

## ***Miami Master Directional Antenna System***

August 4, 2003

Electronics Research Inc. is providing a custom fabricated multi-station directional antenna system that is specially designed to meet the FCC requirements and the general needs of ten radio stations in the Miami, Florida area.

The antenna is the ERI model 1084-8CP-DA configuration. The circular polarized system consists of eight 100" spaced bays using four driven circular polarized radiating elements per bay. The antenna was tested on a 48" rhombus tower, which is the structure planed to use to support the array. All tests were performed at each of the 10 station's carrier frequencies.

The FM stations that will be transmitting from this directional antenna are WPMY @ 93.1 MHz, WLVE @ 93.9 MHZ, WMGE @ 94.9 MHz, WPOW @ 96.5 MHz, WFLC @ 97.3 MHz, WHYI-FM @ 100.7 MHz, WMXJ @ 102.7 MHz, WMIB @ 103.5 MHz, WHQT @ 105.1Mhz and WAMR @ 107.5 MHz.

### **DESCRIPTION OF THE TEST PROCEDURE**

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

## *Miami Master Directional Antenna System*

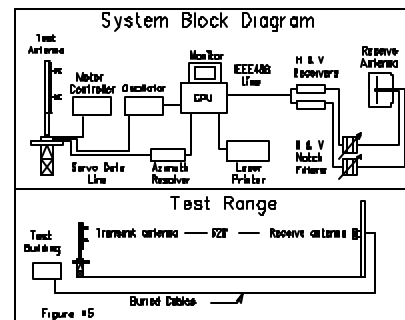
(Continued)

The proof-of-performance was accomplished using a 48" rhombus tower with identical dimension and configuration including all braces, ladders, conduits, coaxial lines and other appurtenances that will be 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 azimuth indicating mechanism, resolution of this azimuth measuring device is one-tenth of a degree.

The antenna under test was operated in the transmitting mode and fed from a Wavetek Model 3000 signal generator. The frequency of the signal source was set at each station's carrier frequency and was constantly monitored by an Anritsu Model ML521B measuring receiver.

A broad-band 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 an Anritsu Model ML521B 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.

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 for each of the 10 stations were recorded separately.



# **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: 1

STATION: WPYM

LOCATION: MIAMI, FL.

ANTENNA TYPE: 1084-8CP-DA

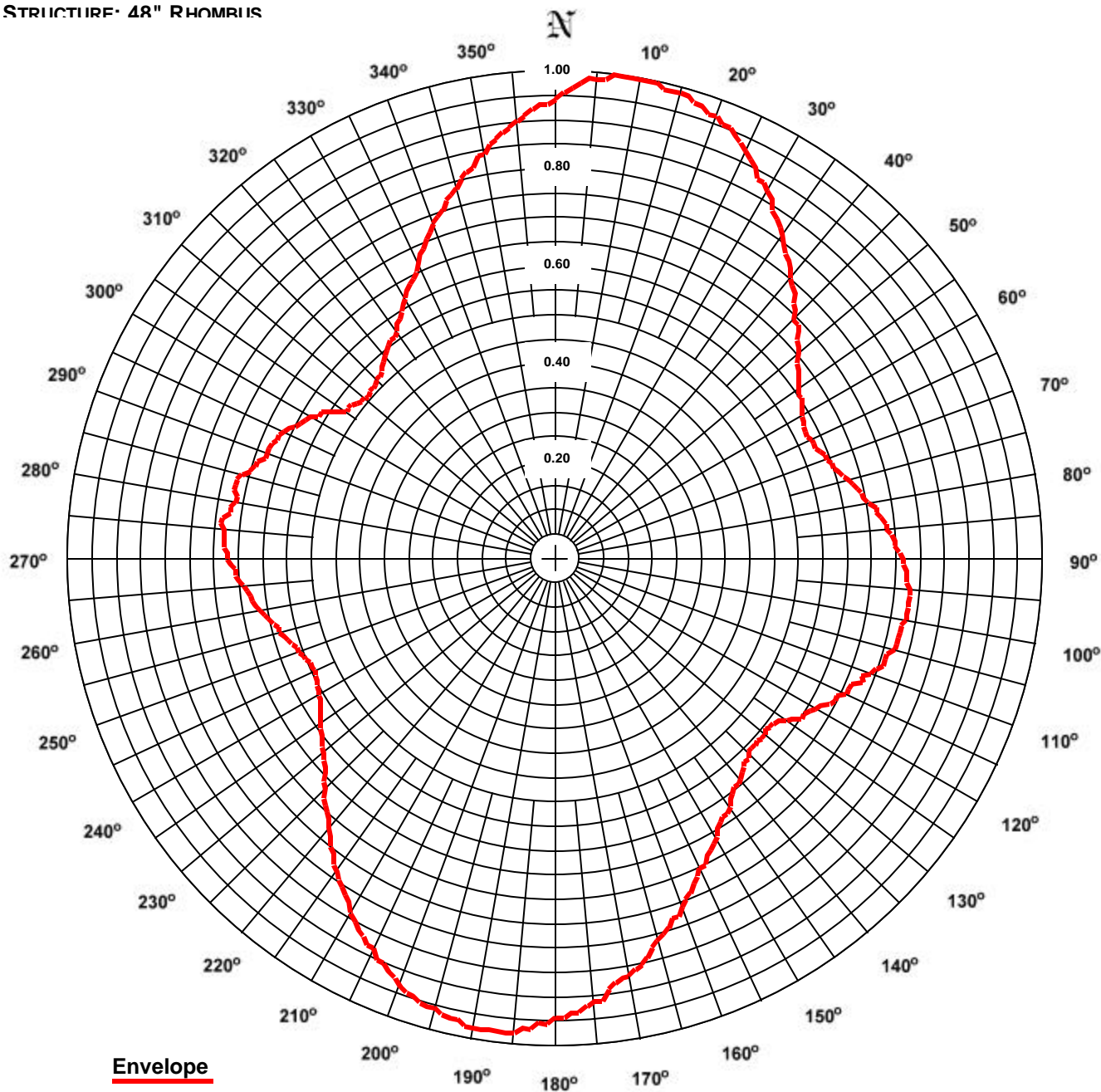
STRUCTURE: 48" RHOMBIUS

DATE: 07/28/2003

FREQUENCY: 93.1 MHz

ORIENTATION: 10° TRUE

MOUNTING: CUSTOM



Envelope

RMS: 0.730

Maximum: 1.000 @ 7° True

Minimum: 0.507 @ 311° True

COMMENTS: COMPOSITE MAXIMUM OF EITHER THE H OR V COMPONENTS.

# ERI<sup>®</sup> Horizontal Plane Relative Field List

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**Station: WPYM**  
**Location: Miami, FL.**  
**Frequency: 93.1 MHz**

**Antenna: 1084-8CP-DA**  
**Orientation: 10° True**  
**Tower: 48" Rhombus**

**Figure: 1**  
**Date: 07/28/2003**  
**Reference: wpym1r.fig**

Angle	Envelope			Polarization	Angle	Envelope			Polarization
	Field	kW	dBk			Field	kW	dBk	
0°	0.944	89.13	19.50	Horizontal	180°	0.944	89.13	19.50	Horizontal
5°	0.989	97.72	19.90	Horizontal	185°	0.977	95.50	19.80	Horizontal
10°	1.000	100.00	20.00	Horizontal	190°	0.977	95.50	19.80	Horizontal
15°	0.989	97.72	19.90	Horizontal	195°	0.955	91.20	19.60	Horizontal
20°	0.966	93.33	19.70	Horizontal	200°	0.933	87.10	19.40	Horizontal
25°	0.923	85.11	19.30	Horizontal	205°	0.881	77.62	18.90	Horizontal
30°	0.871	75.86	18.80	Horizontal	210°	0.841	70.79	18.50	Horizontal
35°	0.813	66.07	18.20	Horizontal	215°	0.785	61.66	17.90	Horizontal
40°	0.750	56.23	17.50	Horizontal	220°	0.724	52.48	17.20	Horizontal
45°	0.692	47.86	16.80	Horizontal	225°	0.668	44.67	16.50	Horizontal
50°	0.653	42.66	16.30	Horizontal	230°	0.624	38.90	15.90	Horizontal
55°	0.610	37.15	15.70	Horizontal	235°	0.589	34.67	15.40	Horizontal
60°	0.582	33.88	15.30	Horizontal	240°	0.562	31.62	15.00	Horizontal
65°	0.581	33.70	15.28	Vertical	245°	0.543	29.51	14.70	Horizontal
70°	0.594	35.29	15.48	Vertical	250°	0.561	31.45	14.98	Vertical
75°	0.622	38.69	15.88	Vertical	255°	0.587	34.49	15.38	Vertical
80°	0.651	42.43	16.28	Vertical	260°	0.615	37.81	15.78	Vertical
85°	0.682	46.52	16.68	Vertical	265°	0.644	41.46	16.18	Vertical
90°	0.714	51.01	17.08	Vertical	270°	0.674	45.46	16.58	Vertical
95°	0.731	53.41	17.28	Vertical	275°	0.682	46.52	16.68	Vertical
100°	0.731	53.41	17.28	Vertical	280°	0.667	44.43	16.48	Vertical
105°	0.722	52.20	17.18	Vertical	285°	0.667	44.43	16.48	Vertical
110°	0.690	47.60	16.78	Vertical	290°	0.629	39.60	15.98	Vertical
115°	0.659	43.42	16.38	Vertical	295°	0.615	37.81	15.78	Vertical
120°	0.615	37.81	15.78	Vertical	300°	0.581	33.70	15.28	Vertical
125°	0.581	33.70	15.28	Vertical	305°	0.523	27.39	14.38	Vertical
130°	0.562	31.62	15.00	Horizontal	310°	0.511	26.16	14.18	Vertical
135°	0.562	31.62	15.00	Horizontal	315°	0.519	26.92	14.30	Horizontal
140°	0.589	34.67	15.40	Horizontal	320°	0.543	29.51	14.70	Horizontal
145°	0.624	38.90	15.90	Horizontal	325°	0.569	32.36	15.10	Horizontal
150°	0.661	43.65	16.40	Horizontal	330°	0.617	38.02	15.80	Horizontal
155°	0.700	48.98	16.90	Horizontal	335°	0.668	44.67	16.50	Horizontal
160°	0.759	57.54	17.60	Horizontal	340°	0.733	53.70	17.30	Horizontal
165°	0.813	66.07	18.20	Horizontal	345°	0.785	61.66	17.90	Horizontal
170°	0.871	75.86	18.80	Horizontal	350°	0.841	70.79	18.50	Horizontal
175°	0.912	83.18	19.20	Horizontal	355°	0.902	81.28	19.10	Horizontal

**Polarization:**  
**Maximum Field:**  
**Minimum Field:**  
**RMS:**  
**Maximum ERP:**  
**Maximum Power Gain:**  
**Horizontal Plane Gain:**

**Envelope**  
**1.000 @ 7° True**  
**0.507 @ 311° True**  
**0.730**  
**100.000 kW**  
**7.256 (8.607 dB)**  
**7.152 (8.544 dB)**

**System Beam Tilt: -0.602°**  
**System First Null Fill %: 10**  
**Polarization: Left hand Circular**

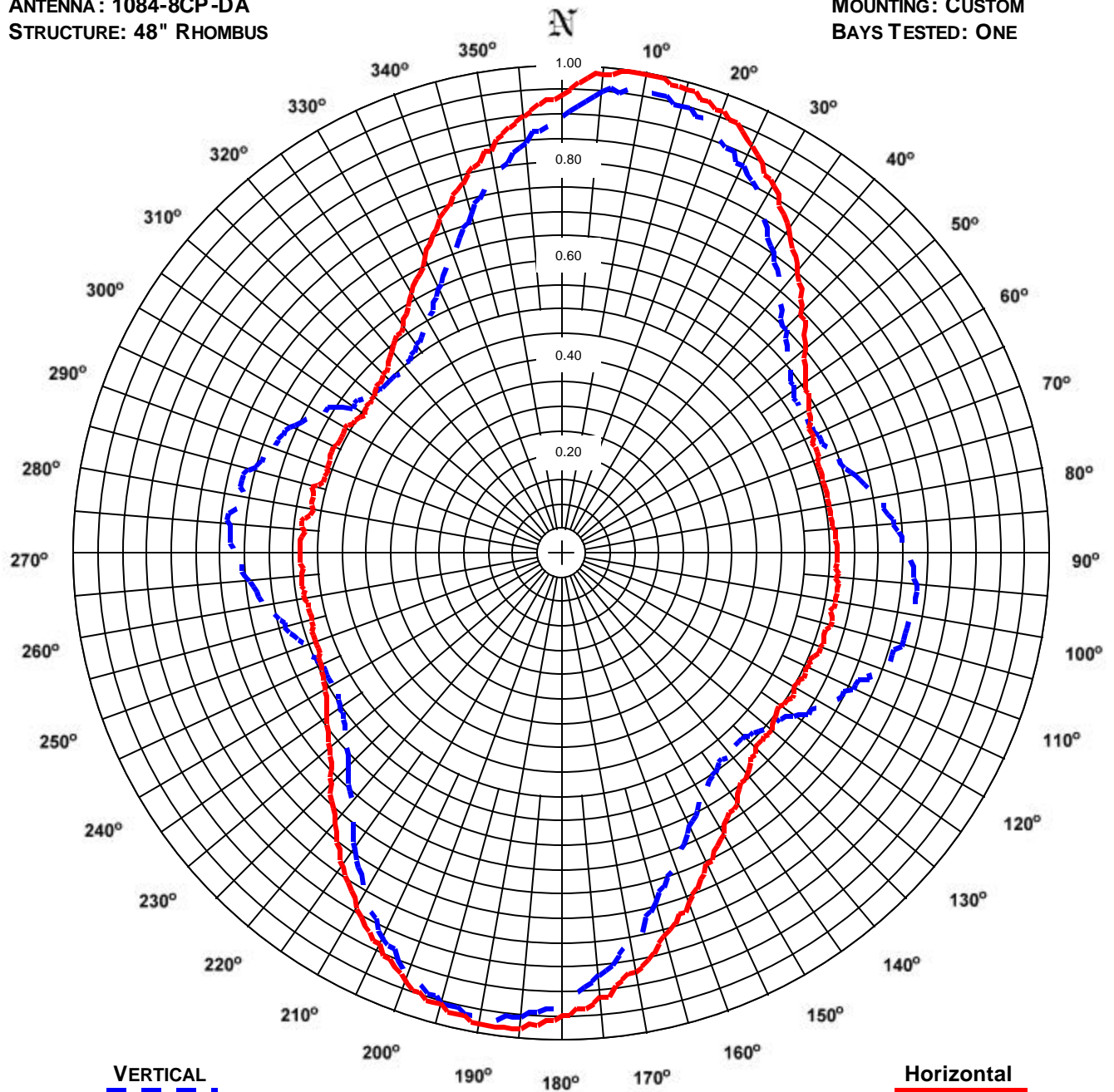
**Total Input Power: 13.781 kW**

# **ERI**® *Horizontal Plane Relative Field Pattern*

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FIGURE NO: 2  
STATION: WPYM  
LOCATION: MIAMI, FL.  
ANTENNA: 1084-8CP-DA  
STRUCTURE: 48" RHOMBUS

DATE: 07/28/2003  
FREQUENCY: 93.1 MHz  
ORIENTATION: 10° TRUE  
MOUNTING: CUSTOM  
BAYS TESTED: ONE



**VERTICAL**  
RMS: 0.701  
MAXIMUM : 0.963 @ 6° TRUE  
MINIMUM : 0.500 @ 313° TRUE

**Horizontal**  
RMS: 0.701  
Maximum: 1.000 @ 7° True  
Minimum: 0.495 @ 305° True

COMMENTS: MEASURED PATTERNS OF THE HORIZONTAL AND VERTICAL COMPONENTS. LEFT HAND CIRCULAR POLARIZED.

# ERI<sup>®</sup> 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: WPYM**  
**Location: Miami, FL.**  
**Frequency: 93.1 MHz**

**Antenna: 1084-8CP-DA**  
**Orientation: 10° True**  
**Tower: 48" Rhombus**

**Figure: 2**  
**Date: 07/28/2003**  
**Reference: wpym1r.fig**

Angle	Horizontal			Vertical			Angle	Horizontal			Vertical		
	Field	kW	dBk	Field	kW	dBk		Field	kW	dBk	Field	kW	dBk
0°	0.944	89.13	19.50	0.899	80.84	19.08	180°	0.944	89.13	19.50	0.920	84.65	19.28
5°	0.989	97.72	19.90	0.952	90.71	19.58	185°	0.977	95.50	19.80	0.952	90.71	19.58
10°	1.000	100.00	20.00	0.963	92.82	19.68	190°	0.977	95.50	19.80	0.963	92.82	19.68
15°	0.989	97.72	19.90	0.952	90.71	19.58	195°	0.955	91.20	19.60	0.952	90.71	19.58
20°	0.966	93.33	19.70	0.920	84.65	19.28	200°	0.933	87.10	19.40	0.920	84.65	19.28
25°	0.923	85.11	19.30	0.879	77.20	18.88	205°	0.881	77.62	18.90	0.869	75.45	18.78
30°	0.871	75.86	18.80	0.820	67.24	18.28	210°	0.841	70.79	18.50	0.801	64.22	18.08
35°	0.813	66.07	18.20	0.757	57.23	17.58	215°	0.785	61.66	17.90	0.739	54.66	17.38
40°	0.750	56.23	17.50	0.698	48.71	16.88	220°	0.724	52.48	17.20	0.674	45.46	16.58
45°	0.692	47.86	16.80	0.651	42.43	16.28	225°	0.668	44.67	16.50	0.622	38.69	15.88
50°	0.653	42.66	16.30	0.608	36.95	15.68	230°	0.624	38.90	15.90	0.581	33.70	15.28
55°	0.610	37.15	15.70	0.581	33.70	15.28	235°	0.589	34.67	15.40	0.554	30.74	14.88
60°	0.582	33.88	15.30	0.574	32.93	15.18	240°	0.562	31.62	15.00	0.542	29.35	14.68
65°	0.569	32.36	15.10	0.581	33.70	15.28	245°	0.543	29.51	14.70	0.542	29.35	14.68
70°	0.556	30.90	14.90	0.594	35.29	15.48	250°	0.537	28.84	14.60	0.561	31.45	14.98
75°	0.556	30.90	14.90	0.622	38.69	15.88	255°	0.531	28.18	14.50	0.587	34.49	15.38
80°	0.556	30.90	14.90	0.651	42.43	16.28	260°	0.537	28.84	14.60	0.615	37.81	15.78
85°	0.562	31.62	15.00	0.682	46.52	16.68	265°	0.537	28.84	14.60	0.644	41.46	16.18
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95°	0.562	31.62	15.00	0.731	53.41	17.28	275°	0.531	28.18	14.50	0.682	46.52	16.68
100°	0.569	32.36	15.10	0.731	53.41	17.28	280°	0.519	26.92	14.30	0.667	44.43	16.48
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110°	0.562	31.62	15.00	0.690	47.60	16.78	290°	0.513	26.30	14.20	0.629	39.60	15.98
115°	0.550	30.20	14.80	0.659	43.42	16.38	295°	0.519	26.92	14.30	0.615	37.81	15.78
120°	0.550	30.20	14.80	0.615	37.81	15.78	300°	0.513	26.30	14.20	0.581	33.70	15.28
125°	0.543	29.51	14.70	0.581	33.70	15.28	305°	0.495	24.55	13.90	0.523	27.39	14.38
130°	0.562	31.62	15.00	0.548	30.04	14.78	310°	0.501	25.12	14.00	0.511	26.16	14.18
135°	0.562	31.62	15.00	0.529	28.03	14.48	315°	0.519	26.92	14.30	0.500	24.98	13.98
140°	0.589	34.67	15.40	0.529	28.03	14.48	320°	0.543	29.51	14.70	0.500	24.98	13.98
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150°	0.661	43.65	16.40	0.574	32.93	15.18	330°	0.617	38.02	15.80	0.554	30.74	14.88
155°	0.700	48.98	16.90	0.615	37.81	15.78	335°	0.668	44.67	16.50	0.601	36.11	15.58
160°	0.759	57.54	17.60	0.682	46.52	16.68	340°	0.733	53.70	17.30	0.667	44.43	16.48
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175°	0.912	83.18	19.20	0.869	75.45	18.78	355°	0.902	81.28	19.10	0.849	72.05	18.58

**Polarization:**

**Maximum Field:**

**Minimum Field:**

**RMS:**

**Maximum ERP:**

**Maximum Power Gain:**

**Horizontal Plane Gain:**

**Horizontal**

**1.000 @ 7° True**

**0.495 @ 305° True**

**0.701**

**100.000 kW**

**7.256 (8.607 dB)**

**7.152 (8.544 dB)**

**Vertical**

**0.963 @ 6° True**

**0.500 @ 313° True**

**0.701**

**92.820 kW**

**7.256 (8.607 dB)**

**7.152 (8.544 dB)**

**System Beam Tilt: -0.602°**

**System First Null Fill %: 10**

**Polarization: Left hand**

**Circular**

**Total Input Power: 13.781 kW**



ELECTRONICS RESEARCH, INC.  
7777 GARDNER ROAD  
CHANDLER, IN. 47610

FIGURE 1

----THEORETICAL----  
VERTICAL PLANE RELATIVE FIELD  
8 LEVELS OF TYPE 1080 ELEMENTS  
-.60 DEGREE(S) BEAM TILT  
10 PERCENT FIRST NULL FILL  
0 PERCENT SECOND NULL FILL

FEBRUARY 27, 2003

93.1 MHz.

BAY SPACING:  
100.00 INCHES

