COMPUTER INTERCONNECTIONS I

The catchword these days is wireless. Wireless Internet access, cordless phones, even a wireless mouse to get the clutter of the mouse cable off your desk. My day job for the past 30 years is working as an electrical engineer designing all these wonderful wireless gadgets. My moonlight job for 25 years has been conducting seminars and writing for publication to help people use their computers effectively.

If it is the wireless age, I'll tell you what, I've never seen so many wires. I've got it pretty much under control on top of my computer desk with the cables tucked away, but underneath it's a nightmare of wires, cables, and power cords. This series of Tech Tips will tackle the tangle of wires around your computer and consumer electronics gadgets as well as help you understand how those wires work and how to make your interconnections work better.

Talking about interconnections may not be as jazzy as arguing about the latest high-performance processor chips from Intel and AMD, but where do 90% of computer hardware problems come from? The interconnects, that's where! Getting the right plug in the right socket is not a trivial task when there are so many with a seemingly endless assortment of sizes and shapes that seem to come loose at just the wrong moment, and that's only on the outside of the computer! Open up the case of a well-equipped PC and you are greeted with another impenetrable jungle of interconnect cables and wires. Let's spend some time sorting out this mess so you can use logic to solve your next interconnect problem instead of just plugging into random holes with the hope that you find the one that works before the one that burns it up.

OK, we are going to talk about how you can keep wires and cables from causing hum and noise in your computer speakers, data loss due to intermittent connections and lots of other topics. But, let's take that last thought about "before it burns up" and talk about computer electrical safety first. Naturally, I did some research by poking around on the Web for electrical safety as related to personal computers. I was shocked (sorry, couldn't help it) by the lack of practical information about handling electricity in and around your computer, given that all computers run on electricity. Your laptop runs on electricity and there are special considerations there too, but there are things to be careful of even when running off the battery.

Let's start with the simple safety issues. How about that power cord? There's one for your computer, one for the monitor, one for the printer and so on. Power cords put up with a lot, but they do fail. You should always pull wires and cables out by grasping the plug, not the wire. You can severely damage the interconnect that way.

I inherited a piece of equipment when I bought this house and it had apparently been pinched at one time. The safety ground wire was broken off and shorted against the hot wire inside the cord. There are safety circuits, which I'll explain later, that tripped, but the previous homeowner got the

equipment working by disabling the safeties. The point is, people do things to electrical equipment that result in hazards, and I could have been killed by touching the cabinet with the power on if I had not replaced the cord before plugging the equipment back in.

Your computer has exactly the same type of three-wire cord and a metal cabinet. The house wiring in the room where your computer is probably doesn't have all those safeties so it's ripe for an electrical shock if the cord is not in good shape. Enough of the horror stories, let's get down to the technical details.

The wiring in your house, and the power cord that leads to your computer uses three wires. These wires are required by contemporary electrical wiring code to be colored black, white and green. The black wire is the "hot" one that is the most dangerous to touch. The white wire is the common, or "return," that is connected to the electrical ground back at the main power box in your house or apartment. The electrical power flows back and forth in the black and white wires. Some equipment gets by with connecting only the black and white wires and depends on completely insulating all the electrical components inside. Most computers, even the latest laptops, use all three wires where the green wire adds a safety ground. This safety ground is connected to the metal parts of your computer case.

Under normal conditions, no current should flow in the green safety ground. The green wire is in fact connected to the white wire at the electrical ground back at the power box. So why is the safety ground so important? If the wiring in your house is done correctly, and you have a computer where you drop a screw that shorts the hot side of the power line to the case, the electricity would take the path of least resistance and travel back through the safety ground wire instead of through your body. The safety ground can handle the current so it should kick out the breaker and shut down the circuit, keeping the electrical short from turning into an electrical fire.

Now you know why it's so important to have your power cords in good shape, but what should you look for? First, you can't do a good job of inspecting a power cord under your desk. Take the cord to a place with good light and look at it closely along every inch. Especially near the plugs, bend the cord back and forth and look for cracks in the insulation. No cracks are acceptable. If the cord appears pinched, stretched or cracked, throw it in the trash and get a new one. A new computer cord can be had for a very few dollars at your local computer store or electronics supply. When I see them on sale, I pick up a few spares to have around so I don't hesitate to toss a defective one.

I mentioned some safeties built into your house. The first line of defense is the circuit breaker. Every circuit in your house must have breakers as they are required by code. Circuit breakers sense when too much current is being drawn and shut off the power. The only purpose of circuit breakers is to keep the wiring from going up in smoke with a short circuit. They don't protect you from shocks.

A second set of devices is installed in certain areas of your house like bathrooms, the kitchen, the garage and places where damp floors are possible. This gadget goes by the acronym of GFCI, or Ground Fault Circuit Interrupter. This is your friend and the best protection for shocks from faulty electronics equipment. It senses an imbalance of currents in the black and white wires, which means the current is flowing into the green wire – or worse- into your body.

As I sit here at my computer desk, I'm surrounded by electronics goodies, some of which I hold onto and have prolonged contact with for hours, such as a VoIP (Voice over Internet Protocol) headset. These gadgets are all connected back to the power line one way or another. The metal case to

my computer is grounded through the safety ground. So, if I should have a faulty device that I am touching, and then lean on my computer case to pop a new DVD in, I could be electrocuted. That's why I prefer to have a GFCI on the circuit in my computer room. You should have an electrician install one for you; it's cheap protection. If you are handy, here is a Web site with GFCI Info.

While you are at the local hardware store, pick up an electrical circuit tester. It's a big yellow or orange plug with three lights. When you plug it into a receptacle to test it, the pattern of lights will tell you if the wires in the wall are hooked up correctly. Every house I've owned has had improperly wired receptacles and this is really dangerous. The tester also has a button that can trip the GFCI to test it to make sure it really works.

Keep the above in mind while using a laptop computer if it is plugged into the wall. If you are going to sit out on the concrete patio, by the pool or anywhere that is damp or has concrete, abandon the power supply and run off the battery. Sitting in a pair of shorts on an aluminum chair or even just with bare feet on the concrete and a computer in your lap connected to the power lines is an invitation for trouble. The battery is going to die of old age if you keep your power supply plugged in all the time, so exercise the battery while you enjoy the sun.

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