

# Morse Code (CW) Learning Advice

## 1. Introduction

These notes are intended to help individuals approach the learning of morse code. The original version was prepared in the early 90s particularly oriented towards passing the test required for a U.K. Amateur Radio Class 'A' Licence at that time. It was updated in 2007 when the licence requirement was abolished. It has been further revised in 2020 in an effort to be particularly useful for Colchester Radio Amateurs (CRA) members who may want to take advantage of a CRA provided programme for learning CW. Hopefully it remains useful beyond that programme.

The notes are based upon the author's own experience and observations over more than 35 years, of learning, and assisting in the learning, of morse code. Within the text, specific tips are given in *italics*. Main advice is summarised at the end.

## 2. General Tips

### • Why learn CW?

Most people reading this will have the amateur radio hobby as a reason for learning CW. A relatively small proportion of these will probably find that they enjoy the mode enough to want to use it to make contacts on-air although like many other aspects of the hobby, it is impossible to know until you can try!

Regardless of whether you fall into the latter category or not, I have found that people who look upon the learning process as a challenge and something to try and enjoy doing tend to be those who make progress more quickly. *So during the period of learning, try to organise your practice, whatever form that might take, in such a way that you can set yourself realistic targets and look to enjoy the challenge.* Try and get into a regular routine for practice each day, and fit this routine into your normal day.

Learning CW requires a significant amount of individual effort and commitment. Therefore I would recommend that you don't bother to start learning if **you** don't really want to. Don't do it just because your friend is doing it, and don't do it if you really haven't time to give it (whether that be due to work, your domestic situation, or simply other interests). In all these situations, you would be better waiting until later. Most people find some aspect of learning CW difficult. Why make it more difficult for yourself by choosing the wrong time? The optimum amount of time is probably 15-30 minutes a day for 5-7 days a week, to make most progress.

### • What are you trying to learn?

Before tackling the learning process itself, let's be clear about what you are trying to do. Learning CW is not the same as learning for your amateur radio licence, or any other knowledge-based subject which is mainly tested by paper-based examinations.

In learning CW, there is a very small amount of content to actually learn. Of course, you have to commit the alphabet, numbers and other symbols and their morse code sound equivalents to memory. But most people accomplish this in itself with little difficulty. The main part of learning CW is to train your brain to recognise the sounds when heard and type or write the corresponding character down. This cannot happen instantly. The reaction time to do this per character has to be brought down gradually, so that the brain is literally "trained" to do it as a mechanical process. You

are also trying to extend your period of concentration, and focus it upon this one repetitive task, hear it - write it down, hear it - write it down, and so on.

You must however learn some cardinal rules, as a part of the learning process. These include:

- *don't anticipate what is coming next*, and certainly don't write it down before you hear it,
- *if you miss a character, forget it and get the next one.*

Training yourself to obey these rules will be much harder for most people than learning the morse alphabet. Don't underestimate how difficult these rules can be to obey. It requires great self-discipline.

### • What can you be taught?

Looking at the above from the opposite viewpoint, what can you be taught? Not very much actually! You can regard learning the morse code equivalent sounds for the various characters as a similar process to a child learning their multiplication tables. Learning this type of material is largely down to the individual, and is effectively learnt by rote, (repeatedly saying the sounds and what they represent aloud to yourself, for short periods, but regularly, for example).

Once you have committed this material to memory, the training process can begin. Again though, *it is a case of finding a source of good quality practice at the right speed and with some degree of feedback and encouragement afterwards*. To say that someone who provides such practice is 'teaching' the code is rather generous. This is not to say that finding someone who can send reliably and consistently to you at exactly the speed that will allow you to improve is not invaluable. It is probably the best form of practice, but just as important in such situations is the encouragement, and feedback you can receive. Listen to it, act on it, and ask questions. Be aware however, that not everyone who can send morse will have developed a style which is good to practice from (few people who pass their driving test drive afterwards in a way that if copied would get someone else through their test!). Also bear in mind that people who send good morse on the air will not necessarily be used to sending slowly for practice purposes, or know the best way to offer that important advice, feedback or enthusiastic encouragement.

### • How long will it take you to learn CW?

Over a period of time, watching others learn and being involved in their learning process as well as my own, I conclude that unsurprisingly *the younger you are, the faster it sticks*. This is true of learning in general. I also conclude that those *people who have a musical aptitude in some way, also find it easier* to train their brains to the different rhythms of the characters. Since morse, when sent at any significant speed is essentially a collection of rhythms, this is probably also unsurprising. The rest of the answer to the question of how long will it take me is dependent on the individual and the amount of regular practice they commit to doing. The quickest people tend to take a month and a half to reach 12 w.p.m. whilst many others will take between three and six months to reach the same standard. It will take a different time for different people. You should be careful not to expect success after a fixed number of weeks or months.

The learning of CW is much to do with training the brain to perform a particular task. In the same way, it is very important that you *believe you can reach the standard that you desire*, in whatever time it takes. It is important that you attempt to *revise your progress as time advances*, and this is

harder to do, since unlike for written exams, it is harder to do a test paper or check against the syllabus for coverage of material. Do *write down your practice sessions in a bound notepad*, as opposed to odd sheets of paper, so that later you can flick back through and see how much more you are getting than you used to when doing similar sessions.

When you write Morse down that you hear, *only write in lower case letters*. This is very important, because there just will not be time to write in capital letters once you want to copy faster CW later. As just one example, take “e” – it is the most common letter in most English text, it has the shortest Morse code (just one dit) but the capital “E” can take 3 pen movements to write, whereas lower case “e” takes only one movement and the pen need not leave the paper.

### 3. How best to learn?

There are a number of ways that you can practice CW. These include group sessions in classes, one-to-one sessions, either in person or over the air, the use of computer programs, recordings on CD, and listening to CW being broadcast on the air, either purposely for practice or just in QSO. The best way is to *pick a selection of these methods which you feel happiest with, can get access to, and which fit into your routine*, and use those.

Recorded CDs are available (e.g. from the RSGB or local clubs) which contain pre-recorded morse at different speeds. These can be useful, especially in the early stages of learning, when committing the various patterns of the morse characters to memory. Afterwards, they are of limited value, because they cannot provide a smooth transition of speed increase to suit every individual, and become repetitive and too familiar after a while.

The common sight of a personal computer in many shacks now and almost everyone having a smart phone or other device means that these additional avenues of practice are usually available. The standard of software varies, but at least it exists for all but the most obscure models of computer or device. With this form of practice, however, it is the way you use it, rather than its existence which determines its usefulness. Most CW practice software allows both the character speed and the spacing between characters to be adjusted. The best way to use this software in the author's opinion is to *set the character speed at 13-15 w.p.m. and the spacing to whatever allows you to write down about 80% of what you hear*. If you set it so that you get everything correct, it is too slow and you are learning very little. If you set it too fast, you will get so little of what is sent that your confidence will suffer.

The same advice above applies to users of electronic devices such as the old but still found Datong Morse Tutor. Such devices, whilst being useful, suffer from a lack of feedback as far as presenting what the machine has sent afterwards, for checking. I have also yet to come across a machine or computer of any type which sends non-clinical CW such as you get from the human operator, containing all the flair and style that only hand-sent morse can give. The machine generated CW also rarely gives much practice of coping with error signs and corrections, something which can often throw the learner. The main advantage of these machines for practice is their constant availability. Their biggest failing though is their lack of ability to praise and encourage the user in the way that a good human provider can, as this element of a practice session is almost as important for good progress as the provision of the morse itself. For these reasons, I would personally always encourage learners to try and *find a way of mixing practice such that it is not solely based around machine generated morse*. If you can find computer software which will check your sending, it can be most advantageous.

By far and away the best method is one-to-one or group practice with someone who is already skilled in sending in a controlled manner at the required speed for your maximum progress. Opportunities for this may be varied. Few people will be available every day, and so it will normally be essential to supplement this type of practice with other methods. Short regular sessions of between thirty to forty minutes with such a person, listening to varied fixed texts, of numbers, letters and mixed combinations of both. It is also useful to begin quite early on listening to sample test-like pieces in QSO format, so that you get familiar with the typical content, punctuation and procedural signs for example. Don't expect to get as much of mixed letters and numbers as just one or the other. The rhythms are quite different and tend to throw you at first, but its good practice to start them all as early as possible.

Be tolerant of different people providing one-to-one or one-to-many practice in different formats and various ways. You should take advantage of as many different opportunities as possible. It can also be useful to just get together with others who are also learning CW and discuss problems and compare progress with each other. But don't rely on just one good session a week at the local club and expect any great progress. You will need to supplement this with a significant amount of individual practice on other days. On-air practice with someone can be a convenient way of regularly meeting up, and it is often best to use an oscillator to make sound transmitted using FM on 2m or 70cms on a fairly local basis for best results and easiest talkback in between the overs.

#### 4. What about sending?

Morse comprises two activities of course, sending as well as receiving. Many people find sending easier to learn than receiving, especially if they have made substantial receive progress before starting to send. This is partly because the correct rhythms are already learnt and is a good idea since it helps to avoid bad habits creeping in too early. However easy sending might seem to you, take care to form each character accurately and precisely, and don't try to send fast at first. Initially, you should concentrate on quality rather than speed, and don't necessarily attempt to send at whatever speed you can currently manage to receive at. Try to send each character at about 12-15 w.p.m.; that is at the speed that you listen to it, but leave large pauses between while you concentrate on your keying action, the quality of the character you are sending and what you want to send next. You will find that as sending becomes less of an effort, the gaps between letters will close up easily and your overall speed will almost automatically increase.

As early as possible before you start sending, have someone already proficient in CW listen to you and give advice. You should remember to practice all characters, including numbers and punctuation required for the test. Many people find numbers procedural signs and punctuation harder to send because the rhythms are more complex.

You should pay particular regard to the following when you start to send:

- the setting of your key - you may need to ask someone who is proficient in morse about this, but be prepared to experiment with any adjustments on your key, particularly with regard to gap size and tension. There are no rules for these settings, and different people find different combinations of large and small gap, high and low tension best for them. Note that some keys may need resetting after they have been exposed to significant temperature or humidity changes.

- your posture - you should aim to sit at a comfortable height where your lower keying arm can be parallel to the table's surface without resting on it when your fingers are on the key. If you are not sitting comfortably, then don't begin!
- your keying action - you should aim to key without resting your arm on the surface of the table and without flexing the fingers. The main movement should come from further along the arm. Only a light action should be necessary to make the characters. Any huge amount of effort or tight gripping of the key suggests poor setting of the key and will lead to fatigue.

Firstly you will find it easiest to send from text which is written down in front of you, and indeed this is all you have to do in the sending part of the CW test. You should find however that trying to send from your head (just simple words, then short sentences at first) as you gain confidence, will make sending from a prepared text seem easier afterwards, so begin to include sending from your head after a while, as a part of your practice. This will also help you when it comes to having a QSO on air later.

## 5. What solo exercises can I try?

When you start out, try to learn the alphabet and other characters in small groups, by saying the rhythms to yourself and looking at the characters written down. Write out the sounds (e.g., A - di-dah, B - dah-di-di-dit, etc.) on paper repeatedly until they sink in. Note that there are actually three different sounds. Dah is always dah but a dit is so short and the inter-character-gap so short that when it is not the last character you don't hear the 'tuh' sound as it completes .. hence di-di-dit for an 'S' which you might have thought of as 3 dots (dits). Dit-dit-dit would be 3 'E's sent quickly together. So learn the sounds from the beginning as they will really sound, not as dots and dashes as printed on a page.

When first learning the patterns, don't worry too much about which letters to learn together. Some people do it alphabetically (e.g. A, B, C etc. or Z, Y, X etc.), and some with similar patterns together (e.g. E, I, S, and H etc.). It doesn't and shouldn't matter, providing your learning is thorough. However if you are practising in a group of people, e.g. CRA members, then it is helpful to agree which groups everyone will try to learn in what order. Do not try to commit all the patterns to memory in one go. Four or five new patterns each day is ample.

Try testing yourself by reciting the whole alphabet as morse sounds (above) aloud as fluently as you can. This will also demonstrate those characters which cause you to pause and think more. When you can fluently recite them all from your head, in sequence and without pausing unduly in-between, you are probably nearing 11-12 wpm speed.

When you are walking by a road, or sat in a line of traffic, try translating signs and other car registration plates into morse sounds aloud or to yourself. If you can translate a whole registration plate of a car as it passes you at about 30m.p.h. when you are walking before it is too far away to read, you are probably able to cope with 12wpm CW.

For sending, the book published by the RSGB (originally by M. Mills, then G. Benbow, and now Roger Cooke G3LDI) contains sets of useful letter sequences to practice, which if sent without sufficiently accurate spacing can form other characters instead. It also now contains a CD with MP3 files on it, which can be played for practice on many different devices.

A computer program to either read your sending, or just to display the waveform of your dits and dahs across the screen can provide useful feedback. The best way though is to have someone else listen to your sending who is already proficient.

## 6. What key should I get?

When you start out, it's best to use a straight key to send with, as it forces you to make the rhythms of each character yourself, even if you are likely to want to use a paddle key later. Straight keys are usually cheaper than paddles which tend to be more precision instruments. This is a good thing if you later decide that morse isn't for you and therefore don't waste a lot of money up front. Any type of straight key is probably okay. There are lots of surplus or ex military keys around, especially at rallies. The most popular current brands are probably HiMound and Kent. The main thing is that the key has simple adjustments for both gap and tension.

Paddle keys are more advanced instruments and can cost a significant amount. Kent, Bencher and Begali are some brand names - the latter is often considered the Rolls Royce of paddle keys. With a paddle key, the radio or device you plug it into makes the perfect length dits and dahs for you, and you need to manage the spacing of characters, words etc. It is much easier to send badly at high speed with a paddle because poor discipline will cause you to run characters together. This can unfortunately be heard quite frequently on the air.

You may want to wire up your key to your radio if not initially to send on-air but potentially to use the sidetone on the radio as a practise oscillator. Note that although some radios have separate sockets for a straight key and a paddle, most utilise the same socket for both. In this case you must always use a stereo 3 contact jack plug and in the case of wiring a two contact straight key only use the tip and barrel connections, not the ring. Also if using a straight key be sure to turn off the rig's internal keyer. For a paddle you need the internal keyer turned on and the speed adjusted appropriately. On many rigs, turning VOX and/or break-in off will allow you to key for practice without transmitting. Consult your rig's manual. To practice on FM with others on-air, you will need to key an oscillator or sidetone on another rig.

## 7. What about CW contesting ?

Being able to do CW can add a lot of extra potential to contest scores. Contest formats are much simpler than being able to chat and rag chew using morse. You need speeds of between 15 and 35 wpm and be able to copy mixed letters and numbers for callsigns and locators etc but also numbers for reports and serial number exchanges. One of the reasons for HF contesters typically only giving 599 RST reports whatever the actual readability, signal strength and tone, is that the regular pattern 599 provides a nice cue before the rest of the exchange. Numbers also have abbreviated patterns (e.g. N for 9 and T for zero) which are much shorter and quicker to send than the full numbers, so it's useful to be aware of those too.

Finally when receiving in a contest, you are much more likely to be typing in what you hear to a contest logging program rather than writing anything down on paper. So this is a skill to practice as well. Some contest loggers will provide a practice mode which allows you to combine receive practice of contest format exchanges with typing practice into the correct information fields for the log. MorseRunner and Rufz are well known programs that simulate CW contests.

But few contesters actually send by hand - it's less error prone, more efficient and much less tiring for a 12, 24 or 48 hour contest to keep switching the brain from send to receive to send to receive repeatedly etc. Computers are good at sending exact, perfect CW. And this makes it easier for new CW contesters to use morse readers (devices, software or inbuilt radio features) to back up their mental ability to read everything first time. That's also why many experienced contesters will slow down for newcomers to match a lower speed but only if they ask a second time, as a sudden change in speed usually causes readers to mis-copy! Although software is better for sending, skilled humans are still better at copying on receive, especially in difficult conditions. Being able to concentrate solely on receiving is much easier for the brain. And for some advanced contest techniques (such as SO2R and 2BSIQ) it is necessary to receive another signal while sending simultaneously.

So if your aim is only to use morse for contests, then there are a few differences in the targets you will set yourself.

## 8. Summary of Advice

- Choose a time to learn CW when you have the time and enthusiasm to do it
- Set yourself realistic targets for progress and track it carefully
- Do not try sending (or touch a key) until you have made good receiving progress
- Never anticipate what character is coming nor write it down ahead of hearing it
- When you miss a character, immediately listen for the next one – don't dwell.
- Write all your practice sessions down in one bound book and date each session
- Always write what you hear in Lower Case (small letters) handwriting.
- Try to use a mix of practice methods – (on-air, 1-1 face to face, computer etc.)
- Do short periods (15-20 minutes) each day rather than an hour every 3 days.
- Try to get into a routine which suits you (ie not when too tired or rushed)
- Set PC/Mac, smartphone or iPad practice software up at a character speed of at least 13 wpm from the start. Set the gap between characters so that you copy around 80% of what is sent. Maintain this approach as you cope with faster and faster CW by gradually closing the gap.
- Don't worry about copying where the word spaces are at first – just make sure you copy the characters. These will come later.
- When sending, get into the habit of ALWAYS correcting your mistakes.
- Try to copy mixed letters, numbers and punctuation/procedural signs at least when you reach around 5 wpm, even if you learn them separately initially.