



Certification
Directional FM Antenna
Antenna Model: PSIFMR-2-DA-HWS
Frequency: 105.5 MHz
Revised 8-7-2007

KRDO
Optima Communications
Security, CO
Ref. J207FM-574



APPENDIX B
DIRECTIONAL ANTENNA PROOF

KRDO-FM - Security, Colorado
Mullaney Engineering, Inc. - September 2007



Propagation Systems, Inc.

Quality Broadcast Antenna Systems

**Directional FM Antenna
KRDO
Optima Communications
Security, CO**

A standard model PSIFMR antenna was used in conjunction with the customer's Western Electric Type B triangular tower to create the necessary directional radiation pattern. The final antenna consists of two radiating elements each secured to the tower with a custom-mounting bracket, two horizontal and one vertical parasitic element. The antenna bays are half-wave spaced. The antenna array is end fed and has a 1-5/8" EIA input. Each radiating element receives equal power and phase.

Pattern testing was performed using a 1/3 scale model element and tower. The azimuth plane measurements were taken on a ground reflection test range. This type of test range utilizes the reflected signal and direct signal from the source antenna to form an interference pattern on the antenna under test. The antenna and tower 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 316.5 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 89% of the envelope RMS.

The antenna is to be mounted 63 meters (206.6 ft) above ground level on the south tower leg. The tower orientation has been certified by a licensed surveyor. Mounting the antenna directly off the south leg will position it at the correct azimuth bearing of 175.6° True. It is required that a broadcast engineer be 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 1.43 kW will be required at the antenna input in order to reach the licensed 1.6 kW ERP. The transmitter output power requirements are dependent upon the transmission line size and length used to feed the antenna. The final length of transmission line must be determined after installation.

Antenna Specifications

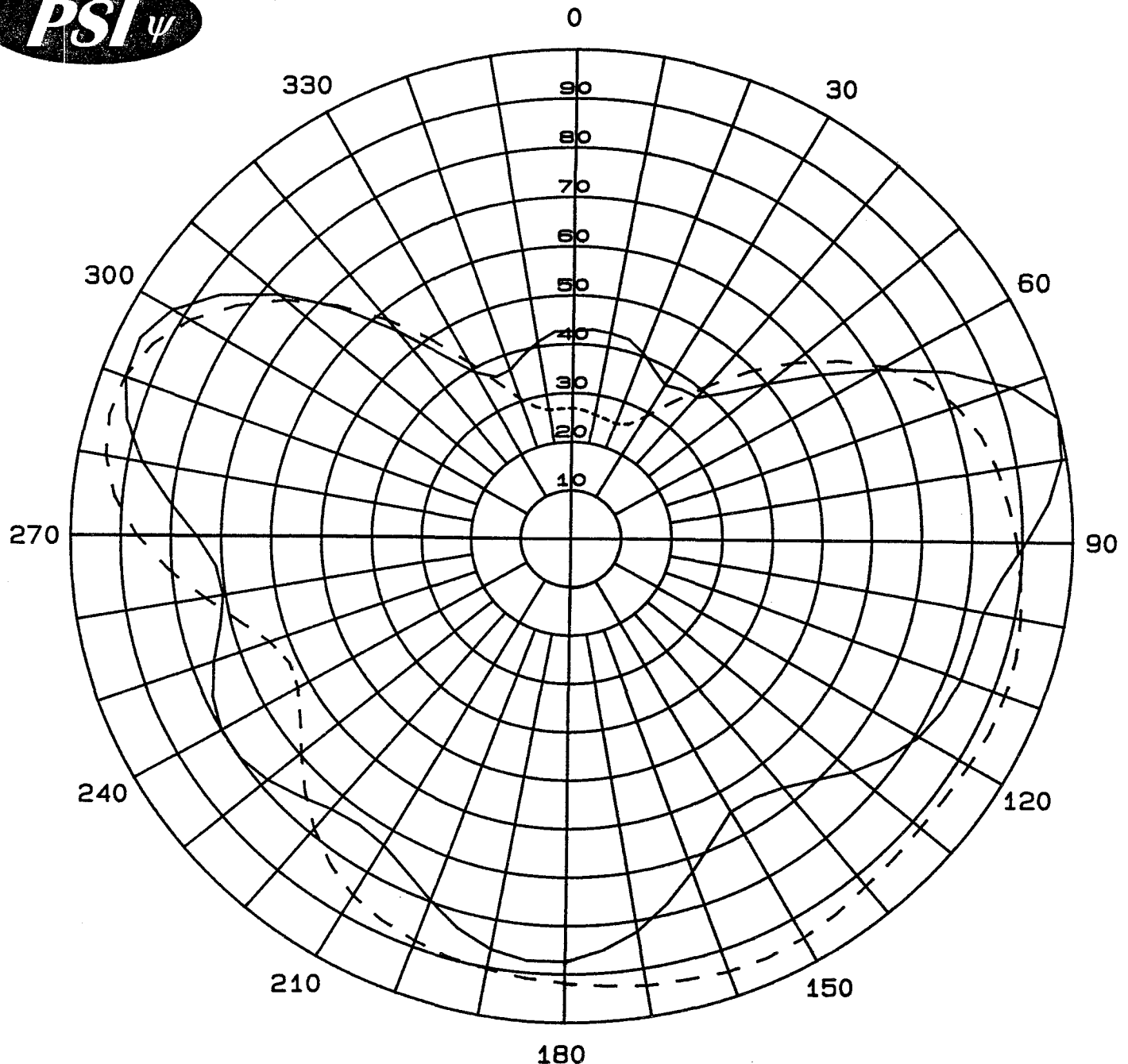
Antenna Model	PSIFMR-2-DA-HWS
Type	2-bay directional FM antenna
Bay Spacing	Half wave spaced elements
Frequency	105.5 MHz
Polarization	Circular
Envelope RMS	.881
Composite RMS	.786
Gain (h-pol)	1.12 (.50 dB)
RMS (h-pol)	.724
Gain (v-pol)	1.03 (.12 dB)
RMS (v-pol)	.757
Input	1-5/8" EIA end fed input
Power rating	9 kW
Length	19.64 ft.
Weight	173 lbs.
Wind Area	20.0 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.

 8/17/2007

Douglas A. Ross
President
Propagation Systems Inc.



Measured Relative Field
Azimuth Plane Pattern
Antenna: PSIFMR-2-DA-HWS
Type: 2-Bay Directional FM
H-pol Gain (solid): 1.12 (.5 dB)
V-pol Gain (dash): 1.03 (.12 dB)
Frequency: 105.5 MHz
KRDO Security, CO

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Revised 8-7-07

Measured Relative Field Tabulation

Antenna: PSIFMR-2-DA-HWS

Optima Communications

Station: KRDO

Frequency: 105.5 MHz

Location: Security, CO

Revised 8-7-07

Horizontal Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.427	0.20	-6.90
10	0.429	0.21	-6.86
20	0.406	0.18	-7.34
30	0.365	0.15	-8.26
40	0.381	0.16	-7.89
50	0.500	0.28	-5.53
60	0.707	0.56	-2.52
70	0.931	0.97	-0.13
80	0.991	1.10	0.41
90	0.907	0.92	-0.36
100	0.837	0.78	-1.05
110	0.832	0.78	-1.11
120	0.807	0.73	-1.37
130	0.740	0.61	-2.12
140	0.664	0.49	-3.06
150	0.647	0.47	-3.29
160	0.729	0.60	-2.25
170	0.821	0.75	-1.22
180	0.873	0.85	-0.69
190	0.861	0.83	-0.81
200	0.797	0.71	-1.48
210	0.735	0.61	-2.18
220	0.735	0.61	-2.18
230	0.783	0.69	-1.63
240	0.800	0.72	-1.45
250	0.757	0.64	-1.93
260	0.705	0.56	-2.54
270	0.748	0.63	-2.03
280	0.870	0.85	-0.72
290	0.951	1.01	0.06
300	0.925	0.96	-0.18
310	0.772	0.67	-1.76
320	0.553	0.34	-4.65
330	0.393	0.17	-7.62
340	0.368	0.15	-8.19
350	0.410	0.19	-7.25

Maximum Value

Field 1.00
Gain 1.12 (.5 dB)
Azimuth Bearing 75 degrees

Minimum Field

Field 0.365
Gain .15 (-8.26 dB)
Azimuth Bearing 30 degrees

Vertical Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.270	0.08	-10.88
10	0.259	0.08	-11.24
20	0.251	0.07	-11.51
30	0.291	0.09	-10.23
40	0.411	0.19	-7.23
50	0.569	0.36	-4.41
60	0.716	0.57	-2.41
70	0.814	0.74	-1.30
80	0.861	0.83	-0.81
90	0.889	0.89	-0.53
100	0.913	0.93	-0.30
110	0.926	0.96	-0.18
120	0.923	0.95	-0.20
130	0.920	0.95	-0.23
140	0.929	0.97	-0.15
150	0.945	1.00	0.00
160	0.946	1.00	0.01
170	0.935	0.98	-0.09
180	0.918	0.94	-0.25
190	0.903	0.91	-0.39
200	0.887	0.88	-0.55
210	0.855	0.82	-0.87
220	0.788	0.70	-1.58
230	0.696	0.54	-2.66
240	0.625	0.44	-3.59
250	0.638	0.46	-3.41
260	0.740	0.61	-2.12
270	0.867	0.84	-0.75
280	0.945	1.00	0.00
290	0.952	1.02	0.06
300	0.884	0.88	-0.58
310	0.755	0.64	-1.95
320	0.582	0.38	-4.21
330	0.417	0.19	-7.11
340	0.306	0.10	-9.79
350	0.268	0.08	-10.95

Maximum Value

Field 0.958
Gain 1.03 (.12 dB)
Azimuth Bearing 285 degrees

Minimum Field

Field 0.251
Gain .07 (-11.51 dB)
Azimuth Bearing 20 degrees

ERP Tabulation

Antenna: PSIFMR-2-DA-HWS

Optima Communications

Station: KRDO

Frequency: 105.5 MHz

Location: Security, CO

Maximum ERP: 1.6 kW (2.04 dBk)

Revised 8-7-07

Horizontal Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.427	0.292	-5.35
10	0.429	0.294	-5.31
20	0.406	0.264	-5.79
30	0.365	0.213	-6.71
40	0.381	0.232	-6.34
50	0.500	0.400	-3.98
60	0.707	0.800	-0.97
70	0.931	1.387	1.42
80	0.991	1.571	1.96
90	0.907	1.316	1.19
100	0.837	1.121	0.50
110	0.832	1.108	0.44
120	0.807	1.042	0.18
130	0.740	0.876	-0.57
140	0.664	0.705	-1.52
150	0.647	0.670	-1.74
160	0.729	0.850	-0.70
170	0.821	1.078	0.33
180	0.873	1.219	0.86
190	0.861	1.186	0.74
200	0.797	1.016	0.07
210	0.735	0.864	-0.63
220	0.735	0.864	-0.63
230	0.783	0.981	-0.08
240	0.800	1.024	0.10
250	0.757	0.917	-0.38
260	0.705	0.795	-1.00
270	0.748	0.895	-0.48
280	0.870	1.211	0.83
290	0.951	1.447	1.60
300	0.925	1.369	1.36
310	0.772	0.954	-0.21
320	0.553	0.489	-3.10
330	0.393	0.247	-6.07
340	0.368	0.217	-6.64
350	0.410	0.269	-5.70

Maximum Value (H-pol)

Field 1.00

ERP 1.6 kW (2.04 dBk)

Azimuth Bearing 75 degrees

Minimum Field (H-pol)

Field 0.365

ERP .213 kW (-6.71 dBk)

Azimuth Bearing 30 degrees

Vertical Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.270	0.117	-9.33
10	0.259	0.107	-9.69
20	0.251	0.101	-9.97
30	0.291	0.135	-8.68
40	0.411	0.270	-5.68
50	0.569	0.518	-2.86
60	0.716	0.820	-0.86
70	0.814	1.060	0.25
80	0.861	1.186	0.74
90	0.889	1.265	1.02
100	0.913	1.334	1.25
110	0.926	1.372	1.37
120	0.923	1.363	1.35
130	0.920	1.354	1.32
140	0.929	1.381	1.40
150	0.945	1.429	1.55
160	0.946	1.432	1.56
170	0.935	1.399	1.46
180	0.918	1.348	1.30
190	0.903	1.305	1.15
200	0.887	1.259	1.00
210	0.855	1.170	0.68
220	0.788	0.994	-0.03
230	0.696	0.775	-1.11
240	0.625	0.625	-2.04
250	0.638	0.651	-1.86
260	0.740	0.876	-0.57
270	0.867	1.203	0.80
280	0.945	1.429	1.55
290	0.952	1.450	1.61
300	0.884	1.250	0.97
310	0.755	0.912	-0.40
320	0.582	0.542	-2.66
330	0.417	0.278	-5.56
340	0.306	0.150	-8.24
350	0.268	0.115	-9.40

Maximum Value (V-pol)

Field 0.958

ERP 1.47 kW (1.67 dBk)

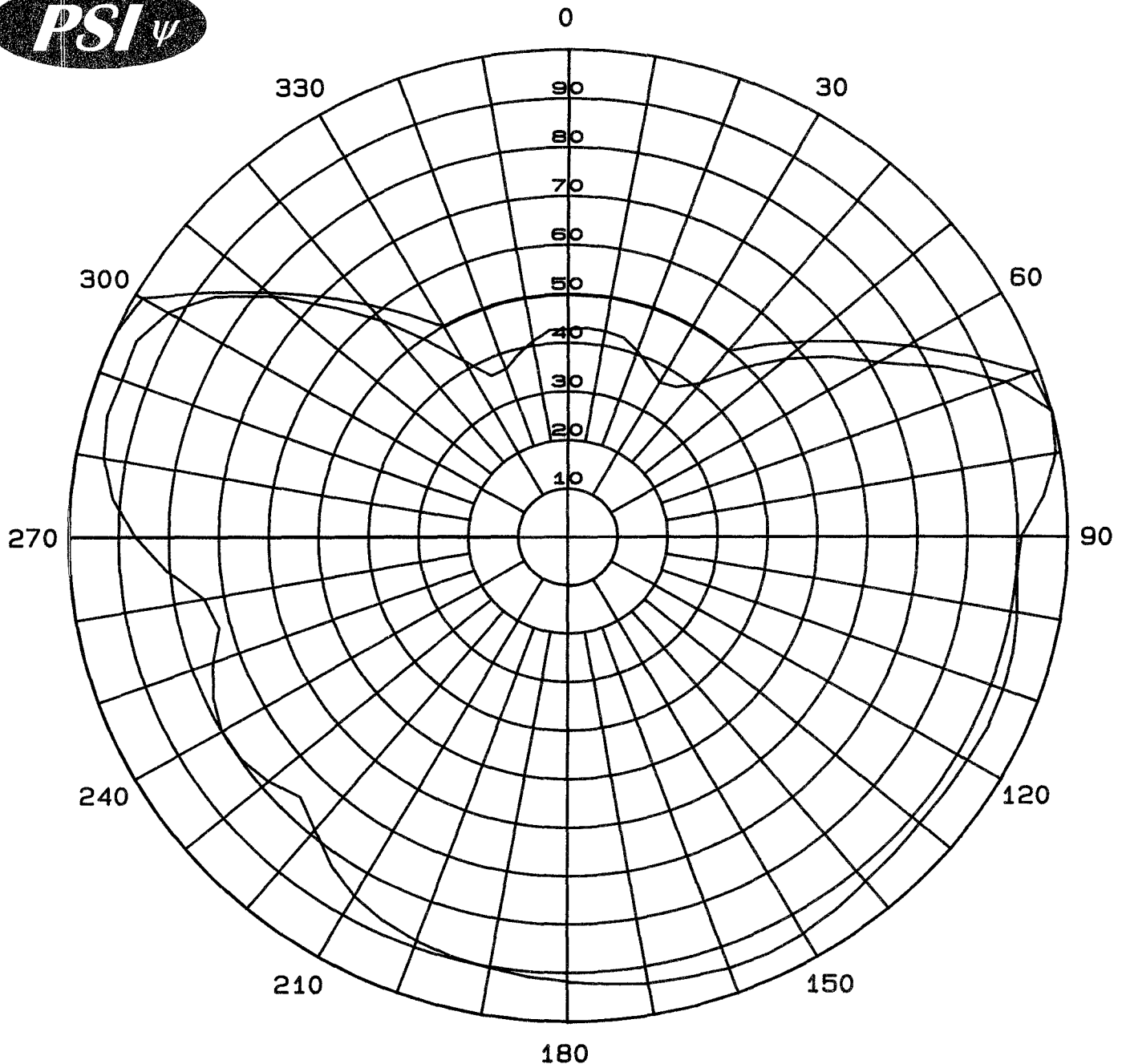
Azimuth Bearing 285 degrees

Minimum Field (V-pol)

Field 0.251

ERP .101 kW (-9.97 dBk)

Azimuth Bearing 20 degrees



Measured Composite and
Maximum Envelope Pattern
Antenna: PSIFMR-2-DA-HWS
Type: 2-Bay Directional FM
Composite RMS: .786
Envelope RMS: .881
Frequency: 105.5 MHz
KRDO Security, CO

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Composite Pattern Tabulation

Antenna: PSIFMR-2-DA-HWS

Optima Communications

Station: KRDO

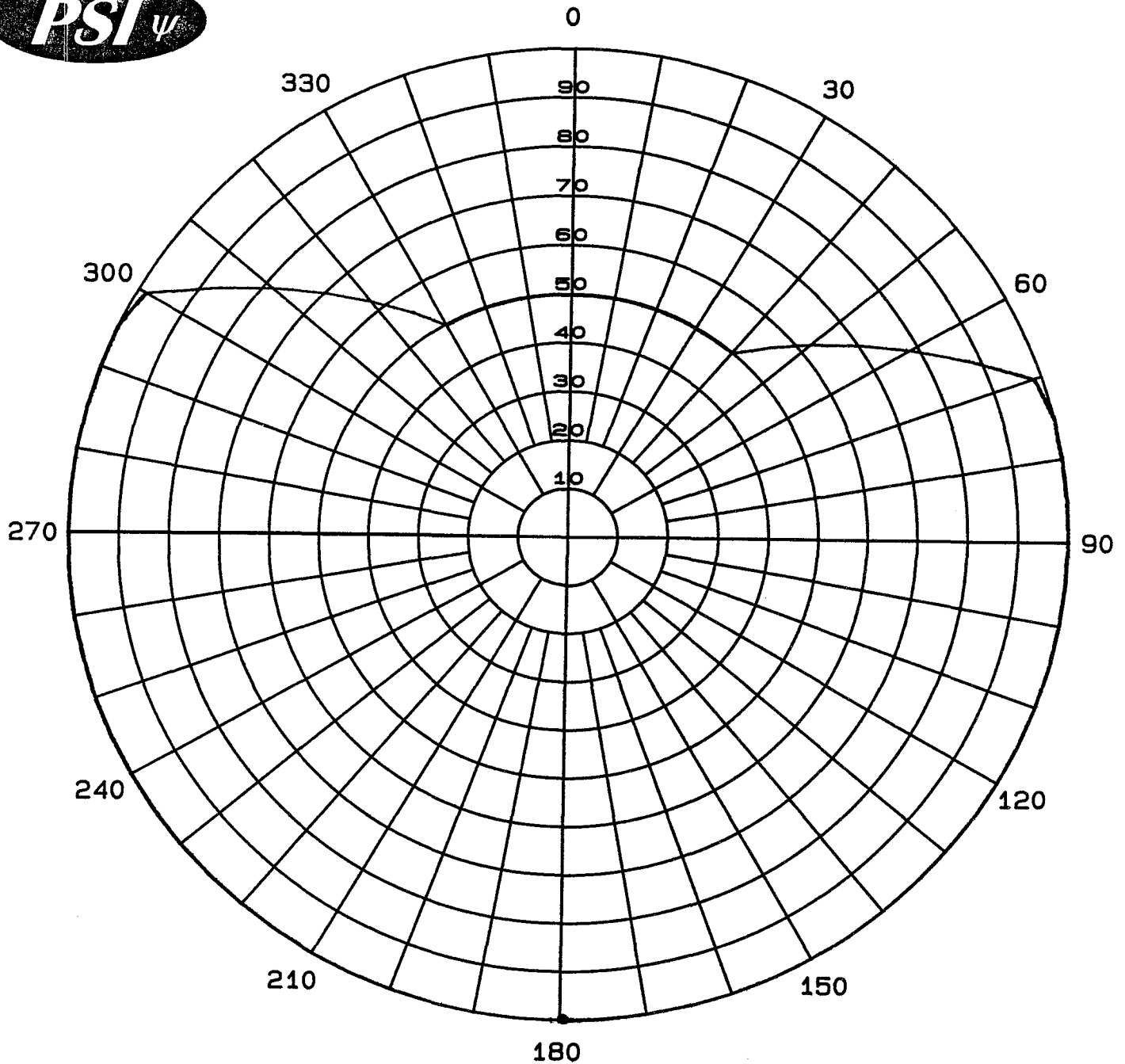
Frequency: 105.5 MHz

Location: Security, CO

Maximum ERP: 1.6 kW (2.04 dBk)

Revised 8-7-07

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.427	0.29	-5.35
10	0.429	0.29	-5.31
20	0.406	0.26	-5.79
30	0.365	0.21	-6.71
40	0.411	0.27	-5.68
50	0.569	0.52	-2.86
60	0.716	0.82	-0.86
70	0.931	1.39	1.42
75	1.000	1.60	2.04
80	0.991	1.57	1.96
90	0.907	1.32	1.19
100	0.913	1.33	1.25
110	0.926	1.37	1.37
120	0.923	1.36	1.35
130	0.920	1.35	1.32
140	0.929	1.38	1.40
150	0.945	1.43	1.55
160	0.946	1.43	1.56
170	0.935	1.40	1.46
180	0.918	1.35	1.30
190	0.903	1.30	1.15
200	0.887	1.26	1.00
210	0.855	1.17	0.68
220	0.788	0.99	-0.03
230	0.783	0.98	-0.08
240	0.800	1.02	0.10
250	0.757	0.92	-0.38
260	0.740	0.88	-0.57
270	0.867	1.20	0.80
280	0.945	1.43	1.55
290	0.952	1.45	1.61
300	0.925	1.37	1.36
310	0.772	0.95	-0.21
320	0.582	0.54	-2.66
330	0.417	0.28	-5.56
340	0.368	0.22	-6.64
350	0.410	0.27	-5.70



Maximum Envelope
Relative Field Pattern
Antenna: PSIFMR-2-DA-HWS
Type: 2-Bay Directional FM
Peak ERP: 1.60 kW (2.04 dBk)
Envelope RMS: .881
Frequency: 105.5 MHz
KRDO Security, CO

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Revised 8-7-07

Maximum Envelope Tabulation

Antenna: PSIFMR-2-DA-HWS

Optima Communications

Station: KRDO

Frequency: 105.5 MHz

Location: Security, CO

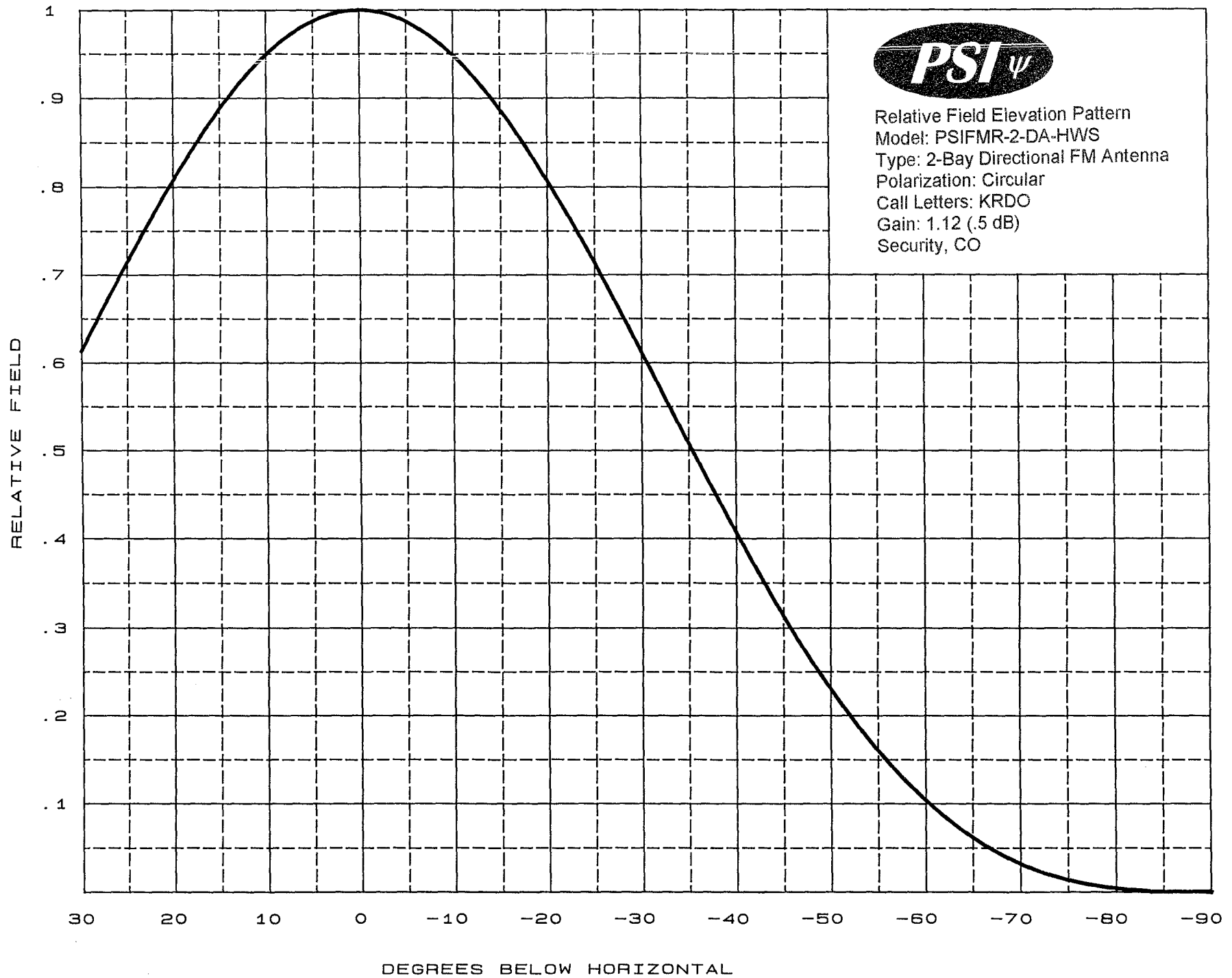
Maximum ERP: 1.6 kW (2.04 dBk)

Revised 8-7-07

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.498	0.40	-4.01
10	0.498	0.40	-4.01
20	0.498	0.40	-4.01
30	0.498	0.40	-4.01
40	0.498	0.40	-4.01
50	0.625	0.63	-2.04
60	0.785	0.99	-0.06
70	0.985	1.55	1.91
80	1.000	1.60	2.04
90	1.000	1.60	2.04
100	1.000	1.60	2.04
110	1.000	1.60	2.04
120	1.000	1.60	2.04
130	1.000	1.60	2.04
140	1.000	1.60	2.04
150	1.000	1.60	2.04
160	1.000	1.60	2.04
165	1.000	1.60	2.04
170	1.000	1.60	2.04
180	1.000	1.60	2.04
190	1.000	1.60	2.04
200	1.000	1.60	2.04
210	1.000	1.60	2.04
220	1.000	1.60	2.04
230	1.000	1.60	2.04
240	1.000	1.60	2.04
250	1.000	1.60	2.04
260	1.000	1.60	2.04
270	1.000	1.60	2.04
280	1.000	1.60	2.04
290	1.000	1.60	2.04
300	0.985	1.55	1.91
310	0.785	0.99	-0.06
320	0.625	0.63	-2.04
330	0.498	0.40	-4.01
340	0.498	0.40	-4.01
350	0.498	0.40	-4.01



Relative Field Elevation Pattern
Model: PSIFMR-2-DA-HWS
Type: 2-Bay Directional FM Antenna
Polarization: Circular
Call Letters: KRDO
Gain: 1.12 (.5 dB)
Security, CO



INSTRUCTION MANUAL
KRDO
Optima Communications
Security, CO
105.5 MHz
Antenna Model: PSIFMR-2-DA-HWS
Revised 8-7-07

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 it's agent prior to assembling the antenna. If any parts are damaged through shipment or are missing, promptly notify the shipping carrier and PSI.

General Notes:

1. Review the antenna elevation and plan the installation. The antenna brackets have been designed for tower leg mount and must be installed on the south tower leg. Be aware of possible mounting conflicts such as other antennas, guy wires, tower leg flanges, conduits etc. and plan accordingly.
2. All bays are to be aligned to the same azimuth angle.
3. Use only the supplied hardware and O-ring at all 1-5/8" 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. Check a bracket on the tower for proper fit.
6. Install one bay/inter-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 must be pressurized with dry air or nitrogen.
9. The antenna has been tuned at the factory but may require field adjustment of the fine matcher.
10. The antenna system should be tested before the erector leaves the premises to insure that the complete antenna system is functioning properly.

Installation Procedure

Step One

The antenna is to mount to the south tower leg with the antenna positioned 175.6° true. The brackets are designed for an angle tower leg and are self aligning for the proper azimuth orientation. The antenna center of radiation will be 63 meters (206.6 ft.) above ground level. No other antenna can be installed within 15 ft. of either radiating element.

Step Two

Attach bay one to the inter-bay one block with the 5/16-18 x 7/8" bolts, locks and O-ring. Inter-bay one block has been pre-attached to the shorting stub. The radomes must be positioned with the red band up and the weep holes down. Refer the drawing J207FM-574-007 for an over view. Next attach the bay bracket to the antenna boom using the supplied #28 hose clamps. Attach an inter-bay parasitic to the tee block with the supplied 5/16-18 x 1" bolts, flats and lock washers. Attach a bracket parasitic using the 5/16-18 x 2" bolts, nuts and locks. Bay one/inter-bay one is now ready to be installed on the tower. **Use caution when erecting the assembly. The inter-bay inner conductor is not captivated. Secure the inter-bay inner conductor before erecting.**

Step Three

Hoist the antenna bay to the proper elevation and secure to the south tower leg with the supplied backing channel using the ½-13 x 6" bolts, nuts and locks. See drawing J207FM-574-007 and 002 for an overview. Next attach the vertical parasitic to the back channel of the bay bracket with the supplied 3/8-16 x 1" bolts, nuts and locks. Position the vertical parasitic element with the black band up. See drawing J207FM-574-016.

Step Four

Next attach bay two to the inter-bay two block with the 5/16-18 x 7/8" bolts, locks and O-ring. The radomes must be positioned with the red band down and the weep holes down. Refer to drawing J207FM-574-006. Next attach the bay bracket to the antenna boom using the supplied #28 hose clamps. Attach an inter-bay parasitic to the tee block with the supplied 5/16-18 x 1" bolts, flats and lock washers. Attach a bracket parasitic using the 5/16-18 x 2" bolts, nuts and locks. Bay two/inter-bay two is now ready to be installed on the tower. **Use caution when erecting the assembly. The inter-bay inner conductor is not captivated. Secure the inter-bay inner conductor before erecting.**

Step Five

Hoist the antenna bay/inter-bay assembly to the proper elevation and connect to inter-bay one that was previously installed on the tower. Secure to the south tower leg with the supplied backing channel using the ½-13 x 6" bolts, nuts and locks. Next attach the vertical parasitic to the back channel of the bay bracket with the supplied 3/8-16 x 1" bolts, nuts and locks. Position the vertical parasitic element with the black band up. See drawing J207FM-574-016. Hoist the fine matcher and connect to the input section using the supplied 5/16-18 x 1-1/4" bolts, nuts, locks and O-ring. Position the fine matcher with the black band up. Secure the fine matcher to the tower with the inter-bay support bracket.

Step Six

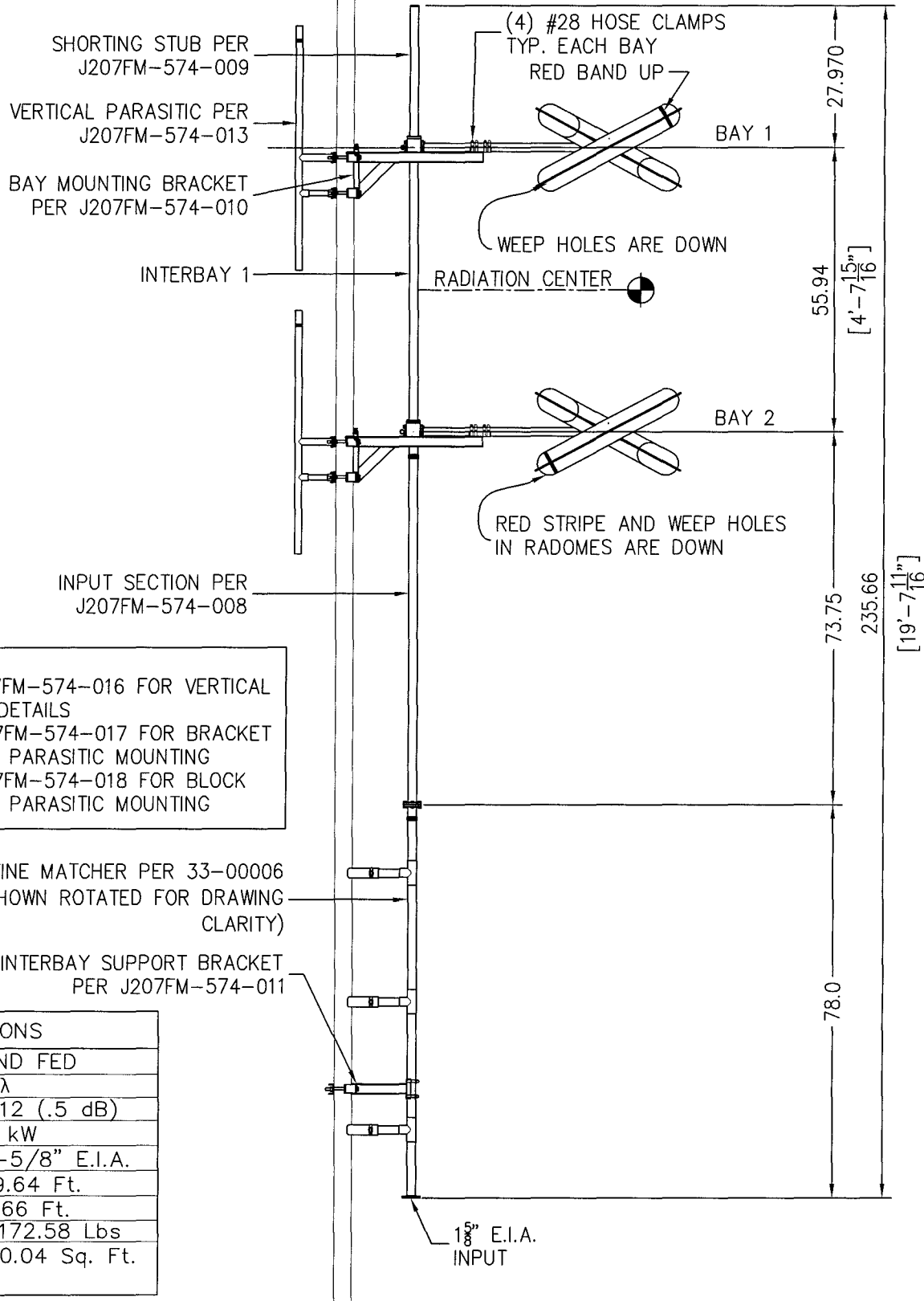
Check all bolted connections for tightness. Connect the main transmission line to the antenna input located at the base of the input section. Do not allow the weight of the feed line to be supported by the antenna. It is required the antenna system be pressurized to a maximum of 5 lbs. with dry air or nitrogen. If the VSWR is greater than 1.15:1 contact the factory at phone number 814-472-5540 before making adjustments to the fine matcher or applying full power to the antenna.

Drawing Index

<u>Drawing</u>	<u>Title</u>
J207FM-574-001	Antenna Elevation
J207FM-574-002	Antenna Orientation Rev A
J207FM-574-007	Bay One Assembly
J207FM-574-006	Bay Two Assembly
J207FM-574-019	Inter-Bay Parasitic Mounting
J207FM-574-017	Bracket Parasitic Mounting
J207FM-574-016	Vertical Parasitic Mounting
J207FM-574-014	Inter-bay Parasitic Outline
J207FM-574-015	Bracket Parasitic Outline
J207FM-574-013	Vertical Parasitic Outline
J207FM-574-010	Bay Bracket
J207FM-574-011	Inter-Bay Bracket
33-00006	Fine Matcher

Antenna Specifications

Model	PSIFMR-2-DA-HWS
Description	2-Bay Medium "Power-Tiller" FM Broadcast Antenna Directional with radomes and half-wave spaced
Frequency	105.5 MHz
Polarization	Circular
Envelope RMS	.881
Composite RMS	.786
Gain H-pol	1.12 (.5 dB)
RMS H-pol	.724
Gain V-pol	1.03 (.12 dB)
RMS V-pol	.757
Input	1-5/8" EIA end fed
Rating	9 kW
Length	19.64 ft.
Antenna Weight	173 lbs.
Wind Area	20.0 sq. ft.



- NOTES:
1. REF. DRAWING J207FM-574-016 FOR VERTICAL PARASITIC MOUNTING DETAILS
 2. REF. DRAWING J207FM-574-017 FOR BRACKET MOUNTED HORIZONTAL PARASITIC MOUNTING
 3. REF. DRAWING J207FM-574-018 FOR BLOCK MOUNTED HORIZONTAL PARASITIC MOUNTING

SPECIFICATIONS

CONFIGURATION: END FED

SPACING: $.5\lambda$

GAIN: 1.12 (.5 dB)

RATING: 9 kW

INPUT: 1-5/8" E.I.A.

LENGTH: 19.64 Ft.

APERTURE: 4.66 Ft.

WEIGHT: ± 172.58 Lbs

WIND AREA: 20.04 Sq. Ft.
(NO ICE)

PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

ANTENNA ELEVATIONS AND SPECIFICATIONS

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.

SIZE

A

MODEL: PSIFMR-2-DA-HWS

DRAWN BY: D.G. Kellar

DATE: 2/16/07

CHANNEL/FREQUENCY: 105.5 MHz

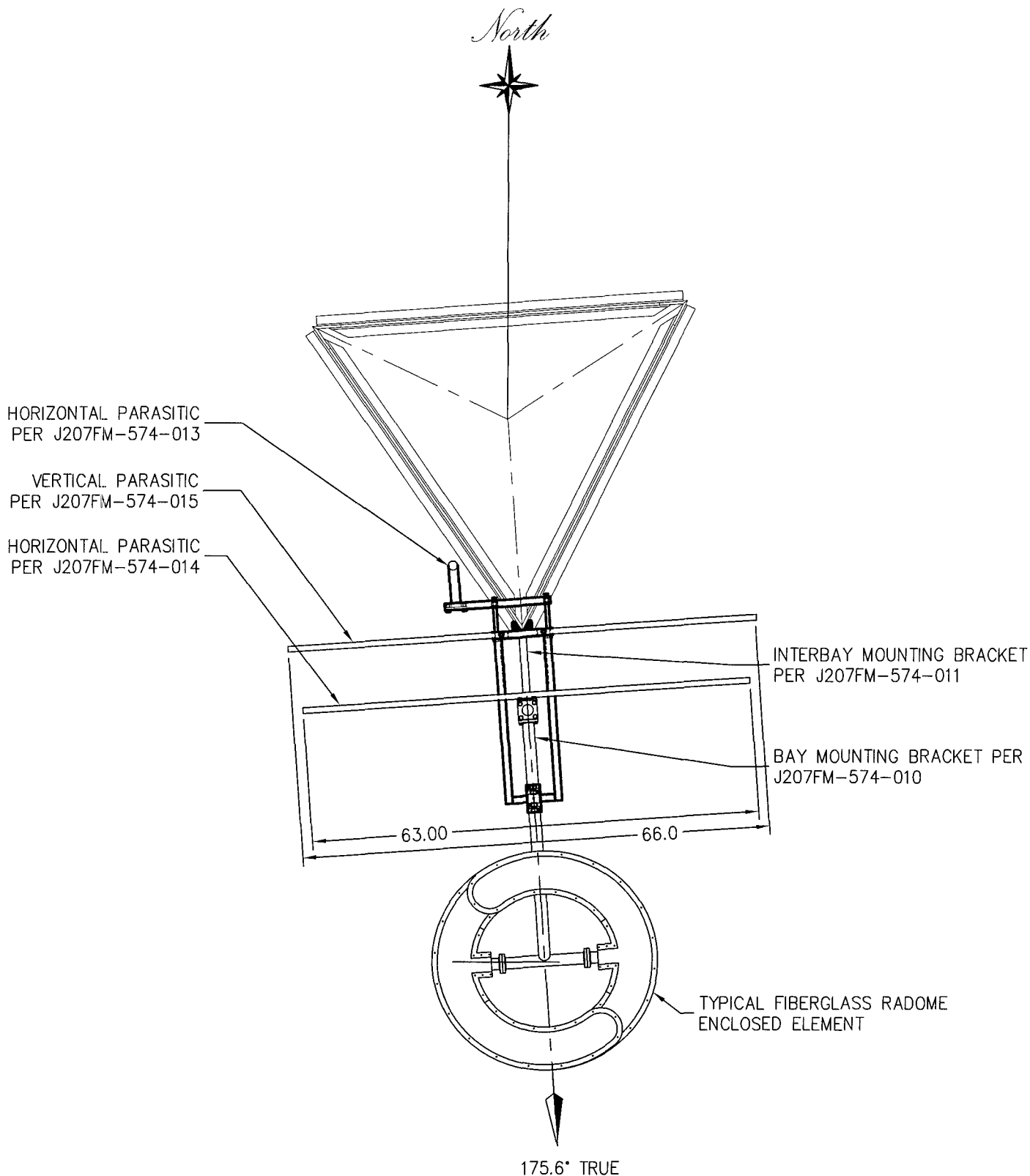
APPROVED BY:

DATE:

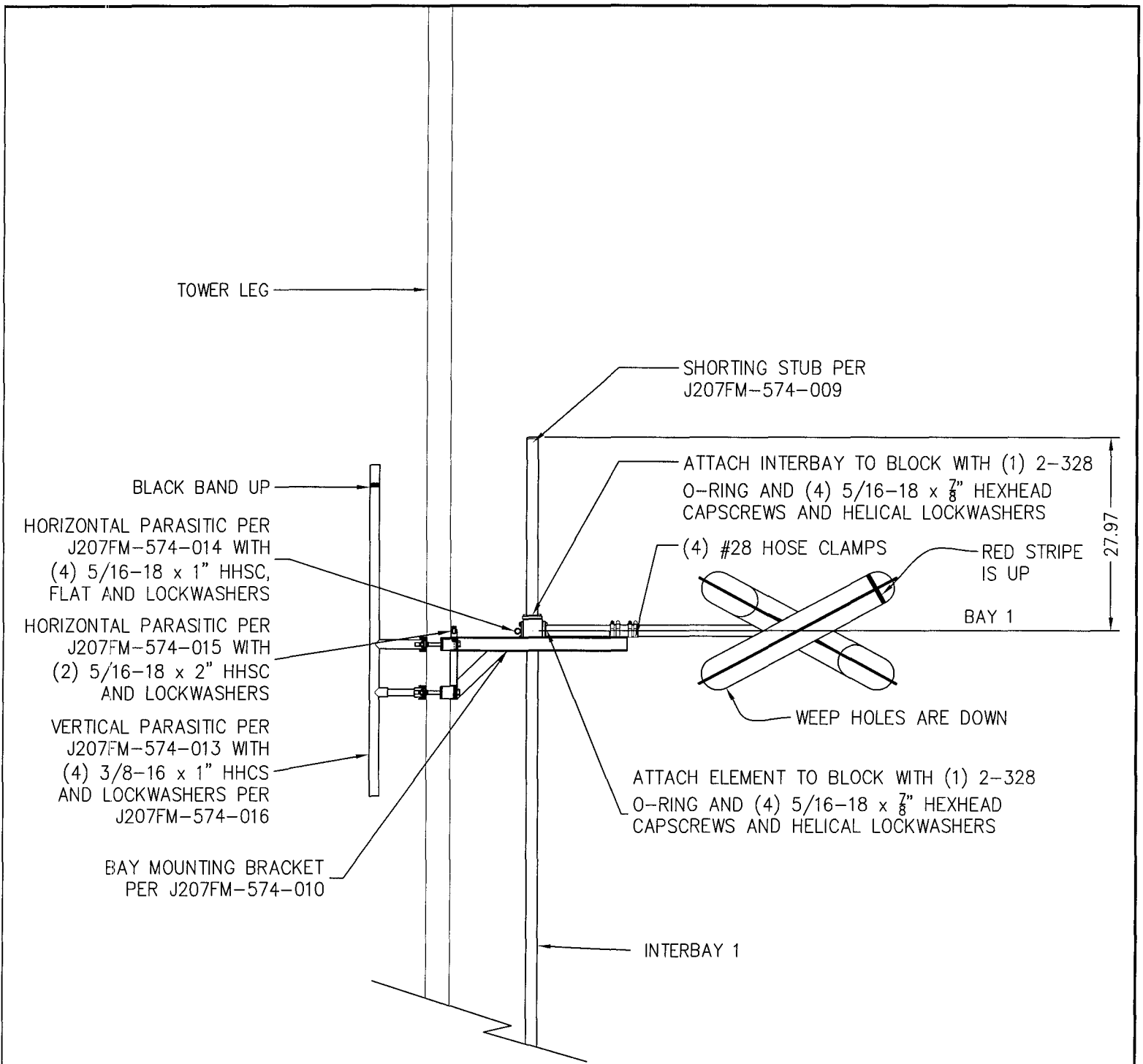
SCALE: 1:30

DRAWING NO.: J207FM-574-001

REV. 0



A	D.G. Kellar	8/22/07	CORRECT ANTENNA ORIENTATION
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		PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA 814-472-5540 ANTENNA PLANVIEW AND ORIENTATION	
MODEL: PSIFMR-2-DA-HWS		DRAWN BY: D.G. Kellar	
CHANNEL/FREQUENCY: 105.5 MHz		DATE: 2/22/07	
SCALE: 1:20		APPROVED BY:	
		DRAWING NO.: J207FM-574-002	
		REV. A	



REV.	MADE BY	CHECKED BY	DATE	CHANGE

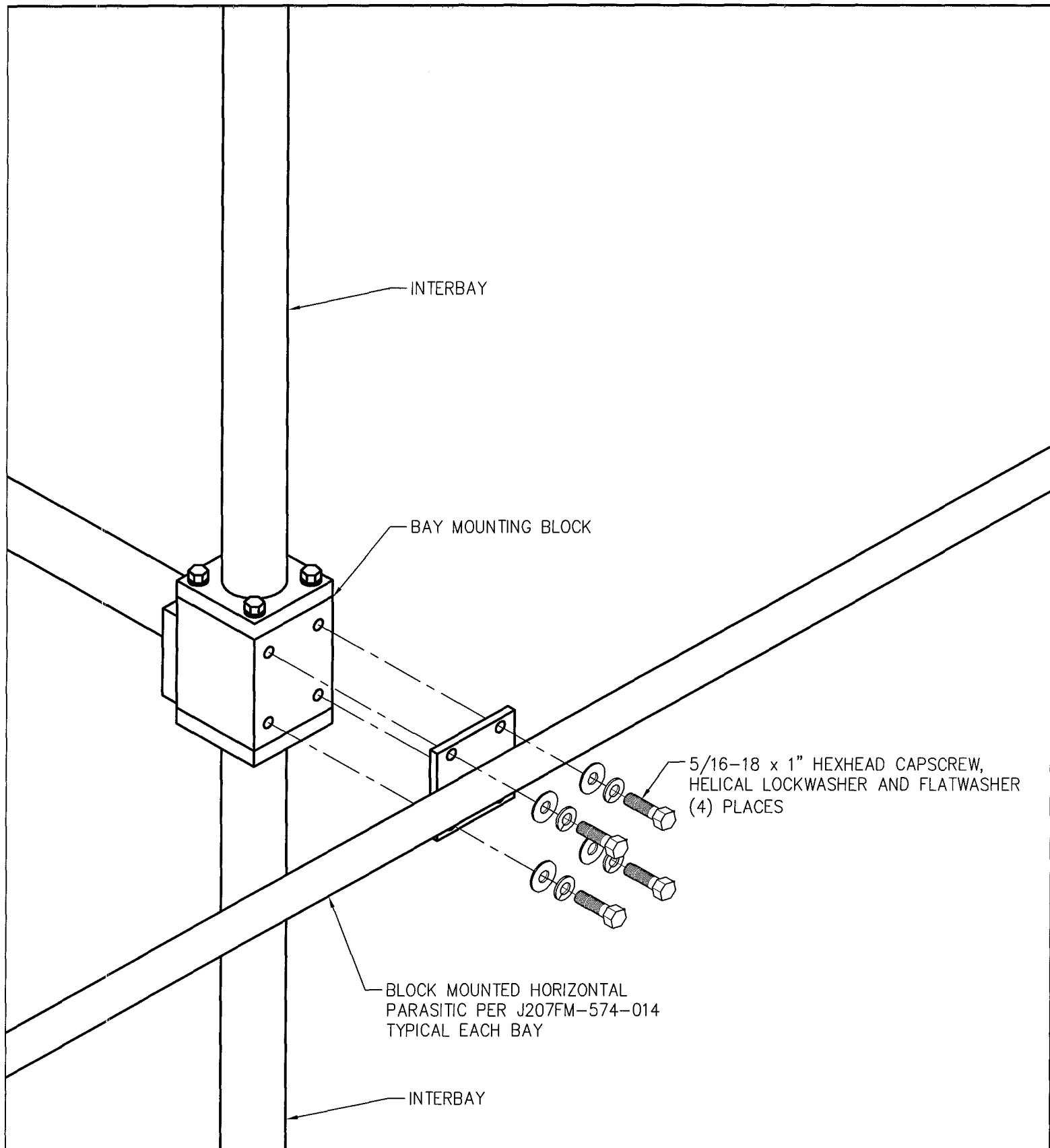
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in whole or in part or assist in making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

PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

BAY 1 ASSEMBLY DETAILS			
MODEL:	PSIFMR-2-DA-HWS	DRAWN BY:	D.G. Kellar
CHANNEL/FREQUENCY:	105.5 MHz	APPROVED BY:	
SCALE:	1:20	DRAWING NO.:	J207FM-574-007
		DATE:	4/17/07
		REV.	0



REV. MADE BY CHECKED BY DATE			PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA 814-472-5540		
CHANGE			HORIZONTAL PARASITIC ELEMENT MOUNTING DETAIL		
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: PSIFMR-2-DA-HWS		DRAWN BY: D.G. Kellar
SIZE A			CHANNEL / FREQUENCY: 105.5 MHz		DATE: 4/23/07
SCALE: 1: 4			DRAWING NO.: J207FM-574-019		REV. 0

5/16-18 x 2" HEXHEAD CAPSCREW,
HEXNUT AND HELICAL LOCKWASHER
STAINLESS STEEL (2) PLACES EACH
BAY

HORIZONTAL PARASITIC PER
J207FM-574-015 EACH BAY

BAY MOUNTING BRCKET PER
J207FM-574-010 EACH BAY

2.0

			PROPAGATION SYSTEMS, INC.					
			Ebensburg, Pennsylvania USA 814-472-5540					
			BRACKET MOUNTED HORIZONTAL PARASITIC MOUNTING					
REV.	MADE BY CHECKED BY	DATE	CHANGE	MODEL: PSIFMR-2-DA-HWS	DRAWN BY: D.G. Kellar	DATE: 3/27/07		
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: 105.5 MHz		APPROVED BY:	DATE:	
				SCALE: 1:1		DRAWING NO.: J207FM-574-017		REV. 0
				SIZE A				

VERTICAL PARASITIC PER
J207FM-574-013

(2) 3/8-16 x 1" HEXHEAD
GALVANIZED BOLT, HEXNUTS
AND HELICAL LOCKWASHERS

ANGLE TOWER LEG

BAY MOUNTING BRACKET
PER J207FM-574-010

(2) 3/8-16 x 1" HEXHEAD
GALVANIZED BOLT, HEXNUTS
AND HELICAL LOCKWASHERS

1/2-13 x 6" ALL THREAD
HEXHEAD GALVANIZED BOLT,
HEXNUT AND HELICAL
LOCKWASHER

PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA 814-472-5540

VERTICAL PARASITIC MOUNTING

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

MODEL: PSIFMR-2-DA-HWS

CHANNEL/
FREQUENCY: 105.5 MHz

SCALE: 1:2

DRAWN BY: D.G. Kellar

APPROVED BY:

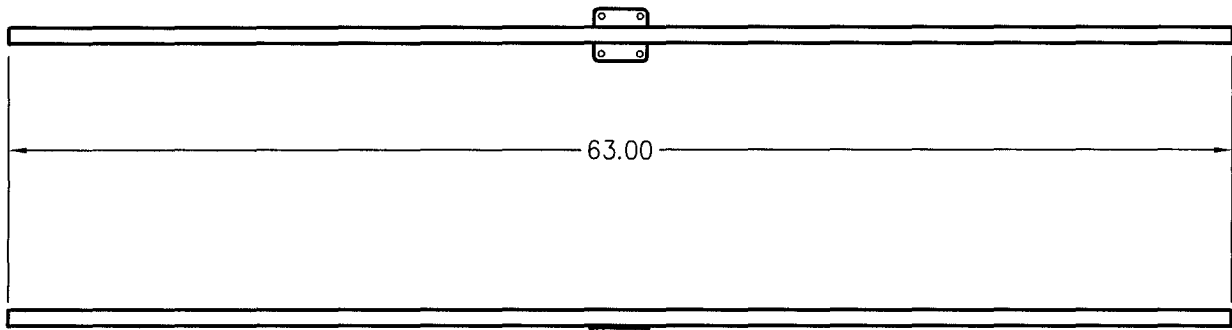
DRAWING NO.:

J207FM-574-016

DATE: 3/27/07

DATE:

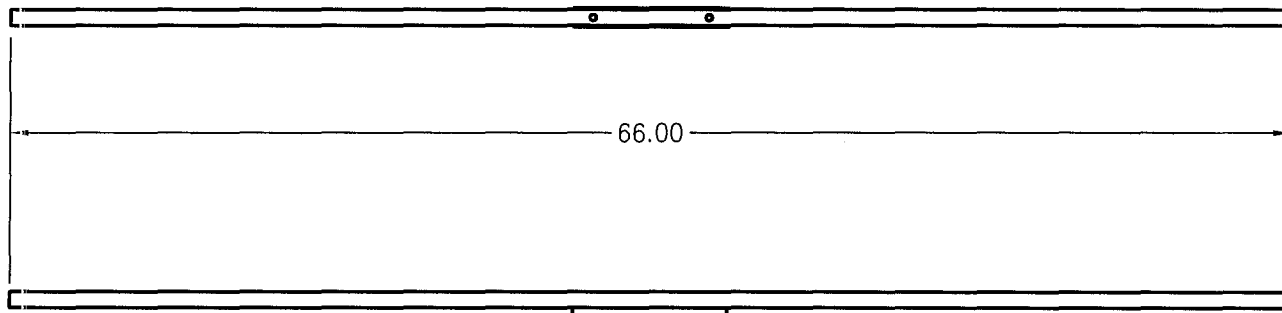
REV. 0



NOTES:

1. (2) REQUIRED
2. WEIGHT: 4.5 Lb/EACH
3. HOT DIP GALVANIZED

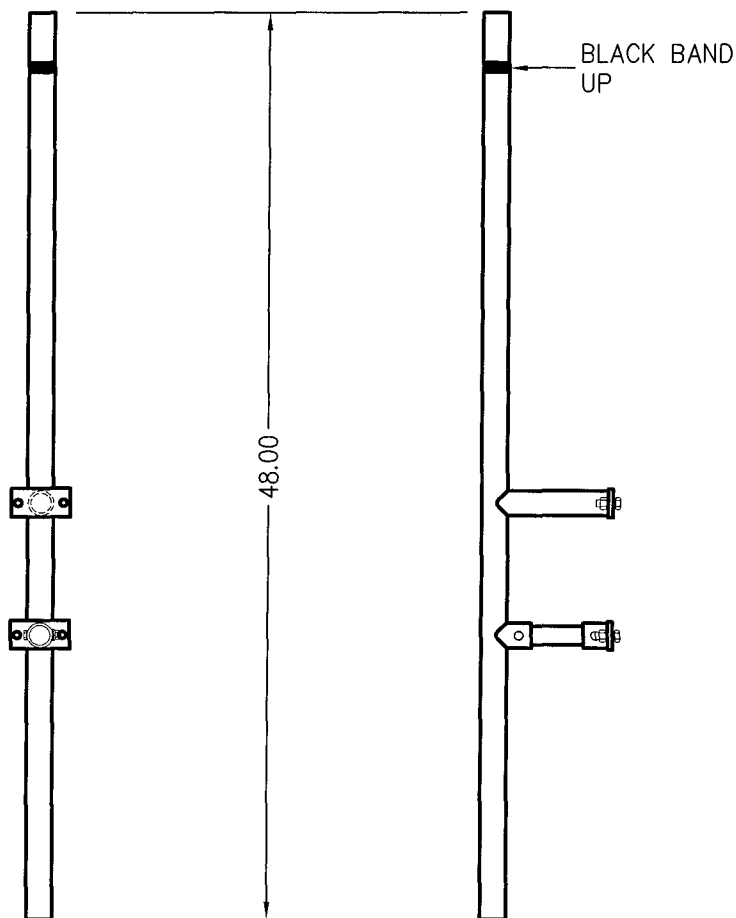
						<h2 style="margin: 0;">PROPAGATION SYSTEMS, INC.</h2> <p style="margin: 0;">Ebensburg, Pennsylvania USA 814-472-5540</p> <p style="margin: 0;">INTERBAY MOUNTED HORIZONTAL PARASITIC</p>		
REV.	MADE BY CHECKED BY	DATE	CHANGE	SIZE				
This drawing is loaned subject to the express understanding and agreement 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.					A	MODEL: PSIFMR-2-DA-HWS CHANNEL/FREQUENCY: 105.5 MHz SCALE: 1:10	DRAWN BY: D.G. Kellar APPROVED BY: DRAWING NO.: J207FM-574-014	DATE: 3/27/07 DATE: REV. 0



NOTES:

1. (2) REQUIRED
2. WEIGHT: 4.5 Lb/EACH
3. HOT DIP GALVANIZED

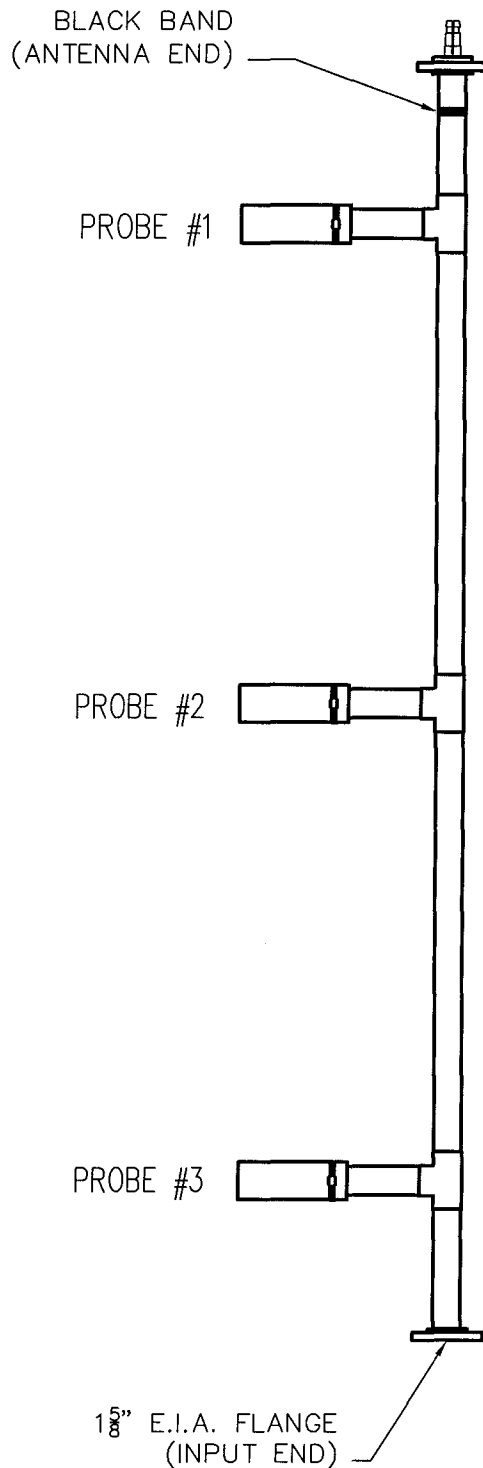
<h2 style="margin: 0;">PROPAGATION SYSTEMS, INC.</h2> <p style="margin: 0;">Ebensburg, Pennsylvania USA 814-472-5540</p>			
BRACKET MOUNTED HORIZONTAL PARASITIC			
REV.	MADE BY CHECKED BY	DATE	CHANGE
<p style="font-size: small; margin: 0;">This drawing is loaned subject to the express understanding and 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>			<div style="font-size: 2em; font-weight: bold; margin: 0;">A</div>
<p style="font-size: small; margin: 0;">MODEL: PSIFMR-2-DA-HWS</p> <p style="font-size: small; margin: 0;">CHANNEL/FREQUENCY: 105.5 MHz</p> <p style="font-size: small; margin: 0;">SCALE: 1:10</p>		<p style="font-size: small; margin: 0;">DRAWN BY: D.G. Kellar</p> <p style="font-size: small; margin: 0;">DATE: 3/27/07</p> <p style="font-size: small; margin: 0;">APPROVED BY:</p> <p style="font-size: small; margin: 0;">DRAWING NO.: J207FM-574-015</p>	
			REV. 0



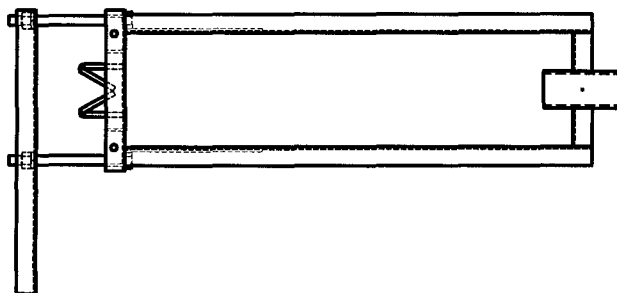
NOTES:

1. (2) REQUIRED
2. HOT DIP GALVANIZED
3. WEIGHT: 14.24 LB

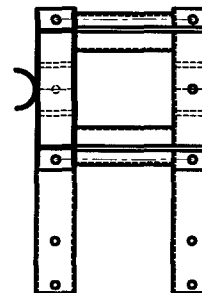
PROPAGATION SYSTEMS, INC.		
Ebensburg, Pennsylvania USA 814-472-5540		
VERTICAL PARASITIC		
REV.	MADE BY CHECKED BY	DATE
		CHANGE
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and 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 <div style="font-size: 2em; font-weight: bold;">A</div>
MODEL: PSIFMR-2-DA-HWS CHANNEL/FREQUENCY: 105.5 MHz SCALE: 1:10		DRAWN BY: D.G. Kellar APPROVED BY: DATE: 3/27/07 DRAWING NO.: J207FM-574-013 REV. 0



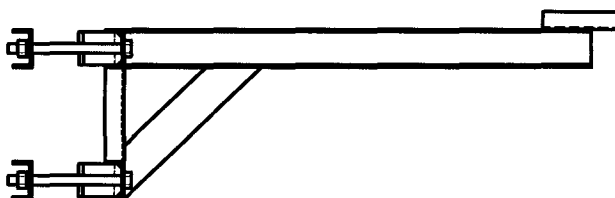
				PROPAGATION SYSTEMS, INC.				
				Ebensburg, Pennsylvania USA 814-472-5540				
				3 PROBE TUNER ASSEMBLY				
REV.	MADE BY	CHECKED BY	DATE	CHANGE	MODEL:	DRAWN BY:	DATE:	
						D. RICHEY	1-28-98	
This drawing is loaned subject to the express understanding and agreement that the drawing and information 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	CHANNEL/FREQUENCY:		APPROVED BY:	
				A	SCALE:		DRAWING NO.:	REV.
					1:16	33-00006	0	



TOP VIEW



END VIEW

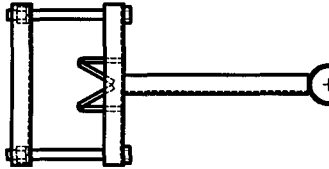


SIDE VIEW

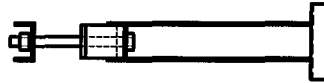
NOTES:

1. APPROXIMATE WEIGHT: 17.5
2. WIND AREA: 1.36 Sq. Ft.
3. (2) ASSEMBLIES REQUIRED
4. PREPARE FOR HOT DIP GALVANIZING

<h2 style="margin: 0;">PROPAGATION SYSTEMS, INC.</h2> <p style="margin: 0;">Ebensburg, Pennsylvania USA 814-472-5540</p> <p style="margin: 0;">CUSTOM BAY MOUNTING BRACKET</p>				
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
MODEL: PSIFMR-2-DA-HWS		DRAWN BY: D.G. Kellar		DATE: 2/26/07
CHANNEL/FREQUENCY: 105.5 MHz		APPROVED BY:		DATE:
SCALE: 1:10		DRAWING NO.: J207FM-574-010		REV. 0



TOP VIEW



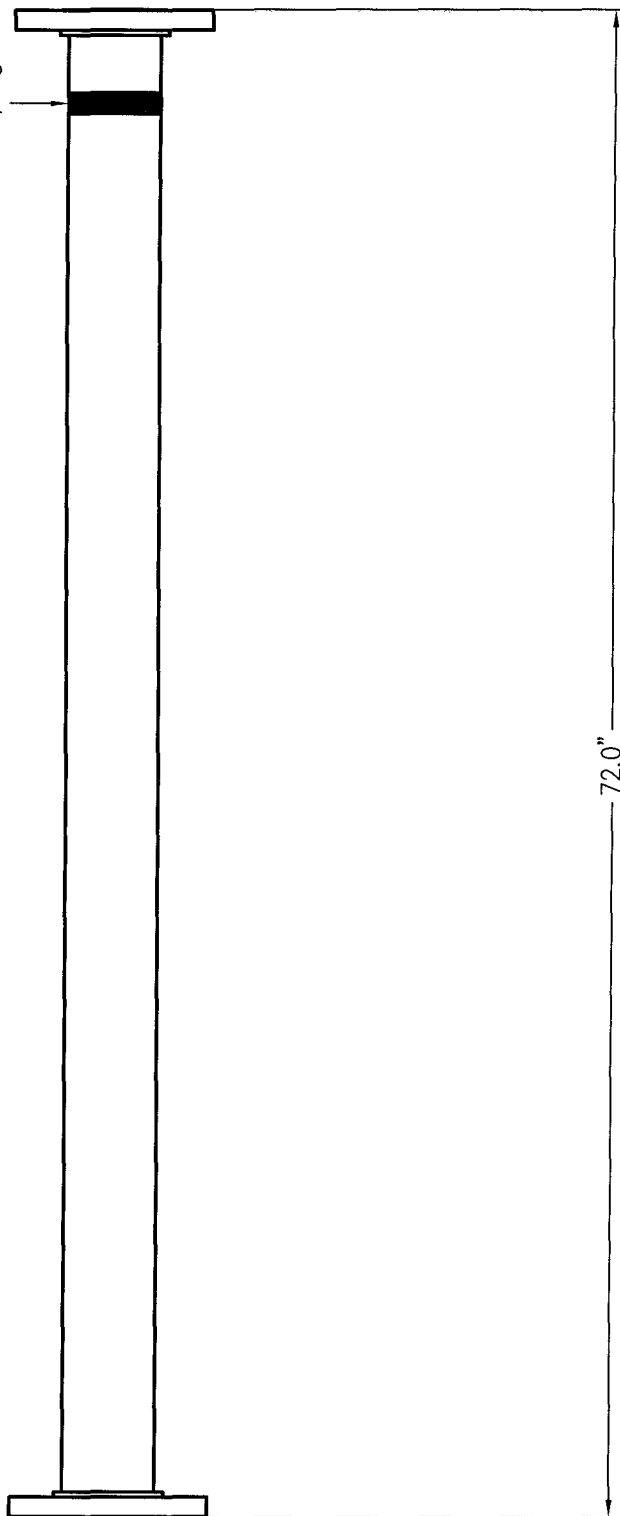
SIDE VIEW

NOTES:

1. APPROXIMATE WEIGHT: 2.45
2. WIND AREA: .25 Sq. Ft.
3. (1) ASSEMBLY REQUIRED
4. PREPARE FOR HOT DIP GALVANIZING

				PROPAGATION SYSTEMS, INC.			
				Ebensburg, Pennsylvania USA 814-472-5540			
				CUSTOM INTERBAY MOUNTING BRACKET			
REV.	MADE BY	DATE	CHANGE	MODEL:	DRAWN BY:	DATE:	
	CHECKED BY			PSIFMR-2-DA-HWS	D.G. Kellar	2/26/07	
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:	APPROVED BY:	DATE:	
				105.5 MHz			
				SCALE:	DRAWING NO.:		REV.
A				1:10	J207FM-574-011		0

BLACK BAND UP
TYPICAL



72.0"

			PROPAGATION SYSTEMS, INC.			
			Ebensburg, Pennsylvania USA 814-472-5540			
REV.	MADE BY CHECKED BY	DATE	CHANGE	INPUT SECTION OUTLINE		
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	MODEL:	DRAWN BY:	
			A	CHANNEL/ FREQUENCY:	APPROVED BY:	DATE:
				SCALE:	DRAWING NO.:	REV.

PSIFMR-2-DA-HWS

D.G. Kellar

2/16/07

105.5 MHz

2:2.66

J207FM-574-008

0

CONTROL POINT

AZIMUTHS ARE BASED ON A SOLAR
OBSERVATION PERFORMED 05/10/07

PROPERTY LINE

AZ = 308°42'36" TRUE

CABLE ANCHOR

CONTROL POINT

PARCEL B

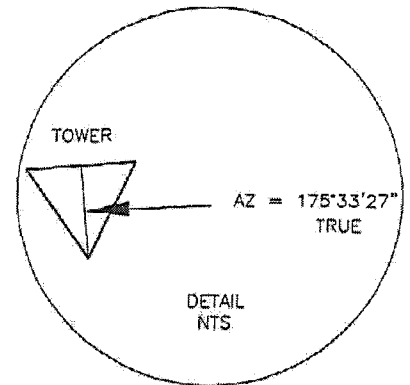
TOWER

CONTROL POINT

CABLE ANCHOR

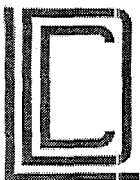


1" = 30'



CABLE ANCHOR

PROPERTY LINE



LDC, Inc.

PLANNING, SURVEYING, LANDSCAPE ARCHITECTURE
2850 Serendipity Circle West
Colorado Springs, CO 80917
(719) 528-6133 FAX (719) 574-8117

1207PM-574
FMR-2-DA-HWS

FIND

