How to lower the EMF radiation in your car

How to diagnose EMF problems in a vehicle, and what can be done about them.

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Modern cars expose the driver and passengers to electromagnetic radiation that is usually higher than in a typical home or office. Most people can drive a car all day with no problems, but people with electrical sensitivities can be affected. The symptoms vary with the person, though commonly include headaches, dizziness, fatigue, irritability and even aggression. Road rage may be a symptom. A few people feel tension, pain or even burning sensations in their hands, feet or chest.

Before making changes to your car or looking for a low-radiation replacement, try some simple diagnostic tests to learn more.

Preparing for the tests

It is essential to do these tests diligently, or nothing will really be learned.

You need to feel as well as possible before each test. Otherwise it will be very difficult to really tell what causes the symptoms. Humans are not good "instruments."

The tests must be done in a low-radiation area, such as a large city park with no nearby transmission towers or power lines. Even better is open country. If driving is difficult, consider asking a helper to drive you there, while you sit on the back seat.

Make sure there is time to recover before each test. Do not rush; make sure there is plenty of time available.

For each test, make sure everything that is not essential is turned off completely, such as:

- headlights
- radio

- air conditioner
- circulation fan
- charging devices
- GPS/navigator
- mobile phone
- wireless network
- any other gadget of any kind

Do not cut corners on these requirements!

First Test

Sit in the driver's seat and turn on the engine. Leave the car parked. Do not move the car at all during this test.

Sit there for at least ten minutes with the engine idling.

If your symptoms have not worsened, then proceed to the Second Test.

If your symptoms did get worse, proceed to Third Test.

Second Test

Drive the car for at least ten minutes. Make sure to stay in a low-radiation area, even if you have to go in circles.

If your symptoms still have not worsened, then the problem is not the car itself. It may be all the gadgets that were turned off, the area you normally drive, or other problems outside the car.

If symptoms did get worse when the car was moving, then the problem is the moving parts of the car, such as:

- steel belts on tires
- tire pressure monitors
- anti-lock brakes
- speedometer/tachometer
- automatic transmission
- electric motors (electric or hybrid cars)

Try the Fourth Test to see what you can further learn.

Third Test

When even the idling car is a problem, get hold of some heavy duty ear protectors (as used for target practice and by operators of heavy equipment). The problem could actually be the noise itself (hyperacusis). This is a common problem for sensitive people who sometimes also have problems with noise from radios, televisions, telephones, lawn mowers, helicopters, etc.

If this test does not help, proceed with the Fourth Test.

The Fourth Test

Sit on the back seat, while the car is parked and the engine is idling. The back seat usually has the lowest radiation level in a car.

Experiment sitting in both sides and the middle. The radiation level can vary dramatically depending on the location of the fuel pump, any spare battery, where the wires go, etc. A gaussmeter can be helpful to find the best spot to sit.

If you feel fine in a different seat, ask a friend or family member to drive you while you sit there. That may be a temporary solution.

If you do not feel well anywhere in the car, that is not a good sign. It may take extensive work to make the car drivable, and it may not be realistic. But read on before giving up.

What to do?

You should now have a better idea about how the car affects you and when. That should help you choose between the various options to try and in what order.

There may be several things that affect you and you'll need to address all of them to feel better. Think of it as if you have five nails stuck in your foot — you won't feel better until all five nails have been removed.

Read through this entire article and also the other articles about low-EMF vehicles on this website (see link at the end). You will probably need to discuss this with someone knowledgeable about cars, and who is also open minded enough to give it serious thought.

For the actual work, you'll probably need the help of a skilled car mechanic, perhaps even more than one.

The rest of this article is a catalog of projects. We list what to consider first up front, as they are the simpler ones and those most likely to make a major difference. Further on we get into more exotic measures, which are difficult and require more expertise. Hopefully they will not be necessary.

The information we present is generic; you will need to determine for yourself what is appropriate to try for your particular situation. This includes any issues regarding personal safety and legalities.

A special problem with cars is that they vibrate a lot. Screws and other equipment may work themselves loose if not fastened well.

If you are not sure if you should do a project, try something else first, then reconsider.

There is no guarantee of success; this is very much pioneering work. Act accordingly.

Warnings and disclaimer

Modifying a vehicle involves risk of damage to the vehicle, risk of injury to persons and possibly breaking laws.

An example could be the mounting of a solar panel on the roof of the car. One or more screws could work themselves loose due to vibration, with the possibility that the panel could fall off and injure someone.

Another example is a possible short in the electrical system, which could start a fire, or the battery leaking acid, both of which could cause damage and injury.

Cars with computers and other sophisticated electronics may be sensitive to any arching (sparking) from disconnecting/reconnecting the battery or other connectors. It may "fry" such electronic parts.

If safety features such as airbags and tire monitors are disconnected, they are not available if they are needed one day. If that day arrives, it could make the difference between injury and death.

Some modifications may not be legal to do yourself, or even at all, depending on the local laws.

We are not aware of any of these problems actually happening, but they could happen, especially if the modifications were done poorly.

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Choosing the car to modify

Before you embark on any major project, consider if your car is a good candidate. It is always easier to modify a car that happens to be less radiant to start with. Depending on how sensitive you are, it may not be possible to modify your existing car. You may need to buy a different car. It could also be much cheaper than making major changes to your existing car.

Do not bother trying to modify an electric vehicle or a hybrid vehicle. It is very unlikely to be successful. We don't know of anyone who has tried.

To identify a good car to attempt the conversion on, please read the article "How to Buy a Low-EMF Car" which is available via the link at the end of this article.

You may find you tolerate another car so well you don't need to make any changes to it.

Get the tools to measure EMF

You'll likely need these three tools:

- AM radio (small portable)
- gaussmeter (teslameter)
- RF meter

A low-cost portable AM radio is best, as they more easily pick up disturbances.

Tune the AM radio to a frequency on the low end of the dial where there is minimal noise and no station can be heard. Then move it around the dashboard, the center console and other areas with electronics. Notice how the radiation can be heard through the speaker. It's a crude tool, but very handy.

It is best if you have a gaussmeter (teslameter) that is sensitive enough to measure 0.01 milligauss (1 nanotesla). Most consumer-grade meters are not that sensitive. Otherwise you may be more sensitive than the instrument.

Most consumer grade RF meters will be sufficient for this job. Some microwave sources transmit in bursts that are difficult to be picked up by low-cost RF meters. The way around that is to mount the RF meter on the tripod and record the MAX value over a few minutes.

It is best to do measurements in a place where the ambient radiation is low. Try to measure a little away from the car before measuring inside the car, so you know what the lowest possible reading is. Be aware that ambient RF levels can change dramatically in a short time.

Replace the smart key

Some cars have a so-called “smart key.” It is a small plastic fob that you just need to keep on your person or in your purse to enter and drive the car. Such a car is usually started by pressing a button instead of turning a key. This type of system irradiates everybody inside the vehicle with high levels of microwaves as long as the engine is on. The radiation comes both from the dashboard and the key itself. The smart key became a common option on cars by around 2015, though some cars had it earlier.

If your car has a smart key, that is probably the biggest source of EMF exposure.

Contact a parts supplier or dealership to see if it is possible to install a regular ignition key instead. This should be possible on models available with either a regular key or a smart key.

Degaussing the tires

When the car is moving, the tires will send out EMF (as a low-frequency magnetic field). The steel belts below the tire thread nearly always have magnetic spots which causes this. The closest tire can expose the person in the car to several milligauss (hundreds of nanotesla).

If you feel fine inside the car when it sits still, but not when it is moving, this could be the reason.

This problem can be solved by removing the magnetic spots. This is called degaussing and is covered in detail by a separate article available via the link at the end of this article.

We will discuss degaussing again later on here, as well.

Grounding straps

A grounding strap connects the chassis of the car to the ground below the car. It is usually a flexible piece of conductive plastic that drags on the asphalt.

These straps are sold to prevent build-up of static electricity, so when people step out of the car they do not get shocked.

Grounding straps do not lower the radiation inside the car. They are a waste of time.

Metal sensitivity

In rare cases a person is bothered when close to a lot of metal. They get symptoms sitting in a car with the ignition off and all electronics totally off. The biological reason for this is not understood and is likely well beyond today's medical understanding of the human body.

Some of these people have found it helpful to place pieces of wood or ceramic tiles in the footwell, so their feet are a little further from the metal floor.

Caution about damaging computer-controlled cars

Modern cars contain computers. Initially, a computer just controlled the ignition for more precise timing of the spark plugs to reduce emissions and to improve mileage. Later on computers took over many more tasks.

Computer chips are more sensitive to electrical disturbances than are simple electronic components, and replacing them can be expensive.

We are not aware of anyone who has tried to make low-EMF modifications to a computer-controlled car's electrical system, so we can't speak from direct experience, but here is one important issue we know about:

The computer chips can be damaged by arching. Arching can happen if you disconnect or reconnect the battery without special precautions. Arching can also happen if you disconnect a live wire or fuse carrying a current. Arching can give computer chips a shock that may destroy them.

Computer chips can also be damaged if the voltage is too high. This could happen if you connect a solar panel to the electrical system, without a battery to moderate the voltage (such as when changing the battery). More about this later.

Disconnect unnecessary parts

Some components in a car are not essential and may add to the radiation inside the car.

Take a look at the fuse box. You'll probably need the car's manual to see what each fuse is for. Experiment by pulling out the fuses that do not serve any essential equipment.

Consider going one step further by unplugging individual modules around the car. This involves opening up the dashboard, center console and interior panels to get to the hidden wires. It may be simple to unplug the connector, or it may be necessary to snip the wire. Be sure you are capable of doing this work, or get someone else to do it, preferably a mechanic with electrical skills.

Some of the options to consider include:

- GPS system
- emergency wireless (such as OnStar)
- wireless network
- stereo
- rear camera *
- tire-pressure monitor *
- cruise control
- electric auxiliary cooling fan **
- backup battery
- clock
- seat warmers
- anti-theft devices

* This is a safety device you may not want to disconnect, though drivers lived without it for a century.

** Without this fan the engine can overheat on steep roads.

It probably does not make sense to disconnect any of the following, since they are just used briefly, or are essential:

- turn signals
- headlights
- electric windows

- electric seat adjusters

You may need to use an AM radio, gaussmeter and RF meter to locate further sources of radiation.

Headlights

Headlights use a lot of electricity, so when they are on, the wiring feeding the lights will generate a magnetic field. This is a problem because of the "dirty DC" electricity coming from the alternator.

In most cars the current is passed through a switch on the dashboard which is close to the driver. Some models also pass the current through the high-beam switch on the turn signal arm on the steering column, which is even closer to the driver.

The obvious simple solution is to avoid driving at night. In some countries the law requires lights to be on in the daytime. In Sweden people with EHS have successfully gotten exemptions from such a law.

We know one Canadian who had more efficient lights installed, which produced enough light at a lower wattage. This reduced the amps going through the steering column, and thus the radiation exposure.

It may be possible to reroute the electricity through a separate switch, though that will probably mean it is no longer possible to flash the lights easily.

Another option is to run the headlights from batteries, without an alternator (see later).

Fluttering relays

Relays are usually located near the fuses but can be elsewhere as well. When they wear out they can flutter and generate high-frequency spikes on the electrical wires.

Turn on the ignition to the car, so the electrical circuits are powered but the engine is not on. You may need to briefly start the engine and then turn the ignition key one step back.

Turn on a portable AM radio and tune it to the low end of the dial where no station can be heard. Then hold the radio up against the relays, with the speaker facing you.

Using an AM radio to check for fluttering or arching relays.

Any fluttering relay should be easily heard in the radio. Pull out the relays one at a time to determine the faulty relay.

Newer cars have so many electronics which can interfere with the AM radio that it may not be possible to do this test.

The reason the engine needs to be off is that the alternator and any electric fuel pumps will disturb the AM radio. The engine noise may also make it impossible to hear the radio.

The test can also be done using an analog gaussmeter, such as the TriField. Digital gaussmeters may not be fast enough.

The alternator

The alternator generates the DC electricity that powers the ignition system and electronics in a car. The alternator produces a magnetic field as it turns, and there can also be radiation from brushes and slip rings that transfer electricity between the rotor and stator. The electricity generated is alternating (AC) which is then rectified to DC, so it will be pulsing and thus still creates magnetic fields around the wires.

It's may be a good investment to replace the alternator, as an old and worn alternator may be more "dirty" than a new one, because of wear of the slip rings or brushes. A brush-less alternator is best.

Disconnect the alternator

The most effective way to handle the alternator problems is to disconnect it entirely. It is sometimes possible to instead let the car run off a battery. This is much better, because a battery does not produce any pulsing DC and thus no EMF. (If the alternator is running, a gaussmeter will show EMF on the battery, but that is because of the alternator and other sources of dirty DC, not the battery itself.) This is only realistic on cars that use very little electricity, such as older cars with a diesel engine. It may not make sense to attempt to this with a gasoline engine since the ignition systems generate a lot of pulses on their own, and consumes a lot of electricity.

Low-cost DC clamp-on ammeter.

To find out how much electricity it takes to run the car, you'll need a DC clamp-on ammeter. Beware that most clamp-on ammeters can only measure AC electricity; you'll need one for DC electricity.

To do the measurement:

- Turn off everything possible in the car (radio, lights, AC, etc.)
- Disconnect ALL wires to the alternator
- Start the engine
- Clamp or place the DC ammeter on the cable to the battery
- Read the number of amps
- Turn off engine
- Reconnect the alternator wires

This test should tell you how much electricity the car consumes by itself, and whether it is feasible to run it without an alternator. The lower the number the better. A few older diesel cars use as little as 1 amp (which is 12 watts on a 12 volt system). If the car consumes more than 10 amps, it is not realistic to do this modification.

Do not worry about the high current when the engine is started. It is brief and not a problem.

It may be possible to fully remove the alternator if the belt it is on is not powering anything else. In most cases the alternator has to be left in place as a belt tightener. Just make real sure ALL wires to it are fully disconnected.

The battery can then be charged by a battery charger when returning from a trip, or solar panels can be installed on the car to charge the battery.

It may be necessary to install extra batteries in the car.

Make sure to install a voltmeter on the dashboard, if there isn't one there already, so the driver can monitor the battery's state of charge.

A 60 watt solar panel mounted on a roof rack on a car without an alternator.

A voltmeter is needed to monitor the battery.

The size of the solar panel depends on how much electricity is needed and the climate. There are people in the sunny Arizonan desert whose cars consume about 10 watts and can be driven all day long with a 40 watt solar panel.

A larger solar panel is needed for a less sunny climate or a northern climate. Try to fit an 80-100 watt panel, or use two panels.

In some climates it will be necessary to use a battery charger during the winter.

A charge controller is needed to ensure the battery is not overcharged. Most charge controllers pulse the current for improved charging, but avoid that feature. Instead, use a simple old-fashioned on/off charger, such as manufactured by Sunforce, Flexcharge or Specialty Concepts.

<u>CAUTION</u>: If you install a solar panel on the car, make sure it is always connected to a battery. If you connect a solar panel to a car's electrical system without a battery, the voltage can rise above 21 volts and overheat sensitive electronics, including computer chips, which may need costly replacement.

This can happen if you change the battery while the solar panel is charging. To avoid this, you can install a switch to disconnect the solar panel.

This is not an issue in electronic-free cars, such as the Mercedes cars from the early 1980s that some people use. (This author has changed the battery many times without any precautions.)

It is possible that modern cars are protected by robust DC-DC voltage converters (that would make sense), but we don't know.

LED bulbs

Older vehicles will have incandescent bulbs for brake lights, license plate, turn signals, etc. If you disconnect the alternator, consider replacing these with the much more energy efficient LED lights. The brake lights are an especially good choice, as they consume a lot of electricity.

LED light bulbs are available that fit directly into the existing sockets.

Older turn signal relays may not work well with LED lamps, as they will flash too fast. The solution is to install a special resistor, but then the energy saving is lost.

These LED lamps are not a good choice for inside the cabin, as their light quality is poor.

The LED lamps we have tested did not have any electronics in them and thus do not generate dirty electricity. (Some LED flashlights do have DC-DC converters to extend battery life, but we haven't seen this problem with automotive LED bulbs.)

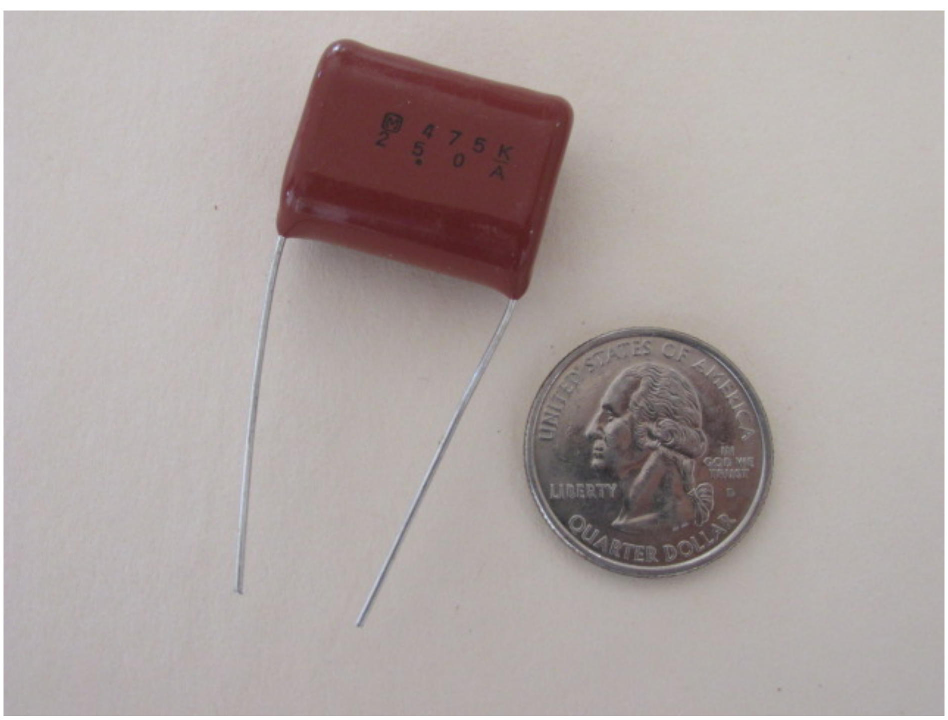
Capacitors

Capacitors can be installed to dampen spikes on the electrical wires. They have been used for decades to dampen the spikes from the spark plugs to reduce interference with radio reception. All modern cars have these already.

Capacitors can be used elsewhere in a car as well. They work best placed as close to the source as possible. If at all possible mount them directly on each piece of equipment, such as between the +12 volt power terminal and bolt holding it on the chassis.

Try to mount one or more 1 uF (or larger) capacitors between the output terminal of the alternator and the housing (i.e. the chassis). Also experiment with whether it helps to place another capacitor between the field input terminal and the housing (the voltage regulator may not like it).

Capacitors are available from online electronics suppliers, such as Digikey in America. The capacitors should be either polymer type or ceramic; do not use electrolytic capacitors (they are slow and less durable). The size should be at least 1 microfarad (1 uF).



A polymer capacitor of 22 uF

Make sure the capacitors are mounted so they won't get loose or fall apart with metal fatigue. A car is a rough environment with a lot of vibrations.

Use your instruments to see if each capacitor was helpful or not. A gaussmeter and an AM radio are the main instruments. If you have access to an oscilloscope, that is even better.

Gasoline engines

Gasoline engines fire spark plugs inside their cylinders. The ignition system rapidly sends pulses of DC electricity of 20,000 volts or higher to the spark plugs so they can generate a brief lightning burst to ignite the fuel.

The first commercial radio transmitters (around 1910) used a similar technology called spark gap transmitters to reach hundreds of miles.

A car's ignition system radiates a lot of high-frequency radiation when it generates the high voltage needed for the spark plugs. The basic principle involves a coil and a magnet (either electrical or permanent) and has not really changed since the early cars. Ignition systems became electronically controlled in the 1970s, and continued to become more sophisticated over time to better control the sparks for increased fuel efficiency and less exhaust. But the basic principle remains unchanged.

This author has not attempted to reduce the radio-frequency radiation from a gasoline engine. Some older books about radio frequency interference for radio amateurs suggest placing capacitors around the ignition system, between the positive wires and chassis. However, doing so can cause new problems, so experiment and check with your instruments.

An American invented a spark plug that does not need an ignition system. It is called the "smartplug" and is described on the website smartplugs.com (as of 2018). But no manufacturer was interested in the invention and the smart plugs are not available for sale, though the inventor did supply one person with EHS with a sample, and it worked. Each smartplug must be designed specifically for the engine.

Diesel engines have no spark plugs and no ignition systems. For that reason, diesel cars are allowed near some radio observatories, while gasoline engines are banned. Using a diesel engine is far superior to a gasoline engine for low-radiation vehicles. The downside is their exhaust, though several people with EHS and MCS do drive diesels (this author knows eleven people). They are just careful, such as when stopping at a traffic light with the windows open.

Modify the wiring

The wiring can be modified to decrease the radiation from it, but this is a major job that has to be done properly to be safe (especially to prevent electrical fires).

In normal household wiring, the cables in the walls have two conductors (phase and neutral) that run right next to each other and carry the current in opposite directions. Because of this, the magnetic fields of the two conductors largely cancel each other out (by about 90%).

In a car, the two conductors (positive and negative) do not run adjacent to each other. The positive runs through a wire (usually red) while in most cases the negative runs through the steel body of the car. This means that their opposing magnetic fields do not cancel each other out.

This was the ultra-short explanation why the following remedy helps. A full explanation is beyond this article, but this is basic EMC engineering and you can easily verify it yourself by comparing the radiation from two wires separated from each other with two wires twisted together.

Use a gaussmeter to identify wires that radiate near the driver and the passengers. This will often include the wire to the fuel pump in the rear and the wire to the battery from the alternator.

In the case of the alternator, try a simple fix by stringing a new black wire from the alternator to where the battery negative is bolted to the chassis. That way most of the charging current won't go through the chassis.

Otherwise, in general try to replace the one positive (red) wire with two: one for positive and one for negative.

If possible, twist the wires around each other, as shown on the picture.

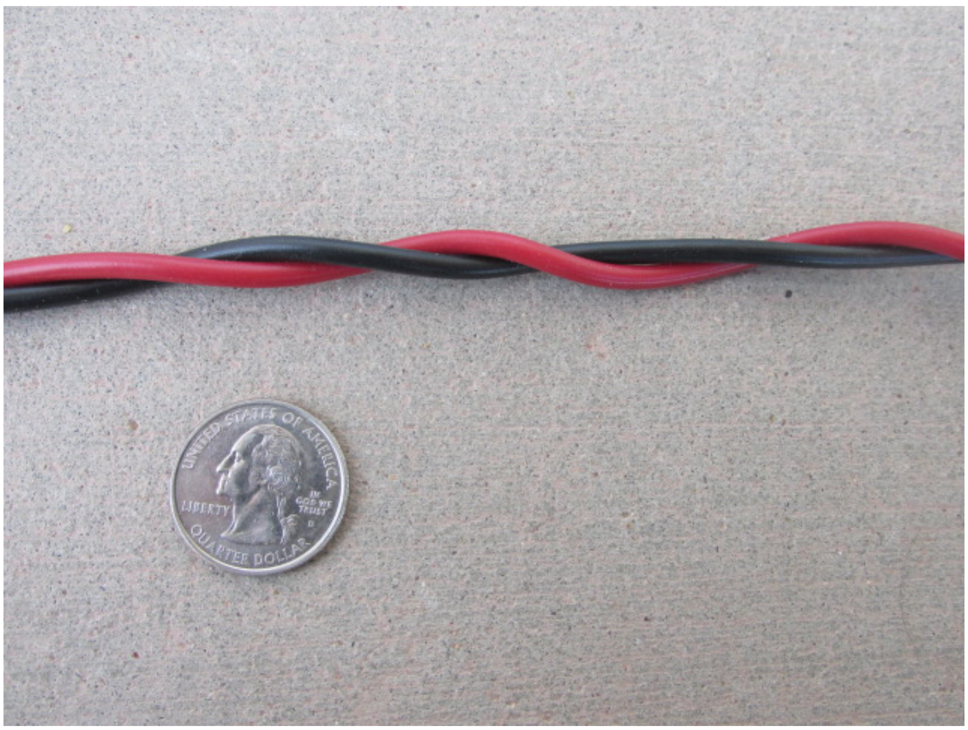
It may also help to fully isolate the device (fuel pump, etc.) from the chassis, so the negative current has one path only, i.e. through the new negative wire.

Route the negative wire along the positive as much as possible, and then directly to the battery. A special junction box for the new negative wires may need to be installed next to the battery's negative post.

Try to route the wires further away from the driver/passenger, if possible. Even a few inches/centimeters can help.

Do not share one negative wire between two circuits. It is important that the current on the negative wire is the same as on the positive wire for the fields to balance each other.

Make sure the new wires are as thick (same gauge) as the wires they replace.



To lower radiation from wires, install twisted-pair positive/negative wires to carry the current, instead of through the chassis.

If the modification is done well, the magnetic radiation (as measured by a gaussmeter) should be reduced about a hundredfold (i.e. by 99%).

Tire-pressure monitors

There are three kinds of tire-pressure monitoring systems:

- indirect
- direct (wireless with battery)

- direct (wireless with wireless power)

The indirect systems work by monitoring small changes in each tire's circumference, as the air pressure in the tire gets lower. This is done by monitoring the speed of each wheel, compared to the other wheels, using magnetic pulses. The same sensors are also used for anti-lock braking systems.

The problem here is mostly the wires carrying the pulses to the central computer. Some cars may have a microprocessor mounted next to each wheel instead. In any case, it does not look like there is a remedy available.

The "direct" systems actually measure the air pressure in each tire and transmit it wirelessly to a receiver someplace in the car. The sensor is built into the air valve on the tire. The sensor is usually powered by a tiny battery built into the sensor. It may be possible to replace the air valve with one without a built-in sensor, or it may be possible to drain the battery in each sensor, or get old sensors with worn-out batteries.

A battery powered wireless monitor built into the valve.

The wirelessly powered systems have no batteries; instead the sensor in the tire is powered by a magnetic field (induction) similar to the RFID anti-shoplifting tags in stores. There is probably a transmitter/receiver coil mounted next to each wheel. It may be possible to disconnect this coil.

We have not actually measured any of the tire-pressure monitors and don't know how bad they are. The wireless powered systems are probably the worst. The battery-powered systems need to conserve electricity and thus will transmit as weakly and infrequently as possible.

If the monitor sensor is defeated, a warning will be displayed on the dashboard, and this safety feature will no longer be active. One source states that under-inflated tires cause about 40,000 car accidents and 650 fatalities each year in United States. It is unclear how many are prevented by these systems.

Shielding

Shielding is like a band-aid — it is a help, but it is much better to limit the source. Shielding is the last option to solve a problem, when all else fails. It should never be the first choice.

Shielding is a large and complicated subject. We will just present some simple and basic pointers here. Don't expect any miracles. Expect to experiment.

Shielding is used to either encapsulate the source of radiation or to encapsulate the person to be protected.

It is best to place shielding as close to the source as possible and either fully encapsulate the source or leave a gap facing away from the driver/passenger. It is much less effective to try to shield the person, such as shown in the picture.

Shielding of a footwell using mumetal foil. Once the panels were put back in place, the shielding was no longer visible. In this case, the shielding reduced low-frequency radiation by about half, which is actually very little.

In general, steel, silicone steel and mumetal (special alloys) are best for low frequencies, while aluminum foil is best for radio frequencies.

Exotic (and expensive) shielding materials will not perform as well as advertised and may not do any good at all if the shielding is not installed well — i.e. covering the source fully, without gaps. Gaps, holes and slits are the bane of a shielding project.

Consider shielding wires that radiate the most, such as those connected to:

- fuel pump
- anti-lock brake magnetic sensors
- transmission speed sensor
- wiring harness inside/below dashboard

Degaussing

When a magnet spins in a circle it generates EMF. The frequency is the same as the number of revolutions per second. This principle is used to generate electricity, whether it is in a car's alternator or in the giant generator in a power plant. No EMF is generated when the magnet is still, except for a weak DC field which very rarely is a problem. When car parts are manufactured they often develop magnetic spots on them. These spots do not fade with time. When a piece of steel with one or more magnetic spots on it spins around, it will send out EMF, which can be measured with a gaussmeter (also called a teslameter).

The most common problems with spinning magnets are the alternator and the tires. These are both covered earlier in this article and should be taken care of before considering any other magnetic problems.

There are two basic ways to remove a magnetic problem:

- degaussing
- replacing with non-magnetic material

There is a detailed article about degaussing car tires available through the link at the end of this article. It includes an introduction to degaussing that we will not repeat here.

Use a gaussmeter to try to identify which moving parts create a measurable field around the driver. They are probably no further away than about a foot (30 cm). Depending on the layout of the vehicle that could include the drive shaft, torq converter, flywheel, gear box, wheels and other moving parts.

Degaussing complex parts (such as the torq converter and gear box) is very difficult to do correctly. Try something simpler first and don't attempt these parts unless absolutely necessary. It will be a lot of trial and error. Use a magnetometer to monitor the work closely.

It is necessary to remove any part before it is degaussed. Otherwise the degausser can't do the job well, and may inadvertently create magnetic hot spots in other parts.

Do not attempt such projects before everything else has been ruled out and the person doing the work must have experience using the degausser as it is easy to botch the job and make it all worse. It may be impossible to remedy a botched job.

Degaussing complex parks is difficult as the degausser's magnetic field is reflected around in unpredictable ways.

Aluminum, stainless steel, copper, ceramic and plastic cannot be magnetized. In some cases it may be better to replace the offending part with one of these materials, if available. Aluminum wheels are one practical example.

It is unlikely that replacing or degaussing car parts (other than the tires) will make sense in a car that still uses an alternator, since the alternator and its dirty electricity will be a stronger source of radiation.

Recreational vehicles/caravans

These types of vehicles may have additional sources of radiation that can be quite powerful.

They often have two separate 12 volt electrical systems with separate batteries. Both systems are charged by the engine alternator, using a "battery isolator" to charge the deep-cycle batteries. This device can be a big problem in itself. The solution is to fully disconnect the battery isolator and charge the deep cycle batteries using solar, shore power or a generator.

When the author disconnected the battery isolator in a RoadTrek 190, the radiation at the driver's seat dropped from 120 milligauss to 20 milligauss (12,000 nanotesla to 2000 nanotesla).

Be aware that inverters and battery chargers (for shore power or generator) are other big sources of radiation. Keep them turned off whenever possible. Perhaps go for a walk while the batteries are being charged and use 12 volt lights and appliances only.

If using solar power, it is best to use a charge controller that does not pulse the current (avoid MPPT or PWM models).

End note

Safe transportation is one of the biggest challenges facing people with severe electrosensitivity.

Converting a car can be a task beyond most people's ability and financial means, especially if the person is very sensitive and the car is not low EMF to start with. Some people have to accept a difficult situation where they have no transportation, or they are unable to drive themselves (but can sit on the back seat).

More articles about low EMF vehicles

This website has more articles about low EMF vehicles, including how to degauss tires, what to look for when shopping for a low EMF car, and a detailed description of a specific conversion. These are all found on www.eiwellspring.org/vehicle.html.

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