



The RELAY)))

April 2024

The Weather Issue

The Official Publication of the Arrowhead Radio Amateur Club

A.R.A.C. Inc.

P.O. Box 7164 Duluth MN 55807-7164

<http://www.thearac.org>

Dues: Member \$20/Family \$25

INDEX

Eyes to the Skies	1
Board Minutes	2
Club Mtg Minutes	3
Prez Sez	5
Testing Sessions	5
CW Abbreviations	6
Band Plan	6
Nets	7
Repeaters	8
Members' Email	10
Calendar	11
Committee Chairs	12
Contest Calendar	18

Eyes to the Skies - April 2024 Solar Eclipse followed by Skywarn Training

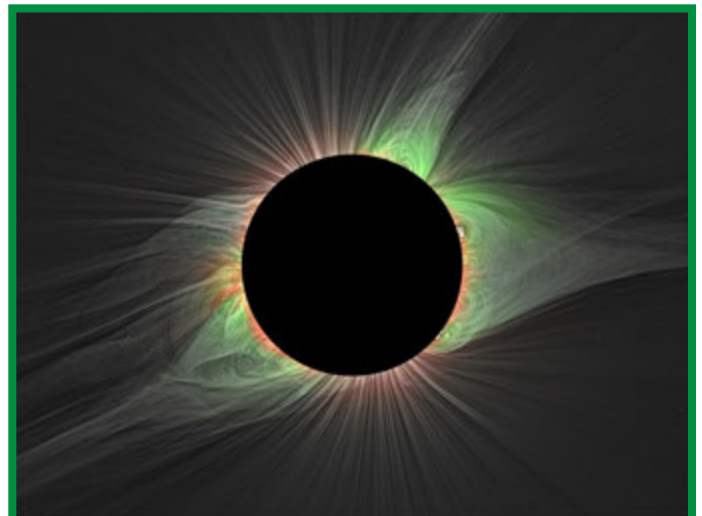
In our March 2024 issue of the *Relay*, we discussed the upcoming April 8th total solar eclipse crossing over North America. In review, a total solar eclipse occurs when the moon passes between the sun and Earth and, for a short time, completely blocks the face of the sun.

"When the sun's disc is completely covered by the moon, daylight suddenly changes from bright sunlight to a very eerie twilight in a matter of seconds," Fred Espenak, a former astrophysicist from NASA Goddard Space Flight Center and author of "Road Atlas for the Total Solar Eclipse of 2024," told ABCNews.com recently.

"It becomes dark enough to pick out bright stars and planets, so it's very dramatic, very startling," Espenak said. "Most people get a very visceral reaction to seeing a total eclipse."

According to Espenak, 2024's total eclipse better than 2017's because:

- ◆ The path of totality is about 115 miles wide, which is almost 60% wider than 2017.
- ◆ The duration of the eclipse is about 60% longer, with some locations within the path experiencing up to four and a half minutes of the eclipse.



Special filters enable scientists to measure different temperatures in the corona during total solar eclipses, such as this one seen in Mitchell, Oregon, on August 21, 2017. The red light is emitted by charged iron particles at 1.8 million degrees Fahrenheit and the green are those at 3.6 million degrees Fahrenheit.

NASA.gov posted this image by M. Druckmuller and published in Habbal et al. 2021

ABC News also posted comments from Michael Zeiler, an expert solar eclipse cartographer, indicating Texas as a prime place for eclipse watchers because it has the best chances for clear skies on eclipse day:

"You want to be in the center of the path for the longest duration," Zeiler explained. "If you have a friend or relative in the path in Texas, and there are 12 million Texans inside the path, that's the spot to go because that's where the best weather prospects are."

Continued on Page 13

The Relay Co-Editors:
Kim & Steve Waller

Kim - KE0NQS Steve - KE0NQT
KE0NQS.mn@gmail.com KE0NQT@gmail.com



SPRING 2024



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facebook!



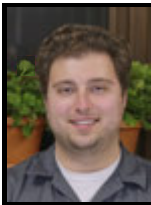
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1ST YEAR BOARD



KD9VKI
 Justin Cheever

Board Meeting Minutes - March 5, 2024

Present:

Board Members

Gene Ellefsen – NØVRM, Dave Pyrlík – KØDJP, Melinda Nelson – KFØGJW, Dave Davis – AAØAC, Doug Nelson - AAØAW, Sam Frey – KEØYTM, Justin Cheever – KD9VKI

Board Advisors (Non-Board Members)

Randy Wabik – KRØB

Guest: Rochelle Nelson

Meeting called to order by President Gene – NØVRM at 18:30 (6:30 pm)

Minutes:

Minutes were sent via email. Motion to approve Doug Nelson – AAØAW. Seconded by Justin Cheever – KD9VKI, motion passed.

Treasurer's Report:

Checking: \$1,555.33
Savings: \$3,260.00
Repeater: \$2,070.60
Subtotal Cash: \$6,885.93

Winter CD: \$1,748.93
Summer CD: \$0.00
Subtotal CD: \$1,748.93
Assets Total: \$8,634.86

Motion to accept as presented presented by Justin Cheever – KD9VKI, seconded by Doug Nelson – AAØAW, motion passed.

Repeater:

Dave Pyrlík – KØDJP Talk about which repeater would be the best for the 94.

Testing:

The next big one will be at the HamFest on May 4th. As always if you are looking to test or upgrade, or know of anyone that is interested in testing please contact Doug Nelson at AA0AW@arrl.net

HamFest:

HamFest is May 4th. We are looking for Volunteers and donations. If you are interested in volunteering or donating products please reach out to a Board Member.

New Business:

Looking for a new company to make name badges for the club.

Motion to adjourn by Doug Nelson – AAØAW. Seconded by Dave Davis – AAØAC, motion passed at 19:15 (7:15 pm)



ARAC Club Meeting Minutes

March 14, 2024

Present:

President: Gene Ellefsen – N0VRM
Vice President: Dave Pyrlík – K0DJP
Treasurer/Membership: Sam Frey – KE0YTM
Secretary: Melinda Nelson – KF0GJW
First Year Board: Justin Cheever – KD9VKI
Second Year Board: Dave Davis – AA0AC
Third Year Board: Doug Nelson – AA0AW
Special Events: Open/Gene Ellefsen – N0VRM (acting)
Parliamentarian: Grant Forsyth – KC0WUP
Testing: Doug Nelson – AA0AW
Repeater: Dave Pyrlík – K0DJP
Property/Picnic: Scott Ahlgren – N0VYU
HamFest/Education: Bob Schulz – KC0NFB

Absent:

Chaplin:

Web Site: Thomas Dorr – KE0RHA
Newsletter/Historian: Kim Waller – KE0NQS
Newsletter/Historian: Steve Waller – KE0NQT

Meeting called to order at 19:05 (7:05 PM) by President Gene Ellefsen – N0VRM. Forty-four (44) members were in attendance.

Minutes:

Minutes are posted on the website and in the newsletter. Motion to accept by Jeff Nast – KC0MKS, seconded by Justin Cheever – KD9VKI, motion Passed.

Treasurer's Report:

Checking: \$1,555.33
Savings: \$3,260.00
Repeater: \$2,070.60
Subtotal Cash \$6,885.93

Winter CD: \$1,748.93
Summer CD: \$0.00
Subtotal CD: \$1,748.93

Assets Subtotal: \$8,634.86

Motion to accept as presented by Bob Schulz – KC0NFB, seconded by Bruce Carlson – KN0NUL, motion passed.

Motion from the board for the following for HamFest

\$500.00 for the Grand Prize
\$300.00 for food
\$100.00 for door prizes

Continued on Page 4



ARAC Club Meeting Minutes, cont.

Motion to approve by Doug Nelson – AA0AW, seconded by Mike Lovold – N0PDG. Motion passed.

Education:

Bob Schulz – KC0NFB nothing currently. Diane Saunders – K0DSL started General Class March 5th through June 4th. If you are interested in upgrading to General Class please reach out to Diane. Currently we have 6 students for the class with testing scheduled for June 11th. Next Tech Class will be starting in the fall.

Testing:

Doug Nelson – AA0AW Next big test session will be May 4th at HamFest. Registration at 9:30, testing at 10:00. The fee is still \$15.00, you will need an FRN number and an email address. As always if you are looking to test or upgrade, or know of anyone that is interested in testing please contact Doug Nelson at AA0AW@arrl.net

Repeater:

Dave Pyrlik – K0DJP Yasue has a special on a repeater and we are looking for a motion to spend \$700.00 to purchase a new repeater for Mahtowa. Motion by Bob Schulz – KC0NFB, seconded by Ben Harmstad – KE0JDB. Motion passed.

New Business:

April – Skywarn (Meeting starts at 6:00 PM)

May 4th Our HamFest (Looking for volunteers and donations)

June – Grandma's Marathon (Registration is open Password – HAM24)

June 22nd – Grandma's Marathon and Field Day

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

Door Prize was won by Greg Scholz – KD0UYN

Motion to adjourn by Paul Dallavia – KC0WDQ, seconded by Bruce Carlson – KN0NUL, motion passed at 19:20 (7:20 PM).



CLUB REPEATER

WØGKP

146.94 (-)

CTCSS TONE

103.5



Prez Sez...

Hello Everyone,

April is **Skywarn Training** month. Our April 11 Club meeting will start **one hour early** at 6:00 pm, followed by Skywarn Training starting at 6:30 pm. This training is open to the Public, so be sure to let people you think would be interested know!

A look ahead to May: **Saturday May 4 is ARAC Hamfest** at the Head of the Lakes Fairgrounds in Superior, WI. We need help setting up at 6:00 am, as well as Ticket sales and Kitchen help. We will also need assistance to take down. This is our big Fundraiser, so please consider helping out. There will be lots of good equipment for sale, so if you need something be sure to attend.

73, Gene Ellefsen NØVRM



LOOKING for an Amateur Radio License TESTING SESSION?

Schedule your own Testing Session *TODAY!*

Contact Doug Nelson-AA0AW at aa0aw@arrl.net or 218-391-5874

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

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

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

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

UPGRADE CANDIDATES:

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

CW Abbreviations

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

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

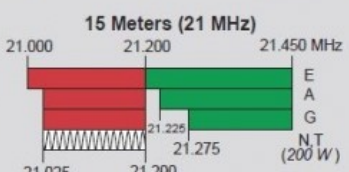
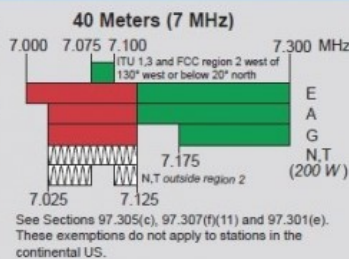
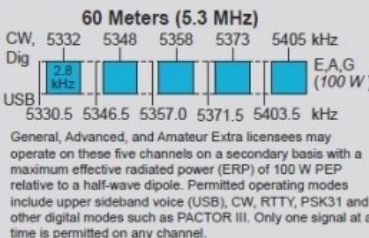
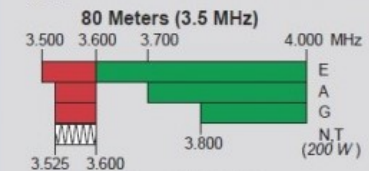
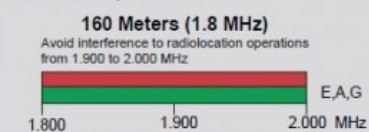
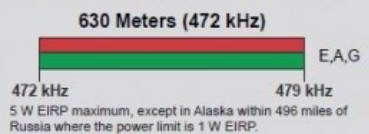
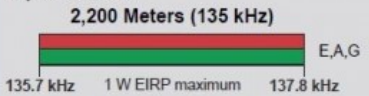


US Amateur Radio Bands

US AMATEUR POWER LIMITS

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

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



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



ARRL THE NATIONAL ASSOCIATION FOR AMATEUR RADIO

KEY

Note: CW operation is permitted throughout all amateur bands.

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

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

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

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

See ARRLWeb at www.arrl.org for detailed band plans.

ARRL
We're At Your Service

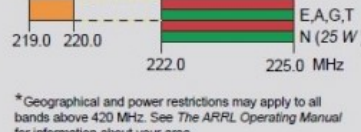
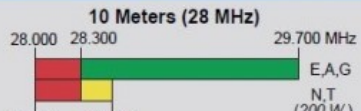
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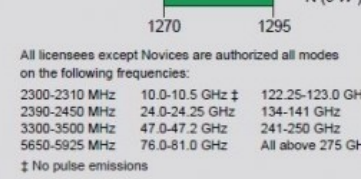
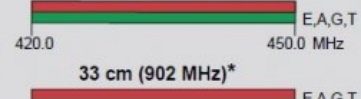
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email: membership@arrl.org

Getting Started in Amateur Radio:
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email: nowham@arrl.org

Exams: 860-594-0300 email: vec@arrl.org



*Geographical and power restrictions may apply to all bands above 420 MHz. See The ARRL Operating Manual for information about your area.



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



DULUTH AREA REPEATERS

ARAC System WØGKP

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

N9MMU/N9QWH System (WI)

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

WECOMM – WI Statewide Linked System WE9COM

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

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



DULUTH AREA REPEATERS, continued

NARC System NAØRC

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

Stand Alone Repeaters

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

Fusion

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

147.150 plus 151.4 NTØB Gilbert. MN Fusion Repeater
 145.170 minus 110.9 WA9KLM Superior, WI – Douglas County RACES/ARES Fusion Repeater (Digital only) Fusion Room 28373

145.250 minus 103.5 KBØYHX Cloquet, MN – Carlton County RACES/ARES Fusion Repeater

444.300 +5.00 103.5 NØEO Duluth, MN – Spirit Valley Amateurs Fusion Repeater WIRES-X NØEO (Analog only) Fusion Room 40494

444.400 +5.00 103.5 NAØRC Knife River, MN – Wires X Connected to NØEO Room 40494
 444.500 +5.00 103.5 NØLCR Two Harbors, MN – Wires X Connected to NØEO Room 40494
 444.600 +5.00 103.5 NØLCR Silver Bay, MN – Wires X Connected to NØEO Room 40494
 444.800 +5.00 103.5 NØLCR Grand Marais, MN – Wires X Connected to NØEO Room 40494

D-Star

147.375 plus NØEO D Star
 442.200 plus NØEO D Star

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

Elmers

El-mer / el-mər/ [el-mer]

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

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



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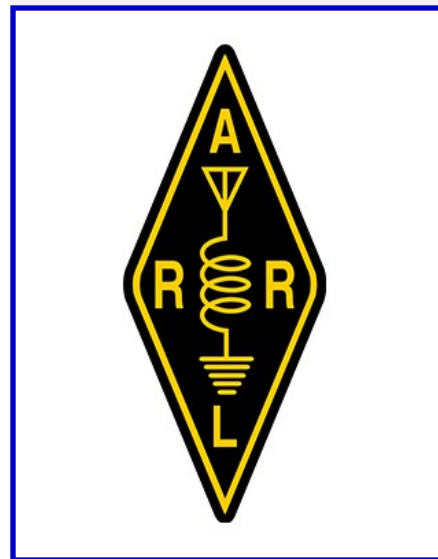
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Members, please check your name and email address for accuracy. If you are not on this list and want to be on the list, contact us with your info. If you need to make a change, please let us know at KE0NQS.mn@gmail.com OR KE0NQT@gmail.com




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

APRIL

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

Get this newsletter *faster*
via email!

Email Doug AAØAW at
aa0aw@arrl.net

One Hour
EARLY!

Next Club Meeting:
Thursday,
April 11th, 2024 - 6 pm
Followed by Skywarn at 6:30 pm!

ARAC Committee Chairs



Club License Trustee:

Ray Barnes KEØZN

Control Operators:

AAØAW - NØKXT - KCØNFB

Newsletter/Historian:

Kim KEØNQS & Steve KEØNQT
Waller

Education Chair:

Bob Schulz KCØNFB

Hamfest Chair:

Bob Schulz KCØNFB

Chaplain:

Rollie Bockbader KBØCK

Visiting Chaplin:

Parliamentarian:

Grant Forsyth KCØWUP

Website:

Thomas Dorr KEØRHA

Membership:

Sam Frey KEØYTM

Property Chair:

Scott Ahlgren NØVYU

Testing:

Doug Nelson AAØAW

Field Day:

Picnic Chair:

Scott Ahlgren, NØVYU

Repeater Chairs:

Randy Haglin NØBZZ
Randy Wabik KAØJZV

Contest Calendar at www.contestcalendar.com

National Contest Journal at www.ncjweb.com

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

Examples: Minnesota QSO Party is MNQP

British Columbia QSO Party = BCQP

QRZ web site at www.qrz.com

VHF Propagation site at www.aprs.mountainlake.k12.mn.us

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

Eyes to the Skies continued from page 1

According to **The Bell Museum**, “Most of Minnesota will see a 75 percent partial eclipse, Southeastern Minnesota will see an 80 percent partial eclipse or more. It will start around 1 p.m., peak around 2 p.m. and end by 3:10 to 3:15 p.m.”

The Bell Museum is Minnesota's official museum of natural history since 1872, and brings together science, art, and the environment with a unique Minnesota perspective. Located on the University of Minnesota St. Paul campus, the museum features “a digital planetarium, high-tech exhibits, famous wildlife dioramas, outdoor learning experiences and more.” Visit <https://www.bellmuseum.umn.edu/> for more information on program, events and hours at The Bell.

Duluth Eclipse Weather

As of this writing, the Duluth, Minnesota weather forecast for April 8th is cloudy, with a chance of showers. As forecasts go, who knows what weather we'll actually have, so we'll have to keep an eye on our local forecast within a few hours of the eclipse for what to expect. If we have cloudy skies, we still will likely notice some changes during the eclipse. Joe Rao reports on Space.com that he has viewed a solar eclipse on a thickly clouded day and describes it as being in a lighted room when someone turns a dimmer switch down and then turns it back up, causing the light to return. Even if it is cloudy, NASA says that viewers should always wear eclipse glasses during any solar eclipse, including people who are not in the path of totality. Alternatively, they say you can view the eclipse with a home-made pinhole viewer. Do a web search and you'll find several website how-to instructions to choose from.

For all the eclipse action, the best seat in the house is perhaps watching live stream video of the total eclipse on your phone or tablet, even as you are outside here in the Northland! Go to <https://www.nasa.gov/nasatv/> for coverage of the eclipse from 12 noon to 3 p.m. CT. They'll have live video from several locations along the path of totality as it moves across the United States.

No matter where you are on April 8th, and to what extent you witness the eclipse, it's still a historic day. After 2024, North America won't see a total eclipse again until 9 years from now in 2033, and even that eclipse will cross Alaska ONLY. We'll have to wait until 20 years from now, in 2044, when totality will be only be passing through Western Canada, Montana and North Dakota. The following year, in 2045, the U.S. will finally experience a total eclipse that spans from coast to coast. Please tell us about your 2024 Total Solar Eclipse experience, whether you're outside in the Northland or viewing NASA coverage live stream. We'll publish your comments in the May issue of **The Relay**. Now, turning to the Skywarn portion of our annual Weather Issue:

Skywarn Training 2024

Spring is here, and with the warmer temperatures comes the sometimes volatile weather of Northland spring and summer. This is when the **Northland National Weather Service** usually holds the first **free 2-hour Skywarn Weather Training** classes of the year to train volunteers in the community to help identify and report, as official **Skywarn Spotters**, severe weather such as large hail, damaging winds and tornadoes. This month's scheduled **ARAC Club meeting** will host Skywarn Training that is open to the public and start one hour earlier than usual.

As always, it's important to note that weather spotters are **not** storm chasers, who are typically meteorologists traveling toward storms to study and document severe weather in order to advance the science of predictive modeling.

Since the 1970s, SKYWARN[®] spotters have helped the National Weather Service issue timely and accurate warnings in their region to protect lives and property. As the National Weather Service says, “There can be no finer reward than to know that their efforts have given communities the precious gift of time, the seconds and minutes which can help save lives.” Who can be a spotter? Well, anyone who spends time outdoors will benefit from Skywarn training, and because ham radio operators play an important role in public safety, we are strongly encouraged to become Skywarn spotters and attend training every 4 years to refresh.

Skywarn Training teaches the following:

- ◆ Basics of thunderstorm development
- ◆ Fundamentals of storm structure
- ◆ Identifying potential severe weather features
- ◆ Information to report
- ◆ How to report information
- ◆ Basic severe weather safety



The 2024 Skywarn Training is April 11th at 6:30 pm, immediately following our 6 pm monthly ARAC Club meeting, 1 hour earlier than usual.

Continued on Page 14

Eyes to the Skies continued from page 13

Advanced Spotter Training

The National Weather Service also offers an Advanced Spotter class, which goes more in-depth into thunderstorm development, storm identification, and radar interpretation. Spotters should take the basic course before taking the Advanced course. In addition, if you can't make a live class, a recorded version is available upon request. For more information about live Advanced course scheduling or recordings, contact Warning Coordination Meteorologist Joe Moore at joseph.moore@noaa.gov.

Additional Training

NWS Duluth offers optional **Winter Spotter Training**. Go to <https://www.weather.gov/dlh/winterspotter> to watch a recording and find out more about how you can help during the winter season! This class covers winter weather science, the winter outlook, how to measure and report winter weather to NWS, and many resources available to stay up-to-date on the forecast.

COMET MetED also offers a basic Skywarn Spotter training course available on their website at https://www.meted.ucar.edu/education_training/course/23 (free MetEd registration is required). The online training is a great supplement and annual refresher, but the National Weather Service recommends taking their course as well (live or recorded version) to learn about how to best get reports to the local NWS office.

Cloud Identification Review

Here's a breakdown of some ominous-looking clouds and whether there is imminent danger associated with them:

Cumulonimbus Clouds

Rapid vertical growth in these cauliflower-looking cumulonimbus clouds shows that there is a mature thunderstorm, likely producing heavy rain. Abundant moisture and instability due to cool air aloft and heating at the surface set the stage for cumulonimbus to develop.

A lifting mechanism, such as a cold front, can help trigger these clouds to form.

Heavy rain, frequent lightning, strong winds and hail can be threats associated with cumulonimbus clouds.



Scud Clouds

Scud clouds may appear to be ominous as they hang vertically below a cumulonimbus cloud. Sometimes, scud clouds are mistaken for funnel clouds.

However, these clouds are benign and non-rotating. They often have a ragged appearance that sets them apart from the usually smooth funnel clouds.



Continued on Page 15



Shelf Clouds

Shelf clouds often form at the leading edge of a gust front or outflow boundary from a thunderstorm or strong winds flowing down and outward from a storm.

The outer part of a shelf cloud is often smoother with a notable rising motion exhibited by a tiered look (hence, the name shelf cloud). Underneath, a turbulent, unsettled appearance is often the case.

A shelf cloud should be seen as a harbinger of strong winds, so take caution.



Continued on Page 16

Eyes to the Skies continued from page 15



Wall Clouds

A wall cloud is a cloud that is lowered from a thunderstorm, forming when rapidly rising air causes lower pressure below the storm's main updraft.

"Wall clouds can range from a fraction of a mile up to nearly 5 miles in diameter," according to the National Weather Service.

Wall clouds that rotate are a warning sign of very violent thunderstorms. They can be an indication that a tornado will touch down within minutes or even within an hour.

Funnel Clouds

A funnel cloud is a rotating column of air (visible due to condensation) that does not reach the ground.

If a funnel cloud reaches all the way to the ground, it is then classified as a tornado.

When out on the road, funnel clouds should be treated as tornadoes, since they could touch down.



Tornadoes

A tornado is a rotating column of air, reaching all the way to the ground. Strong tornadoes are one of the most destructive forces of nature on a small scale, the strongest of which can level entire towns.

A roaring noise, often compared to that of a train, can be heard in many cases when a tornado touches down.

Vehicles are **NOT** a safe place to be if there is a tornado nearby.



Continued on Page 17



Thunderstorm Anvil Clouds

Anvil clouds are the flat top of a thunderstorm, or cumulonimbus cloud.

They can spread up to "hundreds of miles downwind from the thunderstorm itself," according to the National Weather Service.

Lightning can strike from anvil clouds, even far away from a thunderstorm. Lightning described as striking "from out of the blue" is usually from an anvil cloud that has drifted from a thunderstorm.

Mammatus Clouds

Striking mammatus clouds can sometimes be seen below thunderstorm anvil clouds.

The rounded and smooth look of mammatus clouds captivates onlookers.

They are often found underneath anvil clouds of severe thunderstorms; however, they can form underneath clouds associated with non-severe thunderstorms as well.



Asperatus Clouds

An abundance of heat in the atmosphere is needed to produce enough energy for the dramatic, rolling formations of asperatus clouds. Another factor is the interaction of very moist air (often on the fringes of thunderstorm complexes) with very dry air.

The darkness of the clouds is likely due to the large amount of water vapor.

Asperatus clouds are not necessarily accompanied by stormy weather. In fact, they have often been observed without the development of thunderstorms.

This April springs us into an exciting time of observation of the skies. Starting with the total solar eclipse, we continue on with Skywarn spotter training to get us ready for assisting the National Weather Service in giving the public the most accurate and up-to-date weather information and warnings. Be sure to participate Mondays at 8 pm in the Northland WX Net on the ARAC repeater with **Jeff Nast KCØMKS**. For more information contact Jeff at kc0mks@gmail.com

As always, share your photos and "Eyes to the Skies" comments with the Club! Email them to ke0nqs.mn@gmail.com and we'll publish them in a future edition of *The Relay*. ★



Contest Calendar - April 2024

<u>+ K1USN Slow Speed Test</u>	0000Z-0100Z, Apr 1
<u>+ IRTS 70cm Counties Contest</u>	1300Z-1330Z, Apr 1
<u>+ ICWC Medium Speed Test</u>	1300Z-1400Z, Apr 1
<u>+ IRTS 2m Counties Contest</u>	1330Z-1500Z, Apr 1
<u>+ DARC Easter Contest</u>	1500Z-1729Z, Apr 1
<u>+ OK1WC Memorial</u>	1630Z-1729Z, Apr 1
<u>+ ICWC Medium Speed Test</u>	1900Z-2000Z, Apr 1
<u>+ 144 MHz Spring Sprint</u>	1900 local - 2300 local, Apr 1
<u>+ ARS Spartan Sprint</u>	0000Z-0200Z, Apr 2
<u>+ Worldwide Sideband Activity Contest</u>	0100Z-0159Z, Apr 2
<u>+ ICWC Medium Speed Test</u>	0300Z-0400Z, Apr 2
<u>+ ZL Sprint</u>	0800Z-0829Z (CW), Apr 2 and 0830Z-0859Z (SSB), Apr 2
<u>+ QRP Fox Hunt</u>	0100Z-0230Z, Apr 3
<u>+ Phone Weekly Test</u>	0230Z-0300Z, Apr 3
<u>+ A1Club AWT</u>	1200Z-1300Z, Apr 3
<u>+ CWops Test</u>	1300Z-1400Z, Apr 3
<u>+ Mini-Test 40</u>	1700Z-1759Z, Apr 3
<u>+ VHF-UHF FT8 Activity Contest</u>	1700Z-2100Z, Apr 3
<u>+ Mini-Test 80</u>	1800Z-1859Z, Apr 3
<u>+ CWops Test</u>	1900Z-2000Z, Apr 3
<u>+ UKEICC 80m Contest</u>	2000Z-2100Z, Apr 3
<u>+ Walk for the Bacon QRP Contest</u>	0000Z-0100Z, Apr 4 and 0200Z-0300Z, Apr 5
<u>+ CWops Test</u>	0300Z-0400Z, Apr 4
<u>+ CWops Test</u>	0700Z-0800Z, Apr 4
<u>+ SARL 80m QSO Party</u>	1700Z-2000Z, Apr 4

Continued on Page 19



Contest Calendar - April 2024

[+ NRAU 10m Activity Contest](#)

[+ SKCC Sprint Europe](#)

[+ NCCC FT4 Sprint](#)

[+ QRP Fox Hunt](#)

[+ Weekly RTTY Test](#)

[+ NCCC Sprint](#)

[+ K1USN Slow Speed Test](#)

[+ YBDXPI SSB Contest](#)

[+ PODXS 070 Club PSK 31 Flavors Contest](#)

[+ RSGB FT4 International Activity Day](#)

[+ Georgia State Parks on the Air](#)

[+ EA RTTY Contest](#)

[+ Florida State Parks on the Air](#)

[+ Missouri QSO Party](#)

[+ Mississippi QSO Party](#)

[+ Louisiana QSO Party](#)

[+ SP DX Contest](#)

[+ WAB 3.5/7/14 MHz Data Modes](#)

[+ K1USN Slow Speed Test](#)

[+ ICWC Medium Speed Test](#)

[+ Solar Eclipse QSO Party](#)

[+ OK1WC Memorial](#)

[+ ICWC Medium Speed Test](#)

1800Z-1900Z, Apr 4 (CW) and
1900Z-2000Z, Apr 4 (SSB) and
2000Z-2100Z, Apr 4 (FM) and
2100Z-2200Z, Apr 4 (Dig)
2000Z-2200Z, Apr 4
0100Z-0130Z, Apr 5
0100Z-0230Z, Apr 5
0145Z-0215Z, Apr 5
0230Z-0300Z, Apr 5
2000Z-2100Z, Apr 5
0000Z, Apr 6 to 2359Z, Apr 7
1000Z, Apr 6 to 0400Z, Apr 7
1200Z, Apr 6 to 1200Z, Apr 7
1200Z, Apr 6 to 2359Z, Apr 7
1200Z, Apr 6 to 1200Z, Apr 7
1400Z-2200Z, Apr 6 and
1400Z-2200Z, Apr 7
1400Z, Apr 6 to 0400Z, Apr 7 and
1400Z-2000Z, Apr 7
1400Z, Apr 6 to 0200Z, Apr 7
1400Z, Apr 6 to 0200Z, Apr 7
1500Z, Apr 6 to 1500Z, Apr 7
1000Z-1400Z, Apr 7 and
1700Z-2100Z, Apr 7
0000Z-0100Z, Apr 8
1300Z-1400Z, Apr 8
1400Z-2400Z, Apr 8
1630Z-1729Z, Apr 8
1900Z-2000Z, Apr 8

Continued on Page 20



Contest Calendar - April 2024

<u>+ RSGB 80m Club Championship, CW</u>	1900Z-2030Z, Apr 8
<u>+ Worldwide Sideband Activity Contest</u>	0100Z-0159Z, Apr 9
<u>+ ICWC Medium Speed Test</u>	0300Z-0400Z, Apr 9
<u>+ ZL Sprint</u>	0800Z-0829Z (CW), Apr 9 and 0830Z-0859Z (SSB), Apr 9
<u>+ DARC RTTY Sprint</u>	1800Z-1929Z, Apr 9
<u>+ NAQCC CW Sprint</u>	0030Z-0230Z, Apr 10
<u>+ Phone Weekly Test</u>	0230Z-0300Z, Apr 10
<u>+ A1Club AWT</u>	1200Z-1300Z, Apr 10
<u>+ CWops Test</u>	1300Z-1400Z, Apr 10
<u>+ Mini-Test 40</u>	1700Z-1759Z, Apr 10
<u>+ VHF-UHF FT8 Activity Contest</u>	1700Z-2100Z, Apr 10
<u>+ Mini-Test 80</u>	1800Z-1859Z, Apr 10
<u>+ CWops Test</u>	1900Z-2000Z, Apr 10
<u>+ CWops Test</u>	0300Z-0400Z, Apr 11
<u>+ CWops Test</u>	0700Z-0800Z, Apr 11
<u>+ NCCC FT4 Sprint</u>	0100Z-0130Z, Apr 12
<u>+ Weekly RTTY Test</u>	0145Z-0215Z, Apr 12
<u>+ NCCC Sprint</u>	0230Z-0300Z, Apr 12
<u>+ K1USN Slow Speed Test</u>	2000Z-2100Z, Apr 12
<u>+ QRP ARCI Spring QSO Party</u>	0000Z-0600Z, Apr 13
<u>+ JIDX CW Contest</u>	0700Z, Apr 13 to 1300Z, Apr 14
<u>+ SKCC Weekend Sprintathon</u>	1200Z, Apr 13 to 2400Z, Apr 14
<u>+ IG-RY World Wide RTTY Contest</u>	1200Z, Apr 13 to 1800Z, Apr 14
	1200Z-1700Z, Apr 13 (20m-10m) and 0700Z-0900Z, Apr 14 (80m) and 0900Z-1100Z, Apr 14 (40m)
<u>+ DIG QSO Party, CW</u>	1200Z, Apr 13 to 1159Z, Apr 14
<u>+ Yuri Gagarin International DX Contest</u>	1200Z, Apr 13 to 1200Z, Apr 14
<u>+ OK/OM DX Contest, SSB</u>	1200Z, Apr 13 to 1200Z, Apr 14

Continued on Page 21



Contest Calendar - April 2024

<u>+ New Mexico QSO Party</u>	1400Z, Apr 13 to 0200Z, Apr 14
<u>+ Africa FT4 DX Contest</u>	1500Z-1800Z, Apr 13
<u>+ Georgia QSO Party</u>	1800Z, Apr 13 to 0359Z, Apr 14 and 1400Z-2359Z, Apr 14
<u>+ North Dakota QSO Party</u>	1800Z, Apr 13 to 1800Z, Apr 14
<u>+ Hungarian Straight Key Contest</u>	1500Z-1600Z, Apr 14
<u>+ K1USN Slow Speed Test</u>	0000Z-0100Z, Apr 15
<u>+ 4 States QRP Group Second Sunday Sprint</u>	0000Z-0200Z, Apr 15
<u>+ ICWC Medium Speed Test</u>	1300Z-1400Z, Apr 15
<u>+ OK1WC Memorial</u>	1630Z-1729Z, Apr 15
<u>+ ICWC Medium Speed Test</u>	1900Z-2000Z, Apr 15
<u>+ Worldwide Sideband Activity Contest</u>	0100Z-0159Z, Apr 16
<u>+ ICWC Medium Speed Test</u>	0300Z-0400Z, Apr 16
<u>+ ZL Sprint</u>	0800Z-0829Z (CW), Apr 16 and 0830Z-0859Z (SSB), Apr 16
<u>+ 222 MHz Spring Sprint</u>	1900 local - 2300 local, Apr 16
<u>+ Phone Weekly Test</u>	0230Z-0300Z, Apr 17
<u>+ A1Club AWT</u>	1200Z-1300Z, Apr 17
<u>+ CWops Test</u>	1300Z-1400Z, Apr 17
<u>+ Mini-Test 40</u>	1700Z-1759Z, Apr 17
<u>+ VHF-UHF FT8 Activity Contest</u>	1700Z-2100Z, Apr 17
<u>+ Mini-Test 80</u>	1800Z-1859Z, Apr 17
<u>+ CWops Test</u>	1900Z-2000Z, Apr 17
<u>+ RSGB 80m Club Championship, SSB</u>	1900Z-2030Z, Apr 17
<u>+ Walk for the Bacon QRP Contest</u>	0000Z-0100Z, Apr 18 and 0200Z-0300Z, Apr 19
<u>+ CWops Test</u>	0300Z-0400Z, Apr 18
<u>+ CWops Test</u>	0700Z-0800Z, Apr 18
<u>+ NTC QSO Party</u>	1900Z-2000Z, Apr 18

Continued on Page 22



Contest Calendar - April 2024

<u>+ NCCC FT4 Sprint</u>	0100Z-0130Z, Apr 19
<u>+ Weekly RTTY Test</u>	0145Z-0215Z, Apr 19
<u>+ NCCC Sprint</u>	0230Z-0300Z, Apr 19
<u>+ K1USN Slow Speed Test</u>	2000Z-2100Z, Apr 19
<u>+ Holyland DX Contest</u>	2100Z, Apr 19 to 2059Z, Apr 20
<u>+ ES Open HF Championship</u>	0500Z-0859Z, Apr 20
<u>+ Worked All Provinces of China DX Contest</u>	0600Z, Apr 20 to 0559Z, Apr 21
<u>+ Dutch PACCdigi Contest</u>	0700Z to 1900Z, Apr 20
<u>+ YU DX Contest</u>	0700Z, Apr 20 to 0659Z, Apr 21
<u>+ QRP to the Field</u>	0800-1800 local, Apr 20
<u>+ CQMM DX Contest</u>	0900Z, Apr 20 to 2359Z, Apr 21
<u>+ Nebraska QSO Party</u>	1100Z, Apr 20 to 2259Z, Apr 21
<u>+ Texas State Parks on the Air</u>	1400Z, Apr 20 to 0200Z, Apr 21 and 1400Z-2000Z, Apr 21
<u>+ Michigan QSO Party</u>	1600Z, Apr 20 to 0400Z, Apr 21
	1700Z-1800Z, Apr 20 (10m) and 1800Z-1900Z, Apr 20 (15m) and 1900Z-2000Z, Apr 20 (20m) and 2000Z-2100Z, Apr 20 (40m) and 2100Z-2300Z, Apr 20 (80m) and 0700Z-0900Z, Apr 21 (40m) and 0900Z-1000Z, Apr 21 (20m) and 1000Z-1100Z, Apr 21 (15m) and 1100Z-1200Z, Apr 21 (10m)
<u>+ EA-QRP CW Contest</u>	1800Z, Apr 20 to 0500Z, Apr 21 and 1200Z-1800Z, Apr 21
<u>+ Ontario QSO Party</u>	1800Z-2159Z, Apr 20
<u>+ Feld Hell Sprint</u>	

Continued on Page 23



Contest Calendar - April 2024

- [+ International Vintage Contest HF](#)
- [+ Quebec QSO Party](#)
- [+ ARRL Rookie Roundup, SSB](#)
- [+ Run for the Bacon QRP Contest](#)
- [+ K1USN Slow Speed Test](#)
- [+ ICWC Medium Speed Test](#)
- [+ OK1WC Memorial](#)
- [+ ICWC Medium Speed Test](#)
- [+ Worldwide Sideband Activity Contest](#)
- [+ ICWC Medium Speed Test](#)

- [+ ZL Sprint](#)

- [+ SKCC Sprint](#)
- [+ Phone Weekly Test](#)
- [+ A1Club AWT](#)
- [+ CWops Test](#)
- [+ Mini-Test 40](#)
- [+ Mini-Test 80](#)
- [+ CWops Test](#)
- [+ 432 MHz Spring Sprint](#)
- [+ UKEICC 80m Contest](#)
- [+ CWops Test](#)
- [+ CWops Test](#)
- [+ RSGB 80m Club Championship, Data](#)
- [+ NCCC FT4 Sprint](#)
- [+ Weekly RTTY Test](#)
- [+ NCCC Sprint](#)
- [+ K1USN Slow Speed Test](#)

- 0700Z-1100Z, Apr 21 and
1500Z-1900Z, Apr 21
- 1200Z-2200Z, Apr 21
- 1800Z-2359Z, Apr 21
- 2300Z, Apr 21 to 0100Z, Apr 22
- 0000Z-0100Z, Apr 22
- 1300Z-1400Z, Apr 22
- 1630Z-1729Z, Apr 22
- 1900Z-2000Z, Apr 22
- 0100Z-0159Z, Apr 23
- 0300Z-0400Z, Apr 23
- 0800Z-0829Z (CW), Apr 23 and
0830Z-0859Z (SSB), Apr 23
- 0000Z-0200Z, Apr 24
- 0230Z-0300Z, Apr 24
- 1200Z-1300Z, Apr 24
- 1300Z-1400Z, Apr 24
- 1700Z-1759Z, Apr 24
- 1800Z-1859Z, Apr 24
- 1900Z-2000Z, Apr 24
- 1900 local - 2300 local, Apr 24
- 2000Z-2100Z, Apr 24
- 0300Z-0400Z, Apr 25
- 0700Z-0800Z, Apr 25
- 1900Z-2030Z, Apr 25
- 0100Z-0130Z, Apr 26
- 0145Z-0215Z, Apr 26
- 0230Z-0300Z, Apr 26
- 2000Z-2100Z, Apr 26

Continued on Page 24



Contest Calendar - April 2024

- [+ 10-10 Int. Spring Contest, Digital](#)
- [+ UK/EI DX Contest, CW](#)
- [+ SP DX RTTY Contest](#)
- [+ Helvetia Contest](#)
- [+ Florida QSO Party](#)
- [+ UA1DZ Memorial Cup](#)
- [+ BARTG Sprint 75](#)
- [+ K1USN Slow Speed Test](#)
- [+ QCX Challenge](#)
- [+ ICWC Medium Speed Test](#)
- [+ OK1WC Memorial](#)
- [+ ICWC Medium Speed Test](#)
- [+ RSGB FT4 Contest](#)
- [+ QCX Challenge](#)
- [+ Worldwide Sideband Activity Contest](#)
- [+ ICWC Medium Speed Test](#)
- [+ QCX Challenge](#)
- [+ ZL Sprint](#)

0001Z, Apr 27 to 2359Z, Apr 28
 1200Z, Apr 27 to 1200Z, Apr 28
 1200Z, Apr 27 to 1200Z, Apr 28
 1300Z, Apr 27 to 1259Z, Apr 28
 1600Z, Apr 27 to 0159Z, Apr 28 and
 1200Z-2159Z, Apr 28
 1300Z-1859Z, Apr 28
 1700Z-2059Z, Apr 28
 0000Z-0100Z, Apr 29
 1300Z-1400Z, Apr 29
 1300Z-1400Z, Apr 29
 1630Z-1729Z, Apr 29
 1900Z-2000Z, Apr 29
 1900Z-2030Z, Apr 29
 1900Z-2000Z, Apr 29
 0100Z-0159Z, Apr 30
 0300Z-0400Z, Apr 30
 0300Z-0400Z, Apr 30
 0800Z-0829Z (CW), Apr 30 and
 0830Z-0859Z (SSB), Apr 30

Our thanks to **Bruce Horn, WA7BNM** for use of this calendar!
 Visit Bruce at www.contestcalendar.com/contestcal.html

The ARAC RELAY



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