Morse Code 201

MORSE and MORE!

Estes Valley Amateur Radio Club

David O'Farrell, WBØIXV

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- First It's MORSE CODE
  - NOT ***MORRIS*** CODE

  - Morris is a cat

- Samuel Fineley Breese **Morse** is given credit as the inventor of the telegraph and the code

- Alfred Vail was his Assistant:

What we will cover

- Some History
  - My Amateur and Commercial History
  - Brief History of Morse, Wire and Wireless
- How to improve your speed
- What's a word?
- How much bandwidth is CW?
- Speed records
- Other Morse code languages

- My Amateur Radio History
  - First Licensed as a Novice in 1964, when I was 15 years old – KN7YXO
    - That required a 5 wpm code test
  - I upgraded to General Class in 1965 - WA7COH
    - That required a 13 wpm code test from the FCC
  - When I moved to Colorado in 1971, I was issued WBØIXV, and I am currently an Extra class operator

- My Commercial History
  - From 1965 to 1971 I was a telegrapher for the Northern Pacific Railway (later the Burlington Northern RR) on the Tacoma Division in Washington State.

- That required knowledge of American Morse Code

- Signaling using symbolism
  - Indian Smoke Signals
  - “One if by land, Two if by sea”
  - French semaphore signaling
    - 1790’s and after
    - Relayed ever 6 miles
  - All used pre-arranged signals
    - Not a general method of signaling

- America's first telegram was sent by Morse on 6 January 1838

- On May 24, 1844 he sent “What Hath God Wrought” from Baltimore to Washington, D.C. a distance of 40 miles.

- Originally printed on paper tape

TELEGRAPHIC WRITING BY MORSE'S FIRST INSTRUMENT. (FROM ORIGINAL IN ARCHIVES OF NEW JERSEY HISTORICAL SOCIETY.)

- American Morse – Morse's Original code
  - 20% faster than International Morse due to the internal spacing within elements
  - 11 Letters different, 9 numbers different
  - Some American Morse still used today:
    - 30 = SK …-. - (end of work)
    - FN = AR .-. -. (end of message)
    - & = ES . …

THE MORSE TELEGRAPH ALPHABET.

Numerals.

Punctuation.

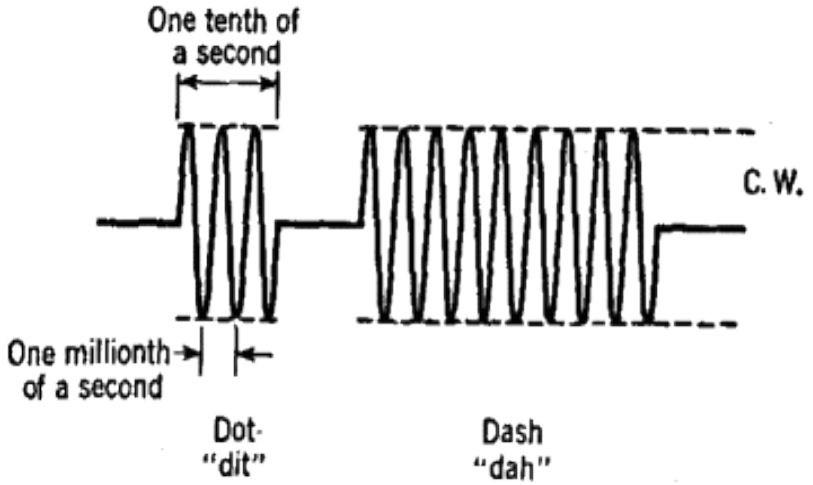
J. H. BUNNELL & CO.,
Telegraph Instruments,
70 Cortlandt St., N. Y.

- **American Morse** – use from the mid 1840's to 1985.

- **International Morse** – currently used only by Amateur Radio operators.

- Am I using Morse Code or CW?

CW – Continuous Wave



- # Amateur Radio Morse History
  - **Prior to 1912** – No license needed!
  - **Radio Act of 1912** –**5 wpm** required; increased to **10 wpm** by 1919
  - **Radio Act of 1927** – No change
  - **Communications Act of 1934**
    - Code speed of **13 wpm** required after 1936

- Amateur tests from **1951:**
  - Novice & Technician test was **5 wpm** –General test was **13 wpm** – sending and receiving
  - Extra test was **20 wpm** – sending and receiving
- Amateur code tests reduced to **5 wpm** in 2000
- FCC eliminates code tests for amateurs in 2007

- FCC **Commercial Radiotelegraph** license - 2013
  - Third, Second, First class radiotelegraph licenses eliminated
  - New Radiotelegraph Operators License (T)
  - Maritime Radio Historical Society gives the exam quarterly.

- Morse code not dead yet!
  - December 2003, ITU adds new Morse character for @ - COMMAT - ‘AC’

- Morse is the First DIGITAL mode

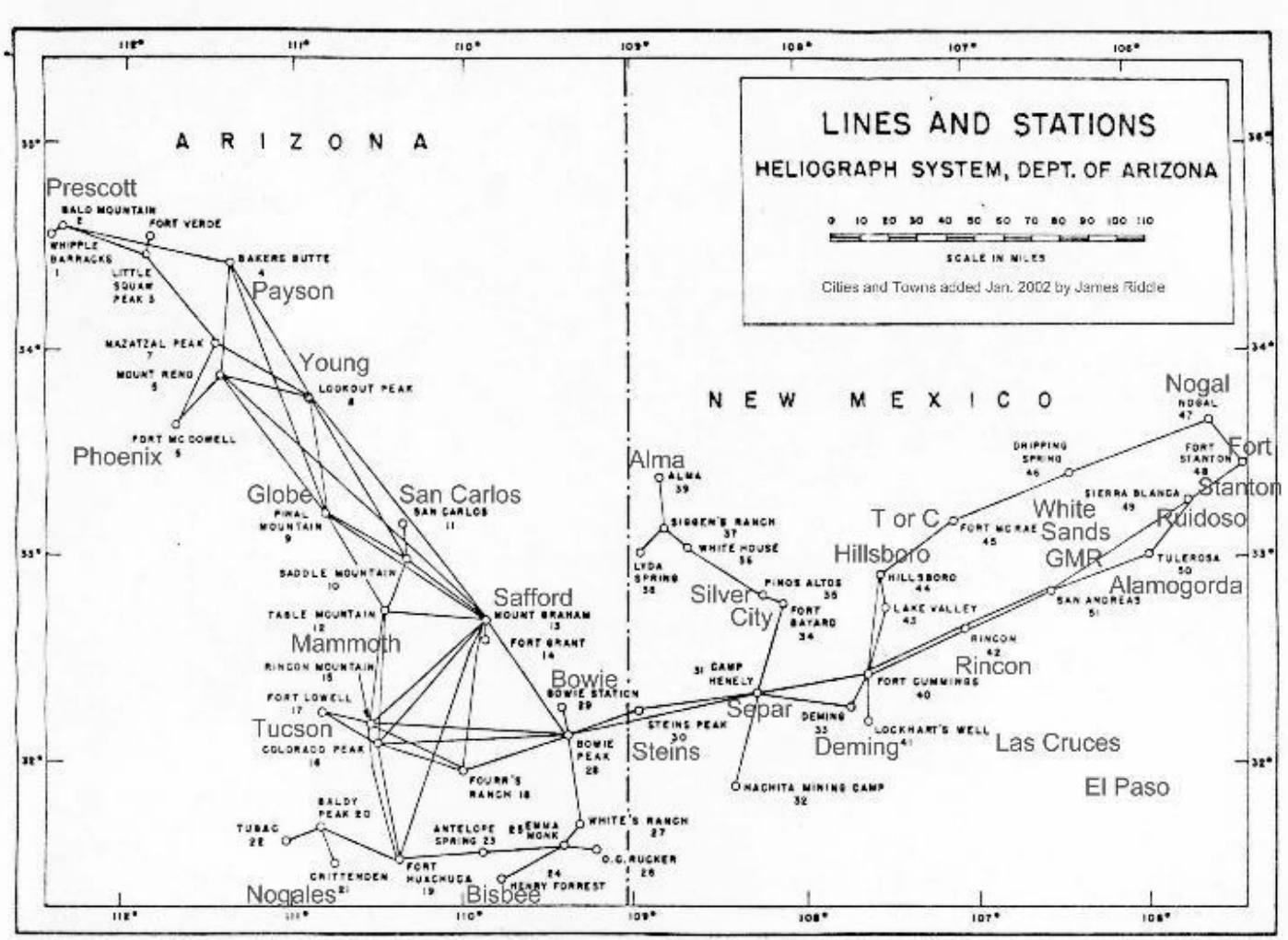
  - CW is sent by either turning a carrier on or off, which is 2 states, so it qualifies as digital by that definition.

  - It also qualifies under the binary definition, using only 1's and 0's Morse Code can be sent.
    - A → 101110

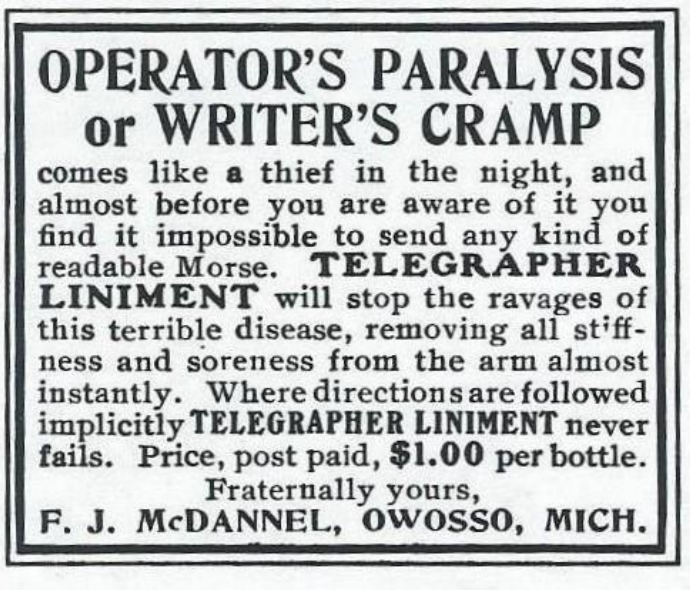
  - It's a digital mode with elements of unequal length.

- It can be done with Light or Sound.
  - It can be done with wigwag flags, blinker lights, horns, whistles, signal mirrors, or heliograph.

- The Morse Code Heliograph distance record is 183 miles (295 km) from Mount Ellen, UT to Mount Uncompahgre, CO by the U.S. Signal Corps, September 17, 1894.



- Sending Morse Code with a Straight Key
  - Telegrapher's Glass Arm
    - Known today as carpel tunnel syndrome



- Sending Morse Code
  - Bug (Semi-automatic key) Dates from 1906.

Speed with this key is around 40 wpm

- Myth of Iambic Keying
  - Device Keystrokes – to send A-Z and 0 - 9
    - Straight Key 132
    - Semi-automatic Bug 87
    - Non-iambic Electronic Keyer 73
    - Iambic Electronic Keyer 65

- Four stages of Learning:
  - Unawareness of lack of knowledge
  - Conscious lack of knowledge
  - Conscious knowledge
  - Unawareness of knowledge

- Four Phases to become an Morse expert:
  - Hustling for the letters
  - Learning to hear words
  - Talking in several words, a phrase or short sentence
  - Becoming only conscious of the content

- Conscious effort is fatal to speed

- **How to improve your speed**
  - Listen for words instead of letters
  - Learn the most used words
  - Copy behind
  - Stop writing it down, copy in your head.

THE

EASY WAY

TO LEARN CODE TO IMPROVE SPEED and SKILL

FOR BEGINNERS AND OPERATORS

Beginners — do you want to LEARN code with the idea of getting maximum speed and proficiency in the shortest amount of time?

Experienced Operators — do you want to IMPROVE your code technique, increase your speed and skill and eliminate nervous tension and difficulty in your code sending and receiving?

Then send for your copy of the CANDLER SYSTEM BOOK OF FACTS today. It tells you in clear, easy-to-read, scientific terms how to accomplish this the *easier* way — the improved, streamlined CANDLER SYSTEM way. It is the outstanding method which has developed thousands of first-class Amateur and Commercial operators . . . many of them Champions in their field.

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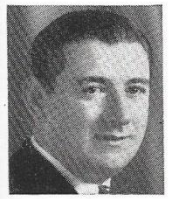
So — whether you want to work toward the profitable goal of becoming an expert Commercial Operator . . . or want the thrill and excitement of being an expert Amateur Operator — the CANDLER SYSTEM has a course designed especially for *you*. And it is priced so low that anyone interested in developing or improving his code proficiency can afford it.

TED MCELROY is the Official Champion Radio Operator, Speed 75.2 w.p.m., won at Asheville Code Tournament, July 2, 1939. Here is what World Champion McElroy has to say: "My skill and speed are the result of the exclusive, scientific training Walter Candler gave me. Practice is necessary, but without proper training to develop Concentration, Co-ordination and a keen Perceptive Sense, practice is of little value. One likely will practice the wrong way."



THE Candler WAY IS THE Champion WAY

NO EXPENSIVE EQUIPMENT NEEDED

Special training is the prime requisite in learning code or in developing skill and speed. CANDLER, from wide experience in training high-speed operators, offers a System designed to make you an expert in a simple, thorough and interesting way — to help you get ahead faster and go farther. Much valuable time is saved when you know the CANDLER SYSTEM, and apply the laws and fundamentals governing speed and accuracy. The CANDLER SYSTEM offers you SPEED, SKILL and TELEGRAPHING PROFICIENCY.

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The SCIENTIFIC CODE COURSE, especially designed for the beginner. Teaches the basic principles of code operation scientifically.

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THE CANDLER SYSTEM COURSE

SCIENTIFIC CODE INSTRUCTION

For Beginners

By
Walter H. Candler, Author

High Speed Telegraphing and Telegraph-Touch-Typewriting

L E S S O N O N E

Introduction

You and I now come together in a very personal way; you to learn and I to teach Continental Code. Our common goal is SUCCESS. Like every worthwhile accomplishment, success in learning Code depends upon your Desire to become an Efficient Radio Operator, backed by Determination, Persistence and Regularity.

While learning Code is unquestionably the most interesting of all studies, it is not a weakling's job. If your Desire is strong enough to cause you to Determine to follow my directions - to study diligently and practice regularly, half your battle is already won. Persistent and intelligent application will, in due course of time, lead you directly to your GOAL!

Anything you can learn in a few hours does not offer much promise as a future vocation. In one of Chicago's sky-scrapers is an old man who has been operating an elevator for twenty years. One day I asked the old fellow how long it took him to learn his job. Here is his reply in his own words:

"Took me about twenty minutes, I guess."

"What salary did you begin at?" I asked.

"Twelve dollars a week, but I get fourteen a week now. They've been mighty good to me."

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- Most used words:
  - the
  - be
  - to
  - of
  - and
  - they
  - in
  - that
  - have
  - I
  - it
  - for
  - not
  - on
  - with
  - he
  - as
  - you
  - do
  - at
  - this
  - but
  - his
  - by
  - from

- Copying one, two, or more characters behind.
  - Carry the letters in your mind
  - Goal to disengage your conscious attention
  - Work to make copying code done more by your subconscious mind.

- Copying behind exercise
  - Spell these words verbally = As you write the words

am	we
an	us
as	up
to	at
so	be
or	do
on	go
no	he
my	if
of	in
me	is

What is a word?

How many letters make a word?

Four or Five?

PARIS vs CODEX standard

PARIS – Natural language word rate

CODEX – Word rate for random letters

PARIS - The word PARIS is exactly 50 elements or dot units

P = di da da di = 1 1 3 1 3 1 1 (3) = 14 elements

A = di da = 1 1 3 (3) = 8 elements

R = di da di = 1 1 3 1 1 (3) = 10 elements

I = di di = 1 1 1 (3) = 6 elements

S = di di di = 1 1 1 1 1 [7] = 12 elements

Total = 50 elements

- CODEX (CODEZ) word standard
  - Using the word CODEX with 60 dot units

- PARIS vs. CODEX (CODEZ) word standard
  - For commercial radiotelegraph licenses

- CW Bandwidth
  - CW Bandwidth = wpm X 4 (e.g., 40 WPM = 160 Hz)

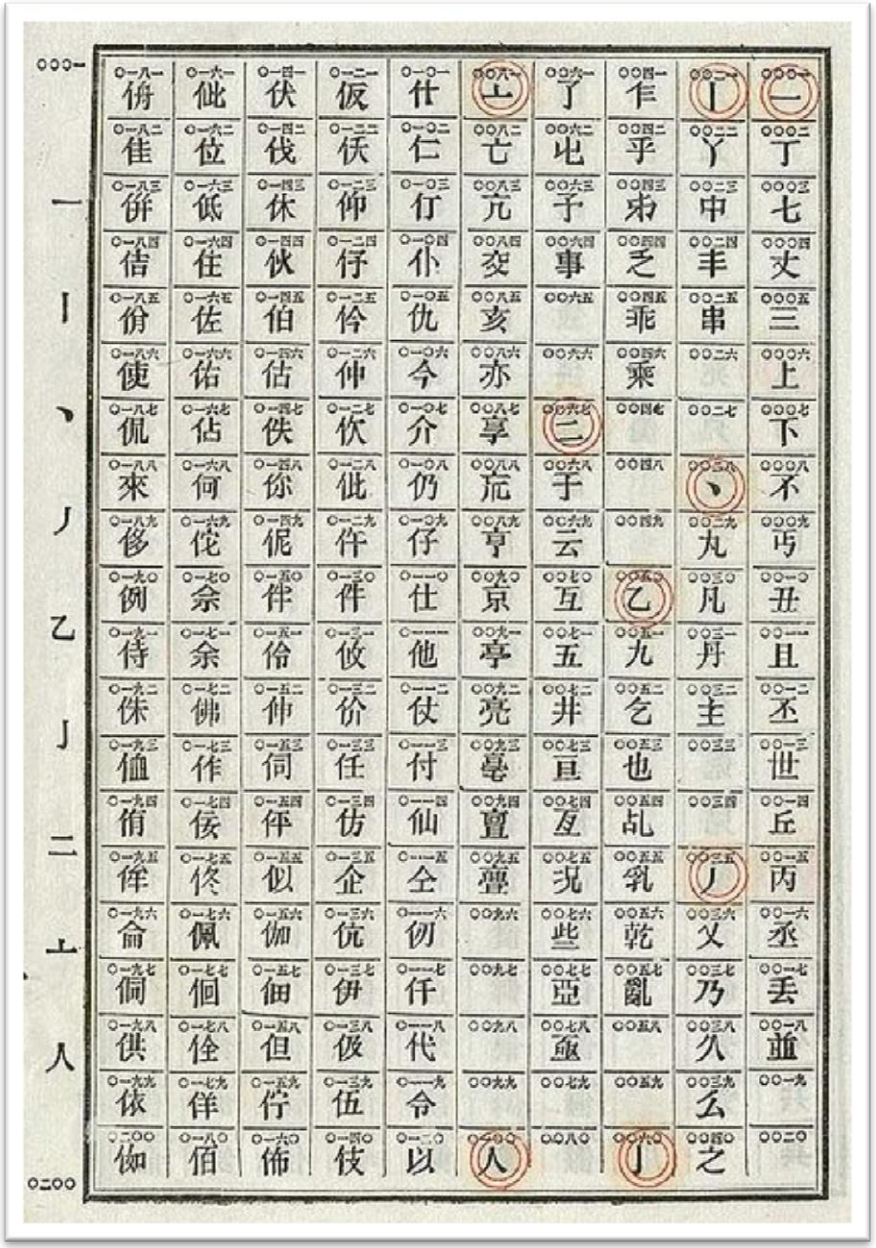
Or more precisely:

CW Bandwidth = baud rate x wpm x fading factor

- Extra Info
  - Other versions of the code
  - Traffic handling
  - Code Speed Records

- Extra Info
  - Other versions of the code
    - Arabic
    - Hebrew
    - Korean
    - Thai
    - Greek
    - Japanese
    - Russian
    - Turkish

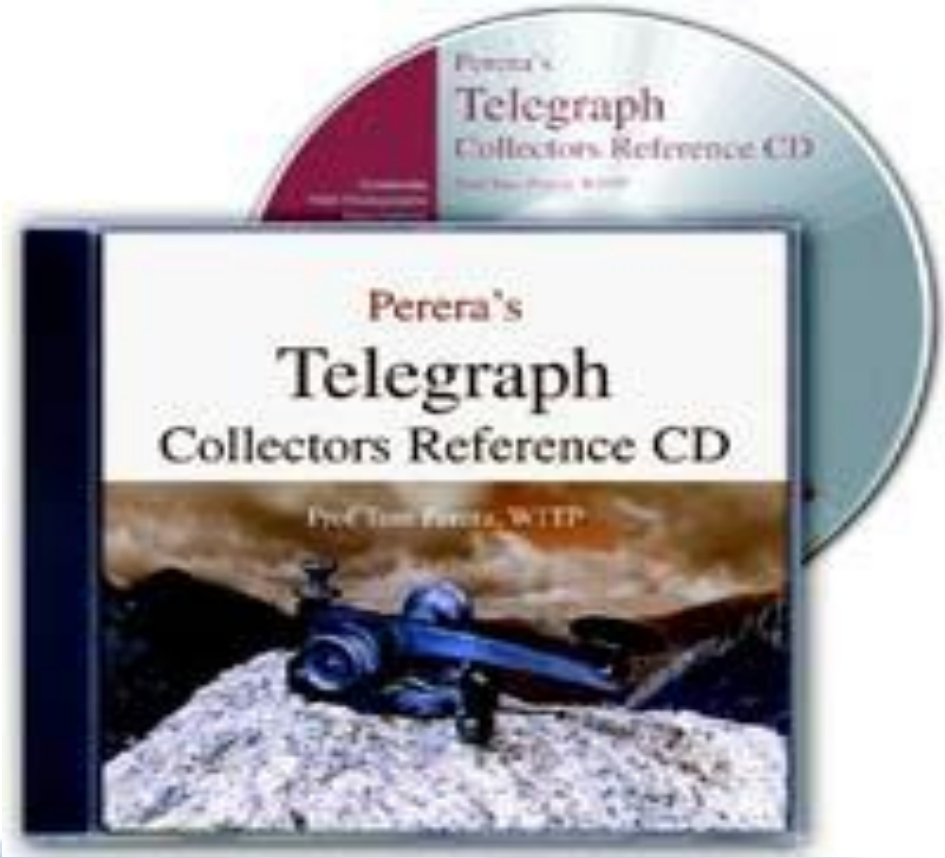
- Chinese Morse Code



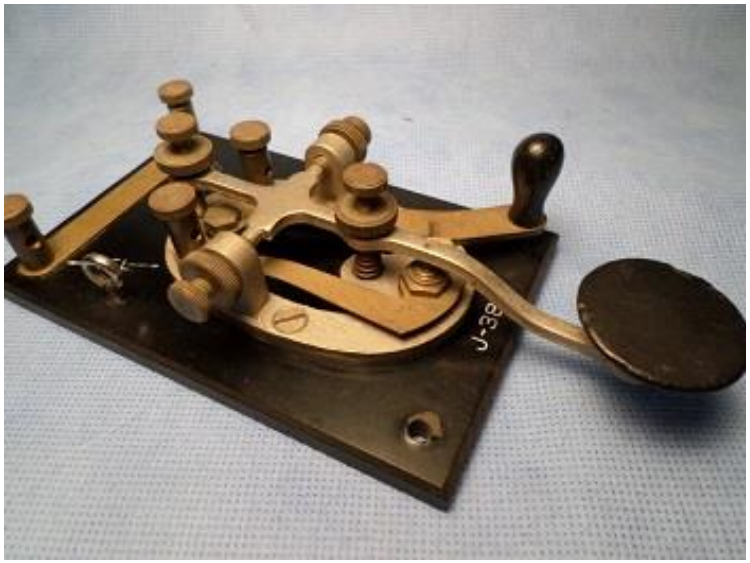
- Extra Info
  - Traffic handling - NTS the National Traffic System
    - Traffic Nets
    - Traffic Procedures and Message Format
      - Header, Preamble, Body, Signature
  - Q signals
    - QRV – I am ready to receive messages
    - QN… - Additional Q signals

- Extra Info
  - Code Speed Records
    - Copying (typewriter) Morse Code
      - Ted McElroy 75.2 wpm perfect copy – July 2,1939
    - Sending with Straight Key
      - Harry A. Turner, U.S. Army Signal Corps – 35 wpm – Nov. 9, 1942
    - RadioSport – High Speed Telegraphy (HST) – ‘marks’
      - 300 letters per minute (60 wpm)
      - 320 figures per minute (64 wpm)
      - 230 mixed per minute (46 wpm)

- Extra Info
  - Key Collecting – Some hobbyists have huge key collections.
    - Can collect straight keys
    - Or, Vibroplex bugs
    - Or, whatever



- J-38 Keys even have a following:
  - American Radio Hardware – (ARH)
  - American Radio & Telegraph Corp. (ARTEC)
  - McElroy Mfg Corp
  - Lionel Corp
  - Radio Essentials (same as ARH)
  - Cook Electric Co.
  - Signal Electric Mfg. (SEMCO)
  - Telegraph Apparatus Corp. (TAC)



- Contact info;
  - WBØIXV@arrl.net
  - 970.577.7372
- Resources:
  - See handout
  - Morse Express
    10691 E Bethany Dr, Suite 800
    Aurora, CO 80014 USA