ARROWHEAD RADIO AMATEUR CLUB, INC. • DULUTH, MINNESOTA • WØGKP • 1929

The RELAY

APRIL 2020

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

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Spring 2020

Join us on facebook!

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Eye to the Sky

Spring & Summer Weather Spotting in the Northland

April is here, and with the warmer temperatures comes the sometimes volatile weather of Northland springs. This is when the National Weather Service usually holds the first free 2-hour **Skywarn Weather Training** 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. 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.

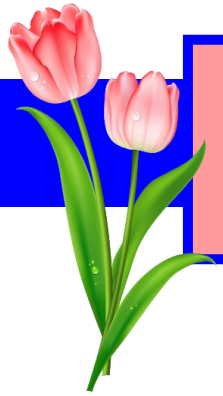
Since the 1970s, SKYWARN® spotters have helped the National Weather Service issue timely and accurate warnings in their region to protect lives and property. As the National Weather Service says, "There can be no finer reward than to know that their efforts have given communities the precious gift of 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.

While the Duluth National Weather Service Skywarn Training sessions have been cancelled this spring due to the Governor's Stay at Home executive order, now is still a great time to review important weather features to be aware of for the safety of our families and community. The National Weather Service is putting together online classes to replace the in-person sessions, but until those are ready, it's good to view the free online weather training at the Comet MetEd website. These don't officially replace the official Skywarn training classes, but are highly recommended by the NWS as a beneficial supplemental instruction that covers the basics of being a spotter. This is an excellent exercise for the entire family to view to learn how to spot potentially dangerous spring and summer storms. Simply visit the web site and register as a user at https://www.meted.ucar.edu/training_course.php?id=23

Continued on page 20

ENTER OUR EASTER EGG PHOTO CONTEST!

See page 23 for details



April 2020

Prez Sez ...

Everyone,

Because of the Shelter in Place order by Governor Walz the in-person April Board meeting at Sammy's and the Club meeting at the Coppertop Church scheduled for April 9 are cancelled.

Board members will be meeting by telephone conference call on Tuesday April 7 and should have gotten an email from Mike Lovold NØPDG with details to connect. If you haven't gotten the email let Mike or me know and we will make sure you get the info.

As for the Club meeting, we are working on having the business portion of the meeting on the 94 repeater that Thursday night on April 7th. Mike is working with Matt Holden, ARRL Director for the Dakota Division for him to give us a Webinar presentation that everyone could log onto for our program. This is still being worked out so more info will be provided as time passes.

We are still planning to have our Hamfest May 2, but this could change with all the uncertainty going on. We will need volunteers to help out for this event. Needed are kitchen help, early morning set up, ticket sales and clean up. If you can help out, let Bob Schulz KCØNFB or myself know. If we get to have this event we want to do a good job, so thank you for your help!

73 Gene Ellefsen NØVRM

ARAC Board Meeting Minutes - March 3, 2020

PRESIDENT

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

VICE PRESIDENT

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

SECRETARY

NØCALL
Robin Davis

218-391-3Ø77
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Bruce Carlson
9Ø6 Anderson Rd
Duluth, MN 55811
763-315-2967
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3RD YEAR BOARD

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

2ND YEAR BOARD

AAØAC
Dave Davis

218-348-6649
aaØac@outlook.com

1ST YEAR BOARD

KDØYLN
Robert Boyd
5054 Boulder Dr
Hermantown, MN 55811

Present: Gene Ellefsen-N0VRM, Mike Lovold-N0PDG, Bruce Carlson-KE0NIT, Dave Davis-AA0AC, Gary Minter-KD9ABS, Bob Boyd-KD0YLN, Doug Nelson-AA0AW, Randy Wabik-KR0B, Grant Forsyth-KC0WUP

Guest: Del Minter-KE0CLI

Meeting called to order by President Gene-N0VRM at 6:30 pm

Minutes taken by Mike-N0PDG

Treasurer's Report:

Checking	1,167.19
Savings	1,373.06
Cash Subtotal	$2,540.25
Outstanding Check (Repeater # 1414)	-1,100.00
Winter CD	1,714.03
Summer CD	1,700.00
CD Subtotal	$3,414.03
Grand Total	$4,854.28

Move to approve as presented by Mike-N0PDB, seconded by Gary-KD9ABS, motion passed

Committee Reports:

Testing:
Doug-AA0AW reported there was a testing session on February 26, 2020. We had one (1) new upgrade to extra class. Congratulations to Rich-KC0ROE. Another Test Session is scheduled for May 2, 2020, at the Ham Fest, 9:30 am Registration with Testing at 10:00 am. There will also be a second Test Session on May 12, 2020, at the House of Refuge, 5:30 pm Registration, Test at 6:00 pm. The Extra Class Test will change to a new Question Pool on July 1, 2020, so study up now to test before the change occurs

Ham Fest:
There is thirty-three (33) tables reserved. We are looking for volunteers to help set up tables and chairs, help in the kitchen during the Fest and cleanup after the Ham Fest ends. Plan is to meet at McDonalds in Superior (WI) at 5:00 am on 21st St and Tower Ave, for coffee, etc., and then head to Fairgrounds for set up. PLEASE VOLUNTEER!

Repeaters:
The air conditioner is not working at the Mahtowa Repeater Site so we are looking for one to replace the one currently on site. The exact size to be determined. Grant-KC0WUP said that he would look and see if he had an extra one to donate

Grandma's Marathon:
Grandma's marathon had their first meeting and things are in progress for another year of the racing with ARAC providing Health and Welfare Communications

Motion to adjourn meeting at 6:58 pm by Gene-N0VRM, seconded by Mike-N0PDG, motion passed

ARAC Club Meeting Minutes

March12, 2020

Present:
President Gene Ellefsen-N0VRM
Vice President Mike Lovold-N0PDG
Treasurer / Membership Bruce Carlson-KE0NIT
Secretary Robin Davis
Second Year Board Bob Boyd-KD0YLN
First Year Board Gary Minter-KD9ABS
Parliamentarian Grant Forsyth-KC0WUP
Special Events – Open / Gene Ellefsen-N0VRM acting
Ham Fest / Education Bob Schultz-KC0NFB
Property / Picnic Scott Ahlgren-N0VYU
Repeater Randy Wabik-KR0B
Testing Doug Nelson-AA0AW

Absent:
Third Year Board Dave Davis-AA0AC
Chaplain (Visiting) Rolland Bockbrader-KB0CK
Newsletter / Historian Kim Waller-KE0NQS
Newsletter Steve Waller-KE0NQT
Repeater Derek McCorison-W0DNF
Repeater Randy Haglin-N0BZZ
Web Site Thomas Dorr-KE0RHA

Meeting called to order at 7:05 pm by President Gene-N0VRM.

Minutes:
Posted on web page and in the newsletter. Move to approve by Bob-KC0NFB, seconded by Geoff Bennett-KE0BNX, motion passed

Treasurer's Report:

Checking	1,167.19
Savings	1,373.06
Cash Subtotal	$2,540.25
Outstanding Check (Repeater # 1414)	-1,100.00
Winter CD	1,714.03
Summer CD	1,700.00
CD Subtotal	$3,414.03
Grand Total	$4,854.28

Move to approve by Grant-KC0WUP, seconded by Gary-KD9ABS, motion passed

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ARAC Club Meeting Minutes, continued

Committee Reports:

Education:

No new class until fall of 2020. Current class started out with seven (7) and is now running between four (4) and five (5). There will be a Test Session at the end of the class on May 12, 2020, at the House of Refuge, where the class is being held.

Ham Fest:

We have a contract but it is unsigned at this time due to a new corporation, DHL Limited, taking over the property. The new contract has raised a lot of questions and concerns such as do we have both buildings? The Fairgrounds Building plus the 4-H Building, which we use for testing. The Board passed a motion to pay the fees associated with renting the facility for the Ham Fest, which are $100.00 deposit and $600.00 rental fee. Other questions are with the pop or soda, contract states we have to see their pop. Our concern is it on a gun or do they have cans? Food, the contact says no cooking on side unless we use a caterer on site. We just warm up precooked foods so we're good. Our $100.00 deposit must be paid again even though we have had a rolling $100.00 deposit for years. This is a new company and they require a new deposit. Bob-KC0NFB stated we will have to chase down the old company to get a refund of our old $100.00 deposit. Gene-N0VRM will work on recovering out deposit. Grant-KC0WUP seconded the Board's motion and the motion passed

Testing:

We will be testing at the Ham Fest, May 2, 2020, and on May 12, 2020, which is the last day of the Community Education Class. On Monday, March 16, 2020, we will have a mini test session, possibly testing only one (1) candidate. If you know of someone who would like to test this Monday at Noon, please contact Doug-AA0AW. This test session will be held at the House of Refuge, 115 W Myrtle St.

Just a reminder – the questions for the Extra exam will be changing July 1, 2020, so if you have been contemplating taking the Extra exam, you may want to schedule it with Doug-AA0AW, prior to July 1st

Parliamentarian:

In reviewing the Bylaws for any negative impact, we are good. Just want to say thank you for being here. Thank you to Grant_KC0WUP for doing an excellent job

Grandma's Marathon:

Scott-N0VYU has the assignment sheet for the various Communication Stations along the Marathon route. Please review the list and if you would like to stay at the same location, please highlight your name in yellow. If you are not on the list and are interested in helping to provide Communications and Welfare for the Marathon, please add your name and contact information on the same page. Ssott-N0VYU will contact you to discuss your participation

$5.00 door prize was won by Gary-KB9ABS, who donated it to the Coffee Kitty

Motion to adjourn by Mike-N0PDG, seconded by Robin, motion passed at 7:19 pm

Arrowhead Radio Amateur Club

HAM FEST!

Sat. May 2nd, 2Ø2Ø 9:ØØam – 1:ØØpm

HEAD OF THE LAKES FAIRGROUNDS – MULTI PURPOSE BUILDING

4700 Tower Ave. (Wisconsin Hwy 35) Superior, WI 54880

Fairgrounds are located next to the Superior Airport.

Admission: $7.ØØ (12 & under FREE!)

Free parking for most vehicles.

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

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

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

Mike's email: mgcizek@gmail.com

ARRL The national association for AMATEUR RADIO

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

Talk-in on WØGKP Repeater:
146.94Ø(-) [1Ø3.5] Duluth
147.ØØØ(-) [1Ø3.5] Mahtowa
146.94Ø(-) [114.8] 2-Harbors

Dealer / Vendor Tables:
4 foot table: $5.ØØ
8 foot table: $1Ø.ØØ
Vendor setup starts at: 7:ØØam

www.thearac.org

Testing on site!

1Ø:ØØ AM 4-H Building
Contact: Doug Nelson
AAØAW / 218-391-5874
aa0aw@arrl.net

Table Reservations:

Robert Schulz, KC0NFB
115 Eden Lane
Duluth, MN 558Ø5-1533
218-481-7458
arac_hamfest@charter.net

Hourly Drawings!

Contest Calendar - April 2020

+ QRP Fox Hunt	0100Z-0230Z, Apr 1
+ Phone Fray	0230Z-0300Z, Apr 1
	1300Z-1400Z, Apr 1 and
	1900Z-2000Z, Apr 1 and
+ CWops Mini-CWT Test	0300Z-0400Z, Apr 2
+ UKEICC 80m Contest	2000Z-2100Z, Apr 1
	1800Z-1900Z, Apr 2 (CW) and
	1900Z-2000Z, Apr 2 (SSB) and
	2000Z-2100Z, Apr 2 (FM) and
+ NRAU 10m Activity Contest	2100Z-2200Z, Apr 2 (Dig)
+ SARL 80m QSO Party	1700Z-2000Z, Apr 2
+ SKCC Sprint Europe	1900Z-2100Z, Apr 2
+ NCCC RTTY Sprint	0145Z-0215Z, Apr 3
+ QRP Fox Hunt	0200Z-0330Z, Apr 3
+ NCCC Sprint	0230Z-0300Z, Apr 3
+ LZ Open 40m Sprint Contest	0400Z-0800Z, Apr 4
+ PODXS 070 Club PSK 31 Flavors Contest	1000Z, Apr 4 to 0400Z, Apr 5
	1300Z, Apr 4 to 0100Z, Apr 5 and
+ Nebraska QSO Party	1300Z-2200Z, Apr 5
	1400Z, Apr 4 to 0400Z, Apr 5 and
+ Missouri QSO Party	1400Z-2000Z, Apr 5
	1400Z-2200Z, Apr 4 and
+ Florida State Parks on the Air	1400Z-2200Z, Apr 5
+ Mississippi QSO Party	1400Z, Apr 4 to 0200Z, Apr 5
+ Louisiana QSO Party	1400Z, Apr 4 to 0200Z, Apr 5

Continued on Page 8

Contest Calendar - April 2020, Continued

+ SP DX Contest	1500Z, Apr 4 to 1500Z, Apr 5
+ EA RTTY Contest	1600Z, Apr 4 to 1600Z, Apr 5
+ North American SSB Sprint Contest	0000Z-0400Z, Apr 5
+ UBA Spring Contest, 6m	0600Z-1000Z, Apr 5
+ RSGB RoLo SSB	1900Z-2030Z, Apr 5
+ IQRP Quarterly Marathon	0800Z, Apr 6 to 2000Z, Apr 12
+ 144 MHz Spring Sprint	1900 local - 2300 local, Apr 6
+ RSGB 80m Club Championship, CW	1900Z-2030Z, Apr 6
+ ARS Spartan Sprint	0100Z-0300Z, Apr 7
+ Phone Fray	0230Z-0300Z, Apr 8
	1300Z-1400Z, Apr 8 and
	1900Z-2000Z, Apr 8 and
+ CWops Mini-CWT Test	0300Z-0400Z, Apr 9
+ NCCC RTTY Sprint	0145Z-0215Z, Apr 10
+ NCCC Sprint	0230Z-0300Z, Apr 10
+ QRP ARCI Spring QSO Party	0000Z-2359Z, Apr 11
+ JIDX CW Contest	0700Z, Apr 11 to 1300Z, Apr 12
+ FTn DX Contest	1200Z, Apr 11 to 1200Z, Apr 12
+ F9AA Cup, PSK	1200Z, Apr 11 to 1200Z, Apr 12
+ SKCC Weekend Sprintathon	1200Z, Apr 11 to 2400Z, Apr 12
+ OK/OM DX Contest, SSB	1200Z, Apr 11 to 1200Z, Apr 12
+ New Mexico QSO Party	1400Z, Apr 11 to 0200Z, Apr 12
	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

Continued on Page 9

Contest Calendar - April 2020, Continued

+ Yuri Gagarin International DX Contest	2100Z, Apr 11 to 2100Z, Apr 12
	1000Z-1200Z, Apr 12 (FT8) and
	1200Z-1400Z, Apr 12 (RTTY) and
	1400Z-1600Z, Apr 12 (PSK) and
	1600Z-1800Z, Apr 12 (FT8) and
	1800Z-2000Z, Apr 12 (RTTY) and
	2000Z-2200Z, Apr 12 (PSK)
+ WAB 3.5/7/14 MHz Data Modes	1200Z-1800Z, Apr 12
+ International Vintage Contest HF	1500Z-1600Z, Apr 12
+ Hungarian Straight Key Contest	0000Z-0200Z, Apr 13
+ 4 States QRP Group Second Sunday Sprint	1900 local - 2300 local, Apr 14
+ 222 MHz Spring Sprint	0030Z-0230Z, Apr 15
+ NAQCC CW Sprint	0230Z-0300Z, Apr 15
+ Phone Fray	1300Z-1400Z, Apr 15 and
	1900Z-2000Z, Apr 15 and
	0300Z-0400Z, Apr 16
+ CWops Mini-CWT Test	1900Z-2030Z, Apr 15
+ RSGB 80m Club Championship, SSB	0145Z-0215Z, Apr 17
+ NCCC RTTY Sprint	0230Z-0300Z, Apr 17
+ NCCC Sprint	2100Z, Apr 17 to 2100Z, Apr 18
+ Holyland DX Contest	0500Z-0559Z, Apr 18 and
	0600Z-0659Z, Apr 18 and
	0700Z-0759Z, Apr 18 and
	0800Z-0859Z, Apr 18
+ ES Open HF Championship	0600Z, Apr 18 to 0559Z, Apr 19
+ Worked All Provinces of China DX Contest	0700Z, Apr 18 to 0659Z, Apr 19
+ YU DX Contest	

Continued on Page 10

Contest Calendar - April 2020, Continued

+ QRP to the Field	0800-1800 local, Apr 18
+ CQMM DX Contest	0900Z, Apr 18 to 2359Z, Apr 19
+ Texas State Parks on the Air	1400Z, Apr 18 to 0200Z, Apr 19 and 1400Z-2000Z, Apr 19
+ Michigan QSO Party	1600Z, Apr 18 to 0400Z, Apr 19
+ EA-QRP CW Contest	1700Z-2000Z, Apr 18 (10-20m) and 2000Z-2300Z, Apr 18 (40-80m) and 0700Z-0900Z, Apr 19 (40m) and 0900Z-1200Z, Apr 19 (20-10m)
+ Ontario QSO Party	1800Z, Apr 18 to 0500Z, Apr 19 and 1200Z-1800Z, Apr 19
+ Feld Hell Sprint	1800Z-2159Z, Apr 18
+ ARRL Rookie Roundup, SSB	1800Z-2359Z, Apr 19
+ Run for the Bacon QRP Contest	1900Z-2400Z, Apr 19
+ SKCC Sprint	0000Z-0200Z, Apr 22
+ Phone Fray	0230Z-0300Z, Apr 22 1300Z-1400Z, Apr 22 and 1900Z-2000Z, Apr 22 and 0300Z-0400Z, Apr 23
+ CWops Mini-CWT Test	1900 local - 2300 local, Apr 22
+ 432 MHz Spring Sprint	1900Z-2030Z, Apr 23
+ RSGB 80m Club Championship, Data	0145Z-0215Z, Apr 24
+ NCCC RTTY Sprint	0230Z-0300Z, Apr 24
+ NCCC Sprint	0001Z, Apr 25 to 2359Z, Apr 26
+ 10-10 Int. Spring Contest, Digital	1200Z, Apr 25 to 1200Z, Apr 26
+ SP DX RTTY Contest	1300Z, Apr 25 to 1259Z, Apr 26
+ Helvetia Contest	

Continued on Page 11

Contest Calendar - April 2020, Continued

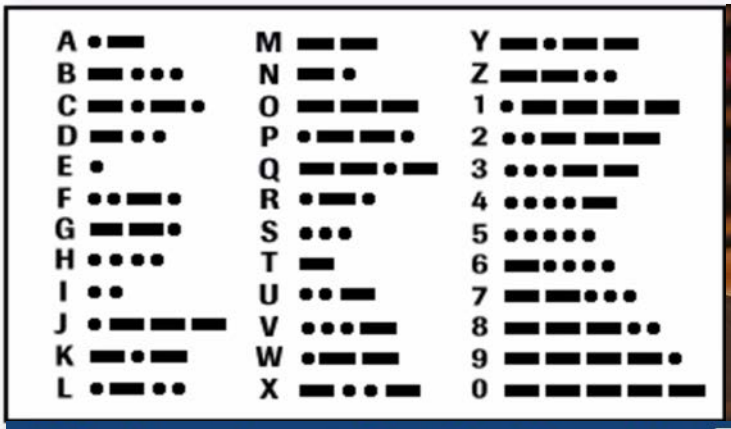
	1600Z, Apr 25 to 0159Z, Apr 26 and
+ Florida QSO Party	1200Z-2159Z, Apr 26
+ BARTG Sprint 75	1700Z-2059Z, Apr 26
	1300Z-1400Z, Apr 27 and
	1900Z-2000Z, Apr 27 and
+ QCX Challenge	0300Z-0400Z, Apr 28
+ RSGB FT4 Contest Series	1900Z-2030Z, Apr 27
+ Phone Fray	0230Z-0300Z, Apr 29
	1300Z-1400Z, Apr 29 and
	1900Z-2000Z, Apr 29 and
+ CWops Mini-CWT Test	0300Z-0400Z, Apr 30
+ UKEICC 80m Contest	2000Z-2100Z, Apr 29

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

Please visit Bruce's site at
www.contestcalendar.com/contestcal.html
for many other helpful contest calendar formats.

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 Buzy?	QRU Have anything for me	
QRV Are You Ready?	QRX Standby	QRS Transit Slower	



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 Telecoms 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.

2,200 Meters (135 kHz)

E,A,G

135.7 kHz 1 W EIRP maximum 137.8 kHz

630 Meters (472 kHz)

E,A,G

472 kHz 479 kHz

5 W EIRP maximum, except in Alaska within 496 miles of Russia where the power limit is 1 W EIRP.

160 Meters (1.8 MHz)

Avoid interference to radiolocation operations from 1.900 to 2.000 MHz

E,A,G

1.800 1.900 2.000 MHz

80 Meters (3.5 MHz)

3.500 3.600 3.700 4.000 MHz

E A G

N,T (200 W)

3.525 3.600 3.800

60 Meters (5.3 MHz)

CW, Dig 5332 5348 5358 5373 5405 kHz

USB 5330.5 5346.5 5357.0 5371.5 5403.5 kHz

2.8 kHz

E,A,G (100 W)

General, Advanced, and Amateur Extra licensees may operate on these five channels on a secondary basis with a maximum effective radiated power (ERP) of 100 W PEP relative to a half-wave dipole. Permitted operating modes include upper sideband voice (USB), CW, RTTY, PSK31 and other digital modes such as PACTOR III. Only one signal at a time is permitted on any channel.

40 Meters (7 MHz)

7.000 7.075 7.100 7.300 MHz

ITU 1,3 and FCC region 2 west of 130° west or below 20° north

E A G

N,T (200 W)

7.175

N,T outside region 2

7.025 7.125

See Sections 97.305(c), 97.307(f)(11) and 97.301(e). These exemptions do not apply to stations in the continental US.

30 Meters (10.1 MHz)

Avoid interference to fixed services outside the US.

200 Watts PEP E,A,G

10.100 10.150 MHz

20 Meters (14 MHz)

14.000 14.150 14.350 MHz

E A G

14.175

14.025 14.150 14.225

17 Meters (18 MHz)

E,A,G

18.068 18.110 18.168 MHz

15 Meters (21 MHz)

21.000 21.200 21.450 MHz

E A G

21.225

N,T (200 W)

21.025 21.275 21.200

12 Meters (24 MHz)

E,A,G

24.890 24.930 24.990 MHz

10 Meters (28 MHz)

28.000 28.300 29.700 MHz

E,A,G

N,T (200 W)

28.000 28.500

6 Meters (50 MHz)

50.1

E,A,G,T

50.0 54.0 MHz

2 Meters (144 MHz)

144.1

E,A,G,T

144.0 148.0 MHz

1.25 Meters (222 MHz)

E,A,G,T

N (25 W)

219.0 220.0 222.0 225.0 MHz

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

70 cm (420 MHz)*

E,A,G,T

420.0 450.0 MHz

33 cm (902 MHz)*

E,A,G,T

902.0 928.0 MHz

23 cm (1240 MHz)*

1240 1300 MHz

E,A,G,T

N (5 W)

1270 1295

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

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

‡ No pulse emissions

KEY

Note:

CW operation is permitted throughout all amateur bands.

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

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

= RTTY and data

= phone and image

= CW *only*

= SSB phone

= USB phone, CW, RTTY, and data

= Fixed digital message forwarding systems *only*

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

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

ARRL
We're At Your Service

ARRL Headquarters:
860-594-0200 (Fax 860-594-0259)
email: hq@arrl.org

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email: membership@arrl.org

Getting Started in Amateur Radio:
Toll-Free 1-800-326-3942 (860-594-0355)
email: newham@arrl.org

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

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NETS

Have a favorite HF/6m/2m/1.25m/7Øcm net that you check into or listen in on? Also, please send corrections and we will add it to the list below - Kim KEØNQS at my email KEØNQS.mn@gmail.com.

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

Next ARAC Board Meeting*

Tuesday, April 7, 2Ø2Ø
@ 6:30 p.m.

**via conference call; Board Members will informed of the call-in number*

Next ARAC Club Meeting

Thursday, April 9, 2020
7 p.m.
on the 94 Repeater

Tune into the Sunday night ES Net on April 5th at 9:00 p.m. for more instructions on viewing the program portion of the club meeting via webinar.

Interested in providing a program, or have an idea for one? Contact Mike NØPDG at lovoldm@gmail.com

CLUB REPEATER WØGKP

146.94 (-)
CTCSS TONE
103.5

KCØNFB Bob, would like to remind all hams to **make sure your license is current** and up-to-date on your address. You can visit the FCC ULS to check it and make changes at www.fcc.gov/uls.

"Stay tuned" for future information on the resumption of *Amateur Radio License Class* and *General & Expert License Study Group*

by visiting our club web site at www.thearac.org and tuning into the Sunday night net at 9:00 p.m.

Duluth Area Repeaters

ARAC System WØGKP

Freq.	*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	123.0	Solway (recv)
146.940	minus	110.9	Cloquet (recv)
147.000	minus	103.5	Mahtowa
444.100	plus	103.5	Duluth UHF Link

N9MMU/N9QWH System (WI)

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

WECOMM – WI Statewide Linked System WE9COM

147.075 plus 110.9 Meteor Hill (closest repeater to Duluth)

LSAC System #1

147.330	plus	151.4	Proctor
147.330	plus	103.5	Duluth (recv for Proctor)
147.330	plus	156.7	Duluth (North) (Fish Lake)
147.270	plus	114.8	Two Harbors
147.270	plus	103.5	Wales
147.090	plus	114.8	Silver Bay
145.410	minus	114.8	Finland
147.300	plus	114.8	Isabella
145.150	minus	103.5	Washburn, WI
146.700	minus	103.5	Bayfield, WI
443.850	+5.00	none	Bayfield, WI
147.165	plus	110.9	Hurley, WI
146.640	minus	151.4	Ely
443.500	+5.00	141.3	Gilbert
147.060	plus	103.5	Virginia
147.360	plus	162.2	Cook
147.165	plus	114.8	Coleraine
443.925	+5.00	110.9	Brainerd

NARC System NAØRC

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

Stand Alone Repeaters

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

Fusion and D Star

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

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

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

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

147.375 plus NØEO D Star
442.2ØØ plus NØEO D Star

[Repeater list compiled by Dr. Frequency—KCØWDQ]

ST. Louis County Department of Emergency Services Net Control Roster

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

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

Ten Meter SSB Net Control Roster

AAØAW Doug Nelson WØLWU Joe Meese
NUØW Gary Hanson K9KDK Al Babcock
WØDIO Dennis Anderson NØVRM Gene Ellefsen
AAØME Randy Johnson KØDSL Diane Saunders
Sunday Nights at 2ØØØ on 28.45Ø MHz USB

Ten Meter CW Net Control Roster

AAØAW Doug Nelson NØPDG Mike Lovold
Sunday Nights at 193Ø on 28.125 MHz

Northland Weather Group Net Control Roster

KCØMKS Jeff Nast
Monday Nights at 2ØØØ on the ARAC System

Douglas County Net

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

Central Carlton County Net

Tuesday Nights at 2Ø3Ø on the ARAC System

Lake County RACES/ARES Net

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

Elmers

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

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

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

Co-Editors,
Kim & Steve Waller
KEØNQS & KEØNQT

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

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

APRIL
CLUB EVENTS

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

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

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

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

Next Meeting: Thursday,
April 9, 2020 - 7 pm
On the 94 Repeater

ARAC Committee Chairs

Club License Trustee:
Ray Barnes KEØZN

Control Operators:
AAØAW - NØKXT - KCØNFB

Newsletter:
Kim KEØNQS & Steve KEØNQT Waller

Education Chair:
Bob Schulz KCØNFB

Hamfest Chair:
Bob Schulz KCØNFB

Chaplains:

Visiting Chaplains:

Denny Anderson WØDIO

Parliamentarian:
Grant Forsyth KCØWUP

Website:
Thomas Dorr KEØRHA

Membership:
Bruce Carlson KEØNIT

Property Chair:
Wulf Gar WU1FGR

Testing:
Doug Nelson AAØAW

Field Day:
Dennis Anderson WØDIO

Picnic Chair:
Scott Ahlgren, NØVYU

Repeater Chairs:
Randy Haglin NØBZZ
Randy Wabik KAØJZV

Contest Calendar at www.contestcalendar.com

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.

U.S. AIR FORCE MILITARY AUXILIARY RADIO SYSTEM

Minnesota State MARS Director
Reginald B. Cass / AFS5MN

Gene Ellefsen
NØVRM

Thank you for your time and interest.

Air Force MARS membership could be for you. We do hope that it is.

If you have the following interests, and capabilities, we are interested in recruiting you to become an Air Force MARS member. Completion of the following on line training is mandatory:

Personally, Identifiable Information (PII) https://iatraining.disa.mil/eta/piiv2/launchPage.htm
Cyber Awareness https://iatraining.disa.mil/eta/disa_cac2018/launchPage.htm

If you have completed: Incident Command System (ICS) -100, 200, 700, and 800 training, and have obtained certification for Air Force MARS or are willing to obtain this training, again, Air Force MARS could be for you.

You must be interested in joining a group of individuals that are dedicated to amateur radio, emergency communications, and willingness to learn and used military communications procedures for voice and digital communications.

You must have equipment that will meet the minimum requirements for voice and digital operation. The equipment will be: transmitter, receiver, (transceiver) modified to operate out of amateur radio bands, computer, modem, and antenna's that are designed to operate on military assigned frequencies. (The best antenna's will be a dipole cut to the operational frequency. NVIS antennas work best. You will not need a linear amplifier, however if you have one that will operate on out of amateur radio bands that will be a plus)

You must go through and complete training. You are allowed up to 180 days to do so.

Air Force MARS operation's and procedures are based upon "MARS Operating Instruction", (MOI). The MOI manual uses as its basis for instruction a series of Allied Communications Publications (ACP's), Department of Defense Directives, Department of Defense Instructions, and Department of Defense Manual.

If you already belong to a MARS program and would like to consider Air Force MARS, please contact one of the recruiting team members.

For even more information please open and read the attachment.

Our recruitment team is as follows:
AFA5XK Dave, WB7DRU wb7dru@gmail.com
AFA5ZV Randy, KRØB afa5zv@gmail.com
AFA5JY Reg, KAØRJY reg_cass@msn.com

Eye to the Sky, Continued from Page 1

At the end of the **MetEd Skywarn Spotter course**, learners should be able to:

- Describe the role of the SKYWARN Spotter
- Identify examples of proper safety while spotting during specific spotting scenarios
- Identify reportable events and criteria for reporting
- List the seven required pieces of information to communicate when making a spotter report
- Demonstrate how to make clear and succinct spotter reports

Identify from a photo or video important visual features to report

AccuWeather meteorologist Meghan Mussoline wrote an excellent article entitled ***Survival Guide: Recognize Which Clouds Mean Danger.*** She says:

"During severe weather outbreaks, conditions can change rapidly and the weather can turn volatile quickly. It is crucial to follow severe weather and tornado-related watches and warnings during episodes of severe storms. Keeping a weather radio nearby, with extra batteries handy, is a must. If you are out on the open road, staying tuned to severe weather alerts and being able to read the clouds for severe weather can help save your life."

Here's a a breakdown of 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 often smooth funnel clouds.

Continued on page 21

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.

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.

Continued on page 22

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.

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 mammutus 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.

Continued on page 23

Eye to the Sky, Continued from Page 22

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.

OK, all of us are starting to feel "cabin fever", so now is the time to get outside! Sit on your porch or walk around in your yard or on a trail. Look at clouds and identify them as you walk, whether they're storm clouds or not!

As you walk, go to University Corporation for Atmospheric Research's **UCAR Center for Science Education** website on your phone at **https://scied.ucar.edu/learning-zone/clouds/cloud-types** for great photos and descriptions of "everyday clouds".

Take photos of clouds as you walk & send your favorite one to **ke0nqs.mn@gmail.com.** We'll select a few to show off in next month's ***Relay.*** "See" you then! ★

Enter the EASTER EGG PHOTO CONTEST for a chance to WIN $25!

Contest Sponsored by KEØNQS & KEØNQT

1. Snap a photo of your single decorated Easter egg & email it along with the artist's name (& call sign if applicable) to ke0nqs.mn@gmail.com by Friday April 17th.
2. All photos will be numbered as they are received and will be uploaded without names to the ARAC web site in a special April Relay "Extra" Newsletter publication
3. Voting will open at 12 Noon on April 18 and close at 6 pm on April 19.
4. ONE Winner will be announced on Sunday, April 19, 2020 during ES Net at 9 pm. In the event of a tie, the tying entries will be resubmitted to ARAC for a second blind vote as announced.
5.Vote via text at 218-491-4724 and text the number of the entry you want to vote for OR email us at ke0nqs.mn@gmail.com to vote for ONE entry. No early or late voting.
6.One vote per person ONLY; must be an ARAC member to vote.
7. One Easter egg photo entry per person; open to all ages
8. Photo entries must be from ARAC members or their immediate family. Immediate family is defined as your spouse, your children, your grandchildren or your parents.