



## **Propagation Systems, Inc.**

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Quality Broadcast Antenna Systems

### **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  $360^\circ$  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

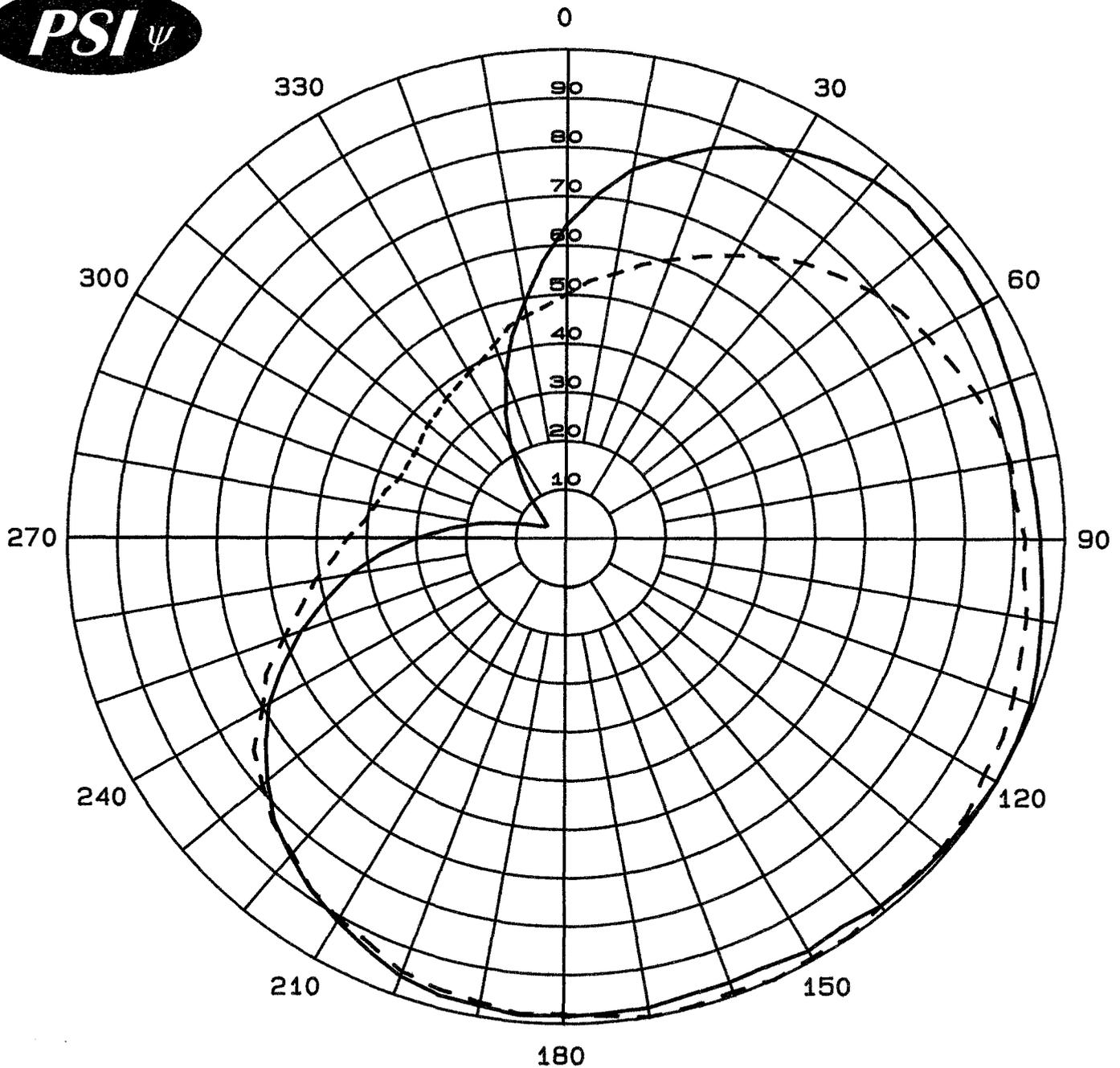
|               |                              |
|---------------|------------------------------|
| Antenna Model | PSIFML-3-DA                  |
| Type          | 3-bay directional FM antenna |
| Bay Spacing   | ¾ wavelength spaced elements |
| Frequency     | 92.1 MHz                     |
| Polarization  | 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

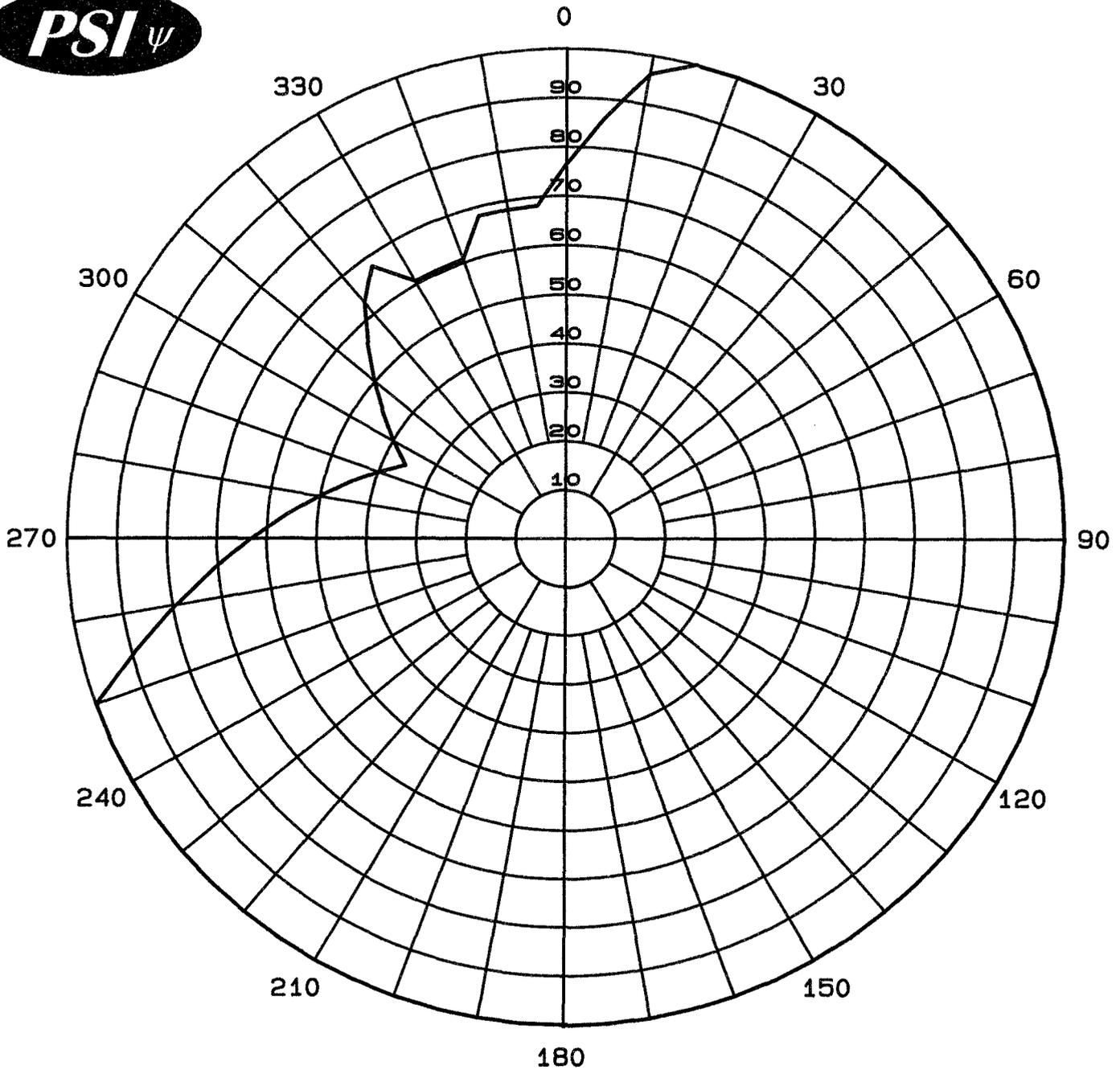
| Angle | Relative Field | ERP (kW) | ERP (dBk) |
|-------|----------------|----------|-----------|
| 0     | 0.499          | 0.0040   | -23.99    |
| 10    | 0.550          | 0.0048   | -23.16    |
| 20    | 0.607          | 0.0059   | -22.29    |
| 30    | 0.671          | 0.0072   | -21.43    |
| 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

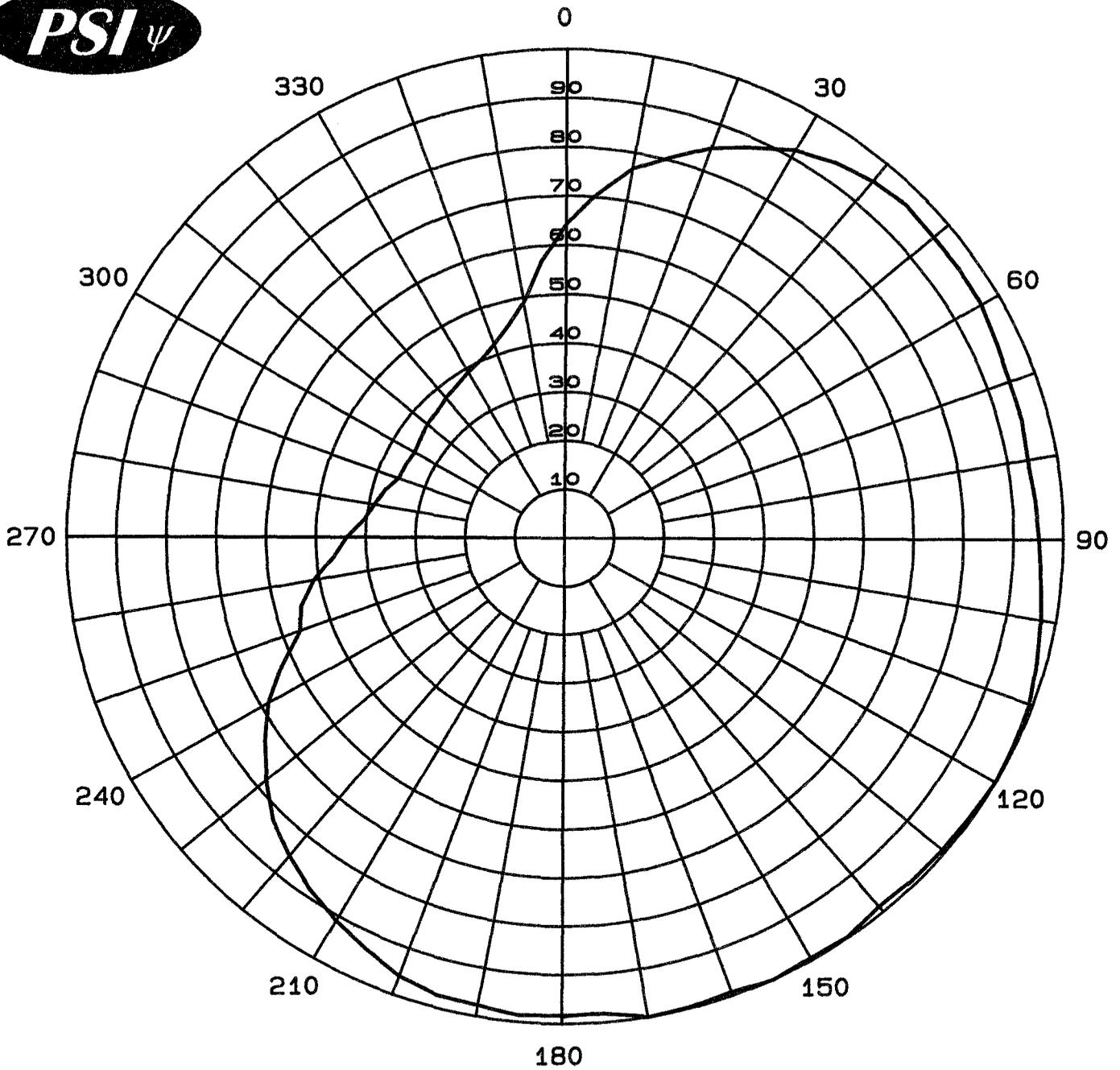
Station: WPTS-FM

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    |



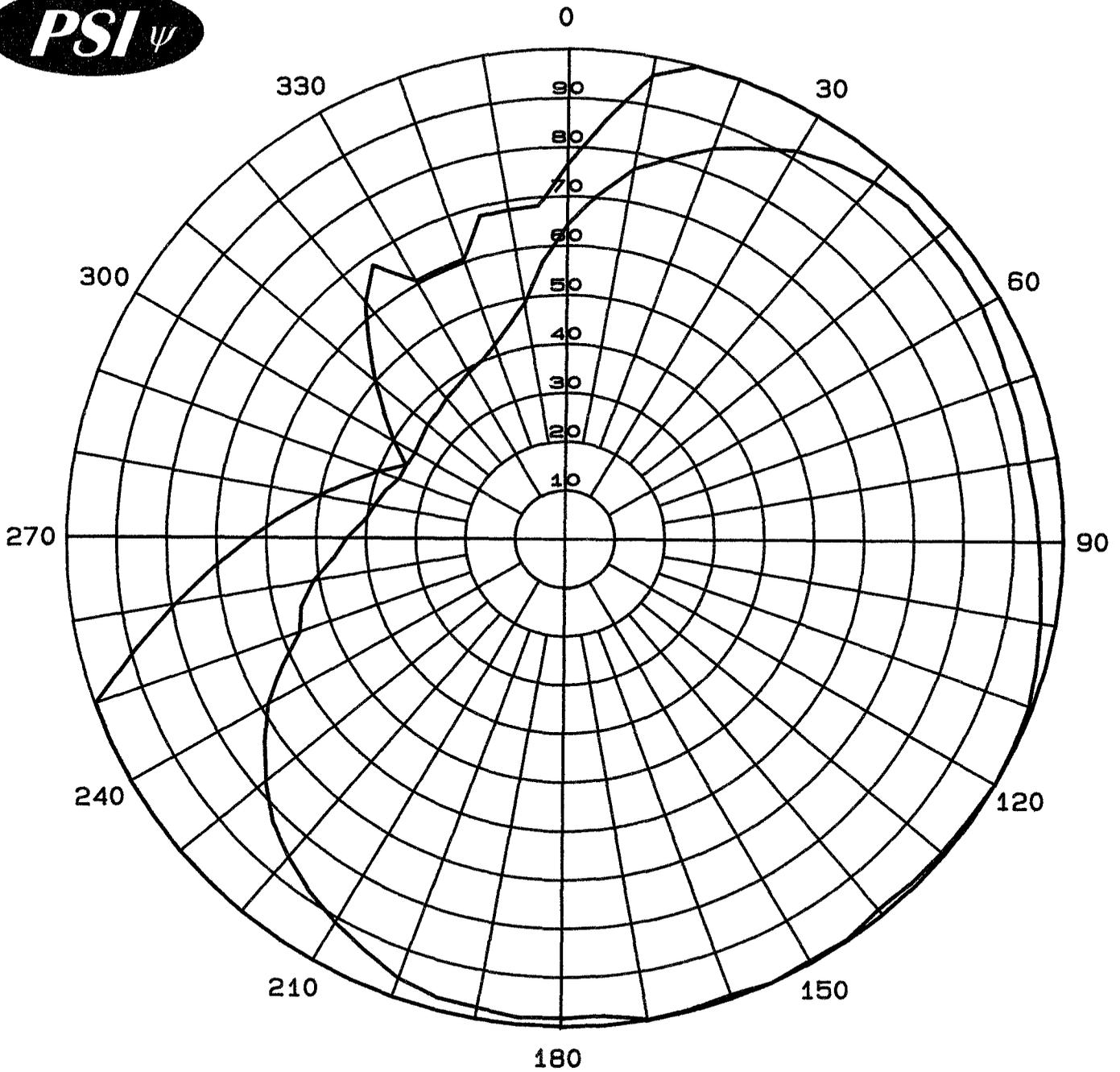
Measured Composite Pattern  
Azimuth Plane  
Antenna: PSIFML-3-DA  
Type: 3-Bay FM Directional  
Polarization: Circular  
ERP: .016 kW (-17.96 dBk)  
University of Pittsburgh  
WPTS-FM Pittsburgh, PA

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## 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    |

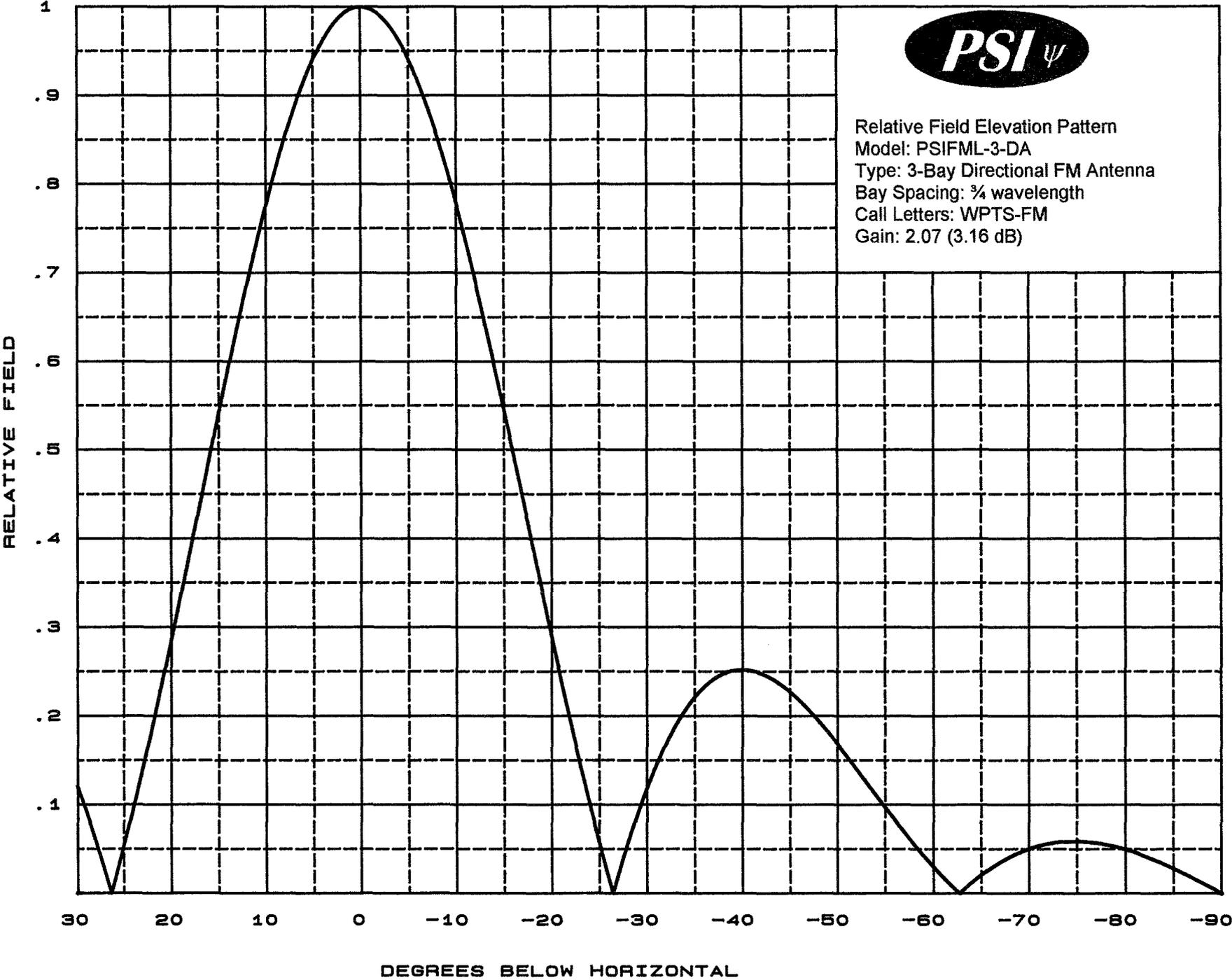


Measured Composite Pattern  
With Maximum Envelope  
Antenna: PSIFML-3-DA  
Type: 3-Bay FM Directional  
Polarization: Circular  
ERP: .016 kW (-17.96 dBk)  
University of Pittsburgh  
WPTS-FM Pittsburgh, PA

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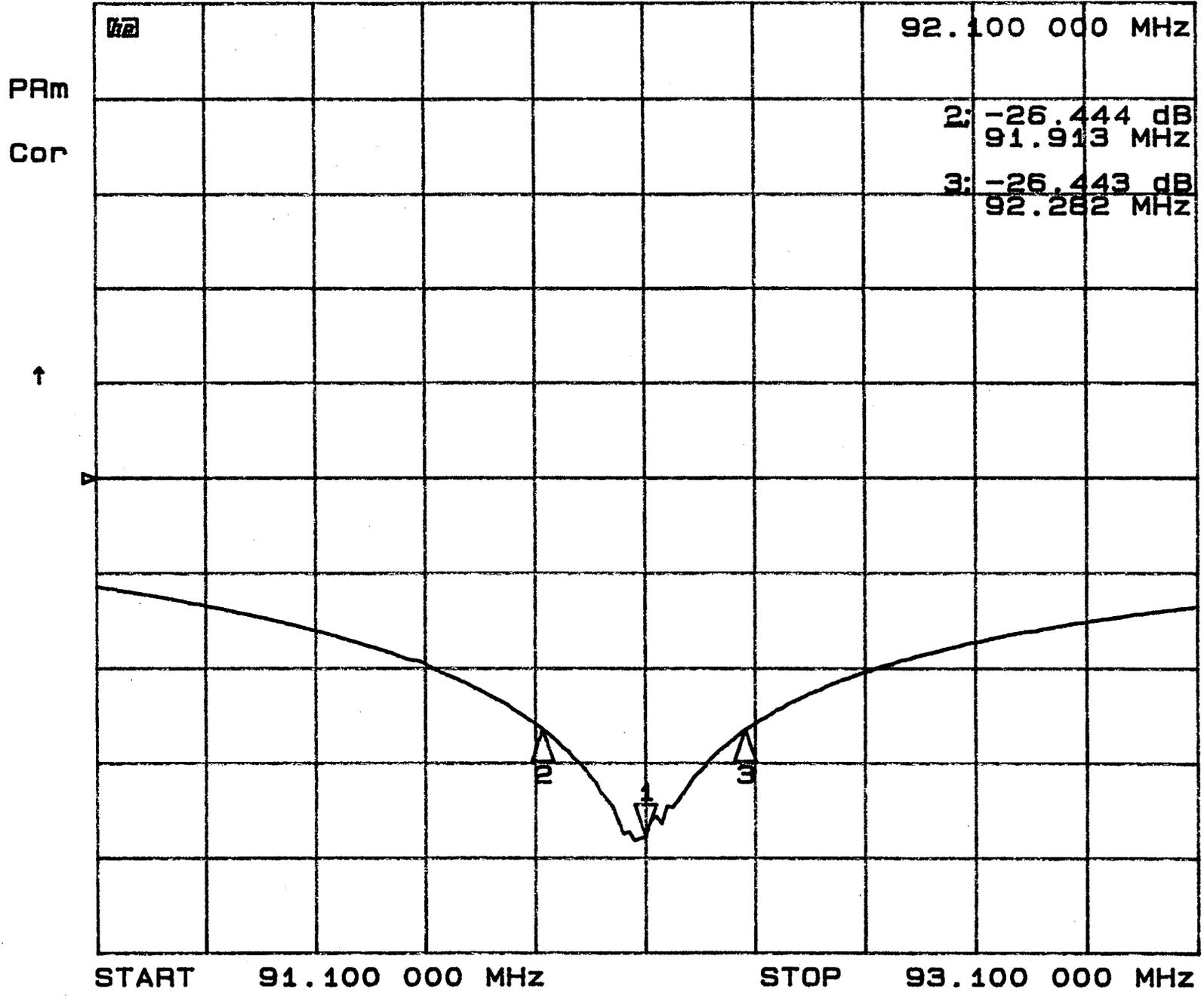
Relative Field Elevation Pattern  
Model: PSIFML-3-DA  
Type: 3-Bay Directional FM Antenna  
Bay Spacing:  $\frac{3}{4}$  wavelength  
Call Letters: WPTS-FM  
Gain: 2.07 (3.16 dB)



1306 FM-511  
FML-3-DA

EWAL

CH1 MEM log MAG 10 dB/ REF 0 dB 1: -37.719 dB



## **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 ½-13 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 ½" 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 ½-13 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 ½" 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 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 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 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

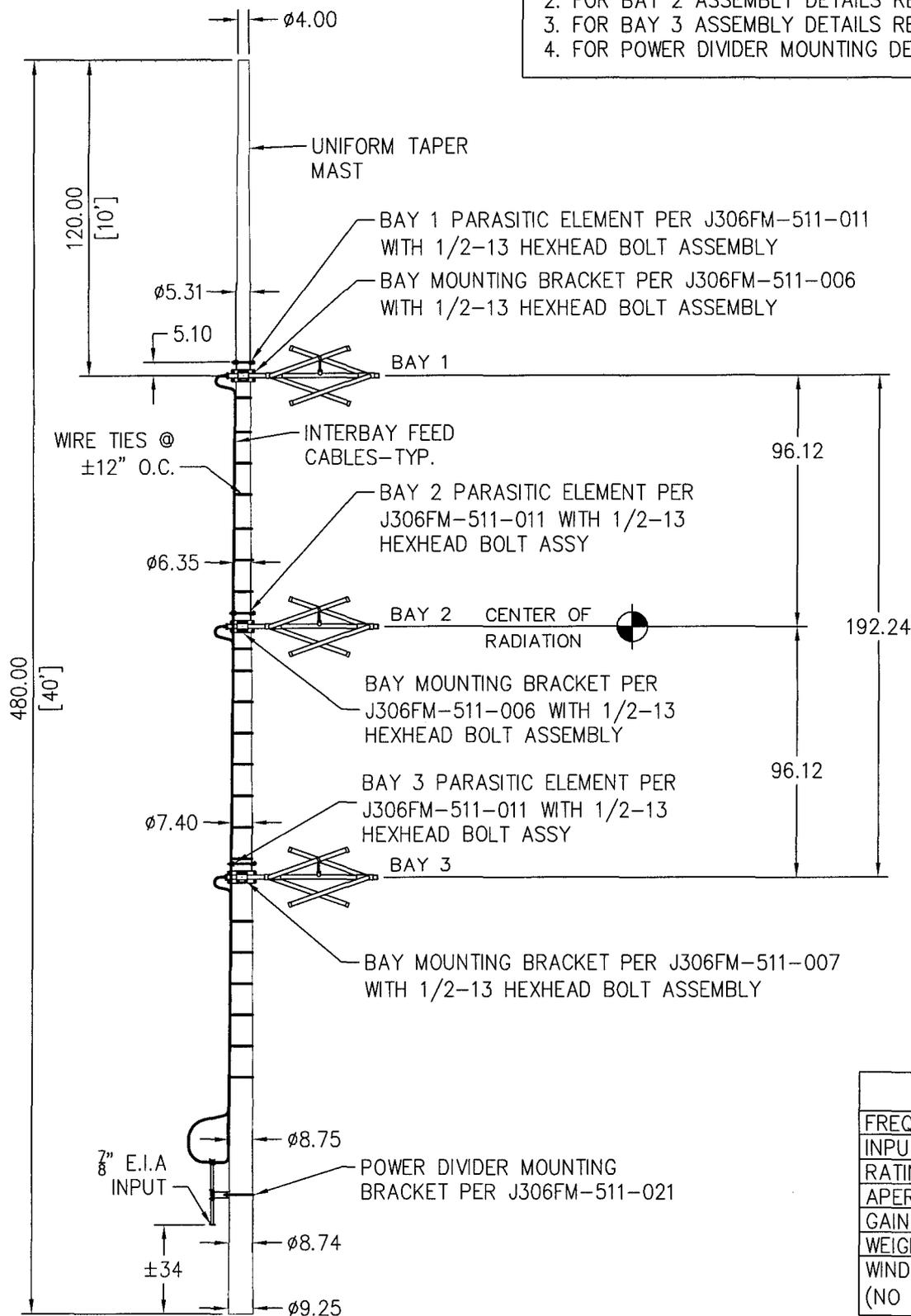
**Check all bolted connections for tightness.** Connect the main transmission line to the antenna input located at the base of the power divider. **Do not allow the weight of the feed line to be supported by power divider/antenna.** The antenna system should be tested before the erector leaves the premises 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:<br>(NO ICE) | 11.6 Sq. Ft.      |

| REV. | MADE BY<br>CHECKED BY | DATE | CHANGE |
|------|-----------------------|------|--------|
|      |                       |      |        |

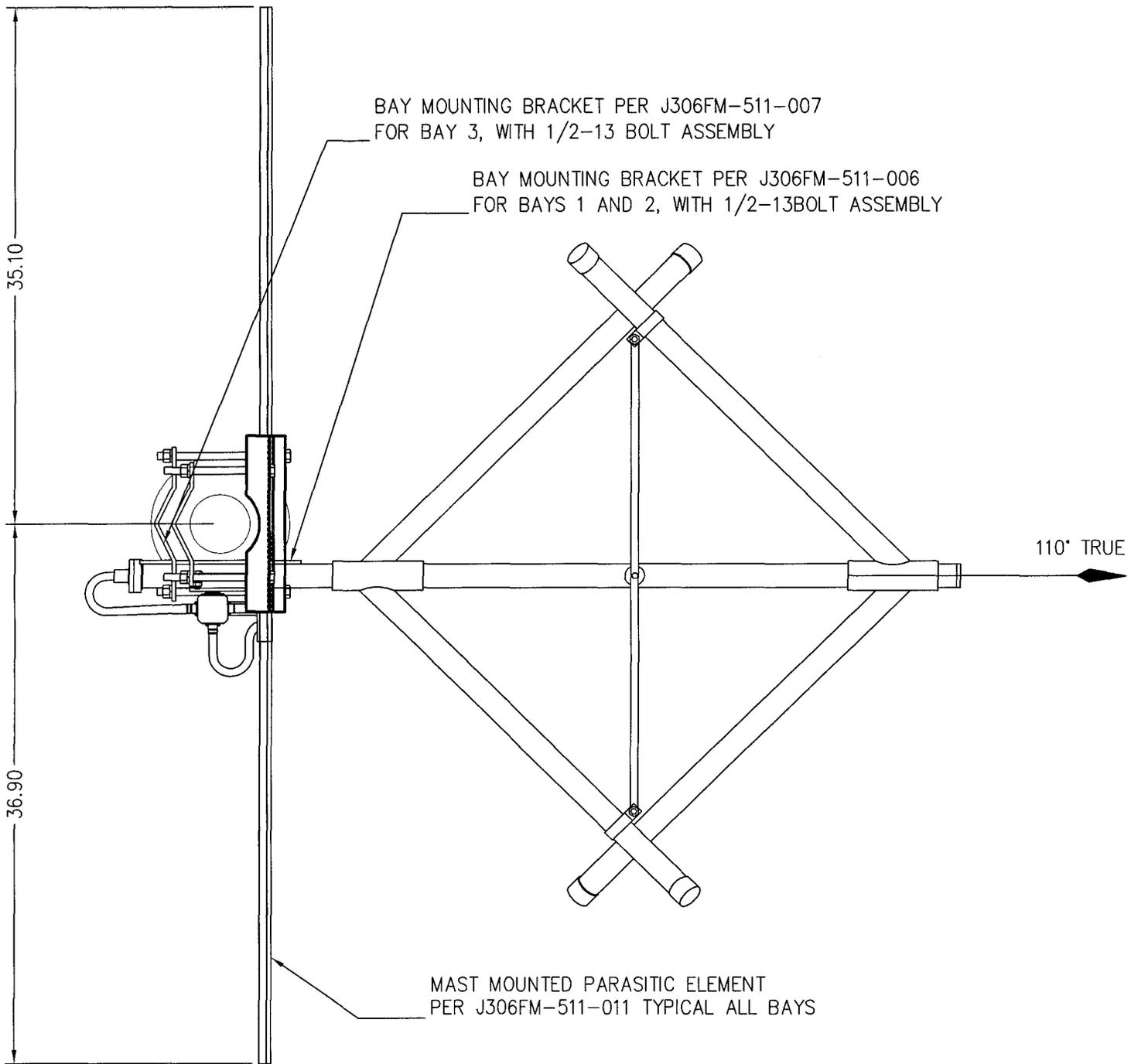
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3/4λ ANTENNA ELEVATIONS AND SPECIFICATIONS

|                             |                             |               |
|-----------------------------|-----------------------------|---------------|
| 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        |



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|---|-----------------------|------|------------------|
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|   |                       |      | SIZE<br><b>A</b> |

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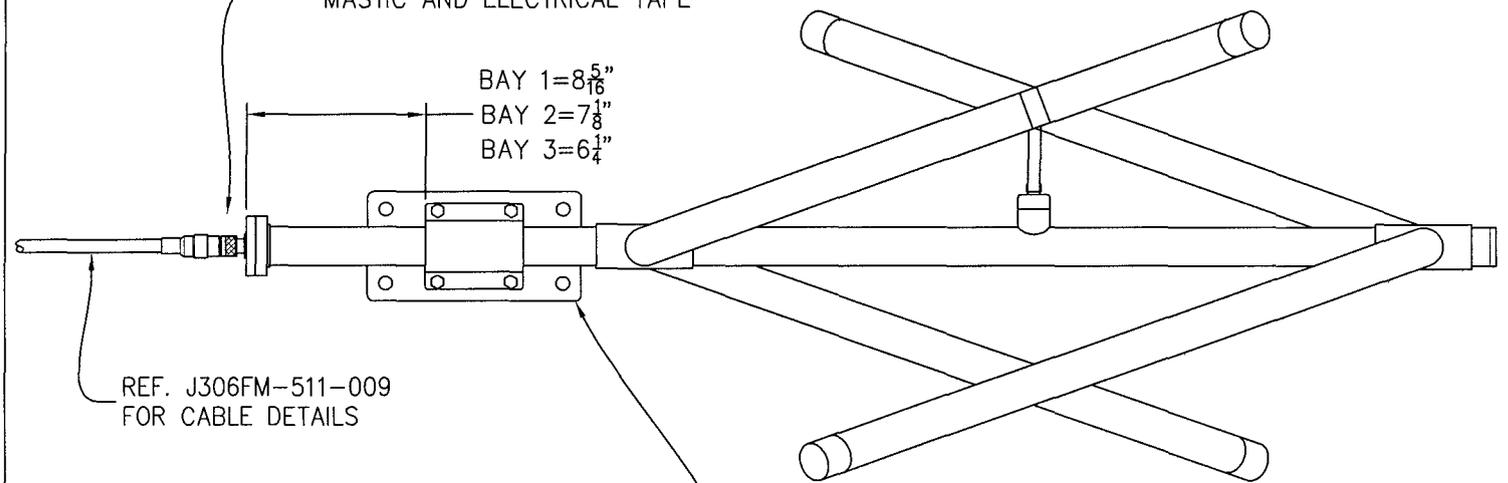
| ANTENNA PLAN VIEW                  |                          |                  |           |
|------------------------------------|--------------------------|------------------|-----------|
| MODEL:<br>PSIFML-3-DA              | DRAWN BY:<br>D.G. Kellar | DATE:<br>3/31/06 |           |
| CHANNEL/<br>FREQUENCY:<br>92.1 MHz | APPROVED BY:             | DATE:            |           |
| SCALE:<br>1:8                      | DRAWING NO.:             | J306FM-511-001   | REV.<br>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



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|------|-----------------------|------|--------|
|      |                       |      |        |

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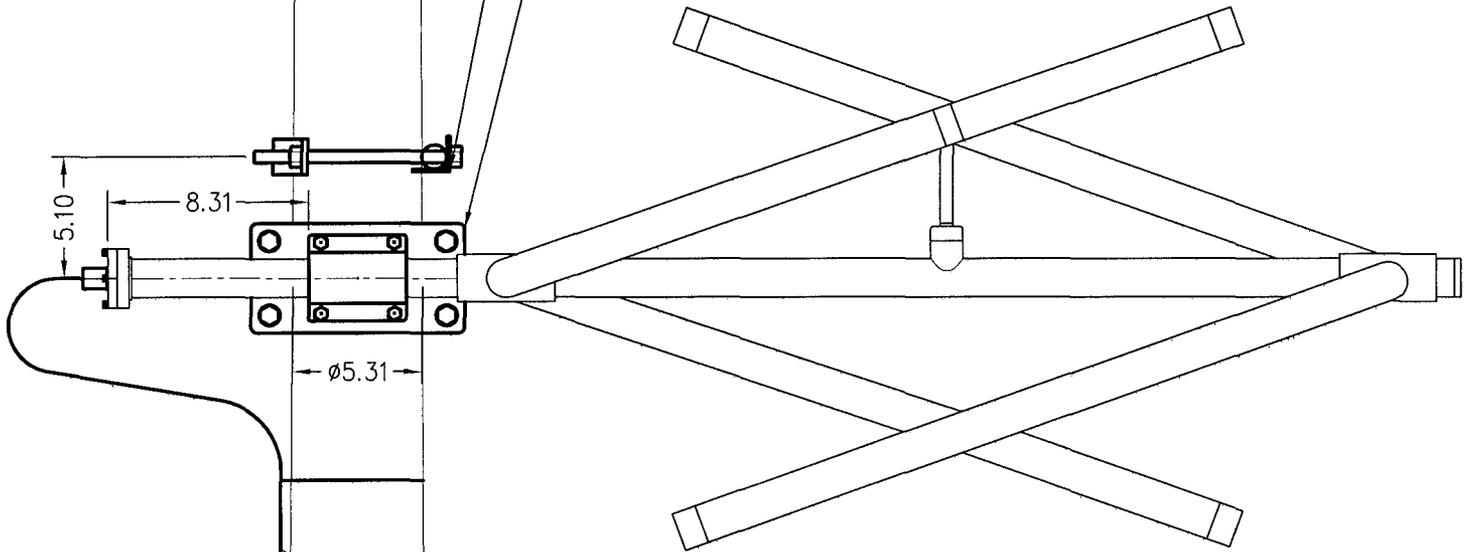
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## TYPICAL BAY OUTLINE

|                                    |                          |                  |
|------------------------------------|--------------------------|------------------|
| MODEL:<br>PSIFML-3-DA              | DRAWN BY:<br>D.G. Kellar | DATE:<br>3/29/06 |
| CHANNEL/<br>FREQUENCY:<br>92.1 MHz | APPROVED BY:             | DATE:            |
| SCALE:<br>1:8                      | DRAWING NO.:             | REV. 0           |
| J306FM-511-010                     |                          |                  |

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 ±12"—TYPICAL

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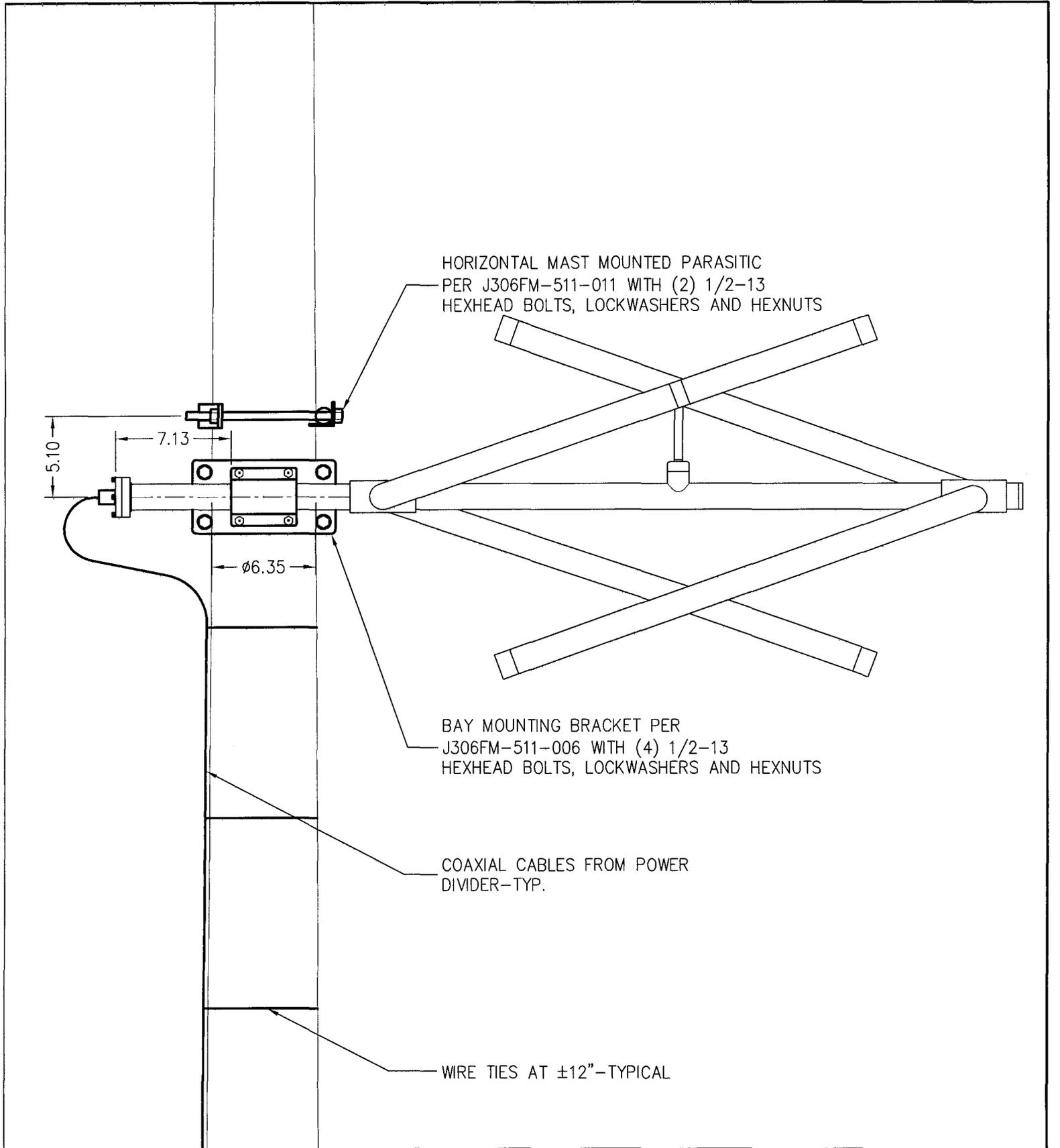
## BAY 1 MOUNTING DETAILS

| REV. | MADE BY<br>CHECKED BY | DATE | CHANGE |
|------|-----------------------|------|--------|
|      |                       |      |        |

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



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|      |                       |      |        |

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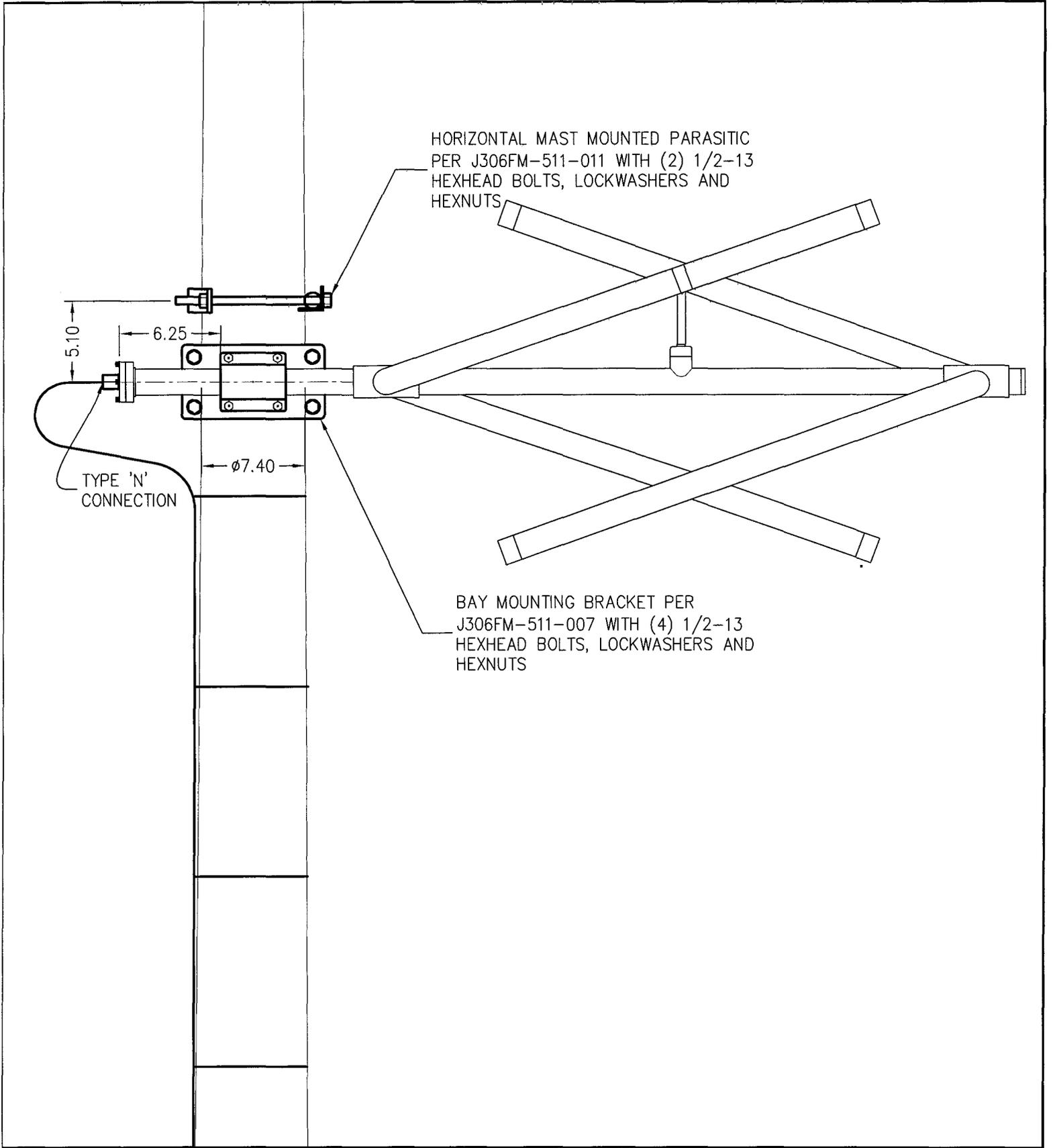
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## BAY 2 MOUNTING DETAILS

|                                    |                          |                  |
|------------------------------------|--------------------------|------------------|
| MODEL:<br>PSIFML-3-DA              | DRAWN BY:<br>D.G. Kellar | DATE:<br>4/11/06 |
| CHANNEL/<br>FREQUENCY:<br>92.1 MHz | APPROVED BY:             | DATE:            |
| SCALE:<br>1:8                      | DRAWING NO.:             | REV.:            |
|                                    | J306FM-511-019           | 0                |



| REV. | MADE BY<br>CHECKED BY | DATE | CHANGE |
|------|-----------------------|------|--------|
|      |                       |      |        |

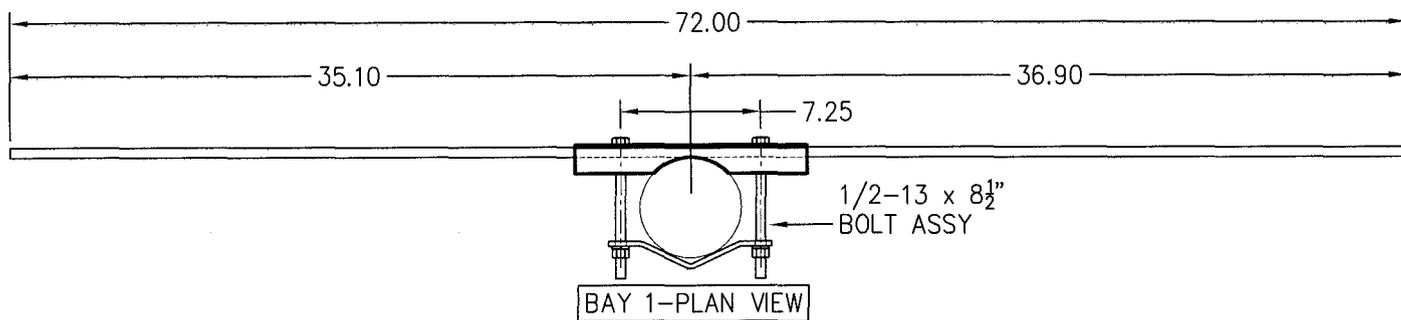
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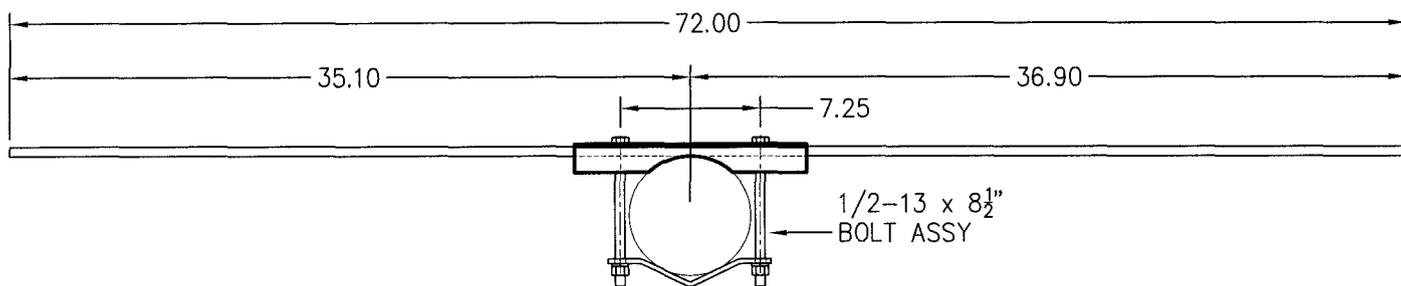
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**BAY 3 MOUNTING DETAILS**

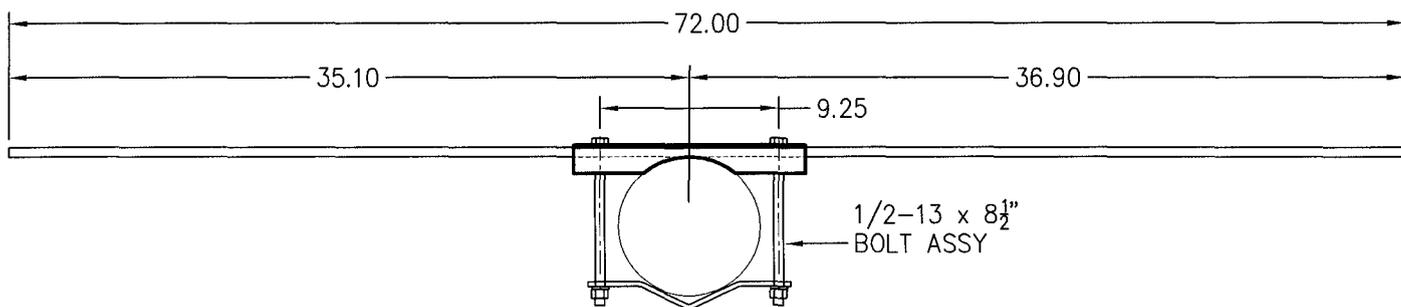
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|---------------------------------|-----------------------------|---------------|
| MODEL: PSIFML-3-DA              | DRAWN BY: D.G. Kellar       | DATE: 4/11/06 |
| CHANNEL/<br>FREQUENCY: 92.1 MHz | APPROVED BY:                | DATE:         |
| SCALE: 1:8                      | DRAWING NO.: J306FM-511-020 | REV. 0        |



BAY 1-PLAN VIEW



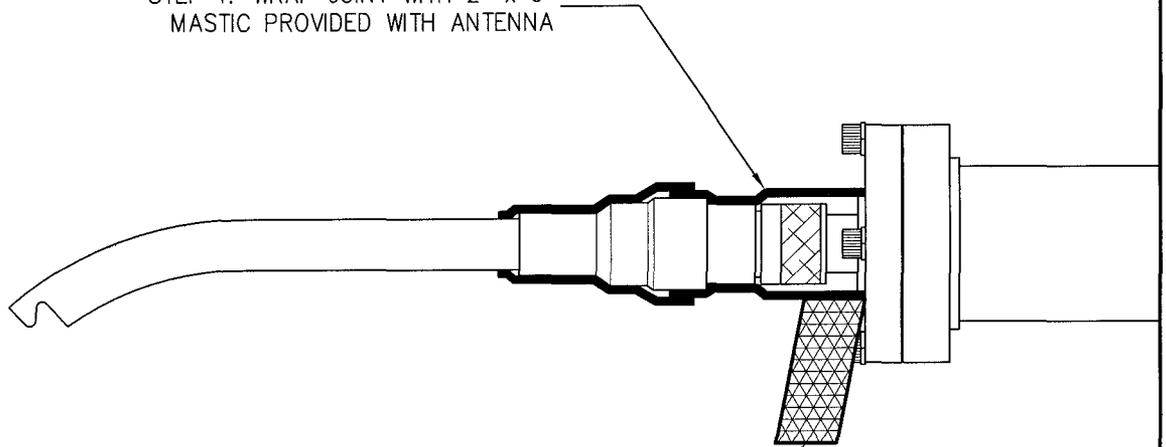
BAY 2-PLAN VIEW



BAY 3-PLAN VIEW

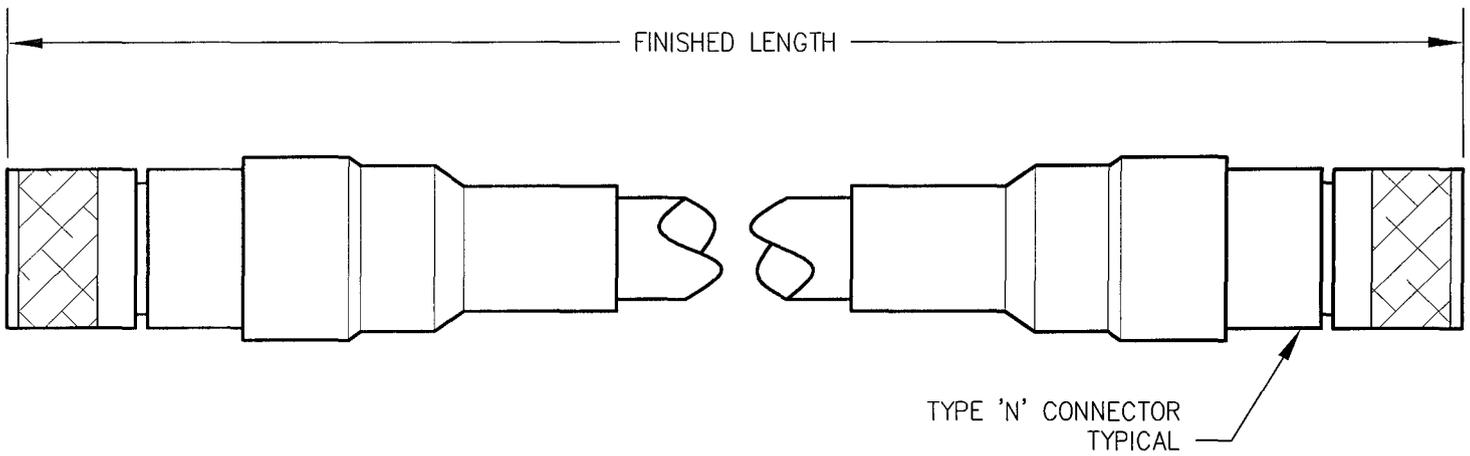
|   |                       |      |        |  |                          |                  |           |
|---|-----------------------|------|--------|--|--------------------------|------------------|-----------|
|   |                       |      |        | <b>PROPAGATION SYSTEMS, INC.</b>         |                          |                  |           |
|   |                       |      |        | Ebensburg, Pennsylvania USA 814-472-5540 |                          |                  |           |
|   |                       |      |        | PARASITIC ASSEMBLY DETAILS               |                          |                  |           |
| REV.  | MADE BY<br>CHECKED BY | DATE | CHANGE | MODEL:<br>PSIFML-3-DA                    | DRAWN BY:<br>D.G. Kellar | DATE:<br>4/07/06 |           |
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|   |                       |      |        | SCALE:<br>1:10                           | DRAWING NO.:             | J306FM-511-011   | REV.<br>0 |
|   |                       |      |        | A  |                          |                  |           |

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



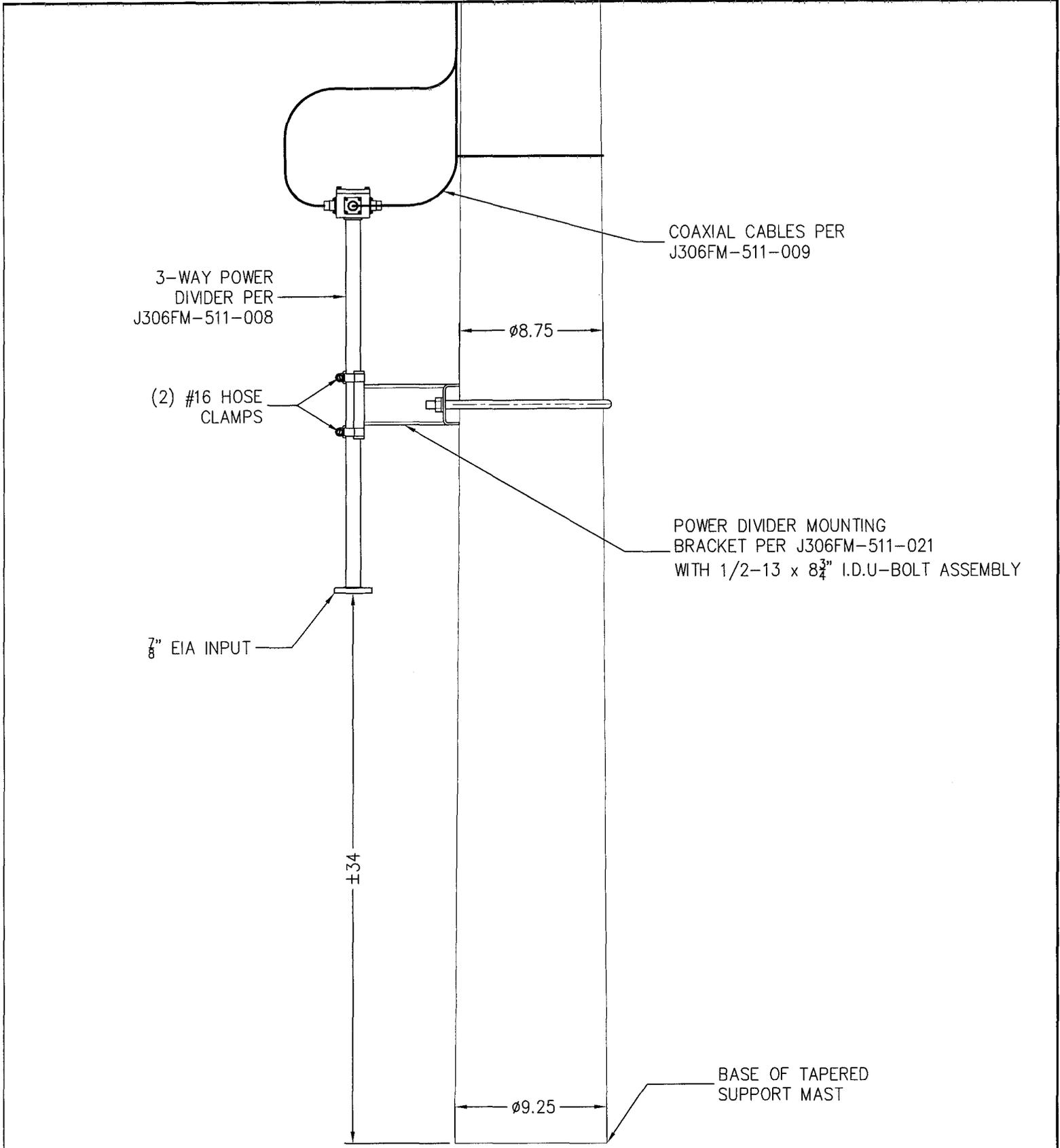
STEP 2: WRAP BLACK ELECTRICAL TAPE (PROVIDED)  
OVER MASTIC. COVER ENTIRE MASTIC AREA

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



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

|  |                       |      |                                    |                       |                              |                      |  |  |  |
|--|-----------------------|------|------------------------------------|-----------------------|------------------------------|----------------------|--|--|--|
| <table border="1"> <tr> <td>REV.</td> <td>MADE BY<br/>CHECKED BY</td> <td>DATE</td> <td>CHANGE</td> </tr> </table>   |                       |      | REV.                               | MADE BY<br>CHECKED BY | DATE                         | CHANGE               | <h2>PROPAGATION SYSTEMS, INC.</h2> <p>Ebensburg, Pennsylvania USA 814-472-5540</p> |  |  |
| REV.   | MADE BY<br>CHECKED BY | DATE | CHANGE                             |                       |                              |                      |  |  |  |
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|  |                       |      | <p>CABLE OUTLINE</p>               |                       |                              |                      |  |  |  |
|  |                       |      | <p>MODEL: PSIFML-3-DA</p>          |                       | <p>DRAWN BY: D.G. Kellar</p> | <p>DATE: 3/29/06</p> |  |  |  |
|  |                       |      | <p>CHANNEL/FREQUENCY: 92.1 MHz</p> |                       | <p>APPROVED BY:</p>          | <p>DATE:</p>         |  |  |  |
| <p>SCALE: 1:1</p>  |                       |      | <p>DRAWING NO.: J306FM-511-009</p> |                       | <p>REV. 0</p>                |                      |  |  |  |



| REV. | MADE BY<br>CHECKED BY | DATE | CHANGE |
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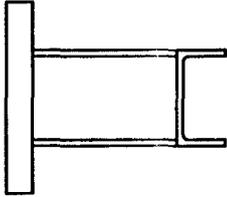
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SIZE  
**A**

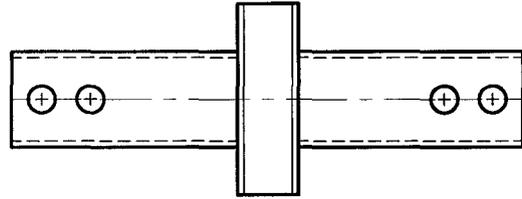
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**POWER DIVIDER MOUNTING DETAILS**

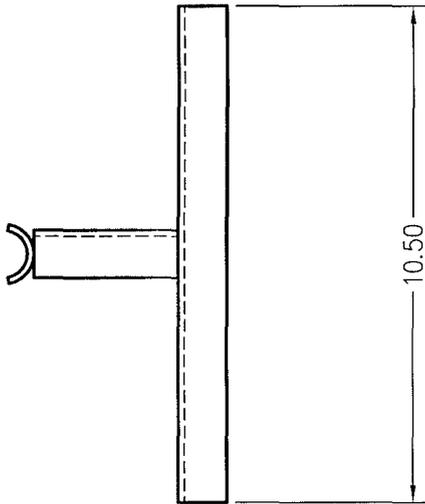
|                             |                             |               |
|-----------------------------|-----------------------------|---------------|
| MODEL: PSIFML-3-DA          | DRAWN BY: D.G. Kellar       | DATE: 4/11/06 |
| CHANNEL/FREQUENCY: 92.1 MHz | APPROVED BY:                | DATE:         |
| SCALE: 1:8                  | DRAWING NO.: J306FM-511-022 | REV: 0        |



SIDE VIEW



FRONT VIEW



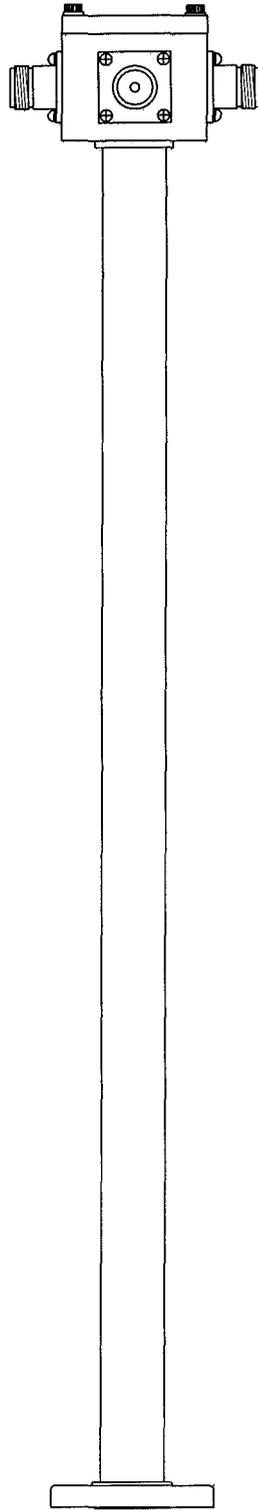
PLAN VIEW

| REV. | MADE BY<br>CHECKED BY | DATE | CHANGE |
|------|-----------------------|------|--------|
|      |                       |      |        |

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**PROPAGATION SYSTEMS, INC.**  
 Ebensburg, Pennsylvania USA 814-472-5540  
 7/8" POWER DIVIDER MOUNTING BRACKET OUTLINE

|                                 |                             |               |
|---------------------------------|-----------------------------|---------------|
| MODEL: PSIFML-3-DA              | DRAWN BY: D.G. Kellar       | DATE: 4/11/06 |
| CHANNEL/<br>FREQUENCY: 92.1 MHz | APPROVED BY:                | DATE:         |
| SCALE: 1:4                      | DRAWING NO.: J306FM-511-021 | REV. 0        |



| REV. | MADE BY<br>CHECKED BY | DATE | CHANGE |
|------|-----------------------|------|--------|
|      |                       |      |        |

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Ebensburg, Pennsylvania USA 814-472-5540

**7/8-TYPE 'N' 4-WAY POWER DIVIDER OUTLINE**

|                                 |                             |               |
|---------------------------------|-----------------------------|---------------|
| MODEL: PSIFML-3-DA              | DRAWN BY: D.G. Kellar       | DATE: 3/29/06 |
| CHANNEL/<br>FREQUENCY: 92.1 MHz | APPROVED BY:                | DATE:         |
| SCALE: 1:1                      | DRAWING NO.: J306FM-511-008 | REV. 0        |