Watts All This About Volts and Amps?

People love to measure things. If you think about it, it only makes sense. If you are making a cake, you need to measure the ingredients so you don't end up with too little flour or too much milk. When you are building a tree house, you measure the distance between limbs to be sure you cut the right length board. In math class, you measure how much time there is until lunchtime.

We need measurements when using electricity too. If we use too little electricity, our lights may not come on. If we use too much electricity, we might blow a fuse, or, worse yet, burn down the house. That is where watts, volts, and amps come in. Watts, volts, and amps are all units of electrical measurement.

Watts are the total amount of electrical energy being used. To figure out the total amount of electrical energy being used -- the watts -- we have to know how strong the electricity is (volts) and how fast the electricity is flowing (amps). The equation for this would be: Watts = Volts x Amps.

Try out this analogy: Think of a boxer, we'll call him "Joe", getting ready to hit a punching bag. The total amount of energy Joe uses to hit that bag is similar to watts. The strength of Joe's muscle is like volts. How fast Joe punches is like amps.

There are two ways Joe can hit the bag with a lot of total energy (watts). One way is to use a lot of muscle power, a lot of force (volts). The other way is to hit the bag with a lot of speed (amps).

Let's say Joe wants to scare his next opponent by knocking the punching bag off of its stand. It will take 500 "watts" of energy to do this. One way Joe could knock the bag off is by using 500 "volts" of muscle power at 1 "amp" of speed. 500 "watts" = 500 "volts" x 1 "amp."

Or, Joe could knock the bag off by using only 1 “volt” of muscle power, but hit the bag at a really fast 500 “amps” of speed. 500 “watts” = 1 “volt” x 500 “amps.”

There are lots of ways Joe could combine his power and his speed to knock the bag off: 100 “volts” of power at 5 “amps” of speed, 50 “volts” of power at 10 “amps” of speed, and so on. The important thing is that he uses enough total energy to get the job done. If Joe uses too little energy, he won’t even dent the bag, and his opponent will laugh at him. If Joe uses too much energy, the bag will go flying off the stand, crash through the wall of the gym, and smash Joe’s car two stories below.

While Joe’s fighting skills may electrify us, we wouldn’t really use watts, and volts, and amps to measure his punches. We are only using them here to help visualize the ways that we measure electricity.

There is one more important electrical measurement - - ohms. Ohms measure the resistance of the flow of electricity. Resistance is how difficult it is for the electricity to flow through a material.

Let’s return to our friend Joe. How hard it is for Joe to throw a punch is like the ohms. If Joe is just working out in the gym, like usual, his fist is just traveling through the air, so there is very little resistance to his punch. The “ohms” would be low. But, if we place Joe in a swimming pool to work out, his fist has to fight through all of that water, and there would be a lot of resistance, so the “ohms” would be very high.

When we are getting ready to send electricity through a wire, we need to know how many ohms of resistance there are, so we are sure to send enough current through to get the job done.

So what is the big deal about watts, volts, amps, and ohms? Nothing really. Like feet and inches, they are simply units of measurement to be sure we use just the right amount of electricity.