Ham Radio Training Topics

This page has links to texts of topics suitable for hams to present on the air as-is, to help train each other in various aspects of ham radio usage, best practices, emergency communication, and preparation. Feel free to present any of the topics in any type of net or activity you think applies, regardless what heading they're listed under here. Also, please feel free to change the wordage or word placement, especially if they seem awkward for the way you normally speak.

Hover over a word in brown to display additional information
Expect to find some information embedded in one topic repeated under another topic
PDF version of all these training topics

- General ham radio education is a sub-topic of another page
- Study and Licensing education is the topic of another page
- The ham radio glossary is on another page

Quick Links

- For regular nets
    radio , personal , protocol , emergency
- For emergency service nets
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- For other training net opportunities
    radio , personal , protocol , emergency , LDS
- Slightly more technical training
    radio , protocol , equipment

- Collapse all sections

For regular nets

Radio-related training topics

Which radio to get [link]

Let's cut to the chase, and then we'll start talking about options and possibililties. You should purchase a Baofeng UV-5R radio, a Signal Stick antenna, and an alkaline sled (battery case), then program it with the frequencies you'll use most.

A handheld transceiver (*HT*)
When selecting a portable radio that you can quickly take with you when you need it, here are some things to consider:
- It must be able to receive and transmit on 2 meters, which is where most local communication takes place on repeaters and nets. Ideally, it should also be a *dual-band* radio, supporting 70 cm, the second-most used frequency band.
- It should be one for which you can purchase an alkaline sled for it, since many models do not have that option. That is, an empty battery case that you can fill with your own non-rechargeable batteries.
- It should be one that many of your friends have. It's very convenient to have a radio, for which you can ask for help from a friend, or compare notes, or bring to club meetings and discuss.
- It should be supported by CHIRP, the free, online radio programming software, to get it programmed quickly, should you need to add a new repeater or net frequency. (You'll need the programming cable that goes to your particular radio model too.)
- It should be able to receive FM broadcast radio, to allow you to hear news and information from commercial radio stations during an incident.
- It should be not only a dual-band radio, but also a *dual-watch* radio, which can allow you to hear incoming communications on two different frequencies at the same time.
- It should be light-weight and small enough to slip onto your pocket or re-sealable sandwich bag.
- It should be inexpensive, to allow you to feel free enough to experiment with it and wear it out, without the worry of replacement or repair cost. Some folks will purchase an HT that's loaded with cool features, as their first radio, only to be too fearful to take it hiking with them or do field experiments with it or involve it in events.

Will your choice of radio still be a good one if all the above criteria aren't met? Probably, but there are some minor inconveniences you might have to live with.

A mobile radio
For those looking to get something a little heftier, whether you install it in your vehicle, set it on your desk, or (yikes!) pack it around on your back, a *mobile* unit might be what you're looking for. Some of the above suggested criteria still apply, such as dual-band, dual-watch, same model used by friends, CHIRP-supported, and low-cost. Obviously, there are other things to consider when you get a mobile unit, such as:
- It needs a separate 13.8-volt power supply, such as a MFJ MFJ-4230MVP or Powerwerx SS-30DV.
- It needs a good, portable antenna, such as a Tram 1185 mag-mount, or a Pockrus J-pole mast-mount antenna.
- It needs 50-ohm coaxial cable that's long enough to reach from your radio to the antenna, but of a model that minimizes the signal loss, such as RG-8X.
- It should deliver (transmit) 25 watts on FM to make it worth your investment

There are other types of radios, such as *portable* and *base* units, but the focus here is on training, and recommendations for reasonable deployment.

Which antenna to get [link]

Similar to those in the real estate business, we radio amateurs have three basic rules: *antenna, antenna, location*. Being interpreted, your location will play a part in your ability to get your signal out to others, but your antenna is the important focus by far. And notice that **radio** is not mentioned in that mantra at all.

Obviously, without your radio, you won't be able to transmit *any* signals, but without a doubt, your antenna is one of the most important components of your amateur station. An appropriate antenna can connect you with the world, or render your station as useless as a vehicle without fuel. But, which antenna is right for your particular application? Let's categorize them by function and see.

When you first purchased your radio, it came with a stubby, little antenna we affectionately call a **rubber duck**. That tiny creature wasn't really meant for you to use seriously, but for testing your new transceiver, to make sure it works. And now that you're sure, it's time to get a real antenna.

At home
In the comfort of your residence, you're going to need an antenna that will get your signal out of your walls and into the air. For that, you should get a Pockrus J-pole, and either mount it on your roof outside or lean it up against the wall inside near a window. To connect to the antenna, you're going to need some RG-8X coaxial cable (coax) terminated in a PL-259 connector on the antenna end.

If you're using a mobile radio at home, you'll need the coax terminated in a PL-259 connector on the radio end. If you're using an HT (handheld transceiver), you'll need to either terminate the radio end of the coax with an SMA connector, or terminate the radio end with a PL-259 connector, plus a pigtail.

Walking around
When you need to walk around with your radio either attached to your body or in your hand, you should get hold of a whip-type antenna, either a telescopic whip or a Signal Stick. You might also find that your long antenna sometimes gets in the way. To help keep it out of the way, you can purchase a lapel microphone that has an antenna connection, which in most cases will keep your antenna up and away from your body.

Driving around
If you're out driving around, you'll need to use an antenna that's mounted on your vehicle; that is, your antenna is installed on a **mount**, which is attached to your car body. That could typically mean either a hole-mount, magnetic-mount, or lip-mount. A *hole-mount* is one that requires you to drill a hole in your car's metal body. A *lip-mount* attaches to the lip or edge of your flat body piece, such as your trunk or hood. A *magnetic-mount* or *mag-mount* simply magnetically attaches to your car's metal body. Glass mounts have not shown to be as effective as the other three types.

Is it possible to mix two of the above situations, like using a telescopic antenna while you're driving? Sure it is, but that might take a little experimenting on your part, to see what works for you. Any kind of antenna inside your vehicle will be shielded by some of your car's metal body (for most vehicles), and so people outside your vehicle might not hear you well. Then again, some hams use a mobile antenna, one that's made for a vehicle, but inside the home, to get more of their signal out of the house. They often do this by getting an antenna with a mag-mount, placing the mag-mount on a cookie sheet or the fridge, and adapt the coax with a pigtail for their HT.

As a side note, it's alright to leave your radio powered on while you change your antenna; just don't press your PTT button with your antenna removed.

What frequencies should be programmed in your radio [link]

Most of today's radios are able to hold many frequencies in their memories, but should you fill them, just because they're there? I recommend you only program into your radio what you need, so that you won't get overwhelmed or confused if you find you need to communicate right away. Ok, so which frequencies should you program? That'll depend on where you'll be at the moment you need them.

Where you're likely to be
If you spend most of your awake time at home or at work, it'll be wise to take that proximity into account, especially if you plan to communicate between home and work. But you might also need to go downtown shopping, to the doctor's office, or visit a friend, and if those take you far away from home, those locations might require some additional frequencies to think about.

Know what channel to change to, if necessary
If you have already programmed your radio with a number of useful frequencies, you're probably prepared to talk on whichever one you need at the moment. But if you have them programmed by name, are you familiar with what the names mean, as in which frequencies, or at least which areas they cover? And when it comes time to switching frequencies, are you able to do that on the spot?

Know how to manually change frequencies at a moment's notice
Be familiar enough with your radio that you can manually enter a new frequency at any time. You might be required to manually enter a frequency you've not already programmed in, because you need to get off a repeater or move off a simplex frequency that's already in use. This'll require you to know how to enter the frequency (*Frequency Mode*), the offset (*OFFSET*), the shift direction (*SFT-D*, plus or minus, or off for simplex), and tone (*T-CTCS*).

Programming your radio on-the-fly while you're traveling is very useful, but often quite cumbersome. So, taking your laptop and an appropriate

programming cable along for the ride can prove indispensable. Do you know how to use the cable and the software to do the programming? You can download charts of programming frequencies, listed by radio model and general location from Noji's programming page.

Request a signal report before starting [link]

It doesn't help a whole lot if I attempt to get on the air, and nobody hears me. Even if I have the very best equipment that money can buy, including a great antenna, and even though I'm certain everybody this side of the Wasatch Front can hear me, it's still possible that they can't. If I'm talking on simplex, my antenna could be oriented incorrectly, I might have a loose connection, or a corroded connection, I might not be speaking close enough to the microphone, or my battery is on its last breath. If I'm trying to talk through a repeater, maybe my tone or offset isn't set, maybe I'm too far from the repeater to hold it open for proper communication, or maybe I've bumped my button and I'm a little off-frequency, or maybe I just need to get out of the basement.

When you need to get on the air, especially in a hurry, it seems there are a number of obstacles that could hinder your otherwise perfect transmission. For that reason, one of the first things you should do before a net or a drill is to request a signal report. Maybe say,
> *This is KI7ABC. Could I please get a signal check?*

and you'll likely find one or more listening hams who'll be happy to help you out by telling you how you sound.

You're typically looking for three things as feedback to your transmission: the **quality** of your sound, your **loudness**, and whether your audio is accompanied by any static or other **noise**. A responding operator who can report these three sound properties is probably the most helpful. By the same token, *you* can offer the most help by reporting these same three qualities to people who are asking for a report. On the other hand, those who say, "You sound fine" mean well, but might be just a bit too brief, and don't give you a lot to go on, although it's still kind of them to try and give you *some* sort of feedback. The brief exception is when a ham operator simply reports,
> *You sound perfect!*

which, in a nutshell, means **crystal clear** audio, **loud** audio, and **no perceptible background noise**.

Once you do this, you're *relatively* confident that the rest of your transmissions could easily be heard by those who need to hear them. Even after that, your signal or audio could still become less-than-perfect if you're moving around, changing your antenna direction, or your battery starts failing. But, at least you've taken that initial step to ensure a smoothly running net or drill.

How to communicate through a repeater [link]

Setting up
First, you need to find out the four basic parameters and set them up in your radio. They are
- frequency
- offset amount
- offset direction
- tone

Once you have these parameters, program them (manually or by computer) into your radio, and you're ready to go. If the repeater is for 2 meters, the offset amount is 0.600 MHz (600 kHz). If the 2-meter repeater has a nominal (output) frequency of 147.000 MHz or less, the offset direction will be minus (-); otherwise, it will be plus (+). Set the tone for all repeaters to 100.0 Hz, unless a particular repeater requires something different. If the repeater is for 70 cm, the offset amount is 5.000 MHz, and the offset direction will always be minus. 220 MHz repeaters are a different story.

Talking
Once you've determined the repeater's not in use, press the PTT button, wait a half-second, then begin speaking. You can simply say one of the following:
> *KI7ABC*
> *This is KI7ABC, monitoring.*
> *This is KI7ABC. Anybody want to talk with a new ham?*

Once somebody answers you, go ahead and carry on a normal conversation, remembering to say your call sign every ten minutes and at the end. If nobody answers, it might be helpful to ask whether your signal is reaching the repeater, by asking

This is KI7ABC. May I please get a signal check?

But in response, you should only expect a signal check, and not engage the other person in conversation. Simply thank him and end with your call sign. Luring another ham into a conversation by requesting a signal check can leave a sour taste in the person's mouth.

Finally, after you finish speaking during your turn, continue holding down the PTT button for a half second before releasing it. This will ensure your last syllable will be heard by the other ham. Furthermore, if you're communicating by a linked repeater, like one on the Intermountain Intertie or the Sinbad System, wait two whole seconds before begin speaking and wait an entire second after your last syllable before releasing the PTT button.

Answering

When the other person has stopped transmitting, listen for the right time to press your PTT button and begin speaking, to play well with the other hams. Here's what you're going to hear:

1. the other station stops transmitting
2. the repeater beeps (known as a _courtesy tone_)
3. after four seconds (known as the _hang time_), the repeater stops transmitting
4. you hear a short, loud crash (known as the _squelch tail_)
5. all goes quiet

The time you should press your PTT button is ideally about one or two seconds after step 2; that is, after you hear the repeater beep. That gives others plenty of time to break into your conversation to join it or announce an emergency. It also gives the repeater a break, so that it doesn't wear out its relays to drop its carrier (step 4) before you key up. So, once you hear the repeater beep, wait one or two seconds, then press your PTT. Every repeater is different, so prepare to be flexible if the repeater you're communicating with doesn't behave exactly this way.

Communicating on reverse [link]

In our ever-charitable desire to be helpful to other hams, we sometimes encounter those who have a difficult time getting into or even reaching the repeater. When we hear somebody struggling like this, it might be worth our while to help out by communicating with the person directly rather than through the repeater. But if he's tuned to the repeater, and you don't know his cell number, how can you alert him, so that you can help him?

One way is to switch to what we call **reverse** mode, which most radios support. The reverse function merely switches the repeater input and output frequencies on your radio. Normally, when communicating through a repeater, you use your radio to talk into the repeater input frequency and listen on the repeater output frequency. On reverse, you talk into the repeater output frequency, so that your friend can hear you, and listen on the repeater input frequency, so that you can hear him.

But communicating on reverse like this only works if the other person can reach you better than he can reach the repeater, because the repeater is out of his range on one side (to the north of him, for example), but you're within his range on the other side (to the south of him, for example). Or this might work when your friend is being obstructed from the repeater because of a mountain or tall building, but you have a clear shot of both him and the repeater.

So, how do you use this reverse function? Many mobile units and some HTs have a button labeled `REV`. Just press that button once, and your radio switches its repeater input and output frequencies, then press it again to get out of reverse, and back to normal repeater communication. If you're on

a Baofeng or Wouxun, simply press the ✱ (star) button for reverse. If you have a Yaesu FT-60R or VX-7R, simply press `C`. Then press the same key to

exit reverse mode. There's no need for your friend to go into reverse mode.

Once you're in communication with the other ham by reverse, kindly let him know that his signal is not making it into the repeater. Offer helpful, non-critical suggestions on what he could do to improve his transmission, like move to a different location, point his antenna straight up, speak closer or louder into his microphone, increase his radio power output, and so forth. It's possible that his battery is running low or that his antenna has come

loose. I always believe my signal sounds wonderful, but one time people were telling me I was sounding terrible, even when I was staring right at the repeater antenna. Turns out I had forgotten to put my antenna back on after cleaning it off. So obviously, installing an antenna might help some of us!

The last thing to keep in mind when communicating in reverse is that you might want to let others know you're in reverse mode, since even though you're not technically using the repeater, you're tying up the repeater, because you're preventing others from using the repeater output. You might get a lot of *you're not in the repeater* reports from others. Another thing is that switching to reverse is no guarantee that you can reach him better; in fact, it might be worse, but it's something you can try, in your quest to be a helpful ham.

Baofeng radios are legal to use [link]

There's been quite a lot of discussion and concern lately about certain announcements made by the FCC regarding some models of Chinese radios. Bottom line is that they are all legit, and can be used legally by licensed amateurs, as long as you're using them on amateur frequencies.

The controversy arose because many Chinese radios have the ability to transmit on frequencies outside amateur bands. Ok, that's not so bad, because we amateurs know the rules, so that notice doesn't really bother us, because we follow the rules. Then along came some marketers who not only advertised that these radios can transmit on those non-amateur frequencies, but encouraged people to transmit on them without a license. That's what got them into trouble, and prompted the FCC to make the announcements.

Because of the confusing wordage of the announcements, coupled with mis-interpretations by an FCC attorney, many hams felt that they could no longer use their cheap, little handhelds legally. But after a series of clarifications, prompted in part by objections from the ARRL, we have been re-assured that our Baofengs and other Chinese radios are perfectly legal to use. And can you sell them? Yes, you can, personally. That means to one ham from another.

So, I repeat: it's completely legal for you to use any Chinese, Japanese, Indian, or even Martian radios, as long as you use them on ham frequencies.

More details are spelled out in the club newsletter, the November 2018 issue of the UVARC Shack p. 22, about the legality of using Chinese radios.

You might want to purchase a mobile radio some day [link]

You might have discovered that your little handheld radio is a wonder of science, enabling you to communicate with friends, loved ones, and others, for fun or in a moment of need. But if you've used it enough, you've also discovered that the little guy has a few limitations. Some of these limitations can be resolved by a change in your transmitting location or a better antenna. But there are times when it would be nice to have a little more juice behind that signal of yours. If this extra signal boost is on your mind, then purchasing a **mobile radio** might just be what you're looking for.

A *mobile radio* is a transceiver that's typically larger in physical size than most HTs (handheld radios), and normally has the ability to transmit on a higher power level than most HTs. Most require an external power supply and an external antenna, and most come with an external hand microphone. And most hams use mobile radios in any of three ways: in a vehicle, at home, or portable.

In a vehicle
Because of its namesake, it's obvious that a mobile radio was designed to be installed and used in your car, truck, or RV, which offers the convenience of having great communication ability from the comfort of your vehicle. If your mobile radio and antenna are installed more or less permanently, all you need to do is pick up your mic and push the PTT; no need to carry the radio, fiddle with cords, or get poked by your antenna. Also, if your service is needed at a location away from your home or work, your mobile can help you communicate and stay updated while you travel.

Can you do this with an HT? Yes, you can, if you can work without the extra transmit power. In fact, you can connect your HT to an outside-mounted antenna (mag-mount, lip-mount, or hole-mount) and your signal will be heard much better and farther than it could with any whip or duck antenna. Furthermore, unlike a true mobile radio, which is tethered by connections to the car's antenna and battery, you can easily remove your HT and take it with you when you get out of your vehicle, because it carries its own *power supply* and antenna.

At home

Many hams have a mobile radio at home as their *base* unit; that is, their main home radio, where they transmit for nets, for emergency, and for ragchewing. Keep in mind that a home base like this requires an external power supply, an external antenna, and coaxial cable. I highly recommend your power supply for this home mobile radio be able to supply 30 amps, even though your radio specifications state that it requires much lower. For the antenna, I recommend a Pockrus J-pole. For coax, I recommend RG-8X, terminated on both ends with PL-259 connectors.

Portable

In the context of mobile radio, the term *portable* means the ability to quickly grab a radio that's more powerful than an HT, but yet available enough for you to collect it (along with its battery, antenna, and coaxial cable), and head out the door. Portable can also refer to the ability to carry a radio more powerful than an HT (plus the battery, antenna, and coax) with you on a hike or a bike trip.

Any way you use one, a mobile can provide you with a little more power, to get your signal out farther, or at least stronger. Most HTs can transmit a maximum of 4 to 8 watts, depending on the model. Most mobiles can transmit 5 watts at their lowest setting. There are times when the extra power is helpful to get around those buildings (*knife-edging*), get down the canyon, and be heard on that distant repeater, and a mobile can often do the trick.

Please understand that this training topic is not meant to tell you that you *need* to rush out and spend your hard-earned cash on new hardware. It's only meant to offer you an option, in case you're getting tired of bad signal reports and the need to constantly repeat your statements over the air.

Let's hear *your* thoughts. Do you have any questions about mobile radios?

Syllabic emphasis [link]

The Japanese language is interesting in more ways than one, and one of those ways is that their words don't have emphasized syllables like we do in English. For example, when I say the word **collection**, instead of saying all three syllables monotonically, with the same emphasis and pitch, as is done with a Japanese word, I emphasize the second syllable by raising the pitch a little, as in **col-LEK-shun**. This works well for us Americans, but emphasizing syllables comes at a price when we use the same speaking pattern on the air.

Especially when we communicate in a noisy environment, or by single-sideband like we do on HF, the background noise can hide important syllables if they're spoken quietly. If we ever find ourselves needing to communicate when it's more critical to be heard well, we might learn quickly that speaking normally might get in the way. Instead, try emphasizing all the syllables you transmit.

For example, if I try and say the call sign **K-I-7-A-B-C** in phonetics, it might sound like **KEE-IN-SEH-AL-BRA-CHAR** to the person trying to hear me, because all my non-emphasized syllables might fall below the noise level. Instead, try saying **KEE-LO-IN-DEE-UH-SE-VEN-AL-FUH-BRA-VO-CHAR-LEE**, emphasizing ALL the syllables equally. This might seem a little un-natural to you, but might also prevent you from having to repeat yourself so often.

An easy way to practice equal syllabic emphasis is by starting with the number *seven* and the letter *november*. Say **SEH-VEN** and **NO-VEM-BURR** instead of **SEH-vun** and **no-VEM-burr**. I can't tell you how many times I've heard people confuse **TWO** and **ZOO-loo**. If instead the person said **ZOO-LOO**, that would have helped a lot.

So, this is yet another example of how you can be heard a little better, without raising your voice or increasing your output power or microphone gain. It's more about sounding *clearer*.

How to use a microphone [link]

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, 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 presents to you, 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*. If you're using a Baofeng radio and are feeling brave, remove the face of the HT body and drill out the mic hole to about an eighth of an inch.

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. If you're using a Baofeng or TYT hand mic, you might want to take the mic apart and drill out the mic hole to about an eighth of an inch, then surround the little mic with a couple of cotton balls. Also, 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, by they are typically confined to hand and desk microphones. Here are some, along with suggested settings, that might apply to *your* mic:
- VOX (voice-activated transmit) : *turn it off*, unless you're certain you want to use it, and know how
- mic gain : keep it turned down *below 35%*
- speech precessor or compressor : *disable* this feature unless you're on SSB (single sideband) and know how to use it to your advantage
- AGC (automatic gain control) : keep this control set to *SLOW*
- volume control and squelch have no effect on how you sound to others

No matter what kind of mic you're using, there are ways to improve your sound quality by remembering a few simple tips. 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.

Probably one of the best ways to know how you sound is for somebody to record your transmission, then send you the audio file. Or you can get on the WebSDR and listen for yourself, although the timing on that can be a bit tricky. Finally, don't talk with your mouth full or while shuffling papers or with music playing in the background.

Handheld radio accessories [link] [PDF]

Whether you plan to use your radio for a family road trip or a local emergency, chances are, you'll be using an HT (handheld transceiver) at one time or another. On one hand, these little units can pack a real punch when you need them; on the other hand, their miniature and portable nature often causes us to forget how limited they can be without extra added gear they might need.

Let's list some of the accessories that can help your HT, or help you when operating your HT. Since this training is meant to complement a *handheld* radio, I'm going to assume that you've already got one, so these things are *in addition to* your HT. Also, these are only suggestions, so some of them might not be as applicable to you, as for another ham:
- A better antenna than the one that came with your HT, such as
  - A Signal Stick

- A whip antenna
- A telescopic whip
- A Slim Jim antenna
- A roll-up J-pole antenna
- An external microphone
- An earpiece or ear bud
- Additional power sources, such as
  - An alkaline sled, which is a battery case filled with alkaline batteries
  - An extra rechargeable battery, like Li-ion, NiMH, $LiFePO_4$, and more
  - A charger, if you believe you'll be near an AC outlet, or a *battery eliminator*, if you're in a vehicle
  - A portable solar panel and charge controller, with appropriate cabling and DC connectors
- A programming cable (and therefore, maybe even your laptop)
- A belt clip (for the radio)
- A lapel clip (for the microphone)
- A chest strap or gear organizer
- Spares for any of the above

And here are a few things not related to ham radio, that might help while you're using your HT:
- A flashlight or desk light or headlamp
- Pen and paper
- A permanent marker
- An umbrella, for either rain or sun

Finally, do you need to rush out and purchase all of these things this very week? Of course not. *You* decide which accessories make the most sense for you to use, then gradually build up your equipment arsenal as you have the means to do so. Also, with experience, you'll find that your equipment wish list will mature, allowing you to pick the *right* gear for your circumstances, and maybe others that we haven't listed.

Alright, let's hear *your* thoughts. Any accessories I haven't mentioned?

Working your VFO [link]

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 quite work 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 manually 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 your radio, and then power it up again later, 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
- tone frequency

- power level
- 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.

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 manually set up 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.

Alright, let's hear from *you*. What are *your* thoughts or questions about working VFO mode?

Personal training topics

You might want to use an ear piece or head phones [link]

Admit it...your spouse doesn't like it when she has to listen to your friends call out to you on your little HT with that irritating, government-sounding audio. So you take it into the next room, where the signal might be sketchy, or outside where it's freezing cold. But to communicate, you need to hear the other person talk to you. And if that other person has a soft voice, is talking too far from his microphone, or has a staticky signal, you find yourself turning up the volume and running your family out of your house.

What you need is something that will let you hear the other person, but that silences your radio so that your family can't hear the people on the other end. There are several things you can purchase, that will fit the bill, like headphones, earphones, a head-piece, and earbuds. Problem is, unlike regular stereo equipment, you can't always go to Walmart and purchase what you need. More often than not, you need to get an ear piece that has a plug, maybe even a double-plug, that fits only your radio model.

Ok, so if others don't want to hear you, simply take it outside, right? Well, if you're able to brave the shivering cold, the better signal will help the other person hear you, but you might have a more difficult time hearing him, because of all the outdoor noise, from cars on the street, from people, and from the breeze. An ear piece can focus all the audio you want to hear from your radio into your head, often in spite of surrounding noise, while still taking advantage of a good location.

But just as importantly, you really should get an ear piece for your radio, to help free up your hands if you're serving during an incident. With an ear piece, you can usually hear the other person on the radio pretty well, without forcing you to get the unit close enough to your ear to hear it, possibly dropping it on the sidewalk. Just attach your radio by a belt clip to your pants, your vest, or backpack, and then you can move the weight of your unit from your hand to your body.

Some ear piece options to consider include those with a speaker and microphone combination, those with a handy PTT switch, maybe near your head, or those that support VOX, or voice-activated transmit. One I like is a speaker-microphone that also has an antenna connection, placing my antenna above my shoulders, and the speaker-microphone on my lapel. Of course, the drawback to speaker-microphones is that people around you can still hear the other person, and you might still be plagued by street noise if you take it outside.

Purchase an ear piece that has a plug or connector made for your particular radio. Clip your radio to your clothing or vest. Route the ear piece wiring

under your vest and over to your radio, such that your head is able to move freely, and your hands can move around without getting tangled in the wiring. Test it, then test it again. With this kind of setup, you'll feel a little more free to help injured victims, while being able to communicate.

Ham radio best practices [link]

The wide world of ham radio might still be somewhat new to you, and you want to jump into it with both feet, so you're bound to make a few mistakes here and there, but that's alright. Still, to play nicely with everybody else, here are a few tips, good habits, and even unwritten rules, to help you avoid little pitfalls and maybe some embarrassment:

Radio etiquette
- After pressing your PTT button, wait about ½ second before speaking, especially if you're communicating through a repeater
- When speaking into your microphone, try talking across its face, rather than blowing directly into it (some call that *puffing*)
- Place your *hand* microphone about two or three inches from your mouth when transmitting, but stay within an inch of your *built-in* microphone
- When using a handheld radio with a whip or rubber duck antenna, try and keep the antenna pointed upward when you're transmitting
- When announcing your call sign along with that of another ham, the rule is to **put yourself last**, as in **KR5LYS, this is KI7ABC** if your call sign is KI7ABC
- While it's customary to call out **CQ** on HF bands, it's best practice on the 2-meter and 70-cm bands to announce your call sign instead, especially on a repeater
- If another ham points out a problem with your transmission ("you're sounding a little scratchy"), always assume the problem is with **you** (location, orientation, power too low, etc.) or **your** equipment first, and always admit your mistakes
- If you'd like to jump into an ongoing conversation, avoid using the word **break**; instead, say your call sign between their transmissions
- After your contact releases his PTT button, allow one to two seconds before you press yours, in case another person wants to join the conversation or has an emergency
- Avoid **kerchunking**, which is repeatedly pressing and releasing your PTT button without announcing your call sign; it's not only illegal, but irritating to others, especially those listening on a repeater
- When speaking through a repeater, try and keep your conversations to under a few minutes

Personal reminders
- While it's not always possible, try and make your conversations positive and upbeat; sounding positive attracts friends, while negative comments tend to turn other hams away from you, even if you mean well
- Don't react like you're offended just because another ham can't remember your name or call sign
- If another ham *does* offend you, let it go; don't retaliate or try and belittle the other ham for it; be the adult in the encounter, even if you're a kid
- Be considerate of your contact's time, and minimize dead-air time by at least thinking of what you're going to say before you key up; and while it's fun to use your PTT button, don't forget that it's also an RTL (release-to-listen) button
- Avoid making insulting or disparaging remarks about others on the air; what people hear you say about others, they'll also believe you'll say about them
- Within reason, avoid burping, coughing, sniffing, clearing your throat, smacking your lips, and making other bodily or disgusting noises on the air

Equipment habits
- When storing your HT for later use, like in a go-kit or bin, use alkaline instead of rechargeable batteries, and keep the battery case removed from the radio until you need to use it
- Make sure your radio is programmed with an appropriate frequency list before you stash it away, but be sure to accompany it with a card or sheet to remind you of what the frequencies or channel names are for
- Learn how to manually program your radio; you might not know when you need to travel through a location where there is no cell signal available for your phone or tablet

A final word about these best practices: when you hear mistakes made by another ham, it's not your job to jump on the air and correct the person.

Just let it go. If you feel that he or she really ought to know, however, try and reach out by cell or email, instead of dressing the person down in front of three hundred others.

Be agreeable [link]

When you're approached by people who say something contrary to what you want to hear, or do something that doesn't precisely meet your approval, it's often easier to point out their seemingly incorrect thinking than to try and see things from their perspective. Instead, agree with others at every opportunity. Avoid telling them they're wrong, if at all possible. For example,

Person asks, **Should I go to Center Street to help them?**
Rather than say, **No, I need you over at 100 N instead.**
Instead say, **Yes, good idea. I could use your help more on 100 N, if you can go there.**
    (Say **Yes** instead of **No**)

Person asks, **Is my radio offset correct?**
Rather than say, **No, it needs to be on 600 kHz.**
Instead say, **Try working it on 600 kHz.**
    (Turn your answer into a positive comment by avoiding a Yes or No answer)

Person asks, **Do you need any help?**
Rather than say, **No, but thanks for asking.**
Instead say, **Thanks for asking! I believe I've got it under control.**
    (Be grateful for the help or idea *and* avoid using the word *but* to point out additional facts. People are quick to pick up on your *but* exceptions, as this next extreme and silly example illustrates)

Person asks, **Do you like me?**
Rather than say, **I do, but you have something in your teeth right here.**
Instead say, **I do like you! By the way, you have something in your teeth right here.**
    (In this silly example, complete the affirmation without reservation, **I do like you!** Then, start another, *unrelated* topic if you need to, **You have something in your teeth...**)

Yes language seldom comes naturally, and often takes some practice. Family members, friends, and hams, tend to be good, well-meaning people who want to feel like their part of the discussion or situation is valuable and worthwhile. Your acknowledgment of that contribution can mean the difference between them feeling very small and worthless, and them feeling motivated to further help and improve, and contribute even more.

When we assume that people are intelligent, and recognize that they're trying to do good things and mean well, it becomes a little easier to see their perspective and acknowledge their contribution to the situation. This applies to emergency communication, radio talk, and everyday conversation. The more *non-negative* you sound, the more others are attracted to you and want to be around you or listen to you.

Help others improve their signal [link]

There are times when you're running a net, or you're trying to communicate with somebody by radio, and he's difficult to hear, for whatever reason. On one hand, you don't want to sound too critical of the person; after all, he's a new ham, and at least he's trying to get his signal out there. But, assuming he's open to ideas and help (most new hams are), what kinds of helpful suggestions can you offer? Depends on what the issues are and other factors. Here's a list of things you can pick-and-choose from, that might be helpful.

Things that can make his audio difficult-to-hear:
- His little radio might not be set on high power
- He might have a rubber duck or some other poor antenna
- His batteries might be running low

Things you can help him with right now:
- He's in a poor location — ask him to try moving a couple of feet to one side or the other, or go outside or at least get out of the basement
- He might be blocked by his house walls — ask him to move near a window
- He might sound as though his signal is repeatedly strong and then scratchy — ask him to not move around quite so much, if possible
- His antenna orientation might be wrong — ask him to point it upward
- He might sound garbled or distorted — ask him to back his mouth away from his microphone an inch or two
- He might sound too quiet — ask him to get as close to the microphone as possible, then speak louder, clearer, and to not allow his voice volume to trail off at the end of the sentence
- He might be transmitting a loud alternator whine — if the whine is loud enough to compete with his audio, ask him to turn off the engine, if possible
- Does he know where his microphone hole is?
- He might be puffing or blowing into his microphone — ask him to speak at the side of the radio or microphone
- He might sound as though he's got a loose connection — ask him to make sure his antenna is securely connected

Things he can do later:
- Get a better antenna
- Get a better microphone
- Install a tiger tail
- Get a longer-lasting battery

If you believe another ham can hear him better than you can, you might want to ask for a relay of his message. As they say in amateur radio, **if you can't hear 'em, you can't work 'em**, meaning you need to be heard by others, so that they can communicate with you. By the way, asking people to modify their microphone gain will actually have little effect on making them sound louder or better for several reasons, especially if they're on an HT.

Be brief when it's your turn [link]

Let's face it...you probably love the sound of your own voice, and can listen to it for hours. Unfortunately, not everybody shares your love for your voice. For many of us, it's easy to get a bit long-winded and start rambling, especially when we're not sure what to say, how to say it, or when to ask for some help on a thought. In short, be brief, but within reason.

Common courtesy
Unlike with cell phones, when you're on the radio, you have a captive audience. I mean, as long as you're talking, there's no way for the others listening to interrupt you or stop you. Are you certain that what **you** have to say is that much more important than what the other person is saying? Yes, you have a lot to share, but practice common courtesy, and allow others a chance to speak **their** minds as well.

If you ever notice that the person (or the others in your group) you're talking with, take a **lot** less time when it's **their** turn, than **you** do when it's **yours**, chances are they're **less** interested in what **you** have to say than you **think** they are. In other words, that might be your clue to either change the subject or take less time when it's your turn.

This is not to say you need to limit your turn at the mic to two-word sentences; in fact, you should feel free to speak. Just think about what you're going to say, then try and consolidate it to a *concise* sentence, that's all. Sometimes it's just not practical to cut your statement shorter, and that's alright too. The point is to use **good judgment** and **be considerate** of other people's time.

Practical reasons
Most radios include a feature known as a *time-out timer* (or *transmit overtime* on some transceivers), often labeled *TOT*, and is typically set for 60 to 120 seconds. Its purpose is to prevent your signal from being transmitted for longer than it should. One reason to limit your transmission time is to prevent "timing out the repeater" or exceeding the repeater's own time-out timer, which is typically set to between three and ten minutes.

If you should ever time out the repeater, the repeater will reset, and possibly reboot its controller, which can take several minutes to revive, preventing everybody from accessing the repeater during that time. If your station has a "stuck mic" or a microphone whose PTT does not release, the repeater might reset repeatedly. If this should happen two or more times within a short period, the repeater could remain "down" until the control operator can revive it remotely. (A hand microphone PTT can get stuck in the "on" position if it's accidentally wedged between the vehicle seat folds, for example.)

If you're involved in an emergency service, like ARES, it's good to practice being concise and to the point anyway. During a callout or even a drill, your communication needs to pack more meaning in a few words than the way you normally speak. People's lives can be at stake if you take too long to make your point.

Guidelines
Here are a few tips that might help you to be brief on the radio:
- Try and keep your transmissions down to about thirty seconds, give or take
- If you think you're getting close to your thirty seconds, release the PTT for a second and resume speaking, if you're telling a story or a long joke
- If you can't think of what to say, release the PTT
- Similar to the previous point, if you find yourself saying "and, uh..........um.........um....." a lot, that's also a good time to release the PTT

Finally
By the way, here's a little-known fact: your PTT button doubles as an *RTL* button. RTL stands for **release to listen**, so while you can press it to talk, you can also release it to listen.
And from an old Chinese proverb,
He that speaketh little, thinketh much. And he that thinketh little, speaketh much.

Protocol training topics

How to run a net [link]

Once in awhile people ask just how to properly run a net. There's no *correct* way to run a net, within reason. For most nets, both new and experienced hams can organize and operate a net by simply reading through a script. As the NCS (*Net Control Station*, or simply *Net Control*) if you repeat the script a few times, you'll come to know it well enough to engage a group of hams when a real net need arises. Still, every net is different, and we might be able to outline the common ingredients that make up an effective net that any ham can control without much training or special knowledge.

> *Before the net even begins, however, your group needs to decide on a 1) net day, 2) net time, and 3) net frequency (especially whether the net should be held on a repeater or by simplex.) Furthermore, it's appropriate to define the net boundaries, such as geographic (as in political, religious, landmarks, etc.), interest (as in hobby, vocation, ethnicity, political, etc.), and circle (who's allowed to check in, like all hams, only women, under 18, any human being. etc.) Normally, these have already been decided, and all that's left now is to hold and run the net.*

Greeting and preamble
Announce to the world that you are starting a net, and briefly explain the net's purpose, then tell everybody who you are. Welcome your listeners and participants. The term *QST* is not necessary, but is a customary procedure to get the attention of hams who are scanning for active signals. A net *preamble* is a short paragraph that explains the net participation procedure, such as **check in only when your residential area is called** or **announce your call sign in phonetics, followed by your name**.

Check-ins
Nets typically request operators to check in by either roll-call or at random. A *roll-call* means that Net Control is reading off some list of operators who check in regularly or who have registered with the net in some way. *Random* means that Net Control will ask anybody to check in, with possibly some restrictions, such as all operators north of a particular city. If your net is being held on simplex, it's a good habit to ask for **relays** every so often.

Following the regular check-in, Net Control might ask for guest check-ins. It's also a courtesy for Net Control to ask for late or missed check-ins about mid-net.

Group announcements
Net Control might announce upcoming events, amateur radio news, or other information of interest to the group.

Training topic
Nets often invite one of their participants to present a moment of appropriate training or education, to help inform the group on a particular topic. It's good to invite group members to ask questions or make comments following the training.

Net traffic
The term *traffic* refers to a rather formalized manner of conveying a message from one ham to another. In the case of most nets, however, that message is communicated the same way we do any other. So, when an operator announces that he or she has *traffic* for the net, that's merely an indication that the person has a special announcement to make to the group.

Individual comments
Completely at the discretion of Net Control, net participants might be asked to optionally share a personal thought or life happening with the net, often, but not necessarily related to the net or training topic.

Roundtable
If there's enough time, Net Control might invite anybody who has a question, comment, or concern, to address the net and engage everybody in a discussion or forum. This might be useful for asking a difficult question regarding amateur radio, or for simply deciding who wants to volunteer the dessert at the upcoming outdoor event.

Closing
It's often courteous to thank the repeater owners and trustees for the use of the repeater on the net, if indeed you're using an actual repeater. After that, thank everybody who checked in or even just listened. Say *73*, you're returning the frequency to *regular amateur use*, then end with your call sign.

And there you have it. Even though we've listed eight sections here, the local 6-meter Net, for example, uses only the Greeting, Check-ins, Individual comments, and Closing, but they also add a section for signal reports. Still other nets, such as the Information Net, add a section on General announcements, which might involve or extend to folks outside the net or intended geographic area.

At any rate, these are only guidelines, and it's up to Net Control to run his or her net any way that's appropriate. One final thing: it's very easy to get caught up in the step-by-step process, so remember to announce your call sign every ten minutes.

Participating in a *directed net* [link]

A ham radio *net*, or on-air gathering of licensed operators, can be both a fun and educational way to inform your operators, while raising their radio skill levels in several ways. A net can be casual and light-hearted, but it's a little easier to control, and wastes less time, when you can keep the agenda flowing. Maintaining order during the net is often easier in a *directed* net.

Net control makes the rules
A directed net is one that's under the control of one radio operator, who dictates the format of the net and the flow of communication. This **Net Control Station**, or NCS, determines the rules that should be followed by all participants. At the start of the net, the NCS should take a little time during the *net preamble* to briefly explain some of those rules; at least, some of the important ones.

You as a participant should understand that, while the net is not meant to be very strict or formal, you should follow all the instructions given you by

Net Control. This means you should not say anything during the net unless you're given permission to speak, and sometimes that takes a little getting used to.

Principles that help the flow
Here are a few tips that can help the net run smoothly:

- If Net Control asks everybody to check in phonetically, do so slowly. Also, Net Control expects you to remain on the net the entire time, unless you ask for an *early out*, as in

  K-I-7-A-B-C, early out

- If you have any sort of announcement that you'd like to make on the net, tell Net Control that you have *traffic*, by saying

  K-I-7-A-B-C, with traffic

  Net Control will ask for your traffic at a later time during the net. And if Net Control asks you to state whether you have any traffic for the net, yet you have none, say

  K-I-7-A-B-C, no traffic

- If you want to ask or answer a question, or add your thoughts to an ongoing discussion, give the suffix (all the letters after the digit) of your call sign, then un-key, waiting for Net Control to acknowledge you, like this:

  You say : **ABC**
  Net Control says : **ABC, go ahead**
  You say : **Yeah, I just wanted to blab. Back to Net. KI7ABC.**

  In this case, a) you announced your call sign suffix, which is nothing more than a *tactical call sign*, b) Net Control acknowledged and said that you were free to speak, and c) you eventually returned the air to Net Control (abbreviated *Net*), and announced your full legal call sign.

- There are times when Net Control might not want to turn the air over to you. When you hear the words **stand by** during the net, do not transmit until told otherwise, like this:

  You say : **ABC**
  Net Control says : **ABC, stand by**
  You don't key up at all, until Net Control comes back around and turns the air over to you

  This last example demonstrates how Net Control is able to maintain message flow during the net.

- Remain on frequency (meaning you should leave your radio turned on and you should be actively listening for instructions from Net Control) until you are released from the net. On the other hand, if you've already informed Net Control when you checked in that you aren't able to remain on frequency, you're free to leave the net at will.
  The reason for remaining on frequency is that Net Control needs to know whether to count on you being there if your help is needed, to relay a message, look up some information, or to get help

One of the problems that a directed net attempts to solve is the circumstance of more than one participant transmitting at the same time, making it so nobody can hear either, which further adds to the confusion. Under the control of a single operator, a net can run a little more smoothly, and even handle an urgent situation quickly if one arises.

So, there's an order to how a *directed net* should run, and Net Control is in charge. The bottom line is that ***you must be given permission by Net Control to speak on a directed net***. What do you think? Let's hear from *you*.

Stand by [link]

Spoken by you
When you need to pause your message or communication, you're probably used to saying "Hold on" or "Hang on for just a minute," in the interest of using plain English. For most communication, that's perfectly acceptable. However, I encourage you to get in the habit of saying "Stand by" instead. This phrase is brief and is well-understood in many circles, especially those that are part of emergency management, public safety, and amateur radio.

There are other phrases we use, to mean the same thing, such as "Please wait" or "Just a sec." A popular one is "Let me reset," for those who are aware that they tend to talk long enough to "time out" their radio, so they un-key momentarily to allow the radio timeout timer to reset. Or worse

yet, they simply un-key without saying anything, hoping nobody hijacks the frequency while they've momentarily un-keyed to reset. Are any of these phrases illegal or bad practice? Absolutely not, but it might be better to get in the habit of saying "Stand by" because it's almost universally understood, and has a specific meaning.

Spoken by Net Control
When you hear the phrase "Stand by" from Net Control or an official, such as the Incident Command shadow, it's telling you two things of importance, that should grab your attention:

1. you must not transmit during this time
2. you must listen closely for further instructions

When asked to "Stand by," we're often tempted to leave the net or go away long enough to make ourselves a ham sandwich. An even less tactful action is to check-in, request a signal check, or attempt to communicate with another person on the net after Net Control has announced "Stand by." When you hear, "Stand by," do not transmit, but do listen closely for the next thing that Net Control has to say.

During one of our training nets, we might ask operators to "Stand by" out of habit so often, that its significance might get lost in sheer usage. But that's a good problem to have. It's better to get used to saying and hearing the phrase than to use it so infrequently that we forget what it means and how to respond to it.

What to say at the end of your QSO [link]

If there's one thing that new hams find awkward, is what to say at the end of the QSO, or conversation. The answer is, your call sign is all you need.

But most people find that rather impersonal or incomplete, and feel compelled to say things like *clear* or *over* or something else that sounds official or police-like. For example, the following is what some hams run into:

Ham 1 : ***Well, I've got to go now, so I'll see you later.***
Ham 2 : ***Ok, I'll catch you later. KI7ABC.***
Ham 1 : ***7-3 KI7ABC from KI7DEF. I'll be clear on your final.***
Ham 2 : ***Ok, 7-3 KI7DEX, I mean KI7DES. No, wait KI7DEF from KI7ABC, clear.***
Ham 1 : ***Ok, KI7DEF, over and out.***

These two hams are doing their best to follow the rules, but feel awkward simplifying their closing, possibly believing the other ham will feel snubbed by his directness. Furthermore, Ham 2 is struggling to remember Ham 1's call sign. To help this, I recommend two things at the end of your QSO:

1. Don't worry about giving the other person's call sign
2. Say your own call sign when it's the only thing left to say, except maybe *7-3*

These are not rules, but suggestions. Here's an example, using the same two hams above:

Ham 1 : ***Well, I've got to go now, so I'll see you later. 7-3.***
Ham 2 : ***Ok, I'll catch you later. 7-3.***
Ham 1 : ***KI7DEF.***
Ham 2 : ***KI7ABC.***

And they're done. Neither said any call signs until it was time to hang up the mic (pronounced *mike*) and neither felt that the other ham was being offensive, because both experienced hams understood the guidelines. You never need to remember or say another person's call sign during your QSO. It's often customary to say the other person's call sign when calling for him, but still not necessary. So, you can say either,

Hey, Jim, are you there? This is Tony
or simply
KI7ABC, KI7DEF

And if you say only call signs, it's understood whose call sign is which, because of the gentlemen's agreement of *putting yourself last*, which means the person talking in this case is most likely KI7DEF.

And no need to say *clear* or *over* or *out* or any similar military-sounding word.

Is it alright to say these extra words? Sure. Nobody's going to chastise you for saying them, but these tips just might make it a bit easier to conclude your radio conversation.

Don't over-use phonetics [link]

A few weeks ago I was driving up in Davis County, and had my mobile radio trained on an Ogden repeater. I heard a ham get on clearly and with great audio, saying that he was mobile, and announced his call sign something like
>   ***yankeedeltathreemikewisskeyromeo***,
>   and that his name is
>   ***deltaalfavictorecho***.
I decided to engage him and gave my call sign, but then asked him to repeat his call sign. Once again, he repeated
>   ***deltayankeethreewisskeyvictorromeo***
or something. I asked him to say it once more, but a little slower. By this time, he was getting a little upset, and asked whether I was a new ham who had not quite mastered memorizing the Phonetic Alphabet.

So, what **was** my problem? Was my brain just not running as quickly as his mouth? Or am I unknowingly dyslexic, requiring extra repetition to get incoming data straight? Well, I know that I can understand **A-B-C** a little better than **alfa-bravo-charlie**, because my native language is **A-B-C**, not **alfa-bravo-charlie**. In fact, when I hear **alfa-bravo-charlie**, I have to stop for a millisecond and mentally translate each word to its corresponding letter. And if the phonetic words are spoken fast enough, by the time I get to the sixth letter, I've already forgotten the first two, since my concentration was on the final one or two.

What it boils down to is this: if the other person could hear you reasonably well, there's no reason to state your call sign, or anything else, using phonetics. The exception is when you're on a net, and Net Control **asks** you to say your call sign or name that way, even if he or she could hear you perfectly. When you're communicating within the noisy environment of HF, you'll often be asked for your call sign in phonetics.

Other noisy situations that might require a more regular announcement of your name or call sign phonetically include operating outdoors, or in a crowd, or near loud equipment or music. To use phonetics when people can hear you clearly is not illegal by any means, but often makes you appear somewhat elitist or just showing off. That being said, it's still good practice to practice, so use good judgment too.

When you do give your call sign using the Phonetic Alphabet, **slow down**, even if you've given it a hundred times:
>   ***keelo-india-seven-alfa-bravo-charlie***
>   and the same with your name
>   ***delta-alfa-victor-echo***
More often than not on a **repeater**, however, people will understand **K-I-7-A-B-C** and **Dave** much easier.

So, please only use phonetics if asked, or if you know you're surrounded by a lot of noise. Even when your signal is difficult to hear, because of your location or antenna, if people want to hear your call sign or name phonetically, they'll often ask for it.

Using alternate phonetics [link] [PDF]

Late one night during a Field Day, an unlicensed young lady called CQ at the GOTA (Get-On-The-Air) station while I sat next to her, logging her contacts. A club station located in Boise, Idaho, was trying and re-trying to decipher the little girl's announcement of **gossara-leema**, which was her way of pronouncing **golf-sierra-leema**, but they just couldn't make out the call sign. After five or six frustrating tries, she was in near-tears and ready to call it quits, so I whispered "great salt lake" to her, and into the microphone she shouted, "**great-salt-lake!**" Immediately, the Boise station acknowledged the GOTA station's call sign, made the proper exchange, and logged the entry. The little lady was all grins after that.

The ITU (International Telecommunication Union) has devised the English version of the *ITU Phonetic Alphabet* to help clarify communication between

radio stations. Depending on your communication mode or how noisy your environment is, some of the words in the Phonetic Alphabet can be less than helpful. Also, it's sometimes difficult to hear some of the ITU words from a person with a mild speech impediment or whose native language is not English. For these reasons and more, it's often helpful to use phonetic words that are not part of the ITU list in the interest of **clarity**. Here's a list of commonly used alternate or substitute phonetic words:

- **america**
- **california**
- **denmark**
- **germany**
- **italy**
- **japan**
- **kilowatt**
- **mexico**
- **norway**
- **ocean**
- **queen**
- **radio**
- **sugar**
- **tokyo**
- **united**
- **victoria**
- **zanzibar**

Can you use phonetic words outside of this list? Of course, such as **michigan** or **mary**, instead of **mexico**, if it helps with clarity. These are only common substitutes. Just keep in mind that most hams are used to hearing the ITU phonetic words, so you might need to slow down when using alternates. Also, there are times when it's appropriate to speak multiple-word phonetics, for even further clarification. One often-used multi-word phrase is **king-henry** for K-H, the first two letters in the call signs of many Hawaiian hams. The one used in our above example, **great-salt-lake** is another.

Finally, be fore-warned that there are some older hams who berate those who use alternate phonetics, out of some religious or otherwise fanatic allegiance to the ITU list. Please rest assured that using alternate phonetics is not illegal, and is in fact highly encouraged to promote *clarity* in communication. And the little girl at the GOTA station? Two months after that Field Day, she became KI7RES, the youngest ham in Utah at the time.

Follow the band plan [link]

While helping a new ham couple with their radio issues one day, I noticed that their HTs (handheld transceivers) were set to 147.3325 MHz. I asked them why they chose that frequency, and they proudly announced that it's well within the 2-meter band, as allocated by the FCC and displayed on the ARRL band chart for Technician licensees, and that one seemed to work for them.

I told them they were correct in selecting a frequency within their Technician privileges, and congratulated them on that. I then asked whether they were familiar with the *Utah Band Plan*, and they said they weren't, but that they had heard there was such a thing. I explained that the band plan further clarified which frequencies were permitted by amateurs on each band.

According to the ARRL band chart (which reflects the corresponding Part 97 rules), anybody with a valid Technician license is indeed permitted to use any frequency in the 2-meter band, which spans 144.000 to 148.000 MHz. However, our local band plan states that certain sub-bands, or subsets of this span, are allocated for specific types of usage. The Utah Band Plan is laid out online at utahvhfs.org/bandplan1.html.

From the online list, you can see that the frequency the couple was using, 147.3325 MHz, falls within one of the sections allocated to repeater operation, and so their selected frequency did not meet the Utah Band Plan for simplex usage. They needed to choose a frequency from within one of

the *three sub-bands designated for simplex operation* to be compliant.

But wait, there's more. Further examination of the Utah Band Plan shows that simplex frequencies must be selected by **odd-numbered 20 kHz frequency separations** in the 145.500 to 145.800 MHz list, and **even-numbered 20 kHz frequency separations** in the other two. This means, for example, you can use 145.510, 145.530, 145.550 MHz, etc., from the first list, and 146.480, 146.500, 146.520, etc., from the second list, and so forth. Therefore, a selection of 146.490 MHz for your simplex operation goes contrary to the Band Plan.

Finally, a band plan is not *the law*, but it **is** a set of strongly suggested agreements that help us all play nicely with each other, in that they prevent chaos and minimize interference between stations. The band plan is set in place by the Frequency Coordinator, and in Utah is supported by the Utah VHF Society. *Keep in mind that not all band plans betwen different states follow the same guidelines.* So, if you travel to another state, don't assume the band plan there is the same as what you're used to; a little research can save you some heart ache.

How to handle a pileup [link]

Whether you're running a net, engaged in a conversation, or calling CQ, there's always a possibility that more than one person will transmit at the same time, in an attempt to communicate with you. We typically refer to that as a **pileup** on single-sideband, or a **double** on FM, although mode has little to do with the end result. When multiple people transmit on the same frequency using single-sideband, you can often hear all the transmissions perfectly. But when two people do the same using FM, you often hear a garbled sound instead, due to the multiple carrier signals attempting to dominate the receiver simultaneously.

Regardless what we call it, how do you handle a situation like that, in which two or more transmissions are reaching you at the same time? First, *listen carefully* for any words or portions of call signs that can help distinguish one person from the rest. Second, *acknowledge* what you can hear. But some times even those tips won't always solve the problem.

If you can easily tell one call sign from another, **simply pick one**, repeat it, and have the person proceed:
> *KI7ABC, go ahead*

If you can't easily tell them apart, try asking them to **say it phonetically**:
> *Could you please repeat that phonetically?*

If you can only distinguish part of a call sign, you might try saying
> *The station ending in delta, please come again with your full call sign*

One tip that seems to make one stand out over others is to ask them to **repeat it slowly**:
> *Could you please come back with your call sign, slowly?*

This last one works because no two people seem to agree mentally on what *slowly* means, and that disagreement will work in your favor.

There are times, especially on single-sideband, when you can hear two callers, but they aren't able to hear each other. In that case, it's up to you to **be the traffic cop**:
> *KI7ABC, please stand by. KJ7XYZ, go ahead.*

At that moment, KI7ABC might realize that *somebody else* is calling you too.

There are also times when the pileup or double takes place because an operator failed to tell the others in the conversation who should speak next. You can avoid that situation by **passing the mic** to the next person in the QSO:
> *Over to Jim*

After you pass the mic to Jim, everybody else in your QSO will know to stand by and allow Jim to take his turn.

Finally, if you simply can't distinguish multiple callers, evan after a couple of repeated attempts, **start over**, like you never heard any of them. Often, this will be enough to clear up the confusion. However you try and tackle the situation, be sure to remain kind and polite, never critical or demanding.

Third-party communication [link]

There might come a time when you'll have to operate your station in behalf of another, possibly unlicensed, person, such as a family member, a neighbor, or maybe even a church leader. Well, it turns out that amateur radio provides a method for you to legally handle that kind of operation, which we call *third-party communication*. However, many, if not most, ham radio operators either don't really know how to perform third-party communication, or find it a little awkward, since it's not an operating mode they use every day. I'm hoping that this short training might help you feel a little more confident about handling third-party traffic.

In amateur radio, the term *third-party communication* originated from the need for a telegraph operator to send a message to another telegraph operator in behalf of an unlicensed person, such as a supervisor, or even a government official, especially during war, a crisis, or other emergency. The **first party** is you, the licensed control operator making the call. The **second party** is the operator you're contacting, who is the licensed control operator answering the call. The **third party** is the unlicensed person for whom the first party is making the call.

Today, rules governing third-party communication have broadened and loosened since those early days, so that the second-party operator never even needs to speak with the first-party operator at all. There are three basic rules that govern third-party communication, although there are other rules that also cover their details. The three are
1. *You, the first party, are the licensed control operator, and must maintain control of your station during the communication*
2. *You must be in close enough proximity to your station to take control of it, should anything go wrong with it*
3. *You must be awake*

The following example illustrates how to carry out a third-party communication, assuming your call sign is **KI7ABC**, and you're trying to reach **KI7XYZ**:
1. You've turned on the radio, set it to the appropriate frequency, and handed the mic to your unlicensed friend.
2. Your unlicensed friend calls out to the second party, giving your call sign; maybe saying something like **KI7XYZ, this is KI7ABC.**
3. The second party responds with **This is KI7XYZ, go ahead.**
4. Your unlicensed friend and the second party are then free to talk back-and-forth on the air at will.
5. Every ten minutes, your unlicensed friend says **KI7ABC** and the second party says **KI7XYZ.**
6. At the conclusion of the conversation, the second party should say something like **Nice talking with you. KI7XYZ.** and your unlicensed friend says something like **Yeah, nice talking with you, too! KI7ABC.**
7. Your unlicensed friend turns the mic back to you, and you turn off your radio.

Notice that during this entire conversation, not once did you need to say anything, not your call sign, no introduction, not the words "third-party", nothing. Your unlicensed friend did all the talking at your station, and that's good enough. A few hams who are unfamiliar with third-party communication might feel uneasy about this procedure, and will step in and announce his or her call sign or say something to seemingly legitimize the communication, such as "for third-party traffic," and that's alright too; it's just not necessary.

There is one small exception to what I just said, that you should probably be aware of. The unlicensed person must not have been a ham who has had his or her licensed revoked or suspended. How will you know whether the unlicensed person has ever had that happen? Likely, you won't know, but if you happen to know that, just be aware of the rule.

I mentioned that one of the rules say that you must be present in case something goes wrong with your station. Well, what can go wrong? Your station could get off-frequency, it can lose battery power, its antenna could come loose, and a host of other possibilities. Also, the unlicensed person could suffer a sudden health problem or unwittingly violate the rules, and start singing or swearing. In those cases, it's up to you, the licensed control operator, to take control of the situation.

Finally, I mentioned that you, the licensed control operator, must be awake. Ok, that makes sense, but what if you're unconscious, due to an accident or health problem of your own? Well, that's the definition of an *emergency*, and a different set of rules take over.

Ok, let's hear from *you*. What are *your* thoughts about third-party communication?

Emergency training topics

How to help when you're on the road [link]

While you're traveling by road, if you're interested in contacting local hams through their repeaters, one thing you can do is download a list of repeaters along your route, and program them into your radio ahead of time. Where can you get that list? From RepeaterBook.com. Just look up the state or the interstate route, and you can see all the repeaters available. Copy the repeater info to CHIRP and program your radio accordingly. Of course, that requires a laptop and an appropriate cable to interface with your radio, to program it.

What you can do alternatively is download the app from RepeaterBook.com and activate it. Then, while you're traveling, the app will display nearby repeaters, based on your GPS location. You can then manually program the repeaters into your radio, or download it to your laptop and program as you go. Of course, that can be a real pain, which is why knowing how to program your radio manually is a good skill to learn.

So, if you travel, you're all set to go, but to do what? To help yourself and others. Here are some possibilities:

You encounter an incident and want to help
If you travel in an area, and learn it's been struck by an incident, such as a tornado, wildfire, chemical spill, or terrorist attack, turn to the **2-meter National Calling Frequency** (146.520 MHz simplex) and listen. If you don't hear anything, either call out on that frequency every 15 minutes,
> *This is KI7ABC, monitoring*

It's possible that somebody will respond, and ask for help, and you'll be there to answer the call. Or start scanning (all frequencies, instead of just memory channels). And yes, scanning is *another* good skill to learn.

You're the one who needs help
If you travel in an incident area, and find yourself in need of assistance, start calling out on the National Calling Frequency every few minutes,
> *This is KI7ABC, and I need help*

Hams who are familiar with the Wilderness Protocol will be monitoring for those in need of help, and might be able to give you the help you need.

Start a conversation on a local repeater
Finally, you're not aware of any local incident, but you never know. So, strike up a conversation with a complete stranger on a local repeater. Find out when he or she first got licensed. Ask about their family, how many kids and dogs, their favorite foods, their hobbies, the breadwinner's occupation, etc. But be sure to leave a one-second break between each un-key and key-up, to allow those with an actual issue or emergency to break in. The mere constant chatter will help put other listeners more at ease, and assure them that the amateur system is still available, should they need help or have a question. Don't worry that you're *tying up the repeater* because that's what it's there for.

For whom you will really be transmitting [link]

Many of us have spent a great deal of effort, training to set up and operate our radios during a time of emergency or disaster, and that's terrific. And if you're part of an emergency radio team, such as ARES, RACES, or AUXCOMM, you might find yourself getting called out or *activated* during an incident, to help out with communication, as part of an organized team of radio volunteers. In spite of your training, however, during an actual emergency, you might discover that your radio skills will be needed much less in an official capacity than you might like to believe. So, for whom will you be doing all that radio communicating?

The answer is, **for yourself or your family**. If an earthquake should hit, it's alright to believe that you're prepared to pull out your radio, start a net, and save the world. But it's much more likely that you'll be listening in on a net that's already in progress, then checking in or staying in touch on behalf of your own family. And that's alright too, because **being self-sufficient** is one of the reasons you got into ham radio.

In the event of a disaster, and both you and your family are safe, and maybe not directly affected by the incident, you can still help with communication without being an official relay or shadow. First, listen to multiple frequencies on your dual-watch radio. Next, check into any net in progress you believe is appropriate, such as a local area net (often organized by a neighborhood ore nearby religious collective) or city net or ARES net. This way, you can make your radio services available, if they become needed, especially as a relay.

So, as you continue to improve your skills and gather your equipment to prepare for a possible emergency, keep in mind that you're putting these

together primarily for you and your family. That's because during a true incident, your primary goal is the safety of your family. And if help is unavailable, unreachable, or otherwise occupied by an ongoing relief effort, it's a little **peace of mind** to know that you might have some sort of communication line to a listening ear.

You might want to upgrade your license [link]

I know a nearby ham who's a wonderful and competent radio operator, and she's completely content with her Technician license, and has no plans to upgrade. That's perfectly fine, since her skills will be the ones most sought for, in our family, our neighborhood, and our area, should they be needed. In other words, in any given emergency, all the communication operation and equipment likely to be required, can be performed by somebody with a Technician license.

In the event of a much more catastrophic or large-scale emergency, such as an earthquake or terrorist strike, the power, cell towers, and other parts of our infrastructure could suddenly become unavailable for a rather large geographic area. In that case, transmitting by your mobile unit, and especially your handheld, can only get you so far. And if you need to reach outside, say, 200 miles, to get help, you'll need to rely on HF. It's possible to transmit this far by tropospheric ducting, by 6-meter single-sideband, or sporadic E, all of which require only a Tech license, but the likelihood of getting anybody's attention this way is very slim.

So, that leaves HF. It's true that a Technician licensee can use a 200-kHz section of the 10-meter band on HF, so they have that much going for them, if they have the equipment and know how to use it. But wait a minute, you ask, Isn't it true that, during a true emergency, any means of communication necessary can be used in the protection of life or property? Yes, that's true, but there's a catch.

Let's say that you and a friend, both Tech licensees, are driving across the Utah desert, transporting some belongings to a third friend. Among your cargo is an HF station, complete with antenna and coax. While you're driving, your car breaks down, outside the reach of any cell towers or even ham radio repeaters. And while walking around looking for signs, your passenger falls and impales an artery on a sage branch. This sure sounds like an emergency to me. Since it dawns on you that you have a complete HF setup, you conclude that you can save your friend's life and call for help on any frequency you need. Well, I believe you're right, but I have a few questions for you.

Do you know *how* to set up an HF station and turn it on? Alright, it's not rocket science, and you're pretty smart, so you manage to figure it out. Will you know how to use it? On what band? On which frequencies? Using what mode? What's the protocol? And what's that awful noise you're hearing, and how do you make it go away? Do you know whether your setup is going to need a tuner? You'd know the answer to those questions if you had trained and practiced using HF. And you won't have been able to get that training and practice without a General license.

Yes, it's possible for a Technician licensee to get *some* training and practice on HF, but I just don't know many who can justify getting an expensive HF rig, just for a small, 200-kHz section of the spectrum. And at this point in the sunspot cycle, nobody will hear you there anyway.

Finally, if you've already got a General class or higher license, you won't need to upgrade. Instead, why not mentor, or at least encourage, Technician licensees to upgrade, by explaining the benefits you heard here. Just keep in mind that, after you explain the reasons to them, and they don't care to upgrade, that's their choice, there's no need to hound them, and they're free to pursue ham radio they way they see fit.

Please tell me your thoughts. I hope nobody will feel truly pressured to upgrade their Tech license to a General, just because of a training item. But I did want to give you some food for thought.

What frequency to monitor for a *nearby* incident [link]

Once in a while an incident occurs, but in another county, or is not large enough to label it a local emergency or to disrupt cell phone operation. These can include an earthquake, chemical spill, a large storm, and out-of-area flood. Although they might not affect you very much right away, or at your current location, the disaster potential might be real enough to worry you, especially if a loved one lives in the affected zone.

Essentially, you're in a non-life-threatening situation. Everybody near you seems alright, they haven't lost consciousness, aren't bleeding much or have minor injuries, they seem emotionally stable, and there's simply no need to call an ambulance. At times like that, we tend to want information,

like how big the nearby incident is, how you should respond, if at all, where you should go, and how to best reassure others.

Similar to what happened during the last earthquake, because we were not in a truly emergent situation, yet somewhat involved in a relatively minor way, there was not really a need to activate emergency protocols; just had to collect a few reports. As a result, the emergency frequencies we had mentioned in previous trainings were fairly irrelevant to the situation. Alright, so, what *should* or *can* we listen to?

We recommend that you tune to local *ragchew* repeater frequencies, plus a locally accessible repeater *system*. Often, when an incident occurs, a previously designated operator will start a net going on one of them, and ask for people from all over to check in and report conditions at their locations. In spite of the mis-information potential, they might just give you the most information from those who are experiencing the incident first-hand.

When the recent earthquake hit, one person assumed Net Control on the Intertie, started a net, and asked for reports from all over Utah. Many people checked in, reported the conditions at their locations, and gradually helped paint us a large mental map of what was or was not happening where, as a result of the earthquake. It was a good and quick way to get a little peace-of-mind, when the broadcast news agencies could not say anything more than what was officially released to them, which was sparse at first.

Here are some recommended ham radio frequencies:
    Utah County
        146.760- repeater
        147.120+ (100.0 Hz) repeater
    Salt Lake County
        146.620- repeater
        147.120+ (100.0 Hz) repeater
Officially designated emergency broadcast radio channels:
        102.7 FM (KSL-FM)
        1160 AM (KSL-AM)
Any or all of several police, sheriff, fire, and EMS (emergency medical services) frequencies, which include, but are not limited to, the following:
        154.860 MHz : North Utah County Sheriff
        156.135 MHz : South Utah County Sheriff
        155.235 MHz : Utah County Search and Rescue
        851.600 MHz : Utah Public Safety (all services)

Search out and find the same or similar kinds of frequencies where you live, including popular repeaters and statewide repeater systems, if you have them.

For emergency service nets

Radio-related training topics

Tactical call signs [link]

One thing hams, as well as police, fire, military, government, and EMS personnel find useful while communicating during an incident is the use of *tactical call signs*. A tactical call sign represents a group name, function, or geographical location, such as *Medical 3*, *Lookout Point*, or *Grid 27*. It's not the same as your FCC-issued call sign, and does not replace it, but can be used as a shortcut or abbreviation during an exercise or emergency.

They help keep things simple
During an actual call-out it can get really tedious, if not confusing and frustrating, for all parties involved, if you had to remember or read back a series of call signs, fumbling with dyslexic numerals and letters as you try and get some important information to a far-away team. Simply say,

> ***Team 2, this is Incident Command***

and then whomever is Incident Command replies with,

> ***Incident Command, go ahead***

That's a little easier easier than,

> ***KG7ZSC, I mean KC7ZSZ, this is KB7BVP***

only to have the other party say,

> ***Was that KC7ZSZ or KC7ZFZ?***

and then you say,

> ***Kilo-charlie-seven-zulu-sierra-zulu, this is kilo-bravo-seven-bravo-victor-papa***

By the time you've figured out the call sign, the patient has died.

They keep station locations organized

Another advantage to tactical call signs is that there is no need to keep track of which call sign is where. Imagine Incident Command needing to get an update on a forest fire line advance.

> ***KC7ZSZ, this is KB7BVP***

with a reply of,

> ***This is N7YHU, KC7ZSZ had to leave***

Incident Command then asks,

> ***Ok, how about KG7UFU?***

with a reply of,

> ***No, KG7UFU had to go too***

Incident Command then says,

> ***Well, who's still there, who can give me an update?***

What a time-wasting mess! Instead, try this:

> ***Hilltop Overlook, this is Incident Command***

with a reply from Hilltop Overlook of,

> ***Hilltop Overlook, go ahead***

and then,

> ***Could you please give me a fire-line status?***

In this case, Incident Command doesn't know, but more importantly *doesn't care*, who's at Hilltop Overlook; he just wants an update from somebody there who's qualified to deliver the update.

They're assigned by NCS

So, whose job is it to assign tactical call signs? It's the responsibility of Incident Command. If IC doesn't care, or has delegated it, it's the responsibility of Net Control, who is typically the *Incident Command shadow*, but Net Control must then communicate them to IC, so that IC can keep an overall picture of the incident by location or group name. If IC starts calling a group *Hospital Deck*, that might be a good clue that you should also call it by that name, because that's familiar to him. And if you're the person making up these tactical call signs, please make them as short as you meaningfully can. Instead of giving one team a name of *Samuel Thornton Fluke Memorial Site 3* maybe simply *Site 3* is good enough.

Now, all that being said, every ham is still required to transmit the FCC-issued call sign every ten minutes and at the end of the communication, regardless of tactical call signs. One way to do this during a drill, exercise, or incident, is by adding to the confusion and stating your actual call sign every time you speak, which is not recommended, because you need to say less, not more. The recommended approach is for Net Control to ask everybody to say their call signs every ten minutes, all at the same time. Yes, you'll be doubling with thirty other people, but you've satisfied the rule, to transmit your call sign; there is no requirement that anybody actually *hear* your call sign.

Setting up a relay station [link]

During an actual incident, what's often needed is a relay station to transfer messages between two stations who couldn't reach each other by repeater (because it's down or unavailable) or by simplex (too many obstructions). You can accomplish this several ways, but probably the two most common

ways is by local control and automatic control.

Local control means you're the relay station, and you need to travel to a location between the two most critical communication stations that are having trouble hearing each other. All three of your stations are using the same simplex frequency. You hear messages from one station, then repeat the same message on the same frequency, so that both stations can hear you. You then hear responses from the other station, and once again repeat the responses on the same frequency, so that both stations can hear you.

Automatic control means you're responsible for setting up a repeater station, possibly a cross-band repeater (XBR), between the two most critical communication stations that are having trouble hearing each other. You set your XBR to a 2-meter simplex and a 70-cm frequency, then ask one of the two distant stations to set their frequency to the 2-meter frequency and the other distant station to the 70-cm frequency.

Things to take into account with either method include location, power needs, and access. The location of your relay station could be in your home, a school, or out in a field if the weather is cooperating, as long as your surroundings don't obstruct your signal, making your relays worthless. If you're away from home, you're going to need to plug into an outlet if the power is on and reachable.

If AC power is not available, you might need a trusty battery, whose size will depend on your radio and usage. If you're going to be out for long, setting up a solar panel might be a good idea, if you have one. Finally, make sure you have immediate access to your station if at all possible, especially if you're running an XBR, in case the battery dies or if the station frequencies needs to readjusted, to avoid interference, for example.

How to relay messages [link]

There are times when you're on a *net*, and it seems that Net Control just couldn't hear the check-in from a weak or distant station, even if you're holding the net by repeater. (Maybe the unheard station is not *in the repeater* because his radio isn't programmed properly or isn't programmed with this particular repeater.) In that case, if you're able to hear the distant station, cut into the check-ins between transmissions by saying **relay**, and Net Control will know that you're hearing somebody he or she isn't, and say, **Go ahead, relay**. You then say, **keelo-bravo station go ahead**, if you heard "KB" from the distant station in the midst of giving its call sign, for example.

After that, your responsibility is to relay the check-in, including call sign, name, location, and any message (*traffic*) that the distant station needs you to pass along to Net Control. As you might guess, this is good practice, because during an incident, you might need to relay for an injured operator who's trapped in a basement, when Net Control is unable to hear him or her.

Be brief
Relaying a message between an unheard station and Net Control is not the time to give long-winded descriptions or explanations, even in the interest of accuracy. Relay the information as completely as you heard it, but allow Net Control to dictate just how much and how accurate your information should be. And being brief does not mean repeating everything in rapid-fire speech. If you normally take three seconds to say something, but compress it into two seconds, you might need to repeat it, requiring six seconds, including the time it requires for Net Control to ask you to repeat it. So, slow down and say it in four seconds the first time.

Ham-to-ham
A relay between radio operators means official A is asking operator A to relay a message to official B. Operator B then communicates the relayed message to official B. This *ham-to-ham* (more correctly *station-to-station*) communication involves only licensed amateur radio operators using the radio equipment, with the officials simply giving and receiving orders.

Official-to-ham
A relay between an official and a radio operator means operator A has handed his or her microphone to official A, allowing the official to communicate directly to operator B, due to the complexity or urgency of the situation or the need at the moment. And even though official A is not a licensed ham radio operator, by third-party rules, operator A can legally allow that, provided operator A is awake and remains in the same room as official A for the duration of the communication.

In either case, you become more or less a piece of furniture that simply passes messages between one party and another. But that's alright, because thet's what you signed up for, by offering your radio station in the service of others.

Radio equipment for shadowing [link]

The equipment you're going to need for *shadowing an official* during an incident can be summed up for two situations: stationary or on foot. And in each case, you have radio equipment *and* support equipment to consider. It'll be up to your good judgment which of these items you should actually use, but here are my recommendations.

Stationary
Being stationary gives you two advantages: you have a place where you might actually be able to sit down, and you don't have to lug all your radio equipment around. Also, people find comfort in being able to refer or resort to a particular location for communication needs.
- TYT TH-7800 mobile radio ($190)
- Tram 1185 magnetic-mount antenna ($23, includes coaxial cable)
- Thunderbolt Magnum Solar 64102 ($70) 12 V 35 Ah SLA solar battery
- Powerpole alligator clips ($10)
- Powerpole T adapter ($13)
- Folding table, folding chairs
- Camping lantern

On foot
When you're shadowing an official (or even when you're alone during an incident), it's often necessary to move quickly from one place to another on foot, because of uneven or obstructed terrain, building entry for light search-and-rescue, or a disaster that covers a wide area.
- Baofeng UV-82HP handheld radio ($63)
- Extended-life battery pack ($18)
- Kenwood shoulder-mount speaker-mic-antenna ($16)
- Super-Elastic Signal Stick antenna ($20, select *SMA Female*)
- Program these frequencies into your radio. If you use CHIRP to program your radio, use this programming file (download it and read it into CHIRP) and this programming cable ($14).
- A small, portable and collapsible wagon ($70) to lug your stuff around in

Know how to manually operate your radio [link]

One day, before the time of GPS technology, a man was driving all over an upscale section of New York City, until he decided to stop for directions. He flagged down a pedestrian and rolled down his window. "Excuse me, sir, could you please tell me how to get to Carnegie Hall?" The pedestrian answered, "Practice, practice, practice."

You've got your ham radio license, you might have taken a CERT course, and now you have a nice, little radio that you've grown to like. In fact, to take your readiness a step further, you had your little unit programmed with 200 channels of something or other. Furthermore, you use your radio by participating in several local nets. Terrific! But if worse comes to worse, there's one more thing that might help you become a little more radio-ready for an actual incident.

During an emergency, do you know what frequencies to use? Because of the nets you participate in, maybe so. But what if your programmed frequencies are busy, and you need to move to a frequency that's not programmed in your radio? Will you know how to manually set that? At a moment's notice, you might need to find a simplex frequency, or change to one that your net control has dictated. Will you know how to do that manually, within seconds? How about if Net Control asks you to change to a repeater that you don't have set in your radio? Will you know how to set the offset, tone, and direction?

Assuming you have all of that, depending on the emergency, your hands should also be free enough to help people, instead of being tied up by a handheld radio. It might be wise to put a belt clip on the back of your radio, then attach it to your belt or pants pocket. On top of that, it might be

convenient to attach a speaker-microphone from your radio to your lapel. Then your hands will be free, except when one hand is pressing the microphone button.

And after doing all of that, suddenly your battery dies. It would be convenient to have a freshly charged battery, or a sled of alkalines that you can slide onto your radio. And what if people complain that they couldn't hear you very well? It would help if you have an extra antenna, either a flexible Signal Stick or a telescopic one, or at least a whip, that you can replace your stock rubber duck with.

Finally, use your net as your personal "emergency" by practicing these things during the net. While your net is going, 1) switch to VFO Mode ("Frequency Mode") and punch in your net frequency manually, 2) clip your radio to your pants pocket and attach your speaker-mic to the radio, 3) turn off your radio and replace the battery, and 4) replace your antenna with a better one. Now, repeat that during the net again next week.

Getting your license was a great first step, but now it's time to do more than just stash your radio away until there's an emergency. Because when an incident arises, and you aren't used to using your radio effectively, you'll suddenly create your own emergency, rendering your license useless. For real estate agents, the motto is "Location, location, location." For those of us trying to prepare for the unthinkable and yet be helpful, it's "Practice, practice, practice."

Have alternate simplex frequencies at your disposal [link]

During an incident, your local (area, neighborhood, city) net will likely be operated over a simplex frequency. That's good, because dependency on a repeater or the internet can cripple you during a widespread incident, which you're training to prepare for. However, there might be times when your agreed-upon frequency will be unavailable, like when it's already in use by another group, when it causes interference to a group outside your county, or when you're asked to vacate the frequency for some reason. In those cases, it's convenient to have two or three alternate simplex frequencies you can quickly move to.

Given the demand and the population, finding a few alternate frequencies might not always be easy, so here are some suggestions. These ideas are based on using simplex frequencies within the 2-meter band and the 70-centimeter band, which means you need to have a radio that supports those bands. It also means that you need to have your radio pre-programmed with those simplex frequencies, and be familiar enough with your radio to turn to them at a moment's notice.

You need to purchase a dual-band radio
Your radio must support both the 2-meter band and the 70-centimeter band at a minimum. That is, 144 to 148 MHz, and 420 to 450 MHz. This makes a whole range of little-known or seldom-used simplex operation available to you. (Keep in mind that a few *dual-band* radios support 1.25 meters [220 MHz] instead of 70 cm, but you're going to need 70 cm.) Also, please understand that, even though your license gives you transmit privileges on most of the frequencies covered by these bands, your state or region *Band Plan* dictates which frequencies you can actually use on simplex, and how, as in mode, bandwidth, separation, and tones.

You should have available two or three alternate simplex frequencies you can use
In one Orem area, those folks have agreed on four simplex frequencies that they've researched, and plan to use for emergency nets. Their primary frequency is 147.480 MHz, which they use each Sunday night on an area training net. Their main backup frequency is 147.440 MHz, which is the frequency used by their neighboring area, whose net they can join if they need to vacate their primary frequency. That same Orem area has also decided on 439.225 MHz as an alternate if they aren't able to use either of the above 2-meter frequencies. Finally, they've decided on 439.425 as yet another alternate, should all the others become unavailable.

Program your radio with these simplex frequencies
Store all of these simplex frequencies in your radio memory, then make a note of which channel contains which frequency, so that you can quickly turn to any one of them. In the case of many Chinese VHF / UHF radios, change to *Channel mode* and select the channel number. For other radios, change to *Memory* to access the channels in which you stored your simplex frequencies.

Know how to manually change to them at a moment's notice

Be familiar enough with your radio that you know how to change to one of the alternate frequencies. For many Chinese VHF / UHF radios, if they're not stored in your radio's memory, change to *Frequency mode*, then punch in the frequency by hand, remembering to set the *shift direction* (SFT-D) to OFF. For most non-Chinese VHF / UHF radios, change to *VFO*, then enter the frequency.

During chaotic moments, it might be necessary to establish or check into a net or other communication using a frequency that you don't use regularly. Having some alternate frequencies can be a life-saver, and knowing how to turn to them can be a time-saver. Remember that *nobody owns a frequency*, and it shouldn't surprise you if another group is using *your* frequency when you need it, so being flexible enough to have options goes a long way.

How about you? Let's hear what *you* have to say.

Ensure your gear is ready [link]

Recently during the local ARES Net, the assigned Net Control Station at the last minute could not fill the NCS role, and asked a friend to step in, and the friend happily accepted. Well, three or four minutes into the net, the handheld battery of the Net Control Station ran out. He then attempted to switch over to a power supply, but discovered that it had a different adapter than what his handheld required. He then switched to his mobile unit, and the ARES frequency was not programmed into the rig, and we all stood by as he fiddled with the manual, to get it on frequency, including the proper tone.

At any time, regardless of the crisis-of-the-day, we might be getting closer to the point where we'll need to rely on amateur radio to communicate. In all probability, our electrical grid will be fully functional. But, I'm not so sure we should wait until the very moment we truly need our communication gear to be available, to check whether it's actually ready. During an actual incident is probably not the best time to check your equipment.

I realize we all live busy lives, and we can't spend a lot of time playing radio. But during the next few days, why not take this time to make sure the radios we rely on, and our backup radios, are in good shape? Use them during a net like this one. Use them during a social net. Use them to casually call up a friend. Use a repeater, ask your friend to switch to another repeater. Go to a simplex frequency, like the **2-meter National Calling Frequency**, and chat if you're within range of each other.

A simple check list
- Check your batteries
  - Examine them for leaking and radio damage
  - Make sure your rechargeable batteries are fully charged
  - Plug in your non-rechargeable backups and make sure they're ready for use
- Check your radios
  - Make sure you know how to assemble both your main radio and your backup radio, as in, install the battery, the antenna, and coaxial cable, if applicable
  - Know how to change channels in your radio memory, and how to manually punch in a frequency that's not in your radio memory, including the offset and tone
  - Check your radios for damage, and make sure the displays are clean and readable
- Check your antenna system
  - Make sure your antenna is not bent or broken
  - Check your connectors by inserting, tugging on them, and removing them a couple of times
  - Make sure your antennas are adequate, so that people can hear you well, and not constantly asking you to repeat things
- Check other radio equipment
  - Check your power supplies
  - Check your coaxial cable and connectors
  - Get on the air and ask for a report on several simplex and repeater frequencies; simply turning them on will not tell you whether you have the correct tone set, whether your offset is correct, whether your antenna is connected properly, and whether your battery charge can handle an actual communication

- The three rules of radio readiness: ***test, test, test***
  - Get on the air with a minimal combination of your gear
  - Get on the air with another or unusual (connectors, adapters, antenna, power, etc.) combination
  - Ask for signal reports from somebody farther away than your own neighborhood

Ok, what do you think? Is there anything else we should be checking at this time? The above list is missing a lot of detail, but was made to be a quick and simple set of tests, to make sure your basics are in place and ready to go. Let's hear from *you*.

Exercise: changing your radio on demand [link]

[Note to the trainer: before your net starts, be sure you have two different ham radios that you can use for this training; be sure their batteries are charged, if they're on battery power, or that their power supplies are working if they're not; also, be sure that each radio has an easily accessible antenna you can attach quickly]

During our check-ins today, I'd like you to also report the make and model your radio you're using to check in. There are no right or wrong or better or worse answers; I'm just trying to find out what you're using right now, ahead of our training topic. Let's go ahead and take your check-ins now.

[Take check-ins in the usual manner, but also ask for radio make and model from each operator; you do not need to take note of their radio models]

You might find out one day that you need to swap out your radio, for whatever reason. Its battery might have run out of charge, or maybe you accidentally pressed a button that put your radio into a state that you can't quickly figure your way out of, or the radio itself might have malfunctioned in some way. It's also possible that you're radio is still working, but that you suddenly need to turn on another one, to work multiple frequencies. For these and other reasons, it's good practice to know how to manually change radios or at least quickly activate an additional one.

Now that check-ins have been taken on this net, I'm going to ask everybody to turn off their radios and check in again, this time using a different radio, if you have one, and report the make and model of that second radio. If you *aren't able* to check in using a different radio, there's no shame in simply reporting the same radio model. Let me now go back over the roll and ask for your check-ins again.

[Take check-ins by roll call, according to the check-ins you received the first time around, and once again ask for each operator's radio make and model]

At this time, you're free to remain on the radio you've ended up with, or switch back to you original radio. I'll give a minute to those who want to switch back. Please stand by.

[Un-key for a minute]

Thanks to everybody for your participation in this brief training. It was not meant to put you on the spot or embarrass you, but to demonstrate one more point of readiness we might be able to improve on.

Personal training topics

Helping somebody in distress [link]

We've talked previously about how to aid somebody who's calling for help. That is, how to discern their needs, whom you should call, and how you can personally assist in the way of equipment or relaying emergency messages. But there's another side to helping a person who is calling for anybody out there to come to their aid, and that's the personal side. In other words, is there something helpful you can actually say to them on the radio?

During an actual crisis, not only will your caller be frantic, but believe it or not, you're going to start freaking out too. The caller will be in great danger, or will be calling for a loved one who's screaming out in pain, and that person will most likely not have his or her mind together during the communication. And in spite of all your training, your bloodstream will be flowing with a half-gallon of adrenaline, causing you to speak very quickly, in a high-pitched voice, and begin to hyperventilate.

So, what can you say to somebody who desperately needs your help, when your own heart is racing? First, let's mention a few things you should **NOT** say:

- **Do not lie to them** by telling them that you understand how they feel, or that help is on the way, or that they're going to be alright. Yes, you've called 911, and police dispatch has assured you they'll get there soon, but you really have no idea if or when. And you have no clue as to how they feel or whether they'll be alright.
- **Don't tell them to stay calm** or to not worry. It's alright to worry. We're human and are born to worry, as a defense mechanism.
- **Don't tell them not to cry** or that they shouldn't feel bad. They have every right to feel bad, and that bad feeling, especially crying, can actually be their own mind's way of dealing with the situation.
- **Do not tell them it's God's will** that these things happened the way they did. You have no idea that's true, and it's often insulting to arbitrarily assign some sort of religious meaning to the situation, and can anger them.
- **Don't tell them that they're strong** and that they'll get through this. You don't know they're strong, and many will seriously question whether they'll actually survive the event.

Ok, so you know a few things you should not say. So, what **could** you say to this person who is under such stress? First, take a deep breath before speaking. Second, slow down and lower your pitch. Here are a few things you **can** say:

- Ask them their name. As much as you can, refer to them by their name. That's their most favorite word and sound in the world. It's calming and reassuring, and tells them that you're listening and are interested.
- Don't overwhelm them with a hundred questions, but ask questions as you would in a regular conversation. Find out what happened, who is injured, and how severe the injuries are. Often, people are looking more for a listening ear than an ambulance.
- Assure them that you're doing whatever you can to help. Tell them you're not a doctor or a policeman, but that you know how to work a radio, and will try and get them the help they need.
- Keep them talking. Again, not to overwhelm them, but ask them about their family, where they live, what their parent does for a living. They *want* to talk about themselves, and it helps distract them from the problem at hand for a little while.

The best way to keep them calm is by you setting the tone and the example, hard as it might be. It's ok to be surprised, but keep your cool, even when the other person says something shocking or unexpected. Don't get angry or upset, don't raise your voice unless you're in a noisy environment, and don't use profanity. Use a calm and deliberate voice, and before long, they'll subconsciously start imitating your tone.

Wear a vest during training or an incident [link]

A couple of years ago, I was called out to an activation by UCARES (Utah County Amateur Radio Emergency Service) to help out with communication during the Tank Hollow fire up in Spanish Fork Canyon. As is my habit, I grabbed my go-kit, my helmet, and my bright yellow vest. I tossed my go-kit and helmet in the front seat passenger side, but put my vest on, figuring that was one less thing I needed to carry in my hand. Soon, I arrived at the command post, where other hams were communicating with one fire team or another.

After about ten minutes, a fireman rushed into the command post, came up to me, and started asking questions about locations and status, and of course I had no idea how to answer him. The team leader, another ham friend at the command post, told the fireman he was in charge of giving status updates, and proceeded to help the officer. The fire fighter was a bit confused at first, but turned his full attention to the team leader. About an hour later, four of us went outside the command post during a break in the day, and right away I was accosted by a Utah County Sheriff deputy with questions. Once again, I had to defer all questions to our team leader, who was still inside our command post.

In just over an hour, these two gentlemen had taught me something valuable. They both assumed that I, the only person wearing an official-looking vest, was in charge. The fact was just the opposite, but the point is, the vest meant something to them, and it got me thinking that these vests likely mean something to a lot of people, like ordinary citizens. It turns out that, on one hand, vests might portray a facade (fake view) of who I really am.

On the other hand, it tells people that the situation is (at least a little) under control, and that people who know what they're doing, are helping to make a bad situation more tolerable for the rest of us, whether those are facts or not. It offers them a small peace of mind, and helps to calm otherwise frantic folks who are worried or in shock.

So, who is authorized to wear one of these official-looking things? You are, if you're helping with communication, first-aid, or another incident-related exercise, drill, or actual emergency. The next time you participate in an ARES or RACES net, volunteer at an ultra-marathon aid station, or help out in a city drill, wear your vest proudly, and make your presence known. At first, you might feel like you're pretending to be somebody or something you're not, but the more experienced among us will congratulate you for taking the initiative to make yourself visible to the public, as part of your training.

If you're interested in getting hold of an amateur radio vest, for example, you can purchase one for $16 from ARRL. Once you get it, I encourage you to wear it during drills, training, and other radio communication exercises, to get accustomed to wearing one. Yes, they might look a little pretentious, and maybe even a bit silly. But if you can overcome those feelings by using your vest periodically, you might also come to realize that people will view you as somebody who has some answers, and can help them in their hour of need.

The most important person in the world [link]

Who **IS** the most important person in the world?

You are.

You personally might not feel you're all that important, especially compared with, say, the President of the United States, or the leader of a highly respected religious organization, or even your daughter. But if your immediate task is to keep any of those people safe, and your own safety has been compromised to the point where you're injured, unconscious, or deceased, how will you accomplish that task? You're not going to do them much good if you've placed your own health or life in danger.

As difficult as it might be for many of us to face, our own safety is our first priority, above that of everybody else. Most of us are born with an internal moral compass that seems to contradict that priority, out of duty or love, and we might even secretly tell ourselves that we intend to obey that compass, no matter the circumstances. But remember that you might also do so at the peril of the very ones you're hoping to protect.

Even though you likely have a lot of radio skill in your back pocket, be sure that it's safe for you to climb the stairs following an earthquake, or to help an unconscious person lying near a downed power line, or enter a room full of coughing people. Be alert for danger signs that warn you of an unsafe situation, so that you don't become one of the victims, possibly rendering your aid and skills useless. Look for standing water, broken glass, the smell of gas, arcing or flashing lights, and creeking building structures. If there's ever any doubt, either get another person's opinion (you shouldn't be alone anyway, if at all possible), or don't approach the situation.

You *want* to help; after all, that's why you're listening to this. Just make sure you do what you reasonably can for your own safety **first**, so that you can effectively help others. Once your own safety is assured, you can be the means of helping or saving many others.

Protocol training topics

Incident Command shadow responsibilities [link]

You've been assigned the responsibility of ***shadowing*** Incident Command or you've volunteered for it. That means you're the main communicator for the incident to all of your civillian (not police, EMS, fire, etc.) operators. You have a few things to start moving on quickly, so here's a minimum list of your duties as Incident Command shadow (not necessarily in this order, but the order might help a little):

- You are **Net Control**, meaning you are *in charge of the civillian radio net*, under the direction of Incident Command. If there's a net already in progress, (politely) inform the operators that you are taking over as Net Control, by order of Incident Command.

- Decide on a **band plan**; that is, a) what frequency you plan to use for Incident Command, b) what frequency should be used by other teams (triage, SAR, medical, evac, etc.) if you should need more than one, c) whether to use simplex or repeater(s), and d) which FRS (walkie-talkie) channel(s) to use.
- Assign **communicator roles**, such as *Operations shadow*, *Medical Team 4 shadow*, *Stake President shadow*, etc.
- Assign **tactical call signs** to your operators, as in "Incident Command" (that's you), "Operations", "Medical Team 4", "Aspen Stake", etc.
- **Start the net** by announcing "QST, QST, QST" and then let everybody know that you are shadowing Incident Command, and that this is a *directed net*, meaning operators can transmit only if permitted by you
- Assign somebody near (in geographical proximity) to you, to monitor the **2-meter National Calling Frequency**, which is **146.520 MHz** (simplex). If your monitoring person has a dual-band / dual-watch radio, ask him or her to also monitor **446.000 MHz** (simplex) simultaneously
- Instruct your operators as follows:
    - **slow down and enunciate**
    - **be brief** (use fewer words) by thinking about what you're going to say, then say it on the air
    - **be accurate**; that is, give proper detail, and don't worry so much about privacy when a person's life is at stake
    - **use each other's tactical call signs**
    - **use plain English** as much as possible. Except for the "QST" at the start of your net, don't use "Q" codes or CB or police or military language. While it's acceptable to use some clarifying words, such as "negative" and "affirmative", try to refrain from ham radio jargon, such as "roger" or "copy" or "clear" or "over". If you need one station to wait on-frequency while you address a concern or answer the question of another, you can say "stand by".
    - **put yourself last** when announcing to whom you're speaking and who you are, by saying, "Medical 1, Incident Command"
    - **be kind and helpful**, not angry and demanding, in spite of the tremendous amount of stress you're under
- **Set the net in motion** by telling everybody that they are now permitted to transmit any message of urgency or need, as they relate to the incident
- Every ten minutes **order all ham operators to ID**; tell them to simply announce their FCC-assigned call signs all at once, and not worry about "doubling" with other operators, since the rule is that you transmit your call sign, not that you be heard; those who wait until others are finished will waste precious time
- **Remain on the job until released** by Incident Command. If you're too tired to continue, or if you need to relieve yourself, have another operator take your place, then inform the Incident Commander of the change. There's no need to announce the change to the net.
- **Repeat the net announcement** by saying that you're holding a net to handle an ongoing incident (or drill) every so often. **If this is not a true incident or emergency, you must state over the air that this is not an emergency**, to prevent unnecessary alarm.

As Incident Command shadow, you've got a big job. But keep in mind that, even though you're "in charge" of your net and your communicators, you still answer to Incident Command, who is in charge of the entire incident. Also, in a large-scale incident, Incident Command might have several communicator shadows, including you as the civillian shadow, a fireman as the fire and SAR (search-and-rescue) shadow, a policeman as the police shadow, etc.

Who's in charge [link]

As an ARES or CERT volunteer, it's possible you might get *called out* to help with an incident as a communicator, if you and your family are safe. But whether we're seasoned operators or brand new at the game, one point of confusion can arise, especially if there's a lot going on at the scene, and that is **who is in charge**. Most of us understand the Incident Command structure, in which the first person on the scene assumes the role of the Incident Commander, until replaced by somebody with greater authority or qualifications. But what we're addressing here is **who you answer to**.

Let's see if we can break that down into just two different viewpoints. First, according to the NIMS *Unity of Command* philosophy, each participant has one and only one supervisor. So, that addresses who your boss is. But are you in charge of anybody or anything? Turns out that's the other viewpoint.

The official is in charge of you
An *official* in this context is somebody who makes decisions and gives direction. This could be a policeman, fireman, a church leader, community leader, or other person who is responsible for handling the incident or gathering information. As a radio operator in the capacity we're discussing, you're the official's **shadow**, essentially following him or her where needed, to be ready to communicate by radio at a moment's notice. You're

essentially the slave, simply relaying messages from the person you are shadowing, to another radio operator at an unseen, possibly distant, location.

What this means is that, while many of us might be experienced at leadership and administration, *you do not make any incident decisions*. You can make decisions regarding how to set up or work your radio equipment, and what to tell your own family, but not regarding the incident. For example, if you see a need (injured person, water, more blankets, etc.), you should bring that to the attention of your official, and that's all. Your official will make the decision of how to handle the given information.

As a shadow, your responsibility is to relay *traffic* and messages as precisely as you're able. At times, the chaos of the incident might make it difficult to work your radio in this way, requiring you to ask for repeats of the messages that need to be relayed. In a very short period of time, you'll discover by experience what works and what doesn't, including how to orient your microphone and antenna, how to enunciate without sounding angry, and how to work in an adrenaline rush without passing out.

You are in charge of your equipment

Even though your official is directing your actions, the **FCC holds you accountable** for the proper operation of your amateur radio equipment, from the power cord to the antenna, by virtue of your license. Nobody has the right to operate, modify, or move your ham radio gear without your express permission, because you are the radio station *owner*. However, you are permitted to delegate the operation, modification, and relocation of your ham radio equipment to another, even an unlicensed, person.

This also means you're responsible for selecting an appropriate frequency for your communication needs. It means you must remove sources of radio interference, should you become aware of such a problem. It also means that it's up to you to find ways to ensure that your station gear remains workable and available at the moments it's needed, whether that means backup power (batteries, generator, solar panels, etc.) or even backup person (you're too tired or stressed.)

You might be in charge of the net

That is, if you are the Incident Command shadow, you are resonsible for establishing a *net*, including assigning frequencies, tactical call signs, and making the traffic (message-handling) rules. You will become *the voice of reason and calm* to all your listeners, which will be a fairly easy task, because of all the training and practice you've had on your local nets and drills, in spite of the excitement of the moment.

If you are a radio operator who is *not* the Incident Command shadow, then you must do as directed by your official *and* by Net Control. If there's a conflict in orders given by the two, you're going to have use your best judgment, but keep in mind that Incident Command is in charge of the incident. In most cases, the best thing to do is follow the orders given by Incident Command, and then inform your official 1) what was told to you by Incident Command and 2) what you are going to do.

Always serve with a companion [link]

Many years ago I served an LDS mission in Japan. While there, I learned one of the rules was that my companion and I went everywhere and pretty much did everything together. Except for showering and personal hygeine moments, we were together in the same room 24/7. And that taught me the value of companionship, not just because of an arbitrary rule, but because of a number of good reasons, which now seem like common sense.

Don't serve alone

I recommend that, when we serve in any emergency communication capacity, such as a drill or an event, or an actual incident, that we work as companions, and for many reasons. When you're working with another, reporting becomes a little more accurate, you feel the need to share your time and resources, time seems to pass a little easier, and you might even feel a bit safer.

There are times when it's just not practical or even possible to find a companion to serve with, and certainly most drill, simulation, or incident leaders will understand. Make sure *you* understand that when you don't, you're taking a risk.

Assist another who's already serving

A couple of years ago I was serving at the Squaw Peak 50 ultra-marathon up Provo Canyon. When I arrived, I noticed a young lady setting up the

radio and refreshments at the aid station. I saw a few others there that I knew, but out of nowhere a man walked up and wanted to know what we were doing. He was obviously inebriated, and started to sit close to the young lady, then helping himself to people's water bottles, and speaking loudly. It was apparent that the people at our aid station were a bit nervous about the situation, so I kept placing myself between the wanderer and the young lady. But the thought occurred to me, What if this woman had been alone? Would she have felt safe? I mean, there's no cell service up there.

My suggestion is that, when you see another radio operator sitting alone, plant yourself right alongside the person, and make yourself a new friend. Let the operator know that you're going to assist and work right alongside him or her. This way, if one of you does get asked about some details or actions, you can now reinforce the other.

It's another level of protection
When serving with another person, and you've forgotten some procedure or protocol, you have somebody who can help remind you of what course to take. When you're with another helper, and questions come up later on your whereabouts at the time of an incident or drill, you have a ready witness who can vouch for you. If you get accused of some misdeed, you have somebody who can assure the authorities of your activities. Finally, working in plain sight with another tends to make you less of a target for an assault or other nefarious activities.

And let me conclude by saying this is MY suggestion, and not a rule or a law, or even a demand; I believe it's just common sense. For safety, for protection, for accountability, and for companionship during a possibly intense moment. But now, I'd like to hear from *you*.

Not an actual emergency [link]

While working at my computer on a project one day, I had my radio on Scan, when it landed on a conversation between three or four people. After a couple of goings back-and-forth, I heard the word *injury*, and then *paramedic*, so I dropped what I was doing and turned to listen. After more than a minute of words like *bleeding* and *trauma*, I started getting just a bit concerned. But then, I started hearing clues, such as *Donald Duck is being transported* and *apply a neck tourniquet*, which told me that this whole communication was part of a simulation or mock disaster. Whew.

Announce that this operation is a drill
I believe that, had the Net Control operator or some other person on the radio, announced that this had been a drill or a staged exercise of some sort, I would not have become nearly so alarmed. Maybe he did, and my scanner missed the announcement. It's very appropriate for the person in charge or in control of the net to say

>**We are staging a training exercise. This is NOT an emergency; only a drill.**
>or
>**This is only a drill, and not an actual emergency.**

Repeat the announcement
Every half hour or other reasonable duration, repeat the announcement that what you're operating is a simulation, and not an actual emergency. This way, people (like me, who tuned in late to the game) will get the chance to hear officially what this alarming event is, instead of having to listen for clues.

Dial back the reality
If you want to lower the level of concern by the listening public, yet keep your drill as realistic as you can, inject silly clues to let them know they're listening to a training exercise, and not a real incident. Use names of celebrities, political figures, or cartoon characters for tactical call signs. Give places names like "bean bag chair" and "donut hole" to lighten up the drill a bit. Try and use words like "bleeding" and "fracture" and "casualty" sparingly.

Say it at the end
At the conclusion of your exercise, repeat the announcement one last time:

>**This concludes our drill. This has NOT been an emergency, but a staged training exercise.**

Don't forget that not only hams will be scanning and listening for alarming words, but it's possible that officials such as firemen and EMS will also pick up on your drill. Your frequent mention of the event as a training exercise will go a long way to lower their level of concern.

What are *your* thoughts? Let's hear from *you*.

Recording time formats [link]

One year during the Provo Freedom Festival parade, I was asked to relieve the person who was operating as Net Control for a portion of their net. It was about 9:30 am, and the parade workers and communicators had been stationed and coordinating since 3 o'clock that morning, so the parade was well under way. I glanced over the notes made by the previous person, who wrote down a couple of minor incidents at 10 am, which confused me, since 10 am hadn't occurred yet. Then it dawned on me that he was recording them in UTC time, not local time. Of course, that raised a few questions in my head.

1. ***What time format should we be using?***
2. ***Did somebody announce the format, or was that covered in some previous training?***
3. ***Does it matter?***

In my opinion, these are good questions, especially if somebody besides you needs to read your notes, like what happened to me. Just to clarify, there are four types of time formats that we as hams tend to encounter: 12-hour local time, 24-hour local time, military time, and UTC time.

12-hour local time is what you read on your 12-hour clock, and let's say that local time reads 9:27 pm on Tuesday. 24-hour local time is the same, but in a 24-hour format and without the am or pm, such as 21:27, using the same example. UTC time is a 24-hour time format, relative to the time zone in England, which is offset from our local time by the time zone and Daylight Saving. Using the same example, 9:27 pm local time would be 03:27 on Wednesday if it's summer, or 04:27 on Wednesday if it's winter.

Military time is seldom used by hams, but is often written by those in the military or law enforcement, and seen by some of us during multi-agency drills and ARES callouts, for instance. It's also a 24-hour local time format, but specifies the time zone, and for the same example, would be 2127T for Utah.

Alright, so which time format is the best one to use, or which *should* we use?

The answer is, the one that's dictated by the person in charge of your activity, such as your Net Control station, event organizer, or an Incident Commander. But if the chief didn't say, (because organizers often overlook that possibly petty detail), *then* which should you use? Your default should be to use **24-hour local time** (like 21:27 Tuesday) if you're engaged in a local activity, such as a church net, city drill, an ARES callout, or CERT activation. But if your communication can *potentially* be heard across time zone boundaries, such as with an HF net or a special event station, you should use **UTC time** (like 03:27 Wednesday for the same example).

What about on the air? To prevent confusion, it's often best to use the same time format on the radio that you use when jotting down an event. If you're forced to mentally translate between two different time formats, it's a lot easier to make mistakes, especially during a crisis.

The bottom line is to do your best to help communicate clearly. Even if you're the only person who will ever see your notes, it's still possible that you'll need to refer to them in the future. And if you do, will you remember what day and time you meant, when you wrote down 1:45? It might become important, for example, if an injured victim's insurance company asks for it, which occasionally happens following a TERT incident.

And we haven't even touched on which *date* format to use, which is recommended by ARES as 0M/0D/YYYY, as in ***07/04/2020***.

So, what are your thoughts? Which time format should we use in our nets? How about other activities? Does it matter? Let's hear from *you*.

Emergency training topics

What kind of grab-and-go bag [link]

When you need to leave your home in a hurry, you'll also need to take with you as much as you can reasonably carry in a *grab-and-go backpack*, to free up your arms to do other tasks. But the kind of backpack you get might not help you as much as you'd like if you select one that doesn't have the features to accommodate your needs. The two biggest backpack concerns are typically size and utility.

Size
You'll want your backpack to be large enough to hold everything you need in a grab-and-go bag, such as clothing, food, water, first-aid, toiletries, flashlight, batteries, and hundreds of other things that are important to you. But if you get one that's too large, you might be tempted to over-fill it, and the pack can become awkward and difficult to carry. One thing to think about is whether your backpack is large enough to expand outward from your body, rather than just upward (taller.)

Utility
The word *utility* refers to your pack's usefulness. If possible, your backpack should contain multiple full-sized storage spaces and plenty of large and small pockets. It should also have plenty of hooks, straps, or other means of attaching items to the exterior of your pack, such as those on a MOLLE or tactical style backpack.

Other features
Other useful features you might want to consider in a grab-and-go backpack are hydration bladder and hose, plastic (rather than metal) zippers, carrying handle, adjustable straps, strap hooks, chest straps, rubber or plastic feet (to set it down without wearing it out), in-pack frame, back padding, bottom hooks or straps (to attach underneath, like a tent or sleeping bag / pad), water resistance, cover or hood, outer webbing or mesh pockets, side pockets (for your water bottle or other), hidden pockets, locking waistband, double-stitching, and zippered expansion.

Location
Finally, you'll need to decide where to store your grab-and-go backpack, which might actually help you decide what kind to get. Place your pack in a coat closet near your front door or other exit, where you believe you'll most likely leave from your home if you need to. This allows you the convenience of checking and re-stocking your bag regularly right in your home. Some place it in their garages for the same reason, because they plan to escape by vehicle. Still others keep their backpacks inside their vehicles at all times. Just some food for thought.

What should belong in your grab-and-go bag [link]

Every person should have two things they have stashed near an exit-way in the event of a true disaster during which they might need to evacuate: a 72-hour kit and a grab-and-go bag. Some folks are resourceful enough to figure out how to combine these, but most of us are not. The ***72-hour kit*** should contain everything we need to sustain life away from home for 72 hours, including water, water purifier, food, medicine, toiletries, TP, blankets, first-aid kit, flashlight, headlamp, batteries, candles, lighter, raincoat, and dry change of clothing.

The ***grab-and-go bag*** should contain your CERT vest, CERT helmet, radio, antenna, radio, batteries, tools, paper forms, pens, markers, non-latex gloves, work gloves, emergency tent, emergency sleeping bag, and wipes. One thing that can make all of this easier to haul is a collapsible wagon, assuming your disaster terrain is flat enough for one. And if you do have a wagon, I would add a portable toilet.

With all of this, you're minimally prepared to serve your community in a CERT capacity. But let's take a look at the radio you've packed in your grab-and-go bag. First, is your radio already programmed with useful frequencies? These should include the following:
- your ***Area Simplex Frequency*** (mine is **147.480 MHz**)
- your ***City Simplex Frequency*** (mine is **145.770 MHz**)
- several local ragchew repeater frequencies (ours are **146.760- MHz** and **146.780- MHz**)
- your local ***ARES*** repeater frequencies (ours is **147.340+ MHz**)
- your ***ERC*** repeater frequency (mine is **147.020+ MHz**)
- **146.520 MHz** simplex, the ***2-meter National Calling frequency***

- a local weather frequency (ours is 162.550 MHz)
- KSL radio **102.7 FM** and **1160 AM** (the designated **Statewide Emergency Broadcast** frequencies)
- many like to program local police frequencies, but no real need for that, especially since most radios can't be programmed to them.

Finally, your radio batteries needs to be alkaline, not rechargeable. Store your pre-programmed radio with a disconnected sled of alkaline batteries and a disconnected Signal Stick or telescopic antenna.

What frequency to monitor, to be of most help [link]

You want to be as helpful as you can be when the need arises, to render some assistance to others. So, what frequencies should you tune to during an incident, especially if cell towers become damaged or otherwise unavailable? Here are some suggested ones, roughly in order:

- Your **Area frequency** if you're near your home neighborhood. Your Area is the geographical location defined by local religious leaders. And you know your Area frequency because it's the one that's held weekly by the predominant faith, and you don't have to be a member of the faith to participate. You should be able to locate yours on noji.com/nets.
- Your **City frequency** if you're within your home city, and is one of those used by your city during a city-wide drill
- Your **ARES** *(Amateur Radio Emergency Service)* **repeater frequency**. For Utah County, that's **147.340+ MHz** (100.0 Hz tone).
- If you're LDS, your **ERC** *(Emergency Response Communications)* **repeater frequency**; for the Lindon Bishops' Storehouse (Utah County), that's **147.020+ MHz** (100.0 Hz tone)
- The **2-meter National Calling Frequency**, which is **146.520 MHz** simplex, and part of the *Wilderness Protocol* (for the 70 cm band, it's **446.000 MHz** simplex)

These are provided, so that you can stay informed on the events as they're unfolding, to relay to others who need the peace-of-mind that information brings:

- The designatd **Statewide Emergency Broadcast** frequencies, which for Utah is KSL radio **102.7 FM** and **1160 AM**
- Any or all of several police, sheriff, fire, and EMS (emergency medical services) frequencies, which include, but are not limited to, the following:

  - **154.860 MHz** : North Utah County Sheriff
  - **156.135 MHz** : South Utah County Sheriff
  - **153.950 MHz** : Utah County Public Safety
  - **155.235 MHz** : Utah County Search and Rescue
  - **851.600 MHz** : Utah Public Safety (fire, EMS, police, chopper, ambulance)

Finally, and possibly counter-intuitive, be sure to program your radios with a few *ragchew repeater frequencies*. That is, frequencies of the nearest repeaters that are the most often used. For Utah County those would likely be **146.760- MHz**, **146.780- MHz** (100.0 Hz tone), and **146.620- MHz**. If you're trying to help, and monitor one of these repeaters, chances are fairly good that somebody who needs help will be calling out on one of these frequencies.

How to answer a call for help [link]

As a CERT member, you know that your community service is very needed when there's an incident or emergency. You've been trained on really valuable skills, like Triage, Minor Medical, Light Search and Rescue, and the Incident Command System, all of which can help save lives when your help is needed. One thing we don't always get much training on, however, is how to answer a call for help.

First, when you hear a request for assistance, you might not recognize it as a call for help. That's because you're listening for a smooth, trained voice who's used to talking on ham radio. The person on the other end might actually sound frantic, high-pitched, and hyperventilated. It'll take everything you've got to remain calm, even if the other person isn't.

Second, the other person might not have ever heard of a call sign, let alone have a license. It'll be up to you to ask the other person a few questions, to help keep him focused, to keep him talking to you as long as you could, until help arrives, if it does. Ask what his or her name is, call him by his

name every chance you get. A person tends to feel more calm, assured, and like you're really listening, when you repeat his or her name often.

Third, find out about his environment, whether he's in a safe place. Is he alone, or are there others nearby? Are they alright? How old is he or she? If it's a child, where are the parents? Are there power lines down near him? Does he smell gas? Is there broken glass on the floor near him? Is there water on the floor or spraying in the air? Are the lights on?

Finding out as much information as you can will help in three ways: it'll provide the caretakers (like police or fire or parents) more info to assess, it'll help calm the other person, and surprisingly, it'll help calm you as well. There's often a lot of talk about protecting privacy, but when a child's life is in danger, the child's privacy is probably not the first priority.

Your emergency gathering place [link]

When disaster strikes, it's helpful to know that you can gather with others at a temporary physical location, for help with your needs, to help with their needs, for information, and for moral support, even when it's not necessary to evacuate. There's comfort in knowing that others nearby understand what you're going through, and might be able to vocalize what you yourself are thinking. Depending on the situation, it might not always be practical or even possible for a group of people to gather at one specific location, but *if it is*, you *should*. Of course, that opens up a lot of questions, like where you should gather, where to go if your meeting place is no longer accessible, and who determines all of that.

Predetermined gathering place
To keep things simple, you should have a place to gather near your home, and another near your work place or school.
- For your home location, approach somebody in a neighborhood leadership position, such as your bishopric if you're LDS, or your Association if you live in an HOA. Ask them where you could gather during an emergency. Many will never have thought about it until you've brought it up.
- If neither of these apply to your situation, *you* take the leadership role, designate a reasonable gathering place, and inform those in your neighborhood. The Block Captian program provides some suggestions for grouping, but they're primarily for the accounting of people, and they tend to favor sheltering in place rather than gathering as neighbors.
- Approach your employer or school official, and ask about an emergency evacuation plan, including an outside location where people can gather.

Unplanned place to gather
Some situations require some quick thinking and a little pre-planning on your part, such as when you're shopping or traveling. When a disaster strikes, it might be up to you to designate a safe place to gather. People will find a little peace-of-mind, knowing that *somebody* has taken the initiative to do *something* for their safety. If another person steps up and devises a plan or location different from the one you had proposed, unless it's clearly dangerous, use your leadership skills in a different way by *supporting* the other person, instead of insisting that *your* way is the *right* way or the *only* way to do things.

Make a contingency plan
In the event that your primary home, work, or school gathering place becomes inaccessible for one reason or another, it's often wise to ask about or pursue a secondary meeting location. Downed tree limbs or power lines, broken-up roads, flooded landscapes, or even pathways that have been barricaded for emergency vehicles, might prevent you and your neighbors from collecting at your predetermined meeting place. Have a Plan B in mind, just in case.

What to take with you
Keeping in mind that this gathering place is temporary, but somewhat close to home or work or school, there are a few things you might want with you, but you don't want to go overboard either. Here are some ideas (smartphone and keys to your home and vehicle are assumed):
- Your *grab-and-go bag*, which might include bandages, water, toilet paper, lighter, headlamp, and batteries
- Warm clothing and jacket
- Laptop with important documents and passwords
- Your handheld radio, programmed with important frequencies, such as your Area frequency, your City frequency, the local ARES frequency, and the most popular local repeater frequency

- If you have the time and luxury, toys and games for the little ones, mementos (such as photographs, jewelry, and sentimental keepsakes), snacks to tie you over for awhile

Your two-minute warning [link]

You hear a loud knock at your door, **Fire department...you have two minutes to leave your house!** In the November 2019 issue of *Reader's Digest*, several homeowners recount hearing those very words during the devastation of the July 2018 fire that ravaged houses in a suburb of Redding, California, in which more than 38,000 were forced to evacuate their homes. If you had only two minutes to leave your home and property, what would you take with you?

People and animals first
Your first concern is for the people in your household, and then your animals. Your animals can be domesticated pets, work animals, or livestock. Plan a way for people and animals to escape quickly. Take into account age and disabilities, and how long it will take to evacuate people who might need extra assistance.

A grab-and-go bag is essential
Stored in a closet right by your front door is your *grab-and-go bag*, which contains all the personal and family items you had planned for an evacuation just like this, long ahead of time. You've stored away bandages, water, toilet paper, over-the-counter medicine, lighter, headlamp, batteries, clothing, ham radio, and other things you and your family need. The convenience of such a bag cannot be overstated, since all your essentials can be picked up in that bag and taken with you in seconds. Remember to rotate out expired medicines and perishables every six or so months.

Maintain a communication method
Taking your smartphone with you goes without saying; it's going to be your primary lifeline to the rest of the world. In a widespread disaster, however, cell towers become easily overloaded, so you need to have a backup plan, which should include ham radio. Be sure to take a handheld ham radio with you as you evacuate your property. And if you've already stashed one in your grab-and-go bag, that's one less thing to think about taking with you.

Other important items to take along
Here are some things to think about:
- Keys to your house and vehicle
- Warm clothing and jacket
- Laptop with important documents and passwords
- Cash, credit cards, other forms of payment
- If you have the time and luxury, toys and games for the little ones, mementos (such as photographs, jewelry, and sentimental keepsakes), snacks to tie you over for awhile

You'll probably have a lot more than two minutes
In a widespread disaster, such as the California wildfire just mentioned, you and your family will most likely have known about the quickly moving flames, how close they were to your place, and the ensuing general evacuation order, long before the two-minute warning is sounded. If you haven't already collected the things you need for your evacuation, those warnings alone should give you a chance to re-adjust your priorities and start gathering your needed items. And if this training topic will do any good at all, it'll help you get a start on that list of items today, plenty of time before any such disaster has occurred.

Your primary communication line [link]

Unless you're face-to-face with the person you need, your primary line of communication should be your smartphone. Yes, ours is a craft, a net, and a training that concentrates on ham radio, but with all of that focus, it's easy to sideline the most important tool at our disposal. Your smartphone should be the first device you turn to, for communication during an incident.

A smartphone contains features, apps, and built-in abilities that are unrivaled in any other device, and I'd like to mention a few of them, as they apply to emergency communication. These include a phone book, a note pad, a flashlight, GPS, and so much more. The trick is knowing how to use them at a moment's notice.

Try calling first
Once disaster strikes, and it's convenient, use your smartphone to call somebody. If you or a person nearby is injured or in immediate danger, call 911. If you're not in immediate danger, call a friend or a co-worker or a clergy member. After that, call your out-of-state contact, if you believe the incident is large enough, like an earthquake or flood or chemical spill. Your call might not go through, but you need to try.

Try texting next
You might find that twenty thousand others are trying to use the cell towers in your city the same time as you. Even though you show five full bars, your fully charged phone might seem to be dead. If it does, your next step is to resort to texting those same people. Your voice call requires quite a lot of bandwidth, and cellular systems will quickly limit connections if they get overloaded, and they tend to get overloaded quite easily. Your text message will often get through when voice calls cannot.

Learn to take notes with your smartphone
Your smartphone will typically have a built-in app for taking notes. Learn how to quickly bring up the app and begin jotting down information. You might want to record the date, the time, any injuries, people's names and phone numbers, contact information, and more. If you need to communicate this to EMS, they might ask you about vitals, such as bleeding, breathing, heart rate, and awareness. The information you note can be stored on your smartphone for quite a long time. Those of us who have had training in ARES, CERT, and AUXCOMM know of the numerous forms that need to be filled out and submitted for one reason or another. Chances are, you won't have any of those paper forms when an incident happens, but you can still note the same information on your smartphone app.

Take notes by email
One handy way to take notes on your smartphone is by opening an email app, as though you're composing an email to somebody, like to yourself. As long as you've got the email app open, it'll automatically save the information you've entered so far, even if you don't actually send the email. This way, if your smartphone battery dies, all your notes are safely stored.

Practice
Just like with ham radio, all of this takes practice. Ok, you probably have plenty of practice making calls and texting, but do you have your out-of-state contact in your phone book? Can you bring up your notes or email app quickly, and are you pretty handy at using the editors on them? Do you have a backup battery charger for your smartphone? And finally, be sure you know how to use your ham radio if you aren't able to get a call or text through.

For other training net opportunities

Radio-related training topics

Setting up a *net* at your work place [link]

With all the nets that people have, it might be nice to set up a net at work. This way, our work place could become better prepared for an incident, it might make a good daytime distraction, and it could be a vehicle to invite others to get licensed. But, like with any other amateur endeavor, there are rules.

You can indeed hold a weekly net at work, and even invite licensed co-workers to check in, and even non-licensed folks to look on. But during a drill or an incident, you won't be able to use ham radio to communicate, because you're getting paid to do so. Not even if you're a policeman, a fireman, a medic, or even the governor. After hours, there's not a problem, because you're not getting paid to do ham.

The one exception is if you're teaching ham radio as a paid professional educator. The rules permit teachers to teach ham radio and get on the air with their students, and still get paid to do all of this. This falls under *incident to classroom instruction* and can apply to other professions if they are also teaching ham radio in a classroom setting during working hours.

So, setting up a regular net at work is good practice, as long as you and your co-participants understand that the object is not so you can do ham radio during working hours, unless life or property is at risk.

Exercise: manually changing frequencies on demand [link]

[Note to the trainer: before your net starts, research two frequencies that you can use for this training; locate one that's coordinated as a simplex frequency *(this training uses 147.600 MHz as a placeholder) but not* scheduled to be used *during the time of your net. Locate another frequency, one that's* coordinated as a repeater output frequency *(this training uses 147.220 MHz as a placeholder), but not being used by a repeater accessible in your area]*

Every so often, you might find out that you need to change frequencies on your radio, especially to one that's not already programmed into it. This can happen because you're traveling to an unexpected location, because all the stations you have programmed are busy, or because Net Control has asked you to change to a particular frequency during a drill or incident. For these and other reasons, it's good practice to know how to manually change to an unprogrammed frequency.

Now that check-ins have been taken on this net, I'm going to ask everybody to change to another frequency, then I'll ask for you to check in again. Once check-ins are completed on that frequency, we'll return to this one, our *home* frequency, where I'll ask for you to check in once more. I'll then ask you repeat that process on yet another frequency that might cause some to stumble. At the end, we'll all return to our home frequency and take a final check-in and conclude the training.

1. On your home frequency :
   Everybody please change frequency to 147.600 MHz simplex. KI7ABC, QSY to 147.600.
2. On 147.600 MHz :
   This is KI7ABC, Net Control for the blah net. Please go ahead and check in now.
3. On 147.600 MHz, once check-ins are complete :
   Thanks, everybody, for your check-ins. Please now change back to the net frequency. This is KI7ABC, QSY to blah.
4. On your home frequency :
   This is KI7ABC, Net Control for the blah net. Please go ahead and check in now.
5. On your home frequency, once check-ins are complete :
   Thanks, everybody, for your check-ins. Please now change frequency to 147.220 MHz simplex. Note that this is recognized by many radios as a repeater frequency, which might require you to force your radio into simplex mode when you change to this frequency. This is KI7ABC, QSY to 147.220.
6. On 147.220 MHz :
   This is KI7ABC, Net Control for the blah net. Please go ahead and check in now.
7. On 147.220 MHz, once check-ins are complete :
   Thanks, everybody, for your check-ins. Please now change back to the net frequency. This is KI7ABC, QSY to blah.
8. On your home frequency :
   This is KI7ABC, Net Control for the blah net. Please go ahead and check in now, one last time.
9. On your home frequency, once check-ins are complete :
   Thanks, everybody, for your check-ins.

This training item was not meant to humiliate you, but to give you a little practice on manually changing frequencies at a moment's notice. If you find yourself in a difficult situation that requires radio contact, knowing how to manipulate your radio can keep you in contact, or maybe even be a life-saver.

Keeping your devices cool in summer [link]

One day last summer the temperature outside hit a hundred degrees again. And as the mercury rose, I started to think about the poor devices cooking in my car. Even with the windows cracked and shades over my dash, it's a veritable oven in there. So, when summer creeps up on us, how can we keep our sensitive electronic devices safe from the heat?

One obvious way to keep our radios, GPSs, phones, MP3 and DVD players, and other gear from roasting is by removing them and taking them inside, where it's typically a lot cooler. But that's not always practical, especially if you have a lot of stuff in your car, and especially if some of it's installed permanently. What if I run my A/C the entire time I'm out of the car? I don't think so.

I used to carry handheld radios in my car, and then put them under my seat when I left my vehicle, but remembering to do that's a chore, and I often forgot. These days I no longer stow handy-talkies in my car, because I have a mobile radio. And my mobile radio has a separated control head, so that most of my radio is in back, out of direct sunlight, while my control head is mounted up front on my dash. I still have to keep the control head cool, so I need to remember and put up my sunshield when I get out of the car.

But not everybody can afford a mobile radio, especially one that comes with a detachable control head, although most new models do have that feature nowadays. So, what's the best solution? I suspect there are as many good ideas as there are listeners, so I'd like to hear *your* thoughts. How do you keep your electronic gear safe from the melting heat?

Keeping your equipment clean [link]

About three Field Days ago, I learned a valuable lesson. It was very warm and a little dusty, so that when a breeze kicked up, some of the dust blew into the screen tent I set up for our GOTA (Get On The Air) station. Didn't think it was much of a problem at the time; I just wiped down whatever dust landed on my rig, tuner, power supply, the table, and our station was good to go. That is, until I got it all home after the event.

At first, the big VFO knob (tuning knob) on my HF rig seemed to grind just a bit, then it became more difficult to turn, and finally it froze altogether. After taking the knob apart, I discovered that the bearings had become full of dust, so I cleaned it out. But my cleaning job wasn't very professional, and after several laborious days and $40 later, I ended up replacing the knob. I had learned my lesson, expensive in terms of both time and money.

Dirt and oils
Most of us don't spend a lot of time cleaning our radio equipment, which is not normally a problem. But over time, dust, oils from our hands, dirt, and other unsavory substances collect on our equipment due to use, which is a good problem to have; I would rather see my radios get dirty from being operated, than collect dust by sitting on some shelf. So, try and protect your radio gear from excessive exposure to dusty environments, if possible. Within reason, clean your hands before picking up your microphone.

Germs
I wouldn't actually say I'm a germophobe, but I'm a little leary of using other people's cell phones and placing my hand on restroom door handles. You likely believe that you're relatively germ-free, but others might not share your belief, and would rather not touch your equipment until they feel it's been wiped down a bit. Back to Field Day, I kept a canister of disinfecting wipes near my GOTA station equipment, in case people want to wipe the microphone or mic stand or even the face of my rig, before they started using it.

Smells
One day I purchased a used desk microphone, only to open the box and fill my room with smells of bourbon, gin, and beer. When Billy Joel said his microphone smelled like a beer, I now know what he was talking about. That made for an interesting guessing game, but it was no fun to clean, having to take it apart and even throw the metallic housing and base into the dishwasher. You might not think that you actually spit on (or into) your microphone, but in fact you do that and more. It's another good reason to talk across your mic face rather than puff directly into it.

Cleaning agents
One word of caution, however. You might want to test a spot of your display, for example, before cleaning the entire rig with some disinfecting wipes or harsh chemical. Most equipment manuals state that you should only use water with mild soap to clean your hardware. And avoid using paper towels, which can scratch your display and rub your radio's lettering and labels right off. While you're at it, you might also want to vacuum or blow the

dust out of the fans in your power supplies and radios.

The benefits of a clean rig
As a side benefit, you might actually find that keeping dust and other flying debris out of, and off of, your radio can actually extend its life, because dust and dirt are abrasive, and can wear out small moving parts, like your microphone or knobs. Also, some dust is a little conductive, and combined with a little moisture, can present low-impedance shorts in your small electronics.

Finally
The point is, you really should keep your radio gear clean, as we had discovered during Field Day. In the end, you want a clean radio that you can rely on if you're in a hurry or need to help out during a small emergency.

How weather affects radio propagation [link]

One question that surfaces occasionally, especially following storms, is how weather affects ham radio. There are many weather-related influences that can act upon station operation, such as temperature, wind, lightning, and barometric pressure, but this topic focuses on conditions resulting from moisture, because of its conductive nature. Remember that "propagation" means *how well a radio signal retains its integrity as it travels along its path*. **In general, moisture from weather affects HF propagation very little, VHF propagation a little more, and UHF propagation much more noticeably.**

Moisture-laden conditions such as rain, snow, fog, clouds, or high humidity tend to partially refract radio signals or reduce its strength, depending upon frequency, sometimes requiring you to get your antenna higher or increase your power output to maintain good communication. Under most circumstances, *you will **not** notice a large change in transmit or receive signal strength or integrity*, regardless of weather changes. But, there are exceptions.

Inversion
One of the activities many of us get involved with, is helping out with aid station communication for marathons, races, and other events that take us up the mountains or into canyons. And yet toward the end of any of these, as the sun is setting in the valley, one phenomenon that seems to always catch us by surprise is the effect that dusk has on 2-meter propagation.

An inversion, caused by a layer of cooler air on the ground being trapped by a warmer layer above it, creates a moisture density "boundary" that actually refracts radio signals. As well as from the typical wintertime inversion, this phenomenon can be experienced as the summer sun sets, and the air closest to the ground cools faster than the air above it.

During this dusk inversion, 2-meter signals originating from under the inversion boundary tend to travel farther due to *tropospheric ducting*, which allows the signals to repeatedly reflect off the ground and the underside of the inversion. By the same phenomenon, 2-meter signals originating from over the inversion (like from on a hill overlooking the valley floor) tend to refract off the inversion and head off into space, while very little of the signal gets through to the ground below.

Wet antennas and feed lines
When antennas get wet, iced, or blanketed with snow, they appear to be shorted out by water, but in reality they are not, because what can appear to you like a DC short is not always an AC short, and antennas function using AC. On one hand, there's no need to go to any lengths to protect your antenna from wet weather. On the other hand, you need to make sure your connectors are waterproof and will not allow any moisture to get into the coax.

Other weather-related situations
While we're talking about the weather, it might be worthwhile to mention a few other weather-related items of interest, two of which do not always involve moisture:

Trees

Because of their water content, live trees can also alter how well radio signals get from one place to another. A few trees won't affect your signal much, but a forest can partially or completely block your signal from getting very far. For most amateur frequencies, the few trees in your back yard will typically have little effect on your ability to be heard. But if you're surrounded by a dense forest, especially one covered in snow or drenched in rain water, you might find your signal to be noticeably degraded.

Wind

If your coaxial cable is free to swing in the breeze, even slightly windy conditions can result in erratic signal reports, and can even work antenna joints and connectors loose. Be sure to secure your feed lines, structures, and antennas to sturdy anchoring posts or buildings. Make sure store-bought vertical antennas have wind ratings (often labeled *wind load*) that can withstand your largest local gusts. Don't underestimate the power of air movement.

Lightning

Collective lightning crashes from thunderstorms many miles away can be heard on your HF receiver as *atmospheric noise*, and can present anything from a minor nuisance to a complete inability to communicate. Related to lightning, excess static build-up due to air movement can discharge not only on your antenna, but on nearby chain-link fences and buildings, often heard on your radio as loud static pops resembling a crackling fire.

This *training* is more of a *heads up* than how to resolve weather-related problems, due to the extra time it would take to cover all of that. The point is, most weather won't affect ham radio operation very much; just don't be too surprised if you start getting unfavorable signal reports when the sun starts setting.

Amateur radios that can transmit outside the amateur bands [link]

Every so often, we see questions or statements posted online about using your radio to transmit on frequencies outside of the amateur bands. Granted, many of our radios won't even allow us to do that, but many do, and people wonder whether they're allowed to use those frequencies, since they're available on a ham radio, after all. Before I go any further, let me say right out that our amateur radio license only permits us to transmit on amateur frequencies, and those within the privileges granted to us by our particular license class.

On the other hand, we also know that, in the event of an actual emergency, we can use any communication means available, if our lives or property are in immediate danger. I don't want to hinder anybody's rescue if their life is truly at risk, but allow me to say that, if you ever find that you really need to communicate outside your privileges, by all means do so, but be prepared to *defend your definition of an emergency*. You might need to explain why you thought your situation warranted that emergent status, and why you needed to use the communication method you chose, to save your life or property.

Now then, back to your radio. You might have discovered that your HT will allow you to transmit outside the amateur radio frequency band, and that this feature might come in real handy if you need to alert somebody official, such as the fire department or police. But, if you don't hold a license to transmit on those frequencies, your transmissions will not be legal. Furthermore, if you transmit on one of the license-free bands, such as FRS, MURS, CB, or others, using your handheld ham radio, those transmissions will also not be legal, because the radio you're using is not authorized for those bands. Moreover, even if you do hold a Maritime, Air, Commercial, or other license, your transmissions on those respective bands using these ham radios will also not be legal, for the same reason, because the radio is not authorized for them.

In the amateur radio world, we've been given quite a bit of latitude as far as equipment goes, so that none of our equipment needs to be authorized or certified (formerly "type accepted") before we can use them to transmit. But again, our transmissions are confined to the amateur bands. So, why don't manufacturers simply prevent us from being able to transmit outside the amateur bands? Well, some actually do, but many do not. I mean, why don't automobile manufacturers prevent our vehicles from exceeding the speed limit? Maybe someday they will, but meanwhile, the responsibility to drive legally falls on our shoulders. The same should apply to amateur radio.

To summarize, during an actual emergency, we're given a lot of freedom. Many of us have radios that can take advantage of that extra latitude, but if we exceed our license privileges, we should be prepared to defend our actions. And just because we can violate the rules doesn't mean we should.

Let's hear your thoughts. Did I omit some important facts?

Personal training topics

Practice being the communicator [link]

During a time of emergency or moment of great alarm, you're breathing hard and fast, you're in a hurry, and so is everybody else. At a time like that, you don't want to offend anybody, but you might speak quickly, directly, and expect a quick response. And when you don't get what you want right away, you might get frustrated, irritated, or even angry.

Most hams are very understanding and patient, but if you don't feel you're at that point yet, this is the time, when your adrenaline is low, to train yourself to be kind, thoughtful, and grateful. That's why we have nets like the New Ham Net and your own stake or area net, to practice taking control and experiencing what it's like to be nervous and hesitating under stress. Then, with a little practice, maybe after a few times at being Net Control, you slow down, ask carefully planned questions, and present a voice of understanding and welcome.

So, here are a few tips that might help:
- Volunteer to help be a communicator at outdoor events, like the Squaw Peak 50, the Kat'cina Mosa 100, the Freedom Festival, the Art City Festival, or Orem Summerfest
- Take it up a notch, and volunteer to run a net as Net Control
- When you're on the radio, slow down your speech and enunciate your words; it might take you only five seconds to say something slowly, or twenty seconds for you to a) say something quickly, b) have Net Control ask you to repeat that, then c) another five seconds for you to repeat it slowly like you should have, to begin with
- Try to remember the others are just as nervous as you, and are doing their very best
- Be kind to them, and never criticize any of them
- Offer advice only if it's asked for, or if you believe it's truly helpful at the moment
- If you feel like you're starting to get upset or angry, take a deep breath and then speak thoughtfully and in a friendly manner
- People under stress often say seemingly non-sensical things on the air; try your best to understand what they're really trying to say, and ask them to repeat if necessary; maybe it's your brain, not their mouth, that's making nonsense

It's easy to take the short path to criticism, and berate, belittle, or sound condescending. Always do your best to be kind and understanding, readily admit your mistakes, and know that the others are freely giving their time as volunteers, and that they might have other or better things to do, than endure your attitude. Remember that *an apology is a sign of strength, not weakness.*

Anything you can add to this list? Let's hear from *you*

Practice common courtesy [link]

Most hams are very kind, helpful, and courteous to others. Still, it's easy to forget to use common courtesy on the air if we don't make that practice a constant part of our hamming. Furthermore, being from a variety of backgrounds, many of us might not always agree on what's courteous and what's not. Here are some DOs and DON'Ts that might prove helpful:

DOs
- Make it a natural habit to say *please* and *thank-you* and *no problem* liberally
- Be polite, welcoming, kind, positive, helpful, and forgiving
- Be quick to sincerely praise the other operator; look for opportunities to put the other person on a pedestal
- Be just as quick to admit to mistakes and own up to your faults; accept correction with humility
- Give the other operator the benefit of the doubt; that is, assume they mean well, and did not intend to offend
- Try to *listen* more to the other person than insist that they hear *you*; people need to know that their input is valued by you

DON'Ts

- Try not to convey a negative attitude or feeling on the radio; if you're in a sour mood, or you feel too angry, sad, or painful, you should probably wait until later, to get on the air
- Avoid criticizing anybody and anything, even the weather or the gubmit, but especially the other operator on the radio
- Refrain from foul language
- Avoid speaking sharply at others, and do your best to not raise your voice in anger or frustration; remain calm if at all possible
- Don't point out faults or shortcomings about other people; there are other avenues besides ham radio to vent that kind of frustration
- Try not to provoke another operator by using cutting remarks, spiteful language, or by bringing up a sensitive topic particular to the person
- Don't talk down to people and believe that you're smarter or better than they are

There you go: common courtesy. Then again, I didn't need to remind you of any of that, right? That's because all these principles are already part of your ingrained habit.

Focus more on others [link]

Without a doubt, *you* are the world's most interesting person. Any intelligent soul on the planet would love to hear every word you have to say about yourself. Your life history, your adventures, your love life, and your aches and pains. At least, that's how we often make it sound like, when we go on and on about ourselves. And then we wonder why nobody wants to talk to us.

It's well-known that a person's most favorite word in the whole world is his or her own name. By the same token, a person's most favorite topic tends to be something about that person. Ask your contact questions about family, employment, school, favorite foods, vacation spots, TV shows, and what makes life enjoyable. It's easy to focus on the negative, so ask about happy moments and experiences and people they're close to.

Try this experiment: next time you're on the radio or cell phone talking with a friend, silently count the number of times you say "I". If you can mentally multi-task, also count the number of times you say "you" and then compare the two. If you find that your conversation is peppered with a lot more "I"s than "you"s, that's only human nature, but it seems that we can overcome the natural man, in order to become better conversationalists.

Of course we want to talk about ourselves, and we have a lot to share. But the important thing is that the other person does too, so why not turn your focus to *their* concerns and things that excite *them*? Most of the time, it takes practice to think of others over ourselves, and to dominate the conversation with *their* point of view or *their* opinions and adventures, rather than our own.

Be genuine and thoughtful in your questions and concerns as you talk with others. Do your best to understand their struggles, to empathize with their feelings, even if you don't agree with them. This approach to conversation will help others *look forward* to talking with you and opening up a little.

Is this topic really all that important? Well, maybe not as much as other things we might discuss, but picture this: If you ever find yourself talking somebody through a crisis or a lonely time, placing your focus on him or her will go a long way towards comforting the person and helping them feel like you're interested in understanding and being a friend. Eventually, they'll start warming up to you and maybe even trust you a little.

It might take a little practice, but focusing our conversations on the other person might not only win you a friend, but future friends who are silently listening in.

Amateur radio license plates [link]

Not to be confused with a *vanity call sign*, an amateur radio license plate is a *personalized vehicle license plate* that displays your current amateur radio call sign as its number, whether that call sign is a vanity or not. And hams wonder whether they should get one, but some are concerned about privacy or confusion, and still others are torn between getting one for amateur radio, or another, favorite organization, such as the *Boy Scouts of America* or *Search and Rescue* or *In God We Trust*.

When we encounter another vehicle that displays ham radio license plates, we often feel an immediate sense of connection and camaraderie with the person, even when we have no idea who the person is. Well, personalized license plates are optional, but there are a number of reasons why you might want to put ham radio plates on your vehicle, and some reasons why you might not, so let's list some PROs and CONs of getting them, and then let *you* decide.

PROs
- It's a fun way for traveling hams to recognize a fellow ham
- In an emergency or special event, it can help officials recognize you as part of the solution (some will actually allow you access to incident areas where they might refuse others)
- It can give you a greater sense of responsible driving and public example (you might be surprised to find just how true this is)
- It can give you a sense of belonging
- It might make it easier to explain why you're parked on a dark hill with a carload of electronics
- It shows your willingness to answer questions about ham radio (because you know people will ask about them)
- All the cool kids are getting them
- Shows just how much of a geek you really are

CONs
- Alerts thieves that you have ham radio equipment in your vehicle
- Stalkers might be able to track your plates to your home address easily
- It costs money ($21 one-time fee)
- You might want to change your call sign in the future, and plates seem rather permanent
- Shows just how much of a geek you really are

If you're interested in getting amateur radio license plates, contact the DMV in your state, and most states support them and can help you. For Utah plates, go to dmv.utah.gov and sign up there.

Protocol training topics

Announce that you're *portable* when traveling [link]

Eventually, you're going to find yourself traveling. And when you do, I hope you find the occasion to bring along a little ham. As in, radio. Whether that's a handy-talkie or a mobile unit, it's a good idea to take something with you. Turns out that, most of the time, people who bring their radios with them on vacation never use them. But you never know when one might come in handy.

In another training topic, we discussed how to locate and connect to various repeaters as you're traveling from one place to another. And we want to connect with repeaters because that's where the majority of active hams hang out. But now, let's mention something that might get the attention of people who are monitoring these repeaters. And you *want* to get their attention because, for every ham who's actively monitoring or using the repeater, there are dozens of others listening in.

These good folks just leave their radios on and tuned to the local repeater, while they eat, work, exercise, clean, or even watch TV. A few even keep their radios on when they sleep, which I don't recommend, because of how it might disrupt your deep sleep cycle. At that moment, when many might be listening, but nobody's talking on the repeater, say your call sign, followed by **portable 7** and see what happens, as in

This is KI7ABC, portable 7

Experienced hams might be tempted to pick up their microphones and respond, asking whether you're traveling, and where you're from. Most new hams have never heard of this, and might ask you what the heck you're talking about. (Because when you travel near home, like within your own county, you typically say, *This is KI7ABC,* **mobile**)

The term **portable** simply means that you're traveling away from home, that you're transmitting with a portable radio. The **7** means you're from the *7 Calling Area*, which is none other than the contiguous states of Utah, Arizona, Idaho, Wyoming, Montana, Nevada, Oregon, and Washington. The *7*

Calling Area means that, when you first get licensed, and you register a mailing address with the FCC from within one of these eight states, you'll automatically be assigned a call sign with the numeral **7** in it, like KI7ABC.

So, announcing **portable 7** on the air is kind of fun. If you're traveling outside the *7 Calling Area*, people can recognize that you're from out of town. Yet if you're traveling within the *7 Calling Area*, it might seem pointless, but you'll find that it's still a fun QSO-starter. Besides, if you ever get in trouble where there's no cell, grabbing the attention of a few friends might come in real handy.

How to handle a bootlegger, and more [link]

One day you might be listening on a repeater, and hear somebody come on the air, possibly announcing that he wants to know if this thing works, and whether there is anybody listening. It might become obvious that the person is unlicensed. Back in *the day* this unlicensed person using a ham radio frequency was called a *bootlegger*. So, how do you answer a call like that? And, *should* you?

According to the rules, it's clear that we're prohibited from communicating with anybody on an amateur frequency if we know the other party is unlicensed. Still, there are exceptions. Such as, when the other person's life is in danger, or he's involved in some other emergency. We can communicate with an unlicensed person if he's in the presence of a person who *does* have a license, like we do during Field Day. Also, we're authorized to communicate with him for the purpose of explaining how to get licensed, or directing him to a club meeting. In any case, you should still be kind and respectful, and not jump to any conclusions.

One way to answer a bootlegger is by being friendly, and asking for his call sign. And if he doesn't have one, that's not the time to berate him or rehearse the rules. Let him know that you and he are using a *ham radio*, and that you have a license to use such a device. Then tell him he can easily get a license of his own, and that you'd be happy to help him learn how to get one, if he's interested.
>   Bootlegger : *Hello. Is anybody out there?*
>   You : *Hello, my name is Nancy. What's yours?*
>   Bootlegger : *My name is Harold. I got this walkie-talkie from my grandpa, and I thought I would try it out.*
>   You : *Well, that's really nice of your grandpa to give it to you. We call it ham radio, and I have a license to use one of these. My call sign is KI7ABC. What's **your** call sign?*
>   Bootlegger : *Um, I'm not sure.*
>   You : *If you're interested in getting a license to use this radio, I'd be happy to help you find out more about a good website and how to take the exam, to get licensed.*

At that point, the unlicensed person will either get the clue that he needs to get off the air, or pursue a license. Either way, you've explained how he could get licensed if he wanted to go that direction, you've satisfied the rules, and you were a terrific example of how friendly a typical ham radio operator is. Should the unlicensed person ever decide to get a license, he'll most likely remember your positive and helpful conversation. Win-win-win.

Ok, there's more. How would you handle a deliberate or malicious kerchunker? Maybe somebody who not only keys up momentarily, but might take an opportunity to play a short music clip on the air, broadcast arbitrary animal sounds, or blurt out an obscenity? This kind of interference tends to make our blood boil, but if we come on the air and chew out the person or tell him he's doing something illegal, he'll most likely have achieved his cheap thrills from provoking you into making an angry outburst. So, what can you do about that one?

Probably the best thing you can do is ignore him; change to a different frequency or turn off the radio. Sometimes he's difficult to ignore, especially if he constantly attempts to key up over your conversation with somebody. But if you really want to engage him, you should still remain friendly and be the mature one. Don't criticize his behavior, don't call him names, and don't lie to him, by telling him that the police is coming after him, for example. You can try this:
>   Bootlegger : *<buzz>...<pop>...<kerchunk>*
>   You : *Hello, this is Nancy, KI7ABC. Can I help you with anything?*
>   Bootlegger : *<kerchunk>*
>   You : *Just so you'll know, this is called ham radio, and I can tell you how you can get licensed to use one of these things.*

Bootlegger : <thhhptptpt>
You : *Well, just let me know. We have friends who can help you get started, if you like. Good luck. KI7ABC.*

It's unfortunate that we sometimes have to face situations like these, but in every case, keep your cool and be kind and friendly. ***You never know...it's possible that the person making those weird sounds might actually be calling for help, and is simply experiencing a dying battery.***

Handling somebody interrupting your net [link]

You're in the middle of your weekly net, and somebody who's not participating in your net decides to try engaging a friend of his on your net frequency, and calls out for him. Or worse, during a real emergency, a person comes on your net frequency and asks what's going on, and whether this is a net. What's the best way to handle such an intruder to your net?

This very thing occurred a couple of years ago during the Provo Freedom Festival parade, which was already under way. The parade communication was well-organized, involving three dozen ham operators and others. Then, during the parade net we all heard the following dialogue, as near as we can recollect:

Outsider : *This is KI7ABC, I hear people talking about asking for reports. Is everything alright?*
Participant : *Hello, I'm KI7XYZ, and this is a net for the Provo Freedom Festival parade. May I help you with something?*
Outsider : *Oh, sorry, I didn't know. Can anybody check in to this net?*
Participant : *If you first report to Net Control at 950 N University Avenue, they can help you with that.*
Outsider : *Oh, ok. KI7ABC*
Participant : *KI7XYZ*

What a terrific example of understanding, helpfulness, and maturity! The participant didn't order the outsider off the air, didn't scold him, and wasn't rude to him. Instead, he ***briefly*** explained what the net was for, and how to learn more, and in a polite way. At the same time, the net participant promptly ushered the outsider off the air, so that he no longer interfered with their net.

Always assume that the person who's interrupting your net, is doing so innocently. Most will gladly vacate the frequency when told that a net is in progress. No matter what the intruder says or how he says it, remain calm, kind, and unreactive to his comments.

So, what if the outsider doesn't vacate your net, after you've kindly informed him? As much as possible, carry on with your net the same as you were previously. It's not your job to be the *net police*, and you've already done what you could to help the outsider, politely. Finally, *keep in mind the possibility that the interrupting station might be asking for help, but is nervous and doesn't know how.*

Making a general announcement without broadcasting [link]

In amateur radio, each ham *transmits* a communication to one other person in a two-way exchange between two people. Then again, there are occasions when one might want to communicate a message to more than one person, and there are several legal ways to accomplish that. Most of us know that the rules are clear about *broadcasting*, which is the *one-way transmission intended for the general public*. What's not always clear, however, are the exceptions to the broadcasting rule, and there are indeed exceptions.

This training topic is not intended to help you violate the rules, but to learn how to get a message out to multiple people within amateur rules. For example, you're permitted to transmit to the general public in ***an emergency***, meaning that ***life or property is in immediate danger***. Here are other exceptions:

Calling out to make a contact
The rules say that it's permissible to call out to many others, if your intention is to establish a one-on-one contact.
Hello, this is KI7ABC...is anybody available to chat?
or if you're on single sideband, like you would typically be on HF (please, not on FM, like on a repeater)
CQ! CQ! CQ! This is KI7ABC. CQ!

Calling out to gather people for a net

It's also permissible to call out to many others, if you're getting their attention in order to start a net or other on-air activity, like a contest, a QSO party, or special event station.

> *QST! QST! QST! Attention all hams! The net will start in five minutes.*

Redirecting listeners to another frequency

At times, it might be necessary to direct their attention to another frequency.

> *Attention all hams! Please change frequency to 146.520 MHz simplex for further instructions.*

or, if you're attempting to redirect a subset of listeners

> *Everybody who's part of the preparedness project, please change frequency to 146.540 MHz simplex, to avoid interfering with the city net, which is already in progress.*

Making a public announcement or warning

It's *not* permissible to make public announcements, because your communication must be one-on-one, so simply make the announcement to one person. In this example, it's not actually known by the caller that KI7DEF is on the road; it's only necessary that he or she is listening:

KI7ABC : *KI7DEF, KI7ABC*
KI7DEF : *This is KI7DEF. Go ahead.*
KI7ABC : *Just wanted to make sure you're aware of a crash on north-bound I-15 near Lehi Main Street. Looks like about a mile of delays, but you can avoid that by getting off at Pleasant Grove.*
KI7DEF : *Roger that. Thanks for the heads up! KI7DEF*
KI7ABC : *KI7ABC*

So, while it's not legal to *broadcast* a non-emergent message to the general public, there are legal ways to get a message out to more than one person on the air.

How to perform a *Final 7-3* [link] [PDF]

When a beloved ham passes away, many find it awkward to say something about the person on the air, and so we tend to avoid mentioning anything about the now *silent key*. You might instead want to honor him or her by a small ritual called the **Final 7-3**. It's an on-air ceremony patterned after the way police and public safety do it. Here's a recommended version, all spoken by a single person (Net Control, who is KI7XYZ), often as part of a *roll-call net*, or sometimes during an appropriate moment in a funeral service (it's traditional for all to stand.)

Key up, and say the following slowly, clearly, and reverently (in *red*):

> *In honor of our good friend, John Doe KI7ABC, who is now silent key* <un-key, then pause three seconds>
> *KI7ABC, John Doe* <un-key, then pause three seconds>
> *KI7ABC, John Doe* <un-key, then pause three seconds>
> *No contact. John Doe, KI7ABC, silent key. May you rest in peace. Seven-three. KI7XYZ.*

And that's it.

Emergency training topics

What frequency to monitor, when *you're* the victim [link]

You want to be as helpful as you can be when the need arises, to render some assistance to others. But what if *you* are the person who needs the help? No doubt you've learned about and prepared many things to be self-sufficient during a critical moment, including with communication. So, what frequencies should you tune to during an incident, especially if cell towers become damaged or otherwise unavailable? Here are some suggested ones,

roughly in order:

- Your **Area frequency** if you're near your home neighborhood. Your Area is the geographical location defined by local religious leaders. And you know your Area frequency because it's the one that's held weekly by the predominant faith, and you don't have to be a member of the faith to participate. You should be able to locate yours on noji.com/nets.
- Your **City frequency** if you're within your home city, and is one of those used by your city during a city-wide drill
- Your **ARES** *(Amateur Radio Emergency Service)* **repeater frequency**. For Utah County, that's **147.340+ MHz** (100.0 Hz tone).
- If you're LDS, your **ERC** *(Emergency Response Communications)* **repeater frequency**. For the Lindon Bishops' Storehouse (Utah County), that's **147.020+ MHz** (100.0 Hz tone).
- The **2-meter National Calling Frequency**, which is **146.520 MHz** simplex, and part of the *Wilderness Protocol* (for the 70 cm band, it's **446.000 MHz** simplex)
- The designatd **Statewide Emergency Broadcast** frequencies, which for Utah is KSL radio **102.7 FM** and **1160 AM**
- Any or all of several police, sheriff, fire, and EMS (emergency medical services) frequencies, which include, but are not limited to, the following:

  - **154.860 MHz** : North Utah County Sheriff
  - **156.135 MHz** : South Utah County Sheriff
  - **153.950 MHz** : Utah County Public Safety
  - **155.235 MHz** : Utah County Search and Rescue
  - **851.600 MHz** : Utah Public Safety (fire, EMS, police, chopper, ambulance)

Finally, and possibly counter-intuitive, be sure to program your radios with a few *ragchew repeater frequencies*. That is, frequencies of the nearest repeaters that are the most often used. For Utah County those would likely be **146.760- MHz**, **146.780- MHz** (100.0 Hz tone), and **146.620- MHz**. If you're in need of help, and call out on one of these repeaters, chances are fairly good that somebody will be monitoring and will answer your call for help.

Importance of scanning [link]

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. On the other hand, if you're traveling and aren't familiar with the local repeaters, scanning the entire band might actually be a better option.

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.

What do you think? Other thoughts about scanning? Let's hear from *you*.

How to call out for help [link]

When you're in real trouble, calling out for help could mean life or death for you or the people with you. And knowing how to get people's attention to obtain that help isn't always obvious.

Use your phone to call for help
Your phone will be your primary lifeline in most cases. When you find your life, health, or property in immediate danger, call 911. There are times when a phone call might not be available to help you, because many others are calling for help the same time as you. In that case, try texting for help; texts will often get through an overloaded cell tower when a call will not.

Use your radio to call for help
If your phone battery is dead, or cell service becomes unavailable, resort to radio. When you really need help right away, hopefully you'll have your grab-and-go bag handy, and it'll contain your ham radio. And if you've managed to escape by car, hopefully you'll have your ham radio installed in your vehicle. Here are steps you can take to call for help by radio: (Except for the call sign, the following are not limited to *ham* radio, and so can be used on walkie-talkies, CB, and other radio types as well.)
1. **Listen** on your Area frequency (if you're near home), City frequency, and Emergency frequency, for a net or communication already in progress. (Your Area frequency is typically organized by your local religious body or geographic area of citizens. Your Emergency frequency is organized by the county ARES group, but can also be the **National Calling Frequency**, if you're following the Wilderness Protocol.)
2. At an appropriate moment, **break** into the ongoing net or conversation and announce that you have *a problem that needs to be addressed immediately*
3. If you don't hear any communication taking place on any of your frequencies, set your radio to **scan** all the frequencies in memory. When the radio stops on a valid conversation, go back to Step 2.
4. If all else fails, change your radio to your Area, City, or Emergency frequency, and say
   > ***"This is KI7ABC, and I need help right away."***
   > or
   > ***"This is KI7ABC. Could somebody help me right away?"***
   > or
   > ***"This is KI7ABC. Could somebody get me an ambulance right away?"***
5. Avoid using the words "emergency" or "break", since many hams are too used to equating these words with drills or simulated exercises, even though they're reserved for true emergencies.

Use any means at your disposal to call for help
If you're experiencing a true emergency, you can do just about anything relatively safely to get the attention of others, especially those who can access the help you need.
- Make a loud noise with these (three times, wait five seconds, then repeat)
  - emergency whistle
  - banging metal, such as pots
  - shouting
  - anything else to grab attention, such as a loudspeaker

- Post signs, ideally in large, red print
- Send a runner to get help
- If you're outdoors, clear the area, then set three fires spaced evenly apart in a line
- Smoke signals (do you know how to do this? it has nothing to do with Morse code)
- Anything else? Use your creativity safely.

When deciding to use *any means at your disposal*, make sure you balance how much of a danger you're in, with reason. Use your head, and keep safety first in your mind, in spite of the adrenaline coursing through your veins.

Handling a missing parent [link]

It might seem more intuitive to ask how to handle a missing child, but that implies you're searching for a child you haven't met, probably a topic for another day. But in this case, you've encountered a child who's become separated from the parent, or a child has found you, while in search of the parent. This means it's the parent who's missing, not the child. Also, this can apply to an adult with diminished mental capacity. Ok, so, now what do you do?

This training is quite relevant, because we ham radio operators serve during many public events, such as parades, festivals, marathons, and carnivals, and in each event, more than one child gets separated from his parent in the crowd. Nearly all of these incidents have ended well, with the child being successfully reunited with the missing parent. But what could we do, to ensure a successful reunion?

Contact the authorities
Get on the phone or radio promptly, and let authorities or at least somebody else know that you're with a child who's been separated from his parent. If it appears that searching for the child's parents will take longer than a few minutes, and you aren't able to locate the police just yet, focus on searching for the authorities rather than the parents; you'll waste a lot more time and effort looking for individuals than for the police, fire, or EMS personnel.

Don't be alone with the child
As quickly as possible, get another person to accompany you with the child. Having multiple adults in the company of the child helps protect both you and the child. Even the call you make to the police is a big step toward not being alone with the child. At the same time, make sure the child is not left alone.

Help reassure the child
As much as you know how, befriend the child. Find out his name, and call him by his name often. Let him know that you're going to do everything you can, to find his parents or get help. Don't make up things by saying that everything's going to be alright, or that he'll be with his parents soon, because you don't know that. Ask him how he feels. One of the best talents you can muster at a time like this is the ability to listen. Only hold or hug the child if he wants to be touched; otherwise, avoid contact with him, except an occasional pat on the shoulder or elbow. Playing a game in an open area with people nearby or with others involved can go a long way to help calm the child.

Find out what you can from the child
Without pounding the scared youngster with a hundred questions, ask him what his mom's name is, where he lives, what his favorite food is, what video game he likes to play, as it's appropriate for his age. If possible, find out where he and his parents were, when they got separated, and what they were doing at the time. Find out how old he is, what school he goes to, what his teacher's name is. Take note of the child's age, size, and what he's wearing, his eye and hair color.

Turn over the child intelligently
Before handing the child to a complete stranger, look for clearly open clues that the child recognizes the parent. Get the parent's name and address and number, then report all the details you can, to the police or other proper authorities. You have no right to restrain the child in the presence of his parents, and the parents have probably been worried sick looking for him, so this moment can be a little awkward for all of you.

Your judgment

How all of this turns out will often result from you using good judgment, and every child and situation is different from the next. The good news is that you were there, right when a child needed you. Neither the child nor his parents will likely remember what you did for them, but you probably will.

How to get involved with ARES [link]

If you're interested in using both your radio and your brain to help out with local emergencies, in a group that already has a training regimen and leadership organization in place, **ARES** might be for you. They're willing to help you not only learn how to use your radio and during an incident, but make use of skills you already have, and maybe learn some new skills. Skills like emergency medical, snow and ice survival, backpacking for rescue, temporary minimalist living, emergency power, and more.

ARES, or *Amateur Radio Emergency Service*, is a service organization program of the ARRL, and consists of licensed amateurs who have voluntarily registered their qualifications and equipment for communication duty in the public service when disaster strikes. Any licensed amateur can apply for ARES membership, and neither ARRL affiliation nor posession of special equipment is required.

ARES members are trained to assist with emergency communication in behalf of local government (such as the County Sheriff), public service (such as the Red Cross and hospitals), and relief agencies (such as the LDS Church and Salvation Army), when requested. They can serve according to their training level, as indicated by their certifications, which are bestowed by the ARES leadership upon completion of specific training requirements.

ARES activation
An ARES team can become *activated* by order of the Public Safety or other emergency personnel in charge, through the ARES leadership. Once activated, ARES members are notified of their assignments and duties, but participation is voluntary. Those who are able and willing to participate in an activation might be asked to provide specific items, such as a special radio, a pickup truck, batteries, or gasoline, if it's available to you. The ARES leadership then asks the volunteers to show up at a particular command post or Emergency Operations Center for further instructions.

ARES membership
ARES typically recruits their members from within a geographical boundary, many of them within a specific county. Any licensed amateur is eligible for ARES participation, and can apply for membership with the local ARES leadership. To apply in Utah County, visit ucares.org, and download the ARES Membership form, and submit the completed form to the local ARES leadership. For Salt Lake County, visit slcoares.net, scroll down to *Join ARES* and click membership page.

ARES training
Most ARES teams provide weekly training for their members, by holding nets, gatherings, and simulated emergency exercises. Training topics are often discussed on the regular nets. Communication and equipment handling proficiency are promoted through certification levels, which can be achieved through increasing stages of training. Members are informed of special or unique training opportunities by listening to the nets or attending intreface meetings.

ARES nets
In many locations, ARES teams hold monthly if not weekly nets. These regular on-air check-ins not only inform members of news and events, but also provide training by presenting a relevant topic of discussion, and encouraging members to run the net themselves. The Utah County ARES team holds nets each Tuesday at 9:00 pm on the 147.340+ (100.0 Hz tone) repeater. The Salt Lake County ARES team helds theirs each Wednesday at 8:30 pm on the 146.700- (100.0 Hz tone) repeater.

ARES resources
As mentioned, one way to learn of important training opportunities and skillset upgrades is by attending the monthly *interface* meeting. In Utah County, these are held on the first Tuesday monthly 7:00 pm at the Utah County Sheriff's Office North Annex in Spanish Fork on even-numbered months, and the Lehi Fire Station #83 (3870 Traverse Mountain Blvd) on odd-numbered months. In Salt Lake County, the same meetings are held on the fourth Wednesday monthly 6:30 pm at the IHC facility (5121 S Cottonwood St) in Murray. Besides online manuals and instruction materials, ARES also has specialized vehicles at their disposal, outfitted with radios for different agencies, antennas, and other communication gear.

Your assignment

Once you reach a relatively proficient point in your ARES training and certification, you can be assigned an appropriate *liaison* post, which is typically an EOC, or *Emergency Operations Center*, located in a hospital, city building, or county facility. When disaster strikes, and ARES is activated, you might be asked to attend to your voluntary assignment *if you and your family are safe, and it is safe in your judgment for you to travel there and serve*.

How to get involved with RACES [link]

Many modern forms of communication, including broadcast, two-way, wifi, cell phone, satellite, television, and more, can trace their roots back to amateur radio. Due to innovations made by amateurs through the past one hundred-plus years, government and military have been able to communicate during times when it's most crucial, such as natural disasters, search-and-rescue, and international conflict. Those sparks of creativity only prompted more experimentation by amateurs, and the airwaves in the early days of radio became flooded with the trials and errors of many projects.

At the onset of World War I, it quickly became apparent that the military could not compete with the huge army of amateur hobbyists for the available radio frequency spectrum. In response, the US Congress ordered all amateur radio operation to cease. After the end of the War, amateurs had to fight to get back on the air, but operate they did. Then came World War II, and the familiar but unfortunate scene happened all over again, with all amateur radio ordered shut down nation-wide.

What is RACES

It was during World War II that the US Congress drafted the War Powers Act of 1941, which provided for an amateur radio service to continue operating, in spite of the invocation of the Act and a resulting shutdown of amateur radio by the President of the United States. Today, this service is known as RACES - the *Radio Amateur Civil Emergency Service*, and is governed primarily on the state level. Regular amateurs can apply for RACES credentials, permitting them to continue operating, but in a RACES capacity, when the President activates the War Powers Act.

RACES accredits amateurs, conducts nets, holds training, hosts conferences, and more. Its purpose is to provide a body of proficient communication volunteers who can use their own equipment, skill, and time to aid with communication during a crisis that's large enough to warrant the activation of the War Powers Act or other large-scale disaster. Once a person is accredited, RACES issues a unique number to the person, to be used along with the FCC-assigned call sign, for identification. Should the War Powers Act become activated, only those with a RACES number can transmit on amateur frequencies.

RACES activation

Presidential invocation of the Emergency War Powers Act is not the only trigger that can activate RACES. State governors and Public Safety officials can also activate a RACES operation if they deem the incident scope to be large enough to warrant the use of amateur communication, because the official communication infrastructure is inadequate or damaged. During an activation, Public Safety officials will send out a notification to RACES members, requesting their help and explaining the scope of the need.

RACES accreditation

Any amateur whose license has never been suspended can apply to RACES to become accredited, but they decide who can eventually earn the accreditation. To become part of RACES in the state of Utah, you must visit the Utah Department of Public Safety website and download the registration form PDF. Fill out the form, sign it, and send it to the address provided. You must agree to a background check, must not be a convicted felon, and must hold a valid amateur radio license.

RACES nets

Once you're assigned your RACES number, you can check into one of the monthly RACES Nets. In Utah, the RACES VHF / UHF nets are held at 8 pm of the third Thursday of even-numbered months on the Intermountain Intertie, Sinbad, Skyline, and other repeater systems, which become linked together state-wide. The RACES Nets are also held at 8 am of the third Saturday of odd-numbered months on 3.920 MHz, which is 80 meters, and therefore requires you to hold a General class license unless you're accompanied by a General or higher licensee. Another aspect of the RACES nets is

that many official government agencies open their EOCs (Emergency Operation Centers) to allow RACES members to check in from their physical locations.

RACES training
The Utah Department of Public Safety typically holds brief RACES trainings during the monthly nets. These are often topics you likely know well, but can also include new or updated information intended for RACES members. More detailed and in-depth training is held annually on the first Saturday of November at the State of Utah RACES Conference, and consumes much of the day. The conference training is free-of-charge, often hands-on, engages most of the attendees, and is very worthwhile.

Your responsibility, your opportunity
On the RACES registration application, you assert that you will *...serve to the best of (your) ability as requested...*, but this is not a military commitment, or anything close. Your volunteer service is welcome and appreciated, yet optional. Still, being one of a few who can operate a radio during wartime or other crisis is big, and your service can mean saving lives.

LDS Church-specific topics

Make use of the ERC [link]

No matter where you live in the US and many other parts of the world, you'll often find that a local religious body has organized aid for its members and their neighbors in the event of a widespread disaster. Nearly all of these include a communication plan, known as **Emergency Response Communications**, which allows for two-way information gathering and reporting with local citizens, regardless of religious affiliation.

In the event of an actual emergency or wide-scale disaster, the ERC might **activate** its emergency protocol, connecting local religious leaders with those at a more general or global level. Their purpose is to report status and accounting of members within the religious organization, but to also communicate information for those affected within the boundaries of the ERC reach.

The ERC Net
Most of these ERC groups establish a regular *net* you can check into, for practice, for training, and to familiarize you with them by maintaining an open channel of communication. The predominant faith in the state of Utah, the Church of Jesus Christ of Latter-day Saints, has set up ERC nets by roughly county boundaries, centered on what's known as Bishops' Storehouses. The one for Utah County is the Lindon Bishops' Storehouse, and they've established a regular net Tuesdays at 8:00 pm on the 147.020+ MHz (100.0 Hz tone) repeater. The ERC also runs an HF net, but I'm going to omit that one in this discussion, to keep things simple.

How to use the ERC
You can take advantage of the opportunity to use the ERC by asking whether you can check into their emergency net, or participate in some way. If you're able to participate, inform others about the net, and check into it yourself and listen for information bulletins, updates, and instructions. *Keep in mind that the team that runs the ERC does not necessarily stock supplies for you or your neighbors, but they can communicate your need to a leader or team who does.*

Be proactive
Find out whether your local ERC is planning to hold a net during a particular drill or simulated emergency. If you find that they will not activate, try contacting their leadership offline, and ask them if there's a reason they don't activate during drills. It's possible that they don't have the manpower, or their equipment is in disrepair, or that they were simply unaware of a particular exercise. Inform them of the exercise, and invite them to participate, as another avenue of contact, simulated for an actual event.

The ERC can help
It's very possible that the ERC has connections to relief materials and supplies that the government might have exhausted, such as food, water, medicine, bedding, living quarters, and light. In addition, the ERC might be able to get you in contact with a unique source of help: a spiritual leader.

To many, a word of comfort, an ordinance or ritual, or even a scripture or prayer, can go a long way to help many remain calm in an otherwise chaotic time.

Three ham radio policies [link] [PDF]

From time to time, three topics regarding amateur radio seem to surface often enough, that I thought I'd summarize some online statements made about them by the Church of Jesus Christ of Latter-day Saints. I'm hoping that this training will save a few from a little heartburn, going forward.

1. **MARA is not associated with the Church**
   Prompted by the Teton Dam disaster of 1976, the Church created an emergency communication network known as *MARA*, or Mercury Amateur Radio Association. After it was discovered that hosting and funding such an organization might have violated Part 97.113(a)(3) and 97.113(b), the LDS Church in 1990 decided to divorce itself from MARA, and create another emergency communication team called *ERRS*, which was renamed in 1995 to *ERC*, the Emergency Response Communications we have today, often located at bishops' storehouses in many parts of the US.

   MARA was a highly organized group of skilled hams, who also had a lot of knowledge, with memberships in local emergency teams as well. The problem is, a few still hold on to the notion that MARA is a radio arm of the LDS Church, and pass that idea on to new hams. MARA is still a good, active, and worthwhile organization to be involved with today, especially if you're interested in improving emergency communication skills. The point is, MARA is not associated with the LDS Church in any way, and I personally invite all LDS amateurs, especially those with Emergency Preparedness callings, to embrace the ERC as the LDS Church emergency response communication arm, like most are doing already.
   Link to the MARA website

2. **Amateur radio associations are not permitted to use Church property**
   The LDS Church does not permit amateur radio clubs or associations, including MARA, to use Church meetinghouses or grounds to hold meetings or events, according to a published statement. This includes ARES, UVARC, TERT, RACES, and others. However, when the LDS Church cooperates with an external entity, such as Utah County or the City of Lindon for example, church members can use Church property for the purpose of drills and emergency exercises in conjunction with those events, *if approved by the stake that oversees the property*.
   Link to the Church statement

3. **Wards and stakes are not permitted to purchase or install amateur radio equipment on Church property**
   A number of people have told me that their bishop or stake president has outfitted their wards with ham radios, for use in drills and emergencies. I'm fairly certain that much of that was done out of ignorance to the policies. LDS Church wards and stakes are not permitted to purchase or accept donated satellite phone equipment or amateur radio equipment of any kind, for emergency use or for installation in or on a meetinghouse. Furthermore, no amateur radio equipment or antennas may be permanently installed in any Church meetinghouse or on Church property, according to another published statement.

   There are a few hams who have noted that their stakes have grandfathered-in some equipment allowance, by virtue of some previous arrangement. I don't know enough about the applicable law, or the Church's policy on that, to have an opinion; I only know of the current official policy, which I can provide. Also, it's been noted that the Church itself does indeed purchase and install amateur radio equipment, such as repeaters and antennas. This is true, but all falls under the direction of the ERC and Welfare arms of the Church, not individual wards and stakes.
   Link to the Church statement

In summary, MARA is not associated with the LDS Church, we're not allowed to hold ham radio meetings on LDS Church property, and wards and stakes are not permitted to purchase or install ham radio equipment, or even accept donations of them.

For slightly more technical training nets

Radio-related training topics

An excessively low SWR can kill you [link]

SWR is directly related to the ratio of the antenna system impedance to the feed line characteristic impedance, and is an indicator of how much of the power sent to the antenna will get reflected by the antenna. Ideally, an SWR of 1.0:1 indicates a perfect match between feed line impedance and antenna system impedance, promoting *maximum power transfer*.

The problem is with that word *ideally*. Many hams become concerned if they discover their antenna system SWR is not perfect, and sometimes take time-consuming steps or great expense to bring a non-ideal SWR down to perfection. Some repeatedly climb up on their roofs or towers in an effort to achieve that elusive measurement, even at the peril of their lives. News flash: *your antenna system does not need to exhibit a 1.0:1 SWR to function well.*

The two primary reasons hams want to reduce their SWR are 1) they don't want the reflection due to the high SWR to burn up the final power transistors on their transceivers, and 2) they want to ensure that all the power they send to the antenna goes out the antenna. If they're running a really old rig, I can understand the first reason to a point, but number 2 is a fear based largely on myth.

First, most modern transceivers (as in, all rigs made in the 21st Century) are outfitted with a circuit called *foldback*, which will automatically reduce the output power of the transmitter if it detects that the reflected power is above a particular threshold. If you attempt to transmit to a load exhibiting high SWR, the reflected voltage will trigger the foldback to reduce the transmitter's output power. This will then reduce the amplitude of the reflected signal into the transmitter ouput transistor, thereby protecting it from overload.

On the other hand, once the reflected signal makes it back to the transmitter, it does take time for the foldback circuit to subsequently reduce the output power, and for the last of the higher-power signal to reflect and return to the transmitter output. Assuming 30 meters of RG-8X (0.88 VF), that time is about 0.23 μs. So, the concern is not completely unreasonable, but not completely realistic either.

Second, even though some of the power is reflected by the antenna because of mis-matched impedance, that reflected signal is not *lost*, but will get *re-reflected* by the transmitter, and back out to the antenna. Like a big echo chamber, this whole situation will be repeated until all the signal power is lost in the feedline or is transmitted out the antenna.

The exception to this is if your feed line is completely open, because maybe you had forgotten to connect your antenna to it, or it has a dead short. Obviously in these cases, the signal will not get emitted out by a non-existing antenna. It will instead become pure feed line loss.

So, how high of an SWR can you live with? Typically, a modern VHF mobile transceiver can handle a very high SWR without initiating foldback, and can work comfortably with an antenna system exhibiting an SWR of 3.5:1 or lower. A typical HF transceiver can handle a moderately high SWR, but will start limiting its output power at about 2.0:1 SWR, reaching its minimum output when it detects around 3.0:1 to 4.0:1 SWR.

With this much tolerance, it's not really necessary to reduce your antenna SWR if it reads 2.1:1 on your analyzer across the target band. Even at full power, your radio will be protected and all your transmitter outut will be sent to your antenna or as heat through your coax. There's no need to climb on your roof and risk your like to fine-tune your SWR down to perfection, especially if perfection can't be reasonably reached.

Protocol training topics

Calling CQ on single-sideband [link]

This training is meant for those of you who work single-sideband, which is the voice mode most often used on HF and 6 meters. If your operation is confined to VHF or UHF, you can still glean a lot of good information from these tips, since some contests also involve VHF using single-sideband.

[Note to Net Control (or whomever is presenting this training): call signs listed here as

K-I-7-A-B-C

should be spoken in the training by you phonetically, as in **kilo india seven . . .***, while call signs listed as*

KI7ABC

*should be spoken in the training by you in letters, as in **K I 7 . . .**]*

I mention *single-sideband* because it's not recommended to call CQ on FM, like when you're on a repeater, where you're not trying to attract the attention of somebody who's casually tuning his receiver across the band.

The traditional way to transmit a non-distress call on single-sideband, inviting anybody who might want to chat with you, is by **calling CQ**:

CQ! CQ! CQ! This is KI7ABC. CQ!

The primary purpose of calling CQ this way is to draw the attention of anybody who might be looking for a contact, but might not be on your frequency. If you talk fast or you don't feel like you're getting enough attention, you might want to add the band name:

CQ 20! CQ 20! CQ 20! This is KI7ABC. CQ 20!

Procedure

1. Change to a frequency that's a 1 kHz multiple, such as 7.257 MHz or 7.258 MHz, and avoid 7.2573 MHz, for example
2. Listen for a few seconds, to make sure the frequency is not in use (which can be difficult during a contest, but not impossible)
3. Start calling CQ
4. Acknowledge the responding station phonetically:

    K-I-7-A-B-C, go ahead

    or

    K-I-7-A-B-C, you're 5-9 in Utah

Tips

- If more than one person answers your call, you'll need to *work the pileup*; listen closely and attempt to distinguish one call sign from the others
- If another person is calling CQ, you're free to respond to his call phonetically:

    K-I-7-A-B-C

- When calling CQ in a contest or Field Day, use the word **contest** or **Field Day** in your announcement, along with your call sign in phonetics, to let others know you're inviting responses from those primarily involved in the particular activity, and not a general CQ to everybody:

    CQ contest! CQ contest! K-I-7-A-B-C. Contest!

    or

    CQ Field Day! CQ Field Day! K-I-7-A-B-C. Field Day!

- By the same reasoning, when you hear a station calling with **contest** or similar, do not waste their time responding, unless you're participating in the contest or event, or want to help them add points to their event, because they're not usually interested in engaging in a casual conversation
- The same goes for an international contact. If you'd like to contact somebody only outside your own country, say ***CQ DX***:

    CQ DX! CQ DX! K-I-7-A-B-C. CQ DX!

- And when you hear somebody call *CQ DX* from within your own country, do not respond to the invitation

Be the helpful ham

Finally, if you announce *CQ contest* or *CQ DX* or similar, and a station who's not participating in your selected event responds, treat the person kindly and with respect. He or she is likely either new to ham radio or to contesting in particular, and would probably appreciate your brief education on what the event is, and how to properly respond, offering them the necessary information to complete the *exchange*.

Equipment-related training topics

A good solar-powered solution [link] [PDF]

There might come a time when you'll need to leave the comforts of your home for longer than just a day or two. And if you're caught up in a long-term incident, such as an earthquake, you might not have easy access to electrical power for your radio and other (lighting, phone, medical devices) needs for several days. It'll be very convenient, therefore, to have solar power available to you during daylight hours, even when it's cloudy. So, let's explore the kinds of equipment you'll need, to accommodate a basic solar setup.

Your solar equipment should be light-weight, sufficient, reliable, and easy to use. I'd like to add *inexpensive*, but quality is often compromised as the price of your solar gear goes down, so the best we can usually hope for is a happy medium we can live with. To best achieve those goals, here are

some solar solutions that might work for you:

Solar panel
Probably the most important parameter of a solar panel is its output wattage. Other factors, such as weight and rigid or flexible frame are also important, but make sure you get a panel or set of interconnected panels that can provide you with the power you need. For a basic VHF / UHF radio, lighting, and cell phone needs, I recommend no less than a total of 80 watts, preferably 100 watts. A high-quality solar panel will also maintain a high output during cloudy or even overcast days.

Charge controller
A *charge controller* is a device that regulates the rate of current flow through (and often the voltage level presented to) your battery, to prevent damaging your battery, while providing sufficient charge rate for it. Many modern solar panels have charge controllers built onto them. An MPPT charge controller will charge your battery to its maximum capacity by automatically monitoring that battery's charge level without the need of manual monitoring. *Your charge controller input voltage should match the range supplied by your panels, and its output voltage should match the range specified by your battery.* Also, I highly recommend one that's capable of handling 20 amps.

Battery
Use a battery that's made for solar, especially a sealed battery for portable use. Because of the daily charge-and-discharge routine, I highly recommend a 12 volt *deep-cycle* AGM battery. Be sure your battery voltage matches that of your charge controller output. Battery capacity is noted by amp-hours (Ah), meaning that it can deliver a steady current for a limited amount of time. I recommend one that is rated at a minimum of 35 Ah (meaning it can deliver 1 amp of current for 35 hours, or 5 amps for 7 hours, etc.), and preferably more, like 100 Ah. Typically, however, the larger the battery capacity, the heavier it is, although lighter options are being developed all the time.

Connectors
On one hand, the connector of choice between large (home) solar panels is the MC4 connector, but your charge controller might simply require a bare wire for its input from the panel or output to your battery. For easy and quick connection / disconnection, I recommend Anderson Powepole™ connectors between your battery and everything it connects to, such as your charge controller, power distribution block, and accessories, such as your USB converter, radio, and lighting.

Education
Before jumping blindly into a solar solution, do some reading, watch some videos, and try out some gear. Talk with friends who have gone the solar route, and find out what their experience is, with type of gear, quality, portability, weight, and cost.

Use it
Become acquainted with your gear and its limitations. Repeatedly practice hauling it to some reasonable location out of town, and setting it up. Try charging your phone, running your laptop, or powering your mobile radio and asking for signal reports as you make contacts. Time yourself, to see how quickly you can deploy and set it up in case you really need to. Actually using your solar setup this way will help you understand what it *can* do and what it *can't* do, which is exactly the feedback you need for future improvements.

Basic lightning protection [link] [PDF]

As most of you know, there aren't many parts of our country that are immune to lightning strikes. As a result, people who have antennas installed on their roof tops wonder whether they should do something to prevent damage to their equipment from the effects of lightning. On one hand, some hams run to their radios when a storm approaches, and disconnect their coax. On the other hand, if they're away from home, that's not always possible or practical. Should you simply keep your coax disconnected, until you need to get on the air?

Repeater station
If you visit a repeater site, you'll likely find a ham radio a lot like your own, located in a small building. Attached to the radio is a length of coax, that connects it to an antenna, which is typically installed up on a tower, whose base is just feet from the building. Because the tower is on top of a mountain, it gets struck by lightning numerous times throughout the year. So, when a lightning storm approaches the mountain, do you think there's

somebody who races up the mountain each time, and disconnects all of the repeater's coaxial cables?

In fact, nobody flies up to the repeater each time it starts raining, that we know of. Instead, a repeater is connected by coax to an antenna and tower that's properly grounded. This proper grounding diverts most of the lightning energy to ground, protecting the repeater and all of its associated gear. Can the same grounding methods be applied to your home station, to protect it from lightning damage? Well, yes, but you really don't need to, or even want to. You don't need to install a commercial-grade grounding system, because chances are, your home will never receive a direct lightning strike. And you don't want to, because the cost of doing so is very high, beyond the reach of mere mortals.

What are the odds?

First, it's much more likely that lightning will strike a few blocks away from you, than right at your house. Is it possible for it to strike your house? Sure it is, but highly unlikely, because your house doesn't offer the cloud much reason to complete an electrical path. Yes, it would be nice to protect your home and all your gear from a direct lightning strike, but in reality what you're trying to protect it from is either a *nearby strike* or *static buildup*, which are much more likely.

Second, when lightning does strike nearby, or if static builds up because of wind or blowing dust or moving clouds, that static can collect on your antenna. And once enough charge collects, that electrical imbalance needs to find a path to ground, and often that path is through your equipment. The object, then, is to give that static buildup a place to go before it reaches that critical level.

Minimal lightning protection setup

Here are some practical and inexpensive things you can do, to apply some **basic lightning and static protection** into your antenna system:

- Drive two eight-foot-long half-inch ground rods into the dirt about a foot away from your house, one just below your antenna, and the other about half-way around your house to the electrical service box
- Connect a length of 4 gauge or 6 gauge bare copper wire between the two ground rods, then connect another length of 4 or 6 gauge bare copper wire from the electrical service box to the ground rod closest to it
- Connect a length of 4 or 6 gauge bare copper wire from the base of the antenna or its mast (if the ground part of the antenna is electrically connected to the mast) to the ground rod below it

At this point, your grounding system should protect your equipment *adequately* if your antenna is a *J-pole*, because the ground on a J-pole is typically higher in elevation than its signal element. If your antenna is any other type, chances are, its signal element will be higher in elevation than the ground portion, leaving the signal side with little or no connection to ground. If or when you're ready to ground the signal portion of your antenna, do this:

- Install a *lightning arrester* onto the ground rod below your antenna
- Connect a length of coax from your antenna to the lightning arrester, then another length of coax from the other side of the lightning arrester to your radio

There are more things you can do, towards making your antenna system completely lightning-proof, but that's not the purpose of this brief overview. If you really want to install a commercial-grade site, and you have the means to do so, it should be able to weather just about any storm. The basic installation I've described here should provide your equipment with some adequate protection from most typical storms and static charge buildup.

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