



Propagation Systems, Inc.

Quality Broadcast Antenna Systems

**Directional FM Antenna
KGZG-FM
Radio Station KMJY, LLC
Newport, WA**

A custom designed 3-element Yagi type antenna with parasitic element was used in conjunction with the customer's Stainless 25G tower to create the necessary directional radiation pattern. The final antenna consists of 4-bays of radiating elements spaced .84-wavelengths mounted directly to the tower leg with one horizontal parasitic element per bay.

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 tower 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 313.5 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.

The antenna is to be mounted 29 meters (95.1 ft.) +2/-4 meters above ground level on the southeast tower leg and positioned 95° True. No other antenna can be installed within 15 ft. of the antenna element. 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 6.56 kW will be required at the antenna input in order to reach the approved 87 kW ERP. The transmitter output power requirements are dependent upon the transmission line size and length used to feed the antenna.

Antenna Specifications

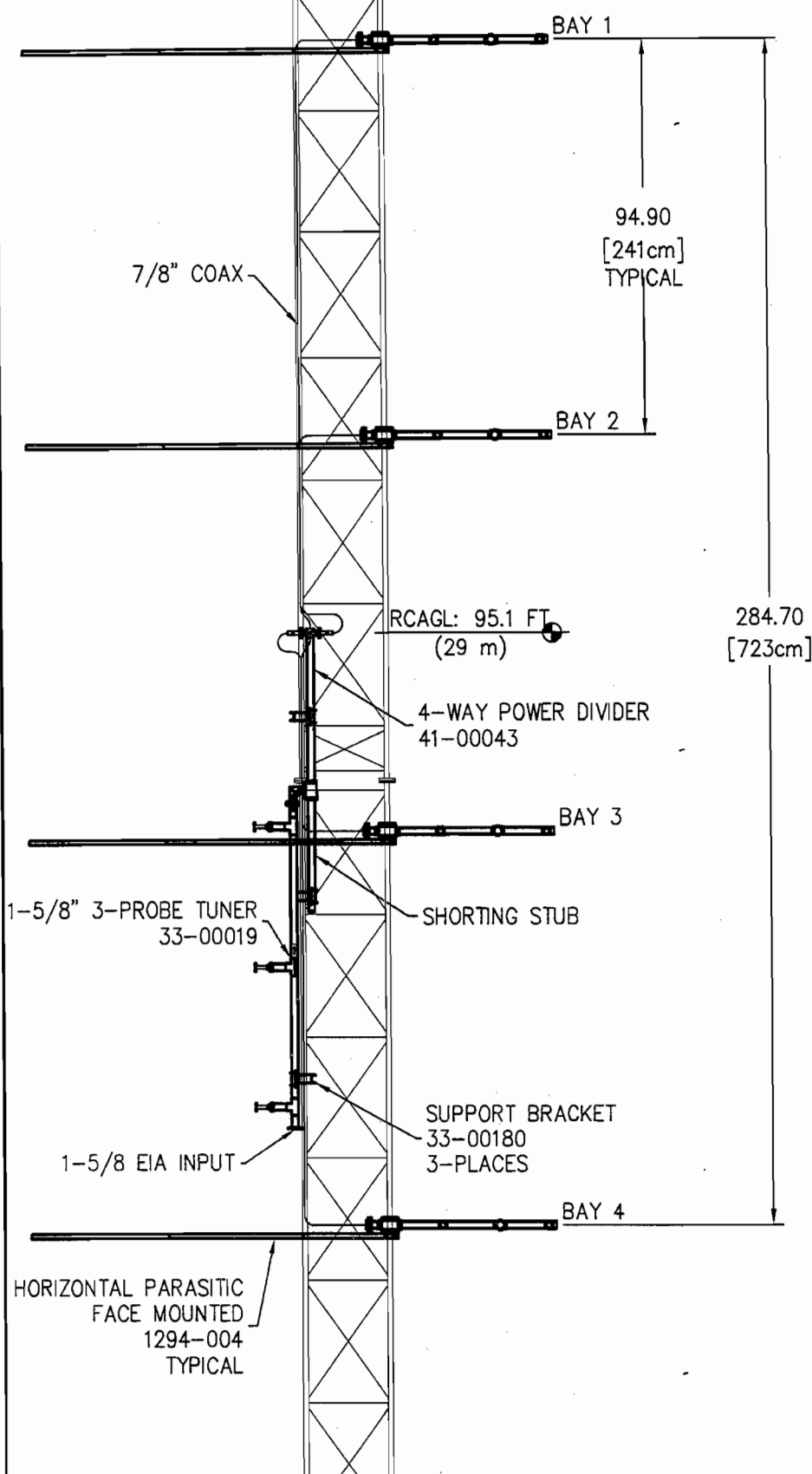
Antenna Model	PSIFM3HY-4-DA
Type	4-bay directional FM Yagi antenna
Frequency	104.5 MHz
Polarization	Horizontal
Envelope RMS	.883
Measured RMS	.454
Gain	13.27 (11.23 dB)
ERP	87 kW
Antenna input power	6.56 kW
Antenna Input	1-5/8" EIA
Power rating	10 kW
Length	23.73 ft.
Weight	153 lbs.
Wind Area	19.41 sq. 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.

 8/19/2014

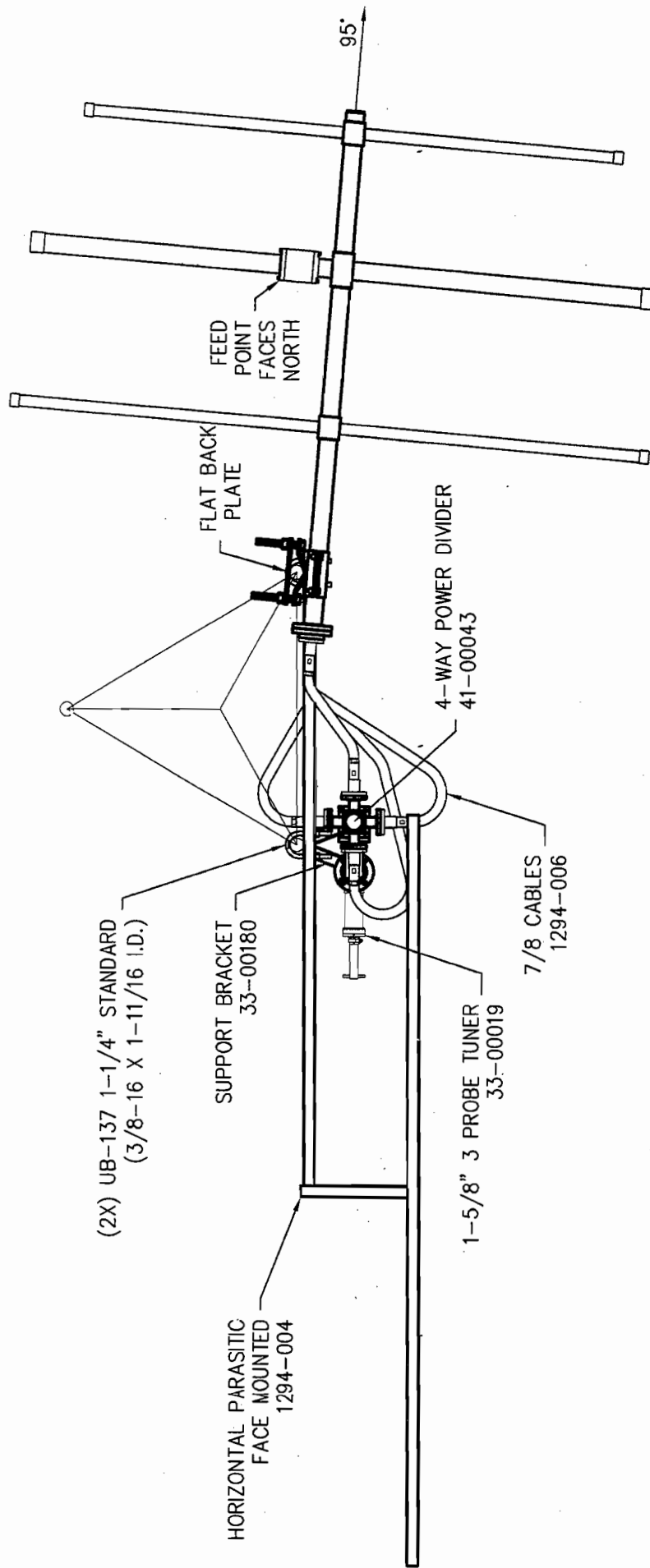
Douglas A. Ross
President
Propagation Systems Inc.



SPECIFICATIONS	
SPACING:	0.84 λ
LENGTH:	23.73 FT [7.23m]
RATING:	10 kW
GAIN:	13.27 (11.23 dB)
WEIGHT:	153 LB [69.4 Kg]
WINDAREA:	19.41 FT ²
TIA-222-F	(NO ICE)
NOTE:	

REV.	MADE BY CHECKED BY	DATE
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: PSIFM3HY-4-DA	DRAWN BY: B.K.SCHILLING	DATE: 7/18/14
CHANNEL/FREQUENCY: 104.5 MHz	APPROVED BY:	DATE:
SCALE: 1:40	DRAWING NO.: 1294-001	REV.



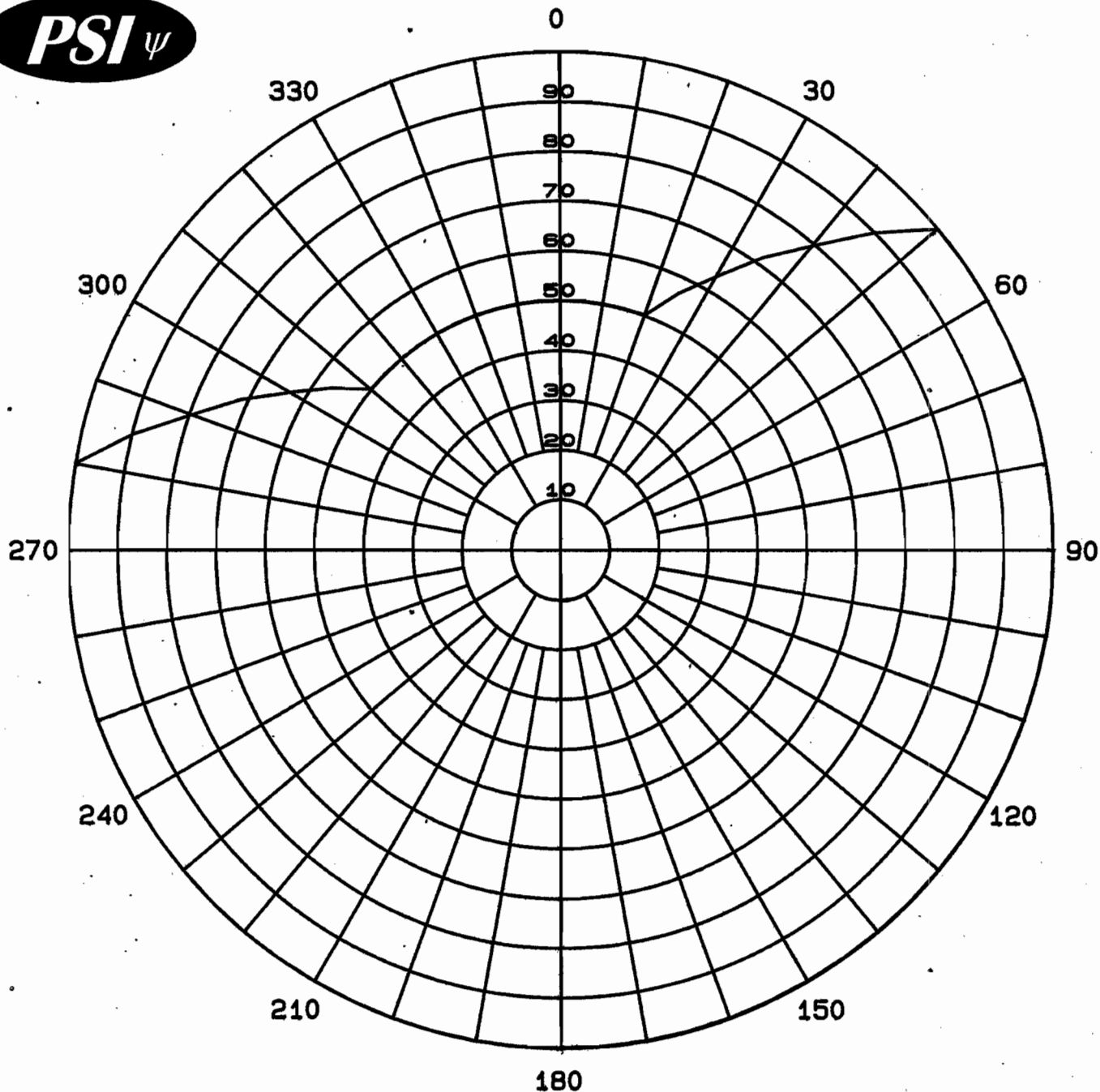
PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA

ANTENNA PLAN VIEW AND ORIENTATION

MODEL:	PSIFM3HY-4-DA	DRAWN BY:	B.K.SCHILLING	DATE:	7/18/14
CHANNEL:		APPROVED BY:		DATE:	
FREQUENCY:	104.5 MHz	DRAWING NO.:	1294-002	SHEET	REV.
SCALE:	1:14	PART NO.:			

MATERIAL:				SIZE	
				A	
				TOLERANCES UNLESS OTHERWISE NOTED	
				FRACTIONS X/X ± 1/16"	
				DECIMALS XX ± .01"	
				DECIMALS XXX ± .005"	
				ANGLES ± 3°	
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REV.	MADE BY	DATE	CHANGE		



Maximum Envelope
Azimuth Plane Pattern
Antenna: PSIFM3HY-4-DA
Type: 4-Bay Directional FM Antenna
ERP: 87 kW (19.40 dBk)
RMS Envelope: .883
Frequency: 104.5 MHz
KGZG-FM Newport, WA

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Maximum Envelope Tabulation

Antenna: PSIFM3HY-4-DA

Radio Station KMJY, LLC

Station: KGZG-FM

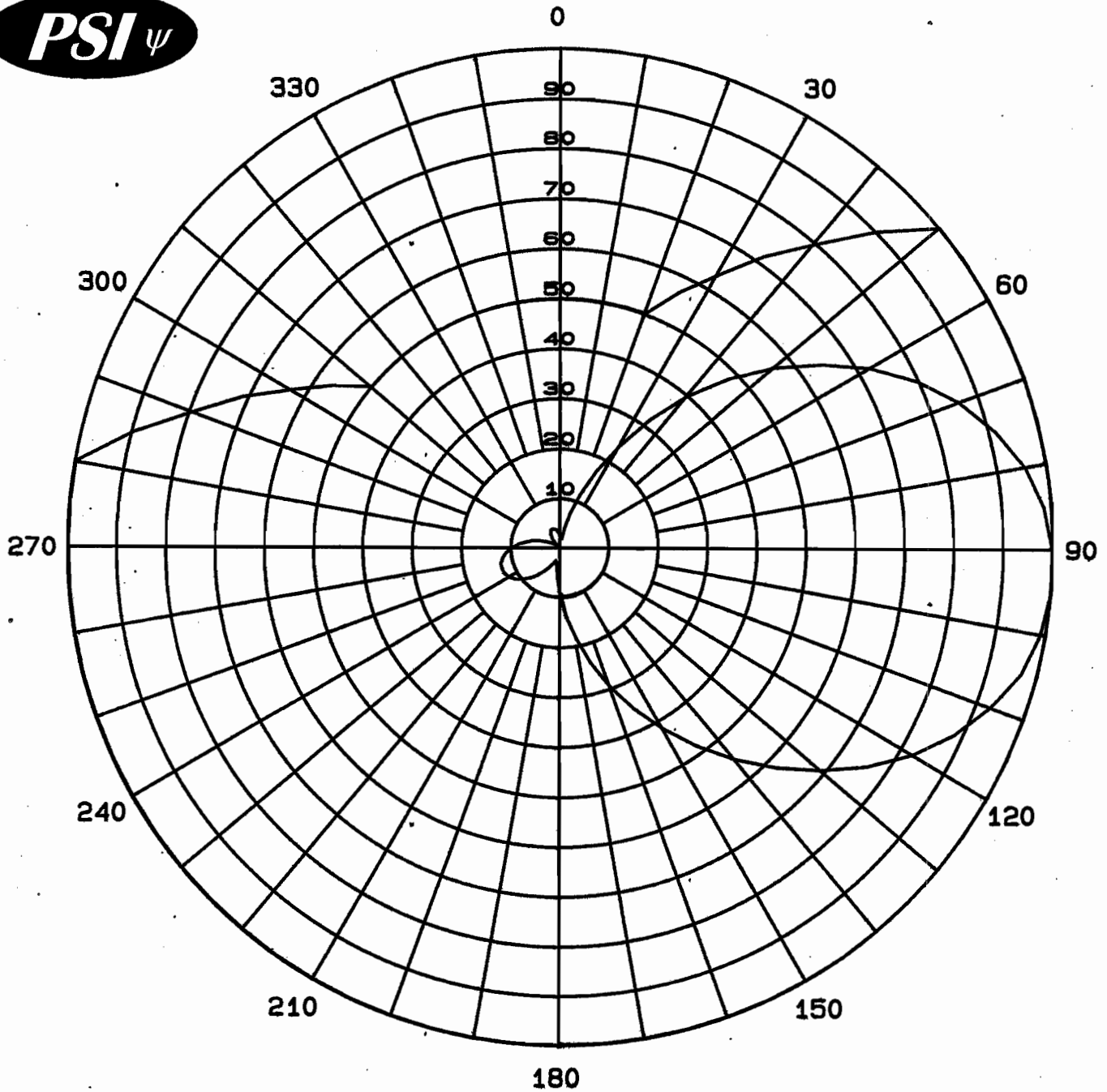
Frequency: 104.5 MHz

Location: Newport, WA

Maximum ERP: 87 kW (19.40 dBk)

Horizontal Polarization

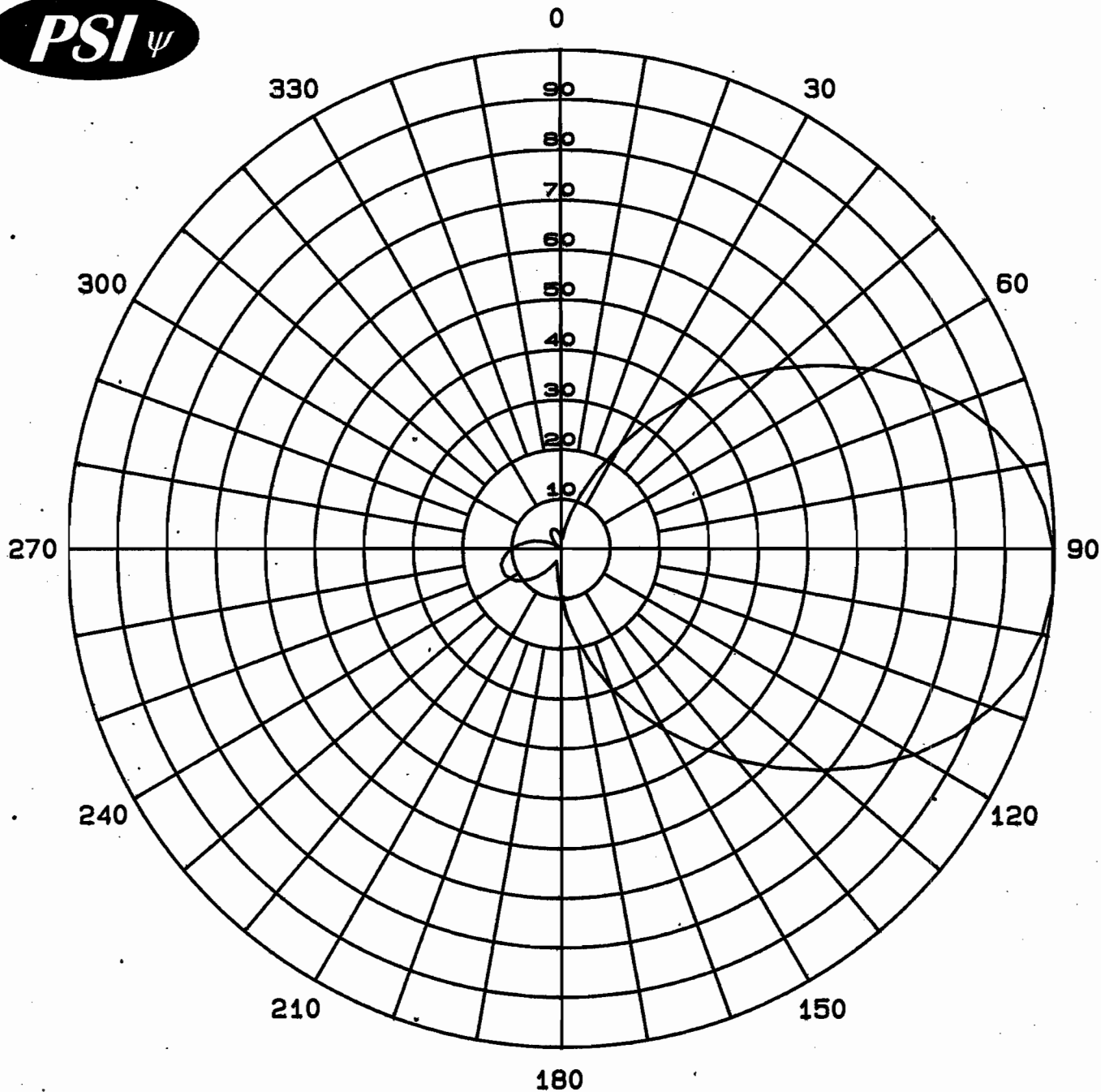
Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.501	21.8	13.39
10	0.501	21.8	13.39
20	0.501	21.8	13.39
30	0.631	34.6	15.40
40	0.794	54.8	17.39
50	1.000	87.0	19.40
60	1.000	87.0	19.40
70	1.000	87.0	19.40
80	1.000	87.0	19.40
90	1.000	87.0	19.40
100	1.000	87.0	19.40
110	1.000	87.0	19.40
120	1.000	87.0	19.40
130	1.000	87.0	19.40
140	1.000	87.0	19.40
150	1.000	87.0	19.40
160	1.000	87.0	19.40
170	1.000	87.0	19.40
180	1.000	87.0	19.40
190	1.000	87.0	19.40
200	1.000	87.0	19.40
210	1.000	87.0	19.40
220	1.000	87.0	19.40
230	1.000	87.0	19.40
240	1.000	87.0	19.40
250	1.000	87.0	19.40
260	1.000	87.0	19.40
270	1.000	87.0	19.40
280	1.000	87.0	19.40
290	0.794	54.8	17.39
300	0.631	34.6	15.40
310	0.501	21.8	13.39
320	0.501	21.8	13.39
330	0.501	21.8	13.39
340	0.501	21.8	13.39
350	0.501	21.8	13.39



Maximum Envelope and
Measured Pattern
Antenna: PSIFM3HY-4-DA
Type: 4-Bay Directional FM Antenna
ERP: 87 kW (19.40 dBk)
RMS Envelope: .883
RMS Measured: .454
Frequency: 104.5 MHz

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PO Box 113
Ebensburg, PA 15931

KGZG-FM Newport, WA



Measured Relative Field
Azimuth Plane Pattern
Antenna: PSIFM3HY-4-DA
Type: 4-Bay Directional FM Antenna
Gain H-pol: 13.27 (11.23 dB)
RMS: .454
Frequency: 104.5 MHz
KGZG-FM Newport, WA

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Measured Relative Field Tabulation

Antenna: PSIFM3HY-4-DA

Radio Station KMJY, LLC

Station: KGZG-FM

Frequency: 104.5 MHz

Location: Newport, WA

Horizontal Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.018	0.004	-23.67
10	0.041	0.022	-16.52
20	0.116	0.179	-7.48
30	0.238	0.752	-1.24
40	0.397	2.091	3.20
50	0.563	4.206	6.24
60	0.724	6.956	8.42
70	0.859	9.792	9.91
80	0.955	12.103	10.83
90	0.998	13.217	11.21
100	0.989	12.980	11.13
110	0.928	11.428	10.58
120	0.825	9.032	9.56
130	0.691	6.336	8.02
140	0.552	4.043	6.07
150	0.419	2.330	3.67
160	0.296	1.163	0.65
170	0.183	0.444	-3.52
180	0.096	0.122	-9.13
190	0.042	0.023	-16.31
200	0.027	0.010	-20.14
210	0.045	0.027	-15.71
220	0.072	0.069	-11.62
230	0.099	0.130	-8.86
240	0.119	0.188	-7.26
250	0.126	0.211	-6.76
260	0.120	0.191	-7.19
270	0.099	0.130	-8.86
280	0.072	0.069	-11.62
290	0.045	0.027	-15.71
300	0.017	0.004	-24.16
310	0.011	0.002	-27.94
320	0.028	0.010	-19.83
330	0.041	0.022	-16.52
340	0.042	0.023	-16.31
350	0.034	0.015	-18.14

Maximum Value

Field 1.00

Gain 13.27 (11.23 dB)

Azimuth Bearing 95 degrees

Minimum Field

Field 0.006

Gain .0005 (-33.21 dB)

Azimuth Bearing 305 degrees

ERP Tabulation

Antenna: PSIFM3HY-4-DA

Radio Station KMJY, LLC

Station: KGZG-FM

Frequency: 104.5 MHz

Location: Newport, WA

Maximum ERP: 87 kW (19.40 dBk)

Horizontal Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.018	0.03	-15.50
10	0.041	0.15	-8.35
20	0.116	1.17	0.68
30	0.238	4.93	6.93
40	0.397	13.71	11.37
50	0.563	27.58	14.41
60	0.724	45.60	16.59
70	0.859	64.20	18.08
80	0.955	79.35	19.00
90	0.998	86.65	19.38
100	0.989	85.10	19.30
110	0.928	74.92	18.75
120	0.825	59.21	17.72
130	0.691	41.54	16.18
140	0.552	26.51	14.23
150	0.419	15.27	11.84
160	0.296	7.62	8.82
170	0.183	2.91	4.64
180	0.096	0.80	-0.96
190	0.042	0.15	-8.14
200	0.027	0.06	-11.98
210	0.045	0.18	-7.54
220	0.072	0.45	-3.46
230	0.099	0.85	-0.69
240	0.119	1.23	0.91
250	0.126	1.38	1.40
260	0.120	1.25	0.98
270	0.099	0.85	-0.69
280	0.072	0.45	-3.46
290	0.045	0.18	-7.54
300	0.017	0.03	-16.00
310	0.011	0.01	-19.78
320	0.028	0.07	-11.66
330	0.041	0.15	-8.35
340	0.042	0.15	-8.14
350	0.034	0.10	-9.98

Maximum Value (H-pol)

Field 1.00

ERP 87 kW (19.40 dBk)

Azimuth Bearing 95 degrees

Minimum Field (H-pol)

Field 0.006

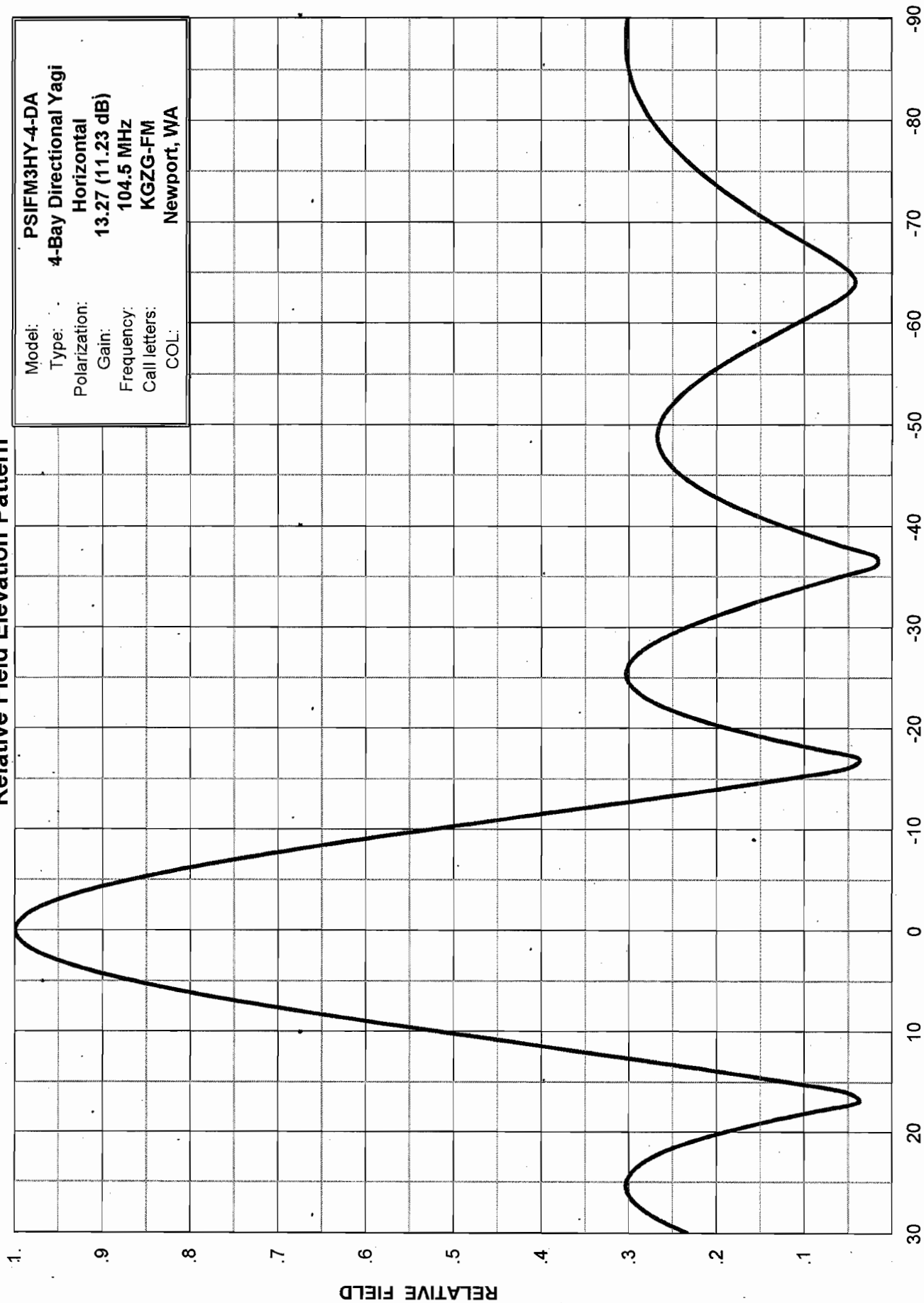
ERP .003 kW (-25.04 dBk)

Azimuth Bearing 305 degrees



Propagation Systems, Inc.

Relative Field Elevation Pattern



Model: PSIFM3HY 4-DA
Type: 4-Bay Directional Yagi
Polarization: Horizontal
Gain: 13.27 (11.23 dB)
Frequency: 104.5 MHz
Call letters: KGZG-FM
COL: Newport, WA

DEGREES BELOW HORIZONTAL