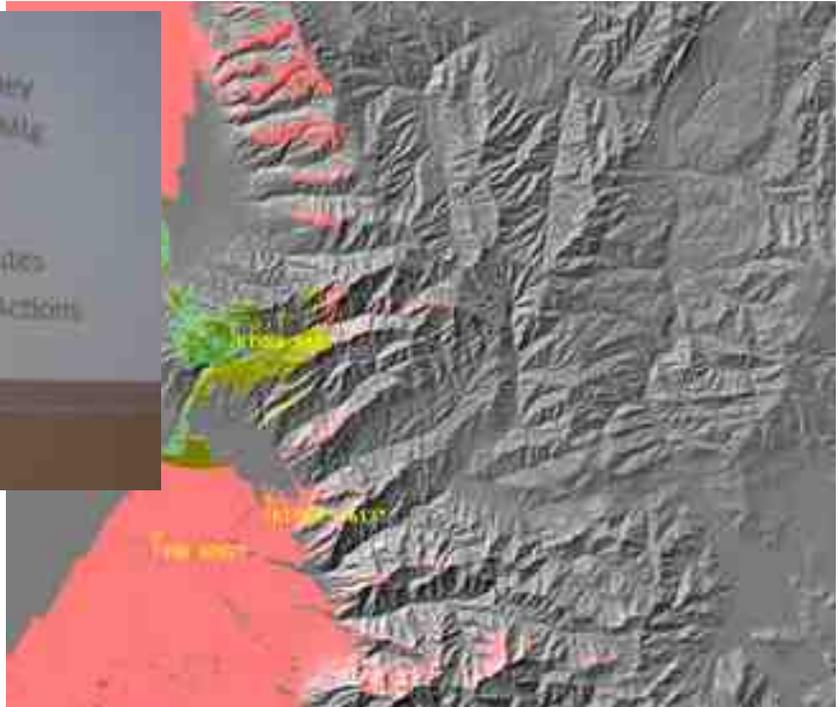


The *Microvolt*

December 2022



Prologue

Publication: *The Microvolt* (USPS 075-430) is the official publication of the Utah Amateur Radio Club, Incorporated, 632 S. University Street, Salt Lake City, UT 84102-3213. 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 Tom Kamlowky, 4137 Clover Lane, Salt Lake City, UT, 84124-2711.

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.

Ham Hot-Line: The Utah Amateur Radio Club (UARC) has a Ham Hotline, 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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IRLP Information

For information on using the club's IRLP node on the 146.76 repeater, check <http://www.utaharc.org/irlp>. The prefix code required is 314. Please do not give this out to nonmembers of UARC.

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>

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

Live (in-person) UARC meetings Have Resumed

After a bit more than two years of plague and pestilence, we are pleased to announce that we are resuming “In-Person” meetings, starting in September 2022. The scheduled topic for the January meeting will be the ever-popular “Homebrew” night, so be sure to bring, demonstrate and explain that project that you’ve been working on for the past two years!.

As before, these meetings will be held in the “Warnock Engineering Building” on the campus of the University of Utah, which is the same place that we held meetings before “it” happened, and we went to online meetings. Just like before, we probably won’t know in which room, exactly, we will be meeting for a little while yet as that is something assigned to us by the powers that be at the U.

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.

UARC meetings are held on the second Thursday of each month except for July (annual steak-fry) and August (vacation).

Upcoming Amateur Radio Events:

QuartzFest: A gathering in the desert of Arizona near the town of Quartzsite, this event will run from January 22-28. QuartzFest occurs on BLM land, is well-attended by those in RVs, Campers and tents and will host a wide variety of activities

- most, but not all being ham-radio related. For more information go to <https://quartzfest.org>.

Utah VHF Society Swap Meet. The 2023 Utah VHF Society Swap Meet will occur on **Saturday, February 25, 2023** - and it **WILL** be at the same place as last year. The doors will open for buyers at 0900 MST and for sellers at 0800.

January UARC meeting. The topic for the January Elmer’s Corner is Emergency Communications. Shawn Evans, K9SLE will go through ARES and FEMA requirements to communicate over your radio efficiently in an emergency, and he will discuss the new CISA certifications that will be required to work in conjunction with a municipality.

The main presenter will be Jeri Brummett, WJ3RI whose topic is Cybersecurity for HAM Radio; What you need to know.

Fresh from the main stage of the recent Rocky Mountain Division HAMfest in Cheyenne WY: Computers, Internet access, and embedded software in our HAM shacks and radio devices have become ubiquitous in Amateur Radio; however, most HAM operators are unsure of how exactly to respond to the security implications of these advancements. The presentation will review the nature of cybersecurity concerns faced by HAM radio operators and help you to better understand and take action to address cybersecurity in your HAM shack.

Our Cover

UARC December In-person Meeting

Elizabeth Barry KJ7MEB presented “Women in Amateur Radio” with anecdotes, events to participate in, and hurdles to overcome. Some of these were truly embarrassing to the male members of the audience (I hope).

Club officers were affirmed by voice vote, the Microvolt editor elected by secret ballot, the winner expected to lose and didn't take notes. Finally, Jed Marti, KI7NNP, presented some work on short range RF propagation with examples from the Salt Lake Valley.

License Classes coming up:

Utah County:

In-person license classes will be offered at the City of Orem during 2022. Each course will cost \$10. Register at: <http://psclass.orem.org/>.

The Technician License class on January 17, 24, 31 and February 6th from 6:30 pm to 8:30 pm at the Orem Public Safety Training Room, 95 East Center St. General Class starts on March 21st, and Extra Class starts on July 11th.

These are “homework” courses; You'll be expected to complete an assignment (and email me the results) by the start of every class period, even the first one. No course textbooks are required. Then again, these courses will be casual, hands-on, and fun for those who remain awake. Please contact Noji (nojiratz@hotmail.com or 801-368-1865) with any questions about the courses.

Classes via Zoom (online or OTA):

James Bennet and Mike Ainsh will be starting a Technician course in January over Zoom, Mondays at 6:30. K7XRD general class preparation is every Tuesday at 7PM on the Crossroads 2 meter repeater 147.160 mHz, 600 kHz offset, tone 127.3.

75 Years of the Transistor

You turn your radio on, the internal computer does a few checks and beeps – you're on the air. No vacuum tubes to heat up, a coal fired power supply

is not needed. All this courtesy of the transistor whose 75th anniversary we celebrate this year.



Here's a 2N1506 Power BJT from the early 1960s and a slightly less than modern 8 bit micro-controller, C8051F911 to be exact full of transistors, both from my junk box. The former available from Digikey for \$33 each, the latter \$4.03 each, neither recommended for new designs.

Early work on germanium and silicon rectifiers preceded the transistor. Indeed the first patents for a transistor were issued in 1925. John Bardeen and Walter Brattain made the first working “point contact” transistor December 16, 1947 at Bell Laboratories. It's simple enough you can build one of your own out of a germanium diode (if you can find one) – see “Home-Made Transistors: Inexpensive Conversion of Selected Germanium Diodes”, Wireless World, January 1954. It's too late to get the Nobel prize, Bardeen got it in 1956. William Shockley (not to be confused with Walter Schottky with the diode named after him) invented the bipolar junction transistor BJT, shown above, in 1948 and it's the discrete we see most today. It's more rugged and reliable, Digikey lists some 8000 starting at two and a half cents each if you buy a bunch of them. For most radio purposes they've been superseded by the FET, JFET, MOSFET, xxxFETyyy, 3 dimensional transistors with countable atoms and many more to come. Many of us adore the steam engine – motive power for the last half of the 19th and the first half of the 20th centuries. They're wonderful, noisy,

inefficient, polluting, maintenance nightmares. Perhaps the perceived slide of amateur radio from the CW, 40 WPM masters of old is a bit of this nostalgia. You could understand the relatively simple circuits, build your own, you could heat the shack with them, and they worked. However, without the transistor and its followers, amateurs would still be stuck in the 1950's as would the rest of civilization. Your HT might have one or two switchable channels, a battery that might last an hour or two depending on how much you wanted to talk and the highest frequency might be 220 mHz. Waterfall display? Instant on? 2.5 kHz signal separation? Digital modes beyond RTTY? Can you afford it? Forget it. But if it didn't happen here on December 16, 1947, the French did it a short while later.

For finer details, see *The Transistor at 75, The Past, Present, and Future of the Worlds most Important Device*, IEEE Spectrum, December 2022.

Get a good antenna for your HT

Noji Ratzlaff

Now that you've purchased an HT (handheld transceiver), equipment-wise you're almost ready to meet the ham radio world head-on. There are still several improvements you can get for your station, but perhaps the most important is a good antenna.

Your HT arrived with a short stock antenna we sometimes call a *rubber duck*. Its purpose is more for testing your radio, rather than for serious use. A good location can help a lot, but a good antenna can help improve your signal at a given location even more. Here are several antenna options that can help.

Traditional whip

A whip antenna is one that's attached to your HT, but is more adapted to serious radio operation

rather than simply testing. The **Signal Stick Antenna** is a superior variation of a traditional whip, that's lighter, more flexible, and performs better than other whips. Simply replace your rubber duck with one of these, and you'll notice the improvement right away.

Telescopic whip

Some HT whip antennas are telescopic, in that they're made from several sections of metal sliding tubes. A telescopic whip antenna tends to be a little more rigid than a traditional whip, but can be stored compactly in its retracted position and can out-perform a traditional whip because it's typically longer. Be sure to collapse it by pulling, not pushing, the sections together.

J-pole

A J-pole antenna is one that contains both a radiator and a counterpoise, typically oriented in parallel with each other. The three most popular J-pole types are the copper cactus J-pole, the open-stub "Pockrus" J-pole, and the roll-up J-pole.

An advantage of a J-pole over other antennas is that they're typically a half-wave long, making the most of your signal. Connect your HT to one by means of a length of coax (coaxial cable) and maybe even a pigtail adapter. Then, stand the antenna up against a window or sliding glass door, or even mount it on your roof.

The J-pole antenna is inexpensive and performs well, but it's prone to (both generating and receiving) interference. So, be sure to create an RF choke out of several 6-inch turns of coax right near the base of your antenna.



Figure 1: J-pole with RF choke made from Coax

Mobile Whip

You can purchase an antenna made for a vehicle, and mount it on your vehicle or on an old cookie sheet in your home, and connect it to your HT by coax, to get your signal out far.

Also, if you don't want to drill a hole in your shiny, new Lexus, you can mount your mobile whip antenna using a magnetic mount, or "mag-mount" as we call it. It'll perform almost as well as one that's hole-bonded with your vehicle body. But, you'll need to prevent the magnet from sliding around and scratching the paint by using a

large-strong magnet or by placing a sheet of protection between the magnet and the vehicle body.

Ground Plane

Often the first antennas that hams tend to make on their own is a ground plane, which consists of a vertical radiating element and one or more radials sticking out and downward from its base. It connects to your HT by coax, performs very well, and is inexpensive.

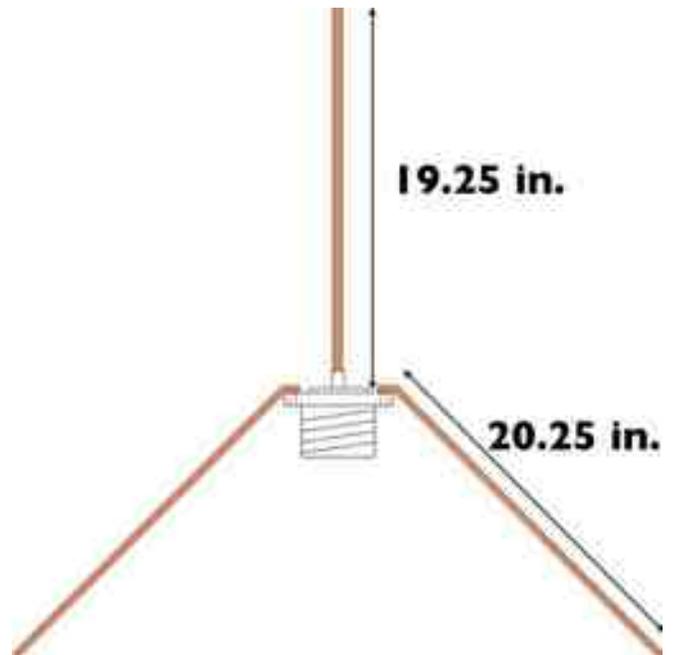


Figure 2: 2-meter ground plane antenna design

Collinear Vertical

A very popular and high-performing omnidirectional antenna you can connect to your HT is a collinear vertical, so-called because it's actually two or more vertical antennas stacked vertically on top of each other, resulting in a greater gain. Connect your HT by coax to one of these mounted on your roof or tripod mast to send your signal far and away.

Yagi Beam

A Yagi beam is a high-performing, directional antenna that's typically mounted on a tower or far above your rooftop. You can easily purchase one or make one of your own, that you can hold in

your hand for portable work, while it's connected by coax to your HT.

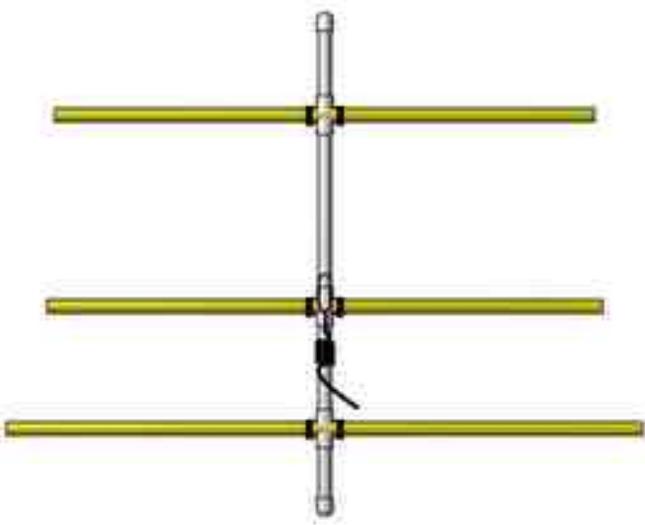


Figure 3: 2-meter tape measure Yagi antenna

Tactical Antenna

Arriving a little late on the scene, but gaining popularity, is the tactical antenna, which is made from tape measure metal strips and which you can attach to your HT like you would a whip.



Figure 4: A Tactical Antenna.

Featured Member of the month:

Brian Johanson KZ7Q

by Linda Reeder, N7HVF

Brian's father, Ed Johanson (K7TEO) exposed Brian to amateur radio at an early age. Ed became a radio amateur in 1962 and was at one time Vice president of UARC. Ed made contacts all around the world; Brian said he wouldn't be surprised if there were some hams who remember his father. Ed encouraged his children to get their ham radio licenses.

Years later Brian became interested in amateur radio. Brian was taking a college course in music theory when his neighbor Lloyd Taylor (K7PV) who convinced him to join in. Lloyd (K7PV) had Brian study a .pdf about ham radio for his first test. When he had questions, Brian would make an appointment to learn from Lloyd at his house. He encouraged self-study, but was very willing to answer questions.

Brian received his technician class license in 2008. His first call sign was KE7WYS. In the spring of 2010 Brian obtained his general class license. Brian received his extra class license July 1, 2014 then changed his call sign to KZ7Q. Brian thought it would be easier to have a shorter call sign for getting on the low bands.

Emergency preparedness was what first attracted Brian to amateur radio. Brian worked hard in training so he would be ready for emergencies. Well, the big emergency occurred on September 29th 2010. A huge fire at Camp Williams burned 4,351 acres. 1600 homes had to be evacuated and 3 were destroyed. This was so very sad. The fire department, the police department, local media, and Matt Robinson the public officer who worked for Herriman City were there. Brian and the Herriman amateur radio club (N7HRC) volunteered their services that day.

Herriman high school was used as a shelter for people who needed a place to stay. Brian was a “runner” on behalf of the evacuees. He would communicate between the Public Information Officer (Matt Robinson), and other amateur radio operators. He also had the opportunity to communicate on the radio for the evacuees. This was a real learning experience for Brian.

Brian has worked at Smith’s for 22 years. Currently, he is stocking shelves in the store.

Brian enjoys being with his amateur radio friends. He participated in the December 10th talk with Santa Clause on ham radio. Brian coordinates the Talk to Santa on the Air program every year for the Herriman Amateur Radio Club. This year, it took place on December 10th, and was held at the Herriman library located at 5380 W. Herriman Main Street.

Brian enjoys writing and loves spending time with Becky, the family dog.

Brian, we wish you the best in all of your endeavors.

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