



## **Propagation Systems, Inc.**

Quality Broadcast Antenna Systems

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**Directional FM Antenna  
WPTS-FM  
University of Pittsburgh  
Pittsburgh, PA**

A standard model PSIFML antenna with parasitic elements was used in conjunction with a model of the customer's support mast to create the necessary directional radiation pattern. The final antenna consists of three radiating elements each secured to the mast with a custom-mounting bracket. The antenna bays are  $\frac{3}{4}$  wavelength spaced and there is one horizontal parasitic element per bay. The antenna array is center fed from a 3-way power divider with  $\frac{1}{2}$ " foam transmission line. Each radiating element receives equal power and phase.

Pattern testing was performed using a 1/3-scale model element and support mast. The azimuth plane measurements were taken on a ground reflection test range. This type of test range utilizes the reflected signal and direct signal from the source antenna to form an interference pattern on the antenna under test. The antenna and tower under test was mounted to a turntable that allowed the structure to be rotated 360° in the azimuth plane. The source antenna was located approximately 75 ft. from the antenna under test. The source height above ground was adjusted to peak the first lobe of the interference pattern at the antenna under test.

The test antenna was mounted in the center of rotation of the turntable. The antenna and mounting structure were rotated clockwise while data was recorded in a counter clockwise direction. All feed cables to the antenna were secured and grounded during pattern measurements. A Hewlett Packard 8753A-network analyzer operating at 276.3 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 90% of the envelope RMS.

The antenna is to be mounted 165 meters (541 ft) above ground level per the construction permit. This elevation corresponds to a center of radiation 10 ft. below the top of the support mast. The antenna will be within the allowable +2/-4 meter tolerance if installed according to the attached instructions. No other antenna can be installed within 10 ft of any radiating element. The antenna is to be positioned 110° True and certified by a licensed surveyor. 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 7.7 watts will be required at the antenna input in order to reach the licensed .016 kW ERP. The transmitter output power requirements are dependent upon the transmission line size and length used to feed the antenna. A length of 1/2" Andrew foam dielectric transmission line model LDF4-50A feeding the antenna is estimated to be 75 ft. The efficiency for this length of line is 89.0% with a resulting transmitter output power of 8.68 watts. The final length of transmission line must be determined after installation.

### **Antenna Specifications**

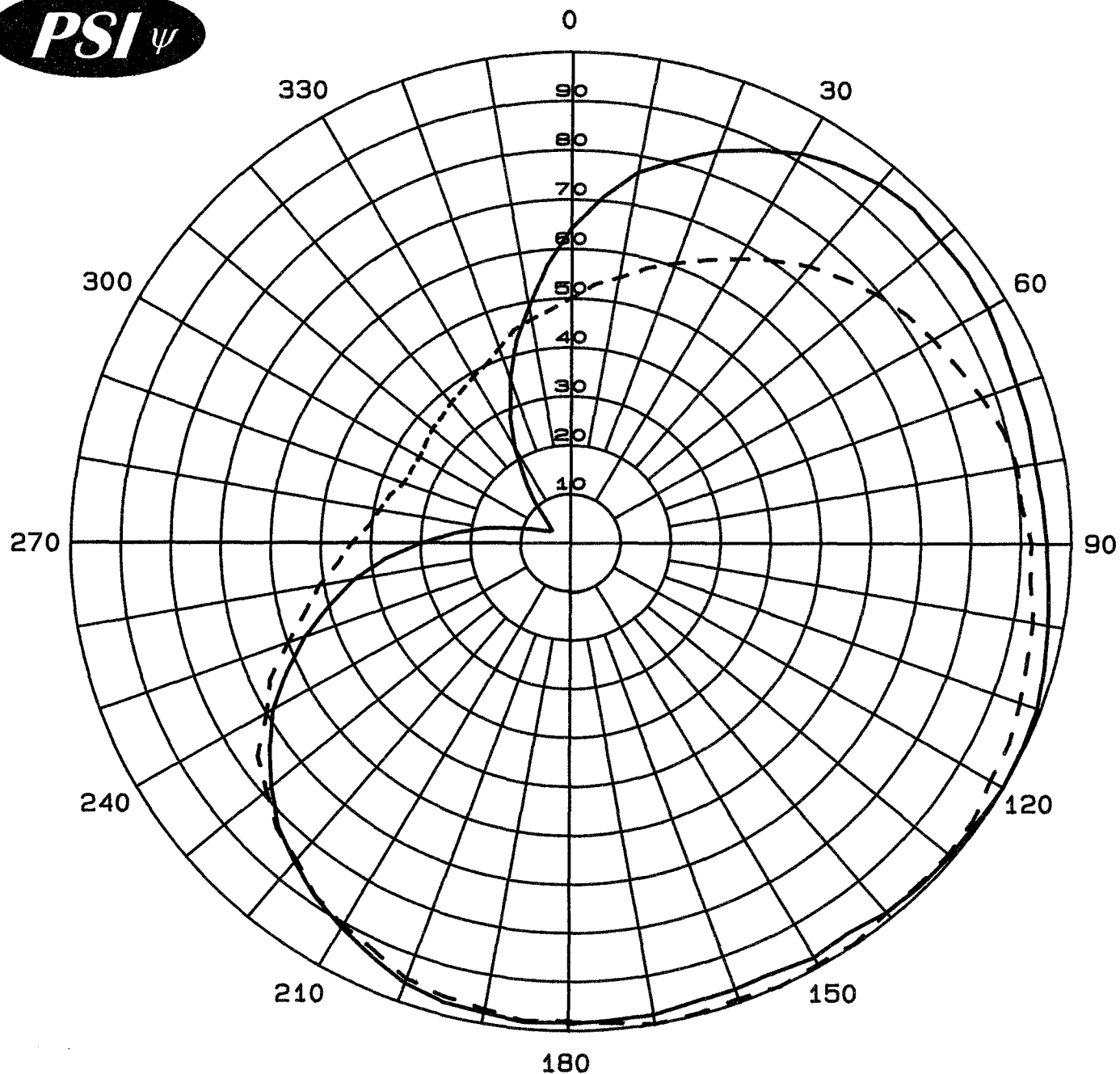
Antenna Model	PSIFML-3-DA
Type	3-bay directional FM antenna
Bay Spacing	$\frac{3}{4}$ wavelength spaced elements
Frequency	92.1 MHz
Polarization	Circular
Envelope RMS	.897
Composite RMS	.806
Gain (h-pol)	2.07 (3.16 dB)
Gain (v-pol)	2.07 (3.16 dB)
Input	7/8" EIA branch fed input
Power rating	1.5 kW
Length	16.02 ft.
Weight	90 lbs.
Wind Area	11.6 sq. ft.

### **Statement of Certification**

This is to certify the antenna has been designed, fabricated and tested under my supervision and it meets the required envelope pattern limitations set forth in the stations construction permit.



Douglas A. Ross  
President  
Propagation Systems Inc.



Measured Relative Field  
Azimuth Plane Pattern  
Antenna: PSIFML-3-DA  
Type: 3-Bay FM Directional  
Polarization: Circular  
Gain (H-pol): 2.07 (3.16 dB)  
Gain (V-pol): 2.07 (3.16 dB)  
WPTS-FM Pittsburgh, PA

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

## Measured Relative Field Tabulation

Antenna: PSIFML-3-DA  
University of Pittsburgh  
Station: WPTS-FM  
Frequency: 92.1 MHz  
Location: Pittsburgh, PA

### Horizontal Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.642	0.853	-0.69
10	0.767	1.216	0.85
20	0.850	1.497	1.75
30	0.917	1.740	2.40
40	0.955	1.889	2.76
50	0.961	1.910	2.81
60	0.961	1.912	2.82
70	0.947	1.854	2.68
80	0.941	1.833	2.63
90	0.951	1.873	2.73
100	0.970	1.947	2.89
110	0.993	2.042	3.10
120	1.000	2.070	3.16
130	0.993	2.040	3.10
140	0.986	2.011	3.03
150	0.979	1.985	2.98
160	0.971	1.952	2.90
170	0.979	1.986	2.98
180	0.983	2.001	3.01
190	0.977	1.977	2.96
200	0.960	1.907	2.80
210	0.910	1.714	2.34
220	0.854	1.509	1.79
230	0.778	1.253	0.98
240	0.686	0.975	-0.11
250	0.565	0.661	-1.80
260	0.440	0.401	-3.97
270	0.297	0.183	-7.38
280	0.174	0.063	-12.01
290	0.083	0.014	-18.46
300	0.047	0.005	-23.34
310	0.055	0.006	-22.02
320	0.113	0.026	-15.79
330	0.223	0.103	-9.86
340	0.357	0.263	-5.79
350	0.490	0.497	-3.04

#### Maximum Value

Field 1.00  
Gain 2.07 (3.16 dB)  
Azimuth Bearing 120 degrees

#### Minimum Field

Field 0.045  
Gain .004 (-23.87 dB)  
Azimuth Bearing 305 degrees

### Vertical Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.499	0.516	-2.87
10	0.550	0.625	-2.04
20	0.607	0.763	-1.17
30	0.671	0.931	-0.31
40	0.738	1.128	0.52
50	0.794	1.303	1.15
60	0.833	1.438	1.58
70	0.873	1.577	1.98
80	0.905	1.694	2.29
90	0.921	1.755	2.44
100	0.940	1.827	2.62
110	0.957	1.895	2.78
120	0.971	1.950	2.90
130	0.989	2.023	3.06
140	0.986	2.014	3.04
150	0.995	2.051	3.12
160	0.992	2.038	3.09
170	0.999	2.066	3.15
180	0.980	1.987	2.98
190	0.970	1.948	2.90
200	0.950	1.869	2.72
210	0.905	1.694	2.29
220	0.848	1.488	1.73
230	0.791	1.295	1.12
240	0.701	1.017	0.07
250	0.601	0.748	-1.26
260	0.512	0.543	-2.65
270	0.438	0.397	-4.01
280	0.389	0.313	-5.04
290	0.356	0.262	-5.81
300	0.350	0.254	-5.96
310	0.362	0.271	-5.67
320	0.375	0.291	-5.36
330	0.392	0.318	-4.97
340	0.423	0.370	-4.31
350	0.463	0.444	-3.53

#### Maximum Value

Field 1.00  
Gain 2.07 (3.16 dB)  
Azimuth Bearing 155 degrees

#### Minimum Field

Field 0.350  
Gain .254 (-5.96 dB)  
Azimuth Bearing 300 degrees

## ERP Tabulation

Antenna: PSIFML-3-DA  
University of Pittsburgh  
Station: WPTS-FM  
Frequency: 92.1 MHz  
Location: Pittsburgh, PA  
Maximum ERP: .016 kW (-17.96 dBk)

### Horizontal Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.642	0.0066	-21.81
10	0.767	0.0094	-20.27
20	0.850	0.0116	-19.37
30	0.917	0.0134	-18.71
40	0.955	0.0146	-18.36
50	0.961	0.0148	-18.31
60	0.961	0.0148	-18.30
70	0.947	0.0143	-18.44
80	0.941	0.0142	-18.49
90	0.951	0.0145	-18.39
100	0.970	0.0150	-18.23
110	0.993	0.0158	-18.02
120	1.000	0.0160	-17.96
130	0.993	0.0158	-18.02
140	0.986	0.0155	-18.08
150	0.979	0.0153	-18.14
160	0.971	0.0151	-18.21
170	0.979	0.0153	-18.14
180	0.983	0.0155	-18.11
190	0.977	0.0153	-18.16
200	0.960	0.0147	-18.32
210	0.910	0.0132	-18.78
220	0.854	0.0117	-19.33
230	0.778	0.0097	-20.14
240	0.686	0.0075	-21.23
250	0.565	0.0051	-22.91
260	0.440	0.0031	-25.09
270	0.297	0.0014	-28.50
280	0.174	0.0005	-33.13
290	0.083	0.0001	-39.58
300	0.047	0.0000	-44.46
310	0.055	0.0000	-43.14
320	0.113	0.0002	-36.90
330	0.223	0.0008	-30.98
340	0.357	0.0020	-26.91
350	0.490	0.0038	-24.15

#### Maximum Value (H-pol)

Field 1.00  
ERP .016 kW (-17.96 dBk)  
Azimuth Bearing 120 degrees

#### Minimum Field (H-pol)

Field 0.045  
ERP 0 kW (-44.99 dBk)  
Azimuth Bearing 305 degrees

### Vertical Polarization

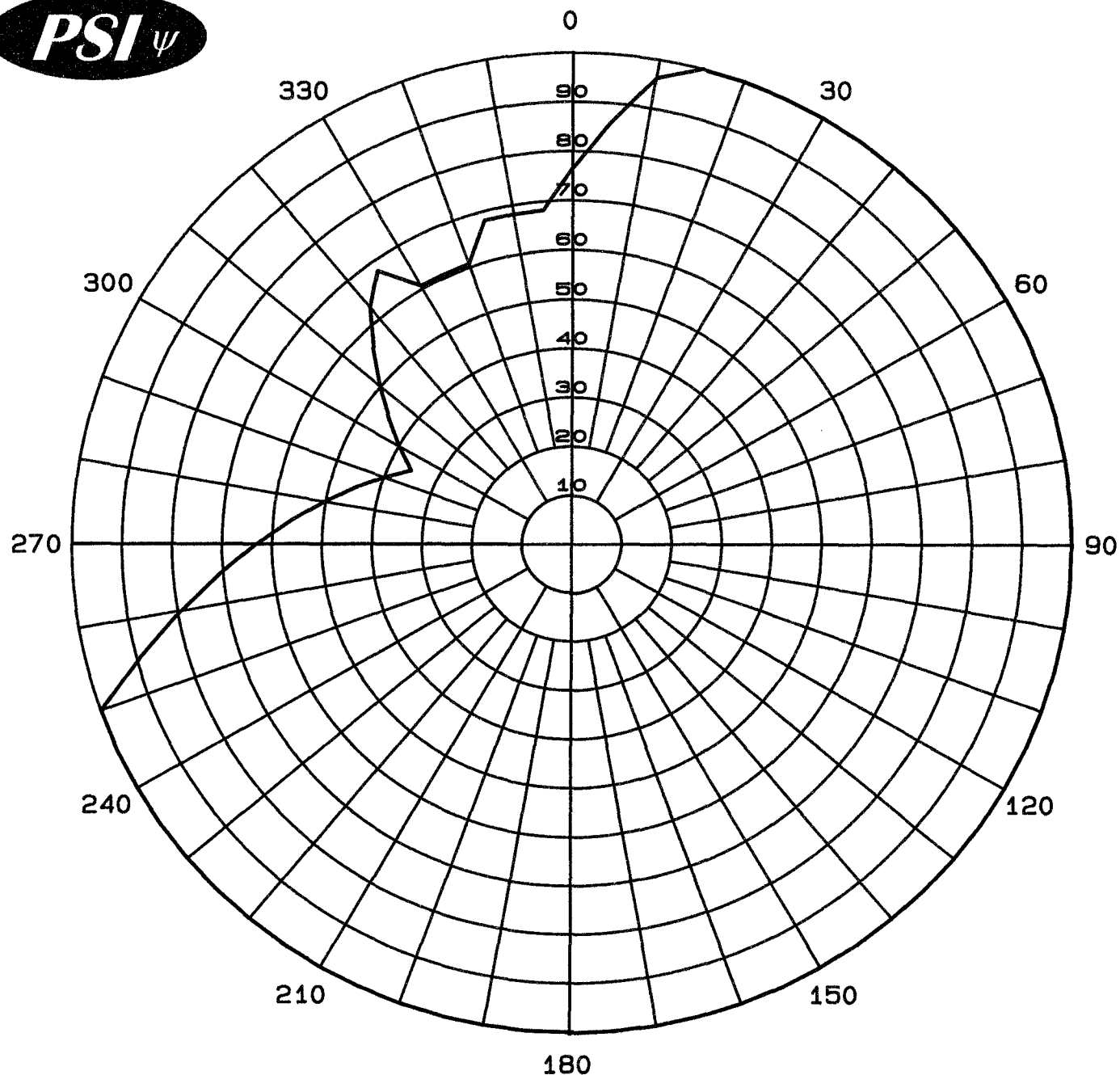
Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.499	0.0040	-23.99
10	0.550	0.0048	-23.16
20	0.607	0.0059	-22.29
30	0.671	0.0072	-21.43
40	0.738	0.0087	-20.60
50	0.794	0.0101	-19.97
60	0.833	0.0111	-19.54
70	0.873	0.0122	-19.14
80	0.905	0.0131	-18.83
90	0.921	0.0136	-18.68
100	0.940	0.0141	-18.50
110	0.957	0.0146	-18.34
120	0.971	0.0151	-18.22
130	0.989	0.0156	-18.06
140	0.986	0.0156	-18.08
150	0.995	0.0158	-18.00
160	0.992	0.0158	-18.03
170	0.999	0.0160	-17.97
180	0.980	0.0154	-18.14
190	0.970	0.0151	-18.22
200	0.950	0.0144	-18.40
210	0.905	0.0131	-18.83
220	0.848	0.0115	-19.39
230	0.791	0.0100	-20.00
240	0.701	0.0079	-21.04
250	0.601	0.0058	-22.38
260	0.512	0.0042	-23.77
270	0.438	0.0031	-25.13
280	0.389	0.0024	-26.16
290	0.356	0.0020	-26.93
300	0.350	0.0020	-27.08
310	0.362	0.0021	-26.78
320	0.375	0.0023	-26.48
330	0.392	0.0025	-26.09
340	0.423	0.0029	-25.43
350	0.463	0.0034	-24.65

#### Maximum Value (V-pol)

Field 1.00  
ERP .016 kW (-17.96 dBk)  
Azimuth Bearing 155 degrees

#### Minimum Field (V-pol)

Field 0.350  
ERP .002 kW (-27.08 dBk)  
Azimuth Bearing 300 degrees



Maximum Envelope Pattern  
Azimuth Plane  
Antenna: PSIFML-3-DA  
Type: 3-Bay FM Directional  
Polarization: Circular  
ERP: .016 kW (-17.96 dBk)  
University of Pittsburgh  
WPTS-FM Pittsburgh, PA

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

### Maximum Envelope Tabulation

Antenna: PSIFML-3-DA

University of Pittsburgh

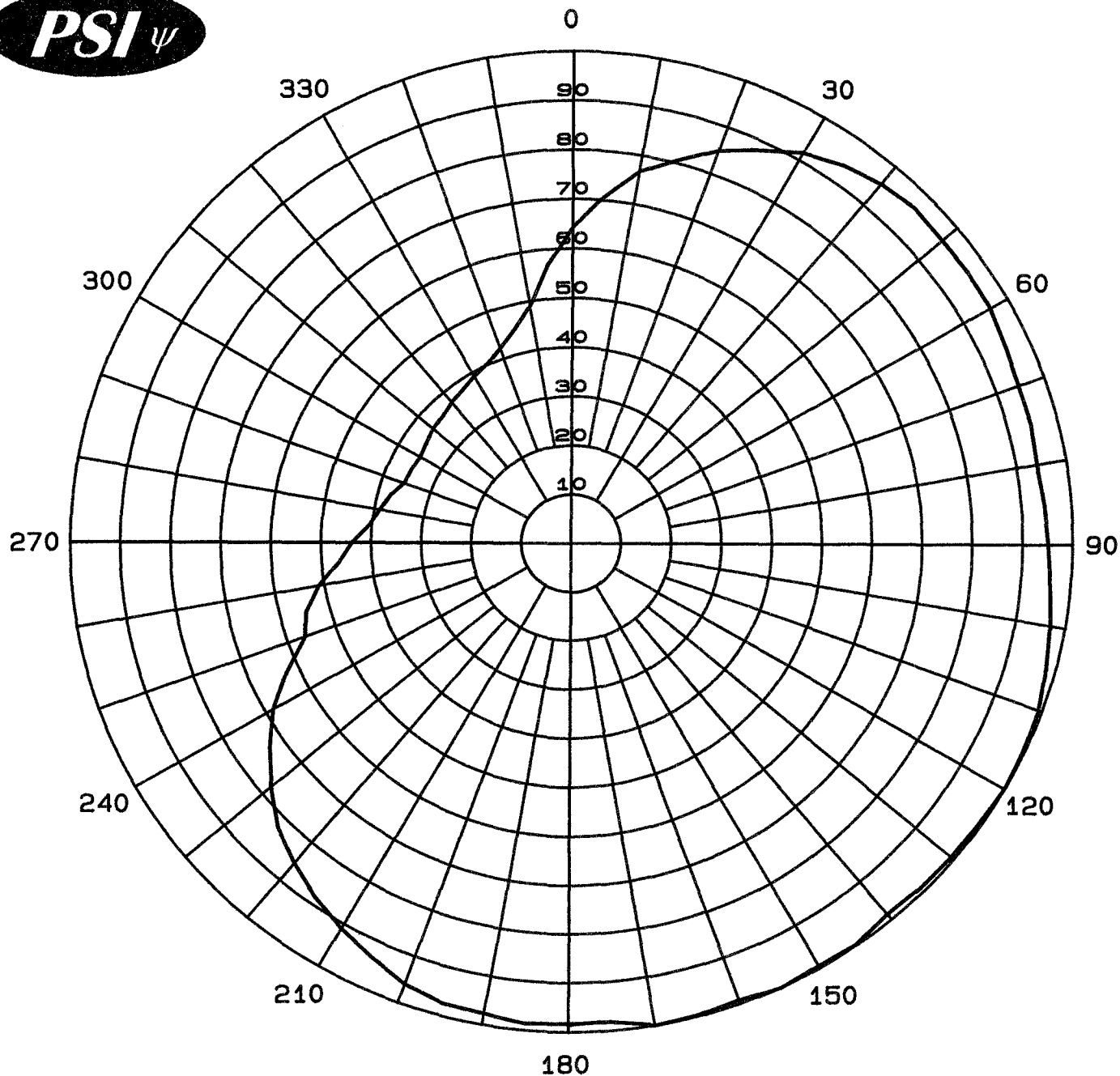
Station: WPTS-FM

Frequency: 92.1 MHz

Location: Pittsburgh, PA

Maximum ERP: .016 kW (-17.96 dBk)

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.764	0.0093	-20.30
10	0.962	0.0148	-18.30
20	1.000	0.0160	-17.96
30	1.000	0.0160	-17.96
40	1.000	0.0160	-17.96
50	1.000	0.0160	-17.96
60	1.000	0.0160	-17.96
70	1.000	0.0160	-17.96
80	1.000	0.0160	-17.96
90	1.000	0.0160	-17.96
100	1.000	0.0160	-17.96
110	1.000	0.0160	-17.96
120	1.000	0.0160	-17.96
130	1.000	0.0160	-17.96
140	1.000	0.0160	-17.96
150	1.000	0.0160	-17.96
160	1.000	0.0160	-17.96
170	1.000	0.0160	-17.96
180	1.000	0.0160	-17.96
190	1.000	0.0160	-17.96
200	1.000	0.0160	-17.96
210	1.000	0.0160	-17.96
220	1.000	0.0160	-17.96
230	1.000	0.0160	-17.96
240	1.000	0.0160	-17.96
250	1.000	0.0160	-17.96
260	0.794	0.0101	-19.96
270	0.630	0.0064	-21.97
280	0.501	0.0040	-23.96
290	0.398	0.0025	-25.96
300	0.398	0.0025	-25.96
310	0.501	0.0040	-23.96
320	0.630	0.0064	-21.97
330	0.607	0.0059	-22.30
340	0.607	0.0059	-22.30
350	0.681	0.0074	-21.30



Measured Composite Pattern  
Azimuth Plane  
Antenna: PSIFML-3-DA  
Type: 3-Bay FM Directional  
Polarization: Circular  
ERP: .016 kW (-17.96 dBk)  
University of Pittsburgh  
WPTS-FM Pittsburgh, PA

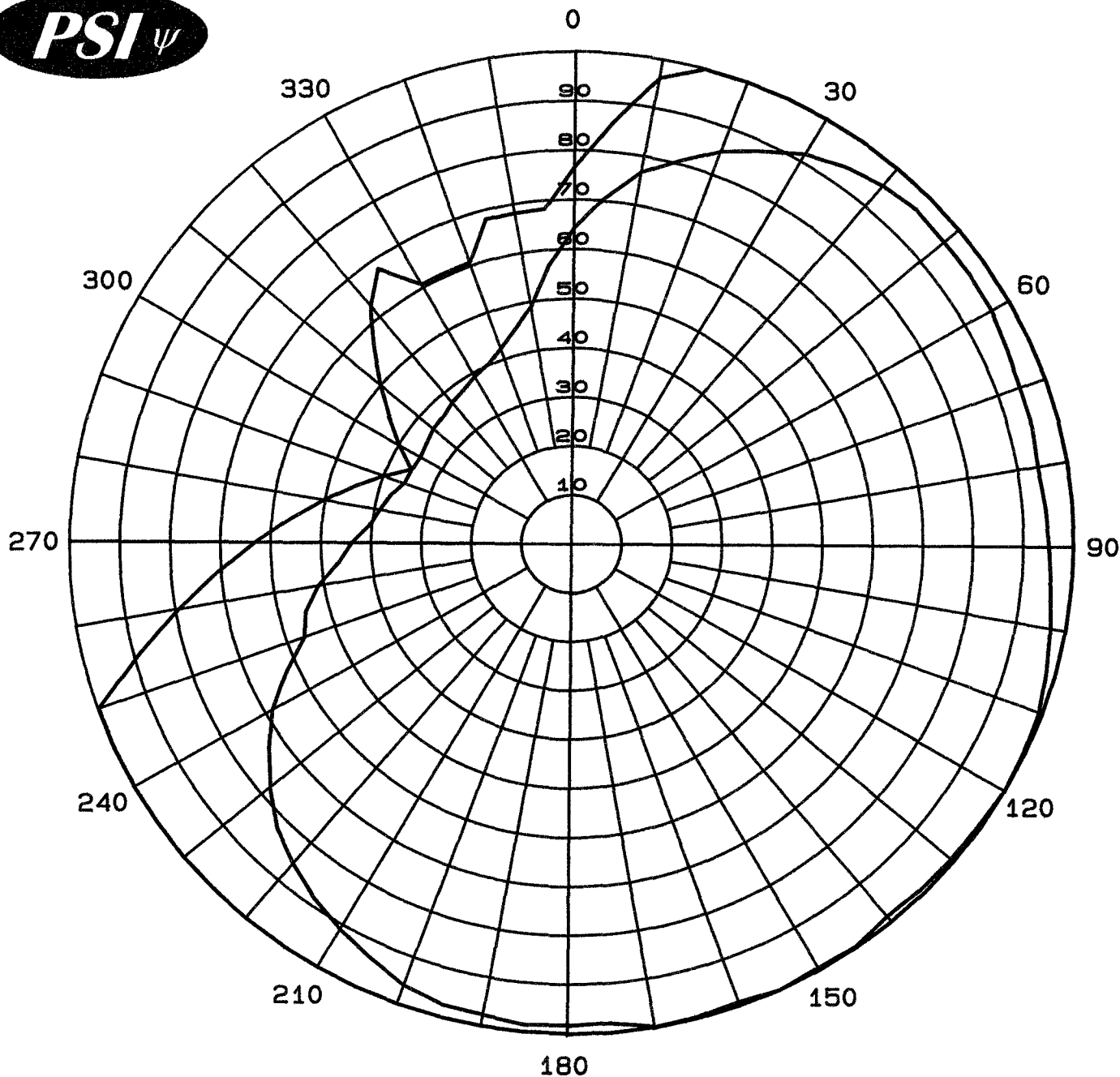
***Propagation Systems Inc.***  
***PO Box 113***  
***Ebensburg, PA 15931***



## Composite Pattern Tabulation

Antenna: PSIFML-3-DA  
University of Pittsburgh  
Station: WPTS-FM  
Frequency: 92.1 MHz  
Location: Pittsburgh, PA  
Maximum ERP: .016 kW (-17.96 dBk)

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.642	0.0066	-21.81
10	0.767	0.0094	-20.27
20	0.850	0.0116	-19.37
30	0.917	0.0134	-18.71
40	0.955	0.0146	-18.36
50	0.961	0.0148	-18.31
60	0.961	0.0148	-18.30
70	0.947	0.0143	-18.44
80	0.941	0.0142	-18.49
90	0.951	0.0145	-18.39
100	0.970	0.0150	-18.23
110	0.993	0.0158	-18.02
120	1.000	0.0160	-17.96
130	0.993	0.0158	-18.02
140	0.986	0.0156	-18.08
150	0.995	0.0158	-18.00
160	0.992	0.0158	-18.03
170	0.999	0.0160	-17.97
180	0.983	0.0155	-18.11
190	0.977	0.0153	-18.16
200	0.960	0.0147	-18.32
210	0.910	0.0132	-18.78
220	0.854	0.0117	-19.33
230	0.778	0.0097	-20.14
240	0.686	0.0075	-21.23
250	0.565	0.0051	-22.91
260	0.512	0.0042	-23.77
270	0.438	0.0031	-25.13
280	0.389	0.0024	-26.16
290	0.356	0.0020	-26.93
300	0.350	0.0020	-27.08
310	0.362	0.0021	-26.78
320	0.375	0.0023	-26.48
330	0.392	0.0025	-26.09
340	0.423	0.0029	-25.43
350	0.490	0.0038	-24.15

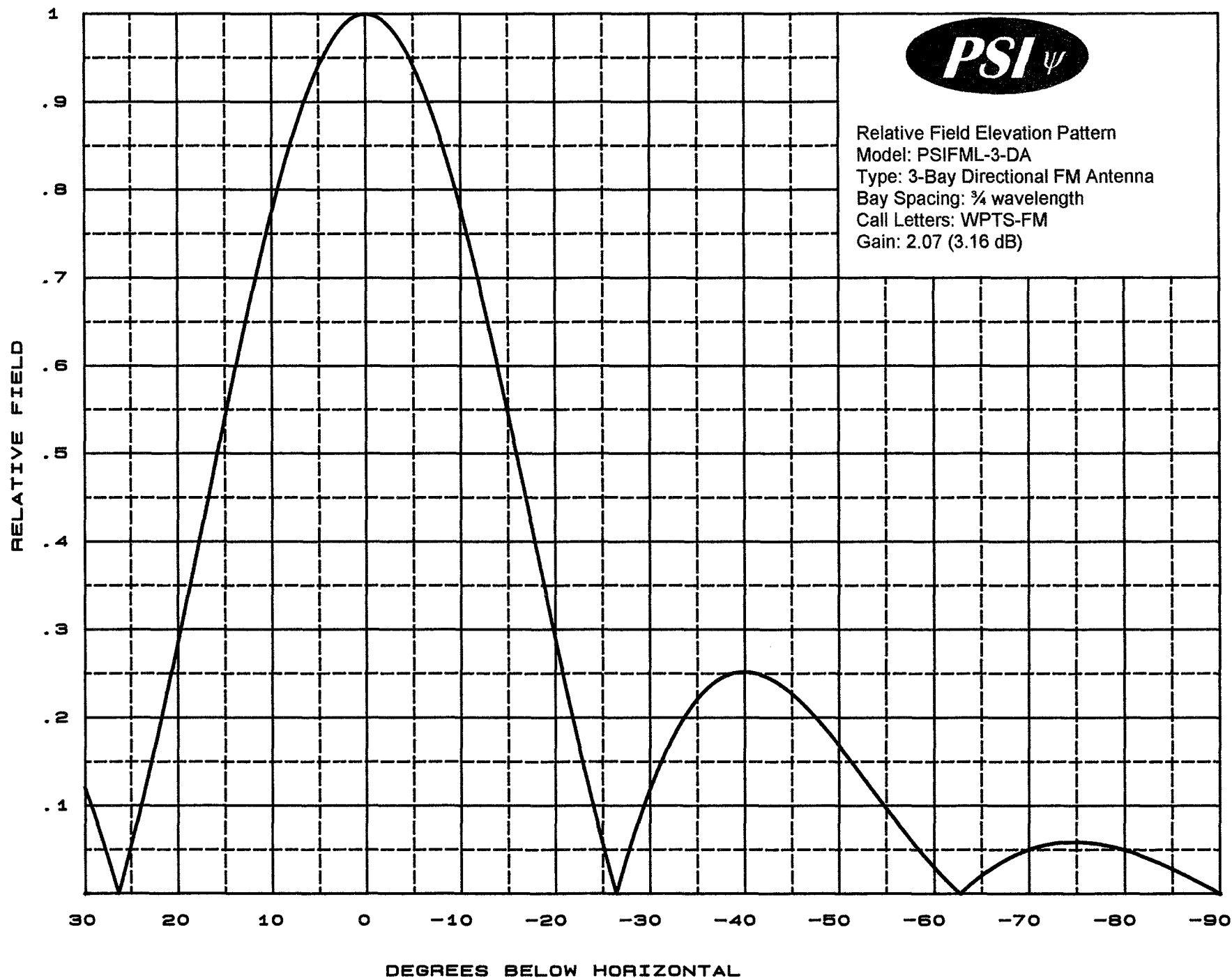


Measured Composite Pattern  
With Maximum Envelope  
Antenna: PSIFML-3-DA  
Type: 3-Bay FM Directional  
Polarization: Circular  
ERP: .016 kW (-17.96 dBk)  
University of Pittsburgh  
WPTS-FM Pittsburgh, PA

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**PO Box 113**  
**Ebensburg, PA 15931**

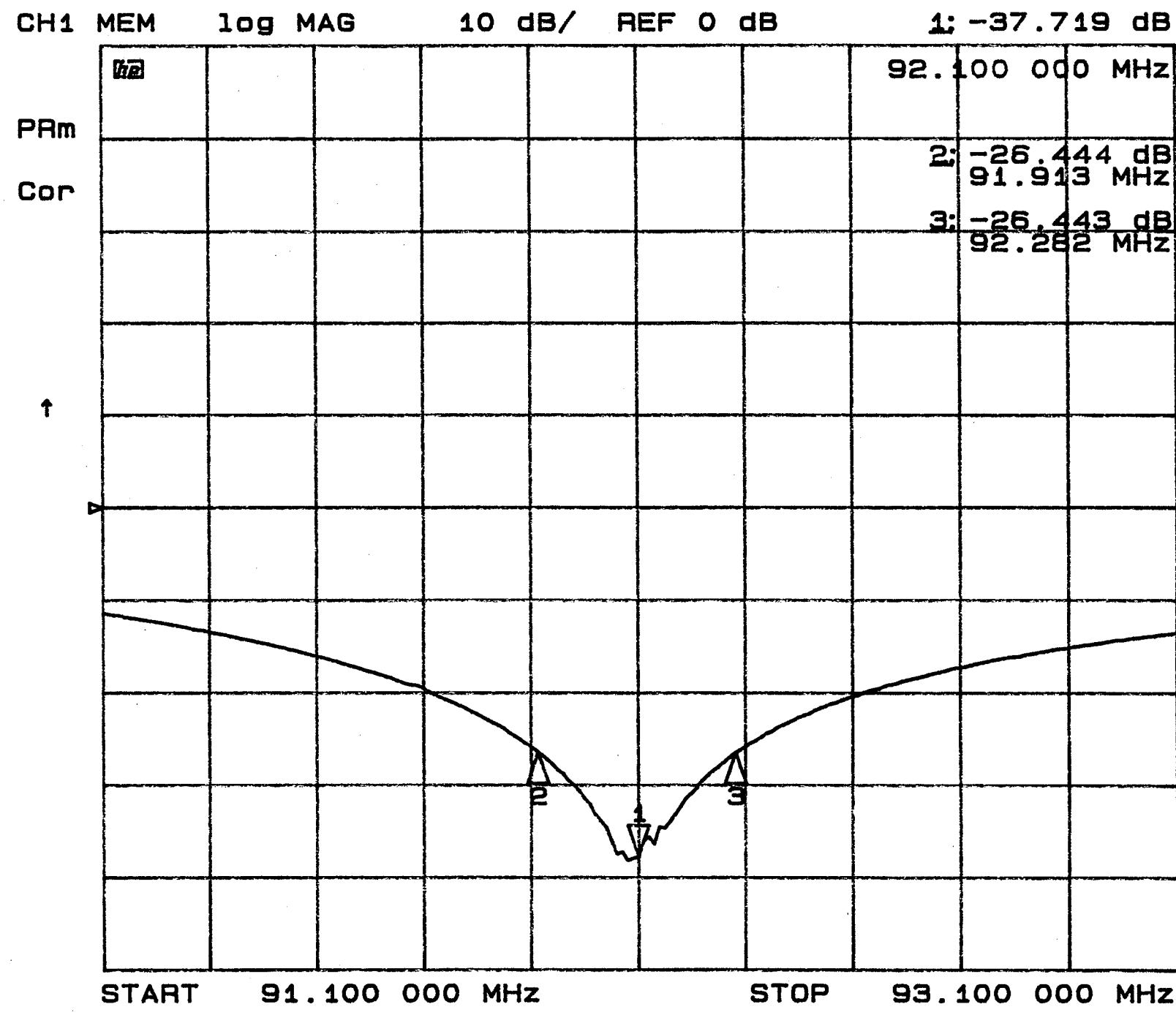


Relative Field Elevation Pattern  
Model: PSIFML-3-DA  
Type: 3-Bay Directional FM Antenna  
Bay Spacing:  $\frac{3}{4}$  wavelength  
Call Letters: WPTS-FM  
Gain: 2.07 (3.16 dB)



1306 FM-511  
FML-3-DA

FINAL



## **General Notes**

1. Review antenna elevation and plan the installation. The antenna brackets have been designed for a tapered support mast.
2. All bays are to be aligned to the same azimuth angle.
3. Use the supplied mastic and electrical tape to seal all connectors.
4. 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.
5. The feed points are in the up position.
6. Install one bay assembly at a time.
7. Keep all transmission lines free from dirt and moisture. All Teflon insulators must be clean and dry.
8. The antenna does not require pressurization.
9. The antenna has been tuned at the factory and should not require field adjustment.
10. 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. Starting with bay one, attach cable A (372.74") to the type "N" connector located at the end of the antenna boom. Use the supplied mastic and electrical tape to seal the connector. Hoist the element to the proper elevation and attach the bay to the support mast using the supplied 1/2-13 x 8-1/2" bolts and back plates. Position the bay 110 degrees true as shown in drawing J306FM-511-001. The mounting bracket has been preset to the proper dimension and should not be moved. Next attach the parasitic element 5.1" above the bay centerline. The parasitic element must be positioned as shown in drawing J306FM-511-001. Secure the 1/2" coax to the support mast with the supplied tire wraps. Use caution not to crush the cable.

### Step Two

Follow the same procedure for bay two. Attach cable B (266.36") to the type "N" connector located at the end of the antenna boom. Use the supplied mastic and electrical tape to seal the connector. Hoist the element to the proper elevation and attach the bay to the support mast using the supplied 1/2-13 x 8-1/2" bolts and back plates. The antenna bay must be spaced 96.1" below the top bay. Position the bay 110 degrees true as shown in drawing J306FM-511-001. The mounting bracket has been preset to the proper dimension and should not be moved. Next attach the parasitic element 5.1" above the bay centerline. The parasitic element must be positioned as shown in drawing J306FM-511-001. Secure the 1/2" coax to the support mast with the supplied tire wraps.

### Step Three

Follow the same procedure for bay three. Attach cable C (160") to the type "N" connector located at the end of the antenna boom. Use the supplied mastic and electrical tape to seal the connector. Hoist the element to the proper elevation and attach the bay to the support mast using the supplied  $\frac{1}{2}$ -13 x 8-1/2" bolts and back plates. The antenna bay must be spaced 96.1" below the middle bay. Position the bay 110 degrees true as shown in drawing J306FM-511-001. The mounting bracket has been preset to the proper dimension and should not be moved. Next attach the parasitic element 5.1" above the bay centerline. The parasitic element must be positioned as shown in drawing J306FM-511-001. Secure the  $\frac{1}{2}$ " coax to the support mast with the supplied tire wraps.

### Step Four

Attach the mounting bracket, drawing J306FM-511-021, to the power divider using the supplied hose clamps. For best support, mount the bracket approximately 6" below the output of the divider. Secure the divider to the support mast approximately 3 ft. above the base of the support mast. Use a 1/2-13 x 8-3/4" U-bolt to secure the divider to the tower leg. Connect the  $\frac{1}{2}$ " feed cables from the antenna bays to the power divider. Use the supplied mastic and vinyl tape to seal all the type "N" connections. Secure the feed cables to the tower with tie wraps. Use caution not to crush the cable.

### Step Five

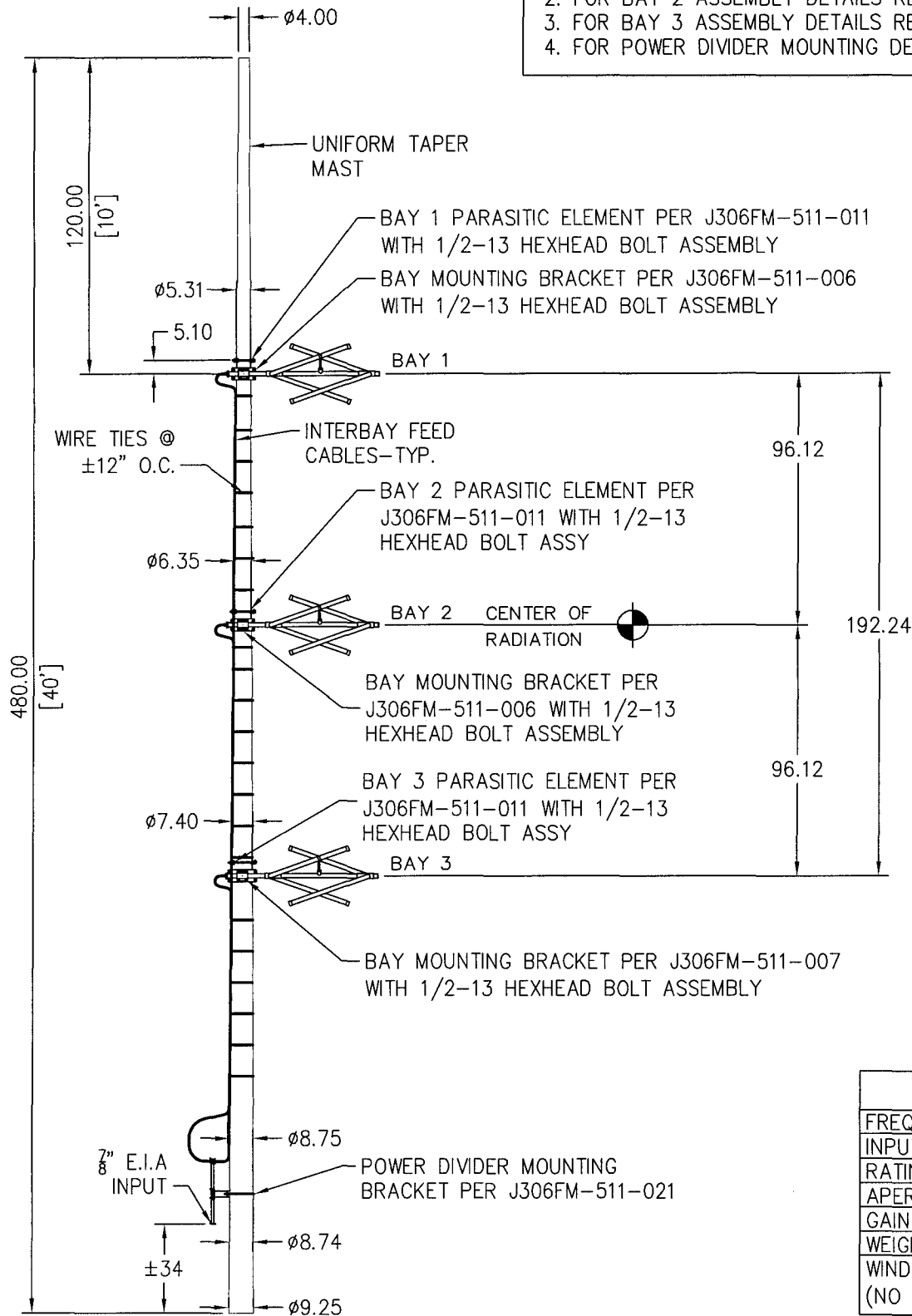
**Check all bolted connections for tightness.** Connect the main transmission line to the antenna input located at the base of the power divider. **Do not allow the weight of the feed line to be supported by power divider/antenna.** The antenna system should be tested before the erector leaves the premises 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 if the antenna has a high VSWR, consult the factory immediately while the tower crew is still on site.

## **Drawing Index**

<u>Drawing Number</u>	<u>Description</u>
J306FM-511-002	Antenna Elevation
J306FM-511-001	Antenna Orientation
J306FM-511-010	Typical Bay Outline
J306FM-511-018	Bay One Mounting Details
J306FM-511-019	Bay Two Mounting Details
J306FM-511-020	Bay Three Mounting Details
J306FM-511-011	Antenna Element Parasitic
31-00045	Type "N" Connector Sealing Detail
J306FM-511-009	Cable Outline
J306FM-511-022	Power Divider Mounting
J306FM-511-021	Power Divider Bracket Outline
J306FM-511-008	Power Divider Outline

## NOTE:

1. FOR BAY 1 ASSEMBLY DETAILS REF J306FM-511-018
2. FOR BAY 2 ASSEMBLY DETAILS REF J306FM-511-019
3. FOR BAY 3 ASSEMBLY DETAILS REF. J306FM-511-020
4. FOR POWER DIVIDER MOUNTING DETAILS REF. J306FM-511-022



## SPECIFICATIONS

FREQUENCY:	92.1 MHz
INPUT:	7/8" E.I.A. INPUT
RATING:	1.5 kW
APERTURE:	16.02 Ft.
GAIN:	2.07 (3.16 dB)
WEIGHT:	90 Lbs
WIND AREA:	11.6 Sq. Ft.
(NO ICE)	

REV.	MADE BY CHECKED BY	DATE	CHANGE	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 PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part to 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.

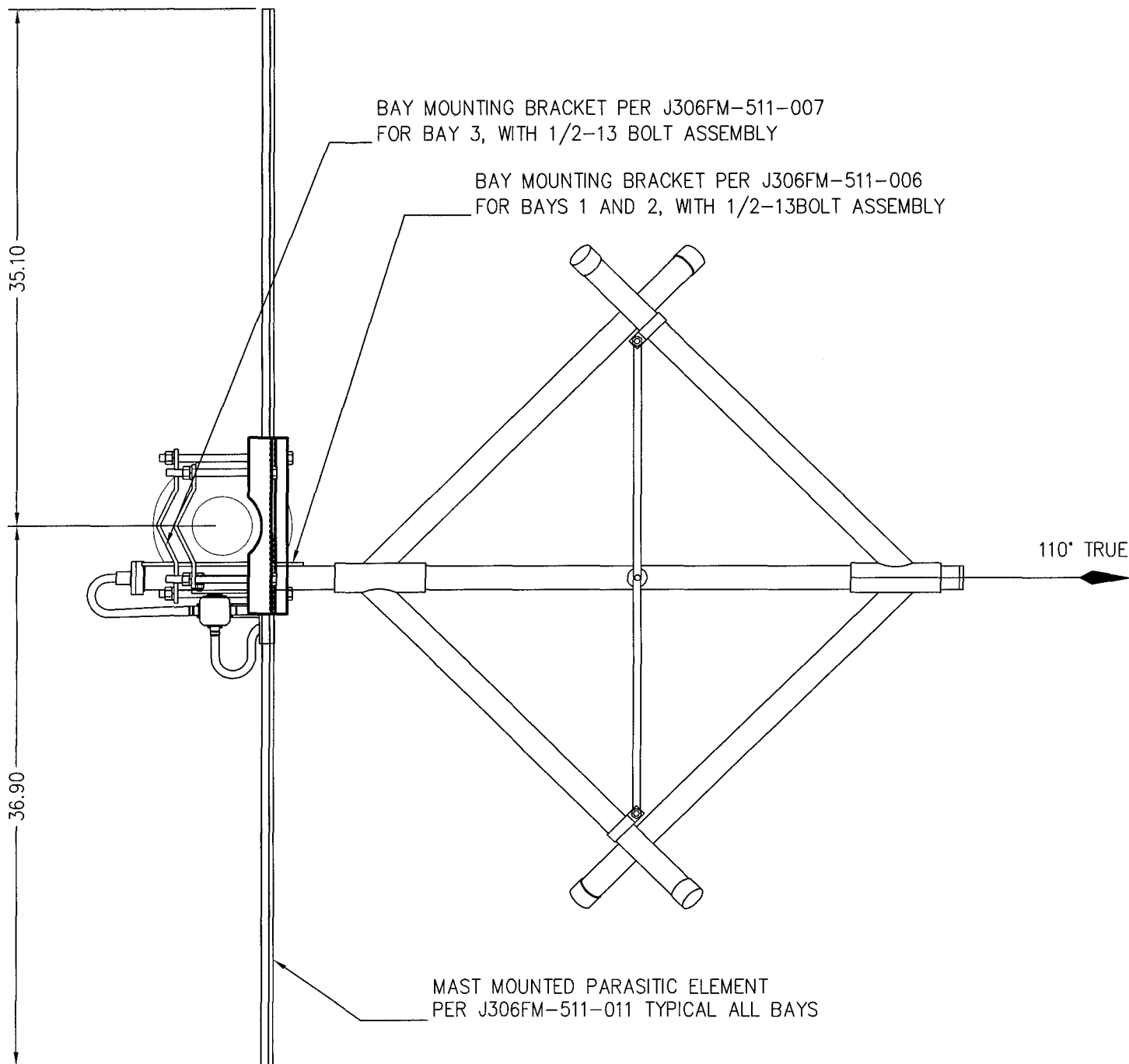
# PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

## 3/4λ ANTENNA ELEVATIONS AND SPECIFICATIONS

MODEL: PSIFML-3-DA	DRAWN BY: D.G. Kellar	DATE: 3/16/06
CHANNEL/ FREQUENCY: 92.1 MHz	APPROVED BY:	DATE:
SCALE: 1:60	DRAWING NO.: J306FM-511-002	REV. 0





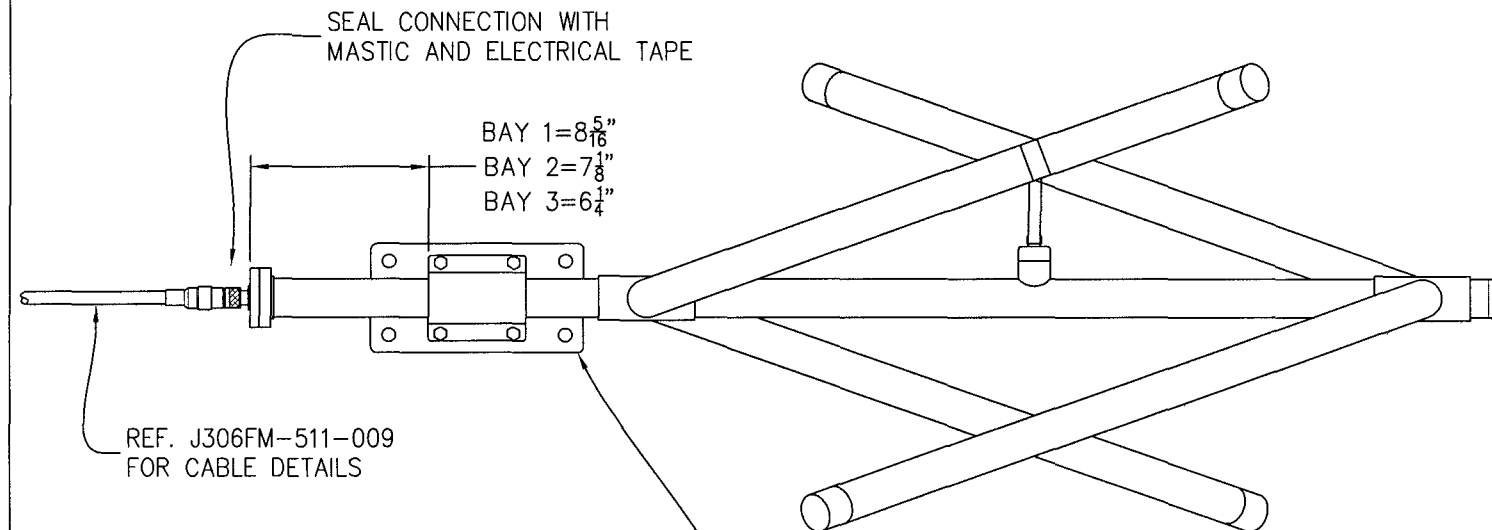
				<b>PROPAGATION SYSTEMS, INC.</b>			
				Ebensburg, Pennsylvania USA 814-472-5540			
REV.	MADE BY CHECKED BY	DATE	CHANGE	ANTENNA PLAN VIEW			
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property 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.				MODEL: PSIFML-3-DA		DRAWN BY: D.G. Kellar	
				CHANNEL/FREQUENCY: 92.1 MHz		APPROVED BY:	
				SCALE: 1:8		DRAWING NO.: J306FM-511-001	
				DATE:		REV. 0	

SEAL CONNECTION WITH  
MASTIC AND ELECTRICAL TAPE

BAY 1=8 $\frac{5}{16}$ "  
BAY 2=7 $\frac{1}{8}$ "  
BAY 3=6 $\frac{1}{4}$ "

REF. J306FM-511-009  
FOR CABLE DETAILS

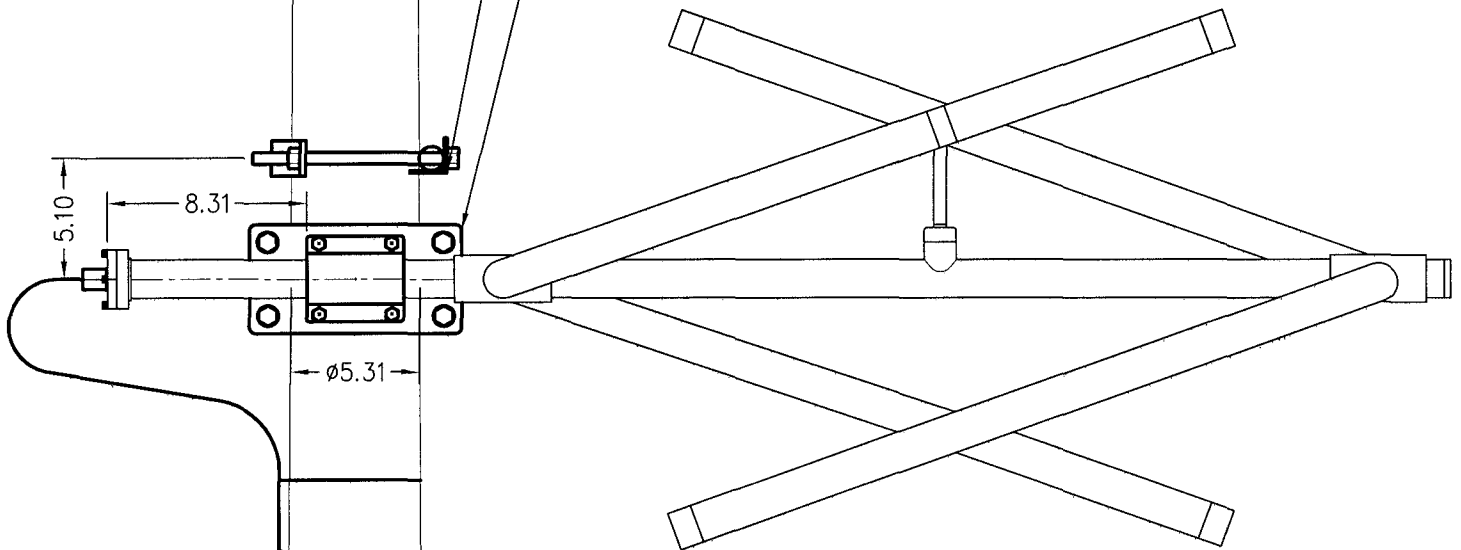
FOR BAYS 1 & 2 REF  
J306FM-511-006, FOR BAY 3  
REF. J306FM-511-007



				<b>PROPAGATION SYSTEMS, INC.</b>			
				Ebensburg, Pennsylvania USA 814-472-5540			
				TYPICAL BAY OUTLINE			
REV.	MADE BY CHECKED BY	DATE	CHANGE	MODEL: PSIFML-3-DA	DRAWN BY: D.G. Kellar	DATE: 3/29/06	
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.				CHANNEL/ FREQUENCY: 92.1 MHz	APPROVED BY:	DATE:	
				SCALE: 1:8	DRAWING NO.:	REV.	
				J306FM-511-010		0	

HORIZONTAL MAST MOUNTED PARASITIC  
PER J306FM-511-011 WITH (2) 1/2-13  
HEXHEAD BOLTS, LOCKWASHERS AND HEXNUTS

BAY MOUNTING BRACKET PER  
J306FM-511-006 WITH (4) 1/2-13  
HEXHEAD BOLTS, LOCKWASHERS AND HEXNUTS



COAXIAL CABLES FROM POWER  
DIVIDER-TYP.

WIRE TIES AT  $\pm 12$ "-TYPICAL

REV.	MADE BY CHECKED BY	DATE	CHANGE

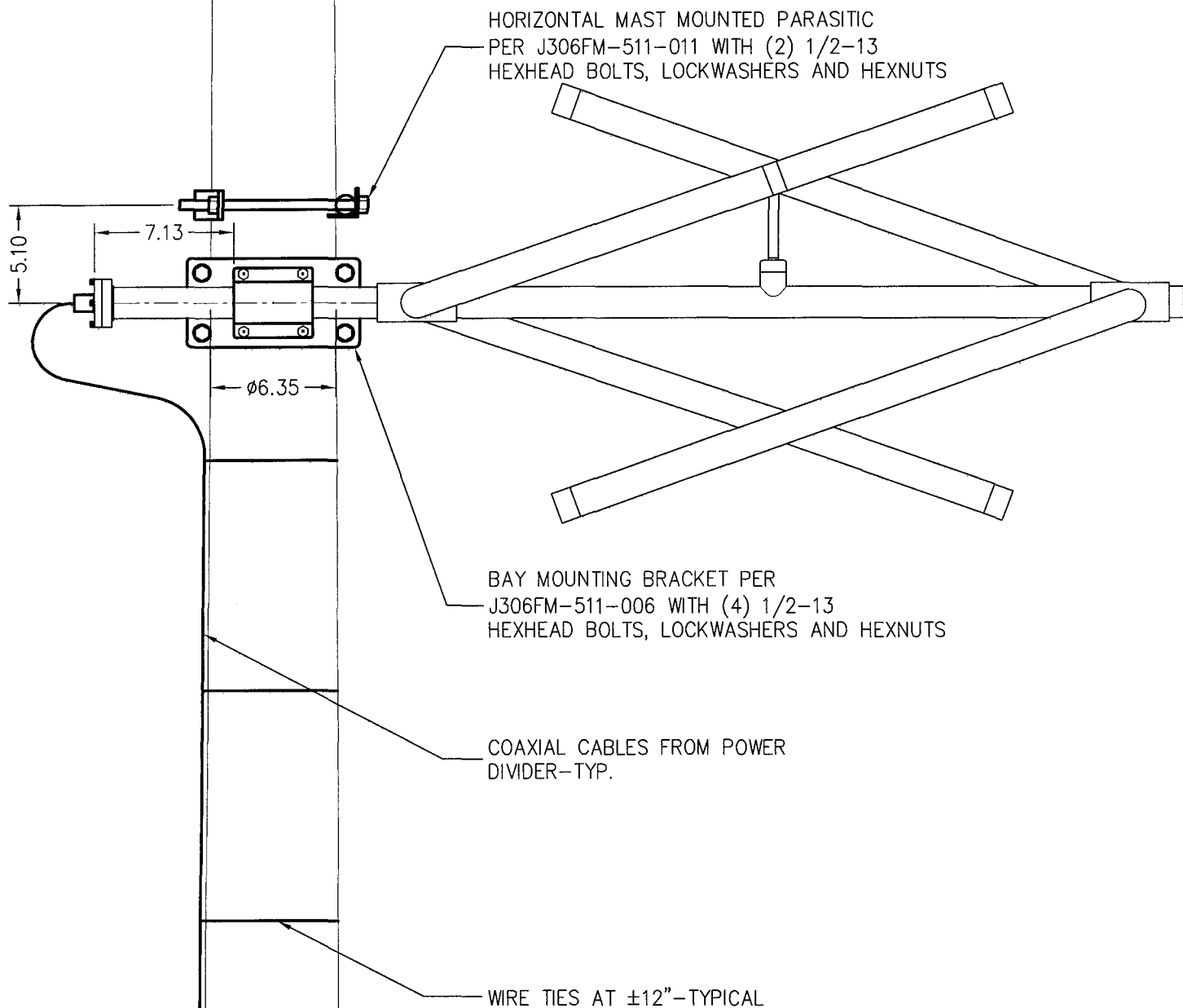
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making or finish any 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.

# **PROPAGATION SYSTEMS, INC.**

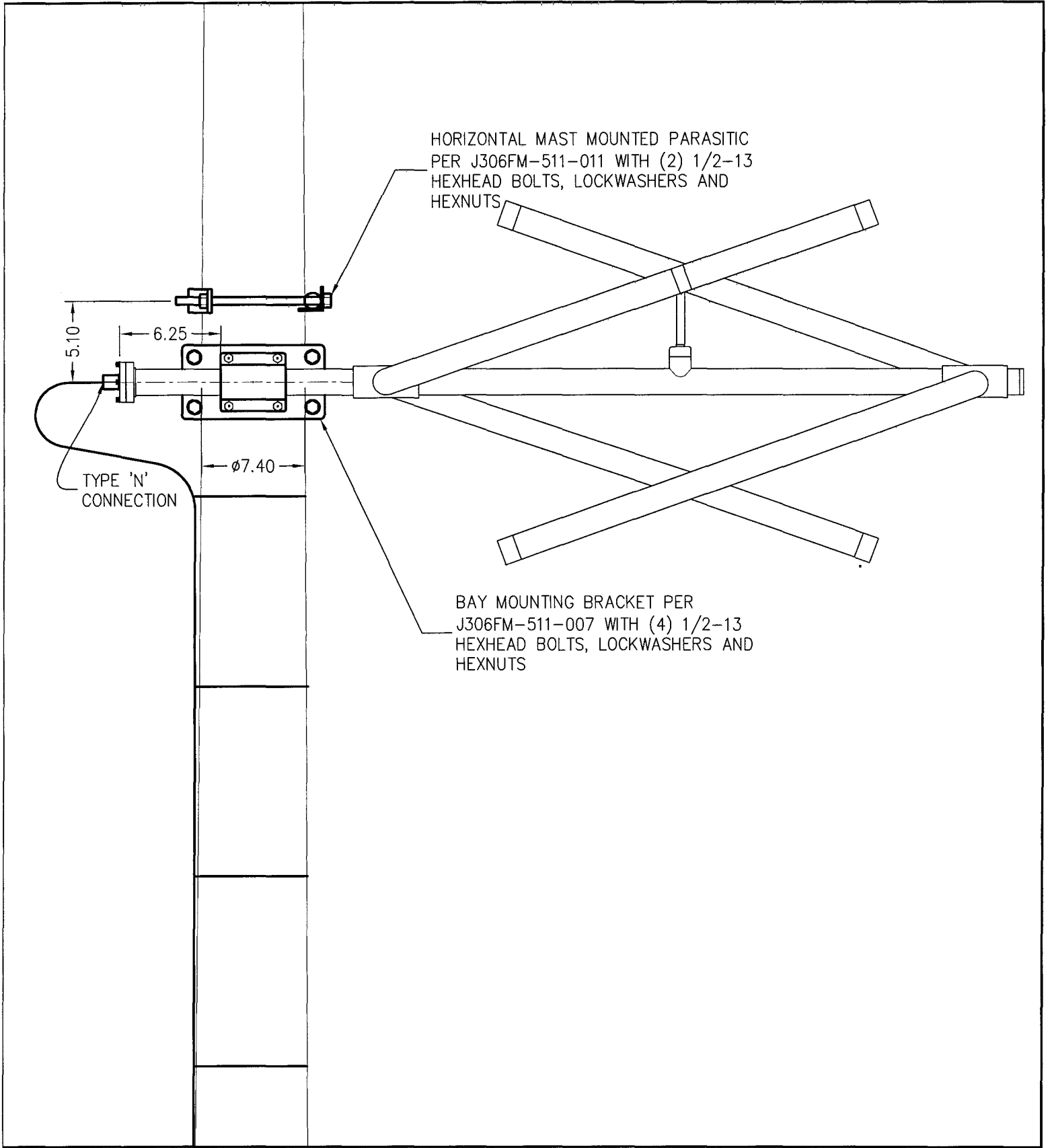
Ebensburg, Pennsylvania USA 814-472-5540

## **BAY 1 MOUNTING DETAILS**

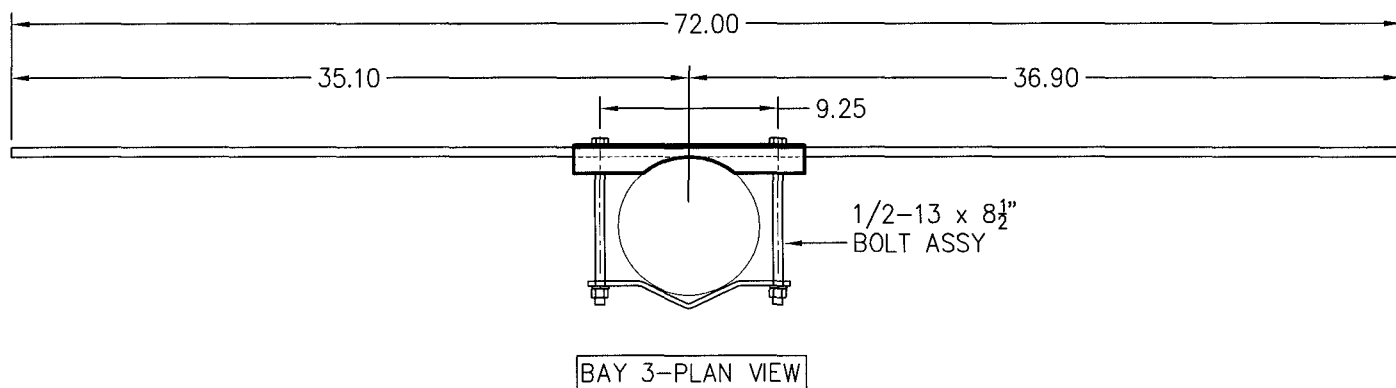
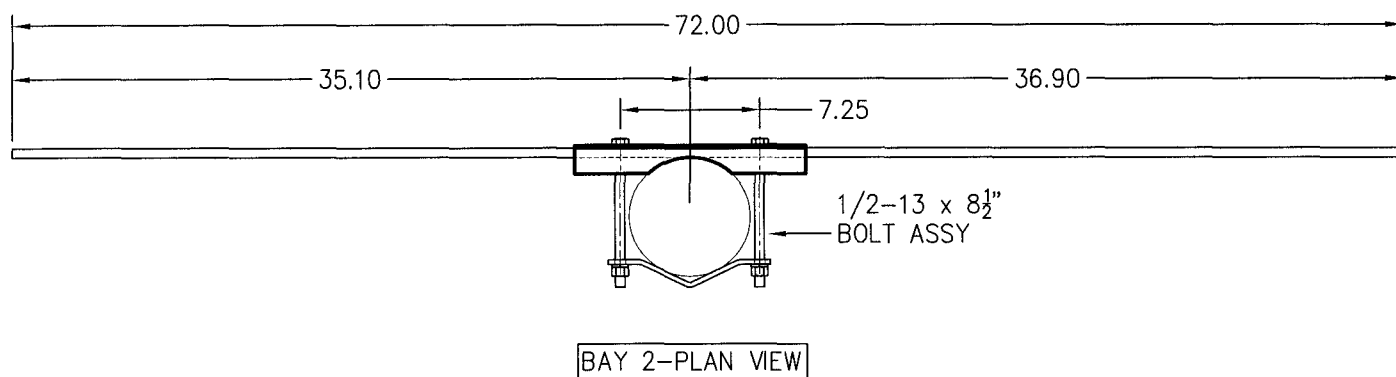
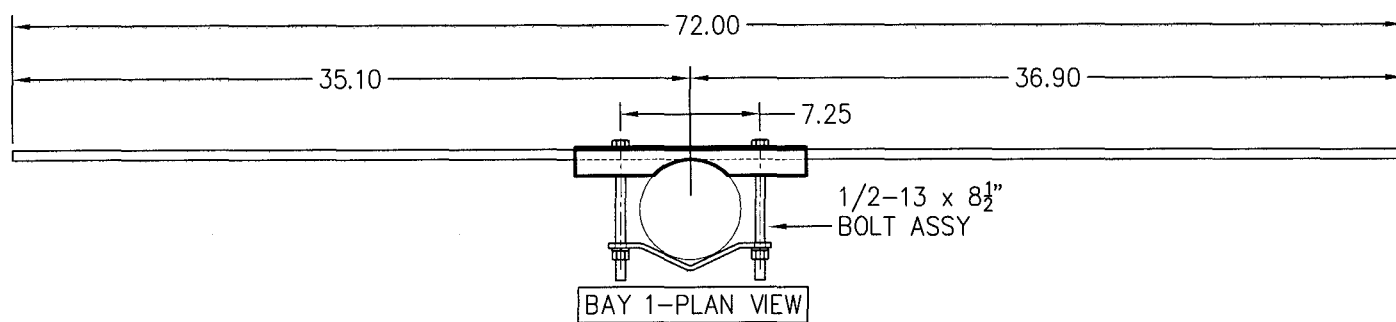
MODEL: PSIFML-3-DA	DRAWN BY: D.G. Kellar	DATE: 4/11/06
CHANNEL/ FREQUENCY: 92.1 MHz	APPROVED BY:	DATE:
SCALE: 1:8	DRAWING NO.: J306FM-511-018	REV. 0



				<b>PROPAGATION SYSTEMS, INC.</b>			
				Ebensburg, Pennsylvania USA 814-472-5540			
				<b>BAY 2 MOUNTING DETAILS</b>			
REV.	MADE BY	CHECKED BY	DATE	CHANGE	MODEL:	DRAWN BY:	DATE:
					PSIFML-3-DA	D.G. Kellar	4/11/06
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making or finish any reproductions hereof, or for the design or making of any item, parts, object, apparatus or parts thereof, except upon the written permissions of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the forgoing agreement.					CHANNEL/FREQUENCY:	APPROVED BY:	DATE:
					92.1 MHz		
					SCALE:	DRAWING NO.:	
A					1:8	J306FM-511-019	0

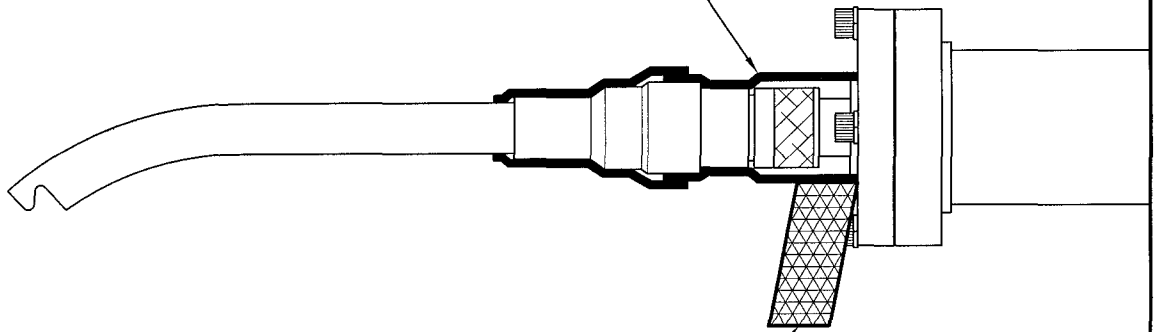


				<b>PROPAGATION SYSTEMS, INC.</b>			
				Ebensburg, Pennsylvania USA 814-472-5540			
				<b>BAY 3 MOUNTING DETAILS</b>			
REV.	MADE BY CHECKED BY	DATE	CHANGE	MODEL: PSIFML-3-DA	DRAWN BY: D.G. Kellar	DATE: 4/11/06	
This drawing is loaned subject to the express understanding and agreement that the drawing 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.				CHANNEL/ FREQUENCY: 92.1 MHz	APPROVED BY:	DATE:	
				SCALE: 1:8	DRAWING NO.:	J306FM-511-020	
				REV. 0			



				<b>PROPAGATION SYSTEMS, INC.</b> Ebensburg, Pennsylvania USA 814-472-5540			
REV.	MADE BY CHECKED BY	DATE	CHANGE				
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making or finish any 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	PARASITIC ASSEMBLY DETAILS		
					MODEL: PSIFML-3-DA	DRAWN BY: D.G. Kellar	DATE: 4/07/06
					CHANNEL/FREQUENCY: 92.1 MHz	APPROVED BY:	DATE:
					SCALE: 1:10	DRAWING NO.: J306FM-511-011	REV. 0

STEP 1: WRAP JOINT WITH 2" x 6"  
MASTIC PROVIDED WITH ANTENNA



STEP 2: WRAP BLACK ELECTRICAL TAPE (PROVIDED)  
OVER MASTIC. COVER ENTIRE MASTIC AREA

				<b>PROPAGATION SYSTEMS, INC.</b>			
				Ebensburg, Pennsylvania USA 814-472-5540			
REV.	MADE BY CHECKED BY	DATE	CHANGE	TYPE N JOINT SEALING INSTRUCTIONS			
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.				MODEL: PSIFML		DRAWN BY: D.G. Kellar	DATE: 2/10/06
				CHANNEL/FREQUENCY:		APPROVED BY:	DATE:
				SCALE: 1:2		DRAWING NO.: 31-00045	REV. 0
				SIZE: A			

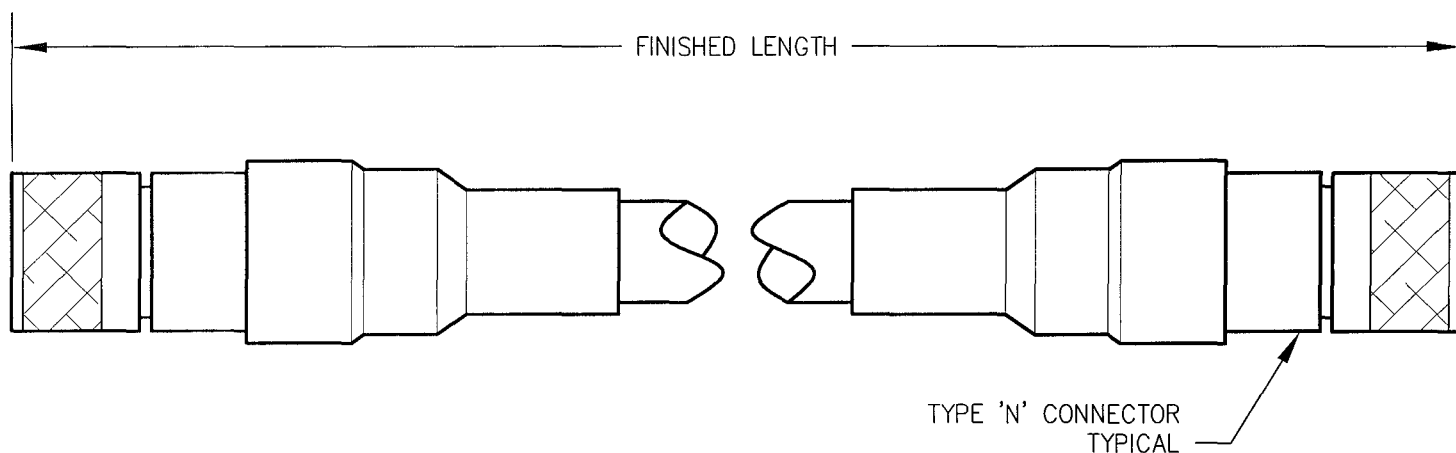


CHART		
CABLE #	BAY #	FINISHED LENGTH
A	1	372.74"
B	2	266.36"
C	3	160.0"

REV.		MADE BY	CHECKED BY	DATE	CHANGE	<b>PROPAGATION SYSTEMS, INC.</b> Ebensburg, Pennsylvania USA 814-472-5540					
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making or finish any reproductions hereof, or for the design or making of any item, parts, object, apparatus or parts thereof, except upon the written permissions of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the forgoing agreement.											
SIZE						CABLE OUTLINE					
A						MODEL:	PSIFML-3-DA	DRAWN BY:	D.G. Kellar	DATE:	3/29/06
						CHANNEL/FREQUENCY:	92.1 MHz	APPROVED BY:		DATE:	
						SCALE:	1:1	DRAWING NO.:	J306FM-511-009	REV.	0



3-WAY POWER  
DIVIDER PER  
J306FM-511-008

(2) #16 HOSE  
CLAMPS

7" EIA INPUT

COAXIAL CABLES PER  
J306FM-511-009

Ø8.75

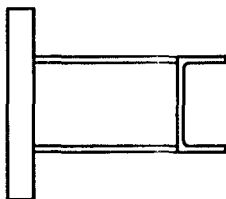
POWER DIVIDER MOUNTING  
BRACKET PER J306FM-511-021  
WITH 1/2-13 x 8 3/4" I.D.U-BOLT ASSEMBLY

±34

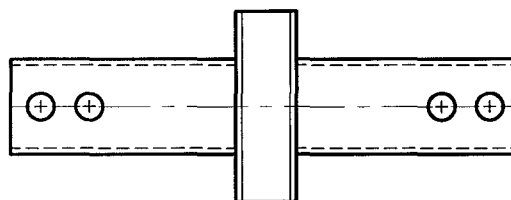
Ø9.25

BASE OF TAPERED  
SUPPORT MAST

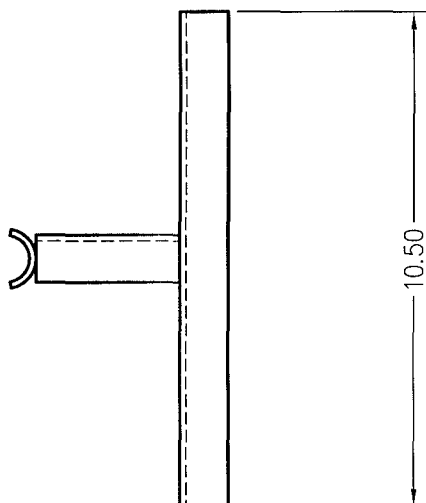
				<b>PROPAGATION SYSTEMS, INC.</b>	
				Ebensburg, Pennsylvania USA 814-472-5540	
REV.	MADE BY CHECKED BY	DATE	CHANGE	POWER DIVIDER MOUNTING DETAILS	
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property 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.				MODEL: PSIFML-3-DA	
				DRAWN BY: D.G. Kellar	
				DATE: 4/11/06	
				CHANNEL/FREQUENCY: 92.1 MHz	
SIZE  A				APPROVED BY:	
				DATE:	
SCALE: 1:8				DRAWING NO.: J306FM-511-022	
				REV: 0	



SIDE VIEW

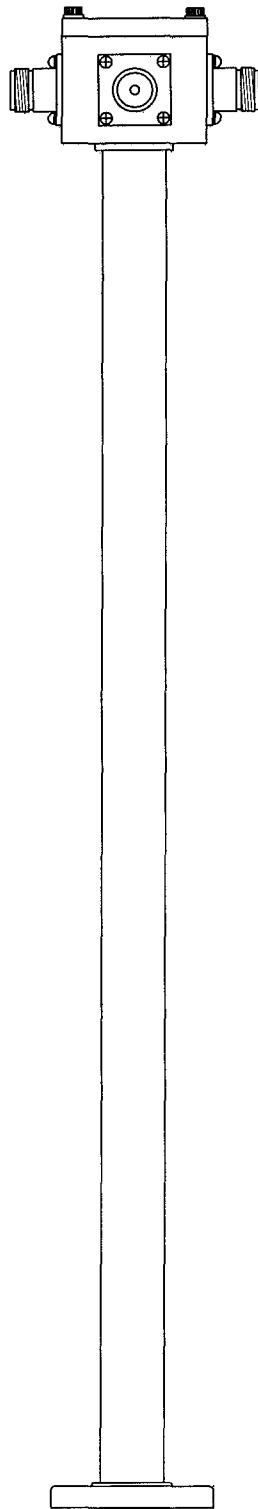


FRONT VIEW



PLAN VIEW

				<b>PROPAGATION SYSTEMS, INC.</b>			
				Ebensburg, Pennsylvania USA 814-472-5540			
				7/8" POWER DIVIDER MOUNTING BRACKET OUTLINE			
REV.	MADE BY CHECKED BY	DATE	CHANGE	MODEL:	DRAWN BY:	DATE:	
				PSIFML-3-DA	D.G. Kellar	4/11/06	
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making or finish any reproductions hereof, or for the design or making of any item, parts, object, apparatus or parts thereof, except upon the written permissions of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the forgoing agreement.				CHANNEL/ FREQUENCY:	APPROVED BY:		DATE:
				92.1 MHz			
				SCALE:	DRAWING NO.:		REV.
				1:4	J306FM-511-021		0



				<b>PROPAGATION SYSTEMS, INC.</b>							
				Ebensburg, Pennsylvania USA 814-472-5540							
				7/8-TYPE 'N' 4-WAY POWER DIVIDER OUTLINE							
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 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.</p>				SIZE		MODEL: PSIFML-3-DA		DRAWN BY: D.G. Kellar		DATE: 3/29/06	
				A		CHANNEL/ FREQUENCY: 92.1 MHz		APPROVED BY:		DATE:	
						SCALE: 1:1		DRAWING NO.: J306FM-511-008		REV. 0	