

# Ozark QRP Banner



## The Official Newsletter of the Four State QRP Group WQ5RP

### MAY 2022 Edition

**In This Edition:** RF Interference, A Slinky Vertical, Ham Radio Solutions, The Hi-Per-Mite, a Cable Test Box, Brass Pounders, Ruggedized EC11, OzarkCon 2022 Photo's, New 4State Kit and more...

OzarkCon 2022 is now just a memory. A great time was had by all. Attendance was just at 100 or so. A bit down from past years but it was still a lot of fun. The 4State group did a fantastic job putting on the event. Good presenters, good prizes, fun Build-a-Thon, FB Homebrew projects, QLF Contest, etc. Bert did a good job running the Special Event Station, KØN. Bert was running all homebrew 4State equipment. If you didn't make it this year, hope you can make it next year. A bit later there are some pictures of the weekend activities.

NMØS announced that there will be some new kits in the coming months. One of them will be a test set for the work bench. This has a lot of nice features and will be a welcome addition to in any shack. There is also the T41 Transceiver Kit in the works.

The next big QRP Event will be Four Days in May at the 2022 Hamvention on May 20 - 22. Hope to see you all there.

If you have been doing or planning anything interesting, an outing or building an antenna or other project, send it to the editor for the next Banner due out in August.

Get ready for **Field Day June 25-26**, the number 1 contest for the QRP operator. Get your group together and join in the fun. Send us your pictures of your event.

**2022 QRP-ARCI SUMMER HOMEBREW SPRINT**, a good time to try out those 4State Kits.  
Date/Time: 2000Z to 2300Z on 10 July 2022 [QRP ARCI - Summer Homebrew Sprint](#)

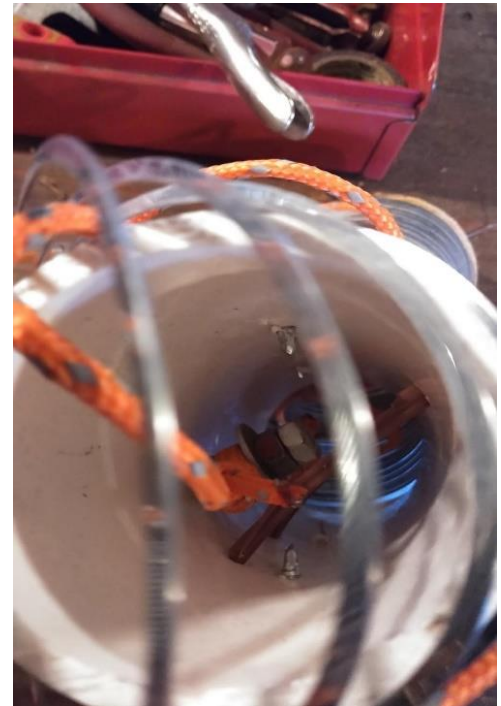
My version of an old antenna idea

## A Slinky Vertical

de NØYJ

My XYL Sharon KE0VMX and I were watching the toys that made America Great on the History Channel, the other day, and one of the featured toys was that child hood favorite, the Slinky. They mentioned that it was used as a portable HF antenna by our military during the Vietnam era. Sharon thought it was an interesting concept so I set out to build one. A small time spent googling revealed that many Hams had built Slinky antennas of various designs. There were even commercial versions available. I brought the idea up as a 4SQRP DMR net topic, and some net participants thought the idea was worth trying, some not so much, Bill, WA9BNZ had a commercial version deployed in his attic as a dipole, and did not have much success, he mentioned it went by way of the local ham fest to another lucky Ham. I decided to build my version.

One thing that all designs seemed to have in common was using a rope as a carrier since Slinky's by design belong with the invertebrates, hi hi. The rope gives them the support they need. I chose to make my version non resonant, those crafty Chinese fellers at Xiegu put a nice tuner in my G90 and I decided to use it. Mine is built with 2 Slinky's configured as a vertical dipole. I cut 2 pieces of rope 8 feet long, put a loop on the center rope connection point for both pieces of rope, those loops pass over the threads of an eye bolt I used in the center of a piece of 2 1/2" schedule 40 plastic pipe that I use as the center insulator, anchor point, and feed line connection support. The eye bolt passes through a hole in one side of the plastic pipe, and is held in place with a nut. I put the loop of each of my support ropes over the threads of the eye bolt within the center of the plastic pipe and held them in place with flat washer and nut, actual 2 nuts in my case, being a negative thinker.





The Slinky's are attached to the plastic pipe center insulator with 2 self-tapping sheet metal screws on each side. The 300 ohm feed line passes through holes drilled in the plastic pipe and solders directly to each Slinky.

For each Slinky I used a wooden disc. I made those discs by using a 3" hole saw to cut them out of some scrap 1/4" plywood. The hole saw provided me with a center hole in each disc.



I put a double knot in the end of each support rope, leaving a tail about 3" long which I passed through the center hole of each disc then tied a loop on the outside of each disc.

The Slinky's are attached to the wooden discs with two self-tapping sheet metal screws, the screws left sharp points on the outside of the discs which I ground flat.



The Slinky's are stored collapsed, on each end of the PVC pipe and the support rope is stored inside the PVC pipe. The feed line is rolled up and taped. The antenna, feed line, and extra rope fits in a small bag, made from the leg of an old pair of jeans.



Using the Slinky CMS "contact maker special". I took down an inverted V, that I have hung in a Pecan tree in the back yard and replaced it with the CMS, I kept track of which side of the feed line was connected to the top, radiating portion of the antenna.





I already had an Elecraft BL-2 balun. I connected the top Slinky to the A tap, and the lower Slinky to the B tap, then coax to Xiegu G90. On the air, that first night I made a contact with a station in Ohio on 40 meters, a contact in Iowa on 80 meters. The next morning, I worked West Virginia and Oregon on 20 meters. All contacts were at about 19 watts.

- Does it work - yes.
- Easy to deploy - yes.
- Nice small package - yes.
- Inexpensive - yes.
- Cool -yes.
- Carefully engineered - nope.

73's  
Bert  
NØYJ

*Editor's Note: Intended to be a metal part for warships, the original Slinky toy was first invented in 1943 by Richard James. [https://en.wikipedia.org/wiki/Richard\\_T.\\_James](https://en.wikipedia.org/wiki/Richard_T._James)*

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## Getting Control of RF Interference

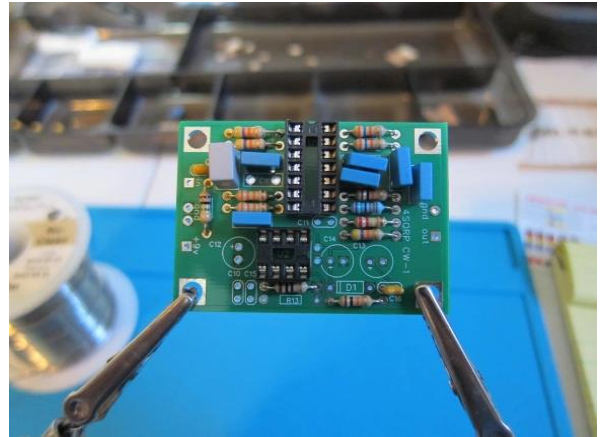
As radio operators, we have all experienced RF interference of some type during our time. To help understand and to eliminate interferences, Jim Brown, K9YC shares his knowledge and experience. Jim writes on many subjects of types of interference. There is a wealth of knowledge on containing RF, microphone and audio interference using ferrites and other methods. You are encouraged to visit Jim's web pages.

- <http://www.audiosystemsgroup.com/K9YC/K9YC-old.htm>
- <http://audiosystemsgroup.com/RFI-Ham.pdf>
- Or just Google K9YC ferrites.

# The Hi-Per-Mite Audio Filter

[Amateur Radio Station WBØISG](#)

The FT-817/818 has been in production for over 20 years and now that I own one, it is easy to see why. It is a fun radio to operate and fits a lot in a small package. There's really just one thing that I don't like about it: the wideness of its filtering can make operating difficult. [The Hi-Per-Mite from the 4 States QRP Group](#) offers an economical and easy to build solution to this radio's shortcoming.



The receiver on the FT-818 hears about 1kHz to 1.5kHz of the band. This is probably fine for SSB, but it is less than ideal for operating CW on the weekend. I hear up to four stations at once while operating during peak times and conditions. I mentioned this to another operator while on the SKCC sked page and he recommended that I try out the Hi-Per-Mite kit offered from the 4 States QRP Group. Boasting a 200 Hz audio pass for only \$28 shipped, it was a deal that I was eager to take advantage of.

The kit is small and easy enough for the beginner to complete as long as they can read a schematic and know how to solder. While the kit didn't ship with instructions, there are some provided on the 4SQRP Hi-Per-Mite webpage.

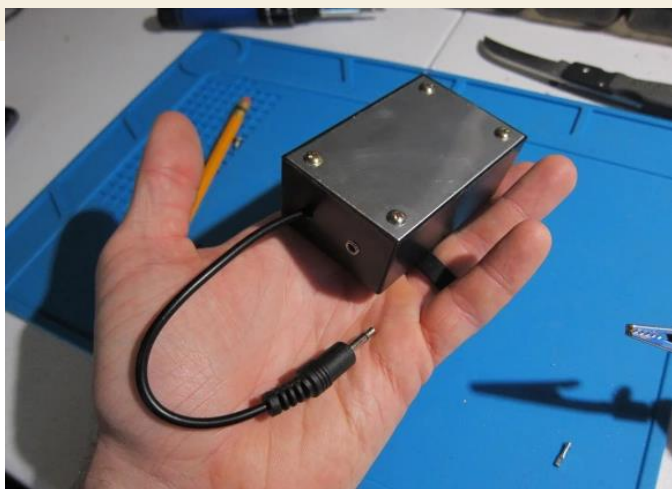
The instructions were slightly confusing at times and differed from the schematic in a couple of ways. In fact, I had some trouble getting it to work once I had all the components installed. Once I connected power and my FT-818 to the circuit, I was disheartened when the audio was horrendously overdriven. Through some conversations with members of the QRP-ARCI and NAQCC organizations on groups.io, I managed to troubleshoot the issue.

All the problems went away once I disregarded the long-form instructions and followed the schematic as it was drawn. This meant that I eliminated a jumper across D1. The audio issues went away! If I read the schematic correctly, I was feeding 12VDC into places where it wasn't meant to go which caused harsh audio.

Now that I have this audio filter working and in a nice enclosure, it permanently resides atop my FT-818. The performance is outstanding. I only hear one station at a time now even when the band is crowded. However, the audio adjustments are touchy at the radio now.







What I need now is a way to power it in a more seamless way. I'm considering adding a pigtail from my 12VDC supply cable to the Hi-Per-Mite so that there are fewer wires cluttering up the desk.

### [Amateur Radio Station WB0ISG](#)

A site devoted to CW and QRP operation. Worth a visit and subscribe to his page!

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## *Laptop for Logging in the field (or shack)*

A month or so ago, NØMII found a simple low-end laptop that could be used for simple programs such as for logging during POTA, SOTA, Field Day, etc.

These units are brand new from Micro Center. They run Windows 10 Education and don't have a lot of horsepower, but for logging they work great. They only have 64GB of storage but have a micro SD port, two USB ports and an HDMI connection. Best part, they only cost \$79.95.

[Evolve III Maestro E-Book 11.6" Laptop Computer - Dark Grey; Intel Celeron N3450 1.1GHz Processor; 4GB LPDDR4-2133 RAM; 64GB ROM Data Storage; Intel HD Graphics 500](#)



**Note:** At the time of publication Micro Center had a good supply.

# Welcome to the Ham Radio Solutions

<https://hamradio.solutions/>



Ham Radio Solutions is pleased to announce CW Hotline, a WiFi connected CW tool. CW Hotline was designed to provide a way to key a remote radio station in CW mode, but can be also used as a private Morse code link to friends. Think "The Bat Phone" for CW. It is available with either a built-in straight key or paddles, or neither if only external keys will be used. Once it is configured with the local WiFi information, just power up, it will link with selected peers and be ready to send and receive.



Some CW Hotline features include:

- A remote CW station keying solution with low latency (2 units required)
- A dedicated Morse code channel for remote friends to communicate and practice
- A stand-alone Iambic keyer with built in paddles
- A code practice oscillator with built in straight key
- Jacks for external key or paddles, amplified sidetone speaker, and transmitter keying
- LED indication of link status and keying
- CW Hotline reproduces the timing and "fist" of the sender
- Compatible with [VBand Internet CW website](#) and can remove all local latency
- Settings adjustable via WiFi or serial
- Powered via 5V Micro USB cable
- Available as a simple kit with all through-hole components

[CW Hotline Assembly Manual v0.5 \(Current\)](#)

[CW Hotline Assembly Manual v0.4 \(Beta Version\)](#)

[CW Hotline User Manual](#)

[CW Hotline Case Drilling Template](#)



You can join us, along with many other users, on our [Discord Server](#).

CW Hotline is currently available as a kit for \$50 plus \$5 US shipping.

International users please [contact us](#) before ordering.



# CABLE TEST BOX

by Donald Sanders W4BWS

This little test box is meant to go into your to-go-bag or be useful around the shack, SOTA, POTA or at field day. It should be helpful at local ARES sites.

Sometimes operators choose to follow standard powerpole wiring polarity others do not or they just make an error when making power cables.

It is a combination of a continuity tester for coax or other cables with a polarity tester for powerpole supplies and cables. This test box allows you to plug it into a power source or cable and know that it is wired properly.

Starting with the BNC connector on one end of the box, there is just enough room to add two banana test points or small binding posts, your choice. I used what I had on hand. Connect the BNC center to the red post and the shell to the black post. I added a green LED from the black post to the battery negative and a 560 ohm  $\frac{1}{4}$  watt resistor from the RED post to the positive battery contact.

I used a 9 volt battery as I had a holder available. A CR2032 3 volt battery can be used and the resistor eliminated. The CR2032 requires a special holder which I did not have on hand. The LED testing function may not work as I haven't tried it with the 3 volt battery. I eliminated any on/off switch as the only time current is flowing is during the testing.

I also noticed that a CR2032 battery makes an easy LED tester. Just place the LED leads, one on each side of the battery. If it lights-GOOD. If not - reverse the leads.

The box was half empty so I added a simple powerpole connector tester on the other end of the box. There is still enough room to store 2 connector adapters inside the box. This is not an assembly article but simply a concept idea. Many things can be built in the small tins. Don't limit your imagination.

I found that soldering a wire in the PP pins and then adding the resistor or LED lead was difficult. My old fingers and eyesight did not help the situation. I found that there are straight PP pins available designed to allow the PP housings to be installed perpendicular to a circuit board. They would make the job easier-no crimping or soldering the pins prior to installing into the housings.

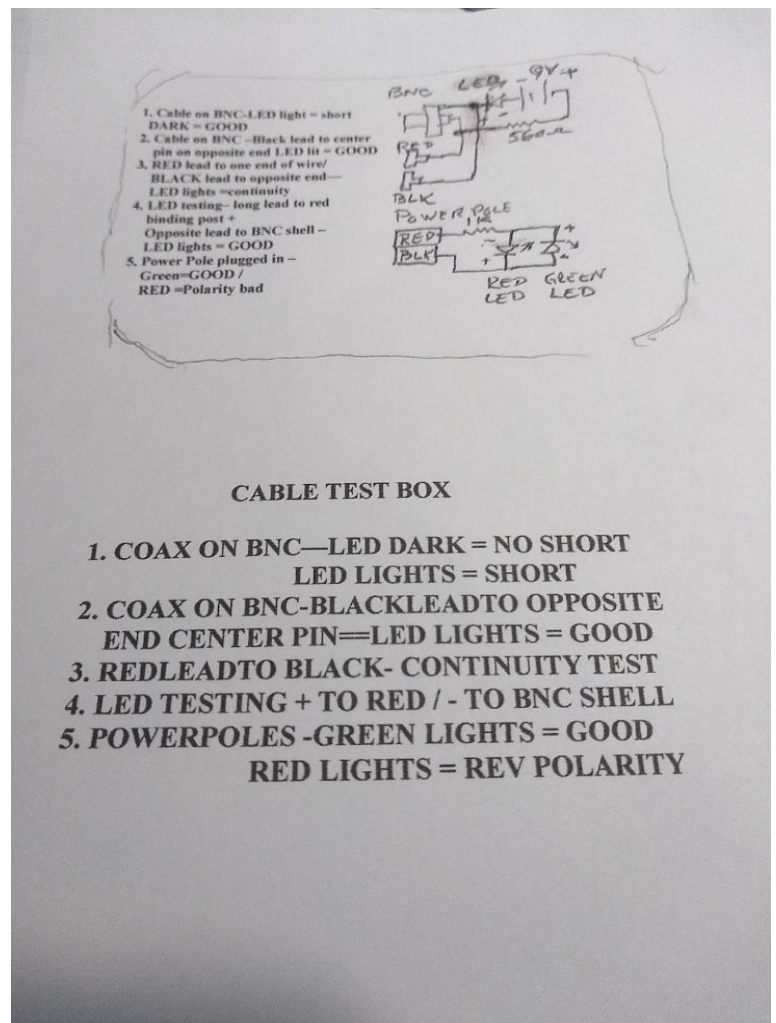
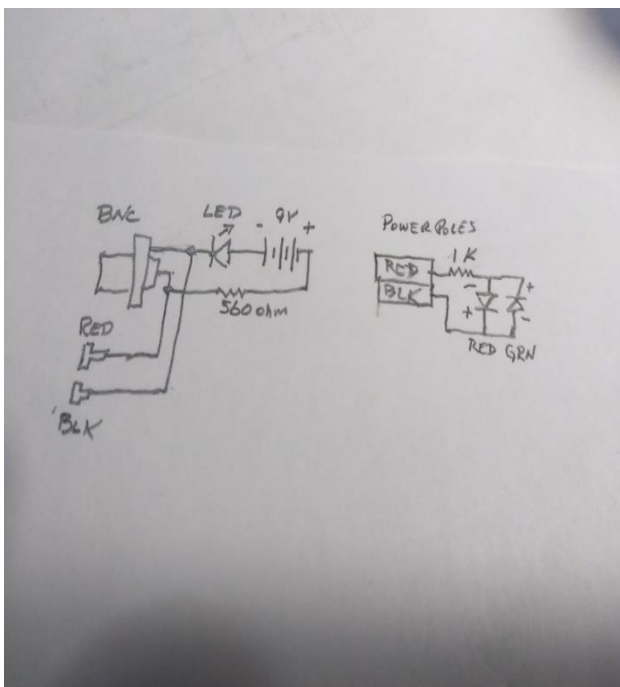
There is available a special tool for insertion/ extraction of power poles. Anderson P/N 111038G2. I believe the Powerpole flat long contacts are part number 1377G4. They will make it easier than solder or crimping the pins. Mouser sells them at about \$1 per pin.



One problem was how to secure the powerpole connector in the tin box. I chose placing a dollop of shoe goo at the junction of the box and the LED and PP housing I also added a plastic shield between the battery housing and the box, extending across the powerpole connector to keep the coax adapters from contacting the led leads. I added a label to the top and inside the lid with instructions and a schematic.



Below is a schematic of the prototype cable test box.



# "BRASS-POUNDERS"

The expression "brass pounder" is credited by Marconi Wireless operator C.J. Weaver of the S.S. Philadelphia right after the turn of the century. Telegraph keys were generally made of brass except for the lever, which was hardened steel.

The first Brass Pounders didn't pound Brass...in fact, the first telegraphers weren't required to have a knowledge of code! Incoming signals were printed on a paper tape, similar to the well known ticker tape, by a machine called an "inker". The receiving operator then converted the incoming characters into letters of the alphabet, with the aid of a codebook. This was quite slow, and it was quickly apparent that "brass-pounders" could achieve much higher speeds and save much time.

The early wireless telegraph key was a crude and massive device. It resembled a pump handle in appearance. Some called it a "pump", others dubbed it "the grasshopper". The old wireless keys were difficult to manipulate. They were required to make or break a heavy current, and some keys had large cooling fins. Some keys were designed to fit special conditions, such as flameproof keys used on early submarines and aircraft, to prevent fire and sparks.

In the earliest days the dots and dashes of the code were of necessity sent slowly. The unsteady, rasping sound of the wireless spark was such that the code characters would have been unrecognizable if sent at too great a speed. Thus, the first wireless messages were transmitted at a rate of only 10 or so words per minute. As technology moved ahead, so did the code speed and by WW1 most operating speeds of 20-25 wpm were required of ship operators.

A few wireless and telegraph men were born to the telegraph key. Some had a sending style so rhythmic, so steady, so completely devoid of error, that the product of their nimble fingers was like music to the ear. Strangely enough, some of the best telegraphers were musicians!

A few wireless men became famous. Thomas Edison started out as a wireless operator. In his later years Edison was nearly totally deaf, and was able to communicate with his friend, Harvey Firestone, another former telegrapher, by tapping on Firestone's knee with his finger. Another youngster pounding brass for the Marconi Company, worked his way up to the highest level of the company, correctly foresaw the huge potential in radio broadcasting to the public, and in later years again foresaw the potential in television, was David Sarnoff, who became President of RCA.

Another name needs to be noted here, Ted McElroy, was able to send and receive at a speed of 76 words-per-minute, a world record, sending with his Vibroplex bug and recording what he had received with his typewriter. His sending style was so perfect that, when reduced to normal speeds of between 25 to 40 wpm, was indistinguishable from the manual. A flawless, two-fisted, hard-drinking, high-living telegrapher, he was the best of his trade.

*Note: Records indicate he could receive at 75wpm. There is no record of sending. Also, it is doubtful he used a Vibroplex as he manufactured his own semi-automatic keys.*

*Editor's Note: Harry Turner (SK), W9YZE of Alton, IL. Holds the World's Record for sending with a hand key at 35 WPM set in 1942 while in the Army.*



# HOW NOT TO INSTALL A TOWER

*Everett Catlin N5MZX*

Recently I had the chance to witness the removal of a 40 Foot Rohn tower at the house of a silent key. I had never been involved in the process of installing or removing a tower before and was fascinated by the process. I wish to pass on my observations and comments on the safe removal of an unsafe tower

The tower was an Rohn 25 tower, rotor, and Mosley TA-33 Triband beam. It had two sets of guy wires that were secured to two wooden fence posts and another one set the eve of the house. Please view pictures.



The large metal base plate was simply resting on the ground. There were no concrete footings. Two pieces of re-bar were driven through the top left and bottom right holes of the plate in an attempt to secure the tower base.



After a very short deliberation, it was unanimously decided that this tower was way too dangerous to climb.

Fortunately, the club had a member, who graciously offered the use of his bucket truck. He safely had the tower down within an hour. Then it took about two more hours to dismantle the antenna and tower. The tower, rotor, and antenna were all found to be in good shape.



Please note that the tower base plate was heavily rusted, and with the application of Blaster Penetrate spray we were able to free all the hardware and remove it from the tower.

Here is a picture of one of the base bolt attachments on the plate and one of the bolts that was removed. Note the severe rusting of the bolt and vertical tube.



Bolts securing tower to base very rusty



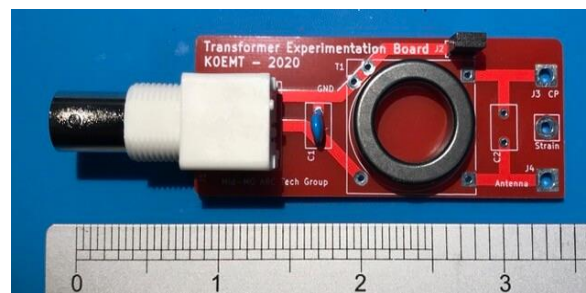
### Rusty guy wires and hardware

Someone once said that a picture is worth a thousand words. These pictures illustrate the improper and dangerous way to install a tower. This installation puts the ham, his property, and those who may some day have to remove the tower in danger.

The lessons learned should be, always install the tower to the manufacture's specifications and local codes. Guy it off with proper anchors and not fence posts or the eave of a house. DO it right the first time because, YOU might have to climb it someday.

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## **NEW KIT! EFHW Antenna Experimenter Boards** Designed by **Bryan Nehl KØEMT**



<http://www.4sgrp.com/EFHW.php>

# You Had Me at DX: My Introduction to WWFF

By David Corbin, WØDCX

Shortly after I visited Onondaga Cave State Park for a POTA (Parks on the Air) activation two months ago, I received a nice follow-up email from one of my contacts. W6LEN, Jess, out in Huntington Beach, California wrote to bring to my attention "the other park" activity called WWFF (World Wide Flora and Fauna). I had heard of this WWFF thing before. When I became a ham four years ago, CQ WWFF was one of the first appended CQs that I heard on the air. It took me a while to comprehend what WWFF meant, and by the time I had figured it out CQ WWFF was already becoming a rarity in my receiver. I began to hear more CQ POTA instead. POTA is much more common now and being a U.S.-based and administered program, POTA is the program I started paying attention to as my interest in park hunting grew.

When I finally became a POTA activator, I naturally found myself uploading my logs to POTA. In his email, Jess reminded me that WWFF was the original parks on the air program, having been organized in and still being administered from Europe with many member nations world-wide, each with their own national coordinators. Since many of the parks I was now activating via POTA are also registered with WWFF, Jess suggested that I consider uploading my park activation logs to WWFF as well as to POTA as a courtesy to hams participating in the WWFF program. He also reminded me that WWFF has always been an international program with a truly worldwide presence with park references worldwide, and that many non-U.S. hams pay very close attention to WWFF operations. This was getting more interesting by the minute!

Consequently, I registered with WWFF and sent in all my existing POTA activation logs to the United States (KFF) "O" call area manager, KH7FC. Shortly, most of my logs had been uploaded to WWFF. A few logs were rejected because either the park is not a registered WWFF park, or else it is currently registered but was not a WWFF park at the time I activated it. Well, this all got me thinking; not only should I upload my park logs to both POTA and WWFF, maybe I should call CQ POTA WWFF when I am out activating a park. And maybe I should self-spot on both the POTA and WWFF websites when I am activating a park that is registered with both organizations. So, on February 15, I went out to Weldon Spring Conservation Area (POTA K-6492, WWFF KFF-5782) and did just that. I had activated Weldon Spring before when it was registered only with POTA, but since then WWFF had also picked it up. It turned out to be a productive afternoon. I self-spotted with POTA and WWFF and called out CQ POTA WWFF. Withing a two-hour period I made 64 QSOs including 2 from France and a slew of U.S. stations that I had not yet heard from during my previous POTA activations.

The two programs are very similar; both track activating and hunting data and both offer various status awards for achieving certain metrics. There are a few differences between POTA and WWFF. The biggest one is that while 10 QSOs per park visit are required to qualify a park as activated with POTA, 44 QSOs are needed to qualify a park as activated with WWFF. However, those 44 qualifying QSOs are cumulative and may be attained during several visits to the same park. Also, WWFF hams will sign off with 44 instead of or in addition to 73. The number 44 seems to have a particular significance in WWFF numerology. There are 4 cardinal directions to the compass (N, S, E, W) and 4 classical natural elements (Earth, Air, Water, Fire). Thus, the number 44. WWFF has added another fun and satisfying dimension to my park operating activity and I am very excited about the enhanced DX potential. I highly

recommend WWFF and POTA to others who enjoy getting out into various natural environments while operating their radios.

Please keep in mind, though POTA and WWFF are like each other in the spirit and purpose of encouraging outdoor ham activities and bringing attention to places of natural, cultural, and historical interest, they are each unique and operate completely independently of each other. They are administered separately, and each one has its own set of rules and customs which should be understood, respected and carefully adhered to.

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## A Toroid Tutorial

### Winding the Inductor

Over the years there has been no shortage of groans and moans over the winding of inductors on toroidal forms. Kit producers sometimes state how few toroids there are to be wound, and at least one ham offers to wind your toroidal coils for a fee. In recent months there seem to be fewer complaints over winding toroidal inductors. Perhaps this bespeaks frustrated QRPers who have thrown in the homebrewing towel (please say it ain't so!), or maybe they've discovered a talisman about toroid winding which, like stealth antennas, they feel must be tightly safeguarded.

I'd like to break ranks, eschew stealthy practices, and open the kimono on my preferred technique for winding toroids.

The problem I faced was keeping each and every turn wound under tension while continuing to wind more turns. It just seemed that the coil forms were too small, my fingers too big and my two hands too few. Luckily, I believe I've found a solution.

During its construction, holding the already wound turns of a toroidal winding rigorously in place while new turns are being added is achieved here by using a two-inch or greater length of tapered wood to plug the core. I favor sawed-off bamboo chopsticks, if only because waiters at Chinese restaurants are amused when I pocket my eating instruments after the meal. Those I acquired are about nine inches long and  $7/32$ " in diameter, with a tapered section (the part that goes in your mouth) that reduces to  $1/16$ " diameter over  $1\frac{1}{2}$ ". Larger diameter chopsticks (with slightly rectangular handles), going for as little as one dollar for 20 sticks, are available at some supermarkets and all oriental food stores. The latter may also stock a king-size chopstick (I imagine this is what the cook uses to dip into the kitchen pot for tasting), costing one dollar for a pair; these measure 18 inches long with a maximal diameter of  $3/8$  inches that tapers over about five inches to a minimal diameter of about  $1/8$  inch.

When the conically shaped portion of the chopstick stub is jammed into the toroid, it holds all the turns securely with fingers totally absent. Additionally, the upstream end of the chopstick stub provides a very useful handle with which to hold, maneuver or put aside the entire assembly, thus freeing one or both hands for other tasks.



It is much more efficient to start winding at the middle of the chosen length of wire. Pair up the two ends of the cut wire to establish the midpoint.

Before each new turn is made, the toroid is held firmly, with thumb and forefinger positioned over the most recently wound portion of the inductor. The chopstick is removed, the wire is passed through the core, pulled tight, and then the chopstick is quickly reinserted. The chopstick remains there until the wire has been wound tightly around the three outer surfaces of the core and is ready to once again pass through the core. Immediately after its removal, and the passing through and pulling tight of the wire, the chopstick is again jammed into the hole to tightly pin the latest and all previous turns. Note that the chopstick always points in the same forward direction as the leading end of the wire.

## **Securing the Turns and Mounting the Inductor**

When the winding is complete, the turns are held firmly in place at the core's inner circumference with the chopstick. Then I secure the other three surfaces—top, bottom and outer periphery -by bandaging them with high quality masking tape (I only use the blue masking tape used by painters and manufactured by 3M). With the inductor's turns thus doubly secured, I then remove the chopstick.

For any inductor, distributed capacitance needs to be held to a minimum. Indeed, capacitance may be viewed as negative inductance, and this is obvious from the fact that the formula for capacitive reactance is a reciprocal whereas that for inductive reactance is not. Putting a dielectric other than air between the turns of any inductor will only increase the distributed capacitance and reduce the Q (quality) of the inductor.

If the toroid has been well wound only a very small amount of doping material need be applied to permanently hold all the turns in place. The doping material must be applied in minimal quantity and at the right location. Using Q-Dope (polystyrene dissolved in acetone and heretofore manufactured by the General Cement Company), or, lacking this, a high quality colorless nail polish, is applied with a toothpick, I paint ONLY the inner circumference of the inductor, for this is where the inter-turn spacing is minimal and consequently where the air dielectric will be least compromised by a thin layer of goo. Such a sparingly applied coating is enough to keep the wound turns in place.

After the Q-Dope or nail polish has dried, the masking tape bandages may be removed. The start and finish leads may then be anchored to the outside of the form with a tiny dab of the same stuff.

I digress. Just about all the kits I've seen put the two pads to connect to the start and finish leads of a toroidal inductor directly adjacent to one another. Doing this implies that the inductor should be wound over just about 360 degrees. NO! I'm not about to bring up stuff that was written seven or more decades ago, yet now is pretty much forgotten. Stopping short, I'll just say that with inductors, be they solenoidal or toroidal, really bad things happen to the inductor's Q when its head gets close to its tail. (With a solenoid, this happens when there are multiple layers of windings going back and forth on the cylindrical form). Readers are probably familiar with the admonition that toroids be wound over no more than 330 degrees. Observing this caution, while it does provide a convenient wire-free portion of the toroidal core to plop on the circuit board, is really important because it helps keep the dark side of inductive reactance at bay.

Stripping the enamel insulation from the wire can be accomplished by laying the wire on a flat surface and scraping it with an X-Acto knife. However, there is some danger of nicking the wire with the knife if it is pressed too hard and/or held at the wrong angle. Therefore, I prefer using sandpaper of varying grits, cut into rectangles no larger than  $1\frac{1}{2} \times \frac{3}{4}$  inches. Each of these is folded in half to form a square and dragged a few times on the portion of wire to be stripped. In order to completely remove the insulation, the toroid needs to be turned between drags so that all of the wire meets the sandpaper. The finer grit squares are used for finer gauge wires, for too coarse a grit will grab the wire and break it, whereas too fine a grit will require multiple passes to do the job.

Tin the bare portion of the inductor's leads.

Reinsert the chopstick to serve as a handle, and with a toothpick pry individual wire turns so that they are equidistantly spaced from each other. In order to obtain this equidistant spacing on all three exterior surfaces of the toroidal core, remove the chopstick and hold the inductor in one hand with the thumbnail positioned next to a turn on one surface to hold it while, with the other hand, use the toothpick, or the other thumbnail, to pry that same turn on an adjacent surface. Besides the toothpick, another useful implement is a wooden cuticle stick sold in the cosmetic section of drugstores, and the upstream end may be filed to a smaller chisel tip. Metal implements, which could pierce the insulation are to be strictly avoided. Arranging the turns' spacing in this manner does improve the inductor's appearance, but more importantly it minimizes the inter-turn capacitance. While tweaking individual turns, try to not to extend the overall winding to the point where it would cover more than 330 degrees of the core's body.

To reduce capacitive coupling to a circuit board's ground plane, toroidal and solenoidal inductors should not be mounted flush against the board. Try to get them  $\frac{1}{16}$  inch, or a bit more for larger inductors, above the circuit board. Most likely, the wire leads will not provide enough support to achieve this elevation. When this is so, fashion a mounting pad with the smallest possible footprint to do the job. I favor tiny pieces cut from a wine bottle cork with an X-acto knife, and these are secured to the board and to the coil with thin coatings of glue (I use Goop). Cork has rigidity, provides a measure of shock absorption, and doesn't seem to add much capacitance. Dense styrofoam might work just as well. Having toroidal inductors that flop around is not at all desirable, especially in a rig destined to bounce around inside a backpack.

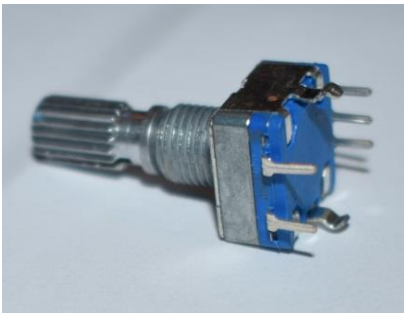
Some of the foregoing techniques may not be applicable to a particular kit. Nevertheless, I've included them with the thought that they would be useful for purely homebrew undertakings.

Properly done, hand winding of toroidal inductors can, and should be, quickly accomplished and a joyful experience.

Charles Moizeau, W2SH

# Ruggedized EC11 Rotary Encoder

Repeating a little history from the last issue, I was first licensed as KN5JJZ in 1957 and got on 40 meters with a home brew period vintage QRP rig. At some point, I built my first device requiring a rotary encoder. Since then, I have used the rotary encoder in a number of projects. For most of these, the rotary encoder of choice was, and continues to be, the EC11.

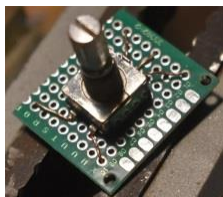


Physical examination of the EC11 does not leave one with an impression of rugged construction. The contacts are quite fragile and are clearly made for use with a printed circuit board. They are weak and not able to support heavy components or sustain consistent vibration. What is not visible are the manufacturer's specifications. The Mouser Electronics' EC11 Datasheet (<https://www.mouser.com/datasheet/2/15/EC11-1370808.pdf>) specifies a contact soldering tip temperature of 350 degrees maximum for 3 seconds maximum **for one time**.

The EC11 is not designed for the soldering and re-soldering that occurs when building and/or developing equipment. I discovered this when trying to use one EC11 on multiple projects. The actual physical punishment on the contacts while attaching wires, components, cable ties, etc. can cause contact failure. I have actually broken contacts off while moving wires to reach other components.

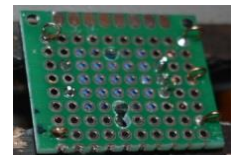
What is needed is an economical way to isolate the EC11 from contact damage, physical and thermal. Looking at the physical layout of the contacts, it is evident they follow the standard perf-board spacing. The mounting lugs are too big for the perf-board and have to be drilled out.

Start with a standard 3x7 centimeter (10x24 holes) perf-board and refer to the figure to the right. Mark cut lines across the perf-board 8 holes from each end (gold lines) and drill four mounting lug holes using a 1/16 inch drill (red dots). Cut along the cut lines



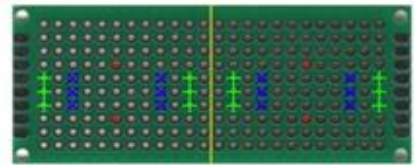
providing two isolation pads. Insert the EC11 pins into the isolation pad (blue "X"). The 1/16 inch mounting lug holes may have to be opened up a bit, but no trouble. Run wire from each EC11 pin to the corner holes (green + signs) and solder to the EC11. Flip the pad over and form solder lugs from the five protruding wires. Solder the base of each of the five wires. Mount the EC11 as normal but use the five new

solder points to bear the weight and heat of circuit connections. This EC11 is in a permanent completed circuit and the isolation pad is shown in use. The EC11

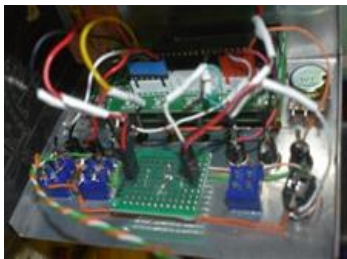
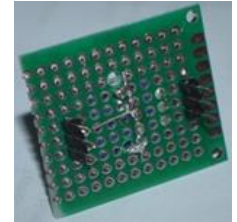


mounting lugs were not used in this installation which was a complete oversight. All future isolation pads will have the mounting lugs firmly soldered to the isolation pads to take the physical abuse off the five contact points.

The home-brew solder lugs worked ok for permanent installation, but does not solve the problem of development. Again, start with a standard 3x7 centimeter (10x24 holes) perf-board and refer to the figure to the right. Mark a cut line that will cut the perf-board in half (gold line) and drill four mounting lug holes using a 1/16 inch drill (red dots). Cut along the cut line providing two isolation pads.



Insert the EC11 pins into the isolation pad (blue "X"). The 1/16 inch mounting lug holes may have to be opened up a bit, but no trouble. Solder 3 pin headers (green + signs) to the board, but be careful to place the header pins facing opposite to the EC11. Solder a wire from each EC11 contact to the closest header pin. Solder a heavier wire across the mounting lugs flowing a little solder to an adjacent board solder point. Run a wire perpendicular to this wire to the empty center header pin. Mount the EC11 as normal but use three pin cables to make circuit connections. This EC11 shows the isolation pad in use. It is in a circuit being developed and is disassembled numerous times for circuit modifications. The EC11 is thermally protected from soldering and physically protected with the torque and pressure taken up with the mounting lugs.



In addition, a single EC11 can be used in a number of circuits by simply unplugging and plugging into the next device.

**N5SE**

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USA**



# OzarkCon 2022



AG1P The M.C.



## BUILD-A-THON





## Presenters





The T41 SMT Transceiver (Possible Future Kit)

QLF Contest





## Homebrew Contest

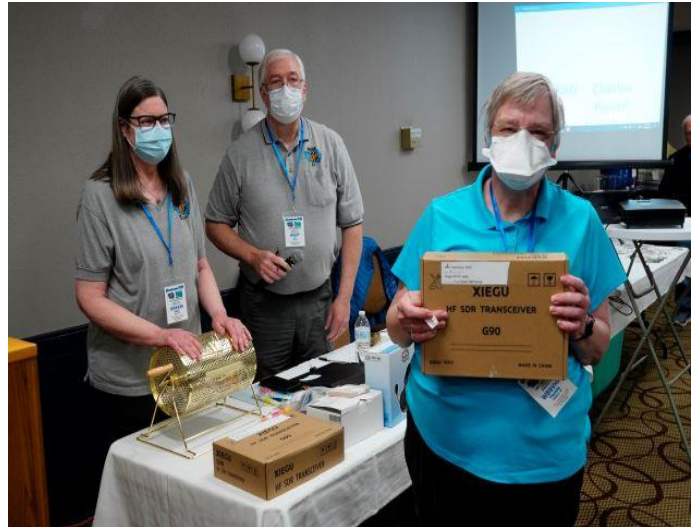


**KØN Special Event Station**





## Additional Pictures from KK5IB







# Station Interference

de KCØPP

Several months ago, Larry, NØSA had some electrical interference at his QTH. Larry traced it down to a power pole and the power company promptly responded and repaired it. I had a similar experience a couple of months ago and traced it down to an area around a transformer and up to a house that had solar panels. I used a good portable receiver on the MW band and orientated it using the loop antenna as a direction finder. After meeting with the Ameren's (Electrical Utility) field person, he said he would bring in another person to help. A week or so later, the noise was gone. I never did find out what they had found. By the way, I don't think it was the solar system, because the interference was still present after dark.

While attempting to operate the 160 meter contest a few weeks ago, I had horrible electrical noise on the band. I was able to contact a few stations including MN, FL, OH, IL, ND and a few more. However, it was difficult to receive them and could not hear the weaker stations. I also was force feeding my 80 meter end fed half wave antenna through a tuner, so my signal output was surely limited.

So back to the noise issue. The next day I took a portable receiver that covered 160 meters and walked around the house. The noise was always strongest near the southwest corner of the house particularly the radio room. But I could hear the noise in other areas on the south end of the house near a receptacle, switch or tracing the wiring in the walls. It was less noticeable and non-existent in the north area as well as at the electrical panel on the north wall of the basement. Another noticeable area was outside the house again mainly in the southwest corner. It was very interesting that all along the cable TV coax throughout the basement all the way to where it enters the house on the north side.

With that I grounded the coax at the entrance of the house and at the far end where it goes up into the radio room. This helped a little along the coax but did not affect the noise on 160.

So now try to find the source. My first thought that it was from a wall wart. Most of the wall warts today are not transformer type but have switching power supplies that are usually noisy. (If you have or find one with a transformer, hold on to it they are getting harder to find.) Well unplugging the wall warts in the shack did not cure the problem. So next I started to unplug power from various equipment. I found some change but the noise was still there. I even unplugged the PC tower thinking the power supply in there was the issue. Finally, I disconnected and turned off my UPS. BINGO the noise was reduced considerably.

So I rewired all of my shack power and eliminated the UPS. Success, the band was now much quieter. This has also helped on the AM broadcast band and 80 meters.



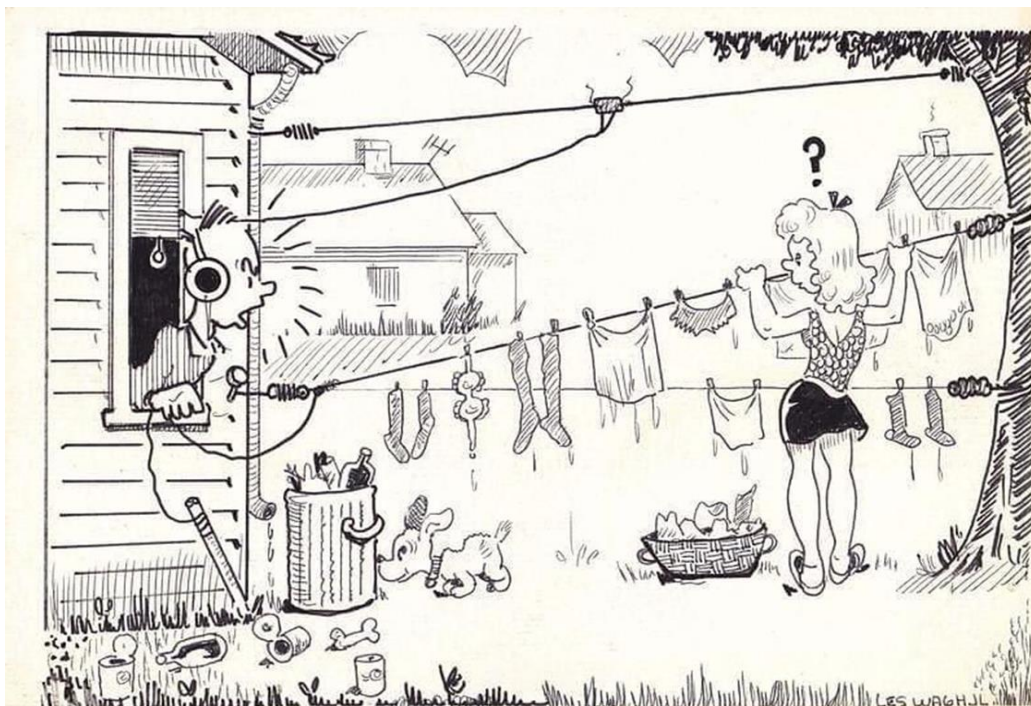


The UPS is a well-known brand, APC 1000 model that I would have never expected it to be producing noise. They are designed to clean the power and protect from power surges as well as provide backup. I also have an APC 1500 and after some testing found that it also produces a lot of noise.

If you are trying to track down noise, a quality multi-band portable receiver is a handy tool to assist you.



*Hey!*



*Huh?*

## Four State QRP Comfortable Nets

Meet each Wednesday night beginning at 20:00 Central Time. Add anything to the exchange that you wish, temp, rig, ant, etc.

Checking into all sessions is encouraged. We call it the "Clean Sweep".

8:00 pm Central time - 40 Meter Net on 7.122 +/- QRM ACØBQ/NCS

8:30 PM Central time - 80 Meter Net on 3.564 +- QRM ACØBQ/NCS

9:00 pm Central time - DMR Net on Talk Group 31654 NØYJ/NCS

NO dIGITAL Net at this time.

All are welcome!

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## DMR Voice Net

Wednesday evening DMR Voice Net will be at (Thursday) 0300 UTC (9:00PM Central Time Wednesday/) Four States QRP has a Brandmeister DMR Talk Group (TG31654). Join us to discuss QRP, ask questions, or just ragchew.

The Wednesday net is a directed net but any other time you may use the Talk Group to chat with other QRPers. Net Control operator is Bert NØYJ.

For information and help, check out the DMR subgroup on 4sqrp.groups.io

<https://4sqrp.groups.io/g/DigitalFM>

## Second Sunday Sprint

Occurs on the second Sunday of each month, 7 to 9 PM Central

Any mode, any band (except WARC & 60 mtrs) -

- Suggested frequencies: standard calling freq. plus 7122 and 3564 (CW), and 3985, 7285, and 14285 (SSB).
- as well as the usual QRP watering holes.

QSO's with the same station on different bands are allowed. CW and SSB portions of a band count as two bands.

- Calling CQ is suggested to be "CQ 4S"
- Exchange is "RST, SPC, member number (power if non-member)"
- 5 Watts max CW, 10 Watts PEP max SSB.

The station with the most contacts each month will be emailed a certificate. Furthermore, the top three stations with the most SSS contacts during the year will also receive certificates via email.

Scores are submitted via the [grpcontest.com/4sgrp](http://grpcontest.com/4sgrp) website (compliments of W8DIZ).

For full details, please download the [complete rules \(PDF\) here](#).

For questions, please contact John (AAØVE): [SecondSundaySprint@4sgrp.com](mailto:SecondSundaySprint@4sgrp.com)

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## Thursday Morning

The Four State morning net has been convened for members who like to start the day on the air.

We meet each Thursday morning at 8:00 AM Central on 7122 kc. 7122 has become the Four State 40M hangout frequency, and often members can be found there on any morning.

## Editor's Note:

Articles are needed to make every Banner issue successful. If you have something of interest, please send it to the editor at the email address below. You do not need to send a finished article. You can send some comments, notes, etc. and I can put it all together for you. Pictures are always of interest. Some of the items of interest would be outings and /or operating events by yourself or a group, construction whether equipment, antennas, accessories, QRP Field Day, SOTA, etc. Anything QRP is welcome.

de KCØPP

[editorgrpbanner@gmail.com](mailto:editorgrpbanner@gmail.com)

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