K9CT Contest Station
2014 Dayton Hamvention
Antenna Forum

Goal

Plan

Execute

Zoning/legal

Technical

Selection of Material

Time schedule

Assembly

Testing

Documentation

Issues/Corrections

Discoveries

Results

Things I learned…why do this?

- Tired of neighbors complaining
- Noise from close consumer electronics
- Wanted to be more effective in contests
- A new challenge
- Learning new things
- Getting harder to do 48 hour contests
- K9NW…"your rate will improve when you are louder"
- W9RE.."your antenna improvement should make a significant difference"

Project Goals

- Winning Regional Station
- State of Art SO2R, M/S and M/2 Station
- 1.8 through 1296 mHz
- CW, SSB, RTTY and EME operation
- Shack setup for 48 hour team operation
- Opportunity to train future contesters
- At least 3 db better than home station
- Competitive DXing station on every band
- FUN!!

Assessment of competition

Who wins the contests?

ARRL SS, NAQP - domestic contest...we are in the middle of these contests. Winners are very good at SO2R operation and have multiple antennas switched in several key directions - E, SE, S and W (WB9Z, N9CK, W9RE, K9BGL)

CQ WW, WPX and ARRL DX - DX contest requiring high gain antennas with low angle takeoff. (K9NS, WB9Z, K9UWA, N0NI, W0AIH)

ARRL 160 - requires gain antenna and good rx antennas (K9DX, K9AY, WB9Z, W9RE, K9UWA, N0NI, W0AIH)

Assessment of competition continued

Who wins the contests?

ARRL 10 - Multiple high gain yagis in multiple directions

VHF Contests – Multiple high gain yagis in multiple directions and vertically polarized for some FM contacts (K2DRH, K9NS, WB9Z)

K9NS - Harvard, IL

K9NS - Harvard, IL

K9NS - Harvard, IL

WB9Z - Crescent City, IL

WB9Z - Crescent City, IL

N0NI, Rippey, IA

W0AIH, Fall Creek, WI

K2DRH, Albany, IL

K2DRH, Albany, IL

Common denominator?

Each has multiple towers

Each has many choices of antennas

Antennas have gain and directivity

They are very competitive

Why have many antennas?

Different arrival angles vary by distance

Angles change during sunspot cycle

Angles change during the day

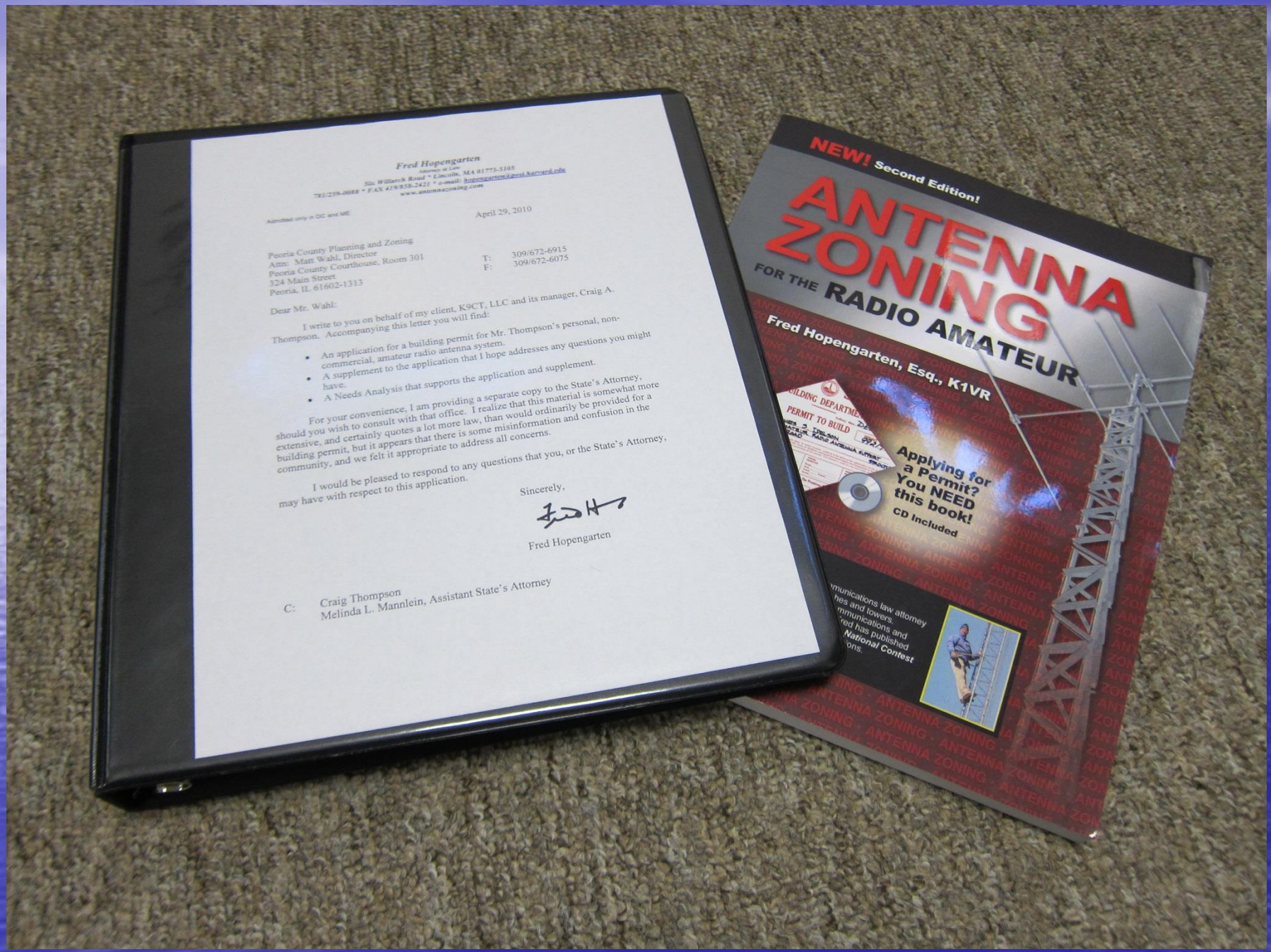
Reduce interference from sides and rear

Layout considerations

- Reduce inter-station interference
- Dipoles for 160 and 80
- Space for receiving antennas
- Minimize attenuation of signals between antenna and shack
- Antenna choice per band
- Multiplier station able to be close to run station

Property

- Flat
- Rectangle
- N/S
- 10 to 20 acres
- Away from residential areas
- Zoning


Fred Hopengarten
Attorney at Law
Six Willarch Road * Lincoln, MA 01773-5105
781/259-0088 * FAX 419/858-2421 * e-mail: hopengarten@post.harvard.edu
www.antennazoning.com
Admitted only in DC and ME
April 29, 2010
Peoria County Planning and Zoning
Attn: Matt Wahl, Director
Peoria County Courthouse, Room 301
324 Main Street
Peoria, IL 61602-1313
T: 309/672-6915
F: 309/672-6075
Dear Mr. Wahl:
I write to you on behalf of my client, K9CT, LLC and its manager, Craig A. Thompson. Accompanying this letter you will find:
An application for a building permit for Mr. Thompson's personal, non-commercial, amateur radio antenna system.
A supplement to the application that I hope addresses any questions you might have.
A Needs Analysis that supports the application and supplement.
For your convenience, I am providing a separate copy to the State's Attorney, should you wish to consult with that office. I realize that this material is somewhat more extensive, and certainly quotes a lot more law, than would ordinarily be provided for a building permit, but it appears that there is some misinformation and confusion in the community, and we felt it appropriate to address all concerns.
I would be pleased to respond to any questions that you, or the State's Attorney, may have with respect to this application.
Sincerely,
Fred Hopengarten
C: Craig Thompson
Melinda L. Mannlein, Assistant State's Attorney
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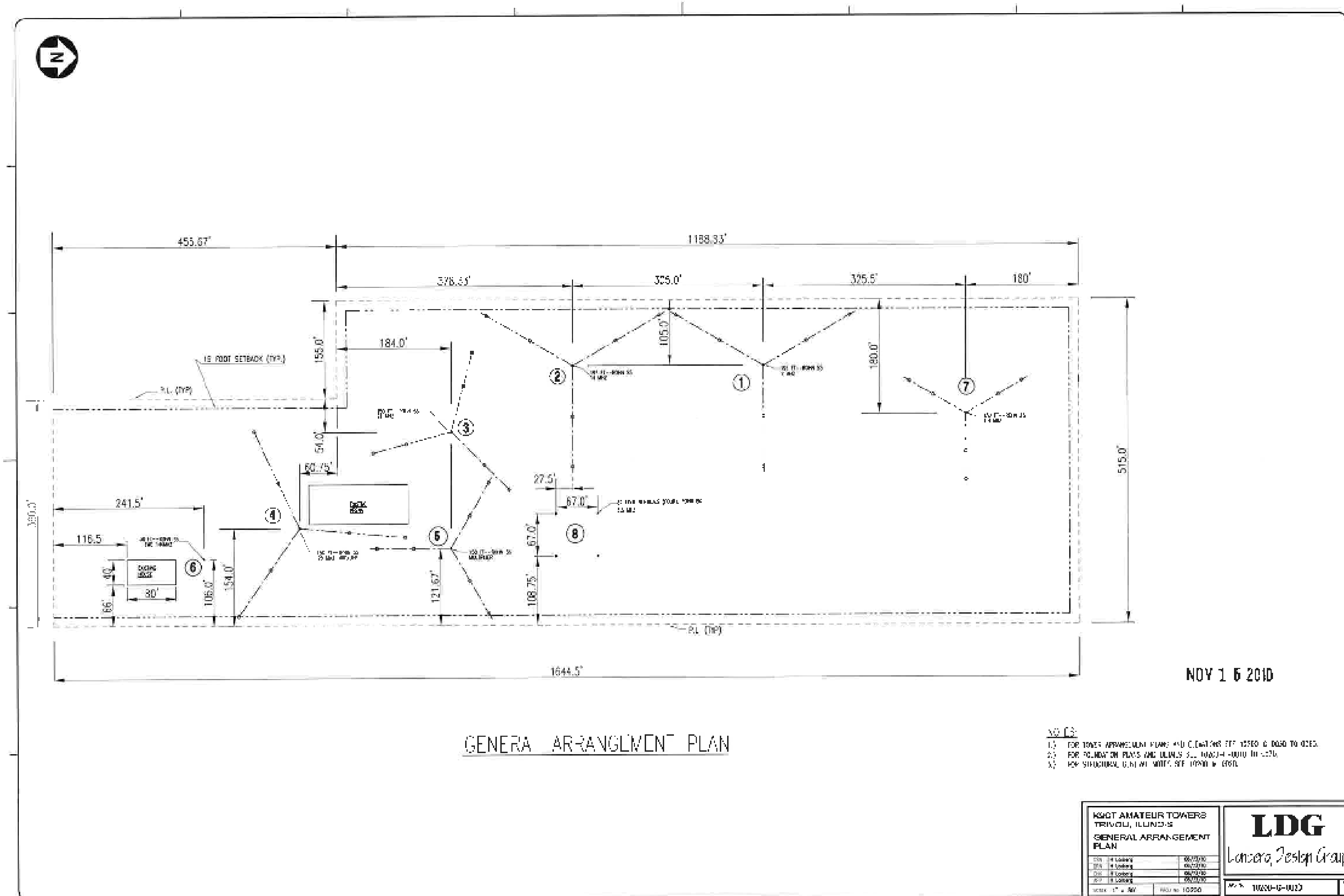
ANTENNA ZONING
FOR THE RADIO AMATEUR
Fred Hopengarten, Esq., K1VR
PERMIT TO BUILD
Applying for a Permit? You NEED this book!
CD Included


BUILDING
PERMIT
#14321
County of Peoria

2009

2010

2012



455.67'
1188.33'
378.33'
325.0'
325.5'
180'
184.0'
155.0'
105.0'
180.0'
15 FOOT SETBACK (TYP.)
P.L. (TYP)
515.0'
54.0'
60.75'
27.5'
67.0'
241.5'
116.5
80'
106.0'
154.0'
121.67'
67.0'
108.75'
P.L. (TYP)
1644.5'
1
2
3
4
5
6
7
8
NOV 1 6 2010
GENERA ARRANGEMENT PLAN
KSGT AMATEUR TOWERS
GENERAL ARRANGEMENT PLAN
LDG

Tools used in selecting antennas and towers:

- EZNEC - The is an antenna design software that can simulate antenna patterns.
- HFTA - High Frequency Terrain Analysis is used to show the effect of local geography on the antenna pattern.
- VOAAREA and VOACAP - is a simulation software that shows the reliability of a path to any DX location using the selected antennas.

Antennas

- 160m – 5 el vertical array
- 160m - dipole
- 160m – 8 circle rx array
- 80m – 4 Square/Comtek controller
- 80m - dipole
- 80m – 8 circle rx array
- 80m – 3 el yagi on 60’ boom
- 40m - two stack of 4 el OWA on 48’ boom
- 20m – three stack of 6 el OWA on 48’ boom
- 15m – three stack of 7 el OWA on 48’ boom
- 10m – three stack of 8 el OWA on 48’ boom
- 40-6m – 2 X SteppIR DB-42 yagi

- **Electrical design by WA3FET:** Jim Breakal WA3FET is one of the world's top Yagi antenna design experts. Jim engineered this Yagi's esoteric electrical performance specifically for the battleground conditions of international DX contesting and expedition pile-up busting honor-roll DXing. **WA3FET's OWA design provides sustained optimal performance across the entire monoband...high forward gain, high front to back, and low VSWR,** with all being nearly flat across the band. When you need to hear weak signal DX in the noise floor this Yagi's exceptionally clean pattern wi focus on your target while discriminating against QRM/QRN coming from undesired azimuths.

- **Mechanical design by K3LR:** Tim Duffy K3LR engineers, operates and constantly improves his winning DX contest superstation in WPA. There are no compromises at K3LR...Tim uses only the best! Working with WA3FET, Tim has mechanically designed and built the best OWA yagi available. K3LR uses OWA Yagis to compete in contests and i DX pileups. K3LR's performance in the battleground of international DX contesting proves over and over again that Ultimate OWA yagis are the best of the best: There is nothing better!

  - All aluminum boom and elements with all stainless hardware
  - Boom is 48 ft
  - Two boom pieces are 24 ft long
  - Boom center splice designed for optimum strength
  - Supplied boom truss is Phillystran
  - Direct 50 ohm feed via buyer provided 1:1 W0IYH current (bead) balun

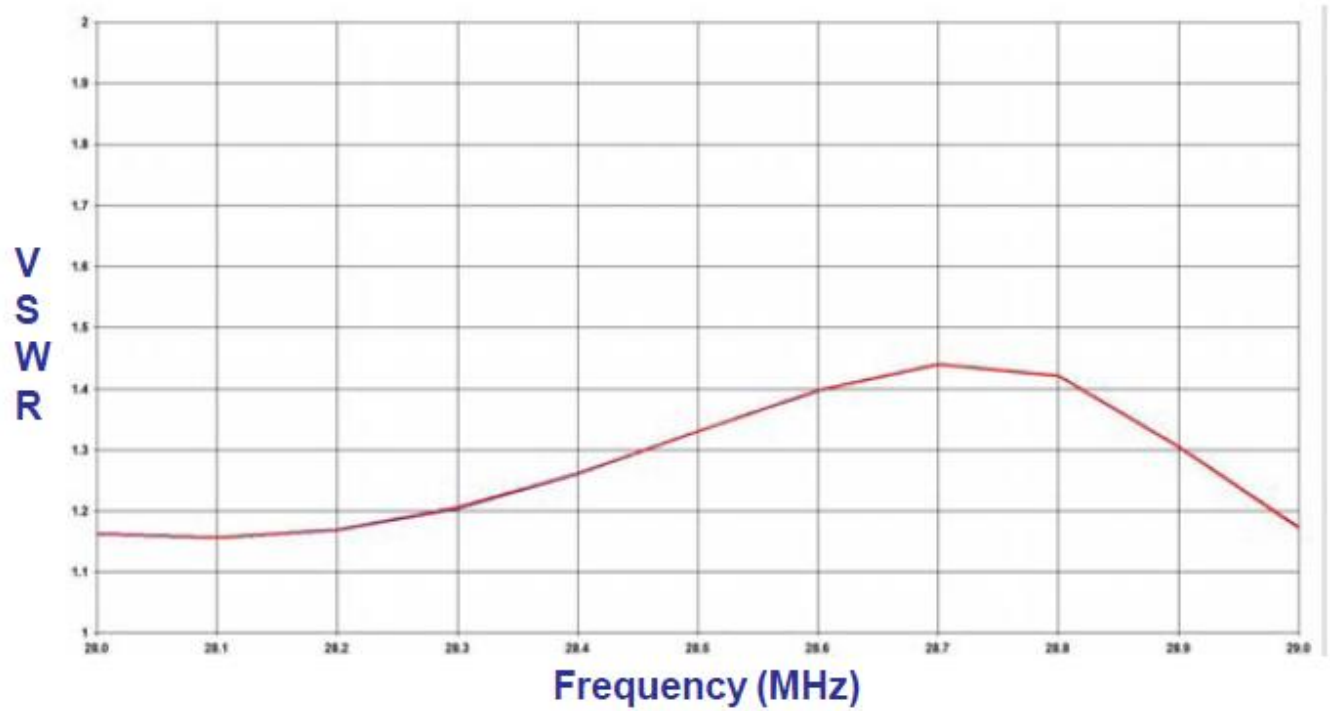
- **VSWR better than 1.4 to 1 across the ENTIRE SSB, CW, RTTY, and DIGITAL passbands:**

  - VSWR is less than 1.4:1 from 28.000 to 29.000 MHz including the SSB, CW, RTTY, and DIGITAL passbands.

- **Pattern and gain are the BEST available on the market:** For a single 10M8OWA-48 mounted 1wl above ground forward gain is greater than 16dB across the entire 10m band, F/B is greater than 25 dB across the entire 10m band, clean pattern expertly and painstakingly optimized by WA3FET and used by K3LR. For a stack of 10M8OWA-48 stacking distance is optimized at 36ft between Yagis, forward gain is greater than 19.0dB across the entire 10m band, F/ is greater than 21.7dB across the entire 10m band.

- **Vital statistics 10M8OWA-48-UHD:**

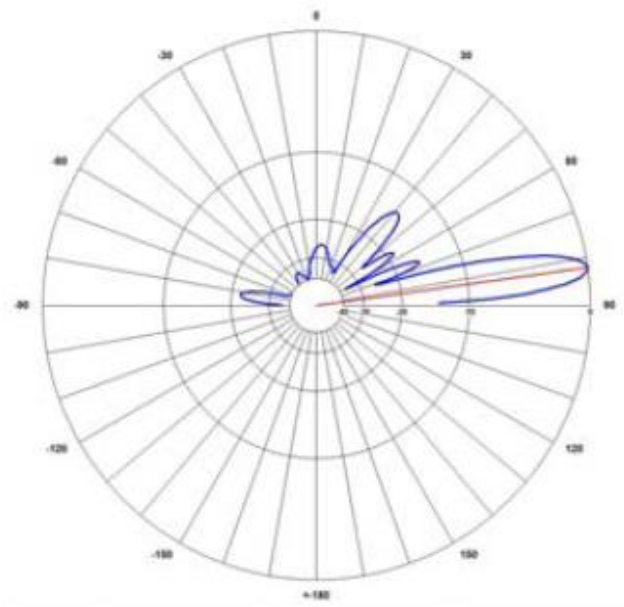
Stacked 10M8OWA-48



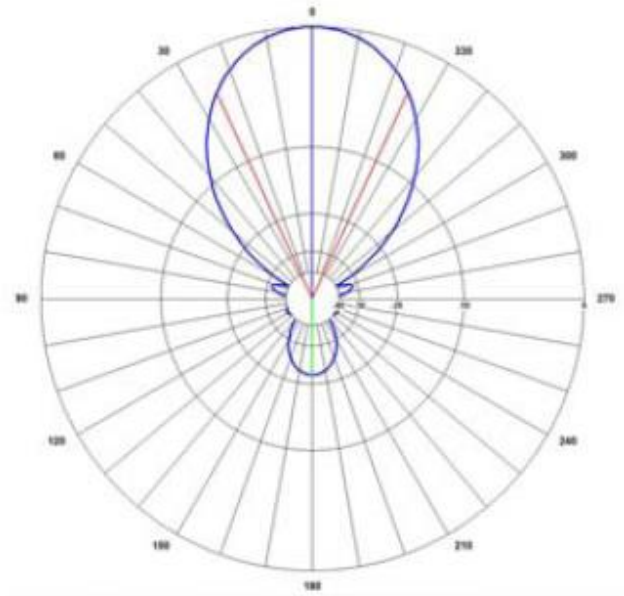
Stacked 10M8OWA-48 at 73ft and 37ft Above Real Ground

28.000 MHz

Forward Gain 19.02 dB
Front/Back 21.79 dB
3dB Beamwidth 50 Deg

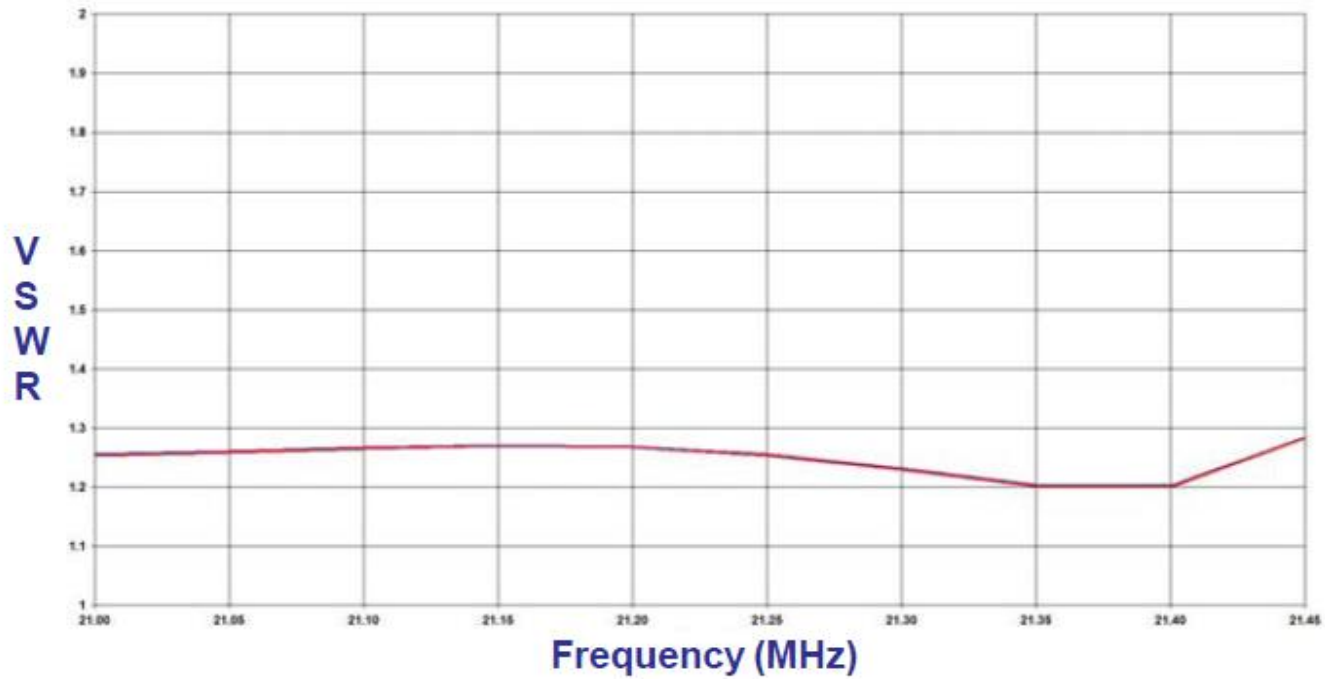


Elevation 73/37 above ground



Azimuth 73/37 above ground

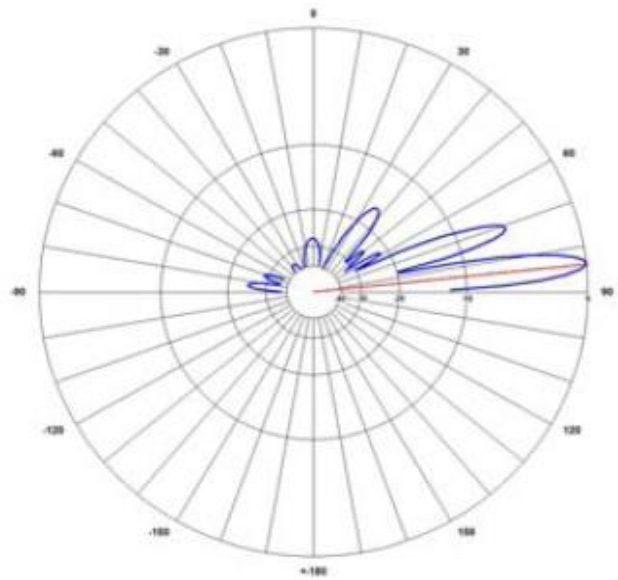
Stacked 15M7OWA-48



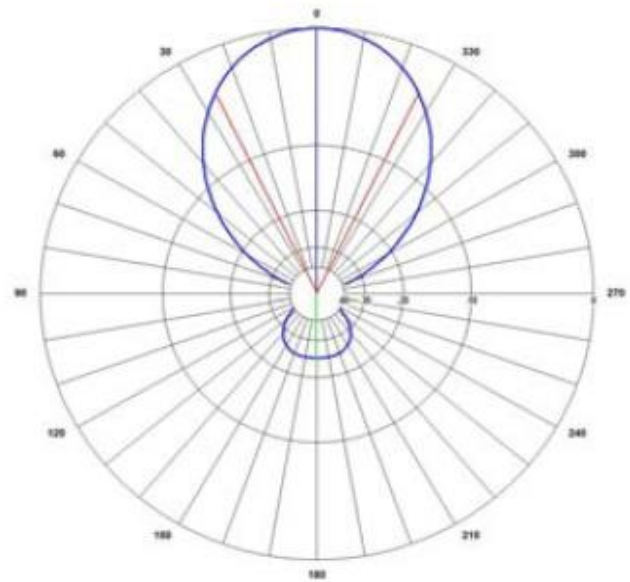
Stacked 15M7OWA-48 at 120ft and 80ft Above Real Ground

21.000 MHz

Forward Gain 18.93 dB
Front/Back 24.51 dB
3dB Beamwidth 52 Deg

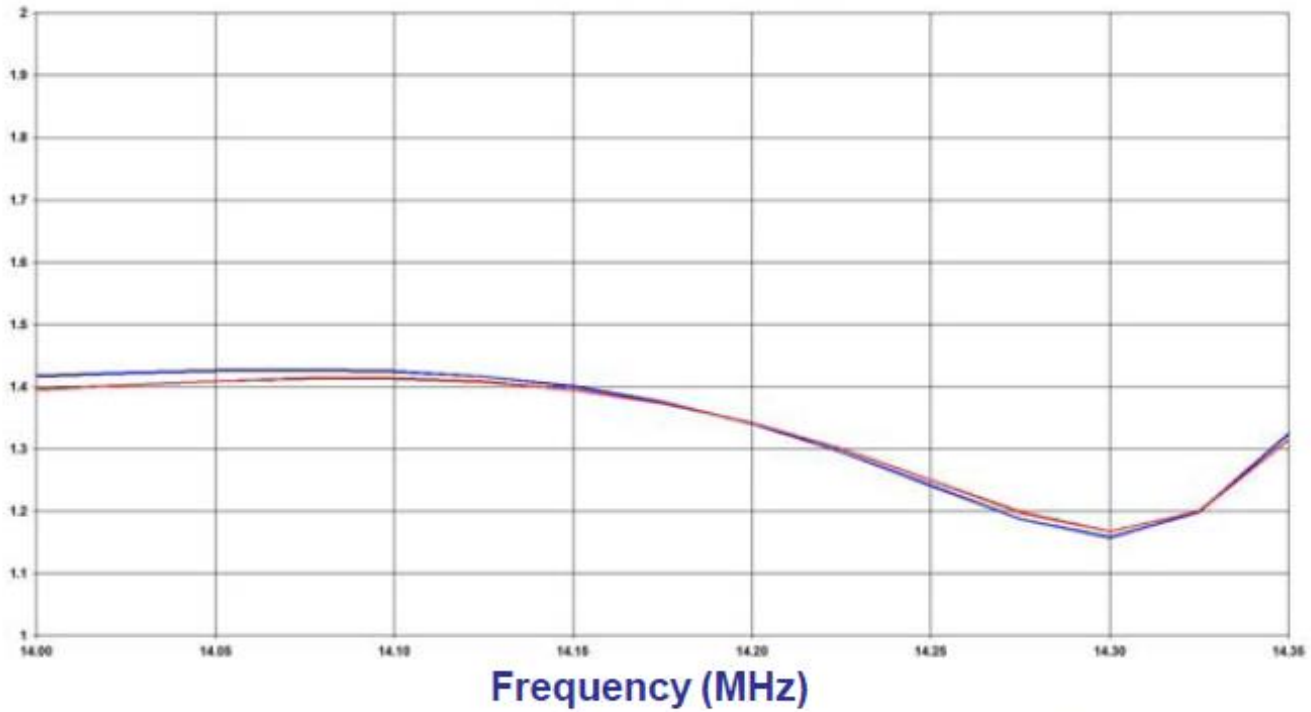


Elevation 120/80 above ground



Azimuth 120/80 above ground

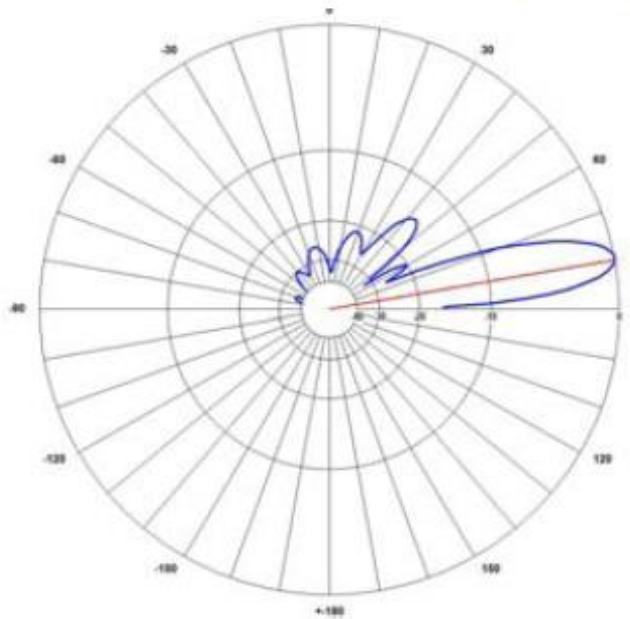
Stacked 20M6OWA-48



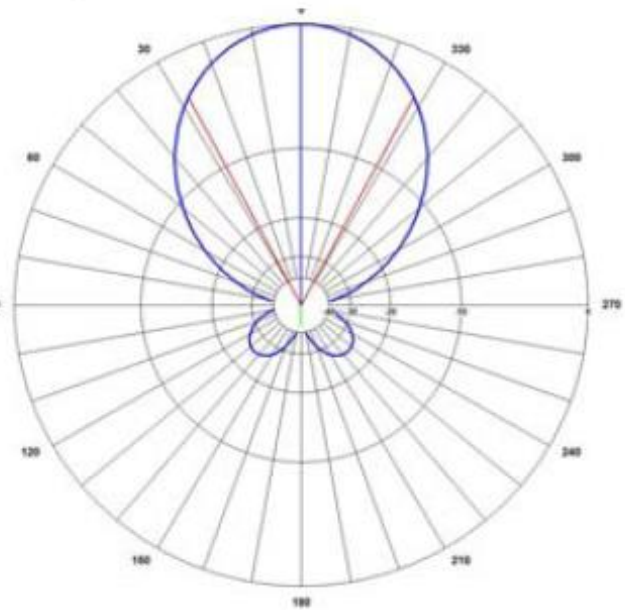
Stacked 20M6OWA-48 at 110ft and 50ft Above Real Ground

14.000 MHz

Forward Gain 17.25 dB
Front/Back 45.26 dB
3dB Beamwidth 56 Deg

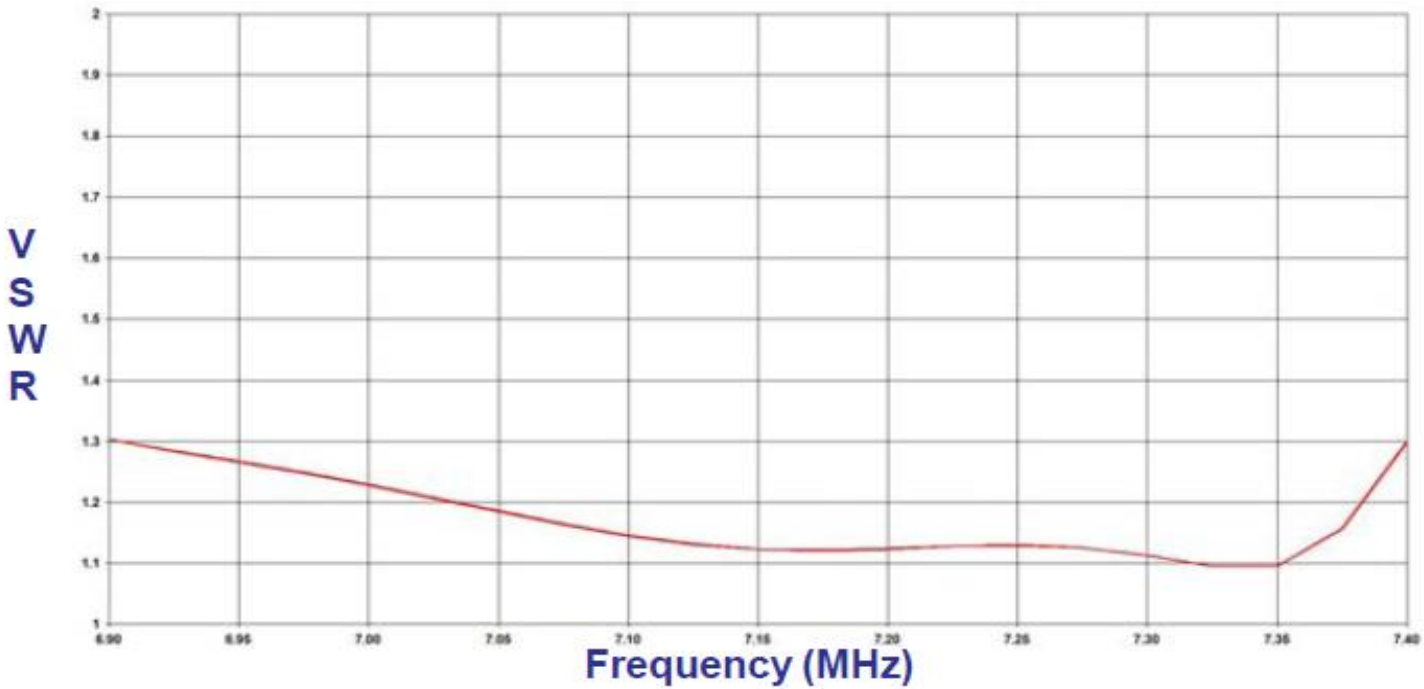


Elevation 110/50 above ground



Azimuth 110/50 above ground

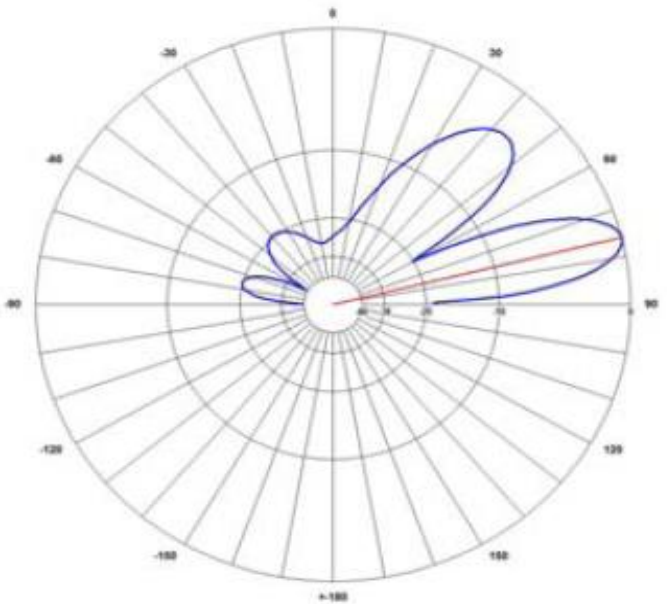
40M4OWA-48



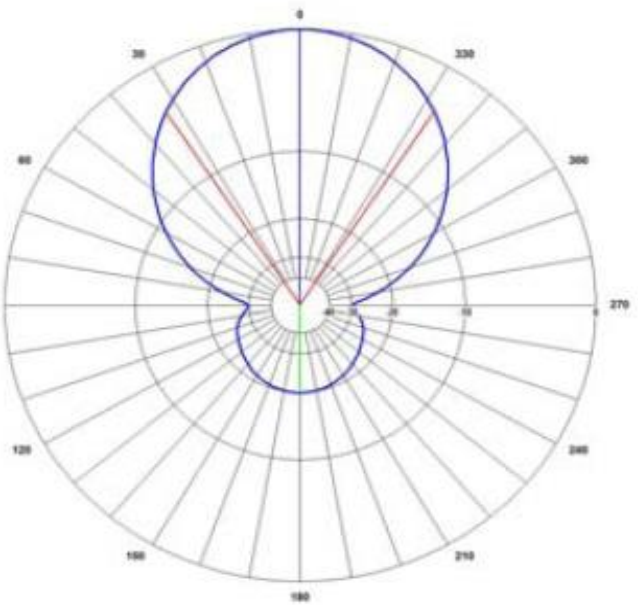
40M4OWA-48 at One (1) Wavelength Above Real Ground

7.000 MHz

Forward Gain 13.13 dB
Front/Back 19.83 dB
3dB Beamwidth 66 Deg

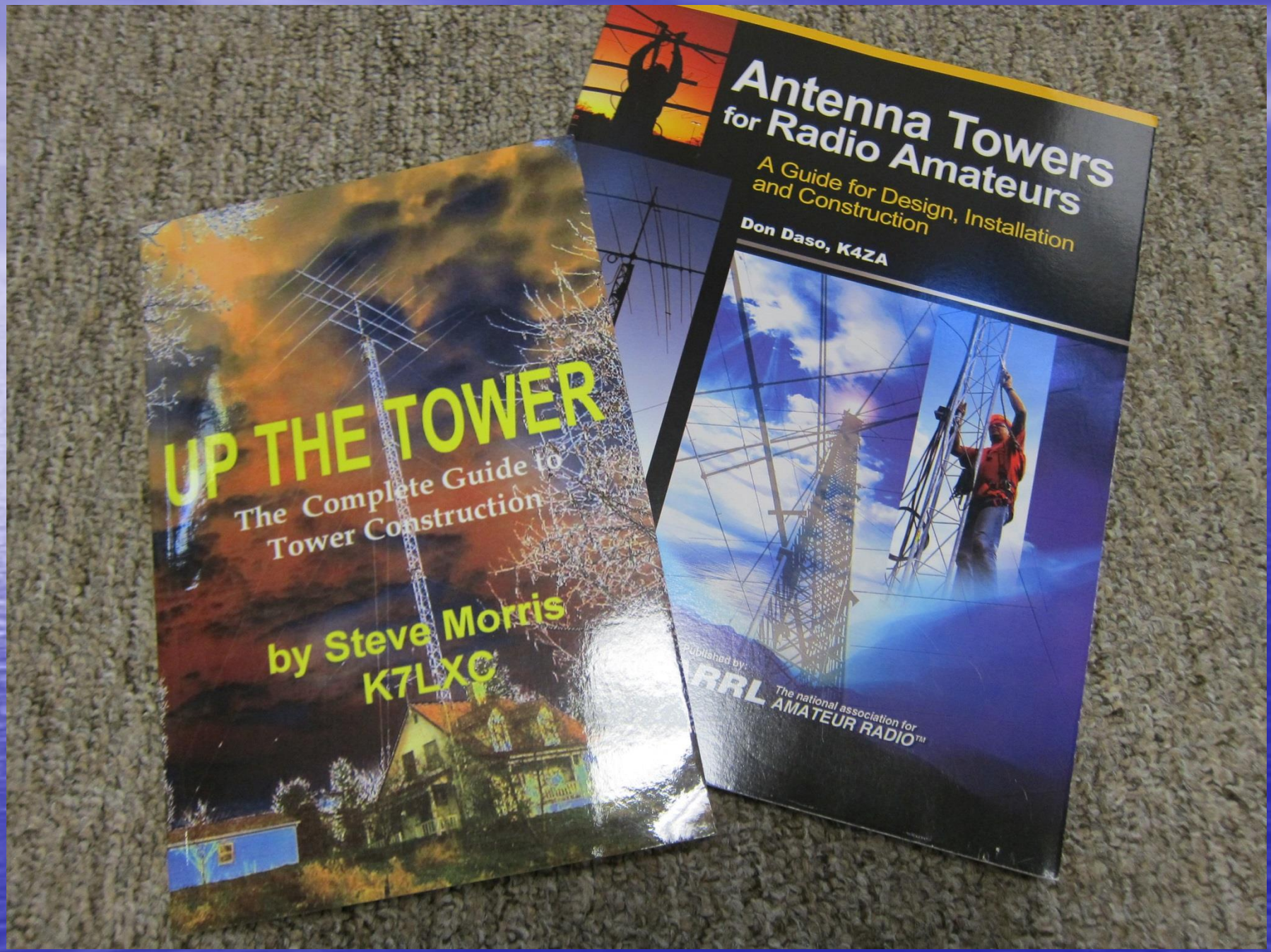


Elevation at 1wl above ground



Azimuth at 1wl above ground

Performance for Ham Bands	DB42 Forward Dir Gain DBi	DB42 Forward Dir Front to Rear, DB	DB42 Reverse Dir Gain DBi	DB42 Reverse Dir Front to Rear, DB
80M (option)	1.7	n/a	1.7	NA
40M	8.0	25.5	8.0	23.2
30M	9.0	12.4	9.0	12.3
20M	10.1	22.0	10.0	23.2
17M	10.8	22.2	10.7	21.9
15M	11.0	25.7	10.6	20.0
12M	11.9	24.1	10.4	8.9
10M	12.2	20.0	10.5	11.7
6M – 4 elements	5.0	2	5	2.0
6M – with optional passive element 50.0 – 53.3 MHz	14.0	25	NA	NA


UP THE TOWER
The Complete Guide to Tower Construction
by Steve Morris K7LXC
Antenna Towers for Radio Amateurs
A Guide for Design, Installation and Construction
Don Daso, K4ZA
Published by:
ARRL
The national association for AMATEUR RADIO™

KR7X Hank Lonberg

K9CT

18905 McDonald Road Trivoli, IL 61569

AMATEUR RADIO TOWER INSTALLATION

TRIVOLI
ILLINOIS

PROJECT SITE

VICINITY MAP

NO SCALE

DRAWING LIST

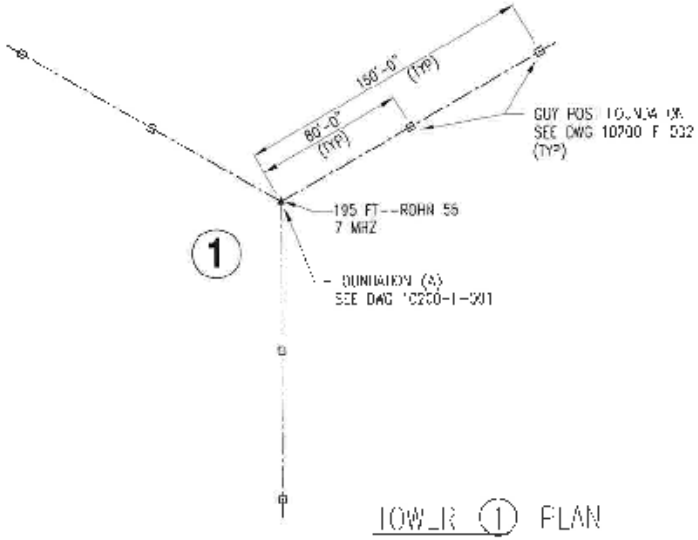
10200-M-0010 Rev 0 VICINITY MAP AND DRAWING INDEX
10200-M-0020 Rev 0 GENERAL NOTES & STANDARD DETAILS
10200-G-0020 Rev 0 GENERAL ARRANGEMENT PLAN
10200-G-0030 Rev 0 TOWER ARRANGEMENT PLAN & DETAILS SHEET 1
10200-G-0040 Rev 0 TOWER ARRANGEMENT PLAN & DETAILS SHEET 2
10200-G-0050 Rev 0 TOWER ARRANGEMENT PLAN & DETAILS SHEET 3
10200-G-0060 Rev 0 TOWER ARRANGEMENT PLAN & DETAILS SHEET 4
10200-F-0010 Rev 0 FND'N PLANS, SECTIONS AND DETAILS SHEET 1
10200-F-0020 Rev 0 FND'N PLANS, SECTIONS AND DETAILS SHEET 2
10200-F-0030 Rev 0 FND'N PLANS, SECTIONS AND DETAILS SHEET 3

K9CT AMATEUR TOWERS
TRIVOLI, ILLINOIS
VICINITY MAP AND
DRAWING INDEX

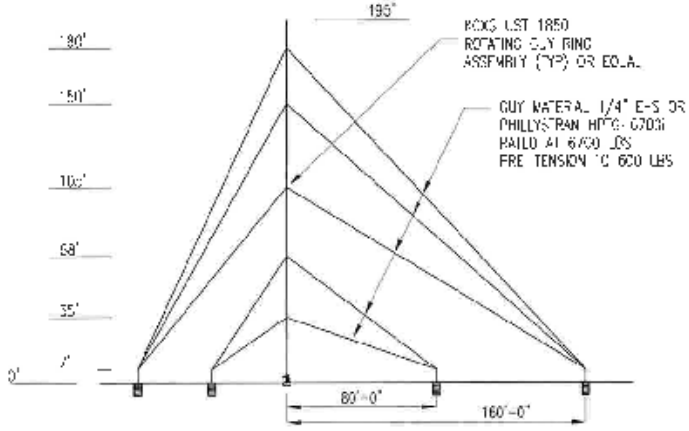
SCALE NONE

Lonberg

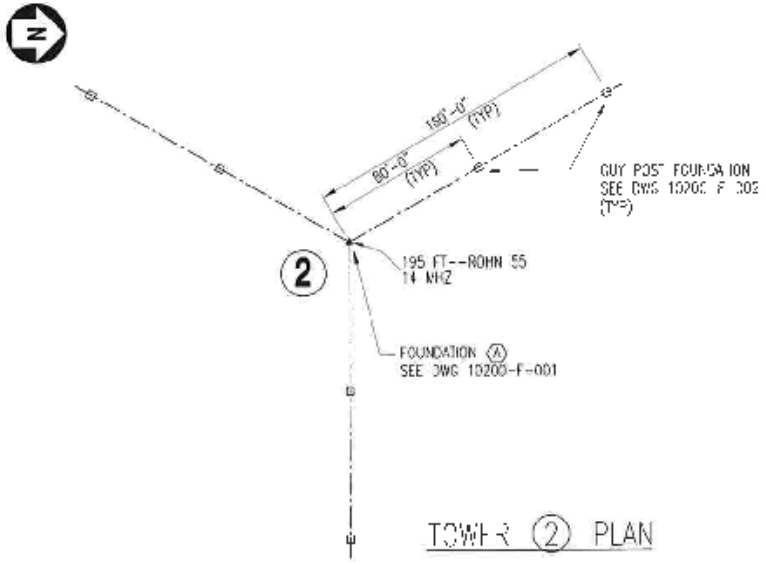

K9CT
18905 McDonald Road Trivoli, IL 61569
AMATEUR RADIO TOWER INSTALLATION
TRIVOLI
ILLINOIS
CALCULATIONS VOLUME 1
40m TOWER
20m TOWER
15m TOWER
10m TOWER
PROJECT SITE
VICINITY MAP
LDG
K9CT
18905 McDonald Road Trivoli, IL 61569
AMATEUR RADIO TOWER INSTALLATION
TRIVOLI
ILLINOIS
CALCULATIONS VOLUME 2
MULTIPLIER TOWER
80m TOWER
160m TOWER
EME TOWER
PROJECT SITE
VICINITY MAP
LDG



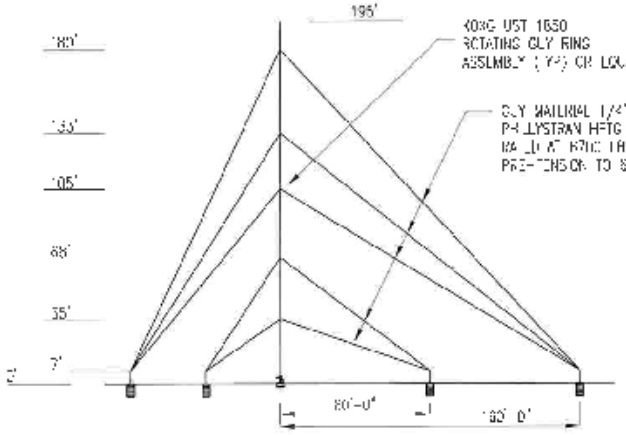
TOWER (1) PLAN



TOWER (1) ELEVATION



TOWER (2) PLAN



TOWER (2) ELEVATION

NOV 1 6 2010

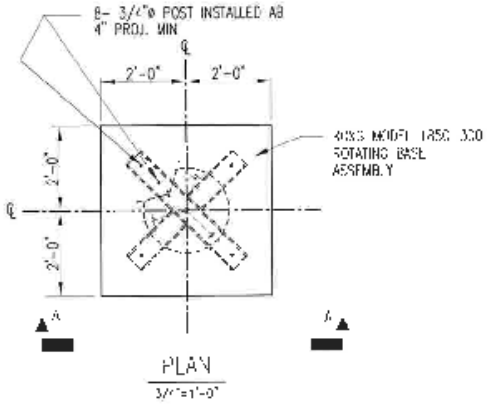
NOTES

1. SEE GENERAL NOTES SHEET 2 DWG 10200-F-002

KOCT AMATEUR TOWERS
TRIVOLI, ILLINOIS
TOWER ARRANGEMENT
PLAN & DETAILS SHEET 1

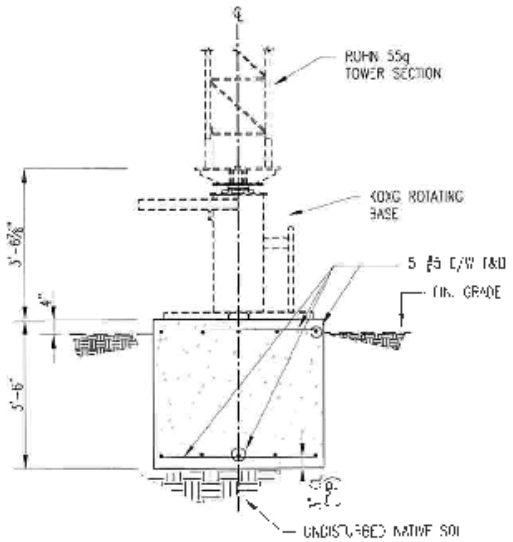
LDG
Lampero Design Group

10700-C-0002

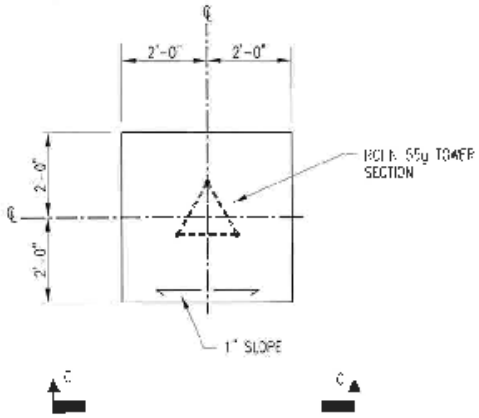


PLAN

FOUNDATION (A)

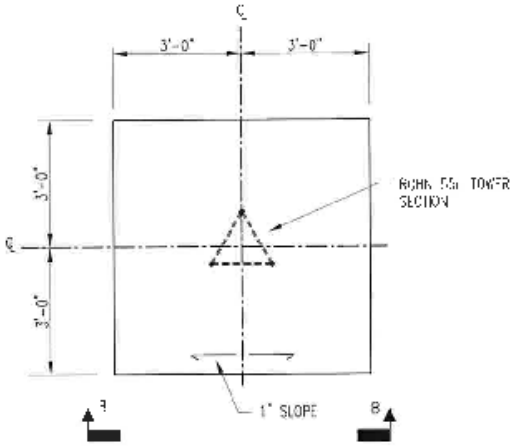


SECTION "A"



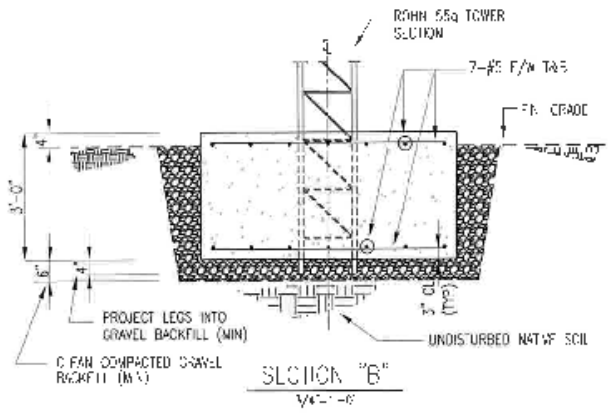
PLAN

FOUNDATION (F)

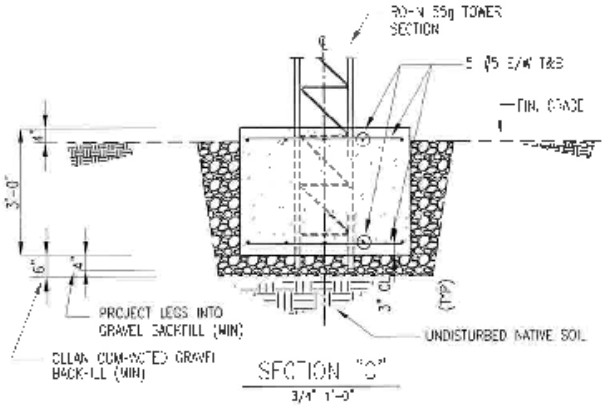


PLAN

FOUNDATION (B)



SECTION "B"



SECTION "C"

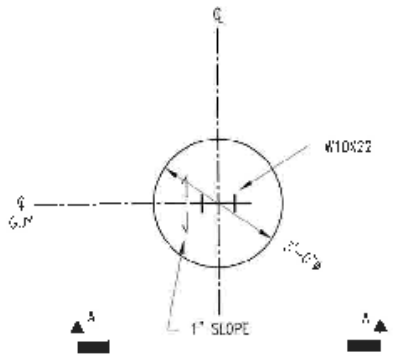
NOV 1 6 2010

NOTES:
1.1 FOR STRUCTURAL GENERAL NOTES SEE 10200-0-2010.

KBCT AMATEUR TOWERS
TINLEY ILLINOIS
PIER PLANS, SECTIONS
AND DETAILS SHEET 1

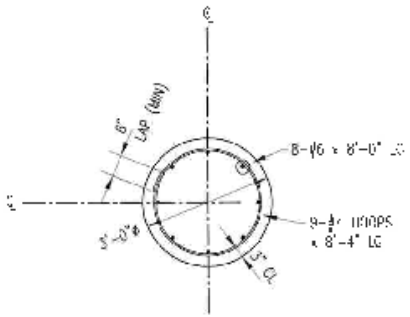
LDG
Lorberg Design Group

10200-1-0010 0

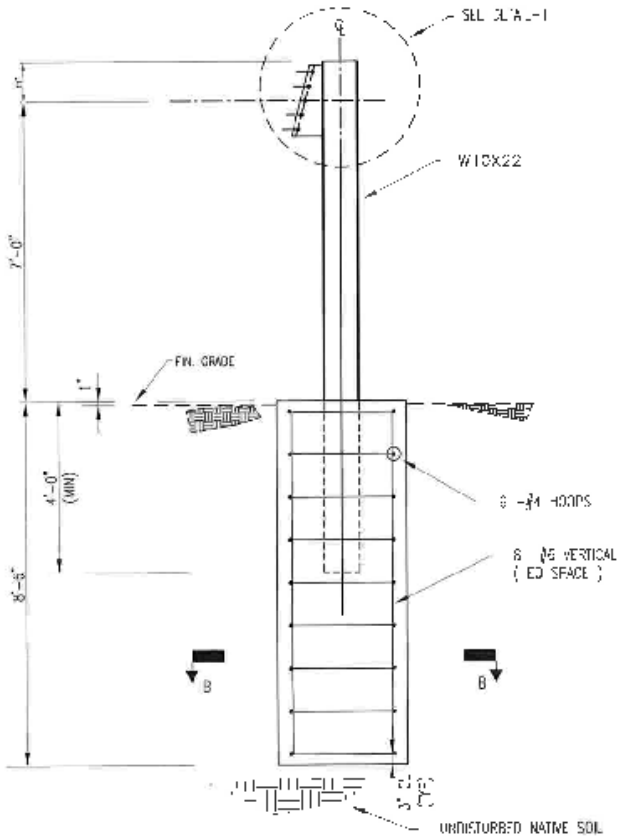


PLAN

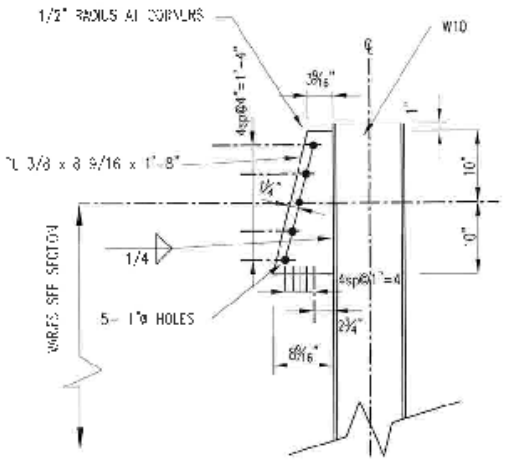
NOTE: ALIGN FOUNDATION WITH GUY DIRECTION



SECTION "B"



SECTION "A"



DETAIL - 1

NOV 1 6 2010

NOTES

GUY POST FOUNDATION

KHOT AMATEUR TOWERS TRIVOLI, ILLINOIS ENGR. PLANS, SECTIONS AND DETAILS SHEET 2	LDG Lanzerq Design Group
	10200-F-0009

Equipment list

- Gathered input from John, W2GD and Don, K4ZA

K9CT Bill of Materials – Tower Construction- Rev2

(Based on KR7X Preliminary Plans/Drawings Sept, 2010)

Rohn Material Summary 55G for Hill Order

Quantity	Rohn Part	Description	Comments
86	55G	Straight Sections	
2	SB55G	Short 5' Base Section	
6	BPL55G	Bearing Plate	All six s/b 2 inch openings
4	GA55GD	Guy Brackets	
3 or 0	AS455G	Accessory Shelf	Array Solutions Alternative Design is better and recommended. For Mult tower (2) and EME (1)

Rohn Material Summary 25G for Hill Order

Quantity	Rohn Part	Description	Comments
2,900 ft	EHS cable	¼ inch EHS cable	Six 500’ rolls - Hill item
1	25AG2	2 in. cone top section	
12	25G	Straight Sections	
1	SB25G5	Short 5’ Base Section	Assumes DXE or WB0W insulators are used
1	BPC25G	Base Plate	
4	GA25GD	Guy Brackets	
0	AS25G	Accessory / Rotator Shelf	For aluminum stinger attachment – PURCHASE THIS ITEM FROM Array Solutions, Rohn shelf will not work

Bulk Tower Material Summary

Quantity	Mfr / Model	Description	Comments
?	Rohn TB3	2 inch thrust bearing	3 in = TB4 - Amts TBD
252	PLP	¼ inch Preforms EHS	Buy by the box direct from PLP.
150	PLP DER-2169	3/8 Glas-Grips	Buy by the box direct from PLP for 3/8 Polygon Rod
9,700 ft	Polygon	3/8 in. guy rod	5000' min order? Color? Order 10,000 feet.
252	3/8 in. thimble	For ¼ EHS ends	Rohn, others, see http://www.uscargocontrol.com/Search?search=thimble&x=25&y=8 Part #: HDTGV3/8 $ .62/each
150	½ in. thimble	For 3/8 Polygon ends	Rohn, others, see above URL Part #: HDTGV1/2 $1.42/each
150	3/8 in. anchor shackle	Screw pin type	Rohn, others see http://www.uscargocontrol.com/Rigging-Supplies-Hardware/Screw-Pin-Anchor-Shackles-Galvanized $1.39 each Part #: SPAS3/8
150	½ in. anchor shackle	Screw Pin type	Rohn, others, see above URL $2.35 each Part #: SPAS1/2
75	turnbuckle	½ in x 12 in Eye/Eye	Rohn, others see http://www.uscargocontrol.com/Rigging-Supplies-Hardware/Eye-Eye-Galvanized-Turnbuckles/Galvanized-Turnbuckle-Eye-Eye-1-2-x-12 $8.60 each Part #: EETBGV1/2X12

Tools

- Ladders
- Ropes
- Lug All
- Klein Grip
- Drift pins
- Crane!

Team

- Dave Arrenholz Contractor
- John Crovelli, W2GD
- Don Daso, K4ZA
- P&K Antenna, Dixon, Brian and Matt
- N7MB, WB9UWA, N9DOA
- H3 Fabricating
- Rebar material and assembly

Time and Construction

- Site prep - year
- Plan – several months
- Permit – one year
- Material acquisition – 6 - 12 months
- Weather delays
- Construction
- Testing
- Repairs

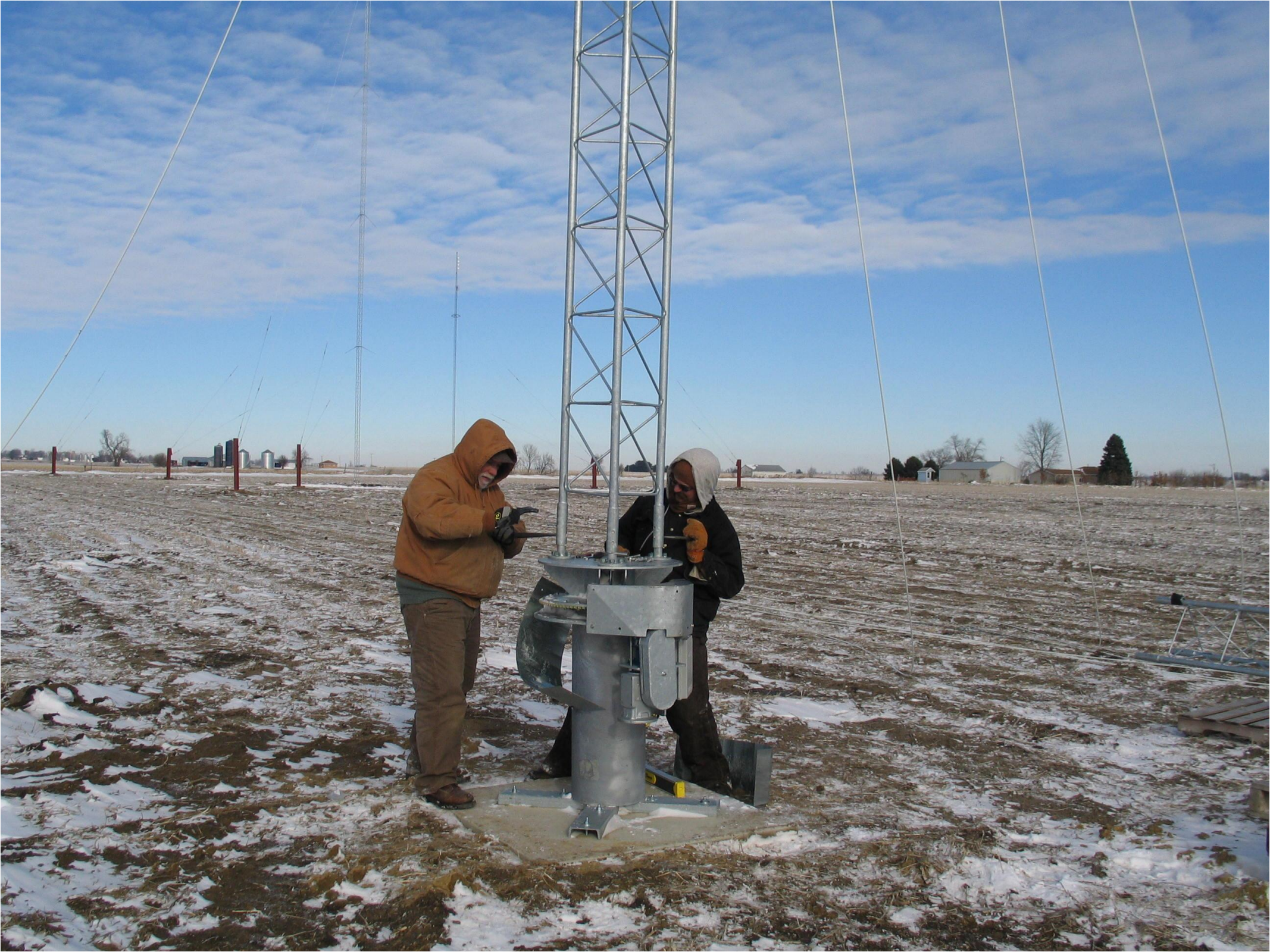

NEW HOLLAND
L190


CANTON
REDI-MIX
PH. 647-3700


Steelhenge - Trivoli


DX


GROVE
GROVE




GINGERICH


P
MENARDS
05/11/2011 22:12


C
05/11/2011 22:13


05/21/2011 21:34


05/21/2011 21:35


05/22/2011 04:19


05/25/2011 21:26


07/17/2011


07/17/2011


MENARDS
MENARDS
MENARDS


HARVEST HOME
ARUBA
R.P.
LUMBER
Weathermate Basic
07/16/2011


08/09/2011


GMC
08/10/2011


06/05/2011 00:53


06/05/2011 00:58


06/05/2011 22:07


06/05/2011 22:07


AKE A STAND
KWELL
HOUSE
Coffee
06/05/2011 22:13


06/05/2011 22:05

Coaxial Cable Required:

9396’ – 1 5/8” Heliax

2147’ – 1 ¼” Heliax

2500’ – ½” Heliax


06/07/2011 22:24


06/07/2011 22:55


06/07/2011 22:59


06/09/2011 03:52


06/09/2011 03:54


06/10/2011 00:50


06/10/2011 00:50


06/12/2011 03:14


06/12/2011 03:15


06/29/2011 20:58


7072 PM
06/29/2011 22:09


For Sale
07/12/2011


07/12/2011


07/12/2011


07/12/2011


KUBOTA
U45
07/12/2011


07/12/2011


07/12/2011


07/27/2011


07/27/2011


07/27/2011


07/12/2011


MENARDS
MENARDS


08/05/2011


Thompson Electronics
Company
800-323-3300
08/12/2011


07/14/2011


07/14/2011


07/14/2011

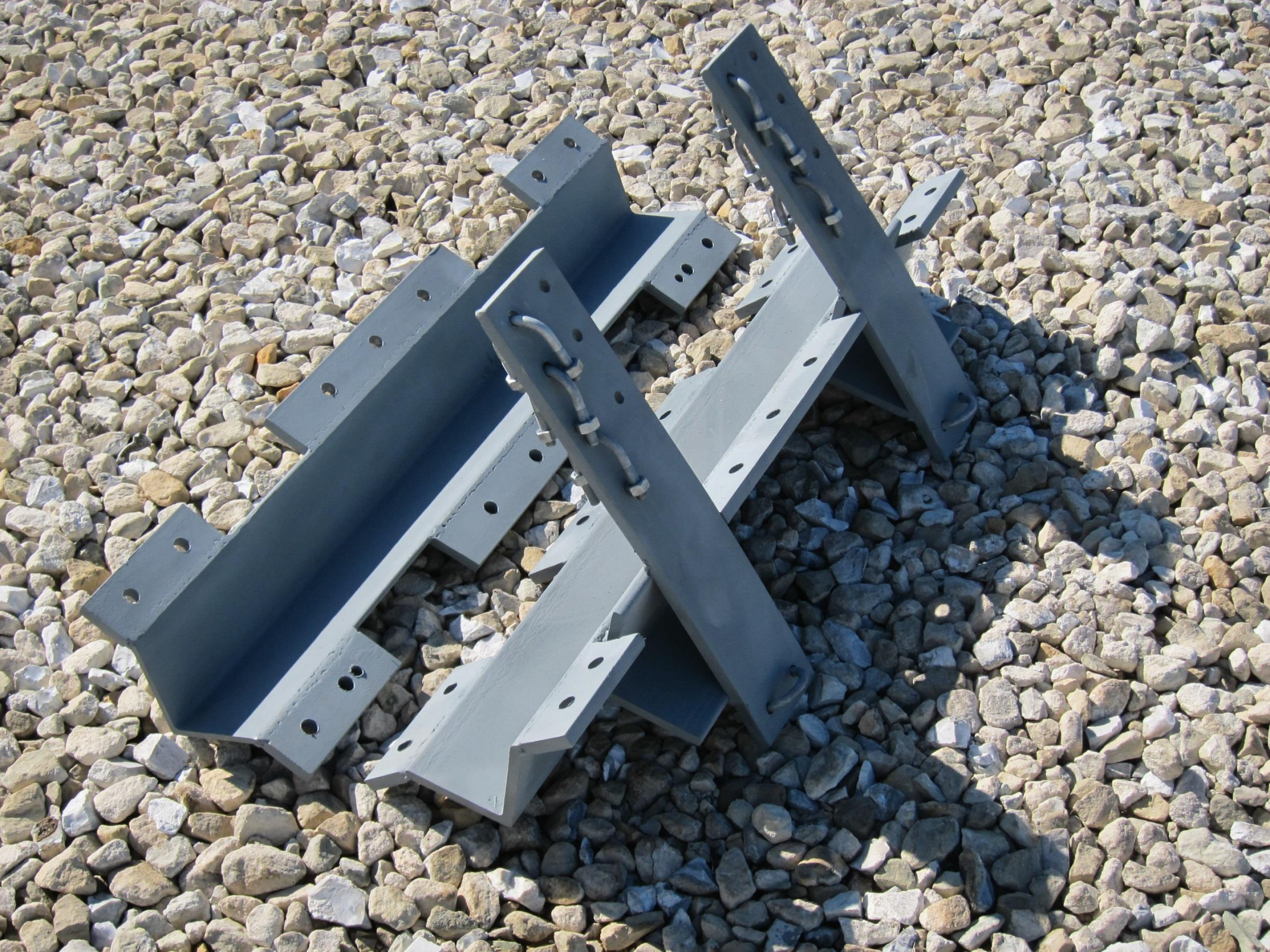

07/17/2011


08/10/2011


08/10/2011


08/10/2011


Aruba
One Happy Island
08/10/2011




08/11/2011


08/12/2011


GINGERICH
GINGERICH
CRANE RENTAL
309-263-7335

Testing

Documentation

Issues/Corrections

Discoveries

Results


07/27/2011


JLG
07/27/2011

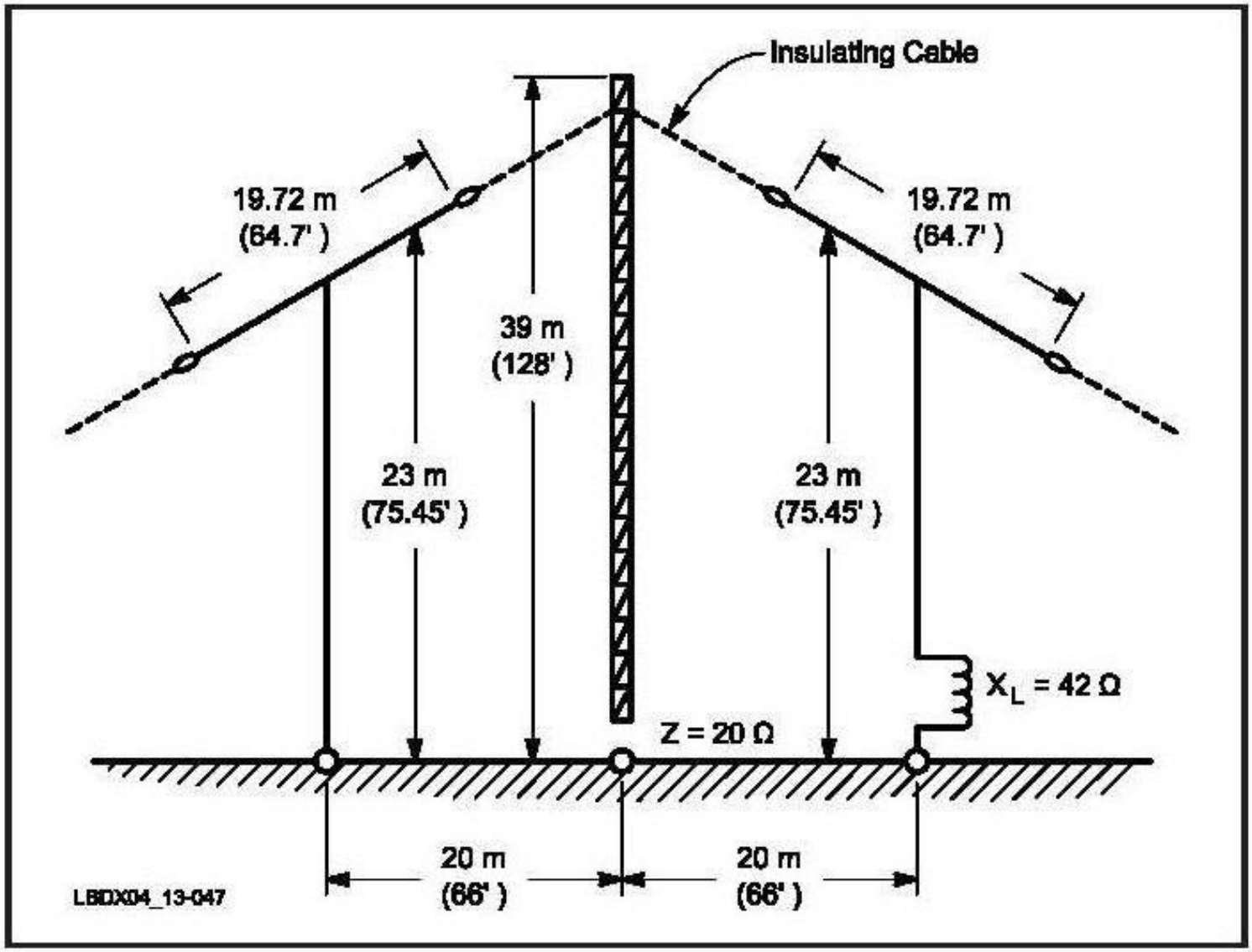


Fig 13-47—This 160-meter 3-element parasitic array produces 4.8 dB gain over a single vertical, and better than 25 dB F/B over 30 kHz of the band. With such an array there is no need for Beverage receiving antennas! The drawing shows only two of the four parasitic elements. The two other elements are left floating.

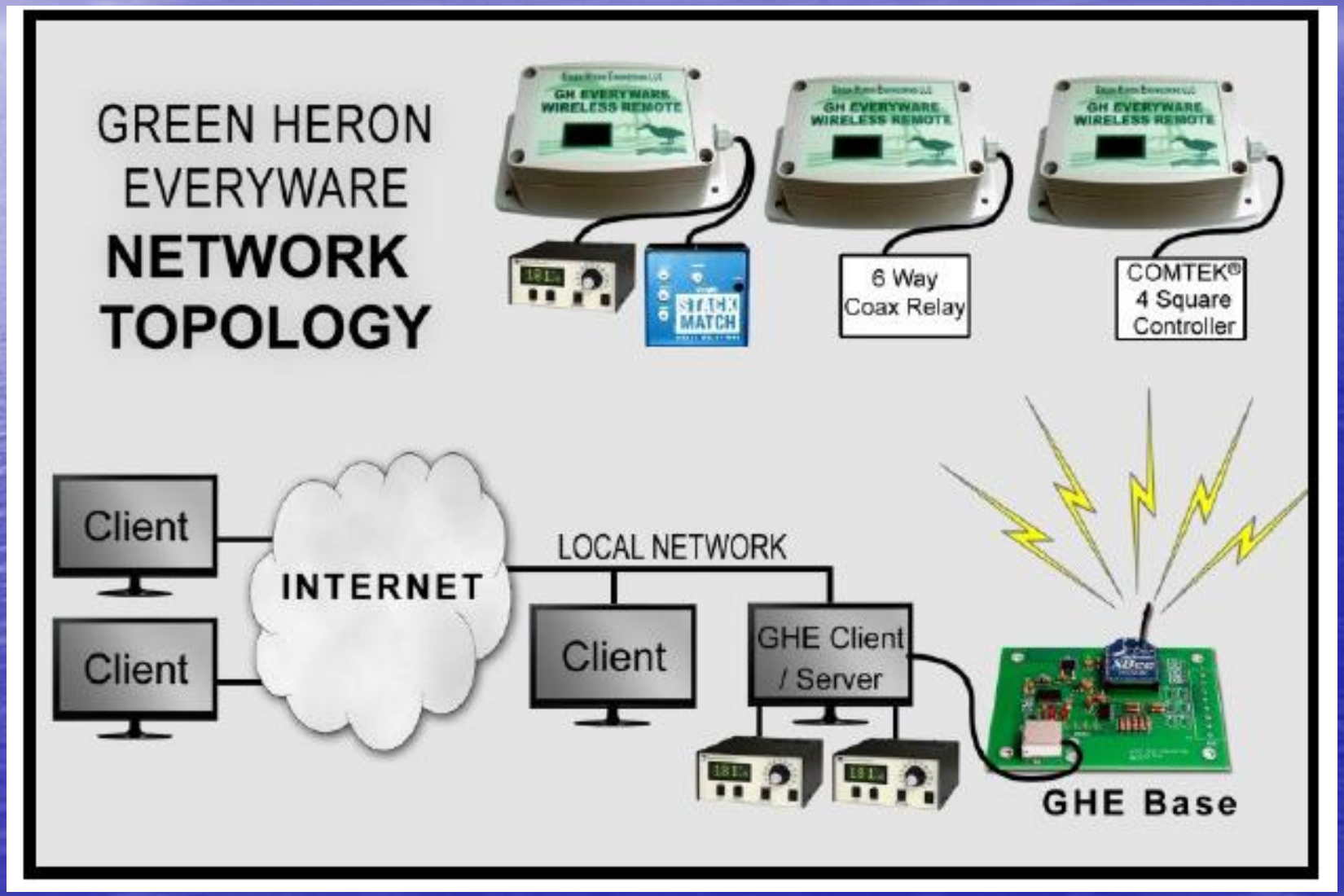

08/18/2011

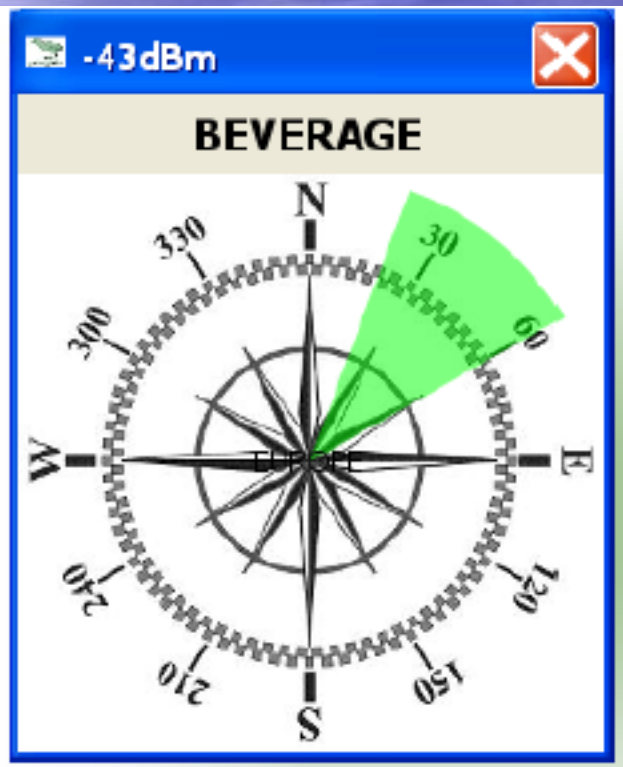
Issues/Corrections

Discoveries

Results

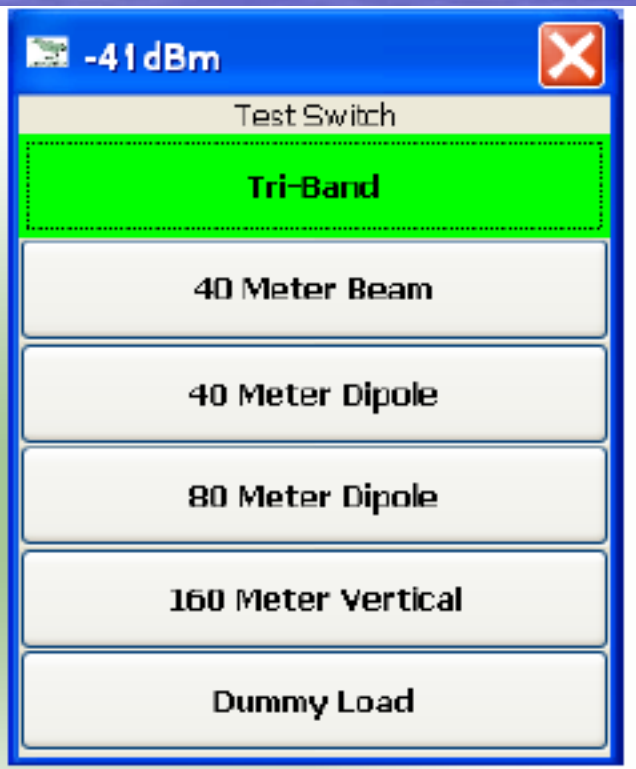
GH Control


GREEN HERON
EVERYWARE
NETWORK
TOPOLOGY
GH EVERYWARE WIRELESS REMOTE
GH EVERYWARE WIRELESS REMOTE
GH EVERYWARE WIRELESS REMOTE
6 Way
Coax Relay
COMTEK®
4 Square
Controller
Client
Client
INTERNET
LOCAL NETWORK
Client
GHE Client
/ Server
GHE Base



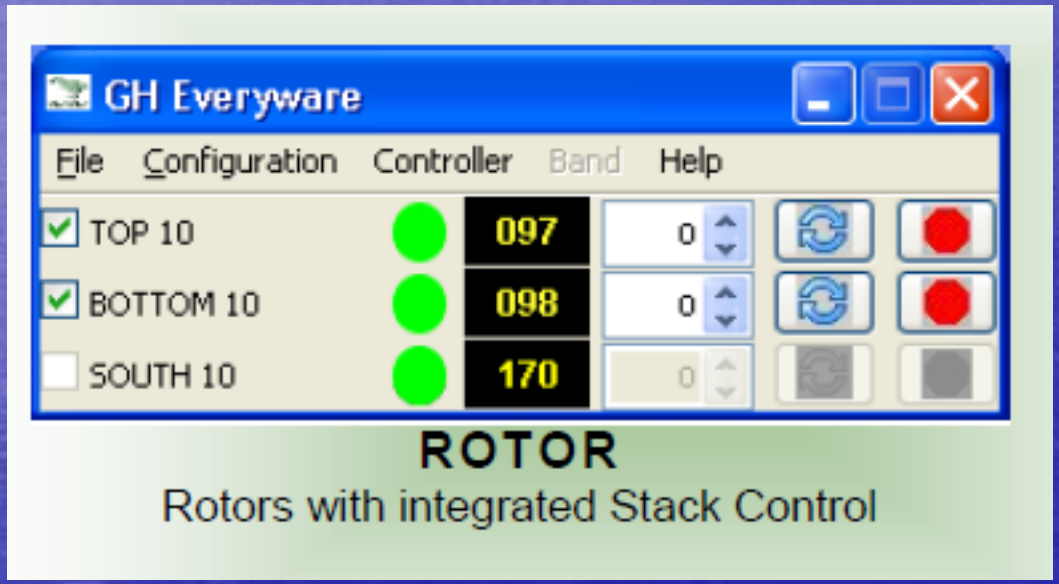
MAP CONTROL

Example custom switch control



BUTTON CONTROL

Example custom switch control

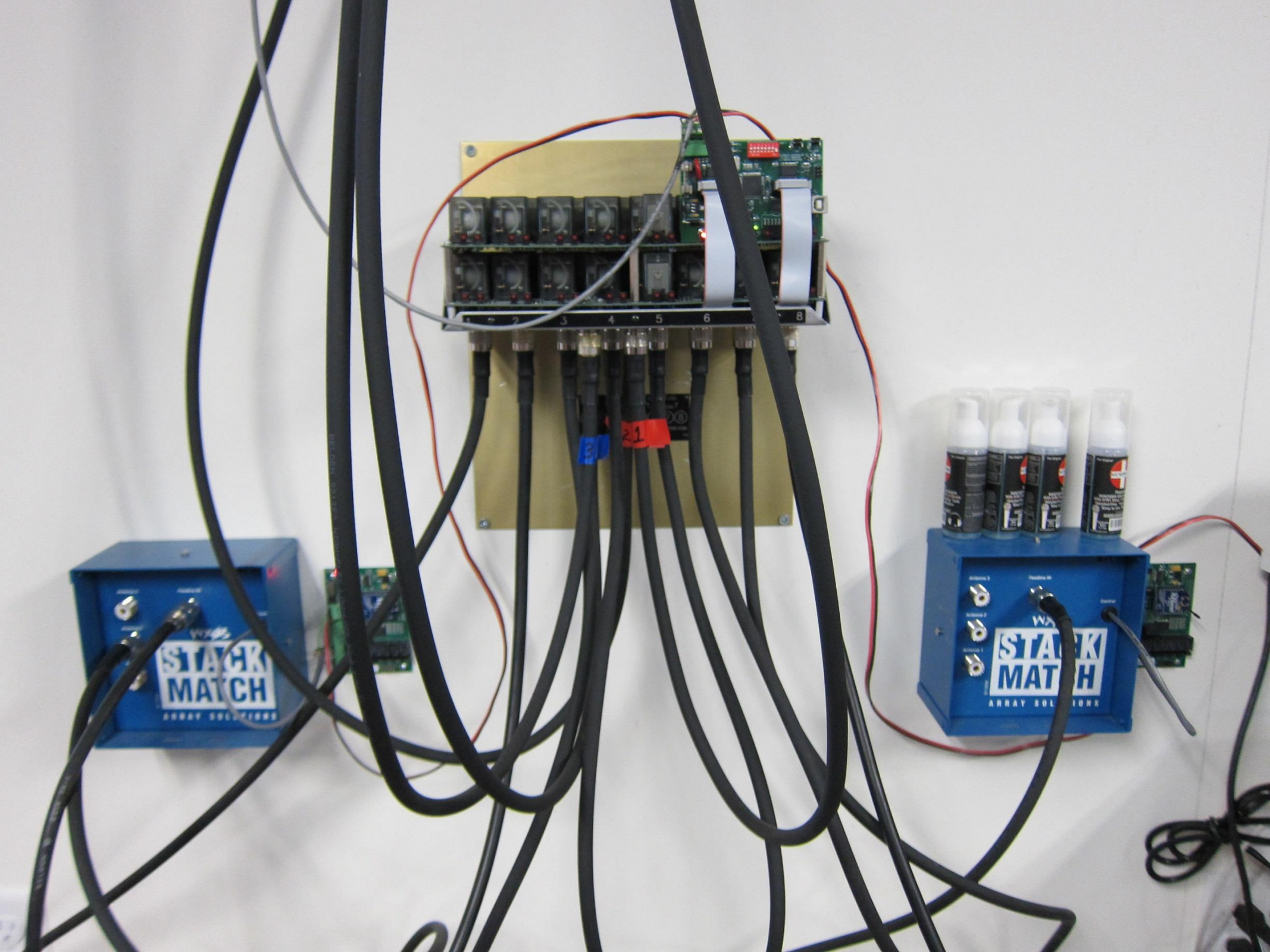


ROTOR

Rotors with integrated Stack Control

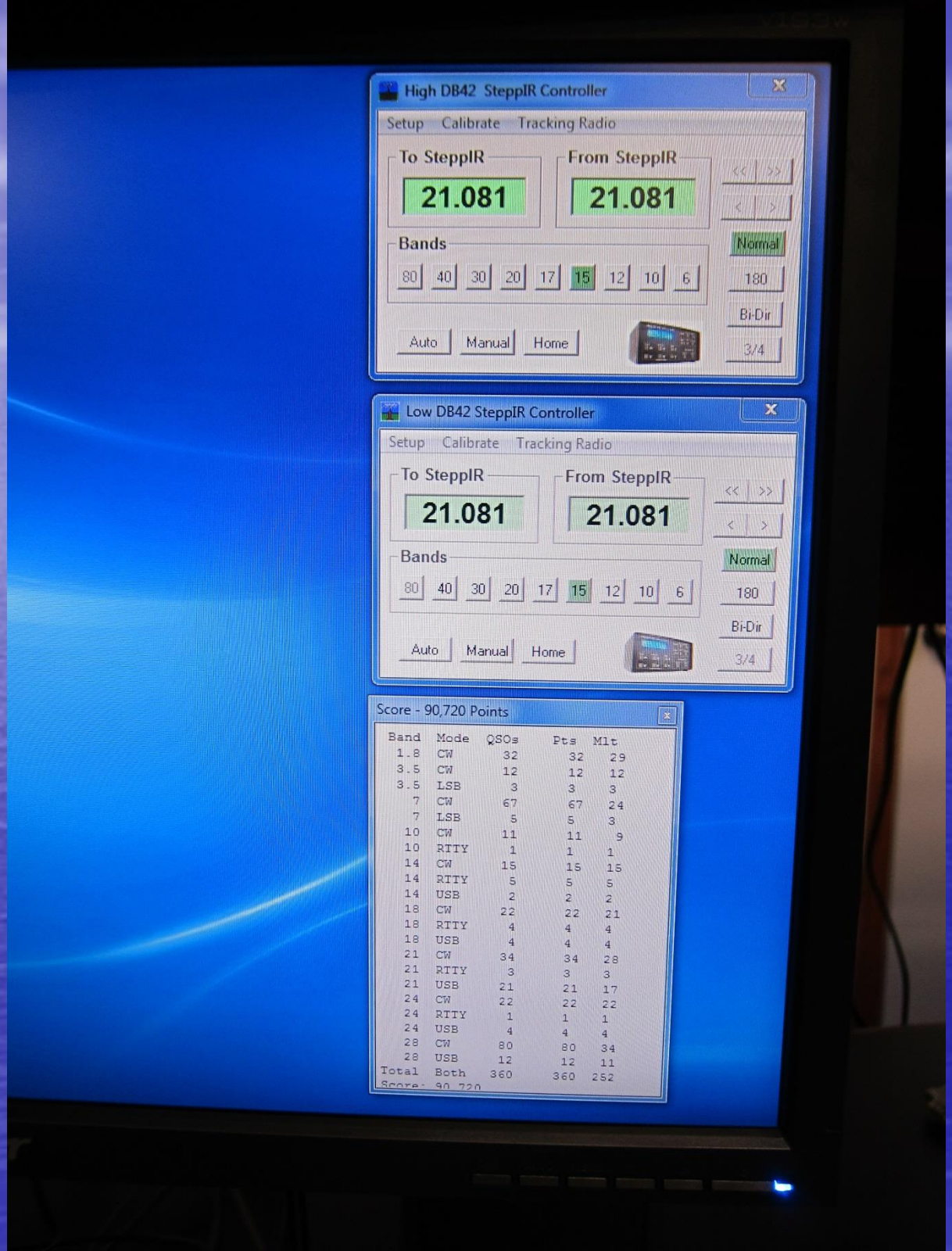

STACK MATCH
STACK MATCH
326
320
054
340
046
046

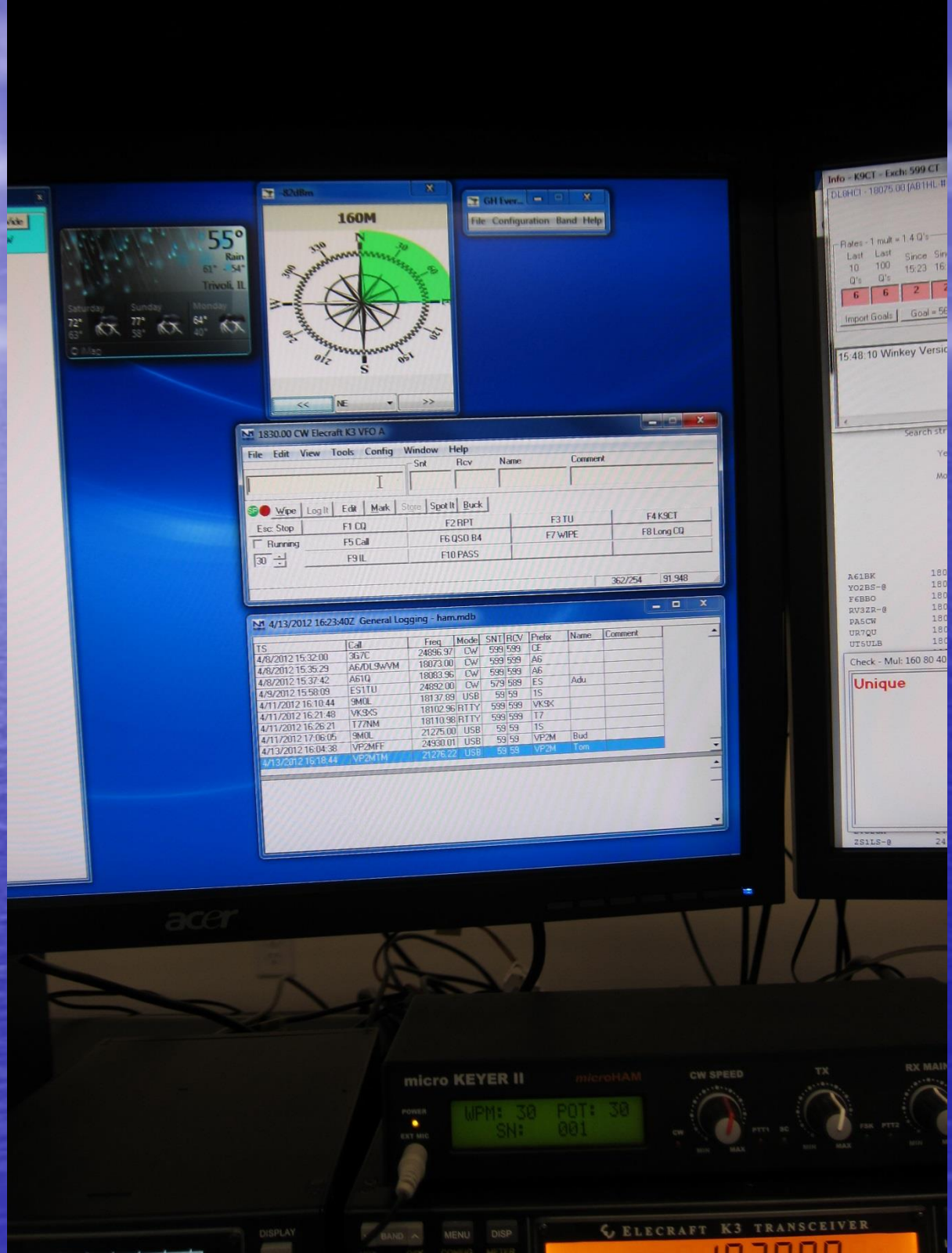

SteppIR SDA 100 Controller
Auto Track Mode +00
= 21.081mhz
LOWER
TUNING
RETRACT
POWER
NORM
180°
BI (3/4)
FINE
COARSE
BAND
AUTOTRACK
SELECT
SETUP
FREQUENCY ADJUST
LOW DB42
326° 341 .6 MAN
CCW
CW
CANCEL
SAVE
CHANGE
SETUP/ITEM
SteppIR SDA 100 Controller
Auto Track Mode +00
= 21.081mhz
UPPER
HIGH DB42
320° 340 .5 MAN
ASTRON SS-30M
40M STACK
054°
20M STACK
340° 319 .5 MAN
15M STACK
046° 48 .0 MAN
10M STACK
046° 45 .6 MAN


STACK MATCH
ARRAY SOLUTIONS
STACK MATCH
ARRAY SOLUTIONS


ALPHA 87A
LP-100A


T-storms
65° - 56°
Trivoli, IL
2 days ago
GH Everyware
File Configuration Band Help
15H 046 0
15M 046 0
15L 046 0
Bottom DB42 327 0
Top DB42 320 0
21081.00 CW Elecraft K3 VFO A
File Edit View Tools Config Window Help
Snt Rcv Name Comment
Wipe Log It Edit Mark Store Spot It Buck
Esc: Stop F1 CQ F2 RPT F3 TU F4 K9CT
Running F5 Call F6 QSO B4 F7 WIPE F8 Long CQ
30 F9 IL F10 PASS F11 Zn?
Telnet failed! Winsock State = 0
360/252 90,720
4/13/2012 15:49:54Z General Logging - ham.mdb
TS Call Freq Mode SNT RCV Prefix Name Comment
4/8/2012 14:24:38 XV2RZ 14016.92 CW 599 599 3W
4/8/2012 14:41:44 ZD7FT 21240.00 USB 59 59 ZD7 Peter
4/8/2012 15:32:00 3G7C 24896.97 CW 599 599 CE
4/8/2012 15:35:29 A6/DL9WVM 18073.00 CW 599 599 A6
4/8/2012 15:37:42 A61Q 18083.96 CW 599 599 A6
4/9/2012 15:58:09 ES1TU 24892.00 CW 579 589 ES Adu
4/11/2012 16:10:44 9M0L 18137.89 USB 59 59 1S
4/11/2012 16:21:48 VK9XS 18102.96 RTTY 599 599 VK9X
4/11/2012 16:26:21 T77NM 18110.98 RTTY 599 599 T7
4/11/2012 17:06:05 9M0L 21275.00 USB 59 59 1S
12/18/2011 13:42:22 SU9VB 21001.00 CW 599 599 SU
11/16/2011 14:18:22 SU9VB 28000.45 CW 599 599 SU


High DB42 SteppIR Controller
Setup Calibrate Tracking Radio
To SteppIR
21.081
From SteppIR
21.081
Bands
80 40 30 20 17 15 12 10 6
Normal
180
Bi-Dir
3/4
Auto Manual Home
Low DB42 SteppIR Controller
Setup Calibrate Tracking Radio
To SteppIR
21.081
From SteppIR
21.081
Bands
80 40 30 20 17 15 12 10 6
Normal
180
Bi-Dir
3/4
Auto Manual Home
Score - 90,720 Points
Band Mode QSOs Pts Mlt
1.8 CW 32 32 29
3.5 CW 12 12 12
3.5 LSB 3 3 3
7 CW 67 67 24
7 LSB 5 5 3
10 CW 11 11 9
10 RTTY 1 1 1
14 CW 15 15 15
14 RTTY 5 5 5
14 USB 2 2 2
18 CW 22 22 21
18 RTTY 4 4 4
18 USB 4 4 4
21 CW 34 34 28
21 RTTY 3 3 3
21 USB 21 21 17
24 CW 22 22 22
24 RTTY 1 1 1
24 USB 4 4 4
28 CW 80 80 34
28 USB 12 12 11
Total Both 360 360 252
Score: 90,720


160M
1830.00 CW Elecraft K3 VFO A
File Edit View Tools Config Window Help
Wipe Log It Edit Mark Store Spot It Buck
Esc Stop F1 CQ F2 RPT F3 TU F4 K9CT
Running F5 Call F6 QSO B4 F7 WIPE F8 Long CQ
F9 IL F10 PASS
4/13/2012 16:23:40Z General Logging - ham.mdb
Unique
micro KEYER II
microHAM
CW SPEED
WPM: 30 POT: 30
SN: 001
ELECRAFT K3 TRANSCEIVER
acer


K9CT
CW
Contest
ALPHA 87A

Discoveries

Results

Discoveries

- Stack
- Noise
- Rain/Snow
- DB42 Stack
- Stack vs other antennas
- DX vs Domestic
- Maintenance

Results

- M/2
- SO2R
- VHF
- EME


Thanks and 73
de K9CT