



# The RELAY)))

SEPTEMBER  
2020

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

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Last Three weeks of  
**Summer  
2020**



Join us on

Co-Editors:

Kim & Steve Waller

Kim - KEØNQS • Steve - KEØNQT

KEØNQS.mn@gmail.com  
KEØNQT@gmail.com

## Is Your Radio Equipment Really Grounded? Measuring the Resistance & Effectiveness of Your Ground System

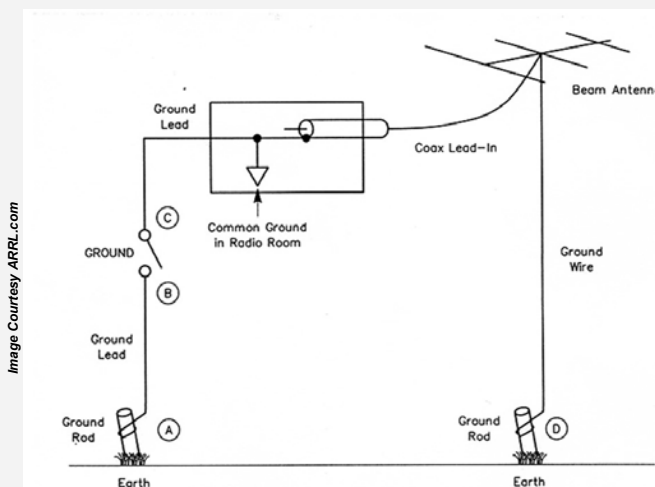
Is your radio equipment really grounded? That's the question that Martin Cardwell NB3T, a ham radio elmer in Baltimore asked in a section of the *Assorted Hints and Kinks* page at the [arrrl.com](http://arrrl.com) website. Though Cardwell has been a silent key for many years now and the article is old, ARRL still considers it valuable information to be shared. Cardwell writes:

"You may believe your radio equipment, antenna and tower are well-grounded. After all, you drove the ground rods into the earth yourself and connected the ground wire to the rods with heavy-duty clamps. This was my situation. Then I started snooping to locate some new QRN that seemed to be power-line related. I didn't discover the QRN source, but in the process I stumbled across something surprising about my ground connections.

"With an ohmmeter, I measured an open circuit from the ground wire to its grounding clamp! This was true for both the equipment ground outside my radio room and for the ground at the base of my beam antenna. I do understand that contact points oxidize and their resistance increases. But the ohmmeter's needle didn't move even on the instrument's X 1000 range! I had no grounds that worked!

"Correcting this situation seemed to be simple: Just solder or weld the ground wire to the ground rod. I did so, but this did not entirely solve the problem. Testing the grounds' resistance now mainly indicated the contact resistance between the ground rod and the earth itself. That resistance was too high. I realized that if the resistance between the wire and the top of the ground rod was high, the resistance between the bottom of the rod is probably high as well.

"I installed my ground rods in 1979. They were neither copper nor copper-covered. I replaced them with 8-foot-long, 5/8-inch diameter rods that essentially consisted of 1/2-inch copper pipe with their centers solidly filled by iron rods.



The letters indicate test points for diagnostic use as described in the text.

"Hints and Kinks readers may be interested in how I checked the resistance from rod to earth. [This diagram] shows my setup, an arrangement that is probably quite common. If an ohmmeter is connected across B and C with the GROUND switch open, the indicated resistance is that of the entire closed loop of A to B to C to D and back to A through the earth. The wire part of this complete loop is less than 3 ohms.<sup>1</sup>

Continued on page 15

# ARAC Board Meeting Minutes – August 4, 2020

## PRESIDENT



**NØVRM**  
Gene Ellefsen  
371Ø Chambersburg Ave  
Duluth, MN 55811  
218-39Ø-3272  
lspitech@mail.com

## VICE PRESIDENT



**NØPDG**  
Mike Lovold  
386Ø Birchwood Rd  
Downtown Arnold, MN  
558Ø3  
lovoldm@gmail.com

## SECRETARY



**NØCALL**  
Robin Davis  
218-391-3Ø77  
davisfam2858@yahoo.com

## TREASURER



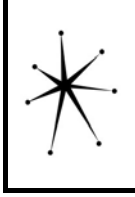
**KEØNIT**  
Bruce Carlson  
9Ø6 Anderson Rd  
Duluth, MN 55811  
763-315-2967  
carlsbr@gmail.com

## 3RD YEAR BOARD



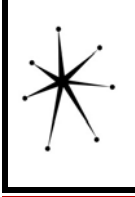
**AAØAC**  
Dave Davis  
218-348-6649  
aaØac@outlook.com

## 2ND YEAR BOARD



**AAØME**  
Randy Johnson  
randy@nsw4x4.com

## 1ST YEAR BOARD



**KD9ABS**  
Gary Minter  
1621 N 26th St  
Superior WI 5488Ø

Present: Gene Ellefsen-NØVRM, Mike Lovold-NØPDG, Bruce Carlson-KEØNIT, Robin Davis, Dave Davis-AAØAC, Gary Minter-KD9ABS, Randy Johnson-AAØME, Grant Forsyth-KCØWUP, Randy Wabik-KRØB, Doug Nelson-AAØAW

Meeting called to order by President Gene-NØVRM at 6:41 pm

### Minutes:

Minutes posted in newsletter and on the web site. Motion to accept by Dave-AAØAC, seconded by Gary-KD9ABS, motion passed

### Treasurer's Report:

|   |            |
|---|------------|
| Checking .....                            | 1,598.85   |
| Savings .....                             | 773.50     |
| Cash Subtotal .....                       | \$2,372.35 |
| Outstanding Check (Repeater # 1414) ..... | -1,100.00  |
| Outstanding Check (WDSE Donation) .....   | -1,200.00  |
| Subtotal Checks .....                     | \$2,300.00 |
| Winter CD .....                           | 1,714.03   |
| Summer CD .....                           | 1,700.00   |
| CD Subtotal .....                         | \$3,414.03 |
| Grand Total .....                         | \$3,486.38 |

Any major expenses left for the year? Ham Fest upfront costs, food prizes, building rental at so much per person, etc.

Gene-NØVRM and Bruce-KEØNIT motioned to move money from Summer CD to cash accounts to cover the outstanding checks

Motion to approve by Gary-KD9ABS, seconded by Mike-NØPDG, motion passed

### Committee Reports:

#### Ham Fest:

Bob Schultz-KCØNFB is calling about making a decision. We don't know what is going to happen yet. Suggestion to play it by ear until September 1, 2020. 25% capacity is possible. It wouldn't be feasible with restricted attendance to hold the Fest. We usually get around 400 attendees. Suggestion to wait until September 1, 2020, to make a decision.

Brainerd is having their Tail Gate Ham Fest but that is located outside. The Crow Wing County Fairgrounds is huge so they can accommodate a lot of folks. It will be held August 22, 2020, in Brainerd

Any other discussion? First Tuesday September 1, 2020, and we can make a decision at that time, at the Board meeting. Let Bob-KCØNFB know that a decision will be made on September 1, 2020. Mike-NØPDG will text Bob-KCØNFB

No major upcoming expenses. Dues will be coming in soon, especially for the folks that renew each year at the Ham Fest. Any member interested in paying their annual dues, please send your check to Bruce-KEØNIT. Gene-NØVRM will make an announcement on the Sunday night nets.

*Continued on page 3*

# ARAC Board Meeting Minutes – August 4, 2020

## Weekly Nets:

Doug-AA0AW will contact Thomas Dorr-KE0RHA to remove Diane Saunders-K0DSL and Denny Anderson-W0DIO off the Net Rosters

## Repeater:

Doug-AA0AW has a PA to put in the main site for the UHF. Gene-N0VRM will contact Larry Anderson-N0XPB to get a key to get access to the 94 Repeater at the WDSE Building

David Pyrlík-K0DJP has a couple of Repeater Cabinets with doors but he has no keys. He stated they are in good condition. He will sell them or donate to a group

Randy-KR0B with Randy Haglin-N0BZZ are not getting to Mahtowa to work on the Repeater. Our equipment is not getting any younger. We need to consider gutting the whole thing and install new equipment. The 94 Repeater is old. It is a good idea. Neither of the Randy's can get to it and parts are not available, etc.

We need to start the discussion to upgrade the Repeater System. We could do a raffle to raise money for that purpose or take donations to cover the costs. We did that for the Mahtowa Repeater

## Discussion Points:

- 100 watt amp
- Linking capability
- Upgrading System
- Modernizing – Jeff Mast-KC0MKS
- More Members involved
- Internet Link – Pros and Cons
- Keep it simple - Analog
- Rebuild entire system?
- Costs
- Manufacturer & options, compatibility
- Doug-AA0AW will contact John Kruk-N9UPC for initial information about upgrading the Repeater System and the possibility of linking analog with fusion
- Mike-N0PDG will contact John Kruk-N9UPC for Yaesu pricing options
- Randy-KR0B will contact Bridgecom for pricing options and will talk to Randy Haglin-N0BZZ
- Additional discussion on UHF, linking controllers, RF linking, fusion, analog, simplex, PL tones, etc.

Mike-N0PDG makes a motion to investigate replacing the 94 Repeater and the network, seconded by Gary-KD9ABS, motion passed. Randy-KR0B will also put a call into Randy-N0BZZ to discuss the possibilities of upgrading the entire Repeater system by ARAC

## **New Business:**

Greg Haapala, Grandma's Race Director, contacted Doug-AA0AW and there will be a Minnesota Mile and the Fitger's 50 Mile Race. Park Point Five Miler is the standard and it came off just fine. MN Mile is extended by two (2) hours to socially distance and Fitger's extended by twelve (12) hours to socially distance. The COD is in agreement with their plans.

## **New Operator:**

Tom Maida-KF0ALP is a new Ham (Traffic Sargent for COD DPD).

Anything else?

Motion to adjourn by Bruce-KE0NIT, seconded by Randy-AA0ME, motion passed

Meeting ended at 7:32 pm



## Prez Sez ...

Hi everyone,

I hope you are enjoying your summer the best you can with the Covid 19 restrictions.

We were not able to have our May Hamfest this year and I know some of you usually pay your annual dues there. You can send them to either the Club Post Office Box or directly to our Treasurer Bruce Carlson to stay current for 2020. Since we don't know when we can resume our meetings at the Copper Top Church, you can also include your 2021 dues if you like. Dues are still \$20.00 for a single and \$25.00 for Family.

Thanks and have a great rest of the Summer!

Gene Ellefsen NØVRM

A.R.A.C.  
P.O. Box 6174  
Duluth, MN 55807

Bruce Carlson  
906 Anderson Rd.  
Duluth, MN 55811

*P.S. Without Hamfest or Fallfest income this year, the Club also welcomes monetary donations in any amount to prepare for 2021 expenses. Thanks so much for participating in any way you can!*

## Newly Licensed

### **CONGRATULATIONS**

To new hams who have joined our amateur radio community in the last few months, as well as those who have newly upgraded to General or Extra!

- ◆ Tom Maida — KFOALP  
is a new Technician as of 6/9/2020!

*Tom is Traffic Sergeant for the Duluth Police Department. Welcome!*



# ARAC Club Meeting Minutes

August 13, 2020

**Present:**

Vice President Mike Lovold-N0PDG  
Treasurer / Membership Bruce Carlson-KE0NIT  
Secretary Robin Davis  
Third Year Board Dave Davis-AA0AC  
Second Year Board Randy Johnson-AA0ME  
First Year Board Gary Minter-KD9ABS  
Parliamentarian Grant Forsyth-KC0WUP  
Property / Picnic Scott Ahlgren-N0VYU  
Special Events – Open / Gene Ellefsen-N0VRM acting  
Ham Fest / Education Bob Schultz-KC0NFB  
Testing Doug Nelson-AA0AW

**Absent:**

President Gene Ellefsen-N0VRM  
Chaplain (Visiting) Rolland Bockbrader-KB0CK  
Newsletter / Historian Kim Waller-KE0NQS  
Newsletter Steve Waller-KE0NQY  
Repeater Randy Wabik-KR0B  
Repeater Derek McCorison-W0DNF  
Repeater Randy Haglin-N0BZZ  
Web Site Thomas Dorr-KE0RHA

Meeting called to order at 7:00 pm by Vice President Mike-N0PDG

Meeting via 94 Repeater

**Treasurer's Report:**

|                                      |            |
|--------------------------------------|------------|
| Checking .....                       | 1,598.85   |
| Savings.....                         | 773.50     |
| Cash Subtotal.....                   | \$2,372.35 |
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| Summer CD.....                       | 1,700.00   |
| CD Subtotal .....                    | \$3,414.03 |
| Grand Total .....                    | \$3,486.38 |

Grant-KC0WUP moved to approve as stated, seconded by Jim Anderson-N0JWA, moving along

Continued on Page 6



# ARAC Club Meeting Minutes

*Continued from Page 5*

## **Committee Reports:**

### Education:

Tech Class, starting September 15, 2020, via Zoom, using Gordon West book again this year. Testing is scheduled for December 15, 2020. Register via Duluth Community Education

### Ham Fest:

ARAC Fall Fest, scheduled for September 26, 2020. On the hockey rink for the vendors, which is a lot larger. We have twenty-two (22) reservations from vendors as of today. Contact Bob-KC0NFB via email ([kc0nfb@charter.net](mailto:kc0nfb@charter.net) or [arac\\_hamfest@charter.net](mailto:arac_hamfest@charter.net)). Thank you for the information

### Testing:

Not much interest right now so no test sessions have been scheduled

### Picnic:

Picnic was cancelled for 2020, gone and passed for this year

## **Old Business:**

Nothing heard

## **New Business:**

Brainerd Tail Gate Ham Fest, scheduled for August 21, 2020, which is an outdoor Fest

Anything else for the Club?

Motion to adjourn the Club meeting by Dave-AA0AC, Joe Meese-W0LWU seconded, assumed passed

Thank you to all that participated tonight

Presentation by David Pyrlik-K0DJP and the room is opening. Email Mike-N0PDG ([lovoldm@gmail.com](mailto:lovoldm@gmail.com)) to get sign on information

Meeting ended at 7:12 pm



**Arrowhead Radio Amateur Club**  
**HAM FEST!**

The **ARAC Board**  
is sad to announce the **CANCELLATION**  
of the **ARAC Hamfest/Fallfest**  
scheduled for September 26<sup>th</sup> in Carlton, MN.

Covid restrictions have made this event too  
hard to prepare for and execute this year.

We hope to see everyone in the Amateur Radio  
community again the spring of 2021  
in Superior WI.

Watch your inbox and *The Relay* in the months  
to come for details on that event.

Hope to see everyone in the spring!

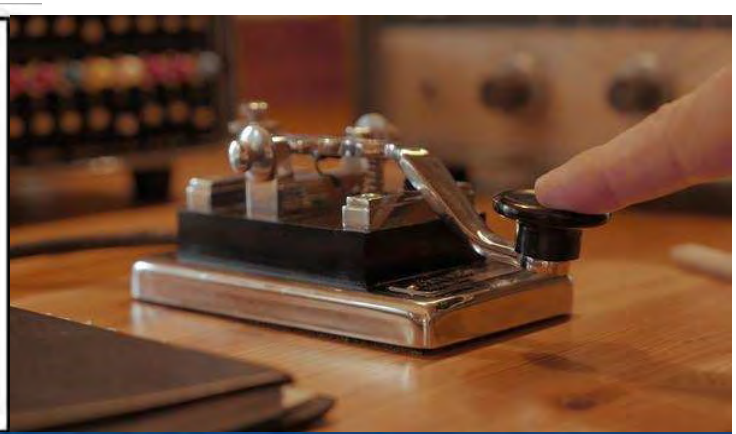
Robert Schulz, KC0NFB

**ARAC Hamfest**

# 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.

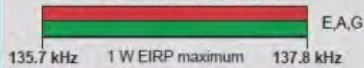
Effective Date for  
2,200 and 630 Meters  
to be announced



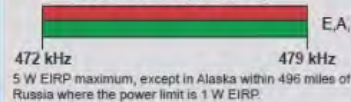
The national association for  
**ARRL AMATEUR RADIO**

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.

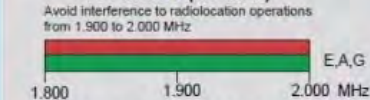
### 2,200 Meters (135 kHz)



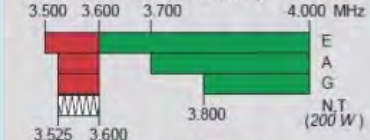
### 630 Meters (472 kHz)



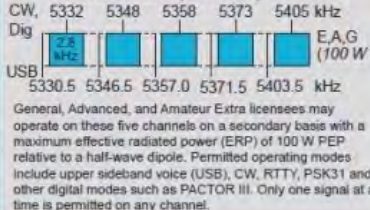
### 160 Meters (1.8 MHz)



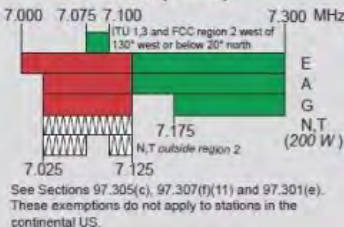
### 80 Meters (3.5 MHz)



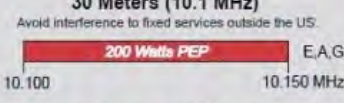
### 60 Meters (5.3 MHz)



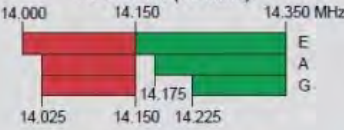
### 40 Meters (7 MHz)



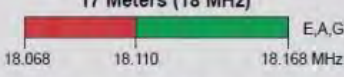
### 30 Meters (10.1 MHz)



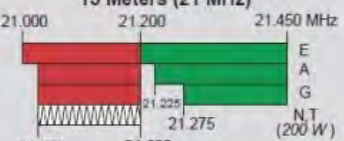
### 20 Meters (14 MHz)



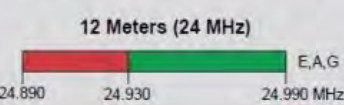
### 17 Meters (18 MHz)



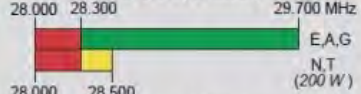
### 15 Meters (21 MHz)



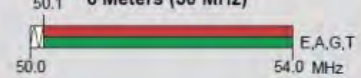
### 12 Meters (24 MHz)



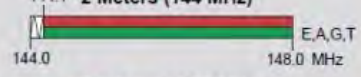
### 10 Meters (28 MHz)



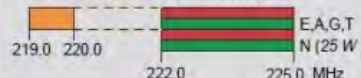
### 6 Meters (50 MHz)



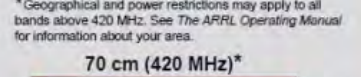
### 2 Meters (144 MHz)



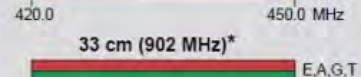
### 1.25 Meters (222 MHz)



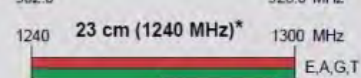
### 70 cm (420 MHz)\*



### 33 cm (902 MHz)\*



### 23 cm (1240 MHz)\*



All licensees except Novices are authorized all modes on the following frequencies:

|               |                 |                   |
|---------------|-----------------|-------------------|
| 2300-2310 MHz | 10.0-10.5 GHz ± | 122.25-123.0 GHz  |
| 2390-2450 MHz | 24.0-24.25 GHz  | 134-141 GHz       |
| 3300-3500 MHz | 47.0-47.2 GHz   | 241-250 GHz       |
| 5650-5925 MHz | 76.0-81.0 GHz   | All above 275 GHz |

± No pulse emissions

### 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** 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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Getting Started in Amateur Radio:  
Toll-Free 1-800-326-3942 (860-594-0355)  
email: [ncwham@arrl.org](mailto:ncwham@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
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- 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



## Next ARAC Board Meeting

Tuesday, September 1, 2020  
@ 6:30 p.m.

House of Refuge Church - 115 W Myrtle St, Duluth

### Next ARAC Club Meeting

Thursday,  
September 10th  
7 p.m.  
on the 94 Repeater

### September Zoom Program

**Matt Holden K0BBC**  
Director, ARRL Dakota Division

You don't need a Zoom account  
to join our Zoom meeting!

Go to:

[https://zoom.us/j/91397255094?  
pwd=Uk5VR1IDWFZ3VVdSZzRs  
MEIkcExrUT09](https://zoom.us/j/91397255094?pwd=Uk5VR1IDWFZ3VVdSZzRsMEIkcExrUT09)

**Meeting ID: 913 9725 5094**

**Passcode: z5HB6P**

To join by phone audio only,  
find your local call-in number  
here:

<https://zoom.us/u/abtq46Aky>

*Interested in providing a program,  
or have an idea for one?*

Contact Mike NØPDG at  
[lovoldm@gmail.com](mailto:lovoldm@gmail.com)

### CLUB REPEATER

**WØGKP**

146.94 (-)  
CTCSS TONE  
103.5

2020  
Spectrum Defense Fund

Protect Your Frequencies.

Donate Today by visiting  
<https://www.arrl.org/arrl-donation-form>



### THANK YOU, ARRL Members!

Because of you, ARRL has maintained constant vigilance  
and taken decisive action throughout the years, including:

- Defeating the threat that Little Leo satellites posed to the 2-meter and 70-cm bands;
- Removing high-powered international broadcasting stations from the heart of the 40-meter band - doubling the size of the worldwide band and making it more useful than it had been in 70 years;
- Working with our colleagues in the International Amateur Radio Union to gain global allocations at 135 kHz and 472 kHz (domestic implementation is the next step);
- Battling the Broadband Over PowerLine (BPL) interference for six years including successfully challenging the FCC in court on its prejudice that tainted the rulemaking process; and
- Defending microwave allocations against the onslaught of commercial wireless broadband;
- Seeking an international allocation at 60 meters (5 mHz).

Your contribution to the Spectrum Defense Fund ensures that ARRL will have the resources to meet future challenges when they appear and to protect your operating privileges!

# Duluth Area Repeaters



## ARAC System WØGKP

| Freq.   | Offset | Tone  | Location              |
|---------|--------|-------|-----------------------|
| 146.940 | minus  | 103.5 | Duluth                |
| 146.940 | minus  | 107.2 | Lakeside (rcv)        |
| 146.940 | minus  | 151.4 | Two Harbors (rcv)     |
| 146.940 | minus  | 100.0 | Gary-New Duluth (rcv) |
| 146.940 | minus  | 123.0 | Solway (rcv)          |
| 146.940 | minus  | 110.9 | Cloquet (rcv)         |
| 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 (rcv for Proctor)   |
| 147.330 | plus  | 156.7 | Duluth (North) (Fish Lake) |
| 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                   |

## NARC System NAØRC

|         |       |       |                  |
|---------|-------|-------|------------------|
| 145.45Ø | minus | 1Ø3.5 | Solway Twp       |
| 145.45Ø | minus | 114.8 | Park Point (rcv) |
| 147.135 | plus  | 114.8 | Park Point (rcv) |
| 147.135 | plus  | 1Ø3.5 | Knife River      |

## Stand Alone Repeaters

|         |       |       |               |
|---------|-------|-------|---------------|
| 145.21Ø | minus | 11Ø.9 | Clam Lake, WI |
| 146.88Ø | minus | 123.Ø | Grand Rapids  |
| 146.91Ø | minus | 146.2 | Duxbury, MN   |

## Fusion and D Star

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

|         |       |       |   |
|---------|-------|-------|---|
| 147.15Ø | plus  | 151.4 | NTØB Gilbert Fusion Rptr                                    |
| 145.17Ø | minus | 11Ø.9 | WA9KLM Superior – Douglas County RACES/ARES Fusion Repeater |

443.1ØØ +5.ØØ 1Ø3.5 KBØYHX Cloquet – Carlton County RACES/ARES Fusion Repeater

444.3ØØ +5.ØØ 1Ø3.5 NØEO Spirit Valley Amateurs Fusion Repeater WIRES-X NØEO

147.375 plus NØEO D Star  
442.2ØØ plus NØEO D Star

[Repeater list compiled by Dr. Frequency—KCØWDQ]

## ST. Louis County Department of Emergency Services Net Control Roster

|       |                |        |                 |
|-------|----------------|--------|-----------------|
| N9DMG | Scott Swanson  | NØVRM  | Gene Ellefsen   |
| AAØAW | Doug Nelson    | KCØWDQ | Paul Dallavia   |
| WØNWO | Dave Miller    | WØDIO  | Dennis Anderson |
| KØDSL | Diane Saunders | AAØME  | Randy Johnson   |

*Sunday Nights at 21ØØ on the ARAC System*  
(See Calendar for net control schedule)

## Ten Meter SSB Net Control Roster

|       |                 |       |                |
|-------|-----------------|-------|----------------|
| AAØAW | Doug Nelson     | WØLWU | Joe Meese      |
| NUØW  | Gary Hanson     | K9KDK | Al Babcock     |
| WØDIO | Dennis Anderson | NØVRM | Gene Ellefsen  |
| AAØME | Randy Johnson   | KØDSL | Diane Saunders |

*Sunday Nights at 2ØØØ on 28.45Ø MHz USB*

## Ten Meter CW Net Control Roster

|       |             |       |             |
|-------|-------------|-------|-------------|
| AAØAW | Doug Nelson | NØPDG | Mike Lovold |
|-------|-------------|-------|-------------|

*Sunday Nights at 193Ø on 28.125 MHz*

## Northland Weather Group Net Control Roster

KCØMKS Jeff Nast

*Monday Nights at 2ØØØ on the ARAC System*

## Douglas County Net

*Tuesday Nights at 2ØØØ on 145.49Ø (N9QWH System)*

## Central Carlton County Net

*Tuesday Nights at 2Ø3Ø on the ARAC System*

## Lake County RACES/ARES Net

*2nd & 4th Wednesday Nights at 19ØØ on the LSAC 1 System*

# Elmers

## El-mer / el-mær/ [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   | 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... |



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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

Co-Editors,  
Kim & Steve Waller  
KEØNQS & KEØNQT





**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

# SEPTEMBER

## CLUB EVENTS

**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   |
|---|---|--|--|---|--------------------------------------|---|
|   |   | <b>1</b><br><b>ARAC BOARD MEETING - 18:30</b><br>House of Refuge<br><br>DC Net 2000<br>CC Net 2030 | <b>2</b>   | <b>3</b>  | <b>4</b><br><br>Minnesota Mile       | <b>5</b>  |
| <b>6</b><br><br>CW 1930 AA0AW<br>USB 2000 AA0AW<br>ES 2100 W0NWO  | <b>7</b><br><br>WX 2000 KC0MKS  | <b>8</b><br><br>DC Net 2000<br>CC Net 2030   | <b>9</b><br>Lake County ARES/RACES Meeting 1800<br>Lake County Net 1900<br>2100 - BWAR | <br><b>10</b><br>ARAC Club Meeting<br>94 Repeater<br>7 pm | <b>11</b><br><br>Superior Fall Trail | <b>12</b><br><br>NorthShore Inline Marathon               |
| <b>13</b><br><br>CW 1930 N0PDG<br>USB 2000 W0LWU<br>ES 2100 N0VRM | <b>14</b><br><br>DC ARES/RACES Mtg<br>1900 DC EOC<br><br>WX 2000 KC0MKS | <b>15</b><br><br>DC Net 2000<br>CC Net 2030  | <b>16</b><br>St. Louis County ARES/RACES Mtg<br>1630 Pike Lake EOC<br><br>2100 - BWAR  | <b>17</b>   | <b>18</b>                            | <b>19</b>   |
| <b>20</b><br><br>CW 1930 AA0AW<br>USB 2000 K9KDK<br>ES 2100 K0DSL | <b>21</b><br><br>WX 2000 KC0MKS   | <b>22</b><br><br>DC Net 2000<br>CC Net 2030  | <b>23</b><br><br>Lake County Net 1900<br>2100 - BWAR                                   | <b>24</b><br><br>Carlton County ARES/RACES Meeting<br>1900 CC EOC   | <b>25</b>                            | <b>26</b><br><br>Club Breakfast @ The Chalet<br>0800-0900 |
| <b>27</b><br><br>CW 1930 N0PDG<br>USB 2000 W0DIO<br>ES 2100 AA0ME | <b>28</b><br><br>WX 2000 KC0MKS   | <b>29</b><br><br>DC Net 2000<br>CC Net 2030  | <b>30</b><br><br>2100 - BWAR   | <b>31</b>   |                                      |   |
|   |   |  |  |   |                                      |   |

Get this newsletter *faster*  
via email!  
Email Doug AAØAW at  
[aa0aw@arrl.net](mailto:aa0aw@arrl.net)

Next Meeting: Thursday,  
*September 10, 2020 - 7 pm*  
On the 94 Repeater

## 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:**

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**Chaplains:**

**Visiting Chaplain:**

Denny Anderson WØDIO

**Parliamentarian:**

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**Website:**

Thomas Dorr KEØRHA

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Bruce Carlson KEØNIT

**Property Chair:**

Wulf Gar WU1FGR

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Doug Nelson AAØAW

**Field Day:**

Dennis Anderson WØDIO

**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).



## Grounded?, Continued from Page 1

"The earth distance from A to D is about 45 feet. The overall resistance of the complete loop runs between 10 to 15 ohms. I am recording this value periodically to notice any changes due to soil moisture or shifts in conductor resistance. Perhaps you should measure the resistance and effectiveness of your complete ground system!"

<sup>1</sup>If you want to check the resistance of only the wire and cable portion of the complete loop: (1) Run a jumper between A and D. (2) Measure the loop resistance as usual at B and C with the GROUND switch open. (3) Subtract from this the resistance of the jumper wire. The answer provides a resistance test of the wire, cable and connections in the loop.

-Martin L. Cardwell, NB3T, Baltimore, Maryland

### ARRL Lab Engineer Zachary Lau KH6CP was asked this question: What is an RF Ground?

He says:

"In my opinion, an RF ground is something that presents a low impedance at all frequencies of interest on the desired ground surface. All frequencies of interest usually means just the transmission frequency and all spurious. Spurious usually include harmonics, but may include mixing products. The ground surface is the tricky part. What do you want to be at ground potential? Surely you don't expect your microphone to be at ground potential on all frequencies, do you? Think about it: A coiled microphone cord is a bigger radiator than many "rubber duck" antennas! With proper matching, you could probably make a better antenna out of the mic cord shield! In this case, low impedance means "small reactance and resistance." Some radio amateurs just look at the resistive part of the impedance and forget about the reactance, which often is huge!

"The size and shape of conductors are very important in evaluating a ground surface. Take, for example, a tall, thin aluminum structure that is grounded at one end. No matter how well you ground that one end, the structure still radiates and receives RF energy--that's why it's called an antenna. The shape that offers the lowest impedance is a sphere. (The Earth is a pretty good approximation of a sphere.) Size is also important--you wouldn't expect a metal-covered tennis ball to present a low impedance on 160 meters.

"Now that we have some idea what a ground should be, the question remains as to how to achieve it. It's pretty ridiculous to have to buy a large metal sphere the size of the Earth just to get a good ground (although it would work well!). The closest practical approximation--a short, thick wire connected to the Earth--works pretty well as long as the wire is much shorter than a wavelength. Notice that I said wavelength. If you expect your "good RF ground" to eliminate the second harmonic of a 10-meter signal (56 MHz), you need a wire much shorter than 8 feet long. (No, four feet is not much shorter, and would not work. In fact, a 4-foot "grounding wire" hooked up to the Earth might be a good radiator at 56 MHz. Much shorter means 2 feet or less in length--at 56 MHz, that is.)

"Following this line of reasoning, it may seem impossible to get a good ground at UHF. Actually, you can get a good ground at UHF by using a large metal plate, which is often called a ground plane. A large, flat surface also presents a low impedance at UHF. (Yes, a "flat Earth" would work just as well as a spherical one--at least in terms of grounding--if you were far enough from its edge.) But if you live in a second-floor apartment (as I do), how do you get a good HF ground? First, you should determine whether or not a ground is needed. (An ac ground should be considered a necessity for those operating equipment from commercial power lines.) Many antennas, however, such as dipoles and loops, operate just fine without an RF ground.

"As for TVI, many amateurs mistake TV fundamental overload as a grounding problem. (It is highly unlikely that TV sets will ever be designed to operate in a strong RF field.) First, install a high-pass filter on the TV set. If the transmitter is indeed radiating energy on a TV channel, try to improve the transmitter shielding, and try an absorptive harmonic filter (See the 1988 ARRL Handbook, p 40-9). Grounding will help if the chassis or mic cord of the rig is hot with RF. In this case, a quarter-wave, tuned counterpoise will provide grounding at one frequency (and its harmonics) on a small surface area. Grounding may or may not help situations involving RF feedback. It may be easier to dissipate and isolate the RF from various cords and wires using ferrite beads and toroids.

"Some people have asked me about measurement techniques for evaluating RF grounds. Well, if you connect a meter between two points that are at the same RF voltage, you may get a nonzero reading anyway! The meter leads can act as a loop antenna that can be expected to pick up RF fields. If you find an easy way around this problem, let me know about it."

-Zachary Lau, KH6CP, ARRL Lab Engineer

Our thanks to KH6CP for this in-depth description! You can read more info on grounding your equipment at [arrl.com](http://arrl.com)'s Assorted Hints & Kinks page, as well as their many archive editions of QST Magazine. Share your "grounding your equipment" story with the Club for a future edition of the ARAC Relay. Email me at [ke0nqs.mn@gmail.com](mailto:ke0nqs.mn@gmail.com) & please include photos of your project. ★



## ATTENTION MEMBERS: URGENT CALL TO ACTION!

As you may have heard, the FCC has made a proposal to add service fees on Amateur Radio transactions. Please read the detail below and go to <https://www.fcc.gov/ecfs/filings> to express your opposition to this Proposal during the official comment period.

### FCC Proposes to Reinstate Amateur Radio Service Fees

08/28/2020

[UPDATED 2020-09-01 @1845 UTC]

Amateur radio licensees would pay a \$50 fee for each amateur radio license application if the FCC adopts rules it proposed this week. Included in the FCC's fee proposal are applications for new licenses, renewal and upgrades to existing licenses, and vanity call sign requests. Excluded are applications for administrative updates, such as changes of address, and annual regulatory fees.

The FCC proposal is contained in a *Notice of Proposed Rulemaking (NPRM)* in MD Docket **20-270**, which was adopted to implement portions of the "Repack Airwaves Yielding Better Access for Users of Modern Services Act" of 2018 — the so-called "**Ray Baum's Act**."

The Act requires that the FCC switch from a Congressionally-mandated fee structure to a cost-based system of assessment. In its *NPRM*, the FCC proposed application fees for a broad range of services that use the FCC's Universal Licensing System (ULS), including the Amateur Radio Service that had been excluded by an earlier statute. The 2018 statute excludes the Amateur Service from annual regulatory fees, but not from application fees.

"[A]pplications for personal licenses are mostly automated and do not have individualized staff costs for data input or review," the FCC said in its *NPRM*. "For these automated processes — new/major modifications, renewal, and minor modifications — we propose a nominal application fee of \$50 due to automating the processes, routine ULS maintenance, and limited instances where staff input is required."

The same \$50 fee would apply to all Amateur Service applications, including those for vanity call signs. "Although there is currently no fee for vanity call signs in the Amateur Radio Service, we find that such applications impose similar costs in aggregate on Commission resources as new applications and therefore propose a \$50 fee," the FCC said.

The FCC is not proposing to charge for administrative updates, such as mailing address changes for amateur applications, and amateur radio will remain exempt from annual regulatory fees. "For administrative updates [and] modifications, which also are highly automated, we find that it is in the public interest to encourage licensees to update their [own] information without a charge," the FCC said.

The FCC also proposes to assess a \$50 fee for individuals who want a printed copy of their license. "The Commission has proposed to eliminate these services — but to the extent the Commission does not do so, we propose a fee of \$50 to cover the costs of these services," the FCC said.

The Ray Baum's Act does not exempt filing fees in the Amateur Radio Service. The FCC dropped assessment of fees for vanity call signs several years ago.

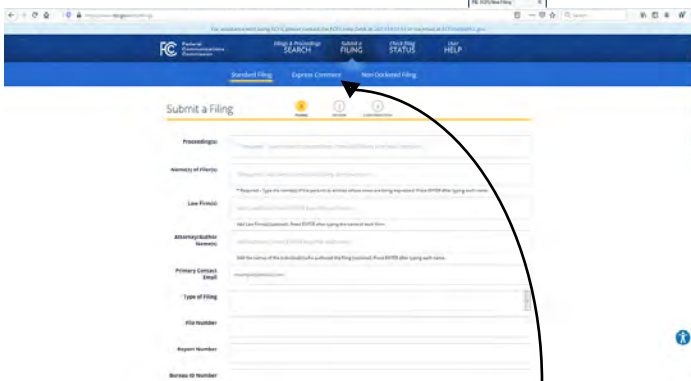
*Continued on Page 17*



# URGENT CALL TO ACTION, continued from p 16

Deadlines for comments and reply comments will be determined once the *NPRM* appears in the *Federal Register*. Interested parties may file comments by using the FCC's Electronic Comment Filing System (**ECFS**), posting to MD Docket No. **20-270**. This docket is already open to accept comments, even though deadlines have not yet been set.

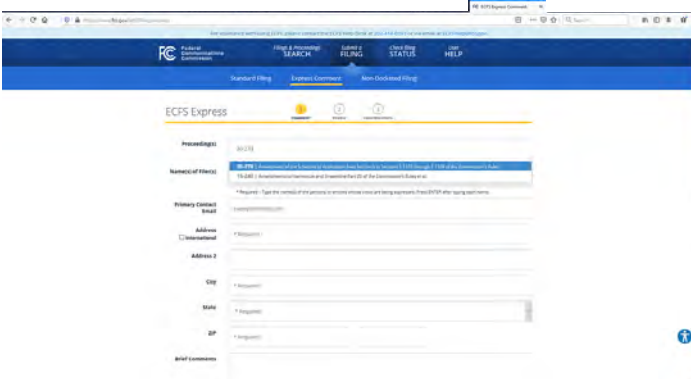
To comment, go to the FCC ECFS at <https://www.fcc.gov/ecfs/filings> and do the following:



1. Go to the web address <https://www.fcc.gov/ecfs/filings> and you will see the FCC "Submit a Filing" page first, per the ARRL. Do not enter anything on this page. Click on the "Express Comment" text.



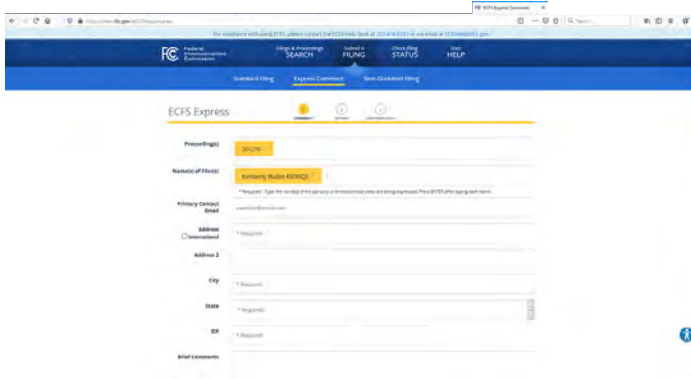
2. You will now be at the FCC's official page to express your comment. Be sure "Express Comment" is underlined in amber.



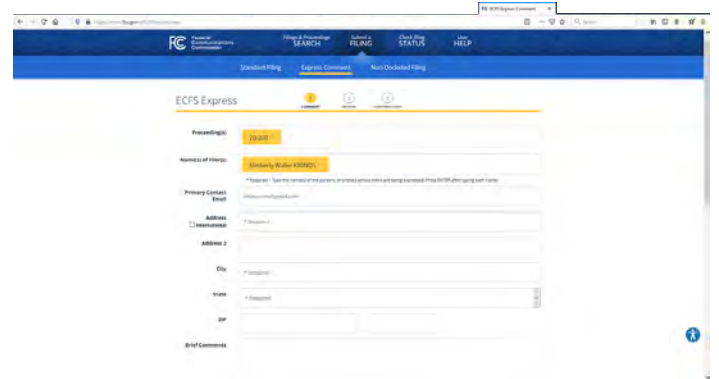
3. In the "Proceeding" box enter the official docket number only, which is 20-270. A drop down menu will appear, then click 20-270.



4. The docket number should now turn to amber. Click the enter button on your keyboard to lock it in & go to the next line.



5. Enter your name & call sign, then click your enter button when it turns amber.



6. Enter your email address. This will stay a white background as shown, then move your cursor each time to fill out the remaining address fields, which will remain as a white background.

7. Express your opinion in "Brief Comments" section and then click the tiny "Email Confirmation" box to be sure the FCC sends you a confirmation they've received your comments. Now click the Aqua box at the bottom to continue to the review screen. Double check that everything is right and submit your official comment.

We hope all of you take a few minutes to make your voice known to the FCC in this matter! Family members who are not hams can comment too. It is important that they understand that Amateur Radio operators perform a tremendously important role in public safety, including during emergencies, and should be free of additional financial encumbrances in executing this valuable voluntary public service. ★

# FOR SALE



Our thanks to the family of Bob Boyd KDØYLN, who have graciously donated Bob's ham shack equipment to the ARAC.

Bob became a silent key on May 31, 2020 & was serving the club as a 1st Year Board Member. N0PDG found sales for 3 items totaling \$970 thus far.

The Board has voted to earmark all proceeds from Bob's equipment toward replacement of our aging repeater.

## THE FOLLOWING ITEMS ARE AVAILABLE FOR SALE:

We are taking offers on non-priced items & will present offers for discussion on all items for consideration as appropriate. Contact N0PDG at [lovoldm@gmail.com](mailto:lovoldm@gmail.com) to make offer.

**YAESU 767GX**, built in power supply. Comes with matching speaker (no cables to hook up the speaker). This radio has an issue with all the lights coming on all the time. Sometimes they come on, sometimes not.

**MAKE OFFER**

**KENWOOD TS-940S** Receives Great! No mic, built in power supply, power button missing. Unit powers up by pushing the display button, likely had work done to it. Unknown on power output.

**MAKE OFFER**

**ICOM 718 RADIO** with mic and power cord. No manual. New are selling for \$625.

**ASKING \$400**

**Morse code book with a cd for learning. Also oscillator, no keyer.**

**ASKING \$20**

**ICOM IC-Z1A Handheld dual band.** Comes with manual. Unknown if works as there is no power cord or charger. Worked fine when gifted to Bob by Randy Johnson AA0ME.

**MAKE OFFER**

**ADDITIONAL ITEMS FOR SALE ON PAGE 19!**

# FOR SALE



Larry Mattfield KEØPJW, of Bovey, Minnesota became a silent key July 25, 2020. NØVRM was contacted by Minton Miller NØNWO who is handling the sale of the radio equipment benefiting Larry's wife of 48 years, Betsy.

Please contact Minton Miller NØNWO at [mdfamily@mchsi.com](mailto:mdfamily@mchsi.com) or 218-256-6708 with questions or offers on the following items:

Icom 7300 \$935.00

Icom sm30 desk mic \$119

Samlex sec1235m \$110.50

LDG AT 600 Prow II auto tuner for Icom \$ 314.50

Yaesu 857d hf/vhf/uhf \$680

Yaesu ft70d 2m ht \$148.75

Yaesu SBH-28 rapid charger \$25.50

Yaesu SBR-24Li batteries (2X) \$34 each or \$68 for both.

MFJ 941E manual antenna tuner \$119

Ameritron ALS 500m mobile 500 watt amp \$850

Ameritron ALS 500 rc mobile amp remote \$55.25

Ameritron SPS 75MV switching power supply \$246.50

vantage pro 2 weather station. \$990.25

diamond 2m/440 X50A bass antenna \$80.75

Solarcon A 99 cb antenna with GPK-1 Ground Plane \$123.25

Alpha Delta DELTA 4b coax switch. \$89.25

# Contest Calendar – September 2020

|  |                              |
|--|------------------------------|
| <a href="#">+ Worldwide Sideband Activity Contest</a>          | 0100Z-0159Z, Sep 1           |
| <a href="#">+ QCX Challenge</a>                                | 0300Z-0400Z, Sep 1           |
| <a href="#">+ RTTYOPS Weeksprint</a>                           | 1700Z-1900Z, Sep 1           |
| <a href="#">+ Phone Fray</a>                                   | 0230Z-0300Z, Sep 2           |
| <a href="#">+ CWops Mini-CWT Test</a>                          | 1300Z-1400Z, Sep 2           |
| <a href="#">+ VHF-UHF FT8 Activity Contest</a>                 | 1700Z-2000Z, Sep 2           |
| <a href="#">+ CWops Mini-CWT Test</a>                          | 1900Z-2000Z, Sep 2           |
| <a href="#">+ UKEICC 80m Contest</a>                           | 2000Z-2100Z, Sep 2           |
| <a href="#">+ G3ZQS Memorial Straight Key Contest</a>          | 2300Z, Sep 2 to 2300Z, Sep 4 |
| <a href="#">+ CWops Mini-CWT Test</a>                          | 0300Z-0400Z, Sep 3           |
|  | 1800Z-1900Z, Sep 3 (CW) and  |
|  | 1900Z-2000Z, Sep 3 (SSB) and |
| <a href="#">+ NRAU 10m Activity Contest</a>                    | 2000Z-2100Z, Sep 3 (FM) and  |
|  | 2100Z-2200Z, Sep 3 (Dig)     |
|  | 1700Z-1900Z, Sep 3           |
| <a href="#">+ RTTYOPS Weeksprint</a>                           | 1900Z-2100Z, Sep 3           |
| <a href="#">+ SKCC Sprint Europe</a>                           | 0145Z-0215Z, Sep 4           |
| <a href="#">+ NCCC RTTY Sprint</a>                             | 0230Z-0300Z, Sep 4           |
| <a href="#">+ NCCC Sprint Ladder</a>                           | 0000Z-2359Z, Sep 5           |
| <a href="#">+ Russian RTTY WW Contest</a>                      | 0000Z-0359Z, Sep 5           |
| <a href="#">+ CWops CW Open</a>                                | 0000Z, Sep 5 to 2400Z, Sep 6 |
| <a href="#">+ All Asian DX Contest, Phone</a>                  | 0600Z-0629Z, Sep 5 and       |
|  | 0630Z-0659Z, Sep 5 and       |
| <a href="#">+ Wake-Up! QRP Sprint</a>                          | 0700Z-0729Z, Sep 5 and       |
|  | 0730Z-0800Z, Sep 5           |
| <a href="#">+ CWops CW Open</a>                                | 1200Z-1559Z, Sep 5           |
| <a href="#">+ AGCW Straight Key Party</a>                      | 1300Z-1600Z, Sep 5           |
| <a href="#">+ RSGB SSB Field Day</a>                           | 1300Z, Sep 5 to 1300Z, Sep 6 |
| <a href="#">+ Colorado QSO Party</a>                           | 1300Z, Sep 5 to 0400Z, Sep 6 |
| <a href="#">+ IARU Region 1 Field Day, SSB</a>                 | 1300Z, Sep 5 to 1259Z, Sep 6 |
| <a href="#">+ IARU Region 1 145 MHz Contest</a>                | 1400Z, Sep 5 to 1400Z, Sep 6 |
| <a href="#">+ CWops CW Open</a>                                | 2000Z-2359Z, Sep 5           |
| <a href="#">+ PODXS 070 Club Jay Hudak Memorial 80m Sprint</a> | 2000Z, Sep 5 to 2000Z, Sep 6 |
| <a href="#">+ WAB 144 MHz QRO Phone</a>                        | 1000Z-1400Z, Sep 6           |
| <a href="#">+ Tennessee QSO Party</a>                          | 1800Z, Sep 6 to 0300Z, Sep 7 |
| <a href="#">+ RSGB 80m Autumn Series, SSB</a>                  | 1900Z-2030Z, Sep 7           |
| <a href="#">+ MI QRP Labor Day CW Sprint</a>                   | 2300Z, Sep 7 to 0300Z, Sep 8 |
| <a href="#">+ ARS Spartan Sprint</a>                           | 0100Z-0300Z, Sep 8           |
| <a href="#">+ Worldwide Sideband Activity Contest</a>          | 0100Z-0159Z, Sep 8           |
| <a href="#">+ RTTYOPS Weeksprint</a>                           | 1700Z-1900Z, Sep 8           |
| <a href="#">+ Phone Fray</a>                                   | 0230Z-0300Z, Sep 9           |
| <a href="#">+ CWops Mini-CWT Test</a>                          | 1300Z-1400Z, Sep 9           |
| <a href="#">+ VHF-UHF FT8 Activity Contest</a>                 | 1700Z-2000Z, Sep 9           |
| <a href="#">+ CWops Mini-CWT Test</a>                          | 1900Z-2000Z, Sep 9           |

*Continued on Page 21*



## Contest Calendar - September 2020, Continued from p.16

|   |   |
|---|---|
| <a href="#">+ CWops Mini-CWT Test</a>                     | 0300Z-0400Z, Sep 10   |
| <a href="#">+ RTTYOPS Weeksprint</a>                      | 1700Z-1900Z, Sep 10   |
| <a href="#">+ NCCC RTTY Sprint</a>                        | 0145Z-0215Z, Sep 11   |
| <a href="#">+ NCCC Sprint Ladder</a>                      | 0230Z-0300Z, Sep 11   |
| <a href="#">+ ARRL EME Contest</a>                        | 0000Z, Sep 12 to 2359Z, Sep 13  |
| <a href="#">+ FOC QSO Party</a>                           | 0000Z-2359Z, Sep 12   |
| <a href="#">+ WAE DX Contest, SSB</a>                     | 0000Z, Sep 12 to 2359Z, Sep 13  |
| <a href="#">+ SARL Field Day Contest</a>                  | 1000Z, Sep 12 to 1000Z, Sep 13  |
| <a href="#">+ SKCC Weekend Sprintathon</a>                | 1200Z, Sep 12 to 2400Z, Sep 13  |
| <a href="#">+ Texas QSO Party</a>                         | 1400Z, Sep 12 to 0200Z, Sep 13 and<br>1400Z-2000Z, Sep 13                                   |
| <a href="#">+ Ohio State Parks on the Air</a>             | 1400Z-2200Z, Sep 12   |
| <a href="#">+ Russian Cup Digital Contest</a>             | 1500Z-1859Z, Sep 12 and<br>0600Z-0959Z, Sep 13  |
| <a href="#">+ Alabama QSO Party</a>                       | 1500Z, Sep 12 to 0300Z, Sep 13  |
| <a href="#">+ ARRL September VHF Contest</a>              | 1800Z, Sep 12 to 0300Z, Sep 14  |
| <a href="#">+ North American Sprint, CW</a>               | 0000Z-0400Z, Sep 13   |
| <a href="#">+ Swiss HTC QRP Sprint</a>                    | 1300Z-1900Z, Sep 13   |
| <a href="#">+ 4 States QRP Group Second Sunday Sprint</a> | 0000Z-0200Z, Sep 14   |
| <a href="#">+ Worldwide Sideband Activity Contest</a>     | 0100Z-0159Z, Sep 15   |
| <a href="#">+ RTTYOPS Weeksprint</a>                      | 1700Z-1900Z, Sep 15   |
| <a href="#">+ Phone Fray</a>                              | 0230Z-0300Z, Sep 16   |
| <a href="#">+ CWops Mini-CWT Test</a>                     | 1300Z-1400Z, Sep 16   |
| <a href="#">+ CWops Mini-CWT Test</a>                     | 1900Z-2000Z, Sep 16   |
| <a href="#">+ RSGB 80m Autumn Series, CW</a>              | 1900Z-2030Z, Sep 16   |
| <a href="#">+ NAQCC CW Sprint</a>                         | 0030Z-0230Z, Sep 17   |
| <a href="#">+ CWops Mini-CWT Test</a>                     | 0300Z-0400Z, Sep 17   |
| <a href="#">+ RTTYOPS Weeksprint</a>                      | 1700Z-1900Z, Sep 17   |
| <a href="#">+ BCC QSO Party</a>                           | 1930Z-1959Z, Sep 17 (CW) and<br>2000Z-2029Z, Sep 17 (SSB) and<br>2030Z-2059Z, Sep 17 (RTTY) |
| <a href="#">+ NCCC RTTY Sprint</a>                        | 0145Z-0215Z, Sep 18   |
| <a href="#">+ NCCC Sprint</a>                             | 0230Z-0300Z, Sep 18   |
| <a href="#">+ AGB NEMIGA Contest</a>                      | 2100Z-2400Z, Sep 18   |
| <a href="#">+ Collegiate QSO Party</a>                    | 0000Z, Sep 19 to 2359Z, Sep 20  |
| <a href="#">+ ARRL 10 GHz and Up Contest</a>              | 0600 local, Sep 19 to 2400 local, Sep 20  |
| <a href="#">+ SARL VHF/UHF Digital Contest</a>            | 1200Z, Sep 19 to 0800Z, Sep 20  |
| <a href="#">+ Scandinavian Activity Contest, CW</a>       | 1200Z, Sep 19 to 1200Z, Sep 20  |
| <a href="#">+ All Africa International DX Contest</a>     | 1200Z, Sep 19 to 1200Z, Sep 20  |
| <a href="#">+ SRT HF Contest SSB</a>                      | 1300Z, Sep 19 to 1300Z, Sep 20  |
| <a href="#">+ Iowa QSO Party</a>                          | 1400Z, Sep 19 to 0200Z, Sep 20  |
| <a href="#">+ QRP Afield</a>                              | 1500Z-2100Z, Sep 19   |
| <a href="#">+ Wisconsin Parks on the Air</a>              | 1600Z-2300Z, Sep 19   |
| <a href="#">+ New Jersey QSO Party</a>                    | 1600Z, Sep 19 to 0359Z, Sep 20  |

Continued on Page 22

# Contest Calendar - September 2020, Continued from p.17

[+ New Hampshire QSO Party](#)

[+ Washington State Salmon Run](#)

[+ Feld Hell Sprint](#)

[+ North American Sprint, RTTY](#)

[+ BARTG Sprint 75](#)

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

[+ 144 MHz Fall Sprint](#)

[+ Worldwide Sideband Activity Contest](#)

[+ RTTYOPS Weeksprint](#)

[+ SKCC Sprint](#)

[+ Phone Fray](#)

[+ CWops Mini-CWT Test](#)

[+ CWops Mini-CWT Test](#)

[+ CWops Mini-CWT Test](#)

[+ RTTYOPS Weeksprint](#)

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

[+ NCCC RTTY Sprint](#)

[+ NCCC Sprint](#)

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

[+ Maine QSO Party](#)

[+ AGCW VHF/UHF Contest](#)

[+ QCX Challenge](#)

[+ QCX Challenge](#)

[+ RSGB FT4 Contest Series](#)

[+ Worldwide Sideband Activity Contest](#)

[+ QCX Challenge](#)

[+ RTTYOPS Weeksprint](#)

[+ 222 MHz Fall Sprint](#)

[+ Phone Fray](#)

[+ CWops Mini-CWT Test](#)

[+ CWops Mini-CWT Test](#)

[+ UKEICC 80m Contest](#)

1600Z, Sep 19 to 0400Z, Sep 20 and

1600Z-2200Z, Sep 20

1600Z, Sep 19 to 0700Z, Sep 20 and

1600Z-2400Z, Sep 20

1800Z-1959Z, Sep 19

0000Z-0400Z, Sep 20

1700Z-2059Z, Sep 20

2300Z, Sep 20 to 0100Z, Sep 21

1900 local - 2300 local, Sep 21

0100Z-0159Z, Sep 22

1700Z-1900Z, Sep 22

0000Z-0200Z, Sep 23

0230Z-0300Z, Sep 23

1300Z-1400Z, Sep 23

1900Z-2000Z, Sep 23

0300Z-0400Z, Sep 24

1700Z-1900Z, Sep 24

1900Z-2030Z, Sep 24

0145Z-0215Z, Sep 25

0230Z-0300Z, Sep 25

0000Z, Sep 26 to 2400Z, Sep 27

1200Z, Sep 26 to 1200Z, Sep 27

1400Z-1700Z, Sep 26 (144) and

1700Z-1800Z, Sep 26 (432)

1300Z-1400Z, Sep 28

1900Z-2000Z, Sep 28

1900Z-2030Z, Sep 28

0100Z-0159Z, Sep 29

0300Z-0400Z, Sep 29

1700Z-1900Z, Sep 29

1900 local - 2300 local, Sep 29

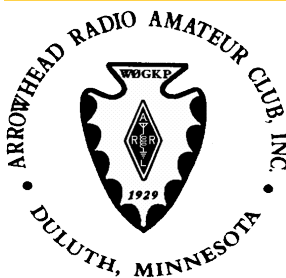
0230Z-0300Z, Sep 30

1300Z-1400Z, Sep 30

1900Z-2000Z, Sep 30

2000Z-2100Z, Sep 30

## The ARAC RELAY



Published monthly and distributed free to members, "The RELAY" is the official publication of the Arrowhead Radio Amateur Club, Inc. Members are encouraged to submit articles, opinions, and classifieds. Your submission will be placed as soon as possible providing it does not conflict with the bylaws of the Arrowhead Radio Amateur Club, Inc. The editors reserve the right to omit any submission that is not a required item. If a submission is questionable, it will be presented to the Board of Directors at the next scheduled board meeting for authorization.

