

Quick Code Practice Oscillator



By Evert Fruitman

Morse Code proficiency comes quicker when you pound and hear the key!

□THE *HMS TITANIC* WAS ONE OF THE FIRST OCEAN-GOING vessels to use the then newly standardized wireless distress call, *SOS. Of course the shipboard radio operator sent it by Morse code, because that was many years before two-way voice communication became a practical reality. To this day, ships at sea and the Coast Guard still monitor certain channels on a regular basis for distress traffic. International law still requires a working knowledge of International Morse Code for those radio operators who sail (or motor) across the ocean.

Almost-painless ways to learn the International Morse Code abound. You can make it even more enjoyable by building some of the equipment yourself. That way you can learn some theory as you learn the code. I went down that road myself with a vacuum-tube code practice oscillator (CPO). In addition to the code, I started learning vacuum-tube theory, transformer theory, and troubleshooting techniques!

Thanks to modern technology, we have a simplified code-practice oscillator that is a fun project and won't overdose us with theory.

The common *clock* oscillator found in computer circuits forms the basis for the Quick Code Practice Oscillator. That basic circuit (Fig. 1) can operate from the low-megahertz frequencies to the subaudible region. (Down there it runs so slowly that you could use a light bulb to tell when the gates turn on and off.) We will pick our circuit values so that it operates in the audible region.

A transistorized oscillator by comparison, would need more parts before it could drive low-impedance earphones or speakers. The inexpensive 7404 hex-inverter integrated circuit (Fig. 2) chosen for this project has enough amplification to handle a wide range of transducers. Some of that ampli-

fication connected in a closed (positive) feedback loop produces an oscillation (a tone) in the audible range. Connect that to an earphone and chop the tone up with a telegraph key (via jack J1) for instant code practice. The resistors in the circuit are 2200-2700-ohm values.

Closing the key completes the battery circuit and applies four to five volts to the 7404 chip. See Fig. 1. The battery, B1, is a 4.5-5.0-volt DC unit. Bias for the first two inverter amps (U1-a and U1-b) comes from the two resistors, R1 and R2,

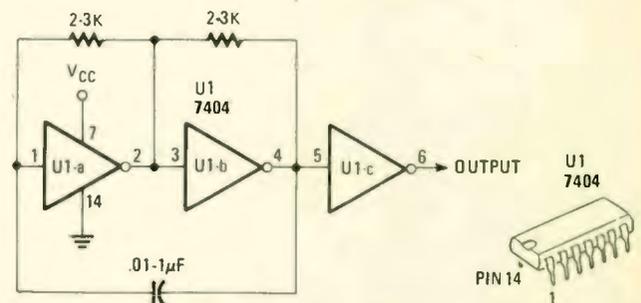


FIG. 1—BASIC SCHEMATIC DIAGRAM of an audio oscillator with buffer that can be used as the tone element of a code practice oscillator. Key may be inserted in V_{cc} line.

connected between their inputs and outputs. The capacitor and rheostat control (R3/C1) close the feedback loop from the input to the properly-phased output. The signal leaving U1-b drives the remaining four inverter amplifiers, U1-c through U1-f; they, in turn, drive the phones or speakers.

The volume control potentiometers, R4-R7, (Fig. 2) may have any value from 1500 ohms to 10,000 ohms. The smaller values work best when speakers, or low impedance phones, are used.

Although the IC manufacturer recommends 5.00-volts \pm 0.5-volt power sources, and loads no smaller than about 250 ohms, I have had no trouble using three penlight cells for power, and 8-ohm speakers for the loads.

*Actually, the *Titanic* sent both SOS and CQD (Come Quick—Disaster) Morse code calls. The SOS call was approved for international use at a Berlin conference in 1908, and it took a few years for all nations to accept the new standard distress call—SOS.

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capacitor leads are long enough to make the on-board connections.

Checkout

Do make sure that pin 7 of U1 (Fig. 2) goes to the plus (+) battery terminal through the key jack, J1; and, that pin 14 is connected to ground. Plug U1 into its socket, connect battery B1, and plug a telegraph key into J1 and a pair of headphones into J2. Press the key, or lean a weight on it (some keys have shorting switches), and adjust the TONE control R3 and VOLUME control R4 for a comfortable listening frequency and level. Long after you have mastered the International Morse Code (See Table 1) and achieved that valued Amateur Radio operator license, the Quick Code Practice Oscillator will make a good adjustable signal source for checking out other home-brew projects that you will find published here in **Hands-On Electronics**. ■