Getting on HF: Antennas

de VE6KK

Peter

SASTAR talk November 30, 2020

What signals are out there?

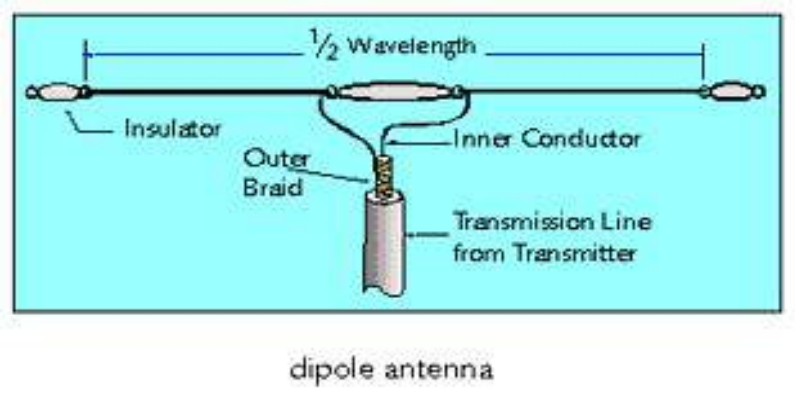
- SWL – short wave listening
- WWV: 5, 10, 15 MHz
- Amateur:
  20M and up (higher freq.) -> day
  40m and lower -> evening
- Listen for FT-8, JT 65 first around
  3.573 **MHz**,7.074 **MHz**,10.136 **MHz**,14.074 **MHz**,24.915 **MHz**,50.323
- DX vs. local -> NVIS, groundwave

What type of antenna?

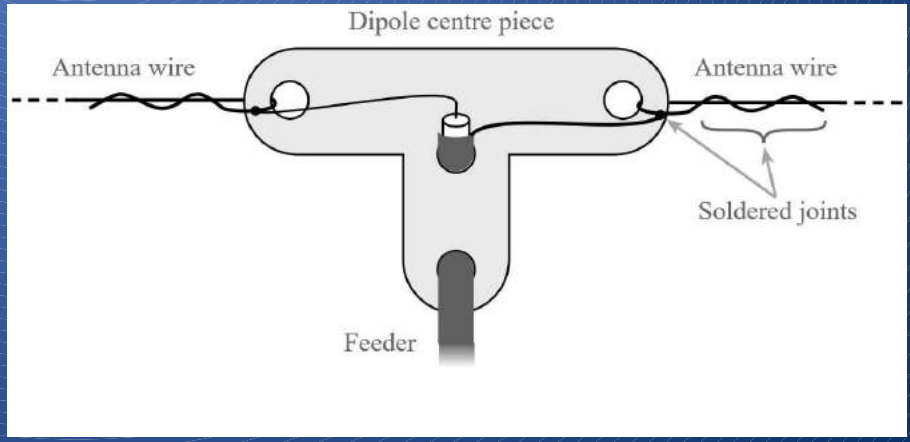
- dream about your ideal antenna farm
- don't think you need it all at once
- temporary first antennas:
  - backyard or portable
  - just a wire out the window at first?
  - what about grounding?
- buy or build something?
  - time vs. $ - buy new, fleas, scrounge
- signal goes where current is max.

A dipole is a dipole..

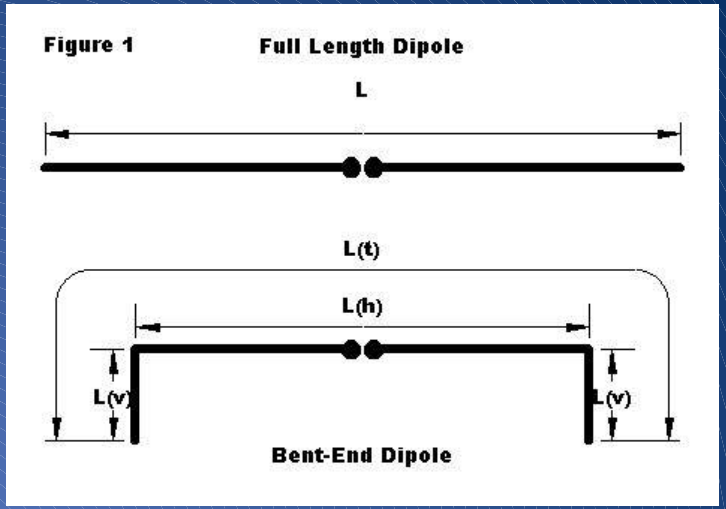
- the basis for everything antenna
- total length? ~ 95% of ½ wavelength
- need wire, 3 insulators, 1 or 2 supports
- or do I ? -> sure if a horizontal or inv. Vee



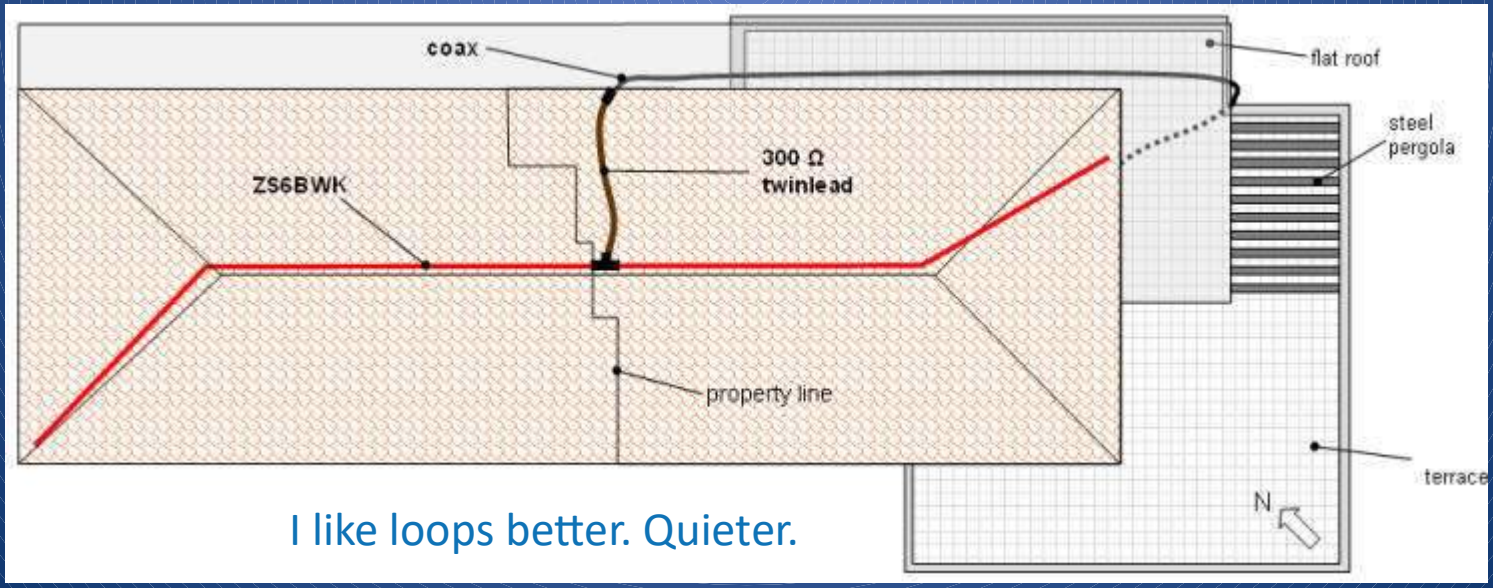
dipole antenna



A dipole is a dipole..



- can I bend the dipole?
- put it in a tree? Attic? Indoors?



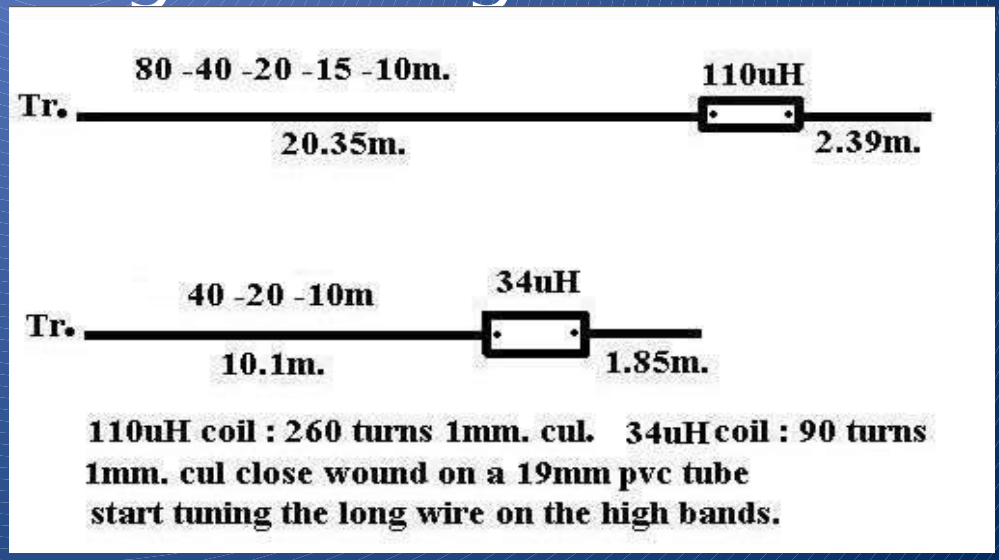
I like loops better. Quieter.

A dipole is a Dipole – or is it?

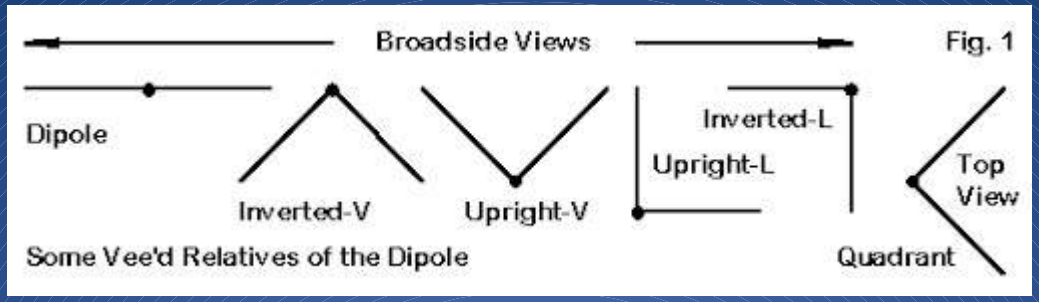
- variations on a theme are endless
  - horizontal, inverted vee
  - horizontal with legs drooped down
  - zig-zagged around obstacles
  - up a tree with one leg on the ground

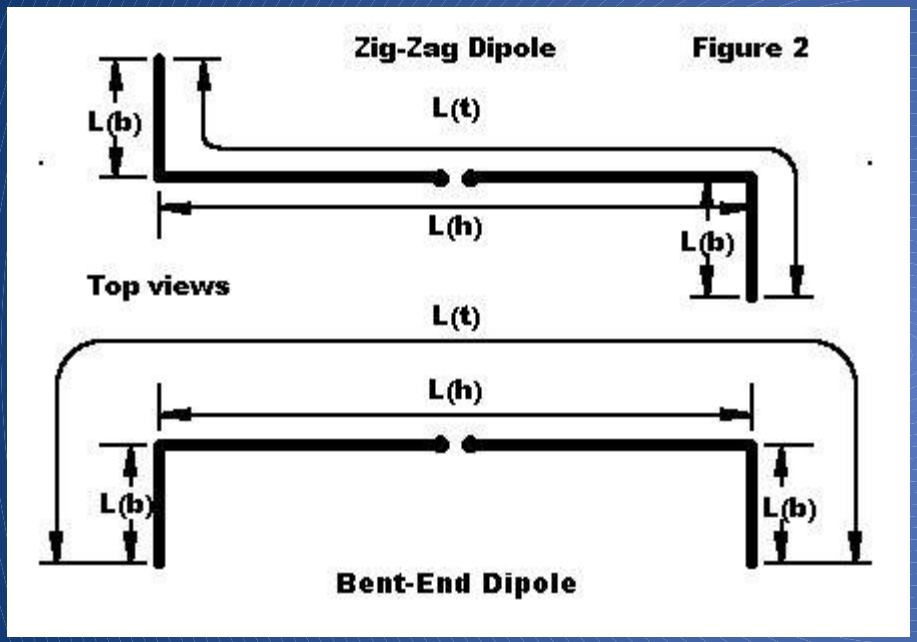
    …wait for it
  - fed at the end

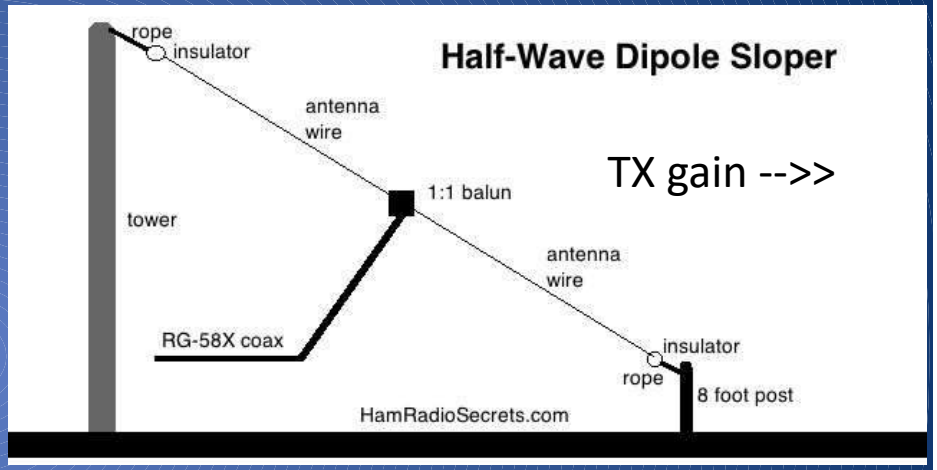
  (via transformer or tuner)

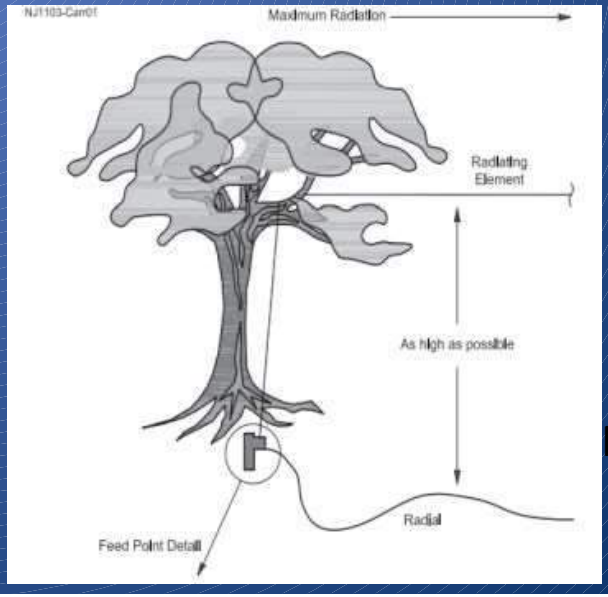


EFHW de PD7MAA









what is this? >

NE0U NCJ
mar-apr/11

A dipole is a Dipole – or is it?

- is a vertical just a dipole?
  - did you see that last picture ?

- grounds:
  1. AC service
     = that green wire
  2. RF
     = radials or counterpoise
  3. Lightning
     = ground rods, protectors

Popular options

- basic dipole or vee on mast or trees
- zipcord dipole > portable
- EFHW vs. random wire
- the vertical
- one wire radial idea
- inverted L up tree and on ground
- commercial G5RV, EFHW, OCFD


Multiband
End-Fed Half Wave
Antenna-EFHW
80/40/30/20/15/10/12/6m
EFHW-8010-1K
Maximum Power: 1kW I.C.A.S
MyAntennas.com
Designed by EI2GL. Made in USA

EFHW

G5RV

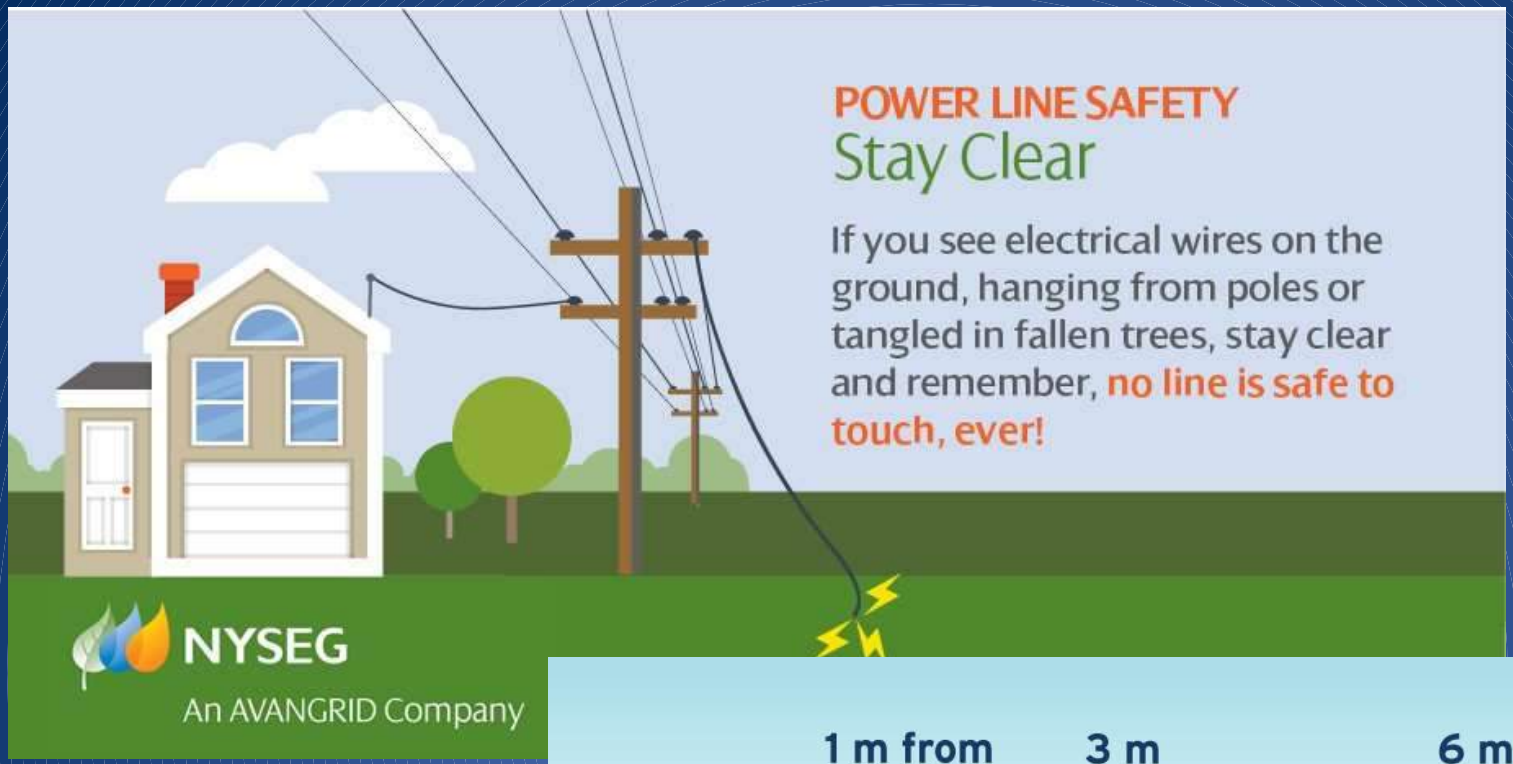
Other ideas

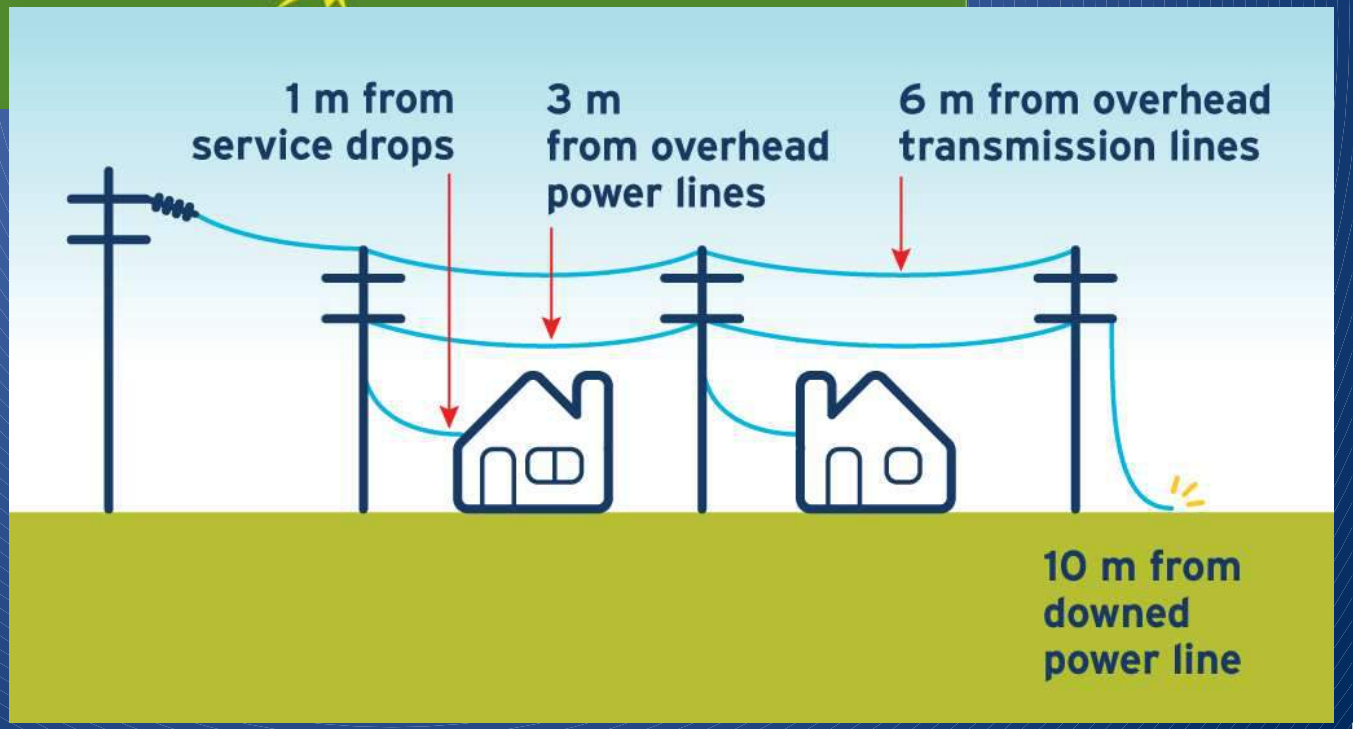
- fibreglass poles
- up a tree?
  - throwline
  - slingshot, bow, air cannon
- NOISEEEE!
- stealth ideas:
  - eavestrough, under soffit
  - wire fence
  - flagpole
- mobile
- remote


STANLEY
Life Guard

Let's do it! (with pictures for now)

- SAFETY
- wire
- insulators
- coax and connectors
- antenna construction
- the SWR meter
- do I need an antenna analyzer or VNA?
- discussion!


POWER LINE SAFETY
Stay Clear
If you see electrical wires on the ground, hanging from poles or tangled in fallen trees, stay clear and remember, no line is safe to touch, ever!
NYSEG
An AVANGRID Company


1 m from service drops
3 m from overhead power lines
6 m from overhead transmission lines
10 m from downed power line

48 x 12 in. High-Efficiency Attic Dipole Loading Coi

www.w6nbc.com

oops

Let's do it! (with pictures for now)

- SAFETY
- wire
- insulators
- coax and connectors
- antenna construction
- the SWR meter
- do I need an antenna analyzer or VNA?
- discussion!


CHILE THHN OR THWN
hscable.en.alibaba.com

5x Small Dogbone Ribbed
Antenna Wire Insulator

2.75 x 0.75 inch
70 x 25 mm

KB9RLW Presents

Quick Tips

Super Cheap Antenna Insulators!

Coax Loss Chart dB per 100 Feet

	RG-316	RG-58	RG-8X	LMR-240	RG-213	9913	LMR-400	Bury-Flex
3.5 MHz	1.5	.8	.65	.45	.3	.23	.2	.26
7 MHz	2.1	1.2	.85	.64	.5	.32	.3	.37
14 MHz	3.0	1.7	1.21	.91	.7	.46	.5	.53
28 MHz	4.2	2.4	1.74	1.29	1.00	.65	.7	.75
50 MHz	5.6	3.2	2.36	1.73	1.40	.88	.9	1.00
144 MHz	9.6	5.5	4.20	2.95	2.40	1.54	1.44	1.73
440 MHz	17	9.9	7.92	5.23	4.40	2.818	2.7	3.08

100 Series

50 Ohm Impedance

NOMINAL ATTENUATION		
MHz	db/100ft	db/100m
900	22.8	74.8
1800	33.2	108.8
2500	39.8	130.6

195 Series

50 Ohm Impedance

NOMINAL ATTENUATION		
MHz	db/100ft	db/100m
900	11.1	36.5
1800	16.0	52.5
2500	19.0	62.4
5800	29.9	98.1

200 Series

50 Ohm Impedance

NOMINAL ATTENUATION		
MHz	db/100ft	db/100m
900	9.9	32.6
1800	14.2	46.6
2500	16.9	55.4
5800	26.4	86.5

240 Series

50 Ohm Impedance

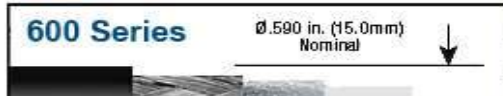
NOMINAL ATTENUATION		
MHz	db/100ft	db/100m
900	7.6	24.8
1800	10.9	35.6
2500	12.9	45.4
5800	20.4	66.8

400 Series

50 Ohm Impedance

NOMINAL ATTENUATION		
MHz	db/100ft	db/100m
900	3.9	12.8
1800	5.7	18.6
2500	6.8	22.2
5800	10.8	35.5

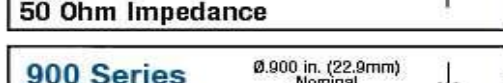
600 Series



50 Ohm Impedance

NOMINAL ATTENUATION		
MHz	db/100ft	db/100m
900	2.5	8.2
1800	3.7	12.1
2500	4.4	14.5
5800	7.3	23.8

900 Series



50 Ohm Impedance

NOMINAL ATTENUATION		
MHz	db/100ft	db/100m
900	1.7	5.6
1800	2.5	8.2
2500	2.9	9.8
5800	4.9	16.0

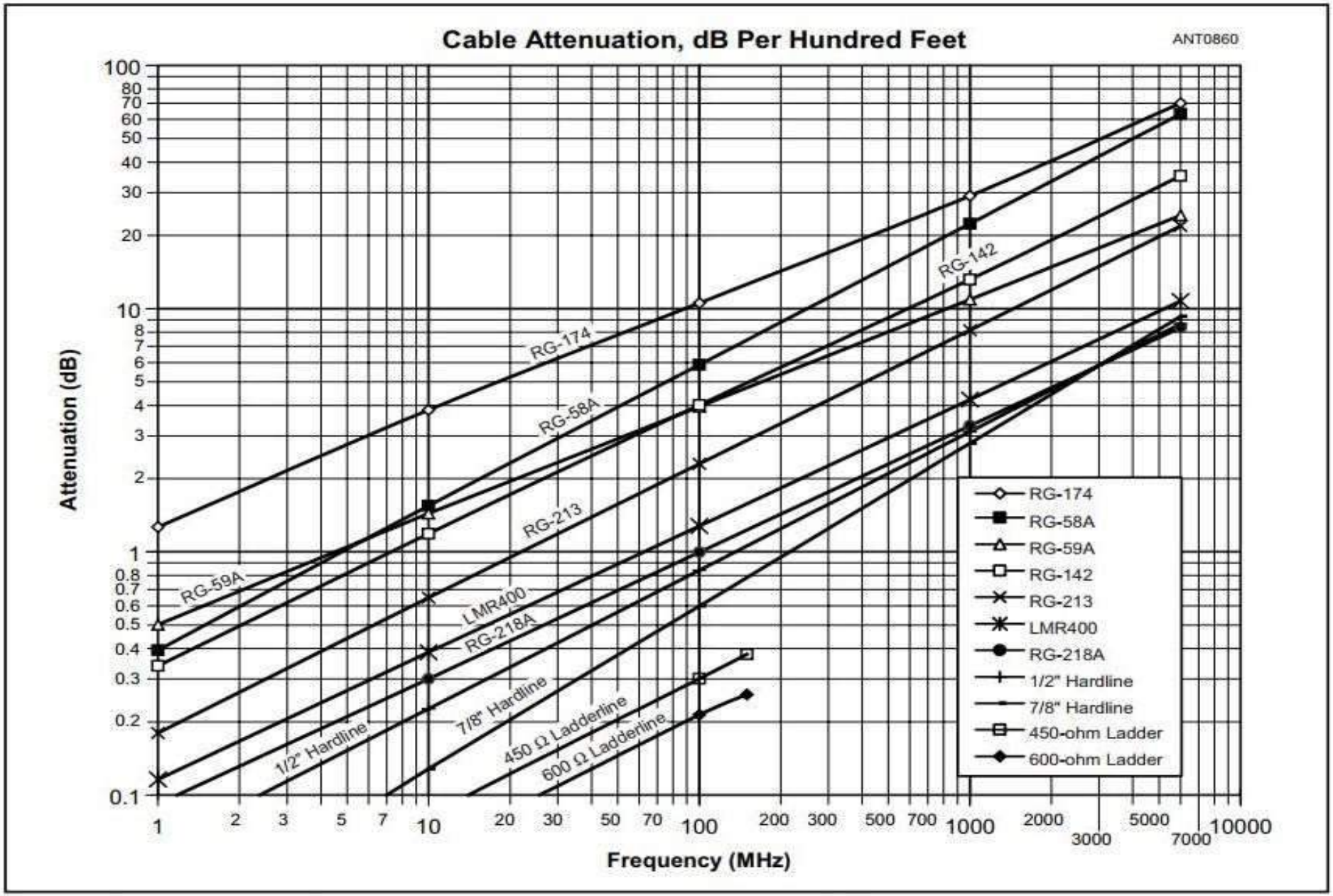
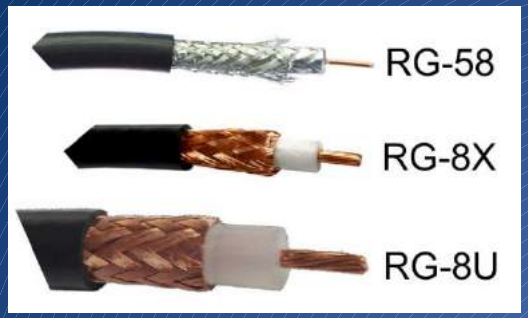


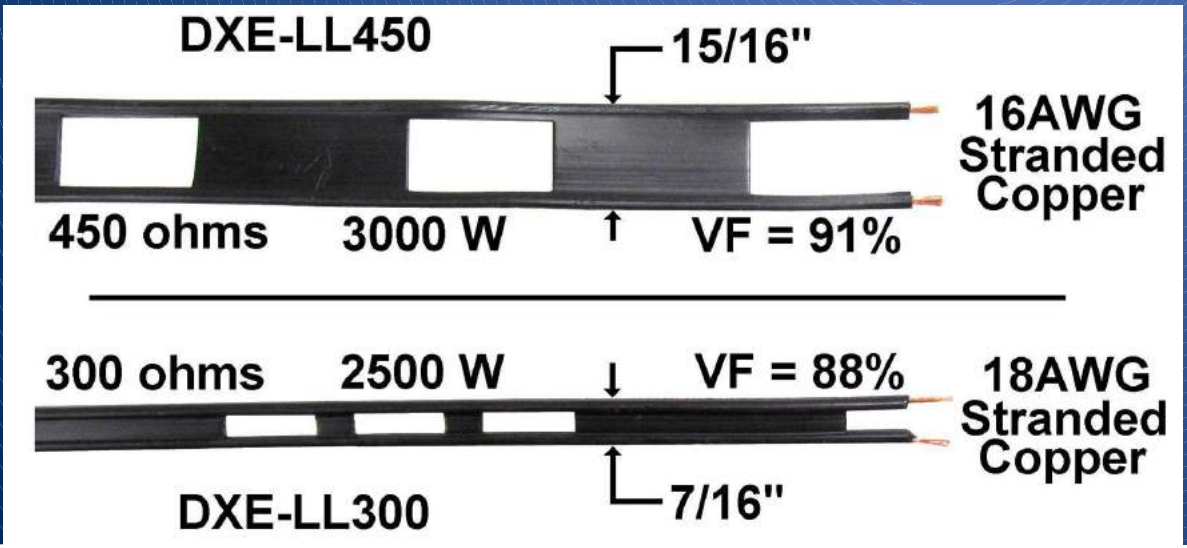
Figure 23.24 — Nominal matched-line attenuation in decibels per 100 feet of various common transmission lines. Total attenuation is directly proportional to length. Attenuation will vary somewhat in actual cable samples, and generally increases with age in coaxial cables having a type 1 jacket. Cables grouped together in the above chart have approximately the same attenuation. Types having foam polyethylene dielectric have slightly lower loss than equivalent solid types, when not specifically shown above.



Gender of Connectors

Feeding ~~an~~ with OWL

ladder line



window line

Let's do it! (with pictures for now)

- SAFETY
- wire
- insulators
- coax and connectors
- antenna construction
- the SWR meter
- do I need an antenna analyzer or VNA?
- discussion!

Insulated wire will require a slightly shorter length

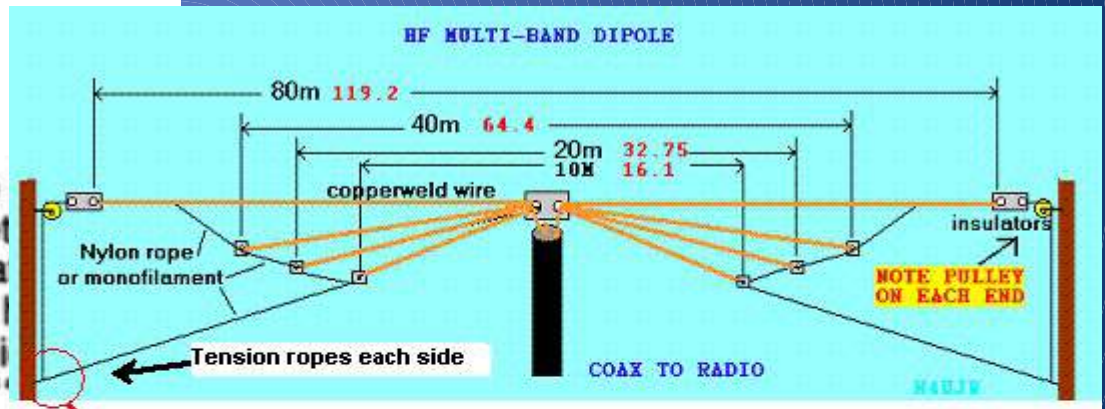
Fan dipoles should have as much space between bands as possible. Spacing horizontally is even better (teepee antenna).

Table 1

Approximate Lengths of Half-Wave Dipoles for the MF/HF Ham Bands*

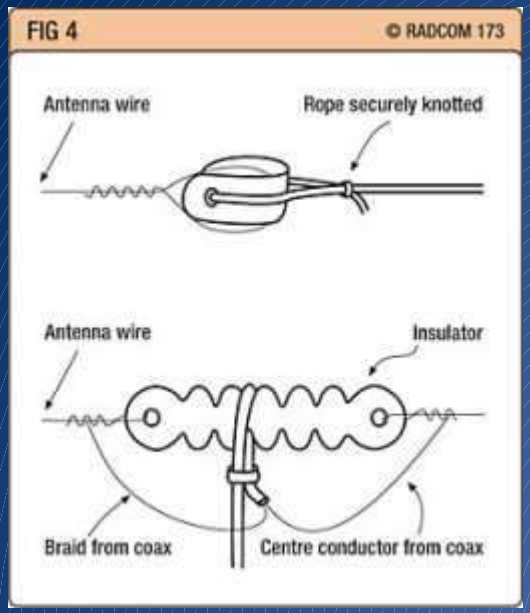
Frequency	*Length*
28.4 MHz	16 ft, 6 in.
24.9 MHz	18 ft, 10 in.
21.1 MHz	22 ft, 2 in.
18.1 MHz	25 ft, 10 in.
14.1 MHz	33 ft, 2 in.
10.1 MHz	46 ft, 4 in.
7.1 MHz	65 ft, 11 in.
3.6 MHz	130 ft
1.8 MHz	260 ft

*General equation for half-wave dipole $\ell = 468 \div f$, where ℓ is length in feet is frequency in megahertz. This equa yields good starting points; you may lengthen or trim your antenna to achi resonance. See the sidebar entitled " Construction and Adjustment."



Tension rope is not tied to pully rope in picture. It is tied near location of pully rope down on supports within easy reach. It is tied last after final SWR adjustment and the antenna is in it's final position.

Suggested total lengths:
80 meters - 120 feet
40 meters - 65 to 66 feet
20 meters - 34 feet
10 meters - 17 feet
These lengths are not exact. Some tuning may be required. Use the standard formula 468 / freqmhz for total feet for each band (freq) of interest. Adjust each length longer or shorter as needed.



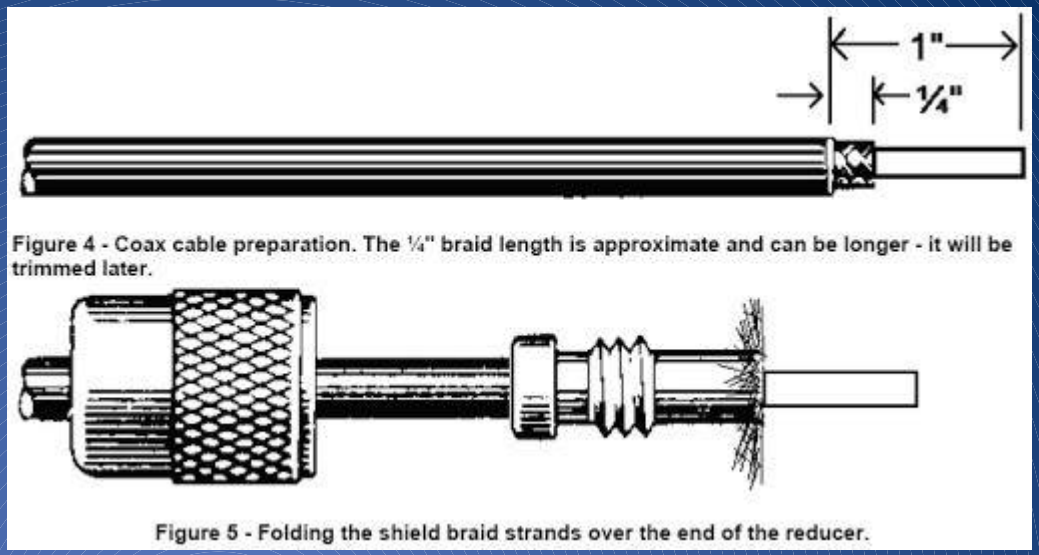
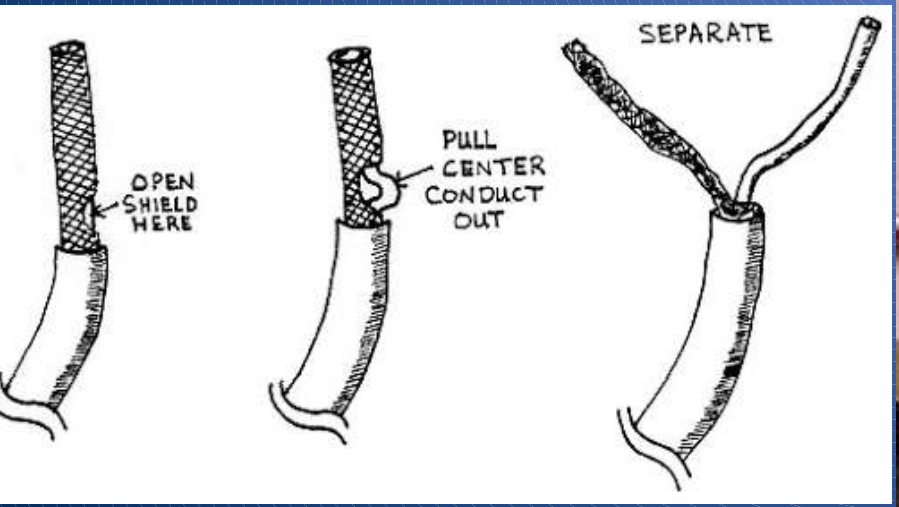


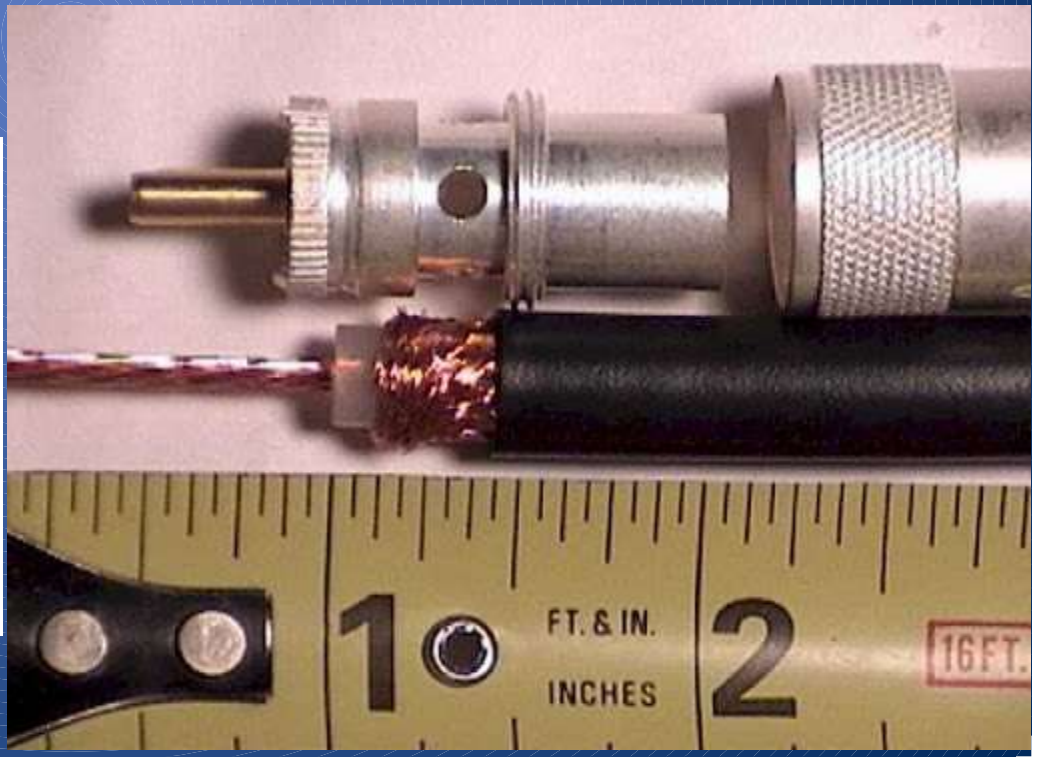
Figure 4 - Coax cable preparation. The ¼" braid length is approximate and can be longer - it will be trimmed later.

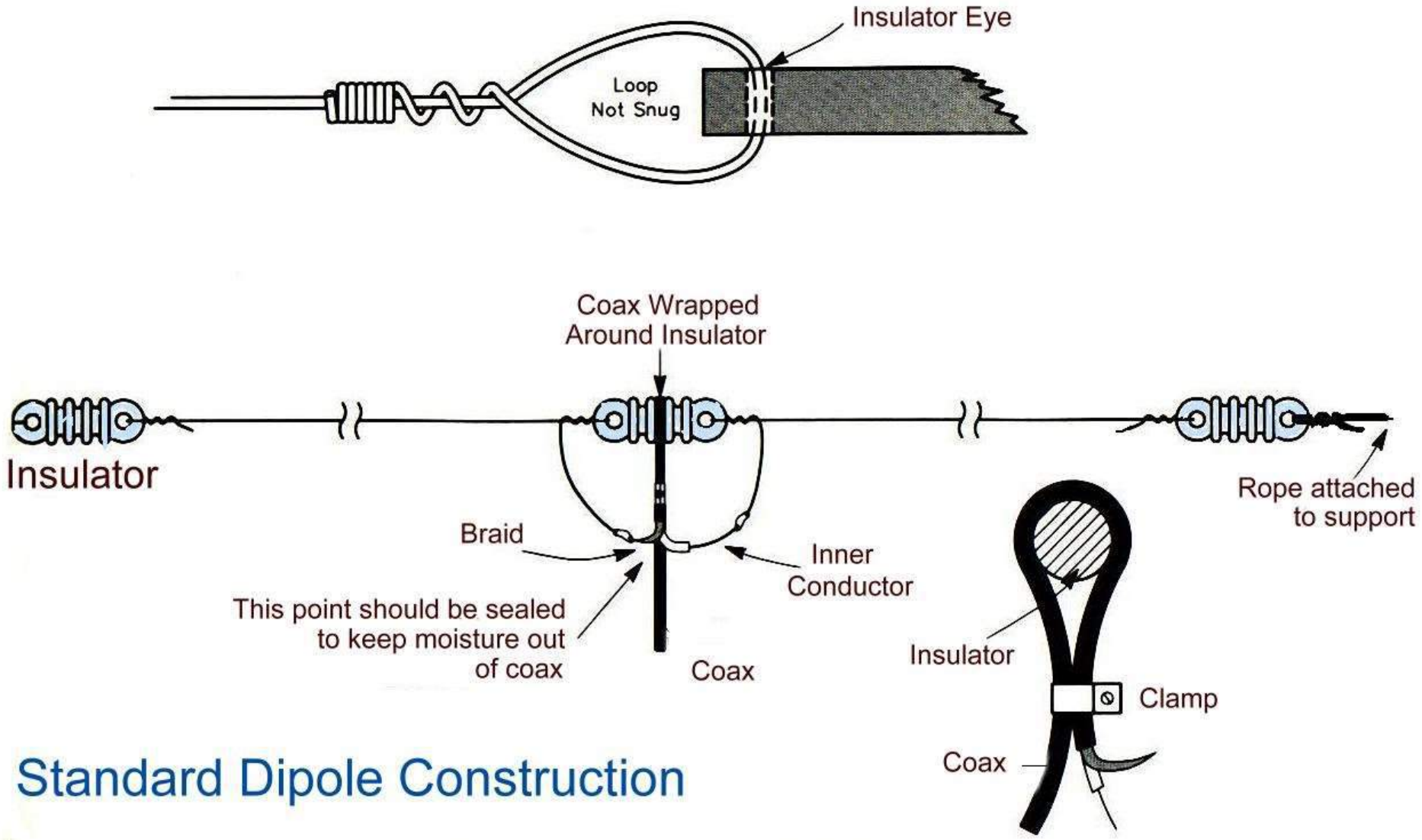
Figure 5 - Folding the shield braid strands over the end of the reducer.

connector installation

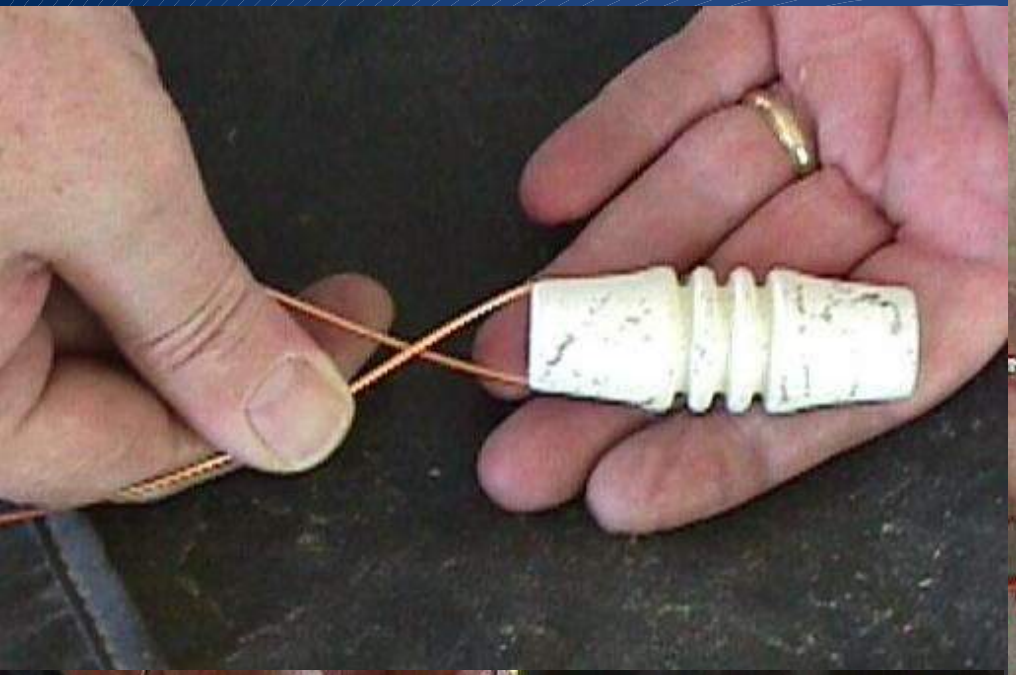
how to open coax for pigtails
don't forget waterproofing!

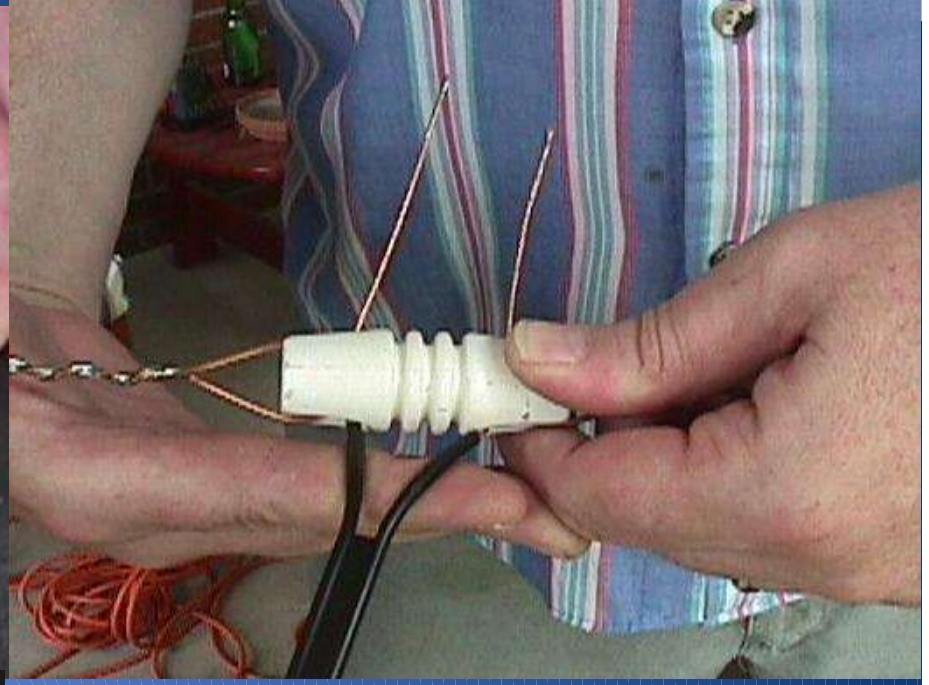


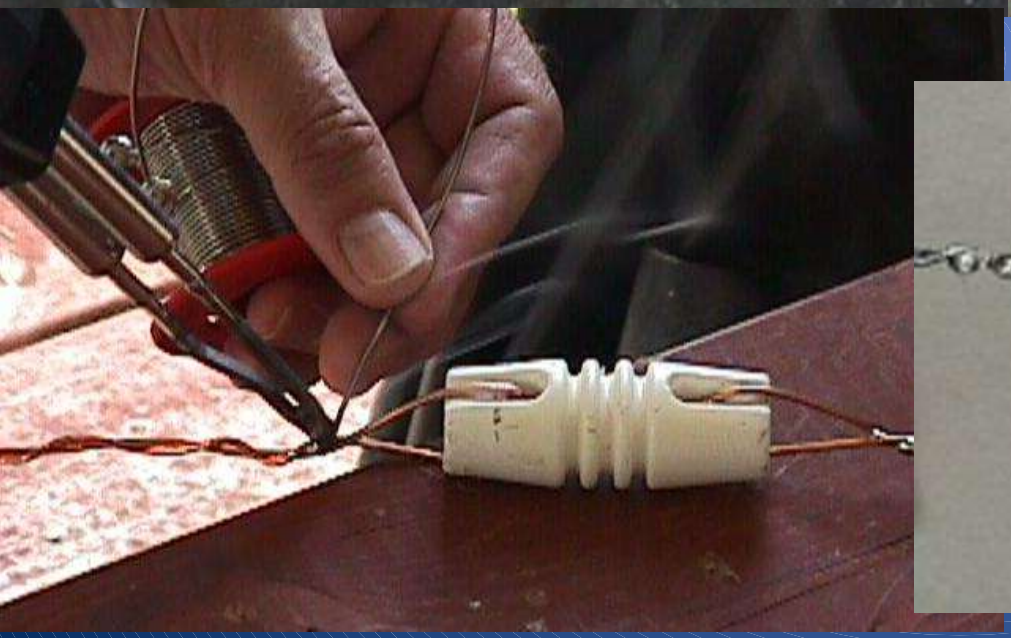


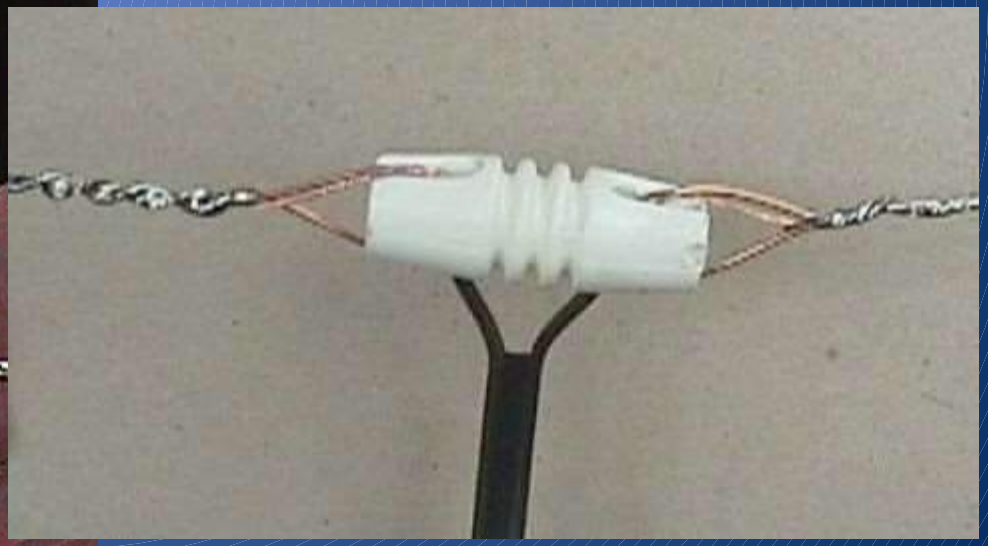


Standard Dipole Construction









not the best way – see next slide

Figure 4 — View of the actual insulator as designed.

Make your own antenna center insulator that is even better than what you can buy.

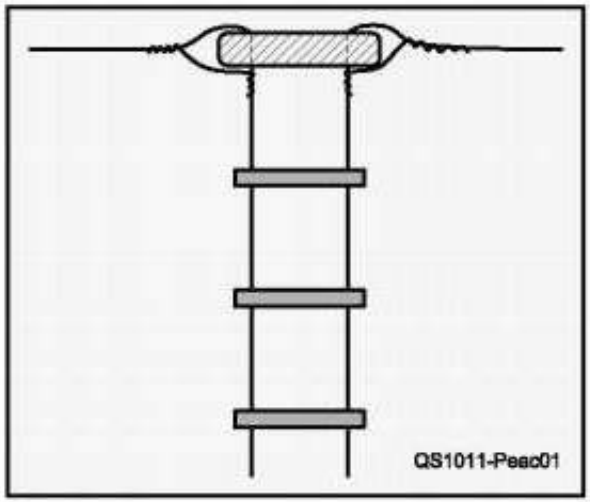


Figure 1 — The usual desired configuration of open wire or window line on the typical insulator. Note that in this position both line conductors are equally stressed.

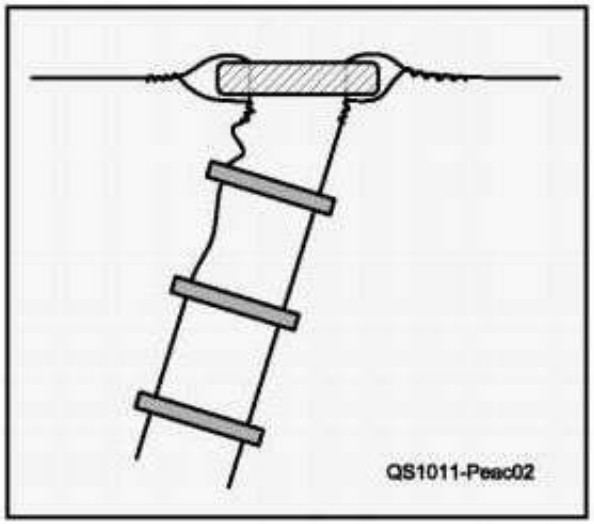


Figure 2 — What really happens as the antenna and line move in the wind. The conductors are subject to unbalanced stress and flexing.

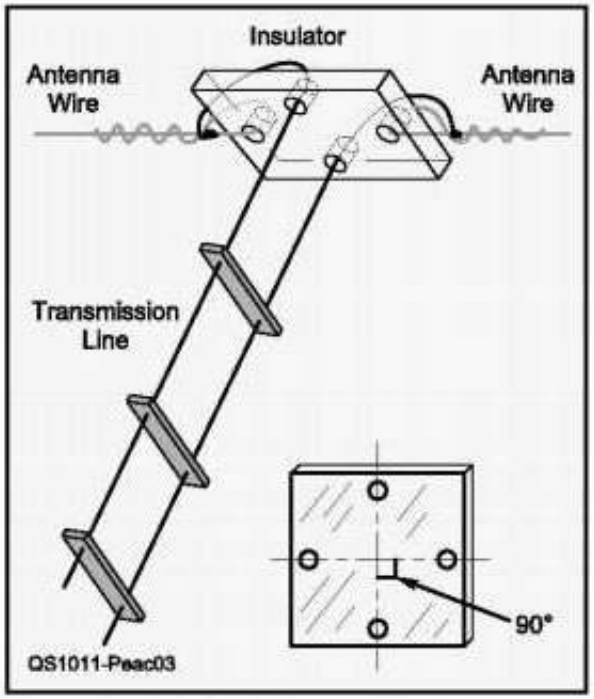


Figure 3 — Making the line attachment perpendicular to the wire access tends to equalize the stress.

Let's do it! (with pictures for now)

- SAFETY
- wire
- insulators
- coax and connectors
- antenna construction
- the SWR meter
- do I need an antenna analyzer or VNA?
- discussion!

built in SWR meter

$$ but nice!

IC-7300 SWR sweep

nanoVNA

Conclusions

- HF listening and operating is great fun
- get a basic RX and some type of wire up
- put up a simple antenna to start
- you can build easily or buy
- use your rig's SWR meter for checks
- see the many great resources on antennas
- ask the group, have someone help out