How To Prepare Your Tractor For An EMP

If you are living on a homestead or farm, then I bet that a tractor will form a central part of your plans. As with other types of motor vehicles, tractors can also be destroyed by an electromagnetic pulse (EMP).

Invariably, if you have a newer tractor, or plan to buy one, you need to know which parts are most vulnerable, how to make repairs, and how to keep the tractor as safe as possible from EMP related damage.

Keep reading to get this knowledge. You will need it, for sure!

What About Buying an Older Model Tractor?

Many people concerned about EMPs ruining their automobile have decided to buy older cars that do not have computers in them. If you happen to be a fan of older cars and know their value and durability, then you may be led to believe that you can do the same thing with a tractor.

Here are some advantages and disadvantages you might encounter if you try to buy, and then fix up an older tractor.

- Even though a tractor may not be used every day, the time that it is in operation puts a lot of wear and tear on the engine, transmission, and drive train. While some old tractors, may, in fact, run for several more decades without trouble, others may break down and require extensive repair at the worst possible moment. You may even find that restoring an older model tractor may cost as much as trying to convert a newer one for the sake of

EMP proofing.

- You will find it much harder to get spare or replacement parts. This problem may be offset if you have metal working tools and parts from compatible tractors built around the same time.
- It will be very hard to obtain shop manuals and schematics that could be used to help you rebuild or maintain the tractor. Before a major crisis happens, you may need to do patent searches for individual parts and also see what kind of information the manufacturer is willing to give you.
- On the positive side, if you find a tractor that runs well and has no computers or electronic parts in it, then you will have to do a lot less work to prepare it for an EMP. As long as you take the extra step of storing it safely, then it should run when most other motorized vehicles fail.

Video first seen on ACES – Fresh from the Field.

Get the Right Information, Skills, and Tools

Even though tractors are more rugged than most vehicles, they can still be ruined by improper maintenance or shoddy mechanical repair efforts. On the other side of the equation, if you are going to be truly self-sufficient, then being able to repair any tractor you own will be very important.

If you do not have the right skills, tools, or information, it is very likely that you won't be able to use your tractor for very long after a major disaster let alone get restore it to working condition after an EMP.

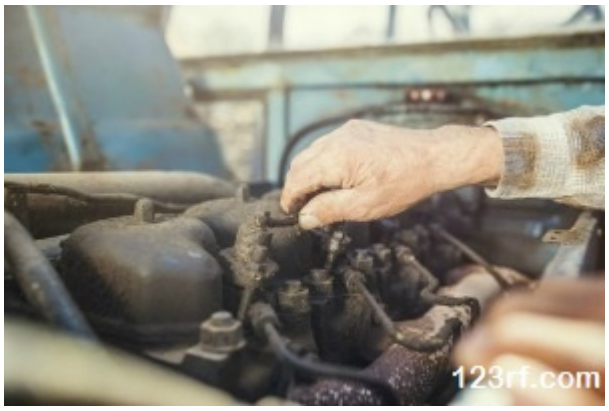
2 Vital Sources of Tractor Repair Information

- The best source of information for making tractor repairs is the shop manual that should be available through the manufacturer of the tractor. The shop manual will list all the parts found in the tractor, as well as how to remove and replace them. It will also give you plenty of detailed diagrams so that you know how all the parts fit together. You may have to pay a bit extra for this manual, however it is well worth the cost.
- Your next most important source of information is a notebook that you will keep that gives details about all maintenance, repairs, and changes you have made to the tractor. For example, if you decide to remove a particular computer system for the sake of EMP proofing, that information should be listed in the notebook.

You should also have detailed schematics and other notes so that you can make repairs to the revised system without causing problems. Never leave these details to memory. Even if you are a skilled mechanic, years, grease, time, and mechanical wear can change things to the point where you may no longer recognize what was done.

At the very least, detailed diagrams and notes about each changed system can help you retrace your steps and restore the tractor to working order.

Essential Tractor Repair and Maintenance Skills



Aside from being able to manage every system in the tractor, you will also need some additional skills if you are going to EMP proof the tractor and continue to use it in the revised form.

You will need **the ability to search through patents** in order to find older technologies that can be used to replace computer modules. You should also be able to look at different alternative designs and choose one that will meet your needs and still offer the best in terms of safety and efficiency.

Given the number of variations on tractor and automotive systems, you are sure to find dozens of designs that may work. Picking the best one, however, can take a good bit of skill.

Some computer systems may be difficult, if not impossible to replace with alternative technologies. As a result, you will need to have a good understanding of computerized automotive systems and how best to manage them. This includes knowing how to get to various sensors as well as how to replace any module that may require it.

Important Tools

Depending on the size of the tractor, you may be able to do some or all of the work using basic hand tools. This includes engine hoists and other equipment that will make it easier and safer to dismantle every part of the tractor.

There may also be some specialized tools that will be of immense use to you. Since many of these tools can be affected by an EMP, you should either focus on possible alternatives that run on water, or try to store them away in a Faraday Cage for later use.

- Air driven tools. If you are working with an especially large tractor, these tools can make mechanical repair easier, safer, and faster. The air tank and hoses should all remain usable after an EMP attack. The compressor and associated gauges may not survive an EMP. You can try looking into trip hammer technologies as they were first invented in China to see if you can modify them to provide compressed air; and then use spring loaded levers and weights to help with determining air pressure within the tank.
- Computer diagnostic systems. If you do not have the time or skills to convert key computer modules in the tractor to alternative forms, then you will need to make sure you can diagnose and replace computer parts that may be damaged by an EMP. Even if you can purchase a low cost hand held diagnostic unit, that may not be enough.

Consult the shop manual for your tractor to find out if any computer systems need to be reset by an external computer. If you find that an external computer is needed, see if you can find some way to obtain the necessary computer, or build something on your own that will do the job.

In this case, you can try Arduino controllers, and then make sure that you have the proper connectors and software languages required to communicate with the computers and sensors in the tractor.

Video first seen on Matthew Reimer.

Know Which Parts are Most Vulnerable

Basically, anything on or in your tractor that conducts electricity can be damaged by an EMP. The amount of damage depends on:

- the intensity of the pulse
- how well or poorly the items conduct electricity
- the ease of transmission from one point to another.

Even though your tractor may be located several miles away from an EMP strike site, power lines and other conductors may deliver the pulse to an area close enough to the tractor to do more damage than expected. Oddly enough, if the tractor is located further away from the power lines, it may be far less damaged.

That being said, the most vulnerable parts of the tractor are similar to the ones at most risk in any other automobile. The computers, wire harnesses, the alternator, motors, lights, and computer sensors can be ruined by even a relatively weak EMP.

Convert From Computers to Older Technologies

The ECU (Engine Control Unit) is one of the most important computers you will find in modern tractors and other automobiles. Basically, this computer alone controls:

- the amount of air and fuel delivered to each cylinder
- the speed at which the engine will idle while standing still. This part of the unit monitors the crankshaft position sensor, which plays a key role in setting other aspects of the engine’s timing.
- spark timing
- valve timing
- adjustments to water flow through the engine based on whether it is cold or warm (this helps with fuel efficiency).

There are also other computer modules for controlling the transmission, braking systems, lights, and any safety features that the tractor might have. To some extent, all of these computers require at least some input from other computers in

the system.

They are all connected by the CAN (Controller Area Network). Usually, this module does not have its own microprocessor. Rather, it simply allows all of the other processors and controllers to communicate with each other.

That being said, depending on the tractor model and computers involved, you may also need to do some additional work to modify the CAN before the tractor will work properly. If you start modifying one system, you can expect to have to bypass other systems or adjust the other computer so that it does not prevent the tractor from running.

Modern tractor computers come with programming that is very difficult to hack and alter. To add insult to injury, many of these programs are protected by copyright law. While these laws may not concern you much in the post crisis world, breaking them now can lead to criminal prosecution.

The whole issue of computerized control modules in modern tractors is a serious problem for people now, and will be an even bigger problem in the post crisis world.

Rather than focus on changing or adjusting the computers that come with the tractor, you can look for open source programs that will do the same job. At the very least, if there are some computer modules and sensors that you cannot do away with, you will still be able to use any spares you have after an EMP occurs.

Is it Possible to Turn the Tractor into a Faraday Cage?

The answer to this question depends largely on:

- how many electrically conducting attachments you have on the main body of the tractor

- whether or not you can put a viable and sufficient insulator between these parts and the rest of the tractor. For example, if you have a grapple rake attached to the tractor, the connection points would have to be shielded in such a way that electricity cannot travel between the accessory and the rest of the tractor.

If the attachment is controlled in part by the tractor's computer, you would also have to convert that system to a fully manual one. Preferably, these manual linkages would also need some kind of non-conductive spacer so that the EMP pulse does not travel into the rest of the tractor.

For the most part, it won't be practical or possible to put the entire tractor in a Faraday Cage. On the other hand, you might be able to reduce the amount of modification needed by localizing all vulnerable parts to a shielded area of the tractor.

The most difficult parts will be the fuel line that extends from the engine to the fuel tank, and also the brake lines for each of the wheels. It may be possible to locate polymers that can be used as insulators, as well as other materials that can replace metal parts that would compromise the rest of the tractor.

Keep Spare Parts You Cannot Convert in a Faraday Cage

It is fair to say that if you have the time, money, and skills, you can more than likely convert any tractor so that it no longer uses any kind of computerized system. If you are on a budget or don't have much time to complete so many tasks, this process can take months or even years to complete.

In the meantime, if society collapses or an EMP occurs, you

will still need a functional tractor. At the very least, until you have fully EMP proofed the tractor, it makes sense to keep spare computer systems and diagnostic tools in a Faraday Cage. You should also keep extra wires, fuses, motors, and anything else that might be ruined easily by an EMP.

Video first seen on Big Family Homestead.

These days, when people think of computers, lightweight tablets, cell phones, and other portable devices come to mind. By contrast, a combination of tractor computers, motors, wiring, tools, and other devices can easily weight several hundred pounds and take up quite a lot of space. This is actually one of the few places where I would recommend building a separate, building sized Faraday Cage to house all of the spare parts.

This building should be located underground and easy enough to get to from any underground bunker that you might decide to build. If you build the shelter more than 10 feet underground, there will also be some natural protection from the effects of an EMP.

As an added bonus, even a shallower depth will also protect you and the equipment from additional ground nuclear blasts that might follow a nuclear explosion that set off the EMP.

Use Cutting Edge Technology to Make Your Own Tractor Parts

Did you know that 3D printers are rapidly becoming very popular with people that want to build all kinds of devices? This includes motor housings, engine parts, and many other devices that would normally take complicated and expensive equipment.

If you do some research, you may be able to find a number of

polymers and other compounds that can be turned into spare tractor parts using a 3D printer. If you are going to put other equipment in a Faraday Cage, this kind of printer and a computer to run it may be worth it.

Aside from making tractor parts, you may also be able to develop or purchase templates that can be used for other parts of your homestead.

Keep the Tractor in a Safe Location

Depending on where your farm or homestead is located, there is a good chance that you will not be using the tractor every single day. If you have winter seasons or other times when a tractor is not needed, the best thing to do is store it in a Faraday Cage.

An underground location would be ideal, however above ground shelters will also work as long as they are built correctly. Similar to other automobiles, it does not make much sense to keep a tractor if you can't bring it out to the fields and use it for its intended purpose.

The best thing you can do is return the tractor to a safe location after you are done with it, and then hope that an EMP does not strike while you are using the tractor.

Simple Things that Might Minimize EMP Effects

In these difficult times, having a working tractor does not mean you have enough money or other resources to do everything needed for EMP proofing. If you cannot afford major modifications or a dedicated Faraday Cage for storage, here are some inexpensive things that might be of use:

- Antennas tend to be some of the best and most overlooked

conductors of an EMP pulse. Radios, remote control systems that feed into cell phone apps, and many other devices in the tractor may have antennas that will spell disaster during an EMP. Even if these antennas are tied to computer modules, it may be possible to remove the antennas without losing the basic functionality of the tractor. Without these devices, you may need to do more work manually, however it will be worth it if you can reduce the risk of the entire tractor being ruined by an EMP.

- If you are near a power transmission substation, or very close to where the EMP struck, there isn't much you can do to prevent damage to a tractor running in the field. That being said, if you are further away from the EMP, staying away from power lines or other large sized conductors might just reduce the amount of energy that gets to the tractor. In this scenario, it can mean the difference between computer parts being destroyed only, or those parts plus vital motors and wiring harnesses.
- Always remove the battery and other sources of free flowing electricity from the tractor when you are done using it for the day. Do not just rely on shutting the engine because there may be any number of computer parts or systems that draw tiny amounts of current even when the tractor is off. Anything that draws power can also increase the risk of damage from an EMP.
- If at all possible, it will also help to find out if any of the computers or sensors have power supplies that are independent of the main battery. These parts truly should be replaced at all cost because they present the most overlooked, and therefore greatest danger when it comes to prepping tractors for an EMP.
- Pay attention to world news and global terror forecasts. When it comes right down to it, figuring out when or if a hostile group is going to launch an EMP attack is not an easy task. If you make a good guess and take the time to shield your tractor, then you will be ahead of the

game.

- Find, and follow a reliable space weather forecasting service. In all probability, an EMP may still more likely come from a solar flare or some other space related event. As such, a space weather forecasting service can be very valuable to you. If you hear that a large scale solar flare is expected to pass close to the Earth, this might be a good time to avoid running the tractor. Needless to say, if you want to minimize the number of times you disconnect the battery, these times might be suitable occasions.

Some New Technologies to Consider

Preppers aren't the only people interested in finding as many useful and inexpensive ways as possible to reduce the effects of an EMP.

Here are some new technologies that may be of use at some point in the future.

Even if these specific materials cannot be used in a tractor application at this time, it may be possible for you and others to develop something that will shield tractors from EMPs.

- **Conductive Paints** – Right now, these paints can be used in buildings to shield from all kinds of radio, microwave, and related electromagnetic frequencies. Work with an electrician that specializes in tractors or automobile electronics so that you can ground any kind of conductive paint safely. It is very important to realize that tractors and other vehicles are something like a huge circuit board. If you disrupt grounding points, it can cause shorts and other problems. At best, you may be lucky to come out of it with little more than some ruined parts. At worst, it can cost your life.
- **EMP Proof Concrete** – If there is one innovation that

promises to reduce or eliminate the risks posed by EMPs, a spray on form of concrete might just do the job. Although EMP Proof Concrete is not yet available to consumers, it is at the manufacturing stage and may become available in a few years.

- **Flexible Conductive Composites** – these compounds are similar to the carbon and nickel layers used in paints and concretes. At some point in the near future, any one of these may make a viable spray coating that can be used to protect your tractor from an EMP blast.

No matter whether you purchase a new or used tractor, it is likely to be a large monetary investment.

If you are concerned about an EMP ruining your tractor, there are some things you can do to reduce the damage or prevent it. As with other automobiles, you will find that the best answers will also cost a bit of money and time.

At the very least, if you are determined to modify a newer tractor so that it does not have computer modules, take the time to learn everything you can about maintaining the tractor. This will help you to keep the tractor in good working order regardless of whether an EMP hits or society collapses for some other reason.

*This article has been written by **Carmela Tyrell** for Survivopedia.*

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