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# RFID-Zapper(EN)

#### From 22C3

-- There is a german version of this article, too (<https://events.ccc.de/congress/2005/wiki/RFID-Zapper>) . --

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## What is the RFID-Zapper?

The RFID-Zapper is a gadget to deactivate (i.e. destroy) passive RFID-Tags (<http://en.wikipedia.org/wiki/RFID>) permanently.

The development-team presently consists of two people (MiniMe and Mahajivana), who had some help from a friend (thank's for that).

Goals are a proof-of-concept and the construction of at least one functioning and appealing prototype, as well as a documentation of the project, so that everyone can build an own RFID-Zapper. Since the project found so much positive resonance, we probably are going to work on some other realizations of the concept, e.g. building an RFID-Zapper from scratch, without a single-use-camera.

## Why should I need such a thing?

We have to expect to be surrounded by RFID-Tags almost everywhere within the near future, and they will serve many different purposes. The benefits and risks of this technology and it's use are already being discussed. However, there will be attempts to use RFID-Tags to establish constant surveillance and to further threaten and compromise the privacy of customers (and citizens and even non-citizens, when governments start to use RFID-Tags like the german government already did).

To defend yourself against such measures, you might want a small, simple and relatively appealing gadget to permanently deactivate RFID-Tags around you, e.g., to deactivate RFID-Tags in recently bought clothes or books without damaging those.

## How does the RFID-Zapper work?

*Passive RFID tags have no internal power supply. The minute electrical current induced in the antenna by the incoming radio frequency signal provides just enough power for the CMOS integrated circuit (IC) in the tag to power up and transmit a response.*

(Quote from Wikipedia (<http://en.wikipedia.org/wiki/RFID>) )

There are several ways to deactivate RFID-Tags. One that might be offered by the industries are RFID-deactivators, which will send the RFID-Tag to sleep. A problem with this method is, that it is not permanent, the RFID-Tag can be reactivated (probably without your knowledge). Several ways of permanently deactivating RFID-Tags are know, e.g., cutting off the antenna from the actual microchip or overloading and literally frying the RFID-Tag in a common microwave-oven, which needs to be turned on only for a short period of time. Unfortunately both methods aren't suitable for the destruction of RFID-Tags

in clothes: cutting off the antenna would require to damage the piece of cloth, while frying the chips is likely to cause a small but potent flame, which would damage most textiles or even set them on fire.

The RFID-Zapper solves this dilemma. Basically it copies the microwave-oven-method, but in a much smaller scale. It generates a strong electromagnetic field with a coil, which should be placed as near to the target RFID-Tag as possible. The RFID-Tag then will receive a strong shock of energy comparable with an EMP and some part of it will blow, thus deactivating the chip forever.

To keep the costs of the RFID-Zapper as low as possible, we decided to modify the electric component of a single-use-camera with flash, as can be found almost everywhere. The coil is made from coated copper wire and placed inside the camera exactly where the film has been. Then one end of the coil is soldered to the camera's capacitor, from which we earlier disconnected the flash. The other end of the coil is soldered to a switch, which itself is connected to the capacitor's other terminal. Once everything is tested, the camera can be closed again and henceforth will serve as a RFID-Zapper, destroying RFID-Tags with the power of ordinary batteries.

## State of the project

The original project was finished successfully and introduced at 22C3



One of our cameras, 2for1 only 7 € in some drugstores



A bit of paper might help

([http://en.wikipedia.org/wiki/Chaos\\_Communication\\_Congress](http://en.wikipedia.org/wiki/Chaos_Communication_Congress)) . Several RFID-Zappers were built at 22C3 in a workshop.

Modification of a single-use-camera with flash has proven to be relatively easy, the capacitor is able to supply enough electrical current.

An old, slightly damaged Camera could also be modified into a RFID-Zapper during the workshop at 22C3.

As far as we know, about 20 working RFID-Zappers were built so far. In only one case we encountered serious problems, the capacitor seemed to be broken.

By the way: It is possible to carefully (don't expose it to any light) extract the photographic film from the camera for further use. (Most films from single-use-camera's seem to have no DX encoding ([http://en.wikipedia.org/wiki/DX\\_encoding](http://en.wikipedia.org/wiki/DX_encoding)) , so they might be useful for push processing ([http://en.wikipedia.org/wiki/Push\\_processing](http://en.wikipedia.org/wiki/Push_processing)) or even pull processing ;-). But don't expect too much from such films, single-use-cameras usually don't come with a high-quality film.

## Proof-of-Concept

Before we first tried to modify a single-use-camera, we tested the concept on a passive 13,56-MHz-RFID-Tag:

- We took an old external flash apart, which had a guide number of 24. The capacitor of the flash had

330  $\mu$ F and 300 V.

- selfwound coil, measures 4,5 x 8 cm, coated copper wire, 1mm thick, 5 windings
- We then de-soldered the actual flash from the capacitor and then soldered the coil to it, but placed a switch between one of the capacitor's terminals and the coil, which later would close the circuit. The capacitor now could be loaded like before and even made the usual high-pitched sound.
- To see whether the RFID-Tag was functioning or not, we had a RFID-Finder (<http://www.heise.de/ct/05/02/202/>) , a gadget to find RFID-Tags.
- Then we ran several tests, each time loading the capacitor to a higher level, before closing the circuit.

When loaded to about 100 V, the RFID-Zapper was able to destroy the RFID-Tags placed right next to it. No visible damage was done to the paper, in which the tag was wrapped. Since the strength of the electrical field decreases with the square of the distance, the final RFID-Zapper will definitely need a capacitor that can supply more than 100 V. Since we didn't have enough RFID-Tags we couldn't test the range of the RFID-Zapper with more current, e.g. 200 V or even 300 V.

## Further Plans

\* We are completing the documentation on our project these days. This documentation will contain a construction-manual for the RFID-Zapper and will be published both in german and english. You should be able to find it on this wiki within the next two weeks, we will also place it on several other homepages, including mahajivana's, which hopefully will go online soon and will contain more about this project.

- Until now we only had access to 13,56-MHz-RFID-Tags, but there are other tags running on different frequencies. We hope to be able to test the RFID-Zapper on such tags soon. If you can help us getting our hands on such tags, please contact us, we will be forever thankful.
- If we have enough 13,56-MHz-RFID-Tags, we will further test the range of the RFID-Zapper.

## Contact

- MiniMe: [RFID.10.minime@spamgourmet.com](mailto:RFID.10.minime@spamgourmet.com)
- Mahajivana: [rfid.20.mahajivana@spamgourmet.com](mailto:rfid.20.mahajivana@spamgourmet.com)
- 22C3-DECT-Phone: 7343

## Caution

(This part of this article probably will be longer than the equivalent part in the german article, since english-speaking people seem to be more concerned with safety matters and less careful with electric devices ;-)

- Poldi kindly informed us, that having a RFID-Zapper with you when checking in to a plane might cause trouble or even get you arrested (he almost was). RFID-Zappers are basically some kind of pocket-EMP (<http://en.wikipedia.org/wiki/EMP>) . Although we doubt that it has the capacity to cause any trouble aboard an airplane, we seriously recommend against testing it, for reasons of your own health as well as that of others.
- RFID-Zappers don't comply with the FCC-rules.
- Modifying a single-use-camera into a RFID-Zapper isn't completely free of risks. If the capacitor is still charged fully or partly, you might catch yourself an electric shock. If you are a healthy, young person, this is probably only going to hurt a lot, but if you should have any kind of problems with your heart and/or circulation, you definitely want to properly discharge the capacitor first. If you use a bigger capacitor, the risk increases.
- Soldering irons are known to be unpleasantly hot at the tip.
- We also recommend against using the RFID-Zapper on RFID-Tags found within electrical devices, for these are likely to suffer damage too. You also shouldn't use RFID-Zappers too near to electric devices, especially if they are expensive. You also shouldn't use it near any magnetic data storage, like

floppy disc, MCs, hard discs, credit cards, streamer-cartridges and so on. And don't try it near your grandpa's pacemaker or other sensitive medical equipment either!

- We don't think that the RFID-Zapper is a strong source of what is known in Germany as *Elektrosmog*, which means some kind of smog caused by electromagnetic fields. But if you are concerned about it, you might want to be careful. Unfortunately we can't tell you whether wearing a hat of aluminium helps or not.
- The RFID-Zapper might cause you to feel armed against companies or governments trying to compromise your privacy. You might even experience euphoria, especially when destroying RFID-Tags. This could lead to dangerous behavior, like speaking your mind, using freedom of speech, fighting for your rights, all of which are bound to ultimately lead to the communist world revolution ;-)
- In America the RFID-Zapper could be considered a "burglar tool" since it could be used to disable RFID tags being used by merchants to prevent theft. Merely having it in your possession could lead to your arrest.

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