AG1YK

HINTS & KINKS

AN AC POWER FAILURE ALARM FOR REPEATERS

◊One of the local VHF Amateur Radio repeaters is located out in the country at a camp. There is no telephone line available and the power line snakes through some heavily wooded areas. For that reason the local electric power company service is not very reliable.

The repeater owner, Lee Lewis, N3NWL, has equipped the site with a generator and means to supply backup power to the radio system during extended outages. The repeater is also equipped with a heavy-duty 12 V battery that handles short-term power requirements. If, after several hours, the electric service is not restored or the generator isn't connected, the battery discharges and the repeater goes off the air. Lee has had this happen several times and the battery, damaged by being fully discharged, required replacement. Since there are few full-time residents in the area it might be days before the electric company is notified of the power outage.

We discussed the situation and decided to build an alarm that would add a tone to the audio of the repeater when the electric power was interrupted. It would be adjusted to be loud enough to be noticed by users while not interfering with normal voice traffic. Club members would be advised to notify N3NWL that the tone was heard so that he could visit the camp and connect the generator.

The next question was how to switch the tone in and out of the circuit. We decided to add a 12 V relay to the power circuit of the alarm that would pull when power was present. The 9 V battery for the tone board would be wired through the *normally closed* contacts of the relay, which would be *open* when 12 V was present. The completed circuit would be wired to the 12 V power supply that powers the repeater (see Figure 1).

My junk box had an old Potter & Brumfield 12 V relay that had an octal base pin arrangement. Just about any 12 V SPDT (single pole double throw) relay would work. Wires for the contacts and the field were soldered directly to the relay pins with pieces of shrink tubing for insulation. I was concerned that the relay might heat up and fail from being energized continually. As a test, I connected the relay coil to a 12 V car battery in the shop and let it run for several hours. There was no apparent increase in temperature of the relay. I was satisfied that the relay would operate in continuous service inside the housing of the alarm unit without any temperature problems.

These homebrew devices may serve for years before needing service so I wanted to include a schematic inside the housing for future reference. There is an excellent program called *Express PCB* (**www.expresspcb.com**) that draws schematics and is free for download. I drew the schematic for this project using that program and found the results quite good and the program a lot of fun. A copy of the completed schematic was placed into the housing.

The tone board is a standard 555 IC with minimal parts to produce a tone of about 850 Hz. The 330 Ω variable resistor at the output adjusts the volume of the tone and therefore the modulation of the repeater audio. Drain from the 9 V battery is about 15 mA when the tone is switched on so it will last quite a long time. I used hook and loop material to attach the relay and battery to the inside of the housing with two small tubular standoffs to mount the circuit board (see Figure 2).

There are two connections to the housing. One is the two-wire line to the output of the 12 V power supply that powers the repeater. It would also be possible to use a 120 V ac relay connected directly to an electrical wall outlet if the repeater has an internal power supply. The other line connects the tone output to the audio input of the repeater controller. It could be strapped across the terminals for the ID message or the audio from the repeater receiver. It also should be wired on the output side of the carrier operated relay (COR) so it doesn't hold the repeater in transmit mode when active. Since there are quite a variety of controllers used with repeaters some experimentation might be needed to marry the circuit to a particular controller application.

Set up and testing are pretty straightforward. Turn on the tone circuit on-off switch. Once the 12 V line from the circuit is connected to the power supply and the tone is wired to the controller, just unplug the 12 V power supply. The backup battery should power the repeater and the 12 V relay will drop out. This connects 9 V to the tone

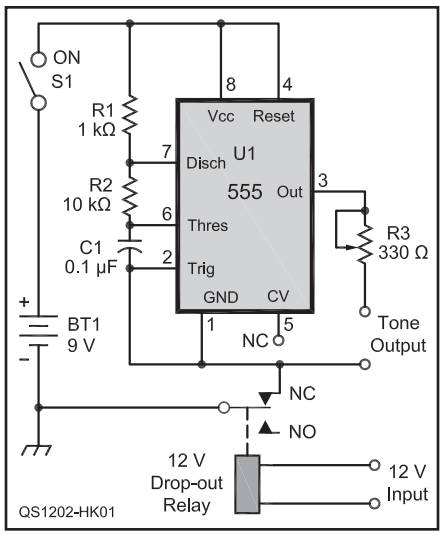

Figure 1 — The schematic of the power failure alarm.

PETER CARR, WW3O

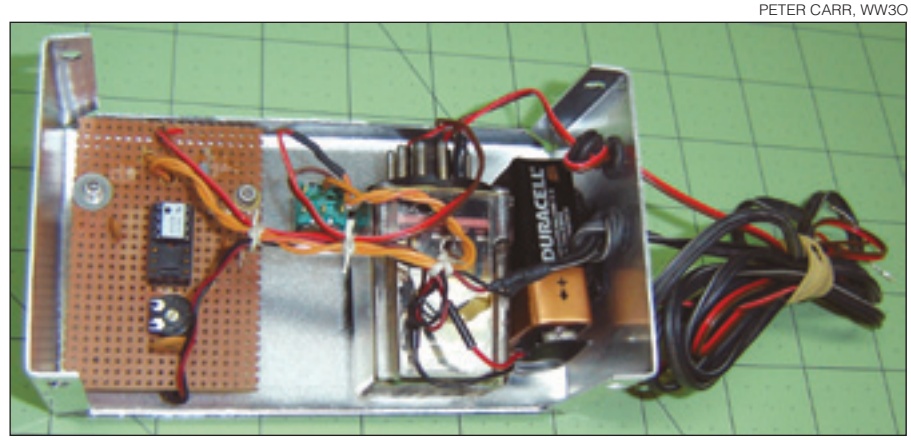

Figure 2 — The power-failure alarm all boxed up and ready to be hooked into the repeater's circuitry.

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board, which sends a tone to the repeater controller. Then, ping the repeater from a handheld radio and listen to the squelch tail or repeater ID message. The tone from the alarm circuit should be heard on the signal. Adjust the variable resistor on the tone board for best modulation and replace the cover on the housing. If, over time, the tone weakens or quits completely it is time to replace the 9 V battery.

There are many repeaters located in remote locations that provide excellent coverage to their users. The downside of their location is the maintenance problems for the hams who service them. I would hope that this circuit will help them with the work they do so the rest of us can continue to enjoy this part of the hobby. — *73, Peter Carr, WW3O, 329 Little Ave, Ridgway, PA 15853-1220*, **ww3o@arrl.net**

CHECKING TOROIDS

◊I needed to remove some HF band noise that was radiating from my furnace's thermostat wires. When the furnace was on, the noise floor would rise about 10 dB as viewed on an RFSpace SDR-IQ receiver — an unacceptable situation. In my "might-need-it" garage, I found a bunch of random toroids that were the right size to make chokes.

None of the toroids were marked or color coded. Winding chokes and testing them would be a pain because there are about 10 wires in the two thermostat lines and it would be very hard to determine which chokes were effective.

Then I thought: "How about using an antenna analyzer to evaluate the toroids?" I have a MFJ-259, which is a good HF signal source. If one places a 51 Ω resistor across the output, the meter will read 1:1 and 50 ohms [remember to set the analyzer's frequency to the one you are trying to block — *Ed.*]. That's good. Now put a 1 foot piece of wire across the resistor and the SWR goes infinite and the resistance goes to zero.

Now make the wire disappear. Thread a few of the same looking toroids on the wire and put the wire across the resistor. What happens? If the analyzer shows 50 Ω and 1:1 SWR, you have found the toroids that will "choke" the signal at the frequency of the analyzer. Go up and down the HF band to see how effective the toroids will be on the frequencies you are concerned about. Next, wind a few turns of wire through one of the "good" ones and do the same test. If it shows 1:1, the toroid will work.

This method quickly identifies toroids that would be effective at blocking the desired frequencies. It will not tell you the power handling capability of the toroid, just its ability to prevent RF from passing.

I made a simple fixture to attach to the MFJ analyzer to do the measurements (see Figure 3). The parts needed are a PL-259 connector, two alligator clips, a 51 Ω carbon resistor (any noninductive resistor around 50 Ω will do) and an insulated support for all the parts. I also added a normally open pushbutton switch to place a short across the resistor to verify that RF is present, but it's not necessary. — *73, Allen Wolff, KC7O, 57 West Grandview Ave, Sierra Madre, CA 91024*, **kc7o@arrl.net**

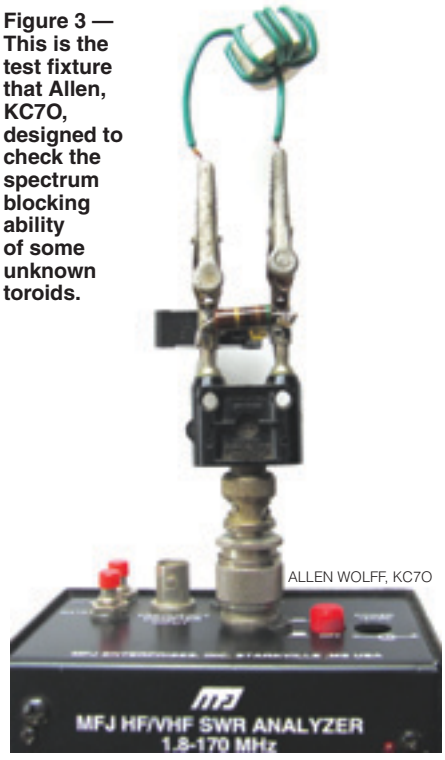

Figure 3 — This is the test fixture that Allen, KC7O, designed to check the spectrum blocking ability of some unknown toroids.

A T-CONNECTOR L-MATCH

◊It is well known that the low radiation resistance of a shortened vertical antenna means it will not be a good match for 50 Ω coax unless some kind of matching network is used. Fortunately, an L-match circuit is easy to make by shunting a capacitor or an inductor to ground at the antenna feed point.

I use helically wound Hamstick-type antennas for HF mobile. The L-match is a good way to get a match to the coax. I was inspired by a *QST* article by Phil Salas, AD5X, that described a mobile mount with switchable capacitors.[1] I wanted something quicker and easier than the elegant AD5X method.

My solution is to use a base mount with an SO-239 connector opposite the antenna stud end. Instead of connecting the coax directly to the mount I attach a coax T-connector. On one side of the connector I connect the coax from the transceiver. On the other side I connect a coax plug with a fixed capacitor attached. I prepared plugs with capacitors for the bands I expected to operate. Figure 4 shows how this works. I use cut-down crimp-type connectors for the capacitor plugs.

It is easy to experiment with different capacitor values using alligator clips and a banana plug. In this way I determined that 400 pF made for a good match for 40 meters and that 150 pF worked well for my 20 meter antenna. Experiments indicated I had satisfactory matches on 15 and 10 meters with no shunt capacitor, but I may revisit this when I start to operate more on the higher bands.

Weatherproofing is a concern for any outdoor antenna, mobile or fixed. I coat the capacitor and the body of its plug with a weatherproof material like so-called liquid electrical tape or I wind a generous length of ordinary electrical tape over it. When I want to operate without a capacitor I put a weatherproof cap on the open end of the T-connector. Rubber furniture feet from the hardware store work well for this. — *73, Al Woodhull, N1AW, 199 Eden Tr, Leyden, MA 01337-9580*, **n1aw@arrl.net**

SOLDERING STATION SAFETY TIMER

◊ Over lunch one day, Wayne Frazier, WA4FTY, revealed to me that he was always forgetting to turn off his soldering station and

[1]P. Salas, AD5X, "A Mobile Antenna Base with Internal Capacitive Matching," *QST*, Feb 2004, pp 43-46.

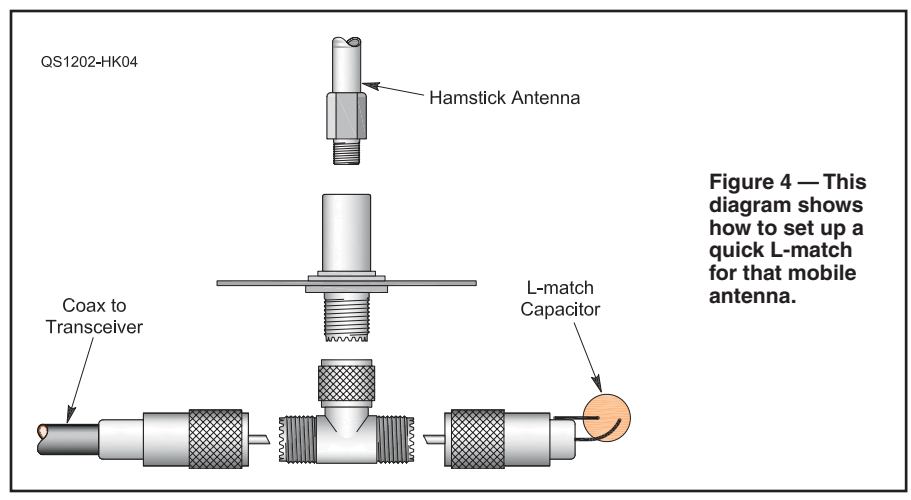

Figure 4 — This diagram shows how to set up a quick L-match for that mobile antenna.

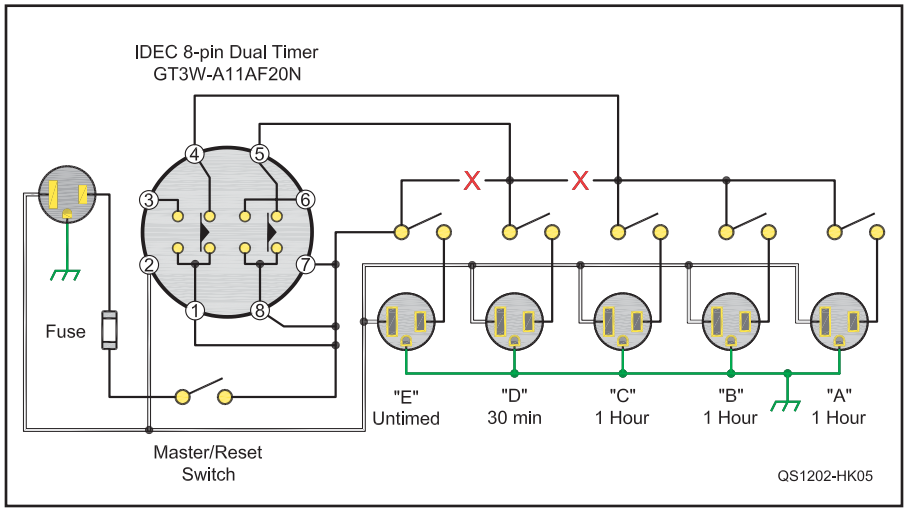

Figure 5 — Schematic of the soldering station timer.

he was thinking about putting it on a timer. Since I have left my soldering station on longer than needed a time or two also, I decided to take his idea on as a project.

First, I repurposed a computer power center that was originally designed to go under a CRT computer monitor as my project box. I then wired a prepackaged 100-240 V ac dual timer in series with the box's main power switch, which can then also be used as a reset switch for the timer (see Figures 5 and 6). I left one of the outlets "untimed." After securing the timer in place I buttoned up the box and relabeled the switches and outlets. I then super glued a bunch of magnets to its top for holding my soldering station and tools in place. This little project is not only useful and satisfying but it saves electricity, extends the life of your soldering iron's tips and who knows, it could prevent a fire.

The parts used in this project were dictated mainly by the contents of my junk box. The timer that was in my junk box is a fairly expensive dual timer manufactured by IDEC (part #GT3W-A11AF20N). It can be purchased at **Newark.com** (part #26H1600). A more common single timer such as the GT3A-1AF20 (Newark.com #30B6173) can also be used, at substantial savings. Both of these timers have a built in power supply that runs off of 100-240 V ac, can handle a 350 W load and, although I chose to set mine at 30 minutes and 1 hour, they can be easily adjusted to operate from less than 1 second to more than 100 hours. — *73, Joe Morse, AD4W, 317 Westlawn Rd, Columbia, SC 29210-5622*, **ad4w@sc.rr.com**

JOE MORSE, AD4W

Figure 6 — Here is the computer power center with the timer installed.

GROUND REMOVAL TOOL

◊When it comes to ground rods it's the same old problem: How do you get them out once they're in the ground? This can be a big problem on Field Day with its temporary ground rods. This tool makes removal easy.

The handle is made of 1 inch OD black pipe (see Figure 7). The pivot is a 4 inch length of 3-inch-OD ¼-inch-wall pipe with a 1 inch U-bolt. The steel plate is 3 × 2 × ¼ inch steel plate with a ¾ inch hole drilled a ½ inch from the end. The chain is 1¾ inches long with ¼ inch links. The welds should be on top of the handle and on the bottom of the steel plate.

JOSEPH BUTVIN, KB3QQT

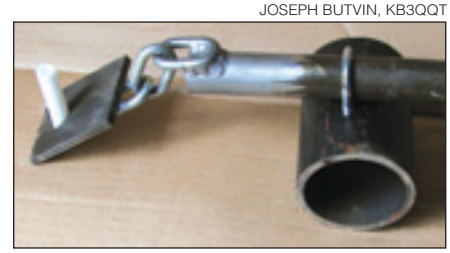

Figure 7 — Joe's removal tool in position and ready to lever the "ground rod" out of the Field Day site.

To use the tool, position the U-bolt about 5 inches from the handle's end. Place the steel plate over the rod as shown in the figure. When you push down on the handle the plate will grab onto the rod and pull the rod from the ground. — *73, Joseph Butvin, KB3QQT, 114 Circle Dr, Donegal, PA 15628*, **kb3qqt@gmail.com**

MOBILE MIC MOUNT

◊When I purchased my 2005 Mazda pickup, I immediately installed a 2 meter mobile radio but had problems finding a good place to attach the microphone hanger. There were no available screws or tie points and using the cup holder to hold the microphone was inconvenient and sometimes unsafe. Looking over the dashboard, a couple of possibilities emerged, namely, the 12 V power taps. This vehicle has two on the dashboard.

I found a piece of PVC rod that was 0.810 inch diameter and cut it 1.5 inches long. Then I drilled a pilot hole, concentric in the center of the rod, and used a small screw to attach the microphone hanger to the rod. I pressed it into the power tap; it was a perfect fit and very convenient spot to hang the microphone. It won't come out until you take it out and will not damage or short out the power tap. Since most people won't have PVC rod of this diameter, an acceptable substitute might be a piece of ¾ inch dowel, with some ¾ inch electrical tape wrapped around it to increase the diameter. — *73, Henry Brown, K1WCC, 19 Sao Paulo Dr, East Falmouth, MA 02536*, **k1wcc@arrl.net**

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