# About Us Holding a CW Class

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After the August 2023 meeting we discussed holding a CW class for anyone interested. The class could be in-person, on the air or via Zoom (or a combination). Zoom is the best choice since the class must be held often in the beginning and it is more convenient for everyone to join in from home.

I tried to set expectations by describing what time commitment is needed and described some of the topics that would be covered but I didn't get into the lexicon part. I'm not trying to discourage anyone,

Continuous Wave (CW) is a communications method that uses Morse code to represent letters, numbers and punctuation AND it includes a lexicon that allows you to exchange information during a ham radio contact (that is, this information was added for use in ham radio).

**I believe that all of you can learn Morse code and use it on the air,** but understand it takes work and dedication. Of course, we're all different so it will take more work for some of us than others.

There are a number of things you will learn, because it's not "just" recognizing the letters and numbers, there is much more, as I will explain below. But these things are learned one after the other, not all at the same time. For example, while you are learning Q-codes and abbreviations you will already know the code, you will be building up your speed and accuracy to copy and send the letters and numbers that you have already learned.

Learning CW requires a commitment of time and energy. It can be tiring. In the beginning, it might even be a bit frustrating, since you are probably not used to learning and have to get your brain working in that mode. We all do. Once you learn the letters, numbers and punctuation then the exercises become practicing and learning how to have a conversation with another ham.

CW is a way of thinking that you have not been introduced to yet. (a CW QSO can look like gibberish until you learn the standard abbreviations we use, that's part of the class too).

My experience with my own learning (believe me, in 1965 the tools available were terrible, now it is much easier and faster) and teaching others (including my XYL and son) is that it takes daily practice just to keep what

you learned the day before. The good part is that in the beginning, around 20 minutes of copying is about all you should do in a day. Or maybe two 20 minute sessions during the day.

To correct a common belief: you cannot memorize a table of dots and dashes and expect to copy more than 5 WPM (Words Per Minute). A table is visual, your radio is audio. You don't hear dots and dashes – they are visual - you hear dits and dahs – like music. You don't watch a flashing light (unless you are deaf), you listen to sound. The sound flows in your ear and your hand writes (or types) characters with no conscious thought. That's how some people (military especially) can type code they are listening to and hold a voice conversation with someone else. Now they teach you to recognize groups of characters as complete words.

To learn to copy we can use mp3 files played back on whatever device you wish but would probably start out with someone sending by hand using a CPO or a radio. I suggest using headphones to block out disturbances when you practice. We begin with learning and practicing the shorter characters (Morse characters have different lengths. They were chosen so that the most common characters have the shortest number of elements. E = dit, I = dit dit, S = dit dit dit, T = dah, M = dah dah, O = dah dah dah, …

You must learn and practice sending too. Your eye sees the written characters of a message and your hand makes the motion to send it with no conscious thought. As you practice you learn to have your hand send your thoughts without writing them down first.

For sending you have to decide what type of key you want to use. There are four types with the last two using the same physical key but a different way to generate the characters. Even within each category there are variations in construction, size and cost. What type key you chose to start with will effect the maximum speed you can achieve and how much energy you use to operate it.

My opinion is that you start with a key type that will not limit you in the future and that you will not have to learn to use a different type in the future. I learned on a straight key and until 7 years ago I used on the infrequent occasions I operated or taught CW. I have since changed to paddles and had to relearn how to send.

A straight key takes the most physical work and has an upper limit in the 20 WPM's, it does not help you send the dits and dahs in the right 1:3

relationship. Carpal tunnel is possible because of how much you are moving your hand up and down. And your hand gets tired faster. I know all of these from experience (except for Carpal Tunnel).

<< Straight Key

To practice sending you need a code practice oscillator (CPO) which you can build or buy (see below). If you have a newer HF rig [tube type radios will not have a keyer but may have an oscillator for a straight key] it will have one built in, you can use it to practice by disabling your transmitter.

"Bugs" are a mechanical device that uses springs and weights to let you send code using a horizontal motion, they can be used to send good code fast but can also be used to send terrible uncopiable code fast or slow. Sending good code with one is more difficult than using paddles and a keyer. Bugs are a holdover from the past. I could never recommend someone use a bug. (I hear someone using one on contests, he doesn't make many contacts, the dit to dah ratio is supposed to be 1 to 3. His are 1 to 10. "dahhhhhhhhhh dit dahhhhhhhhhh  dit". Impossible to decode, at least for me.) As with a straight key, you need a CPO (see below) or transmitter to practice with.

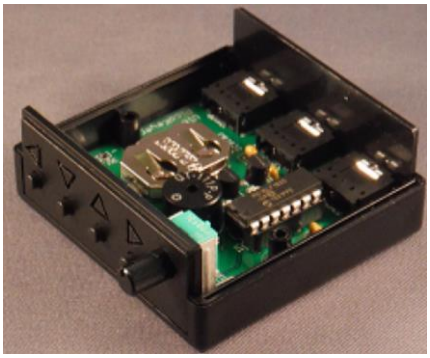
<<< Bug

Paddles take the least motion (and so energy) – just squeezing/flicking your thumb and first finger horizontally and with an electronic keyer (built into all current HF rigs) forms the proper 1:3 relationship. You can operate up into the 40's or more. There are paddles that have two levers and some that have just one, it moves to the right and left to form the dits and dahs. It

sends "dah dit dah dit" (the letter C) instead of what the bug above sends. You can still send bad CW but the lengths of the characters will be correct.

<<< Paddles

To use paddles, you need to connect them to a keyer – an electronic device that generates the audio tone and creates the dits and dahs with the proper length and spacing. For Iambic you need a keyer that generates the tones and properly completes the characters for you. All of the modern HF transceivers that I know of include such a keyer. Some radios have one jack for paddles and another for a straight key. There are small "keyers" like the one from here that you can buy assembled or as a kit. (I have one of these.)



<<< Keyer

The Iambic keyer uses paddles and allows you to press both of the paddles at almost the same time and it generates proper characters with spacing. I have never used a keyer in Iambic mode. The keyer above has an Iambic mode.

After learning the standard alphabet, numbers and punctuation characters, we add the characters that are specific for ham contacts.

You will learn the abbreviations and Q codes in common use. The list is longer than you would expect but remember, using these reduces the length of messages and we usually only use a small subset of the Q codes. CW operators try to minimize what they send so as to maximize speed.

Then there are "cut" numbers. All Morse numbers are the same length – 5 symbols (dits and dahs). They take too long to send so there are abbreviations: N for 9, E for 5, T for 0 and so forth. They are used when it is clear that they represent numbers in the message such as RST: instead of "599" you send "ENN", 5 dits+dahs instead of 15.

You will learn prosigns. One or two letters sent as one character: K, AR, BT, SK, … They delimit parts of the message and indicate that the message is ending and what the receiving station should do next.

The RST signal report: Readability (0 to 5), Signal Strength (0 to 9), Tone (0 to 9). We already use R and S in our phone signal reports, CW adds a report of the quality of the other stations tone.

Finally we get into the contents of a "typical" CW contact. What you send and where you send it. It can look pretty odd but you get used to it.

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CQ CQ CQ DE WB4EHG WB4EHG K

WB4EHG DE WB4BAG K

WB4BAG DE WB4EHG TNX FER CALL <BR> UR RST 597 597 <BT> NAME HR
RICH RICH <BT> QTH DAVIE FL DAVIE FL <BT> HW CPY? DE WB4EHG K

WB4EHG DE WB4BAG R R GUD CPY RICH <BT> UR RST 123 123 <BT> NAME
HR FRED FRED <BT> QTH MIAMI FL <BT> BK TO U DE WB4BAG K

AND SO ON …
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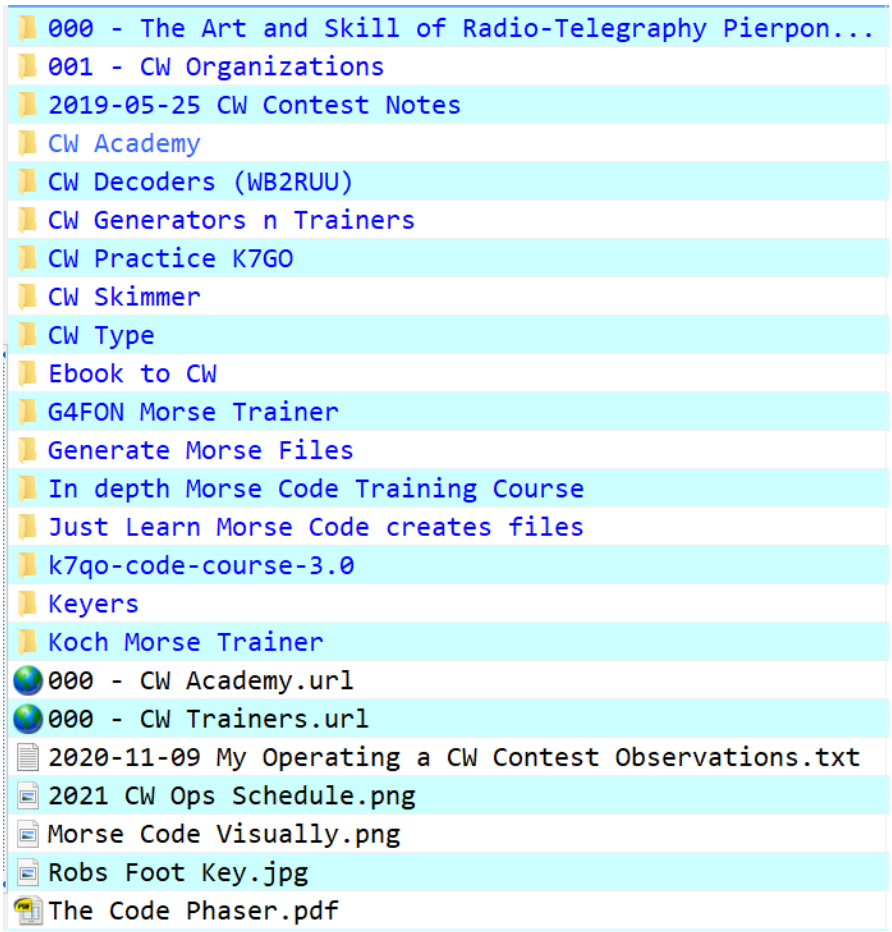
The CWops web site offers **free** classes at three different levels. They are held on Zoom, meet at least twice a week with 4 or 5 students per class. You are given homework assignments to be emailed in before the next class. Their focus is on teaching you to hear complete words instead of individual characters (that doesn't work for call signs). They have many free mp3 files on their site, some are poems, some correspondance between people, some QSOs; you are assigned some for each session. I took the middle class and had to make notes while I listened to the files. It is a very good class but seating is limited and they only teach so many classes a year – they are all volunteers. They teach you to listen to a message and instead of writing down every character they have you pick out the important parts: name, QTH, RST, Weather …

I have all kinds of material related to CW. At least one complete training course on MP3 files. All the mp3 files from the CW Academy class (which are all available for free from their web site). There are programs that generate CW from text files, a program that let's you practice for a contest/event. All of it is available to anyone who wants a copy, bring a thumb drive to a club event.

Here's a screen capture of my CW folder"




## Listing a few advantages of CW over phone:

- CW allows using a much narrower bandwidth receive filter so you can remove signals from close by QSO's on a crowded band. Thus, it is more efficient by using ~100Hz of bandwidth instead of 2,000Hz to 3,000Hz for SSB and 6,000 Hz for AM.

  It is also more efficient because we can fit more QSO's on the band.

- Because CW uses a very narrow bandwidth, the Signal to Noise Radio is higher, you have a better chance to make a contact when conditions are poor and signals are weak.

*Note: I don't remember anyone talking about Signal to Noise Radio (SNR) and how it applies to radio communications, especially for communicating in difficult conditions. Someday we need to have a presentation on that.* (It can be easier to copy a weak signal on a quiet band than a stronger one on a noisy band)

- CW breaks the language barrier. The Morse characters and lexicon (abbreviations, Q codes, cut numbers, RST, prosigns) are used internationally. You are not going to have a detailed conversation but you can make a contact.
- There is a better chance of a non-English speaker getting your call sign correct (and vice a versa) then using phone. Some nationalities have a very difficult time understanding my phonetics: "Echo Hotel Golf" or "England Holland Germany" or any combination of them. The CW version is always understood:

**dit dit dit dit dit dah dah dit**

**e h g**

- During a contest or special event a CW contact is much shorter than the spoken version and is easier to pick out of a pile up – you can train your mind to listen to just one audio frequency out of many.

Still with us? Watch on Groups.io and the DCARC website for details about participating in a CW class and code practice. Make the commitment… you can do it!

73, Rich and Fred