

**OFFICERS**

Andrew Lawson, N2AL - President  
 Michael Foley, K4MJF - Vice Pres.  
 Bob Loving, K9JU - Secretary  
 David Andrews, N1ESK - Treasurer

**Nets**

SMARC Weekly Net.  
 Thursday 1900 hrs  
 146.655 & 443.075

KK4XA Morning Net  
 M-T 0900 hrs  
 146.655 & 443.075  
 KK4XA DMR 444.075-TG-314742

**Club Meetings**

4<sup>th</sup> Monday Monthly\*  
 1900 hrs  
 USW Union Hall  
 339 Hall Road  
 Alcoa, TN 37701  
 \*Excludes June and Dec

**Typical Gatherings**

Tech Lunch  
 Thursdays @ 1130hrs.  
 Windy City Grill  
 2641 Hwy 411  
 Maryville, TN

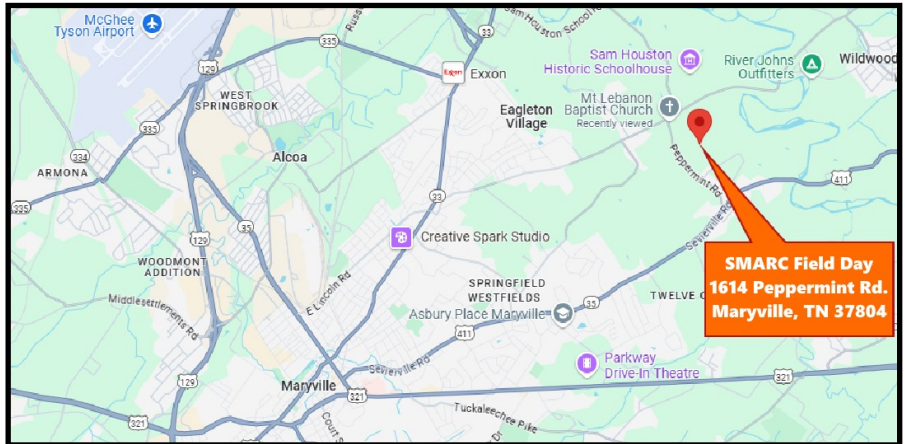
Eyeball Net (Breakfast)  
 Friday's @ 0830hrs  
 TC's Grill  
 2514 Old Niles Ferry Road  
 Maryville, TN

# Field Day 2025



ARRL Field Day is quickly coming up! Always held the fourth weekend in June, Field Day will run June 28th to June 29th. The theme this year is “Radio Connects.”

The Smoky Mountain Amateur Radio Club will be holding Field Day at Mount Lebanon Baptist Church, 1614 Peppermint Rd. in Maryville.

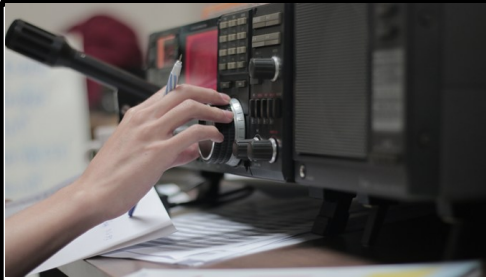


Special thanks to Dave/N9KMY, Kelley/KR4FK, and Geoffrey/KM6TVJ for checking the new location for potential interference. Scanning with a rotatable Buddy Pole at various locations on the premises, they found the site to be relatively free of RFI.



Sign up on the [w4olb.org website](http://w4olb.org) and check out the great YouTube promo videos created by Geoffrey/KM6TVJ! <https://youtu.be/oddpnMhxn6g>

## Smoky Signals



# Contesting Roundup

### MAY

- UN DX Contest: May 17 0600z—2100z
- CQ WW WPX Contest, CW: May 24 0000z—May 25 2359z
- Russian WW MultiMode Contest: May 31 1200z—Jun 11159z

### JUNE

- ARRL June VHF Contest: Jun 14 1800z—Jun 16 0259z
- ARRL Kids Day: Jun 21
- **Field Day: Jun 27-29: Jun 28 1800z—Jun 29 2100z**

### JULY

- RAC Canada Day Contest: Jul 1 0000z—2359z
- CQ WW VHF SSB/CW Contest: Jul 5 1200z—Jul 6 1200z
- RSGB IOTA Contest: Jul 26 1200z—Jul 27 1200z

*Note: All dates and times listed are Zulu/UTC, unless otherwise specified*

*For more Contests, QSO Parties and Sprints check out the [WA7BNM Con-](#)*

## SMARC Trunkfest



On April 28th SMARC held a “Trunkfest” at the United Steelworkers Union Hall in Alcoa.



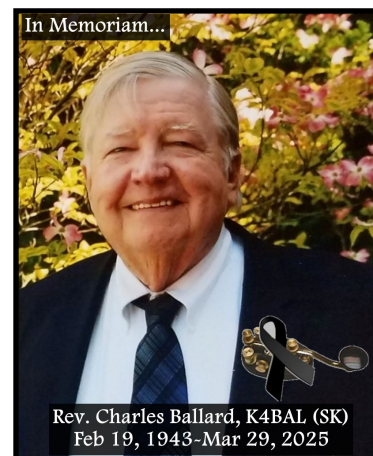
Folks lined up in the parking lot and displayed their used year in their trunks and tailgates, tables and tents.



Grilled dogs, and other provisions were provided courtesy of SMARC VP Mike/K4MJF and his wife Karen.

## Upcoming Hamfests

DATE	NAME	CITY, STATE
May 16-18	Dayton Hamvention	Xenia, OH
Jun 21	Knoxville Hamfest, ARRL State Convention	Knoxville, TN
Jul 19	Greater Nashville & Middle TN HamQuest	Lebanon, TN
Jul 19	MCARC Ham Fest	Athens, TN
Aug 16-17	Huntsville Hamfest	Huntsville, AL
Aug 23	Cedars of Lebanon Hamfest	Lebanon, TN
Oct 3	Hamfest Chattanooga 2025	Ringgold, GA



In Memoriam...

Rev. Charles Ballard, K4BAL (SK)  
Feb 19, 1943-Mar 29, 2025

# Hamfest Season is Here!

The 2025 Hamfest season is well underway! Tens of thousands of amateurs are gearing up to converge on Xenia (Dayton), Ohio for the annual trek to Ham Radio Heaven.

Whether you are a new ham, or have been one for decades, your first visits to the big hamfests are a memorable occasion.

For the uninitiated, each of the “big three” are a uniquely different experience.

tailgate area on the grounds. On-site RV camping is also available.

Weather in Orlando in February can be a mixed bag. Strong cold fronts from the north can still make their way down, bringing cool or wet weather, but generally the temperatures are mild by comparison and the daily summertime severe thunderstorms Florida is known for are still several months away.

HamCation 2026 will be Feb 13-15. Visit <https://www.hamcation.com/> for more information!



HamVention is the big daddy of hamfests stateside. Bested only by the Tokyo Ham Fair globally, attendance averages in the 35,000 visitor range.

Coming up May 16-18, at the Greene County Fair and Expo Center in Xenia, OH,

HamVention will feature nearly every major manufacturers and have dealers from around the world. The “boneyard” at HamVention is second to none.

HamCation in Orlando wrapped up in February. This three day event, held annually at the Central Florida Fairgrounds in Orlando, FL, always falls near (occasionally *on*) Valentine’s Day. Bear that in mind if you have a spouse and/or kids! Fortunately, you have the theme parks and beaches nearby to give the rest of the family something to do while you go on your quest for more “doodads and whatnots!”

HamCation kicks off the “hamfest” season. It holds the number two spot stateside, just behind Dayton HamVention in terms of size, averaging well over 20,000 in attendance.

HamCation hosts numerous vendors and manufacturers, as well as plenty of indoor swap tables and a large



Dayton Contest University is a must for any serious

*(Continued on page 4)*



The “Boneyard” at HamVention stretches across a vast swath of the grounds at the fairgrounds

## Smoky Signals

contester or DXer. Starting the Wednesday evening prior to the hamfest, events will continue throughout the weekend both at the Hope Hotel as well as in forums at the hamfest, culminating with the annual Dayton Contest Dinner on Saturday evening.

Other hamfest adjacent events include the Top Band Dinner, a live performance by the Spurious Emissions band, Youth on the Air social hour, AUXCOMM classes, and various Four Days In May happenings.

Weather wise, it's springtime in Ohio. The snow is gone, but don't be surprised to see some rain showers during your visit. The parking areas can get quite muddy if the rain persists. Likewise, temperatures can run the gambit, starting off cool in the morning and warming up rapidly in the afternoon or vary day by day.

Check out <https://hamvention.org/> for the latest information.



What's better than a hamfest in the hot and humid dog days of the summer in the South? One that is air conditioned, of course!

The Huntsville Hamfest bills itself as the "World's Friendliest Hamfest!"



This is the smallest of the "big three" hamfests, but makes up for it on overall experience.

The entire hamfest, including the swap tables in the Flea Market, is held indoors at the Von Braun Center in downtown Huntsville, AL.

You'll find plenty of forums available, as well as license exam testing and the other usual fair. Most of the major manufacturers, dealers and other vendors can be found on the floor in the venue.

The show features the annual Bill Pasternak Young



Ham of the Year Award presentation by Don Wilbanks/AE5DW, of HamNation and Newline fame.

One of the biggest (not so well kept) secrets of the Huntsville Hamfest is the gatherings up at Monte Sano State Park. Located minutes from the Von Braun Center in downtown Huntsville, Monte Sano State Park is both a POTA and SOTA that features cabins, RV, "glamping" and rough tent camping.

Dozens of amateurs will be activating US-1048 throughout the week and weekend. The pavilion will be busy night and day with activities. If you're in town, stop on by and tell them you're with the hams. It's been reserved exclusively for us and park admission pre-paid for those hams not staying in the park.

The Huntsville Hamfest is August 16-17. Their website is the easiest to remember — <https://hamfest.org/>

**Be sure to share your hamfest experiences and photos with us! 73 de Jeff/N4POD [jeffn4pod@gmail.com](mailto:jeffn4pod@gmail.com)**

**ARRL Membership**

Get the tools and resources you need to do more with your Amateur Radio license.

Learning  
Services  
Community  
Leadership

### GET MORE FROM AMATEUR RADIO

When you join ARRL, you'll have access to information, learning, programs, & services to help you get and stay on the air.

Join today by visiting [arrl.org/membership](http://arrl.org/membership) or call 1-860-594-0200

SMARC is an ARRL affiliated club.

## The World of DX

Hello again fellow SMARC members. Welcome back to the fascinating world of DX.



**Bob K9JU**

In the previous column, I introduced you to ways of working a DX contest in search of entities. In this column, I will depart from the “how to” in order to show you what we are attempting to attain by making contact with the entities of the ARRL DXCC program or any other award issuing program. Part of ham radio, other than chatting on the local repeater or on HF, is chasing awards. There is nothing like having a piece of paper that shows you actually did what you told everyone you did.

In order to qualify for a given certificate or award from the ARRL DXCC program, you must obtain a confirmation of the contact. “Back in the day,” there was only one way to accomplish confirmation and that was with the (then) ubiquitous QSL card. It is fun to receive a QSL card from a far away location and even more so if it is from a “rare” spot on the planet. In this case, “rare” does not refer to how you like your steak cooked! A “rare” entity is typically an island or similar terrestrial feature that is sparsely, if at all, inhabited by more than sea gulls or penguins. Examples are South Orkney Islands and Bouvet Island in the Southern Oceans near the continent of Antarctica.

Don't get me wrong, QSL cards are still in vogue. A discussion of QSL cards and methods of obtaining the



Figure 1-QSL Cards

cards will be addressed in a subsequent column. For now, I want to show you some cards and awards. I hope these photos whet your appetite to collect a few of your own.

If you look closely at the lower right hand card in Figure 1, you will see the call VP6J. The operation was from Pitcairn Island. How many of you recall the “Mutiny on the Bounty”? Fletcher Christian and several of the crew hid out on the island while others from the Bounty sailed to Tahiti. There is an interesting account of the incident on Wikipedia- [https://en.wikipedia.org/wiki/Mutiny\\_on\\_the\\_Bounty](https://en.wikipedia.org/wiki/Mutiny_on_the_Bounty).

The basic DXCC award from the ARRL is the DXCC Mixed certificate and can be attained by confirming contact with 100 or more entities, using any legal mode of transmission. The Mixed award is also band independent.



Figure 2-DXCC Mixed

Beyond the DXCC Mixed award are three mode dependent DXCC awards: CW (Morse Code); Phone; and Digital, the latter sometimes referred to as the RTTY DXCC certificate. Phone may include any phone mode including AM, SSB and FM (where allowed). Digital voice on the HF bands and SSTV are also considered phone modes. Digital is any of the multitude of digital modes including but not limited to RTTY, PSK31, and the WSJT-X suite of digital communications modes including the very popular FT8 and FT4. Sorry, DMR via the internet does not count for any DXCC award issued by the ARRL. In fact, any communications that

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# Smoky Signals

(Continued from page 5)

do not fully use RF are excluded. By the way, there is a separate Satellite DXCC award. Other than satellites, use of repeaters is not allowed.

As you notice, there are numbered stickers on the certificate. These are “endorsements” added when you confirm contact with more than 100 entities. The steps in Figure 2 are smaller than what is currently being issued by the ARRL. The certificate you see was issued in 1980; the stickers have been added over the ensuing decades and years. As of this writing (2025), the steps are now at 50 entities from 150 to 250; the next step is 25 entities for 275 and 300; finally, above 300, the steps are 5 entities.

There are awards for working DXCC on separate bands. These are mode independent and capable of endorsements. The certificates are the same as those for the modes except for being marked by the band, e.g., “20 Meters.” Again as of this writing (2025), the steps for 40M through 10M, inclusive, are at the 50 entities from 150 to 250; then 275 and 300; finally, above 300, the steps are 5 entities. For the 160M, 80M, 6M through the 3 cm bands, and Satellite awards, the steps are: 25 from 125 to 200; 10 from 210 to 250; and 5 above 250.

Once you get the basic award and awards for two or more bands, you may set your sights on the coveted Five Band DXCC (“5BDXCC”) award. The award is issued for making and confirming contact with at least 100 entities on each of the bands 80M, 40M, 20M, 15M and 10M. You may not substitute any of the oth-

er HF bands for those five legacy bands. There was a proposal to change the criteria to any five bands, but for continuing the difficulty of achieving the award and the reward of your operating prowess, the proposal was shot down. There are no “participation” certificates for 5BDXCC.

Contacts on 160M, the WARC bands of 30M, 17M and 12M, and 6M, 2M and above are endorsements to the 5BDXCC certificate. At present, there is no DXCC award for the 60M “band.”

Along with the 5BDXCC certificate, there is a plaque available for 5BDXCC. The endorsements are painted brass plates with the band showing in black as bare brass such as “160 METERS.”

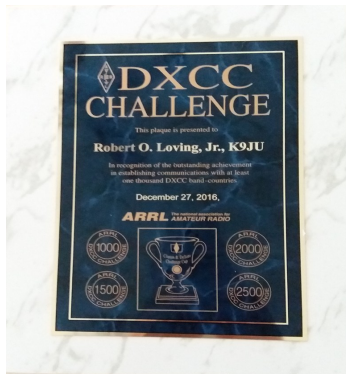


Figure 4-DXCC Challenge

Folks, it ain't over yet! In making contacts with the entities on the different bands, you are accumulating points known as “band-countries” or “band-entities.” For example, if you have confirmed contacts with Spanish stations (EA) on 20M, 15M and 12M, you have 3 points or 3 band-entities. Given

enough time chasing DX, whether in contests or one at a time, when the total equals 1000, you have achieved the minimum requirement for the DXCC Challenge.

The award is endorsed in steps of 500 band-entities with medallions that are placed in the spots labeled “1000” for the basic award, “1500,” “2000,” etc. Believe it or not, some operators have worked over 3000 band entities. At 300 entities per band, these guys would have had to use 160M through 6M to make the 3000 level. That is a lot of entities for some of these bands and emphasizes the difficulty of contacting 3000 band-entities.

Please note that none of these certificates or plaques is free. There is a charge and the plaques are the most expensive on a relative basis. Operators in the United States and its possessions must be members of the



Figure 3-5BDXCC

(Continued on page 7)

# Smoky Signals

(Continued from page 6)

ARRL to participate in the DXCC program and be eligible for the certificates and plaques.

The ARRL isn't the only organization to issue DX awards. Associations in other countries have awards. The awards may represent contact with 100 or more entities across the globe or they may be special event stations celebrating a national anniversary.

The large Cyrillic letters in gold spell "Diplom" or diploma/certificate in English. The certificate was issued in 1985 on the 40th anniversary of the victory ("pobeda") in Europe in World War Two by the Allied Forces. The certificate came from the former USSR ("СССР")!

There are groups or organizations that issue certificates for individual modes. One in particular is the

world using the WSJT-X mode FT8 that you could spend a lot of time pursuing the chase. For more information please visit <https://ft8dmc.eu/>.

Please remember: In chasing after awards of the ARRL DXCC program or awards of other Special Event Stations (SES), regardless of where in a band any DX station may operate, be aware of frequency limitations connected with your FCC issued Amateur Radio license. Even Extra Class operators can not operate phone modes below certain frequencies in the bands. CW is allowed on all frequencies in our bands limited only by the privileges of your license.

Until next time, "73 ES GUD DX."

Bob K9JU

Please email any comments and suggestions to "k9ju@arrl.net".



Figure 5-Diplom

FT8DMC, the FT8 Digital Mode Club. As of this writing date (2025), there is no charge to join the club. The certificates of achievement are sent via email to you as PDF files that you can download and print. There are a slew of awards for working stations around the

## Huntsville Hamfest 2025

The World's Friendliest Hamfest®

In our 72<sup>nd</sup> year!



Saturday August 16 9 AM to 4:30 PM  
Sunday August 17 9 AM to 3 PM

Von Braun Center South Hall  
700 Monroe St. SW, Huntsville, AL 35801

- World Class Educational Forums
- License Exams both days
- Outstanding Youth Lounge
- Over 50 Commercial Vendors
- Huge Expanded Flea Market
- ARRL AL State Convention
- All indoors & air-conditioned
- DX Card Checking
- Grand Prizes both days + hourly prizes

Plus: scheduled gatherings before & during the event! YouTubers at Monte Sano State Park, DX Banquet, W4DXCC Convention, Hospitality Suite at on-site Hotel, Microwave group activities, YL Breakfast, after-hours Hospitality Suite, and more!  
Check the website for details & times  
[www.hamfest.org](http://www.hamfest.org)

QCWA is an **international** organization open to all amateurs first licensed 25 years or more ago.

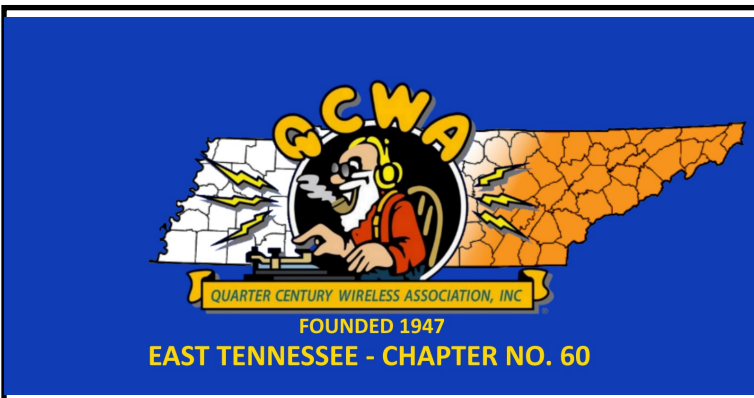
You need not be continuously licensed!

**East Tennessee - Chapter 60 is back!**

<https://www.qcwa60.org>

Youth scholarships are available!

Already a QCWA member? Affiliate with Chapter 60!



# Smoky Signals



**EMCOMM  
NEWS  
TNARES**



**DISTRICT 8  
Monroe County ARES Supports  
Casa Monroe 5k**



Monroe County ARES provided support for the annual Casa Monroe 5k in Madisonville on April 12th.

*If your ARES, EmComm group or other organization has news of interest, please send it to: [info@w4olb.org](mailto:info@w4olb.org)*

**Tennessee ARES District 8** is one of the largest districts in the state of Tennessee. District 8 comprises of 16 (sixteen) counties in East Tennessee:

Anderson, Blount, Campbell, Claiborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Loudon, Monroe, Morgan, Roane, Scott, Sevier and Union.

These align with the TEMA district. The TN ARES District is further sub-divided into 4 (four) distinct areas to provide for better coverage and coordination of activities between neighboring counties:

- Area 1:** Anderson, Campbell, Morgan and Scott
- Area 2:** Blount, Loudon, Monroe, and Roane
- Area 3:** Claiborne, Grainger, Hamblen and Union
- Area 4:** Cocke, Jefferson, Knox and Sevier

**We encourage everyone to check into their local ARES Nets!**

**Knox County ARES/METERS - 146.940—Mon at 19:00 ET**

**Blount County — 146.625—Thu at 21:00 ET**

**Roane County—147.015—Tue at 20:00 ET**

**Monroe County—147.315—Wed at 20:00 ET**

**Sevier County— 146.850—Wed at 20:00 ET**

**Anderson County—147.150—Thu at 19:00 ET**

**Loudon County—146.685— Thu at 20:00 ET**

## SMARC Shirts Now Available

The SMARC polo is made with a dry wicking material, very light weight, is very comfortable to wear and easy to care for. Washing and care instructions are included with every order.

If you want to order a shirt, please make sure you send me an email with "SHIRT ORDER" in the subject line at the email address listed below, make sure you give me your name and callsign exactly how you want it to appear on your shirt, if you want a long or short sleeve shirt and the size.

After you place your order, I will send you an invoice via email, with the total amount due, including tax. Before I place your order, I will double check with you to make sure everything is correct, as once I place the order with the vendor, it cannot be changed.

### There are no refunds or exchanges.

Payment can be made by cash or check payable to me, as the

SMARC Short Sleeve Polo w/logo (Small to XLarge size)	\$28
SMARC Long Sleeve Polo w/logo (Small to XLarge size)	\$32
Upcharge for 2X	\$2
Upcharge for 3X	\$3
Upcharge for 4X	\$4
Tall Short Sleeve Polo (upcharge)	\$4
Tall Long Sleeve Polo (upcharge)	\$4
Add Name and Callsign	\$4

Club is not funding this project. Delivery will be made at the Club meeting(s) or at breakfast, is local only! If you are out of state, or outside of the Greater Knoxville area, you are responsible for postage and shipping to your address!



**TAXES WILL BE ADDED TO ALL ORDERS, AS I HAVE TO PAY TAX ON EACH ORDER**

The sizes and pricing are as follows:

If you have any questions, please feel free to reach out to me, and I will try to answer any questions you might have. You can send me an email at [k4mjf.1@gmail.com](mailto:k4mjf.1@gmail.com)

Thanks for your time! I look forward to hearing from you.

**Mike, K4MJF**

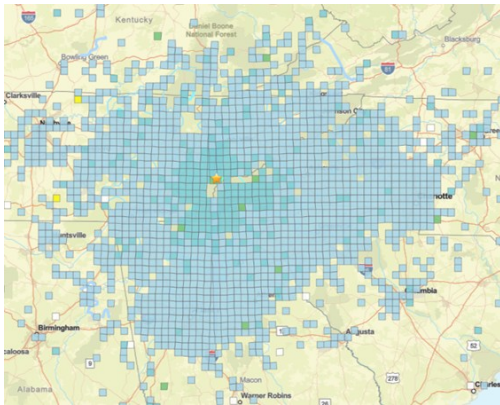
**SMARC Vice President, Net Manager**

**ARRL Technical Specialist**



## The Great Shakeout: Not Just a Drill!

Have you heard of the Great Shakeout?



**“W**hen Everything Else Fails. Amateur Radio often times is our last line of defense...When you need amateur radio, you really need them.”

**The Hon. W. Craig Fugate**

Administrator, US Department of Homeland Security,  
FEMA



Caleb KQ4QCJ

That is the name of an annual drill that is conducted each October. People all across the globe take part in sending in Did You Feel It (DYFI) reports to the United States Geological Survey. In the 2024 “Shakeout year”, over **56,650,277** individuals registered for the event. Of those nearly 57 million, 441,295 of them call the great state of Tennessee home. Now

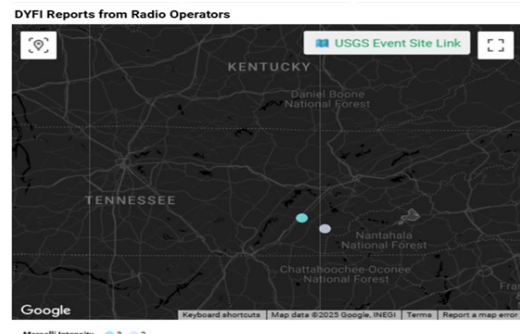
to the nitty-gritty... only 135 of those registered were registered as an Amateur Radio Volunteer Group.

To participate in the event, you can send in a DYFI report online by going to the USGS website. This report is not just for the annual drill, Anyone who experiences an earthquake can submit a report for that real-life event. If you feel a tremor, you can go to <https://earthquake.usgs.gov/data/dyfi/> and see a list of recent phenomena and click to report what you felt. You can even report events that are not on the list if you don't see something that would correlate to your area. These reports are aggregated into an interactive map viewer, as seen above.

As you probably guessed, the header image is a screenshot of DYFI reports relating to the 4.1 magnitude earthquake that shook East Tennessee on the morning of May 10, 2025. The reference number for that event is **se60605931**, if you'd like to look up the data and reports.

Now back to the Great Shakeout. LAXNORTHEAST, the northeast Las Angeles ARES group (<https://www.laxnortheast.org/home>), has an annual exercise that coincides with the Great Shakeout. Their event takes all of the amateur radio DYFI reports and plots them on a separate dashboard. They call this the [Amateur Radio Community Intensity Map \(ARCIM\)](#). Hams across the globe are invited and encouraged to participate. The difference is, we use Winlink instead of submitting reports on the USGS website. There is a form in the Winlink templates list specifically for USGS DYFI reports. Once you run your session and send the emailed form, it goes directly to the USGS just like if you had used the website. If you CC *EARTHQUAKE* on your Winlink report, it will also appear on the LAXNORTHEAST ARCIM.

So why Winlink? Imagine a major quake like the San Francisco earthquake in 1989. Following a major event, the infrastructure will be damaged and traditional communications, including the internet, will likely not be functioning. That is where hams and Winlink step up to the plate and shine. We can utilize amateur radio to file reports, pass traffic, relay messages, etc when nothing else works. In fact, an amateur with a Winlink station could likely send in the DYFI report as fast or faster than a layperson using the web form. The two dots on the smaller image are exactly that. Both of those are DYFI reports filed by amateur operators using Winlink.



May 10<sup>th</sup> Amateur radio earthquake reports

Luckily, the May quake in East Tennessee was a weak one, but it still jarred the community. We know to prepare for storms, flooding, fires and a host of other natural threats. Have you thought about earthquake preparedness? Take this as a grand opportunity to prepare for whatever may happen and have a plan. More information on earthquake preparedness is available on the Red Cross website and many other outlets. I invite you to participate in the [2025 Great Shakeout](#). Who knows, you may get a chance to use what you learned in that exercise to report a real world event.

Author Caleb Lynn, KQ4QCJ. Monroe County ARES EC

## Portable Ham Radio Battery!

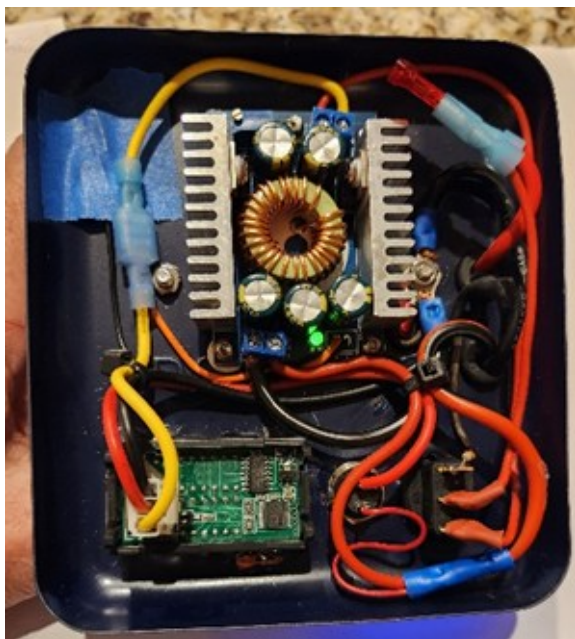


**Dave N9KMY**

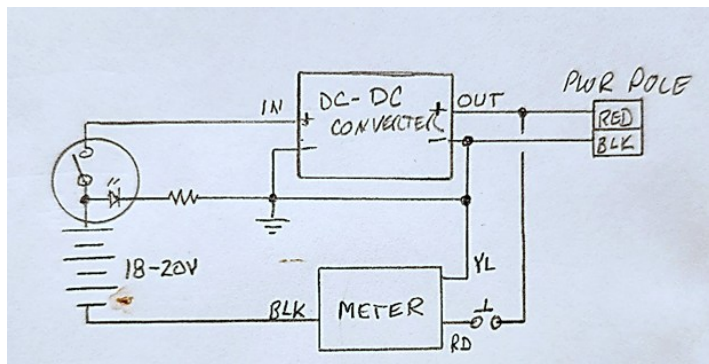
The best battery choice for portable operation is likely a lithium phosphate or LFP. You may already have one or more in the garage that only gets used maybe once per week. Do you have an 18-20v battery powered drill, how about a leaf blower or weed trimmer with a removable pack? Maybe you settled on a manufacturer such as Milwaukee, Ryobi,

Craftsman or maybe WORX so there is no need to add another battery and charger? Here is an idea to make double duty use with those battery packs.

Why not power your portable VHF or HF rig? Hey, you already have the battery and charger, right? So, what might it cost? Likely less than \$50 plus a bit of effort. Amazon, eBay or TEMU have various choices of bare wire battery connectors. Add a DC-DC converter to obtain 13.8vdc, some sort of case and the DC connector of your choice. Here are some photos of the one I built.



And here is the very simple schematic. I used my WORX battery packs (2AH, 4AH or 8AH). I have converted all radios to Power Pole connectors, so that is what I chose to use for output. Optionally, I included a meter to measure voltage and current. Also, added two switches with one for power on/off and the other, a momentary for the power. There is a POT to adjust the voltage. There are some converters also have a max current adjustment.



Some have asked me about the case. It is a metal box a wallet came in - I save too much stuff. It really doesn't matter the physical configuration, in fact Amazon even lists battery connectors with a pre-attached DC-DC converter. Also, there are converters with a built-in meter. Just check them out and find one that works for you. Also, I elected to not supply more than 10A as the converter is limited to 12A.

We recently had an ARES training event where I powered a VHF mobile operating at 15W (drawing about 5A on TX) and even after 3 hours, the charge on the 20AH battery had hardly been used. My guess for a day long POTA using low power and the 4AH battery is likely to be sufficient.

### Parts List – Total Est. Cost: \$50

Matching battery connector (~\$12): Various for Craftsman, Ryobi, WORX, etc.

DC to DC converter (~\$12): Amazon DZS 12A DC-DC Step Down Converter

Power Switch w/LED and Push Button Switch (~\$3)

DC Meter (~\$10): Amazon 2-pack 0.28" Dig volt/amp meter

Misc Crimp Connectors

Fuse (10amp) (~\$0.50)

Power Pole Connector (~\$2)

Case to house device (~\$10): Amazon Hotop 8.5" x 5.3" x 1.9" Tin Box