

***Directional Antenna System
for
WSDD, Bridgeton, Missouri***

May 14, 2010

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 WSDD.

The antenna is the ERI model LP-6E-DA configuration. The circular polarized system consists of 6 full-wavelength spaced bays using one driven circular polarized radiating element and four vertical parasitic elements per bay. The antenna was tested on a 10 3/4" o.d. pole, which is the structure the station plans to use to support the array. All tests were performed on a frequency of 100.3 megahertz, which is the center of the FM broadcast channel assigned to WSDD.

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.



Directional Antenna System Proposed For WSDD, Bridgeton, Missouri

(Continued)

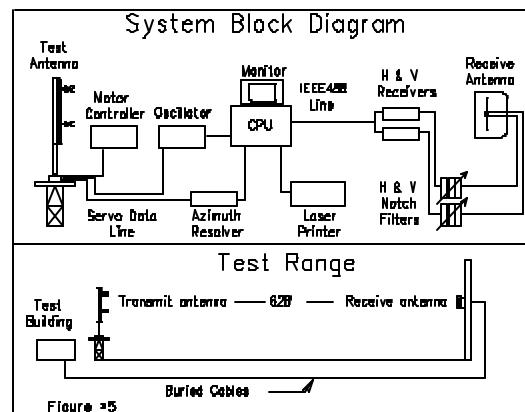
DESCRIPTION OF THE TEST PROCEDURE

The test antenna consisted of two bay levels 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. A section of 1 5/8 inch o.d. rigid coaxial line was used to feed the test antenna, and a section of 1 5/8 inch o.d. rigid outer conductor only was attached above the test antenna. The lines were properly grounded during all tests.

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 10 3/4" o.d. pole 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 100.3 MHz and was constantly monitored by a Rohde & Schwarz ESVD measuring receiver.



Directional Antenna System Proposed For WSDD, Bridgeton, Missouri

(Continued)

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 Helix cables to a Rohde & Schwarz measuring receiver. This data was interfaced to a laser jet printer by means of a computer system. Relative field strength was plotted as a function of azimuth.

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 6 full-wavelength spaced bays using one driven circular polarized radiating element and four 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 LP-6E-DA array is to be mounted on the North degrees East tower of the 10 3/4" o.d. pole at a bearing of North 25 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 17 kilowatts (12.304 dBk).

The power at North 200 degrees East does not exceed 7.93 kilowatts (8.993 dBk).

Directional Antenna System
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(Continued)

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 63 feet 10 inches.

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 Schaefer". The signature is fluid and cursive, with a large initial "T" and a long, sweeping underline.

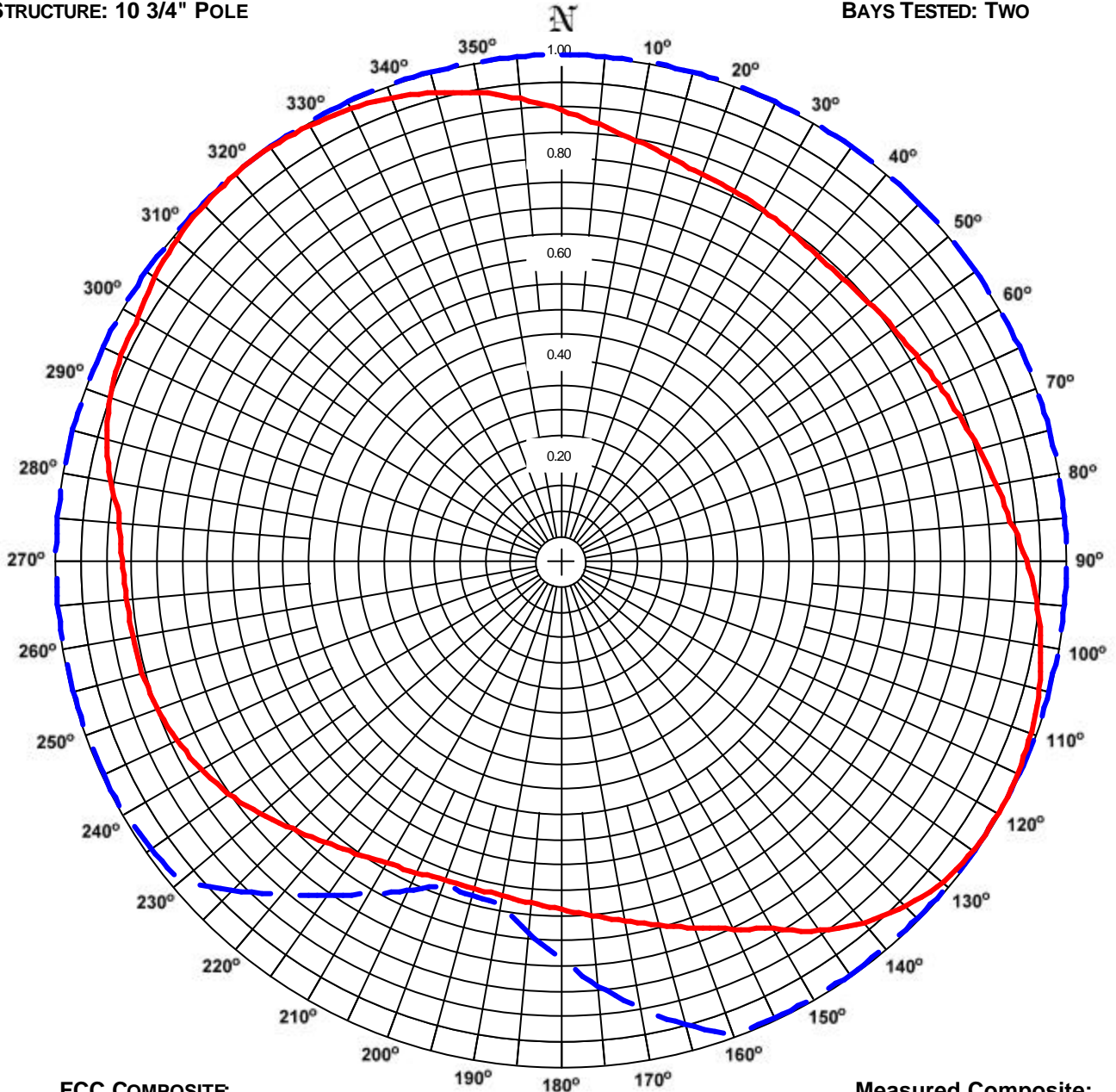
The Microsoft Word document on file electronically at Electronic Research, Inc. governs the specifications, scope, and configuration of the product described. All other representations whether verbal, printed, or electronic are subordinate to the master copy of this document on file at ERI.

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: WSDD
LOCATION: BRIDGETON, MO
ANTENNA: LP-6E-DA
STRUCTURE: 10 3/4" POLE

DATE: 3/5/2010
FREQUENCY: 100.3 MHz
ORIENTATION: 25° TRUE
MOUNTING: STANDARD
BAYS TESTED: TWO



FCC COMPOSITE
RMS: 0.967
MAXIMUM: 1.000 @ 0° TRUE
MINIMUM: 0.683 @ 200° TRUE

Measured Composite:
RMS: 0.866
Maximum: 1.000 @ 120° True
Minimum: 0.672 @ 195° True

COMMENTS: COMPOSITE PATTERN: THIS PATTERN SHOWS THE MAXIMUM OF EITHER THE H OR V AZIMUTH VALUES. THIS PATTERN IS GREATER THAN 85% OF THE FCC FILED COMPOSITE PATTERN BMPH-20100125ADB.

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: WSDD
Location: Bridgeton, MO
Frequency: 100.3 MHz

Antenna: LP-6E-DA
Orientation: 25° True
Tower: 10 3/4" Pole

Figure: 1
Date: 3/5/2010
Reference: wsdd1m.fig

Angle	Envelope			Polarization	Angle	Envelope			Polarization
	Field	kW	dBk			Field	kW	dBk	
0°	0.891	13.49	11.30	Horizontal	180°	0.692	8.13	9.10	Horizontal
5°	0.866	12.74	11.05	Horizontal	185°	0.681	7.88	8.97	Horizontal
10°	0.844	12.11	10.83	Horizontal	190°	0.674	7.73	8.88	Horizontal
15°	0.826	11.59	10.64	Horizontal	195°	0.672	7.68	8.85	Horizontal
20°	0.814	11.25	10.51	Vertical	200°	0.675	7.74	8.89	Horizontal
25°	0.807	11.08	10.45	Vertical	205°	0.682	7.90	8.97	Horizontal
30°	0.800	10.87	10.36	Vertical	210°	0.693	8.16	9.12	Horizontal
35°	0.793	10.70	10.29	Vertical	215°	0.708	8.53	9.31	Horizontal
40°	0.789	10.58	10.24	Vertical	220°	0.728	9.02	9.55	Horizontal
45°	0.790	10.60	10.25	Horizontal	225°	0.753	9.63	9.84	Horizontal
50°	0.795	10.73	10.31	Horizontal	230°	0.780	10.35	10.15	Horizontal
55°	0.802	10.93	10.39	Horizontal	235°	0.805	11.00	10.42	Horizontal
60°	0.811	11.19	10.49	Horizontal	240°	0.825	11.56	10.63	Horizontal
65°	0.824	11.53	10.62	Horizontal	245°	0.840	12.00	10.79	Horizontal
70°	0.838	11.94	10.77	Horizontal	250°	0.851	12.32	10.91	Horizontal
75°	0.855	12.43	10.94	Horizontal	255°	0.858	12.53	10.98	Horizontal
80°	0.874	12.98	11.13	Horizontal	260°	0.861	12.60	11.00	Horizontal
85°	0.893	13.54	11.32	Vertical	265°	0.863	12.67	11.03	Horizontal
90°	0.921	14.41	11.59	Vertical	270°	0.869	12.84	11.08	Horizontal
95°	0.945	15.17	11.81	Vertical	275°	0.878	13.12	11.18	Horizontal
100°	0.964	15.80	11.99	Vertical	280°	0.905	13.93	11.44	Vertical
105°	0.980	16.31	12.12	Vertical	285°	0.931	14.74	11.68	Vertical
110°	0.991	16.68	12.22	Vertical	290°	0.949	15.32	11.85	Vertical
115°	0.997	16.91	12.28	Vertical	295°	0.960	15.67	11.95	Vertical
120°	1.000	17.00	12.30	Vertical	300°	0.967	15.88	12.01	Horizontal
125°	0.999	16.96	12.29	Vertical	305°	0.980	16.34	12.13	Horizontal
130°	0.988	16.61	12.20	Vertical	310°	0.990	16.68	12.22	Horizontal
135°	0.967	15.91	12.02	Vertical	315°	0.997	16.90	12.28	Horizontal
140°	0.936	14.90	11.73	Vertical	320°	1.000	17.00	12.30	Horizontal
145°	0.894	13.60	11.34	Vertical	325°	0.999	16.95	12.29	Horizontal
150°	0.841	12.01	10.80	Vertical	330°	0.994	16.79	12.25	Horizontal
155°	0.806	11.05	10.43	Horizontal	335°	0.985	16.50	12.18	Horizontal
160°	0.775	10.20	10.09	Horizontal	340°	0.973	16.11	12.07	Horizontal
165°	0.748	9.50	9.78	Horizontal	345°	0.958	15.60	11.93	Horizontal
170°	0.725	8.93	9.51	Horizontal	350°	0.939	14.99	11.76	Horizontal
175°	0.706	8.48	9.28	Horizontal	355°	0.917	14.28	11.55	Horizontal

Polarization:	Envelope
Maximum Field:	1.000 @ 120° True
Minimum Field:	0.672 @ 195° True
RMS:	0.866
Maximum ERP:	17.000 kW
Maximum Power Gain:	4.425 (6.459 dB)

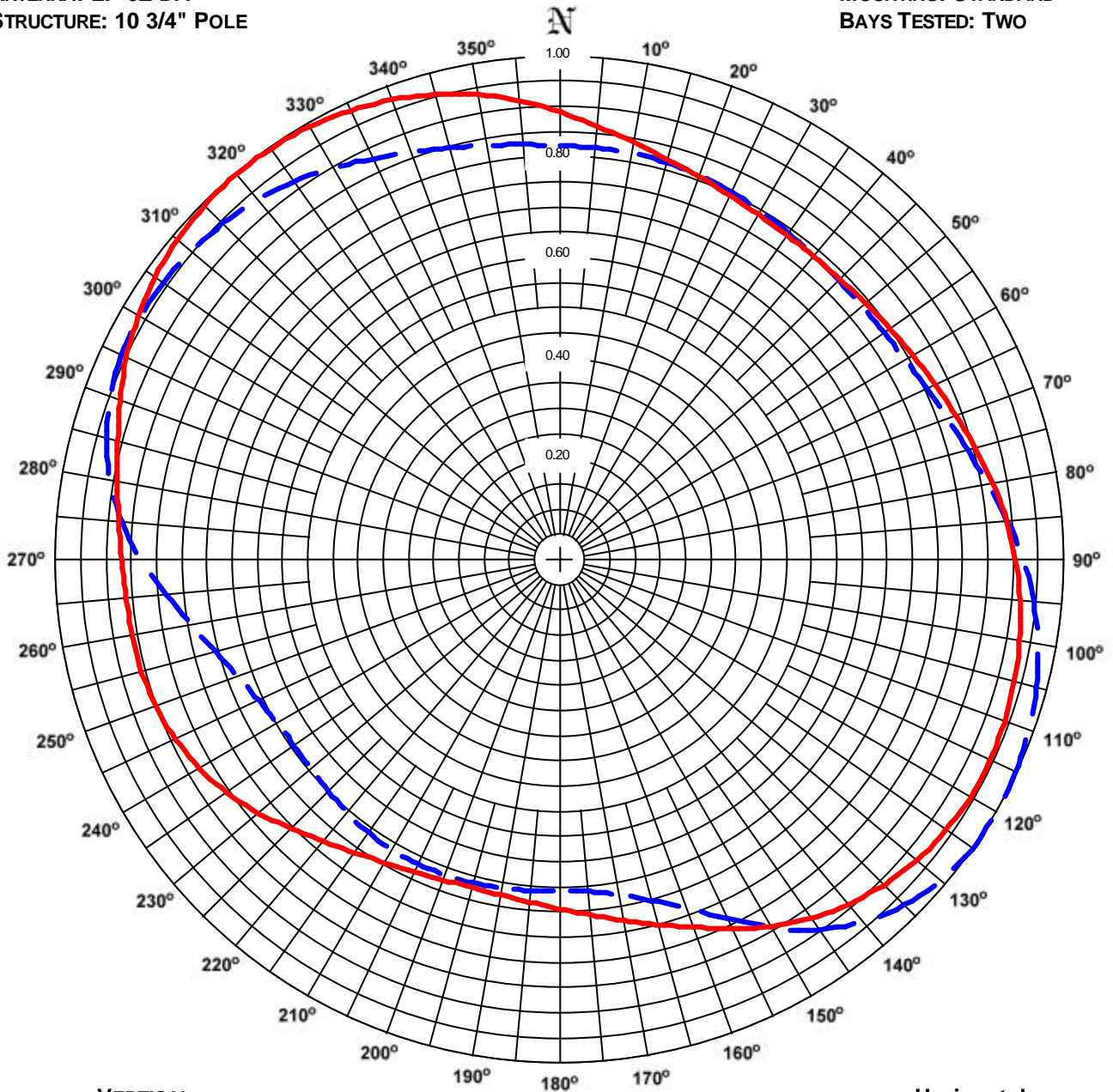
Total Input Power: 3.842 kW

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: WSDD
LOCATION: BRIDGETON, MO
ANTENNA: LP-6E-DA
STRUCTURE: 10 3/4" POLE

DATE: 3/5/2010
FREQUENCY: 100.3 MHz
ORIENTATION: 25° TRUE
MOUNTING: STANDARD
BAYS TESTED: TWO



VERTICAL

RMS: 0.828
MAXIMUM: 1.000 @ 120° TRUE
MINIMUM: 0.642 @ 235° TRUE

Horizontal

RMS: 0.856
Maximum: 1.000 @ 321° True
Minimum: 0.672 @ 195° True

COMMENTS: MEASURED PATTERNS OF THE HORIZONTAL AND VERTICAL COMPONENTS.

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: WSDD
Location: Bridgeton, MO
Frequency: 100.3 MHz

Antenna: LP-6E-DA
Orientation: 25° True
Tower: 10 3/4" Pole

Figure: 2
Date: 3/5/2010
Reference: wsdd1m.fig

Angle	Horizontal			Vertical			Angle	Horizontal			Vertical		
	Field	kW	dBk	Field	kW	dBk		Field	kW	dBk	Field	kW	dBk
0°	0.891	13.49	11.30	0.824	11.54	10.62	180°	0.692	8.13	9.10	0.657	7.34	8.66
5°	0.866	12.74	11.05	0.822	11.49	10.60	185°	0.681	7.88	8.97	0.658	7.36	8.67
10°	0.844	12.11	10.83	0.821	11.46	10.59	190°	0.674	7.73	8.88	0.660	7.40	8.69
15°	0.826	11.59	10.64	0.818	11.38	10.56	195°	0.672	7.68	8.85	0.662	7.46	8.73
20°	0.811	11.18	10.48	0.814	11.25	10.51	200°	0.675	7.74	8.89	0.664	7.50	8.75
25°	0.800	10.87	10.36	0.807	11.08	10.45	205°	0.682	7.90	8.97	0.665	7.52	8.76
30°	0.792	10.66	10.28	0.800	10.87	10.36	210°	0.693	8.16	9.12	0.664	7.49	8.75
35°	0.788	10.55	10.23	0.793	10.70	10.29	215°	0.708	8.53	9.31	0.660	7.41	8.70
40°	0.787	10.54	10.23	0.789	10.58	10.24	220°	0.728	9.02	9.55	0.654	7.28	8.62
45°	0.790	10.60	10.25	0.786	10.50	10.21	225°	0.753	9.63	9.84	0.648	7.13	8.53
50°	0.795	10.73	10.31	0.785	10.48	10.20	230°	0.780	10.35	10.15	0.644	7.04	8.48
55°	0.802	10.93	10.39	0.788	10.54	10.23	235°	0.805	11.00	10.42	0.642	7.01	8.46
60°	0.811	11.19	10.49	0.794	10.73	10.31	240°	0.825	11.56	10.63	0.647	7.11	8.52
65°	0.824	11.53	10.62	0.805	11.03	10.43	245°	0.840	12.00	10.79	0.659	7.38	8.68
70°	0.838	11.94	10.77	0.821	11.45	10.59	250°	0.851	12.32	10.91	0.678	7.83	8.94
75°	0.855	12.43	10.94	0.840	12.01	10.79	255°	0.858	12.53	10.98	0.706	8.47	9.28
80°	0.874	12.98	11.13	0.864	12.70	11.04	260°	0.861	12.60	11.00	0.741	9.33	9.70
85°	0.891	13.49	11.30	0.893	13.54	11.32	265°	0.863	12.67	11.03	0.783	10.43	10.18
90°	0.905	13.93	11.44	0.921	14.41	11.59	270°	0.869	12.84	11.08	0.831	11.73	10.69
95°	0.917	14.31	11.56	0.945	15.17	11.81	275°	0.878	13.12	11.18	0.872	12.92	11.11
100°	0.927	14.61	11.65	0.964	15.80	11.99	280°	0.891	13.51	11.31	0.905	13.93	11.44
105°	0.934	14.84	11.71	0.980	16.31	12.12	285°	0.908	14.02	11.47	0.931	14.74	11.68
110°	0.939	14.99	11.76	0.991	16.68	12.22	290°	0.928	14.65	11.66	0.949	15.32	11.85
115°	0.942	15.07	11.78	0.997	16.91	12.28	295°	0.949	15.32	11.85	0.960	15.67	11.95
120°	0.941	15.05	11.77	1.000	17.00	12.30	300°	0.967	15.88	12.01	0.963	15.76	11.98
125°	0.935	14.87	11.72	0.999	16.96	12.29	305°	0.980	16.34	12.13	0.960	15.68	11.95
130°	0.925	14.55	11.63	0.988	16.61	12.20	310°	0.990	16.68	12.22	0.955	15.49	11.90
135°	0.911	14.09	11.49	0.967	15.91	12.02	315°	0.997	16.90	12.28	0.946	15.21	11.82
140°	0.891	13.51	11.30	0.936	14.90	11.73	320°	1.000	17.00	12.30	0.934	14.83	11.71
145°	0.867	12.79	11.07	0.894	13.60	11.34	325°	0.999	16.95	12.29	0.919	14.35	11.57
150°	0.839	11.97	10.78	0.841	12.01	10.80	330°	0.994	16.79	12.25	0.901	13.79	11.40
155°	0.806	11.05	10.43	0.783	10.42	10.18	335°	0.985	16.50	12.18	0.880	13.18	11.20
160°	0.775	10.20	10.09	0.735	9.19	9.63	340°	0.973	16.11	12.07	0.863	12.66	11.02
165°	0.748	9.50	9.78	0.699	8.30	9.19	345°	0.958	15.60	11.93	0.848	12.24	10.88
170°	0.725	8.93	9.51	0.673	7.71	8.87	350°	0.939	14.99	11.76	0.837	11.91	10.76
175°	0.706	8.48	9.28	0.660	7.40	8.69	355°	0.917	14.28	11.55	0.829	11.68	10.67

Polarization:	Horizontal	Vertical
Maximum Field:	1.000 @ 321° True	1.000 @ 120° True
Minimum Field:	0.672 @ 195° True	0.642 @ 235° True
RMS:	0.856	0.828
Maximum ERP:	17.000 kW	17.000 kW
Maximum Power Gain:	4.425 (6.459 dB)	4.425 (6.459 dB)

Total Input Power: 3.842 kW



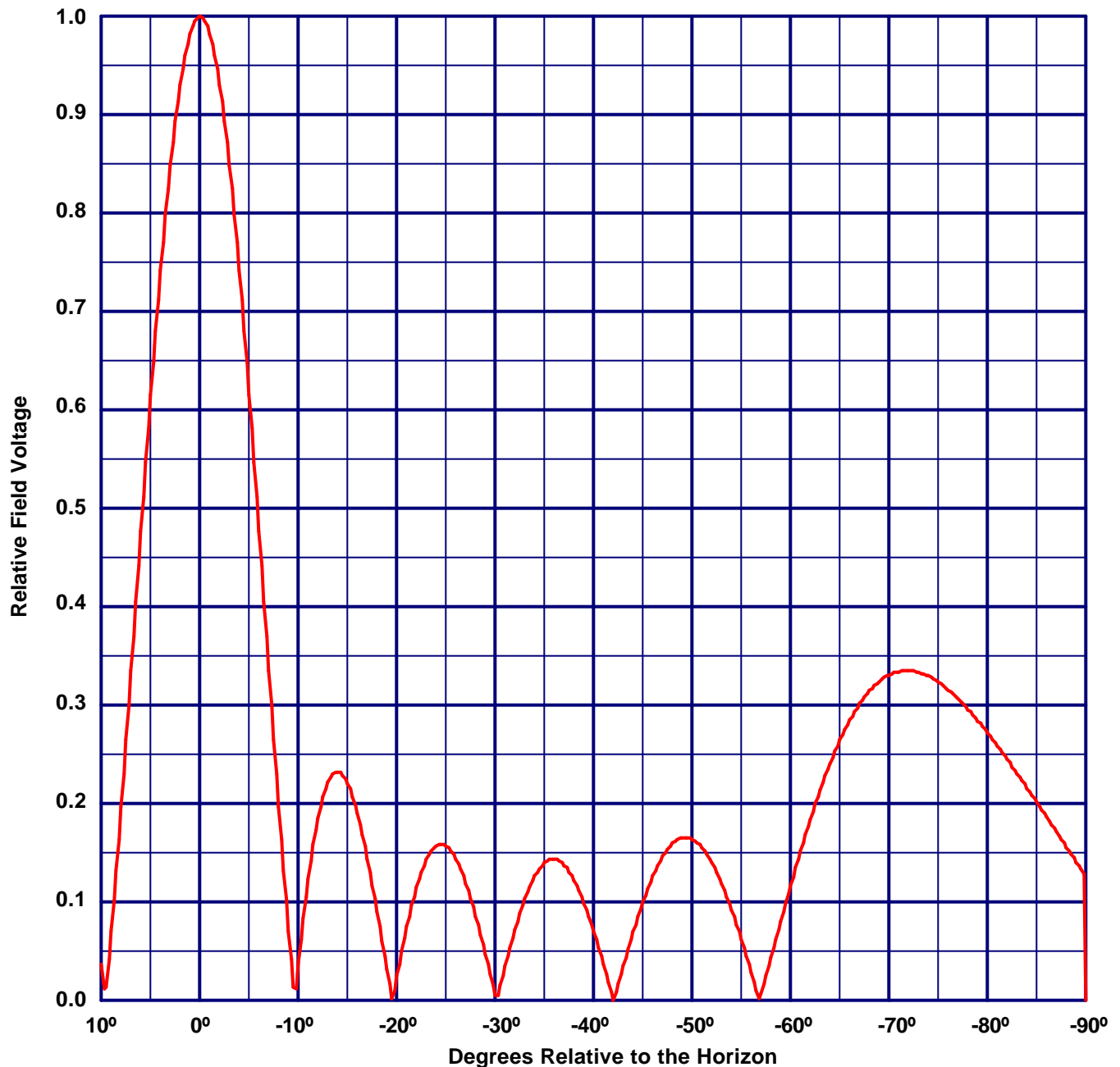
Vertical Plane Relative Field Pattern

WSDD, Bridgeton, MO, 100.3 MHz

Figure#: 3

Date: 3/5/2010

*A 6 level, 1 wave-length spaced LP-6E-DA directional antenna
with 0° beam tilt, 0% null fill and a H/V maximum power ratio of 1.000*



Vertical Polarization Gain:

Maximum: 4.425 (6.459 dB)

Horizontal Plane: 4.425 (6.459 dB)

Horizontal Polarization Gain:

Maximum: 4.425 (6.459 dB)

Horizontal Plane: 4.425 (6.459 dB)

Directional Antenna System for WSDD, Bridgeton, Missouri

(Continued)

ANTENNA SPECIFICATIONS

Antenna Type:	LP-6E-DA
Frequency:	100.3 MHz
Number of Bays:	Six

MECHANICAL SPECIFICATIONS

Mounting:	Standard
System length:	57 ft 5 in
Aperture length required:	63 ft 10 in
Orientation:	25° true

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

ELECTRICAL SPECIFICATIONS (For directional use)

Maximum horizontal ERP:	17.000 kW (12.304 dBk)
Horizontal maximum power gain:	4.425 (6.459 dB)
Maximum vertical ERP:	17.000 kW (12.304 dBk)
Vertical maximum power gain:	4.425 (6.459 dB)
Total input power:	3.842 kW (5.845 dBk)

