

# Microvolt

April 2024



## Radio Pioneers

This issue of *Microvolt* features the early forebears of radio. How many do you recognize? And do you know what or how they've contributed to the craft?



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\*Online version only

## Cover – Radio pioneers

For over a hundred years, many really smart people have contributed to the art and craft of radio. Here are a few you might recognize.



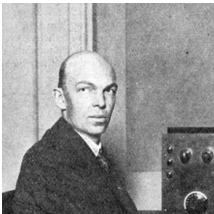
**Oliver Heaviside** discovered the ionosphere, invented coaxial cable, and refined **Maxwell's equations** to the four we have today.



**Nikola Tesla** is credited with being the actual inventor of radio, and promoted AC (alternating current) as the preferred electrical power transmission carrier.



**Hedy Lamarr** invented frequency-hopping, an interference-resistant signal coding method to fight radio jamming during World War II.



**Edwin Armstrong** invented FM (frequency modulation), the superheterodyne receiver, the RF amplifier, and was known as the *pioneer of the airwaves*.



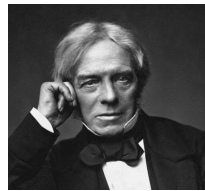
**Samuel Morse** is the namesake for the code used for CW (continuous wave) and invented telegraphy, which revolutionized long-distance communication and helped virtually reduce the size of our large nation.



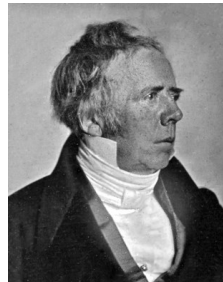
**Heinrich Hertz** discovered radio waves, proving **Maxwell** correct in his electromagnetic theories.



**Reginald Fessenden** invented AM (amplitude modulation), SONAR, and made both the first wireless voice transmission and the first two-way transmission.



**Michael Faraday** discovered electromagnetic induction, the rotating magnetic field, and electrolysis.



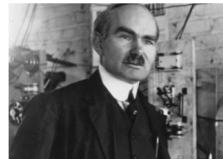
**Hans Christian Oersted** discovered the connection between electricity and magnetism, laying the foundation for future electromagnetic research.



**Guglielmo Marconi** made the first long-distance radio transmissions and the first trans-Atlantic wireless transmissions.



**Mary Loomis** was one of the first women radio engineers, started her own radio school, from which a candidate can graduate only after building a complete radio.



**Lee de Forest** invented the audion and is considered to be the Father of Electronics.



**John Ambrose Fleming** invented the vacuum tube and coined the term *power factor*.



## Editorial – How to elmer

The meaning of the word *elmer* is known to many hams as a *mentor or tutor who offers personal guidance, technical knowledge, assistance, and encouragement to ham radio operators*. While not exhaustive, this brief guide can explain how you can be an elmer to others, or in other words, *how to elmer*. The term "elmer" was coined almost by accident, in a [March 1971 \(page 91\) QST article by Rod Newkirk W9BRD](#).

### Kindness

Above all other attributes, make *kindness* your guiding principle in every conversation. If a new ham asks you a rudimentary question, or one that you're simply tired of repeatedly answering, either answer the question politely, or tell him you'd rather answer at another time. It's not kind to remind the person that he or she should have already known the answer from the exam or study materials, because many of us have probably forgotten more than we remember, and few of us passed the exam with a perfect score. Refrain from simply telling people that they should have Googled it or read the manual, because they likely have already done that. Criticism has no place in the conversation of an elmer.

### Patience

You might not be aware that the person you're helping has a learning impairment, is highly self-conscious, or is otherwise disabled in some way. Working with some can test your patience, so try never to speak sharply or harshly to them; speak in a kind voice. Avoid correcting the person's mistakes, if at all possible; instead, present another point of view. If the new ham states that a dipole is made of two half-wave length elements, simply state that you tend to find better results when you cut them to quarter-wave lengths, which total a half-wavelength. The person might suddenly realize his or her mistake without you resorting to correction.

### Be reachable

Every so often, turn on your radio and announce that you're *monitoring*, indicating that you're willing to converse with whomever is listening. We live busy lives, and don't have time for every person who wants our attention, but make time for, and befriend those you don't know, as well as your close clique of ham buddies. Your generosity will pay off.



### Set the example

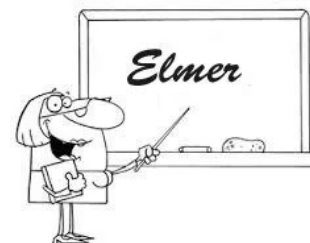
Whether you're helpful or otherwise, people hear you and see you in action, and they look to you for an example of what an experienced ham should say and do. As impossible as it might be at times, try never to be negative on the radio; be positive. Never berate anybody or resort to personal attacks or name-calling; instead, build them up. Be agreeable, even when you don't agree. When you sense a pointless argument brewing, be the first to stand down.

### Humility

You can tell by now that you don't need to know a lot, to elmer others; even the newest licensee has something to teach and share with the rest of us. Still, none of us knows everything, and there is no shame in saying that we weren't aware of a technical detail or a particular circumstance. People tend to have greater respect for those who can admit that they're wrong. Refer the ham to another who is better qualified to answer a question.

### Finally

Does this describe you? Of course it does, and down deep you know that's true. You have a lot that the rest of us can benefit from. Don't be afraid to take a person under your proverbial wing, and kindly show him or her how to elmer.



Anything to add? Email [editor@utaharc.org](mailto:editor@utaharc.org)

## Letters to the editor

Dear Editor:

I keep hearing somebody kerchunking on the local repeater, sometimes for over an hour, and it gets really annoying! I guess I could just change the station, but I enjoy hearing the occasional chatter between hams on this repeater. Should I get on and give them my two cents?

Perplexed in Taylorsville

Dear Perplexed:

Listening to a person who repeatedly presses and releases their PTT button without saying anything, let alone their call sign, can be truly irritating. Chances are, if you get on the air and openly chastise the kerchunker who knows what he's doing (no lady would do that), the cheap thrills he gets from your reaction will only encourage him. Then again, if the person doesn't know he's doing it, your telling him might be pointless. It's often best to ignore the alleged offender, and start a conversation of your own with another ham. Occupying the repeater tends to keep a perpetrator off the air, while allowing the repeater trustees to handle the problem in their own quiet way.

Dear Editor:

Are we allowed to put ham radio license plates on trailers and RVs?

Carl in American Fork

Dear Carl:

According to the current [Application for Personalized Plates](#), you are indeed permitted to install amateur radio license plates on trailers and RVs in Utah. *By the way, all Utah personalized license plates require an annual renewal fee, except Amateur Radio, Search and Rescue Radio, and Purple Heart plates.*

Dear Editor:

Do you know of any good ham radio stores in Utah, where I can go to purchase radios, antennas, coax, and other ham gear? It would really be nice to walk into a place and just browse, or maybe even test drive some stuff before I buy it.

David in North Ogden



Dear David:

Most of us have to look outside Utah, especially online, to purchase new amateur radio equipment such as transceivers, large-scale antennas, tuners, cabling, and so forth, but you can purchase parts for most homebrew projects from local hardware stores. Unfortunately I'm currently unaware of any actual facilities in Utah that carry ham radio gear. You might want to check out [Standard Supply Electronics](#) or [KF7P.com](#) for *related* gear, such as power supplies, connectors, meters, and electronic components.

Dear Editor:

I get conflicting messages about how I sound on the air, between when I'm on my HT and when I'm at home on my base, which is actually a mobile on my dining room table. From what people tell me, I just can't seem to get close enough on my HT, but that I sound really loud on my base. So, is there a rule of thumb to follow, about how close I should talk into my microphone?

Stumped in Kearns

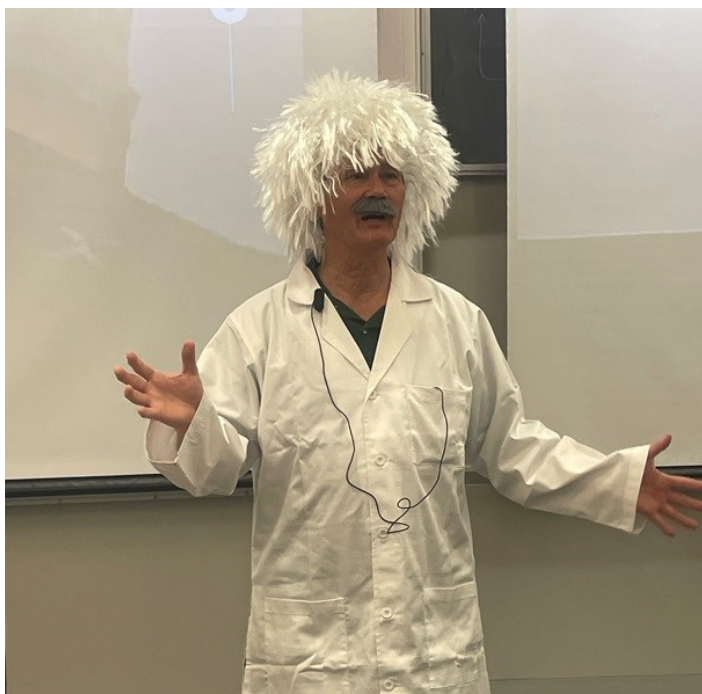
Dear Stumped:

Sounds to me like you're doing the same as the rest of us: learning by experience. Typically I get as close as I can on my HT, but keep an inch or two away on my mobile mic. Occasionally, the difference could also be caused by one of the radios being set to narrow-bandwidth, while the other is set to wide. When you hear a ham overdriving, he's likely too close, maybe kissing his mobile microphone.

Send your thoughts to [editor@utaharc.org](mailto:editor@utaharc.org)

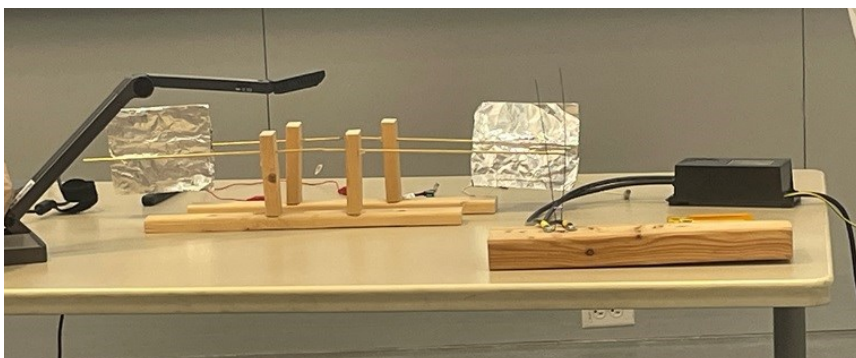
## Club news

Our March 2024 club meeting fell on the 14th, which happened to not only be pi ( $\pi$ ) day, but Einstein's birthday. So, in keeping with this issue's *Radio Pioneers* theme, it was only fitting that our own Albert "Noji" Einstein KNØJI should show up and present a discussion and demonstration of Heinrich Hertz's experiment, in which Hertz set up an apparatus to prove the math derived by James Clerk Maxwell.



After giving us a little history lesson about the discoveries by past notables such as **Hans Christian Oersted**, Karl Gauss, Andre Ampere, and **Michael Faraday**, Noji explained that it was James Clerk Maxwell who saw the pattern, and unified their findings into a set of equations that blew the minds of the scientists of the day. He said that it was **Heinrich Hertz**, however, as a PhD candidate under the renowned Hermann von Helmholtz, who realized Maxwell's theories by laboratory experiment.

Noji then reproduced Hertz's experiment in our meeting by the use of a simple



"transmitter" made from brass rods, aluminum foil, and a piezoelectric igniter he stole off his late mother's barbecue grill. While Hertz used a charged Leyden jar to create the spark that arc'd between the rods, Noji used the igniter to do the same. He demonstrated that the resulting broadband spark signal could be received by a simple dipole, whose voltage momentarily showed up as a lit-up neon bulb placed across the dipole.

Thanks to Albert "Noji" Einstein for a fun and enjoyable, if not entertaining presentation! He said he counted only two who fell asleep during the presentation, a definite club record.

You can see the video presentation here: <https://www.youtube.com/watch?v=nj5sPqi2WXQ>. You can also view past club meeting presentations on our YouTube channel: <https://www.youtube.com/c/UtahAmateurRadioClub>

(Photos courtesy Chuck Johnson WA7JOS)

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## Letters to the editor

Starting with the March 2024 issue of *Microvolt*, we've been printing selected letters to the editor (see page 4). Please email submissions to [editor@utaharc.org](mailto:editor@utaharc.org). We invite thoughtful, humorous, technical, and even controversial comments and questions, but please include your name and town. Entries will be accepted and edited for content at the discretion of the editorial staff. Speaking of which, if you're interested in joining said staff or would simply like to help proofread issues prior to publication, please also contact us.



## For your information

### Microvolt has expanded!

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

[user.xmission.com/~uarc/Microvolt/2024/April2024.pdf](https://user.xmission.com/~uarc/Microvolt/2024/April2024.pdf)

### Field Day 2024

Saturday noon 22 June through Sunday noon 23 June near **Payson Lakes**. We plan to start setting up Thursday night about 6:00 pm.

### Annual UARC Steak Fry

Saturday 20 July 2024 the **Spruces Campground, site GRP7** starting around 3:00 pm.

### License classes

#### *Salt Lake:*

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

**Technician** : Mondays 7:00 pm to 9:00 pm  
Runs ten weeks starting April 1, no foolin'!  
Email [ki7mti@gmail.com](mailto:ki7mti@gmail.com) for the Zoom link

#### *Orem:*

**Extra** : 5 Tuesdays, 6:30 to 9:30 pm  
Jul 16, Jul 23, Jul 30, Aug 6, Aug 13  
Visit [psclass.orem.org](https://psclass.orem.org) to register (\$10)  
**Orem Traffic Training Room**, 95 E Center St  
**HamStudy.org** account required  
Email [nojiratz@hotmail.com](mailto:nojiratz@hotmail.com) for info

#### *Eagle Mountain:*

**General** : 5 Thursdays, 7 to 9 pm  
Apr 04, Apr 11, Apr 18, Apr 25, May 02  
**Technician** : 5 Thursdays, 7 to 9 pm  
May 23, May 30, Jun 06, Jun 13, Jun 20  
Email [ki6oss6365@gmail.com](mailto: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](mailto:w7ps@arrl.net)  
Apr 29, May 20, Jun 24, Jul 29, Aug 25, Sep 30, Oct 28, Nov 25



- Email Rick Morrison W7RIK [w7rik@arrl.net](mailto:w7rik@arrl.net)  
*Utah County:*
  - Sat 20 Apr 2:30 pm : **Provo** : **signup**
  - Wed 17 Apr 7:00 pm : **Provo** : **signup**
  - Sat 04 May 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](https://sdrutah.org)

KK7AVS SDR : [k7xrd.club](https://k7xrd.club)

KJ7L beacon 28.2493 MHz

### HF remote transceiver club stations

If you'd like to know 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?

Whether you're an experienced professional or a raw beginner, the club can always use your help. Reach out to the club leadership by sending an email to [uarc@xmission.com](mailto:uarc@xmission.com)

Also, if you'd like to see something added to this page, please email [editor@utaharc.org](mailto:editor@utaharc.org)

## Spotlight – Stan Sjol WØKP

Stan is an elmer's elmer. A stalwart in the OARC (Ogden Amateur Radio Club) for many years, he's very generous with his time and skills, and has reached out to include everyone who asks his assistance.

At the December 2023 OARC Christmas Party, we identified Stan as "Grandfather Elmer" due to his encouragement of Teresa Haymaker N4MBA to become the first net control operator for our YL net. Teresa, in turn, has been encouraging and elmering the ladies on the net who are now elmers-in-the-making.

Additionally, he keeps up our club *Ham and Eggs Net* going each Tuesday evening, often covering for other net control operators as needed. He knows us well enough that often he can pick up multiple call signs out of a pileup of check-ins by recognizing partial call signs or the voice of the operator.

Stan's an expert at radio and equipment repair. It's well known in the club that if you need equipment looked at, Stan will dig into it and discover what's wrong. He'll also repair the equipment if possible (99% success rate). He loves seeing many radios and getting to play with them while working on them. Beyond radio and equipment repair, Stan assists operators with antenna installations, programming HTs, and patiently and kindly answering every imaginable question from new hams.

Stan lives in an HOA and thus has 8 or 9 antennas in his attic. He loves to tinker with antennas to try them out, measure results, and gain personal knowledge about what works best in his environment. To his credit, Stan has a great relationship with the HOA president who lives next door and who has allowed him to put up an antenna between their houses.



His influence within the club has been manifest by hosting field day multiple years at his ranch in Hooper (prior to his move), mentoring small groups for T-hunts over many years, designing the Golden Spike QSL card for 2018 and 2019. He's always stepping up to advance the hobby, encourage new operators, support the club, and setting the bar high for the approach and demeanor of an elmer's elmer.

Stan, we are all better operators and just better folks because of our association with you. We'll try to follow your inviting and welcoming example to pay forward what we've received from you.

73, Craig Howe WØVRM

**Microvolt** is the official publication of the Utah Amateur Radio Club, Inc. (UARC), 3815 S 1915 E, Salt Lake City, UT 84106, and is published monthly. Reprints are allowed with proper credits to *Microvolt*, UARC, and authors. Online versions located on our website at [user.xmission.com/~uarc/Microvolt](http://user.xmission.com/~uarc/Microvolt)

**We encourage you to submit** original pictures (highest resolution), articles, software and hardware descriptions, nuggets of humor, and responses to editorials. Email your content, pictures attached, to the editor at [editor@utaharc.org](mailto:editor@utaharc.org) by the 20th 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 **NOT** 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, and 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. Send address changes to [kk7avs@gmail.com](mailto:kk7avs@gmail.com)

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

The **UARC Ham Hotline** at **801-583-3002** is for information regarding amateur radio, including club, testing, meeting, and membership information. Leave your name, number, and a short message, and we'll make a good-faith effort to return your call.

*Microvolt* (USPS 075-430) is printed monthly except August, by the Utah Amateur Radio Club. Periodicals postage paid at Salt Lake City, Utah.

POSTMASTER: Send address changes to *Microvolt*, c/o James Bennett, 4960 W 5400 S, Kearns, Utah 84118.

## UARC 2024 Board

President: **Marvin Match**, KA7TPH  
Exec. Vice President: **Linda Reeder**, N7HVF  
Vice President: **Bruce Fereday**, KF7OZK  
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Treasurer: **Shawn Evans**, K9SLE  
*Microvolt* Editor: **Noji Ratzlaff**, KNØJI  
Asst. *Microvolt* Editor: **Ricky Asper**, AC7RA  
Program Chair 1: **Mike McAinsh**, KI7MTI  
Program Chair 2: **Jeri Brummett**, WJ3RI  
Immediate Past President: **Morris Farmer**, AD7SR

**For late breaking news** listen to the UARC Information Net Sundays at 9:00 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 <http://www.xmission.com/> or call 801-539-0852

EIN : **99-0407768**

Utah Business Registration : **575790-0140**





## Tech corner – Your own PCBs, Part 1

It's been a long time since we've been able to hand-wire ½-watt resistors and wax-covered capacitors with a plumber's soldering iron. In this and the subsequent two articles, I'll cover how to create your own PCBs (printed-circuit boards) for minimal cost and no chemical mess. The results aren't perfect, but will be both sufficient and satisfying to the amateur experimenter. The software is easy to learn with a moderate level of electronics knowledge, and you won't spend hundreds of dollars.

I'm addressing this to new amateurs. If you want to set a breadboard experiment you found somewhere in hard fiber glass and copper, and you've never done this before, read on. When you're done, you'll even have extra copies to give to, or inflict on, friends. For less than \$100 you can build a lasting monument to your own ingenuity.

I'm assuming you know how to read a circuit diagram, what the various components do, and what a lot of them look like. Your level of knowledge drives what you can build. We'll see that surface mount components aren't as scary as you might think and they're almost always cheaper than through-hole parts. Modern integrated circuits capture the capabilities of many transistors and passive components in a single package, reducing the size and complexity of your circuit. The op amps (operational amplifiers) used in my demonstration circuit have 26 (or more) transistors in a small package with eight pins, saving space and design time.

I'm giving an example of expressPCB, an ECAD (Electronic Computer-Aided Design) system for the beginner and those of us on a restricted budget. You design and layout your circuit, click order, give them your credit card number, and in a week or so, 3 small printed circuit boards arrive in the mail. Other tools such as *KiCad* and *Eagle* are free but lack the start-to-finish workflow to ease the process.

If you have no electronics experience beyond that required to pass the FCC test, you should consider any of the beginning electronics books including those from the ARRL and all over the internet. These have many experiments, some of which you could consider for a first printed circuit board.

As a demonstration, I'm going to design and build a two-microphone mixer with variable band-pass filtering and gain stages. It's all analog, so no programming required; just turn it on. I'm probably going to make mistakes along the way, but that's part of the process.

### How to get started

1. Download a copy of *ExpressPCB*. Once you create a login, visit <https://www.expresspcb.com/> and follow their directions. I'm assuming you have Windows 10 or 11. You'll need to give them an e-mail address. Spend some time with their tutorials and example PCBs.
2. Do you have an idea? You're going design and build a what? What sort of box are you going to put it in?
3. What are the main (largest, most expensive) components? A microprocessor? RF modules? Op amps? What connectors? Can you buy the components? Are they still being made or have the ones you're familiar with reached their end-of-life?
4. Sketch out the circuit on paper, grit your teeth and enter it into the schematic capture program.
5. Unless you're really sure of yourself, breadboard at least some of the circuit. If you're familiar with Ltspice you can substitute that.
6. Layout the components using the ExpressPCB Plus layout program. Make sure you have the right footprints for each component and that it all fits on the 3.x" x 2.5" board size.



## Tech corner – Your own PCBs, cont'd



7. Connect the components with copper traces, and verify against the schematic. Pour the ground plane.
8. Add a silkscreen board name, test points, connector names, and whatever else there's room for.
9. Send to the board manufacturer with money, and purchase parts if you don't have them.
10. Solder things on, debug, add haywires as needed, declare success or repeat starting at step 5.
11. Make a pretty box and put your project in it.

In this *Microvolt* issue (Part 1) we'll cover steps 2 through 5 above.

### The idea

I wanted to avoid digital circuitry, sticking to elementary analog; hence, a microphone mixer. Earlier, I attempted to connect a Kenwood desktop microphone to my TM-V71 transceiver - the mic's output just couldn't drive the modulation circuitry. Add to this that you may want two microphones of varying capabilities and remove background noise so you need a band-pass filter as well. This necessitates a number of potentiometers but I'm setting it up so some can remain unpopulated – if you don't need the bandpass filter, you can substitute fixed values for them.

I love 3D printing – I can design a box to fit the project, not buy a box and fit a project into it. The microphones will plug into the box, and the output into the transceiver. Be forewarned – there are many standards for PTT microphones, I'm not even going to attempt to fix that part of the circuit. But, I'm assuming an electret that needs a DC bias voltage to operate. Seeing as they can be less than a dollar, they're fairly common.

### The parts

This design will use three **LM358 integrated circuit dual op amps** (operational amplifiers). These are common, inexpensive devices in a variety of packages. For ease of construction, I'm using the 8-pin DIP version with two amplifiers in each package. There is one op amp for each microphone channel and one for the last gain stage of which only half is used.

Adjustments are by potentiometers of various values and are connected to the circuit board with 0.1" headers. This allows you to select what kind to use - slides for a professional look or knobs for a classic look - or you can fix the values by soldering resistors on the pads provided. Note that knobs can be more expensive than the potentiometers themselves. A really fancy safety knob might set you back more than \$500.

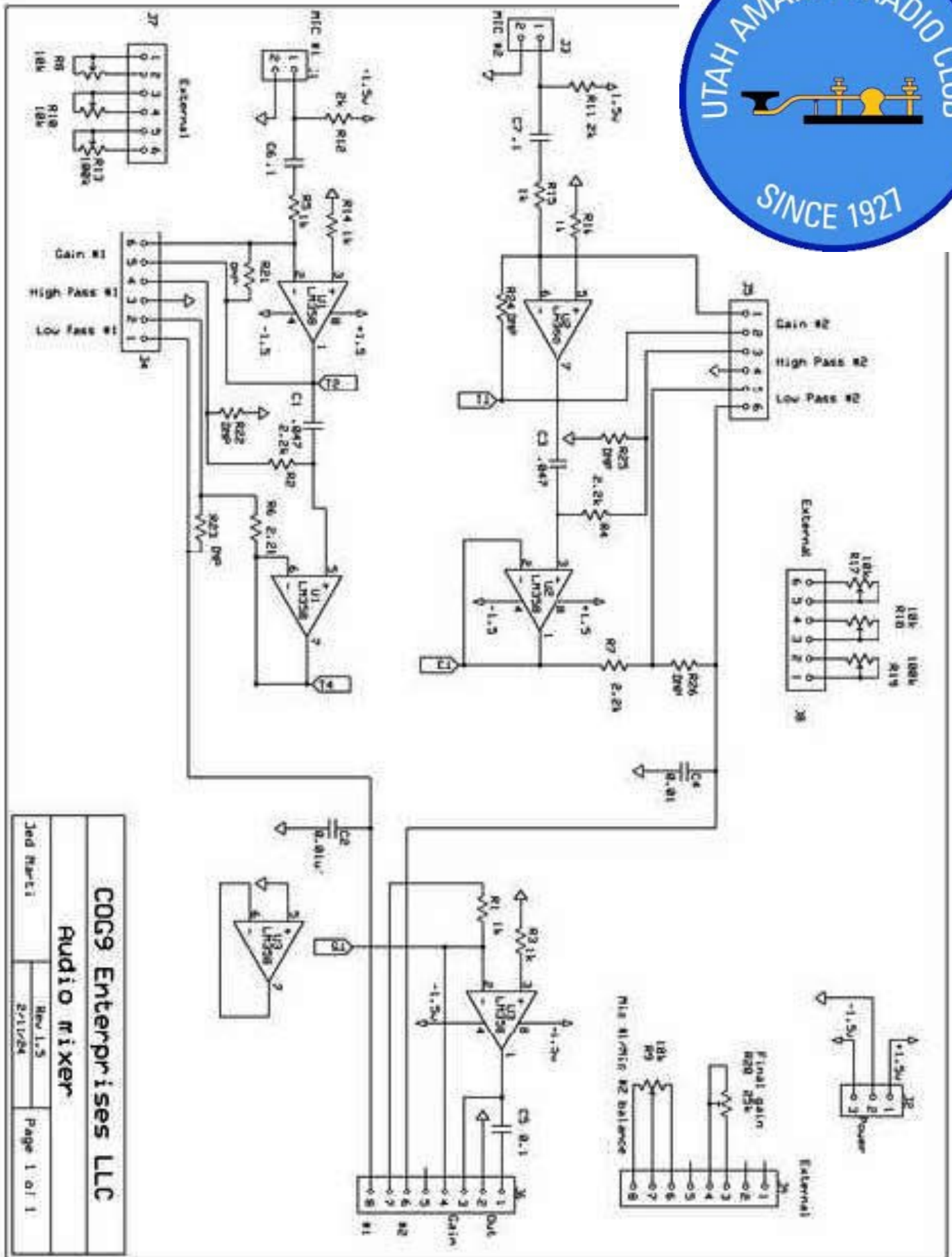
The mixer needs positive and negative voltages which you must also supply through a 3-pin header. This could be anything from two 1.5-volt AAA batteries to two 9-volt batteries or something fancier of your own design. I've avoided buck/boost and switching power supplies to avoid electrical noise. If you want an LED to indicate the device is on, you're on your own.

The audio connectors are problematic. If your microphone has an RJ-11 connector, a screw-on 3.5-mm (3- or 4-wire) plug, or ¼" plug, these need to be part of the box and not the circuit board. In addition, the PTT function of most radio microphones is connected outside the circuit board.

### The circuit

The circuit was entered with the *expressSCH* program. You select parts from a library, add their values, maybe their footprint, and a part number for a BOM (bill of materials), though you only need the type.

# Tech corner – Your own PCBs, cont'd



COG9 Enterprises LLC  
 Audio Mixer  
 Rev 1.5  
 2/1/24  
 Page 1 of 1



## Tech corner – Your own PCBs, cont'd



The mixer has input sections for multiple electret microphones. Each section has an amplification stage and a filter stage. These are then passed to a final amplifier with a balance potentiometer to select either microphone or both. All connections to potentiometers, microphones and power are made through 0.1" headers.

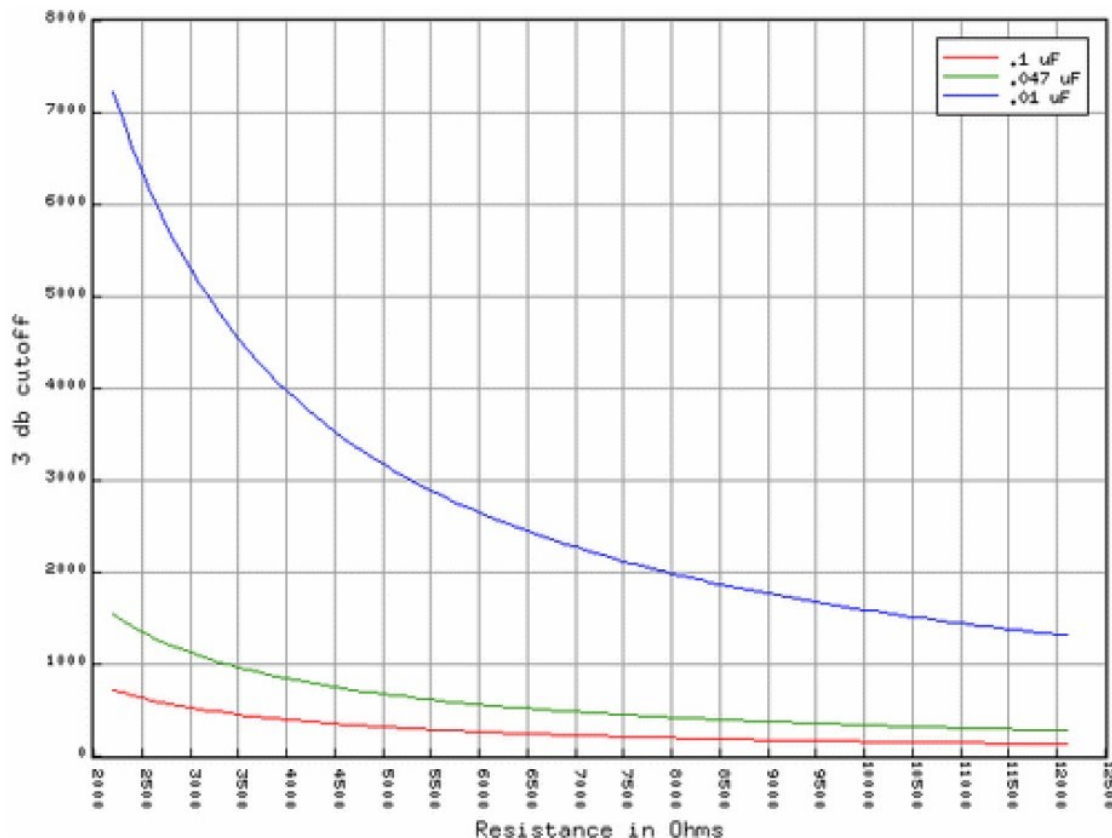
Starting from the microphone (J1), the electret bias resistor R12 provides a DC bias that is removed from the first state amplifier by capacitor C6. This stage has a gain of

$$\frac{R13}{R5} = \frac{R13}{1000}$$

If R13 is set to its full 100-k $\Omega$  value, the gain is 100, though this may well saturate on a big signal. If you want unity gain, you don't need a pot, and you can populate R21 with a 1-k $\Omega$  resistor instead. The filter is a passive band-pass using only resistors and capacitors. A -3 dB cutoff frequency is calculated by

$$f = \frac{1}{2\pi RC}$$

with C in farads. The high-pass filter combination of C1 and R2 + R10 has the green curve in the following plot. At the smallest value for R10, signals below 1540 Hz disappear and at its highest value, and signals below 280 Hz are attenuated. The low-pass filter combination of C2, R6 + R8 has a 3 dB cutoff at 7.23 kHz at the lowest resistance and 1.3 kHz cutoff at the maximum resistance. You can play with the resistance and capacitance values to adjust how wide of a range you want.

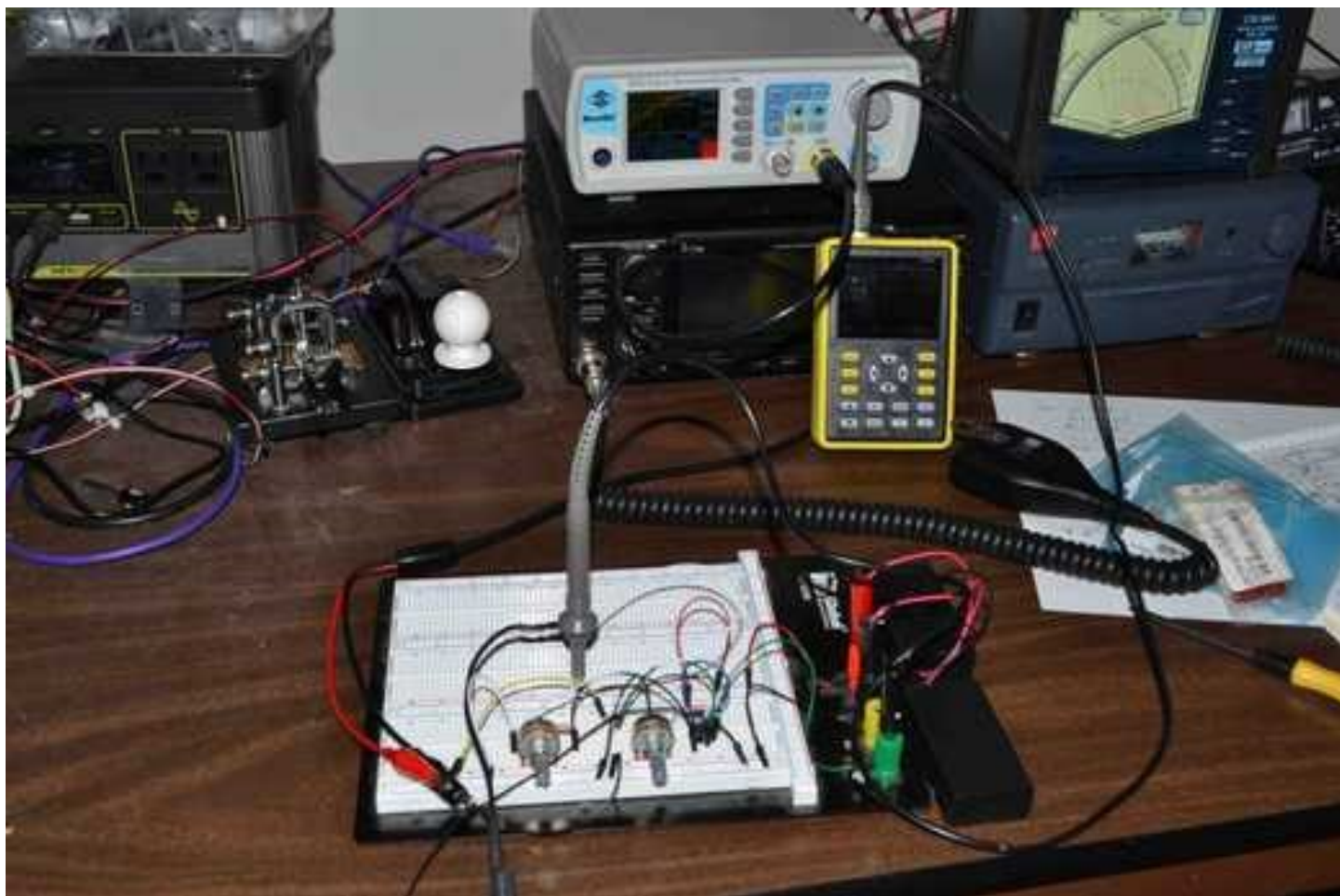


## Tech corner – Your own PCBs, cont'd

The final amplifier stage selects between the two microphones with R9, a 10-k $\Omega$  potentiometer. A final gain stage from R20 can be fixed to unity by putting a 1-k $\Omega$  resistor between pins 3 and 4 on J6. Test points are included on operational amplifier outputs.

### Breadboard and circuit capture

Shown is the first amplifier stage and the RC filter stage. I powered it with two, two-cell 1.5-volt alkaline battery holders giving  $\pm 3$  volts. I used a sweep signal generator and battery-powered oscilloscope to test the band-pass filter and then a PTT microphone from a defunct Xiegu transceiver to test the first stage amplifier.



### Some warnings

Under Windows 11, the capture program exhibits some difficulties. If you close the schematic you're working on, the next time you start it, the component names of your *favorites* will be missing the first letter. Also, if you're used to a commercial system like Altium, you'll find this somewhat slow. There's little help for checking circuit consistency, though it'll check for unconnected pins and parts with the same part number.

### Next month

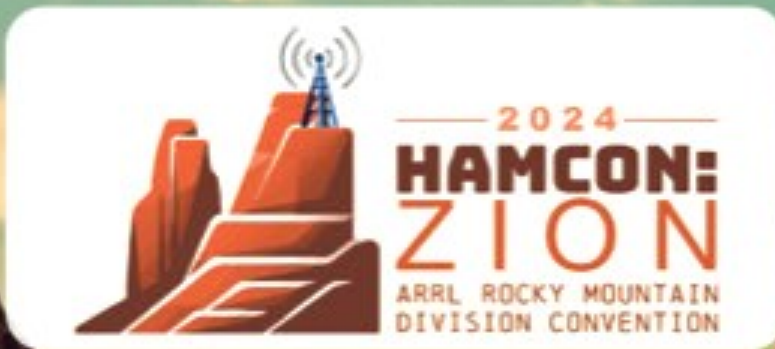
Board layout and ordering parts.

*Jed Marti KI7NNP*





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## Silent key– Dave Deelstra N7ISH



On 04 December 2023, we bid farewell to friend and club member Dave Deelstra N7ISH, who passed away in his Murray home after a year-long battle with cancer. Born in 1950, Dave was the oldest of nine children and was well-known as one of the nicest guys in town. In his younger days, he raced motorcycles and had many other hobbies.

Licensed in 1986, Dave enjoyed communicating with fellow hams around the world. He attended the Steak Fry in 2023 with his partner Cindy, and enjoyed doing satellite communication work. He was an active member of Salt Lake County ARES (SLCOARES) at the turn of the century. He was always congenial and helpful to less-experienced operators.

Dave has attended the Dayton Hamvention a couple of times. Through the years, he's tinkered with his radios, has built several antennas for use when traveling out and about, and en-

joys helping out with emergency communication setup, which is what got him interested in ham radio in the first place. One of Dave's favorite perennial activities is to sit one or more



of his grandkids on his lap and make contacts during ARRL Kids' Day, then look forward to the QSL cards that arrived. He was also the recipient of the prestigious **ARRL DXCC award**, for making contacts with stations in over 100 entities.

Dave's survived by his partner Cindy, Cindy's kids, grandkids, and great-grandkids. Dave will be remembered and missed by all who knew him.

You can see [Dave's obituary here](#).

73 and rest in peace, Dave.



## Strays – Your QRZ page



# QRZ.COM



When you received your FCC license, a website known as [QRZ.com](http://QRZ.com) (or simply, *QRZ*, and pronounced *cue-are-zed*) created a web page as a courtesy to you, free-of-charge, containing only information it gleaned from the FCC public record. It provides a convenient way for other hams to look up your name, home location, and license class. QRZ also displays your email address, your photo, and a personal description, if you've populated your page with those.

### Create a login

As a new ham (or even if you've been around a while), it's in your best interest to create a login on QRZ, to help people know how to contact you off the air. After you do, you can use QRZ to look up other hams quickly, find how to contact them, and see their photo and biographical info if they've posted it.

### Use QRZ for searching

You can use QRZ.com to search for other hams by call signs, names, or location. In the search box, you can enter a complete call sign, to display that person's QRZ page. You can even enter a part of a call sign and a wildcard character ("\*") to search for a group of call signs. For example, you can list all hams that have call signs starting with "KJ7" and ending with "H" (because, maybe, that's all you heard on the air), by simply entering "KJ7\*H" in the search. You can list all hams named "Steve" who live in "Provo" by entering "Steve Provo" in the search, then select by *Name/Addr* in the drop-down.

### Use QRZ for logging

You can log your contacts using QRZ.com, for any amateur band. It's a convenient way to keep track of friends, special events, and faraway stations you want to record permanently. People who look up your QRZ page will be able to see your contact list, a feature no other logging program provides. (It's an easy

way to show others the contacts you've made.) And when the appropriate contacts are confirmed, QRZ will display the associated award (WAS, WAC, Grid Square, etc.) at the top of your page.

### Use QRZ for a flea market

QRZ.com has an online garage sale, of sorts. You can post your own ham radio equipment for sale, or peruse the thousands of used items for sale by others. Hover the Swapmeet tab, then select *Ham Radio Gear for Sale* to display the world's largest listing of ham radio equipment for sale. Be sure to look over [this guide](#) before launching into a buying spree, however.

### There's more

QRZ.com is probably the largest repository of call signs in the world. It was made originally for American call signs, but today contains the call signs of numerous hams from many countries. QRZ also posts announcements, alerts you when your license is about to expire, and contains a popular forum.

### Paid subscription

It's not actually required of you to pay QRZ for your page on their website. But available only through a paid (\$20 annual) subscription, they have many useful features, such as unlimited call sign lookups, the online Swapmeet, and the Web Contact Log.

### Finally

Let others know of their QRZ page, especially the newer hams, who might not be aware of this free service. Encourage them to register for at least the free log-in, to populate their pages or be able to use QRZ to connect with others.

