



Certification
Directional FM Antenna
Antenna Model: PSIFM-4C-DA
Frequency: 106.3 MHz

KHPO
Mapleton Communications
Merced, CA
Ref. J704FM-416



Propagation Systems, Inc.

Quality Broadcast Antenna Systems

**Directional FM Antenna
KHPO
Mapleton Communications
Merced, CA**

A standard model PSIFM antenna with parasitic element was used in conjunction with the customer's 24" triangular face Magnum tower to create the necessary directional radiation pattern. The final antenna consists of four radiating elements each secured to the tower with a custom-mounting bracket. The antenna bays are full wave spaced and there is a total of one horizontal parasitic element per bay. The antenna array is center fed from an existing 1-5/8" flexible transmission line. 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 318.9 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 85% of the envelope RMS.

The antenna is to be mounted 79 meters above ground level on the northwest tower leg. No other antenna can be installed within 10 ft of any radiating element. The antenna is to be positioned 290° 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.

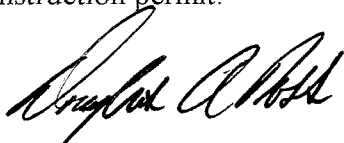
An input power level of 1.34 kW will be required at the antenna input in order to reach the licensed 4.0 kW ERP. The transmitter output power requirements are dependent upon the transmission line size and length used to feed the antenna. The length of 1-5/8" air dielectric transmission line feeding the antenna is estimated to be 260 ft. The efficiency for this length on line is 87.6% with a resulting transmitter output power of 1.53 kW. The final length of transmission line must be determined after installation.

Antenna Specifications

Antenna Model	PSIFM-4C-DA
Type	4-bay directional FM antenna
Bay Spacing	full wave spaced elements
Frequency	106.3 MHz
Polarization	Circular
Envelope RMS	.918
Gain (h-pol)	2.98 (4.74 dB)
RMS (h-pol)	.785
Gain (v-pol)	2.74 (4.38 dB)
RMS (v-pol)	.761
Input	1-5/8" EIA center fed input
Power rating	12 kW
Length	27.75 ft.
Weight	200 lbs.

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 Tabulation

Antenna: PSIFM-4C-DA
Mapleton Communications
Station: KHPO
Frequency: 106.3 MHz
Location: Merced, CA

Horizontal Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.930	2.58	4.11
10	0.978	2.85	4.55
20	0.990	2.92	4.65
30	0.997	2.96	4.72
40	0.930	2.58	4.11
50	0.765	1.74	2.42
60	0.451	0.61	-2.17
70	0.243	0.18	-7.55
80	0.160	0.08	-11.18
90	0.348	0.36	-4.43
100	0.534	0.85	-0.70
110	0.641	1.22	0.88
120	0.653	1.27	1.04
130	0.562	0.94	-0.26
140	0.411	0.50	-2.98
150	0.238	0.17	-7.73
160	0.217	0.14	-8.52
170	0.401	0.48	-3.19
180	0.610	1.11	0.45
190	0.782	1.82	2.60
200	0.908	2.46	3.91
210	0.982	2.87	4.58
220	1.000	2.98	4.74
230	0.973	2.82	4.51
240	0.921	2.53	4.03
250	0.881	2.31	3.64
260	0.879	2.30	3.62
270	0.884	2.33	3.67
280	0.895	2.39	3.78
290	0.900	2.41	3.83
300	0.922	2.53	4.04
310	0.930	2.58	4.11
320	0.925	2.55	4.06
330	0.915	2.49	3.97
340	0.907	2.45	3.89
350	0.923	2.54	4.05

Maximum Value

Field 1.00
Gain 2.98 (4.74 dB)
Azimuth Bearing 220 degrees

Minimum Field

Field 0.160
Gain .076 (-11.17 dB)
Azimuth Bearing 80 degrees

Vertical Polarization

Angle	Relative Field	Power Gain	Gain (dB)
0	0.92	2.32	3.65
10	0.897	2.20	3.43
20	0.843	1.95	2.89
30	0.773	1.64	2.14
40	0.689	1.30	1.14
50	0.577	0.91	-0.40
60	0.476	0.62	-2.07
70	0.386	0.41	-3.89
80	0.326	0.29	-5.36
90	0.305	0.25	-5.94
100	0.307	0.26	-5.88
110	0.307	0.26	-5.88
120	0.310	0.26	-5.80
130	0.302	0.25	-6.02
140	0.320	0.28	-5.52
150	0.337	0.31	-5.07
160	0.385	0.41	-3.91
170	0.456	0.57	-2.44
180	0.575	0.91	-0.43
190	0.759	1.58	1.98
200	0.849	1.97	2.96
210	0.908	2.26	3.54
220	0.945	2.45	3.89
230	0.957	2.51	4.00
240	0.948	2.46	3.91
250	0.929	2.36	3.74
260	0.907	2.25	3.53
270	0.881	2.13	3.28
280	0.862	2.04	3.09
290	0.851	1.98	2.98
300	0.849	1.97	2.96
310	0.863	2.04	3.10
320	0.879	2.12	3.26
330	0.896	2.20	3.42
340	0.913	2.28	3.59
350	0.923	2.33	3.68

Maximum Value

Field 0.96
Gain 2.74 (4.38 dB)
Azimuth Bearing 235 degrees

Minimum Field

Field 0.301
Gain .25 (-6.05 dB)
Azimuth Bearing 95 degrees

ERP Tabulation

Antenna: PSIFM-4C-DA
Mapleton Communications
Station: KHPO
Frequency: 106.3 MHz
Location: Merced, CA
Maximum ERP: 4.0 kW (6.02 dBk)

Horizontal Polarization

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.930	3.46	5.39
10	0.978	3.83	5.83
20	0.990	3.92	5.93
30	0.997	3.98	5.99
40	0.930	3.46	5.39
50	0.765	2.34	3.69
60	0.451	0.81	-0.89
70	0.243	0.24	-6.27
80	0.160	0.10	-9.90
90	0.348	0.48	-3.16
100	0.534	1.14	0.58
110	0.641	1.64	2.15
120	0.653	1.71	2.32
130	0.562	1.26	1.02
140	0.411	0.68	-1.70
150	0.238	0.23	-6.45
160	0.217	0.19	-7.24
170	0.401	0.64	-1.91
180	0.610	1.49	1.73
190	0.782	2.44	3.88
200	0.908	3.30	5.19
210	0.982	3.85	5.86
220	1.000	4.00	6.02
230	0.973	3.79	5.79
240	0.921	3.39	5.31
250	0.881	3.10	4.92
260	0.879	3.09	4.90
270	0.884	3.13	4.95
280	0.895	3.20	5.06
290	0.900	3.24	5.11
300	0.922	3.40	5.32
310	0.930	3.46	5.39
320	0.925	3.42	5.34
330	0.915	3.35	5.25
340	0.907	3.29	5.17
350	0.923	3.41	5.32

Maximum Value (H-pol)

Field 1.00
ERP 4.0 kW (6.02 dBk)
Azimuth Bearing 220 degrees

Minimum Field (H-pol)

Field 0.160
ERP .102 kW (-9.90 dBk)
Azimuth Bearing 80 degrees

Vertical Polarization

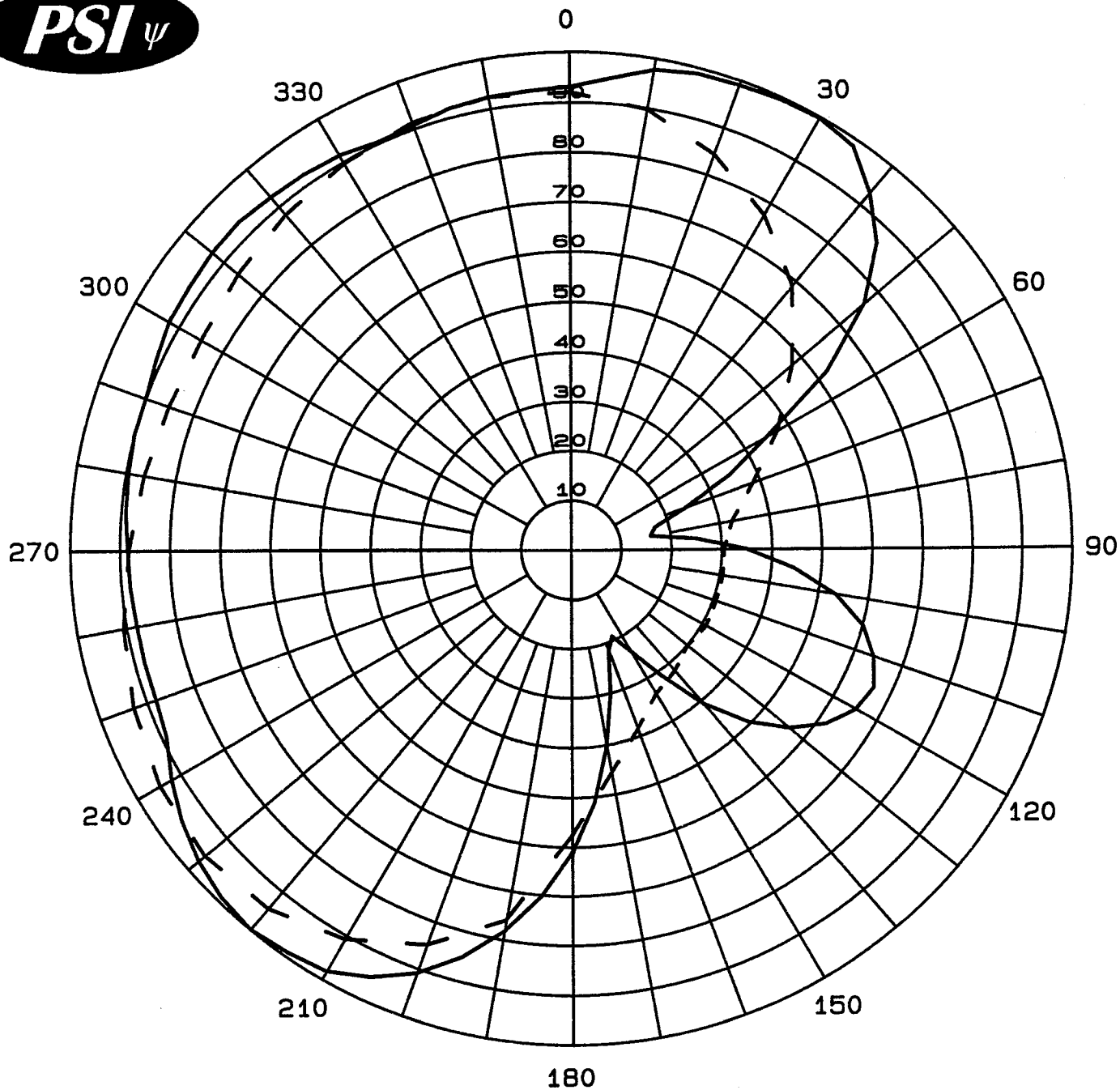
Angle	Relative Field	ERP (kW)	ERP (dBk)
0	0.92	3.39	5.30
10	0.897	3.22	5.08
20	0.843	2.84	4.54
30	0.773	2.39	3.78
40	0.689	1.90	2.78
50	0.577	1.33	1.24
60	0.476	0.91	-0.43
70	0.386	0.60	-2.25
80	0.326	0.43	-3.72
90	0.305	0.37	-4.29
100	0.307	0.38	-4.24
110	0.307	0.38	-4.24
120	0.310	0.38	-4.15
130	0.302	0.36	-4.38
140	0.320	0.41	-3.88
150	0.337	0.45	-3.43
160	0.385	0.59	-2.27
170	0.456	0.83	-0.80
180	0.575	1.32	1.21
190	0.759	2.30	3.63
200	0.849	2.88	4.60
210	0.908	3.30	5.18
220	0.945	3.57	5.53
230	0.957	3.66	5.64
240	0.948	3.59	5.56
250	0.929	3.45	5.38
260	0.907	3.29	5.17
270	0.881	3.10	4.92
280	0.862	2.97	4.73
290	0.851	2.90	4.62
300	0.849	2.88	4.60
310	0.863	2.98	4.74
320	0.879	3.09	4.90
330	0.896	3.21	5.07
340	0.913	3.33	5.23
350	0.923	3.41	5.32

Maximum Value (V-pol)

Field 0.96
ERP 3.68 kW (5.66 dBk)
Azimuth Bearing 235 degrees

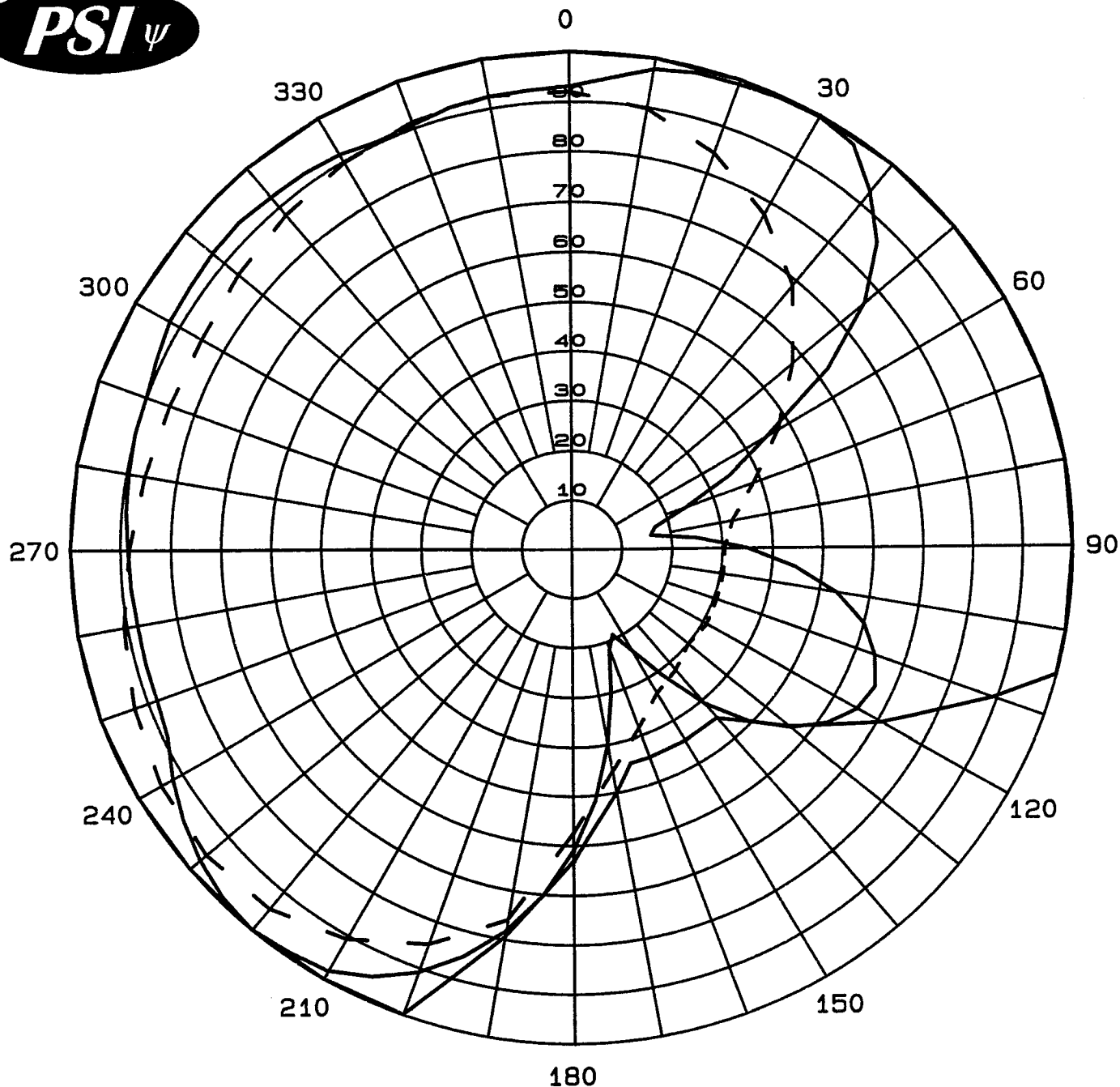
Minimum Field (V-pol)

Field 0.301
ERP .36 kW (-4.41 dBk)
Azimuth Bearing 95 degrees



Measured Relative Field
Azimuth Plane Pattern
Antenna: PSIFM-4C-DA
Type: 4-Bay Directional FM
Gain: H-pol (solid): 2.98 (4.74 dB)
Gain: V-pol (dash): 2.74 (4.38 dB)
Frequency: 106.3 MHz
Station: KHPO Merced, CA

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931



Measured Relative Field
Envelope Pattern Comparison
Antenna: PSIFM-4C-DA
Type: 4-Bay Directional FM
Gain: H-pol (solid): 2.98 (4.74 dB)
Gain: V-pol (dash): 2.74 (4.38 dB)
Frequency: 106.3 MHz
Station: KHPO Merced, CA

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931

Maximum Envelope Tabulation

Antenna: PSIFM-4C-DA

Mapleton Communications

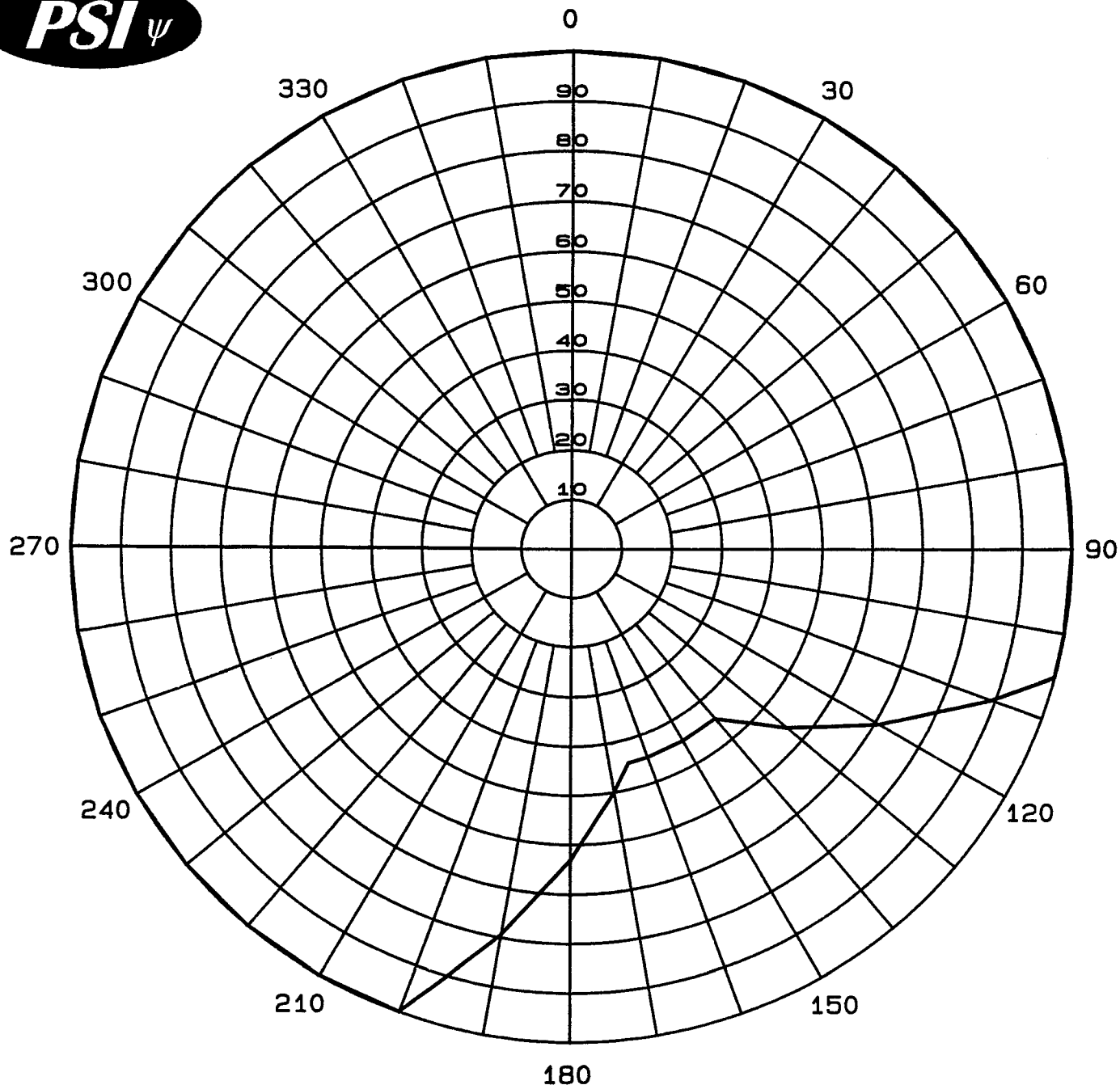
Station: KHPO

Frequency: 106.3 MHz

Location: Merced, CA

Maximum ERP: 4.0 kW (6.02 dBk)

Angle	Relative Field	ERP (kW)	ERP (dBk)
0	1.000	4.00	6.02
10	1.000	4.00	6.02
20	1.000	4.00	6.02
30	1.000	4.00	6.02
40	1.000	4.00	6.02
50	1.000	4.00	6.02
60	1.000	4.00	6.02
70	1.000	4.00	6.02
80	1.000	4.00	6.02
90	1.000	4.00	6.02
100	1.000	4.00	6.02
105	1.000	4.00	6.02
110	0.891	3.18	5.02
120	0.708	2.01	3.02
130	0.562	1.26	1.02
140	0.447	0.80	-0.97
150	0.447	0.80	-0.97
160	0.447	0.80	-0.97
165	0.447	0.80	-0.97
170	0.501	1.00	0.02
180	0.631	1.59	2.02
190	0.794	2.52	4.02
200	1.000	4.00	6.02
210	1.000	4.00	6.02
220	1.000	4.00	6.02
230	1.000	4.00	6.02
240	1.000	4.00	6.02
250	1.000	4.00	6.02
260	1.000	4.00	6.02
270	1.000	4.00	6.02
280	1.000	4.00	6.02
290	1.000	4.00	6.02
300	1.000	4.00	6.02
310	1.000	4.00	6.02
320	1.000	4.00	6.02
330	1.000	4.00	6.02
340	1.000	4.00	6.02
350	1.000	4.00	6.02

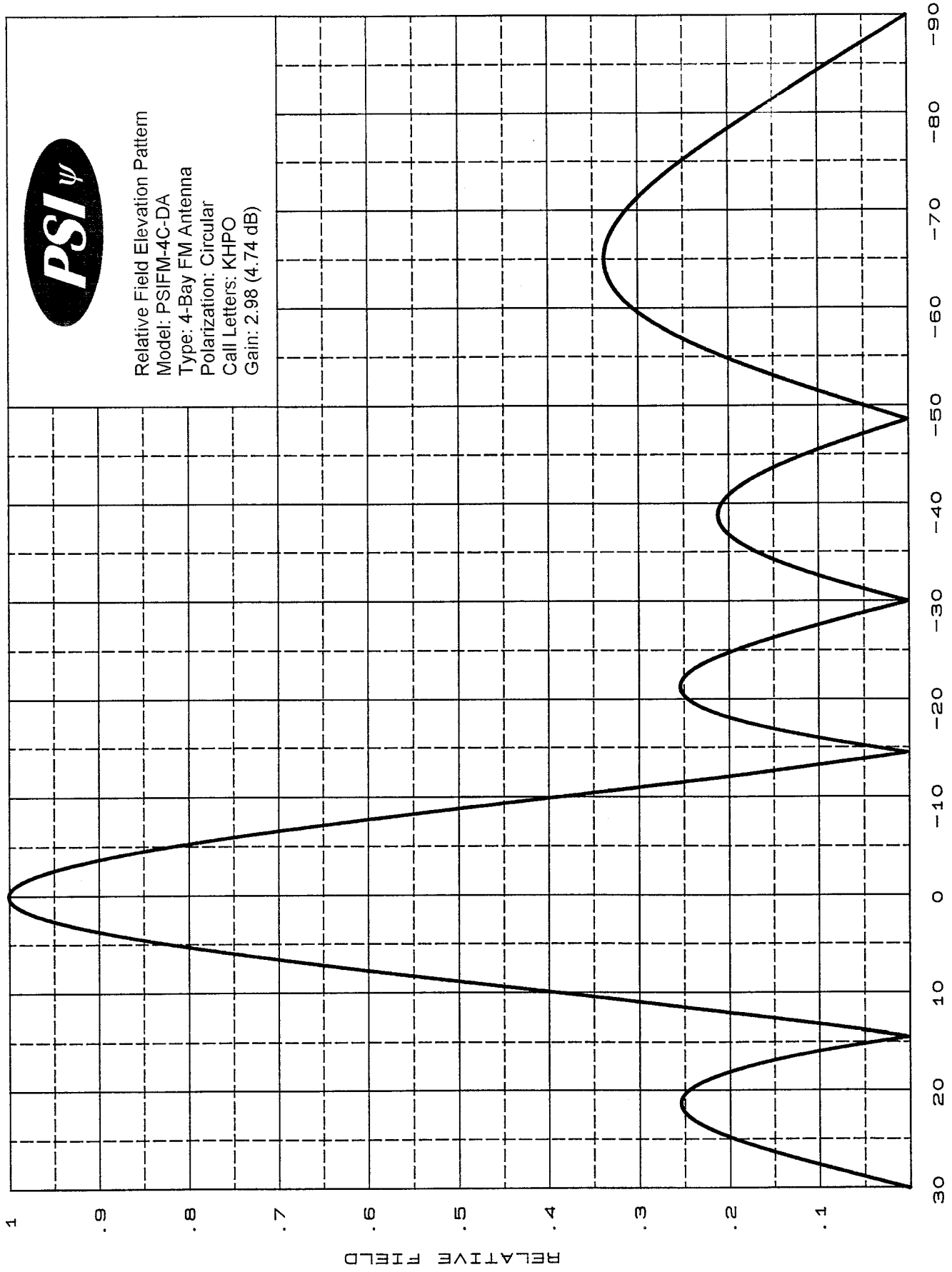


Maximum Envelope Pattern
Azimuth Plane
Antenna: PSIFM-4C-DA
Type: 4-Bay Directional FM
Polarization: Circular
Peak ERP: 4.0 kW (6.02 dB)
Frequency: 106.3 MHz
Station: KHPO Merced, CA

Propagation Systems Inc.
PO Box 113
Ebensburg, PA 15931



Relative Field Elevation Pattern
Model: PSIFM-4C-DA
Type: 4-Bay FM Antenna
Polarization: Circular
Call Letters: KHPO
Gain: 2.98 (4.74 dB)



DEGREES BELOW HORIZONTAL

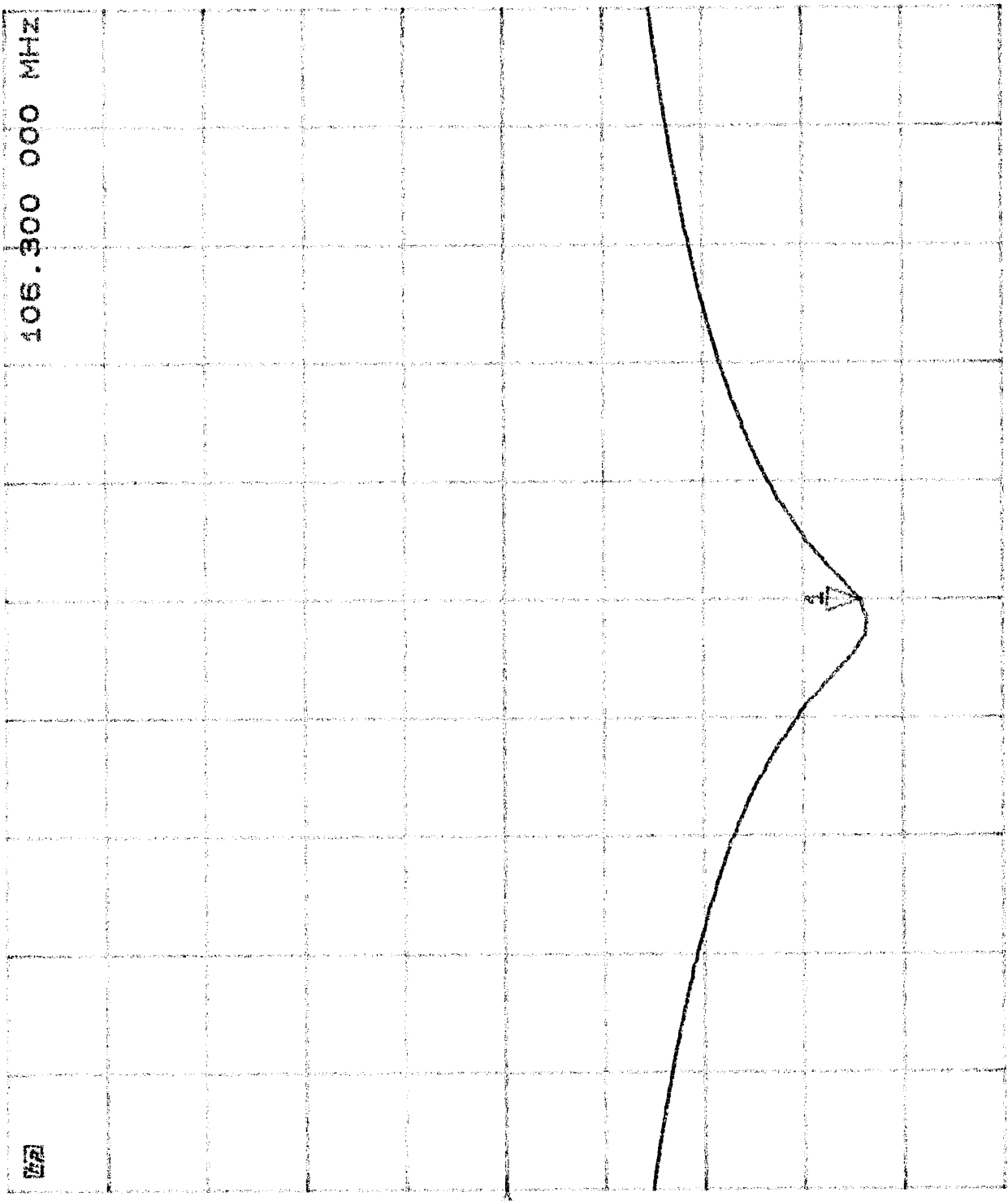
CH1 RFL 109 MAG 10 dB/ REF 0 dB Δ: -35.791 dB

106.300 000 MHz

PRM

COR

↑



START 105.300 000 MHz STOP 107.300 000 MHz

INSTRUCTION MANUAL

Mapleton Communications

KHPO

106.3 MHz

Antenna Model: PSIFM-4C-DA

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 antenna elevation and plan the installation. The antenna brackets are for round member mount only. The antenna is to be mounted on the north/west leg and positioned 290 degrees true. 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 and should not require field adjustment. However a fine matcher has been supplied and if the antenna requires tuning, consult the factory before adjustments are made.
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 must be installed one bay/inter-bay assembly at a time. Starting with bay 1, attach the element and parasitic to inter-bay 1 block. Use only the supplied 5/16-18 x 7/8" hardware and O-ring. The element feed point on all elements must be in the up position and the parasitic positioned as shown in drawing J704FM-416-001. Also refer to drawing J704FM-416-018. Next attach the bay-mounting bracket 33-00029 to the boom of bay 1 using the supplied hose clamps. Attach the inter-bay bracket 33-00030 approximately 12-18" below the bay. The first bay/inter-bay assembly is now ready to be installed on the tower. **The inter-bay inner conductor is not captivated. Take precautions to secure all inner conductors during erection.** Carefully hoist the first bay/inter-bay assembly to the correct location on the tower and secure the brackets to the north/west tower leg using the 1/2-13 x 4" bolts, nuts and locks. Position the bay 290 degrees true per drawing J704FM-416-001.

Step Two

Follow the same procedure with bay 2 and 3. Inter-bay 2 and 3 has been pre attached to the center tee section. Connect each bay as shown in drawing J704FM-416-017. Attach the element to the inter-bay block, attach the parasitic element and attach the bay mounting bracket and inter-bay bracket. Hoist bay 2/3 assembly and connect with inter-bay 1 using the supplied 5/16-18 x 7/8" bolts, locks and O-ring. Position the center tee section so the elbow will be positioned as shown in drawing J704FM-416-001. Secure to the tower.

Step Three

Follow the same procedure for bay 4. After installing bay 4 connect the 1-5/8" elbow and tuner to the center tee section. Use the supplied 5/16-18 x 1-1/4" bolts, nuts, locks and O-ring supplied. Attach the tuner bracket between probe three and the input flange for additional support. See drawing J704FM-416-017 for an overview. The end of the tuner with a black band attached up.

Step Four

Check all bolted connections for tightness. Connect the main transmission line to the antenna input located at the tuner base. Do not allow the weight of the feed line to be supported by the antenna. Pressurize the antenna system to a maximum of 5 lbs. with dry air or nitrogen. 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 at the factory and the tuner has been adjusted for optimum match conditions, see attached test data. If the antenna-input match (VSWR) is greater than a 1.1:1, confirm the antenna was installed properly. If the VSWR is greater than 1.15:1 contact the factory for instructions before applying power to the antenna. If the VSWR is greater than 1.1:1 but less than 1.15:1 the tuner can be adjusted, using the appropriate test equipment, for minimum reflected power.

Drawing Index

Drawing

J704FM-416-002
J704FM-416-001
J704FM-416-018
J704FM-416-017
J704FM-416-015
J704FM-416-010
J704FM-416-013
33-00006
33-00029
33-00030
33-00032

Title

Antenna Elevation
Antenna Orientation
Bay 1 and 2 Side View
Bays 2 and 3 with Center Tee Section
Parasitic
Center Tee Outline
End Cap Outline
Tuner Outline
Bay Bracket Outline
Inter-Bay Bracket Outline
Tuner Bracket Outline

PRESSURE RELIEF
ASSEMBLY WITH 1/8" N.P.T.
THREADED PLUG PER
J704FM-416-013

INTERBAY SUPPORT
BRACKET PER
33-00030
TYP. (3) PLACES

PARASITIC ASSEMBLY
PER J704FM-416-015
TYP. EACH BAY

1 5/8" TEE SECTION

1 5/8" 90° ELL

260' A.G.L.

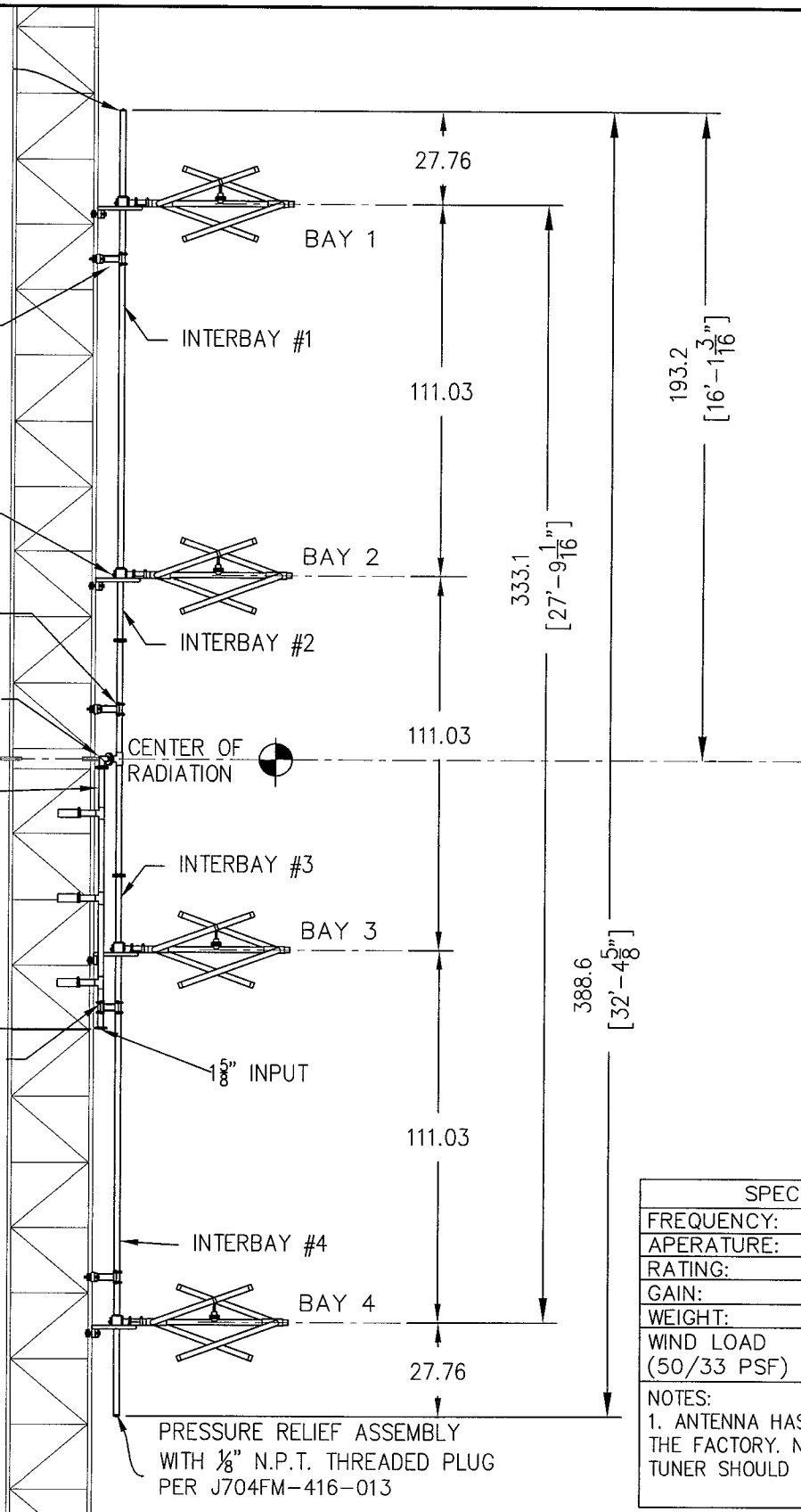
1 5/8" 3-PROBE TUNER

80.51

MOUNTING BRACKET
PER 33-50032 WITH
(4) #28 HOSE CLAMPS

NOTE:
3-PROBE TUNER IS
SHOWN ROTATED
FOR DRAWING
CLARITY

PRESSURE RELIEF ASSEMBLY
WITH 1/8" N.P.T. THREADED PLUG
PER J704FM-416-013



SPECIFICATIONS	
FREQUENCY:	106.3 MHz
APERATURE:	333.1" [27'-9-1/16"]
RATING:	12 kW
GAIN:	2.98 (4.74 dB)
WEIGHT:	200 Lb
WIND LOAD (50/33 PSF)	430 Lb
NOTES: 1. ANTENNA HAS BEEN PRETUNED AT THE FACTORY. NO ADJUSTMENT OF THE TUNER SHOULD BE NECESSARY.	

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.

MATERIAL:	NOT APPLICABLE
TOLERANCES UNLESS OTHERWISE NOTED	SIZE
FRACTIONS X/X ±1/16"	A
DECIMALS XX ±.01"	
DECIMALS XXX ±.005"	
ANGLES ± 3°	

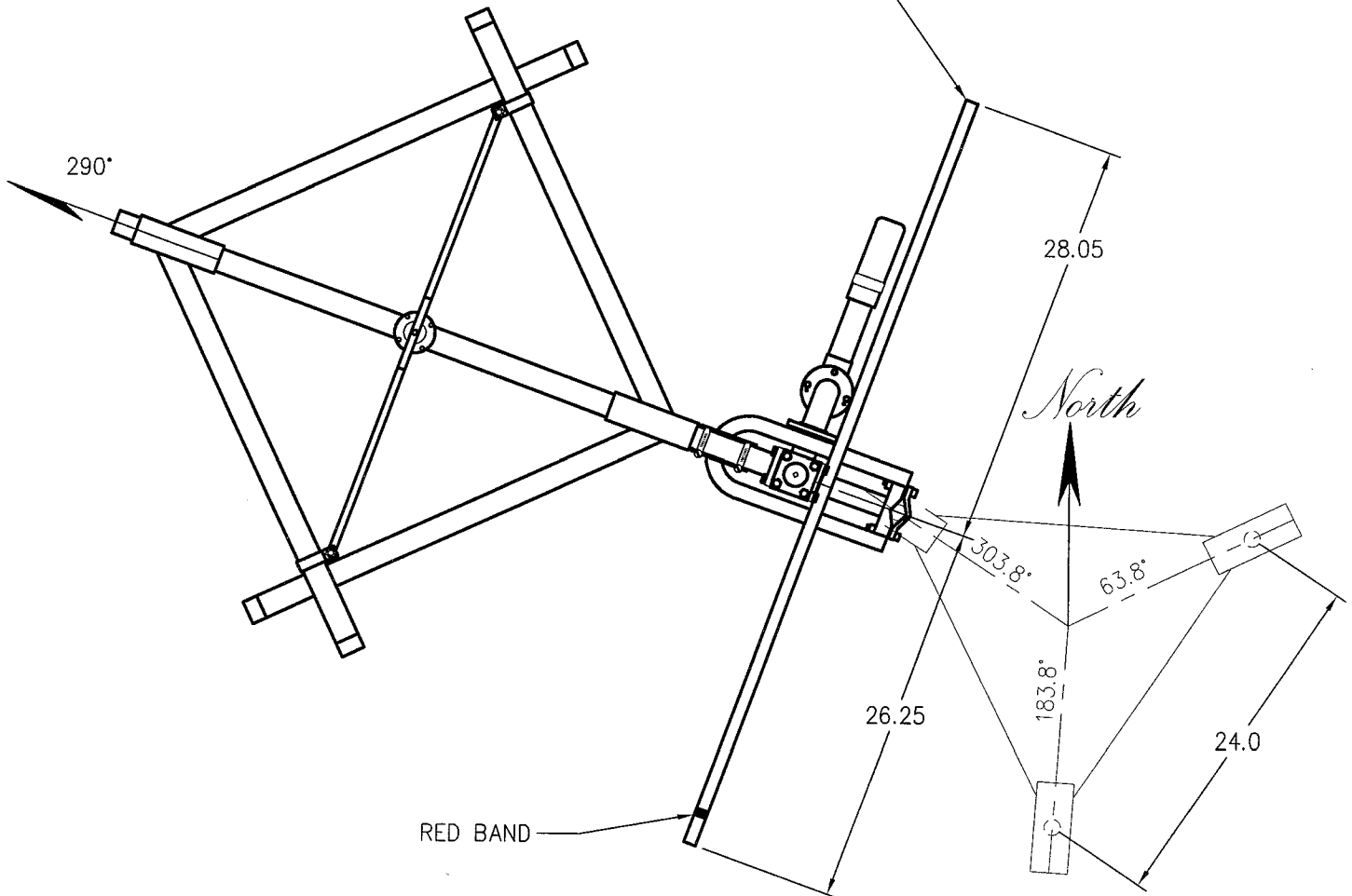
PROPAGATION SYSTEMS, INC.

Ebensburg, Pennsylvania USA

CENTER FED ANTENNA ELEVATIONS

MODEL:	PSIFM-4C-DA	DRAWN BY:	D.G. Kellar	DATE:	7/15/04
CHANNEL/ FREQUENCY:	106.3 MHz	APPROVED BY:		DATE:	
SCALE:	1:50	PART NO.:		DRAWING NO.:	J704FM-416-002
				REV.	0

PARASITIC ASSEMBLY PER
DRAWING J704FM-416-015
TYPICAL EACH BAY



<table border="1"> <tr> <td>REV.</td> <td>MADE BY</td> <td>DATE</td> <td>CHANGE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>				REV.	MADE BY	DATE	CHANGE					MATERIAL:		<h1>PROPAGATION SYSTEMS, INC.</h1> <p>Ebensburg, Pennsylvania USA</p>	
REV.	MADE 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		ANTENNA PLAN VIEW AND ORIENTATION									
TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ± 1/16" DECIMALS XX ± .01" DECIMALS XXX ± .005" ANGLES ± 3°				CHANNEL/ FREQUENCY: 106.3 MHz		MODEL: PSIFM-4C-DA		DRAWN BY: D.G. Kellar		DATE: 8/10/04					
SCALE: 1:12				PART NO.:		DRAWING NO.: J704FM-416-001		REV. 0		APPROVED BY:					

PRESSURE RELIEF ASSEMBLY PER
J704FM-416-013

(4) 5/16-18 x 7/8" BOLTS AND
LOCKWASHERS WITH (1)
2-328 O-RING PER FLANGE

BAY MOUNTING BRACKET
PER 33-00030

BAY 1

1/2-13 x 4.0" BOLT,
HEXNUT AND LOCKWASHER
(2) PER INTERBAY BRACKET

(2) #28 HOSE CLAMPS
REQUIRED PER INTERBAY
SUPPORT BRACKET-TYPICAL

111.03

INTERBAY #1

PARASITIC ASSEMBLY PER
J704FM-416-015 TYPICAL
EACH BAY. ATTACH WITH
(4) 5/15-18 x 7/8" BOLTS
AND LOCKWASHERS

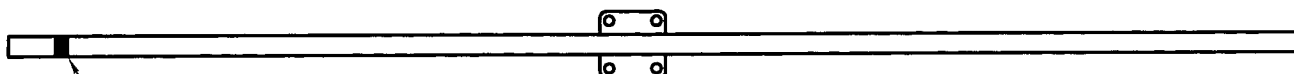
BAY 2

TOWER LEG

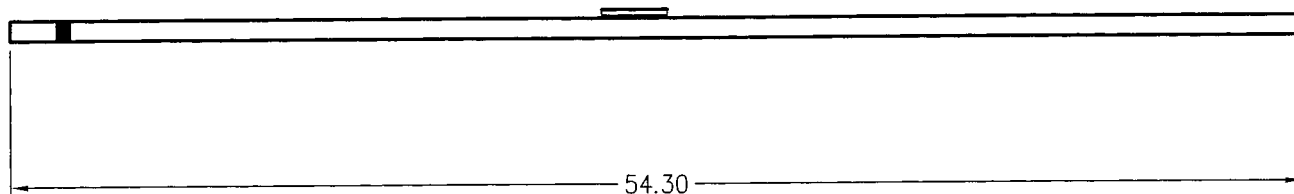
(2) #28 HOSE CLAMPS
REQUIRED PER BAY MOUNTING
BRACKET-TYPICAL

INTERBAY #2

<table border="1"> <tr> <td>REV.</td> <td>MADE BY</td> <td>CHECKED BY</td> <td>DATE</td> <td>CHANGE</td> </tr> <tr> <td colspan="5"> <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> </td> </tr> </table>				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>NOT APPLICABLE</p>		<p>PROPAGATION SYSTEMS, INC.</p> <p>Ebensburg, Pennsylvania USA</p>			
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>TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ±1/16" DECIMALS XX ±.01" DECIMALS XXX ±.005" ANGLES ± 3°</p>						<p>SIZE</p> <p>A</p>		<p>TYPICAL BAY 1 ELEVATION</p>											
<p>MODEL: PSIFM-4C-DA</p>						<p>DRAWN BY: D.G. Kellar</p>		<p>DATE: 9/15/04</p>											
<p>CHANNEL/FREQUENCY: 106.3 MHz</p>						<p>APPROVED BY:</p>		<p>DATE:</p>											
<p>SCALE: 1:20</p>						<p>PART NO.:</p>		<p>DRAWING NO.: J704FM-416-018</p>											
								<p>REV. 0</p>											



RED BAND



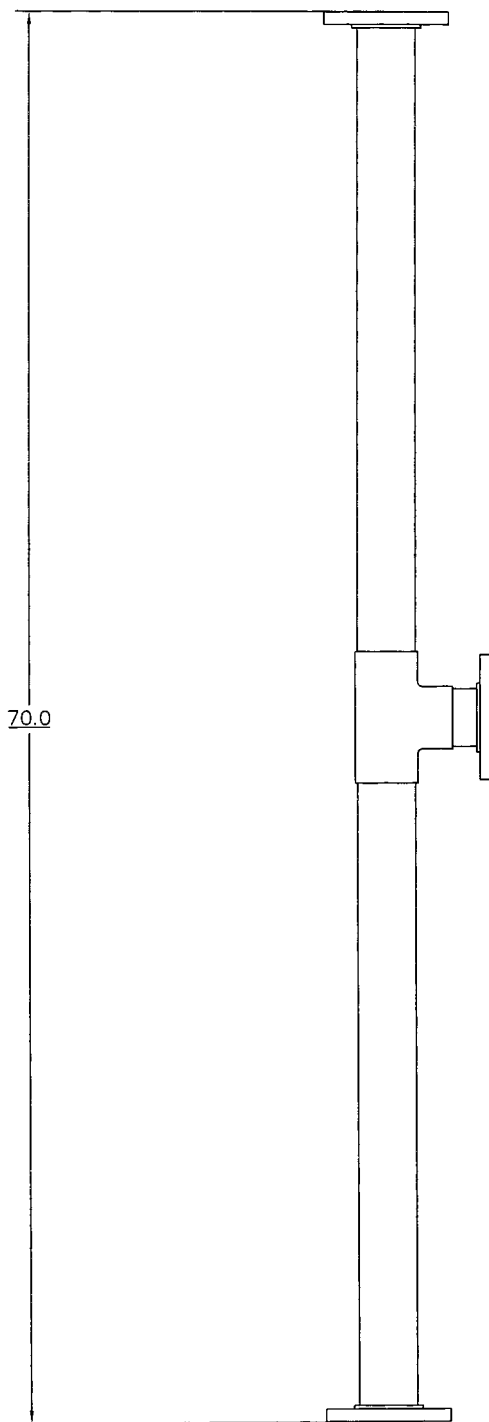
54.30

(4) ASSEMBLIES REQUIRED AS SHOWN

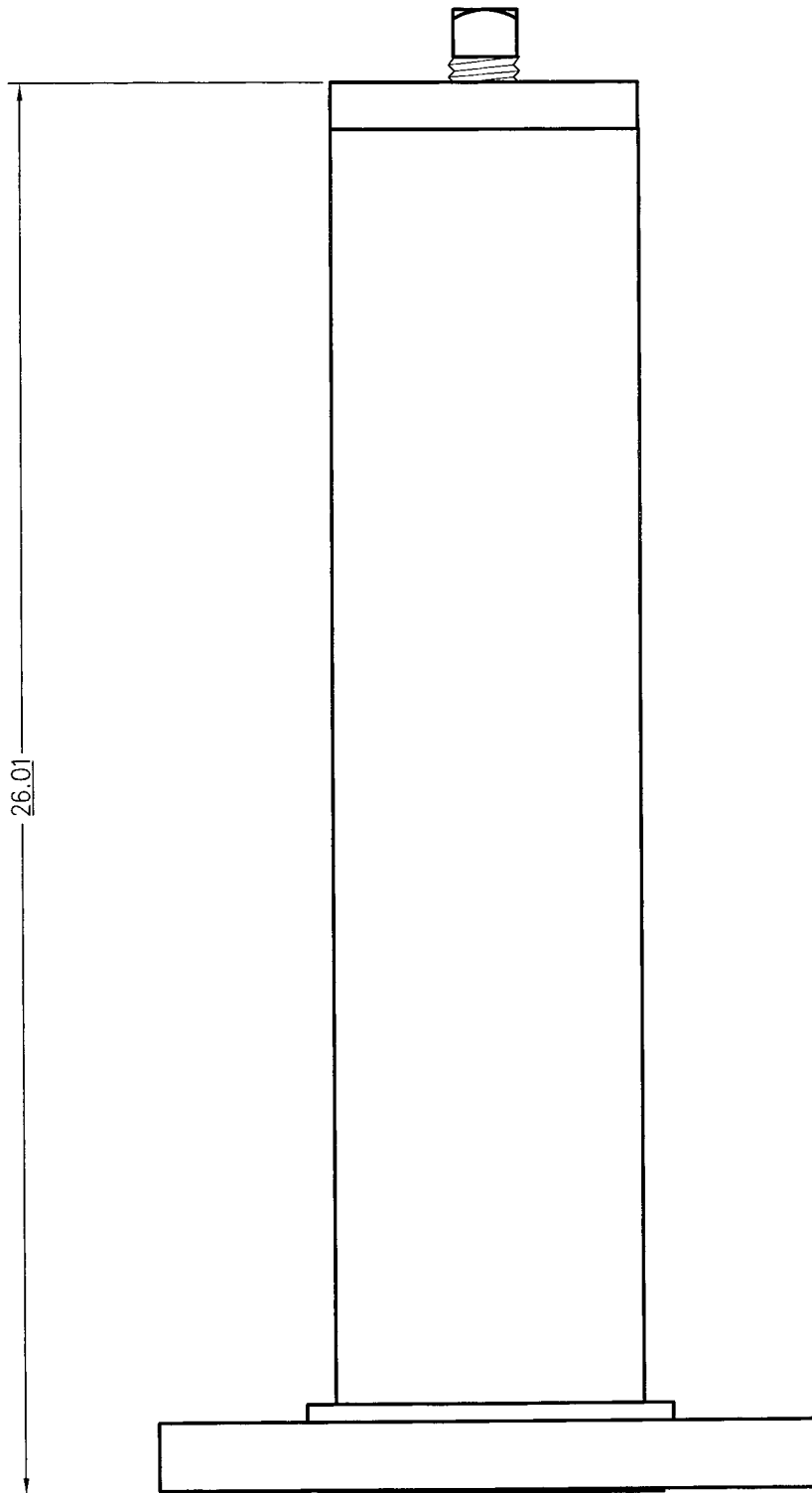
REV.	MADE BY CHECKED BY	DATE	CHANGE
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property of PSI, and will not be otherwise utilized or disposed of, directly or indirectly, and will not be used in 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.			

TOLERANCES UNLESS OTHERWISE NOTED		SIZE
FRACTIONS X/X	$\pm 1/16"$	A
DECIMALS XX	$\pm .01"$	
DECIMALS XXX	$\pm .005"$	
ANGLES	$\pm 3'$	

PROPAGATION SYSTEMS, INC.			
Ebensburg, Pennsylvania USA			
MODEL:	PSIFM-4C-DA	DRAWN BY:	D.G. Kellar
CHANNEL/ FREQUENCY:	106.3 MHz	APPROVED BY:	
SCALE:	1:8	DRAWING NO.:	J704FM-416-015
PART NO.:		REV.	0



				MATERIAL:		PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA					
REV.	MADE BY	CHECKED BY	DATE	CHANGE						NOT APPLICABLE	
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.						TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X $\pm 1/16"$ DECIMALS XX $\pm .01"$ DECIMALS XXX $\pm .005"$ ANGLES $\pm 3'$		SIZE A	1-5/8" CENTER FED POWER DIVIDER TEE OUTLINE		
						MODEL: PSIFM-4C-DA		DRAWN BY: D.G. Kellar		DATE: 9/13/04	
						CHANNEL/FREQUENCY: 106.3 MHz		APPROVED BY:		DATE:	
						SCALE: 1:5.33		PART NO.: 33-00034B		DRAWING NO.: J704FM-416-010	
										REV. 0	



PROFILE VIEW

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>				

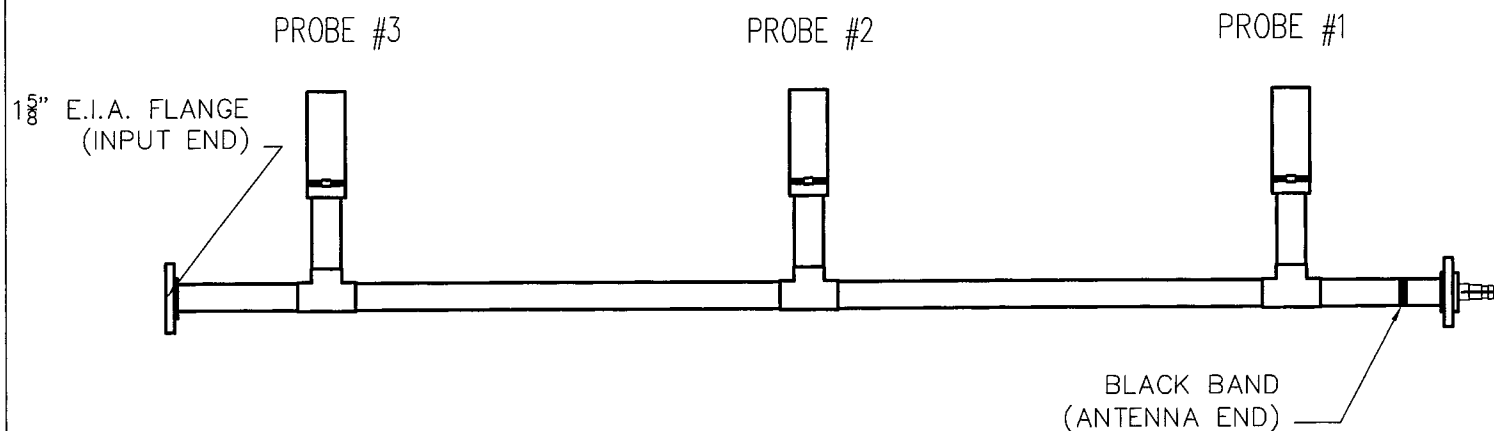
MATERIAL:	
<p>TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X $\pm 1/16"$ DECIMALS XX $\pm .01"$ DECIMALS XXX $\pm .005"$ ANGLES $\pm 3^\circ$</p>	<p>SIZE A</p>

PROPAGATION SYSTEMS, INC.

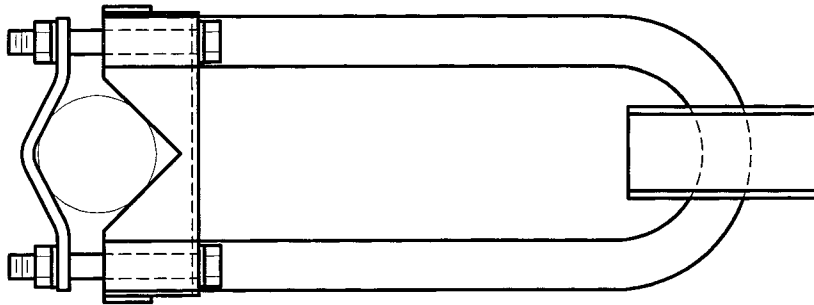
Ebensburg, Pennsylvania USA

EXTENDED PRESSURE CAP OUTLINE

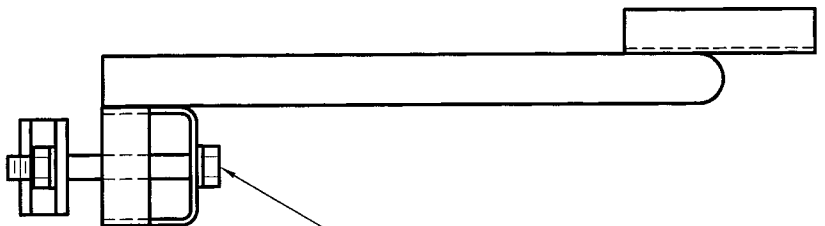
MODEL: PSIFM-4C-DA	DRAWN BY: D.G. Kellar	DATE: 8/19/04
CHANNEL/FREQUENCY: 106.3 MHz	APPROVED BY:	DATE:
SCALE: 1:1	PART NO.: 33-00024	DRAWING NO.: J704FM-416-013
		REV: 0



				MATERIAL:		PROPAGATION SYSTEMS, INC.									
						Ebensburg, Pennsylvania USA									
						3 PROBE TUNER ASSEMBLY									
REV.		MADE BY CHECKED BY		DATE		CHANGE		MODEL:		DRAWN BY: D. RICHEY		DATE: 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 foregoing agreement.								CHANNEL/ FREQUENCY:		APPROVED BY:		DATE:			
								SCALE: 1:16		PART NO.: 33-00006		DRAWING NO.: 33-00006		REV. 0	
								TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ± 1/16" DECIMALS XX ± .01" DECIMALS XXX ± .005" ANGLES ± 3°		SIZE A					

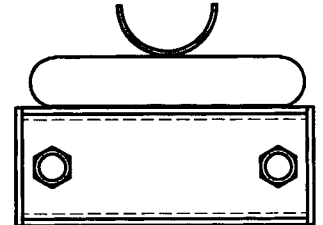


PLAN VIEW



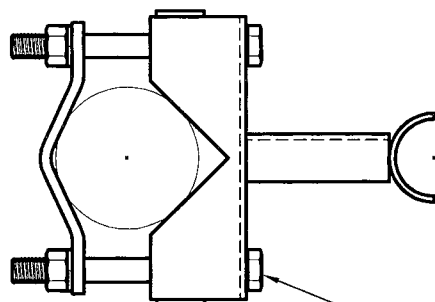
(2) 1/2-13 x 6" HEXHEAD BOLT,
HEXNUT AND HELICAL LOCKWASHERS
AT EACH BRACKET

SIDE VIEW



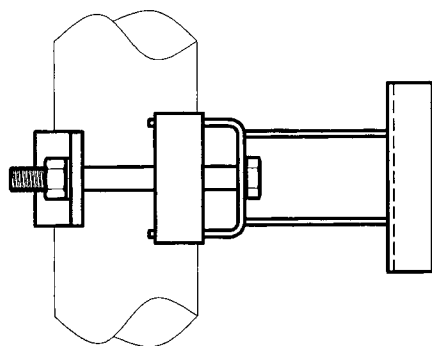
FRONT VIEW

				MATERIAL:		PROPAGATION SYSTEMS, INC.					
				ALL COMPONENTS SHOWN ARE GALVANIZED CARBON STEEL		Ebensburg, Pennsylvania USA					
						FM MOUNTING BRACKET OUTLINE					
REV.	MADE BY	CHECKED BY	DATE	CHANGE		MODEL:	DRAWN BY:	DATE:			
							D. RICHEY	6-24-98			
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.					CHANNEL/ FREQUENCY:		APPROVED BY:		DATE:		
					SCALE:		PART NO.:		DRAWING NO.:		REV.
					1:4		33-00029		33-00029		0
					TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ± 1/16" DECIMALS XX ± .01" DECIMALS XXX ± .005" ANGLES ± 3°	SIZE A					

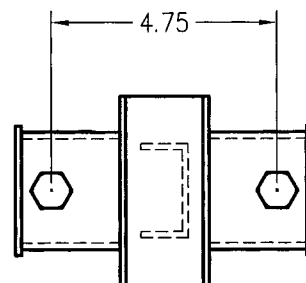


PLAN VIEW

1/2-13 x 6" HEXHEAD BOLT
HEXNUT AND HELICAL LOCKWASHERS
(2) PLACES EACH BRACKET

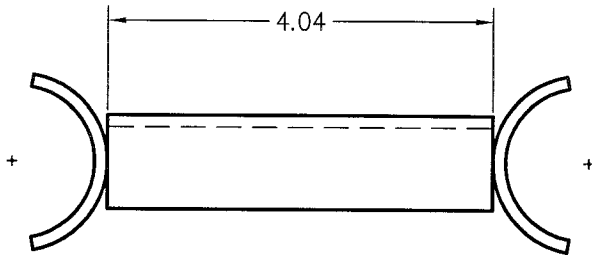


SIDE VIEW

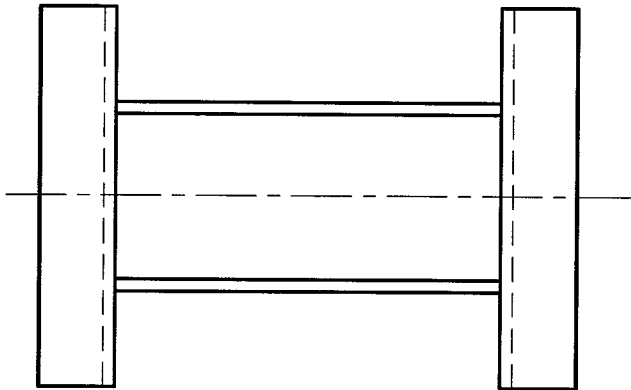


FRONT VIEW

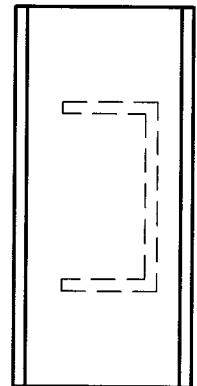
				MATERIAL:		PROPAGATION SYSTEMS, INC.			
						Ebensburg, Pennsylvania USA			
						SUPPORT BRACKET OUTLINE			
REV.				MADE BY		DATE		CHANGE	
This drawing is loaned subject to the express understanding and agreement that the drawing and information therein contained are, and shall remain the property 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.				TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ±1/16" DECIMALS XX ±.01" DECIMALS XXX ±.005" ANGLES ± 3'		SIZE A		MODEL:	
						DRAWN BY: P. MCINTOSH		DATE: 12-19-00	
						APPROVED BY:		DATE:	
						SCALE: 1:4		PART NO.: 33-00030	
						DRAWING NO.: 33-00030		REV. 0	



PLAN VIEW



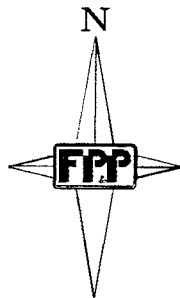
SIDE VIEW



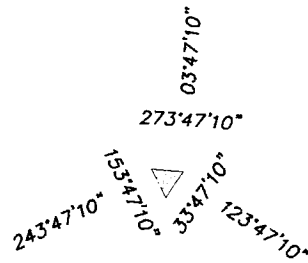
END VIEW

				MATERIAL:		PROPAGATION SYSTEMS, INC. Ebensburg, Pennsylvania USA			
				ALL COMPONENTS SHOWN ARE MILD STEEL, HOT DIP GALVANIZED					
REV.	MADE BY CHECKED BY	DATE	CHANGE	TOLERANCES UNLESS OTHERWISE NOTED FRACTIONS X/X ±1/16" DECIMALS XX ±.01" DECIMALS XXX ±.005" ANGLES ± 3°		SIZE A	MODEL:	DRAWN BY: P. MCINTOSH	DATE: 9-3-99
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.							CHANNEL/ FREQUENCY:	APPROVED BY:	DATE:
						SCALE: 1:2	PART NO.: 33-50032	DRAWING NO.: 33-50032	REV. 0

2
+ 445.95
SET BAR



SCALE 1" = 20'



153°47'10"

03/23/04

08:58

MAGNUM TOWERS → 1 209 383 2950

NO. 061

001

Job Review (E) 350 x 24 A Comm. Tower

Job No.

DAVIDSON ENGINEERING

CIVIL / STRUCTURAL ENGINEERING CONSULTANT

296 Covered Bridge Road

Rogue River, Oregon 97531

Tel: (541) 582-8074 FAX: (541) 582-0072

Merced, CA Ed Hoyt

309/97

Designed by DWD Date 7/10/97 Page 1 of 1

CODE: ASCE 7-93

WIND: 75 MPH basic wind speed

Exposure 'C' (open terrain)

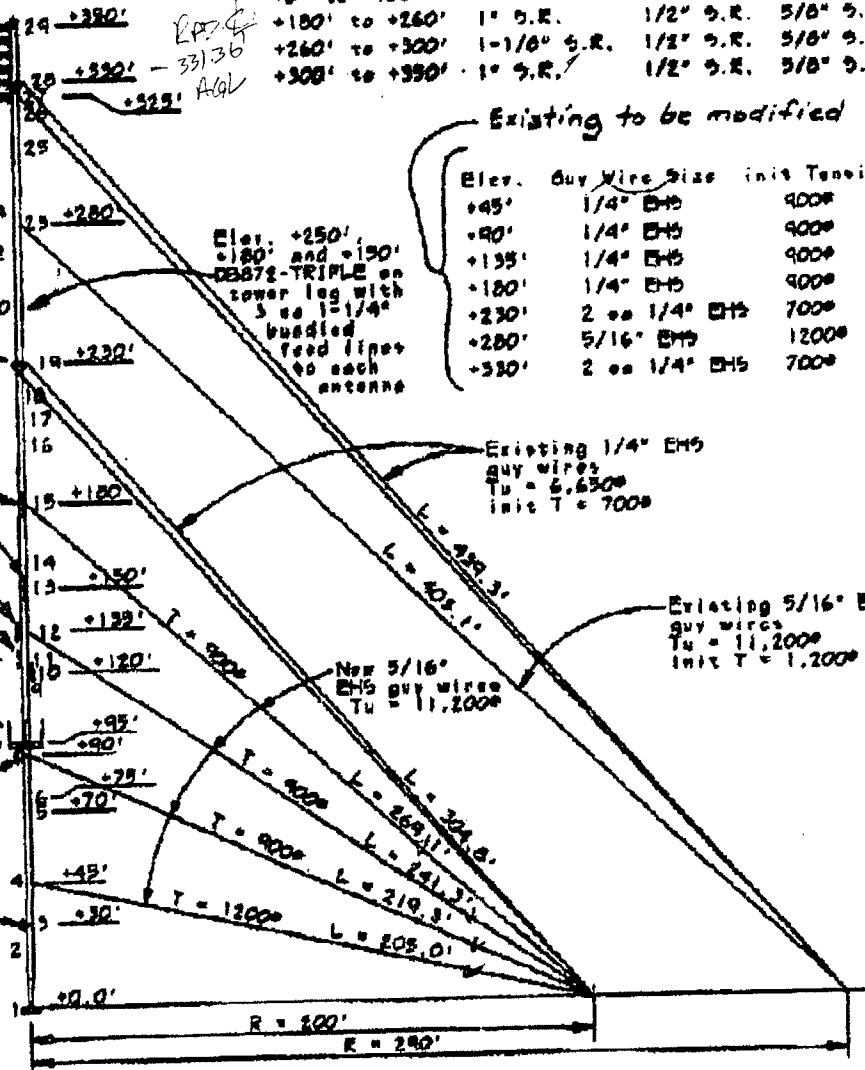
Category 1: I=1.00

Antenna Concepts
AT16L 6-bay PM w/
1-5/8" feed lineNew torsion
stabilizer
arm applyMount ANTENNA
@ 260' LEVEL(E) Torsion
stabilizer
arm applyDB872-TRIPLE
6 foot dia
grid MW dish
w/ 7/8" feed
SCALA PR-450U
w/ 1/2" feed3 on DB810K
on 4' dia
w/ 3 ea 1-5/8"
feed lines4' solid MW
dish w/ radome
and 7/8" feed3' Winged
ant. with
1/2" feed

Elevation	Log Size	Horiz'l	Diag'l
+0' to +180'	1" S.R.	5/8" S.R.	3/4" S.R.
+180' to +260'	1" S.R.	1/2" S.R.	5/8" S.R.
+260' to +300'	1-1/8" S.R.	1/2" S.R.	5/8" S.R.
+300' to +390'	1" S.R.	1/2" S.R.	5/8" S.R.

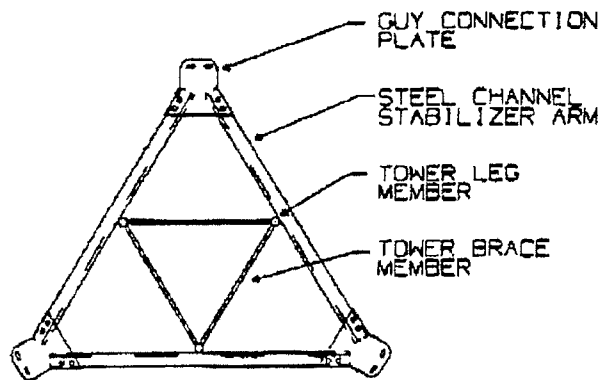
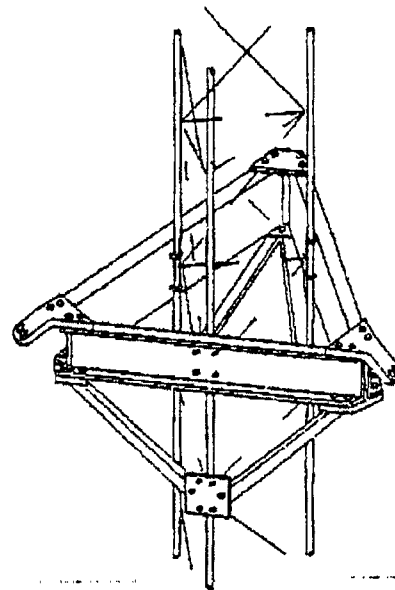
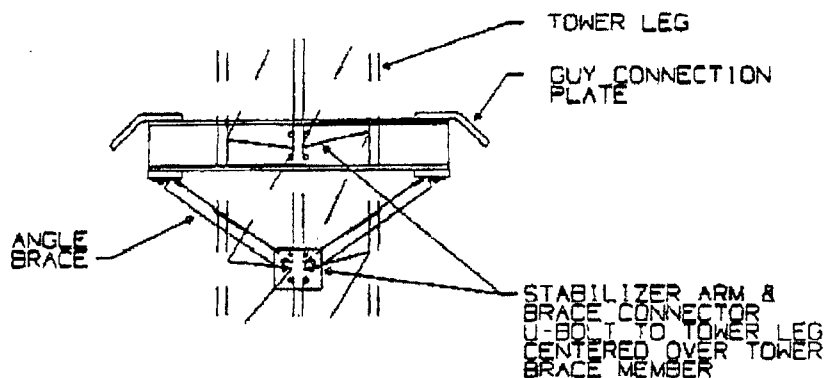
Existing to be modified

Elev.	Buy Wire Size	Init Tension
+45'	1/4" EHS	900#
+90'	1/4" EHS	900#
+135'	1/4" EHS	900#
+180'	1/4" EHS	900#
+230'	2 ea 1/4" EHS	700#
+280'	5/16" EHS	1200#
+330'	2 ea 1/4" EHS	700#

Elev. +250'
+180' and +130'
DB872-TRIPLE on
tower leg with
3 ea 1-1/4"
bundled
feed lines
to each
antennaExisting 1/4" EHS
buy wires
Tu = 6,630#
Init T = 700#Existing 5/16" EHS
buy wires
Tu = 11,200#
Init T = 1,200#New 5/16" EHS
buy wires
Tu = 11,200#

331'-4.38"

JOB		JOB NO	MAGNUM TOWERS INC
CLIENT			
DESIGNED BY MOS		DATE 1-14-89	DWG NO. STARGUY2
		9370 ELDER CREEK ROAD SACRAMENTO CALIFORNIA 95829 (916) 381-5053	

TOP VIEWISOMETRIC VIEWSIDE VIEW

MAGNUM STARGUYS FOR 18M. 24M & 36M

STARGUYS ARE USED TO RESIST TORSIONAL TWISTING INDUCED BY LARGE ECCENTRIC FORCES. THE STARGUYS ARE UTILIZED ON NEW TOWERS OR AN EXISTING TOWER WHERE ANTENNA LOADING HAS BEEN INCREASED. THE SIZE AND POSITION OF THE STARGUY IS DETERMINED BY AN ENGINEERING ANALYSIS OF EACH TOWER'S SPECIFIC LOADING.