



**Our September General meeting will be held on Wednesday, September 21st, at 6:30 pm via Zoom.**

**Please join us!**

**Peter Parker (VK3YE) will be speaking about hand-carried QRP antennas.**



**Sept. Meeting will be on Zoom on Wed, September 21st, at 6:30 pm.**

<https://us06web.zoom.us/j/81928642821?pwd=WXNSTjdEdHd5emZaaDRaaENQdnFWZz09>

**See p. 2 for more info.**



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## Please Join Us for our General Meeting

**Our Sept. General Meeting will be held on Wednesday, September 21st, at 6:30 via Zoom.**

The meeting topic will be about hand-carried QRP antennas, presented by Peter Parker (VK3YE) of Melbourne, (Victoria) Australia.

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/>.



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## Ham Jargon

### I/Q Data

In-phase / quadrature: components of a modulated signal that reflect changes in the amplitude and phase of a sine wave, used for digital signal processing or in analysis. To see an in-depth, graphical explanation of this, go to:

<https://www.pe0sat.vgnet.nl/sdr/iq-data-explained/>.

## LARC's YouTube Channel

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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](http://w0eno.org) and selecting Presentations under the LARC History menu. 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!



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### Help Support your Club with your Online Shopping! \*

Did you know your purchases can make a difference? *When you shop for anything at <https://smile.amazon.com/charity?orig=%2F>, Amazon Smile donates to the Longmont Amateur Radio Club — at no cost to you!* Last quarter, they sent LARC \$50.84 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](https://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 11 LARC members/families are using this link — please join them to help raise funds for our club repeaters and activities!*

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### Useful Ham Radio Web Site

<https://w2lj.blogspot.com/>

A blog by W2LJ, Larry Makoski, all about QRP and CW operating.

*“He couldn't stop smelling the air in great, deep, loud sniffs. It was so delicious. It smelled of water, and mud, and maple trees, and autumn.” Elizabeth Enright*

Currently Boulder County is open with no mask requirement. With that said, the board is looking to get meetings back face-to-face. We have planned and are getting equipment to get hybrid (both virtual and in-person) meetings going.

I would like to welcome Raman Sinha (KVØN) as our new Club Photographer/Videographer!

Upcoming event — **Fox Hunt, Saturday, September 10th, 2022**. See our website for details!

Join the Monday night (6 Meters), Tuesday night, and Thursday night nets for fun and educational talk! Want to try being a net control station (NCS)? [Contact Jerry \(NØOUW\)](#) or me for details! We have a challenge for you!

Do you have an idea for a presentation? Know someone who would like to present to your club? Contact a board member and let's get them in front of LARC! 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.
- April “Above & Beyond” recipient Doug Altman (KEØSI) - for all his service as Event Planner for our Club through many years.
- April “Above & Beyond” recipient Richard “Dick” Paige (KEØVT) for putting together a HAM-FEST with fewer than 30 days notice!
- April “Above and Beyond” recipient Sebastian Wessels (NSØW) for supporting the club with activities, all on his own.
- May “Above and Beyond” recipient Harlan Olson (WØHLO) - helping a silent key widower.
- June “Above and Beyond” recipients Bob Smith (NØZV) and Richard “Dick” Paige (KEØVT) for putting on a Summer Field Day Event for the club to remember.

Who can YOU recommend for their service to LARC to get this Award?

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. Thanks!

Charles Poch - KØITP

[KØITP@WØENO.ORG](mailto: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/13892894>

#### Where Would You Attend a LARC FundRaiser Dinner?

- The Roost
- Mike O'Shay's Restaurant & Ale House
- Longs Peak Pub & Tap House
- Oskar Blues Home Made Liquids & Solids

[pollcode.com](https://vote.pollcode.com/13892894) [free polls](#)

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

### Net — Monday Night 6 Meter Net, 6:30 pm

The Club sponsors an informal net on Monday evenings at 6:30 pm at 50.160 MHz. Check-ins and discussions of interest to 6m enthusiasts are the main topics. Dick Paige (KE0VT) is the net control. There is no net on the Mondays that are holidays. *Hams with new or renewed interest are encouraged to participate. Get on the "Magic Band!"*

### 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 LARC NETS!**

We are planning a FundRaising Dinner for our Club. Please tell us which restaurants you (and all your friends) would most enjoy! LARC will get a portion of the proceeds from the evening!

### TAKE OUR SEPTEMBER POLL!

Either click on the poll on the left, or go to: <https://vote.pollcode.com/13892894>

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
09/09	09/10	FOC QSO Party (CW) <a href="https://g4foc.org/qsoparty/">https://g4foc.org/qsoparty/</a>
09/10	09/10	Ohio State POTA <a href="http://ospota.org/">http://ospota.org/</a>
09/10	09/11	Alabama QSO Party <a href="http://www.alabamagsoparty.org/">http://www.alabamagsoparty.org/</a>
09/10	09/12	ARRL September VHF Contest <a href="http://www.arrl.org/september-vhf">http://www.arrl.org/september-vhf</a>
09/15	09/15	BCC QSO Party <a href="http://www.bavarian-contest-club.de/contest/qsoparty-2022/Rules-BCC-QSO-Parties-2022;art635,2495">http://www.bavarian-contest-club.de/contest/qsoparty-2022/Rules-BCC-QSO-Parties-2022;art635,2495</a>
09/17	09/18	ARRL EME Contest <a href="http://www.arrl.org/eme-contest">http://www.arrl.org/eme-contest</a>
09/17	09/18	Texas QSO Party <a href="http://www.txqp.net/">http://www.txqp.net/</a>
09/17	09/18	Iowa QSO Party <a href="http://www.w0yl.com/IAQP">http://www.w0yl.com/IAQP</a>
09/17	09/18	New Hampshire QSO Party <a href="http://www.w1wqm.org/nhqso/NEW_HAMPSHIRE_QSO_PARTY_RULES.pdf">http://www.w1wqm.org/nhqso/NEW_HAMPSHIRE_QSO_PARTY_RULES.pdf</a>
09/17	09/18	New Jersey QSO Party <a href="http://www.k2td-bcrc.org/njqp/njqp_rules.html">http://www.k2td-bcrc.org/njqp/njqp_rules.html</a>
09/17	09/18	Washington State Salmon Run <a href="http://salmonrun.wwdxc.org/">http://salmonrun.wwdxc.org/</a>
09/17	09/17	Wisconsin POTA <a href="http://wipota.com/files/WIPOTA_contest_rules.pdf">http://wipota.com/files/WIPOTA_contest_rules.pdf</a>
09/24	09/25	Maine QSO Party <a href="http://www.ws1sm.com/MEQP.html">http://www.ws1sm.com/MEQP.html</a>
09/24	09/24	Masonic Lodges on the Air <a href="http://cqmorelight.com/rules">http://cqmorelight.com/rules</a>
10/01	10/02	Collegiate QSO Party <a href="http://collegiateqsoparty.com">http://collegiateqsoparty.com</a>
10/01	10/02	California QSO Party <a href="http://www.cqp.org/Rules.html">http://www.cqp.org/Rules.html</a>
10/08	10/09	Nevada QSO Party <a href="http://nvqso.com/contest-rules/">http://nvqso.com/contest-rules/</a>
10/08	10/09	Arizona QSO Party <a href="https://www.azqp.org/">https://www.azqp.org/</a>
10/08	10/09	Pennsylvania QSO Party <a href="http://paqso.org/pa-qso-party-rules.html">http://paqso.org/pa-qso-party-rules.html</a>
10/08	10/09	South Dakota QSO Party <a href="http://www.sdqso.com">http://www.sdqso.com</a>
10/15	10/16	New York QSO Party <a href="http://www.nyqp.org/">http://www.nyqp.org/</a>
10/16	10/17	Illinois QSO Party <a href="https://w9awe.org/ilqp/">https://w9awe.org/ilqp/</a>

- 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](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, KØITP  
Vice President: Michael Ritchie, WØKKI  
Secretary: Pat Engstrom, W1PGE  
Treasurer: Don Lewis, KEØEE

### ADDITIONAL VOLUNTEERS:

Membership: Steve Shearer, KØSTE  
Technical: Mark Skelton, N7CTM and  
Bryan Gonderinger, AFØW  
Publicity: Steve Haverstick, KFØAGY  
Splatter Editor: Kat Gonderinger, WØUM  
Planning/Special Events: Dick Paige,  
KEØVT & Mark Mollenauer, KDØGOC  
BCARES Representative: Jerry Schmidt,  
NØOUW  
Repeater Trustee: Bryan, AFØW  
Education: Kat, WØUM & Bryan, AFØW  
LARCfest Chair: Dick Paige, KEØVT  
VE Team Leads: Aaron, AJ7R & Kat, WØUM  
LARC Photographer: Raman Sinha, KVØN

### Contact Us:

Email to: [board@w0eno.org](mailto: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, KØITP](mailto:Chuck.KØITP).

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.the.Splatter.Editor).

Articles received by the 25<sup>th</sup> 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:

WØENO-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](http://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:*

- Ralph Bilal, WDØEJA
- Bryan Gonderinger, AFØW
- Lynn Mears, KØCLM
- Ed Mohrman, WA7EM
- Chuck Poch, KØITP
- Steve Shearer, KØSTE



## 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) detailing 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, WØUM, Splatter Editor](mailto:Kat.WØUM)

## LARC VE Exam Session Information

LARC sponsors a VE Exam Session every month. Our *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 — (but on the 2nd Sunday in November). April has two sessions.

### August 27th VE Exam Session Results

A LARC ARRL VE Exam Session was held on Saturday, June 25th. Led by Aaron Rees (AJ7R), the additional Volunteer Examiners (VEs) were Jeanne (AC0XA), David (AD0UF), Lloyd (KF0UOC), Kat (W0UM), and Bryan (AF0W).

At this session, 3 applicants were tested, which resulted in 2 new Technicians and 1 who passed both Technician and General. There were a total of 4 passed exams in all.

Congratulations to everyone who passed their exams!



License	#
Technician	2
General	1
Extra	0
<b>Total</b>	<b>3</b>

### Next Exam Session is SUNDAY, September 18th @ 9 am

Our next VE Exam Session will be on Sunday, September 18th, at 9:00 am in the Professional Building, 350 Terry Street, Longmont, 80501.

As this will be a PVET session, this test session is FREE. You may take it on your laptop or tablet in person with us.

To pre-register for this session, please go to <https://hamstudy.org/sessions/w0pct>.



### Upcoming LARC VE Exam Session Schedule

Date	Day	Time	Exam Session Info	Exam Options
Sep. 18	Sun	9:00 am	LARC/PVET VE Team	In person on your laptop or tablet, or on paper
Oct. 22	Sat	10:00 am	LARC ARRL VE Team	In person on paper
Nov. 13	Sun	9:00 am	LARC/PVET VE Team	In person on your laptop or tablet, or on paper
Dec. 10	Sat	10:00 am	LARC ARRL VE Team	In person 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.**

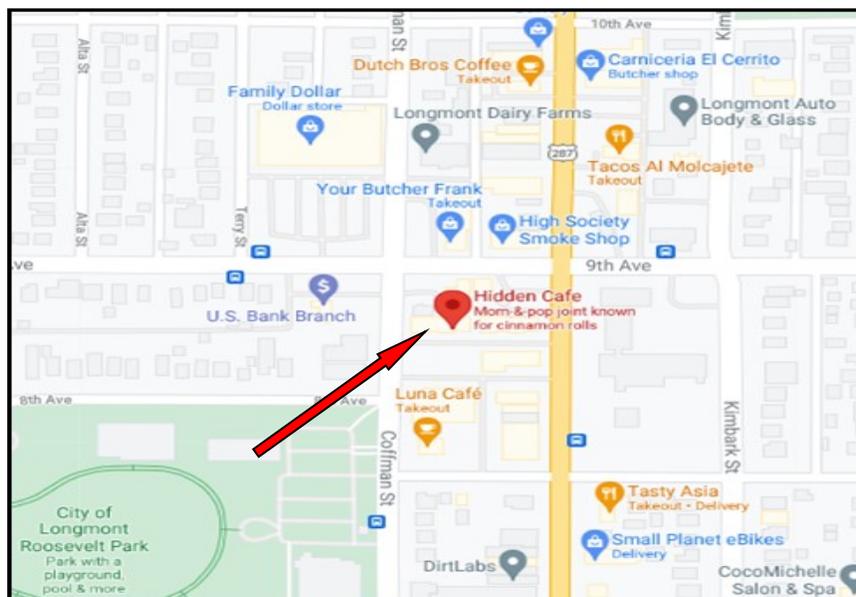
Join us on Saturday mornings at the **Hidden Café in the Towne Square Shops, at 829 Main Street, #5 in Longmont.** It's easiest to enter the parking lot from Coffman Street, just south of 9th Avenue.

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.



**Meet  
for  
Breakfast**



We had 5 new members join the LARC in August. The Club now exceeds 170 members! Congratulations for helping YOUR CLUB achieve this number! Keep up the great work, and with every member's help, we can grow even larger.

LARC Newest Members — August					
Call	First Name	Last Name	Call	First Name	Last Name
KØIPH	Alan	Holesovsky	KFØJYZ	Bonnie	Ramthun
KFØKFJ	Lora	Holesovsky	KFØJXI	Clayton	Thompson
AI7JW	Ian	Wallace			

It's getting closer to our annual meeting where the active LARC members elect the Officers for the upcoming year. Everyone's vote is important. If you have any question(s) about your membership status or are interested in joining or renewing your membership, feel free to contact me (listed below). Your dues must be current in order to be able to vote.

The Club is always looking for additional donations of door prizes to give away at the meetings. If you have something to 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 whether it is a virtual meeting or in person on Wed., 9/21. Any questions or issues, feel free to contact me.

73,

Steve Shearer (KØSTE)  
 Membership Chairman  
[KØSTE@WØENO.ORG](mailto:KØSTE@WØENO.ORG)  
[membership@w0eno.org](mailto:membership@w0eno.org)  
 303-915-9942



## Future Planning

Dick, KEØVT

- Our next public service event will be the **Halloween Parade on 10/29 in Longmont**. If you would like to work this short event, please [contact me](#). *We need 6-8 volunteers for this.*
- Our Christmas party will be held December 14, Wednesday evening. It will probably be held at the Grange Hall in Niwot. The fee is likely to be \$15. **Please schedule this date now, and please email me with your name and call sign, plus how many in your party.** The main meat offering will be catered, with the rest potluck. Bring a dish to share. If you wish to bring a desert let me know that also. The club will provide drinks, plates and utensils. Alcohol is not allowed.

*Volunteers needed for set-up and clean up help.* Dinner will be about 6:30, and we'll need to exit the building by 9:30 or earlier. More details next month. Let's have a BIG turnout!

*Ed, WA7EM*

We haven't had a Fox Hunt in several months. So, get your gear ready and plan your strategy to win our next LARC Fox Hunt this Saturday, September 10!

In a ham radio fox hunt, we search for a hidden transmitter using 2 meter hand held radios and directional antennas (typically a small Yagi). The transmitter is typically hidden in a park, usually on the west side of Longmont.

It sounds simple, but use the next couple days to build or check your antenna and refine your strategy.

Its more fun if you team up with another operator, or better yet, a friend interested in learning about ham radio.

The hunt usually breaks into 2 parts. Part 1 is getting close. Part 2 is the last 100 yards.

In part 1, you typically drive in the direction indicated by the strongest signal when you turn your Yagi antenna. But, be aware that most small Yagis have poor front-to-back ratio – so you may be misled 180 degrees in the wrong direction. Front-to-side ratio is better, so you are less likely to be sent 90 degrees in the wrong direction. If you work with a 2nd team that starts at the opposite end of the search area, you can triangulate and get close more quickly.

Toward the end of part 1, the signal is so strong that you can drive in any direction and still have a very strong signal. That is the time to switch to a very poor antenna (or no antenna) and drive in different directions, noting which direction gets the strongest signal.

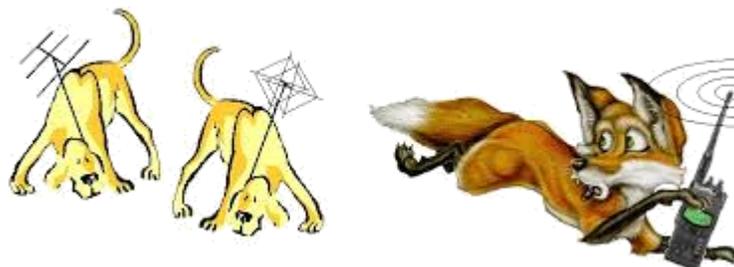
You would think Part 2 would be quick and fast. But, it can be slow and frustrating. Even with no antenna, the signal is so strong that you can't sense a direction to walk. I thought an attenuator would solve this. But, unless you have a very well shielded attenuator, it acts like an antenna and makes the problem worse.

The best strategy I know is to shift the frequency on your radio up or down 5 or 10 kHz. By doing that, you will get a much weaker signal and have a better chance of walking in the right direction.

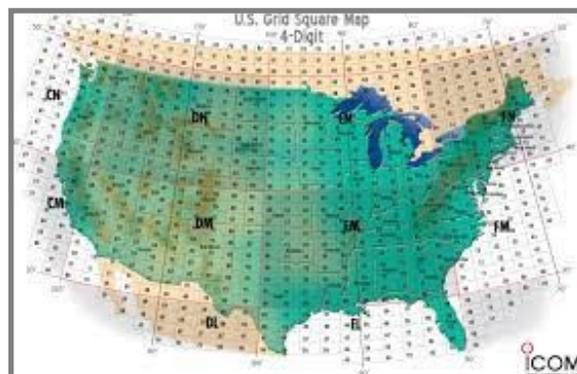
You might choose to join our 8AM breakfast at the Hidden Café in Longmont and then move directly to the hunt.

Hope to see you on Saturday, Sept 10!

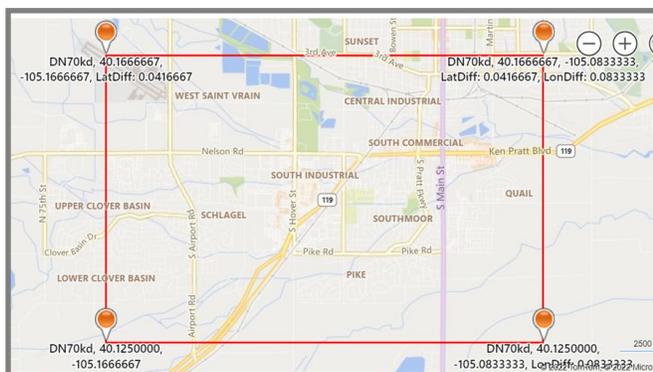
*Ed, WA7EM*



The Maidenhead Grid Square system is a coding system used by amateur radio operators to succinctly describe their geographical location – anywhere in the world. It does this by coding latitude and longitude into a string of letters and numbers. It includes a variable level of precision – as more characters are added to the grid location, the area referenced becomes smaller. Grid squares are commonly used during VHF operating contests and satellite contacts.



To see the area covered by a given grid square on a map, go to <https://www.karhukoti.com/Maidenhead-Grid-Square-Locator> and enter the grid square in the "Grid" text box under "Show A Particular Grid" and click the "Show Grid Area" button. For example, the Boulder County Fairgrounds site of LARC's 2022 Field Day is at DN70kd. This represents an area of approximately 3 by 4 miles in the continental US.



If we back out one level to DN70, you'll see that it extends north all the way to Wyoming, and that DN extends all the way up to Canada!

You can also use this web site to find the distance between two grid squares, convert back and forth between grid square and latitude / longitude, and determine the distance between two latitude / longitude locations, and can see grid square and lat/lon information by scrolling around on a map.

You can find the grid square of the address associated with your amateur radio license by going to <https://www.qrz.com/>, searching for your call sign, and then clicking on the "Detail" tab. You can see a map showing the locations of all amateur license addresses in a grid at: <https://www.qrz.com/gridmapper>

You can also enter a street address at [https://www.levinecentral.com/ham/grid\\_square.php](https://www.levinecentral.com/ham/grid_square.php) to see the associated grid square.

These are the basics of the Maidenhead Grid Square system, but there is more information available if you'd like to dig deeper.

More Info:

- <http://www.arrl.org/grid-squares>
- [https://en.wikipedia.org/wiki/Maidenhead\\_Locator\\_System](https://en.wikipedia.org/wiki/Maidenhead_Locator_System)

Our radios are packed full of resonant circuits of both kinds. Our antennas are resonant circuits of both kinds. To understand a few basic characteristics of these circuits will give us a good understanding of how our stations work.

### RESONANCE IN SERIES CIRCUIT

Consider a resistor, capacitor and inductor (coil of wire) connected in series with a source of alternating current (RF). One side of the AC source is at the inductor (L), the other side at the resistor (R) and the capacitor (C) in the middle. The frequency can be varied over a wide range.

At some low frequency, the capacitive reactance  $X_C$  (resistance of the capacitor) will be much greater than the resistance R. R normally is low because it is mainly the resistance of the wires in the circuit. The inductive reactance  $X_L$ , will be low compared to the  $X_C$ . On the other hand, at some high frequency  $X_C$  will be very low and  $X_L$ , will be very high. R stays the same. Either extreme the current will be low (little power consumption), due to the net reactance being high

At some intermediate frequency, the  $X_C$  and  $X_L$  will equal and the voltage drops across the coil and capacitor will be equal and 180 degrees out of phase. Therefore, they cancel each other completely and current flow is determined wholly by R which is normally very low. At that frequency the current has its largest possible value. This means that power consumption is at maximum. At this point where  $X_C=X_L$  is said to be resonant.

Most antennas react as a Series Resonant Circuit. Therefore, you want to cancel the reactances ( $X_C$  and  $X_L$ ) to resonate the antenna. This commonly applies to most varieties of dipoles, verticals and the Isotron (had to throw that in). The 2 values,  $X_C$  and  $X_L$ , are good to know to understand our antenna systems.

If your antenna is in a tight location, or is not as straight as it should be, one or both of the reactances will change. This means the antenna will not tune like it should. Can it be fixed?

Yes, quite easily. You will need to know the 2 values,  $X_C$  and  $X_L$  of the antenna. Without coax, you can use most analyzers at the antenna to get this reading. With coax connected, you can use a Noise Bridge at the antenna to find these values.

Once you know, it is a simple matter of adding or reducing the value of one of the reactances to make it equal at the frequency you want. Lengthen the antenna to increase  $X_L$  and lower  $X_C$  or shorten the antenna and lower  $X_L$  and increase  $X_C$ . Or, you can add the component (capacitor or coil) to the circuit or antenna to equalize the reactance.

Knowing these values can allow you to get an antenna to work in tight and restrictive locations. Much of this compensation can be done at the radio. This is basically what a tuner is doing. Keep in mind that most of the correct values should be at the antenna. The tuner can be used to make a reasonable adjustment. You can also add the values needed at the antenna if you know what they are.

My next article will be on the parallel configuration.

Ask any Ham which antenna works best. You will get a 100 answers about whatever they bought or built being the best. Some answers are well founded on technical facts. Some are just a bit of ego and defense of what they spent a lot of time and money on.

So, which of those antennas work best?



You can try to get a fact-based response based on trying one, then another, then another. Testing by transmitting can be skewed by how lucky you are to find someone

[>> Continued >>](#)

to answer your CQ or pull you out of a pileup. Testing by receiving is also hit or miss unless you are so lucky as to catch a station that is long winded and transmits a long time. The Beacon Network can be a big help on this <https://www.ncdxf.org/beacon/>.

In February 2019, in a LARC meeting, Ron Schwarz, K2RAS presented some test results on his Mag Loop antenna using WSPR (Weak Signal Propagation Reporter) See <https://w0eno.org/2019/02/21/mag-loop-build-project/> See <https://www.wsprnet.org/drupal/> Ron's presentation was my 1<sup>st</sup> exposure to WSPR. As always, Ron did good engineering in his WSPR testing and his club presentation.

WSPR is a creation of Dr. Joe Taylor K1JT. Joe is a retired Princeton astrophysics professor with extensive professional experience in weak signal propagation. WSPR is one of the many protocols in his WSJT-X software package, along with FT8, FT4 and others. WSPR uses 200 Hz (Hz, not kHz!) piece of spectrum on each band and a very slow audio signaling method. Any ham can transmit a test signal in this tiny portion of the ham band bands. Many stations monitor the WSPR band and forward their signal measurements via internet to a consolidation web server. One can inquire of this web site and see all the spots of his signal over time, including the signal strength. See <http://www.arrrl.org/files/file/History/History%20of%20QST%20Volume%201%20-%20Technology/QS11-2010-Taylor.pdf>

When I got interested in comparing performance of several variants of the "Stealthy Delta" (<https://www.sgcworld.com/Publications/Articles/237qst0502.pdf>) that would fit in my small backyard, I decided WSPR was the right choice. I could look at reports from WSPR spotting stations around the country and world and get fairly accurate signal strength info. Seeing many spotting stations reporting one antenna a few dBm stronger than another is far more analytic than getting an answer to a CQ or how my S meter bounces around during receive.

WSPR can measure propagation of milliwatt signals. The protocol is that good in allowing accurate decoding of test messages from very very low power stations. But, many hams simply crank their 100 watt transceiver down to its lowest setting (usually 5 watts) and use WSJT-X to control transmitting, similar to how its done on FT8 or FT4. On WSPR, 5 watts is considered "high power."

I wanted to be able to repeatably transmit WSPR to test antennas in the field. For example, a few hours before field day starts, use WSPR to determine if the antennas we set up are working well. Although I could drag my big HF rig to the field, I opted for a small portable device. One such device <https://www.zachtek.com/product-page/wspr-desktop-transmitter> Cost \$139. Another is <https://www.qrp-labs.com/ultimate3.html> for about \$130. But, I already owned a QCX-mini 5 watt QRP rig <https://www.qrp-labs.com/qcxmini.html> and it could do WSPR with minimal add-ons. So, that's the route I took.

So, do I have results to share with you? Not yet. Wait until next month. As you might guess, nothing works 1<sup>st</sup> try and finding and fixing the reasons for not working is not straight forward. So, I am not yet done.

The Wireless Association of New York City will be running special event station WA2NYC to remember the 21<sup>st</sup> anniversary of the terrorist attack on the World Trade Center in New York City in 2001.

The station will operate from September 11, 2022 0000z until 0300z September 12, 2022.

Suggested frequencies are: 28.450, 21.350, 14.340, 7.238. Also, D-STAR Reflector XLX020B will be monitored at the top of the hour.

They will also be uploading QSOs to LoTW.

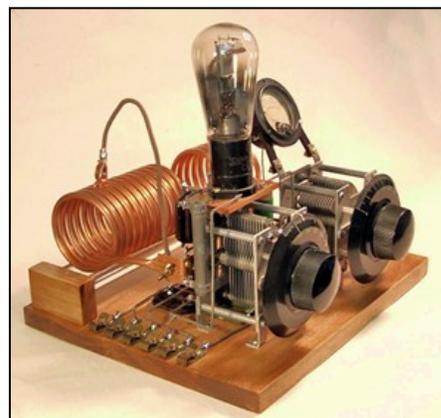
If you would like a paper QSL card, PLEASE send a SASE to the club address:  
Wireless Association of New York City, 233 Wolverine St, Staten Island, NY 10306-1746, USA.



### **Building '29 Style**

If you want to get a feel for what it was like in the "old days" of amateur radio, take a look at "A Gallery of Homebrew '29-Style Rigs" by Steve McDonald, VE7SL at: <https://qsl.net/ve7sl/29gallery.html>

You won't find any waterfall displays, DSP noise reduction, or even single sideband, but you will see a bunch of homemade tube-based transmitters. There is even a link for information on building your own '29-style radio, if you are so inclined.



### September 10th, 2022 - LARC Fox Hunt

Fox Hunt this Sat, Sept 10 starting at 9:30 AM following the 8AM breakfast. I will shut it down by 11:30 and will monitor the repeater for questions / issues. The fox will be hidden in north-west Longmont, and will be on 147.480 and will ID with the call: NSØW

### September 10, 2022 - Ned\*Ned Race

As a reminder, the race will be held in Nederland on September 10th from 0800 to 1200. You can find the map to where each of the stations are located at:

<https://www.google.com/maps/d/edit?mid=1zAXJSKeNwsuLYcDaNa1BdcIcMf08bYE&usp=sharing>

The sign up sheet link:

<https://docs.google.com/spreadsheets/d/1tvBf1SGOKVfUJW5F1PqYGc8I2UINhgBEcdZVcdcb238/edit?usp=sharing>

### September 17th, 2022 - Noon to 3pm

Northern Colorado amateur radio club will have its annual picnic on September 17th, 2022, at the Fossil Creek Lake Pavilion in Fort Collin. The club will supply the burgers, hot dogs, chips, and drinks, and if you'd like, you can bring a dish to share with everyone. The event will start at noon and go around three o'clock. I hope to see everyone there. If you have trouble finding the pavilion, below are the latitude and longitude and the GPS coordinates that will help you; we will also be monitoring the Horsetooth, 447.275 repeater, if you have any issues finding the pavilion.

Lat - 40.50655N log - 105.06414W

GPS: 40° 30' 23.58" N 105° 3' 50.904" E

### October 2, 2022 - BARC HamFest

<https://www.qsl.net/w0dk/barcfest.html> - for more information and/or see page 34.

### October 7-9, 2022 - ARRL Rocky Mountain Division Conference / HamFest

<https://wyhamcon.org> In Cheyenne — for information and details on tickets and events.

### October 15th, 2022 - JOTA - Scout Jamboree on the Air

Need volunteer ham radio operators to help out with this event that lasts the entire weekend. The radio part is only going to be going on Saturday, October 15, 2022. Camp will be set up on Friday evening. That night we are thinking of a pico-balloon launch. Saturday we will have 5-6 stations set up with the following setup, solder kits, analog radio, digital radio, CW, APRS, and ARES/Skywarn. This includes all scout troops (Boy Scouts thru Cub Scouts). You would be needed to work with the scouts at the various different stations. The troops will have leaders to manage the scouts, but we need volunteers to go over basic concepts of radio. We will have the information available for them to speak on. A meeting with the volunteers will occur once a list has been created. The location of the event will be at the Bigfoot Turf Farm, Address: 22455 Weld, Co Rd 49, La Salle, CO 80645. [Contact me for more info.](#)

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 highly recommend [hamstudy.org](https://www.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 T7B04

Which of the following is a way to reduce or eliminate interference from an amateur transmitter to a nearby telephone?

- A. Put a filter on the amateur transmitter
- B. Reduce the microphone gain
- C. Reduce the SWR on the transmitter transmission line
- D. Put an RF filter on the telephone

### General Exam Review -- Question G7B04

Which of the following describes the function of a two input NOR gate?

- A. Output is high when either or both inputs are low
- B. Output is high only when both inputs are high
- C. Output is low when either or both inputs are high
- D. Output is low only when both inputs are high

### Extra Exam Review -- Question E7B04

Where on the load line of a Class A common emitter amplifier would bias normally be set?

- A. Approximately halfway between saturation and cutoff
- B. Where the load line intersects the voltage axis
- C. At a point where the bias resistor equals the load resistor
- D. At a point where the load line intersects the zero bias current curve

*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
Sat. 10/02	<b>BARCfest Hamfest</b> <a href="https://www.qsl.net/w0dk/barcfest.html">https://www.qsl.net/w0dk/barcfest.html</a>	Longmont, CO
Fri-Sun. 10/07-09	ARRL Rocky Mountain Division Convention <a href="http://www.wyhamcon.org/site">http://www.wyhamcon.org/site</a>	Cheyenne, WY
11/05	Enid Hamfest 2022 <a href="http://enidarc.org">http://enidarc.org</a>	Enid, OK
12/03	Superstition Superfest <a href="http://https://superstitionsuperfest.org/">http://https://superstitionsuperfest.org/</a>	Mesa, AZ
01/14/23	Thunderbird ARC Hamfest <a href="https://www.tbirdfest.org/">https://www.tbirdfest.org/</a>	Glendale, AZ
01/23- 01/28	Quartzfest <a href="http://quartzfest.org">http://quartzfest.org</a>	Quartzsite, AZ

## QSO Today Virtual Ham Expo

The QSO Today Virtual Ham Expo is being held on September 17-18<sup>th</sup>. You can go to <https://www.qsotodayhamexpo.com/> to get more information and to register for this Expo. It will have a fully-interactive exhibit hall, exhibitor booths, amateur radio speakers and presentations, classrooms, and an interactive auditorium and an “Eyeball QSO” virtual environment. Be sure to check it out!



## LARC Calendar of Events for 2022

Chuck, K0ITP

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. 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](mailto:k0itp@w0eno.org). Let's get involved in these events, and come up with ideas for other events that sound fun!

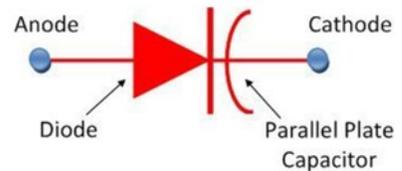
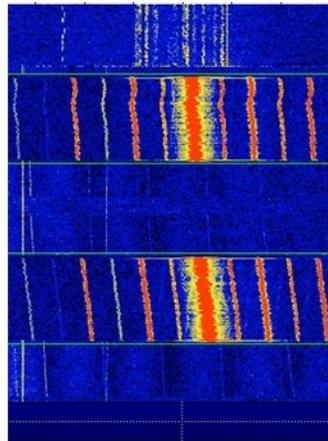
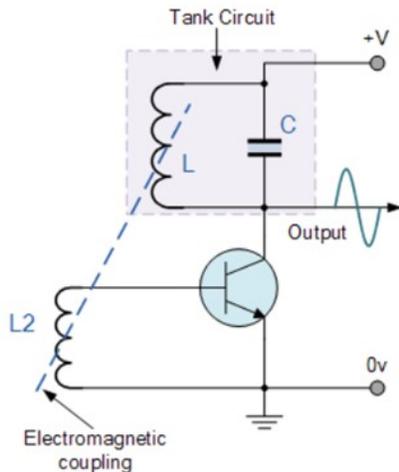
*\* volunteers needed!*

Date	Day	Event	Date	Day	Event
Sep. 10	Sat	LARC Fox Hunt — Join Us!	Oct. 29	Sat	Longmont Halloween Parade*
Sep. 18	Sun	LARC PVET VE Exam Session	Nov. 12	Sat	Turkey Trot Race*
Oct. 22	Sat.	LARC ARRL VE Exam Session	Dec. 14	Wed	LARC Christmas Party*

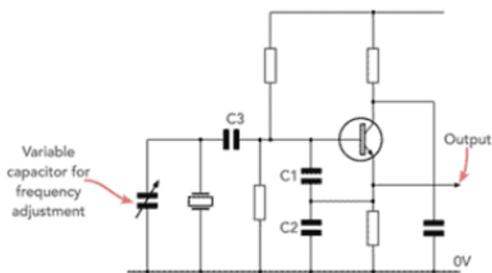
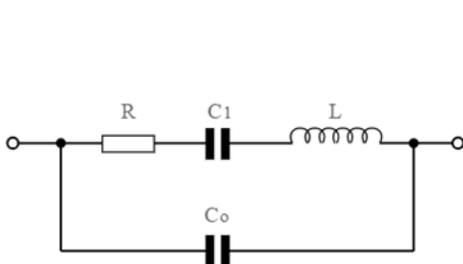
A TCXO is a “Temperature Compensated Crystal Oscillator” So, why is that interesting or important? Let’s start at the beginning.

An oscillator is central to all transmitters and receivers. A variable frequency oscillator (VFO) is the dial you turn on your HF radio, AM/FM radio, etc. In addition to the VFO, there are typically several other fixed frequency oscillators used in intermediate frequency (IF) circuits, used for frequency up-converting and down-converting between RF and audio frequencies.

The most basic oscillator is a LC (inductor/capacitor) resonant circuit. At resonance, the L and C cancel each other, resulting in zero reactance. Inductors and variable capacitors are big and expensive. **And, they change value with temperature.** So, the radio will drift. On a waterfall display, drift looks like below. The skinny vertical lines are other stations with good frequency control. The crooked lines is my cheap QRP radio displaying what drift looks like.



If you are old enough to remember AM/FM radios that you tuned with a big variable capacitor, you remember that if they got old and dirty, they got unreliable. As the semiconductor industry matured, it produced a specialized kind of diode called a **varactor**. It behaves like a capacitor whose value changes according to the reverse bias voltage. Along with some other circuitry, a varactor replaced the variable capacitor for tuning.



Typical VXO, variable frequency crystal oscillator circuit

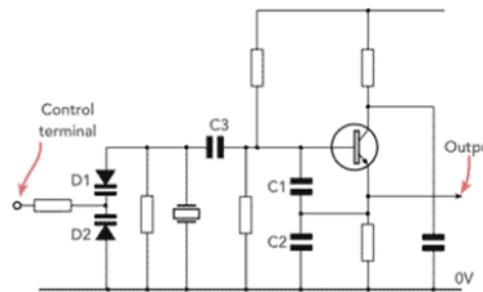
If you need a fixed frequency oscillator (as in an IF circuit or a single frequency radio), a **crystal oscillator** is the classic solution. A crystal is a very thin piece of quartz

>> continued >>

that will vibrate at a set frequency. The equivalent circuit of a crystal is above. You will recognize that it looks a lot like the basic LC circuit.

And, you might recognize that you can change the frequency of that equivalent circuit by adding parallel capacitance, as in the drawing on the right. That added capacitor is frequently called a “trimmer” and historically was used to move the radio’s frequency the last couple percent to be spot-on the desired frequency.

Some modern radio applications (like FT8, FT4, WSPR) cannot tolerate any drift. Old tube radios with big variable capacitors haven’t a prayer of working in those modes. Their frequency would change several kHz over the 1<sup>st</sup> couple hours of warm-up. But even some modern radios struggle to be virtually drift-free. That is where the sophisticated **Temperature Compensated Crystal Oscillator (TCXO)** comes in. A TCXO looks something like this:



Typical VCXO circuit

In a tiny surface mount package, there is a temperature sensor which drives some form of look-up table that varies the voltage applied to the varactor(s), thus changing the amount of “trimmer capacitance” applied to the crystal, thus keeps the output spot-on the intended frequency.

Why am I interested in this low-level detail? Because my QCX-Mini \$50 QRP radio drifts too much to support WSPR. So, I have swapped out the standard crystal with a TCXO. Removing parts from a fine pitch circuit board without lifting pads is delicate work and I am not real good at it. But, I succeeded — the drift problem is resolved and WSPR works. Now, I can proceed with my plan to evaluate alternative antennas using WSPR.

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

Exam Level	Question	Answer
Technician	T7B04	D
General	G7B04	C
Extra	E7B04	A

Last month's article introduced how impedances are displayed using Smith charts. This month's article will attempt to show how the charts can be used to visualize and design transmission line transformers and matching networks. Several examples are provided to help explain the basic underlying principles. With this knowledge, a Smith chart can be used to visualize basic options for matching networks and then tools are available that can be used to automate the calculations for specific implementation. Antennas will be used primarily for examples, but the principles apply to any matching network, such as input and output networks to amplifiers.

One matching network often used in antennas is a transmission line. Impedance changes down a transmission line depending on the transmission line impedance, the electrical length and the termination. A common impedance transformation hams are familiar with is the  $\frac{1}{4}$  wave impedance transformer; a  $\frac{1}{4}$  wave transmission line shorted at one end, for example, appears as an open line at the other end. On a Smith chart the impedance transformation "travels" along a circle representative of the load reflection coefficient or SWR on the transmission line. Using the  $\frac{1}{4}$  wave example, the left red point in Figure 1 represents a short. As you proceed down a transmission line, the impedance travels along a circle in the clockwise direction. For this example, the impedance "travels" along the outside of the chart depending on the length of the transmission line. A full revolution, 360 degrees, around the chart represents a  $\frac{1}{2}$  wavelength. So, a  $\frac{1}{4}$  wavelength of coax transforms the short, the left-hand red point on Figure 1 to the right-hand red point, which is an open. Or conversely, an open to a short. Many Smith charts have outside circular scales in wavelengths to show the transmission line length such as the one in Figure 1.

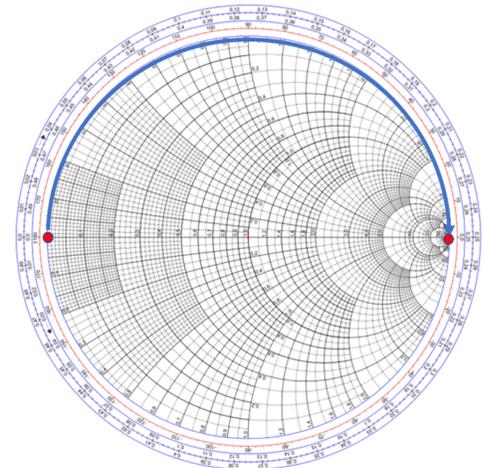


Figure 1.

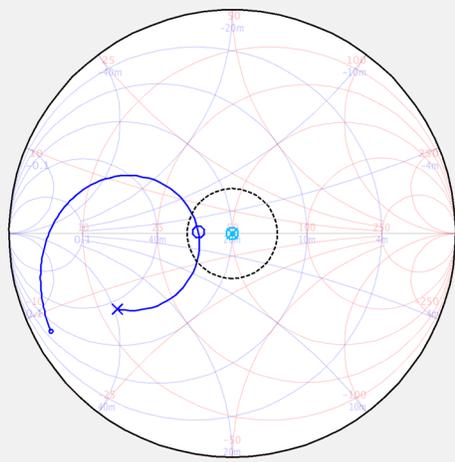


Figure 2.

As a more general example of this, we will return to the 80 m dipole used in the last article, shown in Figure 2. This chart displays the antenna impedance fed with 50 ft of RG-8x coax (~0.22 wavelengths @ 3.5 MHz). If you wanted to determine the impedance at the feedpoint, you would just have to travel counterclockwise (since it is towards the load) along a circle for each point, in wavelengths, for the frequency of the specific point (156 degrees at 3.5 MHz, 171 degrees at 3.75 MHz). Conversely, if you needed to add 10 ft of coax, you could determine the impedance at this point by travelling clockwise. Fortunately, all of this can be done relatively

>> Continued >>

easy with on-line tools, especially since the length of the line in wavelengths changes at each point. Figure 3 shows the result of this using SimNEC, with the purple trace being the impedance after 50 ft of coax, the cyan trace being the impedance at the antenna feedpoint, and the blue line representing the impedance with the addition of 10 ft of coax. This figure also includes an SWR circle of 4.2 which is representative of the 4.0 MHz points, which is describing the impedance transformations along the coax. Note that the purple trace is right on the SWR circle, but the feedpoint is slightly higher SWR and with the extra coax slightly lower. This is because of the coax line loss, which was automatically included by SimNEC for RG-8X.

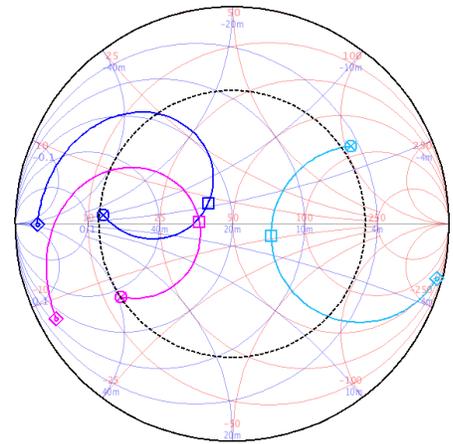


Figure 3.

Note that while this example uses the modeled impedance, if you have an antenna or vector network analyzer (VNA), the antenna impedance can be measured and imported into the tool of your choice. VNAs are not too expensive these days (a NanoVNA can be obtained for under \$100) and are fairly accurate. If you do much antenna work, they can be worth the investment. You can also then compare your measured antenna to modeled performance to help understand differences and how best to adjust them.

One general way to match an antenna's impedance to a 50 ohm transmitter or receiver is to use a transmission line to shift the antenna impedance to 50 ohms with a residual reactance, and then to cancel out the reactance. On a Smith chart, the transmission line transformation shifts the impedance around a circle to the normalized 1.0 circle. The proper length of line needs to be determined to reach the 1.0 circle and the residual reactance needs to be determined so it can be cancelled.

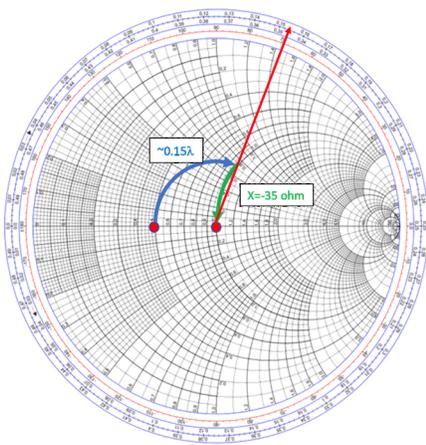


Figure 4.

Figure 4 shows an easy example. Assume you have a 25 ohm (0.5 normalized) resistive impedance you need to match to 50 ohms. Using the outside scale, you can determine that it takes ~0.15 wavelengths, to get to the 1.0 circle and the reactance at that point is 35 ohms. Thus 35 ohms, or a series capacitor of 650 pF at 7 MHz is needed to cancel out this reactance, resulting in 50 ohms. Figure 4 shows the path of this matching network, with the transmission line transformation in blue and the series capacitance in green. Note that the physical length of the coax is shorter than 0.15 wavelengths as determined by the velocity factor of the coax. For RG-8X with a velocity factor

>> *Continued* >>

of 0.82, ~17 feet of coax is required at 7 MHz (wavelength of 42.8 meters, or  $141 \text{ ft} \cdot 0.15 \cdot 0.82 = 17 \text{ ft}$ ).

Another option to match this is to use coax to transform the impedance over to the 20 mS (1/50 ohms) admittance curve and add a shunt coax stub to get to 50 ohms. Transmission line stubs provide an inductive or capacitive reactance depending on length and whether it's terminated with a short or open. On the Smith chart, an admittance curve is used since the stub will be added in parallel and thus the admittance is added. Figure 5 shows the path of this network. In this case, the stub has an open termination and both pieces of coax would be 10.9 ft for RG-8X with a velocity factor of 0.82.

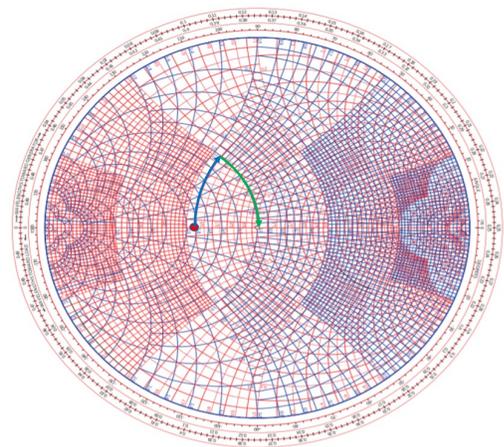


Figure 5.

If transmission line is used that has a different impedance than the chart characteristic impedance, the same basic steps can be used but the impedance along the line traces out a circle centered at the line's impedance. For example, if you were to use 75 ohm coax, the impedance

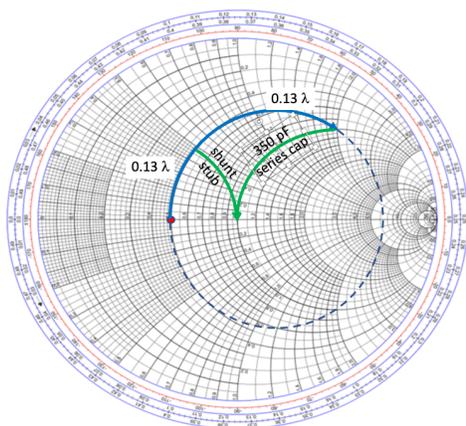


Figure 6.

travels around a circle centered at the 1.5 (normalized 75 ohms) point on the horizontal axis. In this case, a 0.13 wavelength piece of coax is required, with a series 350 pF capacitor (Figure 6). Note that since the transformation circle is no longer in centered at 1.0, the angle must be manually measured or using the computer tools, the length can just be adjusted until the real part of the impedance is 50 ohms. As an alternate to the series capacitor, a shunt stub can be used. In this case, the coax transformer would be 0.06 wavelengths long and the stub would be 0.15 wavelengths with an open termination (6.7 ft and 17.2 ft for RG-11 with a velocity factor of 0.84).

Of course, you can also use all discrete components rather than transmission lines for matching networks. Returning to the dipole in Figure 2, the antenna is resonant (zero reactance) at 3.75 MHz. At 3.5 MHz, the SWR is 5.2. What do you do if you want to operate at 3.75 and 3.5 MHz? One way would be switch in a piece of coax with a series or shunt capacitor to match the impedance at 3.5 MHz. Another way would be to switch in a series inductor with parallel capacitor to match it. A series inductor of 560 nH shifts the impedance to the 20mS admittance curve on Figure 7, and a shunt capacitor of 1900 pF on the output of the inductor shifts that to 50 ohms.

Note that most of the antenna modeling software packages include the capability to automatically calculate matching networks. The package used here, SimNEC is more general than model-

>> Continued >>

ling antennas, but it also has an automatic LC network block that can be inserted to automatically calculate an inductor and capacitor in the correct configuration to match impedances to a source impedance. So math isn't necessary if you find a tool you like.

Hopefully this has given you some examples that help in understanding Smith charts to visualize options for matching networks. Remember that while some of the above steps may seem cumbersome, once you understand the basics, many of the steps outlined can be done for you.

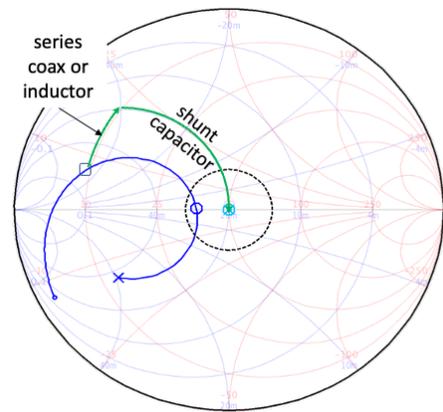


Figure 7.

## RF Patch Panel

*Bryan, AFØW*

Some hams have a lot of radios, antennas, and equipment such as SWR/power meters and antenna tuners. Most of us have everything set up in a relatively fixed configuration, but sometimes you want to experiment with a different antenna, or check the power output of a different transmitter.

In the case of a statically-wired station, this can be a nightmare requiring you to pull out equipment (which may not have enough slack in the cables), and screw and unscrew antenna connectors in odd positions by feel because you cannot see them.

If you frequently make changes to your equipment and connections, then you might want to consider creating an "RF patch panel" where you can easily change configurations on the fly.

David Cole, NK7Z, documented the construction of such a panel and associated cabling on his website at: <https://www.nk7z.net/rf-patch-panel/>.

He chose BNC connectors for his patch panel to allow easy reconfiguration. This necessitated the construction of a bunch of cables to run from the back of the patch panel to his various pieces of equipment. He also installed cabling for DC power distribution on the back of his desk.

Even if you are not interested in a full patch panel, his setup photos might give you ideas for ways to make your own station cable runs neater – I know my shack needs a lot of work!



One easy-to-construct antenna is the so-called "random wire antenna." As the name implies, it consists of a piece of wire, ideally as long as you can get it for your installation location. It is a form of end-fed antenna, so it can be installed easily with just one high point (tree, roof eave, pole, etc.). The other end of the wire connects to an antenna tuner or other matching device.

One potential issue if you're using a typical "shack mounted" antenna tuner with a connector for a random wire antenna, such as the MFJ-941E Versa Tuner II, is that you are bringing the radiating portion of your antenna into your shack. This probably is not a problem if you are using low power levels, but may cause issues if you're operating at, say, 100 watts or more.

A counterpoise is generally recommended as well. This is a wire that attached to the ground connection on your antenna tuner, and functions with the random length wire to form an antenna system.

One thing to keep in mind with such antenna systems is that the "random wire" length is actually not completely random, especially if you want to use the antenna to work multiple bands.

The reason is that at multiples of half a wavelength of the transmit frequency, the impedance of the antenna can be so high that your antenna tuner might not be able to match it with an acceptable SWR.

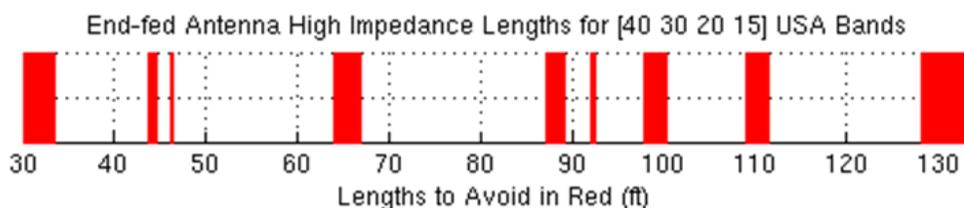
Thankfully, Michael Markowski, AB3AP, has put together a couple of programs to do all the math of keeping track of these multiples when looking at multiple bands. He put together a web page showing the results (<https://udel.edu/~mm/ham/randomWire/>) and includes a chart showing lengths to avoid for combinations of US amateur bands.

One interesting aspect of this chart is that there are no "safe" lengths that apply to all bands, 160 through 6 meters.

If you have a tuner capable of supporting a random wire antenna, you should give it a try and see what sort of system you can devise given your antenna location and any restrictions you may be under (HOA, spouse, etc.).

More Info:

- <https://www.hamuniverse.com/randomwireantennalengths.html>
- [https://www.w8ji.com/long\\_wire\\_antenna.htm](https://www.w8ji.com/long_wire_antenna.htm)



## Ham Activates All 187 POTA References in Colorado

If you were hoping to be the first to activate all 187 POTA areas in Colorado, you are out of luck! However, don't let that discourage you from the fun of working POTA!

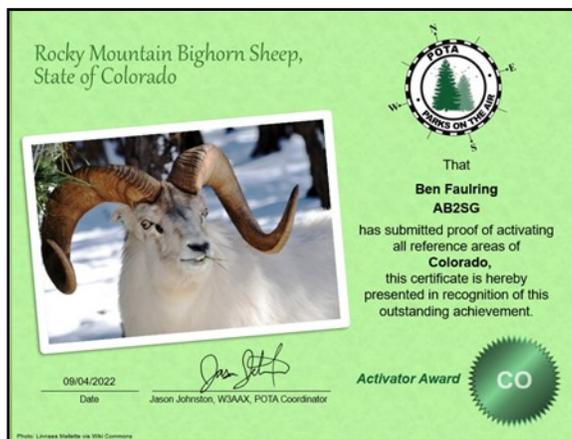
Seen on the Colorado Section – American Radio Relay League Facebook page:

Folks, please congratulate Ben Faulring, AB2SG, on being the first person to activate all 187 POTA reference areas in Colorado. According to Karen Faulring's post in the POTA Facebook group, this effort took five months and logged about 10,000 miles. Ben activated the last needed areas on 1 September 2022, and after verification, was subsequently given this award.

POTA Coordinator Jason Johnston, W3AAX, writes, "AB2SG, Ben Faulring, was the first to demonstrate that it is possible to make at least 10 contacts from all 187 parks of Colorado. This was a surprising, yet commendable achievement demonstrating what is possible as we all practice our emergency communications from National and State level parks, all over the world. Please join me in congratulating Ben, and wishing him even more success with his future POTA goals!"

More Info:

- POTA Homepage: <https://parksontheair.com/>
- POTA Tracking site: <https://pota.app/#/>



## LARC Logo Apparel

See descriptions on page 30. Order your items today at <https://forms.gle/AgZQSMhrRtR1tLEG8>.

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

## Our Workshops were Enjoyed by All!

LARC recently sponsored four hands-on workshops/classes. In March, Chuck (KØITP) held a Homebrew Yagi Antenna-building class. In March-April-May, Ed (WA7EM) conducted a One-Transistor Amplifier study group and building class. In July, Will (KFØFEC) held a Cable Building & Repair activity

If you've ever wanted to learn how or experiment with building your own ham radio gear, these classes/workshops are your chance to have special tools and experienced mentors to assist. Usually all the tools required are provided, and sometimes a small materials fee is charged. These are a great way to learn more about your ham radio hobby! Stay tuned for more workshops coming up!



## BARC Hamfest is on October 2

The Boulder Amateur Radio Club is holding its **Hamfest on SUNDAY, Oct. 2**, starting at 8 am. Admission is \$5, and children 12 & under with a paid adult will get in for free. It is being held at the Boulder County Fairgrounds Exhibit Building at 9595 Nelson Road in Longmont.

They will have door prizes every 15 minutes, with the grand prize drawing at 12:00 noon. You must be present to win.

The Patriot VE Team will be running a [VE Exam Session](#) that begins at 10 am. This session is FREE, and you may bring a tablet or laptop with WIFI access on which to take your exam(s).

This Hamfest will have a radio test table, to test your rig up to 100 watt max for transmitter power output, transmitter spectrum, receiver sensitivity, and DC current draw at 13.8V DC .

Also, a demonstration of an Amateur Radio TV station (ATV) will be presented by Don Nelson, NØYE. *Volunteers are still needed for this event — contact [Mike](#) or [Debbie](#) to sign up.*

## 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](http://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 the 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](mailto: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](http://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](mailto: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](mailto: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](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=3Y4UZGXSVC9W](https://www.paypal.com/donate/?hosted_button_id=3Y4UZGXSVC9W). 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

**amazon**smile

You shop. Amazon gives.

*See them all on page 27! Great 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	<a href="#">Charles Poch</a>	KØITP
Vice President	<a href="#">Michael Ritchie</a>	WØKKI
Secretary	<a href="#">Pat Engstrom</a>	W1PGE
Treasurer	<a href="#">Don Lewis</a>	KEØEE
Technical Committee	<a href="#">Mark Skelton</a>	N7CTM
Membership Committee	<a href="#">Steve Shearer</a>	KØSTE
Past President	<a href="#">Jerry Schmidt</a>	NØOUW
Publicity Committee	<a href="#">Steve Haverstick</a>	KFØAGY
Planning Committee	<a href="#">Dick Paige</a>	KEØVT
Repeater Trustee	<a href="#">Bryan Gonderinger</a>	AFØW
LARCFest Committee	<a href="#">Dick Paige</a>	KEØVT
Special Events Coordinator	<a href="#">Mark Mollenauer</a>	KDØGOC
License Exam Coordinator (ARRL)	<a href="#">Aaron Rees</a>	AJ7R
Education Coordinator/Instructor	<a href="#">Kat Gonderinger</a>	WØUM
Education Coordinator/Instructor	<a href="#">Bryan Gonderinger</a>	AFØW
Splatter Newsletter Editor	<a href="#">Kat Gonderinger</a>	WØUM
LARC Photographer/Videographer	<a href="#">Raman Sinha</a>	KVØN

## Please Visit LARC's Sponsors & Supporters

*(there's always room for more!)*

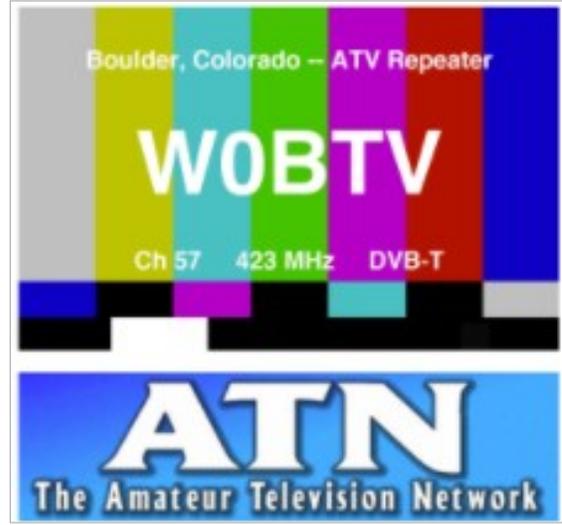
Spaces for entrepreneurs to set up an office, as well as meeting and conference rooms available.



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350 Terry St.  
Longmont, CO. 80503

Contact us at [support@cosolve.co](mailto:support@cosolve.co) for more information



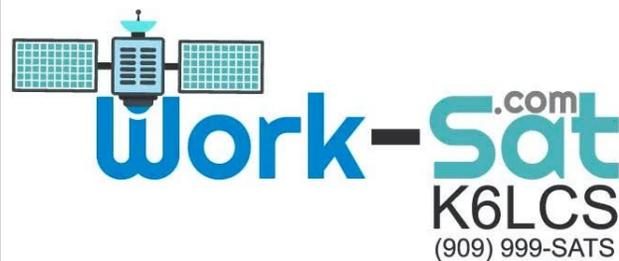
Shop with King Soopers to have them donate to LARC!  
Read more about it on page 28.



**Jim Andrews, KH6HTV**

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[https://  
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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)

Get the FREE newsletter at  
<https://kh6htv.com/>



Clint Bradford, K6LCS

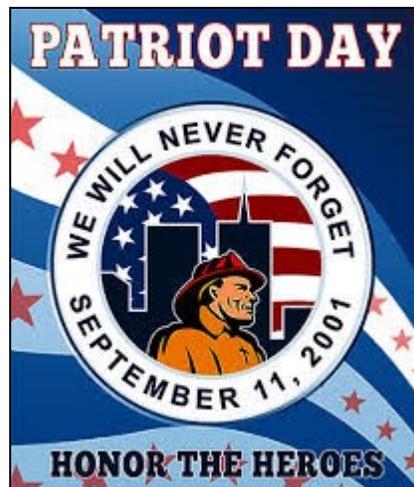
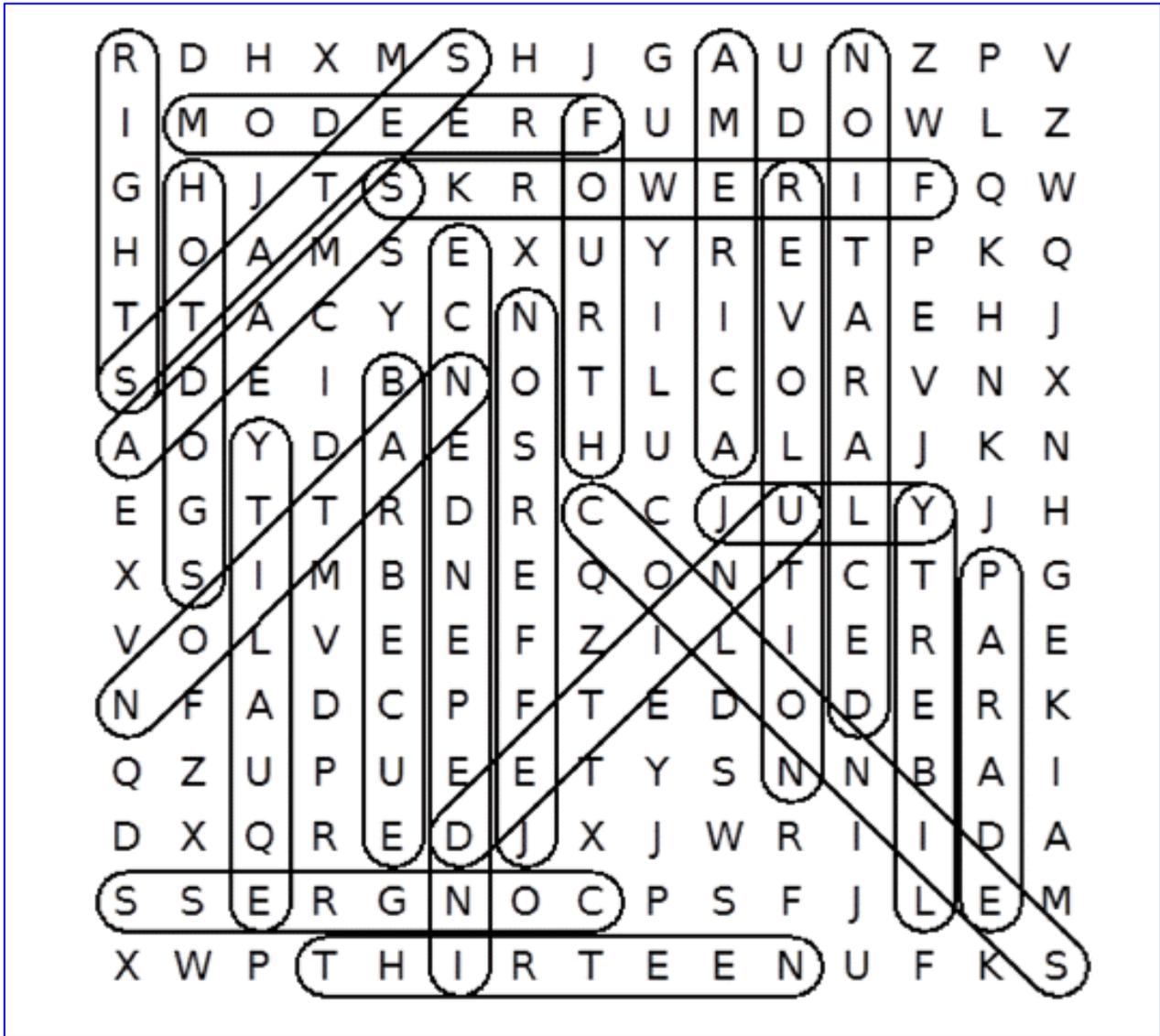
[work-sat.com](http://work-sat.com)



Harlan Olson, W0HLO

[atomicprints.com](http://atomicprints.com)

## July Puzzle Solution



## September Puzzle

### Ham Radio Vocabulary

Please unscramble the words below

1. oraid \_\_\_\_\_
2. ceunfyegr \_\_\_\_\_
3. ctcneinaud \_\_\_\_\_
4. umdnntitooailre \_\_\_\_\_
5. cettoginsn \_\_\_\_\_
6. liroosctal \_\_\_\_\_
7. sidiorottn \_\_\_\_\_
8. apoerotr \_\_\_\_\_
9. lmtuidaep \_\_\_\_\_
10. treytab \_\_\_\_\_
11. nceihotp \_\_\_\_\_
12. ltetlsiae \_\_\_\_\_
13. eeratttwm \_\_\_\_\_
14. netru \_\_\_\_\_
15. neledife \_\_\_\_\_

Created on TheTeachersCorner.net Scramble Maker



Click on page to view [BARCfest link](#).

*Boulder Amateur Radio Club (BARC)*  
***BARCfest Hamfest***

**Ham Radio and Electronics**  
***Sunday, October 2, 2022, 8:00 a.m.***

**Boulder County Fairgrounds – Exhibit Building**  
(North of the Hover Rd. & Nelson Rd. intersection in Longmont, Colorado)

**Admission \$5 – Children 12 and Under Free with Paid Adult**  
(Correct Change Appreciated to Avoid Delays at Door)



**Lots of Great Treasures**  
**Door Prizes Hourly with**  
**Grand Prize at 12 Noon**

(Must be Present to Win)



**V.E. License Exams at 10 a.m.**

Pre-registration required. Go to BARCfest session October 2, 2022 at [hamstudy.org](http://hamstudy.org)

Direct registration link: <https://ham.study/sessions/62bae38019db3d176cd45dce/1>

For questions write to: [barc70@arrl.net](mailto:barc70@arrl.net)

**Main Doors Open to the Public at 8:00 a.m.**

**Vendor Doors Open for Set-up at 6:00 a.m.**

For more BARCfest information contact: [barc70@arrl.net](mailto:barc70@arrl.net) or Debbie (WB2DVT) 303-447-3183



*Boulder Amateur Radio Club (BARC)*

**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 \_\_\_\_\_

QB

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**ARRL** The national association for  
**AMATEUR RADIO®**

# Membership Application

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](http://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.

I do not want my name and address made available for non-ARRL related mailings.

## Choose your print magazine:

*QST*, ARRL's membership journal for active radio amateurs (12 monthly issues)

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

All members can access the digital edition of both magazines

## 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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Toll free (US) 1-888-277-5289 or 860-594-0200 ■ [www.arrl.org/join](http://www.arrl.org/join)