

## ***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*

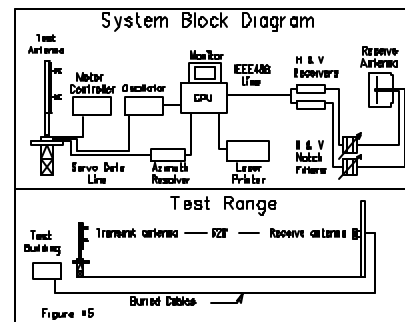
(Continued)

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.

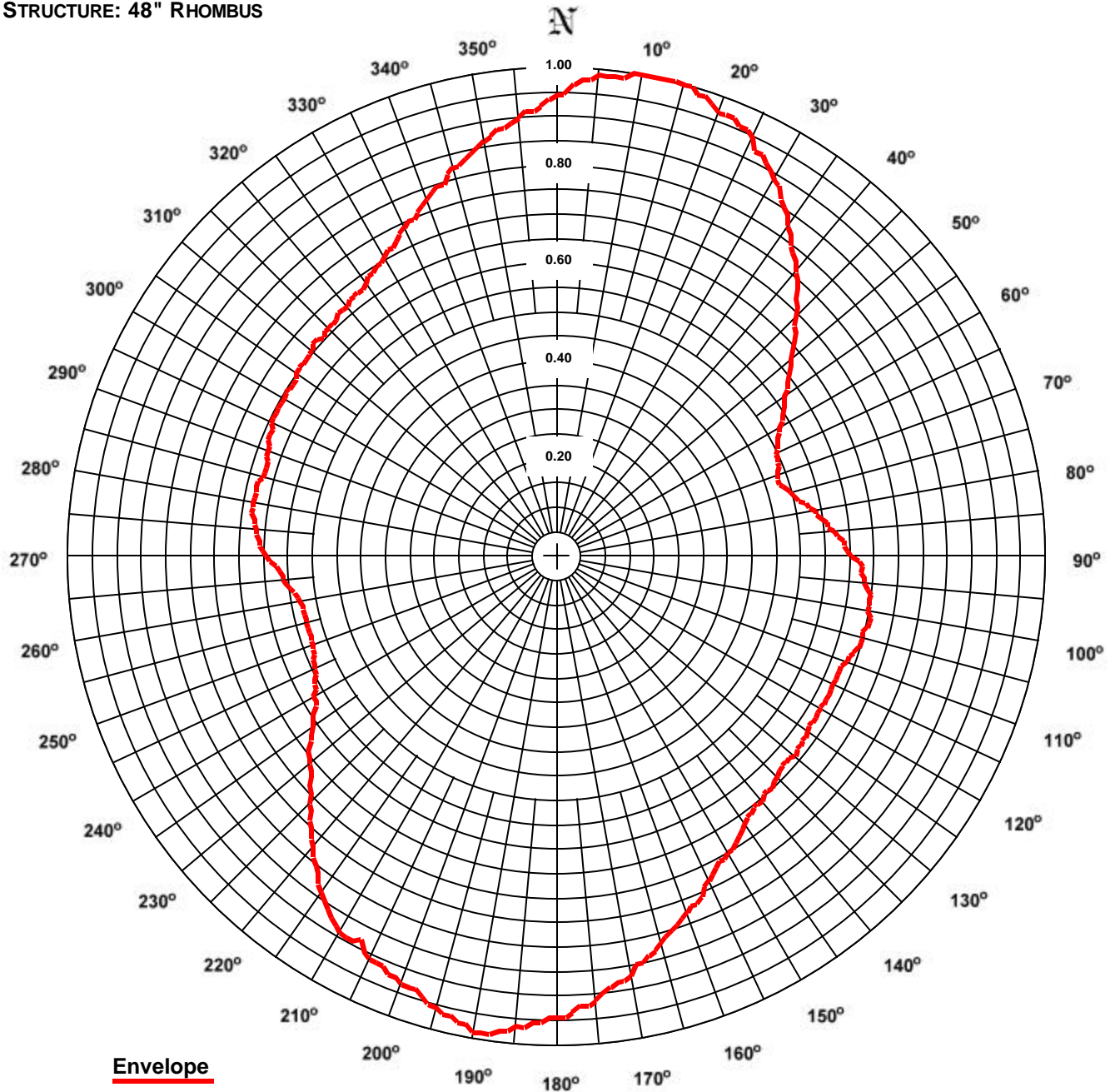


# **ERI**® *Horizontal Plane Relative Field Pattern*

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

FIGURE: 1  
STATION: WHQT  
LOCATION: CORAL GABLES, FL.  
ANTENNA TYPE: 1084-8CP-DA  
STRUCTURE: 48" RHOMBUS

DATE: 07/28/2003  
FREQUENCY: 105.1 MHz  
ORIENTATION: 10° TRUE  
MOUNTING: CUSTOM



RMS: 0.733  
Maximum: 1.000 @ 9° True  
Minimum: 0.479 @ 70° True

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

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

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**Station: WHQT**  
**Location: Coral Gables, FL.**  
**Frequency: 105.1 MHz**

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

**Figure: 1**  
**Date: 07/28/2003**  
**Reference: whqt1r.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°	0.966	93.33	19.70	Horizontal
10°	1.000	100.00	20.00	Horizontal	190°	0.989	97.72	19.90	Horizontal
15°	1.000	100.00	20.00	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°	0.944	89.13	19.50	Horizontal	205°	0.912	83.18	19.20	Horizontal
30°	0.891	79.43	19.00	Horizontal	210°	0.891	79.43	19.00	Horizontal
35°	0.822	67.61	18.30	Horizontal	215°	0.841	70.79	18.50	Horizontal
40°	0.759	57.54	17.60	Horizontal	220°	0.776	60.26	17.80	Horizontal
45°	0.692	47.86	16.80	Horizontal	225°	0.716	51.29	17.10	Horizontal
50°	0.624	38.90	15.90	Horizontal	230°	0.661	43.65	16.40	Horizontal
55°	0.569	32.36	15.10	Horizontal	235°	0.610	37.15	15.70	Horizontal
60°	0.525	27.54	14.40	Horizontal	240°	0.575	33.11	15.20	Horizontal
65°	0.495	24.55	13.90	Horizontal	245°	0.550	30.20	14.80	Horizontal
70°	0.479	22.91	13.60	Horizontal	250°	0.531	28.18	14.50	Horizontal
75°	0.495	24.55	13.90	Vertical	255°	0.531	28.18	14.50	Horizontal
80°	0.537	28.84	14.60	Vertical	260°	0.537	28.84	14.60	Horizontal
85°	0.569	32.36	15.10	Vertical	265°	0.562	31.62	15.00	Vertical
90°	0.603	36.31	15.60	Vertical	270°	0.596	35.48	15.50	Vertical
95°	0.631	39.81	16.00	Vertical	275°	0.617	38.02	15.80	Vertical
100°	0.646	41.69	16.20	Vertical	280°	0.631	39.81	16.00	Vertical
105°	0.646	41.69	16.20	Vertical	285°	0.624	38.90	15.90	Vertical
110°	0.631	39.81	16.00	Vertical	290°	0.631	39.81	16.00	Horizontal
115°	0.624	38.90	15.90	Horizontal	295°	0.646	41.69	16.20	Horizontal
120°	0.624	38.90	15.90	Horizontal	300°	0.646	41.69	16.20	Horizontal
125°	0.624	38.90	15.90	Horizontal	305°	0.653	42.66	16.30	Horizontal
130°	0.638	40.74	16.10	Horizontal	310°	0.653	42.66	16.30	Horizontal
135°	0.638	40.74	16.10	Horizontal	315°	0.661	43.65	16.40	Horizontal
140°	0.653	42.66	16.30	Horizontal	320°	0.668	44.67	16.50	Horizontal
145°	0.668	44.67	16.50	Horizontal	325°	0.684	46.77	16.70	Horizontal
150°	0.700	48.98	16.90	Horizontal	330°	0.708	50.12	17.00	Horizontal
155°	0.733	53.70	17.30	Horizontal	335°	0.741	54.95	17.40	Horizontal
160°	0.776	60.26	17.80	Horizontal	340°	0.776	60.26	17.80	Horizontal
165°	0.822	67.61	18.30	Horizontal	345°	0.822	67.61	18.30	Horizontal
170°	0.871	75.86	18.80	Horizontal	350°	0.861	74.13	18.70	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 @ 9° True**  
**0.479 @ 70° True**  
**0.733**  
**100.000 kW**  
**8.108 (9.089 dB)**  
**7.960 (9.009 dB)**

**System Beam Tilt: -0.603 d°**  
**System First Null Fill %: 11**  
**Polarization: Right hand Circular**

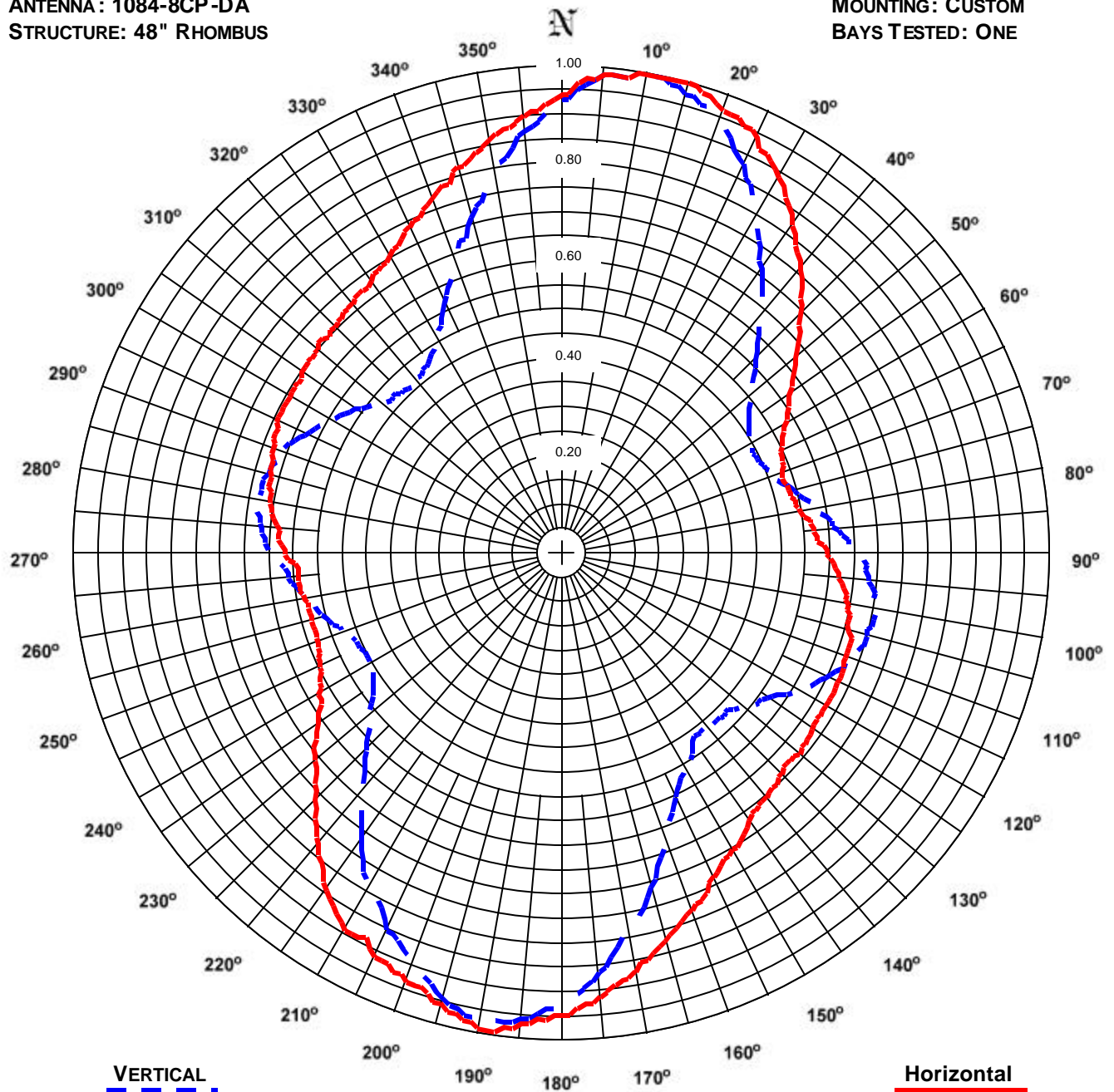
**Total Input Power: 12.333 kW**

# ERI<sup>®</sup> 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: WHQT  
LOCATION: CORAL GABLES, FL.  
ANTENNA: 1084-8CP-DA  
STRUCTURE: 48" RHOMBUS

DATE: 07/28/2003  
FREQUENCY: 105.1 MHz  
ORIENTATION: 10° TRUE  
MOUNTING: CUSTOM  
BAYS TESTED: ONE



VERTICAL

RMS: 0.661  
MAXIMUM: 1.000 @ 9° TRUE  
MINIMUM: 0.442 @ 62° TRUE

Horizontal

RMS: 0.729  
Maximum: 1.000 @ 9° True  
Minimum: 0.479 @ 70° True

COMMENTS: MEASURED PATTERNS OF THE HORIZONTAL AND VERTICAL COMPONENTS. RIGHT 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: WHQT**  
**Location: Coral Gables, FL.**  
**Frequency: 105.1 MHz**

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

**Figure: 2**  
**Date: 07/28/2003**  
**Reference: whqt1r.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	0.933	87.10	19.40	180°	0.944	89.13	19.50	0.923	85.11	19.30
5°	0.989	97.72	19.90	0.989	97.72	19.90	185°	0.966	93.33	19.70	0.955	91.20	19.60
10°	1.000	100.00	20.00	1.000	100.00	20.00	190°	0.989	97.72	19.90	0.977	95.50	19.80
15°	1.000	100.00	20.00	0.977	95.50	19.80	195°	0.955	91.20	19.60	0.944	89.13	19.50
20°	0.966	93.33	19.70	0.944	89.13	19.50	200°	0.933	87.10	19.40	0.891	79.43	19.00
25°	0.944	89.13	19.50	0.881	77.62	18.90	205°	0.912	83.18	19.20	0.851	72.44	18.60
30°	0.891	79.43	19.00	0.794	63.10	18.00	210°	0.891	79.43	19.00	0.794	63.10	18.00
35°	0.822	67.61	18.30	0.716	51.29	17.10	215°	0.841	70.79	18.50	0.716	51.29	17.10
40°	0.759	57.54	17.60	0.638	40.74	16.10	220°	0.776	60.26	17.80	0.638	40.74	16.10
45°	0.692	47.86	16.80	0.562	31.62	15.00	225°	0.716	51.29	17.10	0.569	32.36	15.10
50°	0.624	38.90	15.90	0.507	25.70	14.10	230°	0.661	43.65	16.40	0.513	26.30	14.20
55°	0.569	32.36	15.10	0.468	21.88	13.40	235°	0.610	37.15	15.70	0.473	22.39	13.50
60°	0.525	27.54	14.40	0.447	19.95	13.00	240°	0.575	33.11	15.20	0.452	20.42	13.10
65°	0.495	24.55	13.90	0.447	19.95	13.00	245°	0.550	30.20	14.80	0.457	20.89	13.20
70°	0.479	22.91	13.60	0.462	21.38	13.30	250°	0.531	28.18	14.50	0.473	22.39	13.50
75°	0.484	23.44	13.70	0.495	24.55	13.90	255°	0.531	28.18	14.50	0.501	25.12	14.00
80°	0.495	24.55	13.90	0.537	28.84	14.60	260°	0.537	28.84	14.60	0.531	28.18	14.50
85°	0.519	26.92	14.30	0.569	32.36	15.10	265°	0.543	29.51	14.70	0.562	31.62	15.00
90°	0.543	29.51	14.70	0.603	36.31	15.60	270°	0.569	32.36	15.10	0.596	35.48	15.50
95°	0.569	32.36	15.10	0.631	39.81	16.00	275°	0.582	33.88	15.30	0.617	38.02	15.80
100°	0.596	35.48	15.50	0.646	41.69	16.20	280°	0.610	37.15	15.70	0.631	39.81	16.00
105°	0.610	37.15	15.70	0.646	41.69	16.20	285°	0.617	38.02	15.80	0.624	38.90	15.90
110°	0.617	38.02	15.80	0.631	39.81	16.00	290°	0.631	39.81	16.00	0.610	37.15	15.70
115°	0.624	38.90	15.90	0.596	35.48	15.50	295°	0.646	41.69	16.20	0.582	33.88	15.30
120°	0.624	38.90	15.90	0.562	31.62	15.00	300°	0.646	41.69	16.20	0.550	30.20	14.80
125°	0.624	38.90	15.90	0.513	26.30	14.20	305°	0.653	42.66	16.30	0.519	26.92	14.30
130°	0.638	40.74	16.10	0.490	23.99	13.80	310°	0.653	42.66	16.30	0.490	23.99	13.80
135°	0.638	40.74	16.10	0.468	21.88	13.40	315°	0.661	43.65	16.40	0.468	21.88	13.40
140°	0.653	42.66	16.30	0.462	21.38	13.30	320°	0.668	44.67	16.50	0.468	21.88	13.40
145°	0.668	44.67	16.50	0.468	21.88	13.40	325°	0.684	46.77	16.70	0.479	22.91	13.60
150°	0.700	48.98	16.90	0.507	25.70	14.10	330°	0.708	50.12	17.00	0.513	26.30	14.20
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160°	0.776	60.26	17.80	0.624	38.90	15.90	340°	0.776	60.26	17.80	0.638	40.74	16.10
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170°	0.871	75.86	18.80	0.785	61.66	17.90	350°	0.861	74.13	18.70	0.794	63.10	18.00
175°	0.912	83.18	19.20	0.861	74.13	18.70	355°	0.902	81.28	19.10	0.871	75.86	18.80

**Polarization:** Horizontal  
**Maximum Field:** 1.000 @ 9° True  
**Minimum Field:** 0.479 @ 70° True  
**RMS:** 0.729  
**Maximum ERP:** 100.000 kW  
**Maximum Power Gain:** 8.108 (9.089 dB)  
**Horizontal Plane Gain:** 7.960 (9.009 dB)

**Vertical**  
**1.000 @ 9° True**  
**0.442 @ 62° True**  
**0.661**  
**100.000 kW**  
**8.108 (9.089 dB)**  
**7.960 (9.009 dB)**

**System Beam Tilt: -0.603°**  
**System First Null Fill %: 11**  
**Polarization: Right hand**  
**Circular**

**Total Input Power: 12.333 kW**



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

FIGURE 9

----THEORETICAL----  
VERTICAL PLANE RELATIVE FIELD

8 LEVELS OF TYPE 1080 ELEMENTS  
-.60 DEGREE(S) BEAM TILT  
11 PERCENT FIRST NULL FILL  
0 PERCENT SECOND NULL FILL

FEBRUARY 27, 2003

105.1 MHz.

BAY SPACING:  
100.00 INCHES

