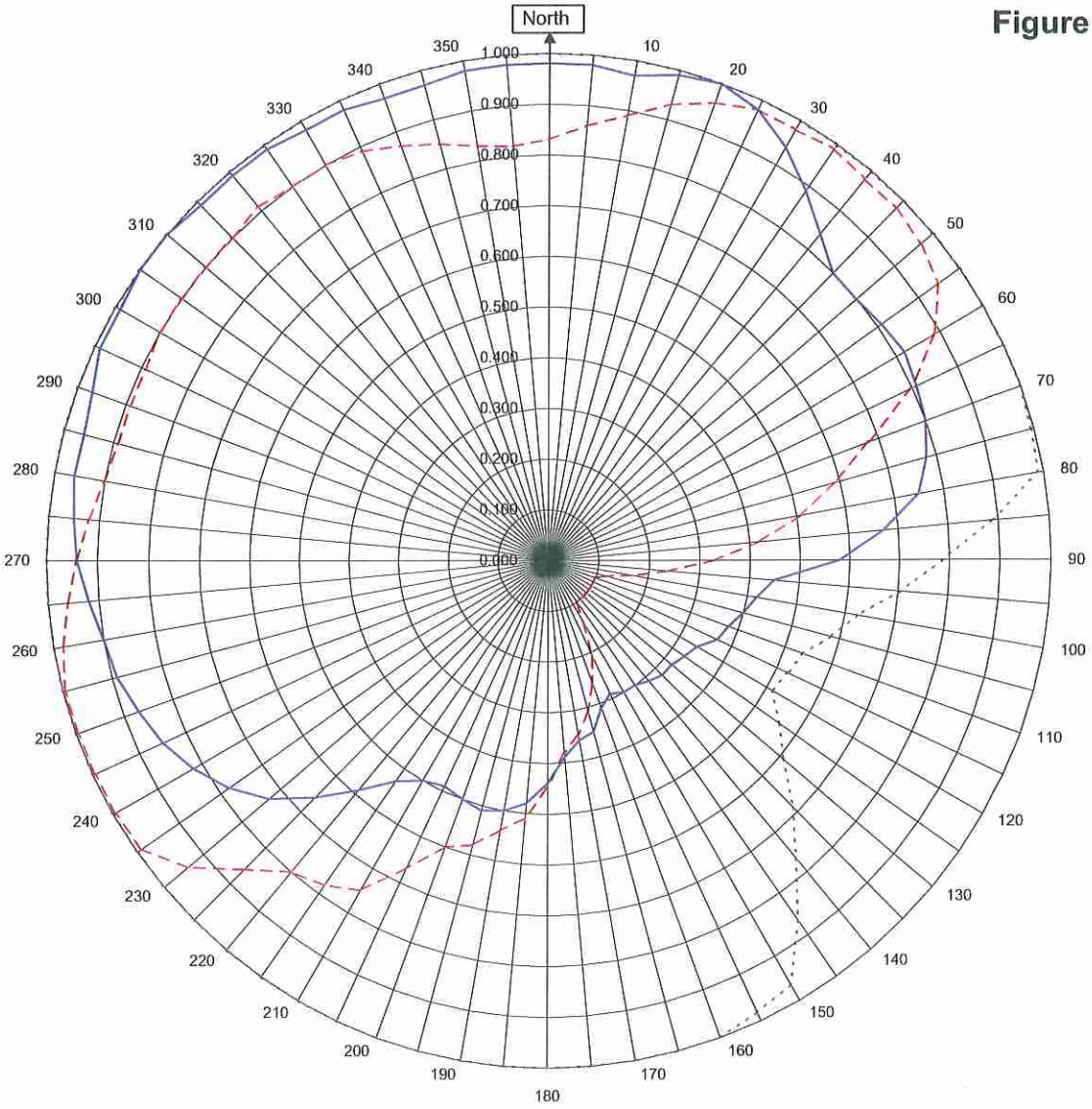
Figure 1



New FM Box Elder, SD

26180

December 7, 2007

Horizontal RMS	0.762
Vertical RMS	0.750
H/V Composite RMS	0.808
FCC Composite RMS	0.949

Frequency	102.7 / 462.15 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	6810-4R-DA Pattern 31
Pattern Type	Directional Azimuth

Figure 1a

Tabulation of Horizontal Azimuth Pattern
New FM Box Elder, SD

Azimuth	Rel Field	Azimuth	Rel Field
0	0.980	180	0.440
10	0.970	190	0.500
20	1.000	200	0.500
30	0.940	210	0.500
40	0.840	220	0.590
45	0.800	225	0.660
50	0.800	230	0.730
60	0.820	240	0.820
70	0.800	250	0.870
80	0.750	260	0.900
90	0.580	270	0.940
100	0.420	280	0.960
110	0.380	290	0.970
120	0.340	300	0.990
130	0.320	310	1.000
135	0.320	315	0.990
140	0.310	320	0.990
150	0.300	330	0.980
160	0.310	340	0.970
170	0.360	350	0.980

Figure 1b

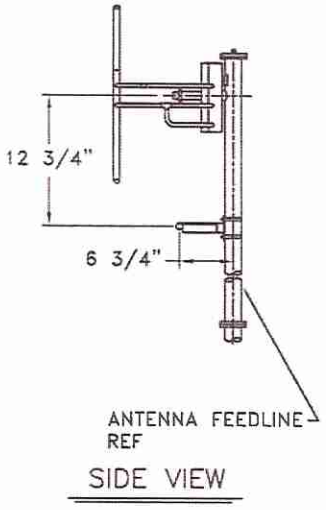
Tabulation of Vertical Azimuth Pattern
New FM Box Elder, SD

Azimuth	Rel Field	Azimuth	Rel Field
0	0.830	180	0.450
10	0.890	190	0.540
20	0.960	200	0.600
30	0.980	210	0.750
40	0.980	220	0.800
45	0.980	225	0.860
50	0.970	230	0.940
60	0.890	240	0.995
70	0.680	250	0.995
80	0.510	260	0.980
90	0.330	270	0.940
100	0.170	280	0.900
110	0.100	290	0.890
120	0.100	300	0.900
130	0.100	310	0.900
135	0.100	315	0.900
140	0.100	320	0.910
150	0.140	330	0.900
160	0.260	340	0.870
170	0.350	350	0.830

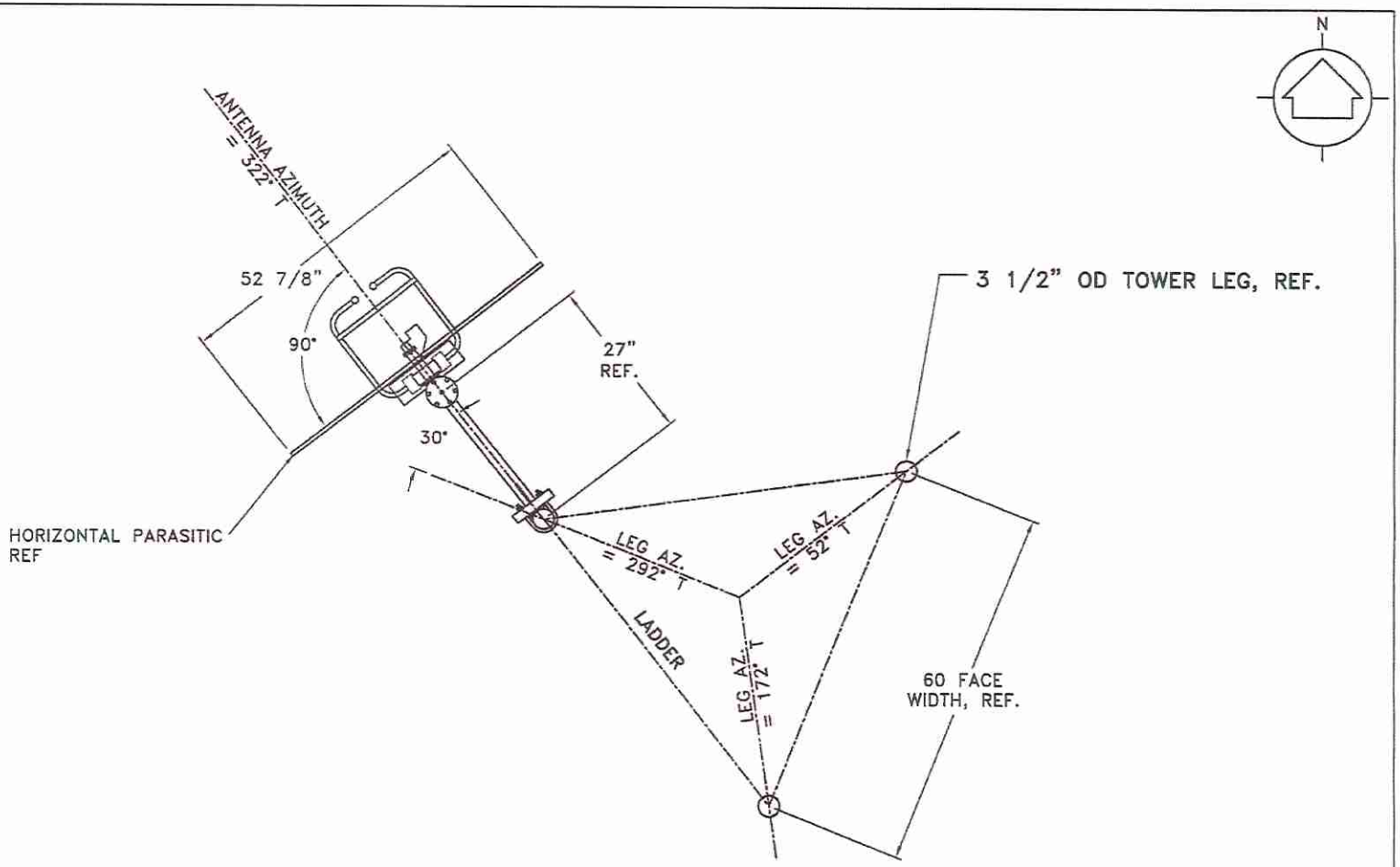
Figure 1c

Tabulation of FCC Directional Composite
New FM Box Elder, SD

Azimuth	Rel Field	Azimuth	Rel Field
0	1.000	180	1.000
10	1.000	190	1.000
20	1.000	200	1.000
30	1.000	210	1.000
40	1.000	220	1.000
50	1.000	230	1.000
60	1.000	240	1.000
70	1.000	250	1.000
80	0.990	260	1.000
90	0.787	270	1.000
100	0.626	280	1.000
110	0.539	290	1.000
120	0.512	300	1.000
130	0.610	310	1.000
140	0.767	320	1.000
150	0.965	330	1.000
160	1.000	340	1.000
170	1.000	350	1.000



SIDE VIEW



TOP VIEW

TOWER: COOPER WELDING & FAB, 5' FACE

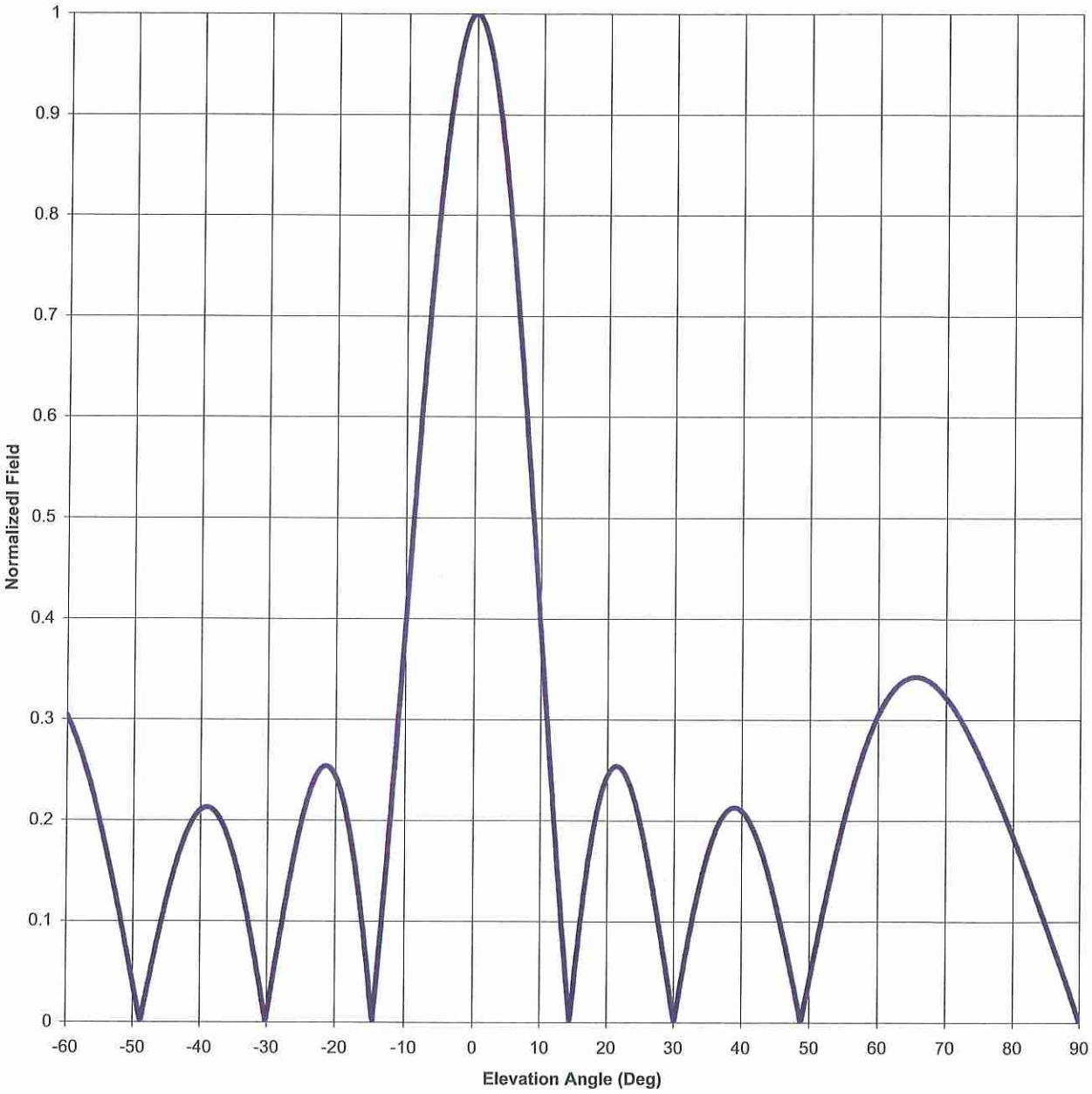
ANTENNA HEADING: 322° TRUE NORTH

SHIVELY LABS A DIVISION OF HOWELL LABORATORIES INC.,BRIDGTON, MAINE			
SHOP ORDER: 26180	FREQUENCY: 102.7 MHz.	SCALE: N.T.S.	DRAWN BY: ASP APPROVED BY:
MODEL: 6810-4R-DIRECTIONAL ANTENNA			
DATE: 11/12/07	FIGURE 2		

Antenna Mfg.: Shively Labs
Antenna Type: 6810-4R-DA
Station: NEW FM
Frequency: 102.7
Channel #: 274
Figure: 3

Date: 12/7/2007

Beam Tilt	0	
Gain (Max)	3.710	5.694 dB
Gain (Horizon)	3.710	5.694 dB



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Beam Tilt	**0**	
Gain (Max)	**3.710**	**5.694 dB**
Gain (Horizon)	**3.710**	**5.694 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	0.147	0	1.000	46	0.092
-89	0.021	-43	0.170	1	0.992	47	0.061
-88	0.040	-42	0.188	2	0.970	48	0.028
-87	0.059	-41	0.202	3	0.933	49	0.006
-86	0.078	-40	0.210	4	0.883	50	0.040
-85	0.096	-39	0.213	5	0.820	51	0.074
-84	0.114	-38	0.210	6	0.747	52	0.107
-83	0.132	-37	0.201	7	0.666	53	0.139
-82	0.150	-36	0.186	8	0.578	54	0.170
-81	0.167	-35	0.166	9	0.486	55	0.198
-80	0.185	-34	0.140	10	0.392	56	0.225
-79	0.201	-33	0.109	11	0.299	57	0.248
-78	0.218	-32	0.074	12	0.207	58	0.270
-77	0.234	-31	0.035	13	0.120	59	0.288
-76	0.249	-30	0.005	14	0.040	60	0.304
-75	0.264	-29	0.047	15	0.033	61	0.317
-74	0.278	-28	0.088	16	0.096	62	0.327
-73	0.290	-27	0.128	17	0.150	63	0.335
-72	0.302	-26	0.164	18	0.192	64	0.340
-71	0.313	-25	0.196	19	0.224	65	0.342
-70	0.322	-24	0.223	20	0.244	66	0.342
-69	0.330	-23	0.242	21	0.253	67	0.340
-68	0.336	-22	0.252	22	0.252	68	0.336
-67	0.340	-21	0.253	23	0.242	69	0.330
-66	0.342	-20	0.244	24	0.223	70	0.322
-65	0.342	-19	0.224	25	0.196	71	0.313
-64	0.340	-18	0.192	26	0.164	72	0.302
-63	0.335	-17	0.150	27	0.128	73	0.290
-62	0.327	-16	0.096	28	0.088	74	0.278
-61	0.317	-15	0.033	29	0.047	75	0.264
-60	0.304	-14	0.040	30	0.005	76	0.249
-59	0.288	-13	0.120	31	0.035	77	0.234
-58	0.270	-12	0.207	32	0.074	78	0.218
-57	0.248	-11	0.299	33	0.109	79	0.201
-56	0.225	-10	0.392	34	0.140	80	0.185
-55	0.198	-9	0.486	35	0.166	81	0.167
-54	0.170	-8	0.578	36	0.186	82	0.150
-53	0.139	-7	0.666	37	0.201	83	0.132
-52	0.107	-6	0.747	38	0.210	84	0.114
-51	0.074	-5	0.820	39	0.213	85	0.096
-50	0.040	-4	0.883	40	0.210	86	0.078
-49	0.006	-3	0.933	41	0.202	87	0.059
-48	0.028	-2	0.970	42	0.188	88	0.040
-47	0.061	-1	0.992	43	0.170	89	0.021
-46	0.092	0	1.000	44	0.147	90	0.000
-45	0.121			45	0.121		

S.O. 26180 Figure 4

VALIDATION OF TOTAL POWER GAIN CALCULATION

NEW FM 102.7 MHz BOX ELDER, SD

MODEL 6810-4R-DA

Elevation Gain of Antenna 2.12

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

H RMS 0.762 V RMS 0.75 H/V Ratio 1.016

Elevation Gain of Horizontal Component 2.154

Elevation Gain of Vertical Component 2.087

Horizontal Azimuth Gain equals 1/(RMS)SQ. 1.722

Vertical Azimuth Gain equals 1/(RMS/Max Vert)SQ. 1.760
Max. Vertical 0.995

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

Total Horizontal Power Gain = **3.710**

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

Total Vertical Power Gain = **3.673**

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ERP divided by Horizontal Power Gain equals Antenna Input Power

50 KW ERP Equals 13.479 KW Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

13.479 KW Times 3.673 KW Equals 49.501 KW ERP

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

0.995 Equals 49.501 KW Vertical ERP

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