Issue 34
October 2020

Utah Valley Amateur Radio Club

The UVARC Shack

A summer unlike any other

During the Pandemic, the City of Orem has made it clear that all public meetings in city facilities are terminated. From the Central Utah Water Conservancy District, enter Jon Babb KJ7MKA, who volunteered his services and facilities to host club meetings in an upscale building. We're very grateful to Jon for looking out for us, allowing us to twice provide our monthly meetings in-person and by live-stream via Zoom and YouTube.

In this issue of the *UVARC Shack*

Three club meetings and a better-than-expected turnout at the swap meet.

Brass Tacks explains the technical workings of a Yagi antenna.

Silent Key for WE7LDS, while My-Shack highlights K7QEZ. *Dear Annette* discusses 10-meter openings, keeping HTs in the cradle, and limiting nets to an hour. Discussion in *Hot Tips* on the importance of scanning. *DIY* for a 1.25-meter folded dipole antenna. *The Amateur in You* discusses your VFO and your microphone.

Please send your ideas, stories, questions, gripes, and photos to ***uvarcshack@gmail.com***

Inside this issue

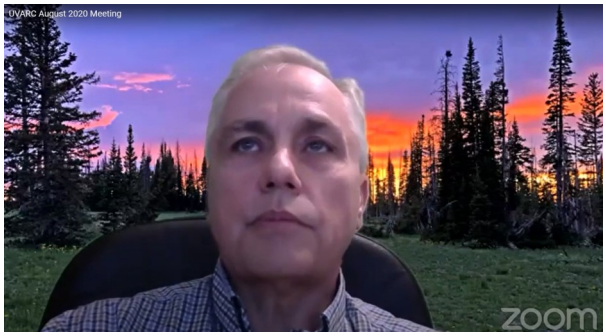
Other points of interest

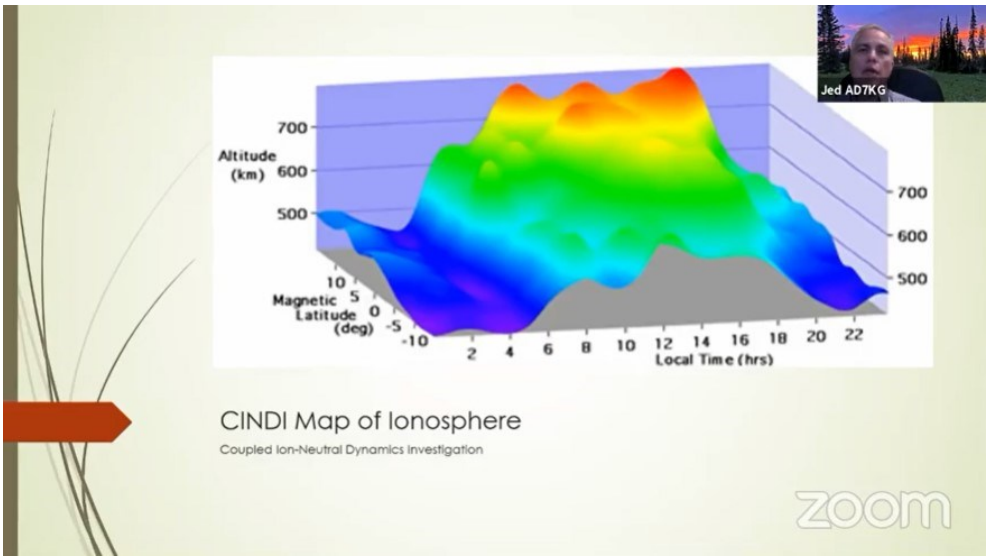
Club meetings

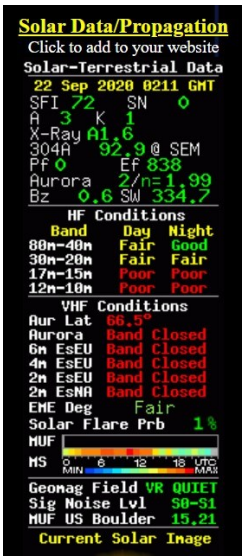
Recap

August 2020 club meeting – Band prediction using VOACAP

In August, Jed Petrovich, AD7KG, presented a terrific slideshow, explanation, and online demonstration of using VOACAP to predict HF propagation and band conditions. Much of the discussion centered around how the sun (both radiation and solar wind particles), the seasons, and time-of-day affect radio frequency propagation. Jed showed us how to not only know what's happening with the bands at the moment, but how to examine their forecasts.







He walked us through some of the tools used to explore and display some of their current characteristics and states. They help give the searching ham a reasonable feel for how favorable the conditions might be for HF communication. Thanks to Jed for his time and preparation on a fascinating discussion. See the YouTube recording of the meeting.

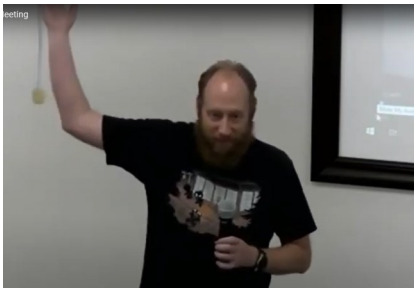
Club meetings

Continued

September 2020 club meeting – Meet the new club leadership

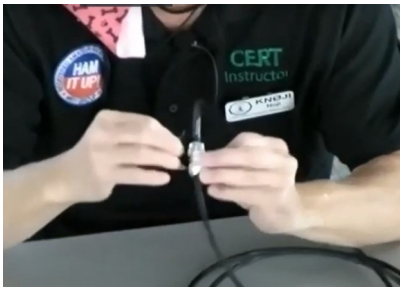
The September club meeting is our annual elections, with Alma Perry W1ZGY, our electioneer, leading the play-by-play in a very close election. It was close to being unanimous, that is. As you probably already know, the newly elected presidency consists of the same people who made up the previous club presidency, but please reach out a socially distant elbow to welcome them anyway. See the YouTube recording of the meeting.

Following the election, Noji Ratzlaff KNØJI gave us a presentation on how to weather-proof your antenna connector, seeing how autumn and its rainy weather will soon be upon us. Using Nashua® Stretch-and-Seal™ silicone tape, he demonstrated how to properly wrap the connectors together, to form a water-tight seal against the weather. He then showed how easy it is to remove the silicone tape cleanly, unlike with silicone paste or electrical tape.



Alma, leading the charge on the voting

Alma, pleased once again that his annual duty is done



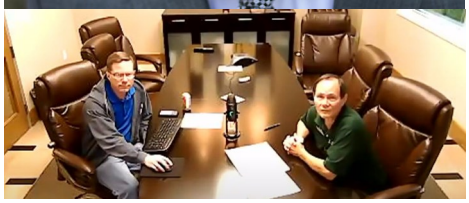
Noji, removing the perfect sealing job he just did

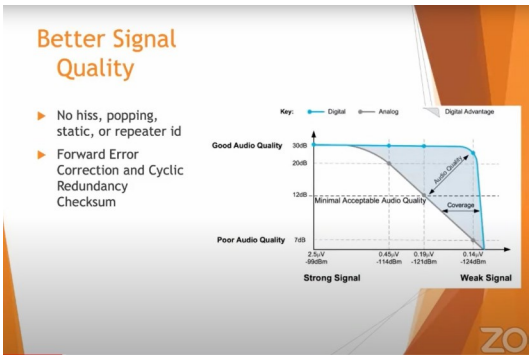
Club meetings

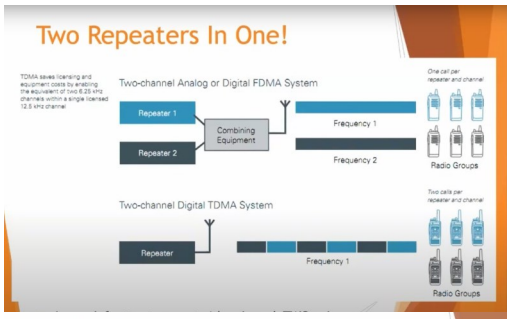
Continued

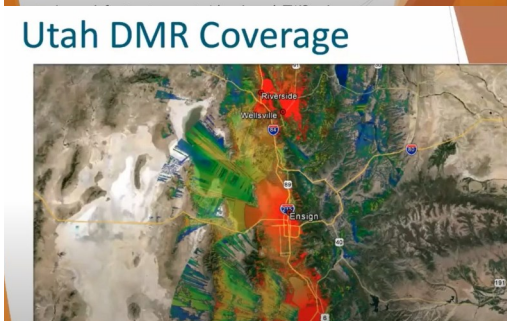
October 2020 club meeting – The ins and outs of DMR

Thanks to a wonderful (and last-minute, I might add) presentation by Chris Andrist KB7WSU, we got quite an education on DMR, its configuration, and method of use. He made a fairly complicated mode setup look easy, and that's his genius.









See the YouTube recording of the meeting.

Silent key

Memorial for a member who has passed on

Lon Anderson, WE7LDS

In 1970, Lon met his life-long sweetheart Carolyn at the American Fork Hi-Spot Drive-In, and married her soon after. He was 19 and she was 15. Three years later, they were sealed in the Salt Lake Temple. The two had three kids through the years, and Lon was very devoted to his wife, who said, *Lon never gave up on me, in spite of me.*

Soon after graduating from high school, Lon went to work on the Alaska Pipeline. After sixteen years in the steel industry, he attended USU (Utah State University), where he opened up as a party animal of sorts, but who had little trouble making good grades. Lon also served in the Army Reserve for 4½ years starting in 1971, having avoided the draft due to a broken foot.

Not one to call attention to himself, Lon suffered two heart attacks, which his wife never found out about until years later. When Carolyn saw him collapse in the arms of his grandson Bryan with his third episode, she said, *Damn you, Lon, we're going to the hospital!*

In his teen years, Lon loved to talk on his CB radio, which led him to discover amateur radio. After getting his ham radio license in 1973, Lon dedicated himself to serving in MARA (Mercury Amateur Radio Association), the communication arm of the LDS Church back in those days. Later, he became one of the original 76ers in Utah County, and often introduced himself as a friendly voice to new hams who happened upon the '76 repeater.

In his later years, one of Lon's favorite companions was his dog Spinneli, who sat faithfully on his lap during movies and hours of television.

Carolyn said that Lon especially loved the company of Doug Mauer WE7BBQ and Carl Pockrus WE7OMG on the radio, and that when she listened in on the '76 repeater to Carl's announcement of Lon's Final 7-3, saying *See you on the other side*, she wept like a baby.

73, Lon, and rest in peace.

My Shack

Highlighting the shack (ham equipment and room) of a member, to give others an idea of the possibilities that might work for them

Ron Hatch, K7QEZ

I grew up in a ham family: both my parents were licensed, and eventually all five children got into the hobby. I've been licensed and active since 1960. As a Novice, I would get up at 4 am during the summer months every other day to get a water turn for our city-block garden; I'd then return and do an hour of CW hamming while the garden got wet.

Our first 2-meter equipment was a Gonset Communicator. We then built a "Benton Harbor Lunch Box," (Heathkit) for 2 meters, and then my father and I assembled a Johnson Ranger kit for HF AM work, to go along with our Hallicrafters SX-111 receiver. We eventually got a couple of Icom "portable" 2-meter rigs (9 C-cells!), then Kenwood, and other handhelds. Later, for HF my father moved on to a Kenwood TS-120 and finally to a Yaesu FT-757GX set-up (both of which I now own and operate). I have added an older Icom IC-730 and a new Icom IC-718 for HF work.

For antennas I have 1) an all-band Maple Leaf Mini (forerunner of today's G5RV Junior), installed as an Inverted-V for north-south access, 2) an OCF all-band dipole, installed in some trees in the back yard for east-west access, and 3) a 23-foot Comet CHA-250B all-band vertical up 20 feet above ground. Today, antennas are a bit challenging, as I live in an HOA neighborhood, and can't really do any major antenna installations.

I am enjoying HF work, as well as 2-meter VHF work (both simplex and through several local repeaters) in the shack, as well as VHF/UHF operation from my car. My father taught his children that hobbies are a good way to learn new things and to stay out of trouble. Ham Radio has been the best hobby I've had (led me to a career in engineering), and I'm sure it will continue to be, until I go to the great Hamfest in the Sky.

— 73, Ron Hatch K7QEZ

Amateurs in Action

Recounts of ham radio operators who have used their time and skills to help others in a time of need

The Chilean rescue

Guillermo Guerra OA4DTU

On 09 July 2020, an aircraft departed Santiago, Chile, to perform an air ambulance service and pick up a patient on Easter Island. About a thousand nautical miles out, the plane lost contact with the control tower back on the continent, so the pilot called out on the Peruvian Relief Net (PRN) channel at 7.100 MHz.

An emergency simulation training exercise had just concluded on the PRN a few minutes earlier, and two operators, Guillermo Guerra OA4DTU and Giancarlo Passalacqua OA4DSN, were still on frequency, chatting, when they heard the distress call from the pilot. Guillermo answered the call, and the pilot began detailing the situation, including the fact that the plane had lost satellite communication, and requested support from Ocean Air Control (OAC) of Chile, since the HF equipment on Easter Island was in disrepair at the moment.

By means of relays through Guillermo and about ten phone calls, the OAC was able to determine the precise location and path of the plane, and communicate that back to the pilot. These relays continued until the pilot reported making VHF contact with the Easter Island control tower, confirming a safe descent and landing.

Soon after landing, the pilot called Guillermo on the phone, then sent him a photo of the aircraft on the rainy Mataveri runway while it was awaiting patient delivery. Soon, the plane was off again, to Santiago airport, where a ground ambulance awaited the patient.

The ordeal lasted about three hours, with Guillermo, the key relay, remaining at his home rig the entire time. Later, the OAC commended Guillermo and the PRN for their handling of the incident.

— Reported by Radio Club Peruano, OA4O

Events

Upcoming happenings

Utah Valley Swapmeet 2020

The *2020 Utah Valley Swapmeet* was a success, in that many folks showed up to buy, sell, trade, or just rub proverbial shoulders with each other, in spite of the Pandemic. Not as many as last year, but we kind of expected that. In short, we had fun, and in the process helped pay for Winter Field Day this next year.

Like we usually do in our swap meets, we gave away door prizes, this time seven of them, three of which were working HF transceivers. Third Prize was a working Yaesu F-757GX HF rig and mic. Second Prize was a partially working Icom IC-728 HF rig and mic. Grand Prize was another Yaesu FT-757GX HF rig, but accompanied by a complete station, including mating power supply, auto-tuner, and associated control cabling.

Several vendors showed up, and it's rumored that Carl actually sold out all his antennas. Thanks to Wendy Shoop and Caryn Alarcon for the logistics to make it all work. And thanks to all of you who came and made it fun and a success!

Brass Tacks

An in-depth look at a radio-related topic

How a Yagi antenna works

If there's any one image that's aptly symbolic of ham radio, it might be that of a *Yagi antenna*. It's perhaps the most sought-after high-performing amateur radio antenna, and for good reason.

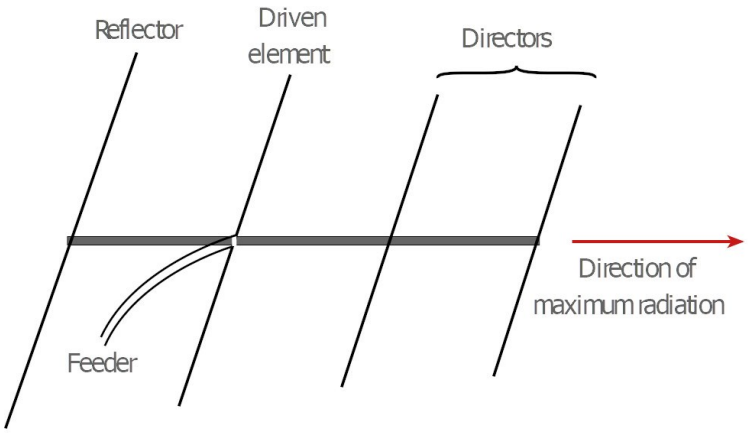
Background

The actual name of this antenna is the Yagi-Uda antenna, after the two who were given the most credit for its design. In fact, it's fairly well understood that in 1926, Shintaro Uda of Japan was the principal engineer of the antenna, with his colleague Hidetsugu Yagi playing a lesser role in the design. Later, Yagi filed a patent on the antenna in Japan, inadvertently omitting Uda's name from the filing. Once the patent was transferred to the Marconi Company in the UK, the Yagi name stuck.

The Yagi antenna is known for its *high gain* and *high noise rejection*. Similar to narrowing a flashlight beam, to concentrate its light to a smaller area, a Yagi antenna can be made with high *directivity*, providing more focus of the signal "beam" in a particular direction, and leading us to refer to such a Yagi antenna by the nickname *beam antenna*.

Construction

The Yagi antenna consists of two or more parallel conductors in the shape of rods, wires, or tubes that we call *elements*. Among these elements are a single *half-wave dipole*, a single rear conductor, and zero or more forward conductors. The feed line (coax or other type) electrically connects to the dipole, which is called the *driven element*, made from two collinear, quarter-wavelength conductors.



The other elements are not electrically connected to the feed line, but operate by feeding off the energy radiated by the driven element, and so are called *parasitic elements*. As will be explained, because of the way each of the parasitic elements reacts to the driven element radiation, the longer rear element is called the *reflector*, and the shorter forward elements are called *directors*. All the conductive elements are then spaced apart, and placed parallel to each

Brass Tacks

continued

other, installed on a rigid *boom*. A Yagi antenna constructed this way radiates in all directions, with the direction of the strongest radiation from the driven element outward, in the direction opposite that of the reflector. Because this antenna can focus more of its radiation energy in one direction than in others, we say that it has ***directivity***, making it a *directional antenna*.

Folded dipole variation

An adaptation of the driven element is the use of a *folded half-wave dipole*, instead of a standard half-wave dipole, to offer nearly four times the *radiation resistance* of a standard dipole, with the same radiation pattern, but with improved radiation efficiency. This results in a greater ratio of the signal sent by the transmitter being converted to electromagnetic radiation, compared with that consumed by the antenna ("ohmic" resistance) and given off as heat.

Furthermore, in a standard half-wave dipole Yagi, the parasitic elements tend to lower the feed-point impedance to nearly 20 ohms, often requiring a gamma (or similar) match to bring the impedance up to nearly 50 ohms. In a folded half-wave dipole Yagi, the parasitic elements tend to lower the feed-point impedance to around 100 ohms, which is within the range of most tuners, avoiding the need to install a match on the antenna, if the target feed line is 50-ohm coaxial cable.

In place of the two-conductor dipole, a folded Yagi uses a folded dipole, which is a single full-wavelength conductor that's folded in half, the two half-sides parallel to each other, but a fraction of the wavelength apart from each other. You might more often see this type of Yagi antenna used for VHF television and FM broadcast radio reception.

Cubical quad antenna

Other shapes of the Yagi antenna elements characterize different models of the same antenna, and result in some advantages over the conventional straight-element Yagi. One formerly popular version is the cubical quad (or simply, "quad"), and its little brother, the quagi antenna, both of which use driven and parasitic elements formed into squares, to allow for greater signal capture (good receiving antenna) and higher gain (good transmitting antenna). In the case of these quads, the elements are typically wires strung tightly around non-conducting rods, such that each side of the driven element is a quarter-wavelength long. In this configuration, a two-element

Brass Tacks

continued

quad antenna exhibits about the same forward gain as a three-element Yagi antenna for the same frequency. To construct a multi-band quad, you would merely install more squares of wires on the same rods, inside the existing wire squares.

Cubical quad antennas do have their disadvantages, however, when compared with the conventional Yagi antenna. Quads tend to be quite large, some 40-meter boxes taller and wider than your house. Cubical quads are also very difficult to build and maintain. Birds love them as a perch, and the tightly stretched wire elements often give way to their weight when they flock on them. Ice buildup can also place excessive weight on the wires. So, even though a cubical quad can outperform a Yagi of the same band, and might even cost a lot less, you'll rarely see one of these gems anywhere today, simply because of its size and required maintenance.

What makes it tick

Our understanding of how a Yagi antenna functions begins with the driven element, a half-wave dipole. Most of us are familiar with the workings of a dipole antenna, so let's refresh our memory on that, and go from there. The half-wave dipole antenna works essentially by reactance, connecting the two sides by capacitance. When an alternating current from the transmitter is fed through the feed line into the dipole, the oscillating charges in the two dipole elements produce time-varying electric and magnetic fields. The resulting *electromagnetic wave*, which increases and decreases in magnitude, then reverses in polarity, alternates at the frequency of the RF (radio frequency) current. Keep in mind that the time-varying electric field follows the *current* in the element, not the voltage.

The electromagnetic wave from the dipole then emanates in all directions equally and perpendicular to the axis of the dipole. The Yagi antenna reflector element is typically about 5% longer than the total length of the driven element. When the electromagnetic wave from the driven element strikes the reflector, a current is induced in the reflector that is 180° out of phase with the original wave, because the reflector acts like a "shorted" dipole.

But because the reflector is a bit longer than the received wavelength, it presents an inductive reactance. That way, because the induced current subsequently causes the reflector to radiate, a new electromagnetic wave is given off by the reflector, the result of a current whose phase lags that of its voltage. The reflector is spaced a fraction of a wavelength from the driven element, allowing the new wave to return to the driven element in phase with the wave given off by the driven element.

A Yagi antenna director is typically about 5% shorter than the driven element. When the combined electromagnetic wave from the driven element and the reflector strikes the director, a current is induced in the director that is 180° out of phase with the original wave, because it also acts like a "shorted" dipole. Because the director is a bit shorter than the received wavelength, it presents a capacitive reactance.

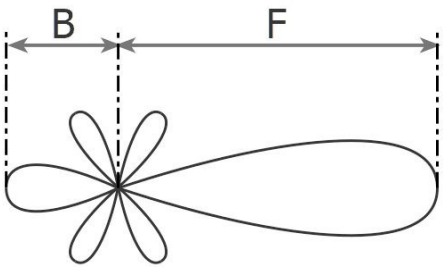
And because the induced current causes the director to radiate, another new electromagnetic wave is given off by the director, the result of a current whose phase leads that of its voltage. The director is spaced a fraction of a wavelength from the driven element, allowing the additional wave to leave the director in phase with the first two combined waves.

Finally, the waves traveling in the reverse direction partially cancel each other out, by virtue of

Brass Tacks

continued

destructive interference, rendering the wave amplitude in the forward direction relatively large, compared with the wave amplitude in the reverse direction, known as the *front-to-back ratio*. The larger the front-to-back ratio, the greater the transmitted signal strength toward the front direction, and the greater the antenna ***gain*** (focus of signal), making the Yagi antenna one of the most effective directional antennas in use today.

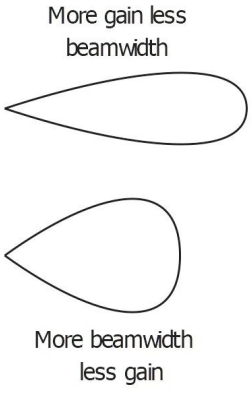


By the physical principle of reciprocity, a Yagi is also an effective receiving antenna, *because* it's an effective transmitting antenna. This is an important concept, because it means that it's able to receive much better from one direction than from others. If an antenna can receive better from one direction, it also means that it can receive less unwanted signals from other directions. For this reason, we say that a Yagi antenna is ***less susceptible to noise*** than less-directional antennas; it simply picks up less noise from other than the forward direction.

APPROXIMATE YAGI-UDA ANTENNA GAIN LEVELS

NUMBER OF ELEMENTS	APPROX ANTICIPATED GAIN DB OVER DIPOLE
2	5
3	7.5
4	8.5
5	9.5
6	10.5
7	11.5

It's known that the more directors are installed on a Yagi antenna, the greater its gain, at about 1 dB of gain increase for each director installed. But with an increase of gain, comes a decrease in ***beamwidth***, which is an angle (planar or spatial) measured by the area projected by –3 dB (half) of the maximum signal strength or greater. A higher-gain antenna, therefore, requires the operator to adjust the antenna direction more often, to effectively contact the same given set of stations, for example.



Also, a Yagi antenna can be oriented vertically, horizontally, or circularly (in the case of a satellite antenna), to produce a signal with the corresponding ***polarization***. Vertical and horizontal orientation can be achieved by simply installing the antenna with the elements aligned in the desired direction of polarization, in relation to the direction of gravitational pull (not that gravity has much to do with it.)

Brass Tacks

continued

Keeping it all together

The Yagi boom is the rigid bar, rod, beam, or pole that holds all the elements in place, including their parallel orientation and their planar spacing. The question that seems to surface most is whether it's acceptable to use a metal conductor for the boom. And the frequent follow-up question is whether the elements should be insulated from such a metal boom. The answer is, ***if the Yagi antenna is constructed properly***, you can use a metal boom, and the parasitic (not driven) elements do not need to be insulated from the boom because the points of contact are all at current nulls (zero amps) at the resonant frequency.

That being said, most competent Yagi antenna designers calculate the minor effects contributed by a metallic boom, using a *boom correction factor*, which in most cases is an approximate *fudge* number. Furthermore, never allow any part of the driven element to come in contact with the metal boom.

Configuration alternatives

Due to their directivity and high gain, Yagi antennas have been utilized in a variety of forms and configurations, as was touched on previously with the folded dipole and cubical quad versions. Here are a few more practical ways they've been used:

- An *NVIS* (near-vertical incidence skywave) antenna is merely a Yagi antenna that is pointed straight upward. The resulting beamwidth striking, and then refracting off, the ionosphere, produces the relatively local zone of contact through skywave propagation. NVIS antennas typically do not include directors, only the driven element and reflector.
- A *satellite antenna* typically consists of two Yagi antennas of two different frequency bands built together to communicate with a satellite uplink and downlink. They can be constructed in parallel with each other or at right angles to each other.
- A *stacked antenna array* is often constructed from two or more Yagi antennas that are electrically connected in-phase by a phasing harness, with all antennas pointed in the same direction, but separated vertically by a half-wavelength.

Antenna height

Finally, be sure to install your Yagi antenna at least a half-wavelength above ground, for optimum effectiveness. Because of the size of your antenna, this might not always be possible. At 40 meters, for example, a height of a half-wavelength means 20 meters, or 66 feet up. Yikes.

Summary

A Yagi antenna is probably the signature antenna of ham radio. It's characterized by multiple parallel elements that work in concert with principles of electrodynamics to produce high gain and low noise reception. Its directivity and gain can be increased by adding directors on the boom, but comes at the cost of reduced beamwidth, requiring frequent direction changing for effective communication. To provide for maximum benefit, you should install your Yagi antenna at least a half-wavelength over ground, which might prove difficult for some.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

Dear Annette

What's on your mind? Serious, humorous, technical, and thoughtful answers to your deepest, (mostly) ham-related questions.

Dear Annette:

What determines the number you get in your first license call sign?

Bill in Lehi

Dear Bill:

At one time, the FCC assigned your call sign "area numeral" according to your location of residence, which had to be changed if you moved out of that *call sign area* (also *calling area*.) Today, the numeral that appears in your first call sign is determined by the address you indicate on the 605 form (Amateur Radio License Application) you submit when you take the Technician exam. For example, say you live in Provo (calling area 7) as a BYU student, but you traveled to Colorado (calling area Ø) to take your Technician exam, yet you indicated your home address is California (calling area 6) on your 605 form. Your first license will contain the numeral 6. There are exceptions, however.

Dear Annette:

I've heard that 10 meters is pretty cool when it's open. So, how can I check whether 10 meters is open at any given time, without wasting a lot of time spinning the dial through the entire band or watching a noisy waterfall?

Drew in American Fork

Dear Drew:

For those of us who do FT8, 10 meters always seems to be open. But if you're looking to make long-distant (DX) SSB contacts on 10 meters, tune to 28.425 MHz and listen for Todd's beacon endlessly announcing "See-cue, see-cue, this is keelo-charlie-four, tango-victor-zooloo" in his slow drawl. If you hear that, 10 meters is most likely available for SSB contacting. Also, Jed Petrovich AD7KG explained how to use VOACAP to check on band conditions. See page 2 of this issue.

Dear Annette:

Is it ok to keep my Baofeng UV-5R turned on while it's charging?

Rem in Payson

Dear Rem:

The charging cradles that accompany the Baofeng HTs are made using very simple circuitry, which aren't designed with a lot of intelligence (as in, charge regulation) built into them. When your radio is turned on, its current draw is quite variable, and can fool the charging circuitry into providing full charge voltage when it doesn't need it, resulting in a potentially degraded battery at the least, or a fire at the worst. Then again, I know several hams who report keeping their Baofeng HTs turned on in their chargers 24/7 without problems, but I believe they're lucky, and I personally wouldn't take that chance.

Dear Annette:

I was under the impression that nets are not allowed to run longer than an hour, but I've heard several that have gone over. Do I understand that rule correctly?

Teischer in American Fork

Dear Teischer:

According to the Part 97 (amateur radio service) rules, the only "nets" (held as drills or tests) that are limited to a specific amount of time are the RACES Net and a net held at a work place, each restricted to one hour per week and 72 hours per year. I don't believe nets held under other circumstances are limited by time.

Got a question for Dear Annette*? Email it to* ***uvarcshack@gmail.com*** *and include your town name. Sorry, no guarantees.*

The Amateur in You, Part 1

What have you been pondering?

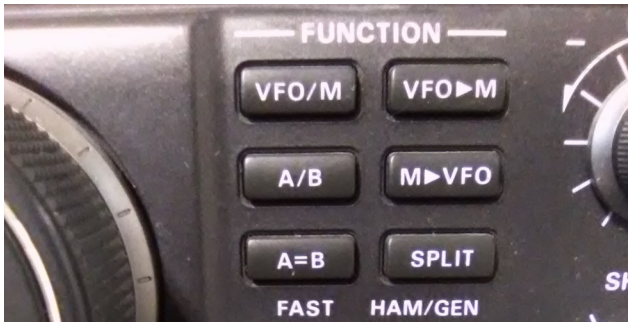
Working your VFO

Just about every modern ham radio has two operating modes: **Memory** (also known as Channel) mode and **VFO** (also known as Frequency) mode. Memory or Channel mode is merely a set of memory channels that have a number of frequencies stored in them, along with the appropriate settings for each, such as offset, tone, and power level. You select each by simply scrolling through the stored channels. VFO or Frequency mode, however, doesn't work quite the same way, and it's often convenient to understand how to work it.

VFO stands for *variable-frequency oscillator*, which simply means that this mode will allow you to set your radio to almost any arbitrary frequency and other parameters needed for any desired type of operation on that frequency. That's useful for tuning to a frequency, setting the parameters, and testing it before you commit it to a memory channel. Even though VFO mode is a kind of *scratch pad* location to get a frequency set up, most radios will preserve those settings in VFO, so that, after you turn off and then power up your radio again, all the information you put into VFO will still be there.

Here are some of the parameters that can be set for a particular frequency:

- repeater offset
- repeater shift direction, such as *plus*, *minus*, or *off*
- ARS, which stands for *automatic repeater shift*, when it's on, will automatically set your frequency offset and shift direction for *standard* repeater frequencies
- tone mode, such as TONE, TSQL, CSQ, DCS, and CTCSS (also ENC)
- tone frequency
- power level



VFO buttons on an HF radio

- squelch level
- bandwidth, meaning *wide* or *narrow*

Also, for HF radios:

- signal mode, such as AM, FM, LSB, USB, CW, and RTTY
- split, to indicate different transmit and receive frequencies

A number of other settings can be saved in memory, some can't, depending on the radio model, but these are among the important ones. An added bonus, many radios have two VFO slots, often labeled VFO A and VFO B.

As you can see, it might be difficult to remember all of the necessary settings, so it'll take a little time and practice on your part, to get your VFO set correctly for a given frequency on your particular radio. Once you get it set up right, you can then store the frequency and all the details in a memory channel, so that you can retrieve it later in Memory or Channel mode.

It's helpful to know how to manipulate and program your VFO when you need to, without needing to rely on a manual or another person. Yes, it's one more thing to learn, about amateur radio, but can be convenient, so that you're not always dependent on somebody else to program your radio for you, especially when you're not near a computer.

The Amateur in You, Part 2

What have you been pondering?

How to use your microphone

People love hearing you when you come through sounding loud and clear. Sometimes, anything less might be out of your control at the moment, such as your location or your radio power level or a better antenna. But one thing that you usually have control of, to help you sound better, is the way you speak into your microphone. And the way you speak into your 'mic' (pronounced mike) often depends on the type you're using and its features.

A ham radio microphone is built a little differently than one for a cell phone, for example, because it's designed to pick up a somewhat different frequency set and sound quality than a cell mic is. Locate your little microphone hole, if that's what your radio has, like with most built-in and hand mics. Most desk mics have a much more obvious interface.

Built-in mic

A typical HT has a microphone implanted somewhere in its face. Get your mouth as close to the mic hole as you can get it, then ***speak with a slightly louder-than normal volume***. Also, speak across the mic, instead of blowing directly into it, to prevent *puffing*. These three habits take *practice* to develop.

Hand mic

Keep your mouth one to three inches away from your mic, then speak with normal loudness. Speak across the mic, instead of blowing directly into to. Try and keep still while you speak. It's easy to fidget while transmitting, which can result in sending everybody an annoying crackling, crunching sound.

Desk mic

Keep your mouth one to three inches away from your mic, then speak with normal loudness. You're free to speak directly into to the mic, because most have a built-in puff shield. Even so, avoid blowing air into the mic as much as you can. Avoid picking up a desk mic while you're transmitting, which can result in everybody hearing the annoying stretching and rubbing of your mic cord.

Microphone features

Many microphones have settings and other features that let you control the quality of your audio, but those are typically confined to hand and desk microphones. Here are some controls, along with their suggested settings, that might apply to your mic:

- **VOX** (voice-activated transmit) : turn it off, unless you really need to use it
- **mic gain** : keep it turned down below 35%
- **speech processor or compression** : disable this feature unless you're on SSB (single sideband)
- **AGC** (automatic gain control) : keep this control set to *SLOW*
- **volume control** and **squelch** have no effect on how you sound to others

Make sure you sound as good as you should, by requesting an audio check on the air. Honest feedback on your audio will often provide the best results, and might even contradict some of the guidelines just listed here. And get a second opinion; two sets of objective ears are sometimes better than one from a biased friend. Just keep in mind that their ears are not your ears, and so your own assessment or preferences might differ from theirs.

Get somebody to record your transmission, then send you the audio file. Finally, don't talk with your mouth full or while shuffling papers or with music playing in the background.

Hot Tips

Good info for the new ham, and old stuff to refresh your memory

Importance of scanning

Before they became hams, many had learned about searching through public safety and other emergency frequencies for alerts, incidents, and other things that were going down at the moment, using *scanners*. This way, they were usually the first to know about what's going on, and then stayed informed with updates to a situation. Using a ham radio, it turns out that you can do something similar. After programming your radio with important frequencies, you can scan them for information and pertinent chatter.

Most of today's handheld and mobile ham radios are capable of scanning two different ways. One is to scan *all frequencies* in the band, incremented by the amount set by the **STEP** menu setting, which can be 5 kHz, 10 kHz, and so forth. Avoid scanning by searching all the frequencies this way, because of the time it takes to traverse the entire band. Chances of missing important announcements are high, and the scan stopping on noisy or irrelevant frequencies, like the weather channel, will occur way too frequently, costing you precious time if you're looking for real information.

The other is to scan only the frequencies you've *programmed into memory*, but that'll require you to do a little research on what set of frequencies you'd like to scan, to be of most help to you during an incident. For these, I recommend a combination of local repeater, useful simplex, and some public safety frequencies. Many of the public safety frequencies will be part of trunked systems, so you'll likely hear only part of the conversation on them, but it's better than nothing, and you'll often catch the majority of the information by context.

Once these are programmed into memory, you can start the scan by the press of a button or two. While scanning, if the radio encounters a carrier signal on a frequency it tunes to, it momentarily halts the scan, to allow you to hear it long enough to decide whether that signal is of interest to you. Furthermore, depending on your radio model, you might be able to select how your radio should behave when it encounters a signal. For example, you can set the scanning function in your radio to continue scanning after a few seconds, or remain on the frequency until you prompt the radio to continue the scan.

You might have frequencies programmed in your radio memory that you want excluded from the scan, because of irrelevance. To do this, you can mark the frequency by **SKIP**, so that the scanning function will skip listening to that frequency for a signal. You can do the same for a noisy frequency, because it's a digital signal, or you're near an LED sign, or you use a charger that gives off a lot of noise on that frequency.

After your memory channels are set up, and the noisy ones marked for skipping, you're all set for scanning. Once an incident occurs, and you've taken appropriate steps to ensure your safety and check in to a local net, you can start the scan going, to listen for relevant traffic or life-saving information bulletins.

DIY

Worthwhile projects you can build on your own

1.25-meter folded dipole antenna

As far as I could tell, we've never highlighted any project for the 1.25-meter band, also called the "220" band, because of its frequency range, from 219 MHz to 225 MHz. (We tend to focus on the 222 MHz to 225 MHz sub-band, where voice communication is permitted.) Furthermore, I don't believe we've ever featured a folded dipole (see *How a Yagi antenna works*, in the *Brass Tacks* column of this issue) either. So, I thought it would be fun to combine the two into a single project, and see how that works for us. We'll test it first on the NanoVNA, then on our club's repeater, which is 224.560– MHz (100.0 Hz tone).

A folded dipole is like two complete dipoles, connected in parallel. The resulting antenna is therefore about an entire wavelength long, and is nothing more than a "squashed, full-wavelength loop" whose ends connect directly into the feed line. According to online calculators, the antenna exhibits an impedance of about 288 ohms at the feed point, requiring a *match* to bring it down to 50 ohms (6:1), or at least 75 ohms (4:1), which is more practical.

Parts list

One 36″ PL-259 coax pigtail
One mop handle
Four 1¼″ #6-32 zinc-plated machine screws
Bits of rubber sheeting (for insulation)
One 2″ PVC coupling
5 feet 6 AWG bare solid copper wire
Four ¼″ ground cable straps
Sharpie™

Construction

The picture on the next page (too large to fit here) shows our goals for this antenna, using the online folded dipole calculator, with our target frequency set to 224.5 MHz. First, straighten the 6 AWG bare copper wire as much as you can.

To form the two rounded ends of the folded dipole, wrap the 6 AWG wire around a 2″ PVC coupling, which actually has an outside diameter of 2¾″, or a radius of 1.375″, close to the 1.54″ specified ("R") by the calculator. From one end of the wire (touching dotted line C), measure 9.69″ for Length D, and mark the spot as one of the two tangents to the coupling. Firmly and carefully wrap the wire half-way around the coupling, and mark the second tangent point on the opposite side from the first tangent. Remove the coupling and mark the third tangent at 19-3/8″ from the second tangent mark. Wrap the wire half-way around the coupling at the third mark, and mark the fourth tangent point on the opposite side from the third tangent.

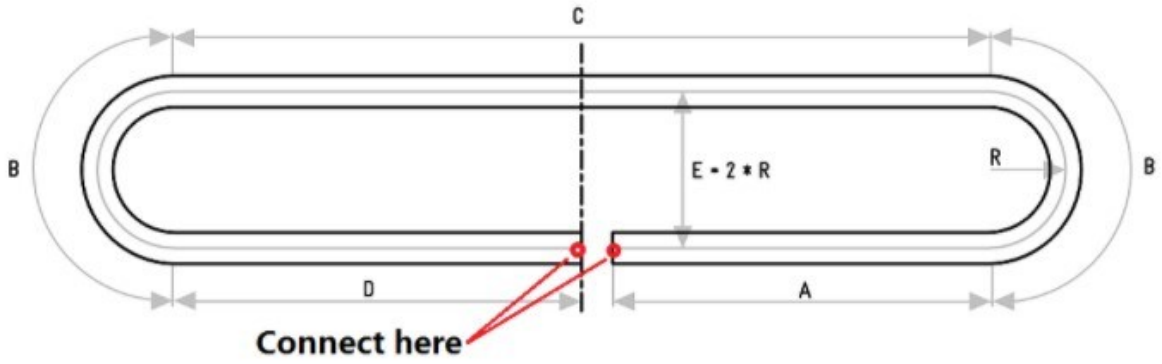



DIY, continued

1.25-meter folded dipole antenna

Folded Dipole Calculator

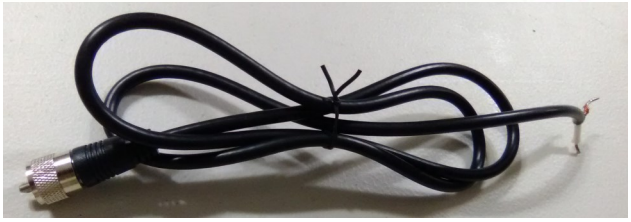
To be combined with a Yagi Uda Antenna or used as is.



Frequency [MHz]	224.5	Length units	○ mm ◉ inch
Length A	9.21	Length Gap	0.48
Length B	4.85	Radius R	1.54
Length C	19.38	Rod Diameter	0.18
Length D	9.69	Total Length	48.45

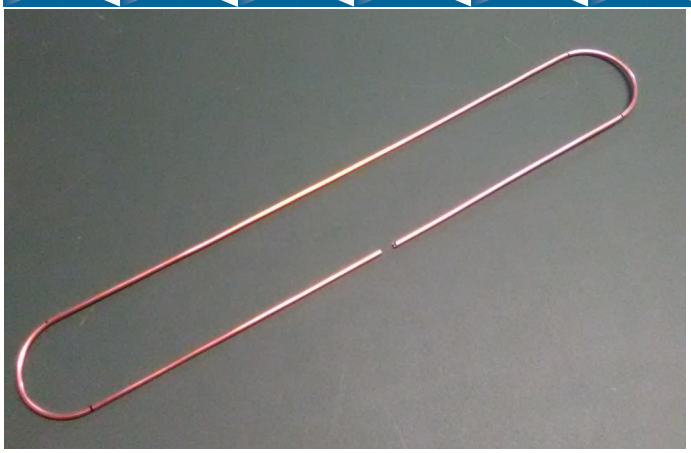
CALCULATE

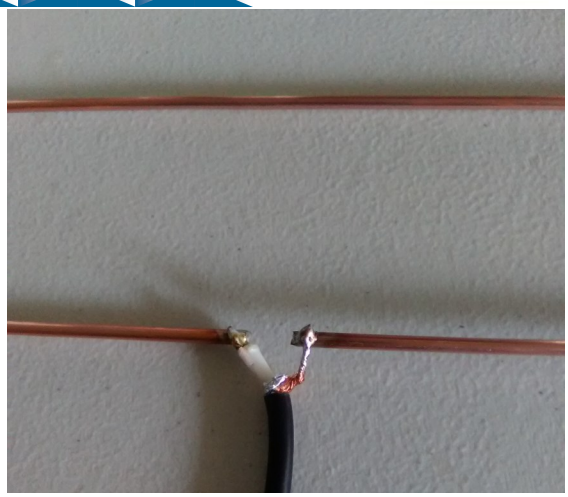
Cut the wire such that a ½″ gap remains between the two ends of the wire. The "PL-259 coax pigtail" is nothing more than a piece of coax, like RG-8X, with a PL-259 connector on one end, and bared wires on the other. Any length 36″ or longer will be ideal.



DIY, continued

1.25-meter folded dipole antenna



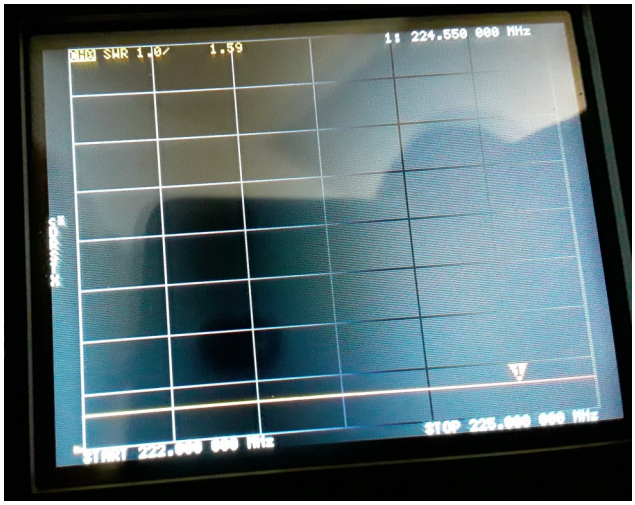


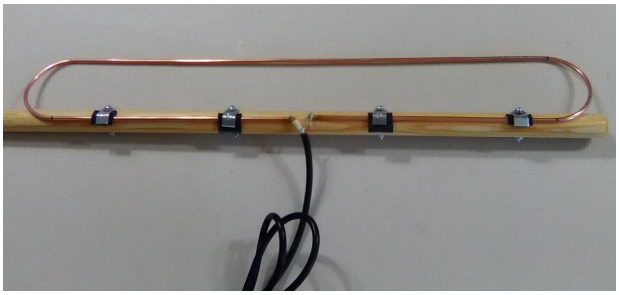
The perfectly formed folded dipole element

Solder the pigtail bare ends to the ends of the folded dipole 6 AWG wire ends, taking care to maintain the ½″ gap. For convenience, mount the finished loop on an appropriate mast. I'm using an old mop handle because it's non-conductive, rigid, and inexpensive (free); your imagination might find something better. If you choose to use a conductive mast (which in fact is what the great majority of 1.25-meter antennas are mounted on), be sure to keep the loop at least a quarter-wavelength away (13 inches, in our case) from the mast.

I mounted my loop by first drilling 1/8″ holes in the mop handle about 3″ and 8″ from one of the loop ends, and the same from the other end. I inserted a machine screw, flat washer, cable strap, and piece of rubber mat on one side, then a split washer and nut on the other, then repeated that for all the other holes. I used the rubber mat to insulate the hardware from the loop, but I probably didn't need to. And that's it...project complete, except for the testing.

Here's the NanoVNA result for SWR across the 1.25-meter band, about 1.56 at 224.550 MHz.





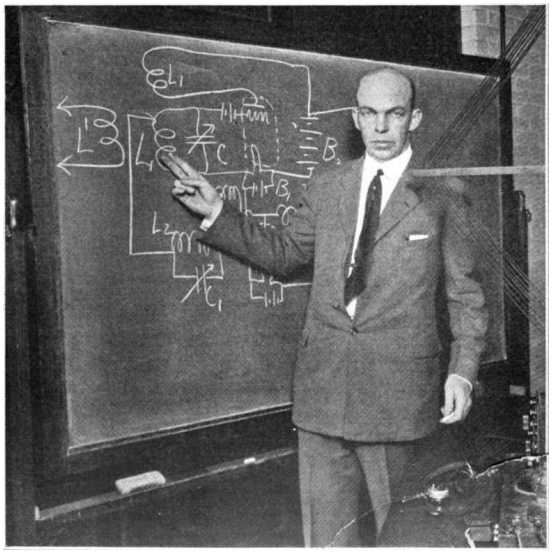
Couldn't do a simplex test, so I talked with my wife Lisa KR5LYS (without a 4:1 balun!) through the club repeaters, me on the 224.560 repeater, and she on the 146.780 repeater, and she said she could hear me very well, then asked what was for dinner tonight.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

Living in the Past

Historical perspective

Pioneer of the airwaves



Professors of Columbia University had awarded that title to Edwin Armstrong, 1890 to 1954, boy genius, engineer, and inventor. Always a tinkerer from youth, Armstrong invented the regenerative circuit, the forerunner of today's RF amplifiers, while he was still in college. Perhaps his largest contributions to the craft were the superheterodyne receiver and FM radio.

Superheterodyning solved the problem of receiver high-frequency demodulation without the need for high-frequency circuitry, which was expensive and subject to temperature drift and other issues that didn't plague lower-frequency demodulation circuitry nearly as much. Most of today's radio receivers still use superheterodyning, although more and more are being developed with digital direct sampling.

Frequency modulation revolutionized broadcast radio, allowing the listener to enjoy relatively static-free demodulated transmissions, at least compared with amplitude modulation. When you turn on your HT and hear your friend static-free at only five watts, you have Edwin to thank for that crystal-clear communication.

Armstrong spent quite a lot of time fighting for patent rights, against others who laid claim to several of his inventions. In spite of the drawbacks during his tumultuous career, Armstrong received 51 patents, and in 1917 was the first person awarded the IEEE Medal of Honor. He was also awarded the Legion of Honor in 1919, the Franklin Medal in 1941, and the AIEE Edison Medal in 1942.

Say it with ~~flowers~~ a radio. In 1923, as a wedding present (and publicity photo) at Palm Beach, Florida, Edwin presented his bride with the word's first portable superheterodyne receiver, which he built.

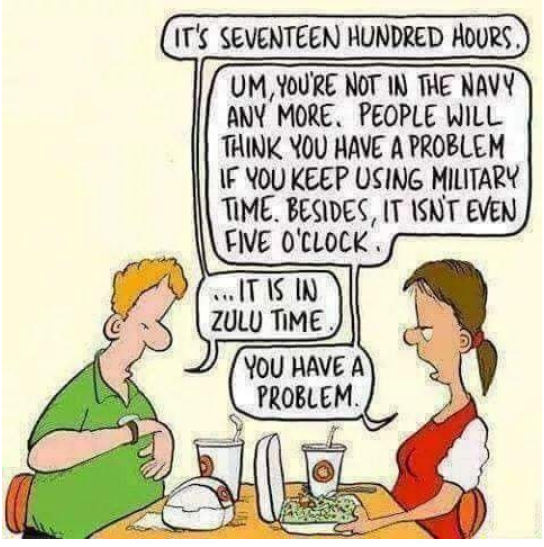
Armstrong received an honorary doctorate from Columbia University in 1929, and another honorary doctorate from Muhlenberg College in 1941. Two halls were named for Edwin Armstrong, one at Columbia University, and the other at the US Army Communications Headquarters at Aberdeen Proving Ground, Maryland.

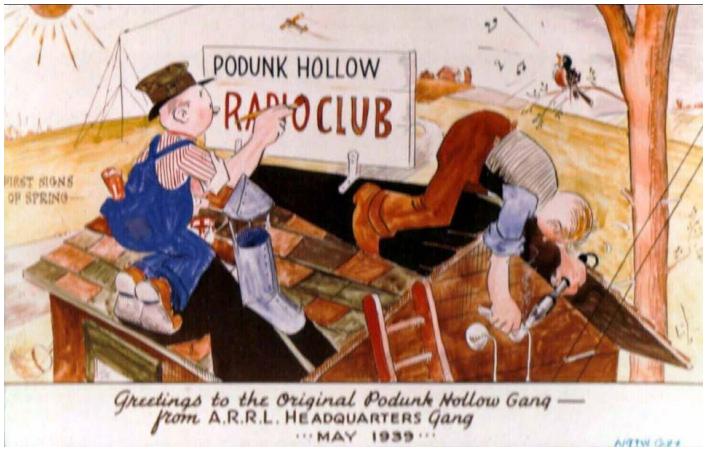
By the end of his life, more honors in the name of radio engineering and electronic innovation were awarded Edwin Armstrong, than probably to any other person, due to his revolutionary and inventive contribution to the art of radio. Today, the name Armstrong has become synonymous with radio engineering among research and education circles world-wide.

Side of Bacon

A little ham humor

I truly don't want to make fun of these guys, because they're trying things out, which is the essence of ham radio, but I just had to share. The guy on the left said he had a hard time being heard, so I told him he should try installing an external antenna. And so, he put his rubber duck on his roof. The ham on the right saw our dialog, and decided to one-up the first ham, and purchase a Signal Stick antenna, and put it up on his roof. On one hand, I honestly can't say that I've ever seen or heard of anybody doing this. On the other hand, it worked for them, so kudos to them! (not that I would recommend this — Noji)





For Your Insight

Information you could use

Club meeting format

Here's the usual agenda for club meetings, at the Orem City Council Chamber Room, 56 N State St:

Talk-in frequency on the club repeaters

6:30 pm : Eyeball QSO

socialize / put faces with call signs

radio programmers available to help you

6:45 pm : Call the meeting to order

meeting lineup (agenda)

announcements / nets / awards / calendar

7:00 pm : Discussion / breakout session

discussions typically involve everybody

breakouts split into separate groups

7:45 pm : Door prizes

7:55 pm : Dismiss and disassemble

8:00 pm : *Club QSY* to a local eatery

Something you'd like to see at the meetings?

Monthly meeting help

We're grateful for the volunteers who help with various tasks that make our club night just that much more friendly and useful to everybody. Monthly, we need help with

programming radios (thanks, Loren / Ralph / Mickey!)

taking photos or videos during the meeting

operating the talk-in radio

setting up tables and chairs (thanks, Heath!)

Lynx

Websites for your education and leisure

Training items and topics for nets

Ham Radio Nets

Radio programming

76ers Group and UVARC Group pages

Utah Ham Radio Exam Schedule

Send your input to ***uvarcshack@gmail.com***

Questions of the Month

Test your knowledge (answers next page)

G9AØ7 : What must be done to prevent standing waves on an antenna feed line?

A. The antenna feed point must be at DC ground potential
B. The feed line must be cut to a length equal to an odd number of electrical quarter wavelengths
C. The feed line must be cut to a length equal to an even number of physical half wavelengths
D. The antenna feed point impedance must be matched to the characteristic impedance of the feed line

E2EØ3 : How is the timing of FT4 contacts organized?

A. By exchanging ACK/NAK packets
B. Stations take turns on alternate days
C. Alternating transmissions at 7.5 second intervals
D. It depends on the lunar phase

Calendar

What's happening
(times are Mountain Time)

Utah County Ham Exam Sessions

GradeCam parking lot, 495 E 1000 S, PG

*Email Steve Whitehead, **nv7v@nv7v.org***

Sat Oct 17, 9:00 am or 10:00 am
Sat Nov 21, 9:00 am or 10:00 am
Sat Dec 19, 9:00 am or 10:00 am
Sat Jan 16, 9:00 am or 10:00 am
Sat Feb 20, 9:00 am or 10:00 am
Sat Mar 20, 9:00 am or 10:00 am

Provo One-day Technician Courses*

Third Saturday Monthly at 8:00 am
BYU Law School Bldg, First Floor
** September through April*

2021 Orem Ham Radio Courses

*Email Noji Ratzlaff, **nojiratz@hotmail.com***

Technician : Tue Jan 19, 26, Feb 2, 9
General : Tue Mar 23, 30, Apr 6, 13
Technician : Tue May 18, 25, Jun 1, 8
Extra : Tue Jul 13, 20, 27, Aug 3, 10
Technician : Tue Sep 21, 28, Oct 5, 12

Club Meeting Calendar (6:30 pm)

On Zoom, YouTube Live, and Facebook Live

November 5	December 3*
January 7	February 4
March 4	April 1
May 6	June 3

** To be announced*

Regular Nets

Jackson Hole Net, Mon 8:00 pm, 146.76
UVARC Ladies' Net, Tue 7:00 pm, 146.78
DMR Utah Net, Wed 6:00 pm, TG 3149, CC 1
UARC 76'ers, Wed 7:00 pm, 146.76
Sultans of Simplex, Wed 8:00 pm, 447.825
UVARC HF Net, Wed 9:00 pm, 7.193 LSB
UVARC New Ham Net, Thu 7:00 pm, 146.78
CERT Net, 2nd & 4th Thu 8:00 pm, 146.78
Utah County 6 meters, Fri 8:00 pm, 50.14
Family History Net, Sat 8:00 pm, 146.78
UVARC Family Net, Sun 3:30 pm, 146.78
See a larger list of nets at noji.com/nets

Upcoming Contests

State QSO Parties
Oct 3 : CA
State QSO Parties
Oct 10 : NV, AZ, PA, SD
State QSO Parties
Oct 17: NY, IL
CQ Worldwide DX Contest, SSB
6 pm Fri Oct 23 to 6 pm Sun Oct 25
See a larger list at contestcalendar.com

Answers to the Questions of the Month

G9AØ7 : **D** (The antenna feed point impedance must be matched to the characteristic impedance of the feed line) [This question keeps coming up, due to myths]

E2EØ3 : **C** (Alternating transmissions at 7.5 second intervals)

Vendors

For your convenience

Pockrus Joystick J-pole

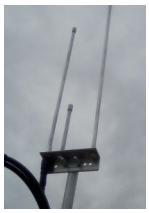
$25, open-stub aluminum half-wave, dual-band J-pole antenna

$35, 6-meter dipole, $20 for the 220 MHz (1.25 m) antenna

by Carl Pockrus, WE7OMG (email myjpoles@gmail.com to purchase)

Half-wave performance, solid construction, weather-proof, low wind-load

Probably the best-performing outdoor antenna you can get for the price



Super-Elastic Signal Stick

$20, vertical quarter-wave flexible antenna

by Richard Bateman, KD7BBC, of *SignalStuff* (and maker of *HamStudy*)

Super-performing antenna for your HT (handhold transceiver)

Visit SignalStuff and select SMA-Male, SMA-Female, or BNC

Ham Radio Podcasts v1.50

by Trevor Holyoak, AG7GX (email android@holyoak.com)

Stream podcasts (such as *100 Watts and a Wire*, *Amateur Radio Newsline*, *ARRL Audio News*, etc.) or download for later listening

For Android 4.1 and up (ad-free available for purchase)

Club Logo and Call Sign Embroidering

Want your call sign or name (or both!) embroidered on your shirt, your hoodie, your duffle? Or how about a club patch with your call sign?

by Glenna Gardner, WE7SEW (glenna0354@gmail.com or text 801-592-2503)

Call sign or name = $5, Both = $8, UVARC patch = $5, Patch with call = $9

Portable Aluminum J-pole

$49, sectioned, open-stub aluminum half-wave, dual-band J-pole antenna

by Stan, KJ7BDV and Kent, N7EKF (email skantenna@yahoo.com for info or call 801-372-7260)

Complete antenna breaks down into a compact 2″ x 6″ x 12″ package weighing only 3 lbs, perfect for backpacking and portable work where you really need a good 2-meter antenna

HamBadgers

Amateur radio name badges and other products

$10, official UVARC ham radio name badge with the club logo

Visit Ham Badgers and select Ham Radio Clubs > Utah Valley Amateur Radio Club

Email Eric Palmatier at hambadgers@gmail.com or call 919-249-8704

Where everybody knows your call sign

Utah Valley Amateur Radio Club
PO Box 1288

K7UVA
Phone/Text: 801-368-1865
Email: k7uva@arrl.net

Repeaters: 146.780–, 100.0
448.200–, 100.0 224.560–, 100.0
145.250-, 100.0 448.225-, 100.0
Newsletter input?
Email uvarcshack@gmail.com
Need help?
Email uvarcelmer@gmail.com

[See all our newsletters on uvarc.club]

We are the *Utah Valley Amateur Radio Club*, a 501(c)(3) non-profit (EIN 81-360-6416) Utah corporation that was organized in an obscure Orem fire station on 02-05-2016 to provide amateur radio enthusiasts in Utah County and surrounding areas a way to gather and discuss all things ham. Our primary purposes are to provide a local amateur radio resource, help new hams in their new-found adventures, and to give more experienced hams a reason to share their wealth of knowledge and wisdom in a friendly atmosphere of fellowship. We're an ARRL Affiliate and work in cooperation with the Utah VHF Society, but are not subsidiary to them, to ARRL, ARES, or any other organization, although many of our members and leaders might also belong to the same.

This newsletter is copyrighted and published by the Utah Valley Amateur Radio Club, and its purpose is to convey the tone and temperament of the club, to inform and entertain its members, and to entice the rest. To join, go to uvarc.club/join, then sign up at www.facebook.com/groups/uvarc/ to stay informed. For more information about our club or about amateur (ham) radio in general, please email or text or call us.

More than just a club, we invite you to become part of a great ham radio movement in Utah Valley

Our fearless leadership

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Vice President..... Chad Buttars
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Heath Stevenson
Orem City Emergency Manager

From all of us to you, 73