



The

# Broadcasters' Desktop Resource

[www.theBDR.net](http://www.theBDR.net)

... edited by Barry Mishkind – the Eclectic Engineer

## Tech Tips Testing UPS Batteries



**By John Stortz**

*[October 2010] Stable power is important at many points in the broadcast chain. Few things are more annoying than waiting for a mission critical computer or some microprocessor-equipped gear to reboot after a power bump or dropout. But are your UPSs (uninterruptible power supplies) up to the task? John Stortz offers an easy way to diagnose the condition of your UPSs.*

Any critical computer is likely plugged into a suitable UPS, or Battery Backup supply. At our stations, we have many UPSs in the 300 to 1500 VA range. Some of the larger UPSs have software that supposedly alerts you when the battery was going bad. But the smaller ones do not and, as they age, the question becomes: how can we be certain the batteries will carry the computers during a short blackout?

### THE OLD WAY

I used to test the batteries in our UPSs by just unplugging the UPS for about a minute and watch what happened. More than a few times, the result was a computer shut down – and the impatient wait for the reboot once power was restored.

There had to be a better way.

Furthermore, after obtaining a Kill-A-Watt, I discovered that computer power consumption varies widely, depending upon how much processing may be going on at any moment; an idle computer draws a lot less than the rated power of about 100 to 350 Watts or so, giving a less accurate view of how it would respond if the computer were not idling.

### A BETTER SOLUTION

The solution was to add a bit more load with a light bulb or two to bring the load closer to the rated load and more closely match the ratings on a specific setup. How much to add, depends on the capacity of the UPS, as well as the computer it is protecting.

With that in mind, I happened to come across a four-lamp vanity light. By using a 150-Watt lamp and three 116-Watt used tower lamps, I was able to simulate various loads, up to about 500 Watts.



**One 150-Watt and three 116-Watt lamps can be used to provide a load of up to about 500 Watts**

### **WATCHING THE METER**

The main test is pretty straightforward: keeping an eye on the output voltage while operating from the UPS battery. I find most UPSs exhibit an initial voltage drop, but then the voltage will rise again. I assume the battery works better after it begins to heat up internally.

Using my test lamps, I first connect a Kill-A-Watt to the UPS output and read the voltage. Then with the normal load still connected – and perhaps using one or more lamps for additional load because idle computers do not draw that much power these days – I unplug the UPS and watch the UPS output for about 45 seconds, making sure the voltage does not drop significantly.



**With the lamps on line, the full capacity of a UPS can be tested**

If the UPS output dips below 106 Volts for more than a couple seconds, or if it fails to maintain at least 111 Volts on average, experience has led me to assume the battery needs replacing. At a remote site, I would begin preparing to replace a battery when the output dips below about 113 Volts.

As a double check, I plug the Kill-A-Watt into a normal wall outlet and connect the UPS plug into the Kill-A-Watt. Now the Kill-A-Watt can read the amperage & wattage going into the UPS. I will go back and check again after about 15 minutes – and expect to see that the charging should have dropped off.

### **KEEPING THE LIGHTS ON**

For critical loads my goal is to be able to switch the UPS completely out of the circuit during testing to prevent us from being knocked off if the UPS should crash during the test. Of course, some can be switched out and some cannot. So I decided to install some transfer switches.

I was constructing the manual transfer switches, but only finished one, when I discovered there were places to purchase a supply of re-conditioned APC automatic transfer switches for a great price. Even better, the electronics packed into these switches made my homebrew switches obsolete before they were built.

In *theory*, I plan to test all UPSs about every six months. Admission: in reality, if I do it once per year, I am probably doing well. The important thing is to do it – and keep documentation of the date, the test load values and the UPS voltages. Doing this could save you an unexpected off-air emergency from a battery that is past its replacement date.

---

*John Stortz is the Chief Engineer for the Moody Bible stations in Tampa, Florida. You can contact John at [ka4flx@gmail.com](mailto:ka4flx@gmail.com)*

**[Return to The BDR Menu](#)**