



# The RELAY)))

November  
2023

The Official Publication of the Arrowhead Radio Amateur Club

A.R.A.C. Inc.

P.O. Box 7164 Duluth MN 55807-7164

<http://www.thearac.org>

Dues: Member \$20/Family \$25

## INDEX

EMPs Part Two	1
Board Mtg Minutes	2
Club Mtg Minutes	3
Prez Sez	5
Testing Sessions	5
CW Abbreviations	6
Band Plan	6
Nets	7
Repeaters	8
Members' Email	10
Calendar	11
Committee Chairs	12
Estate Sale	13
Contest Calendar	18

## Electromagnetic Pulses Part Two: Preparedness

In last month's *Relay*, we discussed Electromagnetic Pulses (EMPs), which can occur both naturally and artificially. We took a cursory look at assessing our equipment and devices in order to *begin* to form a strategy to protect ourselves.

This month we'll continue with Part Two, in order to dive deeper into additional aspects of EMP preparedness. First, we have to make a detailed **EMP Protection Strategy** for our households. That strategy will consist of 3 components: Assess, Plan, Execute. This is all common sense stuff that's easy to do, but we suggest breaking your Strategy down to these 3 components so that you can spend your time & money on the most critical aspects of your family's needs first.

### Assess

Assessing consists of 2 major aspects:

- A. **Making a list of all devices** you own that could be damaged or destroyed by an EMP
- B. **Labeling them as:**
  - Critical (Priority 1),
  - Important (Priority 2)
  - Luxury/Non-essential (Priority 3)

Let's say your lists includes vehicles, cell phones, amateur radio equipment, laptop/tablet computer, gas generator, TV, refrigerator/freezer, LED flashlights, ohm meter, calculators,



### FEMA IPAWS EMP-Protected Shelters in Massachusetts

The U.S. government is using 77 radio stations that cover more than 90 percent of U.S. population to communicate with the public in a national emergency.

*Continued on Page 14*

The Relay Co-Editors:  
Kim & Steve Waller

Kim - KE0NQS      Steve - KE0NQT  
[KE0NQS.mn@gmail.com](mailto:KE0NQS.mn@gmail.com)    [KE0NQT@gmail.com](mailto:KE0NQT@gmail.com)



# Autumn 2023



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# ARAC Board of Directors

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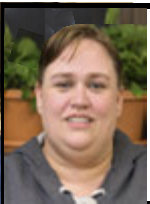
**NØVRM**  
Gene Ellefsen  
3710 Chambersburg Ave  
Duluth, MN 55811  
218-390-3272  
lspitech@mail.com

## VICE PRESIDENT



**KØDJP**  
David Pyrlík  
  
david.pyrlík@gmail.com

## SECRETARY



**KFØGJW**  
Melinda Nelson

## TREASURER



**KEØYTM**  
Sam Frey  
  
ke0ytm@gmail.com

## 3RD YEAR BOARD



**AAØAC**  
Dave Davis  
  
218-348-6649  
aaøac@outlook.com

## 2ND YEAR BOARD



**AAØAW**  
Doug Nelson  
  
aaøaw@arrl.net

## 1ST YEAR BOARD



**WØDIO**  
Denny Anderson

No Minutes for the October 3rd  
**ARAC Board of Directors Meeting,**  
as we did not have a quorum.

Latest Treasurer's Report, as also published in October  
12th Club Meeting Minutes on page 3 of this issue:

### Treasurer's Report:

Checking:	\$2,771.73
Savings:	\$1,706.56
Repeater:	\$3,320.12
<b>Subtotal Cash</b>	<b>\$7,798.41</b>
Winter CD:	\$1,736.49
Summer CD:	\$0.00
<b>Subtotal CD:</b>	<b>\$1,736.49</b>
<b>Assets Subtotal:</b>	<b>\$9,534.90</b>
<b>Grand Total</b>	<b>\$9,534.90</b>

*Our Thanks to*  
**ARAC Treasurer Sam Frey KEØYTM**





# ARAC Club Meeting Minutes

**October 12, 2023**

**Present:**

President: Gene Ellefsen – N0VRM  
Vice President: Dave Pyrlik – K0DJP  
Secretary: Melinda Nelson – KFOGJW  
Second Year Board: Doug Nelson – AA0AW  
Third Year Board: Dave Davis – AA0AC  
Special Events: Open/Gene Ellefsen – N0VRM (acting)  
Parliamentarian: Grant Forsyth – KC0WUP  
Testing: Doug Nelson – AA0AW  
Repeater: Dave Pyrlik – K0DJP  
Repeater: Randy Wabik – KR0B  
Property/Picnic: Scott Ahlgren – N0VYU  
HamFest/Education: Bob Schulz – KC0NFB

**Absent:**

Treasurer/Membership: Sam Frey – KE0YTM  
First Year Board:  
Chaplin:  
Web Site: Thomas Dorr – KE0RHA  
Newsletter/Historian: Kim Waller – KE0NQS  
Newsletter/Historian: Steve Waller – KE0NQT

Meeting called to order at 19:02 (7:02 PM) by President Gene Ellefsen – N0VRM. Thirty-nine (39) members were in attendance.

**Minutes:**

Minutes are posted on the website and in the newsletter. Motion to accept by Doug Nelson – AA0AW, seconded by Grant Forsyth – KC0WUP. Motion Passed.

**Treasurer's Report:**

Checking:	\$2,771.73
Savings:	\$1,706.56
Repeater:	\$3,320.12
<b>Subtotal Cash</b>	<b>\$7,798.41</b>

Winter CD:	\$1,736.49
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<b>Grand Total</b>	<b>\$9,534.90</b>
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Motion to accept as presented by Bruce Carlson – KN0NUL, seconded by Scott Ahlgren – N0VYU, motion passed.

**We will be doing a raffle at Christmas with a Yaesu FT70D Handheld radio.** This is a dual band fusion digital FM handheld Radio. The radio is programed and ready to go. Bob Schulz – KC0NFB is selling raffle tickets.

**Name Badges:**

Please reach out to Melinda Nelson at [jonbeeyore@outlook.com](mailto:jonbeeyore@outlook.com) if your name is here to pick up your name badge.

*Continued on Page 4*



# ARAC Club Meeting Minutes, cont.

KF0LJC – John Snyder  
KC7YFH – Helen Miller  
KE0ELI – John Bergman  
KD0UYP – Devin Elmore  
KE0RQO 0 Brian Krueger  
KE0RGY – Chris Albright  
KA8ZGM – Ralph Garono  
KC0PXY – David Niemi  
KE0TUV – Mike Overas  
KE0KGY – John Hyde  
KF0JFS – Wayne Rustvold  
KF0KWA – Dave Sarazin  
KE0JCZ – Dan Peterson  
K0MAP – Mark Pinther

## **Education**

Bob Schulz – KC0NFB As of now we have 8 signed up on the roster. Number 9 signing up this week.

## **Testing:**

Doug Nelson – AA0AW. Testing session on Tuesday this week. We had 5 candidates that were tested. From this session we have 2 new generals and 2 new technicians. If anyone needs testing contact Doug Nelson at AA0AW@ARRL.net and they will test individually. Do not forget to get your FRN number prior to testing. You can go to FCC.gov/uls and register. You will also need an email address going forward.

## **Nominations:**

President - Gene Ellefsen – N0VRM  
Vice President: Dave Pyrlik – K0DJP  
Secretary: Melinda Nelson – KF0GJW  
Treasurer/Membership: Sam Frey – KE0YTM  
First Year Board: Dave Davis – AA0AC, Justin Cheever – KD9VKI, Brian Beckman – KF0LFZ

## **Repeater:**

Gene Ellefsen – N0VRM, we do have a new antenna for the 94 that Dave Pyrlik has gotten for us through DSCC. \$1,250.18 for the new antenna. Doug Nelson – AA0AW made a motion to donate \$1,250.18 to WLSAR which they will purchase the antenna and then donate back to the club. KD0TH made a motion to accept, Diane Saunders – K0DSL seconded. Motion passed.

## **New Business:**

Winter Field day is coming up on the last Saturday of January, which will be held at Dave Davis - AA0AC's House.

## **Silent Key: (Please keep their family in your thoughts)**

## **New Members:**

KF0NXG – Randall Hicks

Door Prize was won by – KD0TH.

Motion to adjourn by Doug Nelson – AA0AW, seconded by Bruce Carlson – KN0NUL, motion passed at 19:27 (7:27 PM).

**CLUB REPEATER**  
**WØGKP**  
146.94 (-)  
CTCSS TONE  
103.5



## Prez Sez...

**Hi Everyone,**

There's a lot happening in the next couple of months, so here goes!

Nominations for Officers and the **Thomas Reibold W9IM Award** will close at the end of the November Club Meeting, so if you want to nominate someone or yourself be sure to let a Board Member know before the November Meeting ends.

Friday, December 1 we will be **Bell Ringing for the Salvation Army** from 11:00 AM to 7:00 PM, in 2 hour blocks at the Miller Hill Super One. I will have a sign-up sheet at the November Club Meeting.

The December Club Meeting on December 14 will be the **ARAC Annual Christmas Party**. Again it will be a pot luck, so bring your favorite dish to share and a non-perishable food item for the Food Shelf. We will also have the Elections for Officers.

**ARAC** is having a Raffle at this year's Christmas party for a Yaesu FT 70 DR handheld. Tickets are \$1.00.

**Happy Thanksgiving!!**  
**Gene Ellefsen NØVRM**



**LOOKING for an Amateur Radio License TESTING SESSION?**

**Schedule your own Testing Session *TODAY!***

**Contact Doug Nelson-AA0AW at [aa0aw@arrl.net](mailto:aa0aw@arrl.net) or 218-391-5874**

All Exam Candidates are **REQUIRED** to have an FCC Registration Number (FRN) before exam day, which will require your email address.

Not Currently Licensed? For New License Candidate FRN registration, go to: [www.fcc.gov/new-users-guide-getting-started-universal-licensing-system-uls](http://www.fcc.gov/new-users-guide-getting-started-universal-licensing-system-uls)

Upgrading to General or Expert Class & not sure you have an FRN number?  
go to

<https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp>

**UPGRADE CANDIDATES:**

**Please bring a copy of your current license to the exam session.**

# CW Abbreviations

AR End of Message	AS Pse QRX	BK Back to You	SK End of Contact
TU Thank You	PSE Please	K Invite to Transmit	
QST Calling all Amateurs	QRL Are You Busy?	QRU Have anything for me	
QRV Are You Ready?	QRX Standby	QRS Transit Slower	

A	●■■■	M	■■■■	Y	■■■■●
B	■■■■●	N	■■■●	Z	■■■■●●
C	■■■■●●	O	■■■■■	1	●■■■■■
D	■■■■●●●	P	■■■■●●	2	●●■■■■■
E	●	Q	■■■■■●	3	●●●■■■■
F	●●■■■	R	■■■■●●●	4	●●●●■■■
G	■■■■●●	S	■■■■●●●	5	●●●●●■■
H	●●●■■■	T	■■■■●	6	■■■■●●●●
I	●●	U	■■■■●●	7	■■■■●●●●●
J	■■■■■●	V	●●■■■■	8	■■■■●●●●●
K	■■■■●●●	W	■■■■●●●●	9	■■■■●●●●●●
L	■■■■●●●●	X	■■■■●●●●●	0	■■■■●●●●●●

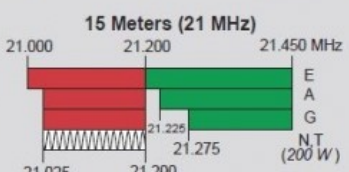
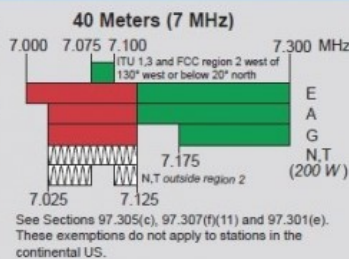
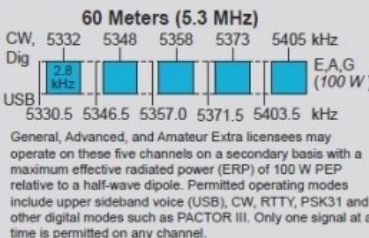
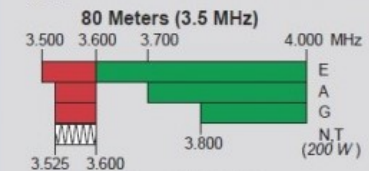
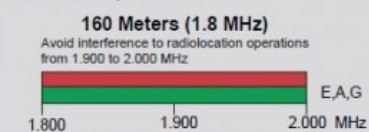
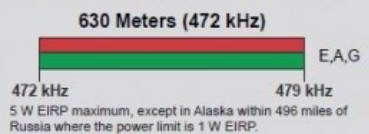
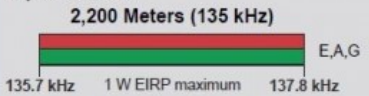


## US Amateur Radio Bands

### US AMATEUR POWER LIMITS

FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

On March 28, 2017, the Federal Communications Commission adopted rules that will allow Amateur Radio access to 472-479 kHz (630 meters) and to 135.7-137.8 kHz (2,200 meters). However, amateurs cannot use these frequencies until 30 days after the Report and Order is published in the Federal Register and the final procedures for registering stations with the Utilities Telecom Council (UTC) have been approved and announced. At the time this chart was created, the Report and Order had not been published and the UTC online registration site is not yet available. Follow ARRL news for further information. New charts will be published at [www.arrl.org/graphical-frequency-allocations](http://www.arrl.org/graphical-frequency-allocations) when the bands are fully available for use.



Effective Date for  
2,200 and 630 Meters  
to be announced



ARRL THE NATIONAL ASSOCIATION FOR AMATEUR RADIO

### KEY

Note: CW operation is permitted throughout all amateur bands.

MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz.

Test transmissions are authorized above 51 MHz, except for 219-220 MHz

- = RTTY and data
- = phone and image
- = CW only
- = SSB phone
- = USB phone, CW, RTTY, and data
- = Fixed digital message forwarding systems only

- E = Amateur Extra
- A = Advanced
- G = General
- T = Technician
- N = Novice

See [ARRLWeb](http://ARRLWeb) at [www.arrl.org](http://www.arrl.org) for detailed band plans.

### ARRL We're At Your Service

ARRL Headquarters:  
860-594-0200 (Fax 860-594-0259)  
email: [hq@arrl.org](mailto:hq@arrl.org)

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email: [news@arrl.org](mailto:news@arrl.org)

Exams: 860-594-0300 email: [vec@arrl.org](mailto:vec@arrl.org)

# NETS

Have a favorite HF/6m/2m/1.25m/70cm net that you check into or listen in on? Also, please send corrections and we will add it to the list below - Kim KEØNQS at my email KEØNQS.mn@gmail.com.

- **Northland Weather Group Net:** Mondays 2000 on the ARAC repeater (146.940 MHz with a tone of 103.5 and standard offset).
- **Minnesota D-Star Net:** Sundays at 19:30 on Reflector 53A
- **Minnesota Section Net** 1200 and 1730 on 3.860 [Net Manager: NØYR] [http://www.mn-section.org/dept\\_stm.html](http://www.mn-section.org/dept_stm.html)
- The non-non-net: Evenings 2000 144.200 USB except for Sunday evenings.
- Badger WX Net: 0500-0715 on 3.985. Give 24 hour high/low/current temperature, precipitation and snowfall.
- **PICONET:** 3.925 from 0900-1100 CT Mon-Sat and 1600-1700 CT Mon-Fri. Info at: <http://www.piconet3925.com>
- Michigan Upper Peninsula Net: 1600 (CST) on 3.921 MHz Sun-Sat and 1200 Sun. Info: <http://www.michupnet.com>
- Great Lakes Marine/Maritime Mobile Net: Morning 07:30 - 3.932; 08:15 - 7.261 MHz and evening 18:30 - 3.1730927; 19:15 - 7.268 MHz. Weekend extra net: 10:00 - 7.261/7.268 MHz. All CST, LSB and +/- QRM. See: <http://www.sailblogs.com/member/glimmnet/>
- MIDCARS: 07:30-13:00 - 7.258 MHz. See: <http://www.midcars.net>
- Iowa snowbird net on 14.257MHz, M-W-F at 10:00 am Local Time. This is an open net.
- Spider Web Net (Marco Island FL) on 14.347 every morning at 0730 CST/CDT: <http://www.spiderwebnet.net>
- Maritime Mobile Service Network: Daily at 1100—2100 Central on 14.300. <http://mmsn.org> and <http://www.14300.net>
- RV Radio Network: Every day at 1900 Central on 7.265 MHz. Web site: <http://www.rvradionetwork.com>
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- Wisconsin Sideband Net: Daily @ 5:15 PM – 3985 [or 3982.5] KHz LSB
- Hobby Helpers Net - Tuesday @ 8 PM – 28.330 MHz USB (Isanti MN) LSB [Net Manager: WOØA].
- Northstar Trader Net: 3.908 +/- at 0830 CST Sundays
- WARFA: 3.908 +/- Sun/Tue/Thu nights at 2200 CST, <http://warfa.org/>
- Youth Net: 14.320-14330 Sundays 1800-1900 UTC, Net Control: AC8PI
- YACHT: Saturdays 1900 CST on EchoLink #481872, <http://yachthams.webstarts.com>
- Northwestern Ontario ARES Net: Evenings at 20:15 (Central) on +/- 3.750Mhz
- The Iron Range Net: Saturdays at 0800 Central time on or near 3.919 Mhz. Look them up on Facebook!
- FORX Net: Mondays at 1900 Central at 3.941 Mhz +/- QRM. WAØJXT — Grand Forks, North Dakota
- HF CW: Fridays 08:00 CST, 7.112 MHz. Informal slow speed CW Net. W8IRT NCS. Email: [w8irt@aol.com](mailto:w8irt@aol.com)
- Minnesota ARES Digital Net: Thursdays at 2000 CST, 3.5835 MHz USB +/- QRM, Mode: Olivia 8/500.
- SARA Digital Net: Sundays at 1900 Local, 3.582.150 MHz USB +/- QRM, Mode: BPSK31/BPSK63
- Spider Web Net (Marco Island FL): 14.347 every morning at 0730 CST/CDT: <http://www.spiderwebnet.net>
- Broadcaster Net: 7.231 or 3.855 M/W/F @ 1500 UTC. 14.255 M-F @ 2130 UTC. <http://www.cbsretirees.com/ham.htm>
- Old Military Radio Net: 7.268 +/- nightly at 0200z. Other times/Frequencies too. See: <http://www.mrca.ar88.net/>
- Rag Chew Crew/Tailgaters/Freewheelers Nets: 3.916 +/- nightly at 1900 CST, <http://www.tailgatersnet.com>
- North South Net: 7.214.6 +/- at 0700 CST, Monday-Saturday



# DULUTH AREA REPEATERS

## ARAC System WØGKP

Frequency	Offset	Tone	Location
146.940	minus	103.5	Duluth
146.940	minus	107.2	Lakeside (recv)
146.940	minus	151.4	Two Harbors (recv)
146.940	minus	100.0	Gary-New Duluth (recv)
146.940	minus	110.9	Cloquet (recv)
147.000	minus	103.5	Mahtowa
444.100	plus 103.5		Duluth UHF Link

## N9MMU/N9QWH System (WI)

145.310	minus	110.9	Duluth
145.490	minus	110.9	Solon Springs
147.255	plus 110.9		Hayward
145.110	minus	110.9	Rice Lake
147.345	minus	136.5	Holcombe
145.230	minus	110.9	Eau Claire

## WECOMM – WI Statewide Linked System WE9COM

147.075	plus 110.9		Meteor Hill (closest repeater to Duluth)
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## LSAC System # 1

147.330	plus 151.4		Proctor
147.330	plus 103.5		Duluth (recv for Proctor)
147.270	plus 114.8		Two Harbors
147.270	plus 103.5		Wales
147.090	plus 114.8		Silver Bay
145.410	minus	114.8	Finland
147.300	plus 114.8		Isabella
145.150	minus	103.5	Washburn, WI
146.700	minus	103.5	Bayfield, WI
443.850	+5.00	none	Bayfield, WI
147.165	plus 110.9		Hurley, WI
146.640	minus	151.4	Ely
443.500	+5.00	141.3	Gilbert
147.060	plus 103.5		Virginia
147.360	plus 162.2		Cook
147.165	plus 114.8		Coleraine
443.925	+5.00	110.9	Brainerd
443.200	+5.00	114.8	Tamarack
147.360	plus 203.5		Aitkin
146.865	minus	146.2	Giese
147.570	simplex	146.2	Hinckley
444.575	+5.00	146.2	Hinckley
443.325	+5.00	146.2	Isanti





# DULUTH AREA REPEATERS, continued

## NARC System NAØRC

147.135 plus 103.5 Knife River  
 145.450 minus 114.8 Park Point (rcv)  
 147.135 plus 114.8 Knife River - Park Point (rcv)

## Stand Alone Repeaters

145.210 minus 110.9 Clam Lake, WI  
 146.880 minus 123.0 Grand Rapids, MN  
 146.910 minus 146.2 Duxbury, MN  
 146.955 minus 146.2 Askov, MN  
 147.105 plus 110.9 Chaffey, WI  
 444.850 +5.00 141.3 Cloquet, MN

## Fusion

Fusion (Analog has tone and C4FM digital with no tone)

147.150 plus 151.4 NTØB Gilbert. MN Fusion Repeater  
 145.170 minus 110.9 WA9KLM Superior, WI – Douglas County RACES/ARES Fusion Repeater (Digital only) Fusion Room 28373  
 145.250 minus 103.5 KBØYHX Cloquet, MN – Carlton County RACES/ARES Fusion Repeater  
 444.300 +5.00 103.5 NØEO Duluth, MN – Spirit Valley Amateurs Fusion Repeater WIRES-X NØEO (Analog only) Fusion Room 40494  
 444.400 +5.00 103.5 NAØRC Knife River, MN – Wires X Connected to NØEO Room 40494  
 444.500 +5.00 103.5 NØLCR Two Harbors, MN – Wires X Connected to NØEO Room 40494  
 444.600 +5.00 103.5 NØLCR Silver Bay, MN – Wires X Connected to NØEO Room 40494  
 444.800 +5.00 103.5 NØLCR Grand Marais, MN – Wires X Connected to NØEO Room 40494

## D-Star

147.375 plus NØEO D Star  
 442.200 plus NØEO D Star

Rev. KCØWDQ as of 10/1/22 For ARAC Newsletter

# Elmers

## El-mer / el-mər/ [el-mer]

1. a male given name: from Old English words meaning "noble" and "famous."
2. an adhesive used to bond like or unlike materials
3. An experienced ham radio operator who mentors new and prospective hams.

Name	Call Sign	Expertise
Jeff Nast	KCØMKS	APRS, EchoLink, WinLink, Fusion, Contesting
Bob Schulz	KCØNFB	Contesting
Jim Anderson	NØJWA	QsoNet
Doug Nelson	AAØAW	HF, VHF/UHF, Contesting, Packet, APRS, Morse Code, VE testing, Echolink, Allstar, EmCom...

# Membership E-mail Directory

Ahlgren, Scott NØVYU  
sahlgren01@msn.com  
Anderson, Jim NØJWA  
kcØmko@centurylink.net  
Anway, Allen KC9LJN  
allen@a2d2.com  
Bakke, Richard KDØQHE  
rabakke46@aol.com  
Barnes, Ray KEØZN  
KEØZN@outdrs.net  
Blodgett, Warren KDØXI  
kdØxi@aol.com  
Blotti, Nick KBØMHD  
NickBlotti@hotmail.com  
Bockbrader, Jonah KEØCXD  
j@pelirrojo.ninja  
Bockbrader, Rollie KBØCK  
Rollie.bockbrader@q.com  
Clemens, Butch KBØSMG  
kbØsmg@2z.net  
Currier, Barb  
bjcurrier@peoplepc.com  
Dall, Jim WDØGVW  
Dall, Teresa KAØCDO  
wdØgvw@gmail.com  
Dallavia, Paul KCØWDQ  
kcØwdq@yahoo.com  
Daly, Ed KØYMF  
eddalymn@aol.com  
Ellefsen, Gene NØVRM  
lspitech@mail.com  
Ferch, Tim AKØTF  
akØtf@aol.com  
Ferguson, Tom WBØDHB  
tferg5@msn.com  
Fleischman, Bill KCØZZL  
wfleisch@d.umn.edu  
Forsyth, Grant KCØWUP  
forsythgrantc@gmail.com  
Frederick, Jerry NØBNG  
nØbng@mchsi.com  
Frederick, Julie NØPIE  
jfreds@mchsi.com  
Frey, Sam KEØYTM  
keØytm@gmail.com  
Gibbs, Rex NØKXT  
nØkxt@yahoo.com  
Gilsdorf, Paul KFØGEX  
paul.gilsdorf@icloud.com  
Godbout, Med WØEEZ  
wØeezmedgodbout@centurytel.net  
Gordon, Fritz KD9BEW  
wizzard7@hushmail.com  
Hanson, Gary NUØW  
captaingary@chartermi.net  
Harstad, Ben KEØJDB  
coast\_guard\_aux\_duluth@yahoo.com  
Hawkinson, Garry WØELH  
garryhawkinson@yahoo.com

Hegrenes, Bruce KØOE  
Hegrenes@charter.com  
Jakubek, Patrick KDØSGK  
kdØsgk@gmail.com  
Johnson, Randy AAØME  
randy@nsw4x4.com  
Leslie, Shirl KBØSBM  
dsleslie@centurytel.net  
Maida, Tom KFØALP  
tmaida@outlook.com  
Makowski, Cletus KBØLBS  
kbØlbs52@msn.com  
Makowski, Karen NØWEZ  
k-wez1@hotmail.com  
Marchetti, Jim KEØLHX  
KEØLHX@outlook.com  
Mattson, Bing KCØKRA  
, Kathy KCØTIV  
HamToHam@msn.com  
McCorison, Derek WØDNF  
derek1Ø68@hotmail.com  
Meese, Joe WØLWU  
rxcpd@yahoo.com  
Miller, Dave WØNWO  
dmiller@nwoutlet.com  
Mullozzi, Anthony (Nick)  
AJ KDØYQA  
Ben KDØYPZ  
Joe KDØYQB  
KDØYQC  
amullozzi@hotmail.com  
Murray, Edwin W1ELM  
w1elm@arrl.net  
Nast, Jeffrey KCØMKS  
kcØmks@gmail.com  
Nelson, Doug AAØAW  
aaØaw@chartermi.net  
Nelson, Glen KAØGGG  
mgnelsonØ1@gmail.com  
Nelson, John KBØSUW  
jon275@q.com  
Nordin, Al WBØDBQ  
anordin@aol.com  
Olson, Lloyd Jr. KC9JTC  
kc9jtc@yahoo.com  
Pearson, Wayne WØKRH  
meppsy@netzero.net  
Pettit, Kathy KCØYVM  
kcØyvm@gmail.com  
Pomroy, Deb KCØUKC  
dpomroy@d.umn.edu  
Pyrlik, David KØDJP  
David.pyrlik@gmail.com  
Reger, Bernard KB9KQZ  
Mike KB9KRA  
Brian KB9KUX  
Chris KB9WJQ  
bjr5488@yahoo.com

Contact Kim or Steve Waller to include your name in this listing!

Contact Kim or Steve Waller to include your name in this listing!

Rosell, Dawson KEØHEL  
rosel032@d.umn.edu  
Saunders, Diane KØDSL  
kØdslae@gmail.com  
Scholz, Greg KDØUYN  
kdØuyn@gmail.com  
Schreyer, Dave WAØAWZ  
wa0awz@gmail.com  
Schulz, Robert KCØNFB  
kcØnfb@charter.net  
Snyders, Mark ACØLE  
snyds1118@msn.com  
Stark, John KCØYVH  
johnvinyl@yahoo.com  
Swanson, Scott N9DMG  
sswanson6749@charter.net  
Waller, Kim KEØNQS  
keØnqs.mn@gmail.com  
Waller, Steve KEØNQT  
keØnqt@gmail.com  
Whelan, Jacqui KBØJIM  
cndymx@gmail.com  
Whelan, John KØJRW  
jr-whelan@hotmail.com  
Winterscheidt, Heinz KD6FSA  
alter.skipper@gmail.com  
Wulf Gar WU1FGR  
wu1fgr.ham@gmail.com

Members, please check your name and email address for accuracy. If you are not on this list and want to be on the list, contact us with your info. If you need to make a change, please let us know at KEØNQS.mn@gmail.com OR KEØNQT@gmail.com



# NOVEMBER

## CLUB EVENTS

**SUNDAY NIGHT NETS**  
 1930 - CW - 28.125 MHz USB-CW  
 2000 - USB 28.450 MHz  
 2100 - Southern St. Louis County  
 Emergency Services Net  
**MONDAY NIGHT NETS**  
 2000 - Northland WX Net - ARAC Repeater

**TUESDAY NIGHT NETS**  
 2000 - Douglas Cty 145.490 MHz  
 2030 - Central Carlton County  
**WEDNESDAY NIGHT NETS**  
 1900 - Lake County - LSAC1  
 2nd & 4th Wednesdays  
 2100 - BWAR

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1  2100 - BWAR	2	3	4
5  CW 1930 N0PDG USB 2000 KB9WLB ES 2100 KE0YTM	6  WX 2000 KC0MKS	7 <b>ARAC BOARD MEETING</b> Sammy's Pizza 6:30 pm  DC Net 2000 CC Net 2030	8 <b>Lake County ARES/RACES Meeting 1800</b>  Lake County Net 1900  2100 - BWAR	9  <b>ARAC Club Meeting</b> Coppertop Church <b>7:00 PM</b>	10	11
12  CW 1930 AA0AW USB 2000 K9KDK ES 2100 AA0AW	13  <b>DC ARES/RACES Mtg 1900 DC EOC</b>  WX 2000 KC0MKS	14  DC Net 2000 CC Net 2030	15 <b>St Louis County ARES/RACES Meeting 1800</b>  2100 - BWAR	16	17	18
19  CW 1930 N0PDG USB 2000 N0VRM ES 2100 K0DSL	20  WX 2000 KC0MKS	21  DC Net 2000 CC Net 2030	22  Lake County Net 1900  2100 - BWAR	23  <b>Carlton County ARES/RACES Meeting 1900 CC EOC</b>	24 <b>Happy Thanksgiving!</b>	25 <b>ARAC Club Breakfast</b> The Chalet 8 am
26  CW 1930 AA0AW USB 2000 N0PDG ES 2100 KD9VKI	27  WX 2000 KC0MKS	28  DC Net 2000 CC Net 2030	29	30		

Get this newsletter *faster*  
via email!

Email Doug AAØAW at  
[aa0aw@arrl.net](mailto:aa0aw@arrl.net)

Next Club Meeting:  
Thursday,  
November 9th, 2023 - 7 pm  
at the Coppertop Church!

## ARAC Committee Chairs



**Club License Trustee:**

Ray Barnes KEØZN

**Control Operators:**

AAØAW - NØKXT - KCØNFB

**Newsletter/Historian:**

Kim KEØNQS & Steve KEØNQT  
Waller

**Education Chair:**

Bob Schulz KCØNFB

**Hamfest Chair:**

Bob Schulz KCØNFB

**Chaplain:**

Rollie Bockbader KBØCK

**Visiting Chaplain:**

**Parliamentarian:**

Grant Forsyth KCØWUP

**Website:**

Thomas Dorr KEØRHA

**Membership:**

Sam Frey KEØYTM

**Property Chair:**

Scott Ahlgren NØVYU

**Testing:**

Doug Nelson AAØAW

**Field Day:**

**Picnic Chair:**

Scott Ahlgren, NØVYU

**Repeater Chairs:**

Randy Haglin NØBZZ  
Randy Wabik KAØJZV

**Contest Calendar** at [www.contestcalendar.com](http://www.contestcalendar.com)

**National Contest Journal** at [www.ncjweb.com](http://www.ncjweb.com)

**QSO Party Note:** State/Province/National QSO Parties are abbreviated with the 2 or 3 letter abbreviation for the state/province/national designation followed by QP for QSO Party:

Examples: Minnesota QSO Party is MNQP  
British Columbia QSO Party = BCQP

**QRZ** web site at [www.qrz.com](http://www.qrz.com)

**VHF Propagation** site at [www.aprs.mountainlake.k12.mn.us](http://www.aprs.mountainlake.k12.mn.us)

**Reminder:** The Contest Corral monthly listing of contests can be found in each issue of QST. ARRL sponsored contests can be found in Contest Corral, highlighted, or on the ARRL's web site at [arrl.org](http://arrl.org).

# ESTATE SALE

## Contact:

**Gary K0GX 763-561-2836**

**k0gx@comcast.net**

RF-KIT RF2K 1500w Solid state amplifier	\$3495.00
Ameritron AL-1200 amplifier 1500w+ 10-160 3CX1200A7 current price 5999.00	\$2495.00
Heathkit SB-200 Amplifier	\$495.00
Heathkit SB-220 Amplifier	\$995.00
Hy-Gain TH-11DX 5 Band H.F. antenna 10-12-15-17-20meters	\$795.00
Drake R-4C Receiver	\$249.00
DrakeMS-4 speaker	\$95.00
Kenwood TS-590S 10-160+6 meters Original box and all accs	\$795.00
Icom IC-706MK2 10-160 + 2m	\$525.00
Yaesu FT450D H.F. transceiver	\$550.00
Radio Shack DX-394 General coverage receiver	\$125.00
Daiwa CN-101L 1.8-150Mhz power/swr meter	\$125.00
MFJ-1762 6 meter 3 element beam antenna	\$150.00
MFJ 989D Legal limit tuner	\$195.00
MFJ 989C 3000watt tuner	\$275.00
MFJ-1025 noise cancelling	\$125.00
OJE PS32wi 23 amp switching power supply	\$75.00
Astron 35M 35amp with meters	\$175.00
Samlex 1235M 35amp power supply	\$125.00
Icom RC-28 remote encoder	\$175.00
Ameritron RCS-8V 5 port remote ant switch	\$160.00
Ameritron RCS-4 4 port remote antenna switch	\$160.00
Astron RS-35M	\$175.00
Alinco 110 2 meter radio	\$110.00
Logikey memory keyer	\$60.00
ICE-421 low pass filter	\$45.00
ICE-420 low pass filter	\$30.00
Heil HS-2 ptt switch	\$22.00
Heil foot switch	\$12.00

furnace & thermostat, printer, electronic “smart” door locks, electronic doorbell, home security system, a safe with an electronic lock, microwave oven, coffee maker, toaster and various small kitchen appliances.

**Going through each of these items, maybe you decide that your Critical list (Priority 1)** consists of your amateur radio equipment, cell phone, tablet computer, generator, LED flashlights, furnace & thermostat and smart door locks.

Perhaps you decide that your Important list (Priority 2) consists of vehicles, refrigerator/freezer, microwave oven, coffee maker and toaster.

Maybe Non-essential (Priority 3) consists of TV, printer, electronic door bell, home security system, safe, small kitchen appliances, and miscellaneous electronic devices such as digital ohm meter, calculators, gaming devices and digital clocks.

In modern life it is easy to view most of our list as a high priority, but try to pare down your Critical List by assessing WHY it is critical. Is an item critical to safety or critical to your job? If so, spend more of your time & money on backups and work-arounds. This brings us to the Planning phase of our **EMP Protection Strategy**:

### Plan

Starting with Priority 1 items, develop a backup or work-around (or both) for each critical device. Communication devices, home heating, food & water, and home security are vital.



### Backups

As discussed in last month's Relay, backing your critical devices might consist of buying backup electronic parts or entire duplicate devices to bunker in a faraday container.

### Work-arounds

These consist of a different way to meet the need that a device normally fulfills.

Whether Priority 1, Priority 2 ,or Priority 3, backups and workarounds should be considered for each device. For example:

### Communication Devices

This is probably where to spend a little money. High quality Faraday bags for laptop, cell phones, key fobs, and remotes are available online for a relatively reasonable price. Military-grade Faraday cases might also be considered for your ham radio equipment.

**Generator EMP Shield - Faraday Bag, by MOS Equipment**  
Certified Military Standard 188-125, \$580  
Available at <https://shopsolarkits.com>

Decide whether to store a replacement communication device or component in a Faraday case for use in an emergency or

*Continued on Page 15*

whether some communication devices, that you use often, such as cell phones, tablet computers and key fobs, can be normally shielded in a case or bag you open and close every day. A Faraday duffle, backpack or envelope would be needed for these. This often requires us changing our routines and preferences a little, but that is the reality of preparedness.

Consider storing backup circuit boards, and entire transceivers to a Faraway bag or case. Get to know every part of your ham shack components, and do what it takes to have backup parts or a work-around with an older model if necessary.

### Home Heating

Furnaces: Putting in a switch to toggle to a generator instead of your house current is a great idea in the Northland. An in-line outlet to plug in your generator would be needed, but this set up works great. There are actually several ways to do this, so thoroughly look at your system to make a viable plan.

In a power grid failure due to EMP, it could be a short duration, or a longer one, so understand how to respond in each situation. If a digital thermostat's electronic board is destroyed, but you have utility company-supplied power back on, you can still "manually" operate that thermostat. This involves briefly shutting off the power to the circuit supplying the thermostat and connecting your thermostat's R & W wires with a jumper kit, or our recommendation, a Wago lever nut. Wago has assorted packs of these in smaller quantities for homeowners or much larger ones for professionals. In this scenario, you would have heat until you pulled one of the wires from your lever nut or toggled a power shut-off switch on the furnace itself. You can also install a non-electronic thermostat right next your furnace for emergencies. Again, there are a couple of ways you can do even that, so it's a good idea to have an elmer or HVAC pro to look at your heating system and give advice.

Whatever you do, make sure you have a back-up or work-around that can heat your home in an emergency.

Check your furnace ignition system to understand what you'll need to do, in case you'd need to manually light it. Most of the time that would not be necessary as long as you have power from either the utility company or generator. As we encouraged in last month's Relay, do thorough research on your critical Priority 1 items to understand what is needed in an EMP or other emergency.

### Generators

Since having a portable gas-powered generator is fairly common in Northern Minnesota, you may very well have one. Most people would consider a generator a Critical (Priority 1) item. And unless your model is very old, chances are that you have one with circuitry that an EMP could damage. You can build a Faraday box for your generator and seal it up with metal tape, but if you only own one generator, this would be cumbersome to take out of a homemade one whenever you need it. This is because homemade Faraday boxes are not usually assembled with RF gaskets or sealed zippers. Usually metal tape is used, and once you unseal it, you have to re-tape all the seams. It's far better to have a Faraday case designed to shield generators and pull it back and forth from there.



**ABOVE: Typical digital home thermostat baseplate**

**RIGHT: Wago lever nut connector makes it easy to safely connect wires and disconnect as needed.**



*Continued on Page 16*

### Refrigerator/freezers

One advantage of fall and winter in the north land is that the cold weather turns outdoors into a freezer. With a common lightweight foam cooler, or durable insulated plastic one, you can keep refrigerated items, cold, but not necessarily frozen. If you are in a rural area, beware that you may want to put these items in an unheated garage, rather than on the back deck or front porch. This is of course, because bears and raccoons may be attracted to your coolers. Crows are also very adept at infiltrating containers, so be aware of these factors.

You may have a little old fridge or two in the garage that don't have any electronics, but most nowadays do. One work around besides the outdoor coolers is to take refrigerated items, such as vegetables, fruit, meat, and pressure cook them on a stove, even a camp stove. This will take owning a non-digital, non-electric, manual pressure cooker, which are still available for sale. You would then need to have glass jars and lids like grandma and great grandma used to have. These are all still sold at places like Fleet Farm and Menards. The idea is that if the power goes out and you're concerned with not being able to eat the food in your refrigerator or freezer quickly enough, you can choose to pressure cook & seal them in jars for preservation. This is a food preservation technique that has served prior generations quite well.

Vacuum sealers also do a great job of extending the age and use of refrigerated and frozen meats, cheeses, vegetables, and fruits. Vacuum sealers take electricity usually, and would need to be plugged into a generator and likely stored in a Faraday bag ahead of time. You can also use "locking zip" vacuum bags with a hand pump port, that does an excellent job of sealing out air and increasing the refrigerated shelf life of foods.

Emergency quantities of meals-ready-to-eat is always important to consider, and several companies offer totes of dehydrated meals in various quantities that you can keep on hand. Just be sure to calculate the amount of water you'll need to add to these and keep the appropriate amount of purified water alongside them. Walmart and Menards have excellence prices on 1 gallon jugs that make backup cooking water and drinking water inexpensive.

### Water

For private well pumps: whether you have a non-submersible shallow well pump, or a deep well pump that submerses into your casing, and it's important to acquaint yourself with the control system to see what is vulnerable in an EMP. In addition, be sure your well system has a manual pump function attached to it. This means that either a small T-handle or lever pump on a side pipe that you can use to manually pump water into a 5 gallon bucket for general home use. The manual pump pipe from your well would ideally have a 3/4" utility/garden hose thread so that you could attach a hose and small non-submersible utility pump to assist.

Municipal water supply: An EMP may, or may not interrupt your access to water. Water pressure from



**A typical municipal water tower holds 1,000,000 gallons of water** *image: Wikipedia*

*Continued on Page 17*



local water tower would continue as long as there is water in the tower. However, when that is depleted, your municipal system may not be able to pump water into the water towers until they repair any damaged pump control components. In a power outage, it is always best to fill your bathtubs and other containers full of water while it is still available, in case water runs out at the tower and you have to wait until your municipal pumps are online again. Be sure to have a portable water filter such as pitchers or other containers, to be sure it is safe to drink if necessary in addition to your sealed purified gallon jugs of water.

### Home Smart Locks

If your home has a front door a electronic smart lock, make sure it has a manual lock option already, or consider having a manual deadbolt lock on hand that you can install in an emergency. You can even install an additional manual deadbolt on your door ahead of time for a work-around. Assessing devices that allow access to your home is a safety imperative, of course, so look at all doors and windows to your home and make a plan.

### Vehicles

Having a functional vehicle is important to all of us, but if you live in a rural area away from town & supplies, it becomes even more of an issue. Last month we discussed that pre-1980s internal combustion engine car might be a good transportation work-around, because they do not have electronic ignition.

That being said, parking your current vehicle in a garage just might provide enough shielding in an EMP—that is if your car is parked in the garage at the time. There are several YouTube videos on how to make your

garage into a Faraday cage by adding conductive material to your existing structure to block electromagnetic fields.



**Steve Waller KE0NQY** says this 1974 Mercedes 240D Diesel is his pick for an EMP-proof backup car, though he prefers metallic bronze. We don't have one of these in our classic car collection, but I might be persuaded with a celestial blue one like this!

If you're building a garage from scratch, an all-steel building (steel frame & steel clad) with no windows and RF gasket/sealing around the door and frame would work. Just remember that anywhere there is a gap would have to be sealed with RF gasket material or metal tape. Metal tape would require you leaving it in place, so for going back and forth from the garage door, an RF seal kit would be a necessity.

### Execute

The last part of our **EMP Protection Strategy** is to execute it. Get the supplies you need and do drill sessions with the members of your household so they know what to do in an

emergency. After the drills, look for ways you can improve. Also, be sure to incorporate into your EMP Protection Strategy a scheduled reassessment of your household once or twice a year. Ask yourself, have you acquired new items or had a change in the way your household operates in any way? Do you have more financial resources or a better understanding of how you can update your strategy?

Do the best you can with the money and time you have now and update as you can. But also incorporate a plan to purchase and install EMP protection devices in your cars, entire home, etc. as these are especially ideal for a robust defense of your home.

Though we couldn't discuss every single item or category in this month's Relay, there are lots of available expertise online. Also, be sure to view past issues of the Relay for suggestions on emergency preparedness in storms and civil unrest (especially cooperative plans with your entire neighborhood) and incorporate these into your strategy. And of course, in an EMP situation where everyone is susceptible at the same time. concerns for unified neighborhood protection, and home protections should be discussed. Understand what your protection strategy is for your family and live with the calm assurance that your are completely prepared.★



# Contest Calendar - November 2023

## Phone Weekly Test

+ Silent Key Memorial Contest

+ A1Club AWT

+ CWops Test

+ VHF-UHF FT8 Activity Contest

+ Mini-Test 40

+ Mini-Test 80

+ CWops Test

+ UKEICC 80m Contest

+ Walk for the Bacon QRP Contest

+ CWops Test

+ CWops Test

+ NRAU 10m Activity Contest

+ SKCC Sprint Europe

+ NCCC FT4 Sprint

+ NCCC RTTY Sprint

+ NCCC Sprint

+ K1USN Slow Speed Test

+ YB Banggai DX Contest

+ IPARC Contest, CW

+ Ukrainian DX Contest

+ ARRL Sweepstakes Contest, CW

+ IPARC Contest, SSB

+ EANET Sprint

+ High Speed Club CW Contest

0230Z-0300Z, Nov 1

0600Z-0859Z, Nov 1

1200Z-1300Z, Nov 1

1300Z-1400Z, Nov 1

1700Z-2100Z, Nov 1

1700Z-1759Z, Nov 1

1800Z-1859Z, Nov 1

1900Z-2000Z, Nov 1

2000Z-2100Z, Nov 1

0000Z-0100Z, Nov 2 and

0200Z-0300Z, Nov 3

0300Z-0400Z, Nov 2

0700Z-0800Z, Nov 2

1800Z-1900Z, Nov 2 (CW) and

1900Z-2000Z, Nov 2 (SSB) and

2000Z-2100Z, Nov 2 (FM) and

2100Z-2200Z, Nov 2 (Dig)

2000Z-2200Z, Nov 2

0100Z-0130Z, Nov 3

0145Z-0215Z, Nov 3

0230Z-0300Z, Nov 3

2000Z-2100Z, Nov 3

0000Z-2359Z, Nov 4

0600Z-1800Z, Nov 4

Cancelled for 2023

2100Z, Nov 4 to 0300Z, Nov 6

0600Z-1800Z, Nov 5

0800Z-1200Z, Nov 5

1400Z-1700Z, Nov 5

*Continued on Page 19*



# Contest Calendar - November 2023

<a href="#"><u>+ ICWC Medium Speed Test</u></a>	1300Z-1400Z, Nov 6
<a href="#"><u>+ OK1WC Memorial</u></a>	1630Z-1729Z, Nov 6
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	1900Z-2000Z, Nov 6
<a href="#"><u>+ RSGB 80m Autumn Series, Data</u></a>	2000Z-2130Z, Nov 6
<a href="#"><u>+ Worldwide Sideband Activity Contest</u></a>	0100Z-0159Z, Nov 7
<a href="#"><u>+ ARS Spartan Sprint</u></a>	0200Z-0400Z, Nov 7
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	0300Z-0400Z, Nov 7
<a href="#"><u>+ QRP Fox Hunt</u></a>	0200Z-0330Z, Nov 8
<a href="#"><u>+ Phone Weekly Test</u></a>	0230Z-0300Z, Nov 8
<a href="#"><u>+ A1Club AWT</u></a>	1200Z-1300Z, Nov 8
<a href="#"><u>+ CWops Test</u></a>	1300Z-1400Z, Nov 8
<a href="#"><u>+ Mini-Test 40</u></a>	1700Z-1759Z, Nov 8
<a href="#"><u>+ VHF-UHF FT8 Activity Contest</u></a>	1700Z-2100Z, Nov 8
<a href="#"><u>+ Mini-Test 80</u></a>	1800Z-1859Z, Nov 8
<a href="#"><u>+ CWops Test</u></a>	1900Z-2000Z, Nov 8
<a href="#"><u>+ CWops Test</u></a>	0300Z-0400Z, Nov 9
<a href="#"><u>+ CWops Test</u></a>	0700Z-0800Z, Nov 9
<a href="#"><u>+ EACW Meeting</u></a>	1900Z-2000Z, Nov 9
<a href="#"><u>+ NCCC FT4 Sprint</u></a>	0100Z-0130Z, Nov 10
<a href="#"><u>+ NCCC RTTY Sprint</u></a>	0145Z-0215Z, Nov 10
<a href="#"><u>+ QRP Fox Hunt</u></a>	0200Z-0330Z, Nov 10
<a href="#"><u>+ NCCC Sprint</u></a>	0230Z-0300Z, Nov 10
<a href="#"><u>+ K1USN Slow Speed Test</u></a>	2000Z-2100Z, Nov 10
<a href="#"><u>+ FISTS Saturday Sprint</u></a>	0000Z-2359Z, Nov 11
<a href="#"><u>+ PODXS 070 Club Triple Play Low Band Sprint</u></a>	0000Z, Nov 11 to 2359Z, Nov 13
<a href="#"><u>+ WAE DX Contest, RTTY</u></a>	0000Z, Nov 11 to 2359Z, Nov 12
<a href="#"><u>+ 10-10 Int. Fall Contest, Digital</u></a>	0001Z, Nov 11 to 2359Z, Nov 12

*Continued on Page 20*



# Contest Calendar - November 2023

[+ SARL VHF/UHF Analogue Contest](#)

[+ JIDX Phone Contest](#)

[+ OK/OM DX Contest, CW](#)

[+ SKCC Weekend Sprintathon](#)

[+ CQ-WE Contest](#)

[+ AWA Bruce Kelley 1929 QSO Party](#)

[+ North American SSB Sprint Contest](#)

[+ FIRAC HF Contest](#)

[+ K1USN Slow Speed Test](#)

[+ 4 States QRP Group Second Sunday Sprint](#)

[+ ICWC Medium Speed Test](#)

[+ OK1WC Memorial](#)

[+ ICWC Medium Speed Test](#)

[+ Worldwide Sideband Activity Contest](#)

[+ ICWC Medium Speed Test](#)

[+ DARC FT4 Contest](#)

[+ QRP Fox Hunt](#)

0300Z-0500Z, Nov 11 (6m) and

0501Z-0700Z, Nov 11 (2m) and

0701Z-0900Z, Nov 11 (70cm)  
and

0300Z-0500Z, Nov 12 (6m) and

0501Z-0700Z, Nov 12 (2m) and

0701Z-0900Z, Nov 12 (70cm)

0700Z, Nov 11 to 1300Z, Nov 12

1200Z, Nov 11 to 1200Z, Nov 12

1200Z, Nov 11 to 2400Z, Nov 12

1900Z-2300Z, Nov 11 (CW/  
Digital) and

0100Z-0500Z, Nov 12 (Phone)  
and

1900Z-2300Z, Nov 12 (Phone)  
and

0100Z-0500Z, Nov 13 (CW/  
Digital)

2300Z, Nov 11 to 0300Z, Nov 13  
and

2300Z, Nov 18 to 0300Z, Nov  
20

0000Z-0400Z, Nov 12

0700Z to 1700Z, Nov 12

0000Z-0100Z, Nov 13

0100Z-0300Z, Nov 13

1300Z-1400Z, Nov 13

1630Z-1729Z, Nov 13

1900Z-2000Z, Nov 13

0100Z-0159Z, Nov 14

0300Z-0400Z, Nov 14

1900Z-2000Z, Nov 14

0200Z-0330Z, Nov 15

*Continued on Page 21*



# Contest Calendar - November 2023

<a href="#"><u>+ Phone Weekly Test</u></a>	0230Z-0300Z, Nov 15
<a href="#"><u>+ A1Club AWT</u></a>	1200Z-1300Z, Nov 15
<a href="#"><u>+ CWops Test</u></a>	1300Z-1400Z, Nov 15
<a href="#"><u>+ Mini-Test 40</u></a>	1700Z-1759Z, Nov 15
<a href="#"><u>+ VHF-UHF FT8 Activity Contest</u></a>	1700Z-2100Z, Nov 15
<a href="#"><u>+ Mini-Test 80</u></a>	1800Z-1859Z, Nov 15
<a href="#"><u>+ CWops Test</u></a>	1900Z-2000Z, Nov 15
<a href="#"><u>+ RSGB 80m Autumn Series, SSB</u></a>	2000Z-2130Z, Nov 15
<a href="#"><u>+ Walk for the Bacon QRP Contest</u></a>	0000Z-0100Z, Nov 16 and 0200Z-0300Z, Nov 17
<a href="#"><u>+ NAQCC CW Sprint</u></a>	0130Z-0330Z, Nov 16
<a href="#"><u>+ CWops Test</u></a>	0300Z-0400Z, Nov 16
<a href="#"><u>+ CWops Test</u></a>	0700Z-0800Z, Nov 16
<a href="#"><u>+ NTC QSO Party</u></a>	1900Z-2000Z, Nov 16
<a href="#"><u>+ NCCC FT4 Sprint</u></a>	0100Z-0130Z, Nov 17
<a href="#"><u>+ NCCC RTTY Sprint</u></a>	0145Z-0215Z, Nov 17
<a href="#"><u>+ QRP Fox Hunt</u></a>	0200Z-0330Z, Nov 17
<a href="#"><u>+ NCCC Sprint</u></a>	0230Z-0300Z, Nov 17
<a href="#"><u>+ YO International PSK31 Contest</u></a>	1600Z-2200Z, Nov 17
<a href="#"><u>+ K1USN Slow Speed Test</u></a>	2000Z-2100Z, Nov 17
<a href="#"><u>+ SARL Field Day Contest</u></a>	1000Z, Nov 18 to 1000Z, Nov 19
<a href="#"><u>+ LZ DX Contest</u></a>	1200Z, Nov 18 to 1200Z, Nov 19
<a href="#"><u>+ All Austrian 160-Meter Contest</u></a>	1600Z-2359Z, Nov 18
<a href="#"><u>+ REF 160-Meter Contest</u></a>	1700Z-2400Z, Nov 18
<a href="#"><u>+ South American Integration Contest CW</u></a>	1800Z, Nov 18 to 2100Z, Nov 19
<a href="#"><u>+ RSGB 1.8 MHz Contest</u></a>	1900Z-2300Z, Nov 18
<a href="#"><u>+ Feld Hell Sprint</u></a>	1900Z-2059Z, Nov 18
<a href="#"><u>+ ARRL Sweepstakes Contest, SSB</u></a>	2100Z, Nov 18 to 0300Z, Nov 20

*Continued on Page 22*



# Contest Calendar - November 2023

[+ FISTS Sunday Sprint](#)

[+ Homebrew and Oldtime Equipment Party](#)

[+ Run for the Bacon QRP Contest](#)

[+ K1USN Slow Speed Test](#)

[+ ICWC Medium Speed Test](#)

[+ OK1WC Memorial](#)

[+ ICWC Medium Speed Test](#)

[+ Worldwide Sideband Activity Contest](#)

[+ ICWC Medium Speed Test](#)

[+ SKCC Sprint](#)

[+ Phone Weekly Test](#)

[+ A1Club AWT](#)

[+ CWops Test](#)

[+ Mini-Test 40](#)

[+ Mini-Test 80](#)

[+ CWops Test](#)

[+ CWops Test](#)

[+ CWops Test](#)

[+ RSGB 80m Autumn Series, CW](#)

[+ NCCC FT4 Sprint](#)

[+ NCCC RTTY Sprint](#)

[+ NCCC Sprint](#)

[+ K1USN Slow Speed Test](#)

[+ ARRL EME Contest](#)

[+ CQ Worldwide DX Contest, CW](#)

[+ Ham Spirit Contest, SSB](#)

[+ K1USN Slow Speed Test](#)

0000Z-2359Z, Nov 19

1300-1500Z, Nov 19 (40m) and

1500-1700Z, Nov 19 (80m)

2300Z, Nov 19 to 0100Z, Nov 20

0000Z-0100Z, Nov 20

1300Z-1400Z, Nov 20

1630Z-1729Z, Nov 20

1900Z-2000Z, Nov 20

0100Z-0159Z, Nov 21

0300Z-0400Z, Nov 21

0000Z-0200Z, Nov 22

0230Z-0300Z, Nov 22

1200Z-1300Z, Nov 22

1300Z-1400Z, Nov 22

1700Z-1759Z, Nov 22

1800Z-1859Z, Nov 22

1900Z-2000Z, Nov 22

0300Z-0400Z, Nov 23

0700Z-0800Z, Nov 23

2000Z-2130Z, Nov 23

0100Z-0130Z, Nov 24

0145Z-0215Z, Nov 24

0230Z-0300Z, Nov 24

2000Z-2100Z, Nov 24

0000Z, Nov 25 to 2359Z, Nov 26

0000Z, Nov 25 to 2400Z, Nov 26

0600Z, Nov 25 to 0559Z, Nov 26

0000Z-0100Z, Nov 27

*Continued on Page 23*

# Contest Calendar - November 2023

<a href="#">+ ICWC Medium Speed Test</a>	1300Z-1400Z, Nov 27
<a href="#">+ QCX Challenge</a>	1300Z-1400Z, Nov 27
<a href="#">+ OK1WC Memorial</a>	1630Z-1729Z, Nov 27
<a href="#">+ ICWC Medium Speed Test</a>	1900Z-2000Z, Nov 27
<a href="#">+ QCX Challenge</a>	1900Z-2000Z, Nov 27
<a href="#">+ RSGB FT4 Contest</a>	2000Z-2130Z, Nov 27
<a href="#">+ Worldwide Sideband Activity Contest</a>	0100Z-0159Z, Nov 28
<a href="#">+ ICWC Medium Speed Test</a>	0300Z-0400Z, Nov 28
<a href="#">+ QCX Challenge</a>	0300Z-0400Z, Nov 28
<a href="#">+ QRP Fox Hunt</a>	0200Z-0330Z, Nov 29
<a href="#">+ Phone Weekly Test</a>	0230Z-0300Z, Nov 29
<a href="#">+ A1Club AWT</a>	1200Z-1300Z, Nov 29
<a href="#">+ CWops Test</a>	1300Z-1400Z, Nov 29
<a href="#">+ Mini-Test 40</a>	1700Z-1759Z, Nov 29
<a href="#">+ Mini-Test 80</a>	1800Z-1859Z, Nov 29
<a href="#">+ CWops Test</a>	1900Z-2000Z, Nov 29
<a href="#">+ UKEICC 80m Contest</a>	2000Z-2100Z, Nov 29
<a href="#">+ CWops Test</a>	0300Z-0400Z, Nov 30
<a href="#">+ CWops Test</a>	0700Z-0800Z, Nov 30

Our thanks to **Bruce Horn, WA7BNM**  
for use of this calendar!

Visit Bruce at

## The ARAC RELAY



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