

TIPS ON LEARNING AND OPERATING CW (Morse Code)

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This is based upon an article Richard Leah wrote for "the Canadian Amateur" Magazine in January 1992 and also published in Hagal Amateur Radio Magazine in Israel and other countries including South Africa under his former call of VE3ANB. Please feel free to use and publish this if you wish but the authors would appreciate being INFORMED if it is used in another publication elsewhere.

We hope this assists all those wishing to learn Morse Code or even those who wish to hone their skills in this fine art of radio communication enjoyed by millions of hams worldwide.

If you have a Morse key and Sounder, please ask someone to safely LOCK IT AWAY for the time being. Until you learn to understand what CW is supposed to sound like, you will surely not be able to send it properly. A good musician always learns how an instrument is supposed to sound like before they learn how to play it. There will be plenty of time to send later, once you have mastered the rhythm of CW.

The secret to learning CW is to LISTEN, LISTEN and LISTEN. By listening to code sent well, either generated by software on your computer or cell phone, or received off air on the ham bands, you will get a feeling for the rhythm of consistent speed PLUS the consistent gap between each character sent.

International Morse Code represents the 26 letters, 10 numbers and punctuation characters with a pattern of dots and dashes. For example the letter "e" is a single dot and the letter "a" is a dot followed immediately by a dash. To represent a short tone on paper we use the word "dit" and for a long tone we use the word "dah". These dits and dahs make up our alphabet and for the purposes of effective communication, also numbers from 0 -9 and the comma, slash, period and question mark. You will need to know these 40 characters in most CW exchanges.

If someone has helpfully given you a chart showing the alphabet and the corresponding dots and dashes, they have done you a great disservice! **Morse Code is an Aural Skill, not Visual!** When used for radio communications Morse Code is really an Aural Language of short and long tones created by the receiver circuitry. Each letter has a unique sound and you can learn to tell the difference with some listening experience. Associating the sight of dots and dashes with letters and numbers creates a visual look up table in your mind. If you then start counting code elements and converting what you heard to a visual memory and then converting to a letter the mental processing time will prevent you from receiving faster than about 5 words per minute. Painfully Slow!

Learn the sound of each character clearly in your mind and very importantly, try to learn each character at a CHARACTER speed of at least 20-25 wpm while leaving a big gap between each character. This method of learning Morse Code is called the Koch Method. Neurological studies show it to be the most effective way to learn. As you progress, you will narrow the time gap between each character WITHOUT changing the character speed. Thus your ability to copy code at the typical speeds used on the air will improve with practice. Indeed, this is the way you

learned your mother tongue. Your parents and siblings spoke to you at normal speed, perhaps enunciating each word clearly, but never slowing down like a 45rpm record played at 33 1/3!

Trying to learn at a character speed of 10 or 5 wpm allows you to count the individual Dits and Dahs and look them up in your mental visual memory, a process that takes a lot of precious time. By the time you have decoded and written down the character perhaps another character has come and gone! And then trying to copy later at a higher character speed will result in frustration and it will make you feel like you have to learn all over again at a new speed.

Try to get into the habit of writing down each character as you copy it in LOWER CASE letters rather than capital letters. You will save a lot of time doing this. It takes more pen strokes to write a capital E than a lower case e. There is a limit to how fast you can write letters and numbers, about 30 words per minute, so trying to write everything down creates another speed limit. 30Wpm might seem fast, but experienced CW operators only write down callsigns, signal reports and other short bits of info from a contact, and rely on their ability to hear whole CW words to understand the conversation.

DO NOT translate the character onto paper with dot and dashes (dits and dahs) and then effect the translation. You need to understand the sound of each character and write that on the paper as a letter or number.

Ray Burlingame-Goff, G4FON (SK), wrote an excellent and free Morse Trainer Program that generates aural CW using the Koch method of learning just a few letters at a time, at a reasonable character speed, for example 25wpm, but also spaced out in a controllable way. When starting out you might chose 3wpm, and as you get familiar with the characters you can pick it up to 10 or 15wpm. When you have mastered the first two letters, add two more, and keep going until you have all 40. The program is available at: <https://www.g4fon.net/CW%20Trainer2.php>

If you have a short wave or amateur receiver you can tune into W1AW code practice schedules for a very effective and realistic learning tool. The W1AW code practice times and frequencies can be obtained on their website at <http://www.arrl.org/w1aw-operating-schedule>. When listening to the W1AW code practice schedules, make a point of listening to transmissions that have a code speed of 15wpm to 25wpm. Before you say "You're crazy!", you may only be able to pick out one or two letters in each word BUT when they slow down to 10 wpm, you will be pleasantly surprised that you are copying most letters at that speed. And when they slow it down even further, you will be picking up most, if not all of the letters giving you a feeling of accomplishment. You may even feel the slower speeds are agonizingly slow, which means you are making good progress.

You should be prepared to spend about 30 to 40 minutes a day listening. Set yourself a schedule each day and NO EXCUSES. If you are not prepared to commit the time you are just wasting it and kidding yourself. You will never pass an exam with good marks by not committing to study.

Do not spend more than 1 hour in the learning and listening process as this could result in over absorbing your mind and like a sponge when wet, you will find that you are not grasping the new stuff coming at you. If you find this is the case, WALK AWAY and try later. We all have off days, so don't let it put you off or give up. Many people "give up" out of frustration so it's vitally important that you end your learning session with a good feeling of accomplishment and feeling good about yourself and the progress you make in each session.

Once you have a grasp for the characters and their sound, send CW to yourself in you head. eg: when you see a road sign saying YIELD or STOP, send it verbally to yourself out loud. YIELD....Dah dit dah dah, di dit, dit, dit dah di dit, dah di dit. STOP.... Di di dit, dah, dah dah dah, dit dah dah dit. See what I mean? You might get some strange looks from people but hey! who cares? This a great fun exercise for the Morse Code learner.

ALL OF THE ABOVE DOES NOT REQUIRE THE USE OF A KEY and Sounder. NOW that you have successfully learned how each character sounds, you have achieved a measure of success in receiving the code at a reasonable speed, and now is the time to practice sending. The question immediately becomes “What type of key to use?”

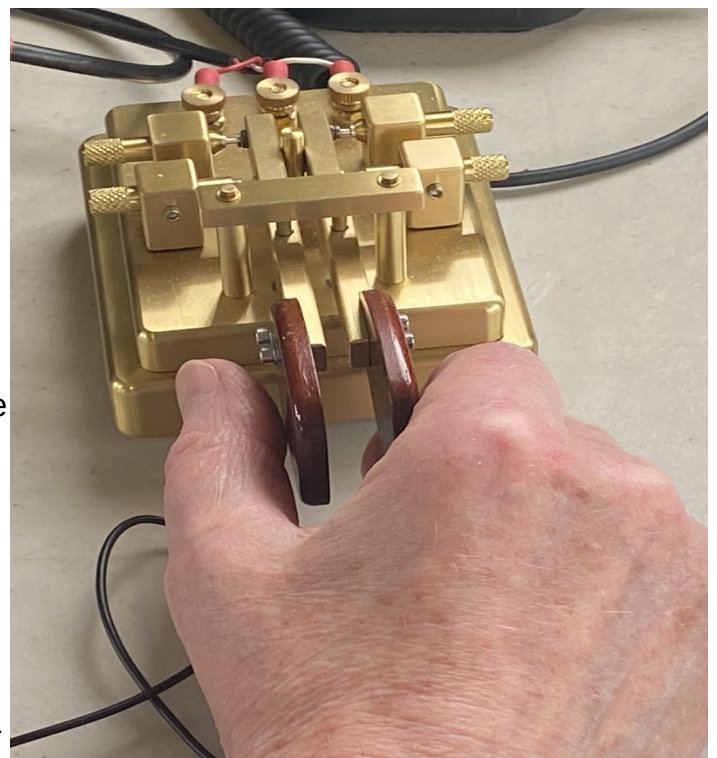
The straight Morse Key is simply a switch which when pressed completes the electrical circuit for short or long periods. A light finger press on the end pad is all that is needed to make code! On this ancient J-38 key there are two knurled knobs on the rocker lever that are used to adjust the gap of the switch, and therefor the required movement of the knob, and the return spring tension. The side slide switch was used in a land line circuit to close the local circuit for reception.



Pressing a key rapidly to make Dits and Dahs can soon make an arm sore. Land telegraphers called the injury “a glass arm”, what we would call “repetitive strain injury” and “carpal tunnel syndrome”. Plus the maximum speed possible is about 15 ~ 18 words per minute, limited by how fast the operator can move her fingers. A better way was developed.

The lambic or dual action key involves two side by side keys, each connected to an electronic timer or Keyer Circuit that create perfectly timed Dits and Dahs. Usually the thumb key creates the Dits and the finger key creates the Dahs. The operator taps the thumb lever and then the finger lever to create an A, or finger thumb finger to get an K. The hand rests on the table, just the finger and thumb move in a light squeezing motion, there is little chance of a repetitive strain injury, and skilled operators can produce clean 40WPM!

Virtually all amateur rigs these days include a built-in keyer so the code generated is of near



perfect shape and far less frustration is experienced when practising sending from the outset. A stand-alone keyer is also a possible additional piece of equipment which is not expensive and would serve the purpose well.

Remember, a good method is to again listen to good code and get a feeling for the rhythm and spacing being used. Don't worry about the speed at this stage. Adjust your key for a minimal amount of movement and physical effort. Get comfortable and send code to yourself using a newspaper or magazine as a text source. Pay special attention to the spacing between each character to have each character stand out. Make it enjoyable and feel good about it.

If you are licensed, get a local ham to QSO with you and make a point of having a CW QSO every day. It's a skill and you need to be proud that you can do it. Get on the air and call CQ at your comfort level. Most who respond will match your speed out of courtesy. Try to send at the same speed as your contact. If they are too fast, ask them to QRS (slow down), they will be happy to do this for you.

If you are still going for your license, find a local ham, tell her or him about your interest, and guaranteed they will be willing to help, send you code, and mentor in other ways.

CW uses a lot of abbreviations much like people do when texting on their cell phones. Eg: Thanks (TKS), For (FER), Very (VY), Good (GUD), Your (UR), Weather (WX), Your signal report (UR SIG RPT) is 599 (5NN). Power is 400 watts (PWR is 4TTW). Note that a nine is sent as an N and a zero as a T in the exchange. Hope to see you again soon (HPE CUAGN SN), And is sent as ES, Best regards is sent as 73 NOT 73's!! You will learn these abbreviations very quickly and use them too. If you make an error, just send a short series of dits and resend the word again. NEVER abbreviate your call sign!

CW is NOT a lost art and can be very enjoyable and EASY. I know hams who choose to use CW exclusively. You will find too that CW has a much more effective way of punching through QRM, QRN and QSB compared to SSB. The author has had many QSO's on CW that could never have had on SSB. Always remember, don't be rushed, be relaxed and always use International Morse Code.

If you have any questions please email the authors. Contact details are on their QRZ page.

The CW Operators Guide

Original Author Unknown

PROSIGNS FOR MORSE CODE

Prosigns are symbols formed by running together two characters into one (without the intercharacter space) to make an abbreviation for the most common procedural signals. Usually written with a BAR over the characters.

AR ----- End of message

AS ----- Stand by

BK ----- Invite receiving station to transmit

BT ----- Pause; Break For Text

CL ----- Going off the air (clear)

CQ ----- Calling any amateur radio station

K ----- Go, invite any station to transmit, usually after calling CQ

KA ----- Beginning of message

KN ----- End of transmission, Go only, invite a specific station to transmit
R ----- All received OK
SK ----- End of contact (sent before call)
VE ----- Understood

CW ABBREVIATIONS

AA - All after AB - All before ABT - About ADEE - Addressee ADR - Address
AGN - Again AM - Amplitude Modulation ANT - Antenna BCI - Broadcast
Interference BCL - Broadcast Listener BCNU - Be seeing you BK - Break, Break in
BN - All between; Been BT - Separation (break) between addr & text; between txt & signature
BTR - Better BUG - Semi-Automatic key B4 - Before C - Yes, Correct
CFM - Confirm; I confirm CK - Check CKT - Circuit CL - I am closing my station; Call
CLBK - Callbook CLD - Called CLG - Calling CNT - Can't CONDX - Conditions
CQ - Calling any station CU - See You CUL - See You later CUM - Come
CW - Continuous wave DA - Day DE - From, This Is DIFF - Difference DLD - Delivered
DLVD - Delivered DN - Down DR - Dear EL - Element ES - AndDX - Distance
ES - and FB - Fine Business, excellent FER - For FM - Frequency Modulation: From
GA - Go ahead; Good Afternoon GB - Good bye, God Bless GD - Good
GE - Good Evening GESS - Guess GG - Going GM - Good morning
GN - Good night GND - Ground GUD - Good GV - Give GVG - Giving
HH - Error in sending HI or HiHi - The telegraph laugh; High HPE - Hope
HQ - Headquarters HR - Here; Hear HV - Have HW - How, How Copy?
IMI - Repeat, Say Again INFO - Info LID - A poor operator LNG - Long
LTR - Later; letter LV - Leave LVG - Leaving MA - Millamperes MILL - Typewriter
MILS - Millamperes MSG - Message; Prefix to radiogram N - No, Negative, Incorrect,
NCS - Net Control Station ND - Nothing Doing NIL - Nothing; I have nothing for you
NM - No more NR - Number NW - Now; I resume transmission OB - Old boy
OC - Old chap OM - Old man OP - Operator OPR - Operator OT - Old timer;
Old top PBL - Preamble PKG - Package PSE - Please PT - Point
PWR - Power PX - Press R - Received as transmitted; Are; Decimal Point
RC - Ragchew RCD - Received RCVR - Receiver RE - Concerning; Regarding
REF - Refer to; Referring to; Reference RFI - Radio frequency interference
RIG - Station equipment RPT - Repeat, Report RTTY - Radio teletype
RST - Readability, strength, tone RX - Receive, Receiver
SASE - Self-addressed, stamped envelope SED - Said SEZ - Says SGD - Sign
SIG - Signature; Signal SINE - Operator's personal initials or nickname SKED - Schedule
SRI - Sorry SS - Sweepstakes SSB - Single Side Band STN - Station SUM - Some
SVC - Service; Prefix to service message T - Zero TFC - Traffic TMW - Tomorrow
TKS - Thanks TNX - Thanks TR - Transmit T/R - Transmit/Receive TRIX - Tricks
TT - That TTS - That is TU - Thank you TVI - Television interference TX - Transmitter;
Transmit TXT - Text U - You UR - Your; You're URS - Yours
VFB - Very fine business VFO - Variable Frequency Oscillator VY - Very W - Watts
WA - Word after WB - Word before WD - Word WDS - Words WID - With
WKD - Worked WKG - Working WL - Well; Will WPM - Words Per Minute
WRD - Word WUD - Would WX - Weather XCVR - Transceiver XMTR - Transmitter
XTAL - Crystal XYL - Wife YL - Young lady YR - Year
30 - I have no more to send 73 - Best Regards 88 - Love and kisses 161 - 73+88=161

The RST System

The RST System of Signal Reporting has been used for years (circa 1934) as a shorthand method of reporting Readability, Signal Strength and for CW, Tone (i.e., quality of the CW tone). For voice contacts only the R and S are used. The S component is usually not the same as your S-Meter reading as most S-Meters aren't calibrated to track the RST System. The RST is also reported on QSL Cards and must be filled in correctly -- e.g., a 569 report for a Voice Contact is invalid. Note that many DX operations and contest stations merely report 59(9) as a convenience to avoid having to log each of the real reports. A questionable practice but a fact of Dxing/Contesting.

READABILITY

- 1 -- Unreadable
- 2 -- Barely readable, occasional words distinguishable
- 3 -- Readable with considerable difficulty
- 4 -- Readable with practically no difficulty
- 5 -- Perfectly readable

SIGNAL STRENGTH

- 1 -- Faint signals, barely perceptible
- 2 -- Very weak signals
- 3 -- Weak signals
- 4 -- Fair signals
- 5 -- Fairly good signals
- 6 -- Good signals
- 7 -- Moderately strong signals
- 8 -- Strong signals
- 9 -- Extremely strong signals (50mV across 50W)

TONE

- 1 -- Sixty cycle a.c. or less, very rough and broad
- 2 -- Very rough a.c. , very harsh and broad
- 3 -- Rough a.c. tone, rectified but not filtered
- 4 -- Rough note, some trace of filtering
- 5 -- Filtered rectified a.c. but strongly ripple-modulated
- 6 -- Filtered tone, definite trace of ripple modulation
- 7 -- Near pure tone, trace of ripple modulation
- 8 -- Near perfect tone, slight trace of modulation
- 9 -- Perfect tone, no trace of ripple or modulation of any kind

Infrequently used is the addition of a letter to the end of the 3 numbers. These are: X = the signal is rock steady like a crystal controlled signal; C = the signal is chirpy as the frequency varies slightly with keying; and K = the signal has key clicks.

X is from the early days of radio when such steady signals were rare. Today most all signals could be given an X but it is hardly ever used. It is helpful to report a chirpy or clickie signal by using the C or K, e.g. 579C or 579K.

Often signals are stronger than S9 (50mV across 50W) and are given in decibels above S9 according to the receiver S meter. Eg: "You are 25dB above S9"

Q-Signals For Amateur Radio Operators In Bold indicates frequent use.

- Q-Sig Message
- QRA** What is the name of your station? The name of my station is ____.
- QRB** How far are you from my station? I am ____ km from your station.
- QRD** Where are you bound and where are you coming from? I am bound ____ from ____.
- QRG** Will you tell me my exact frequency? Your exact frequency is ____ kHz.
- QRH** Does my frequency vary? Your frequency varies.
- QRI** How is the tone of my transmission? The tone of your transmission is: (1-Good, 2-Variable, 3-Bad.)
- QRJ** Are you receiving me badly? I cannot receive you, your signal is too weak.
- QRK** What is the intelligibility of my signals? The intelligibility of your signals is: (1-Bad, 2-Poor, 3-Fair, 4-Good, 5-Excellent.)
- QRL** Are you busy? I am busy, please do not interfere.
- QRM** Is my transmission being interfered with? Your transmission is being interfered with: (1-Nil, 2- Slightly, 3-Moderately, 4-Severly, 5-Extremely.)
- QRN** Are you troubled by static? I am troubled by static: (1-5 as under QRM.)
- QRO** Shall I increase power? Increase power.
- QRP** Shall I decrease power? Decrease power.
- QRQ** Shall I send faster? Send faster (____ WPM.)
- QRR** Are you ready for automatic operation? I am ready for automatic operation. Send at ____ WPM.
- QRS** Shall I send more slowly? Send more slowly (____ WPM.)
- QRT** Shall I stop sending? Stop sending.
- QRU** Have you anything for me? I have nothing for you.
- QRV** Are you ready? I am ready.
- QRW** Shall I inform ____ that you are calling? Please inform ____ that I am calling.
- QRX** When will you call me again? I will call you again at ____ hours.
- QRY** What is my turn? Your turn is numbered ____.
- QRZ** Who is calling me? You are being called by _____. Also see www.QRZ.com
- QSA** What is the strength of my signals? The strength of your signals is: (1-Scarcely perceptible, 2-Weak, 3-Fairly Good, 4-Good, 5-Very Good.)
- QSB** Are my signals fading? Your signals are fading.
- QSD** Is my keying defective? Your keying is defective.
- QSG** Shall I send ____ messages at a time? Send ____ messages at a time.
- QSJ** What is the charge to be collected per word to ____ including your international telegraph charge? The charge to be collected per word is ____ including my international telegraph charge.
- QSK** Can you hear me between your signals and if so can I break in on your transmission? I can hear you between my signals, break in on my transmission.
- QSL** Can you acknowledge receipt? I am acknowledging receipt.
- QSM** Shall I repeat the last message which I sent you? Repeat the last message.
- QSN** Did you hear me on ____ kHz? I did hear you on ____ kHz.
- QSO** Can you communicate with ____ direct or by relay? I can communicate with ____ direct (or by relay through ____.)
- QSP** Will you relay to ____? I will relay to ____.
- QSQ** Have you a doctor on board? (or is ____ on board?) I have a doctor on board (or ____ is on board.)
- QSU** Shall I send or reply on this frequency? Send a series of Vs on this frequency.
- QSV** Shall I send a series of Vs on this frequency? Send a series of Vs on this frequency.
- QSW** Will you send on this frequency? I am going to send on this frequency.
- QSY** Shall I change to another frequency? Change to another frequency.

- QSZ Shall I send each word or group more than once? Send each word or group twice (or ___ times.)
- QTA Shall I cancel message number ___? Cancel message number ___.
- QTB Do you agree with my counting of words? I do not agree with your counting of words. I will repeat the first letter or digit of each word or group.
- QTC How many messages have you to send? I have ___ messages for you.
- QTE What is my true bearing from you? Your true bearing from me is ___ degrees.
- QTG Will you send two dashes of 10 seconds each followed by your call sign? I am going to send two dashes of 10 seconds each followed by my call sign.
- QTH** What is your location? My location is ___.
- QTI What is your true track? My true track is ___ degrees.
- QTJ What is your speed? My speed is ___ km/h.
- QTL What is your true heading? My true heading is ___ degrees.
- QTN At what time did you depart from ___? I departed from ___ at ___ hours.
- QTO Have you left dock (or port)? I have left dock (or port).
- QTP Are you going to enter dock (or port)? I am going to enter dock (or port.)
- QTQ Can you communicate with my station by means of the International Code of Signals? I am going to communicate with your station by means of the International Code of Signals.
- QTR What is the correct time? The time is ___.
- QTS Will you send your call sign for ___ minutes so that your frequency can be measured? I will send my call sign for ___ minutes so that my frequency may be measured.
- QTU What are the hours during which your station is open? My station is open from ___ hours to ___ hours.
- QTV Shall I stand guard for you on the frequency of ___ kHz? Stand guard for me on the frequency of ___ kHz.
- QTX Will you keep your station open for further communication with me? I will keep my station open for further communication with you.
- QUA Have you news of ___? I have news of ___.
- QUB Can you give me information concerning visibility, height of clouds, direction and velocity of ground wind at ___? Here is the information you requested...
- QUC What is the number of the last message you received from me? The number of the last message I received from you is ___.
- QUD Have you received the urgency signal sent by ___? I have received the urgency signal sent by ___.
- QUF Have you received the distress signal sent by ___? I have received the distress signal sent by ___.
- QUG Will you be forced to land? I am forced to land immediately.
- QUH Will you give me the present barometric pressure? The present barometric pressure is ___ (units).
- QLF** Are you sending with your left foot? I am sending with my left foot.

Additional Morse Characters

Period .	RK	Underscore _	UA	Comma ,	NA	Single Quote '	Elong dashE
Slash /	NR	Colon :	(1) long dash S	Plus +	AR	Semicolon ;	CN
Equal =	NU	Dollar Sign \$	VU	Question ?	UD	Warning	RA
Error	HH	Repetition (ii ii)	II	Dash	BU	Exclamation !	KA
Quote "	RR	Open Paren (KE	Close Paren)	KK		