



The RELAY)))

NOVEMBER
2019

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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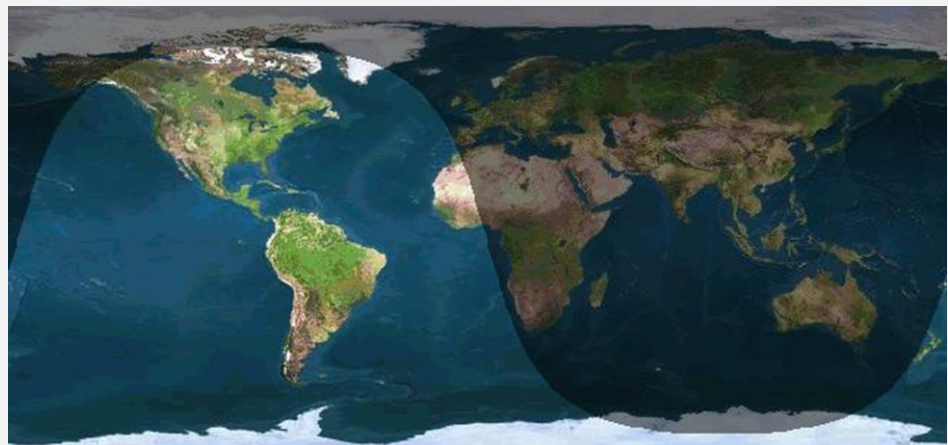
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DXing the Gray Line

For many Hams, DXing is an exciting part of the hobby. DXing is the receiving and identifying distant **radio** or television signals, or making two-way **radio** contact with distant stations. "DX" is telegraphic shorthand for "distance" or "distant".

One intriguing aspect of DXing is "working the gray line". The "gray line" is a band around the Earth that separates daylight from darkness. Propagation along the gray line is very efficient. One major reason for this is that the D layer, which absorbs HF signals, disappears rapidly on the sunset side of the gray line, and it has not yet built upon the sunrise side. Ham radio operators and shortwave listeners can optimize long distance communications to various areas of the world by monitoring this band as it moves around the globe.

"Working the gray" line is simply working 15m or 10m during twilight hours. This means you need a dynamic map of the gray line of earth, which can be found online. DX.QSL.NET, a site dedicated to amateur radio DXing, has a gray line map at <https://dx.qsl.net/propagation/greylines.html>



Snapshot of DX.QSL.NET's dynamic gray line map, early November, 2019. This site updates the map every 5 minutes.



Join us on
facebook!

Co-Editors:

Kim & Steve Waller

Kim - KEØNQS • Steve - KEØNQT

KEØNQS.mn@gmail.com
KEØNQT@gmail.com

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ARAC Board Meeting Minutes - October 1, 2019

PRESIDENT



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

VICE PRESIDENT



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

SECRETARY



NØCALL
Robin Davis

218-391-3Ø77
davisfam2858@yahoo.com

TREASURER



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

3RD YEAR BOARD

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

2ND YEAR BOARD



AAØAC
Dave Davis

218-348-6649
aaØac@outlook.com

1ST YEAR BOARD

KDØYLN
Robert Boyd
5054 Boulder Dr
Hermantown, MN 55811

Present: Gene Ellefsen-NØVRM, Mike Lovold-NØPDG, Bruce Carlson-KEØNIT, Dave Davis-AAØAC, Gary Minter-KD9ABS, Bob Boyd-KDØYLN, Doug Nelson-AAØAW, Kim Waller-KEØNQS, Steve Waller-KEØNQT

Guest: Dennis Anderson-WØDIO, Del Minter-KEØCLI

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

Minutes taken by Mike-NØPDG

Treasurer's Report:

Checking	1,581.87
Savings.....	1,372.37
Cash Subtotal	\$2,954.24

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

Winter CD	1,707.19
Summer CD.....	1,700.00
CD Subtotal	\$3,407.19

Grand Total.....	\$5,261.43
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Motion to approve as presented by Gary-KD9ABS, seconded by Bob-KDØLYN, motion passed

Special Events:

Fall Fest:

The Fall Fest was a success. No number as of yet but there were fourteen (14) tables sold and the turn-out was good

ARAC Club Birthday:

Discussion will be held at the October 10, 2019, Club meeting concerning ARAC's 90th Birthday on December 3, 2019. We need to decide what we want to do as a Club. Kim-KEØNQS stated she would order a cake to celebrate the Club's birthday

Christmas Potluck:

Discussion about past Christmas Parties in the past few years. Motion to spend up to \$500.00 on the food made by Mike-NØPDG, seconded by Bob-KDØLYN, motion to be brought forward to the Club meeting

Aerial Lift Bridge 90th Anniversary Event:

Event went well with over 300 contacts made. If you contacted NOB, please see Diane Saunders-KØDSL to receive your QSL card

Committee Reports:

Repeater:

The Repeater in Mahtowa should be installed this week. The Generator has an issue with auto starting. Gene-NØVRM stated he know somebody that can take a look at it. The Repeater Site is going to be winterized before freeze-up. There was a mention that a new air condition is needed before the summer heat starts up. There is still some debris that needs to be removed

Continued on Page 3

ARAC BOARD Meeting Minutes, Continued from Page 2

Education:

The Community Education Class has three (3) students attending. Class is on Tuesday nights, House of Refuge, starting at 7:00 pm. There are three (3) Hams studying for the General/Extra license

Newsletter:

Steve-KE0NQT and Kim-KE0NQS are looking for Club stories. Please contact them

Thomas J. Reibold Award:

Nominations are open for the W9IBM Award, honoring Father Thomas J. Reibold. This award honors an individual who has promoted the hobby of Ham Radio and specifically ARAC. If you are interested in nominating an individual, please see one of the Board members

Nominations:

Nominations for ARAC's Club Officers opened at the General Membership meeting, held October 10, 2019. If you are interested in serving as an officer of the Club or would like to nominate a member, please nominate them at the meeting or talk to an officer. Offices open include President, Vice President, Treasurer, Secretary, and First Year Board Member. Gary Minter-KD9ABS, who is the Third Year Board Member, will be leaving the Board and nominations will be opened for the First Year Board just as it has occurred for many years

Motion to adjourn at 7:15pm by Dave-AA0AC, seconded by Gary-KD9ABS, motion passed

The logo for 'Prez Sez...' is displayed in a stylized font. 'Prez' is in a light blue color, 'Sez' is in a green color, and the three dots are in a light blue color. The text is centered within a solid blue rectangular background.

Hi everyone,

I want to remind you that **nominations for Club Offices** closes with our November meeting. If you want to nominate someone or put your name in, you need to do so before Dave Davis closes the nominations at the November 14th meeting.

We are also looking for nominations for the **Thomas J. Reibold W9IBM award**. This is given out to someone who is putting out the effort to support and promote the Club and its activities. Again nominations for this award close in November, if you know someone you feel should get this award please write it down and pass it to one of the Board Members before or at the November meeting.

Coming up quick will be the December meeting which will be the annual Christmas Party, we ask you to pick a gift to be given out then!

Have a "HAPPY THANKSGIVING"!

Gene NØVRM 73!

ARAC Club Meeting Minutes

October 10, 2019

Present:

President Gene Ellefsen-N0VRM
Vice President Mike Lovold-N0PDG
Treasurer / Membership Bruce Carlson-KE0NIT
Secretary Robin Davis
Third Year Board Gary Minter-KD9ABS
Second Year Board Dave Davis-AA0AC
First Year Board Bob Boyd-KD0YLN
Chaplain (Visiting) Rolland Bockbrader-KB0CK
Special Events – Open / Gene Ellefsen-N0VRM acting
Ham Fest / Education Bob Schultz-KC0NFB
Property / Picnic Scott Ahlgren-N0VYU
Testing Doug Nelson-AA0AW

Absent:

Parliamentarian Grant Forsyth-KC0WUP
Newsletter / Historian Kim Waller-KE0NQS
Newsletter Steve Waller-KE0NQY
Repeater Randy Wabik-KR0B
Repeater Derek McCorison-W0DNF
Repeater Randy Haglin-N0BZZ
Web Site Thomas Dorr-KE0RHA

Meeting called to order at 7:00 pm by President Gene-N0VRM

Minutes:

Published in newsletter and on the web page. Motion to accept Bob-NC0NFB, seconded by Diane Saunders-K0DSL, motion passed

Treasurer's Report:

Checking	1,581.87
Savings	1,372.37
Cash Subtotal	\$2,954.24
Outstanding Check (Repeater # 1414)	-1,100.00
Subtotal	-\$1,100.00
Winter CD	1,707.19
Summer CD	1,700.00
CD Subtotal	\$3,407.19
Grand Total	\$5,261.43

Moved to approve Dave-AA0AC, seconded by Doug-AA0AW, motion passed

A moment of silence for Silent Key Mark Rude-AK0Z

Carol Christenson-KC0MAK's mother passed away - prayers and thoughts to her and her family

New Business:

Christmas Potluck:

Christmas party coming up in December, Board motion to spend up to \$500.00, seconded by Scott-N0VYU, motion passed. Christmas Potluck, December 12, 2019, starting at 6:00 pm

Thomas J Reibold Award:

We are looking for nominations for the Thomas J Reibold Award for this year. The award honors outstanding service to the Club and to the hobby of Ham Radio. Have someone you would like to see honored? Please give their name to a board member for consideration

Continued on Page 5

ARAC Club Meeting Minutes, Continued from Page 4

Election for Officers:

Nominations for Club Offices. Turning over the meeting to Second year Board Member – Dave Davis-AA0AC. Nominations are now open. Calling for nominations for the office:

President:

Gene-N0VRM

Vice President:

Mike-N0PDG

Secretary:

Robin

Treasurer:

Bruce-KE0NIT

First Year Board Member:

Gary-KD9ABS

Nominations will remain open until the November 14, 2019, Membership meeting

Committee Reports:

Fall Fest:

Good turnout at the Fall Fest, held again in Carlton. John Cavanaugh-KC0AFE reported that 75 tickets were sold and there were high quality vendors including Radio City retirement surplus. We made \$6.00 between the tickets and table rentals. We'll do it again next year as it was a lot of fun

For Sale:

Gary Grivna-K0GX has equipment for sale – Dave-AA0AC has the list

Education:

Four (4) in Technician class held through Duluth Community Education. General and Extra study class going well, using the Gordon West books. Diane Saunders-K0DSL is facilitating the study groups. House of Refuge, Tuesdays, at 7:00 pm, through December

Testing:

Next scheduled test session is December 10, 2019, at House of Refuge, 5:30 pm registration, 6:00 testing, \$15.00 testing fee, which is a bargain

Ham Fest:

Nothing new to report

Repeater:

Randy Haglin-N0BZZ was there on Thursday, spending some time on Repeater and he'll go back next week

Program:

November program is Astro Bob. Interested in doing a program? Let Mike-N0PDG know as there will be openings next year for programs

Guests:

-Gordy Hanson-N0ZRD (MN Metro Ares) with a big thank you to ARAC because they used Mahtowa repeater for MS 150 Bike Tour again this year

-Ben Jackson-K0BHJ (MN Metro Ares)

Dave Johnson-N0KBD (MN Metro Ares)

Chris Schultz-KC0YFX (St Cloud)

Two (2) drawings tonight for door prizes:

\$5.00 cash won by Warren Blodgett-KD0XI

Book donated by Matt Holden won by Ed Murray –W1ELM

Program tonight is on Rock of Ages Lighthouse Preservation Society

Motion to adjourn by Bob-KC0NFB, seconded by inaudible, motion passed

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

Contest Calendar - November 2019

NCCC RTTY Sprint	0145Z-0215Z, Nov 1
+ NCCC Sprint	0230Z-0300Z, Nov 1
+ Silent Key Memorial Contest	0600Z-0859Z, Nov 1
+ Zombie Shuffle	1600-2400 local, Nov 1
	0600Z-1000Z, Nov 2 and
+ IPARC Contest, CW	1400Z-1800Z, Nov 2
+ Ukrainian DX Contest	1200Z, Nov 2 to 1200Z, Nov 3
+ SA Sprint Contest	2100Z-2259Z, Nov 2
+ ARRL Sweepstakes Contest, CW	2100Z, Nov 2 to 0300Z, Nov 4
	0600Z-1000Z, Nov 3 and
+ IPARC Contest, SSB	1400Z-1800Z, Nov 3
+ EANET Sprint	0800Z-1200Z, Nov 3
	0900Z-1100Z, Nov 3 and
+ High Speed Club CW Contest	1500Z-1700Z, Nov 3
+ RSGB FT4 Contest Series	2000Z-2129Z, Nov 4
+ ARS Spartan Sprint	0200Z-0400Z, Nov 5
+ QRP Fox Hunt	0200Z-0330Z, Nov 6
+ Phone Fray	0230Z-0300Z, Nov 6
	1300Z-1400Z, Nov 6 and
	1900Z-2000Z, Nov 6 and
+ CWops Mini-CWT Test	0300Z-0400Z, Nov 7
+ UKEICC 80m Contest	2000Z-2100Z, Nov 6
	1800Z-1900Z, Nov 7 (CW) and
	1900Z-2000Z, Nov 7 (SSB) and
	2000Z-2100Z, Nov 7 (FM) and
	2100Z-2200Z, Nov 7 (Dig)
+ NRAU 10m Activity Contest	2000Z-2200Z, Nov 7
+ SKCC Sprint Europe	0145Z-0215Z, Nov 8
+ NCCC RTTY Sprint	0200Z-0330Z, Nov 8
+ QRP Fox Hunt	0230Z-0300Z, Nov 8
+ NCCC Sprint	0000Z, Nov 9 to 2359Z, Nov 11
+ PODXS 070 Club Triple Play Low Band Sprint	0000Z, Nov 9 to 2359Z, Nov 10
+ WAE DX Contest, RTTY	0001Z, Nov 9 to 2359Z, Nov 10
+ 10-10 Int. Fall Contest, Digital	0700Z, Nov 9 to 1300Z, Nov 10
+ JIDX Phone Contest	1000Z, Nov 9 to 1000Z, Nov 10
+ SARL VHF/UHF Analogue Contest	1200Z, Nov 9 to 1200Z, Nov 10
+ OK/OM DX Contest, CW	1200Z, Nov 9 to 2400Z, Nov 10
+ SKCC Weekend Sprintathon	1900Z-2300Z, Nov 9 (CW/Digital) and
	0100Z-0500Z, Nov 10 (Phone) and
	1900Z-2300Z, Nov 10 (Phone) and
	0100Z-0500Z, Nov 11 (CW/Digital)
+ CQ-WE Contest	2300Z, Nov 9 to 2300Z, Nov 10 and
	2300Z, Nov 16 to 2300Z, Nov 17
+ AWA Bruce Kelley 1929 QSO Party	0000Z-0400Z, Nov 10
+ North American SSB Sprint Contest	

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Contest Calendar - November 2019, Continued

+ 4 States QRP Group Second Sunday Sprint	0100Z-0300Z, Nov 11
+ RSGB 80m Autumn Series, Data	2000Z-2130Z, Nov 11
+ QRP Fox Hunt	0200Z-0330Z, Nov 13
+ Phone Fray	0230Z-0300Z, Nov 13
	1300Z-1400Z, Nov 13 and
	1900Z-2000Z, Nov 13 and
	0300Z-0400Z, Nov 14
+ CWops Mini-CWT Test	0145Z-0215Z, Nov 15
+ NCCC RTTY Sprint	0200Z-0330Z, Nov 15
+ QRP Fox Hunt	0230Z-0300Z, Nov 15
+ NCCC Sprint	1600Z-2200Z, Nov 15
+ YO International PSK31 Contest	0000Z, Nov 16 to 2359Z, Nov 17
+ ARRL EME Contest	1000Z, Nov 16 to 1000Z, Nov 17
+ SARL Field Day Contest	1200Z, Nov 16 to 1200Z, Nov 17
+ LZ DX Contest	1600Z-2359Z, Nov 16
+ All Austrian 160-Meter Contest	1700Z, Nov 16 to 0100Z, Nov 17
+ REF 160-Meter Contest	1900Z-2059Z, Nov 16
+ Feld Hell Sprint	1900Z-2300Z, Nov 16
+ RSGB 1.8 MHz Contest	2100Z, Nov 16 to 0300Z, Nov 18
+ ARRL Sweepstakes Contest, SSB	1300-1500Z, Nov 17 (40m) and
	1500-1700Z, Nov 17 (80m)
+ Homebrew and Oldtime Equipment Party	0200Z-0400Z, Nov 18
+ Run for the Bacon QRP Contest	0200Z-0330Z, Nov 20
+ QRP Fox Hunt	0230Z-0300Z, Nov 20
+ Phone Fray	1300Z-1400Z, Nov 20 and
	1900Z-2000Z, Nov 20 and
	0300Z-0400Z, Nov 21
+ CWops Mini-CWT Test	2000Z-2130Z, Nov 20
+ RSGB 80m Autumn Series, SSB	0130Z-0330Z, Nov 21
+ NAQCC CW Sprint	0145Z-0215Z, Nov 22
+ NCCC RTTY Sprint	0200Z-0330Z, Nov 22
+ QRP Fox Hunt	0230Z-0300Z, Nov 22
+ NCCC Sprint	0000Z, Nov 23 to 2400Z, Nov 24
+ CQ Worldwide DX Contest, CW	1300Z-1400Z, Nov 25 and
	1900Z-2000Z, Nov 25 and
	0300Z-0400Z, Nov 26
+ QCX Challenge	0000Z-0200Z, Nov 27
+ SKCC Sprint	0230Z-0300Z, Nov 27
+ Phone Fray	1300Z-1400Z, Nov 27 and
	1900Z-2000Z, Nov 27 and
	0300Z-0400Z, Nov 28
+ CWops Mini-CWT Test	2000Z-2100Z, Nov 27
+ UKEICC 80m Contest	2000Z-2130Z, Nov 28
+ RSGB 80m Autumn Series, CW	0145Z-0215Z, Nov 29
+ NCCC RTTY Sprint	0230Z-0300Z, Nov 29
+ NCCC Sprint	1200Z, Nov 30 to 1159Z, Dec 1
+ Russian WW MultiMode Contest	

CW Abbreviations

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

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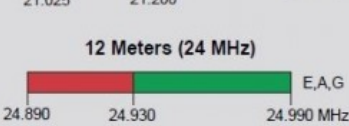
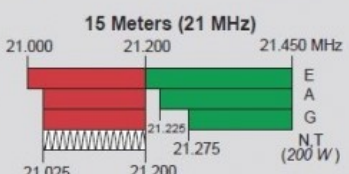
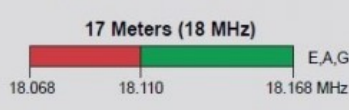
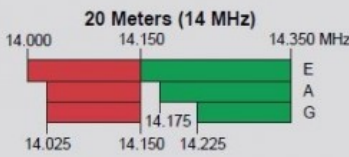
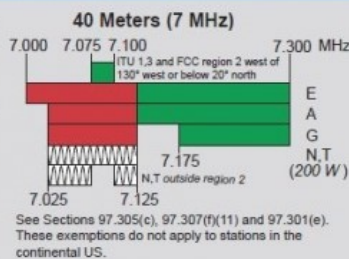
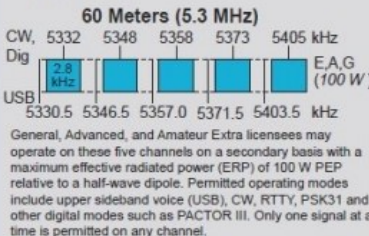
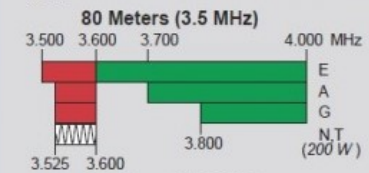
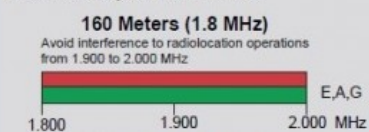
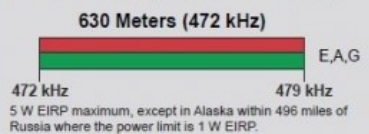
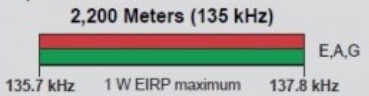


US Amateur Radio Bands

US AMATEUR POWER LIMITS

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

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



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



ARRL The national association for AMATEUR RADIO®

KEY

Note: CW operation is permitted throughout all amateur bands.

MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz. Test transmissions are authorized above 51 MHz, except for 219-220 MHz

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

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

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

ARRL We're At Your Service

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email: nowham@arrl.org

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

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

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Nets... Nets... Nets... Nets... Nets... Nets... Nets... Nets...

Have a favorite HF/6m/2m/1.25m/70cm net that you check into or listen in on? Also, please send corrections and we will add it to the list below - Kim KEØNQS at my email KEØNQSmn@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/glmmnet/>
- MIDCARS: 07:30-13:00 - 7.258 MHz. See: <http://www.midcars.net>
- Iowa snowbird net on 14.257MHz, M-W-F at 10:00 am Local Time. This is an open net.
- Spider Web Net (Marco Island FL) on 14.347 every morning at 0730 CST/CDT: <http://www.spiderwebnet.net>
- Maritime Mobile Service Network: Daily at 1100—2100 Central on 14.300. <http://mmsn.org> and <http://www.14300.net>
- RV Radio Network: Every day at 1900 Central on 7.265 MHz. Web site: <http://www.rvradionetwork.com>
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- Wisconsin Sideband Net: Daily @ 5:15 PM – 3985 [or 3982.5] KHz LSB
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- Hobby Helpers Net - Tuesday @ 8 PM – 28.330 MHz USB (Isanti MN) LSB [Net Manager: WOØA].
- Northstar Trader Net: 3.908 +/- at 0830 CST Sundays
- WARFA: 3.908 +/- Sun/Tue/Thu nights at 2200 CST, <http://warfa.org/>
- Youth Net: 14.320-14330 Sundays 1800-1900 UTC, Net Control: AC8PI
- YACHT: Saturdays 1900 CST on EchoLink #481872, <http://yachthams.webstarts.com>
- Northwestern Ontario ARES Net: Evenings at 20:15 (Central) on +/- 3.750Mhz
- The Iron Range Net: Saturdays at 0800 Central time on or near 3.919 Mhz. Look them up on Facebook!
- FORX Net: Mondays at 1900 Central at 3.941 Mhz +/- QRM. WAØJXT — Grand Forks, North Dakota
- HF CW: Fridays 08:00 CST, 7.112 MHz. Informal slow speed CW Net. W8IRT NCS. Email: w8irt@aol.com
- 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

Wanted!

Looking to buy a non-working Icom 706 for parts. Email me: anordin@aol.com

Please email your for sales or wanted items to Kim, KE0NQS, at KE0NQS.mn@gmail.com

KC0NFB 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.

Amateur Radio License Testing

- Dec 10
House of Refuge
115 West Myrtle, Duluth, MN
5:30 pm registration, 6:00 testing, \$15.00 testing fee, which is a bargain
Questions? Contact Bob KC0NFB at kc0nfb@charter.net

General & Expert License Study Group

- With Diane Saunders K0DSL
- Tuesdays 7pm—9 pm
House of Refuge

2019 HOLIDAYS

November 11 *Veteran's Day*
November 28 *Thanksgiving*
December 25 *Christmas Day*

CLUB REPEATER
W0GKP
146.94 (-)
CTCSS TONE
103.5

Next ARAC Board Meeting

Tuesday, Nov. 5, 2019
@ 6:30 p.m.
Sammy's West Duluth

Next ARAC Club Meeting

Thursday, November 14, 2019
7 p.m.
Copper Top Church

November 14th

Club Meeting Program

"Astro Bob" - Bob King

About Astro Bob

- Retired after 39 years as a photographer and photo editor at the Duluth News Tribune. Freelances for the Duluth News Tribune and also writes a weekly astronomy article in the newspaper's Sunday feature section
- Amateur astronomer and keen on the sky since age 11.
- Membership in the American Association of Variable Star Observers (AAVSO) where he's a regular contributor
- Member, International Meteorite Collectors Assn. and Arrowhead Astronomical Society.
- Bi-monthly radio show on KUMD called Astro Bob's Backyard Astronomy, every other Tuesday morning at 8:20am
- Teaches community education astronomy classes at our local planetarium.
- Author of books: *Urban Legends from Space*, *Wonders of the Universe You Must See Before You Die* and *Night Sky with the Naked Eye* — available on Amazon, Barnes & Noble and Indiebound.

Interested in providing a program, or have an idea for one? Contact Mike N0PDG at lovoldm@gmail.com

Duluth Area Repeaters



ARAC System WØGKP

Freq.	Offset	Tone	Location
146.940	minus	103.5	Duluth
146.940	minus	107.2	Lakeside (rcv)
146.940	minus	151.4	Two Harbors (rcv)
146.940	minus	100.0	Gary-New Duluth (rcv)
146.940	minus	123.0	Solway (rcv)
146.940	minus	110.9	Cloquet (rcv)
147.000	minus	103.5	Mahtowa
444.100	plus	103.5	Duluth UHF Link

N9MMU/N9QWH System (WI)

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

WECOMM – WI Statewide Linked System WE9COM

147.075 plus 110.9 Meteor Hill (closest repeater to Duluth)

LSAC System #1

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

NARC System NAØRC

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

Stand Alone Repeaters

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

Fusion and D Star

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

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

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

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

147.375 plus NØEO D Star
442.2ØØ plus NØEO D Star

[Repeater list compiled by Dr. Frequency—KCØWDQ]

ST. Louis County Department of Emergency Services Net Control Roster

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

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

Ten Meter SSB Net Control Roster

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

Sunday Nights at 2ØØØ on 28.45Ø MHz USB

Ten Meter CW Net Control Roster

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

Sunday Nights at 193Ø on 28.125 MHz

Northland Weather Group Net Control Roster

KCØMKS Jeff Nast

Monday Nights at 2ØØØ on the ARAC System

Douglas County Net

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

Central Carlton County Net

Tuesday Nights at 2Ø3Ø on the ARAC System

Lake County RACES/ARES Net

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



Elmers



El-mer / el-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.

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

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Contact Kim or Steve Waller to include your name in this listing!

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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



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 LSAC & ARAC

NOVEMBER

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

CLUB EVENTS

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3 CW 1930 AA0AW USB 2000 N0VRM ES 2100 AA0AW	4 WX 2000 KC0MKS	5 ARAC BOARD MEETING 1900 Sammy's West Duluth DC Net 2000 CC Net 2030	6 2100 - BWAR	7	8	9
10 CW 1930 N0PDG USB 2000 N0PDG ES 2100 KC0WDQ	11 DC ARES/RACES Mtg 1900 DC EOC WX 2000 KC0MKS	12 DC Net 2000 CC Net 2030	13 Lake County ARES/RACES Meeting 1800 Lake County Net 1900 2100 - BWAR	14 ARAC Club Meeting with Astro Bob Coppertop Church 7 pm	15	16
17 CW 1930 AA0AW USB 2000 AA0AW ES 2100 W0NWO	18 WX 2000 KC0MKS	19 DC Net 2000 CC Net 2030	20 St. Louis County ARES/RACES Mtg 1630 Pike Lake EOC 2100 - BWAR	21	22	23
24 CW 1930 N0PDG USB 2000 W0LWU ES 2100 N0VRM	25 WX 2000 KC0MKS	26 DC Net 2000 CC Net 2030	27 Lake County Net 1900 2100 - BWAR	28 Carlton County ARES/RACES Meeting 1900 CC EOC	29	30 Club Breakfast @ The Chalet 0730-0800

Get this newsletter *faster*
via email!

Email Doug AAØAW at
aa0aw@chartermi.net

Next Meeting: Thursday,
Nov. 14, 2019 - 7 pm
Coppertop Church

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

CONGRATULATIONS

To new hams who have joined our community in the last few weeks, as well as those who have newly upgraded — to General or Extra:

Dave Schreyer WAØAWZ - New Club Member!

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

DXing the Gray Line, Continued from Page 1

Paul Harden NA5N from the National Radio Astronomy Observatory in Socorro, New Mexico posted an interesting in-depth explanation for those new to the subject. Here it is:

“During the day, solar radiation collides with the molecules in our ionosphere, ripping off electrons. These electrons are called "free electrons" because they are not attached to an atom or molecule. All of these free electrons cause the density of the ionosphere to increase. The more dense the ionosphere, the higher the frequency that is reflected back to earth. Our electron density is what determines the maximum usable frequency (MUF), and the action of solar radiation separating electrons from the molecules is called *ionization*.

“In the daytime, solar radiation causes ionization to stratify, that is, to form distinct layers. The layer closest to the earth is called the D-Layer. It does not reflect signals generally, but does absorb some of the energy, and hence the D-Layer is often called the "absorption layer." Higher up in our ionosphere, we find the E- and F-Layers. These layers *do* reflect the signals back to earth if they are below the MUF, and is exactly what causes "skip propagation." So during the day, the sun is ionizing the D, E and F layers (there are actually two F layers, called F1 and F2). Your 10m signal must travel through the D-Layer, getting attenuated, then bounces back from the E or F layer to some exotic DX spot, passing through the D-Layer for more absorption again. But since solar radiation has to travel the farthest to get the D-Layer, absorption is usually fairly minimal. So far, during the middle of the day, we have moderate absorption, and good skip propagation.

Gray/Terminator line

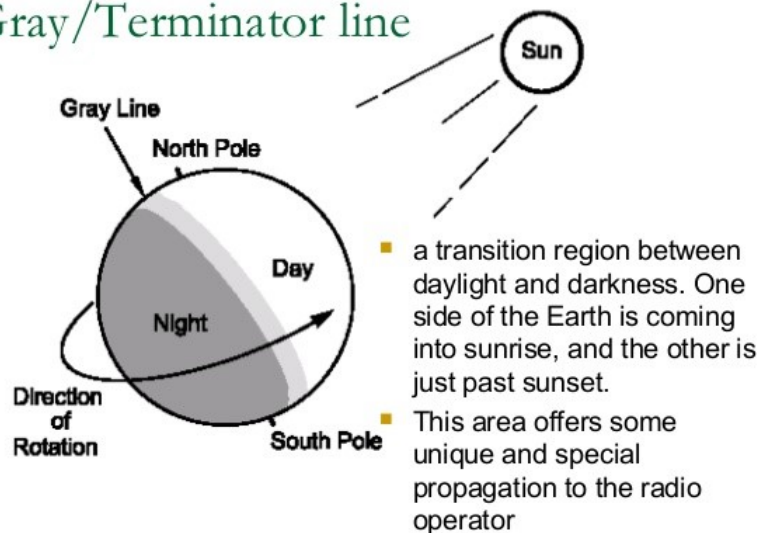


Image Courtesy VE6TN in "Working DX!"

“AT SUNDOWN ... solar radiation no longer strikes our ionosphere right above our heads, and ionization stops. This means there is no solar radiation to form free electrons. In fact, without this solar radiation, these free electrons tend to get attracted back to recombine with their host molecules. This is called "recombination" (gee, how original!). Recombination, when it starts to get dark, causes the electron density to go down, forcing the MUF to go down as well, which is why by total darkness, 10m (and a bit later 15m) are completely dead. The MUF is far below 28 MHz.

“The D-Layer is the *first* layer where ionization stops, since the sunlight no longer reaches near the surface of the earth, but is still illuminating (and ionizing) the ionosphere far above our heads. (For the same reason, we can see satellites pass overhead in the early evening ... it's dark on the ground, but the satellites are still being illuminated.) As the D-Layer goes into recombination, the electron density goes down, and the absorption does down. This is why signals appear stronger at night, because there is less absorption by the D-Layer at night.

Continued on page 17

DXing the Gray Line, Continued from Page 16

“BUT DURING TWILIGHT ... OR IN THE "GRAY LINE" ... the D-Layer suddenly causes little absorption to signals passing through it, while the E and F layers are still being ionized by sunlight. This makes for about 45-60 minutes of interesting operating, *especially for QRPers* (low power operators). There is almost no signal attenuation, but the MUF is still very high, so long-distance skip is still possible. However, when the sun quits illuminating the E and F layers, the MUF can drop dramatically ... sometimes with only a few minutes of warning, sometimes between heartbeats. So when you establish a contact, get the QSL info fast!

“One other advantage of gray-line DX is that your signals tend to reflect off the edge of the ionized portion of the upper layers. This means propagation will often be in a southerly direction, bouncing along the shadow, or terminator, between sunlight and darkness. This is good for working into South America and the South Pacific. Your signals can also bounce northward along the terminator, bending around the pole, and down the *morning terminator* across eastern Europe, the Middle East, and into Africa (depending on the time of year). So gray-line DX also affords an opportunity to work portions of the world not usually accessible during the day, where propagation tends to be more east-west circuits.

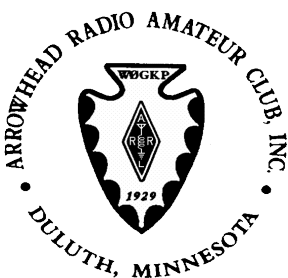
“The same principles apply at sunrise. The upper ionosphere begins to become ionized, while the D-Layer is still dark and offers low absorption, although, the MUF in the morning generally does not support propagation on 10m, so most people enjoy gray-line work on 20m or 15m (if open). Morning gray line can even be eventful on 80m and 40m, due to the low absorption before the sun starts heating the D-Layer.

“And remember, 10m and 15m (and often down to 30m) are *not* generally bothered by a geomagnetic storm. So even during major geomagnetic storms, the higher bands may be open and fairly quiet. And even if a bit noisy, the short period of gray-line operating can still produce a couple of good QSO's. Hope this helps to explain the "gray line" phenomenon, and hope it helps you snag a few new ones.”

Thanks, to Paul Harden NA5N for sharing his expertise on the subject!

Do you have a story to share about DXing or another favorite aspect of the hobby? Submit an article or an idea for an upcoming newsletter topic by emailing us at KE0NQS.mn@gmail.com We'd love to hear from you! ★

The ARAC RELAY



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

