

The *Microvolt*

January 2024



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Prologue

Publication: *The Microvolt* (USPS 075-430) is the official publication of the Utah Amateur Radio Club, Incorporated, 3815 S 1915 E, Salt Lake City, UT 84106. It is published monthly except August. Subscription is included with club membership at \$20 per year. Single copy price is \$1.50. Periodicals postage paid at Salt Lake City, Utah. Postmaster: send address corrections to *The Microvolt*, c/o James Bennet, 4960 W 5400 S Kearns UT 84118.

Deadline for submissions is the 24th of each month prior to publication. Reprints are allowed with proper credits to *The Microvolt*, UARC, and authors. Changes in mailing address should be communicated to the Club Secretary: James Bennet, 4960 W 5400 S Kearns UT 84118.

Club: The Utah Amateur Radio Club was organized under its present name in 1927, although its beginnings may date back as early as 1909. In 1928, it became affiliated with the American Radio Relay League (club #1602) and is a non-profit organization under the laws of Utah. It holds a club station license with the call W7SP, a memorial call for Leonard (Zim) Zimmerman, an amateur radio pioneer in the Salt Lake City area.

Meetings: The club meets each month except July and August. The meetings are usually held on the second Thursday of the month at 7:30 PM in the University of Utah's Warnock Engineering Building, generally in room 1230 or 2230, sometimes in 2250 or 105.

Membership: Club membership is open to anyone interested in amateur radio; a current license is not required. Dues are \$20 per year, including a *Microvolt* subscription. The *Microvolt* and membership cannot be separated. Those living at the same address as a member who has paid \$20 may obtain a membership without a *Microvolt* subscription for \$12. Send dues to the Club Secretary: James Bennet, KK7AVS, 4960 W 5400 S Kearns UT 84118. Let the Secretary know if you prefer the electronic edition of *The Microvolt* instead of the printed version.

Contributions: Monetary contributions are gladly accepted. Send directly to the Club Treasurer: Chuck Johnson, 1612 W. 4915 S. Taylorsville, UT 84123-4244. For in-kind contributions, please contact any board member to make appropriate arrangements.

Repeaters: UARC maintains the 146.62- and 146.76- repeaters. The repeaters are administered by the UARC Repeater Committee. Comments and questions may be directed to any Committee member. The Lake Mountain repeater (146.76-) is IRLP node 3352.

Ham Hot-Line: The Utah Amateur Radio Club (UARC) has a Ham Hotline, 801-583-3002. Information regarding Amateur Radio can be obtained, including club, testing, meeting, and membership information. If no one answers leave your name, telephone number and a short message on the answering machine, and your call will be returned.

UARC 2024 Board

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Repeater Engineer: Clint Turner, KA7OEI	801 566-4497

UARC 2024 Officers

The December 14 UARC in person meeting elected some new officers shown on the front page. Shown left to right on the cover are Noji Ratzlaff KNØJI the incoming *Microvolt* editor, Mike McAnish KI7MTI a returning Program Chairperson, Marvin Match KA7TPH as president, Linda Reeder N7HVF returning Executive VP, Bruce Fereday KF7OZK returning VP, and James Bennet KK7AVS returning secretary. Not present are Shawn Evans K9SLE incoming treasurer and Jeri Brummet WJ3RI Program chairperson.

Writing for *Microvolt*

We encourage you to submit original pictures, articles, book reviews, software and hardware descriptions, nuggets of humor and responses to editorials. Photographs in the highest resolution are best. Send plain text without embedded pictures but labeled to correspond to pictures. E-mail the editor: microvolt@utaharc.org.

We are grateful to the management of XMission, our Internet Service Provider (ISP), for the donation of this Web-Page service.



For account information go to: <http://www.xmission.com/>
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Latest News

UARC Meetings

UARC meetings are held on the second Thursday of each month except for July (annual steak-fry) and August (vacation). Meetings are held in the “Warnock Engineering Building” on the campus of the University of Utah. Watch the UARC website for the room and topics.

We encourage attendance of the live meeting, but we will also do our best to stream the meeting live on UARC’s YouTube page:

<https://www.youtube.com/c/UtahAmateurRadioClub>

From there, look for the feature that is marked “live.” The meeting should commence at 7:30. There should be some chatter on the channel by about 7 P.M. and you can connect in that period to make sure everything is working.

January’s meeting

Mark Twain famously said, “Everybody talks about the weather, but nobody does anything about it.” Well, UARC is doing something about it come the January meeting! We’ve invited Kevin Barjenbruch, the Warning Coordination Meteorologist for the National Weather Service Weather Forecast Office in Salt Lake City to give Storm-Spotter training.

Kevin is a rural Nebraska native, and the impact of weather on his family’s livelihood had much to do with his career choice. After receiving a BS degree in meteorology, he began his career with the NWS in 1988 and has been at his current position in Salt Lake City since 2004. This signaled a move from 16 years as an operational forecaster, to a position where education and outreach are the focus.

Photo Credits

Back pack KK7AVS, club officers KI7NNP. Straight key KI7NNP.

License Classes

Orem:

Technician - 4 Tuesdays, 6:30 to 8:30 PM Jan 23, Jan 30, Feb 6, Feb 13.

General - 4 Tuesdays, 6:30 to 8:30 PM Mar 19, Mar 26, Apr 2, Apr 9.

Extra - 5 Tuesdays, 6:30 to 9:30 PM Jul 16, Jul 23, Jul 30, Aug 6, Aug 13.

Technician - 4 Tuesdays, 6:30 to 8:30 PM, Sept 17, Sept 24, Oct 1, Oct 8.

To register for each course (\$10), go to psclass.orem.org. Each will be held at the Orem Traffic Training Room, 95 E Center St. No books needed, but a free registration on HamStudy.org is required. Email nojiratz@hotmail.com for more information.

Eagle Mountain:

Technician - 5 Thursdays, 7 to 9 PM, Feb 1, Feb 8, Feb 15, Feb 22, Feb 29.

General - 5 Thursdays, 7 to 9 PM, Apr 4, Apr 11, Apr 18, Apr 25, May 2.

Technician - 5 Thursdays, 7 to 9 PM, May 23, May 30, Jun 6, Jun 13, Jun 20.

Technician - 5 Thursdays, 7 to 9 PM, Aug 29, Sep 5, Sep 12, Sep 19, Sep 26.

To register for each course (free-of-charge), email ki6oss6365@gmail.com. Each will be held at the Eagle Mountain City Hall, 1650 Stagecoach Run.

Salt Lake:

Technician: Starting January 8 on every Monday 6:30 PM on Zoom. E-mail KI7MTI@gmail.com to sign up.

General: KK7AVS, KK7JEV 147.16 MHz, positive offset, tone 127.3, every Tuesday 7-9 PM.

Local Beacons, SDR

K7JL: 10 watts, 28.2493 mHz CW, continuous Sandy.
 KK7AVS: SDR 33 cm, 70 cm, 1.25M 2M 6M 10M 20M 40M, Kearns, <http://k7xrd.club>.

Northern Utah WebSDR, <https://www.sdrutah.org>.

Message from the new Editor

Noji Ratzlaff KN0JI

Have you wanted to help the club but don’t have the time for an elected position?

I was recently elected the new Microvolt chief editor, and I’m happy to serve. But the path I envision with our great newsletter going forward will require more effort than I alone can handle. Undoubtedly, you’ve

secretly thought how you might contribute a thought here, an article there, anything to teach, exemplify, or promote amateur radio through the club newsletter. Now's your chance.

Specifically, we're looking for volunteers to help write short paragraphs, essays, or articles on the following (multiple authors each) topics:

Technical content Brief but accurate knowledge spot.

DIY Simple instructions for a useful project.

Humor Clean, appropriate fun that allow us to laugh at ourselves.

Operating Best amateur radio practices.

History Amateur radio, radio, club, pioneers, etc.

Silent Keys We don't always see the obituaries.

Announcements Club events, outside events, ARRL news, etc.

Pontification Editorials, random messages, stray thoughts.

We're also looking to staff a newsletter committee, to help coordinate of all of this, so volunteers as editors / critics / simple helpers who can throw in their opinions and suggestions, are also welcome.

So, if you can help by volunteering your time with any of these, the club membership can only benefit by your generosity, whether you're a seasoned RF veteran or brand new to ham radio. You are free to contribute monthly, annually, once ever, or never. Please don't worry about spelling, punctuation, or grammar... that's my job.

Disclaimer: your contribution is not guaranteed to be accepted, but we'll do our best to consider it. Finally, if you don't volunteer, then you'll be stuck with my poor writing skills, incorrect opinions, and skewed points of view, which I'm more than happy to evangelize.

Thank you and 73,

Dash and Dine

My View

We're all encouraged to build a grab-and-go kit. As you might suspect, this doesn't mean shoplifting an

HT and quickly leaving but constructing a kit that can be quickly assembled allowing you immediate exit for the wild blue ether. I've seen all sorts from random stuff in a plastic tub to elaborate shack-in-a-box set ups with lighting and high power transceivers. I'm not writing about an HT with an extra battery pack and some Kind bars but the more serious expedition where you expect to spend some time and multiple frequencies. Our cover model has just about everything for a day in the mountains.

I recently purchased a GMRS setup to get a feel for its uses and after a bit of play it was all dumped in a cardboard box waiting for the next test, getting in the way and looking forlorn. So I got a cheap Pelican knock off and fit everything in it with the foam insulation keeping it in an assigned spot including a mag-mount antenna, two FRS/GMRS hand helds, their charger and cables, and most importantly the manual.

So far so good, but can I haul it and some sort of battery anywhere? There's some 15 pounds here - 5 lbs of battery, 12 pounds of case. Yes I can haul it up the mountain even with a bum shoulder but that doesn't leave anything for a beer and lawn chair and wrong frequency.

So what is your go kit for? I can see emergency service, public events, contests, expeditions. What is your role? Are you mobile? Are you at a fixed station? Are you in an EOC? Are you walking? Bicycling? Unicycle? Motorcycle? Car/truck/airplane? What's the range you need to communicate? HF, VHF, UHF? Are you using someone else's radio? How long do you need to be there? What kind of power do you need? It is unlikely that any single kit will meet all these exigencies. A SOTA hike in the mountains can't support a field day excursion.

Making one kit for all quests would be very expensive. Consider some of the awesome boxes presented at the October Elmer's meeting. Much thought and money goes into these and each would support at least many of the potential uses. What's your budget and how much can you carry?

The first problem is power. There is more energy in two chocolate chip cookies than a stick of dynamite, it just comes out slower. If you're intent on pumping out 100 watts for hours on end you're going to need a lot of cookies.

The second downfall of any go box is the antenna, particularly if you're working multiple high frequencies. Even common 2m/70cm antennas can be clumsy and inefficient. Solutions range from tactical antennas for VHF/UHF to bits of metallic tape measure stitched

to a blanket. Some multi-band HF antennas can be assembled like a fishing rod but generally require a tuner to function reasonably - so the weight and volume start creeping up.

What can you do? Be realistic. Pick a scenario you're most likely to occur, one you can practice, and build off that. If you can afford more, build a few different kits but instead of money you're now running short of time. How many different radios can you expect to be proficient with?

KI7NNP

*I've enjoyed the last year of editorials, playing reporter, reviewing books and equipment. But it's time for the younger generation with months of creativity remaining to take over.*¹

Contests: Pro and Con Response

Paul Plack, AE4KR

Your December editorial about contesting really hit a nerve for me. In the first paragraph you stated, "I contend that an emphasis on contests drives many from the active ranks." Really? Amateur radio contests have minimal impact on VHF/UHF repeater operations, yet the epicenter of attrition, by far, is among Technician-class hams who make up 75% of Utah's amateur population. Blaming contests seems a stretch.

Contests may present challenges to finding open HF frequencies a few weekends a year. Does that contribute to attrition among hams operating HF? On that list, contests likely rank far below growing incivility, man-made band noise, HOA antenna restrictions and endless on-air conversations about prostate disease.

I'd further argue that contests are one of the few activities which hone our skills to justify our existence and frequency allocations as set forth in 47 CFR 97.1 They provide practice in finding open frequencies, passing traffic efficiently, achieving specific communication goals, and learning to adapt to QRM/QRN. Some provide rare opportunities to test our newer data modes flat-out for 24 hours at a time. The exchange in the ARRL Sweepstakes follows the exact format of an ARRL RadioGram. In contrast, most of our routine nets do little to maintain skills beyond remembering our own callsigns and how to find the PTT button.

Regarding your comparison of hamming to sports, and your position that anyone who finishes out of

first place is a loser, not even professional sports sees things that way. Winners set a benchmark, but making the playoffs for the first time in a decade or setting a new personal best are also celebrated. Even for those who consider only first place a win, ARRL Field Day has seven classes to be won in each of 83 sections in the US and Canada, so at least 581 stations will finish in first place.

I've never seen anyone "pushed out" of ham radio by contests. POTA, which you identified as a source of discouragement, is in fact getting many hams excited to try new things and become less sedentary.

Here's a suggestion to anyone who's contemplating dropping the hobby because they hear a contest, if this person really exists. Do what I do when I hear someone on 40 meters talking at length about his AIC history. Reach out and turn the VFO knob. You'll find someone, somewhere, talking about your interests.

RF Propagation and LIDAR

Modern Data Sources

If you've been outdoors in the summer annoyed by a small twin engine plane flying back and forth, smile, you've been captured by high resolution LIDAR (Light Detecting and Ranging) most likely funded by Utah State government or the US Forest Service. The Utah data is available free at <https://gis.utah.gov> with resolutions ranging from 1.6 to 98 feet with varying elevation resolutions.

So what is the data? It's a picture from the air where every pixel is the height above mean sea level. For the Wasatch, this is the top of trees, buildings, roads, bridges, and bare earth. It is high enough resolution that you can envision the curbs and road pot holes. The data is also manipulated to remove these objects giving bare earth. But, it's not a picture like a JPEG image, you have to do something with the data.

Why is this interesting to the radio amateur? It can go a long way to predicting VHF/UHF/EHF signal propagation. A case in point was monitoring water flow in a canyon HOA. There are two springs with flow meters attempting to communicate with a central site with a satellite connection to the internet. The longer one has reliable communication at 900 MHz and the shorter grey one does not, no matter how high we raised both antennas and increased the power output.

¹Misquoting Max Beerbohm.



Figure 1: 900 MHz server to two springs, Google Maps

The map picture is a screen dump from Google maps and hence isn't very well registered either with the actual roads or real earth coordinates.

After initial setup, debugging, checking continuity, checking the antennas with a VNA, and raising antenna #2 as high as we safely could, no contact could be made. Our initial assumption about antenna #2's location was entirely wrong as verified by Utah LIDAR data.

I downloaded the high resolution LIDAR data from the Utah AGRC website and merged four LIDAR files into a mosaic covering the areas, a total of some 2 gigabytes which these days can be accomplished by a Raspberry PI without melting it down. Showing the same area, now registered and at 2 meters resolution per pixel, we start to see some of the problem. Notice that at this level you can already start to see the road embankments and driveways graded into the mountainside.

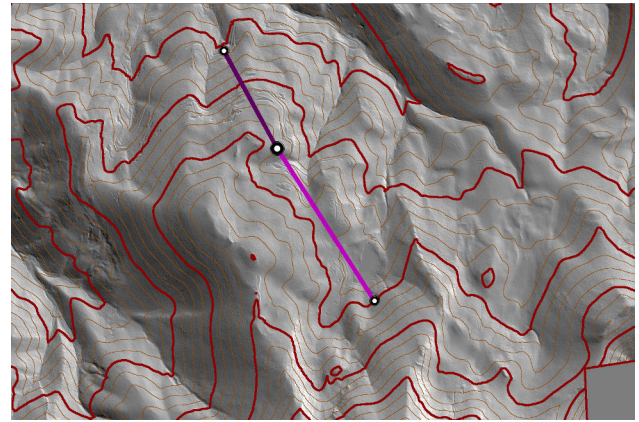


Figure 2: Shaded elevation and contours

If I draw a straight line between the server's antenna and the antenna at spring #1 using Bresenham's algorithm to select both elevation (black) and ground cover points (grey), I see that the signal only goes through trees, it's not blocked by the earth. With a little work, I can even approximate the path loss through individual trees.

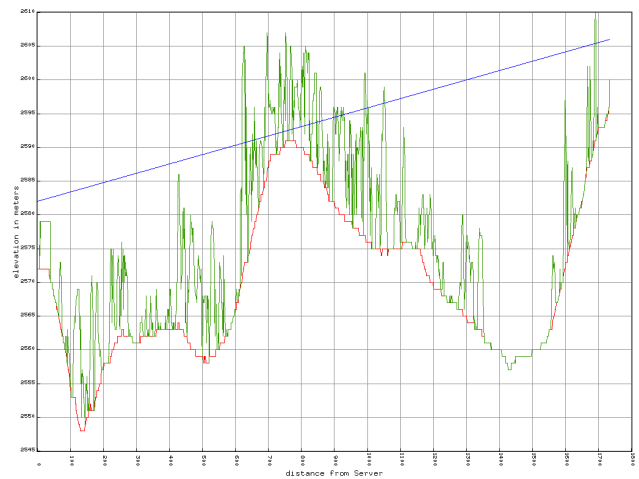


Figure 3: Line-of-sight from server antenna to spring #1 sensor.

The path to spring #2 is definitely problematic. No amount of knife edge diffraction is sufficient to get over the hump - solid limestone, silver ore, and mud. It's clear that a repeater on the neighbor's ridge will be necessary for wireless communication.

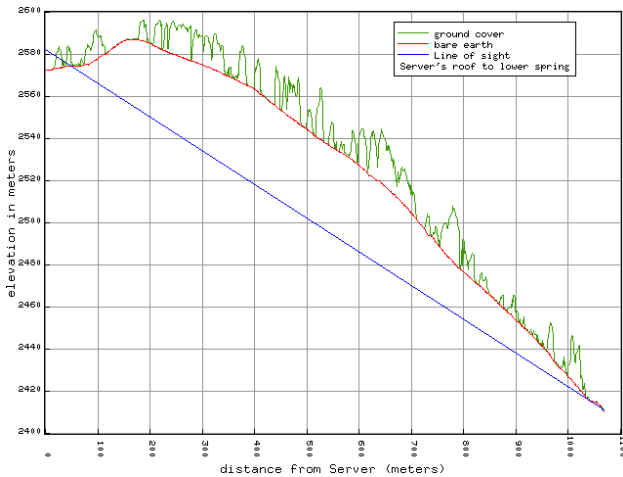


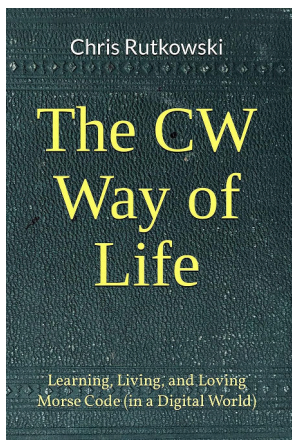
Figure 4: Line-of-sight from server antenna to spring #2 sensor.

Fiddling around with antennas, coax, back and forth with the manufacturer consumed considerably more time than reading the data and writing the code to work with the new data.

KI7NNP

Book Review

The CW Way of Life by Chris Rutkowski NW6V



Starting with Frederic the Great, many were coerced into music lessons at an early age. Some became adept amateurs, a very few make a living at it, some dropped it, and others lacking talent continue to inflict their attempts on others. Making musical sounds is still mostly a mechanical process, even if it's dancing and singing into a microphone. This skill is acquired by lots of repetition to the point that the mechanics become automatic - moving from reading a single note on sheet music and pressing the correct key (or one near it) to reading a phrase and playing it without having ever seen it. The beginner/s exercises are always, at best, boring and annoying.

There are many books, websites, blogs, on-air ways to learn Morse code. The only other book I've read [1] is short and to the point. As a perennial music and CW beginner, this book's method might work though the exercises outlined in the later chapters will resemble karaoke in the car. OK if you're commuting by yourself but awkward if others are present.

The book is self published, some 300 Kindle pages long (my first experience with this, I prefer paper), has many graphs, and interesting anecdotes. There's a great deal of discussion about how to avoid injury using a straight key at high speeds. The flat hat typical of commercial keys I supplanted with a 3D printed version that seems comfortable except the color a bit challenging. If you look on-line you can find lots of bizarre knobs to suit your fancy or fetish.

The author has an envious command of the straight key. You can hear him at <https://www.youtube.com/watch?v=tmYw4x49YXQ> and see some of his collection.

The Straight Key Century Club www.skccgroup.com has many training aids. A much shorter exposition, without the interesting anecdotes, and not as ambitious. There are many on-line reviews ranging from ecstatic to ho-humm.



My own knob design.

References

- [1] *Morse Code Operating for Amateur Radio*. The American Radio Relay League, Inc., 2021.

Member of the Month

Gary Nelson, AG7PY

Gary has been interested in radio communications for many many years and really wanted to get his amateur license. He sat through a class at church back when the FCC came to give you your amateur radio class license test. If you weren't there when they came to or if you didn't pass the test you had to wait 6 months and try again. Gary was out of town on the day working as a physician assistant working as an officer and Medic for the Salt Lake County jail. The physicians he worked with were impressed and told him he should get his physicians assistant license. He graduated from the Utah program in 1991 three months early and went back to college and received 3 degrees. Gary obtained his PA license in 1991 and currently works part time.

Gary worked at the Salt Lake County Sheriff Search and Rescue running the dive rescue team. Gary is a hazmat diver as a crime scene technician for 17 years. Gary was also a Master Scuba instructor and taught for many years. Gary also worked for the Utah State Health Department as a PA for a number of years until the clinic closed due to Covid and budget cuts. Gary was a manager for the Salt Lake County health department overseeing the medical assessment and the travel clinic for several months. He was on the state committee that developed Utah flu pandemic protocols hopefully never to be used. It was used in 2009 when we had the H1N1 flu.

In 2018 Gary received all of his amateur radio class licenses. Two weeks after Gary got his technician license he received his general class license, and then 6 months later his extra class license. Gary was excited to finally get on the air. Gary has a Yaesu FT991S that he uses in his house and a Yaesu FT57D in his truck and lots of hand held radios. Gary loves to talk on the low bands communicating all around the world. Gary has talked to Russia, England and Australia.

Gary is a member of UARC, vice president of the Taylorsville Amateur Radio Club the last four years, and Salt Lake county ARES. Gary is also a part of Races now called Amateur Radio Communications Team Division of Emergency Management DEMARCT.

Gary participated in the Pony Express reenactment as a radio operator. His job was to follow the horse where there is no phone coverage. They traveled 3 to 10 miles an hour from Simpson Springs to Camp Floyd Park in Fairfield and then took over again at Murray Park to the Wyoming border - a very long

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day. Gary enjoys helping with emergencies, ARES, and Sky Warn delivering weather reports.

Gary thanks for your contributions to amateur radio.
73 N7HVF Linda Reeder