

2011 Broadcasters Clinic

FM Directional Antenna Patterns

Making the impossible
Possible

Bob Surette

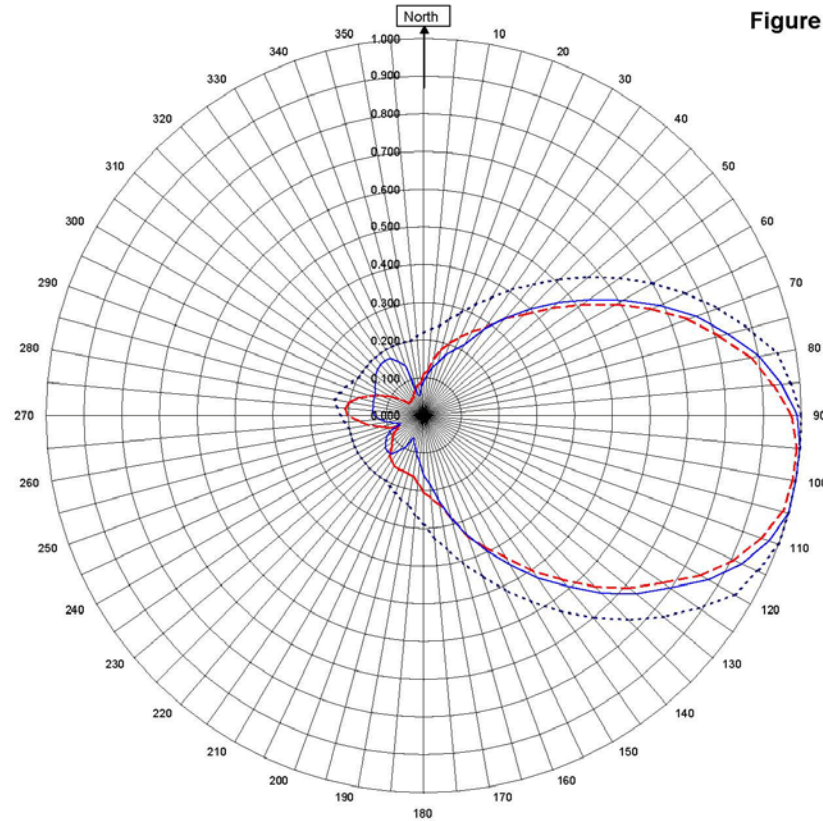
Director of Engineering

Tuesday October 11, 2011

Shively Labs

Shively Labs, a division of Howell Laboratories, Inc. Bridgton, ME (207)647-3327

Figure 1a



WYME Au Sable, NY

23442

December 5, 2008

Horizontal RMS	0.455	Frequency	97.9 / 440.55 MHz
Vertical RMS	0.447	Plot	Relative Field
H/V Composite RMS	0.461	Scale	4.5 : 1
FCC Composite RMS	0.514	See Figure 2 for Mechanical Details	

Antenna Model	6014-1/1-DA
Pattern Type	Directional Azimuth



SHIVELY LABS 6014 ANTENNA ARRAY

SHOP ORDER N/A
STATION N/A
FREQUENCY 98.1
ANTENNA 6014 1 / 2
TOWER N/A

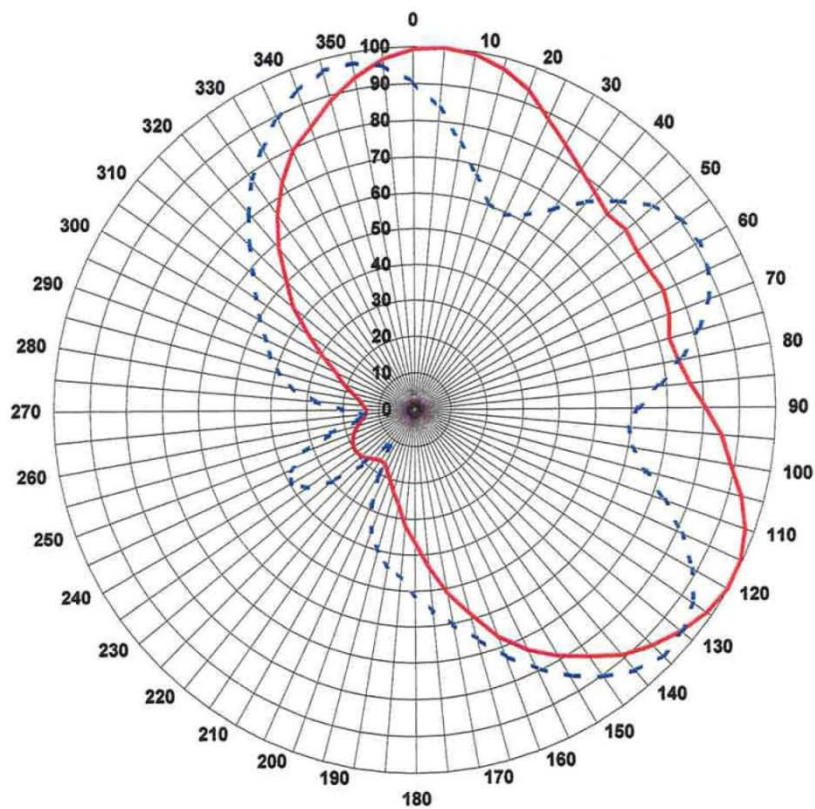
AZIMUTHS
PANEL 1 0
PANEL 2 120
PANEL 3

AMPLITUDE dB
PANEL 1 0
PANEL 2 0
PANEL 3 0

PHASING
PANEL 1 0
PANEL 2 0
PANEL 3 0

VERTICAL
RMS: 66.82%

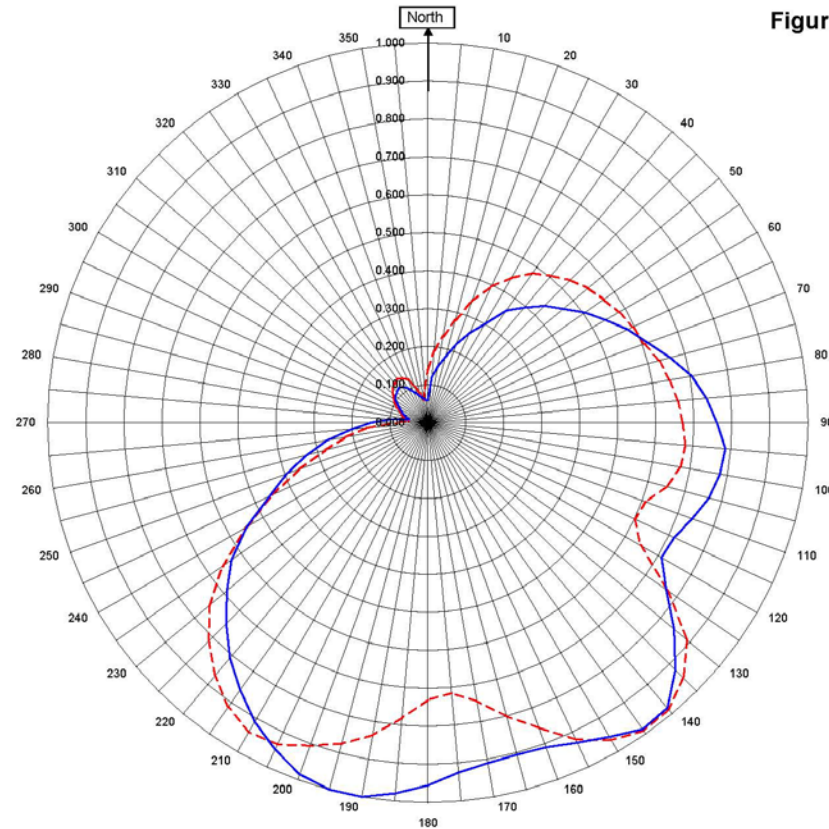
HORIZONTAL
RMS: 66.82%



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Figure 1



WBUF
Buffalo, NY

24193
August 29, 2005

Horizontal RMS	0.616
Vertical RMS	0.591
H/V Composite RMS	0.634

Frequency	92.9 / 418.05 MHz
Plot	Relative Field
Scale	4.5 : 1

Antenna Model	6014-2/2-DA
Pattern Type	Directional Azimuth

See Figure 2 for Mechanical Details

SHIVELY LABS 6014 ANTENNA ARRAY

SHOP ORDER N/A
STATION N/A
FREQUENCY 98.1
ANTENNA 6014 1 / 2
TOWER N/A

AZIMUTHS
PANEL 1 0
PANEL 2 180
PANEL 3

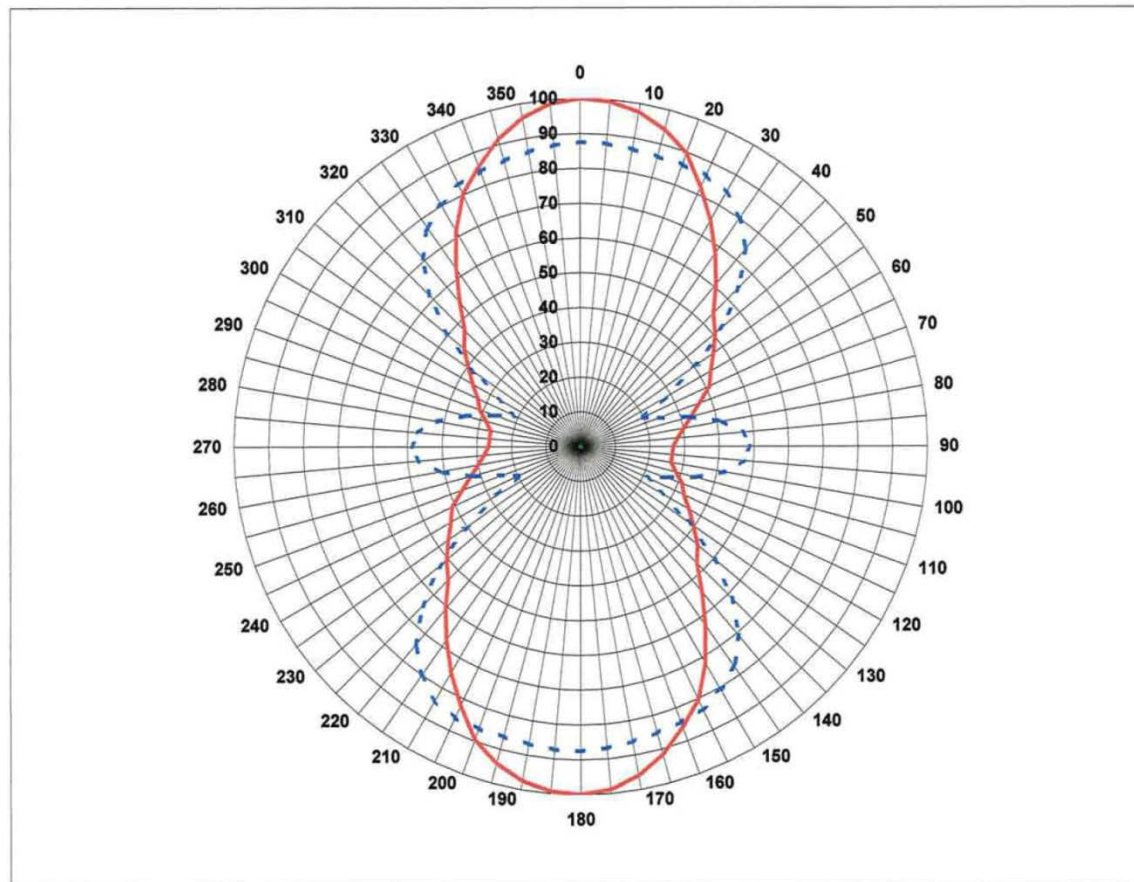
AMPLITUDE dB
PANEL 1 0
PANEL 2 0
PANEL 3 0

PHASING
PANEL 1 0
PANEL 2 0
PANEL 3 0

VERTICAL
RMS: 64.61%

HORIZONTAL
RMS: 63.99%

DA-ENVELOPE
RMS: 0.00%
85%-RMS 0.00%



PATTERN-00
8/17/2010 2:05 PM

SHIVELY LABS 6014 ANTENNA ARRAY

SHOP ORDER N/A
STATION N/A
FREQUENCY 98.1
ANTENNA 6014 1 / 3
TOWER N/A

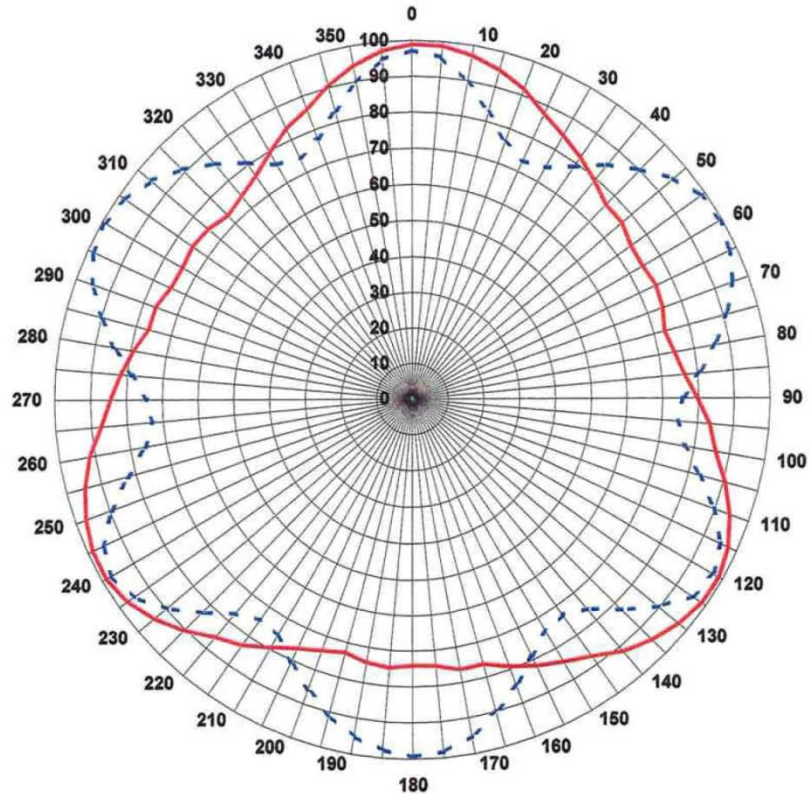
AZIMUTHS
PANEL 1 0
PANEL 2 120
PANEL 3 240

AMPLITUDE dB
PANEL 1 0
PANEL 2 0
PANEL 3 0

PHASING
PANEL 1 0
PANEL 2 0
PANEL 3 0

VERTICAL
RMS: 87.12%

HORIZONTAL
RMS: 84.62%



446 MHz

VERT. ARRAY.

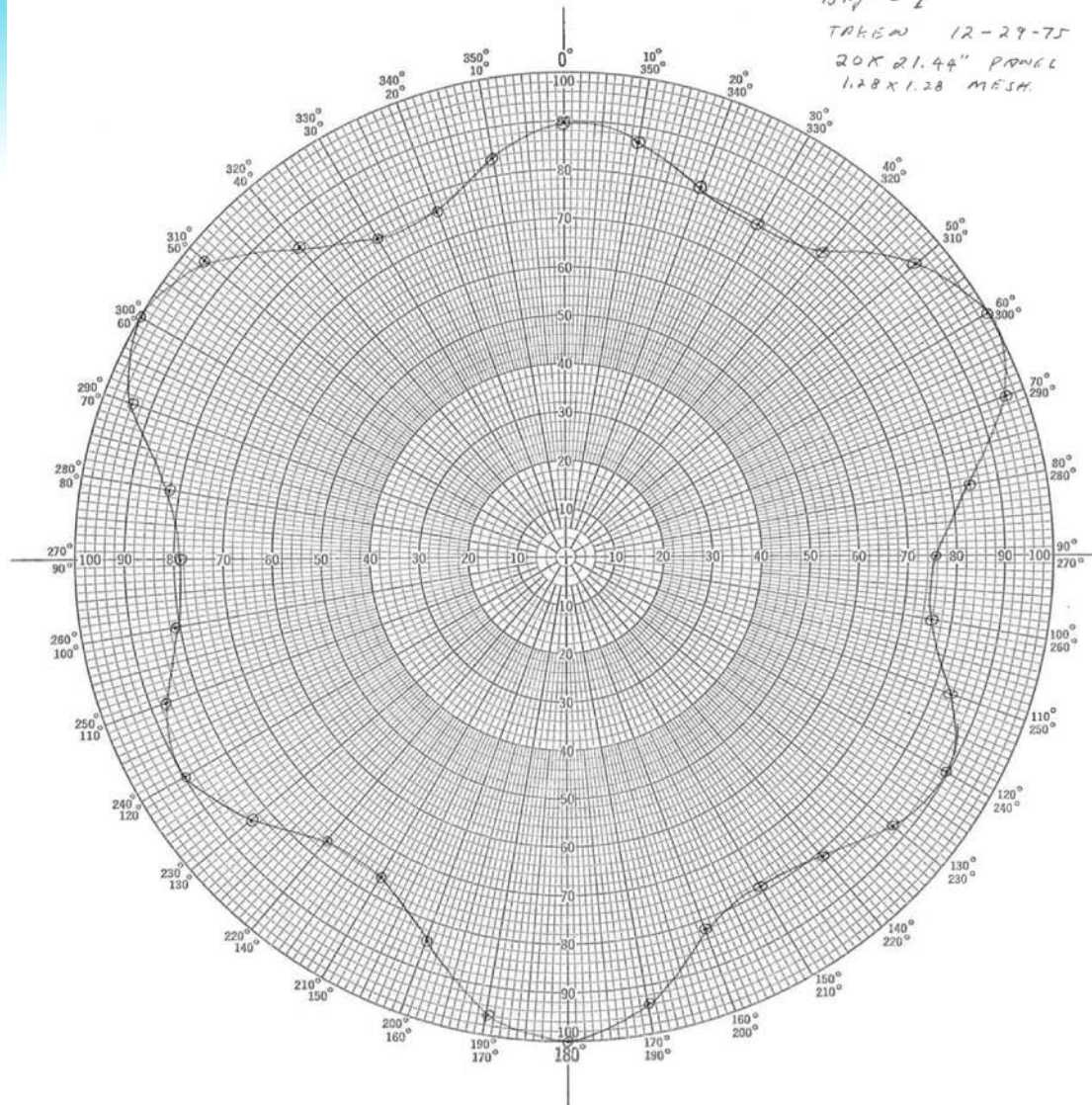
CALC. FROM AVG. OF

BAY #1

TAKEN 12-29-75

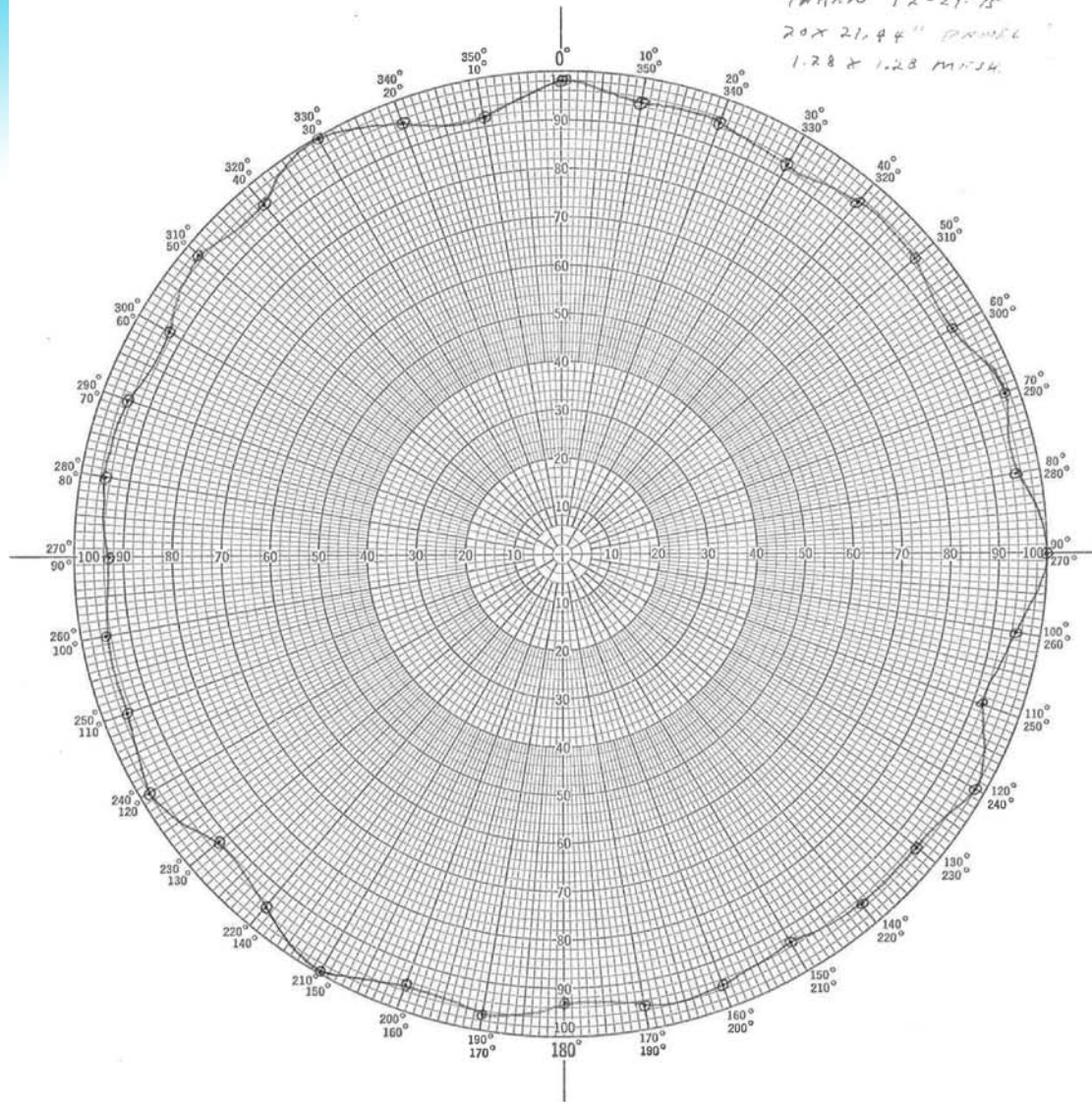
20 X 21.44" PANEL

1.28 X 1.28 MESH

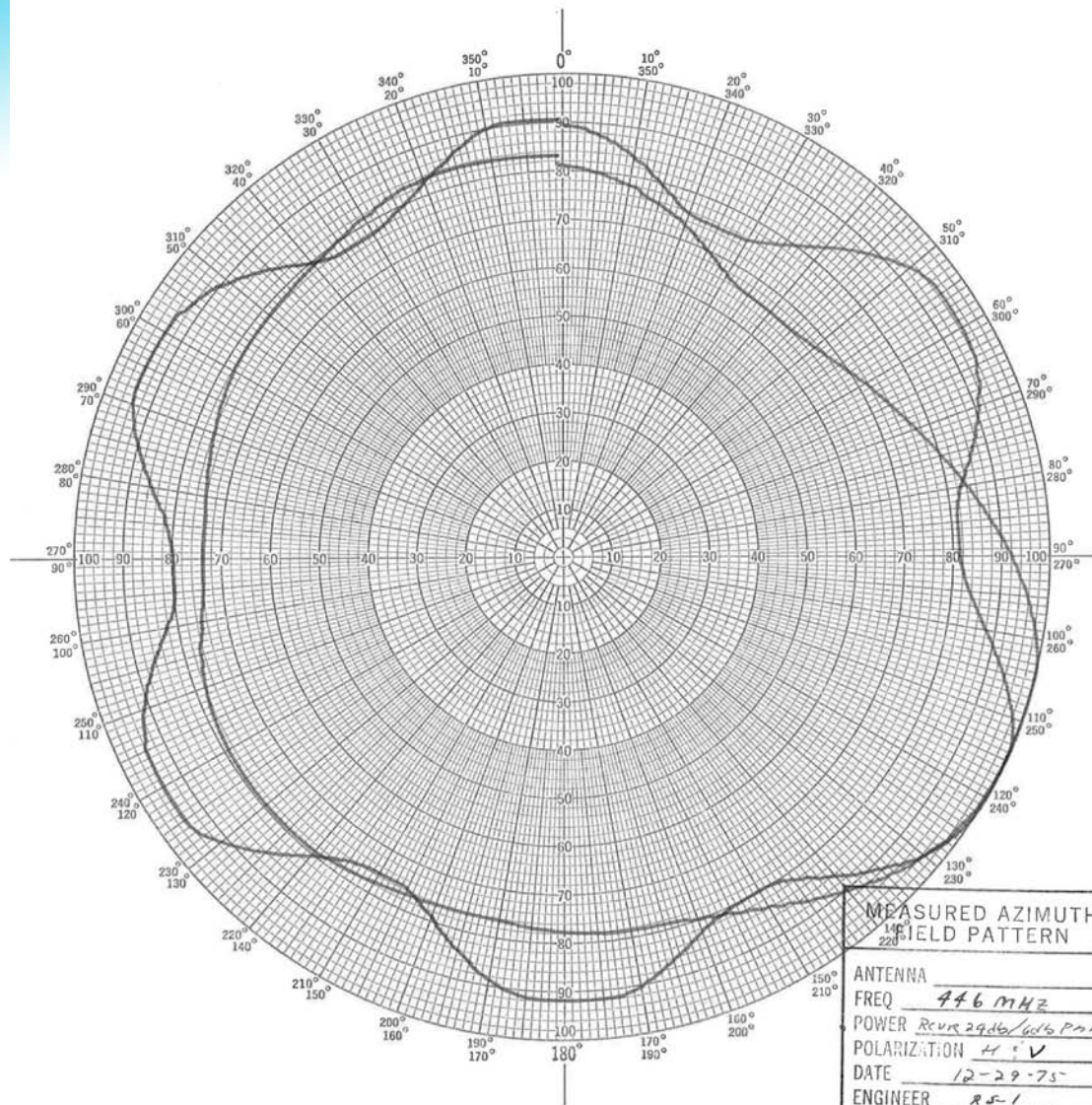


Polar Chart No. 127L
SCIENTIFIC-ATLANTA, INC.
ATLANTA, GEORGIA

446 MHz
 HORIZ. ARRAY
 CALC. FROM AVEC.
 134x ± 1
 TAKEN 12-29-75
 20x 21.44" DIAMETER
 1.28 x 1.23 MESH.



Polar Chart No. 127L
 SCIENTIFIC-ATLANTA, INC.
 ATLANTA, GEORGIA



MEASURED AZIMUTH
FIELD PATTERN

ANTENNA
FREQ 446 MHz
POWER RCVR 29db/60db PAD
POLARIZATION H + V
DATE 12-29-75
ENGINEER RS-1
CONDITIONS: EXACT
RANGE 300 ft
20 x 21.9 ft WID.

SHIVELY LABORATORIES, INC.

Polar Chart No. 127L
SCIENTIFIC-ATLANTA, INC.
ATLANTA, GEORGIA

Shively Labs

DISC NO: 5897232H
 DATE: 06 DECEMBER 2006
 SHOP ORDER: 58972
 STATION: WJPT
 FREQ: 106.3/478.35
 HV RATIO: 1
 ANT TYPE: 6814
 TOWER: ESCO-6FT
 MOUNT: PAN HT'S
 MT REMK: NO
 GRND STRAP: IN
 'A' DIM: N/A

REMARKS: —
 REMARKS:
 PLOT TYPE: RF
 VERTICAL: —
 V RMS: 82.233
 HORIZONTAL: —
 H RMS: 88.312

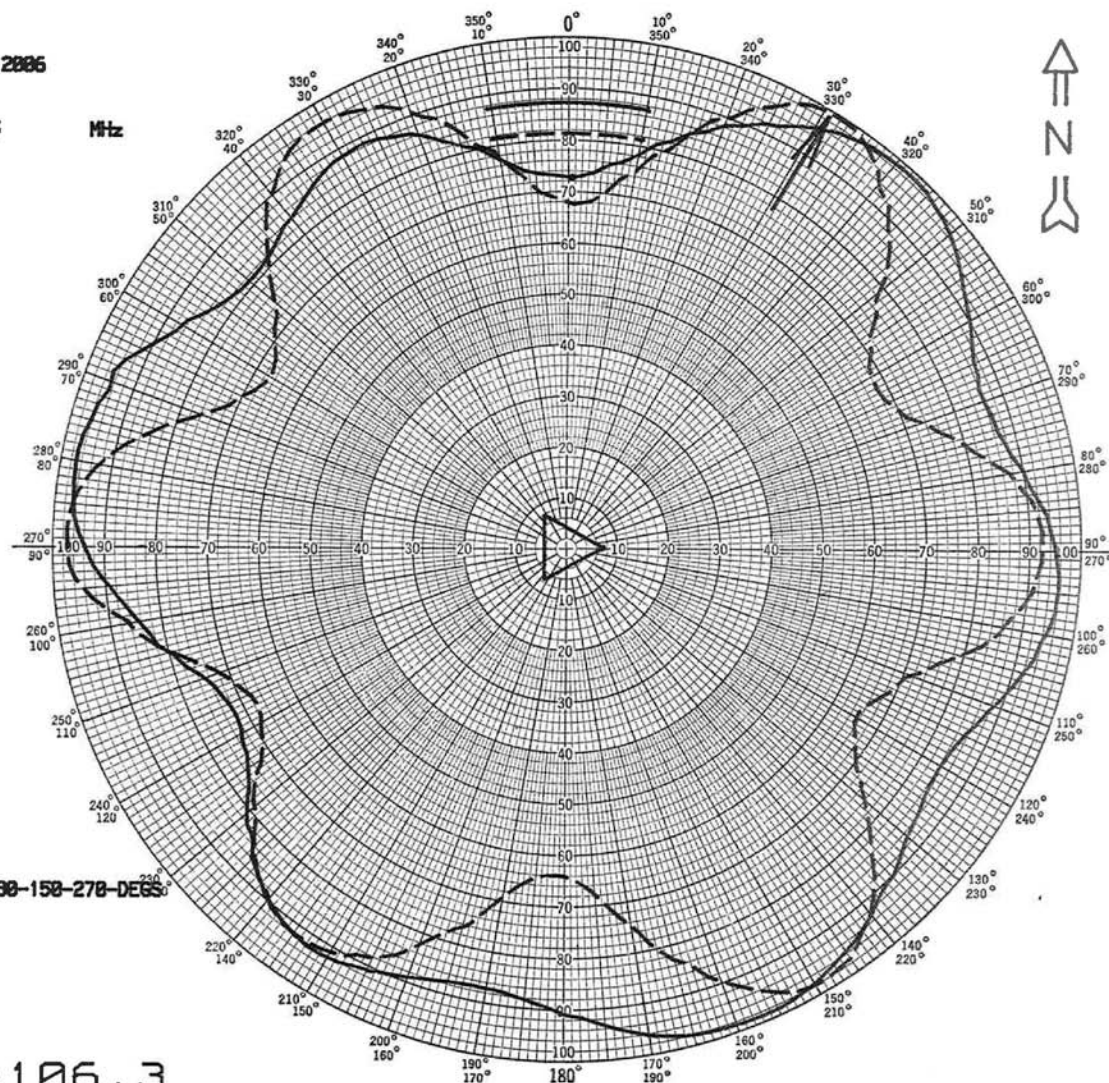
1ST LEG AZIMUTH 90-DEGS

← = ANTENNA HEADING 30-150-270-DEGS

└ = LADDER INSIDE TOWER

PATTERN NUMBER:

SHIVELY-32-106.3



Shively Labs

DISC NO: 5897231H
 DATE: 06 DECEMBER 2006
 SHOP ORDER: 58972
 STATION: WJ60
 FREQ: 102.9/463.05 MHz
 HV RATIO: 1
 ANT TYPE: 6814
 TOWER: ESCO-6FT
 MOUNT: PAN HT'S
 MT REMK: NO
 GRND STRAP: NO
 'A' DIM: N/A IN

REMARKS: —
 REMARKS:
 PLOT TYPE: RF
 VERTICAL: — — — —
 V RMS: 76.678
 HORIZONTAL: — — — —
 H RMS: 86.519

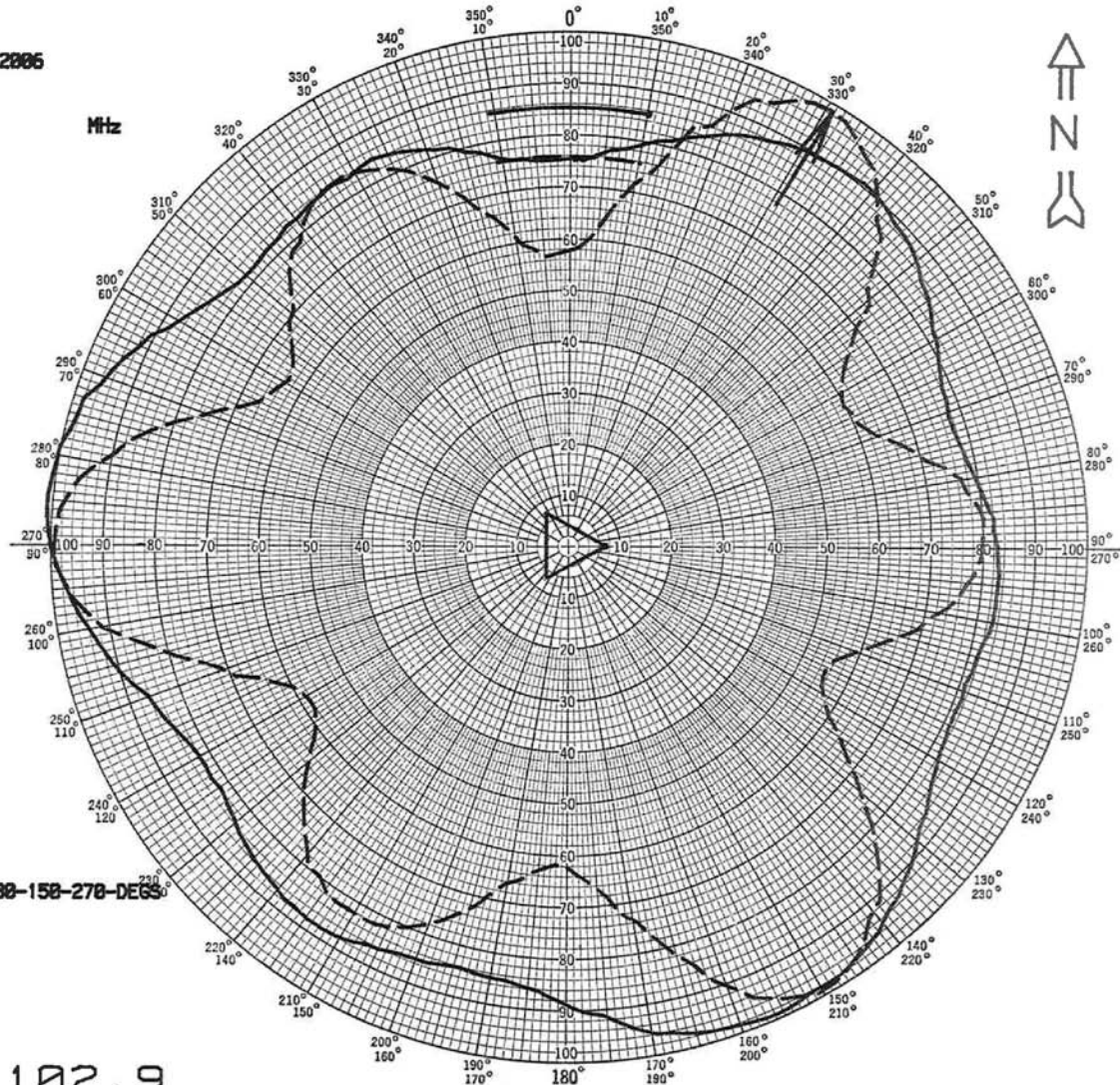
1ST LEG AZIMUTH 90-DEGS

← = ANTENNA HEADING 30-150-270-DEGS

└ = LADDER INSIDE TOWER

PATTERN NUMBER:

SHIVELY-31-102.9



Shively Labs

DISC NO: 5897220H
 DATE: 06 DECEMBER 2006
 SHOP ORDER: 58972
 STATION: WJBX
 FREQ: 99.3/446.05
 HV RATIO: 1
 ANT TYPE: 6814
 TOWER: ESCO-6FT
 MOUNT: PAN MT'S
 MT REMK:
 GRND STRAP: NO
 'A' DIM: N/A IN

REMARKS: —
 REMARKS:
 PLOT TYPE: RF
 VERTICAL: — — —
 V RMS: 77.489
 HORIZONTAL: — — —
 H RMS: 82.89

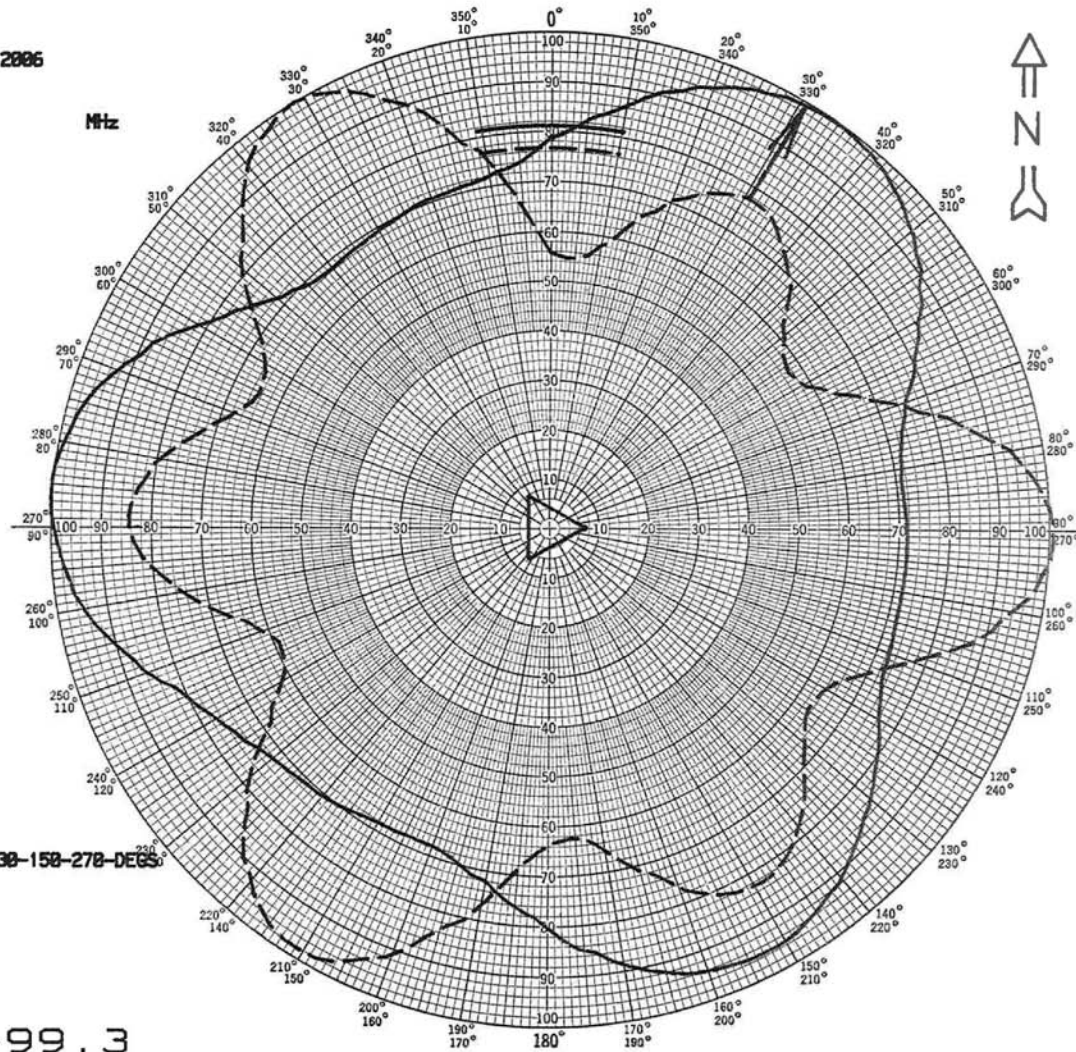
1ST LEG AZIMUTH 98-DEGS

← = ANTENNA HEADING 30-150-270-DEGS

└ = LADDER INSIDE TOWER

PATTERN NUMBER:

SHIVELY-30-99.3



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FORM PF1 - 9/93-1

SHIVELY LABS

PATTERN INFO

DATE: 6-Feb-08
 SHOP ORDER: KMPB
 STATION: KMPB
 FREQUENCY: 90.7/408.15
 ANTENNA TYPE: 6016H-6/1-DA

TOWER: PI-ROD 36
 MOUNT: SPECIAL
 MOUNT REMARKS: SPECIAL
 A-DIMENSION INCHES: N/A

HORIZONTAL PARASITIC: N/A
 B-DIMENSION:
 C-DIMENSION
 PARASITIC LENGTH:

VERTICAL PARASITIC: N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

1st LEG AZIMUTH: N/A
 ANTENNA HEADING: 290-DEGS
 LADDER: N/A

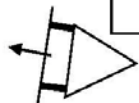
PATTERN NUMBER: 02-98.1

VERTICAL RMS:

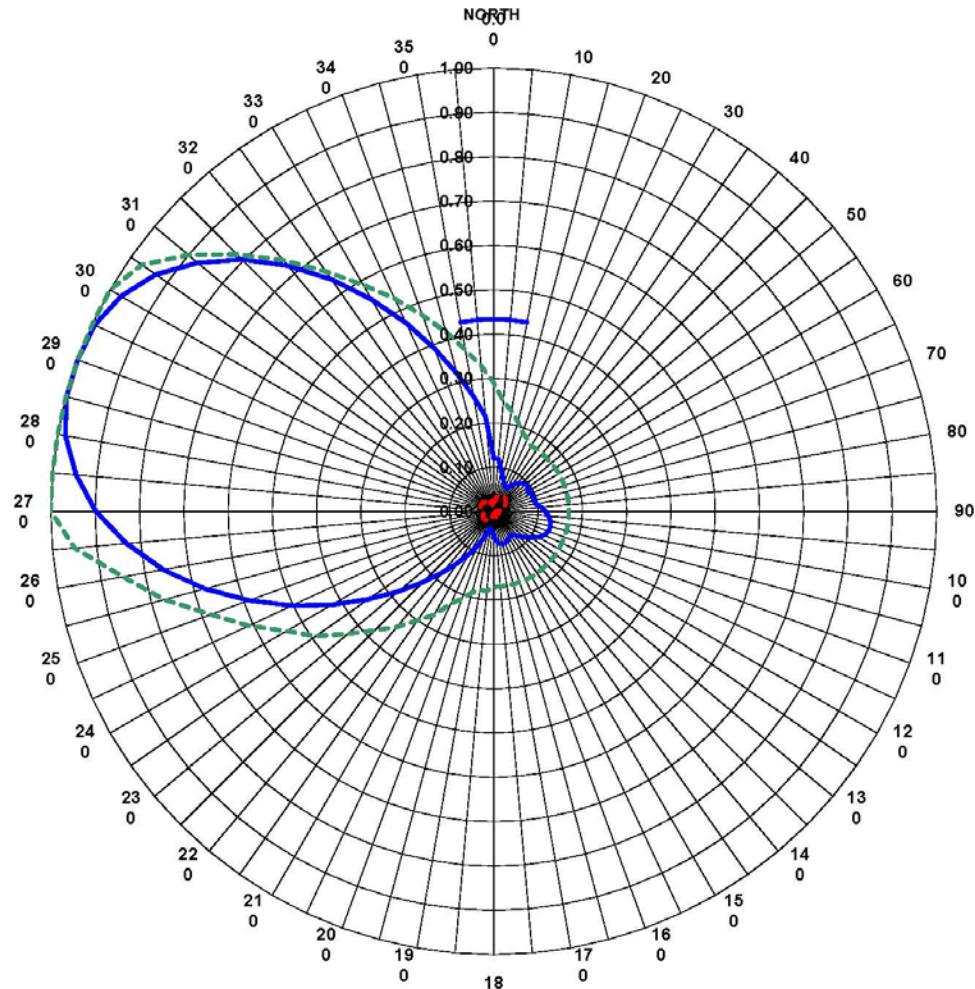
2.39%

HORIZONTAL RMS:

43.33%



6016H-1/1 PANEL
 AZIMUTH 290-
 DEGREES



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SHIVELY LABS 6016 ANTENNA ARRAY

PROJECT #
STATION
FREQUENCY 98.1
ANTENNA 6016 4 / 1
TOWER N/A

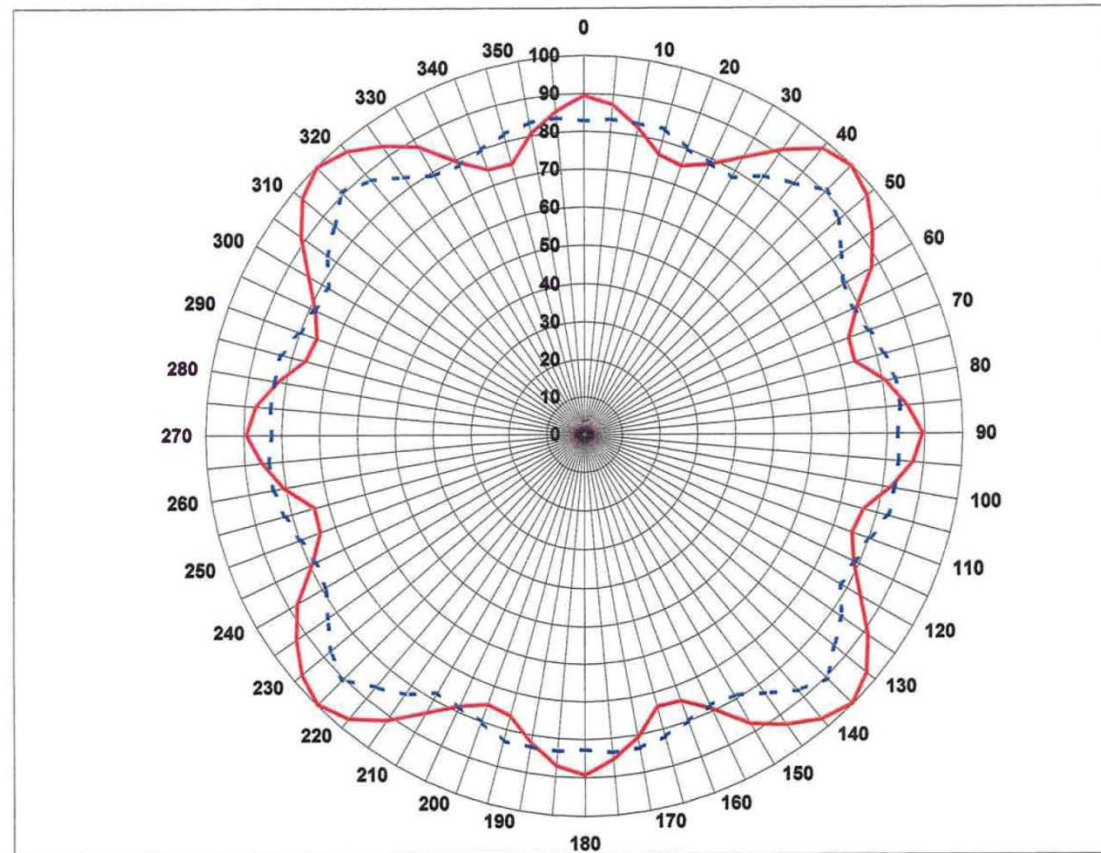
AZIMUTHS
PANEL 1 0
PANEL 2 90
PANEL 3 180
PANEL 4 270

AMPLITUDE dB
PANEL 1 0
PANEL 2 0
PANEL 3 0
PANEL 4 0

PHASING
PANEL 1 0
PANEL 2 0
PANEL 3 0
PANEL 4 0

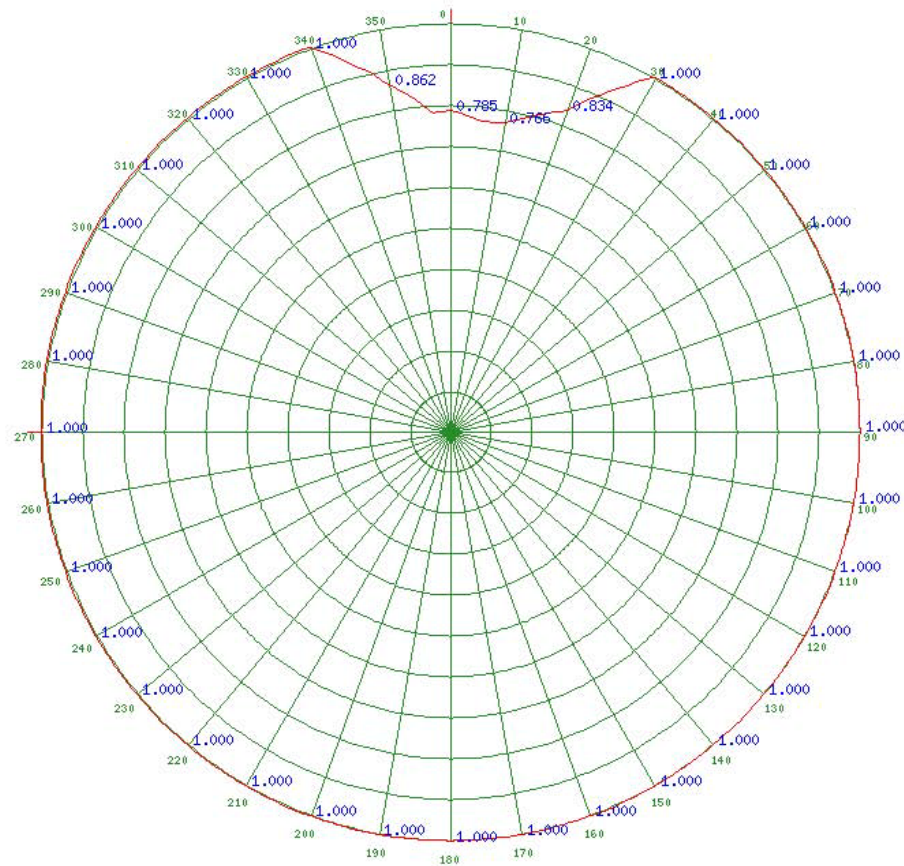
VERTICAL
RMS: 82.58%

HORIZONTAL
RMS: 85.53%



Any specified rotation has already been applied to the plotted pattern.
Field strength values shown on a rotated pattern may differ from the listed values
because intermediate azimuths are interpolated between entered azimuths.

Close Window



[FM Query](#) [FCC](#) [TV Query](#)



SHIVELY LABS

DATE: 8-Sep-11
 SHOP ORDER: 56507
 STATION: N/A
 FREQUENCY: 104.7
 ANTENNA TYPE: 6017

TOWER: POLE
 MOUNT:
 MOUNT REMARKS:
 A-DIMENSION INCHES

HORIZONTAL PARASITIC: N/A
 B-DIMENSION:
 C-DIMENSION
 PARASITIC LENGTH:

VERTICAL PARASITIC: N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

1st LEG AZIMUTH: POLE
 ANTENNA HEADING: SEE SKETCH
 LADDER:

PATTERN NUMBER: 10-A

VERTICAL RMS: ---

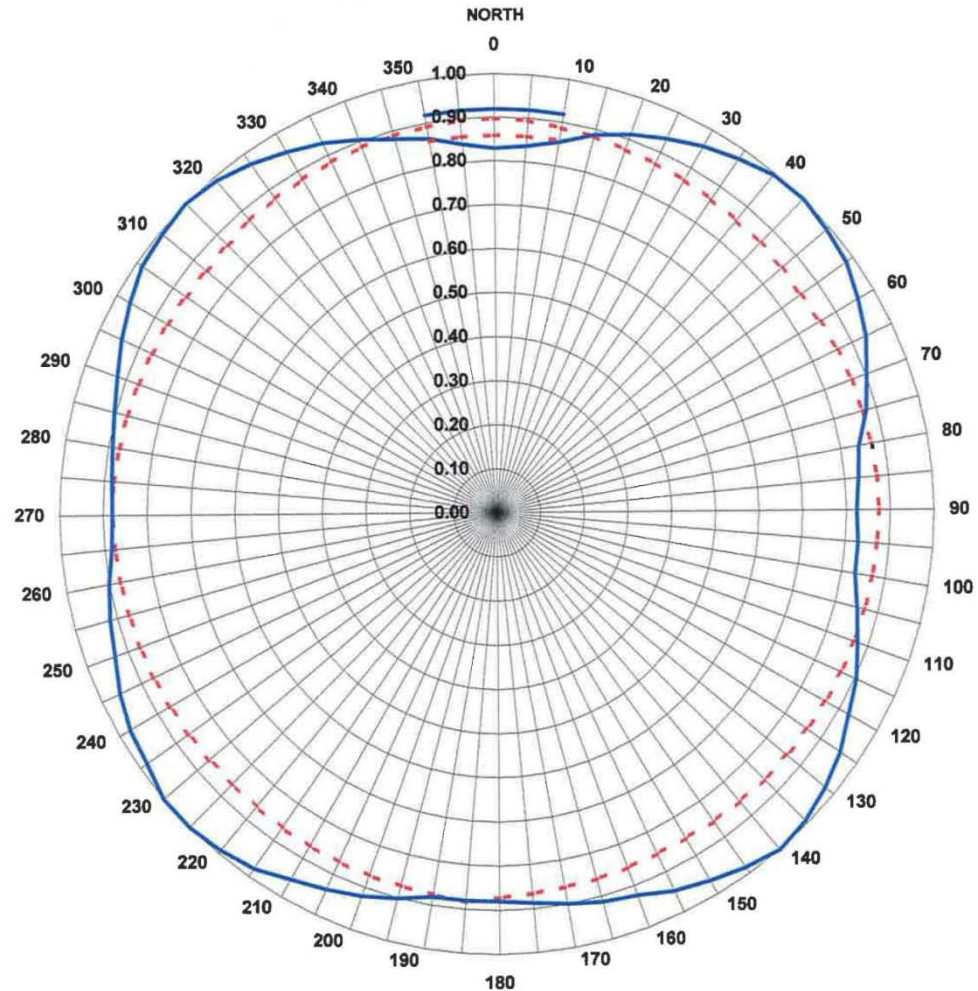
85.82%

HORIZONTAL RMS: —

91.89%



6017 ANTENNA
 AZIMUTHS
 0-90-180-270-DEGREES
 10-INCH POLE



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SHIVELY LABS

PATTERN INFO

DATE: 25-Nov-08
 SHOP ORDER: 52966
 STATION: WEHC
 FREQUENCY: 90.7/408.15
 ANTENNA TYPE: YAGI'S

TOWER: PI-ROD 42
 MOUNT: YAGI MT'S
 MOUNT REMARKS: N/A
 A-DIMENSION INCHES: N/A

HORIZONTAL PARASITIC: N/A
 B-DIMENSION:
 C-DIMENSION
 PARASITIC LENGTH:

VERTICAL PARASITIC: N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

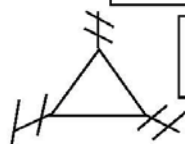
1st LEG AZIMUTH: 0-DEGREES
 ANTENNA HEADING: 0-120-240-DEGS
 LADDER: N/A

PATTERN NUMBER: 02-A

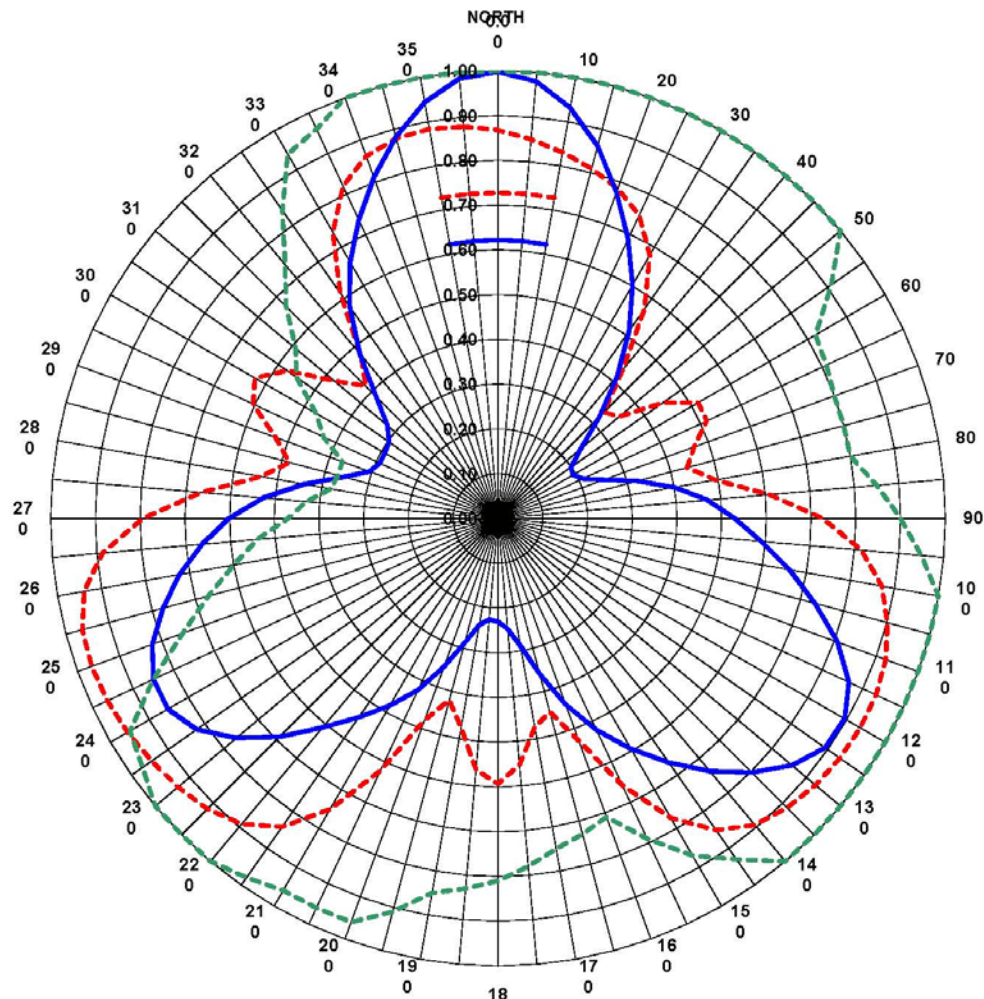
VERTICAL RMS: ---
 72.78%

HORIZONTAL RMS: ---
 62.19%

1st LEG 0-DEGREES



YAGI ANTENNAS
 AZIMUTH 0-120-240-
 DEGREES



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SHIVELY LABS

PATTERN INFO

DATE: 6-Nov-08
 SHOP ORDER: 52010
 STATION: WPIL
 FREQUENCY: 91.7/412.65
 ANTENNA TYPE: YAGI

TOWER: PI-ROD 24
 MOUNT: YAGI MT'S
 MOUNT REMARKS:
 A-DIMENSION INCHES N/A

HORIZONTAL PARASITIC: N/A
 B-DIMENSION:
 C-DIMENSION
 PARASITIC LENGTH:

VERTICAL PARASITIC N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

1st LEG AZIMUTH: 45-DEGREES
 ANTENNA HEADING: 10-180-270-DEGREES
 LADDER: N/A

PATTERN NUMBER: 20

VERTICAL RMS: - - - - -

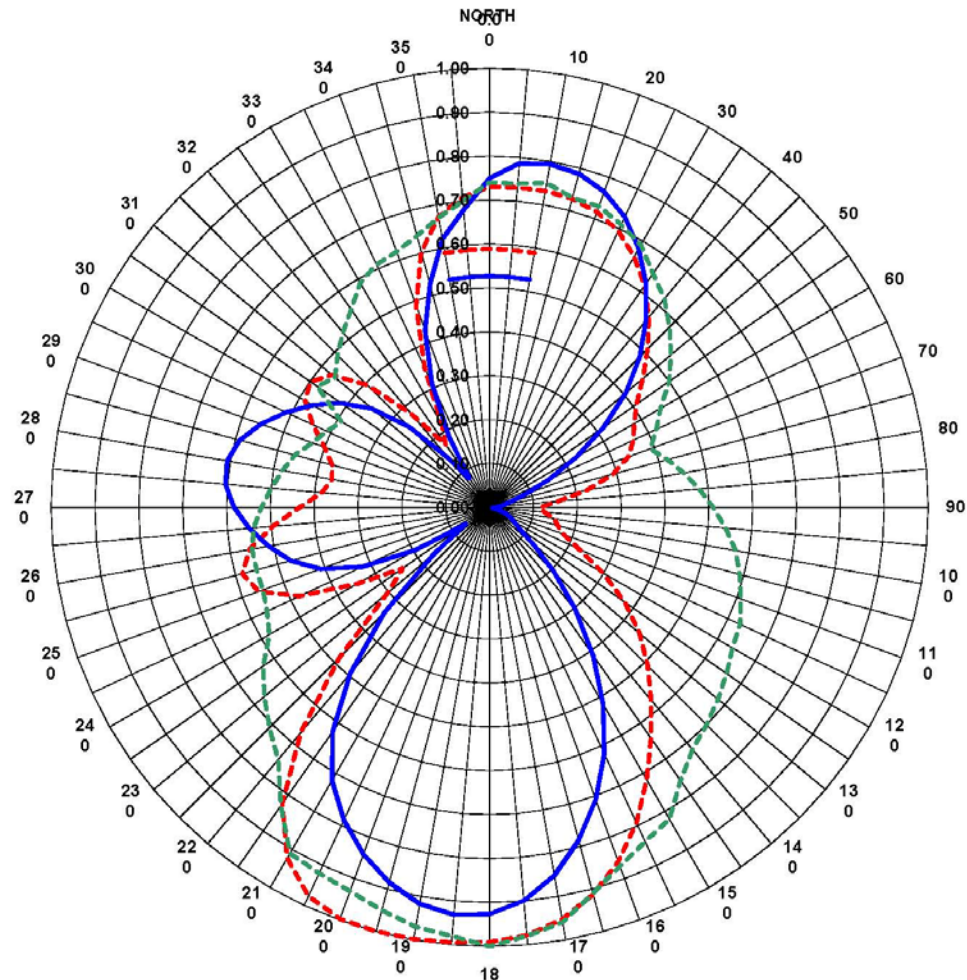
58.86%

HORIZONTAL RMS: ————

52.66%

1st LEG 45-DEGREES

YAGI ANTENNAS
 YAGI 10-DEGS 2-db PAD
 YAGI 180-DEGS M/F CON
 YAGI 270-DEGS 6-db PAD



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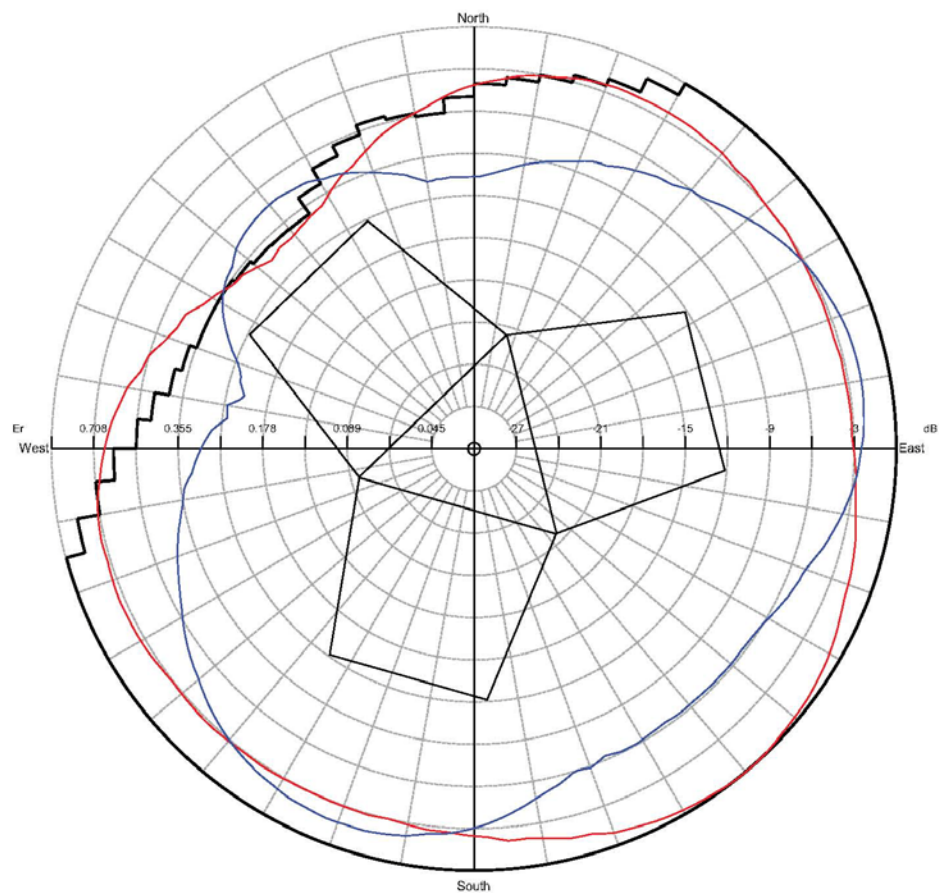
TX station: 08oe2011 Communications Technologies KSIQSTA

Frequency: 96.10 MHz

Gain solid integration : disabled

Site Name: Sweetwater Water Tank Test Ald

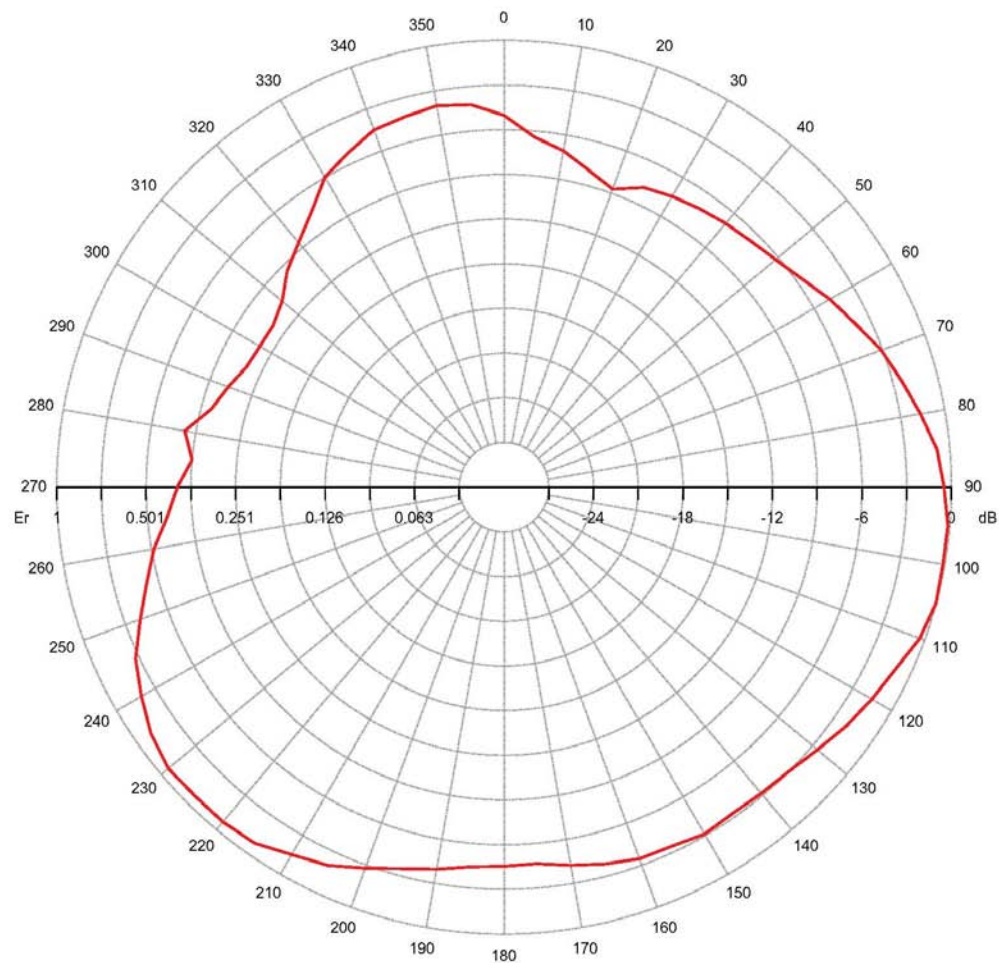
Horizontal diagram at 0.0° depres. (Total Antenna)



— 0.0° depres. (Total Antenna), Gain (dBd): -0.01
— 0.0° depres. (Total Antenna), Gain (dBd): 1.7

Frequency: 96 MHz

Horizontal pattern in Horizontal polarization



Shively Labs

DISC NO: KSIQ02H
 DATE: 24 AUGUST 2011
 SHOP ORDER: RAS-YAGI
 STATION: KSIQ
 FREQ: 96.1/432.45
 HV RATIO: 1
 ANT TYPE: ALD YAGI X
 TOWER: POLE 6-INCH
 MOUNT: YAGI MT'S
 MT REMK:
 GRND STRAP: NO
 'A' DIM: PER CUSTOMER IN

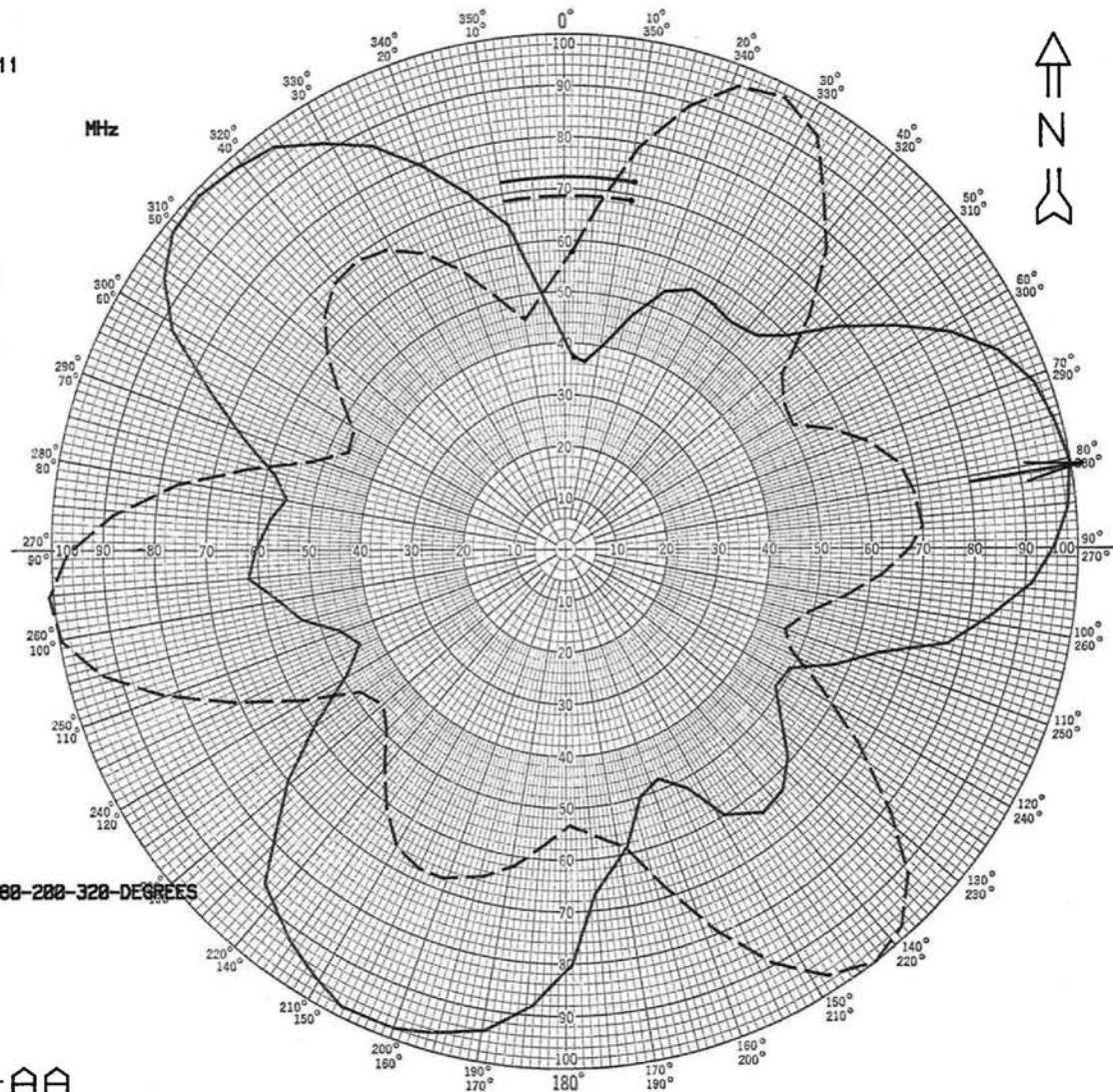
REMARKS:
 REMARKS:
 PLOT TYPE: RF
 VERTICAL: ---
 U RMS: 69.899
 HORIZONTAL: ---
 H RMS: 73.356

1ST LEG AZIMUTH POLE

← = ANTENNA HEADING 80-200-320 DEGREES

L = LADDER

PATTERN NUMBER:
 SHIVELY-02-AA



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FORM PF1 - 9/93-1

Shively Labs

DISC NO: KSIQ03H
 DATE: 24 AUGUST 2011
 SHOP ORDER: RAS-YAGI
 STATION: KSIQ
 FREQ: 96.1/432.45
 HU RATIO: 1
 ANT TYPE: ALD YAGI X
 TOWER: POLE 6-INCH
 MOUNT: YAGI HT'S
 MT REMK:
 GRND STRAP: NO
 'A' DIM: PER CUSTOMER IN

REMARKS: 3-dB PAD YAGI 320-DEGREES

REMARKS:

PLOT TYPE: RF

VERTICAL: ---
 V RMS: 67.118

HORIZONTAL: ---
 H RMS: 68.59

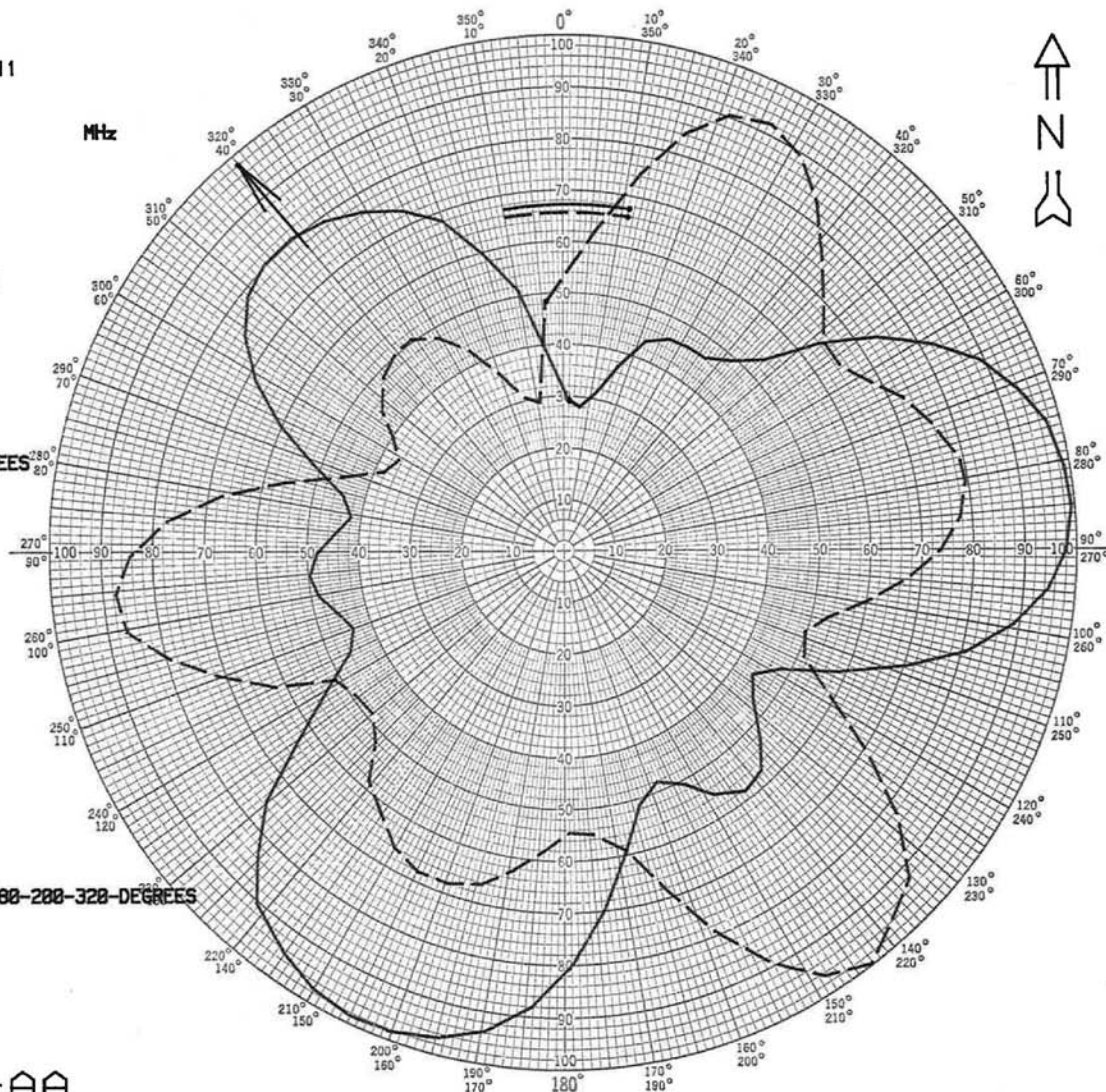
1ST LEG AZIMUTH POLE

← = ANTENNA HEADING 80-280-320-DEGREES

L = LADDER

PATTERN NUMBER:

SHIVELY-03-AA



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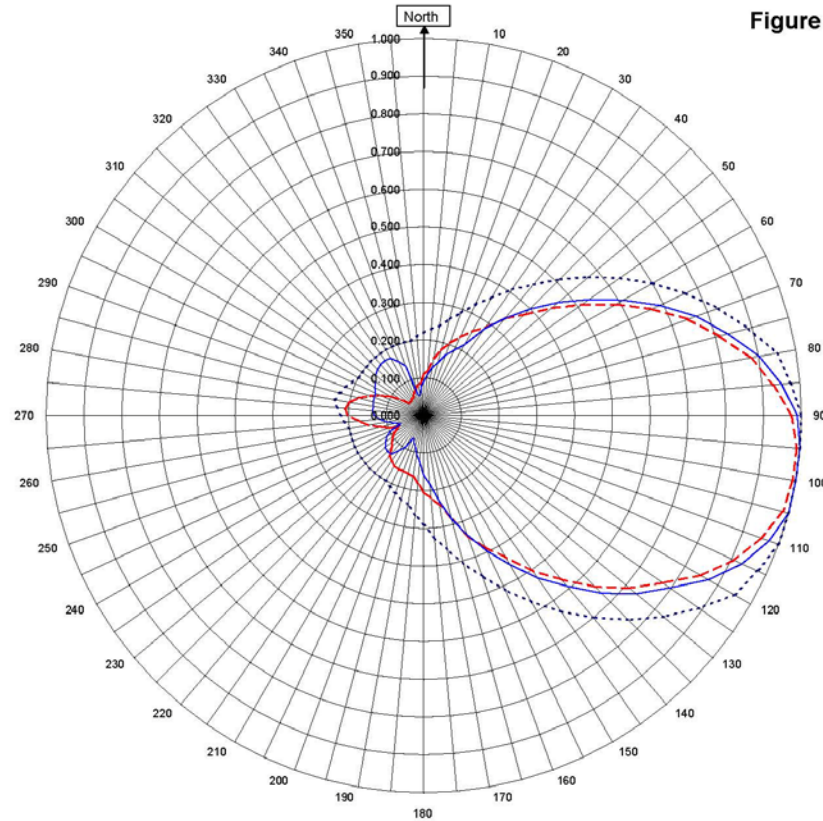
FORM PF1 - 9/93-1



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Figure 1a



WYME Au Sable, NY

23442

December 5, 2008

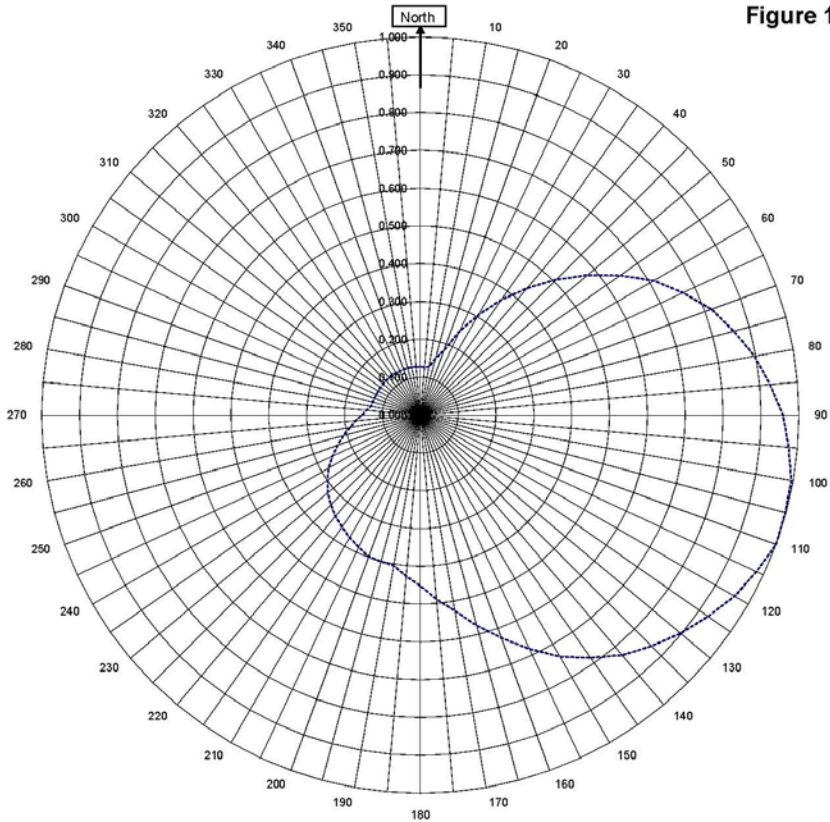
Horizontal RMS	0.455	Frequency	97.9 / 440.55 MHz
Vertical RMS	0.447	Plot	Relative Field
H/V Composite RMS	0.461	Scale	4.5 : 1
FCC Composite RMS	0.514	See Figure 2 for Mechanical Details	

Antenna Model	6014-1/1-DA
Pattern Type	Directional Azimuth

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Figure 1a

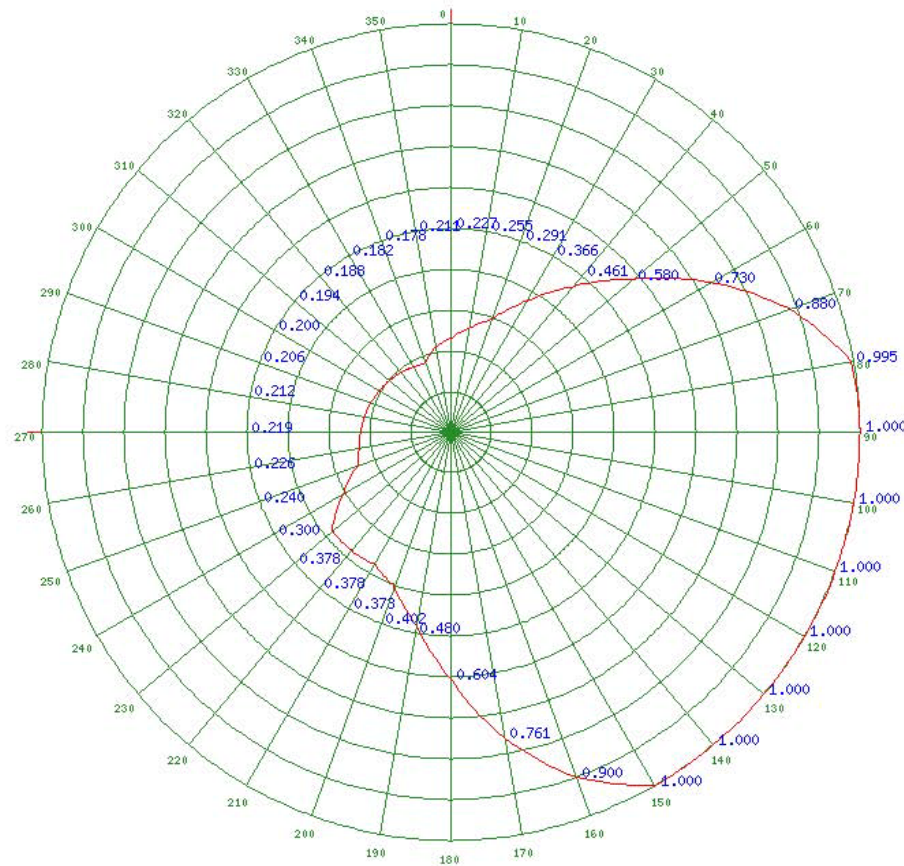


00
0
January 0, 1900

Horizontal RMS	0.000	Frequency	0 / 0 MHz
Vertical RMS	0.000	Plot	Relative Field
H/V Composite RMS	0.000	Scale	4.5 : 1
FCC Composite RMS	0.538	See Figure 2 for Mechanical Details	

Antenna Model	0
Pattern Type	Directional Azimuth

Any specified rotation has already been applied to the plotted pattern.
Field strength values shown on a rotated pattern may differ from the listed values
because intermediate azimuths are interpolated between entered azimuths.

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SHIVELY LABS YAGI ANTENNA ARRAY PATTERN STUDY

PROJECT # 29369
STATION WJIC
FREQUENCY 89.5
ANTENNA YAGI 1 / 2
TOWER ROHN-45

AZIMUTHS
YAGI 1 95
YAGI 2 220
YAGI 3
YAGI 4

AMPLITUDE dB
YAGI 1 0
YAGI 2 -8
YAGI 3 0
YAGI 4 0

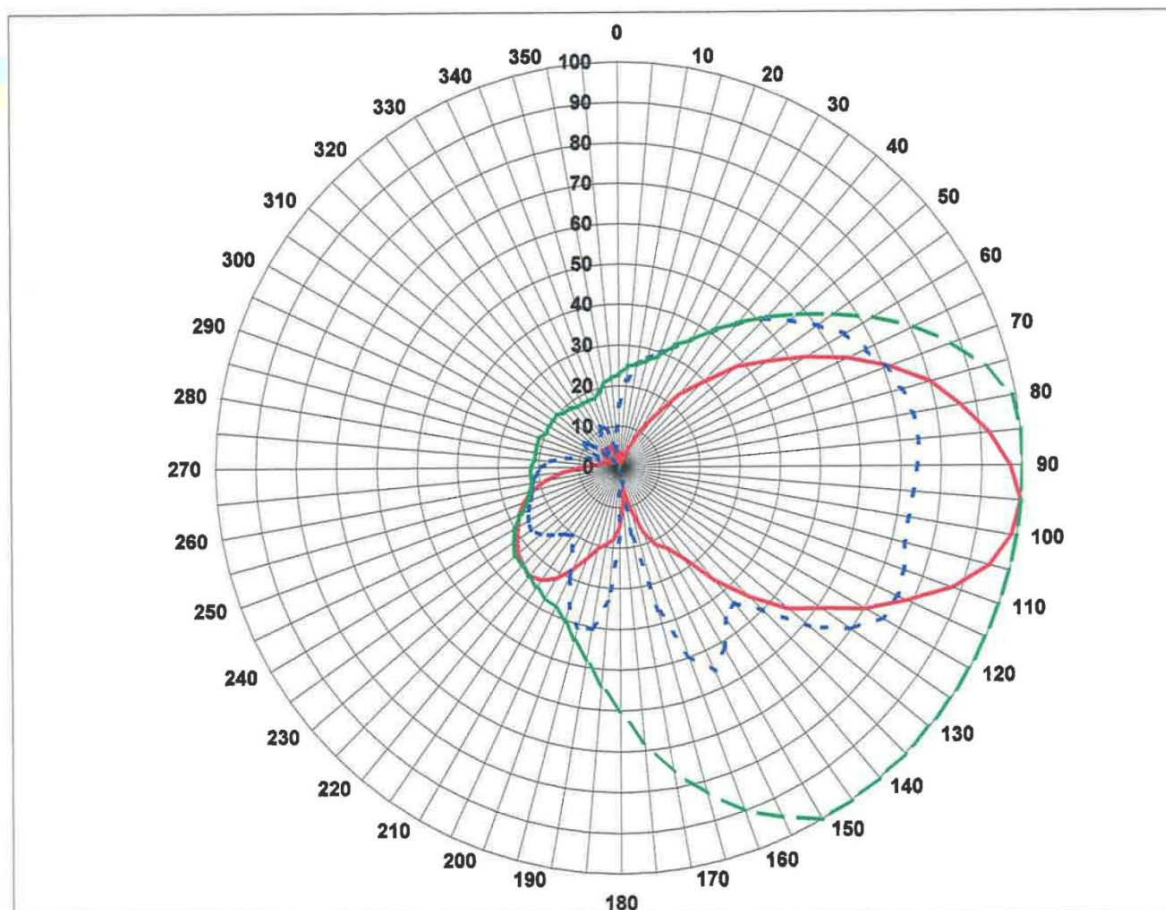
PHASING
YAGI 1 0
YAGI 2 0
YAGI 3 0
YAGI 4 0

VERTICAL
RMS: 42.07%

HORIZONTAL
RMS: 41.11%

DA-ENVELOPE
RMS: 60.60%
RMS: 85% 51.51%

COMP-RMS 46.60%



PATTERN-05
9/6/2011 10:56 AM

SHIVELY LABS

DATE: 12-Sep-11
 SHOP ORDER: 29369
 STATION: WJIC
 FREQUENCY: 89.5
 ANTENNA TYPE: ALD YAGI

TOWER: ROHN-45
 MOUNT: SEE SKETCH
 MOUNT REMARKS:
 A-DIMENSION INCHES

HORIZONTAL PARASITIC: N/A
 B-DIMENSION:
 C-DIMENSION
 PARASITIC LENGTH:

VERTICAL PARASITIC: N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

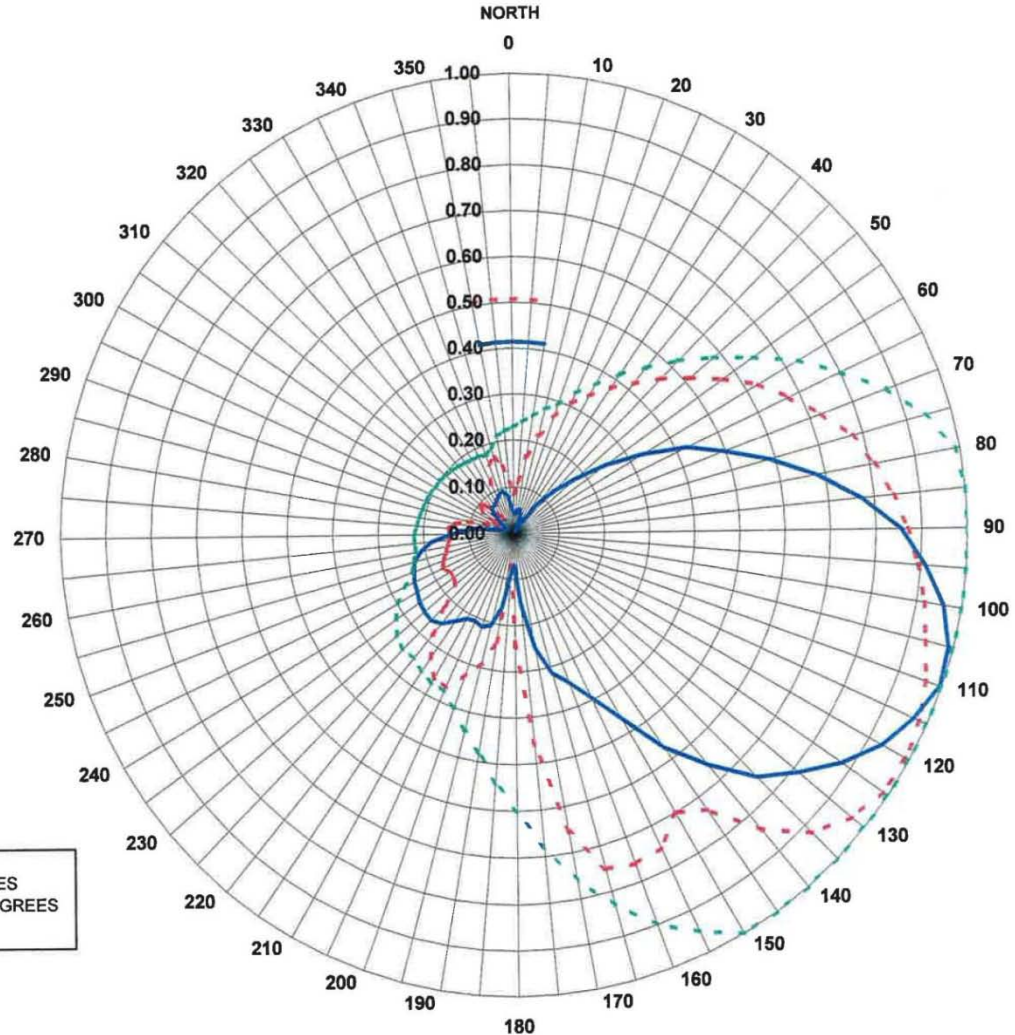
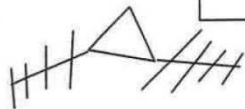
1st LEG AZIMUTH: 15-DEGREES
 ANTENNA HEADING: 110 & 220 DEGREES
 LADDER: N/A

PATTERN NUMBER: 07-B

VERTICAL RMS: ---
 50.74%

HORIZONTAL RMS: ———
 41.41%

TWO ALDENA YAGIS
 AZIMUTHS 110 & 220 DEGREES
 ATTENUATION 10-Db YAGI 220-DEGREES
 SPECIAL SLANT



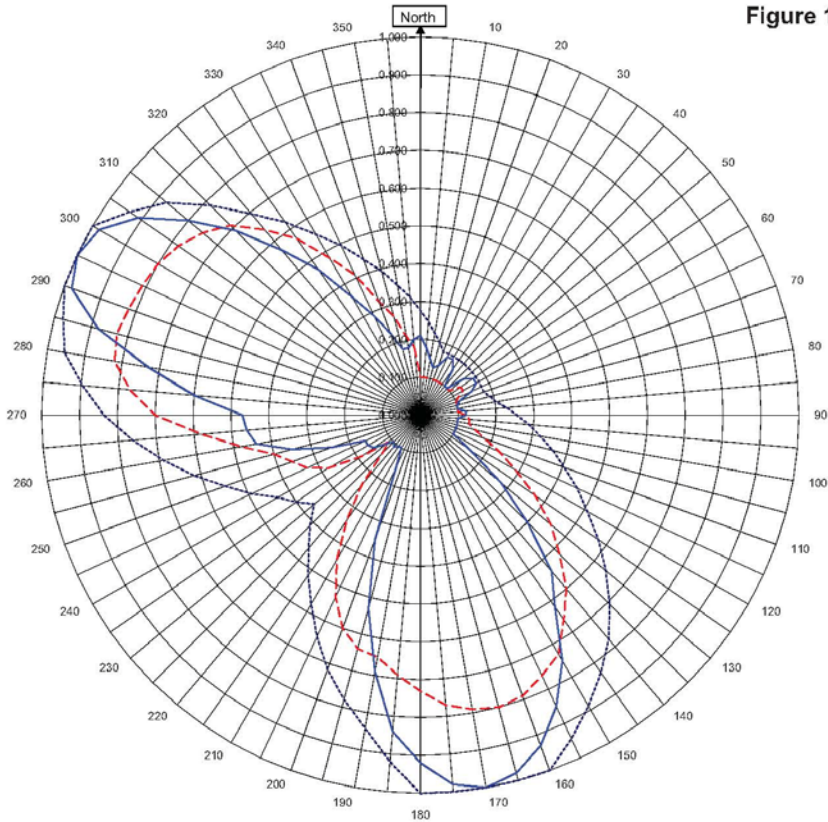
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Shively Labs

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Figure 1a



WSEW Sanford, ME

28984

March 28, 2011

Horizontal RMS	0.490	Frequency	88.7 / 399.15 mHz
Vertical RMS	0.484	Plot	Relative Field
H/V Composite RMS	0.533	Scale	4.5 : 1
FCC Composite RMS	0.625	See Figure 2 for Mechanical Details	

Antenna Model	Aldena Slant (45) Yagi Array
Pattern Type	Directional Azimuth

SHIVELY LABS YAGI ANTENNA ARRAY PATTERN STUDY

PROJECT #
STATION
FREQUENCY
ANTENNA
TOWER

SALES
WZXX
90.1
YAGI 1 / 1
N/A

AZIMUTHS

YAGI 1
YAGI 2
YAGI 3
YAGI 4

85

AMPLITUDE

YAGI 1
YAGI 2
YAGI 3
YAGI 4

dB
0
0
0
0

PHASING

YAGI 1
YAGI 2
YAGI 3
YAGI 4

0
0
0
0

VERTICAL

RMS: 39.22%

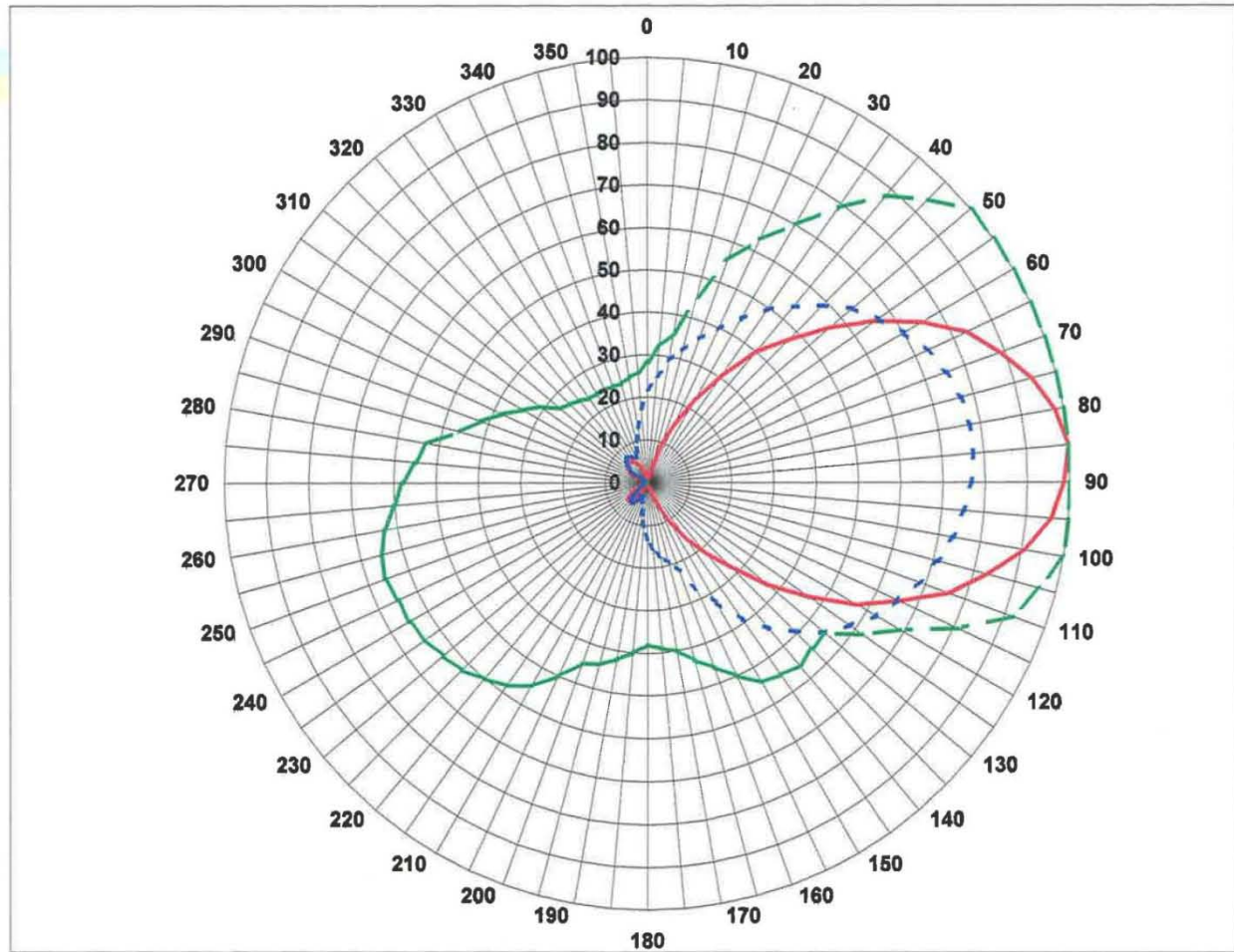
HORIZONTAL

RMS: 39.99%

DA-ENVELOPE

RMS: 63.25%
RMS: 85% 53.76%

COMP-RMS 43.99%



PATTERN-03

9/7/2011 8:21 AM

SHIVELY LABS YAGI ANTENNA ARRAY PATTERN STUDY

PROJECT #
STATION
FREQUENCY
ANTENNA
TOWER

SALES
WZXX
90.1
YAGI 1 / 2
N/A

AZIMUTHS

YAGI 1
YAGI 2
YAGI 3
YAGI 4

85
245

AMPLITUDE

YAGI 1
YAGI 2
YAGI 3
YAGI 4

dB
0
-4
0
0

PHASING

YAGI 1
YAGI 2
YAGI 3
YAGI 4

0
0
0
0

VERTICAL

RMS: 48.09%

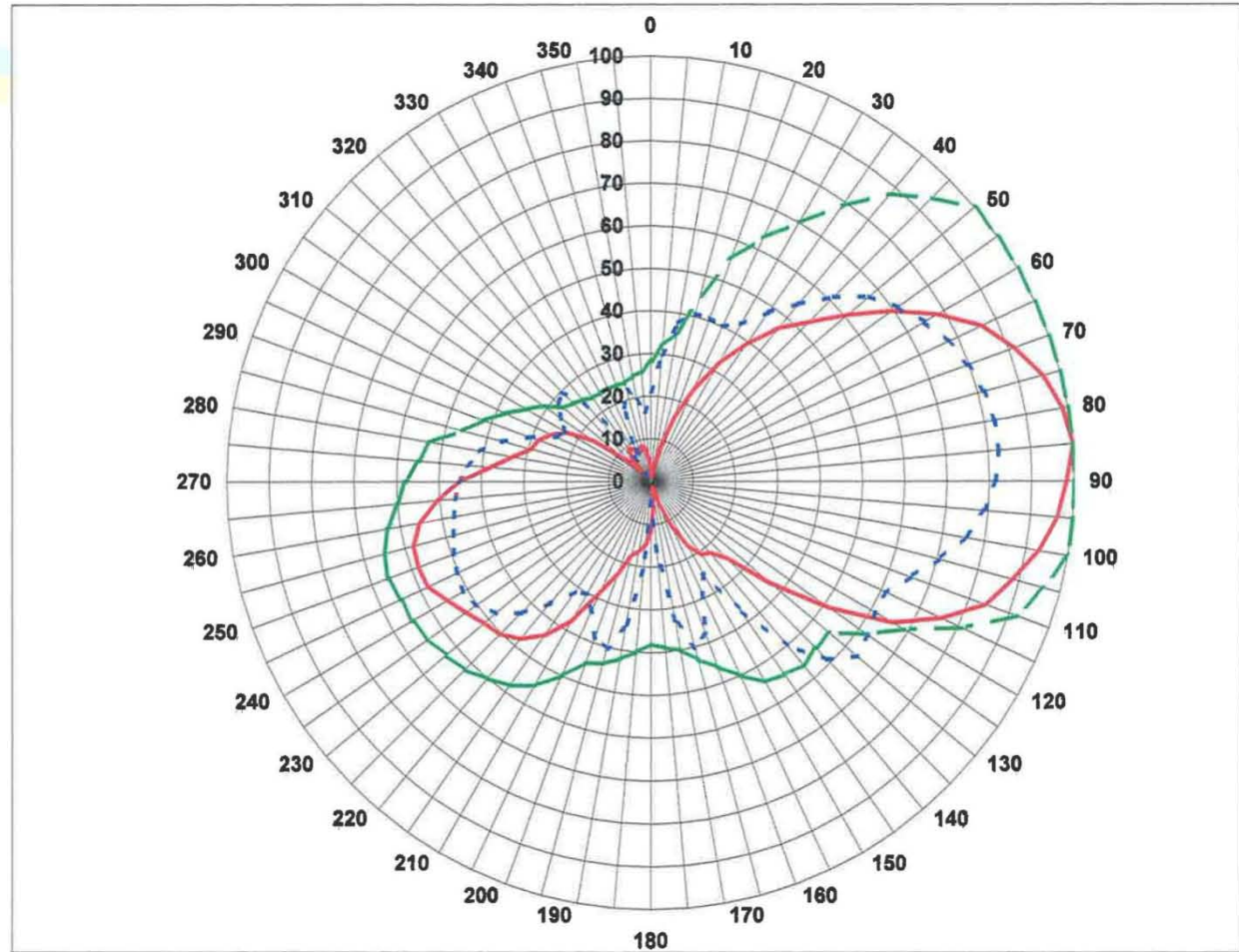
HORIZONTAL

RMS: 48.50%

DA-ENVELOPE

RMS: 63.25%
RMS: 85% 53.76%

COMP-RMS 53.34%



PATTERN-02

9/7/2011 8:20 AM

SHIVELY LABS YAGI ANTENNA ARRAY PATTERN STUDY

PROJECT # 54505
 STATION 89.3
 FREQUENCY 89.3
 ANTENNA YAGI 4 / 1
 TOWER N/A

AZIMUTHS
 YAGI 1 20
 YAGI 2 100
 YAGI 3 180
 YAGI 4 270

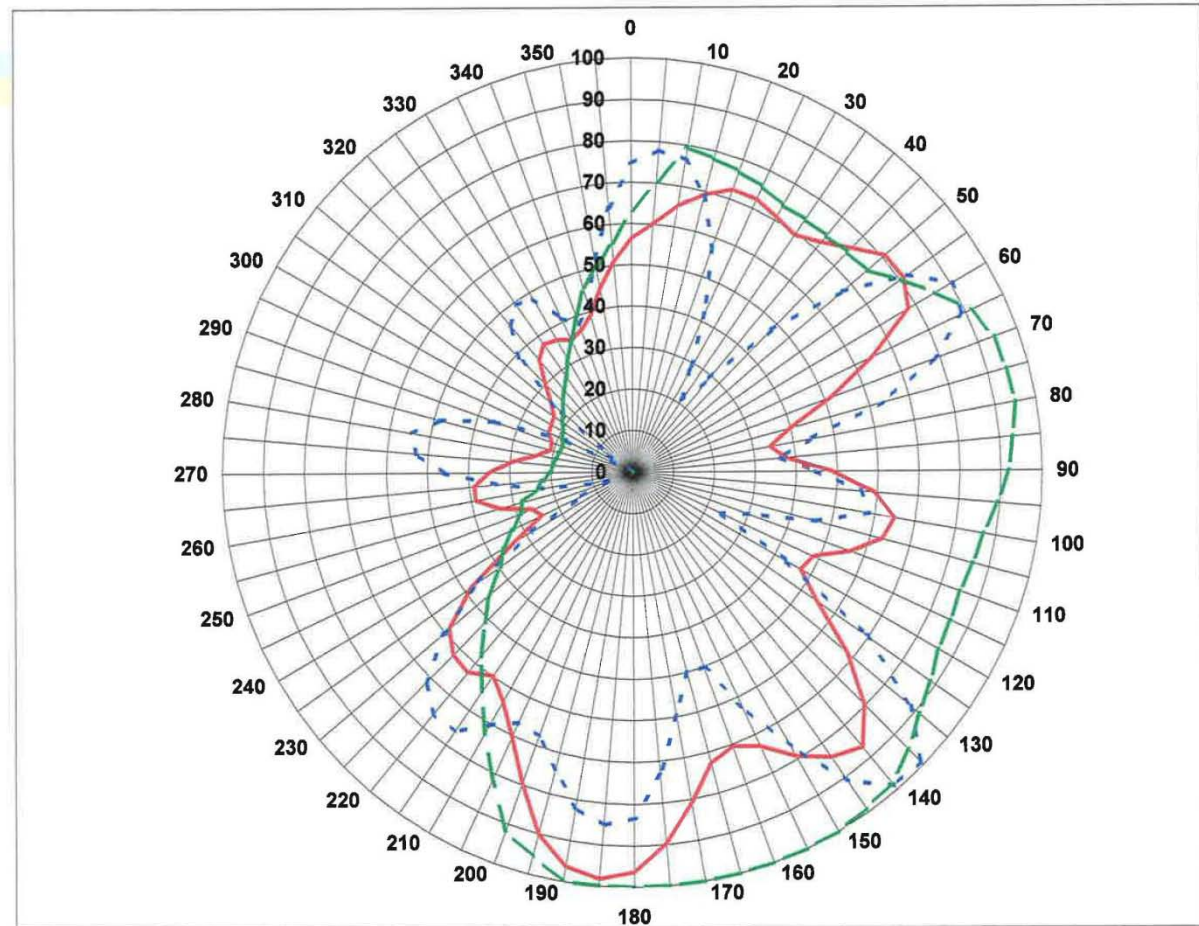
AMPLITUDE
 YAGI 1 0.8
 YAGI 2 0.7
 YAGI 3 1
 YAGI 4 0.4

PHASING
 YAGI 1 0
 YAGI 2 0
 YAGI 3 0
 YAGI 4 0

VERTICAL
 RMS: 58.79%

HORIZONTAL
 RMS: 59.96%

DA-ENVELOPE
 RMS: 71.82%
 RMS: 85% 61.05%



2/4/2010

11:58 AM

Shively Labs

DISC NO: 2913611H
 DATE: 02 JUNE 2011
 SHOP ORDER: 29136
 STATION: WUTW
 FREQ: 88.5-398.25
 HV RATIO: 1
 ANT TYPE: ALD YAGI 45
 TOWER: 44-IN FACE
 MOUNT: YAGI MT'S
 HT REMK:
 GRND STRAP: NO
 'A' DIM: N/A IN

REMARKS:
 REMARKS:
 PLOT TYPE: RF
 VERTICAL: ---
 V RMS: 52.812
 HORIZONTAL: ---
 H RMS: 51.939

PROCT AREA ---
 DA RMS = 83.82 %
 85% OF RMS = 71.25 %

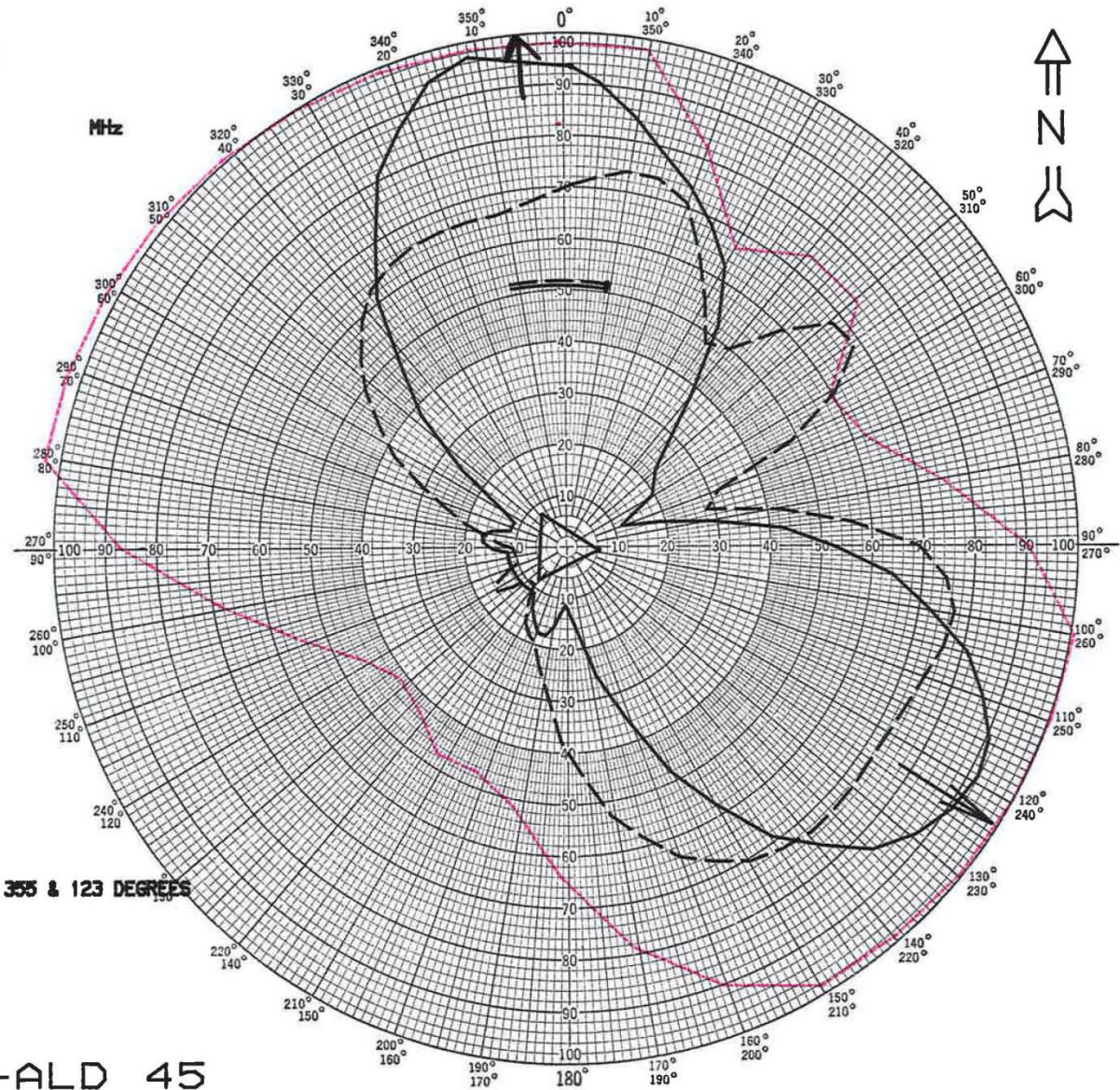
1ST LEG AZIMUTH 93-DEGREES

← = ANTENNA HEADING 355 & 123 DEGREES

└ = LADDER

PATTERN NUMBER:

SHIVELY-11-ALD 45



SHIVELY LABS

DATE: 3-Oct-11
 SHOP ORDER: 29462
 STATION: WVTW
 FREQUENCY: 88.5
 ANTENNA TYPE: 6014-1/2-DA

TOWER: 43.5-INFACE
 MOUNT: PAN MT'S
 MOUNT REMARKS:
 A-DIMENSION INCHES N/A

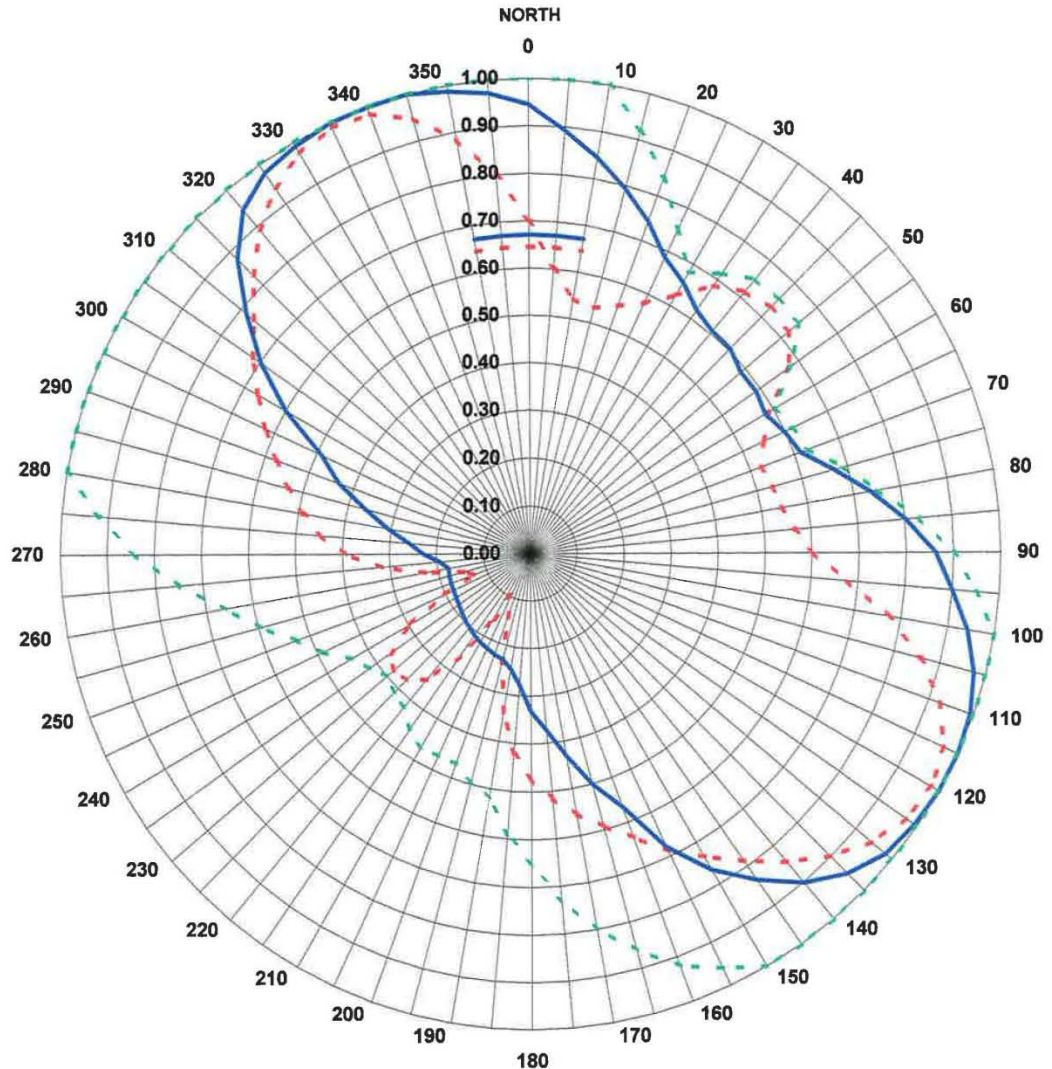
HORIZONTAL PARASITIC: N/A
 B-DIMENSION:
 C-DIMENSION
 PARASITIC LENGTH:

VERTICAL PARASITIC N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

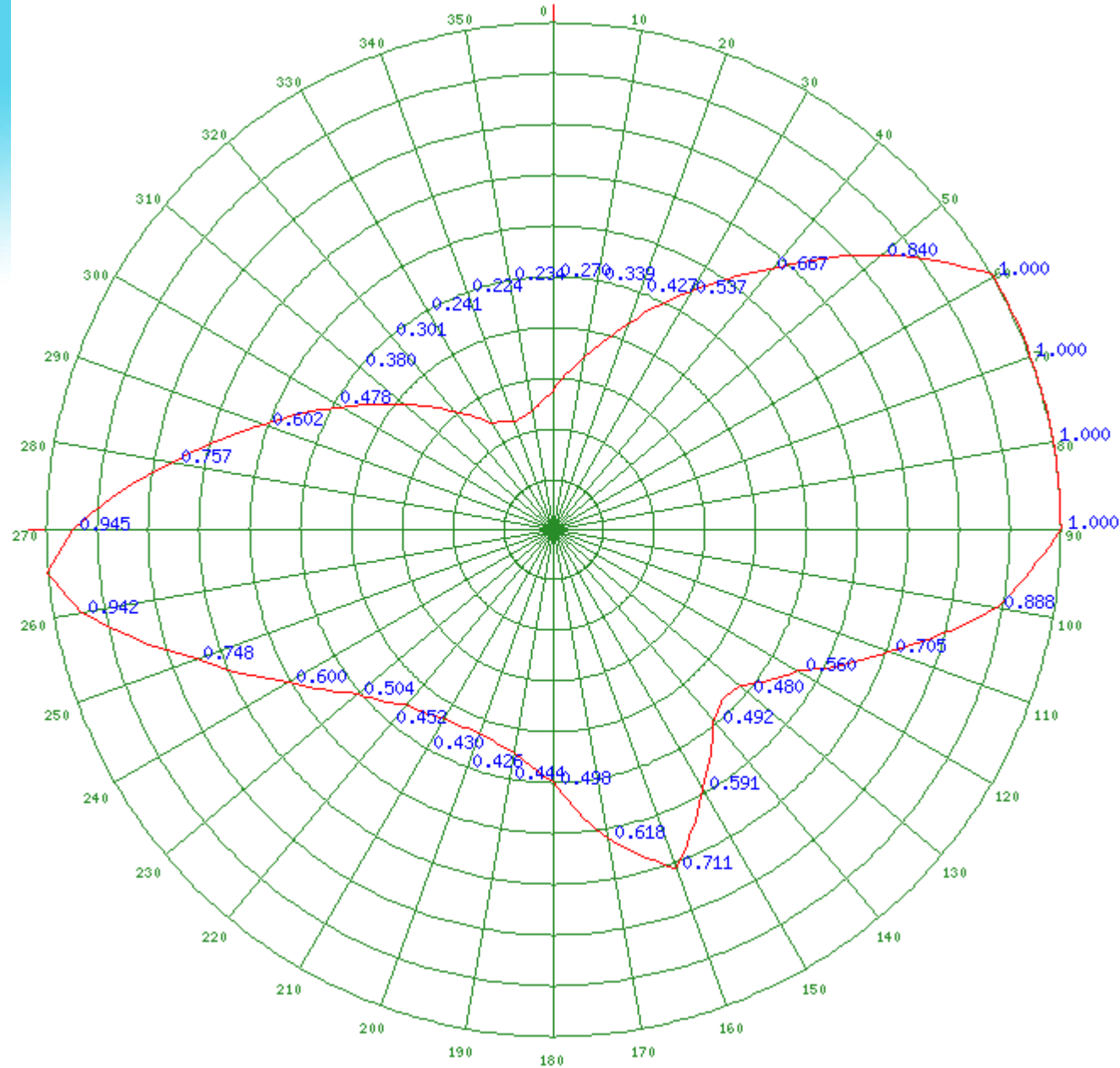
1st LEG AZIMUTH: 93-DEGREES
 ANTENNA HEADING: 115 & 340 DEGREES
 LADDER: N/A

PATTERN NUMBER: 20-A

VERTICAL RMS: ---
 64.47%
 HORIZONTAL RMS: ———
 67.05%



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SHIVELY LABS

PATTERN INFO

DATE: 31-Oct-08
 SHOP ORDER: 27083
 STATION: KDRK
 FREQUENCY: 91.3/410.85
 ANTENNA TYPE: ALD YAGI

TOWER: KLINE
 MOUNT: YAGI MT'S
 MOUNT REMARKS:
 A-DIMENSION INCHES

HORIZONTAL PARASITIC: N/A
 B-DIMENSION:
 C-DIMENSION
 PARASITIC LENGTH:

VERTICAL PARASITIC: N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

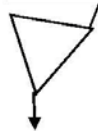
1st LEG AZIMUTH: 80-DEGREES
 ANTENNA HEADING: 175-DEGREES
 LADDER: N/A

PATTERN NUMBER: 3

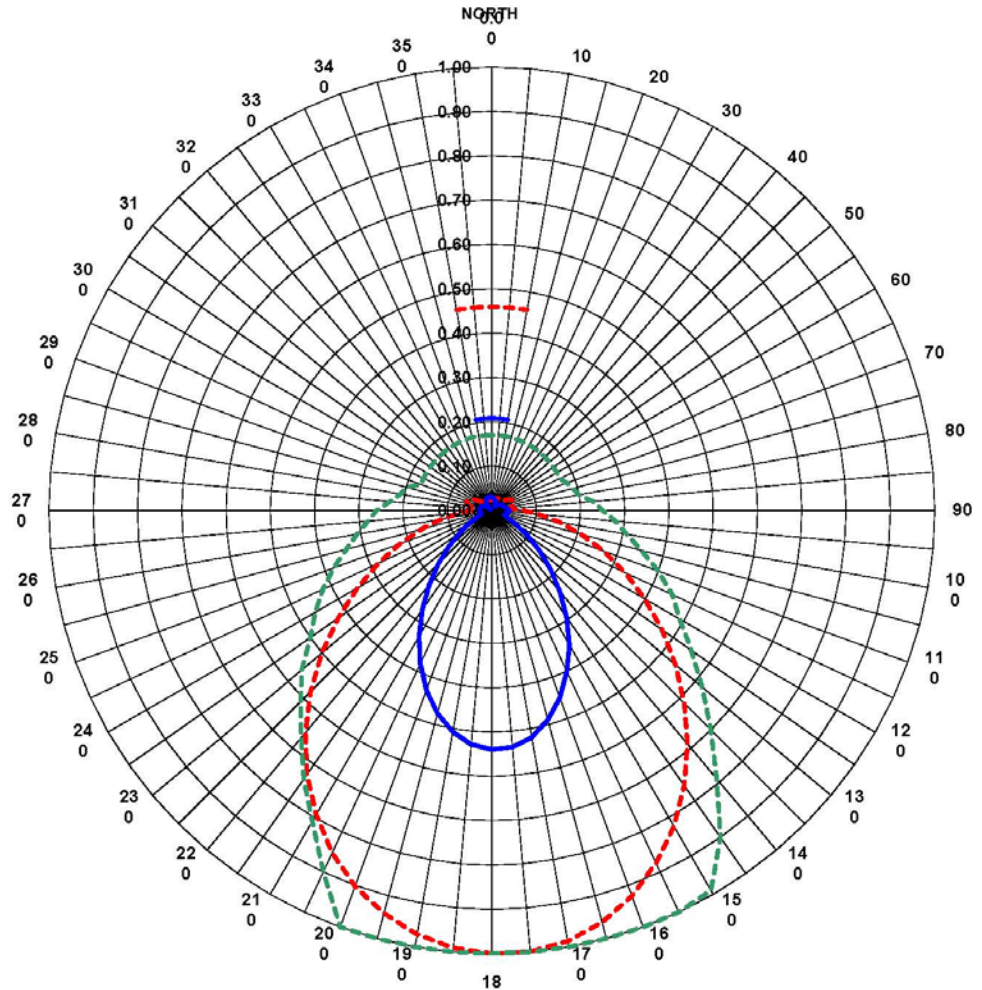
VERTICAL RMS: ---
 45.94%

HORIZONTAL RMS: ———
 20.79%

1st LEG 80-DEGREES



ALDENIA YAGI
 YAGI ANGLE 32-DEGREES
 ROTATED 25-DEGREES
 COUNTER CLOCKWISE
 AZIMUTH 175-DEGREES



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SHIVELY LABS

DATE: 18-Jul-07
 SHOP ORDER: 25872
 STATION:
 FREQUENCY: 97.7/439.65
 ANTENNA TYPE: 6810-DA

TOWER: POLE 3.5-IN.
 MOUNT: POLE MT./SNG MT.
 MOUNT REMARKS:
 A-DIMENSION INCHES 2.75

HORIZONTAL PARASITIC:
 B-DIMENSION: 1.5
 C-DIMENSION 1.5
 PARASITIC LENGTH: 12.75

VERTICAL PARASITIC N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

1st LEG AZIMUTH: POLE
 ANTENNA HEADING: 135-DEGS
 LADDER: N/A

PATTERN NUMBER: 9

VERTICAL RMS: ---

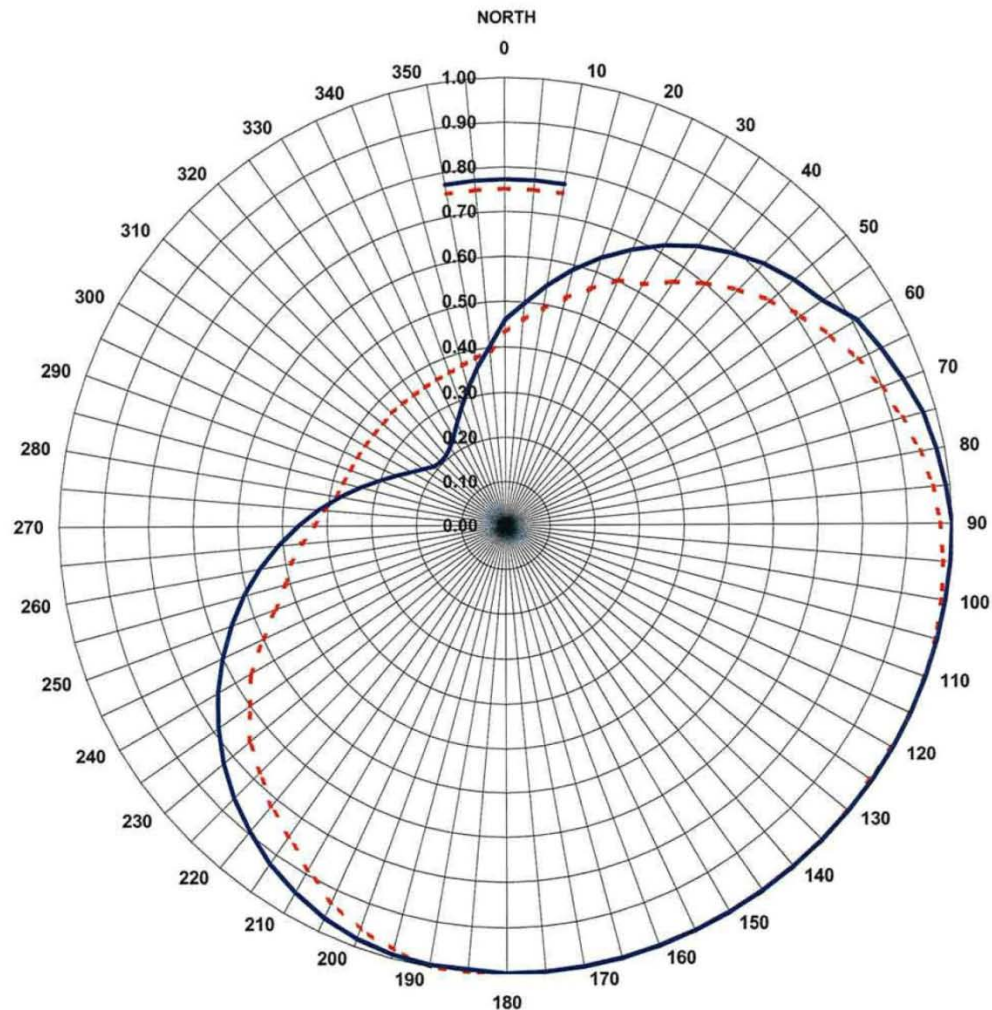
74.99%

HORIZONTAL RMS: ———

77.15%

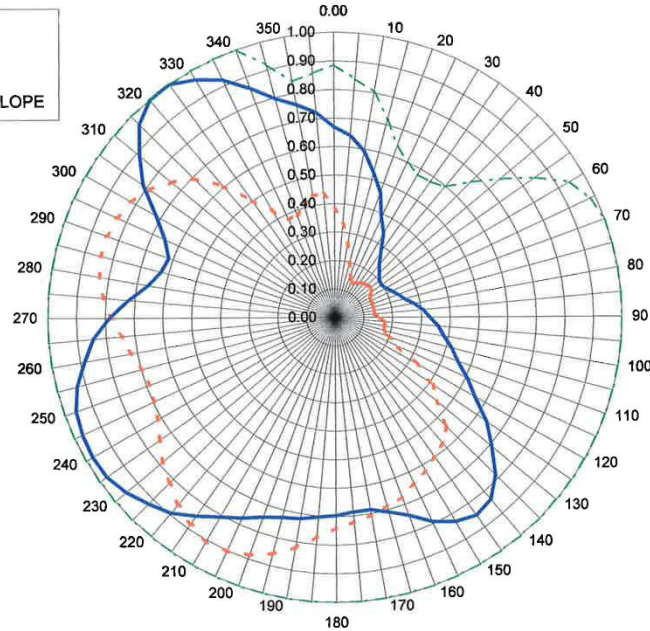
POLE 3.5-INCHES

6810 ANTENNA
 AZIMUTH 135-DEGREES
 KFFR



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SHIVELY LABS



SHOP ORDER 56292
STATION WVBA
PATTERN 3

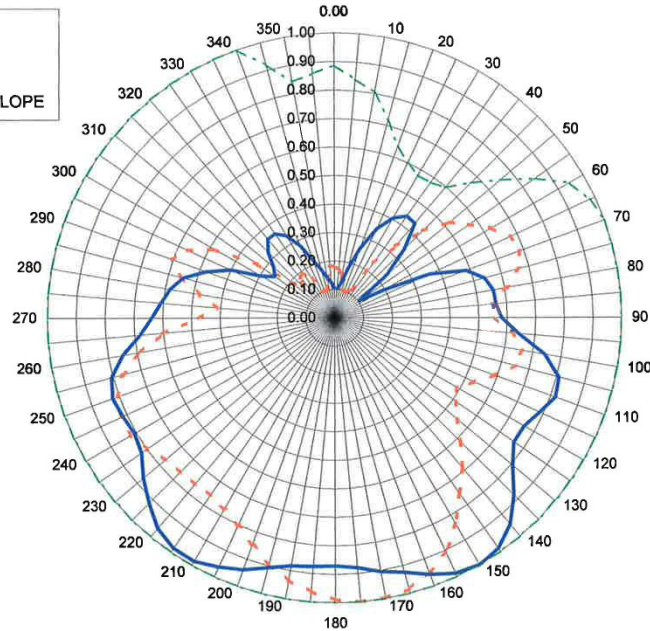
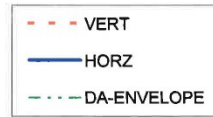
V-RMS 57.51%
H-RMS 69.07%

DA-RMS 95.26%
DA 85% 80.97%

COMP HORZ
RMS AZIMUTH
72.70% GAIN 2.10

DEGREE	VERT	HORZ	DEGREE	VERT	HORZ	DEGREE	VERT	HORZ	DEGREE	VERT	HORZ
0	0.38	0.67	90	0.16	0.33	180	0.74	0.70	270	0.78	0.79
5	0.33	0.64	95	0.17	0.36	185	0.77	0.70	275	0.81	0.72
10	0.26	0.59	100	0.18	0.38	190	0.82	0.72	280	0.83	0.66
15	0.20	0.53	105	0.17	0.42	195	0.86	0.73	285	0.84	0.63
20	0.16	0.47	110	0.19	0.45	200	0.89	0.74	290	0.85	0.61
25	0.14	0.39	115	0.24	0.51	205	0.90	0.77	295	0.84	0.65
30	0.14	0.34	120	0.32	0.56	210	0.90	0.81	300	0.82	0.72
35	0.15	0.28	125	0.41	0.64	215	0.88	0.85	305	0.79	0.81
40	0.16	0.24	130	0.46	0.71	220	0.86	0.89	310	0.74	0.89
45	0.16	0.22	135	0.55	0.79	225	0.82	0.92	315	0.69	0.96
50	0.16	0.20	140	0.58	0.84	230	0.79	0.95	320	0.61	1.00
55	0.15	0.20	145	0.60	0.85	235	0.75	0.97	325	0.50	1.00
60	0.14	0.21	150	0.63	0.83	240	0.71	0.98	330	0.44	0.97
65	0.14	0.22	155	0.65	0.79	245	0.70	0.97	335	0.38	0.92
70	0.14	0.23	160	0.67	0.74	250	0.69	0.96	340	0.38	0.86
75	0.14	0.25	165	0.69	0.71	255	0.69	0.93	345	0.41	0.80
80	0.14	0.28	170	0.70	0.69	260	0.72	0.89	350	0.44	0.76
85	0.14	0.31	175	0.72	0.69	265	0.74	0.84	355	0.43	0.72

SHIVELY LABS



SHOP ORDER 56292
STATION WVBA
PATTERN 6

V-RMS 60.86%
H-RMS 65.52%

DA-RMS 95.26%
DA 85% 80.97%

COMP HORZ
RMS AZIMUTH
69.79% 2.33

DEGREE	VERT	HORZ	DEGREE	VERT	HORZ	DEGREE	VERT	HORZ	DEGREE	VERT	HORZ
0	0.18	0.10	90	0.56	0.58	180	0.99	0.87	270	0.47	0.64
5	0.17	0.10	95	0.62	0.64	185	0.96	0.87	275	0.41	0.61
10	0.16	0.12	100	0.66	0.74	190	0.94	0.88	280	0.48	0.58
15	0.10	0.18	105	0.65	0.81	195	0.89	0.91	285	0.55	0.55
20	0.10	0.26	110	0.59	0.82	200	0.84	0.94	290	0.60	0.48
25	0.10	0.35	115	0.53	0.79	205	0.80	0.96	295	0.56	0.40
30	0.12	0.41	120	0.49	0.76	210	0.77	0.98	300	0.48	0.30
35	0.23	0.44	125	0.51	0.76	215	0.76	0.98	305	0.33	0.25
40	0.33	0.43	130	0.55	0.81	220	0.76	0.96	310	0.19	0.28
45	0.43	0.34	135	0.62	0.88	225	0.76	0.92	315	0.16	0.33
50	0.52	0.24	140	0.69	0.95	230	0.77	0.87	320	0.18	0.36
55	0.57	0.10	145	0.75	0.99	235	0.80	0.82	325	0.19	0.36
60	0.63	0.19	150	0.83	1.00	240	0.82	0.81	330	0.16	0.33
65	0.67	0.36	155	0.91	0.99	245	0.82	0.81	335	0.10	0.28
70	0.68	0.49	160	0.95	0.96	250	0.81	0.82	340	0.10	0.22
75	0.66	0.54	165	0.99	0.92	255	0.77	0.80	345	0.10	0.18
80	0.61	0.56	170	1.00	0.90	260	0.69	0.75	350	0.14	0.14
85	0.55	0.56	175	1.00	0.88	265	0.60	0.68	355	0.18	0.13



Shively Labs

DISC NO: 2831830H
 DATE: 82 JUNE 2818
 SHOP ORDER: 28318-WHRB
 STATION: WHRB
 FREQ: 95.3/428.85
 HU RATIO: .975
 ANT TYPE: 6818-40-SS
 TOWER: POLE 16-IN.
 MOUNT: POLE MT./DBL MT.
 MT REMK:
 GRND STRAP: NO
 'A' DIM: 7.258 IN
 'B' DIM: — IN
 'C' DIM: — IN
 'PH' DIM: — IN
 'D' DIM: 4.000 IN
 'E' DIM: IN
 'F' DIM: 1.000 IN
 'PV' DIM: 11.000 IN

REMARKS: ADDED POLE 289-DEGREES 9.7-FT

REMARKS: FROM OTHER POLE SCALE

PLOT TYPE: RF

VERTICAL: — — — —

V RMS: 65.711

HORIZONTAL: — — — —

H RMS: 72.387

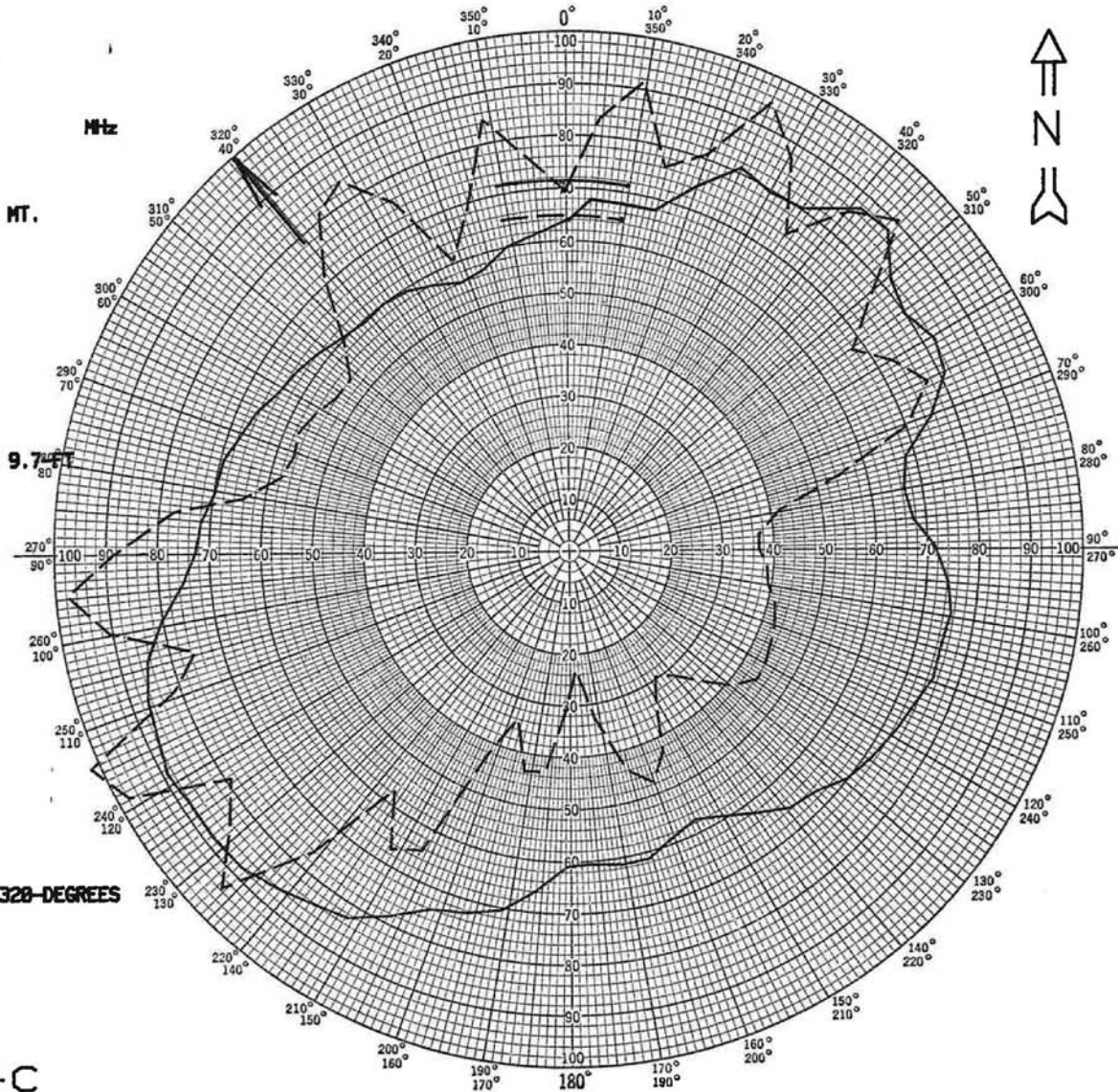
1ST LEG AZIMUTH POLE

← = ANTENNA HEADING 320-DEGREES

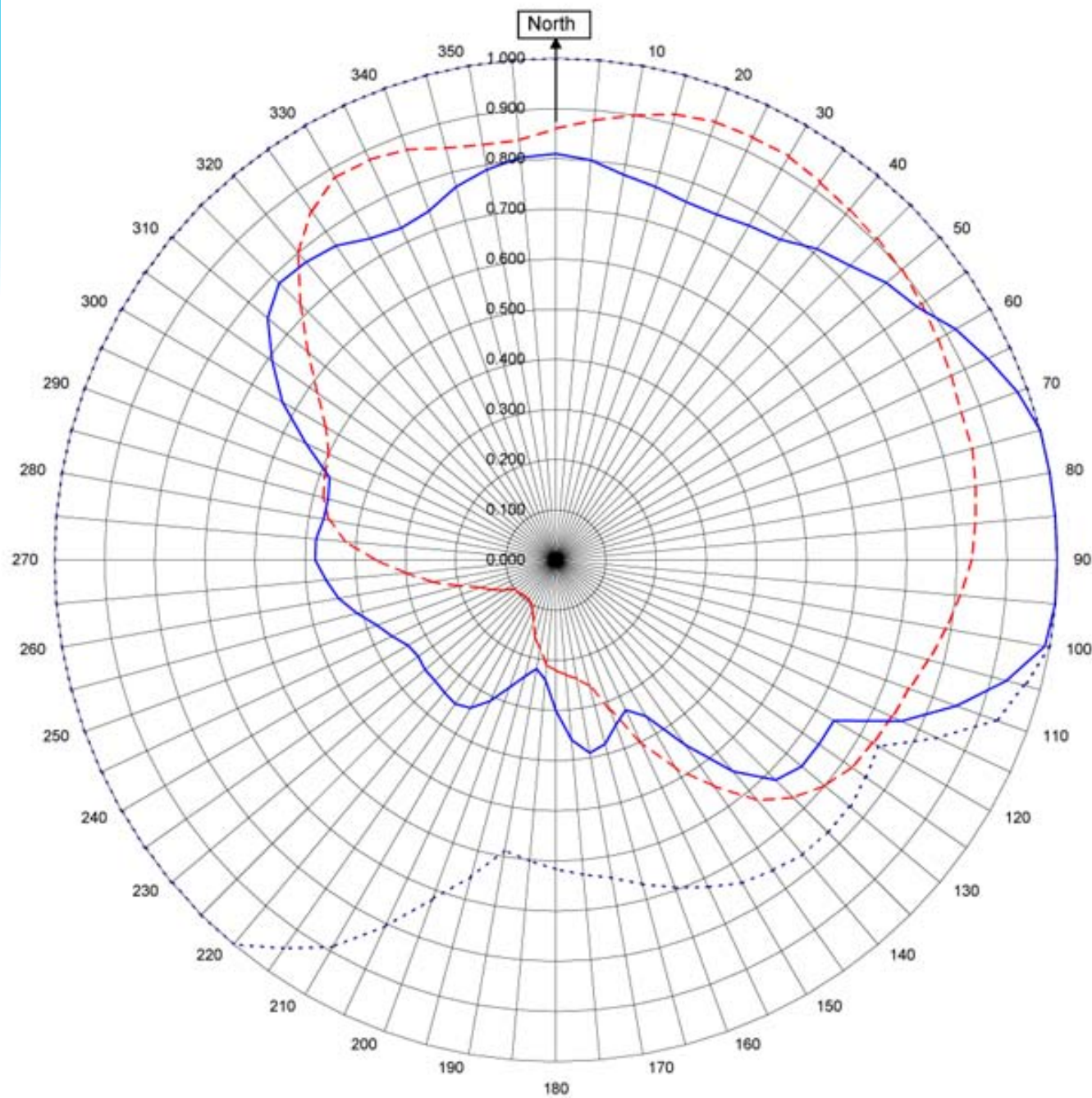
└ = LADDER 28-DEGREES

PATTERN NUMBER:

SHIVELY-30-C





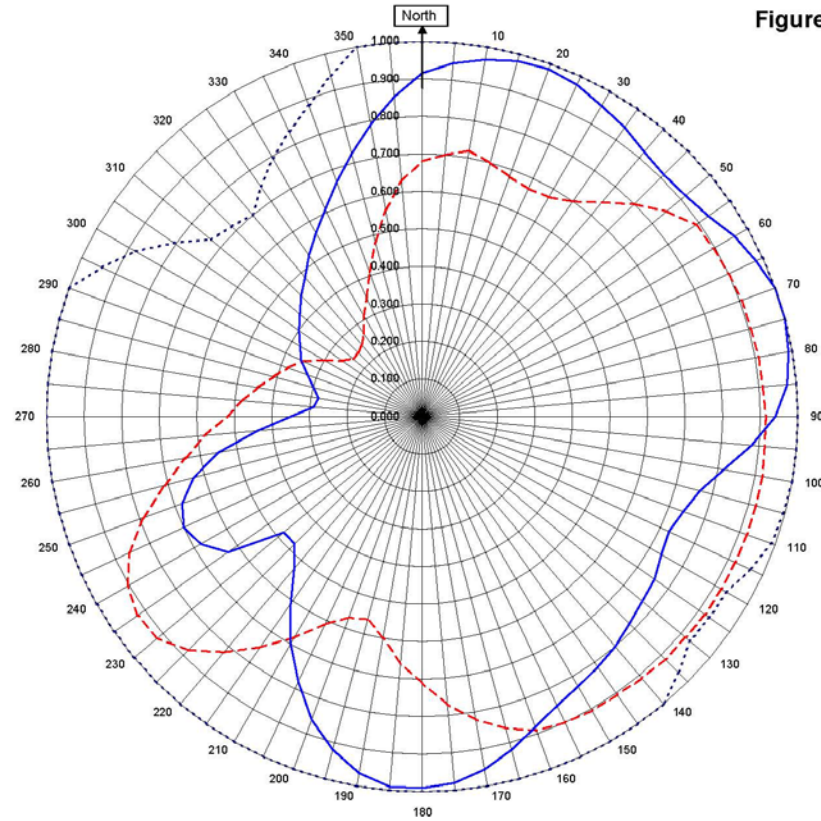




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Figure 1



KMUW Wichita, KS

25804

August 1, 2008

Horizontal RMS	0.775	Frequency	89.1 / 400.95 MHz
Vertical RMS	0.733	Plot	Relative Field
H/V Composite RMS	0.832	Scale	4.5 : 1
FCC Composite RMS	0.971	See Figure 2 for Mechanical Details	

Antenna Model	6810-6R-DA
Pattern Type	Directional Azimuth



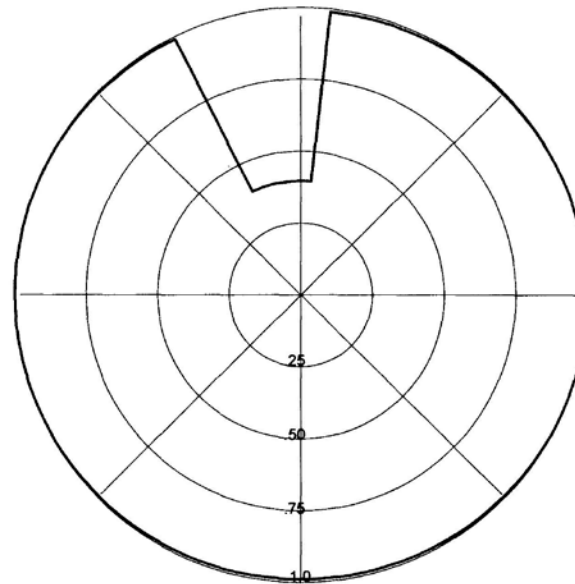








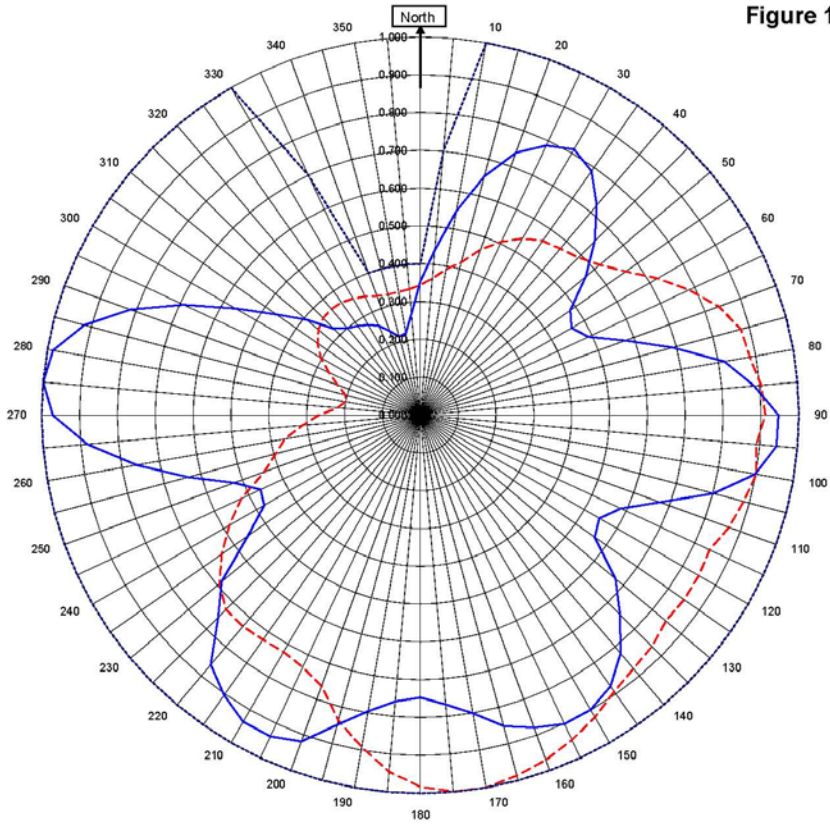
Bearing	Field Value
000	0.400
010	1.000
020	1.000
030	1.000
040	1.000
050	1.000
060	1.000
070	1.000
080	1.000
090	1.000
100	1.000
110	1.000
120	1.000
130	1.000
140	1.000
150	1.000
160	1.000
170	1.000
180	1.000
190	1.000
200	1.000
210	1.000
220	1.000
230	1.000
240	1.000
250	1.000
260	1.000
270	1.000
280	1.000
290	1.000
300	1.000
310	1.000
320	1.000
330	1.000
340	0.400
350	0.400



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Figure 1a



00
0
January 0, 1900

Horizontal RMS	0.706	Frequency	100.9 / 454.05 mHz
Vertical RMS	0.673	Plot	Relative Field
H/V Composite RMS	0.771	Scale	4.5 : 1
FCC Composite RMS	0.964	See Figure 2 for Mechanical Details	

Antenna Model	0
Pattern Type	Directional Azimuth

SHIVELY LABS

PATTERN INFO

DATE: 11-Apr-08
 SHOP ORDER: 52452
 STATION: CKRO
 FREQUENCY: 97.1/436.95
 ANTENNA TYPE: 6810-5R-PS

TOWER: MAXTOWER-24
 MOUNT: FACE MT./SNG MT.
 MOUNT REMARKS:
 A-DIMENSION INCHES 3.5

HORIZONTAL PARASITIC: N/A
 B-DIMENSION:
 C-DIMENSION
 PARASITIC LENGTH:

VERTICAL PARASITIC N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

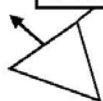
1st LEG AZIMUTH: 25-DEGREES
 ANTENNA HEADING: 325-DEGREES
 LADDER:

PATTERN NUMBER: 50-A

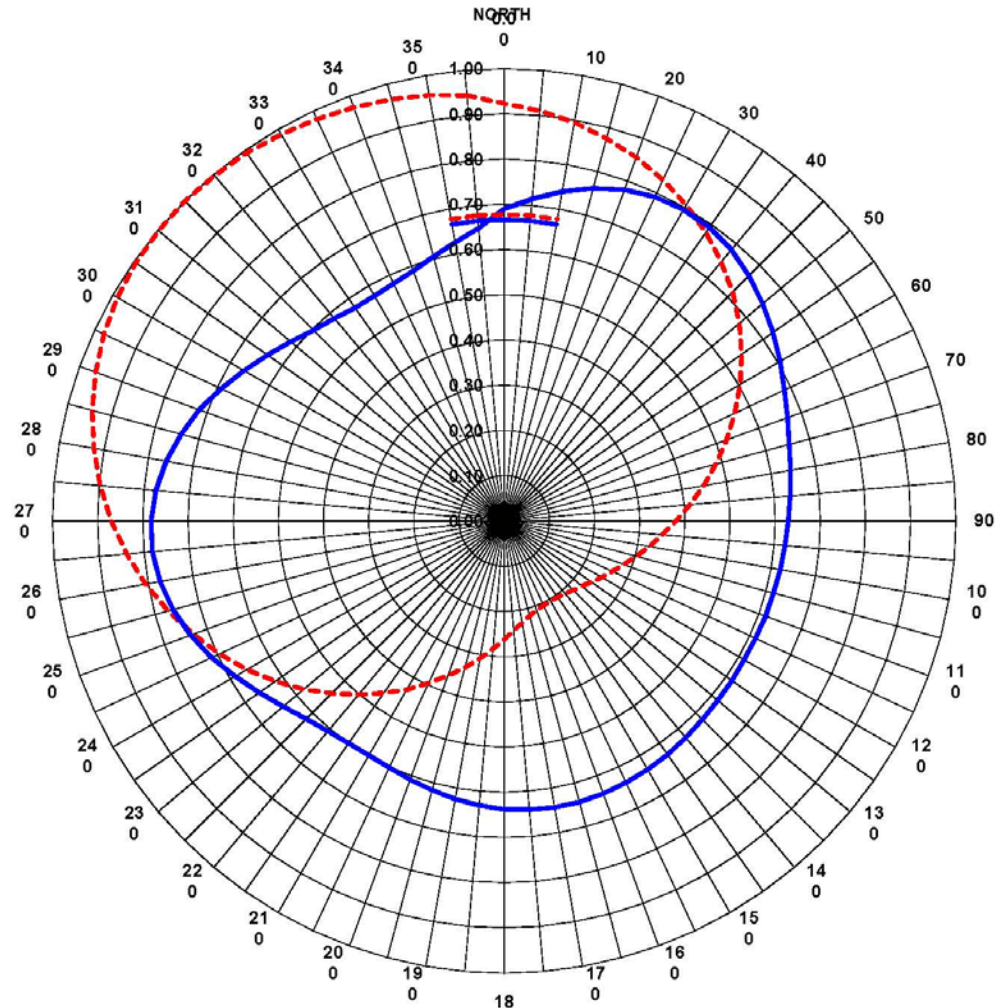
VERTICAL RMS: ---
 67.76%

HORIZONTAL RMS: ———
 66.59%

1st LEG 0-DEGREES



6810-5R CKRO 97.1
 AZIMUTH 325-DEGREES



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Shively Labs



DISC NO: 1902512H
 DATE: 18 JUNE 2011
 SHIP ORDER: 119075-ELU
 FREQ: 187.9/485.05
 NU RATIO: 1
 ANT TYPE: 5014-3/1
 TOWER: 7-FT FACE
 HOUKIT:
 REMARKS: GRND STRAP:
 'A' DIM: 1M

Hz

REMARKS: 2-GRD STRAPS
 PLUT TYPE: R

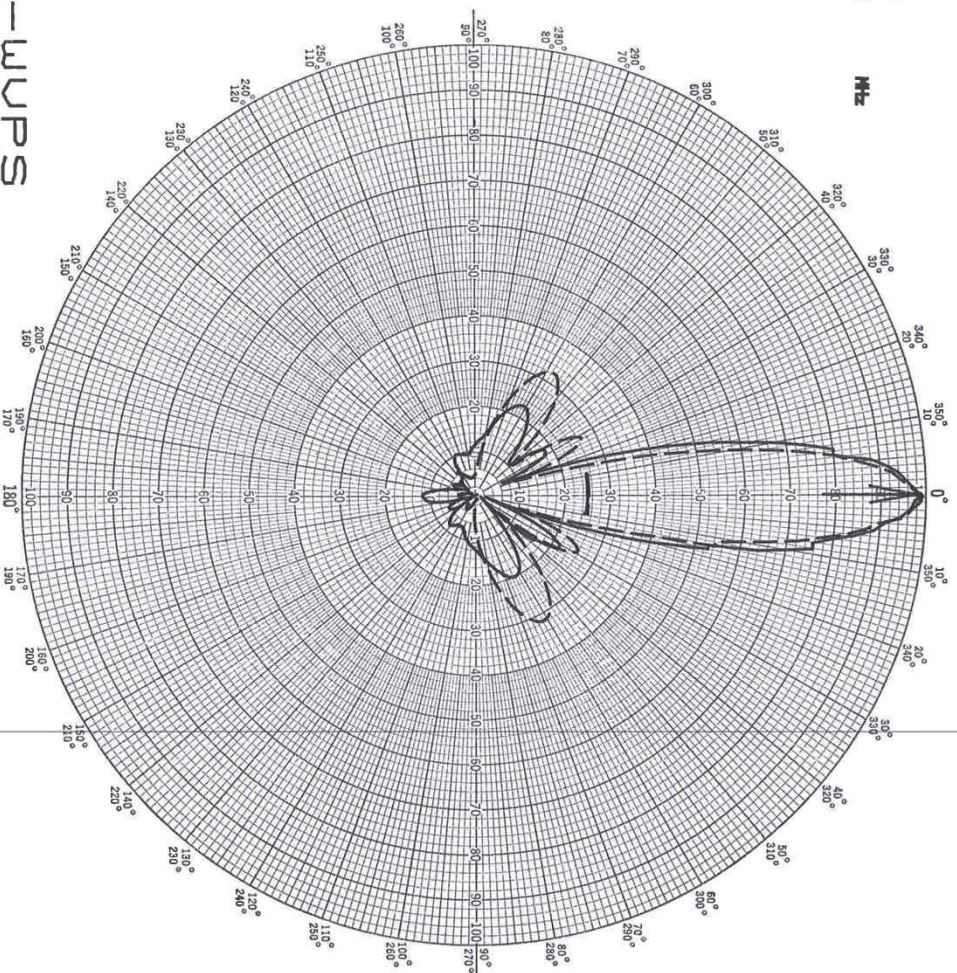
VERTICAL: ---
 U RMS: 4.9364
 HORIZONTAL: ---
 H RMS: 4.9217

← = ANT. HEADING

L = LADDER

PATTERN NUMBER:

12-107.9-WUPS



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FORM PFI-935-1

Just
to
Summarize

SHIVELY LABS

DATE: 3-Oct-11
 SHOP ORDER: 29462
 STATION: WVTW
 FREQUENCY: 88.5
 ANTENNA TYPE: 6014-1/2-DA

TOWER: 43.5-INFACE
 MOUNT: PAN MT'S
 MOUNT REMARKS:
 A-DIMENSION INCHES N/A

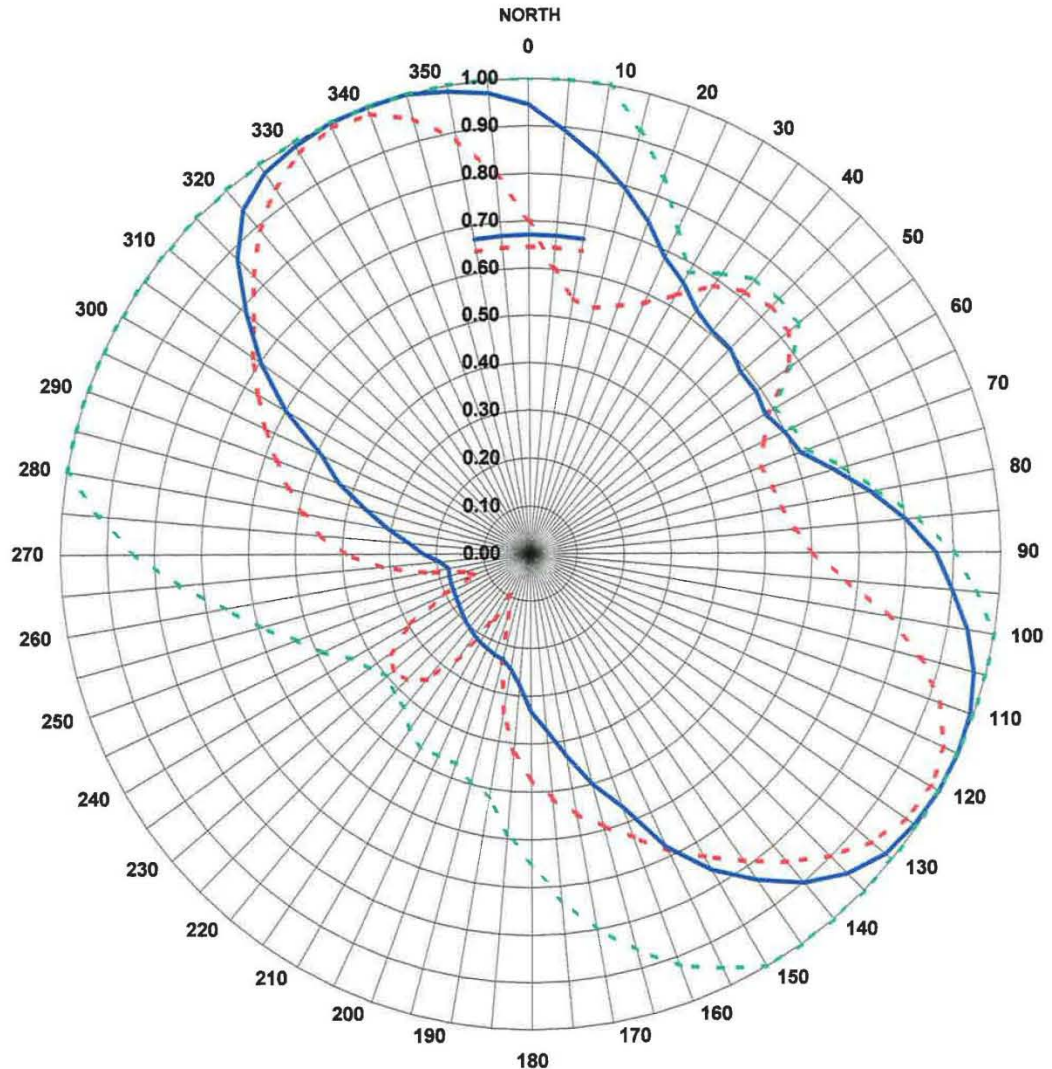
HORIZONTAL PARASITIC: N/A
 B-DIMENSION:
 C-DIMENSION
 PARASITIC LENGTH:

VERTICAL PARASITIC N/A
 D-DIMENSION:
 E-DIMENSION:
 F-DIMENSION
 PARASITIC LENGTH:

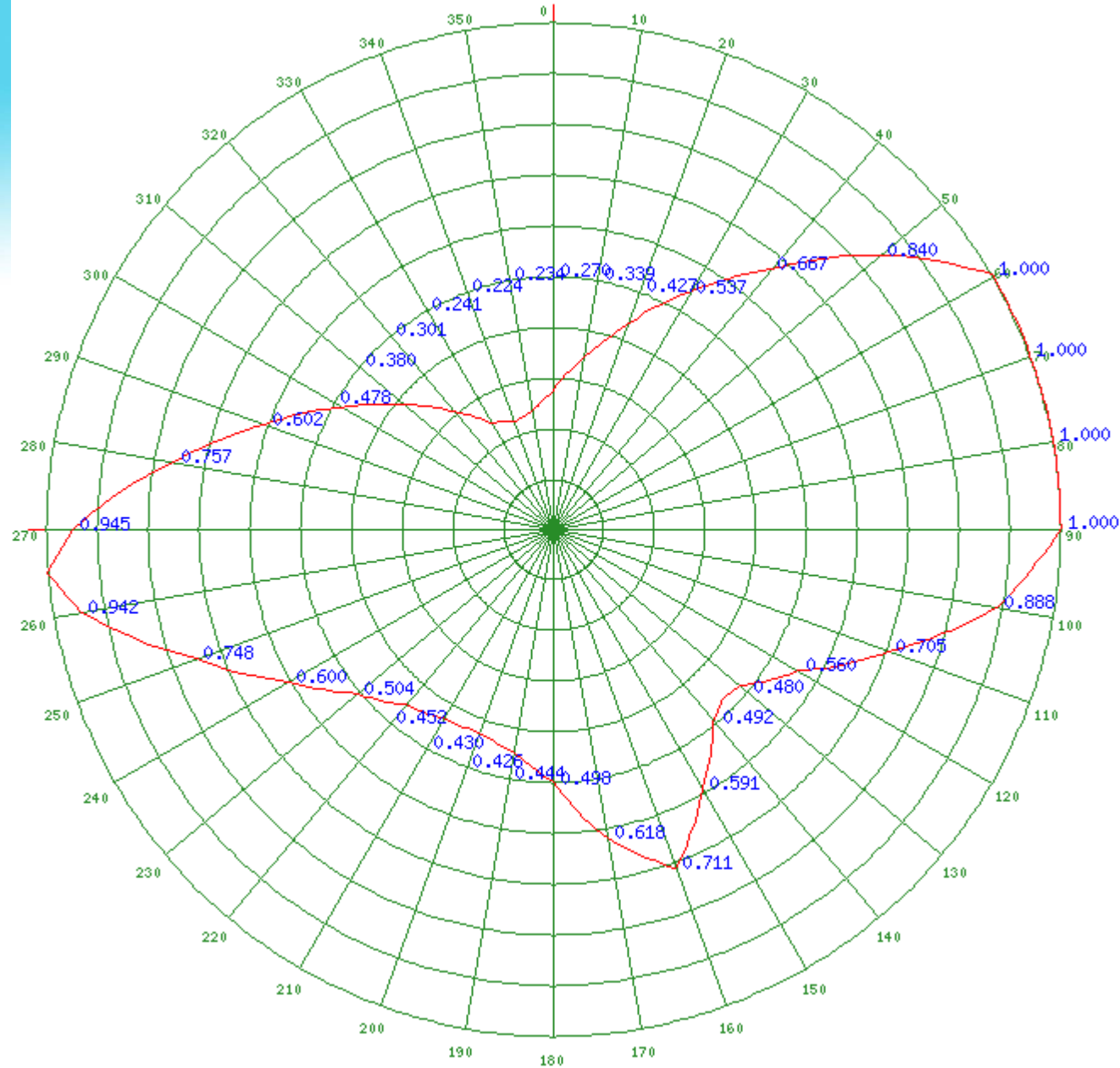
1st LEG AZIMUTH: 93-DEGREES
 ANTENNA HEADING: 115 & 340 DEGREES
 LADDER: N/A

PATTERN NUMBER: 20-A

VERTICAL RMS: ---
 64.47%
 HORIZONTAL RMS: ———
 67.05%



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Thank You!