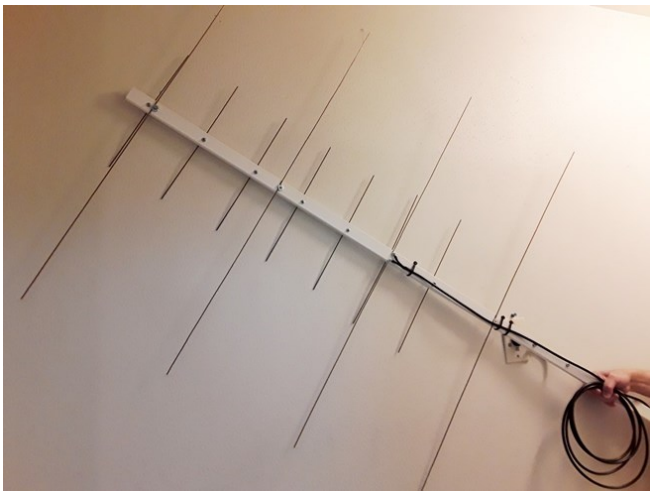
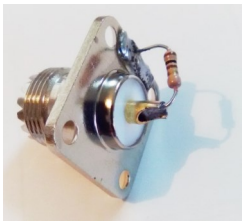
Microvolt

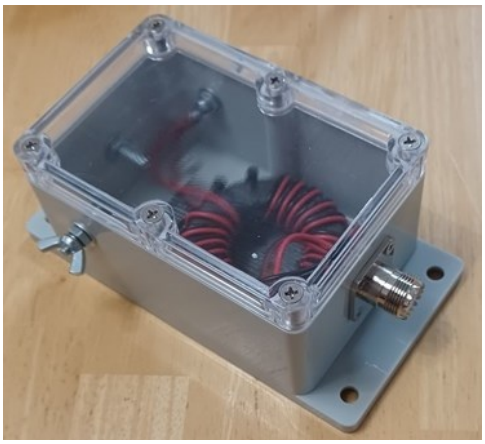
Monthly newsletter of the Utah Amateur Radio Club

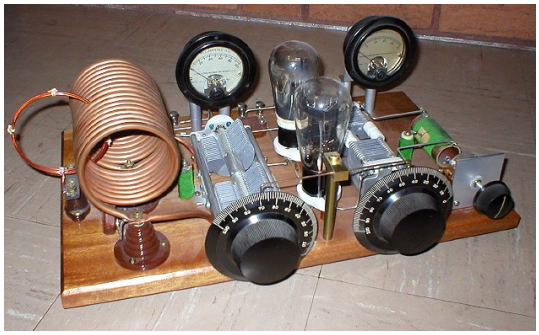
November 2024





DYI : doing it yourself





From the earliest days of amateur radio, operators and participants have set the standard of designing and building their own equipment. More than an optional activity like it is today, many past amateurs have had to build their own gear out of necessity, which led them to experiment, innovate, and improve upon previous designs. Today's amateur radio continuum offers us the unparallelled freedom to modify and enjoy our own craft within our license privileges. Whether to improve your skills or just because it's fun, you might prefer to *do it yourself*.

Cover – Doing it yourself

Those of us who engage in making our own amateur radio equipment sometimes say that we ***home-brew*** our gear, a tongue-in-cheek reference to the times when people illegally brewed their own liquor at home. Seriously, our licenses provide us the privilege of creating a radio out of scraps, and even modifying existing radios meant for other services. We can legally use our creations without their being subjected to any kind of government scrutiny, so long as we use them within the limits of our license privileges.

While numerous hams enjoy the activity of home-brewing their own antenna and electronics, it's become something of a dying art. The ease of making a purchase by a few mouse clicks, together with the complexity of modern electronics, have discouraged many away from **tinkering**. Also, the cost and time commitment of building electronic equipment have placed many good designs out of the reach of today's busy hobbyists. These have confined the list of possible projects to antennas, baluns / transformers, and support gear (launchers, software, pass-throughs, etc.) for numerous would-be crafters.

Still, those who have ventured into the home-brew world have discovered that they can make production-quality antennas for under $30, that otherwise are marketed for well over $150. At the same time, they add to their experience and hone their skills with each step. Additionally, they also realize that building their own equipment is another milestone toward self-sufficiency because they become less dependent on others to install equipment, build simple gadgets, or perform repairs.

Rewarding as it might be, doing it yourself doesn't necessarily mean doing it alone. While some tasks require serious time working by yourself, friends and helpers can assist with many others, like a club kit build, an online design collaboration, or folks gathering to raise an antenna for a disabled ham.

Because of your unique skills and your generosity, you might have found yourself being asked to take on the work of ***doing it for others***. That's terrific, and we highly encourage your unselfish service! Might we suggest, however, that while you build, install, or mount something for another, try not to do all the work yourself, and let your benefactor do some of the work, so he or she can share the joy of the DIY experience.

Finally

The word ***amateur*** was bestowed on our hobby to give us the uncommon ***ability*** to do things ourselves. However, the idea of home-brewing or building something might not appeal to you at all, and that's fine; many are perfectly satisfied pursuing amateur radio in their own way without needing to pick up a screwdriver or a drill. It's simply one potentially fun way to involve yourself in our craft of many faces if you're so inclined.

Microvolt editorial staff

Editorial – Hobby or utility?

There was a time when people got involved in amateur radio because of the electronic **tinkering**, the building, and the sheer joy of making a wireless contact with another. Even today, many get interested for the same reasons, because maybe they have an inner desire to learn and make stuff. For these folks, amateur radio was ***an end***; that is, it was the goal.

But today, it seems most get interested in amateur radio because of its *utility*, as in family and emergency preparedness, a need to communicate with loved ones during hikes, and to help with events, such as marathons and other races. For these hams, amateur radio is ***a means to an end***; that is, it's a tool to help them reach a goal.

Ok, so, which is it to you? A recent Facebook poll asked for which of these two (or other) reasons people got into the craft of ham radio. The responses weren't terribly surprising, but they did offer a few insights.

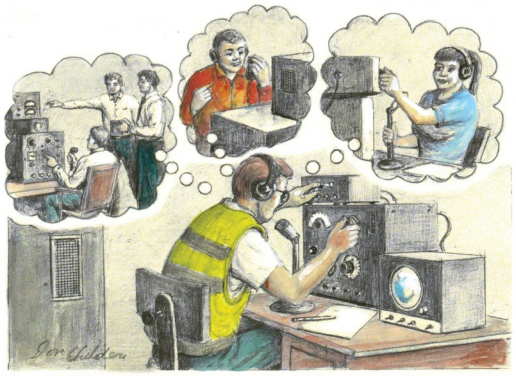
It's a hobby

One of the biggest reasons I used to hear people tell me about why they started, and stayed with, amateur radio is that *they could*. Ham radio seemed to be within the reach of the common folk, for whom even a little electronics knowledge went a long way. My grandpa originally got me interested in ham radio because he was fascinated with how stuff works. But life, being what it is, took a toll on my time, and my grandpa's passing found my interests leaning elsewhere, like school, girls, cars, and the Army.

It's a utility

Even though my grandpa got me interested because of the hobby, a good friend got my wife and me back into the craft because of the utility and service of EmComm (emergency communication).

Yet another point my wife made is regarding the *social aspect* of amateur radio. In light of the shut-ins and crippled and medically house-bound friends I know, I realized what a genius she is, no surprise there. Amateur radio has become a lifeline to these good folks and others who rely on radio for friendship, and who might otherwise find themselves in a very lonely world. Some of these impaired folks had left ham radio years ago, only to return after remembering how radio bridged that social link.



Does it really matter?

So, back to my question for you: which is it? And more importantly, is that reason enough to keep your interest going in the craft? To me, I suppose it doesn't really matter why a person gets into ham radio, so long as he or she finds it to be something that can fill a need, inside or out. The problem I'm trying to solve is how to make ham radio *relevant* enough to people so that they can continue finding it either useful or fun...or both. At this point in my life, amateur radio is a tool for family preparedness that's also a fun, social hobby. Guess I can find enjoyment in all aspects, but for these reasons, I no longer refer to amateur radio as strictly a hobby. What about you?

Anything to add? Email ***editor@utaharc.org***

Letters to the editor

Dear Editor:

Are J-poles any good?

John in Fruit Heights

Dear John:

There are two major types of J-pole antennas, the "copper cactus" that many people make at home, and the "open-stub" that many purchase.

Here is **the link to the open-stub J-pole** : https://noji.com/hamradio/jpole.php

Here is **the link to the copper cactus J-pole** : https://noji.com/hamradio/pdf-ppt/noji/Noji-Article-2-Meter-Copper-J-Pole.pdf

The copper cactus J-pole is a little easier to make (if you're good at soldering copper), but is only single-band, and is somewhat RF-problematic (because its matching section unfortunately radiates), due to its pattern, common-mode current, and signal loss. The open-stub J-pole does not exhibit these adverse RF characteristics, requires no soldering, supports both 2 meters and 70 cm, resists bending better under heavy wind load, and exhibits greater gain.

I have both, and both work terrifically on 2 meters. If you want to work 70 cm as well (of course you do), then likely the open-stub J-pole is best for you.

Dear Editor:

What kind of solvent or cleaning substance is safest for cleaning dirt and germs from ham radio rigs?

Barry in St. George

Dear Barry:

I use Clorox wipes (which contain no Clorox) or Lysol wipes for nearly all my equipment cleaning. It's inexpensive, does not contain abrasive or harmful solvents, wipes away grease and germs, leaves no residue, and is disposable.

Dear Editor:

How closely together can I install my HF and VHF antennas? How about two VHF antennas?

Michael in Cedar City

Dear Michael:

Assuming no two of these closely installed antennas will ever be used for signal transmission at the same time, your primary concern will likely be unwanted coupling. Conductive objects near an antenna can be capacitively coupled with it, making them part of the antenna, throwing off its feed point impedance, and therefore its SWR. A quarter-wavelength separation works well for VHF antennas, but is impractical for HF antennas. A second concern is minimization of the transmitted signal entering the receiver of the non-transmitting antenna. Every foot of separation (depending on the antenna pattern), results in about 10 dB of signal reduction (50 watts from an antenna can result in about 50 milliwatts induced in an antenna three feet away). The tolerated separation will be frequency-dependent, but for amateur, I recommend at least two feet.

Hey, Editor, which is better, a manual tuner or an automatic tuner?

Giovanni in Riverton

Dear Giovanni:

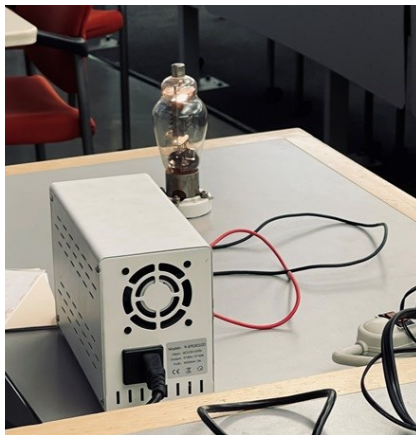
The first time you use a manual tuner during a contest might drive you toward an automatic one because of its required re-tuning when jumping between bands. Or when you find that rare DX station calling CQ, and you're hurrying to get to him, only to waste precious seconds fiddling with your tuner. A manual tuner can get you closer to a perfect match, but an automatic tuner can get you "close enough" for amateur work, and in much less time.

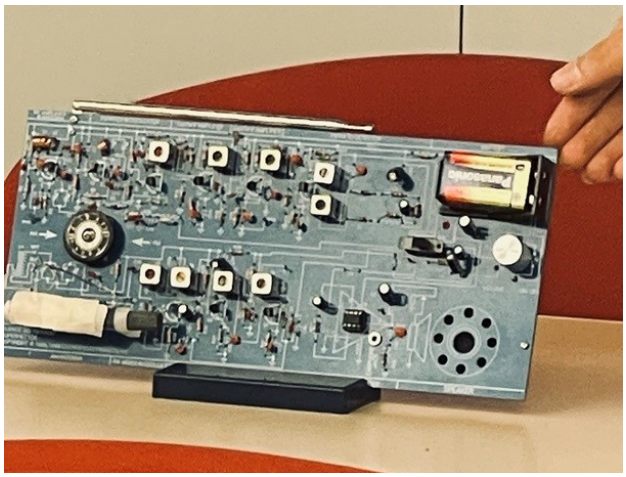
Send your thoughts to ***editor@utaharc.org***

Club news

The October 2024 meeting featured our annual ***Homebrew Night***, at which club members could bring crafts and projects they've been working on the past year. On **page 13** we feature some photos of those who participated. The conspicuous blank space is because you weren't there.

James Bennett KK7AVS took the opportunity at the opening to honor **Ron Speirs K7RLS**, who recently became a silent key, by illuminating the filament of an 812A vacuum tube. Son Daland also shared some little-known stories about Ron.





You can see the video presentation here: **https://youtu.be/KKr5-mJSzVM**. *You can also view past club meeting presentations on our YouTube channel:* **https://www/youtube.com/@UtahAmateurRadioClub**

(Photos courtesy Shawn Evans K9SLE, et al)

UARC is now officially a 501(c)(3) non-profit

After long last, UARC has finally received the letter from the IRS in July 2024 indicating our club is officially designated as 501(c)(3) non-profit status, paving the way to a number of opportunities going forward.

End of the printed and mailed Microvolt

We're about to reach the end of a long era. Or rather, we're about to embark on a new era. Starting with the January 2025 issue, *Microvolt* will no longer be mailed out in printed form and will be available in digital form (online) only. The December 2024 issue will be the final issue that we plan to print and mail to members generally. If you'd like a printed copy and don't have reasonable access to a color printer, please reach out to us at **uarc@xmission.com**

For your information

Microvolt has expanded!

Your club newsletter *Microvolt* is now longer than the 8 pages you're used to. See the rest of the story in the online version, located at

https://user.xmission.com/~uarc/Microvolt/2024/November2024.pdf

Winter Field Day 2025

UARC plans to participate in Winter Field Day for the first time in many years, possibly the first time ever. WFD takes place from noon Saturday January 25 through noon Sunday January 26.

Field Day 2025

Saturday noon 28 June through Sunday noon 29 June **near Payson Lakes**. We plan to start setting up Thursday night about 6:00 pm.

License classes

Salt Lake:

General : Tuesdays 7:00 pm to 9:00 pm
147.160+ MHz (127.3 Hz tone)

Orem:

Technician : 4 Tuesdays, 6:30 to 8:30 pm
Jan 21, Jan 28, Feb 4, Feb 11
Visit **psclass.orem.org** to register ($10)
Orem Traffic Training Room, 95 E Center St
HamStudy.org account required
Email **nojiratz@hotmail.com** for info

Eagle Mountain:

Technician : 5 Thursdays, 7 to 9 pm
Feb 13, Feb 20, Feb 27, Mar 13, Mar 20
Email **ki6oss6365@gmail.com** to register (free)
Eagle Mountain City Hall, 1650 Stagecoach Run

Exam sessions

Salt Lake County:

- Email Garth Wiscombe W7PS **w7ps@arrl.net**
  Oct 28, Nov 25
- Email Rick Morrison W7RIK **w7rik@arrl.net**

Utah County:

- Sat 16 Nov 2:30 pm : **Provo** : **signup**
- Wed 20 Nov 7:00 pm : **Provo** : **signup**
- Sat 22 Mar 10:00 am : **Eagle Mtn** : **signup**

Club repeaters

Farnsworth Peak : 146.620– MHz (no tone)
Scott Hill : 146.620– MHz (no tone)
Lake Mountain : 146.760– MHz (no tone)

SDRs and beacons

Northern Utah WebSDR : **sdrutah.org**
KK7AVS SDR : **k7xrd.club**
N7RIX SDR : **https://sdr.n7rix.com**
K7JL beacon 28.2493 MHz

HF remote and club transceiver stations

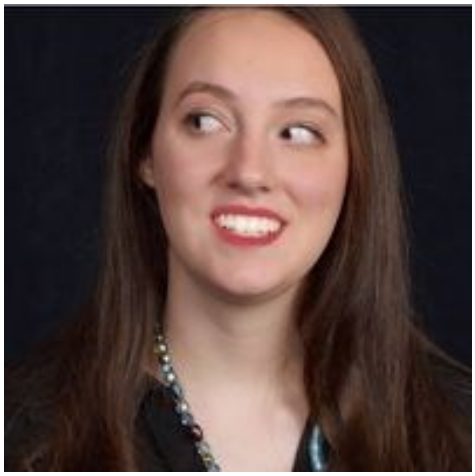
If you'd like to learn how to get started using the remote stations, visit the **HF Remotes link** on **the club website**:

https://user.xmission.com/~uarc/HFRemote,html

How can I help?

Reach out to the club leadership by sending an email to **uarc@xmission.com**. Also, add to this page by emailing **editor@utaharc.org**

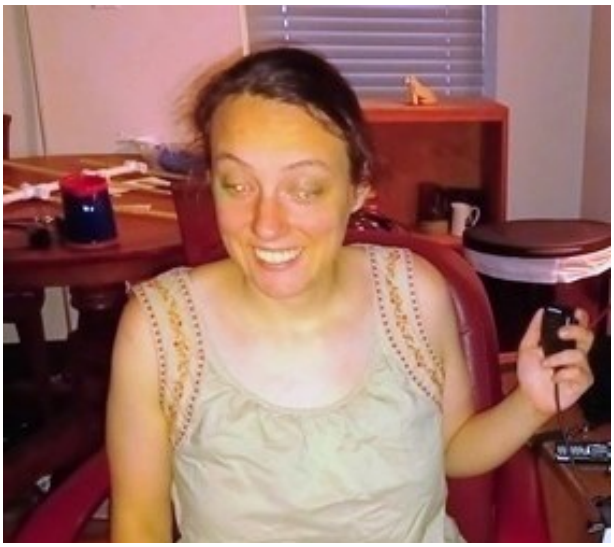
Spotlight – Sabra Ewing AI7UG



Sabra (pronounced SAY-bruh) Ewing AI7UG is a Salt Lake City transplant from Dallas, Texas. Previously she lived in Austin, where she graduated from Austin Community College with a degree in Computer Information Systems, and later in Business Management from Texas State University.

Sabra was born without the blessing of eyesight, and grew up in Dallas. In 2017, she moved to Salt Lake City on the advice of a friend who informed her that Utah had better accessibility services for the blind than did Texas. She now loves living in her downtown Salt Lake apartment with her service dog Cricket and enjoys the snow a little more than she does the heat.

Sabra said that she had heard of amateur radio and had always wanted to get into it, but thought the test and equipment were too expensive. In 2023, she met Sylvia Bernert K7KQY in a party at Liberty Park, where Sylvia told Sabra about her ham radio experiences. Sylvia also told her about the free ham radio class held by the Salt Lake Crossroads Amateur Radio Club, and about an inexpensive radio that she could buy. Furthermore, She invited Sabra to a picnic happening that August by the same club, where she might meet other hams.



Sabra took the Technician class, but became a little discouraged because the class used a lot of visual aids. Eventually, she got hold of the Gordon West tapes, which helped a lot. In October 2023, Sabra took the Technician exam given by the KI6OSS VE team at Eagle Mountain and passed with flying colors. After Thanksgiving that same year, she passed her General and Amateur Extra license exams.

Another ham in the Crossroads club gave Sabra a Baofeng HT with a microphone, and I gave her a quarter-wave antenna that would help her get a better signal out of her first-floor apartment than did the rubber duck antenna that came with the radio. James Bennett KK7AVS installed a half-wave antenna at Sabra's apartment, and that seemed to work better for her. Now she's able to participate in the Crossroads simplex nets.

Sabra has since purchased a Xiegu X6100 radio for HF. Although she's been having trouble transmitting on HF from her apartment, Sabra has been able to get on 10 meters and has been participating in the Salt Lake 10 Meter net on Tuesday evenings. When Sabra attended Field Day with UARC at Payson Lakes, she talked on 20 and 40 meters. At the UARC Steak Fry, Sabra made several contacts on 10 and 20 meters.

Sabra is a member of UARC, the Salt Lake Crossroads Amateur Radio Club, and the Utah VHF Society. She participates with the Wasatch adaptive sports for the disabled and enjoys biking and skiing. Sabra also likes reading books.

Congratulations, Sabra, for getting into amateur radio and passing the Extra Class exam. Best wishes for continued success in the hobby!

– 73 from Linda Reeder N7HVF

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We encourage you to submit original pictures (highest resolution), articles, software and hardware descriptions, appropriate humor, and responses to editorials. Email the content, pictures attached, to the editor at **editor@utaharc.org** by the 24th just prior to the target month.

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 now a 501(c)(3) non-profit organization. It holds a club station license with the call sign W7SP, a memorial to Leonard "Zim" Zimmerman, amateur radio pioneer in the Salt Lake City area.

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, room 2230.

Club membership is open to anybody interested in amateur radio; a current license is not required. Dues are $20 per year, including a *Microvolt* subscription, which cannot be separated from membership. Those at the same address as a member who has paid the $20 can obtain a membership without a *Microvolt* subscription for $12. Send dues to club secretary James Bennett, 4960 W 5400 S, Kearns, Utah 84118. Email address changes to **kk7avs@gmail.com**

Tax-deductible monetary contributions are gladly accepted. Send directly to club treasurer Shawn Evans, 1338 S Foothill Dr, #265, Salt Lake City, Utah 84108-2321. For in-kind contributions, please contact **uarc@xmission.com** to make arrangements.

UARC maintains the 146.620– and 146.760– repeaters, which are administered by the UARC Repeater Committee. Direct comments and questions to any committee member. The 146.760– repeater is on IRLP node 3352.

Call the **UARC Ham Hotline** at **801-583-3002** for amateur radio information, including club, testing, meeting, and membership information. Leave a message, and we'll make an effort to return your call.

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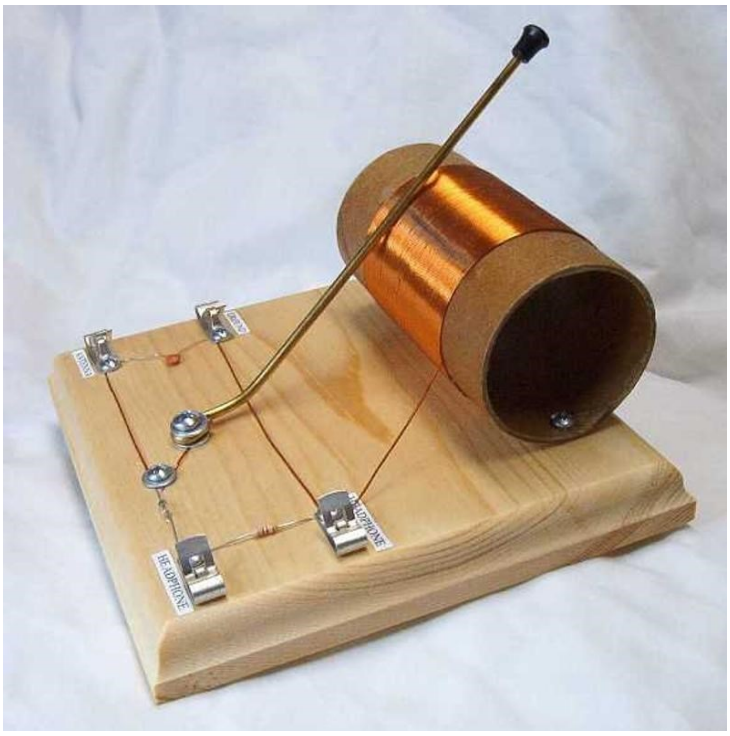
For late breaking news listen to the UARC Information Net, Sundays at 8:30 pm on 146.620– or visit the announcement page.

We are grateful to the management of our internet service provider XMission, for the donation of our web service. For account information go to https://xmission.com/ or call 801-539-0852

EIN : **99-0407768**

Utah Business Registration : **575790-0140**

Tech corner – AM crystal radio

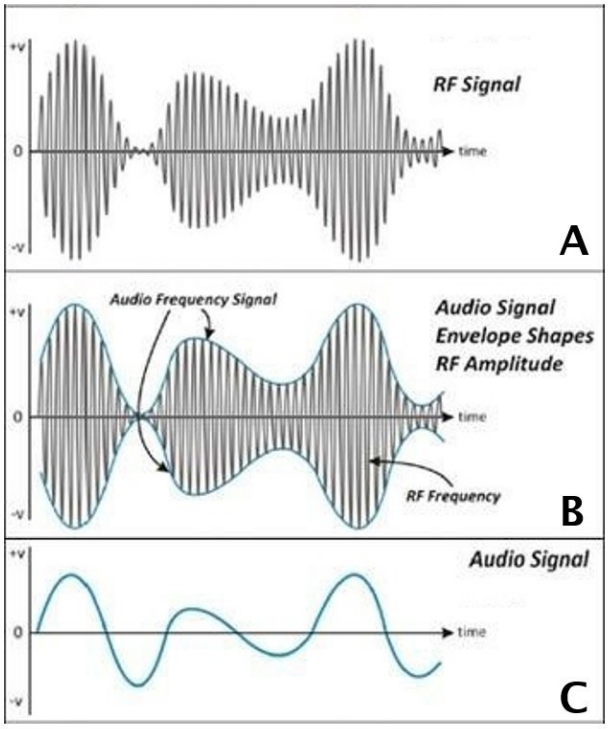


While not exactly amateur radio-related, an AM crystal radio is one of those projects that you might have done as a kid or wish you had done. Well, this DIY project will give you the opportunity to re-live a once-forgotten time or to build a crystal radio for the first time, from scratch.

The magic of a crystal radio is the fact that you can create a real radio receiver that works without any visible power source such as a battery, wall power, or solar panel. Drawing solely from the energy of the existing AM broadcast radio waves, you can tap into that power to bring your creation to life. But to make use of that mysterious power source, you'll need a good antenna and a good ground.

How it works

Without going into too much technical detail, let's examine how this is done. AM radio waves appear as a sine wave that oscillates at what we call the carrier frequency. For example, the radio station KSL AM transmits a carrier wave of 1160 kHz (or 1.160 MHz). But the amplitude (strength) of the carrier signal changes (is "modulated") according to the presence of a sound wave such as music or a broadcaster's voice. When the signal arrives at the antenna (Figure A), it's a constant-frequency carrier wave whose amplitude has been modified by a sound wave.



However, many AM signals are present in the air at any given time, so we need to have a tuned circuit to filter out all but the frequency of interest (bandpass filter). Next, to extract the sound from that wave, we recognize that the waveform envelope (shape) is symmetric about the time axis (Figure B). So, we need to remove either the signal half above the axis or below it, which can be done with a diode rectifier, in this case called a detector, so that only, say, the positive part of the signal proceeds through the circuit.

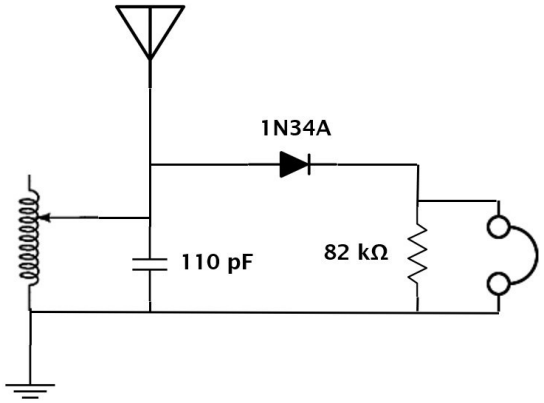
Finally, we need to recover the shape of the positive waveform, and that's accomplished by a capacitor, which performs two tasks. The capacitor will act like a low-pass filter in that the higher (carrier) frequencies are shunted to ground. At the same time, the capacitor removes the DC bias of the signal, centering it about the time axis (Figure C).

Tech corner – AM crystal radio, cont'd

All that remains is for the earpiece to transform that electrical audio-frequency (AF) envelope into actual sound. We'll be using a ceramic (sometimes called "crystal") earpiece, because the signal is too weak to be heard through a conventional earphone or head set. Also, because modern high-impedance, weak-signal ceramic earpieces are piezoelectric, the capacitor is built into them, so we might not even need a discrete component capacitor.

The heart of this radio is the crystal, so-called because a thin wire called a cat's whisker once attached to galena crystal formed a crude semiconducting junction that was originally used as a rectifier. Later, it was discovered that the same rectifying effect could be achieved by attaching the cat's whisker to any dissimilar crystalline material such as a *blued* razor blade. In our case, we'll use a modern Germanium diode for the rectifier, and the fact that it's encased in glass seems to promote the visual reminder of it being a crystal.

Let's see what it's going to take to build an AM crystal radio set. The object is to build the circuit from this schematic diagram. The keys to a well-functioning crystal radio are the antenna and the ground, which I'll address at the end. I used old-fashioned **Fahnestock clips** because they're easy to install and are a quick disconnect for electronic parts, especially for the antenna, the ground, and the earpiece, all of which should be easily and quickly removable. The most visible component is the tuning coil, which is an air-core inductor, using a bicycle spoke as the variable tuning sliding rod.



Parts list

One **3/4" project board**, about 7"x 9"

4 oz **20 AWG enameled magnet wire**

One **crystal earpiece**

One **82 k-ohm ¼-watt resistor**

Eight **½" #8 pan-head wood screws**

Three **#8 stainless washers**

One **7" long 2" ID cardboard tube**

One **1N34A germanium diode**

Six **Fahnestock clips**

Two **220 pF ceramic capacitors**

One **24" stainless steel bicycle spoke**

Sandpaper, tape, glue, **spaghetti bead**

Construction

Drill two 1/16" holes in the cardboard tube 5 inches apart. Insert about eight inches of the magnet wire into one of the holes, and begin winding the wire tightly around the tube, as evenly and as closely together as possible. To prevent kinking the wire, it might be easiest to place the spool of wire on some stable horizontal bar, then pull the wire straight off the spool onto the tube by rotating the tube with one hand while keeping the wire tight with the other.

When your windings reach the other hole, thread about eight inches of the wire through the hole and secure the wire. Re-inspect the coil, to make sure the windings are still tight and have no gaps between them. Lay a strip of glue across the windings on one side, and another on the opposite side. Drill two #8 holes six inches apart, next to one of the glue stripes.

Using two 3/4" wood screws, mount the coil to the board near the edge on one side, on **small standoffs**,

Tech corner – AM crystal radio, cont'd

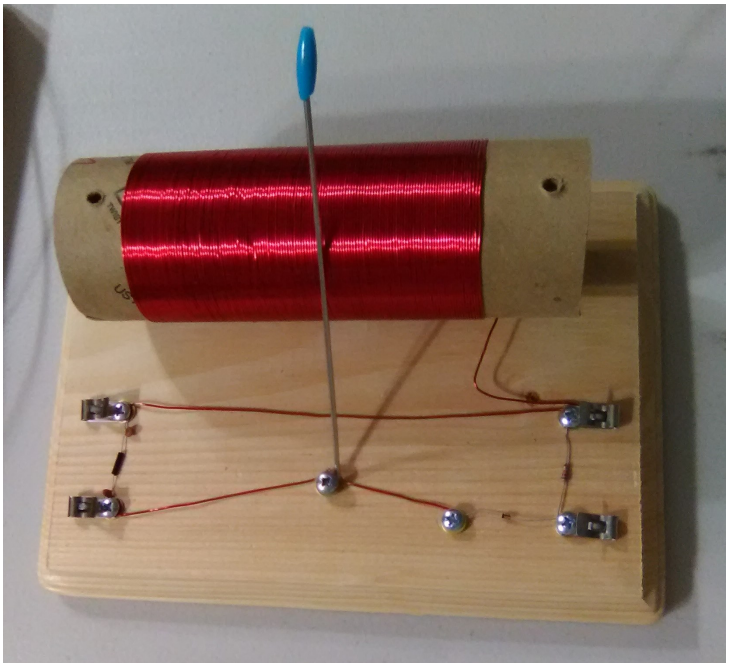
making sure no part of the coil sticks out over the edge of the board. Facing the board with the coil on the back (opposite from you) end, mount four Fahnestock clips, two near the left end of the board, and two near the right end. Install the 82 k-ohm resistor between the screws of the two right clips, then install the 110 pF capacitor between the screws of the two left clips. If you're using 220 pF capacitors, you'll need to connect a couple of them in series, as shown at the right, to make 110 pF.

Cut three pieces of the unused magnet wire, one 7", one 4", and one 2" long, Strip the ends of all three wires by scraping or sanding the enamel off, exposing the shiny copper surfaces. Cut the left coil wire to about three inches, and place it inside the tube, near the edge of the tube. Estimate the length of the right end of the coil wire, then cut and strip that as well. Attach the right coil wire to the back right clip screw. Attach the 7" wire to the two back clip screws. Attach the 4" wire to the front left clip screw and a 3/4" screw at the front center of the board. Attach the diode between the right front clip screw and another ½" screw about 1½" to the left of that clip, with the cathode (black stripe) on the left end. It really doesn't matter which way the diode faces, but we'll follow the schematic.

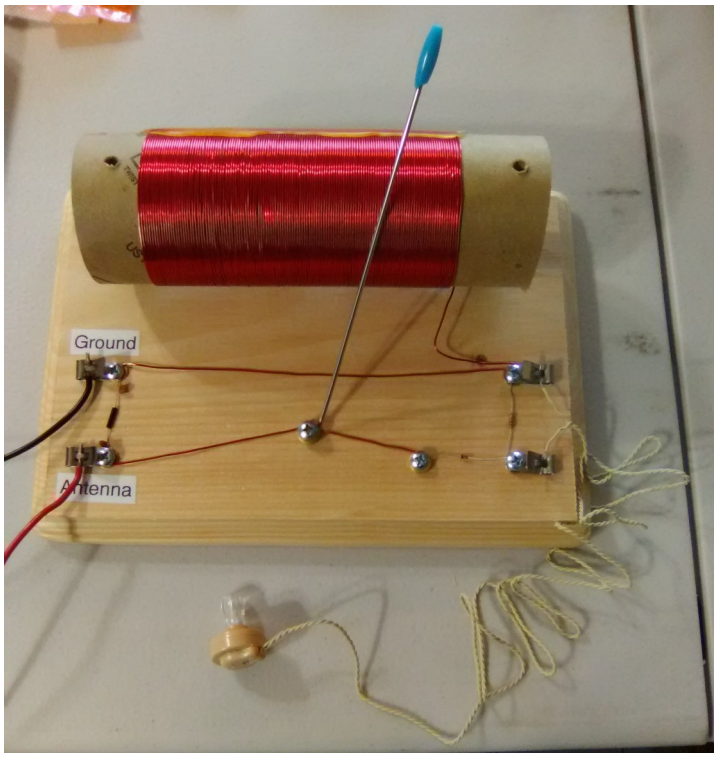
Make sure the bicycle spoke is unpainted, clean, and shiny, then cut off any portion of both ends that aren't perfectly straight. Twist about ½" of one end into a hook shape, to wrap around a wood screw. Attach one bared end of the 2" wire to the front-center wood screw and the ½" diode screw, then momentarily remove the 3/4" wood screw. Slip the 3/4" wood screw through a washer, then through the bicycle spoke hook, then a second washer, then through the loop of the 2" wire. Drill out the spaghetti bead with a 2-mm bit, or 5/64" bit, since that's close to 2 mm, the size of a typical bike spoke. Attach the spaghetti bead to the exposed end of the bicycle spoke, which is now the tuning rod.

Make sure the rod can move freely across the coil, but with some resistance to ensure a good contact. On the coil, mark the path where the rod contacts the coil. Use sandpaper to scrape off the enamel insulation of the coil wire, exposing the shiny copper surface of the coil track. Clean all dust and enamel residue from the wiper and the coil. Your crystal radio is now ready for operation. For a finishing touch, I added some LRFs (little rubber feet) to the underside of the board.

Tech corner – AM crystal radio, cont'd



Almost there



The finished product

Let the magic begin

For your antenna, simply use a long wire (insulated, to prevent accidental contact with other metal) and drape it over your bushes, trees, vinyl fences, etc., as high as you can get it. I recommend 18 gauge stranded. Your antenna wire should be as long as you can make it (30 feet to 120 feet is good), but keep it away from metal objects such as chain-link fences, aluminum siding, and gutters. Bare one end, and bring it to your crystal set.

For the ground, again simply use an insulated 18-gauge stranded wire, and connect it to an outside ground rod, grounding system, or other reliable ground. Your house (third prong on the outlet) ground might be bonded to your electric service; I tend not to count on it, but it's better than nothing.

For a crystal radio, don't underestimate the power of a good ground. If you want the ideal ground, you should have multiple ground rods outside, bonded together and to your electric service by a buried 4-gauge bare copper wire. Your ground wire should then be attached to the nearest ground rod, which should be located right outside the room where your crystal radio sits.

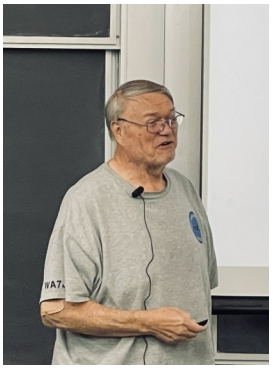
Attach the bared ends of the earpiece to the two right clips. Attach your ground wire to the upper left clip and your antenna wire to the lower left clip. Slip the earpiece into your ear, tune into a nearby station with the tuning rod, and enjoy!

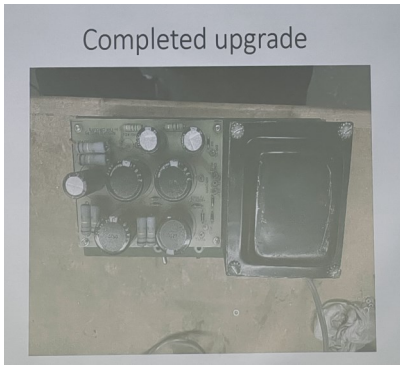
Noji Ratzlaff KNØJI

Homebrew night – in photos

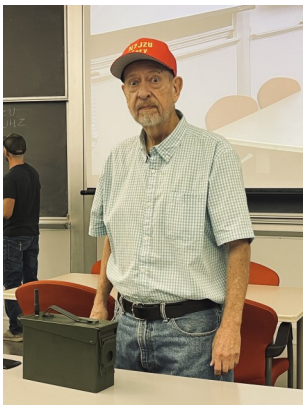
James Bennett KK7AVS

Daland, son of Ron





Chuck Johnson WA7JOS



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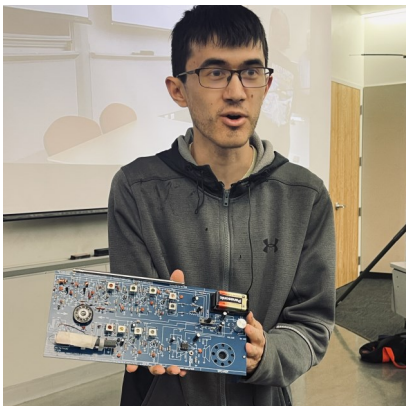

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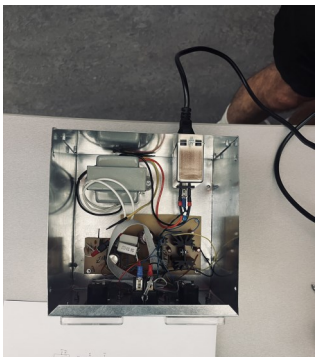
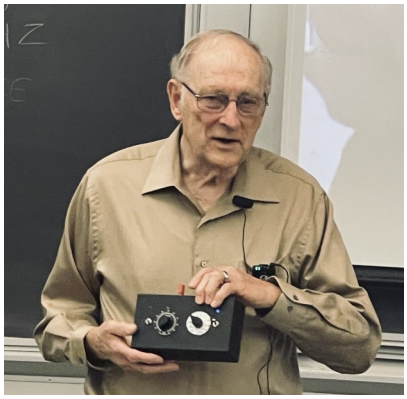


Gary Wong AB1IP

Robert Smith KJ7UHZ



Robert Gibby KE7TYX

Michael Chambers KN6KRB

(Photos courtesy Shawn Evans K9SLE, et al)

Strays – Tinkering

Are you one of those folks who can't help but get your nosy fingers into the workings of something? When you encounter a piece of gear, are you tempted to disassemble it beyond recognition, just to find out what makes it tick? If so, some say you might have the *knack*, but we know the truth: you're a hopeless tinkerer.

Tinkering can mean exploring, modifying, adjusting, fixing, reviving, enhancing, or investigating a new or curious device. Using American slang, it can also mean fiddling, poking, tweaking, and messing; you get the idea. While tinkering can apply to things that are not quite as tangible, such as software, literature, and designs, the focus of our tinkering tends to be ***physical gadgetry***.

Achtung! Alles Lookenspeepers!

Das computermachine ist nicht fuer gefingerpoken und mittengrabben. Ist easy schnappen der springenwerk, blowenfusen und poppencorken mit spitzensparken. Ist nicht fuer gewerken bei das dumbkopfen. Das rubbernecken sichtseeren keepen das cotten-pickenen hans in das pockets muss; relaxen und watchen das blinkenlights.

For many of us, tinkering is what we do. We can't let a fine chunk of machinery be, and not wonder how it looks and works under the hood, so to speak. We can't take any piece of equipment for granted; we are driven to open it up and explore. Curiosity might kill the cat, but it's what keeps us tinkerers young and alive.

And speaking of young, if you admit to playing with the DIY toy set that is named for our very weakness, the ***Tinkertoy***, you'll be dating yourself. It was the Lego of yesteryear, created more than 110 years ago, partly in an effort to inspire kids to use their imaginations. Another tinkering toy called the ***Erector Set*** was created around the same time, and became hugely popular in the US because it was one of only a few toys that allowed the little tinkerer to couple a small electric motor with the construction.

Since those days, numerous other **construction toys** have emerged, such as ***Lincoln Logs***, ***Legos***, ***K'Nex***, ***Snap Circuits***, and many more. These have encouraged and expanded the minds of young tinkerers for many years.

But wait, there's more

Tinkering for fun, for curiosity, or to troubleshoot a problem is a terrific vice, but you can take it one step further. Use your tinkering mind in the service of others; let your curious mind help those who are not so fortunately blessed by teaching them, mentoring them, and setting an example of a true elmer by sharing your wonder and your enthusiasm.

Many people shy away from opening a device or trying to fix a problematic piece of equipment out of fear. They often don't have your tinkering background, and are afraid of making a bad problem worse. You, on the other hand, have long since cast off your doubts and inhibitions and are ready to put your skills to the test. But, ***instead of doing it for them, have them do the repair or installation***, which will help them learn by first-hand experience and gain some tinkering confidence.

Clubs and social groups are always looking for people just like you to not only participate in assembling a project, but to show the rest of us how it's done. The next time you learn of a home-brew night, a DIY meeting, or other ham radio event (fair, hamfest, special station, etc.), volunteer your time and talents, and show off your tinkering wizardry and allow others to feel the same excitement!