



The RELAY)))

SEPTEMBER
2021

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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Observing Jupiter by Radio

Editors' Note: A version of this article appeared in our newsletter several years ago, courtesy the Thrush Observatory. We thought it interesting to re-visit this, especially for those hams newer to the hobby. Though old equipment is mentioned at times, it's still a fun project that is adaptable for today.

If you have been an amateur radio operator or shortwave listener for some time, you probably have already heard it; an unmistakable rush of soft static that sounds amazingly like waves crashing on a seashore. You may not have known however, that this "interference" was not of earthly origin, rather it originated at least 500,000,000 miles away from us with the planet Jupiter.

Jupiter is the largest and closest to the sun of the "gas giant" planets in our solar system. Like the sun, Jupiter is composed primarily of hydrogen. If Jupiter had been several magnitudes larger during its formation, the core of the planet would have been under sufficient pressure to induce nuclear fusion and our solar system would have had two stars instead of one. As it is, the hydrogen gas within the deeper reaches of the planet (there is no solid surface) is compressed into a "metallic" state where electrons become freely shared by the proton nuclei.

Above this inner region lies an "atmosphere" of hydrogen and other gases. Clouds of methane, ammonia, ammonium, hydrosulfide, and water form complex stormy bands which encircle the planet. The Great Red Spot is the most famous feature of Jupiter. It is actually a long duration storm, which because of its tremendous size, has a life expectancy of hundreds of years. From our vantage point, even through a 2" telescope, we see Jupiter as a banded sphere flanked by many tiny but bright moons. The innermost moon, Io, is of interest to us as radio observers of the planet. Early observations of Jupiter at the microwave wavelength of 3 cm corresponded to a blackbody (broadband thermal



Jupiter, the largest planet in the Solar System with 79 known moons, is the third-brightest object in the night sky.

Photo Courtesy Thrush Observatory

Continued on Page 16



Last Days of
SUMMER
2021



Join us on
facebook!

Co-Editors:

Kim & Steve Waller

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ARAC Board Meeting - August 3, 2021

PRESIDENT



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

VICE PRESIDENT



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Mike Lovold
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Downtown Arnold, MN
558Ø3
lovoldm@gmail.com

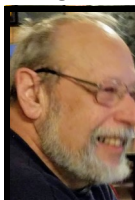
SECRETARY



NØCALL
Robin Davis

218-391-3Ø77
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TREASURER



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

AAØME
Randy Johnson

randy@nsw4x4.com

2ND YEAR BOARD



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

1ST YEAR BOARD

AAØAC
Dave Davis

218-348-6649
aaØac@outlook.com

Present:

Board Members

Gene Ellingsen-NØVRM, Mike Lovold-NØPDG, Robin Davis, Bruce Carlson-KNØNUL, Gary Minter-KD9ABS

Board Advisors (Non-Board Members)

Doug Nelson-AAØAW, Grant Forsyth-KCØWUP

Meeting called to order at 6:33 pm by President Gene-NØVRM

Minutes:

Posted on web site and in the newsletter. Any questions? Move to approve by Gary-KD9ABS, seconded by Mike-NØPDG, motion passed

Treasurer's Report:

Checking 2,789.68
Savings 2,174.01
Subtotal Cash \$4,963.69

Winter CD 1,724.37
Summer CD 0.00
Subtotal CD \$1,724.37

Assets Subtotal: \$6,688.06

Outstanding Checks:
Mahtowa Repeater -1,100.00
Bob Boyd-KDØLYN Memorial -1,190.00
Reserved Funds -\$2,290.00

Grand Total \$4,398.06

We are in good shape. Expenses are increasing due to picnic costs, food for meetings. Questions? Hearing none, motion to accept by Mike-NØPDG, seconded by Gary-KD9ABS, motion passed

Picnic:

Was a success. Raffle Tickets - 128 tickets sold \$256.00 back into the kitty . Not a lot of new Ham Radio Operators at the picnic. We need to work on getting more people to attend

Continued on Page 3

ARAC Board Meeting - August 3, 2021

events, check into nets, etc.

New Business:

Effective after the next election, Mike-N0PDG will not be running for the office of Vice President. He wanted to nominate Repeater David Pyrlík-K0DJP for Vice President. Six (6) years is long enough for him to be Vice President and he thinks we need young blood getting involved in the Club. Thank you to Mike-N0PDG, as he is one (1) of the best program coordinators ever. He thinks change is good and he is ready for somebody else to step into the role

Club Promotion:

Talking with Kim Waller-KE0NQS, she is trying to get a promotional video for ARAC. She talked to Dennis Anderson-W0DIO and he is willing to narrate the video. Kim-KE0NQS is looking for additional history on ARAC. Plans are to use it to promote our Club both in and out of the Ham Community

Programs:

Program suggestion on how to check into the nets

Testing:

Possible test session early October

QSL Card:

Randy Solem-KF0PUG, QSL card sent to the Club

Ham Fest:

Brainerd Tail Gate Ham Fest, August 14, 2021 at 9:00 am. Free admission held at Crow Wing County Fairgrounds. Several Hams from their Club attended our Ham Fest and a few from our Club are attending this Ham Fest

Grant-KC0WUP arrived at 7:02 pm

Motion to adjourn by Mike-N0PDG, seconded by Gary-KD9ABS, motion passed at 7:07 pm





ARAC Club Meeting

August 12, 2021

Present:

President Gene Ellefsen-N0VRM
Vice President Mike Lovold-N0PDG
Treasurer / Membership Bruce Carlson-KN0NUL
Secretary Robin Davis
Special Events – Open / Gene Ellefsen-N0VRM acting
Ham Fest / Education Bob Schultz-KC0NFB
Property / Picnic Scott Ahlgren-N0VYU
Repeater David Pырlik-K0DJP
Testing Doug Nelson-AA0AW
Web Site Thomas Dorr-KE0RHA

Absent:

First Year Board Dave Davis-AA0AC
Second Year Board Gary Minter-KD9ABS
Third Year Board Randy Johnson-AA0ME
Parliamentarian Grant Forsyth-KC0WUP
Chaplain (Visiting) Rolland Bockbrader-KB0CK
Newsletter / Historian Kim Waller-KE0NQS
Newsletter Steve Waller-KE0NQT
Repeater Randy Wabik-KR0B
Repeater Derek McCorison-W0DNF
Repeater Randy Haglin-N0BZZ
Web Site Thomas Dorr-KE0RHA

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

Reminder to put your name on a ticket for the attendance drawing at the end of the meeting

New or Upgraded Hams Operators:

General Aaron Johnson-KE0OPK
Technician Mara Ohrt-KF0FLG
Technician Jordan Chopskie-KF0EDQ
Technician Tom Maida-KF0ALP
Congratulations on passing your test and welcome to the ARAC Club

Minutes:

Minutes posted in newsletter and on the web site. Motion to accept by Bob-KC0NFB, seconded by Mike-N0PDG, motion passed

Treasurer's Report:

Checking	2,789.68
Savings.....	2,174.01
Subtotal Cash.....	\$4,963.69
Winter CD.....	1,724.37
Summer CD.....	0.00
Subtotal CD.....	\$1,724.37
Assets Subtotal:	\$6,688.06

Continued on Page 5



ARAC Club Meeting, continued

Outstanding Checks:

Mahtowa Repeater	-1,100.00
Bob Boyd-KD0LYN Memorial.....	-1,190.00
Reserved Funds	-\$2,290.00

Grand Total \$4,398.06

Motion to accept the Treasurer's Report by Mark Soder-KI0DB, second by Jeff Nast-KC0MKS, motion passed

New Business:

Gene-N0VRM met with First United Methodist Church Coordinator and she relayed that masks are going to be required for in-house meetings. Next month, we will be required to wear masks at our monthly meeting

Letter from Mike Lovold-N0PDG announcing his retirement from the office of Vice President, effective the Election in December. In that letter, he nominated David-K0DJP for the office of Vice President. David-K0DJP, who was present, accepted that nomination

Elections:

All Board positions will be open, President, Vice President, Treasurer, Secretary, 1st Board Member, with an Election to be held in December

Participation from members is what makes the Ham Club work. We need to encourage new Hams to become members of ARAC, new blood, new ideas, new members

Gene-N0VRM is working on a Grant Application to Enbridge for funds for the Repeater Projects

Repeaters:

Mahtowa Repeater – Randy Wabik-KR0B tried to get there yesterday but it may not have happened. He was called to the fire at WWJC, which is part of the Radio Stations he works for. Further discussion on the Mahtowa Repeater, the controller is out of date and not working. The radio is working, which was donated by Randy Haglin-N0BZZ. Actively pursuing replacing or updating the Mahtowa Repeater, which is Randy-N0BZZ's hands. More information to follow

Motion by Bruce-KN0NUL, seconded by Mike-N0PDG, motion passed





Prez Sez ...

Hi everyone,

It was nice to have a good turnout for the Club picnic on August 1. The food was good and the weather was great; couldn't ask for anything better. **A big thank you for all those that pitched in to help with the picnic!!**

Coming up Saturday, September 25 is the Carlton Fallfest at the 4 Seasons Complex under the water tower in Carlton. Keep that date open. Hope to see a lot of you there.

Our Vice President **Mike Lovold NØPDG** has informed us he will not be running for reelection next year. There is someone who has put his hat in the ring for Mike's position. **Thanks Mike for all the help you have given us!!!!**

With that being said, nominations for Board positions will be taken in October and November, so if you would like to serve in any of the positions let one of the current Board members know to get on the ballot.

73's,

Gene Ellefsen NØVRM

P.S. We'd love to have NEW HAMS join our Board, so seriously consider it! This is a great way to learn more about ham radio and the Club. Meetings consist of monthly Board meetings at Sammy's Pizza besides our Club meetings at the Coppertop, so contact a Board Member to nominate yourself!

ARAC New or Upgraded Hams

General: Aaron Johnson-KE0OPK
Technician: Mara Ohrt-KF0FLG
Technician: Jordan Chopskie-KF0EDQ
Technician: Tom Maida-KF0ALP

**Congratulations on passing your test and
welcome to the ARAC Club!**



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 antennas 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.

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

CW Abbreviations

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



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

US AMATEUR POWER LIMITS

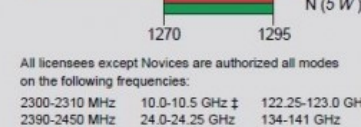
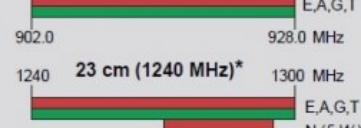
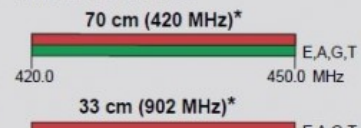
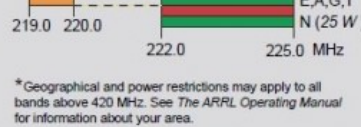
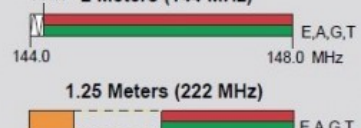
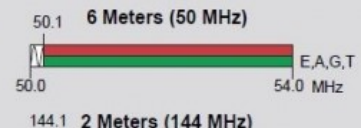
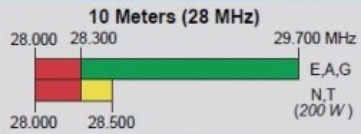
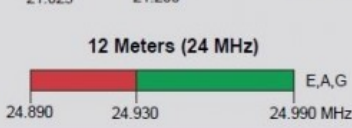
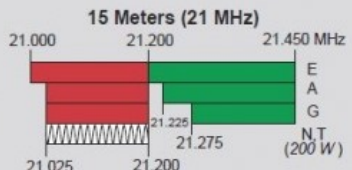
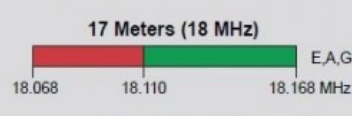
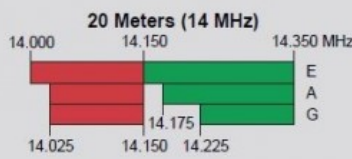
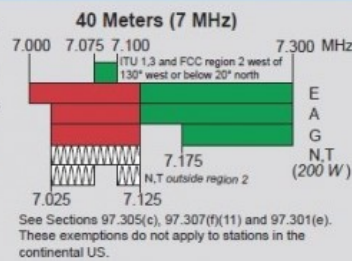
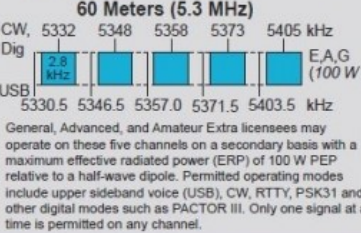
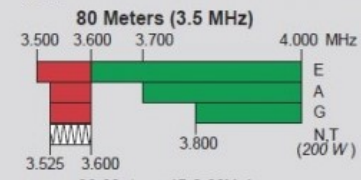
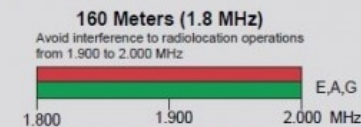
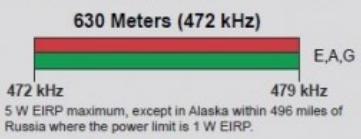
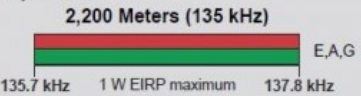
FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

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



The national association for
ARRL AMATEUR RADIO

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



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.

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Toll-Free 1-800-326-3942 (860-594-0355)
email: nowham@arrl.org

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

NETS

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

- **Northland Weather Group Net:** Mondays 2000 on the ARAC repeater (146.940 MHz with a tone of 103.5 and standard offset).
- **Minnesota D-Star Net:** Sundays at 19:30 on Reflector 53A
- **Minnesota Section Net** 1200 and 1730 on 3.860 [Net Manager: NØYR] http://www.mn-section.org/dept_stm.html
- 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.rvradionet.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



Next ARAC Board Meeting

Tuesday, September 7, 2021
@ 6:30 p.m.
Sammy's Pizza

Next ARAC Club Meeting

Thursday,
September 9, 2021
7 p.m.
Coppertop Church!

PLEASE WEAR A MASK,
as requested by our hosts at the
Coppertop Church!

September 9th Program (via Zoom)

"Astro Bob" King
*Host of Astro Bob's
Backyard Astronomy
on KUMD*

Listen to Astro Bob's audio files at
<https://www.kumd.org/astro-bobs-backyard-astronomy>

*Zoom meeting details will be
posted on Facebook*

*Interested in providing a program,
or have an idea for one?*

Contact Mike NØPDG at
lovoldm@gmail.com

FALLFEST 2021

Saturday, September 25th
9 a.m. - 1:00 p.m.

Four Seasons Arena
90 Chestnut Avenue
Carlton, MN

(directly under the water tower)

Admission only \$3!
(12 & Under FREE)

Refreshments will be available for sale

RADIOS, ELECTRONIC EQUIPMENT,
SUPPLIES, AND EMERGENCY
RESPONSE GEAR

**DOOR PRIZES &
\$100 GRAND
PRIZE!**

8' Table Rentals JUST \$3!
Contact KC0NFB at

kc0nfb@charter.net
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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
443.200	+5.00	114.8	Tamarack
147.360	plus	203.5	Aitkin
146.865	minus	146.2	Giese
147.570	simplex	146.2	Hinckley
444.575	+5.00	146.2	Hinckley
443.325	+5.00	146.2	Isanti

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 (Analog only) Fusion Room 40494			
147.375	plus		NØEO D Star
442.2ØØ	plus		NØEO D Star

Repeater list compiled by Dr. Frequency—KCØWDQ

ST. Louis County Department of Emergency Services Net Control Roster

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

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

Ten Meter SSB Net Control Roster

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

Sunday Nights at 2ØØØ on 28.45Ø MHz USB

Ten Meter CW Net Control Roster

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

Sunday Nights at 193Ø on 28.125 MHz

Northland Weather Group Net Control Roster

KCØMKS Jeff Nast

Monday Nights at 2ØØØ on the ARAC System

Douglas County Net

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

Central Carlton County Net

Tuesday Nights at 2Ø3Ø on the ARAC System

Lake County RACES/ARES Net

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

Elmers

El-mer / el-mær/ [el-mer]

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

<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,



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

SEPTEMBER

CLUB EVENTS

TUESDAY NIGHT NETS
 2000 - Douglas Cty 145.490 MHz
 2030 - Central Carlton County
WEDNESDAY NIGHT NETS
 1900 - Lake County - LSAC1
 2nd & 4th Wednesdays
 2100 - BWAR

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5 CW 1930 AA0AW USB 2000 N0VRM ES 2100 AA0ME	6 HAPPY LABOR DAY! WX 2000 KC0MKS	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 Net 1900 2100 - BWAR	 9 ARAC Club Meeting Coppertop! 7 pm	10	11
12 CW 1930 N0PDG USB 2000 N0PDG ES 2100 N9DMG	13 DC ARES/ RACES Mtg 1900 DC EOC WX 2000 KC0MKS	14 DC Net 2000 CC Net 2030	15 St. Louis County ARES/ RACES Mtg 1630 Pike Lake EOC 2100 - BWAR	16	17	18
19 CW 1930 AA0AW USB 2000 AA0AW ES 2100 AA0AW	20 WX 2000 KC0MKS	21 DC Net 2000 CC Net 2030	22 Lake County Net 1900 2100 - BWAR	23 Carlton County ARES/RACES Meeting 1900 CC EOC	24	25 FALLFEST Four Seasons Arena CARLTON 9 a.m. - 4 p.m.
26 CW 1930 N0PDG USB 2000 W0LWU ES 2100 KC0WDQ	27 WX 2000 KC0MKS	28 DC Net 2000 CC Net 2030	29 2100 - BWAR	30		

Get this newsletter *faster*
via email!
Email Doug AAØAW at
aa0aw@arrl.net

Next Meeting: Thursday,
September 9, 2021 - 7 pm
at the Coppertop Church!

ARAC Committee Chairs



Club License Trustee:

Ray Barnes KEØZN

Control Operators:

AAØAW - NØKXT - KCØNFB

Newsletter/Historian:

Kim KEØNQS & Steve KEØNQT
Waller

Education Chair:

Bob Schulz KCØNFB

Hamfest Chair:

Bob Schulz KCØNFB

Chaplains:

Visiting Chaplain:

Denny Anderson WØDIO

Parliamentarian:

Grant Forsyth KCØWUP

Website:

Thomas Dorr KEØRHA

Membership:

Bruce Carlson KEØNIT

Property Chair:

Wulf Gar WU1FGR

Testing:

Doug Nelson AAØAW

Field Day:

Dennis Anderson WØDIO

Picnic Chair:

Scott Ahlgren, NØVYU

Repeater Chairs:

Randy Haglin NØBZZ
Randy Wabik KAØJZV

Contest Calendar at www.contestcalendar.com

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.

FOR SALE



**For Sale:
Four sections Rohn 25G tower,
plus one top section.**

**Included are mast and home-
brew gin pole. \$500.**

**Located in Warba, can be deliv-
ered to Duluth area for \$50.**

**Contact Jeff Bodin, WA0VOM
at jdbodin@gmail.com**

Denny Burt KB0SPA has a close friend—Lynn Johnson KB9PFF of Siren, WI—who became a Silent Key. KB9PFF's radio equipment is now located in Barnum at the house of KB0SPA. Denny has difficulty hearing phone calls, so those interested in the following items, please send texts to KB0SPA at **218-341-4033**

1. Lafayette swr signal strength meter. 30.00
2. Radio shack htx 242, 2 meter mobile 50.00
3. Icom 2000 2 meter mobile.65.00
4. Icom 2100 2 meter mobile 65.00
5. Kenwood ts-480 hf 200 watt radio 550.00
6. Palomar dx-100 hf mobile amp 3-30 MHz 50.00
7. mirage 35 watt 2 meter mobile amp FM only 30.00
8. Mfj 259 antenna analyzer 150.00
9. Uniden bc60lt handheld scanner 20.00
10. Kenwood HT-22at 60.00
11. Mfj RF line insulator 25.00
12. 2 tv antenna rotors 40.00 each
13. 2 vintage regency crystal scanners 10.00 each
14. Homemade 80 meter antenna 30.00
15. 1/4 inch guy wire 80 feet. 20.00
16. Stud finder 3.00
17. Straight line Lazer tape 5.00
18. 2 realistic speakers 5.00
19. Homemade 2 meter beam 5.00
20. Yaesu hf 757 gx Radio 200.00

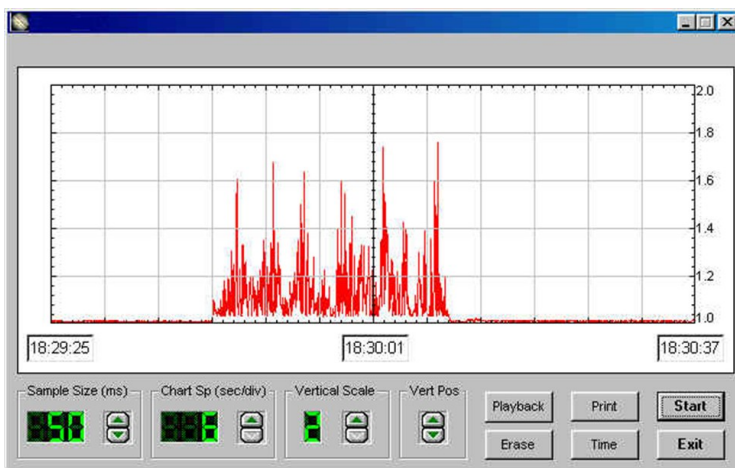
List Your **FOR SALE** items in the next ARAC Relay! Submit photos and descriptions to ke0nqs.mn@gmail.com

Jupiter, Continued from Page 1

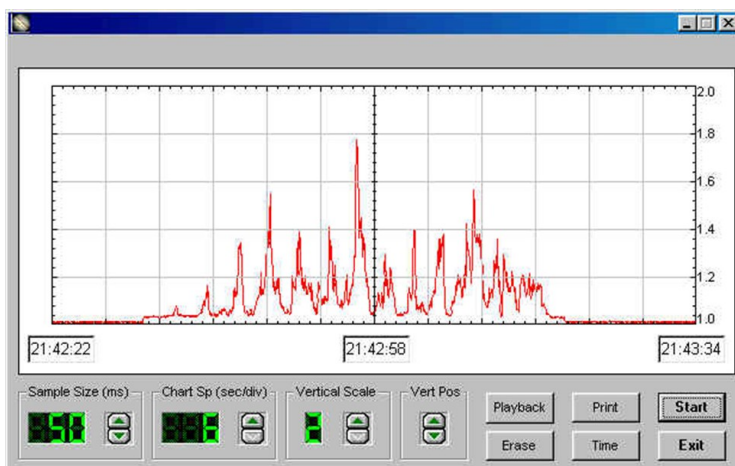
emission) of 150 Kelvin. Indeed, that is the approximate temperature of Jupiter's cloud tops. Subsequent observations at lower frequencies began to point to extraordinarily high energies which could not be explained as thermal in nature. These high energy emissions, which occur below 40.5 Mhz, are the result of a phenomena called synchrotron radiation. This type of radio emission occurs when charged particles, usually electrons, are accelerated to extremely high velocities in a magnetic field. The electrons thus accelerated shed excess energy in the form of radio and sometimes even light frequency waves. In Jupiter's case the magnetic field is provided by the planet itself. The noise storms occur when the inner moon, Io, passes through major flux lines of magnetic field in such a way that the emissions are essentially beamed in our direction.

The Voyager space probe missions revealed Io to be an extremely active satellite, with large volcanic plumes rising above the icy surface. It is possible that these volcanic eruptions play a role in the radio storm phenomena. In any case, the storms are predictable in nature based on rotation of the magnetic field, the position of Io in its orbit, and the relative position of the Earth. Any experimenter wishing to provide a useful service to other amateur Jupiter observers could develop a computer algorithm to predict these storms.

For casual observing, all that is necessary in the form of equipment is a shortwave receiver of good sensitivity capable of receiving in the 18 to 30 Mhz range. The 21 Mhz ham band is an excellent place to listen for Jupiter. Some older shortwave receivers fall off in sensitivity at about this frequency. In such a case, a pre selective amplifier may be included between the antenna and the receiver.



SBurst Radio Noise from Jupiter
Images Courtesy Thrush Observatory



These preamps are available commercially or may be constructed from plans available in amateur radio web sites.

The antenna need not be anything special; a simple dipole will do. In fact, directional antennas may be a hindrance if they cannot be tracked as Jupiter changes position in the sky. A somewhat better antenna system would include two dipoles, switchable from the operating position. one dipole would oriented north-south and the other east-west. Suspending the dipoles approximately 1/4 wave above a wire poultry netting ground plane may help in reception when Jupiter is near the zenith. If a directional antenna such as a 3 or 4 element yagi is used, then it may be helpful to tilt the antenna upward, perhaps 30 degrees or so, to achieve a compromise in reception when Jupiter lies at higher elevations. Lowering the antenna to a few feet above ground can also increase the angle of reception.

Consult an astronomy site such as skyandtelescope.com or astronomy.com to determine when Jupiter is in view (remember, it need not be a night time observation). Several ephemeris programs are available

Continued on Page 17

for a variety of computer formats. Many of these programs are public domain software. These programs provide sky coordinates (right ascension and declination), as well as the altitude and elevation of the planets for any time, date, or location.

Other factors which must be considered are the placement of Jupiter and the Earth in their orbits around the sun and the reflectivity of the ionosphere. The orbital placement may bear somewhat on the strength of the received signal, but perhaps not to the exclusion of hearing the storms. The earth's ionospheric conditions are on the other hand very important. If the frequency at which you are listening seems alive with terrestrial signals from distant points on the globe, then there will be little chance of hearing Jupiter as the ionosphere is so reflective that it will prevent the penetration of signals from space. In this case you can try listening on frequencies closer to 30 Mhz where the ionosphere may still be transparent. If this fails, then you are probably out of luck for the present. When you finally catch Jupiter, and you will if you are persistent, there are two types "noise" to listen for; the ocean wave type described earlier, which is called an L burst (L for long), and a short burst type static called an S burst. The S bursts often have a "rapid fire" characteristic and tend to drift upward in frequency. You can record these events on audio recorder or on a strip chart recorder.

Radio Equipment Needed to Monitor the Decametric Synchrotron Emissions

Jovian (another name for things relating to Jupiter) Receiving System

The equipment required to receive Jovian originated electromagnetic storms is quite reasonable to assemble:

ANTENNA

Dipole Antenna

The antenna required to observe Jupiter may be as simple as a half wave dipole antenna. The gain from this antenna will be quite low there for requiring a RF preamp to be used. A half wave dipole antenna can be constructed with a two pieces of wire, 11 feet, 8.4 inches in length connected to a 50 ohm coax cable. One length of wire is connected to the inner conductor, and the second piece of wire is connected to the coax shield. The antenna is laid out on a East-West line. The antenna should be raised above the ground by poles or some other means to a height of at least seven feet.

DDRR Antenna

The Directional Discontinuity Ring Radiator (DDRR) antenna is a good compromise between the 1/2 wave dipole and a large beam antenna. DDRR is a loop antenna made from soft aluminum or copper tubing, 1/2 inch in diameter and is cut to 125.5 inches (21MHz). A reflector made of metallic window screen and mounted on a wood, metal or PVC tube frame which is placed 5 inches behind the loop antenna. The loop is supported by a minimum of 4 insulating wood or PVC stand-offs attached to the reflectors frame. The coax cable inner conductor is connected to the antenna element and the outer conductor is connected to the wire screen reflector. A good pre-amp should be located very close to the loop antenna element. The antenna assembly is then located on a East/West line and will be used in a drift scan mode.

Preamp

If the receiver and/or the antenna system lack the necessary sensitivity to detect Jovian noise then an antenna pre-amp will be required. Radio Shack offers a 10 db gain pre-amp which can be located at the antenna. They also offer a tuned pre-amp which can be placed next to the receiver. The external pre-amp is preferred. Several other manufactures produce pre-amps in the range of 18 to 23 MHz. Ham radio sites offer various pre-amp choices as well online resellers.

Continued on Page 18

Jupiter, Continued from Page 17

Receiver

Any good quality communications receiver capable of receiving in the 18 MHz to 23 MHz range will work. The receiver's selectivity is very important in reducing the effect of nearby radio emissions. The frequencies that the Jovian noise is detected on is also used by many services. Since there is no protected frequency for the reception of Jovian radio emissions, care must be taken in finding a clear channel at your location.

Note: If at all possible the receiver should have the ability to shut off the AGC. This may reduce the sensitivity of the receiver, however it will increase the ability of the receiver to detect the slight signal changes emanating from a Jovian storm.

Receiver Modifications

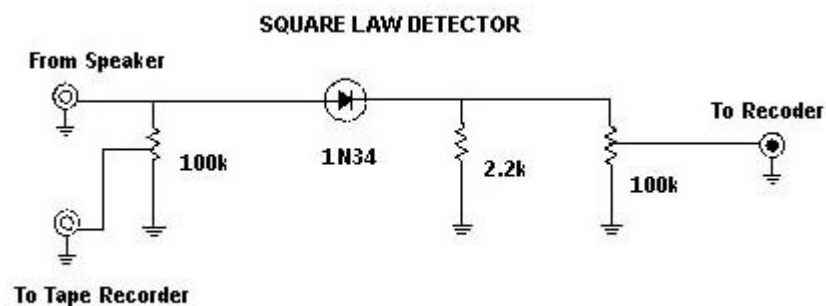
Modifying the receiver to defeat the AGC will aid in the detection of Jovian storms. The AGC tries to keep the volume constant by biasing the RF or IF amplifiers in such a way as to hold the audio output at a constant level.

Audio Recorder

An audio recorder capable of turning on from a signal level increase (voice actuated) or can be controlled by the communications receiver is necessary to verify the received noise is from Jupiter. An excellent way to monitor Jovian noise is with an old stereo cassette tape deck. The left channel is connected to the audio output of the SW receiver, while the right channel is connected to another receiver monitoring WWV or the Canadian time station. This setup will allow you to time stamp Jovian storms. The time stamp will allow the observer to accurately determine when a Jovian storm has occurred. Once the time is known then the Jovian predictive data can be utilized to determine the type of storm.

Square Law Detector

The Square Law Detector is an interface from the receiver to the recording device. A easy to build detector is shown below. Component placement is not critical. All resistors are 1/4 watt.



Recording Devices

Old Rustrak 288 Strip Recorder or equivalent computer program

The Rustrak 288 is no longer made, but still available on ebay or other used goods sellers

OK, here ends our throwback look at observing Jupiter. Have you observed space via radio? Tell us about your experiences at KE0NQS.mn@gmail.com & we'll share it in an upcoming Relay! ★

Contest Calendar - September 2021

Phone Weekly Test - Fray	0230Z-0300Z, Sep 1
+ CWops Mini-CWT Test	1300Z-1400Z, Sep 1
+ VHF-UHF FT8 Activity Contest	1700Z-2000Z, Sep 1
+ CWops Mini-CWT Test	1900Z-2000Z, Sep 1
+ UKEICC 80m Contest	2000Z-2100Z, Sep 1
+ G3ZQS Memorial Straight Key Contest	2300Z, Sep 1 to 2300Z, Sep 3
+ Walk for the Bacon QRP Contest	0000Z-0100Z, Sep 2 and
+ Walk for the Bacon QRP Contest	0200Z-0300Z, Sep 3
+ CWops Mini-CWT Test	0300Z-0400Z, Sep 2
+ CWops Mini-CWT Test	0700Z-0800Z, Sep 2
+ RTTYOPS Weeksprint	1700Z-1900Z, Sep 2
+ NRAU 10m Activity Contest	1700Z-1800Z, Sep 2 (CW) and
	1800Z-1900Z, Sep 2 (SSB) and
	1900Z-2000Z, Sep 2 (FM) and
+ NRAU 10m Activity Contest	2000Z-2100Z, Sep 2 (Dig)
	1900Z-2000Z, Sep 2
+ SKCC Sprint Europe	1900Z-2100Z, Sep 2
+ NCCC RTTY Sprint	0145Z-0215Z, Sep 3
+ NCCC Sprint Ladder	0230Z-0300Z, Sep 3
+ K1USN Slow Speed Test	2000Z-2100Z, Sep 3
+ CWops CW Open	0000Z-0359Z, Sep 4
+ Russian RTTY WW Contest	0000Z-2359Z, Sep 4
+ All Asian DX Contest, Phone	0000Z, Sep 4 to 2400Z, Sep 5
+ Wake-Up! QRP Sprint	0600Z-0629Z, Sep 4 and
+ Wake-Up! QRP Sprint	0630Z-0659Z, Sep 4 and
+ Wake-Up! QRP Sprint	0700Z-0729Z, Sep 4 and
+ Wake-Up! QRP Sprint	0730Z-0800Z, Sep 4
+ Portable Operations Challenge	0800Z-1159Z, Sep 4
+ CWops CW Open	1200Z-1559Z, Sep 4
+ AGCW Straight Key Party	1300Z-1600Z, Sep 4
+ Two-Meter Classic Sprint	1300Z-1330Z, Sep 4
+ IARU Region 1 Field Day, SSB	1300Z, Sep 4 to 1259Z, Sep 5

Continued on Page 20

Contest Calendar - September 2021, Continued

+ RSGB SSB Field Day	1300Z, Sep 4 to 1300Z, Sep 5
+ Colorado QSO Party	1300Z, Sep 4 to 0400Z, Sep 5
+ IARU Region 1 145 MHz Contest	1400Z, Sep 4 to 1400Z, Sep 5
+ Portable Operations Challenge	1600Z-1959Z, Sep 4
+ PODXS 070 Club Jay Hudak Memorial 80m	2000Z, Sep 4 to 2000Z, Sep 5
+ CWOps CW Open	2000Z-2359Z, Sep 4
+ Portable Operations Challenge	0000Z-0359Z, Sep 5
+ WAB 144 MHz QRO Phone	1000Z-1400Z, Sep 5
+ Tennessee QSO Party	1800Z, Sep 5 to 0300Z, Sep 6
+ K1USN Slow Speed Test	0000Z-0100Z, Sep 6
+ RSGB 80m Autumn Series, SSB	1900Z-2030Z, Sep 6
+ MI QRP Labor Day CW Sprint	2300Z, Sep 6 to 0300Z, Sep 7
+ ARS Spartan Sprint	0100Z-0300Z, Sep 7
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Sep 7
+ RTTYOPS Weeksprint	1700Z-1900Z, Sep 7
+ Phone Weekly Test - Fray	0230Z-0300Z, Sep 8
+ CWops Mini-CWT Test	1300Z-1400Z, Sep 8
+ VHF-UHF FT8 Activity Contest	1700Z-2000Z, Sep 8
+ CWops Mini-CWT Test	1900Z-2000Z, Sep 8
+ CWops Mini-CWT Test	0300Z-0400Z, Sep 9
+ CWops Mini-CWT Test	0700Z-0800Z, Sep 9
+ RTTYOPS Weeksprint	1700Z-1900Z, Sep 9
+ EACW Meeting	1900Z-2000Z, Sep 9
+ NCCC RTTY Sprint	0145Z-0215Z, Sep 10
+ NCCC Sprint Ladder	0230Z-0300Z, Sep 10
+ K1USN Slow Speed Test	2000Z-2100Z, Sep 10
+ FOC QSO Party	0000Z-2359Z, Sep 11
+ WAE DX Contest, SSB	0000Z, Sep 11 to 2359Z, Sep 12
+ SARL Field Day Contest	0800Z, Sep 11 to 0600Z, Sep 12

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Contest Calendar - September 2021, Continued

+ SKCC Weekend Sprintathon	1200Z, Sep 11 to 2400Z, Sep 12
+ Ohio State Parks on the Air	1400Z-2200Z, Sep 11
+ Alabama QSO Party	1500Z, Sep 11 to 0300Z, Sep 12
	1500Z-1859Z, Sep 11 and
	0600Z-0959Z, Sep 12
+ Russian Cup Digital Contest	1800Z, Sep 11 to 0300Z, Sep 13
+ ARRL September VHF Contest	0000Z-0400Z, Sep 12
+ North American Sprint, CW	0000Z-0200Z, Sep 13
+ 4 States QRP Group Second Sunday Sprint	0000Z-0100Z, Sep 13
+ K1USN Slow Speed Test	0100Z-0159Z, Sep 14
+ Worldwide Sideband Activity Contest	1700Z-1900Z, Sep 14
+ RTTYOPS Weeksprint	0230Z-0300Z, Sep 15
+ Phone Weekly Test - Fray	1300Z-1400Z, Sep 15
+ CWops Mini-CWT Test	1900Z-2000Z, Sep 15
+ CWops Mini-CWT Test	1900Z-2030Z, Sep 15
+ RSGB 80m Autumn Series, CW	0000Z-0100Z, Sep 16 and
	0200Z-0300Z, Sep 17
+ Walk for the Bacon QRP Contest	0030Z-0230Z, Sep 16
+ NAQCC CW Sprint	0300Z-0400Z, Sep 16
+ CWops Mini-CWT Test	0700Z-0800Z, Sep 16
+ CWops Mini-CWT Test	1700Z-1900Z, Sep 16
+ RTTYOPS Weeksprint	1830Z-1859Z, Sep 16
+ BCC QSO Party	1900Z-2000Z, Sep 16
+ EACW Meeting	0145Z-0215Z, Sep 17
+ NCCC RTTY Sprint	0230Z-0300Z, Sep 17
+ NCCC Sprint	2000Z-2100Z, Sep 17
+ K1USN Slow Speed Test	2100Z-2400Z, Sep 17
+ AGB NEMIGA Contest	

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Contest Calendar - September 2021, Continued

+ YB7-DX Contest	0900Z, Sep 11 to 1400Z, Sep 12
+ SKCC Weekend Sprintathon	1200Z, Sep 11 to 2400Z, Sep 12
+ Ohio State Parks on the Air	1400Z-2200Z, Sep 11
+ Alabama QSO Party	1500Z, Sep 11 to 0300Z, Sep 12
	1500Z-1859Z, Sep 11 and
	0600Z-0959Z, Sep 12
+ Russian Cup Digital Contest	1800Z, Sep 11 to 0300Z, Sep 13
+ ARRL September VHF Contest	0000Z-0400Z, Sep 12
+ North American Sprint, CW	0000Z-0200Z, Sep 13
+ 4 States QRP Group Second Sunday	0000Z-0100Z, Sep 13
+ K1USN Slow Speed Test	0100Z-0159Z, Sep 14
+ Worldwide Sideband Activity Contest	1700Z-1900Z, Sep 14
+ RTTYOPS Weeksprint	0230Z-0300Z, Sep 15
+ Phone Weekly Test - Fray	1300Z-1400Z, Sep 15
+ CWops Mini-CWT Test	1900Z-2000Z, Sep 15
+ CWops Mini-CWT Test	1900Z-2030Z, Sep 15
+ RSGB 80m Autumn Series, CW	0000Z-0100Z, Sep 16 and
	0200Z-0300Z, Sep 17
+ Walk for the Bacon QRP Contest	0030Z-0230Z, Sep 16
+ NAQCC CW Sprint	0300Z-0400Z, Sep 16
+ CWops Mini-CWT Test	0700Z-0800Z, Sep 16
+ CWops Mini-CWT Test	1700Z-1900Z, Sep 16
+ RTTYOPS Weeksprint	1830Z-1859Z, Sep 16
+ BCC QSO Party	1900Z-2000Z, Sep 16
+ EACW Meeting	0145Z-0215Z, Sep 17
+ NCCC RTTY Sprint	0230Z-0300Z, Sep 17
+ NCCC Sprint	2000Z-2100Z, Sep 17
+ K1USN Slow Speed Test	2100Z-2400Z, Sep 17
+ AGB NEMIGA Contest	

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Contest Calendar - September 2021, Continued

+ Collegiate QSO Party	0000Z, Sep 19 to 2359Z, Sep 20 0500Z-0700Z, Sep 18 (6m) and 0700Z-0900Z, Sep 18 (2m) and 0900Z-1100Z, Sep 18 (70cm) and 0500Z-0700Z, Sep 19 (6m) and 0700Z-0900Z, Sep 19 (2m) and 0900Z-1100Z, Sep 19 (70cm)
+ SARL VHF/UHF Digital Contest	0600 local, Sep 18 to 2400 local, Sep 19
+ ARRL 10 GHz and Up Contest	1200Z, Sep 18 to 1200Z, Sep 19
+ Scandinavian Activity Contest, CW	1400Z, Sep 18 to 0200Z, Sep 19
+ Iowa QSO Party	1400Z, Sep 18 to 0200Z, Sep 19 and 1400Z-2000Z, Sep 19
+ Texas QSO Party	1500Z-2100Z, Sep 18
+ QRP Afield	1600Z-2300Z, Sep 18
+ Wisconsin Parks on the Air	1600Z, Sep 18 to 0700Z, Sep 19 and 1600Z-2400Z, Sep 19
+ Washington State Salmon Run	1600Z, Sep 18 to 0359Z, Sep 19
+ New Jersey QSO Party	1600Z, Sep 18 to 0400Z, Sep 19 and 1600Z-2200Z, Sep 19
+ New Hampshire QSO Party	1800Z-1959Z, Sep 18
+ Feld Hell Sprint	0000Z-0400Z, Sep 19
+ North American Sprint, RTTY	1700Z-2059Z, Sep 19
+ BARTG Sprint PSK63 Contest	2300Z, Sep 19 to 0100Z, Sep 20
+ Run for the Bacon QRP Contest	0000Z-0100Z, Sep 20
+ K1USN Slow Speed Test	1900 local - 2300 local, Sep 20
+ 144 MHz Fall Sprint	0100Z-0159Z, Sep 21
+ Worldwide Sideband Activity Contest	1700Z-1900Z, Sep 21
+ RTTYOPS Weeksprint	0000Z-0200Z, Sep 22
+ SKCC Sprint	0230Z-0300Z, Sep 22
+ Phone Weekly Test - Fray	1300Z-1400Z, Sep 22
+ CWops Mini-CWT Test	1900Z-2000Z, Sep 22
+ CWops Mini-CWT Test	

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Contest Calendar - September 2021, Continued

+ CWops Mini-CWT Test	0300Z-0400Z, Sep 23
+ CWops Mini-CWT Test	0700Z-0800Z, Sep 23
+ RTTYOPS Weeksprint	1700Z-1900Z, Sep 23
+ EACW Meeting	1900Z-2000Z, Sep 23
+ RSGB 80m Autumn Series, Data	1900Z-2030Z, Sep 23
+ NCCC RTTY Sprint	0145Z-0215Z, Sep 24
+ NCCC Sprint	0230Z-0300Z, Sep 24
+ K1USN Slow Speed Test	2000Z-2100Z, Sep 24
+ CQ Worldwide DX Contest, RTTY	0000Z, Sep 25 to 2400Z, Sep 26
+ Maine QSO Party	1200Z, Sep 25 to 1200Z, Sep 26
+ Masonic Lodges on the Air	1400Z-2200Z, Sep 25
	1400Z-1700Z, Sep 25 (144) and
	1700Z-1800Z, Sep 25 (432)
+ AGCW VHF/UHF Contest	0700Z-1000Z, Sep 26
+ UBA ON Contest, 6m	0000Z-0100Z, Sep 27
+ K1USN Slow Speed Test	1300Z-1400Z, Sep 27
+ QCX Challenge	1900Z-2030Z, Sep 27
+ RSGB FT4 Contest Series	1900Z-2000Z, Sep 27
+ QCX Challenge	0100Z-0159Z, Sep 28
+ Worldwide Sideband Activity Contest	0300Z-0400Z, Sep 28
+ QCX Challenge	1700Z-1900Z, Sep 28
+ RTTYOPS Weeksprint	1900 local - 2300 local, Sep 28
+ 222 MHz Fall Sprint	0230Z-0300Z, Sep 29
+ Phone Weekly Test - Fray	1300Z-1400Z, Sep 29
+ CWops Mini-CWT Test	1900Z-2000Z, Sep 29
+ CWops Mini-CWT Test	2000Z-2100Z, Sep 29
+ UKEICC 80m Contest	0300Z-0400Z, Sep 30
+ CWops Mini-CWT Test	0700Z-0800Z, Sep 30
+ CWops Mini-CWT Test	1700Z-1900Z, Sep 30
+ RTTYOPS Weeksprint	1900Z-2000Z, Sep 30
+ EACW Meeting	

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.



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