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COMPLIANCE WITH SPECIAL OPERATING CONDITIONS  
AND CALCULATION OF TRANSMITTER POWER OUTPUT

Special Operating Condition #1: A complete antenna proof-of-performance prepared by ERI is included as part of the attachment.

Special Operating Condition #2: A certification is attached from licensed/professional land surveyor William P. McManus, PLS, of Duffy, Dolcy, McManus & Roesch, establishing that the WCHR-FM directional antenna has been oriented to the proper azimuth.

Special Operating Condition #3: An affidavit from Thomas J. Trembly, Jr., chief engineer for WCHR-FM, concerning oversight of the WCHR-FM transmitting antenna installation is included as part of the attachment.

Special Operating Condition #4: An exhibit prepared by William Jeffrey Reynolds, Technical Consultant with du Treil, Lundin & Rackley, Inc., Consulting Engineers, demonstrating that the measured directional antenna pattern complies with the community coverage provisions of section 73.315 is included as part of the attachment. As indicated, the 70 dBu contour based on the ERI measured composite directional antenna pattern encompasses 100% of the 2010 census population and 91% of the land area within Manahawkin.

Special Operating Condition #5: The measured horizontally and vertically polarized radiation components do not exceed, at any azimuth, the composite radiation pattern authorized by the construction permit. Furthermore, the principal minima and the associated field strength limit of 1.25 kilowatts at 0 degrees true is not exceeded by the measured horizontally or vertically polarized radiation components.

Special Operating Condition #7: The applicant recognizes the responsibility to reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.

Calculation of Transmitter Power Output (TPO): The 8.838 kW (9.463 dBk) figure is based on consideration of total transmission system attenuation of 1.75 dB (66.8%). Given an antenna power gain of 2.201 (3.426 dB), a TPO of 8.838 kW produces an ERP of 13 kW (11.139 dBk).

***Directional Antenna System  
for  
WCHR, Manahawkin, New Jersey***

March 21, 2019

Electronics Research Inc. is providing a custom fabricated multiplexed antenna system that is specially designed to meet the FCC requirements and the general needs of radio station WCHR.

The antenna is the ERI model 1194-3CP-DA-SP configuration. The circular polarized system consists of three 0.67-wavelength spaced bays using four driven circular polarized radiating element per bay and attached to four passive panels. The antenna was mounted on the 6' face tower face with bracketry to provide an antenna orientation of North 145 degrees East. The antenna was tested on a 6' face tower, which is the structure the station plans to use to support the array. All tests were performed on a frequency of 105.7 megahertz, which is the center of the FM broadcast channel assigned to WCHR. Two non-directional station WOBM at 92.7 and W228EH at 104.14 MHz are included in the system and will be inserted into the fourth port of the hybrid to each element.

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.



# Directional Antenna System For WCHR, Manahawkin, New Jersey

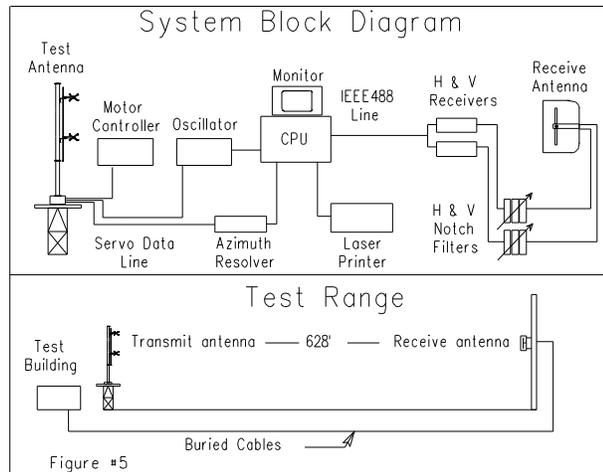
(Continued)

## 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.

The proof-of-performance was accomplished using a 6' 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 a US Digital angle position indicator. The resolution of this angle position indicator is one-hundredth of a degree.

The antenna under test was operated in the transmitting mode and fed from a HP8657D signal generator. The frequency of the signal source was set at 105.7 MHz and was constantly monitored by a Rohde & Schwarz ESVD measuring receiver.

A broadband horizontal and vertical dipole system, located approximately 628 feet from the test antenna, was used to receive the emitted test signals.

# Directional Antenna System For WCHR, Manahawkin, New Jersey

(Continued)

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 Heliac cables to a Rohde & Schwarz measuring receiver. This data was interfaced to a laser jet printer by means of a 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 were recorded separately.

## CONCLUSIONS

The circular polarized system consists of three .67-wavelength spaced bays using four driven circular polarized radiating element per bay attached to four passive panels. The power distribution and phase relationship will be fixed when the antenna is manufactured. Proper maintenance of the elements should be all that is required to maintain the pattern in adjustment.

The 1194-3CP-DA-SP array is to be mounted on the 6' face tower at a bearing of North 145 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 individual horizontal and vertical components, the composite maximum of either the horizontal or vertical component at any azimuth and the FCC filed envelope pattern. The horizontal plane relative field list for the composite pattern and the individual H & V components are shown as Figure #1 & 1A respectively. The actual measured pattern does not exceed the authorized FCC composite pattern at any azimuth. A calculated vertical plane relative field pattern is shown on Figure #3 attached. The power in the maximum will reach 13 kilowatts (11.139 dBk).

The power at North 0 degrees East does not exceed 1.25 kilowatts (0.969 dBk).

Directional Antenna System  
For  
WCHR, Manahawkin, New Jersey

(Continued)

The RMS of the vertically polarized horizontal plane component does not exceed the RMS of the horizontally polarized horizontal plane component.

The composite horizontal and 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 32 feet 6 inches.

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.

A handwritten signature in black ink, appearing to read "Tom Scharf". The signature is written in a cursive style with a large initial "T" and "S".

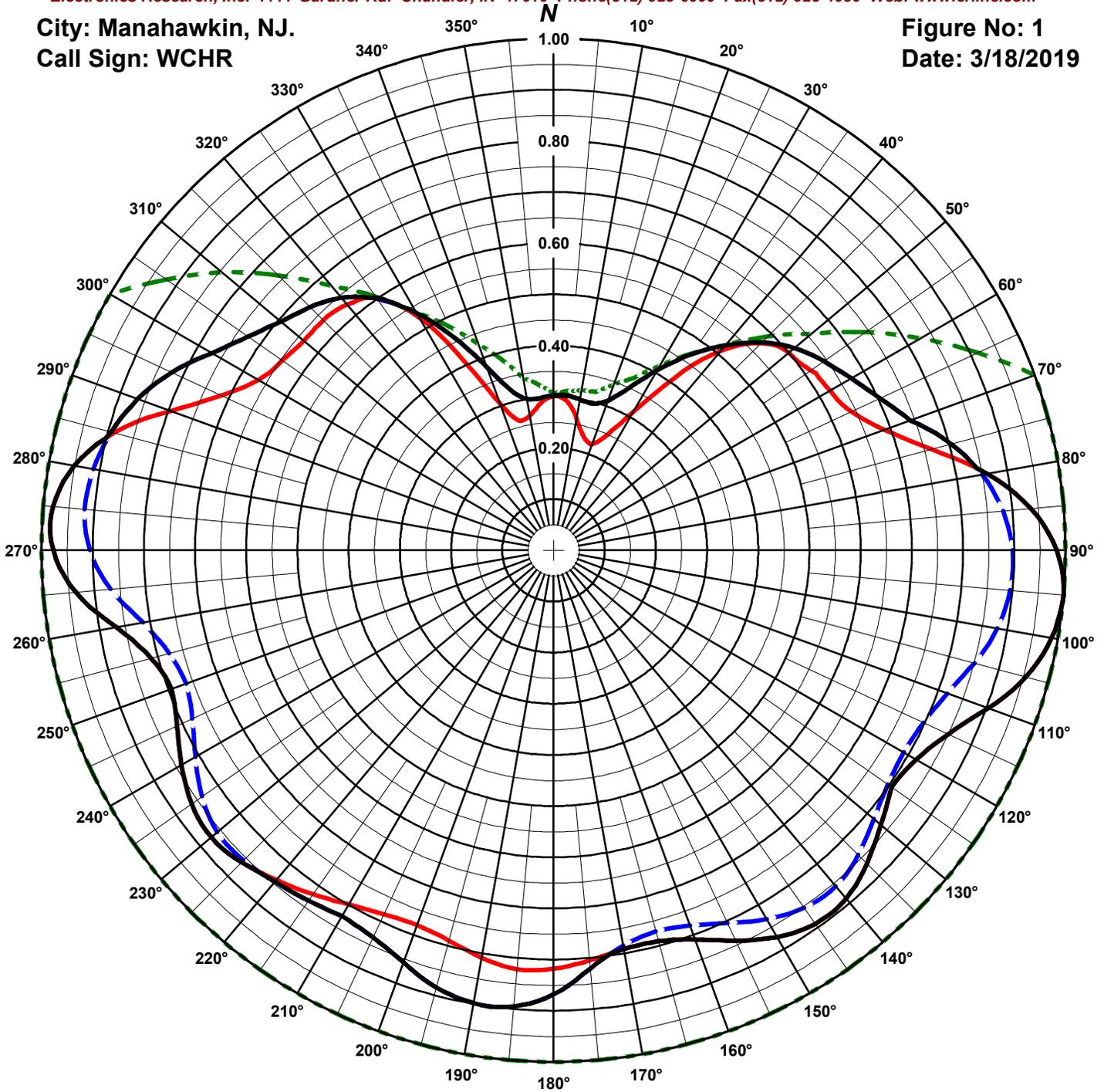
The Microsoft Word document on file electronically at Electronic Research, Inc. governs the specifications, scope, and configuration of the product described. All other representations whether verbal, printed, or electronic are subordinate to the master copy of this document on file at ERI.

# 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 Web: www.eriinc.com

City: Manahawkin, NJ.  
Call Sign: WCHR

Figure No: 1  
Date: 3/18/2019



Antenna Orientation: 190° True

Frequency: 105.7 MHz

Antenna Type: 1194-3CP-DA-SP

Antenna Mounting: Custom

Tower Type: 6' Tower

**HORIZONTAL**

**RMS: .741**

**Maximum: 1 @ 95°**

**Minimum: .22 @ 19°**

**VERTICAL**

**RMS: .741**

**Maximum: .919 @ 275°**

**Minimum: .296 @ 14°**

**COMPOSITE**

**RMS: .763**

**Maximum: 1 @ 95°**

**Minimum: .296 @ 14°**

**FCC ENVELOPE**

**RMS: .876**

**Maximum: 1 @ 70°**

**Minimum: .307 @ 0°**

Measured patterns of the horizontal and vertical components. Right side of the hybrid is cabled.

# 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 Web: www.eriinc.com

Figure# 1

Date: 3/18/2019

Station: WCHR

Antenna: 1194-3CP-DA-SP

Location: Manahawkin, NJ.

Antenna Orientation: 190° True

Frequency: 105.7 MHz

Number of Bays: 3

Azimuth	Envelope			Polarization	Azimuth	Envelope			Polarization
	Field	kW	dBk	Maximum		Field	kW	dBk	Maximum
0°	0.303	1.194	0.770	Vertical	180°	0.868	9.796	9.911	Vertical
5°	0.304	1.199	0.788	Vertical	185°	0.895	10.413	10.176	Vertical
10°	0.299	1.162	0.651	Vertical	190°	0.899	10.499	10.211	Vertical
15°	0.297	1.145	0.588	Vertical	195°	0.885	10.173	10.075	Vertical
20°	0.311	1.259	1.001	Vertical	200°	0.857	9.549	9.800	Vertical
25°	0.351	1.601	2.043	Vertical	205°	0.835	9.055	9.569	Vertical
30°	0.407	2.150	3.324	Vertical	210°	0.826	8.873	9.481	Vertical
35°	0.466	2.829	4.516	Vertical	215°	0.836	9.076	9.579	Vertical
40°	0.523	3.551	5.504	Vertical	220°	0.846	9.303	9.686	Vertical
45°	0.574	4.284	6.319	Vertical	225°	0.862	9.660	9.850	Horizontal
50°	0.615	4.916	6.916	Vertical	230°	0.873	9.897	9.955	Horizontal
55°	0.645	5.400	7.324	Vertical	235°	0.863	9.677	9.857	Horizontal
60°	0.672	5.863	7.681	Vertical	240°	0.839	9.146	9.612	Horizontal
65°	0.703	6.433	8.084	Vertical	245°	0.811	8.552	9.321	Horizontal
70°	0.742	7.155	8.546	Vertical	250°	0.794	8.191	9.134	Horizontal
75°	0.804	8.400	9.243	Vertical	255°	0.814	8.608	9.349	Horizontal
80°	0.861	9.629	9.836	Horizontal	260°	0.867	9.769	9.899	Horizontal
85°	0.936	11.392	10.566	Horizontal	265°	0.937	11.413	10.574	Horizontal
90°	0.983	12.551	10.987	Horizontal	270°	0.977	12.406	10.936	Horizontal
95°	1.000	13.000	11.139	Horizontal	275°	0.981	12.514	10.974	Horizontal
100°	0.988	12.687	11.034	Horizontal	280°	0.950	11.735	10.695	Horizontal
105°	0.956	11.870	10.745	Horizontal	285°	0.894	10.384	10.163	Vertical
110°	0.903	10.601	10.253	Horizontal	290°	0.864	9.701	9.868	Vertical
115°	0.850	9.403	9.733	Horizontal	295°	0.822	8.793	9.441	Vertical
120°	0.818	8.702	9.396	Horizontal	300°	0.770	7.699	8.864	Vertical
125°	0.806	8.446	9.267	Horizontal	305°	0.728	6.893	8.384	Vertical
130°	0.835	9.064	9.573	Horizontal	310°	0.696	6.289	7.986	Vertical
135°	0.866	9.743	9.887	Horizontal	315°	0.672	5.865	7.683	Vertical
140°	0.889	10.274	10.117	Horizontal	320°	0.644	5.390	7.316	Vertical
145°	0.891	10.326	10.139	Horizontal	325°	0.601	4.700	6.721	Horizontal
150°	0.873	9.906	9.959	Horizontal	330°	0.536	3.731	5.718	Vertical
155°	0.842	9.210	9.642	Horizontal	335°	0.459	2.737	4.373	Vertical
160°	0.810	8.522	9.305	Horizontal	340°	0.381	1.889	2.762	Vertical
165°	0.791	8.137	9.105	Horizontal	345°	0.325	1.370	1.368	Vertical
170°	0.792	8.152	9.112	Horizontal	350°	0.300	1.172	0.691	Vertical
175°	0.821	8.758	9.424	Vertical	355°	0.298	1.158	0.636	Vertical

**Horizontal Polarization:**

**Maximum: 2.201 (3.426 dB)**

**Horizontal Plane: 2.201 (3.426 dB)**

**Maximum ERP: 13.000 kW**

**Vertical Polarization:**

**Maximum: 1.859 (2.692 dB)**

**Horizontal Plane: 1.859 (2.692 dB)**

**Maximum ERP: 10.980 kW**

**Total Input Power: 5.907 kW**

**Reference: WCHR1M.FIG**

**This list shows the the maximum azimuth values of either the horizontal or vertical components.**

# 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 Web: www.eriinc.com

Figure# 1A

Date: 3/18/2019

Station: WCHR

Antenna: 1194-3CP-DA-SP

Location: Manahawkin, NJ.

Antenna Orientation: 190° True

Frequency: 105.7 MHz

Number of Bays: 3

Azimuth	Horizontal			Vertical			Azimuth	Horizontal			Vertical		
	Field	kW	dBk	Field	kW	dBk		Field	kW	dBk	Field	kW	dBk
0°	0.301	1.181	0.724	0.303	1.194	0.770	180°	0.818	8.693	9.392	0.868	9.796	9.911
5°	0.293	1.116	0.476	0.304	1.199	0.788	185°	0.822	8.774	9.432	0.895	10.413	10.176
10°	0.261	0.886	-0.528	0.299	1.162	0.651	190°	0.809	8.501	9.295	0.899	10.499	10.211
15°	0.229	0.682	-1.662	0.297	1.145	0.588	195°	0.789	8.101	9.085	0.885	10.173	10.075
20°	0.221	0.637	-1.961	0.311	1.259	1.001	200°	0.780	7.901	8.977	0.857	9.549	9.800
25°	0.249	0.809	-0.922	0.351	1.601	2.043	205°	0.785	8.010	9.037	0.835	9.055	9.569
30°	0.313	1.271	1.040	0.407	2.150	3.324	210°	0.800	8.311	9.196	0.826	8.873	9.481
35°	0.411	2.196	3.415	0.466	2.829	4.516	215°	0.820	8.749	9.420	0.836	9.076	9.579
40°	0.509	3.372	5.279	0.523	3.551	5.504	220°	0.841	9.202	9.639	0.846	9.303	9.686
45°	0.573	4.261	6.295	0.574	4.284	6.319	225°	0.862	9.660	9.850	0.856	9.535	9.793
50°	0.601	4.690	6.711	0.615	4.916	6.916	230°	0.873	9.897	9.955	0.857	9.541	9.796
55°	0.613	4.884	6.888	0.645	5.400	7.324	235°	0.863	9.677	9.857	0.838	9.132	9.606
60°	0.624	5.063	7.044	0.672	5.863	7.681	240°	0.839	9.146	9.612	0.807	8.474	9.281
65°	0.641	5.349	7.283	0.703	6.433	8.084	245°	0.811	8.552	9.321	0.778	7.869	8.959
70°	0.688	6.152	7.890	0.742	7.155	8.546	250°	0.794	8.191	9.134	0.764	7.578	8.796
75°	0.763	7.576	8.794	0.804	8.400	9.243	255°	0.814	8.608	9.349	0.777	7.855	8.952
80°	0.861	9.629	9.836	0.850	9.399	9.731	260°	0.867	9.769	9.899	0.814	8.618	9.354
85°	0.936	11.392	10.566	0.881	10.097	10.042	265°	0.937	11.413	10.574	0.868	9.802	9.913
90°	0.983	12.551	10.987	0.897	10.455	10.193	270°	0.977	12.406	10.936	0.905	10.652	10.274
95°	1.000	13.000	11.139	0.896	10.426	10.181	275°	0.981	12.514	10.974	0.919	10.980	10.406
100°	0.988	12.687	11.034	0.880	10.067	10.029	280°	0.950	11.735	10.695	0.912	10.815	10.340
105°	0.956	11.870	10.745	0.851	9.425	9.743	285°	0.888	10.251	10.108	0.894	10.384	10.163
110°	0.903	10.601	10.253	0.818	8.704	9.397	290°	0.796	8.240	9.159	0.864	9.701	9.868
115°	0.850	9.403	9.733	0.798	8.268	9.174	295°	0.715	6.654	8.231	0.822	8.793	9.441
120°	0.818	8.702	9.396	0.790	8.108	9.089	300°	0.666	5.763	7.606	0.770	7.699	8.864
125°	0.806	8.446	9.267	0.798	8.268	9.174	305°	0.647	5.445	7.360	0.728	6.893	8.384
130°	0.835	9.064	9.573	0.817	8.676	9.383	310°	0.637	5.275	7.222	0.696	6.289	7.986
135°	0.866	9.743	9.887	0.842	9.215	9.645	315°	0.636	5.253	7.204	0.672	5.865	7.683
140°	0.889	10.274	10.117	0.857	9.557	9.803	320°	0.627	5.109	7.083	0.644	5.390	7.316
145°	0.891	10.326	10.139	0.853	9.465	9.761	325°	0.601	4.700	6.721	0.599	4.666	6.689
150°	0.873	9.906	9.959	0.832	9.009	9.547	330°	0.526	3.598	5.560	0.536	3.731	5.718
155°	0.842	9.210	9.642	0.804	8.404	9.245	335°	0.402	2.101	3.224	0.459	2.737	4.373
160°	0.810	8.522	9.305	0.781	7.920	8.988	340°	0.305	1.212	0.834	0.381	1.889	2.762
165°	0.791	8.137	9.105	0.771	7.737	8.886	345°	0.262	0.895	-0.483	0.325	1.370	1.368
170°	0.792	8.152	9.112	0.785	8.009	9.036	350°	0.267	0.925	-0.338	0.300	1.172	0.691
175°	0.805	8.420	9.253	0.821	8.758	9.424	355°	0.288	1.081	0.336	0.298	1.158	0.636

**Horizontal Polarization:**

**Maximum: 2.201 (3.426 dB)**

**Horizontal Plane: 2.201 (3.426 dB)**

**Maximum ERP: 13.000 kW**

**Vertical Polarization:**

**Maximum: 1.859 (2.692 dB)**

**Horizontal Plane: 1.859 (2.692 dB)**

**Maximum ERP: 10.980 kW**

**Total Input Power: 5.907 kW**

**Reference: WCHR1M.FIG**

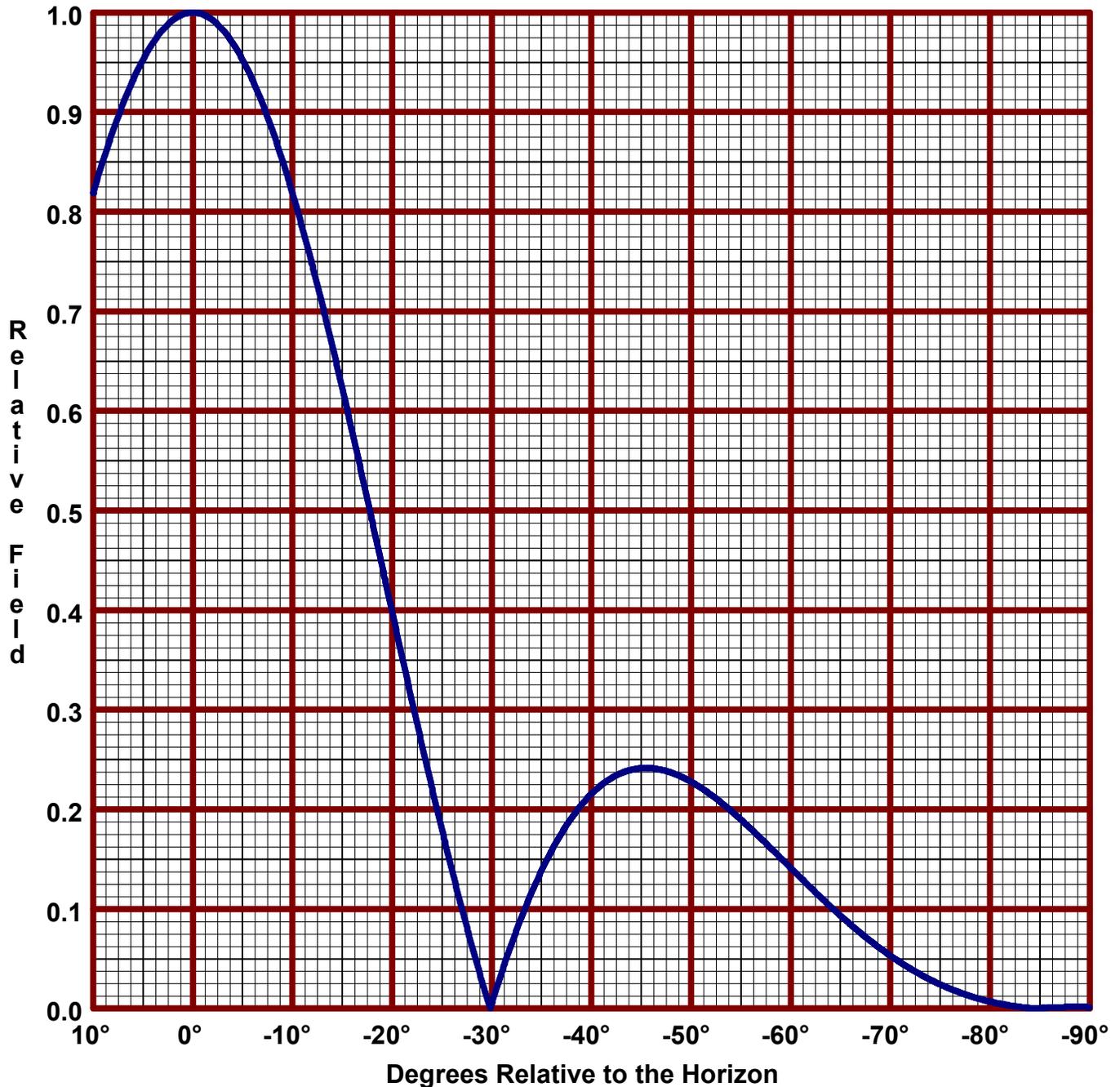
**This list shows the azimuth values for the horizontal and vertical components.**

# ERI<sup>®</sup> Vertical Plane Relative Field Pattern

Electronics Research, Inc. 7777 Gardner Rd. Chandler, IN 47610 Phone(812) 925-6000 Fax(812) 925-4030 Web: www.eriinc.com

Figure No: 3  
Call Sign: WCHR  
Location: Manahawkin, NJ.  
Frequency: 105.7 MHz  
Antenna: 3 bay 1194-3CP-DA-SP

Date: 3/18/2019  
H/V Power Ratio: 1  
.67 Wave-length Spacing  
0° Beam Tilt  
0% First Null Fill



**Horizontal Polarization:**  
Maximum: 2.201 (3.426 dB)  
Horizontal Plane: 2.201 (3.426 dB)  
Maximum ERP: 13.000 kW

**Vertical Polarization:**  
Maximum: 1.859 (2.692 dB)  
Horizontal Plane: 1.859 (2.692 dB)  
Maximum ERP: 10.980 kW

# Directional Antenna System for WCHR, Manahawkin, New Jersey

(Continued)

## ANTENNA SPECIFICATIONS

Antenna Type: 1194-3CP-DA-SP  
Frequency: 105.7 MHz  
Number of Bays: Three

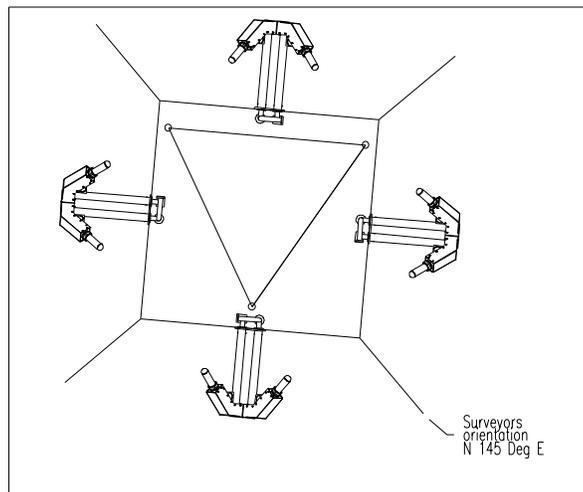
## MECHANICAL SPECIFICATIONS

Mounting: Custom  
System length: 22 ft 6 in  
Aperture length required: 32 ft 6 in  
Orientation: 145° true  
Input flange to the antenna 1 5/8" female.

## ELECTRICAL SPECIFICATIONS

(For directional use)

Maximum horizontal ERP: 13.000 kW (11.139 dBk)  
Horizontal maximum power gain: 2.201 (3.426 dB)  
Maximum vertical ERP: 10.98 kW (10.406 dBk)  
Vertical maximum power gain: 1.859 (2.692 dB)  
Total input power: 5.907 kW (7.714 dBk)



**DUFFY • DOLCY • McMANUS & ROESCH**

634 LOST PINE WAY, GALLOWAY, NJ 08205 • 609-652-0105 • FAX# 609-652-2032

November 20, 2019

Tom Trembly  
Townsquare Media  
8 Robbins Street, Ste. 201  
Toms River, NJ 08753

RE: Antenna Orientation  
Block 1605, Lot 1.18  
Berkeley Township  
Ocean County, NJ  
Project #10302

Dear Tom,

Please be advised that, as requested, my field crew located the antenna that sits atop the tower located on the referenced parcel. The antenna's southeast wing is oriented at azimuth 145.00 degrees based on N.J. State Plane Coordinate System derived by using GPS Control. The location of the orientation of the wing is within 0.1 degree.

Should have any questions, please feel free to call.



William P. McManus, PLS  
Professional Land Surveyor  
N.J. License No. 31660

Enclosure  
WPM/hmt



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**November 21, 2019**

**FCC Permit File Number: BMPH-20181203AAS**

**BROADCAST ENGINEER AFFIDAVIT**

This affidavit is to certify that the antenna for Facility ID 24934, WCHR-FM, was installed on the tower located at 1015 Atlantic City Blvd., Bayville, New Jersey (ASRN 1047622) in strict accordance with manufacturer instructions and documentation.

The ERI 1194-3CP-DA-SP panel antenna was assembled and installed by a crew from Stellar Communication Systems, LLC. under my direct supervision and observation.

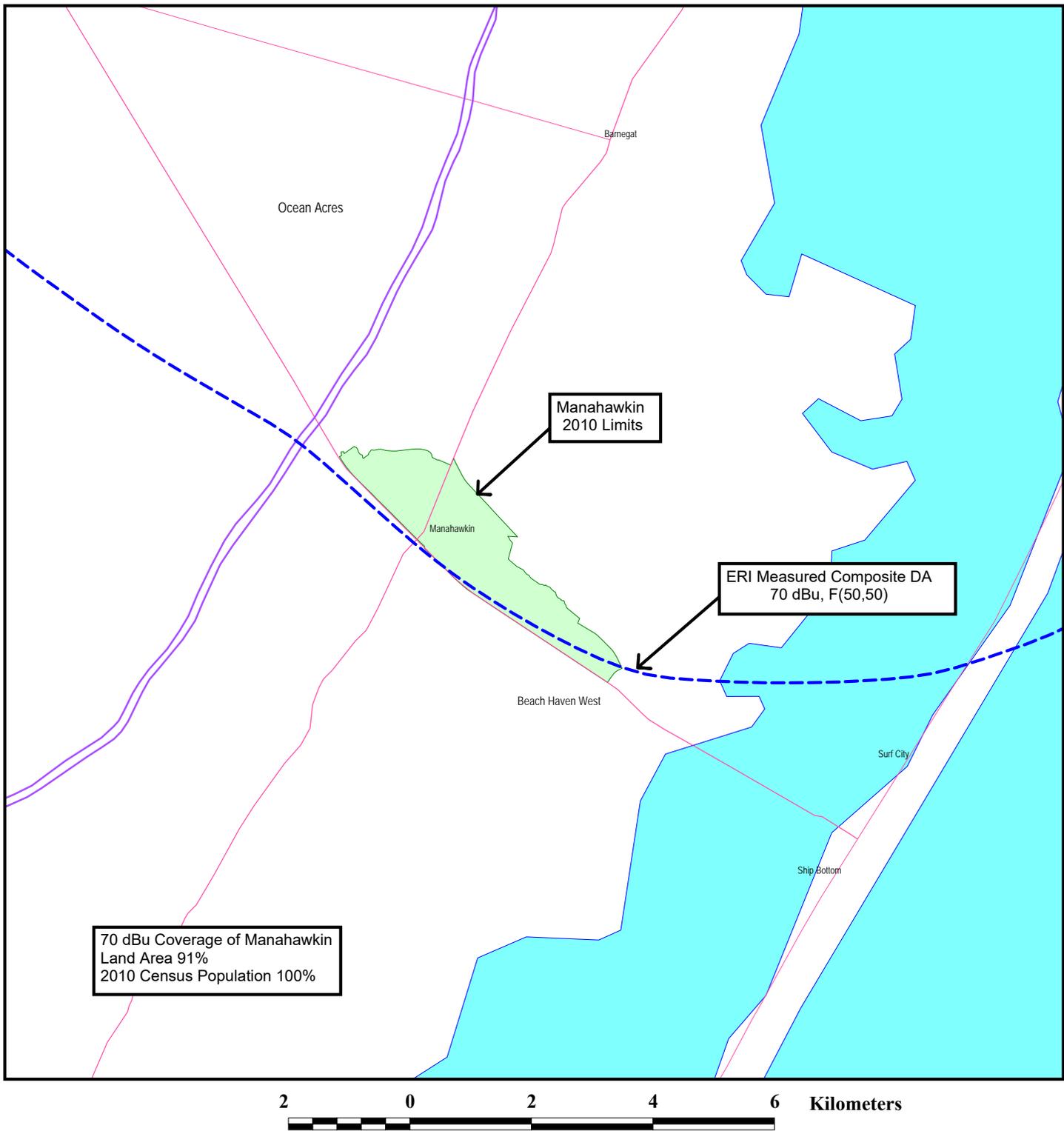
I have been a broadcast engineer for over 17 years, including experience with RF and antenna systems, and have served as Chief Engineer for WCHR-FM and its sister stations since 2012.

Respectfully submitted,

Thomas J. Trembly, Jr.

Chief Engineer – WCHR-FM, WOBFM-FM, WJLK-FM, WOBFM-AM, WADB-AM, W228EH

Figure 1



**COMPLIANCE WITH SECTION 73.315**

**STATION WCHR-FM  
MANAHAWKIN, NEW JERSEY  
CH 289B1 (105.7 MHz) 13 KW (DA) 139 M**

du Treil, Lundin & Rackley, Inc. Sarasota, Florida