

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

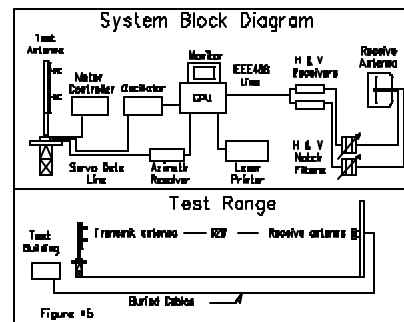
(Continued)

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: WAMR

LOCATION: MIAMI, FL.

ANTENNA TYPE: 1084-8CP-DA

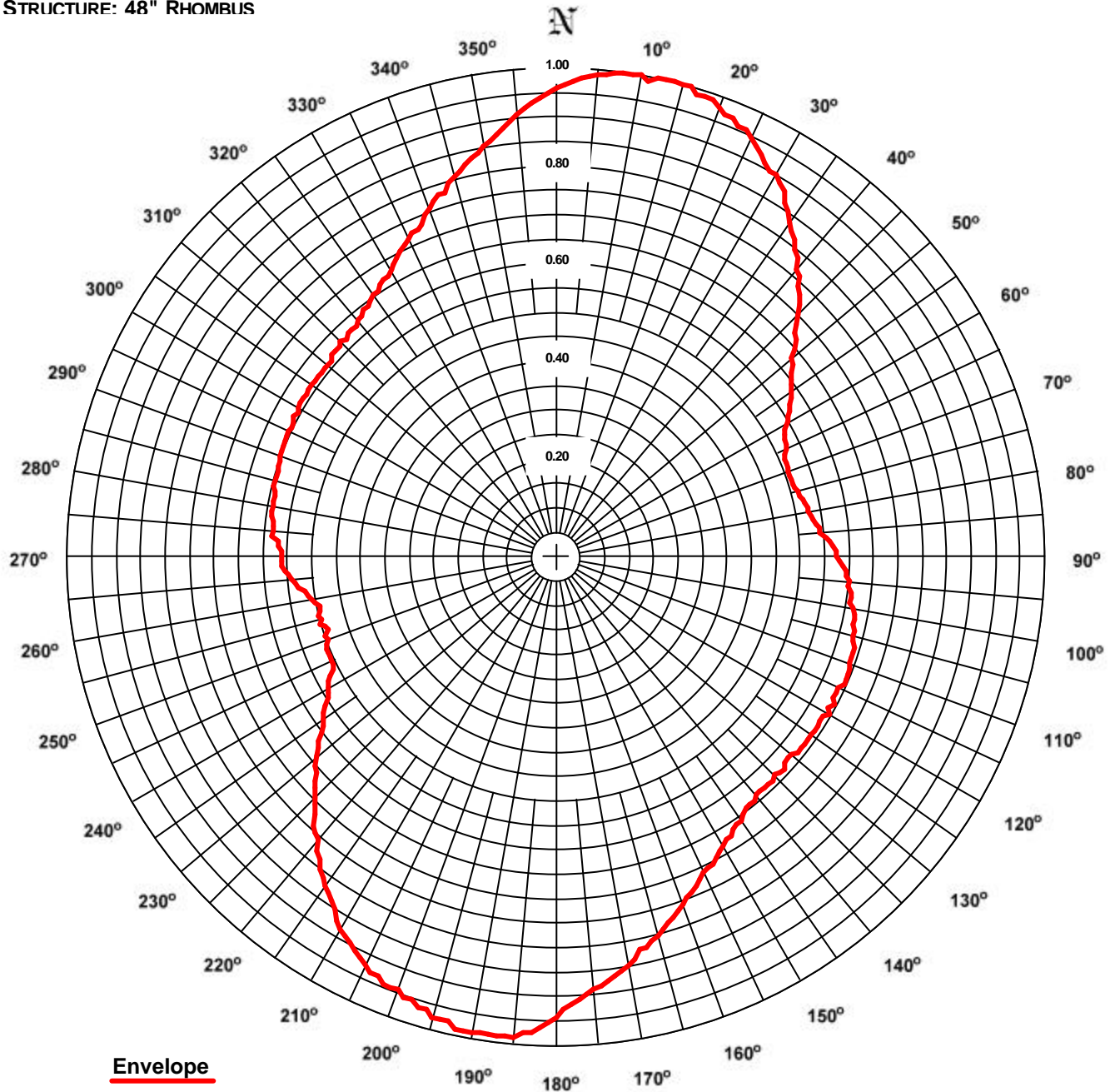
STRUCTURE: 48" RHOMBUS

DATE: 07/28/2003

FREQUENCY: 107.5 MHz

Orientation: 10° True

MOUNTING: CUSTOM



RMS: 0.724

Maximum: 1.000 @ 10° True

Minimum: 0.490 @ 252° True

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

ERI® *Horizontal Plane Relative Field List*

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Station: WAMR
Location: Miami, FL.
Frequency: 107.5 MHz

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

Figure: 1
Date: 07/28/2003
Reference: wamr1r.fig

Angle	Envelope			Polarization	Angle	Envelope			Polarization
	Field	kW	dBk			Field	kW	dBk	
0°	0.957	87.05	19.40	Horizontal	180°	0.944	84.67	19.28	Vertical
5°	0.988	92.80	19.68	Horizontal	185°	0.989	92.84	19.68	Vertical
10°	1.000	95.00	19.78	Horizontal	190°	0.989	92.84	19.68	Vertical
15°	1.000	95.00	19.78	Horizontal	195°	0.977	90.72	19.58	Horizontal
20°	0.977	90.72	19.58	Horizontal	200°	0.944	84.67	19.28	Horizontal
25°	0.944	84.67	19.28	Horizontal	205°	0.923	80.86	19.08	Horizontal
30°	0.902	77.22	18.88	Horizontal	210°	0.881	73.74	18.68	Horizontal
35°	0.832	65.72	18.18	Horizontal	215°	0.822	64.23	18.08	Horizontal
40°	0.767	55.94	17.48	Horizontal	220°	0.759	54.67	17.38	Horizontal
45°	0.700	46.53	16.68	Horizontal	225°	0.700	46.53	16.68	Horizontal
50°	0.631	37.82	15.78	Horizontal	230°	0.638	38.70	15.88	Horizontal
55°	0.589	32.94	15.18	Horizontal	235°	0.582	32.19	15.08	Horizontal
60°	0.550	28.69	14.58	Horizontal	240°	0.537	27.40	14.38	Horizontal
65°	0.519	25.57	14.08	Horizontal	245°	0.507	24.42	13.88	Horizontal
70°	0.507	24.42	13.88	Horizontal	250°	0.495	23.32	13.68	Horizontal
75°	0.513	24.99	13.98	Horizontal	255°	0.495	23.32	13.68	Horizontal
80°	0.525	26.17	14.18	Horizontal	260°	0.507	24.42	13.88	Vertical
85°	0.543	28.04	14.48	Horizontal	265°	0.543	28.04	14.48	Vertical
90°	0.575	31.46	14.98	Vertical	270°	0.562	30.04	14.78	Vertical
95°	0.603	34.49	15.38	Vertical	275°	0.582	32.19	15.08	Vertical
100°	0.617	36.12	15.58	Horizontal	280°	0.589	32.94	15.18	Vertical
105°	0.631	37.82	15.78	Horizontal	285°	0.596	33.71	15.28	Horizontal
110°	0.638	38.70	15.88	Horizontal	290°	0.603	34.49	15.38	Horizontal
115°	0.638	38.70	15.88	Horizontal	295°	0.603	34.49	15.38	Horizontal
120°	0.646	39.60	15.98	Horizontal	300°	0.610	35.30	15.48	Horizontal
125°	0.638	38.70	15.88	Horizontal	305°	0.610	35.30	15.48	Horizontal
130°	0.631	37.82	15.78	Horizontal	310°	0.610	35.30	15.48	Horizontal
135°	0.631	37.82	15.78	Horizontal	315°	0.624	36.96	15.68	Horizontal
140°	0.638	38.70	15.88	Horizontal	320°	0.631	37.82	15.78	Horizontal
145°	0.661	41.47	16.18	Horizontal	325°	0.653	40.53	16.08	Horizontal
150°	0.684	44.43	16.48	Horizontal	330°	0.676	43.42	16.38	Horizontal
155°	0.716	48.72	16.88	Horizontal	335°	0.716	48.72	16.88	Horizontal
160°	0.759	54.67	17.38	Horizontal	340°	0.759	54.67	17.38	Horizontal
165°	0.804	61.34	17.88	Horizontal	345°	0.804	61.34	17.88	Horizontal
170°	0.851	68.82	18.38	Horizontal	350°	0.851	68.82	18.38	Horizontal
175°	0.891	75.46	18.78	Horizontal	355°	0.907	78.10	18.93	Horizontal

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

Envelope
1.000 @ 10° True
0.490 @ 252° True
0.724
95.000 kW
8.504 (9.296 dB)
8.342 (9.213 dB)

System Beam Tilt: -0.604°
System First Null Fill %: 11
Polarization: Right hand Circular

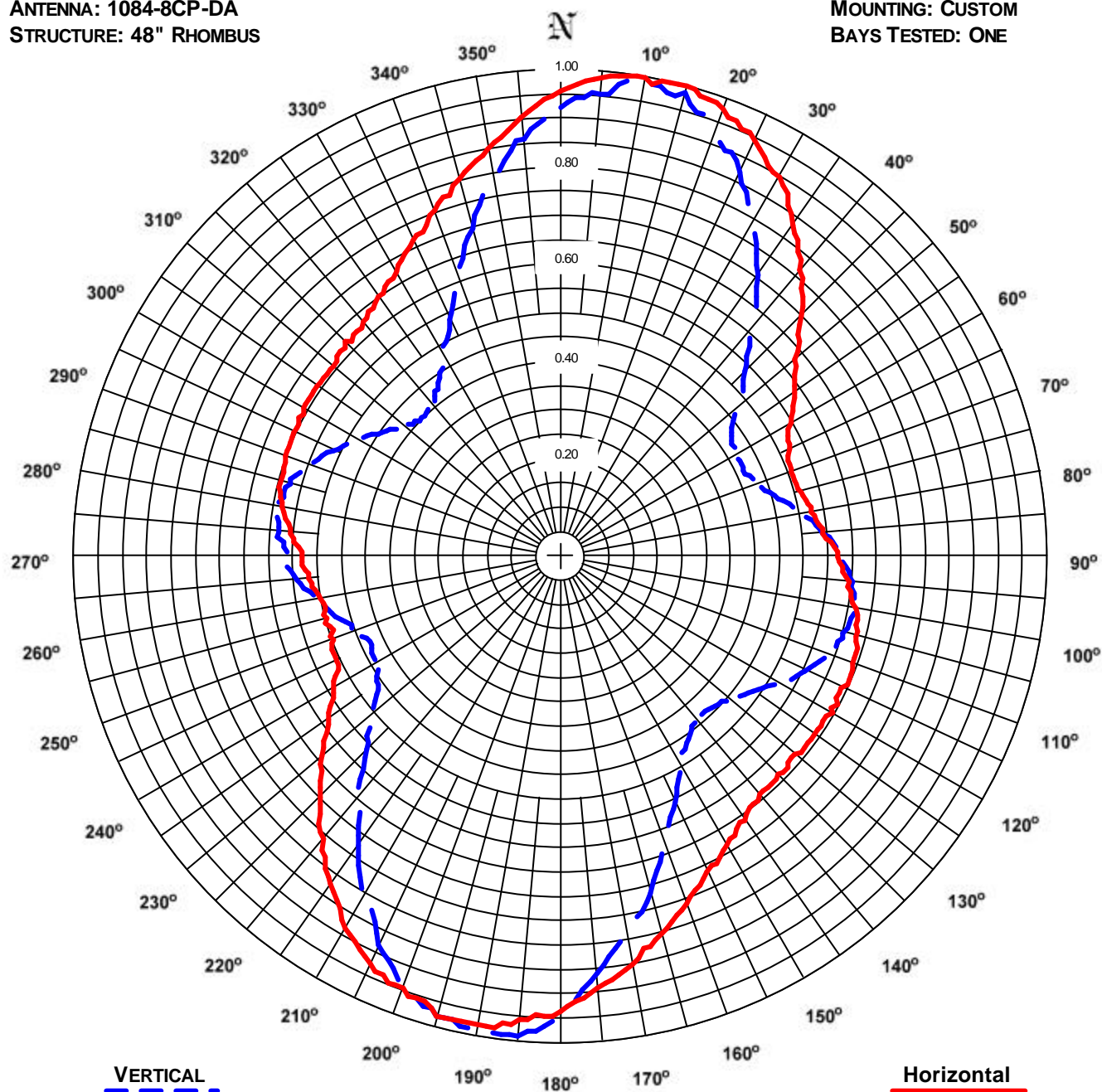
Total Input Power: 11.171 kW

ERI® *Horizontal Plane Relative Field Pattern*

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

DATE: 07/28/2003
FREQUENCY: 107.5 MHz
ORIENTATION: 10° TRUE
MOUNTING: CUSTOM
BAYS TESTED: ONE



VERTICAL
RMS: 0.646
MAXIMUM: 1.000 @ 10° TRUE
MINIMUM: 0.403 @ 314° TRUE

Horizontal
RMS: 0.722
Maximum: 1.000 @ 10° True
Minimum: 0.490 @ 252° True

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

ERI[®] *Horizontal Plane Relative Field List*

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Station: WAMR
Location: Miami, FL.
Frequency: 107.5 MHz

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

Figure: 2
Date: 07/28/2003
Reference: wamr1r.fig

Angle	Horizontal			Vertical			Angle	Horizontal			Vertical		
	Field	kW	dBk	Field	kW	dBk		Field	kW	dBk	Field	kW	dBk
0°	0.957	87.05	19.40	0.923	80.86	19.08	180°	0.933	82.74	19.18	0.944	84.67	19.28
5°	0.988	92.80	19.68	0.955	86.64	19.38	185°	0.955	86.64	19.38	0.989	92.84	19.68
10°	1.000	95.00	19.78	1.000	95.00	19.78	190°	0.977	90.72	19.58	0.989	92.84	19.68
15°	1.000	95.00	19.78	0.989	92.84	19.68	195°	0.977	90.72	19.58	0.977	90.72	19.58
20°	0.977	90.72	19.58	0.933	82.74	19.18	200°	0.944	84.67	19.28	0.944	84.67	19.28
25°	0.944	84.67	19.28	0.871	72.06	18.58	205°	0.923	80.86	19.08	0.881	73.74	18.68
30°	0.902	77.22	18.88	0.794	59.94	17.78	210°	0.881	73.74	18.68	0.804	61.34	17.88
35°	0.832	65.72	18.18	0.708	47.61	16.78	215°	0.822	64.23	18.08	0.724	49.86	16.98
40°	0.767	55.94	17.48	0.617	36.12	15.58	220°	0.759	54.67	17.38	0.646	39.60	15.98
45°	0.700	46.53	16.68	0.537	27.40	14.38	225°	0.700	46.53	16.68	0.562	30.04	14.78
50°	0.631	37.82	15.78	0.479	21.76	13.38	230°	0.638	38.70	15.88	0.501	23.86	13.78
55°	0.589	32.94	15.18	0.432	17.69	12.48	235°	0.582	32.19	15.08	0.457	19.85	12.98
60°	0.550	28.69	14.58	0.417	16.51	12.18	240°	0.537	27.40	14.38	0.432	17.69	12.48
65°	0.519	25.57	14.08	0.417	16.51	12.18	245°	0.507	24.42	13.88	0.427	17.29	12.38
70°	0.507	24.42	13.88	0.432	17.69	12.48	250°	0.495	23.32	13.68	0.447	18.95	12.78
75°	0.513	24.99	13.98	0.462	20.31	13.08	255°	0.495	23.32	13.68	0.479	21.76	13.38
80°	0.525	26.17	14.18	0.507	24.42	13.88	260°	0.501	23.86	13.78	0.507	24.42	13.88
85°	0.543	28.04	14.48	0.543	28.04	14.48	265°	0.519	25.57	14.08	0.543	28.04	14.48
90°	0.569	30.74	14.88	0.575	31.46	14.98	270°	0.531	26.77	14.28	0.562	30.04	14.78
95°	0.596	33.71	15.28	0.603	34.49	15.38	275°	0.556	29.36	14.68	0.582	32.19	15.08
100°	0.617	36.12	15.58	0.610	35.30	15.48	280°	0.582	32.19	15.08	0.589	32.94	15.18
105°	0.631	37.82	15.78	0.603	34.49	15.38	285°	0.596	33.71	15.28	0.575	31.46	14.98
110°	0.638	38.70	15.88	0.589	32.94	15.18	290°	0.603	34.49	15.38	0.550	28.69	14.58
115°	0.638	38.70	15.88	0.556	29.36	14.68	295°	0.603	34.49	15.38	0.513	24.99	13.98
120°	0.646	39.60	15.98	0.519	25.57	14.08	300°	0.610	35.30	15.48	0.479	21.76	13.38
125°	0.638	38.70	15.88	0.484	22.27	13.48	305°	0.610	35.30	15.48	0.447	18.95	12.78
130°	0.631	37.82	15.78	0.457	19.85	12.98	310°	0.610	35.30	15.48	0.417	16.51	12.18
135°	0.631	37.82	15.78	0.442	18.52	12.68	315°	0.624	36.96	15.68	0.403	15.41	11.88
140°	0.638	38.70	15.88	0.437	18.10	12.58	320°	0.631	37.82	15.78	0.412	16.13	12.08
145°	0.661	41.47	16.18	0.457	19.85	12.98	325°	0.653	40.53	16.08	0.437	18.10	12.58
150°	0.684	44.43	16.48	0.495	23.32	13.68	330°	0.676	43.42	16.38	0.479	21.76	13.38
155°	0.716	48.72	16.88	0.556	29.36	14.68	335°	0.716	48.72	16.88	0.537	27.40	14.38
160°	0.759	54.67	17.38	0.624	36.96	15.68	340°	0.759	54.67	17.38	0.617	36.12	15.58
165°	0.804	61.34	17.88	0.716	48.72	16.88	345°	0.804	61.34	17.88	0.700	46.53	16.68
170°	0.851	68.82	18.38	0.785	58.58	17.68	350°	0.851	68.82	18.38	0.785	58.58	17.68
175°	0.891	75.46	18.78	0.861	70.42	18.48	355°	0.907	78.10	18.93	0.861	70.42	18.48

Polarization:

Maximum Field:

Minimum Field:

RMS:

Maximum ERP:

Maximum Power Gain:

Horizontal Plane Gain:

Horizontal

1.000 @ 10° True

0.490 @ 252° True

0.722

95.000 kW

8.504 (9.296 dB)

8.342 (9.213 dB)

Vertical

1.000 @ 10° True

0.403 @ 314° True

0.646

95.000 kW

8.504 (9.296 dB)

8.342 (9.213 dB)

System Beam Tilt: -0.604°

System First Null Fill %: 11

Polarization: Right hand

Circular

Total Input Power: 11.171 kW

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

FIGURE 10

----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

107.5 MHz.

BAY SPACING:
100.00 INCHES

