

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

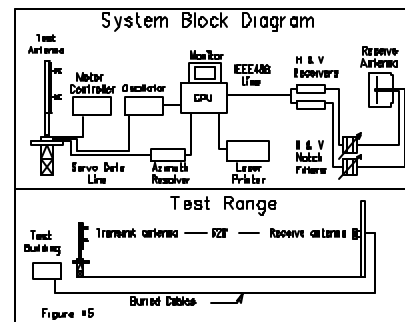
(Continued)

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: WPOW

LOCATION: MIAMI, FL.

ANTENNA TYPE: 1084-8CP-DA

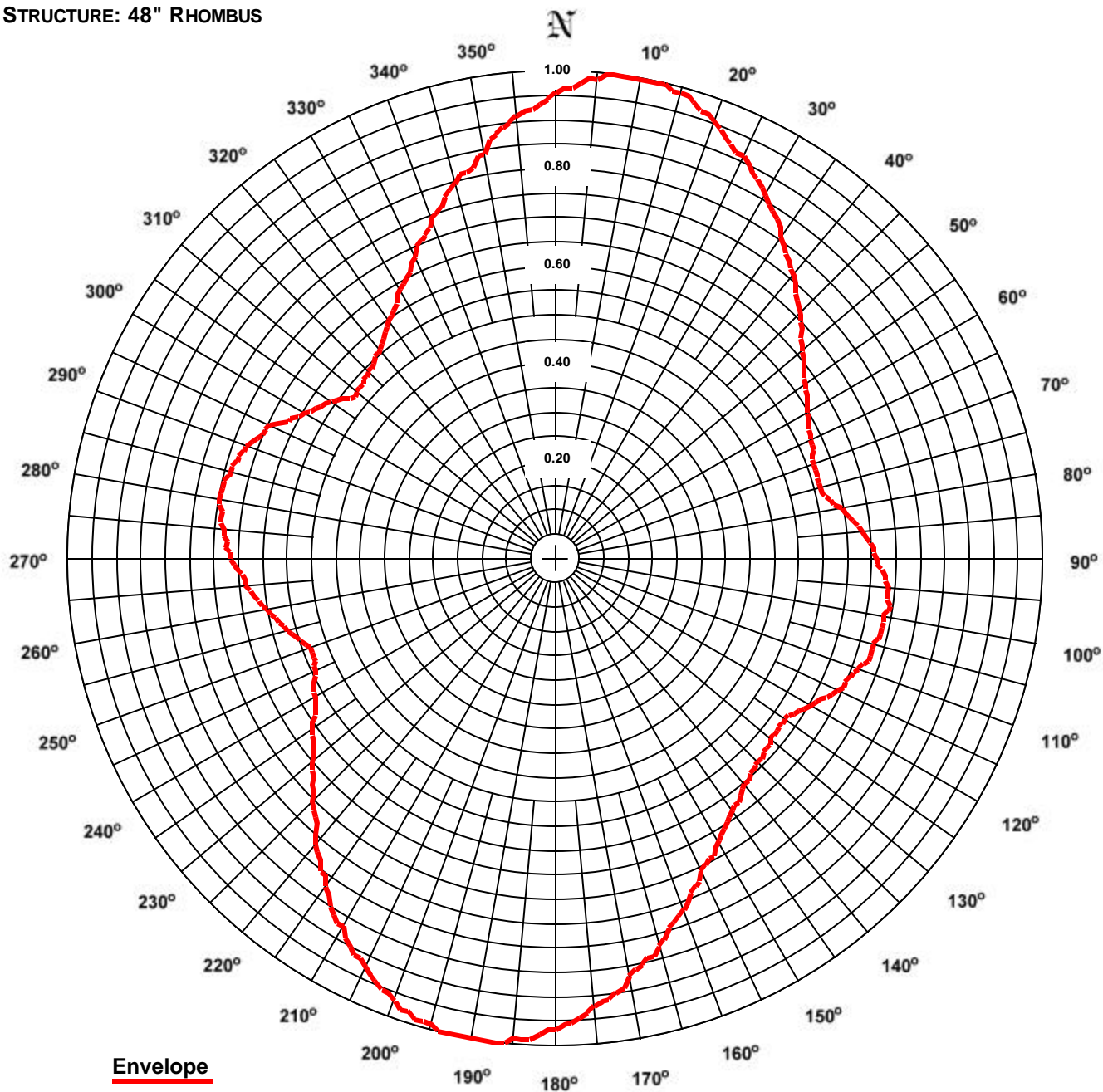
STRUCTURE: 48" RHOMBUS

DATE: 07/28/2003

FREQUENCY: 96.5 MHz

ORIENTATION: 10° TRUE

MOUNTING: CUSTOM



RMS: 0.735

Maximum: 1.000 @ 6° True

Minimum: 0.531 @ 309° True

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

ERI[®] *Horizontal Plane Relative Field List*

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Station: WPOW
Location: Miami, FL.
Frequency: 96.5 MHz

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

Figure: 1
Date: 07/28/2003
Reference: wpow1r.fig

Angle	Envelope			Polarization	Angle	Envelope			Polarization
	Field	kW	dBk			Field	kW	dBk	
0°	0.955	91.20	19.60	Horizontal	180°	0.966	93.33	19.70	Horizontal
5°	0.989	97.72	19.90	Vertical	185°	0.989	97.72	19.90	Horizontal
10°	1.000	100.00	20.00	Vertical	190°	1.000	100.00	20.00	Horizontal
15°	0.989	97.72	19.90	Vertical	195°	0.989	97.72	19.90	Horizontal
20°	0.955	91.20	19.60	Vertical	200°	0.966	93.33	19.70	Horizontal
25°	0.912	83.18	19.20	Horizontal	205°	0.923	85.11	19.30	Horizontal
30°	0.861	74.13	18.70	Horizontal	210°	0.871	75.86	18.80	Horizontal
35°	0.804	64.57	18.10	Horizontal	215°	0.822	67.61	18.30	Horizontal
40°	0.759	57.54	17.60	Horizontal	220°	0.767	58.88	17.70	Horizontal
45°	0.708	50.12	17.00	Horizontal	225°	0.708	50.12	17.00	Horizontal
50°	0.661	43.65	16.40	Horizontal	230°	0.653	42.66	16.30	Horizontal
55°	0.624	38.90	15.90	Horizontal	235°	0.610	37.15	15.70	Horizontal
60°	0.596	35.48	15.50	Horizontal	240°	0.569	32.36	15.10	Horizontal
65°	0.575	33.11	15.20	Horizontal	245°	0.543	29.51	14.70	Horizontal
70°	0.562	31.62	15.00	Horizontal	250°	0.537	28.84	14.60	Vertical
75°	0.562	31.62	15.00	Horizontal	255°	0.569	32.36	15.10	Vertical
80°	0.596	35.48	15.50	Vertical	260°	0.603	36.31	15.60	Vertical
85°	0.631	39.81	16.00	Vertical	265°	0.638	40.74	16.10	Vertical
90°	0.661	43.65	16.40	Vertical	270°	0.668	44.67	16.50	Vertical
95°	0.684	46.77	16.70	Vertical	275°	0.684	46.77	16.70	Vertical
100°	0.684	46.77	16.70	Vertical	280°	0.700	48.98	16.90	Vertical
105°	0.676	45.71	16.60	Vertical	285°	0.692	47.86	16.80	Vertical
110°	0.661	43.65	16.40	Vertical	290°	0.676	45.71	16.60	Vertical
115°	0.638	40.74	16.10	Vertical	295°	0.646	41.69	16.20	Vertical
120°	0.603	36.31	15.60	Vertical	300°	0.596	35.48	15.50	Vertical
125°	0.575	33.11	15.20	Horizontal	305°	0.562	31.62	15.00	Vertical
130°	0.575	33.11	15.20	Horizontal	310°	0.531	28.18	14.50	Horizontal
135°	0.589	34.67	15.40	Horizontal	315°	0.543	29.51	14.70	Horizontal
140°	0.603	36.31	15.60	Horizontal	320°	0.562	31.62	15.00	Horizontal
145°	0.631	39.81	16.00	Horizontal	325°	0.596	35.48	15.50	Horizontal
150°	0.668	44.67	16.50	Horizontal	330°	0.638	40.74	16.10	Horizontal
155°	0.708	50.12	17.00	Horizontal	335°	0.684	46.77	16.70	Horizontal
160°	0.767	58.88	17.70	Horizontal	340°	0.741	54.95	17.40	Horizontal
165°	0.822	67.61	18.30	Horizontal	345°	0.794	63.10	18.00	Horizontal
170°	0.871	75.86	18.80	Horizontal	350°	0.841	70.79	18.50	Horizontal
175°	0.923	85.11	19.30	Horizontal	355°	0.912	83.18	19.20	Horizontal

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

Envelope
1.000 @ 6° True
0.531 @ 309° True
0.735
100.000 kW
7.381 (8.681 dB)
7.268 (8.614 dB)

System Beam Tilt: -0.602 deg
System First Null Fill %: 10
Polarization: Right hand Circular

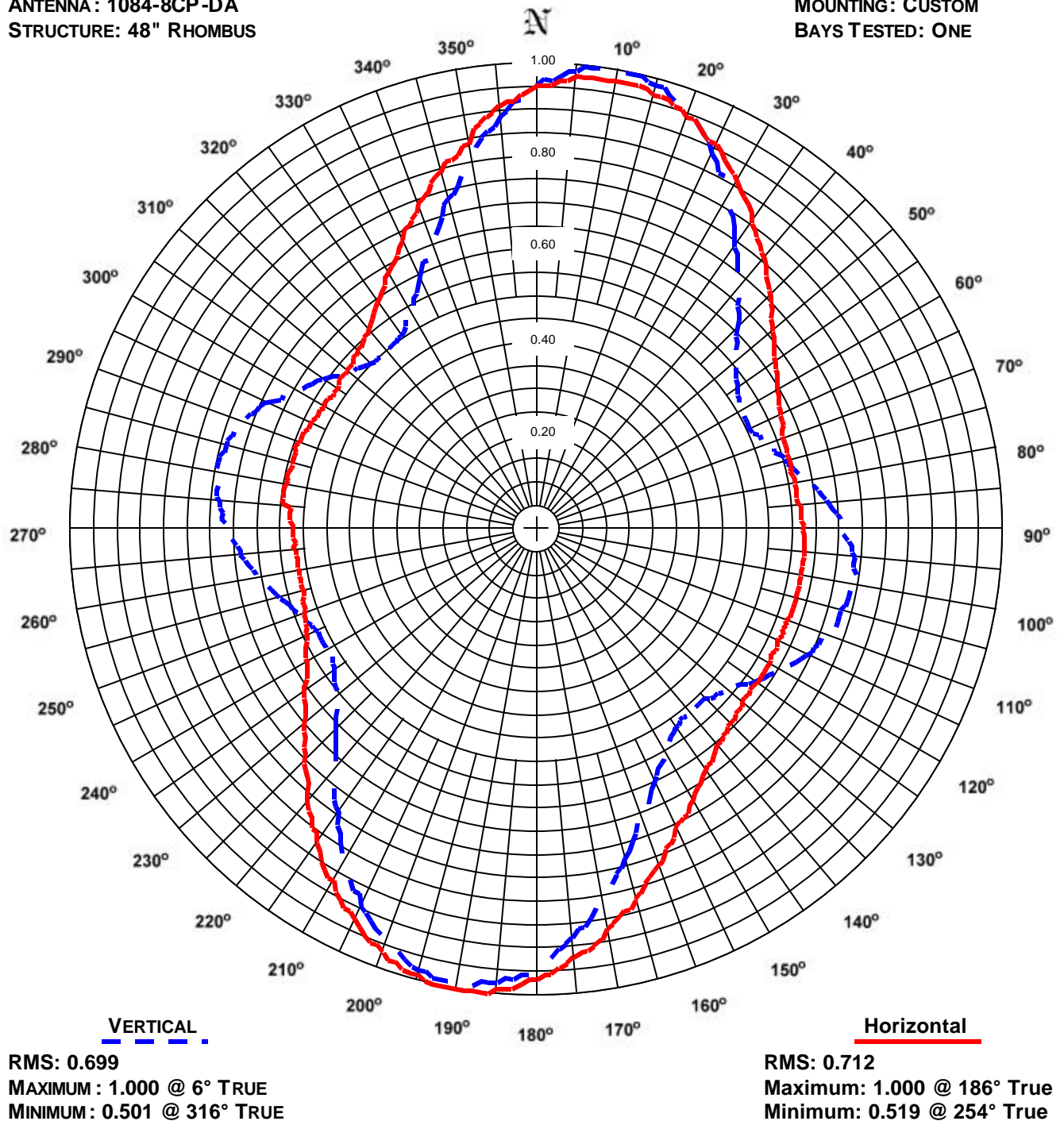
Total Input Power: 13.549kW

ERI[®] Horizontal Plane Relative Field Pattern

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

DATE: 07/28/2003
FREQUENCY: 96.5 MHz
ORIENTATION: 10° TRUE
MOUNTING: CUSTOM
BAYS TESTED: ONE



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

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: WPOW
Location: Miami, FL.
Frequency: 96.5 MHz

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

Figure: 2
Date: 07/28/2003
Reference: wpow1r.fig

Angle	Horizontal			Vertical			Angle	Horizontal			Vertical		
	Field	kW	dBk	Field	kW	dBk		Field	kW	dBk	Field	kW	dBk
0°	0.955	91.20	19.60	0.955	91.20	19.60	180°	0.966	93.33	19.70	0.933	87.10	19.40
5°	0.977	95.50	19.80	0.989	97.72	19.90	185°	0.989	97.72	19.90	0.977	95.50	19.80
10°	0.977	95.50	19.80	1.000	100.00	20.00	190°	1.000	100.00	20.00	0.989	97.72	19.90
15°	0.966	93.33	19.70	0.989	97.72	19.90	195°	0.989	97.72	19.90	0.977	95.50	19.80
20°	0.944	89.13	19.50	0.955	91.20	19.60	200°	0.966	93.33	19.70	0.944	89.13	19.50
25°	0.912	83.18	19.20	0.891	79.43	19.00	205°	0.923	85.11	19.30	0.891	79.43	19.00
30°	0.861	74.13	18.70	0.822	67.61	18.30	210°	0.871	75.86	18.80	0.822	67.61	18.30
35°	0.804	64.57	18.10	0.741	54.95	17.40	215°	0.822	67.61	18.30	0.741	54.95	17.40
40°	0.759	57.54	17.60	0.676	45.71	16.60	220°	0.767	58.88	17.70	0.676	45.71	16.60
45°	0.708	50.12	17.00	0.610	37.15	15.70	225°	0.708	50.12	17.00	0.610	37.15	15.70
50°	0.661	43.65	16.40	0.556	30.90	14.90	230°	0.653	42.66	16.30	0.562	31.62	15.00
55°	0.624	38.90	15.90	0.525	27.54	14.40	235°	0.610	37.15	15.70	0.531	28.18	14.50
60°	0.596	35.48	15.50	0.513	26.30	14.20	240°	0.569	32.36	15.10	0.519	26.92	14.30
65°	0.575	33.11	15.20	0.507	25.70	14.10	245°	0.543	29.51	14.70	0.519	26.92	14.30
70°	0.562	31.62	15.00	0.531	28.18	14.50	250°	0.531	28.18	14.50	0.537	28.84	14.60
75°	0.562	31.62	15.00	0.556	30.90	14.90	255°	0.519	26.92	14.30	0.569	32.36	15.10
80°	0.562	31.62	15.00	0.596	35.48	15.50	260°	0.519	26.92	14.30	0.603	36.31	15.60
85°	0.569	32.36	15.10	0.631	39.81	16.00	265°	0.519	26.92	14.30	0.638	40.74	16.10
90°	0.569	32.36	15.10	0.661	43.65	16.40	270°	0.525	27.54	14.40	0.668	44.67	16.50
95°	0.575	33.11	15.20	0.684	46.77	16.70	275°	0.531	28.18	14.50	0.684	46.77	16.70
100°	0.575	33.11	15.20	0.684	46.77	16.70	280°	0.550	30.20	14.80	0.700	48.98	16.90
105°	0.575	33.11	15.20	0.676	45.71	16.60	285°	0.543	29.51	14.70	0.692	47.86	16.80
110°	0.569	32.36	15.10	0.661	43.65	16.40	290°	0.543	29.51	14.70	0.676	45.71	16.60
115°	0.569	32.36	15.10	0.638	40.74	16.10	295°	0.537	28.84	14.60	0.646	41.69	16.20
120°	0.575	33.11	15.20	0.603	36.31	15.60	300°	0.525	27.54	14.40	0.596	35.48	15.50
125°	0.575	33.11	15.20	0.569	32.36	15.10	305°	0.525	27.54	14.40	0.562	31.62	15.00
130°	0.575	33.11	15.20	0.537	28.84	14.60	310°	0.531	28.18	14.50	0.531	28.18	14.50
135°	0.589	34.67	15.40	0.513	26.30	14.20	315°	0.543	29.51	14.70	0.507	25.70	14.10
140°	0.603	36.31	15.60	0.507	25.70	14.10	320°	0.562	31.62	15.00	0.501	25.12	14.00
145°	0.631	39.81	16.00	0.519	26.92	14.30	325°	0.596	35.48	15.50	0.507	25.70	14.10
150°	0.668	44.67	16.50	0.550	30.20	14.80	330°	0.638	40.74	16.10	0.543	29.51	14.70
155°	0.708	50.12	17.00	0.596	35.48	15.50	335°	0.684	46.77	16.70	0.596	35.48	15.50
160°	0.767	58.88	17.70	0.661	43.65	16.40	340°	0.741	54.95	17.40	0.653	42.66	16.30
165°	0.822	67.61	18.30	0.733	53.70	17.30	345°	0.794	63.10	18.00	0.733	53.70	17.30
170°	0.871	75.86	18.80	0.813	66.07	18.20	350°	0.841	70.79	18.50	0.804	64.57	18.10
175°	0.923	85.11	19.30	0.881	77.62	18.90	355°	0.912	83.18	19.20	0.891	79.43	19.00

Polarization: Horizontal
Maximum Field: 1.000 @ 186° True
Minimum Field: 0.519 @ 254° True
RMS: 0.712
Maximum ERP: 100.000 kW
Maximum Power Gain: 7.381 (8.681 dB)
Horizontal Plane Gain: 7.268 (8.614 dB)

Vertical
1.000 @ 6° True
0.501 @ 316° True
0.699
100.000 kW
7.381 (8.681 dB)
7.268 (8.614 dB)

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

Total Input Power: 13.549kW

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

FIGURE 4

----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

96.5 MHz.

BAY SPACING:
100.00 INCHES

