



Propagation Systems, Inc.

Exhibit 9
Proof-of-Performance

Quality Broadcast Antenna Systems

Directional FM Antenna

WRVX

VCY America, Inc.

Cameron, MO

A standard model PSIFMR antenna with parasitic elements was used in conjunction with the customer's 24" face triangular tower to create the necessary directional radiation pattern. The final antenna consists of six radiating elements each secured to the tower with a custom mounting bracket. The antenna bays are full wave spaced and there are two horizontal parasitic elements per bay. The antenna array is end fed from an existing flexible transmission line. Each radiating element receives equal power and phase.

Pattern testing was performed using a 1/3 scale model element and tower. The azimuth plane measurements were taken on a ground reflection test range. This type of test range utilizes the reflected signal and direct signal from the source antenna to form an interference pattern on the antenna under test. The antenna and tower under test was mounted to a turntable that allowed the structure to be rotated 360° in the azimuth plane. The source antenna was located approximately 75 ft. from the antenna under test. The source height above ground was adjusted to peak the first lobe of the interference pattern at the antenna under test.

The test antenna was mounted in the center of rotation of the turntable. The antenna and mounting structure were rotated clockwise while data was recorded in a counter clockwise direction. All feed cables to the antenna were secured and grounded during pattern measurements. A Hewlett Packard 8753E-network analyzer operating at 275.1 MHz was used as both the source and receiver. The level of the received signal was compared with a standard dipole to establish the directivity of the final pattern. The final pattern measured does not exceed the envelope pattern and is 87.0% of the envelope RMS.

The antenna is to be mounted 80 meters (262 ft.) +2/-4 meters above ground level on a the east tower face positioned 90° True. No other antenna can be installed within 10 ft of any radiating element. Any guy wire that passes within 20 ft. of a radiating element must be changed to the appropriate non-metallic substitute. It is recommended that a broadcast engineer be present to supervise the installation of the antenna and that he or she certifies that the antenna has been installed according to the enclosed instructions.


An input power level of 5.17 kW will be required at the antenna input in order to reach the approved 27.5 kW ERP. The transmitter output power requirements are dependent upon the transmission line size and length used to feed the antenna. The final length of transmission line must be determined after installation.

Antenna Specifications

Antenna Model	PSIFMR-6-DA
Type	6-bay directional FM antenna
Bay Spacing	Full wave spaced elements
Frequency	91.7 MHz
Polarization	Circular
Envelope RMS	.892
Composite RMS	.776
Gain (h-pol)	5.31 (7.25 dB)
Gain (v-pol)	5.20 (7.16 dB)
ERP	27.5 kW
Antenna input power	5.17 kW
Input	1-5/8" EIA end fed input
Power rating	9 kW
Length	65.5 ft.
Weight	494 lbs.
Wind Area	29 sq. ft.

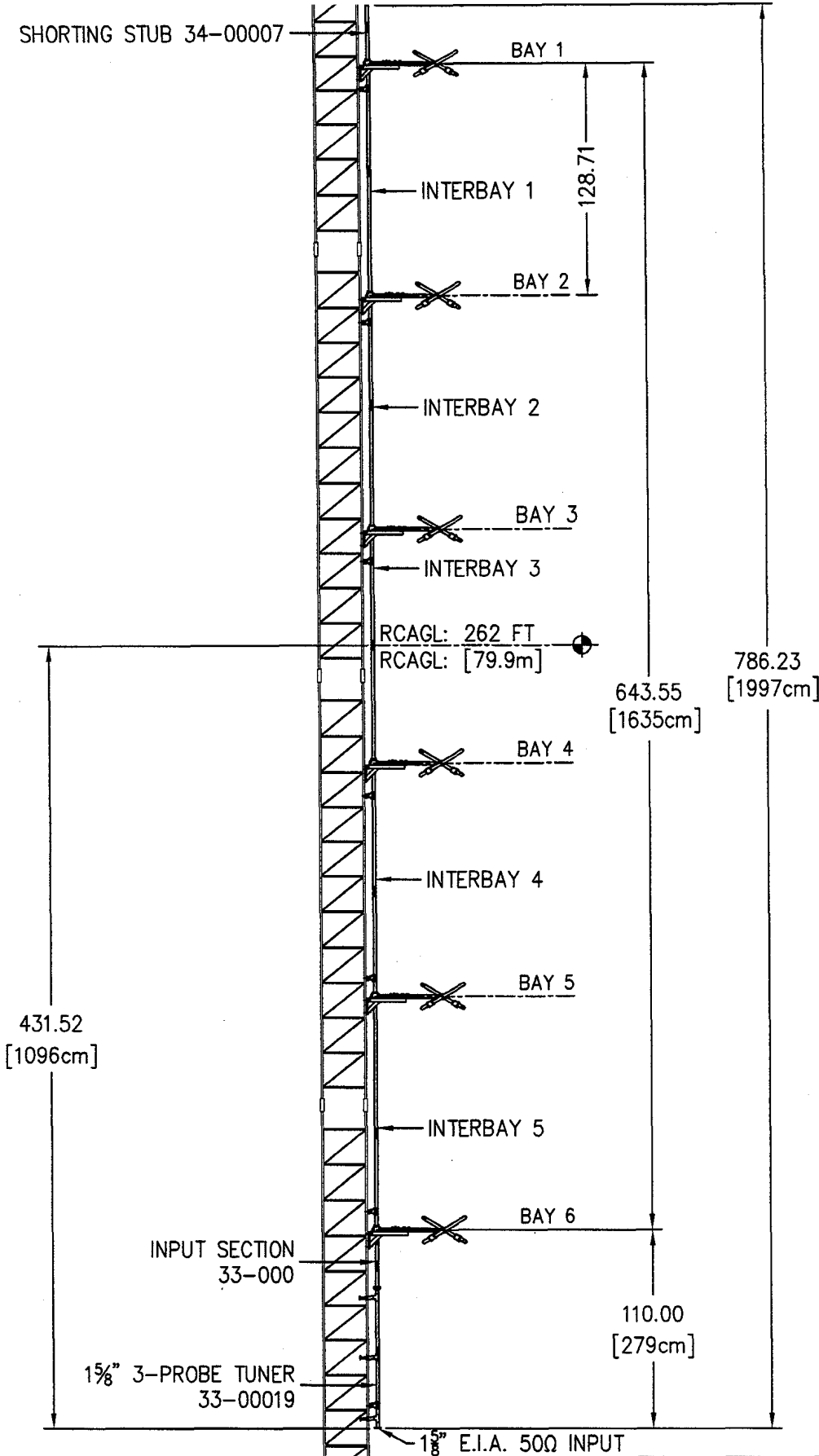
Statement of Certification

This is to certify the antenna has been designed, fabricated and tested under my supervision and it meets the required envelope pattern limitations set forth in the stations construction permit.



9/10/2012

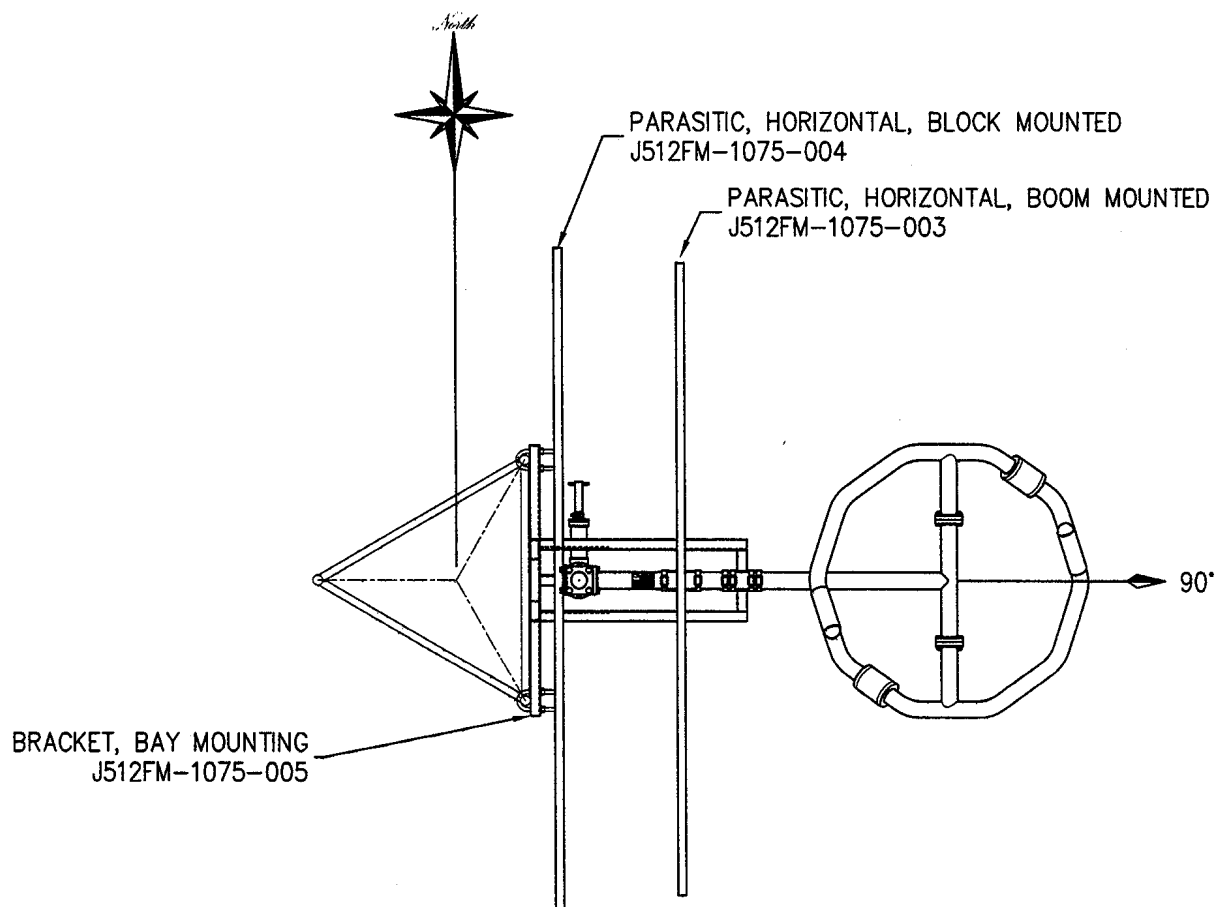
Douglas A. Ross
President
Propagation Systems Inc.



SPECIFICATIONS	
SPACING:	1.0λ
LENGTH:	65.5 [20m]
APERTURE:	53.63 FT [16.35m]
RATING:	9 kW
GAIN:	5.31 (7.25 dB)
WEIGHT:	494 LB [225 Kg]
WINDAREA:	29 FT ²
TIA-222-F	(NO ICE)
NOTES:	
1. REF. J512FM-1075-011 FOR ELEVATIONS AND ASSEMBLY AT BAYS 1 AND 2	
2. REF. J512FM-1075-012 FOR ELEVATIONS AND ASSEMBLY AT BAYS 3 AND 4	
3. REF. J512FM-1075-013 FOR ELEVATIONS AND ASSEMBLY AT INPUT	
4. 15/8" 3-PROBE TUNER SHOWN ROTATED FOR DRAWING CLARITY.	

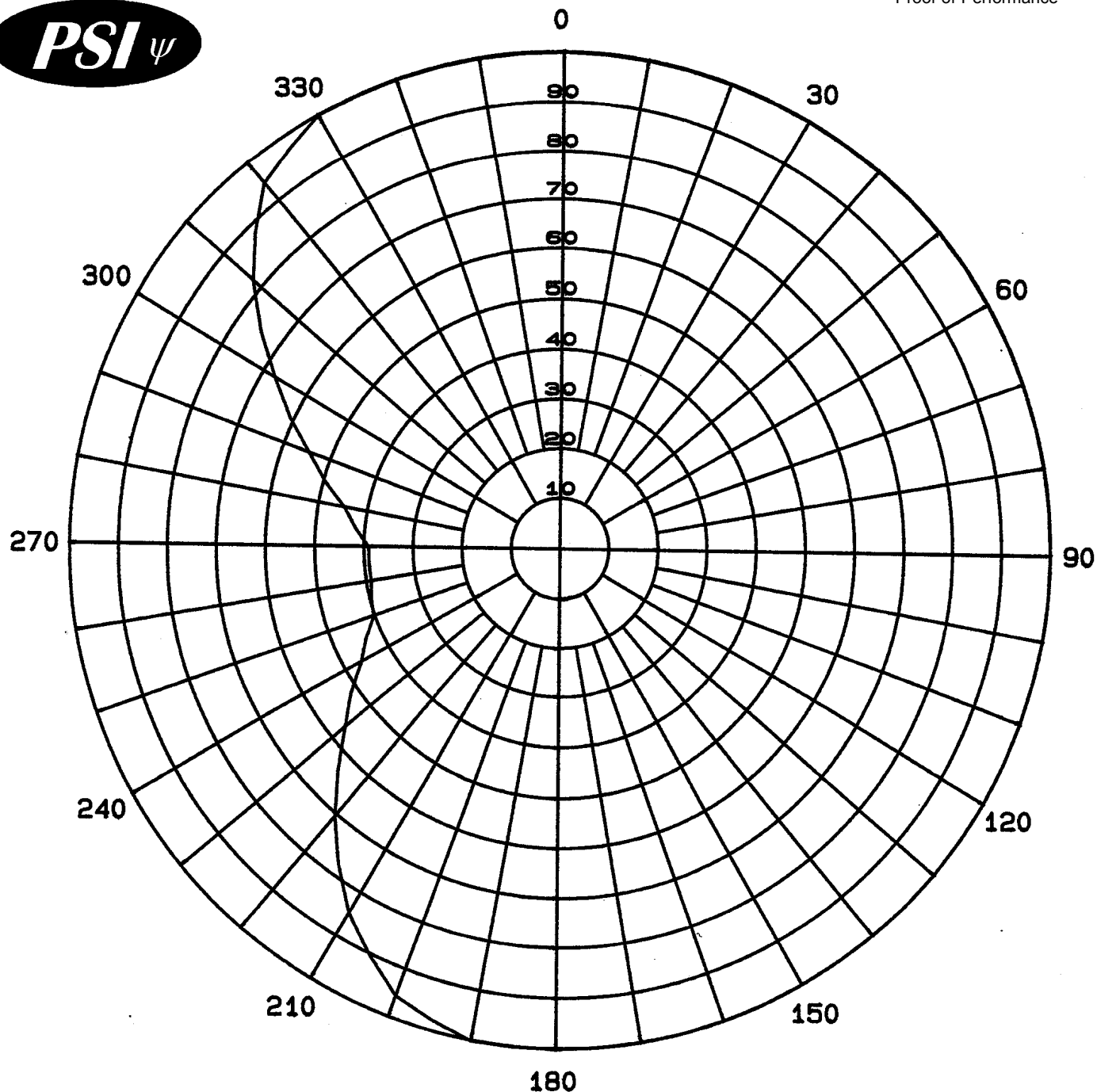
REV.	MADE BY CHECKED BY	DATE	CHANGE
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SIZE			A

PROPAGATION SYSTEMS, INC.			
Ebensburg, Pennsylvania USA 814-472-5540			
ELEVATIONS AND SPECIFICATIONS			
MODEL:	PSIFMR-6-DA	DRAWN BY:	D.G. Kellar
CHANNEL/FREQUENCY:	91.7 MHz	APPROVED BY:	
SCALE:	1:90	DRAWING NO.:	J512FM-1075-001
DATE:			6/29/12
DATE:			
REV.			



PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA 814-472-5540						
				PLAN VIEW AND ORIENTATION		
REV.	MADE BY CHECKED BY	DATE	CHANGE	MODEL: PSIFMR-6-DA CHANNEL/FREQUENCY: 91.7 MHz SCALE: 1:20	DRAWN BY: D.G. Kellar APPROVED BY: DRAWING NO.: J512FM-1075-002	DATE: 6/29/12 DATE: REV.
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making or finish any reproductions hereof, or for the design or making of any item, parts, object, apparatus or parts thereof, except upon the written permissions of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the forgoing agreement.				SIZE A		

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Maximum Envelope
Azimuth Plane Pattern
Antenna: PSIFMR-6-DA
Type: 6-Bay Directional FM Antenna
ERP: 27.5 kW (14.39 dBk)
RMS Envelope: .892
Frequency: 91.7 MHz
WRVX Cameron, MO

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Maximum Envelope Tabulation

Exhibit 9
Proof-of-Performance

Antenna: PSIFMR-6-DA

VCY America, Inc.

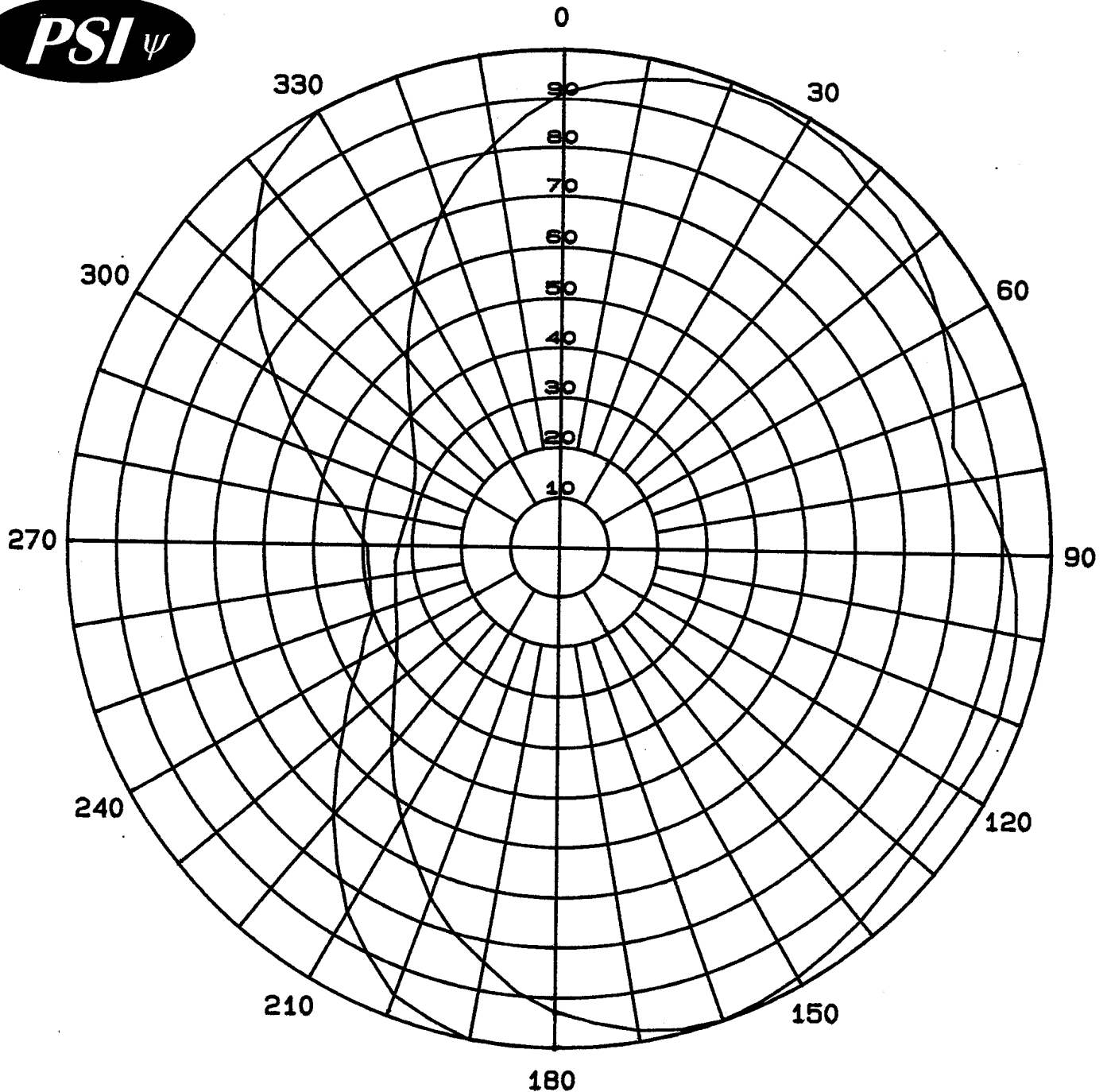
Station: WRVX

Frequency: 91.7 MHz

Location: Cameron, MO

Maximum ERP: 27.5 kW (14.39 dBk)

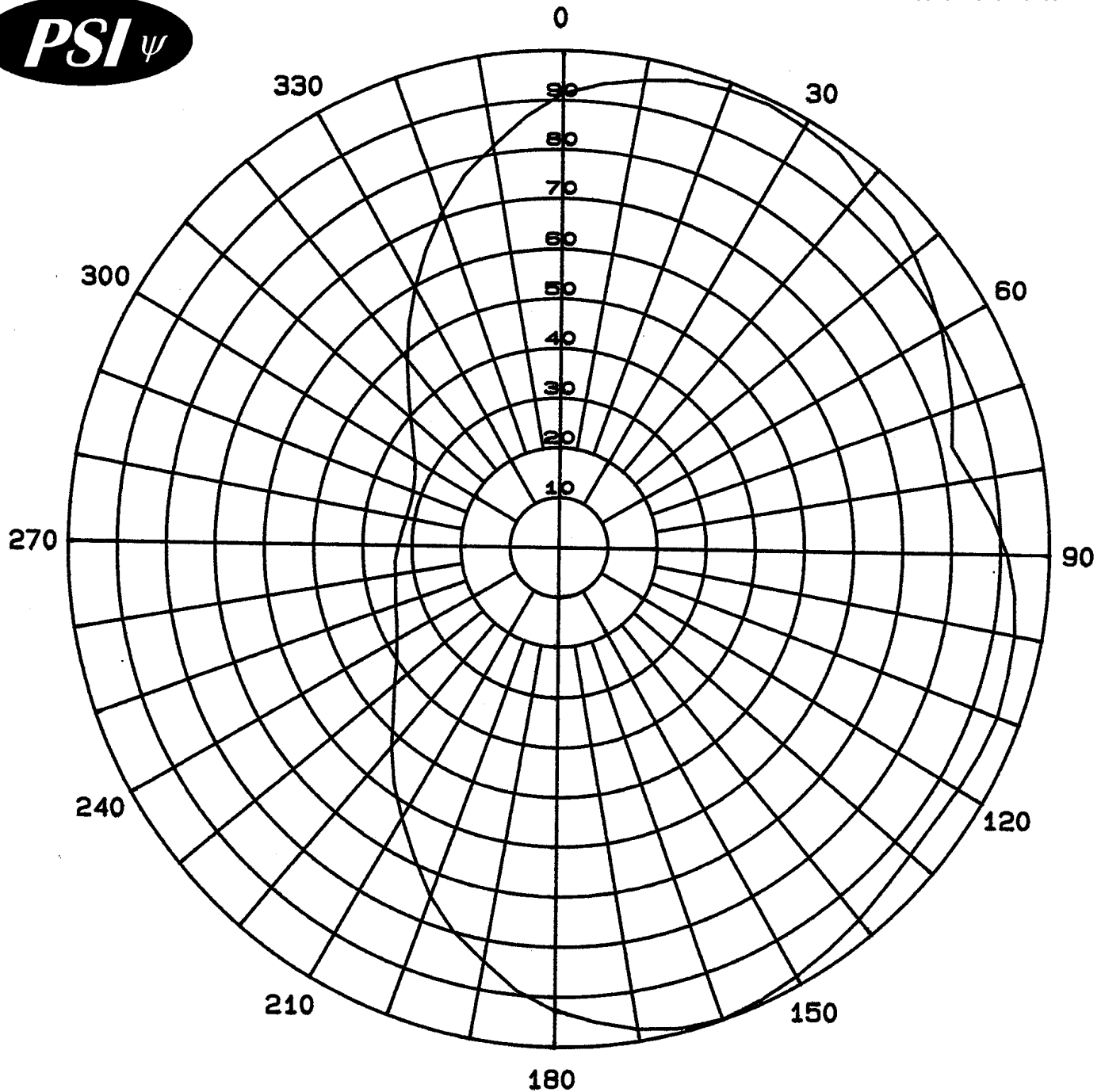
Angle	Relative Field	ERP (kW)	ERP (dBk)
0	1.000	27.50	14.39
10	1.000	27.50	14.39
20	1.000	27.50	14.39
30	1.000	27.50	14.39
40	1.000	27.50	14.39
50	1.000	27.50	14.39
60	1.000	27.50	14.39
70	1.000	27.50	14.39
80	1.000	27.50	14.39
90	1.000	27.50	14.39
100	1.000	27.50	14.39
110	1.000	27.50	14.39
120	1.000	27.50	14.39
130	1.000	27.50	14.39
140	1.000	27.50	14.39
150	1.000	27.50	14.39
160	1.000	27.50	14.39
170	1.000	27.50	14.39
180	1.000	27.50	14.39
190	1.000	27.50	14.39
200	0.955	25.08	13.99
210	0.846	19.68	12.94
220	0.706	13.71	11.37
230	0.568	8.87	9.48
240	0.465	5.95	7.74
250	0.402	4.44	6.48
260	0.389	4.16	6.19
270	0.389	4.16	6.19
280	0.445	5.45	7.36
290	0.543	8.11	9.09
300	0.671	12.38	10.93
310	0.821	18.54	12.68
320	0.946	24.61	13.91
330	1.000	27.50	14.39
340	1.000	27.50	14.39
350	1.000	27.50	14.39



Maximum Envelope and
Composite Pattern
Antenna: PSIFMR-6-DA
Type: 6-Bay Directional FM Antenna
ERP: 27.5 kW (14.39 dBk)
RMS Envelope: .892
RMS Composite: .776
Frequency: 91.7 MHz

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

WRVX Cameron, MO



Measured Composite
Azimuth Plane Pattern
Antenna: PSIFMR-6-DA
Type: 6-Bay Directional FM Antenna
ERP: 27.5 kW (14.39 dBk)
RMS Composite: .776
Frequency: 91.7 MHz
WRVX Cameron, MO

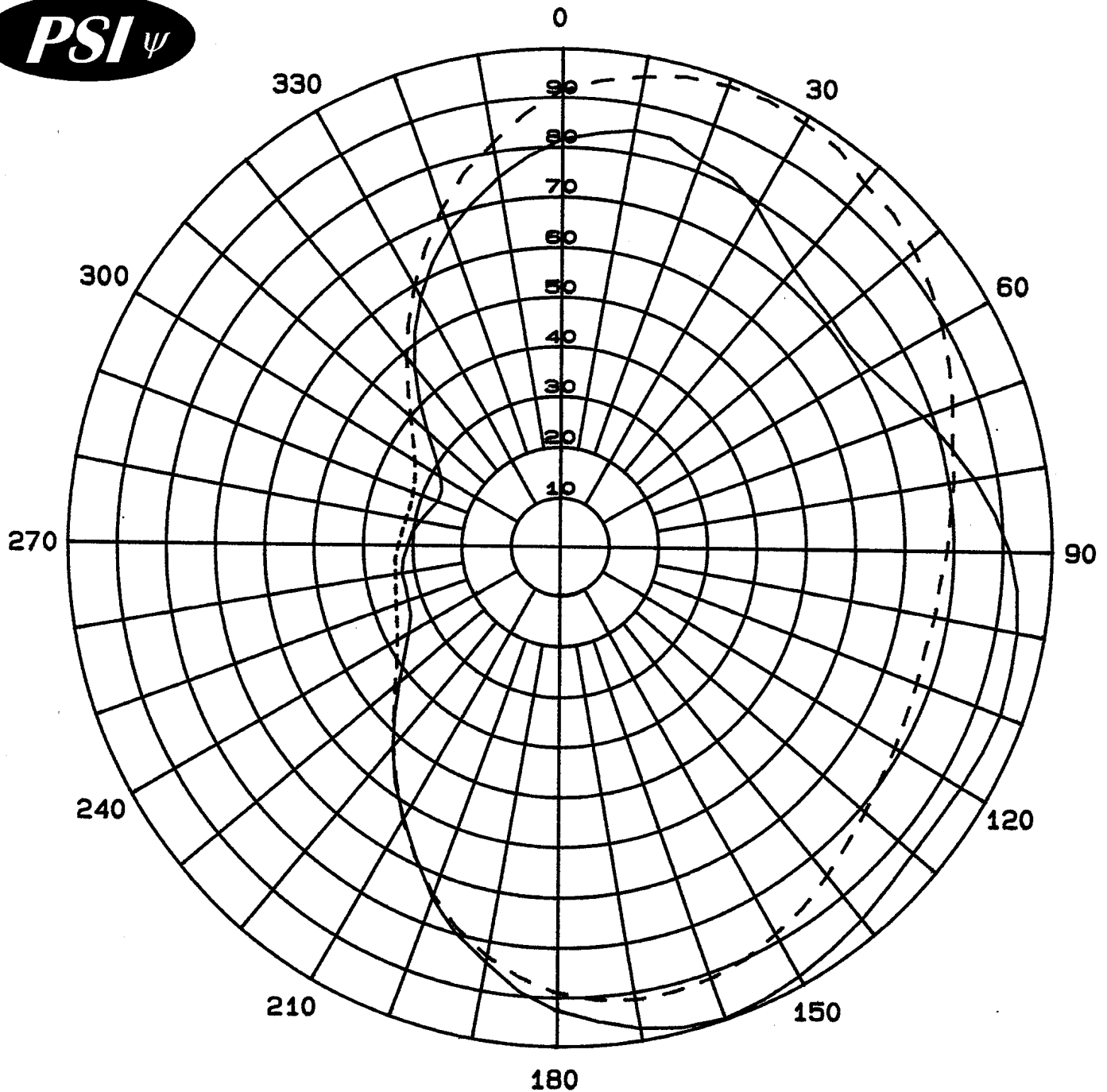
Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Composite Pattern Tabulation

Exhibit 9
Proof-of-Performance

Antenna: PSIFMR-6-DA
VCY America, Inc.
Station: WRVX
Frequency: 91.7 MHz
Location: Cameron, MO
Maximum ERP: 27.5 kW (14.39 dBk)

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.914	22.97	13.61
10	0.958	25.24	14.02
20	0.986	26.74	14.27
30	0.984	26.63	14.25
40	0.956	25.13	14.00
50	0.935	24.04	13.81
60	0.894	21.98	13.42
70	0.848	19.78	12.96
80	0.853	20.01	13.01
90	0.913	22.92	13.60
100	0.944	24.51	13.89
110	0.954	25.03	13.98
120	0.944	24.51	13.89
130	0.941	24.35	13.87
140	0.961	25.40	14.05
150	0.983	26.57	14.24
160	1.000	27.50	14.39
170	0.977	26.25	14.19
180	0.927	23.63	13.73
190	0.841	19.45	12.89
200	0.746	15.30	11.85
210	0.629	10.88	10.37
220	0.525	7.58	8.80
230	0.434	5.18	7.14
240	0.379	3.95	5.97
250	0.353	3.43	5.35
260	0.338	3.14	4.97
270	0.328	2.96	4.71
280	0.317	2.76	4.41
290	0.317	2.76	4.41
300	0.340	3.18	5.02
310	0.397	4.33	6.37
320	0.487	6.52	8.14
330	0.597	9.80	9.91
340	0.714	14.02	11.47
350	0.817	18.36	12.64



Measured Relative Field
Azimuth Plane Pattern
Antenna: PSIFMR-6-DA
Type: 6-Bay Directional FM Antenna
Gain H-pol (solid): 5.31 (7.25 dB)
Gain V-pol (dash): 5.20 (7.16 dB)
Frequency: 91.7 MHz
WRVX Cameron, MO

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Measured Relative Field Tabulation

Exhibit 9
Proof-of-Performance

Antenna: PSIFMR-6-DA

VCY America, Inc.

Station: WRVX

Frequency: 91.7 MHz

Location: Cameron, MO

Horizontal Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.815	3.527	5.47
10	0.847	3.809	5.81
20	0.824	3.605	5.57
30	0.790	3.314	5.20
40	0.733	2.853	4.55
50	0.716	2.722	4.35
60	0.725	2.791	4.46
70	0.782	3.247	5.12
80	0.853	3.864	5.87
90	0.913	4.426	6.46
100	0.944	4.732	6.75
110	0.954	4.833	6.84
120	0.944	4.732	6.75
130	0.941	4.702	6.72
140	0.961	4.904	6.91
150	0.983	5.131	7.10
160	1.000	5.310	7.25
170	0.977	5.069	7.05
180	0.927	4.563	6.59
190	0.841	3.756	5.75
200	0.746	2.955	4.71
210	0.628	2.094	3.21
220	0.525	1.464	1.65
230	0.425	0.959	-0.18
240	0.354	0.665	-1.77
250	0.327	0.568	-2.46
260	0.326	0.564	-2.48
270	0.310	0.510	-2.92
280	0.289	0.443	-3.53
290	0.265	0.373	-4.28
300	0.280	0.416	-3.81
310	0.353	0.662	-1.79
320	0.464	1.143	0.58
330	0.573	1.743	2.41
340	0.670	2.384	3.77
350	0.747	2.963	4.72

Maximum Value

Field 1.00
Gain 5.31 (7.25 dB)

Azimuth Bearing 160 degrees

Minimum Field

Field 0.265
Gain .373 (-4.28 dB)

Azimuth Bearing 290 degrees

Vertical Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.914	4.436	6.47
10	0.958	4.873	6.88
20	0.986	5.162	7.13
30	0.984	5.141	7.11
40	0.956	4.853	6.86
50	0.935	4.642	6.67
60	0.894	4.244	6.28
70	0.848	3.818	5.82
80	0.813	3.510	5.45
90	0.788	3.297	5.18
100	0.775	3.189	5.04
110	0.774	3.181	5.03
120	0.789	3.306	5.19
130	0.814	3.518	5.46
140	0.851	3.846	5.85
150	0.887	4.178	6.21
160	0.913	4.426	6.46
170	0.917	4.465	6.50
180	0.890	4.206	6.24
190	0.828	3.640	5.61
200	0.739	2.900	4.62
210	0.629	2.101	3.22
220	0.521	1.441	1.59
230	0.434	1.000	0.00
240	0.379	0.763	-1.18
250	0.353	0.662	-1.79
260	0.338	0.607	-2.17
270	0.328	0.571	-2.43
280	0.317	0.534	-2.73
290	0.317	0.534	-2.73
300	0.340	0.614	-2.12
310	0.397	0.837	-0.77
320	0.487	1.259	1.00
330	0.597	1.893	2.77
340	0.714	2.707	4.32
350	0.817	3.544	5.50

Maximum Value

Field 0.99
Gain 5.20 (7.16 dB)

Azimuth Bearing 25 degrees

Minimum Field

Field 0.315
Gain .527 (-2.78 dB)

Azimuth Bearing 285 degrees

ERP TabulationExhibit 9
Proof-of-Performance

Antenna: PSIFMR-6-DA

VCY America, Inc.

Station: WRVX

Frequency: 91.7 MHz

Location: Cameron, MO

Maximum ERP: 27.5 kW (14.39 dBk)

Horizontal Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.815	18.27	12.62
10	0.847	19.73	12.95
20	0.824	18.67	12.71
30	0.790	17.16	12.35
40	0.733	14.78	11.70
50	0.716	14.10	11.49
60	0.725	14.45	11.60
70	0.782	16.82	12.26
80	0.853	20.01	13.01
90	0.913	22.92	13.60
100	0.944	24.51	13.89
110	0.954	25.03	13.98
120	0.944	24.51	13.89
130	0.941	24.35	13.87
140	0.961	25.40	14.05
150	0.983	26.57	14.24
160	1.000	27.50	14.39
170	0.977	26.25	14.19
180	0.927	23.63	13.73
190	0.841	19.45	12.89
200	0.746	15.30	11.85
210	0.628	10.85	10.35
220	0.525	7.58	8.80
230	0.425	4.97	6.96
240	0.354	3.45	5.37
250	0.327	2.94	4.68
260	0.326	2.92	4.66
270	0.310	2.64	4.22
280	0.289	2.30	3.61
290	0.265	1.93	2.86
300	0.280	2.16	3.34
310	0.353	3.43	5.35
320	0.464	5.92	7.72
330	0.573	9.03	9.56
340	0.670	12.34	10.91
350	0.747	15.35	11.86

Maximum Value (H-pol)

Field 1.00

ERP 27.5 kW (14.39 dBk)

Azimuth Bearing 160 degrees

Minimum Field (H-pol)

Field 0.265

ERP 1.93 kW (2.86 dBk)

Azimuth Bearing 290 degrees

Vertical Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.914	22.97	13.61
10	0.958	25.24	14.02
20	0.986	26.74	14.27
30	0.984	26.63	14.25
40	0.956	25.13	14.00
50	0.935	24.04	13.81
60	0.894	21.98	13.42
70	0.848	19.78	12.96
80	0.813	18.18	12.60
90	0.788	17.08	12.32
100	0.775	16.52	12.18
110	0.774	16.47	12.17
120	0.789	17.12	12.33
130	0.814	18.22	12.61
140	0.851	19.92	12.99
150	0.887	21.64	13.35
160	0.913	22.92	13.60
170	0.917	23.12	13.64
180	0.890	21.78	13.38
190	0.828	18.85	12.75
200	0.739	15.02	11.77
210	0.629	10.88	10.37
220	0.521	7.46	8.73
230	0.434	5.18	7.14
240	0.379	3.95	5.97
250	0.353	3.43	5.35
260	0.338	3.14	4.97
270	0.328	2.96	4.71
280	0.317	2.76	4.41
290	0.317	2.76	4.41
300	0.340	3.18	5.02
310	0.397	4.33	6.37
320	0.487	6.52	8.14
330	0.597	9.80	9.91
340	0.714	14.02	11.47
350	0.817	18.36	12.64

Maximum Value (V-pol)

Field 0.99

ERP 26.95 kW (14.31 dBk)

Azimuth Bearing 25 degrees

Minimum Field (V-pol)

Field 0.315

ERP 2.73 kW (4.36 dBk)

Azimuth Bearing 285 degrees

