

The *Microvolt*

October 2023



6 Meter Beam

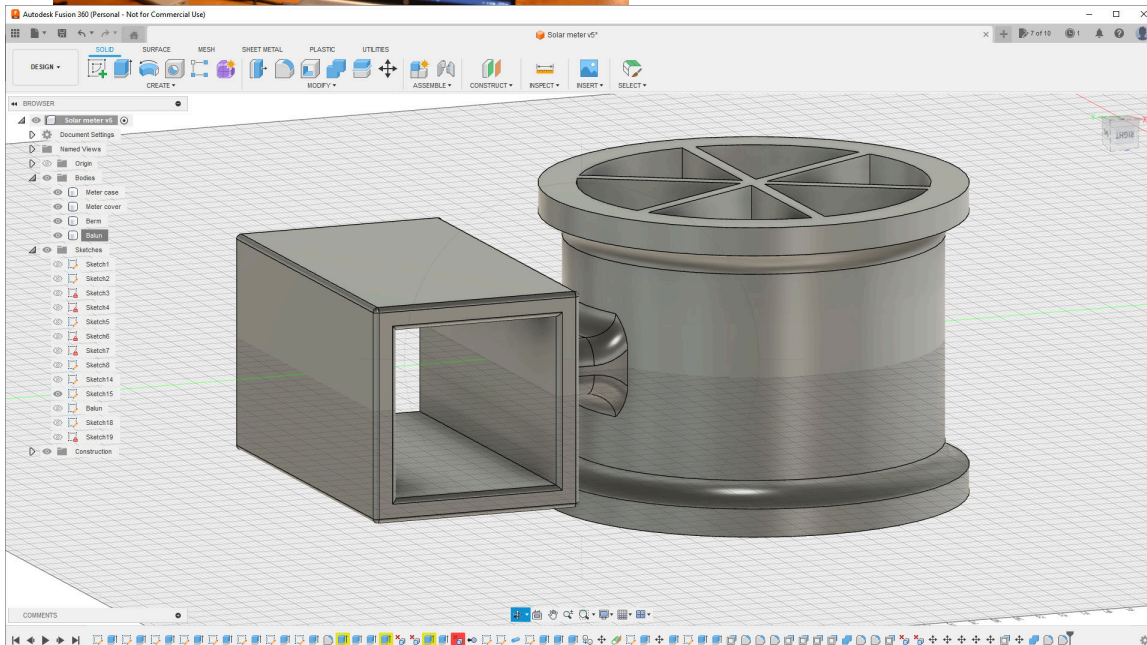
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Prologue

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.

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Repeater Engineer: Clint Turner, KA7OEI	801 566-4497

Late Breaking News

For late breaking news listen to the UARC Information Net Sundays at 21:00 on 146.62 or set your browser to: <http://user.xmission.com/~uarc/announce.html>

2024 UARC Steak Fry, July 20, 2024

The annual UARC steak fry is now July 20, 2024 (not July 13) so as not to conflict with the ARRL Rocky Mountain Division Convention in St. George.

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/>
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 October meeting will be devoted to home projects. Bring your project or picture and be prepared to answer questions for 10 minutes.

Our Cover

Leamington antenna switcher (Gary Crum KK7DV), Computer controlled video switcher, 6 meter balun design (Chuck Johnson WA7JOS).

Photo Credits

Manufacturers’ web pages, 6 meter antenna (Chuck Johnson WA7JOS).

License Classes

Utah County:

The Utah Valley Amateur Radio Club will be holding an Amateur Extra course 6:30 pm to 9:30 pm for five Tuesdays in a row at the Orem Public Safety Training Room, 95 E Center Street. We’ll hold the course on July 18, July 25, August 1, August 8, and August 15. Sign up for the \$10 course at psclass.orem.org. No books needed, but you’ll need to bring a laptop or smartphone to each class. This class is fun, engaging, and hands-on, but its homework will challenge you. If you have questions, please call Noji Ratzlaff 801-368-1865 or email nojiratz@hotmail.com.

Salt Lake:

Technician: Zoom with KI7MTI and KK7AVS every Monday from 6:30 PM. Contact KI7MTI@gmail.com for invite.

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

Extra: In person starting September 19th, up to 4 people at a time, contact Ron Speirs K7RLS@comcast.net or 801-904-3587.

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>

CBS, FRS, GMRS, MURS

My View

FCC abbreviations for various radio services with minimal licensing requirements, these are designated for use by individuals with minimal training. Decreasing price and increasing capabilities of electronic communication systems has exploded the use and abuse of these services.

Many of the users view the devices as cell phone extensions - communications in unserved areas, for emergencies and child monitoring. Many view acquiring a license as unwarranted government intrusion and extra expense for minimal return. Knowledge of basic electricity, electronics, safety, and operations is not a given.

Herein are descriptions of the service modalities, comments on their future directions and how radio amateurs might interact with their users to the benefit of both.

Citizens Band Service radio has been around for a long time with some changes. We can think of it as the 11 meter band with 40 twenty kilohertz channels ranging between 26.965 MHz and 27.405 MHz. The full regulations are in FCC 47 C.F.R. Part 95 [1]. A license is not required but the transmitter must be certified for this use.

Rules: You can talk to one station for 5 minutes then you must wait for 1 minute before resuming. No

power amplifier can be added. The antenna can be only 20' above highest point on a building or 60' above ground. Originally you were only supposed to communicate 150 miles, but inadvertent DX put paid to that, the rules were not enforced either by the FCC or socially by responsible users.

Currently CB is pretty much dead. Suborning amateur 10 meter power amplifiers and high gain antennas became common place. Many of the worst features of social media manifested themselves here long before the internet. None of the rules were enforced. The highway patrol used to monitor channel 9 for roadside emergencies but the practice is dwindling. After CB's glorification by Hollywood in the 60's and 70's its use is now as out of fashion as bell bottoms[2].

You may notice that many member of the month amateurs got their first radio exposure with simple CB walkie-talkies and went on to do great things in amateur and professional radio.

Family Radio Service or FRS is a private, two-way, short-distance voice and data communications service for facilitating family and group activities. No license is needed, no age limits and even use it for business. There are 22 channels available in the 462 MHz range with a maximum radiated power of .5 watt or 2 watts depending upon channel. These frequencies are shared with GMRS.

Hand held FRS devices are available at modest cost - \$30 a pair seems to be the going price. You can add a pair of Dewalt yellow ones to complement you tool collection for \$150 (the batteries are different).

Many of these devices are inexpensive toys but real communication is possible and the limited range minimizes congestion when they may be most needed. They are simple enough to use without constantly referring to the manual. Frequency rules and power output are handled by the radio hardware.

The failure of Citizens Band is less likely here. Full legal limit 70 cm PA's are expensive, and they won't increase your range much. Getting your antenna up higher is the way to go but this can be very expensive and won't fit in your pocket. The signals mostly head off into space, you're spending a lot of money for not much additional performance. The main problem is the availability of 5 watt GMRS hand helds and 50 watt mobile stations with the same coverage. Abuse of these could be a problem for FRS users. Abusive language, trolling, and monopolizing a channel is less likely because of UHF propagation restrictions and fox hunting a 70 cm station is easier than an 11 meter one.

General Mobile Radio Service Shares frequencies with FRS but there are additional ones. Here you have to be 18 years old and pony up \$35 but your license lasts for 10 years. You're allowed more power than FRS, a few more frequencies, and use of repeaters.

There are 30 channels with a confusing list of restrictions, but they're all built into the radio hardware. ERP is 50 watts but some channels are limited to $\frac{1}{2}$. One second digital data is available on the lower channels. You can't talk to amateur radio operators (say a repeater that broadcasts on amateur frequencies) and you're not supposed to tweak amateur radios to get to these frequencies.

Hand held GMRS units (limited to 5 watts) are available for about \$40 if you buy in quantity. If you want a base station or mobile prices range from \$110 to \$800 depending upon the accessories you want. Repeaters are available on a restricted channel set.

Multi-Use Radio Service MURS uses channels in the 151 – 154 MHz spectrum range. The most common use of MURS channels is for short-distance, two-way communications using small, portable hand-held radios that function similar to walkie-talkies. You don't need a license, you can't get one even if you want one. ERP is limited to 2 watts and repeaters are not allowed.

Some example uses are dog tracking collars and resort communications where 2 meters is less susceptible to vegetation. The antenna limit is 20 feet above the highest point of the structure on which it is mounted, or 60 feet above the ground. Confusing, if the structure goes much higher than 60 feet?

These services and schemes are widely used by both amateurs and the unwashed. At one time there were more than 1 million CB users and today there are probably many more FRS and GMRS users in the west where cell phone coverage can be spotty. This represents a vast potential group of untapped recruits. Many of these "push to talk" users are satisfied with the limited capabilities. The radios are purchased for camping, off roading, or parent-child communications during emergencies. Once the novelty wears off, they're placed on a shelf, the batteries left to discharge, or in the case of alkalines, rot the radio insides out. The owners forget their limitations and how to enable even the most basic functions.

How can we help this group? Should we even try? We can impart some basic knowledge from our experiences with the emergency and social aspects of communication. The most important lessons we can give:

1. **Practice** Maybe not a contact a day, but at least once a month turn the things on, send someone with a hand held on an errand and establish communication. Switch to a different channel en-route. Check the batteries for charge, remove alkalines until needed.
2. **Power/Antennas** Long range is your enemy. Each channel can accommodate a limited number of users. The greater your range, the more users you can offend, the more that can hear sensitive information, and the fewer that can use the channel.
3. **Keep it short** Rag chewing during emergencies is a no-no. Listen first, then talk.
4. **Jargon** Avoid 10-codes and relics of the 1960's.

Why bother? Many of these users are younger than most of us. They're not going to start studying for a technician license. But many years from now, they may remember how helpful and non-judgemental we were and wish to give back.

KI7NNP
WRYT968

6 Meter Beam for Leamington

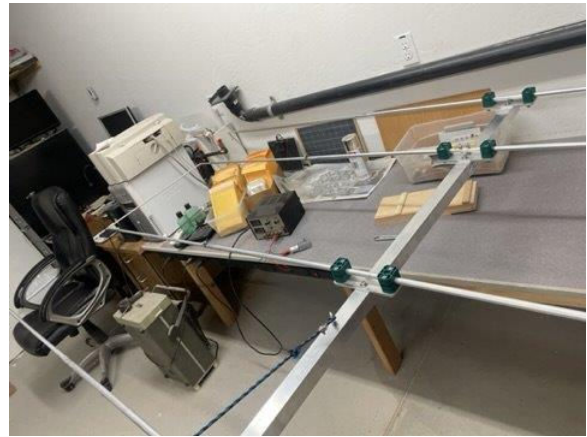
Chuck Johnson WA7JOS, Gary Crum KK7DV

Are you ready for 6 meters? It's finally arrived - the robust EAntenna 50LFA6M 6 element, 12dBi, 32 dB F/B and 100 mph wind rating (is this enough?). It can handle 5 kW without melting.



Spanish design, German construction

The boom is 21.5 feet long and about 10 feet wide would fill up many a back yard, some assembly required.



Active element in the shop

We need to construct a balun and make the connection before we hoist it skyward. There's been much discussion about where to place it on the tower and how hard it's going to be in different positions.



Needs balun and coax

The switching software is ready, the antenna swither is ready, we're ready to install this on the Leamington tower during the May 25th Memorial Day work party, or sooner if there's enough interest and the weather cooperates. Watch the UARC website.

Do you want to get started with the Leamington remote? See <http://user.xmission.com/~uarc/HFRemote.html> for rules.

Antenna Analyzers

Jed Marti KI7NNP

Antenna analyzers of various sorts are common in the shack. You'd probably want one to adjust your antenna for the best match near the frequencies you commonly use. Yes, you can use an antenna tuner to perform the match, if it's able, but that's wasting power in the wrong place.

Where is your antenna resonant - an antenna analyzer is an option. Take the MFJ-259D which claims to do just about everything for \$350. Analog meters, 100 kHz to 230 MHz, needs 10 AA batteries so don't drop it on your toes. I had an earlier version that I used to tune my 2 meter J-pole but it ceased functioning after a short period and got sent to the great electronics graveyard by the lake. The club owns two MFJ analyzers that can be borrowed.



MFJ-259D Antenna Analyzer

This is a bit big to cart around on the tower or march between the shack and antenna. A little farther up the scale is the Rig Expert AA-230 Zoom. This has a small color LCD screen, the same sort of range and buttons to push. For \$350 you can do the same stuff but without twisting knobs and hand recording values. And for \$15 you can get a belt holder for those really tall towers.



RigExpert AA-230 ZOOM

If you're flush, the RigExpert AA-3000 for \$1300 goes up to 3 GHz, has a sunlight readable screen (this is important) and it *spricht Deutsch*. Or for \$100 you can get the bare board and play to your arduino heart's content (made in Ukraine).



RigExpert ZERO-II

Vector network analyzers are essentially sweep frequency generators and measurement devices with many more capabilities. These range from the pocket NanoVNA for \$55 to over \$300k (Anritsu MS4647B). If you have to ask the price, you can't afford it. Not having the money for something I only use occasionally, my *go to* instrument is the NanoVNA.



Cheap, not so cheap

The NanoVNA comes in many forms with different screen sizes, broader frequency ranges, even different manufacturers. You can stick it in your pocket, take it to SOTA, or stuff it in your Go Kit. It comes with a USB serial port at 9600 baud so you can capture data and set parameters.

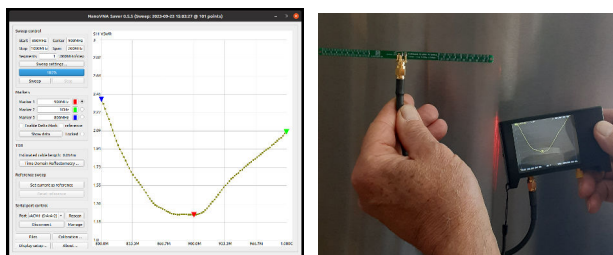
What difference does a few hundred thousand dollars make?

1. The number of ports.
2. Stability.
3. Sweep speed.
4. Sweep range.

There's many things you can do with a VNA.

1. Smith charts,
2. Cable lengths, distance to fault,
3. SWR measurement,
4. Stub computations,
5. Self resonant frequency [3].
6. With a bit of work, power spectrum.

Here's the Linux version of the computer user interface and the nanoVNA showing the VSWR of a 915 MHz dipole antenna for a range of 800 MHz to 1 GHz.



New UARC Audio Visual System

To expand UARC's internet capabilities the club purchased a new Audio Visual system including:

- ATEM MiniPro audio/video switcher/recorder,
- HP laptop with ATEM software, Windows 11, WiFi,
- 1 TB SSD drives for recording,
- RODES wireless microphone,
- Vivitar video camera and tripod,
- USB C hubs,
- HAYEAR 14 MP HDMI microscope camera,
- HDMI, USB, audio cables and adapters,
- Extra batteries and chargers.

The ATEM switcher allows for 4 HDMI video inputs, 2 audio inputs (as well as audio from the 4 HDMI feeds), different fades between video feeds, live output stream, live recording (MP4), live output to Facebook, Youtube and other social media.

If you bring your own laptop for a presentation and it has HDMI output, it can be connected directly to the switcher and you control the presentation. If

you're demonstrating small hardware the microscope can show details not possible with the main camera. If you want to hear radio output, your audio can be connected to the switcher and recorded as well as amplified by the PA system. Remote presentations over Zoom are also feasible through the UARC laptop.

We attempted to use this for the September in person meeting with the usual teething problems including internet connections, color disagreements with the University AV system and the meeting didn't get recorded.



References

- [1] F. C. Commission, "47 C.F.R. part 95," <https://www.fcc.gov/wireless/bureau-divisions/mobility-division>.
- [2] F. Lebowitz, "Or not CB: That is the answer," in *The Fran Lebowitz Reader*. Vintage Books, 1994.
- [3] Coilcraft, "Measuring self resonant frequency," Coilcraft, Inc., Tech. Rep. 363, 2004.

Silent Key

Dennis Nelson, N7FOD



Long time amateur, UARC and ARRL member, Dennis Nelson has passed away. Dennis was the member of the month in November 2015. He loved 80 meters, building electronic equipment and rebuilding old cars.

Member of the Month

Robert McKinnie AL7AW

This month we feature Robert McKinnie AL7AW. Robert was interested in chemistry and had his own chemistry lab when he was in the 4th and 5th grade. He received his Boy Scout chemistry merit badge sparking a lifelong interest in science and technology. Robert's sister's boy friend gave him a him a broadcast and short wave radio and he started to listen to short wave radio programs. Robert discovered that by increasing the antenna length he could hear more stations. When Robert's father came home and saw all of Robert's antennas all over the back yard he told his son he needed to get in touch with Bob Alarsmer K7BMH. Bob took Robert to the Klamath Oregon amateur radio club meetings. Robert was 12 years old when he received his novice radio license in 1958. His call sign was AN7GME, perfect for CW. A year later Robert had a conditional class license and his call sign became KB7GME. When ever Robert is on the phone bands he would say "Good Morning Everybody" mimicking the letters of his call sign. Robert got his general license when he was a freshman in high school and this call sign lasted for 20 years.

In 1975 Robert was working as a computer systems analyst in Seattle, Washington. While Robert and his wife Diana were living in Seattle they had 3 children a girl, a boy and a girl. Then they moved to Alaska and Robert wanted an Alaska call sign and became KL7JKG. Robert didn't like it so he got his advanced radio license and became AL7AW in 1982.

Robert and his family moved to Parker, Texas where he worked for 25 years. Robert's wife Diana and their 2 daughters got their ham radio licenses though they weren't very active in amateur radio. In 2010 Robert retired and moved to Virginia and in his free time time he studied hard and received his extra class radio license.

In 2013 Robert moved to Salt Lake City to live with his daughter. In 2017 he bought a new house and put up VHF and UHF antennas. Robert got involved with the 76ers and had a lot of fun going to lunch on Fridays. Robert started working with the walkathons and really enjoys helping them out. Robert is a member

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of UARC, a life time member of the ARRL and a life member of the Quarter Century Wireless Association (QCWA).

Robert loves working with and helping people. Robert also enjoys working on cars and his house. He hopes to start working on antennas again and to have something to bring to UARC'S home brew night in October. Robert we wish you the best on your projects. Thank you for your contributions to amateur radio.

73 N7HVF Linda Reeder