



WIRELESS ELECTRONICS DESTROYER SYSTEM USING EMP

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ABSTRACT: -

High power electromagnetic pulses are of great importance in a variety of applications such as transient radar, investigations of the effect of strong radio-frequency impulses on electronic systems and modern bio-medical technology. In response to the current trend, a simple, compact, and portable electromagnetic pulse (EMP) radiating source has been developed, based on pulsed transformer technology and capable of producing nanosecond rise- time pulses at voltages exceeding 0.5 MY. For this type of application pulsed transformer technology offers a number of significant advantages over the use of a Marx generator, e.g. design simplicity, compactness and cost effectiveness. The transformer is operated in a dual resonance mode to achieve a high energy transfer efficiency, and although the output voltage inevitably has a slower rise-time than that of a Marx generator, this can be improved by the use of a pulse forming line in conjunction with a fast spark-gap switch.

The transformer design is best achieved using a filamentary modeling technique, that takes full account of bulk skin and proximity effects and accurately predicts the self and mutual inductances and winding resistances of the transformer. One main objective of the present research was to achieve a high-average radiated power, for which the radiator has to be operated at a high pulse repetition frequency (PRF), with the key component for achieving this being the spark-gap switch in the primary circuit of the pulsed transformer. Normally a spark- gap switch has a recovery time of about ten milliseconds, and a PRF above 100 Hz is difficult to achieve unless certain special techniques are employed.

As the aim of the present study is to develop a compact system, the use of a pump for providing a fluid flow between the electrodes of the spark gap is ruled out, and a novel spark-gap switch was therefore developed based on the principle of corona- stabilization. For simplicity, an omnidirectional dipole-type structure was used as a transmitting antenna. Radiated electric field measurements were performed using a time-derivative sensor, with data being collected by a suitable fast digitizing oscilloscope. Post-numerical processing of the collected data was necessary to remove the ground reflected wave effect. Measurements of the radiated electric field at 10 m from the radiating element indicated a peak amplitude of 12.4 kV/m. Much of the work detailed in the thesis has already been presented in peer review

INTRODUCTION

Over the last few decades, there has been considerable progress in the development of high peak power microwave and radio-frequency sources. Such sources are required in a variety of applications that include transient radar, mine detection, communication systems, industrial materials processing and modern bio-medical field. The advantages of using wideband waveforms for radar include better spatial resolution and target information recovery from reflected signals being intercepted more easily than with narrowband signals.

A new and quite different area of application of high-voltage ultra wideband waveform is in the field of cancer treatment in conjunction with chemotherapy where it has been observed that the effectiveness of chemotherapy is enhanced by the presence of ultra wideband radiation. Modern electronic equipment is known to be potentially susceptible to high-power electromagnetic pulse (EMP) radiation, which raises the necessity of investigating the effect that is produced on all these systems and also of designing suitably hardened equipment.

Sources capable of producing high peak power radio-frequency (RF) pulses can be broadly classified into two categories, based respectively on: i) direct switching technology and ii) bremsstrahlung radiation of relativistic electron beam oscillations in an electrostatic field. In a direct switching system, RF pulses are transmitted by exciting an antenna with pulses generated by a fast discharge circuit, with the basic system elements required being shown in Figure. The initial energy supply is a low power electrical source which supplies energy to the pulsed power generator in continuous form. Here the energy is

NEED OF WIRELESS ELECTRONICS DESTROYER

- To utilize and destroy for unwanted video capturing in trail rooms.
- For damaging effect of high energy can be developed into weapon for military purposes.
- To demonstrate the effect of electromagnetic pulse on various smart and dumb devices.

SCOPE OF WIRELESS ELECTRONICS DESTROYER

EMP weapon produces a pulse of energy that creates a powerful electromagnetic field capable of short-circuiting a wide range of electronic equipment, particularly computers, satellites, radios, radar receivers and even civilian traffic lights.

PRINCIPLE OF ELECTROMAGNETIC IMPULSE

electromagnetic pulse (EMP), also a transient electromagnetic disturbance (TED), is a brief burst of electromagnetic energy. Depending upon the source, the origin of an EMP can be natural or artificial, and can occur as an electromagnetic field, as an electric field, as a magnetic field, or as a conducted electric current. The electromagnetic interference caused by an EMP disrupts communications and damages electronic equipment; at higher levels of energy, an EMP such as a lightning strike can physically damage objects such as buildings and aircraft. The management of EMP effects is a branch of electromagnetic compatibility (EMC) engineering.

EMP weapons are designed to deliver the damaging effects of a high-energy EMP that will disrupt unprotected infrastructure in the country, thus the employment of an EMP weapon against a country is the scenario of war most likely to collapse the functionality of the electrical network of the country.

SYSTEM DESIGN OF ELECTROMAGNETIC PULSE

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Electromagnetic Pulse General Characteristics

An electromagnetic pulse is like electromagnetic radiation. The meaning of short duration is it can spread about a range of different frequencies. Here are the general characteristics of the electromagnetic pulse:

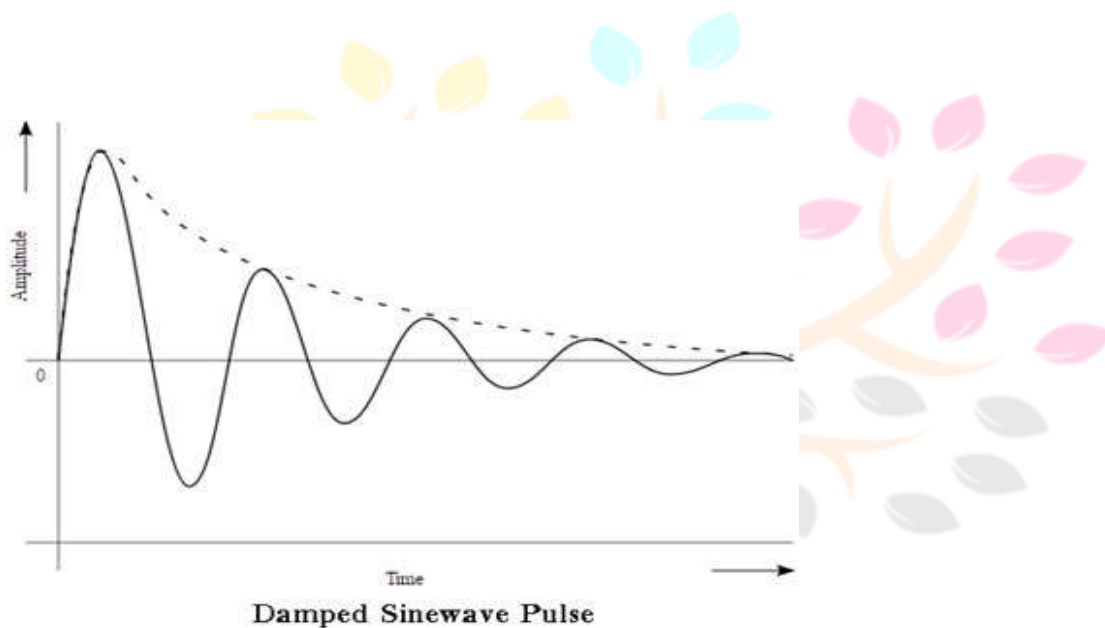
- Type of the energy whether radiated or electric or magnetic
- The range or the spectrum of different frequencies that are present.
- In the Pulse waveform, kind of shape, its duration and the amplitude.

Electromagnetic Pulse Frequency Ranges

- The electromagnetic pulse energy typically comprises various frequencies of DC to some kind of upper limit that depends on the source. The range can be defined as the EMP, which can also be referred to as DC to the daylight, excluding the highest form of frequencies which comprises the optical and ionizing ranges.

Electromagnetic Pulse Waveforms

- The waveform describes as to how the instantaneous amplitude changes with time. The Real pulses usually tend to be complicated, and so the simplified kind of models are used.



As shown in the diagram, most of the pulses are said to have a very sharp form of leading- edge, built quickly up to a maximum level. However, the double form of the exponential curve, also known as the classic model, that climbs deeply and also quickly reaches the peak and then tends to decay slowly.

Types of Electromagnetic Pulse

Different types of Electromagnetic Pulse arise from the man-made and natural, and also the weapons effects.

Types of different natural pulses event that occur includes:

- Lightning pulse
- Electrostatic discharge
- Meteoric EMP
- Coronal Mass Ejection

Types of manmade Electromagnetic Pulse event occurring includes:

- Switching of the electrical circuitry.
- Electric motors create a kind of pulse as and when the internal contacts of electrical circuits make or break the connections.
- The ignition systems of Gasoline engine create pulses when spark plugs are said to be energized or even fired.
- Continual actions of the digital electronic circuitry.
- Surges in the Power line.

Types of various military Electromagnetic Pulse include:

- Nuclei (NEMP), of nuclear explosion.

EQUIPMENTS FOR PROJECT

<u>Sr.No</u>	<u>Name of equipment</u>	<u>Quantity</u>
1.	Copper wire (EMP Emitter)	<u>1</u>
2.	LED	<u>1</u>
3.	PCB board	<u>1</u>
4.	Resistor	<u>2</u>
5.	Battery 10000 mah	<u>1</u>
6.	AC to DC converter	<u>1</u>
7.	Magnetron	<u>1</u>
8.	Jumper wire	<u>1</u>
9.	Step up transformer	<u>1</u>
10.	High voltage Capacitor	<u>1</u>
11.	Switch	<u>1</u>

COMPONENTS OF PROJECT

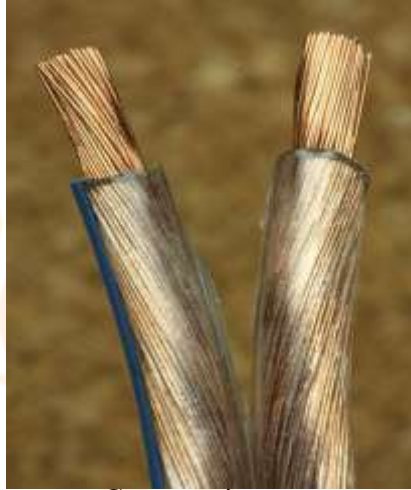
Sr.no.	Name of Components	Price of Component (Rs.)
1.	Copper wire	100
2.	LED	20
3.	Resistor	50
4.	Battery 10000 mah	1200
5.	PCB board	750
6.	AC to DC converter	500
7.	Magnetron	3000
8.	Step up transformer	2500
9.	High voltage transformer	600
10.	Switch	10
11.	Jumper wire	50

EQUIPMENTS FOR PROJECT

1) Copper Wire

Copper has been used in electrical wiring since the invention of the electromagnet and the telegraph in the 1820s. The invention of the telephone in 1876 created further demand for copper

wire as an electrical conductor.



Copper wires.



Copper cable.



Coaxial cable made from copper.

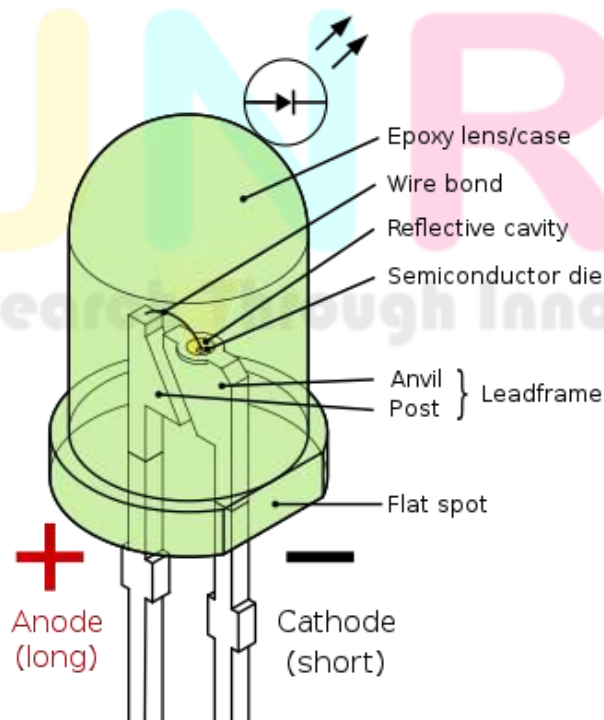
Copper is the electrical conductor in many categories of electrical wiring. Copper wire is used in power generation, power transmission, power distribution, telecommunications, electronics circuitry, and countless types of electrical equipment. Copper and its alloys are also used to make electrical contacts. Electrical wiring in buildings is the most important market for the copper industry. Roughly half of all copper mined is used to manufacture electrical wire and cable conductors.

2) LED

A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor.[5] White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.



Electronic symbol



Parts of a conventional LED. The flat bottom surfaces of the anvil and post embedded inside the epoxy act as anchors, to prevent the conductors from being forcefully pulled out via mechanical strain or vibration.

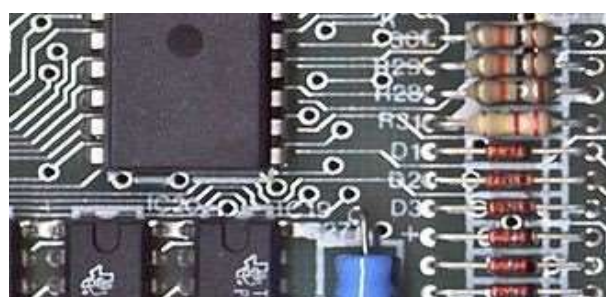
Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared (IR) light. Infrared LEDs are used in remote-control circuits, such as those used with a wide variety of consumer electronics. The first visible-light LEDs were of low intensity and limited to red. Early LEDs were often used as indicator lamps, replacing small incandescent bulbs, and in seven-segment displays. Later developments produced LEDs available in visible, ultraviolet (UV), and infrared wavelengths, with high, low, or intermediate light output, for instance white LEDs suitable for room and outdoor area lighting. LEDs have also given rise to new types of displays and sensors, while their high switching rates are useful in advanced communications technology with applications as diverse as aviation lighting, fairy lights, automotive headlamps, advertising, general lighting, traffic signals, camera flashes, lighted wallpaper, horticultural grow lights, and medical devices.

3) **PCB board**

A printed circuit board (PCB; also printed wiring board or PWB) is a medium used in electrical and electronic engineering to connect electronic components to one another in a controlled manner. It takes the form of a laminated sandwich structure of conductive and insulating layers: each of the conductive layers is designed with an artwork pattern of traces, planes and other features (similar to wires on a flat surface) etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate. Electrical components may be fixed to conductive pads on the outer layers in the shape designed to accept the component's terminals, generally by means of soldering, to both electrically connect and mechanically fasten them to it. Another manufacturing process adds vias: plated-through holes that allow interconnections between layers.



PCB of a DVD player. PCBs may be made in other colors.



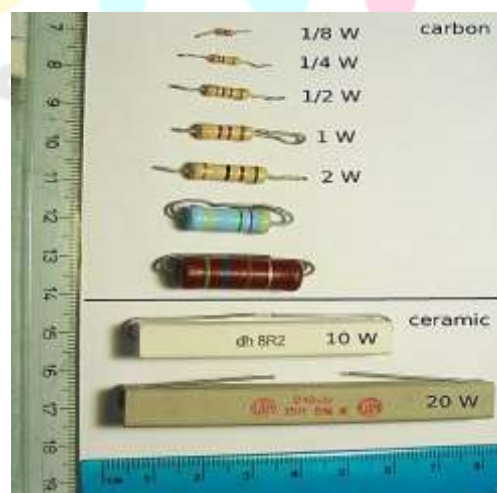
Part of a 1984 Sinclair ZX Spectrum computer board, a PCB, showing the conductive traces, vias(the through-hole paths to the other surface), and some electronic components mounted using through-hole mounting

Printed circuit boards are used in nearly all electronic products. Alternatives to PCBs include wire wrap and point-to-point construction, both once popular but now rarely used. PCBs require additional design effort to lay out the circuit, but manufacturing and assembly can be automated. Electronic design automation software is available to do much of the work of layout. Mass-producing circuits with PCBs is cheaper and faster than with other wiring methods, as components are mounted and wired in one operation. Large numbers of PCBs can be fabricated at the same time, and the layout has to be done only once. PCBs can also be made manually in small quantities, with reduced benefits.

4) Resistor

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.

Electronic Symbol



Various resistor types of different shapes and sizes

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms. Resistors are also implemented within integrated circuits.

The electrical function of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude. The nominal value of the resistance falls within the manufacturing tolerance, indicated on the component.

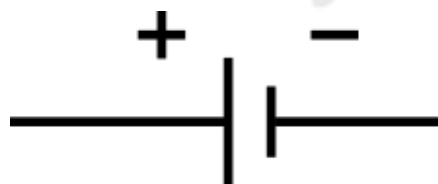
5) Battery

A battery is a source of electric power consisting of one or more electrochemical cells with external connections for powering electrical devices. When a battery is supplying power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells; however, the usage has evolved to include devices composed of a single cell.



Various cells and batteries (top left to bottom right): two AA, one D, one handheld ham radio battery, two 9-volt (PP3), two AAA, one C, one camcorder battery, one cordless phone battery

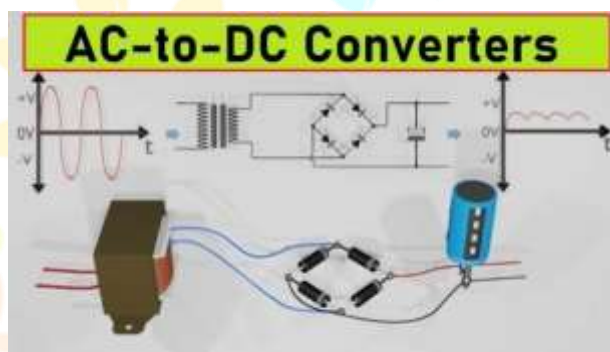
Electronic symbol



Primary (single-use or "disposable") batteries are used once and discarded, as the electrode materials are irreversibly changed during discharge; a common example is the alkaline battery used for flashlights and a multitude of portable electronic devices. Secondary (rechargeable) batteries can be discharged and recharged multiple times using an applied electric current; the original composition of the electrodes can be restored by reverse current. Examples include the lead–acid batteries used in vehicles and lithium-ion batteries used for portable electronics such as laptops and mobile phones.

Batteries come in many shapes and sizes, from miniature cells used to power hearing aids and wristwatches to, at the largest extreme, huge battery banks the size of rooms that provide standby or emergency power for telephone exchanges and computer data centers. Batteries have much lower specific energy (energy per unit mass) than common fuels such as gasoline. In automobiles, this is somewhat offset by the higher efficiency of electric motors in converting electrical energy to mechanical work, compared to combustion engines.

6) AC to DC converter



AC to DC Converters are one of the most important elements in power electronics. This is because there are a lot of real-life applications that are based on these conversions. The electrical circuits that transform alternating current (AC) input into direct current (DC) output are known as AC-DC converters. They are used in power electronic applications where the power input a 50 Hz or 60 Hz sine-wave AC voltage that requires power conversion for a DC output.

The process of conversion of AC current to dc current is known as rectification. The rectifier converts the AC supply into the DC supply at the load end connection. Similarly, transformers are normally used to adjust the AC source to reduce the voltage level to have a better operation range for DC supply.

Alternating current (AC) & Direct current (DC)

Alternating Current Concept

In alternating current, the current changes direction and flows forward and backward. The current whose direction changes periodically is called an alternating current (AC). It has non-zero frequency. It is produced by AC generator, dynamo, etc.

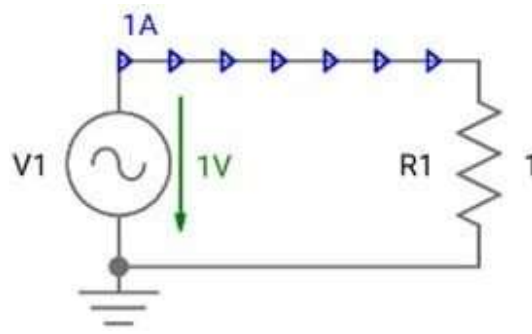


Fig: Simple AC Circuit

Direct Current

In direct current, the current doesn't change its magnitude and polarity. If the current always flows in the same direction in a conductor then it is called direct current. It has zero frequency. It is produced by cells, battery, DC generator etc.

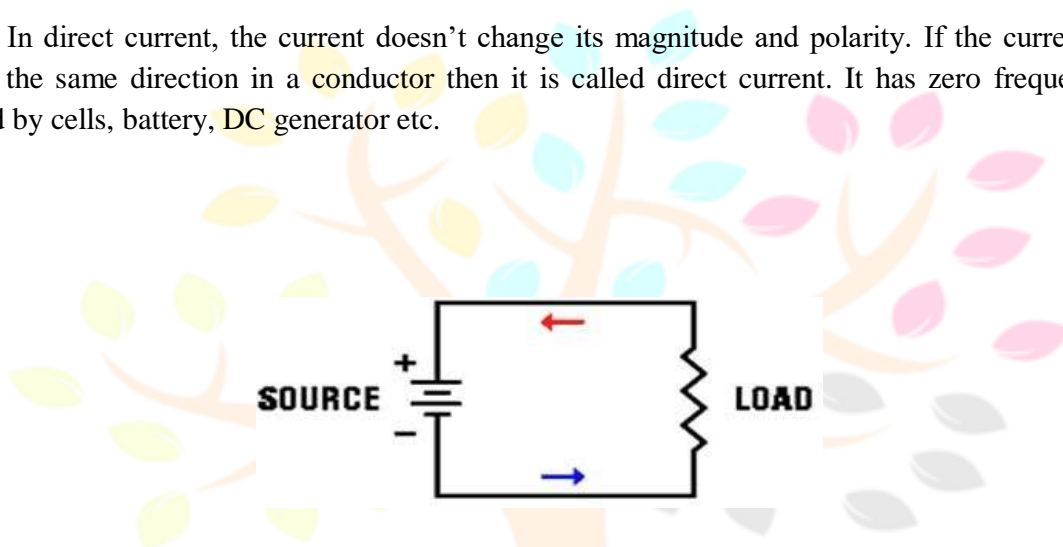


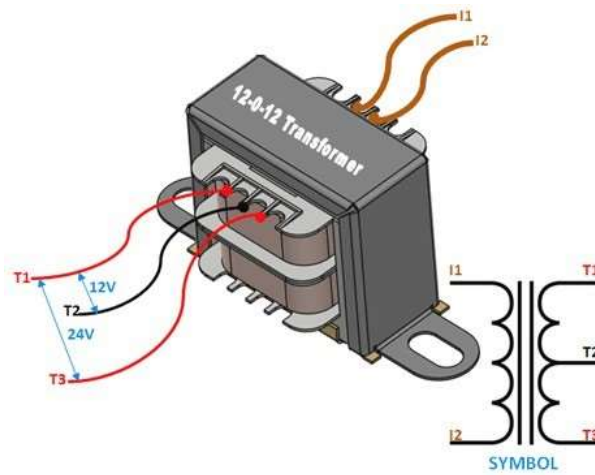
Fig: Simple DC Circuit

Simple Steps to change AC into DC

Now us discuss about AC to DC converter. Let us consider frequently used converter in the power supply circuit, 230V AC to 5V DC converter.

1. Stepping down the Voltage Levels

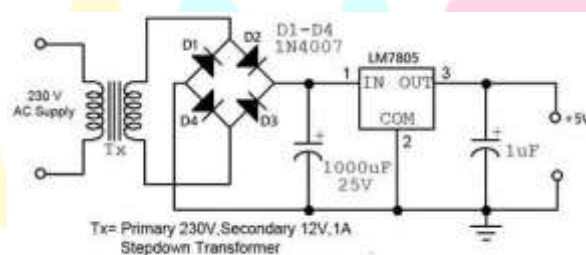
Sometimes voltages need to be increased while sending power to long distances. Similarly, voltages need to be decreased for equipment that uses the lower power. The step-up transformers are being used for stepping up the voltage levels and step-down transformers are being used for stepping down the voltage levels.



Consider a transformer with 12V Output. The 230V AC power supply is converted into 12V AC by using step down transformer. RMS value and its peak value can be given by the product of the square root of two and RMS value and is approximately equal to 17V which is the output of the step-down transformer.

2. AC to DC Power Converter Circuit

The rectifier converts the AC supply into the DC supply at the load end connection. There are different types of rectifiers, such as half-wave, full-wave, and bridge rectifiers.

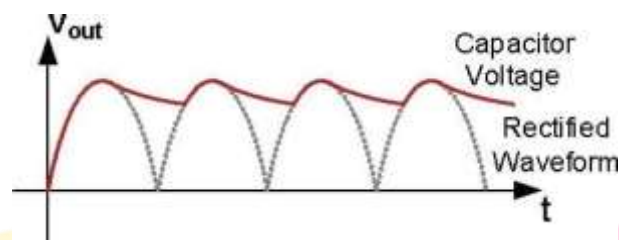


Full Bridge rectifier which consists of four diodes are connected in the form of a bridge. The diode conducts only in one direction, i.e during forward bias. It remains in an off state in another direction, i.e. during reverse bias.

In the above circuit, during the positive half cycle, the diodes D2 & D4 conducts. And during the negative half cycle of the power supply, diodes D1 & D3 conducts. Thus, in this way input AC power is rectified into output DC power. But the problem is DC output power consists of pulses and is not pure DC.

3. Obtaining Pure DC Waveform

We need to convert the pulsating DC to pure DC. To do that, most of the circuit uses a Capacitors. The capacitor is used to store energy while the input voltage is increasing from zero to its peak value. The energy from the capacitor can be discharged while the input voltage is decreasing from its peak value to zero.



Thus, In this way, we can convert the pulsating DC into pure DC using this charging & discharging process of the capacitor.

4. Regulating Fixed DC Voltage

In order to fix the output voltage to the fixed desired value, we finally use the voltage regulator IC. The DC voltage regulators IC comes with the name 78XX. The last two digits XX-represents the output voltage value. For example, to limit the output voltage to 5V, we use the 7805 Voltage Regulator IC. And to limit the voltage to 9V, we use a 7809 Voltage regulator IC.

7) Magnetron

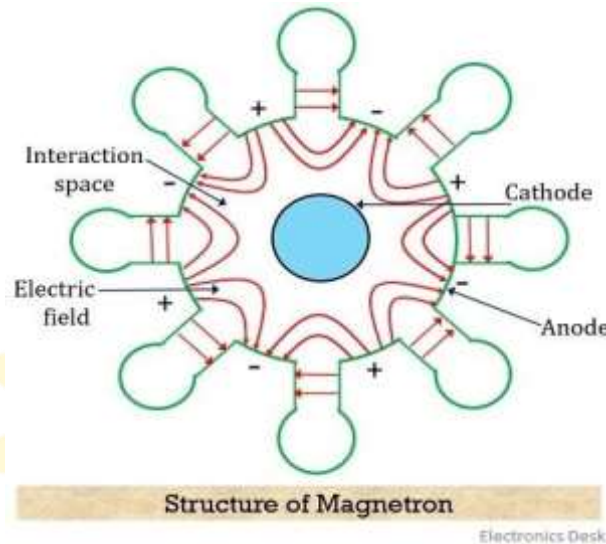
A magnetron is a device that generates high power electromagnetic wave. It is basically considered as a self-excited microwave oscillator. And is also known as a crossed-field device. The reason behind calling it so is that the electric and magnetic field produced inside the tube are mutually perpendicular to each other thus the two crosses each other. A magnetron is basically a vacuum tube of high power having multiple cavities. It is also known as cavity magnetron because of the presence of anode in the resonant cavity of the tube.

The operating principle of a magnetron is such that when electrons interact with electric and magnetic field in the cavity then high-power oscillations get generated. Magnetrons are majorly used in radar as being the only high-power source of RF signal as a power oscillator despite a power amplifier. It was invented in the year 1921 by Albert Hull. However, an improved high power cavity magnetron was invented in 1940 by John Randall and Harry Boot.

Here in this article, we will discuss how a cavity magnetron works. But before that, we must know how a magnetron is constructed.

Construction of Magnetrons

The figure here shows a magnetron with 8 cavities: structure of magnetron.



A cylindrical magnetron has a cylindrical cathode of a certain length and radius present at the Centre around which a cylindrical anode is present. The cavities are present at the circumference of the anode at equal spacing. Also, the area existing between anode and cathode of the tube is known as interaction space/region.

It is to be noted here that there exists a phase difference of 180° between adjacent cavities. Therefore, cavities will transfer their excitation from one cavity to another with a phase shift of 180° . Thus we can say that if one plate is positive then automatically its adjacent plate will be negative. And this is clearly shown in the figure given above.

More specifically we can say that edges and cavities show 180° phase apart relationship.

As we have already discussed that here the electric and magnetic field are perpendicular to each other. And the magnetic field is generated by using a permanent magnet.

8) Jumper wire

A jump wire (also known as jumper, jumper wire, DuPont wire) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.



Stranded 22AWG jump wires with solid tips.

Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

9) Voltage sensor

In electrical engineering, current sensing is any one of several techniques used to measure electric current. The measurement of current ranges from picoamps to tens of thousands of amperes. The selection of a current sensing method depends on requirements such as magnitude, accuracy, bandwidth, robustness, cost, isolation or size. The current value may be directly displayed by an instrument, or converted to digital form for use by a monitoring or control system.

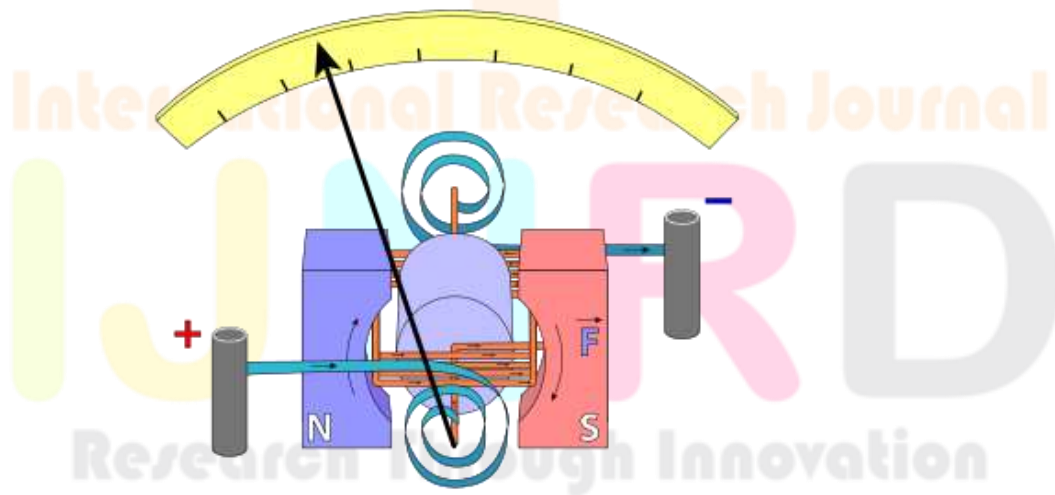


Diagram of D'Arsonval/Weston type galvanometer. As the current flows from + terminal of the coil to – terminal, a magnetic field is generated in the coil. This field is counteracted by the permanent magnet and forces the coil to twist, moving the pointer, in relation to the field's strength caused by the flow of current.

Current sensing techniques include shunt resistor, current transformers and Rogowskicoils, magnetic-field based transducers and others.

Current sensor

A current sensor is a device that detects electric current in a wire and generates a signal proportional to that current. The generated signal could be analog voltage or current or a digital output. The generated signal can be then used to display the measured current in an ammeter, or can be stored for further analysis in a data acquisition system, or can be used for the purpose of control.

The sensed current and the output signal can be:

Alternating current input

- analog output, which duplicates the wave shape of the sensed current.
- bipolar output, which duplicates the wave shape of the sensed current.
- unipolar output, which is proportional to the average or RMS value of the sensed current.

Direct current input

- unipolar, with a unipolar output, which duplicates the wave shape of the sensed current
- digital output, which switches when the sensed current exceeds a certain threshold

10) Step up transformer

This is a very useful device, indeed. With it, we can easily multiply or divide voltage and current in AC circuits. Indeed, the transformer has made the long-distance transmission of electric power a practical reality, as AC voltage can be “stepped up” and current “stepped down” for reduced wire resistance power losses along power lines connecting generating stations with loads. At either end (both the generator and at the loads), voltage levels are reduced by transformers for safer operation and less expensive equipment.

A transformer that increases the voltage from primary to secondary (more secondary winding turns than primary winding turns) is called a step-up transformer. Conversely, a transformer designed to do just the opposite is called a step-down transformer.

Let's re-examine a photograph shown in the previous section:

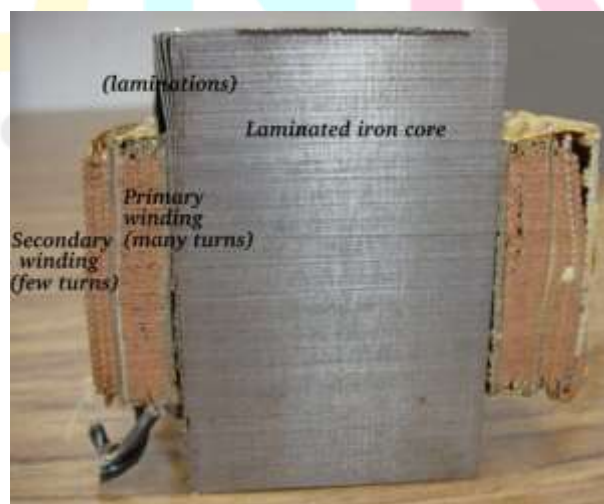


Figure 8.1 Transformer cross-section showing primary and secondary windings is a few inches tall (approximately 10 cm).

A step-up transformer is a type of transformer that converts the low voltage (LV) and high current from the primary side of the transformer to the high voltage (HV) and low current value on the secondary side of the transformer. The reverse of this is known as a step down transformer.

A transformer is a piece of static electrical equipment which transforms electrical energy (from primary side windings) to the magnetic energy (in the transformer's magnetic core) and again to the electrical energy (on the secondary transformer side). A step-up transformer has a wide variety of applications in electrical systems and transmission lines.

The operating frequency and nominal power are approximately equal on the primary and secondary transformer sides because the transformer is a very efficient piece of equipment – while the voltage and current values are usually different.

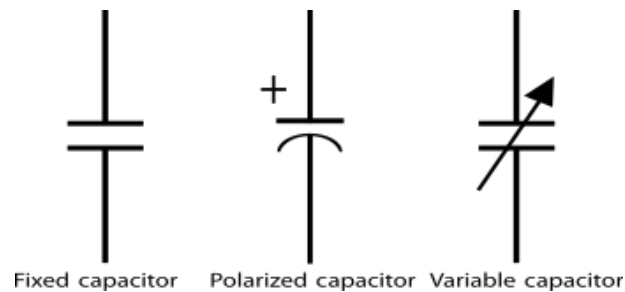
A transformer provides galvanic isolation in the electrical system. Due to these two main features, the transformer is the most important part of the electrical system and provides economical and reliable transmission and distribution of electrical energy.

11) High Voltage Capacitor

A capacitor is a device that stores electrical energy in an electric field by virtue of accumulating electric charges on two close surfaces insulated from each other. It is a passive electronic component with two terminals.



Electronic symbol



The effect of a capacitor is known as capacitance. While some capacitance exists between any two electrical conductors in proximity in a circuit, a capacitor is a component designed to add capacitance to a circuit. The capacitor was originally known as the condenser, a term still encountered in a few compound names, such as the condenser microphone.

The physical form and construction of practical capacitors vary widely and many types of capacitors are in common use. Most capacitors contain at least two electrical conductors often in the form of metallic plates or surfaces separated by a dielectric medium. A conductor may be a foil, thin film, sintered bead of metal, or an electrolyte. The nonconducting dielectric acts to increase the capacitor's charge capacity. Materials commonly used as dielectrics include glass, ceramic, plastic film, paper, mica, air, and oxide layers. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, an ideal capacitor does not dissipate energy, although real-life capacitors do dissipate a small amount (see non-ideal behavior). When an electric potential difference (a voltage) is applied across the terminals of a capacitor, for example when a capacitor is connected across a battery, an electric field develops across the dielectric, causing a net positive charge to collect on one plate and net negative charge to collect on the other plate. No current actually flows through the dielectric. However, there is a flow of charge through the source circuit. If the condition is maintained sufficiently long, the current through the source circuit ceases. If a time-varying voltage is applied across the leads of the capacitor, the source experiences an ongoing current due to the charging and discharging cycles of the capacitor.

The earliest forms of capacitors were created in the 1740s, when European experimenters discovered that electric charge could be stored in water-filled glass jars that came to be known as Leyden jars. Today, capacitors are widely used in electronic circuits for blocking direct current while allowing alternating current to pass. In analog filter networks, they smooth the output of power supplies. In resonant circuits they tune radios to particular frequencies. In electric power transmission systems, they stabilize voltage and power flow.[2] The property of energy storage in capacitors was exploited as dynamic memory in early digital computers,[3] and still is in modern DRAM

12) Switch

In electrical engineering, a switch is an electrical component that can disconnect or connect the conducting path in an electrical circuit, interrupting the electric current or diverting it from one conductor to another.[1][2] The most common type of switch is an electromechanical device consisting of one or more sets of movable electrical contacts connected to external circuits. When a pair of contacts is touching current can pass between them, while when the contacts are separated no current can flow.

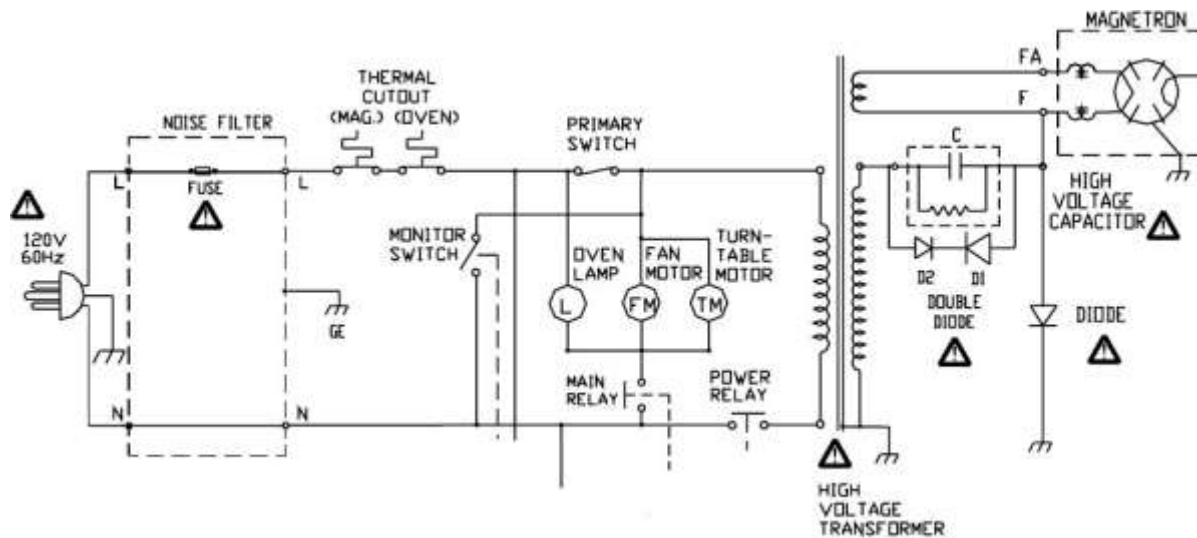
Switches are made in many different configurations; they may have multiple sets of contacts controlled by the same knob or actuator, and the contacts may operate simultaneously, sequentially, or alternately. A switch may be operated manually, for example, a light switch or a keyboard button, or may function as a sensing element to sense the position of a machine part, liquid level, pressure, or temperature, such as a thermostat. Many specialized forms exist, such as the toggle switch, rotary switch, mercury switch, push-button switch, reversing switch, relay, and circuit breaker. A common use is control of lighting, where multiple switches may be wired into one circuit to allow convenient control of light fixtures. Switches in high-powered circuits must have special construction to prevent destructive arcing when they are opened.



Electronic symbol



CIRCUIT DIAGRAM



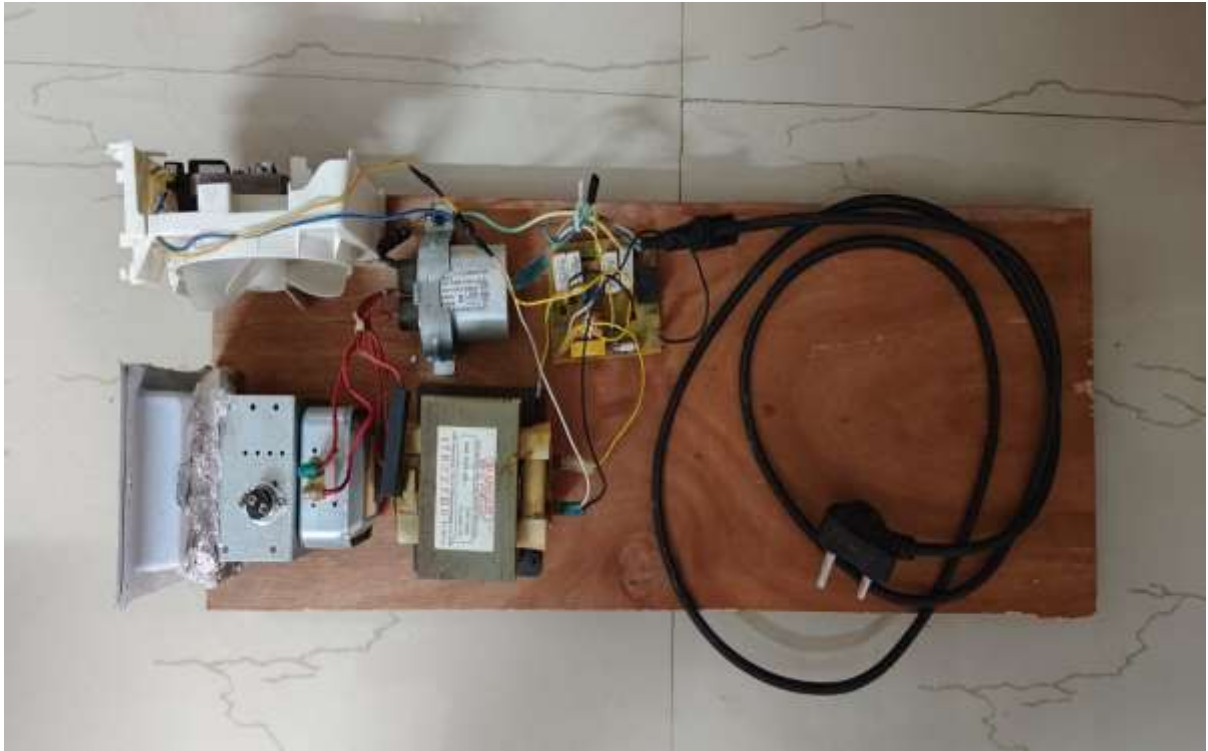
WORKING

High Voltage transformer: Unlike many other household appliances, the microwave oven requires more power than the normal voltage that the home's electrical wiring carries. To accomplish this, a step-up transformer with a high-voltage output is placed inside the oven. The 240V supply is jumped to a few thousand volts, which is then fed to the cavity magnetron. **Cavity Magnetron:** A cavity magnetron is a high-powered vacuum tube that transforms the electrical energy into long-range microwave radiations, and hence it is the most important component of a microwave oven. **Micro-controller:** A microcontroller is something that enables communication between a user and a machine. It is a controlling unit that contains one or more processing cores along with memory and programmable input/output peripherals. It processes the instructions that a user gives to the microwave oven and also displays them on a seven-segment display or a LED screen.

Waveguide: As the name suggests, a waveguide is a hollow metallic tube that guides the waves generated at the magnetron's output toward the cavity (the place where we place the food).

Cooling Fan: Cooling fans reduce the magnetron's operating temperature and ensure its efficacy and longevity. The process is fairly simple; however, the mechanism involved in that process is somewhat atypical. After the generation of microwaves at the magnetron, they are guided by the waveguide towards the object in the cavity. The microwaves penetrate through the surface of the object and it. As the orientation of the electric field changes over time, the polar molecules of water attempt to follow the field by changing their orientation inside the material to line up along the field lines in an energetically favorable configuration (namely, with the positive side pointing in the same direction as the field lines). As these molecules change direction rapidly (millions of times per second at least), they gain energy, which increases the temperature of the material. This process is called dielectric heating. The microwave energy diminishes according to the inverse square law, and therefore, the cavity chamber, where we place food, is designed in such a way that it carries out the maximum efficiency of the heating effect of microwaves. Furthermore, most of the microwave ovens come with a door switch that does not allow the process to initiate until the door is completely sealed.

PROJECT IMAGE



APPLICATIONS

1. To Stop Cars
2. Destroyer electronics system
3. Use as Weapons

ADVANTAGES

1. To use military purpose.
2. Electromagnetic energy source.
3. Quick and accurate results.
4. Helpful for police and provides and automatic safety systems for cars and other vehicles aswell.

SAFETY AND ETHICAL ASPECTS AND DESIGN

- The main safety issue with the EMP generator is that one has to be careful when a high voltage (150 V or higher) is charged on the capacitor.
- The person working with generator had to be very careful not to touch the two terminals of the capacitor with any part of the body as doing so can potentially seriously burn.
- Another built-in safety feature $1\text{M}\Omega$ and $10\text{M}\Omega$ resistors in parallel with transmitting loop.

CONCLUSION

The proposed system provides safety to the public by destroying any kind of misused electronic devices such as cameras in confidential rooms. The system can be handled by humans safely. It damages devices within a small range. This new technology can be used like a weapon in commercial areas and can be easily carried by user.

The research programmed described in this thesis was intended to develop, manufacture and test a compact, portable and repetitive EMP generator capable of radiating high peak power pulses. The design emphasis was to be on producing a robust source, as it was meant for applications and investigations outside a laboratory environment. All aspects of the project aims were successfully completed and have been reported in peer-reviewed academic journals and at prestigious international conferences and symposia.

The generator developed is based on Tesla transformer technology, with the transformer performance being predicted very accurately by the filamentary modelling technique. The transformer is able to generate pulses of more than 0.5 MY, with a high energy transfer efficiency of 82% between the primary and secondary circuits. A novel low-inductance spark-gap switch based on the corona-stabilization technique was developed for the repetitive operation of the EMP generator. The switch is able to operate at a pulse repetition frequency of about 2 kHz, and even at such a high rate no breakdown was observed inside the system.

Various diagnostic tools, including an in-built capacitive divider working in a V-dot mode and a further fast capacitive voltage divider were developed for monitoring the system performance. The results obtained when using these devices were found to very closely match the corresponding predicted results. Finally, the EMP generator was tested in an open space outside the laboratory environment, where a peak radiated field of 12.5 kV/m was measured at 10 m from the generator, with peak radiated powers in the order of hundreds of MW.

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