

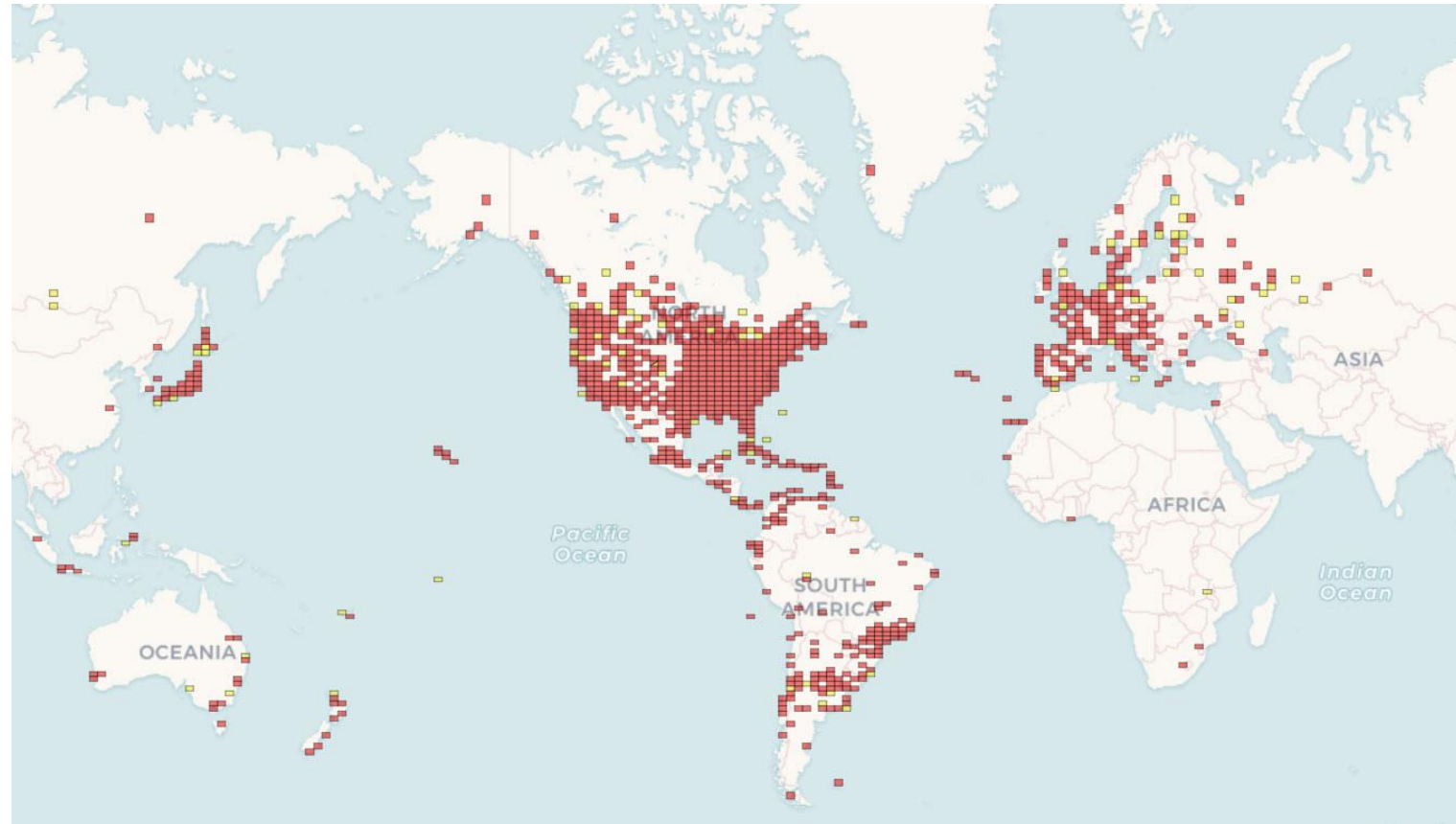
# A Tale of 3 Stealth Antennas

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# Do They work?

- I have been using a stealth antenna, in some form, for over 2 years
- Over 9600 confirmed HF contacts in QRZ with these antennas



# Can you find them?

This pictures shows all three of my HF antennas deployed



# The Reveal



## The Antennas

- Inverted-L rain gutter with stinger
- 70ft non-resonant long wire
- 1 meter diameter magnetic loop antenna

# Why Did I go with a Stealth Antenna?

## A Reason

- My HOA = “Home Owners Association”

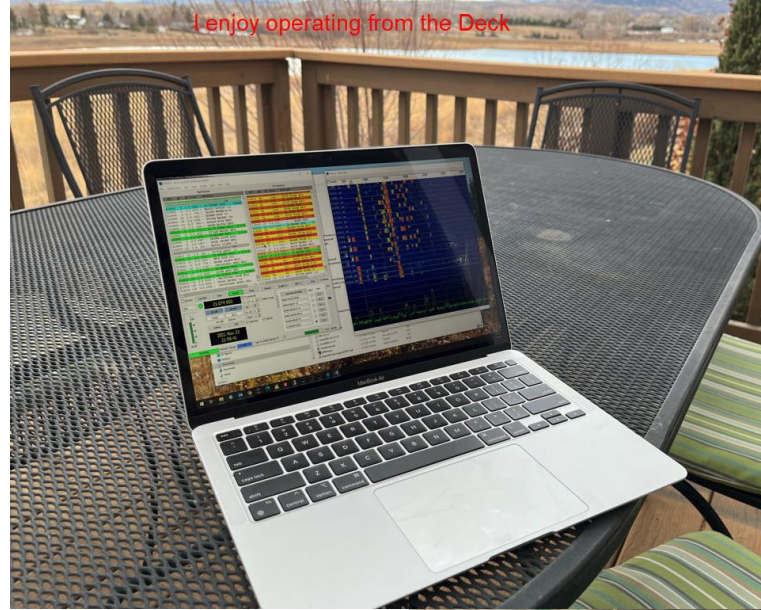
2.6 **Antennae** – Not permitted. No exterior radio antennae, television antennae or other antennae may be erected. Satellite dishes are allowed provided they do not exceed 24” in diameter and placement of such satellite is approved by ACC.

## The Real Reason

- My HOA = “Her Override Authority”
  - Aka XYL
- House Rules
  - No Visible Wires
  - No Visible Poles
  - No Visible Radio in the house (another story)

# My Setup

- Garden Shed
- Radio – Flexradio 6400 (100 watts). Remote control operation.
- Tuner – Icom AH-4
- Direct connection to the antenna, no unun
- Lightning Arrestor and grounding relay.
- Counterpoise – 10 wires and the bunny fence.
- Shingles – Asphalt
- Siding Hardie board cement siding
- Solar Panels – mystery radiator
- Almost exclusively digital, FT8, FT4



# The Magnetic Loop Antenna

- Portable – What makes it stealthy is that you can put it away
- Very High-Q RLC circuit, signal inductively coupled into the loop
- Directional pattern, contact reporting looks like bowtie
- Very narrow bandwidth, tricky to tune
- Tuning drifts with temperature changes
- Added a remote controlled motor to allow for easy adjustments
- Capacitor supports 100W (15KV)



COMBO High Power Magnetic Loop  
Antenna 17-20-30-40 Mts + 33 FT  
Low Loss Coax

Condition: New  
:

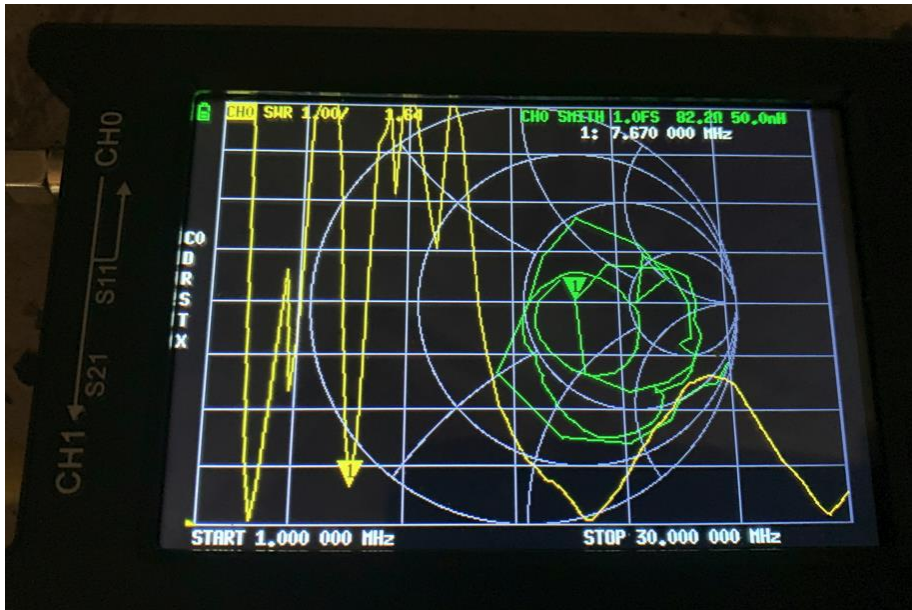
Quantity:  8 available / **28 sold**

Price: **US \$285.00**

# The Gutter

- Inverted-L configuration
- Added a wire stinger to make the antenna electrically longer, ran the stinger into the attic.
- Seemingly Omni-directional
- Never able to create an EZNEC model that matched reality, 4 resonant points

Band	SWR after Tuning
160	1.2
80	1.2
60	1.3
40	1.3
30	1.3
20	1.4
17	1.3
15	1.2
12	1.9
10	2
6	1.6





# Non-Resonant Antenna

- Non-Resonant is not random
- Antenna is fed directly without an unun.
- Needed a length of wire that is not a near a  $\frac{1}{2}$  wavelength on any band so that it can be tuned by the tuner
- Wrote a program, calculates resonances and identifies any potential  $\frac{1}{2}$  wavelength issues, chose 70 ft
- Still fairly Omni-Directional based on contact reporting

Band	SWR after Tuning
160	1.5
80	1.3
60	1.5
40	1.1
30	1.1
20	1.1
17	1.4
15	1.2
12	1.3
10	1.6
6	2.2



```
/bin/bash -l -c ssh cah@mi  
61 = 0  
62 = 0  
63 = 10  
64 = 50  
65 = 85  
66 = 85  
67 = 85  
68 = 0  
69 = 0  
70 = 0  
71 = 0  
72 = 0  
73 = 0  
74 = 0  
75 = 12  
76 = 0  
77 = 17
```

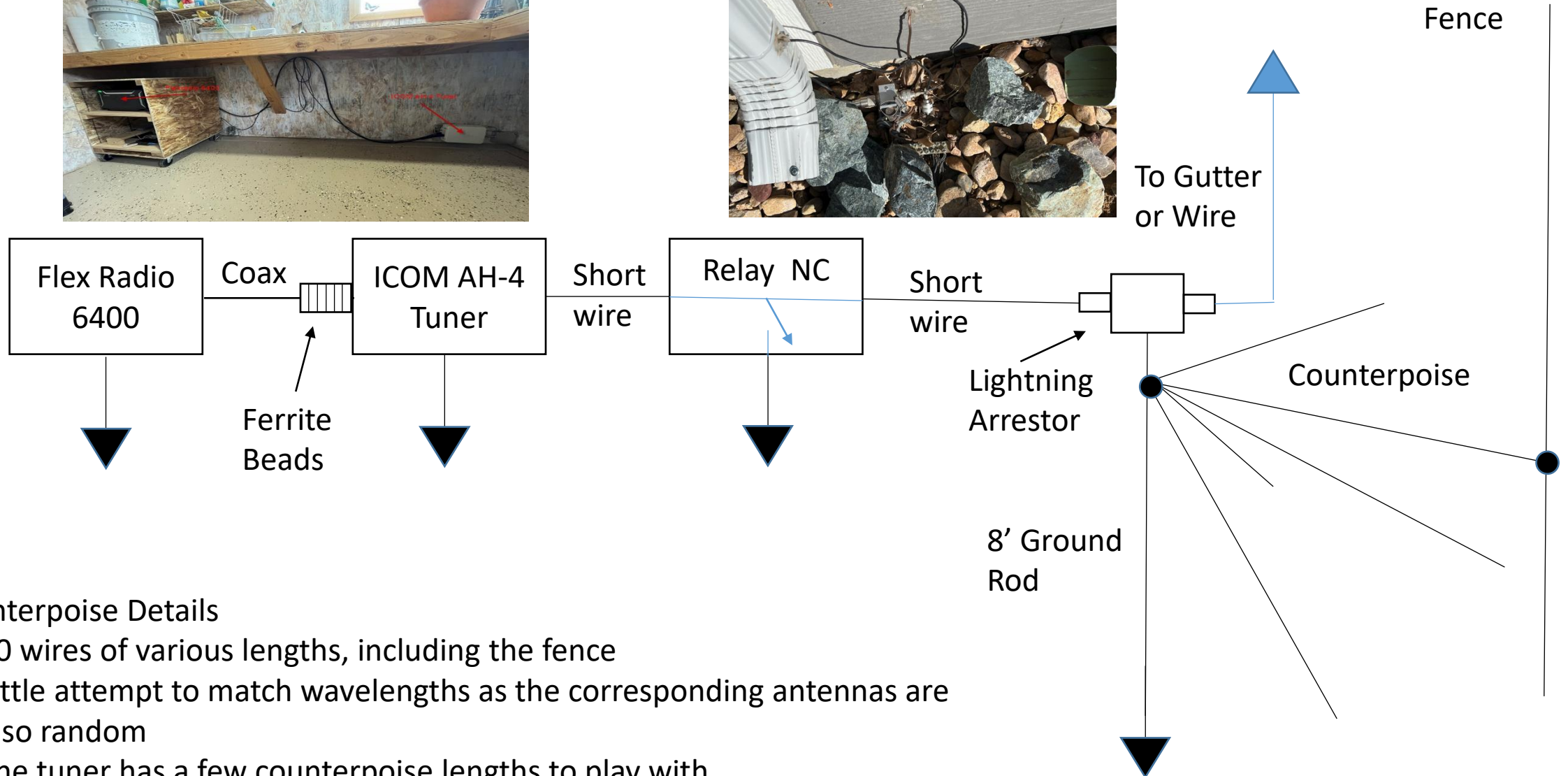
# Performance of Each Antenna

Confirmed Contacts			
<i>Band</i>	<i>70</i>	<i>Gutter</i>	<i>Loop</i>
10m	12	41	
12m	16	113	
15m	123	811	
17m	273	1126	71
20m	432	3366	65
30m	194	958	1
40m	154	1035	14
60m	3	132	
80m	61	258	
160m	0	9	

Average Contact Distance (mi)			
<i>Band</i>	<i>70</i>	<i>Gutter</i>	<i>Loop</i>
10m	3109	1988	
12m	2983	1702	
15m	3492	2138	
17m	2418	1981	1415
20m	1665	1430	1477
30m	1712	1265	575
40m	1477	974	1789
60m	1111	990	
80m	2308	856	
160m	0	779	

- I wrote a program to take adif files from qrz/lotw and export them to Excel
- These tables are pivot tables directly from Excel

# More details about the antenna construction



## Counterpoise Details

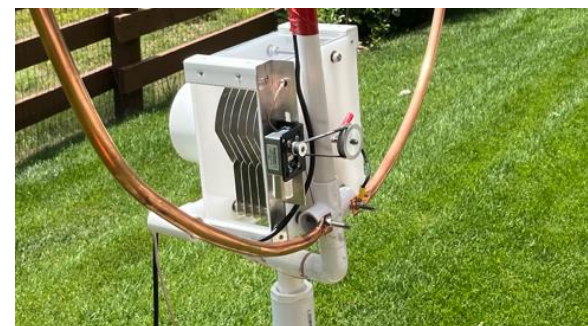
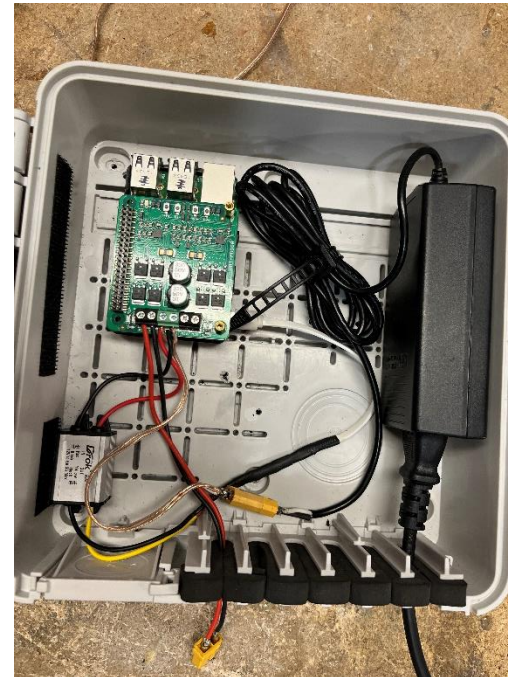
- 10 wires of various lengths, including the fence
- Little attempt to match wavelengths as the corresponding antennas are also random
- The tuner has a few counterpoise lengths to play with

# My tuners: Wire and Loop

Wire/Gutter: ICOM-AH4



Loop: Raspberry-Pi based Motor Controller



# RFI in the House

- My antennas run up the corner of my house, the gutter and along the gutter
- Used ARRL [RFI Exposure Calculator](#) to determine safe distances
  - 3 feet on 10 meters
  - 0.8 feet on 40 meters
- Based on this we put a large plant in the corner of the dining room.
- Biggest RFI issue was with analog computer speakers, amplified, long wire on the input. Fixed with multiple ferrites on the inputs
- LAN cable to the FlexRadio. Cat-6, ~100 feet long, grounded at the radio. Looks like a counterpoise, it was. Lost network when higher power was used. Replaced with optical fiber and Ethernet to fiber converters
- No problems with GFCIs or AFCIs tripping
- Gas Fireplace – Tell the ghost story

# Summary – Stealth Antennas

- Do they work? -> Yes
- Are they stealthy? -> Yes
- Can you have fun with them? ->Yes
- Are they compromise antennas? -> Yes
- Do I still want a Tri-Band Yagi on a 60ft tower -> Yes
- Is my XYL happy? -> Yes