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

The RELAY

September 2025

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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:
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Last Days of Summer 2025

Join us on Faceb

America in Space

Race to the Moon: Then & Now

September marks the last days of summer, moving into the autumnal equinox on the 22nd, at 1:19 p.m. Central Standard Time, to be precise. As yours truly grows "long in the tooth", I sit on my terrace and gaze at the skies in the waning light of the day. Celestial blues, in all their glorious resonant shades, present the perfect backdrop for stargazing. The "stars" nowadays are not just the constellations of my youth. **Orion, Ursa Major, Ursa Minor, Cassiopeia, Taurus, Scorpius,** and **Leo** are now joined in the night sky by satellites made by human hands. And some of them are easily observable as moving in constellations of their own.

Beneath the sapphire expanse of the forthcoming night, I look at the moon and ponder our history. I am an American who grew up with space exploration as a prominent focus in news, educational curriculum, and culture. Space exploration was something that fascinated and united us all as Americans. Young and old alike learned new aspects of space science and technology at a steady—and sometimes breathtaking—pace. My grandparents were as awestruck as we were, watching the "evening news", which was filled with scenes of **NASA** astronauts in spacesuits preparing for an Apollo mission or the latest Space Shuttle developments.

In the 1960's, one man in particular ignited the spark of American determination and inspiration to push the beyond the boundaries of this beautiful planet into space. Addressing Congress on May 25th, 1961, he passionately spoke of his belief that America's next space exploration goal should be entirely focused upon landing on the moon and safely returning to earth. As a *Continued on Page 13*

Image: National Geographiic Website Archive 2017

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KRØB
Randy Wabik

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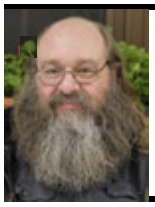

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2ND YEAR BOARD

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Justin Cheever

jcheever13@gmail.com

1ST YEAR BOARD

KFØLFZ
Brian Beckman

Board Meeting Minutes - August 5, 2025

Present:

Board Members

Gene Ellefsen – N0VRM, William Turk - KF0ILA, David Pyrlik - K0DJP, Brian Beckman - KF0LFZ, Diane Saunders - K0DSL, Randy Wabik – KR0B, Dave David - AA0AC

Board Advisors (Non-Board Members)

Doug Nelson - AA0AW, Grant Forsyth – KC0WUP

Guest:

Meeting called to order by President Gene – N0VRM at 18:36 (6:36 pm)

Minutes:

Sent out

Treasurer's Report:

Checking: 1212.86
Savings: 6298.86
Repeater: 4676.33
Assets Subtotal: $12,180.05

Motion made by Justin Cheever - KD9VKI to accept Treasurer's report as is, seconded by William Turk - KF0ILA. Motion passed.

New Business:

- Rick is new picnic chair
- New Vara FM digipeter N0EO-15 can be used to help reach MAPLE for winlink or help with Vara Chat.

Motion to adjourn by Brian Beckman - KF0LFZ, seconded by William Turk- KF0ILA, motion passed at 19:08 (7:08 PM).

ARAC Club Meeting Minutes

AUGUST 14, 2025

Present:

President: Gene Ellefsen – N0VRM
Treasurer/Membership: Randy Wabik - KR0B
Secretary: William Turk – KF0ILA
First Year Board: Brian Beckman- KF0LFZ
Second Year Board: Justin Cheever – KD9VKI
Third Year Board: Dave Davis – AA0AC
Parliamentarian: Grant Forsyth – KC0WUP
HamFest/Education: Bob Schulz – KC0NFB
Special Events: Open/Gene Ellefsen – N0VRM (acting)
Testing: Doug Nelson – AA0AW
Vice President: Dave Pyrlik – K0DJP
Repeater: Dave Pyrlik – K0DJP
Property/Picnic: Scott Ahlgren – N0VYU

Absent:

Newsletter/Historian: Kim Waller – KE0NQS
Newsletter/Historian: Steve Waller – KE0NQT
Web Site: Thomas Dorr – KE0RHA
Chaplin:

Meeting called to order at 19:00 (7:00 PM) by President Gene Ellefsen – N0VRM.

Minutes:

Minutes are posted on the website and in the newsletter. Motion to accept by John Nelson - N0UOZ, seconded by Ray Barnes - KE0ZN, motion Passed.

Treasurer's Report:

Checking: 1212.86
Savings: 6298.86
Repeater: 4676.33
Assets Subtotal: $12,180.05

Firsted by William Turk - KF0ILA seconded by John Nelson - N0UOZ

Continued on Page 4

Testing:

As always if you are looking to test or upgrade or know of anyone that is interested in testing, please contact Doug Nelson at AA0AW@arrl.net.

New Business:

- Club has been contacted about an estate sale for selling equipment, talk to Gene for more information
- N0EO-15 is a new Digital VARA digipeter for use in Duluth. It allows to connect to each other for keyboard to keyboard or help to connect to MAPLE for Winlink.
- Class's are coming for tech class, starting september 23rd, Contact Bob KC0NFB
- October 18th and 19th Wild Duluth marathons, volunteers needed, Please get ahold of Paul KC0WDQ
- Last Saturday in September is Fall Fest in Carlton
- Race September 13th, Repeater will be used on that day, so please hold traffic till after.

Silent Key: (Please keep their family in your thoughts)

Door Prize was won by Tom Doran

Motion to adjourn by Paul G. - KF0GEX, seconded by John Nelson - N0UOZ, motion passed at 19:21 (7:21 PM).

CLUB REPEATER
WØGKP
146.94 (-)
CTCSS TONE
103.5

Prez Sez

Hello Everyone,

Coming up soon will be nominations for Club Officers.

Nominations will be accepted at the October and November Club meetings with election at the December meeting. Positions open are President, Vice President, Secretary, Treasurer and First Year Board Member.

If you are interested let me, or a Board Member, know.

73,
Gene Ellefsen NØVRM

IN MEMORIAM

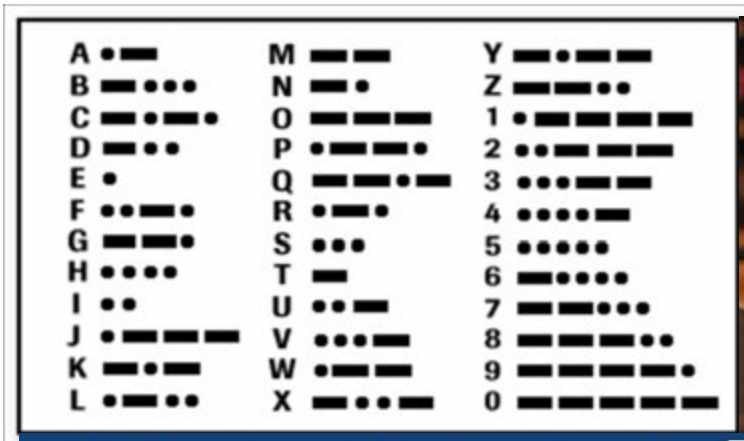
Herman A. "Butch" Clemens KBØSMG
March 1941 - August 27, 2025

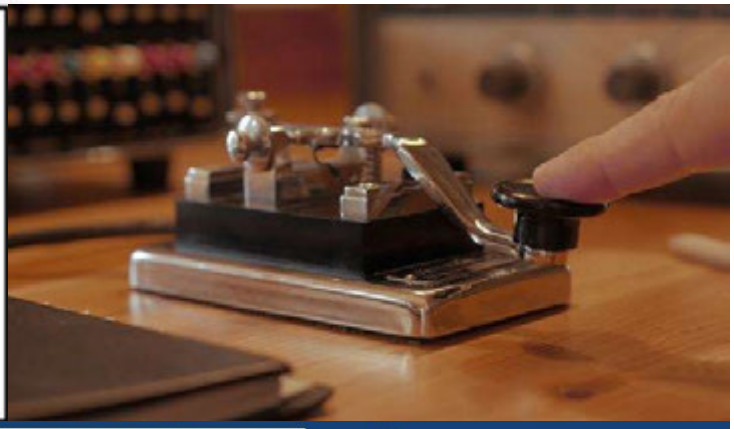
With great sadness we report that, at 84 years of age, Herman "Butch" Clemens KBØSMG of Eveleth became a Silent Key on August 27th. Butch held a General License and was a longtime member of the Arrowhead Radio Amateur Club.

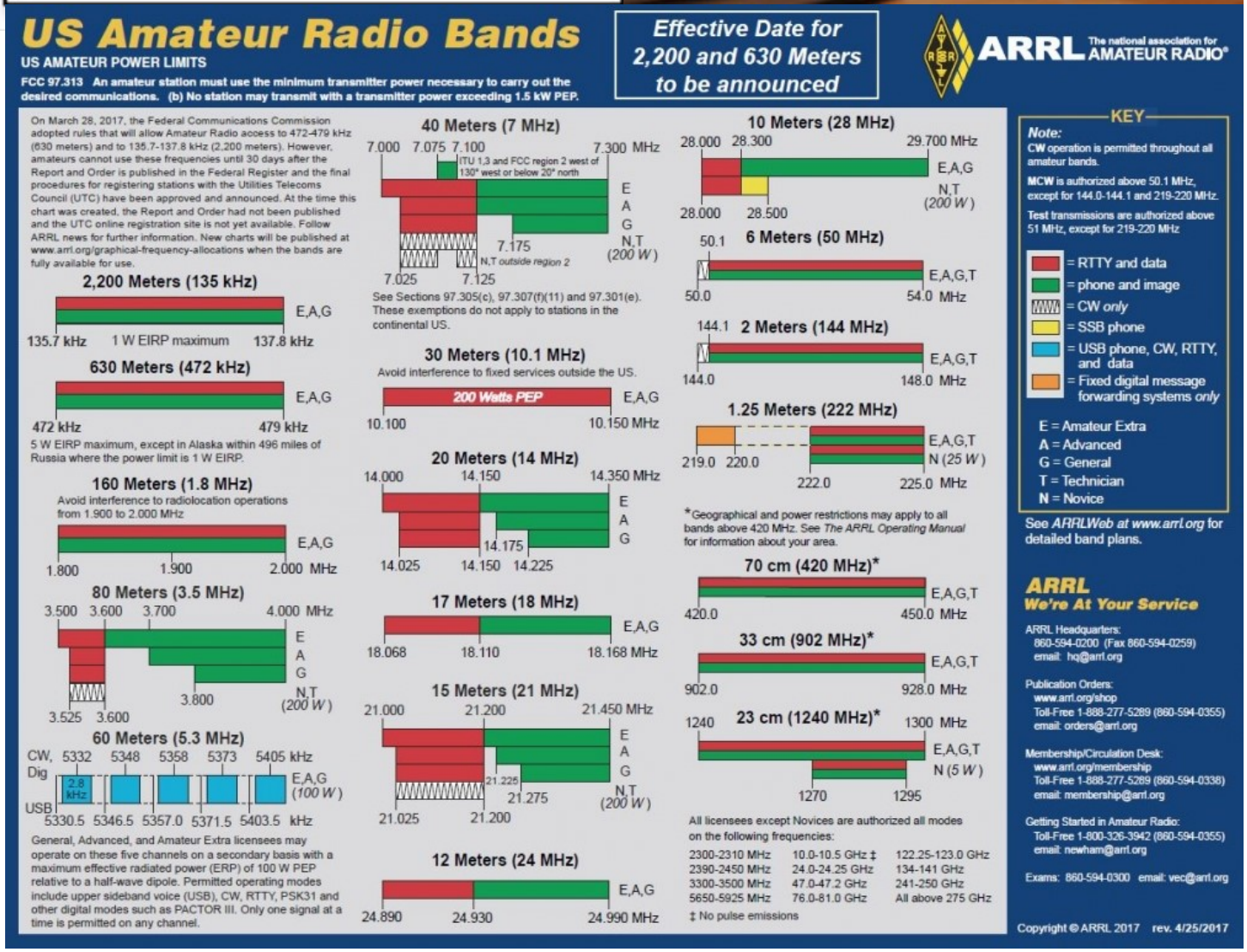
Rest in peace, dear Friend.

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	







NETS

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

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

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)

LSAC System – some may work/some may still be linked

147.330	plus	151.4	Proctor
147.270	plus	114.8	Two Harbors
147.270	plus	103.5	Wales
147.090	plus	114.8	Silver Bay
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
443.325	+5.00	146.2	Isanti

Rev. KCØWDQ as of 12/01/24 For ARAC Newsletter

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DULUTH AREA REPEATERS, continued

NARC System NAØRC

147.135	plus	103.5	Knife River
147.135	plus	114.8	Duluth (rcv)

Stand Alone Repeaters

145.210	minus	110.9	Clam Lake, WI
146.880	minus	123.0	Grand Rapids, MN
146.910	minus	146.2	Duxbury, MN
146.955	minus	146.2	Askov, MN
147.105	plus	110.9	Chaffey, WI
444.850	+5.00	141.3	Cloquet, MN

Fusion

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

147.150 plus 151.4 NTØB Gilbert. MN Fusion Repeater
145.170 minus 110.9 WA9KLM Superior, WI – Douglas County RACES/ARES Fusion Repeater (Digital only) Fusion Room 28373

145.250 minus 103.5 KBØYHX Cloquet, MN – Carlton County RACES/ARES Fusion Repeater

444.300 +5.00 103.5 NØEO Duluth, MN – 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
444.800	+5.00	103.5	NØLCR Grand Marais, MN – Wires X Connected to NØEO Room 40494
440.400	+5.00	110.9	WØLSA Maple, WI – Wires X Connected to NØEO Room 40494

D-Star

147.375	plus	NØEO D Star
442.200	plus	NØEO D Star

Rev. KCØWDQ as of 12/01/24 For ARAC Newsletter

Elmers

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

Name	Call 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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Wulf Gar **WU1FGR**
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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 KE0NQS.mn@gmail.com OR KE0NQT@gmail.com

Co-Editors,
Kim & Steve Waller
KEØNQS & KEØNQT

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

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

SEPTEMBER
CLUB EVENTS

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

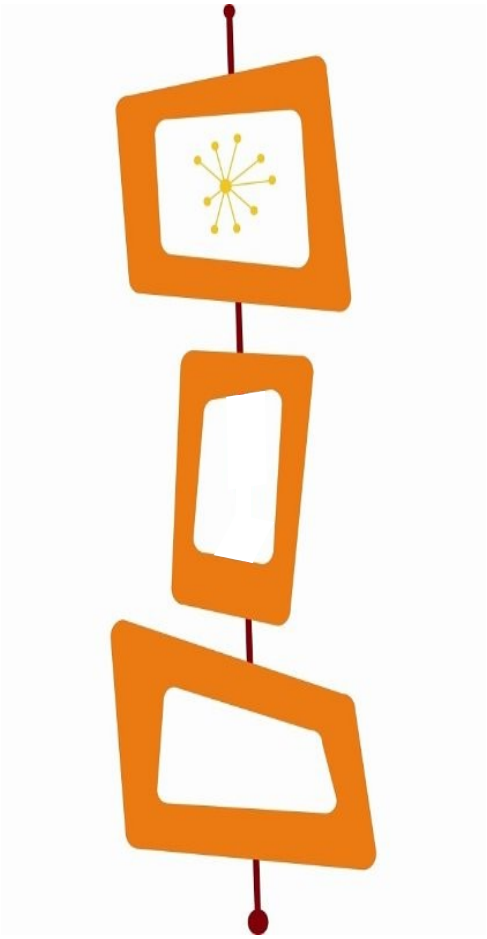
WEDNESDAY NIGHT NETS
19ØØ -**Lake County - LSAC1**
2nd & 4th Wednesdays
21ØØ -**BWAR**

	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 K9KDK** **ES 2100 WØNWO**	8 **Douglas County 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 21ØØ -**BWAR**	**11** **ARAC** **Club Meeting** **Coppertop Church** **7 PM**	12	**13**
14 **CW 1930 AAØAW** **USB 2000 KROB** **ES 2100 NØVRM**	15 **WX 2000 KCØMKS**	16 DC Net 2000 CC Net 2030	17 **St Louis County ARES/RACES Meeting 1800** 21ØØ -**BWAR**	18	19	20
21 **CW 1930 NØPDG** **USB 2000 NØVRM** **ES 2100 KEØYTM**	22 **WX 2000 KCØMKS**	23 DC Net 2000 CC Net 2030	24 Lake County Net 1900 21ØØ -**BWAR**	25 **Carlton County ARES/RACES Meeting** **1900 CC EOC**	26	27
28 **CW 1930 AAØAW** **USB 2000 NØPDG** **ES 2100 AAØAW**	29 **WX 2000 KCØMKS**	30 DC Net 2000 CC Net 2030				
						

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

Next Club Meeting:
September 11, 2025 - 7 pm
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 Chaplin:

Parliamentarian:
Grant Forsyth KCØWUP

Website:
Thomas Dorr KEØRHA

Membership:
Sam Frey KEØYTM

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

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.

result, Congress—who of course have the power of the purse—approved the Apollo program that very day, marking America's formal commitment to a manned lunar landing. And the man who resoundingly convinced Congress of the moon mission's imperative, was of course, **President John F. Kennedy**. But Kennedy knew he wasn't done. He would need to convince the American public to fund this endeavor in an unprecedented level for the rest of the decade and beyond. We would have to be unwaveringly committed in this goal to succeed. **NASA** began laying the groundwork for JFK's ambitious lunar program. When Kennedy felt it was time, he'd speak to the American people and inspire them to embrace it. June, July, and August of 1961 were filled with a flurry of initial briefings and decisions with **NASA** about the launch of the Gemini and Apollo programs. First and foremost, a site for a Mission Control Center would have to be found. On **July 7, 1961 NASA Administrator James E. Webb** established preliminary site criteria and formed a selection team. See below for a breakdown on the technical & logistical criteria, strategic & political factors, and the development focus:

MISSION CONTROL - MANNED SPACECRAFT CENTER (MSC) SITE SELECTION

NASA Technical and Logistical Criteria:

- a site with at least 1,000 acres of affordable land;
- a mild climate for year-round operations;
- all-weather commercial jet service (Houston's airport met this);
- barge transportation in ice-free waters (via the Houston Ship Channel for heavy equipment);
- proximity to a Department of Defense air base (Ellington Field);
- a nearby university (Rice University and the University of Houston for recruiting engineers and scientists).

Houston, Texas met all these, edging out top contender Tampa, Florida, which was near MacDill Air Force Base, but the base was unavailable due to "current military needs".

HISTORY NOTE: At the time, MacDill's "military needs" very much focused on having the base available to scramble jets toward Cuba, given Fidel Castro's cozy alliance with the Soviet Union and the massive April 1961 failure of the U.S.-backed Bay of Pigs operation by Cuban exiles to overthrow Castro. Cuba is just 90 miles south of the coast of Florida and 200 miles from Tampa.

Strategic and Political Factors:
Houston's growing aerospace industry and access to skilled labor were key. Texas politicians, including **Vice President Lyndon B. Johnson** and **Congressman Albert Thomas** (chairman of the House Appropriations Subcommittee on NASA), lobbied heavily. Thomas, a Houston Democrat and Johnson's protégé, influenced the decision through budget leverage, ensuring Texas's role in the Space Race with the Soviet Union. The site's isolation from urban areas minimized safety risks, while its Gulf Coast location supported water-based testing. Regardless of politics, Houston was ideal. In 1973, the **MSC** was renamed **The Lyndon B. Johnson Space Center (JSC)** in honor of the late president, who as Senate Majority Leader sponsored the **NASA Act** in 1958, creating **NASA**.

Development Focus: The **Manned Spacecraft Center** was designed for human spaceflight leadership, including the new Mission Control Center (MCC) to handle complex Gemini and Apollo missions. It shifted control from Cape Canaveral's inadequate facilities, enabling real-time monitoring, simulations, and integration with contractors like North American Aviation. By 1965, the MCC in Houston became the primary control hub for all U.S. human spaceflights, starting with Gemini 4.

Choosing Houston for the **Manned Spacecraft Center** was pivotal in the summer of 1961, solidifying the plan for centralizing human spaceflight operations, including mission control, astronaut training, and spacecraft development. Though the site would not break ground until the following spring, Gemini and Apollo mission teams moved forward with intensity. Here's a look at key lunar program activities from summer 1961 through

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the end of 1962. This is noteworthy because it was during this time that a lot of groundwork was laid with decisions about who and how the lunar landing program would work. This was the overarching design plan and decision time in our "race to the moon" program that would identify each component and form teams and phases. What's more, of course, the individual teams and phases obviously had to be designed to dovetail with other teams and phases to efficiently reach each milestone. We couldn't possibly discuss all of the amazing teams, but here are some foundational activities that occurred during the first 18 months:

- **May 25, 1961: President John F. Kennedy addressed Congress**, committing the U.S. to landing a man on the Moon by 1970, requesting $7–9 billion over five years to accelerate the Space Race against the Soviet Union post-Gagarin's orbit.
- **June 1961: Vice President Lyndon B. Johnson** consulted NASA, DOD, and industry leaders, confirming the Moon landing's feasibility by 1970 and fostering NASA-DOD collaboration for launch vehicles and tracking.
- **July 21, 1961: NASA launched Mercury-Redstone 4** with **Virgil "Gus" Grissom**, the second U.S. suborbital flight, testing recovery procedures critical for Gemini and Apollo missions.
- **July 28, 1961: NASA issued an RFP to 16 companies for Apollo spacecraft design**, initiating contractor involvement for the three-person lunar vehicle.
- **September 19, 1961: NASA selected Houston, Texas, for the Manned Spacecraft Center (MSC)** on 1,000 acres donated by Rice University, to centralize human spaceflight control, training, and development for Gemini and Apollo; operations began in temporary leased facilities.
- **November 28, 1961: NASA awarded North American Aviation (NAA) a $350 million contract** for Apollo command and service modules, chosen over Martin and Boeing for its Mercury experience, despite cost concerns.
- **December 7, 1961: NASA approved Project Gemini as a bridge between Mercury and Apollo**, focusing on two-person flights for rendezvous, docking, and extended missions; DOD tasked with Titan II modifications.
- **December 22, 1961: NASA contracted McDonnell Aircraft Corporation for Gemini spacecraft,** leveraging Mercury expertise, for $350 million, with the first prototype due in 1963.
- **January 3, 1962: NASA announced Project Gemini's objectives,** including long-duration flights, rendezvous with Lockheed-built Agena vehicles (NASA/DOD contract), and spacewalks for Apollo.
- **February 20, 1962: NASA launched Mercury-Atlas 6 with John Glenn**, the first U.S. orbital flight (three orbits), boosting morale and validating systems for Gemini adaptations.
- **March 31, 1962: NASA froze Gemini spacecraft design**, incorporating larger size, onboard propulsion, and Titan II compatibility, built by Martin Company under DOD contract.
- **April 16, 1962: NASA broke ground on the permanent Manned Spacecraft Center** in Houston's Clear Lake area, a 1,620-acre site. Construction, costing $100 million, included the Mission Control Center, astronaut training facilities, and spacecraft testing labs, completed in June 1964 for initial operations, with full functionality by 1965, enabling Gemini and Apollo mission oversight.
- **May 24, 1962: NASA launched Mercury-Atlas 7 with Scott Carpenter**, duplicating Glenn's three-orbit flight to gather human performance data for Gemini's endurance goals.
- **July 1962: NASA selected Lunar Orbit Rendezvous (LOR) for Apollo, championed by John Houbolt,** enabling a lightweight lunar lander; DOD provided input on launch vehicles.
- **September 12, 1962: President Kennedy delivered his "We Choose to Go to the Moon" speech at Rice University**, reaffirming the lunar goal to 40,000 attendees, emphasizing Houston's MSC role, and touring NASA facilities.
- **September 18, 1962: NASA selected nine new astronauts (the "New Nine"), including Neil Armstrong and Buzz Aldrin**, expanding the corps to 23 for Gemini and Apollo training.
- **October 3, 1962: NASA launched Mercury-Atlas 8 with Wally Schirra,** a six-orbit flight testing heat shield and systems for Gemini's reentry capabilities.
- **November 1962: Construction began on NASA's Launch Operations Center** (now Kennedy Space Center) at Merritt Island, Florida, under DOD collaboration for Saturn facilities; Kurt Debus appointed director.
- **November 21, 1962: President Kennedy met with NASA Administrator James Webb** at the White House to review Apollo progress, including Saturn rocket and contractor performance.
- **December 1962: Martin Company (DOD/NASA contract) delivered the first modified Titan II for Gemini**; NAA began fabricating Apollo mockups for testing.

By the end of 1962, the American public were definitely "on board" with President Kennedy vision for reaching the moon. His September 12, 1962 address to the nation was about 18 minutes long and broadcast live on

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on the three television networks ABC, CBS and NBC. These were free “over the air” television stations that broadcast to television “sets” in people’s homes. At the time, 50 million American homes had a television.

The sets were 19-23 inch cathode ray terminals with vacuum tubes and a tuner. A dipole television antenna on the roof of the home or building was often needed, but television sets also could be outfitted with a portable 2-rod antenna on top of the TV that telescoped and rotated for the viewer to adjust until clear “picture” and sound were achieved. Foil was commonly used to augment the 2-rod “rabbit ears” antenna for better reception.

Very few television sets came with remote controls; you selected VHF channels 2-13 and volume level by turning knobs on the front of the television set. Yes, if you wanted to change the channel or volume, you had to rise from where you were sitting and ***walk over to the television set*** to turn the knob to your desired selection. Also, there was no “mute button” on the front of the TV, to pop on and off momentarily in the event that the telephone rang and your mother or father yelled “I’m on the phone!”, which was their indication for you to turn the TV volume lower while they conversed on the telephone. After they “hung up” (manually placing the corded telephone receiver handle back onto the wall or desk cradle/base, there was ***no button to pop back on*** to reach your previously preferred volume. You had to recalibrate the knob back to a higher volume manually. In extended phone conversations, or early in the morning when your parents were still asleep, the custom was to sit very, very close to the television screen with the volume turned to an extremely low level that you felt would escape detection.

One last detail: In 1962 television was in “black and white”, so if you’ve ever seen an old black and white movie or TV show recording, that was what live broadcast images looked like too. I was not yet born in 1962 but I remember having my family own a black & white television with manual channel and volume knobs before switching to a “color television” with manual channel and volume knobs. I digress down memory lane. Back to President Kennedy’s live address to the nation on September 12, 1962:


Bell Telephone from the 1960s
Your phone number was printed on a round label

From Rice University Stadium, Kennedy delivered his iconic “We Choose to Go to the Moon” speech, committing the U.S. to landing humans on the Moon by 1970. 30-40 million homes listened to the

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18 minute speech, live via ABC, CBS and NBC. No matter what channel you chose to view, Kennedy's address was on.

Historical Context of the We Choose to Go to the Moon speech:
Leading up to this speech, the U.S. was already actively pursuing space exploration driven by the Cold War Space Race with the Soviet Union. The Soviet Union's April 1961 achievement of launching Yuri Gagarin in the first manned orbit aboard the Vostok I spacecraft logged a definite "Win" on the board for the Soviets. Shortly after this, the United States successfully launched Alan Shepard into suborbital flight on May 5, 1961. A milestone for the U.S. but still behind in the race.

The Soviets snagging this historical first (after the Soviets beat the U.S. with the successful orbit of the unmanned Sputnik in 1957, when Kennedy was still a Senator from Massachusetts) prompted Kennedy to seek the bold U.S. response of landing a man on the moon first. NASA had already initiated Project Mercury (1958–1963) to achieve human spaceflight, and Kennedy wanted build on this to fast-track the U.S. into a lunar landing program that propelled us to winning the race to the moon. To do this, he needed the American people to commit to funding that race with a blank check of "what ever it takes". He needed to capitalize on America's post-WWII prosperity and patriotic view that as a nation we could do anything that we put our mind to. Things that are hard. Things that others think are impossible.

"WE CHOOSE TO GO TO THE MOON IN THIS DECADE AND DO THE OTHER THINGS, NOT BECAUSE THEY ARE EASY, BUT BECAUSE THEY ARE HARD."

President John F. Kennedy
September 12, 1962

I encourage everyone to go online to read a transcript Kennedy's 2,505-word speech in its entirety, or listen to a video or audio recording of it. There are many sites to choose from, so I'll leave that up to you. Though the preamble comparing our relatively short human achievement time may be a little odd to some, there are plenty of great timeless (and timely!) quotes that resonate for us today. Here are a few:

"Those who came before us made certain that this country rode the first waves of the industrial revolutions, the first waves of modern invention, and the first wave of nuclear power, and this generation does not intend to founder [sink] in the backwash of the coming age of space. We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people.

"We choose to go to the Moon. We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too."

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"I think we're going to do it, and I think that we must pay what needs to be paid. I don't think we ought to waste any money, but I think we ought to do the job. And this will be done in the decade of the sixties. It may be done while some of you are still here at school at this college and university. It will be done during the term of office of some of the people who sit here on this platform. But it will be done. And it will be done before the end of this decade."

"Many years ago the great British explorer George Mallory, who was to die on Mount Everest, was asked why did he want to climb it. He said, "Because it is there." Well, space is there, and we're going to climb it, and the Moon and the planets are there, and new hopes for knowledge and peace are there. And, therefore, as we set sail we ask God's blessing on the most hazardous and dangerous and greatest adventure on which man has ever embarked."

President John F. Kennedy's vision of America landing a man on the moon and safely returning was realized July 16-24, 1969. Apollo 11 launched from Kennedy Space Center, Florida and returned to earth by safely splashing down in the North Pacific. Though sadly Kennedy would not live to see it, he would forever be remembered in the hearts of Americans for casting the bold vision to achieve this historic milestone.

The mission was crewed by **Neil A. Armstrong** (Commander), **Edwin E. "Buzz" Aldrin Jr.** (Lunar Module Pilot), and **Michael Collins** (Command Module Pilot).

Launching on July 16, 1969, aboard a Saturn V rocket, the spacecraft entered lunar orbit on July 19 following a 76-hour journey. On July 20, Armstrong and Aldrin descended in the **Lunar Module "Eagle,"** landing in the Sea of Tranquility, where Armstrong took his first step at 10:56 PM EDT declaring, **"That's one small step for man, one giant leap for mankind."**

The official NASA Apollo 11 crew portrait for the first mission to land humans on the moon, taken on May 24,1969. From left to right, Commander Neil A. Armstrong, Command Module Pilot Michael Collins and Lunar Module Pilot Edwin "Buzz" E. Aldrin, Jr.

The pair spent 2 hours, 31 minutes on the surface, collecting 47.5 pounds of lunar material and conducting experiments. They lifted off on July 21, rendezvousing with Collins in lunar orbit.

The mission concluded on July 24 with a splashdown 900 miles southwest of Hawaii, where Navy divers from the **USS Hornet** retrieved the astronauts via helicopter hoist, marking the triumphant full circle fulfillment of Kennedy's 1962 inspirational declaration "We Choose to Go to the Moon".

A riveted American public tuned in to see the extraordinary event.

On July 20, 1969, at 10:56 p.m. EDT. Neil Armstrong's historic first step on the Moon was broadcast live to the American public via the three major television networks—ABC, CBS, and NBC—capturing a moment that united the nation.

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CBS was anchored by the legendary **Walter Cronkite**, who had covered space missions for years and provided emotional commentary; NBC featured **John Chancellor** as the lead anchor, known for his calm delivery; and ABC was led by **Jules Bergman**, the network's science editor, alongside **Frank Reynolds** for on-air narration. The coverage for the moonwalk segment lasted approximately three hours, from the Lunar Module's landing at 4:17 p.m. EDT through the extravehicular activity (EVA) and President Nixon's phone call to the astronauts, as part of a broader 31-hour "TV super-special" across the networks from launch to splashdown.

An estimated 125–150 million Americans tuned in live, representing about 94% of households with televisions at the time, while worldwide viewership reached around 600 million, including non-Americans across 91 countries via satellite relays, making it one of the most watched events in history.

Technology for Live Broadcast of Armstrong's First Step

Capture Technology

Video: The lunar surface video was captured using a Westinghouse Apollo Lunar Surface Close-up Camera (ALSCC), a lightweight black-and-white slow-scan TV camera with 10 frames per second and 320-line resolution, mounted on the Modularized Equipment Stowage Assembly (MESA) of the Lunar Module "Eagle." Armstrong activated it manually after stepping onto the Moon at 10:56 PM EDT on July 20, 1969, providing a wide-angle view. A second camera, the Lunar Surface TV Camera, was deployed later by Aldrin for higher-quality footage.

Audio: Audio was recorded via the astronauts' helmets, equipped with microphones connected to the Lunar Module's communication system. This captured Armstrong's voice, transmitted through the astronauts' suits to the spacecraft.

Transmission Process

Moon to Earth: The video and audio signals were sent from the Lunar Module's high-gain S-band antenna to Earth, using a 2.1-meter dish operating at 2,287.5 MHz. The signal was received by three 64-meter Deep Space Network (DSN) antennas: Goldstone (California), Parkes (Australia), and Honeysuckle Creek (Australia), managed by NASA's Jet Propulsion Laboratory (JPL).

Houston Mission Control: The DSN stations relayed the signal to the Manned Spacecraft Center (MSC) in Houston via microwave links and AT&T's long-distance network. At MSC, the slow-scan video (incompatible with commercial TV standards) was converted to NTSC format (525 lines, 30 fps) using a scan converter, and audio was synchronized.

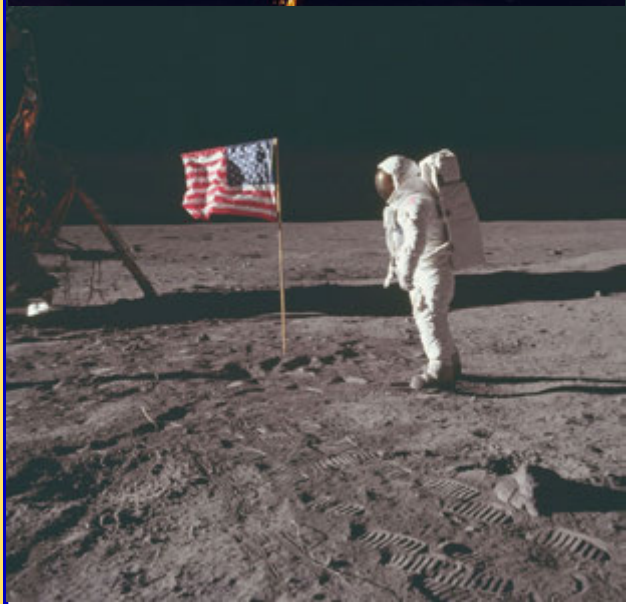
Broadcast to Networks: The processed signal was transmitted from Houston to ABC, CBS, and NBC via AT&T's terrestrial microwave and coaxial cable network, reaching network studios for live airing to 35–40 million viewers on black-and-white TVs.

How It Worked

The handheld aspect came from Armstrong's manual camera activation and movement, though the primary feed was fixed. The signal traveled 238,855 miles from the Moon, was downlinked by DSN, converted at Houston, and uplinked to networks, all in real-time for the July 20, 1969, broadcast.

Time Delays

Moon to Houston: The one-way light speed delay from the Moon to Earth is approximately 1.28 seconds (due to the 238,855-mile distance divided by the speed of light, 186,282 miles per second). This accounts for the signal's travel time to the DSN and relay to Houston.
Houston to TVs: The additional delay from Houston to network studios and then to home TVs was minimal, about 0.1–0.2 seconds, due to microwave and cable transmission across the U.S. Total delay from Moon to viewer was roughly 1.4–1.5 seconds, noticeable but not disruptive for live viewing.



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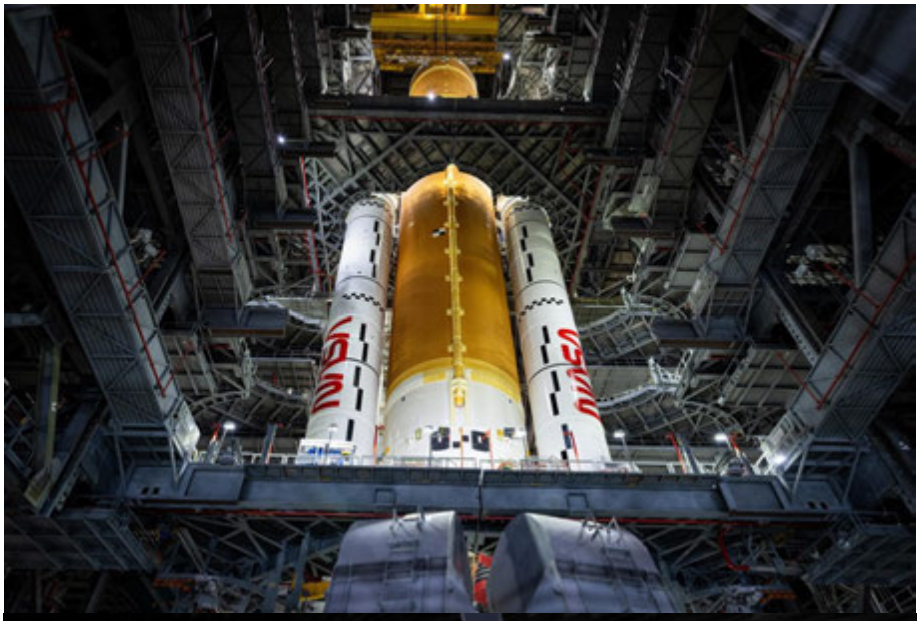
We find ourselves at another pivotal time in history. In the spirit of American ingenuity and unyielding determination that propelled us to the moon in the Apollo era, the United States stands poised once again on the cusp of lunar triumph through NASA's ambitious **Artemis** program, an exciting project that promises to solidify our place as the world's preeminent spacefaring nation. Launched in 2017, Artemis is not merely a mission, but is perhaps a patriotic renaissance, forging a sustainable human presence on the Moon to unlock its resources, inspire future generations, and secure America's dominance in the new Space Race as we surge ahead with unmatched innovation.

With **Artemis II set for April 2026**—a crewed flight around the Moon aboard the **Space Launch System (SLS) rocket** and **Orion spacecraft**, carrying astronauts **Reid Wiseman**, **Victor Glover**, **Christina Koch**, and **Jeremy Hansen**—NASA is building momentum toward **Artemis III** in mid-2027. In that mission, American astronauts are slated to step onto the lunar south pole, harnessing water ice for fuel and life support.



NASA Images of Artemis II

Bolstered by the One Big Beautiful Bill Act signed by **President Donald J. Trump** on July 4, 2025, which injects $10 billion into **NASA** including $4.1 billion for **SLS rockets** and $2.6 billion for the **Lunar Gateway station,** the program exemplifies our nation's resolve to lead humanity's expansion into space.

As President Trump declared in a recent address, **"We're going back to the Moon, bigger and better than ever, to win the second space race and pave the way to Mars—America first, always!"**

This era of hope, fueled by public-private partnerships with trailblazers like **SpaceX's Starship** and **Blue Origin**, heralds a future where the Stars and Stripes flies eternally on the lunar surface, inspiring every American to dream big and reach for the impossible.

I believe that **President John F. Kennedy** would be proud.

We hope you enjoyed this article about our lunar program 'then & now". In 2026 we'll be sure to cover more detail about America's current program to return to the moon. If you have recollections of the Apollo lunar program or opinions about the Artemis program, let us know by emailing us at ke0nqs.mn@gmail.com and we'll share your contribution in a future edition of the Relay.★

Contest Calendar - August 2025

+ K1USN Slow Speed Test	0000Z-0100Z, Sep 1
+ ICWC Medium Speed Test	1300Z-1400Z, Sep 1
+ OK1WC Memorial (MWC)	1630Z-1729Z, Sep 1
+ ICWC Medium Speed Test	1900Z-2000Z, Sep 1
+ RSGB 80m Autumn Series, SSB	1900Z-2030Z, Sep 1
+ MI QRP Labor Day CW Sprint	2300Z, Sep 1 to 0300Z, Sep 2
+ ARS Spartan Sprint	0000Z-0200Z, Sep 2
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Sep 2
+ ICWC Medium Speed Test	0300Z-0400Z, Sep 2
+ Phone Weekly Test	0230Z-0300Z, Sep 3
+ A1Club AWT	1145Z-1300Z, Sep 3
+ CWops Test (CWT)	1300Z-1400Z, Sep 3
+ Mini-Test 40	1700Z-1759Z, Sep 3
+ VHF-UHF FT8 Activity Contest	1700Z-2100Z, Sep 3
+ Mini-Test 80	1800Z-1859Z, Sep 3
+ CWops Test (CWT)	1900Z-2000Z, Sep 3
+ UKEICC 80m Contest	2000Z-2100Z, Sep 3
+ Walk for the Bacon QRP Contest	0000Z-0100Z, Sep 4 and 0200Z-0300Z, Sep 5
+ CWops Test (CWT)	0300Z-0400Z, Sep 4
+ CWops Test (CWT)	0700Z-0800Z, Sep 4
+ NRAU 10m Activity Contest	1700Z-1800Z, Sep 4 (CW) and 1800Z-1900Z, Sep 4 (SSB) and 1900Z-2000Z, Sep 4 (FM) and 2000Z-2100Z, Sep 4 (Dig)
+ SKCC Sprint Europe	1900Z-2100Z, Sep 4
+ NCCC FT4 Sprint	0100Z-0130Z, Sep 5
+ Weekly RTTY Test	0145Z-0215Z, Sep 5
+ NCCC Sprint Ladder	0230Z-0300Z, Sep 5

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Contest Calendar - September 2025

+ K1USN Slow Speed Test	2000Z-2100Z, Sep 5
+ CWOps CW Open	0000Z-0359Z, Sep 6
+ All Asian DX Contest, Phone	0000Z, Sep 6 to 2400Z, Sep 7
+ Wake-Up! QRP Sprint	0600Z-0629Z, Sep 6 and 0630Z-0659Z, Sep 6 and 0700Z-0729Z, Sep 6 and 0730Z-0800Z, Sep 6
+ SARL Field Day Contest	0800Z, Sep 6 to 1000Z, Sep 7
+ SARL VHF/UHF FM Contest	0800Z, Sep 6 to 1000Z, Sep 7
+ CWOps CW Open	1200Z-1559Z, Sep 6
+ Russian RTTY WW Contest	1200Z, Sep 6 to 1159Z, Sep 7
+ AGCW Straight Key Party	1300Z-1600Z, Sep 6
+ RSGB SSB Field Day	1300Z, Sep 6 to 1300Z, Sep 7
+ IARU Region 1 Field Day, SSB	1300Z, Sep 6 to 1259Z, Sep 7
+ IARU Region 1 145 MHz Contest	1400Z, Sep 6 to 1400Z, Sep 7
+ Ohio State Parks on the Air	1400Z-2200Z, Sep 6
+ CWOps CW Open	2000Z-2359Z, Sep 6
+ PODXS 070 Club Jay Hudak Memorial 80m Sprint	2000Z, Sep 6 to 2000Z, Sep 7
+ WAB 144 MHz Phone	1000Z-1400Z, Sep 7
+ Tennessee QSO Party	1700Z, Sep 7 to 0300Z, Sep 8
+ K1USN Slow Speed Test	0000Z-0100Z, Sep 8
+ ICWC Medium Speed Test	1300Z-1400Z, Sep 8
+ OK1WC Memorial (MWC)	1630Z-1729Z, Sep 8
+ ICWC Medium Speed Test	1900Z-2000Z, Sep 8
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Sep 9
+ ICWC Medium Speed Test	0300Z-0400Z, Sep 9
+ DARC CW-Training Contest	1800Z-1859Z, Sep 9
+ Phone Weekly Test	0230Z-0300Z, Sep 10
+ A1Club AWT	1145Z-1300Z, Sep 10

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Contest Calendar - September 2025

+ CWops Test (CWT)	1300Z-1400Z, Sep 10
+ Mini-Test 40	1700Z-1759Z, Sep 10
+ VHF-UHF FT8 Activity Contest	1700Z-2100Z, Sep 10
+ Mini-Test 80	1800Z-1859Z, Sep 10
+ CWops Test (CWT)	1900Z-2000Z, Sep 10
+ RSGB 80m Autumn Series, CW	1900Z-2030Z, Sep 10
+ CWops Test (CWT)	0300Z-0400Z, Sep 11
+ CWops Test (CWT)	0700Z-0800Z, Sep 11
+ NCCC FT4 Sprint	0100Z-0130Z, Sep 12
+ Weekly RTTY Test	0145Z-0215Z, Sep 12
+ NCCC Sprint Ladder	0230Z-0300Z, Sep 12
+ K1USN SST Open	2000Z-2359Z, Sep 12
+ WAE DX Contest, SSB	0000Z, Sep 13 to 2359Z, Sep 14
+ ARRL EME Contest	0000Z, Sep 13 to 2359Z, Sep 14
+ SKCC Weekend Sprintathon	1200Z, Sep 13 to 2400Z, Sep 14
+ Africa FT4 DX Contest	1500Z-1800Z, Sep 13
+ ARRL September VHF Contest	1800Z, Sep 13 to 0300Z, Sep 15
+ North American Sprint, CW	0000Z-0400Z, Sep 14
+ IRTS 70cm Counties Contest	1300Z-1330Z, Sep 14
+ IRTS 2m Counties Contest	1330Z-1500Z, Sep 14
+ K1USN Slow Speed Test	0000Z-0100Z, Sep 15
+ 4 States QRP Group Second Sunday Sprint	0000Z-0200Z, Sep 15
+ ICWC Medium Speed Test	1300Z-1400Z, Sep 15
+ OK1WC Memorial (MWC)	1630Z-1729Z, Sep 15
+ ICWC Medium Speed Test	1900Z-2000Z, Sep 15
+ RSGB FT4 Contest	1900Z-2100Z, Sep 15
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Sep 16
+ ICWC Medium Speed Test	0300Z-0400Z, Sep 16
+ Phone Weekly Test	0230Z-0300Z, Sep 17

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Contest Calendar - September 2025

+ A1Club AWT	1145Z-1300Z, Sep 17
+ CWops Test (CWT)	1300Z-1400Z, Sep 17
+ Mini-Test 40	1700Z-1759Z, Sep 17
+ VHF-UHF FT8 Activity Contest	1700Z-2100Z, Sep 17
+ Mini-Test 80	1800Z-1859Z, Sep 17
+ CWops Test (CWT)	1900Z-2000Z, Sep 17
+ Walk for the Bacon QRP Contest	0000Z-0100Z, Sep 18 and 0200Z-0300Z, Sep 19
+ NAQCC CW Sprint	0030Z-0230Z, Sep 18
+ CWops Test (CWT)	0300Z-0400Z, Sep 18
+ CWops Test (CWT)	0700Z-0800Z, Sep 18
+ BCC QSO Party	1800Z-1959Z, Sep 18
+ NTC QSO Party	1900Z-2000Z, Sep 18
+ NCCC FT4 Sprint	0100Z-0130Z, Sep 19
+ Weekly RTTY Test	0145Z-0215Z, Sep 19
+ NCCC Sprint	0230Z-0300Z, Sep 19
+ AGB NEMIGA Contest	1600Z-1700Z, Sep 19
+ K1USN Slow Speed Test	2000Z-2100Z, Sep 19
+ ARRL 10 GHz and Up Contest	0900Z, Sep 20 to 0759Z, Sep 22
+ Scandinavian Activity Contest, CW	1200Z, Sep 20 to 1200Z, Sep 21
+ Iowa QSO Party	1400Z, Sep 20 to 0200Z, Sep 21
+ New Jersey QSO Party	1400Z, Sep 20 to 0159Z, Sep 21
+ Texas QSO Party	1400Z, Sep 20 to 0200Z, Sep 21 and 1400Z-2000Z, Sep 21
+ QRP Afield	1500Z-2100Z, Sep 20
+ Wisconsin Parks on the Air	1600Z-2300Z, Sep 20
+ New Hampshire QSO Party	1600Z, Sep 20 to 0400Z, Sep 21 and 1200Z-2200Z, Sep 21
+ Washington State Salmon Run	1600Z, Sep 20 to 0700Z, Sep 21 and 1600Z-2400Z, Sep 21

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Contest Calendar - September 2025

+ Feld Hell Sprint	1800Z-1959Z, Sep 20
+ North American Sprint, RTTY	0000Z-0400Z, Sep 21
+ BARTG Sprint PSK63 Contest	1700Z-2059Z, Sep 21
+ ARS Flight of the Bumblebees	1700Z-2100Z, Sep 21
+ Run for the Bacon QRP Contest	2300Z, Sep 21 to 0100Z, Sep 22
+ K1USN Slow Speed Test	0000Z-0100Z, Sep 22
+ ICWC Medium Speed Test	1300Z-1400Z, Sep 22
+ OK1WC Memorial (MWC)	1630Z-1729Z, Sep 22
+ ICWC Medium Speed Test	1900Z-2000Z, Sep 22
+ 144 MHz Fall Sprint	2300Z, Sep 22 to 0600Z, Sep 23
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Sep 23
+ ICWC Medium Speed Test	0300Z-0400Z, Sep 23
+ SKCC Sprint	0000Z-0200Z, Sep 24
+ Phone Weekly Test	0230Z-0300Z, Sep 24
+ A1Club AWT	1145Z-1300Z, Sep 24
+ CWops Test (CWT)	1300Z-1400Z, Sep 24
+ Mini-Test 40	1700Z-1759Z, Sep 24
+ Mini-Test 80	1800Z-1859Z, Sep 24
+ CWops Test (CWT)	1900Z-2000Z, Sep 24
+ UKEICC 80m Contest	2000Z-2100Z, Sep 24
+ CWops Test (CWT)	0300Z-0400Z, Sep 25
+ CWops Test (CWT)	0700Z-0800Z, Sep 25
+ RSGB 80m Autumn Series, Data	1900Z-2030Z, Sep 25
+ NCCC FT4 Sprint	0100Z-0130Z, Sep 26
+ Weekly RTTY Test	0145Z-0215Z, Sep 26
+ NCCC Sprint	0230Z-0300Z, Sep 26
+ K1USN Slow Speed Test	2000Z-2100Z, Sep 26
+ Bill Windle QSO Party	0000Z-2359Z, Sep 27
+ CQ Worldwide DX Contest, RTTY	0000Z, Sep 27 to 2400Z, Sep 28

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+ Maine QSO Party	1200Z, Sep 27 to 1200Z, Sep 28
+ YU DX Contest	1200Z, Sep 27 to 1159Z, Sep 28
+ Masonic Lodges on the Air	1400Z-2200Z, Sep 27
+ AGCW VHF/UHF Contest	1400Z-1700Z, Sep 27 (144) and 1700Z-1800Z, Sep 27 (432)
+ AWA Amplitude Modulation QSO Party	2000Z, Sep 27 to 2400Z, Sep 28
+ UBA ON Contest, 6m	0700Z-1000Z, Sep 28
+ K1USN Slow Speed Test	0000Z-0100Z, Sep 29
+ QCX Challenge	1300Z-1400Z, Sep 29
+ ICWC Medium Speed Test	1300Z-1400Z, Sep 29
+ OK1WC Memorial (MWC)	1630Z-1729Z, Sep 29
+ ICWC Medium Speed Test	1900Z-2000Z, Sep 29
+ QCX Challenge	1900Z-2000Z, Sep 29
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Sep 30
+ ICWC Medium Speed Test	0300Z-0400Z, Sep 30
+ QCX Challenge	0300Z-0400Z, Sep 30
+ 222 MHz Fall Sprint	2300Z, Sep 30 to 0600Z, Oct 1

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

Visit Bruce at www.contestcalendar.com/contestcal.html

The ARAC RELAY

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