



Propagation Systems, Inc.

Quality Broadcast Antenna Systems

**Directional FM Antenna
WAYR
Good Tidings Trust, Inc.
Brunswick, GA**

A standard model PSIFM circular polarized antenna element was used in conjunction with the customer's ERI triangular tower to create the necessary directional radiation pattern. The final antenna consists of four radiating elements (bays), one horizontal parasitic element per bay and two vertical parasitic elements per bay. Each bay is secured to the tower with a custom-mounting bracket. The antenna bays are full wave spaced. The antenna array is fed from a 1-5/8" rigid inter-bay transmission line, which distributes equal power and phase to each radiating element.

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 structure 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 was tested on scaled 36" face tower section with all appurtenances. The antenna under test 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 8753A-network analyzer operating at 272.1 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 90% of the envelope RMS.

The antenna is to be mounted to the northeast tower leg and positioned 70 degrees true as shown in drawing J103FM-319-001. The correct orientation of the antenna is to be confirmed by a licensed surveyor. The antenna center of radiation is to be 322 ft above ground level. At this elevation, the center of radiation will be within the +2/-4m tolerance allowed by the FCC. No other antenna can be mounted at the same elevation or within 10 ft. of any radiating element. The distance the antenna is mounted from the tower is fixed according to the supplied mounting brackets. It is recommended that a broadcast engineer is present to supervise the installation of the antenna and that he or she certifies the antenna has been installed according to the enclosed instructions.

An input power level of 2.87 kW will be required at the antenna input in order to reach the licensed 14.0 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	PSIFM-4-DA
Type	4-bay directional FM antenna
Frequency	90.7 MHz
Polarization	Circular
Envelope RMS	.690
Gain (h-pol)	4.87 (6.88 dB)
RMS (h-pol)	.624
Gain (v-pol)	4.87 (6.88 dB)
RMS (v-pol)	.620
Input	1-5/8" EIA end fed input
Power rating	12 kW
Length	44.45 ft.
Weight	411 lbs.
Windload (50/33)	1100 lbs.

Measured Relative Field Tabulation

Antenna: PSIFM-4-DA
 Good Tidings Trust, Inc.
 Station: WAYR
 Frequency: 90.7 MHz
 Location: Brunswick, GA

Horizontal Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.751	2.75	4.39
10	0.774	2.92	4.65
20	0.783	2.99	4.75
30	0.786	3.01	4.78
40	0.811	3.20	5.06
50	0.859	3.59	5.56
60	0.921	4.13	6.16
70	0.970	4.58	6.61
80	0.999	4.86	6.87
90	1.000	4.87	6.88
100	0.980	4.68	6.70
110	0.914	4.07	6.09
120	0.837	3.41	5.33
130	0.728	2.58	4.12
140	0.621	1.88	2.74
150	0.551	1.48	1.70
160	0.483	1.14	0.55
170	0.437	0.93	-0.32
180	0.377	0.69	-1.60
190	0.300	0.44	-3.58
200	0.223	0.24	-6.16
210	0.159	0.12	-9.10
220	0.150	0.11	-9.60
230	0.211	0.22	-6.64
240	0.303	0.45	-3.50
250	0.378	0.70	-1.57
260	0.389	0.74	-1.33
270	0.373	0.68	-1.69
280	0.314	0.48	-3.19
290	0.249	0.30	-5.20
300	0.246	0.29	-5.31
310	0.321	0.50	-2.99
320	0.408	0.81	-0.91
330	0.492	1.18	0.71
340	0.574	1.60	2.05
350	0.663	2.14	3.31

Maximum Value

Field 1.00
 Gain 4.87 (6.88 dB)
 Azimuth Bearing 82-91 degrees

Minimum Field

Field 0.148
 Gain .107 (-9.72 dB)
 Azimuth Bearing 215 degrees

Vertical Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.527	1.35	1.31
10	0.622	1.88	2.75
20	0.724	2.55	4.07
30	0.787	3.02	4.79
40	0.857	3.58	5.53
50	0.898	3.93	5.94
60	0.952	4.41	6.45
70	0.979	4.67	6.69
80	1.000	4.87	6.88
90	0.997	4.84	6.85
100	0.967	4.55	6.58
110	0.929	4.20	6.24
120	0.859	3.59	5.56
130	0.803	3.14	4.97
140	0.724	2.55	4.07
150	0.655	2.09	3.20
160	0.525	1.34	1.28
170	0.417	0.85	-0.72
180	0.329	0.53	-2.78
190	0.296	0.43	-3.70
200	0.271	0.36	-4.47
210	0.255	0.32	-4.99
220	0.237	0.27	-5.63
230	0.241	0.28	-5.48
240	0.270	0.36	-4.50
250	0.289	0.41	-3.91
260	0.310	0.47	-3.30
270	0.319	0.50	-3.05
280	0.320	0.50	-3.02
290	0.336	0.55	-2.60
300	0.364	0.65	-1.90
310	0.382	0.71	-1.48
320	0.366	0.65	-1.86
330	0.352	0.60	-2.19
340	0.343	0.57	-2.42
350	0.403	0.79	-1.02

Maximum Value

Field 1.00
 Gain 4.87 (6.88 dB)
 Azimuth Bearing 80-88 degrees

Minimum Field

Field 0.237
 Gain .27 (-5.63 dB)
 Azimuth Bearing 220 degrees

ERP Tabulation

Antenna: PSIFM-4-DA

Good Tidings Trust, Inc.

Station: WAYR

Frequency: 90.7 MHz

Location: Brunswick, GA

Maximum ERP: 14.0 kW (11.46 dBk)

Horizontal Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.751	7.90	8.97
10	0.774	8.39	9.24
20	0.783	8.58	9.34
30	0.786	8.65	9.37
40	0.811	9.21	9.64
50	0.859	10.33	10.14
60	0.921	11.88	10.75
70	0.970	13.17	11.20
80	0.999	13.97	11.45
90	1.000	14.00	11.46
100	0.980	13.45	11.29
110	0.914	11.70	10.68
120	0.837	9.81	9.92
130	0.728	7.42	8.70
140	0.621	5.40	7.32
150	0.551	4.25	6.28
160	0.483	3.27	5.14
170	0.437	2.67	4.27
180	0.377	1.99	2.99
190	0.300	1.26	1.00
200	0.223	0.70	-1.57
210	0.159	0.35	-4.51
220	0.150	0.32	-5.02
230	0.211	0.62	-2.05
240	0.303	1.29	1.09
250	0.378	2.00	3.01
260	0.389	2.12	3.26
270	0.373	1.95	2.90
280	0.314	1.38	1.40
290	0.249	0.87	-0.61
300	0.246	0.85	-0.72
310	0.321	1.44	1.59
320	0.408	2.33	3.67
330	0.492	3.39	5.30
340	0.574	4.61	6.64
350	0.663	6.15	7.89

Maximum Value (H-pol)

Field 1.00

ERP 14.0 kW (11.46 dBk)

Azimuth Bearing 82-91 degrees

Minimum Field (H-pol)

Field 0.148

ERP .31 kW (-5.13 dBk)

Azimuth Bearing 215 degrees

Vertical Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.527	3.89	5.90
10	0.622	5.42	7.34
20	0.724	7.34	8.66
30	0.787	8.67	9.38
40	0.857	10.28	10.12
50	0.898	11.29	10.53
60	0.952	12.69	11.03
70	0.979	13.42	11.28
80	1.000	14.00	11.46
90	0.997	13.92	11.44
100	0.967	13.09	11.17
110	0.929	12.08	10.82
120	0.859	10.33	10.14
130	0.803	9.03	9.56
140	0.724	7.34	8.66
150	0.655	6.01	7.79
160	0.525	3.86	5.86
170	0.417	2.43	3.86
180	0.329	1.52	1.81
190	0.296	1.23	0.89
200	0.271	1.03	0.12
210	0.255	0.91	-0.41
220	0.237	0.79	-1.04
230	0.241	0.81	-0.90
240	0.270	1.02	0.09
250	0.289	1.17	0.68
260	0.310	1.35	1.29
270	0.319	1.42	1.54
280	0.320	1.43	1.56
290	0.336	1.58	1.99
300	0.364	1.85	2.68
310	0.382	2.04	3.10
320	0.366	1.88	2.73
330	0.352	1.73	2.39
340	0.343	1.65	2.17
350	0.403	2.27	3.57

Maximum Value (V-pol)

Field 1.00

ERP 14.0 kW (11.46 dBk)

Azimuth Bearing 80-88 degrees

Minimum Field (V-pol)

Field 0.237

ERP .79 kW (-1.04 dBk)

Azimuth Bearing 220 degrees

Maximum Envelope Tabulation

Antenna: PSIFM-4-DA

Good Tidings Trust, Inc.

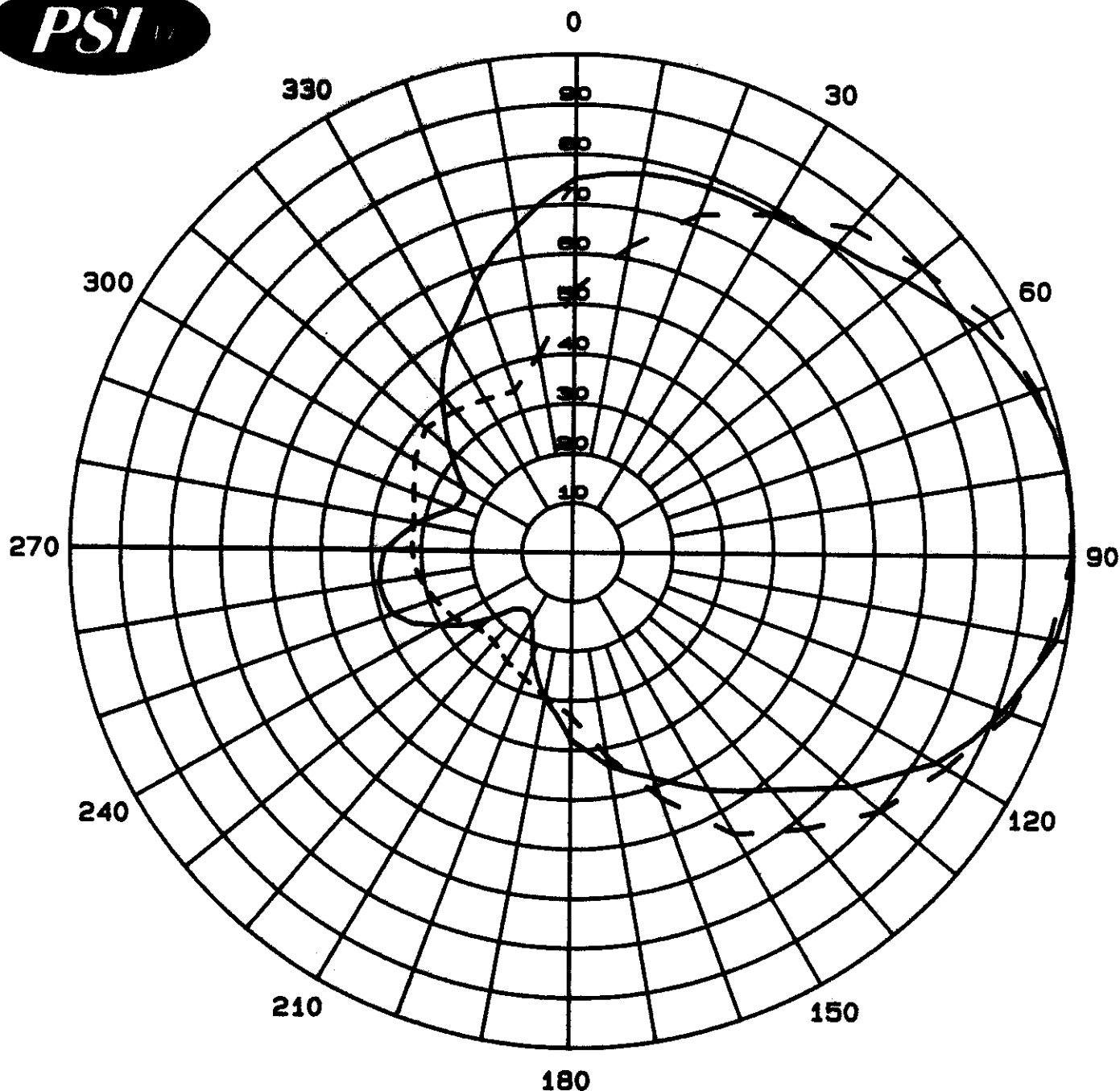
Station: WAYR

Frequency: 90.7 MHz

Location: Brunswick, GA

Maximum ERP: 14.0 kW (11.46 dBk)

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.750	7.88	8.96
10	0.820	9.41	9.74
20	0.880	10.84	10.35
30	0.950	12.64	11.02
40	1.000	14.00	11.46
45	1.000	14.00	11.46
50	1.000	14.00	11.46
60	1.000	14.00	11.46
70	1.000	14.00	11.46
80	1.000	14.00	11.46
90	1.000	14.00	11.46
100	1.000	14.00	11.46
110	0.950	12.64	11.02
120	0.880	10.84	10.35
130	0.820	9.41	9.74
135	0.785	8.63	9.36
140	0.750	7.88	8.96
150	0.670	6.28	7.98
160	0.580	4.71	6.73
170	0.505	3.57	5.53
180	0.435	2.65	4.23
190	0.390	2.13	3.28
200	0.390	2.13	3.28
210	0.390	2.13	3.28
220	0.390	2.13	3.28
225	0.390	2.13	3.28
230	0.390	2.13	3.28
240	0.390	2.13	3.28
250	0.390	2.13	3.28
260	0.390	2.13	3.28
270	0.390	2.13	3.28
280	0.390	2.13	3.28
290	0.390	2.13	3.28
300	0.390	2.13	3.28
310	0.390	2.13	3.28
315	0.413	2.38	3.77
320	0.435	2.65	4.23
330	0.505	3.57	5.53
340	0.580	4.71	6.73
350	0.670	6.28	7.98



Measured Relative Field

Azimuth Plane Pattern

Antenna: PSIFM-4-DA

Type: Directional FM

Gain H-pol (solid): 4.87 (6.88 dB)

Gain V-pol (dash): 4.87 (6.88 dB)

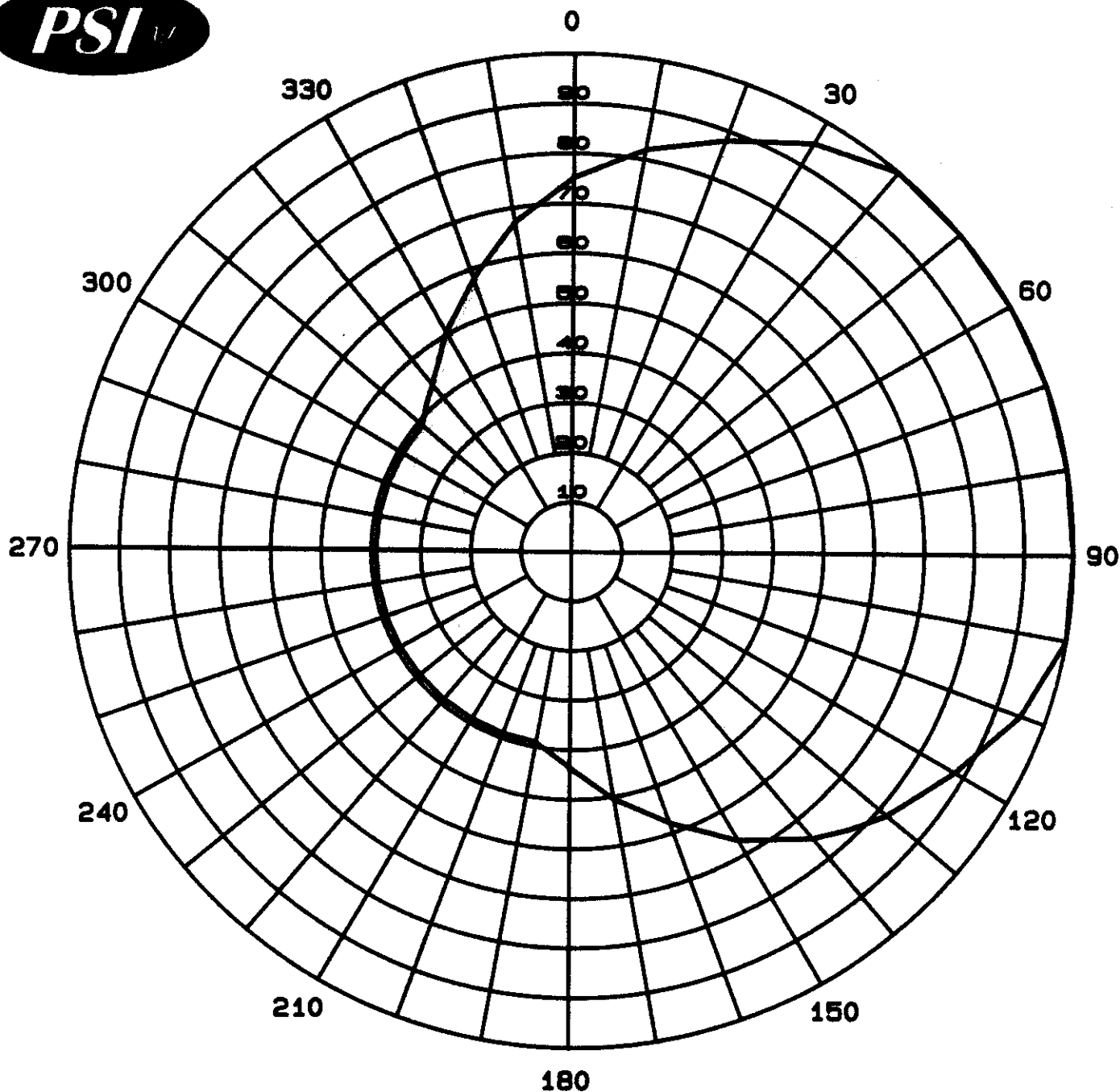
Call Letters: WAYR

Good Tidings Trust, Inc.

Propagation Systems Inc.

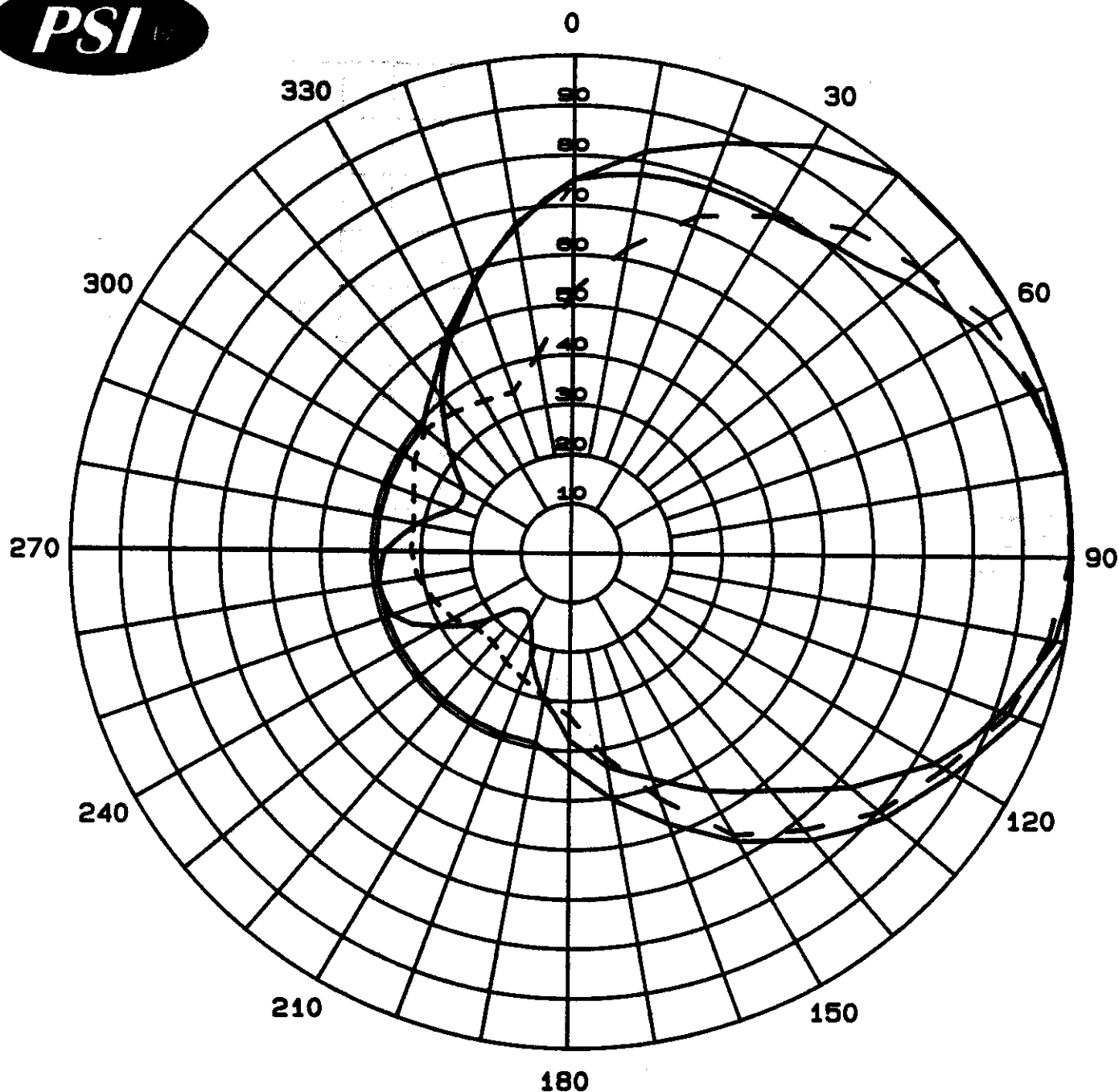
PO Box 113

Ebensburg, PA 15931



Maximum Envelope
Azimuth Plane Pattern
Antenna: PSIFM-4-DA
Type: Directional FM
Peak ERP: 14.0 kW (11.46 dBk)
Call Letters: WAYR
Frequency: 90.7 MHz
Good Tidings Trust, Inc.

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

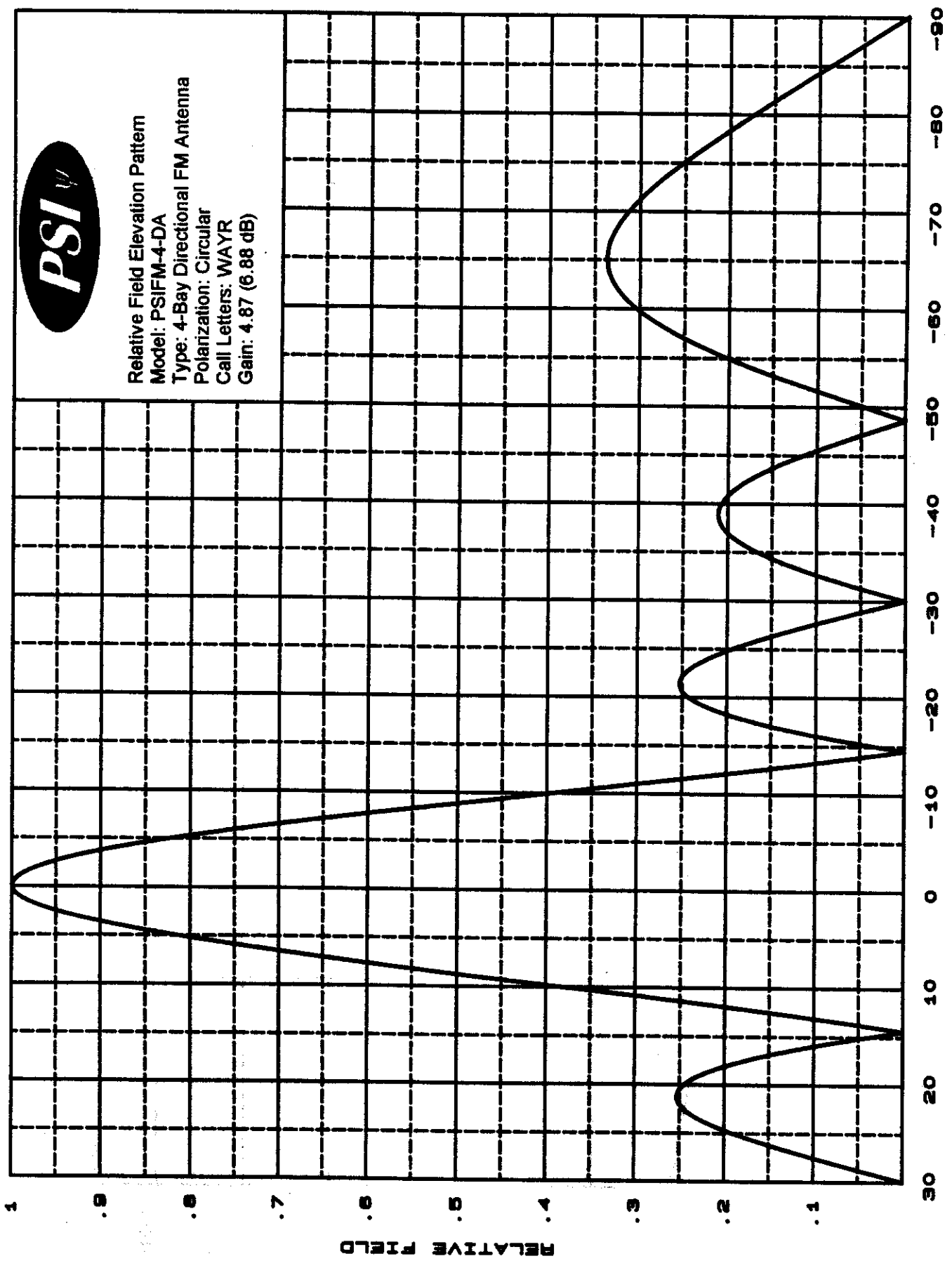


Measured Relative Field
Maximum Envelope Comparison
Antenna: PSIFM-4-DA
Type: Directional FM
Gain H-pol (solid): 4.87 (6.88 dB)
Gain V-pol (dash): 4.87 (6.88 dB)
Call Letters: WAYR
Good Tidings Trust, Inc.

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

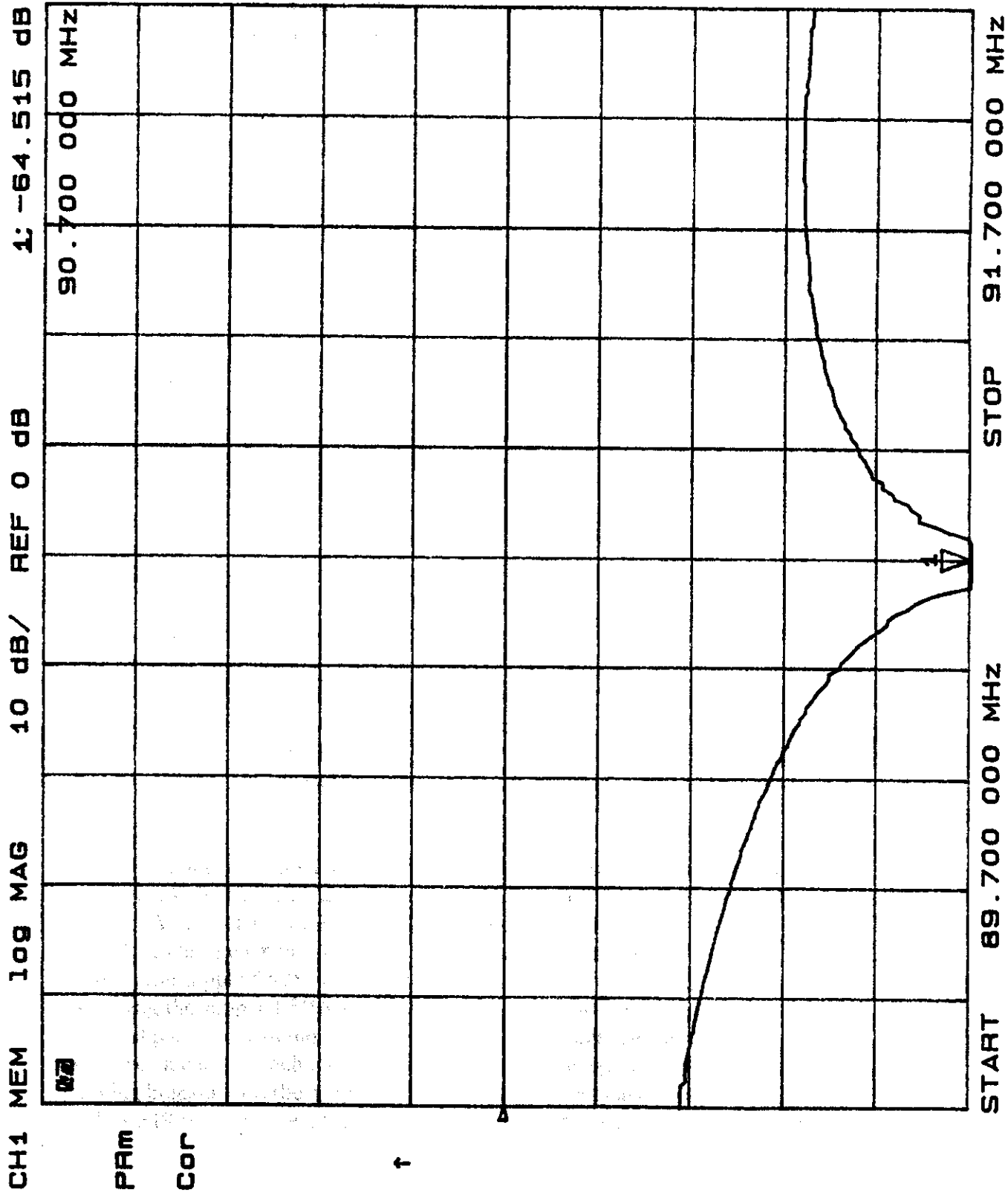


Relative Field Elevation Pattern
Model: PSIFM-4-DA
Type: 4-Bay Directional FM Antenna
Polarization: Circular
Call Letters: WAYR
Gain: 4.87 (6.88 dB)



DEGREES BELOW HORIZONTAL

1086
Fig. 4. D9



Uncrating

When uncrating the antenna system, open each crate carefully so that the crates may be used to return any merchandise that may have been damaged in shipping. Separate all parts and confirm that all items on the packing list have been received. If any parts are missing, notify PSI or its agent prior to assembling the antenna. If any parts are damaged through shipment or are missing, promptly notify the shipping carrier.

General Notes

1. Review antenna elevation and plan the installation. The antenna brackets have been designed for tower leg mount.
2. All bays are to be aligned to the same azimuth angle, 70 degrees true.
3. Exercise care when assembling the inner conductors of the coaxial line. The bullet should fit firmly in the inner conductor in order to assure a proper connection.
4. The feed points are in the up position.
5. Install one bay/inter-bay assembly at a time.
6. Keep all transmission lines free from dirt and moisture. All Teflon insulators must be clean and dry.
7. The antenna requires pressurization.
8. The antenna has been tuned at the factory and should not require field adjustment.
9. The antenna system should be tested before the erector leaves the premises to insure that the complete antenna system is functioning properly.

Installation Instructions

Step One

Review the enclosed drawings and read all steps for a general overview of the antenna installation. Plan the installation before erecting. It may be necessary to measure the antenna layout on the tower to avoid any conflicts that might arise with the mounting brackets. The antenna is to mount on the northeast tower leg. It may be necessary to reposition the existing transmission lines on the tower leg to attach the brackets.

Step Two

Starting with bay one, attach the radiating element to inter-bay one using the supplied 5/16-18 x 7/8" bolts, lock washers and O-ring. Next attach the end cap to the inter-bay tee block. Attach a bay bracket to the horizontal boom of the radiating element using the supplied #28 hose clamps. Attach an inter-bay bracket approximately 12-18" below the bay using the supplied #28 hose clamps. Attach a horizontal parasitic to the inter-bay tee block using the supplied 5/16-18 x 7/8" bolts and lock washers. Use the 61" long horizontal parasitic with mounting plate. The bay bracket also requires two vertical parasitic elements. Attach the horizontal support, drawing J103FM-319-006 to the bay mounting bracket with the supplied 3/8-16 x 2" bolts, nuts and locks. See drawing J103FM-319-013 for an exploded view. Next attach the vertical parasitic elements to the

Uncrating

When uncrating the antenna system, open each crate carefully so that the crates may be used to return any merchandise that may have been damaged in shipping. Separate all parts and confirm that all items on the packing list have been received. If any parts are missing, notify PSI or its agent prior to assembling the antenna. If any parts are damaged through shipment or are missing, promptly notify the shipping carrier.

General Notes

1. Review antenna elevation and plan the installation. The antenna brackets have been designed for tower leg mount.
2. All bays are to be aligned to the same azimuth angle, 70 degrees true.
3. Exercise care when assembling the inner conductors of the coaxial line. The bullet should fit firmly in the inner conductor in order to assure a proper connection.
4. The feed points are in the up position.
5. Install one bay/inter-bay assembly at a time.
6. Keep all transmission lines free from dirt and moisture. All Teflon insulators must be clean and dry.
7. The antenna requires pressurization.
8. The antenna has been tuned at the factory and should not require field adjustment.
9. The antenna system should be tested before the erector leaves the premises to insure that the complete antenna system is functioning properly.

Installation Instructions

Step One

Review the enclosed drawings and read all steps for a general overview of the antenna installation. Plan the installation before erecting. It may be necessary to measure the antenna layout on the tower to avoid any conflicts that might arise with the mounting brackets. The antenna is to mount on the northeast tower leg. It may be necessary to reposition the existing transmission lines on the tower leg to attach the brackets.

Step Two

Starting with bay one, attach the radiating element to inter-bay one using the supplied 5/16-18 x 7/8" bolts, lock washers and O-ring. Next attach the end cap to the inter-bay tee block. Attach a bay bracket to the horizontal boom of the radiating element using the supplied #28 hose clamps. Attach an inter-bay bracket approximately 12-18" below the bay using the supplied #28 hose clamps. Attach a horizontal parasitic to the inter-bay tee block using the supplied 5/16-18 x 7/8" bolts and lock washers. Use the 61" long horizontal parasitic with mounting plate. The bay bracket also requires two vertical parasitic elements. Attach the horizontal support, drawing J103FM-319-006 to the bay mounting bracket with the supplied 3/8-16 x 2-1/4" bolts, nuts and locks. See drawing J103FM-319-013 for an exploded view. Next attach the vertical parasitic elements to the

horizontal support. The parasitic elements have been drilled with an offset that will allow them to be centered with the radiating element. Mount the parasitic elements with the black band up using the supplied 3/8-16 x 1-3/4" bolts, nuts and locks.

The top bay (element one) is to be mounted approximately 337 ft. above ground level. This will place the radiation center at 321 ft. above ground level. No other antenna can be mounted within 15 ft. of any radiating element. Hoist the assembled bay and inter-bay to the appropriate elevation and secure the brackets to the northeast tower leg with the supplied 3/8-16 x 2" ID U-bolts. **Use caution when erecting. The inter-bay inner conductor is not captivated. Secure the inner conductor before erecting the assembly.** The element feed point must be positioned with the Teflon insulator up. After securing the brackets to the tower, align the bay bracket parasitic elements so they are vertical and plumb. The antenna and mounting bracket is to be positioned as shown in drawing J103FM-319-001.

Step Three

Follow the same procedure for bay two. Attach bay two to its corresponding inter-bay and attach the bay and inter-bay brackets. Attach the parasitic elements and hoist the assembly and connect bay two/inter-bay assembly to inter-bay one using the supplied O-ring and 5/16-18 x 7/8" bolts and lock washers. **Use caution when erecting. The inter-bay inner conductor is not captivated. Secure the inner conductor before erecting the assembly.** Use caution not to split the anchor insulator connector when assembling the line sections. The element feed point must be positioned with the Teflon insulator up.

Step Four

Follow the same procedure for bay three and bay four. Inter-bay four has been shipped pre-assembled to the fine matcher. The black band on the fine matcher section must be up. **Use caution when erecting.** For best support, attach inter-bay four bracket between probes two and three on the fine matcher. The fine matcher can be rotated to allow easy access to the tuning probes/rubber boots.

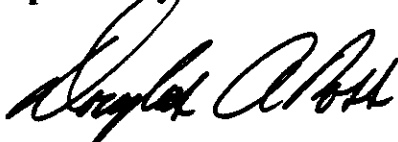
Step Five

Check all bolted connections for tightness. Connect the main transmission line to the antenna input located at the base of the fine matcher. **Do not allow the weight of the feed line to be supported by antenna.** The antenna system should be tested before the erector leaves the premises to insure that the complete antenna system is functioning properly. The antenna has been tested and tuned at the factory. It should not require tuning, however the antenna has been supplied with a fine matcher that can be adjusted for optimum VSWR. Consult the factory before making adjustments to the fine matcher. The system should be tested before the tower crew leaves the site. The antenna requires pressurization with dry air or nitrogen to a maximum of 5 psi.

Step Six

The final measured horizontally polarized gain of the antenna is 4.87 (6.88 dB). To reach the full licensed ERP of 14 kW the maximum antenna input is 2.87 kW. The antenna was not supplied with transmission line. If 350 ft. of 1-5/8" line is used from the transmitter to the antenna, the efficiency is approximately 85.0%. The required transmitter output would then be 3.38 kW.

Prepared By



Douglas A. Ross
Propagation Systems Inc.

Drawing Index

Drawing Number

J103FM-319-002
J103FM-319-001
J103FM-319-012
J103FM-319-013
J103FM-319-006
J103FM-319-007
J103FM-319-004
J103FM-319-005
J103FM-319-00
35-00006

Description

Antenna Elevation
Antenna Orientation
Parasitic Mounting Side View
Vertical Parasitic Mounting Detail
Vertical Parasitic Assembly
Horizontal Parasitic Outline
Bay Bracket
Inter-Bay Bracket
End Cap Outline
Fine Matcher

BAY MOUNTING
BRACKET PER
J103FM-319-004
TYPICAL EACH BAY

INTERBAY MOUNTING
BRACKET PER
J103FM-319-004
TYPICAL

PRESSURE RELIEF WITH
 $\frac{1}{8}$ " NPT THREADED PLUG

33"

BAY #1

130.13"
DIM 'A'
TYP.

INTERBAY #1

HORIZONTAL PARASITIC
PER J103FM-319-007
TYPICAL EACH BAY

BAY #2

INTERBAY #2

533.39"
44.45 Ft.

322 Ft. A.G.L.
CENTER OF
RADIATION

BAY #3

(2) #28 HOSE CLAMPS
TYPICAL EACH INTERBAY
BRACKET & TUNER
BRACKET
INTERBAY #3

(2) #28 HOSE CLAMPS
TYPICAL EACH BAY

BAY #4

VERTICAL PARASITIC PER
J103FM-319-002-TYPICAL
EACH BAY

1 $\frac{5}{8}$ " INPUT SECTION
PER J103FM-319-010

1 $\frac{5}{8}$ " E.I.A.
INPUT

3/8-16 x 2"
I.D. U-BOLT,
HEXNUT AND
LOCKWASHERS
TYPICAL

FINE MATCHER
PER 33-00019

MATERIAL:

NOT APPLICABLE

PROPAGATION SYSTEMS, INC

Ebensburg, Pennsylvania USA

4-BAY END FED ANTENNA ELEVATIONS

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 permission of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the foregoing statement.

TOLERANCES
UNLESS OTHERWISE NOTED
FRACTIONS X/X $\pm 1/16$ "
DECIMALS XX $\pm .01$ "
DECIMALS XXX $\pm .005$ "
ANGLES $\pm 3^\circ$

SIZE
A

MODEL: PSIFM-4-DA

CHANNEL/FREQUENCY: 90.7 MHz

SCALE: 1:48

PART NO:

DRAWN BY: D.G. Kellar

APPROVED BY:

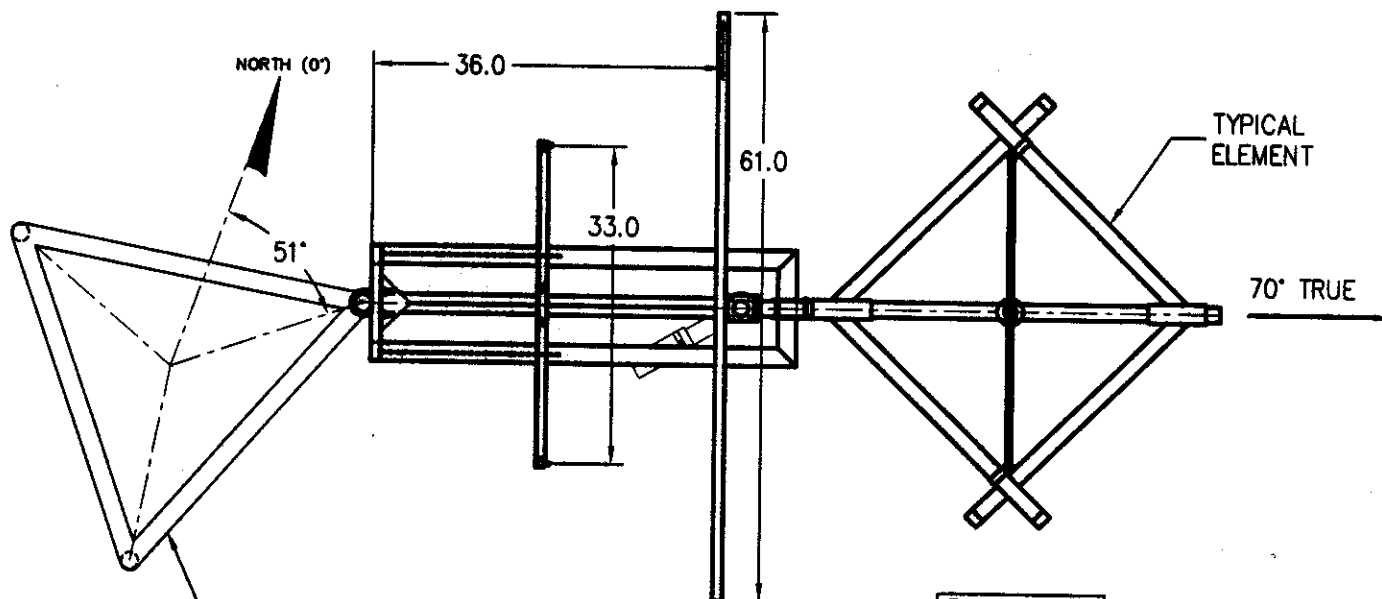
DRAWING NO:

J103FM-319-002

DATE: 1/20/03

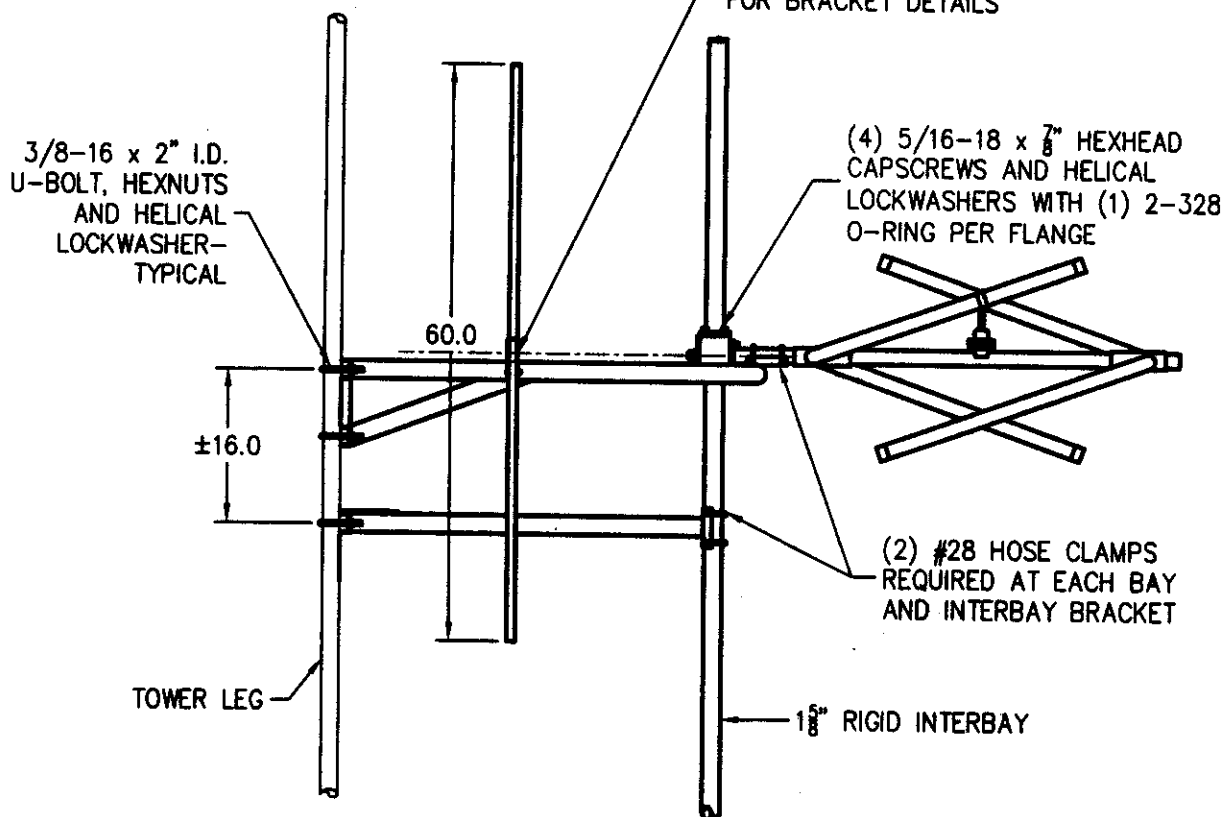
DATE:

REV



PLAN VIEW

REF. DRAWING J103FM-319-004
FOR BRACKET DETAILS



SIDE 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 used or disposed of, directly or indirectly, and 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 permission of PSI first obtained. The acceptance of this drawing will be construed as acceptance of the foregoing agreement.</p>				

MATERIAL:

NOT APPLICABLE

TOLERANCES
UNLESS OTHERWISE NOTED
FRACTIONS X/X ± 1/16"
DECIMALS XX ± .01"
DECIMALS XXX ± .005"
ANGLES ± 3°

SIZE

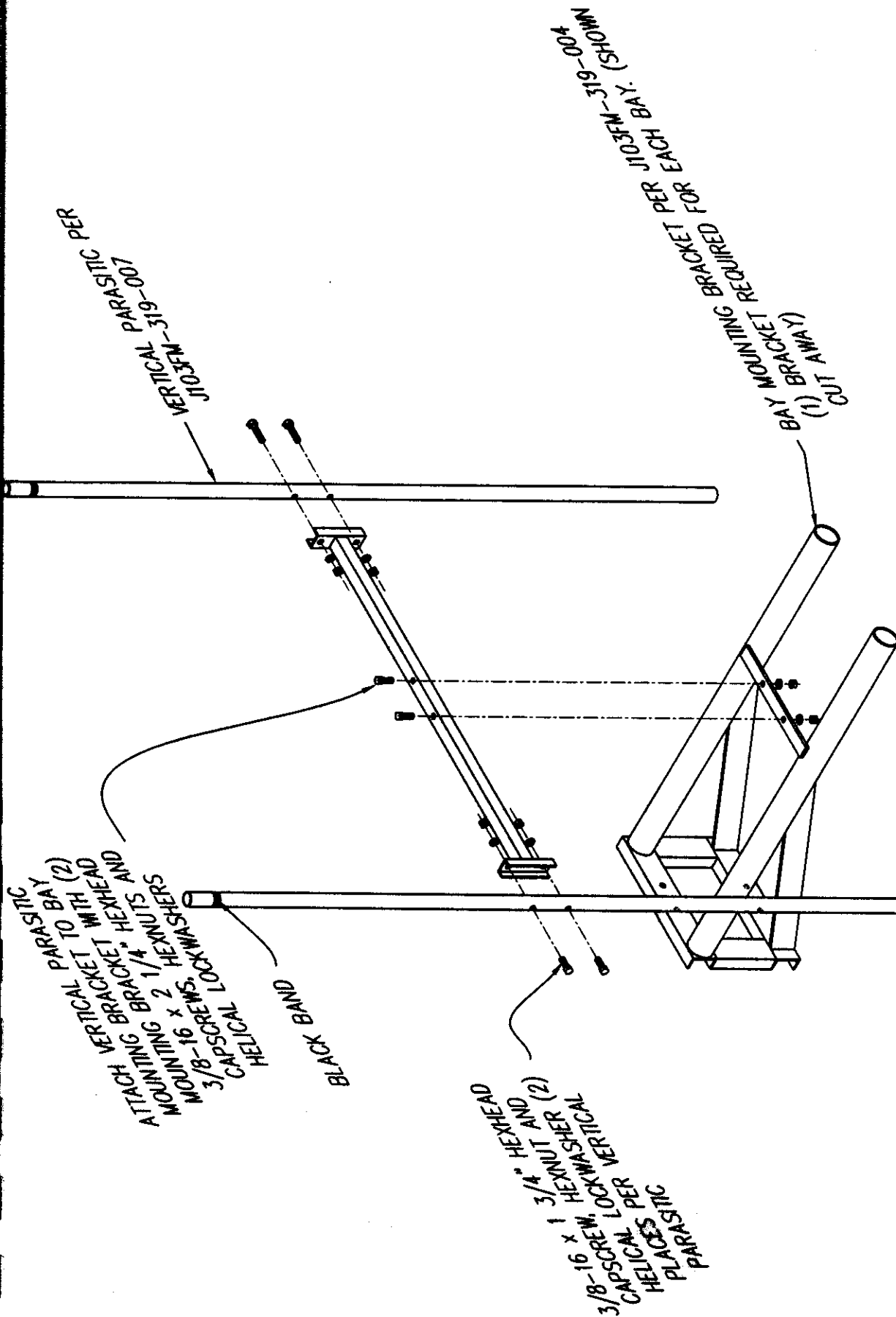
A

PROPAGATION SYSTEMS, INC.

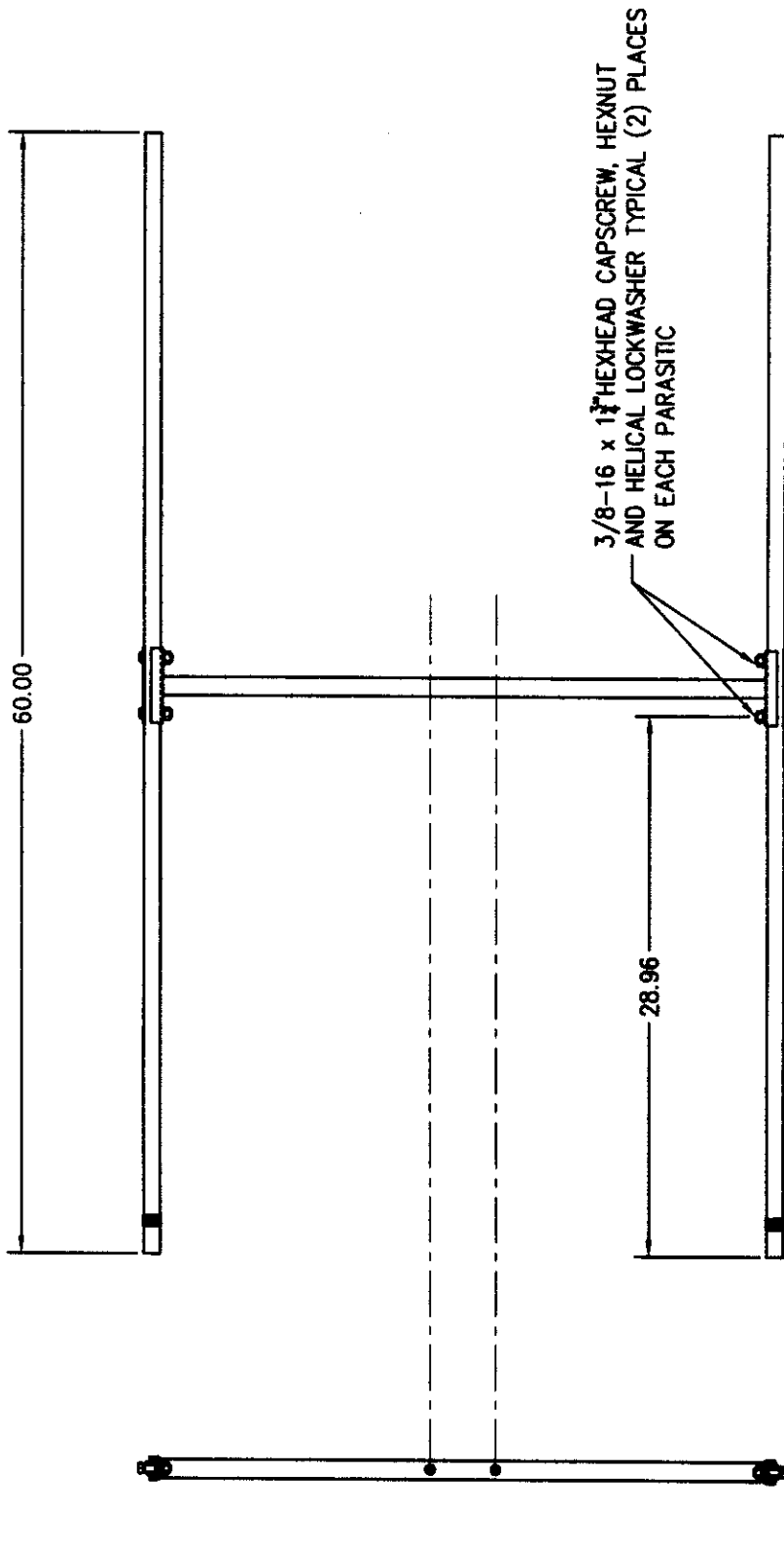
Ebensburg, Pennsylvania USA

TYPICAL BAY #1 TOP AND SIDE VIEW

MODEL: PSIFM-4	DRAWN BY: D.G. Kellar	DATE: 1/20/03
CHANNEL/FREQUENCY: 90.7 MHz	APPROVED BY:	DATE:
SCALE: 1:12	PART NO.:	DRAWING NO.: J103FM-319-001
		REV: 0



PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA		PARASITIC MOUNTING DETAILS-ISOMETRIC	
MODEL: PSIFM-4-DA	DRAWN BY: D.G. Keller	DATE: 8/13/03	DATE:
FREQUENCY: 90.7 MHz	APPROVED BY:	DATE:	DATE:
SCALE: 1:12	PART NO: J103FM-319-013	DRAWING NO:	REV: 0
MATERIAL: NOT APPLICABLE		TOLERANCES UNLESS OTHERWISE NOTED: FRACTIONS X/A ±1/16" DECIMALS X/A ±.01" ANGLES ±.005°	
This drawing is issued subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain, the property of PSC, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or used in making or making 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 permission of PSC first obtained. The acceptance of this drawing will be construed as an acceptance of the foregoing agreement.			
REV:	CHECKED BY:	DATE:	CHANGE:



TOP VIEW

END VIEW

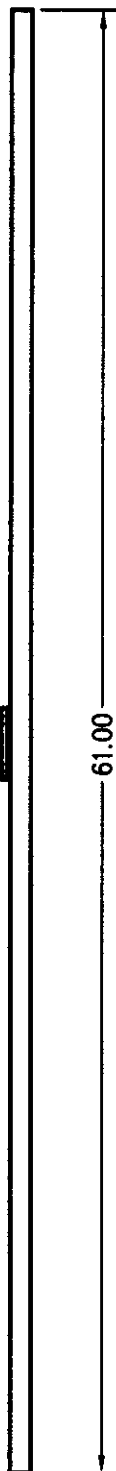
PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA		VERTICAL PARASITIC FABRICATION DETAILS	
MODEL:	PSIFM-4-DA	DRAWN BY:	D. G. Keller
DATE:	7/29/03	APPROVED BY:	
CHANNEL/	90.7 MHz	DATE:	
FREQUENCY		DRAWING NO.:	J103FM-319-006
SCALE:	1:10	REV	0

MATERIAL: ALL COMPONENTS SHOWN ARE MILD CARBON STEEL (EXCEPT FASTENERS)		SIZE A
TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/XX ±1/16" DECIMALS XX ±.01" ANGLES XXX ±.005°		

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 PPSI AND WILL NOT BE REPRODUCED, COPIED, OR DISSEMINATED IN ANY MANNER, DIRECTLY OR INDIRECTLY, AND WILL NOT BE USED IN WHOLE OR IN PART OR AS A BASIS FOR MAKING OR MAKING ANY INFORMATION FOR THE MAKING OF DRAWINGS, PRINTS OR OTHER REPRODUCTIONS HEREOF, OR FOR THE DESIGN OR MAKING OF ANY ITEM, PART, OBJECT, APPARATUS OR PARTS THEREOF, EXCEPT UPON THE WRITTEN PERMISSION OF PPSI FIRST OBTAINED. THE ACCEPTANCE OF THIS DRAWING WILL BE CONSTRUED AS AN ACCEPTANCE OF THE FOREGOING AGREEMENT.	MAKE BY CHECKED BY DATE	CHANGE
---	-------------------------------	--------

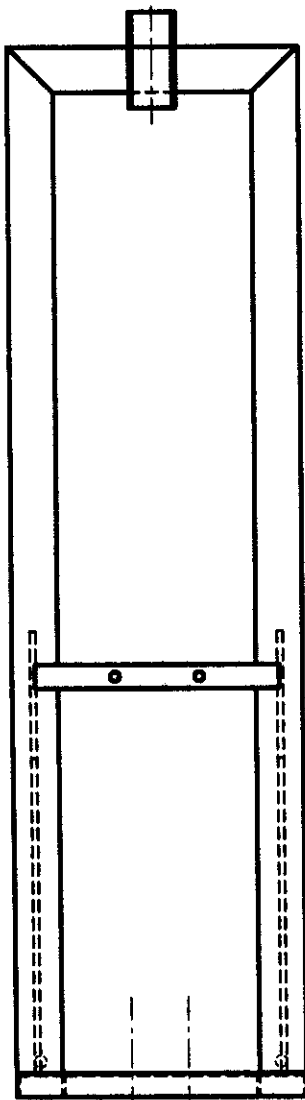


FRONT VIEW

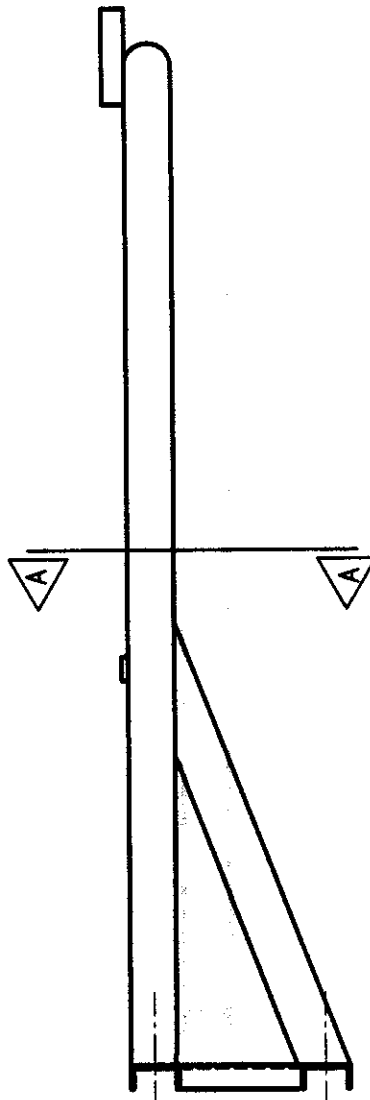


TOP VIEW

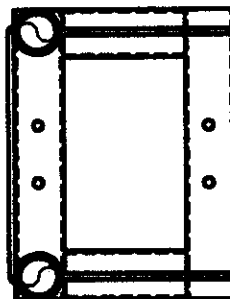
PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA		HORIZONTAL PARASITIC ASSEMBLY	
MODEL: PSIFM-4-DA		DATE: 7/29/03	
DRAWN BY: D.G. Keller		APPROVED BY:	
FREQUENCY: 90.7 MHz		DATE:	
SCALE: 1:8		DRAWING NO.: J102FM-319-007	
MATERIAL:		SIZE: A	
TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/4 ±1/16" DECIMALS .XX ±.01" DECIMALS .XXX ±.005" ANGLES ± 3°		THIS DRAWING IS LOANED SUBJECT TO THE EXPRESS UNDERSTANDING AND AGREEMENT THAT THE DRAWING AND INFORMATION CONTAINED HEREIN ARE THE PROPERTY OF PROPAGATION SYSTEMS, INC. AND WILL NOT BE REPRODUCED, COPIED, OR OTHERWISE USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF PROPAGATION SYSTEMS, INC. THE MAKING OF DRAWINGS, PRINTS OR OTHER REPRODUCTIONS HEREOF OR FOR THE DESIGN OR MAKING OF ANY INSTRUMENT OR OBJECT, APPARATUS OR PART THEREOF, WITHOUT THE WRITTEN PERMISSIONS OF PS, FIRST OBTAINED. THE ACCEPTANCE OF THIS DRAWING WILL BE CONSTRUED AS AN ACCEPTANCE OF THE FOREGOING AGREEMENT.	
REV.	MAKE BY	DATE	CHANGE



PLAN VIEW

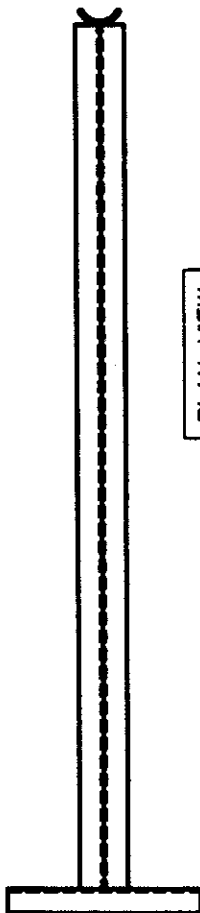


SIDE VIEW



SECTION 'A-A'

PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA		SECTION 'A-A'	
CUSTOM BAY MOUNTING BRACKET DETAILS		MODEL: PSIFM-4-DA	
DRAWN BY: D. A. Keller		DATE: 7/28/03	
APPROVED BY:		DATE:	
CHANNEL FREQUENCY: 90.7 MHz		SCALE: 1:8	
PART NO: J103FM-319-004		DRAWING NO:	
MATERIAL: AS SHOWN		SIZE: A	
TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/8 ±1/16" DECIMALS XX ±.01" ANGLES XXX ±.3°		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 REPRODUCED, COPIED, OR DISSEMINATED IN ANY MANNER, DIRECTLY OR INDIRECTLY, AND WILL NOT BE USED IN WHOLE OR IN PART OR FOR ANY OTHER REPRODUCTION, REUSE, OR FOR THE DESIGN OR MAKING OF ANY PART, PARTS, OBJECT, APPARATUS OR PARTS THEREOF, WITHOUT THE WRITTEN PERMISSION OF PSI. THE ACCEPTANCE OF THIS DRAWING WILL BE CONSIDERED AS AN ACCEPTANCE OF THE FOREGOING AGREEMENT.	
REV.	DATE	CHANGE	DATE

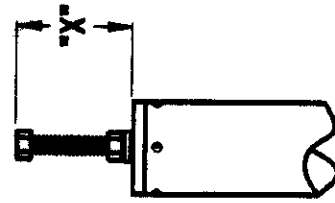
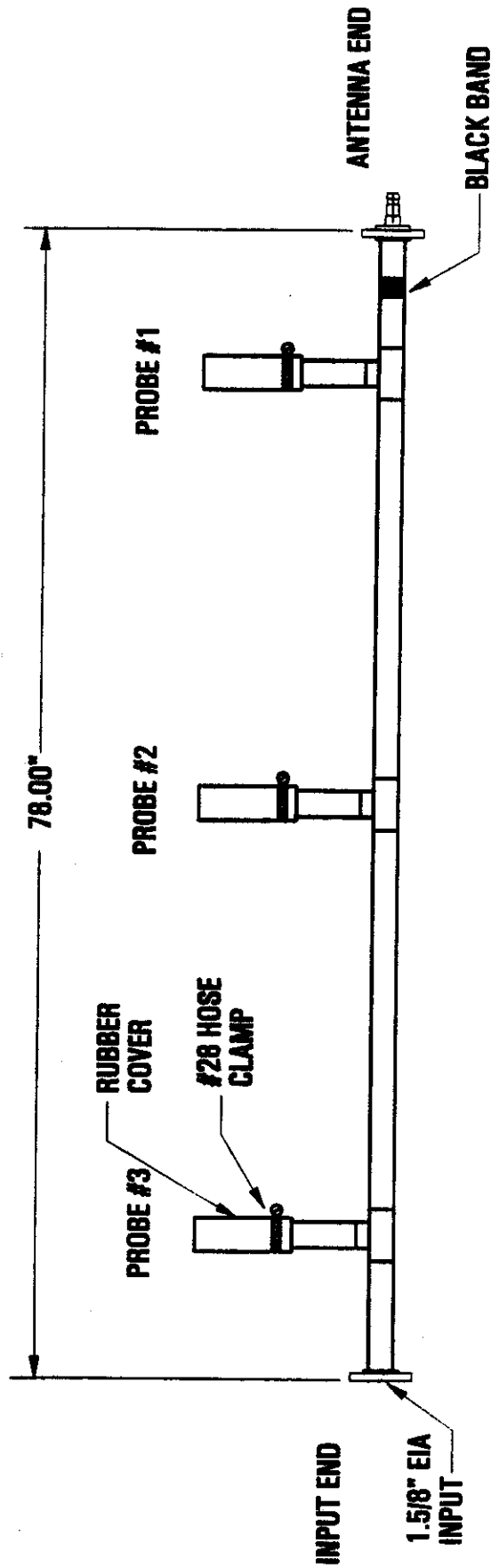


PLAN VIEW



SIDE VIEW

REV		MADE BY	CHECKED BY	DATE	CHANGE	
<p>This drawing is issued subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PS, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or made 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 permission of PS first obtained. The acceptance of this drawing will be construed as an acceptance of the foregoing agreement.</p>						
MATERIAL:		TOLERANCES UNLESS OTHERWISE NOTED		SIZE		A
		FRACTIONS 1/16" ± .01"		DECIMALS .XX ± .005"		
		ANGLES				
<p>PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA</p>						
CUSTOM INTERBAY MOUNTING BRACKET DETAILS						
MODEL: PSFM-4-DA		DRAWN BY: D.G. Keller		DATE: 7/28/03		
CHANNEL FREQUENCY: 90.7 MHz		APPROVED BY:		DATE:		
SCALE: 1:8		DRAWING NO.: J103FM-319-005		REV: 0		



PROBE	DIM. "X"
1	3.20
2	2.31
3	3.50

ENLARGED VIEW, SINGLE PROBE
PROBE SHOWN WITHOUT RUBBER COVER

J 103 FAN-319

PROPAGATION SYSTEMS INC. EBENSBURG, PENNSYLVANIA U.S.A.		3 PROBE TUNER ASSEMBLY	
		MODEL: FM-4-D-1	DATE: 1-28-88
CHANNEL/FREQ: 90.7 MHz		APPL. INT.	DATE
SCALE: NONE		DIM. IN.	REV.
MATERIAL		TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS XX" DECIMALS .XX" ANGLES	SIZE A

This drawing is issued 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 as a basis for making or fabricating any equipment, parts, or other reproduction thereof, or for the design or making of any item, parts, object, apparatus or parts thereof, except upon written permission of PSI Inc. The completion of this drawing will be considered as an acceptance of the foregoing agreement.

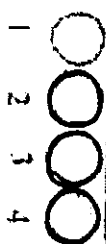
<u>Feet</u>	<u>Pwr</u>	<u>Equipment</u>
-------------	------------	------------------

410	15.0 kW	ERI high power two bay antenna with 3" heliax cable
380	4.2 kW	ERI low power two bay antenna with 1 5/8" heliax cable
350	1.0 kW	DB Products - DB408 - four bay UHF vertical whip antenna with 1/2" cable
350	3.5 kW	Scala OGB 90900K omnidirectional antenna with 1 1/4" cable
350	3.5 kW	Scala OGB 90900K omnidirectional antenna with 1 1/4" cable
350	receive	450.25 receive only; 929.1375; 929.5875; 929.8625
350	receive	455.25 receive only
300	2.3 kW	WAYR 90.7
220	485 W	Scala OGB 9-900 antenna with 7/8" cable
210	auxiliary	ERI low power one bay antenna with 1 5/8" cable - auxiliary FM
100	receive	Mark mini-grid dish with 7/8" cable
80	receive	Mark mini-grid dish with 7/8" cable
60	660 W	Scala CA5-450 Yagi with 7/8" cable

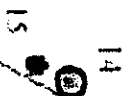


North

291°



Climbing Ladder



Building

15

171°



3/8

Doug Ross

From: Marilyn Matheny - Graham Brock, Inc. [marilyn@grahambrock.com]
Sent: Friday, March 21, 2003 10:52 AM
To: Doug Ross
Subject: Re: WAYR



Tenant Inf

Doug:

Attached is a diagram showing where the climbing stairs and the transmission lines on the tower are located. The lines that are above 300 feet are 2, 3, 4, 6, 7, 8, 11 and 14. I think this should be all the information you asked for, but please let me know if you need anything else.

Marilyn

----- Original Message -----

From: "Doug Ross" <psiba@surfshop.net>
To: "Marilyn Matheny - Graham Brock, Inc." <marilyn@grahambrock.com>
Sent: Tuesday, March 18, 2003 2:22 PM
Subject: RE: WAYR

Thanks

-----Original Message-----

From: Marilyn Matheny - Graham Brock, Inc.
[mailto:marilyn@grahambrock.com]
Sent: Tuesday, March 18, 2003 2:11 PM
To: Doug Ross
Subject: Re: WAYR

Doug:

I will try to get that information to you later this afternoon. As you may know, there was a translator filing window that closed yesterday (the first window in 6 years for translators) and we are just coming up for air.

Marilyn

----- Original Message -----

From: "Doug Ross" <psiba@surfshop.net>
To: <marilyn@grahambrock.com>
Sent: Tuesday, March 18, 2003 1:10 PM
Subject: WAYR

Hi Marilyn,

Have you had a chance to check into the location of the transmission lines on the WAYR tower.

Doug Ross