

# The *Microvolt*

December 2023

$$\mathcal{L} = \frac{d^2 n^2}{18d + 40l} \quad (1)$$

$$\mathcal{L} = \begin{cases} l > r & \frac{\left(\frac{d}{10}\right)^2 n^2}{4.5d + 10l} \\ l \leq r & \frac{\left(\frac{d}{10}\right)^2 n^2}{4d + 11l} \end{cases} \quad (2)$$

$$\mathcal{L} = \frac{n^2 \mu_0 \mu_r A}{l} \quad (3)$$

$$\mathcal{L} = \frac{0.394r^2 n^2}{9r + 10l} \quad (4)$$

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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 2023 Board

President: Marvin Match, KA7TPH	801 328-3641
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Bookseller: Rick Gregory, KG7GOW	801 582-7783
Historian: Ron Speirs, K7RLS	801 904-3587
License Trustee: Brett Sutherland, N7KG	801 298-5399
Repeater Engineer: Clint Turner, KA7OEI	801 566-4497

## Late Breaking News

The price of the paper used for *Microvolt* has skyrocketed. Many magazines have ceased paper print and switched to digital only. The board is discussing discontinuing paper print. Check into the UARC round table on Sunday nights on 146.62 (usually 9:30-9:45) to make your opinion known or write to the editor [editor@utaharc.org](mailto:editor@utaharc.org).

Members supporting the UARC information net on Sunday nights note with dismay that the on-air meetings run long past their bedtime and would like to move the net back one hour to 8 PM. Chime in on the UARC round table at 146.62 and make your views known or e-mail the editor at [editor@utaharc.org](mailto:editor@utaharc.org).

## 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](mailto: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/>  
Or call 801 539-0852

## 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.

The Dec 14, 2023 meeting will feature Rick Mead, W7VQ who will speak on the National Traffic System (NTS) new version 2.0.

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### Our Cover

Equations for winding your own coils, Millcreek CERT exercise KF7NQY, Northern Utah SDR.

### Photo Credits

Millcreek CERT exercise KF7NQY, LCR KI7NNP.

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### License Classes

#### Utah County:

No new classes until 2024.

#### Salt Lake:

**Technician:** Not until 2024. E-mail [KI7MTI@gmail.com](mailto:KI7MTI@gmail.com) to sign up.

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

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### 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>

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### Contests: Pro and Con

#### My View

ARRL and amateur radio clubs want to increase hobby participation and thus protect our limited access to the radio spectrum. We’ve done STEM camps and demonstrations for young people, launched and tracked balloons, participated in emergency communications exercises, taught classes, and helped non-amateurs with their unlicensed services. But a big draw is contests and certificates. I contend that an emphasis on contests drives many from the active ranks.

Some of us like professional sports, some of us don’t. Football of all sorts, basketball, and baseball are immense money machines that feature clear winners and losers courtesy of never ending playoffs. Other such sports appear at the Olympics and then disappear for 4 years. Until aging out, I spent a fair chunk of my life swimming, diving, scuba diving, surfing, skiing, hiking, hang gliding, sailing, gardening, playing piano, sitting at a computer and other activities designed to cause health problems later in life. Some of these lend themselves to contests, even professional, such as swim meets, down hill racing, regattas, piano competitions and sport computer programming. But, you can participate in these for enjoyment with a minimally competitive spirit.

The Oxford Dictionary defines a contest as “an event in which people compete for supremacy in a sport, activity, or particular quality”. Despite mealy mouth attempts to indicate otherwise, a contest separates winners from losers. If you entered a contest and you “won” third place, or 10th place, you’re a loser. Competition for the highest spot may improve how we do things, or it might not. Herein lies a problem for attracting and retaining more amateur radio operators.

**Pro** Contests require proficiency, a good ear, a thick skin, and perseverance; attributes that come in handy when required in an emergency. Practice makes perfect.

Contests acquaint you with your equipment’s limitations. Contests acquaint you with your limitations.

Winning a contest is a real ego trip. As Calvin’s father points out, losing a contest builds character.

Contests are prized by a large amateur radio cohort and serve a useful purpose.

**Con** To win, you need both experience, the best equipment and location that money can buy.

Practice makes perfect. It also makes for hide bound adherence to unwritten custom, and abuse for not knowing it. NA7C's expostulation of the POTA CW rules is enough to make you disconnect your key after the first CQ.

For most of us, amateur radio is a hobby, not a profession. The drive, ambition and time required for contest participation is lacking. Goal line celebrations, champagne fights, parading with trophies are inappropriate for a mostly sedentary activity. Contests as the essence of amateur radio is detrimental to creation of a larger ham population. The same is true for chasing ratings. Some amateurs are just happy to talk to others on VHF/UHF and that's the extent of their activity. Others just like to build random stuff and play with it. Do we push these people out?

KI7NNP

## Millcreek CERT Exercise

**Shawn Evans K9SLE, Scott Rosenbush K7HSR**

On Saturday, November 18th, 2023, Millcreek City Emergency Management alongside South Salt Lake Emergency Management held its bi-annual disaster training exercise at the Columbus Senior Center in South Salt Lake City. CERT students completing their class participated and took leadership roles in the exercise. We had CERT members from Millcreek, South Salt Lake, Holladay, Murray, and Salt Lake City participate. About 20 teenage members of the local Junior ROTC joined and volunteered as victims and incident helpers. Hams in attendance represented the Salt Lake City Crossroads ARC, UARC, ARES, and Millcreek CERT.



CERT stands for Community Emergency Response Team and provides basic disaster preparedness to the community. CERT members are trained to assist their community in the immediate aftermath of a disaster

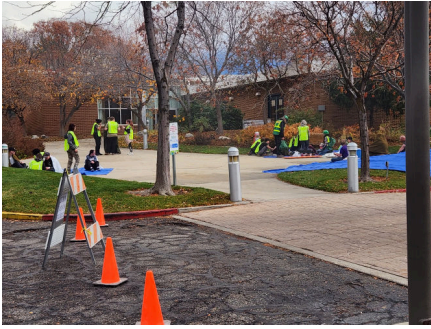
when professional responders may not be immediately available. The training covers various aspects of emergency response, including first aid, fire safety, search and rescue, and disaster psychology.

A CERT training exercise prepares individuals and communities for emergencies. These drills typically simulate various disaster scenarios, such as earthquakes, tornados, or other disaster event to help members practice their response and coordination skills. Participants may go through scenarios like triage, first aid, fire suppression, and search and rescue. The goal is to enhance the community's ability to handle emergencies effectively and efficiently.

Volunteers portray disaster victims during drills, allowing CERT members to practice their response and aid skills in a more lifelike setting. Our junior ROTC volunteers simulated various injuries, emotional states, and situations that responders would encounter during a real emergency. Their involvement enhances the effectiveness of CERT training, providing participants with hands-on experience in dealing with different aspects of disaster response, including medical care, evacuation, and emotional support. Victim volunteers play a crucial role in helping CERT members develop the skills and confidence needed to assist and respond to the needs of individuals affected by emergencies.

For this drill, CERT members organized a severe weather event simulating widespread damage across the city. The scenario involved downed power lines and trees that closed off sections of the city causing delays for emergency responders. We also had collapsed structures, ruptured gas lines, fires, and injured residents. Our victim volunteers started being victims, and our CERT volunteers went to work.

As the drill unfolded, the CERT members swiftly mobilized, established a command center and incident management to coordinate their efforts. They efficiently assessed the simulated damage, prioritizing tasks based on urgency. Teams were dispatched to conduct search and rescue operations, provide first aid, and address other immediate needs.



Communication played a crucial role, and the CERT members adeptly utilized their GMRS and Amateur Radios to stay in touch and share critical information. They demonstrated effective teamwork, utilizing their training to handle challenges such as message handling and information gathering.



Amateur radio and GMRS operators play a vital role in emergency communication.

1. **Reliable Communication:** Amateur radio operators are often able to provide reliable communication during emergencies when other forms of communication may fail. This is because ham radios can operate independently of traditional infrastructure like telephone lines or the internet.



2. **Local and Global Reach:** Amateur radio operators can facilitate communication on a local level, such as within a community affected by a disaster, or on a global scale. This flexibility allows for effective coordination and information exchange.
3. **Emergency Networks:** Amateur radio operators often form networks, such as the Amateur Radio Emergency Service (ARES), to support emergency response efforts. They provide communication links local authorities, and other organizations involved in disaster response.
4. **Independence:** Amateur radio operators use their own equipment, including portable or battery-operated setups, making them less dependent on external power sources. This self-sufficiency is crucial during power outages or when traditional communication infrastructure is compromised.
5. **Information Gathering:** Amateur radio operators can collect and relay valuable information about the situation on the ground, including the extent of damage, the number of casualties, and resource needs. This information aids emergency responders in planning and allocating resources effectively.
6. **Community Support:** Amateur radio operators often volunteer their time and expertise to assist their communities during emergencies. They may provide communication support for events such as severe weather, natural disasters, or public events where large crowds gather.

Amateur radio is an important asset in emergency situations, offering reliable and independent communication that can make a significant difference in coordinating response efforts and providing crucial information.

The CERT members engaged with the community, calming residents and guiding them to safety. Their prior training in triage and first aid proved invaluable as they attended to the injured with confidence and skill.

Throughout the drill, the CERT members adapted to changing circumstances and collaborated seamlessly with local emergency services. Their well-coordinated response showcased the importance of community preparedness and the effectiveness of the CERT program in ensuring a resilient and capable community in the face of emergencies. The success

of the drill not only boosted the confidence of CERT members but also strengthened the city’s overall readiness for real-life emergencies.



**LCR Meters**

**Cheap to Outrageous**

Having to measure inductance of 3D printed coil forms, I used 4 different LCR meters and looked at a few more. Inductance must be measured near the frequency you’re intending to use the inductor at. However even the \$6000 units don’t meet this unless you’re working 2200 meters. Let’s start from cheap to moderately expensive. If you have \$15k burning a hole in your pocket, you’re on your own.

**Bargain Basement: CAMWAY LCR Meter \$31.49**



I purchased one of these to add to my collection of low cost instruments. The instructions might be a chatBot’s version of translation from whatever country it’s from, same for the 1 page instructions. There’s no auto-ranging. Calibration below 200  $\mu$ H is manual, you do the subtraction. Excitation frequency unknown.

Measurement	Values
Resistance	0.1 - 20M ohms (0.8% on lower)
Capacitance	0.1 pf - 2,000 $\mu$ F
Inductance	0.1 $\mu$ H - 20 H

**Two buttons: PEAK Atlas LCR45 \$159.75**

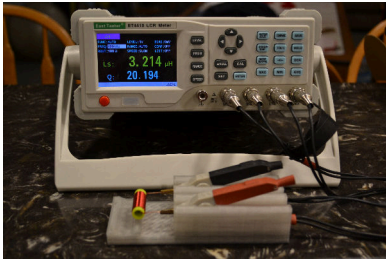


I borrowed this one from KJ7MEB to test my bench top meter with good results. The 200 kHz range is twice the others sampled.

Measurement	Values
Frequencies	DC, 1 kHz, 15 kHz, or 200 kHz
Resistance	0 - 2M ohms
Capacitance	0.5 pf - 10,000 $\mu$ F
Inductance	1 $\mu$ H - 10 H

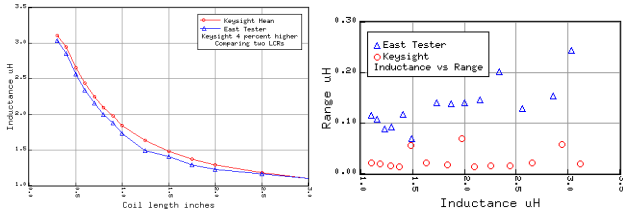
The leads are a little flimsy and are not Kelvin. Don’t lose the instruction manual.

**Freg: East Tester ET4410 \$250**



This is my *goto* meter for thousands of capacitor and inductor measurements. It has kelvin leads, measures stuff, has an undocumented PC interface, and lots of amusing English including the button misspelling (this appears on other manufacturers as well).

The ET4410 reads consistently higher inductance than the Keysight and has a greater variability.



**Handheld: Keysight U1733C LCR Meter \$568**



I borrowed this one and did a fair number of measurements to compare to the East Tester. It has really short probes with alligator clips that draw blood if you slip.

Measurement	Values
Frequencies	100 Hz, 120 Hz, 1 kHz, 10 kHz, 100 kHz
Resistance	0 - 200M ohms
Capacitance	0.5 pf - 10,000 μF
Inductance	1 nH μH - 2000 H
Other	PC interface, Q, dissipation

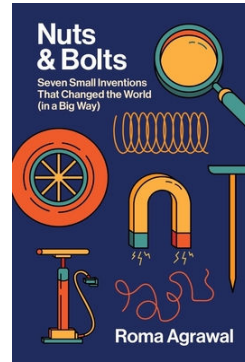
**Conclusion**

For small inductance and capacitor values accuracy suffers in indirect ratio to the price. If your needs aren't that great, \$32 will help you measure many of the values in your junk box.

**Book Review**

**Nuts and Bolts: Seven Small Inventions that Changed the World (in a Big Way) Norton, 2023, by Roma Agrawal**

I always purchase my nails and screws, an excuse to browse Home Depot and Ace Hardware, I've never made my own. You can make your own lemon battery, marginal electric motor, and a minimal FM radio using just basic tools. Roma Agrawal examines seven such items and their place in society in a story telling mode reminiscent of Mary Roach and Jennifer Ackerman and makes her own nails.



We take the nail for granted until you check the inflated prices at the hardware store. Early in US history nails were so precious that if a house was destroyed, the nails were rescued for reuse.

The nail, wheel, spring, magnet, lens, string, and pump are all progenitors of radio system components. Screws hold our radios together, wheels in rotating capacitors and resistors, magnets caused by inductors, lenses on LEDs, string as stranded wires and cables from the thinnest litz wire to those holding up the Brooklyn bridge, and pumps (this is a stretch) as MEMS accelerometers part of GPS receivers and cell phones.

I found the female perspective on these inventions fascinating and the 200+ pages riveting. Pity those around me for repeating the stories I found amusing.

KI7NNP

**Ham Radio Eclipse**

**Linda Reeder N7HVF**

Saturday October 14 James Bennet KK7AVS invited me to help him with an experiment. He wanted to know what effect the eclipse would have on the ham bands. James went to Travis mountain and set up 10 and 40 meters. I was at home listening on 40 meters. All during the eclipse 40 meters was dead. You could only make local contacts. I couldn't believe I couldn't talk to California on 40 meters on a Saturday morning. James was making all kinds of contacts on 10 meters.

James described told me when the moon passed by the sun. Then 2 meters went dead. James said when it was dark 10 meters faded away and then it came right back. Finally when the eclipse was over 40 meters came back to life. James was talking to Bakersfield California and I talked to Arizona. James has a recording of our contacts. I had so much fun.

## Member of the Month

### Dan Judd N7QXB



Dan has been involved in radio and broadcasting since he was a teenager. He helped build the Pleasant Grove High School radio station KPGR. At 17 he got his first class radio telephone license. This led to him working as a chief engineer at several radio stations in Utah and Houston, Texas. While in Houston he worked on a couple of radio projects involving 2000 foot towers. Dan worked with Gordon Smith K7HFV at Bonville Data Systems. While at BDS he traveled the country installing SCA sub-carriers on FM broadcast stations.

Years later, he worked for UDOT as an Avalanche Forecaster in Big and Little Cottonwood Canyons. It was here that he gained experience with remote automated weather stations. After leaving UDOT he started his own business and installed weather stations all across the western US. He installed and maintained all the weather stations used for the 2002 Winter Olympics.

For the past 30 years he has also manufactured a sensor used to measure snow depth and water levels. His depth sensor is in use all over the world.

In 1992 Dan got his Ham Radio Technician license. In 2018 he started playing around with an SDR radio and decided he wanted to get on HF. He got his General license in early 2019 and followed up with his Extra license 3 weeks later. The Extra class test was administered by Gordon.

Dan's favorite thing about amateur radio is the people. Dan is the only Ham in his family. His wife Vicki is a tolerant XYL who doesn't mind his hobby as long as he keeps his RF out of her computer and TV. He also has two sons who are RF challenged.

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His latest project is a 52 foot tower and tri-bander antenna that he demonstrated at UARC's home brew night.

Dan is an avid fisherman, for those both alive and from 50 million years ago. He also enjoys photography and astro photography.

Dan we wish you all the best in your endeavors.

73 N7HVF Linda Reeder