Terminated Folded Dipole Antenna
Wide-Band Folded Dipole

What is it? How to build it. How does it perform.

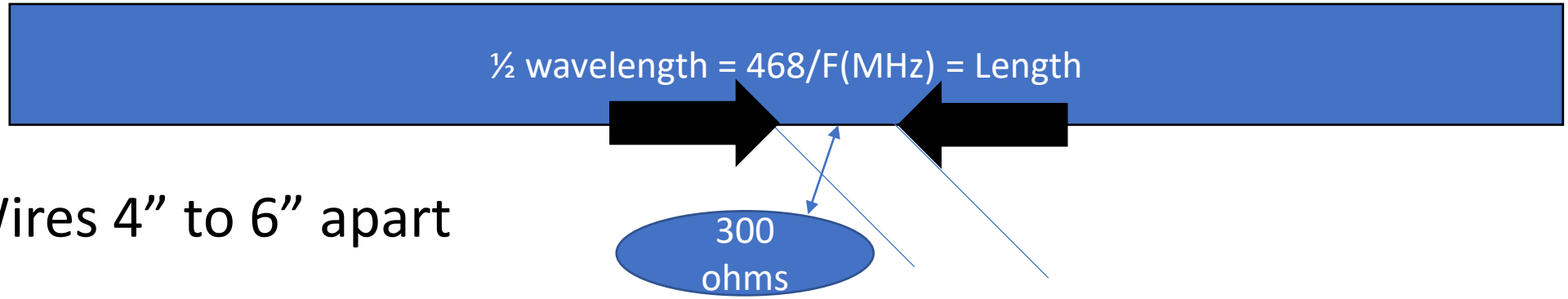
WHY:

- As space for antennas continues to shrink in the present era of smaller urban and suburban yard, hams have begun to turn to 1-antenna solutions to their operating needs. Among the choices for a horizontal antenna that operates on all of the HF amateur bands, the wide-band "folded dipole" (WBFD) has been gaining popularity.

- A Terminated Folded Dipole is a folded dipole in which a resistive and/or reactive termination is **inserted** in the middle of the exposed loop of the active metallic dipole element circuit, opposite the feed point.

ARRL Antenna Book, Section 6-10, and 26-8

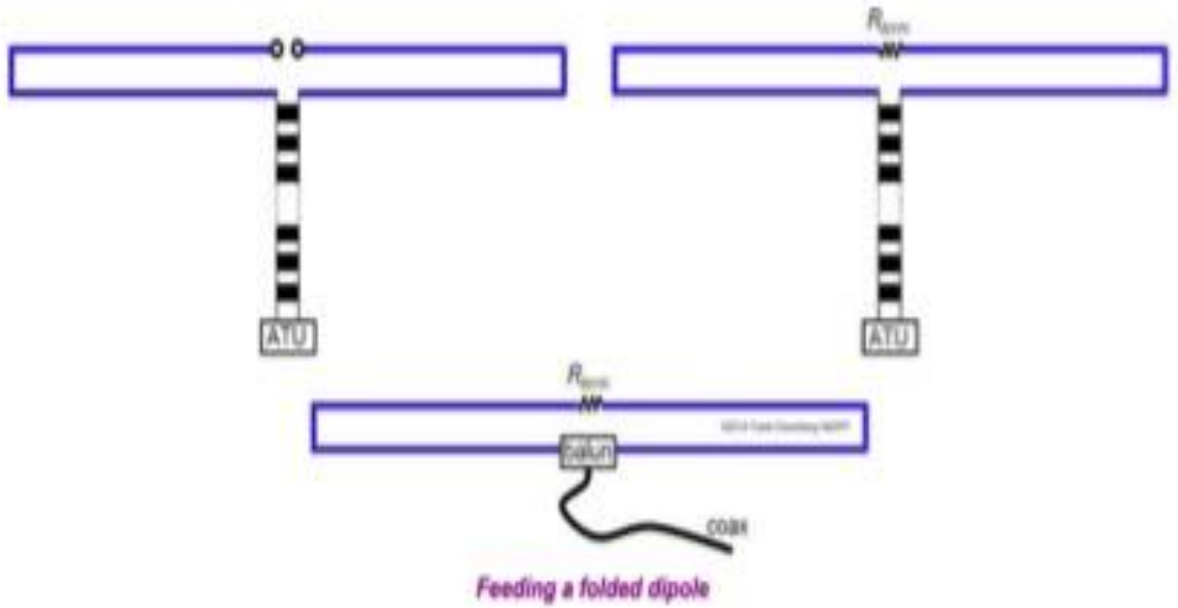
- A folded dipole has a better match over wider bandwidth compared to a single wire dipole
- This is partly explained by the fact the two conductors in parallel form a single conductor **of greater effective diameter.**
- Wire length calculated is overall length of the antenna from end to end. Use 300 or 450 ohm twin lead.
- Wires 4” to 6” apart



ARRL Handbook, Sections 21.12 & 21.57 Twin Folded Terminated Dipole

- A resistor is applied in top wire to act as a swamping load, reducing higher feed point impedance over a wide freq. range.
- The resistor dissipates some of the transmitter power (+/-50% at some frequencies…..BUT the improvement in SWR allows **coax feedline** to be used without an independent matching unit (a variable capacitor)
- The normal impedance of a ½ wave single dipole is +/- 72 ohms when fed at the center.
- A Folded Dipole's impedance is 4 times that of a typ. Dipole or +/- 288 ohms and can be fed with 300-ohm twin lead.

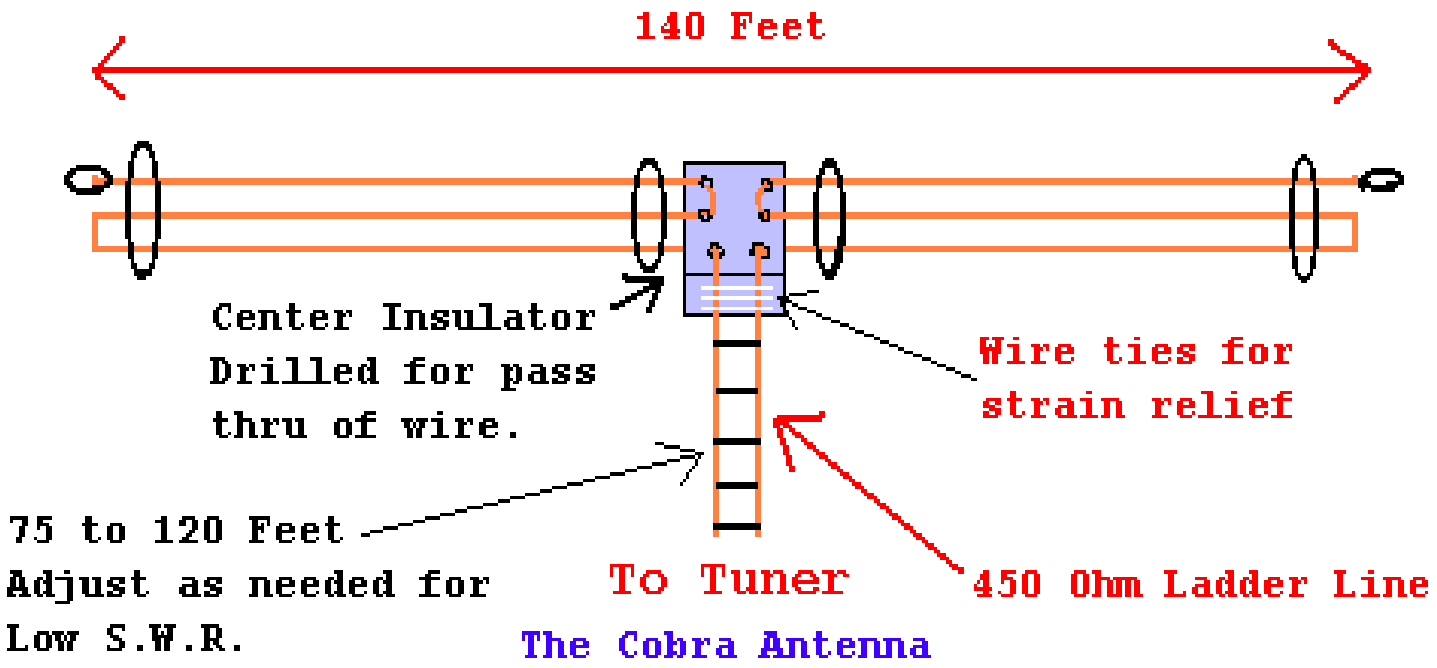
VARIATIONS:



Feeding a folded dipole

The span of the antenna can be further reduced, by folding the dipole legs into a zigzag (though this may complicate feeding the antenna):

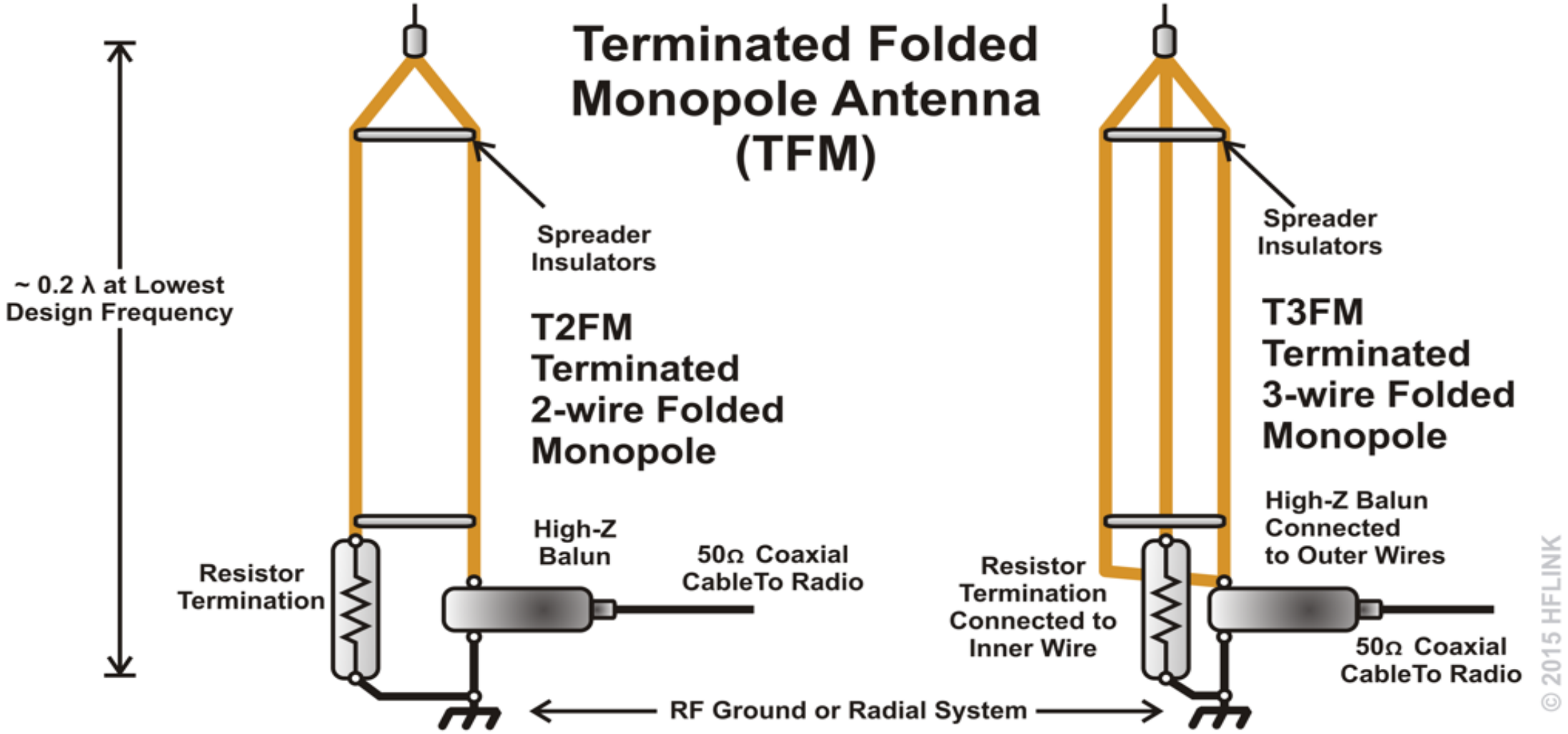
THE “COBRA” ANTENNA
uses a flat 3 conductor wire as radiating element



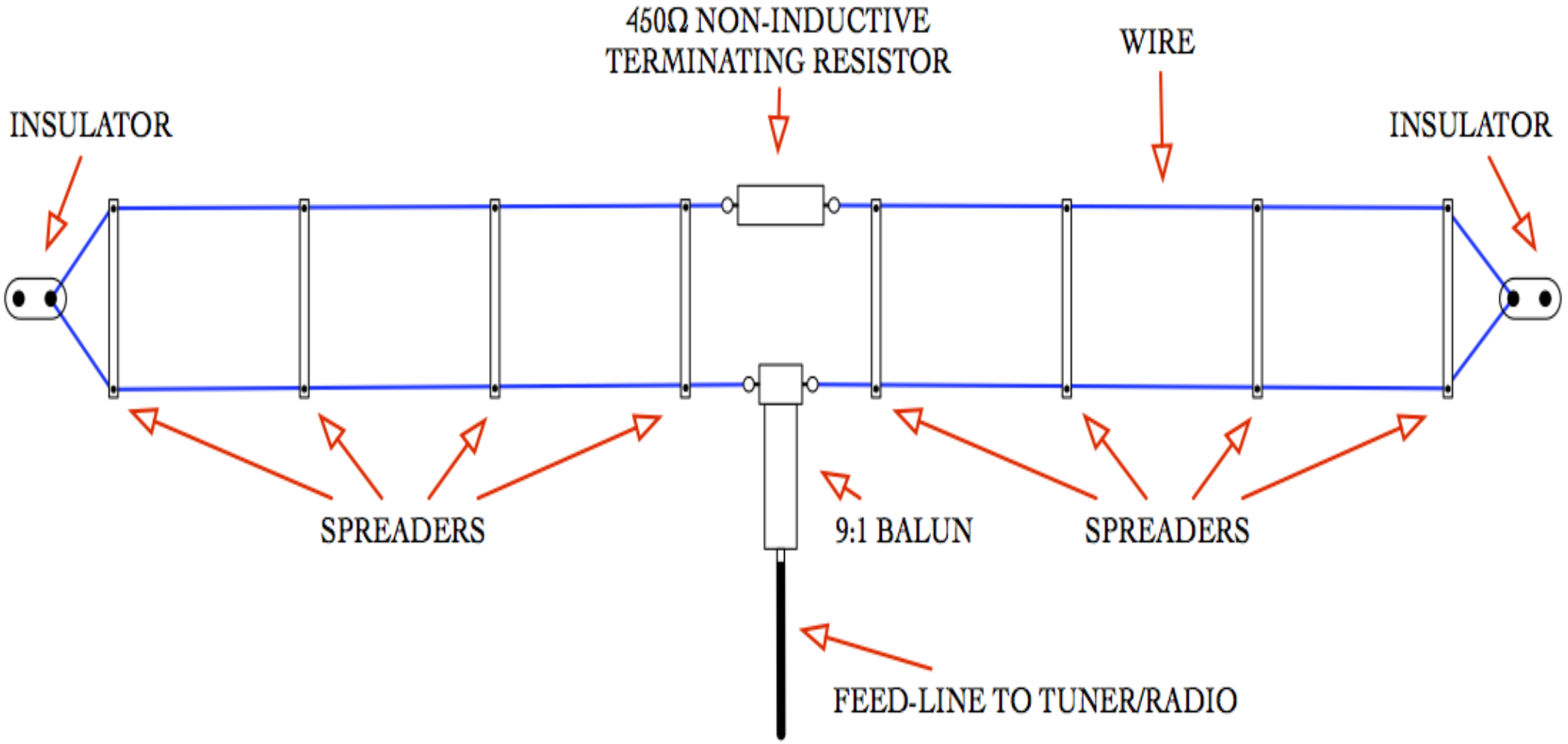
160 Thru 10 Meters = 140 Feet
80 Thru 10 Meters = 70 Feet

N4UJW

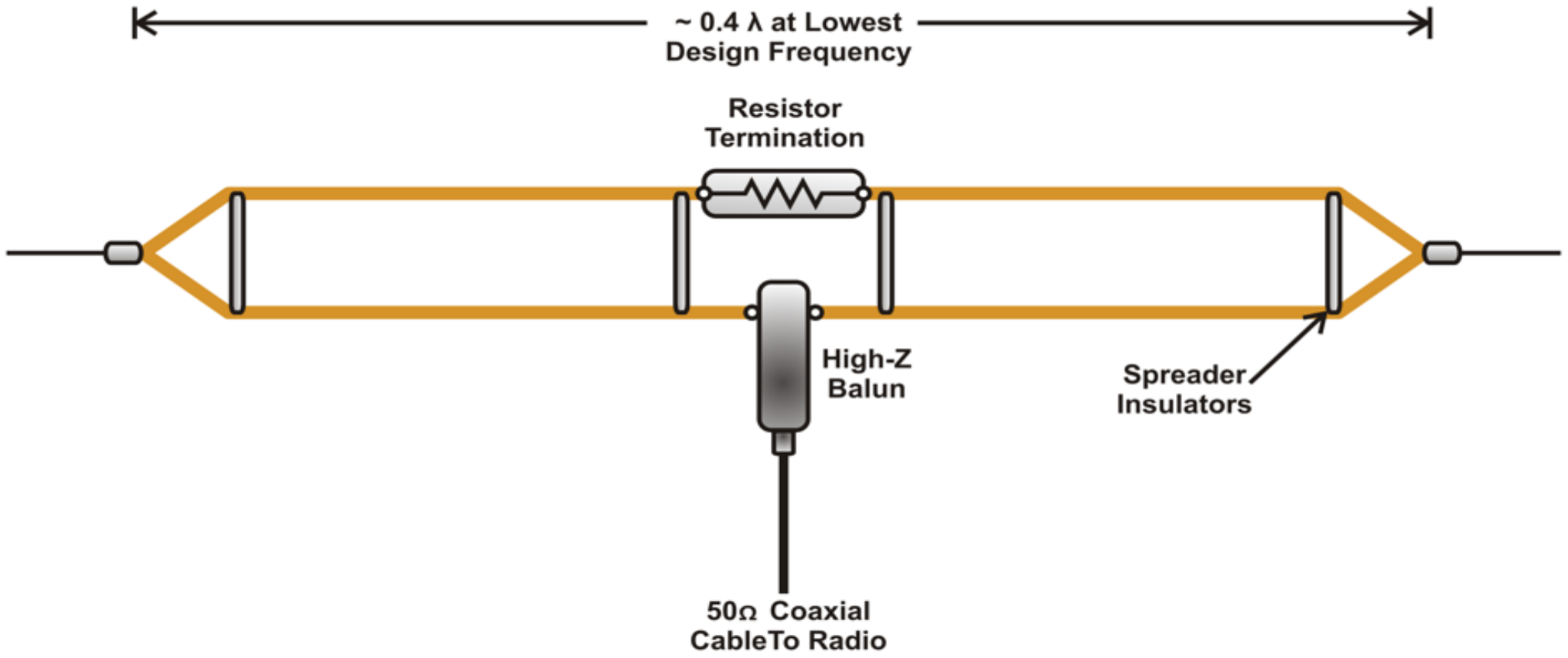
CAN BE USED IN A VERTICAL CONFIGURATION however, requires a radial or ground system



Basic construction:

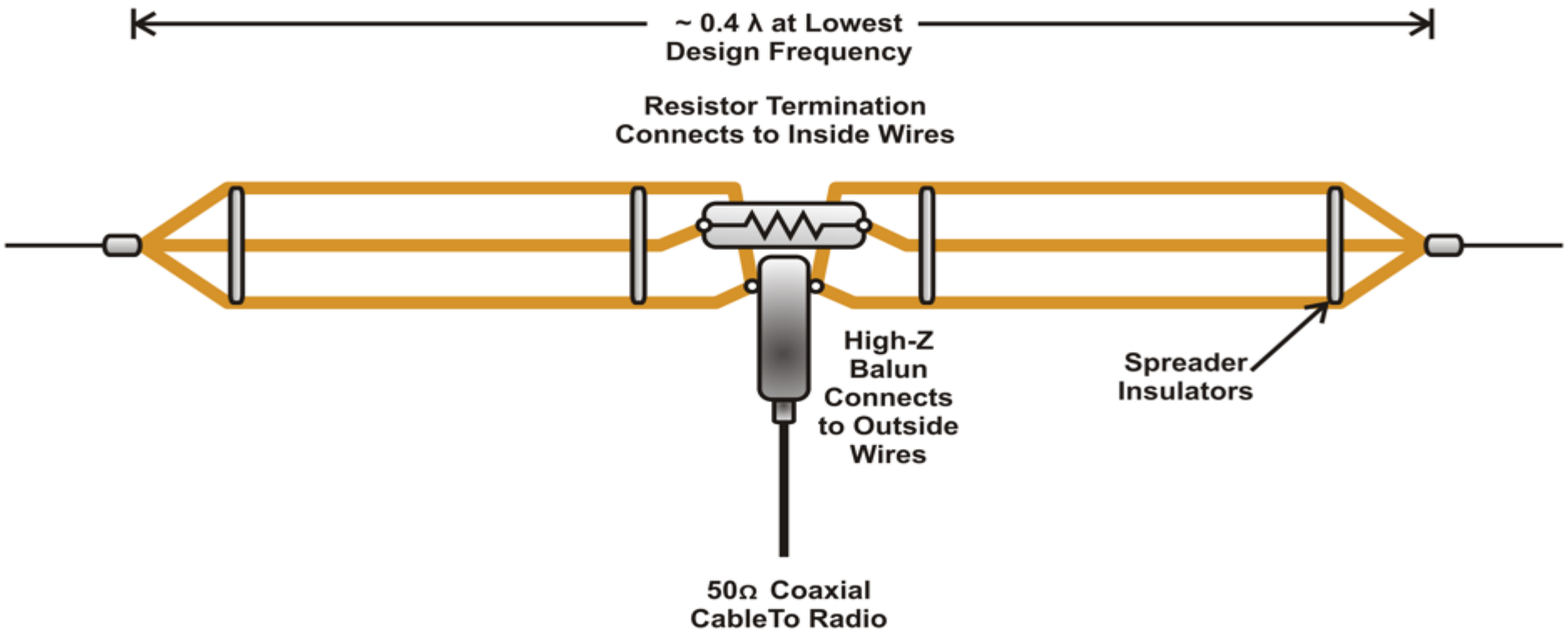


EXAMPLE #1



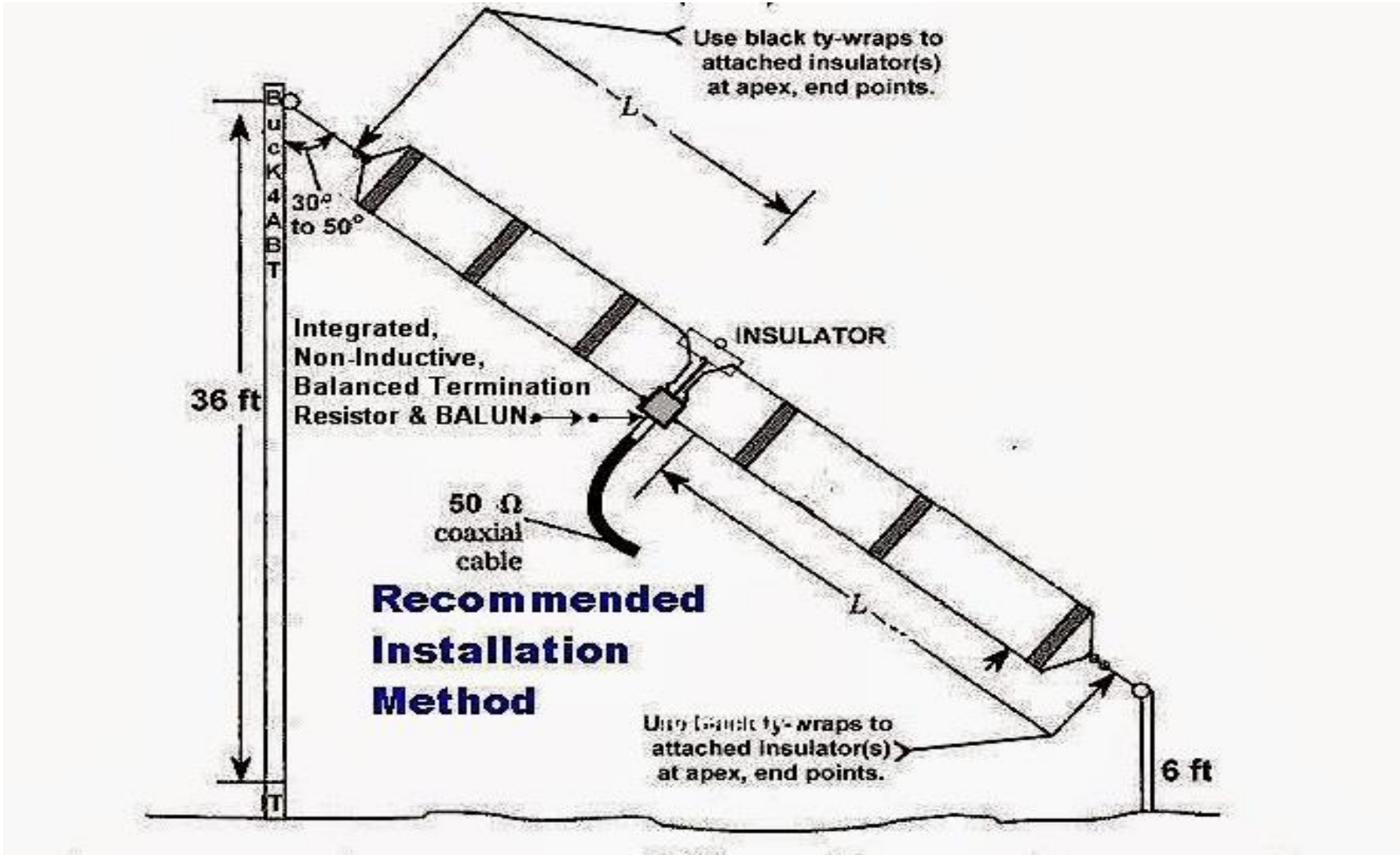
Terminated Folded Dipole Antenna (T2FD or TFD)

EXAMPLE #2…AS A 3 wire “FLAT TOP”

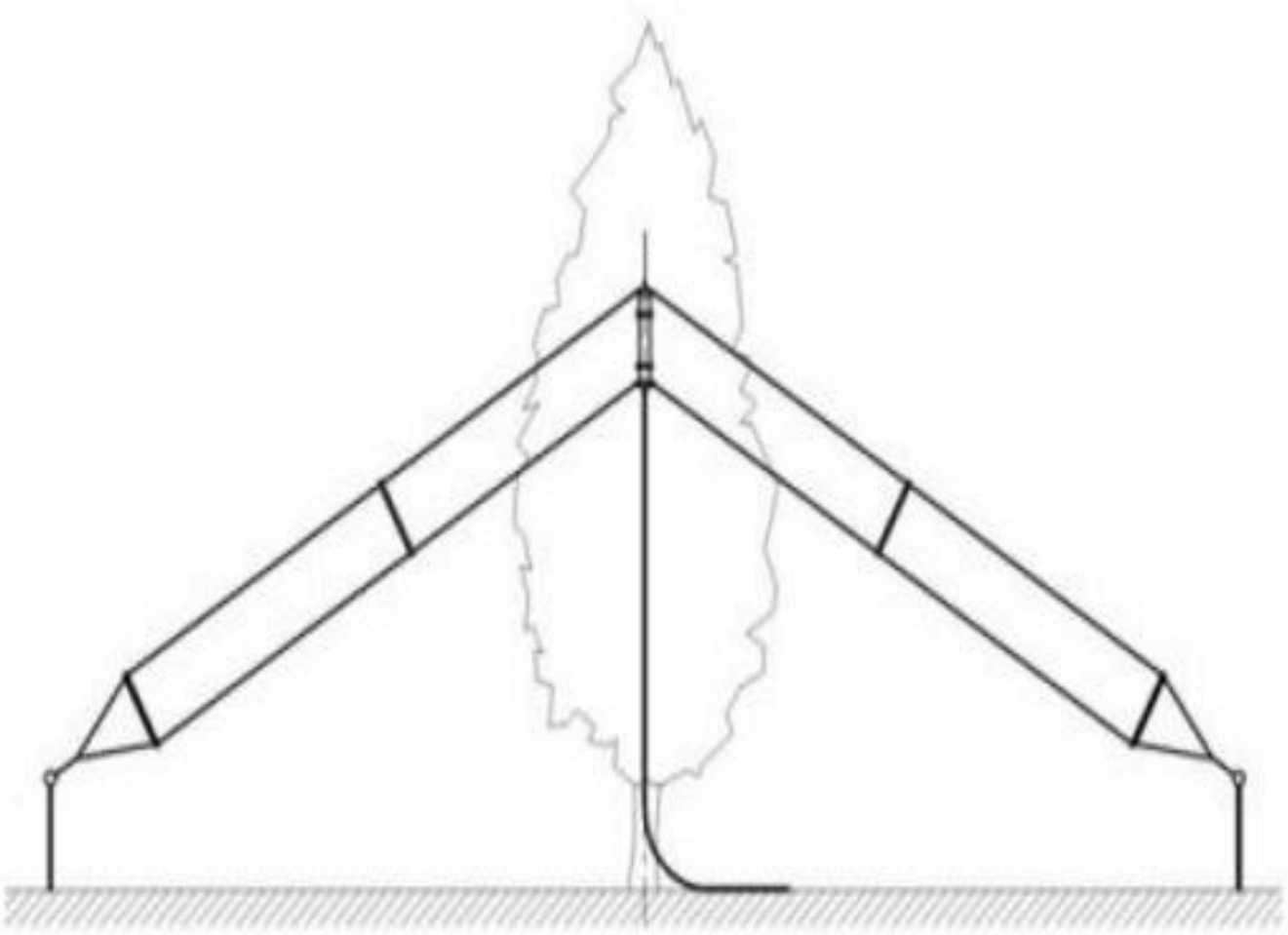


Terminated 3- wire Folded Dipole Antenna (T3FD)

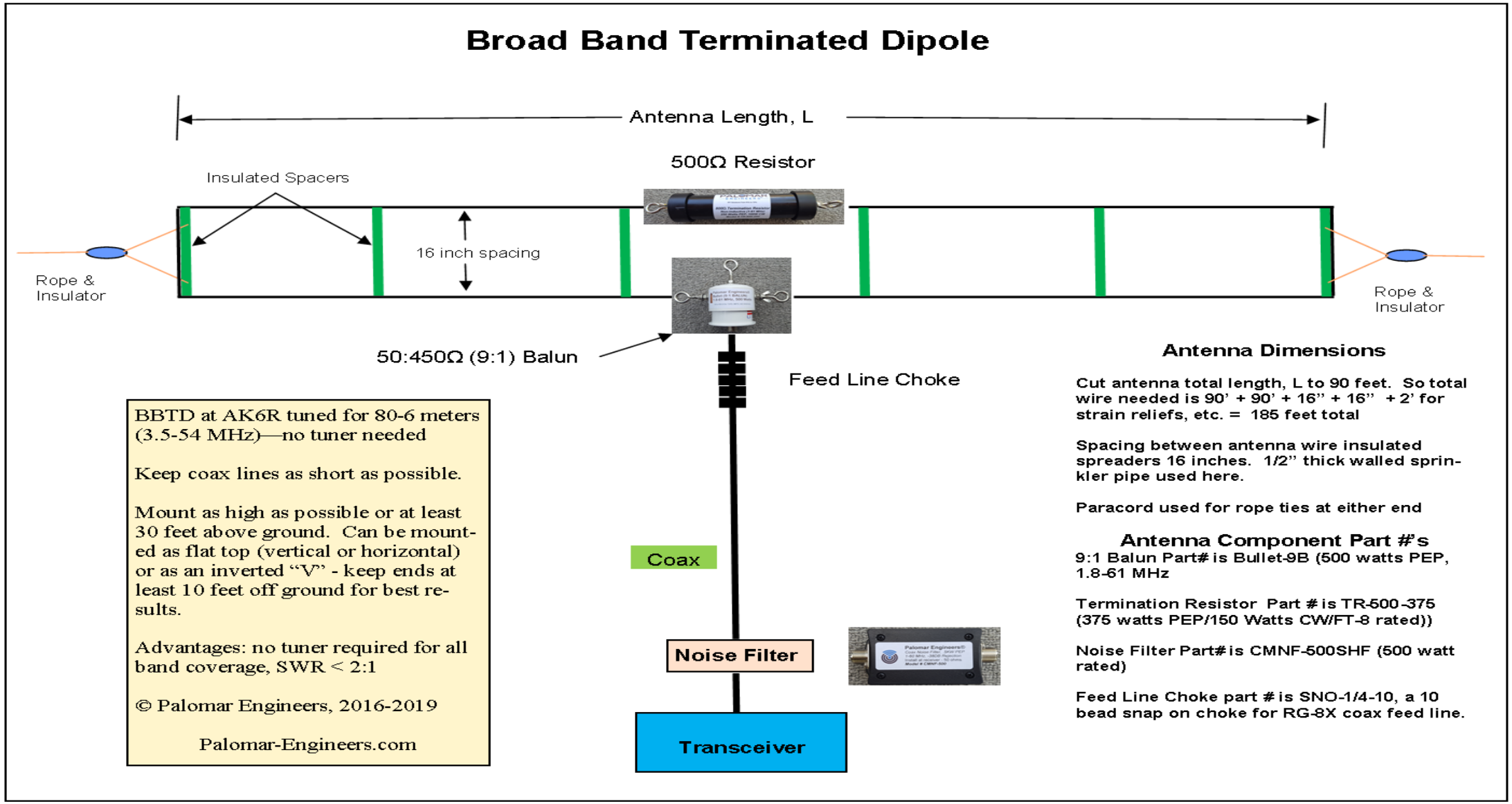
EXAMPLE #4..AS A SLOPER ANTENNA



EXAMPLE #5…AS AN INVERTED VEE



MY CHOSEN CONFIGURATION (Palomar Engineers)I used this basic design, but with radiowavz components at 18”cc of wires for my build.

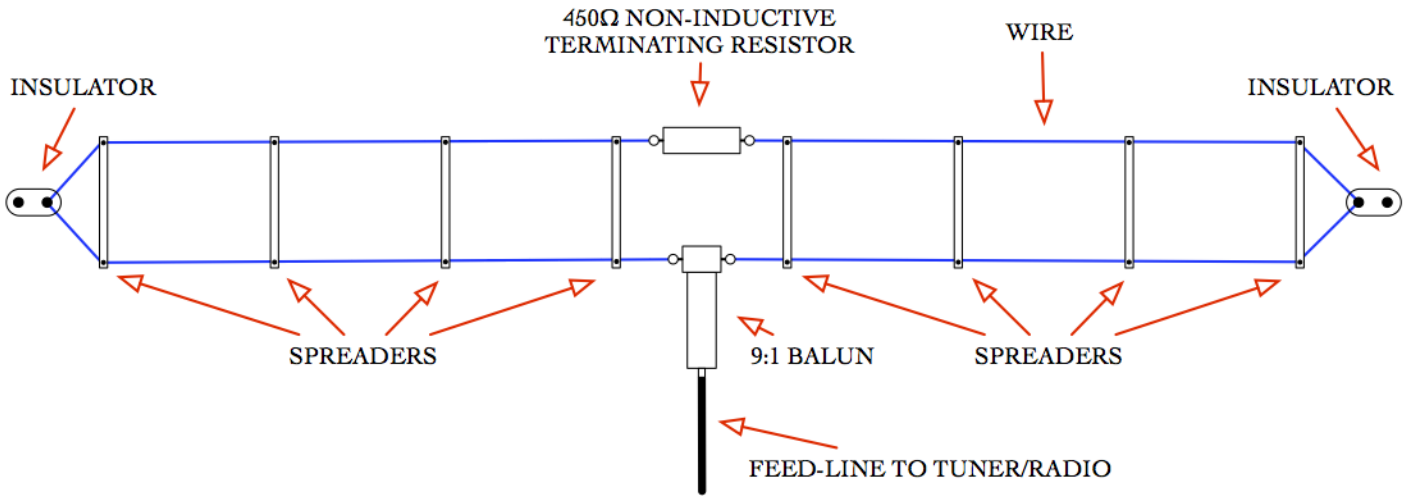


DESIGN:

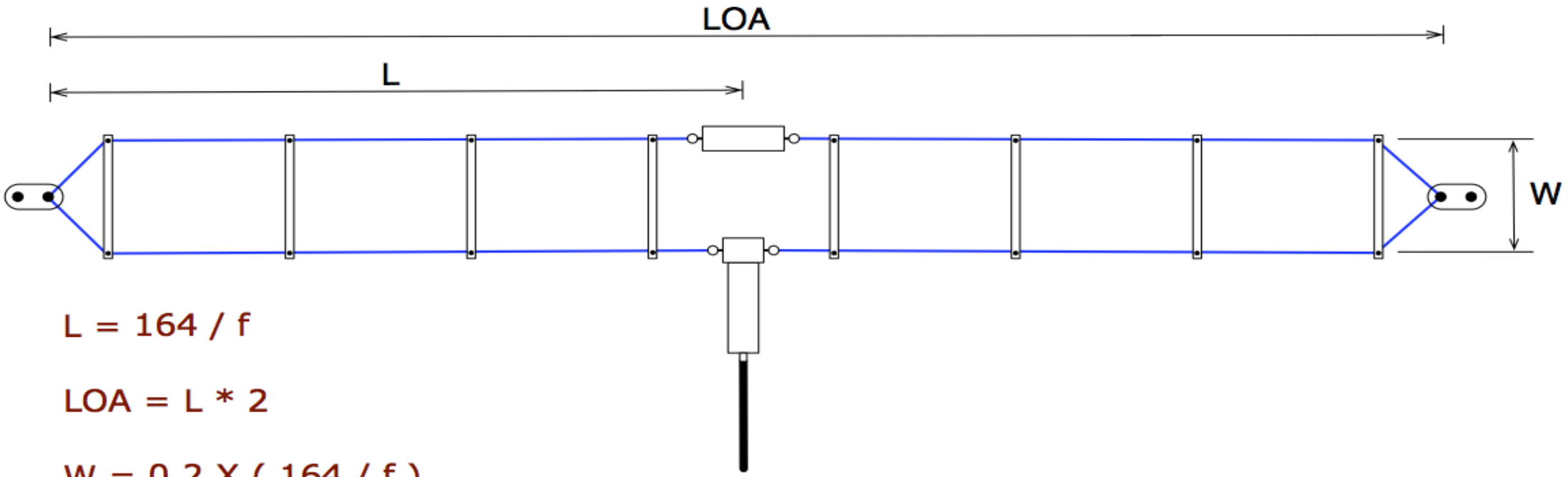
The antenna design appears to be a folded dipole. However, a folded dipole is a resonant antenna, while the WBFD is designed to operate with a low feed point impedance across a wide range of frequencies. Moreover, the WBFD contains a non-inductive terminating resistor usually located at the point in the loop directly opposite the feed point. Normally, the resistor is in the 800-900 Ohm range, **AND ABOUT 1/2 THE INPUT WATTS…750 WATTS for full legal limit**).

This impedance is roughly replicated at the feed point. Therefore, install a 16:1 RF transformer (either of transmission-line transformer or normal transformer design) at the feed point. The result is a low SWR value for 50-Ohm coaxial cable across the entire frequency range @ 1500 watts PEP.

Typical…100-watt Balun and resistor to suit!! (resistor is ½ the input watts..ie..50-watt cap. @ 450 ohms)



How to Calculate dimensions:



L = 164 / f

LOA = L * 2

W = 0.2 X (164 / f)

Where: LOA is expressed in feet
L is expressed in feet
W is expressed in inches
f = frequency in MHz

For Basic Bands: use 90 feet for 160 meters

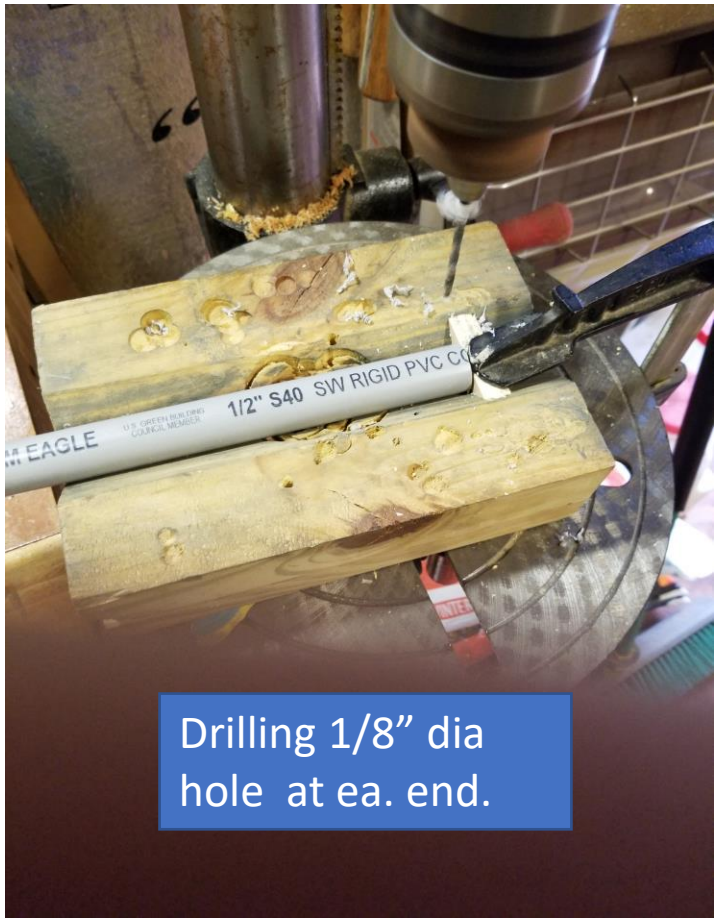
BALANCED TERMINATED FOLDED DIPOLE DIMENSIONS						
MINIMUM FREQUENCY (MHz)	LEG LENGTH (feet)	LENGTH OVERALL (LOA) (feet)	W (inches)	TOTAL WIRE LENGTH (feet)		
1.8000	**91.13**	**182.27**	**18.23**	**367.58**		
1.9000	86.34	172.68	17.27	348.23		
2.0000	82.02	164.04	16.40	330.82		
3.5000	46.87	93.74	9.37	189.04		
3.7500	43.74	87.49	8.75	176.44		
3.9000	42.06	84.12	8.41	169.65		
4.0000	41.01	82.02	8.20	165.41		
5.3585	30.61	61.23	6.12	123.47		
7.1500	22.94	45.89	4.59	92.54		

AB3ME antenna

- I made my antenna 100 feet long as that was the maximum space, I had each side of my tower, and was the recommendation of radiowavz
- Total wire length was 100’ top and bottom, plus 1.3’ each end for a total length of 202’ 6”
- I measured two separate lengths of 101’-3” to be used for each side, to be spaced at 18” apart.
- I purchased an 800-watt resistor and a 16:1 balun from radiowavz and their plastic spreader for their antenna to support the balun /resistor mounting.

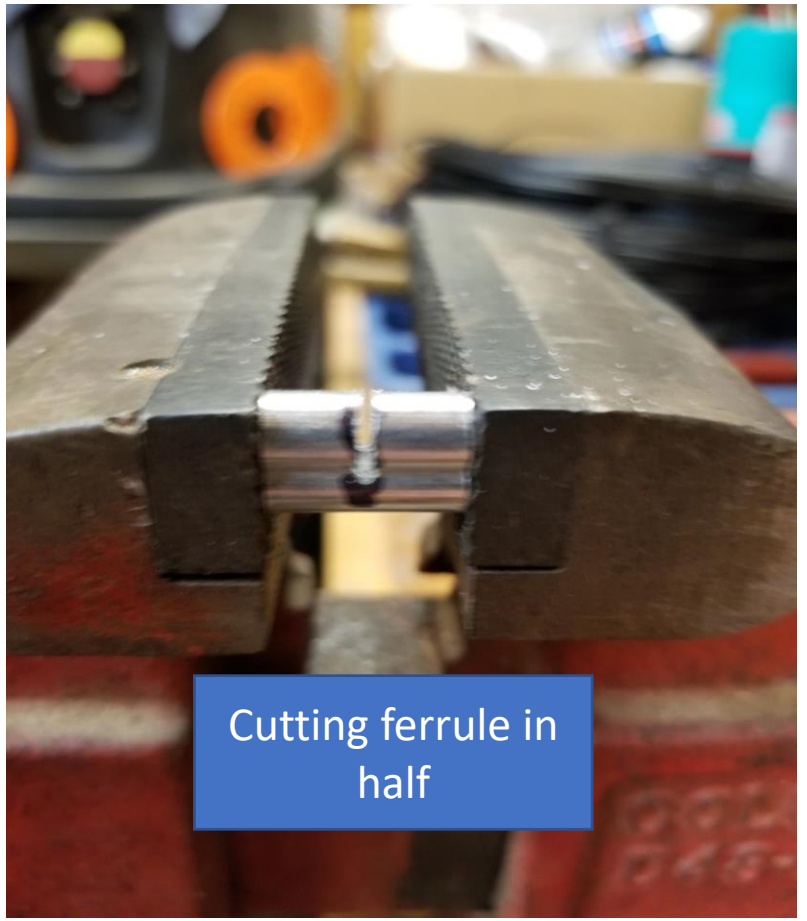
Radiowavz resistor and balun attached to Plastic spacer ($284.00)..(16:1 Balun, 800-watt resistor, wires at 18” cc.)

½” sched 40 plastic elect conduit spacers



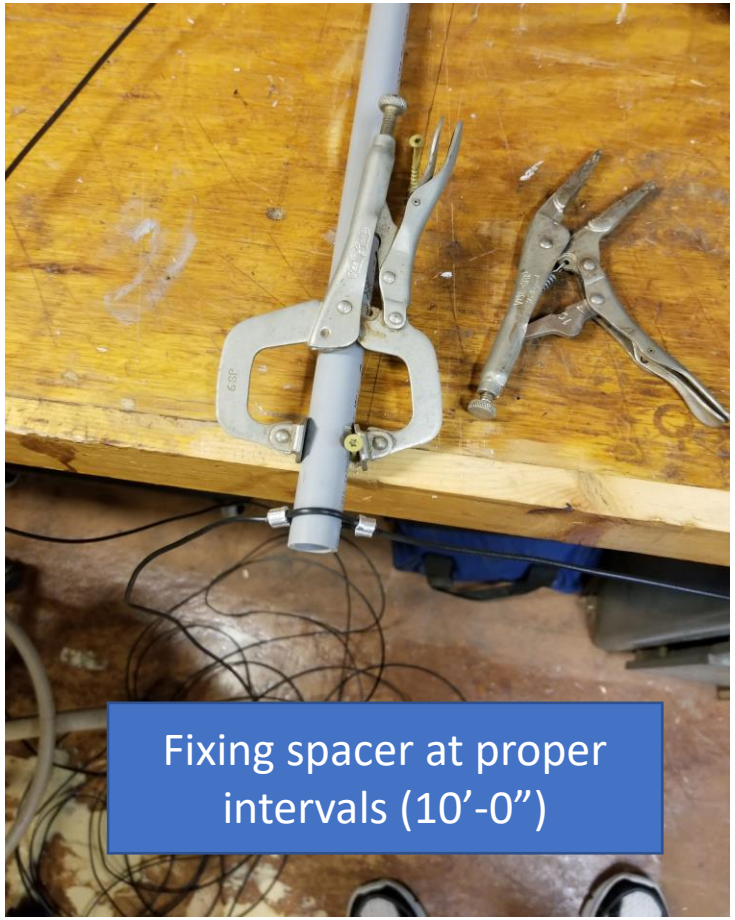
Drilling 1/8” dia hole at ea. end.

Planned crimping method



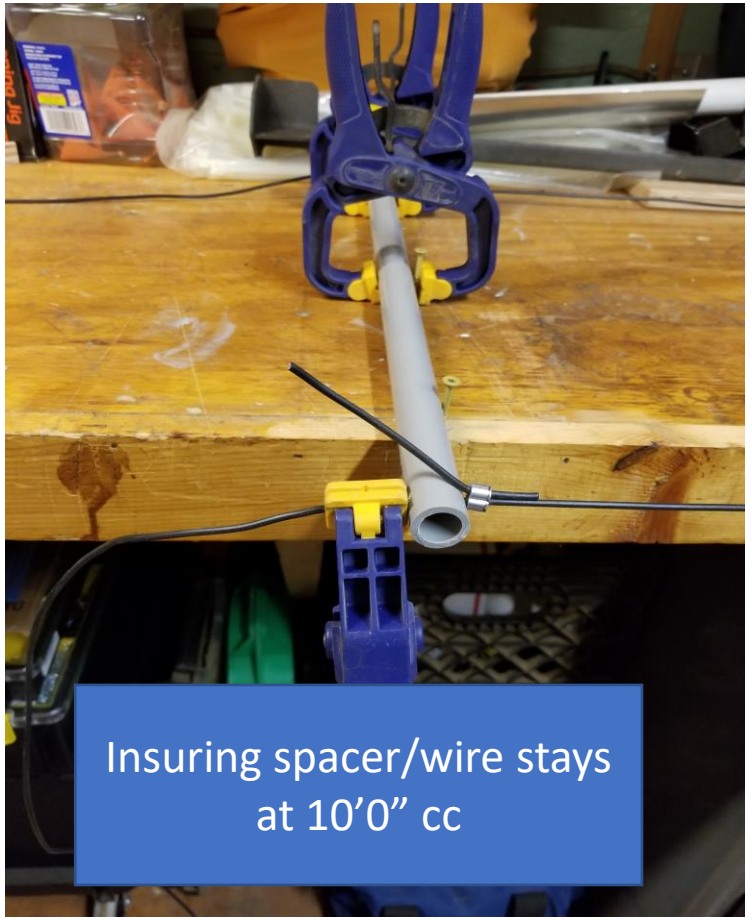
Cutting ferrule in half

Assembly of spacers and wire



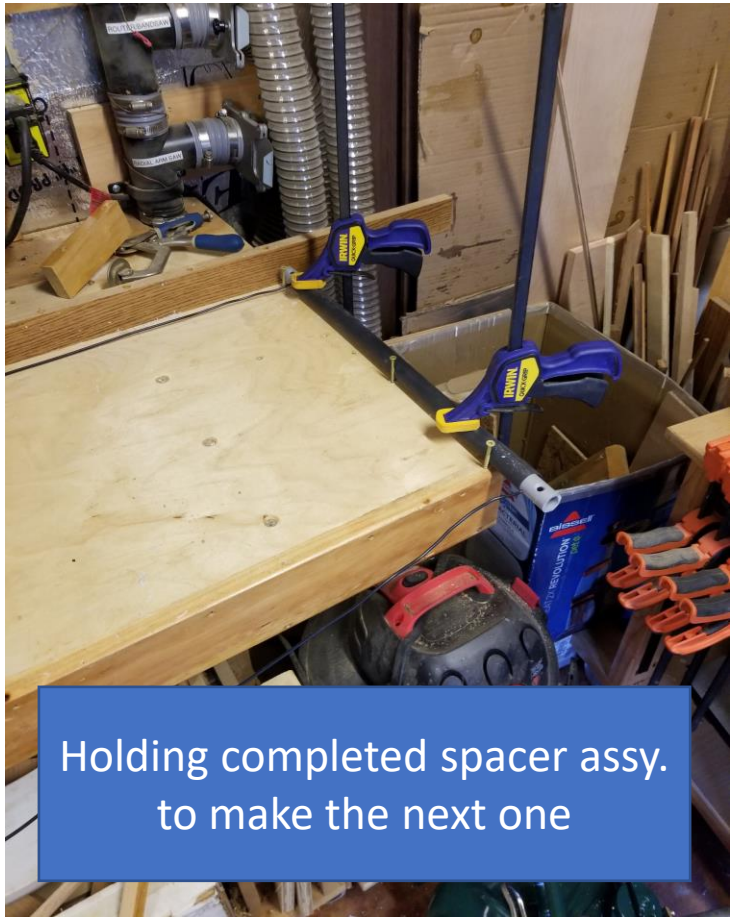
Fixing spacer at proper intervals (10’-0”)

Holding spacer in proper location while making crimp



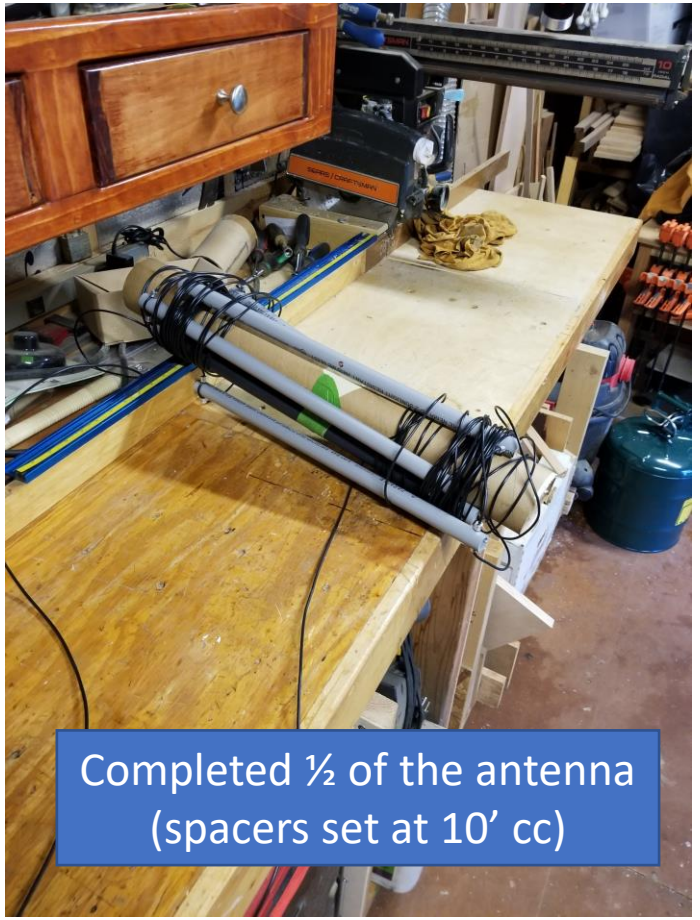
Insuring spacer/wire stays at 10’0” cc

Complete Assembly of wire and spacers



Holding completed spacer assy. to make the next one

Rolling up spacer/wire sections as build continues on



Completed ½ of the antenna (spacers set at 10’ cc)

Attach resistor/balun/spacer assy. to wires

Resistor and balun attached to top and bottom wires with thimble/crimped connectors

ANTENNA SWR RECORD DATE = September 3, 2021 ANTENNA = Terminated Folded Dipole 100 ft. (OAL)

	Measurements taken using MFJ 269C*				Measurements taken using LP-100A					Average
160 M					VOICE					
mhz	1.8				1.9				2.0	2.03
MFJ*	2.2				2.1				2.1	
LP-100A	2.36				2.46				2.08	2.03
80 M	CW				VOICE					
mhz	3.5		3.6		3.8				4.0	1.87
MFJ*	1.7	1.7			1.7				1.6	
LP-100A		1.65			2.05				1.92	1.87
60 M	ERP of 100 watts maximum relative to 1/2 wave Dipole									
	VOICE	CW	VOICE	CW	VOICE	CW	VOICE	CW	VOICE	CW
		5.332		5.348		5.3585		5.373		5.405
mhz	5.3305		5.3465		5.357		5.371.5		5.403.5	1.34
MFJ*	1.4		1.4		1.4		1.4		1.4	
LP-100A	1.32		1.33		1.34		1.35		1.36	1.34
40 M	CW				VOICE					
mhz	7	7.125				7.213			7.3	1.91
MFJ*	1.7	1.7				1.7			1.7	
LP-100A		2.06				1.91			1.75	1.91
30 M	VOICE---200 Watts MAX!									1.97
mhz	10.1				10.125				10.15	
SWR*	1.4				1.8				1.8	
LP-100A	2.02				1.97				1.93	1.97
20 M	CW				VOICE					
mhz	14.00	14.15				14.25			14.35	1.9
MFJ*	1.7	1.7				1.7			1.7	
LP-100A		1.81				1.92			1.97	1.9
17 M	CW				VOICE					
mhz	18.068	18.11				18.139			18.168	2.53
MFJ*	2.4	2.4				2.4			2.4	
LP-100A		2.5				2.53			2.55	2.53
15 M	CW				VOICE					
mhz	21	21.2				21.325			21.450	1.91
MFJ*	1.9	1.9				1.8			1.8	
LP-100A		2.14				1.84			1.75	1.91
12 M	CW				VOICE					
mhz	24.89	24.93				24.96			24.990	1.29
MFJ*	1.2	1.2				1.2			1.2	
LP-100A		1.36				1.35			1.33	1.29
10 M	CW				VOICE					
mhz	28.00	28.30				29.00			29.70	2.5
MFJ*	2.6	2.8				2.5			2.5	
LP-100A		3.14				2.41			2.87	2.81
6 M	CW				VOICE					
mhz	50.00	50.10				52.05			54.0	1.95
MFJ*	1.2	1.2				2.4			1.8	
LP-100A		1.05				2.4			2.41	1.95

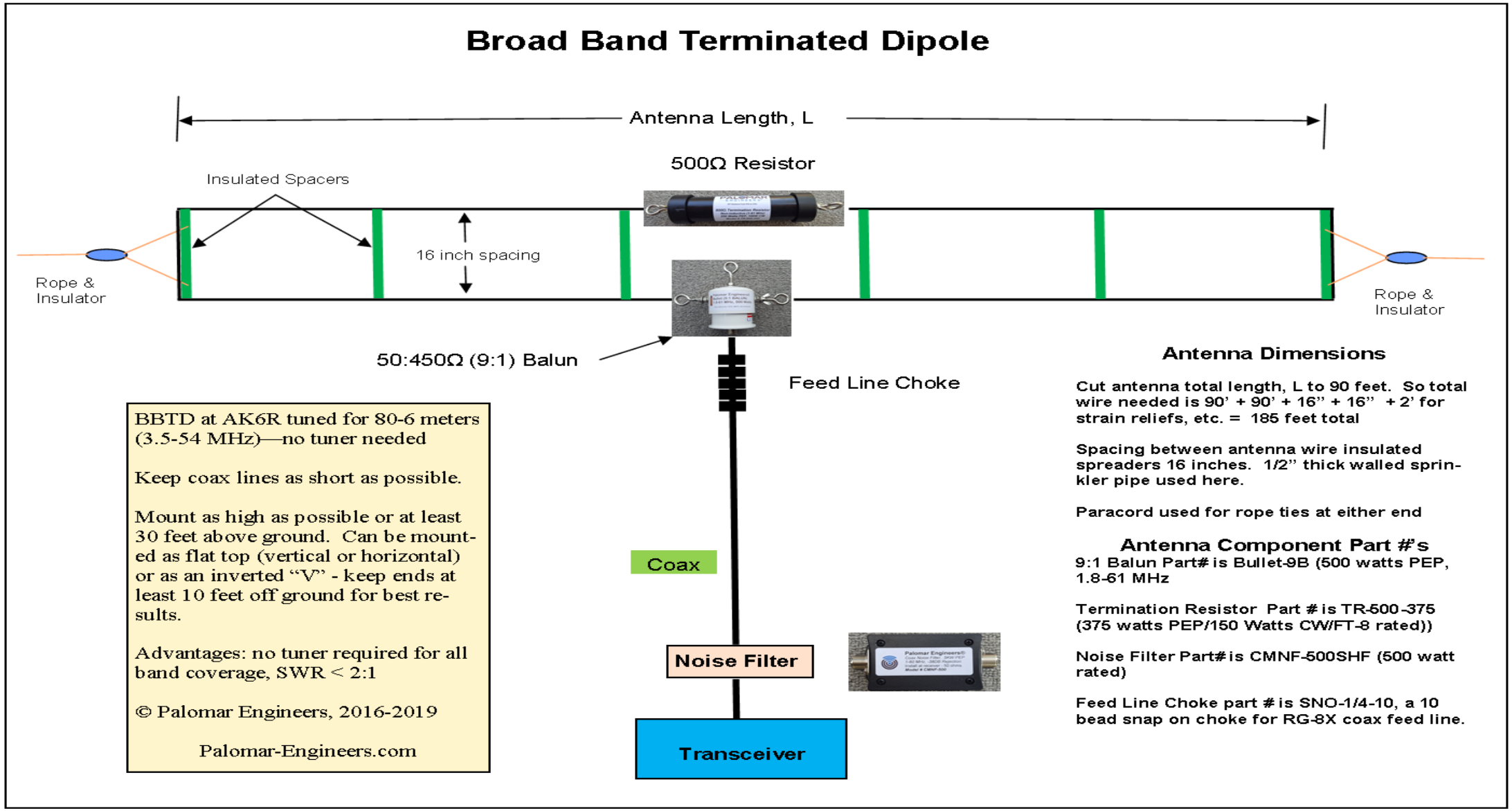
SWR PLOT OF TERMINATED FOLDED DIPOLE

UPDATE OCT 13, 2021

I placed a phone call to Radiowavz to inquire as to how to adjust the SWR on the folded dipole antenna I built. The reply from them was to make it 90 feet instead of 100 feet long. 100 feet seems to be a problem but goes away as 120 feet is approached.

So, building of the 2nd antenna at 90 feet overall length will prove interesting if the SWR results turn out to be lower than this 100 foot one. This antenna was used by us for the PA QSO party this past weekend and allowed us to make 285 contacts with 61 of 67 counties worked in Pa. See the next two slides.....

2nd Build...Use Palomar Eng. Parts and dimensions: (90' OverAll length of Antenna={OAL})



Palomar 9:1 Balun, two 500-watt resistors.
Wire at 16” cc. Antenna = 90’-0” long

Finished center support out of ¼” thick black plastic.
NOTE..1/8” dia SS suspension wire assy to hang center...connected to balun, eye bolt guide past resistors