Propagation Systems, Inc.
Quality Broadcast Antenna Systems

Directional FM Antenna
KJZP
St. Paul Bible College
Prescott, AZ

A standard model PSIFML antenna with parasitic elements was used in conjunction with the customer's 4" diameter support mast to create the necessary directional radiation pattern. The final antenna consists of one radiating element secured to the mast with a standard mounting bracket. There are a total of two vertical parasitic elements and one horizontal parasitic element.

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 mast 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 support mast was 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 8753A-network analyzer operating at 270.3 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 92.7% of the envelope RMS.

The antenna is to be mounted 5 meters (16.4 ft) +2/-4 meters above ground level on a 4" diameter mast and positioned 5° True. No other antenna can be installed on the mast. 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 .0329 kW will be required at the antenna input in order to reach the approved .027 kW ERP. The transmitter output power requirements are dependent upon the transmission line size and length used to feed the antenna.

P.O. Box 113, 719 Pensacola Road, Ebensburg, PA 15931 (814)472-5540 FAX (814)472-5676

Antenna Specifications

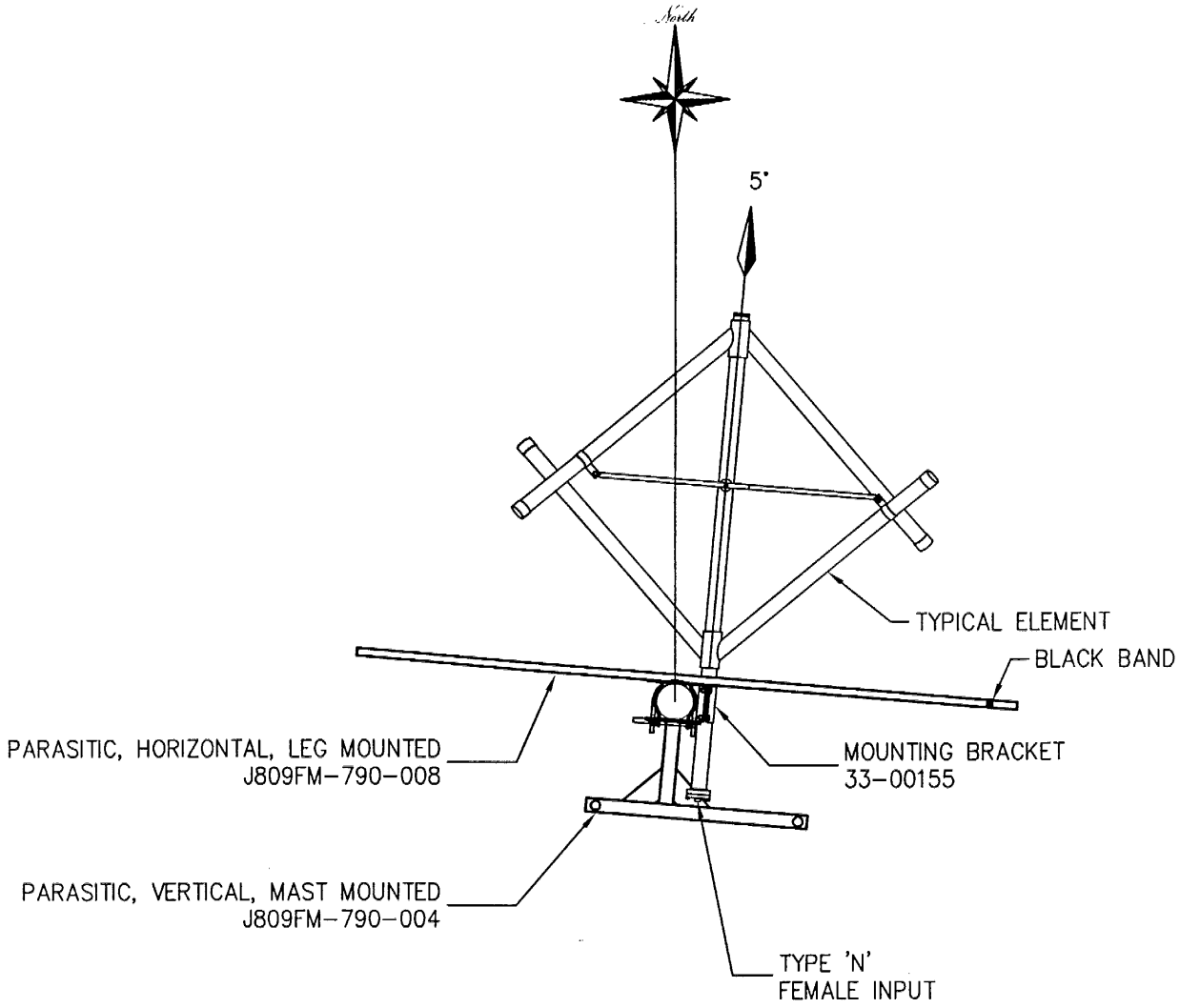
Antenna Model	PSIFML-1A-DA
Type	1-bay directional FM antenna
Frequency	90.1 MHz
Polarization	Circular
Envelope RMS	.784
Composite RMS	.727
Gain (h-pol)	.82 (-.86 dB)
Gain (v-pol)	.82 (-.86 dB)
ERP	.027 kW
Antenna input power	.0329 kW
Antenna Input	Type "N" female
Power rating	750 watts
Length	5.75 ft.
Weight	46.76 lbs.
Wind Area	4.22 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.

9/29/09

Douglas A. Ross
President
Propagation Systems Inc.



REV.	MADE BY / CHECKED BY	DATE	CHANGE

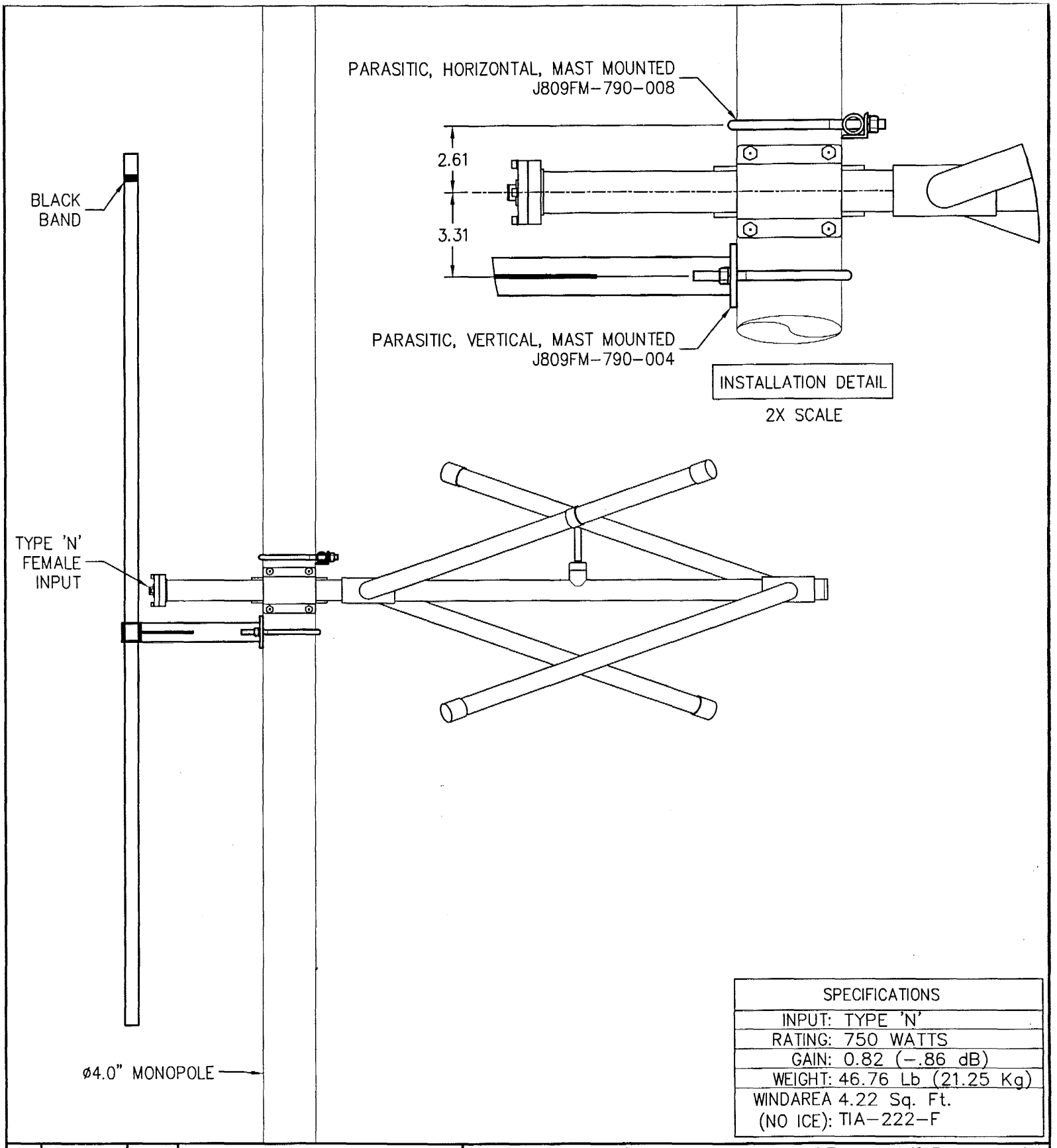
SIZE: A

PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

ANTENNA PLAN VIEW AND ORIENTATION

MODEL: PSIFML-1A-DA	DRAWN BY: D.G. Kellar	DATE: 8/18/09	
CHANNEL/ FREQUENCY: 90.1 MHz	APPROVED BY:	DATE:	
SCALE: 1:20	DRAWING NO.: J809FM-790-002	REV.	



INSTALLATION DETAIL

2X SCALE

SPECIFICATIONS
INPUT: TYPE 'N'
RATING: 750 WATTS
GAIN: 0.82 (-.86 dB)
WEIGHT: 46.76 Lb (21.25 Kg)
WINDAREA 4.22 Sq. Ft. (NO ICE): TIA-222-F

REV.	MADE BY / CHECKED BY	DATE	CHANGE

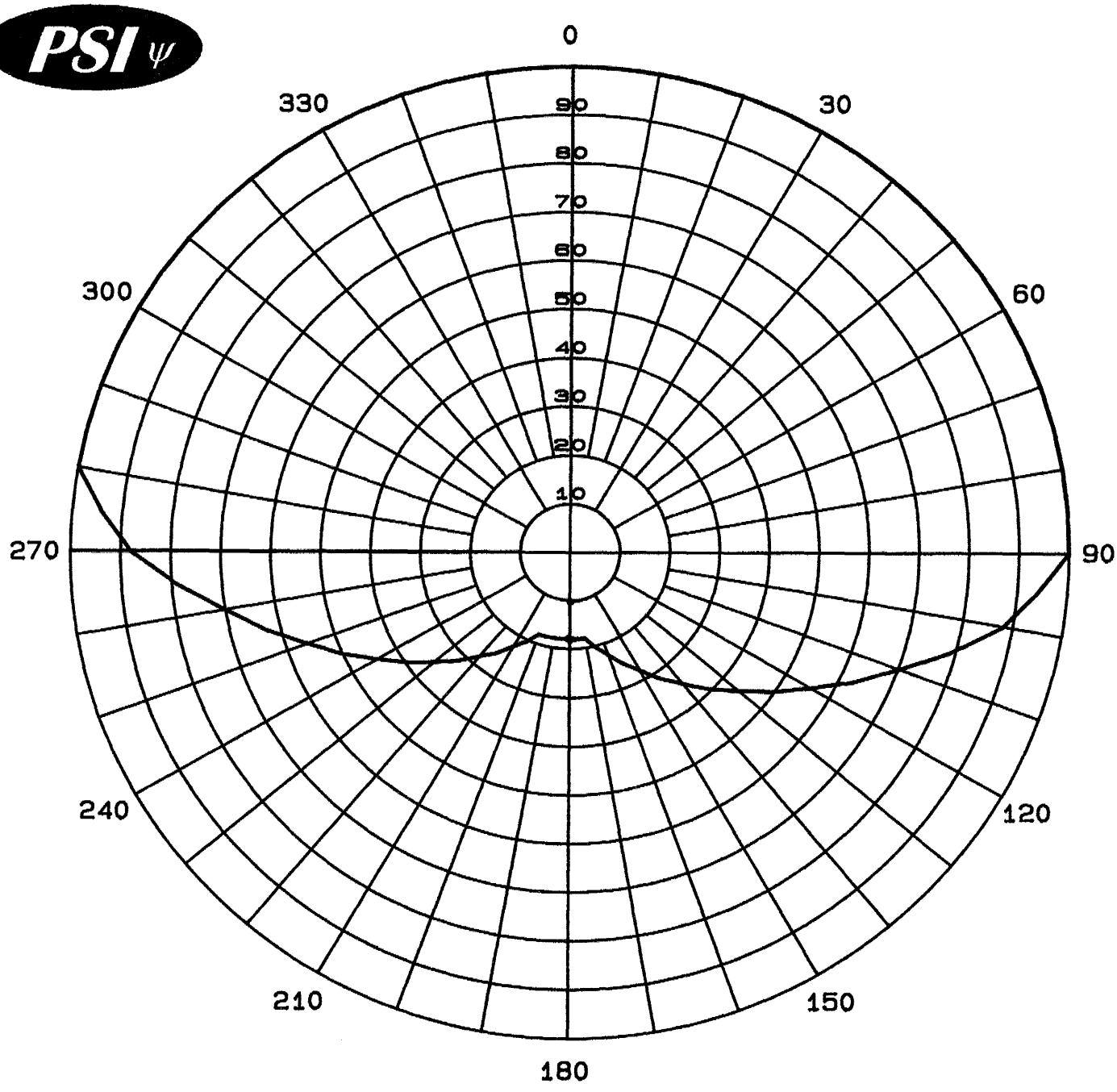
SIZE: A

PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

ANTENNA ELEVATIONS AND SPECIFICATIONS

MODEL:	DRAWN BY:	DATE:
PSIFML-1A-DA	D.G. Kellar	8/18/09
CHANNEL/ FREQUENCY: 90.1 MHz	APPROVED BY:	DATE:
SCALE: 1:10	DRAWING NO.: J809FM-790-001	REV.



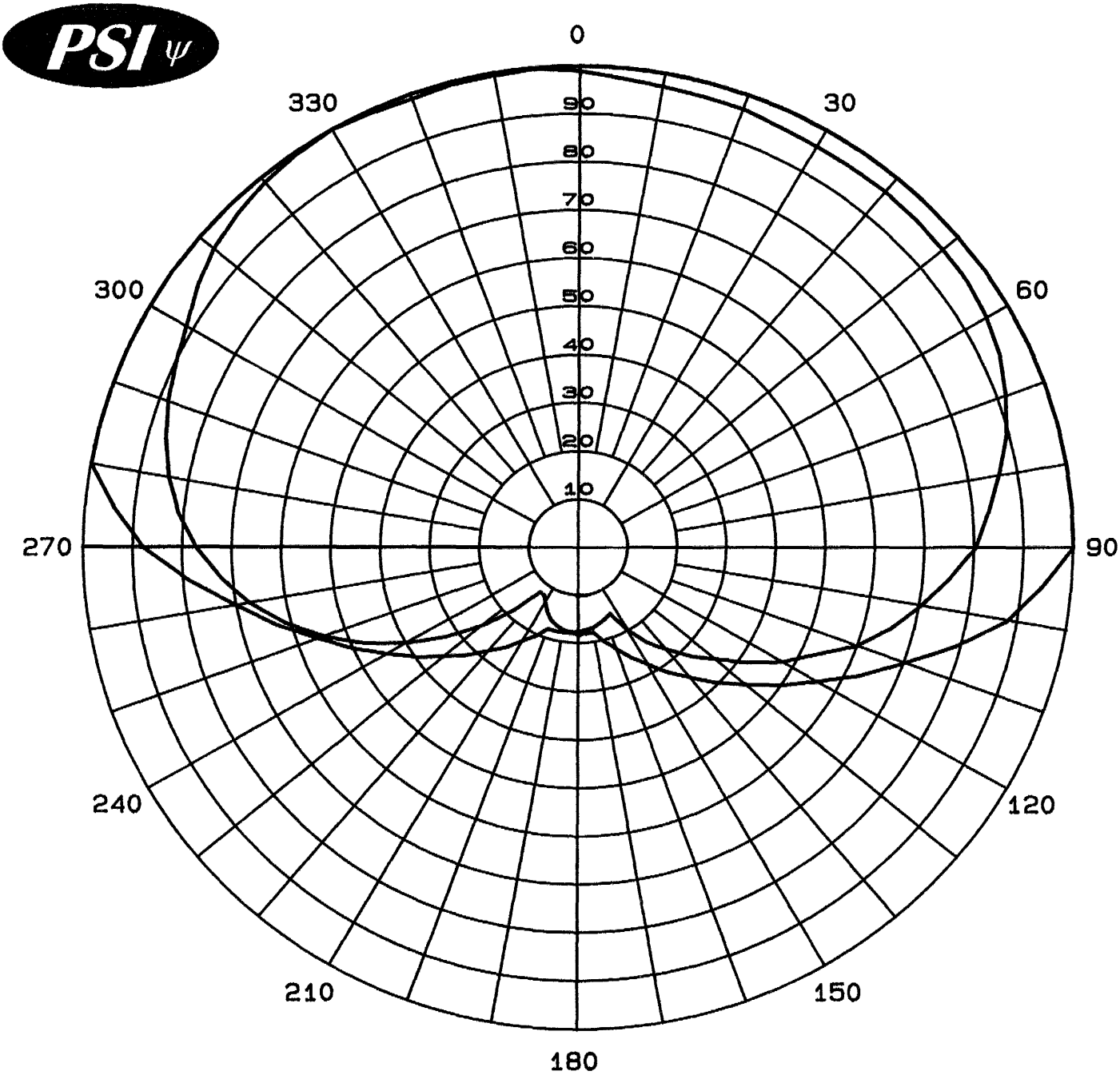
Maximum Envelope
Azimuth Plane Pattern
Antenna: PSIFML-1A-DA
Type:1-Bay Directional FM Antenna
ERP: .027 kW (-15.69 dBK)
RMS Envelope: .784
Frequency: 90.1 MHz
KJZP Prescott, AZ

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Maximum Envelope Tabulation

Antenna: PSIFML-1-DA
St. Paul Bible College
Station: KJZP
Frequency: 90.1 MHz
Location: Prescott, AZ
Maximum ERP: .027 kW (-15.69 dBk)

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	1.000	0.027	-15.69
10	1.000	0.027	-15.69
20	1.000	0.027	-15.69
30	1.000	0.027	-15.69
40	1.000	0.027	-15.69
50	1.000	0.027	-15.69
60	1.000	0.027	-15.69
70	1.000	0.027	-15.69
80	1.000	0.027	-15.69
90	1.000	0.027	-15.69
100	0.879	0.021	-16.81
110	0.699	0.013	-18.80
120	0.556	0.008	-20.78
130	0.442	0.005	-22.78
140	0.352	0.003	-24.76
150	0.280	0.002	-26.74
160	0.223	0.001	-28.72
165	0.178	0.001	-30.68
170	0.178	0.001	-30.68
180	0.178	0.001	-30.68
190	0.178	0.001	-30.68
200	0.178	0.001	-30.68
210	0.223	0.001	-28.72
220	0.280	0.002	-26.74
230	0.352	0.003	-24.76
240	0.442	0.005	-22.78
250	0.556	0.008	-20.78
260	0.699	0.013	-18.80
270	0.879	0.021	-16.81
280	1.000	0.027	-15.69
290	1.000	0.027	-15.69
300	1.000	0.027	-15.69
310	1.000	0.027	-15.69
320	1.000	0.027	-15.69
330	1.000	0.027	-15.69
340	1.000	0.027	-15.69
350	1.000	0.027	-15.69



Maximum Envelope and
Composite Pattern
Antenna: PSIFML-1A-DA
Type:1-Bay Directional FM Antenna
ERP: .027 kW (-15.69 dBK)
RMS Envelope: .784
RMS Composite: .727
KJZP Prescott, AZ

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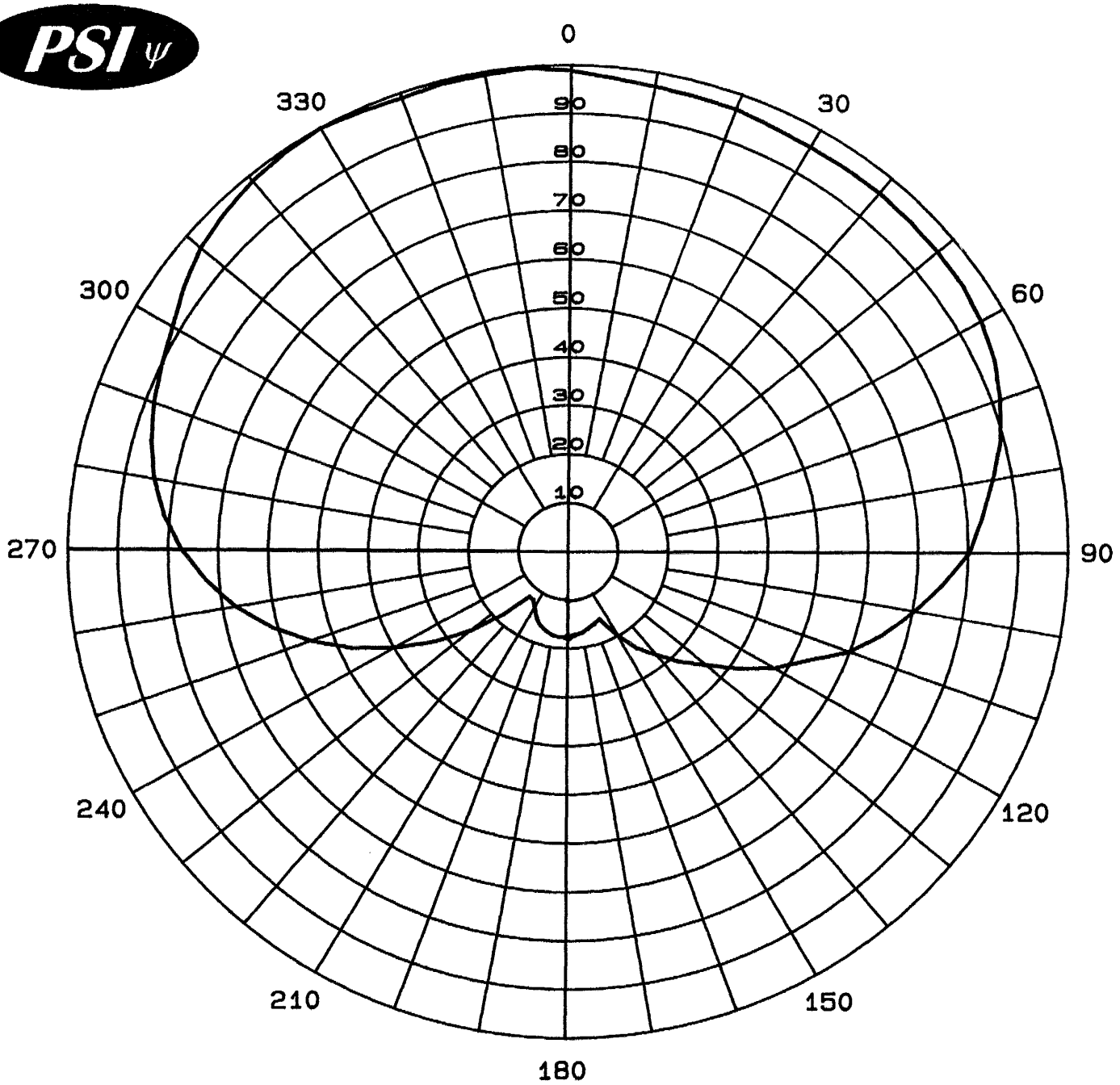


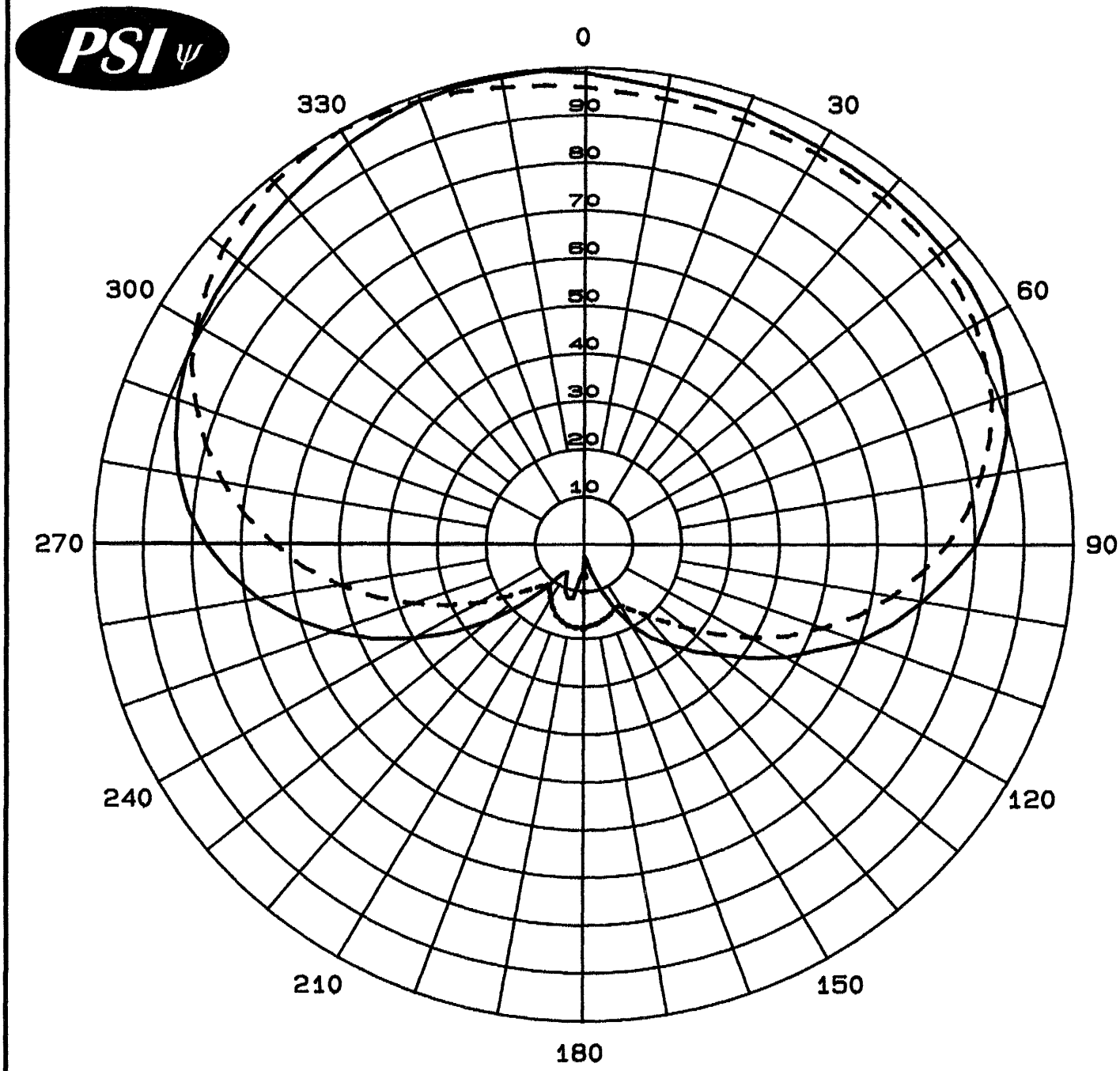
Measured Composite
Azimuth Plane Pattern
Antenna: PSIFML-1A-DA
Type:1-Bay Directional FM Antenna
ERP: .027 kW (-15.69 dBK)
Frequency: 90.1 MHz
RMS Composite: .727
KJZP Prescott, AZ

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Composite Pattern Tabulation

Antenna: PSIFML-1-DA
St. Paul Bible College
Station: KJZP
Frequency: 90.1 MHz
Location: Prescott, AZ
Maximum ERP: .027 kW (-15.69 dBk)

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.989	0.026	-15.78
10	0.972	0.026	-15.93
20	0.968	0.025	-15.97
30	0.960	0.025	-16.04
40	0.962	0.025	-16.02
50	0.959	0.025	-16.05
60	0.950	0.024	-16.13
70	0.918	0.023	-16.43
80	0.862	0.020	-16.98
90	0.803	0.017	-17.59
100	0.702	0.013	-18.76
110	0.598	0.010	-20.15
120	0.477	0.006	-22.12
130	0.362	0.004	-24.51
140	0.277	0.002	-26.84
150	0.198	0.001	-29.75
160	0.157	0.001	-31.77
170	0.168	0.001	-31.18
180	0.176	0.001	-30.78
190	0.175	0.001	-30.83
200	0.161	0.001	-31.55
210	0.132	0.000	-33.27
220	0.119	0.000	-34.18
230	0.251	0.002	-27.69
240	0.399	0.004	-23.67
250	0.545	0.008	-20.96
260	0.672	0.012	-19.14
270	0.772	0.016	-17.93
280	0.840	0.019	-17.20
290	0.883	0.021	-16.77
300	0.915	0.023	-16.46
310	0.963	0.025	-16.01
320	0.988	0.026	-15.79
330	1.000	0.027	-15.69
340	0.989	0.026	-15.78
350	0.994	0.027	-15.74



Measured Relative Field
Azimuth Plane Pattern
Antenna: PSIFML-1A-DA
Type:1-Bay Directional FM Antenna
Gain H-pol (solid): .82 (-.86 dB)
Gain V-pol (dash): .82 (-.86 dB)
Frequency: 90.1 MHz
KJZP Prescott, AZ

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Measured Relative Field Tabulation

Antenna: PSIFML-1A-DA
St. Paul Bible College
Station: KJZP
Frequency: 90.1 MHz
Location: Prescott, AZ

Horizontal Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.989	0.802	-0.96
10	0.972	0.775	-1.11
20	0.968	0.768	-1.14
30	0.960	0.756	-1.22
40	0.962	0.759	-1.20
50	0.959	0.754	-1.23
60	0.950	0.740	-1.31
70	0.918	0.691	-1.61
80	0.862	0.609	-2.15
90	0.803	0.529	-2.77
100	0.702	0.404	-3.94
110	0.598	0.293	-5.33
120	0.477	0.187	-7.29
130	0.362	0.107	-9.69
140	0.277	0.063	-12.01
150	0.198	0.032	-14.93
160	0.101	0.008	-20.78
170	0.035	0.001	-29.98
180	0.067	0.004	-24.34
190	0.116	0.011	-19.57
200	0.107	0.009	-20.27
210	0.066	0.004	-24.47
220	0.119	0.012	-19.35
230	0.251	0.052	-12.87
240	0.399	0.131	-8.84
250	0.545	0.244	-6.13
260	0.672	0.370	-4.31
270	0.772	0.489	-3.11
280	0.840	0.579	-2.38
290	0.883	0.639	-1.94
300	0.908	0.676	-1.70
310	0.924	0.700	-1.55
320	0.943	0.729	-1.37
330	0.967	0.767	-1.15
340	0.989	0.802	-0.96
350	0.994	0.810	-0.91

Maximum Value
Field 1.00
Gain .82 (-.86 dB)
Azimuth Bearing 355 degrees
Minimum Field
Field 0.026
Gain .0006 (-32.56 dB)
Azimuth Bearing 175 degrees

Vertical Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.960	0.756	-1.22
10	0.950	0.740	-1.31
20	0.945	0.732	-1.35
30	0.945	0.732	-1.35
40	0.944	0.731	-1.36
50	0.940	0.725	-1.40
60	0.922	0.697	-1.57
70	0.888	0.647	-1.89
80	0.825	0.558	-2.53
90	0.744	0.454	-3.43
100	0.638	0.334	-4.77
110	0.516	0.218	-6.61
120	0.395	0.128	-8.93
130	0.275	0.062	-12.08
140	0.192	0.030	-15.20
150	0.148	0.018	-17.46
160	0.157	0.020	-16.94
170	0.168	0.023	-16.36
180	0.176	0.025	-15.95
190	0.175	0.025	-16.00
200	0.161	0.021	-16.73
210	0.132	0.014	-18.45
220	0.110	0.010	-20.03
230	0.151	0.019	-17.28
240	0.248	0.050	-12.97
250	0.368	0.111	-9.54
260	0.504	0.208	-6.81
270	0.633	0.329	-4.83
280	0.748	0.459	-3.38
290	0.843	0.583	-2.35
300	0.915	0.687	-1.63
310	0.963	0.760	-1.19
320	0.988	0.800	-0.97
330	1.000	0.820	-0.86
340	0.989	0.802	-0.96
350	0.974	0.778	-1.09

Maximum Value
Field 1.00
Gain .82 (-.86 dB)
Azimuth Bearing 330 degrees
Minimum Field
Field 0.110
Gain .010 (-20.03 dB)
Azimuth Bearing 220 degrees

ERP Tabulation

Antenna: PSIFML-1A-DA
St. Paul Bible College
Station: KJZP
Frequency: 90.1 MHz
Location: Prescott, AZ
Maximum ERP: .027 kW (-15.69 dBk)

Horizontal Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.989	0.0264	-15.78
10	0.972	0.0255	-15.93
20	0.968	0.0253	-15.97
30	0.960	0.0249	-16.04
40	0.962	0.0250	-16.02
50	0.959	0.0248	-16.05
60	0.950	0.0244	-16.13
70	0.918	0.0228	-16.43
80	0.862	0.0201	-16.98
90	0.803	0.0174	-17.59
100	0.702	0.0133	-18.76
110	0.598	0.0097	-20.15
120	0.477	0.0061	-22.12
130	0.362	0.0035	-24.51
140	0.277	0.0021	-26.84
150	0.198	0.0011	-29.75
160	0.101	0.0003	-35.60
170	0.035	0.0000	-44.81
180	0.067	0.0001	-39.16
190	0.116	0.0004	-34.40
200	0.107	0.0003	-35.10
210	0.066	0.0001	-39.30
220	0.119	0.0004	-34.18
230	0.251	0.0017	-27.69
240	0.399	0.0043	-23.67
250	0.545	0.0080	-20.96
260	0.672	0.0122	-19.14
270	0.772	0.0161	-17.93
280	0.840	0.0191	-17.20
290	0.883	0.0211	-16.77
300	0.908	0.0223	-16.52
310	0.924	0.0231	-16.37
320	0.943	0.0240	-16.20
330	0.967	0.0252	-15.98
340	0.989	0.0264	-15.78
350	0.994	0.0267	-15.74

Maximum Value (H-pol)

Field	1.00
ERP	027 kW (-15.69 dBk)
Azimuth Bearing	355 degrees

Minimum Field (H-pol)

Field	0.026
ERP	.018 W (-17.45 dBW)
Azimuth Bearing	175 degrees

Vertical Polarization

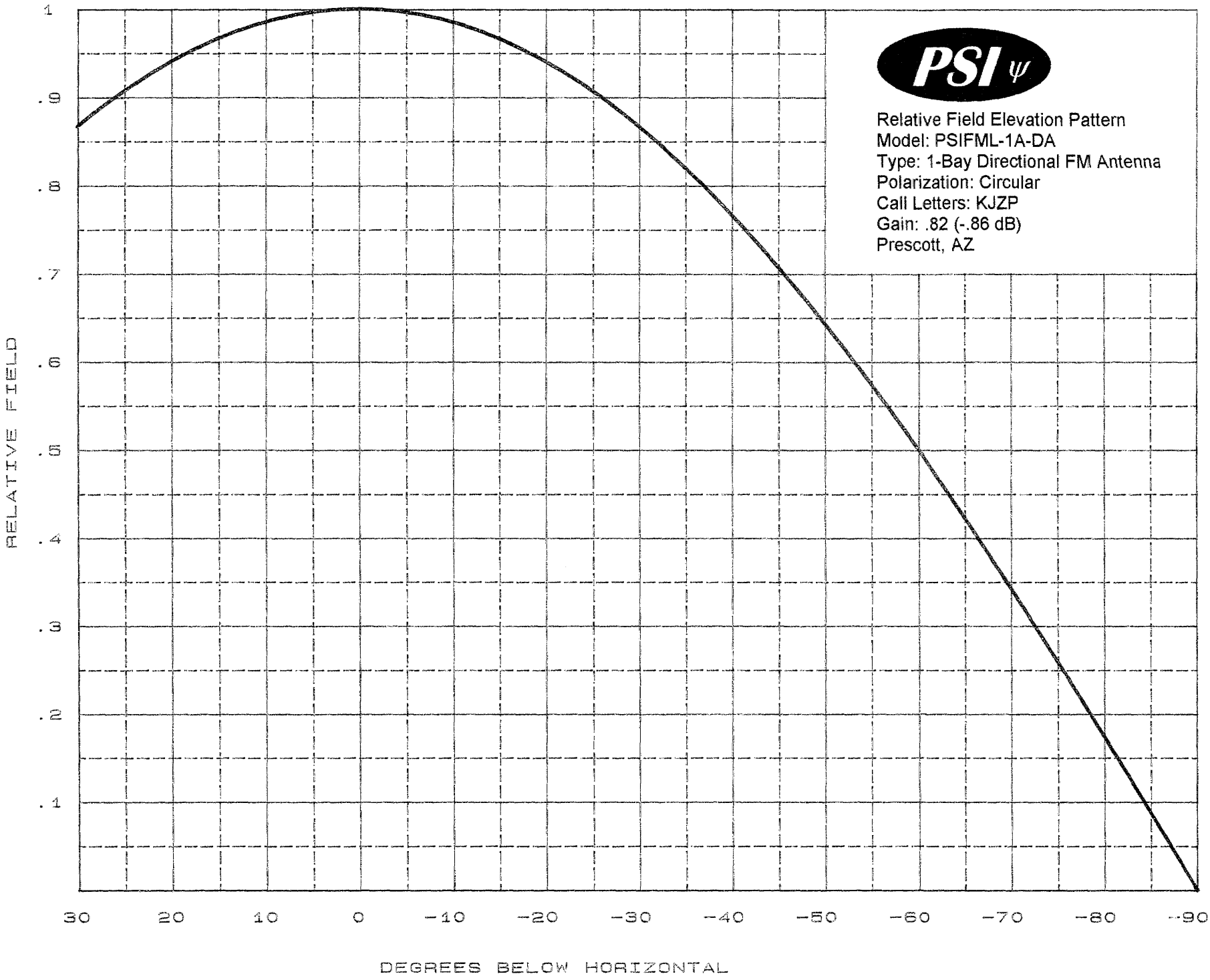
Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.960	0.0249	-16.04
10	0.950	0.0244	-16.13
20	0.945	0.0241	-16.18
30	0.945	0.0241	-16.18
40	0.944	0.0241	-16.19
50	0.940	0.0239	-16.22
60	0.922	0.0230	-16.39
70	0.888	0.0213	-16.72
80	0.825	0.0184	-17.36
90	0.744	0.0149	-18.25
100	0.638	0.0110	-19.59
110	0.516	0.0072	-21.43
120	0.395	0.0042	-23.75
130	0.275	0.0020	-26.90
140	0.192	0.0010	-30.02
150	0.148	0.0006	-32.28
160	0.157	0.0007	-31.77
170	0.168	0.0008	-31.18
180	0.176	0.0008	-30.78
190	0.175	0.0008	-30.83
200	0.161	0.0007	-31.55
210	0.132	0.0005	-33.27
220	0.110	0.0003	-34.86
230	0.151	0.0006	-32.11
240	0.248	0.0017	-27.80
250	0.368	0.0037	-24.37
260	0.504	0.0069	-21.64
270	0.633	0.0108	-19.66
280	0.748	0.0151	-18.21
290	0.843	0.0192	-17.17
300	0.915	0.0226	-16.46
310	0.963	0.0250	-16.01
320	0.988	0.0264	-15.79
330	1.000	0.0270	-15.69
340	0.989	0.0264	-15.78
350	0.974	0.0256	-15.92

Maximum Value (V-pol)

Field	1.00
ERP	.027 kW (-15.69 dBk)
Azimuth Bearing	330 degrees

Minimum Field (V-pol)

Field	0.110
ERP	.32 W (-4.95 dBW)
Azimuth Bearing	220 degrees


PSI ψ
Relative Field Elevation Pattern
Model: PSIFML-1A-DA
Type: 1-Bay Directional FM Antenna
Polarization: Circular
Call Letters: KJZP
Gain: .82 (-.86 dB)
Prescott, AZ
RELATIVE FIELD
1
.9
.8
.7
.6
.5
.4
.3
.2
.1
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
DEGREES BELOW HORIZONTAL