

# ***ERI<sup>®</sup> Electronics Research, Inc.***

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

## ***Directional Antenna System for KOUZ, Blanchard, Louisiana***

August 18, 2005

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 KOUZ.

The antenna is the ERI model P300-3B-DA configuration. The vertically polarized system consists of 3 full-wavelength spaced bays using one driven vertical dipole. The antenna was mounted on the North 0 degrees East tower face with bracketry to provide an antenna orientation of North 0 degrees East. The antenna was tested on a 24" face tower, which is the structure the station plans to use to support the array. All tests were performed on a frequency of 89.1 megahertz, which is the center of the FM broadcast channel assigned to KOUZ.

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.



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## DESCRIPTION OF THE TEST PROCEDURE

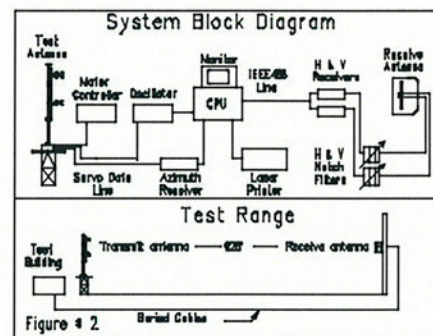
The test antenna consisted of a full scale model of the complete vertically polarized system. The elements and brackets that were used in this test are electrically equivalent to those that will be supplied with the antenna. A section of 3 1/8 inch o.d. rigid coaxial line was used to feed the test antenna, and a section of 3 1/8 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 the vertical polarization component.

The proof-of-performance was accomplished using a 24" face tower 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 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 89.1 MHz and was constantly monitored by an Anritsu Model ML521B measuring receiver.

A broad-band vertical dipole system, located approximately 628 form 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 a buried Heliax cable to an Anritsu Model ML521B measuring receiver.





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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.

CONCLUSIONS

The vertically polarized system consists of 3 full-wavelength spaced bays using one driven vertical dipole. 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 P300-3B-DA array is to be mounted on the North 0 degrees East tower face of the 24" face tower at a bearing of North 0 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 measured relative field value of the vertical component relative to azimuth. A calculated vertical plane relative field pattern is shown on Figure #3 attached. The power in the maximum will reach 20 kilowatts (13.01 dBk).

The power at North 80-110 degrees East does not exceed 11.735 kilowatts (10.695 dBk).

The power at North 140-220 degrees East does not exceed 2.995 kilowatts (4.764 dBk).

The 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 37 feet if the antenna is to be top mounted.



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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.

*Tom Shank*



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

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FIGURE: 1

STATION: KOUZ

LOCATION: BLANCHARD, LA

ANTENNA TYPE: P300-3B-DA

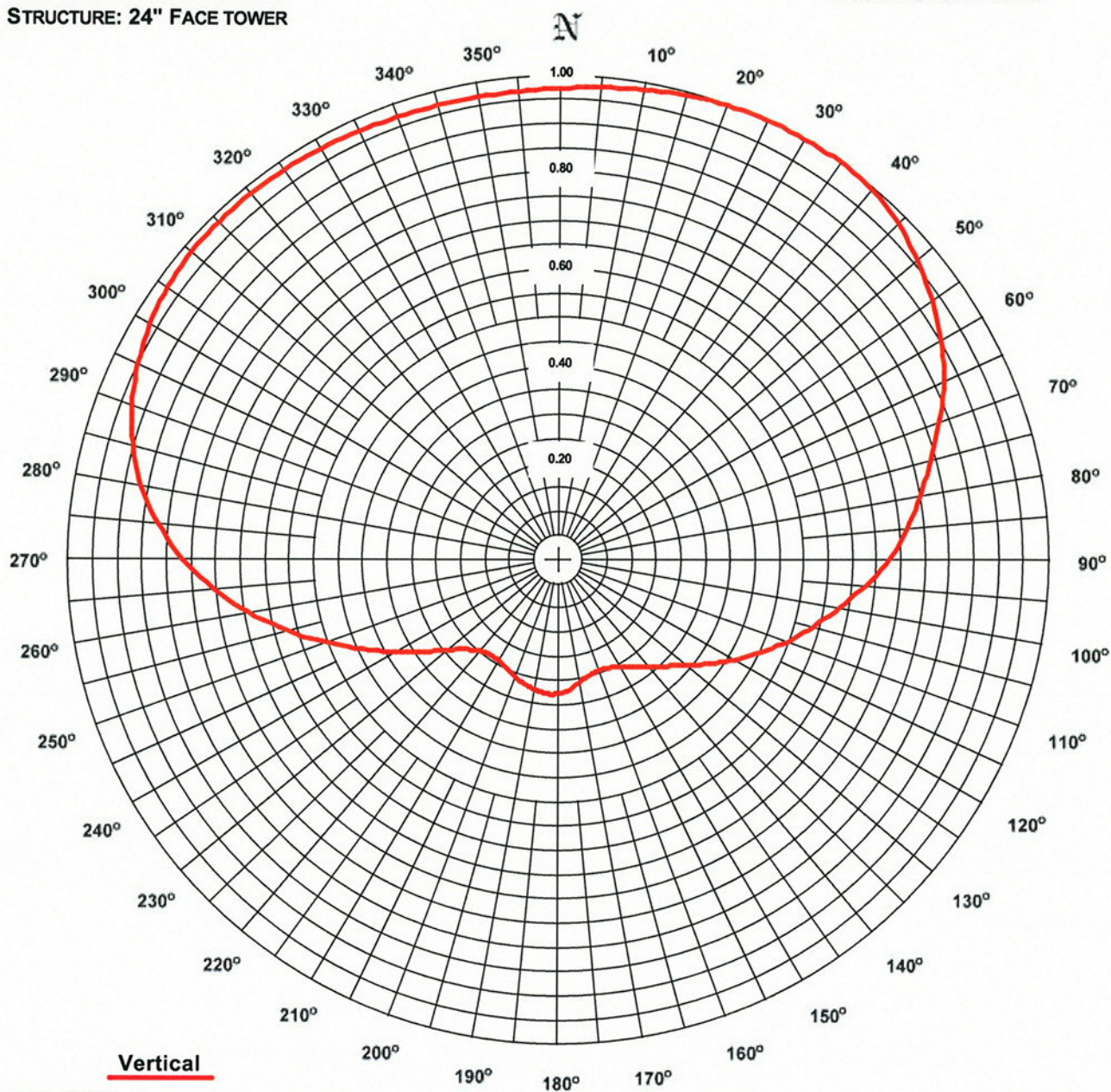
STRUCTURE: 24" FACE TOWER

DATE: 8/18/2005

FREQUENCY: 89.1 MHz

ORIENTATION: 0° TRUE

MOUNTING: STANDARD



Vertical

RMS: 0.719

Maximum: 1.000 @ 30° True

Minimum: 0.241 @ 213° True

COMMENTS: THIS PATTERN SHOWS THE MAXIMUM OF THE VERTICAL AZIMUTH VALUES. THIS PATTERN IS GREATER THAT 85% OF THE FCC FILED COMPOSITE PATTERN BPED-19961112MC.



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

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**Station: KOUZ**  
**Location: Blanchard, LA**  
**Frequency: 89.1 MHz**

**Antenna: P300-3B-DA**  
**Orientation: 0° True**  
**Tower: 24" Face tower**

**Figure: 1**  
**Date: 8/18/2005**  
**Reference: kouz1m.fig**

Angle	Pattern data			Polarization	Angle	Pattern data			Polarization
	Field	kW	dBk			Field	kW	dBk	
0°	0.971	18.87	12.76	Vertical	180°	0.278	1.55	1.90	Vertical
5°	0.976	19.07	12.80	Vertical	185°	0.279	1.56	1.92	Vertical
10°	0.984	19.35	12.87	Vertical	190°	0.273	1.50	1.75	Vertical
15°	0.991	19.62	12.93	Vertical	195°	0.267	1.42	1.53	Vertical
20°	0.996	19.83	12.97	Vertical	200°	0.258	1.34	1.26	Vertical
25°	0.999	19.95	13.00	Vertical	205°	0.249	1.24	0.93	Vertical
30°	1.000	20.00	13.01	Vertical	210°	0.242	1.17	0.70	Vertical
35°	1.000	20.00	13.01	Vertical	215°	0.241	1.16	0.66	Vertical
40°	0.995	19.78	12.96	Vertical	220°	0.248	1.23	0.90	Vertical
45°	0.980	19.21	12.83	Vertical	225°	0.264	1.39	1.44	Vertical
50°	0.956	18.29	12.62	Vertical	230°	0.292	1.71	2.32	Vertical
55°	0.932	17.39	12.40	Vertical	235°	0.334	2.23	3.47	Vertical
60°	0.903	16.32	12.13	Vertical	240°	0.384	2.94	4.69	Vertical
65°	0.869	15.11	11.79	Vertical	245°	0.442	3.90	5.91	Vertical
70°	0.830	13.76	11.39	Vertical	250°	0.506	5.11	7.09	Vertical
75°	0.788	12.41	10.94	Vertical	255°	0.574	6.59	8.19	Vertical
80°	0.752	11.30	10.53	Vertical	260°	0.643	8.27	9.18	Vertical
85°	0.715	10.24	10.10	Vertical	265°	0.708	10.03	10.01	Vertical
90°	0.677	9.17	9.62	Vertical	270°	0.768	11.80	10.72	Vertical
95°	0.630	7.93	8.99	Vertical	275°	0.820	13.46	11.29	Vertical
100°	0.582	6.77	8.31	Vertical	280°	0.868	15.09	11.79	Vertical
105°	0.538	5.80	7.63	Vertical	285°	0.900	16.21	12.10	Vertical
110°	0.498	4.96	6.95	Vertical	290°	0.927	17.19	12.35	Vertical
115°	0.455	4.14	6.17	Vertical	295°	0.949	18.00	12.55	Vertical
120°	0.416	3.46	5.39	Vertical	300°	0.965	18.63	12.70	Vertical
125°	0.376	2.83	4.52	Vertical	305°	0.977	19.07	12.80	Vertical
130°	0.342	2.34	3.69	Vertical	310°	0.983	19.32	12.86	Vertical
135°	0.313	1.96	2.91	Vertical	315°	0.984	19.36	12.87	Vertical
140°	0.289	1.67	2.22	Vertical	320°	0.983	19.31	12.86	Vertical
145°	0.270	1.46	1.64	Vertical	325°	0.980	19.22	12.84	Vertical
150°	0.256	1.32	1.19	Vertical	330°	0.977	19.08	12.81	Vertical
155°	0.248	1.23	0.90	Vertical	335°	0.973	18.92	12.77	Vertical
160°	0.245	1.20	0.79	Vertical	340°	0.970	18.80	12.74	Vertical
165°	0.249	1.24	0.92	Vertical	345°	0.968	18.73	12.73	Vertical
170°	0.258	1.33	1.25	Vertical	350°	0.967	18.70	12.72	Vertical
175°	0.271	1.47	1.67	Vertical	355°	0.968	18.75	12.73	Vertical

**Polarization: Vertical**  
**Maximum Field: 1.000 @ 30° True**  
**Minimum Field: 0.241 @ 213° True**  
**RMS: 0.719**  
**Maximum ERP: 20.000 kW**  
**Maximum Power Gain: 6.014 (7.792 dB)**

**Total Input Power: 3.325 kW**



Directional Antenna System  
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(Continued)

ANTENNA SPECIFICATIONS

Antenna Type:	P300-3B-DA
Frequency:	89.1 MHz
Number of Bays:	3

MECHANICAL SPECIFICATIONS

Mounting:	Standard
System length:	30 ft 9 in
Aperture length required:	37 ft <sup>1</sup>
Orientation:	0° true
Input flange to the antenna 1 5/8 inch female	

ELECTRICAL SPECIFICATIONS  
(For directional use)

Maximum vertical ERP:	20 kW (13.01 dBk)
Vertical maximum power gain:	6.014 (7.792 dB)
Total input power:	3.325 kW (5.219 dBk)

