Practical Metal Foil Tape Antennas

Copper Wire

Aluminum Tubing

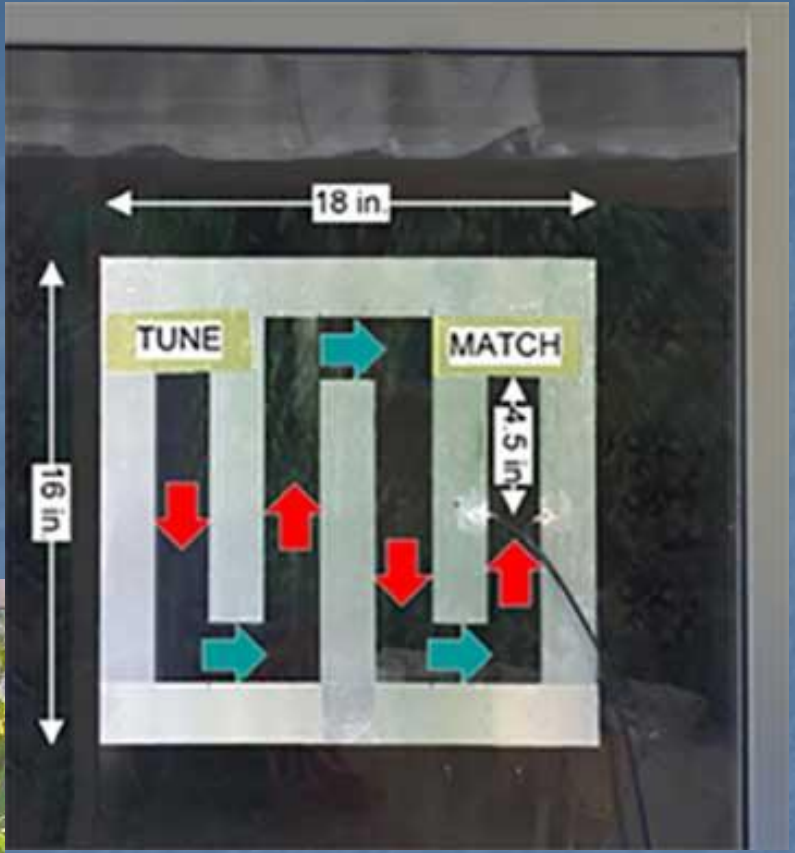
Hams Generally Consider ONLY These Antenna Building Materials

Copper Tubing

Stainless Rod

Versatile Building Materials

Foil Tape for Slot Antennas



Slot Antennas for Ham Radio Amazon Kindle

Spirally Loaded Copper Tape and PVC Dipole

QST Oct. 2020

This easy-to-build 2-meter-band vertical dipole is only 40% as tall as a J-pole.

High interest for HF

John Portune, W6NBC

Here is a simple starter antenna — especially for a new ham — that offers good performance, and would be a good radio club build-it-yourself project. It's stealthy and low visibility to neighbors and home

Continuously Loaded Foil Tape Antennas

6m Birdtenna

XYL Friendly

Attic Loading Coil


Hidden Rose Trellis
Foil Tape HF Antenna

Building Small Tape Helices

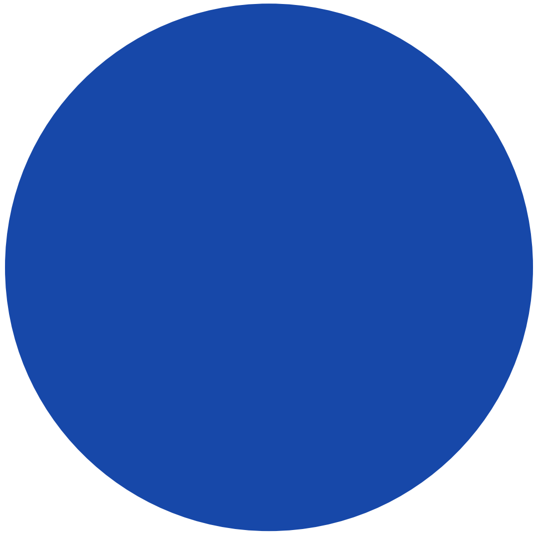
(Emphasis on HF)

Lower Frequency

1. Power
2. Skin effect
3. Efficiency

Handling Power

Flat = Round ?



Width = Circumference

Same Cross Section

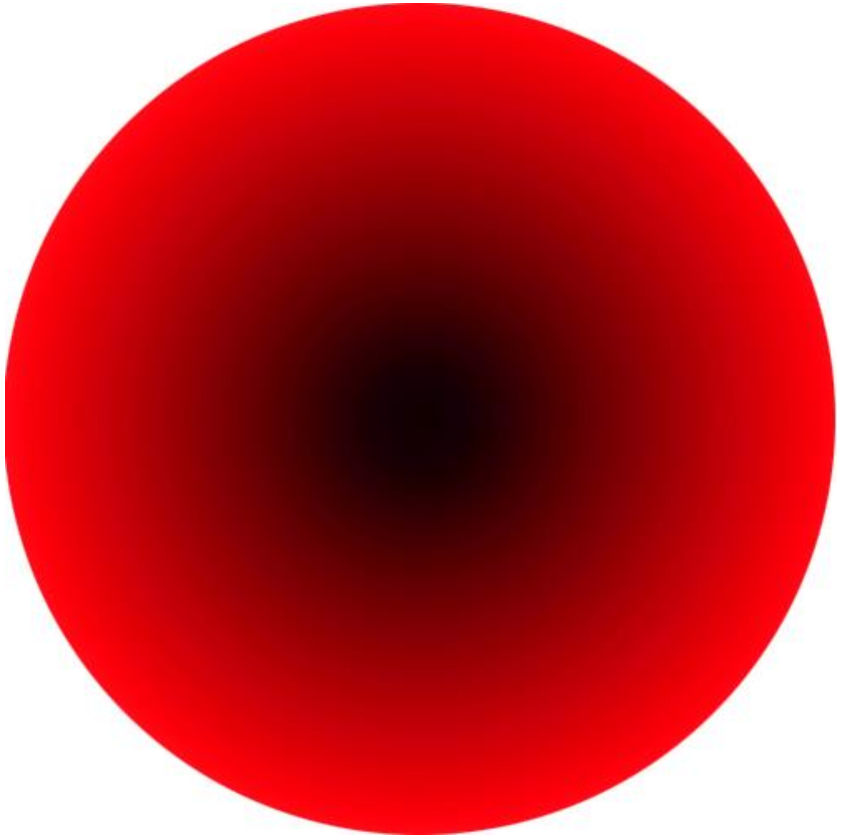
e.g. 3/8 tubing = 1 in. 1.5 mill tape

(Also works for NEC modeling)

Skin Effect

AC/RF flows on surface

Uses less of conductor




Even
At
60 Hz

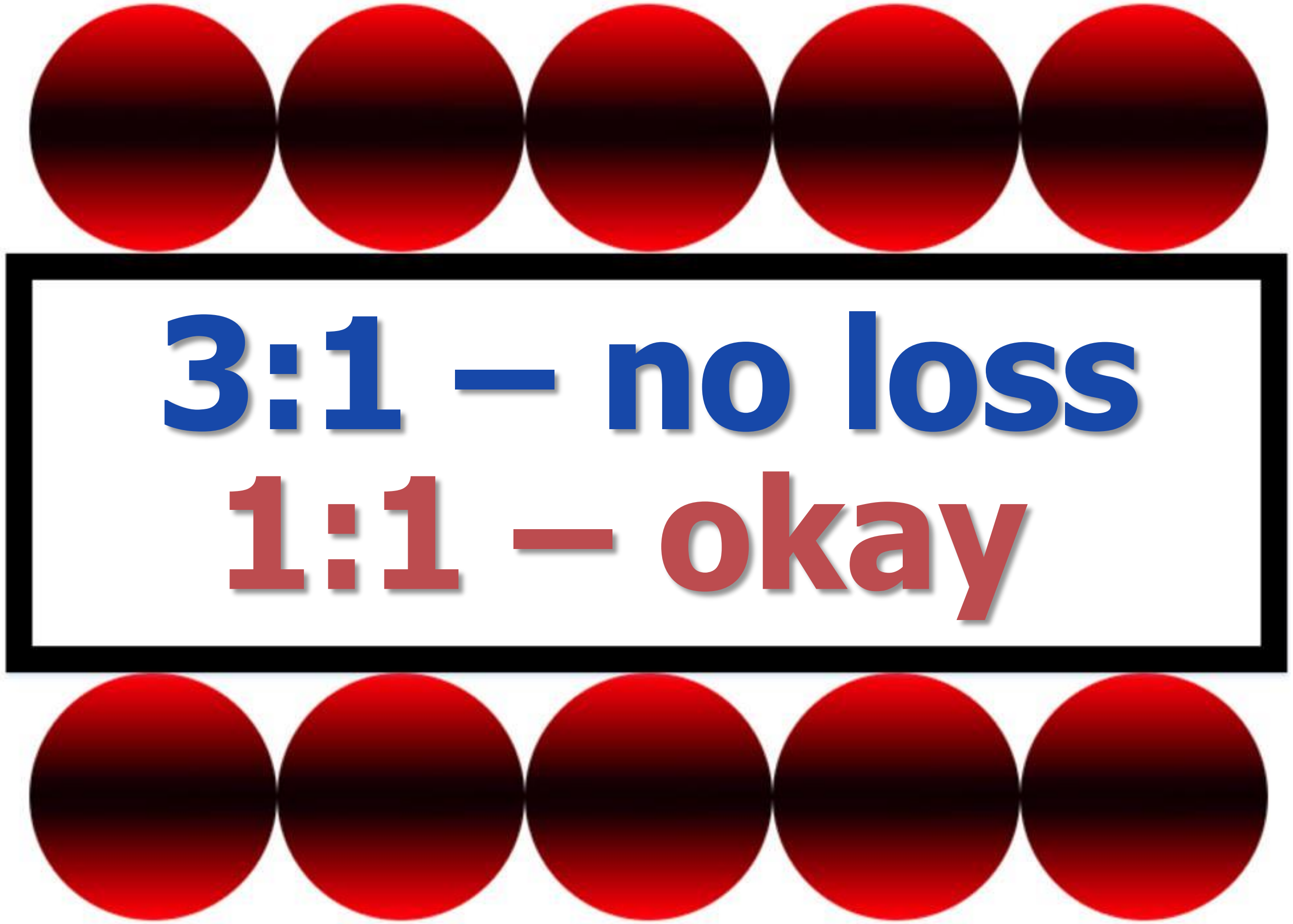
Band m	MHz	Aluminum mils	Copper mils
160	1.8	2.4	1.9
80	3.5	1.7	1.4
60	5	1.4	1.2
40	7	1.2	1.0
30	10	1.0	0.8
20	14	0.9	0.7
17	18	0.8	0.6
15	21	0.7	0.6
12	25	0.6	0.5
10	28	0.6	0.5
6	50	0.5	0.4
2	144	0.3	0.2
1.25	220	0.2	0.2
0.7	440	0.2	0.1

Skin=thickness
2 sides
Double depth

Pay attention when buying

Add layers for lower bands

Adjacent-turn Skin Effect



Aluminum tape is just as good at copper

40% Less conductive

Double skin depth

The Biggie

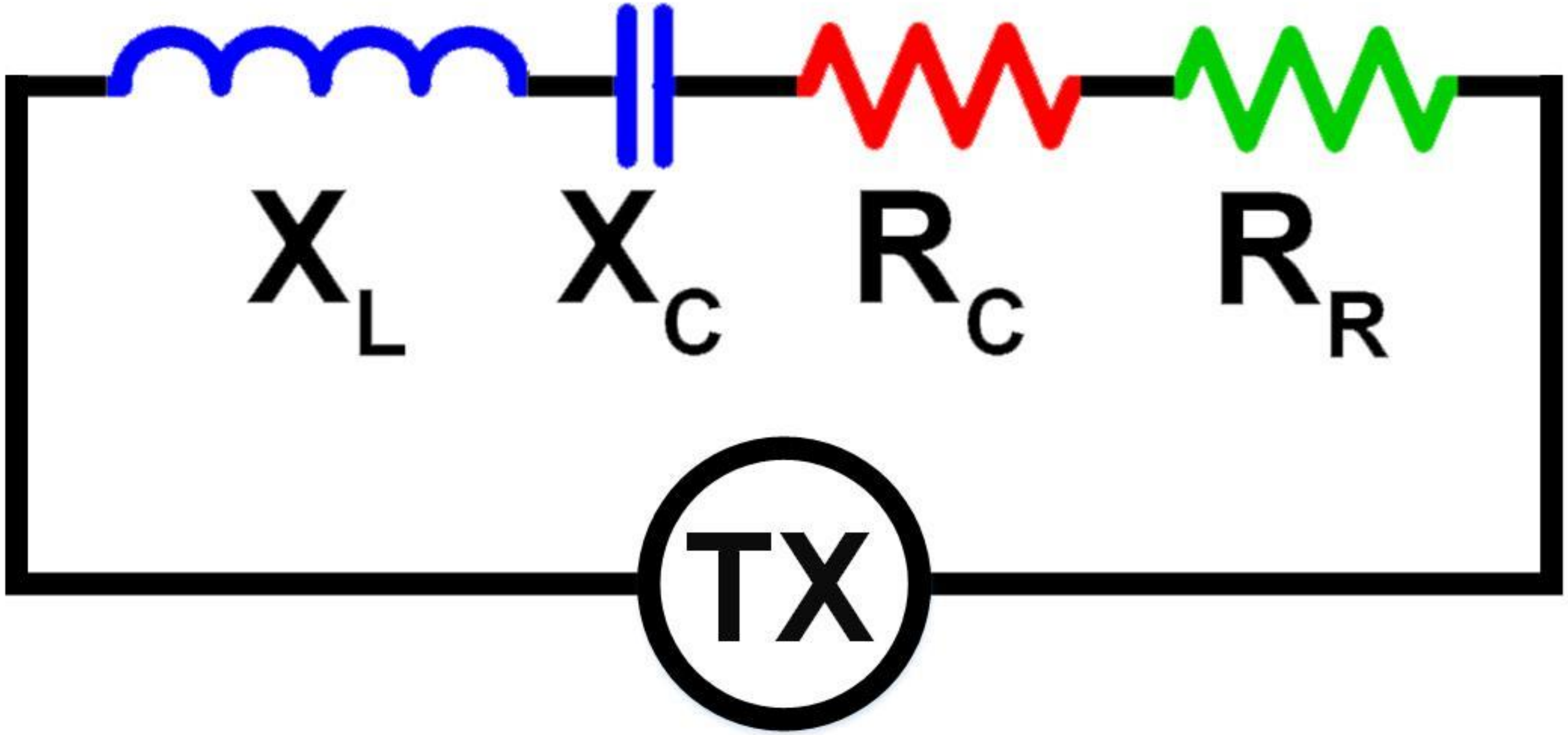
Antenna Efficiency

Antenna Efficiency is the Percent of TX Power <u>NOT</u> lost

Recipients of TX Power

Tuning Only
Use No Power

Consume
Power



Conductor Resistance – R_C

Conductor Resistance R_C
Makes HEAT

Radiation Resistance R_R
Makes RADIO WAVES

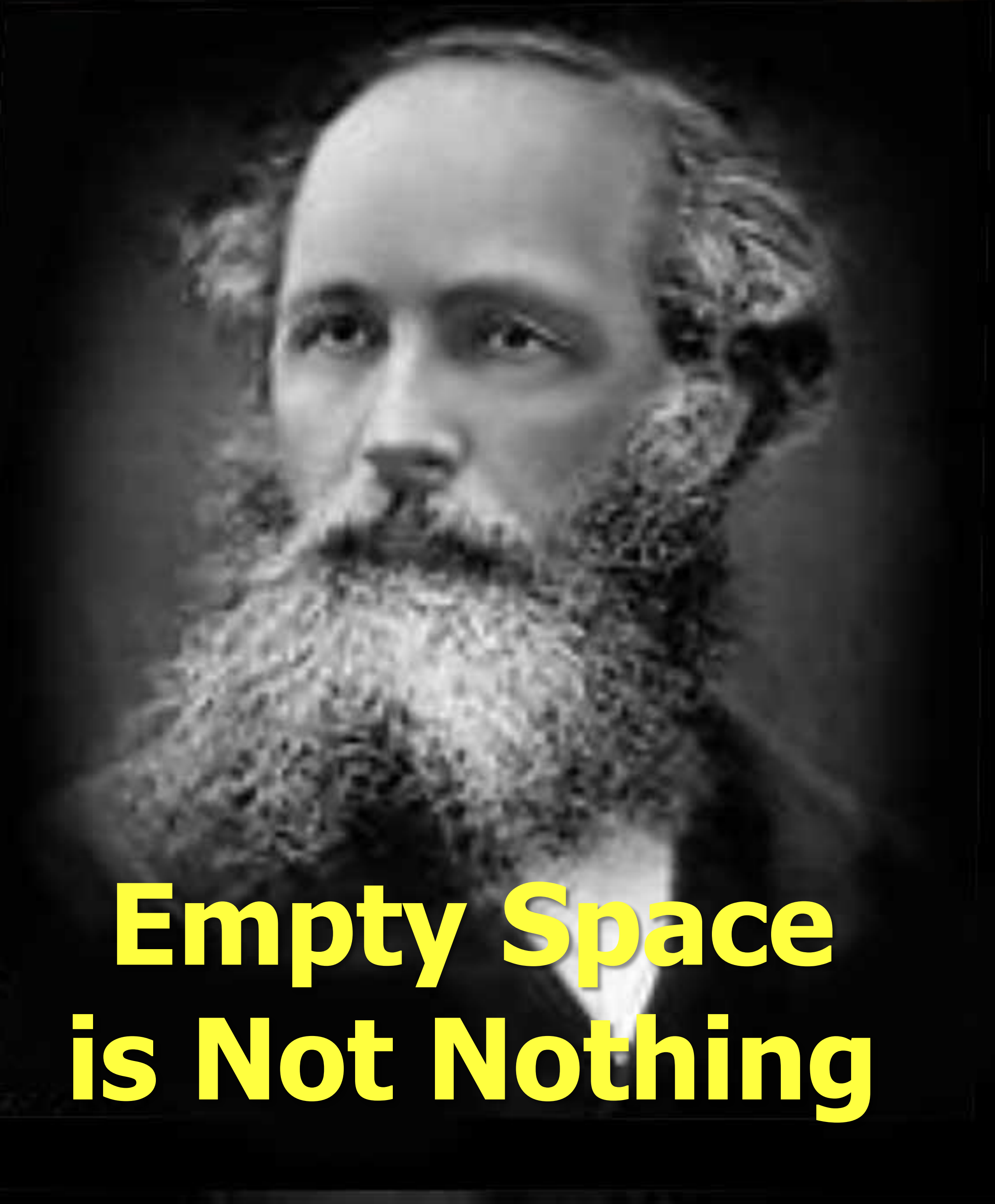
Radiation Resistance – R_R

$$\vec{\nabla} \cdot \vec{D} = \rho$$

$$\vec{\nabla} \cdot \vec{B} = 0$$

$$\vec{\nabla} \times \vec{H} = \vec{j} + \frac{\partial \vec{D}}{\partial t}$$

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$



Empty Space is Not Nothing

Radiation Resistance – R_R

Push on it – It Makes Waves

A real (load on) or Resistance in an antenna caused by space

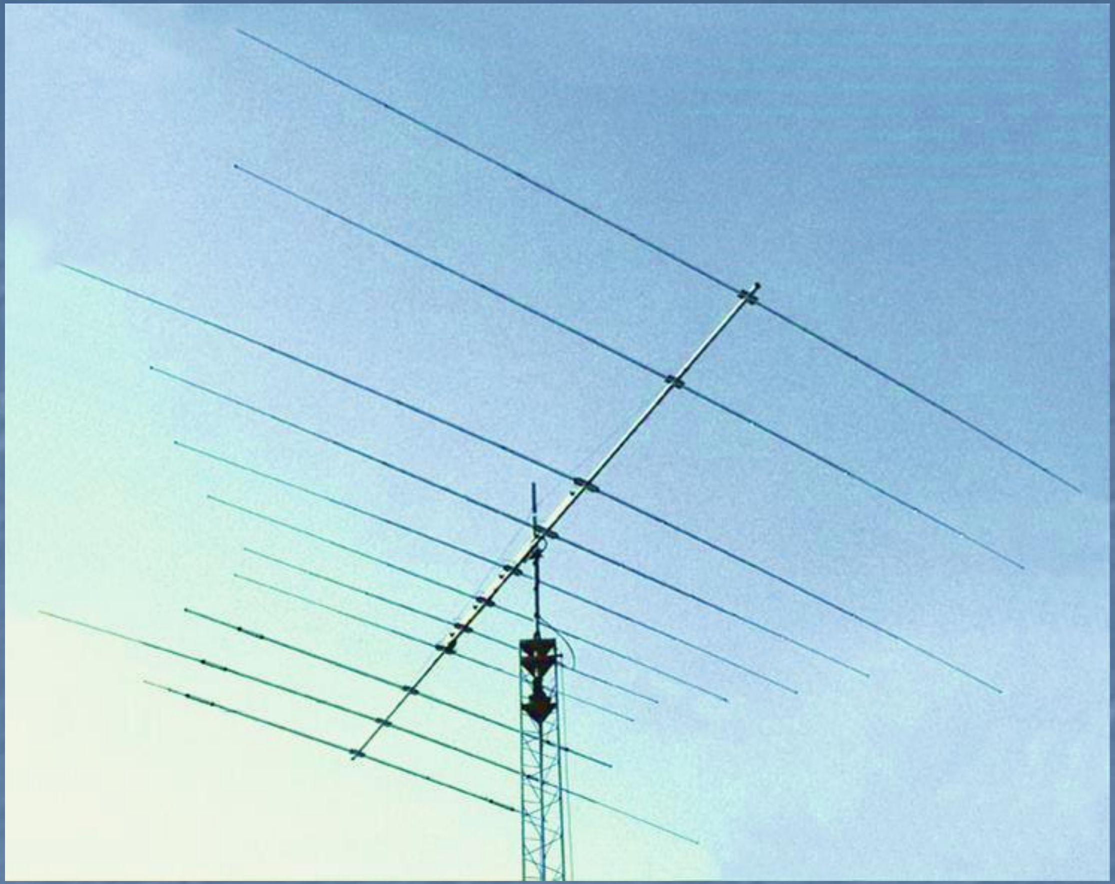
Efficiency vs. Antenna Size

R_C ⇕ directly with size

1/2 size – 1/2 R_C

R_R ⇕ square of size

1/2 size – 1/4 R_R



LARGE ≈ λ

R_R /Eff. – High

SMALL ≈ λ

R_R /Eff. – Low

Let’s Lower the Frequency

10 ft. 4 in. PVC Pipe No-Radial OCF Dipole

2 in. Aluminum Tape, 2 in. gap

25 MHz – 10, 12m

1 in. Aluminum Tape, 1 in. gap

15 MHz – 20, 17, 15m

5 ft. 3.5 in. Pool Noodle No-Radial OCF Dipole

1 in. Tape, 1/2 in. gap

More than one in series

Ways to Change Frequency

- Pole Length – More Turns
- Pole Diameter – More L

- Tape Width – Higher R_C
- Tape Spacing – Higher R_C

LESS width/spacing?

Ever Use these?

Efficient?

If you build one, send me photos and details

I enjoy feedback

jportune
@aol.com

w6nbc.com

QSO TODAY
VIRTUAL
HAM EXPO 2021
AUGUST 14-15

Practical Metal Foil Tape Antennas