

Emergency Light Design for Genset Room at Bogor Academy of Technology

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ABSTRACT

The purpose of the study was to determine the design of emergency light lamps in the design of 1-phase generator installations at the Bogor Academy of Technology. To find out how to test the emergency light tool on the design of the 1-phase generator installation of the Bogor Academy of Technology. To design an emergency light in a generator room there are several things that need to be considered, including: Determining the location / place of installation of emergency light generator components that are appropriate, Performing installation / wiring emergency light generator room in accordance with PUIL standards. The results showed that the electric current will choose to flow through the LDR and not through the 12 Kohm Resistor connected to the base of the transistor, there is no current flowing in the relay, the relay does not work so it cannot pull the switch that will connect the AC electric current (PLN) to the lamp. If the LDR or light sensor is not exposed to light, the lights will turn on automatically. and battery charging lasts for 4 hours and the LED can light up for 5 - 7 hours with white light.

Keywords: Emergency ligh;, LDR; PUIL.

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Introduction

When there is a sudden power outage or rolling blackouts from the local PLN, it will certainly cause problems for the surrounding community. The blackout can cause problems for someone or the local community. Both from office workers to housewives will have their activities or routines disrupted. They cannot do their usual work. These activities are due to power outages especially if the blackout lasts for days. However, in the era of globalization now the problem of power outages has a solution even though it is temporary.

Technology has developed rapidly and helps humans now. Electricity is one of the energy sources that is needed in human survival, and from this, humans always try to find ways to create these energy sources. The power outage can be overcome with other alternative technologies, for example generators. Utilization of generators as an alternative to electricity in the community is common, although only used by certain people or offices.

In the operation of the generator during a power outage from PLN certainly need lighting in the generator control room, so as to facilitate technicians in operating the generator.

Based on the background, the problem formulation that can be raised is: (1)How to design an emergency light in the design of a 1-phase generator installation at the Bogor Academy of Technology. (2)How to test the emergency light tool on the design of the 1-phase generator installation at the Bogor Academy of Technology.

The research objectives are: (1) To find out the design of emergency light lamps in the design of 1-phase generator installations at the Bogor Academy of Technology. (2)To find out how to test the emergency light tool on the design of the 1-phase generator installation of the Bogor Academy of Technology.

A generator set or genset is a machine capable of producing electrical power as a substitute energy consisting of the generator itself and its driving engine. This device is assembled in such a way with certain details to produce the amount that suits your needs.

The basic principle of a generator engine is to convert kinetic energy (motion) through an engine drive device into electrical energy produced by a generator. So that the generator set or generator can be said to be a source of electrical energy or a power generation machine.

In simple terms, the way a generator works is like a dynamo on an old bicycle where it utilizes the moving coil inside to be converted into electricity. The components of the generator include the following:

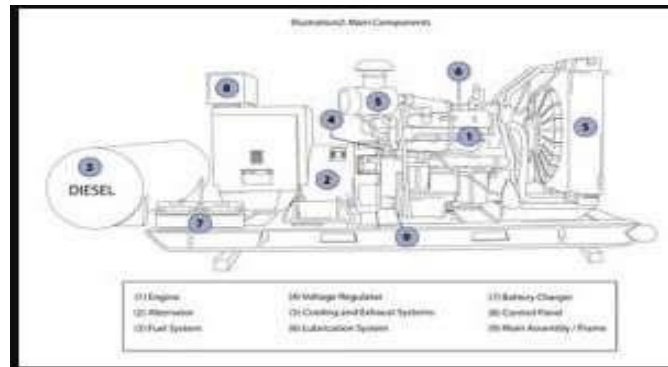


Fig 1. Genset Components

Automatic emergency lights are widely dubbed emergency magic lights because of their ability to automatically charge the battery and automatically turn on when there is a light outage.

The automatic feature in emergency lights makes most of us wonder, what exactly the components in emergency lights work like.

Before learning how these components work, we must first know what components are contained in emergency LED lights and what components distinguish between ordinary energy-saving bulbs and this type of lamp.

One of the main components found in emergency lights and found in ordinary led lights is : (1) Heat Sink, (2) Driver led, (3) led chip, (4)Cover lamp led.

Components in emergency lights that are not found in ordinary lighting lamps are power storage batteries, and power converter components from AC to DC. The power storage battery works as a power source that makes the lights turn on automatically. The battery will provide power to the LED Chip when there is no PLN electricity supply entering the lamp. While the power converter component from AC to DC is in charge of converting PLN electricity into power that is suitable for input and accommodated by batteries in emergency lights.

In good quality emergency lights, the power converter component is equipped with a circuit breaker that functions to ensure that the battery does not continue to be in a cas condition when the power in the battery is full. So that the current supplied to the battery will automatically turn off when the battery is full. The absence of this component can make the battery become quickly damaged due to overcas and make the battery drop.

If it is already in a drop condition the battery can only last a short time compared to its original strength. For example, a battery that can originally last for 6 hours of emergency light, may slowly become 4 hours, 2 hours, or lose its ability to store power completely.

Lamps are objects that are very much needed today. As lighting and as one of the objects to fulfill the decoration to make it look more charming. It is undeniable that many spots decorated with lights look more attractive than not. But of course for that you have to choose the lamp model carefully.

Now the lamp also has a variety of new uniqueness. Technology does not only include cell phones or machines. There are also lights that use advanced technology. Many kinds of unique lamps have been traded freely on the market. And these unique lights are indeed very marketable, because their sophistication makes it easier for humans or attracts public attention.

Research Method

To make it easier to install this emergency light, pay attention to the following emergency light installation scheme:

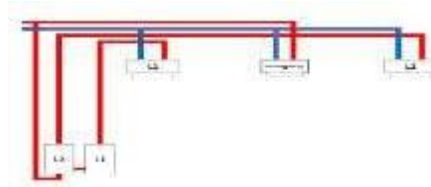


Fig 2. Emergency light installation system

After determining which point will be backed up by an emergency lamp when the pln goes out, adjust the installation wiring as shown above. The picture above is an example of installing 2 series switches 2 lights, and one emergency lamp as an emergency ban later.

a. Single switch installation



Fig 3. Single Switch

The picture above is a basic 1-lamp single switch scheme, and has not added an emergency light installation when the pln goes out.

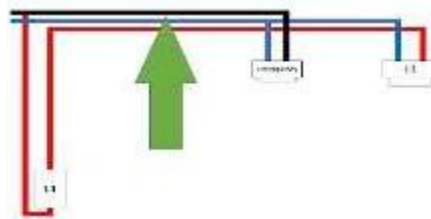


Fig 4. Single switch and emergency lamp

Black cable that has been added with 1 unit of emergency light. We can take the phase of the emergency lamp from the input phase of the switch. If you are installing emergency lights without a technician, always maintain work safety, turn off the electric mcb first and only after this executes work such as pulling cables, connecting and installing emergency lights on the ceiling of the house.

To design an emergency light in a generator room there are several things that need to be considered, including:

1. Determine the location / place of installation of the right emergency light generator components
2. Perform installation / wiring emergency light generator room in accordance with PUIL standards

Result

Emergency lights require a rectifier circuit that functions to reduce the 220 volt AC voltage to 12 volt DC. The lamp holder used in this multifunctional emergency lamp is in the form of a box made of plastic so that the transformer is inserted into the box and requires a socket connection to connect the current into the circuit so that the designed device works properly. The circuit will work to turn on and off the lights connected to the electricity (PLN) automatically. If the electricity is off (no light), the lights will turn on and if there is light (daylight / live electricity) the circuit will go out. This light sensor circuit is suitable for garden lights, study lights and house lights.

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This emergency light rectifier circuit uses several components including (Sutrisno, 1984):

1. 350 mA transformer, serves to reduce the voltage from 220 volts to 12 volts.
2. Diode, serves to limit the direction of movement of electric current.
3. Capacitor 220 mF serves to store and stabilize the current and voltage for a while

This emergency lamp uses an inverter circuit that functions to convert DC current into AC, because this lamp has a socket so that the user can use AC current for daily needs.

The results of the multifunctional emergency light design were tested in the dark (night) and in the light. The dark state represents nighttime conditions without any light due to power failure.

The brighter the light that hits it, the smaller the resistance value it has (even negligible magnitude). This condition will cause the electric current will choose to flow through the LDR and not through the 12 Kohm Resistor connected to the base of the transistor. This condition makes the transistor unable to work (like an open switch) so that no current flows from the collector to the transistor emitter. This means that no current flows to the relay attached to the transistor collector because the relay does not get an electric current. In this condition the relay does not work so it cannot pull the switch that will connect the AC electric current (PLN) to the lamp. This situation will make the electric lights go out. If the LDR or light sensor is not exposed to light, the lights will turn on automatically. The components described in table 1 are installed according to the component layout that has been made into a circuit path. The working principle of the Emergency LED Light circuit:

1. If the PLN source is connected to this tool, the battery contained in this tool will automatically recharge.
2. Light sensor, serves to detect light intensity conditions.
3. Ultrasonic sensor, functions to detect objects that approach the lamp.
4. To determine the condition of the battery that is in the process of recharging, an indicator circuit consisting of a resistor and LED is installed.

The results of the emergency light design were tested in the dark (night) and in the light. The dark state represents nighttime conditions without any light due to power failure. During the day the LDR has a very small resistance value. The brighter the light that hits it, the smaller the resistance value it has (even negligible in magnitude). This condition will cause the electric current will choose to flow through the LDR and not through the 12 Kohm Resistor connected to the base of the transistor. This condition makes the transistor unable to work (like an open switch) so that no current flows from the collector to the emitter of the transistor. This means that no current flows to the relay attached to the transistor collector because the relay does not get electric current. In this condition the relay does not work so it cannot pull the switch that will connect the AC electric current (PLN) to the lamp. This situation will make the electric lights go out. If the LDR or light sensor is not exposed to light, the lights will turn on automatically.

Based on the test results that have been carried out, this tool can function properly, namely charging the battery lasts for 4 hours with a maximum capacity of around 2000mAh. LED lights can be lit for 5 - 7 hours with white light.

Conclusion

Based on the results of the discussion above, it can be concluded that: The electric current will choose to flow through the LDR and not through the 12 Kohm Resistor connected to the basistransistor. There is no current flowing in the relay attached to the transistor collector because the relay does not get electric current. Relay does not work so it can not pull the switch that will connect the AC electric current (PLN) to the lamp. This situation will make the electric lights go out. If the LDR or light sensor is not exposed to light, the lights will turn on automatically. Battery charging lasts for 4 hours with a maximum capacity of about 2000 mAh. LED lights can burn for 5 - 7 hours with white light

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