



Certification
Directional FM Antenna
Antenna Model: PSIFMPV-3-DA
Frequency: 88.1 MHz

KDIM
Creative Education Media Corporation
Coweta, OK
Ref. J1103FM-381



Propagation Systems, Inc.

Quality Broadcast Antenna Systems

**Directional FM Antenna
KDIM
Creative Educational Media Corporation, Inc.
Coweta, OK**

A custom designed model PSIFMPV-3-DA, a vertical polarized panel antenna, was used in conjunction with the customer's 36" face triangular tower to create the necessary directional radiation pattern. The final antenna consists of three bays of corner reflector type panels and one bay of flat panel type radiators. The corner reflector type panels are positioned 5° True and the flat panel is positioned 95° True. Each panel is a custom design and both attach to the tower with mounting brackets that control the panel's orientation. Each panel has a vertical dipole antenna radiator. The antenna array is centered and utilizes a 4-way power divider. A single 7/8" cable feeds equal power to each panel.

Pattern testing was performed using a 1/3 scale model element and tower. The vertically polarized 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 mounting 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 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 264.3 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 panel spacing, orientation and dipole configuration was adjusted to produce a pattern that meets the envelope requirements. The final pattern measured does not exceed the envelope pattern and is greater than 85% of the envelope RMS.

The antenna is to be mounted in accordance with the supplied instructions and drawings. The antenna center of radiation approved in the construction permit is 125m (410 ft.) above ground level. The antenna top will be at the 423 ft. level. At this mounting elevation, the KDIM antenna will be within the FCC allowed $\pm 2/-4$ m tolerance. No other antennas can be installed within 10 ft of any radiating element. It is also recommended that any guy wires that are within 15 ft of the antenna be replaced with a suitable fiberglass substitute. 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.

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.
2. The bays are located at the same elevation above ground.
3. Use only the supplied hardware and O-ring at all 7/8" and 1-5/8" EIA flange connections.
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. Install one panel 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. A fine matcher has been supplied for final adjustment in the field.
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. Attach the triangular stiffener plates to the back panel, J1103FM-381-021, using the supplied 3/8-16 x 1-3/4" bolts, nuts and locks, see drawing J1103FM-381-023. Do not tighten the hardware at this time. Next attach the side panels, J1103FM-381-022, to the stiffener plates/back panel. Align the side panels so they are at 45 degrees to the back panel. After the side panels have been attached and aligned, tighten all the 3/8" bolts. Assemble the remaining two corner reflector panels. Next attach the 1-1/2" galvanized support pipes to the back panel of the top bay (1) and to bay (2). The mounting holes for the support pipe are detailed in drawing J1103FM-381-020. The support pipes for bay 2 extend from the center of the panel down to bay 3. See drawing J1103FM-381-002 for an overview of the three corner reflector type panels. Next attach the dipole element to the back panel using the 3/8-16 x 1-3/4" bolts. The 7/8" EIA input flange is to be on the topside of the panel see drawing J1103FM-381-033.

Step Two

The 95° panel does not have side panels. Attach the 1-1/2" galvanized support pipe x 78" to the panel. The 7/8" EIA input flange is to be on the topside of the panel. After all the panels have been assemble, carefully hoist the bay one corner reflector panel to the proper elevation and secure to the north tower leg using the supplied 3/8-16 x 2" ID U-bolt. The panel attaches directly to the north tower leg. The dipole element must be positioned as shown in J1103FM-381-001. The 1-1/2" support pipe attaches to the west and east tower legs with the supplied standoff brackets, two per leg. See drawing J1103FM-381-001 for an overview. The north panel is to be positioned 5° True. Hoist bay 2; attach to the tower leg and the support pipes that extend down from bay 1. Separate the panels 160.5". Attach the support brackets to the west and east tower legs. Follow the same procedure for bay 3.

Step Three

Hoist the 95° panel to the same elevation as bay 1 corner reflector and secure to the east tower leg and bay 1 support pipe as shown in drawing J1103FM-381-001. The panels are to be at the same elevation. The orientation of this panel is 95° True. The dipole element must be positioned with the 7/8" input connector closer to the top of the panel.

Step Four

Install the power divider and tuner on the inside of the tower. Position the power divider output near the center of radiation. Attach one mounting bracket near the power divider output using the supplied hose clamps. Attach the second bracket between probes 2 and 3 of the tuner. Secure the brackets to the tower with the supplied brackets.

Step Five

Connect the 7/8" cables to the power divider using the supplied 1/4-20 x 1-1/4 bolts, nuts locks and O-ring. Connect the cable to the panels using the 1/4-20 x 1" bolts, locks and O-ring. Cables for bay 1 and bay three are the same. Use the short cable for bay 2. See drawing J1103FM-381-034. Secure the excess cable to the tower with the supplied tie wraps.

Step Six

Check all connections for tightness. Connect the main transmission line to the antenna input located at the base of the tuner. **Do not allow the weight of the feed line to be supported by the antenna.** The antenna system should be tested before the erector leaves the premises to insure that the complete antenna system is functioning properly. If the antenna has a high VSWR, consult the factory immediately. The antenna was tuned at the factory, however fine adjustment may be necessary after installation. Be sure to position the tuner with the black band up. Pressurize the antenna with dry air or nitrogen to a maximum of 5 psi.

Drawing Index

<u>Drawing Number</u>	<u>Description</u>
J1103FM-381-002	Antenna Elevation (5° panel)
J1103FM-381-035	Antenna Front Elevation (95° panel)
J1103FM-381-001	Antenna Orientation (Top View)
J1103FM-381-032	Feed Network
J1103FM-381-020	5 Degree Panel Assembly (Isometric)
J1103FM-381-029	Reflector Assembly
J1103FM-381-005	Balun Outline
J1103FM-381-021	Director Back Panel
J1103FM-381-022	Director Side Panel
J1103FM-381-023	Stiffener Assembly
J1103FM-381-029	95 Degree Panel
J1103FM-381-030	Support Pipe
33-00030	Tuner Bracket
J1103FM-381-003	Power Divider
J1103FM-381-034	7/8" Feed Cable
J1103FM-381-025-028	Standoff Brackets
J1103FM-381-022	Balun Mounting
33-00006	Tuner Outline

Measured Relative Field Tabulation

Antenna: PSIFMPV-3-DA

Station: KDIM

Frequency: 88.1 MHz

Location: Coweta, OK

Horizontal Component
Calculated Relative Field

Angle	Relative Field	Power Gain	Gain (dB)
0	0.022	0.006	-22.18
10	0.022	0.006	-22.18
20	0.022	0.006	-22.18
30	0.022	0.006	-22.18
40	0.022	0.006	-22.18
50	0.022	0.006	-22.18
60	0.022	0.006	-22.18
70	0.022	0.006	-22.18
80	0.022	0.006	-22.18
90	0.022	0.006	-22.18
100	0.022	0.006	-22.18
110	0.022	0.006	-22.18
120	0.022	0.006	-22.18
130	0.022	0.006	-22.18
140	0.022	0.006	-22.18
150	0.022	0.006	-22.18
160	0.022	0.006	-22.18
170	0.022	0.006	-22.18
180	0.022	0.006	-22.18
190	0.022	0.006	-22.18
200	0.022	0.006	-22.18
210	0.022	0.006	-22.18
220	0.022	0.006	-22.18
230	0.022	0.006	-22.18
240	0.022	0.006	-22.18
250	0.022	0.006	-22.18
260	0.022	0.006	-22.18
270	0.022	0.006	-22.18
280	0.022	0.006	-22.18
290	0.022	0.006	-22.18
300	0.022	0.006	-22.18
310	0.022	0.006	-22.18
320	0.022	0.006	-22.18
330	0.022	0.006	-22.18
340	0.022	0.006	-22.18
350	0.022	0.006	-22.18

Maximum Field (H-pol)

Field 0.022
Gain .006 (-22.18 dB)

Vertical Component
Measured Relative Field

Angle	Relative Field	Power Gain	Gain (dB)
0	0.985	11.74	10.70
10	0.982	11.66	10.67
20	0.831	8.35	9.22
30	0.566	3.87	5.88
40	0.330	1.32	1.21
50	0.338	1.38	1.40
60	0.439	2.33	3.68
70	0.467	2.64	4.21
80	0.409	2.03	3.07
90	0.295	1.05	0.22
100	0.157	0.30	-5.23
110	0.036	0.02	-17.95
120	0.078	0.07	-11.37
130	0.131	0.21	-6.86
140	0.141	0.24	-6.20
150	0.113	0.16	-8.08
160	0.064	0.05	-13.08
170	0.057	0.04	-14.10
180	0.114	0.16	-8.02
190	0.161	0.31	-5.06
200	0.184	0.41	-3.89
210	0.185	0.41	-3.82
220	0.163	0.32	-4.95
230	0.147	0.26	-5.85
240	0.181	0.40	-4.03
250	0.188	0.43	-3.69
260	0.179	0.39	-4.12
270	0.165	0.33	-4.80
280	0.162	0.32	-5.00
290	0.203	0.50	-3.01
300	0.267	0.86	-0.64
310	0.348	1.46	1.65
320	0.452	2.47	3.93
330	0.583	4.12	6.15
340	0.734	6.51	8.14
350	0.882	9.42	9.74

Maximum Field (V-pol)

Field 1.00
Gain 12.1 (10.83 dB)
Azimuth Bearing 4 degrees

Minimum Field

Field 0.026
Gain .01 (-20.87 dB)
Azimuth Bearing 112 degrees

ERP Tabulation

Antenna: PSIFMPV-3-DA

Station: KDIM

Frequency: 88.1 MHz

Location: Coweta, OK

Maximum ERP: 100 kW

Horizontal Component

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.022	0.0500	-13.01
10	0.022	0.0500	-13.01
20	0.022	0.0500	-13.01
30	0.022	0.0500	-13.01
40	0.022	0.0500	-13.01
50	0.022	0.0500	-13.01
60	0.022	0.0500	-13.01
70	0.022	0.0500	-13.01
80	0.022	0.0500	-13.01
90	0.022	0.0500	-13.01
100	0.022	0.0500	-13.01
110	0.022	0.0500	-13.01
120	0.022	0.0500	-13.01
130	0.022	0.0500	-13.01
140	0.022	0.0500	-13.01
150	0.022	0.0500	-13.01
160	0.022	0.0500	-13.01
170	0.022	0.0500	-13.01
180	0.022	0.0500	-13.01
190	0.022	0.0500	-13.01
200	0.022	0.0500	-13.01
210	0.022	0.0500	-13.01
220	0.022	0.0500	-13.01
230	0.022	0.0500	-13.01
240	0.022	0.0500	-13.01
250	0.022	0.0500	-13.01
260	0.022	0.0500	-13.01
270	0.022	0.0500	-13.01
280	0.022	0.0500	-13.01
290	0.022	0.0500	-13.01
300	0.022	0.0500	-13.01
310	0.022	0.0500	-13.01
320	0.022	0.0500	-13.01
330	0.022	0.0500	-13.01
340	0.022	0.0500	-13.01
350	0.022	0.0500	-13.01

Maximum ERP (H-pol)

Field 0.022
ERP .050 kW (-13.01 dBk)

Vertical Component

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.985	97.04	19.87
10	0.982	96.37	19.84
20	0.831	69.02	18.39
30	0.566	31.99	15.05
40	0.330	10.92	10.38
50	0.338	11.40	10.57
60	0.439	19.27	12.85
70	0.467	21.78	13.38
80	0.409	16.75	12.24
90	0.295	8.69	9.39
100	0.157	2.48	3.94
110	0.036	0.13	-8.78
120	0.078	0.60	-2.20
130	0.131	1.70	2.31
140	0.141	1.98	2.97
150	0.113	1.29	1.09
160	0.064	0.41	-3.90
170	0.057	0.32	-4.93
180	0.114	1.30	1.15
190	0.161	2.58	4.11
200	0.184	3.37	5.28
210	0.185	3.43	5.35
220	0.163	2.64	4.22
230	0.147	2.15	3.32
240	0.181	3.27	5.14
250	0.188	3.53	5.48
260	0.179	3.20	5.06
270	0.165	2.74	4.37
280	0.162	2.61	4.17
290	0.203	4.13	6.16
300	0.267	7.13	8.53
310	0.348	12.08	10.82
320	0.452	20.42	13.10
330	0.583	34.04	15.32
340	0.734	53.83	17.31
350	0.882	77.81	18.91

Maximum ERP (V-pol)

Field 1.00
ERP 100 kW (20 dBk)
Azimuth Bearing 4 degrees

Minimum ERP

Field 0.026
ERP .068 kW (-11.7 dBk)
Azimuth Bearing 112 degrees

General Specifications

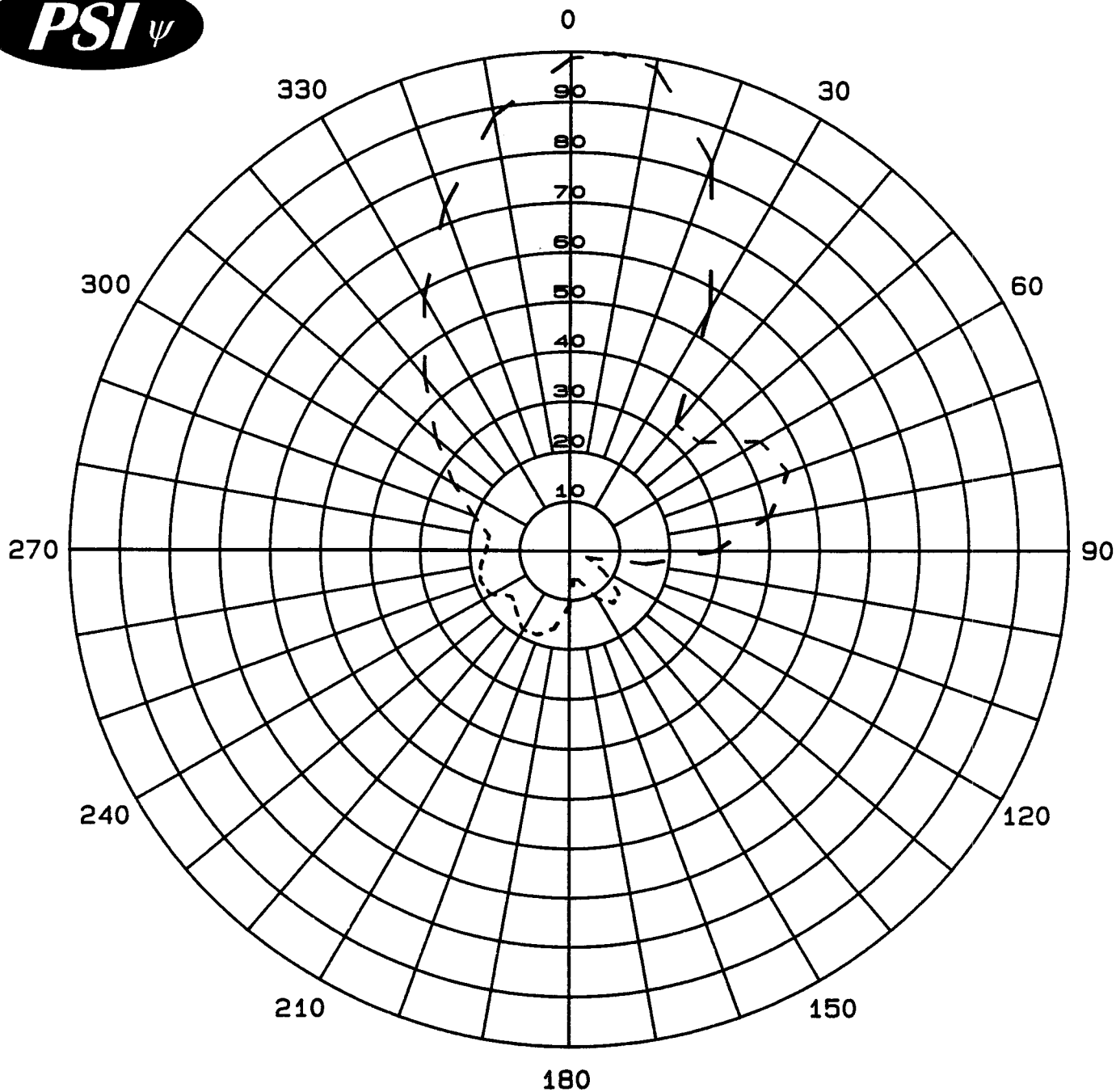
Antenna Model	PSIFMPV-3-DA
Type	3-bay custom directional panel FM antenna
Polarization	Mixed
Frequency	88.1 MHz
Gain (V-pol)	12.1 (10.83 dB)
RMS (V-pol)	.420
RMS Envelope	.483
Gain (H-pol)*	.006 (-22.18 dB)
RMS (H-pol)	1.0
Input	1-5/8" EIA
Power rating	12 kW
ERP	100 kW
Input power	8.26 kW
Length	26.75-ft.

* H-pol gain based on general NEC analysis of vertically polarized antenna

Prepared By

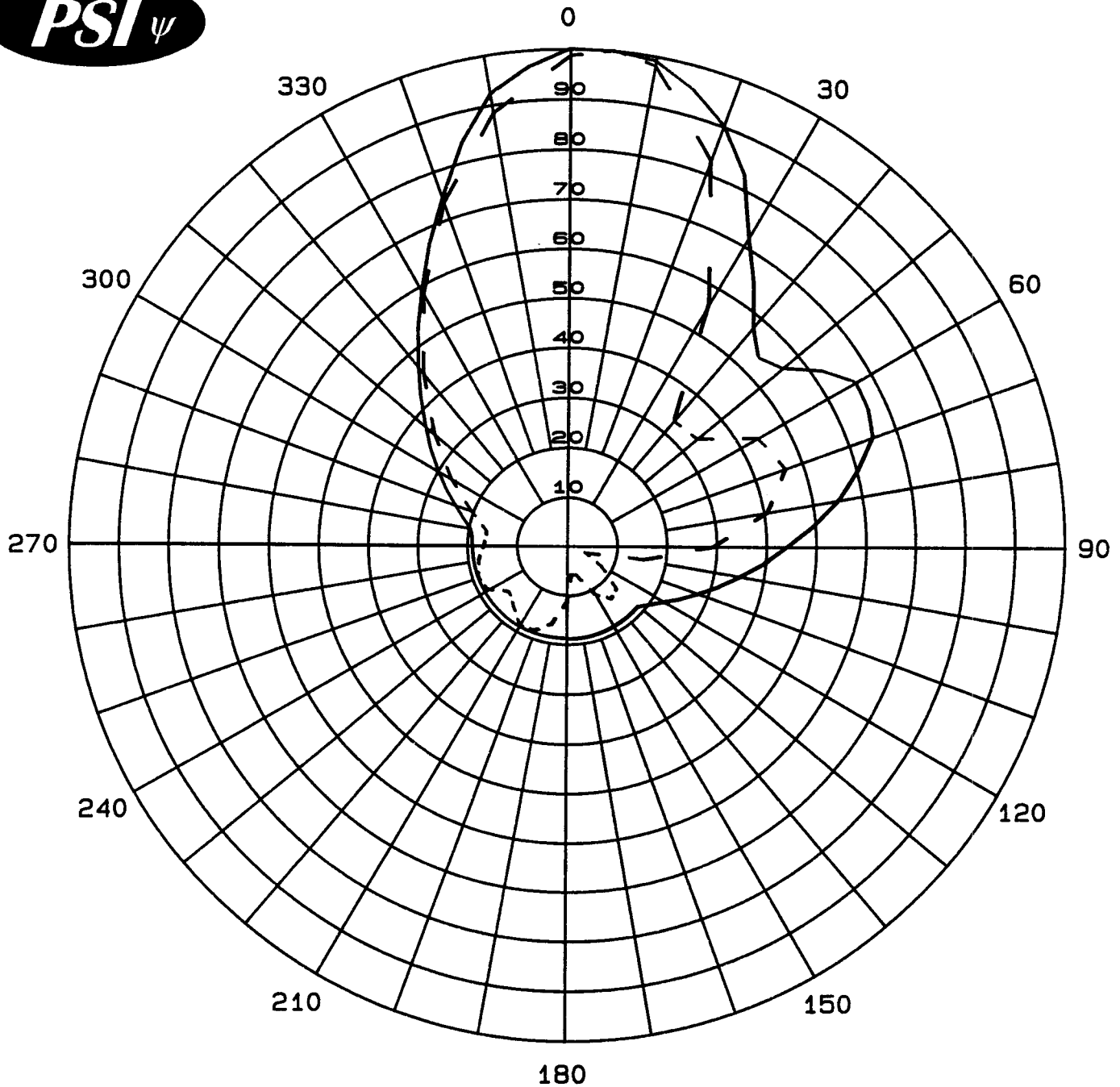


Douglas A. Ross
Propagation Systems Inc.



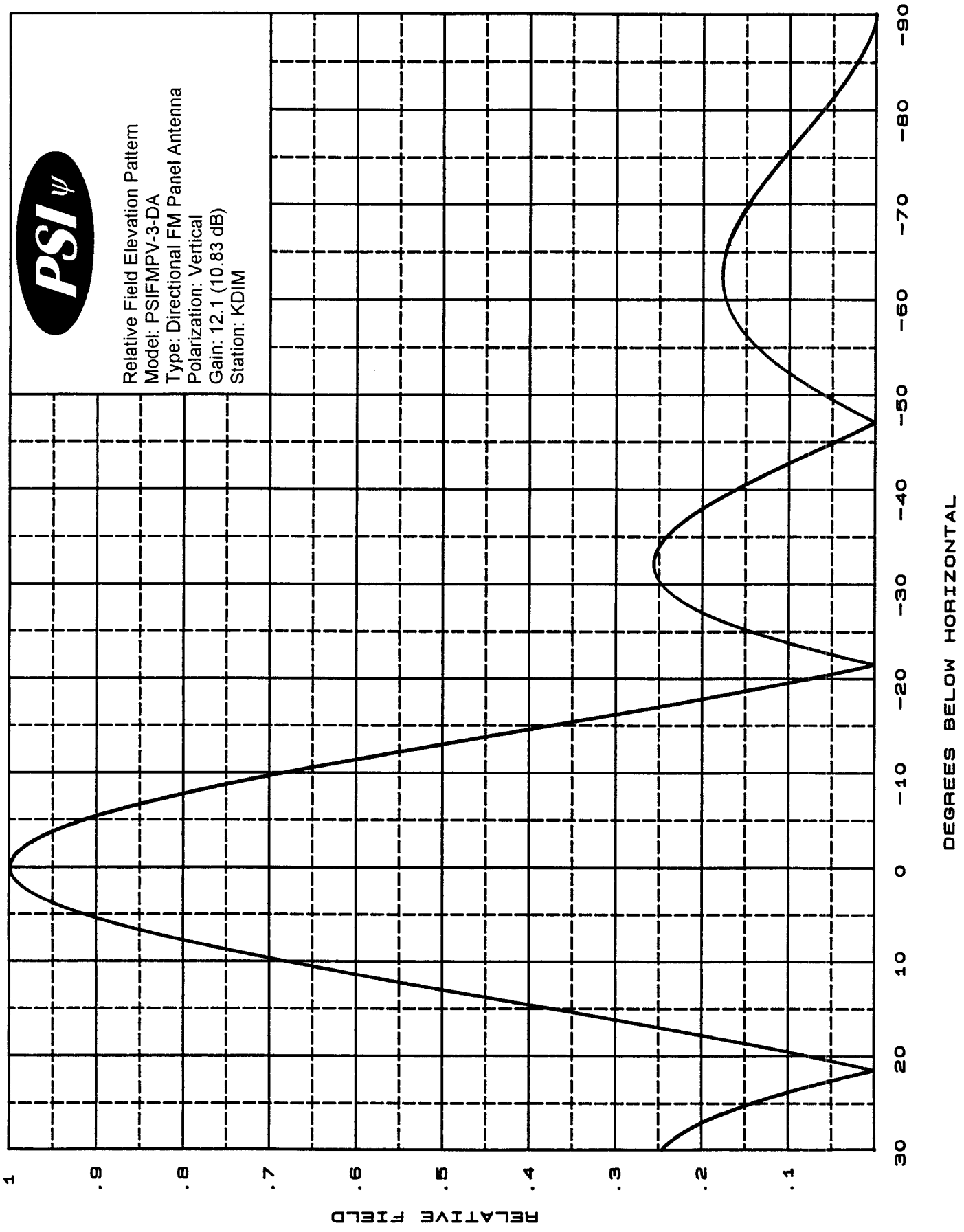
Measured Relative Field
Azimuth Plane Pattern
Antenna: PSIFMPV-3-DA
Type: Directional FM Panel
Polarization: Vertical
Peak Gain: 12.1 (10.83 dB)
Station: KDIM
Location: Coweta, OK

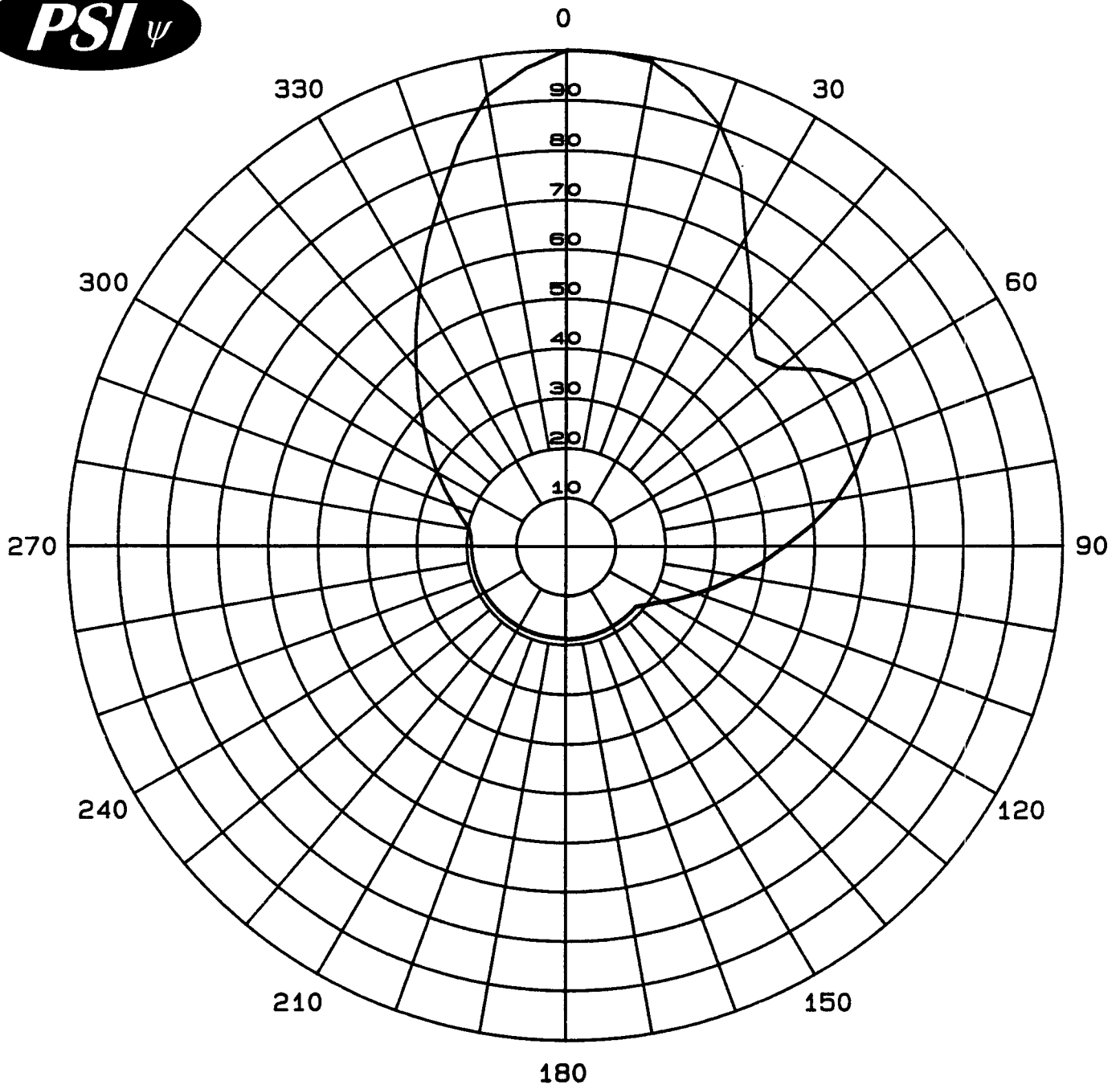
Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931



Measured Relative Field and
Envelope Comparison
Antenna: PSIFMPV-3-DA
Type: Directional FM Panel
Polarization: Vertical
Peak Gain: 12.1 (10.83 dB)
Station: KDIM
Location: Coweta, OK

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931





Maximum Envelope
Azimuth Plane Pattern
Antenna: PSIFMPV-3-DA
Type: Directional FM Panel
Polarization: Vertical
Peak ERP: 100 kW (20.0 dBk)
Station: KDIM
Location: Coweta, OK

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Envelope Pattern

Antenna: PSIFMPV-3-DA

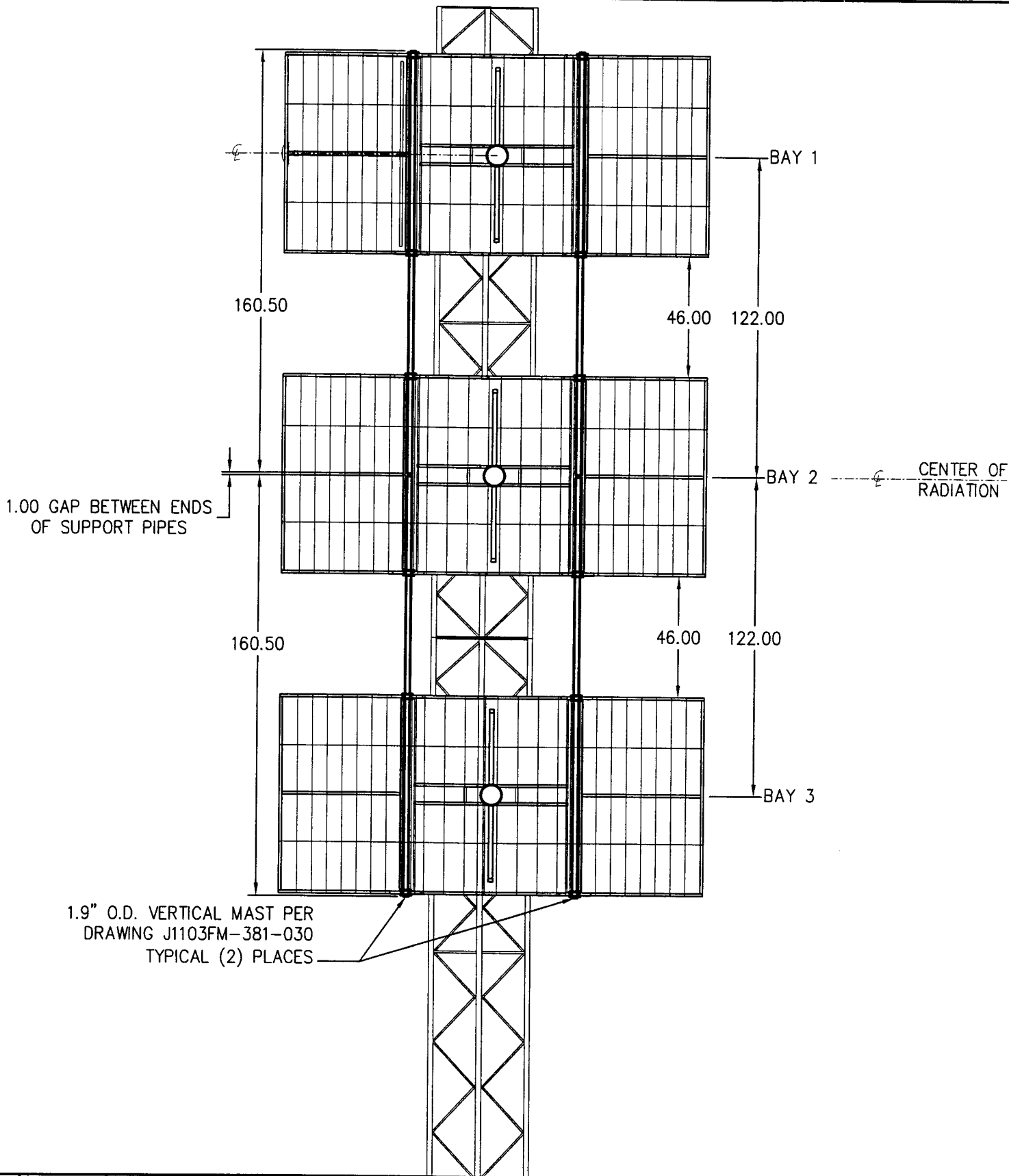
Station: KDIM

Frequency: 88.1 MHz

Location: Coweta, OK

Maximum ERP: 100 kW

Angle	Relative Field	ERP kW	ERP dbK	Angle	Relative Field	ERP kW	ERP dBK
0	1.000	100.00	20.00	180	0.188	3.53	5.48
5	1.000	100.00	20.00	185	0.188	3.53	5.48
10	0.991	98.21	19.92	190	0.188	3.53	5.48
15	0.953	90.82	19.58	195	0.188	3.53	5.48
20	0.904	81.72	19.12	200	0.188	3.53	5.48
25	0.810	65.61	18.17	205	0.188	3.53	5.48
30	0.721	51.98	17.16	210	0.188	3.53	5.48
35	0.647	41.86	16.22	215	0.188	3.53	5.48
40	0.577	33.29	15.22	220	0.188	3.53	5.48
45	0.539	29.05	14.63	225	0.188	3.53	5.48
50	0.560	31.36	14.96	230	0.188	3.53	5.48
55	0.620	38.44	15.85	235	0.188	3.53	5.48
60	0.667	44.49	16.48	240	0.188	3.53	5.48
65	0.665	44.22	16.46	245	0.188	3.53	5.48
70	0.653	42.64	16.30	250	0.188	3.53	5.48
75	0.605	36.60	15.64	255	0.188	3.53	5.48
80	0.555	30.80	14.89	260	0.188	3.53	5.48
85	0.498	24.80	13.94	265	0.188	3.53	5.48
90	0.443	19.62	12.93	270	0.188	3.53	5.48
95	0.397	15.76	11.98	275	0.189	3.57	5.53
100	0.352	12.39	10.93	280	0.195	3.80	5.80
105	0.315	9.92	9.97	285	0.215	4.62	6.65
110	0.280	7.84	8.94	290	0.237	5.62	7.49
115	0.251	6.30	7.99	295	0.266	7.08	8.50
120	0.224	5.02	7.00	300	0.297	8.82	9.46
125	0.204	4.16	6.19	305	0.334	11.16	10.47
130	0.188	3.53	5.48	310	0.372	13.84	11.41
135	0.188	3.53	5.48	315	0.418	17.47	12.42
140	0.188	3.53	5.48	320	0.469	22.00	13.42
145	0.188	3.53	5.48	325	0.528	27.88	14.45
150	0.188	3.53	5.48	330	0.591	34.93	15.43
155	0.188	3.53	5.48	335	0.666	44.36	16.47
160	0.188	3.53	5.48	340	0.744	55.35	17.43
165	0.188	3.53	5.48	345	0.838	70.22	18.46
170	0.188	3.53	5.48	350	0.921	84.82	19.29
175	0.188	3.53	5.48	355	0.965	93.12	19.69



PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA

ANTENNA ELEVATIONS @ 5°

MODEL: PSIFMPV-3-DA

DRAWN BY: D.G. Kellar

DATE: 5/10/04

CHANNEL/FREQUENCY: 88.1 MHz

APPROVED BY:

DATE:

SCALE: 1:50

PART NO.:

DRAWING NO.: J1103FM-381-002

REV: 0

MATERIAL:

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

SIZE
A

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 foregoing agreement.</p>				

REF. DRAWING J1103FM-381-029
FOR PANEL DETAILS, REF. DRAWING
J1103FM-381-014 FOR BALUN
DETAILS

1.9" O.D. VERTICAL MAST PER
DRAWING J1103FM-381-030
TYPICAL (2) PLACES

CL

BAY 1

122.00

BAY 2

CENTER OF
RADIATION

122.00

BAY 3

PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA

ANTENNA ELEVATIONS @ 95'

REV.	MADE BY CHECKED BY	DATE	CHANGE
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MATERIAL:

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

SIZE

A

MODEL: PSIFMPV-3-DA

DRAWN BY: D.G. Kellar

DATE: 6/10/04

CHANNEL/
FREQUENCY: 88.1 MHz

APPROVED BY:

DATE:

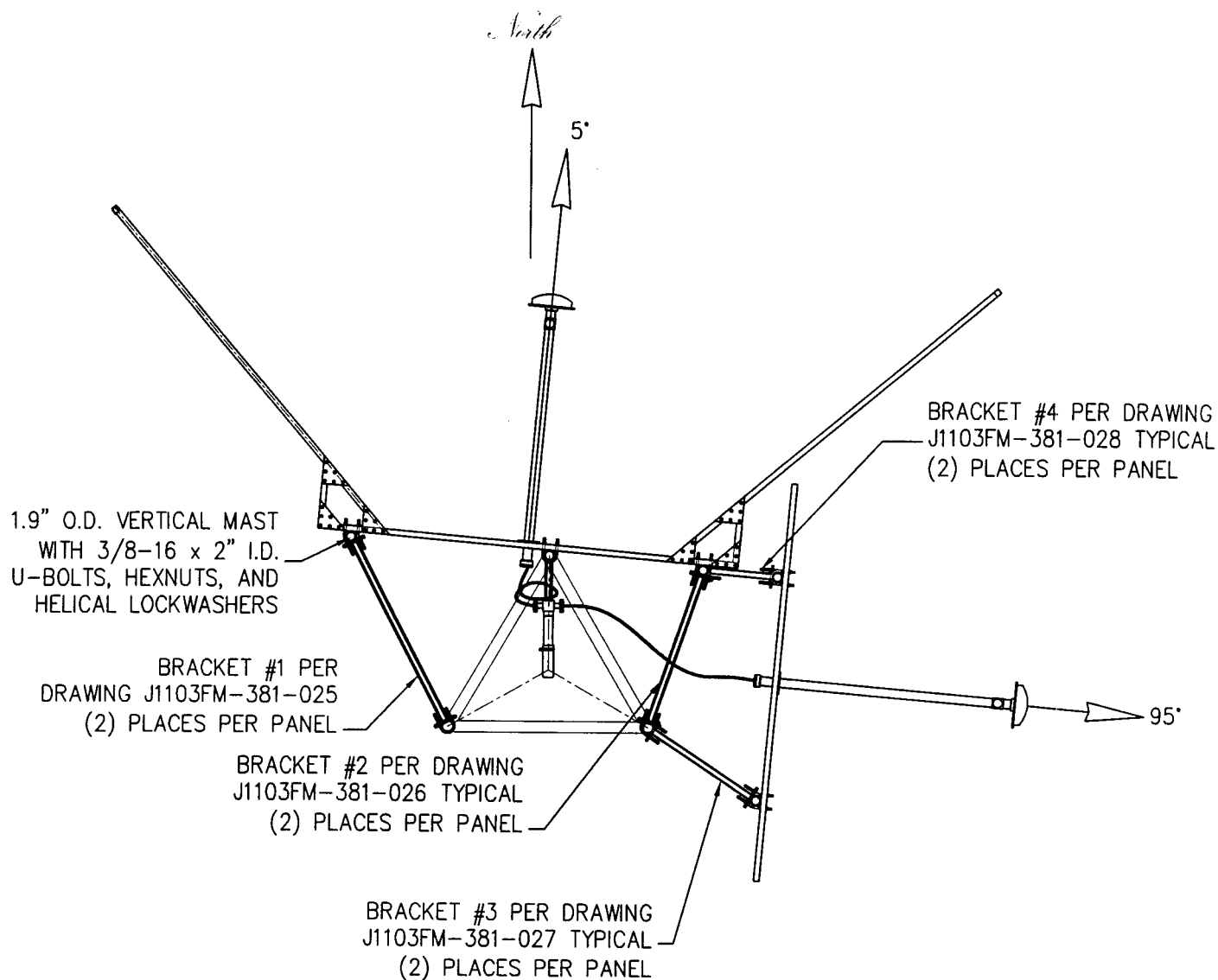
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PART NO.:

DRAWING NO.: J1103FM-381-035

REV.

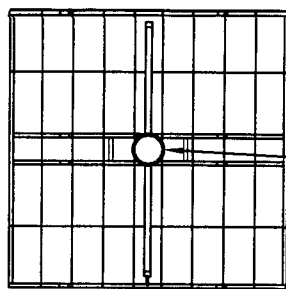
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PLAN VIEW

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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 foregoing agreement.						MODEL: PSIFMPV-3-DA		DRAWN BY: D.G. Kellar		DATE: 5/05/04									
						CHANNEL / FREQUENCY: 88.1 MHz		APPROVED BY:		DATE:									
						SCALE: 1:30		PART NO.:		DRAWING NO.: J1103FM-381-001									
						TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ± 1/16" DECIMALS XX ± .01" DECIMALS XXX ± .005" ANGLES ± 3°		SIZE A		REV 0									

95°



1/4-20 x 1.0" HEXHEAD
CAPSCREW, HEXNUT AND
HELICAL LOCKWASHER, (1)
#2-215 O-RING - TYPICAL

7/8" CABLES PER
J1103FM-381-034

1/4-20 x 1 1/4" HEXHEAD CAPSCREW,
HEXNUT AND HELICAL LOCKWASHER,
(1) #2-215 O-RING REQUIRED
TYPICAL

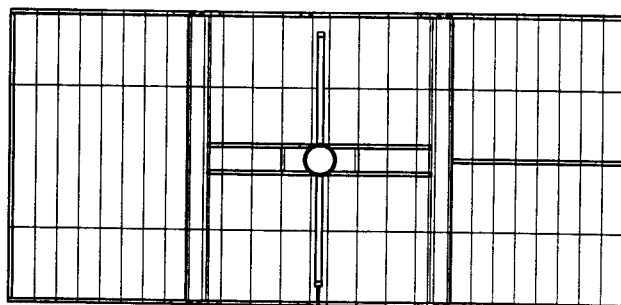
1 5/8" x 7/8" 4-WAY POWER DIVIDER
PER J1103FM-381-003

BLACK BAND

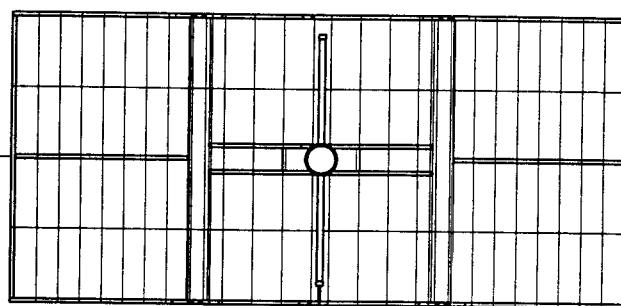
1 5/8" FINE MATCHER

SUPPORT BRACKET 33-00030 (2)
PLACES WITH (2) 1/2-13 x 4"
HEXHEAD BOLT, HEXNUT AND HELICAL
LOCKWASHERS - TYPICAL (2) PLACES

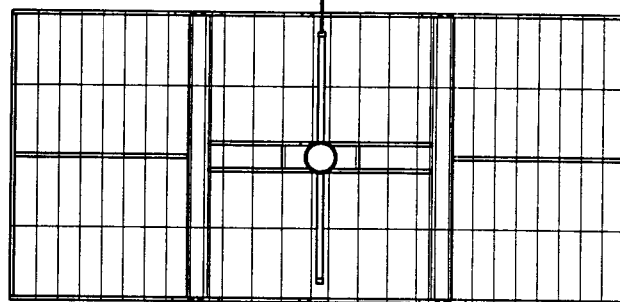
5°



BAY 1



BAY 2



BAY 3

SHORT CABLE

PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA

ANTENNA FEED NETWORK LAYOUT

MODEL: PSIFMPV-3-DA

DRAWN BY: D.G. Kellar

DATE: 6/02/04

CHANNEL/
FREQUENCY: 88.1 MHz

APPROVED BY:

DATE:

SCALE: 1:50

PART NO.:

DRAWING NO.: J1103FM-381-032

REV. 0

MATERIAL:

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

SIZE

A

REV.	MADE BY	CHECKED BY	DATE	CHANGE

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NOTE:

1. REFERENCE DRAWING J1103FM-381-033 FOR
DETAILS OF ATTACHING BALUN TO PANEL

REF DRAWING J1103FM-381-023
FOR ASSEMBLY AND FASTENER
DETAILS

REF. DRAWING J1103FM-381-021
FOR BACK PANEL OUTLINE

ATTACH PANEL TO LEG OF TOWER
WITH (3) 3/8-16 x 2" I.D. U-BOLTS,
HEXNUTS AND HELICAL LOCKWASHERS
TYPICAL ALL PANELS

REF DRAWING J1103FM-381-022
FOR SIDE PANEL

ATTACH MAST TO BACK OF PANELS
WITH (2) 3/8-16 x 2" I.D. U-BOLTS,
HEXNUTS AND HELICAL LOCKWASHERS
TYPICAL ALL BACK PANELS

BRACKET #2 PER DRAWING
J1103FM-381-026 (2) PLACES
EACH PANEL

BRACKET #1 PER DRAWING
J1103FM-381-025 (2) PLACES
EACH PANEL

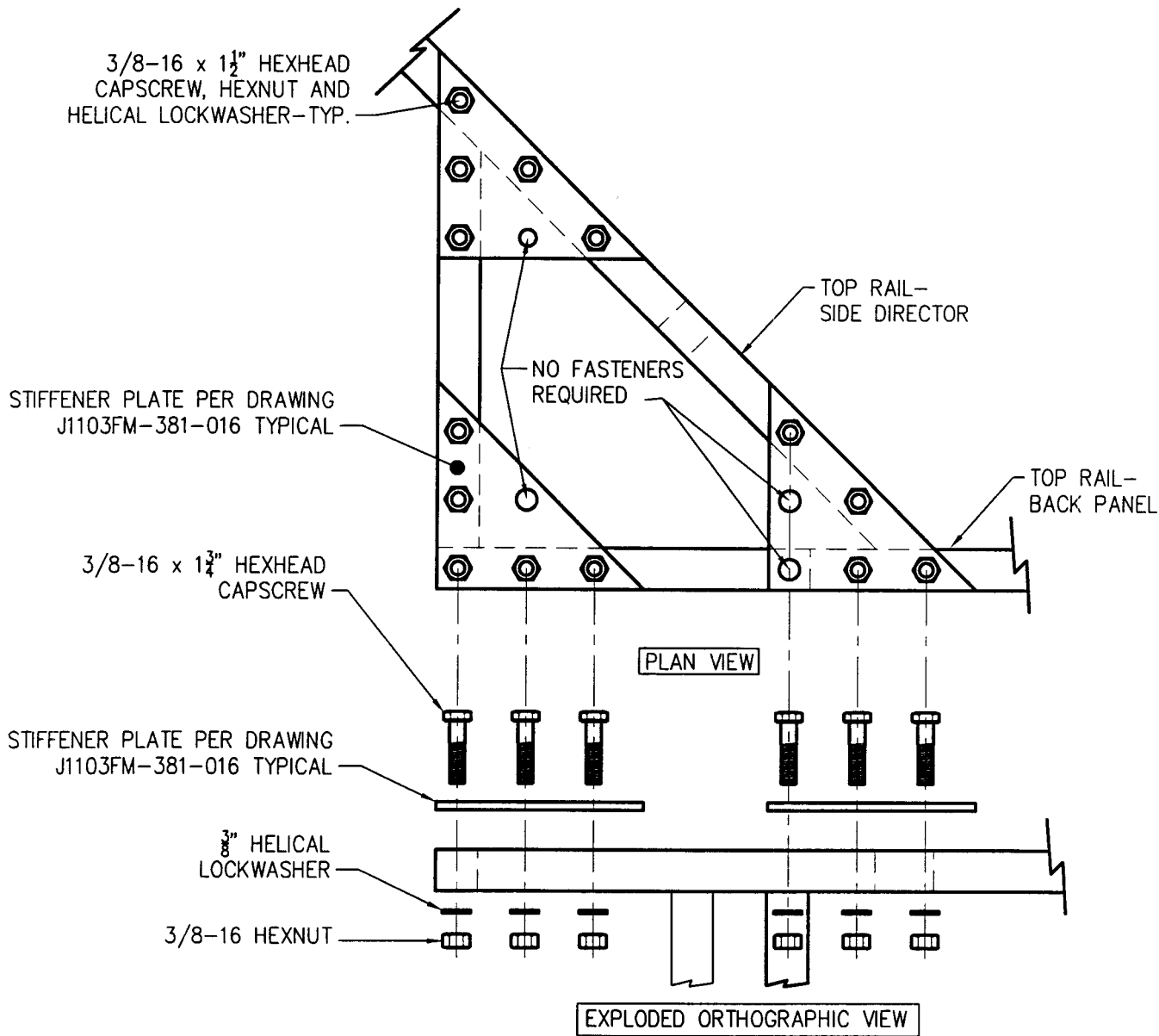
ANTENNA SUPPORT MAST PER
DRAWING J1103FM-381-030-TYPICAL

ATTACH BRACKETS TO TOWER LEG
WITH (1) 3/8-16 x 2" I.D. U-BOLT,
HEXNUTS AND HELICAL LOCKWASHERS
TYPICAL ALL BRACKETS

ATTACH BRACKETS TO MAST
WITH (1) 3/8-16 x 2" I.D. U-BOLTS,
HEXNUTS AND HELICAL LOCKWASHERS
TYPICAL ALL BRACKETS

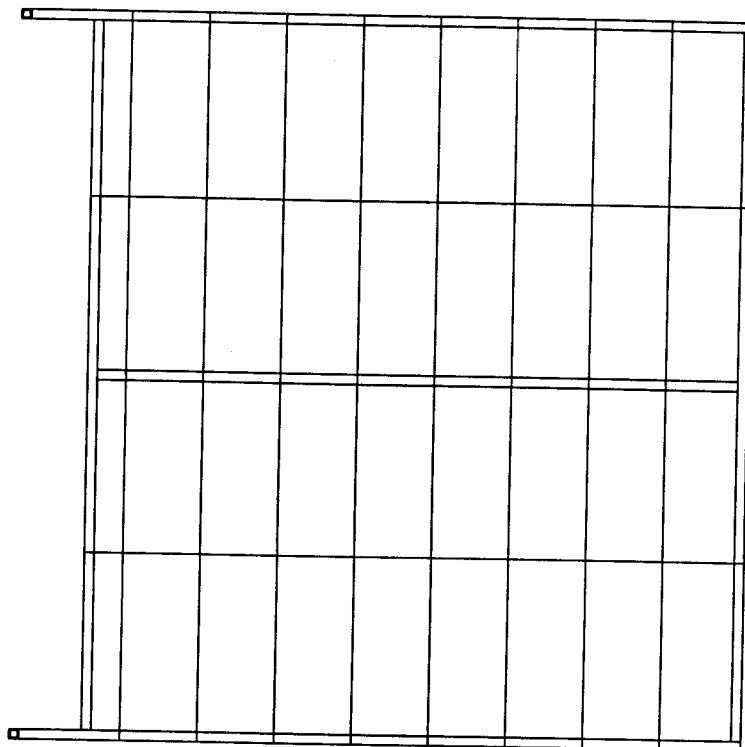
<p>REV. MADE BY CHECKED BY DATE CHANGE</p>				<p>MATERIAL:</p>		<p>PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA</p>					
<p>NOT APPLICABLE</p>				<p>NOT APPLICABLE</p>							
<p>UNLESS OTHERWISE NOTED FRACTIONS X/X ± 1/16" DECIMALS XX ± .01" DECIMALS XXX ± .005" ANGLES ± 3'</p>						<p>SCALE: 1:20</p>		<p>PART NO.:</p>		<p>DRAWING NO.: J1103FM-381-020</p>	
<p>Model: PSIFMPV-3-DA</p>						<p>Channel/Frequency: 88.1 MHz</p>		<p>Drawn By: D.G. Kellar</p>		<p>Date: 6/02/04</p>	
<p>Approved By:</p>						<p>Scale:</p>		<p>Part No.:</p>		<p>Rev: 0</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 foregoing agreement.



NOTES:
 1. DETAILS ARE SIMILAR LEFT AND RIGHT AND TOP AND BOTTOM OF ALL PANELS

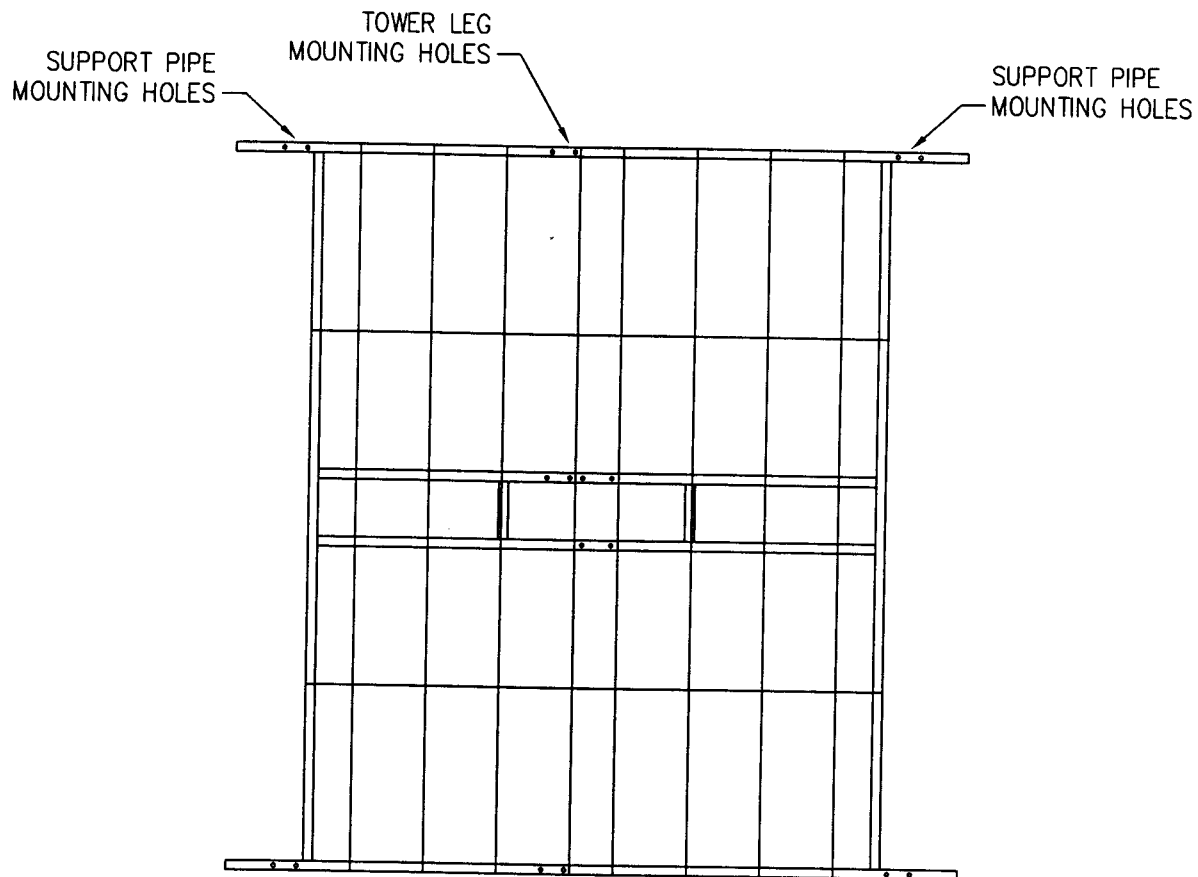
REV. MADE BY DATE CHANGE				MATERIAL: NOT APPLICABLE		PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA								
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise 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 foregoing agreement.				TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ±1/16" DECIMALS XX ±.01" DECIMALS XXX ±.005" ANGLES ± 3'		SIZE A		MODEL: PSIFMPV-3-DA		DRAWN BY: D.G. Kellar	DATE: 5/06/04			
								CHANNEL/FREQUENCY: 88.1 MHz		APPROVED BY:		DATE:		
								SCALE: 1:4		PART NO.:		DRAWING NO.: J1103FM-381-023		REV: 0



<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 foregoing agreement.</p>				<p>MATERIAL:</p>		<h1>PROPAGATION SYSTEMS, INC.</h1> <p>Ebensburg, Pennsylvania USA</p>							
<p>REV.</p>		<p>MADE BY CHECKED BY</p>		<p>DATE</p>		<p>CHANGE</p>		<p>DIRECTOR SIDE PANEL OUTLINE</p>					
								<p>MODEL: PSIFMPV-3-DA</p>		<p>DRAWN BY: D.G. Kellar</p>		<p>DATE: 5/06/04</p>	
								<p>CHANNEL/ FREQUENCY: 88.1 MHz</p>		<p>APPROVED BY:</p>		<p>DATE:</p>	
								<p>SCALE: 1:20</p>		<p>PART NO.:</p>		<p>DRAWING NO.: J1103FM-381-022</p>	
												<p>REV. 0</p>	

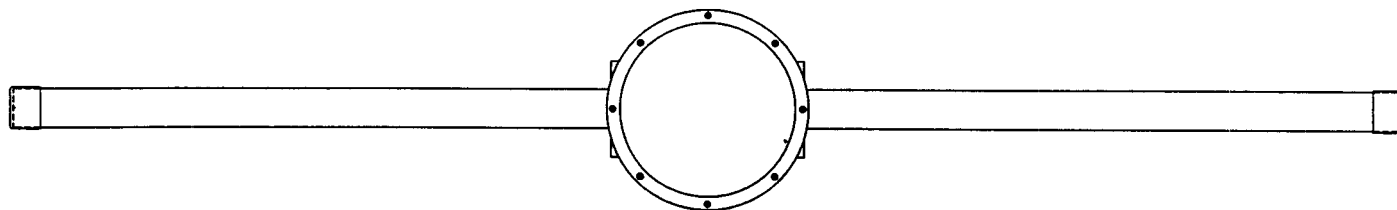
TOLERANCES
UNLESS OTHERWISE NOTED
FRACTIONS X/X ± 1/16"
DECIMALS XX ± .01"
DECIMALS XXX ± .005"
ANGLES ± 3°

SIZE
A

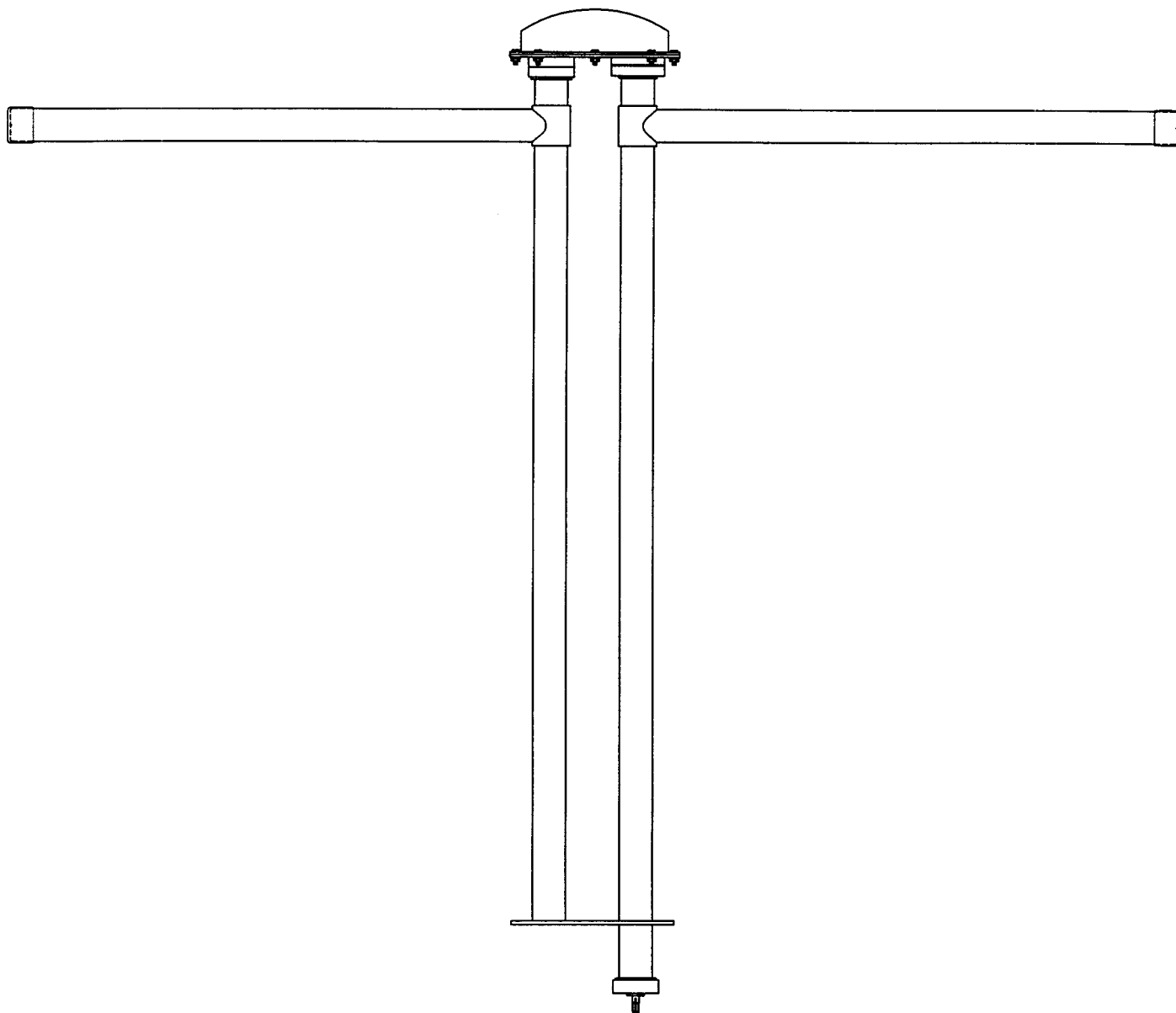


FRONT OF PANEL

REV. MADE BY CHECKED BY DATE CHANGE				MATERIAL:		PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA									
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 foregoing agreement.				TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X $\pm 1/16"$ DECIMALS XX $\pm .01"$ DECIMALS XXX $\pm .005"$ ANGLES $\pm 3'$		SIZE A		MODEL: PSIFMPV-3-DA		DRAWN BY: D.G. Kellar		DATE: 5/06/04			
								CHANNEL/FREQUENCY: 88.1 MHz		APPROVED BY:		DATE:			
								SCALE: 1:20		PART NO.:		DRAWING NO.: J1103FM-381-021		REV: 0	
								BACK PANEL OUTLINE							



TOP VIEW

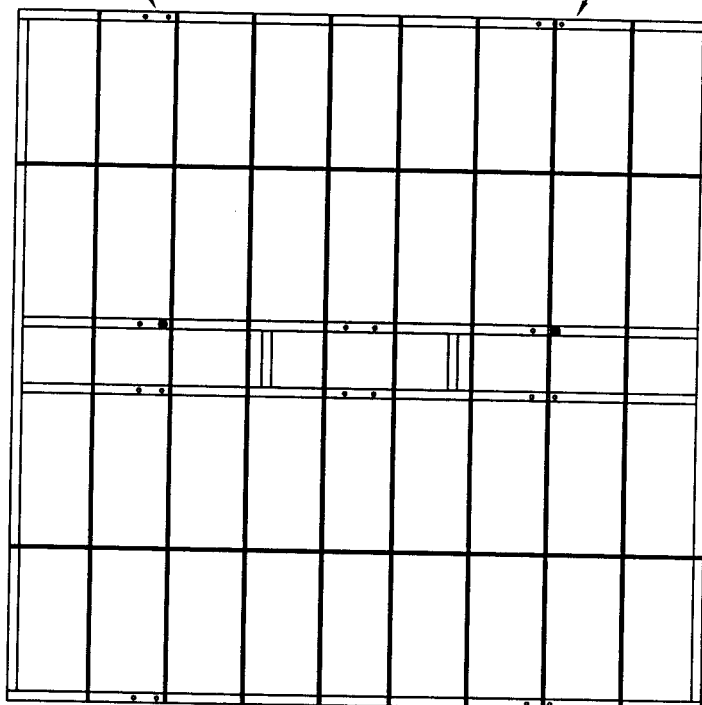


SIDE VIEW

A	D.G. Kellar	5/27/04	ADD ITEM 33	MATERIAL:	PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA 2-DIPOLE BALUN OUTLINE					
	MADE BY									
REV.	CHECKED BY	DATE	CHANGE	NOT APPLICABLE	MODEL:	PSIFMPV-3-DA	DRAWN BY:	D.G. Kellar	DATE:	5/05/04
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 foregoing agreement.				TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ± 1/16" DECIMALS XX ± .01" DECIMALS XXX ± .005" ANGLES ± 3°	SIZE	CHANNEL/FREQUENCY:		APPROVED BY:		DATE:
					A	88.1 MHz				
						SCALE:	PART NO.:	DRAWING NO.:		REV.
						1:8	33-00139	J1103FM-381-005		A

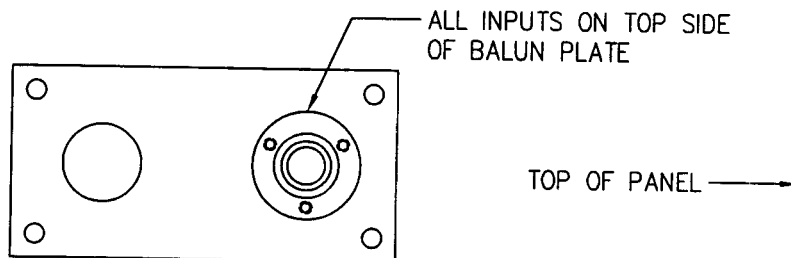
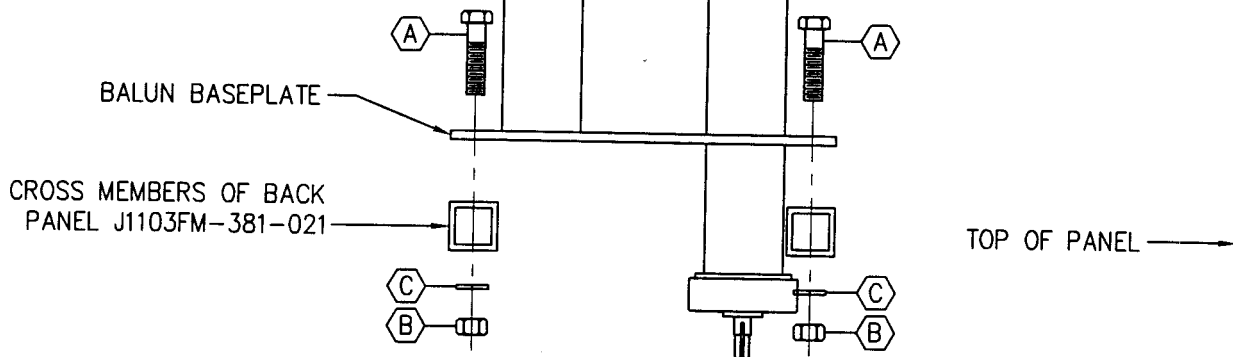
SUPPORT PIPE
MOUNTING HOLES

SUPPORT PIPE
MOUNTING HOLES



FRONT OF PANEL

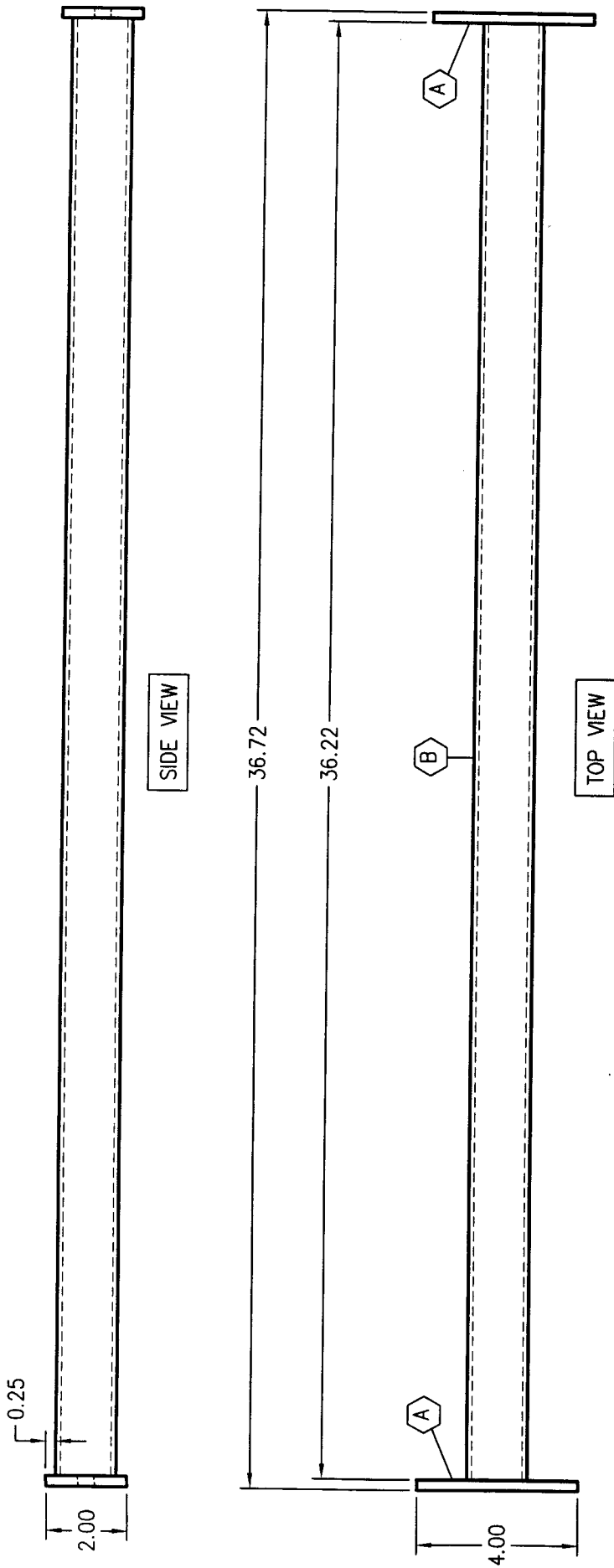
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making 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 foregoing agreement.				MATERIAL:		PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA			
REV.	MADE BY CHECKED BY	DATE	CHANGE			72" x 72" PANEL OUTLINE			
				TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X $\pm 1/16"$ DECIMALS XX $\pm .01"$ DECIMALS XXX $\pm .005"$ ANGLES $\pm 3'$		SIZE A		MODEL: PSIFMPV-3-DA	
						CHANNEL/ FREQUENCY: 88.1 MHz		DRAWN BY: D.G. Kellar	
						SCALE: 1:20		DATE: 5/11/04	
						PART NO.:		APPROVED BY:	
						DRAWING NO.: J1103FM-381-029		DATE:	
								REV. 0	



BACK VIEW

MATERIALS LIST		
ITEM	QTY	SIZE AND DESCRIPTION
A	4	3/8-16 x 1-3/4" HEXHEAD CAPSCREW, ST. ST.
B	4	3/8-16 HEXNUT, ST. ST.
C	4	3/8" HELICAL LOCKWASHER, ST. ST.

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 foregoing agreement.</p>				
<p>MATERIAL:</p>				
<p>PROPAGATION SYSTEMS, INC.</p> <p>Ebensburg, Pennsylvania USA</p> <p>BALUN MOUNTING AND FASTENER DETAILS</p>				
<p>MODEL: PSIFMPV-3-DA</p>		<p>DRAWN BY: D.G. Kellar</p>		
<p>CHANNEL/FREQUENCY: 88.1 MHz</p>		<p>DATE: 6/02/04</p>		
<p>SCALE: 1:4</p>		<p>APPROVED BY:</p>		
<p>PART NO.:</p>		<p>DRAWING NO.: J1103FM-381-033</p>		
<p>TOLERANCES UNLESS OTHERWISE NOTED</p> <p>FRACTIONS X/X ± 1/16"</p> <p>DECIMALS XX ± .01"</p> <p>DECIMALS XXX ± .005"</p> <p>ANGLES ± 3'</p>		<p>SIZE: A</p>		
<p>REV. 0</p>				

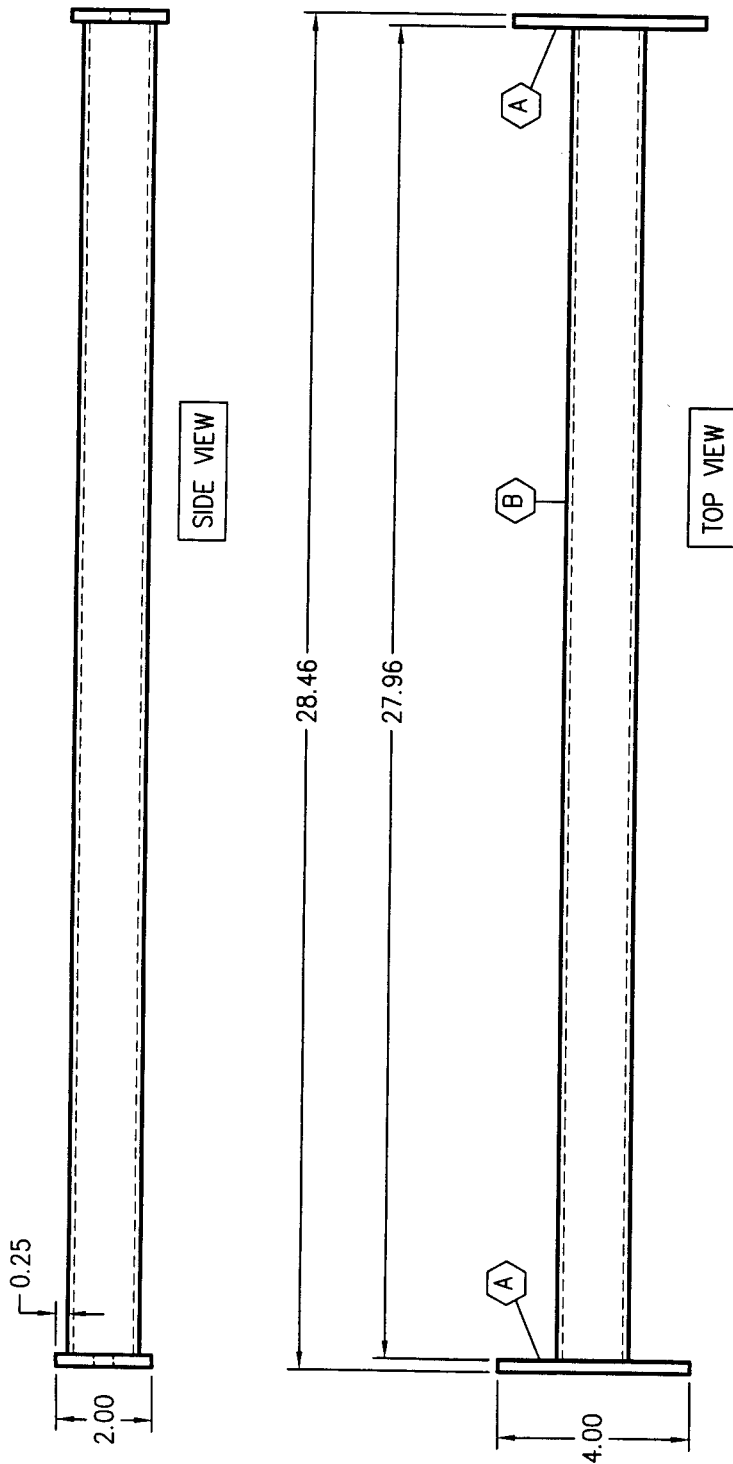


MATERIALS LIST		
ITEM	QTY	SIZE AND DESCRIPTION
A	2	1/4" x 4" x 2" PERFORATED ENDPLATE PER J1103FM-381-024
B	1	1-1/2" x 1-1/2" x 11 GA x 36.22" MILD STEEL TUBING

NOTES:

- (6) ASSEMBLIES REQUIRED
- ASSEMBLY TO BE HOT DIP GALVANIZED.
- ASSEMBLY WEIGHT: 9.1 Lb/EACH

PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA		MODEL: PSIFMPV-3-DA		DRAWN BY: D.G. Keller	DATE: 5/07/04
		CHANNEL/FREQUENCY: 88.1 MHz		APPROVED BY:	DATE:
BRACKET#1 FABRICATION DETAILS		SCALE: 1:1		PART NO.: J1103FM-381-025	
MATERIAL: 1 1/2" x 1 1/2" x 11 GA. SQUARE TUBE, MILD STEEL		TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/8 ± 1/16" DECIMALS XX ± .01" DECIMALS XXX ± .005" ANGLES ± 3°		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 or assist in making or finish any information for the making of any copies, or for the reproduction hereof, or for the design or making of any item, parts, object, apparatus or equipment, without the written permission of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the foregoing agreement.					
REV.	MADE BY	CHECKED BY	DATE	CHANGE	

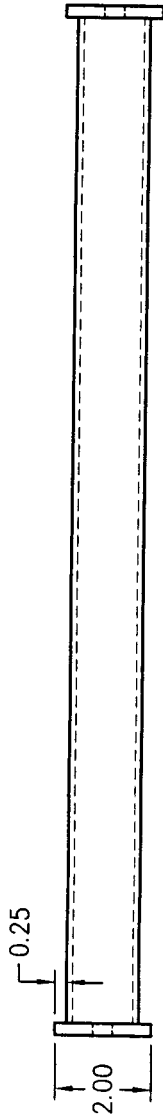


MATERIALS LIST		
ITEM	QTY	SIZE AND DESCRIPTION
A	2	1/4" x 4" x 2" PERFORATED ENDPLATE PER J1103FM-381-024
B	1	1-1/2" x 1-1/2" x 11 GA x 27.96" MILD STEEL TUBING

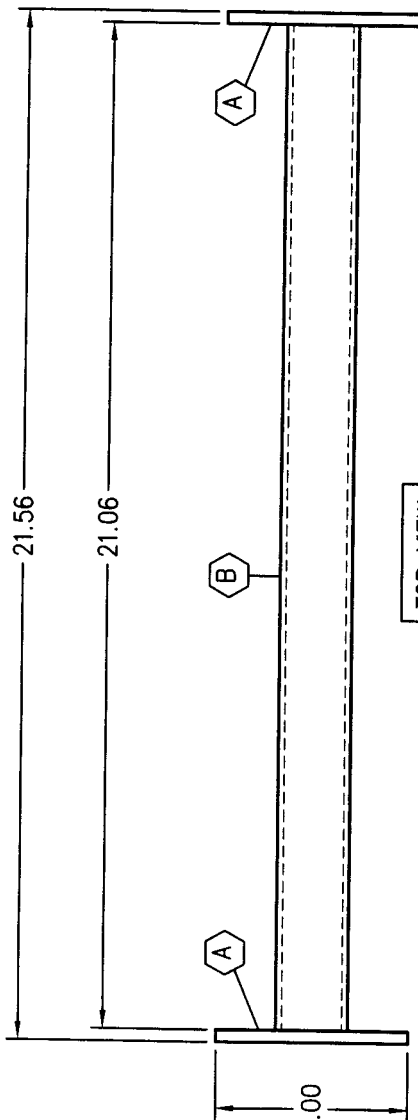
NOTES:

- (6) ASSEMBLIES REQUIRED
- ASSEMBLY TO BE HOT DIP GALVANIZED.
- ASSEMBLY WEIGHT: 7.5 Lb/EACH

PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA		MODEL: PSIFMPV-3-DA		DRAWN BY: D.G. Kellar	DATE: 5/07/04
		CHANNEL/FREQUENCY: 88.1 MHz		APPROVED BY:	DATE:
SCALE: 1:1		PART NO.:		DRAWING NO.: J1103FM-381-026	
MATERIAL: 1 1/2" x 1 1/2" x 11 GA. SQUARE TUBE, MILD STEEL		TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ± 1/16" DECIMALS XX ± .01" ANGLES XXX ± 3°		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 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, sub-assembly or parts thereof, except upon the written permission of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the foregoing agreement.					
REV.	MADE BY	CHECKED BY	DATE	CHANGE	



SIDE VIEW



TOP VIEW

MATERIALS LIST

ITEM	QTY	SIZE AND DESCRIPTION
A	2	1/4" x 4" x 2" PERFORATED ENDPLATE PER J1103FM-381-024
B	1	1-1/2" x 1-1/2" x 11 GA x 21.06" MILD STEEL TUBING

NOTES:

- (2) ASSEMBLIES REQUIRED
- ASSEMBLY TO BE HOT DIP GALVANIZED.
- ASSEMBLY WEIGHT: 6.2 Lb/EACH

PROPAGATION SYSTEMS, INC.

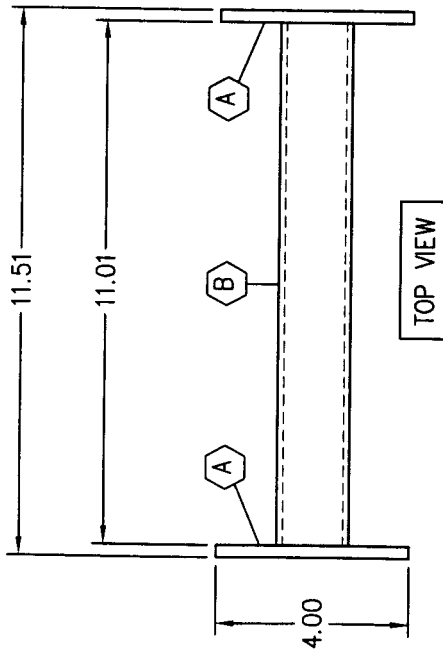
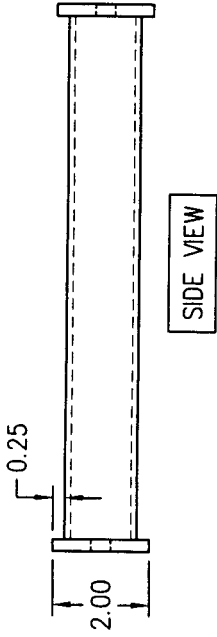
Ebensburg, Pennsylvania USA

BRACKET#3 FABRICATION DETAILS

MODEL:	PSIFMPV-3-DA	DRAWN BY:	D.G. Keller	DATE:	5/07/04
CHANNEL/FREQUENCY:	88.1 MHZ	APPROVED BY:		DATE:	
SCALE:	1:1	PART NO.:	J1103FM-381-027	REV:	0

MATERIAL:		SIZE	
1 1/2" x 1 1/2" x 11 GA. SQUARE TUBE, MILD STEEL		A	
TOLERANCES UNLESS OTHERWISE NOTED		FRACTIONS X/XX ± 1/16"	
		DECIMALS XX ± .01"	
		ANGLES XXX ± 3°	
REV.	MADE BY	DATE	CHANGE

This drawing is loaned subject to the express understanding and agreement that the drawing and information herein 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 design or reproduction of any item, parts, or other reproductions hereof, or for the design or making of any item, parts, or other reproductions hereof, except upon the written permission of PSI first obtained. The acceptance of this drawing will be construed as an acceptance of the foregoing agreement.



MATERIALS LIST		
ITEM	QTY	SIZE AND DESCRIPTION
A	2	1/4" x 4" x 2" PERFORATED ENDPLATE PER J1103FM-381-024
B	1	1-1/2" x 1-1/2" x 11 GA x 11.01" MILD STEEL TUBING

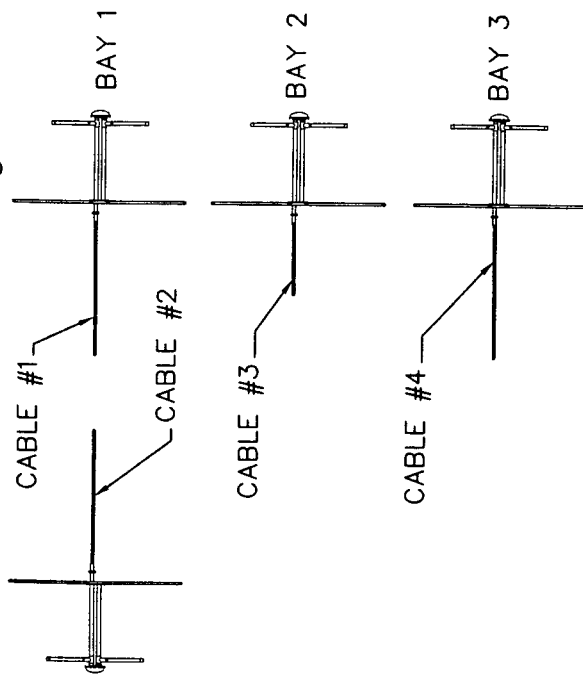
NOTES:

- (2) ASSEMBLIES REQUIRED
- ASSEMBLY TO BE HOT DIP GALVANIZED.
- ASSEMBLY WEIGHT: 4.3 Lb/EACH

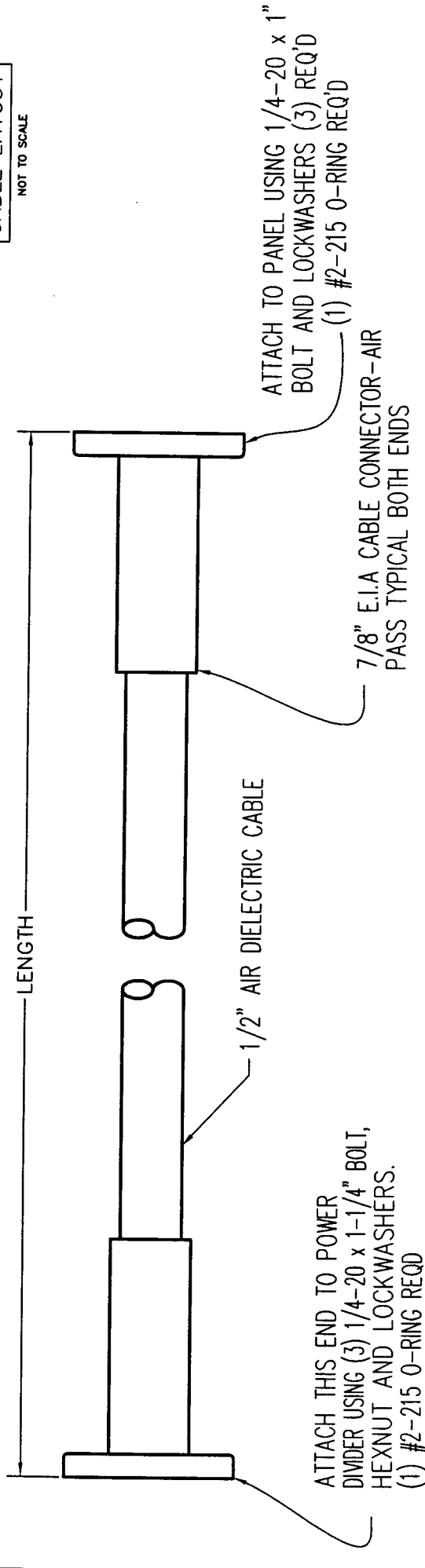
PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA		MODEL: PSIFMPV-3-DA		DRAWN BY: D.G. Keller	DATE: 5/07/04
		CHANNEL FREQUENCY: 88.1 MHZ		APPROVED BY:	DATE:
BRACKET#4 FABRICATION DETAILS		SCALE: 1:1		PART NO.: J1103FM-381-028	
MATERIAL: 1 1/2" x 1 1/2" x 11 GA. SQUARE TUBE, MILD STEEL		SIZE: A		TOLERANCES UNLESS OTHERWISE NOTED: FRACTIONS X/XX ± 1/16" DECIMALS XX ± .01" ANGLES XXX ± .003"	
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 reproduced, 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 foregoing agreement.					

FINISHED CABLE LENGTH:	192.75"	192.75"	70.05"	192.75"	BLE "
CABLE CUT LENGTH:	190"	190"	67.3"	190"	
QUANTITY REQUIRED:	(1)	(1)	(1)	(1)	(1)

BAY #	LENGTH	ORIENTATION
BAY 1	192.75"	5°
BAY 1	192.75"	95°
BAY 2	70.05"	5°
BAY 3	192.75"	5°



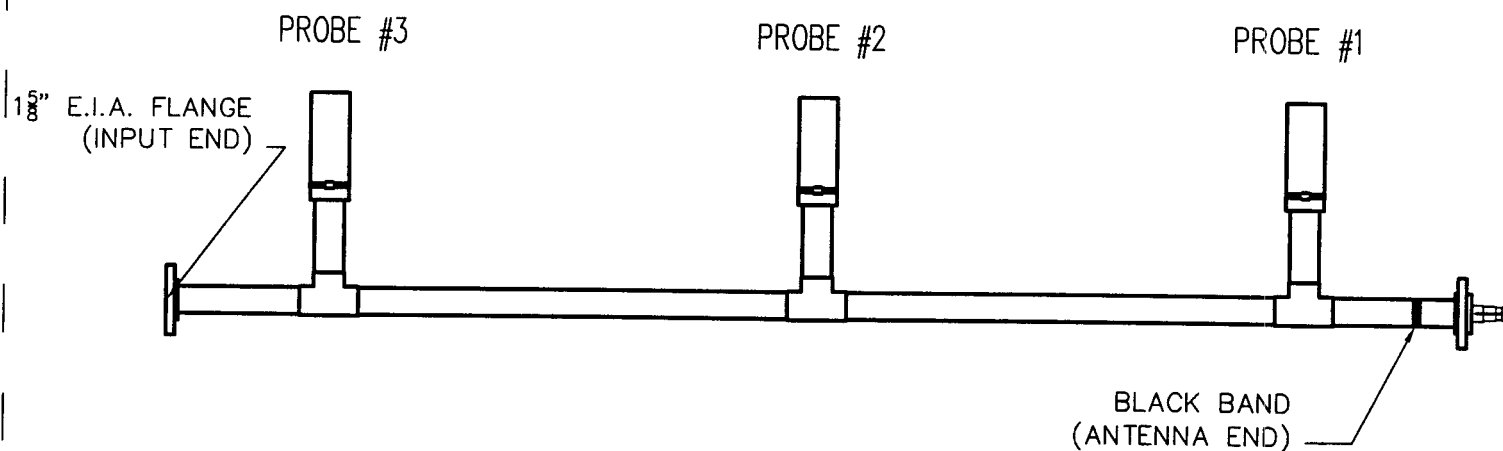
CABLE LAYOUT
NOT TO SCALE



PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA		MATERIAL: NOT APPLICABLE		SIZE A
		TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/4 ± 1/16" DECIMALS XX ± .01" ANGLES XXX ± 3'		
MODEL: PSIFMPV-3-DA CABLE OUTLINE		DRAWN BY: D.G. Kellar DATE: 6/02/04		SCALE: 1:2 PART NO.: J1103FM-381-034 REV. 0
CHANNEL/FREQUENCY: 88.1 MHZ		APPROVED BY:		DATE:
SCALE: 1:2		DRAWING NO.: J1103FM-381-034		REV. 0

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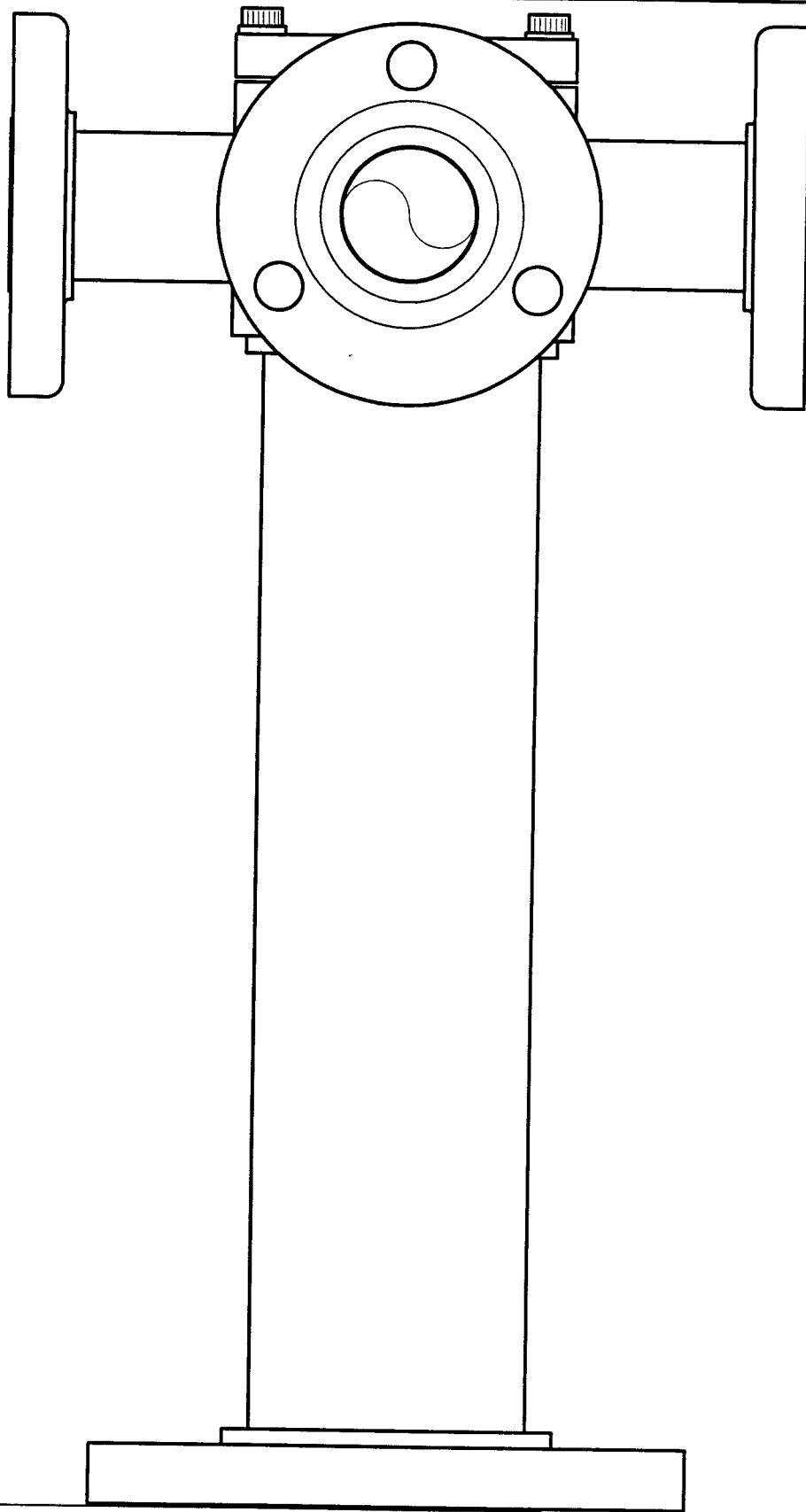
REV.	MADE BY	CHECKED BY	DATE	CHANGE



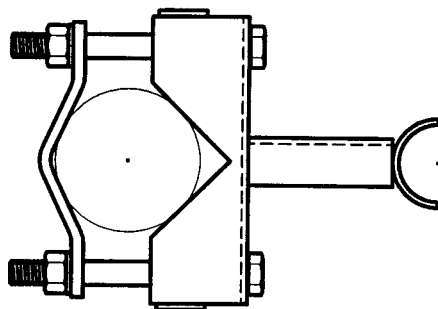
REV.		MADE BY	CHECKED BY	DATE	CHANGE
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used 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 in acceptance of the foregoing agreement.					
MATERIAL:					
PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA					
3 PROBE TUNER ASSEMBLY					
MODEL:			DRAWN BY:		DATE:
			D. RICHEY		1-28-98
CHANNEL / FREQUENCY:			APPROVED BY:		DATE:
SCALE:		PART NO.:		DRAWING NO.:	
1:16		33-00006		33-00006	
					REV. 0



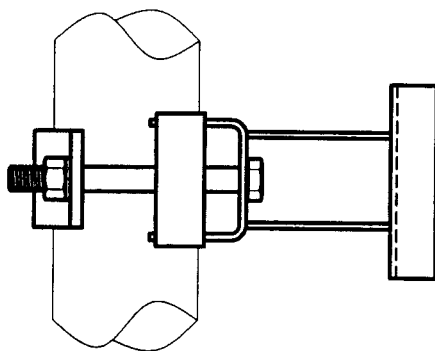
24"



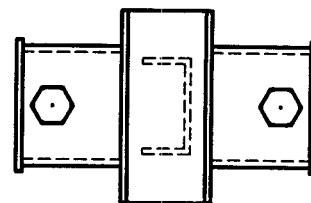
<div><div>MADE BY</div><div>CHECKED BY</div></div>			<div>DATE</div>	<div>CHANGE</div>	MATERIAL: NOT APPLICABLE		PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA 1-5/8" - 7/8" 4-WAY POWER DIVIDER				
<div>This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise used or disposed of, directly or indirectly, and not be used in whole or in part or assist in making or finish any information for the making of drawings, prints or other reproductions hereof, or for the design or making of any item, parts, object, apparatus or parts thereof, except upon written permissions of PSI first obtained. The use of this drawing will be construed as acceptance of the foregoing agreement.</div>					TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ± 1/16" DECIMALS XX ± .01" DECIMALS XXX ± .005" ANGLES ± 3°		SIZE A	MODEL: PSIFMPV-3-DA	DRAWN BY: D.G. Kellar	DATE: 6/02/04	
					CHANNEL/ FREQUENCY: 88.1 MHz		APPROVED BY:		DATE:		
					SCALE: 1:1	PART NO.: 41-00044	DRAWING NO.: J1103FM-381-003		REV. 0		



PLAN VIEW

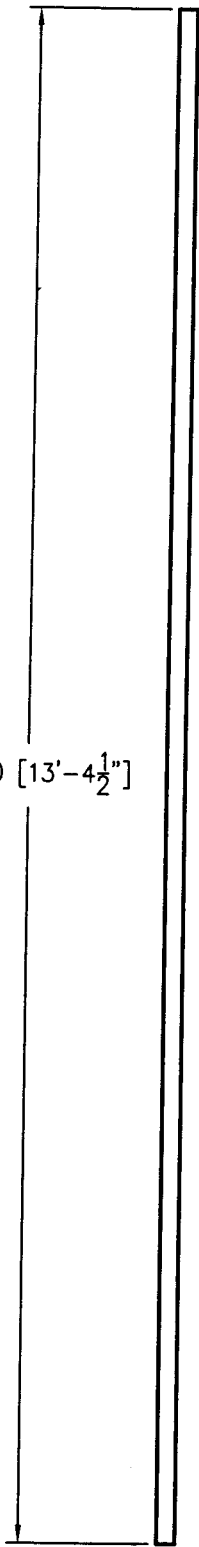


SIDE VIEW



FRONT VIEW

REV. MADE BY CHECKED BY DATE CHANGE				MATERIAL:		PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA			
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 foregoing agreement.				TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ±1/16" DECIMALS XX ±.01" DECIMALS XXX ±.005" ANGLES ± 3'		SIZE A		SUPPORT BRACKET OUTLINE	
MODEL:				DRAWN BY: P. MCINTOSH		DATE: 12-19-00		APPROVED BY:	
CHANNEL/FREQUENCY:				SCALE: 1:4		PART NO.: 33-00030		DRAWING NO.: 33-00030	
REV. 0				DATE:		REV.		0	



160.50 [13'-4 1/2"]

NOTES:
WEIGHT: 36.38 Lb/EACH, 145.52 Lb TOTAL

<div><div>MADE BY</div><div>CHECKED BY</div></div>			<div>DATE</div>	<div>CHANGE</div>	MATERIAL:	PROPAGATION SYSTEMS, INC.			
<div><div>UNLESS OTHERWISE NOTED</div><div>FRACTIONS X/X ± 1/16"</div><div>DECIMALS XX ± .01"</div><div>DECIMALS XXX ± .005"</div><div>ANGLES ± 3°</div></div>						<div>Ebensburg, Pennsylvania USA</div>			
<div><div>THIS DRAWING IS LOANED SUBJECT TO THE EXPRESS UNDERSTANDING AND AGREEMENT THAT THE DRAWING AND INFORMATION THEREIN CONTAINED ARE, AND SHALL REMAIN THE PROPERTY OF PSI, AND WILL NOT BE OTHERWISE USED OR DISPOSED OF, DIRECTLY OR INDIRECTLY, AND NOT BE USED IN WHOLE OR IN PART OR ASSIST IN THE DESIGN OR MAKING OF ANY ITEM, PARTS, OBJECT, APPARATUS OR PARTS THEREOF, EXCEPT UPON WRITTEN PERMISSIONS OF PSI FIRST OBTAINED. THE PLANCE OF THIS DRAWING WILL BE CONSTRUED AS ACCEPTANCE OF THE FORGOING AGREEMENT.</div></div>						ANTENNA SUPPORT MAST OUTLINE			
						MODEL: PSIFMPV-3-DA		DRAWN BY: D.G. Kellar	
CHANNEL/FREQUENCY: 88.1 MHz		APPROVED BY:		DATE:					
SCALE: 1:20		PART NO.:		DRAWING NO.: J1103FM-381-030					
				REV. 0					