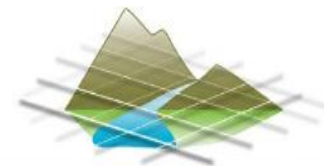


NVIS HF Antenna Design

John Yaldwyn ZL4JY AREC



PARTNERSHIPS IN LAND SEARCH AND RESCUE

What is NVIS?

Near vertical incidence sky wave (NVIS)

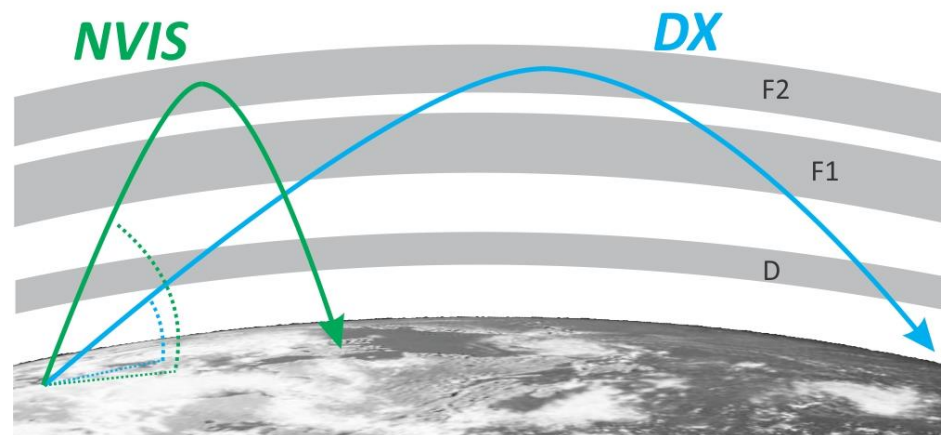
Goal is not long distance (DX) but reliable short range HF

Reliable propagation method provides for usable comms over paths longer than groundwave but shorter than DX sky wave

- NVIS range is typical 50 to 500 km
- Best frequencies are between 3 and 8 MHz

Antennas must have high angle radiation pattern straight up

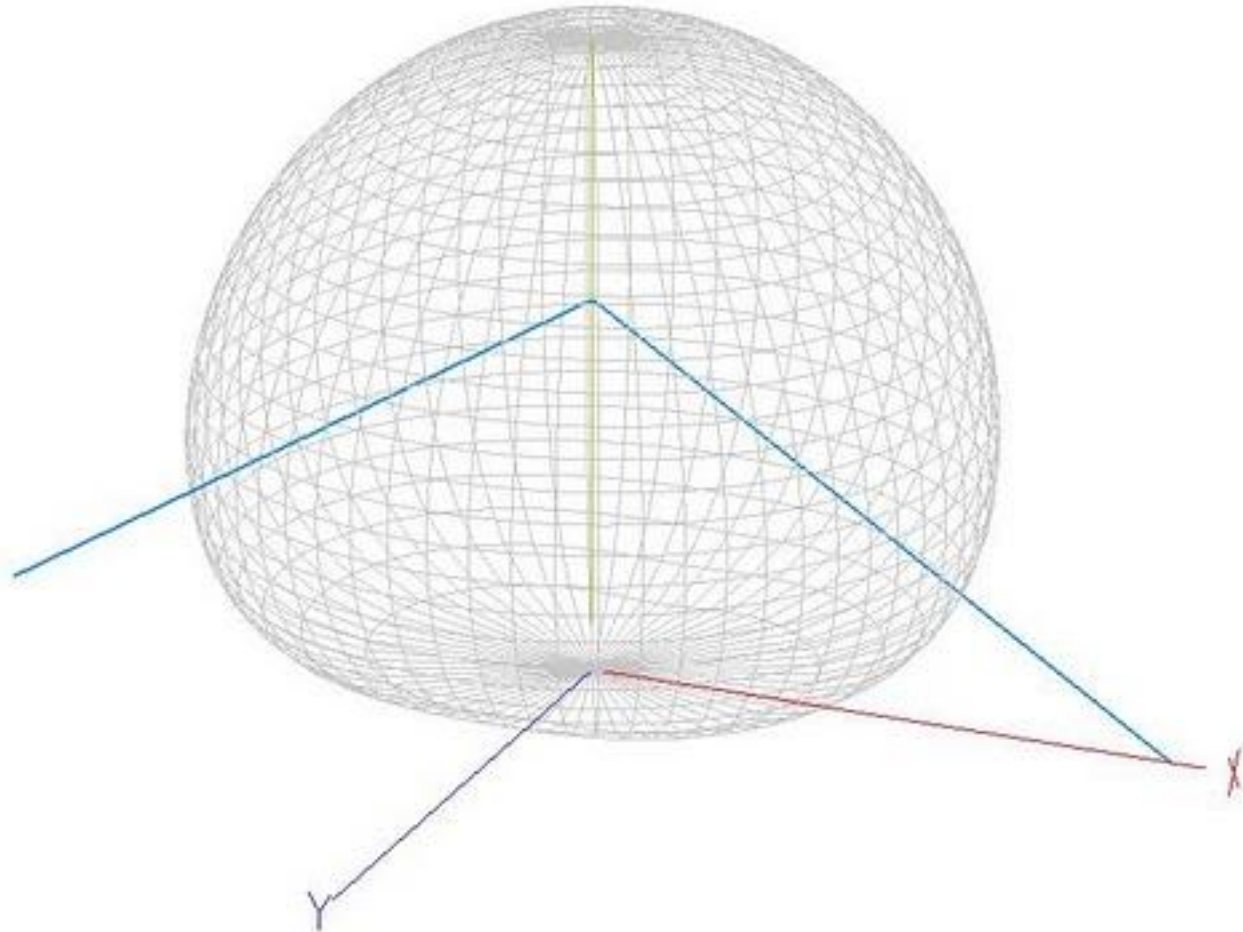
- Dipoles need to be low to the ground
- Vertical do not work



ZL4JY design – 9m mast with 2 to 10 MHz cantered doublet



Cantered doublet – near omni directional radiation pattern



Antenna is a 28 metre per leg cantered doublet fed with 600 ohm open wire feeder erected over ground plane consisting of seven galvanized wires.

ARRL 1930 mast design with kiwi number 8 wire ingenuity



How to feed 600 ohm open wire feeder?

The impedance of the antennas varies greatly over the 2 to 10 MHz range

The open wire feeder is mismatched since the antenna is nothing like 600 ohms

- Varies from 3 to 5,000 ohms depending on frequency
- Both extremes hard to match without loss

There is a trick!

The length of the feeder (9m) actually transforms the worst case impedance excursions into something a normal antenna tuner can manage

Tuner needs balanced output, best avoid unbalanced tuner with 'balun'

- IC AH-4 with chokes in coax and control lines works very well



AS-2259/GR military antenna

Portable design based on lightweight metal mast that is a 50 ohm coax

There are 4 antenna elements that are also used as guy lines to support the antenna

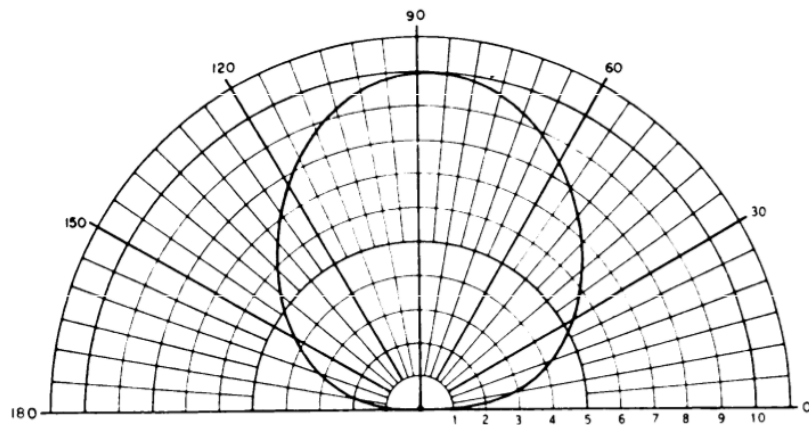
The elements are 24' 10" and the long elements are 36' 10"

A short and a long element are connected to the outer (ground) side of the mast/coax

The other short and long elements connect to the mast center

A tuner must be used (included in military man pack radios)

It's a 'cloud warmer' directing RF energy vertically



15.5-MHz Elevation Plane Pattern, Average Ground.

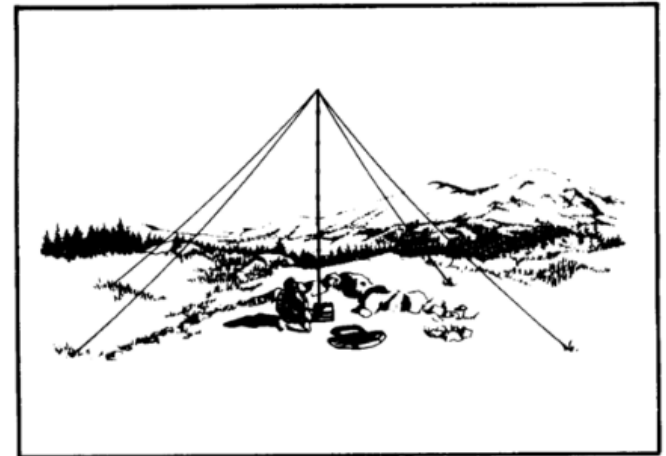


Figure 3-16. AS-2259/GR (NVIS).

Dimensions

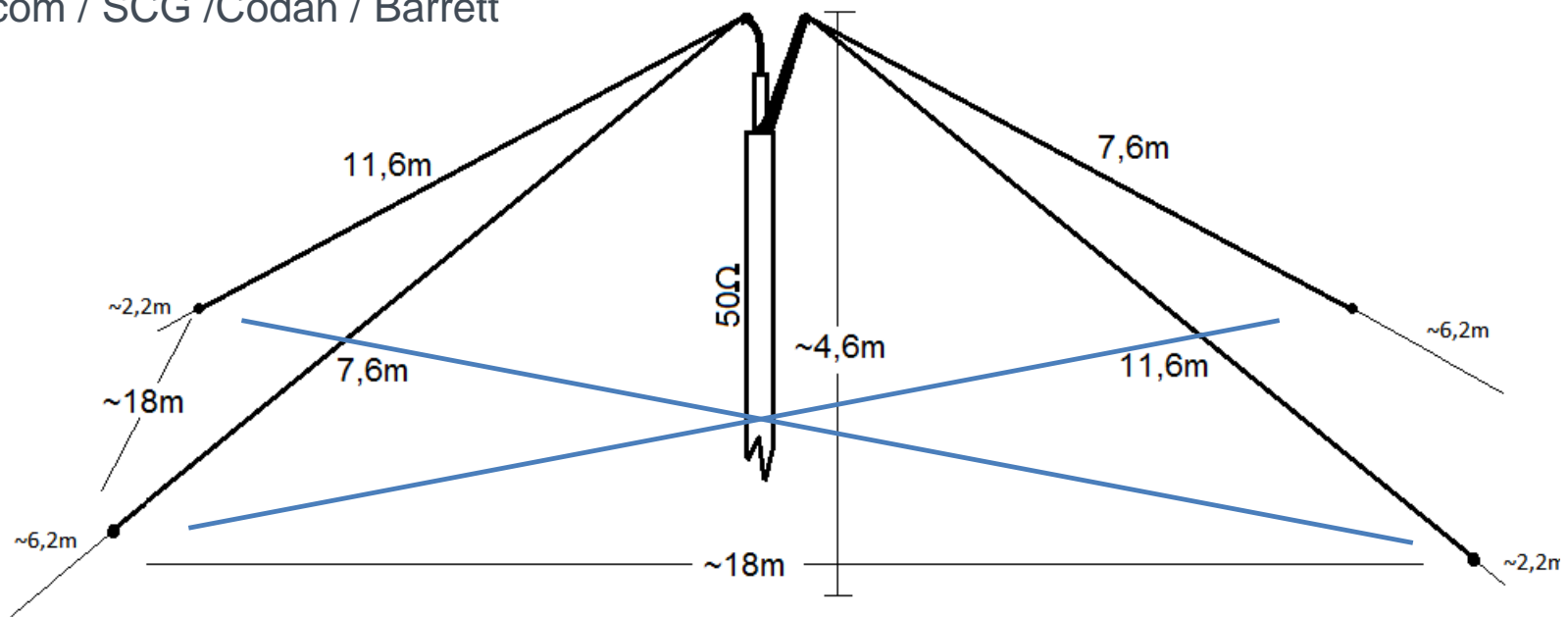
NVIS performance enhanced with ground wire counterpoise under elements shown in blue (below)

High SWR on coax (use RG213)

Must use a tuner at base

Icom / SCG / Codan / Barrett

Military NVIS antenna (AS2259/GR)



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NOTES

AREC is the public service arm of NZART Inc