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*To view an article on **cell phones in cars**, click here.*

Introduction

We are often asked about EMFs in cars, and many people who are concerned about EMFs measure for them in the car they drive or in a car they are interested in purchasing, whether they are electrically hypersensitive (EHS) or not.

Much of this concern is borne, or course, from the assumption that electric cars and the electric motor in hybrids must be filled with EMFs because they run on electricity, not gasoline. While that is true, it is also the case that the gas-powered cars you have driven for years *also* have high EMF levels. Measure them with a Gauss meter and see for yourself. More on that in a minute.

First, let's establish which type of EMF we are dealing with. The predominant type of EMF found in electric cars and the electric motor of a hybrid is from harmonic frequencies of so-called "dirty electricity." These are generated by the constantly changing voltages in wiring throughout the car created by various components of the motor and its electronics as you drive and brake. That is how electric cars and the electric motors in hybrids work.

Yes, there is DC electricity, which we cannot measure with AC Gauss meters, yet there is also AC electricity but at constantly changing voltages. That is what you are picking up with your Gauss meter, particularly a Tri-Field meter set to magnetic fields, if it is the so-called "Frequency Weighted" model. If you purchased your Gauss meter from LessEMF or other vendors in the past few years, you will have bought the Frequency Weighted model. As I explain on my EMF Meters and Instruments page in the Magnetic Field section, the Frequency Weighted Tri-Field Meter overstates the actual magnetic field reading due to the nature of the meter, which is analog. This is considered by Alpha Labs, the maker of the Tri-Field meter, to represent the more "bio-active" EMF frequencies, but the Flat Response model has little magnetics inside of it to dampen this effect and give you a reading that is close to what you would measure with a digital Gauss meter. The safe exposure guideliens of 1-2 millGauss agreed upon by the international EMF safety community is measured by digital Gauss

meters, not a Frequency Weighted Tri-Field meter.

LessEMF recently switched the preference for which Gauss meter they sell to the Flat Response model. You know you have a Flat Response model because it has the words “FLAT RESPONSE” printed at the bottom of the words on the back of the meter. It costs the same as the Frequency Weighted model. I asked Emil DeToffel, owner of LessEMF, why he made the switch, and he said it was because of the large difference in the readings obtained from the Frequency Weighted model compared to what everyone else reads on their digital Gauss meters, which is taken care of by the little magnetis in the Flat Response model.

Having said all that, the major EMFs you are exposed to in an electric or hybrid car, once again, are the harmonics frequencies created by the components as they change from one voltage to another, known as dirty electricity. Some people are not bothered by dirty electricity (thought their cells don’t like it), while other people who are electrically hypersensitive definitely do. I have clients who cannot sit in an electric car or hybrid because they are made uncomfortable due to dirty electricity.

If that is the case for you, then an electric car or hybrid will not be for you. Get an older model car with a gas-powered engine and measure it’s magnetic fields with a Flat Response Tri-Field meter or a digital Gauss meter. Find the model of gas-powered car that has the lowest reading at the feet, legs and pelvis of the driver’s seat (and passenger seat, if you are sensitive and someone else drives for you).

Unfortunately, it is not easy to measure dirty electricity, or harmonic frequencies, in a car because there is no 120 Volt AC electric outlet inside the car to plug your Greenwave or Stetzer Microsurge Electromagnetic Interference (EMI) meter into, like we do in a house. That eliminates the most common way of measuring dirty electricity used by most people. We use an oscilloscope and spectrum analyzer for that. You can contact LessEMF to purchase a portable PC-based oscilloscope that uses a laptop for the display, which you can bring into the car and measure the dirty electricity with. You can purchase a whip antenna from LessEMF to measure the electric field component and their “blue cube” magnetic field detector to measure the magnetic field component of the dirty electricity.

Depending upon which model of Gauss meter you buy, it will tell you how much of a field you have from the harmonic frequencies. Each Gauss meter has an upper limit on the range of frequencies that it diesplays, so some include more harmonics than others. LessEMF and Safe Living Technologies list the frequency range measured by their Gauss meters so you can decide.

Also, triple-axis Gauss meters are preferable to single–axis Gaussmeters, but they cost more. See EMF Meters and Instruments for an explanation of that phenomenon and why it is important to purchase a triple axis Gauss meter whenever you can.

While most people assume that the gas-powered car they have driven all these years is free of EMFs while hybrid and all-electric cars on the market today are full of them, people honestly don't realize that the alternator and other components in the engine of a gasoline-powered car put out large magnetic fields that come right through the firewall between the engine compartment and where the driver and front passenger sit, particularly where your legs and feet are. In other words, we have all been sitting in large magnetic fields in the front seat for decades when we drive or ride in a car and have not known it (unless you are electrically sensitive, in which case you have known and felt this all along).

Magnetic Fields in Cars

Magnetic field levels in cars vary considerably from model to model and need to be evaluated individually with a Gauss meter. If you don't already have one, you can purchase a Gauss meter to measure them for yourself when you test drive a car or to measure the car you currently drive. Go to my article EMF Meters and Instruments and scroll down to the section on Magnetic Fields to see an array of Gauss meters available online at various prices.

The location of the alternator does vary, so you just have to see what the magnetic field levels are in every car you test drive. You may be lucky and find a gas-powered model that has relatively low magnetic field levels in the driver's seat and leg area.

The only company that makes an all-electric car that I know of that purposely shields against magnetic fields is Tesla Motors. If you can spend what it takes for a great all-electric car, you will be in good shape. I have riden in two Teslas for clients so far and found magnetic field levels of roughly 1 mG using a digital triple axis Magnii DSP-523 Gauss meter, so they are indeed magnetic field-reduced. Gasoline-powered cars and hybrids, on the other hand, can have AC magnetic fields as high as 5-10 mG or more at the feet and leg areas of the driver.

The bottom line is you simply have to measure each car for yourself. If you are electrically sensitive, you need to go by how you feel, regardless of what any gauss meter reads. Measure throughout the area that every part of your body will occupy as you drive as well as that of your passengers, especially children. Generally, back seats have much lower magnetic fields, if any, than front seat compartments, although some hybrids do have high magnetic field levels at the rear seat in front of the battery.

In general, try to determine where the strongest sources are for the driver and all passengers, particularly when the car is in motion. There will be many sources, not just right in front of or beneath your feet and legs. You can test in neutral, or the car may need to be in motion. However, be careful, and have someone else drive while you move the meter about and take readings.

Assuming you do find magnetic field readings above our generally accepted safe exposure levels for healthy people of 1.0 mG when the car is running, you then must deal with the question of how to effectively shield against these fields. Shielding against AC magnetic fields is the most difficult and expensive form of mitigation we encounter. The problem is, AC magnetic fields from electricity at such a low frequency as 60 Hz (cycles per seconds) bend around corners.

In reality, lines of magnetic field flux don't dissipate with shielding. They just get compressed and redirected, and only if the angle of the shielding plates or thick foil is correct. If the angle is very small and the plate is essentially perpendicular to the lines of flux, they will penetrate through the shielding, even if it is special material. Magnetic fileds act as if they re-propagate from edges of shielding material if that material is not wide enough, thereby providing a new source of the field that is closer to you. Also, you can only use special materials, such as nickel alloy, found in MuMetal and G-Iron, rather than standard steel or aluminum.

Getting adequate shielding in a house by simply putting up a large enough piece of G-Iron is possible if you are mounting a shield on a wall to protect against a so-called "point source" of magnetic field exposure on the other side, such as a breaker panel.

Trying to do the same in the convoluted confines of a car between the engine compartment and your body is another thing altogether. It usually does not work well. You can't shield all surfaces adequately, it is very expensive, and the results are not encouraging. Sources of magnetic field exposure can exist to the sides and not just in front of you, and it is virtually impossible to reach areas behind the console or dashboard.

Look at the FAQ page on LessEMF's website for their take on this process by clicking here and clicking on the question, "How can I shield high magnetic fields in my car?" They have varied success with their customers, but they, or Safe Living Technologies in Canada, are the best you can do as far as shielding magnetic fields in a car is concerned.

Controlling EMFs

Our philosophy is, control all EMFs that you can in your home, particularly where you sleep, so that when you are exposed to various EMFs away from home, such as while driving, you have better health to begin with and can withstand some degree of exposure. Remember, we have all been exposed to somewhat elevated magnetic fields in our gas-powered cars for decades and not known it. That doesn't mean they are not harmful. I am just trying to put the issue into perspective and help people to not worry unnecessarily about hybrid or electric-powered cars. Again, if you are not electrically sensitive, reduce and eliminate all the EMFs you do have control over in your home and in a car, and you can therefore better tolerate those you cannot.

If you are sensitive, you will probably need to avoid electric and hybrid vehicles altogether and measure gas-powered cars for a model with the lowest reading.

Modern cars also have computers and those people who are really EMF sensitive often react to harmonic frequencies from computer components in cars. For these people, generally speaking, the older the car, the simpler it is in terms of digital electronics. Many sensitive people can only tolerate cars without these electronics.

There are additional types of EMFs in modern cars, particularly from radio frequencies. This includes Wi-Fi and BlueTooth from GPS and communication with cell phones. These can and should be disabled, whether you are electrically sensitive or not. Using a cell phone in a car has its own problems, which I discuss in a separate article, entitled Car Rooftop Cell Antennas.

Good luck. Happy car hunting.

Print article