



# Improve Workbench Safety with GFCI and a Kill Switch

An electrical safety upgrade that includes ground-fault circuit interruption, a bench power kill switch, and an auto-off latching relay for a soldering iron.

## Allen Wolff, KC7O

A radio amateur's workbench can be a dangerous place. Aside from the obvious hazards posed by high-voltage power supplies, there are not-so-obvious shock hazards due to ground faults.

Ground-fault circuit interrupters (GFCIs) are designed to break the circuit when the current becomes unbalanced, saving many (including me) from electrical shocks, equipment overheating, and potential fire hazards due to leakage that is not enough to trigger a house circuit breaker.

## Adding GFCI Protection

If your bench is served by a single circuit breaker, you can change the breaker to a GFCI type and you are done. If you are not comfortable inside an electrical panel or do not want to incur the expense of an electrician's house call, you can swap one of the bench sockets for a GFCI socket.

GFCI sockets provide ground-fault protection to all the other sockets downstream from the GFCI socket, so you don't need to replace all the sockets to get total bench protection. If other sockets are on a different circuit breaker, then each string of sockets on a breaker will need a GFCI socket at the head of the string. Wiring directions are generally included inside (or as a part of) the

packaging when you buy the socket. Another option is to use a portable unit that plugs into a grounded socket.

## Adding a Kill Switch

Along with GFCI protection, I wanted to add a kill switch for my test bench so I could simultaneously turn off power to the whole bench. My series-connected outlets all come from one circuit breaker. I found it was easier and cheaper to put the kill switch in the first outlet in the string and a GFCI outlet in the second position in the string.

I replaced the first duplex outlet in the string with a switched receptacle. The receptacle, although switched, is not GFCI protected. In the second outlet after the switch, I placed a GFCI which feeds the rest of the string. Now when I leave the garage, I turn off the kill switch, powering off the test bench along with all test equipment plugged into it.

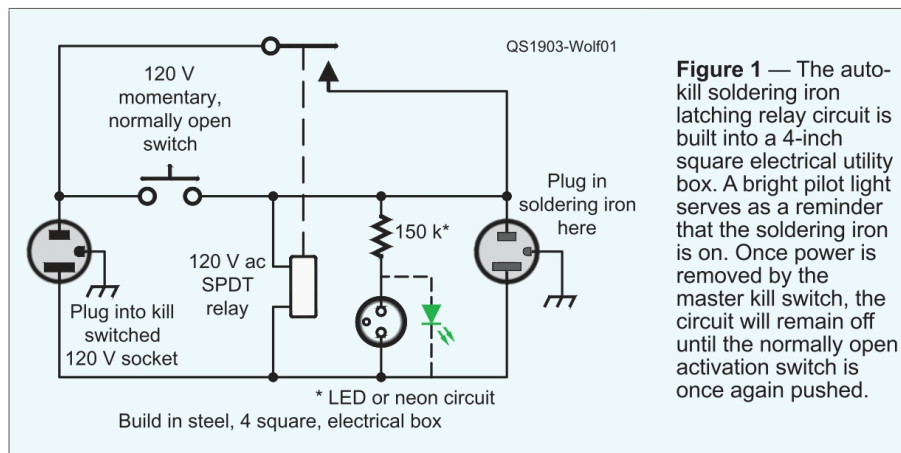
## Auto-Off for the Soldering Iron

As an adjunct to the kill switch, I added a soldering iron auto-kill

latching relay (see Figure 1) to not have my soldering iron come on every time I turn on my workbench. When the normally open pushbutton is pushed, the relay latches and the soldering iron is powered on until the kill switch is turned off. The next time the bench is activated, the soldering iron remains off until the button is once again pushed.

Amateur Extra-class licensee and ARRL Life Member Allen Wolff, KC7O, has been an Amateur Radio operator for 54 years. He holds a Bachelor of Science degree in electrical engineering, RF communications from Drexel University in Philadelphia, Pennsylvania, and is retired from a career in aerospace manufacturing. In 1999, Allen was awarded the ARRL Herb Brier Instructor of the Year Award for his 17 years of teaching Novice and Technician classes that accounted for at least 450 new Amateur Radio licenses.

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**Figure 1** — The auto-kill soldering iron latching relay circuit is built into a 4-inch square electrical utility box. A bright pilot light serves as a reminder that the soldering iron is on. Once power is removed by the master kill switch, the circuit will remain off until the normally open activation switch is once again pushed.

Photo courtesy of Tony Webster, [flickr.com/photos/diversejy](https://www.flickr.com/photos/diversejy/).