



# The RELAY)))

SEPTEMBER  
2022

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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### The Relay Co-Editors:

Kim & Steve Waller

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Last Days of  
**SUMMER**  
**2022**



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## Amateur Radio on the Moon

### Ham Radio Transmitter Aboard New Moon Lander

This month, **NASA** is scheduled to launch the **Artemis 1** moon rocket. Artemis 1 is the first spacecraft in the new Artemis program of missions, as well as the first flight of NASA's **Space Launch System (SLS)** rocket series and the **Orion Spacecraft**. Orion is officially named **Orion Multi-Purpose Crew Vehicle** or **Orion MPCV**. Orion was designed to be a partially reusable crewed spacecraft for NASA's Artemis program, however it is compatible with other launch vehicles as the need arises.

The Artemis 1 mission, with the Orion spacecraft aboard, will have no crew this time. It is a six-week Moon-orbiting mission designed to test all the SLS rocket stages and Orion spacecraft functions in preparation for future Artemis missions. After reaching orbit and performing a trans-lunar injection (burn to the Moon), ten **CubeSat** satellites will be deployed and the Orion spacecraft will enter a distant retrograde orbit for six days, after which the spacecraft will reenter the Earth's atmosphere and splash down in the Pacific Ocean.

In the past several months, various problems surfaced during the pre-flight testing phase, delaying launch. On August 17th, the fully stacked vehicle was rolled on a mobile launch pad in launch position. The first launch attempt was made August 29th, but was scrubbed because of a core stage issue.

The next launch window opens at 18:17 UTC (14:17 EDT) on Saturday, September 3, 2022. The Kennedy Space Center Visitor Complex has public viewing of the launch and includes live commentary from space experts. If like me, you'll be no where near Kennedy Space Center on September 3rd, watch the live launch on the media platform of your



NASA's Space Launch System (SLS) rocket and Orion spacecraft, standing atop the mobile launcher at Launch Pad 39B, at the Kennedy Space Center in Florida. Photo Credit: SciTechDaily.com

*Continued on Page 14*

# ARAC Board Meeting - August 2, 2022

## PRESIDENT



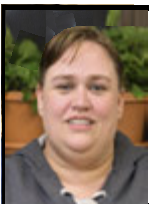
**NØVRM**  
Gene Ellefsen  
3710 Chambersburg Ave  
Duluth, MN 55811  
218-390-3272  
Ispitech@mail.com

## VICE PRESIDENT



**KØDJP**  
David Pyrlík  
  
david.pyrlík@gmail.com

## SECRETARY



**KFØGJW**  
Melinda Nelson

## TREASURER



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

## 3RD YEAR BOARD



**KD9ABS**  
Gary Minter  
1621 N 26th St  
Superior WI 54880

## 2ND YEAR BOARD



**AAØAC**  
Dave Davis  
  
218-348-6649  
aaøac@outlook.com

## 1ST YEAR BOARD



**AAØAW**  
Doug Nelson  
  
aaøaw@arrl.net

## Present:

### Board Members

Gene Ellefsen – NØVRM, Bruce Carlson – KNØNUL,  
Gary Minter – KD9ABS, Melinda Nelson – KFØGJW,  
Dave Pyrlík – KØDJP, Dave Davis – AAØAC

### Board Advisors (Non-Board Members)

Randy Wabik – KRØB

**Guest:** Elmer Berg – KCØNGY, Jon Nelson – NØUOZ,  
Rochelle Nelson

Meeting called to order by President Gene – NØVRM at 18:32  
(6:32 pm)

## Minutes:

Minutes were sent to Board Members via email. There were no questions or comments made. Motion to approve by Bruce Carlson – KNØNUL, seconded by Gary Minter – KD9ABS, motion passed.

## Treasurer's Report:

Checking:	\$1,103.30
Savings:	\$2,374.63
Repeater:	\$4,666.67
<b>Subtotal Cash</b>	<b>\$8,144.60</b>

Winter CD :	\$1,730.42
Summer CD:	\$0.00
<b>Subtotal CD:</b>	<b>\$1,730.42</b>

**Assets Subtotal: \$9,875.02**

Minus Checks Outstanding:  
1578 David Snyder \$245.00  
**Checks Subtotal: -\$245.00**

**Grand Total: \$9,630.02**

This will be the last report that you will see from January for the checking account, because it just fills the back page. Starting next month, you will start losing January, February, and March. The only thing that happened

*Continued on Page 3*

## ARAC Board Meeting - continued from page 2

In the checking for July was the food for the club meeting, deposit for dues and rent for the Biffy for Field Day. Nothing happened in the other accounts for the month. No questions on Treasurer's Report. Motion to approve by Melinda Nelson – KF0GJW, seconded by Gary Minter – KD9ABS, motion passed.

### Picnic

Sunday, we have the picnic. We have some pulled pork left over from the Hamfest, and brats, and corn on the cob. Elmer – KC0NGY, volunteered bring his roaster again. Thank you for this. We can get in at 10:00 AM, we are telling everyone 11:15AM so we have time to get things started cooking. Jeff Peterson – KD0DHF volunteered to grill again. Gene – N0VRM will be picking up buns for the brats, has some in the freezer at home so he will look to see how many more he will need to get. Cut down on the corn on the cob to one case as we did not go through the two cases from last year. If there are leftovers, we will offer them to people and ask for a donation on the corn as we cannot store it.

### Repeater:

Randy Wabik – KR0B, Nothing new on the repeater. Spoke with Randy Haglin – N0BZZ about setting up a date to clean things out of Mahtowa. Everything for equipment might be available in September. Want to get the right equipment so we do not have to revisit issues 2 years down the road. First of the month I will review everything and see if thing have changed.

Question – Do we have insurance for the equipment. Answer – We have liability insurance for the club, but nothing for equipment.

Question – How many antennas are up on the antenna farm? Answer – There are nineteen antennas up there.

Question – Have you ever heard back from the one amplifier place? Answer – I have called them twice and emailed and I have not heard back from them.

### Education:

Gene – N0VRM – Bob Schulz – KC0NFB texted me and stated that the Technician Class will be starting up September 20<sup>th</sup> via zoom.

Motion to adjourn by Bruce Carlson – KN0NUL, seconded by Gary Minter – KD9ABS, motion passed at 19:00 (7:00 pm)





# ARAC Club Meeting Minutes

**August 11, 2022**

**Present:**

President: Gene Ellefsen – N0VRM  
Vice President: Dave Pyrlik – K0DJP  
Treasurer/Membership: Bruce Carlson – KN0NUL  
Secretary: Melinda Nelson – KF0GJW  
First Year Board: Doug Nelson – AA0AW  
Second Year Board: Dave Davis – AA0AC  
Special Events: Open/Gene Ellefsen – N0VRM (acting)  
Parliamentarian: Grant Forsyth – KC0WUP  
Repeater: Dave Pyrlik – K0DJP  
Testing: Doug Nelson – AA0AW  
Repeater: Randy Wabik – KR0B  
HamFest/Education: Bob Schulz – KC0NFB

**Absent:**

Third Year Board: Gary Minter – KD9ABS  
Property/Picnic: Scott Ahlgren – N0VYU  
Chaplin:  
Web Site: Thomas Dorr – KE0RHA  
Newsletter/Historian: Kim Waller – KE0NQS  
Newsletter/Historian: Steve Waller – KE0NQT

Meeting called to order at 19:05 (7:05 PM) by President Gene Ellefsen – N0VRM. Twenty-seven (27) members in attendance.

**Picnic:**

Gene – N0VRM – We had our picnic on Sunday. It went very well and appreciate everyone's help. The weather cooperated with us, and a lot of great food and great fellowship turn out.

**Minutes:**

Posted on the web page and in the newsletter. No discussion on the minutes. Motion to approve by Grant Forsyth – KC0WUP, seconded by Dave Davis – AA0AC, motion passed.

**Treasurer's Report:**

Checking:	\$1,103.30
Savings:	\$2,374.63
Repeater:	\$4,666.67
<b>Subtotal Cash</b>	<b>\$8,144.60</b>

Winter CD :	\$1,730.42
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1578 David Snyder	\$245.00
<b>Checks Subtotal:</b>	<b>-\$245.00</b>

**Grand Total: \$9,630.02**

*Continued on Page 5*



# ARAC Club Meeting Minutes, continued

There was one check that was outstanding as of August 1<sup>st</sup>, and it has since come in and cleared. If anyone would like I have a copy of the checkbook register that you can look at. Are there any questions? No questions. Motion to accept as presented by Doug Nelson – AA0AW, seconded by Jeff Nast – KCOMKS, motion passed.

## **Repeater:**

Randy Wabik – KR0B, Mahtowa – We have not had any activity on. We are having difficulty getting supplies. He has called different distributors, and nobody knows when they will be able to ship equipment, might be 3 months may be longer.

## **Education:**

Bob Schulz – KC0NFB – Education classes will start September 20<sup>th</sup> has been confirmed. Will be hosting via Zoom again.

## **Testing:**

Doug Nelson – AA0AW nothing scheduled right now. Have a couple people that are currently studying so they may be testing soon. Thinking about scheduling a session in October. There are five people that are interested. If anyone needs testing contact Doug Nelson at [AA0AW@ARRL.net](mailto:AA0AW@ARRL.net) and they will test individually. **Do not forget to get your FRN number prior to testing.** You can go to [FCC.gov/uls](http://FCC.gov/uls) and register. You will also need an email address going forward.

## **Hamfest:**

Bob Schulz – KC0NFB – Fallfest is coming up on September 23<sup>rd</sup>. Carlton will be September 23<sup>rd</sup> and 24<sup>th</sup>. There are a couple other HamFest coming up.

## **New Business:**

Gene – N0VRM The newsletter is out. Kim Waller – KE0NQS does a wonderful job at this. Also, it would be nice to get people's emails and contact information. Question – Who do you contact to get the information into the list. We will get a listing setup for the next meeting to get everyone's information updated for the newsletter.

Doug Nelson – AA0AW Races coming up – On September 17<sup>th</sup>, the Northshore Inline will be using the 94 repeater for health and welfare communications. October 15<sup>th</sup> is the Wild Duluth.

Question – What time in the Inline over with? Answer – about 1:00-1:30 PM

Gene – N0VRM I know it is a little early but last year we got back to doing bell ringing for the Salvation Army. Are there any interests in doing it again this year? Gene will be going down and reserving our spot early as we were one of the top fund raisers last year. Gene will be reserving the whole time for the Friday. Just start thinking about what time you would like to volunteer for. We will be doing 2-hour blocks again. Also, remember that December is our election of Board of Officers, Christmas Party, and we do the donation for the Salvation Army. We will start taking nominations for Board of Officers next month as the nominations close on the November meeting. If you would like to be on the board of officers please contact Doug Nelson – AA0AW, Dave Davis – AA0AC, or Gary Minter – KD9ABS. We also do the Thomas J Reibold Award W9IBM Memorial Award for someone who goes above and beyond to promote amateur radio here in the Twin Ports. If you know someone who deserves that please let a board member know.

## **New Members or returning members:**

Tammy Weber – KC9WYW

Joe Weber – KC9WYV

Door Prize was won by Sam Frey – KE0YTM

Motion to adjourn by Cliff Tanner – AC0FO, seconded by Paul Dallavia – KC0WDQ, motion passed at 19:21 (7:21 PM).

Program presented by Bob Heil with Heil Sound.





# Calling All Hams...

Dear Arrowhead Radio Amateurs Club,

The Salvation Army North Division is in the process of expanding The Salvation Army Team Emergency Radio Network (SATERN) membership in Minnesota & North Dakota.

SATERN volunteers are Emergency Disaster Services members that provide The Salvation Army with auxiliary & emergency radio communications, along with technical support, during disasters and special events. Members volunteer under the direction of a Salvation Army staff member or a staff appointed volunteer leader with experience. Members are required to be current on all of The Salvation Army training requirements.

Volunteers play a crucial role in disaster response efforts by offering basic needs to those who may have lost everything. To learn more about what The Salvation Army does during a disaster response, [click here](https://disaster.salvationarmyusa.org/aboutus/?ourservices) - <https://disaster.salvationarmyusa.org/aboutus/?ourservices>

The first step in becoming a disaster worker with The Salvation Army's Emergency Disaster Services program is to create an online profile and complete a simple application. Go to <https://disaster.salvationarmyusa.org/volunteer/new/> in order to begin that process. After you have completed the online application, your information will be shared with your local Salvation Army.

If you have any questions, please contact [satern.north@gmail.com](mailto:satern.north@gmail.com)

We look forward to volunteering with you!

73,

Dean Blosberg, NØHOY  
SATERN Coordinator  
The Salvation Army  
Central Territory  
North Division

**WELCOME New or Returning ARAC Members!**

Extra: Tammy Weber KC9WYW  
Extra: Ralph Garono KA8ZGM  
General: Joe Weber KC9WYV  
General: Helen Miller KC7YFH  
Technician: Justin Cheever KD9VKI  
Technician: Andrew Haugen KFØDBH

# 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

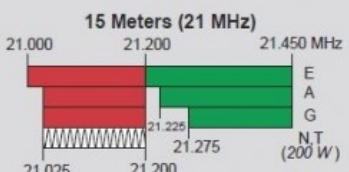
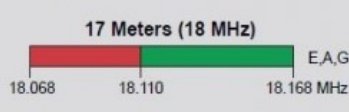
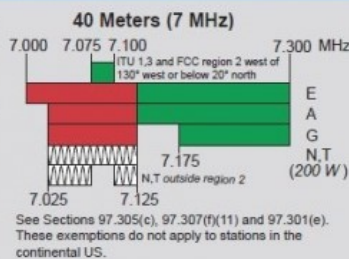
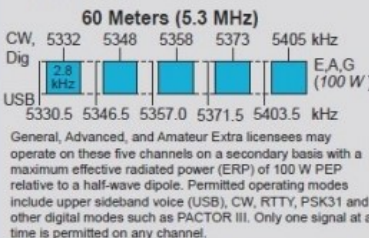
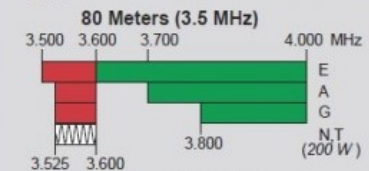
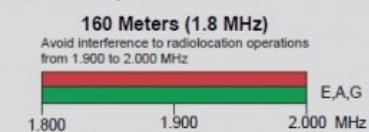
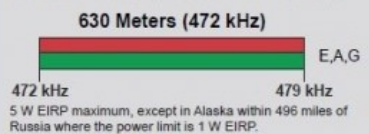
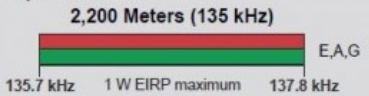


## US Amateur Radio Bands

### 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.

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](http://www.arrl.org/graphical-frequency-allocations) when the bands are fully available for use.



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



ARRL The national association for AMATEUR RADIO

### KEY

Note: CW operation is permitted throughout all amateur bands.

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

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

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

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

See [ARRLWeb](http://ARRLWeb) at [www.arrl.org](http://www.arrl.org) for detailed band plans.

### ARRL We're At Your Service

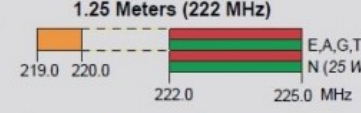
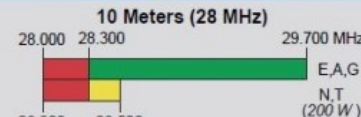
ARRL Headquarters:  
860-594-0200 (Fax 860-594-0259)  
email: [hq@arrl.org](mailto:hq@arrl.org)

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[www.arrl.org/shop](http://www.arrl.org/shop)  
Toll-Free 1-888-277-5289 (860-594-0355)  
email: [orders@arrl.org](mailto:orders@arrl.org)

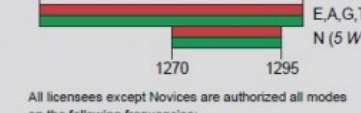
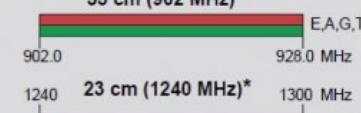
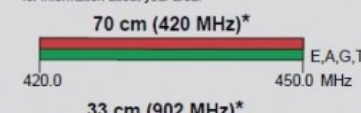
Membership/Circulation Desk:  
[www.arrl.org/membership](http://www.arrl.org/membership)  
Toll-Free 1-888-277-5289 (860-594-0338)  
email: [membership@arrl.org](mailto:membership@arrl.org)

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

Exams: 860-594-0300 email: [vec@arrl.org](mailto:vec@arrl.org)



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



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

# 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](http://www.mn-section.org/dept_stm.html)
- The non-non-net: Evenings 2000 144.200 USB except for Sunday evenings.
- Badger WX Net: 0500-0715 on 3.985. Give 24 hour high/low/current temperature, precipitation and snowfall.
- **PICONET:** 3.925 from 0900-1100 CT Mon-Sat and 1600-1700 CT Mon-Fri. Info at: <http://www.piconet3925.com>
- Michigan Upper Peninsula Net: 1600 (CST) on 3.921 MHz Sun-Sat and 1200 Sun. Info: <http://www.michupnet.com>
- Great Lakes Marine/Maritime Mobile Net: Morning 07:30 - 3.932; 08:15 - 7.261 MHz and evening 18:30 - 3.1730927; 19:15 - 7.268 MHz. Weekend extra net: 10:00 - 7.261/7.268 MHz. All CST, LSB and +/- QRM. See: <http://www.sailblogs.com/member/glimmnet/>
- MIDCARS: 07:30-13:00 - 7.258 MHz. See: <http://www.midcars.net>
- Iowa snowbird net on 14.257MHz, M-W-F at 10:00 am Local Time. This is an open net.
- Spider Web Net (Marco Island FL) on 14.347 every morning at 0730 CST/CDT: <http://www.spiderwebnet.net>
- Maritime Mobile Service Network: Daily at 1100—2100 Central on 14.300. <http://mmsn.org> and <http://www.14300.net>
- RV Radio Network: Every day at 1900 Central on 7.265 MHz. Web site: <http://www.rvradionetwork.com>
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- Wisconsin Sideband Net: Daily @ 5:15 PM – 3985 [or 3982.5] KHz LSB
- Hobby Helpers Net - Tuesday @ 8 PM – 28.330 MHz USB (Isanti MN) LSB [Net Manager: WOØA].
- Northstar Trader Net: 3.908 +/- at 0830 CST Sundays
- WARFA: 3.908 +/- Sun/Tue/Thu nights at 2200 CST, <http://warfa.org/>
- Youth Net: 14.320-14330 Sundays 1800-1900 UTC, Net Control: AC8PI
- YACHT: Saturdays 1900 CST on EchoLink #481872, <http://yachthams.webstarts.com>
- Northwestern Ontario ARES Net: Evenings at 20:15 (Central) on +/- 3.750Mhz
- The Iron Range Net: Saturdays at 0800 Central time on or near 3.919 Mhz. Look them up on Facebook!
- FORX Net: Mondays at 1900 Central at 3.941 Mhz +/- QRM. WAØJXT — Grand Forks, North Dakota
- HF CW: Fridays 08:00 CST, 7.112 MHz. Informal slow speed CW Net. W8IRT NCS. Email: [w8irt@aol.com](mailto: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





# UPCOMING EVENTS

## Next ARAC Board Meeting

Tuesday, September 6, 2022

@ 6:30 p.m.

Sammy's Pizza - Spirit Valley

## Next ARAC Club Meeting

Thursday, September  
8th

7 p.m.

Coppertop Church!



First United Methodist Church

230 E Skyline Pkwy,  
Duluth, MN 55811

HAPPY  
LABOR  
DAY

2022

MONDAY, SEPTEMBER 5th



**LOOKING**  
for an  
Amateur Radio License  
**TESTING SESSION?**

No need to wait for a class!

*Schedule your own  
Testing Session TODAY!*

Contact Doug Nelson-AA0AW at  
aa0aw@arrl.net or 218-391-5874



Enjoy  
Great Food  
& Fun!

ARAC Official Website <http://www.thearac.org> 9



# DULUTH AREA REPEATERS

## ARAC System WØGKP

Frequency	Offset	Tone	Location
146.940	minus	103.5	Duluth
146.940	minus	107.2	Lakeside (recv)
146.940	minus	151.4	Two Harbors (recv)
146.940	minus	100.0	Gary-New Duluth (recv)
146.940	minus	110.9	Cloquet (recv)
147.000	minus	103.5	Mahtowa
444.100	plus	103.5	Duluth UHF Link

## N9MMU/N9QWH System (WI)

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

## WECOMM – WI Statewide Linked System WE9COM

147.075	plus	110.9	Meteor Hill (closest repeater to Duluth)
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## LSAC System #1

147.330	plus	151.4	Proctor
147.330	plus	103.5	Duluth (recv for Proctor)
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

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

## Stand Alone Repeaters

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

## Fusion

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

147.15Ø	plus	151.4	NTØB Gilbert, MN Fusion Repeater
145.17Ø	minus	11Ø.9	WA9KLM Superior – Douglas County RACES/ARES Fusion Repeater (Digital only) Fusion Room 28373

443.1ØØ 5.ØØ1Ø3.5 KBØYHX Cloquet - Carlton County RACES/ARES Fusion Repeater

## Fusion continued

444.3ØØ 5.ØØ 1Ø3.5 NØEO Spirit Valley Amateurs Fusion Repeater WIRES-X NØEO (Analog only) Fusion Room 40494

444.3ØØ 5.ØØ 1Ø3.5 NØEO Spirit Valley Amateurs Fusion Repeater WIRES-X NØEO (Analog only) Fusion Room 40494

444.400 5.00 103.5 NAØRC Knife River, MN – Wires X Connected to NØEO Room 40494

444.500 5.00 103.5 NØLCR Two Harbors, MN – Wires X Connected to NØEO Room 40494

444.600 5.00 103.5 NØLCR Silver Bay, MN – Wires X Connected to NØEO Room 40494

## D Star

147.375	plus	NØEO D Star
442.200	plus	NØEO D Star

Revised by KCØWDQ on 4/29/2022 for The ARAC Relay

## 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-mør / [el-mer]

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

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

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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



**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

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

## CLUB EVENTS

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4  CW 1930 AA0AW USB 2000 AA0AW ES 2100 W0NWO	5 <b>Happy Labor Day!</b> <b>DC ARES/ RACES Mtg 1900 DC EOC</b> WX 2000 KC0MKS	6 <b>ARAC BOARD MEETING</b> Sammy's Pizza 6:30 pm  DC Net 2000 CC Net 2030	7   2100 - BWAR	 8 <b>ARAC Club Meeting</b> Coppertop Church 7:00 PM	9	10
11  CW 1930 N0PDG USB 2000 W0LWU ES 2100 N0VRM	12  WX 2000 KC0MKS	13  DC Net 2000 CC Net 2030	14 <b>Lake County ARES/RACES Meeting 1800</b> Lake County Net 1900 2100 - BWAR	15	16	17
18  CW 1930 AA0AW USB 2000 K9KDK ES 2100 N9DMG	19  WX 2000 KC0MKS	20  DC Net 2000 CC Net 2030	21 <b>St Louis County ARES/RACES Meeting 1800</b> 2100 - BWAR	22 <b>Carlton County ARES/RACES Meeting 1900 CC EOC</b>	23	24 <b>ARAC Club Breakfast</b> <b>The Chalet</b> 4833 Miller Trunk Hwy Hermantown, MN 8 AM
25  CW 1930 N0PDG USB 2000 N0VRM ES 2100 AA0AW	26	27  DC Net 2000 CC Net 2030	28  Lake County Net 1900 2100 - BWAR	29	30	

Get this newsletter *faster*  
via email!  
Email Doug AAØAW at  
[aa0aw@arrl.net](mailto:aa0aw@arrl.net)

Next Meeting: Thursday,  
September 8th, 2022 - 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

**Chaplain:**

Rollie Bockbader KBØCK

**Visiting Chaplain:**

**Parliamentarian:**

Grant Forsyth KCØWUP

**Website:**

Thomas Dorr KEØRHA

**Membership:**

Bruce Carlson KEØNIT

**Property Chair:**

Scott Ahlgren NØVYU

**Testing:**

Doug Nelson AAØAW

**Field Day:**

**Picnic Chair:**

Scott Ahlgren, NØVYU

**Repeater Chairs:**

Randy Haglin NØBZZ  
Randy Wabik KAØJZV

**Contest Calendar** at [www.contestcalendar.com](http://www.contestcalendar.com)

**National Contest Journal** at [www.ncjweb.com](http://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](http://www.qrz.com)

**VHF Propagation** site at [www.aprs.mountainlake.k12.mn.us](http://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](http://arrl.org).

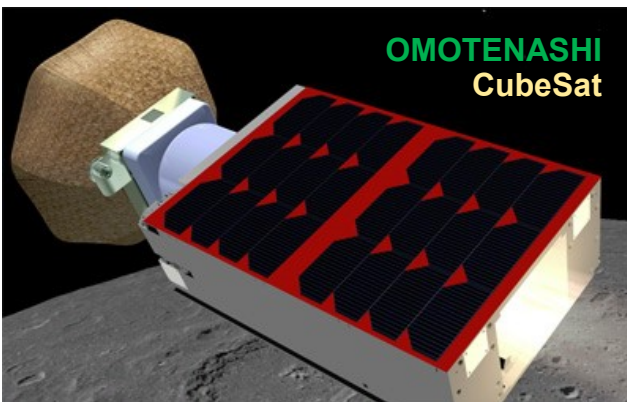
## Moon Rocket Launch, continued from page 1

choice. NASA will stream the launch live on the **NASA.com** website and on **NASA TV**. **NASA Live** will also be live streaming on YouTube, along with many other media outlets. In addition, you can check your cable TV & Satellite TV guides for live launch programming as well.

OK. "What does all of this have to do with Amateur Radio?" you might ask. Well, that's where the CubeSats come in. First, here's a little CubeSat wiki:

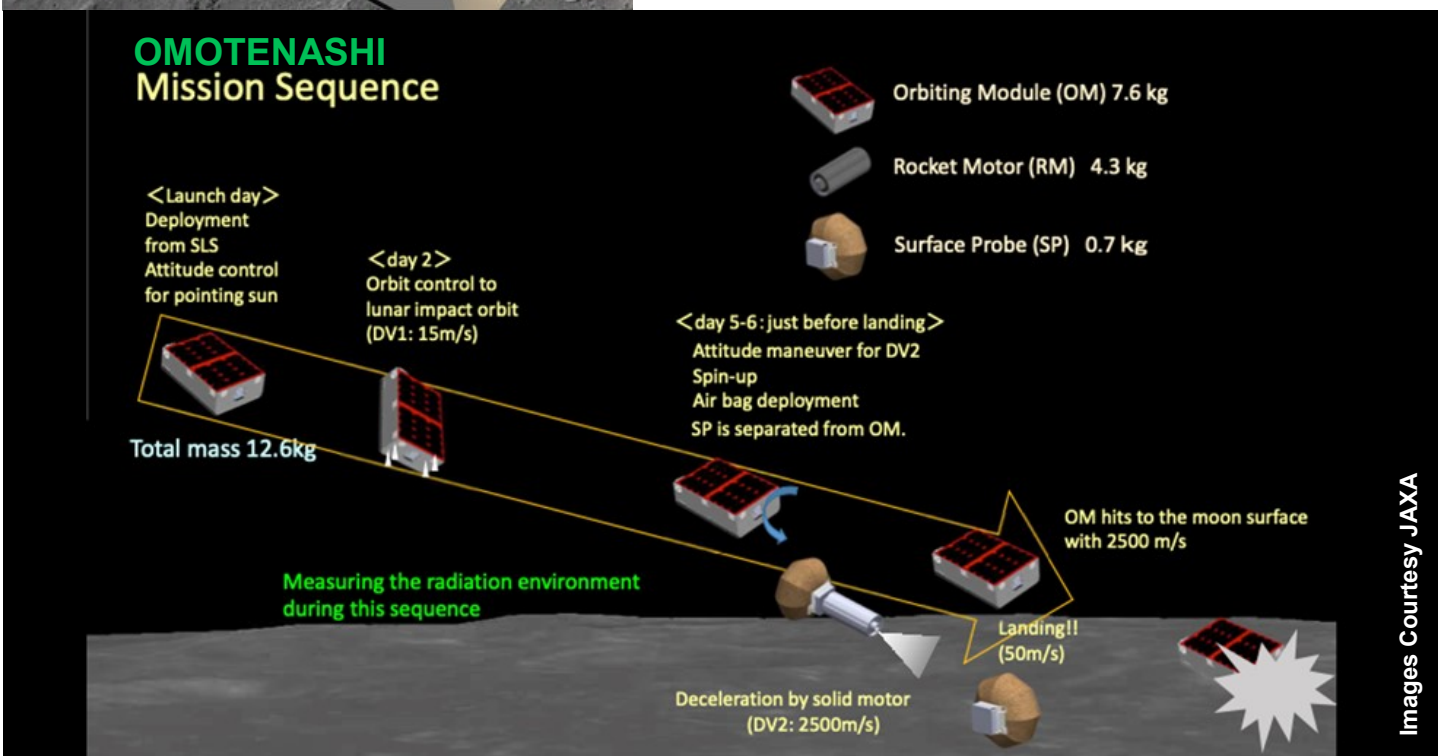
*"CubeSat is a class of miniaturized satellite based around a form factor consisting of 10 cm (3.9 in) cubes. CubeSats have a mass of no more than 2 kg (4.4 lb) per unit, and often use commercial off-the-shelf (COTS) components for their electronics and structure. CubeSats are put into orbit by deployers on the International Space Station, or launched as secondary payloads on a launch vehicle. As of August 2021, more than 1,600 CubeSats have been launched.*

*"In 1999, California Polytechnic State University (Cal Poly) professor Jordi Puig-Suari and Bob Twiggs, a professor at Stanford University Space Systems Development Laboratory, developed the CubeSat specifications to promote and develop the skills necessary for the design, manufacture, and testing of small satellites intended for low Earth orbit (LEO) that perform a number of scientific research functions and explore new space technologies. Academia accounted for the majority of CubeSat launches until 2013, when more than half of launches were for non-academic purposes, and by 2014 most newly deployed CubeSats were for commercial or amateur projects."*



A Japanese CubeSat called **Omotenashi** will be one of ten CubeSats aboard the SLS rocket on the Artemis 1 mission, and it will be launched into a heliocentric orbit in cislunar space, with a planned mission period of 5 to 6 days. Omotenashi is a small spacecraft and semi-hard lander of the 6U CubeSat format and is planned to demonstrate low-cost technology to **land and explore the lunar surface**, making it the smallest lunar lander to date. Omotenashi will have an X-band and UHF communication system, although it will not carry an amateur band transponder. Wataru Torii of the Japan Aerospace Exploration Agency (JAXA) Ham Radio Club, JQ1ZVI, says radio amateurs can play a role in gathering data from the spacecraft.

*Continued on Page 15*



## Moon Rocket Launch, continued from page 14

He says, “The spacecraft is made up of two main separable components, both having independent communication systems — an orbiting module and a surface probe. A solid rocket motor that decelerates the surface probe for lunar landing is integrated in the component design.

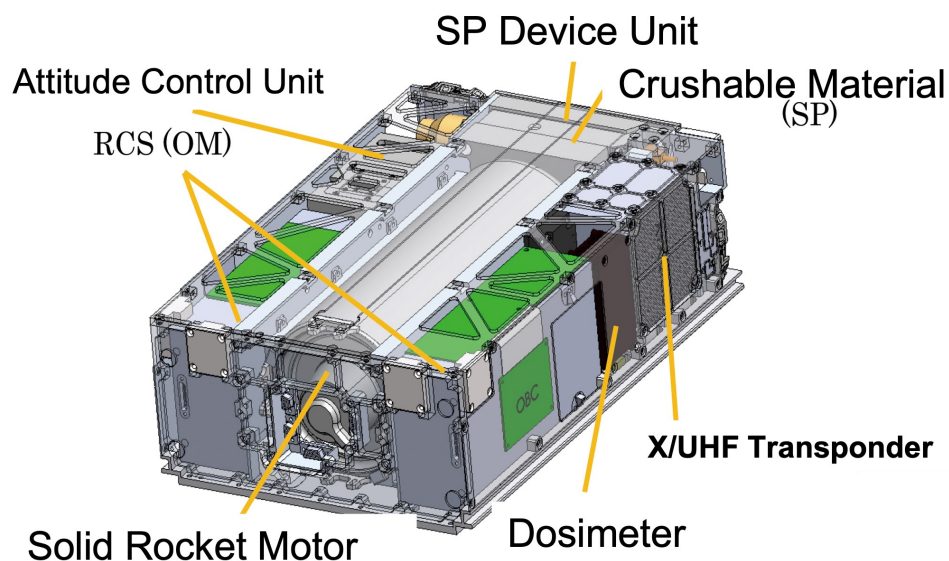
“The orbiting module will take the surface probe to the moon. It will transmit beacon or digital telemetry data on UHF (437.31 MHz). The surface probe — the moon lander — will transmit digital telemetry or three-axis acceleration analog-wave with FM modulation on UHF (437.41 MHz). Transmitter power will be 1 W in both cases.

“If we succeed in receiving the UHF signal from the surface probe, we could know the acceleration data on the impact on the moon and the success of the landing sequence,” Torii explained. “We already have a station for uplink and downlink at Wakayama in Japan — used as an EME [moonbounce] station. However, if the satellite is invisible from Japan, we cannot receive the downlink signal. So, we need a lot of help from ham radio stations worldwide.” Torii noted that the RF system on the lander only operates on UHF.

The orbiting module beacon will transmit on 437.31 MHz using PSK31. The surface probe beacon will transmit on 437.41 MHz using FM, PSK31, and PCM-PSK/PM.

JAXA shares their Omotenashi’s design images and descriptions with us:

### OMOTENASHI Design Overview



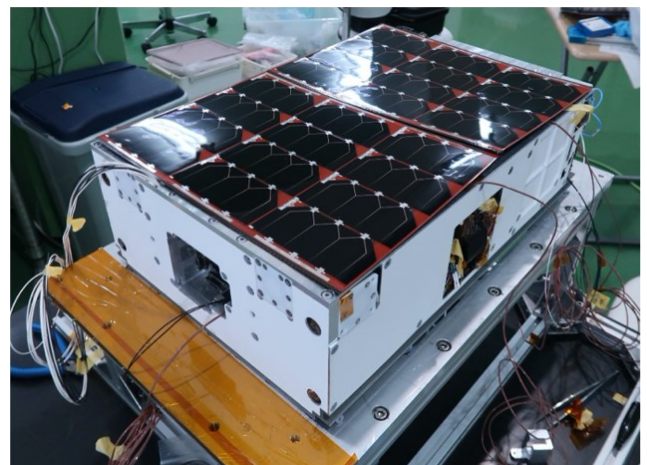
**Omotenashi** is a 6U CubeSat composed of three parts:

- ◆ Orbiting Module(OM),
- ◆ Surface Probe(SP) and
- ◆ Solid Rocket Motor (SM).

The function of Orbiting Module is to bring Surface Probe and Solid rocket Motor to the Lunar Impact Orbit.

The unique characteristic of Omotenashi is that it has a solid rocket motor inside. This is the cylindrical component in the renderings. JAXA designed a solid rocket motor to decelerate the Moon lander on the landing phase. They put it vertically through the interior and arranged the other components on either side.

The square box on the head of a rocket motor is the moon lander, Surface Probe. As OMOTENASHI has no soft-landing mechanism such as legs or parachute, the light and tiny component has to be able to land and survive on the Moon.



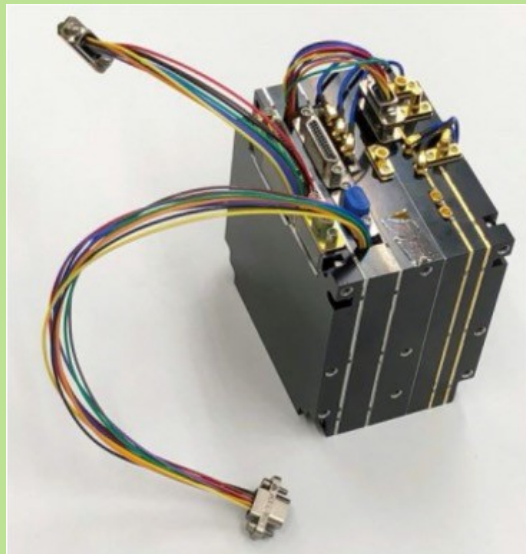
Continued on Page 16

OMOTENASHI (FM) Image Courtesy JAXA

## Moon Rocket Launch, continued from page 15

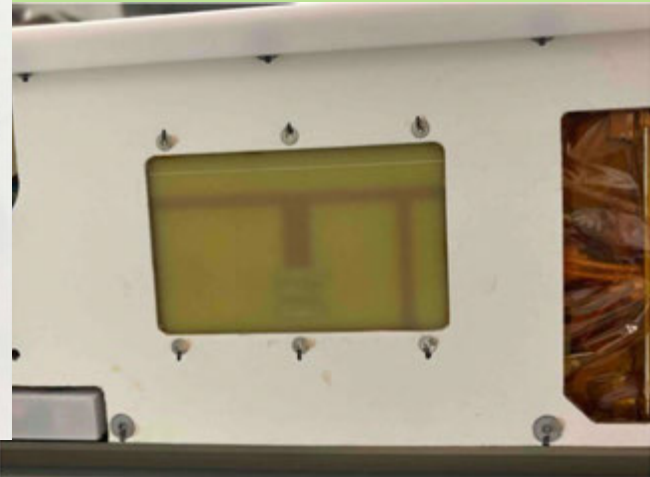
The communication systems work on X band and UHF band. The X-band LGA is patch antenna and has about 7dBi. In UHF-band, JAXA developed a metamaterial antenna for the limited space.

As Omotenashi is a 6U CubeSat, they don't use big connector such as DSub or SMA, and they apply tiny connectors instead, such as MDM or SMPM.



Images Courtesy JAXA

### X Transponder & UHF TX/RX



Though its Solid Rocket Motor is powerful, only Surface Probe can land on the moon. The Surface Probe's weight is just 0.7kg. To reduce its weight, engineers had to “defeature” the functions and leave only minimums. Finally, SP has only batteries, OBC, accelerometer, and UHF transmitter (no receiver!).

In Figure 1 below, you can see Surface Probe in the center, and its shape is a rectangular box. The octagon clothes around the SP is an antenna in the UHF band. JAXA arrays four invert-F antennas to generate circular polarized RF waves. They have a 90 degrees phase difference with the neighboring element. And the Surface Probe is filled with epoxy to endure the landing shock. They fold this antenna when stored in OM, as Figure 2 shows.

*Continued on Page 17*

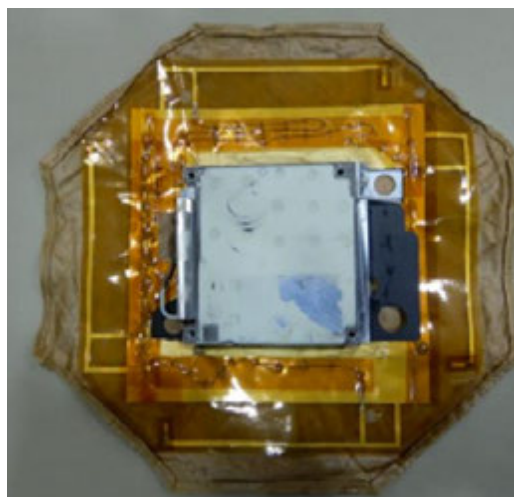
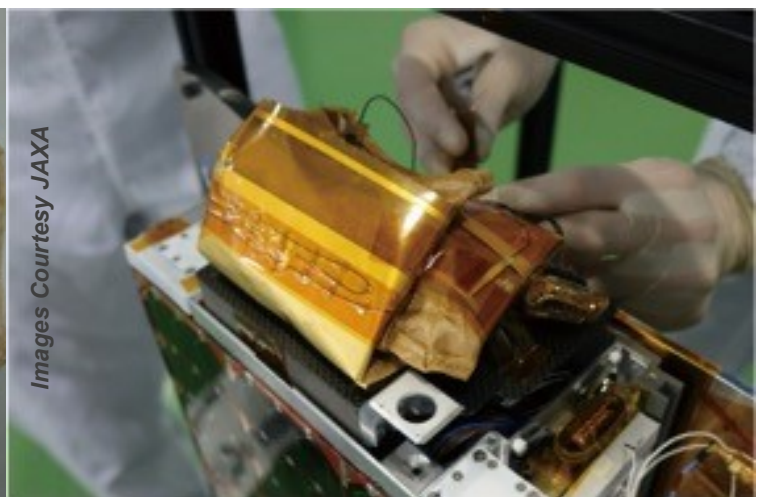


Figure 1: Surface Probe Overview



Images Courtesy JAXA

Figure 2: Surface Probe Folded



# Moon Rocket Launch, continued from page 16

So what about the name OMOTENASHI? JAXA says that it is an acronym for Outstanding MOon exploration TEchnologies demonstrated by NAno Semi-Hard Impactor. We think it is really great that



Official Artemis 1 patch

they made a long name for it in English & broke it down into an acronym. This of course is a long-standing US tradition for military in particular, but also government, industry—and NASA! As you know, Japanese language characters are completely different, and would not have made such a direct acronym, so this was a really nice touch. By the way, in Japanese Omotenashi means “welcome” or “hospitality”, so we wish them the best! For Omotenashi mission updates, check out JAXA’s website at <https://global.jaxa.jp/> or follow them on Twitter @OMOTENASHI\_JAXA

Next, for context, let’s look at an overview of NASA’s first 3 missions of the Artemis Program. See charts below for a nice mission summary of each of them with the info we know so far.

*Continued on Page 18*

## Artemis 1 Mission

### Mission Summary

**Mission Type:**

Uncrewed Orbital Test Flight

**Mission Duration:** 39 Days

**Launch Date/Time:**

3 September 2022, 18:17 UTC

**Launch Site:**

Kennedy Space Center LC-39B

**Rocket Type:** Space Launch System (SLS) Block 1

**Landing Date:** 11 October 2022

**Landing Site:**

Pacific Ocean, off San Diego

**Recovery Vessel:** USS Portland

### Spacecraft Summary

**Spacecraft Name:**

Orion CM-002

**Spacecraft Type:** Orion MPCV

**Manufacturers:**

Boeing

Airbus Defence & Space

Lockheed Martin

Northrop Grumman

Aerojet Rocketdyne

### Spacecraft Orbital Parameters

**Reference System:**

Selenocentric

**Regimen:**

Distant Retrograde Orbit

**Orbit Period:** 14 days

## Artemis 2 Mission

### Mission Summary

**Mission Type:**

Crewed Lunar Flyby

**Mission Duration:** 10 Days

**Launch Date/Time:**

May 2024

**Launch Site:**

Kennedy Space Center LC-39B

**Rocket Type:** Space Launch System (SLS) Block 1

**Landing Date:** TBD

**Landing Site:**

Pacific Ocean

**Recovery Vessel:** TBD

### Spacecraft Summary

**Spacecraft Name:**

Orion CM-002

**Spacecraft Type:** Orion MPCV

**Manufacturers:**

Boeing

Airbus Defence & Space

Lockheed Martin

Northrop Grumman

Aerojet Rocketdyne

### Spacecraft Orbital Parameters

**Reference System:**

Selenocentric

**Regimen:**

Flyby of Moon

**Flyby Mileage Duration:**

7,400 km (4,600 miles)

## Artemis 3 Mission

### Mission Summary

**Mission Type:**

Crewed Lunar Landing

**Mission Duration:** 30 Days

**Launch Date/Time:**

2025 Planned

**Launch Site:**

Kennedy Space Center LC-39B

**Rocket Type:** Space Launch System (SLS) Block 1

**Landing Date:** TBD

**Landing Site:**

Pacific Ocean

**Recovery Vessel:** TBD

### Spacecraft Summary

**Spacecraft Name:**

Orion CM-002

**Spacecraft Type:** Orion MPCV

**Manufacturers:**

Boeing

Airbus Defence & Space

Lockheed Martin

Northrop Grumman

Aerojet Rocketdyne

### Spacecraft Orbital Parameters

**Reference System:**

Selenocentric

**Regimen:**

Lunar Landing, South Polar Region of the Moon

# Moon Rocket Launch, continued from page 17

In review, **Artemis 1** will last six weeks and will test all the rocket stages and spacecraft that will be used in later Artemis missions. After reaching orbit and performing a trans-lunar injection (burn to the Moon), the Artemis 1 mission will deploy ten CubeSat satellites and the Orion spacecraft will enter a distant retrograde orbit for six days. The Orion spacecraft will then return and reenter the Earth's atmosphere, protected by its heat shield, and splash down in the Pacific Ocean.



The **Artemis 2** mission will send 4 astronauts in the first crewed Orion MPCV Spacecraft into a lunar flyby for a maximum of 21 days. The mission profile is a multi-trans lunar injection (MTLI), or multiple departure burns, and includes a free return trajectory from the Moon. Orion will be sent to a high Earth orbit for roughly 42 hours. The crew will perform various checkouts of the spacecraft's life support systems as well as an in-space rendezvous and proximity operations demo using the spent Interim Cryogenic Propulsion Stage (ICPS) as a target. When Orion reaches perigee once again, it will fire its main engine to complete the TLI maneuver which will send it to a lunar free return trajectory, before returning to Earth.

The **Artemis 3** plan is to land a crew at the Moon's south polar region. Two astronauts will be on the surface of the Moon for about one week. The mission also intends to be the first to place a woman on the Moon. While up to 4 astronauts will leave Earth on board Orion Landing Vehicle, the surface mission with the Human Landing System (HLS) will consist of only 2 of the 4 crew members. The remaining astronauts will stay on board Orion. The lunar surface astronauts will conduct up to four spacewalks on the Moon's surface, performing a variety of scientific observations, including sampling water ice. Before the Artemis 3 landing, some additional equipment will be pre-positioned on the surface, including an unpressurized rover for astronauts to use during their lunar excursions. This rover will have the capability to be controlled remotely. Several permanently shadowed regions of the moon could be reached by short forays of 5 to 15 km (3.1 to 9.3 mi), well within the range of the rover, should NASA decide to do so.



How exciting to watch a new generation of space missions begin in the Artemis Program! This is a great time to teach kids in your life about space exploration history. Show them movies made about historic events (Note: That Kevin Costner movie "Hidden Figures" was amazing!) & watch the Artemis 1 launch if you can! ★



# Contest Calendar - September 2022

[+ CWops Test](#)

[+ CWops Test](#)

[+ RTTYOPS Weeksprint](#)

[+ NRAU 10m Activity Contest](#)

[+ SKCC Sprint Europe](#)

[+ G3ZQS Memorial Straight Key Contest](#)

[+ NCCC RTTY Sprint](#)

[+ NCCC Sprint Ladder](#)

[+ K1USN Slow Speed Test](#)

[+ Russian RTTY WW Contest](#)

[+ CWOps CW Open](#)

[+ All Asian DX Contest, Phone](#)

[+ Wake-Up! QRP Sprint](#)

[+ SARL Field Day Contest](#)

[+ CWOps CW Open](#)

[+ RSGB SSB Field Day](#)

[+ AGCW Straight Key Party](#)

[+ IARU Region 1 Field Day, SSB](#)

[+ Colorado QSO Party](#)

[+ IARU Region 1 145 MHz Contest](#)

[+ CWOps CW Open](#)

[+ PODXS 070 Club Jay Hudak Memorial 80m Sprint](#)

[+ WAB 144 MHz QRO Phone](#)

0300Z-0400Z, Sep 1

0700Z-0800Z, Sep 1

1700Z-1900Z, Sep 1

1700Z-1800Z, Sep 1 (CW) and

1800Z-1900Z, Sep 1 (SSB) and

1900Z-2000Z, Sep 1 (FM) and

2000Z-2100Z, Sep 1 (Dig)

1900Z-2100Z, Sep 1

2300Z, Sep 1 to 2300Z, Sep 3

0145Z-0215Z, Sep 2

0230Z-0300Z, Sep 2

2000Z-2100Z, Sep 2

0000Z-2359Z, Sep 3

0000Z-0359Z, Sep 3

0000Z, Sep 3 to 2400Z, Sep 4

0600Z-0629Z, Sep 3 and

0630Z-0659Z, Sep 3 and

0700Z-0729Z, Sep 3 and

0730Z-0800Z, Sep 3

0800Z, Sep 3 to 1000Z, Sep 9

1200Z-1559Z, Sep 3

1300Z, Sep 3 to 1300Z, Sep 4

1300Z-1600Z, Sep 3

1300Z, Sep 3 to 1259Z, Sep 4

1300Z, Sep 3 to 0400Z, Sep 4

1400Z, Sep 3 to 1400Z, Sep 4

2000Z-2359Z, Sep 3

2000Z, Sep 3 to 2000Z, Sep 4

1000Z-1400Z, Sep 4

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## Contest Calendar - September 2022, Continued

<a href="#"><u>+ Tennessee QSO Party</u></a>	1800Z, Sep 4 to 0300Z, Sep 5
<a href="#"><u>+ K1USN Slow Speed Test</u></a>	0000Z-0100Z, Sep 5
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	1300Z-1400Z, Sep 5
<a href="#"><u>+ OK1WC Memorial</u></a>	1630Z-1729Z, Sep 5
<a href="#"><u>+ RSGB 80m Autumn Series, SSB</u></a>	1900Z-2030Z, Sep 5
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	1900Z-2000Z, Sep 5
<a href="#"><u>+ MI QRP Labor Day CW Sprint</u></a>	2300Z, Sep 5 to 0300Z, Sep 6
<a href="#"><u>+ Worldwide Sideband Activity Contest</u></a>	0100Z-0159Z, Sep 6
<a href="#"><u>+ ARS Spartan Sprint</u></a>	0100Z-0300Z, Sep 6
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	0300Z-0400Z, Sep 6
<a href="#"><u>+ RTTYOPS Weeksprint</u></a>	1700Z-1900Z, Sep 6
<a href="#"><u>+ Phone Weekly Test</u></a>	0230Z-0300Z, Sep 7
<a href="#"><u>+ A1Club AWT</u></a>	1200Z-1300Z, Sep 7
<a href="#"><u>+ CWops Test</u></a>	1300Z-1400Z, Sep 7
<a href="#"><u>+ Mini-Test 40</u></a>	1700Z-1759Z, Sep 7
<a href="#"><u>+ VHF-UHF FT8 Activity Contest</u></a>	1700Z-2100Z, Sep 7
<a href="#"><u>+ Mini-Test 80</u></a>	1800Z-1859Z, Sep 7
<a href="#"><u>+ CWops Test</u></a>	1900Z-2000Z, Sep 7
<a href="#"><u>+ UKEICC 80m Contest</u></a>	2000Z-2100Z, Sep 7
<a href="#"><u>+ Walk for the Bacon QRP Contest</u></a>	0000Z-0100Z, Sep 8 and 0200Z-0300Z, Sep 9
<a href="#"><u>+ CWops Test</u></a>	0300Z-0400Z, Sep 8
<a href="#"><u>+ CWops Test</u></a>	0700Z-0800Z, Sep 8
<a href="#"><u>+ RTTYOPS Weeksprint</u></a>	1700Z-1900Z, Sep 8
<a href="#"><u>+ EACW Meeting</u></a>	1900Z-2000Z, Sep 8
<a href="#"><u>+ NCCC RTTY Sprint</u></a>	0145Z-0215Z, Sep 9
<a href="#"><u>+ NCCC Sprint Ladder</u></a>	0230Z-0300Z, Sep 9
<a href="#"><u>+ K1USN Slow Speed Test</u></a>	2000Z-2100Z, Sep 9
<a href="#"><u>+ FOC QSO Party</u></a>	0000Z-2359Z, Sep 10
<a href="#"><u>+ WAE DX Contest, SSB</u></a>	0000Z, Sep 10 to 2359Z, Sep 11

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## Contest Calendar - September 2022, Continued

<a href="#"><u>+ YB7-DX Contest</u></a>	0900Z, Sep 10 to 1400Z, Sep 11
<a href="#"><u>+ SKCC Weekend Sprintathon</u></a>	1200Z, Sep 10 to 2400Z, Sep 11
<a href="#"><u>+ Ohio State Parks on the Air</u></a>	1400Z-2200Z, Sep 10
<a href="#"><u>+ Russian Cup Digital Contest</u></a>	1500Z-1859Z, Sep 10 and 0600Z-0959Z, Sep 11
<a href="#"><u>+ Alabama QSO Party</u></a>	1500Z, Sep 10 to 0300Z, Sep 11
<a href="#"><u>+ ARRL September VHF Contest</u></a>	1800Z, Sep 10 to 0300Z, Sep 12
<a href="#"><u>+ North American Sprint, CW</u></a>	0000Z-0400Z, Sep 11
<a href="#"><u>+ K1USN Slow Speed Test</u></a>	0000Z-0100Z, Sep 12
<a href="#"><u>+ 4 States QRP Group Second Sunday Sprint</u></a>	0000Z-0200Z, Sep 12
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	1300Z-1400Z, Sep 12
<a href="#"><u>+ OK1WC Memorial</u></a>	1630Z-1729Z, Sep 12
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	1900Z-2000Z, Sep 12
<a href="#"><u>+ Worldwide Sideband Activity Contest</u></a>	0100Z-0159Z, Sep 13
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	0300Z-0400Z, Sep 13
<a href="#"><u>+ RTTYOPS Weeksprint</u></a>	1700Z-1900Z, Sep 13
<a href="#"><u>+ Phone Weekly Test</u></a>	0230Z-0300Z, Sep 14
<a href="#"><u>+ A1Club AWT</u></a>	1200Z-1300Z, Sep 14
<a href="#"><u>+ CWops Test</u></a>	1300Z-1400Z, Sep 14
<a href="#"><u>+ Mini-Test 40</u></a>	1700Z-1759Z, Sep 14
<a href="#"><u>+ VHF-UHF FT8 Activity Contest</u></a>	1700Z-2100Z, Sep 14
<a href="#"><u>+ Mini-Test 80</u></a>	1800Z-1859Z, Sep 14
<a href="#"><u>+ RSGB 80m Autumn Series, CW</u></a>	1900Z-2030Z, Sep 14
<a href="#"><u>+ CWops Test</u></a>	1900Z-2000Z, Sep 14
<a href="#"><u>+ NAQCC CW Sprint</u></a>	0030Z-0230Z, Sep 15
<a href="#"><u>+ CWops Test</u></a>	0300Z-0400Z, Sep 15
<a href="#"><u>+ CWops Test</u></a>	0700Z-0800Z, Sep 15
<a href="#"><u>+ RTTYOPS Weeksprint</u></a>	1700Z-1900Z, Sep 15
<a href="#"><u>+ BCC QSO Party</u></a>	1800Z-1959Z, Sep 15
<a href="#"><u>+ NTC QSO Party</u></a>	1900Z-2000Z, Sep 15

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## Contest Calendar - September 2022, Continued

<a href="#"><u>+ NCCC RTTY Sprint</u></a>	0145Z-0215Z, Sep 16
<a href="#"><u>+ NCCC Sprint Ladder</u></a>	0230Z-0300Z, Sep 16
<a href="#"><u>+ K1USN Slow Speed Test</u></a>	2000Z-2100Z, Sep 16
<a href="#"><u>+ AGB NEMIGA Contest</u></a>	2100Z-2400Z, Sep 16
<a href="#"><u>+ ARRL EME Contest</u></a>	0000Z, Sep 17 to 2359Z, Sep 18
	0300Z-0500Z, Sep 17 (6m) and
	0500Z-0700Z, Sep 17 (2m) and
	0700Z-0900Z, Sep 17 (70cm) and
<a href="#"><u>+ SARL VHF/UHF Digital Contest</u></a>	0300Z-0500Z, Sep 18 (2m) and
	0500Z-0700Z, Sep 18 (6m) and
	0700Z-0900Z, Sep 18 (70cm)
<a href="#"><u>+ ARRL 10 GHz and Up Contest</u></a>	0600 local, Sep 17 to 2400 local, Sep 18
<a href="#"><u>+ Scandinavian Activity Contest, CW</u></a>	Cancelled for 2022
<a href="#"><u>+ Iowa QSO Party</u></a>	1400Z, Sep 17 to 0200Z, Sep 18
<a href="#"><u>+ Texas QSO Party</u></a>	1400Z, Sep 17 to 0200Z, Sep 18 and
	1400Z-2000Z, Sep 18
<a href="#"><u>+ QRP Afield</u></a>	1500Z-2100Z, Sep 17
<a href="#"><u>+ Wisconsin Parks on the Air</u></a>	1600Z-2300Z, Sep 17
<a href="#"><u>+ Washington State Salmon Run</u></a>	1600Z, Sep 17 to 0700Z, Sep 18 and
	1600Z-2400Z, Sep 18
<a href="#"><u>+ New Jersey QSO Party</u></a>	1600Z, Sep 17 to 0359Z, Sep 18
<a href="#"><u>+ New Hampshire QSO Party</u></a>	1600Z, Sep 17 to 0400Z, Sep 18 and
	1600Z-2200Z, Sep 18
<a href="#"><u>+ Feld Hell Sprint</u></a>	1800Z-1959Z, Sep 17
<a href="#"><u>+ North American Sprint, RTTY</u></a>	0000Z-0400Z, Sep 18
<a href="#"><u>+ BARTG Sprint PSK63 Contest</u></a>	1700Z-2059Z, Sep 18
<a href="#"><u>+ Run for the Bacon QRP Contest</u></a>	2300Z, Sep 18 to 0100Z, Sep 19
<a href="#"><u>+ K1USN Slow Speed Test</u></a>	0000Z-0100Z, Sep 19
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	1300Z-1400Z, Sep 19
<a href="#"><u>+ OK1WC Memorial</u></a>	1630Z-1729Z, Sep 19

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## Contest Calendar - September 2022, Continued

<a href="#"><u>+ ICWC Medium Speed Test</u></a>	1900Z-2000Z, Sep 19
<a href="#"><u>+ 144 MHz Fall Sprint</u></a>	1900 local - 2300 local, Sep 19
<a href="#"><u>+ Worldwide Sideband Activity Contest</u></a>	0100Z-0159Z, Sep 20
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	0300Z-0400Z, Sep 20
<a href="#"><u>+ RTTYOPS Weeksprint</u></a>	1700Z-1900Z, Sep 20
<a href="#"><u>+ Phone Weekly Test</u></a>	0230Z-0300Z, Sep 21
<a href="#"><u>+ A1Club AWT</u></a>	1200Z-1300Z, Sep 21
<a href="#"><u>+ CWops Test</u></a>	1300Z-1400Z, Sep 21
<a href="#"><u>+ Mini-Test 40</u></a>	1700Z-1759Z, Sep 21
<a href="#"><u>+ VHF-UHF FT8 Activity Contest</u></a>	1700Z-2100Z, Sep 21
<a href="#"><u>+ Mini-Test 80</u></a>	1800Z-1859Z, Sep 21
<a href="#"><u>+ CWops Test</u></a>	1900Z-2000Z, Sep 21
<a href="#"><u>+ Walk for the Bacon QRP Contest</u></a>	0000Z-0100Z, Sep 22 and 0200Z-0300Z, Sep 23
<a href="#"><u>+ CWops Test</u></a>	0300Z-0400Z, Sep 22
<a href="#"><u>+ CWops Test</u></a>	0700Z-0800Z, Sep 22
<a href="#"><u>+ RTTYOPS Weeksprint</u></a>	1700Z-1900Z, Sep 22
<a href="#"><u>+ RSGB 80m Autumn Series, Data</u></a>	1900Z-2030Z, Sep 22
<a href="#"><u>+ NCCC RTTY Sprint</u></a>	0145Z-0215Z, Sep 23
<a href="#"><u>+ NCCC Sprint Ladder</u></a>	0230Z-0300Z, Sep 23
<a href="#"><u>+ K1USN Slow Speed Test</u></a>	2000Z-2100Z, Sep 23
<a href="#"><u>+ CQ Worldwide DX Contest, RTTY</u></a>	0000Z, Sep 24 to 2400Z, Sep 25
<a href="#"><u>+ Maine QSO Party</u></a>	1200Z, Sep 24 to 1200Z, Sep 25
<a href="#"><u>+ Masonic Lodges on the Air</u></a>	1400Z-2200Z, Sep 24
<a href="#"><u>+ AGCW VHF/UHF Contest</u></a>	1400Z-1700Z, Sep 24 (144) and 1700Z-1800Z, Sep 24 (432)
<a href="#"><u>+ AWA Amplitude Modulation QSO Party</u></a>	2200Z, Sep 24 to 2200Z, Sep 25
<a href="#"><u>+ UBA ON Contest, 6m</u></a>	0700Z-1000Z, Sep 25
<a href="#"><u>+ K1USN Slow Speed Test</u></a>	0000Z-0100Z, Sep 26
<a href="#"><u>+ ICWC Medium Speed Test</u></a>	1300Z-1400Z, Sep 26

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## Contest Calendar - September 2022, Continued

<a href="#">+ QCX Challenge</a>	1300Z-1400Z, Sep 26
<a href="#">+ OK1WC Memorial</a>	1630Z-1729Z, Sep 26
<a href="#">+ RSGB FT4 Contest</a>	1900Z-2030Z, Sep 26
<a href="#">+ ICWC Medium Speed Test</a>	1900Z-2000Z, Sep 26
<a href="#">+ QCX Challenge</a>	1900Z-2000Z, Sep 26
<a href="#">+ Worldwide Sideband Activity Contest</a>	0100Z-0159Z, Sep 27
<a href="#">+ ICWC Medium Speed Test</a>	0300Z-0400Z, Sep 27
<a href="#">+ QCX Challenge</a>	0300Z-0400Z, Sep 27
<a href="#">+ RTTYOPS Weeksprint</a>	1700Z-1900Z, Sep 27
<a href="#">+ 222 MHz Fall Sprint</a>	1900 local - 2300 local, Sep 27
<a href="#">+ SKCC Sprint</a>	0000Z-0200Z, Sep 28
<a href="#">+ Phone Weekly Test</a>	0230Z-0300Z, Sep 28
<a href="#">+ A1Club AWT</a>	1200Z-1300Z, Sep 28
<a href="#">+ CWops Test</a>	1300Z-1400Z, Sep 28
<a href="#">+ Mini-Test 40</a>	1700Z-1759Z, Sep 28
<a href="#">+ Mini-Test 80</a>	1800Z-1859Z, Sep 28
<a href="#">+ CWops Test</a>	1900Z-2000Z, Sep 28
<a href="#">+ UKEICC 80m Contest</a>	2000Z-2100Z, Sep 28
<a href="#">+ CWops Test</a>	0300Z-0400Z, Sep 29
<a href="#">+ CWops Test</a>	0700Z-0800Z, Sep 29
<a href="#">+ RTTYOPS Weeksprint</a>	1700Z-1900Z, Sep 29
<a href="#">+ NCCC RTTY Sprint</a>	0145Z-0215Z, Sep 30
<a href="#">+ NCCC Sprint Ladder</a>	0230Z-0300Z, Sep 30
<a href="#">+ K1USN Slow Speed Test</a>	2000Z-2100Z, Sep 30

Our thanks to Bruce Horn, WA7BNM for use of this calendar!  
 Visit Bruce at [www.contestcalendar.com/contestcal.html](http://www.contestcalendar.com/contestcal.html)

## The ARAC RELAY



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