

***Directional Antenna System
for
WNFN, Millersville, Tennessee***

April 15, 2008

Electronics Research Inc. is providing a custom fabricated antenna system that is specially designed to meet the FCC requirements and the general needs of radio station WNFN.

The antenna is the ERI model 1093-2CP-DA configuration. The circular polarized system consists of 2 full-wavelength spaced bays using three driven circular polarized radiating elements attached to three flat panels and six vertical parasitic elements per bay. The antenna was mounted on the North 108 degrees East tower face with bracketry to provide an antenna orientation of North 108 degrees East. The antenna was tested on a 12' face Kline tower, which is the structure the station plans to use to support the array. All tests were performed on a frequency of 106.7 megahertz, which is the center of the FM broadcast channel assigned to WNFN.

Pattern measurements were made on a sixty-acre antenna pattern range that is owned and operated by Electronics Research, Inc. The tests were performed under the direction of Thomas B. Silliman, president of Electronics Research, Inc. Mr. Silliman has the Bachelor of Electrical Engineering and the Master of Electrical Engineering degrees from Cornell University and is a registered professional engineer in the states of Indiana, Maryland and Minnesota.

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EXHIBIT #B
APP FOR STATION LICENSE
CUMULUS LICENSING LLC
WNFN RADIO STATION
CH 294C3 - 2.95 KW (DA)
MILLERSVILLE, TENNESSEE
April 2008

Directional Antenna System Proposed For WNFN, Millersville, Tennessee

(Continued)

DESCRIPTION OF THE TEST PROCEDURE

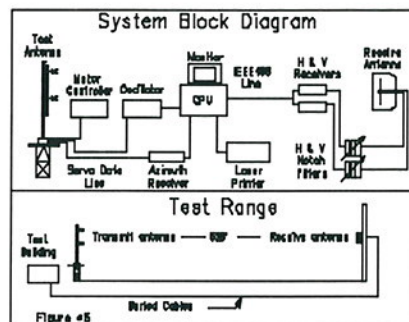
The test antenna consisted of one level of the circular polarized system with the associated vertical parasitic elements. The elements and brackets that were used in this test are electrically equivalent to those that will be supplied with the antenna.

The power distribution and phase relationship to the antenna elements was adjusted in order to achieve the directional radiation patterns for both horizontal and vertical polarization components.

The proof-of-performance was accomplished using a 12' face Kline tower with identical dimension and configuration including all braces, ladders, conduits, coaxial lines and other appurtenances that are included in the actual aperture at which the antenna will be installed. The structure was erected vertically on a turntable mounted on a non-metallic building with the antenna centered vertically on the structure, making the center of radiation of the test approximately 30 feet above ground. The turntable is equipped with a motor drive and a US Digital angle position indicator. The resolution of this angle position indicator is one-hundredth of a degree.

The antenna under test was operated in the transmitting mode and fed from a HP8657D signal generator. The frequency of the signal source was set at 106.7 MHz and was constantly monitored by a Rohde & Schwarz ESVD measuring receiver.

A broadband horizontal and vertical dipole system, located approximately 628 feet from the test antenna, was used to receive the emitted test signals. The dipole system was mounted at the same height above terrain as the center of the antenna under test. The signals received by the dipole system were fed to the test building by way of two buried Heliax cables to a Rohde & Schwarz measuring receiver. This data was interfaced to a Hewlett-Packard Laser Jet 4P printer by means of a Pentium computer system. Relative field strength was plotted as a function of azimuth.



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Proposed For
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(Continued)

The measurements were performed by rotating the test antenna in a counter-clockwise direction and plotting the received signal on polar coordinated graph paper in a clockwise direction. Both horizontal and vertical components were recorded separately.

CONCLUSIONS

The circular polarized system consists of 2 full-wavelength spaced bays using three driven circular polarized radiating elements attached to three flat panels and six vertical parasitic elements per bay. The power distribution and phase relationship will be fixed when antenna is manufactured. Proper maintenance of the elements should be all that is required to maintain the pattern in adjustment.

The 1093-2CP-DA array is to be mounted on the North 108 degrees East tower face of the 12' face Kline tower at a bearing of North 108 degrees East. Blue prints provided with the antenna will show the proper antenna orientation alignment. The antenna alignment procedure should be directed by a licensed surveyor as prescribed by the FCC.

Figure #1 represents the maximum value of either the horizontal or vertical component at any azimuth. The measured horizontal plane relative field pattern, for both the horizontal and vertical polarization components, is shown on Figure #2 attached. The actual measured pattern does not exceed the authorized FCC composite pattern at any azimuth. A calculated vertical plane relative field pattern is shown on Figure #3 attached. The power in the maximum will reach 2.95 kilowatts (4.698 dBk).

The power at North 190-210 degrees East does not exceed 1.45 kilowatts (1.614 dBk).

The RMS of the vertically polarized horizontal plane component does not exceed the RMS of the horizontally polarized horizontal plane component.

The composite horizontal and vertical maximum relative field pattern obtained from the measured data as shown on Figure #1 has an RMS that is greater than 85% of the filed composite pattern.

The clear vertical length of the structure required to support the antenna is 29 ft 2 in.

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(Continued)

The directional antenna should not be mounted on the top of an antenna tower that includes a top-mounted platform larger than the cross-sectional area of the tower in the horizontal plane. No obstructions other than those that are specified by the blue prints supplied with the antenna are to be mounted within 75 ft. horizontally of the system. The vertical distance to the nearest obstruction should be a minimum of 10 ft. from the directional antenna. Metallic guy wires should be a minimum distance of forty feet horizontally from the antenna.

ELECTRONICS RESEARCH, INC.

A handwritten signature in black ink, appearing to read "Tom Scharf". The signature is fluid and cursive, with a large initial "T" and a stylized "S".

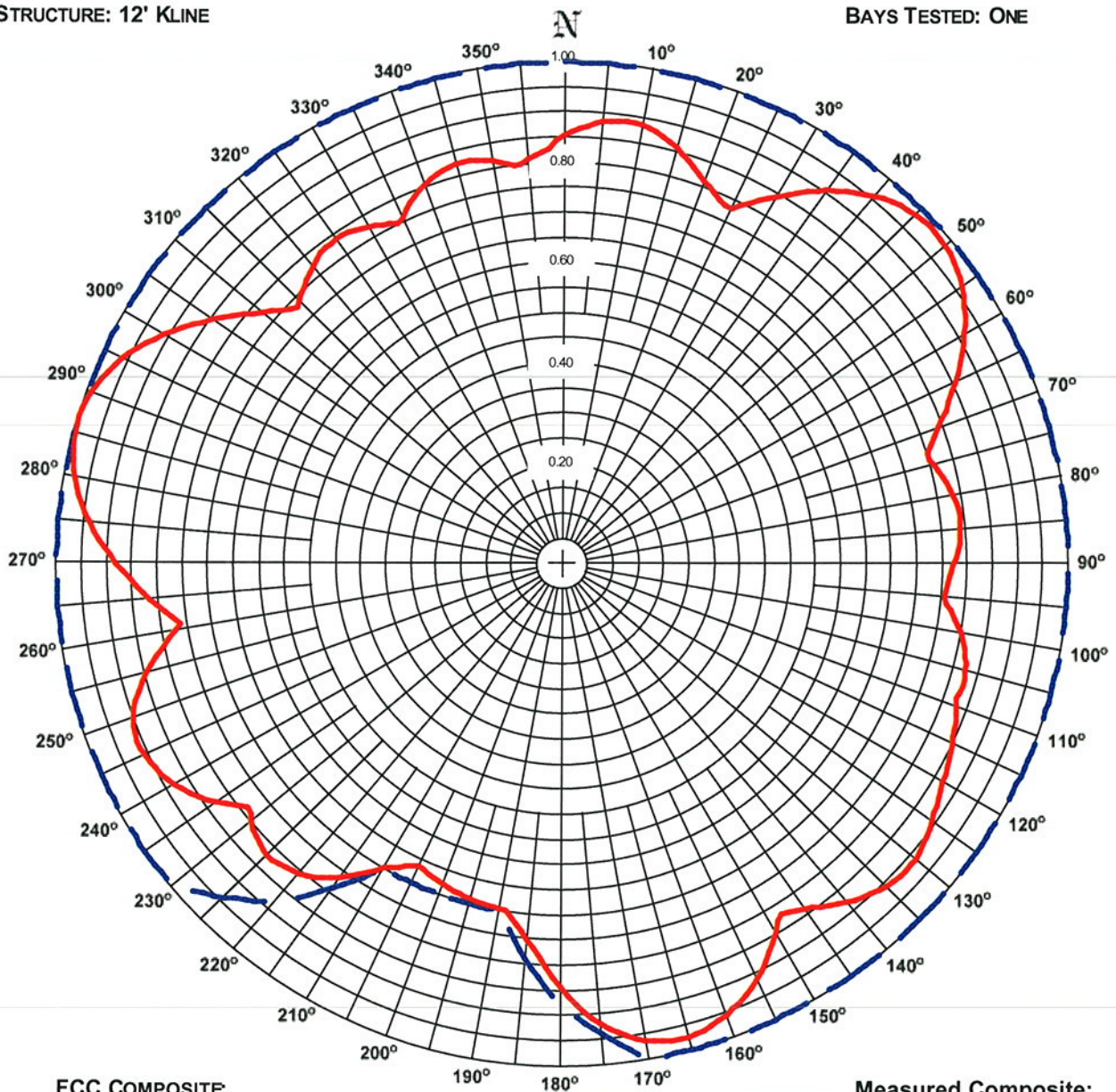
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ERI® *Horizontal Plane Relative Field Pattern*

Electronics Research, Inc. 7777 Gardner Rd. Chandler, In 47610 Phone (812) 925-6000 Fax (812) 925-4030 <http://www.eriinc.com/>

FIGURE NO: 1
STATION: WNFN
LOCATION: MILLERSVILLE, TN
ANTENNA: 1093-2CP-DA
STRUCTURE: 12' KLINE

DATE: 4/15/2008
FREQUENCY: 106.7 MHz
ORIENTATION: 108° TRUE
MOUNTING: CUSTOM
BAYS TESTED: ONE



FCC COMPOSITE
RMS: 0.972
MAXIMUM: 1.000 @ 0° TRUE
MINIMUM: 0.700 @ 190° TRUE

Measured Composite:
RMS: 0.849
Maximum: 1.000 @ 286° True
Minimum: 0.664 @ 205° True

COMMENTS: MEASURED PATTERNS OF THE HORIZONTAL AND VERTICAL COMPONENTS.

ERI[®] *Horizontal Plane Relative Field List*

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Station: WNFN
Location: Millersville, TN
Frequency: 106.7 MHz

Antenna: 1093-2CP-DA
Orientation: 108° True
Tower: 12' Kline

Figure: 1
Date: 4/15/2008
Reference: wnfn2m.fig

Angle	Envelope			Polarization	Angle	Envelope			Polarization
	Field	kW	dBk			Field	kW	dBk	
0°	0.853	2.15	3.32	Vertical	180°	0.843	2.10	3.21	Horizontal
5°	0.884	2.31	3.63	Vertical	185°	0.751	1.66	2.21	Horizontal
10°	0.888	2.33	3.67	Vertical	190°	0.697	1.43	1.56	Vertical
15°	0.859	2.18	3.38	Vertical	195°	0.691	1.41	1.49	Vertical
20°	0.813	1.95	2.90	Vertical	200°	0.679	1.36	1.34	Vertical
25°	0.782	1.80	2.56	Horizontal	205°	0.664	1.30	1.14	Vertical
30°	0.847	2.12	3.25	Horizontal	210°	0.699	1.44	1.59	Horizontal
35°	0.908	2.43	3.86	Horizontal	215°	0.763	1.72	2.34	Horizontal
40°	0.956	2.70	4.31	Horizontal	220°	0.806	1.92	2.82	Horizontal
45°	0.984	2.86	4.56	Horizontal	225°	0.822	1.99	3.00	Horizontal
50°	0.986	2.87	4.57	Horizontal	230°	0.798	1.88	2.74	Horizontal
55°	0.962	2.73	4.36	Horizontal	235°	0.830	2.03	3.08	Vertical
60°	0.916	2.47	3.94	Horizontal	240°	0.881	2.29	3.59	Vertical
65°	0.855	2.16	3.34	Horizontal	245°	0.906	2.42	3.84	Vertical
70°	0.790	1.84	2.65	Horizontal	250°	0.899	2.39	3.78	Vertical
75°	0.760	1.70	2.31	Vertical	255°	0.848	2.12	3.27	Vertical
80°	0.784	1.81	2.59	Vertical	260°	0.775	1.77	2.49	Vertical
85°	0.789	1.84	2.65	Vertical	265°	0.816	1.97	2.94	Horizontal
90°	0.773	1.76	2.46	Vertical	270°	0.881	2.29	3.60	Horizontal
95°	0.757	1.69	2.28	Vertical	275°	0.938	2.59	4.14	Horizontal
100°	0.800	1.89	2.76	Horizontal	280°	0.979	2.83	4.52	Horizontal
105°	0.825	2.01	3.03	Horizontal	285°	0.999	2.94	4.69	Horizontal
110°	0.828	2.02	3.06	Vertical	290°	0.993	2.91	4.64	Horizontal
115°	0.850	2.13	3.29	Vertical	295°	0.962	2.73	4.36	Horizontal
120°	0.869	2.23	3.48	Vertical	300°	0.911	2.45	3.88	Horizontal
125°	0.892	2.35	3.71	Vertical	305°	0.846	2.11	3.24	Horizontal
130°	0.912	2.45	3.90	Vertical	310°	0.778	1.79	2.52	Horizontal
135°	0.908	2.43	3.86	Vertical	315°	0.741	1.62	2.09	Vertical
140°	0.878	2.27	3.56	Vertical	320°	0.775	1.77	2.48	Vertical
145°	0.838	2.07	3.16	Vertical	325°	0.789	1.84	2.64	Vertical
150°	0.846	2.11	3.25	Horizontal	330°	0.775	1.77	2.49	Vertical
155°	0.913	2.46	3.90	Horizontal	335°	0.759	1.70	2.30	Horizontal
160°	0.955	2.69	4.30	Horizontal	340°	0.805	1.91	2.81	Horizontal
165°	0.974	2.80	4.47	Horizontal	345°	0.825	2.01	3.03	Horizontal
170°	0.963	2.73	4.37	Horizontal	350°	0.816	1.96	2.93	Horizontal
175°	0.918	2.49	3.96	Horizontal	355°	0.809	1.93	2.86	Vertical

Polarization:
Maximum Field:
Minimum Field:
RMS:
Maximum ERP:
Maximum Power Gain:

Envelope
1.000 @ 286° True
0.664 @ 205° True
0.849
2.950 kW
1.466 (1.662 dB)

Total Input Power: 2.012 kW

ERI[®] Horizontal Plane Relative Field Pattern

Electronics Research, Inc. 7777 Gardner Rd. Chandler, In 47610 Phone (812) 925-6000 Fax (812) 925-4030 <http://www.eriinc.com/>

FIGURE NO: 2

STATION: WNFN

LOCATION: MILLERSVILLE, TN

ANTENNA: 1093-2CP-DA

STRUCTURE: 12' KLINE

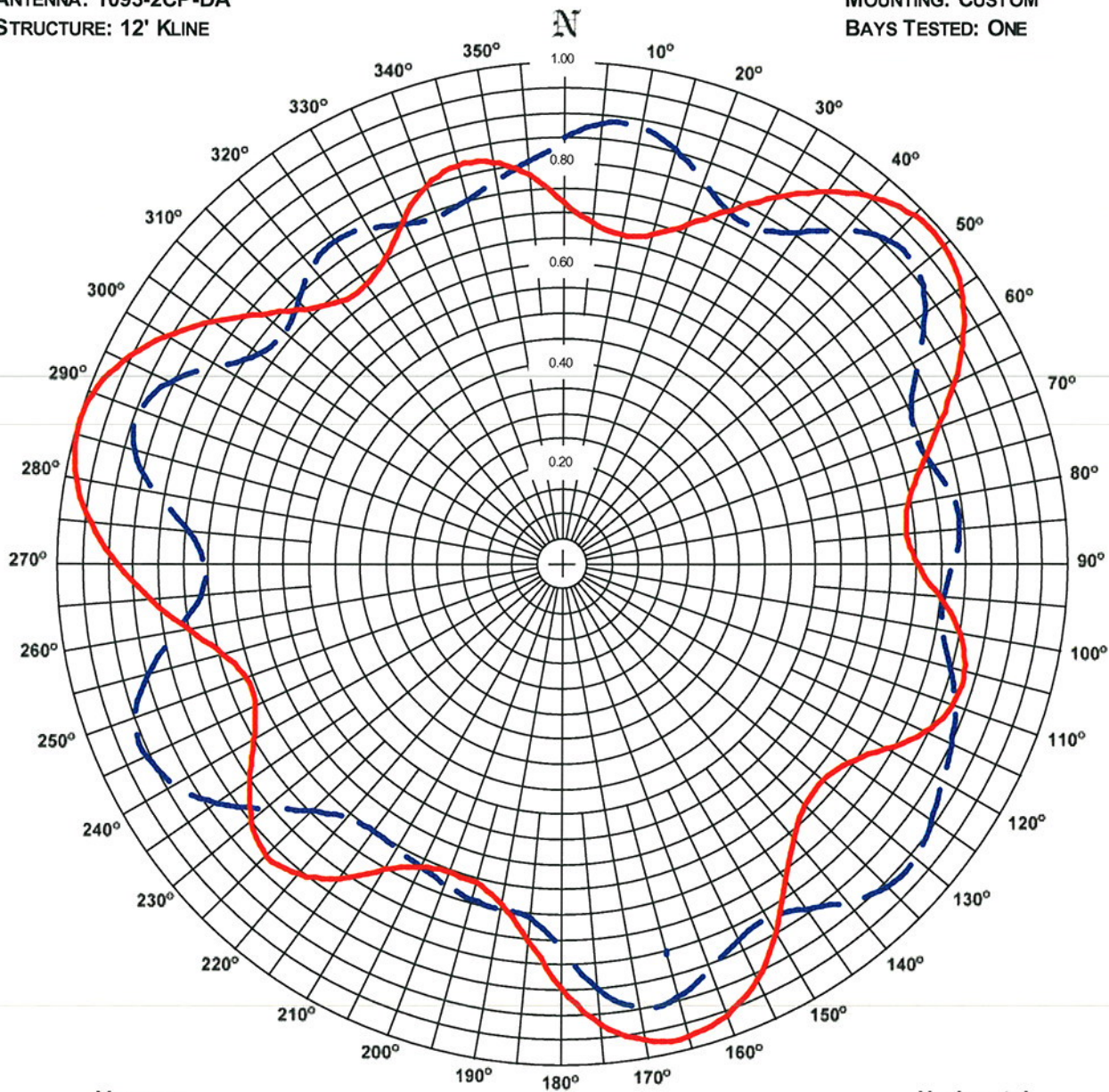
DATE: 4/15/2008

FREQUENCY: 106.7 MHz

ORIENTATION: 108° TRUE

MOUNTING: CUSTOM

BAYS TESTED: ONE



VERTICAL

RMS: 0.803

MAXIMUM: 0.921 @ 48° TRUE

MINIMUM: 0.649 @ 216° TRUE

Horizontal

RMS: 0.803

Maximum: 1.000 @ 286° True

Minimum: 0.653 @ 197° True

COMMENTS: MEASURED PATTERNS OF THE HORIZONTAL AND VERTICAL COMPOENTS.

ERI[®] Horizontal Plane Relative Field List

Electronics Research, Inc. 7777 Gardner Rd. Chandler, In 47610 Phone (812) 925-6000 Fax (812) 925-4030 <http://www.eriinc.com/>

Station: WNFN
Location: Millersville, TN
Frequency: 106.7 MHz

Antenna: 1093-2CP-DA
Orientation: 108° True
Tower: 12' Kline

Figure: 2
Date: 4/15/2008
Reference: wnfn2m.fig

Angle	Horizontal			Vertical			Angle	Horizontal			Vertical		
	Field	kW	dBk	Field	kW	dBk		Field	kW	dBk	Field	kW	dBk
0°	0.724	1.55	1.90	0.853	2.15	3.32	180°	0.843	2.10	3.21	0.764	1.72	2.36
5°	0.684	1.38	1.40	0.884	2.31	3.63	185°	0.751	1.66	2.21	0.709	1.48	1.71
10°	0.669	1.32	1.21	0.888	2.33	3.67	190°	0.688	1.40	1.45	0.697	1.43	1.56
15°	0.683	1.37	1.38	0.859	2.18	3.38	195°	0.657	1.27	1.05	0.691	1.41	1.49
20°	0.723	1.54	1.88	0.813	1.95	2.90	200°	0.653	1.26	1.00	0.679	1.36	1.34
25°	0.782	1.80	2.56	0.776	1.78	2.50	205°	0.664	1.30	1.14	0.664	1.30	1.14
30°	0.847	2.12	3.25	0.773	1.76	2.46	210°	0.699	1.44	1.59	0.654	1.26	1.00
35°	0.908	2.43	3.86	0.811	1.94	2.87	215°	0.763	1.72	2.34	0.649	1.24	0.94
40°	0.956	2.70	4.31	0.870	2.23	3.49	220°	0.806	1.92	2.82	0.659	1.28	1.07
45°	0.984	2.86	4.56	0.914	2.47	3.92	225°	0.822	1.99	3.00	0.694	1.42	1.53
50°	0.986	2.87	4.57	0.916	2.48	3.94	230°	0.798	1.88	2.74	0.756	1.68	2.26
55°	0.962	2.73	4.36	0.875	2.26	3.53	235°	0.753	1.67	2.23	0.830	2.03	3.08
60°	0.916	2.47	3.94	0.812	1.94	2.89	240°	0.703	1.46	1.63	0.881	2.29	3.59
65°	0.855	2.16	3.34	0.761	1.71	2.32	245°	0.667	1.31	1.19	0.906	2.42	3.84
70°	0.790	1.84	2.65	0.744	1.63	2.13	250°	0.664	1.30	1.14	0.899	2.39	3.78
75°	0.732	1.58	1.98	0.760	1.70	2.31	255°	0.693	1.42	1.52	0.848	2.12	3.27
80°	0.693	1.42	1.51	0.784	1.81	2.59	260°	0.749	1.66	2.19	0.775	1.77	2.49
85°	0.684	1.38	1.39	0.789	1.84	2.65	265°	0.816	1.97	2.94	0.719	1.52	1.83
90°	0.704	1.46	1.65	0.773	1.76	2.46	270°	0.881	2.29	3.60	0.708	1.48	1.69
95°	0.749	1.66	2.19	0.757	1.69	2.28	275°	0.938	2.59	4.14	0.742	1.62	2.11
100°	0.800	1.89	2.76	0.765	1.73	2.37	280°	0.979	2.83	4.52	0.818	1.97	2.95
105°	0.825	2.01	3.03	0.795	1.87	2.71	285°	0.999	2.94	4.69	0.878	2.28	3.57
110°	0.822	1.99	2.99	0.828	2.02	3.06	290°	0.993	2.91	4.64	0.894	2.36	3.72
115°	0.791	1.85	2.66	0.850	2.13	3.29	295°	0.962	2.73	4.36	0.862	2.19	3.40
120°	0.736	1.60	2.04	0.869	2.23	3.48	300°	0.911	2.45	3.88	0.790	1.84	2.65
125°	0.690	1.41	1.48	0.892	2.35	3.71	305°	0.846	2.11	3.24	0.734	1.59	2.01
130°	0.670	1.32	1.22	0.912	2.45	3.90	310°	0.778	1.79	2.52	0.718	1.52	1.82
135°	0.678	1.36	1.33	0.908	2.43	3.86	315°	0.721	1.53	1.86	0.741	1.62	2.09
140°	0.711	1.49	1.74	0.878	2.27	3.56	320°	0.686	1.39	1.43	0.775	1.77	2.48
145°	0.768	1.74	2.41	0.838	2.07	3.16	325°	0.683	1.38	1.38	0.789	1.84	2.64
150°	0.846	2.11	3.25	0.815	1.96	2.92	330°	0.708	1.48	1.70	0.775	1.77	2.49
155°	0.913	2.46	3.90	0.824	2.01	3.02	335°	0.759	1.70	2.30	0.750	1.66	2.20
160°	0.955	2.69	4.30	0.859	2.18	3.38	340°	0.805	1.91	2.81	0.740	1.61	2.08
165°	0.974	2.80	4.47	0.893	2.35	3.72	345°	0.825	2.01	3.03	0.752	1.67	2.22
170°	0.963	2.73	4.37	0.895	2.37	3.74	350°	0.816	1.96	2.93	0.778	1.78	2.51
175°	0.918	2.49	3.96	0.849	2.13	3.28	355°	0.781	1.80	2.55	0.809	1.93	2.86

Polarization:	Horizontal	Vertical
Maximum Field:	1.000 @ 286° True	0.921 @ 48° True
Minimum Field:	0.653 @ 197° True	0.649 @ 216° True
RMS:	0.803	0.803
Maximum ERP:	2.950 kW	2.503 kW
Maximum Power Gain:	1.466 (1.662 dB)	1.244 (0.949 dB)

Total Input Power: 2.012 kW

Directional Antenna System for WNFN, Millersville, Tennessee

(Continued)

ANTENNA SPECIFICATIONS

Antenna Type:	1093-2CP-DA
Frequency:	106.7 MHz
Number of Bays:	Two

MECHANICAL SPECIFICATIONS

Mounting:	Custom
System length:	18 ft 4 in
Aperture length required:	29 ft 2 in
Orientation:	108° true

Input flange to the antenna 1 5/8" female.

ELECTRICAL SPECIFICATIONS (For directional use)

Maximum horizontal ERP:	2.950 kW (4.698 dBk)
Horizontal maximum power gain:	1.466 (1.662 dB)
Maximum vertical ERP:	2.503 kW (3.985 dBk)
Vertical maximum power gain:	1.244 (0.949 dB)
Total input power:	2.012 kW (3.036 dBk)

