

[A List of Lists](#)[Forum](#)[About](#)

the Survival MOM™

[At Home](#)[Instant Survival Tips](#)[More](#)[Prepared](#)OCT
18
2012

Why and how to protect your gear from EMP

11 Comments

Posted in: [Featured](#), [Skills](#)

Like

43

Tweet

8

18

I hope that you are working on this month's skill, [Make a Faraday Cage](#). In this article, Rob Hanus of [The Preparedness Podcast](#), explains more about an EMP and goes into detail how he has built Faraday containers for his [family](#).

One of the scarier survival events that preppers need to be concerned about is an attack involving a High-altitude ElectroMagnetic Pulse, also called HEMP. All nuclear weapons create EMP, but when detonated high in the atmosphere, the EMP generated is so massive that it can destroy electronics and permanently knock out the power grid across the entire country.

While there have been several venues of entertainment to come out recently that highlight this type of event, typical of Hollywood, changes in physics and reality were made to better suit the plot. Let's take a look at some facts and how you can protect your sensitive electronic gear from an EMP attack.

Factual information is hard to come by

The first thing that we need to look at is the distinct lack of information available about EMP and its effects. Most of what we know is from nuclear tests, both American and Soviet, in the 1960s. Data and information after that period is still highly classified, so all we have to go on is what has been declassified from this earlier era of tests. However, this information, along with a few pieces of recent data, is enough to make some reasonable projections.

The second thing we need to understand is that a HEMP attack on the United States is about as bad as it gets. Experts predict that [70% – 90% of Americans](#) would be dead within 12 – 18 months after an EMP

attack. The reason for this is the extreme dependence on electricity and the delocalization of [resources](#), like food, water and sanitation abilities.

EMP is survivable, but you need to start preparing for it now. Unlike other disasters, there is no warning or precursor, and no ability to, “finish prepping,” once it occurs. EMP is an instantaneous event. One second after an EMP attack, it’s lights out forever.

Just as deadly, the Coronal Mass Ejection

A Coronal Mass Ejection, or CME, is another event that can take out the entire power grid. When highly charged plasma particles from the surface of the sun crash into the Earth’s magnetosphere, it induces electrical current in long lines of metal, like wires and pipes. This induction of current will destroy the transformers needed for power transmission on the grid, essentially wiping out the ability for power grid to remain operational.

However, unlike EMP, a CME event does not destroy electronic devices, unless they happen to be connected to the power grid or long lines that will collect the induced current. For more on the differences between EMP and CME, you can read about it [here](#).

Why bother protecting electronics?

In this article, we’re going to be covering how to make a simple Faraday cage to protect your electronic devices. There are two main reasons why you want to protect your gear from EMP. The first is that having the ability to communicate via [radio](#) and generate power, both can give you a huge tactical advantage when trying to survive in a powerless world.

The second is the massive amount of information that you can store in digital format. As hardly anyone today remembers how to do things the, “old world,” way, this information will allow you to restart your life at a mid-1800s level.

What is a Faraday cage?

The Faraday cage is named after Michael Faraday, the scientist who discovered its properties for shielding against electromagnetic waves, including electricity. You can build simple Faraday cages at home at a very low cost that will work just as well as the expensive ones that the government uses. All it takes is some common household items.

A Faraday cage protects its contents by preventing electromagnetic energy from getting inside. Expensive Faraday units use a combination of a fine copper mesh and solid aluminum. You can build your own at home using aluminum foil and a galvanized steel trash can. By the way, Faraday shielding doesn’t actually have to be a cage, it’s simply anything that blocks electromagnetic radiation.

There are lots of places on the Internet claiming that all you need to do is put your gear into a microwave oven or Mylar bag and it will be protected from EMP. It would be wonderful if these worked, but unfortunately, I am highly skeptical of them. You can easily test these and see for yourself.

The frequencies for EMP range from approximately AM radio to approximately FM radio (actually, EMP frequencies have a much broader range, but the AM/FM radio comparison is close enough). AM signals go as low as 540 kHz and the FM radio band stops at 108 MHz. Don’t worry if those frequencies don’t mean anything to you. The important thing to know is that you can test how effective a container will work at shielding electromagnetic frequencies, simply by using an AM/FM radio.

First, tune the radio to a strong FM station and turn up the volume. Put it into the Faraday cage you're testing and listen to see if the radio station is still being picked up by the radio. Don't get too excited if it doesn't, as FM signals are very easy to shield against.

Next, tune the radio to a strong AM station and retest. The low frequency of AM signals are very good at penetrating objects. If you can't hear the AM station anymore, that's a good sign. Anything that can block strong AM and FM radio signals would probably make a good Faraday cage. Keep in mind, though, that the power of these signals in your home are relatively weak (unless you happen to live under a radio tower).

This is important to know because you will see videos online where people put their cell phones into a microwave, Mylar bag or some other type of "Faraday" protection and demonstrate the effectiveness by showing how the cell phone loses the WiFi and cell tower signals.

Cell signals are extremely weak to begin with and are very easy to block. These demonstrations are not good tests for protecting against EMP. A food grade Mylar bag won't even stop 11 watts of WiFi signal (a 2.4 GHz frequency) from reaching my iPhone when it's right next to the wireless router. It certainly won't stop the destructive pulse from EMP.

I conducted EMP-protection tests myself

When looking for an inexpensive way to protect my electronic gear from EMP, this author personally tested several methods. As I mentioned, the tests are imperfect because we're only testing for a certain range of frequencies, but we can get really good information from these tests.

One test involved being on top of a mountain that was filled with radio antennas. The collective power of all these radio towers was 9,000,000 watts of RF (Radio Frequency) energy! Another test was standing at the base of a 50,000 watt AM station.

So, what worked?

Using the AM/FM radio test, it was found that both Mylar bags and microwave ovens were not good Faraday cages. Both of these failed inside my home. They simply did not work well at all. When I tuned an AM radio to a strong station and put it in the microwave, I could still hear the station. The shielding on a microwave oven is tuned to block out signals in the 2.4 GHz range, which is the same as most WiFi routers (most cell phones are close to this range, too). Thus, when you put your cell phone in them, it's not surprising that they lose signal. They can also block out most FM radio stations. However, because of the nature of longer radio waves, AM signals pass right through the shielding found in the modern microwave oven.

Because Mylar bags are a lot easier to transport than a microwave oven, they were tested at the radio antennas sites. Even tightly wrapping the radio in two Mylar bags, the signals still got through. In fact, the Mylar bags didn't seem to reduce the RF radiation at all.

It turns out that a very effective shielding can be made from aluminum foil. Common heavy duty aluminum foil successfully blocked all nine million watts of RF energy from reaching the radios. The radio needed to be wrapped in three layers, but it worked! For AM signals though, I needed five layers to successfully block out the RF energy.

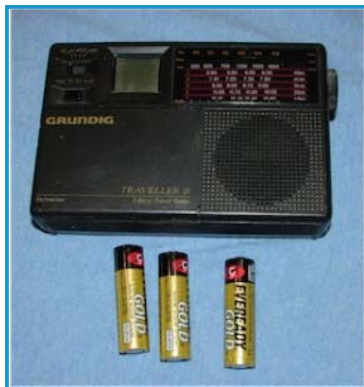
This means that you should be able to easily protect your electronic gear from EMP simply by wrapping it in aluminum foil. I also found that placing the foil-wrapped radio inside a galvanized steel trash can greatly increased the effectiveness of the shielding.

Here's how to do it

To start, here's a few things to keep in mind:

- There needs to be a minimum of 3 layers of aluminum foil completely surrounding the device.
- Use a minimum of 5 layers if you're not going to be using a second layer of shielding, e.g. the metal trash can.
- The foil must not contact the device directly, so first wrap it in paper or cloth. I use cloth.
- The foil-wrapped device must not touch the inside of the outer Faraday container.
- In order for the Faraday cage to be effective, the metal needs to completely surround the device being protected.
- Use heavy duty aluminum foil, the thicker the better.

When you wrap your electronic device, it's important to prevent it from touching the foil. Otherwise, it's like making an antenna for the EMP to get right to the item you're trying to protect. You can protect this by wrapping the device in paper, wax paper, an envelope or cardboard box. Whichever works best for whatever you're wrapping in foil. If the device has protrusions, it's best to wrap it in something thicker than thin plastic wrap or paper. Use a box or envelope of some sort. This will help keep the item from poking through the foil.



Remove batteries from electronics.

If your device has an antenna that does not retract or fold into the device and can be removed, go ahead and remove it. Likewise for any cords or wires.

It's not necessary to remove these,

but can make it more difficult to wrap. You don't want to have any risk of protruding parts poking through the foil, as this will void any Faraday protection. Just make sure that any wires, cords and antennas are completely within the foil.

If the device has a removable battery, remove it and store it separately. The last thing you want is to find out that the batteries leaked and ruined the equipment that you went to so much trouble to protect.

You can use anything non-conductive to wrap the devices, here I used an old sheet and plastic wrap. The cloth sheet prevents "pointy" parts of the device from poking through the foil and the plastic wrap keeps cloth to hold the fabric in place. I could have used tape, but the plastic wrap is reusable and I can see through it to make sure that the cloth is in place. I don't use plastic wrap directly on devices, as I don't



want any letters or print on the device to get stuck to the plastic in long term storage and come off when I remove the wrap.



All wrapped up.

Wrap the device in the foil, making sure that all areas around the device have a minimum of 3 layers. If you're not going to be storing these foil-wrapped items in another Faraday container, then make sure to wrap 5 layers of foil around the device. In tests that I've done, it seems that wrapping each layer individually seems to work better than folding the foil into a double layer and then wrapping.



You don't have to wrap up every item individually. You can save time and space, and avoid the need for cloth and plastic wrap by putting several devices into a small bag, cloth pouch or box.

What if you want to protect devices that have internal batteries that can't be removed? Many of these items would be helpful in a post-EMP world, but you'll need to determine a way to store them and periodically recharge the batteries.

Once you have all of your devices wrapped in several layers of aluminum foil, you've taken a big step in protecting them from EMP. However, you should place all of these foil-wrapped items into another layer of Faraday protection, as EMP is an extremely powerful pulse and every layer between it and the device diminishes its ability to destroy electronics.



Combine gear into a bag.

One of the easiest ways to do this second layer is to put them into a galvanized steel trash can. With a tight fitting lid, it's surprising how well this works.



Because you need to keep the items inside the can from touching the inside metal of the can, line the trash can with cardboard. If a foil wrapped item touches the inside of the can, it's like there's only one level of protection, and could end up focusing the EMP directly towards the device. Not a good thing.

Once you have your items wrapped and your can lined, place the items in the can and put the lid on. You may want to duct tape the lid in place, so that it doesn't get accidentally knocked loose. Any gap between the lid and the can and it loses its ability to function as a Faraday cage. If you have space, go ahead and wrap the items in more cloth, to further protect them from accidentally shifting and causing a tear or hole in the foil when you move the can.



As you can see from the picture above, there is a lot of room in a 31 gallon trash can. Pack the items that can be left sealed in foil indefinitely on the bottom and place on top the items that need to be checked on or have their batteries charged. If you happen to fill the can with equipment, make sure you place cloth or



other non-conductive material on top so that nothing can touch the inside of the can lid or the top around the sides. Also, make sure that you have a metal to metal contact between the lid and the can. Don't put paint, tape or anything that would get between the can and the lid, as this would likely render the can ineffective as a Faraday cage.

One final note. Should an EMP attack ever happen, don't rush to open your Faraday cage and start pulling out your gear. The enemy may pop off the first EMP and then wait a few days or a week before popping off another one. This way they could ensure that they are destroying as much as possible.

Consider having two sets of gear in separate Faraday cages. The first one would be small and only have a few items, like an AM/FM/Shortwave radio and a few walkie-talkies. Your second one would be larger and contain all of your main gear, which you would open only after a reasonable amount of time, or when you needed the equipment inside.

As you can see, protecting your electronic gear isn't difficult. While EMP will destroy most electronic equipment and take out the power grid, by taking simple precautions now, you can ensure that you have functioning equipment to make the transition to a whole new way of life a little easier.

© 2012, [thesurvivalmom](#). All rights reserved.

Check these out, too!

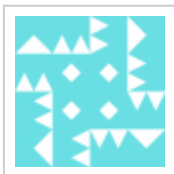
- [Skill of the Month: Make a Faraday cage](#)
- [What's in YOUR Faraday Cage? A common sense guide to preparing for an EMP](#)
- [The Basics of EMP: What is it, how likely, and how to prepare?](#)
- [Preserving the Most Precious Memories](#)

Like < 43

Tweet < 8

18

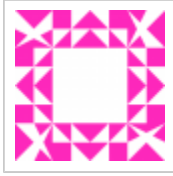
(11) Readers Comments



Julie

OCTOBER 18, 2012 AT 12:13 PM

Thanks for the info! Sounds so much easier than I thought. Any advice on protecting vehicles from an EMP? it is my understanding that car ignitions won't work after such an attack.

[Reply](#)

Hannibal

OCTOBER 18, 2012 AT 2:10 PM

I know a guy that insists that simply disconnecting a cars battery will protect the cars computer from an EMP. Is there any truth to this?

For Anne, battery backups, solar power tied to battery banks and generators will still run a lot of electronic equipment. Think HAM radios and the ability to connect with others over great distances. The more info from the outside the better.

[Reply](#)

Rob Hanus

OCTOBER 18, 2012 AT 6:24 PM

The hardest thing to protecting your gear against EMP is actually doing it. Followed closely, I think, by how to manage those devices that don't have removable batteries, but you want to store anyway. Things like old iPhone or Androids, ebook readers, and so on. For these devices, I think it's just a matter of having to have the discipline to take these out every 30 to 60 days and charge them up.

As for vehicles, there is no way to know for sure. There has been no hard-core conclusive testing on vehicles, so a lot of what scientists and engineers talk about are only educated guesses. Granted, these are very educated guesses, but there's enough dispute among them to be able to derive a conclusive answer from it.

There's also a lot of variables: Is the car running when EMP hits? Is it parked under a metal roof or underground? How well shielded is the computer on the vehicle from the manufacturer? Etc.

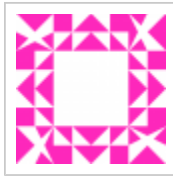
Best answer we have: Some cars will be toast, some won't. You may be able to reset the computer by disconnecting the battery for a few minutes.

[Reply](#)

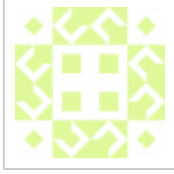
Hannibal

OCTOBER 19, 2012 AT 12:59 PM

[Reply](#)



Thank you!



Anne

OCTOBER 18, 2012 AT 12:16 PM

What I don't understand is, if there is going to be no power for a very long time or maybe indefinitely, why protect electronic devices that you will then be unable to use because there is no power? I get the walkie talkies and a radio, but what else are people thinking of? Exactly what devices are people trying to shield, and are they things that would be able to run on batteries? My thinking has run along the lines of just adjusting to life without power and do everything possible to be able to survive and thrive without it. Am I missing the point?

Reply



Rob Hanus

OCTOBER 18, 2012 AT 6:42 PM

Receiving information over AM or Shortwave would be good to have, but so would the ability to communicate with others, especially for defense purposes. Far easier for a group or neighborhood with a few CB radios to be able to warn each other about intruders, than clanging on a large bell.

Many modern flashlights, including LED lights, are very susceptible to EMP.

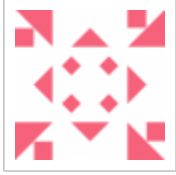
If you live on a farm or retreat, I'm sure having some spare parts to keep your alternate energy system working and/or your well pump working would be incredibly handy.

Night vision and perimeter monitoring would give you the tactical advantage to stay alive as you try to defend your home or retreat.

The ability to have massive amounts of information in a digital format allows for you to search for specific information far faster and more efficient than with paper books. You should have paper books, but having additional books in digital form, is a huge plus. Not to mention having thousands of novels, videos and songs that you wouldn't otherwise have.

For more info: <http://www.thepreparednesspodcast.com/what-to-store-in-your-faraday-cages> or <http://thesurvivalmom.com/2012/07/16/whats-in-your-faraday-cage-a-common-sense-guide-to-preparing-for-an-emp/>

Reply



Kelly

OCTOBER 18, 2012 AT 12:58 PM

Why do you have to shield disconnected power cords? I get that they can act as antennas, but if not connected to anything, what damage can EMP do to them?

Thanks for the great, practical info!

Reply



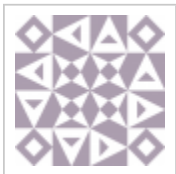
Rob Hanus

OCTOBER 18, 2012 AT 6:48 PM

I don't think the article said to wrap these by themselves. If you cannot remove cords and antennas from devices, then they need to be completely contained in the same container as the device they're connected to. If they can be removed and do *not* have any electronics in them, they don't need to be protected, though you'll want to keep all parts together so you don't lose or misplace these removed parts.

Keep in mind, though, that some cords, especially those like charging cords, have chips in them. This includes cords you wouldn't expect to have chips in them like Apple's cords for iOS devices. These would also need to be protected to ensure that they will function after an EMP.

Reply



Zena

OCTOBER 19, 2012 AT 1:01 PM

Thanks for the informative post. Question: what about the charge controller for my off-grid power system? We live off the solar panels, charge controller, inverter and batteries (Edison batteries are amazing, by the way!) with a back up generator for long stretches of cloudy weather. We are about 7 miles from the nearest utility pole. I can't figure out if this system is vulnerable to what you are describing. I need to know if I should be wrapping my power shed with tinfoil! Thanks! – Z

Reply

Rob Hanus

OCTOBER 20, 2012 AT 10:57 AM



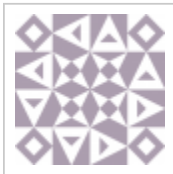
First, keep in mind that anything that is connected to wires or metal is more susceptible to an EMP. The metal in wires and pipes acts like a collector for the EMP and directs it into whatever is connected. If what is connected contains semiconductors, they'll probably be damaged or not outright destroyed. Small devices not connected to wires or metal might survive, or they might not; it depends on how strong the EMP is at your location (i.e., are you directly under the blast or at the edge of the line-of-site radius).

Charge controllers, inverters, blocking diodes are all very susceptible to an EMP. I think there are some ways to protect using MOVs, but I have no experience with these. The only way to make sure that you'll have all your systems working after an EMP event is to have safely squirreled away replacements for them. Likewise with your generator; store whatever electronic parts are needed for it to run.

Wrapping your shed in foil might work, but unless there was no gaps in the metal sheathing, it would probably only be marginal protection. However, that doesn't mean that you shouldn't do it. Since we don't know exactly how an EMP will behave, particularly for a given location, every step you take is like adding another layer.

So, putting tin metal sheeting on your shed, storing often used items in a sealed metal trash can when not in use, deep storing in Faraday containers replacements and spare parts, and even unplugging devices and appliances from the wall outlet when not in use would all help to decrease your susceptibility to an EMP.

Reply



Zena

OCTOBER 20, 2012 AT 4:31 PM

Thanks! – Z

Reply

LEAVE A REPLY

Your email address will not be published. Required fields are marked *

Name *

Email *

Website

Comment

You may use these HTML tags and attributes:

 <abbr title=""> <acronym title=""> <blockquote cite=""> <cite> <code> <del
datetime=""> <i> <q cite=""> <strike>

Post Comment



Contact Lisa

© 2012 The Survival Mom™. All Righ

[Back to top](#) | [Home Page](#)

Name *

Email *

Your Message *

Submit