Simulation Lamp and Emergency Fan Control For Air Circulation At the Basement using IC LM 308

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Abstract. On a multi-storey buildings are usually always have a basement that is used as a vehicle parking spaces and emergency generator room without us knowing much produce toxic gases, namely carbon monoxide gas (CO). Without us realizing at the basement the fan for air circulation is limited, so in case of power outage from the PLN, and the generator substitutes can not be operated, the basement will be stuffy because the air circulation fan does not work and can cause carbon monoxide poisoned. Based on the background the author was inspired to find a way out in case of a sudden power outage events, so that it can avoid poisoning monoxide gas which released by motor vehicle fumes.To overcome these problems, the authors make a circuit of simulation that can run lights and air circulation fan emergency at any time when a power outage.

Keywords *: Control Light, Fan, IC LM 308*

1 Introduction

On a multi-storey buildings are usually always have a basement that is used as a vehicle parking spaces and emergency generator room without us knowing much produce toxic gases, namely carbon monoxide gas (CO). Without us realizing at the basement the fan for air circulation is limited, so in case of power outage from the PLN, and the generator substitutes can not be operated, the basement will be stuffy because the air circulation fan does not work and can cause carbon monoxide poisoned

Based on the background the author was inspired to find a way out in case of a sudden power outage, so that it can avoid poisoning carbon monoxide gas which released by motor vehicle fumes.To overcome these problems, the authors make a circuit of simulation that can turn on lamp and air circulation fan emergency at any time when a power outage.

In circuit simulation control the lamp and emergency air circulation fan that is designed to save power at bateray and change the power from DC to AC intended to supply electrical power in case of a sudden power outage. The control circuit simulation will work if the current of electricity from the source or from PLN turn off then the circuit of simulation that can **turn on lamp** and air circulation fan emergency will work, if the power source is back to normal it will be interrupted or back to standby.

2. Theory Basic

In the making this circuit simulation, we need of some components

2.1 Resistor

Resistor is an electronic component that provides barriers to the transfer of electrons. the ability to inhibit the resistor is also called resistance or electrical resistance

Figure 1. Resistor (id.wikipedia.org)

Based on the use of resistors can be divided into four parts:

1. Fixed resistor ; resistor which value can not be changed
2. Variable resistor : resistor which value can be changed
3. NTC and PTC Resitor: NTC Resistor (Negative Temperature Coefficient) is resistor whose value will be smaller in contact with hot temperatures. PTC resistor (Positive Temperature Coefficient) is resistor which vallue will be higher in contact with cold temperatures
4. LDR (Light Dependent Resistor) : resistor which value will change when exposed to light. when the light is dark, the resistance will bigger, whereas when a bright , the resistance will smaller. (prihono, 2009).

2.2 Capacitors

A capacitor or a condenser is a passive two-terminal electrical component used to store electrical energy temporarily in an electric field. capacitors symbolized are follows :

Figure 2. Capacitor (komponenelektronika.biz)

There are 3 types of capasitor :

1. Fixed Capacitor : capacitor which value can not be changed. There are 3 types fixed capacitor : ceramic capacitor, polyester capasitor, and padder capacitor

2. Electrolit Capasitor (Elco) : tubular capacitors, has two poles of positive and negative polarity legs, characterized by a positive long legs short while negative
3. Variable Capacitor : capacitor which value can be changed (prihono, 2009)

2.3 Diode

Diode is a device with two terminals and is made up of two types of semiconductors (silicon n type and p-type) connected. This tool is able energized by the current relatively easily in one direction, but very difficult in the reverse direction (Barry Woollard, 2006)

Figure 3. Diode (prakaryarekayasa.blogspot.com)

2.4 Diode zener

zener diode is a highly doped silicon diode, unlike a normal diode, has retreated a sudden breakdown at relatively low voltages. The same effect occurs in the diode that is less polluted. This avalanche the diode also has a breakdown very quickly with a relatively large current flow when it reaches avalanche. For avalanche diode, this breakdown voltages typically occur at a voltage above 6 volts. In practice the two types of diode is called a zener diode. (Mike Tooley,2002)

Figure 3. Diode zener (komponenelektronika.biz)

2.5 Transistor

Transistor is short for transfer resistor, a term that gives instructions on how to how these devices work; the current flowing in the output circuit is determined by the current flowing in the input circuit. Transistors are classified into two categories (bipolar and field-effect) and are also grouped according to the semiconductor material used (silicon or germanium) and by areas of application. (Mike Tooley , 2002)

Figure 5. Transistor (kitronik.co.uk)

2.6 Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. (https://en.wikipedia.org/wiki/Relay)

Figure 6. Relay (electronics.stackexchange.com)

2.7 IC LM308

IC LM 308 is an operational amplifier IC. Operational amplifier (often op-amp or op-amp) is a DC-coupled high-gain electronic voltage amplifier with a differential input and, usually, a single-ended output. In this configuration, an op-amp produces an output potential (relative to circuit ground) that is typically hundreds of thousands of times larger than the potential difference between its input terminals. (https://en.wikipedia.org/wiki/Operational_amplifier)

Figure 7. IC LM 308 (twistywristarcade.com)

3. Research Methods

Research method is illustrated in block diagram form belowThis circuit consists of several block diagram as shown below:

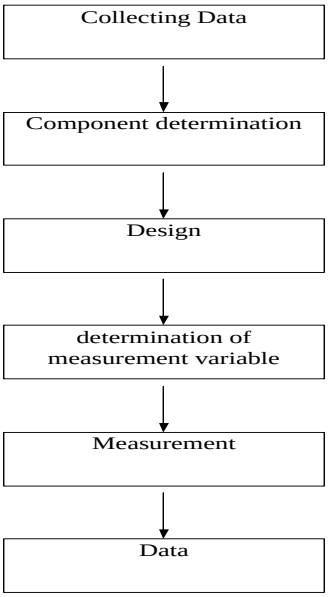

Figure 8. Diagram Block research method

Flow of Research
Data collection is done by observation, field studies and literature through books and internet articles. Through the literature obtained in the framework of solving the problems that can be more focused.

Components Determination
in the determination of the necessary components such as resistor, capasitor, zener, IC308, relay, etc.

Measurement
the results of the design is measure and data capture.
Instrument that used in this measurement is :

1. Multimeter
2. incandescent lamps
3. DC fan
4. Amperemeter
5. Cable jumper
6. Wattmeter

4. Diagram lock Circuit

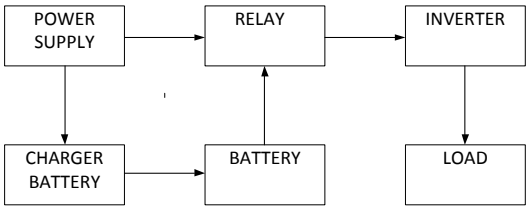

Figure 9. Diagram Block Circuit

1. Power supply
   Used to provide the supply voltage for the relay and battery charger
2. Inverter
   Serves to convert direct voltage into alternating voltageRelay
3. Relay
   Serves to disconnect or connect the battery to the inverter
4. Charger battery
   Serves to charge the battery and turn off the charging process when the battery has been fully
5. Batteries
   Serves to supply power to the inverter
6. Load
   the purpose of this measurement is to determine the advantages and disadvantages of the tools created and to determine the performance of the circuit so that used in accordance with the functions.

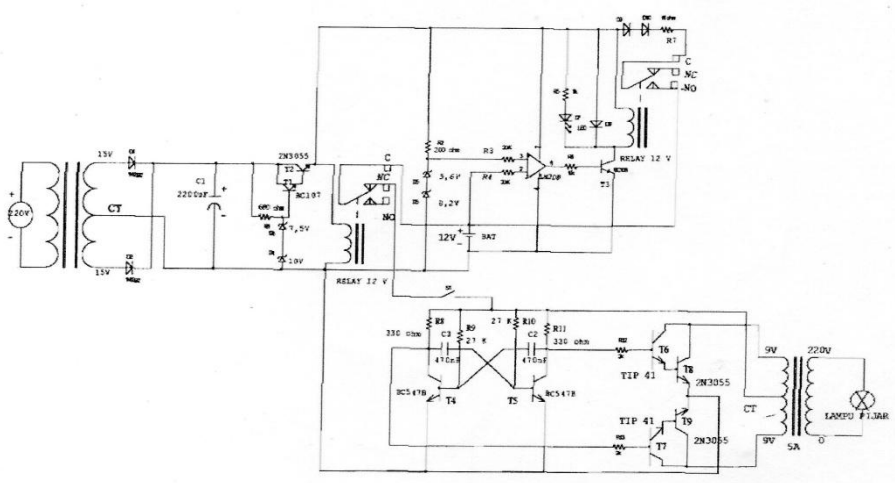

Figure 10. The circuit of Simulation Lamp and Emergency Fan Control For Air Circulation

5. Data

In this measuring is focused on measure the battery charger and inverter.

Data :

a. Battery Charger

Output voltage charger with no load = 8 volt

Output voltage charger with load = 10 volt

Output current charger = 0,8 Ampere

Changer in fine condition, time to fill charger on battery ± 6 hours

b. Inverter

Output voltage charger with no load = 110 volt

Output power with no load = 3 watt

1. Output voltage with elektra incandescent lamps 20 watt = 70 volt
2. Output voltage with DC fan = 12 volt

Table 1. Measuring result with elektra lamp 20 watt

PLN source

No	Load	I	V	W
1	1 lamp	7,5 mA	220 volt	20 watt
2	2 lamps	18,5 mA	220 volt	40 watt

Table 2. Measuring result with elektra lamp 20 watt

Inverter source

No	Load	I	V	W
1	1 lamp	56 mA	90 volt	3 watt
2	2 lamps	120 mA	90 volt	5 watt

Table 3. Measuring result with AC fan HSD 103

PLN source

No	Load	I	V	W
1	AC fan	1,3 mA	220 volt	5 watt

Table 4. Measuring result with DC fan HSD-8025

Inverter source

No	Load	I	V	W
1	Dc fan	60 mA	90 volt	5 watt

Table 5. Measuring result with DC fan HSD-8025

Step down Transormer source

No	Load	I	V	W
1	Dc fan	0,12 A	12 volt	1,44 watt

6. Analysis

This circuit as a backup power supply which serves to supply electricity at any time if the supply of electricity have trouble. This power supply has the important parts, such as: chargers, inverters, transformer and relay controllers. The output of battery charger is 8 volts, whereas if it is connected with the load it will be 10 volts.

Measuring with 12 volt DC fan load of 1.44 watts measured value of current, voltage and power not experienced a significant decline. whereas the test with 220 volt incandescent bulbs have increased.

The working principle of this circuit is PLN will turn on when the voltage of the electric current flowing drive the relay as a magnetic switch. Current will flow into the step-down transformer after it passes through the rectifier diode and battery charge. If the battery is fully charged, the circuit breaker will automatically disconnect the current work towards the battery. When the voltage of PLN turn off then the relay will connect current from the battery and will be forwarded to the inverter circuit 12 volt DC to 220 volt AC transformer and then headed to the riser voltage to the load. To activate this circuit is to connect the device to the input voltage source PLN 220 volt then output device to load and connect the DC terminal to the 12 volt battery charger serves as an extra if it need a longer live time. After that the power switch is pressed to the ON position. At the time of PLN flow exists, then the device will charge the battery until the battery capacity will turn off automatically. When the electricity network to crash, this circuit will supply the electric power to the load automatically

7. Conclusions

The result from this research are :

1. design control unit lamps and automatic emergency circulation fan is a unit which serves to supply the electrical voltage when PLN power outage.
2. contact delay time connecting that connects the battery to the inverter is about 0-4 seconds. This means that this control tool can turn on the lamp and fans of the state into the flame extinguished after o-4 seconds.

References

[1] Barry Woollard, 2006. *Elektronika Praktis*, Jakarta, PT.Prasnya Paramita

[2] Bishop, Owen , 2004, *Dasar-dasar Elektronika*, Jakarta, Erlangga

[3] Malvino, (2003), *Prinsip-prinsip Elektronika* , Jakarta ,Salemba Teknika

[4] Prihono, (2009), *Jago Elektronika Secara Otodidak*, Jakarta : PT. Kawan Pustaka

[5] Tooley, Mike (2003), *Rangkaian Elektronik Prinsip dan Aplikasi*, Jakarta : Erlangga

[6] https://en.wikipedia.org/wiki/Operational_amplifier, accessed on 1st Februari 2016

[7] https://en.wikipedia.org/wiki/Relay, accessed on 1st Februari 2016