A Beginner's Guide to Making CW Contacts

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There are dozens of specialities or activities under the broad banner of Amateur Radio. Amateur radio is also known as ham radio, why, nobody knows for certain. From working DX, to building radios from scratch, to satellite communications, to slow-scan TV, to just plain rag chewing(or talking) with new and old friends all over the world; there is something for everybody.

As a true ham radio fanatic, my personal favorite ham activity is yakking with other hams in Morse Code, also called CW(for continuous waves). Morse Code has a mystique to it, it is an extremely cool method with which to communicate. In this **Beginner's Guide to Making CW Contacts** I am going to try and give those hams new to CW a better idea of how to start. How to find someone to talk with, what to talk about, how to deal with QRM, how to end a CW contact, how to get lots and lots of QSL cards, and much more useful and practical information.

I wrote this **Guide** from the perspective of hams in the United States. Many of my references, for example to frequencies and to radio propagation, pertain to amateur radio in North America, although most of the CW operating techniques I discuss apply to worldwide CW operation.

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Learning the Code

Morse Code has a way of polarizing hams, they either love it, or can't stand it. CW(or Morse Code) has been decreasing in popularity over the last several decades as voice and other digital modes become more popular. But a listen across the CW portion of the ham radio bands will find thousands of hams still using this vintage communications technique. The FCC still requires a code proficiency test, just 5 wpm, as part of their license to use the HF amateur radio spectrum. Besides, CW is way cool, but I'm prejudiced. HI.(HI is the telegraphic equivalent of a laugh)

I believe that learning and using Morse Code is very similar to learning a foreign language. Don't try to learn Morse Code the way I first did when I was a BoyScout: don't memorize a list that tells you "A" is "dot dash" or "B" is "dash dot dot dot". This method will stunt your progress and lead to frustration. Ideally, when you hear the "dot dash" sound in your ear, your mind will immediately recognize that as "A". Inserting a third step, where your mind first translates the "dot dash" sound into the written dot dash you learned from a list, and **then** into the letter "A", is one thing that makes learning Morse Code so difficult for so many people.

There are a number of techniques suggested to help learn Morse Code. Among these are:

- Learn the code in groups, beginning with letters comprised of all dits first, then on to letters with all dahs next, then finally learning letters with both dits and dahs.
- Learn the code in groups of letters that have related sounds. For example, U(dit dit dah), F(dit dit dah dit), and the question mark(dit dit dah dah dit dit).
- Learn the more frequently used letters and characters first, and the more difficult ones last.
- Listen to the Morse Code characters sent at a high speed, with long pauses between each. This is known as the Farnsworth method.

Thanks to L. Peter Carron, Jr., W3DKV and his book, *Morse Code: The Essential Language,* The American Radio Relay League, 1991, for this partial list of techniques.

Learning CW from a practice tape is, I believe, one of the best ways. Many companies offer these audio tapes or CD-ROMS, although they can be a bit dry and boring, and I recommend a bit of live CW listening with a shortwave receiver. Try the US novice bands 40 meters 7100-7150 kHz and 80 meters 3675-3725 kHz for practice. Conditions on the 15 and 10 meter novice band are slowly improving these days, although the current sunspot cycle 23 is now slowly diminishing. Lots of beginning novices and technician-plus hams here using much slower CW(like 5 to 10 wpm) than you'll find on the US general CW bands. Learning CW with the personal help of another ham is also a great idea, as is taking a class in CW operation. Many amateur radio clubs offer classes for beginning hams in licensing, including Morse Code.

The Morse Code used today by amateur radio operators is also known as the International Code. By definition, the duration of the dah is three times as long as that of a dit, and the space between dits and dahs inside an individual character(such as dit dit dah or U) is equal to the duration of one dit. The space between characters is equal to three dits, and the space between words is equal to seven dits. During a CW QSO nobody is checking to see if you are using the correct spacing, just do your best. It takes practice. Code sent with the correct spacing sounds better and is easier to copy.

Forcing yourself to listen to Morse Code that is slightly faster than you are able to copy comfortably is a good way to increase your code speed. You don't need to copy every letter, just concentrate on better learning the CW letters and symbols you already know, and the others will follow. When I was first learning CW I enjoyed listening to the CW speed demons(20 wpm plus) at the bottom of each ham band, just to see if I could get their callsign. Hams often send their callsigns several times at the beginning and end of a transmission, making it easier to copy. Everything else they sent was usually a blurr. I then kept a running list of the different countries I had heard, just to see how many countries I could get. I'm sure this helped me increase my code speed.

Actual on-the-air CW contacts are probably the best way to increase your code speed and CW proficiency. And to have fun while practicing.

Finding Someone To Talk With

Answer a CQ

How the heck do you begin a CW conversation? How do you find another ham to talk with? My favorite method is to **answer a CQ**. Sending several CQs followed by your callsign indicates you want to start a contact with someone. Simply tune up and down the band searching for that familiar "CQ", zero beat your transmit frequency with that of the CQer(or as close as you can get), and call them when they finish their CQ. Normally a one by two call on your part is all that is needed, "N1XYZ de WB8FSV WB8FSV K". If band conditions are poor, or there is a lot of QRM(interference), perhaps a two by three or a one by four call is in order. One by two initial calls in response to a CQ are common these days, sending your call letters too many times marks you as a beginner.

Please do not reply to a CQ if the CQer is transmitting too close(within one kHz or so) to an ongoing QSO. Doing so will likely cause unnecessary QRM to the ongoing QSO, you may even drive them off the air. Not cool. Common ham courtesy says do your best not to cause unnecessary QRM. Occasionally I will hear a CQing station that I would really like to answer, but the CQer is too close to an ongoing QSO, as I mentioned above. The best thing would be to not answer the CQer, but I have been know to answer the CQer at least one or two kHz away from the CQers frequency. My hope is that they will hear me and move their transmitting frequency to mine. Then I can have my contact and not cause QRM to the ongoing QSO. Sometimes this works, but likely the CQer will not even hear you, or will not change their transmit frequency when they answer you.

Sometimes when you answer another ham's CQ, they may not hear you well enough to get all of your callsign. Or they may not hear you at all if the band conditions are bad. There is such a thing as one way skip: you may hear West Coast stations fine, but none of them hear you. Not uncommonly more than one station besides you will reply to the same CQ that you did. You may even hear the other station(s) answering the same CQer that you are, at the same time. The CQing station may hear a mixed jumble of several stations answering him or her at the same time. The CQing station may then send "QRZ?" or "QRZ de N1XYZ?" Meaning, who the heck is calling me, please call again. Or the CQer may send nothing at all, perhaps they are just overwhelmed by more than one answer at a time, or by all the QRM. Many times I have found that if a CQer does not respond to my first reply and I hear only silence, if I call him(or her) again, they may well return to me.

Not uncommonly, when you begin to reply to another ham's CQ, you will hear other stations besides yourself calling the CQer at the same time that you are. I usually continue transmitting and then see if the CQer answers me or one of the other stations. If the CQer chooses you over the other stations, you can assume your signal was likely stronger or more interesting. If you do not have a competitive nature, then stop transmitting as soon as you hear other hams answering the CQer. Let them have the contact. Should you really want to make the contact yourself, continue calling and then drag out your call by sending your callsign once or twice after you hear the other answering station(s) finish their call. This trick, often used by DXers, sometimes works. Also, if while answering a CQer, you hear the CQer return to another different station, stop transmitting. You lost. Continue your search for another CQer. If you **really** want to contact this CQing station you could simply wait for them to finish their current contact and then tailend them.

Occasionally as I scan the band looking for a CQ to answer, I may come across a ham sending their callsign two or more times, before they sign, "N1XYZ N1XYZ K". I believe it is safe to assume this ham has just finished sending a CQ, and often, if I like their callsign, I will listen a second, then go ahead and call them. Since I heard only their callsign and not the actual CQ, it is possible that this is **not** a CQ(maybe they were calling another ham instead). Listen a few seconds to ensure you are not interrupting a QSO, then assume that it was a CQ. I have found that sometimes if I wait for this suspected CQer to send another separate CQ, by that time they will have attracted a few more replies to their CQ, and I may lose out on what could have been a good contact. In the same regard, you may be in contact with another ham and end one of your transmissions by sending your own callsign two or more times(perhaps you repeat your call a few times because the other ham has copied it wrong). Then as a result, in the middle of your contact, you may be called by a third ham, who incorrectly assumes you have called CQ. Simply ignore the interrupting third ham.

When answering a CQer you should zero beat the other ham's frequency, or set your transmit frequency as close to theirs as possible. Many hams today, in order to deal with the increasing QRM, make use of very narrow receive filters. The CQer may have their narrow filter turned on and not hear you answer if you are more than a few hundred cycles away from their transmit frequency. This is a quite common occurance on the CW ham bands, and points to the importance of correctly zero beating with your ham rig. By the same token, should you be calling CQ, do so with your narrow CW filter turned off, or you may well not hear several answering hams. Many hams are uncertain how to correctly zero beat their rigs on CW.

If you are fortunate to have a newer transceiver that has dual VFOs, it can simplify your search for a CQ to answer. While scanning for a CQ, if you come across something interesting, such as someone tuning up(a potential CQer), a clear frequency(that you may wish to use later to call your own CQ), or an interesting QSO(that you might want to tailend when it finishes), then leave one of your VFOs on that spot. As you then continue scanning for a CQ, you can periodically, at the press of one button, switch to your second inactive VFO and see what's happening on your other interesting frequency. Having two VFOs built into your radio can greatly enhance the ease and convenience of your CW operation. Sometimes I wish my rig had three or four VFOs. HI. If your ham rig does not have dual VFOs, you can simply remember, or write down, any interesting frequencies you come across while scanning.

Call Your Own CQ

Tuning around searching for CQs can tend to be frustrating. At times there just don't seem to be many folks calling CQ, and the ones I do hear are jumped on by a much stronger or faster station than me. Never fear, there are other productive ways to find a CW contact. Obviously another method would be to find a nice quiet unused frequency and call CQ yourself. Before you fire up your transmitter and send a CQ, listen a few minutes to the frequency to ensure that you are not going to stomp on another conversation. It is very possible that another ham is transmitting on the same frequency but their signal is skipping over you. It is highly recommended that you send a "QRL?", or better yet send a "QRL de WB8FSV?" to see if the frequency is clear. Technically the FCC requires you identify each transmission, and an unidentified "QRL?" is frowned upon. Although everybody does it. Or, if you have the patience, an even better method is to simply listen to the frequency in question for at least 5 minutes. Even then I would still send a "QRL?" before I cut loose with my CQ.

An old fashioned and rarely heard equivalent of "QRL?" is "dit-dit dit", or the CW letters, "I E". It would be sent before a CQ to see if the frequency was clear. Just like "QRL?". The correct response is the same as that to "QRL?" If you happen to be listening and hear someone send an "I E", if the frequency is not busy the correct response is to say nothing or to perhaps send an "N" for "no". If the frequency **is** busy, like you are having a QSO on the frequency, the correct response would be to send a "C" or "yes". "C" is often used as a CW abbreviation for the word "yes".

If your CQ is answered by more than one station, usually the best practice is to reply to the strongest station. The strongest station is more likely to copy you stronger also, and you will be better able to copy each other should you both be attacked by QRM, QRN, or QSB. If you are able to copy the callsigns of both hams who answer your CQ, and the weaker station has a more interesting callsign, certainly you could answer the weaker/more interesting ham. Since the weaker station is answering your CQ, obviously they can hear you as well. Should two stations respond to your CQ, you can answer them both and try a three-way contact. Three-way contacts on CW are **difficult** to do.

Send your CQ at the speed you would like to be answered. A three or four by two call repeated twice should be sufficient, "CQ CQ CQ de WB8FSV WB8FSV CQ CQ CQ de WB8FSV WB8FSV K". There are many variations. You will hear some beginners sending 15 or 20 CQs before their callsign, not a good idea. If you scan the band and find it active and full of ham signals, a shorter CQ should work. At times when I know another ham is listening on the frequency(perhaps I just heard them tune up), I may get them to answer with a simple one by one, "CQ de WB8FSV K".

After sending your CQ you may get an instant response, or you may get no response at all. It may also take some hams a moment to respond to your CQ. They may need to tune up their rigs, zero beat your frequency, or take a few seconds to run to their desk from across the shack. These folks may answer you five or ten seconds after your CQ. Be patient. After sending a CQ myself, I may tune around my transmit frequency a bit using my receiver's RIT(receiver incremental tuning). Because some hams may have trouble zero beating my transmit frequency correctly. Perhaps they are still using crystal control - not uncommon with homebrew QRP radios.

If I get no response after a couple 3 by 2 CQ calls, or I can tell there is very little activity on the band, I may then send a 6 by 2 CQ. The more CQs you transmit, the greater the chance that another ham scanning by will hear and answer you. I believe a pair of 6 by 2 calls is more than enough CQs. Should you still get no response to your own CQs, maybe the band conditions are just plain lousy, maybe you are transmitting too close to another QSO that you can't hear, maybe no one wants to talk to you. Try another frequency, try another band, listen for someone else calling CQ, or turn off the radio and go feed the cat.

Tailend Another QSO

A third major way to find someone to talk with on the ham bands is **tailending**. To tailend a conversation is to wait until another contact is completed, and then call the participant you want to talk with. This may work about half the time. Not uncommonly you will get no answer. The station you call is probably not expecting a call, they may have already turned off their radio, or may simply have something else to do. But sometimes tailending works. As you scan across the band looking for CQs or for a clear frequency on which to call your own CQ, you may hear an interesting conversation that you wish to contribute to, or you may hear a ham friend you want to say hello to.

The polite way to tailend another QSO is wait until the other stations are completely finished. This is easy to determine if you are able to hear both of the stations talking. But sometimes due to radio conditions you will hear just one of the stations. For example, you hear the end of a QSO between KH6XYZ and WB8FSV. You would like to work KH6XYZ and are unable to hear WB8FSV. When you hear the first station send something like, "HOPE TO CUAGN 73 WB8FSV de KH6XYZ TU K", wait. Wait a minute or two until the first station KH6XYZ acknowledges WB8FSV's last transmission, perhaps by sending a final "73" or a "dit-dit". If instead you call KH6XYZ as soon as you heard them sign, "de KH6XYZ TU K", you may well be transmitting at the same time and on the same frequency as WB8FSV, who KH6XYZ is trying to listen to. This is a good way to make KH6XYZ dislike you and decide not to answer you. This polite advice does not generally apply to tailending a rare DX station. Calling and working rare DX stations is usually a mean and cut throat procedure. Another reason I much prefer friendly domestic CW QSOs over fighting for rare DX.

At times you may be waiting to tailend a ham QSO, when the station you would like to talk to ends their last transmission with a "CL" for "closing" or "clear". This indicates that person is signing off and leaving the air, turning off their rig, and will accept no other calls. If you call the CLing station anyway, they may still reply out of politeness, but they are probably anxious to leave. If you just have to talk with them, don't keep them too long.

Breaking In

Breaking into an ongoing conversation is also possible, although rarely successful. Breaking into a QSO on CW is **much** more difficult than on phone. It is rarely done on CW. Some folks will think you impolite and ignore you, many newer hams will have no idea what's going on and consider you to be QRM. If you want to try, the standard method on CW is to wait between transmissions and then send "BK" for break, or better yet send, "BK de WB8FSV" if you have enough time. Allowing a third person to break into your contact can be confusing, especially for new hams. These "roundtable" QSOs are easier to manage on phone, or in the controlled environment of an organized net, like an NTS traffic net. But don't worry, breaking in is rarely encontered on CW. For those new hams who later move from CW to phone, be careful about using the word "break" on phone or SSB. On phone many hams use "break" to interrupt a net or a conversation when they have an emergency to report.

"Break in" has another meaning in CW. It refers to the time it takes your receiver to recover after you stop transmitting. Most modern transceivers have what is called full break in, meaning that you can receive instantly after transmitting on CW. You can even receive in between the dits and dahs of individual letters. Full break in CW even has its own Q signal, QSK. Years ago radio receivers had a several second delay before you could receive after transmitting, in order that your sensitive receiver was not overloaded by your nearby transmitter. Full break in CW is taken for granted today, but it is one of many technological innovations that today make ham radio so much easier. Such as dual VFOs, digital readout, automatic tuning, or one of my favorites: direct frequency keypad entry.

What Do You Talk About? The Art of Rag Chewing

Now that you have established contact with another ham via CW, what the heck do you talk about? Every ham contact, CW or phone, consisits of at least three basic items: your name, your location or QTH, and a signal report(RST) for the other station. What order you send these three items is unimportant, although commonly today you will hear signal report/location/name. When I started in ham radio 30 years ago, the order was almost always signal report/name/location.

The Standard name/location/RST/73 QSO

These three items are the essential minimum required for a QSO. While it is true that in working a DX station in a pileup you may only exchange callsigns and a signal report, in a "real" contact the name/location/RST are standard, and you continue from there. The next most commonly discussed subjects in CW QSOs are usually the weather(WX), the radio equipment people are using, the hams' ages and how long they have been hams. For many CW contacts that will be the extent of the contact. The other ham will sign off and end the contact. Most likely because the other ham is new to CW conversation making, and simply doesn't know what else to say. Or perhaps the short-winded ham isn't into making conversation. Personally I enjoy longer CW contacts, called "rag chews".

QSO Template for Beginners

When first starting out on CW, many new hams will often use a **template** or model, to make sure they send all the essential information. For example:

"______ de WB8FSV TNX FER CALL BT MY NAME IS JACK JACK BT QTH IS HILLIARD, OH HILLIARD, OH BT UR RST IS ___ BT HW COPY?"

And perhaps on your second transmission:

"______ de WB8FSV TNX ______(name) FOR NICE REPORT BT MY RIG IS A KNWD TS 450 ANT IS A DIPOLE BT WX IS ________ TEMP IS ___ BT HW COPY?"

Just fill in the blanks to fit the QSO, inserting your own callsign, name, QTH, and rig. And go on from there as a starting point if you choose. By the way, that strange BT is used in CW as a spacer, a device to separate your thoughts. Some folks will use a period instead. BT is sent in CW as (dah dit dit dit dah). The CW letters B and T sent together.

I feel that a more professional CW technique is to limit the amount of punctuation used during a QSO. Some new hams may send four or five BTs in a row while they think about what they will send next. One or two BTs in a row should be enough. Here is what I mean by limiting punctuation, "TNX DAVE UR RST IS 579 579 MY NAME IS JACK JACK ES MY QTH IS HILLIARD, OH HILLIARD, OH BT HW? N1XYZ de WB8FSV K". There, I got away with using just one BT.

Other Stuff to Talk About

For some beginning hams, and for some experienced hams too, that is all the information they will willingly send to you. You may have to draw out more conversation from them. Kinda like pulling teeth. HI . When I work a new ham on CW I often end each of my transmissions with a question to give the other guy(or girl) something to talk about, to draw them into a conversation. For example, "How many states have you worked? Any DX?" or "Is it raining at your QTH also?" If the other ham mentions something such as their age and how long they have been a ham, you can take that as a hint they would like you to send them back the same information about yourself.

If you live in a small town, describe where it is in relation to a much larger city. Does the area where you live have any unusual characteristics that other hams might find interesting? I often tell other hams that I live on the edge of town - two blocks from cornfields. Or that central Ohio is a flat as a pancake due to glaciers scraping it level 15,000 years ago. Or that Hilliard is Ohio's fastest growing city. What is your town's population? Any famous or semi-famous people born there(besides yourself)? How large is your yard? Where is your radio shack located in your house?

Over the years I have developed a number of topics that I may bring into a CW contact in order to keep the conversation going. Even for me sometimes I just run into a wall, my mind goes blank, and I can't think of what to send next, so these commonly used topics of mine can come to the rescue at times. For example, I'll describe how my cat Rasta often naps on top of my TS 450 rig and I believe that after all these years I suspect my cat understands CW. Or I'll describe what I see at that moment out my basement window. Or talk about how I enjoy collecting stuff(stamps, baseball cards, radios, QSL cards). Or ask the other ham if they have access to the Internet to see if we share a common interest about computers.

I try to send the name of the other ham I am in contact with at least once during each of my transmissions. This frequent use of the other person's name makes for a friendlier QSO and tells them you care who they are. Don't get carried away with this personalizing your comments. Using the other ham's name once per transmission is enough.

When you first start out, any CW contact is fun. It's cool to see how far your equipment will reach, how many states you are able to work. After you have made a number of CW contacts you may discover that the best contacts are those that are different. Not the standard name/location/RST/rig/WX/age/73 type of contact. You may meet another ham who just loves to gab(like me) or who is involved in a different ham activity(such as satellite or packet) and would love to tell you about it, or another ham who may have a lot in common with you such as age, work, or other hobbies. One of the fascinating things for me about making ham radio contacts is you don't know what the other ham is like or how the conversation will develop until you begin.

Standard Operating Techniques

Correctly Reporting RST

Here I am including a few useful topics that didn't fit in elsewhere. For example, what is this **RST** thing? It is a method of giving another ham a signal report and stands for readability, signal strength, and tone. R is on a scale of 1 to 5, and both S and T on a scale of 1 to 9. An RST of 599 would be the strongest cleanest report possible. For really incredibly strong signals some hams will refer to a 20 or 30 over S9, reflecting an S-meter reading. Readability is self-explanatory, R5 is normal, R4 to me means you copy more than half of what is sent, and R3 to me means you only hear a word or two. I have **never** given another ham an R of 2 or 1. Signal strength is pretty subjective, just use your ears to judge. Some new hams use their rig's S-meter to determine the S they report. I don't think this is a good idea. Tone is the most misunderstood and misused report. Only rarely will I give a report less than T9, and then never lower than T8. For example, if someone has a bad AC hum on their signal, key clicks, chirp, or is drifting badly in frequency, I may give them a T8. Giving a tone report of less than T9 may really get the other ham worried about the quality of their transmitted signal, so be prepared to explain what you mean.

The RST report that one ham gives to another often influences the RST report that is received in return. If, at the beginning of a QSO, the other ham first gives me a good 599 report, I find myself more likely to send them back a good report also. I believe we do this subconsciously, it is human nature. As an optimist, my RST reports generally tend towards the positive. Even if it is a contact during which I send the first RST, I may well add an S point or two to the other ham's RST. An S point or so above what I might give if I were brutally honest. I want to begin the QSO on the right foot and make the other ham feel good about continuing the contact.

Not uncommonly when you hear a ham send an RST report, for example 599, they will send the letter "N" in place of the number "9". Or 5NN in this case. This number code is another time saving device used on CW. Or you may hear the letter "T" sent in place of the number zero, "MY POWER IS 2TT WATTS". Each "T" is usually sent several times in length longer than the actual letter T to distinguish it from a T. There is a number code for almost every number, even though the N and T codes are virtually the only ones you will **ever** hear. Although during the 1998 CQ WW DX Contest I heard many European CW stations report their zones as "a4" or "a5" instead of sending "14" or "15". It saved them several milliseconds of time I suppose. Here is the entire number code, for the interest of those old timers reading this. Its use probably dates back half a century in CW.

1 = a	6 = 6
2 = u	7 = b
3 = v	8 = d
4 = 4	9 = n
5 = e	0 = t

How to Zero Beat Another Station

CW stations should always try to **zero beat** each other. That means to adjust your rig's transmit frequency to exactly match the transmit frequency of the other ham you would like to talk to. Hearing two CW stations conduct a conversation a few hundred cycles apart is a waste of frequency space, and is inviting QRM. How does one zero beat another station? Easy to do on phone or SSB, just tune so that the other fellow's voice sounds normal. But trickier on CW because when you put your receiver exactly on a CW station's transmit frequency, you hear nothing, zero. In modern transceivers, in the CW mode, the receiver's BFO is offset from the displayed, transmit frequency in order to produce an audible tone. In other words, the transmit and receive frequencies are far enough apart for you to hear a pleasantly pitched tone when your transmitter frequency is tuned to exactly that of the ham you are listening to. This frequency offset is frequently about 600 Hz or Hertz.

Here is how I zero beat another CW station with my own rig, a Kenwood TS 450. I tune into, or sweep through, the other CW signal, the pitch going from high to low, until the other ham's CW signal disappears. Now my receiver is zero beat with the other ham's transmit frequency. But I want my **transmit** frequency to be zero beat with the other ham's transmit frequency. So then I tune again, with the other ham's pitch going from low to high, until I am 600 Hz away. For example, if the other ham's transmit frequency is 7137.90 kHz, I would tune my transceiver to 7137.30 (7137.90 minus .60 equals 7137.30.) to transmit exactly on his transmit frequency. The direction you tune or sweep, the pitch going either from high to low or going from low to high, is rig dependent. On Kenwood ham radios you would tune the pitch from high to low as you tune higher in frequency, to reach the 600 Hz offset and be zero beat with the others ham's transmit frequency.

I wrote the above paragraph several years ago, and currently I zero beat using a different method. I still have my Kenwood TS-450, but now as I tune around looking for a station to contact, I leave my RIT(receiver incremental tuning) turned on. Leaving your RIT on while tuning goes against convential wisdom, but I find it works for me. I leave my RIT on about 500 to 600 Hz up. When I discover another station I wish to zero beat, I tune by ear so that their CW tone drops down in tone to almost nothing, meaning that my transmit frequency is now approximately zero beat with theirs. Then I reset my RIT back up a few Hertz so that I can hear the other station. Takes me one or two seconds. Tuning by ear for an approximately 600 Hz tone just comes with experience. I have found that this method of zero beating works best for me. Recently I have become a DXing nut, and I find this new method faster for me. There is no one best method for zero beating. Whatever works best for you and for your rig.

This zero beat frequency stuff is pretty weird, it confuses me at times, and I hope I explained it correctly. The frequency offset for CW in most transceivers explains why when you are listening to a CW signal in the tranceiver's "CW" mode, and you switch to phone, to "LSB" or "USB," you loose the CW signal and have to go search a bit for it again.

Using CW Abbreviations and Q Signals

Abbreviations are **very** commonly used in CW. They save time and are, I think, one reason why CW is so cool. Once you have learned many of the abbreviations as well as CW operating techniques, you are "in", you're a member of the CW using fraternity. Knowing and using CW correctly is kinda like belonging to an exclusive club. Anbody can pick up a microphone and talk on the ham bands; doing CW requires skill and finesse.

Lists of abbreviations and Q signals used on CW are available many places, I will just mention a few of the most commonly used.

ADR	address	GN	good night	RIG	station equipment
AGN	again	GND	ground	RPT	repeat
BK	break	GUD	good	SK	end of transmission
BN	been	HI	the telegraphic laugh	SRI	sorry
C	yes	HR	here	SSB	single side band
CL	closing	HV	have	TMW	tomorrow
CUL	see you later	HW	how	TNX-TKS	thanks
DE	from (French)	N	no	TU	thank you
DX	distance	NR	number	UR	your
ES	and (French)	NW	now	VY	very
FB	fine business	OM	old man	WX	weather
GA	go ahead	PSE	please	XYL	wife
GB	good bye	PWR	power	YL	young lady
GE	good evening	R	received as transmitted	73	best regards
GM	good morning	RCVR	receiver	88	love and kisses

And the International "Q" signals, recognizable in any language:

QRL	Is the frequency busy?	QRT	stop sending
QRM	interference	QRX	wait, standby
QRN	noise, static	QSB	fading
QRO	increase power	QSL	acknowledge receipt
QRP	decrease power	QSY	change frequency
QRS	send slower	QTH	location

Don't get worried about using abbreviations when you are starting out with CW. It is perfectly OK to spell out every word during a QSO. It's just easier using abbreviations. There are **many** more CW abbreviations and Q signals, but those should keep you busy. There are also a whole series of QN_ signals for use on CW traffic nets. Also used commonly on CW are punctuation marks; the period, comma, question mark and BT being the most common. To separate thoughts or topics during a CW contact a period or a BT (dah dit dit dit dah) are commonly used. You'll hear the slash symbol sometimes (dah dit dit dah dit) to note portable or QRP operation for example. Like WB8FSV/9 or WB8FSV/QRP.

The "K" letter used at the end of each CW transmission indicates, "end of transmission - go ahead". When two hams engaged in a CW conversation do not wish to be disturbed by anyone else breaking in, they may send "KN" instead of "K" at the end of each transmission. Or if a ham wants to limit the extent of his CQ, he may also use KN. For example, "CQ VT CQ VT de N1XYZ KN" says this ham would like to be answered **only** by hams in the state of Vermont.

Here are a few other commonly heard CW expressions that are actually combinations of letters sent as a single character. You **will** encounter these CW symbols on the air.

Wait, stand by (AS)	dit dah dit dit dit
Slash (DN)	dah dit dit dah dit
End of message (AR)	dit dah dit dah dit
End of contact (SK)	dit dit dit dah dit dah
and of course, Break (BT)	dah dit dit dit dah

At the very end of a CW contact you may hear the two stations sending dits at each other, this derives from the old expression, "shave and a haircut, two bits". It sounds like dit dit-dit dit dit, dit-dit. The first station will send the dit dit-dit dit dit and wait for the second station to send dit-dit in return. This was more popular on CW years ago, but you will still hear it today. Today it may be shortened to sending just the final dit-dit, as in "73 N1XYZ de WB8FSV GN dit-dit". New hams more frequently use the full dit dit-dit dit dit, dit dit expression than more experienced hams. Not uncommonly when I end a QSO on the novice bands and trade dit dits with the other ham, I may hear a third, or even a fourth station add their own dit dit. They were listening along in silence to our QSO, and decided to add their two bits as well. This is an unprofessional operating habit. If the eavesdropping station wants to make their presence known with a few dits, I believe they should go ahead and tailend one of us, and start a legitimate QSO. Just goes to show that as you transmit on the ham bands, there are likely more than just a few folks listening.

Obscure, Rarely Used CW Characters

To be honest, I have never heard any of these CW characters in 29 years on CW, but it is still fun to know they exist. Do not use them on the air, other hams will not have any idea what you are sending.

Colon	[:]	dah dah dah dit dit dit	Underline	[_]	dit dit dah dah dit dah
Semicolon	[;]	dah dit dah dit dah dit	Paragraph	[ ]	dit dah dit dah dit dit
Hyphen	[-]	dah dit dit dit dit dah	Dollar sign	[$]	dit dit dit dah dit dit dah
Double hyphen	[=]	dah dit dit dit dah	Multiplication sign	[x]	dah dit dit dah
Quotation	["]	dit dah dit dit dah dit	Addition sign	[+]	dit dah dit dah dit
Apostrophe	[']	dit dah dah dah dah dit	Understood	[ ]	dit dit dit dah dit
Left-handed bracket	[(]	dah dit dah dah dit	Attention	[ ]	dah dit dah dit dah

Right-handed bracket	[)]	dah dit dah dah dit dah	Underline	[_]	dit dit dah dah dit dah

To transmit a fractional number in CW, send a slash[/](dah dit dit dah dit) between the numbers in the fraction. One half is transmitted as 1/2. To send a number that includes a fraction, transmit a hyphen between the whole number and the fraction itself. 5 2/3 is sent as 5-2/3. To indicate the percentage sign, transmit the figure zero followed by the slash and the figure zero again. Similar to the fraction, a hyphen is used to transmit a whole number, or a fraction, followed by a percentage sign. For example 2 % is transmitted as 2-0/0. To send the minute sign['] or the second sign["] used in latitude and longitude coordinates, use the apostrophe once or twice as appropriate. There are also 12 or more Morse Code characters for letters used in certain European languages which use the Latin alphabet. Thanks again to L. Peter Carron, JR., and his book, *Morse Code:The Essential Language*, The American Radio Relay League, 1991, for these obscure CW characters.

Here are a few of the auxiliary CW characters used with some European languages, thanks to Chuck, KB2E, in his letter to the FISTS Keynote newsletter. "...the German A with two dots over it, Ä, (dit dah dit dah); the Spanish-Scandinavian A with an accent mark, or a dot, over it, Å, (dit dah dah dit dah); the German-Spanish CH (dah dah dah dah); the French E with an accent over it, É, (dit dit dah dit dit); the Spanish N with that wavy line over it that we all know now because of the infamous El Nino, ñ, (dah dah dit dah dah); the German O with two dots over it, Ö, (dah dah dah dit); and the German U with two dots over it, Ü, (dit dit dah dah)." I am uncertain of the precise linguistic terms attached to each of these diacritical marks, whether they be grave, umlaut, or circumflex, but you get the idea. I have never heard them used in CW, but then again I don't work very many Europeans on 40 and 80 meters.

Taking Notes During a QSO, Logging, Using GMT/UTC Time

While I am in contact with another station CW station, I take notes. In fact I write down every word sent by the other ham. Mainly this is because I have a memory like a screendoor in a submarine! But I recommend at least noting the main points made by the other station, so that you will remember what to comment on during your next transmission. I circle with my pen those items I want to remember to bring up next go around.

I am kind of strange in that I save all these notes I've taken during my QSOs, going back 30 years. Really. It is absolutely fascinating to go back through my notes and read, word for word, what I talked about when I was a novice 29 years ago. Kinda like a ham diary. By FCC regulations we are no longer required to keep a log of the radio contacts we make, but I **highly** recommend it. Not only for QSLing purposes, but so that you can look up when in the past you worked a familiar callsign. And looking through your old logbooks will bring back lots of pleasant memories of QSOs gone by. I keep copious notes in my logbook, beyond the standard date/time/frequency/callsign/RST/name/location, to help me remember what was special about each contact.

I fill out as much information as I can in my logbook at the very beginning of each QSO. This saves me time and, if I accidently bump the VFO dial during the QSO and change frequency, I can use my logbook to look up my original frequency. Or you can use your frequency lock control if your rig is so equipped. My cat Rasta has been known to jump up on my desk while I am QSOing and rub against my VFO before I can stop him. Perhaps my cat did not like the other ham's fist. HI.

After you have been on the air a while, another ham will someday surprise you during a QSO by using your name before you give to them, or asking if your old Heath DX 60B transmitter is still running. How did they know your name or about your rig? Turns out you have worked this ham before but forgotten, and they either have a **very** good memory, or they keep their log on a computer. I would love to put all 29 years of my ham contacts in a computer database, but whew! The data entry would take months. If you are just beginning your ham career and have a computer, then get some logging software.

Hams should always use GMT or UTC time when logging and keeping records. Try to keep a schedule set up for 8 pm with another ham who lives in a different time zone. Do you meet at 8 pm your local time or 8 pm their time? No problem if you both use UTC time. **Always** fill out QSL cards using UTC time. Do not use 24 hour military time. Confusion often arises when you make a ham contact close to 0000 hours UTC. Because in UTC the date changes at 0000 or midnight UTC. What date do you put on your QSL card? Use the UTC date. I frequently receive QSL cards from new hams with the correct UTC time but the wrong date. They have grown up accustomed to the date changing at midnight their own local time.

Keeping track of the current time in UTC takes practice. You could tune your receiver to a time standard station like WWV or CHU to determine the current UTC. Clocks are available that tell time in UTC format. Or you could, like me, just memorize your local/UTC equivalents. You can make a little chart with your local/UTC equivalents. You will need to make two such charts since local/UTC equivalents change twice a year, with the switch between daylight time and daylight savings time. This twice yearly switch pretty much takes place all over the world, not just in the United States.

If your browser is JavaScript enabled, here is a clock to convert your local computer's time to GMT/UTC.

The current time on your own computer in GMT/UTC is: Wed, 18 Feb 2015 14:05:16 GMT

For a basic explanation of what GMT/UTC time is, visit my Radio Fundamentals Homepage.

Identifying as per FCC Regulations

Speaking of FCC regulations, amateur radio operators are required to identify themselves on the air by transmitting their callsigns. At least every ten minutes. I believe it is also a good idea to identify at the beginning and end of each of your transmissions as well, even if less than ten minutes has passed. You will hear some experienced CW operators taking turns transmitting during a QSO without IDing. For example:

- first station "WHATS UR WX LIKE? BK"
- second station "SUNNY ES COOL. HW ABT U? BK"
- first station "MONSOON HR, RAIN ES 70 DEGS..."

No problem as long as they ID every ten minutes. If band conditions are poor or there is lots of QRM, IDing at the beginning and end of each transmission is wise, or the other station may not realize you turned it over to them. Easy way to completely loose one another. To save time I will sometimes end my transmissions with only my own callsign, like "HW COPY? de WB8FSV K". Cool, as long as every ten minutes I start or end one of my transmissions with something like, "WHAT SAY FRED? N1XYZ de WB8FSV K"

Dealing With QRM and QRN

Characteristically, when listening to shortwave radio frequencies, which include the most popular ham radio bands, you will hear noise, static, interference, and fading. They sometimes make reception of ham radio signals difficult, sometimes downright impossible. I view them as a challenge. I call them the three dreaded Qs: QRM(interference), QRN(noise and static), and QSB(fading). With experience and practice you can learn to deal with the three dreaded Qs and enhance your enjoyment of amateur radio.

First let me discuss QRM, probably the most frequently encountered and most disturbing of the three Qs. And the only one you yourself can help reduce by your own radio operating habits. QRM is a fact of life on the ham bands, get used to it. Try to plan your operating methods so that you cause as little QRM to other hams as possible, and everybody will be happier. There are technical means to help alleviate QRM: passband filters, audio filters, DSP and RIT. For example your RIT(receiver incremental tuning) can be used to "tune out" QRM. You can move your RIT away from the interfering signal until it is nearly out of your receiver's passband tuning range, leaving just the signal you want to hear. I have found that even when there is no QRM, moving my RIT a little bit changes the tone of the signal I want, often improving reception.

With practice you will be able to eventually, with your ears alone, "tune out" many of the interfering stations and concentrate on the signal you want. Most QRM from other hams is unintentional. If you find someone intentionally QRMing you, playing games with you, the best advice is to ignore them. **Do not acknowledge their presence in any way** or you may encourage them to continue. Ask for a repeat, change frequency, sign off if you have to. I would not mention anything about "QRM" or "SOME LID".

Sometimes when I answer a CQing station and that station is unable to copy me, perhaps due to QRM near our frequency, I will then call them a second time after changing my transmit frequency a few hundred Hertz. That small change may allow the other ham to now hear me through the QRM. The same thing is true if some QRM suddenly appears during your QSO. Although don't QSY too far, or the station you are talking with may lose you.

You and the other station may both agree to QSY(change frequency) to escape some QRM. Be careful. Successful QSYing on CW is quite difficult. For me it works about fifty percent of the time. Quite often you will lose each other. QSY during a CW QSO with caution. Be careful to state exactly where you would like to QSY, say up 2 kHz, or to 3715 kHz, rather than simply stating, "let's QSY up" somewhere.

Another practical use to having dual VFOs in your ham rig is that you may be able to use them to chase off QRM. Sometimes during a QSO I will put both of my transceiver's VFOs on my same operating frequency. Then tune the inactive VFO a few hundred cycles(or Hertz) up or down in frequency. Whether you tune up or tune down a few hundred cycles depends on the direction that your rig's receiver "sweeps" as you tune. My Kenwood sweeps or changes pitch from high to low as I tune higher in frequency. During my QSO if I hear another ham call "QRL?" to see if the frequency is clear, I will interrupt my own QSO for a few seconds, switch to my second inactive VFO, and transmit a quick "C", meaning, "yes this frequency is in use." I could have remained on my original frequency and sent my "C" in answer to his "QRL?" But it is likely the QRLing ham would not have heard my answer due to the narrow passband of his receiver(in other words he is too far away from my transmit frequency) or due to the direction of the sweep of his own receiver. By leaving my second inactive VFO a bit off of my own transmit frequency, I can protect a larger area of frequency space around myself from potential QRM. Again, please do not answer a CQ if the CQer is too close(within a kHz or less) to an ongoing QSO in order to avoid QRMing the other QSO.

One very annoying, for US hams, form of QRM is the shortwave broadcast stations found most evenings throughout the 40 meter novice band. We have to share the band with them, I like to view it as a challenge. There will be times during a QSO when one of these broadcasting stations will sign/on and begin transmitting on or very close to the frequency you are talking on. First you will hear their unmodulated carrier as they tune up, followed by their interval signal. Then usually at the top or bottom of the hour, the broadcast station will begin their official broadcast with their national anthem. Then the news. Quite often you will lose all trace of the other ham you were in QSO with as soon as the broadcaster opens up with their carrier. Sometimes you can still hear each other through the unmodulated carrier, but you had better quickly say your 73s before the music starts. A few times I have been able to continue a contact as long as the broadcast station does not transmit music. If the broadcast QRM on 40 meters is just too much for you, there is always 80 meters. Or switch your ham receiver to the AM mode and delve into the fascinating world of shortwave broadcasting.

QRN refers to noise heard on shortwave radio. There are basically two types of QRN, natural and man-made. Natural QRN is the static generated, for the most part, by thunderstorms. The radio static, or QRN, generated by thunderstorms travels great distances via skip, just like radio signals on shortwave. At any given moment you may be able to hear the static from dozens of storms, hundreds and thousands of miles away. At a given distance from a radio station on shortwave there is a dead zone, which the radio signal skips over. Same thing is true for thunderstorm static. I have been on 40 meters CW while I knew there was a thunderstorm nearby, and heard no static. I was in the thunderstorm's dead zone, its static was skipping over me. Other hams I then contacted were barely able to copy me through the static, although I heard them fine. Pretty weird. There are many more thunderstorms during the warm summer months, meaning that winter provides the best reception on the 40 and 80 meter ham bands. Both thunderstorms and static decrease in number and intensity with nightfall. Rarely, during a particularly intense solar disturnbance, the shortwave radio frequencies will go dead. All you may hear is a continuous rushing noise or QRN caused by the solar disturbance.

Man-made QRN comes from many sources, including automobile engines, electric motors, fluorescent lights, electric fences, loose wires on electric power lines, and lawnmowers. Other QRN is purposely broadcast on shortwave radio frequencies, such as over-the-horizon radar and high speed RTTY. It becomes what we call QRN when it is broadcast by nonhams on ham frequencies. A good noise blanker or a ham radio equipped with DSP may help reduce this noise. Before I purchased my current home, I walked the property with a portable SW radio receiver tuned to 80 meters, to determine if there was any man-made QRN inherent to the site. I heard no local QRN, so I bought the house.

Oh yes, and then there is QSB, or fading. This is a natural phenomenon, one of the mysteries of radio propagation. Check out my Radio Fundamentals Homepagefor an explanation of how fading works.How QSB works is not difficult to understand. Why it occurs is the mystery. There seems to be at least a little fading present on most shortwave frequencies, particularly at night. The duration and depth of the fades can vary widely. Just another challenge to make your ham radio operating and shortwave radio listening more interesting.

Repeating Info Due to QRM

It is important to ensure that the ham you are in contact with is able to copy at least the three essential items of the QSO: your name/location/RST. So normally in any CW contact these items are repeated twice, "UR RST IS 579 579 BT MY NAME IS JACK JACK" etc. If the band conditions are stinko, three repeats might be in order, of at least the name and RST. For the rest of the contact, in bad QRM, QRN, or QSB, hams have been known to employ one of two other repeating techniques. One would be, "MY MY WX WX IS IS CLOUDY

CLOUDY" and the other technique is, MY WX IS CLOUDY MY WX IS CLOUDY". I normally use the latter.

You can tell that the other ham you are in contact with is experiencing QRM if they tell you, if they ask for lots of repeats, if they get your name or callsign wrong, or if they hesitate long seconds before returning to you after you complete a transmission. If the ham you are talking with sends many more repeats than normal, you can assume they are hearing QRM on your signal, and they probably would like you to use many repeats as well. If I believe my signal is being stepped on, I will send the other ham's name more frequently than I normally would, to assure them that at least I can copy **them.** For example, "TNX DAVE BT MY WX IS LOUSY BT DAVE HW IS UR WX? HW COPY DAVE? N1XYZ de WB8FSV K". Even in very heavy QRM folks are more likely to pick out their own name or callsign out of the muck. Occasionally you will work another ham on CW who refuses to copy your callsign correctly. Usually you can correct them by repeating your callsign frequently at the beginning and end of your transmission. Or if that doesn't work, try, "MY CALL IS WB8FSV WB8FSV NOT WD8FSU". Amazingly a few hams on CW will continue to use your incorrect callsign regardless of what you tell them.

Correcting Mistakes in CW

Everyone occasionally makes a mistake while sending their Morse Code. Sometimes your key or keyer seems to have a mind of its own. The most common method to correct a mistake is for the sending station to send a rapid series of dits, like the number five with a few extra dits added. Eight dits is the recommended number of dits, although no one is counting. And to then send the correct CW character or word. This is fine. Personally when I send a mistake **in the middle of a word**, I don't see the need to emphasize it with the rapid dits. I simply pause and then send the correction. The station you are talking with is copying along with you, letter by letter, and they probably realize as soon as you that you have made a mistake. I feel it is more professional to use a pause rather than the rapid fire dits.

But, if I make a mistake **at the beginning of a word**, the other ham copying along with me has no idea I have made a mistake. So in this case a device is needed to signal that a mistake has been made. I prefer to use a question mark rather than the rapid fire dits. Another CW device you may hear less often to indicate a mistake is "dit-dit", like the CW letter I, sent once or twice after the mistake and before the correction.

You will hear some hams use a question mark to signify that they are going to repeat a word, even if they have **not** made a mistake. For example, "MY NAME IS JACK? JACK". This use of a question mark is frequently employed to indicate the repetition of a difficult or unusual word in a CW radiotelegram by CW traffic handlers.

How Long Should the Contact Last?

Talk as long or as short as you like. Most CW contacts on the novice bands seem to last about half an hour or so, which mean that they rarely get beyond the standard name/location/RST/rig/WX/73 stage. That is perfectly OK. I myself like to talk a bit longer. For me, a good CW rag chew generally lasts around an hour, sending and receiving at about 13 wpm. My longest CW contact ever was a 3 1/2 hour marathon, but after the second hour we began trying to stretch it out to see how long we could go! At about 10 wpm(words per minute), a common speed on the novice bands, it can easily take half an hour just to send the name/location/RST/rig/WX/age/73 info. Normal human verbal conversation is around 120 wpm, so a SSB or phone QSO of half an hour would cover a lot more ground than a CW QSO of half an hour at 10 wpm.

How Fast/Slow Should You Send CW?

Normally, adjust your code speed to match that of the other ham you are talking to. This is especially true if you answer another ham's CQ or tailend a conversation. People commonly send a CQ at the speed they would like to be answered. If you answer a person CQing at say, 15 wpm, and you send at 10 wpm, the CQer generally will be polite and slow down to your speed. This does not always happen, so be careful about answering a CQ sent by a CW speed demon. Normally a "PLEASE QRS" (please send slower) sent to the other station will elicit the correct response from them, and they will slow down.

It is easy, especially with an electronic keyer, to send faster than you are able to comfortably receive. Try to match your send speed to that of your receive speed. With practice your speed will improve. Making CW contacts is a great and fun way to increase you code speed. Another tip is to occasionally stretch yourself, try to copy CW at a slightly higher speed than you are comfortable. Do not do this during a QSO you are having when you are under pressure to copy everything correctly. But just listening around the band. Participating in slow speed CW traffic nets is another neat way to help you increase your code speed, and perform a public service at the same time.

You'll discover a wide variety of CW speeds on the novice bands. Most folks go slow, less than 15 wpm, but you will hear hams going over 30 wpm also. They may go fast to show off, or perhaps there are no more clear frequencies available in the general bands. Some speedy novices and techs may be experienced CW operators, perhaps they were hams years ago and were recently relicensed, or learned CW in the military or merchant marine and just now got into ham radio. Also the 80 meter novice band was moved a few years ago and now includes frequencies used by higher speed CW traffic nets. You will frequently hear them in the early evening between 3675 and 3700 kHz. Many of the hams you encounter on the novice bands will be novices and technician-pluses, but there are a number of general, advanced and extra class hams to be found also. They may feel more comfortable doing CW at slower speeds or they may, like me, simply enjoy working new hams. I have been lucky in my 33 years as a ham to have been the very first contact for over 80 hams now.

How Do You Gracefully End a QSO?

It's no big deal, many hams will just send, "TNX FOR QSO 73" or "GOTTA GO TNX 73" and sign off. That is fine. Myself, I like to leave a bit more politely, such as, "DINNER HR 73", "I GOT A PHONE CALL, CUL", "TIME HR TO QSY TO BED", "MY XYL IS YELLING, TURN OFF THAT RADIO AND DO SOMETHING USEFUL", or "SRI ED MCMAHN IS AT MY DOOR WITH 10 MILLION DOLLARS 73".

There will be times when, after several exchanges, you realize that you just don't want to talk to this person anymore. You could, as I have heard some hams do, just disappear. But I think having a few tactful excuses for leaving to choose from is a good idea.

It is not uncommon that QRM will grow to the point that it is impossible to copy the other station you are in QSO with. Some hams in this case will just give up and stop transmitting. I would recommend instead that you at least send a 73 and sign off properly. Don't leave the other ham wondering what happened to you. On your end you may not hear anything except QRM, but perhaps the other ham you were talking with still copies you fine. Maybe the QRM is one way, skipping over his location. If the QRM or QRN or QSB just destroys a QSO I am involved in, I will send something like, "SRI DAVE NO COPY NO COPY QRM QRM 73 73 N1XYZ de WB8FSV."

Occasionally during a QSO, the station I am talking to simply disappears. Maybe they have rig problems, an important phone call, or the irresistable call of nature. Try not to simply disappear. If another ham vanishes during a contact with me, first I will send a friendly, "DAVE?", and if no answer, then send, "N1XYZ de WB8FSV K" once or twice before I give up. Even then I leave my VFO on the same frequency a few minutes while I fill out my logbook and the QSL card, in case the ham reappears.

A Typical Evening for Me on 40 meters CW

Choosing My Band

After turning on my rig, getting comfortable in my chair, opening my logbook, and pulling out my scratchpad, I choose my band. I personally enjoy 80 and 40 meter CW, particularily 40 meters, so I will search between 7100 and 7150 kHz. 80 and 40 meters are noted as good rag chewing bands, as are 160 and 30 meters. Starting at 7100 I slowly turn the dial of my transceiver, stopping at each CW signal I hear. I will listen a few seconds, long enough to determine if the station is sending a CQ, or is already engaged in a conversation. I am looking for a CQ to answer, the way in which I usually begin a CW contact. Since I am not a novice or technician, I almost feel like an intruder in the novice bands, and would much rather answer than send a CQ here. Although if I am unable to locate an interesting CQ after searching for 15 or 20 minutes, I may go ahead and call my own CQ. Or perhaps search the general CW frequencies, or switch bands, or go watch TV. HI.

Scanning for CQs

A full scan from 7100 to 7150 kHz for CQs might take only a couple minutes, particularily at night when the 40 meter band will be filled with powerful SW broadcast stations, rendering big chunks of the novice band unusable. Activity on 40 meters at night is usually limited to a few small relatively clear areas in between the broadcast stations. For example, now the regions around 7108 and 7137 kHz are often clear most evenings. Several years ago 7125 kHz was always available at night, not now- this is because the SW broadcast stations periodically change their operating frequencies and schedules. A scan of the 40 meter novice band in the daytime may take longer with the absence of the broadcast stations and with more hams. Weekends on 40 meters can get quite busy.

In most of the world the 40 meter ham band stretches from 7000 to 7100 kHz, and 7100 to about 7500 kHz is used as a shortwave broadcast band. Only hams in North and South America are able to use the full 7000 to 7300 kHz. And only in the United States is 40 meters divided into different phone and CW segements. Hams in Canada and in South America can use CW or phone anywhere within 7000 to 7300 kHz. This explains why you can hear Spanish speaking SSB phone stations some evenings in the 40 meter novice band. This is a good indication of band conditions, how 40 is often open deep into South America in the evenings. When the band conditions are good, you may even hear European or Asian SSB stations just below 7100 kHz.

Once I discover a CQing station, I first determine if that ham will be able to hear or copy me. If the CQer is relatively weak, chances are they will be unable to copy me. Generally the stronger the station you hear, the greater the chance they will hear you in return. Radio propagation is usually two way. Not always. Sometimes it is fun to call a weak station just to see if your rig can reach them. Perhaps the other ham's signal is weak because they have a less than optimal antenna system, such as a dipole in their attic. Or maybe they are using QRP(low power). After scanning the band for a while and perhaps making a few calls, you will be able to judge the condition of the band. Is the skip long or short? Is the band open to the West Coast, south to Florida, or not at all. Occasionally I will turn on my rig , listen a bit, try to answer a few CQs to no avail, make a few fruitless CQs myself, then give up and go play on the Internet. Particularily true during the last few years with the bottom of the sunspot cycle upon us. The current sunspot cycle, Cycle 23, peaked during Spring 2000 and radio propagation conditions are now slowly declining.

Do I Want to Answer this CQ?

But, let's say I hear a strong CQ. Next I determine if I want to answer this CQ. Since I enjoy working new hams, a ham with a new callsign gets first priority by me. After you are on the air a while, you can pretty well guess how long a ham has been licensed by just their callsign. Usually. I am attracted by certain types of callsigns. For example a one by two call, like W8TZ, is usually an old timer. They often enjoy rag chewing and are full of fascinating ham stories and experiences. Callsigns that form words intrigue me, such as KA4TON or N3HAM, or callsigns that are similar to mine, like KB9FSW. In 33 years on the ham bands I have worked only five other FSV callsigns: W3FSV, KA1FSV, VE3FSV, WB4FSV, and WA0FSV. I treasure those QSL cards. My wife and I love New England and my ears always perk up when I hear a 1 district callsign. From Ohio I seem to have a pipeline into New England, meaning I find it quite easy to work New England hams.

Often when I hear a CQ, I will quickly look it up in the Callbook, to discover what city the ham is calling from. Perhaps it is a city or state I have visited or vacationed in, have friends or family in, have a favorite sports team in, in other words have some connection to that we can talk about in our potential QSO. My computer is upstairs and my radio room is downstairs, so I cannot access a CD callsign database. Therefore I use a printed Callbook. Even a Callbook a couple years old helps I believe. It enhances my ham radio operation by allowing me to discover a little more information about a ham before I decide to answer their CQ. Unfortunately 1997 was the last year that printed Callbooks will be available. Too bad, it is the end of an era. Of course after I have completed the contact, and am filling out the QSL(I try to QSL **every** contact), I use a callsign server on the Internet to get the ham's current mailing address.

Not having a printed Callbook or access to a callsign server is perfectly OK. It just means you will wait a few moments longer to discover to whom you are talking. The suspense can be exciting. You can still QSL the other ham by asking them to send you their mailing address over the air, or to send you their card first.

Making a Contact

So now I've decided to answer the CQer and establish a contact. A one by two call should be sufficient on my part. Although if band conditions are lousy, something like a one by three or a two by four might be more appropriate. I have already made sure my rig is tuned up and ready to transmit. Your ham transmitter must be tuned so that there is an impedence match between the transmitter and the antenna, ensuring the best possible transmitted signal. Many modern transceivers include an automatic antenna tuner which makes tuning a breeze. When tuning up your rig do it as quickly as possible so you don't cause unecessary QRM to others. Even if you use an automatic antenna tuner you are transmitting a weak but audible CW signal over the air. Tuning up without an automatic antenna tuner usually means you are transmitting a very strong carrier over the air. Make it short please. Actually you should be using a dummy load to tune into, so that you are not heard over the air. If you must tune up on the air, try to do so on a clear frequency, or perhaps on top of one of those 40 meter shortwave broadcasting stations.

And the CQing station comes back to me. Hooray! It's a KF4 station in North Carolina, a ham I worked about a month ago. The callsigns in this story have been changed to protect the innocent. HI. He doesn't remember me, but his callsign and QTH seem familiar, so I look in my logbook and find him. On the average I make about 20 CW contacts a week, mostly on 40 and 80 meter CW, so I commonly hear and work the same stations more than once. After we exchange the standard name/location/RST, I ask him if he has received my QSL card yet and how many states he has worked so far. He remembers our previous contact. During our first QSO the KF4 had only been on the air for a couple weeks, and at about 10 wpm and with lots of mistakes, the minimal name/location/RST was enough to deal with. Now on our second contact we are able to find out more about each other. Hey neat, he is into computers also. We swap e-mail addresses and I tell him about my homepage. I will e-mail him tomorrow and send him the address of my homepage. Sending http addresses on CW is not easy. I am forever having to explain what a tilde is. My KF4 friend in North Carolina says thanks for the FB QSO but it is almost his bedtime. I send him some of my famous personalized QSO ending lines, and we both sign.

Some hams on CW soon develop several of their own personal phrases or expressions to liven up and personalize their QSOs. There are the standard CW phrases that everyone uses such as, "HOPE TO CUAGN, NICE TO MEET U, BEST 73 TO U ES URS". These are perfectly OK, but I like to use some of my own unique CW expressions, "RAIN HR, GREAT STAY INSIDE ES HAM WX or ENJOYED QSOING WID U or HELP QRM ATTACK!". To hear my best ones you will have to work me on the air. QCWA magazine(Quarter Century Wireless Association) regularly prints many of the humorous CW expressions that its members have heard on the air.

It is almost my bedtime also, but I would like to squeeze in one more CW contact. So after logging my KF4 contact I begin another band scan for CQs. 40 meters tonight is pretty noisy and filled with three very loud SW broadcast stations, normal. I've been looking now for fifteen minutes after my contact with the KF4 station, and found no CQs. Each time I have scanned across the novice band I noticed the area around 7145 kHz is clear. Perhaps I will call CQ here myself if I can't find any other CQs. But then I do hear a weak CQ from a new ham, a KC2. He is pretty weak, meaning I may well be weak to him as well, but I answer his CQ anyway. There isn't much else going on. Low and behold, he comes back to me.

He does not have a very good fist, his CW spacing is way off, he makes a lot of mistakes, and his CW operating technique needs work. But I am still able to copy about 75 percent of what he sends, and make a good guess at the rest. I copy, "THIS S TY FERST QSO". I am his first contact. Infinitely cool. My favorite kind of contact. I live to make first contacts. My new KC2 friend only sends his QTH once, half of which I loose in the QRM, and he forgets to send his name and my RST. Still I believe it was a fairly successful first QSO. The contact took about 45 minutes, mainly since we were working at less than 5 wpm and I sent many repeats of my information.

I have a great deal of patience with new hams. After all we were all new hams at one time. Most hams well remember their first contact. My own first contact was at 5:30 pm on Feb 6, 1970 on 15 meter CW with a WB8 station. It was a local ham across town. I had to telephone her to ask her to listen for me on the air. I had been calling CQ for two days with no answers. Later I discovered that a vertical antenna mounted on the roof needs to be grounded. This was news to me. After I put some radials on my vertical I began to get lots of answers to my CQs.

It is getting late and the KC2 and I both sign off. I fill out my logbook and a QSL card for the KC2, including a short letter congradulating him on his first contact. Time now to QSY to bed. I turn off my Kenwood TS 450, and **disconnect the antenna.** The end of a most successful ham radio day. In two evening hours I have renewed acquaintances with an old ham friend and made a new ham friend. What a neat hobby!

Slow Speed CW Traffic Nets

Handling traffic is a time-honored tradition in amateur radio. "Traffic" refers to messages or radiotelegrams and "handling" means generating, relaying, and delivering these messages. Since CW was around a couple decades before phone, CW traffic handling dates to the very beginning of radio. Handling traffic, particularly during a disaster such as a hurricane or flood where normal communications are down, is often cited as one of the main justifications for the continued existence of amateur radio and our occupation of all of our valuable radio spectrum. The public's impression of the usefulness of ham radio is often reflected in the vital public service we perform during emergencies and public events.

Thousands of US and Canadian hams meet daily in nets to send and receive much of this traffic. A number of CW traffic nets operate in the novice bands, usually 80 meters. They purposely operate at a slow speed so as to encourage the participation of new hams. Many of these nets are primarily intended to be training nets in the proper techniques of handling CW traffic. It's really quite easy to do traffic handling. These slow speed CW traffic nets provide an excellent opportunity for you to increase your code speed. And perform a public service, give a little back to amateur radio, at the same time. Should there ever be a natural disaster, such as a tornado or major flood, in you area, knowing how to send and receive emergency messages is an important skill. An asset for you, for your community, and for amateur radio.

Not every state has a slow speed CW traffic net, but you can probably find one in a nearby state that will welcome you. I learned my traffic handling on OSN, the Ohio Slow Net, that meets daily at 6:10 pm local time on 3708 kHz. I have been a net control station on this and other traffic nets, and I am now the Ohio Section Traffic Manager. Just look around 80 meters CW in the early evenings for a group of hams using the QN_ signals found on traffic nets. Or contact the ARRL(American Radio Relay League) for information on these slow speed CW and other traffic nets.

The Central Ohio Traffic Net(COTN) is the local 2 meter FM traffic net that I frequent. And here is the ARRL Great Lakes Division homepage. You can find me in there someplace.

Straight Key, Electronic Key, Bug, or Computer Keyboard?

There are basically four types of devices used by most hams to send Morse Code. The straight key, also called the hand key, as well as the electronic keyer, the bug, and the computer keyboard. My favorite is the straight key, which I use 90 percent of the time. The straight key is more natural, more organic, and so is the resulting code. Learning to use a straight key well is not easy, it takes a great deal of practice. Pounding brass well with a straight key is an art. I am far more impressed when I hear an excellent "fist" on a straight key than I am with near perfect code sent with an electronic keyer.

I own two electronic keyers which I use mainly when I want to send faster speed CW. 15 wpm is about the top speed you can send intelligible code with a straight key. Although I have heard hams send good CW at 20 to 25 wpm with a straight key- it amazes me they can send that fast. Learning to use an electronic keyer, while it takes practice too, is easier than learning to use a straight key well. Once you have mastered the electronic keyer, using it can be a real pleasure. To effortlessly and gently squeeze those two paddles and produce near perfect code is one of the great joys of CW. I still prefer the organic/natural sound of a straight key fist to the mechanical sound of an electronic keyer. Hams using a straight key have a fist with personality. On an electronic keyer your fist sounds like everyone else's. Usually. Some new hams have difficulty sending with a keyer. I believe learning to send CW first on a straight key before switching to an electronic keyer is a wise method.

Speaking of personality, that to me is the biggest advantage to using a bug. Although a bug also produces code mechanically, the operator has complete control of the length of their dahs. This gives the ham the ability to send with their own distinctive fist, or "swing". Unfortunately, learning to send well with a bug takes years of practice, and a bug is notoriously difficult to adjust. Using a bug well is a challenge, almost like playing a musical instrument. After practicing on my own bug for five years, I developed a passable fist, until last year when my cat knocked my bug off my desk onto the floor. It hasn't sounded right since then. I hope my cat Rasta is not a no-code cat. After listening to CW stations for a few years, identifying the distinctive "swing" of a bug user is easy. When you hear someone sending good code with a bug, you are listening to a CW Master, a highly trained expert who has honed their CW skills through years of patient determined experience. In the hands of such a CW Master, a bug is capable of producing beautiful enchanting Morse Code.

A quick word about sending CW with a computer keyboard. Some Morse Code challenged hams use this method to generate and send CW. But for the most part I don't like computer generated and decoded CW. For me, using a keyboard is not "real" CW. Even worse is to use a Morse Code reader that decodes and prints out the code for you. A traditional amateur radio operator sends and receives CW using their own senses and faculties. I find computer generated and decoded CW too mechanical and impersonal. But at least it is CW.

FISTS - A Cool Club for CW Operators

There is an international organization dedicated to promotion of the use of CW in the ham bands. This group or club of hams is called FISTS, and is also known as the International Morse Preservation Society. I have had great fun since I recently joined FISTS. At times it is difficult to find another ham to talk with on CW. The FISTS club promotes several ham radio frequencies, those for example ending in 58: 14058, 7058, or 3558 kHz, as places to find other FISTS members to rag chew with. Another aim of FISTS is to encourage friendship within the club membership, which they do in part with these CW calling frequencies. I love to rag chew on CW and it is great knowing where to find others with the same interests. They also offer several awards for working 100 members and for working at least one member in each of the 50 United States. There are over 9000 FISTS members now, but finding one in each of the 50 US states is quite an undertaking. Very few hams have achieved this award so far.

Not long ago I worked my 100th FISTS member and qualified for my Century Award. Cool. Took me seven months. As much fun as working new FISTS members and adding to your total, is running into folks you have already worked and deepening friendships. After a couple QSOs you learn each others' names without having to look them up in your log. Of course you do not need to be a FISTS member to do this, but FISTS folks seem to me to be friendlier and more likely to rag chew. FISTS also has its own excellent QSL bureau.

Neat FISTS Story - I was lucky to have been able to attend the 1998 Dayton Hamvention, May 15-17. Actually since I only live 72 miles from Hara Arena in Dayton where the Hamvention is held, I have attended every year for nearly 24 years now. I know how fortunate I am. This year I made it a point to attend the FISTS party Friday evening, hoping to put faces to some familiar calls. There I met Geo, G3ZQS, the founder of the FISTS organization, FISTS number 01. He came all the way from England to the Dayton Hamvention and to meet FISTS members. Neato. I drove home later that evening, and, still full of radio enthusiasm, I got on the 7058 FISTS frequency about 10 pm. After one FISTS QSO I heard a weak CQ FISTS and discovered it was Geo, operating as W8/G3ZQS. Using a friend's rig Geo was operating from his hotel room with a whip antenna on a truck bumper. It was quite a thrill to finally work Geo on the air, particularly since I had just had an eyeball QSO with him. A mini FISTS pileup on Geo thereby ensued.

How to Get Zillions of QSLs

My second favorite ham activity, after rag chewing, is collecting QSL cards. Guess it's because I love to collect stuff. I average one or two QSLs in my mailbox every day. One important secret to successful QSLing, at least among US hams(not DX), is to send your QSL card out first. If you wait for the other folks you work to send you their cards first, you can expect to receive at best one QSL for every ten contacts you make. One out of 20 is more likely. I try to QSL every single contact I make. I realize that can get expensive postagewise, but to me it is worth it.

Another important secret to QSLing is, I believe, to personalize your QSL card. Be sure to put a note from you on the QSL, with as much personal information as space permits, about what you discussed in your contact. My own QSL card contains all the required information just on the front of the card, leaving the back free for me to fill up with my personal notes to the other ham. My own QSL cards are homemade. Here is my QSL card. I drew the picture on the front, and I print them on the copier at my workplace(don't tell my boss). This further personalizes my cards. I always mail my QSL inside of an envelope, thus ensuring my card arrives relatively unfolded, smudged or otherwise mutilated. I think folks appreciate a QSL in undamaged condition, and I seem to get more returns that way. Again the postage costs more for an envelope, but that is the reason I go to work every day. To make money to pay the electric bill so that I can ham, and so that I can pay all that postage. HI.

Finally, if there is a ham station from which you really need or want a QSL card, such as in Vermont or Hawaii, I would include a first class postage stamp with the QSL inside the envelope. Thus the other ham has one less reason not to return his or her QSL to you. An SASE(self-addressed stamped envelope) sent to the other ham is also a good idea, saving them the trouble of writing out your address. I myself do not usually send an SASE, because hams occasionally have oversized QSL cards that may not fit inside the SASE envelope you send them. Hams who live in rare states like Wyoming I'm sure are overwhelmed by QSL requests, and sending them return postage or an SASE increases your chances for their card. A connection to the Internet and a callsign server is an asset. An up to date address to which to send your QSL is a must.

Some hams who live in a small town regularly give the name of their QTH as that of a nearby larger city so that other hams will know where they are located. Not a good idea. Be proud of your own small town. If the QTH you give over the air does not match your mailing address(the address in the Callbook or callsign server), you may confuse hams when they later try to mail you their QSL card. They may decide not to send you their card.

Keeping accurate records of to whom you have sent, and from whom you have received QSL cards is important. Your logbook is a convenient place to do this. Sometimes I receive two QSLs from a ham for the same contact. They first mailed their card to me. But when they later received my QSL they could not remember, or had poor records, of whether they had sent me their card. So they mailed me a second card to be sure. I suggest filling out the QSL card that you intend to mail very soon after you make the contact. The QSO will still be fresh in your mind so that you are better able to write personal comments on the card, and so that you are more inclined to fill out and mail the QSL. Don't wait until you have a large stack of cards to send. QSLing then becomes more of a chore than a pleasure, and less likely to get done.

When you first begin to receive QSL cards, it is fun to display them up on your wall, in those clear plastic containers commonly available. After you have received a large number of QSLs, it becomes necessary to store them in a convenient place. Convenient because you well may wish to look up an old QSL card months later if you work the station again. Finding an old friend's QSL while you are QSOing them can enhance the contact. I keep my QSL cards in shoeboxes. I have filled six shoeboxes now. For quick easy access I keep the cards organized by US call districts 1, 2, 3, etc., and then by callsign type, KA1s, KB1s, N1s, WA1s, WB1s, K1s, W1s, etc. This is the next best method for keeping your cards organized and findable, short of keeping a computer log.

I feel my QSLing methods are fairly successful. I get about a 75 percent return rate on the QSL cards that I send out. New hams generally QSL better than more experienced hams. CW operators generally QSL better than phone operators.

Did I leave out any important aspect of beginning CW operation that you would like to see covered? Did I make any major mistakes? Please e-mail me, or sign my guestbook, and let me know.

Jack Wagoner WB8FSV