



The RELAY)))

April 2026

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>

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The Relay Co-Editors:

Kim & Steve Waller

Kim - KEØNQS Steve - KEØNQT
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Spring 2026



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From Ancient Skies to AI Weather Prediction Then & Now

Humans have tried to predict the weather for millennia. The Babylonians, as early as 650 BC, recorded cloud patterns and planetary movements to forecast storms. In ancient China, farmers relied on the 24 solar terms—a calendar based on the sun's position—to time planting and harvests around seasonal shifts.

Aristotle wrote *Meteorologica* circa 340 BC. It stands as one of the earliest Western attempts to explain weather through natural causes on Earth.

In it, Aristotle argued that atmospheric phenomena arose from the interactions of four elements—earth, water, air, and fire—in the sublunary sphere. The sublunary sphere, according to Aristotle, was the imperfect region below the Moon where the four elements (earth, water, air, and fire) constantly mixed and changed, giving rise to all weather phenomena on Earth.

He surmised that rain formed when moist vapors rose and condensed, winds from rising dry exhalations, and thunder and lightning from the sudden ignition of trapped dry air. This naturalistic framework shaped scientific thought for nearly 2,000 years, providing the dominant model for weather prediction and education until Renaissance instruments and empirical observation finally replaced philosophical speculation with measurable data.

The real leap began in the 1500s with the invention of instruments that turned observation into measurable research science:

The Thermoscope & Thermometer

In 1593, Galileo Galilei developed a device called the thermoscope, the first-known device of its kind to indicate temperature. This was an air-based instrument designed to move water up or down in a glass tube that had several floating small glass vessels inside. The individual floating vessels rose or fell according to their density relative to the temperature change. Most people currently call this device the Galileo Thermometer, the but thermometer as we know it came a bit later.

After Galileo's thermoscope, in 1612, Italian physician **Santorio Santorio** (first & last name!) added a numerical scale to the device, enabling the first quantitative temperature readings and early attempts at measuring human body temperature. In 1654, **Grand Duke Ferdinando II de' Medici** of Tuscany developed the first sealed liquid-in-glass thermometer using alcohol, which eliminated interference from atmospheric pressure. The breakthrough came in 1709 when German physicist **Daniel Gabriel Fahrenheit** created a

Continued on Page 13



Modern version of the thermoscope invented by Galileo Galilei in 1593. Often called the "Galileo Thermometer", this example has colored floats with temperature medallions.

Image: Kim Waller



ARAC Board of Directors

PRESIDENT

	<p>NØVRM Gene Ellefsen 3710 Chambersburg Ave Duluth, MN 55811 218-390-3272 ispitech@mail.com</p>
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VICE PRESIDENT

PHOTO COMING SOON!	<p>NØUOZ Jon Nelson</p>
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SECRETARY

	<p>KFØGJW Melinda Nelson jonbeeyore@outlook.com</p>
--	---


TREASURER

	<p>KRØB Randy Wabik</p>
--	------------------------------------

3RD YEAR BOARD

	<p>KD9VKI Justin Cheever jcheever13@gmail.com</p>
--	---

2ND YEAR BOARD

	<p>KFØLFZ Brian Beckman</p>
--	--

1ST YEAR BOARD

	<p>AAØAC Dave Davis 218-348-6649 aaøac@outlook.com</p>
--	--

Board Meeting Minutes—March 3, 2026

Present:

Board Members

Gene Ellefsen – NØVRM, Jon Nelson – NØUOZ, Melinda Nelson – AFØET, Randy Wabik – KRØB, Brian Beckman – KFØLFZ, Justin Cheever – KD9VKI, Dave Davis – AAØAC

Board Advisors (Non-Board Members)

Doug Nelson – AAØAW, Grant Forsyth – KCØWUP

Guest:

Rochelle Nelson

Meeting called to order by President Gene – NØVRM at 18:31 (6:31 pm)

Minutes:

Minutes were sent via email. Motion to approve Jon Nelson – NØUOZ, and Justin Cheever – KD9VKI, motion passed.

Treasurer's Report:

Checking: \$858.16
Savings: \$5,801.96
Repeater: \$4,360.68
Subtotal Cash \$10,020.80
Cash on hand: \$104.00
Subtotal COH: \$104.00
Outstanding Checks:
Assets Subtotal: \$11,124.80

Motion made by Jon Nelson – NØUOZ to accept Treasurer's report as is, seconded by Dave Davis – AAØAC. Motion passed.

Testing:

Need a copy of the FRN number, an ID, and a copy of your licenses. As always if you are ready to test or know someone who wants to test, please get ahold of Doug Nelson – AAØAW at AAØAW@arrl.net.

Repeater:

Randy Wabik – KRØB, Will be looking at getting new cans.

New Business:

HamFest is Coming up on May 2nd. Looking for Volunteers. Open Registration for Grandma's Marathon – Password HAM26. If interested please contact Melinda Nelson – AFØET at jonbeeyore@outlook.com or Doug Nelson – AAØAW at AAØAW@arrl.net.

Motion to adjourn by Jon Nelson – NØUOZ, seconded by Dave Davis – AAØAC, motion passed at 19:03 (7:03 PM).





ARAC Club Meeting Minutes

March 12, 2026

Present:

President: Gene Ellefsen – N0VRM
Vice President: Jon Nelson – N0UOZ
Treasurer/Membership: Randy Wabik – KR0B
Secretary: Melinda Nelson – AF0ET
First Year Board: Dave Davis – AA0AC
Second Year Board: Brain Beckman – KF0LFZ
Third Year Board: Justin Cheever – KD9VKI
HamFest/Education: Bob Schulz – KC0NFB
Special Events: Open/Gene Ellefsen – N0VRM (acting)
Repeater: Dave Pyrlik – K0DJP & Randy Wabik – KR0B
Parliamentarian: Grant Forsyth – KC0WUP
Testing: Doug Nelson – AA0AW
Property/Picnic: Scott Ahlgren – N0VYU

Absent:

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

Meeting called to order at 19:01 (7:01 PM) by President Gene Ellefsen – N0VRM. Twenty-nine (29) members were in attendance.

Minutes:

Minutes are posted on the website and in the newsletter. Motion to accept by Grant Forsyth – KC0WUP, seconded by Dave Pyrlik – K0DJP, motion Passed.

Treasurer's Report:

Checking: \$727.22
Savings: \$5,801.96
Repeater: \$4,360.68
 Subtotal Cash \$10,889.86
Cash on hand: \$134.63
 Subtotal COH: \$134.63
Outstanding Checks:
 Assets Subtotal: \$11,024.49

Motion made by Doug Nelson – AA0AW, seconded by Bob Schulz – KC0NFB. Motion passed.

Repeater:

Randy Wabik – KR0B, will be looking at getting new cans.

Education:

General Class is going via Zoom. If interested, please contact Diane Sanders – K0DSL at K0DSLAE@gmail.com

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ARAC Club Meeting Minutes continued

Testing:

Next testing session will be held May 2nd during Swap Fest.

June 2nd for the General Class

Please make sure that you have the updated syllabus. As always if you are looking to test or upgrade or know of anyone that is interested in testing, please contact Doug Nelson – AA0AW at AA0AW@arrl.net.

New Business:

HamFest is Coming up on May 2nd. Looking for Volunteers.

Open Registration for Grandma's Marathon – Password HAM26. If interested please contact Melinda Nelson – AF0ET at jonbeeyore@outlook.com or Doug Nelson – AA0AW at AA0AW@arrl.net.

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

· KC0JRJ – Pat Hayden

New members/Returning members (Please welcome them when they get on the radio):

Door Prize: was won by Mike Lovold – N0PDG

Motion to adjourn by Rick Minotte – KB0YBA, seconded by Dave Davis – AA0AC, motion passed at 19:17 (7:17 PM).

2026 Program:

April – Skywarn

May – Intro to Race Volunteering

June – Grandma's Marathon by Grandma's Marathon Team Melinda Nelson – AF0ET and Doug Nelson – AA0AW.

July – Intro to Fox Hunting

August –

October –

November –

December – Christmas Party

If you are interested in seeing a program, or would like to host a program, please reach out to Jon Nelson at jonbeeyore@outlook.com or 715-817-1986.



CLUB REPEATER

WØGKP

146.94 (-)

CTCSS TONE



Prez Sez...

Hello Everyone,

It is the time of the year for our annual Hamfest on Saturday May 2 at the Head of the Lakes Fairgrounds in Superior WI, from 9:00 AM to 1:00 PM.

We need volunteers for setup at 6:00 AM! We will meet at McDonalds on 21st & Tower at 5:00 AM for breakfast, then head out to the Fairgrounds.

We need volunteers for Ticket Sales and Kitchen Help! The kitchen is a BIG money maker for us, so if we could get enough people to work shifts, that would be great! We also need help for take-down when it is over.

Save your pennies to make that important purchase at this year's Hamfest!!!

See you there,

Gene Ellefsen NØVRM



IN MEMORIAM

Patrick W Hayden – KCØJRJ

With sadness we report that
Patrick W Hayden KCØJRJ
became a Silent Key
on March 28, 2026.

*Please keep his family and
friends in your prayers.*

Rest in peace, dear Friend.

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

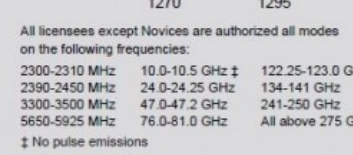
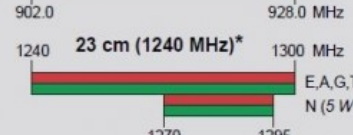
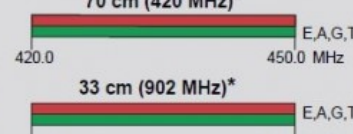
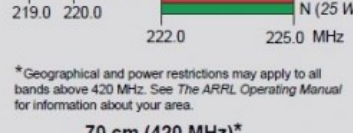
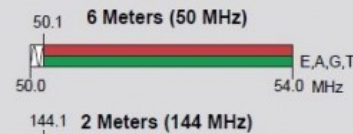
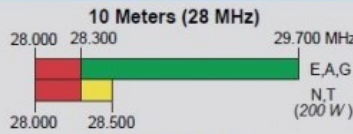
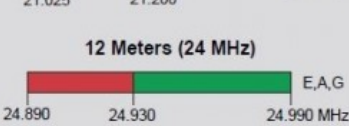
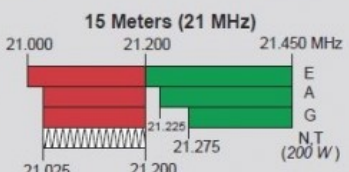
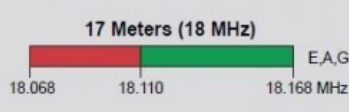
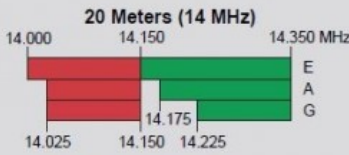
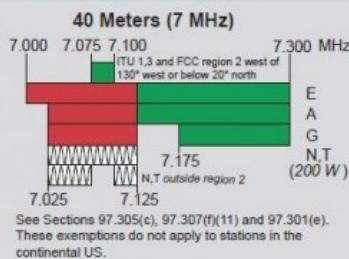
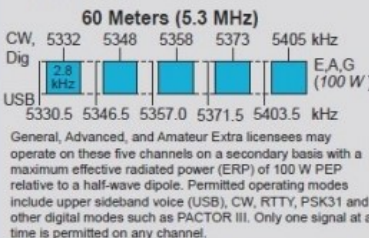
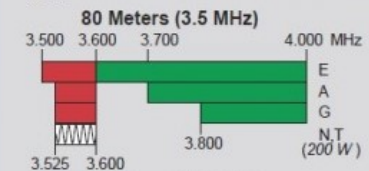
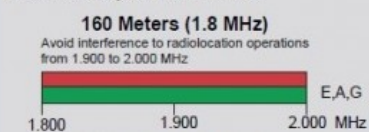
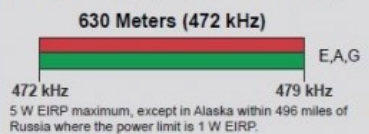
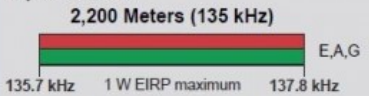
FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

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



ARRL The national association for 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 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 for detailed band plans.

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email: news@arrl.org

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



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)	Not Operating
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 – some may work/some may still be linked

147.330	plus	151.4	Proctor	Not Operating
147.270	plus	114.8	Two Harbors	
147.270	plus	103.5	Wales	
147.090	plus	114.8	Silver Bay	Not Operating
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	Not Operating
443.500	+5.00	141.3	Gilbert	
147.060	plus	103.5	Virginia	
147.360	plus	162.2	Cook	Not Operating
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	Not Operating
443.325	+5.00	146.2	Isanti	

Rev. KCØWDQ as of 12/01/24 For ARAC Newsletter

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DULUTH AREA REPEATERS, continued

NARC System NAØRC

147.135 plus 103.5 Knife River
 147.135 plus 114.8 Duluth (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
 440.400 +5.00 110.9 WØLSA Maple, WI – 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 12/01/24 For ARAC Newsletter

Elmers

El-mer / el-mər/ [el-mer]

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

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



Membership Email Directory

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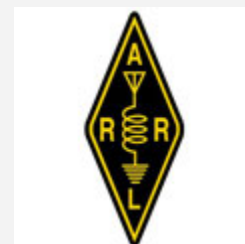
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Co-Editors,
Kim & Steve Waller
KE0NQS & KE0NQT



APRIL

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

	Mon	Tue	Wed	Thu	Fri	Sat
			1 2100 -BWAR	2	3 Friday Night 6 meter Gag-Chew 50.125 USB 7 PM	4
5 Happy Easter! CW 1930 NØPDG USB 2000 NØVRM ES 2100 KCØWDQ	6 WX 2000 KCØMKS	7 ARAC BOARD MEETING Sammy's Pizza 6:30 pm DC Net 2000 CC Net 2030	8 Lake County ARES/RACES Meeting 1800 Lake County LSAC1 1900 2100 -BWAR	9 ARAC Club Meeting Coppertop Church 7 PM	10 Friday Night 6 meter Gag-Chew 50.125 USB 7 PM	11
12 CW 1930 AAØAW USB 2000 AAØAW ES 2100 KFØLFZ	13 Douglas County ARES/RACES Mtg 1900 DC E WX 2000 KCØMKS	14 DC Net 2000 CC Net 2030	15 2100 -BWAR	16	17 Friday Night 6 meter Gag-Chew 50.125 USB 7 PM	18
19 CW 1930 NØPDG USB 2000 KB9WLB ES 2100 WØNWO	20 WX 2000 KCØMKS	21 DC Net 2000 CC Net 2030	22 Lake County LSAC1 1900 2100 -BWAR	23 Carlton County ARES/RACES Meeting 1900 CC EOC	24 Friday Night 6 meter Gag-Chew 50.125 USB 7 PM	25
26 CW 1930 AAØAW USB 2000 K9KDK ES 2100 NØVRM	27 WX 2000 KCØMKS	28 DC Net 2000 CC Net 2030	29 2100 -BWAR	30		
						

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Email Doug AAØAW at
aa0aw@arrl.net

Next Club Meeting:
April 9, 2026 - 7 pm
Coppertop Church

ARAC Committee Chairs



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AAØAW - NØKXT - KCØNFB

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Waller

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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.

Weather Prediction continued from page 1

reliable sealed alcohol thermometer, followed in 1714 by his mercury (quicksilver) thermometer. Mercury's uniform expansion, combined with Fahrenheit's precise glassworking and standardized scale (published 1724), produced the first accurate, reproducible thermometers still foundational to weather measurement today.

The Barometer

Italian physicist and mathematician **Evangelista Torricelli** created the mercury barometer in 1643, allowing people to measure atmospheric pressure for the first time. This important scientific instrument allowed observation of pressure tendency to forecast changes in the weather. Pressure tendency refers to how barometric pressure changes over time. A rapid fall often signals approaching storms, while a steady rise typically indicates improving weather.

The Hygrometer

The hygrometer is an instrument for measuring atmospheric humidity, the earliest form of which was invented by **Leonardo da Vinci** and was improved upon by various inventors in the centuries that followed:

15th Century (Prototype): Leonardo da Vinci created a scale-based device using absorbent material (cotton) on one side and non-absorbent material (wax) on the other to measure moisture.

17th Century (Practicality): Francesco Folli (1664) and **Robert Hooke** developed practical and mechanical versions, with Hooke exploring the use of organic materials like oat beards.

1783 (Hair Hygrometer): Swiss physicist **Horace Bénédict de Saussure** built the first accurate hygrometer using a human hair, based on the principle that hair expands and contracts with humidity.

1820 (Dew-Point): John Frederic Daniell invented the dew-point hygrometer to measure the saturation point of the air.

19th Century (Psychrometer): The "dry and wet-bulb psychrometer" was developed, allowing for improved precision by comparing two thermometers.

These advancements were crucial for early meteorology, allowing scientists to track moisture in the air beyond just relying on physical sensations.



Fifty-Degree Thermometers from the mid-17th century on exhibit at the Museo Galileo in Florence, Italy

Black dots represent single degrees and white represented 10-degree increments

These delicate instruments were used to measure atmospheric temperatures

Image: Museo Galileo

The Telegraph

By the 1800s, the telegraph revolutionized everything. Data could travel instantly across distances, leading to the first weather maps and daily forecasts. In the United States, the Smithsonian Institution began coordinating volunteer observers in 1849, and the Army Signal Service (predecessor to today's National Weather Service) launched systematic forecasting in 1870. The U.S. Weather Bureau became a civilian agency in 1890.

Right here in Minnesota, weather history runs deep. Systematic records began as early as October 1819 at Fort Snelling—one of the earliest continuous datasets in the young United States. Army surgeons and observers used basic thermometers and barometers on the bluffs overlooking the confluence of the Mississippi and Minnesota Rivers, noting everything from prairie fires and severe storms to Minnesota's first reported tornado. Those early logs, though crude by today's standards, laid groundwork for understanding our region's volatile climate.

Weather Balloons and Radiosondes

Humans first explored the upper atmosphere in the 1780s using hot-air and hydrogen balloons, carrying barometers and thermometers aloft.

Systematic use began in the late 19th century when French meteorologist **Léon Teisserenc de Bort** launched hundreds of unmanned balloons starting in 1896 from his observatory in Trappes, France. These carried self-recording instruments (meteorographs) that measured temperature and pressure; the packages parachuted back to Earth for recovery. His work led to the discovery of the tropopause and stratosphere.

Early 20th-century limitations—kites and aircraft couldn't reach high enough or operate in all weather—drove the next leap. In the late 1920s, scientists attached crude radio transmitters to free balloons.

The breakthrough came with the radiosonde (a small instrument package with sensors for temperature, pressure, and humidity plus a radio transmitter). French scientist **Robert Bureau** flew the first true radiosonde

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Weather Prediction continued from page 13

January 7, 1929, and coined the term. Soviet meteorologist **Pavel Molchanov** followed with a practical design in 1930 that transmitted data in Morse code. Finnish professor **Vilho Väisälä** developed an improved version in 1931, founding the Vaisala company.

In the United States, the **National Bureau of Standards** refined radiosondes in the mid-1930s. The **U.S. Weather Bureau** established a national radiosonde network in 1937, launching balloons twice daily—a practice that continues today at about 92 **National Weather Service** sites (including those serving Minnesota).

World War II accelerated improvements, adding wind-tracking capability (creating "rawinsondes"). Modern weather balloons are large latex spheres filled with helium or hydrogen. They carry a lightweight radiosonde (now with GPS for precise wind data), ascend at about 5–6 m/s to around 100,000 feet (30 km), then burst, letting the instrument parachute back. Data feeds directly into computer models, including today's hybrid AI systems, filling critical gaps in upper-air observations that satellites and surface stations cannot provide.

National Weather Service offices in Chanhassen and Duluth launch balloons routinely. These soundings are vital for predicting lake-effect snow from Superior, spring severe weather, and cold-air outbreaks in northern Minnesota's data-sparse regions.

The First Computer-Generated Weather Forecast on ENIAC (1950)

In spring 1950, a team led by meteorologist **Jule Charney**, with collaborators **Ragnar Fjørtoft** and mathematician **John von Neumann**, ran the world's first successful numerical weather prediction on the massive **ENIAC** computer at the **Aberdeen Proving Ground (APG)**, a major **U.S. Army** facility in Aberdeen, Maryland.

Using a barotropic vorticity equation, they produced four 24-hour forecasts for North America on a coarse grid. Barotropic vorticity equation is a simplified mathematical model used in early computer forecasting that describes how atmospheric vorticity (spin) changes over time, assuming constant density and no temperature variations with height.

Although the computations took roughly 24 hours per forecast (matching real time), the experiment proved that electronic computers could solve atmospheric equations faster than manual methods, launching the era of modern numerical weather prediction.



Classic 20th Century Analog Barometer

TIROS-1: The First Weather Satellite (1960)

On April 1, 1960, **NASA** launched TIROS-1 (Television Infrared Observation Satellite), the world's first successful meteorological satellite, from Cape Canaveral.

Weighing about 270 pounds and carrying two television cameras, it transmitted more than 19,000 usable images during its 78-day mission, revealing large-scale cloud patterns and storm systems from space for the first time.

This breakthrough transformed weather forecasting by providing a global view that ground-based observations could never achieve, paving the way for today's continuous satellite monitoring.



ENIAC display at Penn School of Engineering:
"The World's First Electronic, Large Scale, General-Purpose Digital Computer"
Image: Penn Engineering

Continued on Page 15

A Short History of Doppler Radar

The Doppler radar revolution began with Austrian physicist **Christian Doppler**, who in 1842 described how the frequency of waves shifts as their source moves toward or away from an observer. This principle found military use during World War II, when radar systems detected enemy aircraft by bouncing radio waves off them.

After the war, surplus military radars were repurposed for weather:

in 1942 the **U.S. Weather Bureau** received 25 Navy units, and by 1959 it had built the nation's first national radar network using conventional (non-Doppler) systems such as the WSR-57. These could show storm location and rainfall intensity but could not measure wind motion.

Research in the 1950s and 1960s—led by scientists at **MIT**, the **Air Force**, and **NOAA's National Severe Storms Laboratory (NSSL)**—proved that the Doppler shift in returned signals could reveal the speed and direction of precipitation particles inside storms. NSSL operated its first dedicated S-band Doppler research radar in 1971.

In 1978 the **Joint Doppler Operational Project** (NSSL and Air Force Geophysics Lab) began developing a practical network system. The result was **NEXRAD—Next Generation Weather Radar**, officially the WSR-88D (**Weather Surveillance Radar-1988 Doppler**). Prototypes were tested in the 1980s; the first unit went operational near Norman, Oklahoma, in 1992.

By the mid-1990s the network of 159 radars was complete across the United States (plus Puerto Rico and Guam). For the first time, forecasters could directly see rotation inside thunderstorms, dramatically improving tornado warning times. Today the NEXRAD network remains the backbone of U.S. severe-weather detection. Ongoing upgrades—including dual-polarization technology added in the 2010s—allow it to distinguish rain, hail, snow, and even non-meteorological targets with far greater precision. The system continues to deliver life-saving lead time for Minnesota's spring tornadoes, summer downpours, and winter blizzards.

How Data Powers Modern Weather Forecasts

Massive amounts of real-time data from multiple sources feed into **Numerical Weather Prediction (NWP)** models that forecast conditions across Minnesota, including remote northern areas like International Falls and Bemidji.

Satellites provide the broadest view:

Geostationary Satellites (GOES) deliver frequent images and atmospheric soundings of clouds, moisture, and temperatures, while polar-orbiting satellites scan the entire globe twice daily for detailed vertical profiles. Doppler radar networks (NEXRAD) detect precipitation intensity, movement, and rotation inside storms—critical for spring severe weather and winter blizzards. Twice-daily weather balloon launches (radiosondes) from about 92 U.S. sites, including those supporting the Duluth NWS office, measure temperature, pressure, humidity, and winds high into the atmosphere.

Surface observations come from **Automated Surface Observing Systems (ASOS)** at airports and official stations, **plus thousands of citizen weather stations**. Data from personal stations registered with the **Citizen Weather Observer Program (CWOP)** flows into NOAA's **Meteorological Assimilation Data Ingest System (MADIS)**, where it is quality-checked and blended with professional observations.

All this information undergoes **data assimilation**—a sophisticated process that combines observations with a previous model forecast to create the most accurate picture of the current atmosphere. Supercomputers then solve complex physics equations on a 3D grid, stepping the model forward in time. High-resolution models like the **HRRR** provide detailed short-term guidance for northern Minnesota's unique challenges: lake-effect snow from Superior, rapid cold-air outbreaks, and isolated thunderstorms in data-sparse forested regions. The result? More reliable forecasts that help communities in International Falls, Bemidji, and beyond prepare for everything from heavy Continued on Page 16



National Weather Service Doppler Radar at Lincoln, Illinois. This station is similar to the Duluth, Minnesota Doppler station design.

Image: National Weather Service

snow to severe spring storms. Even small contributions from backyard stations help fill observational gaps and improve model accuracy.

Today's Artificial Intelligence Assisted Weather Forecasting

Fast forward to this very moment.

Modern forecasting combines decades of physics-based numerical models with a groundbreaking new suite of Artificial Intelligence assisted systems that **NOAA** made operational in December 2025. These systems are called **AIGFS**, **AIGEFS**, and **HGEFS**.

Artificial Intelligence Global Forecast System (AIGFS)

AIGFS is **NOAA's** operational AI-based deterministic global weather model, implemented in December 2025 as part of Project **EAGLE**. Developed by the **National Centers for Environmental Prediction (NCEP)**, a major branch of the National Weather Service (NWS) in collaboration with NOAA research labs and **EPIC**, it is a fine-tuned version of **Google DeepMind's GraphCast** model trained on historical weather data.

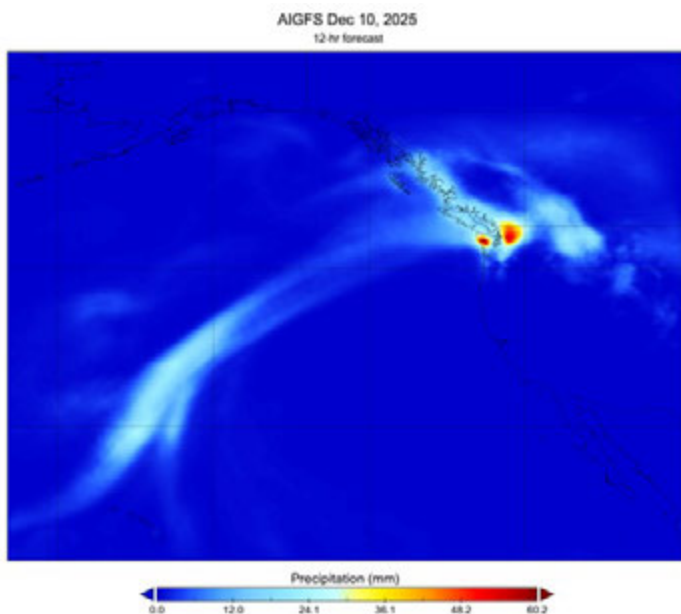
AIGFS uses machine learning to rapidly predict large-scale weather patterns from current observations. It produces a 16-day forecast in about **40 minutes** while using up to 99.7% less computing power than the traditional physics-based GFS, with improved skill for many features like pressure systems and precipitation.

Artificial Intelligence Global Ensemble Forecast System (AIGEFS)

AIGEFS is NOAA's operational AI-based ensemble weather model, implemented in December 2025 under Project **EAGLE**. Also based on a fine-tuned version of **Google DeepMind's GraphCast**, **AIGEFS** runs 31 slightly different members to generate a range of probable outcomes rather than a single forecast. This helps forecasters assess uncertainty and improves skill over the traditional GEFS, often **extending useful forecast accuracy by 18–24 hours** while using far less computing power.

Hybrid Global Ensemble Forecast System (HGEFS)

Also called **Hybrid-GEFS**, this is NOAA's pioneering "grand ensemble" model, implemented in December 2025 under Project **EAGLE**. It combines the 31 members of the **traditional physics-based GEFS** with the 31 members of the **AI-based AIGEFS**. This creates a robust 62-member ensemble that better represents forecast uncertainty by blending the physical consistency of traditional models with the efficiency and pattern-recognition strengths of AI. Early testing shows it **consistently outperforms both the pure AI and pure physics ensembles** on most metrics.



NOAA was able to depict and predict a much better, and faster image of an active system with AI for the first time in late 2025. Their Caption: "This AIGFS forecast in the form of a map, for December 10, 2025, shows the heavy precipitation from an atmospheric river hitting the U.S. Pacific Northwest."

Why Add AI Assistance to Traditional Models?

Saving more lives in severe weather. AI models learn patterns from decades of historical data (faster/cheaper for some tasks), while physics-based ones ensure physical consistency (e.g., conservation of energy). Forecasters blend outputs with human expertise, especially for northern Minnesota's unique challenges: lake-effect snow from Superior, rapid spring transitions, isolated severe storms in rural areas, and cold-air outbreaks.

Impact: Faster runs mean quicker updates during fast-moving spring systems, with improved accuracy in data-sparse regions like some of northern Minnesota.

And even with supercomputers and AI, forecasts **improve dramatically when more ground-level data fills in the gaps**. That's where everyday Minnesotans—and stations in northern Minnesota's forests, lakes, and rural expanses—come in.

Let's turn the page to look at two personal weather station types: Contributing Stations, which upload to the Citizen Weather Observer Program and Private Stations that do not automatically report. We'll also look at build sheets so that you can decide what personal station is right for you. *Continued on Page 17*

Personal Weather Stations

Contributing Stations

These stations upload every 5–15 minutes to **CWOP (Citizen Weather Observer Program)**. CWOP data goes into MADIS and gets assimilated into models like RAP/HRRR—directly improving forecasts and warnings for your neighborhood.

Many also upload to **Weather Underground (WU)**, which meteorologists use heavily. Setup is free; you just register for a CWOP ID (takes 5 minutes online) and enter it in the station's software/app. These are especially valuable in northern Minnesota's remote areas, microclimates near lakes & woods, filling gaps during blizzards or severe spring storms. Here are 3 build sheet examples to get you started:

Build Sheet 1: Davis Instruments Vantage Vue or Vantage Pro2

Our top recommendation for reliability

- ◆ Price: Vue ~\$400–\$750 (console + sensors); Pro2 ~\$800–\$1,500 (more sensors).
- ◆ Key Sensors: Temperature, humidity, wind speed/direction, rainfall, barometric pressure (Pro2 adds UV/solar radiation).
- ◆ Connectivity: Wireless console + optional WeatherLink Live/IP for direct internet upload (no computer needed).
- ◆ How it feeds models: Built-in support for CWOP + WU via Davis software or WeatherLink.com. Uploads every 5–15 min after you add your free CWOP ID.
- ◆ Setup time: 30–60 min for sensors + pole; 5 min for CWOP registration.
- ◆ Pros: Professional-grade accuracy/durability; excellent in harsh MN winters; expandable; data quality-checked by NWS.
- ◆ Cons: Higher upfront cost.
- ◆ Minnesota angle: Rock-solid for tornado-season wind/pressure data in rural areas; many MN SkyWarn spotters use these.

Build Sheet 2: Ambient Weather WS-2000 or WS-2902 series

Best value WiFi Option

- ◆ Price: \$150–\$300 (console + array); expandable to \$400+.
- ◆ Key Sensors: Temp/RH, wind, rainfall, baro pressure, UV/solar (higher models).
- ◆ Connectivity: WiFi-enabled color tablet console + phone app.
- ◆ How it feeds models: Native upload to WU + AmbientWeather.net; easy CWOP forwarding via free third-party tools (WeeWX, AmbientCWOP.com, or WeatherBridge device ~\$100 extra).
- ◆ Setup time: 20–40 min; WiFi setup in app.
- ◆ Pros: Affordable, beautiful graphs/alerts in app, expandable (lightning, air quality, etc.), very popular in MN.
- ◆ Cons: Needs careful siting (avoid heat sources); some older models less rugged.
- ◆ Minnesota angle: Great for hyper-local spring storm tracking; thousands already feeding data that helps Chanhassen NWS office.

Build Sheet 3: WeatherFlow Tempest

Modern, low-maintenance pick

- ◆ Price: ~\$300–\$400 (complete system).
- ◆ Key Sensors: Ultrasonic wind (no moving parts), temp/RH, rainfall, baro, lightning/hail detection, solar-powered.
- ◆ Connectivity: WiFi hub + excellent phone app.
- ◆ How it feeds models: Built-in WU upload; CWOP via free Google Apps Script or WeeWX (one-time setup). Tempest data also flows to Synoptic/Mesonet for NWS use.
- ◆ Setup time: 15–30 min; fully wireless/solar.
- ◆ Pros: Hail & lightning alerts perfect for MN severe weather; very low maintenance; accurate.
- ◆ Cons: CWOP not “one-click” (but easy scripts exist).
- ◆ Minnesota angle: Ideal for open prairie or lake-adjacent yards; real-time hail data is a game-changer for farmers.

Bonus low-cost add-on: CoCoRaHS 4" rain gauge (~\$30–\$50). Manual daily reports (app or website) go straight to NWS. Pairs perfectly with any automated station above for ultra-precise precipitation data.

Now let's look at a couple of build sheet examples for Private Weather Stations that don't auto-report.

Continued on Page 18

Private stations

These give you great backyard data for your own use and SkyWarn spotting, but the readings stay on your console/phone unless you add extra software/hardware. No automatic contribution to NWS models.

Build Sheet 1: Entry-level AcuRite or La Crosse console-only models AcuRite Iris 5-in-1 or basic La Crosse

- ◆ Price: \$50–\$150.
- ◆ Key Sensors: Basic temp/RH, wind, rain (varies by model).
- ◆ Connectivity: Local display console or Bluetooth to phone app (no WiFi/internet upload built-in).
- ◆ How it stays private: Data never leaves your property unless you manually log it.
- ◆ Setup time: 15–30 min.
- ◆ Pros: Cheap, simple, no internet/privacy worries.
- ◆ Cons: Limited history, no alerts, lower accuracy if poorly sited; zero contribution to forecasts.
- ◆ Minnesota angle: Fine for personal backyard monitoring but misses the chance to help neighbors during blizzards or tornadoes.

Build Sheet 2: Standalone Digital Gadgets or Phone Apps

Basic indoor/outdoor thermometers, simple rain gauges, or phone barometer apps

- ◆ Price: \$10–\$40.
- ◆ Key Sensors: One or two (temp, humidity, or pressure).
- ◆ Connectivity: None or Bluetooth only.
- ◆ How it stays private: Purely local—no upload capability.
- ◆ Setup time: 5 minutes.
- ◆ Pros: Dirt cheap, zero maintenance.
- ◆ Cons: Very limited data; phone sensors are notoriously inaccurate for serious use.
- ◆ Minnesota angle: Good starter for kids or quick checks, but not useful for SkyWarn-level spotting.

We hope you've enjoyed this journey through the fascinating history of weather prediction — from Aristotle's ancient theories and early instruments to today's powerful AI-assisted models and the vital role of real-time data. As severe weather season approaches in northern Minnesota, now is the perfect time to take action to prepare for spring and summer weather events.

Consider becoming **SkyWarn** certified through the local National Weather Service office, equipping your backyard with a personal weather station, and teaching the little ones in your family about severe weather prediction and safety. Encouraging kids to help monitor and maintain the family's weather station is a wonderful way to spark their interest while building practical skills. Whether your station contributes data to official models or simply sharpens your own observations, every set of eyes and sensors helps keep our communities safer during sudden spring storms and severe summer weather. **Stay safe and well my friends! ★**



Contest Calendar - April 2026

+ QRP Fox Hunt	0200Z-0330Z, Apr 1
+ Phone Weekly Test	0230Z-0300Z, Apr 1
+ A1Club AWT	1145Z-1300Z, Apr 1
+ CWops Test (CWT)	1300Z-1400Z, Apr 1
+ VHF-UHF FT8 Activity Contest	1700Z-2100Z, Apr 1
+ Mini-Test 40	1700Z-1759Z, Apr 1
+ Mini-Test 80	1800Z-1859Z, Apr 1
+ CWops Test (CWT)	1900Z-2000Z, Apr 1
+ UKEICC 80m Contest	2000Z-2100Z, Apr 1
+ VHF-UHF FT8 Activity Contest-NA	0000Z-0500Z, Apr 2
+ Walk for the Bacon QRP Contest	0000Z-0100Z, Apr 2 and 0200Z-0300Z, Apr 3
+ CWops Test (CWT)	0300Z-0400Z, Apr 2
+ CWops Test (CWT)	0700Z-0800Z, Apr 2
+ Maundy Thursday Contest	1200Z-1500Z, Apr 2 and 2000Z-2300Z, Apr 2
+ SARL 80m QSO Party	1700Z-2000Z, Apr 2 1800Z-1900Z, Apr 2 (CW) and 1900Z-2000Z, Apr 2 (SSB) and 2000Z-2100Z, Apr 2 (FM) and 2100Z-2200Z, Apr 2 (Dig)
+ NRAU 10m Activity Contest	2000Z-2200Z, Apr 2
+ SKCC Sprint Europe	2000Z-2200Z, Apr 2
+ QRP Fox Hunt	0100Z-0230Z, Apr 3
+ NCCC FT4 Sprint	0100Z-0130Z, Apr 3
+ Weekly RTTY Test	0145Z-0215Z, Apr 3
+ NCCC Sprint	0230Z-0300Z, Apr 3
+ K1USN Slow Speed Test	2000Z-2100Z, Apr 3
+ YBDXPI SSB Contest	0000Z, Apr 4 to 2359Z, Apr 5
+ PODXS 070 New Member Jamboree	0000Z-2359Z, Apr 4

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Contest Calendar - April 2026

+ EA RTTY Contest	1200Z, Apr 4 to 1200Z, Apr 5
+ Louisiana QSO Party	1400Z, Apr 4 to 0200Z, Apr 5
+ Mississippi QSO Party	1400Z, Apr 4 to 0200Z, Apr 5
+ SP DX Contest	1500Z, Apr 4 to 1500Z, Apr 5
+ K1USN Slow Speed Test	0000Z-0100Z, Apr 6
+ ICWC Medium Speed Test	1300Z-1400Z, Apr 6
+ IRTS 70cm Counties Contest	1300Z-1330Z, Apr 6
+ IRTS 2m Counties Contest	1330Z-1500Z, Apr 6
+ DARC Easter Contest	1500Z-1729Z, Apr 6
+ OK1WC Memorial (MWC)	1630Z-1729Z, Apr 6
+ ICWC Medium Speed Test	1900Z-2000Z, Apr 6
+ ARS Spartan Sprint	0000Z-0200Z, Apr 7
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Apr 7
+ ICWC Medium Speed Test	0300Z-0400Z, Apr 7
	0800Z-0829Z (CW), Apr 7 and
+ ZL Sprint	0830Z-0859Z (SSB), Apr 7 and
	0900Z-0929Z (SSB), Apr 7
+ Phone Weekly Test	0230Z-0300Z, Apr 8
+ A1Club AWT	1145Z-1300Z, Apr 8
+ CWops Test (CWT)	1300Z-1400Z, Apr 8
+ VHF-UHF FT8 Activity Contest	1700Z-2100Z, Apr 8
+ Mini-Test 40	1700Z-1759Z, Apr 8
+ Mini-Test 80	1800Z-1859Z, Apr 8
+ CWops Test (CWT)	1900Z-2000Z, Apr 8
+ VHF-UHF FT8 Activity Contest-NA	0000Z-0500Z, Apr 9
+ CWops Test (CWT)	0300Z-0400Z, Apr 9
+ CWops Test (CWT)	0700Z-0800Z, Apr 9
+ NCCC FT4 Sprint	0100Z-0130Z, Apr 10
+ Weekly RTTY Test	0145Z-0215Z, Apr 10

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Contest Calendar - April 2026

+ NCCC Sprint	0230Z-0300Z, Apr 10
+ K1USN Slow Speed Test	2000Z-2100Z, Apr 10
+ QRP ARCI Spring QSO Party	0000Z-0600Z, Apr 11
+ JIDX CW Contest	0700Z, Apr 11 to 1300Z, Apr 12
+ SKCC Weekend Sprintathon	1200Z, Apr 11 to 2400Z, Apr 12
+ OK/OM DX Contest, SSB	1200Z, Apr 11 to 1159Z, Apr 12
+ Yuri Gagarin International DX Contest	1200Z, Apr 11 to 1159Z, Apr 12
+ IG-RY World Wide RTTY Contest	1200Z, Apr 11 to 1800Z, Apr 12
	1200Z-1700Z, Apr 11 (20m-10m) and
+ DIG QSO Party, CW	0700Z-0900Z, Apr 12 (80m) and
	0900Z-1100Z, Apr 12 (40m)
+ RSGB FT4 International Activity Day	1200Z, Apr 11 to 1200Z, Apr 12
+ New Mexico QSO Party	1400Z, Apr 11 to 0200Z, Apr 12
	1400Z, Apr 11 to 0400Z, Apr 12 and
+ Missouri QSO Party	1400Z-2000Z, Apr 12
+ Africa FT4 DX Contest	1500Z-1800Z, Apr 11
	1800Z, Apr 11 to 0359Z, Apr 12 and
+ Georgia QSO Party	1400Z-2359Z, Apr 12
+ North Dakota QSO Party	1800Z, Apr 11 to 1800Z, Apr 12
+ Hungarian Straight Key Contest	1500Z-1600Z, Apr 12
+ 4 States QRP Group Second Sunday Sprint	0000Z-0200Z, Apr 13
+ K1USN Slow Speed Test	0000Z-0100Z, Apr 13
+ ICWC Medium Speed Test	1300Z-1400Z, Apr 13
+ OK1WC Memorial (MWC)	1630Z-1729Z, Apr 13
+ RSGB 80m Club Championship, CW	1900Z-2030Z, Apr 13
+ ICWC Medium Speed Test	1900Z-2000Z, Apr 13
+ 144 MHz Spring Sprint	2300Z, Apr 13 to 0600Z, Apr 14
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Apr 14
+ ICWC Medium Speed Test	0300Z-0400Z, Apr 14

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Contest Calendar - April 2026

- + ZL Sprint
 - + DARC RTTY Sprint
 - + NAQCC CW Sprint
 - + Phone Weekly Test
 - + A1Club AWT
 - + CWops Test (CWT)
 - + VHF-UHF FT8 Activity Contest
 - + Mini-Test 40
 - + Mini-Test 80
 - + CWops Test (CWT)
 - + VHF-UHF FT8 Activity Contest-NA
 - + Walk for the Bacon QRP Contest
 - + CWops Test (CWT)
 - + CWops Test (CWT)
 - + NTC QSO Party
 - + NCCC FT4 Sprint
 - + Weekly RTTY Test
 - + NCCC Sprint
 - + Florida State Parks on the Air
 - + K1USN Slow Speed Test
 - + World Wide Holyland Contest
 - + Texas State Parks on the Air
 - + ES Open HF Championship
- 0800Z-0829Z (CW), Apr 14 and
0830Z-0859Z (SSB), Apr 14 and
0900Z-0929Z (SSB), Apr 14
1800Z-1929Z, Apr 14
0030Z-0230Z, Apr 15
0230Z-0300Z, Apr 15
1145Z-1300Z, Apr 15
1300Z-1400Z, Apr 15
1700Z-2100Z, Apr 15
1700Z-1759Z, Apr 15
1800Z-1859Z, Apr 15
1900Z-2000Z, Apr 15
0000Z-0500Z, Apr 16
0000Z-0100Z, Apr 16 and
0200Z-0300Z, Apr 17
0300Z-0400Z, Apr 16
0700Z-0800Z, Apr 16
1900Z-2000Z, Apr 16
0100Z-0130Z, Apr 17
0145Z-0215Z, Apr 17
0230Z-0300Z, Apr 17
1200Z-2359Z, Apr 17 and
1200Z-2359Z, Apr 18 and
1200Z-2359Z, Apr 19 and
1200Z-2359Z, Apr 20
2000Z-2100Z, Apr 17
2100Z, Apr 17 to 2059Z, Apr 18
0000Z, Apr 18 to 2359Z, Apr 19
0500Z-0859Z, Apr 18

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Contest Calendar - April 2026

+ Worked All Provinces of China DX Contest	0600Z, Apr 18 to 0559Z, Apr 19
+ Dutch PACCdigi Contest	0700Z to 1900Z, Apr 18
+ QRP to the Field	0800-1800 local, Apr 18
+ CQMM DX Contest	0900Z, Apr 18 to 2359Z, Apr 19
+ Georgia State Parks on the Air	1200Z, Apr 18 to 2359Z, Apr 19
+ World Time Zone Challenge	1200Z, Apr 18 to 1200Z, Apr 19
+ Michigan QSO Party	1600Z, Apr 18 to 0400Z, Apr 19
	1700Z-1800Z, Apr 18 (10m) and
	1800Z-1900Z, Apr 18 (15m) and
	1900Z-2000Z, Apr 18 (20m) and
	2000Z-2100Z, Apr 18 (40m) and
+ EA-QRP CW Contest	2100Z-2300Z, Apr 18 (80m) and
	0700Z-0900Z, Apr 19 (40m) and
	0900Z-1000Z, Apr 19 (20m) and
	1000Z-1100Z, Apr 19 (15m) and
	1100Z-1200Z, Apr 19 (10m)
+ Feld Hell Sprint	1800Z-2159Z, Apr 18
+ Ontario QSO Party	1800Z, Apr 18 to 0300Z, Apr 19 and
	1200Z-2000Z, Apr 19
+ International Vintage Contest HF	0700Z-1100Z, Apr 19 and
	1500Z-1900Z, Apr 19
+ Quebec QSO Party	1300Z-2400Z, Apr 19
+ ARRL Rookie Roundup, SSB	1800Z-2359Z, Apr 19
+ Run for the Bacon QRP Contest	2300Z, Apr 19 to 0100Z, Apr 20
+ K1USN Slow Speed Test	0000Z-0100Z, Apr 20
+ ICWC Medium Speed Test	1300Z-1400Z, Apr 20
+ OK1WC Memorial (MWC)	1630Z-1729Z, Apr 20
+ ICWC Medium Speed Test	1900Z-2000Z, Apr 20
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Apr 21

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Contest Calendar - April 2026

+ ICWC Medium Speed Test	0300Z-0400Z, Apr 21
+ ZL Sprint	0800Z-0829Z (CW), Apr 21 and 0830Z-0859Z (SSB), Apr 21 and 0900Z-0929Z (SSB), Apr 21
+ 222 MHz Spring Sprint	2300Z, Apr 21 to 0600Z, Apr 22
+ SKCC Sprint	0000Z-0200Z, Apr 22
+ Phone Weekly Test	0230Z-0300Z, Apr 22
+ A1Club AWT	1145Z-1300Z, Apr 22
+ CWops Test (CWT)	1300Z-1400Z, Apr 22
+ Mini-Test 40	1700Z-1759Z, Apr 22
+ Mini-Test 80	1800Z-1859Z, Apr 22
+ RSGB 80m Club Championship, SSB	1900Z-2030Z, Apr 22
+ CWops Test (CWT)	1900Z-2000Z, Apr 22
+ CWops Test (CWT)	0300Z-0400Z, Apr 23
+ CWops Test (CWT)	0700Z-0800Z, Apr 23
+ NCCC FT4 Sprint	0100Z-0130Z, Apr 24
+ Weekly RTTY Test	0145Z-0215Z, Apr 24
+ NCCC Sprint	0230Z-0300Z, Apr 24
+ K1USN Slow Speed Test	2000Z-2100Z, Apr 24
+ Tupalayo DX Contest	0800Z, Apr 25 to 1159Z, Apr 26
+ SP DX RTTY Contest	1200Z, Apr 25 to 1200Z, Apr 26
+ UK/EI DX Contest, CW	1200Z, Apr 25 to 1200Z, Apr 26
+ Helvetia Contest	1300Z, Apr 25 to 1259Z, Apr 26
+ Nebraska QSO Party	1400Z, Apr 25 to 0200Z, Apr 27
+ Florida QSO Party	1600Z, Apr 25 to 0159Z, Apr 26 and 1200Z-2159Z, Apr 26
+ UA1DZ Memorial Cup	1300Z-1859Z, Apr 26
+ BARTG Sprint 75	1700Z-2059Z, Apr 26
+ K1USN Slow Speed Test	0000Z-0100Z, Apr 27

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Contest Calendar - April 2026

+ QCX Challenge	1300Z-1400Z, Apr 27
+ ICWC Medium Speed Test	1300Z-1400Z, Apr 27
+ OK1WC Memorial (MWC)	1630Z-1729Z, Apr 27
+ QCX Challenge	1900Z-2000Z, Apr 27
+ RSGB FT4 Contest	1900Z-2100Z, Apr 27
+ ICWC Medium Speed Test	1900Z-2000Z, Apr 27
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Apr 28
+ QCX Challenge	0300Z-0400Z, Apr 28
+ ICWC Medium Speed Test	0300Z-0400Z, Apr 28
+ ZL Sprint	0800Z-0829Z (CW), Apr 28 and 0830Z-0859Z (SSB), Apr 28 and 0900Z-0929Z (SSB), Apr 28
+ Phone Weekly Test	0230Z-0300Z, Apr 29
+ A1Club AWT	1145Z-1300Z, Apr 29
+ CWops Test (CWT)	1300Z-1400Z, Apr 29
+ Mini-Test 40	1700Z-1759Z, Apr 29
+ Mini-Test 80	1800Z-1859Z, Apr 29
+ CWops Test (CWT)	1900Z-2000Z, Apr 29
+ UKEICC 80m Contest	2000Z-2100Z, Apr 29
+ 432 MHz Spring Sprint	2300Z, Apr 29 to 0600Z, Apr 30
+ CWops Test (CWT)	0300Z-0400Z, Apr 30
+ CWops Test (CWT)	0700Z-0800Z, Apr 30
+ RSGB 80m Club Championship, Data	1900Z-2030Z, Apr 30

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

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