By Jeff M. Gold, AC4HF

Build Your Own Code Keys!

Can't afford straight keys or paddles? Build them yourself!

When it comes to Amateur Radio, I live by the expression, "If you build it, it will be more fun." During my six-year career as a ham, I've noticed that the equipment I use most often is the equipment I've built myself. I have both commercial transceivers and small home-brew QRP (low power) transceivers on my operating bench. The commercial gear remains pretty much in new condition. The little QRP transceivers that I've built myself show the wear and tear of constant use!

If you're a ham on a budget—and who isn't these days?—QRP is the way to go. You can put together a low-power station for a tenth of the cost of a "low end" 100-W HF transceiver. And at low power levels (5 W or less) you aren't likely to interfere with your neighbors' TVs or stereos.

But if you decide to try your hand at QRP, it pays to become acquainted with CW. Most QRP enthusiasts use CW for two reasons: (1) CW transmitters are simple and easy to build and, (2) a low-power CW signal can be heard under conditions that would render an SSB signal useless at the same power level.

Depending on your technical skill, you can build your QRP transceiver from a kit, or buy one off the shelf. For sheer satisfaction, however, it's hard to beat the pleasure of crafting something with your own hands. If you aren't up to the task of putting together your own rig, why not build your own straight key or paddles?

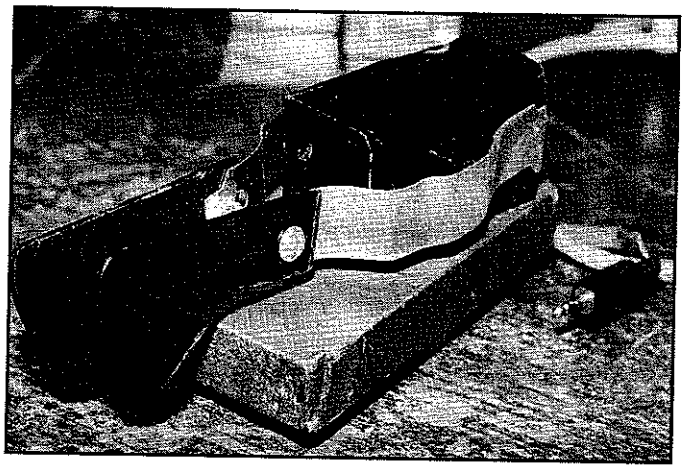
How They Work

Pick up a standard *straight key*. Look at it carefully and you'll notice it has two terminal connections for the wires that go to your transceiver. When you press down on the key, you effectively short these two terminals together. When the key is connected to your rig, shorting the terminals completes a circuit and places the radio in the transmit mode. As you open and close the key, the transceiver jumps from transmit to receive, then back again. This is known as *on-off keying*, or OOK.

If you have a VOM (volt-ohm meter), you see this effect with your own eyes. Just set it for resistance measurement and connect the probes to your key terminals. When you close the key, the VOM should indicate zero resistance—a short circuit.

Paddles work a little differently. With a straight key you directly control the creation of the dits and dahs according to how long you hold down the key. With paddles you operate an electronic device known as a *keyer* that automatically generates the dits and dahs for you. A paddle key normally has three wires. One wire is ground or "common," while the remaining two are the keying lines for the dits or dahs. If you press one paddle, the keyer sends a series of dits until you release it. If you press the other paddle, the key sends a series of dahs until you release it. By deftly tapping the paddles, you can send very accurate Morse.

Which is best—paddle or straight key? I won't touch that question with the proverbial 10-foot pole because the answer depends on your personal preferences! Some hams enjoy the precise keying that a paddle and keyer can provide. On the other hand, it takes more practice to become "paddle proficient," and you have the additional expense of the keyer itself. Straight key aficionados enjoy its flexibility, and the fact that the key preserves the keying "accent" of its operator. High-speed CW, however, is considerably more difficult with a straight key.



A slot cover from the rear panel of a personal computer (bent into a U), along with a couple of microswitches, makes an ultra-cheap set of paddles!

Take a look at three inexpensive keys/paddles that I've constructed. They are very easy to make. Although this is not intended as a detailed construction article, my creations may give you some ideas!

My First Project

My first paddle project made use of materials I had available in my parts drawers. I had a small block of wood, some Plexiglas, an old Plexiglas pen/pencil holder and a couple of microswitches. I used fairly large microswitches that had a "soft" feel to them. In other words, it takes very little pressure on the switches to activate them.

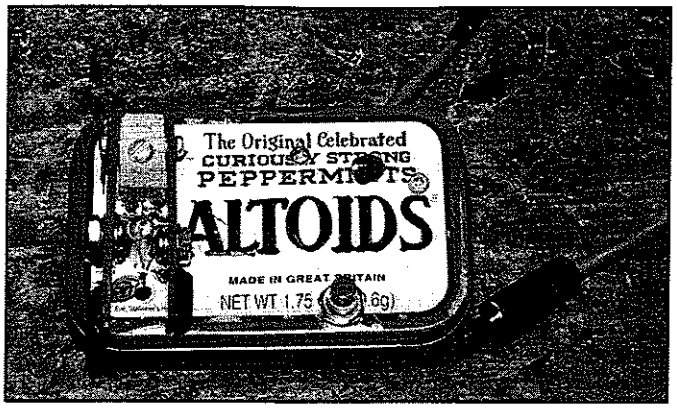
I cut the pencil holder down to about four inches. I soldered two wires to each of the switches. When you press on the switch it completes the circuit between the two connected wires. I mounted one switch on each side of the plastic pen/pencil holder while feeding the wires out the back of the holder.

Now I needed a set of paddle arms. If you've ever installed an internal modem or other card-style device in a PC, you're familiar with those strips of metal that cover the slots in the back of the computer. You have to remove them to install the card. Some folks just toss these strips in the trash, but I hang on to mine. You never know when you'll need them to complete a key!

I took one of these metal strips and bent it in a vise. When I was finished, I had a narrow U-shaped arm that fit nicely around the microswitches. Then, I cut some small pieces of Plexiglas to make the finger pieces of the paddles. I used small nuts and bolts to secure them to the paddle arms. I mounted the entire unit on a piece of wood.

Wiring the paddle key was simple. I used a single insulated wire to connect one of the microswitch terminals to its matching partner on the other switch. This was the "common." I used two more insulated wires to connect the remaining switch terminals to the dot and dash inputs on my keyer. I usually use the right paddle for dahs and the left for dits. This is the way I learned to use paddles, but you can

The next time you see a used mouse at a fleamarket, think CW key!



The makers of Altoids never anticipated this use for their containers! To the left is a tiny set of paddles. The TiCK-2 keyer and battery is inside.

easily reverse this arrangement.

I adjusted the degree of bending until I got the "feel" of the paddles to be just the way I like it. I've used these paddles for a number of years, especially for portable operating. They're lightweight and fairly durable!

The Mouse Key

Now that computer hardware is cropping up at almost every hamfest fleamarket, you can get your hands on a used mouse for a pittance. With a two-button mouse you can craft a paddle key; a three-button mouse can become a combo straight/paddle key![1]

The first thing to do is remove the mouse ball on the bottom of the mouse. It's held in place by a plastic piece that easily twists off. Next, cut off the computer connector on the other end of the mouse cable.

Now comes the *somewhat* tricky part—identifying which wire in the cable bundle connects to which mouse switch. Carefully remove only the outer insulation of the end of the mouse cable. Separate the individual wires and strip the insulation from the ends. Take apart the rest of the mouse. It's usually held together by a few Phillips-head screws. Just locate the small microswitches directly under the mouse buttons. There will be one trace (or wire connection) common to all the microswitches. There will also be individual wires going to each switch. Note the color of the common wire and the colors of the wires going to the switches.

Next, simply connect the appropriate cable wires to a plug that matches your keyer's jack. The common wire will go to the ground or common connection of the keyer, and one of each of the other wires will go to the dot or dash terminals. If you're working with a three-button mouse, you can connect the wire from one of the switches to a plug for your transceiver (you'd end up with two plugs on the end of the mouse cable—one for your paddle keyer and the other for a straight-key input).

Using a mouse as a CW keyer takes some practice! You can help the situation considerably by buying a mouse that has the "feel" you desire. For example, some mouse switches require more finger pressure than others.

The "Cool Key"

The last home-made paddles I'd like to tell you about are my most recent project, and one of my most enjoyable. My teenage son even brings his friends into the shack to show them my "cool key." It is small, self-contained, and very easy to make. This is a fun project that you will enjoy using long after you've finished it!

Find a small can of Altoids breath mints. Unless *you* need them (not even your best friends will tell you!), remove the lozenges and give them to someone else. Find a diplomatic way to do this!

The next item you'll need is material for the paddle arms. At first I cut up some plastic from a candy container, but I couldn't get it to work right. On one of my trips from my ham shack to the outside world I caught a glimpse of my son eating cheese and crackers. He was using a small plastic rectangular "knife" to spread the cheese. I immediately went over and asked for the plastic implement. He gave me one of his dad-is-inventing-again looks. The plastic appeared to be pretty close to the correct size and thickness, but I needed one more. I found another package and asked my son to finish it as quickly as possible. This wasn't much of a problem since my son is a very active adolescent. Now I had the base and paddles for my project.

I looked around the shack and found some wood. Cutting a very small block to use as a center post between the paddles, I drilled a hole through the block and matched a hole on the Altoids box. I bolted the block to the Altoids case on the left-hand side and cut a hole in the box for the keyer's memory pushbutton. I mounted my tiny TiCK-2 keyer to the right side of the Altoids box.[2] I drilled a hole in each end of the plastic paddle arm and put a small nut and bolt on each. I drilled very small holes on the other ends and used small wood screws to attach the paddle arms to the block.

I mounted a $^1/_2$-inch metal standoff directly in the middle between the two paddle arms. I attached the "dit" wire from the keyer to the right-hand side nut and bolt that would contact the center standoff, and the "dash' wire from the keyer to the bolt on the other paddle. I attached the common wire to the center post and the keyer. I needed to play with the thickness of the center block to adjust the feel. It was quite easy to do using sandpaper and a wood file. I was able to mount a 9-V battery directly under the paddle arms. The finished product was a totally self-contained keyer and paddle!

The paddles work great. I smile every time I look at the very small, durable combo. I currently have quite a large collection of the small plastic "knives" from cracker snacks, and my son just finished off another box of Altoids. I am looking forward to making some small adjustments and improvements on my next model!

The Bottom Line

The bottom line is that psychotherapy is quite expensive these days. We all need diversions to liven up our lives and give them some balance. Building usable, inexpensive station accessories is a very satisfying means to an end. I find that I even enjoy my failures. Even if a project isn't 100% successful, at least I've learned something along the way. Of course, when a project exceeds my expectations, the euphoria of accomplishment is delightful. And it beats paying someone $150 an hour to make you feel the same way!

[1]I'm not the first to discover this alternative use for a mouse. See "Mobile Morse by Mousekey" by Terry L. Wirth, K7ACN, in "Hints & Kinks", January 1996 *QST* and "Mr. MouseKey" by Bill Jones, KD7S, in "Up Front", July 1994 *QST*.

[2]G. Diana, N2JGU, and B. Mitchell, WB8YGG, "TiCK-2—The Tiny CMOS Keyer 2," Oct 1997 *QST*, page 42

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