

## Who Couldn't Use a Faraday Cage? (Plus, How to Make One)

### From Emergency Essentials

#### What It is

A Faraday cage, also known as a Faraday shield, Radio Frequency Cage, or EMF (Electromotive Force) Cage, is simply an enclosure built to protect electronic devices from electromagnetic radiation and electrostatic discharges. It can be anything from a small box to a large room, covered with conductive metal or wire mesh, which prevents surges from damaging the equipment inside.

The sources of these surges can be powerful lightning strikes, destructive solar flares (CMEs, or Coronal Mass Ejections) directed toward earth, or the effects of an EMP (electromagnetic pulse) from a nuclear bomb detonation high in the atmosphere.

The device is named for Michael Faraday, who observed in 1836 that the excess charge from a conductor remained on the outside of a container and had no effect on the interior contents. He experimented by building a room coated with metal foil and allowed high-voltage discharges from a generator to strike the outside of it. He used an electroscope to show that there was no electric charge present on the inside of the room's walls. Though the device bears Faraday's name, Benjamin Franklin is believed to have been the first to discover the principle.

Faraday cages, or shields, are used all throughout our society. Some are used in the scan-rooms of MRI machines, in which the "cage" effect prevents radio frequency signals from being added to the data from the patient's image. Some electrical linemen wear "Faraday suits" when working on live, high-voltage power lines to prevent accidental electrocution. Military planners and politicians who have reason to keep their communications private often meet in Faraday-protected rooms that are impervious to electronic "eavesdropping." In 2013, the Vatican even used the technology to shield the Sistine Chapel from curious listeners during the deliberations to select the new Pope.

Many people buy Faraday bags to protect their cell phones and laptops both from electrical surges and from unwanted surveillance or tracking. According to the National Weather Service, an automobile is essentially a Faraday cage, and it's the metal surrounding you, not the rubber tires, that protects you from lightning (as long as you're not touching metal inside the car). A smaller example is a microwave oven, which is a Faraday cage in reverse, trapping the waves inside the device instead of keeping them out. In fact, an old microwave oven makes a good Faraday cage for small electronics!

Typical items that can be stored in a Faraday cage include

- Laptop or notebook computers
- Thumb drives or external hard drives
- Cell phones

- Ipads, iPods, and e-readers
- Portable AM/Shortwave radios, ham radio equipment, and walkie-talkies
- DC/AC inverters
- Battery-powered radios

### **Why You Might Need One**

Why, you may ask, would it do any good for you to have working electronics when everyone else's would be down or destroyed? First of all, you might still be able to communicate with people outside the affected area (and it may be very difficult at first to determine how large that affected area is).

Second, you won't be the only "techie" who thought to protect valuable electronics in a Faraday cage. Some preppers do this as a matter of course, and eventually you would probably be able to communicate with them. (Cell towers, however, would likely be "fried" and need to be rebuilt). Communication at such a time would be extremely valuable. Unless there had been well-publicized warnings of impending CMEs in the days before the event, many people would have no idea what had happened to our world. Ham radio operators, who could communicate with other Hams around the globe, might become the new heroes of the day. Many AM/FM and shortwave radio stations believe that they'll still be able to broadcast after an EMP or CME event, and without all the usual "noise" of our plugged-in society, their waves may be able to travel farther than they do now. Hopefully there would be Faraday-protected radios out there to receive their signals!

There is, however, a likelihood that the earth's electromagnetic field would be seriously disrupted by such an event, and it might take quite a while for things to settle down and not cause static on the airwaves.

### **How to Make a Faraday Cage**

To be effective, a Faraday cage must:

- Be covered with conductive metal or mesh. Copper is the most conductive metal, followed by aluminum. (Well--gold and silver are better, but we assume you won't be covering your cage with those!)
- Be properly grounded (according to some experts, to prevent shocks when touched)
- Adequately surround whatever it's protecting.

In addition, whatever is inside should be adequately insulated from the cage itself, such as being placed on wood, in a cardboard box, or on a rubber mat so that it doesn't touch any metal.

### **Faraday Box # 1—The Galvanized Trash Can**



You will need

- A galvanized metal trash can with a tight-fitting lid
- Several boxes of heavy-duty aluminum foil
- Enough metal screening or mesh to wrap around the top of the can and fit over the lip
- Cardboard boxes of assorted sizes that fit inside the can
- Plastic garbage bags or plastic wrap
- Cloth pieces to wrap items

Wrap the items you wish to protect first in cloth, then plastic, then 3-4 layers of heavy-duty foil, being sure that the foil is molded to the shape of the item and that each layer completely covers the previous one, with no tears or holes.

Place your wrapped items in cardboard boxes. Tape shut, then wrap the entire box with 2 layers of foil. Line the trash can with cardboard, including the bottom, making sure there are no gaps. The foil-wrapped boxes must not touch the metal of the can. Set the can on wood or cardboard, not touching any other metal. Several experts say that simply putting the lid on the can, even if it fits tightly, is an insufficient seal. They suggest folding a sheet of metal screening around the top of the can and over the top lid and then forcing the lid over that to maintain a constant, tight-fitting metallic connection.

Remember, this is for long-term storage of the appliances inside, not something that you can take your appliances out of to use and then return to the container without a great deal of trouble. A good idea is to look around for good deals on duplicates of things you use every day.

Another important thing to remember is that you will need some type of charger—hand-cranked or solar-powered—to power up your devices once a crisis has passed. If you can wrap and store one of these in a protected Faraday container, you'll be glad to have it.

### **Faraday Cage # 2—A Metal-Clad Box**

Any box made of non-conductive material such as plywood, and then totally covered with metal, metal mesh, or metal screening can serve as a Faraday cage. The metal must touch at all the corners and over and all around any opening for the protection to be complete, as an electrical charge will Replace its way through any gaps or crevices in the construction. The smaller the holes in the mesh or screen, the better the protection—but either mesh or screen is believed to work better than solid metal. The metal can be attached to the wood with staples or screws, whichever seems to work best for you. You might consider applying the metal mesh so that it folds around the corners. Then let the next piece overlap the edge of the first, securely fastened together and to the wood so that there is no break in the conductive shield.

### **Updated: Living Off the Grid**

For those who don't rely as heavily on electronic equipment for day-to-day life, the idea of Living Off the Grid is more realistic. Those who live off the grid don't need to worry quite as much about EMP's or CME's causing havoc and chaos to their daily routine because they have already given up a lot of the equipment that would be affected by those electromagnetic pulses. However, living off the grid doesn't always mean going completely electronics-free. In this case, living off the grid may not protect you from the aftermath of EMP's or CME's even if you produce your own electricity from an alternate source. Faraday cages can benefit a variety of lifestyles to protect you and your electronics. There are many uncertainties about exactly what would happen in the case of an enormous release of electromagnetic energy in our civilized, plugged-in world. We can hope that nothing will happen to damage our electronics, but in case our hopes are vain, we'll be happy for every measure we've taken to prepare!

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