

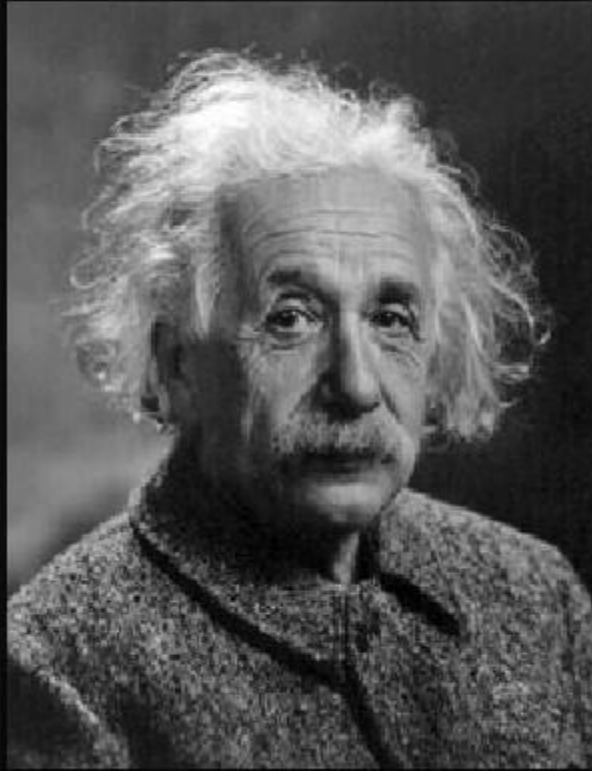
CW – Mode for the Ages

de K4NA

With some minor clerical assistance from N4DPH



Radio = Magic



The wireless telegraph is not difficult to understand. The ordinary telegraph is like a very long cat. You pull the tail in New York, and it meows in Los Angeles. The wireless is the same, only without the cat.

(Albert Einstein)

izquotes.com

CW is a mode of operation

Don't say, “I'm learning CW”.
You are using the mode 'CW'.

Examples –

“I’m using Phone modes”

(Types = SSB, AM, FM)

“I’m using Digital modes”

(Types = PSK31, JT65, Olivia)

Early History – Morse Code

Until 1830's, message transfer was via horse, runner, smoke signals, or ship.

News from London to NY took one month

News from NY to SF took two weeks minimum

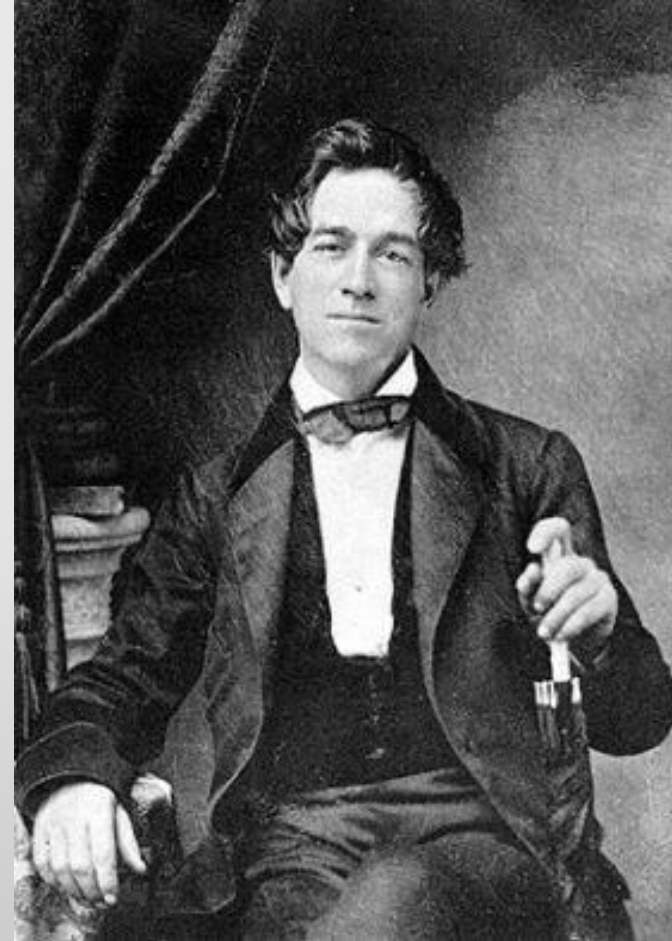
During the 1830's and 40's, many experimenters in EU and NA dabbled with electricity and electrical communications.

In 1837, two Americans, Samuel F.B. Morse and Alfred Vail, married the concept of electrical signals and messaging.

Communication Pioneers



Samuel F.B. Morse

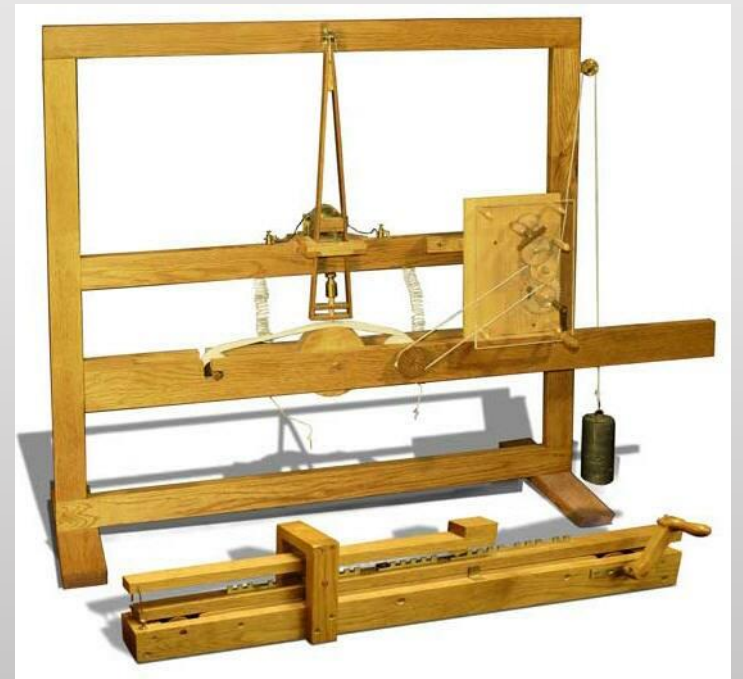


Alfred Vail

First Morse Code Message

In 1844, history was made when Morse and Vail sent a message using a telegraph line strung between Baltimore and Washington D.C.

The first Morse Code message said



One of Morse's first telegraphs

Early Message Content

The first Morse code messages had combinations of dots and dashes that made a number.

Each number represented a word.

Every number had to be looked up in a book to find the word it represented.

A telegraph key was used to tap out dots and dashes with spaces that made a number.

Simplified System

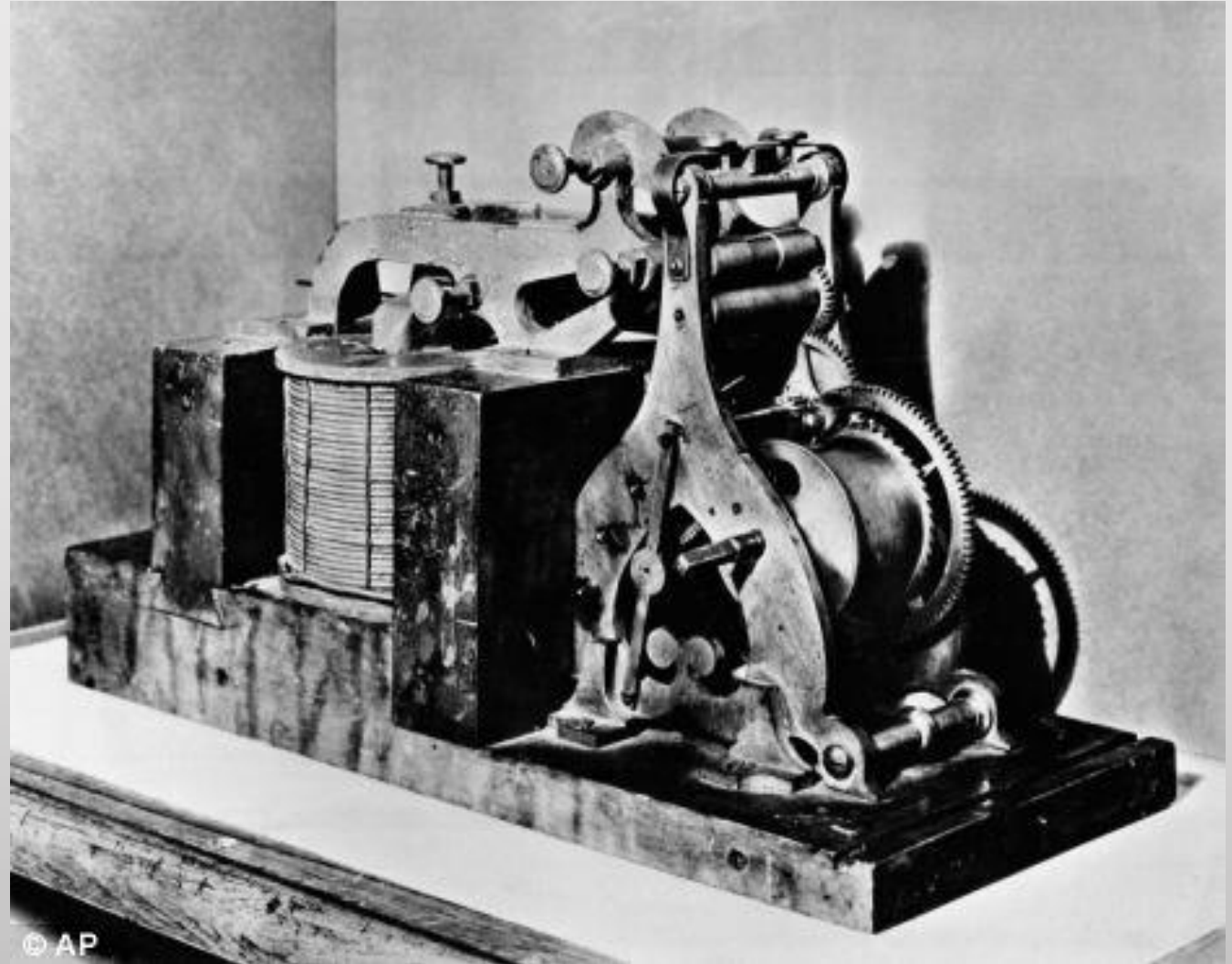
Vail simplified the system so that each letter of a word was represented by dots and dashes.

This code system, along with their telegraph invention, was patented in 1840.

This became known as 'American Morse' or 'Railroad Morse'.

Telegraph use exploded across America and Europe

Here is a common telegraph receiver often called a 'register' or 'coherer'



How was Morse Code sent and received?

A telegraph key and a sender was used to send an electrical impulse along a wire. When it reached a receiver on the other end, an armature moved creating 'clicking sounds' as it made imprints on a tape.

Operators soon learned to read the 'clicks' and the tape was not really needed. However, some people wouldn't accept messages handwritten because they didn't trust the operator's ability to decode the message.

Question for the OT ops in the room - What is a LID?

Click or Clack

The telegraph message was read like this: A dot make a quick 'click clack' sound. A dash made a 'click (pause) clack' sound.

Decades later, when radio was invented, the 'clicking sounds' were replaced by sounds of 'dots' and 'dashes'. The dots were (and are) called 'di' and the dashes are called 'dah'.

	American (Morse)	Continental (Gerke)	International (ITU)
A	· —	· — — —	· —
Ä	· — — —	· — — — — —	· — — —
B	· — · —	· — — — — —	· — — —
C	· — · —	· — — — — —	· — — —
CH	· — · —	· — — — — —	· — — —
D	· — · —	· — — — — —	· — — —
E	· —	· — — — — —	· —
F	· — · —	· — — — — —	· — — —
G	· — · —	· — — — — —	· — — —
H	· — · —	· — — — — —	· — — —
I	· —	· — — — — —	· —
J	· — · —	· — — — — —	· — — —
K	· — · —	· — — — — —	· — — —
L	· — · —	· — — — — —	· — — —
M	· —	· — — — — —	· —
N	· —	· — — — — —	· —
O	· —	· — — — — —	· —
Ö	· —	· — — — — —	· —
P	· — · —	· — — — — —	· — — —
Q	· — · —	· — — — — —	· — — —
R	· — · —	· — — — — —	· — — —
S	· —	· — — — — —	· —
T	· —	· — — — — —	· —
U	· —	· — — — — —	· —
Ü	· —	· — — — — —	· —
V	· — · —	· — — — — —	· — — —
W	· — · —	· — — — — —	· — — —
X	· — · —	· — — — — —	· — — —
Y	· — · —	· — — — — —	· — — —
Z	· — · —	· — — — — —	· — — —
1	· — — —	· — — — — —	· — — — — —
2	· — — —	· — — — — —	· — — — — —
3	· — — —	· — — — — —	· — — — — —
4	· — — —	· — — — — —	· — — — — —
5	· — — —	· — — — — —	· — — — — —
6	· — — —	· — — — — —	· — — — — —
7	· — — —	· — — — — —	· — — — — —
8	· — — —	· — — — — —	· — — — — —
9	· — — —	· — — — — —	· — — — — —
0	· — — —	· — — — — —	· — — — — —

Finalizing the Standard

Modifications began with Morse, especially in Europe. A code called 'Continental' or 'Gerke' Code was adopted by many.

In 1865, the International Telegraphy Congress adopted this code and it became known as 'International Morse Code'.

This is the same code we use today.

How many in this room had to pass a 'code test' to get their ticket?

Historical Operators



**Bankhead Amateur
Radio Club, Inc.**

Established in 1982 • In Memory of Norris Howard, Sr., SK.



N4IDX

The First “DX” Operator

On December 12, 1901, an Italian named Marconi made the first 'wireless' contact across the Atlantic Ocean from Newfoundland to Ireland.

He was awarded the Nobel Prize for Physics in 1909.



Bloomberg News

In 2016, the ARRL reenacted Marconi's first contact.

Propagation

To show how little was known about radio propagation in those days, their contact was made when the entire transmission path was in daylight on a frequency somewhere around 850 Khz!

A single letter 'S' (three dots) was sent repeatedly until it was said to have been heard on the other end. This was never verified by an independent listener.

... ..

Unregulated Mess

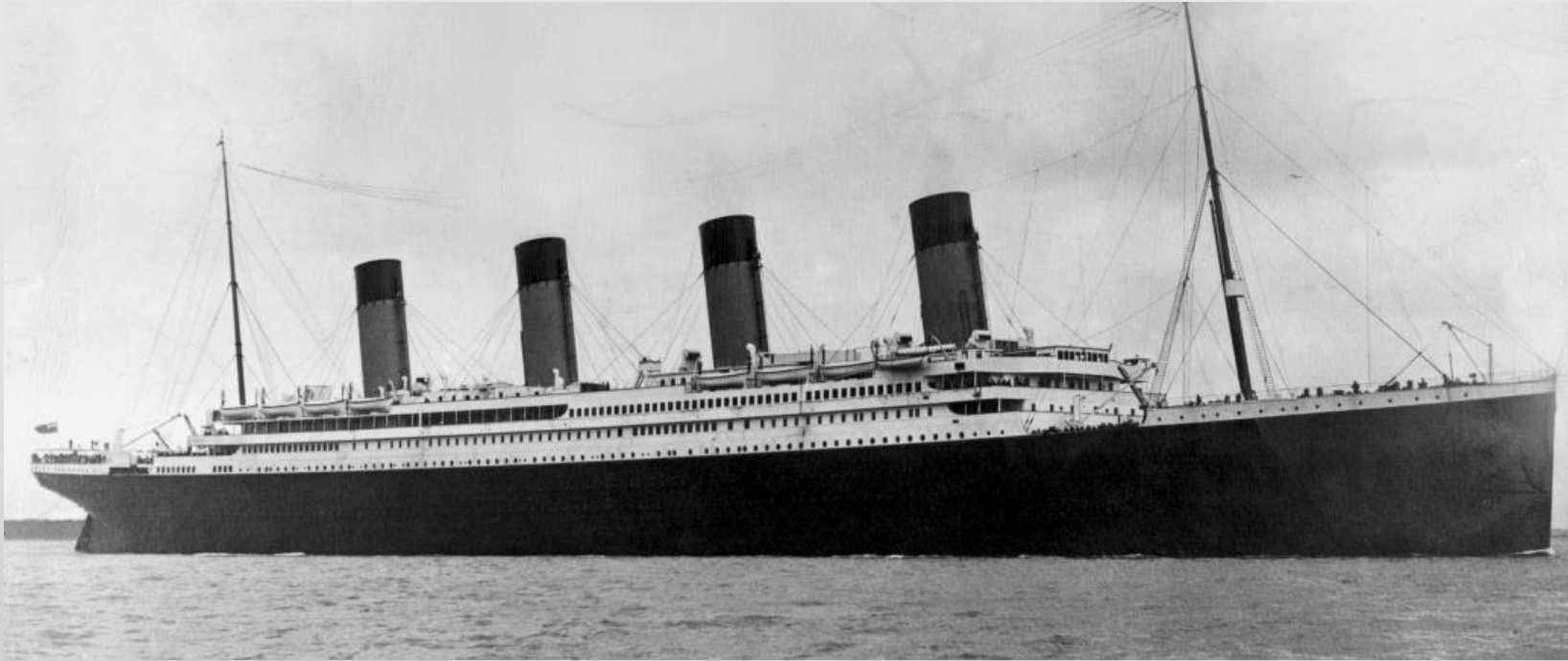
Experimenters were numerous with both commercial and individual stations filling the airwaves....

no regulations existed.

The term 'ham operator' began during this period..
How did we get this name?

Spark Gap communication ruled the day

<https://www.youtube.com/watch?v=YSf93g0heUA>



An event on April 15, 1912 changed all this. What was it?

World-Changing Event

Titanic's radio was a 5 KW spark gap system operating on the freq of 500 Khz. Her antenna ran the entire length of the ship. Her radio operators had complained to the radio operator of the neighboring ship, California (which had stopped to avoid damage from floating ice) to stop sending or jamming their transmissions while they were trying to send passenger messages. The California radio op turned his wireless radio off. Hours later the California's bridge saw distress flares in the direction of the Titanic.

This one incident made countries realize that something had to be done to control this new wireless mode of communication.

International Cooperation

International cooperation was imperative. The International Radio Union was established.

The IRU recommended regulations for all member nations.

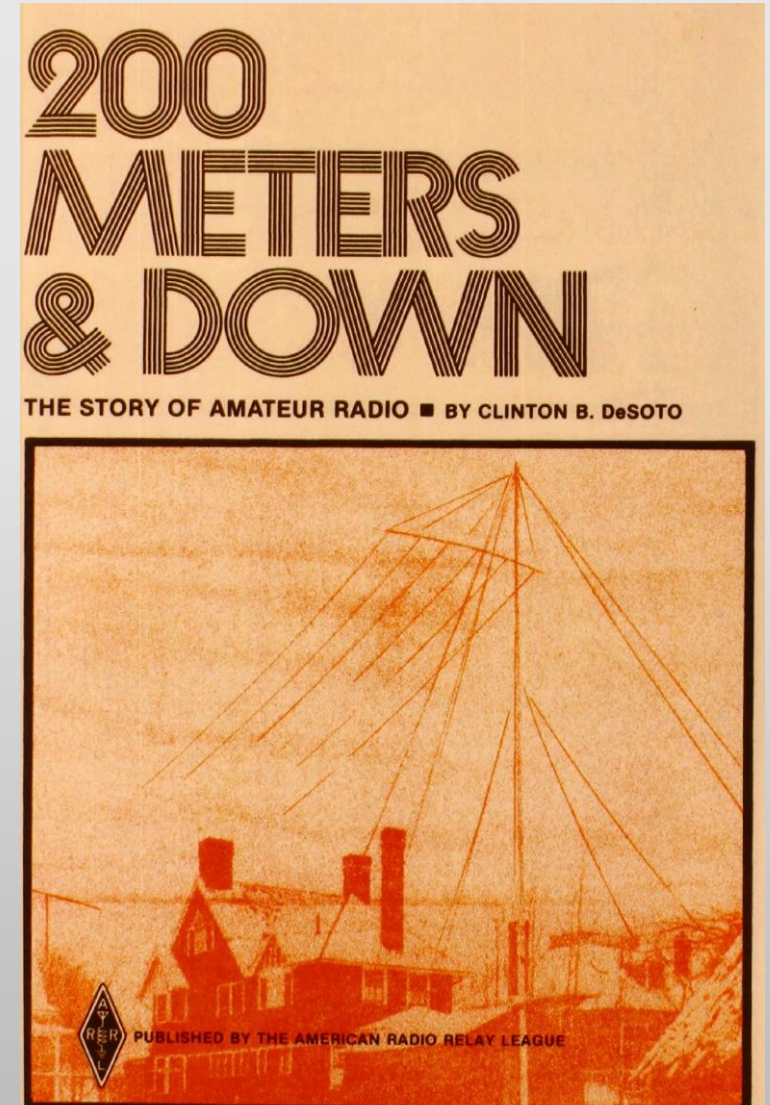
The U.S. brought all radio communications under the Department of Commerce, then the Federal Radio Commission and finally in 1934, the Federal Communications Commission.



200 Meters and Down

200 Meters & Down - The Story of Amateur Radio! - Clinton DeSoto

This book chronicles the exciting evolution of Amateur Radio from the pioneers who perfected the wireless art, through the technical advances of the mid-1930s



Regulations Begin

In 1927 the International Radio Conference was convened in Washington DC.

Regulations were put in place for amateur radio and adopted by almost all countries attending.

These regulations recommended all licensed amateur operators be proficient in receiving/sending International Morse Code.

Individual countries established code speeds for license classes

Amateur Bands Established

The 1927 Washington Convention also established amateur bands as follows:

AMATEUR FREQUENCY BANDS
assigned by The Washington Convention of 1927

Kilocycles	Width in Kilocycles	Assignment	Approx. Meters on basis factor 3	Meters on basis factor 2.998	Harmonic family for centers of related portions		Amateur Purpose
					Kilocycles	Meters	
1715-2000	285	<i>Amateur, Mobile, point-to-point</i>	150 - 175	149.9 - 174.8	1775	168.92	<i>Domestic</i>
3500-4000	500	" "	75 - 85.7	74.96 - 85.66	3550	84.46	"
7000-7300	300	<i>Amateur Exclusively</i>	41.1 - 42.9	41.07 - 42.83	7100	42.23	<i>International Night</i>
14,000-14,400	400	" "	20.83 - 21.43	20.82 - 21.42	14,200	21.11	<i>International Day</i>
28,000-30,000	2000	<i>Amateur & Experimental</i>	10.00 - 10.71	9.99 - 10.71	28,400	10.56	<i>Experimental</i>
56,000-60,000	4000	" "	5.00 - 5.36	4.997 - 5.354	56,800	5.28	"

Do you recognize any of these frequencies?

Regulation Changes

The U.S. code regulations remained unchanged until 1991 when Technicians no longer had to pass the 5 WPM code test.

In 2000, both General and Extra Class exam requirements were dropped from 20 and 13 WPM to 5 WPM for both.

In 2006, all code requirements were eliminated.

Interesting Note: All amateur operating was suspended during WWII. After the War, the U.S. Navy lobbied Congress to eliminate amateur radio. Fortunately for us, this failed



K4NA's Hints on Learning International Morse Code

A T T I T U D E

Daily Practice

Learn by SOUND, not by sight

Use Farnsworth Method

<http://www.arrl.org/files/file/Technology/x9004008.pdf>



Keep it SIMPLE

.... lots of worthless videos on how to learn.

Two good ones:

<http://www.hamwhisperer.com/p/morse-code-course.html>

<http://www.arrl.org/learning-morse-code>

Use a code practice oscillator

1. try using a transceiver with an internal keyer
2. buy/build a code practice oscillator and key

As soon as you learn the code and can copy 5 wpm, STOP writing it down.

Keys

Three types of keys are available:

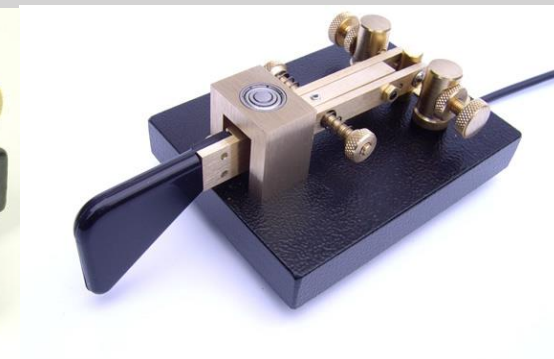
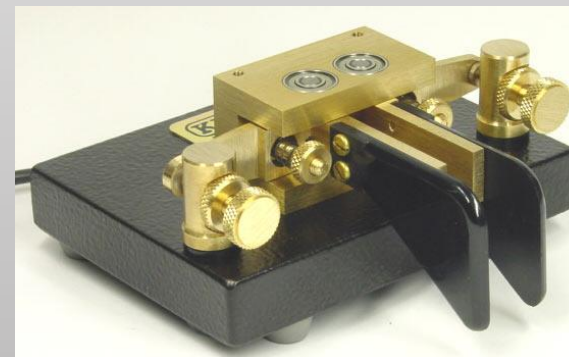
a. manual or straight keys



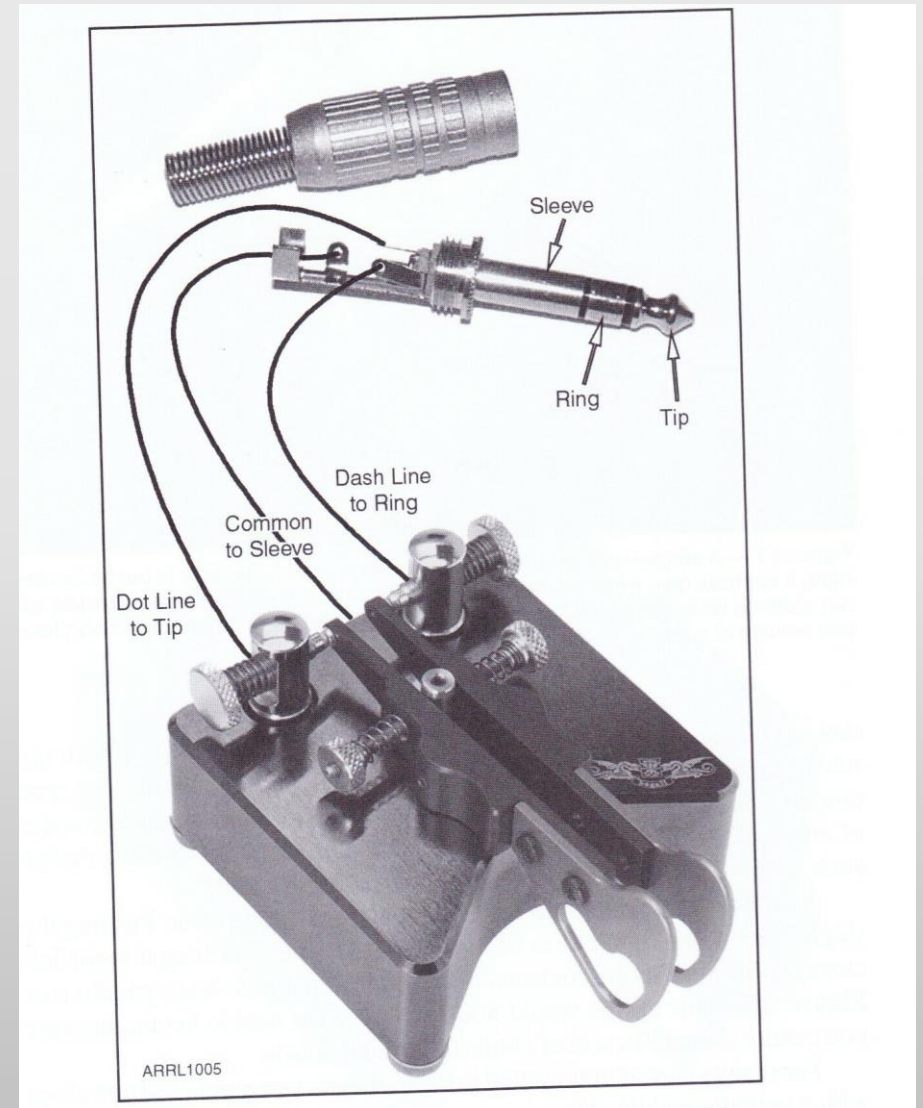
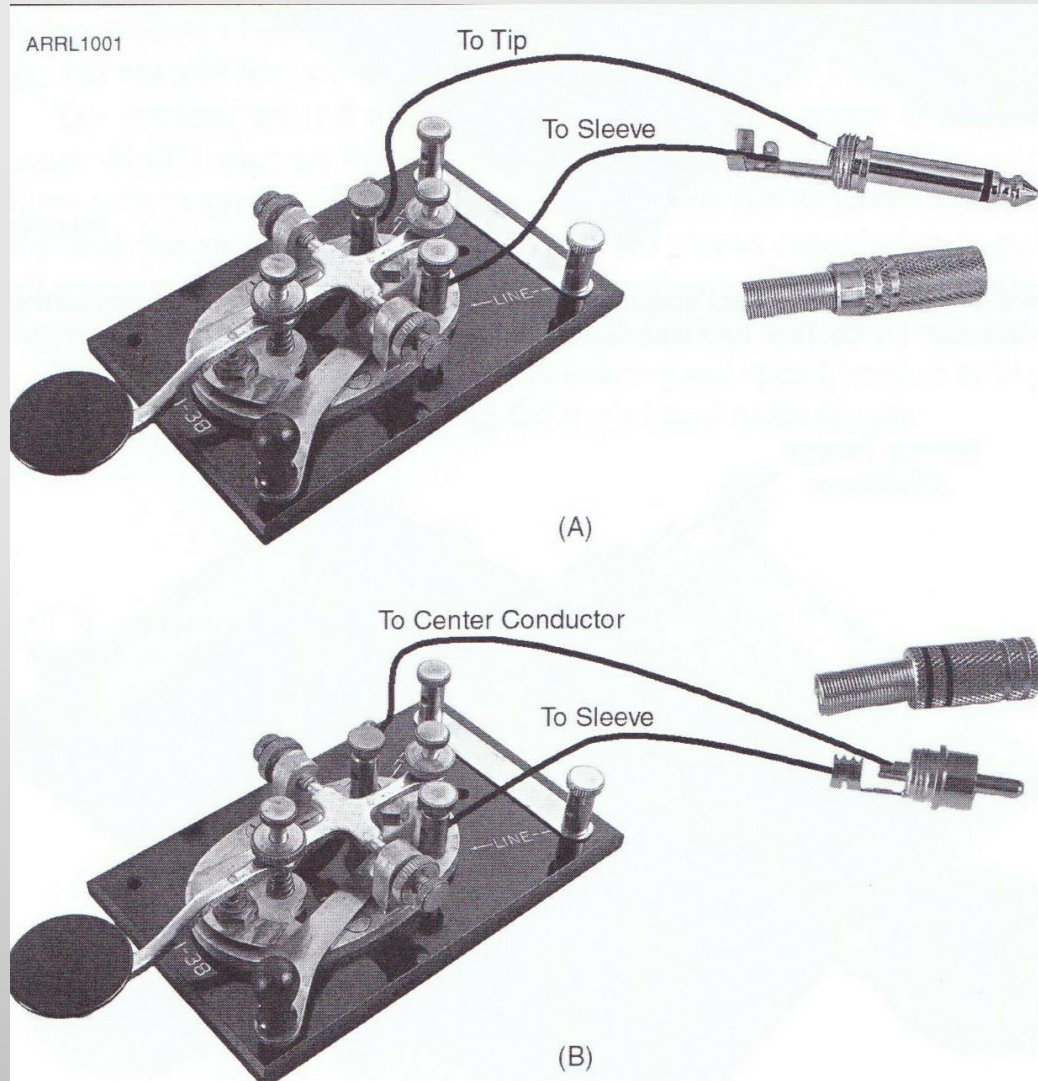
b. semi automatic = BUGs



c. paddles – single lever or dual lever
(often call an 'iambic paddle')



How to Hook Up Keys



Transceiver Settings for CW

Mode = CW

- 1. Semi or Full Breakin**
- 2. Relay Delay**
- 3. Using Memories / Internal Keyer**
- 4. Bandwidth**
- 5. CW Sidetone or Pitch**

- 6. Preamps / NR / Attenuator**
- 7. RIT / XIT or Split VFO's**
- 8. Keyer Mode A or B**
- 9. AGC**
- 10. CW Rise Time**
- 11. IF Shift**

Commonly Used CW Abbreviations

ABT – about

AGN – again

BK – break

BTR - better

CONDX - conditions

CQ – calling any station

ES - and

FB - fine business

FER - for

GG - going

GUD - good

HR – here

HV - have

LID - poor operator

NR - number

OM - old man

PSE - please

PWR - power

RX - receive

RPT - report

SIG - signal

SRI - sorry

TFC - traffic

TT - that

TNX - thanks

URS - yours

WID - with

WKD - worked

WUD - would

XCVR - transceiver

XYL - wife

YL - young lady (unmarried)

Morse Code Prosigns

AAA is the period. Use it at the end of a sentence when the following sentence will pertain to the same subject.

AR is used at the end of a transmission when calling a specific station before the two-way contact has been established. Use it in place of K or KN when answering a CQ, or calling someone for a sked.

AS means "Please stand by for a moment", usually used to let the other guy know that you have to talk to someone else in the room, answer the telephone, or fix some technical glitch and that the band didn't just fall out from under your QSO. You'll be back in just a minute.

BT is kind of like the period. Use it at the end of a sentence when the next sentence will pertain to a different topic.

CL follows SK when you are also vacating the frequency just used. Note that the letters are not run together on this one.

DE From

DN is the slash (/). It is used to indicate mobile, QRP, or operation from a different call area than that indicated by your callsign.

IMI is the question mark.

K is used at the end of a transmission means you are listening for an answer from any station. Use it when calling CQ. Once you have established contact with a station and you do not want to be interrupted by a third party, use KN instead.

KN is used at the end of a transmission when only the other party already in the QSO is invited to respond.

MIM is the comma.

R means "Roger" or "Received". Use it at the beginning of a transmission ONLY if you copied 100% of what was just sent to you. Don't use it if anything was missed. Use BK instead, and something like "FB on UR QTH but missed UR name". You can also start a transmission with BK even if something was not missed. High speed operators often use this method instead of KN and R.

SK is used at the end of your final transmission of a QSO. If the other station has not yet sent his "final" you may follow SK with KN.

Signal Reports

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.

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.

Why don't we use the Tone report for Phone signal reports?

The RST system as listed on the ARRL web site, [Quick Reference Operating Aids](#):

Final Thoughts

World Records – Ted McElroy 1939 75 wpm random copy

Harry Turner 35 wpm with straight key

https://www.youtube.com/watch?v=MCTj_N6dAts

https://www.youtube.com/watch?v=q_ZEwZzuqW0

<https://www.youtube.com/watch?v=pRuRE-Bwk1U>

<https://www.youtube.com/watch?v=YPsgEdmlUf0>

Helpful Resources

<http://www.arrl.org/code-practice-files>

<http://www.n5kd.org/radio/morse/>

<http://www.qrpkits.com/cpo.html>

<http://aa9pw.com/morsecode/>

<http://www.morsex.com/ameco/oscs.htm>

<http://ac6v.com/morseaids.htm>

<http://morsex.com/misc/ttone.htm>

<http://www.skccgroup.com/>

<http://w1tp.com/im1000a.htm>

<http://w0is.com/miscpages/oldradiobooks.html>

<https://www.youtube.com/watch?v=uIXz-AZdDPM>

<https://www.amazon.com/200-Meters-Down-Story-Amateur/dp/0872590011>

<http://store.cq-amateur-radio.com/shop/dits-and-dahs-shipping-to-america/>

Questions?