What A Faraday Cage Is And Why You Need One

- America is more vulnerable to HEMP than any other nation on Earth.
- Today, the US electric grid is over 1,000,000 times more vulnerable than it was in the 1960's and is growing more vulnerable every year.
- A Faraday cage is a shielded envelope that protects a space by conducting electromagnetic energy around it via the skin effect.
- Faraday cages are inexpensive insurance against perhaps the single greatest threat to the USA and perhaps all of humanity.
- Faraday cages are useful for more than just EMP. Pocket liners sewn from conductive fabrics protect against data skimming, auto theft and can make your cell phone 'disappear' from the grid and reappear as needed.

Why Every American Should Have a Faraday Cage

The USA is one of the most technologically advanced nations on the planet. Our embrace and adoption of technology has helped us maintain our lead as the richest nation on the planet, but it has also given our great nation a fatal vulnerability … our power grid.

If our electrical grid goes down, so does banking, agriculture, transportation, water treatment and supply, food production and distribution, manufacturing, healthcare and much of our national defense. There is hardly an aspect of life in modern America that would not be affected.

Our power grid has been patched together, piece by piece, over the past 135 years. It is aging, unstable and nobody knows how to restart it if it ever goes down because it has never happened before.

HEMP

Just one nuclear weapon, detonated high enough above the central US, could bring down the power grid in nearly the entire lower 48 states and parts of Canada and Mexico.

In case you are wondering, this is not Sci Fi fantasy. This is a clear and present danger confirmed by two Congressional Commissions, NASA, the National Academy of Sciences and others. In my opinion, the single most dangerous aspect of the HEMP threat is that Americans are so inexcusably ignorant of it.

If enough Americans were aware of the threat HEMP poses, we would harden our grid against the worst aspects of it for $200M-$300M and go back to guarding against the myriad lesser threats that can’t kill off 90% of the country that spend far more money on.

Plenty of information about HEMP has been declassified since 2004. Unfortunately, being confronted with the truth has not been enough to get the sheeple to get the US Government to do anything about it.

Video first seen on Electric Power Research Institute

While American ignorance of HEMP is still alive and well,

plenty of credible evidence exists that Russia, China, North Korea, Iran and other nations are well aware of the threat that HEMP poses to a highly automated, high tech nation like the USA.

Not convinced? Here is a quote of Chinese military doctrine as quoted by Dr. Peter Pry of the Congressional EMP Commission in his book, "Electronic Armageddon."

> *"Some people might think that things similar to the 'Pearl Harbor Incident' are unlikely to take place during the information age. Yet it could be regarded as the 'Pearl Harbor Incident' of the 21st Century if a surprise attack is conducted against an enemy's crucial information systems of command, control and communications by such means as … electromagnetic pulse weapons … Even a superpower like the United States, which possesses nuclear missiles and powerful armed forces, cannot guarantee its immunity … In their own words, a highly computerized and open society like the United States is extremely vulnerable to electronic attacks from all sides. This is because the U.S. economy, from banks to telephone systems and from power plants to iron and steel works, relies entirely on computer networks …. When a country grown increasingly powerful economically and technologically … it will become increasingly dependent on modern information systems …. The United States is more vulnerable to attacks than any other country in the world."*

How HEMP Works

When a nuclear weapon is detonated, part of the energy from the detonation is expressed as electromagnetic energy, like highly energetic radio waves. These waves can damage electronics, especially sensitive microelectronics.

When a nuclear weapon is detonated high in the atmosphere, it knocks high energy electrons of atoms in the mid to upper

atmosphere via a mechanism that physicists call Compton Scattering which is typically referred to in EMP literature as the **‘Compton Effect.’**

The first time the US detonated a nuclear weapon high in the atmosphere was during a test called Hardtack Yucca in Nevada during Operation Hardtack I. We sent a nuclear device of only 1.7 kilotons up to 86,000 feet using a helium balloon.

Scientists did not understand why it produced a thousand times more EMP than a device the same size on the ground. Scientists wrote it off, thinking it was as an anomaly, possibly instrument malfunction.

In a later test called Starfish Prime in the South Pacific, in 1962, we detonated a thermonuclear weapon high up in the atmosphere using a missile.

While scientists were not expecting the result, the thousand-fold increase in EMP yield of this large nuclear weapon was undeniable and they soon understood the mechanism of Compton Scattering, by which it occurred.

The HEMP form Starfish Prime damaged electrical systems 1400 miles away in Hawaii. Understand that this was before the era of microelectronics and that today, our electrical grid and electronics are over 1,000,000 times more vulnerable to HEMP than there were in 1962.

As transistors grow tinier and tinier, they are powered by lower and lower voltages, so when EMP induces too much voltage into them, they are very easily damaged.

What Electronics Are Vulnerable To HEMP

Generally speaking, the longer the length of a conductor and more modern microelectronics it contains, the more vulnerable

it is to HEMP.

Microelectronics as small as a wristwatch, USB Memory Stick or a MicroSD card would be much more difficult to damage by HEMP from a nuclear weapon because it may lack sufficient conductor length to build up enough charge to damage it.

Microelectronics the size of handheld radios and larger are much more vulnerable and any microelectronics that are connected to a wall outlet are extremely vulnerable. The electrical grid is basically a big EMP antenna, so connecting microelectronics to the grid before an EMP takes place would be an effective way to get them fried.

The older the circuits are, the less vulnerable they are. EMP mainly affects transistor-based microelectronics. Technology old-enough to use vacuum tubes would not be affected unless it was connected to a very long conductor.

A severe geomagnetic EMP caused by a solar storm in 1852 called the Carrington Event that damaged telegraph equipment, batteries, burned telegraph lines right off their poles and caught fire to some telegraph offices long before microelectronics ever existed.

The reason was that the very long conductors (telegraph lines) built up many volts per kilometer. In lines that ran hundreds or thousands of kilometers, this created far more voltage than the circuits could handle.

Risk/Reward Analysis Of Owning A Faraday Cage

When I warn of the dangers of HEMP, I am not attempting to foretell the future, warning that an HEMP attack is inevitable. What I am doing is warning others that a potential threat exists.

I am also not saying that owning a Faraday cage makes a person fully prepared to survive EMP. People do not generally die from microelectronics withdrawals. An EMP would kill through starvation, disease and violence.

Would-be survivors should store beans, bullets and band-aids in addition to making a Faraday cage, but if you want any of your microelectronic force multipliers to survive the HEMP to help get you through the starvation, disease and competition for resources that would undoubtedly follow a catastrophic EMP, you will need to protect those gadgets by storing them in a Faraday cage.

In assessing risk, one must consider not only the risk, (whether terrorists, Iran, North Korea, China, Russia or some other entity would carry out an HEMP attack) but also our exposure to that risk (which for Americans is near total since, by some predictions, and HEMP attack could end up killing up to 90% of the population of the USA.)

The fact is that no one knows the probability of a terrorist HEMP attack, because we cannot predict the future. What we can do well is that we can detect fragility and it is plain to see that our exposure to the threat is severe.

By preparing for the threat, we reduce our fragility, or our exposure to the threat.

Owning a Faraday cage is an inexpensive emergency preparation against the catastrophic risk which is HEMP. In a world where a number of cognitive biases have mankind systemically underestimating catastrophic risk, owning a Faraday cage is a refreshing, responsible, and sane thing to do.

Storing some key electronics in a Faraday cage reduces your exposure to HEMP by ensuring that you will still be able to communicate, receive news and instructions via radio, detect fallout, generate electricity, recharge batteries, access digital libraries you have saved, use computers, laser

rangefinder, LED lighting, night vision, GPS, electronic security and any other microelectronics that could aid in your survival in the event of HEMP.

HEMP is not the only kind of EMP. EMP occurs naturally as a product of solar storms interacting with the Earth’s magnetic field. This type of EMP is called geomagnetic EMP and has different properties than HEMP.

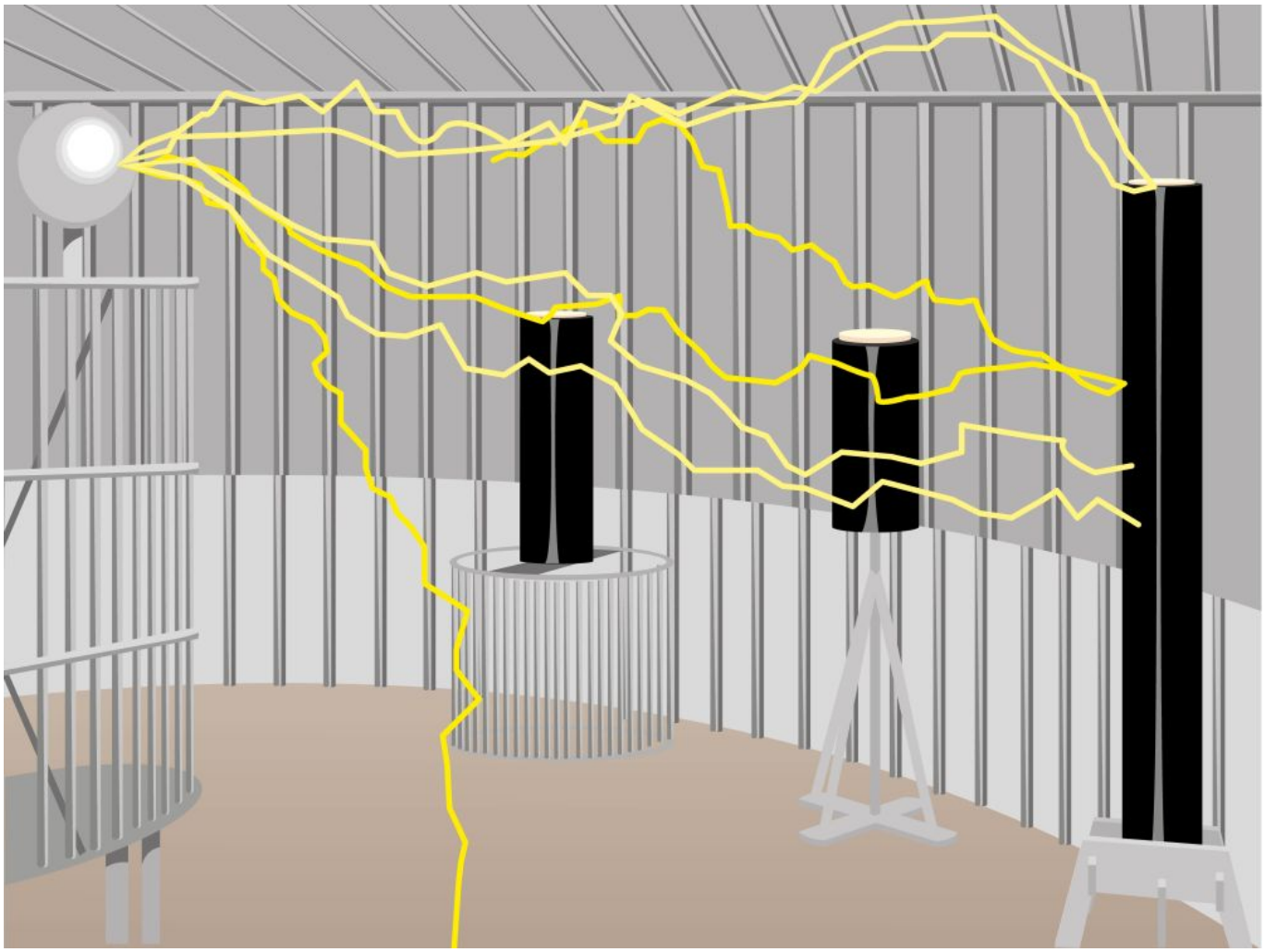
Because geomagnetic EMP affects only very long conductors running parallel to the surface of the Earth and the Earth’s magnetic field lines, a Faraday cage is not necessary to protect against this kind of EMP. Unplugging electronics from the power grid is typically sufficient.

The problem is that since we cannot foretell the future, we cannot know which type of EMP will happen first and since electronics have to be unplugged to put them inside a simple Faraday cage, storing items in Faraday cages protects against both geomagnetic and HEMP. This makes the Faraday cage a prudent measure against both types of EMP.

What Is A Faraday Cage?

You have probably already gathered that Faraday Cages protect microelectronics against EMP. A Faraday cage is a shielded envelope that protects a space from electromagnetic energy.

To do this, the skin of a Faraday Cage must be made of an electrical conductor, like copper, aluminum or ferrous metals and should be lined with a layer of non-conductive material to prevent contact with the skin from inside the cage.



Why Are They Called Cages?

In early electromagnetic experiments, a popular and visually impressive demonstration of the physical properties of the Faraday cage was to put a person inside a conductive metal cage and to arc great bolts of high voltage electricity at them from different angles using a powerful Tesla coil.

You may have seen this experiment and if you have not, I recommend it. Great bolts of electricity snap and arc and ionize the air. It is a lot of fun. For this experiment, the Faraday cage can have gaps or holes in it because of the frequency of the electricity.

As long as the cage conducts the electrical energy around the

person in the shielded space, they remain unharmed.

To shield across the frequency range that must be covered to protect microelectronics against the wide-spectrum EM fields generated by HEMP, a Faraday cage must not have any holes or gaps exceeding ¼" in size, so Faraday cages or bags are typically made of sheets of conductive materials or fine mesh.

How a Faraday Cage Works

A Faraday cage creates a shielded envelope of conductive material around a protected space that conducts EM energy around the protected space via the skin effect. Electrons must be allowed to flow freely and unimpeded throughout the conductive skin.

Since electrons follow the path of least resistance, the skin conducts them around the equipment inside the protected envelope.

Faraday cages should also be lined with a non-conductive layer, so they typically have a conductive layer, of say, aluminum or the aluminized layer of Mylar, on the outside and a non-conductive layer, of say, rubber or the PET layer of Mylar, on the inside.

This is to prevent current coursing through the skin of the Faraday cage from being conducted into the protected space and into the electronics we are protecting.

If the antenna of a radio inside a Faraday cage was able to touch the conductive skin of the cage while it was energized, it could be damaged. A layer of non-conductive material prevents that from happening.

Practical Faraday Cages

I have written other articles on how to build Faraday cages of

varying sizes and types from ammo can or trash can size, to closet size, to Quonset hut size, so I will not go into construction methods here, but it is useful to visualize types of Faraday cages.

As long as the cage has a conductive skin, it is a simple matter to line it with a non-conductor. This can be accomplished with a pack liner, a plastic bag or even a carboard box, provided it is thick enough.

Faraday cages can be built out of ammo cans, trash cans, aluminum pressure cookers or metal boxes.

Lids must fit tight and any non-conductive gaskets should be removed and replaced with conductive ones. Care must be taken anywhere panels, lids or doors mate to the rest of the skin. These must be free of non-conductive paint or adhesives that impede the free flow of electrons throughout the skin.

This can make for a lot of work if the cage is composed of many panels like a shipping container or shed. Another consideration that is often overlooked is that the shielded envelope must completely envelope the protected space.

If a shed lacks a floor, an entire side of the cage is unshielded. Electrons cannot flow there because there is no conductive floor to flow through. This can result in EMP being radiated into the protected space compromising the equipment.

In a pinch, a Faraday cage could be constructed out a cardboard box and aluminum foil, though it would not be very practical to remove and replace gear or maintain batteries. The foil would also be very fragile and tear easily.

A Faraday cage can also be a bag. These bags typically alternate conductive and non-conductive layers to achieve greater shielding effectiveness with less conductor thickness. Some of the better bags feature fine conductive mesh.

Such bags are often used in IT forensics work where police take electronics as evidence and cannot risk the electronics sending or receiving signals. Since the radio waves they send and receive are EM energy, like EMP, Faraday cages block those too.

Faraday Cages Have Applications Beyond EMP

Another application for Faraday cages is privacy and IT security. I carry a conductive metal wallet that shields the RFID chips on my credit cards from data theft by skimming. I also use Faraday pouches to line my pockets to protect my passport from skimming and to protect my car keys.

Some technically competent criminals can use electronics with high-gain antennas and amplifiers to ping a key fob from outside the victim’s home, capture the unlock code and then repeat the code to vehicle, unlocking it and, in some cases, starting it.

Putting my car keys in a Faraday bag protects against this. Integrating the Faraday bag into my EDC Valet and coat pocket using conductive fabric, made these security solutions convenient. I can also use my pocket liner to make my cellphone disappear form the grid and reappear as needed.

This helps manage my digital bread crumb trail. Like it or not, making so many data points available to law enforcement makes us susceptible to misinterpretation of evidence, cherry picking data and creating false context.

Understanding the basics of Faraday cages prepares survivalists for much more than just EMP.

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