

# Circuit Designing for Reduction in Unauthorised Power Theft

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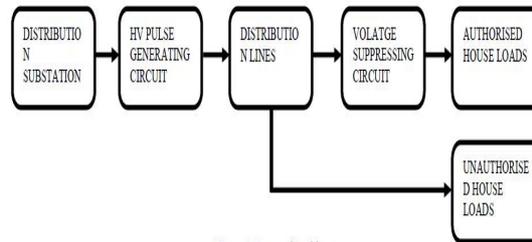
**ABSTRACT:** In this paper, our team is dealing with an handy method for break in power theft. Power theft leads to cost billions of dollars per year in most of the countries. In our present electricity generating system we waste more than half of our resources. Owing to lack of anti theft technology we introducing more handy way to reduce theft in this paper. The proposed arrangement consists of two circuits and two home replica (one warranted and other unwarranted) .One circuit is connected at distribution substation and another inside the energy meter installed in the consumer's premises of warranted home. Sending end circuit will send high voltage pulse at uniform time. While in the case of unwarranted home a receiving end circuit will reduce this high voltage pulse to regular 230VAC, in unwarranted home it will affect its circuitry. This paper as a whole gives an handy, high performance technique which can transmits the power to the required area by decreasing power theft. The proposed arrangement can be used for both single phase and three phase system.

**KEYWORDS:** power theft, warranted, unwarranted, high voltage pulse

## I. INTRODUCTION

Most of the developing countries try to tackle the power theft problem owned by government utilities. In our country (INDIA) the power theft leads to losses of US\$ 4.5 billion per year. Which is about 1.5% of GDP. Here the loser are the honest people, poor consumers. In India till date there is no specific technique which determines the specific location of fault immediately. Power theft has the adverse financial impact power theft may lead to increase in cost or charge per unit. Moreover power theft is nearly related to government indicators where peak levels are recorded in countries without constructive liability, political uncertainty and more corruption. Precisely generating more power in not sufficient to meet today's requirements. Power used and losses occurred need to be closely monitored so that generated power is used in proper manner moreover in efficient manner. This unlawful use power affect the economy of the country which indirectly affects the planning of national energy due to unrecorded data. Power theft can be in way of fraud, illegal connections, irregularities in bill payment. The main purpose of our system is reduce the power theft. This kind of theft is mostly seen in undeveloped or slum areas which account more percentage of power theft.

## II. PROPOSED ARCHITECTURE



The arrangement consists of 2 circuits. One for producing or generating high voltage pulse and second for decreasing high voltage pulse to normal 230v. This high voltage pulse is installed at distribution side and the suppressing circuit is installed on energy metre at consumer side

## III. THEORY OF OPERATION

### A. Working Model Detail

In this model we are going to use 12 Volt AC supply as reference voltage i.e. 230V AC. And for high voltage pulse we are going to use 24 Volt AC supply

### B. High Voltage Pulse Generating Circuit

High voltage generating circuits consists of Rectifier, Voltage divider, voltage regulator, Relay and a Key. Here AC voltage is converted into DC and this DC voltage is given to voltage regulator for continuous 12V DC supply. The relay is connected to the output of the voltage regulator through push button. There will be no voltage across the relay during the normally open condition and relay contact will be at 2<sup>nd</sup> terminal. And during the normally closed condition 12V will appear across the relay coil and it will get energized and the relay contact will switch to terminal 1<sup>st</sup>. Now, the relay is connected 24V AC supply via voltage divider such that this 24VAC will appear across 1<sup>st</sup> terminal and 2<sup>nd</sup> terminal will have 12V AC voltage. Therefore when the switch is normally open, 12V AC will flow through power lines and when switch is normally closed 24V AC will flow through power lines.

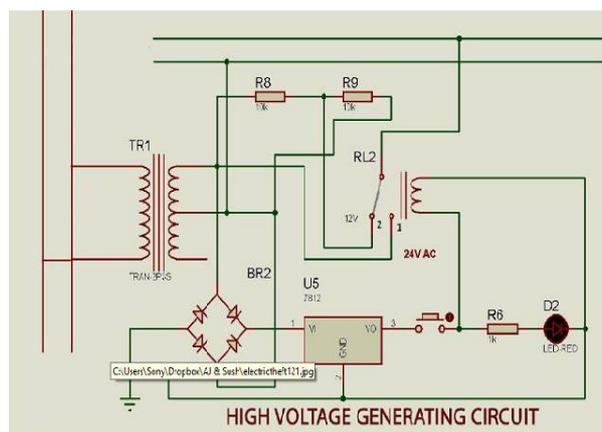


Fig 2 High Voltage Generating Circuit

### C. Voltage Cutoff (Suppressing) Circuit

It contains a Rectifier, Voltage divider, Comparator, Voltage Regulator, Relay and Microcontroller. AC voltage is converted to DC voltage using Bridge rectifier. Voltage regulator gives 9V DC which is compared with the output of the rectifier. Microcontroller receives the input from the output of the comparator and sends the signal to the

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relay via a transistor. The one consisting of the voltage suppressing circuit will not get damaged i.e. authorised consumer when high supply is given. This will affect the unauthorised consumer since, the voltage suppressing circuit is not available in their energy metre.

## IV. COMPONENTS

### A. Relay

Relays are components which allow a low-power circuit to switch a relatively high current on and off, or to control signals that must be electrically isolated from the controlling circuit itself. To make a relay operate, we have to pass a suitable pull-in and holding current (DC) through its energizing coil. In each case the coil has a resistance which will draw the right pull-in and holding currents when it is connected to that supply voltage. So the basic idea is to choose a relay with a coil designed to operate from the supply voltage we are using for our contro

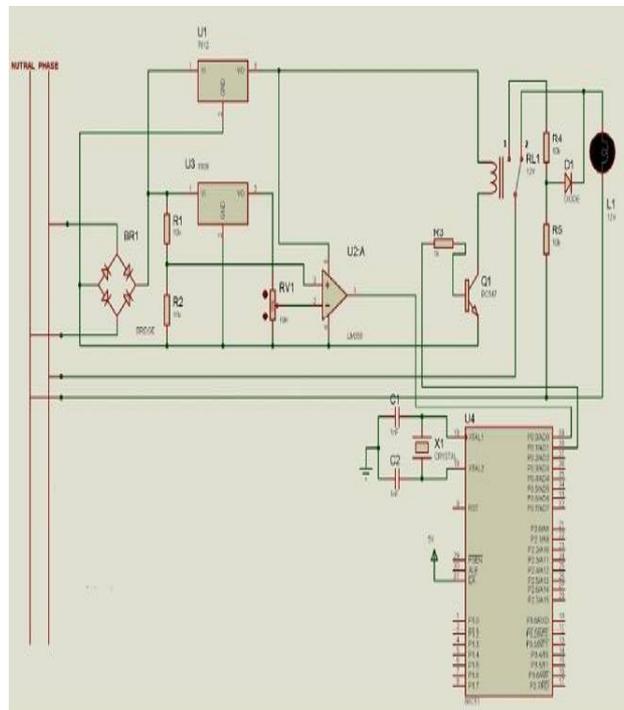


Fig 3 Voltage Suppressing Circuit

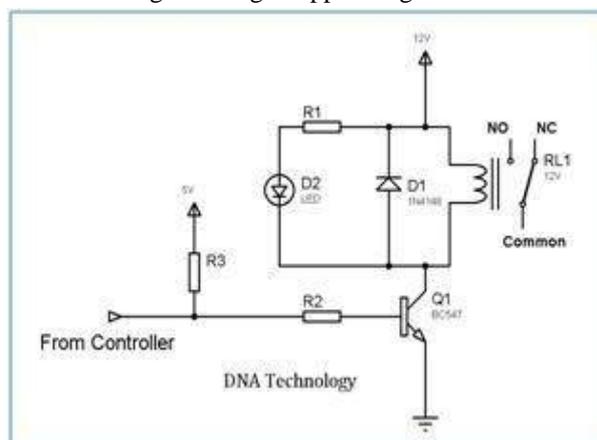


Fig 4 Relay

circuit (and with contacts capable of switching the currents you want to control), and then provide a suitable relay

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driver circuit so that our low-power circuitry can control the current through the relays coil. Typically this will be around 70mA.

Figure shows the basic relay driver circuit. As we can see an NPN transistor is being used to control the relay. The transistor is driven into saturation (turned ON) when a LOGIC 1 is written on the PORT PIN thus turning ON the relay. The relay is turned OFF by writing LOGIC 0 on the port pin. A diode (1N4007/1N4148) is connected across the relay coil; this is done so as to protect the transistor from damage due to the BACK EMF generated in the relay's inductive coil when the transistor is turned OFF. When the transistor is switched OFF the energy stored in the inductor is dissipated through the diode & the internal resistance of the relay coil. Normally 1N4148 can be used as it is fast switching diode with a maximum forward current of 300ma. This diode is also called as free-wheeling diode.

## B. Bridge Rectifier

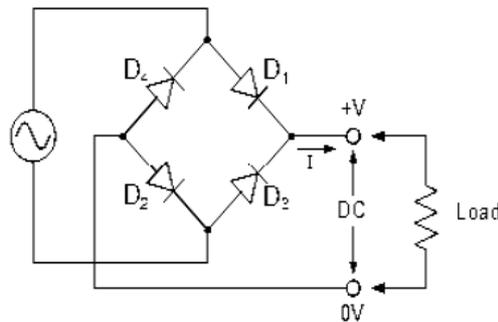


Fig 5 Bridge Rectifier

It makes use of four diodes in a bridge arrangement to get full wave rectification This type of single phase rectifier uses four individual rectifying diodes connected in a closed loop "bridge" configuration to produce the desired output. It does not require centre tap transformer which is one of its main advantage because of which the size and cost is reduced

## C. Comparator

In power electronics, a comparator is a device which compares two voltage or current sources and gives output signal in digital form indicating which larger one is. It has two analog input terminal  $V_+$  and  $V_-$  and one binary digital output  $V_0$ . The main function of the comparator is compare the input sources and give the output according to the required conditions

## D. Voltage Regulator

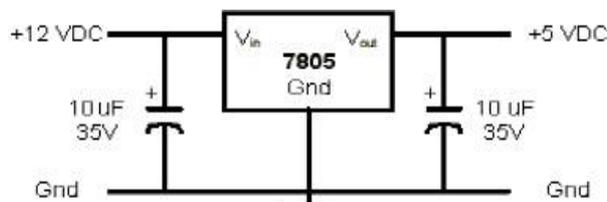


Fig 5 Voltage Regulator

It is used to maintain the constant voltage. It may use electromechanical method or may use electronics components according to its design and use

## E. Microcontroller

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1. 80C51 CPU
2. 5 V operating voltage from 0 MHz to 40 MHz
3. 16/32/64 kB of on-chip flash user code memory with ISP and IAP
4. Supports 12-clock (default) or 6-clock mode selection via software or ISP
5. SPI and enhanced UART
6. PCA with PWM and capture/compare functions
7. Four 8-bit I/O ports with three high-current port 1 pin (16 mA each)
8. Three 16-bit timers/counters
9. Programmable watchdog timer
10. Eight interrupt sources with four priority levels
11. Second DPTR register

## V. CONCLUSION

The proposed design provides the solution caused due to power theft in INDIA. Moreover by providing such model not only theft can be reduced but also the losses caused due to theft can be reduced. This design will lead to unauthorised consumer to install the energy metre thereby reducing the losses

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