How not to get in Dutch with your wife

Stealth Antennas for HOAs

- An Antenna is nothing more than a powered and tuned circuit producing waves, voltage, and current flow inside.

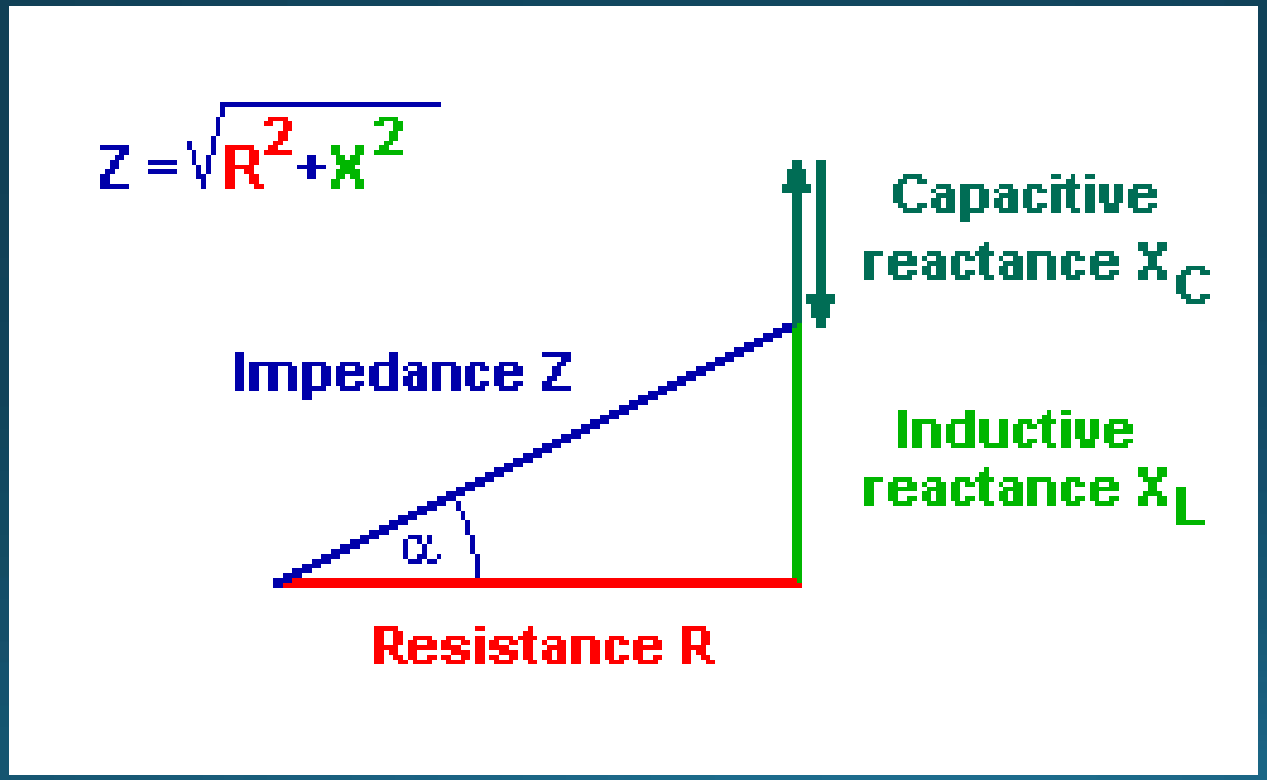
- An Antenna may have any two of:
  - Bandwidth
  - Efficiency
  - Small Size

But not the third.

Antenna Bandwidth

- The quality (**Q**) factor of an **antenna** is a common and simple way to quantify the bandwidth of an **antenna**
- The **Q** of the **antenna** is defined as the quotient between the power stored in the reactive field and the rad
- The **Q of an antenna** is a measure of the bandwidth of an **antenna** relative to the center frequency of the bandwidth. If the **antenna** operates over a band between f1 and f2 with center frequency fc=(f1+f2)/2, then the **Q** is given by: **Antennas** with a high **Q** are narrowband, **antennas** with a low **Q** are wideband. iated power
- Low **Q** antennas have low losses, and you often want to keep losses to a minimum. High **Q** antennas are good if you are only receiving signals, since a high **Q** antenna nearly filters out signals that are "out of band". A low **Q** antenna, on the other band, allows you to receive a wider bandwidth

Impedance


$Z = \sqrt{R^2 + X^2}$
Capacitive reactance X_C
Impedance Z
Inductive reactance X_L
α
Resistance R

J-Pole Antenna Theory

- The Ladder Line J-Pole is a vertically polarized antenna with two elements: the radiator and the matching stub. Although the antennas radiator and stub are ¾ wavelength and ¼ wavelength, respectively, it operates as an end-fed half-wave antenna. Here is how you determine the length of the J-poles two elements.

L ¾ = 8856 x V

- f

L ¼ = 2952xV

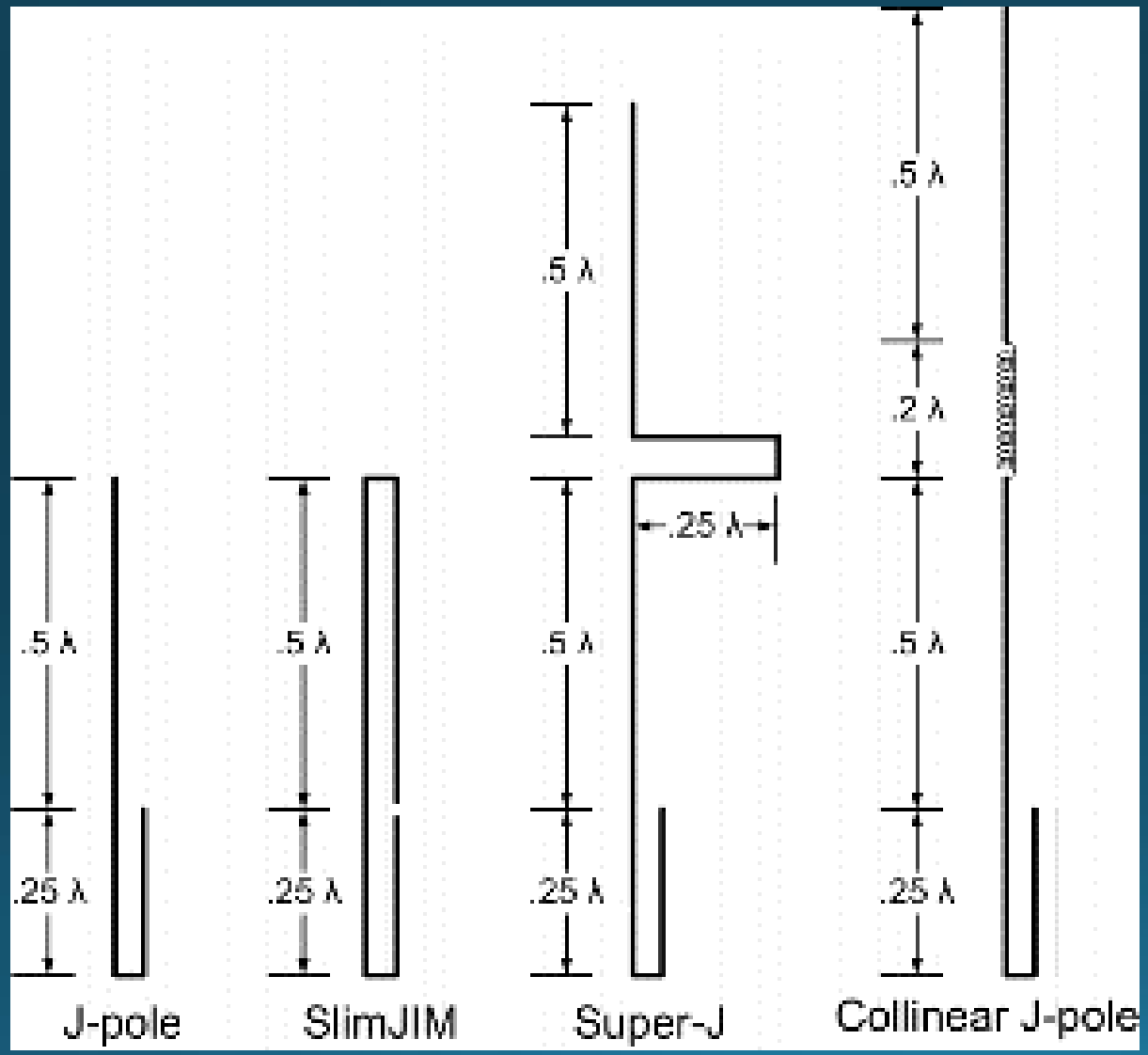
- f

Where:

- L ¾ = the length of the ¾ wavelength radiator in inches
- L ¼ = the length of the ¼ wavelength stub in inches
- V = the velocity factor of the ladder line *
- F = the design frequency in MHz.

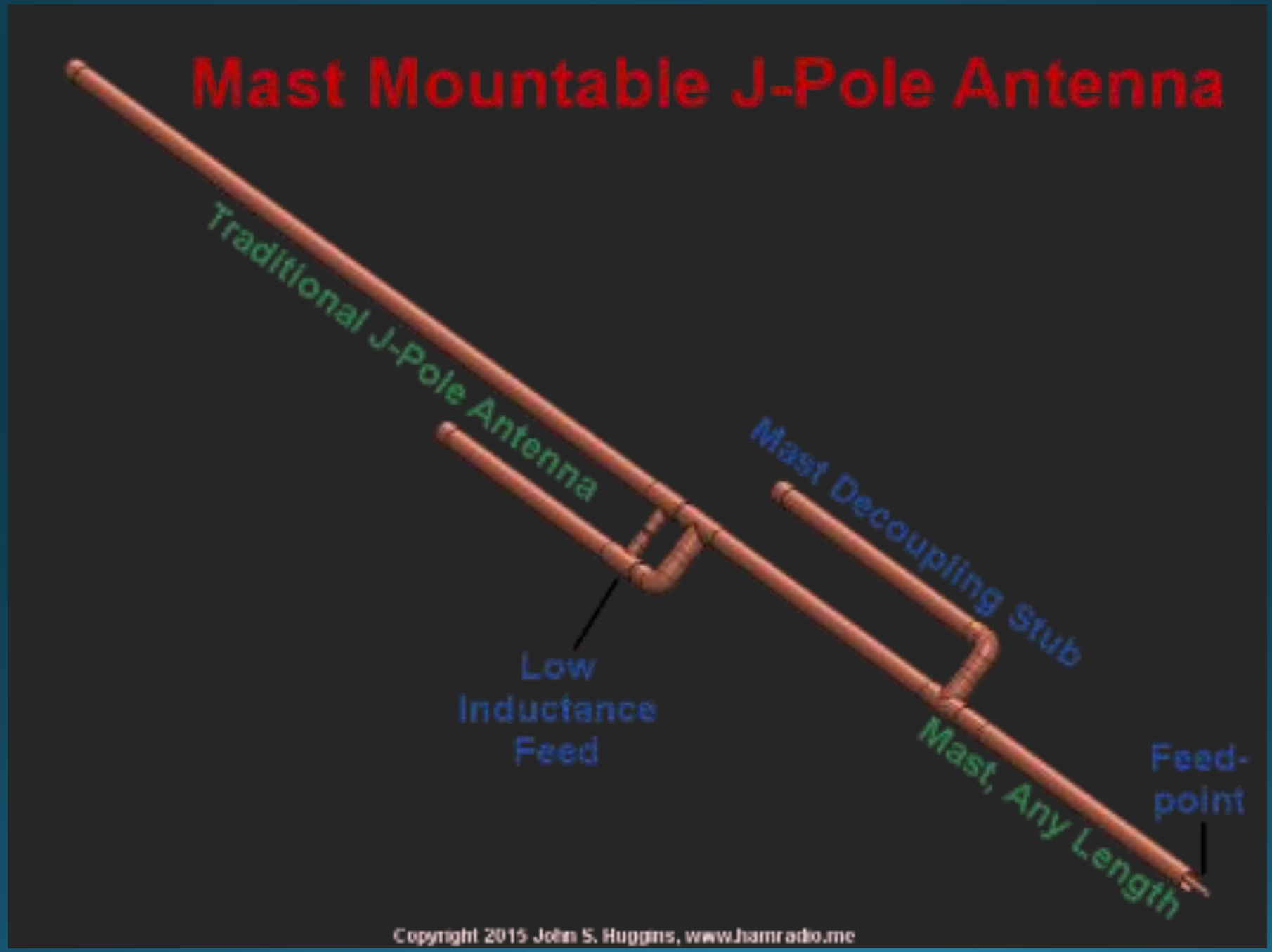
*Copper wire has a velocity factor of about 0.93, whereas 300-ohm ladder line has a velocity factor of 0.81 to 0.85 depending on who made it

J-Pole Antenna variations



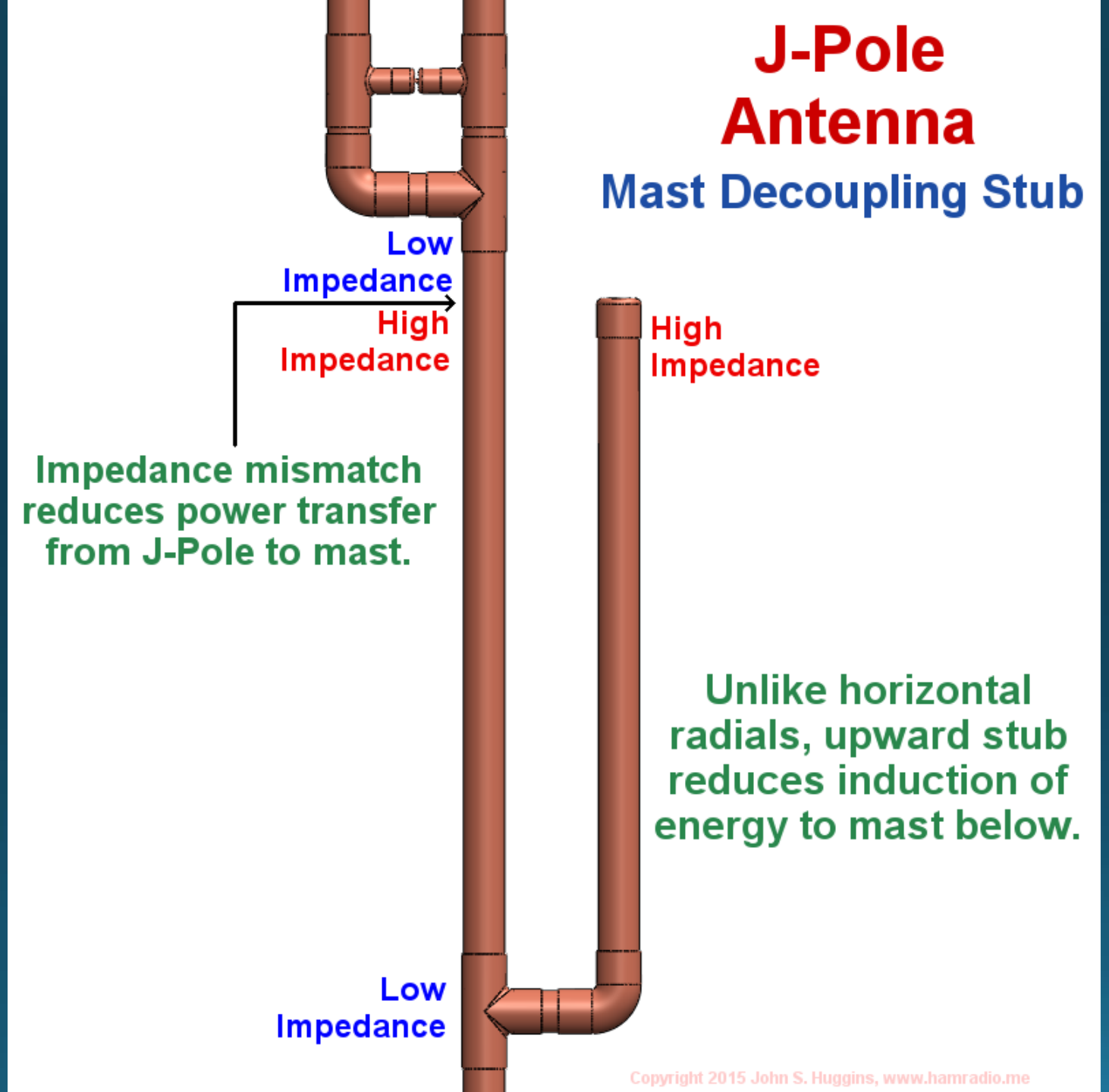
J-Pole detractions

- **Mast currents**: The j-pole is capable of shoving currents into its mounting structure. Yet this fact goes missing in the prevailing Internet j-pole discussions and howtos. Wishful thinking and a good amount of fortuitous mounting circumstances mask the undeniable propensity of the j-pole to conduct and induce currents in nearby conductors.
- **Feed-line common-mode currents**: For the same reasons the j-pole encourages mast currents, it does the same to the feedline outer shield. Fortunately just about everyone knows about this and wisely applies techniques to mitigate (choke) these currents. This can be overcome by adding an additional stub to stop the current from propagating down the mast or incorporating about 5 or 6, 4" loops in the feed line near the connection to the J-pole.
- **Exposed feedline**: Let's face it, j-pole antennas with external feedline solutions are about the silliest idea to have ever come along in radio and especially amateur radio. If there was just one reason the commercial world doesn't use the j-pole antenna, the exposed, fragile feedline would fit the bill perfectly. Where longevity matters, professional antenna systems tuck feed-lines out of sight and weather. Certainly some antenna systems have visible coax, but few have the great big loop of coax waiting for physical impairment by whatever the world throws at the antenna installation.
- **High inductance feed lines**: Nicely-narrow, ladder-line, j-pole antennas aside, those made with copper pipe and similar large conductors have a necessarily wide gap at the feedpoint. Upon leaving the confines of the transmission line (be it coax or parallel) the wires travel a small distance before connection to the antenna's impedance. Though small, the inductance of these leads does measurably modify the overall impedance.


Mast Mountable J-Pole Antenna
Traditional J-Pole Antenna
Mast Decoupling Stub
Low
Inductance
Feed
Mast, Any Length
Feed-
point
Copyright 2015 John S. Huggins, www.hamradio.me

J-Pole Antenna

Mast Decoupling Stub

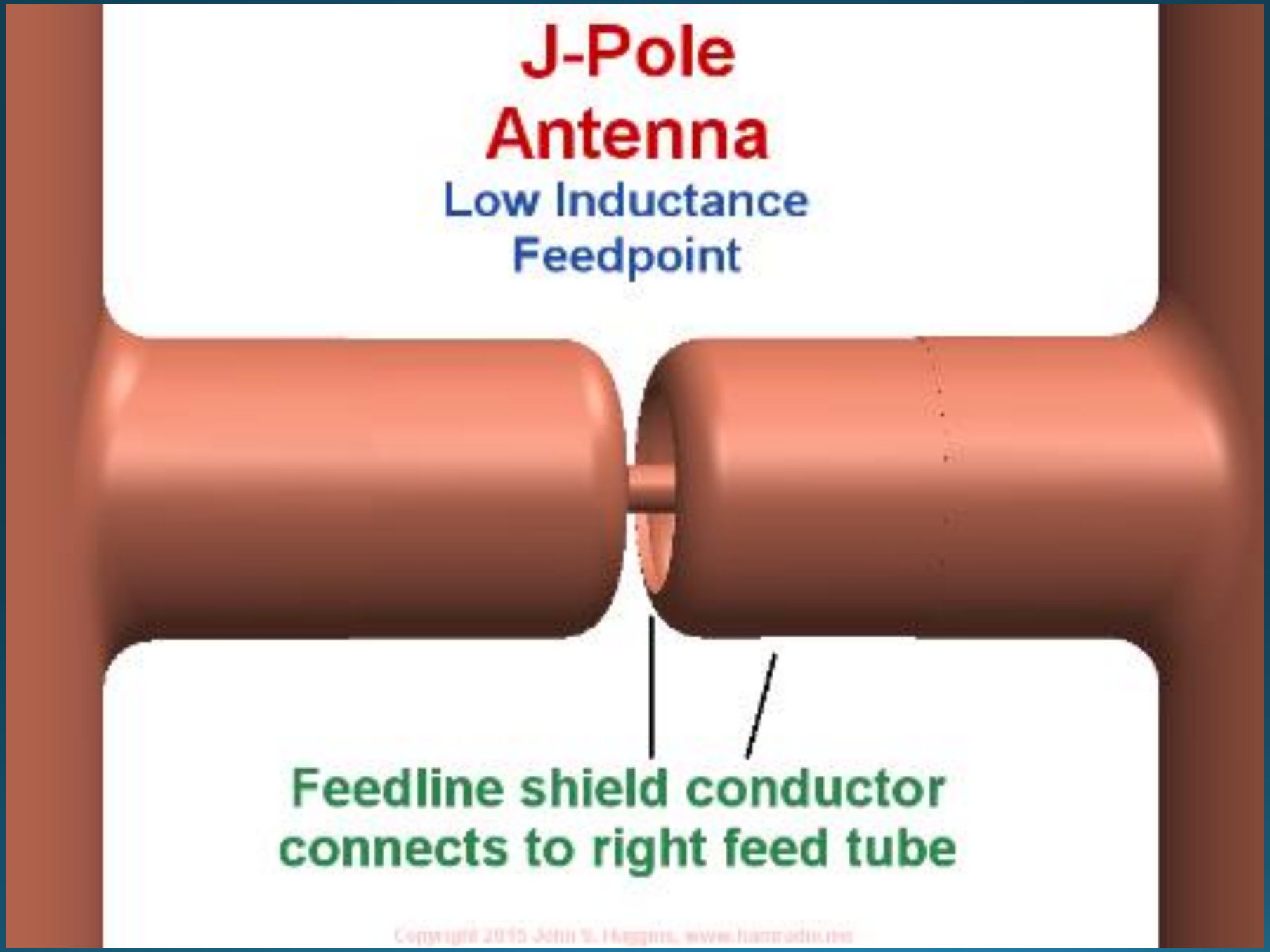


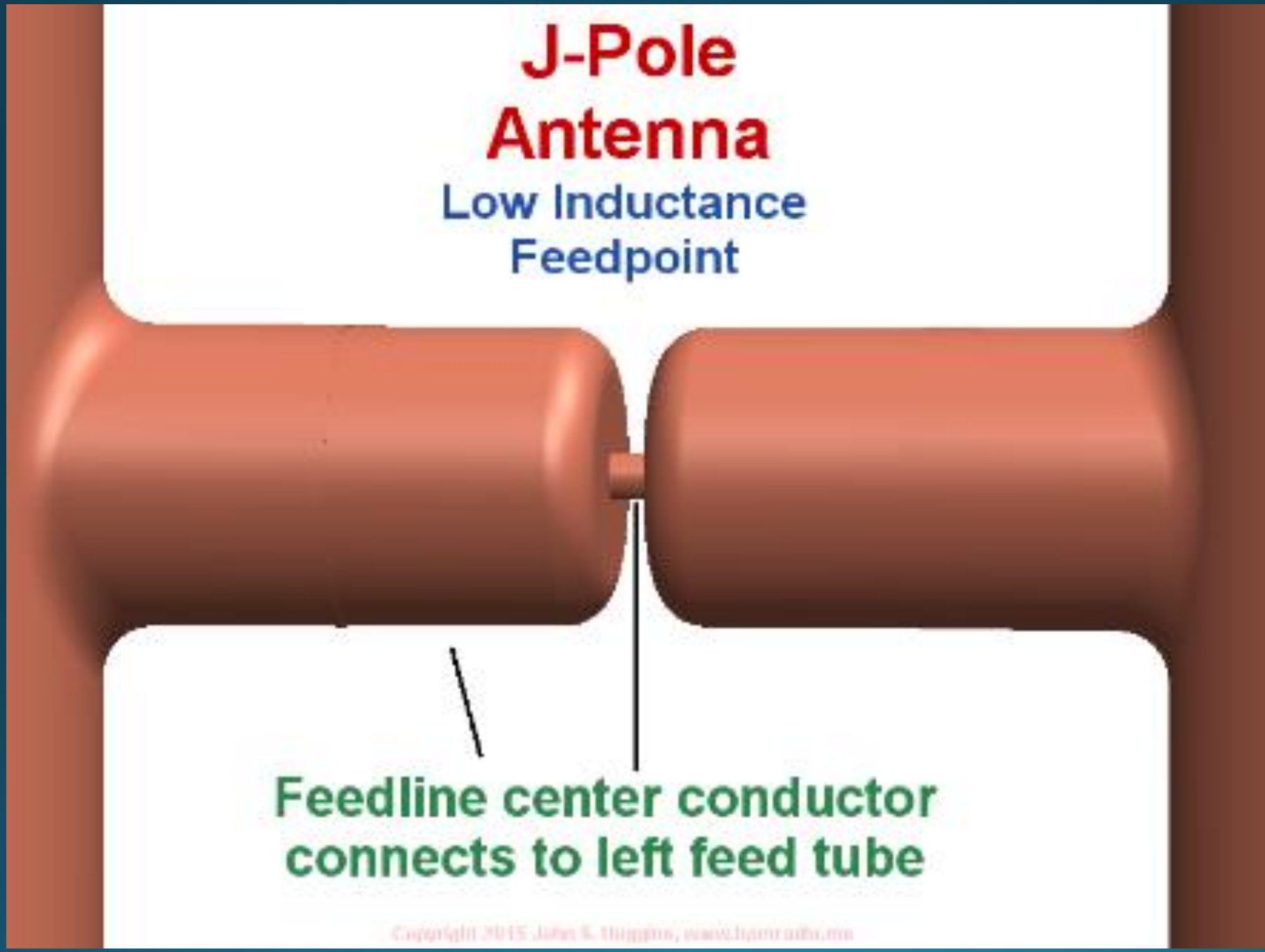
Impedance mismatch reduces power transfer from J-Pole to mast.

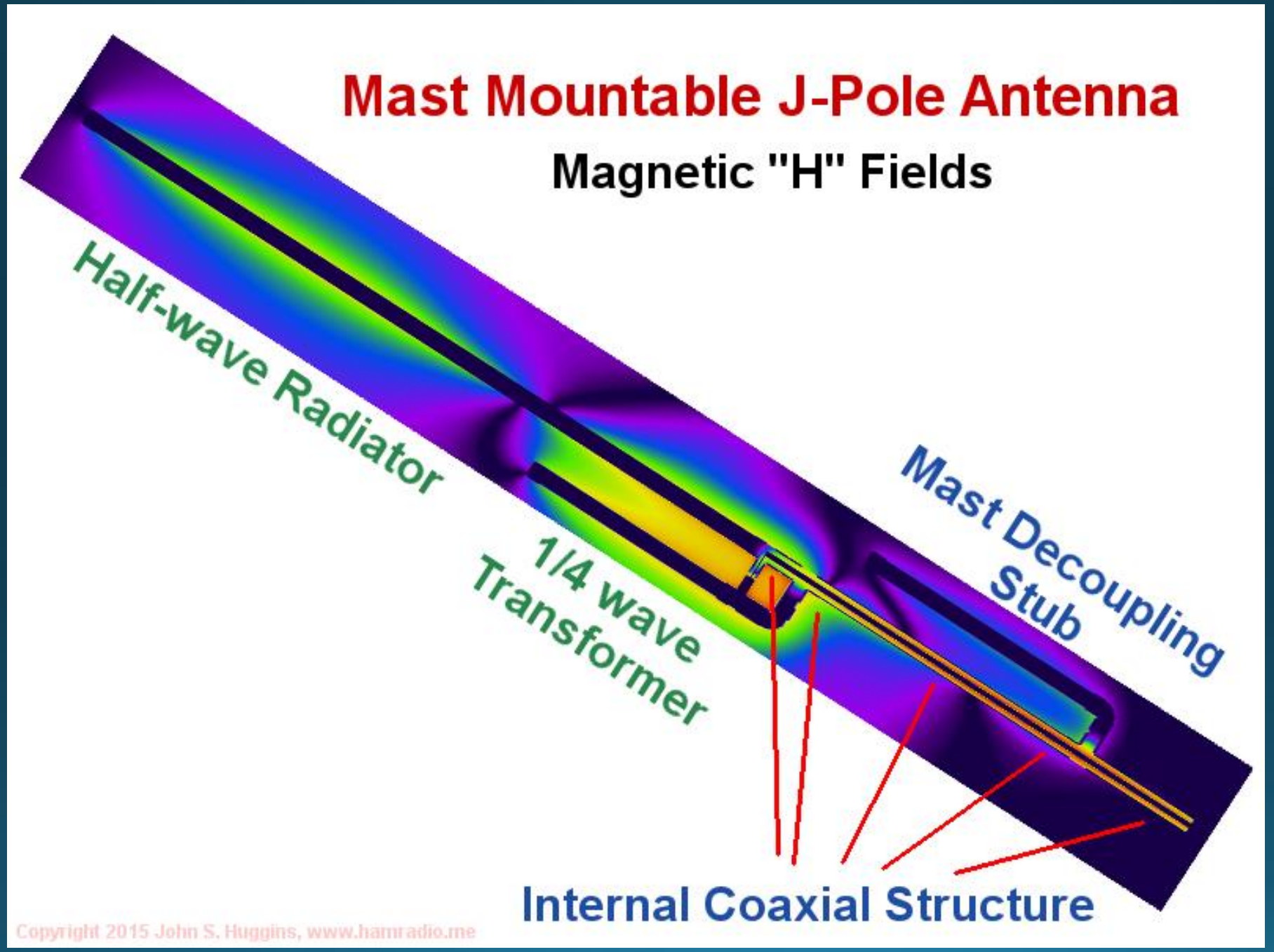
Unlike horizontal radials, upward stub reduces induction of energy to mast below.

J-Pole Antenna

Low Inductance Feedpoint




J-Pole
Antenna
Low Inductance
Feedpoint
Feedline center conductor
connects to left feed tube


Mast Mountable J-Pole Antenna
Magnetic "H" Fields
Half-wave Radiator
1/4 wave Transformer
Mast Decoupling Stub
Internal Coaxial Structure
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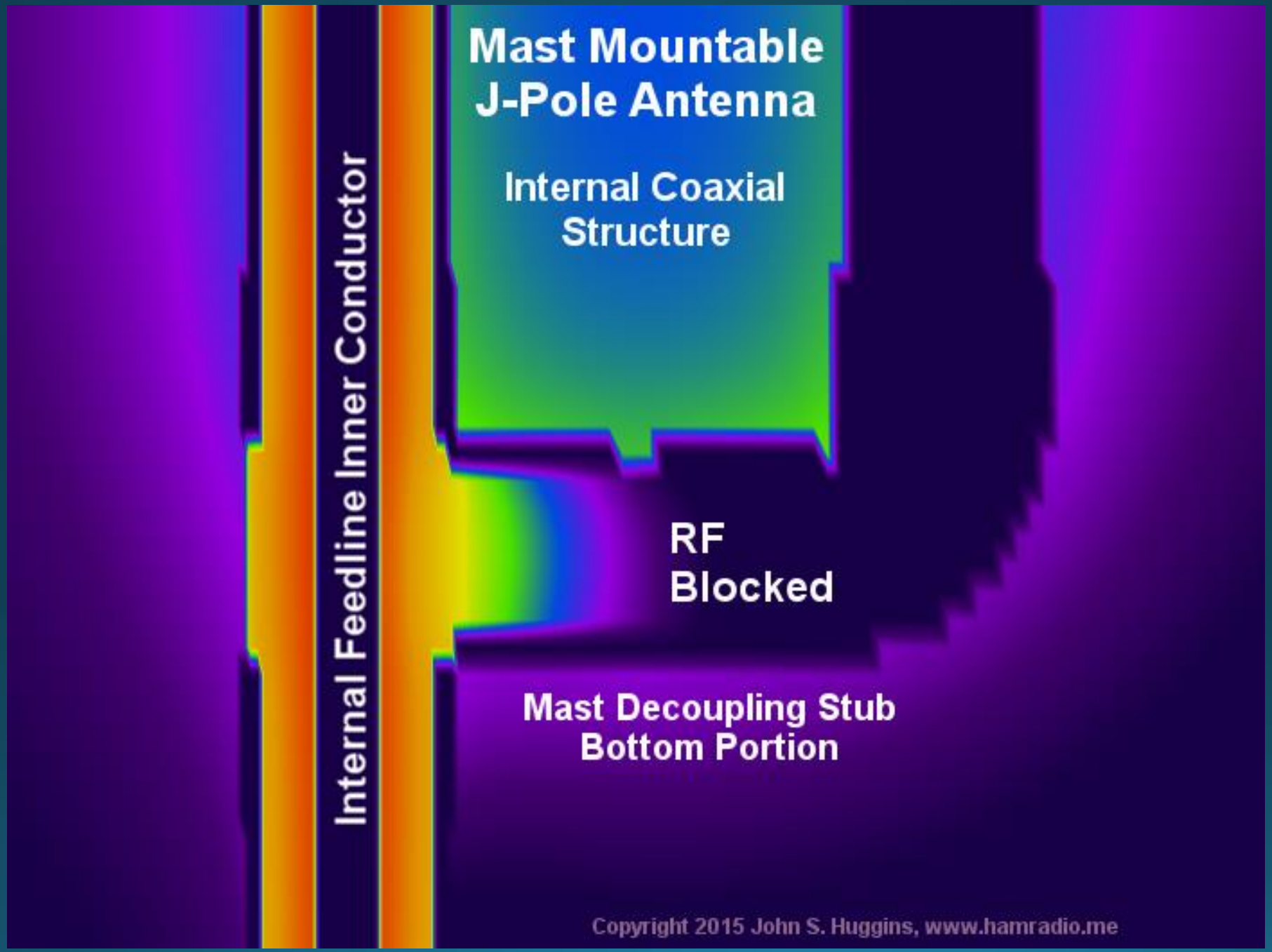
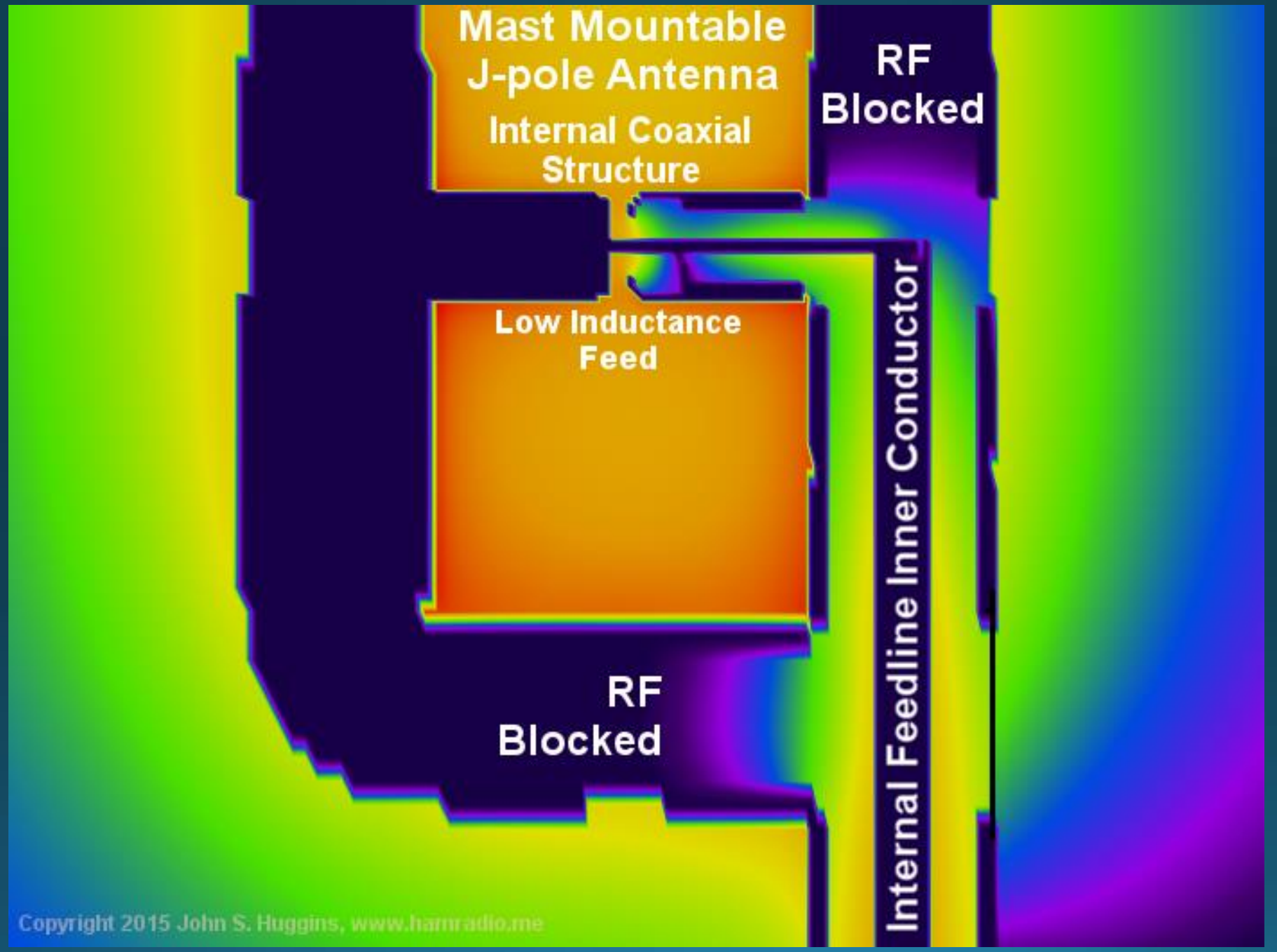
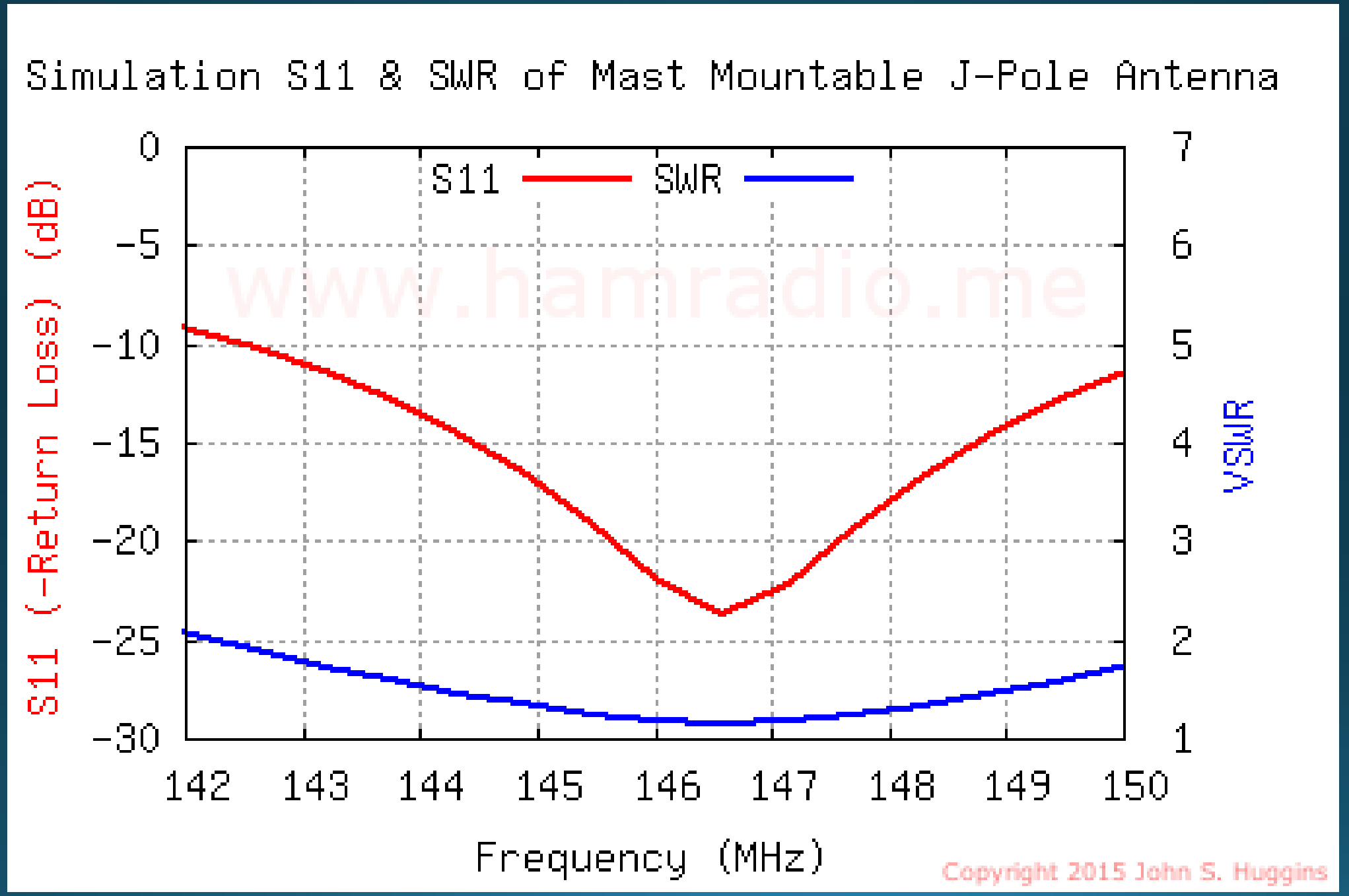

Mast Mountable
J-Pole Antenna
Internal Coaxial
Structure
Internal Feedline Inner Conductor
RF
Blocked
Mast Decoupling Stub
Bottom Portion
Copyright 2015 John S. Huggins, www.hamradio.me


Mast Mountable
J-pole Antenna
Internal Coaxial
Structure
RF
Blocked
Low Inductance
Feed
Internal Feedline Inner Conductor
RF
Blocked
Copyright 2015 John S. Huggins, www.hamradio.me


Simulation S11 & SWR of Mast Mountable J-Pole Antenna
S11
SWR
S11 (-Return Loss) (dB)
VSWR
0
-5
-10
-15
-20
-25
-30
7
6
5
4
3
2
1
142
143
144
145
146
147
148
149
150
Frequency (MHz)
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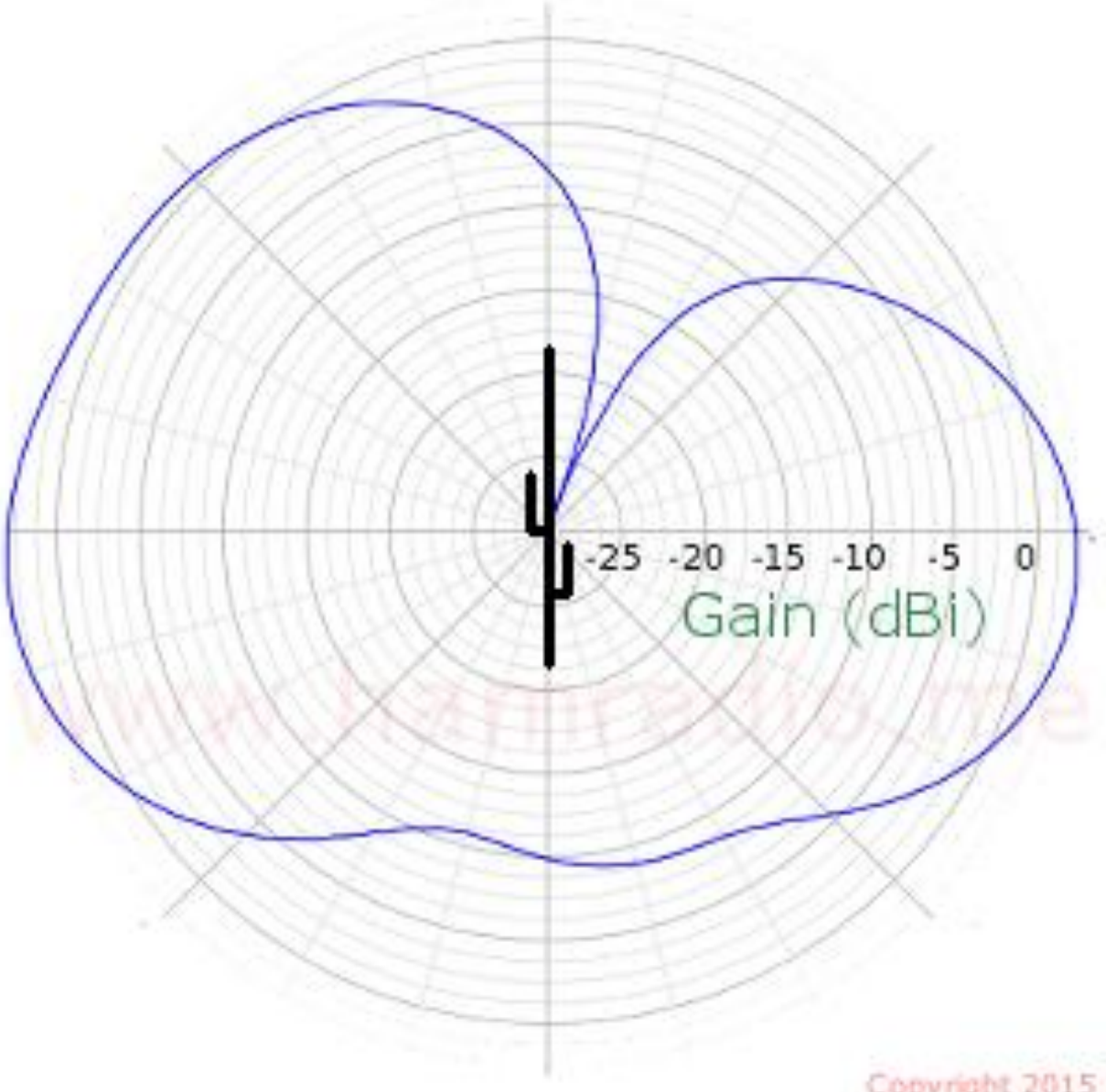
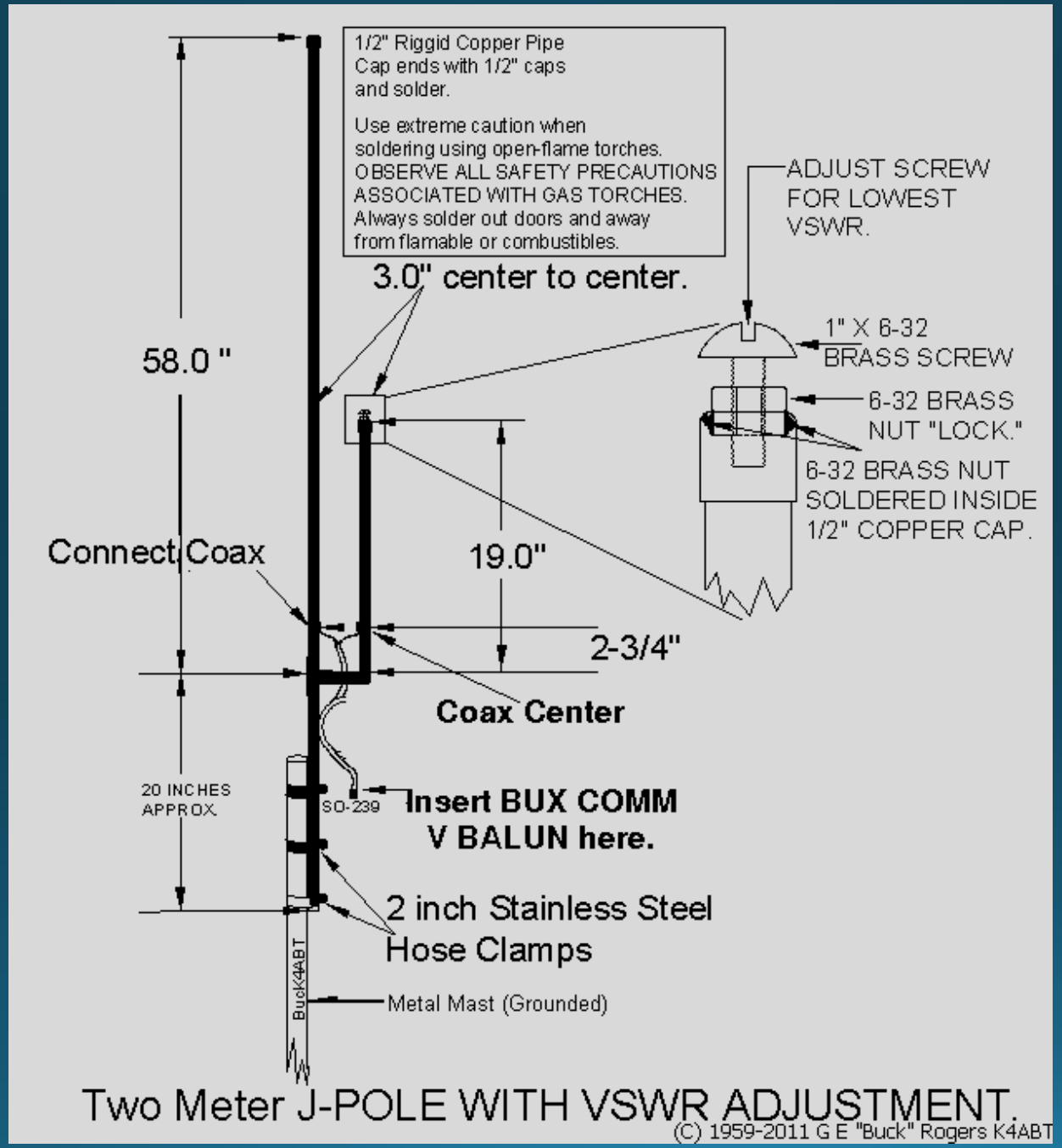
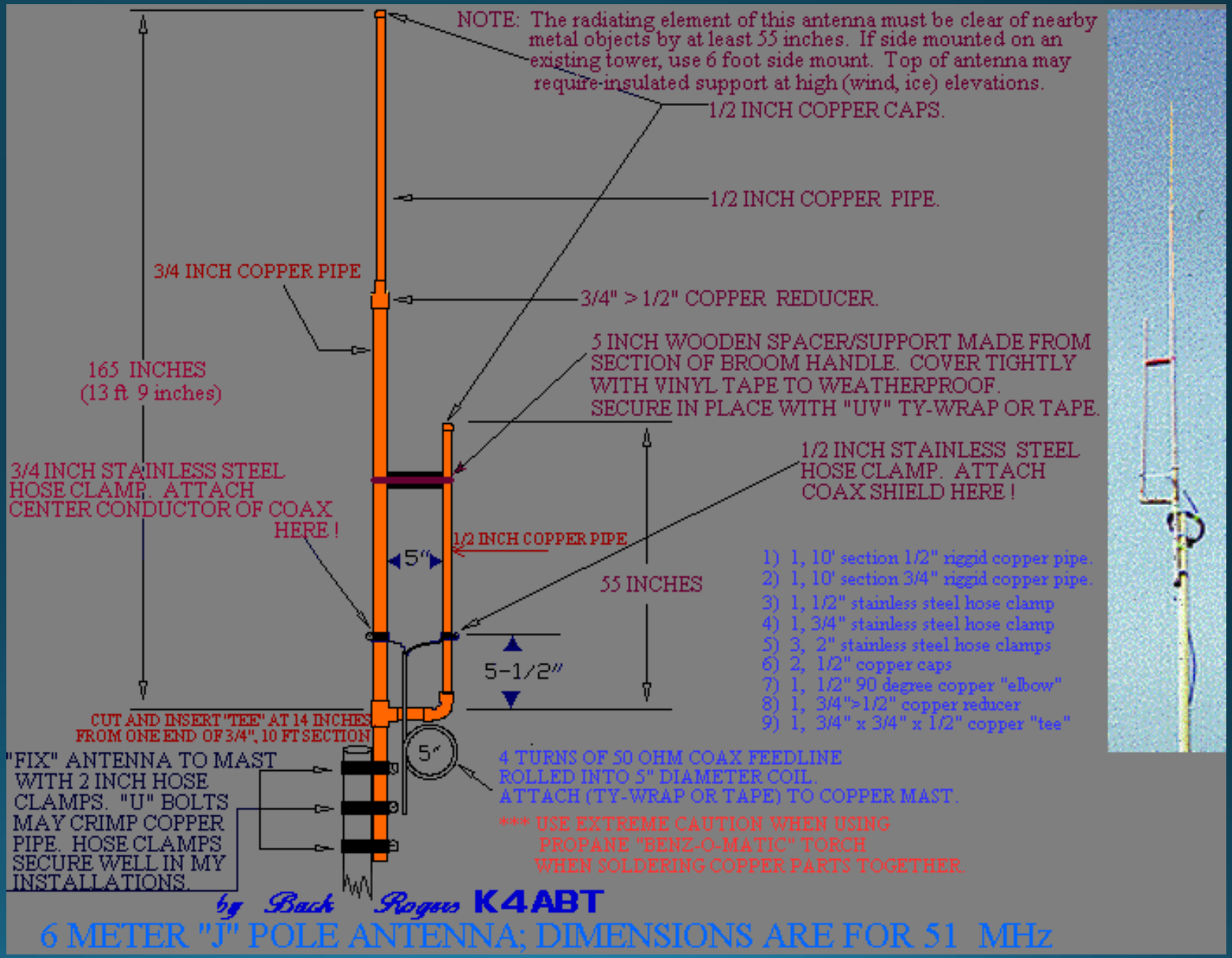
Simulation Gain of Mast Mountable J-Pole Antenna



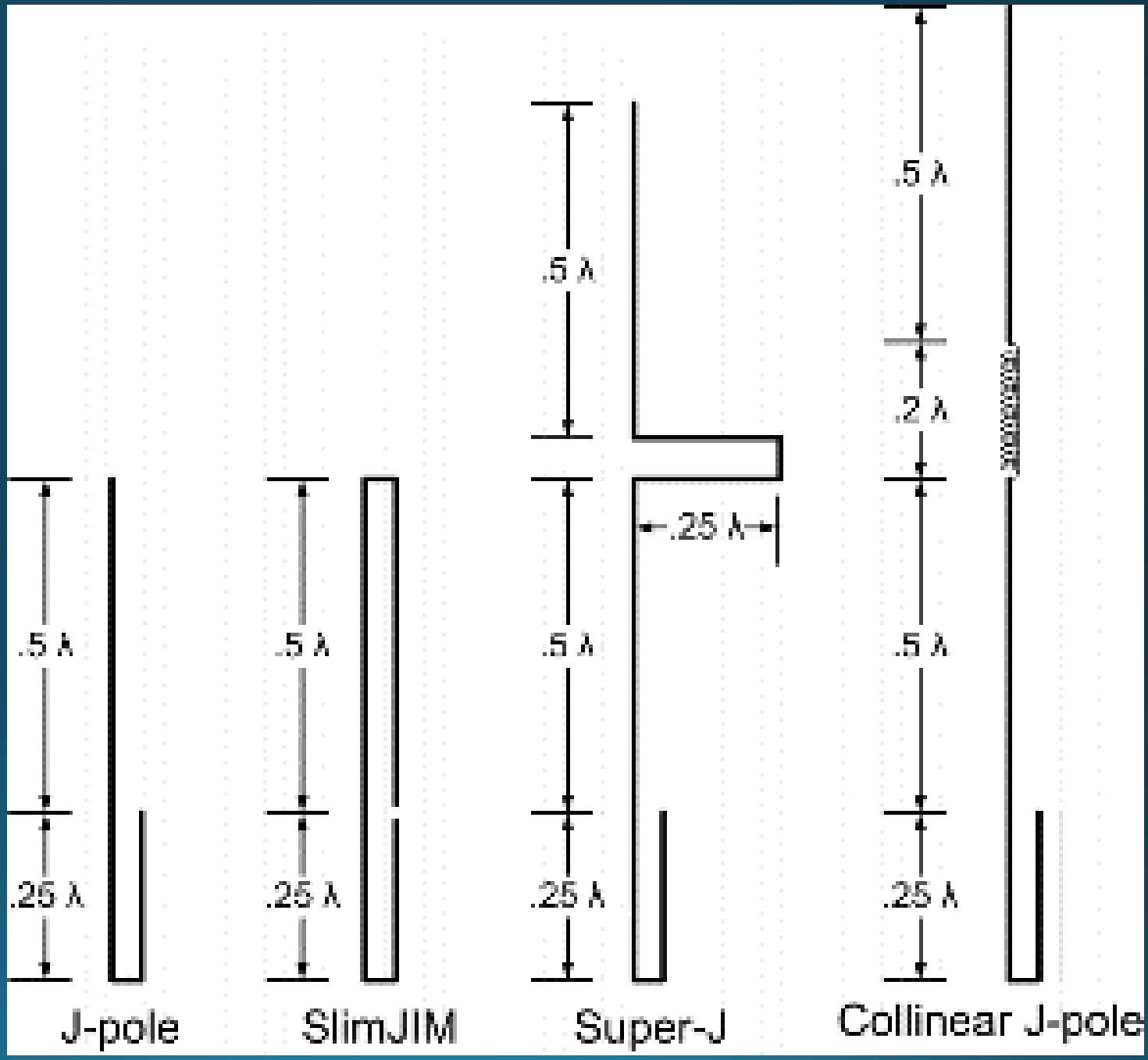


Two Meter J-POLE WITH VSWR ADJUSTMENT.

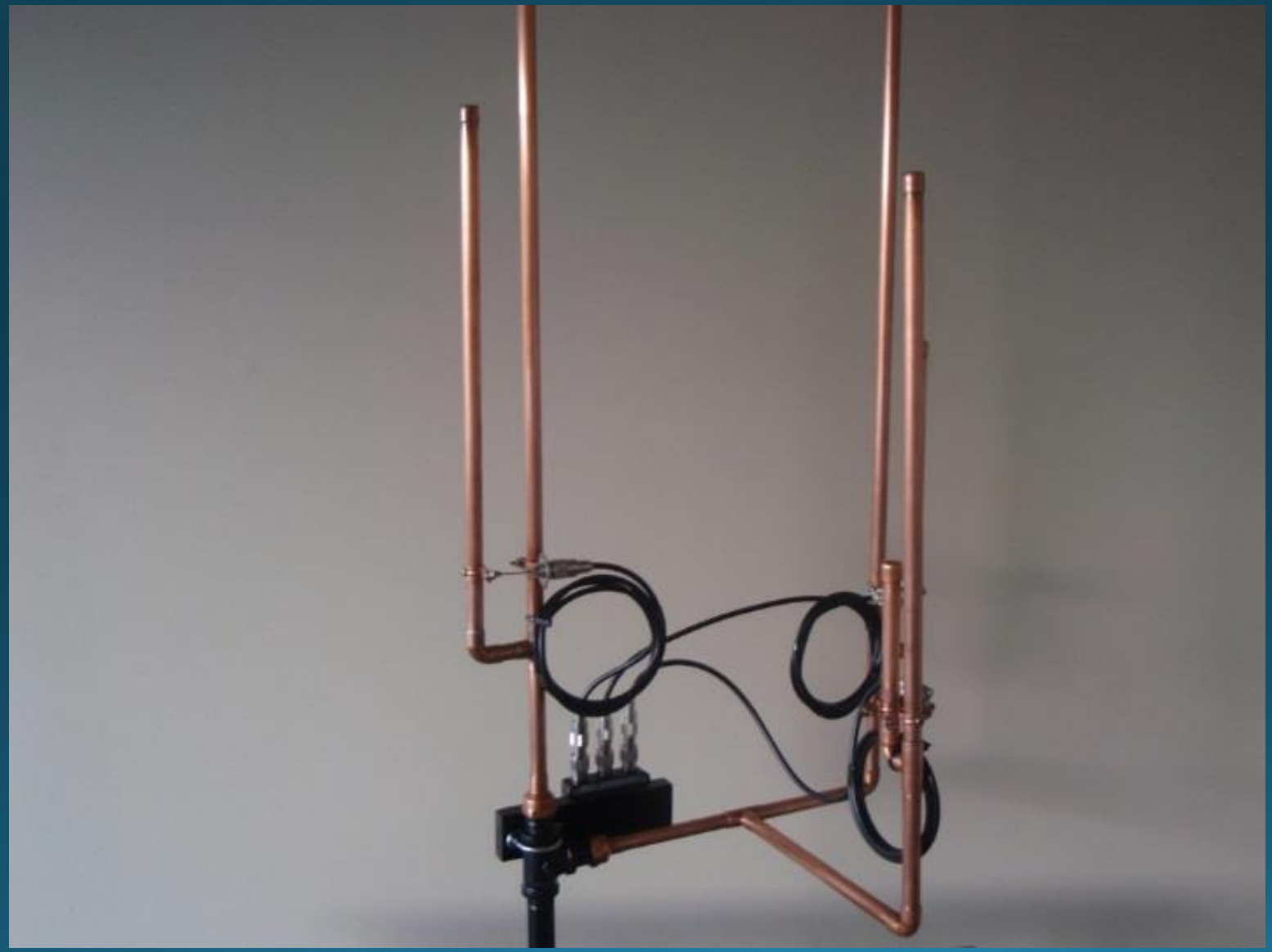
6m J-Pole


NOTE: The radiating element of this antenna must be clear of nearby metal objects by at least 55 inches. If side mounted on an existing tower, use 6 foot side mount. Top of antenna may require insulated support at high (wind, ice) elevations.
1/2 INCH COPPER CAPS.
1/2 INCH COPPER PIPE.
3/4 INCH COPPER PIPE
3/4" > 1/2" COPPER REDUCER.
5 INCH WOODEN SPACER/SUPPORT MADE FROM SECTION OF BROOM HANDLE. COVER TIGHTLY WITH VINYL TAPE TO WEATHERPROOF. SECURE IN PLACE WITH "UV" TY-WRAP OR TAPE.
165 INCHES
(13 ft 9 inches)
3/4 INCH STAINLESS STEEL HOSE CLAMP. ATTACH CENTER CONDUCTOR OF COAX HERE !
1/2 INCH STAINLESS STEEL HOSE CLAMP. ATTACH COAX SHIELD HERE !
1/2 INCH COPPER PIPE
5"
55 INCHES
5-1/2"
1) 1, 10' section 1/2" riggid copper pipe.
2) 1, 10' section 3/4" riggid copper pipe.
3) 1, 1/2" stainless steel hose clamp
4) 1, 3/4" stainless steel hose clamp
5) 3, 2" stainless steel hose clamps
6) 2, 1/2" copper caps
7) 1, 1/2" 90 degree copper "elbow"
8) 1, 3/4"x1/2" copper reducer
9) 1, 3/4" x 3/4" x 1/2" copper "tee"
CUT AND INSERT "TEE" AT 14 INCHES FROM ONE END OF 3/4", 10 FT SECTION
5"
"FIX" ANTENNA TO MAST WITH 2 INCH HOSE CLAMPS. "U" BOLTS MAY CRIMP COPPER PIPE. HOSE CLAMPS SECURE WELL IN MY INSTALLATIONS.
4 TURNS OF 50 OHM COAX FEEDLINE ROLLED INTO 5" DIAMETER COIL. ATTACH (TY-WRAP OR TAPE) TO COPPER MAST.
*** USE EXTREME CAUTION WHEN USING PROPANE "BENZ-O-MATIC" TORCH WHEN SOLDERING COPPER PARTS TOGETHER.
by Back Rogers K4ABT
6 METER "J" POLE ANTENNA; DIMENSIONS ARE FOR 51 MHz

J-Pole Antenna Variations

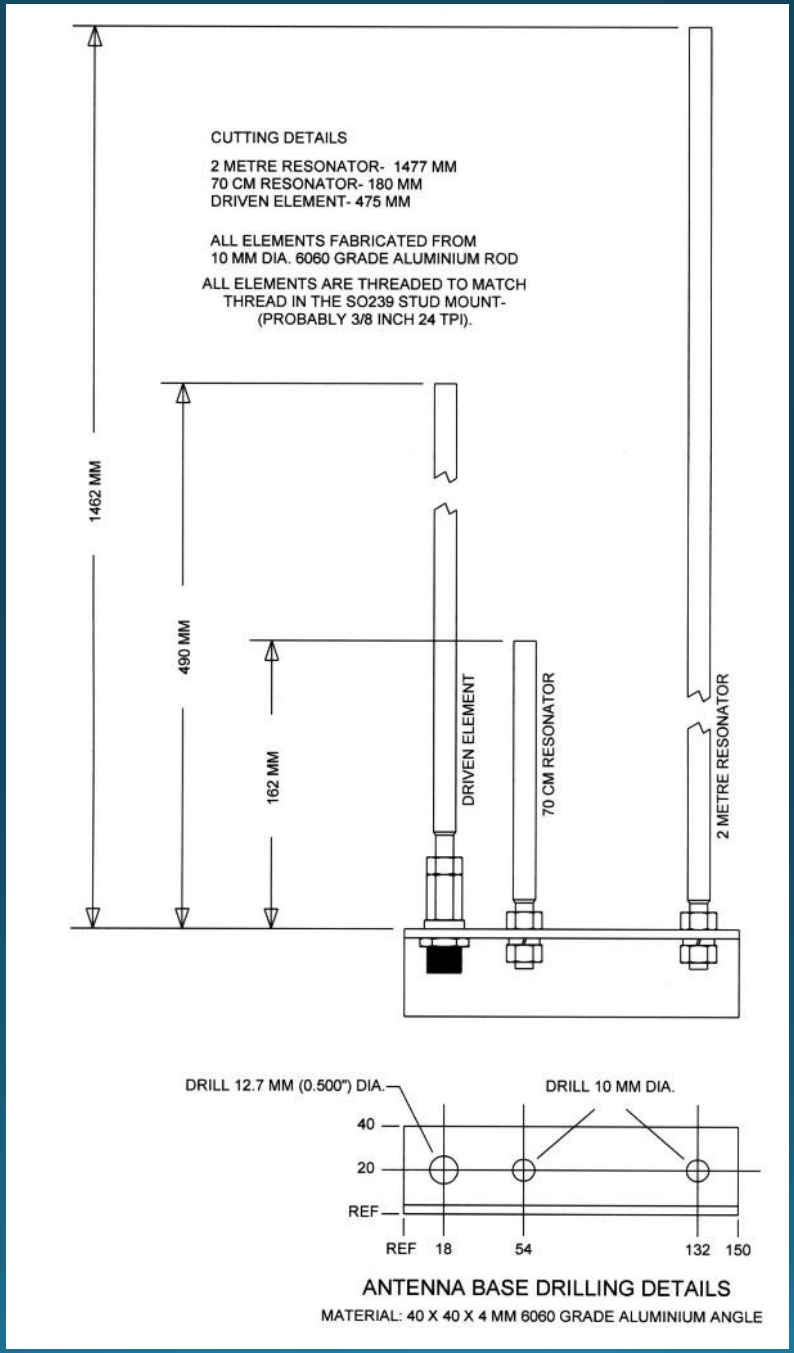


Tri-band 70cm, 1.5m, & 2m Attic Cactus Farm



Tri-band Connection Detail

Arrow J-Pole


CUTTING DETAILS
2 METRE RESONATOR- 1477 MM
70 CM RESONATOR- 180 MM
DRIVEN ELEMENT- 475 MM
ALL ELEMENTS FABRICATED FROM
10 MM DIA. 6060 GRADE ALUMINIUM ROD
ALL ELEMENTS ARE THREADED TO MATCH
THREAD IN THE SO239 STUD MOUNT-
(PROBABLY 3/8 INCH 24 TPI).
1462 MM
490 MM
162 MM
DRIVEN ELEMENT
70 CM RESONATOR
2 METRE RESONATOR
DRILL 12.7 MM (0.500") DIA.
DRILL 10 MM DIA.
40
20
REF
REF 18 54 132 150
ANTENNA BASE DRILLING DETAILS
MATERIAL: 40 X 40 X 4 MM 6060 GRADE ALUMINIUM ANGLE

J - VHF Model J146/440

Simply the Best

Does NOT require a ground plane.

Mount on a metal mast

Ideal for mounting in an attic,
On a roof vent pipe, (up to 1 1/2")
On a wooden or Fiberglass pole,
On Fiberglass or Plastic Vehicles,
(Motorhomes, Trucks, **Boats**)
Mount it just about anywhere.

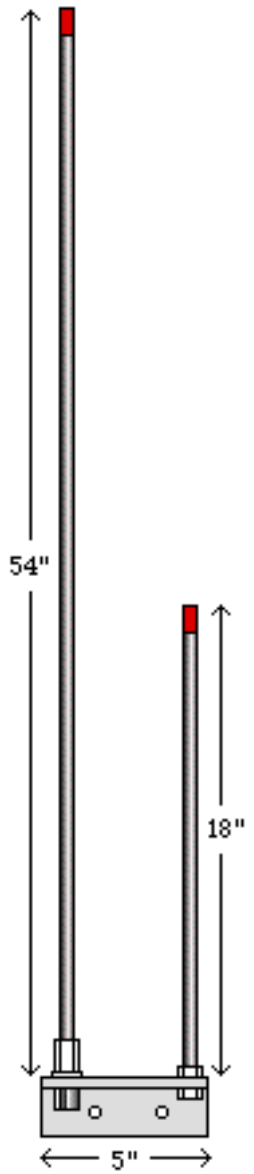
Low SWR - Wide Bandwidth

Has Gain over a 1/4 wave .

Omni-Directional.

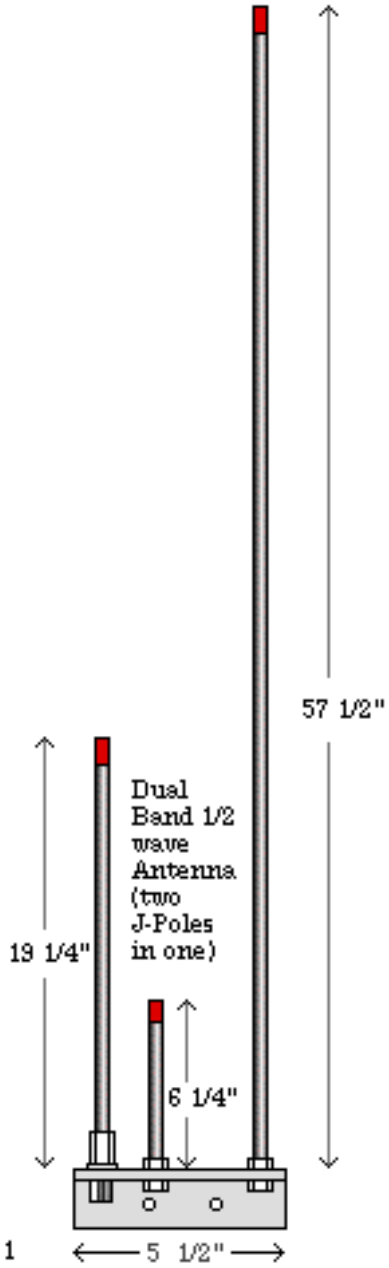
This is a very Heavy Duty Antenna.
The Elements are made from 3/8"
Solid Round Aluminum with a Heavy
Duty Angle Mounting Bracket.

Mounting Hardware for
mast up to 1 1/2" Included.



Covers 150 -162 MHz.
With an VSWR of less than 1.5 - 1

Single SO239
Feed Connector

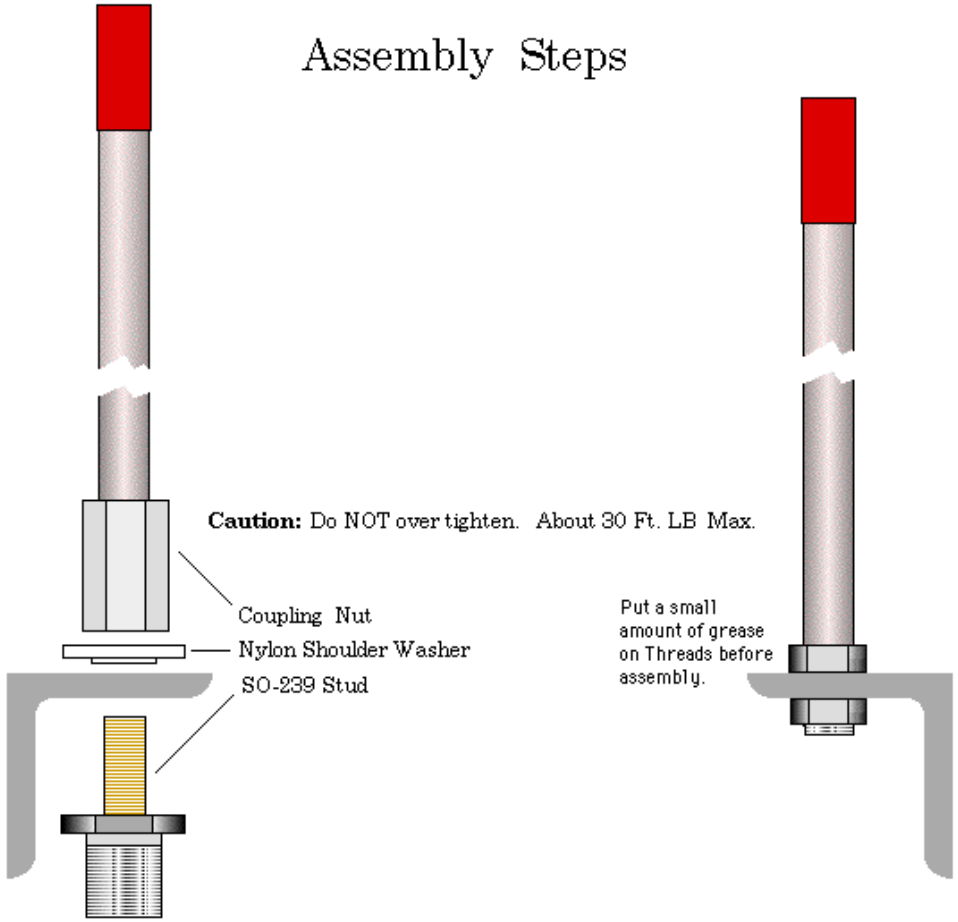


Covers 143-149 MHz. VHF
Covers 437-450 MHz. UHF
With an VSWR of less than 1.5 - 1

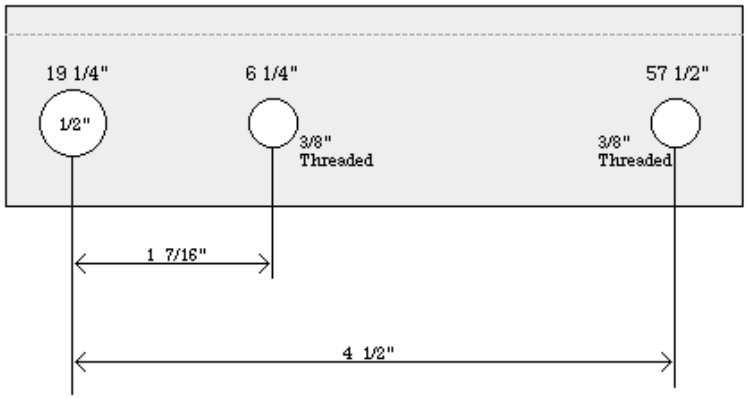
Part Description

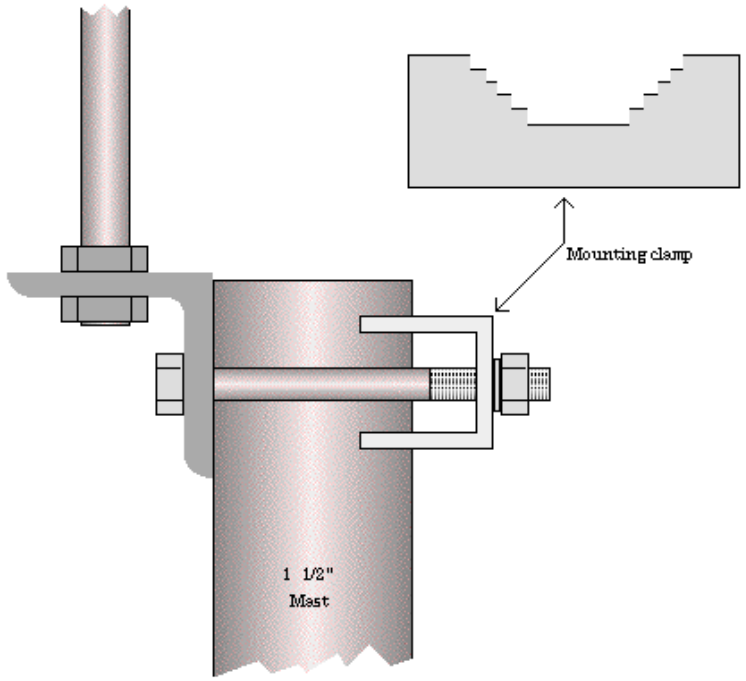
3/8" X 19 1/4" Element with Coupling Nut
3/8" X 6 1/4" Element with 2 Stainless Nuts
3/8" X 57 1/2" Element with 2 Stainless Nuts
1 1/2" X 1 1/2" X 5 1/2" Assembley / Mounting Bracket
SO-239 Stud
Nylon Shoulder Washer

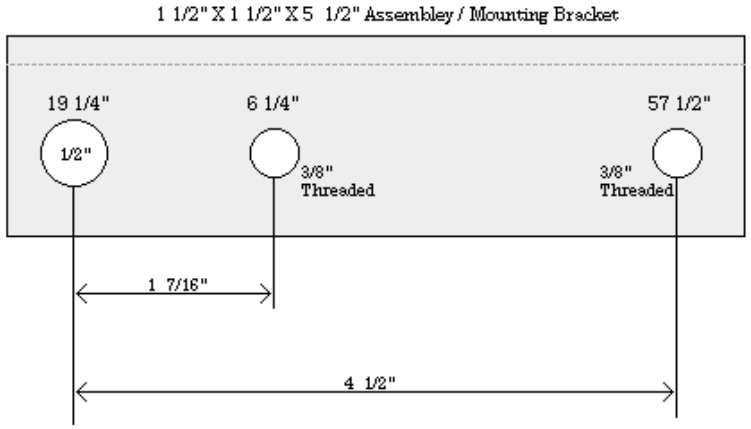
Assembly Steps

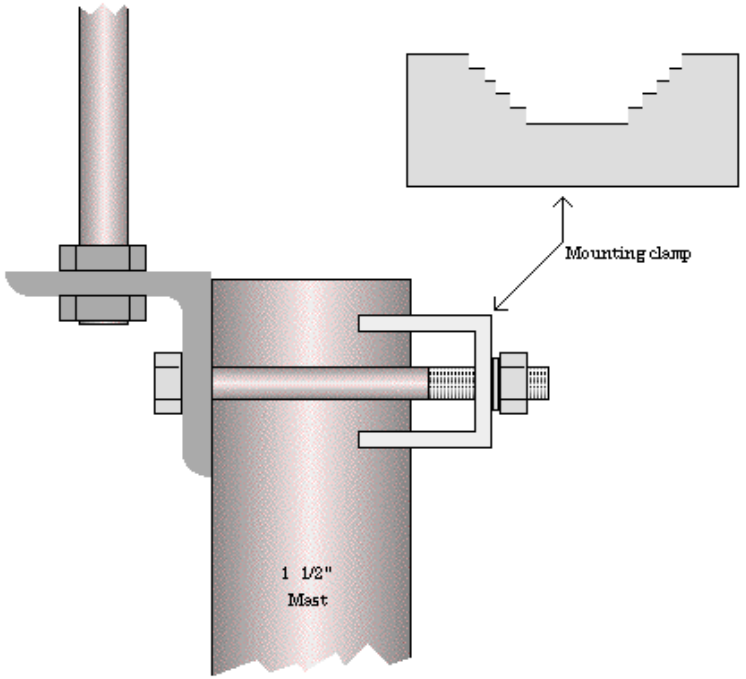


1 1/2" X 1 1/2" X 5 1/2" Assembley / Mounting Bracket

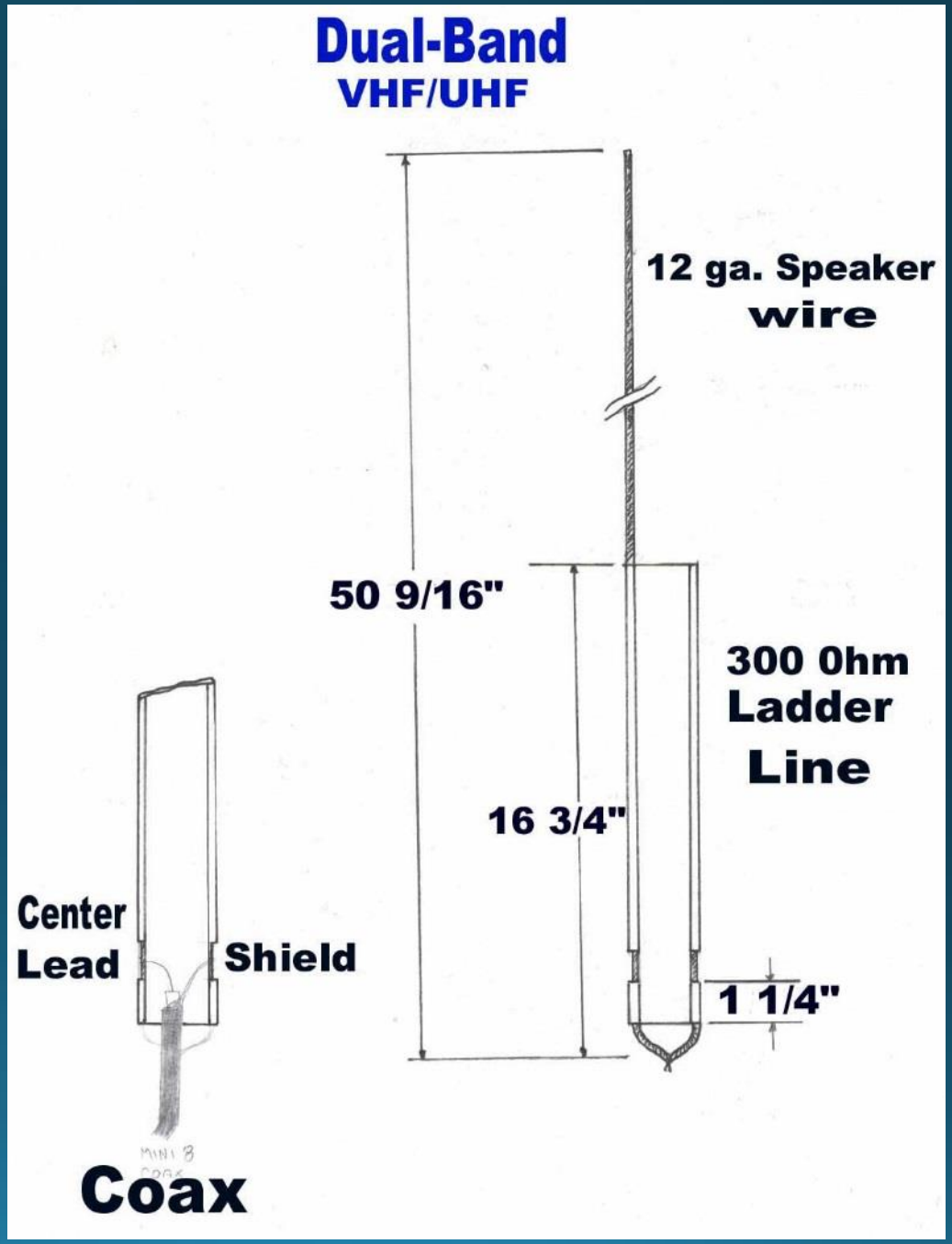




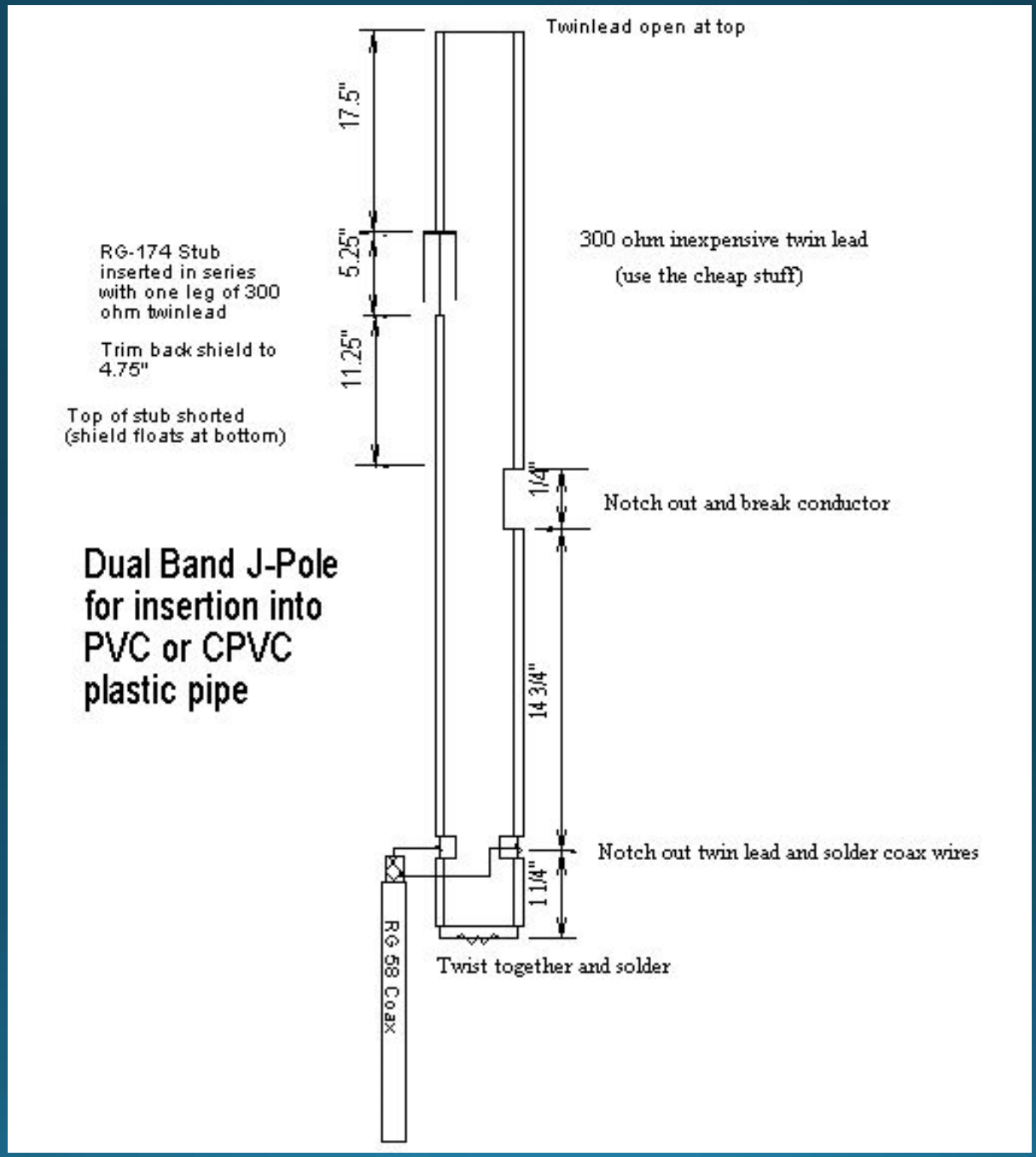

1 1/2" X 1 1/2" X 5 1/2" Assembley / Mounting Bracket
19 1/4"
6 1/4"
57 1/2"
1/2"
3/8"
Threaded
3/8"
Threaded
1 7/16"
4 1/2"

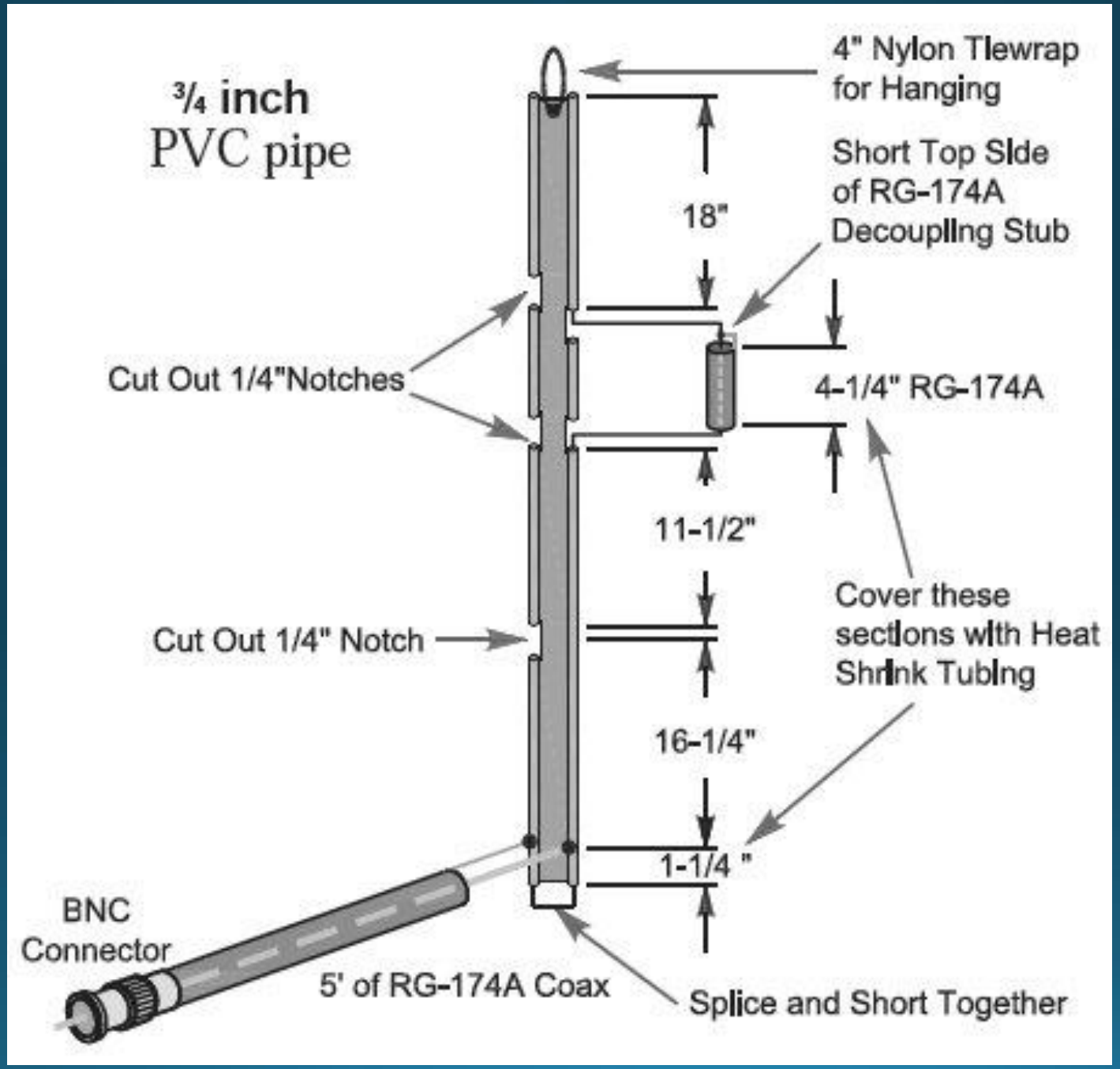

Mounting clamp
1 1/2"
Mast

Ladder Line J

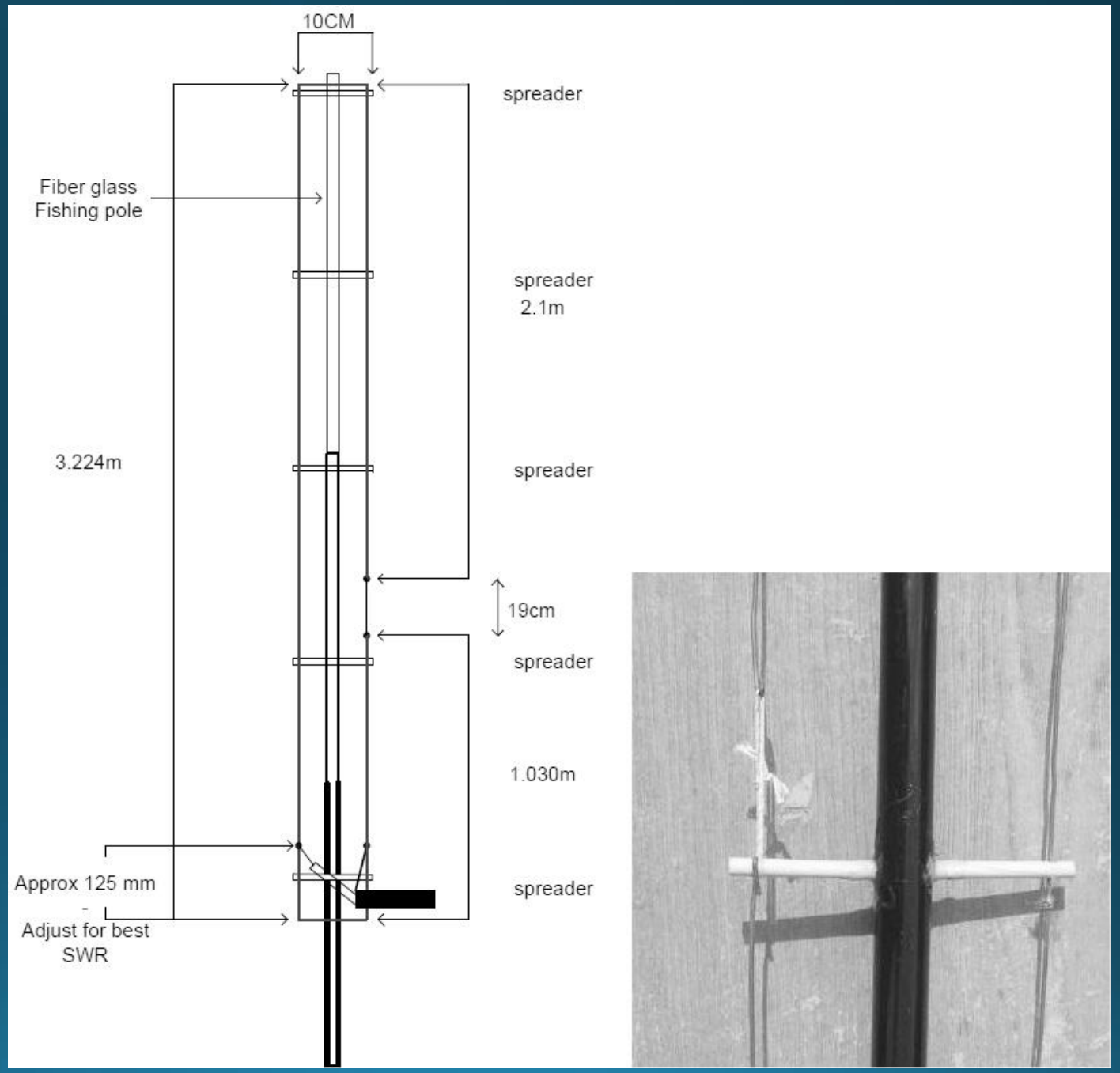


Protect It

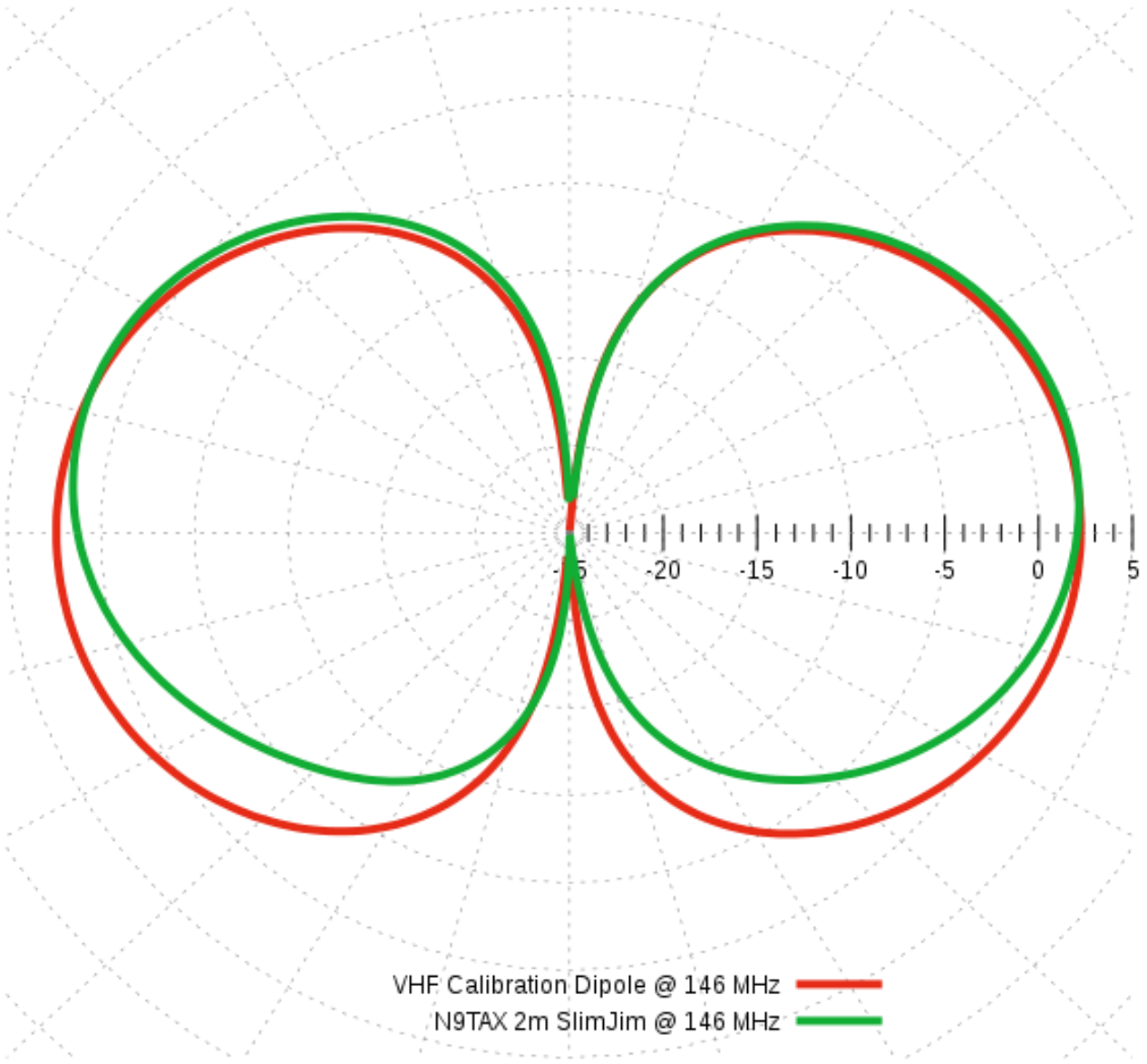

Twinlead open at top
17.5"
5.25"
11.25"
RG-174 Stub inserted in series with one leg of 300 ohm twinlead
Trim back shield to 4.75"
Top of stub shorted (shield floats at bottom)
300 ohm inexpensive twin lead
(use the cheap stuff)
1/4"
Notch out and break conductor
Dual Band J-Pole for insertion into PVC or CPVC plastic pipe
14 3/4"
Notch out twin lead and solder coax wires
1 1/4"
Twist together and solder
RG 58 Coax

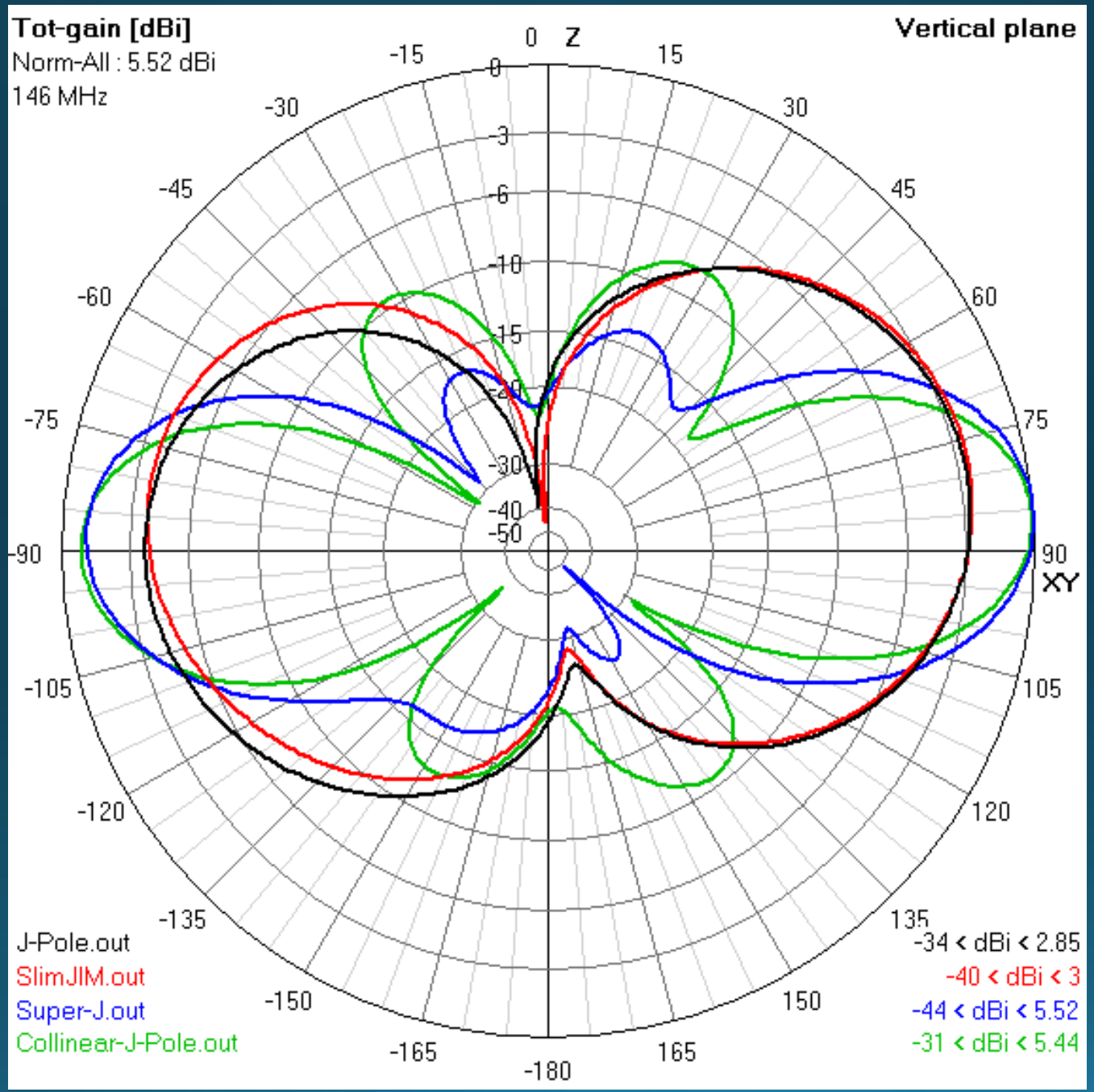

¾ inch
PVC pipe
4" Nylon Tlewrap
for Hanging
Short Top Side
of RG-174A
Decoupling Stub
18"
Cut Out 1/4"Notches
4-1/4" RG-174A
11-1/2"
Cut Out 1/4" Notch
Cover these
sections with Heat
Shrink Tubing
16-1/4"
1-1/4 "
BNC
Connector
5' of RG-174A Coax
Splice and Short Together

Slim Jim 4m

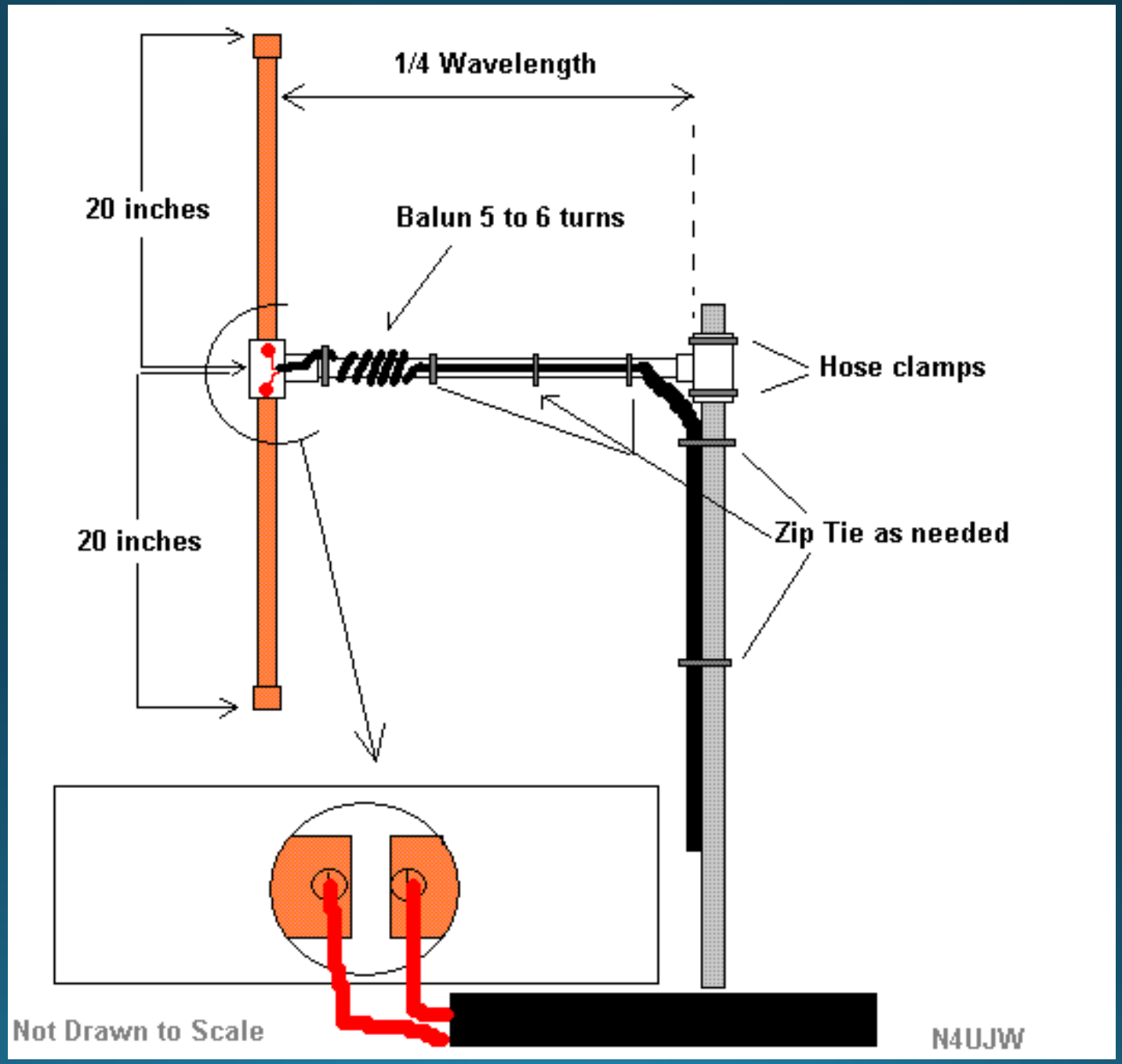

10CM
spreader
Fiber glass
Fishing pole
spreader
2.1m
3.224m
spreader
19cm
spreader
1.030m
Approx 125 mm
-
Adjust for best
SWR
spreader

E-Plane gain (dBi) of J Antenna (SlimJim variation) vs. Dipole

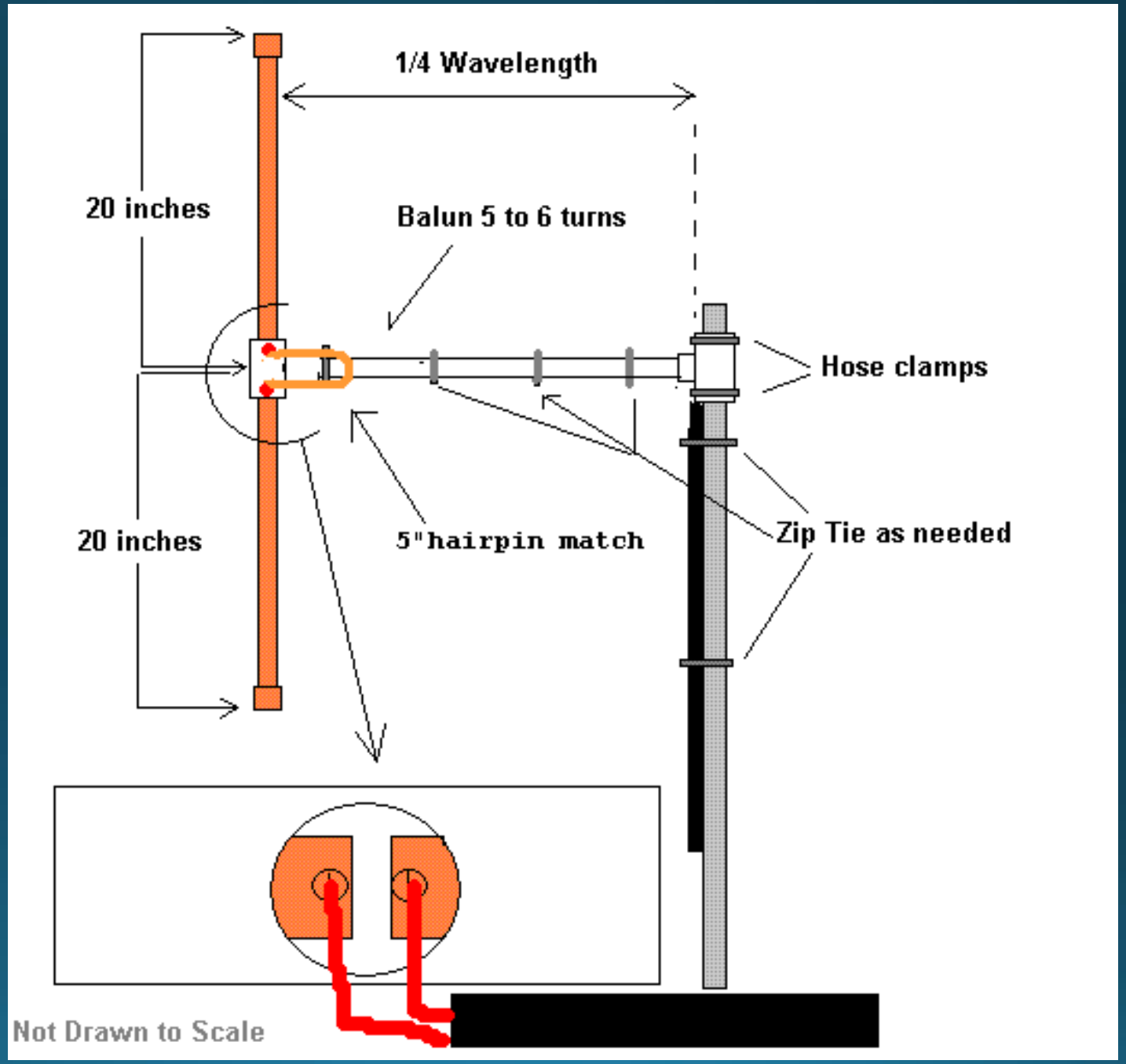



Tot-gain [dBi]
Norm-All : 5.52 dBi
146 MHz
Vertical plane
0
Z
15
30
45
60
75
90
XY
105
120
135
150
165
-180
-165
-150
-135
-120
-105
-90
-75
-60
-45
-30
-15
0
-3
-6
-10
-15
-20
-30
-40
-50
J-Pole.out
SlimJIM.out
Super-J.out
Collinear-J-Pole.out
-34 < dBi < 2.85
-40 < dBi < 3
-44 < dBi < 5.52
-31 < dBi < 5.44

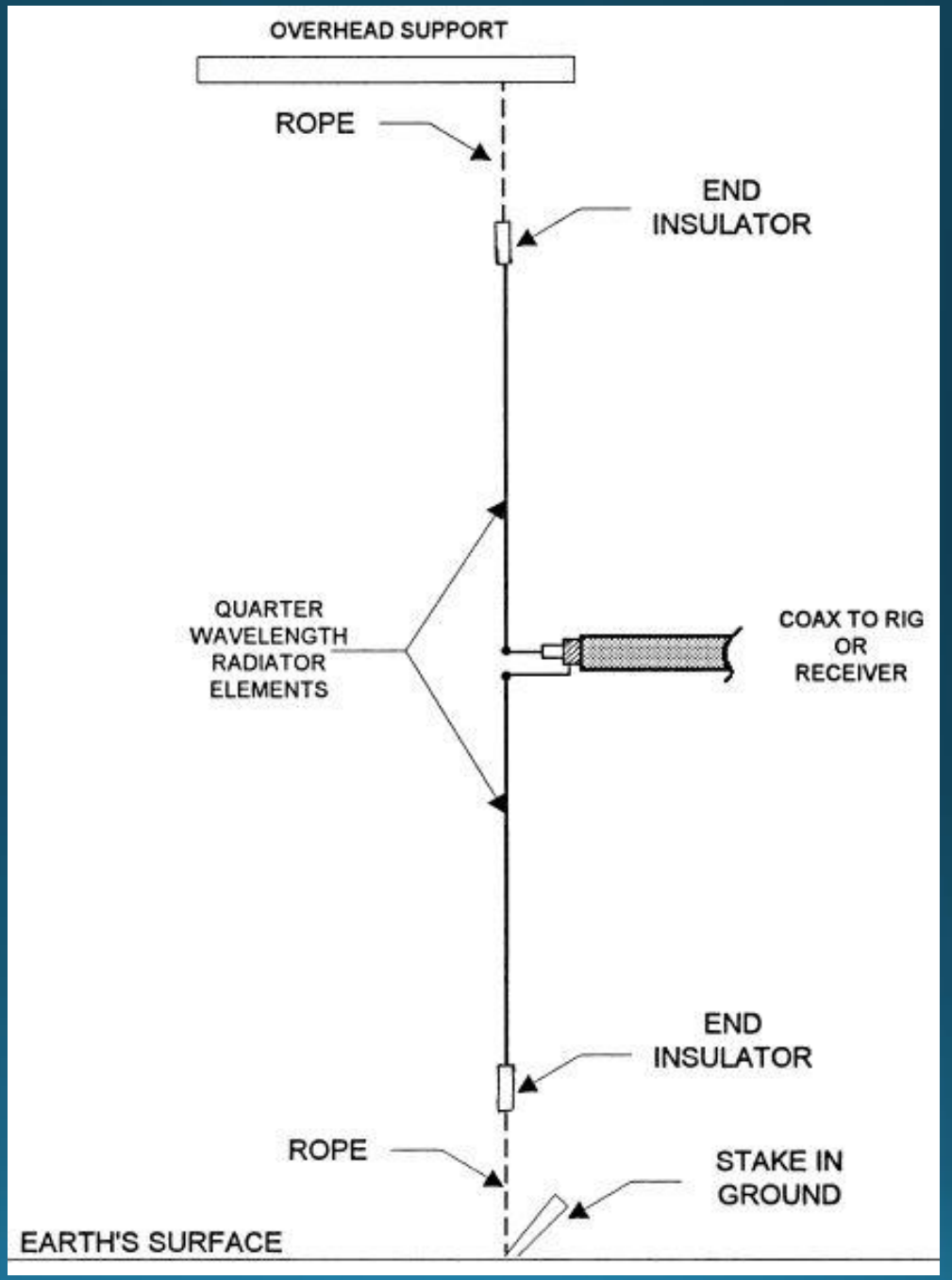
Vert Dipole


1/4 Wavelength
20 inches
Balun 5 to 6 turns
Hose clamps
20 inches
Zip Tie as needed
Not Drawn to Scale
N4UJW

Vert Dipole

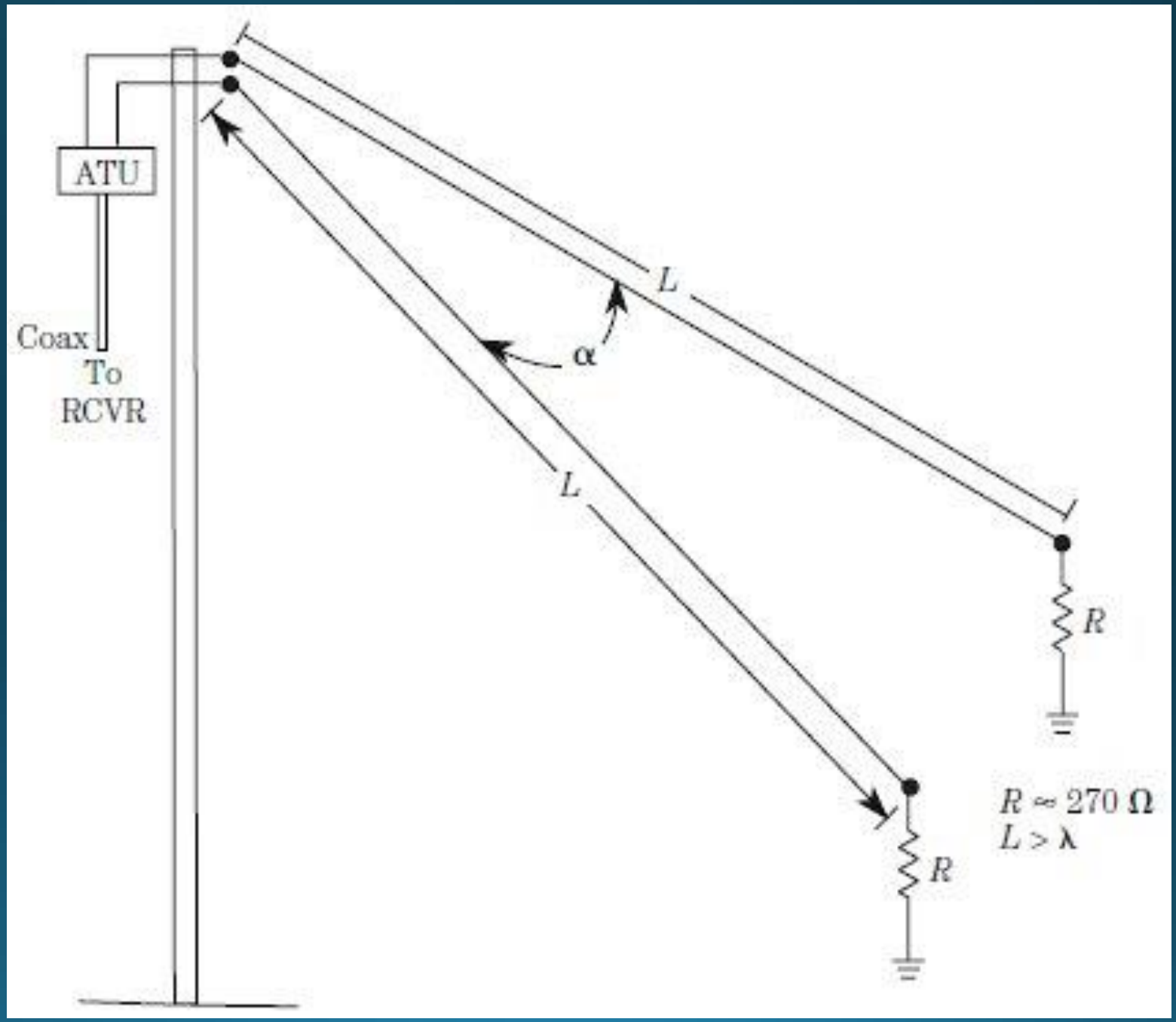

1/4 Wavelength
20 inches
Balun 5 to 6 turns
Hose clamps
20 inches
5"hairpin match
Zip Tie as needed
Not Drawn to Scale

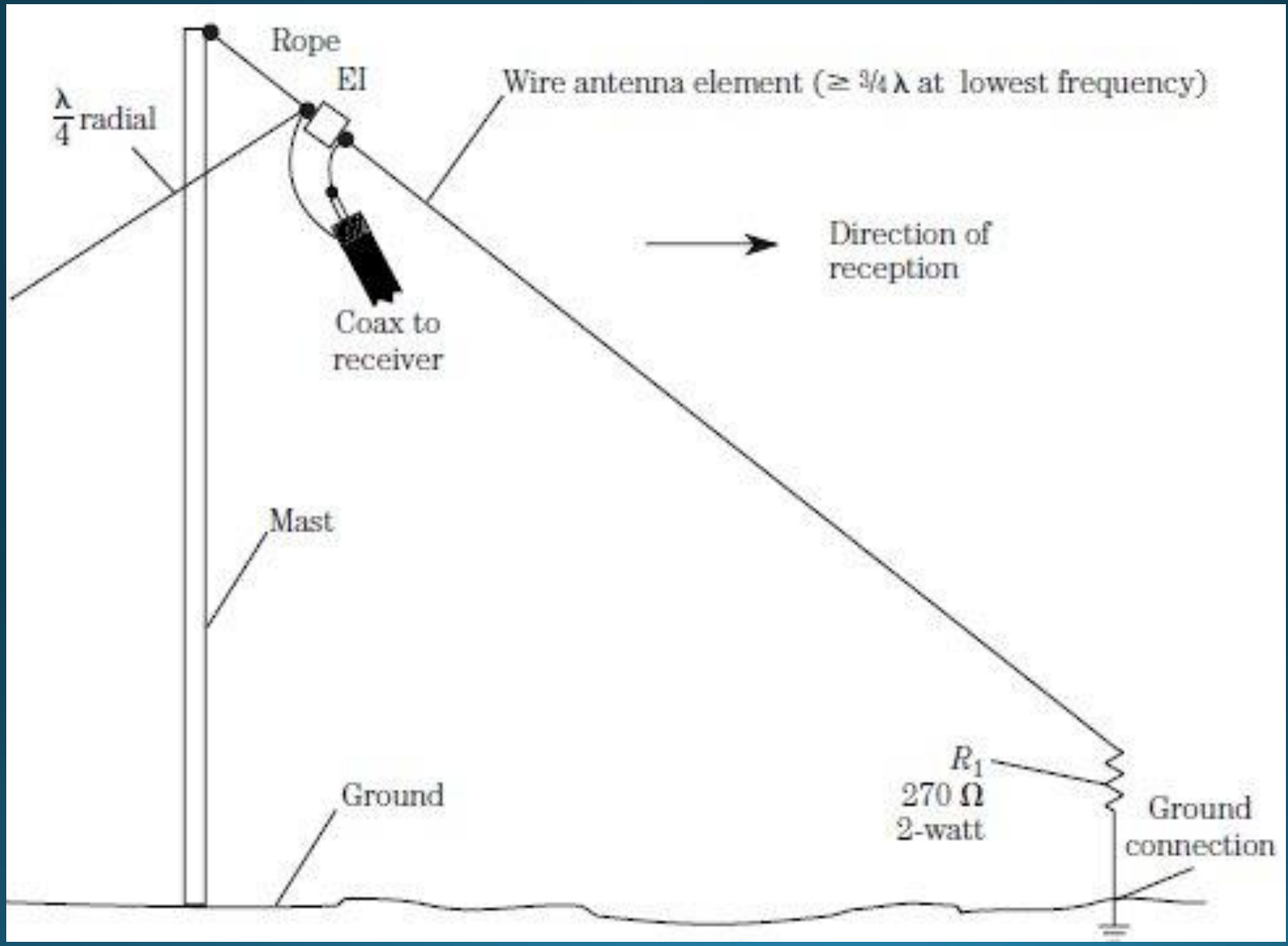
Vertical Dipole



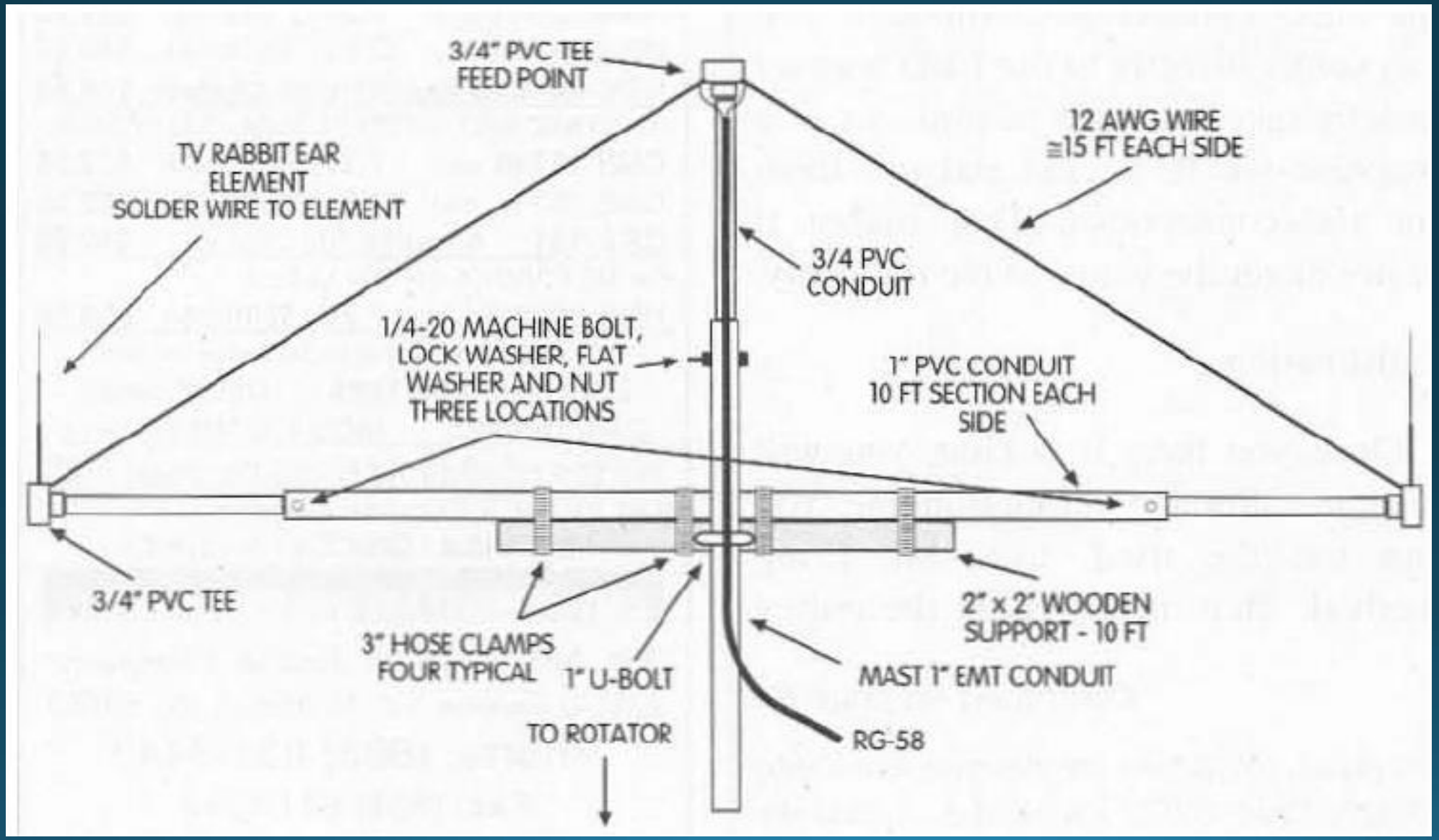
Efactor Dual Band

Veesloper

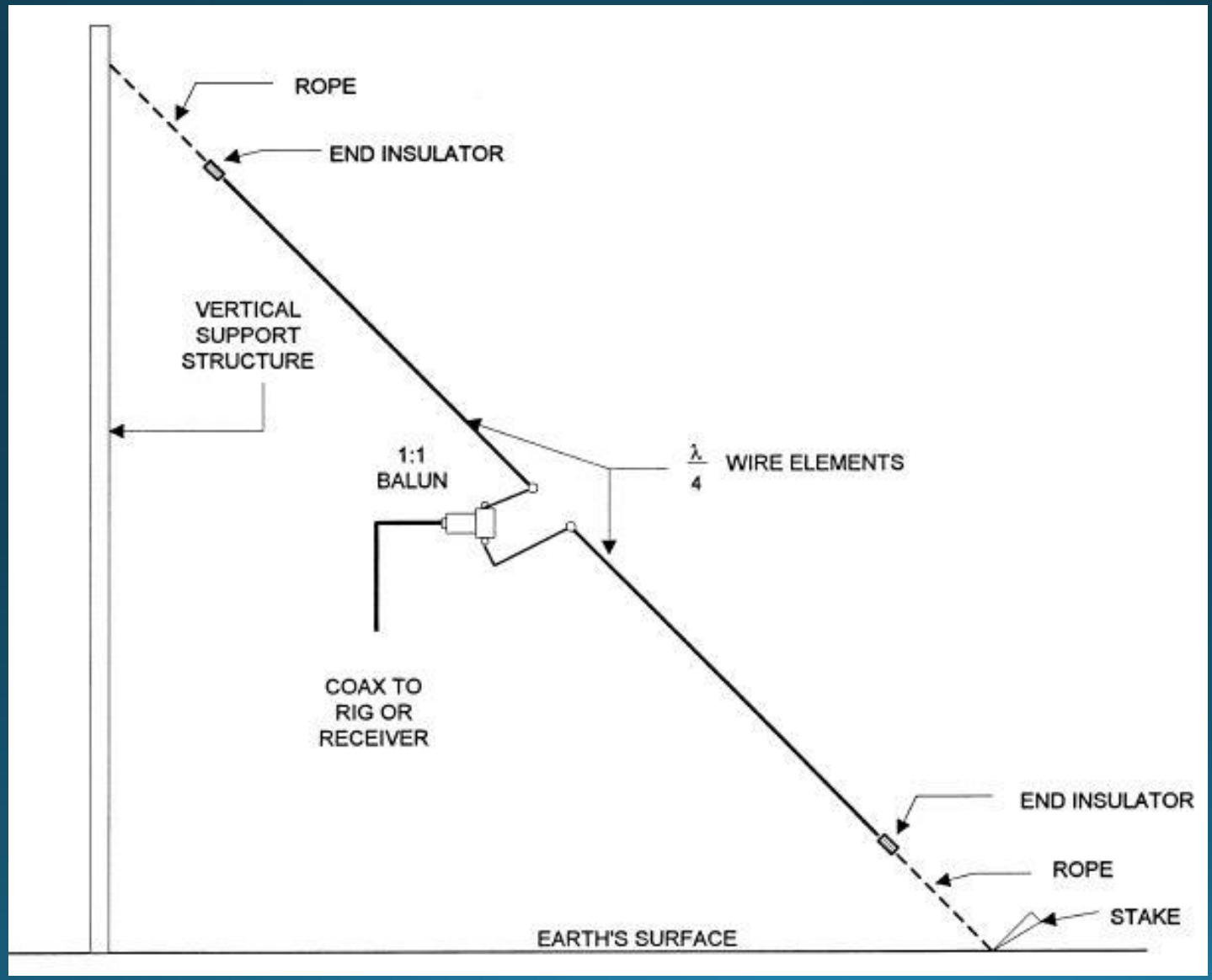



Rope
El
Wire antenna element (≥ ¾ λ at lowest frequency)
λ/4 radial
Direction of reception
Coax to receiver
Mast
Ground
R_1
270 Ω
2-watt
Ground connection

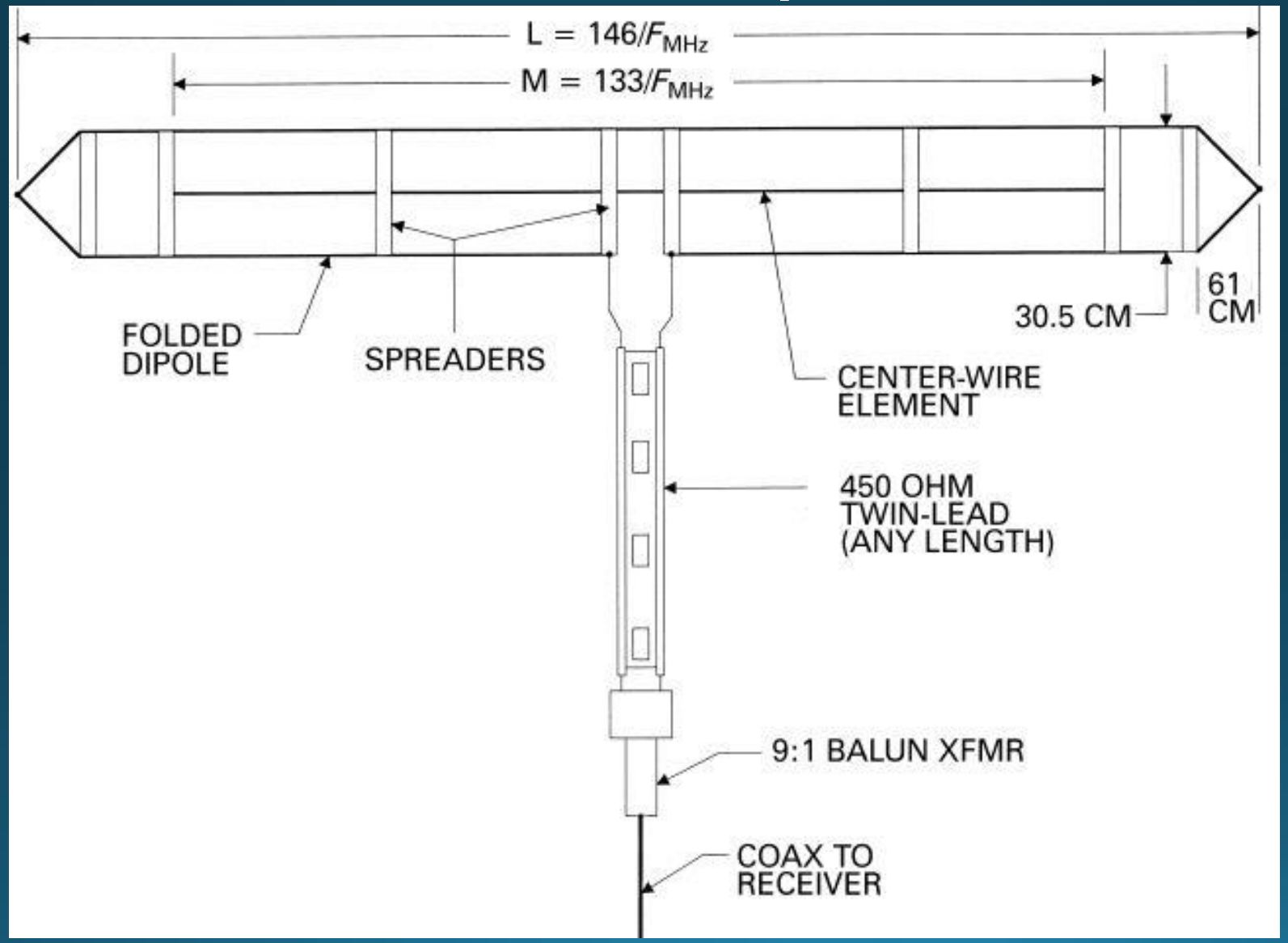
Taylor Vee Antenna – 20m



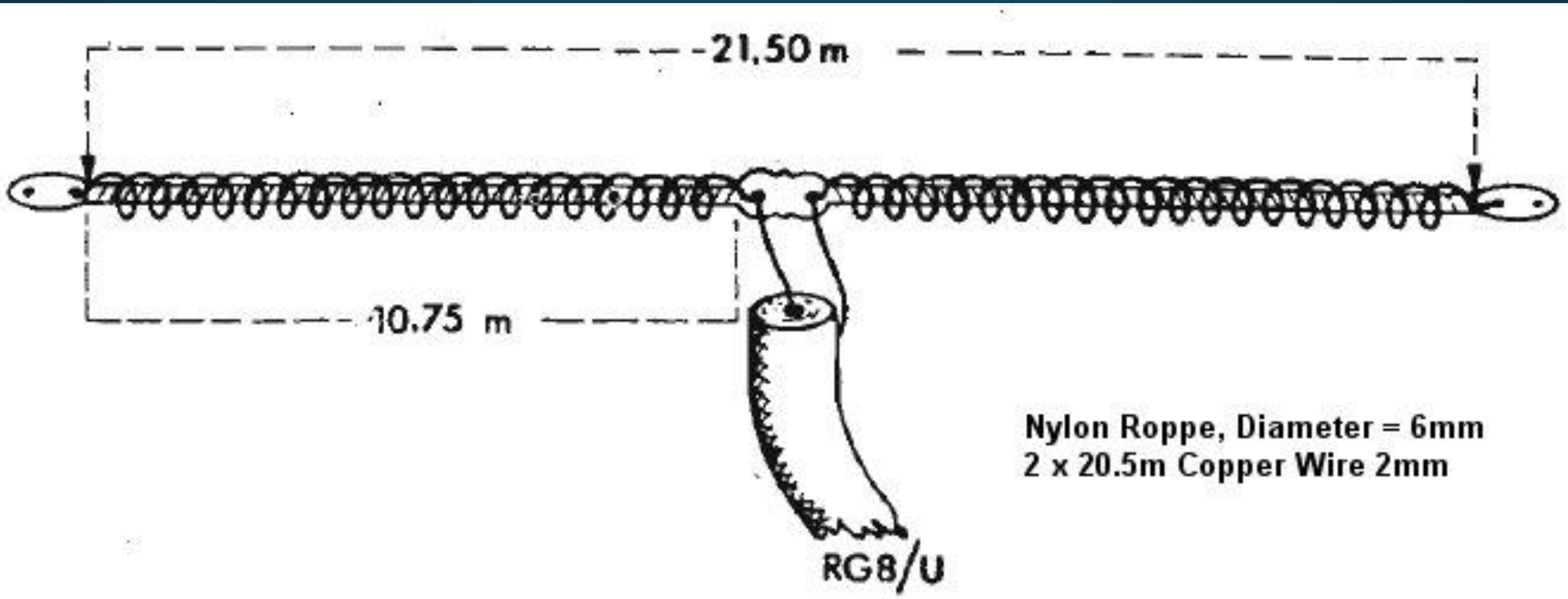
Sloping Dipole



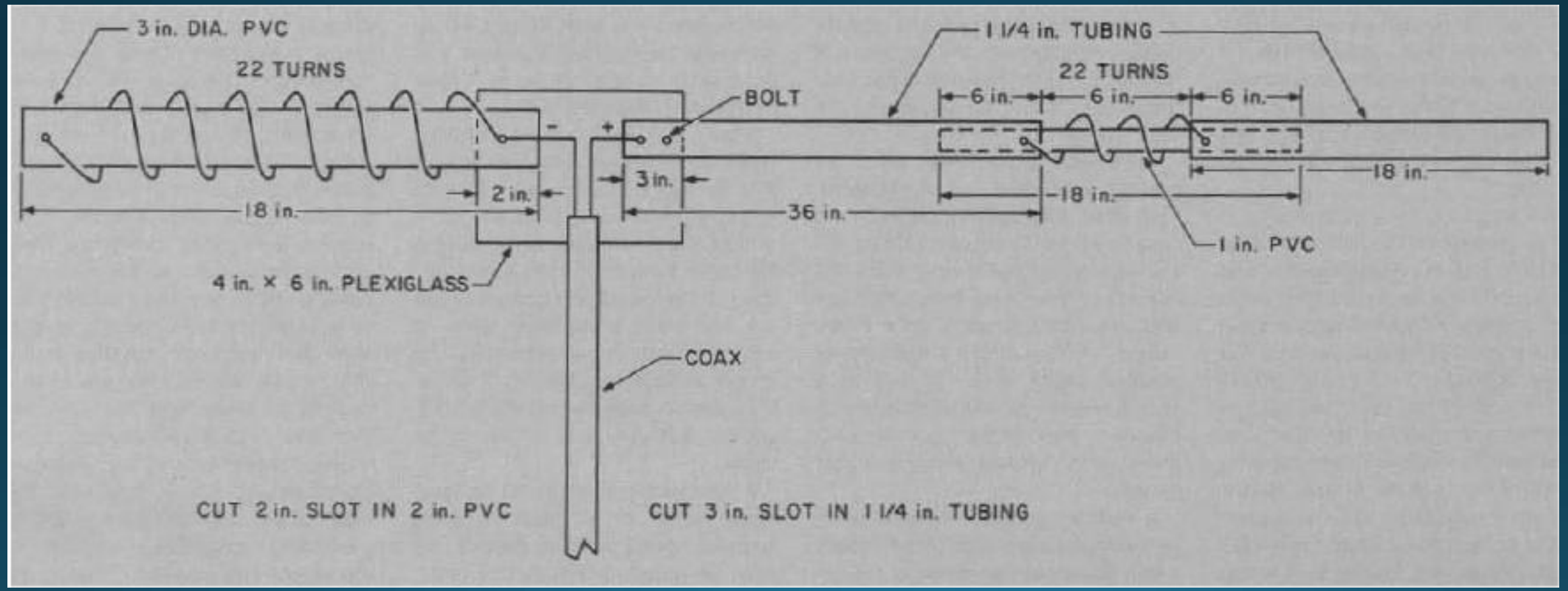
Wide Band Folded Dipole



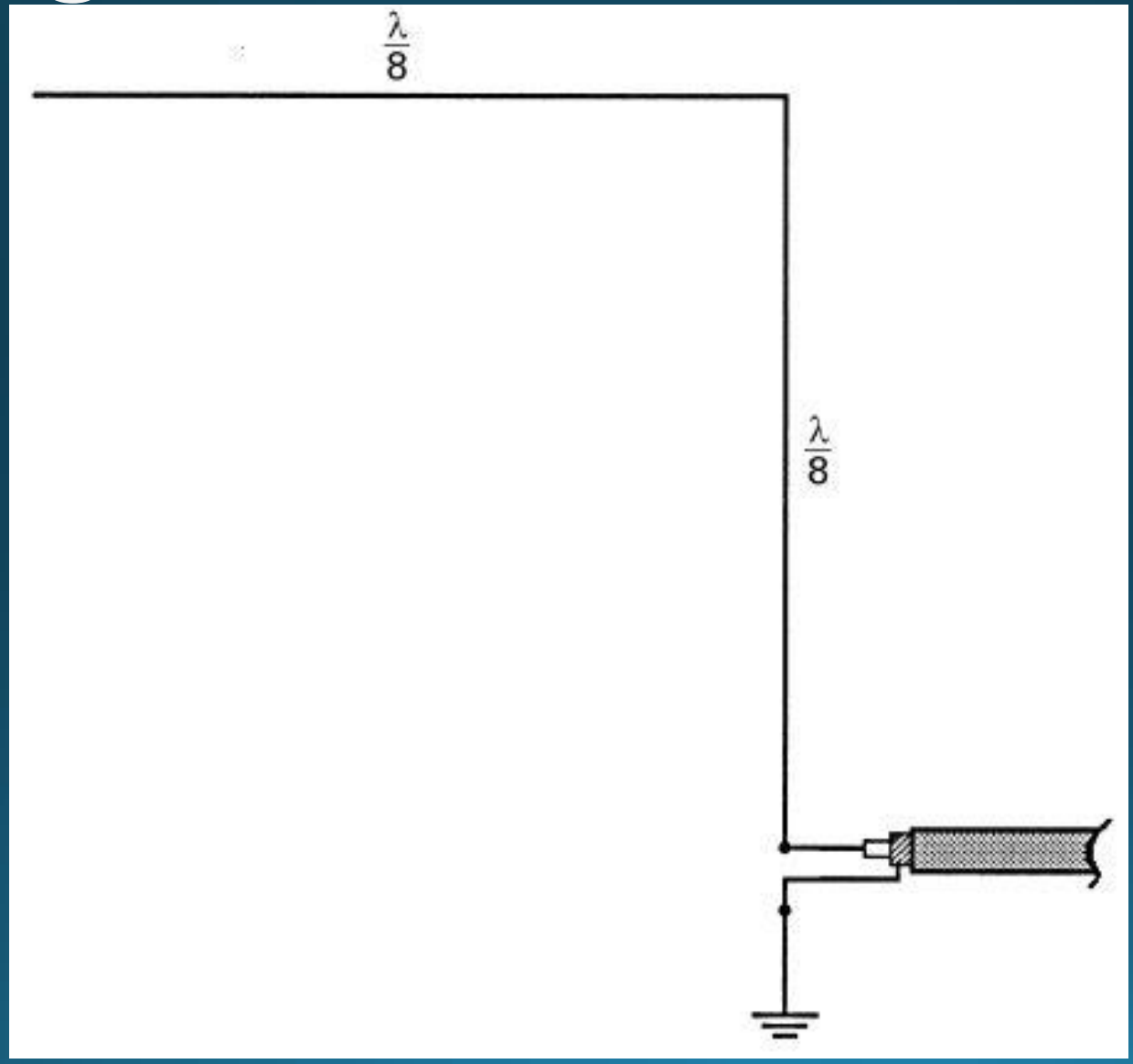
Super Space Multi-Band 80 – 10m



ShortFat 15m



Right Angle Marconi Antenna

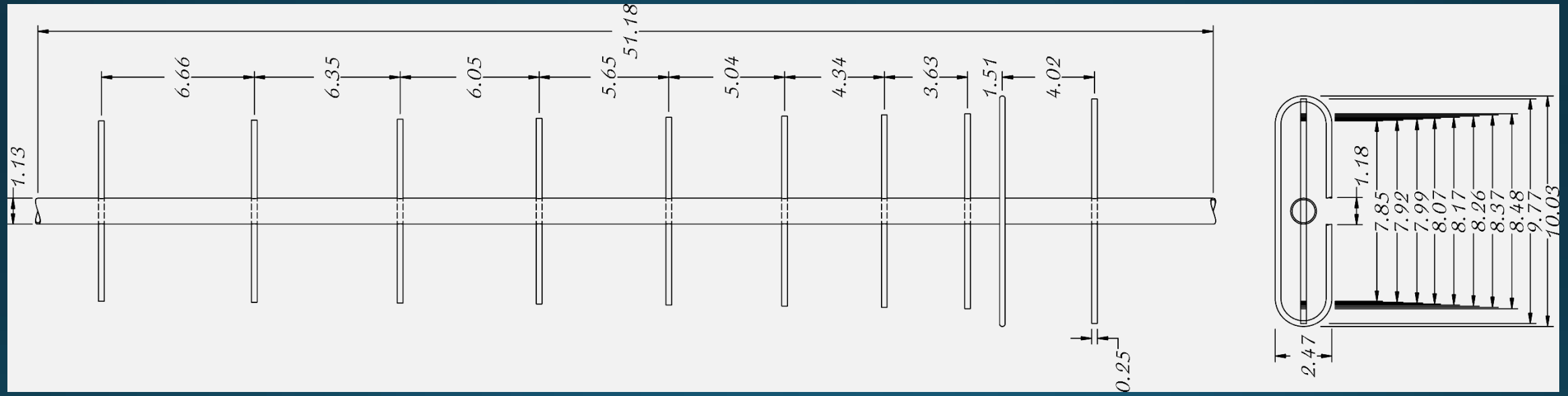


Dual Band Tape Measure Uda - Yagi

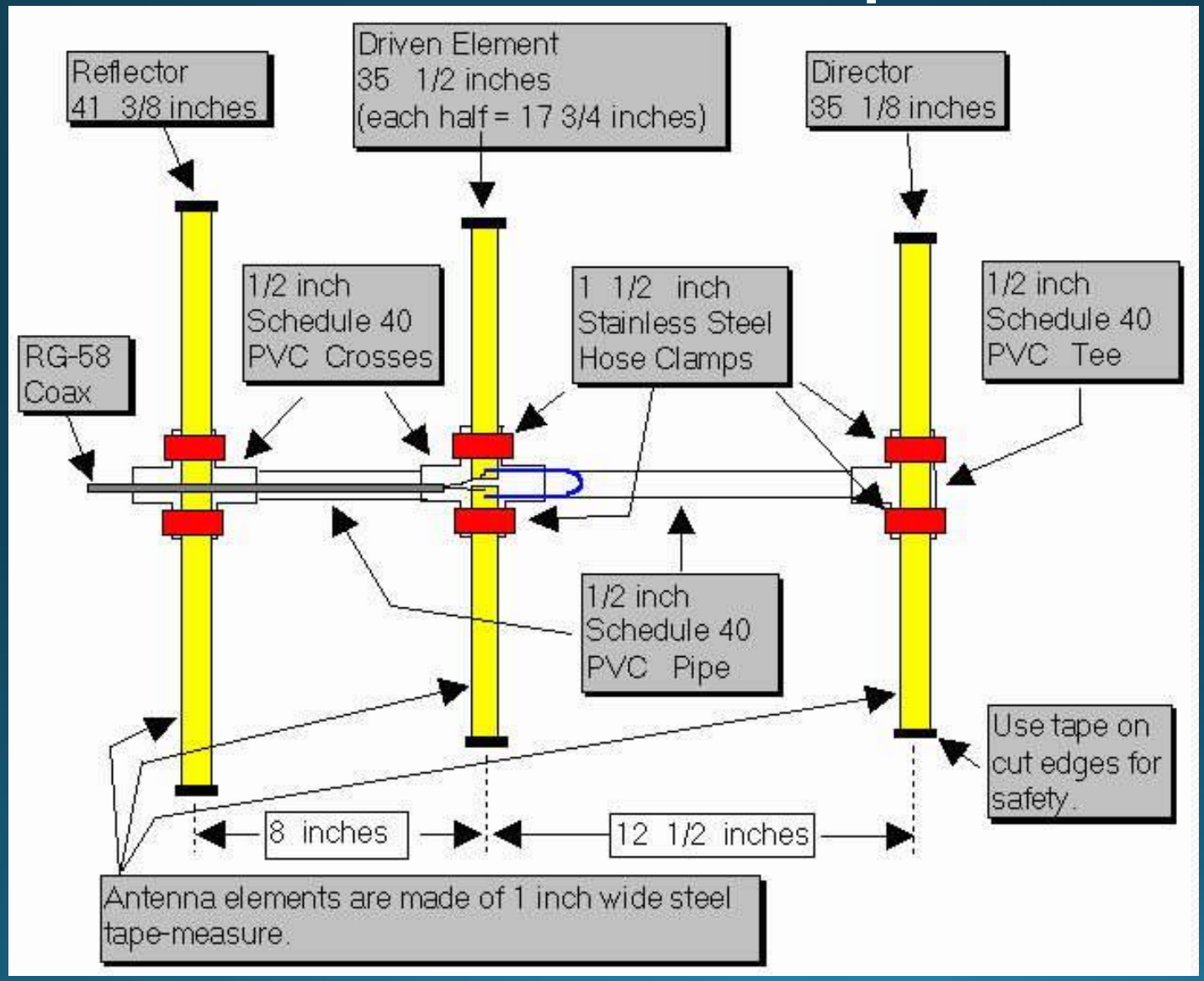
3 Element Uda – Yagi beam – KJ6FYX

9 Element

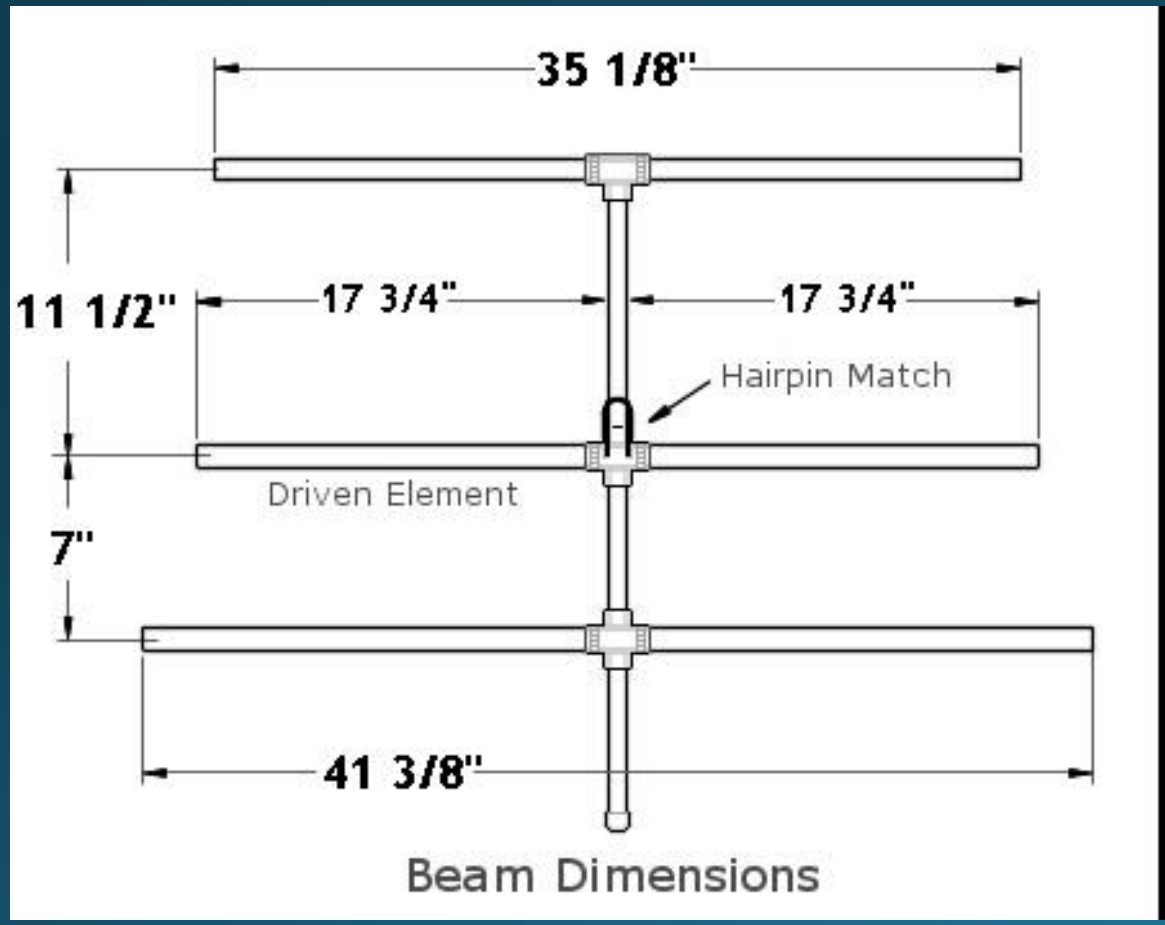
585 MHz



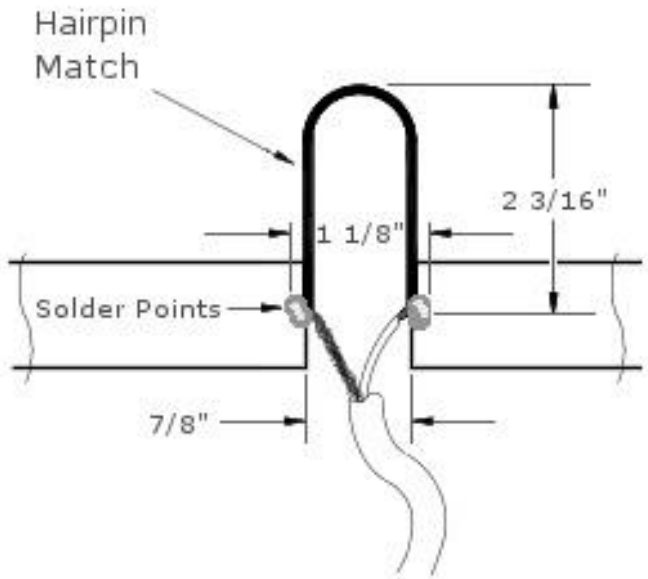
3 Element Beam w/ Hairpin Match



3 Element Beam



Beam Dimensions



Hairpin Match Detail

Flag Pole Antennas

- 43 ft – 160 – 6m band - MFJ-2990 $324.95 + shipping and another $100 in accessories needed.
- 30 ft 10 – 80m - ZeroFive-Antennas $849 + shipping
- - JK Antennas Force12 $119.95

“TV” Antenna in HOA

- You have a right to install a TV antenna on your home? It’s true, so sayeth the U.S. Government. The FCC calls it the Over-The-Air Reception Devices rules, or, unfortunately, **OTARD**.
- OTARD came about as part of the **Telecommunications Act of 1996** and mainly applies to satellite antennas and TV antennas, since those are the two most common items that people would mount on their house in order to receive video signals.
- In effect since October of 1996, the rules establish that you have a right to install a video antenna on your property, regardless of whether the property is owned or rented, and it specifically prohibits restrictions from an HOA, landlord or property manager that would: (1) unreasonably delay or prevent installation, maintenance or use; (2) unreasonably increase the cost of installation, maintenance or use; or (3) preclude reception of an acceptable quality signal.

Links

- http://www.buxcomm.com/jpoles4ever.htm
- http://www.hamuniverse.com/jpole.html J-Pole Calculator
- **http://efactorantennas.com/id3.html**
  - **Gordon West WB6NOA article in CQ VHF Magazine Summer 2008 on his Efactorantenna Dual-Band**
- http://www.astrosurf.com/luxorion/qsl-antennas-basics.htm