



A competitive contest station

...without towers...

N1PGA

Wires, Quads & Yagi antennas in the trees...

Agenda

- Station
- Antennas: What, Where & How
- Performance: Contests & RBN
- Some “how-to” techniques & tips
- Extras: if time allows
 - Top Secret R&D files
 - Operator improvement
 - FAQ's
 - Other...

N1PGA
John Vogel
Grafton, MA
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8-22-25



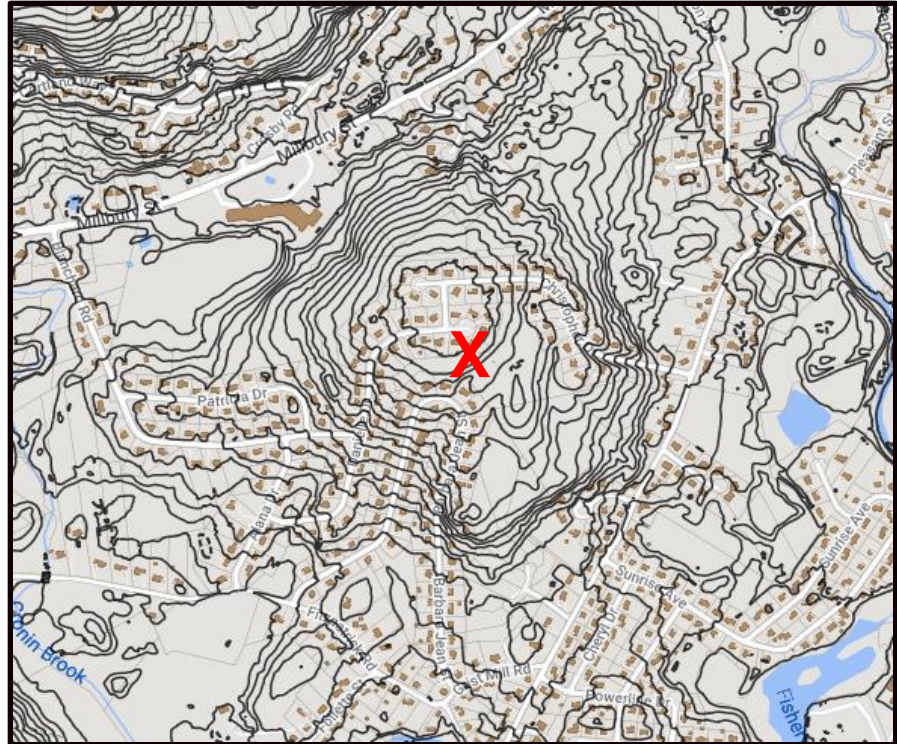
N1PGA Intro

N1PGA

- Extra Class '93 20wpm
- Contester & DX'er (DXCC 305-ish)
- Homebrew antennas (-1)
- Fixed directions
- Trees not towers
- "Backyard engineering"
- Competitive contest results

QTH

- Grafton, MA
- Suburban neighborhood
- 2/3 acre lot
- Hilltop ~485' asl
- Trees





N1PGA Station

Northeast
HamXposition

Antennas

- Under or in-between trees
 - Under the canopy
 - Shielded from WX
 - Intended to move a bit
- Homebrew (-1) & resonant
- Fixed direction 10-20m
- “Low” mounting heights 30-45’
- Ropes & pulleys
- 50’ min separation
- LMR-400 type feed lines
 - All homerun
 - Longest ~170’



SB10m

- ☐ EU 6-ele yagi @ 45’
- ☐ W 5-ele yagi @ 40’
- ☐ S 2-ele quad @ 30’
- ☐ NW 2-ele quad @ 45’

Shack

- Icom 7610
- Alpha 99 amp
- Daiwa 901HP watt meter
- Heil iCM deskmic - boom mount
- External speaker – not headset
- Homebrew antenna switching
- N1MM logging

SOAB & DXing

- 10-20m
 - 2-ele Monobanders - fixed EU
 - Tri-bander - fixed SA/Carrib
 - **Note:** Nothing W or N 10-20m
- 40m 2-ele vertical array NE-SW
- 80m wire 1/4wl vert w/raised radials
- 160m Inv-L w/ground radials
- Beverages: NE, NW, SW
- BOG: SA / Carrib

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Contesting orientation

Focus: DX contests

- ARRL DX
- CQWW
- “Big efforts” 3 or 4x /yr
- Single band 160m & 10m
- UnAssisted
- High Power 2018

Goals: Have fun !

- ✓ ARRL DX SSB: **Top 5**
- ✓ CQWW SSB: **Top 10**
- ✓ SB160m: **Top 10**
- ✓ SB 10m: **#1 US**

Overarching Goal:

*Have fun and do the very best
I can in context of whatever
the conditions may provide.*

Operating:

- Single radio
- Single VFO 99%
- No RF Gain
- No RIT
- No mem channels
- SSB 99.99% live audio
- CW 99.99% msgs
- **Spoiler** → SO2V is likely 2024 2025



In the beginning...

When we moved to this QTH almost 27 years ago...

Northeast
HamXposition

It all started with
these 2 bird feeders

Athletic, motivated
squirrels
necessitated
improved bird feeder
deployments



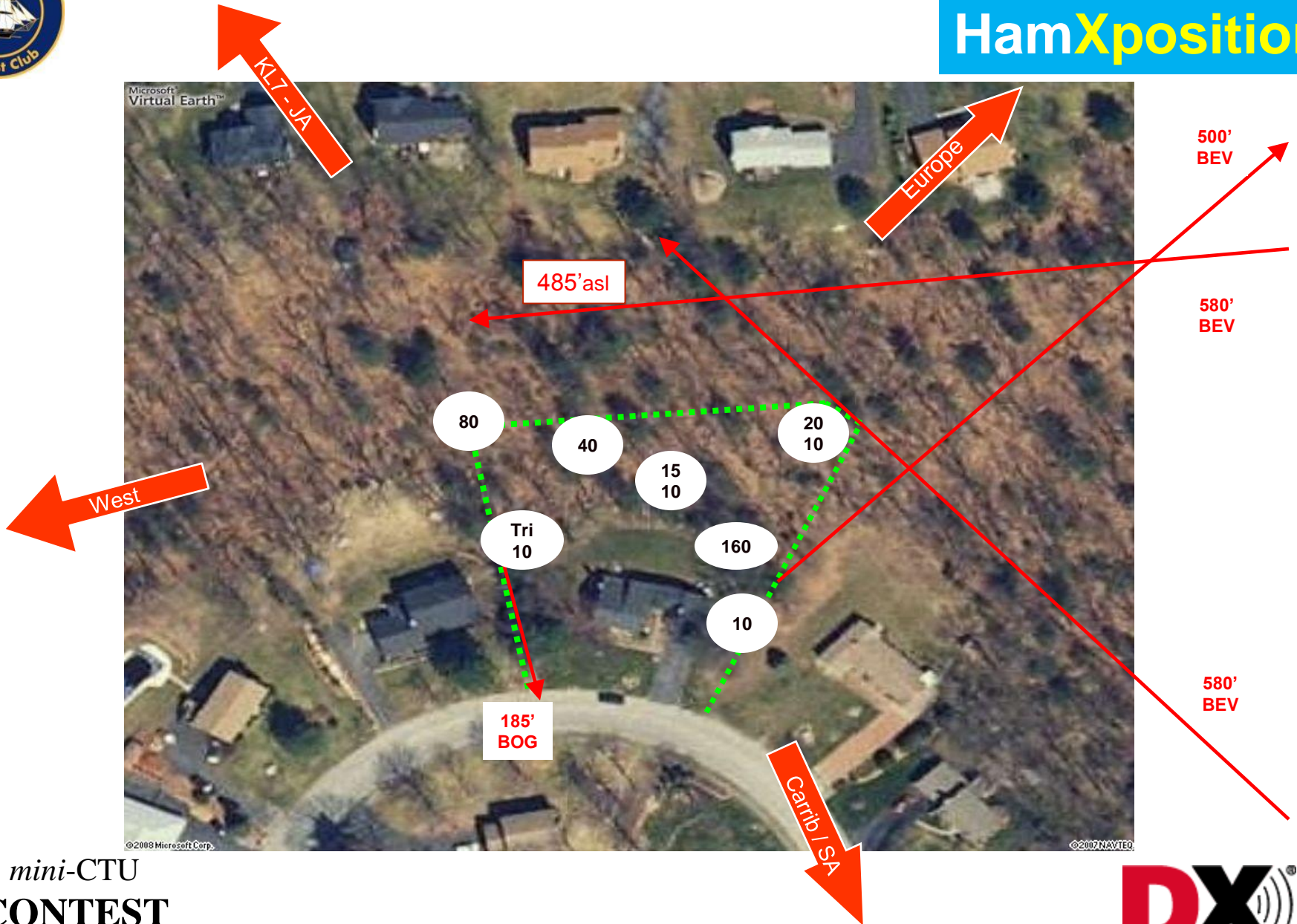
H'mm...
I wonder what else
could I suspend
with pulleys up at
35'

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Northeast HamXposition



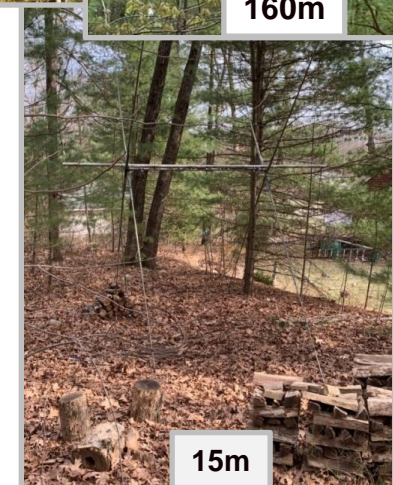
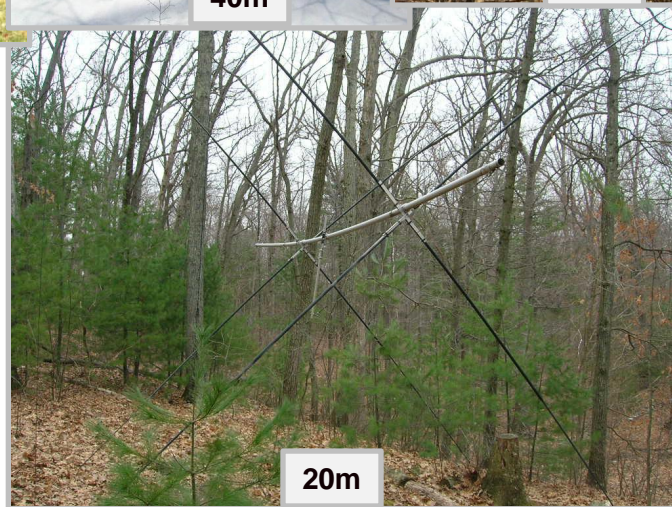
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Family portrait "all band"

Northeast
HamXposition

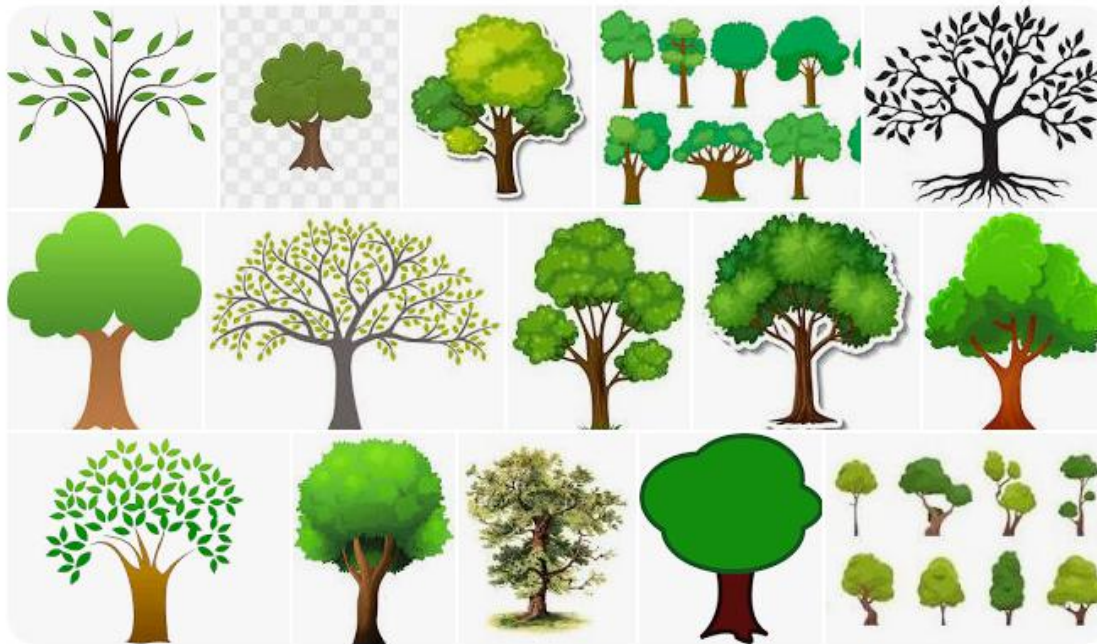


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Antennas & Trees





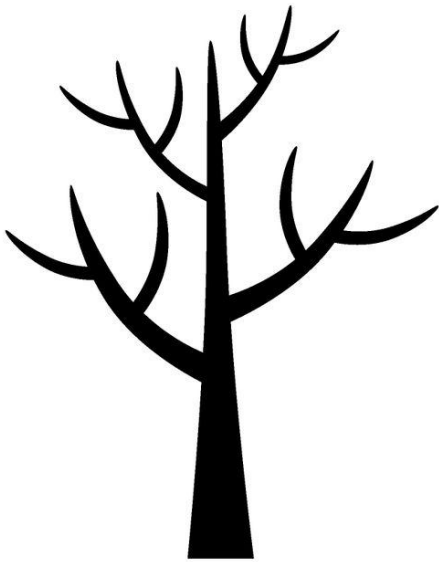
Finding an "ideal" tree

A year-round activity

Northeast
HamXposition

Fall / Winter / Spring:
Easier to see options

Summer:
Easier to assess viability





Methods to attach, raise & lower antennas

Northeast
HamXposition

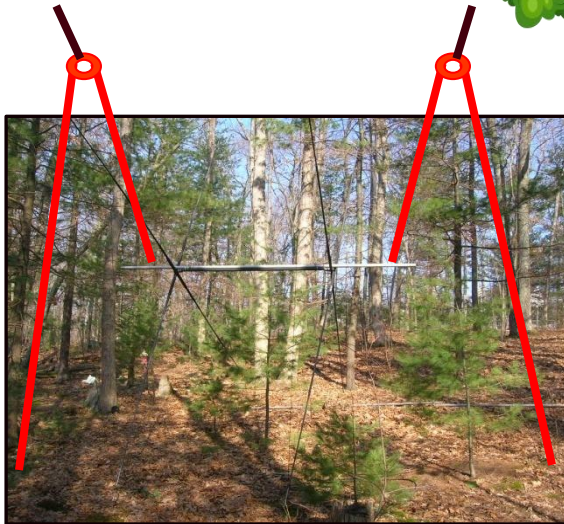
- 1 limb
1 pulley
- Easy
 - Stable
 - Rotation



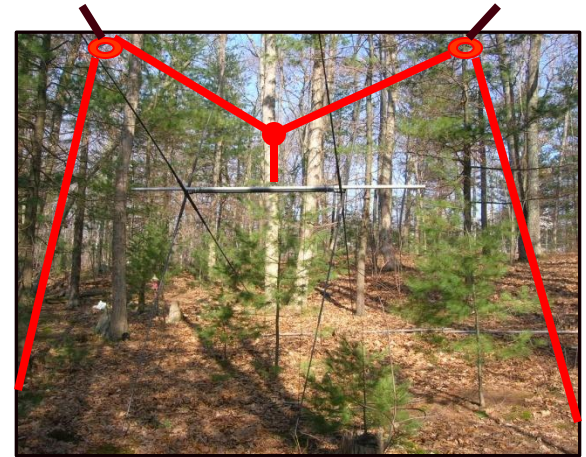
- 1 limb
1 pulley
- Easy
 - ~ More stable
 - Rotation



- 2 trees (limbs)
2 pulleys
- Easy x 2
 - Fixed dir.
 - Very stable
 - Weight capacity
 - ~ Redundancy
 - ~ Rotation ltd.



- 2 trees
2 pulleys
- Easy x 2
 - Rotation
 - **Sag**



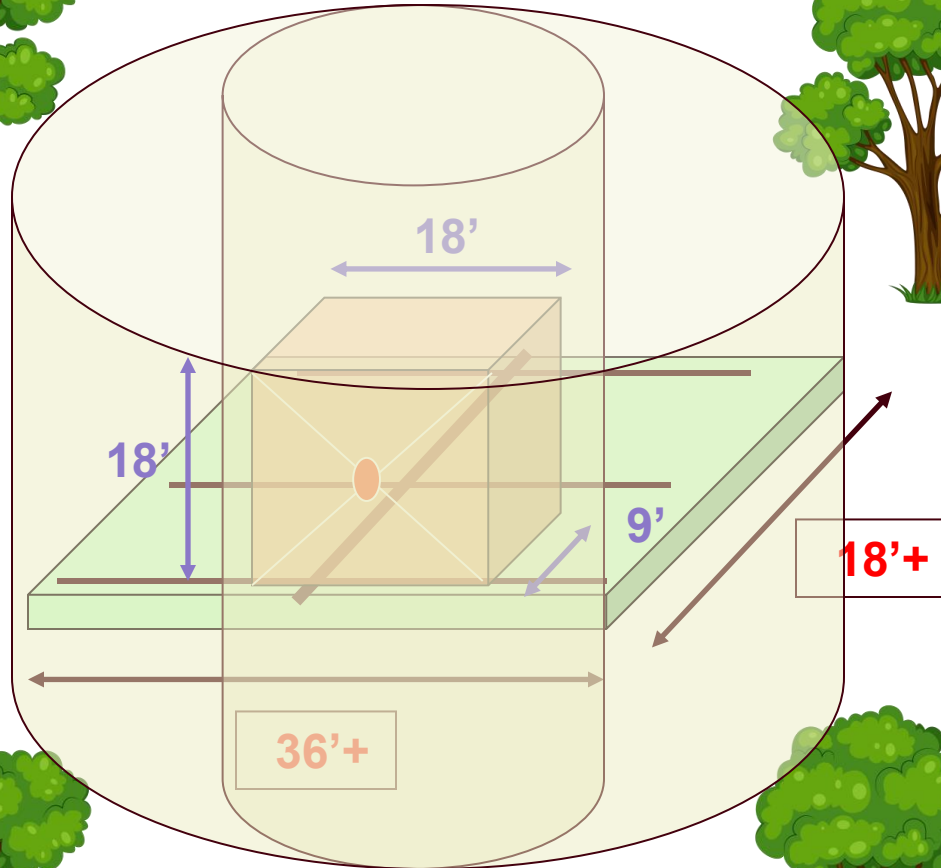
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Spatial / dimensional view
Example: 20m 3el Yagi -vs- 2el Quad

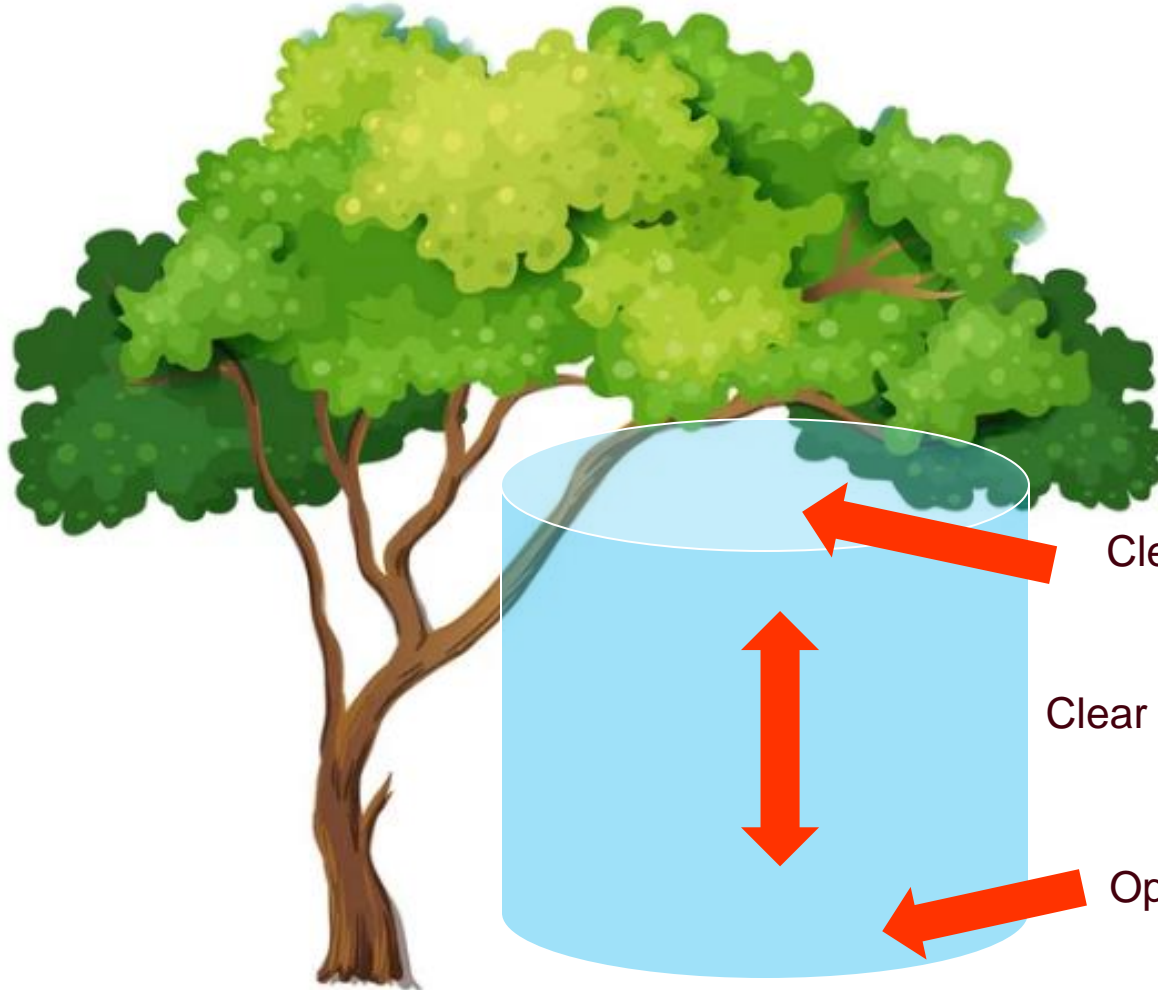


15,200 -vs- 61,000 sq ft
In the "cylinder" or column



An "ideal" spot - Single pulley
For a cylinder or column

Northeast HamXposition



Clear final height
Important !

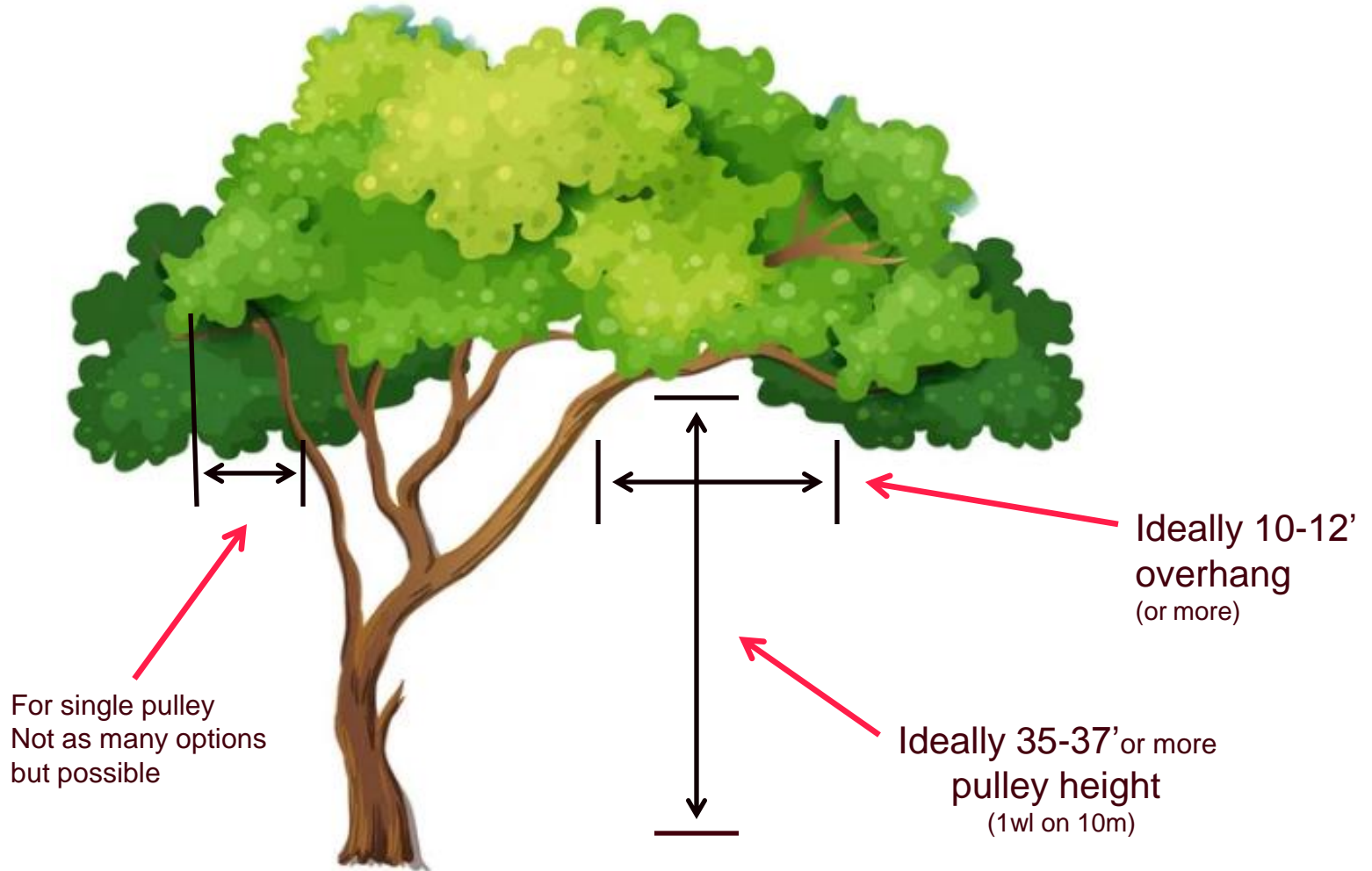
Clear path up & down
Preferred

Open work area
Preferred



An "ideal" spot
Single pulley

Northeast
HamXposition





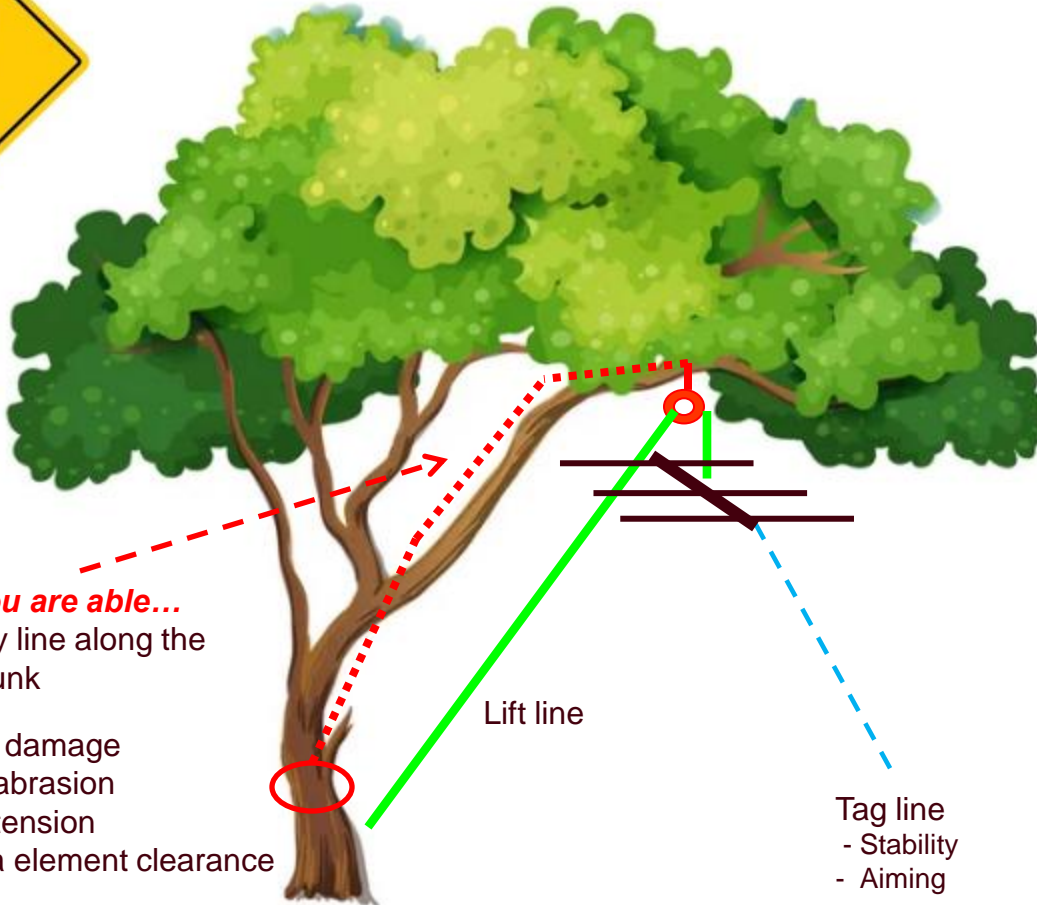
Technique: Single branch / limb
Single pulley

Northeast
HamXposition

As best as you are able...

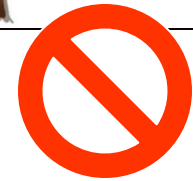
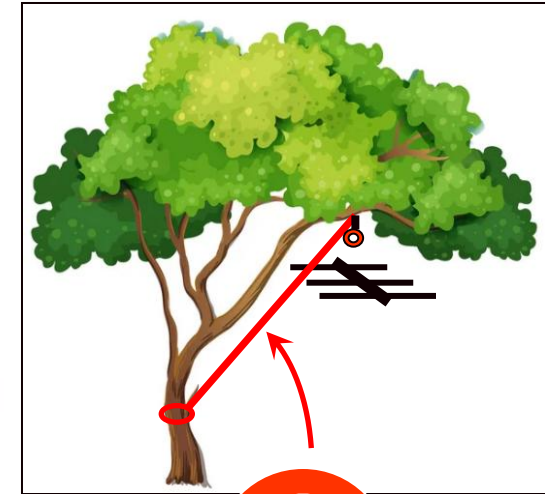
Rout the pulley line along the
limb / spar / trunk

- ✓ Limits bark damage
- ✓ Limits line abrasion
- ✓ Limits line tension
- ✓ Some extra element clearance



Lift line

Tag line
- Stability
- Aiming



NOT a direct tie-off to base

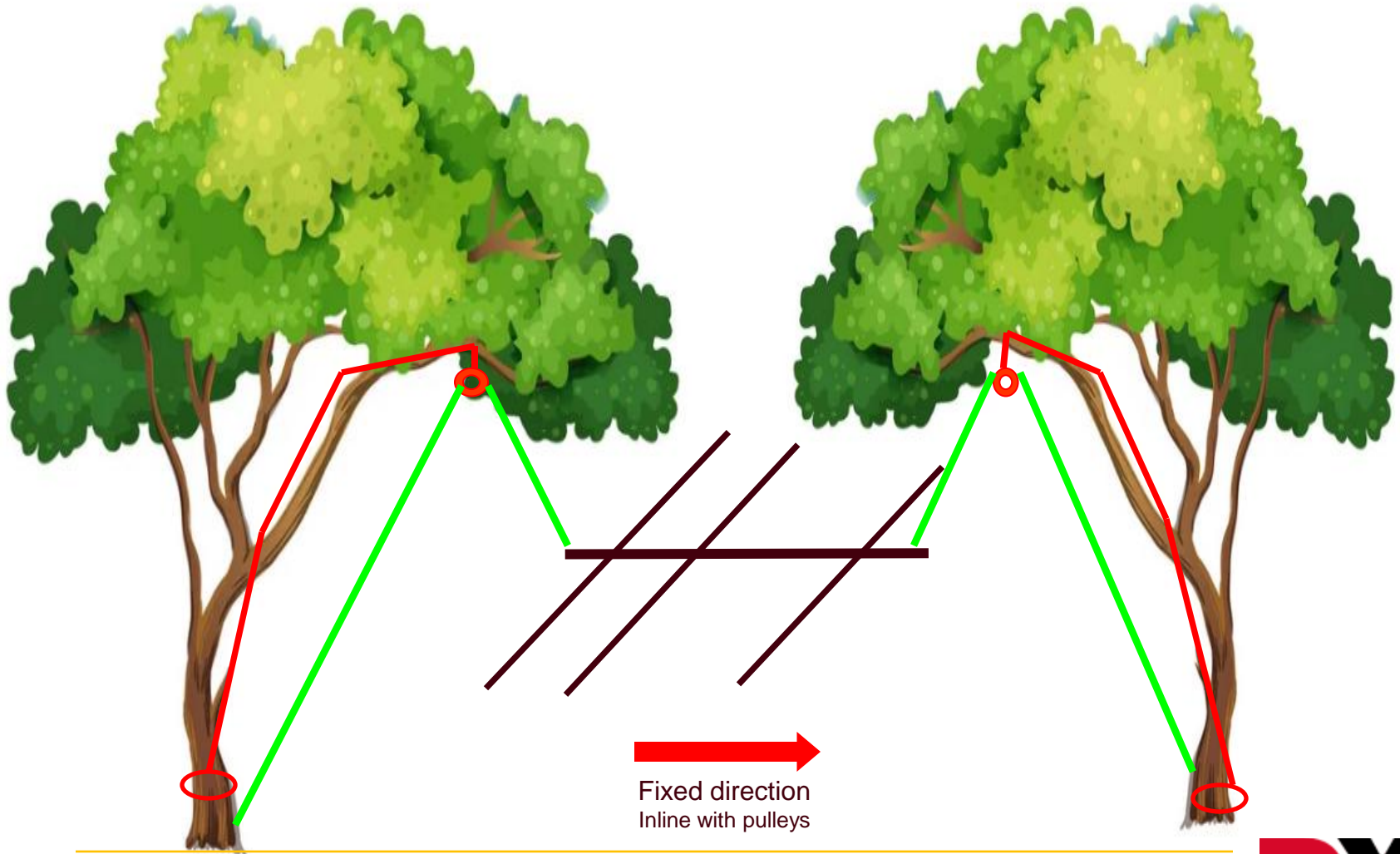
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Technique: 2 trees close spaced
2 pulleys

Northeast
HamXposition



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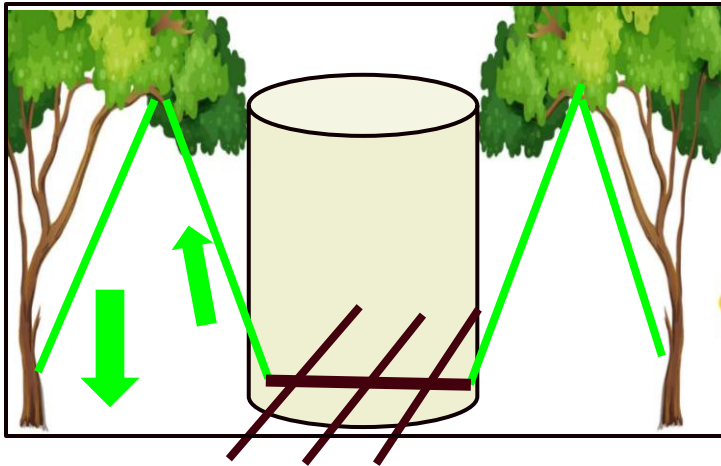




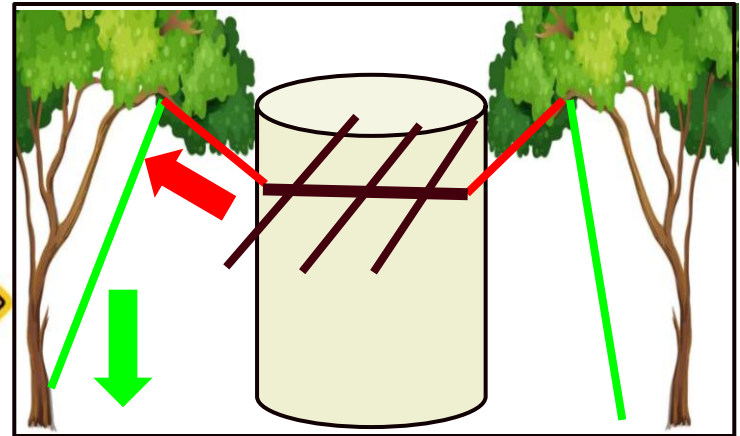
Lesson learned - Wide spaced trees

Sky is not the limit...

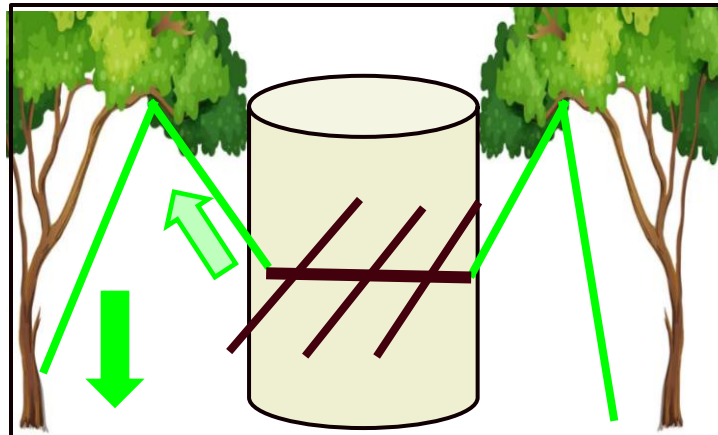
Northeast
HamXposition



1 – All lifting force from pulling down on the lift line lifts antenna vertically



3 – Most lifting force does not lift antenna vertically. Becoming all horizontal & lots of tension. (This is Bad)

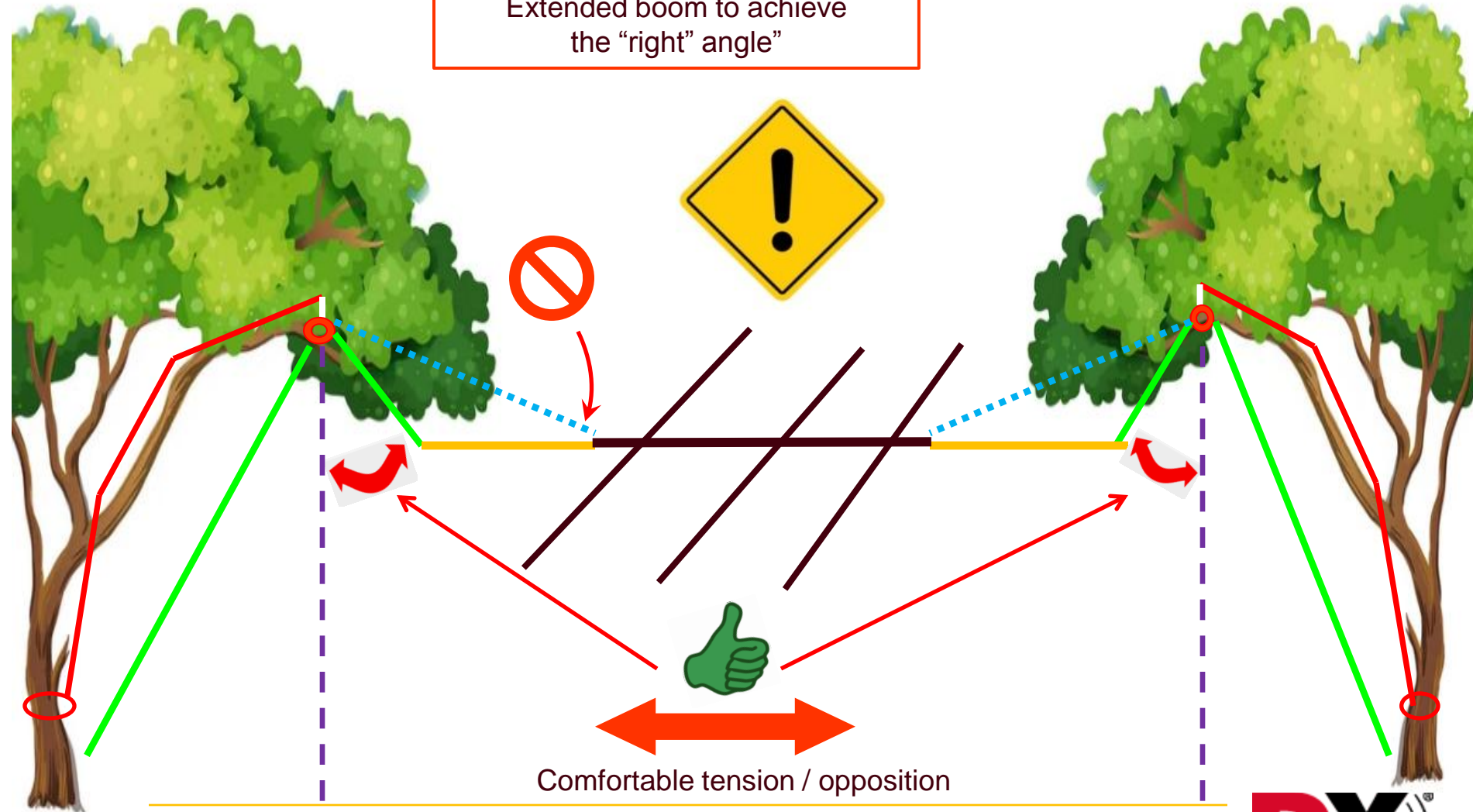


2 – Lifting force lifts antenna mostly vertically but some diagonal



Technique: 2 pulleys
2 trees wide spaced

Extended boom to achieve
the "right" angle



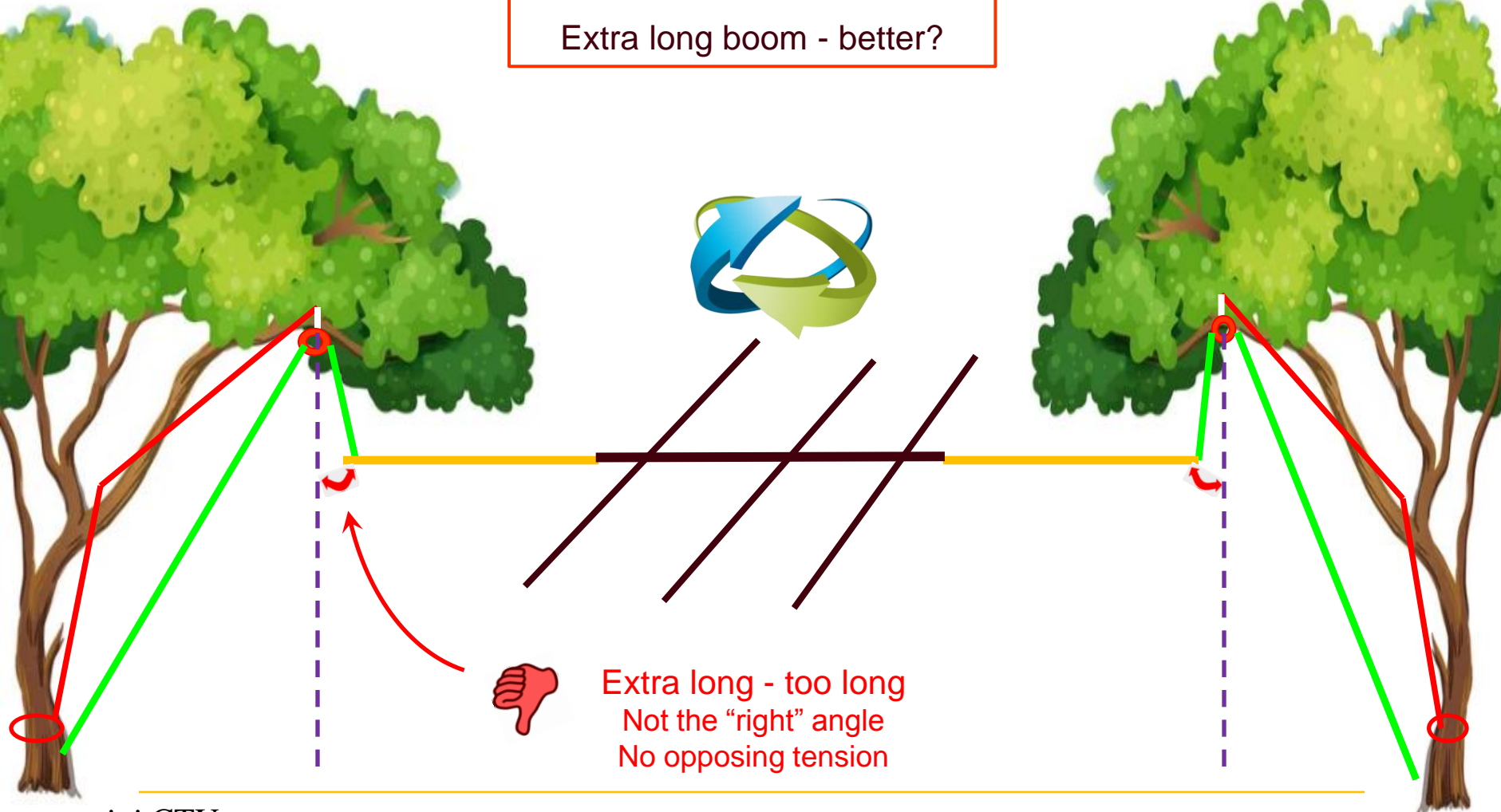


Northeast

HamXposition

Technique: 2 ropes / 2 pulleys
2 trees **wide spaced**

Extra long boom - better?



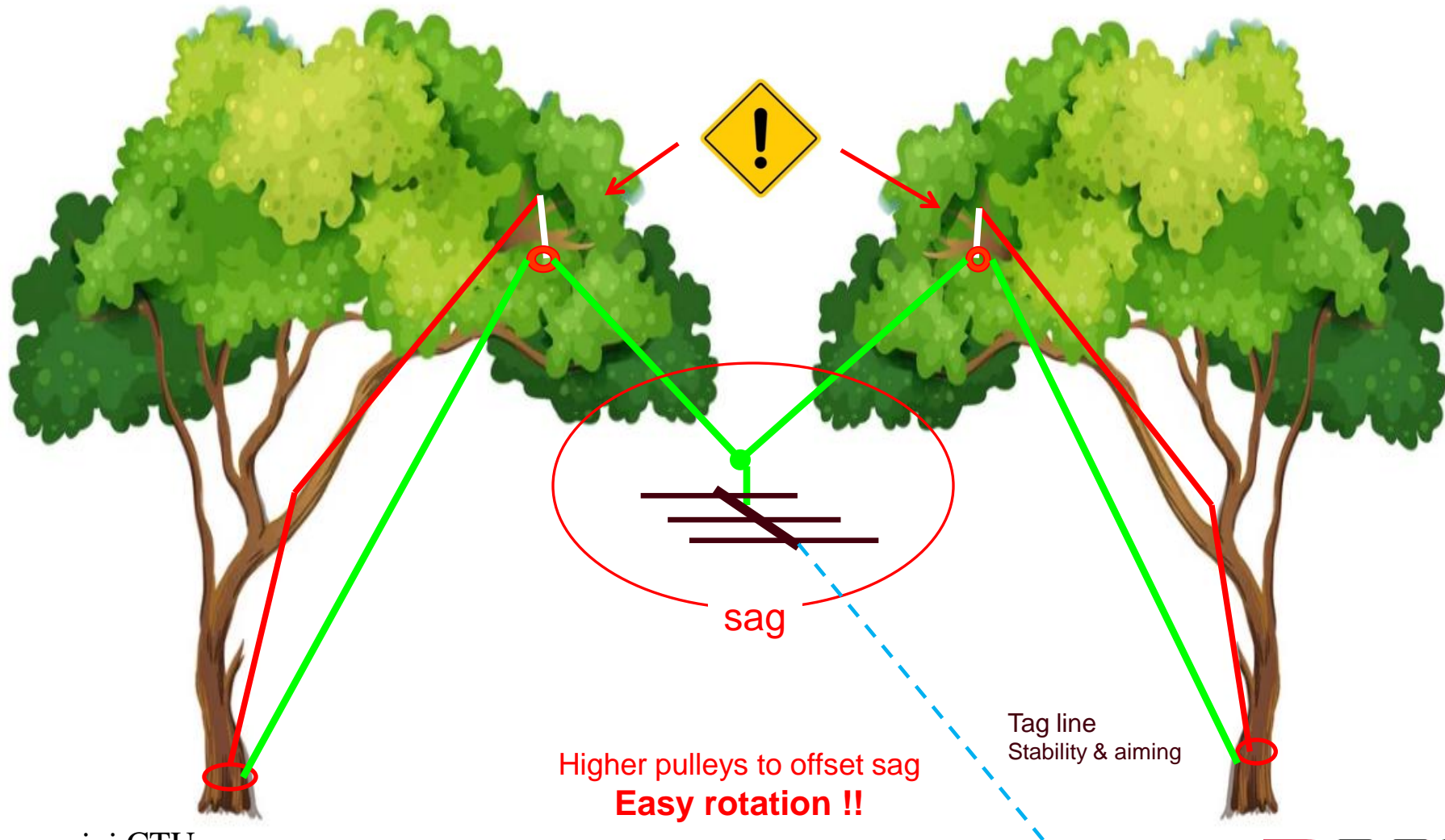
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Technique: Two trees **close spaced**
Two pulleys - Single point attach

Northeast
HamXposition



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Get 'em up high... but maybe not **too** high
48-hour contest -vs- DXing year round

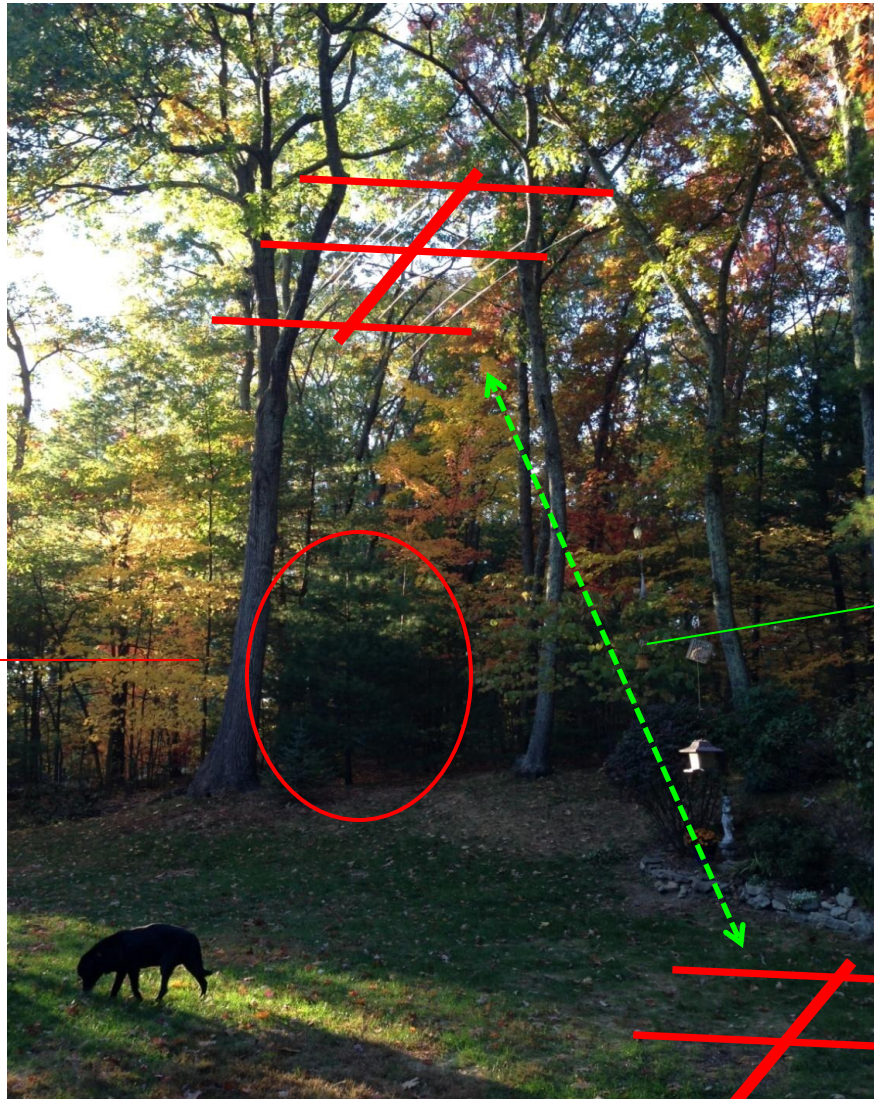




Coming at it from a different angle...

Northeast
HamXposition

The pine shrub
grew just a little
over 20-years



If I still needed to use this
location, I would tram the
antenna up from under the
bird feeder.

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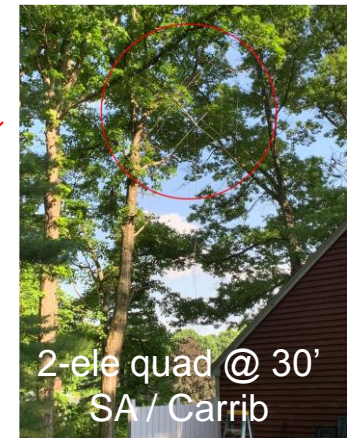


N1PGA Antennas



10m Contest antennas

Northeast HamXposition



Tribander
standby

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15m location
EU 15m quad –or- JA 10m quad

Northeast
HamXposition



~50'+

~20'

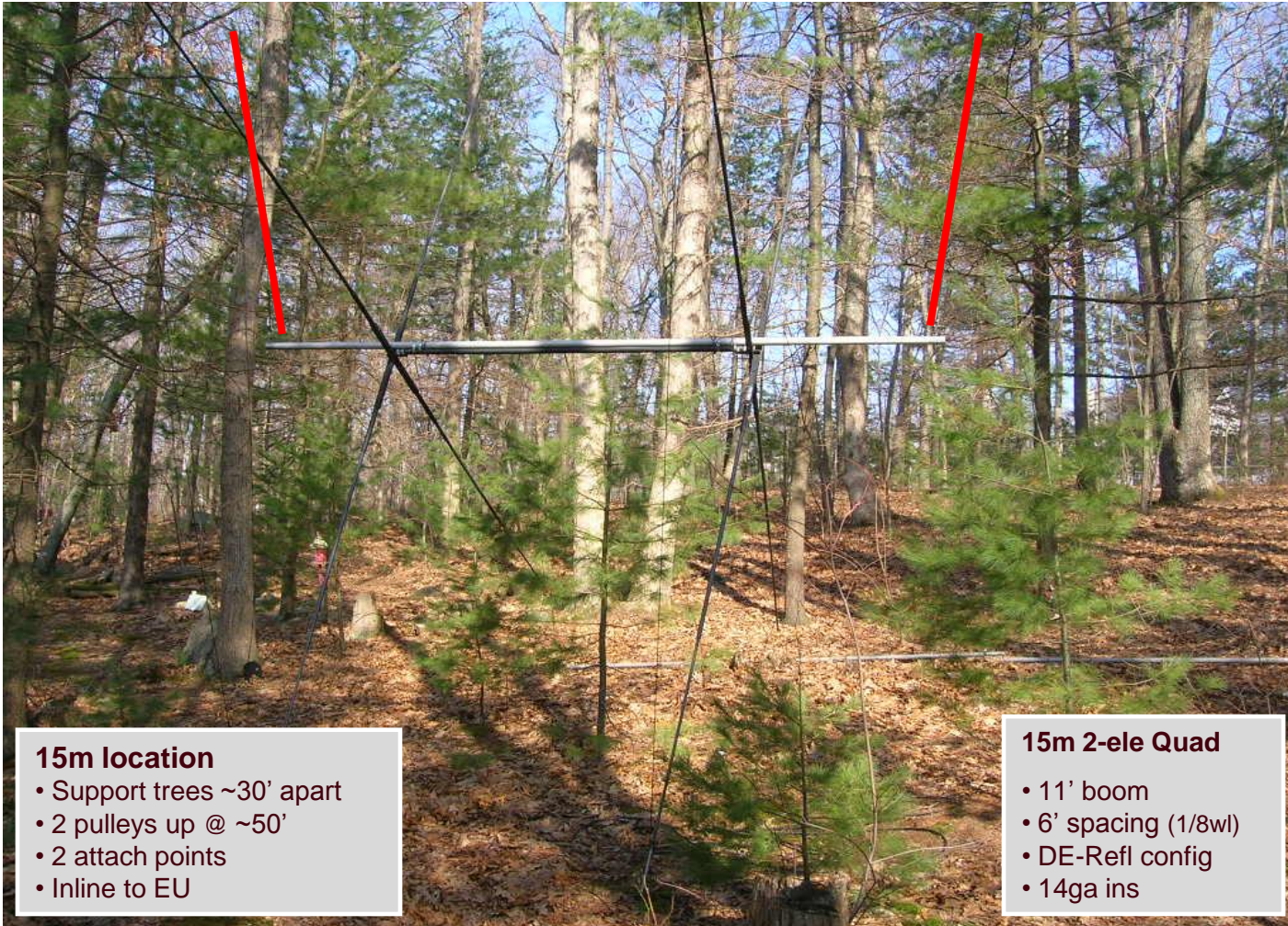
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15m location

Northeast
HamXposition



15m location

- Support trees ~30' apart
- 2 pulleys up @ ~50'
- 2 attach points
- Inline to EU

15m 2-ele Quad

- 11' boom
- 6' spacing (1/8wl)
- DE-Refl config
- 14ga ins

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15m 2-ele Quad @ 45'
Then & Now

Northeast
HamXposition



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Tribander

Force12 C3s

- 12' boom
- 2-ele on 10-15-20
- @ ~35-40'
- Fixed to SA / Carrib.
- Single pt suspension
- Rope & pulley (2:1)
- 10-12' away from trunk
- Partial rotation / aim
 - Easy ~120° +/-
 - Work ~360° +/-

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10m 2-ele Quad (#1)

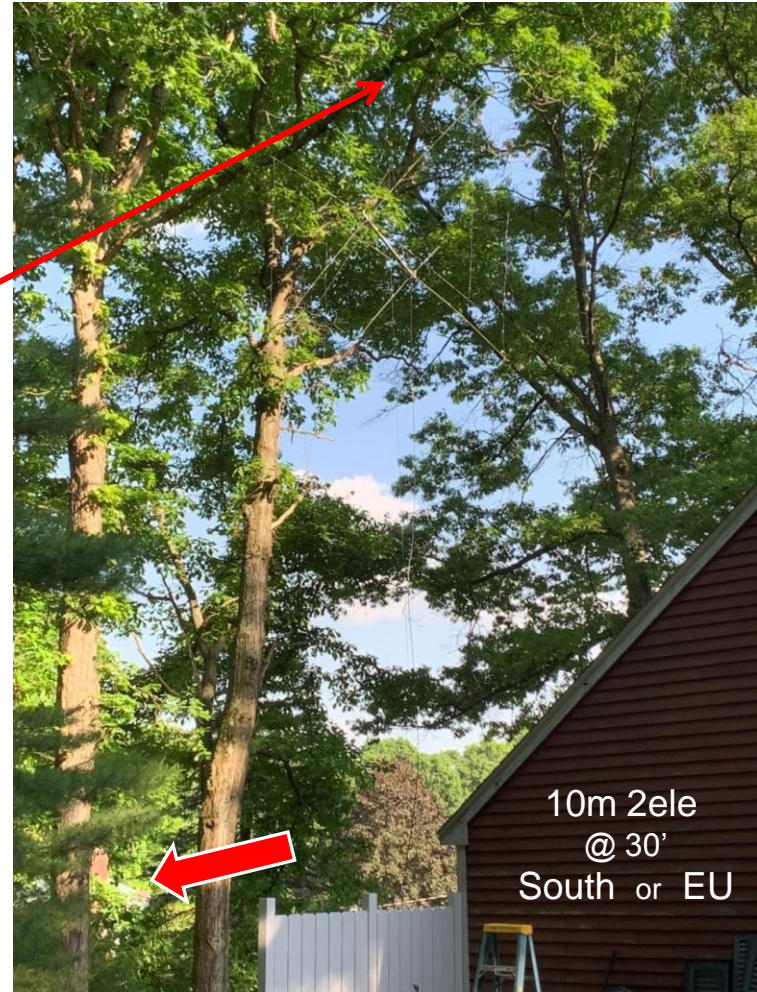
- Typical @ 30' height SA / Carrib
- DE / Refl 14ga bare CU
- Small turning radius
- 7-1/2 lbs = easy 1 person handling
- Easy assembly in 10-15 minutes
- Easy secure off season storage
- Performance comp: 4-ele yagi 15' boom
- Orange FG driveway stakes
- Single tag line (SA/Carrib primary)



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Northeast
HamXposition

37' limb



10m 2ele
@ 30'
South or EU

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10m 2-ele Quad (#2)

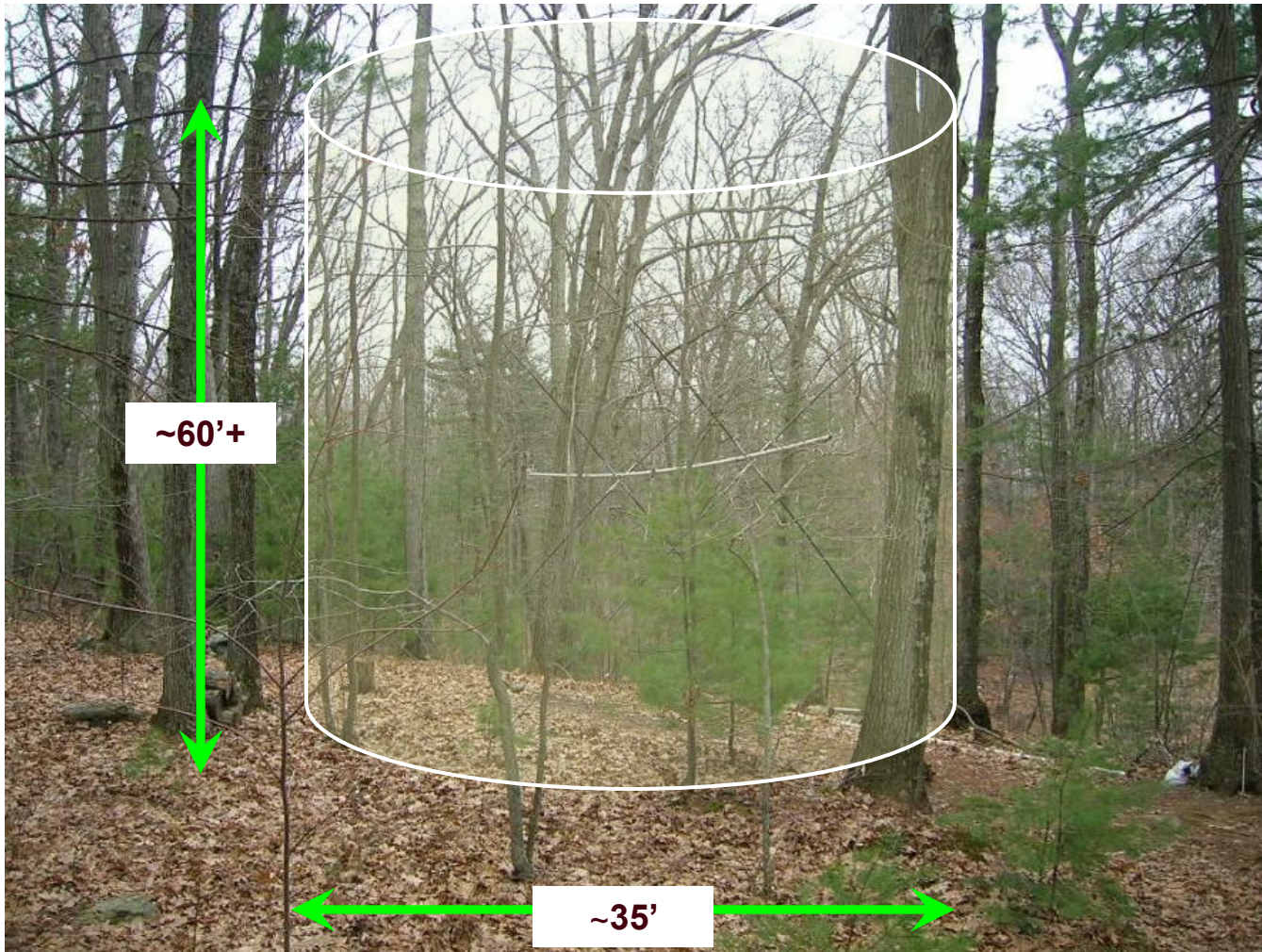
- Typical @ 45-50' height JA / KL7
- DE / Refl 14ga bare CU
- Tractor Supply FG electric fence poles
- Small turning radius
- 7-1/2 lbs = easy 1 person handling
- Easy assembly in 10-15 minutes
- Easy secure off season storage
- Performance comp: 4-ele yagi 15' boom





20m location

Northeast
HamXposition



mini-CTU
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20m location

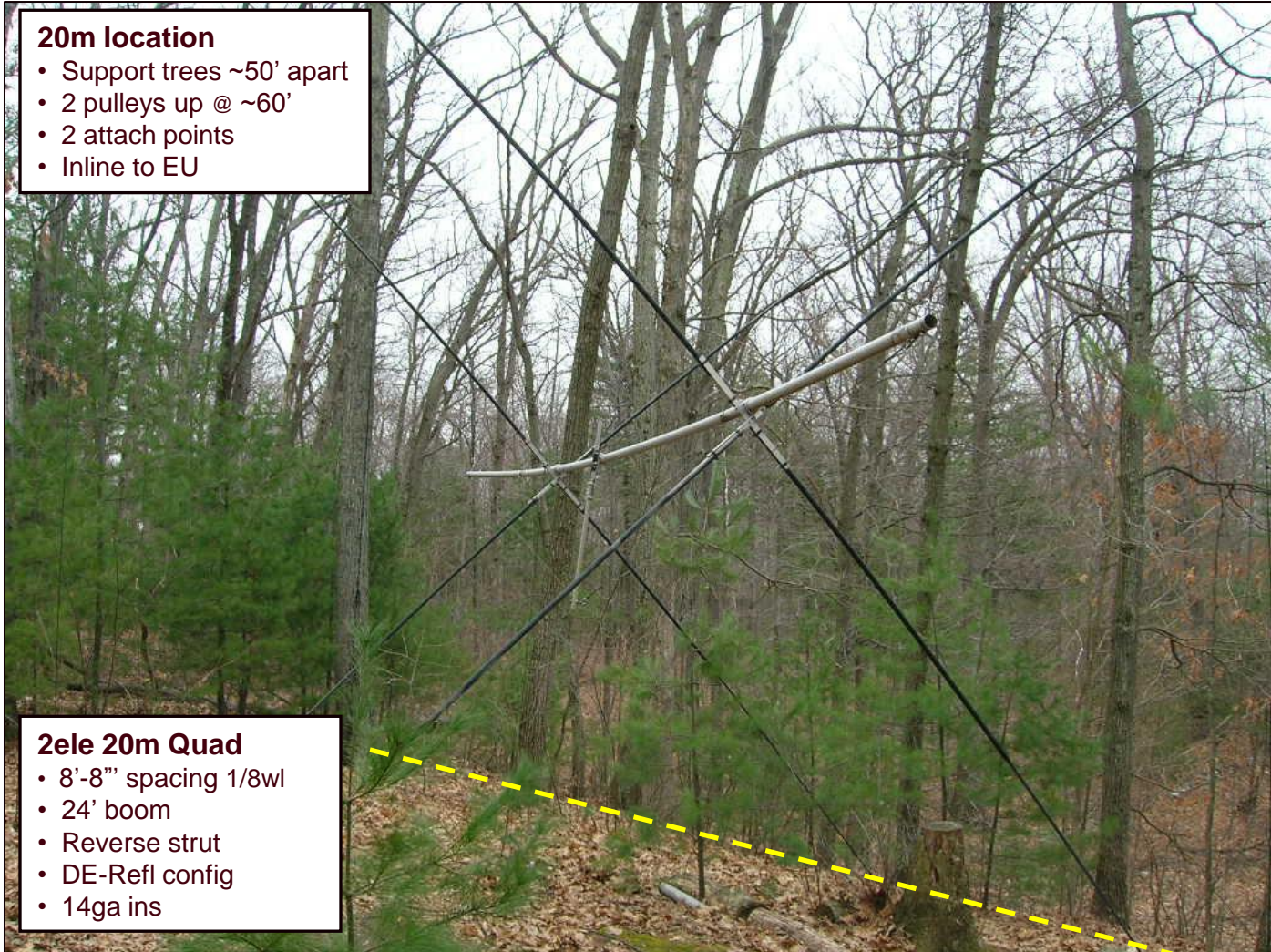
Northeast HamXposition

20m location

- Support trees ~50' apart
- 2 pulleys up @ ~60'
- 2 attach points
- Inline to EU

2ele 20m Quad

- 8'-8" spacing 1/8wl
- 24' boom
- Reverse strut
- DE-Refl config
- 14ga ins



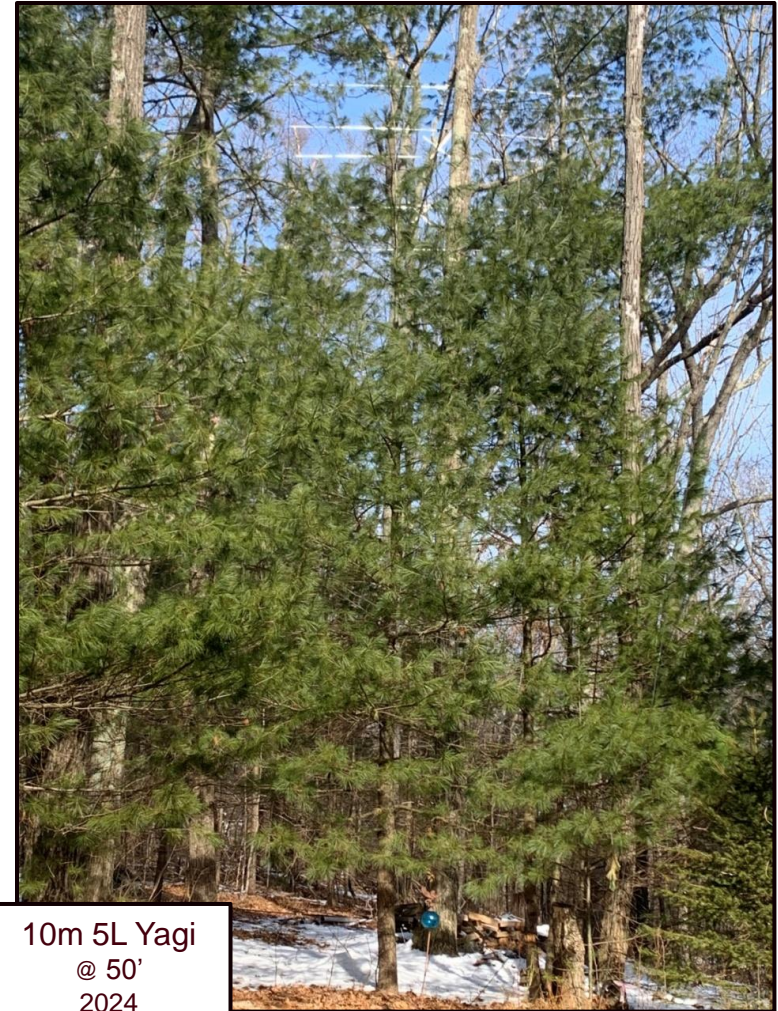


20m location
Then & Now

Northeast
HamXposition



20m Quad
@ 50'
circa 2000



10m 5L Yagi
@ 50'
2024

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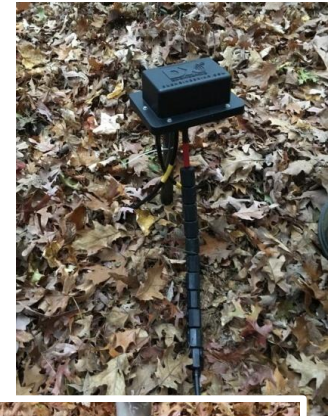
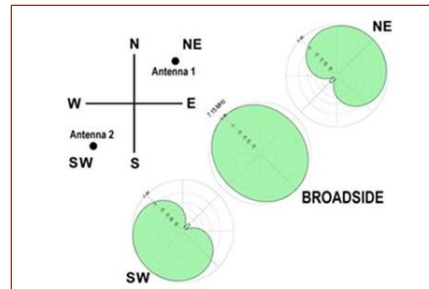


40m 2 element vertical array

Northeast
HamXposition



- ☐ 33' verticals (NE – SW)
- ☐ 33' spacing
- ☐ Skinny (1-1/4" bottom sections)
- ☐ Un-guyed
- ☐ DXE controller
- ☐ 90 radials 1/4wl ea



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Northeast HamXposition



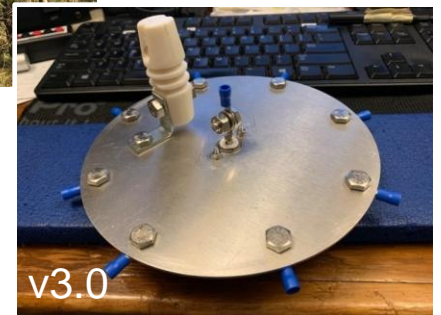
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80m 1/4wl wire vertical ~66'

- ✓ Elevated feedpoint @ ~8'
- ✓ Elevated radials 8 @ ~8'
- ✓ 25:50 ohm UNUN transformer
- ✓ CM choke



Next gen
elevated feed



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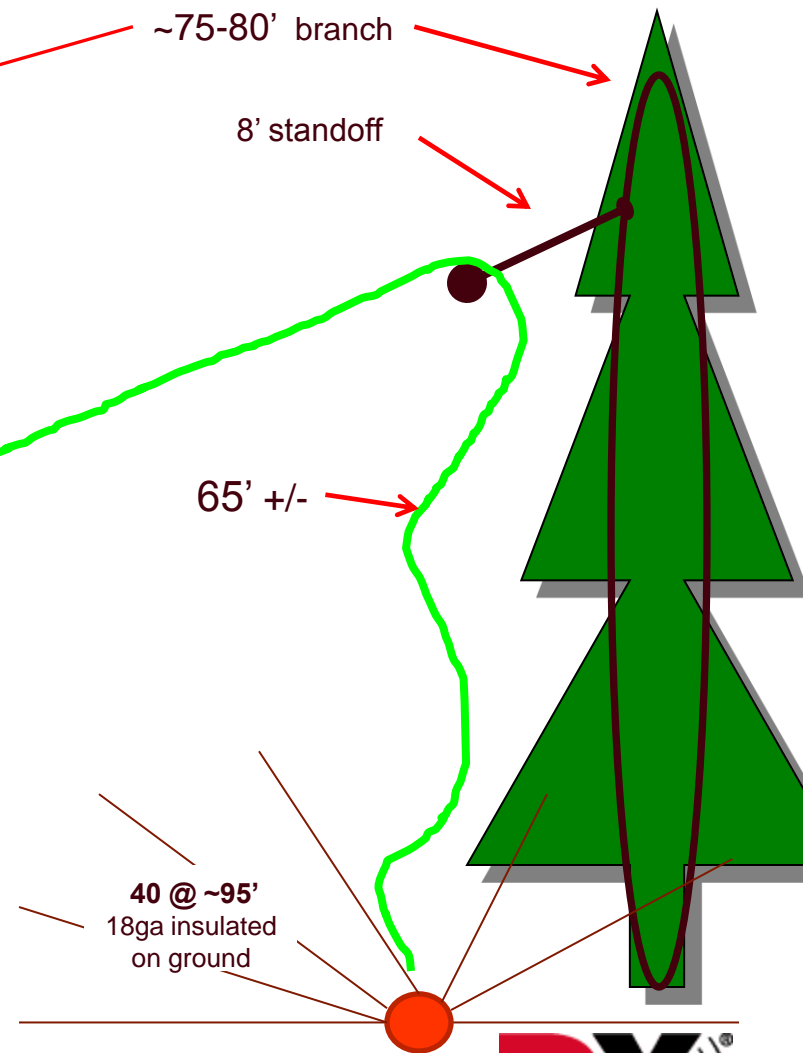


Northeast HamXposition



160m Inv-L

End insulator
@30' +/-



~75-80' branch

8' standoff

65' +/-

40 @ ~95'
18ga insulated
on ground

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Lets put some numbers to this...



All in on 10m
for Cycle-25
peak

N1PGA Contest Results (US)



ARRL DX - SSB			
2025	#3	SOSB 10	HP
2024	#2	SOSB 10	HP
2023	#4	SOSB 10	HP
2022	#7	SOAB	HP
2020	#8	SOAB	HP
2019	#12	SOAB	HP
2018	#8	SOAB	HP

2016	#3	SOAB	LP
2015	#5	SOAB	LP
2013	#2	SOAB	LP
2011	#2	SOAB	LP
2009	#2	SOAB	LP

ARRL DX - CW			
2022	#2	SOSB 160	HP
2021	#4	SOSB 160	HP

ARRL 10m			
2024	#8	SO SSB	HP
2023	#4	SO SSB	HP
2023	#5	SO SSB	HP

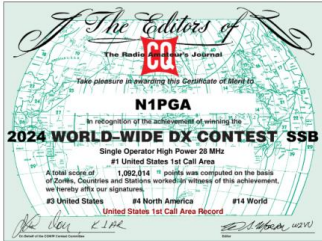
ARRL 160m			
2023	#3 YCCC	SOSB 160	HP

CQWW - SSB			
2024	#3 **	SOSB 10	HP
2023	#7	SOSB 10	HP
2022	#4	SOSB 10	HP
2021	#12	SOAB	HP
2020	#17	SOAB	HP
2019	#10	SOAB	HP
2018	#13	SOAB	HP

2017	#1	SOAB	LP
2016	#2	SOAB	LP
2012	#8	SOAB	LP
2010	#7	SOAB	LP
2005-09	#3 4 6 8	SOAB	LP

CQWW -CW			
2021	#3 **	SOSB-A 160	HP

* 1st Call Area
Record





Lets put some other numbers to this...

RBN - Spots Analysis Tool

ARRL DX CW
February 2020

N1PGA & K5ZD and W3LPL



Northeast HamXposition

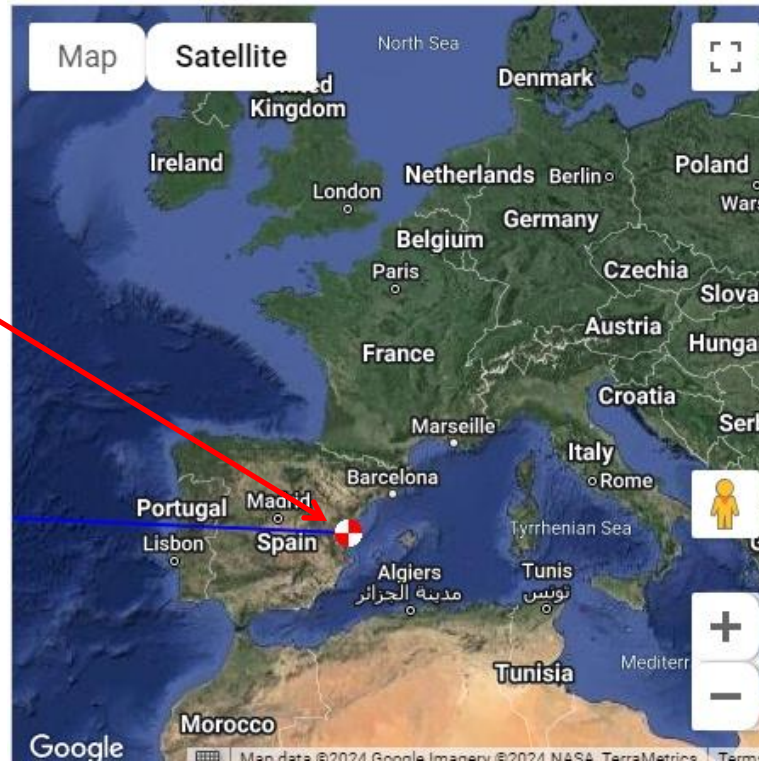
N1PGA, K5ZD, W3LPL

2020 ARRL CW

24-hours 2-15-2020

RBN - Spots Analysis Tool

EA5WU data



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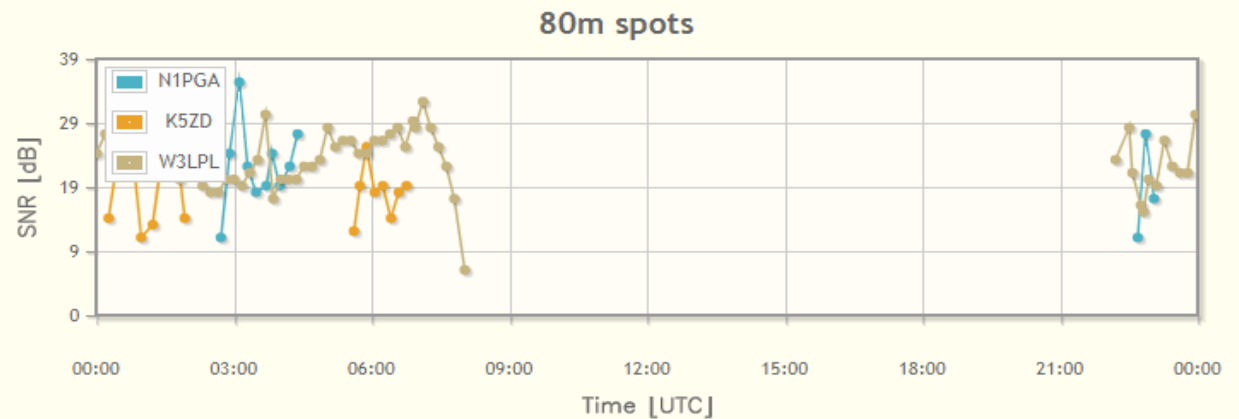
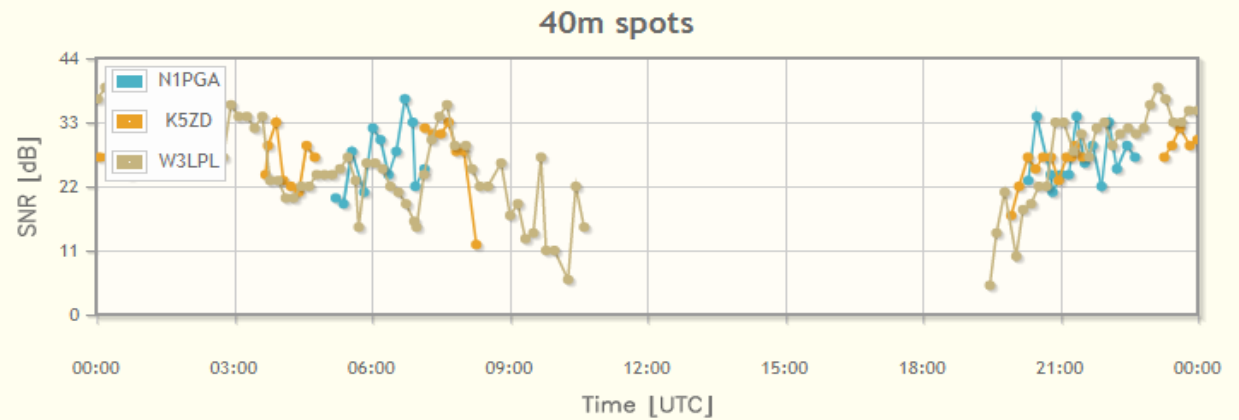
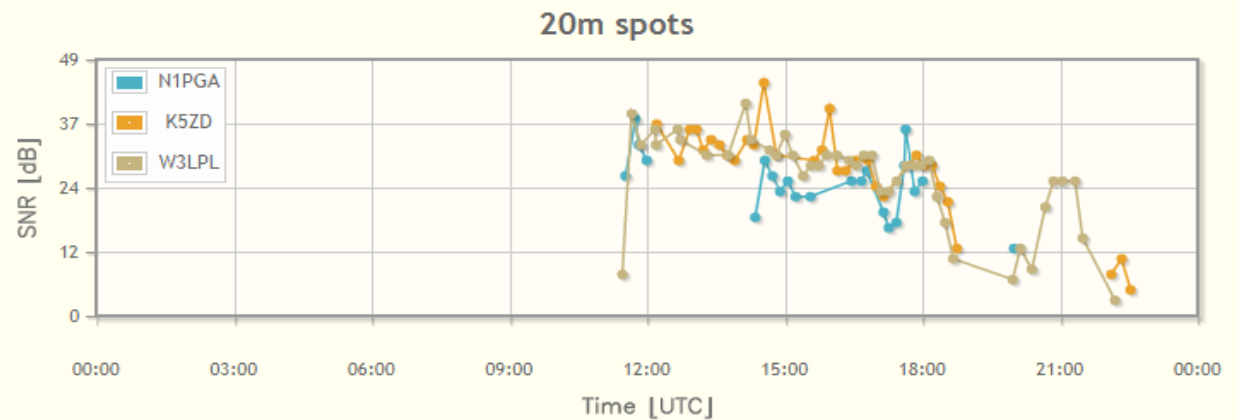
N1PGA, K5ZD, W3LPL

2020 ARRL CW

24-hours 2-15-2020

RBN - Spots Analysis Tool

EA5WU data



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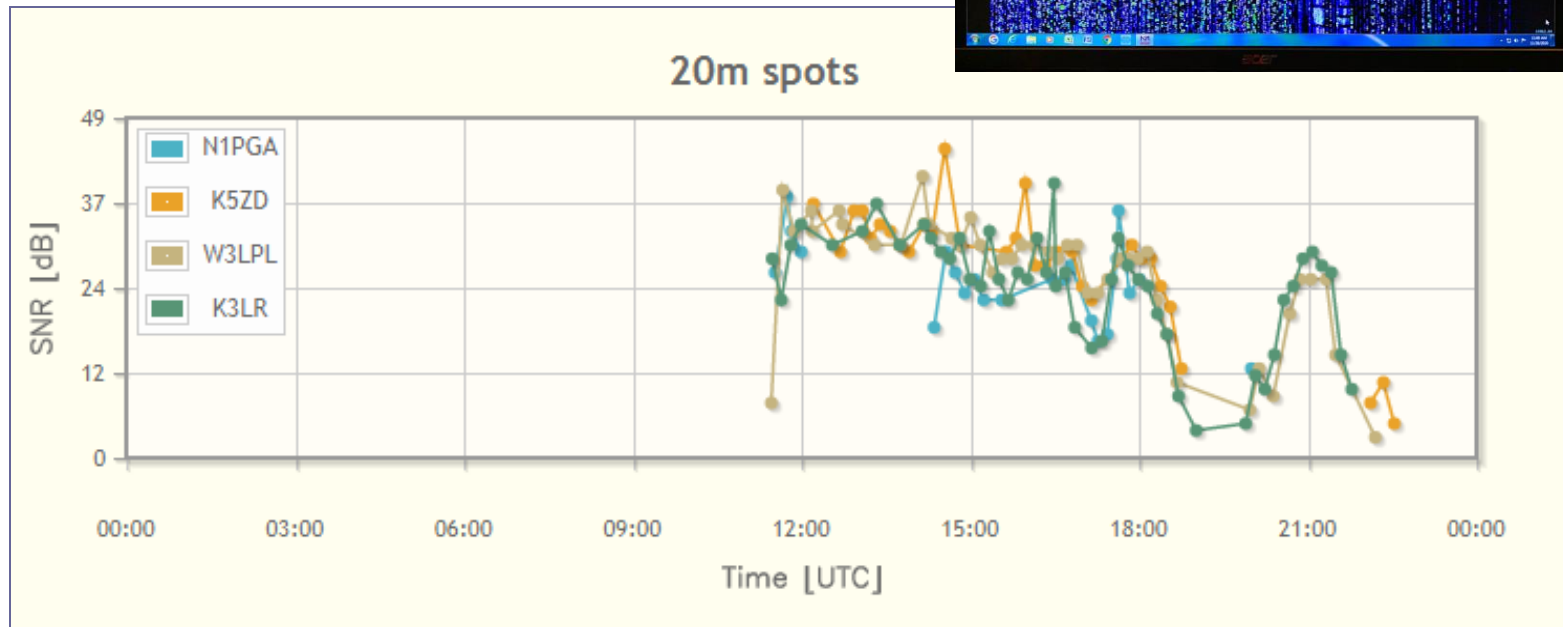
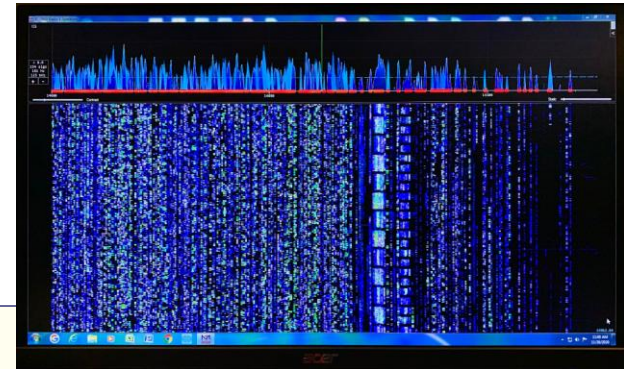
N1PGA, K5ZD, W3LPL & K3LR

2020 ARRL CW

24-hours 2-15-2020

RBN - Spots Analysis Tool

EA5WU data





A little closer look at some specifics & how to's...



Short "mast" 2' above boom

Self centering & balanced
gravity, physics, lever arm

Northeast
HamXposition



Above the boom

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Short "mast" 2' above boom

Self centering & balanced
gravity, physics, lever arm ?

Northeast
HamXposition



Above the boom

Top of "mast" is
centered directly
over the boom.

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Lifting line attachment "above the boom" Dampened movement



F12 C3s tribander
12' boom
6 elements
32' max ele length
30-lbs +/-

Video:
Boom bounce
[Front to Back](#)

Video:
Wing waggle
[Left to Right](#)



Big & Heavy ? Mechanical advantage !

Northeast
HamXposition



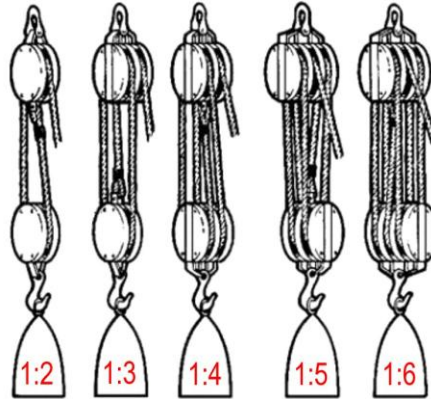
\$20 quality of life
improvement

Extra 35' rope
\$ 5.00

Extra pulley
\$ 5.00

Extra carabiners
\$ 8.00

EQ plate
\$ 5.00



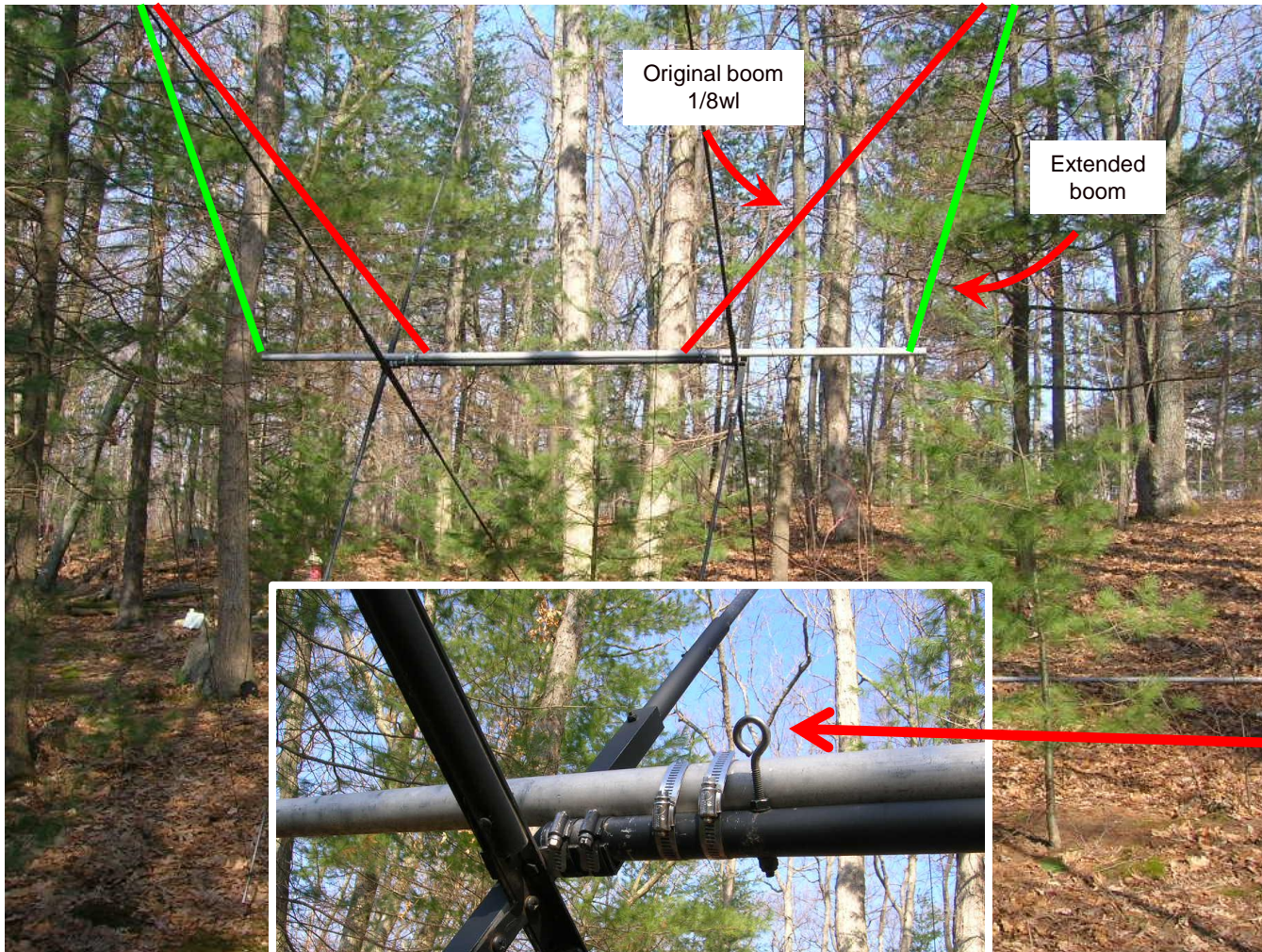
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15m quad – learning something – extended boom

Northeast
HamXposition



Original boom
1/8wl

Extended
boom



Above the boom
Original boom

(Yes – low tech
sistered boom)



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Self centering & balanced:
gravity, physics, lever arm

Northeast
HamXposition



Above the boom

Extended boom

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15m quad adjustments – feet on the ground

Northeast
HamXposition



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Above the boom



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Northeast HamXposition

Rope & pulley advantage

- ✓ Rapid raise & lowering
- ✓ Ease of maintenance
- ✓ Feet on the ground
- ✓ Windload shared by entire antenna
- ✓ Antenna floats in even windiest WX

2 pt suspension

- ✓ Ease of maintenance
- ✓ Very stable
- ✓ 4 pt is even more so

Single pt suspension

- ✓ Ease of installation – 1 pulley
- ✓ Potential for rotation
- ✓ Needs a tag line to steer/aim

If you still can't reach...

- Remove a 6' boom section
1 bolt – easy – done !
(NoALOX)





10m Contest yagi (in the 20m Quad location)

20 minute+/- change over: From 4 to 5 ele, all 10 ele tips changed, new spacing

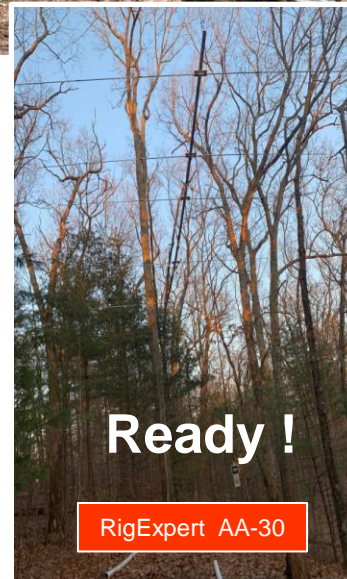
Northeast

HamXposition

Easy work at shoulder height



Measure twice..!



RigExpert AA-30

Got em right!



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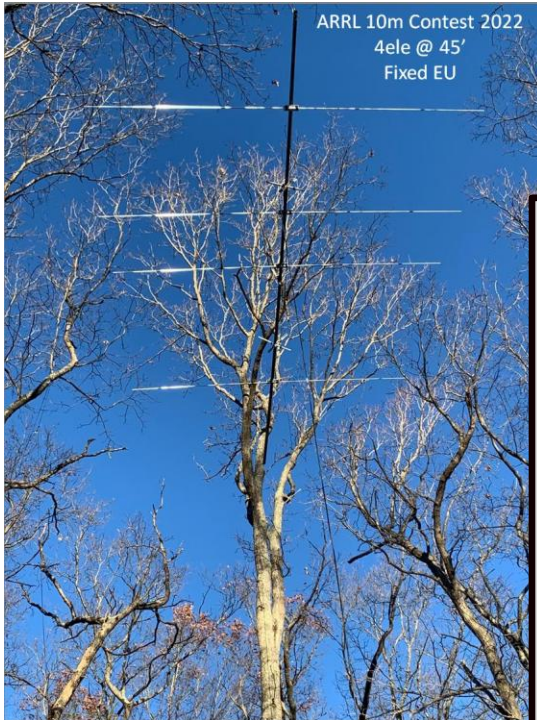


10m Contest yagis (in 20m Quad location)

~ 20 minute change over: from 4 to 5 ele, 10 ele tips changed, new spacing

Northeast
HamXposition

So how'd they play?



2022 4-ele

#4 US SB10 HP

701 qso run EU
5:20 duration

28.353Mhz
About 7am local

131/hr average
Best hour 170q

4L yagi EU
4L yagi West
2L quad SA/Carrib
2L quad JA



2023 5-ele

#2 US SB10 HP
#2 World SB10 HP

972 qso run EU
7:30 duration

28.459.5Mhz
About 7am local

129.6/hr average
Best hour 174q

5L yagi EU
4L yagi West
2L quad SA/Carrib
2L quad JA

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They played pretty well I'd say..!





If you only had one antenna...

Northeast
HamXposition

....So wait, you're saying I could do alright in DX contests, with a single antenna? A gain antenna like a beam fixed in between 2 trees pointing in just 1 direction....?



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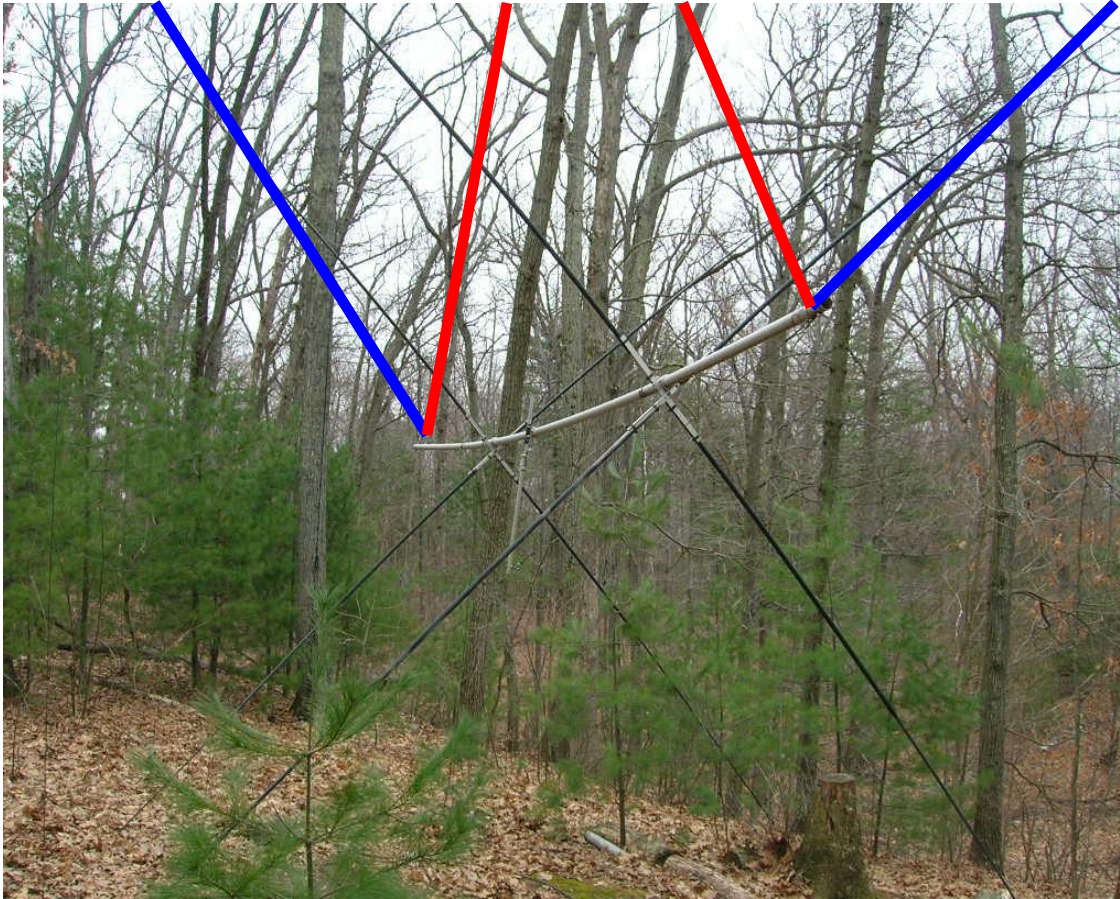
Other things you can do...
Fixed antennas



Steerable pattern Opposing pairs



Northeast
HamXposition



Dual support lines:

- Ability to “steer” the pattern
- Cradling / stability
- Weight capacity
- Security

Compensate for non-prime
positioned trees

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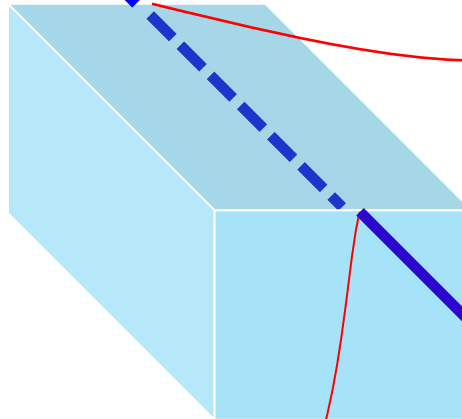
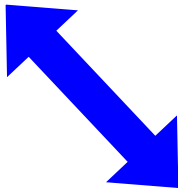


Northeast HamXposition

Blue lines - taut

Red lines - slack

Europe



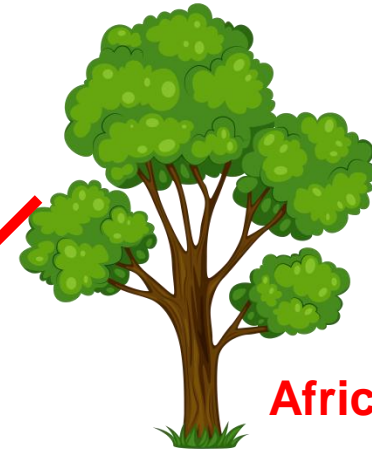
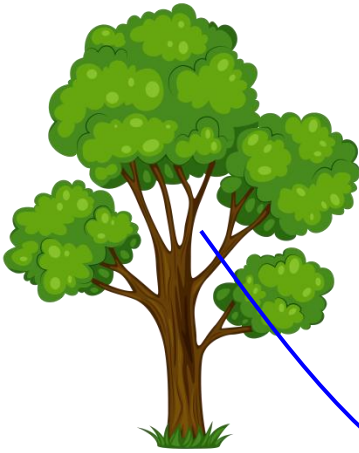
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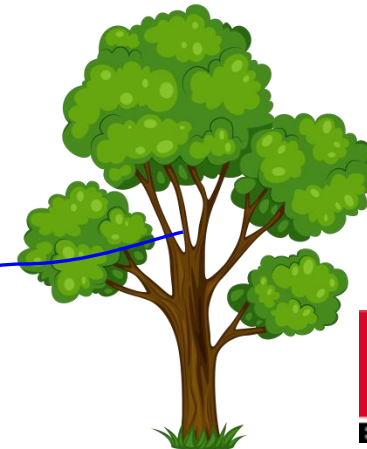
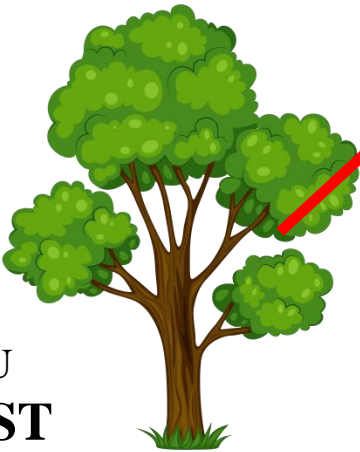
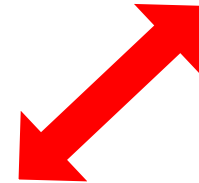


Northeast HamXposition

Red lines - taut
Blue lines - slack



Africa



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Single antenna - 3 directions ?

Northeast
HamXposition



SA 12:00 noon – 4:00pm
Mults

EU opening 6:00am – 12:00noon
QSOs & Mults

West 4:00pm – 8:00pm close
Mults

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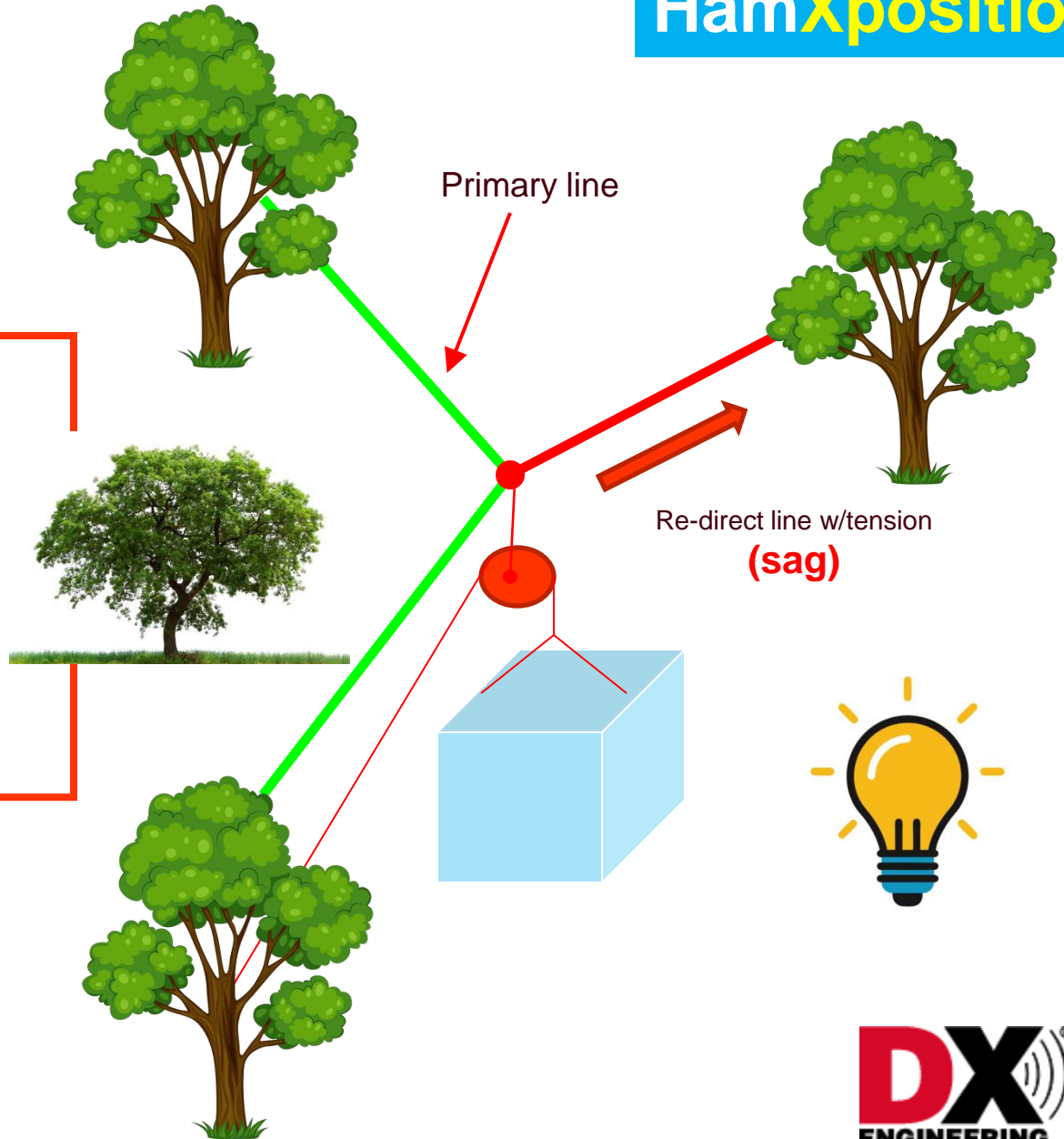




Mid-line redirect

Put the antenna where you need it to be...

- To avoid obstacles
 - tree / shed / patio / garage
- Raise / lower / work in the clear
- 3x support lines –
 - stable
 - sag
- Similar technique to avoiding a branch while raising a dipole





FAQs

Do you notice any signal attenuation from being so close to trees & leaves?

- Nothing noticed. Seem to be antennas in free space.

Any seasonal differences?

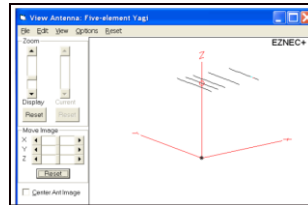
- No, none noticed.

Closest element to canopy?

- Probably 4-5' (tri-bander)

How do you put the pulley lines in place?

- This device:

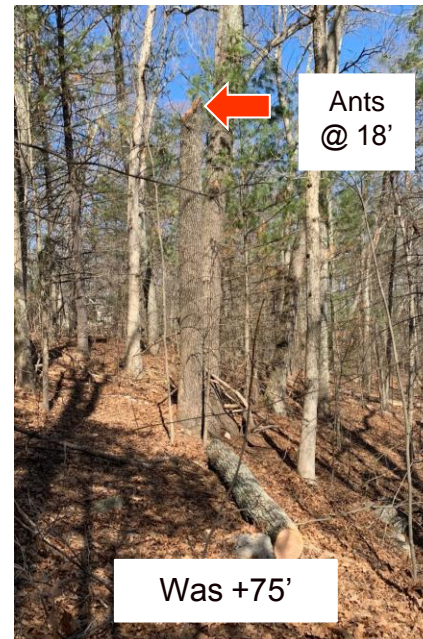


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Northeast
HamXposition

Concerns about utilizing trees?

- None really, but some awareness that limbs & trees die off
 - Hard to assess viability of upper limbs
 - Damage from limbs falling from above
- An example from this Spring 2025
 - A “healthy looking” Oak
 - About 75' from my 6-ele yagi to EU



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FAQs

What about the pulleys?

- Home Depot laundry line nylon pulleys
- Some split side plate arborist pulleys



What type ropes / lines do you use?

- Mostly light 1/8" and 1/4" double braid polyester rope by STI from HRO
 - Tightly woven outer jacket

What about chafe / abrasion?

- Currently none in place / none needed

How do you deal with the coax feedlines coming down from the antennas?

- I let them drop straight down and lay right on the ground

Isn't there abrasion on the coax outer jacket from it rubbing back & forth?

- No, none noticed
- 1 or 2 loop coil used
- Spiral wrap, ballistic nylon sleeves and lengths of garden hose are ready to go if needed

Thoughts on camouflage paint antennas?

- I've not painted any of the yagis
- I have painted the 40m verticals to reduce visibility
- I need to periodically paint the Quad FG spreader arms as UV protection
 - Grey, Brown, Black, Beige all FB

What about matching?

- Tribander – not needed
- 80m / 160m verticals - UNUNs
- 40m array – not needed
- Quads - 1/4wl 75-ohm coax
- 10m yagis – not needed



- Aren't you disadvantaged by having 'only' ropes & pulleys?
 - Not at all - actually it's the opposite!
 - ✓ Fast & Easy access (inspect, repair, adjust)
 - ✓ Enabling (12 locations ID'd)
 - ✓ SOSH (single op single handed)
 - ✓ Project pace
 - ✓ Adapt to WX
 - ✓ Experiment
 - ✓ Seasonal
 - ✓ Pre-Contest touchups
 - ✓ Temp ants
 - ✓ Far less expense
 - ✓ F.O.G. (feet flat on the ground)
 - ✓ and more...!



Okay I think I got it – anything else?

- ✓ Contest temporary
- ✓ DXing
- ✓ Field Day
- ✓ POTA
- ✓ SOTA
- ✓ Special event
- ✓ ECOM
- ✓ Summer qth
- ✓ Vacation qth
- ✓ DXpedition
- ✓ Budget
- ✓ Home station build – 1st steps
- ✓ and on...



That's what I'm doing at N1PGA without towers...

Have another look out back...
What could you do?

- ✓ Basic yet Effective antennas
- ✓ Installed at "low" mounting heights
- ✓ Lightweight and rugged
- ✓ Multiple methods: connect, raise, lower
- ✓ "Feet on the ground" maintenance
- ✓ Limited \$ expenditure homebrew
- ✓ Surprisingly good performance (RBN)
- ✓ Competitive contest results



SSB in **60** days Oct 25, 2025



A competitive contest station
...*without towers*...

Wires, Quads & Yagi antennas in the trees...

