



# The RELAY)))

AUGUST  
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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# Summer 2020



Join us on  
facebook!

Co-Editors:

Kim & Steve Waller

Kim - KEØNQS ● Steve - KEØNQT

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## Sunspots are Back!

### With Opportunities to Improve RF Propagation

Our Sun has a great effect on radio frequency propagation as its "exhaust" interacts with Earth's magnetic field. Right now two sunspots have appeared from Solar Cycle 25 that have amateur radio operators excited because the level of sunspot activity has an enormous effect on the ionosphere and as a result, on HF radio propagation conditions.

**Sunspots** are temporary phenomena on the Sun's photosphere that appear as spots darker than the surrounding areas. They are regions of reduced surface temperature caused by concentrations of magnetic field flux that inhibit convection. Sunspots usually appear in pairs of opposite magnetic polarity.

### The geomagnetic activity forecast for the period July 31 to August 26 from F.K. Janda, OK1HH:

- Quiet on August 4 – 7, 15 – 19, 22 – 26
  - Quiet to unsettled on July 31, August 2 – 3, (8,) 9, 11, (12 – 14,) 20
  - Quiet to active on (August 1, 10, 21)
  - Unsettled to active not expected
  - Active to disturbed not expected
- Solar wind will intensify on: August 1 – 3 (-4, 11 – 15,) 20 – 21, (22 – 25)

For those interested, **Tad Cook K7RA** of Seattle has a sunspot numbers blog at <http://www.wm7d.net/hamradio/solar/k7ra.shtml>. He reports that the daily sunspot number was 11 for July 21-27, rising to 22 for July 28-30.



The Sun with sunspots visible Image Courtesy NASA

What is a sunspot number? **Carl Luetzelschwab, K9LA** wrote a nice piece for ARRL entitled *What the Numbers Mean, and Propagation Predictions--a brief introduction to propagation and the major factors affecting it* (read it at <http://www.arrl.org/the-sun-the-earth-the-ionosphere>).

In the article Carl says, "Sunspots are areas on the sun associated with

Continued on page 14

# ARAC Board Meeting Minutes – July 7, 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



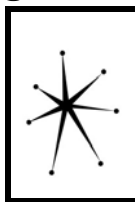
**NØCALL**  
Robin Davis  
  
218-391-3Ø77  
davisfam2858@yahoo.com

## TREASURER



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

## 3RD YEAR BOARD



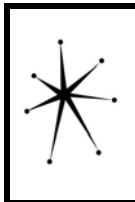
**KD9ABS**  
Gary Minter  
1621 N 26th St  
Superior WI 5488Ø

## 2ND YEAR BOARD



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

## 1ST YEAR BOARD



**Open Seat**

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

**Guest:** Del Minter-KEØCLI

Meeting called to order at 6:34 pm by President Gene-NØVRM

### Minutes:

Posted in newsletter and on the web page. Motion to accept by Bruce-KEØNIT, seconded by Mike-NØPDG, motion passed

### Treasurer's Report:

Checking..... 1,148.85  
Savings..... 1,373.40  
Cash Subtotal..... \$2,522.35

Outstanding Check (Repeater # 1414)..... -1,100.00

Winter CD..... 1,714.03  
Summer CD..... 1,700.00  
CD Subtotal..... \$3,414.03

Grand Total..... \$4,836.38

Last three (3) months, varied only around \$100.00 dollars. Paid semi-annual payment to church for use of their facilities, \$150.00. Bruce-KEØNIT is depositing dues as they come in. We don't have a lot of expenses

We have not made the annual payment to WDSE. We could cash the Summer CD, which is coming due in August. Insurance is paid through February, PO Box is paid for the year, and Storage Fee is paid annually and that is done for now. Board needs to direct Bruce-KEØNIT to pay WDSE the money we normally pay. Robin made motion to cash Summer CD when it comes due to pay WDSE; Mike-NØPDG seconded the motion. \$1,500.00 is the low end of a fee that is charged monthly to rent antenna space on a tower (\$3.00 per foot). We pay \$1,200.00 per year for space on the tower (antennas at 560 feet and 100 feet), the power (including temporary Emergency Power) and space for our repeater inside their building (generator room). Motion passed pending Club approval

Motion to accept Treasurer's Report as presented by Dave-AAØAC, seconded by Randy-AAØME, motion passed

Gary-KD9ABS arrived at 6:46 pm

### Committee Reports:

#### Picnic:

To hold the picnic at Chambers Grove Park is limited to 25 people max per the City of Duluth. Members to check on alternative sites prior to cancelling

#### Ham Fest:

Still planned for September, last Saturday of the month, depending on MN COVID response

#### Testing:

COVID-19 has restricted testing but we held four (4) test sessions in June. Sixteen (16) new Ham Radio Operators or upgraded licenses. Nothing scheduled for the immediate future, waiting for requests

Motion to adjourn by Mike-NØPDG, seconded by Gary-KD9ABS, motion passed at 7:05 pm



## Prez Sez ...

Hi Everyone,

Hope you are all having a good summer so far.

With all the COVID-19 restrictions we have had to give up our usual routines like club meetings — and no picnic this year. However you can use time at home to get those radio projects done like antenna work and station modifications. Just use safe practices and ask for help. We don't want anybody getting hurt.

Now is also a good time to get on the air. There have been some good band openings, so get on and make some contacts!

Have a great summer!!

Gene Ellefsen NØVRM 73

## Silent Key

### **Russ Hall** **KCØPDF**

*Message from NØVRM:*

It is with sadness to report that on Thursday July 23 **Russ Hall** KCØPDF became a Silent Key. Please keep Russ's family in your prayers.



# ARAC Club Meeting Minutes

July 9, 2020

## Present:

President Gene Ellefsen-N0VRM  
Vice President Mike Lovold-N0PDG  
Treasurer / Membership Bruce Carlson-KE0NIT  
Secretary Robin Davis  
Third Year Board Dave Davis-AA0AC  
First Year Board Gary Minter-KD9ABS  
Special Events – Open / Gene Ellefsen-N0VRM acting  
Ham Fest / Education Bob Schultz-KC0NFB  
Testing Doug Nelson-AA0AW

## Absent:

Second Year Board Randy Johnson-AA0ME  
Chaplain (Visiting) Rolland Bockbrader-KB0CK  
Parliamentarian Grant Forsyth-KC0WUP  
Property / Picnic Scott Ahlgren-N0VYU  
Newsletter / Historian Kim Waller-KE0NQS  
Newsletter Steve Waller-KE0NQT  
Repeater Randy Wabik-KR0B  
Repeater Derek McCorison-W0DNF  
Repeater Randy Haglin-N0BZZ  
Web Site Thomas Dorr-KE0RHA

Meeting called to order at 7:02 pm via 94 Repeater by President Gene-N0VRM

## Minutes:

Posted on the web page and in the newsletter. Any discussion or questions? Motion by Ryan Michaelson-KB1YTR, Cliff Tanner-AC0FO, motion passed

## Treasurer's Report:

Checking.....	1,148.85
Savings.....	1,373.40
Cash Subtotal .....	\$2,522.35
Outstanding Check (Repeater # 1414).....	-1,100.00
Winter CD .....	1,714.03
Summer CD .....	1,700.00
CD Subtotal .....	\$3,414.03
Grand Total.....	\$4,836.38

Any discussion or questions? Motion to accept by Jim Anderson-N0JWA, seconded by Jeff Nast-KC0MKS, motion passed

## Committee Reports:

### Education:

Quick, we are looking at what will actually happen with the classes. They are still scheduled for the beginning of September 2020. Tentatively scheduled in person or to be held via Zoom

Continued on Page 5



# ARAC Club Meeting Minutes

*Continued from Page 4*

Testing:

We ran four-(4) test session prior to July 1, 2020. Sixteen (16) new Hams Operators or upgrades. New Extra Syllabus is available and the test questions have changed as of July 1, 2020. No further test sessions scheduled at this time

Ham Fest:

Currently in the planning stage to be held in September. It will be up to the State and to Carlton County, if we will hold it as scheduled. We are looking for tables to rent – thank you to Diane Saunders-K0DSL for doing some investigation, as they do not have tables at that location. Hopefully we will be able to have our Ham Fest. Gene-N0VRM saw a sign stating tables for rent. Don't know what they had or the prices but maybe someone can follow up with them. Bob-KC0NFB will check it out along with the VFW in Carlton, which may let us use tables for free. It would be nice to have our Fest, visit with friends, everybody likes coming up here

Picnic:

Scott-N0BYU are you on the Repeater? Apparently not. He did investigate the upcoming picnic scheduled for the first Sunday in August. No more than twenty-five (25) people at the most in the park. We have to maintain six (6) feet social distancing. There is no water or bathrooms but they do have portable toilets. The decision was made to not do the picnic at this time by the Officers. How do we decide which twenty-five (25) people could go? Those who set up and cook get to go? It is just not feasible. I look forward to it, as I know many others do. The August picnic is cancelled

Newsletter:

Put a plug in for the Newsletter. Kim-KE0NQS does a wonderful job. We are lucky to have such a good newsletter. Also, check out the web page. We have a pretty good web page as well

New Business:

\$1,200.00 donation to WDSE for our use of their antenna on their tower, at 550 feet. The going rate is \$3.00 per foot. We would usually donate after the Ham Fest because we have money in the coffers. The Board made a motion to cash in the Summer CD to make our annual donation. Open for any discussion or questions on this. Motion to cash in the Summer CD by Diane-K0DSL, seconded by Jim-N0JWA. Any objections? We will consider this passed. This is important. We are blessed with a great system. We have our antenna on their tower and our Repeater is in their building. The 94 Repeater is also on their power and on the emergency backup power. That is why we make the annual donation to WDSE

Any other business?

Bob-KC0NFB with Info for the Group: As some of you remember, in 2012, we did a cleanup on our handbook. The handbook is the Constitution and Bylaws. I lost mine when I crashed the hard drive of my computer but it is in the process of being rebuilt. We are looking for detailed minutes from 2012 to rebuild our handbook. There weren't a lot of changes but some information that was removed such as the alcohol policy, etc.

Anything else?

Mike-N0PDG can you give some information about John Kruk-N9UPC 's webinar tonight. Mike-N0PDG shared it on the Facebook page. Click on the link, give your name (first and last) and email and it will send you a confirmation. Email Mike-N0PDG [N0PDG@ARRL.net](mailto:N0PDG@ARRL.net) if you need to sign on for tonight's webinar. Thank you, Mike-N0PDG, for setting this up

Thank you to all given this situation with the COVID Pandemic. If you have comments or improvements, please let Gene-N0VRM know. We will listen to your suggestions, constructive criticism, something we can do better. Hopefully, we will be back at the church soon. I'd be happy to shop for donuts again and share conversation and coffee

Motion to adjourn by Mike-N0PDG, Paul Dallavia-KC0WDQ seconded any objections? Motion passed at 7:23 pm

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

**Sat. Sept. 26, 2020 9:00am – 1:00pm**

Four Seasons Sports Complex and Events Center

90 Chestnut Avenue Carlton, Mn. 55718

Under the water tower in downtown Carlton

Admission: \$7.00 (12 & under FREE!)

*Used and like new radios, supplies, equipment, and computer related items including software and hardware! Personalized Ham items also available!*

Yaesu Representative John N9UPC will be on site with new radio equipment displayed and for sale.

<<< QSL card checking for ARRL awards program by Mike Cizek W0VTT >>>

Mike's email: [mgcizek@gmail.com](mailto:mgcizek@gmail.com)



This is an A.R.R.L. sanctioned event.

**Talk-in on W0GKP Repeater:**  
146.940(-) [103.5] Duluth  
147.000(-) [103.5] Mahtowa  
146.940(-) [114.8] 2-Harbors

**Testing on site!**

**10:00 AM 4-H Building**  
**Contact: Doug Nelson**  
**AA0AW / 218-391-5874**  
**aa0aw@arrl.net**

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**Dealer / Vendor Tables:**  
4 foot table: \$5.00  
8 foot table: \$10.00  
Vendor setup starts at: 7:00am

**Table Reservations:**

**Robert Schulz, KC0NFB**  
**115 Eden Lane**  
**Duluth, MN 55805-1533**  
**218-481-7458**  
**arac\_hamfest@charter.net**

# Hourly Drawings!

# 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	■■■■●●●●●
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## US Amateur Radio Bands

### US AMATEUR POWER LIMITS

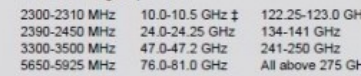
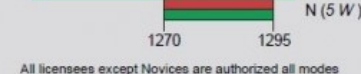
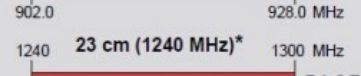
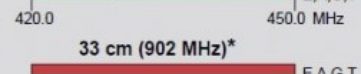
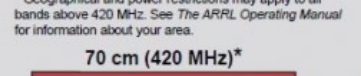
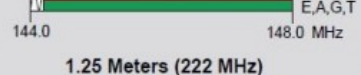
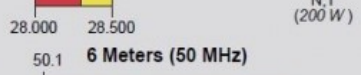
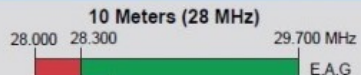
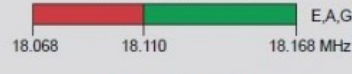
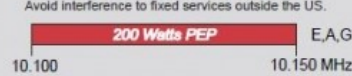
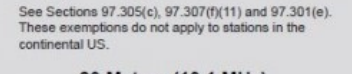
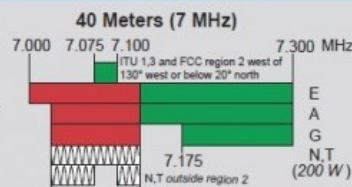
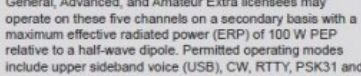
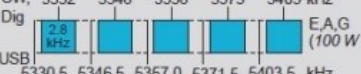
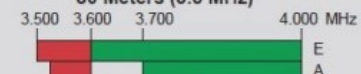
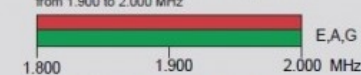
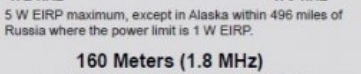
FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

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.



**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**

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

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

# NETS

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

- **Northland Weather Group Net:** Mondays 2000 on the ARAC repeater (146.940 MHz with a tone of 103.5 and standard offset).
- **Minnesota D-Star Net:** Sundays at 19:30 on Reflector 53A
- **Minnesota Section Net** 1200 and 1730 on 3.860 [Net Manager: NØYR] [http://www.mn-section.org/dept\\_stm.html](http://www.mn-section.org/dept_stm.html)
- The non-non-net: Evenings 2000 144.200 USB except for Sunday evenings.
- Badger WX Net: 0500-0715 on 3.985. Give 24 hour high/low/current temperature, precipitation and snowfall.
- **PICONET:** 3.925 from 0900-1100 CT Mon-Sat and 1600-1700 CT Mon-Fri. Info at: <http://www.piconet3925.com>
- Michigan Upper Peninsula Net: 1600 (CST) on 3.921 MHz Sun-Sat and 1200 Sun. Info: <http://www.michupnet.com>
- Great Lakes Marine/Maritime Mobile Net: Morning 07:30 - 3.932; 08:15 - 7.261 MHz and evening 18:30 - 3.1730927; 19:15 - 7.268 MHz. Weekend extra net: 10:00 - 7.261/7.268 MHz. All CST, LSB and +/- QRM. See: <http://www.sailblogs.com/member/glimmnet/>
- MIDCARS: 07:30-13:00 - 7.258 MHz. See: <http://www.midcars.net>
- Iowa snowbird net on 14.257MHz, M-W-F at 10:00 am Local Time. This is an open net.
- Spider Web Net (Marco Island FL) on 14.347 every morning at 0730 CST/CDT: <http://www.spiderwebnet.net>
- Maritime Mobile Service Network: Daily at 1100—2100 Central on 14.300. <http://mmsn.org> and <http://www.14300.net>
- RV Radio Network: Every day at 1900 Central on 7.265 MHz. Web site: <http://www.rvradionetwork.com>
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- Wisconsin Sideband Net: Daily @ 5:15 PM – 3985 [or 3982.5] KHz LSB
- 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, August 4, 2020  
@ 6:30 p.m.

Sammy's Pizza—West Duluth

### Next ARAC Club Meeting

Thursday, August 13th  
7 p.m.  
on the 94 Repeater

Tune into the  
Sunday night ES Net  
on Aug. 9th at 9:00 p.m. for more information on accessing the program portion of the meeting as an online Zoom meeting. You do not need a Zoom account to participate, plus you can also listen to the program by phone if you wish.

### August Program

#### DAVID PYRLIK KØDJP

David will doing a Zoom presentation on DMR programming and will also speak to us about Motorola communications.

*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/arrrl-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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Contact Kim or Steve Waller to include your name in this listing!

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Co-Editors,  
Kim & Steve Waller  
KEØNQS & KEØNQT



# AUGUST

## CLUB EVENTS

### SUNDAY NIGHT NETS

1930 - CW - 28.125 MHz USB-CW  
 2000 - USB 28.450 MHz  
 2100 - Southern St. Louis County  
 Emergency Services Net

### MONDAY NIGHT NETS

2000 - Northland WX Net - ARAC Repeater

### TUESDAY NIGHT NETS

2000 - Douglas Cty 145.490 MHz  
 2030 - Central Carlton County

### WEDNESDAY NIGHT NETS

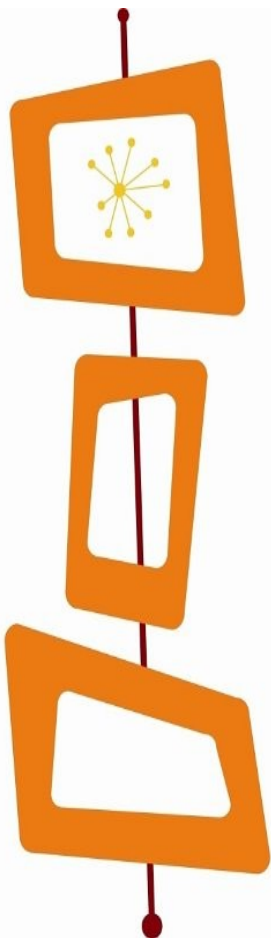
1900 - Lake County - LSAC1  
 2nd & 4th Wednesdays  
 2100 - BWAR

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2  CW 1930 NØPDG USB 2000 WØLWU ES 2100 KØDSL	3  WX 2000 KCØMKS	4 <b>ARAC BOARD MEETING</b> Sammy's Pizza Spirit Valley  DC Net 2000 CC Net 2030	5  2100 - BWAR	6	7	8
9  CW 1930 AAØAW USB 2000 K9KDK ES 2100 AAØME	10 <b>DC ARES/ RACES Mtg 1900 DC EOC</b>  WX 2000 KCØMKS	11  DC Net 2000 CC Net 2030	12 <b>Lake County ARES/RACES Meeting 1800</b>  Lake County Net 1900 2100 - BWAR	13  <b>ARAC Club Meeting 94 Repeater 7 pm</b>	14	15
16  CW 1930 NØPDG USB 2000 WØDIO ES 2100 N9DMG	17  WX 2000 KCØMKS	18  DC Net 2000 CC Net 2030	19 <b>St. Louis County ARES/ RACES Mtg 1630 Pike Lake EOC</b>  2100 - BWAR	20	21	22
23  CW 1930 AAØAW USB 2000 NØVRM ES 2100 AAØAW	24  WX 2000 KCØMKS	25  DC Net 2000 CC Net 2030	26  Lake County Net 1900 2100 - BWAR	27 <b>Carlton County ARES/RACES Meeting 1900 CC EOC</b>	28	29 <b>Club Breakfast @ The Chalet 0800-0900</b>
30  CW 1930 NØPDG USB 2000 NØPDG ES 2100 KCØWDQ	31  WX 2000 KCØMKS					

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

Next Meeting: Thursday,  
*August 13, 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:**

Bob Schulz KCØNFB

**Chaplains:**

**Visiting Chaplain:**

Denny Anderson WØDIO

**Parliamentarian:**

Grant Forsyth KCØWUP

**Website:**

Thomas Dorr KEØRHA

**Membership:**

Bruce Carlson KEØNIT

**Property Chair:**

Wulf Gar WU1FGR

**Testing:**

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).

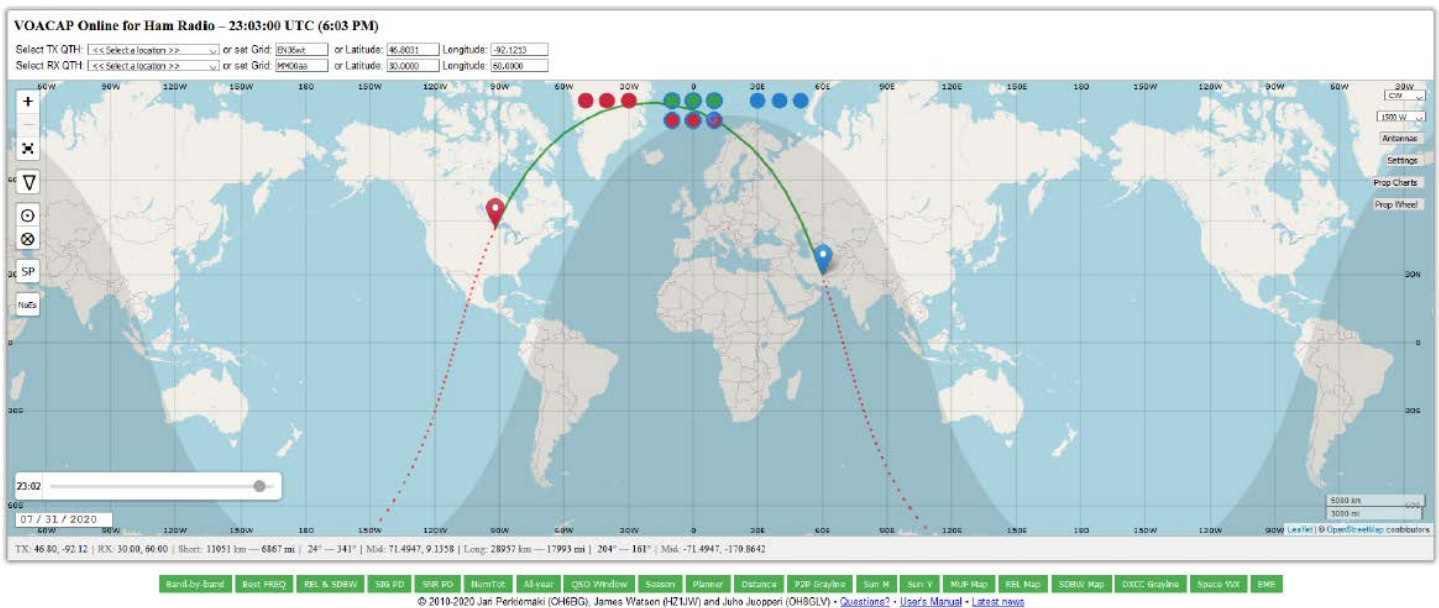
## Sunspots, Continued from Page 1

with ultraviolet radiation. Thus they are tied to ionization of the F region. **The daily sunspot number**, when plotted over a month time frame, is very spiky. Averaging the daily sunspot numbers over a month results in the monthly average sunspot number, but it is also rather spiky when plotted. Thus a more averaged, or smoothed, measurement is needed to measure solar cycles. This is the smoothed sunspot number (SSN). The SSN is calculated using six months of data before and six months of data after the desired month, plus the data for the desired month. Because of this amount of smoothing, the official SSN is one-half year behind the current month. Unfortunately this amount of smoothing may mask any short-term unusual solar activity that may enhance propagation.

**“Sunspots come and go in an approximate 11-year cycle.** The rise to maximum (4 to 5 years) is usually faster than the descent to minimum (6 to 7 years). At and near the maximum of a solar cycle, the increased number of sunspots causes more ultraviolet radiation to impinge on the atmosphere. This results in significantly more F region ionization, allowing the ionosphere to refract higher frequencies (15, 12, 10, and even 6 meters) back to Earth for DX contacts. At and near the minimum between solar cycles, the number of sunspots is so low that higher frequencies go through the ionosphere into space. Commensurate with solar minimum, though, is less absorption and a more stable ionosphere, resulting in the best propagation on the lower frequencies (160 and 80 meters). Thus, in general, high SSNs are best for high-frequency propagation, and low SSNs are best for low-frequency propagation.”

### Interested in professional-grade HF (3-30 MHz) propagation prediction online?

Jari Perkiömäki (OH6BG), James Watson (HZ1JW) and Juho Juopperi (OH8GLV) have built one for public use (see screenshot below). **Go to <https://www.voacap.com/hf/>** to view data.



Well we've just scratched the surface (sunspot pun intended) on the subjects of sunspots and radio frequency propagation. There's so much more to learn and experiment with as an amateur radio operator. Educational resources are plentiful on the internet for you to dive into the angle of RF propagation that interests you. Take advantage of any additional free time, if you have it and have fun! ★

**Have a RF propagation story to share?**

**Send it to us at [ke0nqs.mn@gmail.com](mailto:ke0nqs.mn@gmail.com) and we'll publish in a future issue of The Relay.**

# Contest Calendar – August 2020

<a href="#">± Batavia FT8 Contest</a>	0000Z, Aug 1 to 2359Z, Aug 2
<a href="#">± 10-10 Int. Summer Contest, SSB</a>	0001Z, Aug 1 to 2359Z, Aug 2
<a href="#">± European HF Championship</a>	1200Z-2359Z, Aug 1
<a href="#">± WAB 144 MHz Low Power Phone</a>	1400Z-1800Z, Aug 1
<a href="#">± RTTYOPS Weekend Sprint</a>	1600Z-1959Z, Aug 1
<a href="#">± ARRL 222 MHz and Up Distance Contest</a>	1800Z, Aug 1 to 1800Z, Aug 2
<a href="#">± North American QSO Party, CW</a>	1800Z, Aug 1 to 0559Z, Aug 2
<a href="#">± SARL HF Phone Contest</a>	1400Z-1700Z, Aug 2
<a href="#">± Worldwide Sideband Activity Contest</a>	0100Z-0159Z, Aug 4
<a href="#">± ARS Spartan Sprint</a>	0100Z-0300Z, Aug 4
<a href="#">± RTTYOPS Weeksprint</a>	1700Z-1900Z, Aug 4
<a href="#">± Phone Fray</a>	0230Z-0300Z, Aug 5
<a href="#">± CWops Mini-CWT Test</a>	1300Z-1400Z, Aug 5
<a href="#">± VHF-UHF FT8 Activity Contest</a>	1700Z-2000Z, Aug 5
<a href="#">± CWops Mini-CWT Test</a>	1900Z-2000Z, Aug 5
<a href="#">± CWops Mini-CWT Test</a>	0300Z-0400Z, Aug 6
<a href="#">± RTTYOPS Weeksprint</a>	1700Z-1900Z, Aug 6
<a href="#">± NRAU 10m Activity Contest</a>	1800Z-1900Z, Aug 6 (CW) and 1900Z-2000Z, Aug 6 (SSB) and 2000Z-2100Z, Aug 6 (FM) and 2100Z-2200Z, Aug 6 (Dig)
<a href="#">± SKCC Sprint Europe</a>	1900Z-2100Z, Aug 6
<a href="#">± QRP Fox Hunt</a>	0100Z-0230Z, Aug 7
<a href="#">± NCCC RTTY Sprint</a>	0145Z-0215Z, Aug 7
<a href="#">± NCCC Sprint</a>	0230Z-0300Z, Aug 7
<a href="#">± WAE DX Contest, CW</a>	0000Z, Aug 8 to 2359Z, Aug 9
<a href="#">± QRP ARCI European Sprint</a>	0800Z-1100Z, Aug 8
<a href="#">± SKCC Weekend Sprintathon</a>	1200Z, Aug 8 to 2400Z, Aug 9
<a href="#">± Maryland-DC QSO Party</a>	1400Z, Aug 8 to 0400Z, Aug 9
<a href="#">± RTTYOPS Weekend Sprint</a>	1600Z-1959Z, Aug 8
<a href="#">± 4 States QRP Group Second Sunday Sprint</a>	0000Z-0200Z, Aug 10
<a href="#">± SARL Youth Sprint</a>	1200Z-1400Z, Aug 10
<a href="#">± Worldwide Sideband Activity Contest</a>	0100Z-0159Z, Aug 11
<a href="#">± MMonVHF/DUBUS 144 MHz Meteorscatter Sprint Contest</a>	1500Z, Aug 11 to 1459Z, Aug 13

*Continued on Page 16*

# Contest Calendar – August 2020

Continued from Page 15

+ RTTYOPS Weeksprint	1700Z-1900Z, Aug 11
+ NAQCC CW Sprint	0030Z-0230Z, Aug 12
+ Phone Fray	0230Z-0300Z, Aug 12
+ CWops Mini-CWT Test	1300Z-1400Z, Aug 12
+ VHF-UHF FT8 Activity Contest	1700Z-2000Z, Aug 12
+ CWops Mini-CWT Test	1900Z-2000Z, Aug 12
+ CWops Mini-CWT Test	0300Z-0400Z, Aug 13
+ RTTYOPS Weeksprint	1700Z-1900Z, Aug 13
+ QRP Fox Hunt	0100Z-0230Z, Aug 14
+ NCCC RTTY Sprint	0145Z-0215Z, Aug 14
+ NCCC Sprint	0230Z-0300Z, Aug 14
+ SARTG WW RTTY Contest	0000Z-0800Z, Aug 15 and 1600Z-2400Z, Aug 15 and 0800Z-1600Z, Aug 16
+ ARRL 10 GHz and Up Contest	0600 local, Aug 15 to 2400 local, Aug 16
+ Russian District Award Contest	0800Z, Aug 15 to 0800Z, Aug 16
+ Keyman's Club of Japan Contest	1200Z, Aug 15 to 1200Z, Aug 16
+ Feld Hell Sprint	1600Z-1759Z, Aug 15
+ North American QSO Party, SSB	1800Z, Aug 15 to 0559Z, Aug 16
+ CVA DX Contest, CW	2100Z, Aug 15 to 2100Z, Aug 16
+ SARL HF Digital Contest	1400Z-1700Z, Aug 16
+ NJQRP Skeeter Hunt	1700Z-2100Z, Aug 16
+ ARRL Rookie Roundup, RTTY	1800Z-2359Z, Aug 16
+ Run for the Bacon QRP Contest	2300Z, Aug 16 to 0100Z, Aug 17
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Aug 18
+ RTTYOPS Weeksprint	1700Z-1900Z, Aug 18
+ Phone Fray	0230Z-0300Z, Aug 19
+ CWops Mini-CWT Test	1300Z-1400Z, Aug 19
+ CWops Mini-CWT Test	1900Z-2000Z, Aug 19
+ CWops Mini-CWT Test	0300Z-0400Z, Aug 20
+ RTTYOPS Weeksprint	1700Z-1900Z, Aug 20
+ QRP Fox Hunt	0100Z-0230Z, Aug 21
+ NCCC RTTY Sprint	0145Z-0215Z, Aug 21
+ NCCC Sprint	0230Z-0300Z, Aug 21

Continued on Page 17

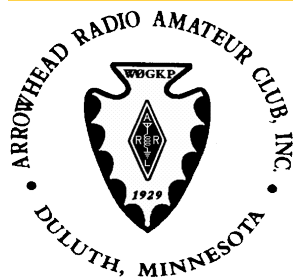


# Contest Calendar – August 2020

Continued from Page 16

+ Hawaii QSO Party	0400Z, Aug 22 to 0400Z, Aug 24
+ RTTYOPS Weekend Sprint	1600Z-1959Z, Aug 22
+ Ohio QSO Party	1600Z, Aug 22 to 0400Z, Aug 23
+ CVA DX Contest, SSB	2100Z, Aug 22 to 2100Z, Aug 23
+ 50 MHz Fall Sprint	2300Z, Aug 22 to 0300Z, Aug 23
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Aug 25
+ RTTYOPS Weeksprint	1700Z-1900Z, Aug 25
+ SKCC Sprint	0000Z-0200Z, Aug 26
+ Phone Fray	0230Z-0300Z, Aug 26
+ CWops Mini-CWT Test	1300Z-1400Z, Aug 26
+ CWops Mini-CWT Test	1900Z-2000Z, Aug 26
+ CWops Mini-CWT Test	0300Z-0400Z, Aug 27
+ RTTYOPS Weeksprint	1700Z-1900Z, Aug 27
+ QRP Fox Hunt	0100Z-0230Z, Aug 28
+ NCCC RTTY Sprint	0145Z-0215Z, Aug 28
+ NCCC Sprint	0230Z-0300Z, Aug 28
+ Feld Hell Sprint	0000Z-2359Z, Aug 29
+ ALARA Contest	0600Z Aug 29 to 0559Z, Aug 30
+ World Wide Digi DX Contest	1200Z, Aug 29 to 1200Z, Aug 30
+ YO DX HF Contest	1200Z, Aug 29 to 1200Z, Aug 30
+ WVE Islands QSO Party	1200Z, Aug 29 to 0300Z, Aug 30
+ Kentucky State Parks on the Air	1400Z-2200Z, Aug 29
+ Kansas QSO Party	1400Z, Aug 29 to 0200Z, Aug 30 and 1400Z-2000Z, Aug 30
+ RTTYOPS Weekend Sprint	1600Z-1959Z, Aug 29
+ SARL HF CW Contest	1400Z-1700Z, Aug 30
+ QCX Challenge	1300Z-1400Z, Aug 31
+ QCX Challenge	1900Z-2000Z, Aug 31

## 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.*

