



Propagation Systems, Inc.

Quality Broadcast Antenna Systems

**Directional FM Antenna
WJPG
Maranatha Ministries
Cape May Court House, NJ**

A modified PSIFLV antenna with parasitic elements was used in conjunction with the customer's 36" face triangular tower to create the necessary directional radiation pattern. The final antenna consists of three radiating elements each secured to the tower with a custom-mounting bracket. The antenna bays are full wave spaced and there are four vertical parasitic elements per bay. The antenna array is center 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 264.3 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% of the envelope RMS.

The antenna is to be mounted 122 meters (400 ft.) above ground level on the east tower leg and positioned 95° True. At this elevation the antenna will be within the allowed +2m/-4m tolerance. No other antenna can be installed within 10 ft of any radiating element. Any guy wires located within 10 ft. of any radiating element must be replaced with a 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 .159 kW will be necessary at the antenna input in order to reach the required 1.5 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	PSIFLV-3A-DA
Type	3-bay directional FM antenna
Bay Spacing	Full wave spaced elements
Frequency	88.1 MHz
Polarization	Vertical
Envelope RMS	.606
Composite RMS	.528
Gain (v-pol)	9.45 (9.75 dB)
ERP	1.5 kW
Antenna input power	.159 kW
Input	7/8" EIA center fed input
Power rating	2.25 kW
Length	28.78 ft.
Weight	231 lbs.
Wind Area	29 sq. ft.

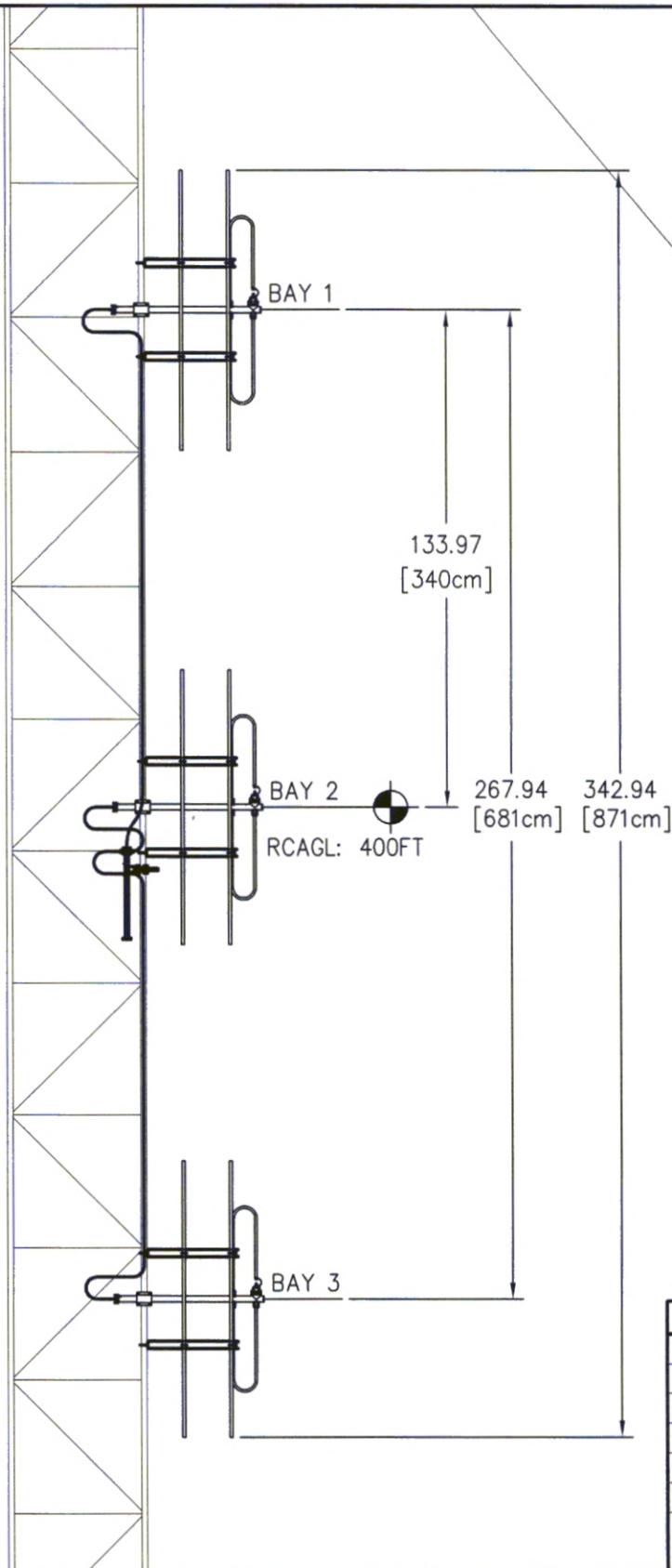
Statement of Certification

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 station's construction permit.



3/10/2016

Douglas A. Ross
President
Propagation Systems Inc.



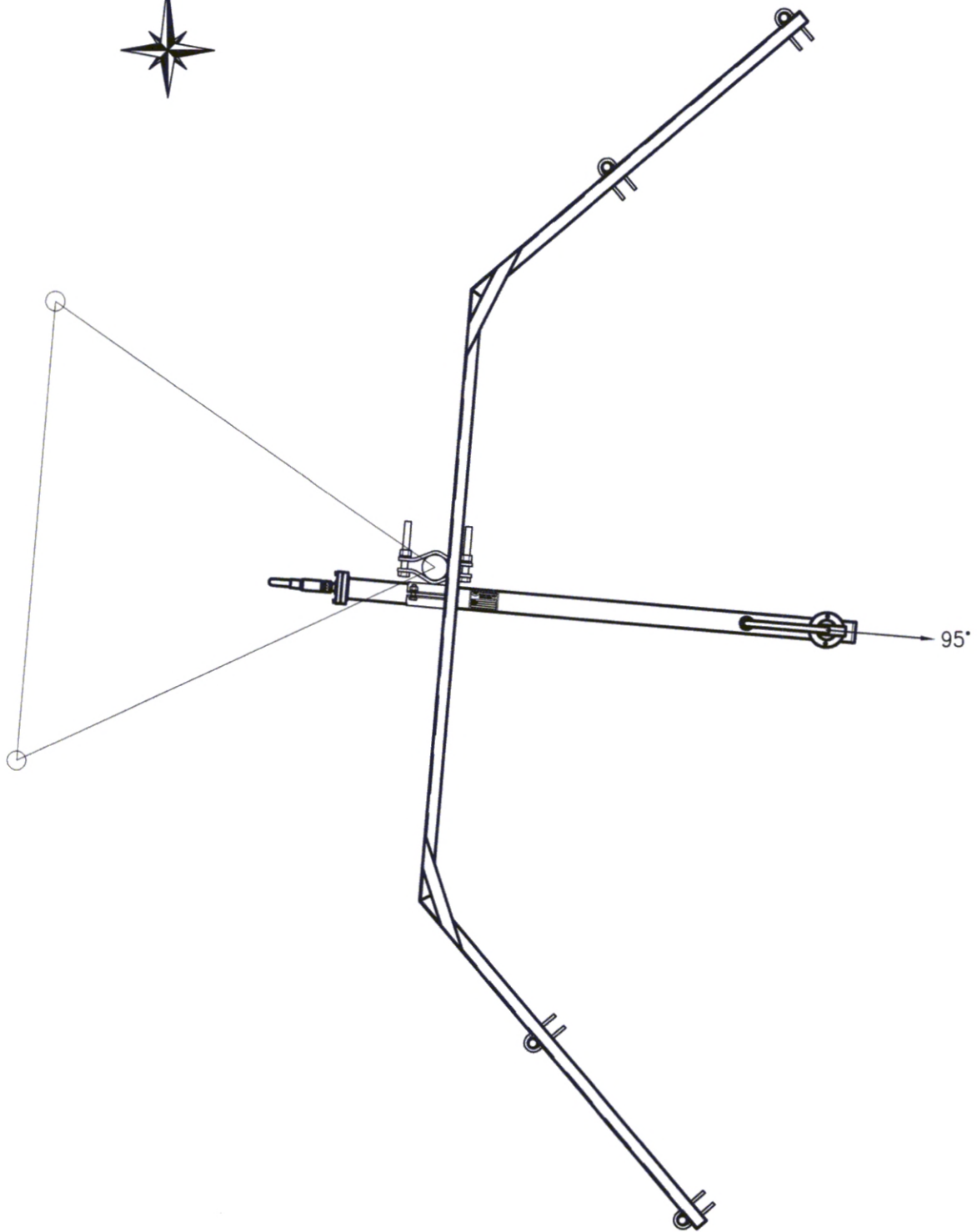
SPECIFICATIONS	
SPACING:	1.0λ
LENGTH:	28.78 FT [8.77m]
APERTURE:	22.33 FT [6.81m]
RATING:	2.25 kW
GAIN:	9.45 (9.75 dB)
WEIGHT:	231 LB [104.8 Kg]
WINDAREA:	29 FT ²
TIA-222-F (NO ICE)	

REV.	MADE BY	CHECKED BY	DATE	CHANGE

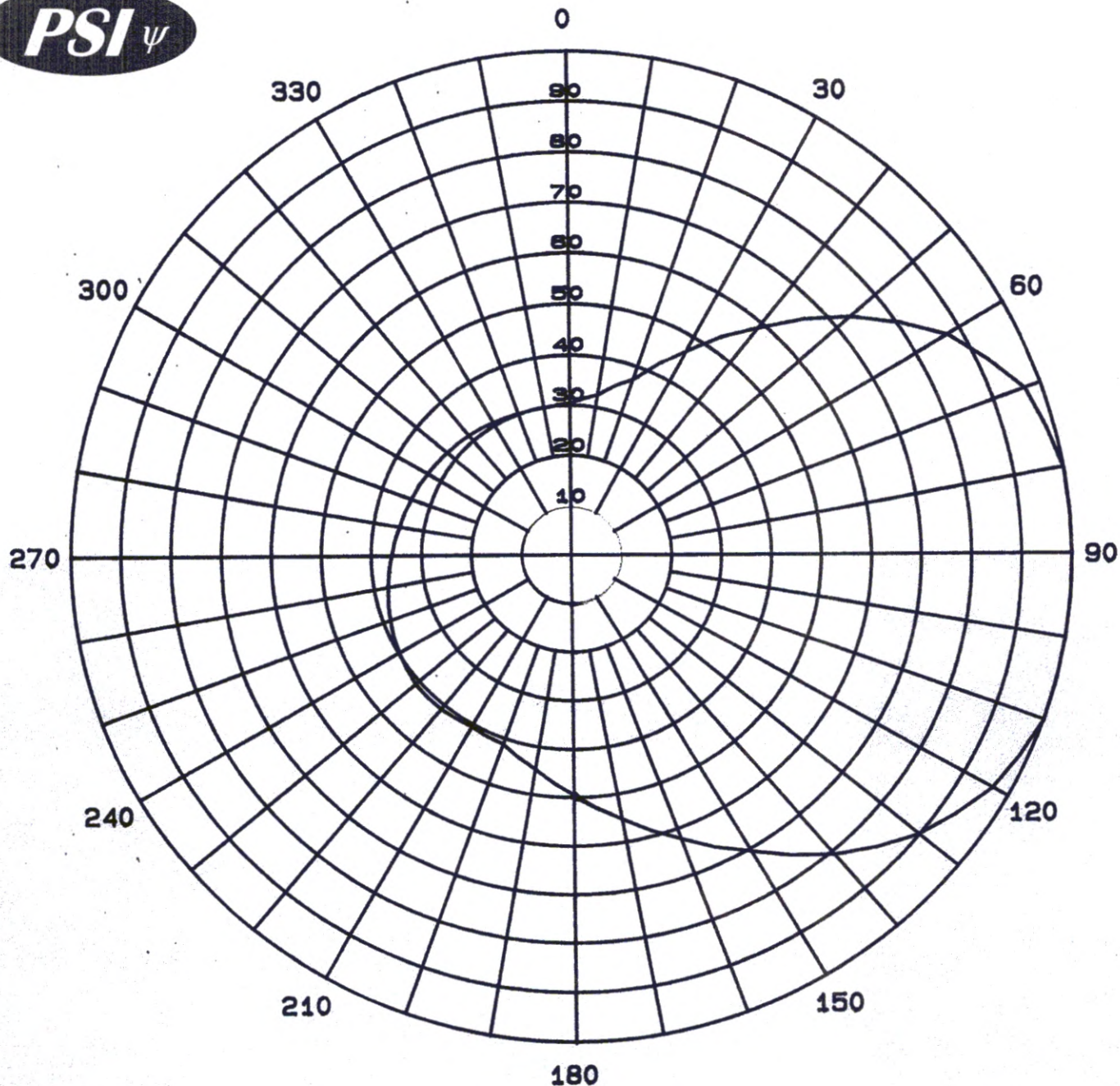
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making or finish any information for the making of drawings, prints or other 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

PROPAGATION SYSTEMS, INC.		
Ebensburg, Pennsylvania USA 814-472-5540		
ANTENNA ELEVATION AND SPECIFICATIONS		
MODEL: PSIFLV-3A-DA	DRAWN BY: B.K.SCHILLING	DATE: 3/11/16
CHANNEL/FREQUENCY: 88.1 MHz	APPROVED BY:	DATE:
SCALE:	DRAWING NO.: 1545-001	REV.



				PROPAGATION SYSTEMS, INC.							
				Ebensburg, Pennsylvania USA 814-472-5540							
				ANTENNA ORIENTATION AND PLAN VIEW							
REV.		MADE BY CHECKED BY		DATE		CHANGE					
<p>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 information for the making of drawings, prints or other 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.</p>				SIZE		MODEL: PSIFLV-3A-DA		DRAWN BY: B.K.SCHILLING		DATE: 3/11/16	
				A		CHANNEL/ FREQUENCY: 88.1 MHz		APPROVED BY:		DATE:	
						SCALE:		DRAWING NO.: 1545-002		REV.	



Maximum Envelope
Azimuth Plane Pattern
Antenna: PSIFLV-3A-DA
Type: 3-Bay Directional FM Antenna
ERP: 1.5 kW (1.76 dBk)
RMS Envelope: .606
Frequency: 88.1 MHz
WJPG Cape May Court House, NJ

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PO Box 113
Ebensburg, PA 15931

Maximum Envelope Tabulation

Antenna: PSIFLV-3A-DA

Maranatha Ministries

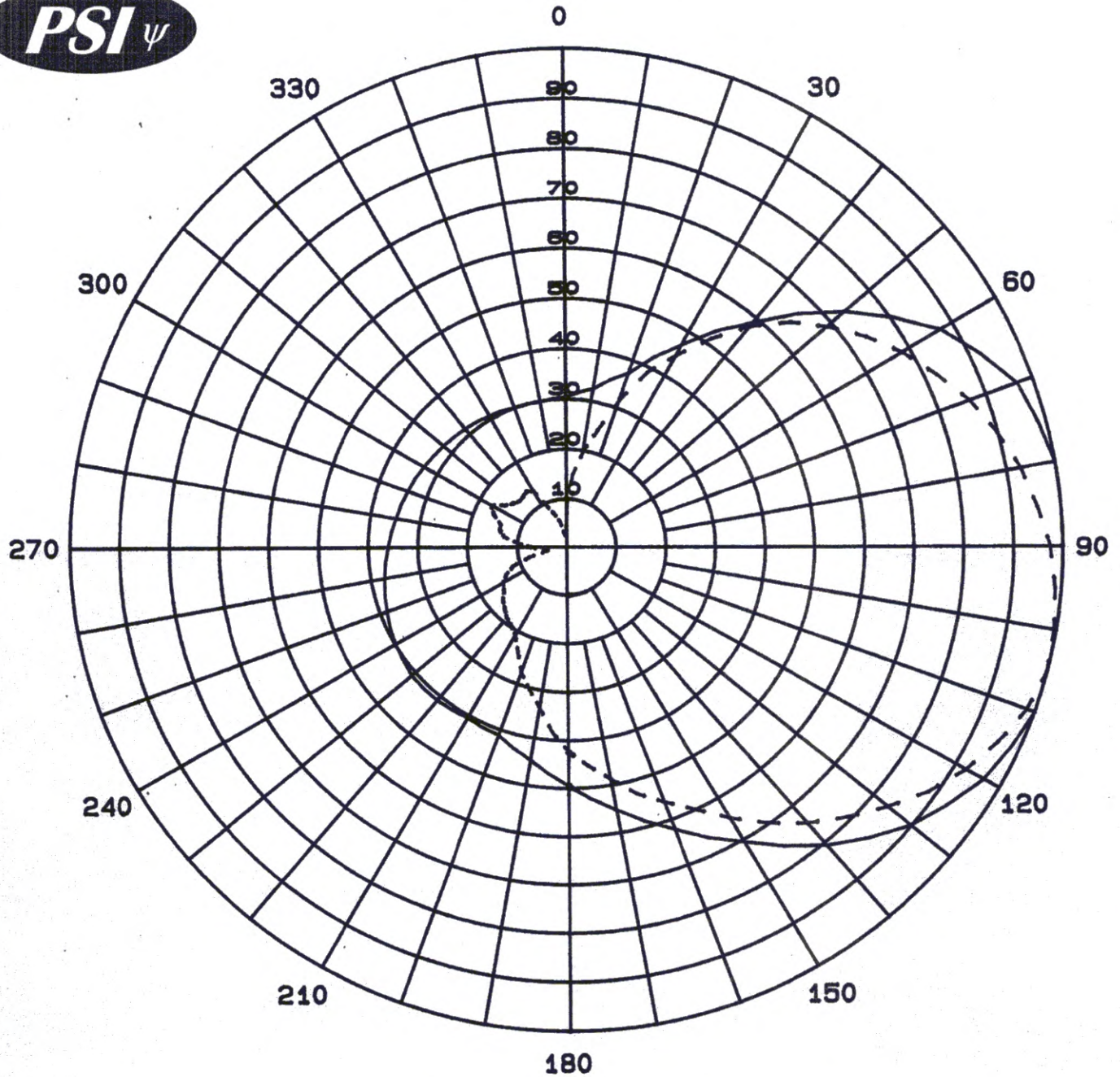
Station: WJPG

Frequency: 88.1 MHz

Location: Cape May Court House, NJ

Maximum ERP: 1.5 kW (1.76 dBk)

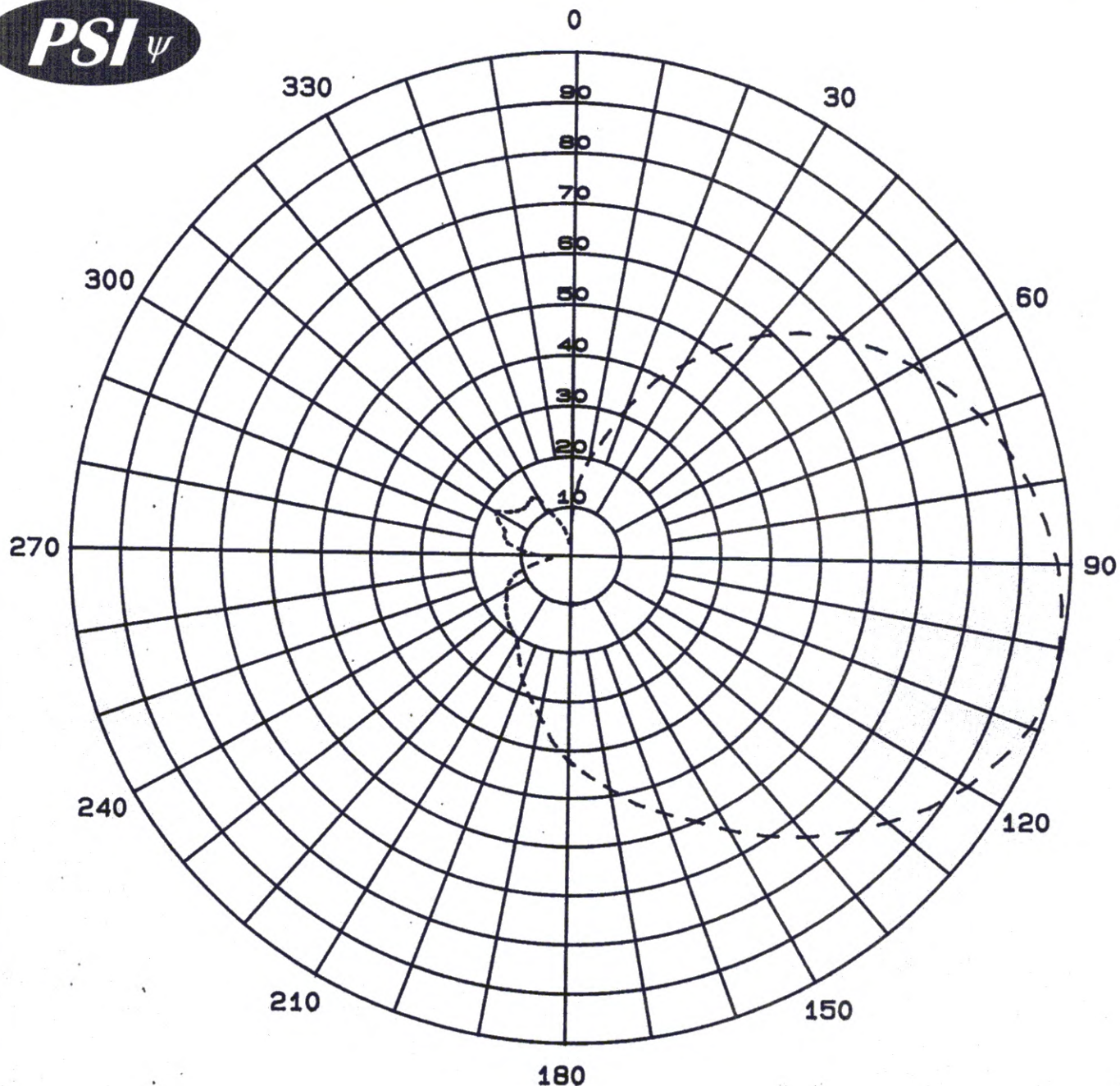
Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.304	1.50	1.76
10	0.326	0.16	-7.97
20	0.375	0.21	-6.76
30	0.471	0.33	-4.78
40	0.590	0.52	-2.82
50	0.737	0.81	-0.89
60	0.875	1.15	0.60
70	0.968	1.41	1.48
80	1.000	1.50	1.76
90	1.000	1.50	1.76
100	1.000	1.50	1.76
110	1.000	1.50	1.76
120	0.964	1.39	1.44
130	0.897	1.21	0.82
140	0.807	0.98	-0.10
150	0.705	0.75	-1.28
160	0.622	0.58	-2.36
170	0.552	0.46	-3.40
180	0.494	0.37	-4.36
190	0.446	0.30	-5.25
200	0.411	0.25	-5.96
210	0.404	0.24	-6.11
220	0.410	0.25	-5.98
230	0.409	0.25	-6.00
240	0.399	0.24	-6.22
250	0.386	0.22	-6.51
260	0.373	0.21	-6.80
270	0.360	0.19	-7.11
280	0.349	0.18	-7.38
290	0.340	0.17	-7.61
300	0.331	0.16	-7.84
310	0.323	0.16	-8.06
320	0.315	0.15	-8.27
330	0.308	0.14	-8.47
340	0.302	0.14	-8.64
350	0.299	0.13	-8.73



Maximum Envelope and
Measured Pattern
Antenna: PSIFLV-3A-DA
Type: 3-Bay Directional FM Antenna
ERP: 1.5 kW (1.76 dBk)
RMS Envelope: .606
RMS Measured: .528
Frequency: 88.1 MHz

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WJPG Cape May Court House, NJ



Measured Relative Field
Azimuth Plane Pattern
Antenna: PSIFLV-3A-DA
Type: 3-Bay Directional FM Antenna
Gain V-pol (dash): 9.45 (9.75 dB)
Frequency: 88.1 MHz
Station: WJPG
Cape May Court House, NJ

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Measured Relative Field Tabulation

Antenna: PSIFLV-3A-DA

Maranatha Ministries

Station: WJPG

Frequency: 88.1 MHz

Location: Cape May Court House, NJ

Vertical Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.084	0.067	-11.76
10	0.199	0.374	-4.27
20	0.317	0.950	-0.22
30	0.446	1.880	2.74
40	0.580	3.179	5.02
50	0.690	4.499	6.53
60	0.784	5.808	7.64
70	0.866	7.087	8.50
80	0.929	8.156	9.11
90	0.974	8.965	9.53
100	0.995	9.356	9.71
110	0.983	9.131	9.61
120	0.923	8.051	9.06
130	0.837	6.620	8.21
140	0.747	5.273	7.22
150	0.648	3.968	5.99
160	0.562	2.985	4.75
170	0.488	2.250	3.52
180	0.424	1.699	2.30
190	0.335	1.061	0.26
200	0.275	0.715	-1.46
210	0.210	0.417	-3.80
220	0.190	0.341	-4.67
230	0.170	0.273	-5.64
240	0.150	0.213	-6.72
250	0.117	0.129	-8.88
260	0.041	0.016	-17.99
270	0.072	0.049	-13.10
280	0.128	0.155	-8.10
290	0.141	0.188	-7.26
300	0.176	0.293	-5.34
310	0.141	0.188	-7.26
320	0.137	0.177	-7.51
330	0.135	0.172	-7.64
340	0.074	0.052	-12.86
350	0.026	0.006	-21.95

Maximum Value

Field 1.00

Gain 9.45 (9.75 dB)

Azimuth Bearing 105 degrees

Minimum Field

Field 0.026

Gain .006 (-21.95 dB)

Azimuth Bearing 350 degrees

ERP Tabulation

Antenna: PSIFLV-3A-DA

Maranatha Ministries

Station: WJPG

Frequency: 88.1 MHz

Location: Cape May Court House, NJ

Maximum ERP: 1.5 kW (1.76 dBk)

Vertical Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.084	0.011	-19.75
10	0.199	0.059	-12.26
20	0.317	0.151	-8.22
30	0.446	0.298	-5.25
40	0.580	0.505	-2.97
50	0.690	0.714	-1.46
60	0.784	0.922	-0.35
70	0.866	1.125	0.51
80	0.929	1.295	1.12
90	0.974	1.423	1.53
100	0.995	1.485	1.72
110	0.983	1.449	1.61
120	0.923	1.278	1.06
130	0.837	1.051	0.22
140	0.747	0.837	-0.77
150	0.648	0.630	-2.01
160	0.562	0.474	-3.24
170	0.488	0.357	-4.47
180	0.424	0.270	-5.69
190	0.335	0.168	-7.74
200	0.275	0.113	-9.45
210	0.210	0.066	-11.79
220	0.190	0.054	-12.66
230	0.170	0.043	-13.63
240	0.150	0.034	-14.72
250	0.117	0.021	-16.88
260	0.041	0.003	-25.98
270	0.072	0.008	-21.09
280	0.128	0.025	-16.09
290	0.141	0.030	-15.25
300	0.176	0.046	-13.33
310	0.141	0.030	-15.25
320	0.137	0.028	-15.50
330	0.135	0.027	-15.63
340	0.074	0.008	-20.85
350	0.026	0.001	-29.94

Maximum Value (H-pol)

Field 1.00

ERP 1.5 kW (1.76 dBk)

Azimuth Bearing 105 degrees

Minimum Field (H-pol)

Field 0.026

ERP .001 kW (-29.94 dBk)

Azimuth Bearing 350 degrees



Relative Field Elevation Pattern
Model: PSIFLV-3A-DA
Type: Directional FM
Polarization: Vertical
Number of Bays: Three
Gain: 9.45 (9.75 dB)
Station: WJPG

