ELECTRONICS RESEARCH, INC. ERI®

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 WGSS, Copiague, New York

March 26, 2012

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 WGSS.

The antenna is the ERI model 100A-2F-DA-HW configuration. The circular polarized system consists of two half-wavelength spaced bays using one driven circular polarized radiating element per bay, two horizontal parasitic elements per bay and two vertical parasitic elements per bay. The antenna was tested on a steel pole, which is the structure the station plans to use to support the array. All tests were performed on a frequency of 89.3 megahertz, which is the center of the FM broadcast channel assigned to WGSS.

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
WGSS, Copiague, New York

(Continued)

DESCRIPTION OF THE TEST PROCEDURE

The test antenna consisted of a full-scale model of the complete circular polarized system with the associated horizontal and 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.

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 steel 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 a US Digital angle position indicator. The resolution of this angle position indicator is one-hundredth of a degree.

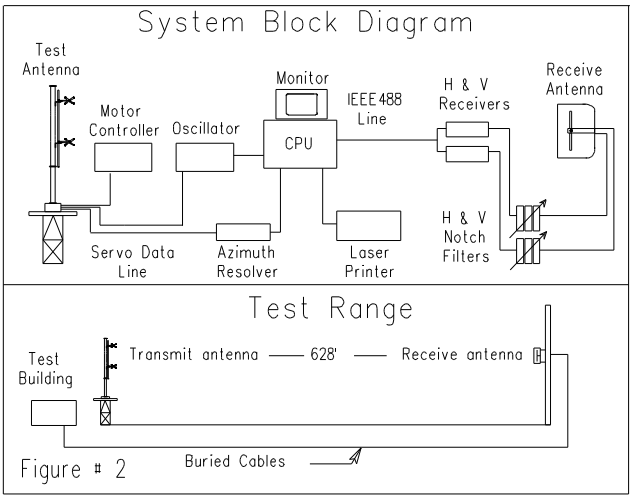

Figure # 2

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 89.3 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. The dipole system was mounted at the same height above terrain as the center of the antenna under test.

(Continued)

The signals received by the dipole system were fed to the test building by way of two buried Heliax 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 co-ordinated graph paper in a clockwise direction. Both horizontal and vertical components were recorded separately.

CONCLUSIONS

The circular polarized system consists of two half-wavelength spaced bays using one driven circular polarized radiating element per bay, two horizontal parasitic elements per bay 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 100A-2F-DA-HW array is to be mounted on the steel pole at a bearing of North 120 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 maximum value of either the horizontal or vertical component at any azimuth. The measured horizontal plane relative field pattern, for both the horizontal and vertical polarization components, is shown on Figure #2 attached. 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 0.110 kilowatts (-9.586 dBk).

The power at North 30 degrees East does not exceed .052 kilowatts (-12.84 dBk).

The power at North 100-120 degrees East does not exceed .060 kilowatts (-12.218 dBk).

The power at North 280-290 degrees East does not exceed .0035 kilowatts (-24.559 dBk).

(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 that 85% of the filed composite pattern.

The clear vertical length of the structure required to support the antenna is 20 feet 5 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.

ERI® Horizontal Plane Relative Field Pattern

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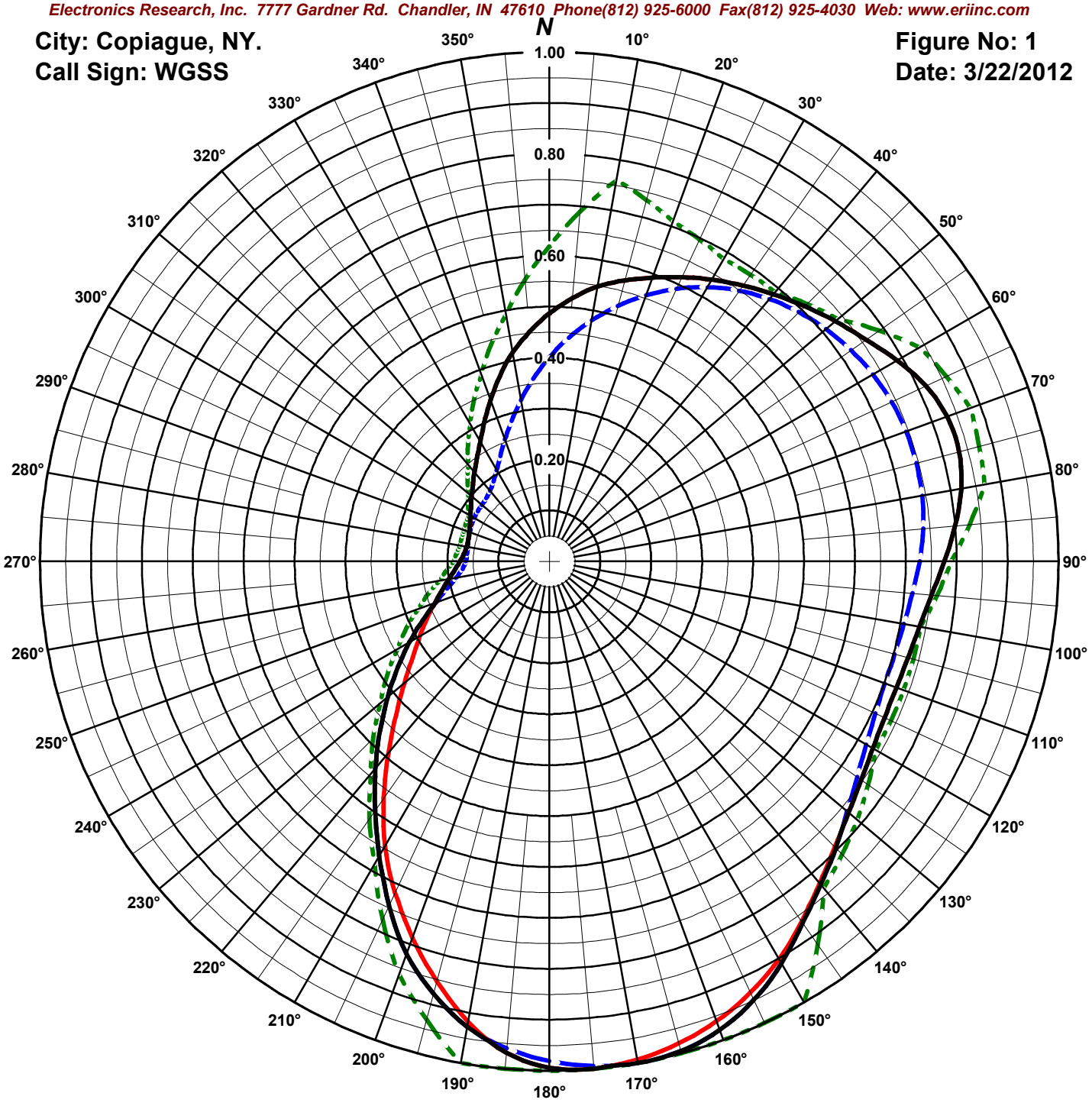
City: Copiague, NY.
Call Sign: WGSS

Figure No: 1
Date: 3/22/2012



Antenna Orientation: 120° True

Frequency: 89.3 MHz
Antenna Type: 100A-2F-DA-HW

Antenna Mounting: Custom
Tower Type: Steel pole

HORIZONTAL	VERTICAL	COMPOSITE	FCC ENVELOPE
RMS: .634	RMS: .618	RMS: .64	RMS: .675
Maximum: 1 @ 176°	Maximum: 1 @ 169°	Maximum: 1 @ 169°	Maximum: 1 @ 150°
Minimum: .164 @ 282°	Minimum: .162 @ 275°	Minimum: .164 @ 282°	Minimum: .178 @ 280°

Measured patterns of the horizontal and vertical components, with the composite maximum of either the the H or V components and the filed FCC envelope pattern BMPED-20111130JFL.

ERI® Horizontal Plane Relative Field Pattern

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Figure# 1 **Date: 3/22/2012**
Station: WGSS **Antenna: 100A-2F-DA-HW**
Location: Copiague, NY. **Antenna Orientation: 120° True**
Frequency: 89.3 MHz **Number of Bays: 2**

Azimuth	Envelope			Polarization	Azimuth	Envelope			Polarization
	Field	kW	dBk	Maximum		Field	kW	dBk	Maximum
0°	0.487	0.026	-15.841	Horizontal	180°	0.994	0.109	-9.639	Horizontal
5°	0.518	0.030	-15.295	Horizontal	185°	0.968	0.103	-9.867	Horizontal
10°	0.548	0.033	-14.811	Horizontal	190°	0.928	0.095	-10.233	Vertical
15°	0.571	0.036	-14.454	Horizontal	195°	0.878	0.085	-10.714	Vertical
20°	0.593	0.039	-14.127	Horizontal	200°	0.820	0.074	-11.311	Vertical
25°	0.615	0.042	-13.803	Horizontal	205°	0.745	0.061	-12.147	Vertical
30°	0.638	0.045	-13.484	Horizontal	210°	0.668	0.049	-13.090	Vertical
35°	0.661	0.048	-13.180	Horizontal	215°	0.596	0.039	-14.075	Vertical
40°	0.684	0.052	-12.879	Horizontal	220°	0.531	0.031	-15.082	Vertical
45°	0.709	0.055	-12.579	Horizontal	225°	0.470	0.024	-16.146	Vertical
50°	0.733	0.059	-12.280	Horizontal	230°	0.414	0.019	-17.244	Vertical
55°	0.759	0.063	-11.978	Horizontal	235°	0.363	0.014	-18.392	Vertical
60°	0.789	0.068	-11.647	Horizontal	240°	0.317	0.011	-19.575	Vertical
65°	0.816	0.073	-11.356	Horizontal	245°	0.274	0.008	-20.831	Vertical
70°	0.831	0.076	-11.191	Horizontal	250°	0.240	0.006	-21.999	Horizontal
75°	0.833	0.076	-11.173	Horizontal	255°	0.218	0.005	-22.813	Horizontal
80°	0.822	0.074	-11.293	Horizontal	260°	0.200	0.004	-23.554	Horizontal
85°	0.800	0.070	-11.526	Horizontal	265°	0.186	0.004	-24.196	Horizontal
90°	0.776	0.066	-11.790	Horizontal	270°	0.175	0.003	-24.711	Horizontal
95°	0.753	0.062	-12.046	Horizontal	275°	0.168	0.003	-25.072	Horizontal
100°	0.738	0.060	-12.223	Horizontal	280°	0.165	0.003	-25.258	Horizontal
105°	0.729	0.059	-12.326	Horizontal	285°	0.165	0.003	-25.260	Horizontal
110°	0.725	0.058	-12.376	Horizontal	290°	0.167	0.003	-25.127	Horizontal
115°	0.726	0.058	-12.362	Horizontal	295°	0.172	0.003	-24.883	Horizontal
120°	0.734	0.059	-12.274	Horizontal	300°	0.179	0.004	-24.540	Horizontal
125°	0.747	0.061	-12.114	Horizontal	305°	0.188	0.004	-24.110	Horizontal
130°	0.767	0.065	-11.888	Horizontal	310°	0.199	0.004	-23.605	Horizontal
135°	0.796	0.070	-11.564	Vertical	315°	0.212	0.005	-23.039	Horizontal
140°	0.829	0.076	-11.214	Vertical	320°	0.228	0.006	-22.410	Horizontal
145°	0.867	0.083	-10.823	Vertical	325°	0.248	0.007	-21.708	Horizontal
150°	0.911	0.091	-10.394	Vertical	330°	0.271	0.008	-20.925	Horizontal
155°	0.950	0.099	-10.028	Vertical	335°	0.301	0.010	-20.001	Horizontal
160°	0.979	0.105	-9.772	Vertical	340°	0.337	0.012	-19.035	Horizontal
165°	0.995	0.109	-9.626	Vertical	345°	0.376	0.016	-18.090	Horizontal
170°	1.000	0.110	-9.586	Vertical	350°	0.416	0.019	-17.203	Horizontal
175°	1.000	0.110	-9.588	Horizontal	355°	0.452	0.022	-16.487	Horizontal

Horizontal Polarization:
Maximum: 1.606 (2.058 dB)
Horizontal Plane: 1.606 (2..58 dB)
Maximum ERP: 0.110 kW

Vertical Polarization:
Maximum: 1.606 (2.058 dB)
Horizontal Plane: 1.606 (2.058 dB)
Maximum ERP: 0.110 kW

Total Input Power: 0.068 kW
Reference: WGSS1M.FIG

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

ERI® Horizontal Plane Relative Field Pattern

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Figure# 1A **Date: 3/22/2012**
Station: WGSS **Antenna: 100A-2F-DA-HW**
Location: Copiague, NY. **Antenna Orientation: 120° True**
Frequency: 89.3 MHz **Number of Bays: 2**

Azimuth	Horizontal			Vertical			Azimuth	Horizontal			Vertical		
	Field	kW	dBk	Field	kW	dBk		Field	kW	dBk	Field	kW	dBk
0°	0.487	0.026	-15.841	0.400	0.018	-17.538	180°	0.994	0.109	-9.639	0.981	0.106	-9.754
5°	0.518	0.030	-15.295	0.441	0.021	-16.702	185°	0.968	0.103	-9.867	0.960	0.101	-9.943
10°	0.548	0.033	-14.811	0.480	0.025	-15.954	190°	0.918	0.093	-10.329	0.928	0.095	-10.233
15°	0.571	0.036	-14.454	0.519	0.030	-15.283	195°	0.853	0.080	-10.967	0.878	0.085	-10.714
20°	0.593	0.039	-14.127	0.556	0.034	-14.685	200°	0.786	0.068	-11.677	0.820	0.074	-11.311
25°	0.615	0.042	-13.803	0.590	0.038	-14.163	205°	0.717	0.057	-12.478	0.745	0.061	-12.147
30°	0.638	0.045	-13.484	0.621	0.042	-13.717	210°	0.645	0.046	-13.394	0.668	0.049	-13.090
35°	0.661	0.048	-13.180	0.649	0.046	-13.343	215°	0.567	0.035	-14.521	0.596	0.039	-14.075
40°	0.684	0.052	-12.879	0.672	0.050	-13.034	220°	0.492	0.027	-15.746	0.531	0.031	-15.082
45°	0.709	0.055	-12.579	0.692	0.053	-12.779	225°	0.425	0.020	-17.009	0.470	0.024	-16.146
50°	0.733	0.059	-12.280	0.709	0.055	-12.572	230°	0.372	0.015	-18.186	0.414	0.019	-17.244
55°	0.759	0.063	-11.978	0.723	0.058	-12.403	235°	0.327	0.012	-19.294	0.363	0.014	-18.392
60°	0.789	0.068	-11.647	0.734	0.059	-12.271	240°	0.293	0.009	-20.243	0.317	0.011	-19.575
65°	0.816	0.073	-11.356	0.742	0.061	-12.181	245°	0.265	0.008	-21.137	0.274	0.008	-20.831
70°	0.831	0.076	-11.191	0.745	0.061	-12.137	250°	0.240	0.006	-21.999	0.237	0.006	-22.077
75°	0.833	0.076	-11.173	0.746	0.061	-12.130	255°	0.218	0.005	-22.813	0.208	0.005	-23.227
80°	0.822	0.074	-11.293	0.743	0.061	-12.163	260°	0.200	0.004	-23.554	0.186	0.004	-24.202
85°	0.800	0.070	-11.526	0.737	0.060	-12.237	265°	0.186	0.004	-24.196	0.171	0.003	-24.919
90°	0.776	0.066	-11.790	0.727	0.058	-12.354	270°	0.175	0.003	-24.711	0.164	0.003	-25.301
95°	0.753	0.062	-12.046	0.715	0.056	-12.494	275°	0.168	0.003	-25.072	0.162	0.003	-25.385
100°	0.738	0.060	-12.223	0.707	0.055	-12.597	280°	0.165	0.003	-25.258	0.163	0.003	-25.353
105°	0.729	0.059	-12.326	0.702	0.054	-12.657	285°	0.165	0.003	-25.260	0.164	0.003	-25.277
110°	0.725	0.058	-12.376	0.701	0.054	-12.671	290°	0.167	0.003	-25.127	0.166	0.003	-25.167
115°	0.726	0.058	-12.362	0.706	0.055	-12.604	295°	0.172	0.003	-24.883	0.169	0.003	-25.048
120°	0.734	0.059	-12.274	0.719	0.057	-12.455	300°	0.179	0.004	-24.540	0.170	0.003	-24.955
125°	0.747	0.061	-12.114	0.738	0.060	-12.228	305°	0.188	0.004	-24.110	0.172	0.003	-24.894
130°	0.767	0.065	-11.888	0.764	0.064	-11.928	310°	0.199	0.004	-23.605	0.172	0.003	-24.851
135°	0.793	0.069	-11.599	0.796	0.070	-11.564	315°	0.212	0.005	-23.039	0.175	0.003	-24.714
140°	0.825	0.075	-11.254	0.829	0.076	-11.214	320°	0.228	0.006	-22.410	0.181	0.004	-24.429
145°	0.863	0.082	-10.863	0.867	0.083	-10.823	325°	0.248	0.007	-21.708	0.191	0.004	-23.957
150°	0.902	0.089	-10.486	0.911	0.091	-10.394	330°	0.271	0.008	-20.925	0.207	0.005	-23.282
155°	0.934	0.096	-10.176	0.950	0.099	-10.028	335°	0.301	0.010	-20.001	0.228	0.006	-22.434
160°	0.961	0.101	-9.936	0.979	0.105	-9.772	340°	0.337	0.012	-19.035	0.254	0.007	-21.476
165°	0.980	0.106	-9.760	0.995	0.109	-9.626	345°	0.376	0.016	-18.090	0.286	0.009	-20.470
170°	0.993	0.109	-9.644	1.000	0.110	-9.586	350°	0.416	0.019	-17.203	0.321	0.011	-19.454
175°	1.000	0.110	-9.588	0.994	0.109	-9.634	355°	0.452	0.022	-16.487	0.360	0.014	-18.464

Horizontal Polarization:
Maximum: 1.606 (2.058 dB)
Horizontal Plane: 1.606 (2.058 dB)
Maximum ERP: 0.110 kW

Vertical Polarization:
Maximum: 1.606 (2.058 dB)
Horizontal Plane: 1.606 (2.058 dB)
Maximum ERP: 0.110 kW

Total Input Power: 0.068 kW
Reference: WGSS1M.FIG

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

ERI® Vertical Plane Relative Field Pattern

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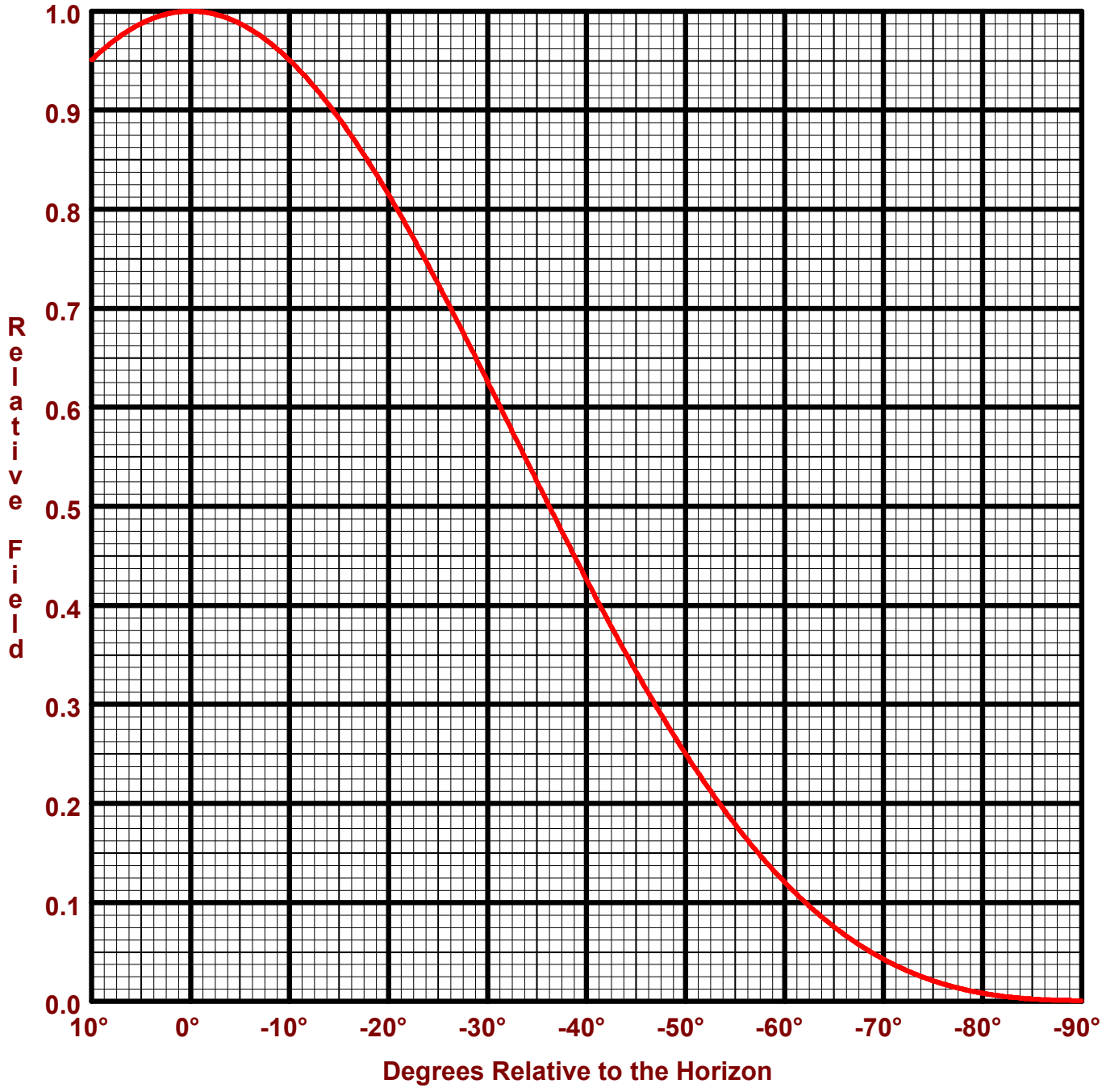
Figure No: 3
Call Sign: WGSS
Location: Copiague, NY.
Frequency: 89.3 MHz
2 bay 100A-2F-DA-HW antenna

Date: 3/22/2012
H/V Power Ratio: 1
.5 Wave-length Spacing
0° Beam Tilt
0% First Null Fill



Horizontal Polarization:
Maximum: 1.606 (2.058 dB)
Horizontal Plane: 1.606 (2.058 dB)
Maximum ERP: 0.110 kW

Vertical Polarization:
Maximum: 1.606 (2.058 dB)
Horizontal Plane: 1.606 (2.058 dB)
Maximum ERP: 0.110 kW

Directional Antenna System
for
WGSS, Copiague, New York

(Continued)

ANTENNA SPECIFICATIONS

Antenna Type:	100A-2F-DA-HW
Frequency:	89.3 MHz
Number of Bays:	Two

MECHANICAL SPECIFICATIONS

Mounting:	Custom
System length:	5 ft 5 in
Aperture length required:	20 ft 5 in
Orientation:	120 ° true

Input flange to the antenna 7-16 Din female.

ELECTRICAL SPECIFICATIONS
(For directional use)

Maximum horizontal ERP:	0.11 kW (-9.586 dBk)
Horizontal maximum power gain:	1.606 (2.058 dB)
Maximum vertical ERP:	0.11 kW (-9.586 dBk)
Vertical maximum power gain:	1.606 (2.058 dB)
Total input power:	0.068 kW (-11.644 dBk)