



## **Propagation Systems, Inc.**

Quality Broadcast Antenna Systems

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**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	1.68	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.

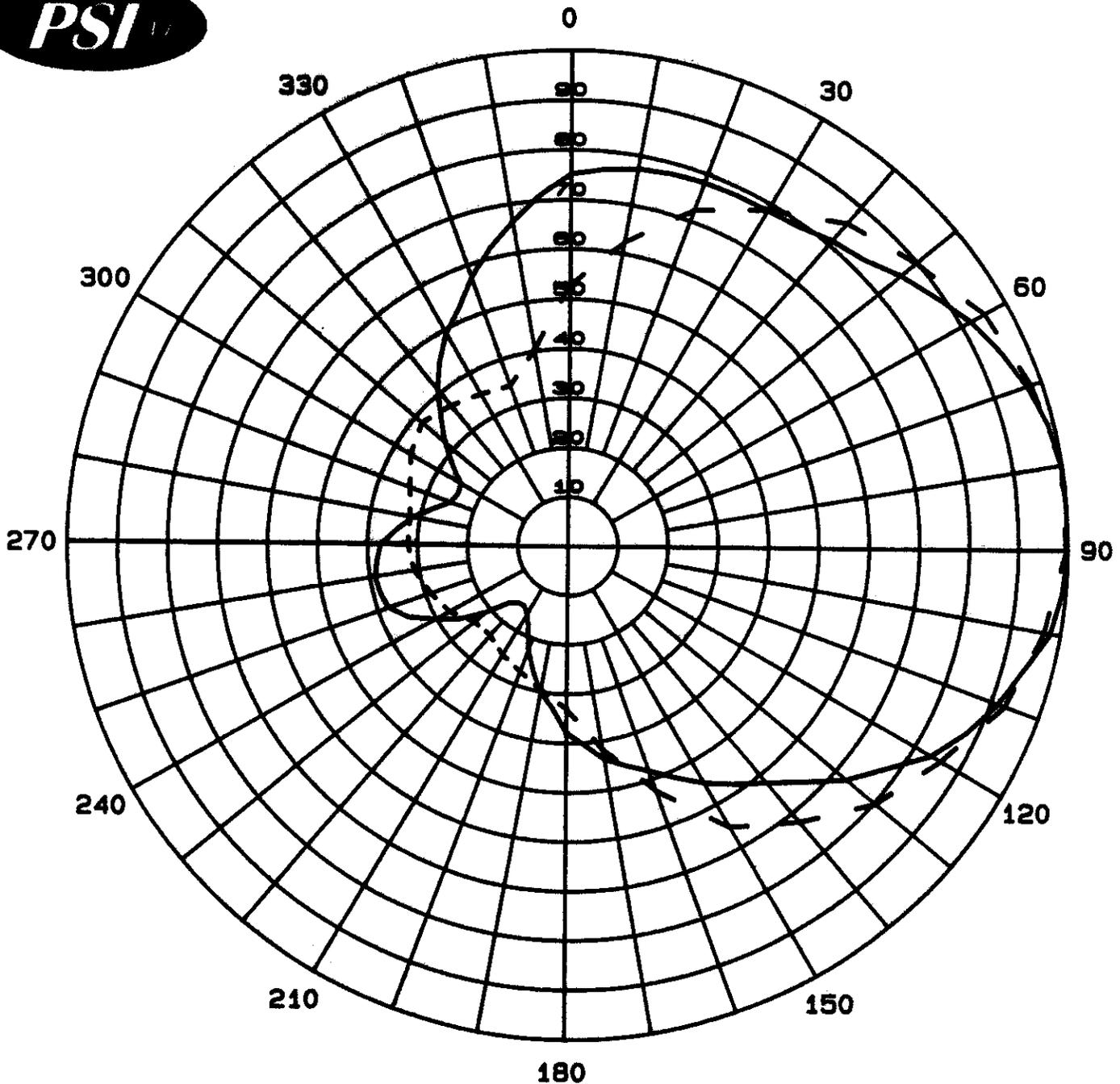
Station: WAYR

Frequency: 90.7 MHz

Location: Brunswick, GA

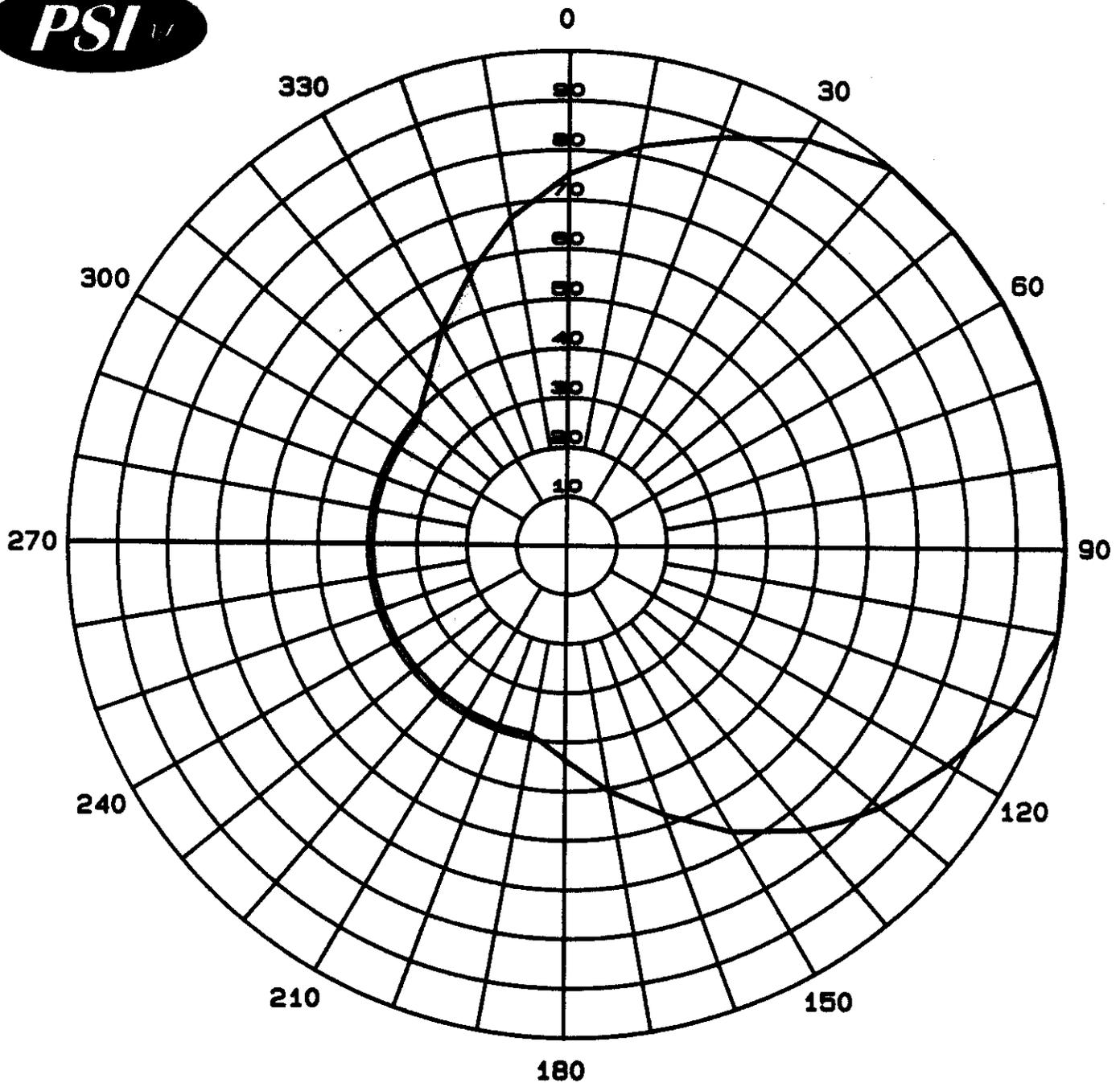
Maximum ERP: 14.0 kW (11.46 dBk)

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



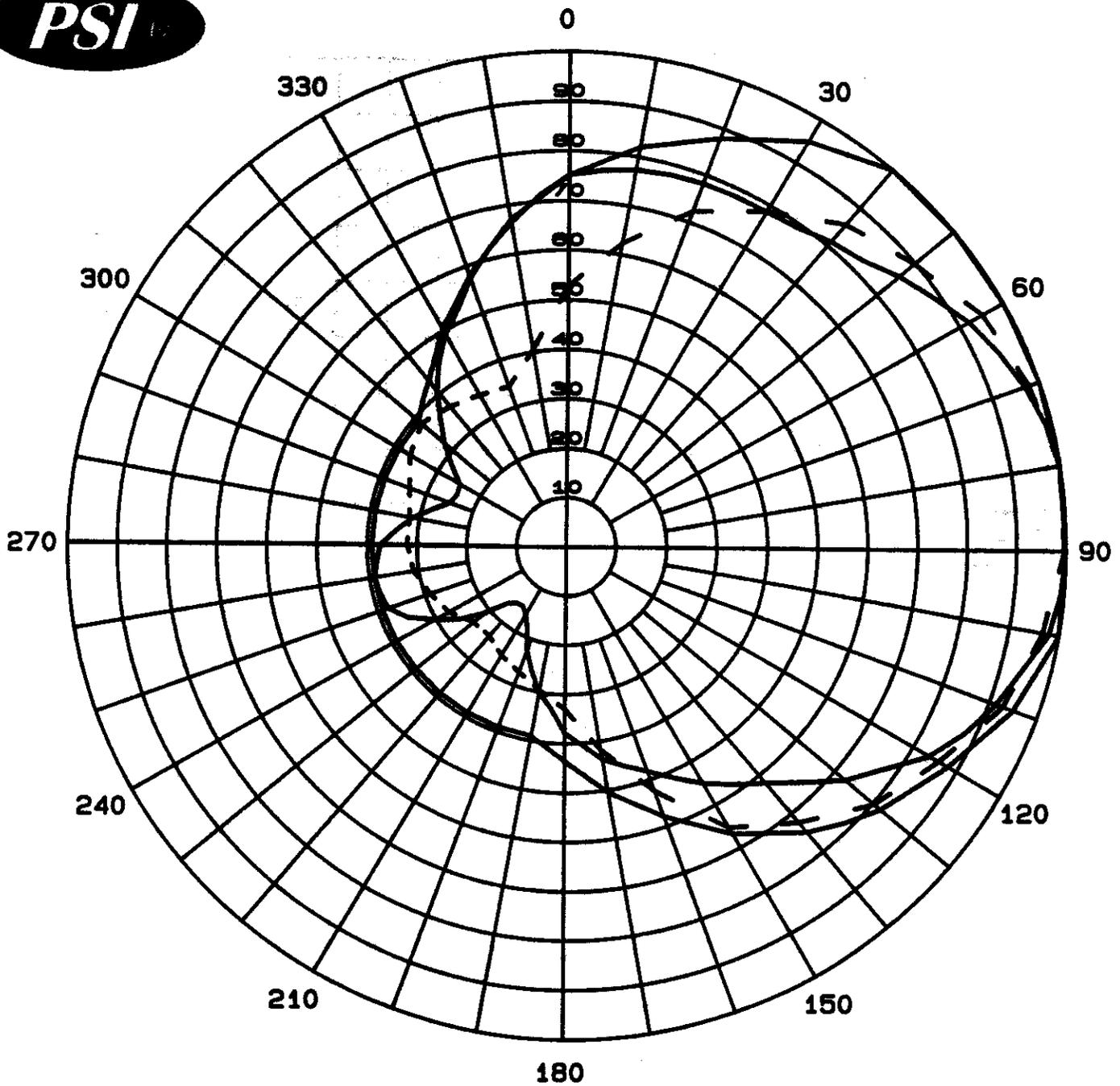
Measured Relative Field  
Azimuth Plane Pattern  
Antenna: PSIFM-4-DA  
Type: Directional FM  
Gain H-pol (solid): 4.87 (6.88 dB)  
Gain V-pol (dash): 4.87 (6.88 dB)  
Call Letters: WAYR  
Good Tidings Trust, Inc.

**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**

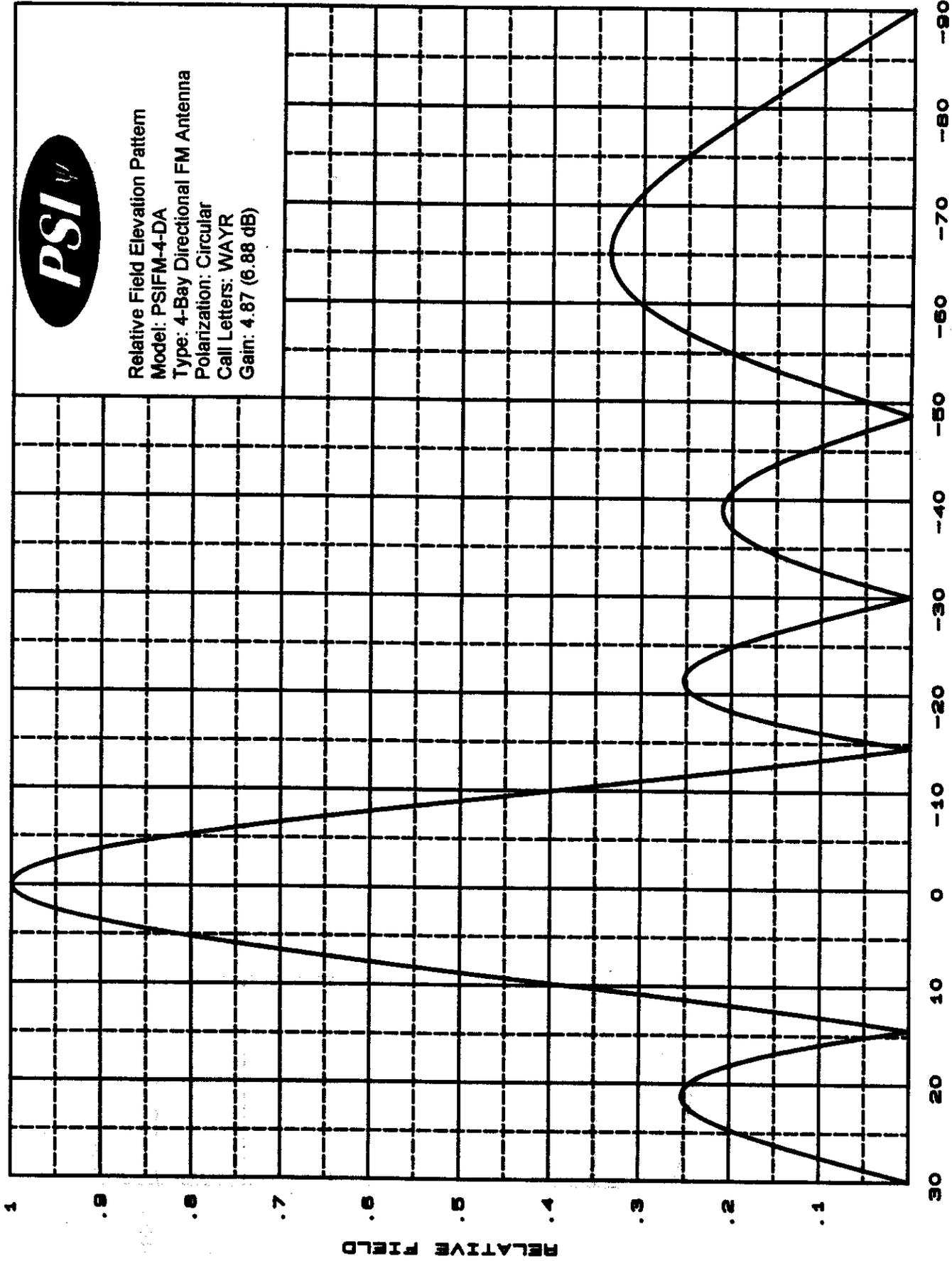


Measured Relative Field  
Maximum Envelope Comparison  
Antenna: PSIFM-4-DA  
Type: Directional FM  
Gain H-pol (solid): 4.87 (6.88 dB)  
Gain V-pol (dash): 4.87 (6.88 dB)  
Call Letters: WAYR  
Good Tidings Trust, Inc.

**Propagation Systems Inc.**  
**PO Box 113**  
**Ebensburg, PA 15931**

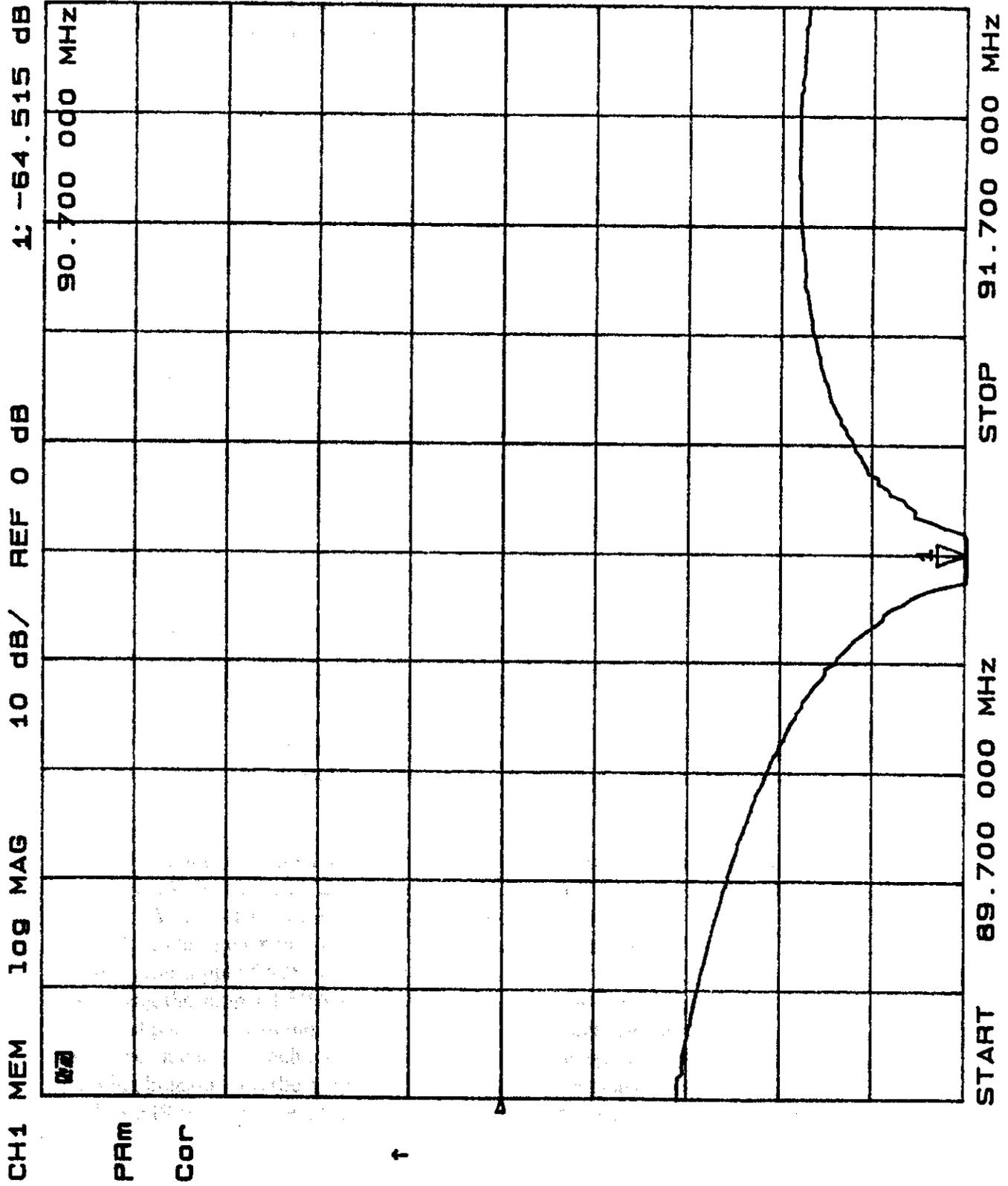


Relative Field Elevation Pattern  
Model: PSIFM-4-DA  
Type: 4-Bay Directional FM Antenna  
Polarization: Circular  
Call Letters: WAYR  
Gain: 4.87 (6.88 dB)



DEGREES BELOW HORIZONTAL

1988  
Fig. 4. 2.9



## 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.

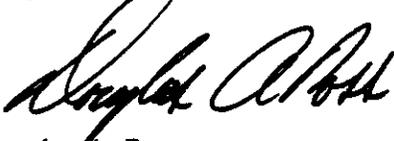
#### Step Five

**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.

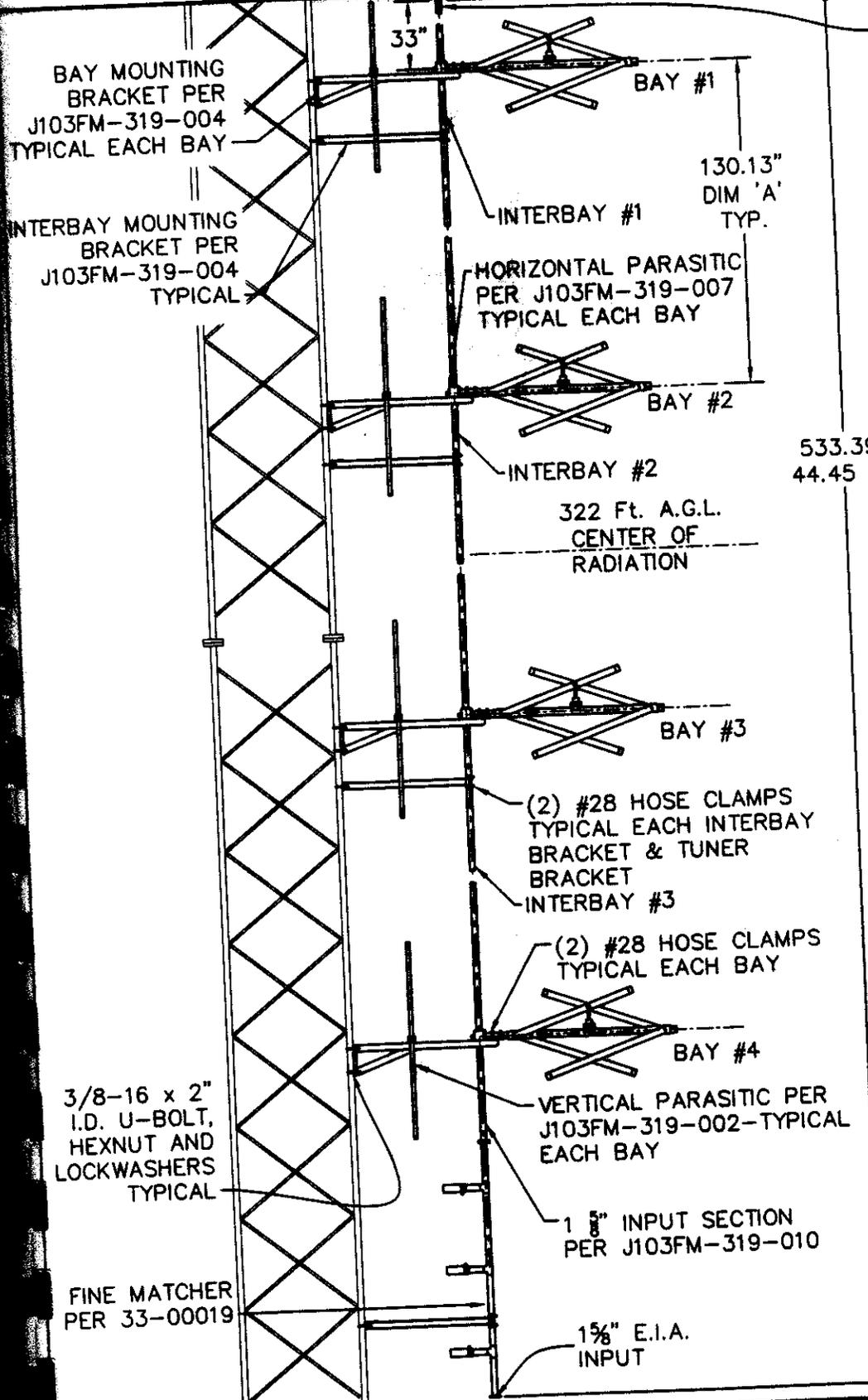
**Drawing Index**

**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



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

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

INTERBAY MOUNTING  
 BRACKET PER  
 J103FM-319-004  
 TYPICAL

BAY #1

130.13"  
 DIM 'A'  
 TYP.

HORIZONTAL PARASITIC  
 PER J103FM-319-007  
 TYPICAL EACH BAY

BAY #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

# PROPAGATION SYSTEMS, INC

Ebensburg, Pennsylvania USA

4-BAY END FED ANTENNA ELEVATIONS

REV.	MADE BY	DATE	CHANGE

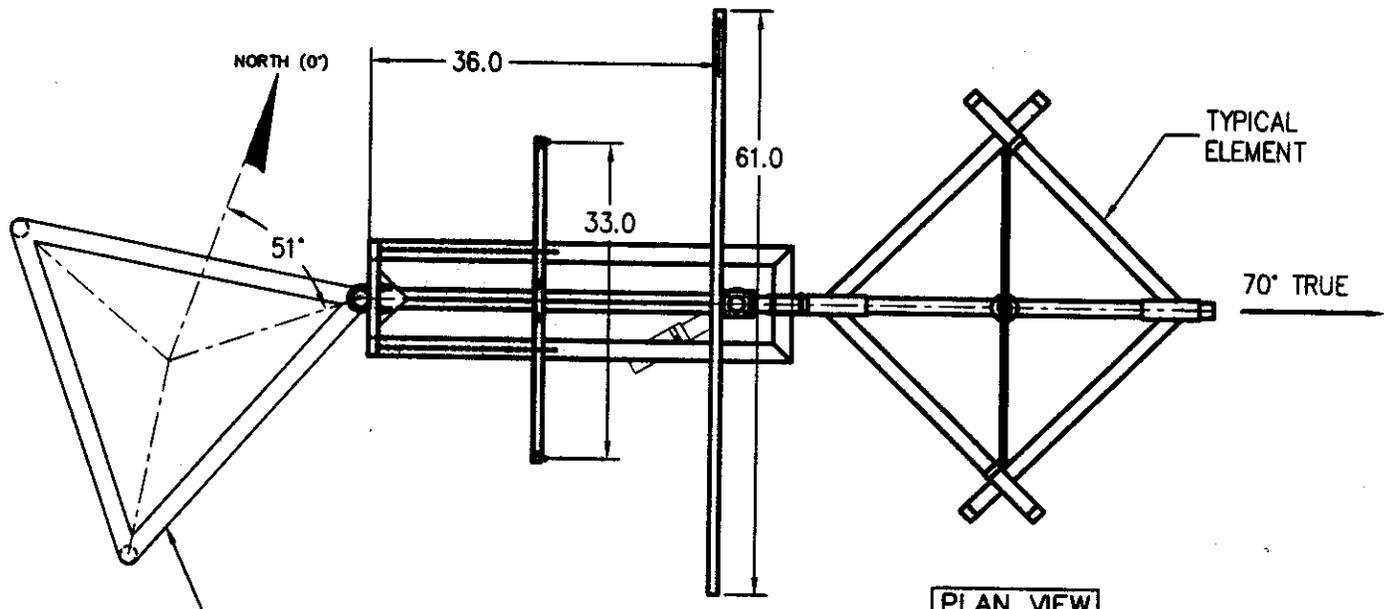
MATERIAL: NOT APPLICABLE

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

SIZE: A

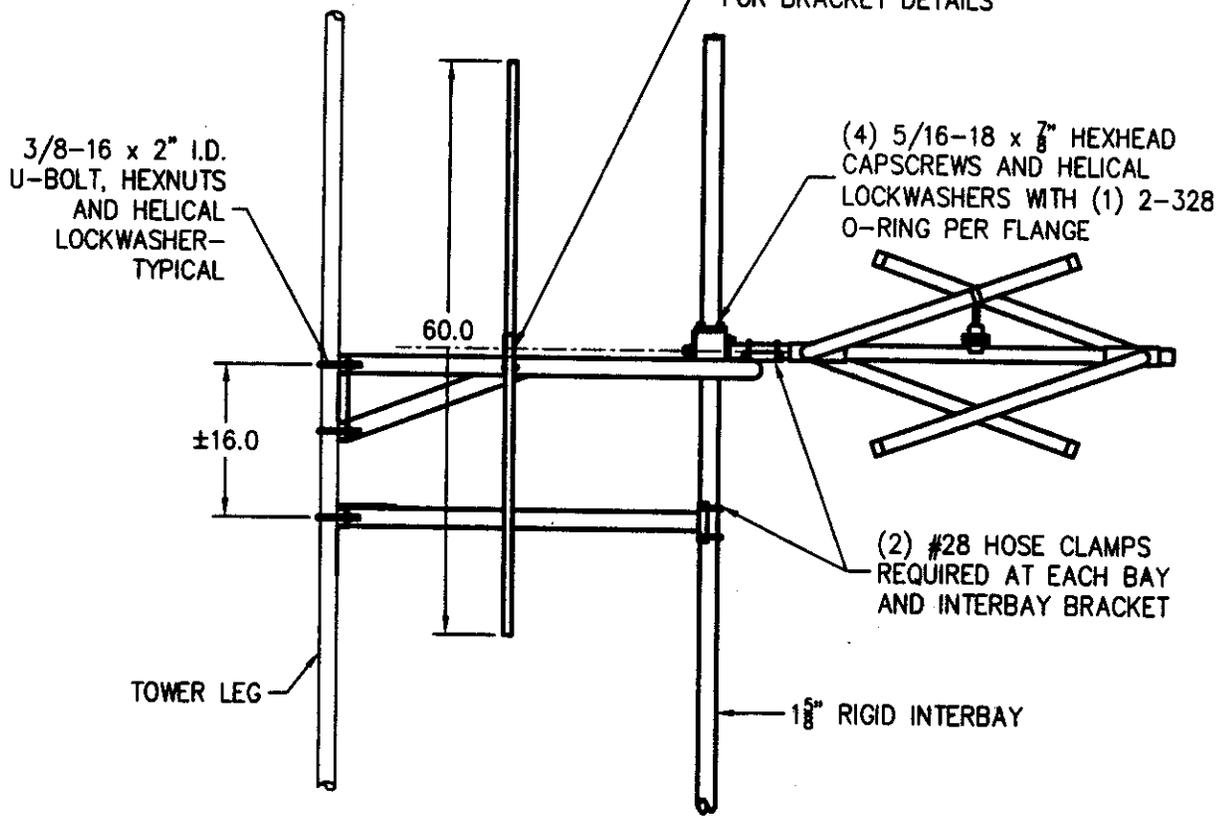
MODEL: PSIFM-4-DA	DRAWN BY: D.G. Kellar	DATE: 1/20/03
CHANNEL/FREQUENCY: 90.7 MHz	APPROVED BY:	DATE:
SCALE: 1:48	PART NO:	DRAWING NO: J103FM-319-002

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PLAN VIEW

REF. DRAWING J103FM-319-004 FOR BRACKET DETAILS



SIDE VIEW

MADE BY  
CHECKED BY  
DATE  
CHANGE

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MATERIAL:  
NOT APPLICABLE

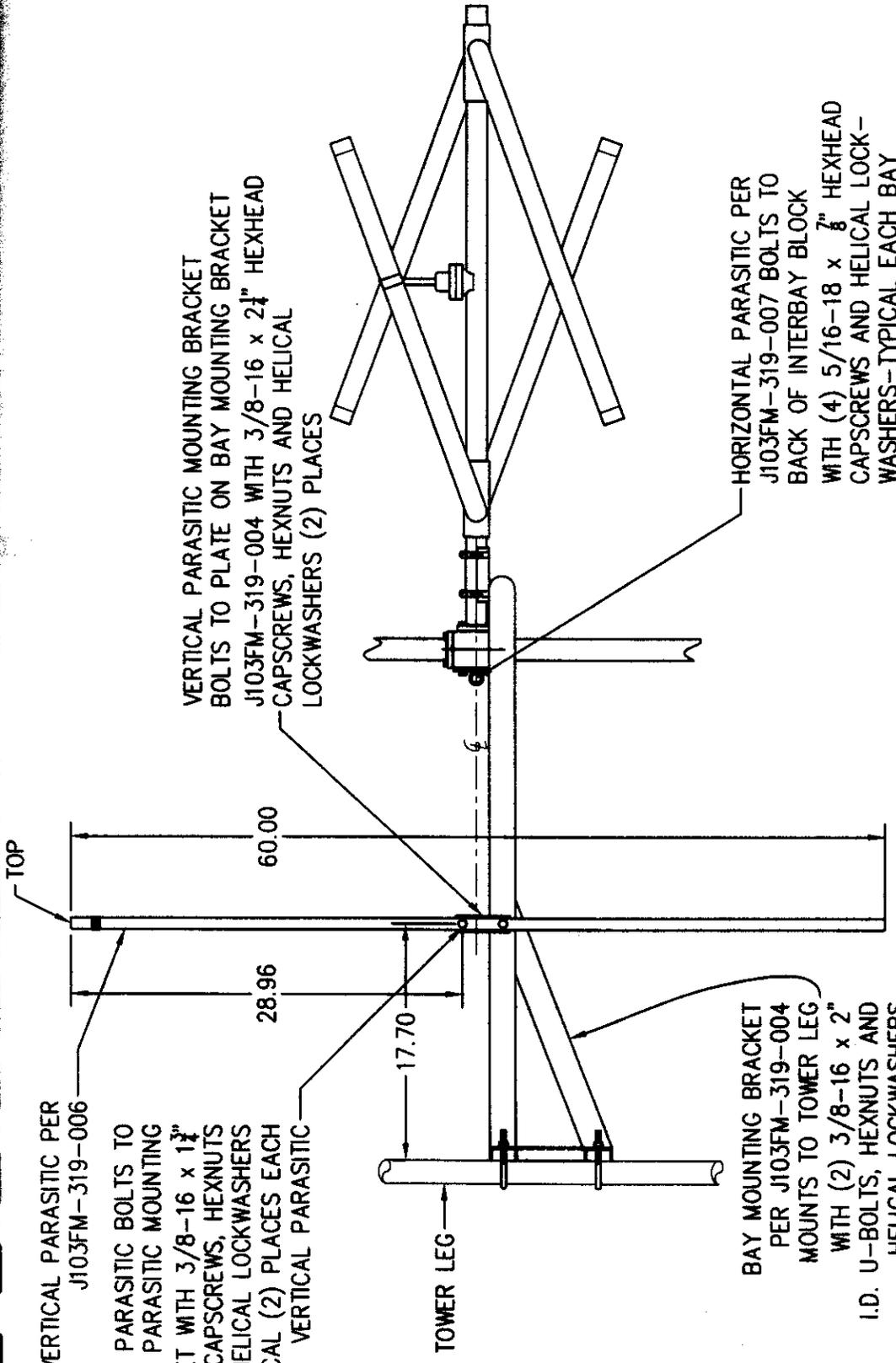
TOLERANCES UNLESS OTHERWISE NOTED  
FRACTIONS X/X ± 1/16"  
DECIMALS XX ± .01"  
DECIMALS XXX ± .005"  
ANGLES ± 3'

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



VERTICAL PARASITIC PER  
J103FM-319-006

VERTICAL PARASITIC BOLTS TO  
VERTICAL PARASITIC MOUNTING  
BRACKET WITH 3/8-16 x 1 3/4"  
HEXHEAD CAPSCREWS, HEXNUTS  
AND HELICAL LOCKWASHERS  
TYPICAL (2) PLACES EACH  
VERTICAL PARASITIC

VERTICAL PARASITIC MOUNTING BRACKET  
BOLTS TO PLATE ON BAY MOUNTING BRACKET  
J103FM-319-004 WITH 3/8-16 x 2 1/4" HEXHEAD  
CAPSCREWS, HEXNUTS AND HELICAL  
LOCKWASHERS (2) PLACES

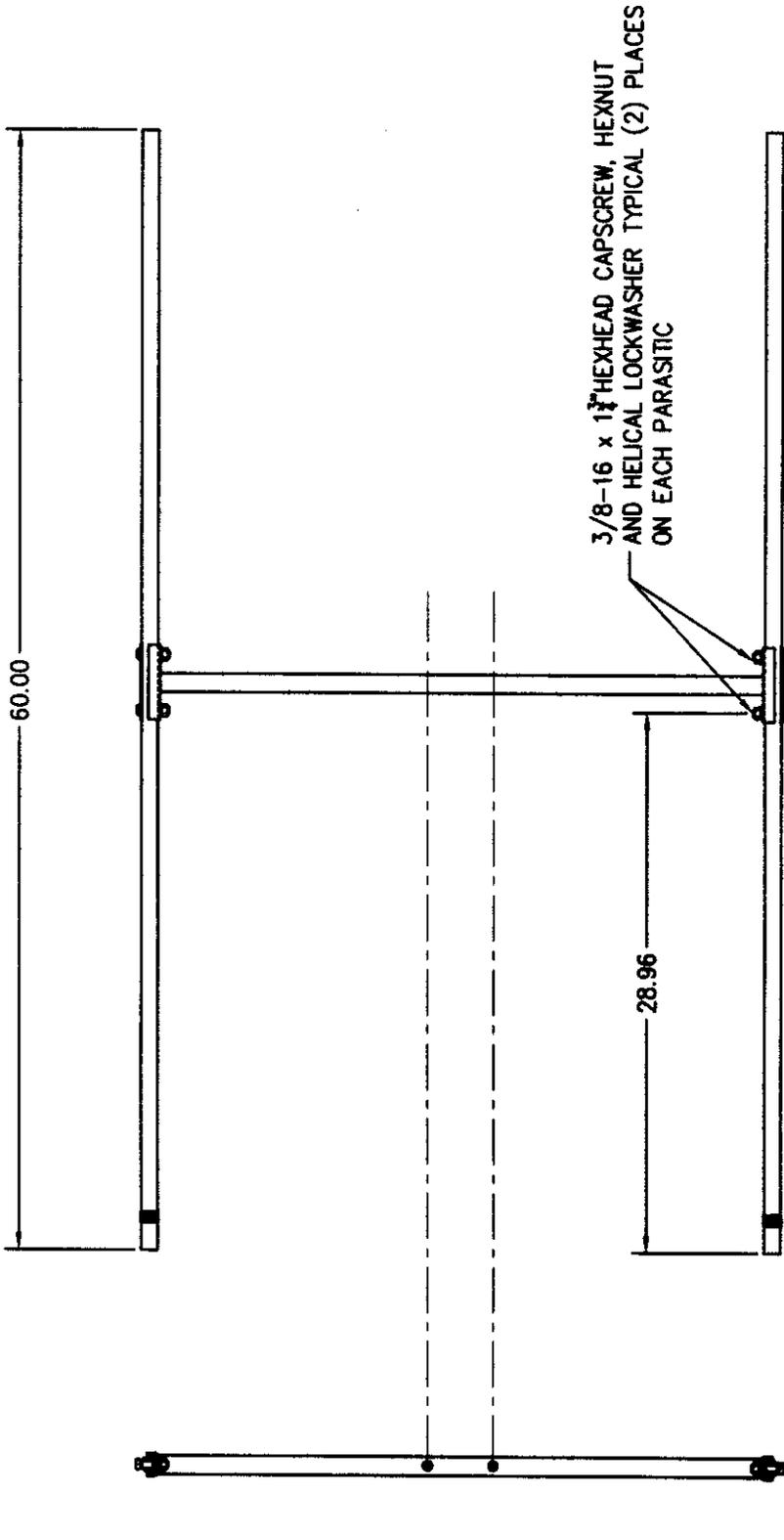
TOWER LEG

BAY MOUNTING BRACKET  
PER J103FM-319-004  
MOUNTS TO TOWER LEG  
WITH (2) 3/8-16 x 2"  
I.D. U-BOLTS, HEXNUTS AND  
HELICAL LOCKWASHERS  
(GALVANIZED)

HORIZONTAL PARASITIC PER  
J103FM-319-007 BOLTS TO  
BACK OF INTERBAY BLOCK  
WITH (4) 5/16-18 x 7/8" HEXHEAD  
CAPSCREWS AND HELICAL LOCK-  
WASHERS-TYPICAL EACH BAY

PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA		DATE: 8/13/03
PARASITIC MOUNTING DETAILS		DRAWN BY: D.G. Keller
MODEL: PSIFM-4-DA	APPROVED BY:	DATE:
CHANNEL/REGULATORY: 90.7 MHZ	SCALE: 1:12	PART NO: J103FM-319-012
MATERIAL: NOT APPLICABLE		REV: 0
TOLERANCES UNLESS OTHERWISE NOTED: FRACTIONS X/4 ± 1/16" DECIMALS XX ± .01" ANGLES XX ± 3'		REV: 0
<p>This drawing is loaned subject to the express understanding and agreement that the drawings and information contained herein are the property of PROPAGATION SYSTEMS, INC. and shall not be used, copied, reproduced, or otherwise disseminated in any form or by any means without the written permission of PROPAGATION SYSTEMS, INC. The acceptance of this drawing by the recipient shall constitute an agreement to the terms and conditions of this license.</p>		
REV.	MADE BY	DATE
	CHECKED BY	
	CHANGE	



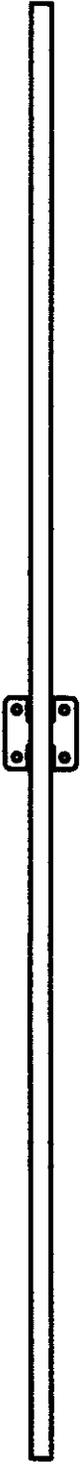


3/8-16 x 1 1/2" HEXHEAD CAPSCREW, HEXNUT  
AND HELICAL LOCKWASHER TYPICAL (2) PLACES  
ON EACH PARASITIC

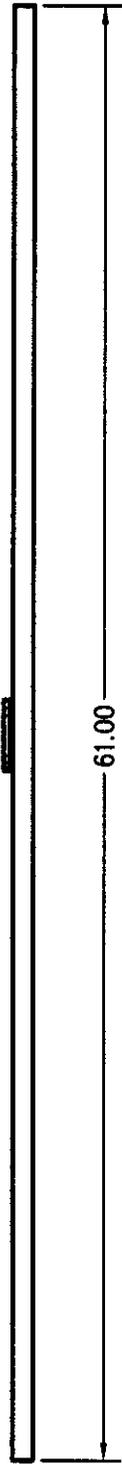
TOP VIEW

END VIEW

<p><b>PROPAGATION SYSTEMS, INC.</b> Ebensburg, Pennsylvania USA</p>		<p>DATE: 7/29/03</p>	
<p>VERTICAL PARASITIC FABRICATION DETAILS</p>		<p>DATE: 7/29/03</p>	
<p>MODEL: PSIFM-4-DA</p>	<p>DRAWN BY: D.G. Keller</p>	<p>APPROVED BY:</p>	<p>DATE:</p>
<p>CHANNEL FREQUENCY: 90.7 MHz</p>	<p>SCALE: 1:10</p>	<p>DRAWING NO.: J103FM-319-006</p>	<p>REV: 0</p>
<p>MATERIAL: ALL COMPONENTS SHOWN ARE MILD CARBON STEEL (EXCEPT FASTENERS)</p>		<p>SIZE: A</p>	
<p>TOLERANCES UNLESS OTHERWISE NOTED: FRACTIONS 3/4, ±1/16" DECIMALS .XX ±.01" ANGLES .005" ±.3°</p>		<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 PPSI AND WILL NOT BE REPRODUCED, COPIED, OR DISSEMINATED DIRECTLY OR INDIRECTLY, AND WILL NOT BE USED IN WHOLE OR IN PART OR AS AID IN MAKING OR MAKING ANY INSTRUMENT 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.</p>	
<p>REV:</p>	<p>MADE BY:</p>	<p>CHECKED BY:</p>	<p>DATE:</p>
<p>CHANGE</p>			



FRONT VIEW



TOP VIEW

**PROPAGATION SYSTEMS, INC.**  
Ebensburg, Pennsylvania USA

HORIZONTAL PARASITIC ASSEMBLY

MODEL: PSIFM-4-DA

DRAWN BY: D.G. Keller

DATE: 7/29/03

STANDARD FREQUENCY: 90.7 MHZ

APPROVED BY:

SCALE: 1:8

PART NO.: J102FM-319-007

REV: 0

MATERIAL:

SIZE: A

TOLERANCES UNLESS OTHERWISE NOTED

FRACTIONS X/16 ± 1/16"

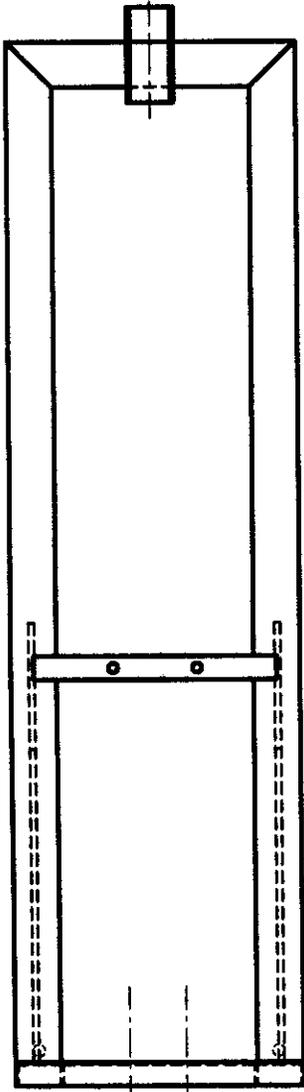
DECIMALS .XX ± .005"

DECIMALS .XXX ± .0005"

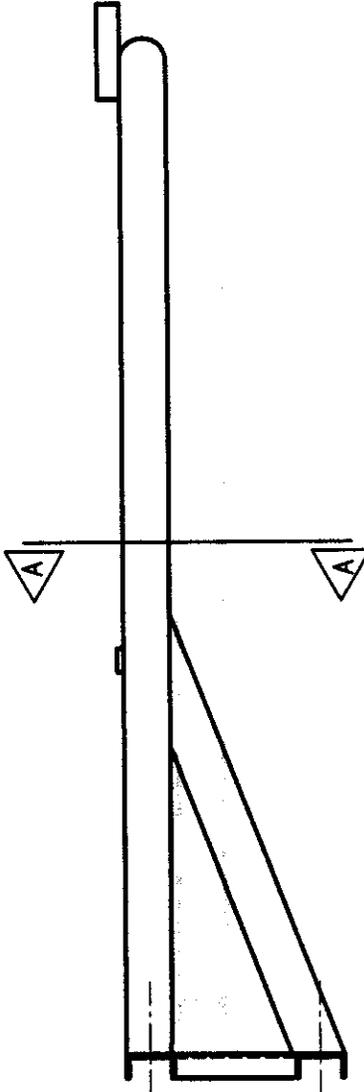
ANGLES ± 3'

REV.	MADE BY	CHECKED BY	DATE	CHANGE

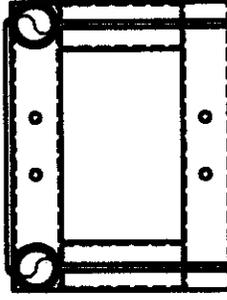
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PLAN VIEW



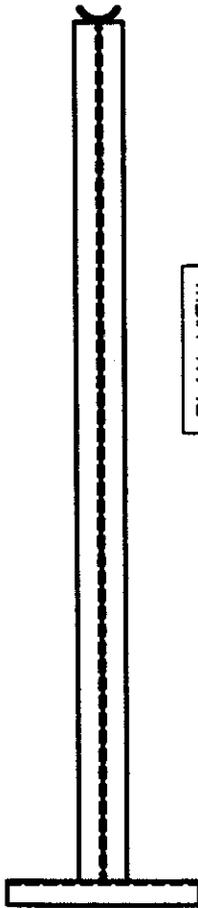
SIDE VIEW



SECTION 'A-A'

MATERIAL: AS SHOWN		TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/8 ±1/16" DECIMALS XX ±.01" DECIMALS XXX ±.005" ANGLES ± 3'	
MODEL: PSIFM-4-DA		DATE: 7/28/03	
DRAWN BY: D. A. Keller		APPROVED BY:	
FREQUENCY: 90.7 MHZ		DATE:	
SCALE: 1:8		DRAWING NO: J103FM-319-004	
PART NO:		REV: 0	
PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA CUSTOM BAY MOUNTING BRACKET DETAILS			

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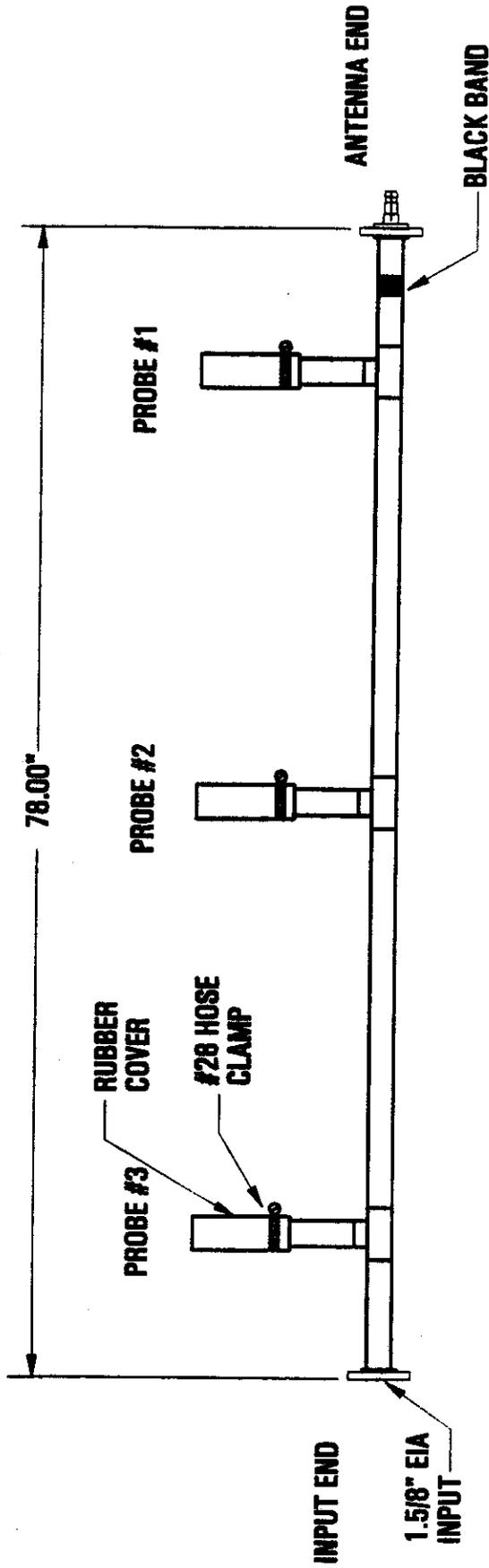


PLAN VIEW

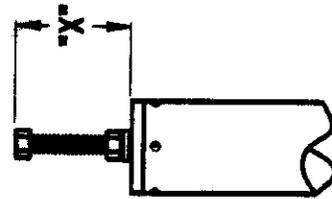


SIDE VIEW

<b>PROPAGATION SYSTEMS, INC.</b> Ebensburg, Pennsylvania USA		MODEL: PSIFM-4-DA	DRAWN BY: D.G. Keller	DATE: 7/28/03
CUSTOM INTERBAY MOUNTING BRACKET DETAILS		CHANNEL FREQUENCY: 90.7 MHz	APPROVED BY:	DATE:
MATERIAL:		SCALE: 1:8	DRAWING NO.: J103FM-319-005	REV: 0
TOLERANCES UNLESS OTHERWISE NOTED: FRACTIONS 1/4 DECIMALS .XX ANGLES		SIZE: A	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 PSE, AND WILL NOT BE OTHERWISE UTILIZED OR DISPOSED OF, DIRECTLY OR INDIRECTLY, AND WILL NOT BE USED IN WHOLE OR IN PART OR REPRODUCED OR REPRODUCED IN ANY MANNER 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 PERMISSIONS OF PSE FIRST OBTAINED. THE ACCEPTANCE OF THIS DRAWING WILL BE CONSTRUED AS AN ACCEPTANCE OF THE FORGING AGREEMENT.	
REV	MADE BY	CHECKED BY	DATE	CHANGE



J 103 FA 219



PROBE	DIM. "X"
1	3.20
2	2.31
3	3.52 out

ENLARGED VIEW, SINGLE PROBE  
PROBE SHOWN WITHOUT RUBBER COVER

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<b>PROPAGATION SYSTEMS INC.</b> EBENSBURG, PENNSYLVANIA U.S.A.	
3 PROBE TUNER ASSEMBLY	
MODEL: FM-4-D17	DATE: 1-28-88
CHARACTER: 907	DATE:
SCALE: NONE	DRAW. NO.: 33-00006
REV.:	

MATERIAL:	SIZE: A
TOLERANCES UNLESS OTHERWISE NOTED	
FRACTIONS XX"	+1/16"
DECIMALS XX"	+1.01"
ANGLES XX"	+1.01"

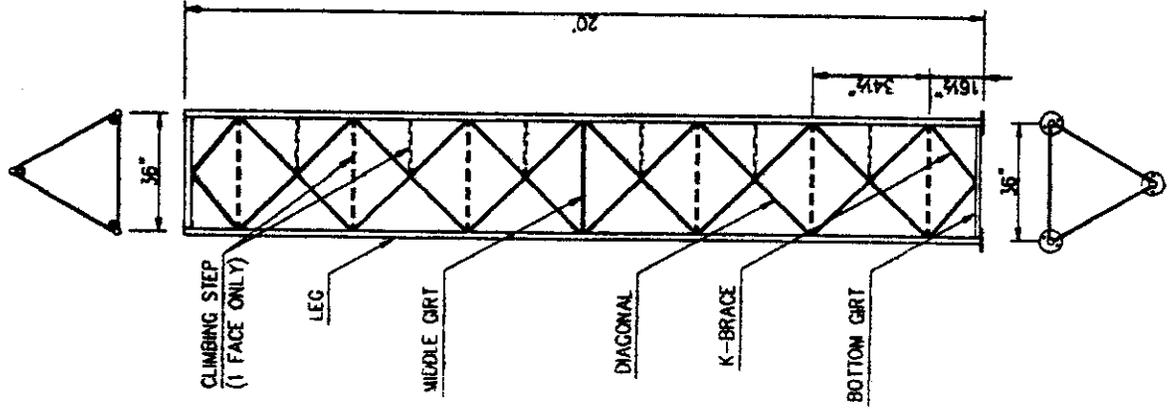
TOWER SECTION NUMBER

2

SEE DRAWINGS FOR DETAILS

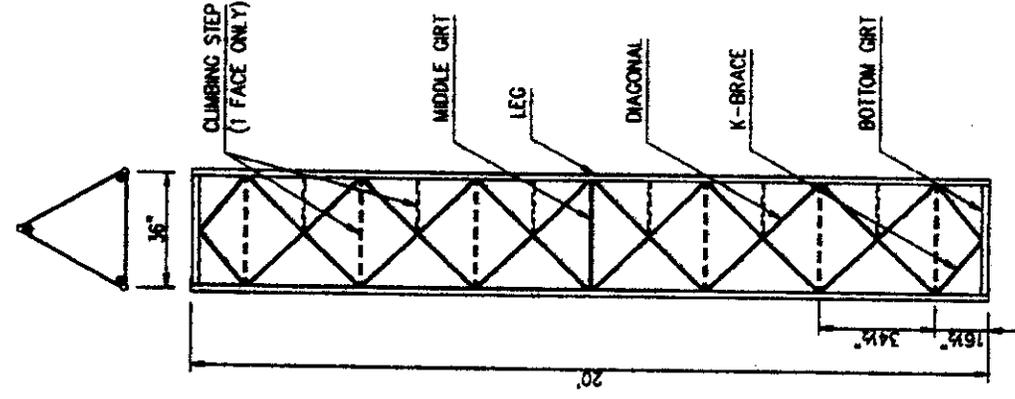
- W-1 BASE FLANGE
- W-2 RING FLANGE
- W-4 INNER MEMBER

MEMBER	MATERIAL	SIZE
LEGS	ASTM A-378	1 1/2" S.R.
DIAGONALS	ASTM A-36	1/2" S.R.
K-BRACE	ASTM A-36	1/2" S.R.
GRTS (TOP & BOT.)	ASTM A-36	2" X 1/2" PL
(MIDDLE)	ASTM A-36	1/2" S.R.
STEPS (LONG)	ASTM A-36	1/2" S.R.
(SHORT)	ASTM A-36	1/2" S.R.
FLANGES (TOP)	ASTM A-519	2 1/2" O.D. X 1 1/2" I.D.
(BOTTOM)	ASTM A-572	7/8" X 1/2" PL
GUSSETS (TOP)	ASTM A-36	---
(BOTTOM)	ASTM A-36	---
BOLTS (TOP)	ASTM A-325	1 1/2" X 7"
(BOTTOM)	ASTM A-325	1 1/2" X 7"
SECTION WEIGHT	840 LBS.	



- 3. 5. 6. 8. 9. 11. 12. 14. 15. 17
- SEE DRAWINGS FOR DETAILS
- W-2 RING FLANGE
- W-4 INNER MEMBER

| MEMBER            | MATERIAL   | SIZE                      |
|-------------------|------------|---------------------------|
| LEGS              | ASTM A-378 | 1 1/2" S.R.               |
| DIAGONALS         | ASTM A-36  | 1/2" S.R.                 |
| K-BRACE           | ASTM A-36  | 1/2" S.R.                 |
| GRTS (TOP & BOT.) | ASTM A-36  | 2" X 1/2" PL              |
| (MIDDLE)          | ASTM A-36  | 1/2" S.R.                 |
| STEPS (LONG)      | ASTM A-36  | 1/2" S.R.                 |
| (SHORT)           | ASTM A-36  | 1/2" S.R.                 |
| FLANGES (TOP)     | ASTM A-519 | 2 1/2" O.D. X 1 1/2" I.D. |
| (BOTTOM)          | ASTM A-519 | 2 1/2" O.D. X 1 1/2" I.D. |
| GUSSETS (TOP)     | ASTM A-36  | ---                       |
| (BOTTOM)          | ASTM A-36  | ---                       |
| BOLTS (TOP)       | ASTM A-325 | 1 1/2" X 7"               |
| (BOTTOM)          | ASTM A-325 | 1 1/2" X 7"               |
| SECTION WEIGHT    | 840 LBS.   |                           |



| No. | REVISIONS | By | Date |
|-----|-----------|----|------|
|     |           |    |      |
|     |           |    |      |
|     |           |    |      |

**ERI**  
STRUCTURES

**EIB ELECTRONICS RESEARCH, INC.**  
Established 1963  
NEWBURGH, IN 47630

**JOB STANDARD TOWER SECTIONS  
FOR DOCK JUNCTION, GEORGIA**

Project No. ST-286      Date: 01/14/84  
 Customer: WME/108.8 - 194.1 ME      Scale: NONE  
 Drawn by: S. MCGULLY      Checked by:      Material: AS NOTED  
 Job: C-5-V-P      Order: ST-286      Drawing No.: S-2

Use of this drawing is limited to the specific application authorized by the manufacturer. No other use is permitted. The user assumes all responsibility for the design and construction of the structure and for the safety of the structure. The manufacturer is not responsible for any damage or injury resulting from the use of this drawing. This drawing is the property of ERI and is to be returned to ERI upon completion of the project. © 1984 ERI. All rights reserved.

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| <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

-  - 3 1/8
-  - 15/8
-  - 1 1/4

291°

- 1
- 2
- 3
- 4

Climbing Ladder

- 5
- 6
- 7

- 14
- 15

- 13
- 12

- 11
- 10
- 9
- 8

171°

Building

15

## 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