ARROWHEAD RADIO AMATEUR CLUB, INC. • DULUTH, MINNESOTA •

# The RELAY

October 2023

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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



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Kim & Steve Waller

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Autumn 2023

Join us on Facebook!

# Electromagnetic Pulses

## Part One: Overview

There's been chatter here and there about the risk of Electromagnetic Pulses (EMPs) to our national infrastructure and how the average citizen—and we as amateur radio operators—can mitigate and/or recover from such a threat. In this issue of the ***Relay*** we will submit to you Part One of our discussions of EMPs, with an overview of what they are. We'll also take a cursory look at assessing our equipment and devices in order to *begin* to form a strategy to protect ourselves. If you are a member of ARES or RACES, this subject may well have arisen in your meetings. If it has not, it is time to introduce the topic of EMP strategies for discussion.

In next month's ***Relay*** we'll continue with Part Two, in order to dive deeper into additional aspects of EMP preparedness. At the end of this article, we'll cite some links for you to read more from subject matter experts, whether you'd like to know the scientific testing and research of EMPs or if you'd prefer to be guided by video through various ways to shield your ham shack and home. This topic is far more scientifically complex and interwoven into our geopolitical world than we could address in this publication, so we encourage you to delve into it more deeply on your own in the weeks and months to come.

*Continued on Page 14*

Photo Credit: Freeimages.com

# ARAC Board of Directors

## PRESIDENT

**NØVRM**
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lspitech@mail.com

## VICE PRESIDENT

**KØDJP**
David Pyrlik

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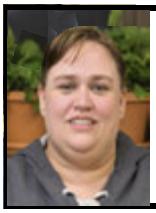
## SECRETARY



**KFØGJW**
Melinda Nelson

## TREASURER

**KEØYTM**
Sam Frey

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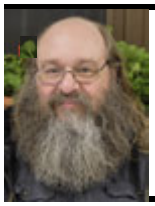
## 3RD YEAR BOARD



**AAØAC**
Dave Davis

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## 2ND YEAR BOARD

**AAØAW**
Doug Nelson

aaøaw@arrl.net

## 1ST YEAR BOARD

**WØDIO**
Denny Anderson

**No Minutes for the September 5th ARAC Board of Directors Meeting, as we did not have a quorum.**

**Latest Treasurer's Report, as also published in Setember 14th Club Meeting Minutes on page 3 of this issue:**

## Treasurer's Report:

| | |
|---|---|
| Checking: | $2,347.19 |
| Savings: | $3,575.93 |
| Repeater: | $3,319.30 |
| Subtotal Cash | $9,242.42 |
| | |
| Winter CD: | $1,736.49 |
| Summer CD: | $0.00 |
| Subtotal CD: | $1,736.49 |
| Assets Subtotal: | $10,978.91 |
| | |
| Minus Check Outstanding (1590) | $1,200.00 |
| Checks Subtotal | -$1,200.00 |
| **Grand Total** | **$9,9778.91** |

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

## September 14, 2023

**Present:**
President: Gene Ellefsen – N0VRM
Treasurer/Membership: Sam Frey – KE0YTM
Secretary: Melinda Nelson – KF0GJW
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: Randy Wabik – KR0B
Property/Picnic: Scott Ahlgren – N0VYU
HamFest/Education: Bob Schulz – KC0NFB

**Absent:**
Vice President: Dave Pyrlik – K0DJP
First Year Board: Dennis Anderson – W0DIO
Repeater: Dave Pyrlik – K0DJP
Chaplin:
Web Site: Thomas Dorr – KE0RHA
Newsletter/Historian: Kim Waller – KE0NQS
Newsletter/Historian: Steve Waller – KE0NQT

Meeting called to order at 19:06 (7:06 PM) by President Gene Ellefsen – N0VRM. Forty-six (46) 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: $2,347.19
Savings: $3,575.93
Repeater: $3,319.30
Subtotal Cash $9,242.42

Winter CD: $1,736.49
Summer CD: $0.00
Subtotal CD: $1,736.49
Assets Subtotal: $10,978.91

Minus Check Outstanding
1590 $1,200.00
Checks Subtotal -$1,200.00
**Grand Total** **$9,9778.91**

*Continued on Page 4*

Motion to accept as presented by Grant Forsyth – KC0WUP, seconded by Randy Wabik – KR0B, motion passed. Question from Bob Fleischman – KC0ZZL, are there any bills that are encumbered right now? Answer – No.

**Education:**
Bob Schulz – KC0NFB As of now we have 3 signed up on the roster. Another 7 that showed interest.

**Testing:**
Doug Nelson – AA0AW. 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.

**Repeater:**
Gene Ellefsen – N0VRM, we do have a new antenna for the 94 that Dave Pyrlik has gotten for us through DSCC. We may have to move our repeater for the 94 to a different room at the Channel 10 building.

We will be doing a raffle at Christmas with a Yaesu FT70D Handheld radio. This is a dual band fusion digital FM handheld Radio. Board passed, seconded by Bob Schulz – KC0NFB. Motion passed.

**New Business:**
- If you are a new ham please reach out to Sam Frey so we can get your name on a list to get you a name badge.
- Winter Field day coming up on the Last day of January, which will be held at Dave Davis - AA0AC's House.
- Looking for Nominations starting in October and closing at the end of November. We are looking for 1st Year Board Member, as well as any office if you show interest in. We are also looking for a nomination for the Thomas J Reibold W9IBM Memorial Award for someone who goes above and beyond to promote amateur radio here in the Twin Ports. If you know someone who deserves this please submit your nomination in writing to a board member starting October 1st.

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

Door Prize was won by Diane Saunders – K0DSL.

Motion to adjourn by Bob Schulz – KC0NFB, seconded by Grant Forsyth – KC0WUP PDG, motion passed at 19:21 (7:21 PM).

**CLUB REPEATER**
**WØGKP**

**146.94 (-)**
**CTCSS TONE**
**103.5**

# Prez Sez ...

**Hi Everyone,**

It is that time of the year we start accepting nominations for Club Officers. Positions open for nomination are President, Vice-President, Secretary, Treasurer, and First Year Board Member. If you are interested in one of these positions or want to nominate some else, please let one of the current Board Members know. Nominations close at the end of the November 9th ARAC club meeting . Also, we need nominations for the **Thomas Reibold W9IBM Award**, given to someone that is promoting Amateur Radio in the Twin Ports.

Additionally, we need to someone to take over the current First Year Board position, Denny Anderson is stepping down, so any one who can finish out the last 2 years of his term, please let any current Board Member know.

**RAFFLE RAFFLE RAFFLE !!!** We have not had a Raffle for a while, so we are Raffling off a **Yaesu FT-70DR** handheld radio. It is a dual band with C4FM mode. Tickets will go on sale at the October Club Meeting and the radio will be given out at the December meeting. **Tickets are $1.00!**

Thanks,
**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 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.**

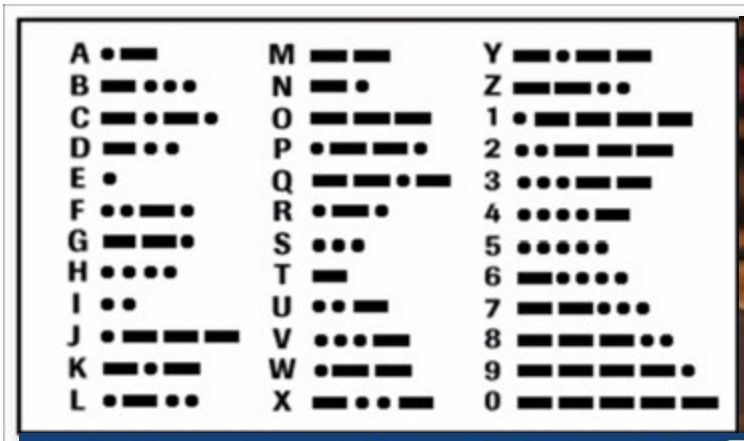
**Not Currently Licensed? For New License Candidate FRN registration, go to:**
**www.fcc.gov/new-users-guide-getting-started-universal-licensing-system-uls**

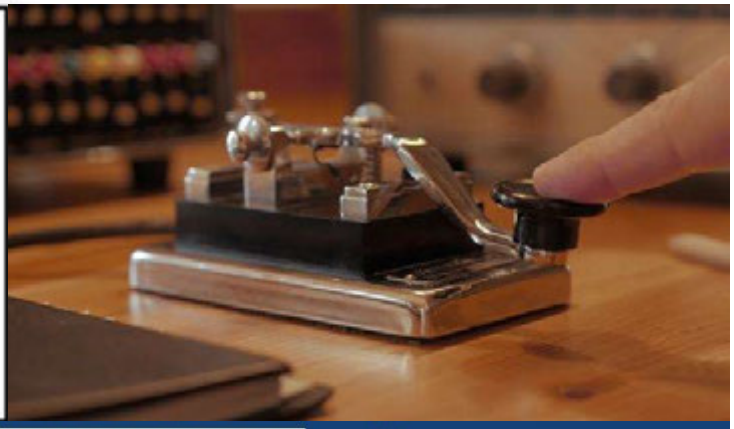
**Upgrading to General or Expert Class & not sure you have an FRN number? go to**
***https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp***

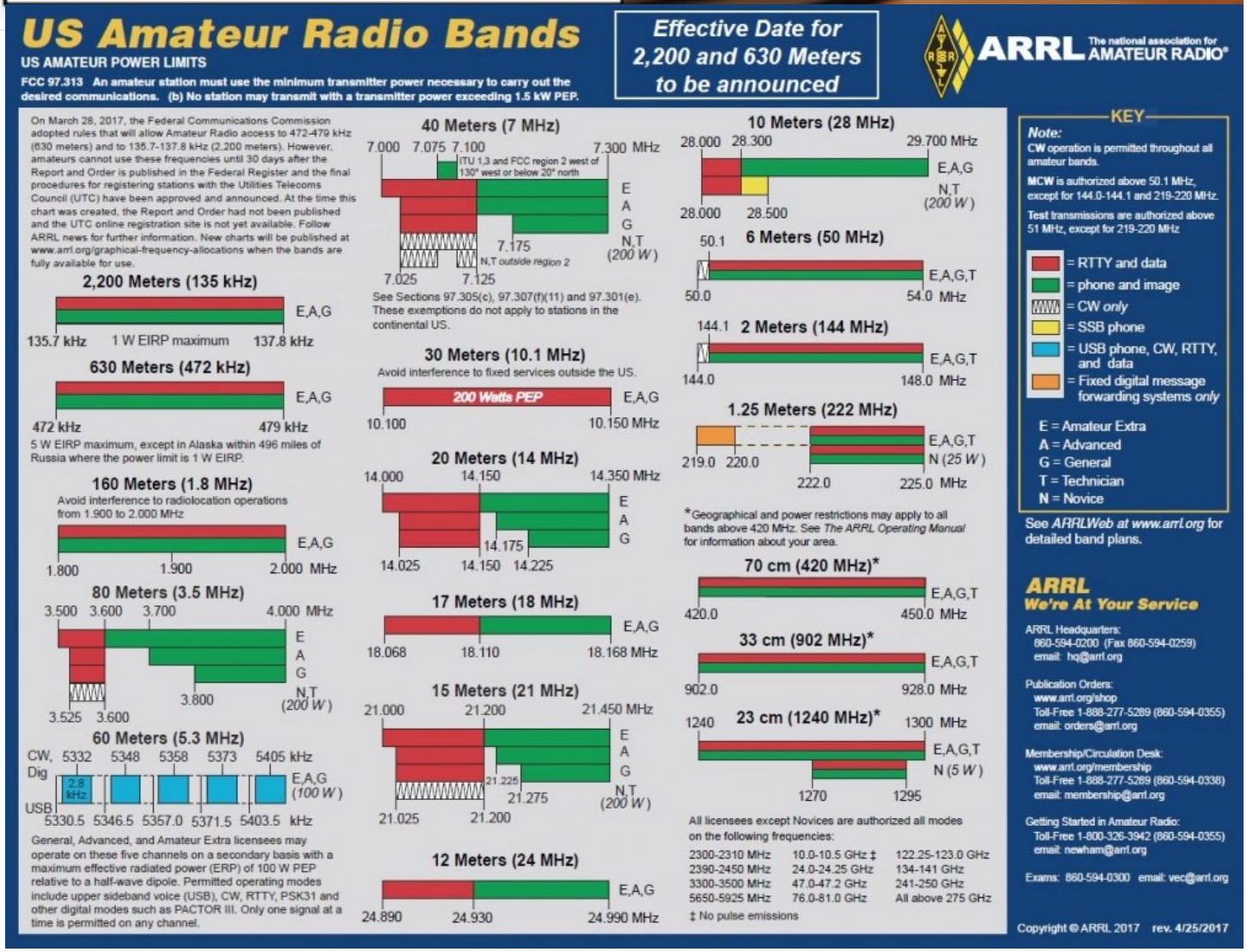
***UPGRADE CANDIDATES:***
***Please bring a copy of your current license to the exam session.***

# 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 | |





# NETS

Have a favorite HF/6m/2m/1.25m/7Øcm 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 2ØØØ on the ARAC repeater (146.940 MHz with a tone of 103.5 and standard offset).
- **Minnesota D-Star Net:** Sundays at 19:3Ø on Reflector 53A
- **Minnesota Section Net** 12ØØ and 173Ø on 3.86Ø [Net Manager: NØYR] http://www.mn-section.org/dept_stm.html
- The non-non-net: Evenings 2ØØØ 144.2ØØ USB except for Sunday evenings.
- Badger WX Net: Ø5ØØ-Ø715 on 3.985. Give 24 hour high/low/current temperature, precipitation and snowfall.
- **PICONET**: 3.925 from Ø9ØØ-11ØØ CT Mon-Sat and 16ØØ-17ØØ CT Mon-Fri. Info at: http://www.piconet3925.com
- Michigan Upper Peninsula Net: 16ØØ (CST) on 3.921 MHz Sun-Sat and 12ØØ Sun. Info: http://www.michupnet.com
- Great Lakes Marine/Maritime Mobile Net: Morning Ø7:3Ø - 3.932; Ø8:15 - 7.261 MHz and evening 18:3Ø - 3.173Ø927; 19:15 - 7.268 MHz. Weekend extra net: 1Ø:ØØ - 7.261/7.268 MHz. All CST, LSB and +/- QRM. See: http://www.sailblogs.com/member/glmmnet/
- MIDCARS: Ø7:3Ø-13:ØØ - 7.258 MHz. See: http://www.midcars.net
- Iowa snowbird net on 14.257MHz, M-W-F at 1Ø:ØØ am Local Time. This is an open net.
- Spider Web Net (Marco Island FL) on 14.347 every morning at Ø73Ø CST/CDT: http://www.spiderwebnet.net
- Maritime Mobile Service Network: Daily at 11ØØ—21ØØ Central on 14.3ØØ. http://mmsn.org and http://www.143ØØ.net
- RV Radio Network: Every day at 19ØØ Central on 7.265 MHz. Web site: http://www.rvradionetwork.com
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.48Ø MHz USB
- Wisconsin Sideband Net: Daily @ 5:15 PM – 3985 [or 3982.5] KHz LSB
- Hobby Helpers Net - Tuesday @ 8 PM – 28.33Ø MHz USB (Isanti MN) LSB [Net Manager: WOØA].
- Northstar Trader Net: 3.9Ø8 +/- at Ø83Ø CST Sundays
- WARFA: 3.9Ø8 +/- Sun/Tue/Thu nights at 22ØØ CST, http://warfa.org/
- Youth Net: 14.32Ø-1433Ø Sundays 18ØØ-19ØØ UTC, Net Control: AC8PI
- YACHT: Saturdays 19ØØ CST on EchoLink #481872, http://yachthams.webstarts.com
- Northwestern Ontario ARES Net: Evenings at 2Ø:15 (Central) on +/- 3.75ØMhz
- The Iron Range Net: Saturdays at Ø8ØØ Central time on or near 3.919 Mhz. Look them up on Facebook!
- FORX Net: Mondays at 19ØØ Central at 3.941 Mhz +/- QRM. WAØJXT — Grand Forks, North Dakota
- HF CW: Fridays Ø8:ØØ CST, 7.112 MHz. Informal slow speed CW Net. W8IRT NCS. Email: w8irt@aol.com
- Minnesota ARES Digital Net: Thursdays at 2ØØØ CST, 3.5835 MHz USB +/- QRM, Mode: Olivia 8/5ØØ.
- SARA Digital Net: Sundays at 19ØØ Local, 3.582.15Ø MHz USB +/- QRM, Mode: BPSK31/BPSK63
- Spider Web Net (Marco Island FL): 14.347 every morning at Ø73Ø CST/CDT: http://www.spiderwebnet.net
- Broadcaster Net: 7.231 or 3.855 M/W/F @ 15ØØ UTC. 14.255 M-F @ 213Ø UTC. http://www.cbsretirees.com/ham.htm
- Old Military Radio Net: 7.268 +/- nightly at Ø2ØØz. Other times/Frequencies too. See: http://www.mrca.ar88.net/
- Rag Chew Crew/Tailgaters/Freewheelers Nets: 3.916 +/- nightly at 19ØØ CST, http://www.tailgatersnet.com
- North South Net: 7.214.6 +/- at Ø7ØØ 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)

**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 |

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

*Continued on Page 9*

# 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 / ɛl-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

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**Brian** **KB9KUX**
**Chris** **KB9WJQ**
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**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***

**SUNDAY NIGHT NETS**
193Ø - **CW - 28.125 MHz USB-CW**
2ØØØ -**USB 28.45Ø MHz**
21ØØ - **Southern St. Louis County Emergency Services Net**

**MONDAY NIGHT NETS**
2ØØØ- **Northland WX Net -** ARAC Repeater

# OCTOBER
## CLUB EVENTS

**TUESDAY NIGHT NETS**
2ØØØ -**Douglas Cty 145.49Ø MHz**
2Ø3Ø -**Central Carlton County**

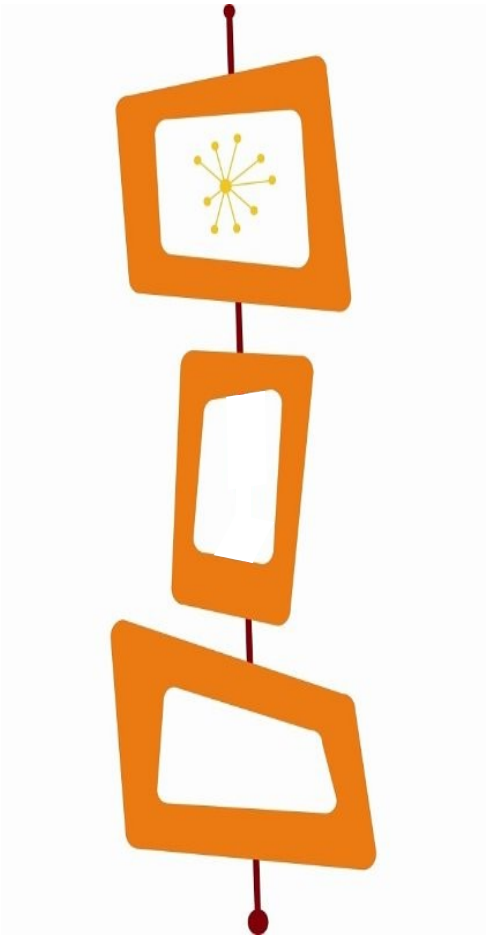
**WEDNESDAY NIGHT NETS**
19ØØ -**Lake County - LSAC1**
**2nd & 4th Wednesdays**
21ØØ -**BWAR**

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| 1<br>CW 1930 AAØAW<br>USB 2000 KB9WLB<br>ES 2100 KØDSL | 2 | 3<br>ARAC BOARD MEETING<br>Sammy's Pizza<br>6:30 pm<br>DC Net 2000<br>CC Net 2030 | 4<br>21ØØ -**BWAR** | 5 | 6 | 7 |
| 8<br>CW 1930 NØPDG<br>USB 2000 K9KDK<br>ES 2100 KD9VKI | 9<br>DC ARES/ RACES Mtg 1900 DC EOC<br>WX 2000 KCØMKS | 10<br>DC Net 2000<br>CC Net 2030 | 11<br>Lake County ARES/RACES Meeting 1800<br>Lake County Net 1900<br>21ØØ -**BWAR** | 12<br>ARAC<br>Club Meeting<br>Coppertop Church<br>7:00 PM | 13 | 14 |
| 15<br>CW 1930 AAØAW<br>USB 2000 NØVRM<br>ES 2100 KCØWDQ | 16<br>DC ARES/ RACES Mtg 1900 DC EOC<br>WX 2000 KCØMKS | 17<br>DC Net 2000<br>CC Net 2030 | 18<br>St Louis County ARES/RACES Meeting 1800<br>21ØØ -**BWAR** | 19 | 20 | 21 |
| 22<br>CW 1930 NØPDG<br>USB 2000 NØPDG<br>ES 2100 WØNWO | 23<br>WX 2000 KCØMKS | 24<br>DC Net 2000<br>CC Net 2030 | 25<br>Lake County Net 1900<br>21ØØ -**BWAR** | 26<br>Carlton County ARES/RACES Meeting 1900 CC EOC | 27 | 28<br>ARAC<br>Club<br>Breakfast<br>The Chalet<br>8 am |
| 29<br>CW 1930 AAØAW<br>USB 2000 AAØAW<br>ES 2100 NØVRM | 30<br>WX 2000 KCØMKS | 31<br>HAPPY HALLOWEEN!<br>DC Net 2000<br>CC Net 2030 | | | | |
| | | | | | | |

**Get this newsletter *faster* via email!**
**Email Doug AAØAW at**
***aaØaw@arrl.net***

**Next Club Meeting:**
**Thursday,**
***October 12th, 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**

**National Contest Journal at 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**
**VHF Propagation site at 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.**

# 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 |

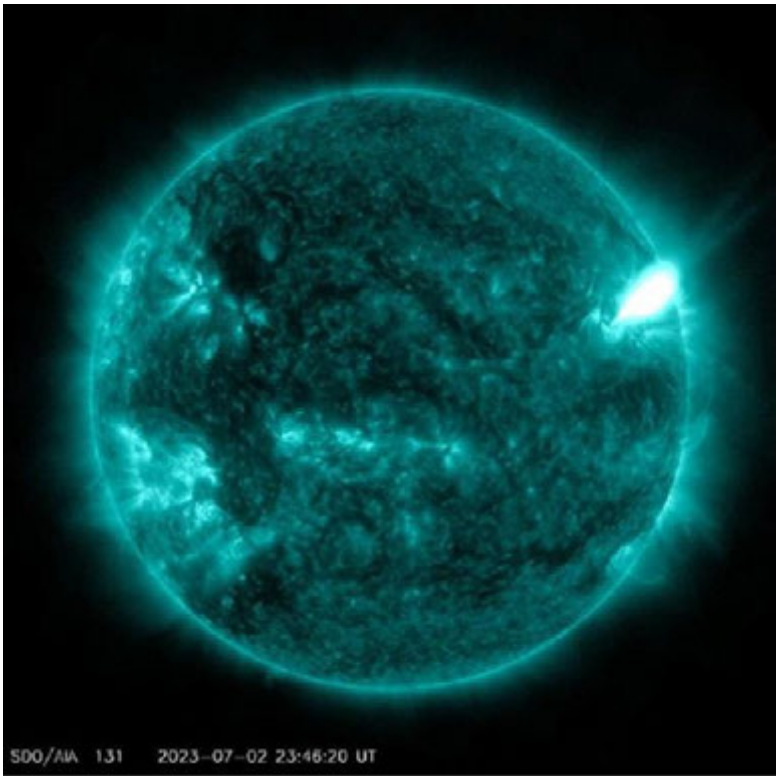
As for an overview of what EMPs actually are, here we go:

**Electromagnetic Pulses** are bursts of electromagnetic energy that can come from either a natural source or an artificial source. These bursts of energy can disrupt communication and damage or destroy electronic equipment. Each of these 3 Ds—**disrupt, damage, destroy**—come with distinct strategies for preparedness and/or recovery.

**Lightening** is a common natural source of EMPs on Earth, so we've learned to install surge protectors, whether whole-house or individual device, to divert that surge of energy safely into the ground. Most American households have surge protection at very least for our computers and TVs, and many people surge protect their appliances too.

**Solar Flares** are another naturally-occurring EMP. In July of this year, a solar flare occurred that caused radio signal blackouts on earth. Peaking at 7:14 p.m. EST on July 2nd, NASA reported that the flare erupted from a sunspot that was seven times the width of Earth. The top of Earth's atmosphere was ionized from the solar flare's radiation, and according to Spaceweather.com, this resulted in a "deep radio shortwave blackout over western parts of the U.S. and Pacific Ocean." The radio blackout was 30 minutes in duration.

**How are solar flares formed?** Well, Space.com says that when "magnetic fields around sunspots become tangled, break and then reconnect, in some cases" (as in the July 2023 flare) "plumes of plasma can also be part of the process."




**NASA's Solar Dynamics Observatory captured an image of the July 2023 solar flare event, which showed a bright flash in the top right area of the sun. The flare was classified as a X1.0 flare, which means it is in the most intense class of flares, according to the agency.**

Since 2019, the sun has been in **Solar Cycle 25**. These cycles last 11 years, and the National Weather Service originally forecast that Cycle 25 sunspot activity would peak in 2025.

In June 2023 however, researchers reported that the Cycle 25 had "ramped up much faster, with more sunspots and eruptions than experts had forecast." As such, since experts say the sun has entered a period of increased sunspot activity that could last several years, it's a good idea to watch for any solar flare alerts from sources like **Spaceweather.com**, **NASA**, the **National Oceanic & Atmospheric Administration**, as well as the **National Weather Service**.

That is because as sunspots become more active all over the sun's surface, this could create solar storms, even ones that are strong enough to damage our power grid and interrupt the global positioning satellite systems we rely upon.

Matthew Owens, a professor of Space Physics at the University of Reading in

*Continued on Page 15*

London, was interviewed in February 2023 by Marianne Guenot of ***Business Insider*** on the subject of increased solar activity. *To read the entire article on Business Insider's site, go to:* **https://www.businessinsider.com/sun-more-active-solar-storms-auroras-power-outages-grounded-flights-2023-2**

In that interview Professor Owens made the following comments:

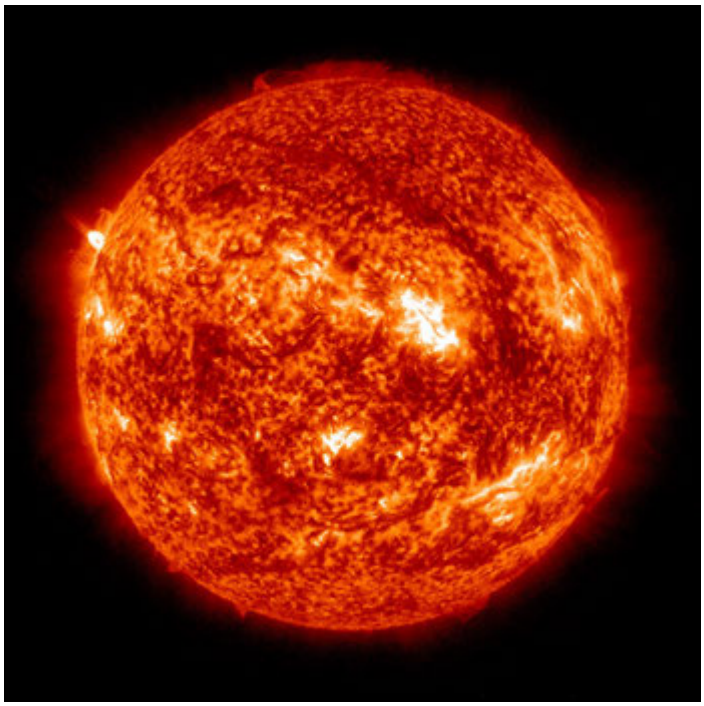
- Every 11 years, the sun becomes "convectively unstable," meaning its magnetic fields become so unstable that the magnetic north and south poles abruptly flip, throwing our star's polarity out of whack.
- As the magnetic fields become more confused, bigger sun spots can appear on the surface of the sun.
- Space weather can ground flights, as the Federal Aviation Administration won't allow flights if they don't have both radio and satellite communications.
- One damaged transformer won't cause much of an issue. But a huge geomagnetic storm heading toward Earth — a storm so big it would "probably give us aurora down to the equators" — could cause several transformers to go at once, or overwhelm other transformers that could then blow up, knocking out the whole grid. In that case, restarting the grid "could be a matter of weeks or even months."

The concern about protecting our power grid from damage *is* at the forefront for those charged with maintaining the 3 separate U.S. grids that work together to form what we'd consider "The Grid." These grids are self-contained interconnections of power production and transmission referred to as the Eastern, Western, and Texas interconnections.

Our grid has been called "the largest machine in the world", made up of eleven thousand power plants, three thousand utilities, and over two million miles of power lines.

As you'd expect, hardening our power grid infrastructure against EMPs includes installing surge protectors, grounding equipment, and shielding critical components and control systems.

Also key is developing robust situational awareness and response capabilities that include sophisticated monitoring and detecting of potential EMP threats, and establishing a detailed plan to rapidly respond and recover from an EMP event.



**NASA's Solar Dynamics Observatory posted this image of sunspot activity on October 6th, 2023.**

**Now turning our discussion to EMP threats that are artificial**. These EMPs are weapons designed to disrupt, damage or destroy our electrical and electronic equipment. There are essentially two classes of EMP weaponry: Non-nuclear and Nuclear. Wikipedia has some excellent definitions of these, so we'll begin there.

**Non-nuclear electromagnetic pulse** (**NNEMP**) is a weapon-generated electromagnetic pulse without use of nuclear technology. Devices that can achieve this objective include a large low-inductance capacitor bank discharged into a single-loop antenna, a microwave generator, and an

*Continued on Page 16*

explosively pumped flux compression generator. To achieve the frequency characteristics of the pulse needed for optimal coupling into the target, **wave-shaping circuits or microwave generators** are added between the pulse source and the antenna. **Vircators** are vacuum tubes that are particularly suitable for microwave conversion of high-energy pulses.

**NNEMP** generators can be carried as a payload of bombs, cruise missiles (such as the CHAMP missile) and drones, with diminished mechanical, thermal and ionizing radiation effects, but without the consequences of deploying nuclear weapons.

OK, yours truly is trying ***not*** to go down the rabbit hole of military aviation, which I love. But a tiny sidebar here: The **CHAMP** missile stands for **Counter-electronics High Power Microwave Advanced Missile Project.** This project began in 2009 and was developed by Boeing Defense, Space and Security in cooperation with the Air Force Research Laboratory. For the past few years, CHAMP has been executing its mission to deliver non-nuclear EMPs directed at targets deemed a threat, deployed from a U.S. military aircraft. These are blasts of microwave energy that destroy electronics very effectively without other collateral damage. With the capacity to deliver 100 shots per sortie, CHAMP is a highly efficient advanced electronic warfare tool that's retrofitted for current aircraft. Our military does not disclose how many aircraft are currently equipped with CHAMP.

CHAMP is "light-years" ahead of the beloved **A6 Prowler** first developed by Grumman (now Northrop Grumman) in 1968. Derived from Grumman's rugged all-weather A6 Intruder attack aircraft, A6 Prowlers were **electronic warfare (EW)** aircraft used by our Air Force, Navy and Marines. Their mission was to effectively jam targeted electronics to disrupt their operational capability, or to send deceptive spoof signals to confuse enemy devices. They also played an important role in signals intelligence, which, as it indicates, is intelligence-gathering by interception of signals. The last iteration of the Prowler was the EA-6B ICAP III version, carrying the ALQ-99 Tactical Jamming System and it was retired by the U.S. Marines on 8 March 2019.

Just as prior EW programs like the EA-6B Prowler were an important tool in maintaining air superiority anywhere it was deployed, CHAMP paved the way for the next generation of EW weaponry, which in technology generations, is already here.

While CHAMP is currently in use, its successor was developed by a joint effort between Air Force Research Laboratory and Office of Naval Research. The **High-Powered Joint Electromagnetic Non-Kinetic Strike Weapon (HiJENKS)**, uses smaller and more rugged high-powered microwaqve (HPM) technology that can be integrated on a wider range of carrier systems.

**Two U.S. Navy EA-6B Prowlers over Turkey flying in support of Operation Northern Watch, 2002. Camera Operator: TSGT CECIL D DAW JR, USAF**

The electromagnetic pulse from NNEMP weapons must come from within the weapon, while nuclear weapons generate EMP as a secondary effect. These facts limit the range of NNEMP weapons, but allow finer target discrimination. The effect of small e-bombs has proven to be sufficient for certain terrorist or military operations. Examples of such operations include the destruction of electronic

*Continued on Page 17*

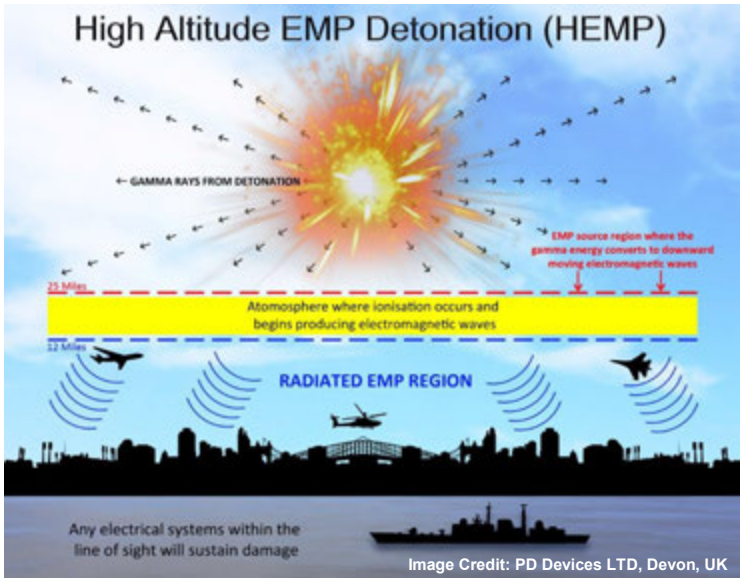
control systems critical to the operation of many ground vehicles and aircraft.

The concept of the explosively pumped flux compression generator for generating a non-nuclear electromagnetic pulse was conceived at least as early as 1951 by Andrei Sakharov in the Soviet Union. Due to the nature of military secrets, it is hard to be certain who was actually first. Many countries were already working on non-nuclear EMP research and development as the knowledge of this technology began to emerge to the general public. Moving ahead in our discussion to the kind of EMP attack that concerns us most: One of **nuclear** origin.

**A nuclear electromagnetic pulse** (**NEMP**) is the abrupt pulse of electromagnetic radiation resulting from a nuclear explosion. The resulting rapidly changing electric fields and magnetic fields may couple with electrical/electronic systems to produce damaging current and voltage surges.

The intense gamma radiation emitted can also ionize the surrounding air, creating a secondary EMP as the atoms of air first lose their electrons, and then regain them. NEMP weapons are designed to maximize such EMP effects as the primary damage mechanism, and some are capable of destroying susceptible electronic equipment over a wide area.

A **High-altitude Electromagnetic Pulse** (**HEMP**) weapon is a NEMP warhead designed to be detonated far above the Earth's surface, up 19 miles (30 km) or more. The explosion releases a blast of gamma rays into the mid-stratosphere, which ionizes as a secondary effect and the resultant energetic free electrons interact with the ***Earth's magnetic field*** to produce a much stronger EMP than is normally produced in the denser air at lower altitudes.




A HEMP consists of 3 phases (called E1,E2,E3) in succession that take place in fractions of a second. The phases most damaging to electrical infrastructure and electronics are E1 and E3. To read the break-down of how and why, see the links to the **Metatech** white papers at the end of this article that discuss HEMPs in detail. These are essential reads in my opinion, but you be the judge.

Most experts agree that if a HEMP attack were to occur over the U.S. any unprotected electronic equipment in the affected area would be damaged or destroyed. Opinions differ on the extent of the damage to various types of things, but objects with circuit boards and chips are expected to be inoperable.

In the geographically affected area, modern cars, cell phones, computers, TVs, and appliances would not work unless they had been properly shielded. It is important to understand that in a HEMP attack, the damage would vary in degree depending on how far you are from “ground zero” and in what direction. The image above indicates damage to electrical systems within the line of sight, but our illustration on page 18 shows how the intensity at ground zero (or the “eye” precisely below the point of the detonation) is essentially almost null. The highest intensity of damage would occur in the small red crescent (smile pattern), then moving out from there, a larger yellow crescent with less intense damage. From there, concentric circles of green, then blue, then purple, represent successively fading intensity of possible damage. This is helpful in understanding the likely damage pattern of an HEMP attack on our power grids in particular. As we look at the map of our three U.S.

Continued on Page 18

power grids—Eastern, Western and Texas (See below), we see that the Omaha "ground zero" and the intense smile pattern in our HEMP attack example is in the Eastern Interconnection power grid, with the other two power grids experienced nominal damage or none. As mentioned earlier, the private-public network of entities who protect and maintain our grids are actively pursuing shielding from the threat of EMPs, including bunkering replacement parts and supplies to repair components in such an attack.

On March 26, 2019 President Trump signed Executive Order entitled ***Coordinating National Resilience to Electromagnetic Pulses*** to intensely pursue infrastructure hardening from the threat of EMPs. This Order is still functioning today with the areas of responsibility and timelines as written. Read the order at this address:
***https://trumpwhitehouse.archives.gov/presidential-actions/executive-order-coordinating-national-resilience-electromagnetic-pulses/***

That brings to the point where we ***begin*** to discuss what we can do to protect ourselves. In next month's Relay, Part Two will explore much more in depth by looking at various aspects of shielding for a variety of devices in our lives, as well as making a detailed **EMP Protection Strategy** for our households. That strategy will consist of 3 components: Assess, Plan, Execute.

Within that strategy are two essential aspects that we will begin to talk about today:

- Procurement and Storage of Key Replacement parts and accessories for our devices
- Faraday Protection

## Key Replacement Parts & Accessories

In a word, **Redundancy**. In the Assessment phase of your EMP Protection Strategy you'll look at essential devices in your life to understand which ones have circuit boards, switches, etc. that you can replace with back up parts you have shielded separately.

This will potentially take some research on your part, but do it. Ask others, consult the

*Continued on Page 19*

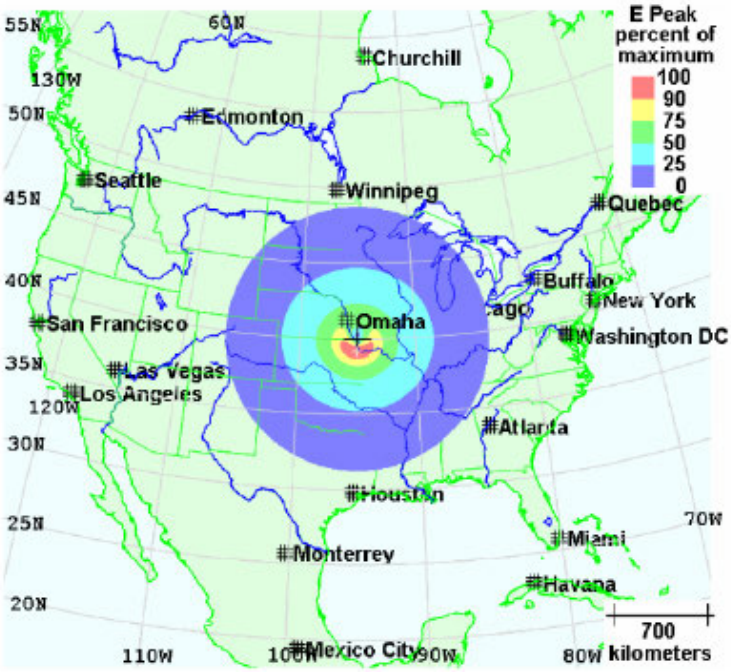
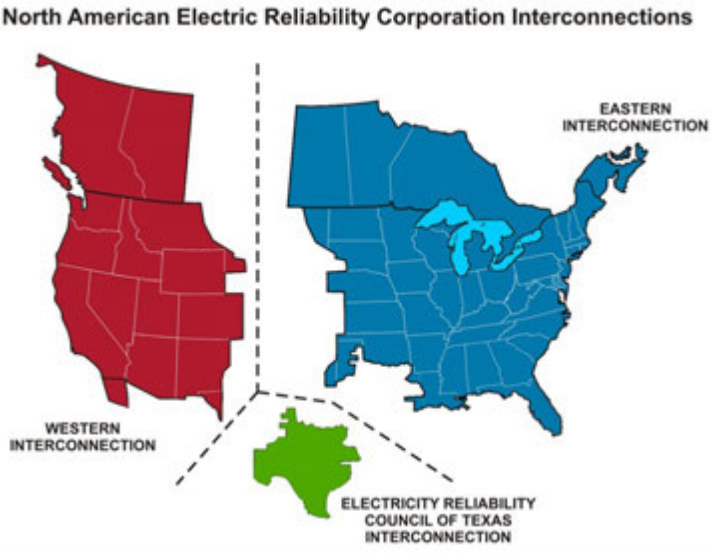



**Image & Description from Metatech R-320 HEMP whitepaper, p. 14:**
**A Sample E1 HEMP "smile" diagram. Such diagrams show contour of peak incident E levels, for a burst height of 46.6 miles (75 km) in this example. Here contour level are shown as fractions of the biggest peak level (which is to the south of the burst point for this northern latitude burst). Over the exposed region, the average value is 10.4% of the maximum (12.4% if we use the square root of the average of the peak instead).**



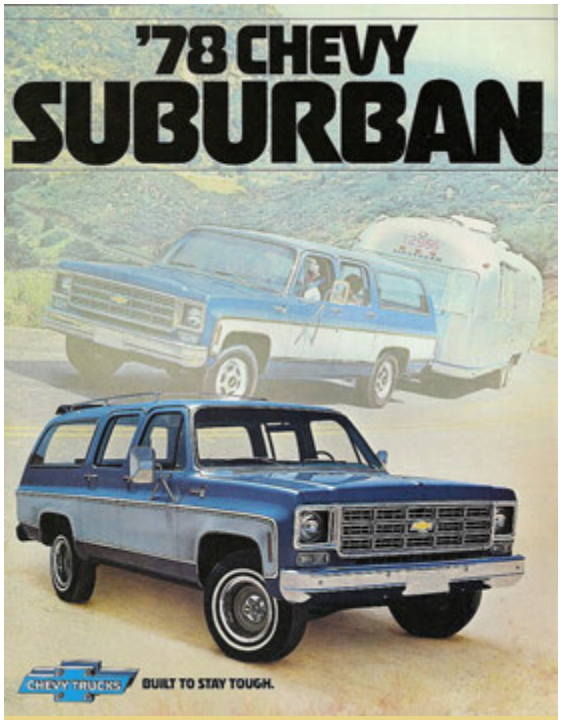
internet, look at tech manuals you may have on hand, but do it. Find out if these parts are available for your crucial items and order them. Alternatively, you may need to consider purchasing another of the same device if replacement parts are not available or the device is not serviceable.

For example on your portable power generator, you may be able order spare electronic parts (if applicable) that you can shield in a separate Faraday device. The generator itself should also be protected by building a Faraday shield around it. You could remove vulnerable parts beforehand if you rarely use the generator, but if you need it fast in a "simple" power outage in a storm, having to install parts would potentially be a hassle. If you have 2 portable generators, even better.

Now speaking of redundancy, also think in terms of redundant ***function***, rather than redundant identical devices. With regard to transportation, it would be ideal to have a old car without electronics. Experts agree that many modern cars could survive an EMP with minimal damage (and be very repairable) and perhaps no damage—unless they are in the strongest "smile" zone of a strike. Even then, the cars would likely be worth repairing, but there'd be a wait on parts and appointments. For your consideration however, cars with internal combustion engines made before the 1980's had distributors and points for ignition instead of electronic ignition. Having a good running old "boat" of a car with a full tank of gas is excellent if you can. Ladies & gentlemen, this is your chance for making the case to your spouse that you ***need*** a classic car if you don't already have one! You don't have to spend a bunch of money necessarily, even one that looks scrappy but runs will work. Bonus: The old car's gas tank can "double" as your reserve fuel tank for your generators, etc. ***But make sure the gas tank is in good shape and not rusty***! If it **is** rusty, you absolutely **can** clean it and seal it if you need to, instead of replacing it. See links at the end of this article for a couple of options.

**Fuel Tank Capacity**

And if you are going to buy an old car, look up the size of the fuel tank as a consideration in your decision. Current cars have fuel tanks with a typical capacity of 18-20 gallons. So if you buy an old car, there's a certainly a possibility it's even bigger. My 1961 Lincoln Continental has a nice big 24 gallon fuel tank, but the largest capacity tank I know on a pre-1980 vehicle without electronic ignition is a 1978 Chevy Suburban at a truly whopping 40 gallons (see official ad below for this beast; I couldn't resist). I don't own one of those, but that is seriously impressive! Though the Suburban would go on to have 42 gallon tanks in the 1990's, they all have electronic ignition.



*40 Gallon Fuel Tank! Plus 305 V8 or 350 V8 Options*

**Batteries**

Experts agree that batteries, including your car batteries will withstand an EMP just fine. Engineer Andy Duffy, who regularly posts on the forum ***Quora*** says this:

"Generally speaking, batteries are one of the most robust electrical components. Many of them such as car starter batteries are designed to handle very high currents for short periods, just like you get from an EMP. These would be *entirely* unaffected, and would just laugh at the EMP.

"However, there are some batteries that have electronic circuitry built in. These could potentially be damaged.

"As a general rule when you're talking about risk from EMP or rogue transients your *electrical* components

*Continued on Page 20*

(batteries, motors, contactors, wiring, etc.) are built tough enough to handle it, but it's the dinky *electronics* (printed circuit boards, chips, etc.) that are at risk. Basically anything that miniaturized and made from silicon could be fried, the big stuff won't."

We'll talk more about ideas for functional work-around of your critical devices & their components in the November ***Relay***. In the meanwhile, we turn to an overview of Faraday protection:

### What does Faraday even mean?

**Michael Faraday**, one of the world's greatest experimental physicists, is known as the father of the electric motor, electric generator, electric transformer, and electrolysis. He wrote the "**Law of Induction**" and went on to invent the **Faraday Cage** in 1836.

A **Faraday cage** or **Faraday shield** is an enclosure used to block electromagnetic fields. A Faraday shield may be formed by a continuous covering of conductive material, or in the case of a Faraday cage, by a mesh of such materials.

A Faraday cage operates because an external electrical field causes the electric charges within the cage's conducting material to be distributed so that they cancel the field's effect in the cage's interior. This phenomenon is used to protect sensitive electronic equipment (for example RF receivers) from external radio frequency interference (RFI) often during testing or alignment of the device.


**Faraday Defense 5 pc Kit NEST-Z Faraday Bag EMP/Solar-Flare Prepper Ultra Thick - Military Grade Design, Superior Shielding Performance $47.99 on Amazon.com**

Faraday cages cannot block stable or slowly varying magnetic fields, such as the Earth's magnetic field (a compass will still work inside). To a large degree, though, they shield the interior from external electromagnetic radiation if the conductor is thick enough and any holes are significantly smaller than the wavelength of the radiation. Electromagnetic shielding enclosures provide less attenuation of outgoing transmissions than incoming. They can block electromagnetic pulse (EMP) waves from natural phenomena very effectively, but a tracking device, especially in upper frequencies, may be able to penetrate from within the cage (e.g., some cell phones operate at various radio frequencies so while one frequency may not work, another one will).

Looking over your devices, you might decide to purchase commercial Faraday shield products for some items and make your own Faraday box for other harder to fit items. Bags that shield phones, vehicle key fobs, remotes, and small spare circuit boards or computer chips are relatively inexpensive on the internet. Just be sure to buy from a reputable source and that the product info says it is for EMP protection in the description.

There are also good quality materials readily available, such as heavy duty foil tape, heavy duty foil, and copper or copper/nickel heavy duty Faraday fabric by the yard, to aid you in building your own Faraday container. YouTube instructions on making your own Faraday protection items are easily found in a search. We've enclosed link info on one such popular video in our Suggested Reading list at the end of this article. It is important that we understand that assembling Faraday shields ***does***

*Continued on Page 21*

constitute adapting our daily routine a bit, as an EMP could come with no warning. That means converting your existing laptop bag to a Faraday one, putting your phone and key fobs in a Faraday bag in your pocket or backpack, putting your phone and key fobs in a Faraday case or bag next to you at night. Though we understand that electricity, and thus WiFi and cell towers, will likely be down for some areas in an EMP, having your devices get through unscathed is obviously preferable, since repairs will be made and service will be available again to those of us with working devices.


**TOP LEFT:**
**Mission Darkness Faraday Bag 2-Pack for Key Fobs—$15.00** on Amazon.com

**TOP RIGHT:**
**Samfolk Faraday Box with Faraday pouch 2-Pack—$20.99** on Amazon.com

**BOTTOM LEFT:**
**Mission Darkness Military Grade Faraday Duffle with detachable pouch—$299.00** on Amazon.com

**BOTTOM RIGHT:**
**Mission Darkness Dry Shield Faraday Tote—$90.00** on Amazon.com

**EMPs are a scary subject for most people.** But as we examine the data, we can make a plan to prepare ourselves in the best way possible, then live our lives without fear. In the next ***Relay***, we'll drill down to examine more devices, methods, and best practices in making an EMP Protection Plan for our households.

We'd love to hear your submissions on specific things you've done, or are considering, for EMP protection that we can incorporate into Part Two for Club Members to think about. Are you a subject matter expert in energy, physics, electronics, or aerospace? Let us know your take on EMP preparedness at ke0nqs.mn@gmail.com See you next time!★

## SUGGESTED READING

**An Intro to Electromagnetic Pulse** by Jerry Emanuelson BSEE **- Future Science LLC** https://www.futurescience.com/emp.html

**Metatech white paper 320 - The Early-Time (E1) High-Altitude Electromagnetic Pulse and Its Impact on the U.S. Power Grid**
https://www.futurescience.com/emp/ferc_Meta-R-320.pdf

**Metatech white paper 324 - High-Frequency Protection Concepts for the Electric Power Grid**
https://www.futurescience.com/emp/ferc_Meta-R-324.pdf

**YouTube Video - 3 Ways to Build a Faraday Cage - DIY Prepper 11:40** minutes https://www.youtube.com/watch?v=8-dEDCsYTKM

**JD Power Guide: How to Clean Rust from a Gas Tank**
https://www.jdpower.com/motorcycles/shopping-guides/how-to-clean-rust-out-of-a-gas-tank

**KBS Fuel Tank Sealer System – Removes Rust & Seals the Inside of Your Tank** https://www.kbs-coatings.com/2020-02-21-ts.html

# Contest Calendar - October 2023

| | |
|---|---|
| + UBA ON Contest, SSB | 0600Z-0900Z, Oct 1 |
| + Peanut Power QRP Sprint | 2200Z-2359Z, Oct 1 |
| + K1USN Slow Speed Test | 0000Z-0100Z, Oct 2 |
| + ICWC Medium Speed Test | 1300Z-1400Z, Oct 2 |
| + OK1WC Memorial | 1630Z-1729Z, Oct 2 |
| + ICWC Medium Speed Test | 1900Z-2000Z, Oct 2 |
| + RSGB 80m Autumn Series, CW | 1900Z-2030Z, Oct 2 |
| + Worldwide Sideband Activity Contest | 0100Z-0159Z, Oct 3 |
| + ARS Spartan Sprint | 0100Z-0300Z, Oct 3 |
| + ICWC Medium Speed Test | 0300Z-0400Z, Oct 3 |
| + German Telegraphy Contest | 0700Z-1000Z, Oct 3 |
| + Phone Weekly Test | 0230Z-0300Z, Oct 4 |
| + A1Club AWT | 1200Z-1300Z, Oct 4 |
| + CWops Test | 1300Z-1400Z, Oct 4 |
| + Mini-Test 40 | 1700Z-1759Z, Oct 4 |
| + VHF-UHF FT8 Activity Contest | 1700Z-2100Z, Oct 4 |
| + Mini-Test 80 | 1800Z-1859Z, Oct 4 |
| + CWops Test | 1900Z-2000Z, Oct 4 |
| + 432 MHz Fall Sprint | 1900 local - 2300 local, Oct 4 |
| + UKEICC 80m Contest | 2000Z-2100Z, Oct 4 |
| + Walk for the Bacon QRP Contest | 0000Z-0100Z, Oct 5 and 0200Z-0300Z, Oct 6 |
| + CWops Test | 0300Z-0400Z, Oct 5 |
| + CWops Test | 0700Z-0800Z, Oct 5 |
| + SARL 80m QSO Party | 1700Z-2000Z, Oct 5 |
| + NRAU 10m Activity Contest | 1700Z-1800Z, Oct 5 (CW) and 1800Z-1900Z, Oct 5 (SSB) and 1900Z-2000Z, Oct 5 (FM) and 2000Z-2100Z, Oct 5 (Dig) |

*Continued on Page 23*

# Contest Calendar - October 2023

| | |
|---|---|
| + SKCC Sprint Europe | 1900Z-2100Z, Oct 5 |
| + NCCC FT4 Sprint | 0100Z-0130Z, Oct 6 |
| + NCCC RTTY Sprint | 0145Z-0215Z, Oct 6 |
| + NCCC Sprint | 0230Z-0300Z, Oct 6 |
| + K1USN Slow Speed Test | 2000Z-2100Z, Oct 6 |
| + Collegiate QSO Party | 0000Z, Oct 7 to 2359Z, Oct 8 |
| + Oceania DX Contest, Phone | 0600Z, Oct 7 to 0600Z, Oct 8 |
| + TRC DX Contest | 0600Z, Oct 7 to 1800Z, Oct 8 |
| + Microwave Fall Sprint | 0800 local - 1400 local, Oct 7 |
| + Russian WW Digital Contest | 1200Z, Oct 7 to 1159Z, Oct 8 |
| + IARU Region 1 UHF/Microwaves Contest | 1400Z, Oct 7 to 1400Z, Oct 8 |
| + International HELL-Contest | 1600Z-1800Z, Oct 7 (80m) and 0900Z-1100Z, Oct 8 (40m) |
| + California QSO Party | 1600Z, Oct 7 to 2200Z, Oct 8 |
| + SKCC QSO Party | 1800Z, Oct 7 to 1800Z, Oct 8 |
| + QRP ARCI Fall QSO Party | 0000Z-2359Z, Oct 8 |
| + UBA ON Contest, CW | 0600Z-0900Z, Oct 8 |
| + K1USN Slow Speed Test | 0000Z-0100Z, Oct 9 |
| + 4 States QRP Group Second Sunday Sprint | 0000Z-0200Z, Oct 9 |
| + ICWC Medium Speed Test | 1300Z-1400Z, Oct 9 |
| + OK1WC Memorial | 1630Z-1729Z, Oct 9 |
| + ICWC Medium Speed Test | 1900Z-2000Z, Oct 9 |
| + 10-10 Int. 10-10 Day Sprint | 0001Z-2359Z, Oct 10 |
| + Worldwide Sideband Activity Contest | 0100Z-0159Z, Oct 10 |
| + ICWC Medium Speed Test | 0300Z-0400Z, Oct 10 |
| + DARC RTTY Sprint | 1800Z-1929Z, Oct 10 |
| + NAQCC CW Sprint | 0030Z-0230Z, Oct 11 |
| + Phone Weekly Test | 0230Z-0300Z, Oct 11 |
| + A1Club AWT | 1200Z-1300Z, Oct 11 |
| + CWops Test | 1300Z-1400Z, Oct 11 |

*Continued on Page 24*

# Contest Calendar - October 2023

| | |
|---|---|
| + Mini-Test 40 | 1700Z-1759Z, Oct 11 |
| + VHF-UHF FT8 Activity Contest | 1700Z-2100Z, Oct 11 |
| + Mini-Test 80 | 1800Z-1859Z, Oct 11 |
| + CWops Test | 1900Z-2000Z, Oct 11 |
| + RSGB 80m Autumn Series, Data | 1900Z-2030Z, Oct 11 |
| + CWops Test | 0300Z-0400Z, Oct 12 |
| + CWops Test | 0700Z-0800Z, Oct 12 |
| + EACW Meeting | 1900Z-2000Z, Oct 12 |
| + NCCC FT4 Sprint | 0100Z-0130Z, Oct 13 |
| + NCCC RTTY Sprint | 0145Z-0215Z, Oct 13 |
| + NCCC Sprint | 0230Z-0300Z, Oct 13 |
| + K1USN Slow Speed Test | 2000Z-2100Z, Oct 13 |
| + Makrothen RTTY Contest | 0000Z-0800Z, Oct 14 and 1600Z-2400Z, Oct 14 and 0800Z-1600Z, Oct 15 |
| + Nevada QSO Party | 0300Z, Oct 14 to 2100Z, Oct 15 |
| + Oceania DX Contest, CW | 0600Z, Oct 14 to 0600Z, Oct 15 |
| + Solar Eclipse QSO Party | 1200Z-2200Z, Oct 14 |
| + SKCC Weekend Sprintathon | 1200Z, Oct 14 to 2400Z, Oct 15 |
| + Scandinavian Activity Contest, SSB | 1200Z, Oct 14 to 1200Z, Oct 15 |
| + Arizona QSO Party | 1500Z, Oct 14 to 0500Z, Oct 15 |
| + Pennsylvania QSO Party | 1600Z, Oct 14 to 0400Z, Oct 15 and 1300Z-2200Z, Oct 15 |
| + South Dakota QSO Party | 1800Z, Oct 14 to 1800Z, Oct 15 |
| + PODXS 070 Club 160m Great Pumpkin Sprint | 2000Z, Oct 14 to 2000Z, Oct 15 |
| + Argentina National 7 MHz Contest | 2130Z-2330Z, Oct 14 |
| + Asia-Pacific Fall Sprint, CW | 0000Z-0200Z, Oct 15 |
| + UBA ON Contest, 2m | 0700Z-1000Z, Oct 15 |
| + Run for the Bacon QRP Contest | 2300Z, Oct 16 to 0100Z, Oct 17 |
| + K1USN Slow Speed Test | 0000Z-0100Z, Oct 16 |

*Continued on Page 25*

# Contest Calendar - October 2023

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|---|---|
| + ICWC Medium Speed Test | 1300Z-1400Z, Oct 16 |
| + ARRL School Club Roundup | 1300Z, Oct 16 to 2359Z, Oct 20 |
| + OK1WC Memorial | 1630Z-1729Z, Oct 16 |
| + RSGB FT4 Contest | 1900Z-2030Z, Oct 16 |
| + ICWC Medium Speed Test | 1900Z-2000Z, Oct 16 |
| + Worldwide Sideband Activity Contest | 0100Z-0159Z, Oct 17 |
| + ICWC Medium Speed Test | 0300Z-0400Z, Oct 17 |
| + Phone Weekly Test | 0230Z-0300Z, Oct 18 |
| + A1Club AWT | 1200Z-1300Z, Oct 18 |
| + CWops Test | 1300Z-1400Z, Oct 18 |
| + Mini-Test 40 | 1700Z-1759Z, Oct 18 |
| + VHF-UHF FT8 Activity Contest | 1700Z-2100Z, Oct 18 |
| + Mini-Test 80 | 1800Z-1859Z, Oct 18 |
| + AGCW Semi-Automatic Key Evening | 1900Z-2030Z, Oct 18 |
| + CWops Test | 1900Z-2000Z, Oct 18 |
| + Walk for the Bacon QRP Contest | 0000Z-0100Z, Oct 19 and<br>0200Z-0300Z, Oct 20 |
| + CWops Test | 0300Z-0400Z, Oct 19 |
| + CWops Test | 0700Z-0800Z, Oct 19 |
| + NTC QSO Party | 1900Z-2000Z, Oct 19 |
| + NCCC FT4 Sprint | 0100Z-0130Z, Oct 20 |
| + NCCC RTTY Sprint | 0145Z-0215Z, Oct 20 |
| + NCCC Sprint | 0230Z-0300Z, Oct 20 |
| + Telephone Pioneers QSO Party | 1700Z-2000Z, Oct 20 (CW/Dig) and<br>2200Z, Oct 20 to 0100Z, Oct 21 (SSB) and<br>1700-2000Z, Oct 21 (SSB) and<br>2200Z, Oct 21 to 0100Z, Oct 22 (CW/Dig) |
| + K1USN Slow Speed Test | 2000Z-2100Z, Oct 20 |
| + YBDXPI FT8 Contest | 0000Z, Oct 21 to 2359Z, Oct 22 |
| + JARTS WW RTTY Contest | 0000Z, Oct 21 to 2400Z, Oct 22 |

*Continued on Page 26*

# Contest Calendar - October 2023

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|---|---|
| + 10-10 Int. Fall Contest, CW | 0001Z, Oct 21 to 2359Z, Oct 22 |
| + YLRL DX/NA YL Anniversary Contest | 1400Z, Oct 21 to 0200Z, Oct 23 |
| + New York QSO Party | 1400Z, Oct 21 to 0200Z, Oct 22 |
| + Stew Perry Topband Challenge | 1500Z, Oct 21 to 1500Z, Oct 22 |
| + Worked All Germany Contest | 1500Z, Oct 21 to 1459Z, Oct 22 |
| + Feld Hell Sprint | 2000Z-2359Z, Oct 21 |
| + Classic Exchange, Phone | 1300Z, Oct 22 to 0700Z, Oct 23 and 1300Z, Oct 24 to 0700Z, Oct 25 |
| + Illinois QSO Party | 1700Z, Oct 22 to 0100Z, Oct 23 |
| + K1USN Slow Speed Test | 0000Z-0100Z, Oct 23 |
| + ICWC Medium Speed Test | 1300Z-1400Z, Oct 23 |
| + OK1WC Memorial | 1630Z-1729Z, Oct 23 |
| + ICWC Medium Speed Test | 1900Z-2000Z, Oct 23 |
| + Worldwide Sideband Activity Contest | 0100Z-0159Z, Oct 24 |
| + ICWC Medium Speed Test | 0300Z-0400Z, Oct 24 |
| + SKCC Sprint | 0000Z-0200Z, Oct 25 |
| + Phone Weekly Test | 0230Z-0300Z, Oct 25 |
| + A1Club AWT | 1200Z-1300Z, Oct 25 |
| + CWops Test | 1300Z-1400Z, Oct 25 |
| + Mini-Test 40 | 1700Z-1759Z, Oct 25 |
| + Mini-Test 80 | 1800Z-1859Z, Oct 25 |
| + CWops Test | 1900Z-2000Z, Oct 25 |
| + UKEICC 80m Contest | 2000Z-2100Z, Oct 25 |
| + CWops Test | 0300Z-0400Z, Oct 26 |
| + CWops Test | 0700Z-0800Z, Oct 26 |
| + RSGB 80m Autumn Series, SSB | 1900Z-2030Z, Oct 26 |
| + NCCC FT4 Sprint | 0100Z-0130Z, Oct 27 |
| + NCCC RTTY Sprint | 0145Z-0215Z, Oct 27 |
| + NCCC Sprint | 0230Z-0300Z, Oct 27 |
| + Zombie Shuffle | 1500-2400 local, Oct 27 |

*Continued on Page 27*

# Contest Calendar - October 2023

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|---|---|
| + K1USN Slow Speed Test | 2000Z-2100Z, Oct 27 |
| + CQ Worldwide DX Contest, SSB | 0000Z, Oct 28 to 2359Z, Oct 29 |
| + ARRL EME Contest | 0000Z, Oct 28 to 2359Z, Oct 29 |
| + Ham Spirit Contest, CW | 0600Z, Oct 28 to 0559Z, Oct 29 |
| + Classic Exchange, CW | 1300Z, Oct 29 to 0700Z, Oct 30 and 1300Z, Oct 31 to 0700Z, Nov 1 |
| + K1USN Slow Speed Test | 0000Z-0100Z, Oct 30 |
| + ICWC Medium Speed Test | 1300Z-1400Z, Oct 30 |
| + QCX Challenge | 1300Z-1400Z, Oct 30 |
| + OK1WC Memorial | 1630Z-1729Z, Oct 30 |
| + ICWC Medium Speed Test | 1900Z-2000Z, Oct 30 |
| + QCX Challenge | 1900Z-2000Z, Oct 30 |
| + Worldwide Sideband Activity Contest | 0100Z-0159Z, Oct 31 |
| + ICWC Medium Speed Test | 0300Z-0400Z, Oct 31 |
| + QCX Challenge | 0300Z-0400Z, Oct 31 |

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

**Visit Bruce at www.contestcalendar.com/contestcal.html**


## *The ARAC RELAY*

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