FM Radio Jammer

Measurement and Control System

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A **signal jammer** refers to a gadget used in interrupting or dislocating radio signals. Most often, it is used to disrupt mobile phones from transmitting and receiving signals. They are typically wireless and can be used anywhere to disable cellular phones. Also, it can be used to interfere with WLAN or wireless local area networks that correspondingly resulted to the development and availability of jammers such as Wi-Fi, Bluetooth jammer and Wireless video jammers to name a few. Even sophisticated and high tech signal jammers are capable of jamming satellites. Signal jammers have some difficulties in disrupting with other electronic devices that are in good working order. Such jammers are used and regulated as well by the government and are intended to jam the communication lines of cellular phones only. In the same way, they damage only the receiving end of a cellular phone call as it interferes directly with the base station and cell phone itself. Signal jammers have small electromagnetic wave and being such, it does not have known damage to the human body and to the cellular phone. But for jammers that are bigger such as outdoor signal stations may have some effects on one's health.

Radio Jammer

A **radio jammer** is any device that deliberately blocks, jams or interferes with authorized wireless communications. In the United States, jammers are illegal and their use can result in large fines.In some cases jammers work by the transmission of radio signals that disrupt communications by decreasing the signal-to-noise ratio. The concept can be used in wireless data networks to disrupt information flow. It is a common form of censorship in totalitarian countries, in order to prevent foreign radio stations in border areas from reaching the country.

Jamming is usually distinguished from interference that can occur due to device malfunctions or other accidental circumstances. Devices that simply cause interference are regulated under different regulations. Unintentional 'jamming' occurs when an operator transmits on a busy frequency without first checking whether it is in use, or without being able to hear stations using the frequency. Another form of unintentional jamming occurs when equipment accidentally radiates a signal, such as a cable television plant that accidentally emits on an aircraft emergency frequency.

A basic signal jammer for cellular phones may cost you around a hundred dollars while GPS jammers are priced more expensively. For less than two hundred dollars, you can already purchase a Bluetooth or Wi-Fi jammer. But multi-function video and Wi-Fi jammers may cost you around three hundred dollars. Because of their cheap and affordable prices, they become more popular and have been used widely for different purposes.

You can find a number of online retailers today that offer these types of jammers. You can choose GPS signal jammer one depending on your needs and the amount that you can afford. Of course, your choice should also depend on the type of device you have and the kind of signal you want to jam. During World War II, ground radio operators would attempt to mislead pilots by false instructions in their own language, in what was more precisely a spoofing attack than jamming. Radar jamming is also important to disrupt use of radar used to guide an enemy's missiles or aircraft. Modern secure communication techniques use such methods as spread spectrum modulation to resist the deleterious effects of jamming.

Jamming of foreign radio broadcast stations has often been used in wartime (and during periods of tense international relations) to prevent or deter citizens from listening to broadcasts from enemy countries. However, such jamming is usually of limited effectiveness because the affected stations usually change frequencies, put on additional frequencies and/or increase transmission power. Jamming has also occasionally been used by the governments of Germany (during WW2), Israel, Cuba, Iraq, Iran (Iraq and Iran war, 1980), China, North and South Korea and several Latin American countries, as well as by Ireland against pirate radio stations such as Radio Nova. The United Kingdom government used two coordinated, separately located transmitters to jam the offshore radio ship, Radio North Sea International off the coast of Britain in 1970.

Subtle jamming is jamming during which no sound is heard on the receiving equipment. The radio does not receive incoming signals yet everything seems superficially normal to the operator. These are often technical attacks on modern equipment, such as "squelch capture".
Thanks to the FM capture effect, frequency modulated broadcasts may be jammed, unnoticed, by a simple un-modulated carrier. The receiver locks onto the larger carrier signal and hence will ignore the FM signal with information. Digital signals use complex modulation techniques such as QPSK. These signals are very

robust in the presence of interfering signals. However, the signal relies on hand shaking between the transmitter and receiver to identify and determine security settings and method of high level transmission. If the jamming device sends initiation data packets the receiver will begin its state machine to establish two way data transmission. A jammer will loop back to the beginning instead of completing the handshake.

This method jams the receiver in an infinite loop where it keeps trying to initiate a connection but never completes it, which effectively blocks all legitimate communication. Bluetooth and other consumer radio protocols such as WiFi have built in detectors so that they transmit only when the channel is free. Simple continuous transmission on a given channel will continuously stop a transmitter transmitting, hence jamming the receiver from ever hearing from its intended transmitter. Other jammers work by analyzing the packet headers and depending on the source or destination, selectively transmit over the end of the message, corrupting the packet.

Bluetooth Jammer

Bluetooth jammer is normally equipped with multi-functional jammer that jams video and Wi-Fi. This works by disabling or disrupting Wireless LAN, Bluetooth devices for transmission of videos for privacy.

GSM Jammer

GPS signal jammer. They are commonly used by the military as a way of confusing GPS tracking. But there are no tracking systems made at home like this. Civilians who are using jammers in covering or hiding up his location or vehicle are those who are being tracked by the GPS receiver. Cellphone signal jammer used by civilians can cover only up to ten meters.

Cellular Jammer

Cellular phone jammer is the most common jammers that we have today. It is capable of disrupting and preventing the cellular phone from receiving signals from the base station. This is done by blocking the radio waves. The most basic one typically works in a ten meter to one kilometer distance. However, those that involve

outdoor signal stations that are bigger with different positions and base stations can jam signals of any CDMA or GSM phones effectively.

HARDWARE IMPLEMENTATION

1. Battery

An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smartphones, and electric cars .When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that when connected to an external circuit will flow and deliver energy to an external device.

When a battery is connected to an external circuit, electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate terminals and so deliver energy to the external circuit. It is the movement of those ions within the battery which allows current to flow out of the battery to perform work .Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to additionally include devices composed of a single cell. Primary (single-use or "disposable") batteries are used once and discarded; the electrode materials are irreversibly changed during discharge.

Common examples are the alkaline battery used for flashlights and a multitude of portable electronic devices. Secondary (rechargeable) batteries can be discharged and recharged multiple times using mains power from a wall socket; the original composition of the electrodes can be re-stored by reverse current. Examples include the lead-acid batteries used in vehicles and lithium-ion batteries used for portable electronics such as laptops and smartphones.Batteries come in many shapes and sizes, from miniature cells used to power hearing aids and wristwatches to small, thin cells used in smartphones, to large lead acid batteries used in cars and trucks, and at the largest extreme, huge battery banks the size of rooms that provide standby or emergency power for telephone exchanges and computer data centers.

2. Coil

An electromagnetic coil is an electrical conductor such as a wire in the shape of a coil, spiral or helix. Electromagnetic coils are used in electrical engineering, in applications where electric currents interact with magnetic fields, in devices such as inductors, electromagnets, transformers, and sensor coils. Either an electric current is passed through the wire of the coil to generate a magnetic field, or conversely an external time-varying magnetic field through the interior of the coil generates an EMF (voltage) in the conductor.

A current through any conductor creates a circular magnetic field around the conductor due to Ampere's law .The advantage of using the coil shape is that it increases the strength of magnetic field produced by a given current. The magnetic fields generated by the separate turns of wire all pass through the center of the coil and add (superpose) to produce a strong field there. The more turns of wire, the stronger the field produced. Conversely, a changing external magnetic flux induces a voltage in a conductor such as a wire, due to Faraday's law of induction .The induced voltage can be increased by winding the wire into a coil, because the field lines intersect the circuit multiple times.

3. NE555 Timer

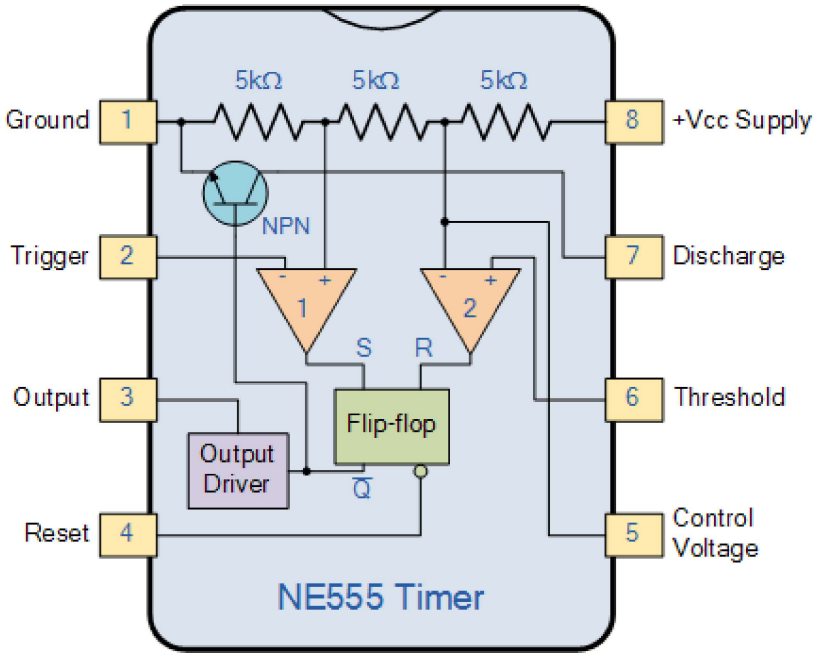
The 555 Timer is a commonly used IC designed to produce a variety of output waveforms with the addition of an external RC network.
The basic 555 timer gets its name from the fact that there are three internally connected 5kΩ resistors which it uses to generate the two comparators reference voltages. The 555 timer IC is a very cheap, popular and useful precision timing device which can act as either a simple timer to generate single pulses or long time delays, or as a relaxation oscillator producing a string of stabilised waveforms of varying duty cycles from 50 to 100%.

The 555 timer chip is extremely robust and stable 8-pin device that can be operated either as a very accurate Monostable, Bistable or Astable Multivibrator to produce a variety of applications such as one-shot or delay timers, pulse generation, LED and lamp flashers, alarms and tone generation, logic clocks, frequency division, power supplies and converters etc, in fact any circuit that requires some form of time control as the list is endless.

The single 555 Timer chip in its basic form is a Bipolar 8-pin mini Dual-in-line Package (DIP) device consisting of some 25 transistors, 2 diodes and about 16 resistors arranged to form two comparators, a flip-flop and a high current output stage as shown below. As well as the 555 Timer there is also available the NE556 Timer Oscillator which combines TWO individual 555's within a single 14-pin DIP package and low power CMOS versions of the single 555 timer such as the 7555 and LMC555 which use MOSFET transistors instead.

A simplified "block diagram" representing the internal circuitry of the **555 timer** is given below with a brief explanation of each of its connecting pins to help provide a clearer understanding of how it works.

555 Timer Block Diagram



• Pin 1. – **Ground**, The ground pin connects the 555 timer to the negative (0v) supply rail.

• Pin 2. – **Trigger**, The negative input to comparator No 1. A negative pulse on this pin "sets" the internal Flip-flop when the voltage drops below 1/3Vcc causing the output to switch from a "LOW" to a "HIGH" state.

• Pin 3. – **Output**, The output pin can drive any TTL circuit and is capable of sourcing or sinking up to 200mA of current at an output voltage equal to approximately Vcc – 1.5V so small speakers, LEDs or motors can be connected directly to the output.

• Pin 4. – **Reset**, This pin is used to "reset" the internal Flip-flop controlling the state of the output, pin 3. This is an active-low input and is generally connected to a logic "1" level when not used to prevent any unwanted resetting of the output.

• Pin 5. – **Control Voltage**, This pin controls the timing of the 555 by overriding the 2/3Vcc level of the voltage divider network. By applying a voltage to this pin the width of the output signal can be varied independently of the RC timing network. When not used it is connected to ground via a 10nF capacitor to eliminate any noise.

• Pin 6. – **Threshold**, The positive input to comparator No 2. This pin is used to reset the Flip-flop when the voltage applied to it exceeds 2/3Vcc causing the output to switch from “HIGH” to “LOW” state. This pin connects directly to the RC timing circuit.

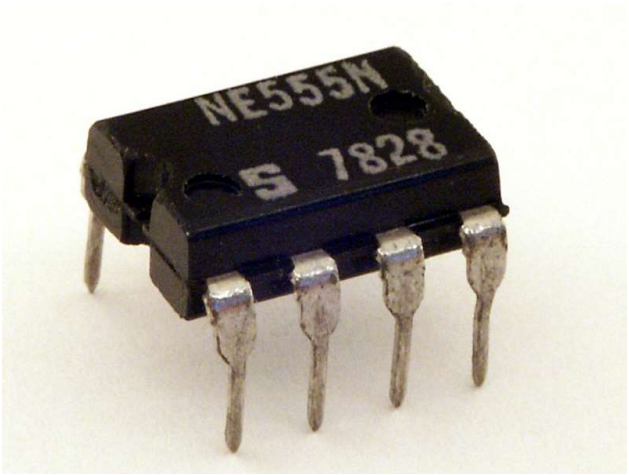
• Pin 7. – **Discharge**, The discharge pin is connected directly to the Collector of an internal NPN transistor which is used to “discharge” the timing capacitor to ground when the output at pin 3 switches “LOW”.

• Pin 8. – **Supply +Vcc**, This is the power supply pin and for general purpose TTL 555 timers is between 4.5V and 15V.

The **555 Timers** name comes from the fact that there are three 5kΩ resistors connected together internally producing a voltage divider network between the supply voltage at pin 8 and ground at pin 1. The voltage across this series resistive network holds the negative inverting input of comparator two at 2/3Vcc and the positive non-inverting input to comparator one at 1/3Vcc.

The two comparators produce an output voltage dependent upon the voltage difference at their inputs which is determined by the charging and discharging action of the externally connected RC network. The outputs from both comparators are connected to the two inputs of the flip-flop which in turn produces either a “HIGH” or “LOW” level output at Q based on the states of its inputs. The output from the flip-flop is used to control a high current output switching stage to drive the connected load producing either a “HIGH” or “LOW” voltage level at the output pin.

The most common use of the 555 timer oscillator is as a simple astable oscillator by connecting two resistors and a capacitor across its terminals to generate a fixed pulse train with a time period determined by the time constant of the RC network. But the 555 timer oscillator chip can also be connected in a variety of different ways to produce Monostable or Bistable multivibrators as well as the more common Astable Multivibrator.



4. BF 494 Transistor

BF494 is an NPN medium frequency **transistor** in a TO-92; SOT54 plastic package. A **semiconductor device** is used to amplify or switch electronic signals and electrical power. It's made of **semiconductor material** and has at least three terminals for connecting to a **circuit** outside of it. The current through another pair of terminals is controlled by a voltage or current applied to one pair of **transistor** terminals. A **transistor** can magnify a signal because the regulated (output) power can be higher than the controlling (input) power. Some **transistors** are still packaged separately nowadays, but many more are included in integrated **circuits**.

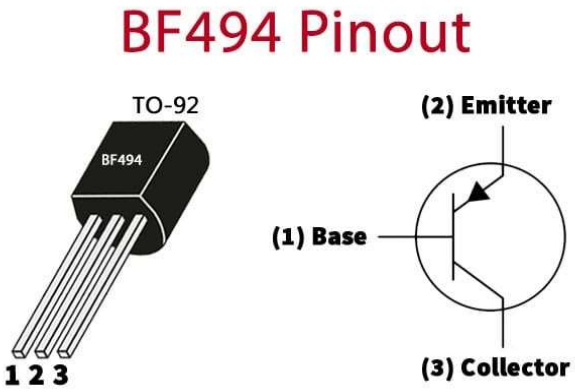
BF494 Applications

• HF Applications in Radio and Television Receivers

• FM Tuners

• Low Noise AM Mixer-oscillators

• IF Amplifiers in AM/FM Receivers



5. Trimmer/ Variable Capacitor

Trimmer capacitors are variable capacitors which serve the purpose of initial calibration of equipment during manufacturing or servicing. They are not intended for end-user interaction. Trimmer capacitors are almost always mounted directly on the PCB (Printed Circuit Board), so the user does not have access to them, and set during manufacturing using a small screwdriver. Due to their nature, trimmer capacitors are cheaper than full sized variable capacitors and rated for many fewer adjustments.

Trimmer capacitors are used to initially set oscillator frequency values, latencies, rise and fall times and other variables in a circuit. Should the values drift over time, these trimmer capacitors allow repairmen to re-calibrate equipment when needed. There are two types of trimmer capacitors: air trimmer capacitor and ceramic trimmer capacitor.

Applications for trimmer capacitors

The potential applications for trimmer capacitors are numerous. They are used whenever there is a capacitance value that needs to be matched to a certain circuit during the manufacturing process. The reason for their use (instead of using precise fixed-value capacitors) is that other elements in the circuit have their own tolerances and their values could differ by as much as 20% from

what the engineer expected to see in a circuit. In order to adapt to those tolerances, trimmer capacitors are used.

They are commonly used in various RF circuits, VHF through microwave. Special non-magnetic types are used in medical devices such as MRI and NMR scanners, which produce very high magnetic fields that would otherwise destroy capacitors containing ferromagnetic materials such as steel. Other common applications include oscillators, tuners, crystal oscillators and filters. Trimmer capacitors can be found in communication equipment such as mobile radios and aerospace transmitters and receivers, signal splitters and CATV amplifiers.

6. Ceramic Capacitor

The ceramic capacitor is one of the most common types of capacitors used in most electrical instruments due to its high reliability and low cost. In this form, ceramic or porcelain discs are used to make non-polarized capacitors and are used in various industries. The poor conductivity of ceramic materials makes them excellent dielectrics, as well as efficient supporters of electrostatic fields.

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ceramic materials makes them excellent dielectrics, as well as efficient supporters of electrostatic fields.

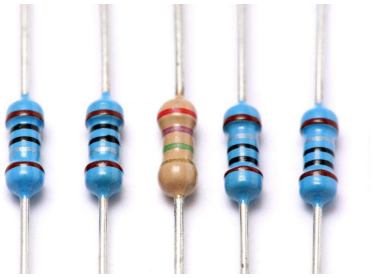
7. Electrolytic Capacitor

An electrolytic capacitor is a type of capacitor that uses an electrolyte to achieve a larger capacitance than other capacitor types. An electrolyte is a liquid or gel containing a high concentration of ions. Almost all electrolytic capacitors are polarized, which means that the voltage on the positive terminal must always be greater than the voltage on the negative terminal. The benefit of large capacitance in electrolytic capacitors comes with several drawbacks as well. Among these drawbacks are large leakage currents, value tolerances, equivalent series resistance and a limited lifetime. Electrolytic capacitors can be either wet-electrolyte or solid polymer. They are commonly made of tantalum or aluminum, although other materials may be used. Supercapacitors are a special subtype of electrolytic capacitors, also called double-layer electrolytic capacitors, with capacitances of hundreds and thousands of farads. This article will be based on aluminum electrolytic capacitors. These have a typical capacitance between 1μF to 47mF and an operating voltage of up to a few hundred volts DC. Aluminum electrolytic capacitors are found in many applications such as power supplies, computer motherboards and many domestic appliances. Since they are polarized, they may be used only in DC circuits.

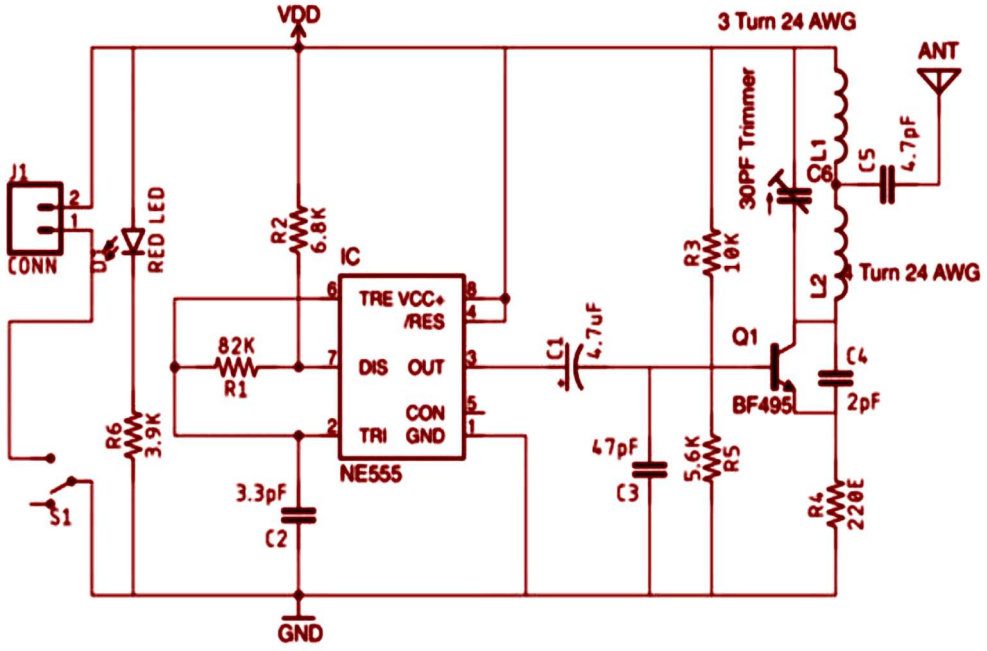
8 .Resistors

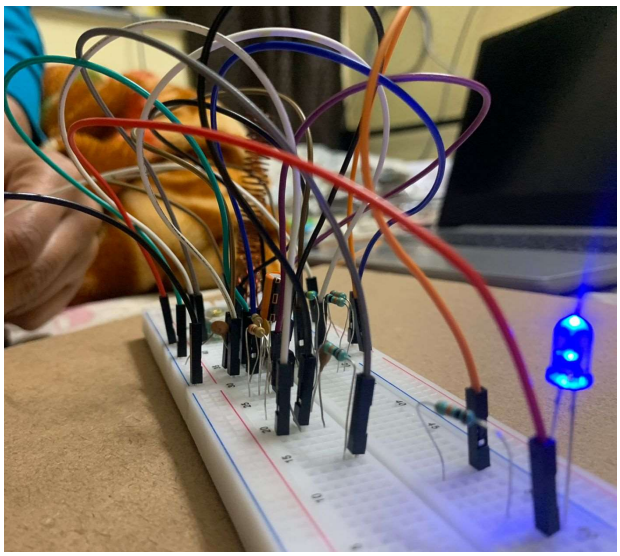
Special components called resistors are made for the express purpose of creating a precise quantity of resistance for insertion into a circuit. They are typically constructed of metal wire or carbon and engineered to maintain a stable resistance value over a wide range of environmental conditions.

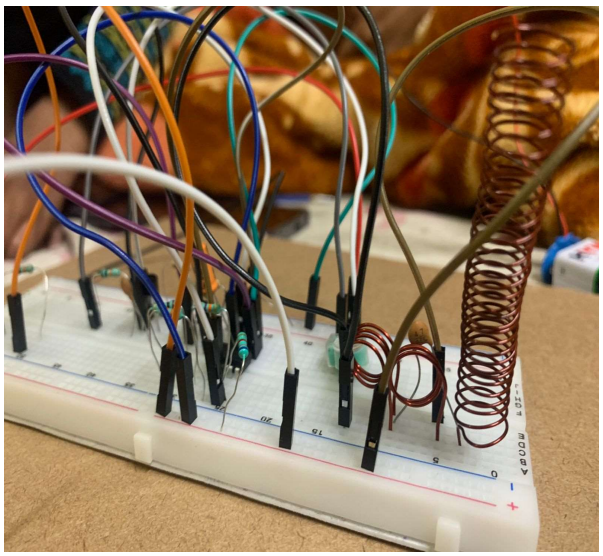
Unlike lamps, they do not produce light, but they do produce heat as electric power is dissipated by them in a working circuit. Typically, though, the purpose of a resistor is not to produce usable heat, but simply to provide a precise quantity of electrical resistance.



Circuit Diagram







APPLICATION

- Sticky emp can be made, could also be used to stop guided missiles. The Sticky EMP can be used to create shadow paths to hide from hostiles, or target power boxes near laser trip wires to disable them using a gun.

- Can be used as a military weapon. The proposed system can be used to block enemy communications to a large extent for a long period which is very vital in a real warzone situation.

- EMP jammers can be used in anti-ballistic missiles in order to counter ballistic missiles and hence preventing nuclear warheads from causing any destruction.

- Emp jammer cane be used in prison cells to prevent the prisoners from communicating to the outside world and hence blocking their means for communication.

FUTURE SCOPE

- Military Application

The advancement of modern weaponry and warfare is beyond remarkable and an EMP Jammer will prove to be one such remarkable weapon when it comes to destroy and jam enemy devices(smart and dumb). The proposed system can be used to block enemy communications to a large extent for a long period which is very vital in a real warzone situation.

- Sticky EMP

The Sticky EMP delivers a localized electromagnetic pulse, disabling lights and security devices nearby connected with an electrical subsystem for a short period of time. The Sticky EMP can be used to create shadow paths to hide from hostiles, or target power boxes near laser trip wires to disable them using a gun. We can also use a GPS tracker with the sticky EMP so that it reaches the exact destination and can be activated remotely.

- Anti-ballistic missiles

An anti-ballistic missile (ABM) is a surface to air missile designed to counter ballistic missiles. Ballistic missiles are used to deliver nuclear, chemical, biological or conventional warheads in a ballistic flight trajectory. The term "anti-ballistic missile" is a generic term conveying a system designed to intercept and destroy any type of ballistic threat. EMP jammers can be used in anti-ballistic missiles in order to counter ballistic missiles.

CONCLUSION

In the new era of modern warfare and weaponry system, an EMP Jammer is a device which will prove to be the next generation weaponry system destroying enemy communication system which will practically blindfold the enemy in the war zone. This can prove to be a vital moment because hampering with communication system can cause a lot of chaos. The proposed device can also be used in anti-ballistic missile and hence prevent a nuclear disaster .The EMP jammer damages any nearby electronic devices and affects its performance .It has high military value, it could be used to stop guided missiles.