

Re: UPS/Power conditioning questions

Source: <http://unix.derkeiler.com/Newsgroups/comp.os.vms/2005-03/1015.html>

From: w_tom (w_tom1_at_hotmail.com)

Date: 03/12/05

Date: Fri, 11 Mar 2005 18:22:22 -0500

First we define a computer grade UPS. This one outputs a modified sine wave. That means unloaded in battery backup mode, the 120 VAC output is two 200 volt square waves with a 270 volt spike between those square waves. This 'dirty' output may be destructive to small electric motors. But the output is only intended for powering computers. Computer power supplies are so resilient that 'computer grade' UPSes can output some of the 'dirtiest' electricity.

This 'dirty' electrical output when in battery backup mode is why UPS manufacturers quietly suggest using no power strip protectors on a UPS output. Even Best made this 'no protector' recommendation, even though their Ferrup UPSes had a lowest total harmonic distortion.

These manufacturers play games with the expression 'sine wave'. Pure sine wave means what? Nothing technical. The expression is to confuse those who would represent color glossy sales brochures as if numerical specifications. Even the word 'dirty' is a misnomer. What is dirty? Too much voltage? Not enough voltage? Too much noise? Too high total harmonic distortion? Loss of power for 1/2 of a sine wave? All might be a problem. So which one defines 'dirty'?

Each type of power problem must be addressed separately. Most problems are solved by a power supply that meets minimum standards – such as those defined in Intel specs. Standards that existed even 30 years ago.

Ferrups promoted 'big iron' solutions for better filtering. But they forget to mention, for example, that safety ground wire carries destructive transients completely around the UPS and directly into computer motherboard. What has the Ferrup provided? Filtering that the computer power supply really does not require. If I was using a sophisticated analog system, then I might consider a Ferrup for its cleaner power. But the advantages of a Ferrup provide little advantage to a

computer.

In summary, what constitutes a good UPS depends on which kind of 'dirty' is being solved.

A computer must work just fine even when voltage drops so low that incandescent lamps are at less than 40% intensity. Supply must withstand (without damage) short transients of over 1000 volts. Power supply must work just fine even when the AC power is lost for 17 milliseconds. Again, defacto industry standards. Computers are quite resilient. However internal protection assumes a typically destructive transient will be earthed at the service entrance. 'Whole house' protection is required so that a transient will not overwhelm computer's and UPS's internal protection. Yes, even the control electronics in a UPS require and therefore have internal protection.

That leaves only blackouts and extreme brownouts as the remaining unsolved significant problem. Most every UPS solves that problem. Some do it better by maintaining power longer, switching to batteries less frequently (Automatic Voltage compensation), and sending warning signals to the computer. However, many plug-in UPSes are designed so cheaply as to expire the battery about every 3 years. Ironic. Even car batteries exposed to harsh outside environments now last seven years. In serious UPS systems, batteries are now lasting something short of 20 years. Obviously more money will buy a UPS with a better battery. But how do you discover which provides the better battery / battery charging system? Easier to just confirm the UPS uses an industry standard battery that you can replace every 3 years without factory service. And yes, some UPSes do use proprietary batteries that sometimes costs almost as much as a new UPS.

IOW just about any UPS of sufficient power will perform fine for a computer since 1) a computer power supply is so resilient, 2) the UPS is for data protection from blackouts and extreme brownouts, 3) and other power protection problems must be addressed elsewhere as part of a building wide solution. Yes, that is a 'building wide' solution as even Montandon and Rubenstein demonstrate in a 4 Nov 1998 paper in the IEEE Transactions on Electromagnetic Compatibility – if one desires Data Center type reliability.

An overview about power protection – and why a more expensive Ferrup provided so little to a system wide solution.

jordan@ccs4vms.com wrote:

> w_tom,

> *thanks for all the useful info. Do you have info/opinion on the*

comp.os.vms: Re: UPS/Power conditioning questions

- > *'higher grade' UPS models, like the Best FERRUPS, as far as power*
- > *conditioning and protection from 'other than surge' power problems*
- > *(like brownouts)?*
- >
- > *My previous employer always wanted the FERRUPS units for critical*
- > *systems (not that they always had the budget), and if I had a*
- > *commercial budget instead of a hobbyist budget (hence the APC Backups*
- > *Pro 1100) they're still what I'd look at getting (whatever the current*
- > *owner's name is; I know Best got bought out).*
- >
- > *Thanks again for all the info!*
- >
- > *Rich*