HF LOOP ANTENNA'S

DELTA & HORIZONAL LOOP'S

By George Riedel – N1EZZ
Email: georgeusn1@gmail.com

Sky Wire and Delta HF Loops

- Bigger and Higher is Better IMHO
- Less expensive than a Beam w/tower and rotor
- My loop is the best antenna I ever have used
- Vertical Delta Loops are Bi-Directional
- Horizontal Loops and Horizonal Delta Loops are Omni-Directional
- Horizontal Loops and Horizonal Delta Loops polarizations can be changed

Delta Loop Antennas:

Get the DX edge!
A full-size Delta Loop, fed in the bottom corner, is a good low angle radiator and is great for working DX. This antenna normally has about a 3 DB gain over a 1/2 wave center fed dipole. The Delta Loop is not only a great transmitting antenna but a low noise receiving antenna. The direction of fire is broadside to the antenna. This means that if the base wire of the antenna goes from north to south, the direction of gain will be east and west (HYPOWERANTENNA.COM)

Servicing ham radio operators around the world for over 24 years

Hy Power Antenna Company
1843 Renwick Street Bethlehem, PA 18017
Phone: 610-317-9779 Email: hypowerantenna@ptd.net

www.hypowerantenna.com –

https://www.eham.net/reviews/detail/1420

Work the world from small city lots
QRP to Legal limit
Stainless Electrical Hardware
Antennas Completely Assembled

Historically, Delta and Horizonal Loops have been use by the US Military (NAVY) for over 100 years. Loops first used in the early development of RADIO

NAVY Wireless Shore Stations first used Delta & Horizonal Loops around 1917 in the SPARK GAP transmitters days

Early in 1917, at the beginning of the U.S. entry into World War I, **Dr. A. Hoyt Taylor left his position as head of the physics department of the University of North Dakota and became District Communication Superintendent for the Great Lakes District** with headquarters at the U. S . Naval Training Station, Great Lakes , Illinois . The Navy had to use shore station sites separated by a considerable distance for the functions of radio transmission and reception to reduce interference and to allow simultaneous operation. Naval Radio Station NAJ, located on the Training Station site, served as a relay point for messages between Washington:, D. c., and the West Coast, since direct transmission was not satisfactory. Simultaneous transmission and reception at the site was not possible due to the high-power arc transmitter interference. **Circuits were devised by Dr. Hoyt 's laboratory using long wire and loop antennas which "balanced out" the transmitter interference, including arc mush, thus for the first time permitting simultaneous transmission and reception on a single site . A doubling of communication traffic resulted (August 1917) .**

* * * * * * * * * * * * * * * *

NAVCOMSTA'S – BIG LOOPS

GITMO – NAW

SAN FRANCISCO – NPG

ANNAPOLIS – NSS

ARLINGTON VA - NAA

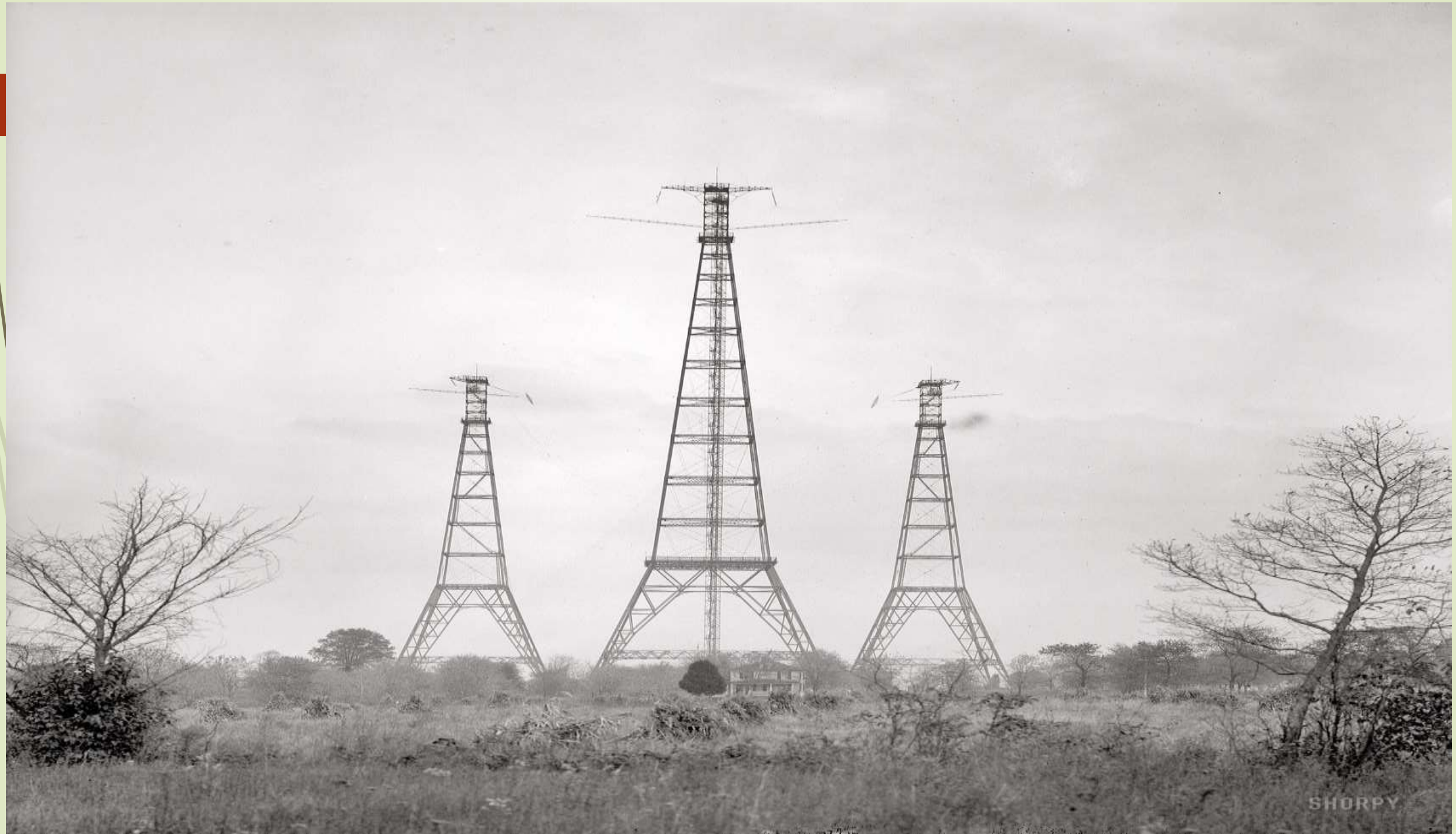
BALBOA CZ - NBA

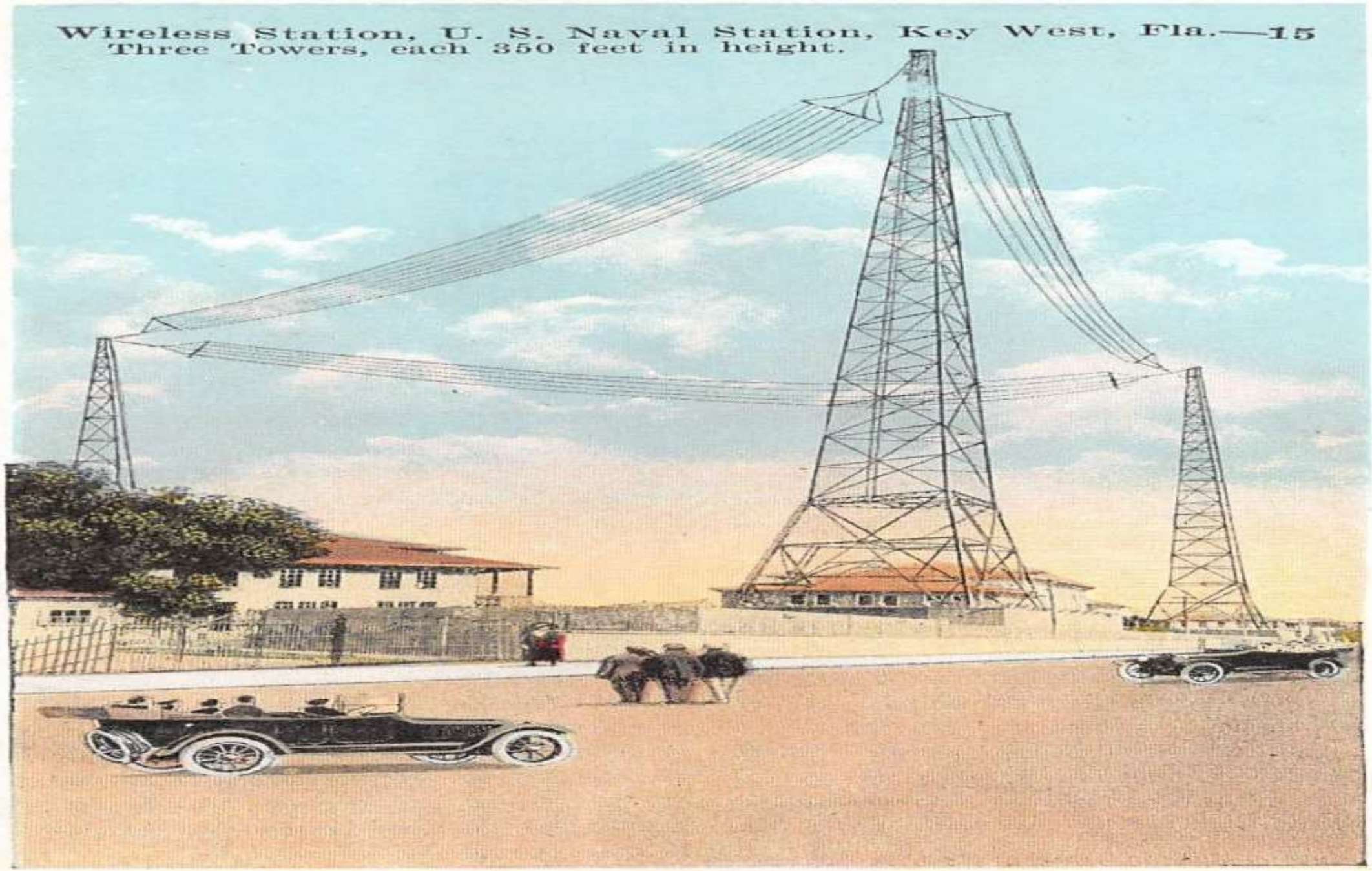
SAN JUAN PR – NAU

PEARL HARBOR – NAM

HONOLULU - NPM

KEY WEST FL – NAR


SHORPY


Wireless Station, U. S. Naval Station, Key West, Fla.—15
Three Towers, each 350 feet in height.

NAVCOMMSTA BALBOA, CANAL ZONE
CALL SIGN – NBA

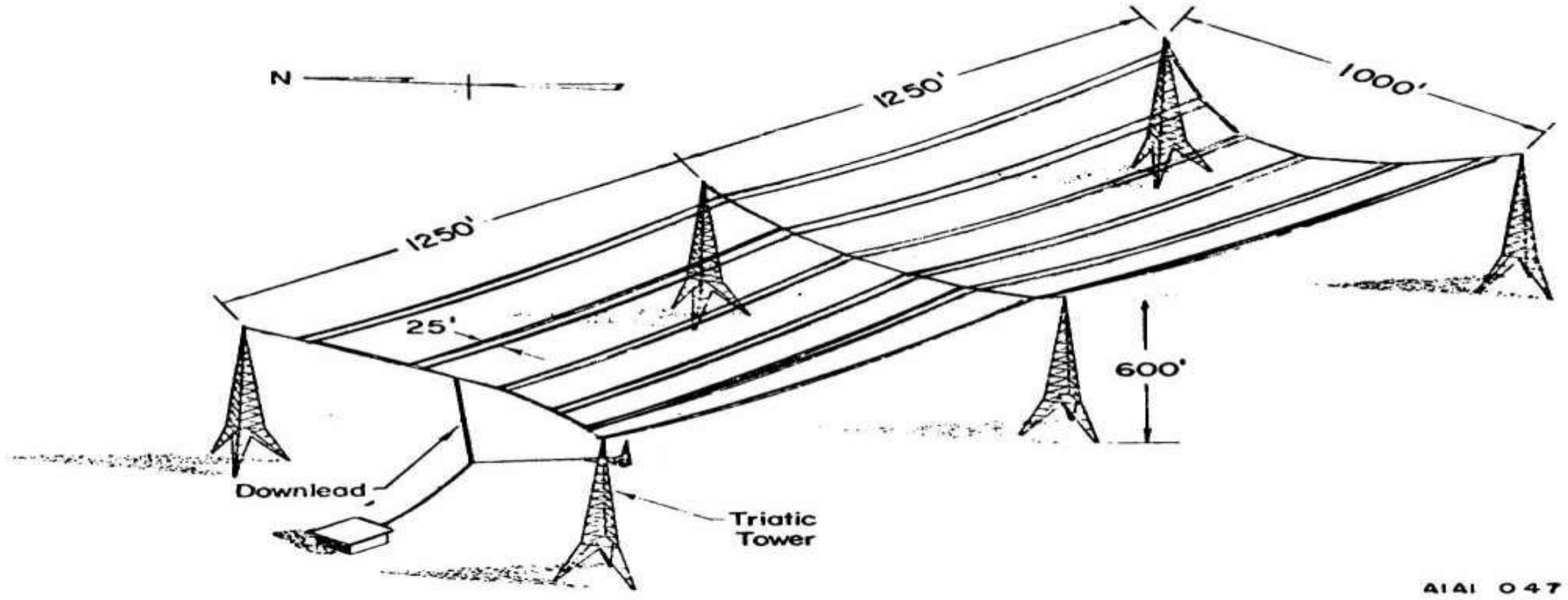


Figure 3-12. Balboa (Summit) Antenna, Pictorial View

adingroom/docs/CIA-RDP76-00451R000200010013-1.pdf
News-Herald: B... DRUDGE REPORT 2... Local Weather from... VOACAP Online - p... Null-modem emula... Imported Mobile HF Ground

FIGURE 19
PORTABLE HF SPACED LOOP ANTENNA ON
THE MODIFIED AN/PRD-7 AND 8 PEDESTAL

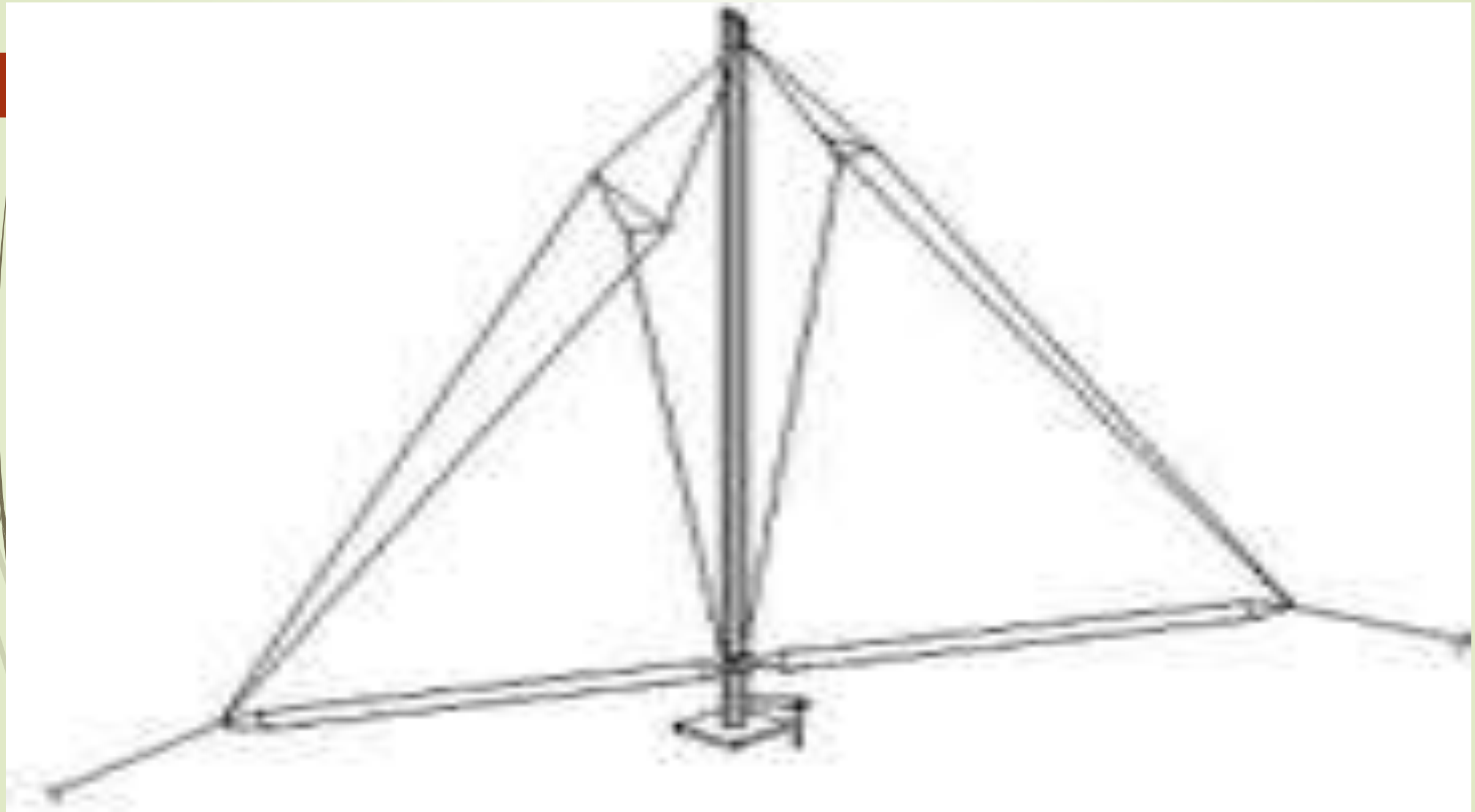
U.S. Territorial Governments still use HF Loops

- September 14th 2017 – St. John, E.O.C., U.S.V.I.
- VITEMA – Virgin Islands Territorial Emergency Management Agency

HORIZONAL AND DELTA LOOP BUILD IDEA'S

* AMATEUR, COMMERCIAL BUYS

* HOME BREW BUILD IDEA'S

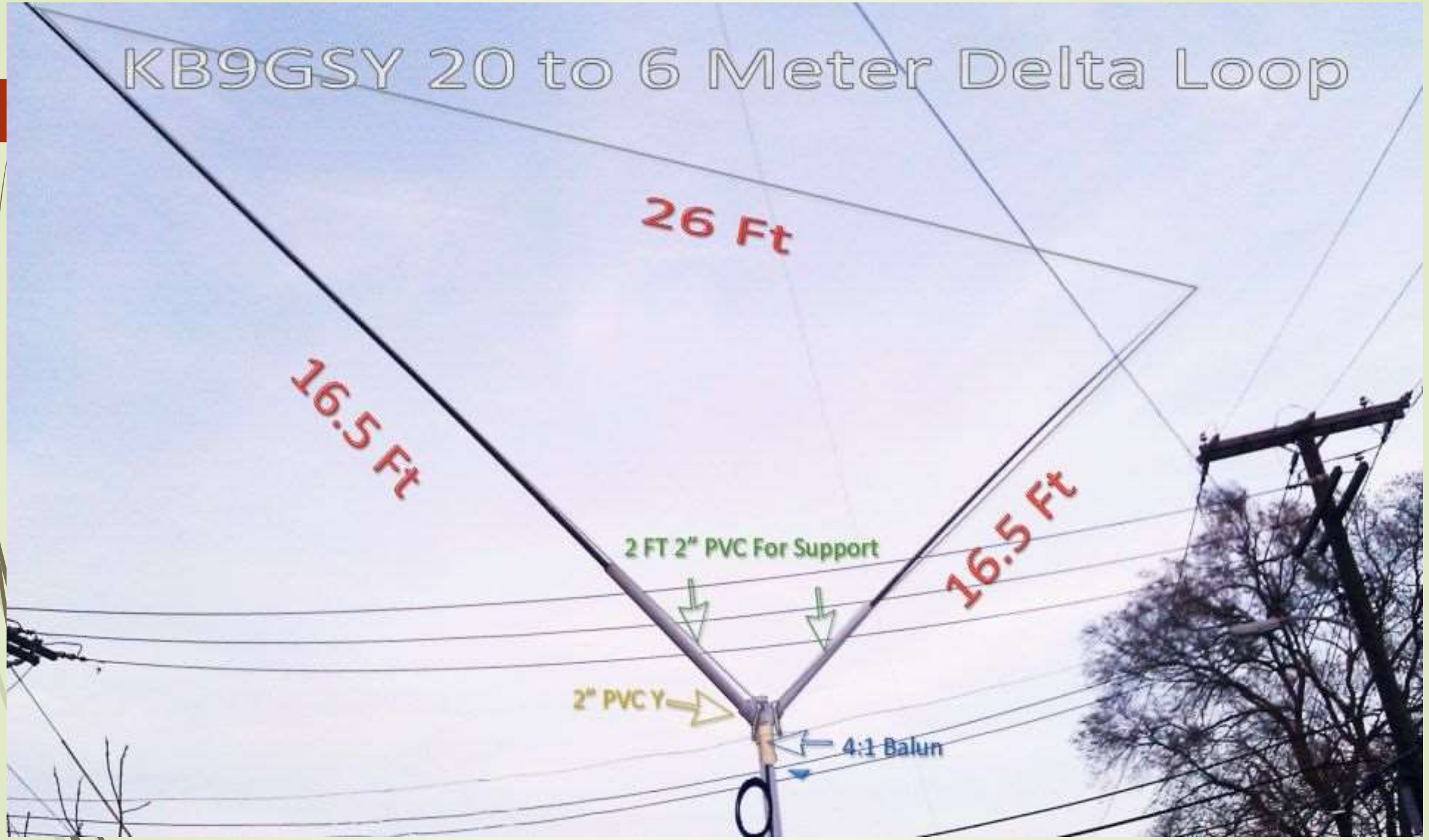


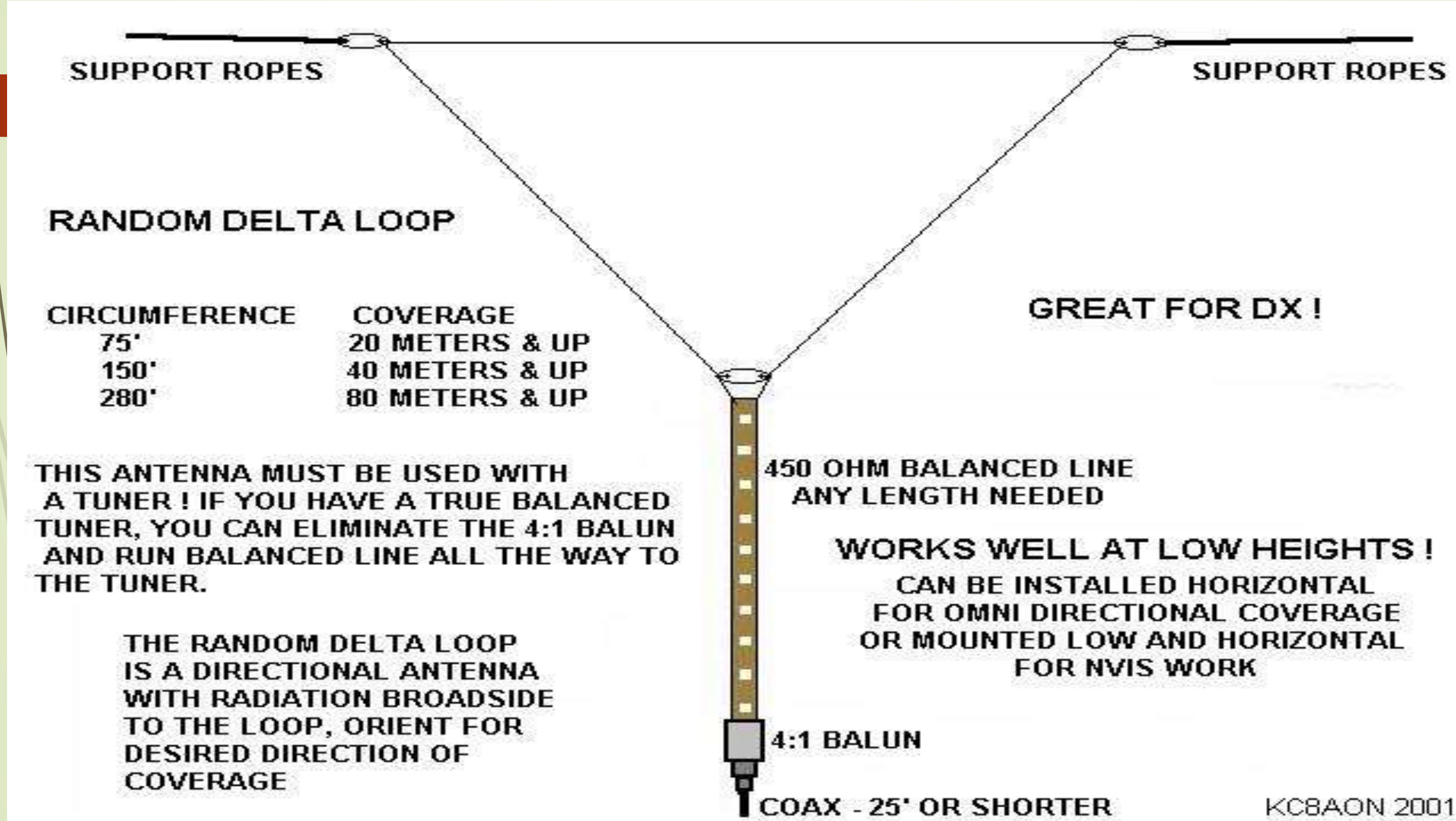

Multiband Vertical Loop Antenna
10, 14, 21, 28 MHz
Jacques Audet VE2AZX
Sept. 2016
jacaudet@videotron.ca
Web: ve2azx.net

EA ANTENNA

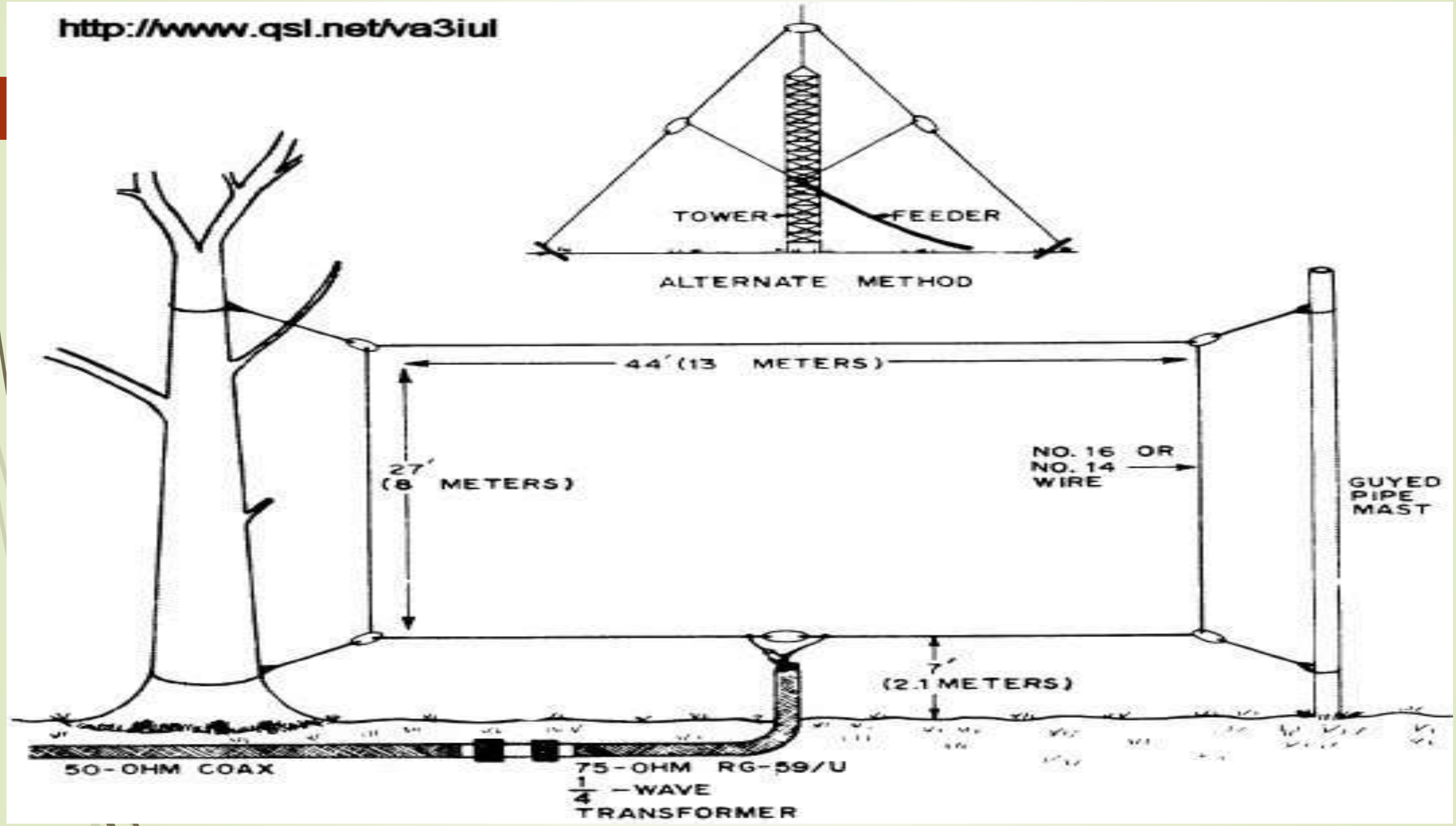
MULTIBAND DELTA LOOP

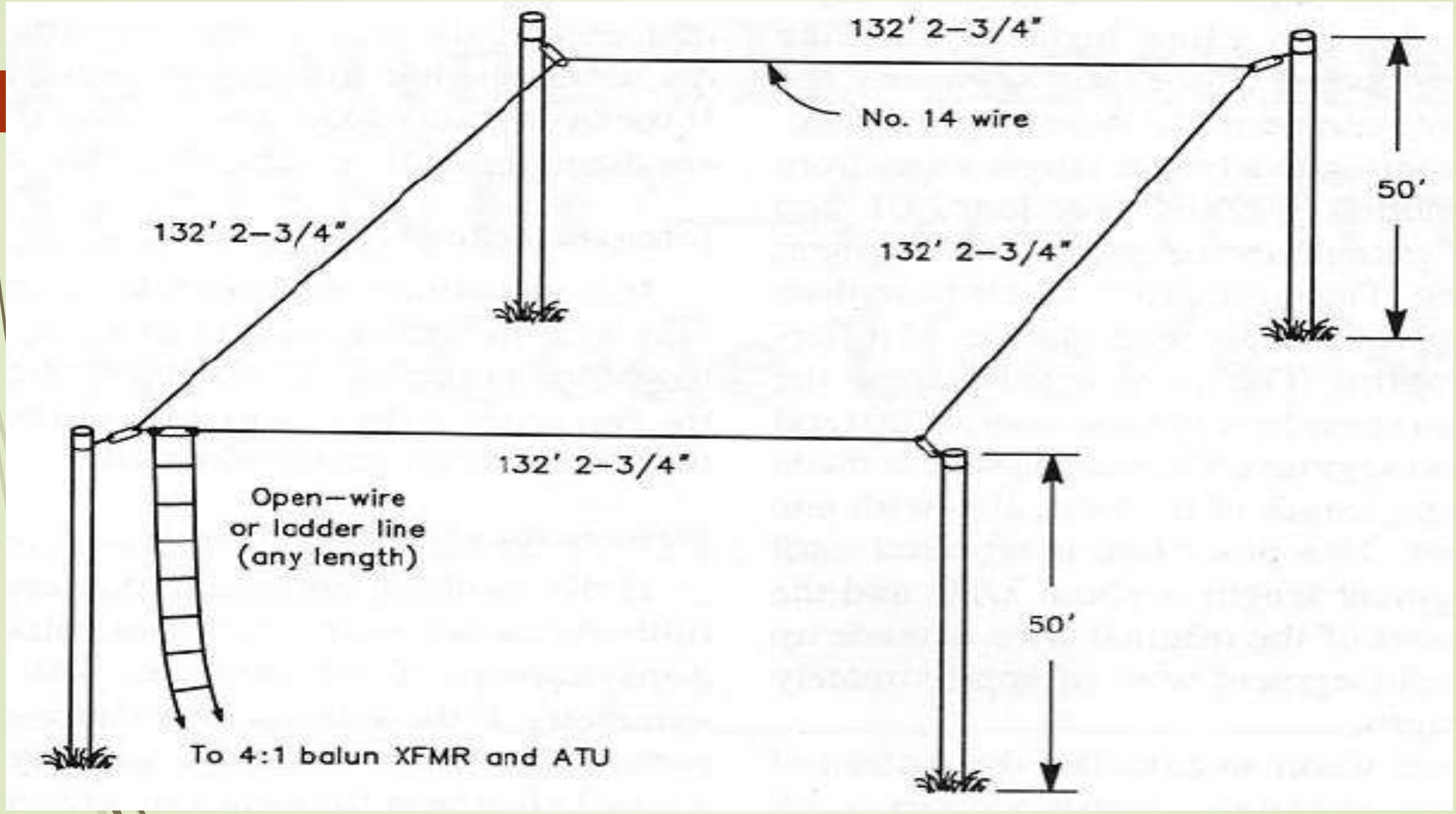
EADELTA7B


KB9GSY 20 to 6 Meter Delta Loop
26 Ft
16.5 Ft
16.5 Ft
2 FT 2" PVC For Support
2" PVC Y
4:1 Balun


SUPPORT ROPES
SUPPORT ROPES
RANDOM DELTA LOOP
CIRCUMFERENCE COVERAGE
75' 20 METERS & UP
150' 40 METERS & UP
280' 80 METERS & UP
GREAT FOR DX !
THIS ANTENNA MUST BE USED WITH A TUNER ! IF YOU HAVE A TRUE BALANCED TUNER, YOU CAN ELIMINATE THE 4:1 BALUN AND RUN BALANCED LINE ALL THE WAY TO THE TUNER.
450 OHM BALANCED LINE
ANY LENGTH NEEDED
WORKS WELL AT LOW HEIGHTS !
CAN BE INSTALLED HORIZONTAL
FOR OMNI DIRECTIONAL COVERAGE
OR MOUNTED LOW AND HORIZONTAL
FOR NVIS WORK
THE RANDOM DELTA LOOP
IS A DIRECTIONAL ANTENNA
WITH RADIATION BROADSIDE
TO THE LOOP, ORIENT FOR
DESIRED DIRECTION OF
COVERAGE
4:1 BALUN
COAX - 25' OR SHORTER
KC8AON 2001

http://www.qsl.net/va3iul




132' 2–3/4"
No. 14 wire
50'
132' 2–3/4"
132' 2–3/4"
132' 2–3/4"
Open–wire
or ladder line
(any length)
50'
To 4:1 balun XFMR and ATU

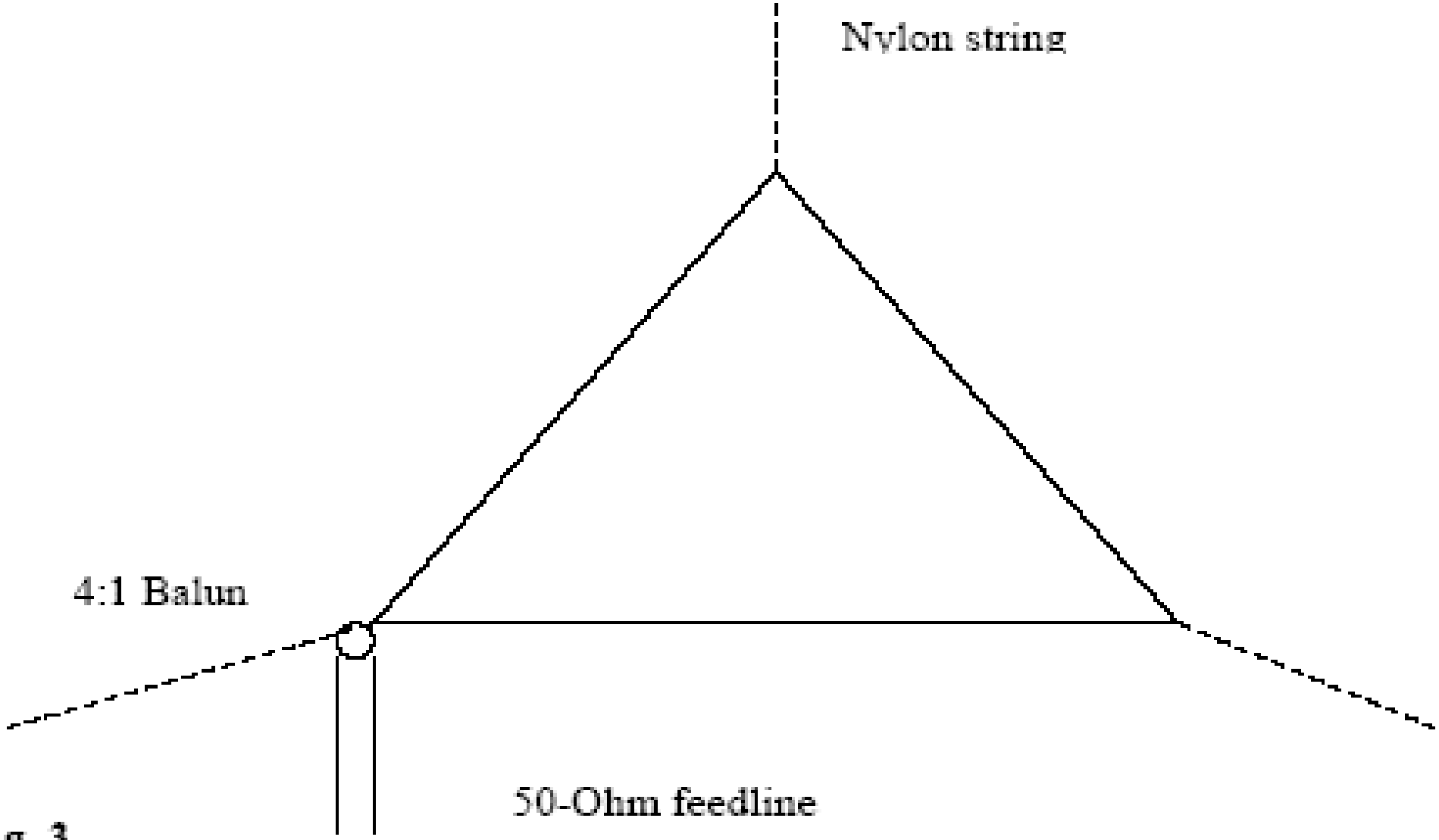
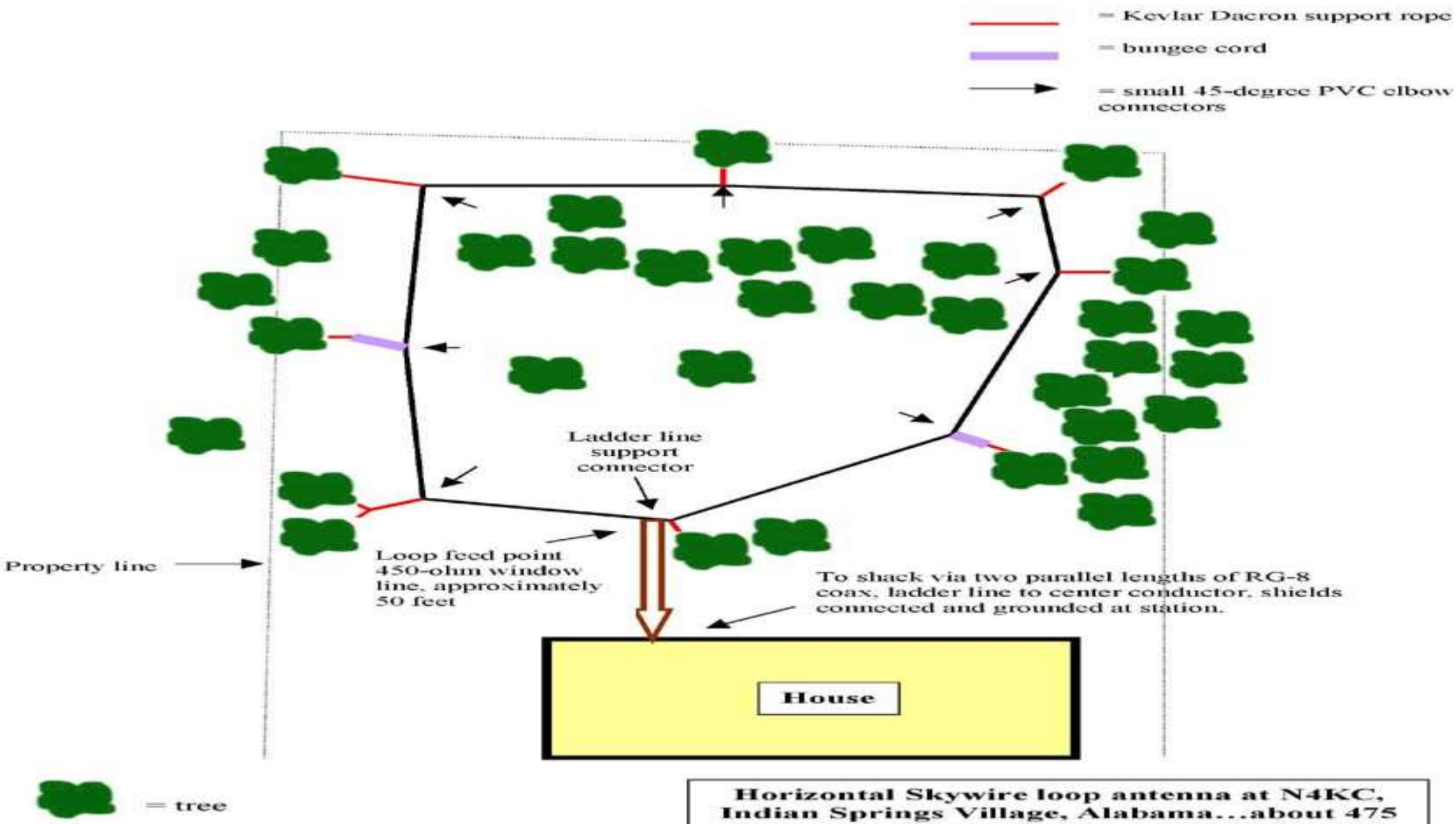


Fig. 3



Horizontal Skywire loop antenna at N4KC, Indian Springs Village, Alabama…about 475 feet of #12 stranded, insulated copper wire, fed with 450-ohm ladder line to twin runs of RG-8 coax into house/radio shack.

HORIZONAL LOOPS & DIPOLES ANTENNA HEIGHT

- COMMENT HERE:
- Amateur dipoles and loops are commonly elevated above the ground at or about 35/40 foot. At that height the antennas are normally Horizontally Polarized.
- My research found that the higher any horizontal dipole or loop wire is above the ground, the vertical lobe flattens out and the antenna becomes SKEWED or a blend of vertically and horizontally polarized antenna
- I asked two RF Engineers – they both said yes

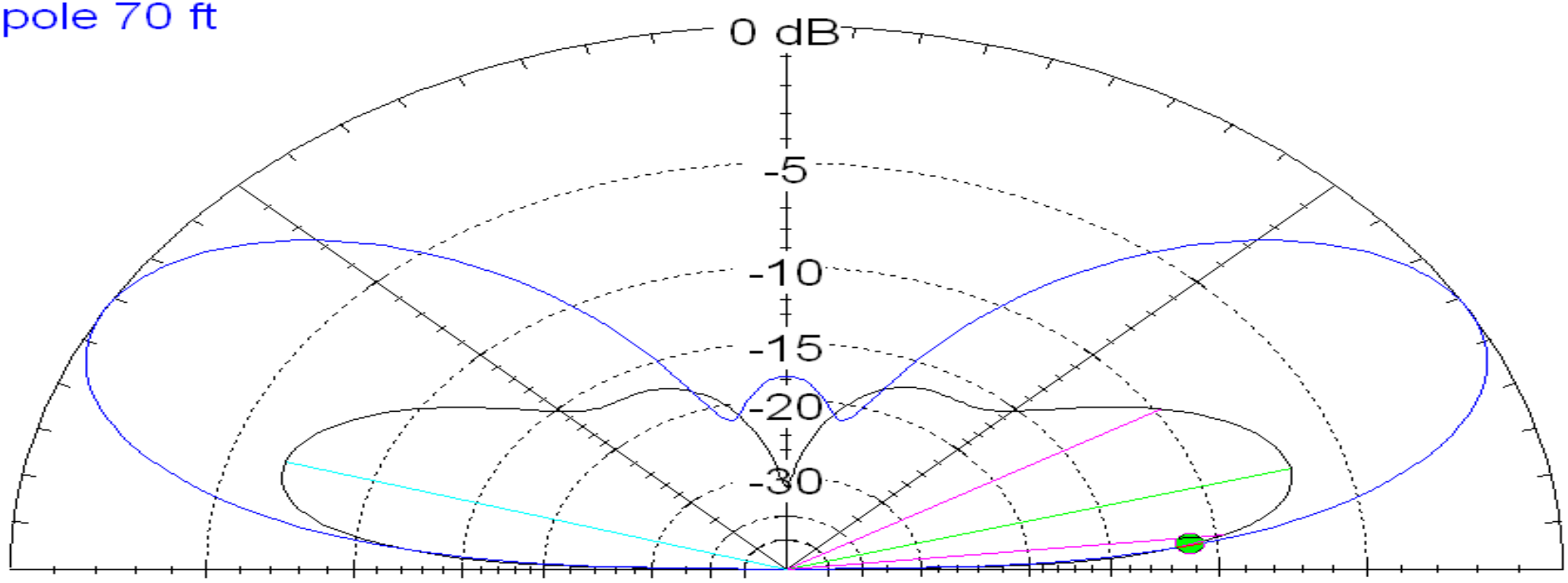
  that is true????

Total Field

EZNEC+

* **Primary**

dipole 70 ft



7.1 MHz

Elevation Plot	
Azimuth Angle	267.0 deg.
Outer Ring	8.09 dBi
3D Max Gain	1.37 dBi
Slice Max Gain	1.37 dBi @ Elev Angle = 16.0 deg.
Beamwidth	24.9 deg.; -3dB @ 6.4, 31.3 deg.
Sidelobe Gain	1.35 dBi @ Elev Angle = 163.0 deg.
Front/Sidelobe	0.02 dB

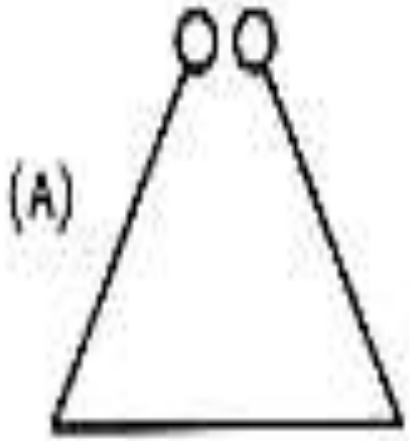
Cursor Elev	5.0 deg.
Gain	-3.04 dBi
	-4.41 dBmax
	-4.41 dBmax3D

Delta Loop Polarization -

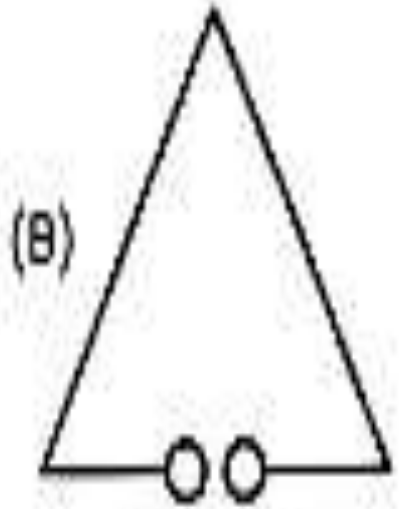
Signal take-off angle can be changed by changing the feed point location's on the antenna.

I always was told if feed is in the center of the Delta Loop, polarization would be Horizonal.

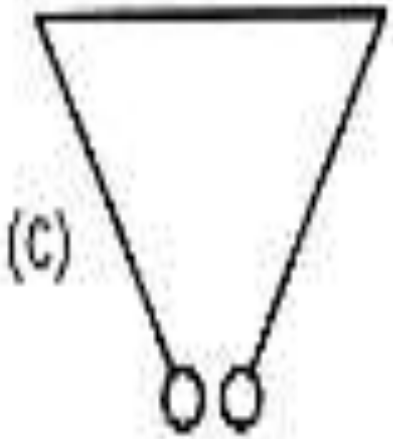
Also I believed that if Delta Loop was fed at corners, polarization would he Vertical.



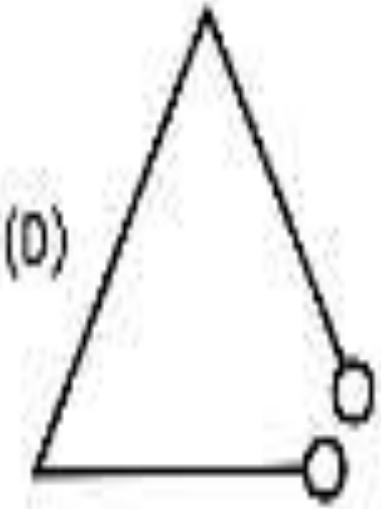
Apex Up
Apex Feed



Apex Up
Low - Side Feed



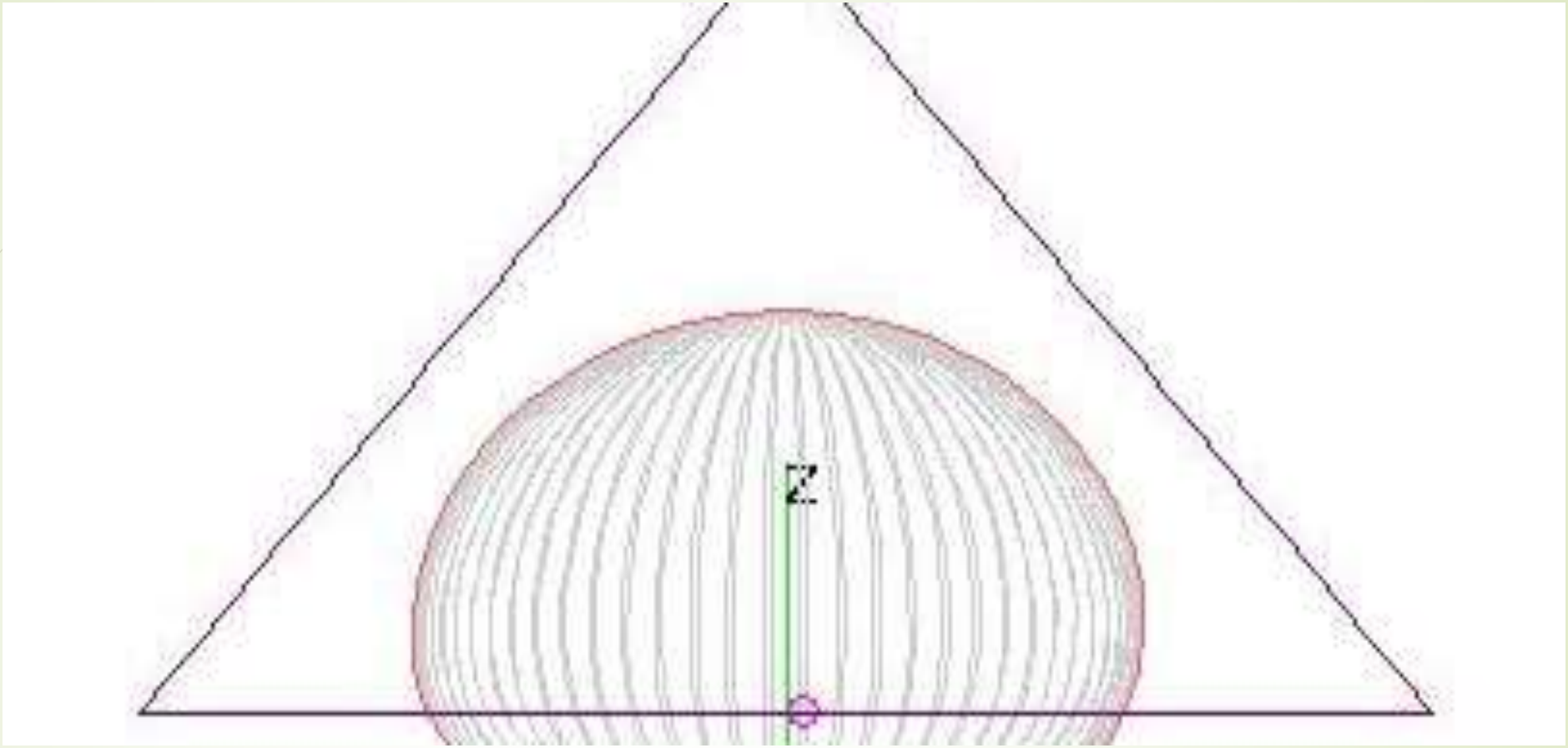
Apex Down
Apex Feed



Apex Up
Corner Feed

	Polarization	Radiation Angle
A	Horizontal	Moderately High
B	Horizontal	High
C	Horizontal	Moderately High
D	Vertical	Low

Feed Impedance ≈ 100 Ω



Delta loop fed at center bottom

2D Plot: 40m Delta Loop - Vertical Pol.

File Edit View Options Reset

Highlight
- Off
- Azimuth Slice
- Elev Slice

0 360

180

Slice Azimuth

180

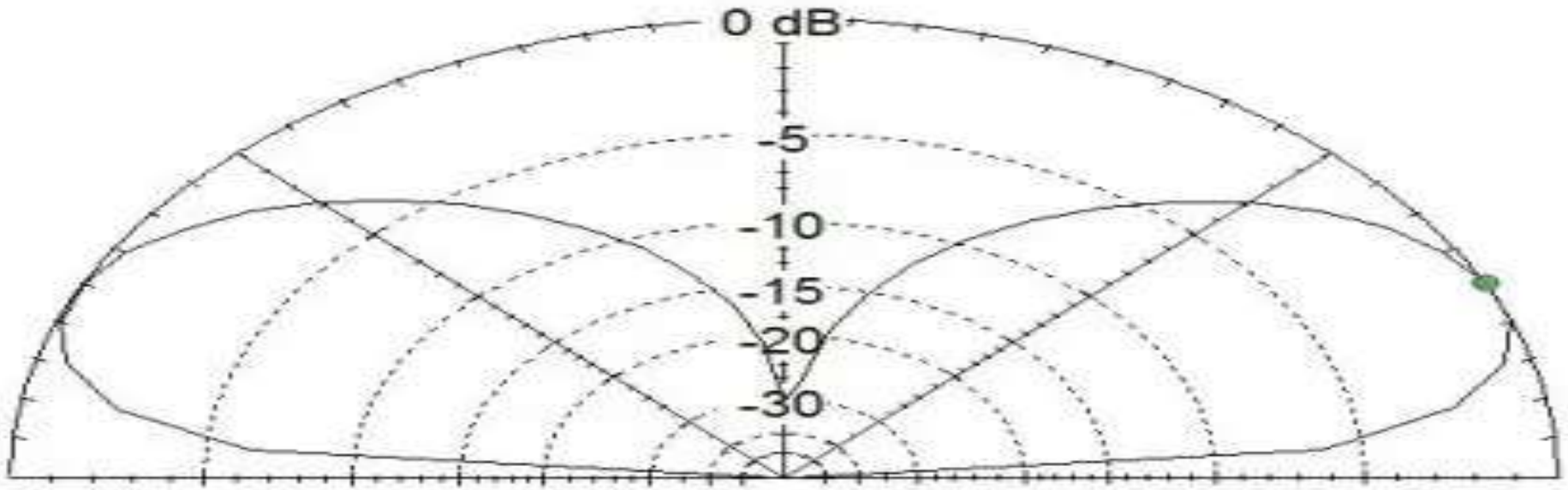
25

0

Cursor Elev

Total Field

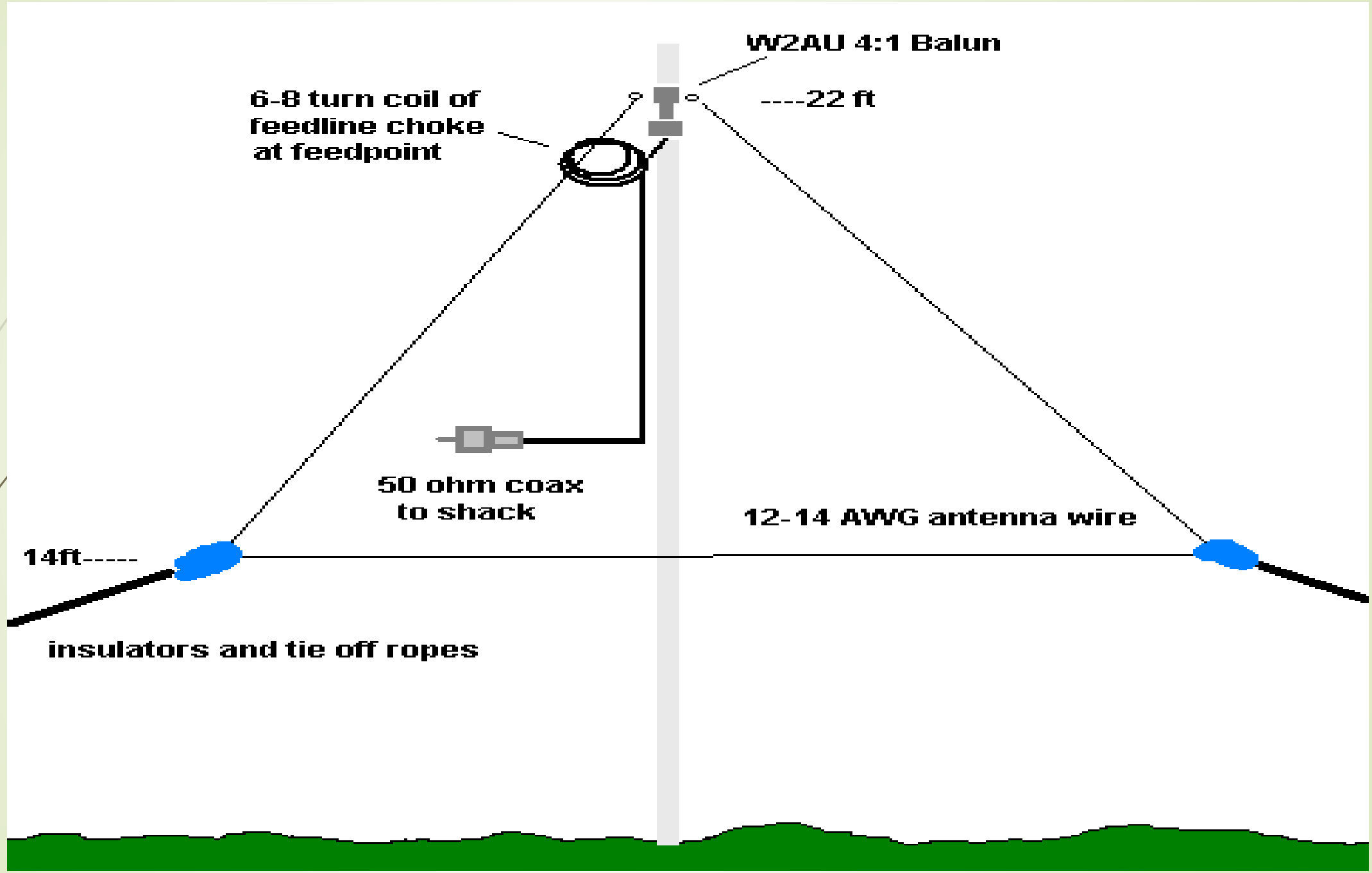
EZNEC Pro/4

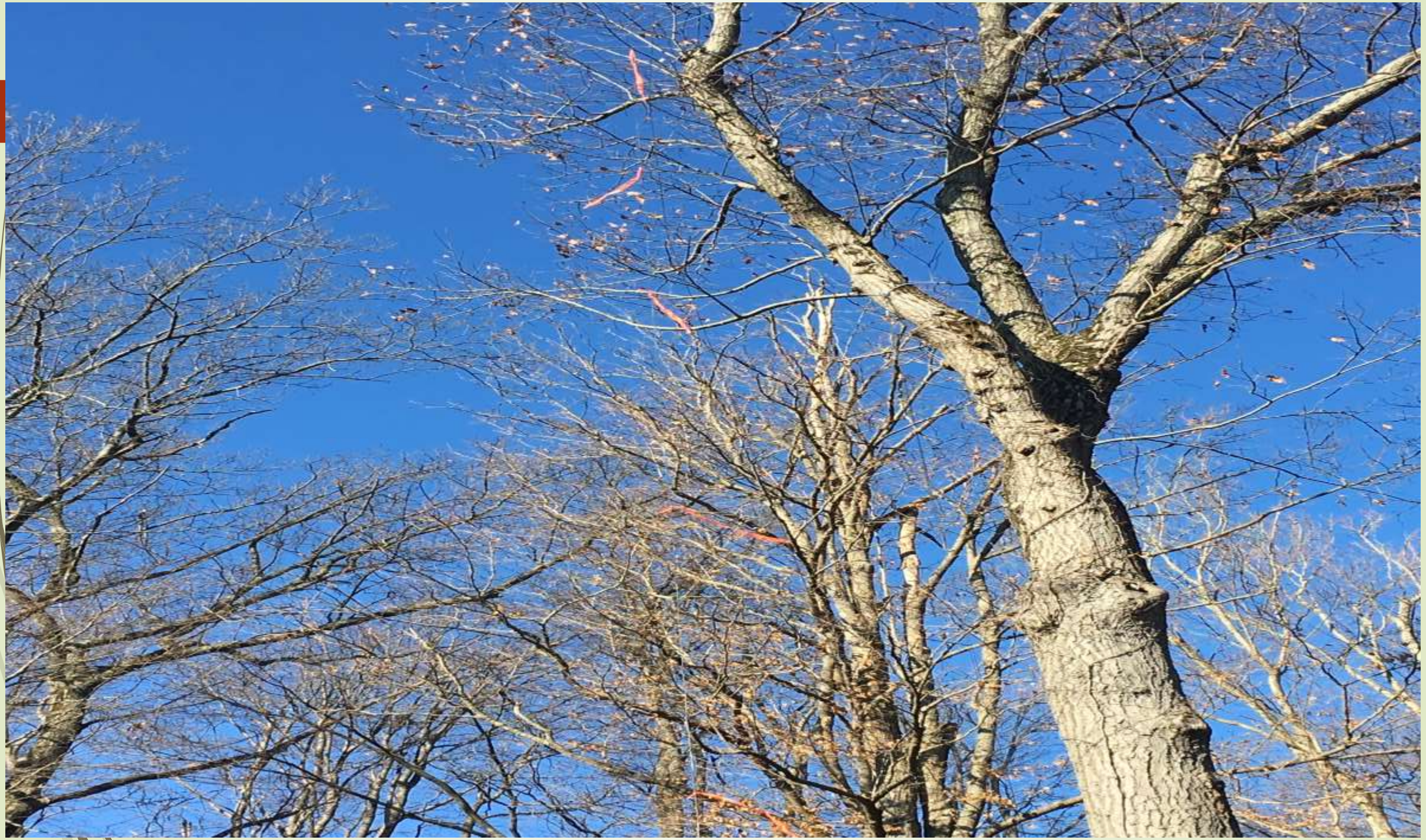


7.15 MHz

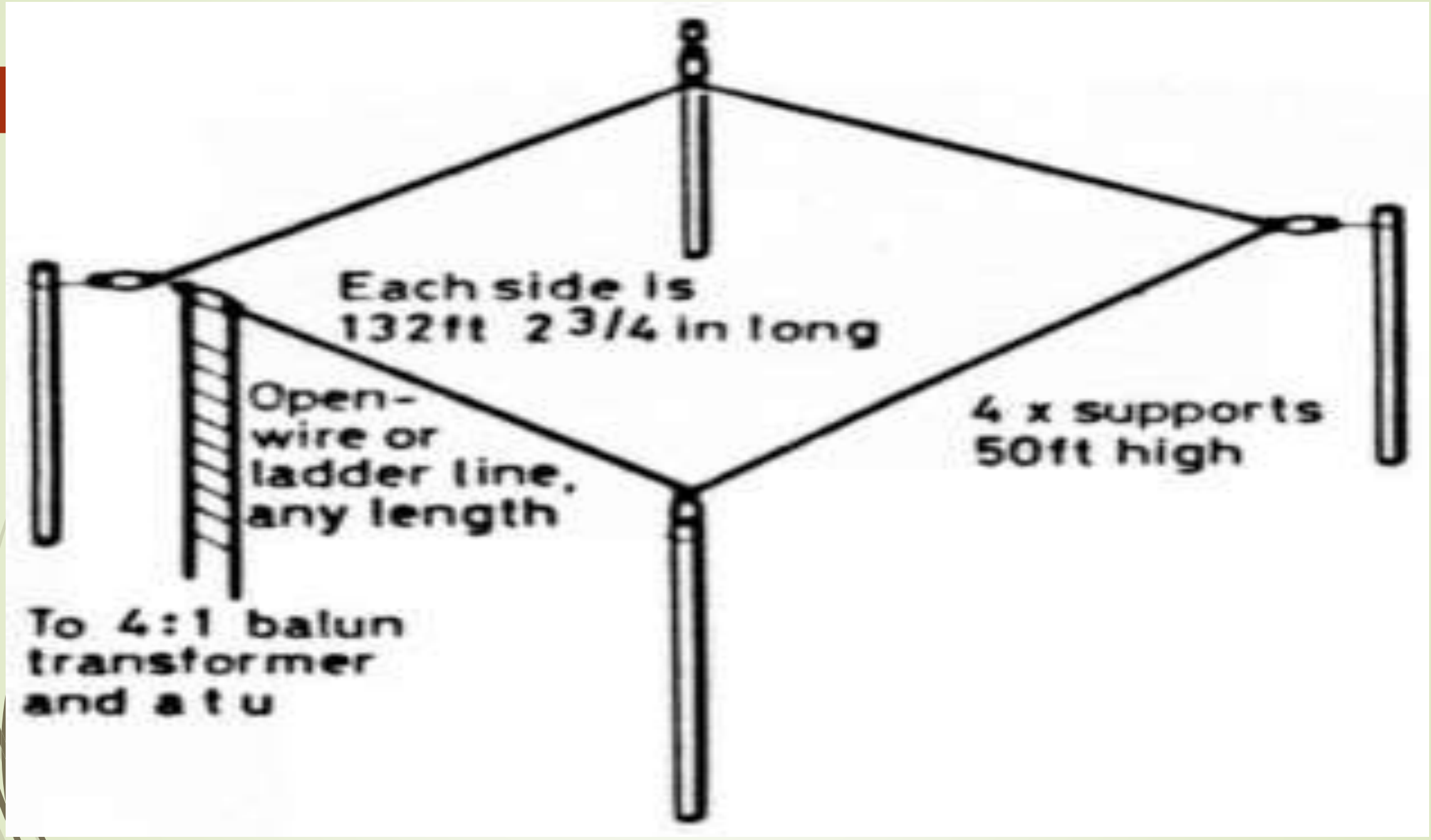
Elevation Plot	
Azimuth Angle	180.0 deg.
Outer Ring	1.35 dBi
3D Max Gain	1.35 dBi
Slice Max Gain	1.35 dBi @ Elev Angle = 25.0 deg.
Beamwidth	36.3 deg.; -3dB @ 9.1, 45.4 deg.
Sidelobe Gain	1.28 dBi @ Elev Angle = 155.0 deg.
Front/Sidelobe	0.07 dB

Cursor Elev	25.0 deg.
Gain	1.35 dBi
	0.0 dBmax
	0.0 dBmax3D


W2AU 4:1 Balun
6-8 turn coil of
feedline choke
at feedpoint
----22 ft
50 ohm coax
to shack
12-14 AWG antenna wire
14ft-----
insulators and tie off ropes




MILITARY AFFILIATE RADIO SYSTEM
MARS
U.S. ARMY
AIR FORCE
NAVY-MARINE CORPS


Each side is
132ft 2 3/4 in long
Open-
wire or
ladder line,
any length
4 x supports
50ft high
To 4:1 balun
transformer
and a t u

QUAD – Square Build -Horizonal Loop in my front yard

- PLASTIC MILITARY MASTS – 3 EACH LEG
- 12 AWG WIRE AT 12 FT OFF GROUND
- WIRE LENGTH – 135 LINEAR FOOT
- EACH LEG OF SQUARE WAS 34 FOOT
- SHORT PIECE OF 300 OHM LADDER LINE:
- TERMINATED INTO 4:1 ARRAY SOLUTION BALUN
- RG8 OUT OF BALUN TO TUNER –RADIO AND AMP
- 17 AWG ELECTRIC FENCE WIRE ON GROUND AS A SINGLE REFLECTOR 5% LONGER (THINK YAGI)

* HORIZONAL BUILD: 20 40 & 80 METER PERFORMANCE:
** HORIZONALLY POLARIZED??

OHIO ARES NVIS CONTEST – I'm using 400 watts

- 7.266 Walter Reed Army HospVA 379m
- 7.255 ECARS NET Cape May NJ-380 mi
- 7.272 Net KB3WFV Maryland
- 7.255 ECARS North Carolina
- 7.272 Net KK4UGK S.Carolina 432 mi
- 7.258 MIDCARS K9DRP Central IL
- 7.251 KG4E Gram NC 364 air miles
- 3.850 KD8MDX Grass Lake MI
- 3.850 WB8MF Crawford OH
- 3.850 W8ABLL Saginaw MI
- 3.850 W8HH Morgan County OH
- 3.850 N8PJ Marietta OH
- 3.850 W8BR Muskingum Cty. OH
- 3.850 KC8YJJ Jefferson City OH
- 3.850 WG8Z Cincinnati OH
- 3.850 VE3WXZ Ont. Canada
- 3.850 W8ERD Delaware OH
- 3.850 K8FH Lorain OH
- 3.850 W8NRH Worthington OH
- 3.850 KD2DO Rochester NY 246 mi
- 3.850 W8SGT OHIO EMA Col. OH
- 3.850 NF8O Dave Medina OH
- 3.850 W8TNX Licking Cty. OH
- 3.850 KD8MSJ Monroe City OH
- 14.300 KB4BX Mobil Maritime Net 1058 mi

MY SKY WIRE LOOP

Approx. 1,500 LINEAR FOOT OF 10AWG WIRE

67 FT. OFF GROUND AT TIE POINTS (Barberton Tree Service)

Fed with 300 ohm Ladder Line (now 600 ohm True Ladder Line)

Array Solutions 4:1 Tuner Balun (AS-200-T) Made for loops

And wire antennas

10 awg wire and DX T-Connection W/300 Ohm ladder line

Antenna grounding rod w/10awg wire to antenna wires

Antenna wires to grounding rod, DX-T removed to porch


MARS

Let's build a loop

What are you going to need ??

YOUR GOING TO NEED A BALUN

I USE AN ARRAY SOLUTIONS AS-200-T – Tuner Balun made for loops and dipoles

IT WILL TAKE FULL LEGAL LIMIT OF 1500 WATTS

DX Engineering is a great sources for Balun and their close to home


LDG
Power
Tune
C Up
L Up
C Dn
L Dn
AT-1000Pro II Autotuner

DX Engineering EZ-BUILD® UWA8X Center-T and End Insulator Kits

Ladder Line Use

RG8X or *LMR* 400 Coax

ANTENNA WIRE CONSIDERATIONS

- I use 10 awg, 22 stranded copper coated electrical wire, UV has degrades the plastic covering over the years, but it still works fine
- 12 or 14 awg is common
- DX Engineering has UV resistant antenna wire and it's all 14 awg, or non - UV resistant wire at Lowes or Home Depot. I suggest 12awg.

SKY WIRE or DELTA LOOP Feed Line Choices

- 300 ohm Ladder Line (my choice) Low wind loading
- 450 ohm Ladder Line –
- 600 ohm True Ladder Line – Very good choice
- RG8X – Good however may have some feed line loss
- LMR-400 Hard Line – Great Stuff ! but is a hard to work with
- NOTE: All Ladder line does not like to be close to metal
- I keep mine at least 4 inches AWAY from metal objects

Trees /Antenna Grounding /Lightening

- If your loop is hung in trees, periodic maintenance of the trees is required
- Limbs break off and fall on the wires
- Trees sway violently in storms, your antenna wire has to be free floating
- Pulley's – Grounding Rods at base

LOOP WIRE LENGTHS AND FORMULA'S

Formula for length of FULL WAVE, horizontal loop

The formula for a calculating the length of a full wave loop antenna is: Length (feet) = 1005/f MHz.

544' is comfortably resonant at 1.847kHz, 3.694kHz, 7.389kHz, 14.779kHz and 29.558kHz. Not an optimal length.

560' is comfortably resonant at 1.794kHz, 3.589kHz, 7.178kHz, 14.357kHz and 28.714kHz. Not an optimal length.
565' is comfortably resonant at 1.778kHz, 3.557kHz, 7.115kHz, 14.230kHz and 28.460kHz. Still a little short.

574' is comfortably resonant at 1.750kHz, 3.5kHz, 7.00kHz, 14.000kHz and 28.000kHz.

Calculated wire lengths at mid-band for Loops:

10 meters	34.835 feet
12 meters	40.296 feet
15 meters	47.349 feet
17 meters	55.469 feet
20 meters	70.546 feet
30 meters	97.185 feet
40 meters	140.559 feet
75/80 meters	269.798 feet
160 meters	528.947 feet

My big loop performance experiences: (North – South- East – West Signal Path)

- MARS Trans Con Net – P.R. and Alaska – San Juan (1,806 miles) – Palmer AK (3,903 miles) w/400 watts
- Have worked Slovenia(4,522 miles and Venice, Genoa Italy (4,459 miles) on 20 meters with w/100 watts mid September and Oct 9th.
- Worked north of San Palo Brazil on 40 meters with w/100 watts (4,462 miles)
- Worked a friend in Iceland with w/400 watts (2,821 miles)
- Worked US ARMY in Kojii ,Okinawa w/400 watts
- (Okinawa Japan 7,430 miles) Johannesburg S.A. 8,364 miles) Namibia Africa (7,657 miles) w/400 watts
- 14.216 - IT9BDM - Sicily Italy 4,792 miles 10.11.19 150pm w/100 watts
- 14.212 OH2BLV – Finland 10/13/19 0745am 100 watts 4,322 miles
- 14.214 OH7K –Finland 10/13/19 0746am 100 watts 4.322 miles
- 14.295 PV8AL-Brazil 10.14.19 100 watts (5-8 4:46 pm

My Big Loop performance continued -

- 14.226 – S51DX – SOLIVINA
- 14.290 - ?? – SPAIN
- 14.217 – F6HHQP France
- 14.227 – EA8GLV – Med side of Spain
- 14.270-ZS6TVB –Johannesburg S.Africa
- 14.235 - ZS6ROGJohannesburg S.Africa
- 14.297 EA8AM. Cannery Is. Spain
- 14.225 EA3BOX. Barcelona Spain
- 14.275 IK4LZH . Italy – 100 watts
- 7.188 KP2Z. San Juan Tony
- 14.240 EA5GVZ . Cannery Is. Spain
- 14.260 EA8WAM . Cannery Is. Spain
- 14.245 - IK4ZLH . Italy John
- 14.243 - V52SAO . Namibia Africa
- 14.210 – PY2A?? . Brazil
- 14.210 - IK4GRO . Italy
- 14.294- EI2JW Ireland
- 14.240 - PY2LED. San Palo Brazil
- 14.298 - ON5WH . Rick Belgium
- 14.240 - LY5A . Lithuania
- 14.270 - IK4O . Italy
- 14.254 - IL4LZH . Italy
- 14.210 DL1DGS Germany

V51WW – 14.247/4:05 pm -10.17.19 (7,663 air miles from Akron OH)
100 watts!!