



**Our April General Meeting
was on Wednesday, April 20th,
via Zoom, at 6:30 pm.**

Frank Skinner (K0J0Z), presented about
MARS—the Military Auxiliary
Radio System.



For more meeting info, please see page 2!

**April Meeting was on Zoom on
Wed, March 16th, at 6:30 pm.**

[https://us06web.zoom.us/j/81928642821?
pwd=WxNStjdEdHd5emZaaDRaaENQdnFWZz09](https://us06web.zoom.us/j/81928642821?pwd=WxNStjdEdHd5emZaaDRaaENQdnFWZz09)

See p. 2 for more info.



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April General Membership Meeting

Our General Meeting was on Wednesday, April 20th, at 6:30 pm.

Frank Skinner (K0J0Z), spoke about the Military Auxiliary Radio System (MARS).

Some requests for when you join our meetings:

- When you fill out your name, *please add your call sign after your first name.* (Example: Chuck (K0ITP) Poch). If you don't have a call sign yet, just put "no call." *You can change your name field with the 3 little dots at the top right corner of your screen.*
- You will be muted automatically. (If you need help getting in, call out on our club repeater via VHF, UHF, or on EchoLink). Be sure to have your video going and your volume up, so we can see, hear, and interact with you!

The Zoom meeting started at 6:30 pm with social time, ask an Elmer, meet a Board member, and general questions. The *actual meeting* begins at 7:00 pm, with intros and club business, and then the presentation began at approximately 7:15 pm.

Going forward, this Zoom info will be the same for all Monthly General Meetings.

Our Zoom Meetings are held and found on this link:

[https://us06web.zoom.us/j/81928642821?
pwd=WXNSTjdEdHd5emZaaDRaaENQdnFWZz09](https://us06web.zoom.us/j/81928642821?pwd=WXNSTjdEdHd5emZaaDRaaENQdnFWZz09)

Meeting ID: 819 2864 2821

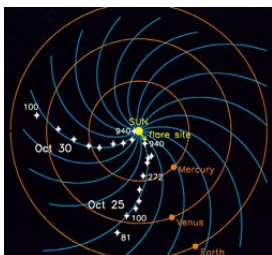
Passcode: 787437

Find your local number: [https://us06web.zoom.us/j/
kcsybGuZpe](https://us06web.zoom.us/j/kcsybGuZpe).

If you have to miss this meeting, you can see our meetings at
<https://w0eno.org/meeting-presentations/>



Ham Jargon



Interplanetary Magnetic Field

Portion of the solar magnetic field that is carried by the solar wind among the planets of the solar system. It is another name for the Sun's magnetic field.

From <https://www.windows2universe.org/>.

LARC's YouTube Channel

Check out videos of many of our previous meetings and activities at:

<https://www.youtube.com/channel/UC0bX61lXfLHEvix6msKzITg> or by going to the club web site at w0eno.org and selecting Presentations. Subscribe to our channel so you don't miss out!

If you miss a meeting or you don't drive after dark, you will still be able to watch them here!



Help Support your Club with your Online Shopping! *

Did you know your purchases can make a difference? *When you shop for anything at smile.amazon.com/ch/84-1056239, Amazon Smile donates to the Longmont Amateur Radio Club — at no cost to you!* Last quarter, they sent LARC \$38 as their donation from our members' shopping. Every last dollar helps! *You can also just click on the picture below to log into your Amazon account to shop and to help your Club at the same time.*



When you go to this link, you enter your own username and password, just like you normally do. You can also go to smile.amazon.com and select Longmont Amateur Radio Club. *Shopping with this Amazon link doesn't cost you anything – Amazon provides this donation, and every little bit helps our club!*

** Currently only 8 LARC members/families are using this link — please join them to help raise funds for our club repeaters and activities!*

Useful Ham Radio Web Site

<https://www.windows2universe.org/>

A very interesting site brought to you by the National Earth Science Teachers Association. This site contains a lot of information on many areas of science. Also do a search with the word "radio," and you'll find more relevant info to our hobby.

“April is the kindest month. April gets you out of your head and out working in the garden.” - Marty Rubin. “where I grow antennas!” - KØITP

LARC is keeping up with what is going on with Covid-19. Currently Boulder County is open with no mask requirements. With that said, the board is looking to get meetings back face-to-face. We have some planning to do to get hybrid (both virtual and in-person) meetings going, so let the work begin!

We have several upcoming events. Keep an eye on the website and emails for information.

April 23—Fox Hunt. See website for details.

Join the Tuesday night and Thursday night nets for fun and educational talk! Want to try being a net control station (NCS)? Contact Jerry (NØ0UW) or me for details! We have a challenge for you!

Do you have an idea for a presentation, or do you know someone who would like to present to your club? Contact a board member and let's get them in front of your club! We are looking for presenters for our 2022 General Meetings.

Keep your ideas coming for new events and/or activities for the club. I ask that if you have an idea, that if you could run it (with help if needed), it would be a big help to make it successful.

I always mention the appreciation award I do for our club members. If you know someone who deserves an extra “Thank you” or “Above and Beyond,” please let me know! I’m looking for recipients for our 2022 awards and recognition. Please tell me your thoughts.

Congratulations to the 2022 Above and Beyond recipient so far:

- January “Above & Beyond” recipient Steve Shearer (KØSTE) - for all the monetary and volunteer hours you put in to support the club.
- February — n/a
- March—n/a
- April “Above & Beyond” recipient Doug Altman (KEØSI) - for all his service as Event Planner for our Club through many years.
- May — tbd
- The rest of the months for 2022 — tbd

Who can YOU recommend for their service to LARC?

I have always said that this is your club. How can you help? We’re looking for individuals to help with committees and general volunteering for our LARCFest 2023 Committee (already in planning stage), Christmas Party, and other club events. If you can help or want to become more involved with your club, please [contact a board member](#).

As always, please contact me with any questions, comments, suggestions, or concerns.

Thank you and 73,
Charles Poch - KØITP
LARC President
KØITP@WØENO.ORG





Take our Poll!

Please take LARC's quick and fun Poll by answering this question. Feel free to add any comments you would like.

After you have finished and submitted it, you will be given the option to see a summary of all the responses so far. Your answers and identity are completely anonymous if you wish. Please select the answers that apply! If clicking on the polls below doesn't take you to the poll, please go to: <https://vote.pollcode.com/59945695>

Net — Tuesday Night Hamlet Net, 7:00 pm

The Club sponsors an informal net for newer ham radio operators on Tuesday evenings at 7:00 pm. Learn how to use nets, ask questions, discuss ham radio topics, get familiar with your radio & make new friends on the club's linked repeaters on 147.270 and 448.800 MHz, Tuesday nights at 7:00 pm. *For more information about this net, click on the title above.*

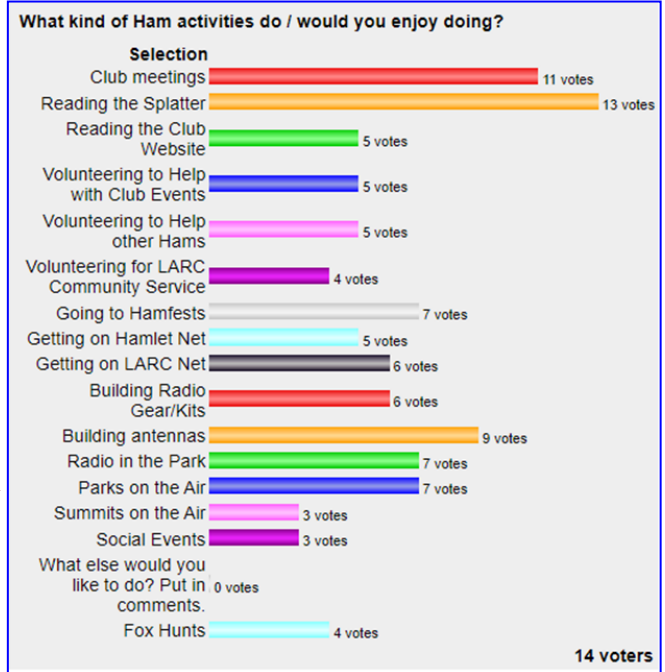
You can also reach our nets on the internet via [EchoLink!](#)

Net — Thursday Night Club Net, 8:00 pm

The Club also sponsors an informal net each week on Thursday evenings at 8:00 pm to chat about whatever is on your mind and to announce upcoming Amateur Radio Club activities. You will find the net on 147.270 and 440.800 MHz on Thursday nights at 8:00 pm. *Click on the title above for more information.*

STAY CONNECTED TO YOUR FELLOW HAMS! GET ON OUR NETS!

Feb. Poll Results — Thanks for voting!



In which ham activities do you participate regularly?

- Chasing DX
- Rag Chewing
- Contests/Sprints
- Kit Building
- Antenna Design/Testing
- Helping other hams
- LARC Activities
- Earning Awards
- Homebrew from scratch
- County hunting
- State hunting
- Country hunting
- Continent hunting

[pollcode.com](https://vote.pollcode.com/59945695) [free polls](#)

Take our April Poll Now! It will only take about 2 minutes!

Because we only had 9 votes, I'm running our March Poll again! Please Vote if you haven't yet — Inquiring minds want to know!



TAKE OUR APRIL POLL!

Either click on the poll on the left, or go to: <https://vote.pollcode.com/59945695>

We want to know your thoughts! Please also add your comments!

Upcoming Special Events and Contests

Here are some selected upcoming QSO Parties and Special Events that you could get on to pass the time this spring. See the links below for more information, rules, logs, and QSL card information. They all present a great opportunity to get on the air and have some fun, and are great for beginners as well! Plan your calendar! Lots of radio fun coming right up!

Start Date	End Date	More Info
04/21	04/24	San Jacinto Day https://w5nac.com/
04/23	04/27	50th Anniv of Apollo 16 https://nasaontheair.wordpress.com/
04/24	04/24	North American SSB Sprint Contest http://ssbsprint.com/rules/
04/30	04/30	Whiskey 4 Moonshine https://whiskey4moonshine.wordpress.com
04/30	05/01	Florida QSO Party http://floridaqsoparty.org/rules/
05/07	05/07	Wings over the Rockies B29/Warbirds Fly-In https://www.parkerradio.org/event/wings-over-the-rockies-special-event-station-2/
05/07	05/08	ARI International DX Contest http://www.ari.it/
05/07	05/08	7th Call Area QSO Party http://7qp.org
05/07	05/08	Indiana QSO Party http://www.hdxcc.org/inqp/rules.html
05/07	05/08	Delaware QSO Party http://www.fsarc.org/qsoparty/rules.htm
05/07	05/08	New England QSO Party https://neqp.org/rules/
05/07	05/10	Golden Spike Special Event Station http://ogdenarc.org/w7g.php
05/14	05/15	103rd Anniv of Peace Conference https://www.theworldwar.org/amateurradio
05/14	05/15	Canadian Prairies QSO Party https://cpqp.ve6hams.ca/
05/14	05/15	CQ-M International DX Contest http://cqm.srr.ru/en-rules/
05/19	05/19	NTC QSO Party https://qsl.net/ntc/party.html
05/21	05/21	UN DX Contest http://undxc.kz/rules-eng/
05/21	05/21	YOTA Contest https://www.ham-yota.com/contest/
05/21	05/22	Arkansas QSO Party http://www.arkqp.com/
05/14	05/14	Armed Forces Day Crossband Test https://www.dodmars.org
05/15	05/21	National Police Week—Honor our Fallen Heroes www.qrz.com/db/k3fbi
05/16	05/31	Memorial Day 2022 https://www.qrz.com/db/kc5nx
05/21	05/21	Armed Forces Day www.qrz.com/db/w5kid

- You can see much more QSO Party and Contest Information at:
<https://www.contestcalendar.com/contestcal.html>
- You can see many more Special Event station information and dates at:
http://www.arrl.org/special_events/search/page:1/model:Event
- To learn more about having fun with QSO Parties, take a look at this link:
<http://www.arrl.org/files/file/QST/This%20Month%20in%20QST/April2019/KENNEDY.pdf>

2022 BOARD OF DIRECTORS

President: Charles Poch, K0ITP
Vice President: Michael Ritchie, W0KKI
Secretary: Pat Engstrom, W1PGE
Treasurer: Don Lewis, KE0EE

ADDITIONAL VOLUNTEERS:

Membership: Steve Shearer, K0STE
Technical: Mark Skelton, N7CTM and
Bryan Gonderinger, AF0W
Publicity: Steve Haverstick, KF0AGY
Splatter Editor: Kat Gonderinger, W0UM
Planning/Special Events: Doug Altman,
KE0SI & Mark Mollenauer, KD0GOC
BCARES Representative: Jerry Schmidt,
N0OUW
Repeater Trustee: Bryan, AF0W
Education: Kat, W0UM & Bryan, AF0W
LARCfest Chair: Dick Paige, KE0VT
VE Team Leads: Aaron, AJ7R & Kat, W0UM

Contact Us:

Email to: board@w0eno.org will reach all members of the Board.

Board meetings are held on the first Wednesday of each month at 6:30 pm. General Club meetings are held on the third Wed. of each month at 6:30 pm.

Current Club meetings are held online using Zoom and are open to all. Join us!

If you have a suggestion for a topic or for a guest speaker, or would like to present a topic yourself, please send email to [Chuck, K0ITP](mailto:Chuck.K0ITP).

If you have a general interest article about ham radio that you would like to see in a future issue of Splatter, please email it to [Kat, the Splatter Editor](mailto:Kat,theSplatterEditor).

Articles received by the 25th of the previous month will be considered for publication in the issue for that month.

Longmont Amateur Radio Club
P.O. Box 86
Longmont, CO 80502

LARC is a non-profit organization organized exclusively for one or more of the purposes as specified in Section 501 (c)(3) of the Internal Revenue Code Vol. 17. No.6.

Repeaters:

VHF:

147.270 MHz (+) 600 kHz, 100 Hz CTCSS

UHF:

448.800 MHz (-) 5 MHz, 88.5 Hz CTCSS

Echolink:

W0ENO-R, Station #8305

Visit & Post on our Facebook Page!

Our club has a Facebook page — did you know that? Feel free to share your ham-related posts, projects, activities, and news at:

<https://www.facebook.com/LongmontAmateurRadioClub/>.

We'd love to have our members active on both our LARC web site at w0eno.org AND on our Facebook page, so check it out, share, and post today! Tell all your ham operator friends!

Find us on 

Thank You!

Many thanks to our special contributing authors for this month's Splatter:

- Doug Altman, KE0SI
- Ralph Bilal, WD0EJA
- Bryan Gonderinger, AF0W
- Ed Mohrman, WA7EM
- Chuck Poch, K0ITP
- Steve Shearer, K0STE
- Raman Sinha, KV0N

Call for Articles!

I am constantly looking for articles to publish in the Splatter monthly newsletter. Topics should apply to Amateur Radio, or other closely-related topics of interest to most ham operators. Tell us about your ham radio activities and projects. Articles (250-500 words) of things you have done and/or built (with pictures!) are always of interest.

Submissions may be edited for spelling, grammar, content, or length if necessary. The deadline for submissions is the 25th of each month; however, submissions received after the deadline will be considered if they fit into the newsletter. If a late entry doesn't make it into the current month's news, it may be used in one of the following months.

[Kat, W0UM, Splatter Editor](mailto:Kat,W0UM,SplatterEditor)

LARC VE Exam Session Information

LARC sponsors a VE Exam Session every month. Upgrade your license before FCC fees start up! Our regular *LARC (ARRL VEC) Exam Sessions* are given on the fourth Saturday of the even-numbered months — (but on the 2nd Saturday for December), and our *LARC/Patriot VE Exams* are given on the third Sunday of the odd-numbered months. April has two sessions.

April 2 VE Exam Session & April 23rd Exam Date

Our LARC ARRL VE Team held an Exam Session on Saturday, April 2nd, led by Aaron Rees (AJ7R).

Also assisting with this Exam Session were David Casem (AD0UF), Jeanne Lindstrom (AC0XA), Lloyd Ferguson (KE0U0C), Jaimeson Rust (KF0ABA), and Kat Gonderinger (W0UM). Thank you to our volunteer examiners for your service! We couldn't have done it without you!

At this session, 13 candidates were tested, which resulted in 3 new Technicians, 6 Generals, and 2 upgraded new Amateur Extras. There were a total of 12 passed exams in all.

Congratulations to everyone who passed their exams!

Another ARRL VE Exam is being held at 10 am on Saturday, April 23rd, at 350 Terry St.



License	#
Technician	3
General	6
Extra	2
Total	12

May Exam Session is on SUNDAY, May 15th @ 9 am

Our next LAUREL VE Exam will be with the LARC Patriot VE Team led by Kat (W0UM) and Bryan (AF0W) on Sunday, May 16th, at the Terry Street Professional Building at 350 Terry St., Longmont, 80501, *upstairs in the Onyx Room*. This is a free exam session, which may be taken in-person online on the candidate's personal laptop or tablet.



Please pre-register at <https://hamstudy.org/sessions/w0pct>. Walk-ins are also allowed, and will be seated as seats become available.

Upcoming LARC VE Exam Schedule

Date	Day	Time	Exam Session Info	Exam Options
Apr. 23	Sat	10:00 am	LARC ARRL VE Team	In person on paper
May 15	Sun	9:00 am	LARC/PVET VE Team	In person on laptop or tablet, or on paper
Jun. 25	Sat	10:00 am	LARC ARRL VE Team	In person on paper
Jul. 17	Sun	9:00 am	LARC/PVET VE Team	In person on laptop or tablet, or on paper

Ham Enthusiast Breakfast Every Saturday Morning

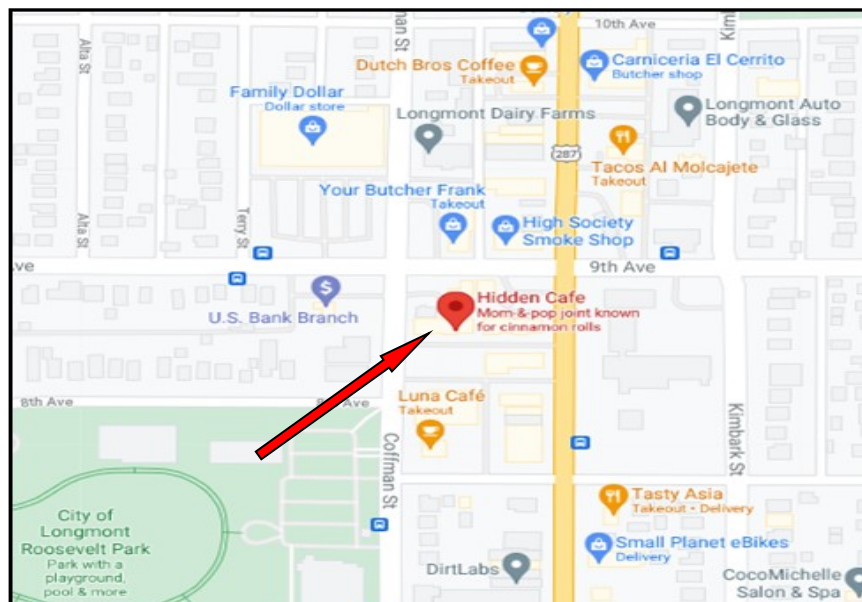
Want some social time with other ham radio operators in a small group? Join us for breakfast!

Saturday morning breakfasts meet at 8:00 am every Saturday.

Join us on Saturday mornings at the **Hidden Café in the Towne Square Shops, at 829 Main Street, #5 in Longmont.** It's easiest to enter the parking lot from Coffman Street, just south of 9th Avenue.

These are hosted by Don Lewis, KE0EE.

We hope you will join us on a regular basis for breakfast. If the group gets much larger, we will relocate to a larger restaurant. Get on the 8 pm Thursday Night Net to confirm the location, and/or check our website to see if the location has changed.



Self Reliance Expo and Preparedness Fair



The next Colorado Self Reliance & Simple Life Expo is coming on April 29 — May 1, 2022, at the Arapahoe County Fairgrounds.

This is a total immersion event in preparedness, survival, camp craft, off-grid living, and homesteading skills. You will see a showcase of products and be able to have hands-on interactive experiences. There will be both indoor and outdoor activities and vendors with classes and informational exhibits. You will find many

products (survival gear, emergency food, water purification and storage products, books, and more. Topics will include fire-making, fishing, forging, and others. Go to <https://self-relianceexpo.ticketspice.com/self-reliance-expo>, and use coupon code TAKE50OFF when purchasing your tickets online to save 50%. The Patriot VE Team will be giving Technician classes Saturday & Sunday morning, with and VE Exams in the afternoons.

We had three new members join the LARC in March. When you meet them or hear them on the air, please give them a warm welcome!

LARC Newest Members — March		
Call	First Name	Last Name
KEØTDQ	Lisa	Finley
KØGWP	Gregg	Peter
KGOYS	Eric	Permut

Following the General club meeting on March 16th, a random name of the attendees was drawn, and the winner was Ed (KEØAHG). Ed chose the Nitelze Multi-Tool as his prize.

Our club is always looking for additional donations of door prizes to give away at the meetings. If you have something you can donate for the drawing(s), you can contact me at the email or cell number below. It does not have to be a ham radio item, but anything that could be beneficial to another member.

Stay safe, and hope to see and/or hear you at the next LARC General Meeting on April 20th. Any questions or issues, feel free to contact me.

73,

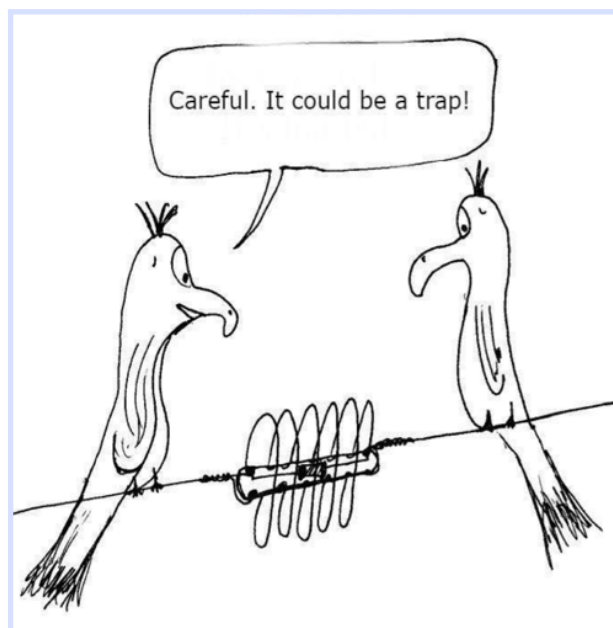
Steve Shearer (KØSTE)

Membership Chairman

KØSTE@WØENO.ORG

membership@wøeno.org

303-915-9942



As seen on kb6nu.com blog.

LARCFest 2022 was a success even with the short notice from Boulder County. Any event by our club is only successful due to the volunteers that turned out and the participants. While I don't have the absolute numbers, we had around 300 attendees and 20 volunteers.

As usual, our President, Chuck Poch (K0ITP) did all of the computer work taking vendor information and assigning tables. The hamfest would not have happened without him. Bob Smith (N0ZFV) designed the flyer and put up with my changes too. Bob also worked tirelessly on Friday and Saturday.

Some of the volunteers were board members, but most were regular club members. Here is a shout out to all who volunteered with their names and calls herewith.

- | | |
|---------------|---------------|
| Chuck, K0ITP | Steve, KM6SJA |
| Bob, N0ZFV | Ed, KB0TVH |
| Steve, K0STE | David, KF0CFD |
| Steve, KF0AGY | Lynn, K0CLM |
| Mark, N7PUR | Don, KE0EE |
| Don, WB4FAS | Pat, W1PGE |
| Fred, AF4BY | Ed, WA7EM |
| Jim, KJ7QFK | Ted, K0RQV |
| Mike, W0KKI | |

Also Kerri Ryan (Chuck's wife) and Lynn Paige volunteered as well and were great help.

There were 4 seminars, hosted by Don, WB4FAS and Ed, WA7EM, plus ARES and ARRL.

We also had an ARRL VE Exam Session as part of our LARCFest. Our volunteers for this special test session were Aaron Rees, AJ7R; David, AD0UF; Jeanne, AC0XA; Lloyd, KE0UOC; Jaimeson, KF0ABA; and Kat, W0UM.

THANK YOU ALL!

Dick Paige, LARCFest Chair 2022

KE0VT



The LARC table at our 2022 LARCFest, that was held on Saturday, 04/02/22.



See the video of our LARCFest at <https://w0eno.org/2022/04/20/larcfest-2/>



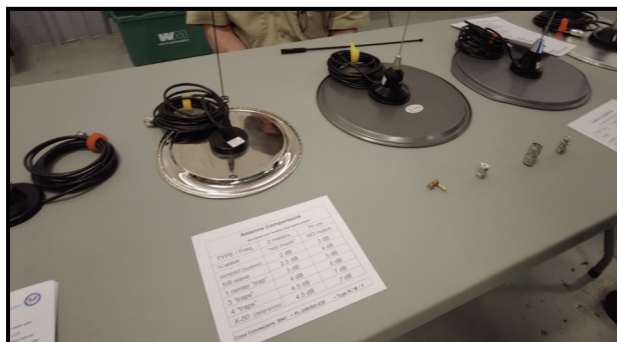
Chuck (KO1TP), our club President, hawking a variety of things at our LARC table.



Yagi Fox Hunt Antenna Kits built by LARC being sold as a fundraiser for our club.



A mag loop antenna being displayed and sold.



Antenna testing results displayed by BCARES.



Seminar by Don Lee, WB4FAS on Getting Started on CW.



Seminar by Ed Mohrman, WA7EM on Signal Paths with Tiny SA.

Once the weather starts warming up, there will likely be an increase in hams participating in Summits on the Air, or SOTA. This is an activity that encourages (via a point system) portable operation in mountainous areas. You can “activate” a summit by operating a portable station from a peak, or you can “chase” activators by listening for their transmissions. Even non-licensed individuals can participate – they can accrue points by receiving both sides of a QSO between an activator and another chaser.

You can find out more about this at: <https://www.sota.org.uk/>.



If you are an activator, one thing that can really increase your score (by getting more chasers to contact you) is to spot yourself on the SOTAWatch web site (<https://sotawatch.sota.org.uk/en/>). While you may be able to accomplish this with your phone or tablet and cell service, it is also possible to spot yourself via RF using APRS.

Stewart Wilkinson, G0LGS, runs a service called APRS2SOTA which accomplishes this. You do have to be pre-approved to send spots through this system, so be sure to read all the details at: <https://www.sotasports.co.uk/>.

If you have a Kenwood TH-D72 radio, here is a site that gives specific directions for that radio: <http://kh7al.blogspot.com/2018/01/aprs-self-spotting-for-summits-on-air.html>.

If you don't have a radio with built-in APRS capability, you can still utilize this service with an audio interface and Direwolf (<https://packet-radio.net/direwolf/>), or a portable TNC such as the Mobilinkd (<http://www.mobilinkd.com/>).

So if you are looking for a new physical challenge, try activating some summits, or if you are looking for something more relaxed, try your hand at chasing activators.

Here's a recent Reddit post with one ham's SOTA equipment, so you can get an idea of what you might take along on an activation: https://www.reddit.com/r/amateurradio/comments/u76thb/my_kit_for_sota_portable_ops/.



What Happened to Heathkit?

Bryan, AFØW

Many older hams are very familiar with Heathkit. Perhaps they've built a kit themselves, or have obtained and used a radio or piece of test equipment constructed by someone else.

While there is currently a company doing business as Heath Company (<https://heathkit.com/>), they are a far cry from the Heathkit of old.

Electronic Design magazine has an article from 2009 titled "Whatever Happened to Heathkit?" on their web site at: <https://www.electronicdesign.com/technologies/analog/article/21801229/whatever-happened-to-heathkit> that may bring back memories.



If you found that interesting, here are two other articles: <https://uxplanet.org/what-heathkit-taught-me-about-good-ux-design-ce8636b01b00> and <https://blog.solidsignal.com/news/fun-and-games/throwback-thursday-heathkit/> (includes links to a couple of old Heathkit catalogs).

Internet Archive Wayback Machine

Bryan, AFØW

Sometimes when researching Amateur Radio (or other) topics, you come across a web link to an article you want to read, or a program you want to download, but the link is dead. Maybe the owner of the site passed away or just lost interest in maintaining a web site, or maybe they changed to a new system (like LARC did when we switched from Drupal to WordPress) and the old URLs no longer work.

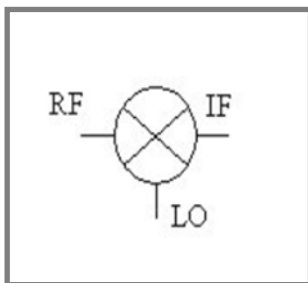
Whatever the reason, there may be a way you can still access that data using a site called the Internet Archive Wayback Machine at <https://archive.org/web/>. Simply enter the web address you are trying to access, and it will tell you whether or not it has any archived copies – yes “copies.” It evidently periodically rescans saved sites to see if there are any changes, so you can “go back in time” and view earlier versions of a site as well.

If there is some reason you think a useful site may go away, you can also enter it into the list of sites that are saved by using the “Save Page” section of the Wayback Machine page.



Typically, when you analyze some circuit, you take some things on faith and say “oh, that circuit does XYZ” because you have seen it before, you saw it in a textbook, or somehow are familiar with it. Sometimes you are quite confident that you know what it is and how it works. Sometimes not. Such is the case with mixer circuits. Its complicated and I have to take a lot on faith.

A Mixer is used in a Superheterodyne (Superhet) receiver and transmitter to up-convert or down-convert a signal. The common symbol for a mixer is shown. The “X” in the symbol means “multiply”. The RF and the Local Oscillator (LO) signals are multiplied together to produce the Intermediate Frequency (IF) output. We are confident from our Analytic Geometry math classes that when you multiply two sine waves together, you get an output that contains both the sum of the 2 frequencies and difference between the 2 frequencies. Of this mathematics, we can be highly confident.



$$\sin(\omega_1 t) \times \sin(\omega_2 t) = 1/2 \{ \cos[(\omega_1 - \omega_2)t] - \cos[(\omega_1 + \omega_2)t] \}$$

In the Superhet receiver the local oscillator is at a frequency so the difference signal down-converts a RF signal (at maybe 7 or 14 Mhz) to some intermediate frequency where it is amplified and filtered and eventually passed to one last mixer that outputs audio.

So, we trust the math and we know why mixers are used. But, what exactly is in that circle with an X in it? Well, it could be a lot of things. 1st, what is isn't. It is not a math co-processor that actually does multiplication really fast. There is no such circuit (even in state of the art FPGAs). This is where our confidence gets a little shaky and we have to take some things on faith.

An example of *linear* combining of 2 signals is adding them as 2 sound sources might be linearly combined in a sound mixing board. A graph of this linear combining would be a straight line. But, that is not what RF mixers do. A mixer does *non-linear* combining.

Any non-linear combining of 2 signals produces an exponential series output. This is sorta like saying you slam two signals together against a brick wall and you get several signals out. Pick through the mess and find the one you want. To some extent that is true. But, smart designers pick the best practical mixer circuit that makes the desired signal big and strong and the rest of the mess easy to filter out.

The “mess” you make with by the non-linear combining of 2 signals is shown. Each higher order member of that infinite set gets smaller and smaller. So if you just take the 1st 2 set members, you have

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

>> continued >>

$$e^x - 1 \approx x + \frac{x^2}{2}$$

If you say X is the sum of the 2 input sine waves (RF and LO), then you can then recognize a substitution of the square term and arrive at the final form. Typically, the mixer is followed by a filter that passes the (a-b) part and deletes the (a+b) and parts.

$$v_o = (\sin at + \sin bt) + \frac{1}{2}(\sin at + \sin bt)^2 + \dots$$

$$v_o = \cos((a - b)t) - \cos((a + b)t) + \dots$$

In project #66 in the ARRL “Hands On Radio Experiments” book, you build a mixer using 2 resistors and a diode.

There are many companies selling passive mixers such as below. They are passive (no power connector). 3 terminals – RF-in, Local Oscillator and IF-out. Application for a lot of these in microwave and military products.

RF Mixer MM1-0212LS from Marki Microwave



The vintage Heathkit radio uses a tube mixer with the grid connected to the RF and the cathode connected to the LO. The LO signal is much larger than the RF signal, so I think the LO effectively turns the RF on and off. Like described in the *tapr.org* paper sited below, this turning on and off produces the difference between the 2 inputs, much like the difference you see in movies between the film frame rate and the rotation of a automobile wheel. I have observed the sum and difference outputs using my Tiny-SA, but there may have been other “mess” signals I did not recognize.

Modern radios (especially SDRs) use a 4 position switch (a chip) that is driven by the local oscillator and samples the RF at 0, 90, 180 and 270 degrees, producing the In-Phase and Quadrature (I&Q) down or up converted signals that are helpful for SDR processing. This “sampling mixer” has the same non-linear combining affect as does more traditional diode, tube or transistor mixers. This is widely referred to as the “Tayloe Mixer”. The Tayloe mixer is described in the following;

- http://www.norcalqrp.org/files/Tayloe_mixer_x3a.pdf
- https://files.tapr.org/meetings/DCC_2020/2020DCC_KL7NA.pdf
- https://github-wiki-see.page/m/greenjacketgirl/SDR_Receiver/wiki/6.-Tayloe-Mixer

Bottom line is that implementation of a mixer is far more complicated that the simple “multiply 2 sine waves” math model. Selection depends on all the details of cost, complexity and the purity of the output (after filtering). Modern digital circuits enable new solutions substantially different than old analog methods.

Ed, WA7EM

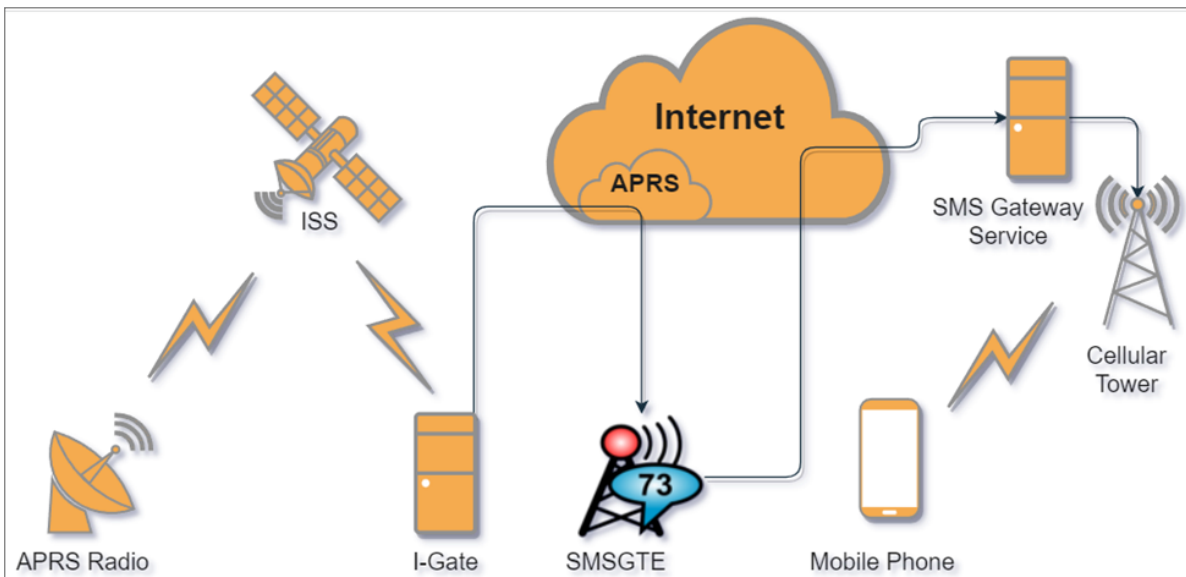
>> continued >>

You may have heard that the International Space Station (ISS) contains amateur radio equipment capable of supporting both voice and packet (APRS) operations, and you may have heard there you can send SMS text messages via APRS, but did you ever think to try sending that SMS message via the ISS?

Robert Bolton (AE7II) did, and he wrote about his experience on his blog at: <https://www.kj7nzi.net/blog/sending-sms-messages-through-iss/>.

To find out more about sending SMS messages via APRS, see: <https://smsgte.org/>.

Also note that currently, the ISS radio system is switched between voice repeater and data/packet mode, so make sure it's running in packet mode before you try to access it via APRS. You can check the current mode at: <https://www.ariss.org/current-status-of-iss-stations.html>.



FCC Station Inspections

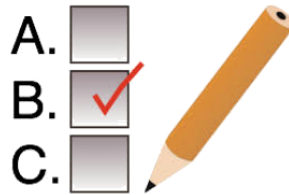
Bryan, AF0W

Title 47, Part 97, Section 97.103(c) Station Licensee Responsibilities states “The station licensee must make the station and the station records available for inspection upon request by an FCC representative.” Recently, I came across a web post asking what exactly this allowed the FCC to do. A reply in the post referred to an Inspection Fact Sheet put out by the FCC – you can read it here: <https://www.fcc.gov/reports-research/guides/inspection-fact-sheet>.

It answers such questions as “The FCC Agent at my door does not have a search warrant, so I don’t have to let him in, right?” and “What happens if I do not allow the FCC agent to inspect my equipment?”

Presumably, the FCC is not going to conduct a station inspection except in cases of egregious rule violations, such as deliberate interference with emergency or commercial communication systems.

Here are some exam questions from the current exam pools. Go ahead and answer them, and then check your answers on page 21. Let's see how you do! We recommend hamstudy.org to study with flashcards and also to take your practice tests. It keeps track of your weak areas for you!



Technician Exam Review -- Question T2B03

If a station is not strong enough to keep a repeater's receiver squelch open, which of the following might allow you to receive the station's signal?

- A. Open the squelch on your radio
- B. Listen on the repeater input frequency
- C. Listen on the repeater output frequency
- D. Increase your transmit power

General Exam Review -- Question G2B03

What is good amateur practice if propagation changes during a contact and you notice interference from other stations on the frequency?

- A. Tell the interfering stations to change frequency
- B. Report the interference to your local Amateur Auxiliary Coordinator
- C. Attempt to resolve the interference problem with the other stations in a mutually acceptable manner
- D. Increase power to overcome interference

Extra Exam Review -- Question E2B03

How is an interlaced scanning pattern generated in a fast-scan (NTSC) television system?

- A. By scanning two fields simultaneously
- B. By scanning each field from bottom to top
- C. By scanning lines from left to right in one field and right to left in the next
- D. By scanning odd numbered lines in one field and even numbered lines in the next

Check your answers on page 21!

Upcoming Hamfests and Conventions

You can use this info to plan some of your upcoming travel to get away from home. You will find the local events in bold print.

Some conventions and hamfests may have been canceled or postponed — check the hamfest event calendar on the ARRL website calendar to be sure it's still on at <http://www.arrl.org/hamfests/search/page:1/model:Event>.

Date(s)	Description	Location
05/06-08	High Desert Amateur Radio of NM Springtime Hamfest Tailgate & Parks on the Air http://nm5hd.org	Pena Blanca, NM
05/07	CARA Hamfest http://K7RDG	Sierra Vista, AZ
5/14	2022 Prescott Hamfest http://www.prescotthamfest.com	Prescott Valley, AZ
05/14	ARRL Nebraska State Convention http://lincolnhamfest.org	Lincoln, NE
05/20-22	Dayton Hamvention 2022 https://hamvention.org/	Xenia, OH
05/21	1st Annual Alien City Hamfest https://www.pecosvalleyarc.com/alien-city-hamfest-2022	Roswell, NM
05/28	Eastern NM ARC Tailgate http://www.ka5b.org	Clovis, NM
06/04	Montrose ARC Tailgate Party https://montrosehamradio.org	Delta, CO
07/09	BHARC Summer TailGate http://w0blk.com	Rapid City, SD
07/16	Megafest https://ppraa.org	Monument, CO

LARC Calendar of Events for 2022

Chuck, KØITP

I would like LARC to host at least one club event each month. Some are still in planning, but this is what we have planned so far. We're open for suggestions on the "tbd" months!

If you would like to host an event, or have ideas for an event you think would be of interest to club members, please contact me at k0itp@w0eno.org. Let's get involved in these events, and come up with ideas for other events that sound fun! ** volunteers needed!*

Date	Day	Event	Date	Day	Event
April 20	Wed	LARC General Meeting @ 6:30pm	Aug. 06	Sat	Boulder County Fair Parade*
April 23	Sat	ARRL VE Exam @ 10 am	Aug. 6	Sat	Radio in the Park
April 23	Sat	FOX Hunt! @ 1 pm	Sep.	tbd	tbd
May	tbd	tbd	Oct. 29	Sat	Longmont Halloween Parade*
Jun. 25	Sat	ARRL Field Day*	Nov. 12	Sat	Turkey Trot Race*
July	tbd	tbd	Dec.	tbd	LARC Christmas Party*

Upcoming RMHAM University Class

Rocky Mountain Ham (RMHAM) is offering one last class for the season until they start up again in the fall.

If you are interested in taking this class, you can register at:

<https://www.rmham.org/cgi-bin/rmham-u/signup>.



Date & Time	Presenter(s)	Topic
May 14, 8:30 am	Rob NØRPF	Balloons and things relating to Rob and others from EOSS Edge of Space Sciences will present on balloons, pico-balloons, and other high flying interests.

RMHAM Past Presentation Videos Available

Past presentation and class videos and notes (dating back to 2013) are available to view as well at <https://www.rmham.org/course-syllabus/>.



Wire Winder/ HOLDERS — Ongoing Fundraiser for LARC

Mike WØKKI



We have wire winders/holders with the club's call sign for sale at \$5 each. Members can also get them customized with their call sign if they want, with a minimum order of 3 (\$15) for the customized ones. Currently, customized ones will be red in color. We do have a mix of red, green, blue, and white in the club call sign.

If you would like to place an order, you can contact me directly at w0kki@w0eno.org to order.

(The \$5 is there to show the size — but no, you don't get that too!)

Do you want to gain some practice running Winlink (<https://www.winlink.org/>)? If so, there are at least two groups running weekly Winlink activities in which you can participate!

The first is the Colorado R1D1 ARES group, with their Winlink Thursday event. It is open to all licensed amateurs, and you don't have to be a member of the R1D1 ARES group to participate. For more info, see their web page at: <https://coaresr1d1.org/winlink-thursday/>.

They have some tutorial videos at: <https://coaresr1d1.org/winlink-tutorials/>. RMHAM also has presentations and videos from their March 12 Wireless Data Transmission event at: <https://www.rmham.org/course-syllabus/>.

The other activity is Winlink Wednesday (<https://winlinkwednesday.net/>). You can find out the current week's instructions by clicking on the "Current Weeks Net Reminder" link on the bottom right side of the top banner. Their web site also includes training videos and other net information.



Winlink Wednesday

[Amatur Radio] "plays a vital public safety communications service... [with]...tremendous potential...when all other forms of radio communication fail, especially during emergencies."

The Hon. Greg Walden
Member, U.S. Congress

Answers to The Fifth Degree — What Do YOU Know — Questions from p. 18

Exam Level	Question	Answer
Technician	T2BØ3	B
General	G2BØ3	C
Extra	E2BØ3	D

This question is asked quite frequently. Actually what many want to know is, how low to mount the antenna to where it will still work?

There is much to learn about HF propagation. However, a few basics can help to achieve good results. On VHF and higher you can go by the rule, "the higher the better". This is a ground wave transmission. You can liken it to line of sight. If you were to raise yourself above ground, you would see a farther distance to the horizon. So will the ground wave. On VHF, this will increase the performance in distance. Actually on VHF in particular, it is more forgiving and will bend with the terrain somewhat. This is a reason for using VHF for police and fire in rural areas. We are referring to distances of 10 to 15 miles car to car (depending on power) and as much as 100 miles through a repeater at a very high altitude.

What happens at the HF frequencies? A lot!

HF is normally used for much longer distances than the VHF ground wave. Therefore, where do you start and what factors affect it?

There is one thing to keep in mind. HF radiation rarely reflects. Due to the low frequency, there is insufficient inductance in objects to make it reflect. However, there are other factors that affect HF.

We can start with what you are walking on. The soil conditions of the earth varies per location. Conductivity and various minerals in the soil affect HF communications.

Depending on this chemistry will determine how much HF radiation will be absorbed and not leave the antenna site. What do you look for?

If the antenna is very low to the ground, you can observe the performance. Tuning of the antenna is one factor. Is the antenna reacting peculiar? Minimum SWR a bit too high? If measured, is the impedance of the antenna very low. Possibly receiving performance has deteriorated severely.

Another check is measuring SWR at low power as compared to high power. If at low power the SWR is closer to normal and high power it increases a lot, then a nearby object is most likely having an affect. Like the earth. Radiation can be absorbed and due to a transformer affect radiate some RF back into the antenna or possibly the feedline laying on it. This will increase the SWR and can make the antenna very narrow in bandwidth.

If this is the case, Raising the antenna even a few feet will make a change toward normal functioning of the antenna.

We can usually use the same rule as VHF, "the higher the better". However, when you are limited in what you can do, you will want to know the minimum you can get away with. HF will start performing reasonably well if you can get sufficient height from your ground absorption factor. On the average, 20 feet will do it. Some areas are more forgiving and some areas are worse. You will get indications of it by taking note of the readings mentioned.

Next article will continue on this subject.

Your questions are welcome. I will try and answer them in future articles. Email me at wd0eja@isotronantennas.com.

73,

Ralph, WD0EJA

Bilal Company

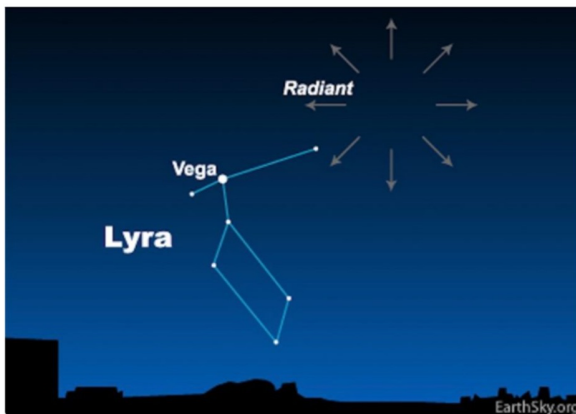
Isotron Antennas



Check out this interesting space YouTube channel of Dr James O'Donoghue, who is a planetary scientist at the Japanese Space Agency (JAXA), who also used to be a NASA Fellow at Goddard Space Flight Center in Maryland.

- <https://space-facts.com/dr-james-odonoghues-space-animations/>
- https://www.youtube.com/channel/UCSaCQr2ppyNUY_kjnWY1yVQ
- <https://www.youtube.com/user/jayphys85/featured>

And my favorite animation: <https://www.newswest9.com/video/tech/science/amaze-lab/cool-animation-shows-different-rotations-of-our-solar-systems-planets/609-03cdb657-ed02-46f2-b542-7ca22b238a6f>.



Flaming Space Rocks

You will be able to see the Lyrids in the northeast sky between midnight and dawn starting on April 15th, and lasting through the end of the April. They will peak between April 21st through 23rd. The predicted peak is at 0400 UTC on April 22nd. At its peak, you should be able to see 100 meteors each hour. These are a byproduct of Comet Thatcher.

May Meteor Shower

The ETA Aquariids will be able to be seen the mornings of May 4, 5, and 6 in the hours before dawn, with 4 UTC on May 5th to be the shower's peak.

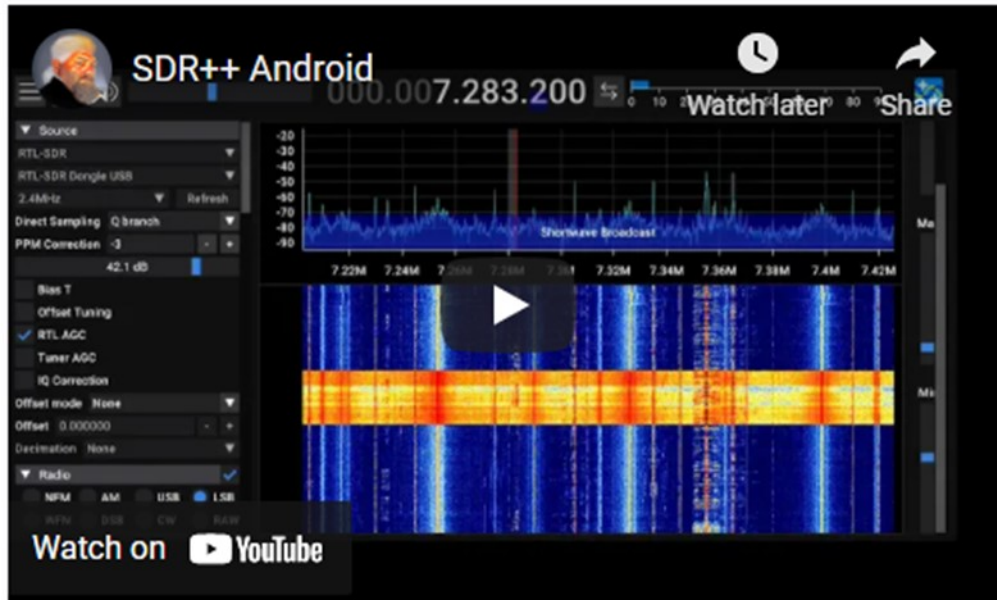
This meteor shower stretches out for a few days, with the moon being a waxing crescent. This shower will last from April 15th to May 27th.



SDR Plus Plus for Android Lovers

A full-fledged wideband Software Defined Radio (SDR) is now available for Android phones and tablets. To read more information about this, go to <https://forums.grz.com/index.php?threads/sdr-plus-plus-for-android-lovers.806694/>.

You can also watch a video about it at https://youtu.be/cskyJvo_x9s, and you can also download it at <https://drive.google.com/file/d/1Z2HPG8RQt8QXsznAq85oewb6TI11KaL3/view?usp=sharing>.



Local SKYWARN Spotter Training — Last of the Season!

Go to https://www.weather.gov/bou/spot_training to learn more and to sign up for this free Weather Spotter Training.

Here are the remaining classes for this spring 2022 season:

Date	Day	Time	Location
04/23	Saturday	10:00 am	Commerce City
05/02	Monday	6:00 pm	Thornton
05/03	Tuesday	6:00 pm	Arvada, Arvada City Hall
05/11	Wednesday	6:00 pm	Boulder

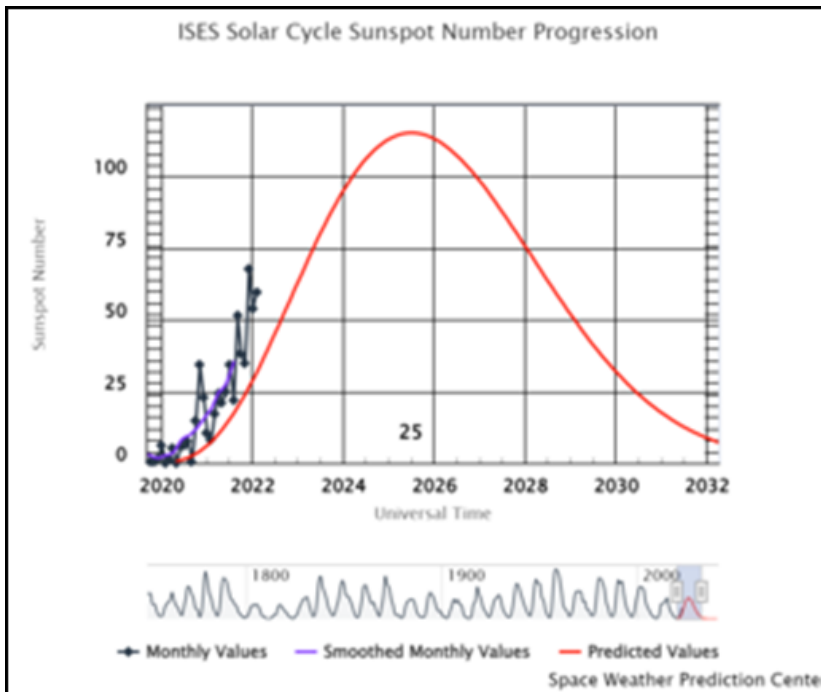


Solar Cycle 25 is Gearing Up!

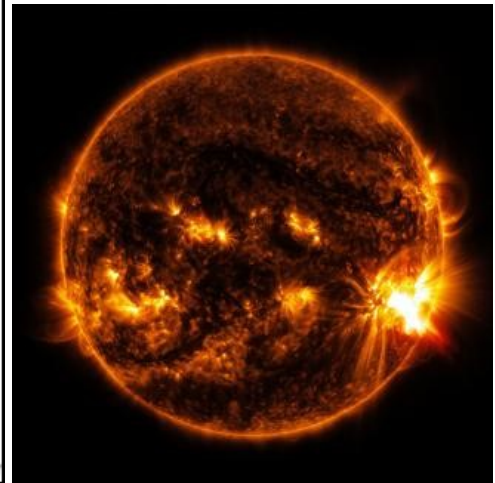
The current solar cycle is getting better and better for ham radio, as the sun grows more active. Solar Cycle 25 is outperforming the official forecasts, and actual sunspot counts to date are stronger than those predicted.

With this solar cycle ramping up, strong solar storms are more likely to erupt, which boost the potential for both possible disruptions with satellites, radio communication, and power systems.

More solar activity will also lead to more displays of bright auroras.



ISES Solar Cycle 25 Sunspot Number Progression and Predictions as of March 2022.



Also see: https://en.wikipedia.org/wiki/Solar_cycle_25



Our regular location is not available this year due to maintenance of the building during the 25th and 26th of June. As of this moment the location is to be determined. If you know of any place available, please let me know!

We are planning on 20 meter and 40 meter operations for sure, plus 10 & 15, plus possibly 6 meters if we can get organized to do so. This depends on YOUR participation!

Are you going to participate? Do you have a portable generator to use or loan to the club for the radio operations? Will you operate overnight? CW operators are needed as well!

Please email me at Gwabi2@hotmail.com if you wish to join us.

I would like to do either a chili supper or hot dog extravaganza Saturday around 5:00pm for operators and anyone else who cares to show up. An RSVP for this will be necessary.

Technicians, this is an opportunity to work HF with experienced mentors sitting beside you. It will be a blast! Come one, come all!

Thank you, Dick Paige, KE0VT



LARC Logo Apparel

These are great clothes to wear for all our club-related activities, and to show your pride for our club at other ham events and around town! They also make great gifts for your favorite hams!

Order your items today at <https://forms.gle/AgZQSMhrRtR1tLEG8>.

					
Short-sleeved Shirt \$32	Long-sleeved Shirt \$40	Fleece Jacket \$43	Soft-shell Jacket \$55	Cap \$16	Patches SM \$4 LG \$6

Are Your LARC Dues Current?

Did you know that your dues and/or annual renewals can be paid online at the club website (w0eno.org) using PayPal? You don't have to have a PayPal account; you can pay with a credit card (Visa, MC, Discover, AmEx), or select 'bill me later.' You can also join or renew by mailing a check to the club (LARC, P.O. Box 86, Longmont, CO, 80502), or by giving payment to Steve Shearer (K0STE) at a club meeting when we start having them in person again. *If you aren't current on your dues, you are moved to a different mailing list and may not get club info, emails & this Splatter newsletter. Get them paid up, send email, and you're back on list!*

Yearly dues are only \$20 per year for an individual or for a family at the same address. You can find membership information by clicking on the Membership link on our club web page. Contact Steve at membership@w0eno.org if you need to know your current dues status.

Calling All Businesses, Restaurants, Services, and Retail Shops!

Advertise with LARC in the Splatter!

The Splatter newsletter is published once a month. You can advertise your business with us at very reasonable prices!

Your ad will run for a one-year period (12 months) from when your first ad runs.

Get more business by offering a special promotion code for our readers, or by offering a deal on certain products — or just advertise your business!

Donate to LARC for Monthly Drawings

When you donate products or gift cards to our club for the drawings at our monthly meetings, we will run a business-card sized ad for you or for your business in our next monthly Splatter for free!

You also will be mentioned in the next month's Splatter newsletter and in the final issue of the year as a donor to our Club for the year, as well as on our w0eno.org web site. You will also get a donation receipt from our Treasurer.

If you can make a donation, please send your information to Steve Shearer at k0ste@w0eno.org.

PROMOTE YOUR BUSINESS WITH SPLATTER ADVERTISING

Ad size and cost – *per year.*

Business Card	2"h x 3.5"w	\$100
Quarter Page	4.2"h x 3.25"w	\$200
Half Page	4.25"h x 7"w	\$300
Full Page	8.5"h x 7"w	\$500

The above prices are per year – not per month. (12 months of ads)

Your advertisement will be seen by amateurs throughout Colorado, the Rocky Mountain States, and even the rest of the United States. Splatter circulation is approx. 1,500.

Send Ad and/or Contact us for more details at:

Splatter@w0eno.org

Checks are to be Made out to Longmont Amateur Radio Club. LARC is a 501(c)(3) corporation.

Support Your Club!

Usually, our annual April LARCFest (hamfest) is our biggest fundraiser each year for LARC. In 2020 and 2021, however, they were both cancelled due to the Covid-19 pandemic. We are trying to raise funds for the club in other ways to be able to support more activities and events for our members, support our community, and also to keep our repeaters up-to-date and add new technology.

1. Get a King Soopers or City Market card and link it to our club. Every time you shop, LARC earns a small portion donated by the grocery store! See the directions at: <https://www.kingsoopers.com/i/community/community-rewards>. Select Longmont Amateur Radio Club as your charity (organization # VW736).
2. Do all your Amazon Ordering on Amazon Smile. Doesn't cost you a cent extra! For every order you submit, Amazon sends LARC a small percentage of your sales amount. Go to https://smile.amazon.com/gp/chpf/homepage/ref=smi_chpf_redirect?ie=UTF8&ein=84-1056239&ref=smi_ext_ch_84-1056239_cl
3. Donate directly to our club on our LARC website at https://www.paypal.com/donate/?hosted_button_id=3Y4UZGXS9W. You can use PayPal or a debit or credit card, and you will be sent a receipt from our club treasurer.
4. Volunteer to participate in or to lead ham-related activities for the club members. Your specific skills and knowledge will be a big help to enrich our club! You'll have a lot of fun, too!
5. Advertise your biz or skills with the Splatter. See page 27 for more details. We want your business!
6. Purchase or gift our LARC Logo Wear, and LARC receives a small percentage of your sale! So far, we have a cap and shirt — more items coming soon! These are a great fundraiser for our club! Be proud to wear to ham radio events everywhere! These are purchased, embroidered, and patched by a local business owner who is also a LARC member! These make great Holiday Gifts



Click here to shop at AmazonSmile and Amazon will donate to LARC

amazonsmile

You shop. Amazon gives.

*See them all on page 26! Reduced Prices!
Get your items now!*

- Short-sleeve Shirts (\$32) embroidered with your call sign, name if desired, and our LARC Logo patch.
- Long-sleeve Shirts (\$40) embroidered with your call sign, name if desired, and our LARC Logo patch.
- Fleece Jackets (\$43) embroidered with your call sign, name if desired, and our LARC Logo patch.
- Soft-shell Jackets (\$55) embroidered with your call sign, name if desired, and our LARC Logo patch.
- Caps (\$16) emblazoned with our LARC Logo patch on the front with your call sign embroidered on the back.
- Individual Patches \$4 (2.5") and \$6 (3.5")
- See the pictures of these new items on page 26 of this Splatter.
- To order any of our LARC Logo Items, go to <https://forms.gle/AgZQSMhrRtR1tLEG8>

Editor's Note

I welcome and thank you for any news items you submit for publication in the LARC Splatter.

Please note that all articles submitted may be edited for spelling, grammar, and length. Files in the form of DOC, DOCX, RTF, PDF, and TXT are all accepted.

If you would like picture(s) included, please send them in separate files, in JPG or PNG format. If you would like a caption under the picture, please specify what you would like your caption to say.

Longmont Amateur Radio Club

LARC is organized for educational and scientific purposes and to provide public communication services to the local community and adjacent areas through the operation of Amateur Radio. The Club holds regular meetings for the business of the Club, for the presentation of papers, amateur radio topics and their discussion.



Longmont Amateur Radio Club 2022 Leadership Team & Committee Chairs

Position	Name	Call Sign
President	Charles Poch	KØITP
Vice President	Michael Ritchie	WØKKI
Secretary	Pat Engstrom	W1PGE
Treasurer	Don Lewis	KEØEE
Technical Committee	Mark Skelton	N7CTM
Membership Committee	Steve Shearer	KØSTE
Past President	Jerry Schmidt	NØOUW
Publicity Committee	Steve Haverstick	KFØAGY
Planning Committee	Doug Altman	KEØSI
Repeater Trustee	Bryan Gonderinger	AFØW
LARCFest Committee	Dick Paige	KEØVT
Special Events Coordinator	Mark Mollenauer	KDØGOC
License Exam Coordinator (ARRL)	Aaron Rees	AJ7R
Education Coordinator/Instructor	Kat Gonderinger	WØUM
Education Coordinator/Instructor	Bryan Gonderinger	AFØW
Splatter Newsletter Editor	Kat Gonderinger	WØUM

Please Visit LARC's Sponsors & Supporters

(there's always room for more!)

Spaces for entrepreneurs to set up an office, as well as meeting and conference rooms available.



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Contact us at support@cosolve.co for more information



Shop with King Soopers to have them donate to LARC!
Read more about it on page 28.



Jim Andrews, KH6HTV

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om/2021/02/an-55a-atv-
handbook-1.pdf](https://kh6htv.files.wordpress.com/2021/02/an-55a-atv-handbook-1.pdf)

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Clint Bradford, K6LCS

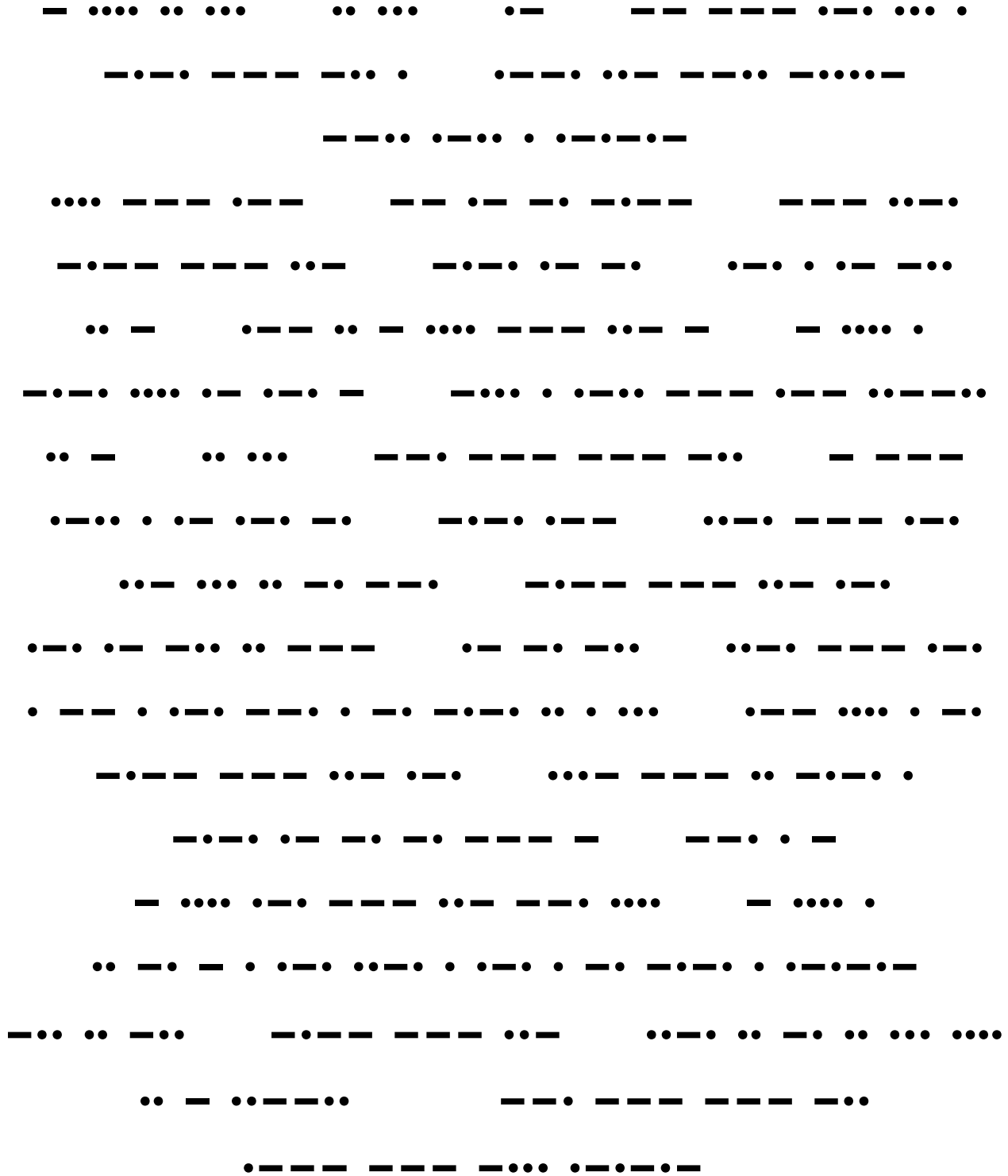
work-sat.com



Harlan Olson, W0HLO

atomicprints.com

April Puzzle — Decipher the Code!




See chart on next page to solve if you don't read CW.

April Puzzle — Decoding Chart

A	• —	1	• — — —
B	— • • •	2	• • — — —
C	— • — •	3	• • • — —
D	— • •	4	• • • • —
E	•	5	• • • • •
F	• • — •	6	— • • • •
G	— — •	7	— — • • •
H	• • • •	8	— — — • •
I	• •	9	— — — — •
J	• — — —	0	— — — — —
K	— • —	.	• — • — • —
L	• — • •	,	— — • • — —
M	— —	?	• • — — • •
N	— •	/	— • • — •
O	— — —		
P	• — — •		
Q	— — • —		
R	• — •		
S	• • •		
T	—		
U	• • —		
V	• • • —		
W	• — —		
X	— • • —		
Y	— • — —		
Z	— — • •		

Symbol Length and Spacing

- A DOT is one unit of time
- A DASH is three units of time
- Symbol spacing is one unit (DOT Length)
- Character spacing is three units (DASH length)
- Word spacing is seven units



<http://kw4fb.com>

Longmont Amateur Radio Club

P.O. Box 86

Longmont, CO 80502-0086

w0eno.org

Membership Application

Tax Deductible Donation to LARC: \$20 per year [] New Member: [] Renewing Member Payable via PayPal with [sent application](#).

First Name: _____ Last Name: _____ Birth Year: _____

Address: _____ City: _____

State: _____ Zip: _____ - _____ Call Sign: _____ Class: _____

E-mail: _____ (needed for correspondence)

H-Phone _____ C-Phone: _____ B-Phone: _____

I am a member of: [] ARRL [] BCARES [] VE

DISCLAIMER AND WAIVER: I apply for membership in LARC. I understand that some LARC activities are potentially hazardous. If I am injured or killed while participating in a LARC activity, I and my heirs agree to hold harmless LARC and its officers, directors, and members.

SIGNATURE: _____ DATE: _____

OTHER LICENSED FAMILY MEMBERS (Same Address) (No extra cost)

Name: _____ Call: _____ Signature: _____

Name: _____ Call: _____ Signature: _____

Name: _____ Call: _____ Signature: _____

Note: A tax deductible receipt will be provided.

THE CHECKED MEETING TOPICS ARE OF INTEREST TO ME

Training Class for [] Technician [] General [] Extra [] Volunteer Examiner

Band: [] HF [] VHF [] 222 [] UHF [] 900MHz [] Other _____

Mode: [] CW [] SSB [] AM [] FM [] ATV [] Other _____

Digital: [] SSTV [] PSK31 [] MFSK [] PACKET [] FT8 [] APRS [] Other _____

Electronics: [] Components [] Circuit Analysis [] Amplifiers [] Other _____

Other Topics: [] Antennas [] Propagation [] Satellites [] Kit Building [] Fox Hunts [] Soldering

[] DSP [] DX [] ARES [] Contests [] QRP [] HamFests [] Emergency Preparedness

[] Community Service Events [] Other _____

[] Other _____ [] Other _____



ARRL The national association for
AMATEUR RADIO®

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Application for use by ARRL Affiliated Clubs

Contact Information

- I am a brand new member or my membership has been lapsed for 2 or more years. My club will keep \$15 of my dues.
 I am renewing (includes lapsed members of less than 2 years). My club will keep \$2.00 of my dues.

Name _____ Call Sign _____

Address _____

City _____ State _____ ZIP _____

Email _____ Phone _____

Date of Birth ____/____/____ **Get an annual birthday coupon (US only)**

My Family Member is Joining or Renewing: (\$10 per member)

Name _____ Call Sign _____

Name _____ Call Sign _____

Your Annual Membership Dues – Circle Your Choice/s.

	1 Year	2 Years	3 Years	
US	\$49	\$95	\$140	Monthly <i>QST</i> or <i>On the Air</i> via standard mail for US members
Youth	\$25			Must be 21 years old or younger AND the oldest licensed Radio Amateur in the household
Canada	\$62	\$120	\$177	Monthly <i>QST</i> via standard mail for Canadian members
International	\$76	\$147	\$217	Monthly <i>QST</i> via standard mail for International members
International/Canada – no print magazine	\$49	\$95	\$140	Digital magazines
Family	\$10	\$20	\$30	Must reside with primary member and have corresponding membership dates; no extra copies of magazine
Blind	\$10	\$20	\$30	No delivery; all other member benefits apply. Requires a one time signed and dated statement of Legal Blindness

Additional membership options available online at www.arrl.org/join. US Memberships include \$21 per year for magazine subscriptions. Dues are subject to change without notice and are non-refundable. Memberships may not be combined with any other promotion or special offer.

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 On the Air – New! Beginner-to-intermediate-level help and advice (6 bimonthly issues)

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Payment Information

Please charge my ARRL dues less my club's commission. I have paid the commission directly to my club.

\$ _____ Total Charge to: Visa MasterCard Amex Discover Check Enclosed

Card Number _____ Expiration Date _____

Card Holder's Signature _____

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