



Propagation Systems, Inc.

Quality Broadcast Antenna Systems

**Directional FM Antenna
WCDG
Silver Dove Broadcasting, Inc.
Dahlonega, GA**

A standard model PSIFML antenna with a parasitic element was used in conjunction with the customer's 26" face triangular tower to create the necessary directional radiation pattern. The final antenna consists of one radiating element and one horizontal parasitic element secured to the southeast tower leg.

Pattern testing was performed using a 1/3 scale model element and mast. 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 8753D-network analyzer operating at 266.1 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 88.9% of the envelope RMS.

The antenna is to be mounted 19 meters (62.3 ft.) above ground level on the southeast tower leg and positioned 122.5 degrees true and certified by a licensed surveyor. At this elevation the antenna will be within the allowed +2m/-4m tolerance. No other antenna can be installed within 3 meters from the radiating element. Any guy wires that pass within 25 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 .856 kW will be necessary at the antenna input in order to reach the required .60 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	PSIFML-1A-DA
Type	1-bay directional FM antenna
Frequency	88.7 MHz
Polarization	Circular
Envelope RMS	.866
Composite RMS	.770
Gain (h-pol)	.718 (-1.44 dB)
Gain (v-pol)	.718 (-1.44 dB)
ERP	.600 kW
Antenna input power	.856 kW
Input	Type "N" female 7/8" EIA adapter includes
Power rating	.750 kW with Type "N" 1.50 kW with 7/8" EIA adapter
Length	3 ft.
Weight	29.1 lbs.
Wind Area	2.99 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.



Douglas A. Ross
President
Propagation Systems Inc.

7/8" E.I.A. 50Ω INPUT

PARASITIC, HORIZONTAL, LEG MOUNTED
J1011FM-1033-003

RCAGL: 62.32 FT
RCAGL: [19m]

SPECIFICATIONS

RATING: 750W TYPE 'N'

RATING: 1500W 7/8" ADAPTER

GAIN: .718 (-1.44 dB)

WEIGHT: 29.1 LB [13.23 Kg]

WINDAREA: 2.99 FT²

TIA-222-F (NO ICE)

A	D.G. Kellar	3/02/12	CHANGE INPUT TO 7/8" E.I.A. PER D. ROSS
REV.	MADE BY	CHECKED BY	DATE
			CHANGE

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SIZE

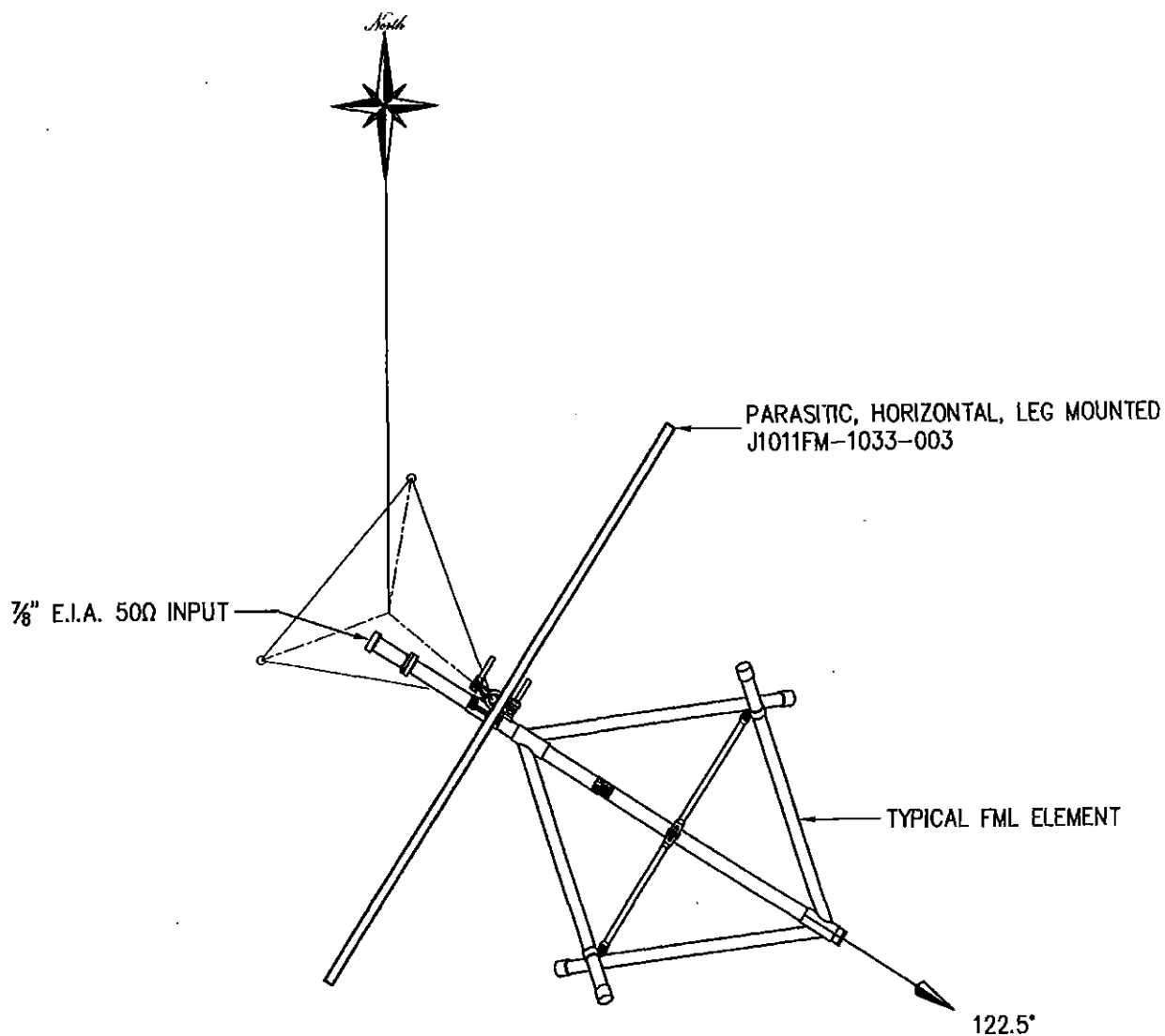
A

PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

ELEVATIONS AND SPECIFICATIONS

MODEL:	PSIFML-1A-DA	DRAWN BY:	D.G. Kellar	DATE:	11/22/11
CHANNEL/FREQUENCY:	88.7 MHz	APPROVED BY:		DATE:	
SCALE:	1:20	DRAWING NO.:	J211FM-1033-001	REV.	A



A	D.G. Keller	3/02/12	CHANGE INPUT TO 7/8" E.I.A.
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 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 on acceptance of the foregoing agreement.

SIZE

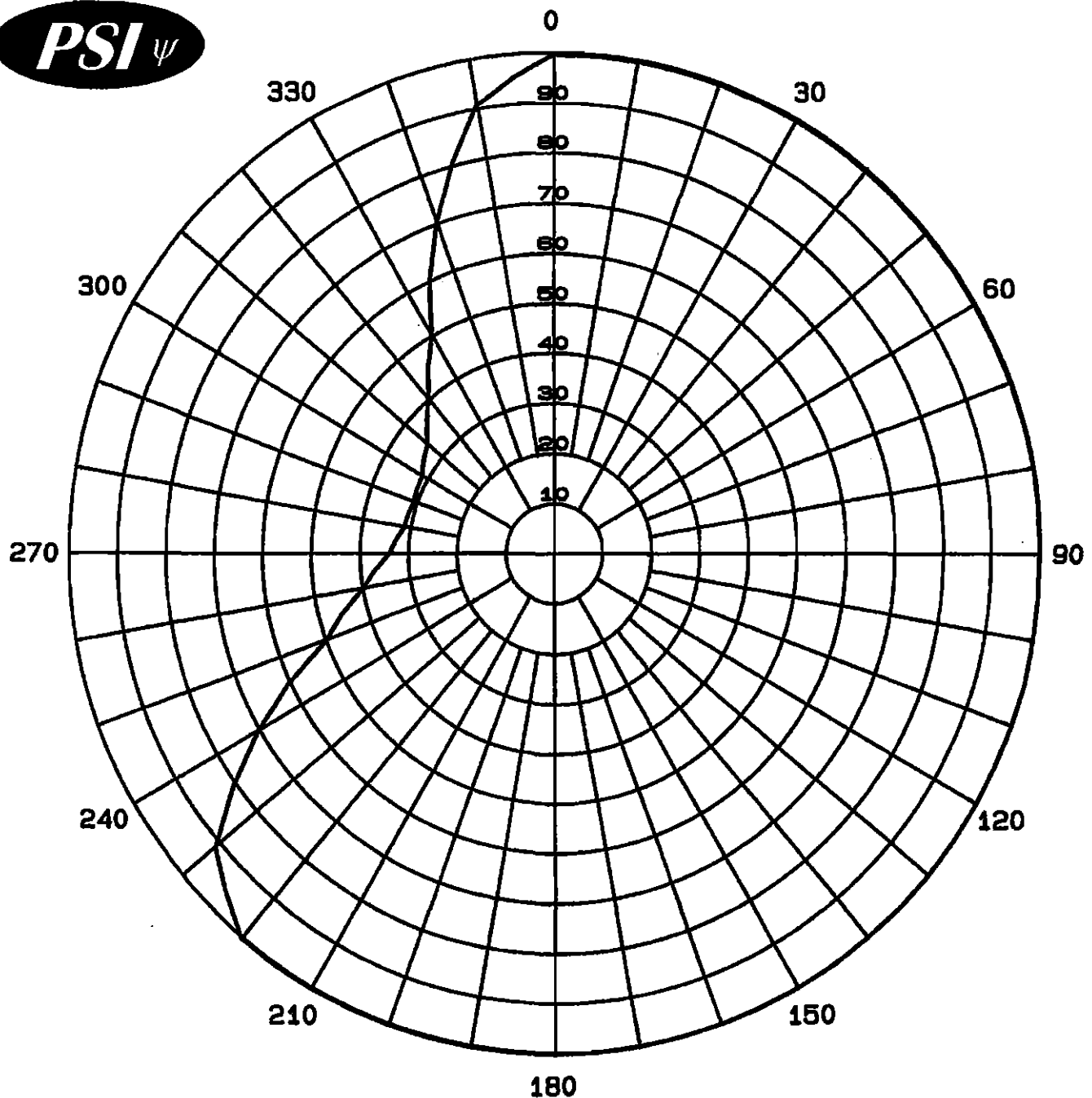
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PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

PLAN VIEW AND ORIENTATION

MODEL:	PSIFML-1A-DA	DRAWN BY:	D.G. Keller	DATE:	12/27/11
CHANNEL/FREQUENCY:	88.7 MHz	APPROVED BY:		DATE:	
SCALE:	1:20	DRAWING NO.:	J1011FM-1033-002	REV.	A



Maximum Envelope
Azimuth Plane Pattern
Antenna: PSIFML-1A-DA
Type: 1-Bay Directional FM Antenna
ERP: .60 kW (-2.22 dBk)
RMS Envelope: .866
Frequency: 88.7 MHz
WCDG Dahlonega, GA

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Maximum Envelope Tabulation

Antenna: PSIFML-1A-DA

Silver Dove Broadcasting, Inc.

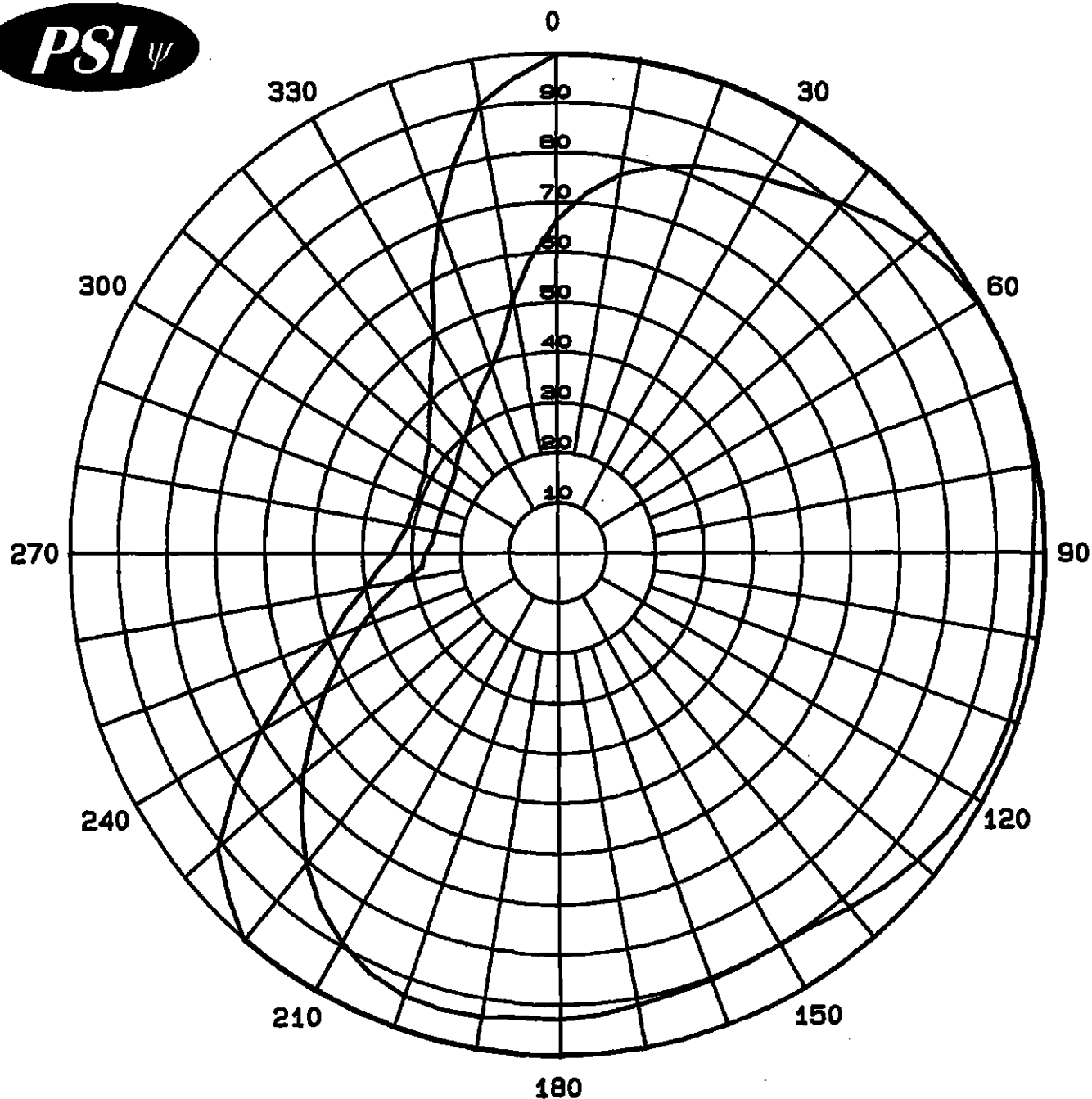
Station: WCDG

Frequency: 88.7 MHz

Location: Dahlonega, GA

Maximum ERP: .60 kW (-2.22 dBk)

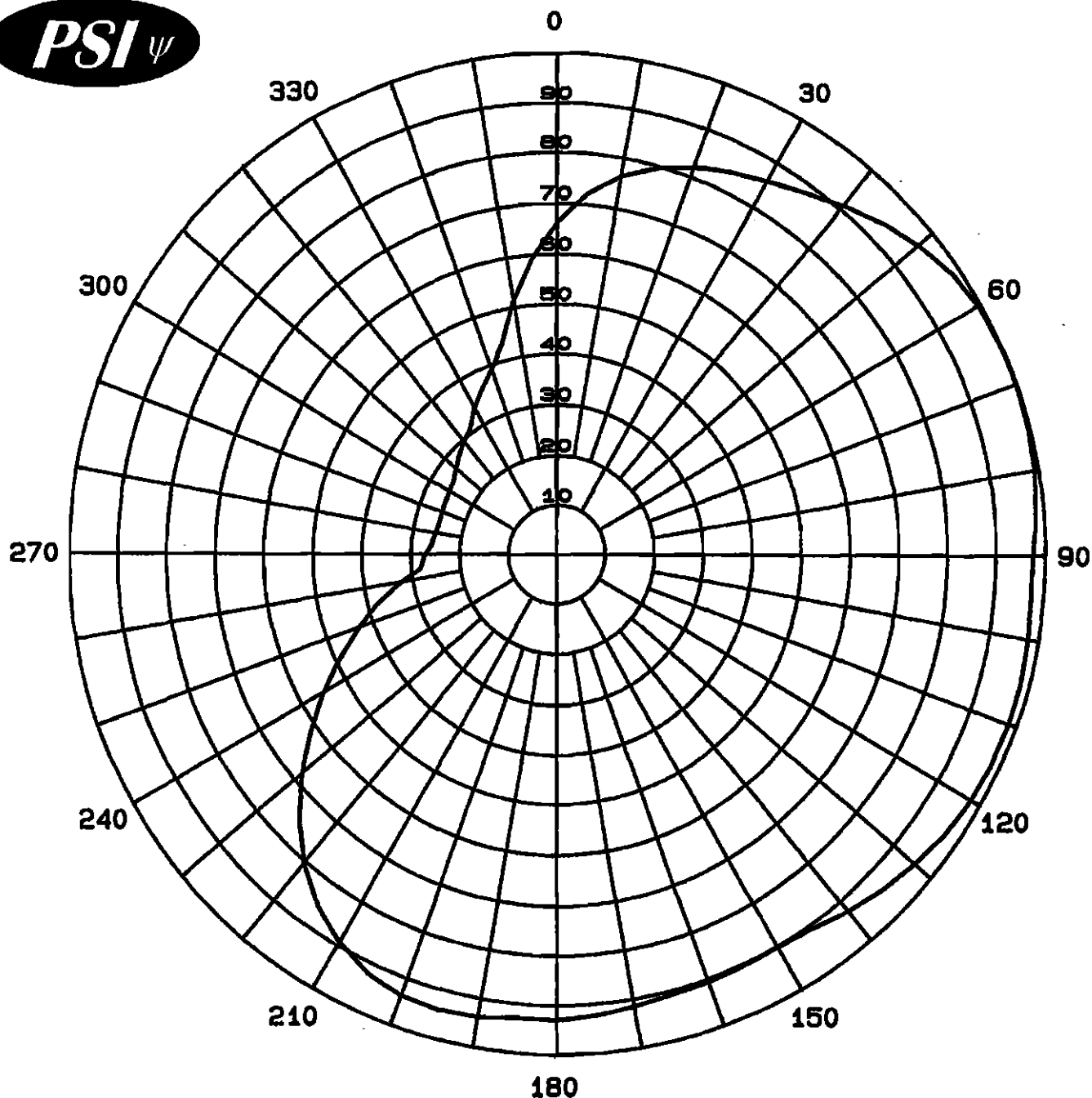
Angle	Relative Field	ERP (kW)	ERP (dBk)
0	1.000	0.60	-2.22
10	1.000	0.60	-2.22
20	1.000	0.60	-2.22
30	1.000	0.60	-2.22
40	1.000	0.60	-2.22
50	1.000	0.60	-2.22
60	1.000	0.60	-2.22
70	1.000	0.60	-2.22
80	1.000	0.60	-2.22
90	1.000	0.60	-2.22
100	1.000	0.60	-2.22
110	1.000	0.60	-2.22
120	1.000	0.60	-2.22
130	1.000	0.60	-2.22
140	1.000	0.60	-2.22
150	1.000	0.60	-2.22
160	1.000	0.60	-2.22
170	1.000	0.60	-2.22
180	1.000	0.60	-2.22
190	1.000	0.60	-2.22
200	1.000	0.60	-2.22
210	1.000	0.60	-2.22
220	1.000	0.60	-2.22
230	0.911	0.50	-3.03
240	0.705	0.30	-5.25
250	0.502	0.15	-8.20
260	0.401	0.10	-10.16
270	0.341	0.07	-11.56
280	0.314	0.06	-12.28
290	0.308	0.06	-12.45
300	0.314	0.06	-12.28
310	0.341	0.07	-11.56
320	0.401	0.10	-10.16
330	0.502	0.15	-8.20
340	0.705	0.30	-5.25
350	0.911	0.50	-3.03



Maximum Envelope and
Composite Pattern
Antenna: PSIFML-1A-DA
Type: 1-Bay Directional FM Antenna
ERP: .60 kW (-2.22 dBk)
RMS Envelope: .866
RMS Composite: .770
Frequency: 88.7 MHz

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

WCDG Dahlonega, GA



Measured Composite
Azimuth Plane Pattern
Antenna: PSIFML-1A-DA
Type: 1-Bay Directional FM Antenna
ERP: .60 kW (-2.22 dBk)
RMS Composite: .866
Frequency: 88.7 MHz
WCDG Dahlonega, GA

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Composite Pattern Tabulation

Antenna: PSIFML-1A-DA

Silver Dove Broadcasting, Inc.

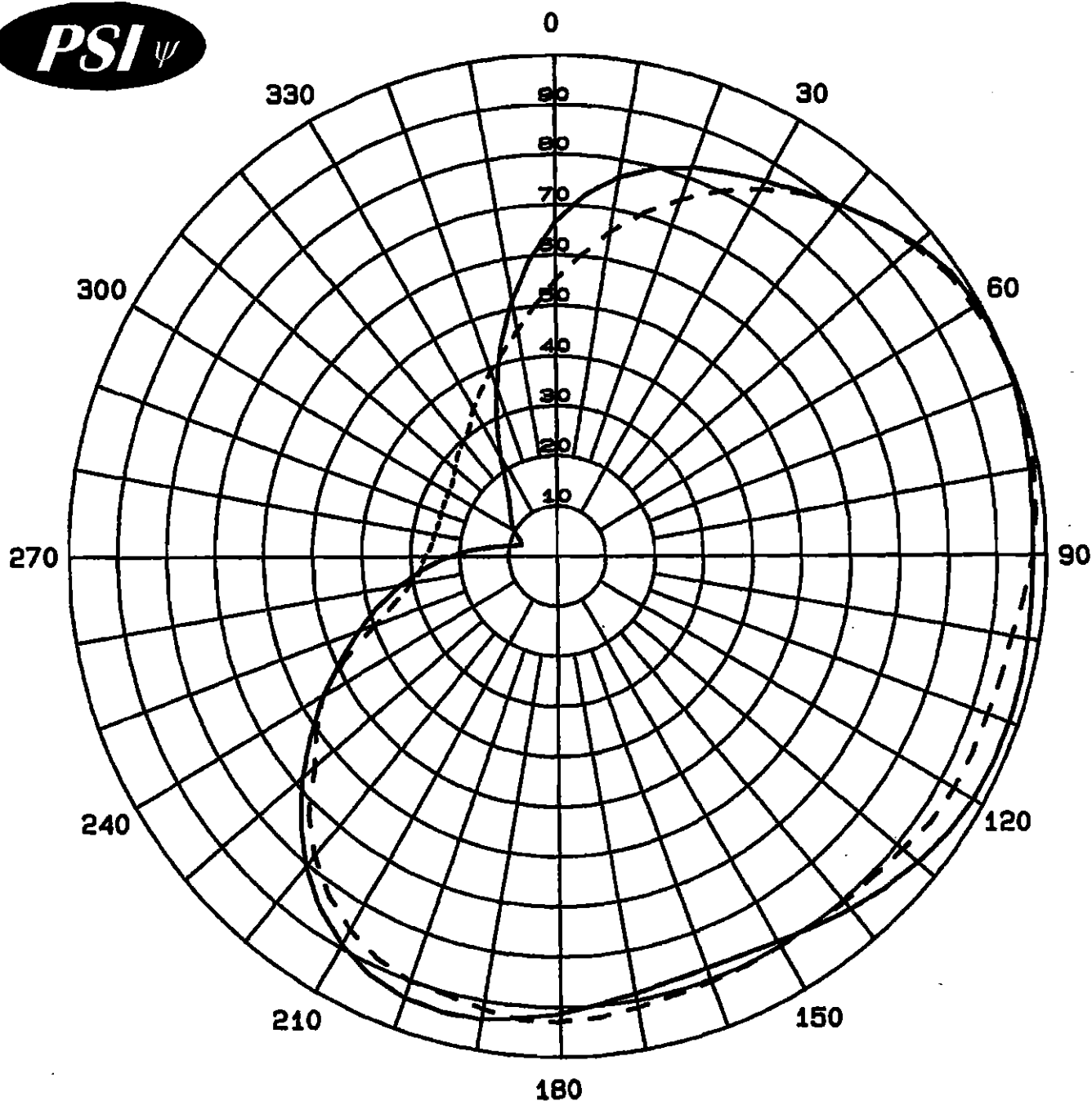
Station: WCDG

Frequency: 88.7 MHz

Location: Dahlonega, GA

Maximum ERP: .60 kW (-2.22 dBk)

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.667	0.27	-5.74
10	0.769	0.35	-4.50
20	0.825	0.41	-3.89
30	0.863	0.45	-3.50
40	0.913	0.50	-3.01
50	0.966	0.56	-2.52
60	0.998	0.60	-2.24
70	1.000	0.60	-2.22
80	0.992	0.59	-2.29
90	0.974	0.57	-2.45
100	0.977	0.57	-2.42
110	0.982	0.58	-2.38
120	0.977	0.57	-2.42
130	0.954	0.55	-2.63
140	0.922	0.51	-2.92
150	0.899	0.48	-3.14
160	0.903	0.49	-3.10
170	0.912	0.50	-3.02
180	0.926	0.51	-2.89
190	0.934	0.52	-2.81
200	0.933	0.52	-2.82
210	0.890	0.48	-3.23
220	0.803	0.39	-4.12
230	0.683	0.28	-5.53
240	0.555	0.18	-7.33
250	0.436	0.11	-9.43
260	0.332	0.07	-11.80
270	0.273	0.04	-13.50
280	0.256	0.04	-14.05
290	0.253	0.04	-14.16
300	0.257	0.04	-14.02
310	0.272	0.04	-13.53
320	0.299	0.05	-12.71
330	0.341	0.07	-11.56
340	0.395	0.09	-10.29
350	0.518	0.16	-7.93



Measured Relative Field
Azimuth Plane Pattern
Antenna: PSIFML-1A-DA
Type: 1-Bay Directional FM Antenna
Gain H-pol (solid): .718 (-1.44 dB)
Gain V-pol (dash): .718 (-1.44 dB)
Frequency: 88.7 MHz
WCDG Dahlonega, GA

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Measured Relative Field Tabulation

Antenna: PSIFML-1A-DA
Silver Dove Broadcasting, Inc.
Station: WCDG
Frequency: 88.7 MHz
Location: Dahlonega, GA

Horizontal Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.667	0.319	-4.96
10	0.769	0.425	-3.72
20	0.825	0.489	-3.11
30	0.863	0.535	-2.72
40	0.912	0.597	-2.24
50	0.966	0.670	-1.74
60	0.998	0.715	-1.46
70	0.997	0.714	-1.46
80	0.983	0.694	-1.59
90	0.974	0.681	-1.67
100	0.977	0.685	-1.64
110	0.982	0.692	-1.60
120	0.977	0.685	-1.64
130	0.954	0.653	-1.85
140	0.922	0.610	-2.14
150	0.889	0.567	-2.46
160	0.875	0.550	-2.60
170	0.885	0.562	-2.50
180	0.910	0.595	-2.26
190	0.934	0.626	-2.03
200	0.933	0.625	-2.04
210	0.890	0.569	-2.45
220	0.803	0.463	-3.34
230	0.683	0.335	-4.75
240	0.555	0.221	-6.55
250	0.436	0.136	-8.65
260	0.332	0.079	-11.02
270	0.230	0.038	-14.20
280	0.130	0.012	-19.16
290	0.076	0.004	-23.82
300	0.097	0.007	-21.70
310	0.121	0.011	-19.78
320	0.150	0.016	-17.92
330	0.226	0.037	-14.36
340	0.359	0.093	-10.34
350	0.518	0.193	-7.15

Maximum Value

Field 1.00
Gain .718 (-1.44 dB)
Azimuth Bearing 65 degrees

Minimum Field

Field 0.076
Gain .004 (-23.82 dB)
Azimuth Bearing 290 degrees

Vertical Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.553	0.220	-6.58
10	0.659	0.312	-5.06
20	0.758	0.413	-3.85
30	0.846	0.514	-2.89
40	0.913	0.599	-2.23
50	0.961	0.663	-1.78
60	0.990	0.704	-1.53
70	1.000	0.718	-1.44
80	0.992	0.707	-1.51
90	0.973	0.680	-1.68
100	0.943	0.638	-1.95
110	0.934	0.626	-2.03
120	0.931	0.622	-2.06
130	0.913	0.599	-2.23
140	0.903	0.585	-2.33
150	0.899	0.580	-2.36
160	0.903	0.585	-2.33
170	0.912	0.597	-2.24
180	0.926	0.616	-2.11
190	0.913	0.599	-2.23
200	0.897	0.578	-2.38
210	0.856	0.526	-2.79
220	0.776	0.432	-3.64
230	0.651	0.304	-5.17
240	0.555	0.221	-6.55
250	0.401	0.115	-9.38
260	0.307	0.068	-11.70
270	0.273	0.054	-12.72
280	0.256	0.047	-13.27
290	0.253	0.046	-13.38
300	0.257	0.047	-13.24
310	0.272	0.053	-12.75
320	0.299	0.064	-11.93
330	0.341	0.083	-10.78
340	0.395	0.112	-9.51
350	0.459	0.151	-8.20

Maximum Value

Field 1.00
Gain .718 (-1.44 dB)
Azimuth Bearing 70 degrees

Minimum Field

Field 0.253
Gain .046 (-13.38 dB)
Azimuth Bearing 290 degrees

ERP Tabulation

Antenna: PSIFML-1A-DA

Silver Dove Broadcasting, Inc.

Station: WCDG

Frequency: 88.7 MHz

Location: Dahlonega, GA

Maximum ERP: .60 kW (-2.22 dBk)

Horizontal Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.667	0.267	-5.74
10	0.769	0.355	-4.50
20	0.825	0.408	-3.89
30	0.863	0.447	-3.50
40	0.912	0.499	-3.02
50	0.966	0.560	-2.52
60	0.998	0.598	-2.24
70	0.997	0.596	-2.24
80	0.983	0.580	-2.37
90	0.974	0.569	-2.45
100	0.977	0.573	-2.42
110	0.982	0.579	-2.38
120	0.977	0.573	-2.42
130	0.954	0.546	-2.63
140	0.922	0.510	-2.92
150	0.889	0.474	-3.24
160	0.875	0.459	-3.38
170	0.885	0.470	-3.28
180	0.910	0.497	-3.04
190	0.934	0.523	-2.81
200	0.933	0.522	-2.82
210	0.890	0.475	-3.23
220	0.803	0.387	-4.12
230	0.683	0.280	-5.53
240	0.555	0.185	-7.33
250	0.436	0.114	-9.43
260	0.332	0.066	-11.80
270	0.230	0.032	-14.98
280	0.130	0.010	-19.94
290	0.076	0.003	-24.60
300	0.097	0.006	-22.48
310	0.121	0.009	-20.56
320	0.150	0.014	-18.70
330	0.226	0.031	-15.14
340	0.359	0.077	-11.12
350	0.518	0.161	-7.93

Maximum Value (H-pol)

Field 1.00
ERP .60 kW (-2.22 dBk)

Azimuth Bearing 65 degrees

Minimum Field (H-pol)

Field 0.076
ERP .003 kW (-24.60 dBk)
Azimuth Bearing 290 degrees

Vertical Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.553	0.183	-7.36
10	0.659	0.261	-5.84
20	0.758	0.345	-4.63
30	0.846	0.429	-3.67
40	0.913	0.500	-3.01
50	0.961	0.554	-2.56
60	0.990	0.588	-2.31
70	1.000	0.600	-2.22
80	0.992	0.590	-2.29
90	0.973	0.568	-2.46
100	0.943	0.534	-2.73
110	0.934	0.523	-2.81
120	0.931	0.520	-2.84
130	0.913	0.500	-3.01
140	0.903	0.489	-3.10
150	0.899	0.485	-3.14
160	0.903	0.489	-3.10
170	0.912	0.499	-3.02
180	0.926	0.514	-2.89
190	0.913	0.500	-3.01
200	0.897	0.483	-3.16
210	0.856	0.440	-3.57
220	0.776	0.361	-4.42
230	0.651	0.254	-5.95
240	0.555	0.185	-7.33
250	0.401	0.096	-10.16
260	0.307	0.057	-12.48
270	0.273	0.045	-13.50
280	0.256	0.039	-14.05
290	0.253	0.038	-14.16
300	0.257	0.040	-14.02
310	0.272	0.044	-13.53
320	0.299	0.054	-12.71
330	0.341	0.070	-11.56
340	0.395	0.094	-10.29
350	0.459	0.126	-8.98

Maximum Value (V-pol)

Field 1.00
ERP .60 kW (-2.22 dBk)

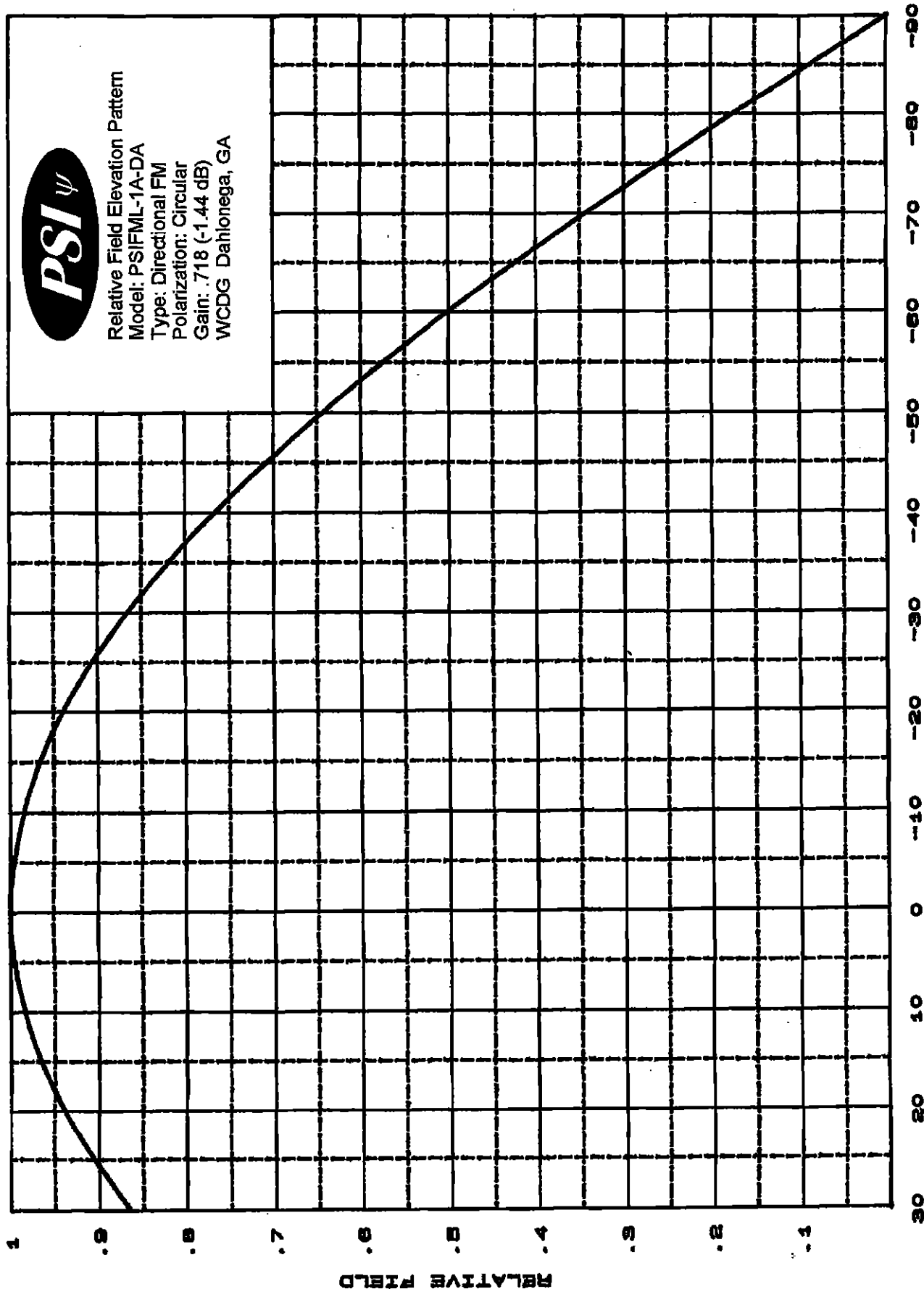
Azimuth Bearing 70 degrees

Minimum Field (V-pol)

Field 0.253
ERP .038 kW (-14.16 dBk)
Azimuth Bearing 290 degrees



Relative Field Elevation Pattern
Model: PSIFML-1A-DA
Type: Directional FM
Polarization: Circular
Gain: .718 (-1.44 dB)
WCDG Dahlonega, GA



DEGREES BELOW HORIZONTAL