

# Building a 6m Rotatable Dipole

V 1.0



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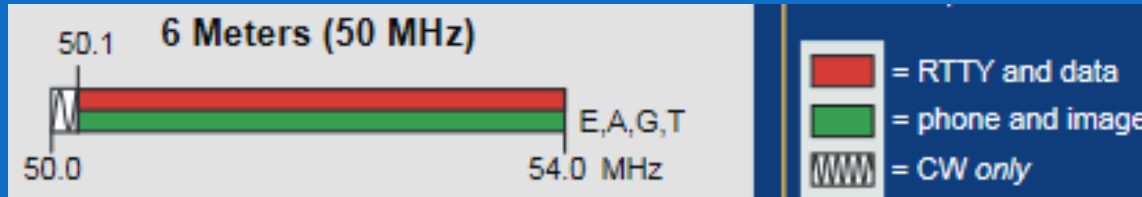
# I built this antenna because:

- As solar cycle 25 ramps up there will be more activity on 6m
- We have seen some nice openings already this year
- 6m antennas are generally small. A half wave is 9 feet
- FT8/FT4 works great for making 6m contacts with weak stations
- I wanted to have the experience of building this type of antenna from scratch



# About 6m

- The US 6m band ranges from 50.000 to 54.999MHz



- Weak signal operation is 50.100 to 50.3MHz
- CW, SSB, FT8/FT4 are within this sub bands
- FT8 uses 50.313 and 50.323Hz
- All license classes have full access on 6m
- All modes can be used on 6m

# The full US 6m band plan

## 6 Meters (50-54 MHz)

50.0-50.1	CW, beacons
50.060-50.080	beacon subband
50.1-50.3	SSB, CW
50.10-50.125	DX window
50.125	SSB calling
50.3-50.6	All modes
50.6-50.8	Nonvoice communications
50.62	Digital (packet) calling
50.8-51.0	Radio remote control (20-kHz channels)
51.0-51.1	Pacific DX window
51.12-51.48	Repeater inputs (19 channels)
51.12-51.18	Digital repeater inputs
51.5-51.6	Simplex (six channels)
51.62-51.98	Repeater outputs (19 channels)
51.62-51.68	Digital repeater outputs

52.0-52.48	Repeater inputs (except as noted; 23 channels)
52.02, 52.04	FM simplex
52.2	TEST PAIR (input)
52.5-52.98	Repeater output (except as noted; 23 channels)
52.525	Primary FM simplex
52.54	Secondary FM simplex
52.7	TEST PAIR (output)
53.0-53.48	Repeater inputs (except as noted; 19 channels)
53.0	Remote base FM simplex
53.02	Simplex
53.1, 53.2, 53.3, 53.4	Radio remote control
53.5-53.98	Repeater outputs (except as noted; 19 channels)
53.5, 53.6, 53.7, 53.8	Radio remote control
53.52, 53.9	Simplex



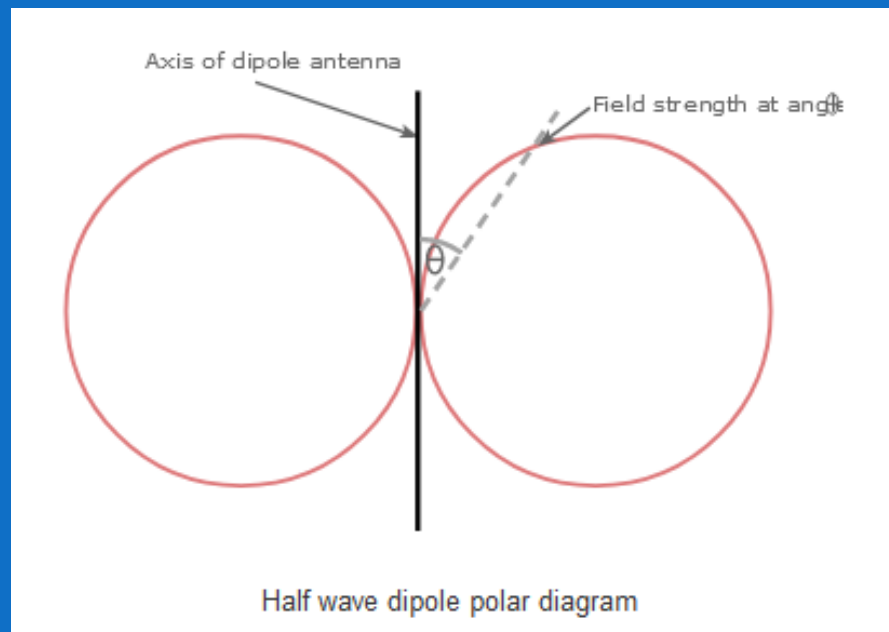
# 6m Antenna Dimensions

- A 6m dipole antenna cut for 50.313 is  $\sim 9' 4''$  total length
- Each element is two different diameter aluminum rods, one inside the other, they can be tuned by sliding the small diameter in and out of the larger diameter



# As a Rotatable Dipole

- Is a horizontally mounted dipole that can be rotated in a circle
- A dipole presents an impedance of  $\sim 73$  Ohm, thus a 1.5:1 SWR
- Since the radiation pattern of a dipole is to its sides, the dipole is able to enhance or decrease a signal



This view is looking down on an antenna which is oriented towards the top of this page. If the antenna is oriented north/south the lobes will be east/west.

# As a 6m Vertical

- A 6m dipole antenna can be mounted vertically giving it an omni-directional pattern
- An inverted VEE is 5% shorter and approaches a 50Ohm impedance
- There are other choices for a 6m vertical
  - Ground plane
  - J-Pole
  - Sqalo
  - Halo



## Now, my implementation

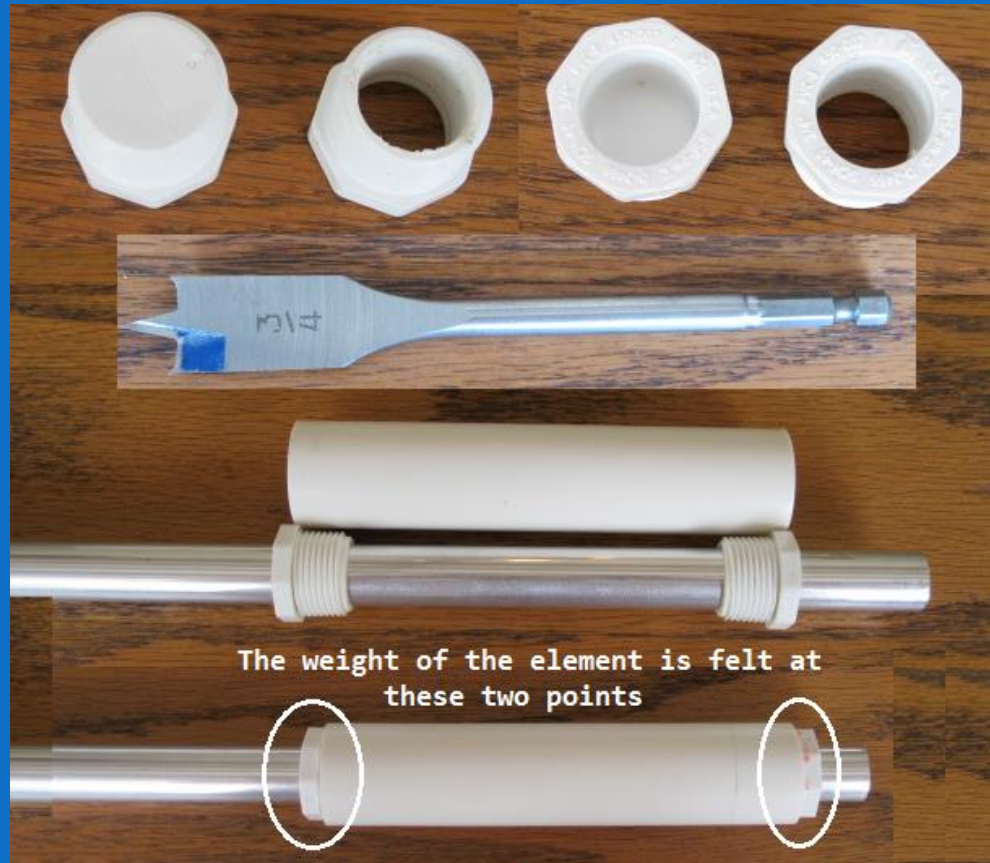
- I chose to use aluminum tubing mounted with PVC and arranged so that the coax connection would be within a watertight enclosure to keep water out of the coax



I will screw a self tapping metal screw here to hold the aluminum tube in place. And another on the other side

# Supporting the AI Elements

- Since each side of the antenna was made of aluminum tubing around 4' long, I chose to mount the tubing inside concentric pieces of PVC using end caps drilled out to the diameter of the aluminum tube. This provides support both where the force is up and where the force is down



You should assume that at some time a bird will land on the element, increasing the downward force.

# Wiring

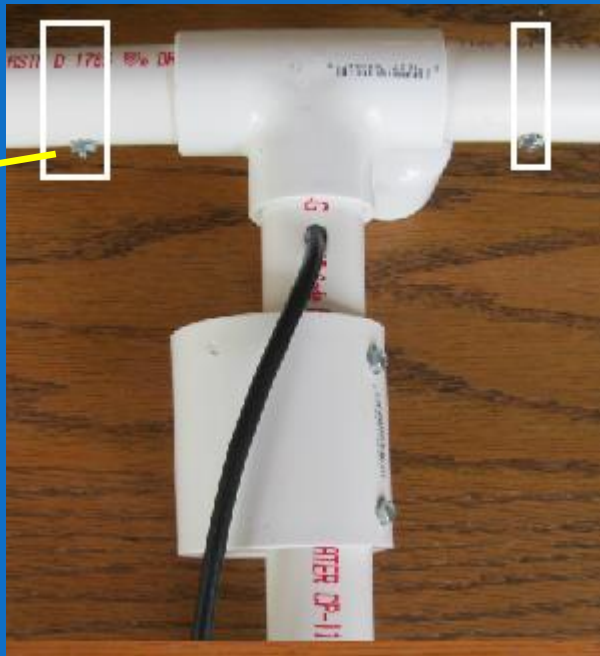
- I wanted all connections to be inside the PVC to keep it safe from water.
- I used solder lugs on the coax pigtail
- And routed the coax through a hole in the PVC mounting arm



# The Balun

- A balun is a device that converts a balanced antenna like a dipole to an unbalanced feed-line.
- The object is to keep all of the RF inside the coax.
- There are many ways to do this.
- I chose to mount a larger piece of PVC where the feed line exited the mast and wrap the coax around that form.

The AI tubing is screwed to the PVC here



# Tuning

- Tune the antenna by adjusting the length of the two elements by sliding the smaller diameter Al rod into and out of the larger.
  - Both elements should be the same length
- Tune the antenna mounted where it will be used.
  - This allows you to adjust for ground reflection
- Tune the antenna with the signal source (antenna tuner, low power transmit, VNA, ...) located where the transmitter will be.
  - This allows you to adjust for your particular run of coax
- If you are going to operate SSB, CW, FT8 tune the antenna for the low part of the band
- If you are going to operate FM repeaters, mount the antenna vertically and tune for the FM part of the band



# Commercial 6m Omni Directional Antennas

- [Cushcraft AR6 6m Ringo](#) \$140
- [Cushcraft ASQ-6 Squalo](#) \$190
- [Diamond CP62 Ground Plane \( 6m, 2m\)](#) \$235
- [Comet GP-15 \(6m, 2m, 70cm\)](#) \$170
- [Hustler G6-440 \(6m, 2m, 70cm\)](#) \$210
- [HO Loop](#) \$200
- [J-Pole](#) \$110



# Home Brew 6m Omni Directional Antennas

- [J-Pole](#)
- [Halo](#)
- [Squalo](#)
- [Moxon](#)
- [Hustler G6-440](#)
  
- And MANY, MANY more

