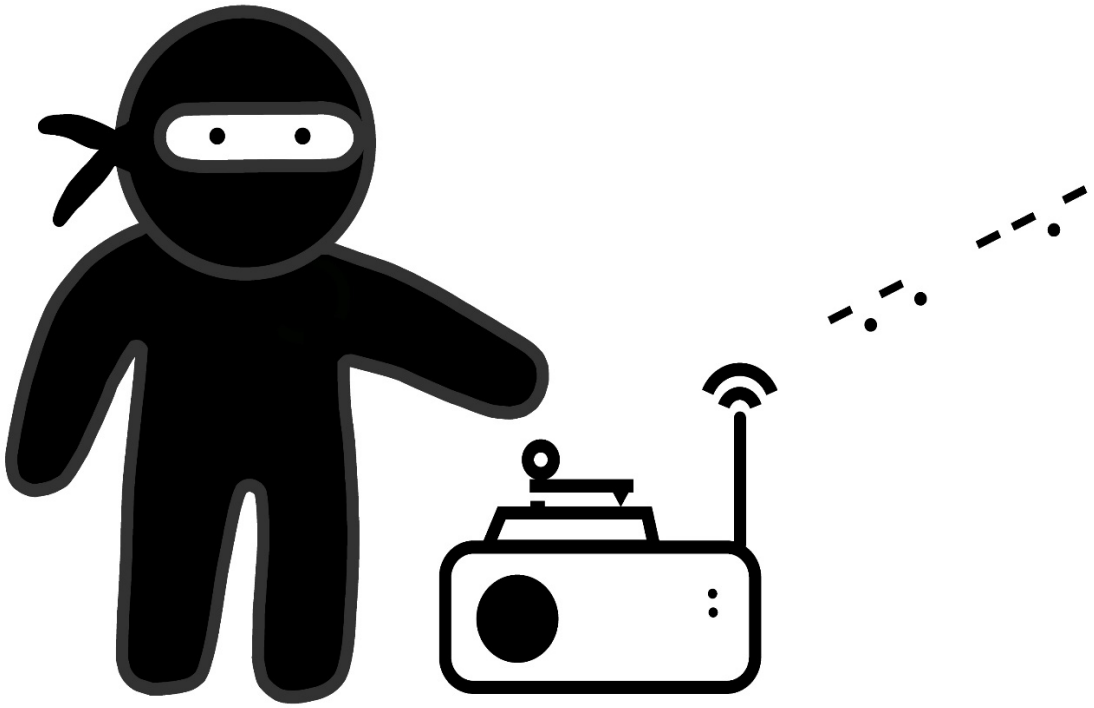
A Learning Approach To Achieve QRQ



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1. Background

In Morse code, speed is arbitrary and a mutual agreement between operators. Sending fast or slow is a choice. Some radio enthusiasts enjoy communicating using CW at high speeds, often defined as QRQ for shorthand. (Formally, QRQ is a Q-signal [1] defined as "Send Faster." When sent following a question mark, it means "shall I send faster?")

High-Speed CW is relative. What is fast to one operator may be slow to another. One benchmark is the CW Operators Club[2], which requires its members to send and receive CW at no less than 25wpm.

In our multi-faceted hobby of amateur radio, there is a form of Radio Sport known as HST (High-Speed Telegraphy). And every two years a bi-annual international HST competition is sponsored by the IARU (International Amateur Radio Union) [3]. This competition is most popular in Eastern Europe. The competitors are divided into age and gender groups, and they compete in both receiving and sending CW. There is no upper-speed limit, so QRQ takes on a very different definition here. Quite simply, the person who goes the fastest with the least errors wins.

2. Abstract

The CWOps club provides an excellent system of courses to introduce CW to beginners and advise students up to 25wpm in both receiving and sending. All the CWOps courses are free of charge, and they are a fantastic resource for the Amateur Radio community. Most operators find 25wpm to be a comfortable speed for QSOs and effective rag chewing. However, there is no formal CWOps course for speeds beyond 25wpm.

The authors are not aware of any club or course that provides a structured high-speed CW curriculum. If such a course were available, we believe that a large community of radio enthusiasts would enjoy pursuing learning high-speed CW.

This paper aims to introduce a one-year plan for studying high-speed CW. We propose a method to increase CW receiving skills from 30wpm to 45wpm. (Sending abilities are mostly outside the scope of the paper.)

3. Authors

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Jack Treloar (AA0IZ) is an electrical engineer for an aerospace company by day, and he enjoys designing homebrew Ham gear on the weekends. He collects QSL cards, and his favorite passion is CW rag chewing. He is a lifetime member of the FISTS CW Club, the Long

Island CW Club, and the CW Operators Club. Jack is promoting a QRQ Friends Program for Amateur radio operators who enjoy learning and practicing high-speed CW.

Terry Jackson (WB0JRH) is a retired utility manager with a passion for CW. He was a Russian CW Intercept Operator from 1966 - 1969, living in Bremerhaven, Germany. He operated a Navy MARS station in the 1970s and phone-patched hundreds of soldiers in Vietnam with their loved ones in the States. He is an active member of CWops, LICW Club, FISTS, and SKCC. Currently, he teaches several CW classes, including QRQ.

4. Introduction

Anyone who does not have acute hearing loss can achieve QRQ through consistent practice. The key to success is having a long-term mindset and sufficient motivation to pursue QRQ practice.

What motivates a person to pursue high-speed CW? Why put in all the effort? Arguably, the best reason is simply for its enjoyment! Enjoying CW is proportional to one's proficiency; the better you become at receiving CW, the more you will enjoy it. It is a fortuitous cycle that drives people to achieve proficiency at copying with higher and higher speeds.

Some may be initially motivated to learn QRQ to brag or show off. However, it is unlikely that they will persist long enough to reach their proficiency goals. The return on investment is terrible – a few minutes of glory after many hours, months, and years' worth of practice.

The biggest obstacle for most QRQ learners is the mindset of success. A person who believes they will never copy CW at high speed often creates a self-fulling prophecy before they ever try. Having a goal for QRQ is rewarding! The journey to QRQ is fun!

5. QRQ Course Plan

a. Course Goal

This QRQ course guides students using a structured approach to achieve receiving proficiency at 45 wpm from a starting proficiency of 30 wpm. The essential skill to build upon is IWR (Instant Word Recognition).

b. Practice Time

Consistent practice of 30 to 40 minutes a day is enough to achieve the goal in about one year. You should practice 15 to 20 minutes twice per day. Please take a short break if you can no longer focus or you notice your proficiency suddenly drop off during practice. Don't over-train to the point where you ignore the CW as background noise. Above all, please enjoy your practice!

c. Approach to Practice

QRQ practice requires focus. It is like meditation. Over time you build endurance for longer and faster practice and develop a mental filter to suppress noise and other distractions. Until then, avoid distractions to maintain focus and practice efficiently.

Relax before you practice. Have your mind at ease and ready to focus on what you will hear. Don't rush into your practice session straight from stress or other distractions. You may consider listening to CW just before you fall asleep when you are most relaxed. Decoding QRQ takes place in the subconscious mind. The conscious mind can solve complex and abstract problems, but it comes with the cost of being very slow—so the faster the code, the more processing that must occur in the subconscious mind.

QRQ is a lot like mastering a spoken language. Once learned, we focus on the meaning of what is being said and not explicitly on phonemes, individual words, and grammar. And so as our unconscious mind takes on the hard work of copying Morse code, we move from ICR (Instant Character Recognition) to IWR (Instant Word Recognition) and finally to focus on the meaning of what is being sent.

You may find it helpful to encourage the unconscious mind to pick up the heavy work by engaging the conscious mind in a small task, such as petting a dog or cat or watching a scenic YouTube video with the sound turned off.

You will be pleased to know that the effort it took you to build your CW speed from 20 to 30wpm will be significantly more than it will take to go from 30 to 45wpm. Once you master 30wpm, you will increasingly rely on IWR. For example, with IWR, you will recognize the complete sound pattern of words like CQ, DE, and ES. And with IWR, you will not have to use ICR to recognize the individual characters and string them together to identify each word. The secret to QRQ copy is to build up a vocabulary of unique sound patterns for each word at increasing speeds. This might seem intimidating but fear not. You have trained your brain from childhood to hear words.

You will likely find longer words easier to copy in Morse code at higher speeds. In our experience, words that take longer than 2 seconds to send in Morse code are too long to consistently be perceived as a single sound pattern and copied with IWR. A good example is INFORMATION. At 30wpm, it takes 3.4 seconds to send. At 50wpm, it takes 2 seconds. As you work towards higher speeds, a larger proportion of words fit within this 2-second boundary so that you can more easily learn to copy their unique sound pattern using IWR.

With an extensive vocabulary and experience, you will develop the ability to instantly recognize prefixes, suffixes, and parts of compound words. This is a skill that sits between ICR and IWR. We call it IPR (Instant Partial Recognition — At this time, there is no formally or commonly recognized name for this skill.) Using the example word, INFORMATION, you will eventually learn to recognize the prefix INFO and the suffix TION as a complete sound pattern. Learning to recognize prefixes and suffixes instantly will speed up learning to recognize other words with the same prefixes and suffixes. Your

first IPR will likely be the suffix ING. It is one of the most common prefixes in the English language.

Keep a log of your practice. It is common for students to think they are not progressing, failing to achieve their goals, and losing hope at some point in their journey. However, with a practice log, they may look back over their notes and view their progress over time to see that they have indeed improved. So keep a record with dates and jot down brief notes about your practice sessions in a journal. If you aren't seeing the expected progress, reach out to your mentor for advice. On the other hand, when you realize that you've made progress, celebrate it!

d. How to Practice

The recommended practice sets follow the standard Morse Code Ninja format of 1) Sent in Morse code, 2) Spoken, and 3) Repeated in Morse code.

In Part 1 of the format, carefully listen using IWR. You may be able to pay close enough attention to use ICR on the first letter or two while simultaneously listening using IWR. As you recognize each word, silently say the word to yourself. This approach sometimes requires multi-tasking as it will require saying one word and listening to the next word! Then in the 1-second break before the spoken section, quickly repeat the entire sentence out loud.

Also, consider practicing using Phonic Copy. This is a form of sounding out the word as you hear it for the first time. This skill will help you recognize words that you haven't heard before or have not mastered using IWR. See Appendix F – Phonic Copy for a detailed discussion on learning this skill.

In Part 2, merely listen to the sentence as it is spoken. In the brief pause, before it is repeated in Morse code, quickly say the entire sentence out loud. This ensures that you are primed to listen to the sentence in Morse code. (You may skip this step if you got the whole sentence correct in Part 1.)

In Part 3, as the sentence is repeated in Morse code, silently speak the words — meaning move your mouth as if you were speaking them without actually making a sound.

Carefully draw out or compress the word to precisely match how they are sent in Morse code. And strive to hear each and every letter of the word(s) that you missed, which can sometimes be challenging! You may also find it helpful to visualize the word spelled out precisely matching how the timing of when each letter is sent.

e. What to Practice

Please visit the Morse Code Ninja web page. At the top, there is a tab for Practice [4]. There you will find many files that you can download with speeds that go into the QRQ range—up to 100wpm. Please know that there are fees in the background to produce and deliver these files, so consider making a small donation if you find them helpful. A link can be found under the Contact tab.

This QRQ course uses the Morse Code Ninja practice series with 16 practice sets—Sentences from Top X Words, where X is equal to 100 through 1,600. Each practice set lets the student focus on learning up to 100 words at a time. This is the foundation for the QRQ study plan.

You should download these files as you need them. Alternatively, watch the practice sets on YouTube by selecting the Sentences filter on the Morse Code Ninja Practice page and then selecting the speed and type. The webpage will then automatically take you to the desired YouTube video.

Please refer to the appendices at the end of this document, where you will find both a "Suggested Practice Plan" and an "Alternate Practice Plan". See the online version [5] of the practice plans to estimate how long it will take to go through the course. Enter the length of your practice session and how many sessions you have per day, and it will calculate an estimate of how long the course may take you.

Practice with each file in its entirety. Experience suggests that you must head copy a word at least 10 times to commit that word to memory. Some words will take even more practice to master. Depending on your starting proficiency at 30wpm, you may start with the Sentences from the Top 100 Words or the Sentences from the Top 300 Words.

You may want to refer back to this practice material in the future to have fun and stay sharp. Your goals are to study efficiently and to enjoy your practice.

Two suggestions… the Morse Code Ninja website has many Speed Racing files. This format works by challenging you to copy the target word or character at the fastest speed possible. If you miss it, no problem. The format incrementally slows down after a one-second pause between each speed. The fastest speed is 1.5 times the slowest speed. You may find that you get the most use from this format by identifying the fastest speed you are proficient at, such as the Top 100 Words, and then using a Speed-Racing practice set where that is the slowest speed. You may need to adjust up or down a little to find the practice set that gives you the most efficient practice. Specifically, look for the Speed Racing versions of the Top X Words and Sets of X Words. This innovation by Kurt (ADØWE) can provide additional practice to build instant word recognition and help you initially adjust to higher speeds.

And consider supplementing your practice with a CW audiobook. This has an unrestricted vocabulary that will allow you to increasingly rely on IWR and practice using ICR and IWR. With the unrestricted vocabulary and continuous copy, the speed will need to be slower than the vocabulary-building exercises. Start at a comfortable head-copy speed, such as 20wpm, and increase the speed over time. See Appendix E - A Case for "Book Copy".

f. How to Measure Your Success

There are two approaches to measuring your progress: estimation and objective measurement.

Estimation:
For estimation, do not be overly concerned with precision. Strive to estimate to the nearest 25% using a scale of less than 50%, 50%, 75%, and 100%. For evaluating your percent correct with sentences, you have a couple of options. Estimate the total number of words being copied correctly. Or estimate the number of sentences copied correctly in their entirety.

Whether estimating or measuring, be consistent. It will avoid confusion later when you are comparing previous scores.
Consider keeping a log of your practice and using estimation to record your accuracy over time. It takes little extra work, and the additional information will be helpful as you assess your progress over time.

Objective Measurement:
For an objective measurement, use pen and paper. When practicing with individual words or callsigns, make a mark in the correct column every time you get one right. Whenever you get one wrong, make a mark in the missed column. Then calculate your percent correct at the end of the session (number_correct / total_marks * 100).

There are a couple of options when practicing with sentences or QSO segments. You can consider any dropped words or abbreviations as a miss for the entire sentence or segment. Alternatively, you can have three columns — Correct, Partially Correct, and Missed. When you get most of the words correct, add a mark to the partially correct column. With this variation, you can count a Correct answer as 1, a Partially Correct answer as 0.5, and a Miss as 0. Then calculate the percent correct at the end of the session (score / total_points_possible * 100).

Because of the extra effort, you may want to use objective measurements sparingly. So you might consider the following approaches.

One approach is to begin a new practice set, such as the Sentences from the Top 500 Words, and objectively measure your performance in the first couple of sessions. Then measure again in the last couple of sessions for that practice set.

A second approach is to objectively measure your performance in each practice set during the last couple of sessions. Later after you have progressed further in the series or bumped up to a higher speed, jump to a random spot in that same practice set and measure again. You should see a significant performance improvement. For example, suppose you got 65% of sentences entirely correct in the last session practicing with the Sentences from the Top 500 Words at 30wpm. After reaching the Sentences from the Top 1000 Words at 30wpm, you might measure again and see that you get 85% correct from the same Sentences from the Top 500 Words at 30wpm.

g. Practice Friends

Like the CW Academy[6] programs, this course can benefit by following a cohort model where each student is paired with another student(s). In this way, students may use each other for support and motivation. However, unlike in the CW Academy, the QRQ students must create their own meeting schedules. Since this course requires about a year of commitment, it is impractical to assume that students can meet twice a week or even weekly. It is more practical for students to meet online, perhaps twice a month.

A good plan for QRQ study is to intersperse your regular individual practice with occasional online video chats with another student at about the same proficiency level. Use the meetings to review progress, practice, and catch up. It would also be best to consider scheduling periodic on-air QRQ QSOs with them. To facilitate this, the authors are promoting a QRQ Friends Program. Amateur radio operators who want to find a CW practice QRQ friend may complete a simple registration form.

You will find an example of this form in Appendix C. Please use the form available for download from the same web page where this paper is located. If you are interested, follow the instructions on the form to complete the registration.

After several forms have been received, a QRQ Friends Program coordinator will schedule an online meeting and send an invitation with the details via email to the applicants. The online session will be limited to 10 applicants and will be scheduled for an hour on a Sunday afternoon. Meetings will be held no more frequently than bi-weekly.

Please know that this is an informal program! The QRQ Friends Program aims to provide a venue for students to locate similar aspiring CW QRQ amateur radio operators. Ideally, hams can find a QRQ friend with similar skills in a nearby time zone who can be available on a similar schedule. Please understand that there is no CW training offered through the QRQ Friends Program. Please know that this program is not affiliated with any formal CW club.

h. Proficiency Goal vs. Top Speed

To achieve your proficiency goal, recognize that you will need to gain *limited* proficiency at higher speeds beyond your proficiency goal. For example, if your goal is to copy sentences at 40wpm solidly, you will need limited copying proficiency at 50wpm and even more limited at 60wpm. So as necessary, supplement the suggested practice with extra practice exercises that are tailored to your goal.

As you learn to copy a more extensive vocabulary of words using IWR, you will need to use ICR to copy less familiar words. Copying by IWR versus ICR is not an either-or mental process. It is common and necessary to use both skills at the same time.

Because of this, you need to create enough mental capacity for the conscious mind to copy with ICR while also copying familiar words with IWR, you will need to make IWR as effortless as possible. Practicing at higher speeds and achieving limited proficiency with these speeds is the key to enabling you to do just that!

You can extend the course as necessary to reach your ultimate proficiency goals by repeating the Sentences from the Top X Words and the Sentences from the Top 1000 Words - Review Part X practice series using ever faster speeds. The practice content is so extensive there is no danger of memorizing it. But avoid listening to the same practice set more than twice in a row. Coming back to the same practice set after weeks or months is fine.

i. QRQ Sending

Your QRQ study will be enhanced by including both receive and send practice. Send practice reinforces hearing the underlying rhythm. And you will develop Instant Muscle Memory for Words. This muscle memory is analogous to IWR. The unconscious mind takes on the hard work of moving the hand in a cadence of quick movements to send a word on a key. Ideally, you will grow your vocabulary for IWR and muscle memory for sending words in lockstep.

Realize that QRQ sending starts by developing a positive mental attitude. This mental image is brought on by visualizing that you are successful at sending good CW with proper timing and spacing. A positive I CAN DO IT attitude will build confidence and make practice comfortable and enjoyable. Consider starting each sending session with a couple of positive affirmations.

Learning to send at high speeds requires being comfortable with being uncomfortable. And *listening* to CW at uncomfortable speeds is paramount to mastering QRQ sending. They are interconnected.

Within a QRQ sending practice session, alternate between comfortable and uncomfortable speeds. You may start slow and build to faster uncomfortable speeds. Or work your way down from faster to slow.

Periodically record and review your sending or have someone knowledgeable evaluate your sending. You must assess your sending and catch any problems before slipping into bad habits. It is difficult to undo what you have learned and redevelop the correct muscle memory.

During practice, mistakes are anticipated and accepted. Think of children learning to talk. They don't care if they make mistakes. They know they will be understood. Do not be hard on yourself. Relax and move forward. Above all, have fun! However, accuracy is more important than speed when engaged in a live QSO. Speed will improve with experience.

Consider downloading the text files available from the Morse Code Ninja website. Select the Practice page and scroll down to the "Playback in Other Programs" heading. Download and unzip the practice-text.zip file. It will contain all the source text used to generate the practice files. Open up the Sentence from the X Top Words, read a sentence,

look away, and send it from memory. (Be careful not to read ahead within the text file that you are also using for receive practice.)

Although QRQ sending is mostly outside this paper's scope, it is an integral part of QRQ CW. Please consider attending the Long Island CW Club's Advanced Sending and Receiving QRQ class[7]. It is every Thursday evening and taught by Terry (WB0JRH).

6. Not quite ready? No problem

To undertake this course, it will be helpful to have mastered the ability to head-copy short sentences at 25wpm and have started your journey to master IWR.

As you move towards stress-free head-copy and increasingly rely on IWR, there are a couple of problems you may encounter. Don't worry. We have been there, and we have an approach to overcoming them. (For a broader discussion on Morse Code proficiency levels and what it takes to reach 25wpm, please see Appendix D – So you want to go faster.)

a. Word Dropping

Word dropping is a phenomenon where you recognize each word but immediately forget it as soon as you start copying the next word in the sentence! This problem occurs when there is not enough conscious capacity to hold on to the words in your working memory and follow the meaning of what is being said. It often occurs in the learning process when you are still copying letter-by-letter with ICR. It is possible to copy every word in a sentence yet have no idea what is being sent!

On the Morse Code Ninja website, you will find a series of incrementally harder practice sets starting from the easiest two-word combinations. The idea is to take as much cognitive load off of remembering a string of words. First, master copying two words and then incrementally master copying a longer series of words.

These practice sets are built on n-grams and will be familiar and common to any native English speaker. In this context, n-grams are the most frequent N number of words used in a series. For example, a common 2-gram is WHEN THEY. A common 3-gram is A MATTER OF. A common 4-gram is THERE HAS BEEN A.

The n-gram practice series is titled Sets of 2 Words through Sets of 5 Words. Start by practicing with the Sets of 2 Words. Once you commonly get 90% of them correct, move up to the Sets of 3 Words. Continue progressing until you get to the Sets of 5 Words. If you need additional practice before transitioning to sentences, consider the Sets of 5 Words Encore and Sets of 5 Words Encore2.

b. Delayed Instant Word Recognition

As you progress to copying sentences, it can be a challenge to recognize each word before the start of the following word. This problem will leave you unable to consistently copy all of the words in a sentence.

The solution is straightforward — add additional space between the words in the sentences and, over time, reduce the extra word space. This approach is analogous to using Farnsworth timing while mastering ICR and then transitioning to standard timing.

Consider using the following practice series. As soon as you get 75 to 90% correct, move on to the next one. You may find that you can skip from 4x to 2x word spacing. Try it out before committing your time to practice with the 3x word spacing.

- 4x Word-Spacing - Sentences from Top 100 Words
- 4x Word-Spacing - Sentences from Top 200 Words
- 4x Word-Spacing - Sentences from Top 300 Words
- 4x Word-Spacing - Sentences from Top 400 Words
- 4x Word-Spacing - Sentences from Top 500 Words

- 3x Word-Spacing - Sentences from Top 100 Words
- 3x Word-Spacing - Sentences from Top 200 Words
- 3x Word-Spacing - Sentences from Top 300 Words
- 3x Word-Spacing - Sentences from Top 400 Words
- 3x Word-Spacing - Sentences from Top 500 Words

- 2x Word-Spacing - Sentences from Top 100 Words
- 2x Word-Spacing - Sentences from Top 200 Words
- 2x Word-Spacing - Sentences from Top 300 Words
- 2x Word-Spacing - Sentences from Top 400 Words
- 2x Word-Spacing - Sentences from Top 500 Words

7. A few words about 50wpm and beyond

At speeds beyond 50 wpm, you may notice some additional difficulty. This is the speed at which many people notice Morse code losing its tone and taking on more of a pulsating sound.

In music, the inter-onset interval (IOI) is the interval between onsets of stimuli, or more specifically, the time between the perceived beginning of one note and the next one. The faster the rhythm, the shorter the IOI. Research shows that as IOIs shorten to 50ms, human perception shifts from perceiving a beat/rhythm to pitch.

At 50wpm, a dot is 24ms, and the dash is 72ms long. The average of these two numbers is 48ms. At 73wpm, both the length of a dot and dash fall below 50ms — the dot is 16.4ms while the dash is 49.2ms. Very few people ever develop proficiency beyond 75wpm.

However, copying beyond 50wpm is not impossible. Referees witnessed a 10-year-old competitor at the IARU HST Championships held in Montenegro in 2021, copying a call sign sent from RufzXP at 212wpm. [8]

At speeds up to about 50wpm, it is still possible to recognize individual characters and copy some with ICR. At even higher speeds, you will likely need to use IWR entirely. At these higher speeds, the words are so short that they will either just pop into your mind, or you won't recognize them at all.

8. Conclusion

Learning instant word recognition is the same as learning instant character recognition. At lower CW speeds, you learn to hear the sound pattern of individual characters. At higher CW speeds, you learn to recognize the sound patterns of words.

Common words will become your place markers to help keep you in the context of the material you hear. You will need to build your word vocabulary through IWR practice. Having a goal for QRQ is essential. Your goal might be Contesting, Rag Chewing, or better QSOs. So supplement the suggested practice with additional practice that is tailored to your goal.

Learning to hear QRQ can be compared to learning to play the piano. You must learn to enjoy the practice even if no one is there to witness it. People who master playing the piano or become accomplished QRQ'ers are the very people who love doing it.
It's essential for you to enjoy the journey. Be resilient and learn from your mistakes as they come along. Modify your practice whenever you think it is needed.

Your QRQ journey is like a marathon and not a sprint. Have fun along the way!

9. Questions and Feedback

If you have any questions or feedback, send an email to Kurt Zoglmann (kurt@morsecode.ninja), Jack Treloar (jacktreloar@frontier.com), and Terry Jackson (terrycj45@gmail.com). We are happy to help!

The structured approach to achieving QRQ is a starting point, open to refinement. With additional feedback and collective experience, our goal is to make QRQ accessible to as many people as possible.

We wish you all the best on your Morse code journey!

10. References

1. American Radio Relay League – Communicating with Other Hams Q-Signals
2. CW Operators Club – Celebrating the unique art form of Morse Code CWOps
3. Wikipedia – High-speed Telegraphy HST
4. Morse Code Ninja – Practice Practice Files
5. QRQ Course Estimate – Online Calculator
6. CWOps – CW Academy CWA
7. Long Island CW Club – Class Calendar
8. RufzXP – Yannis Scutaru, age 10 HST Competitor

Appendix A – Suggested Practice Plan

35wpm	Hours of Practice
Sentences from Top 100 Words	1.8
Sentences from Top 200 Words	2
Sentences from Top 300 Words	1.9
Sentences from Top 400 Words	1.9
Sentences from Top 500 Words	2.1
Sentences from Top 600 Words	2.5
Sentences from Top 700 Words	2
Sentences from Top 800 Words	2
Sentences from Top 900 Words	2.1
Sentences from Top 1000 Words	2.3
Sentences from Top 1100 Words	7.3
Sentences from Top 1200 Words	7.8
Sentences from Top 1300 Words	8
Sentences from Top 1400 Words	10.6
Sentences from Top 1500 Words	11.4
Sentences from Top 1600 Words	13.3

40wpm	
Sentences from Top 100 Words	1.6
Sentences from Top 200 Words	1.8
Sentences from Top 300 Words	1.7
Sentences from Top 400 Words	1.7
Sentences from Top 500 Words	1.9
Sentences from Top 600 Words	2.3
Sentences from Top 700 Words	1.9
Sentences from Top 800 Words	1.9
Sentences from Top 900 Words	1.9
Sentences from Top 1000 Words	2.1
Sentences from Top 1100 Words	6.7
Sentences from Top 1200 Words	7.1
Sentences from Top 1300 Words	7.3
Sentences from Top 1400 Words	9.7
Sentences from Top 1500 Words	10.4
Sentences from Top 1600 Words	12.1

	45wpm
Sentences from the Top 1000 Words - Review Part 1	11.6
Sentences from the Top 1000 Words - Review Part 2	11.3
Sentences from the Top 1000 Words - Review Part 3	12.2
Sentences from the Top 1000 Words - Review Part 4	12.5
Sentences from the Top 1000 Words - Review Part 5	12.2
Total	217
Number of Sessions	652
Number of Days	326
Number of Months	11

Note: These totals are based on having a 20-minute practice session two times per day. Please reference the online version and use the built-in calculator to adjust for different practice session times and practice session frequency.

Appendix B – Alternate Practice Plan

30wpm	Hours of Practice
Sentences from Top 100 Words	2
Sentences from Top 200 Words	2.2
Sentences from Top 300 Words	2.1
Sentences from Top 400 Words	2.1
Sentences from Top 500 Words	2.3
Sentences from Top 600 Words	2.8
Sentences from Top 700 Words	2.3
Sentences from Top 800 Words	2.3
Sentences from Top 900 Words	2.3
Sentences from Top 1000 Words	2.6
Sentences from Top 1100 Words	8.2
Sentences from Top 1200 Words	8.8
Sentences from Top 1300 Words	9
Sentences from Top 1400 Words	11.9
Sentences from Top 1500 Words	12.7
Sentences from Top 1600 Words	14.8
40wpm	
Sentences from Top 300 Words	1.7
Sentences from Top 400 Words	1.7
Sentences from Top 500 Words	1.9
Sentences from Top 600 Words	2.3
Sentences from Top 700 Words	1.9
Sentences from Top 800 Words	1.9
Sentences from Top 900 Words	1.9
Sentences from Top 1000 Words	2.1
Sentences from Top 1100 Words	6.7
Sentences from Top 1200 Words	7.1
Sentences from Top 1300 Words	7.3
Sentences from Top 1400 Words	9.7
Sentences from Top 1500 Words	10.4
Sentences from Top 1600 Words	12.1

	50wpm
Sentences from Top 300 Words	1.5
Sentences from Top 400 Words	1.5
Sentences from Top 500 Words	1.6
Sentences from Top 600 Words	2
Sentences from Top 700 Words	1.6
Sentences from Top 800 Words	1.6
Sentences from Top 900 Words	1.6
Sentences from Top 1000 Words	1.8
Sentences from Top 1100 Words	5.7
Sentences from Top 1200 Words	6.1
Sentences from Top 1300 Words	6.3
Sentences from Top 1400 Words	8.3
Sentences from Top 1500 Words	8.9
Sentences from Top 1600 Words	10.5

	50wpm
Sentences from the Top 1000 Words - Review Part 1	10.9
Sentences from the Top 1000 Words - Review Part 2	10.6
Sentences from the Top 1000 Words - Review Part 3	11.4
Sentences from the Top 1000 Words - Review Part 4	11.7
Sentences from the Top 1000 Words - Review Part 5	11.3
Total	278
Number of Sessions	667
Number of Days	334
Number of Months	11

Note: These totals are based on having a 25-minute practice session two times per day. Please reference the online version and use the built-in calculator to adjust for different practice session times and practice session frequency.

Appendix C – QRQ Friends Program Form (reference copy)

(Please Download and fill out the PDF file.)

QRQ Friends Registration

Please complete all fields. Save with a filename that includes your call sign.
(Example filename: KA1BC.pdf)
Please email your completed form to: jacktreloar@frontier.com

Name: (First, Last) Date: (mm/dd/yy)
Call Sign: (Call Sign) QTH: (City, State)
Email: (Email Address)
Phone: (Phone Number)

- What year did you become a Ham? (year)
- How many years have you been active on CW? (years)
- What is your favorite CW activity?

  (examples: QSO's, or Contesting, or Rag Chewing, etc.)
- Why are you pursuing QRQ?

  (Click or tap here to enter text)
- When was your most recent CW QSO?

  Click here to enter text
- What is your favorite brand and type of key?

  (examples: W1SFR Single Paddle Cootie, Begali HST, Vibroplex Bug, 9a5n, N3ZN, etc.)

- Do you use a keyboard to send, and if so, is it for all speeds or just for speeds beyond where you can comfortably send by hand?

  (Click or tap here to enter text)

- On an average day with normal bands and QSB what is your comfortable receiving speed? (wpm)

- What is your comfortable sending speed during a rag chew?

  (wpm)

- What are your CW receiving and sending speed goals? (wpm / wpm)

- How often could you practice with a CW friend?

  (daily, weekly, bi-weekly, etc.)

- What radio bands work the best for you?
  (10m, 17m, 20m, 24m, 30m, 40m, 80m, 160m : List all that apply to you)

- What hour(s) of the day are you available to practice?
  (mornings, afternoons, evenings)

- Do you have any other hobbies?
  (Click or tap here to enter text)

- Please write a few sentences to briefly describe yourself. Where are you on your CW journey? Describe for your friend what is most important for you to succeed with your practice.

  (Click or tap here to enter text)

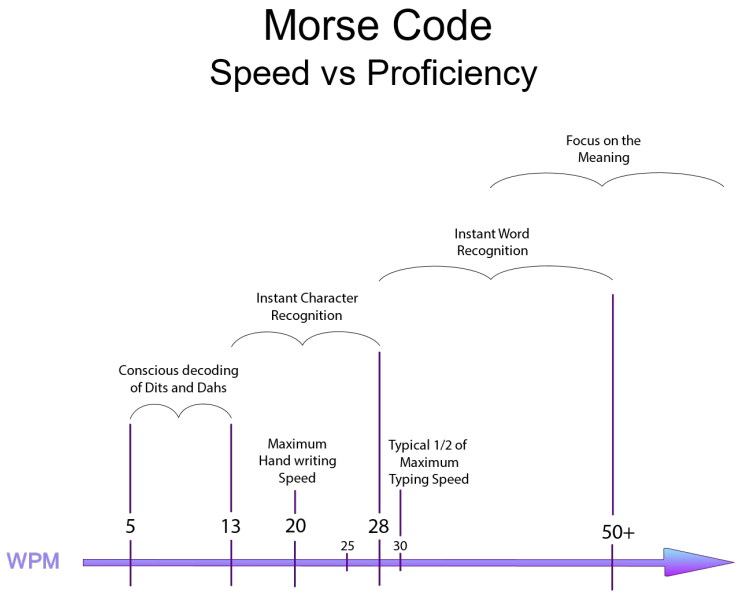
- ✓ Please write any comments that you want to share with the Friends program coordinator. These comments won't be shared with anyone else. This is for you to give input and ask for anything.

  (Click or tap here to enter text)

Appendix D – So you want to go faster?

Author Kurt Zoglmann (AD0WE)

At some point in our Morse code journey, we all yearn to copy faster. However, as a reminder, accuracy should always trump speed in the real world. If you are working at a higher speed than your proficiency or band conditions allow, at best, you may frustrate yourself and the other operator. And at worst, you may fail to communicate successfully.



So what does it take to go faster? In short, it requires learning to operate at a higher proficiency, as shown in the diagram to the right. Knowing this and achieving it are two different things. First, let us cover some theory, and then we will look at approaches to move from one proficiency level to the next.

There are two types of mental processes — conscious and unconscious. The conscious mind is amazing. It allows us to solve complex and difficult problems, such as a calculus homework assignment. It empowers us to engage in abstract, logical, and analytical thinking. Anytime we stop to focus and concentrate, we are almost certainly employing our conscious mind. The downside is how slow it is compared to the unconscious mind!

By comparison, the unconscious mind is lightning fast. It is effortless, automatic, and continuous. It is also where the majority of our information processing takes place. The unconscious mind feeds higher-level information to the conscious mind. For example, in everyday conversation, our unconscious mind does all of the hard work of interpreting phonemes, words, and grammatical structure. It also allows our conscious mind to focus on the meaning of what is being said, and it enables us to understand someone casually talking at 150wpm effortlessly.

The unconscious mind's lightning-fast ability to process information is the key to copying code faster. As a general principle, as the Morse code speed increases, a larger amount of the processing and interpretation must be done by the unconscious mind. And this is directly related to the four levels of Morse code proficiency.

Levels of Morse code proficiency:

1. Conscious decoding of Dits and Dahs
2. Instant Character Recognition
3. Instant Word Recognition
4. Focus on the Meaning

Before we dive into these levels, it is helpful to understand that they are not used exclusively. It is not uncommon to shift back and forth. As an analogy, consider the act of breathing. It is nearly always under the control of the unconscious mind. But by drawing our focus to it, we may control it with our conscious mind. With enough experience, it is possible to shift our Morse code proficiency level to best match the context and speed of the code being copied. For example, a callsign must be copied character by character, while a word can be copied as a complete sound pattern.
So what are the four proficiency levels? And how do they relate to your ability to copy at higher speeds?

1. Conscious decoding of Dits and Dahs:
At this proficiency level, you actively listen to the dits and dahs. Once there is a word or inter-word space, the sequence of dits and dahs is looked up in your conscious mind to identify the character being sent. For example, you might hear Di-Dah-Dit, think Dit - Dah - Dit, and then look up the sequence to identify it as the letter R.

If you find yourself repeating the sound pattern in your mind, you may also be at this level.

At this basic proficiency level, the conscious mind is doing all of the work to decode and interpret the Morse code! And because the conscious mind is so much slower than the unconscious mind, you will be unable to go faster than 10 to 13 words a minute at this level.
If you learn Morse code at 5wpm, using sound-a-likes, memorization charts, or other learning-aids, you will inevitably start your Morse code journey at this proficiency level. This is not advised since you may inevitably get stuck and unable to copy code beyond 13wpm. Some people get stuck for years despite heroic efforts to overcome it! And others transition to higher speeds without much of a problem.

2. Instant Character Recognition:
At this level of proficiency, the unconscious mind is doing the hard work of instantly recognizing each letter as it is sent. The characters are recognized instantly and effortlessly. For example, when you hear di-dah-dit, you think of the letter R. Then the slow, conscious mind follows letter by letter to form words, abbreviations, and callsigns.

To begin learning Morse code with ICR (Instant Character Recognition), you will need to use either the Farnsworth or Koch Method.

The **Koch Method** is a learning technique named after German psychologist Ludwig Koch. With this method, the full target speed is used, starting with just two letters. Once strings containing those two characters can be copied with 90% accuracy, an additional character is added. This step is repeated until the full character set is mastered.

The **Farnsworth method** is a learning technique named after Donald R. "Russ" Farnsworth (F6TTB). With this method, you are taught to copy characters at their full and standard speed. However, the spacing is lengthed between characters and words, which gives you time to think about the sound pattern you just heard. Typically students start with a character speed of 20wpm and an effective speed of 10wpm. Like the Koch method, students start with two characters and continue to add characters as soon as they reach 90% accuracy.

The key to mastering ICR with the Koch Method and Farnsworth Method is to ensure that you learn the sound pattern of characters at a speed of at least 20wpm. If you can count the dits and dahs at 20wpm, you will need to learn at a higher speed, probably 25 to 30wpm. Otherwise, it is almost impossible to avoid counting the dits and dahs. And with the Farnsworth method, you will need to use an overall speed that prevents you from repeating the sound pattern in your head. Typically an overall speed of 10wpm is sufficient.

Does it matter how you copy with ICR? Yes! It will affect the maximum speed you can achieve, which may be anywhere from 20 to 30wpm. There are three ways that you can copy Morse code using ICR and the previous proficiency level of Conscious Decoding of Dits and Dahs.

Pencil-Copy: With this method, each letter is written down on paper after being instantly recognized. The speed limit comes down to the fact that people can not write very fast, and it is tiresome. Even using a modified printing style for speed, most people will only sustain 20wpm while putting each letter down on paper.

This method is often employed at slower speeds since it does not require a computer, it is simple to learn, and it alleviates the conscious mind from having to keep track of a sequence of letters to form words and abbreviations. And it frees the conscious mind from keeping track of more higher-level statements and sentences.

Keyboard-Copy: With this method, each letter is typed on a keyboard. Instead of hearing di-dah-dit and thinking of the letter R, you associate the di-dah-dit sound pattern with pressing the letter R on a keyboard.

With keyboard-copy, the unconscious mind is doing even more of the work compared to ICR with pencil-copy. And the interpretation of the meaning often comes from reading the words and abbreviations formed on the screen! This can create an odd sensation when the conscious mind does not know what is being sent until it is read on the screen!

Keyboard-copy is faster than pencil-copy. Our continuous keyboard-copy ability will be half our steady typing speed. For instance, most proficient touch typists can sustain a typing speed of 60wpm, which puts their maximum sustained keyboard-copy speed at 30wpm.

Head-Copy: With this method, nothing is recorded outside of the mind's eye. Using this method with ICR, the unconscious mind does the hard work of instantly recognizing the sound patterns and prompting the conscious mind with each character. The conscious mind must then take on

the hard work of following character-by-character to identify words, abbreviations, and then the higher-level meaning of statements and sentences.

If you are head copying, this method is sometimes described as the process of affixing letters on a blank blackboard or ticker-tape in the mind's eye as each letter is received. Then you read what is on the board. Perhaps, this description is more of an analogy than reality for most people.

Using ICR and head copy, most people will max out somewhere between 25 and 30wpm. This maximum speed refers to continuous copying. At higher speeds, it is possible to copy a short burst of characters such as a callsign or serial number, which is often a skill developed to participate in contests at 30 to 40wpm. The world record for unaided callsign copy is 195 wpm!!

I recommend starting your Morse code journey learning to head-copy with ICR. This will allow you to quickly achieve 25 to 30wpm real-world speeds operating on the air, and it will enable you to progress to the next two proficiency levels.

3. Instant Word Recognition:
At this proficiency level, the unconscious mind does most of the hard work. You hear the sound pattern of entire words and abbreviations as a whole, and then you instantly and effortlessly recognize them. While the unconscious mind does a lot of hard work, the conscious mind must keep track of words and the grammatical structure to form meaningful statements and sentences. For example, you hear dah-di-dah-dit dah-dah-di-dah, and think CQ.

This proficiency level often allows users to achieve speeds of 50wpm or greater with enough practice, and it is nearly always done with head-copy. It is interesting to note that this level of proficiency often develops early on with real-world practice. It is common to learn the sound pattern of CQ, 599, 5NN, TEST, and your callsign without trying to learn them as sound patterns, and you can copy them at much higher speeds than anything else.

Gaining proficiency at this level is a matter of building up a vocabulary of sound patterns. Consider the following ABC's of success to master IWR (Instant Word Recognition).

The ABC's of success:
A) Learn the sound pattern of words and abbreviations at or slightly above your maximum ICR speed. Working at that speed will encourage you to focus on the word's entire sound pattern and not follow letter-by-letter. It's analogously to why we learn ICR at a character speed of 20wpm or faster — in that case, we want to avoid focusing on individual dits and dahs.

B) After learning to copy the sound pattern of individual words, strive to copy two and then three words at a time. You may find my n-gram Morse code practice sets useful in developing this skill — Sets of 2 Words, and Sets of 3 Words — and perhaps using them at 30wpm. They are based on the most common two and three-word combinations in the English language. And because they are so common and familiar, it helps ease copying multiple words for the first time. If you copy one of the words, you may easily guess the missing word(s).

Copying multiple words at a time is mostly a matter of giving your conscious mind enough space or mental capacity to take on the challenge of remembering several words at a time.

C) After learning to copy handfuls of words at a time, strive to master copying an entire sentence. I recommend starting with the easiest sentences made up of the most common 100 words in the English language. And then move on to sentences that use larger vocabularies. You may find my practice sets — Sentences from the Top 100 Words, Sentences from the Top 200 Words, and so on — very useful.

Once you have built up a vocabulary of sound patterns at a given speed and understand them in statements and sentences, it is straightforward to increase your maximum copy speed. Diligently and incrementally, practice at ever faster speeds to reach your goal.

As a tip, if you listen to Morse code without headphones, pay close attention to any echo in the room. You may need to make adjustments to minimize echo, which can interfere with clearly hearing Morse code at or above 40wpm.

4. Focus on the Meaning:
At this proficiency level, the unconscious mind is doing all of the hard work! The conscious mind is free to focus on the meaning of what is being sent. This level of proficiency is the nirvana that most aspire to achieve. It is equivalent to listening to someone talk to you in your primary language. It is easy and effortless.

This level of proficiency develops with extensive practice and experience. As the unconscious mind takes on ever greater responsibility, it increasingly frees up the conscious mind to focus on the meaning.

Appendix E – A Case for “Book Copy”

Author John Silzel (N6HCN) — Reprinted with permission. Originally published in the May 2018 edition of Solid Copy.

It may be that there are two different CW dialects. The “symbolic” dialect, so fluently spoken by contesters and commercial ops, is far more efficient than voice for the accurate transmission of data: formal traffic, call signs or serial numbers, even ciphered military communications. In symbolic CW, anticipation of the next character is a no-no, since the traffic consists of compressed data of high information content and little redundancy. Every character is crucial, and copy must be perfect.

The other CW dialect may be newer and reflect the rise of CW as an art: the use of code as an auditory language. This “conversational” CW is more like speech or silent reading: concepts and context ride naturally on a fuller vocabulary. Neither sender nor receiver may remember the exact words sent, and neither is conscious of characters at all. This CW dialect comes closer to reading than data transmission, and in fact brain mapping research1,2 shows that the brain processes “head copy” much the same way as it does speech or printed text during fast, silent reading.

We know that learning a second language begins awkwardly, with symbols and sounds, mechanical grammatical rules and memorization of seemingly infinite vocabulary. But at some point, the mind assimilates the new tongue, and the mechanics of the language become internalized and unconscious. This process appears to involve a rewiring, or “neuroplasticity” of the brain, involving new connections between sensory and cognitive centers, and a detectable increase in gray matter density.

It seemed to me that expertise in conversational CW, like fluency in any language, would benefit from *immersion.* But my family and work could not accommodate hours and hours at my rig hunting up a ragchew or listening to W1AW sessions, only a portion of which were of interest or at useful speed, anyway. Making matters worse were poor propagation, QSB, and nighttime QRN at my home. If only, I thought, I could listen to... a good *story*... sent perfectly, anywhere, hour after hour in CW, at a speed always high enough to stretch my copy skills.

The Solution: CW e-Books

I found the answer on my first internet search: a free, open-source software application called “ebook2cw”. (http://fkurz.net/ham/ebook2cw.html) This code runs on Windows, MAC OS, and best of all on Linux, my favorite OS. The work of champion QRQQ operator Fabian Kurz, DJ1YFK (CWOps #1566), ebook2cw does just what it says: converts any ASCII text file to a collection of audio .mp3 files that can be loaded on an inexpensive player or your smartphone, burned to CD, or played however you normally listen to digital music. Converting a full-size novel takes about 40 minutes on a laptop, and just slightly longer on a $35 Raspberry Pi computer, an amazing unit worthy of its own article. My solution is to drag-and-drop the converted audio files to a cheap Coby 8Gb MP3 player, which fits in my pocket and holds enough CW for months of nightly “reading”.

All of this is great, but until book publishers start releasing CW editions (we won't hold our breaths, will we?) you'll need a way to get your reading material in ASCII form. Fortunately, the good folks at The Gutenberg Project (www.gutenberg.org) have provided more than 50,000 ebooks, virtually copyright-free, with more added all the time. Acquiring a CW library is as simple as downloading the "plain ASCII text" version of your chosen book. Even "War and Peace" is only about 3 Mbytes, smaller than an average music download.

It's of course optional, but I like to use an editor to "search and replace", making some CW-friendly edits to the downloaded book: I replace "and" with "ES" for example. I used to remove quotation marks, but I've found that copying that unusual character has become second nature. In fact, ebook2cw handles more punctuation than we use on the air and has means for you to insert prosigns as well. Ebook2cw will optionally insert a BT at the end of each paragraph, which I like very much. (Fabian Kurtz tells me it will even handle some special Greek, Cyrillic, and Hebrew characters!) While you're at it, check your book to see what text is used to delineate chapters. Ebook2cw can break the book into chapters based on "hits" to a particular search string, like "CHAPTER", and I add this keyword to books whose chapters were ambiguously marked in the original file. This whole editing process takes only about 15 minutes for a typical novel.

At this point, you're ready to feed the edited book into Ebook2cw. I use the no-frills command-line version of the app, but there is a version of the code that includes the familiar "GUI" window interface. It is a simple process and there are good instructions on the website listed above. There are separate speed settings for characters and WPM. I set the program to chop the book up by chapters, and limit each MP3 file to 30 minutes, so they're manageable for me in one reading session. (Longer files mean more work to find my place if I fall asleep while listening!) I set ebook2cw's QRQ feature to give me 3-4 WPM of QRQ per 30 minutes, so each file begins at my current comfortable "base" speed and ends up pushing me a bit. Any time I am not stretching a bit to copy the last QRQ, I will reconvert the remaining chapters, bumping things up 3 WPM or so. But I never let it get frustrating — my goal is a relaxed but focused reading experience, not a sweat -breaking adrenaline meltdown! (Save that for CWTs...)

Rewiring Your Brain: From CW "Guinea Pig" to Speed Reader

Your first CW book might seem like slow going. At first, I thought I'd wear out the "rewind" button on my mp3 player. Books are, after all, more eloquent and complex than our on-air QSOs. Strange spellings, dialog, contractions, and sections of oddly spelled vernacular can be challenging at first. Stick with it, and don't be tempted to peek at the text! If you like Westerns, the books by Zane Grey stick to a fairly common vocabulary and style that helped me adapt to "book copy". When I started out, my (rusty) base speed was about 15 WPM, I still needed a pencil and paper, and I was accustomed to Farnsworth timing. My first goals (besides enjoying the books) were to toss my pencil "cold turkey" and wean myself to normal CW word and character spacing. Then I began to build WPM. As any op knows, this is an irregular process, with plateaus and periods where progress seems nonexistent. But with a good book, it is easy to be patient and "stick with the program".

Once hooked on a good book, you'll be motivated to practice. And with regular practice, learning is inevitable. Your brain is pre-wired for language and cannot help but become more and more fluent. Relax and enjoy the book, speed will come inevitably and effortlessly. After a few books, the unconscious head copy will have you wondering just how fast you can go! I believe anyone can eventually pass 30 WPM by spending 30 minutes per day doing “book copy”.

You’ll probably spend several months reading a novel in CW, so you’ll want to pick good reading material. No matter your tastes, there are fine books out there just waiting to be converted to CW. Some favorites of mine are “Riders of the Purple Sage”, “The Heritage of the Desert” and “Mysterious Rider” by Zane Grey. “Two Years Before the Mast” by Dana, and “Log of a Cowboy” by Adams are great picks. If a novel sounds daunting, try short stories, like the Sherlock Holmes cases by Sir Arthur Conan Doyle. In the military nonfiction vein, you might enjoy “Blood Brothers”, by Colonel Eugene C. Jacobs, and if you’re a geek like me, or just want to practice numbers, you can read government technical reports like the declassified “Project Trinity” documents detailing the first atomic tests. All of these and more are downloadable via the Project Gutenberg site. And of course, you can convert any text file, email, or webpage text — even this issue of Solid Copy! I’ve tried scanning and OCR of printed books, but the process takes too long for me.

The Payoff

Why try this admittedly eccentric pastime? Well, for one thing, enjoying a good book in bed with your eyes shut is very relaxing, and there is no book light or page turning to disturb the XYL. There is no SDR to tweak, no panadapter to scan, no QSB, no QRM, just Fabian’s computer-perfect fist, solid copy, and no speed limits. A suspenseful plot unfolding in rapid CW reminds me of listening to a radio drama, and the pace, though slower than reading or an audio book, has become surprisingly enjoyable.

Like other ops, I have been startled to find that the neuroplastic “rewiring” of my brain has some strange side effects, as well. The ears automatically “lock” onto CW almost instantly and unconsciously, and seem to find code everywhere, on and off the bands. You might find yourself distracted by the odd things being “said” by birds, dishwashers, squeaking machinery, and the vari- ous beeping devices all around us. During ragchews you might be unaware that you are copying code rather than voice. You might find yourself copying more than one QSO at a time.

Has it been a while since you enjoyed effortless CW as a true language, a mental connection, hanging on every word to see if the “good guy” was going to win, or leaning back at the paddles, eyes shut, enjoying a rapid-fire QSK back-and-forth, telling jokes or yarn-spinning with one of the fine ragchewers on the bands? I’m sure that “book copy” will give even the most crazy-fast op a new level of fun and fluency in our wonderful “second language”. You might find yourself waxing eloquent on the air, adopting the gritty prose of Hemingway, or the sly humor of Twain in your next ragchew. If you need help converting that first book, drop me an email and I'll be glad to assist.

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Appendix F – Phonic Copy

Author Paul Carreiro (N6EV) — Reprinted with permission. Originally published in 2009 and last updated on February 4, 2017.

Introduction:
As with any processes, there are alternate methods to achieve an end goal. Since I hadn't seen it depicted yet in the various discussions about head copy, I want to share the method I use. Like many have testified, my transition from written to head copy came by operating true mobile CW operation (in motion.. as opposed to portable operation) where written copy is impossible / impractical.

Before we break down the phonic method of head copy, let's first consider basic code reception with the following concept from Steve, N8CPA: "Letters are graphic representations of sound. Code is an aural representation of graphic representations of sounds." At the beginner level of code reception, code elements are received audibly; mentally converted to a letter representation of that code element; then that letter representation is written down. Comprehension of the content of the message occurs only after the written letters are constructed into words and sentences. As proficiency increases, the speed of this conversion improves, and perhaps the method of writing down each letter becomes more efficient. But the basic process is unchanged as speed increases. Various speed plateaus are reached due to bad habits, poor writing techniques and ultimately, the limit induced by the time required to mentally convert from audio element to letter representation to written form.

Most head copy methods that you see described involve learning to recognize word code patterns rather than individual letters. Variations also include using a mental 'blackboard' to queue up letters until a word is recognized. Comprehension occurs after each word pattern is completed and recognized. These word recognition methods have been used by countless operators successfully over the years. Since the written portion of the process is removed, copy speed naturally is improved. And while I understand the concept of recognizing word patterns… I often wonder what happens when a word arrives that you haven't yet learned to recognize pattern wise? Comprehension, while vastly improved over written copy, is still stuttered. I want to be clear, I'm not saying the word pattern method is wrong or invalid. To me, it just seems less efficient (and comfortable) than the method I'm about to describe.

The Phonic Copy method can be summed up by altering Steve's concept above to read: "Code is an aural representation of a phonic sound." Each Morse Code element represents the phonic sound of a corresponding letter, not the letter itself. This means, as elements (letters / numbers) are received, they are phonically pronounced in the speech / aural portion of the mind (the auditory cortex) rather than visualized graphically as letters or whole words in the written / visual portion of the mind (the visual cortex). One universal principle to increasing copy speed is to remove the number of steps or conversions it takes from reception to comprehension. By eliminating the conversion from aural representation to graphic representation, phonic copy allows instant comprehension, many times even before a word is completed. As Drew, AF2Z aptly states: "You can hear a word building to completion as it streams by, not as a

unit word sound that pops into your mind …. (and) not as individual letters that you have to assemble either. It's more like spoken words that are being pronounced rather slowly."

To expand on and better demonstrate the Phonic Copy concept, let's use the word "PRONOUNCED" as an example. I doubt this would be a word that many using the word pattern recognition method would have practiced and learned before hand as it is not a common word used in QSOs. Look at the word 'P R O N O U N C E D' and step through it phonically letter by letter in the speech / aural portion of your mind. Each letter has a distinct phonic sound associated with it. This Phonic Copy method (thanks to Walt, W5ALT for helping give it a name) is the same process, except instead of visually stepping through the word as you just did, the phonic sound elements are recognized (verbalized in the speech / aural portion of the mind) as each code element is audibly received. There is no visualization, letter queuing or pattern recognition involved (other than converting the code elements into phonics). Numbers are simply recognized as you would speak them. Punctuation and pro-signs are recognized easily by their pattern.

Copying this way, there are no unrecognized (not yet learned) patterns or words to worry about. Nor is there a queue of letters to keep track of (blackboard method). In fact, using this method, I can listen to two CW stations conversing in Spanish, and 'hear' the conversation as if they were in front of me. Granted, comprehension is limited in this example as my Spanish is marginal! The code simply flows as a phonically pronounced stream of words and numbers in the mind. Comprehension is instantaneous (assuming you understand what the word means!), as opposed to waiting for a pattern (word) to be recognized. As with other head copy techniques, this method is easier to use the faster the code is sent. So it doesn't lend itself to extreme QRS speeds. It also lends itself to conversational CW where apprehension and the mind's own error correction kick in. You wouldn't use this method to copy random five letter code groups.

You could compare these two head copy techniques to, on one hand, seeing a stream of written letters or words pop up on a computer screen (visual / graphically recognized pattern method), versus having words spoken out of a speaker of that computer (Phonic Copy method). Or more simply, the difference between reading text versus listening to speech. Admittedly, I have not experienced the visual / pattern recognition head copy techniques that have been discussed and used by the vast majority of CW ops. But it would still seem to me that Phonic (pronounced) Copy would be a more fluid and easily learned method. It simulates an audible conversation with someone, as opposed to a chat room conversation. From personal experience using this technique, my head copy speed skyrocketed to over 45 wpm, and has easily translated down to slower speeds. Copying 'Conversational CW' at QRQ speeds using the phonic method is truly effortless, relaxing and achieves that nirvana state where the Morse becomes a language, not just a code representing letters and numbers.

I offer Phonic Copy as an alternative method / perspective for head copy that has worked for me and others. For whatever reason, it has not been well documented to my knowledge compared to the word recognition method. And near as I can tell, a very small percentage of CW operators practice this method. Take it or leave it. Your mileage may and will probably vary. No warranty expressed or implied.

What ever method you use… ENJOY CW! As long as we communicate, and have fun while doing so… we've achieved the ultimate goal.

Your thoughts are welcome.

Learning the Phonic Copy Method:
I've been asked many times since writing this article back in 2009 how to learn the Phonic Copy Method. Initially, these were tough questions to answer as I didn't intentionally set out to learn this method. It came quite by accident without recognizing exactly what process I was using. So I went back and analyzed the circumstances in which I learned to head copy phonically. The key to this method, as mentioned above, is the use of the speech / aural sections of the brain (the auditory cortex, Broca's area, Wernicke's speech area) versus the written / visual sections used in other head copy methods. I learned while driving long highway distances. While driving, the brain processes the road and potential hazards ahead via the visual stimuli presented. This leaves the aural / speech section of the brain available to process the auditory Morse Code into phonic speech sounds.

My advice for learning this method is to set yourself in an environment where your eyes are occupied by some visual stimuli, while your ears are left without distraction to process the incoming Morse elements. As with other head copy methods, the code element speed should be at or above 18-20 WPM and the content should be plain conversational text, not random letters or words. During initial training, it will be easier to start with Farnsworth style code, with plenty of space between each code element. Start by consciously equating the sound of a code element to its corresponding phonic. Don't worry about catching every code element, words or comprehending the context of the text. Then just keep the code in the background while occupying your eyes. You can do this while driving if you have a receiver, or MP3 player. Or, at home, start a long video with the audio turned down. Pick something interesting. Perhaps the many ham related videos on YouTube. Be sure the video's audio is turned down, then start your Morse audio input. It's a bit like walking and chewing gum at the same time, but the brain has an amazing ability to multi-task like this. As you gain more experience in converting the code elements to phonic sounds, progressively shorten the extra Farsworth spacing until it's removed.

Keep at it and eventually you will pick up strings of phonic sounds that form words. When you get to this point and start stringing words together you will start to comprehend the context of the conversation. That's when the other aspect of this method kicks in to assist… that of anticipation. Just as with normal speech conversation, there are logical patterns to sentences (nouns / verbs / adjectives, etc), and there is logical flow to the context of conversation. The language area of your brain (the Broca's area) has already been trained to do this when you were a child learning to speak and understand speech. It's okay if you anticipate the next word wrong. We're not copying forward here. The brain will auto-correct when it hears speech it wasn't expecting. It's an amazing muscle. Exercise it!

To further reinforce the process of linking aural code elements to phonics, do the following. In between the sessions of listening to plain text code described above; mix in some sessions where you send words from a key / code practice oscillator while sounding them out phonetically in the mind. This too can be plain text by conducting a mock conversation / QSO. Don't read text while

doing this. Keep the process entirely aural. Before sending each word, sound the word out slowly in your mind. Then repeat the word, again in your mind phonetically as you send each letter on the key / code practice oscillator. As you progress, you can eliminate the pre-sent sounding of the entire word. At this point, just progress from word to word sounding them out phonically in the mind while sending each corresponding letter.

Please contact me and let me know if you have attempted to learn the Phonic Copy Method. I'm curious what others results are like. I'm available for advice and encouragement also.

73, Paul N6EV

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