

# Ozark QRP Banner



## The Official Newsletter of the Four State QRP Group

WQ5RP

August 2022 Edition

**In This Edition:** BNC 90, Loop on the Ground Receiving Antenna, KX2/KX3 Paddles, Stainless Steel Paddles, Morse Code USB/HID Interface, SMD/SMT & ME, QRP AM Broadcast Interference High Pass Filter, Field Day Reports, UPS Interference, End Fed Wire Antenna Notes.

QRP operation is something that we all consider on HF. But there may be more to it. KØPFX passed on this youtube video. WQØP is working KM5PO, 442 miles with 1 Watt using rain scatter on 10ghz. <https://www.youtube.com/watch?v=uBHhppoJH9w> This is amazing.

### Free Book: Managing Interstation Interference

Whenever two or more transceivers are used in close proximity there is some level of interference involved. This level can vary from practically no problem to actually burning up components in the receiving radio. The purpose of this book is to identify and quantify the various parameters that create the interference and to show methods that will reduce or eliminate it.

It is my pleasure to promote this man's book. W2VJN is the former owner of INRAD. AF3I. [https://www.vibroplex.com/techdocs/INRAD/MII\\_W2VJN.pdf](https://www.vibroplex.com/techdocs/INRAD/MII_W2VJN.pdf)

### FIELD DAY

#### A Mirror of Amateur Radio History

Steeped in tradition and mystery, today's Field Day evolved from humble beginnings in the Golden Age of Radio. Anything but stable, Field Day rules and practices have changed radically since the 1930s. Here is a short history of our favorite event.

<https://hams.soe.ucsc.edu/sites/default/files/History%20of%20Field%20Day.pdf>

[Thank you to those who contributed to this edition.](#)

# For Want of a Nail—or, why to never trust a BNC 90

*Jeff Logullo, NØMII*

A few weeks ago I dashed to Castlewood for a quick POTA activation. I wanted to try an old antenna (Hamstick mag-mounted on the Explorer roof). I'd done some antenna analyzer measurements in the driveway, and things seemed to be okay. Off to the park!



Gib KEOPRK met me there just as I was getting started; I already had two contacts in the log. Suddenly... nothing. What had been a mini-pileup was now gone. I started calling CQ again. And there! A few more guys in the log. And again: silence. Called CQ some more.

"Hey—look at your SWR!" Gib remarked. Sure enough, the SWR was sky-high. Something was amiss with my antenna setup... and with only seven contacts, not enough for a full POTA activation. Aggravated, I packed up and headed home, but not after thanking Gib for spotting

the SWR.

Turns out the antenna was fine. I traced the intermittent problem to... a 90° BNC adapter! Seems like it's just a passive component, but there must be more going on than appearances would let on.

A few nights ago I finally got a Round Tuit, and broke out the Dremel with a cutoff wheel to examine the culprit. The photos tell the tale: the center contact of each end of the adapter connects to what looks like a piece of brass rod. And those two rods have no trustworthy electrical connection—merely mechanical. After cutting the bugger open, I just tapped on one of the pieces and it fell right out of the adapter.

I have several of these critters. Ironically I bought the first one from Elecraft when I ordered my KX3. It seemed like a good idea to angle the stress of the radio's BNC connector to the rear. Well... that's not such a good deal if you're going to be accidentally "disconnecting" your antenna entirely, eh?



And there's no way to tell what's inside, short of destruction. I no longer know which of the remaining adapters came from Elecraft, even if that's any assurance of the quality inside. I'm sure I got some from a hamfest, from Gateway... who knows? Regardless, I plan to just throw them all away.

A better substitute may be a short (six inch or so) jumper of RG-174 with a male and female BNC at either end. Or female BNC at the rig end, with an inline SO-239 at the other. We'll see.

But no more BNC 90s. I am **so** done with those!

# KK5JY Loop on Ground Receiving Antenna

de NFØR/QRPP

The original article is at: <http://www.kk5jy.net/LoG/>

I believe this dedicated receiving antenna is more effective on CW compared to SSB. However, either mode certainly benefits. I have not tried the LoG on any digital mode.

Here's an example from WXØV for an 80M signal on <https://www.youtube.com/watch?v=wMb8i5QajW0> starting at 9:52. This is a fair representation of what is possible taking into consideration an improved signal-to-noise ratio while not overlooking signal attenuation.

I have used the LoG successfully on 30M, 40M and 80M. I did not operate on 160M this winter but the antenna is useful on Top Band too.

Depending on conditions the LoG can reduce atmospherics and man-made noise. Happily, this improves reception of otherwise marginal signals and occasionally unusable ones.

I admit to engaging the LoG occasionally when it's not needed. There is something to be said for listening to smoother and thus less fatiguing audio.

Depending on signal strength - pre amp, RIT or passband adjustments may be required when switching over to the LoG. Wearing headphones tends to reduce the need for these adjustments.

Just a reminder this is a low-cost, low-profile receiving antenna that can be installed invisibly if necessary to comply with HOA requirements. And, it's actually an easy project.

I had never wound a binocular core before. Here is a helpful video by "ianxfs" (no name or callsign). See: <https://www.youtube.com/watch?v=I0m4uronvh8> The how-to starts at 7:59

Trial & error showed that twelve inches of #26 copper magnet wire was the right diameter and length for creating the six-turn antenna winding. Five inches of wire works for the two-turn feedline winding. I used #26 green enameled copper wire-wrap for the latter.

After several trials it was obvious that I needed some way to maintain consistent tension on the magnet wire while adding turns. My solution was to clamp the core vertically in the padded jaws of a Panavise. I started by inserting the wire upwards in my left hand and fed the wire into and around the core with my right. I checked each turn visually under magnification to confirm it was properly positioned inside the core.

I used 50 ohm coax for my project instead of the specified 75 ohm coax. To match the impedance, add one turn on the antenna side for a total of six turns. A detailed explanation in MONTV's video starts at 9:04 in <https://www.youtube.com/watch?v=uQUIPHwStcY>

I waited until both windings were done then scraped off the enamel and tinned the leads. If I did not have two colors of magnet wire a bit of nail polish or tape could identify one end of the core.

The plastic enclosure from my junk box is a Hammond 1551RTBU. It measures 2.0" x 2.0" x 0.8 and is similar to in size to KK5JY's choice.



I struggled with soldering four connections in the available space. I expect to repeat this project to optimize it for portable use. But the project box and/or #73 mix binocular core may be larger to simplify the build.

Any stranded or solid insulated wire radiator will work. I used #26 magnet wire installed right over the grass. Three steel hoops bent from utility warning flag supports plus the transformer served as the tie points. The 60' square loop is 15' on each side. Any similar shape seems to work just fine.

My temporary radiator disappeared after our yard service made the first cut of the growing season using a large commercial lawn mower. If I had installed the radiator a month earlier or used additional steel hoops to lower the antenna profile this would not have happened.

The LoG's performance has encouraged me to invest in 25' of RG-316 to replace a twenty-year old RG-174 feedline here at home.

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## Paddles for the KX2/KX3 Owner by QRP Builder

No need to take your expensive paddle out into the field, or if you want to try an attached paddle to your KX3/KX2, here is an inexpensive practical alternative. You construct it from the individually routed PCB pieces, and after soldering, forms a strong mechanical assembly. All the electrical circuitry is embedded into the pieces and forms the needed connections upon assembly and fits onto the standard Elecraft KX3/KX2 mounting holes and internal connector pins, with no adapters or separate wires.



To the right is the Iambic paddle. Below is the single lever paddle and the paddle attached to a stand-alone base.



<https://qrpbuilder.com/>



Adapter shown with optional KX  
Single Lever Paddle attached

# Stainless Steel CW Morse Paddle With Magnetic Base

## Features:

- With a 3.5mm socket
- Made of stainless steel, the small morse keyer boasts long lifespan
- With three neodymium magnets on its base, it can be easily adsorbed on to iron objects such as radio shell and automobile cover, so as to facilitate outdoor platform erection
- The key paddles with magnetic return force
- Adjustable gap between two paddles
- With a left-hand and right-hand switch, which can be switched freely from left to right and from right to left

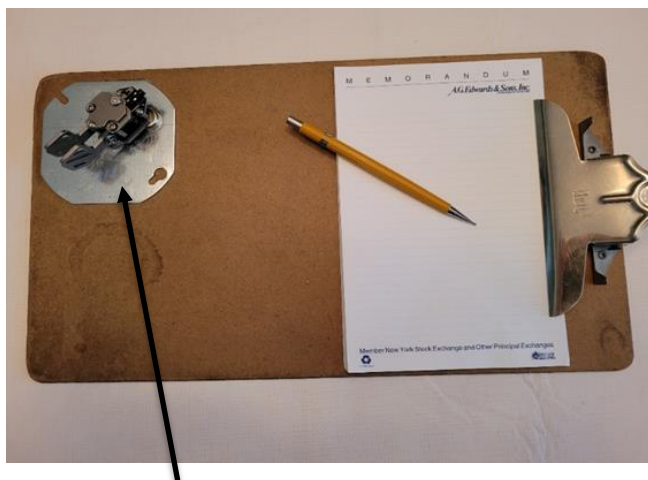


Polarity Switch



Magnets

Available on eBay; search Stainless Steel CW Key. Sold by many vendors



Metal Plate glued to clipboard

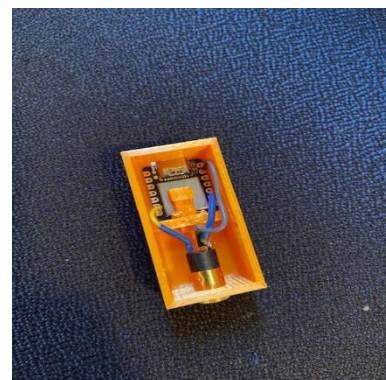
Shown as used at the St. Louis QRP Society, Field Day by KCØPP

# Morse Code USB/HID Interface (The Gadget)

The Gadget is an adapter that allows you to connect up a Morse Code (CW) Key or Paddle as a keyboard to any device with a USB port

## DESCRIPTION

Morse code or Continuous Wave (CW) is an amazing technology. In 1991 in an effort to revive flagging interest in HAM radio the FCC removed the requirement to know how to send and receive Morse code. Everyone predicted Morse would quickly become extinct. A funny thing happened; Morse code usage exploded. There are now more people in the world who use Morse code, then at any time in the past, ever! My project is a device that lets you connect up a CW key or paddle to a computer/tablet/iPhone/Android. It basically turns your single or double key tapping into a full USB keyboard. Why? There are plenty of apps and software that help you learn how to receive or understand Morse, there are very few that allow help you learn how to use a key or paddle or simply practice and get better. I have also created software that gamifies using a CW Key or paddle to help people learn. I needed the gadget to interface the key with the game.



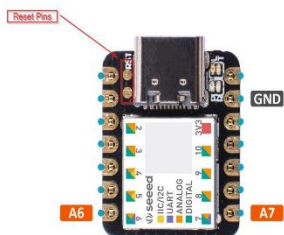
## DETAILS

**Some people might consider Morse Code a dead language, certainly ancient history, not the stuff of Sci-Fi or the future...**

These people need to get out more...

Morse Code is amazing- with it and a handful of inexpensive parts and a battery you can build a radio and communicate around the world.

My project consists of a Seeduino, (a very small Arduino) a 3d printed case, a micro jack some wire, a USB-c/USB cable and software that will let you connect up either a simple key (1 contact) or a paddle (2 contacts) to any device that supports a USB keyboard.



The gadget converts the users tapping to characters and then types them via the USB cable. You can then hook up to a computer, laptop, tablet, iPhone, or Android and use a CW Key/Paddle to type.

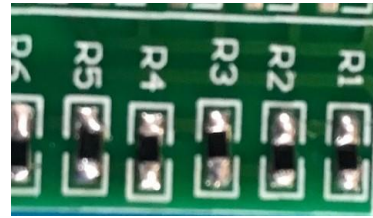
That in itself opens up amazing possibilities, Texting with CW key... word processing with one button...

The reason I wanted to be able to do this is I am creating video games to help people learn Morse code. Many many apps and programs will play Morse code for you to learn. Very very few let you play it back. The gadget also allows you to use gamification to improve your Morse Sending, by analyzing your speed and rhythm and helping you improve.

I will be releasing the plans, .stl files and code for the gadget so that anyone who wants to, can easily build one. <https://hackaday.io/project/184702-morse-code-usbhid-interface-the-gadget>



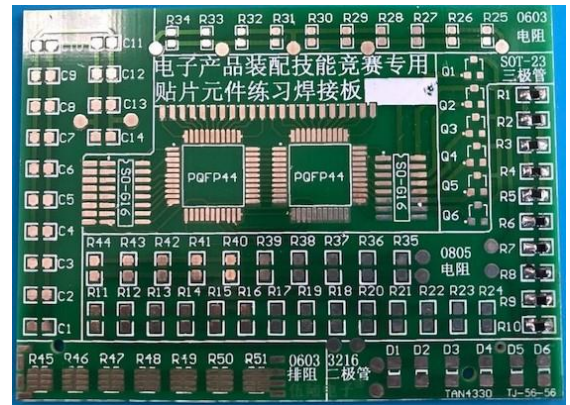
# SMD / SMT & ME



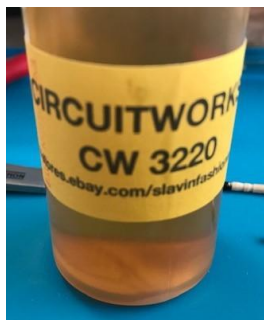
A while back I thought that I should take a look at SMT since that seems to be the way circuit board construction is heading. I was pleasantly surprised at how easy it actually is, providing you take a few baby steps first. Here I will describe my journey.

Of course there's a plethora of videos and instructions on how to handle this tiny job and I would encourage you to take part in watching and reading what you can find. One of the better videos for me was found at Kits and Parts ([SMD/SMT Audio Amp Training Kit \(kitsandparts.com\)](http://kitsandparts.com)) Where Bruce Hall, W8BH did a good job of the nitty gritty of the task. There are other links there also that you will find useful. The board shown on the K&P page is still available but only as a test board that you can use if you have some SMD parts available to you. I purchased a PCB and will use reclaimed parts from old equipment for practice on it.

I also purchased a Practice Kit with some parts from Amazon for around \$8.00 and that is shown here, just search for SMD Practice Kit. The kit doesn't do anything so you can't really mess much up, however, the resistors can be measured after mounting so you are able to check to see how good you did. Other components can also be measured to make sure you didn't destroy them with heat. The objective is to try and perhaps fail and learn at no additional costs.



I use a head mounted lighted magnifier acquired from Marlin P. Jones that was around \$10 on sale, a temperature controlled soldering station from MPJ and a silicone mat to work on that helps keep the PCB from moving around the table as it is best to keep the project flat. I try to always clean the PCB with 91% alcohol prior to assembly and also to clean up the leftover flux after soldering. Actually any % of alcohol works equally well but 91% dries quicker because it has less water in it.



The liquid flux I use came from Ebay, shipped free with what will be a lifetime supply. It was recommended in a video I watched and it works well even for part removal, which I also suggest you look up on YouTube or Duck-Duck-Go (Google) search because once you get started in SMD/SMT you will develop the skills to repair SMD/SMT boards.



The next item you need is a quality pair of tweezers like is shown at the right. I purchased mine from Hobby Lobby and can be found in the bead department, not easily seen is the rubber like coating on the tips that helps keep the little critters from popping out and getting lost. The tip angle really helps with placing the small parts where they need to go. I still needed some additional assistance holding things in place while soldering. So after some deep thought I got the point !



I often use a toothpick to apply small dabs of solder flux or clean between things so it was a natural item to look at. We have a larger toothpick (.080 diameter and 4" long) that's used for holding a sandwich wrap or used for hor d' oeuvres and the best part is that the top is flat. It is just about right to hold the component down BUT, the little critter would sometimes slide away because the contact area of the component and the toothpick were both smooth.

I keep finding uses for Liquid Tape (LT), so here we go again. Just a little dab of the Liquid Tape is all you need to coat the blunt end. After it dries the LT retains a pliable, almost sticky characteristic like silicone caulking and it is most effective at holding the part in place while you solder it. I applied the LT to the pointed end just in case I need something that small.



To solder the part, first apply a drop or two of the liquid flux on the pad, heat the pad and apply a dab of solder, place the part using the tweezers and before letting go, apply the enhanced toothpick to the top of the part, remove the tweezers and apply heat to the solder to fix side one I turn the board around and hit the second side to finish the soldering task.



So go ahead, study up on how to mount and reclaim SMD/SMT parts. It is not as difficult as I imagined. My only problem is being able to see the numbers on the parts even with the magnifier, once I get that issue taken care of the rest will be pure fun for this 79yo OM !

Make some smoke, 73,

John  
KK4ITX

kk4itx@arrl.net



# QRP AM Broadcast Interference High Pass Filter

## de KB9JJA



I suffer from AM Broadcast interference at my QTH. My larger HF rigs do a good job of filtering this out, but many of my QRP rigs do not.

I recently built a TrUDX as well as purchased a Xiegu X6100. Both have wide open front ends and suffer from overload from the AM broadcast signals on most bands.

I wanted something for a permanent installation at my home station, as well as a portable solution for remote operations. A little bit of Google Foo turn up an article by VK3IL on a filter he designed.

<https://vk3il.net/projects/broadcast-band-filter/>

As the portable filter will work at home as well as in the field I decided to tackle that one first.

I first needed to scale it down into the 10 or 15 watt range. I chose to design the filter around the T50-6 toroids as they will handle about 20-25 watts into a resonant antenna as well would fit into a 25mm or 1 inch case which is the perfect size for my needs.

A perfect size case was found on Amazon.

Bellow is the winding info for the T50-2 toroids. I also chose to use surface mount capacitors from DigiKey to save space.

T1, T3 - 20 Turns of #22 enameled wire on T50-6

T2, - 19 Turns of #22 enameled wire on T50-6

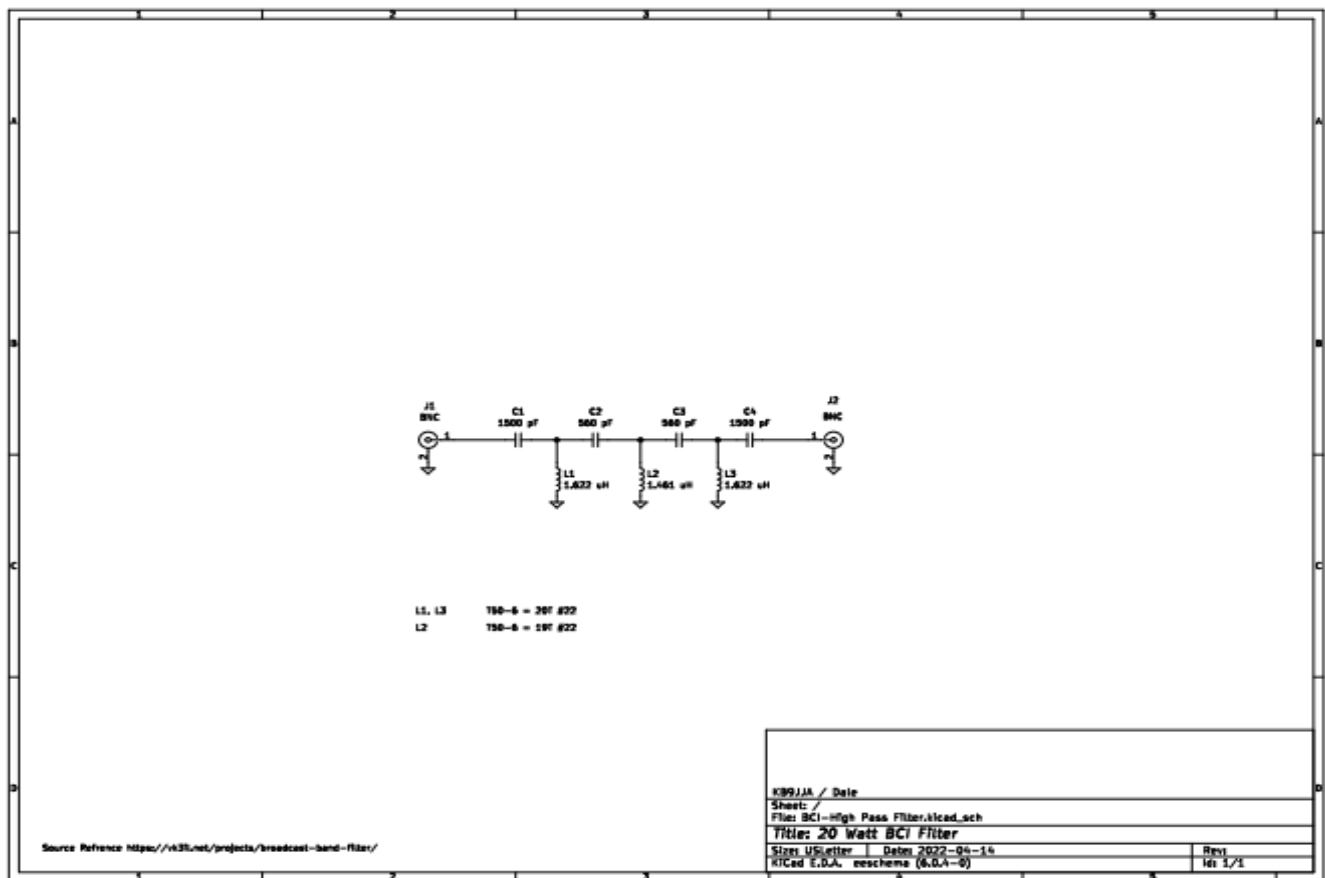
C1,C4 - 1500 pF 630V COG 1206 DigiKey# CGA5H4COG2J152J115AA

C2,C3 - 560 pF 630V COG 1206 DigiKey# C3216COG2J561K085AA

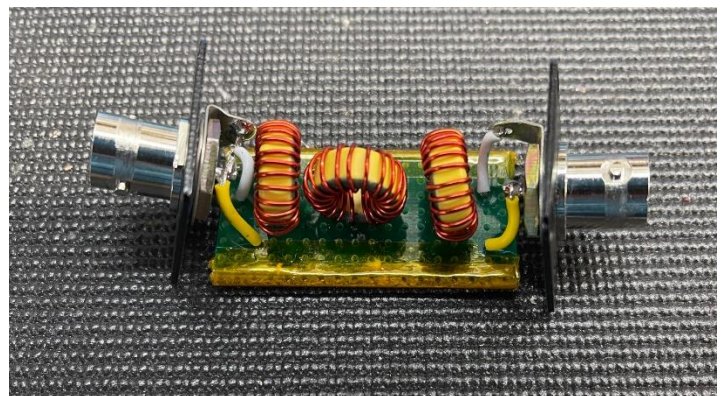
The filter works very well. It blocks everything bellow about 3Mhz, and has very little loss across the HF bands.

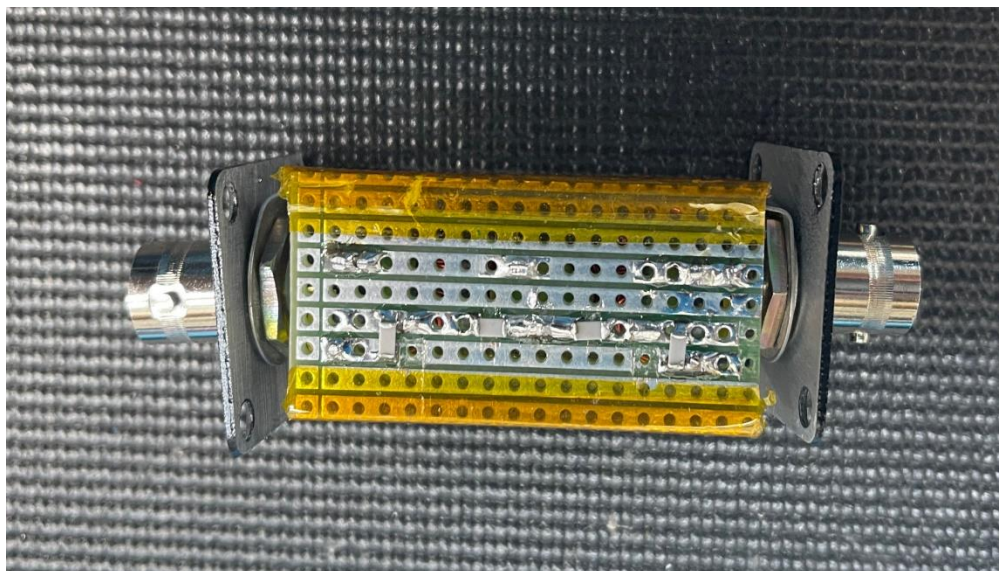
160 Meters is not usable with the filter as it will block it. But I do not operate 160 Meters QRP anyway. I will have to solve that one for my permanent QTH filter.

The filter also is usable on 6 Meters but it does introduce some loss once it gets to that band. If I am operating 6 meters QRP I can simply remove the filter.



The T50-6 Toroids are mounted at right angles to keep them from interacting with each other. As the case I chose was rather small, I had to use short mounting BNC connectors which I had on hand. These are not common and I would recommend a slightly longer case if you plan on using BNC connectors. The short wires are just long enough to allow the case ends with the BNC's solder in place to be moved out up to clear the case half when the board is slid into its mounting slot.





I used Stripe Board as it works well with the mix of through hole and surface mount components. The Kapton tape on the edge of the boards is there only to allow a snug fit of the board in to the case. The slots in the case are a bit thicker than the circuit board.

The case was purchased from Amazon, they are also available on Ebay. It is a 25x25x40 mm extruded aluminum case. It is nicely powder coated on every surface. I sanded the coating off the inside of both ends to allow the BNC connector to make good electrical contact. I also sanded the coating away from the ends of each case section so they could make a good ground connection to the ends. This ensures that the case is fully grounded and shielded. Originally I prototyped this build dead bug style with out a case. With out the shielding of the case I still got a bit of interference. I would highly recommend using a fully shielded metal box for this project.



The finished BCI Filter. It is actually usable into the 6 meter band but has a higher loss than on the HF bands.



The Spectrum Analyzer Sweeps are shown here:

[https://www.wentztech.com/radio/Projects/QRP\\_BCI\\_Filter/index.html](https://www.wentztech.com/radio/Projects/QRP_BCI_Filter/index.html)



# Field Day Reports

It was fun operating Field Day with Vibroplex Code Warrior paddles using the "magic" cable Lawrence, ADØBI, wired for me converting it, or any other set of paddles, into a dual paddle side swiper (a "Twotie" rather than a Cootie) key?

Lou,  
N8LA

WG5F was active in the 2022 ARRL Field Day from Northeast Oklahoma as Class 1E.

We began Saturday morning repairing two corners of the 256 foot horizontal loop we have at the "lake" property near Lake Hudson, Oklahoma. During recent storms, the Dacron support ropes on two adjacent corners had chafed enough to break apart. I shot fishing line over the trees with my slingshot, pulled up replacement Dacron cords, and then hoisted the loop back into its normal configuration (about 35 feet in the air). The loop is feed with 450 ohm ladder line and was previously routed into the 2nd bedroom of the mobile home, thru a LDG 4:1 balun and then a short piece of RG58 to the radio. The Loop is a super quiet antenna and really makes up for QRP power levels.

The operating position was different this year. Over the past two years, I've been slowly working on converting a 40 foot steel shipping container into an wired, insulated, air conditioned ham shack. While the conversion and build out is far from over, this was the first time that I've brought in a table, chairs, and antenna feedline so we could use the new shack. It took a longer stretch of RG58 to run outside from the loop's balun into to the radio. It was terrific operating from inside the new ham shack.

We used the Elecraft KX3 exclusively, at 5 watts, on battery power, on both CW and SSB. The Begali Adventure Key on the magnetic base was used for CW and a Heil BM-17 headset was used for SSB. We made 171 contacts with 19 of those being SSB. 5-Bands, 80-10 meters, with the majority of the work being done on 40 & 20 CW (hunt and pounce.) (No Missouri contacts this year!?) N3FJP software did the logging/dupe checking work for us.

Karen (W5KKM) made a few CW contacts and our 9 year old Granddaughter helped us with the antenna work and station set up. She was not quite ready to get on the air however. (She did ask for a Technician Study guide and a 4SQR SuperSimpleCodePracticeOscillator!)

We specified "4sqr" as our club in the Field Day submission to the ARRL, so hopefully our claimed score of 1,785 points will show up in the club totals.

72,  
-Ed, WG5F-

## Field Day 2022: Sweatn' Out A New St. Louis QRP Society Record Score

*Jeff Logullo, NØMII*

It was hot. My word, was it ever hot. Lots of memories of Field Day this year... but I know that as time passes, there will be only one thing I'll remember for certain: oppressive heat. Old Farmer's Almanac, you should have given us a little more warning! Despite the heat, we had great participation, several visitors, and have turned in a new club record score of 8,440 (7,490 + 950 bonus). Take a look at the last few years' data and you'll see we did well.



Year	Category	CW QSOs	SSB QSOs	Digital QSOs	QSOs	Points	Bonus	Score
2016	4AB	379	19	0	398			4935
2017	4AB	556	26	0	582	5690	1250	6940
2018		623	13	0	636	6295	1150	7445
2019	4AB	308	0	0	308	3080	1150	4230
2020	(COVID)							
2021	4AB	373	1	188	562	5615	1150	6765
2022	4AB	591	4	156	751	7490	950	8440

This was the second year we logged via computer, and I'm very happy with the results. This year we were careful to limit any given laptop to only one or two bands with no overlap. That meant that (unlike last year) we got accurate assistance with avoiding

dupes. Having all the laptops being the same model (those nifty sub-\$80 systems from Micro Center) helped too.

Our digital station put in another good showing. We tried to keep it somewhat "frequency-agile" and give the FT8 station a crack at the best bands throughout the session. Vern AE0TT and Gib KEØPRK ran things while the sun was up. Not sure if it was nightfall or approaching storms (or both) but the digital stuff was put away overnight. Perhaps next year we can look for a few more ops that enjoy digital pursuits to help with the late shift.

Did I mention storms? There was a stretch of a few hours where we kept having to wait out nearby lightning/thunder. And yes there was a good stretch of rain too. So keep that in mind as you view the scores.

When it wasn't raining or thundering, we were on the air. And I felt we kept rigs busy. The bands were a bit strange early on; as I recall, 15m was a "late bloomer" this year, and 10m was a no-show whenever I gave it a try on CW. Disappointing, that. Next year I suggest we try a system of signing up for blocks of time on the primary HF bands to avoid the late night lulls. We'll see!



Club members/operators this year were (in order of appearance in our op/visitor log): NØMII, KCØPP, KEØLD, WØDF, KB9LLD, WBØTUA, KKØU, WA9GQT, KØFHG, NFØR, and KEØPRK. We were visited by

AAØZ, KOØZ, ADØAJ, and Tony KB9LLD's family Lori, David, and Marshall. We also had a surprise guest: Dave Proper K2DP, our ARRL Midwest Division Vice-Director, dropped in for a visit. Several of us went home with his QSL card to commemorate the "eyeball QSO." It was nice of him to drop by! Some of our "regulars" were missed this year. John AAØVE allowed his son to schedule his *wedding* on Field Day weekend. Good grief! Larry NØSA used the lame excuse of quarantining from COVID prior to some surgery. Sean KK9U claims he had to be overseas - what next? Okay - just kidding here. You were missed and I hope you can keep next June on your calendar clear for FD!

Speaking of NØSA, Larry assembled a set of bandpass filters for three HF bands, and we gave them a run. I think they must have helped, and I thank Larry for this donation to the club for use in future years. (Maybe we can bring them to a multi-op POTA outing to give them a more thorough evaluation without the frantic nature of Field Day.)



One final note of thanks: I was clearing out a box of old FD papers and supplies when I found the stack of reservation slips from the City of Bridgeton for the shelters we've used for the past several years. Each one carries the name "Mel Whitten" KØPFX who has dutifully shown up at Bridgeton City Hall the first of the year to make a reservation for the club. Thank you sir for your stalwart efforts! We are truly grateful.



20m antenna



80m antenna



FT8 antenna & tent



## 2022 SLQS Field Day Summary de KCØPP

Saturday was **HOT!** 99° with a 109° Heat Index. Lots of water, fans and cooling towels. But we survived. Thunderstorms (Lightning all around) on Saturday night and rain Sunday morning.

**Rigs:** KX3's, K2's and IC-7300 @ 5 watts.

**Modes Used:** SSB, CW, FM, FT8 and other digital modes.

**Antennas:** 10-80M Trap Vertical for the HF FT8 Station, 6M Halo, 2M Disconne, 10M Vert EFHW, 15M Vert EFHW, 20M Lazy H, 40M Dipole, 80M Dipole.

All Stations on Battery and one station used Solar Charging.

Of course, we had a great dinner cooked by Head Chef, KØFHG. BBQ Pork Steaks cooked on-site, potato salad and Beans provided by AEØTT and XYL.



Never let a Pork Steak get away – NFØR



Fine looking Pork Steaks, oh & tube steaks



NØMII – 15m



KB9LLD – 6m & 2m



Hiding from the sun – KKØU, 20m



40m team – WBØTUA, WA9GQT



# Update on UPS Interference

In the May edition of the Banner, I discussed severe interference from my APC UPS. I had two of them a 1000 and a 1500. Both put excessive noise back on the AC circuit.

While digging around in my inventory (junk box), I discovered a brute force AC filter. I thought that maybe this would calm things down a bit. After installing the filter on the AC input to the UPS I tested for noise using a good AM/SW radio. I found the noise to be about the same. However, it was a bit lower the further away from the UPS that I got with the filter in-line.

Maybe the internal filtering of the two UPS' had gone bad or maybe they are just noisy. Here is the FCC labeling from the two UPS'.



Another APC UPS that I have, model PRO 650, tested clean, no noticeable noise at all. At the right is the FCC label from that unit.



So beware if you have noise on the lower frequencies. My noise was from the AM broadcast band to about 4Mhz. If you purchase a new UPS, test it right away. Even if it is not used in the radio shack, my noise spread outside of the area.

Good Luck.

KCØPP



# End Fed Wire Antenna Notes (April 16, 2022)

Tim McDonough N9PUZ

An end fed antenna is, as the name implies, fed at one end of the antenna wire vs. in the middle as you would feed a doublet. It is a multi-band antenna if you choose the length of your wire carefully. This discussion is NOT about an EFHW (End Fed Half Wave) antenna. That is a different animal, but the two are often confused in discussions.

The length of the wire is not truly "random" as the title of many articles may lead you to believe. It can be a variety of lengths; however, it must NOT be a half wavelength, or a multiple of one, on any band where you wish to operate. This antenna will NOT be resonant anywhere you want to operate. You will need a radio with an internal tuner, or need an external tuner of some type.

The following two references go into more detail and have already done the math for you.

<http://hamuniverse.com/randomwireantennalengths.html>

<http://udel.edu/~mm/ham/randomWire/>

Let's skip the explanation and the math. What are good wire lengths to consider?

Shorter lengths may load below 40M but performance may be poor. I find the most useful length is close to, but not exactly, 1/4 wavelength long on the lowest frequency you wish to operate. I consider a 30 ft long wire the smallest acceptable length for 10M through 40M operation.

10M - 40M: 29 35.5 41 58 71 84 107 119 148 203 347 407 423

A longer length is preferred for better performance everywhere and especially if you want to go lower, say to 80M. In my personal experience, the 84 ft wire works better on 80M than the 71ft wire. However, I have made 80M SSB SOTA contacts from Bald Knob Cross in Southern Illinois using my EARCHI 9:1 UNUN and a short 30ft wire. Experiment and have fun!

10M - 80M: 71 84 107 119 148 203 347 407 423

An additional thing to realize is that doublets are traditionally fed at the center because the impedance there is much lower. The end point of a wire is typically a very high impedance so it can be difficult to match. Some tuners may have enough range to match it. Often, a UNUN with a transformation ratio of 4:1 or 9:1 is used to feed the wire. This adds a bit of inefficiency due to the transformer, but brings the impedance your tuner has to match into a range most internal radio tuners can handle. LDG Electronics, Balun Designs, and the Emergency Amateur Radio Club of Hawaii (EARCHI) all make good 9:1 UNUNs. EARCHI even has plans to build your own if you like to tinker;

[http://www.earchi.org/92011endfedfiles/Endfed6\\_40.pdf](http://www.earchi.org/92011endfedfiles/Endfed6_40.pdf)

Your antenna system will need some type of counterpoise to work best. The two common ways to provide this are to either a) attach a separate counterpoise wire to the UNUN, or b) Use a long enough piece of coaxial feedline between your radio and the UNUN to allow the coax shield to provide the RF return path. The coax option works especially good for portable operation. My experience is that a length of coax 10-25 ft long seems to work well. The length of the counterpoise doesn't seem to be super critical. With the wire or coax laying on the ground, the ground will have an unpredictable effect anyway.

It's a good idea to elevate the UNUN that connects to your antenna wire. The entire wire is your radiator and you don't want one end of it essentially laying on the ground. As little as one foot makes a big difference in performance, more is even better and I find that for portable operation supporting the UNUN 2-3 feet off the ground makes a good compromise between antenna performance and ease of setup.

Depending on the amount of power you use, it is possible you may get some RFI in your radio with the coax only option. This can normally be cured by placing a 1:1 UNUN a few feet from your radio or adding a couple of snap on type ferrite beads a few feet from the radio end of the coax. If you use the ferrites, Mix 43 seems to work very well. In either case, the 1:1 UNUN or the ferrite beads will isolate your radio from the antenna system.

My favorite wire lengths for portable operation with my KX2 running 5-10 Watts are 30 ft and 84 ft. The 84 ft wire makes a big difference if you want to take the time to string up the longer wire. The 30 ft wire is quick to setup with a 20 ft tall collapsible mast and works really well at frequencies 40M and above. Nothing is absolute, I have made 10W, 80M SSB contacts. However, it was a SOTA activation so people were looking for me and I was on a spot about 1,030 ft high. The point is, all antennas are a compromise. In general, you will get the best performance if you put up the longest "good" length of wire possible given your operating location and the amount of effort you are willing to invest. If you tend to be on the lazy side, shorter wires are typically less work to put up. Hence my attraction to the 30ft wires. I normally just want to make contacts outdoors. I'm not too picky about how far away the other operator is located.

Even for portable operation, you don't have to limit yourself to a sloping or nearly vertical wire. A friend of mine routinely uses an 84ft wire but he uses a pair of 28 ft poles. He has his UNUN about 3ft up on one pole with the wire running vertically to the tip. He puts the second mast about 59 ft away to hold up the far end of the wire. This makes a nice inverted "L" setup. Of course, this would be a nice configuration for a more permanent home or vacation antenna as well.

I imagine someone will ask, so...

#### Main Items In My Usual Portable Station:

- Elecraft KX2 @ 5-10 Watts & Internal Lithium Ion Battery
- 20ft collapsible "crappie" pole from Walmart, Bass Pro, etc.
- 30 ft wire
- 9:1 EARCHI UNUN
- I use a hiking pole to hold the UNUN 2-3 ft off the ground.
- 10 to 20ft of RG-58 coax with ferrite beads a couple of feet from the radio end

None of this is cast in stone. I imagine there are a LOT of other configurations, wire lengths, etc. that will work very well, perhaps even better. Experiment and have fun. But, always remember: It's only a hobby!

Tim N9PUZ

## 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:

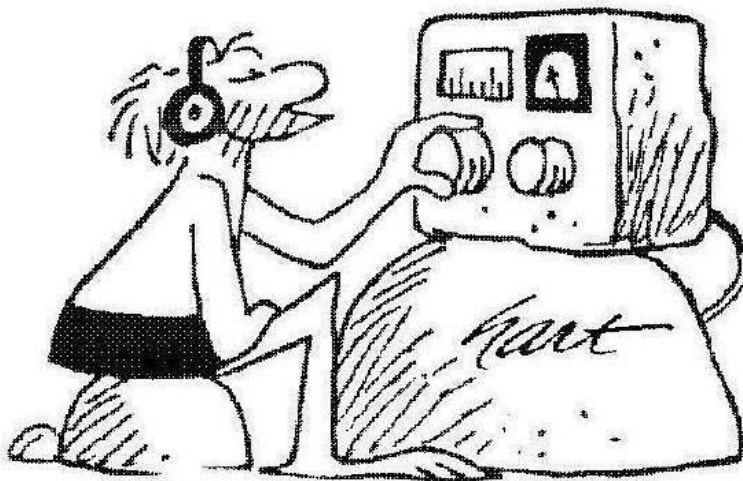
Articles are needed to make every Banner issue successful. If you have something of interest, please send it to the editor at the email address below. You do not need to send a finished article. You can send some comments, notes, etc. and I can put it all together for you. Pictures are always of interest. 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

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## CQ Field Day!