

2024-07-09 Hamlet Net - J Pole Antennas

Announcements:

- Test Session Info
 - Next VE session is Saturday, July 27th in the Clover Building at the Boulder County Fairgrounds, and starts at 9 am. ~~It is an ARRL session, so there is a \$15 fee to test.~~ It is a PVET session, so there is no fee to test. For more info, and to pre-register, see the Licensing/Testing page on the club web site, <https://w0eno.org/>, under the Education menu.
- ARRL has posted that the Logbook of the World is back up and running. They do expect long processing times as there will likely be a huge rush by users to get their logs uploaded.
- LARC is holding an event this Saturday on the 13th at 9am at the Clover building (the building where we do testing at the fairgrounds) - right across the street from the Field Day location. Chuck and Mike, our President and Vice President, will be discussing future club events and would like your help and feedback with this. It should be just an few hours. If nothing else come out socialize, have a doughnut, and maybe learn something and or contribute to the club having better events in the future.
- We have some volunteer opportunities available where you can help out LARC:
 - Photographer / videographer - record team activities and upload to web site / YouTube
 - Newsletter Editor - put together the monthly Splatter newsletter
 - Social media manager
- There are several Board positions that will be available in October. Currently, the Treasurer and Secretary are planning to make this their last year of service. If you are interested in serving on the board of a 501(c)3 non-profit, please consider running for one of these positions. The current members would be more than happy to "show you the ropes" during the year, so you wouldn't start with zero experience.
- Our sister club up in Nederland is looking for some help with events they are running. They have a weekly Monday night net with no predetermined agenda, so you can lead it however you want. They are also planning a Field Day site at Golden Gate State Park and are welcoming anyone who wants to participate. Finally, they are looking for operators for the Ned Gravel run on July 8th. They have signup links for all these events, so head over to their web site <https://w0ned.org/> for more information!

- You can start earning your 2024 membership or future renewal by acting as NCS for at least 5 nets this year. You can run either this Tuesday night net or the Thursday night net (or both). We have scripts available for both, so all you need is a good connection into the repeater, and somewhere to keep track of names and call signs as people check in. If you're going to be on the net anyway, why not save some dough at the same time! There are four free memberships available for 2023, so don't wait to get started!
- Chuck has set a goal for the Club of running at least one activity a month. This can be a hands-on construction activity, an operating activity like Field Day, a fox hunt, or a special event station. The goal is to get people together to have fun with amateur radio! We have multiple locations at our disposal, as well as lots of Club equipment, so if you have an idea for something you think others hams would like to do, please let us know, and if you're willing to run it, even better!
- The Club is also looking for presentation topics for 2024. If you have any ideas, or better yet, would like to present, please let Chuck know and we'll get you on the schedule!
- All club activities are open to anyone - members and non-members. If you have questions, ask them on a net or **send email to elmer@w0eno.org**

Presenter: Bryan, AF0W

Topic: J Pole Antennas

- If you've been around ham radio for a while, you've probably heard of (and likely seen an example of) the J Pole antenna
- A J Pole antenna is a vertical, omni-directional, single-band antenna that is fairly easy to build
- If you've seen one, you know that the name comes from the physical shape of the antenna, which resembles an upper-case J
 - a. There are two vertical elements - one longer than the other - connected by a short horizontal element
 - b. The feed point is located near the bottom of the antenna
- This type of antenna was invented in 1909 for use in Zeppelin airships which trailed lengths of wire out of their gondolas for radio communications
- It has a few advantages over typical $\frac{1}{4}$ and $\frac{5}{8}$ wavelength antennas
 - a. One of the major advantages is that it does not require radials or a ground plane to function

- b. This makes it easier to construct and install, and reduces wind resistance on the antenna itself
 - c. J Pole antennas provide a small gain of around 2 dB over a quarter-wave ground plane antenna
 - d. They also have low angles of radiation
- The J Pole antenna is effectively an end-fed half-wave antenna
 - a. The end of such an antenna is the point at which the voltage is at a maximum and the current at a minimum
- Ohm's Law (voltage equals current times resistance) can be rewritten as resistance equals voltage over current
 - a. High voltage and low current means this point on the antenna also has a high impedance - somewhere in the neighborhood of 1000 to 4000 ohms
 - b. This is much higher than the 50 ohms that are typically used for amateur feedlines and devices
- An impedance mismatch will result in a high standing wave ratio, or SWR, and poor performance from the antenna system
- To address this, the antenna feedpoint impedance needs to be transformed into something close to 50 ohms
- In the J Pole antenna, this is done by using a quarter wavelength of balanced feed line, only the feedline is part of the antenna itself
 - a. When looking at a J Pole antenna, you will see a long element on one side - this is the half wave radiator portion of the antenna
 - b. At the bottom of the antenna, there is a section with two parallel elements - one at the bottom of the half wave element, and the other spaced apart from it and connected to the first by the horizontal part of the antenna
 - c. These parallel elements comprise the quarter wavelength feeder that transforms the impedance
- The antenna is fed across the parallel elements at the bottom of the "J"

Construction

- J Pole antennas can be constructed from many different materials

- A common choice is copper pipe, but portable versions (sometimes called "roll up J Poles") can be made from 300 ohm TV antenna feed line or 450 ohm window line
- The upper section of the antenna is the antenna's half wave radiator, while the lower section is the quarter wave tuning stub
- If you recall from the Technician exam, you can calculate the wavelength in meters by dividing 300 by the frequency in MHz
 - a. Using a frequency of 146 MHz, which is at the center of the 2 meter band, this results in a wavelength of 80.9 inches
 - b. This formula assumes a very thin bare wire in free space
 - c. To adjust for constructing the antenna using ½ inch copper pipe, this number is multiplied by a factor of 0.958, as determined from a chart in the ARRL Antenna Book - resulting in a corrected wavelength of 77.5 inches
 - d. Half a wavelength is therefore 38.8 inches, and one-quarter of a wavelength is 19.4 inches
- The other dimension needed for the antenna is the spacing between the quarter wave elements
 - a. There is a link to a web page with calculations for determining this distance - it says the distance is not critical, and should be chosen to make the antenna easy to build
 - b. The distance does impact the feed point for the antenna
 - c. The web site suggests a separation distance of 2.5 inches
- The coax feeding the antenna is attached to the parallel section of the antenna -
 - a. The bottom of the parallel section of the antenna is shorted together by the horizontal element, and is at 0 ohms.
 - b. The top of the matching section is an open circuit, so the impedance is very high
 - c. The feedline is attached at the point where the impedance is approximately 50 ohms
 - d. The center conductor of the coax is attached on the side of the antenna with the half wave radiator, and the shield to the shorter side
- To tune the antenna for lowest SWR, move both feed point connections up or down

- a. If the lowest SWR is not 1:1, change the radio frequency until it is.
- b. If this frequency is lower than the center of the band, then shorten the halfwave radiator
- c. If this frequency is higher than the band center, then you will have to cut a longer radiator for your antenna
- There is nothing to prevent you from making a J Pole for any band, but antennas for HF frequencies will be fairly large
 - a. Remember that the long side of the J consists of the halfwave and quarter wave portions of the antenna - for 10 meters, this would be over 24 feet!
- Suppression of feed line RF currents will likely be required - ferrites or open-air baluns comprised of loops of the coax feedline can be used for this purpose

Slim Jim

- You may have heard the term "Slim Jim antenna" and wondered if this is the same thing as a J Pole antenna
- The Slim Jim is actually a variation on the J Pole antenna
- It was introduced by Fred Judd, G2BCX, in 1978
- While it uses more material for the antenna elements, it exhibits no performance advantage over the conventional J Pole antenna design
- The construction of a Slim Jim antenna is the same as a regular J Pole, except there is a horizontal element at the top of the J which extends down almost the full half wavelength toward the bottom of the antenna
- The half wavelength radiator now appears similar to that of a folded dipole
- According to Michael Martens, KB9VBR, of KB9VBR Antennas, there are some differences between the Slim Jim and traditional J Pole antennas:
 - a. The overall length of his Slim Jim antenna is 11 inches shorter
 - b. The gain of the Slim Jim is twice that of the J Pole
 - c. The bandwidth of the Slim Jim is slightly over double that of the J Pole
 - d. The takeoff angle of the Slim Jim is much lower than that of the J Pole (8 degrees versus 20 degrees)

- e. One downside of the Slim Jim is that the antenna needs to be isolated from the mast system, whereas the J Pole does not
 - For example, if you have a metal mast, you would need to do something like attach a piece of PVC pipe to the top of the mast, and then attach the Slim Jim to the top of that
- f. Another is that the antenna requires more materials so costs more
 - As an example, he sells his 2m copper J Pole antenna for \$46, and the Slim Jim for \$58
- He also states that the J Pole is a good choice if you are mounting the antenna at a lower mast height or are in an urban area or valley - the Slim Jim would need to be mounted in the air at about the 20 or 30 foot level

Ed Fong Antenna

- Another popular antenna is from Ed Fong, WB6IQN, available as either the DBJ-1 dual band base antenna, or the DBJ-2 Dual Band Roll Up Antenna
- Ed designed these antennas to perform as half wave radiators for both the 2m and 70 cm bands (remember, the traditional J Pole antennas are designed for a single band)
- The roll up antenna is an extremely portable antenna that is great for hiking and camping
- Ed has graciously provided detailed plans for building these antennas in his articles published by the ARRL (DBJ-1 in Feb 2003 QST, and DBJ-2 in March 2007 QST) so you can make one yourself
- He's also got a tri-band model, the TBJ-1 that adds 220 MHz support.
- He also sells antennas which are produced by his graduate students - both the DBJ-1 base antenna and DBJ-2 rollup antenna are around \$50
- The DBJ-1 base antenna will handle up to 75 watts, while the DBJ-2 roll up antenna will handle 50
- Ed did a presentation at a LARC meeting back in January of 2021. A recording of this meeting can be found on our Club website and Youtube channel (<https://www.youtube.com/watch?v=JR9BGE2HcDw>)
- N9TAX also sells a dual band rollup Slim Jim antenna for \$30 that handles 100 watts

Questions:

- **The question for the week is:** Do you use a 2m and/or 70cm antenna for a base station antenna, and if so, what type do you use?
- **In my case,** I've got three different base station antennas. My primary station that I am using right now is connected to an Ed Fong DBJ-1 antenna I have mounted in my attic. I also have one of his DBJ-2 rollup antennas that I purchased for operating while out of the house - I've used it on multiple vacations connected to an HT to listen to local nets and communicate via APRS. Finally, I have a secondary station with a collinear dual-band antenna from Diamond Antenna, the X-50. Externally, it looks similar to the PVC pipe used on the Ed Fong DBJ-1 antenna, but it does have three ground plane elements.

More Info:

- Copper Pipe J Pole Antennas: http://www.cvarc.org/resources/Tech_Articles/buildjpole.html
- J Pole Vertical Antenna: <https://www.electronics-notes.com/articles/antennas-propagation/vertical-antennas/j-pole-vertical-antenna.php>
- J Pole Antenna on Wikipedia: https://en.wikipedia.org/wiki/J-pole_antenna
- Slim Jim and J Pole Calculator: <https://m0ukd.com/calculators/slim-jim-and-j-pole-calculator/>
- J Pole Antenna Design Calculator: <https://www.hamuniverse.com/jpole.html>
- Slim Jim 2 meter Aerial: <https://www.hamuniverse.com/g2bcxslimjimantenna.html>
- Slim Jim Antenna Project: <https://www.hamuniverse.com/slimjim.html>
- Slim Jim vs. J Pole Antennas: <https://www.jpole-antenna.com/2012/10/21/slim-jim-vs-j-pole-antennas/>
- Ed Fong's Antennas: <https://edsantennas.weebly.com/>
- Ed Fong's antenna plans (DBJ-1, DBJ-2, TBJ-1): <https://edsantennas.weebly.com/about.html> (scroll to bottom of page)
- Review of DBJ-1 Antenna: https://www.miklor.com/COM/Review_DBJ1.php
- N9TAX Labs: <https://n9taxlabs.com/>
- Diamond X-50 Antenna: <https://www.diamondantenna.net/x50a.html>
- Spectral IsoPole (mentioned on net): <https://www.isopole.com/index.php#productos>

- If you have ideas for net topics or general meeting topics / presenters, please let us know! Tell us on a net, or send email to k0itp@w0eno.org

Email to elmer@w0eno.org

1. K0DBL - Don - Mead - Ed Fong at top of roof on backside of house. HOA just sees PVC. Heard some dropouts on 70cm - sounds like packet loss.
2. WA0JJC - Bob - Boulder - Used to have a homemade copper J Pole for 2m. Was getting ready to modify for 70cm, but got an Arrow Antenna from Cheyenne that does 2, and 70cm. Has loops of coax for air balun, and works fine. Didn't hear any dropouts.
3. AE0DO - John - N of Longmont - Did try out a J Pole - was one of his first ham projects. Tried making out of 300 ohm twin lead on a Baofeng. Was better than rubber duck, but still not good enough for a good connection into repeater.
4. K0IVV - Bob - East Longmont - (no response)
5. WA7EM - Ed - Erie - Have an Ed Fong dual-band. About 20-25 feet up and performs quite well on both bands. Can hit lots of repeaters nearby.
6. AF0W - Bryan - Longmont -

DMR Reference - Steve

Can paint antenna - just need to make sure paint does not contain metallic elements

End: 7:40pm