



The RELAY)))

NOVEMBER
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

INDEX

Webb Space Telescope	1
Board Mtg Minutes	2
Club Mtg Minutes	4
Prez Sez	6
In Memoriam	6
MARS	7
CW Abbreviations	8
Band Plan	8
Nets	9
Upcoming Events	10
Repeaters	11
Members' Email	12
Calendar	13
Committee Chairs	14
FOR SALE	15
Contest Calendar	20-24

Co-Editors:

Kim & Steve Waller

Kim - KEØNQS Steve - KEØNQT

KEØNQS.mn@gmail.com
KEØNQT@gmail.com



Join us on
facebook!



AUTUMN 2021

The Webb Space Telescope: A New Era of Observation Dawns

Several years our club newsletter featured an in-depth article on the **James Webb Space Telescope (JWST)**, an exciting project jointly developed by **NASA**, the European Space Agency (ESA), and the Canadian Space Agency (CSA). This article will give another overview of the Webb Space Telescope and its mission, with important updates to its launch date and post-launch timelines.

The **NASA Goddard Space Flight Center** took the lead in the development mission, with **Northrup Grumman Aerospace Systems** as primary contractor. The **Space Telescope Science Institute (STScI)** will manage operations of the telescope following its launch.

Located in Baltimore, Maryland, STScI is operated by the Association of Universities for Research in Astronomy. "We help humanity explore the universe with advanced space telescopes and ever-growing data archives," they say. In fact, the STScI continues to administer the science operations centers for both the Hubble Space Telescope and the Nancy Grace Roman Space Telescope. Their expertise made them the clear choice for a new science operations *and* mission operations center for the James Webb Space Telescope.

How did the world's largest and most powerful new space telescope get its name? JWST was named for James E. Webb, **NASA Administrator** from 1961 to 1968. Webb played a key developmental role in the Apollo project.



THE JAMES WEBB SPACE TELESCOPE

▲ This stunning rendering is NASA's James Webb Space Telescope official poster. Image courtesy NASA

Continued on Page 16

ARAC Board Meeting - October 5, 2021

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



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

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 Ellefsen-NØVRM, Mike Lovold-NØPDG, Bruce Carlson-KNØNUL, Robin Davis, Gary Minter-KD9ABS, Dave Davis-AAØAC

Board Advisors (Non-Board Members)

Doug Nelson-AAØAW, Randy Wabik-KRØB, Grant Forsyth-KCØWUP

Guests Elmer Berg-KCØNGY, Del Minter-KEØCLI

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

Minutes:

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

Treasurer's Report:

Checking.....	3,195.54
Savings	2,174.01
Subtotal Cash.....	\$5,369.71
Winter CD	1,724.37
Summer CD	0.00
Subtotal CD	\$1,724.37
Assets Subtotal:	\$7,094.08
Outstanding Checks:	
Mahtowa Repeater	-1,100.00
Bob Boyd-KDØLYN Memorial	-1,190.00
Reserved Funds	-\$2,290.00
Grand Total.....	\$4,804.08

Gene-NØVRM paid for the Storage Unit, paid through November 2022. They no longer are giving the discount of paying for a year and getting one (1) month free

Motion to approve as presented by Gary-KD9ABS, seconded by Robin, motion passed

Grants:

Gene-NØVRM completed grant applications for funds and received a reply from Enbridge. They normally don't fund hobby clubs such as ARAC. After some discussion about the communications we provide, two (2) of the people on their board, they picked out the community service we do and they voted to give us a grant. Most organizations that provide grants are focused on children clubs or veterans groups, but we need to emphasize the communication we provide to the community. Some organizations will not consider ARAC and won't fund without the Club being a 501C3, so we are restricted. The grant will go through a third party before we will actually receive the funds.

We will track the money separately in our Accounting. Bruce-KNØNUL stated we would track how the funds will be spent to report to the organization that provided the grant. We keep our monies separately, no different for this dedicated money. We do borrow money out of our accounts for cash flow at the Ham Fest - take it out Friday and put it back on Monday.

Continued on Page 3

ARAC Board Meeting - October 5, 2021

A couple other applications are in – one (1) with the parent company for Husky. They use the same clearing company as Enbridge does for donations. Approximately a two (2) months process for the application process. Gene-N0VRM will talk to Shane Bauer; Executive Director of Grandma's Marathon to get a letter from Grandma's to add to the packet going to Halvor Truck Lines. Back up what we do for Grandma's Marathon

Repeater:

We have around \$2,000.00 in the funds for the repeater. How will we make Mahtowa work? The grant from Enbridge is for the 94 Repeater. The reason we are holding the money for Mahtowa is so it will talk to the Duluth Repeater. At this point, as far as the Club goes, Randy Haglin-N0BZZ should be approached with a dead line. No work is needed at Mahtowa as far as antennas. Why spend \$1,100.00, to just change it out? We have given him many opportunities to get the work completed and we should make one last appeal to get this done. We need an answer from him. Put the money into the 94 Repeater, our main site, before working on the other Repeaters. Get it working fine, the 94, the antenna is newer, the hard line is twenty (20) years old. Approach Randy-N0BZZ to determine does he want to do this or not. We will also need a tower climbing crew. Estimate is \$5,000.00 for the climbing crew. We might be able to piggy-back on work WDSE will be doing. If there is a crew on the tower already, \$1,100.00 might be enough to cover the work we need done. Gene-N0VRM talk to John Pantsar, Chief Engineer at WDSE, about any possible upcoming work. We have a 440 radio that could be used at Mahtowa, from the Spirit Valley Amateur Club. Then they could talk to each other. Gene-N0VRM will talk to Randy-N0BZZ

Gene-N0VRM will check into the process to become a 501C3. Doug-AA0AW warned to be careful with the wording on the application for the 501C3. Gene-N0VRM talked with Cheryl Meese-WA0PSB and she said her company's donations go mostly to organizations that work with children. Cheryl-WA0PSB did state that we, the ARAC, need to consider changing away from the 501C7. If we changed, it is possible we could have the change by next year. It is documented on the internet, type in 501C3, to locate the application process

What is the total amount we need to make this happen? Randy-KR0B's plan was a three (3) year plan, repeater, controller, and amplifier - 9,000.00 for the antenna part of the project

Randy-KR0B's suggestion is that we just shelve the Mahtowa project and reallocate the money into the cost to hire Randy-N0BZZ for climbing as part of the 94 Repeater revision. Randy-N0BZZ has climbed the tower for WDSE in the past, many times. Climbing probably won't happen until next year because of the weather. It won't hurt to ask John Pantsar, Chief Engineer at WDSE, as previously suggested. The FCC requires that you re-lamp towers every year. The climbing to change bulbs is becoming obsolete as most towers are going to LED lights

Any other business?

Nominations:

Nominations for officers will be handled by Gary-KN9ABS as the second year Board member. Randy-AA0ME is up for election this year as Third Year Board Member and he will not rerun as he is moving to Utah. Bruce-KN0NUL will be interested in continue as Treasurer for at least another year. He is also stating that this will be his last year as Treasurer. Five (5) years as a Treasurer is industry standard and the Treasurer should be changed to a different person. Nominations will open on Thursday at the General Membership meeting

Thomas J Reibold W91BM Memorial Award:

The Board members will be looking for nominations for the Thomas Reibold Award for 2021. The award is given to an ARAC member who provided dedicated service to the Club, in honor of a past member

Testing:

Looking for another place for testing as the church has been so busy in the evenings. Doug-AA0AW is looking at the Proctor Moose, using the building on Monday nights and Doug-AA0AW is a member at the Moose so it makes the ask easier

Wild Duluth Race:

Set up for Wild Duluth Race on Saturday, October 16, 2021? Yes, all the Communication spots are filled. Doug-AA0AW will be emailing the information to those working this race

Upcoming Events:

October 23, 2021, we will have a Wild Game Feed at the church (House of Refuge), the Road Kill Café, from 1:00 pm to 5:00 pm. Donations accepted, all funds received will be going to the church

Motion to adjourn by Mike-N0PDG, seconded by Gary-KD9ABS, motion passed at 7:13 pm



ARAC Club Meeting

October 14, 2021

Present:

President Gene Ellefsen-N0VRM
Vice President Mike Lovold-N0PDG
Treasurer / Membership Bruce Carlson-KN0NUL
Secretary Robin Davis
First Year Board Dave Davis-AA0AC
Second Year Board Gary Minter-KD9ABS
Third Year Board Randy Johnson-AA0ME
Special Events – Open / Gene Ellefsen-N0VRM acting
Ham Fest / Education Bob Schultz-KC0NFB
Repeater Randy Wabik-KR0B
Repeater David Pyrlík-K0DJP
Testing Doug Nelson-AA0AW

Absent:

Parliamentarian Grant Forsyth-KC0WUP
Chaplain (Visiting) Rolland Bockbrader-KB0CK
Property / Picnic Scott Ahlgren-N0VYU
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

New or Upgraded Hams Operators:

Technician Bob Loubeck
Technician Randy
Technician Paul Fleming

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 Dave-AA0AC, motion passed

Treasurer's Report:

Checking	3,195.54
Savings	2,174.01
Subtotal Cash.....	\$5,369.71
Winter CD	1,724.37
Summer CD	0.00
Subtotal CD	\$1,724.37
Assets Subtotal:	\$7,094.08
Outstanding Checks:	
Mahtowa Repeater	-1,100.00
Bob Boyd-KD0LYN Memorial.....	-1,190.00
Reserved Funds	-\$2,290.00
Grand Total	\$4,804.08

Motion to accept by Robin, seconded by Gary-KD9ABS, motion passed. Reminder that Bruce-KN0NUL is accepting dues money for the Club, including for 2022

Continued on Page 5



ARAC Club Meeting, continued

Nominations for Officers:

President, Vice President, Treasurer, Secretary and First Year Board Member are open for Election. Gary-KD9ABS will be opening the nominations and calling for each office.

President:

Nomination for Gene Ellefsen-N0VRM

Called three (3) times for nomination for the office of President

Vice President:

Mike-N0PDG will not be seeking re-election to the office

Nomination for David Pyrlík-K0DJP

Called three (3) times for the office of Vice President

Treasurer:

Bruce Carlson-KN0NUL

Called three (3) times for the office of Treasurer

Secretary:

Robin Davis

Called three (3) times for the office of Secretary

First Year Board Member:

Doug Nelson-AA0AW

Called three (3) time for the office of First Year Board Member

Nominations for each of the offices will stay open until the November General Membership meeting

Thomas J Reibold Award W9IBM Memorial Award:

Board members are seeking nominations for the Thomas. If you would like to suggest a nominee, please see Randy-AA0ME, Gary-KD9ABS or Dave-AA0AC, our current Board members

Fall Fest:

Thank you from John Cavanaugh-KC0AFE for your participation in making the Fall Fest successful again this year. They plan on doing it again next year, 2022. Everyone coming makes this a success and they appreciate it!

Bell Ringing:

Previously, ARAC has rung bells for the Salvation Army Red Kettle Campaign. It was not done last year because of the COVID restrictions. Is there any interest in returning to the tradition of bell ringing again this year? Several members indicated their interest so Gene-N0VRM will call the Salvation Army to set up a time for ARAC to ring bells

Repeater:

Discussion at the Board meeting brought forward concerning replacing the 94 Repeater. We have funds set aside in memory of Bob Boyd-KD0LYN for this project. Gene-N0VRM for ARAC has received notification that the Club will be receiving two (2) grants for this project. The first grant is from Enbridge, \$800.00, and the second grant is from Grandma's Marathon in the amount of \$1,500.00. This money will be used to upgrade the equipment such as the Repeater, the Controller, the Amp, etc. Randy-KR0B worked up an estimate several months ago to give us direction as to the costs involved with upgrading the 94. Part of the funds required will be the estimate of \$5,000.00 to hire a tower climber. Gene-N0VRM is continuing the process of applying for additional grants. As part of this process, Gene-N0VRM had a discussion with Cheryl Meese-WA0PSB concerning donations and applying for grants to ARAC. She strongly recommended we change the Club's designation from 501C7 (Registered MN Non-Profit) to 501C3, which will enable us to receive donations. After some investigation, Gene-N0VRM recommends we apply for the new designation, using Form 1023EZ, as we have a budget under \$50,000.00 as a Club. There is a onetime fee of \$275.00 for the application. Motion by Mike-N0PDG, seconded by Robin, to proceed with the application for a designation of 501C3, motion passed

Education:

The Class is going well, with six (6) people attending online

Testing:

Doug-AA0AW has not received any interest in testing for their license. He is also looking at other options to hold the testing as the House of Refuge Church has become so busy that it is no longer viable for testing

FCC Fees:

Question if anyone has heard of the FCC increasing the costs for obtaining, changing or maintaining a Ham Radio License. At this time, it is status quo, pricing is staying the same for 2022

Paul Fleming, new Ham Radio Operator, won the \$5.00 door prize

Motion to adjourn by Bob-KC0NFB, seconded by Jeff Nast-KC0MKS, motion passed at 7:27 pm

Prez Sez...

Hi everyone,

It is **ARAC** election time. Nominations accepted until the close of the November Club meeting. Positions open are President, Vice President, Treasurer, Secretary and First Year Board Member. If you would like to be active in the Club operations by taking one of these positions, let one of the current Board Members know!!

We are also seeking a nomination for the **Thomas J. Reibold W9IBM Memorial Award**. This award recognizes someone for their dedication and encouragement of the Amateur Radio hobby in the Twin Ports.

BELL RINGERS NEEDED !!!!!

At the last Club meeting it was decided to do the Bell Ringing for the **Salvation Army** this year. We are scheduled for **Friday December 3rd** from **12:00 PM to 8:00 PM** at the Miller Hill Super One. We do 2-hour shifts or whatever will work for you. I will take sign-ups, so let me know what time you would like. Thanks! My email: lspitech@mail.com

Gene Ellefsen NØVRM Have a great Thanksgiving !!!!



Carolyn Margaret Nelson

April 10, 1928 ~ October 10, 2021 (age 93)

Carolyn Margaret (Clarke) Nelson, 93, of Duluth, MN passed away October 10, 2021, at her home.

Carolyn was born in Duluth to Thomas J. "Jim" Clarke I and Dorothy M. (Smith) Clarke on April 10, 1928. She attended Denfeld High School graduating in 1946. She married Raymond H. Nelson in 1950 and settled in the Riverside community where she raised her family. She was first and foremost a mom, grandma and the best cook ever, as well as the neighborhood Avon Lady for many years.

Carolyn was preceded in death by her husband, Raymond; and sisters, Mary Lessor and Elizabeth Cerino.

Carolyn is survived by her children, Raymond L. Nelson of Las Vegas NV, Douglas (Cheryl) Nelson, Claudia (Randy) Johnson and Barbara (James) Holmes of Duluth, MN; grandchildren, Jon, Erin, Matthew, Nicole, Lindsay and James; great-grandchildren, Rochelle, Braydon, Skylar, Lukas, Natalie, Vienna, Sierra and Cheyenne; and brother, Thomas J. (Linda) Clarke II; and numerous nieces and nephews.

A private family gathering will be held at a date yet to be determined. The family wishes to extend their gratitude to Spirit Valley Assisted Living and their staff for their excellent care of Carolyn during the past 10 years.



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	■■■■■■■●
L	■■■■●●●	X	■■■■●●●	0	■■■■■■■



US Amateur Radio Bands

US AMATEUR POWER LIMITS

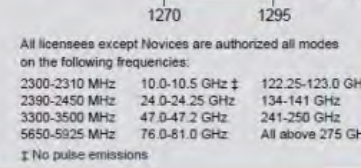
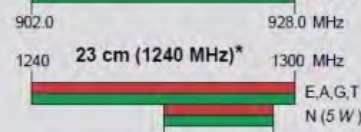
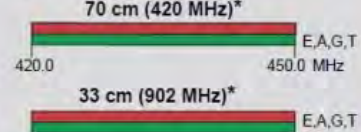
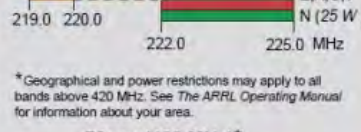
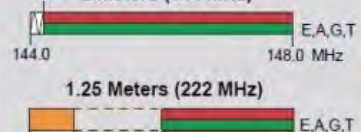
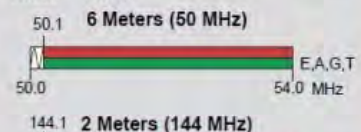
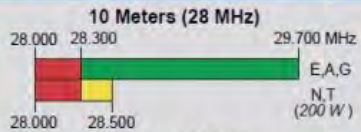
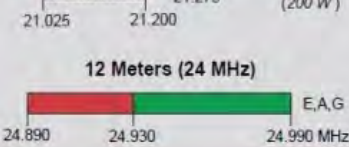
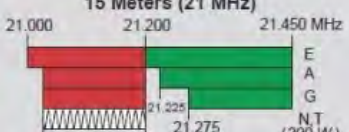
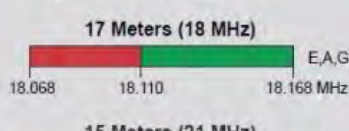
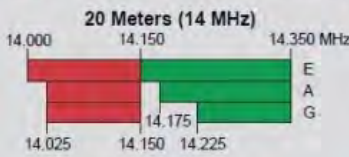
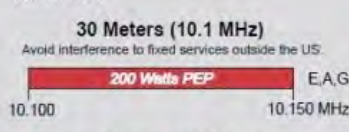
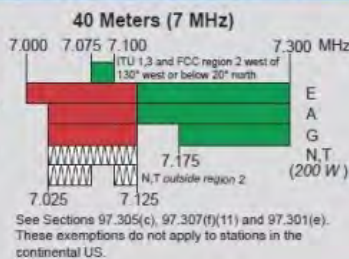
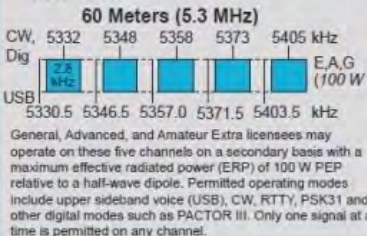
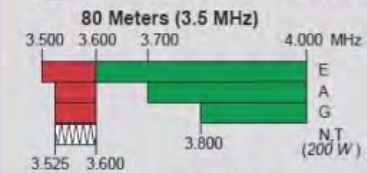
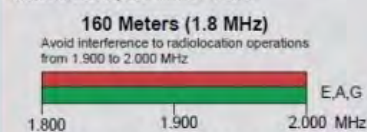
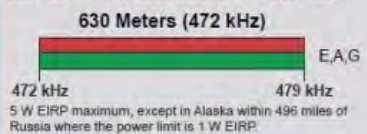
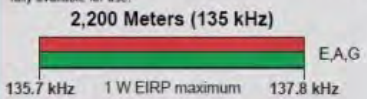
FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

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



ARRL The national association for AMATEUR RADIO®

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



KEY

Note: CW operation is permitted throughout all amateur bands.

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

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

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

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

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

ARRL
We're At Your Service

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

Publication Orders:
www.arrl.org/shop
Toll-Free 1-888-277-5289 (860-594-0355)
email: orders@arrl.org

Membership/Circulation Desk:
www.arrl.org/membership
Toll-Free 1-888-277-5289 (860-594-0336)
email: membership@arrl.org

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



Next ARAC Board Meeting

Tuesday, November 2, 2021
@ 6:30 p.m.
Sammy's Pizza

Next ARAC Club Meeting

Thursday, November 11th
7 p.m.
Coppertop Church!

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

November 11th Program
Salvation Army Bell Ringing
PLUS
Station WWV NIST
Physical Measurement Lab
Fort Collins, Colorado

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

Contact Mike NØPDG at

Amateur Radio License Testing Session!

Monday November 29, 2021
Registration 6:30 p.m.
Testing at 7 p.m.

Moose Lodge
415 3rd Ave. Proctor, MN

Questions? Please contact Doug Nelson
AA0AW at aa0aw@arrl.net Walk-ins always
welcome, with no prior reservation!



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...

Membership E-mail Directory

Ahlgren, Scott NØVYU
sahlgren01@msn.com

Anderson, Jim NØJWA
kcØmko@centurylink.net

Anway, Allen KC9LJN
allen@a2d2.com

Bakke, Richard KDØQHE
rabakke46@aol.com

Barnes, Ray KEØZN
KEØZN@outdrs.net

Blodgett, Warren KDØXI
kdØxi@aol.com

Blotti, Nick KBØMHD
NickBlotti@hotmail.com

Bockbrader, Jonah KEØCXD
j@pelirrojo.ninja

Bockbrader, Rollie KBØCK
Rollie.bockbrader@q.com

Clemens, Butch KBØSMG
kbØsmg@2z.net

Currier, Barb
bjcurrier@peoplepc.com

Dall, Jim WDØGVW

Dall, Teresa KAØCDO
wdØgvw@gmail.com

Dallavia, Paul KCØWDQ
kcØwdq@yahoo.com

Daly, Ed KØYMF
eddalymn@aol.com

Ellefsen, Gene NØVRM
lspitech@mail.com

Ferch, Tim AKØTF
akØtf@aol.com

Ferguson, Tom WBØDHB
tferg5@msn.com

Fleischman, Bill KCØZZL
wfleisch@d.umn.edu

Forsyth, Grant KCØWUP
forsythgrantc@gmail.com

Frederick, Jerry NØBNG
nØbng@mchsi.com

Frederick, Julie NØPIE
jfreds@mchsi.com

Gibbs, Rex NØKXT
nØkxt@yahoo.com

Godbout, Med WØEEZ
wØeezmedgodbout@centurytel.net

Hanson, Gary NUØW
captaingary@chartermi.net

Harstad, Ben KEØJDB
coast_guard_aux_duluth@yahoo.com

Hawkinson, Garry WØELH
garryhawkinson@yahoo.com

Hegrenes, Bruce KØOE
Hegrenes@charter.com

Jakubek, Patrick KDØSGK
kdØsgk@gmail.com

Johnson, Randy AAØME
randy@nsw4x4.com

Leslie, Shirl KBØSBM
dsleslie@centurytel.net

Maida, Tom KFØALP
tmaida@outlook.com

Makowski, Cletus KBØLBS
kbØlbs52@msn.com

Makowski, Karen NØWEZ
k-wez1@hotmail.com

Marchetti, Jim KEØLHX
KEØLHX@outlook.com

Mattson, Bing KCØKRA
, Kathy KCØTIV
HamToHam@msn.com

McCorison, Derek WØDNF
derek1Ø68@hotmail.com

Meese, Joe WØLWU
rxcpd@yahoo.com

Miller, Dave WØNWO
dmiller@nwoutlet.com

Mullozzi, Anthony (Nick)
KDØYQA
AJ KDØYPZ
Ben KDØYQB
Joe KDØYQC
amulloz@hotmail.com

Murray, Edwin W1ELM
w1elm@arrl.net

Nast, Jeffrey KCØMKS
kcØmks@gmail.com

Nelson, Doug AAØAW
aaØaw@chartermi.net

Nelson, Glen KAØGGG
mgnelsonØ1@gmail.com

Nelson, John KBØSUW
jon275@q.com

Nordin, Al WBØDBQ
anordin@aol.com

Olson, Lloyd Jr. KC9JTC
kc9jtc@yahoo.com

Pearson, Wayne WØKRH
meppsy@netzero.net

Pettit, Kathy KCØYVM
kcØyvm@gmail.com

Pomroy, Deb KCØUKC
dpomroy@d.umn.edu

Pyrlik, David KØDJP
David.pyrlik@gmail.com

Reger, Bernard KB9KQZ
Mike KB9KRA
Brian KB9KUX
Chris KB9WJQ
bjr5488@yahoo.com

Rosell, Dawson KEØHEL
rosel032@d.umn.edu

Saunders, Diane KØDSL
kØdslae@gmail.com

Scholz, Greg KDØUYN
kdØuyn@gmail.com

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

Schreyer, Dave WAØAWZ
wa0awz@gmail.com

Schulz, Robert KCØNFB
kcØnfb@charter.net

Snyder, Mark ACØLE
snyds1118@msn.com

Stark, John KCØYVH
johnvinyl@yahoo.com

Swanson, Scott N9DMG
sswanson6749@charter.net

Waller, Kim KEØNQS
keØnqs.mn@gmail.com

Waller, Steve KEØNQT
keØnqt@gmail.com

Whelan, Jacqui KBØJIM
cndymx@gmail.com

Whelan, John KØJRW
jr-whelan@hotmail.com

Winterscheidt, Heinz
KD6FSA
alter.skipper@gmail.com

Wulf Gar WU1FGR
wu1fgr.ham@gmail.com

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

NOVEMBER

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 ARAC BOARD MEETING Sammy's Pizza 6:30 pm DC Net 2000 CC Net 2030	3	4	5	6
7 CW 1930 NØPDG USB 2000 WØLWU ES 2100 AAØAW	8 DC ARES/ RACES Mtg 1900 DC EOC WX 2000 KCØMKS	9 DC Net 2000 CC Net 2030	10 Lake County ARES/RACES Meeting 1800 Lake County Net 1900 2100 - BWAR	11  HAPPY VETERANS DAY! ARAC Club Meeting Coppertop 7 pm	12	13
14 CW 1930 AAØAW USB 2000 K9KDK ES 2100 KCØWDQ	15 WX 2000 KCØMKS	16 DC Net 2000 CC Net 2030	17 St. Louis County ARES/ RACES Mtg 1630 Pike Lake EOC 2100 - BWAR	18	19	20
21 CW 1930 NØPDG USB 2000 ES 2100 WØNWO	22 WX 2000 KCØMKS	23 DC Net 2000 CC Net 2030	24 Lake County Net 1900 2100 - BWAR	25 Carlton County ARES/RACES Meeting 1900 CC EOC	26	27 ARAC Club Breakfast The Chalet 4833 Miller Trunk Hwy Hermantown, MN 8 am
28 CW 1930 AAØAW USB 2000 AAØAW ES 2100 NØVRM	29 WX 2000 KCØMKS	30 DC Net 2000 CC Net 2030		29		

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

Next Meeting: Thursday,
November 11, 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

Webb Space Telescope, Continued from Page 1

During those early Apollo space program years, James Webb (b.1906– d.1992), is credited for establishing scientific research as a core **NASA** activity. As a result of this research and development focus, funding to the program was increased and **NASA** grew to become a world leader in advancing our exploration and understanding of space.

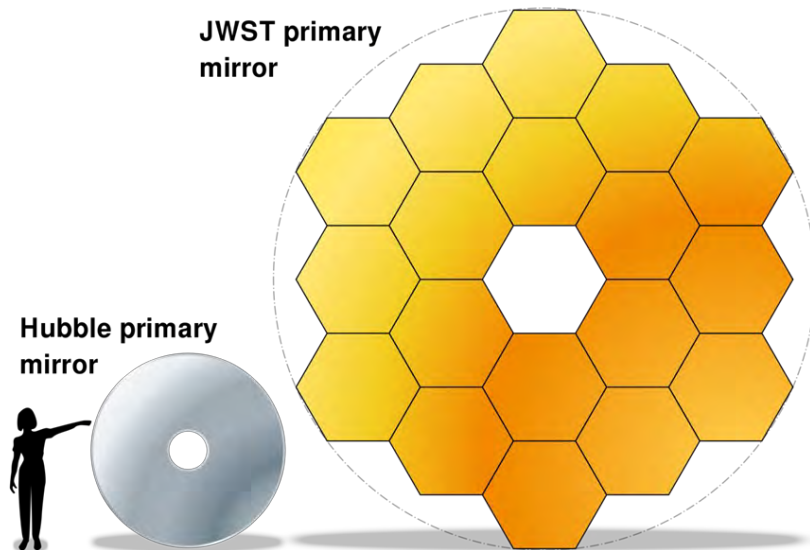
Webb Space Telescope Lofty Goals

NASA enthusiastically says, “The Webb Space Telescope will provide improved infrared resolution and sensitivity over Hubble, and will enable a broad range of investigations across the fields of astronomy and cosmology, including observing some of the most distant events and objects in the universe, such as the formation of the first galaxies, and detailed atmospheric characterization of potentially habitable exoplanets.”

The James Webb Space Telescope has an expected mass about half of Hubble Space Telescope's, but its primary mirror, a 6.5 m (21 ft) diameter gold-coated beryllium reflector will have a collecting area over six times as large, 25.4 m² (273 sq ft), using 18 hexagonal mirrors with 0.9 m² (9.7 sq ft) obscuration for the secondary support struts.

The JWST is oriented toward near-infrared astronomy, but can also see orange and red visible light, as well as the mid-infrared region, depending on the instrument. The design emphasizes the near to mid-infrared for three main reasons:

- high-redshift objects have their visible emissions shifted into the infrared
- cold objects such as debris disks and planets emit most strongly in the infrared
- this band is difficult to study from the ground or by existing space telescopes such as Hubble



Main mirror assembled at Goddard Space Flight Center, May 2016.

Mission

JWST has four official mission goals:

- to search for light from the first stars and galaxies that formed in the Universe after the Big Bang
- to study the formation and evolution of galaxies
- to understand the formation of stars and planetary systems
- to study planetary systems and the origins of life.

These goals can be accomplished more effectively by observation in near-infrared light rather than light in the visible part of the spectrum. For this reason the JWST's instruments will not measure visible or ultraviolet light like the Hubble Telescope, but will have a much greater capacity to perform infrared astronomy. The JWST will be sensitive to a range of wavelengths

Continued on Page 17

Webb Space Telescope, Continued from Page 16

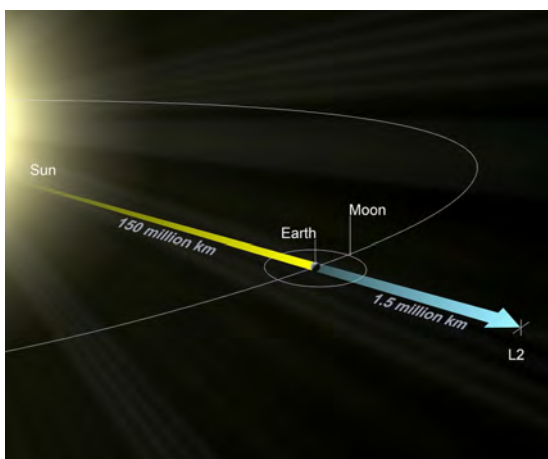
from 0.6 (orange light) to 28 micrometers (deep infrared radiation at about 100 K (-173 °C; -280 °F)). JWST may be used to gather information on the dimming light of star KIC 8462852, which was discovered in 2015, and has some abnormal light-curve properties.

Launch & Orbit

Currently, launch is scheduled for **December 18th, 2021** on an **Ariane 5** launch vehicle from the **Guiana Space Centre** in French Guiana. The JWST successfully arrived in French Guiana on October 12th, 2021 after a 5,800 mile, 16-day journey across the ocean.

The observatory attaches to the Ariane 5 launch vehicle via a launch vehicle adapter ring which could be used by a future spacecraft to grapple the observatory to attempt to fix gross deployment problems. However, the telescope itself is not serviceable, and astronauts would not be able to perform tasks such as swapping instruments, as with the Hubble Telescope. Its nominal mission time is five years, with a goal of ten years. JWST needs to use propellant to maintain its halo orbit around the second Lagrange point (L2), which provides an upper limit to its designed lifetime, and it is being designed to carry enough propellant for ten years. The planned five year science mission begins after a 6-month commissioning phase. An L2 orbit is unstable, so it requires orbital station-keeping, or the telescope will drift away from this orbital configuration.

As described, the JWST will be located near the second Lagrange point of the Earth-Sun system, which is 1,500,000 km (930,000 mi) from Earth, directly opposite to the Sun. Normally an object circling the Sun farther out than Earth would take longer than one year to complete its orbit, but near the L2 point the combined gravitational pull of the Earth and the Sun allow a spacecraft to orbit the Sun in the same time it takes the Earth. The telescope will circle about the L2 point in a halo orbit, which will be inclined with respect to the ecliptic, have a radius of approximately 800,000 km (500,000 mi), and take about half a year to complete. Since L2 is just an equilibrium point with no gravitational pull, a halo orbit is not an orbit in the usual sense: the spacecraft is actually in orbit around the Sun, and the halo orbit can be thought of as controlled drifting to remain in the vicinity of the L2 point. This requires some station-keeping: around 2–4 m/s per year from the total budget of 150 m/s. Two sets of thrusters constitute the observatory's propulsion system.



JWST will not be exactly at the L2 point, but circle around it in a halo orbit.

What are Lagrange points? NASA scientists say: “They are places around a planet’s orbit where the gravitational pull of the planet and the Sun and the motion of the orbit combine to create an equilibrium — requiring very little energy to stay in orbit.”

Infrared astronomy

JWST is the formal successor to the Hubble Space Telescope (HST), and since its primary emphasis is on infrared astronomy, it is also a successor to the Spitzer Space Telescope. JWST will far surpass both those telescopes, being able to see many more and much older stars and galaxies. Observing in the infrared spectrum is a key technique for achieving this, because of cosmological redshift, and because it better penetrates obscuring dust and gas. This allows observation of dimmer, cooler objects. Since water vapor and carbon dioxide in the Earth's atmosphere strongly absorbs most infrared, ground-based infrared astronomy is limited to narrow wavelength ranges where the atmosphere absorbs less strongly. Additionally, the atmosphere itself radiates in the infrared spectrum, often overwhelming light from the object being observed. This makes a space telescope preferable for infrared observation.

The more distant an object is, the younger it appears: its light has taken longer to reach human observers. Because the universe is expanding, as the light travels it becomes red-shifted, and objects at extreme distances are therefore easier to see if viewed in the infrared. Infrared radiation can pass more freely through regions of cosmic dust that scatter visible light. Observations in infrared allow the study of objects and regions of space which would be obscured by gas and dust in the visible spectrum,¹ such as the molecular clouds where stars are born, the circumstellar disks that give rise to planets,

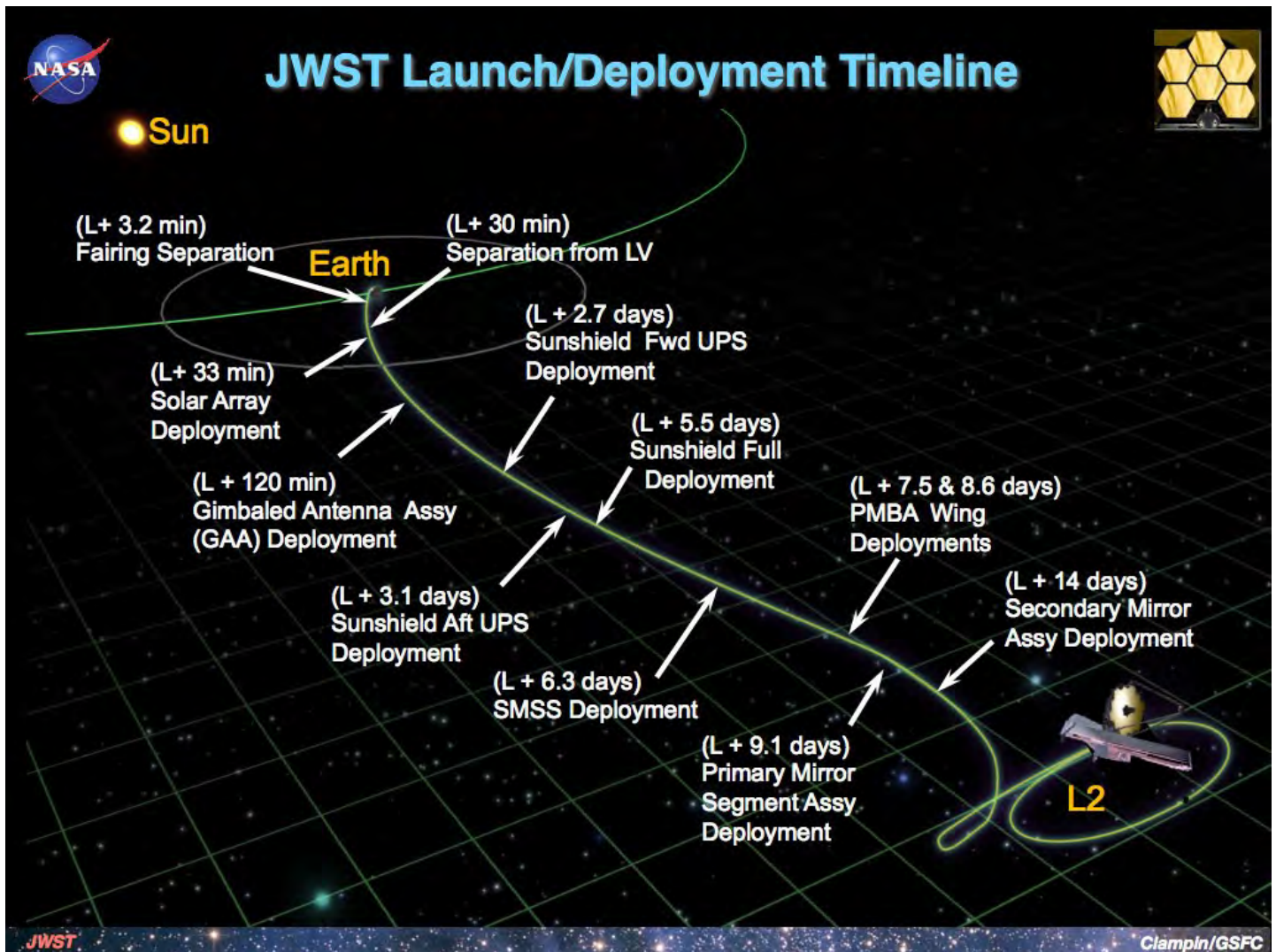
The more distant an object is, the younger it appears: its light has taken longer to reach human observers. Because the universe is expanding, as the light travels it becomes red-shifted, and objects at extreme distances are therefore easier to see if viewed in the infrared. Infrared radiation can pass more freely through regions of cosmic dust that scatter visible light. Observations in infrared allow the study of objects and regions of space which would be obscured by gas and dust in the visible spectrum,¹ such as the molecular clouds where stars are born, the circumstellar disks that give rise to planets,

Continued on Page 18

Webb Space Telescope, Continued from Page 17

and the cores of active galaxies. Relatively cool objects (temperatures less than several thousand degrees) emit their radiation primarily in the infrared, as described by Planck's law. As a result, most objects that are cooler than stars are better studied in the infrared. This includes the clouds of the interstellar medium, brown dwarfs, planets both in our own and other solar systems, comets, and Kuiper belt objects that will be observed with the Mid-Infrared Instrument (MIRI).

Some of the missions in infrared astronomy that impacted JWST development were Spitzer and the Wilkinson Microwave Anisotropy Probe (WMAP) probe. Spitzer showed the importance of mid-infrared, which is helpful for tasks such as observing dust disks around stars.¹ Also, the WMAP probe showed the universe was "lit up" at redshift 17, further underscoring the importance of the mid-infrared. Both these missions were launched in the early 2000s, in time to influence JWST development.



JWST after-launch deployment planned timeline. Image courtesy NASA

JWST Ground Support and Operations

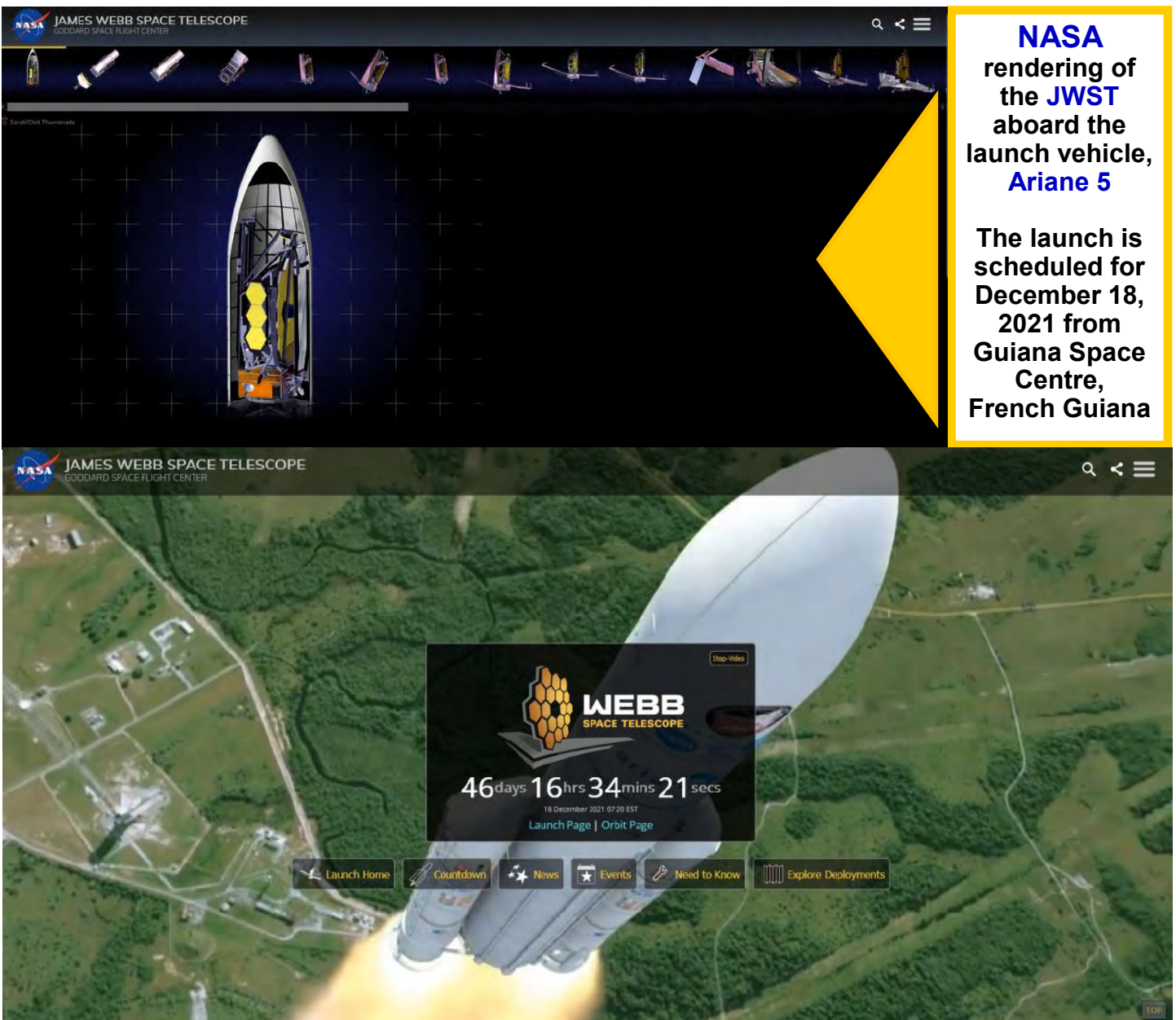
The Space Telescope Science Institute (STScI), on the Homewood Campus of Johns Hopkins University, was given an initial budget of US\$162.2 million intended to support JWST operations through the first year after launch. In this capacity, STScI will be responsible for the scientific operation of the telescope and delivery of data products to the astronomical community. Data will be transmitted from JWST to the ground via the [NASA Deep Space Network](#), processed and calibrated at STScI, and then distributed online to astronomers worldwide. Similar to how Hubble is operated, anyone, anywhere in the world, [Continued on Page 19](#)

Webb Space Telescope, Continued from Page 18

will be allowed to submit proposals for observations. Each year several committees of astronomers will peer review the submitted proposals to select the projects to observe in the coming year. The authors of the chosen proposals will typically have one year of private access to the new observations, after which the data will become publicly available for download by anyone from the online archive at STScI.

The bandwidth and digital throughput of the satellite is designed to operate at 458 gigabits of data per day for the length of the mission. Most of the data processing on the telescope is done by conventional single-board computers. The conversion of the analog science data to digital form is performed by the custom-built SIDECAR ASIC (System for Image Digitization, Enhancement, Control And Retrieval Application Specific Integrated Circuit). NASA stated that the SIDECAR ASIC will include all the functions of a 9.1 kg (20 lb) instrument box in a 3 cm (1.2 in) package and consume only 11 milliwatts of power. Since this conversion must be done close to the detectors, on the cool side of the telescope, the low power use of this IC will be crucial for maintaining the low temperature required for optimal operation of the JWST.

The James Webb Space Telescope is certainly ushering in a whole new era of exciting space observations. Remember the first time you saw the breath-taking images from Hubble? JWST promises to deliver stunning new images and data that we can barely imagine now! To follow the latest updates on the history-making JWST launch and mission, be sure to visit NASA's James Webb Space Telescope page at <https://jwst.nasa.gov/content/webbLaunch/index.html> You'll be glad you did! ★



The image shows two screenshots from the NASA James Webb Space Telescope website. The top screenshot displays a 3D rendering of the JWST inside the Ariane 5 launch vehicle, with a yellow arrow pointing to the right. The bottom screenshot shows a live countdown timer for the launch on December 18, 2021, at 07:20 EST. The timer shows 46 days, 16 hours, 34 minutes, and 21 seconds remaining. Below the timer are navigation buttons for Launch Home, Countdown, News, Events, Need to Know, and Explore Deployments.

NASA
rendering of
the **JWST**
aboard the
launch vehicle,
Ariane 5

The launch is
scheduled for
December 18,
2021 from
Guiana Space
Centre,
French Guiana

WEBB
SPACE TELESCOPE

46 days 16 hrs 34 mins 21 secs
18 December 2021 07:20 EST
Launch Page | Orbit Page

Launch Home Countdown News Events Need to Know Explore Deployments

Contest Calendar - November 2021

+ K1USN Slow Speed Test	0000Z-0100Z, Nov 1
+ Silent Key Memorial Contest	0600Z-0859Z, Nov 1
+ RSGB 80m Autumn Series, Data	2000Z-2130Z, Nov 1
+ ARS Spartan Sprint	0100Z-0300Z, Nov 2
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Nov 2
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 2
+ QRP Fox Hunt	0100Z-0230Z, Nov 3
+ Phone Weekly Test - Fray	0230Z-0300Z, Nov 3
+ CWops Mini-CWT Test	1300Z-1400Z, Nov 3
+ VHF-UHF FT8 Activity Contest	1700Z-2000Z, Nov 3
+ CWops Mini-CWT Test	1900Z-2000Z, Nov 3
+ UKEICC 80m Contest	2000Z-2100Z, Nov 3
	0000Z-0100Z, Nov 4 and
+ Walk for the Bacon QRP Contest	0200Z-0300Z, Nov 5
+ CWops Mini-CWT Test	0300Z-0400Z, Nov 4
+ CWops Mini-CWT Test	0700Z-0800Z, Nov 4
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 4
	1800Z-1900Z, Nov 4 (CW) and
	1900Z-2000Z, Nov 4 (SSB) and
	2000Z-2100Z, Nov 4 (FM) and
	2100Z-2200Z, Nov 4 (Dig)
+ NRAU 10m Activity Contest	1900Z-2000Z, Nov 4
+ EACW Meeting	2000Z-2200Z, Nov 4
+ SKCC Sprint Europe	0100Z-0230Z, Nov 5
+ QRP Fox Hunt	0145Z-0215Z, Nov 5
+ NCCC RTTY Sprint	0230Z-0300Z, Nov 5
+ NCCC Sprint	2000Z-2100Z, Nov 5
+ K1USN Slow Speed Test	0500Z-1200Z, Nov 6
+ IPARC Contest, CW	1200Z, Nov 6 to 1200Z, Nov 7
+ Ukrainian DX Contest	1300Z-1330Z, Nov 6
+ Two-Meter Classic Sprint	2100Z, Nov 6 to 0300Z, Nov 8
+ ARRL Sweepstakes Contest, CW	0500Z-1200Z, Nov 7
+ IPARC Contest, SSB	

Continued on Page 21

Contest Calendar - November 2021, Continued

+ EANET Sprint	0800Z-1200Z, Nov 7
+ High Speed Club CW Contest	1400Z-1700Z, Nov 7
+ K1USN Slow Speed Test	0000Z-0100Z, Nov 8
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Nov 9
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 9
+ QRP Fox Hunt	0200Z-0330Z, Nov 10
+ Phone Weekly Test - Fray	0230Z-0300Z, Nov 10
+ CWops Mini-CWT Test	1300Z-1400Z, Nov 10
+ VHF-UHF FT8 Activity Contest	1700Z-2000Z, Nov 10
+ CWops Mini-CWT Test	1900Z-2000Z, Nov 10
+ RSGB 80m Autumn Series, SSB	2000Z-2130Z, Nov 10
+ CWops Mini-CWT Test	0300Z-0400Z, Nov 11
+ CWops Mini-CWT Test	0700Z-0800Z, Nov 11
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 11
+ EACW Meeting	1900Z-2000Z, Nov 11
+ QRP Fox Hunt	0100Z-0230Z, Nov 12
+ NCCC RTTY Sprint	0145Z-0215Z, Nov 12
+ NCCC Sprint	0230Z-0300Z, Nov 12
+ K1USN Slow Speed Test	2000Z-2100Z, Nov 12
+ Day of the YLs Contest	0000Z, Nov 13 to 2359Z, Nov 14
+ PODXS 070 Club Triple Play Low Band Sprint	0000Z, Nov 13 to 2359Z, Nov 15
+ WAE DX Contest, RTTY	0000Z, Nov 13 to 2359Z, Nov 14
+ 10-10 Int. Fall Contest, Digital	0001Z, Nov 13 to 2359Z, Nov 14
	0500Z-0700Z, Nov 13 (6m) and
	0700Z-0900Z, Nov 13 (2m) and
	0900Z-1100Z, Nov 13 (70cm) and
	0500Z-0700Z, Nov 14 (6m) and
	0700Z-0900Z, Nov 14 (2m) and
	0900Z-1100Z, Nov 14 (70cm)
+ SARL VHF/UHF Analogue Contest	0700Z, Nov 13 to 1300Z, Nov 14
+ JIDX Phone Contest	1200Z, Nov 13 to 0400Z, Nov 14
+ RCA Transatlantic QSO Party	1200Z, Nov 13 to 1200Z, Nov 14
+ OK/OM DX Contest, CW	1200Z, Nov 13 to 1200Z, Nov 14
+ SKCC Weekend Sprintathon	1200Z, Nov 13 to 2400Z, Nov 14

Continued on Page 22

Contest Calendar - November 2021, Continued

+ FISTS Saturday Sprint	1600Z-1800Z, Nov 13
	1900Z-2300Z, Nov 13 (CW/Digital) and
	0100Z-0500Z, Nov 14 (Phone) and
	1900Z-2300Z, Nov 14 (Phone) and
	0100Z-0500Z, Nov 15 (CW/Digital)
+ CQ-WE Contest	2300Z, Nov 13 to 0300Z, Nov 15 and
	2300Z, Nov 20 to 0300Z, Nov 22
+ AWA Bruce Kelley 1929 QSO Party	0700Z to 1700Z, Nov 14
+ FIRAC HF Contest	1400Z, Nov 14 to 0800Z, Nov 15 and
	1400Z, Nov 16 to 0800Z, Nov 17
+ Classic Exchange, Phone	0000Z-0100Z, Nov 15
+ K1USN Slow Speed Test	0100Z-0300Z, Nov 15
+ 4 States QRP Group Second Sunday Sprint	0100Z-0159Z, Nov 16
+ Worldwide Sideband Activity Contest	1700Z-1900Z, Nov 16
+ RTTYOPS Weeksprint	0200Z-0330Z, Nov 17
+ QRP Fox Hunt	0230Z-0300Z, Nov 17
+ Phone Weekly Test - Fray	1300Z-1400Z, Nov 17
+ CWops Mini-CWT Test	1900Z-2000Z, Nov 17
+ CWops Mini-CWT Test	0000Z-0100Z, Nov 18 and
	0200Z-0300Z, Nov 19
+ Walk for the Bacon QRP Contest	0130Z-0330Z, Nov 18
+ NAQCC CW Sprint	0300Z-0400Z, Nov 18
+ CWops Mini-CWT Test	0700Z-0800Z, Nov 18
+ CWops Mini-CWT Test	1700Z-1900Z, Nov 18
+ RTTYOPS Weeksprint	1900Z-2000Z, Nov 18
+ EACW Meeting	0100Z-0230Z, Nov 19
+ QRP Fox Hunt	0145Z-0215Z, Nov 19
+ NCCC RTTY Sprint	0230Z-0300Z, Nov 19
+ NCCC Sprint	1600Z-2200Z, Nov 19
+ YO International PSK31 Contest	2000Z-2100Z, Nov 19
+ K1USN Slow Speed Test	0000Z, Nov 20 to 2359Z, Nov 21
+ ARRL EME Contest	1000Z, Nov 20 to 1000Z, Nov 21
+ SARL Field Day Contest	

Continued on Page 23

Contest Calendar - November 2021, Continued

+ LZ DX Contest	1200Z, Nov 20 to 1200Z, Nov 21
+ All Austrian 160-Meter Contest	1600Z-2359Z, Nov 20
+ REF 160-Meter Contest	1700Z, Nov 20 to 0100Z, Nov 21
+ Feld Hell Sprint	1900Z-2059Z, Nov 20
+ RSGB 1.8 MHz Contest	1900Z-2300Z, Nov 20
+ ARRL Sweepstakes Contest, SSB	2100Z, Nov 20 to 0300Z, Nov 22 1300-1500Z, Nov 21 (40m) and 1500-1700Z, Nov 21 (80m)
+ Homebrew and Oldtime Equipment Party	2100Z-2300Z, Nov 21
+ FISTS Sunday Sprint	2300Z, Nov 21 to 0100Z, Nov 22
+ Run for the Bacon QRP Contest	0000Z-0100Z, Nov 22
+ K1USN Slow Speed Test	0100Z-0159Z, Nov 23
+ Worldwide Sideband Activity Contest	1700Z-1900Z, Nov 23
+ RTTYOPS Weeksprint	0000Z-0200Z, Nov 24
+ SKCC Sprint	0230Z-0300Z, Nov 24
+ Phone Weekly Test - Fray	1300Z-1400Z, Nov 24
+ CWops Mini-CWT Test	1900Z-2000Z, Nov 24
+ CWops Mini-CWT Test	2000Z-2100Z, Nov 24
+ UKEICC 80m Contest	0300Z-0400Z, Nov 25
+ CWops Mini-CWT Test	0700Z-0800Z, Nov 25
+ CWops Mini-CWT Test	1700Z-1900Z, Nov 25
+ RTTYOPS Weeksprint	1900Z-2000Z, Nov 25
+ EACW Meeting	2000Z-2130Z, Nov 25
+ RSGB 80m Autumn Series, CW	0145Z-0215Z, Nov 26
+ NCCC RTTY Sprint	0230Z-0300Z, Nov 26
+ NCCC Sprint	2000Z-2100Z, Nov 26
+ K1USN Slow Speed Test	0000Z, Nov 27 to 2400Z, Nov 28
+ CQ Worldwide DX Contest, CW	0000Z-0100Z, Nov 29
+ K1USN Slow Speed Test	1300Z-1400Z, Nov 29
+ QCX Challenge	1900Z-2000Z, Nov 29
+ QCX Challenge	2000Z-2130Z, Nov 29
+ RSGB FT4 Contest Series	

Continued on Page 24

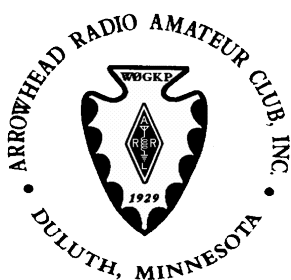
Contest Calendar - November 2021, Continued

- + Worldwide Sideband Activity Contest 0100Z-0159Z, Nov 30
- + QCX Challenge 0300Z-0400Z, Nov 30
- + RTTYOPS Weeksprint 1700Z-1900Z, Nov 30

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.



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.

