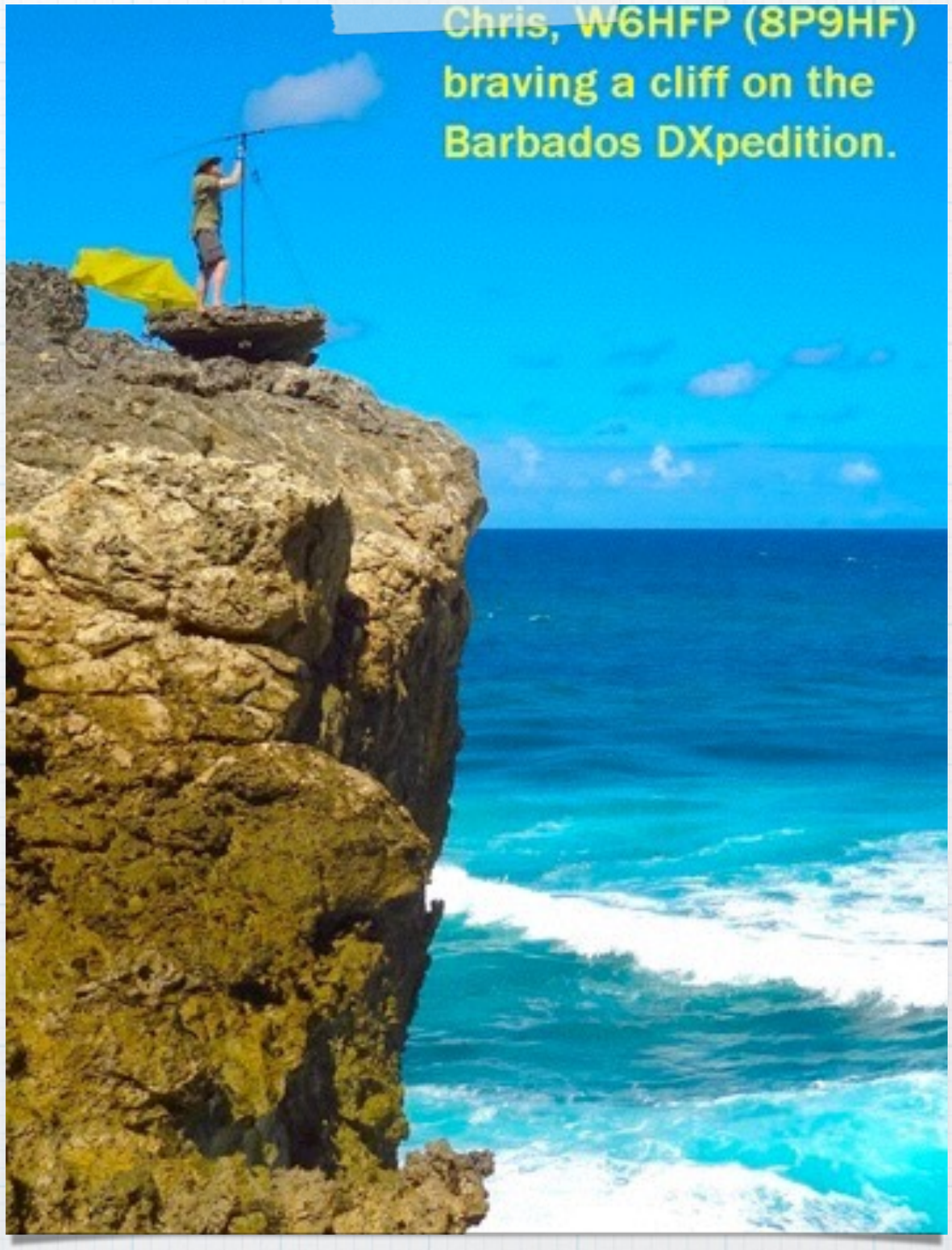
Buddipole in the Field

B. Scott Andersen,
NEIRD



What is a Buddipole?

* Buddipole is a portable antenna system for 80m—2m that breaks down into small packages for travel and storage.
* The system is based on standard 3/8x24 threading so it can utilize non-Buddipole parts as well.

History from W3FF

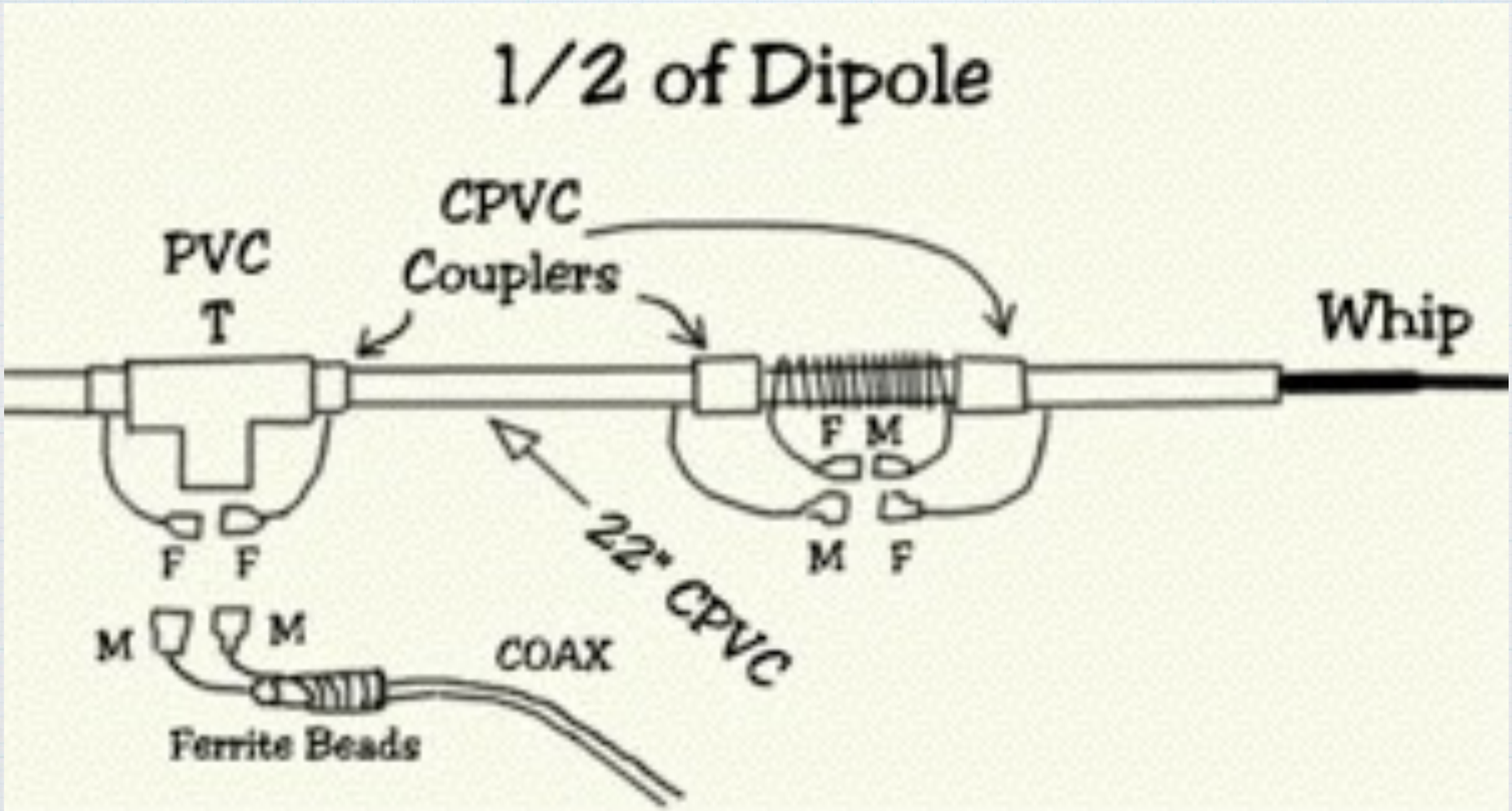
History of the Buddipole

In January of 2000, I began experimenting with a "walking portable" ham station. Since then, thousands of stations have been worked on the amateur radio bands, mostly from 10 Meters through 60 Meters.

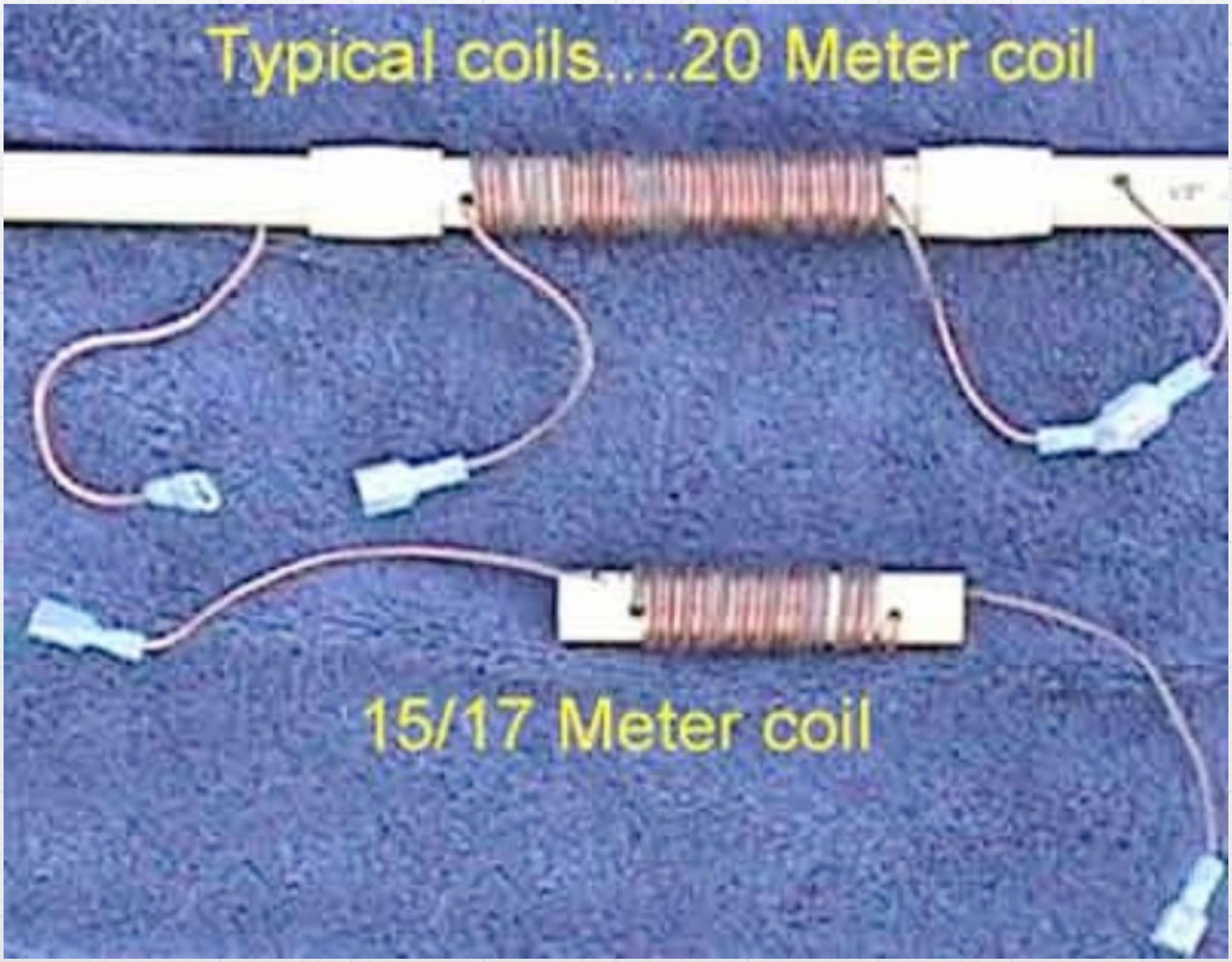
Homebrew Buddipole

* https://sites.google.com/site/w3ffhomepage/
* PVC, speaker wire, cheap hardware
* Slip-together design
* Grass roots user group of enthusiast
* Yahoo! Buddipole User Group (BUG)

The general idea



Loading coils



Whips

Photo 1: Whip Details

Center TEE

Photo 1: T Details

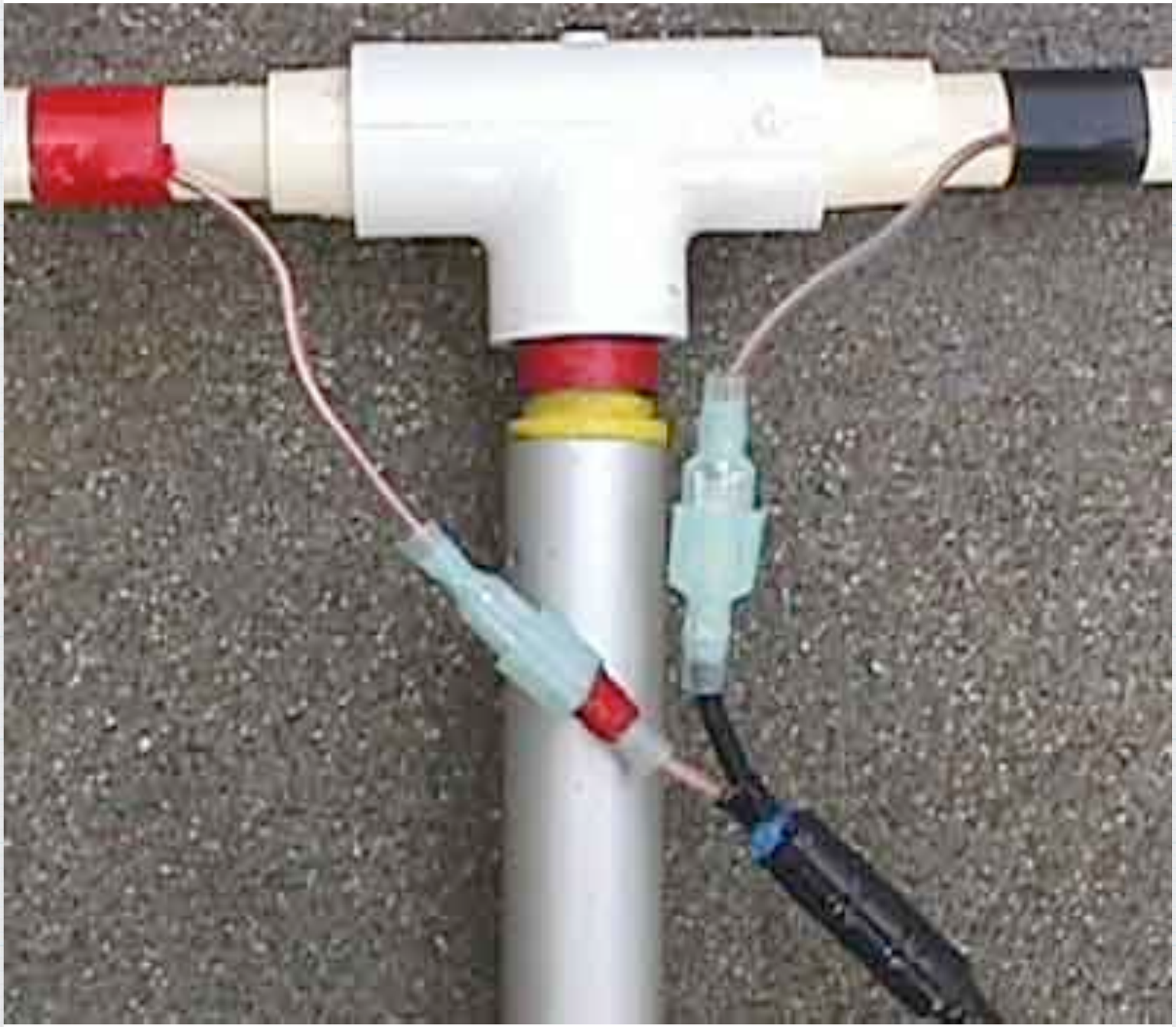


Photo 1: T with Balun

Theory

Feedpoint impedance

* Measured in ohms (Ω), consists of:
  * Radiation resistance
  * Reactance
  * Losses

Losses

* Wire has some resistance
* There are losses due to interaction with the ground
* Coils introduce losses
* Any power that goes into the antenna but doesn't come out in a useful way is a loss

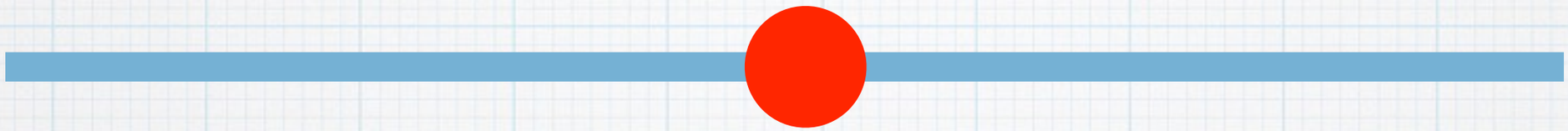
Efficiency

$$\text{Efficiency}\% = \frac{\text{Radiation\_resistance}}{\text{Radiation\_resistance} + Losses} x100$$

For a dipole: $\frac{67}{70} x100 = 96\%$

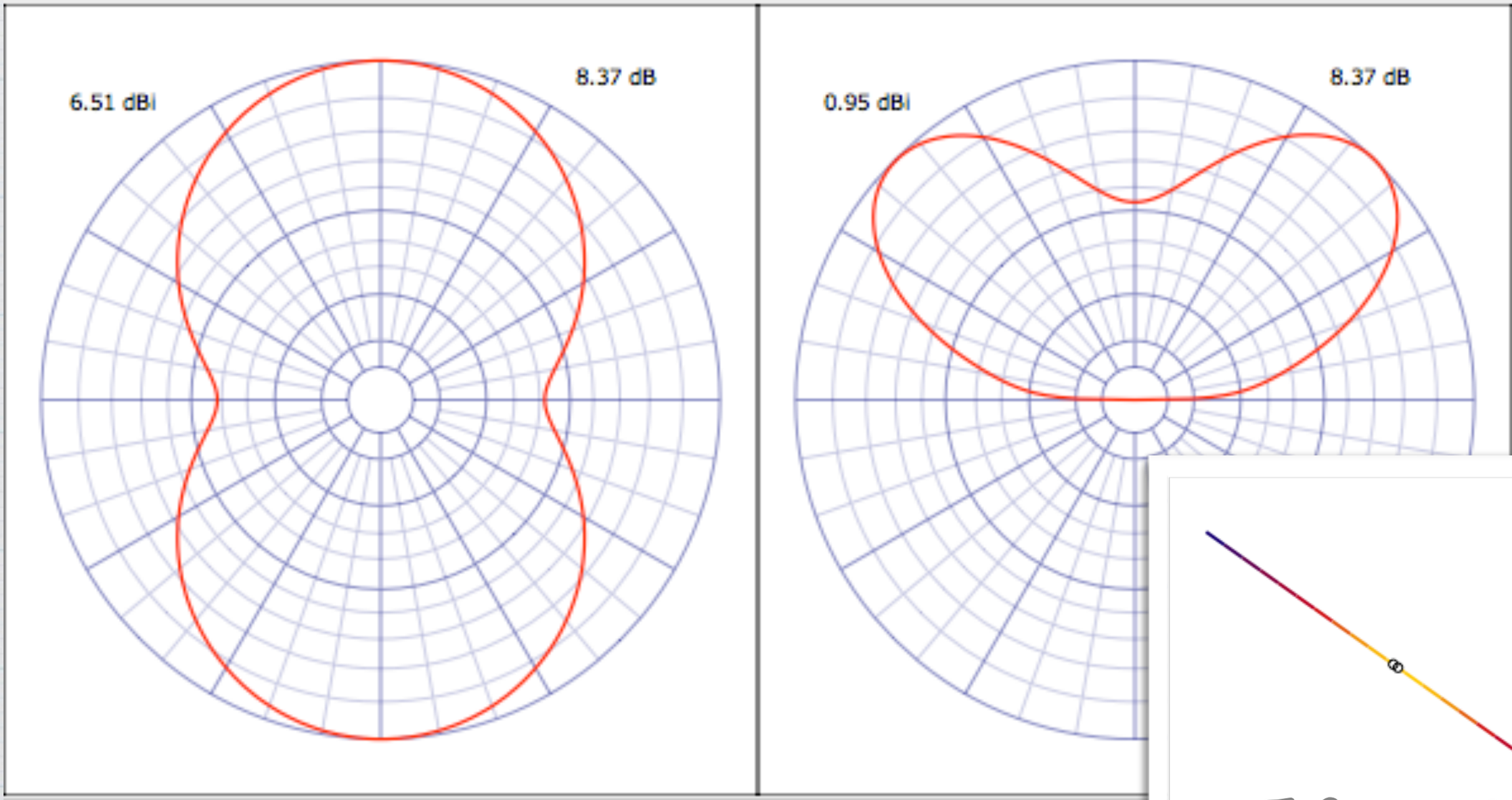
Radiation resistance is 67 ohms
Ohmic losses of about 3 ohms
No reactance
This gives us a very efficient system

Dipoles

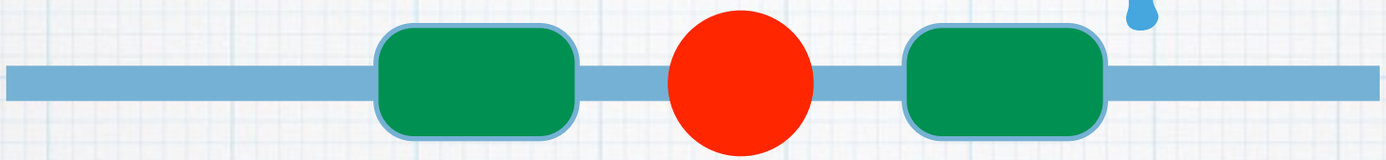


* Half-wave dipole
* Center-fed at height has about a 72Ω feed impedance,
* and if tuned, little or no reactance

20m center fed dipole



Shortened Dipoles

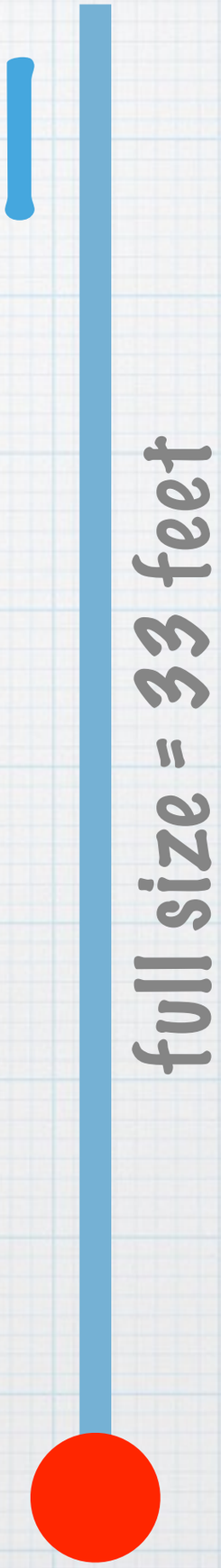


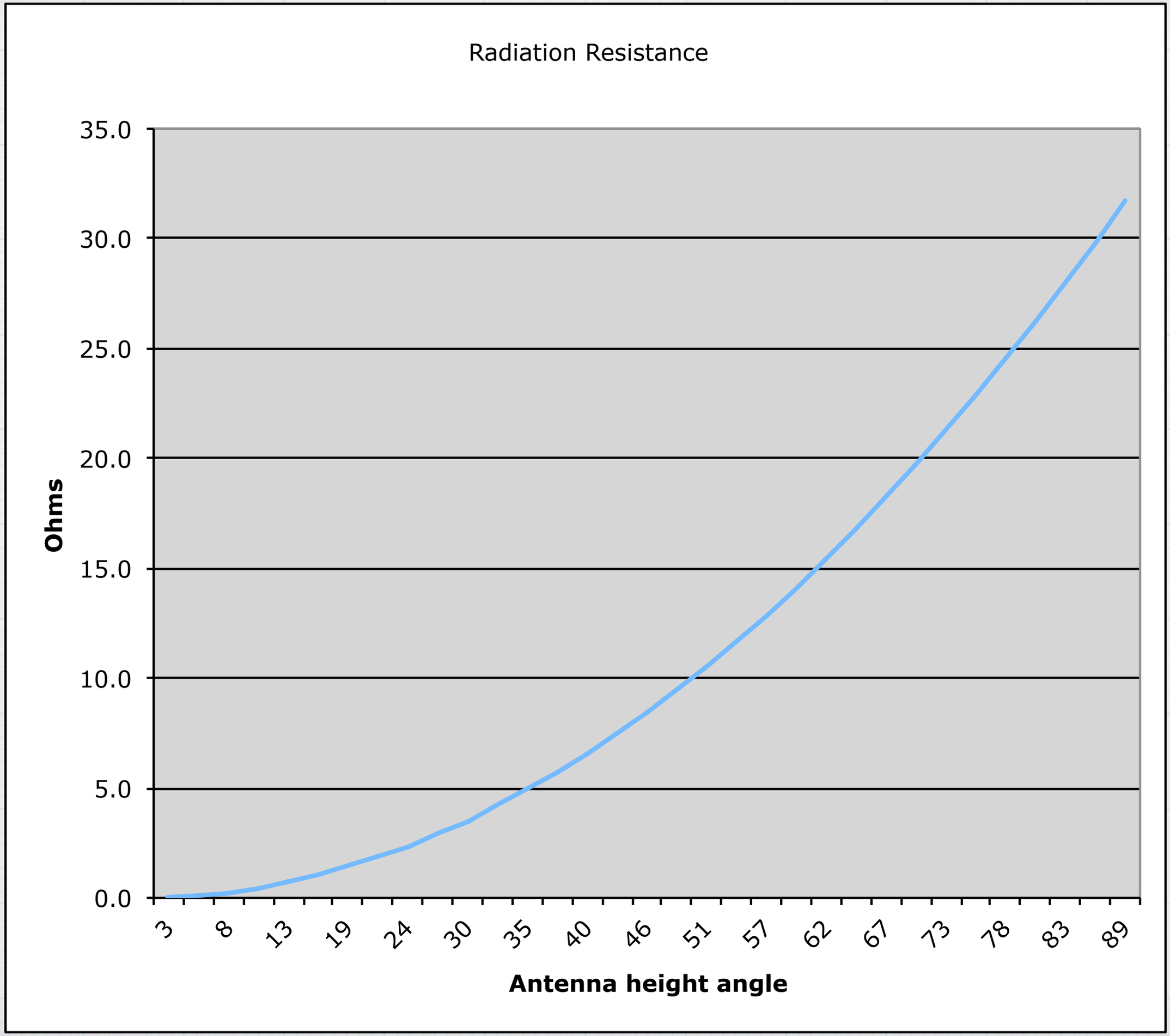
* If you shorten an antenna the radiation resistance goes down and it gains capacitive reactance
* Capacitive reactance can be cancelled out by inductive reactance (that's why we have coils on short antennas), but the coils introduce more losses

40m 1/4 vertical

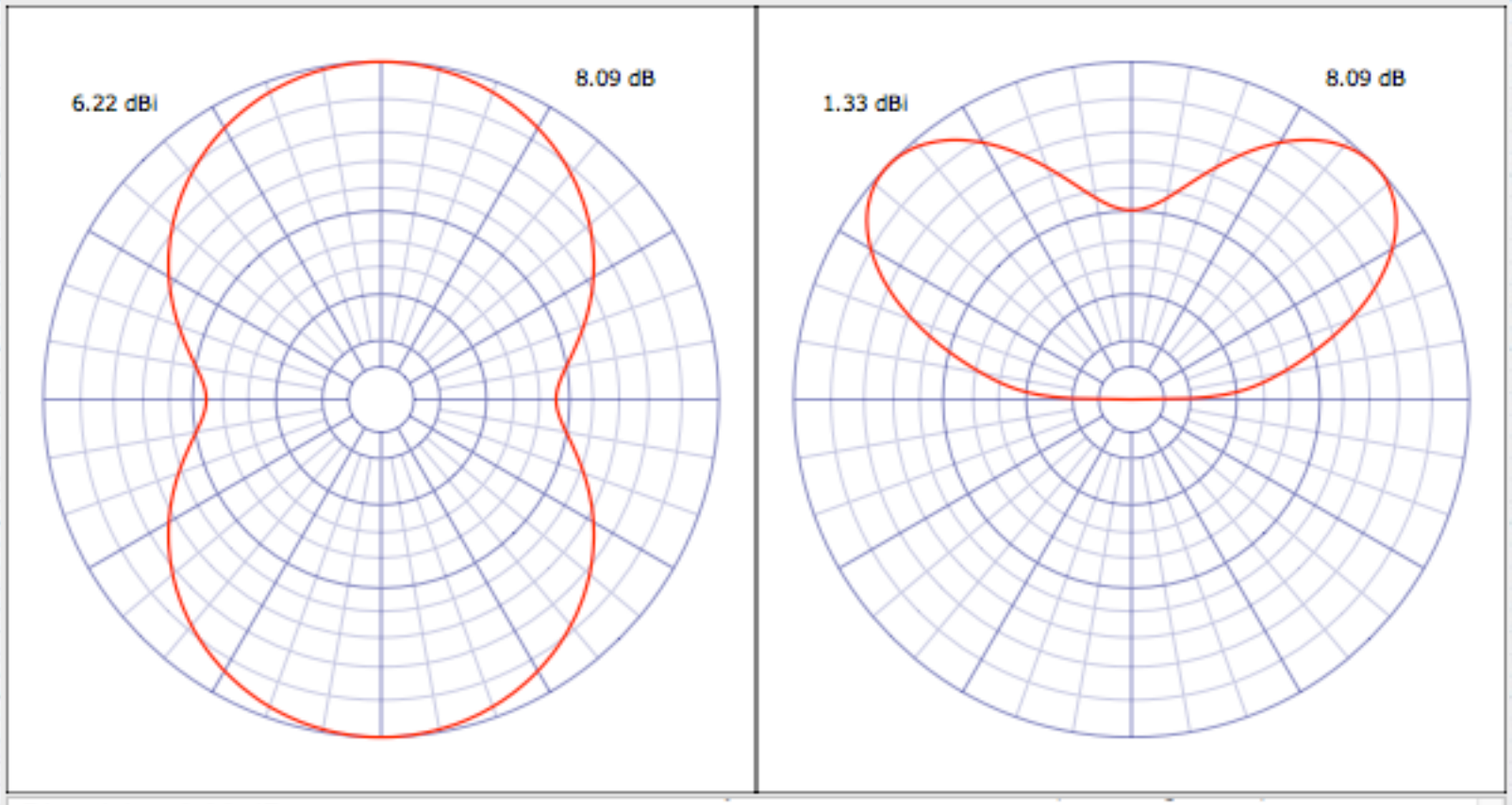
* 1/4 verticals are kind of "half dipoles" so you get about 1/2 of the radiation resistance of a dipole

* As you make it shorter, Rrad goes down




Radiation Resistance
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Ohms
3
8
13
19
24
30
35
40
46
51
57
62
67
73
78
83
89
Antenna height angle

20m short dipole



Directivity: 8.09 dB
Max gain: 7.34 dBi (azimuth 90 deg., elevation 30 deg.)
Front-to-back ratio: 0.00 dB (elevation 30 deg)
Front-to-back ratio: 0.00 dB (elevation of front lobe)
Front-to-rear ratio: 0.00 dB
Average Gain: 0.8489 (0.712 dB)
Compute time: 0.04 sec

--------- 2015-04-25 19:16 ---- (nec2c) -----

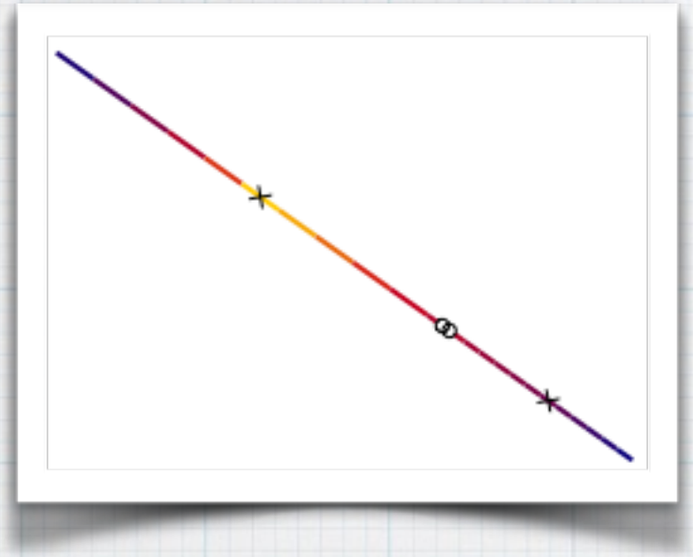
Frequency 14.080 MHz
Feedpoint(1) - Z: (32.459 + i 0.489) I: (1.0000 + i -0.0000) VSWR(Zo=50 Ω): 1.5:1

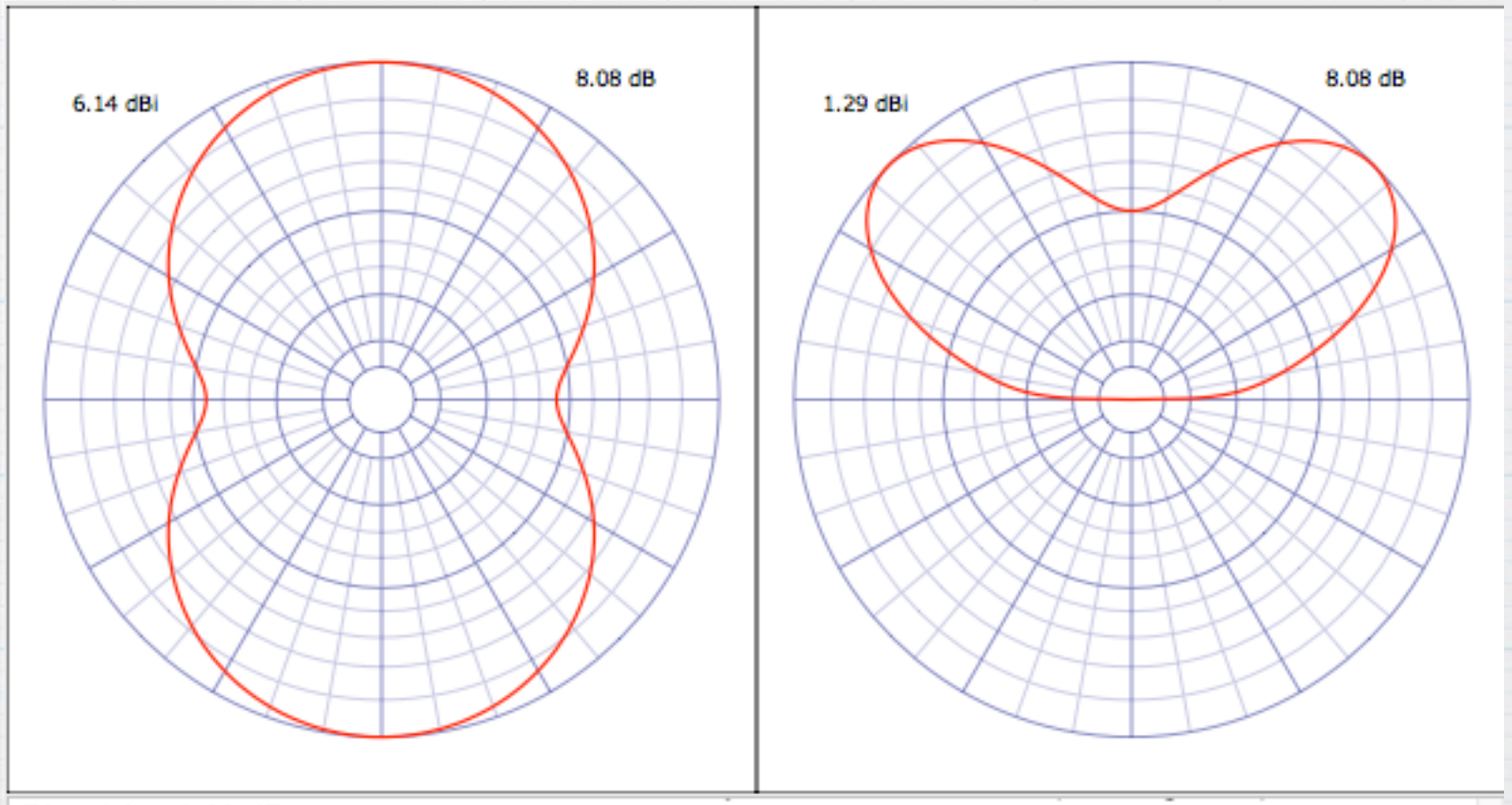
* 3m on a side
* Center fed
* Loading coils
* 32Ω feed point impedance

Dipoles

* You don't need to feed it in the middle
* Off-center-fed dipoles are common
* But, when you feed it off-center the feedpoint impedance goes up
* Carolina Windom has 450Ω feedpoint needing a 9:1 balun to match a 50Ω radio

20m short OCF dipole





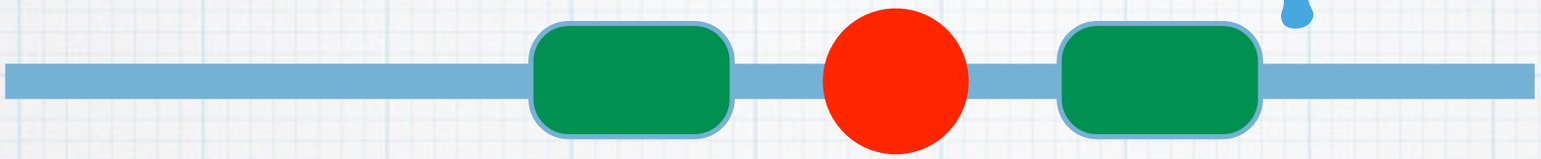
Directivity: 8.08 dB
Max gain: 7.26 dBi (azimuth 90 deg., elevation 30 deg.)
Front-to-back ratio: 0.00 dB (elevation 30 deg)
Front-to-back ratio: 0.00 dB (elevation of front lobe)
Front-to-rear ratio: 0.00 dB
Average Gain: 0.8349 (0.783 dB)
Compute time: 0.04 sec

--------- 2015-04-25 20:59 ---- (nec2c) -----

Frequency 14.080 MHz
Feedpoint(1) - Z: (47.869 + i 4.696) I: (1.0000 + i -0.0000) VSWR(Zo=50 Ω): 1.1:1

* 1.75m on one side
* 4.25m on the other
* Off-Center Fed (OCF)
* Loading coils
* 48Ω feed point impedance

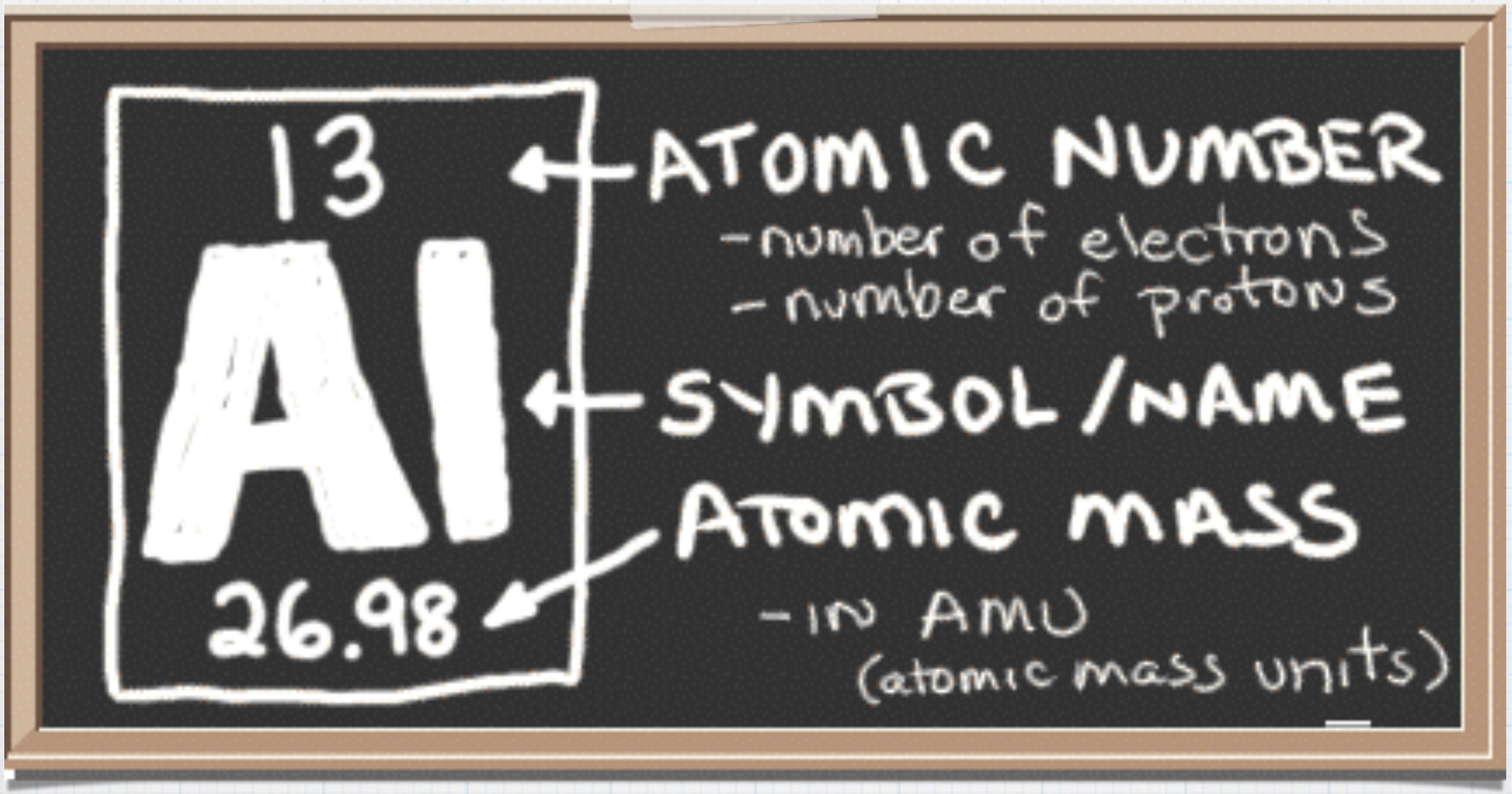
Shortened Dipoles



* So: Shorten the dipole and the radiation resistance goes down, cap reactance up
* We "tune" the antenna with the coil
* And, we move the feed point offset from center to raise the impedance to something close to 50 ohms again
* That's what Buddipole does!

Commercial

BUDDIPOLE


13
Al
26.98
ATOMIC NUMBER
- number of electrons
- number of protons
SYMBOL / NAME
ATOMIC MASS
- IN AMU
(atomic mass units)

Aluminum

VersaTee

Rotating Arm Kit

Coils

Coil clips

Antenna "arms"

Whips


W3FF
ANTENNAS
BUDDIPOLE
www.buddipole.com

Long mast

19 feet plus the tripod
This makes dipole configurations or Yagis viable. Roof / balcony deployments are nice.

TRSB

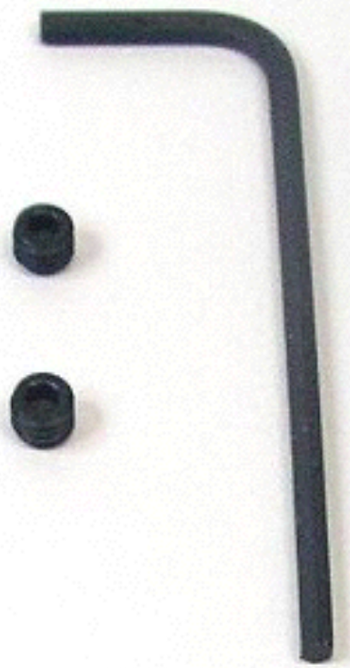
Triple Ratio Switch Balun

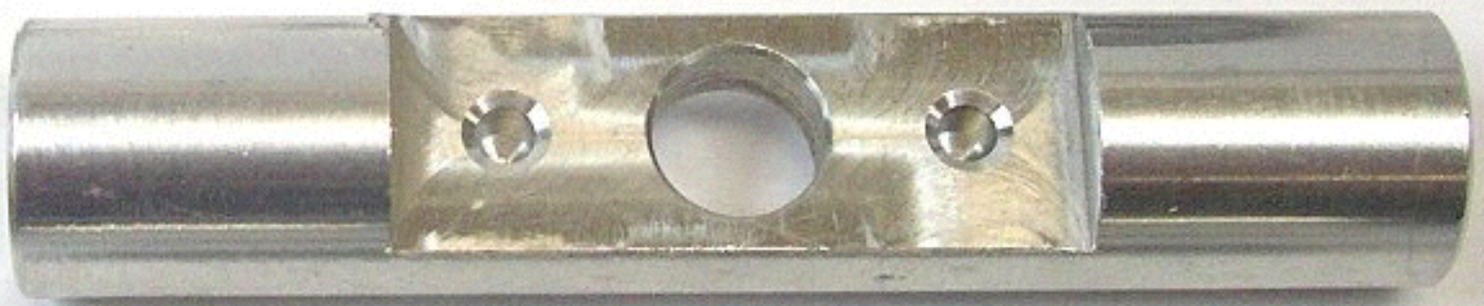
Matches antennas with
50Ω, 25Ω, or 12.5Ω
impedances to 50Ω radios

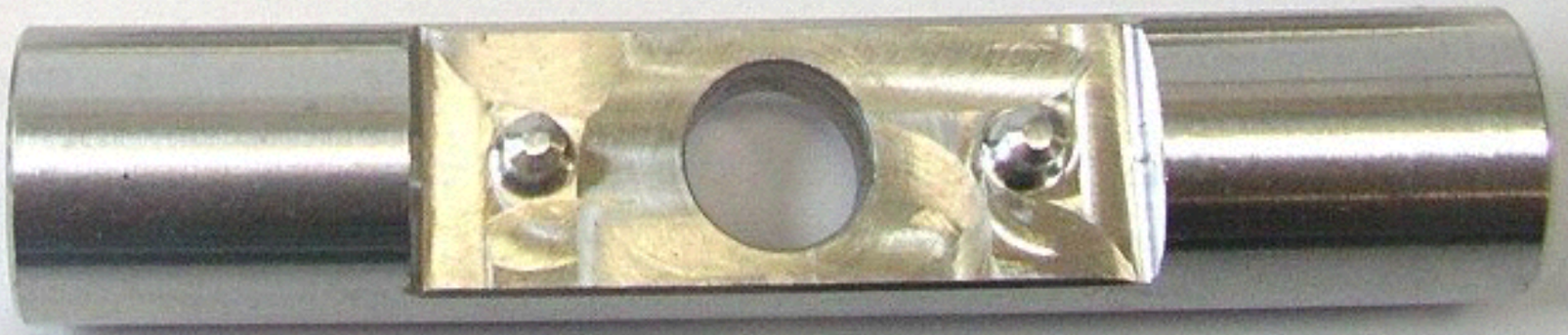
Mini-Buddipole

Shock-cord mast

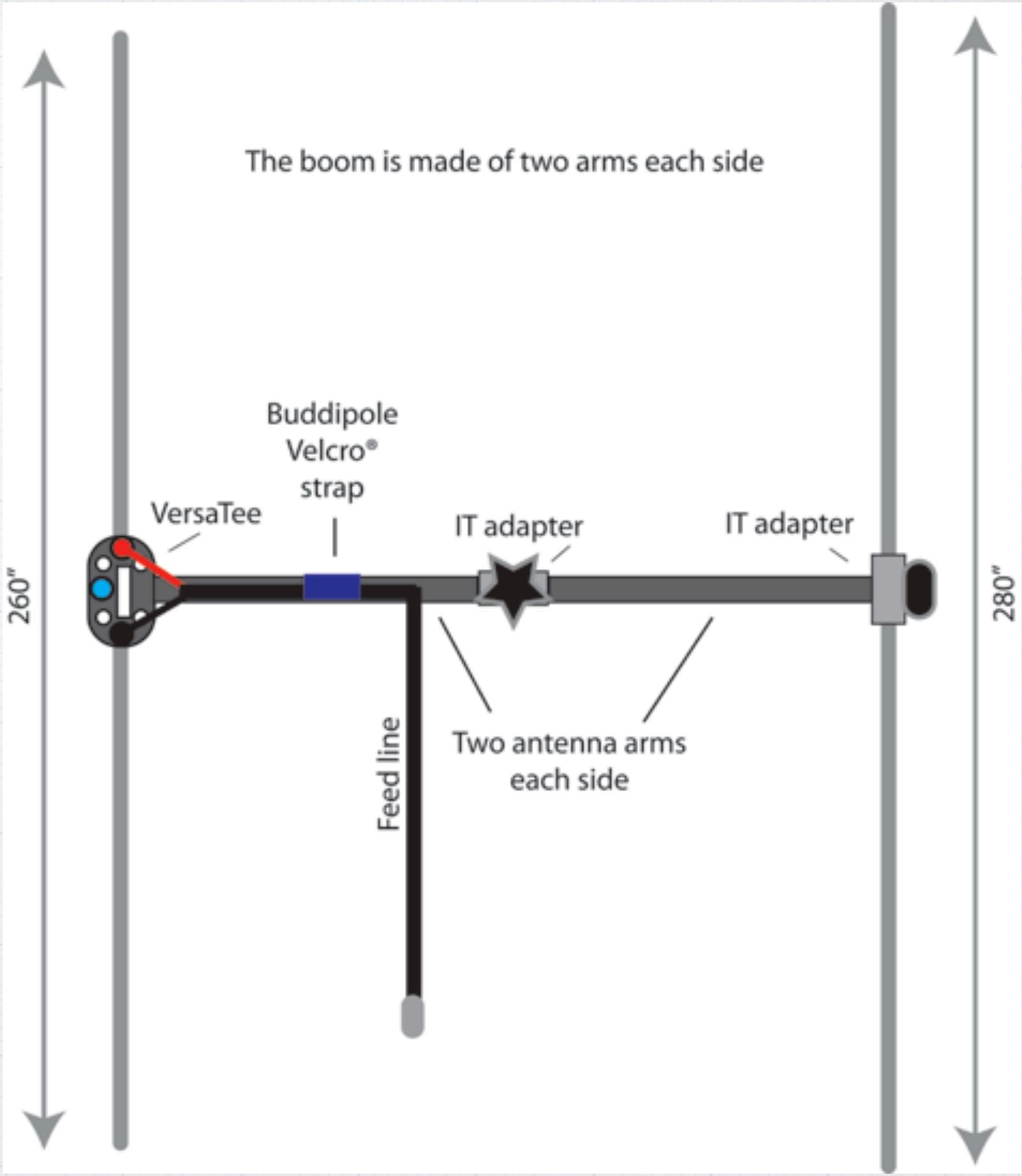
Adjustable shock-cord whips



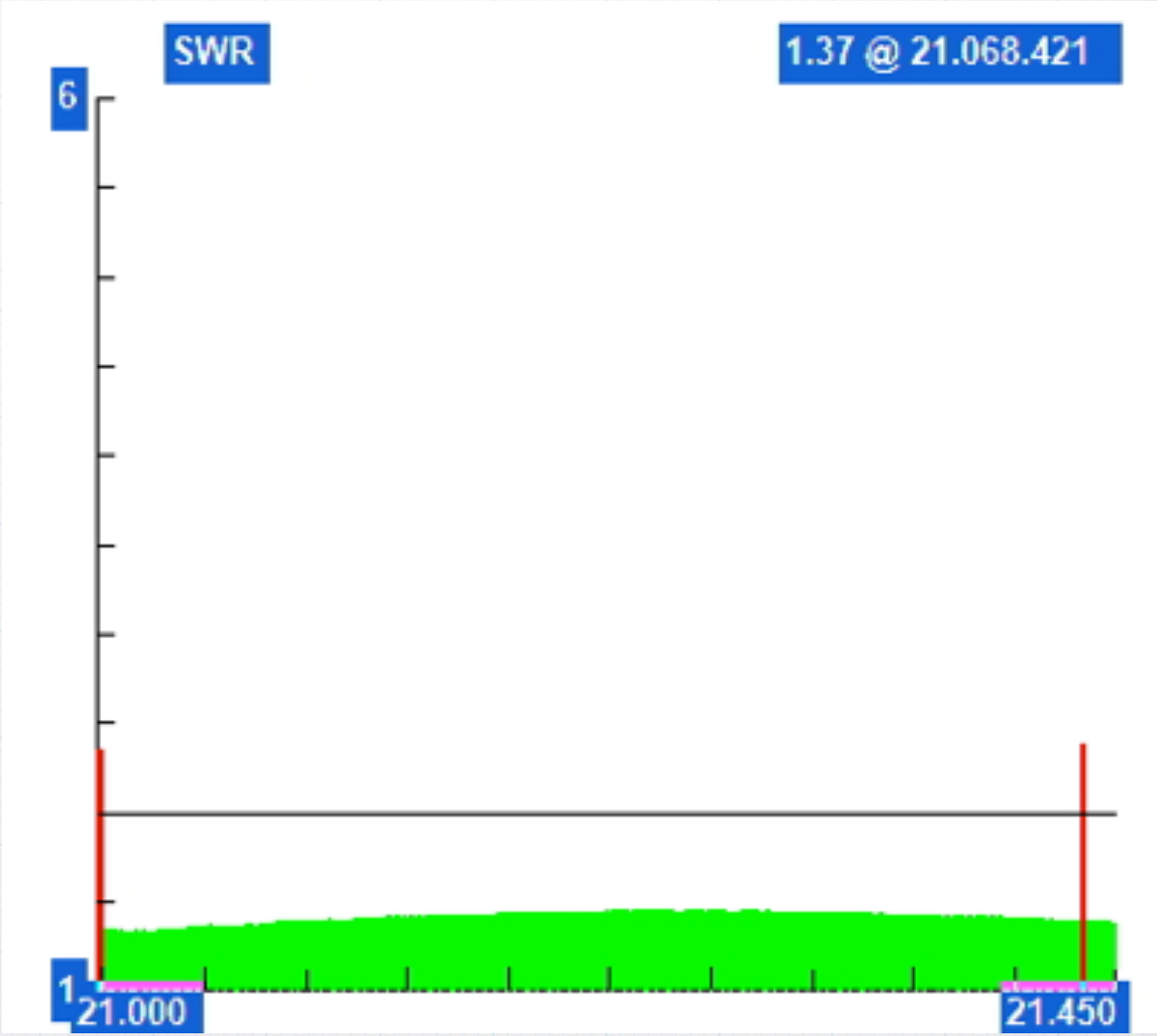


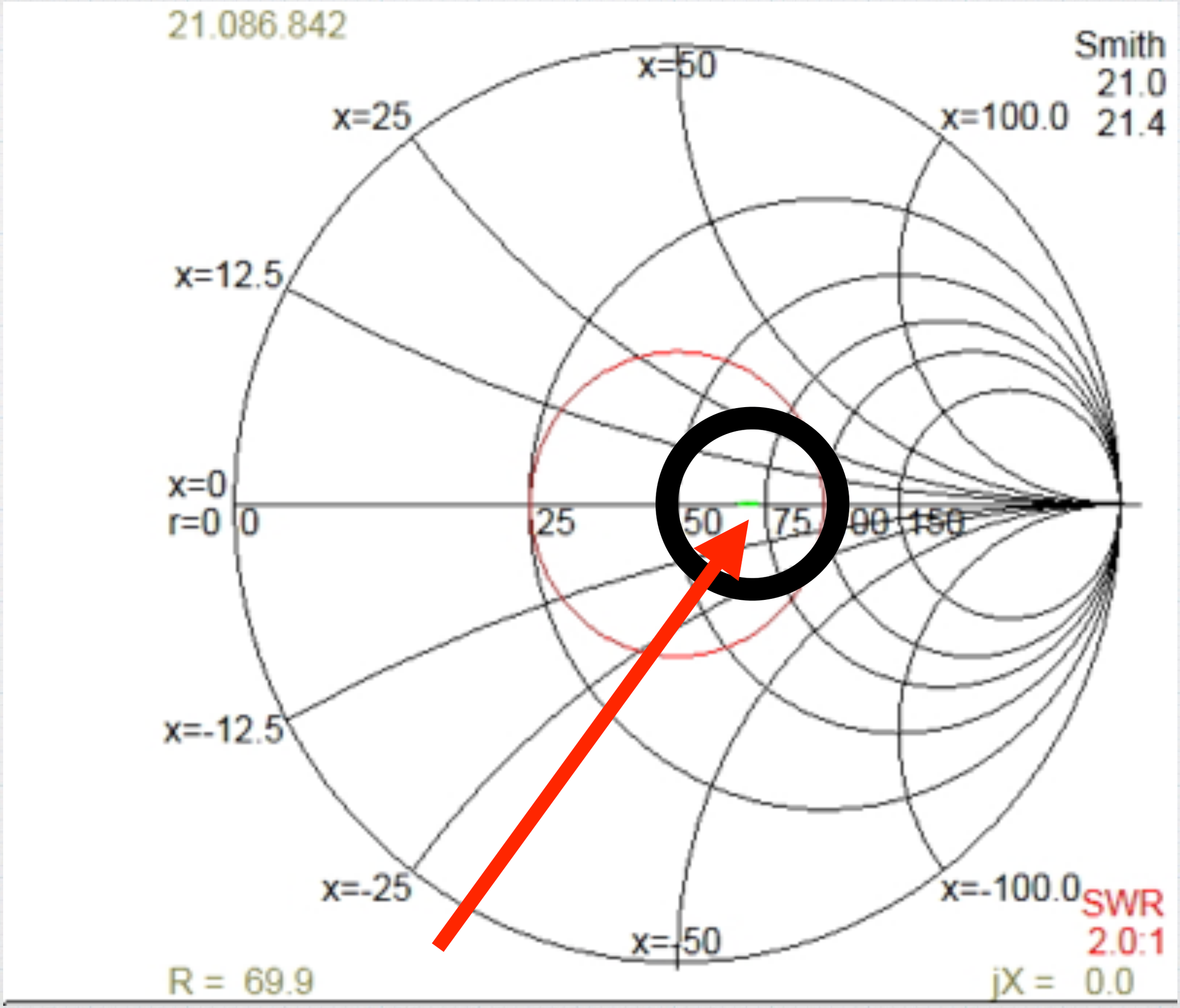


15m 2-elem


The boom is made of two arms each side
Buddipole Velcro® strap
VersaTee
IT adapter
IT adapter
260"
280"
Feed line
Two antenna arms each side

SWR




21.086.842
Smith
21.0
21.4
x=50
x=25
x=100.0
x=12.5
x=0
r=0
0
25
50
75
00
150
x=-12.5
x=-25
x=-50
x=-100.0
SWR
2.0:1
R = 69.9
jX = 0.0

By the numbers

* 977 contacts, 808 in the CQ WPX SSB
* 794 unique stations
* 48 states (missing ND and WY)
* 58 DXCC entities
* 17 zones
* Contest QSOs QRP (5 watts)

March 2010 — St. Thomas — 15m Yagi

BUDDIPOLE IN THE FIELD

by **B. Scott Andersen, NE1RD**
Foreword by **Chris Drummond, W6HFP**
BUDDIPOLE, Inc.