

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

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 WPDQ Freehold Township, New Jersey

June 18, 2001

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 WPDQ.

The antenna is the ERI model P300-2B-DA configuration. The vertically polarized system consists of 2 full-wavelength spaced bays using one driven vertical dipole and two vertical parasitic elements per bay. The antenna was tested on a tapered pole, which is the structure the station plans to use to support the array. All tests were performed on a frequency of 89.7 megahertz which is the center of the FM broadcast channel assigned to WPDQ.

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.

EXHIBIT #B1  
APPLICATION FOR LICENSE  
LAZARUS ELIAS  
FOUNDATION, INC.  
WPDQ-FM CH209A / 5.0KW DA  
FREEHOLD TOWNSHIP, NJ  
November 2001

# Directional Antenna System For WPDQ Freehold Township, New Jersey

(Continued)

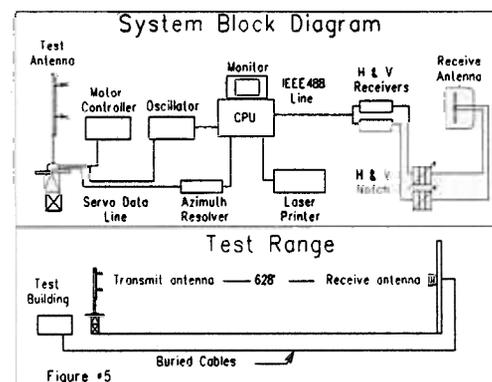
## DESCRIPTION OF THE TEST PROCEDURE

The test antenna consisted of a full scale model of the complete vertically polarized system with the associated vertical parasitic elements. 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 vertical polarization component.

The proof-of-performance was accomplished using a tapered pole 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 89.7 MHz and was constantly monitored by an Anritsu Model ML521B measuring receiver.



Directional Antenna System  
For  
WPDQ  
Freehold Township, New Jersey

(Continued)

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 Heliac cable 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.

### CONCLUSIONS

The vertically polarized system consists of 2 full-wavelength spaced bays using one driven vertical dipole and two vertical parasitic elements per bay. 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 P300-2B-DA array is to be mounted on the tapered pole at a bearing of North 178 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 5 kilowatts (6.99 dBk).

The power at North 350 degrees East does not exceed 0.480 kilowatts (-3.188 dBk).

The power at North 0 degrees East does not exceed 0.450 kilowatts (-3.468 dBk).

Directional Antenna System  
For  
WPDQ  
Freehold Township, New Jersey

(Continued)

The power at North 10 degrees East does not exceed 0.480 kilowatts (-3.188 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 26 feet if the antenna is to be top mounted.

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.

The calculated maximum power gain of the envelope pattern as shown on Figure # 1 is 4.213 (6.246dB), which would require an input power of 1.187 kilowatts.

ELECTRONICS RESEARCH, INC

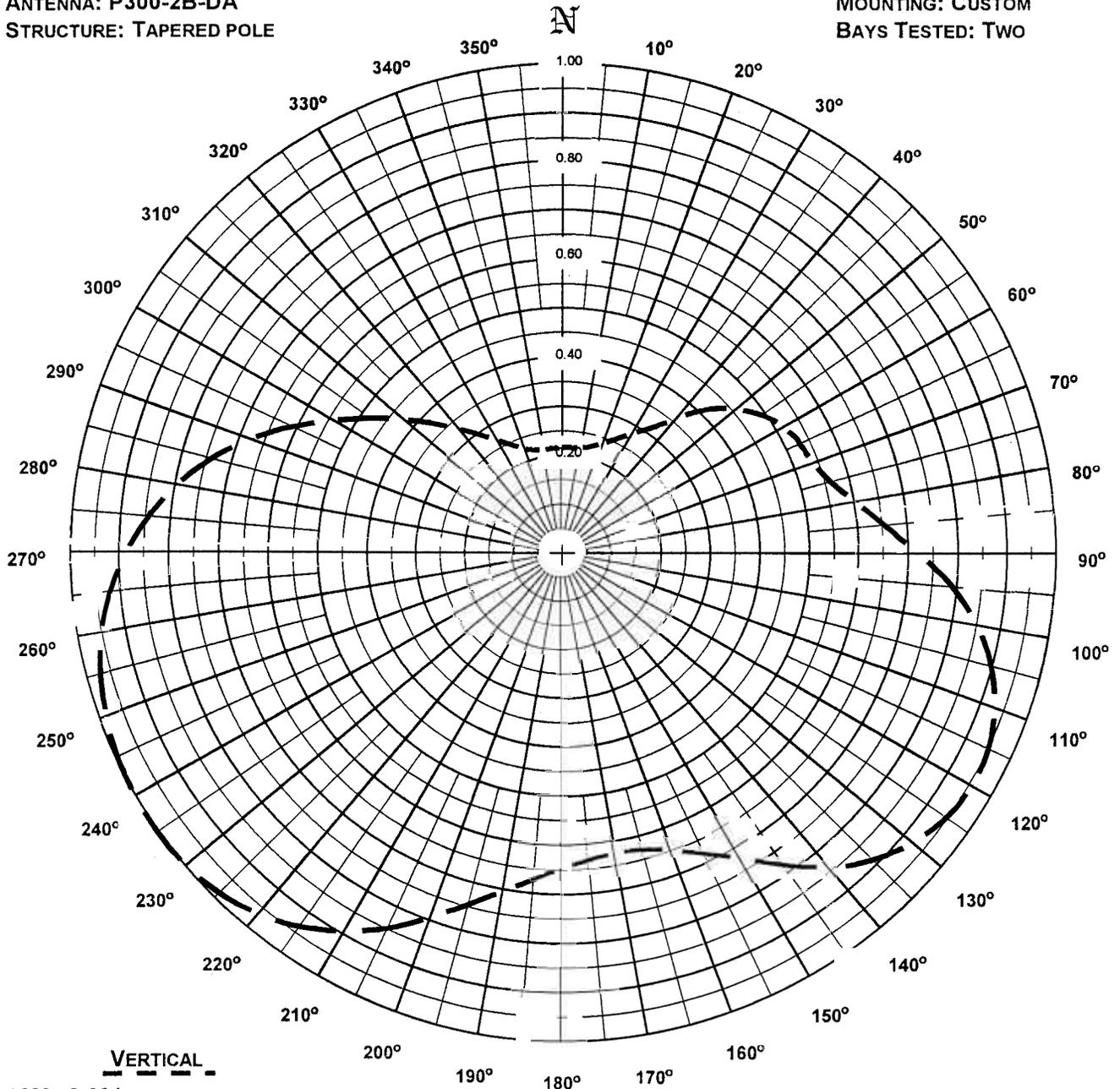
*Tom Schaufly*

# 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: 1  
STATION: WPDQ  
LOCATION: FREEHOLD TOWNSHIP, NJ  
ANTENNA: P300-2B-DA  
STRUCTURE: TAPERED POLE

DATE: 6/18/01  
FREQUENCY: 89.7 MHz  
ORIENTATION: 178° TRUE  
MOUNTING: CUSTOM  
BAYS TESTED: TWO



RMS: 0.691  
MAXIMUM: 1.000 @ 234° TRUE  
MINIMUM: 0.218 @ 350° TRUE

COMMENTS: MEASURED PATTERN OF THE VERTICAL COMPONENT. OPOSITE PATTERN: THIS PATTERN SHOWS THE MAXIMUM OF THE VERTICAL AZIMUTH VALUES. THIS PATTERN DOES NOT EXCEED THE FCC FILED COMPOSITE PATTERN AT ANY AZIMUTH. THE RMS OF THIS PATTERN IS GREATER THAN 85% OF THE FILED FCC COMPOSITE PATTERN BPED-20001012AAT

# **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:** WPDQ  
**Location:** Freehold Township, NJ  
**Frequency:** 89.7 MHz

**Antenna:** P300-2B-DA  
**Orientation:** 178° True  
**Tower:** Tapered pole

**Figure:** 1  
**Date:** 6/18/01  
**Reference:** wpdq2m.fig

Angle	Pattern Data			Polarization	Angle	Pattern Data			Polarization
	Field	kW	dBk			Field	kW	dBk	
0°	0.220	0.24	-6.17	Vertical	180°	0.644	2.08	3.17	Vertical
5°	0.220	0.24	-6.15	Vertical	185°	0.668	2.23	3.48	Vertical
10°	0.223	0.25	-6.06	Vertical	190°	0.700	2.45	3.89	Vertical
15°	0.230	0.27	-5.76	Vertical	195°	0.740	2.74	4.38	Vertical
20°	0.244	0.30	-5.26	Vertical	200°	0.789	3.11	4.93	Vertical
25°	0.263	0.35	-4.61	Vertical	205°	0.843	3.56	5.51	Vertical
30°	0.288	0.41	-3.83	Vertical	210°	0.891	3.97	5.98	Vertical
35°	0.318	0.51	-2.95	Vertical	215°	0.931	4.33	6.37	Vertical
40°	0.368	0.68	-1.69	Vertical	220°	0.962	4.62	6.65	Vertical
45°	0.421	0.89	-0.53	Vertical	225°	0.984	4.84	6.85	Vertical
50°	0.464	1.08	0.32	Vertical	230°	0.996	4.96	6.96	Vertical
55°	0.497	1.23	0.92	Vertical	235°	1.000	5.00	6.99	Vertical
60°	0.520	1.35	1.32	Vertical	240°	0.999	4.99	6.98	Vertical
65°	0.533	1.42	1.53	Vertical	245°	0.995	4.95	6.94	Vertical
70°	0.543	1.47	1.68	Vertical	250°	0.985	4.85	6.86	Vertical
75°	0.566	1.60	2.04	Vertical	255°	0.970	4.71	6.73	Vertical
80°	0.607	1.84	2.65	Vertical	260°	0.951	4.52	6.55	Vertical
85°	0.659	2.17	3.37	Vertical	265°	0.922	4.25	6.29	Vertical
90°	0.725	2.63	4.19	Vertical	270°	0.888	3.94	5.95	Vertical
95°	0.796	3.16	5.00	Vertical	275°	0.846	3.58	5.54	Vertical
100°	0.854	3.65	5.62	Vertical	280°	0.798	3.19	5.03	Vertical
105°	0.899	4.04	6.07	Vertical	285°	0.744	2.77	4.42	Vertical
110°	0.931	4.33	6.37	Vertical	290°	0.683	2.34	3.68	Vertical
115°	0.950	4.51	6.54	Vertical	295°	0.616	1.90	2.79	Vertical
120°	0.954	4.55	6.58	Vertical	300°	0.548	1.50	1.76	Vertical
125°	0.944	4.46	6.49	Vertical	305°	0.486	1.18	0.72	Vertical
130°	0.921	4.24	6.28	Vertical	310°	0.430	0.93	-0.34	Vertical
135°	0.885	3.92	5.93	Vertical	315°	0.381	0.73	-1.39	Vertical
140°	0.837	3.50	5.44	Vertical	320°	0.339	0.57	-2.42	Vertical
145°	0.776	3.01	4.78	Vertical	325°	0.302	0.46	-3.40	Vertical
150°	0.719	2.59	4.13	Vertical	330°	0.273	0.37	-4.30	Vertical
155°	0.676	2.28	3.59	Vertical	335°	0.249	0.31	-5.07	Vertical
160°	0.645	2.08	3.18	Vertical	340°	0.233	0.27	-5.68	Vertical
165°	0.627	1.97	2.94	Vertical	345°	0.222	0.25	-6.07	Vertical
170°	0.622	1.94	2.87	Vertical	350°	0.218	0.24	-6.23	Vertical
175°	0.629	1.98	2.96	Vertical	355°	0.219	0.24	-6.21	Vertical

**Polarization:** Vertical  
**Maximum Field:** 1.000 @ 234° True  
**Minimum Field:** 0.218 @ 350° True  
**RMS:** 0.691  
**Maximum Vertical ERP:** 5.000 kW  
**Maximum Power Gain:** 4.213 (6.246 dB)

**Total Input Power:** .187 kW

Directional Antenna System  
For  
WPDQ  
Freehold Township, New Jersey

(Continued)

ANTENNA SPECIFICATIONS

Antenna Type:	P300-2B-DA
Frequency:	89.7 MHz
Number of Bays:	2

MECHANICAL SPECIFICATIONS

Mounting:	Custom
System length:	19 ft 9 in
Aperture length required:	26 ft.
Orientation:	178° true
Input flange to the antenna	3 1/8 inch female

ELECTRICAL SPECIFICATIONS  
(For directional use)

Maximum vertical ERP:	5 kW (6.99 dBk)
Vertical maximum power gain:	4.213 (6.246 dB)
Total input power:	1.187 kW (0.744 dBk)

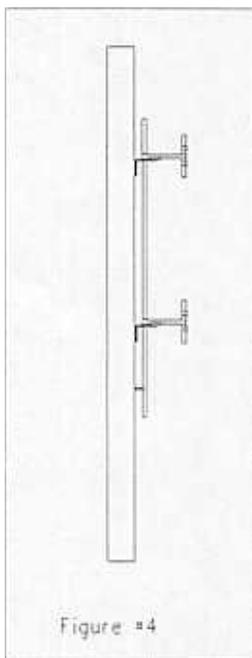
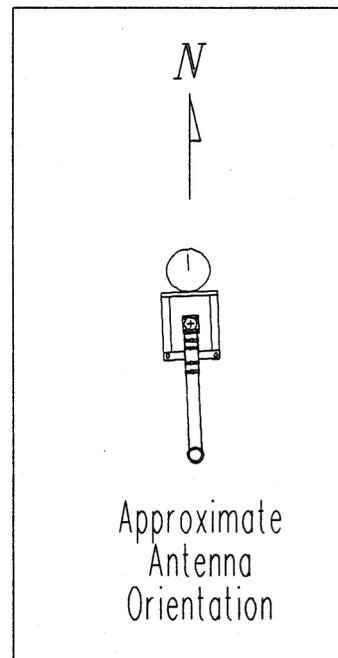


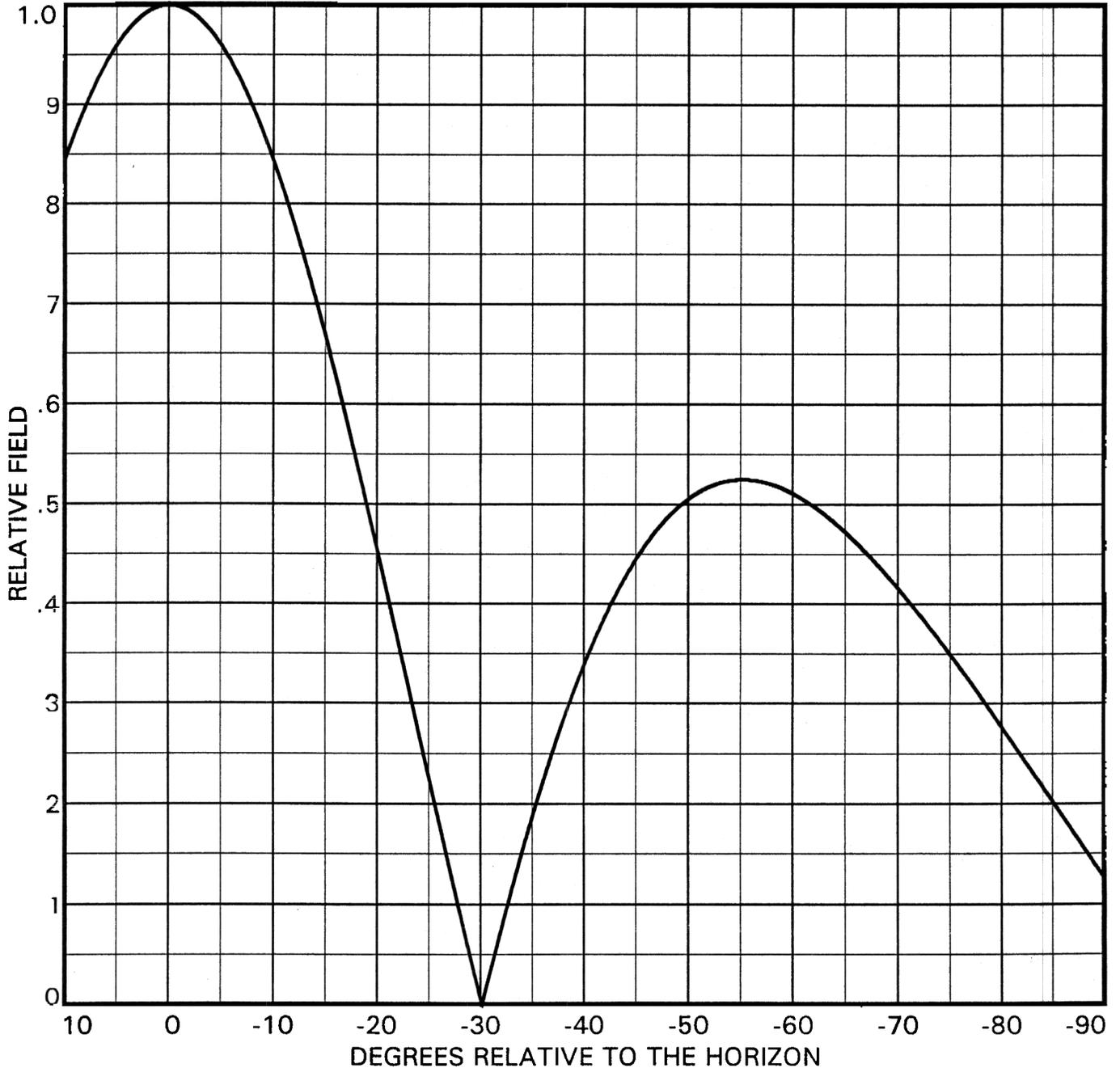
Figure #4



# THEORETICAL VERTICAL PLANE RELATIVE FIELD PATTERN

FIGURE # 3  
Freehold Township, New Jersey  
WPDQ  
89.7MHz  
2 BAY P300-2B-DA ANTENNA

June 18, 2001  
0 DEGREE BEAM TILT  
0 PERCENT FIRST NULL FILL  
0 PERCENT SECOND NULL FILL  
1 WAVELENGTH SPACING



ELECTRONICS RESEARCH, INC. 7777 Gardner Rd. Chandler, In. 47610 Phone: (812) 925-6000 Fax: (812) 925-4030

 **A**ssociated **L**and **P**rofessional **S**  
PROFESSIONAL SURVEYING PLANNING ENVIRONMENTAL  
7 Marl Road, Farmingdale, New Jersey 07727  
(732) 751-1600 Fax (732) 751-1400

August 8, 2001

Mark Stamat  
WPDQ 89.7 FM  
1745 Route 9 North  
West Farms Plaza  
Howell NJ 07731

Re: Antenna alignment at WPDQ, Howell NJ

The undersign certifies that on July 15, 2001 Associated Land Professionals provided alignment for the newly installed antenna at an azimuth of 178 degrees with respect to true North at the WPDQ radio station 1745 Route 9 in Howell Township, Monmouth County New Jersey. Please accept this letter as certification that the above described antenna is verified to be in the proper alignment of 178 degrees to true North.

Very Truly Yours,



RONNIE VAN HUSS, PLS

Owner,

ASSOCIATED LAND

PROFESSIONALS

NJ Land Surveyor

License No. 35889

EXHIBIT #B2  
APPLICATION FOR LICENSE  
LAZARUS ELIAS  
FOUNDATION, INC.  
WPDQ-FM CH209A / 5.0KW DA  
FREEHOLD TOWNSHIP, NJ  
November 2001

Mr. Albert W. Horner  
107 N. Cambridge Ave.  
Ventnor City NJ. 08406

November 27, 2001

10 Sylvan Dr. Suite 26  
PO Box 24466  
St. Simons Island Ga. 31522

Dear Mr. Brock,

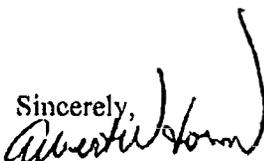
Please allow me to confirm the major details of the antenna installation for Radio Station WPDQ 89.7 FM in Howell New Jersey.

On July 17<sup>th</sup>, 2001, I personally supervised the proper installation and orientation of their new antenna. It was installed in accordance with the manufactures instructions.

The antenna is an ERI model P300-2.

Its orientation is 178 degrees true north. The coordinates were mapped and marked by Associated Land Professionals of Farmingdale NJ, license # 35889.

Sincerely,



Albert W. Horner  
Local Broadcast Engineer  
FCC GROL # PG-GB-008957

EXHIBIT #B3  
APPLICATION FOR LICENSE  
LAZARUS ELIAS  
FOUNDATION, INC.  
WPDQ-FM CH209A / 5.0KW DA  
FREEHOLD TOWNSHIP, NJ  
November 2001