

Satellite Amateur Radio Club



Plastics for Ham Construction Projects

w6nbc.com/slides



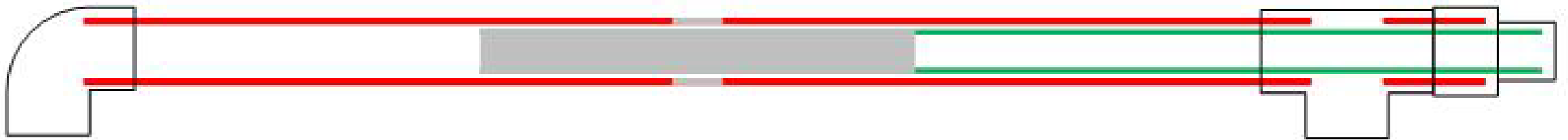
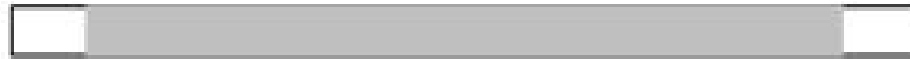
**10-20m
okay
on 40m**

**1 1/2 PVC
(1.9 OD)**

**4-foot
square**

Dual Linear Capacitors

Band Tuning

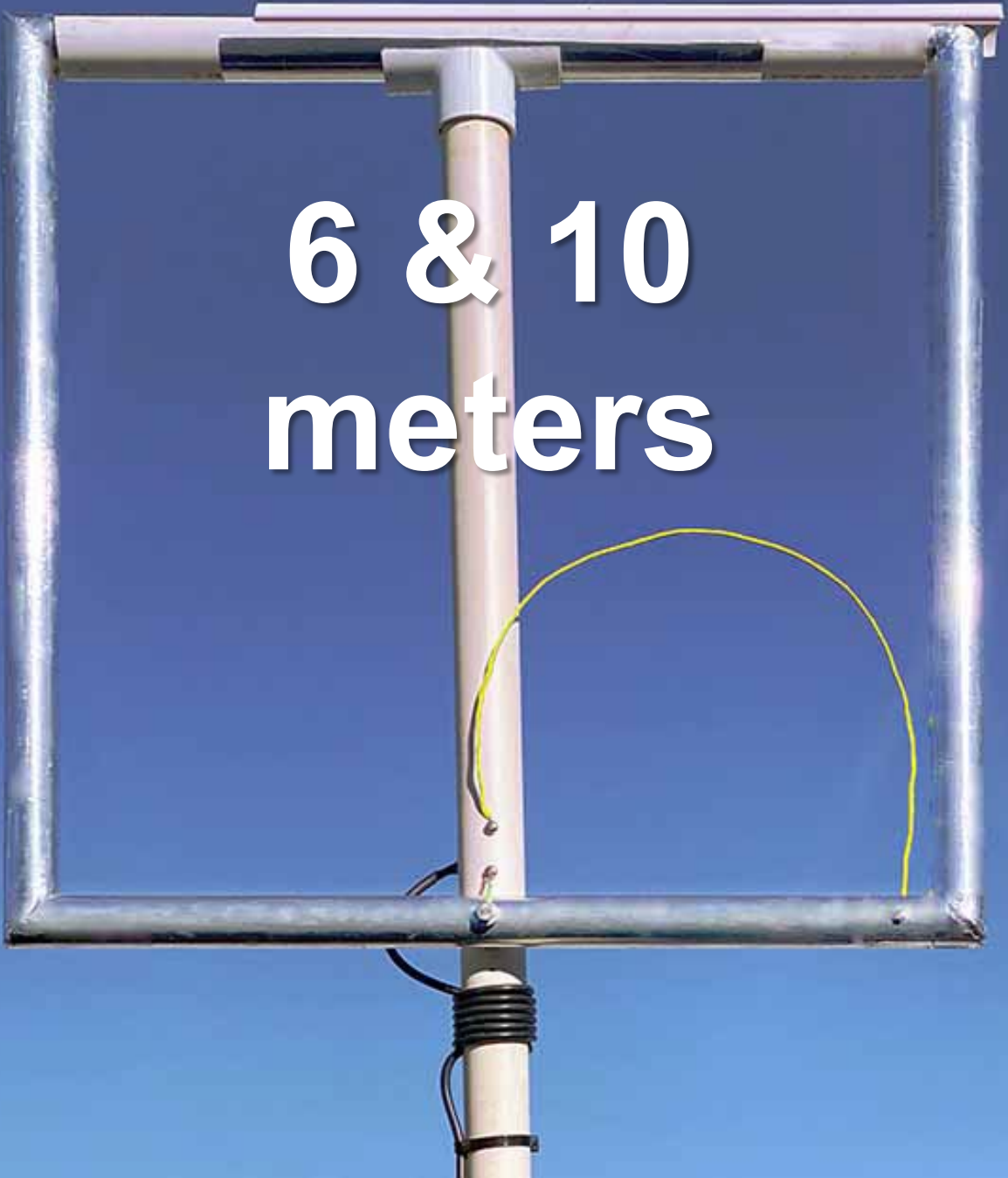


Fine Tuning

Band Tuning 2 in. PVC (20m)



Fine Tuning 1 in. PVC



**6 & 10
meters**

**1 in. PVC
2-foot
square**

**May-June
*On the Air
Magazine***

***A Major Lesson to learn
about Dielectric
Loss in the Plastic used for
Antennas and Capacitors***

- ***Rob Jahnke K0XL Loop Design***
- ***Miguel Vaca VK3CPU Mag Loop Calculator***
- ***K5DCC Denny Johnson Loop Builder/User***

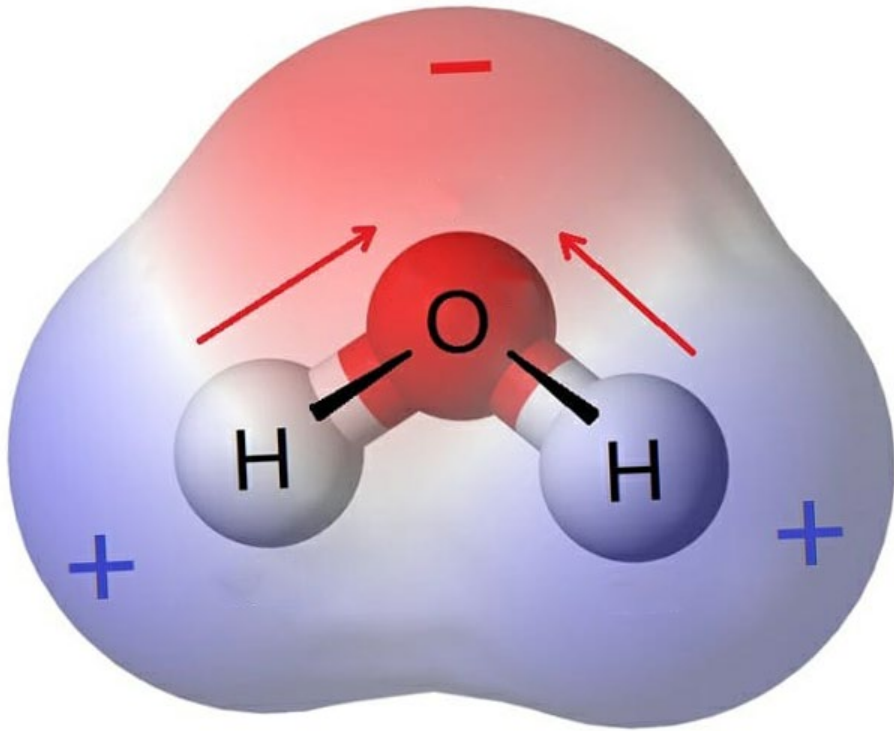
*Eine kleine
Polymerphysik*

A little polymer physics

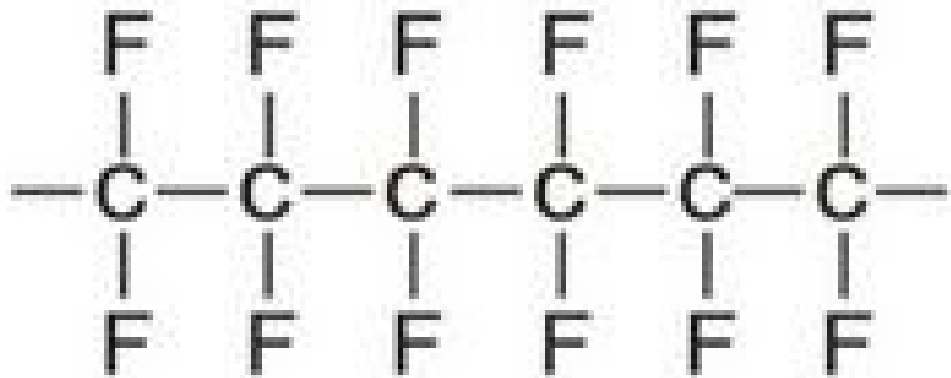
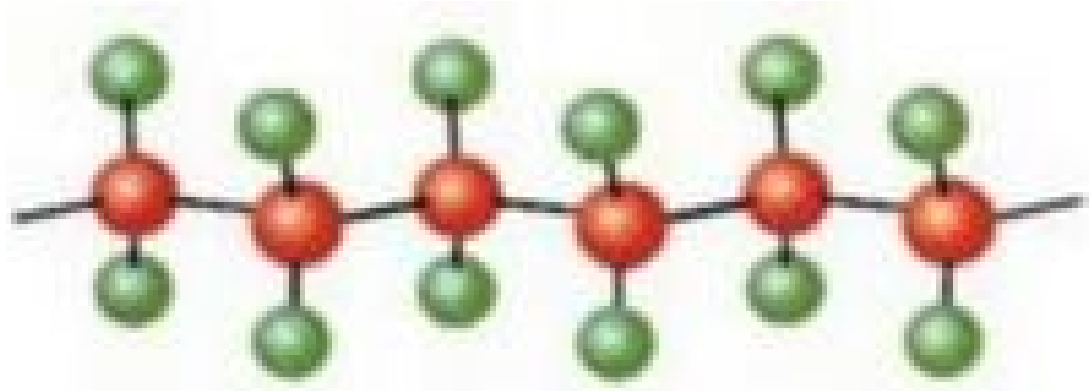
**Polar and Non-Polar Plastics
And Dissipation Factor δ**

POLAR MOLECULE (Non-Symmetric)

Water Molecule



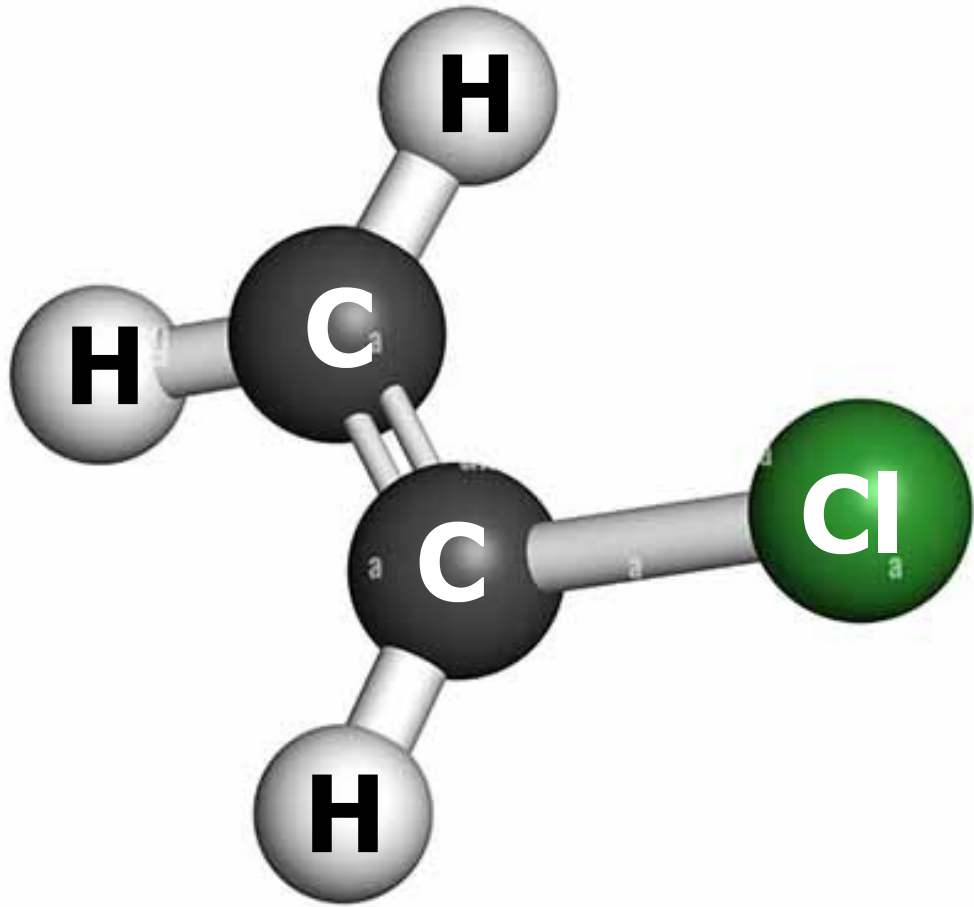
- **Electrons share orbits**
- **Spend more time around Oxygen Atom**



Polytetrafluoroethylene
(PTFE)

**NON-POLAR
MOLECULE
(Symmetric)**

Teflon Molecule

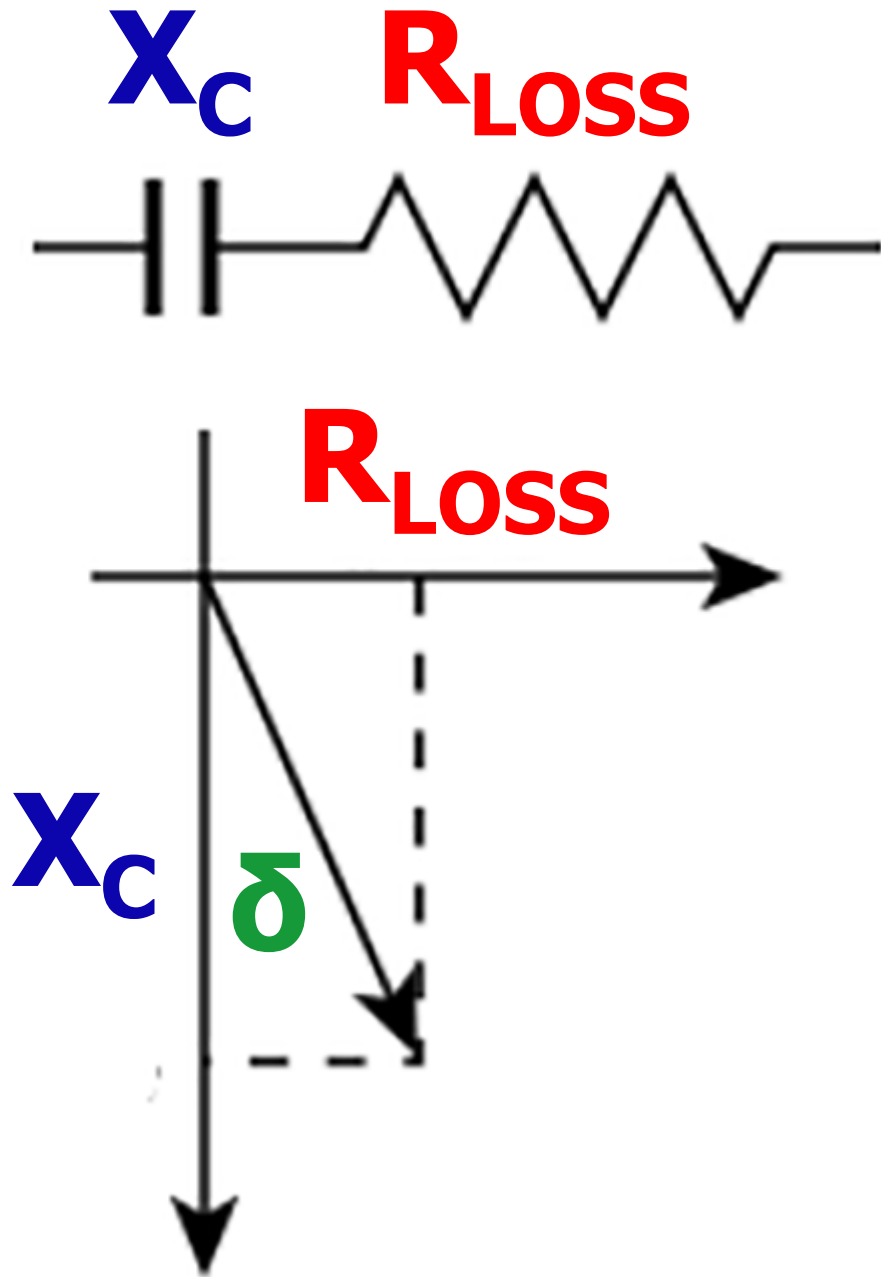


POLAR
(Non-Symmetric)

PVC Molecule

Dissipation Factor Loss Tangent δ

Energy lost (to **heat**)
in a dielectric



- $\delta = 0^\circ$, loss zero
- $\delta = 90^\circ$, loss 100 %
- $\delta = \mathbf{1/X_C:R_L}$

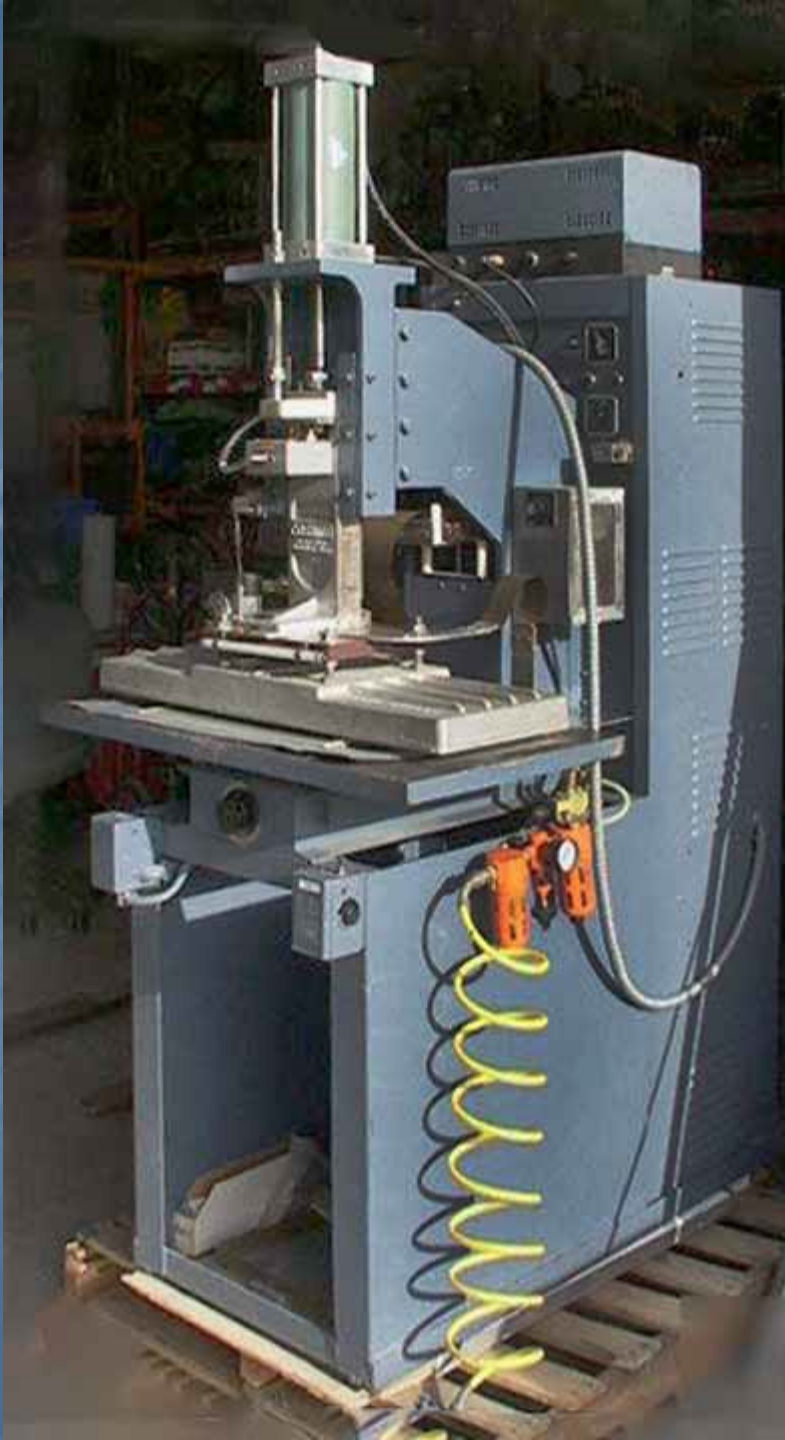
Non-polar Molecules

PTFE	Teflon	δ Dissipation Factor	0.0001
	Silicone Sealant (clear)		0.0002
PE	Low density polyethylene		0.0003
PP	Polypropylene		0.0003
PE	High density polyethylene		0.0005
PS	Polystyrene		0.0005

Polar Molecules

PC	Lexan, polycarbonate		0.0100
EVA	Hot Glue		0.0150
PET	Mylar		0.0160
	PC board		0.0170
PVC	PVC, vinyl, electrical tape		0.0170
ABS	ABS		0.0200
	Epoxy		0.0200
PMMA	Acrylic, Plexiglas		0.0300
PA	Nylon		0.0360

Examples of Dielectric Heating in Plastic



27 MHz RF Heat Sealer

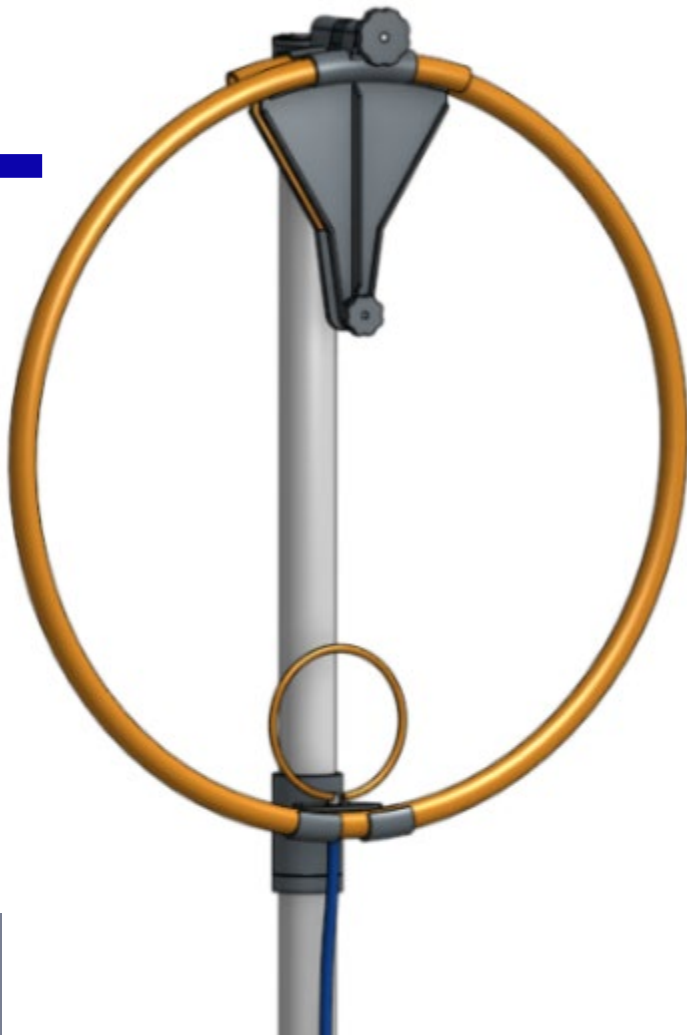
Polar Plastics
PVC, Polyurethane,
PET, PEVA, EVA and
ABS

Eye-Opening

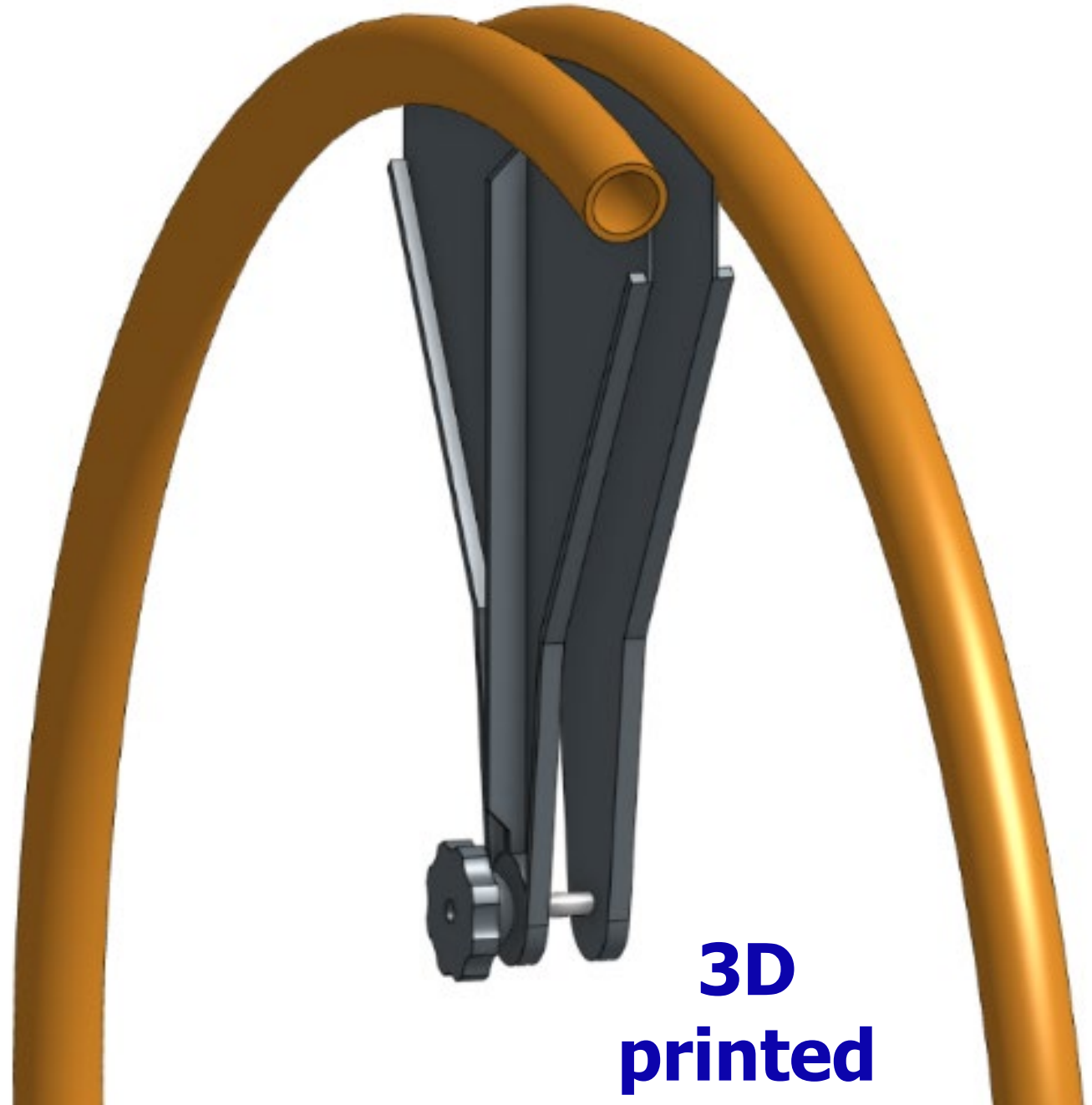
Ham

Example

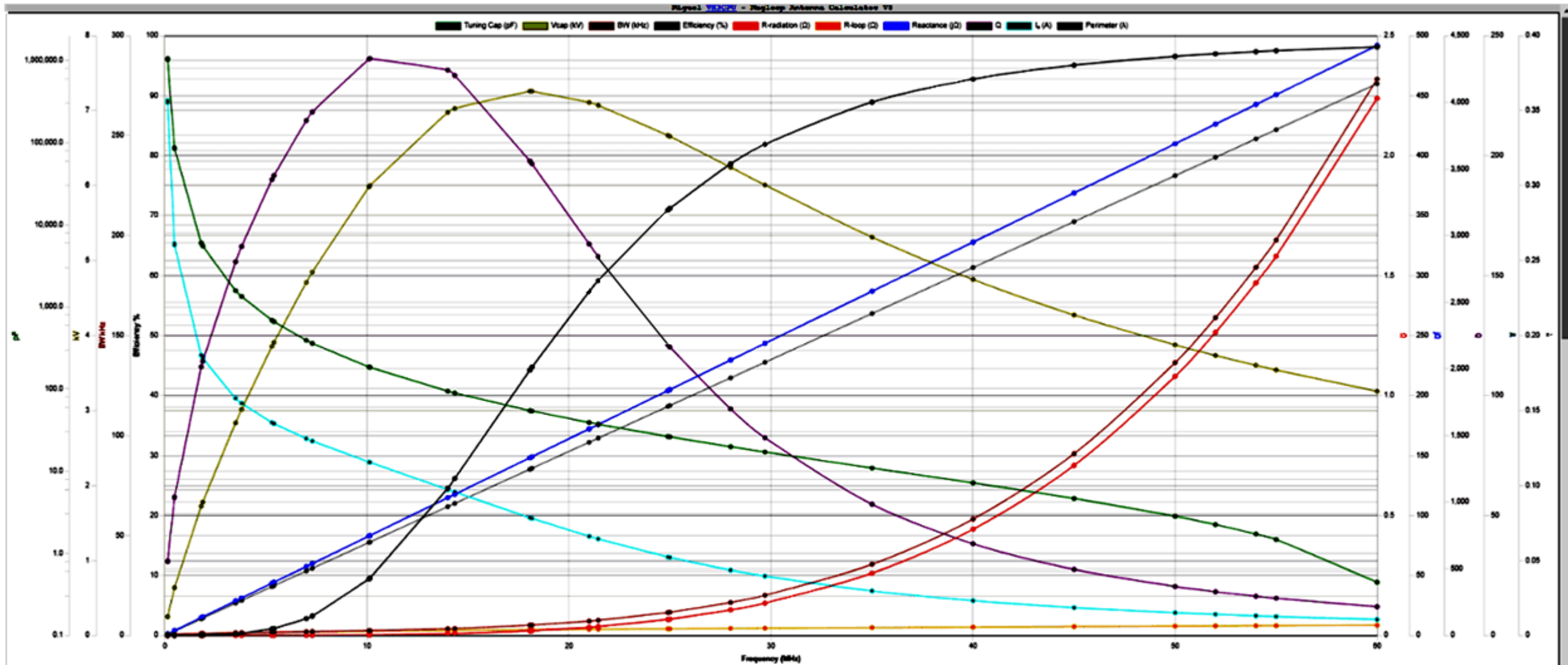
KOXL



**5/8 OD Copper
with Course & Fine
Tuning 6 & 10-
meters**



**3D
printed**



L = 1.30 μH
 Tx = 100 W
 Re = 0.000 Ω



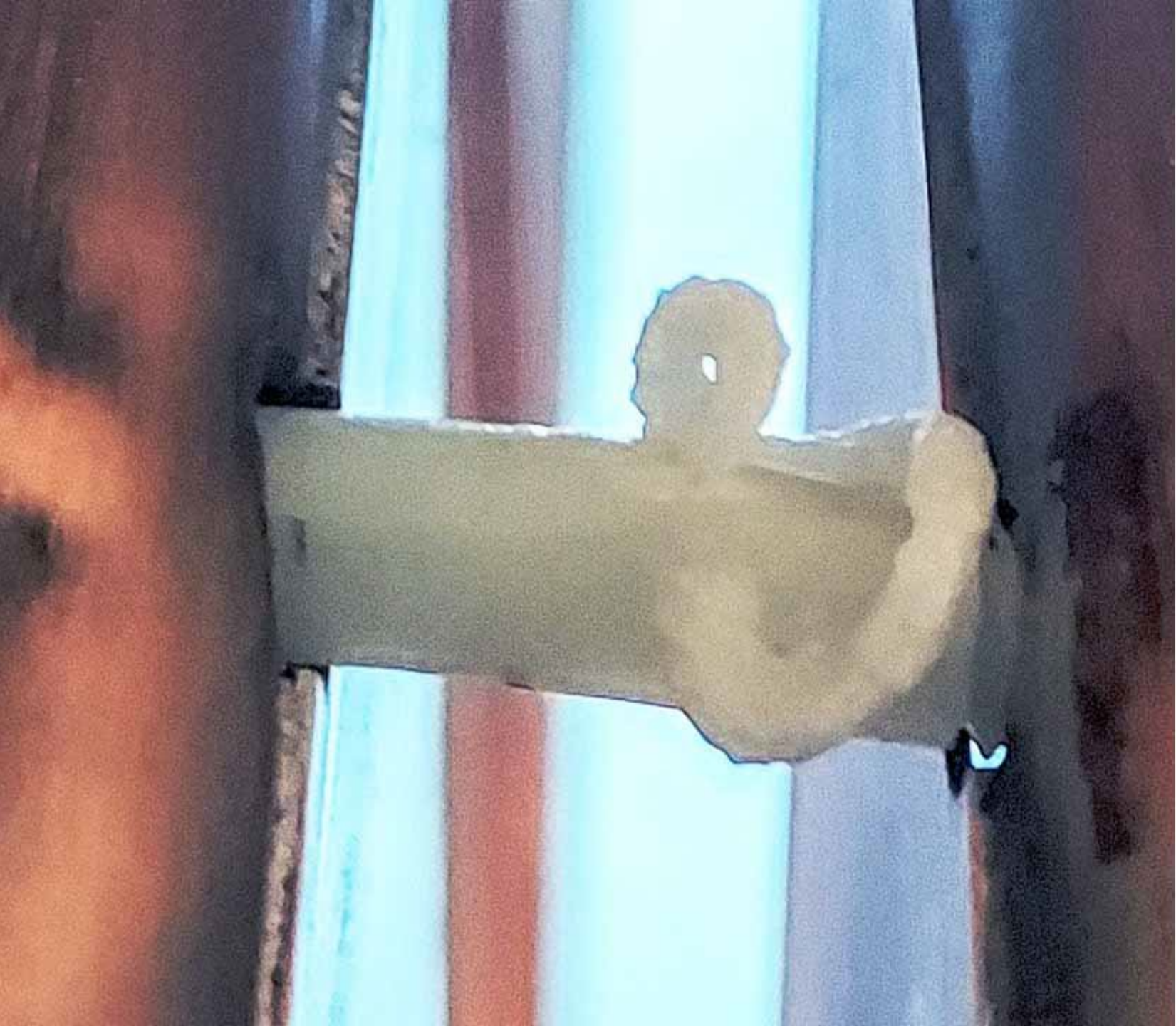
A = 0.212 m²
 M = 1
 OS = 2.00
 DBL = 1.84 m

C = 5 pF
 SWR = 62.5 MHz
 cond = 1.840 m

<https://miguelvaca.github.io/vk3cpu/magloop.html>



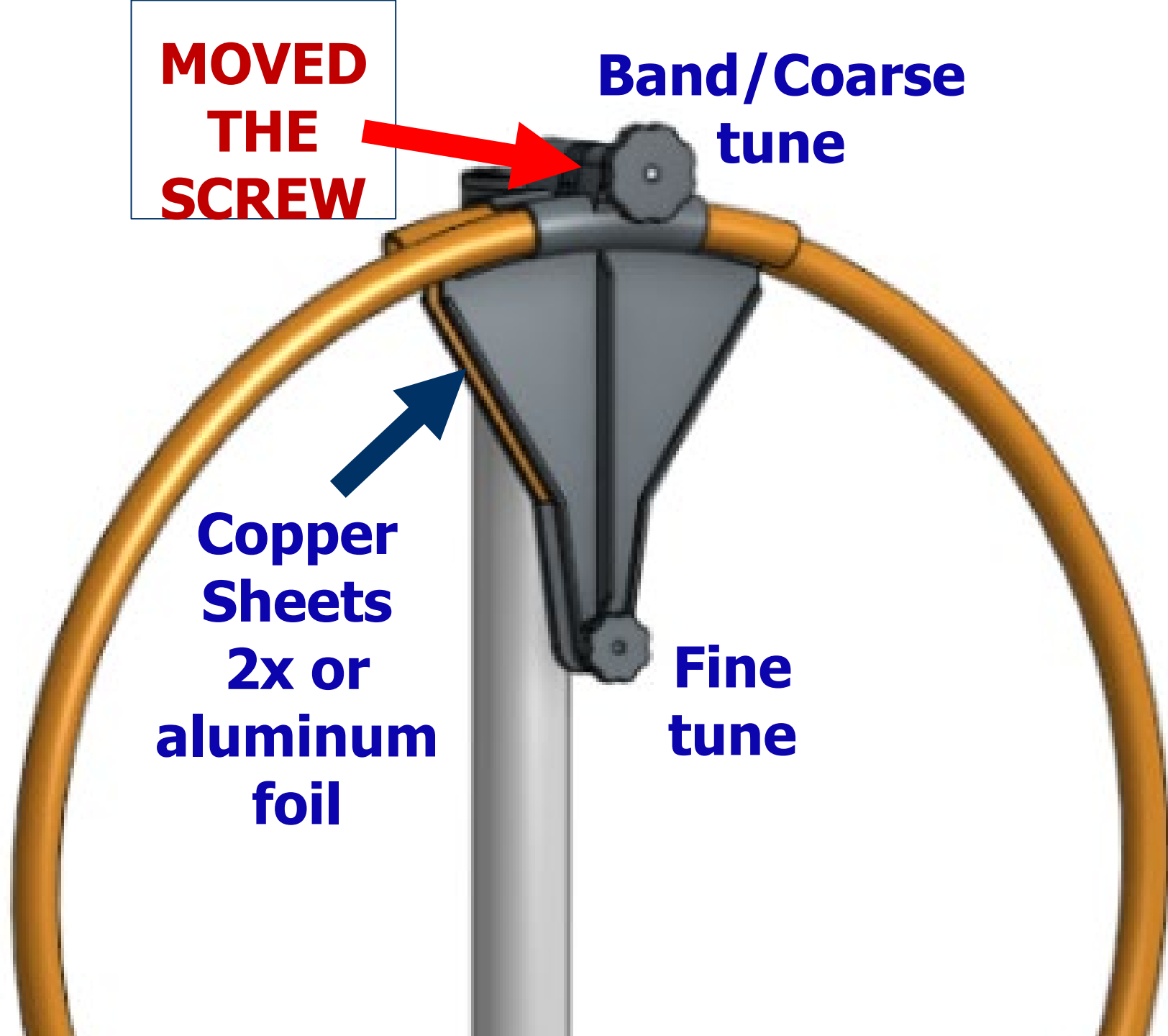




**100
Watts**

KOXL

2 ft. 5/8 in.
OD Soft
Copper
with Coarse
& Fine
Tuning for
6 & 10
meters



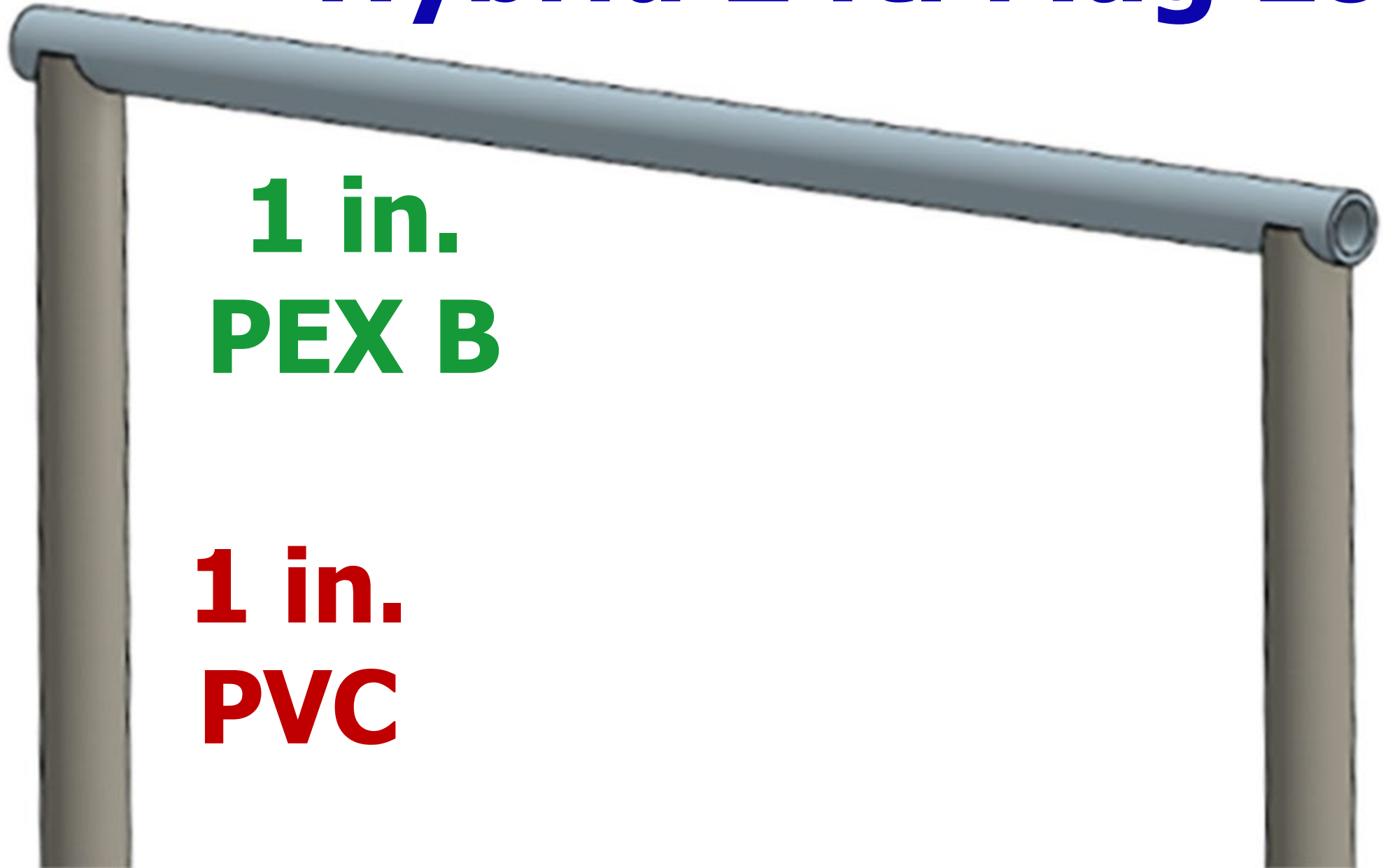
Nano VNA-F

PORT 1
S21
PORT 2



NanoVNA-F

Hybrid 2 ft. Mag Loop



**1 in.
PEX B**

**1 in.
PVC**



PVC



**ABS
DWV**



DØGGY



**w6nbcmail@
gmail.com**

w6nbc.com/probe

"That's all Folks!"
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