

What the hell is E, M, and F

In my meanderings through paranormal sites and forums I constantly see people talking about EMF detectors and their reliability. These comments are usually prefaced by the term 'ghost detector' and followed by how great a particular meter is and why it is the best (normally followed by the cost). It is disconcerting that most people seem to have forgotten, or never learned the basics of the electromagnetic spectrum and electricity. By understanding the physics of electricity and magnetism we may be able to more accurately understand what exactly it is that we are 'finding' with this equipment.

What I am going to attempt is to give an overview of basic principles of AC and DC electricity, definitions and uses for each. This is important as it is an integral part of most places that we will be investigating. And the more that the field starts to move beyond feelings and séance into evidence and experimentation, the more fully we will need to understand the way that our instruments use and measure this all pervasive energy type. Magnetism, the M of EMF, is many times remembered as that thing that holds my daughters artwork onto the refrigerator or a stick of metal that attracts metal. The truth is that while what we know is essentially true it doesn't describe the importance of magnetism in our studies. Magnetism and electricity are so tightly linked that when we talk or detect one we are actually talking about both. (Finally, I will discuss the implications for the paranormal and the equipment developed for scientists and engineers for the detection of variances in the normal 'background' noise of a specific area. The manifestation of a paranormal entity in a location should change the electromagnetic field in a specific area, because if it doesn't we won't be able to detect it.)

While we all interact with electricity every day, we rarely concern ourselves with what it is or how it works. The basics of electricity are pretty miraculous when we think about it. The flip of a switch closes a circuit that can be thousands of miles long, this circuit pushes a microscopic particle at an incomprehensible speed that heats up a wire to glow and allow us to enjoy our many William Gibson novels and Cheetos. It amazes me that we now take this magical act for granted, indeed, most of us wouldn't be able to live without it, we've forgotten how. In order to unmask the E-M spectrum lets talk about electricity first.

Direct current, or DC, is the type of electricity found in nature in the form of lightning, that static snap that we annoy our significant others, and the reason our sweaters stick to our bodies. This is also the type of charge that is stored in the batteries of all of those convenient appliances that we carry with us (cell phones, ipods, etc.). In a battery a carbon rod is suspended in a chemical solution that strips an electron from the rod and forces it to the negative pole (the flat end of a AA battery) then it moves to the positive pole completing the circuit. This is the electric current that nature uses in our own nervous tissues and allows us locomotion as well as consciousness.

Alternating current (AC) was invented by Nikola Tesla based on a DC generator developed by Thomas Edison. AC electricity is the electricity that is used in all of our homes. The difference between AC and DC is that in AC the electron flows in both directions, it moves one way then moves back the way it came (the positive and negative poles change). This change of direction is done a specific number of times per minute and a full cycle is called a hertz. Hertz are standardized frequencies that differ depending on location for instance the standard in the United States is 60hz and the standard in Europe is 50hz. The thing that AC does much better than DC is that it allows for extremely large circuits (up to thousands of miles) with little loss of power, lessens resistance, and because of that is MUCH cheaper to produce than DC power.

Typically, when I think of a magnet the standard school bar magnet comes to mind. I fondly recall the heady day of elementary school when I would drop iron filings down a bully's shoes. This is indeed a magnet, as are those wonderful things on the fridge, but we rarely think of the magnets that make this computer work. Magnets, though usually hidden are all pervasive in our lives and yet we know little about them. When thinking of magnetism beyond the bar magnet we should consider that magnetism is about the motion of charged particles. Sound familiar? Yep, it's the same as electricity the main difference is that electricity is the exchange of electrons and magnetism uses charged

particles. Matter consists of charged particles; this charge is what holds matter together. Positive attracts negative and like charges repel each other, we can see this if we try to take to magnets and put the positive pole next to the positive pole.

With this in mind, it is easy to understand the inter-relationship between electrical and magnetic charges. Both electrical and magnetic charges create magnetic fields. These fields are streams of charged particles traveling toward the opposite pole. The Earth itself has an enormous magnetic field caused, it is believed, by its iron nickel core and extends into space well beyond the atmosphere. The 'magnetosphere' weakens, like all magnetic fields, with distance and can be distorted through interaction with other magnetic fields like the solar winds, the moon, and even human beings. Now the magnetic field given off by animals is on an order of magnitude smaller than the magnetosphere, but it still distorts it locally to a degree that is measurable using the right equipment.

Human beings, like all animals use bursts of direct current in their nervous systems and metal objects have many extra electrons to shed which creates a measurable charge. Animals, metals, and all natural static charges use DC electricity to create this field. This field is much different from one created by AC electricity. Because AC electricity alternate poles the AC magnetic field itself alternates poles. This alteration causes the field to wander, for the lack of a better word, in search of the proper pole and move more erratically than a DC charge which tends to maintain location and shape based on its sources motion and interaction with other fields.

E-M energy is what our senses use to understand and discover the world, whether it is through vision which directly records the visible spectrum of E-M radiation, or through the transmission of signals from our fingers through our nervous system to our brain. The ability to measure these fields or changes in the fields should aid in our understanding of anything that will interact with those fields. One common theory of the paranormal is that entities must gather energy in order to interact with our world. In light of some of the ideas that have been discussed here this makes sense. The entity gathers energy then releases it, presumably, to communicate with us. This energy should produce a measurable magnetic field that will move with the entity until all of its energy is released. This is the difficult part of our job; we have to be in the right place at the right time with the right equipment to record the event.

The equipment that according to the physics concerned with this E-M field subject and theory needs to be made to record the specific type for field or particles. A simple definition for radiation is 'the emission of energy in particles or waves', this emission of particles should be able to be detected by two common scientific items; the Geiger counter and the Air Ion detector. The Geiger counter calculates particles emitted in an area. An Air Ion detector detects particles that have gained or lost an electron in a specific area (one that is directly in contact with the probe) In addition to these items we also use cameras that record the infrared to the ultraviolet parts of the electromagnetic spectrum. The spectrum recorded by the cameras is both reflected and emitted E-M sources just beyond the range of our eyes.

And finally, let's discuss the Electromagnetic Field detectors. In order to use them properly one must understand the purpose of the specific design, what range and types of E-M that it is made to detect. These items are designed for scientific and engineering measurement of a specific range of a specific field. Most of those that we see advertised as 'ghost detectors' measure in the 50/60hz. AC range and have a lower sensitivity (sometimes none) in other ranges of AC fields. The DC detectors are very very expensive (the least expensive is in the range of \$200-\$300) and use special sensors that only detect a DC field. Because there are specific types of EMF detectors one must have a very good reason to be using any detector. The use of an AC detector is great for field work where people have claimed to be seeing shadows, hearing voices, and have feelings of oppression as AC fields have been known to effect some people in this way and will go a long way to debunking a haunting that you do not have any other evidence of the paranormal. However, it is my belief and that of others in the field that any manifestations that we will be able to record will be in the DC range. AC does not exist in nature, and only alternates because of mechanical means, the chances of a ghost carrying around an AC generator (the only way to create an AC field) is incredibly small. Whereas, we can inadvertently create a DC charge by shuffling our feet on a carpet, and the releasing it onto the unsuspecting ear of our significant other; it seems that the simplest way for a ghost to use energy is in the DC range, hence all of the drained batteries before activity. I am not saying that they can't use AC power to 'charge' but I doubt that the release of the energy would maintain the

hertz of a standard AC charge. Ultimately, the understanding of the physical world can only aid in the gathering of evidence, as everything that exists in the world must somehow interact with it for us to see/hear/touch/feel it.

Here are a few links that you may find helpful:

Electricity

http://en.wikipedia.org/wiki/Alternating_current

<http://www.pbs.org/wgbh/amex/edison/sfeature/acdc.html>

<http://www.kpsec.freeuk.com/acdc.htm>

Magnetism and Magnetic Fields

<http://www-spod.gsfc.nasa.gov/Education/wmfield.html>

<http://en.wikipedia.org/wiki/Magnetism>

<http://www.femu.rwth-aachen.de/spektrum.php3?l=e>

Radiation

<http://en.wikipedia.org/wiki/Radiation>