A Complete Guide To

Building A Faraday Cage

&

What You Should Keep In IT

By Ryan Preda

Table of Contents

Introduction

What if you woke up one morning and nothing worked? What if there was no electricity?

Dr. Peter Pry (Executive Director of the Task Force on National and Homeland Security) warns that the consequences of not being prepared for this event are much more severe than one may think:

“Within a year of an EMP event at least two thirds of the U.S. population will perish from starvation, disease, and social collapse.”

Former CIA double agent Reza Kahlili, who spent time in the Iranian Army, confirmed that the Iranians have conducted missile tests on ships in the Caspian Sea that are consistent with an EMP attack:

“They are going to get to the Gulf of Mexico with ballistic missiles. They can launch one at a moment’s notice, and they wouldn’t care about the repercussions.”

This is mostly because they can sink the vessel, leaving no traces, and because the U.S. won’t be able to retaliate!

This is a catastrophic threat, and North Korea, China, Russia, and even ISIS all understand it, and they are all working on it. And if they’ll ever wage war on us, they would be stupid not to strike America’s Achilles’ heel!

If one of the nuclear powers blasts a nuclear weapon 275 miles above the U.S. it will produce an EMP that will basically send us, the Canadians, and the Mexicans back to the Dark Ages.

Will we be able to fight back in case of a nuclear war?

I don't think so! Probably most of our ICBMs will turn into a pile of junk (although some are EMP hardened). The communication lines and mobiles will become useless. And on top of that, I don't think that our ballistic missile defense (BMD) system will work at all after a powerful HEMP.

Years ago the U.S. Army indeed straightened some military equipment against an EMP attack. The congressional study EMP Report (back in 2004) indicated potential casualty rates of 90%. The result: The commission was disbanded! What does the U.S. do to prevent an EMP attack right now? NOTHING!

In a highly developed country such as the United States, the EMP is one of the most devastating things that might happen, but people aren't always aware of what the impact of an EMP could be, not even when they are told that an EMP would absolutely toast the electrical grid and pretty much everything that has at least one electronic circuit in it. But think about a world with no electricity, plenty of damaged vehicles blocking the roads, no means of communication, no refrigeration, no heat, no functional medical equipment, planes falling from the sky, nuclear plants unable to cool down their reactors—basically a world in which every piece of electronics we use, from pacemakers to phones to gasoline pumps, would stop working. And this would last for at least 18 months!

A powerful EMP is generated by a nuclear device that is detonated high in the atmosphere. A powerful electromagnetic discharge can permanently damage the electrical grid and cause the collapse of transportation and communication networks.

Banks won't be able to release your money, grocery stores won't be able to use their systems to sell merchandise, people will panic and devastate stores to get all the supplies they might find, the roads will be blocked by damaged cars, and it will be virtually impossible to travel along highways or refresh stocks of medicine and food.

No central heating, no light in your house, no running water, no functional electronics—and this would be the situation for the next couple of years. Yes, it's correct; according to the EMP Commission Report, it would take an average of 18 months to change all the damaged components and restore the electrical grid. But did this estimation take into account all the issues that will arise from the impossibility to produce spare parts and from the severe damage of the transportation network? How many of us would live to see it functional again?

The only thing in the world that could protect your electronics against the effects of a massive EMP is a Faraday cage. It's something every concerned citizen should have since survival would greatly depend on it.

How Does the Faraday Cage Work?

The first Faraday cage was invented in 1836 by Michael Faraday. Basically, a Faraday cage is built to protect the items inside it against static electric fields. Faraday cages are hollow conductors that will take the electrostatic charges and distribute them evenly on their surfaces, canceling the field's effect on the interior and thus protecting the items placed inside it.

Faraday discovered that an electrical conductor—and metals are great conductors! —only exhibits an electrical charge on its surface. Practically, the electrical charge has no effect on the interior of the conductor. Maybe the most obvious Faraday cages are planes—they are often struck by lightning; however, the passengers and the equipment inside are not hurt or damaged. Still, this is not enough in case of an EMP, since it's not the electrical charge that causes the most damage. It's mainly the electromagnetic radiation that destroys electronic circuits. An EMP will destroy all the automatic controls of a plane, making it impossible to land and causing them to simply crash to the ground. So speaking from the point of view of an EMP, the most important thing about a Faraday cage is that it shields the interior against electromagnetic radiation. The effectiveness of a Faraday cage depends somewhat on the type of metal it is built from and on the thickness of the metal shield.

How to Build a Faraday Cage at Home

As I already explained, a Faraday cage is any sealed enclosure that has an electrically conductive outer layer and a non-conductive inner layer that will prevent electronics from being in direct contact with the electrically charged outer layer.

The simplest Faraday cage you can build at home is made from a simple cardboard box. The huge advantage of the Faraday cage made from a cardboard box is that you can actually take it along with you in your bug-out bag for instance. It would offer protection to a small radio, a small cellphone, a solar battery charger, basic duplicate electronics for your car, and so on.

All you have to do is wrap the cardboard box in heavy-duty aluminum foil. My advice is to use at least two layers of aluminum. You can then test the box—you will find detailed information on how to do that in this guide—and if necessary, you can apply additional layers of aluminum foil for the best result. Make sure that the box is completely isolated. Pay extra attention to the corners of the box—the aluminum foil is somewhat delicate, and it might break around the corners.

Another handy solution to building a Faraday cage is using a galvanized trash can. This variant has many advantages: It uses a common item, the trash can, and it also provides plenty of space for many more electronics than a simple box. The average size of a trash can is 31 gallon (20.5 x 20.5 x 27 inches approximately) so if you choose to use this as a Faraday cage, you can even fit in a small laptop, for instance.

The Faraday box made in a trash can needs to be carefully lined with some isolating material. You can use cardboard, Styrofoam, carpet scraps—they are all in-hand solutions. Make sure that this inner isolating layer is complete and intact, without any gaps, as they could lead to permanent damage to the electronics you choose to store inside. Don’t forget to insulate the lid as well!

There are viable solutions for even larger Faraday cages built at home as long as you keep in mind the basic rules: conductive outer layer, isolating

inner layer. However, larger Faraday cages are much harder to move around, so don't expect to be able to take them with you if you need to change your location. You can use a wooden box wrapped in aluminum foil, but you need to pay attention to the nails in it. You can use a metal storage cabinet that would be insulated with cardboard on the inside. Make sure that all the items you put inside are packed in their original cardboard box!

Or you can even make your own Faraday room. Many engineers use the so-called shielded rooms to filter out interfering signals that might affect their experiments. Shielded rooms are also used in medicine for some examination devices. You can build one too! A closet is the best choice. You just need to wrap all four walls, the floor, the ceiling, and, of course, the door, in a conductive material. Heavy-duty aluminum foil is a good choice; just make sure that the pieces are well overlapped and the seams are taped with conductive tape. All electrical outlets and light switches should be carefully covered in foil, and you should also put a large piece of cardboard on the floor to protect the foil from damage. Some tests proved that this type of room can offer more than 50dB of shielding up to several hundred MHz. An additional safety measure to protect the electronics you want to store in your shielded room is to keep them in their original boxes while wrapping them in aluminum foil. Basically, this means you have electronics individually packed in Faraday cages and placed inside a shielded room.

Also, a great idea for maintaining this extra protection is to wrap each box in a piece of cloth prior to putting them in aluminum foil. This little trick protects the aluminum foil against the sharp edges and corners of each of the boxes. Keep in mind that if the aluminum foil is even slightly damaged, the Faraday cage will not work, and your electronics will be permanently damaged!

What Should You Put Inside Your Faraday Cage?

The list of items to be protected in your Faraday cage can vary depending on the available space you have. The best piece of advice is to have a small Faraday cage that could also be placed in your bug-out bag, which would protect some very basic items, and a larger one, located in your safe place, where you can store electronics that will simply make your life easier in the incoming years.

Here is a list of important electronics that you should store in a Faraday cage:

- A radio for communication, important updates, and gathering information on what is going on in the whole country
- A set of walkie-talkies that run on rechargeable batteries
- A small generator
- A rechargeable flashlight—or several!
- An old laptop computer where you have stored useful information for survival, manuals on survival DIY projects, and so on
- A DVD with the essential software you need in order to reinstall the operating system
- Electronic parts for your car: a PCM (Powertrain Control Module), an Electronic Fuel Injection, Electronic Ignition, and possibly other parts depending on the type of vehicle you are using
- Solar chargers and solar power adapters
- Hearing aid
- A cell phone with a spare battery
- An external hard disk drive or USB flash disks to store relevant information
- A radiation detector to check for radiation levels in case of a nuclear EMP
- Battery chargers
- Spare electrical parts for your generator
- Spare solar panel
- Rechargeable hand tools: drill, saw, power screwdriver

- A motor for a small wind turbine
- Various electronic components, if you are able to use them
- Watches
- Electric toothbrush
- Electric shaver/hair clipper
- Medical devices: blood sugar tester, oxygen generator, pacemaker, and so on

Daily Protection

Our way of life practically exposes all our small electronic devices to the effects of an EMP. Theoretically, a device that is not working at the moment of an EMP is protected against the shock. But that's just the theory.

Lots of electronic devices we use are not turned off but are left in standby. And all of them are connected to the electrical grid, even when we don't use them. It's easy to understand that they are actually exposed to the EMP, and it's quite probable that they would get toasted once the electrical grid is affected. Anti-static bags might offer some protection in case of an EMP. I wouldn't count on them exclusively, but I would make a habit of unplugging devices when they're not in use and storing them in such bags. They come in different sizes and are pretty versatile.

Does Your Faraday Cage Work? Here's How to Test It!

Testing a Faraday cage is pretty simple. Since it's essential that your Faraday cage works, I recommend using two different tests: One is using a cell phone, the other one a radio.

Put a cell phone in your Faraday cage, and try calling it from another phone. If your Faraday cage works, the cell phone will not ring. The voice mail will be all you hear at the other end of the line.

Another test can be done using a small battery-operated radio. Turn it on, and put it in the Faraday cage. If your cage is perfectly insulated, the radio should stop working since radio waves can't penetrate inside.

If the Faraday cage you built is not as effective as you expected, add another aluminum foil layer, and test it again. Also, always double-check if the foil completely covers the box or if the insulation inside the garbage can is properly done. After all, it's a matter of survival, so you can never be too careful!

Frequently Asked Questions About a Faraday Cage

- **Can a Faraday cage provide 100% protection against ALL EMPs?**

Unfortunately, no. It depends on the frequency of the EMP and how thick the Faraday cage walls are. Anyway, a Faraday box is much more efficient than a Faraday cage made from mesh because the higher the frequency of the EMP, the smaller the openings need to be.

- **Can microwave ovens be used as Faraday cages?**

Some people ask whether a microwave oven would protect electronics from an EMP. Some say it would since there's little chance to be able to call a cell phone placed inside a microwave oven or to make a radio play while being placed inside. The truth is a microwave oven is only effective for a rather narrow frequency band, while a true Faraday cage should screen out all frequencies. Long story short, I decided to test my microwave oven as well as my freezer and my refrigerator—and they didn't pass the test. Of course, I decided to build my own Faraday cage following

the above mentioned instructions rather than take a chance with a microwave oven.

- **Is it necessary to ground your Faraday cage?**

Small Faraday cages, with no conductors penetrating the shield, do not need grounding. Larger cages with penetrating conductors might need grounding. However, unless you have a large amount of experience with grounding high-intensity, high-frequency magnetic fields, specialists advise against grounding the Faraday cage.