ISSN (Online): 2456-0448
International Journal Of Innovative Research In Management, Engineering And Technology
Vol. 1, Issue 4, May 2016

STUNGUN

[1] Abdul Salam A , [2] Rashid O , [3] Rahul KR Yashwanth , [4] Sruthy K
[1] abdulsalam.fazilsalam@gmail.com, [2] rashidorakottil@gmail.com, [3] rahulkr1436@gmail.com,
[4] sruthykanattil@gmail.com

Abstract: **Electric stun guns have been developed as less-lethal devices that law enforcement officers can use to control potentially violent subjects, as an alternative to using firearms. These devices apply high voltage, low amperage and pulsate electric shocks to the subject, which causes involuntary skeletal muscle contraction and renders the subject unable to further resist. In field use of these devices, the electric shock is often applied to the thorax, which raises the issue of cardiac safety of these devices. An important determinant of the cardiac safety of these devices is their electrical output. Here the outputs of three commercially available electric stun guns were evaluated with a resistive load and in a human-sized animal model**.

Keywords: ***Stun gun, Thorax, Cardiac safety.***

I. INTRODUCTION

The electric stun gun is a modern, portable, personal-protection appliance. It generates high potential energy to ward off vicious animals or other attackers. It is an aid to help escape from a potentially dangerous situation. The Device develops about 200,000 volts. Higher voltages attained by adding additional multiplier stages, but it should be noted that those stage will also increase the Overall size of the unit. The stun is very compact, being built into a small plastic case. It is powered by a single 9-volt battery, either NiCad or alkaline. The high voltage is applied to two electrodes which require only light contact to be effective. When touched with the teaser, the victim will receive a stunning, but non-lethal jolt of electricity that will usually discourage any further encounters. The electric stun gun teaser is a power supply which consists of a micro-size regenerative amplifier/ oscillator coupled to an energy multiplier section.

It should not be confused with cheap induction-type cattle prods. The teaser is more versatile than other high-voltage stun devices currently being sold. Those devices are basically high-voltage, AC generators which jam the nervous system. However, the teaser may be used for heating and burning applications, or anywhere a high voltage DC supply is required. An electric shock weapon is an incapacitate weapon used for incapacitating a person by administering electric shock aimed at disrupting superficial muscle functions and/or causing pain without significantly hurting the subject.

Multiple types of these devices exist differing by the mode of use. Stun guns, batons (or prods), and belts administer an electric shock by direct contact, whereas Teasers (conducted electrical weapons, CEW) fire projectiles that administer the shock through thin Flexible wires and Long-range electroshock projectiles, which can be fired from ordinary shotguns and do not need the wires, have been developed as well.

2. CONSTRUCTION

Electroshock weapon technology uses a temporary high-voltage, low-current electrical discharge to override the body's muscle-triggering mechanisms. The recipient is immobilized via two metal probes connected via wires to the electroshock device. The recipient feels pain, and can be momentarily paralyzed while an electric current is being applied. It is reported that applying electroshock devices to more sensitive parts of the body is even more painful. The maximum effective areas for stun gun usage are upper shoulder, below the rib cage, and the upper hip. High voltages are used, but because most devices use a non-lethal current, death does not usually occur. The resulting "shock" is caused by muscles twitching uncontrollably, appearing as muscle spasms.

The internal circuits of most electroshock weapons are fairly simple, based on either an oscillator, resonant circuit (a power inverter), and step-up transformer or a diode capacitor voltage multiplier to achieve an alternating high-voltage discharge or a continuous direct-current discharge. It may be powered by one or more batteries depending on manufacturer and model. Output voltage is claimed to be in the range of 100 V up to 6 KV; current intensity output is claimed to be in the range of 100 to 500 mA individual impulse duration is claimed to be in the range of 10 to 100 μs (microseconds); frequency of impulse is claimed to be in the range of 2 to 40 Hz; electrical charge delivered is

Claimed to be in the range of 15 to 500 μC (micro-Coulomb); energy delivered is claimed to be in the range of 0.9 to 10J. The output current upon contact with the target will depend on various factors such as target's resistance, skin type, moisture, bodily salinity, clothing, the electroshock weapon's internal circuitry, discharge waveform, and battery conditions.

3. CIRCUIT COMPONENTS

- 555 timer
- 8 pin chip socket
- A 9:1000 ferrite core auto transformer
- 10 μF capacitor
- 0.1 μF capacitor
- 10 x BA159 diodes
- 10 x 3nF, 1200 V ceramic capacitor
- Neon Lamp
- IRF530 MOSFET
- 680 ohm resistor
- 2k ohm potentiometer
- IR LED
- 2 *9V Battery
- Micro Switch
- Printed Circuit Board
- Connecting wires

4. DESCRIPTION OF COMPONENTS

RESISTOR - The flow of charge (or current) through any material, encounters an opposing force similar in many respect to mechanical friction. This opposing force is called resistance of the material. It is measured in ohms. In some electric circuits resistance is deliberately introduced in the form of the resister

TRANSFORMER - Transformer works on the principle of mutual inductance. We know that if two coils or windings are placed on the core of iron, and if we pass alternating current in one winding, back emf or induced voltage is produced in the second winding. We know that alternating current always changes with the time. So if we apply AC voltage across one winding, A 12 V
voltage will be induced in the other winding. Transformer works on this same principle. It is made of two windings wound around the same core of iron. The winding to which AC voltage is applied is called primary winding. The other winding is called as secondary winding

CAPACITORS - A capacitor can store charge, and its capacity to store charge is called capacitance. Capacitors consist of two conducting plates, separated by an insulating material (known as dielectric). The two plates are joined with two leads. The dielectric could be air, mica, paper, ceramic, polyester, polystyrene, etc. This dielectric gives name to the capacitor. Like paper capacitor, mica capacitor etc

DIODES - Diodes are semiconductor devices which might be described as passing current in one direction only. Diodes have two terminals, an anode and a cathode. The cathode is always identified by a dot, ring or some other mark. Diode is a unidirectional device. In this current flows only one direction. Diodes can be used as voltage regulators, tuning devices in RF tuned circuits, frequency multiplying devices in RF circuits, mixing devices in RF circuits, switching applications or can be used to make logic decisions in digital circuits. There are also diodes which emit "light", of course these are known as light-emitting-diodes or LED's. A rectifying diode of the 1N4001-07 (1A) type or even one of the high power, high current stud mounting types

555 TIMER - The 555 timer IC is an integrated circuit (chip) used in a variety of timer, pulse generation, and oscillator applications. The 555 can be used to provide time delays, as an oscillator, and as a flip-flop element. Derivatives provide up

ISSN (Online): 2456-0448
International Journal Of Innovative Research In Management, Engineering And Technology
Vol. 1, Issue 4, May 2016

to four timing circuits in one package. It is an 8pin silicon chip. In a-stable mode this is used to produce low frequency oscillations.

The IC 555 has three operating modes:

Non-stable Mode: In this mode, the 555 functions as a "one-shot" pulse generator. Applications include timers, missing pulse detection, bounce free switches, touch switches, frequency divider, capacitance measurement, pulse-width modulation (PWM) and so on.
A-stable (free-running) Mode: The 555 can operate as an oscillator. Uses include LED and lamp flashers, pulse generation, logic clocks, tone generation, security alarms, pulse position modulation and so on. The 555 can be used as a simple ADC, converting an analog value to a pulse length. E.g. selecting thermistor as timing resistor allows the use of the 555 as a temperature sensor: the period of the output pulse is determined by the temperature. The use of a microprocessor based circuit can then convert the pulse period to temperature, linearise it and even provide calibration means.
Bi-Stable Mode or Schmitt Trigger: The 555 can operate as a flip-flop, if the DIS pin is not connected and no capacitor is used. Uses include bounce-free latched switches. 555timer in A-stable mode is used.

MOSFET - The metal–oxide–semiconductor field-effect transistor (MOSFET, MOS-FET, or MOS FET) is a type of transistor used for amplifying or switching electronic signals. In the stun gun project MOSFET IRF530 is used for the low frequency operation. Although the MOSFET is a four-terminal device with source (S), gate (G), drain (D), and body (B) terminals, the body (or substrate) of the MOSFET is often connected to the source terminal, making it a three-terminal device like other field-effect transistors. Because these two terminals are normally connected to each other (short-circuited) internally, only three terminals appear in electrical diagrams. The MOSFET is by far the most common transistor in both digital and analog circuits, though the bipolar junction transistor was at one time much more common.

5. BLOCK DIAGRAM

Fig 1: Block diagram of the given system
When supply is given now the timer produce oscillation then MOSFET triggered then transformer produce output this output given to multiplier circuit this circuit doubled the given output

6. CIRCUIT DIAGRAM

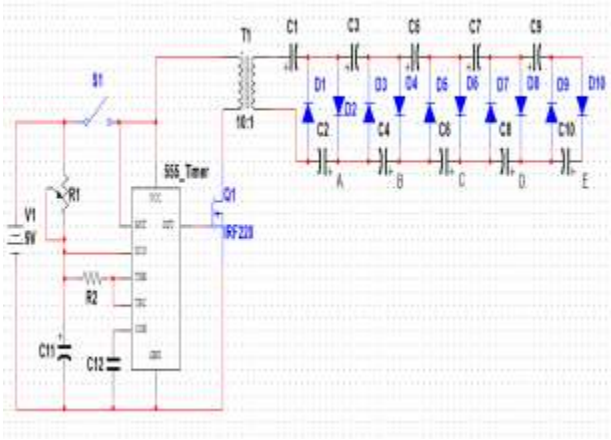

Fig 2: Circuit diagram

Actually, it consists of two of types of designing -Stable multi-vibrators design and Voltage multiplier design. Designing the circuit requires pioneer step of deciding the output voltage. Here our requirement is to generate a 10KV DC voltage from 1000V.
From the equation,
$V_{out} = (2V_{in} + 1.414)S$, where S is number of stages.
To obtain voltage of 100KV, about 5 stages of voltage doublers would be required.
Here we design a 5 stage voltage multiplier circuit generating an output voltage of 10KV.
Since input voltage is around 1000V, each capacitor should have a voltage rating of at least 2000V. Since here operating frequency is low, of the order of Hertz, we require a 2500V, 10uf.
For designing the a-stable multi-vibrator circuit, we select a 555 timer. To design a 555 timer in a-stable mode, passive external components need to be selected.
Assuming a maximum operating frequency of 50Hz and a duty cycle of 75%, I calculate R1 to be around 1.44K, R2 around 720 ohms and C1 around 10uf. Here we select a 2K potentiometer, 720 ohm resistor and 10uf capacitor. Since this is a low frequency operation, a MOSFET IRF530 is used.

Operation of Voltage Multiplier in Stun Gun Circuit

As soon as the switch S1 is pressed, the a-stable operation of 555 Timer starts. A pulsating electric signal of low current is produced, which is stepped up using a step up transformer, to a voltage of around 1000V. The signal from the timer is fed through a MOSFET switch.
1. During first positive half cycle, capacitor C3 charges through diode D1, which is forward biased. Since the capacitor has no discharge path, it stores the charge. This produces a voltage equal to the AC input peak value at the end of half cycle.

2. During negative half cycle, diode D4 is forward biased and capacitor C4 charges through C3 and D2. At the end of the cycle a voltage equal to double the input AC voltage.

3. Again during next positive half cycle, diode D3 is forward biased and capacitor C5 charges. Again during next half cycle, diode D4 is forward biased and capacitor C6 charges. At the end of cycle, a voltage equal to 4 times the input peak voltage is obtained at point 2.

4. The sane procedure applies for other two stages and finally a voltage equal to 10 times the input voltage is obtained at point 5.

7. APPLICATIONS

- It can be used for security purpose for individuals from intruders.
- It can be used as protection from animals.
- It can be used as modern warfare equipment.
- It can be used as a self defense equipment, especially for ladies

8. CONCLUSION

The Electronic Stun Gun was designed as a self-defense weapon for use against vicious dogs or other attacking animals. The device is most effective when the electrodes contact an area of low resistance such as skin or flesh. Those include the snout or mouth since the resistance of those areas is much lower than areas of hair or of fur. The electrodes could be pointed to penetrate these areas better. The stun gun generates great stopping power. One contact will give a powerful jolt and should discourage any further attacks.

REFERENCES

1. **http://www.electronicshub.org/stun-gun-circuit/**
2. **http://www.555-timer-circuits.com/stun-gun.html**
3. **http://www.electroschematics.com/335/stun-gun-simple-schematic/**
4. **http://www.homemade-circuits.com/2013/08/stun-gun-circuit.html**
5. **http://www.instructables.com/id/DIY-Taser/**