

MULTIPURPOSE LIGHTNING AUTO RESET FOR HOUSES

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ABSTRAK

Projek ini adalah bertujuan untuk membina satu litar elektrik di mana litar tersebut berkeupayaan untuk berfungsi secara automatik. Suis pemutus litar utama yang terdapat di rumah – rumah akan terpadam apabila berlakunya kilat yang kuat atau berlakunya masalah litar pintas atau beban lampau. Objektif utama projek ini adalah untuk menghidupkan kembali suis tersebut secara automatik tanpa memerlukan penghuni menghidupkannya secara manual. Jadi ia akan memudahkan kehidupan seharian kita.

ABSTRACT

This project is all about to design an electric circuit which the circuit can operate by automatically. A main switch of circuit breaker will off when lighting happened or the problem of short circuit or overload happened. The main objectives is to on the switch by automatically without on manually by human. So it can make our daily lives easier.

CONTENTS

CHAPTER	TOPIC	PAGE
	TITLE OF PROJECT	i
	PSM II REPORT STATUS VERIFICATION FORM	ii
	DECLARATION	iii
	ACKNOWLEDGEMENT	v
	ABSTRAK	vi
	ABSTRACT	vii
	TABLE OF CONTENT	viii
	LIST OF FIGURES	xii
	LIST OF TABLES	xiv
	LIST OF ABBREVIATION	xv
1	INTRODUCTION	1
	1.1 Background Project	1

1.2	Problem Statement	2
1.3	Objectives of Project	3
1.4	Scope of Project	3
1.5	Methodology	4
1.6	Outline of Thesis	4
2	LITERATURE REVIEW	6
2.1	Introduction	6
2.2	Circuit Breaker	7
2.2.1	Types of Circuit Breaker	7
2.2.1.1	Miniature Circuit Breaker – Low Voltage Circuit Breaker	10
2.3	Solenoid	12
2.3.1	Electromechanical Solenoid	13
2.4	Timer	15
2.4.1	Monostable Circuit	19
2.4.2	Astable Circuit	21
3	METHODOLOGY	23
3.1	Introduction	23

3.2	Planning	24
3.3	Flow Chart	24
3.4	Determine the Problem	26
3.5	Information	26
3.6	Literature Review	26
	3.6.1 Application of Circuit Breaker	27
	3.6.2 Relay	29
4	RESULTS AND ANALYSIS	30
4.1	Introduction	30
4.2	Design Development	31
	4.2.1 PROTEUS 7 Professional	31
4.3	Circuit Development	35
	4.3.1 Exposed Circuit	35
	4.3.2 Developing	36
	4.3.3 Etching the Board	37
	4.3.3 Drilling and Soldering	37
4.4	Results	38
	4.4.1 Testing	42

5	CONCLUSION & DISCUSSION	44
5.1	Introduction	44
5.2	Conclusion	45
5.3	Discussion	45
	REFERENCES	47
	APPENDICES	48

LIST OF FIGURES

FIGURE	TITLE	PAGE
2.1	Miniature Circuit Breaker	10
2.2	Structure of Circuit Breaker	11
2.3	A magnetic field created by solenoid	13
2.4	Solenoid	14
2.5	Diagram of Solenoid	14
2.6	555Timer	15
2.7	Schematic Diagram of 555Timer	16
2.8	Example of Monostable circuit	20

2.9	Diagram of waveforms of monostable circuit	20
2.10	Example of Astable circuit	21
3.1	Flowchart	25
3.2	Block Diagram	27
3.3	Circuit Breaker	28
3.4	Relay	29
4.1	Window shows the Generate Electrical Rules Check icon	32
4.2	Electrical Rules Check Window	32
4.3	Window shows the Generate Electrical Rules Check icon	33
4.4	Windows PCB Design	34
4.5	PCB Design	35
4.6	Exposed Machines	36
4.7	After Etching, drilling and soldering	37
4.8	Timer Circuit	39
4.9	Alarm Circuit	40
4.10	Light Circuit	41
4.11	Timer and Relay Circuit	43
4.12	Prototype	43

LIST OF TABLES

TABLE	TITLE	PAGE
2.1	Specifications of 555 Timer	19

LIST OF ABBREVIATION

PCB – Printed Circuit Board

MCB – Miniature Circuit Breaker

MCCB – Molded Case Circuit Breaker

LV – Low Voltage

DC – Direct Current

MV – Medium Voltage

RCCB – Residual Current Circuit Breaker

RCBO – Residual Current Circuit Breaker With Over Current Protection

ELCB – Earth Leakage Circuit Breaker

FM – Frequency Modulated

UV – Ultra Violet

CHAPTER 1

INTRODUCTION

1.1 Background Project

Circuit breaker is an electrical switch that functions to protect the electrical circuit from the damages caused by short circuit or over load. This particular circuit breaker automatically switches on after encountering harsh environmental conditions (lightning, rain, fog, noise) that cause normal circuit breakers to interrupt the service until they are reset manually. Many houses are equipped lightning circuit breaker. When the circuit breaker shut off, it can be switch on manually. By using timer and solenoid, after ten seconds the circuit breaker off, it can be switch automatically.

This project is to renew the system from manual to automatic. The main function of 'Multi-purpose Lightning Auto Reset for Houses' is used solenoid and timer to switch on the main switch of circuit breaker. The main idea is to construct an automatic system using solenoid as a component which is used to push up the switch on. The others function is to give the sign to the residents in the houses when the tripping occurs which is the alarm system and emergency light will operated.

1.2 Problem Statement

Circuit breaker is unlike a fuse that operates once and need to be replaced. Circuit breaker can be reset (either manually or automatically) to resume normal operation. Circuit breaker is a device that made in varying sizes, from small devices which is to protect an individual household appliance up to large switchgear designed to protect high voltage circuits feeding an entire city. The previous system used manually to push up the switch to on. Thus, this project is proposed to encounter these problems. The system will be upgraded to on the switch automatically by using solenoid and timer.

When the tripping happened, the switch circuit breaker will shut off. It will touch the limit switch and send the signal to the timer circuit and operated the solenoid, alarm system and emergency light. The additional functions such as alarm system and emergency light are to make the system as multi purpose.

1.3 Objectives Of Project

The objectives of this project are listed below to make sure it achieved the goals and requirements:

1. To solve the problem when tripping happened.
2. To upgrade the circuit breaker system by providing an auto reset circuit breaker.
3. To design a prototype based on the specification that are needed.
4. Implement the others function such as emergency light and alarm system.

1.4 Scope of Project

The scopes that need to complete the project ‘Multi-purpose Lightning Auto Reset for Houses’ is:

1. Study the basic concepts of timer operation.
2. Design an emergency light and alarm system circuit.
3. Design the system that will focus on application and safety aspect.
4. The system is function when the switch circuit breaker is touched the limit switch. The solenoid automatically pushes up the switch of circuit breaker to on.

1.5 Methodology

1. Project planning is important to define the title of project to carry out the main element of it.
2. Others step that followed by literature review is problem identification where it find the relevant and related information about the auto reset circuit breaker.
3. The designs focused on the mechanisms that use for this project which it achieve the automatic function.
4. To develop a prototype, the selection of components needs to decide the suitable parts that have a difference functions. When the auto reset circuit breaker is produced, the analysis will be implementing.
5. The components used are important to choose depends on the circuit that we build. The criteria that we need look over are lifetime, power, voltage and economical aspect.

1.6 OUTLINE OF THESIS

This thesis consists of five chapters. It is the overall outline of report. The first chapter discussed about the background, the problem statement, the objectives and the scope of this project. While Chapter Two is discussed more on theory and literature reviews that have been done. It will discuss on components of the hardware used in this project.

Chapter Three is discussed about the methodology of hardware development of this project which is involves the activities of research and what constitutes it to success. Chapter Four will present the prototype design and the experimental results of the project while Chapter Five discussed the conclusion and discussion of this project. It also discussed about the future development to improve the system to be more functional.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss about the project that includes the components involves in the development of this project.

There are many electrical and electronic circuits used in our daily lives. All circuit have their functions such as power supply, lighting, loading system control, train and elevation control, and overload protection. These circuits are made up of basic electrical and electronic devices. All devices, individually or working together can delay, interrupt, isolate, or integrate electrical and electronic circuits, and prevent damage to equipments.

2.2 Circuit Breaker

Circuit breaker is constitute an automatically operated electrical switch that which to protect an electrical circuit from damage caused by overload or short circuit. A circuit breaker can operated to be reset either manually or automatically to resume normal operation. Circuit breakers are often implemented with a solenoid (electromagnet) whose strength increases as the current increases and eventually trips the circuit breaker.

2.2.1 Types of Circuit Breaker

Many types of circuit breaker are classified by their voltage class, construction types, interrupting types and structural features.

The type of circuit breaker is:

1. Low voltage circuit breaker.

Low voltage circuit breaker (less than 1000 VAC) types are usually used in domestic, commercial and industrial application, include:

- ✚ MCB (Miniature Circuit Breaker) – is rated current not more than 100 A. trip characteristics normally not adjustable. Thermal or thermal magnetic operation.
- ✚ MCCB (Molded Case Circuit Breaker) – is rated current up to 1000 A. thermal or thermal magnetic operation. Trip current may be adjustable in larger ratings.
- ✚ Low voltage power circuit breakers can be mounted in multi –tiers in LV switchboards or switchgear cabinets.

Large low-voltage molded case and power circuit breakers may have an electrical motor operator, allowing them to be tripped (opened) and closed under remote control. These form part of an automatic transfer switch system for standby power.

Low-voltage circuit breakers also made for direct-current (DC) applications. Example; DC supplied for subway lines. A direct current needs a special breaker because the arc does not have a natural tendency to go out on each half cycle as for alternating current. A direct current circuit breaker will blow-out coils which it generates a magnetic field that rapidly stretches the arc when interrupting direct current. Small circuit breakers are either installed directly in equipment, or are arranged in a breaker panel.

1 Medium-voltage circuit breakers

Medium-voltage circuit breaker is rated between 1 and 72 kV assembled into metal-enclosed switchgear line ups for indoor use or may be individual components installed outdoors in a substation. Air-break circuit breakers replaced oil-filled units for indoor applications but now it being replaced by vacuum circuit breakers (up to about 35 kV). Like the high voltage circuit breakers, these also operated by current sensing protective relays operated through the current transformers. The characteristics of MV breakers are given by international standards such as IEC 62271. Medium-voltage circuit breakers nearly always use separate current sensors and protection relays, instead of relying on built-in thermal or magnetic over current sensors.

Medium-voltage circuit breakers are classified by the medium used to extinguish the arc:

✚ Vacuum circuit breaker – is rated current up to 3000 A. These breakers are interrupting the current by creating and extinguishing the arc in a vacuum container. These can be practically applied for voltages up to about 35,000 V which is corresponding roughly to the medium-voltage range of power systems. Vacuum circuit breakers tend to have longer life expectancies between overhaul than do air circuit breakers.

✚ Air circuit breaker – is rated current up to 10,000 A. Trip characteristics are often fully adjustable including configurable trip thresholds and delays. Example electronically controlled, though some models are microprocessor controlled via an integral electronic trip unit. Often used for main power distribution in large industrial plant where the breakers are arranged in draw-out enclosures for ease of maintenance.

✚ SF6 circuit breakers extinguish the arc in a chamber filled with sulfur hexafluoride gas.

Medium-voltage circuit breakers are connected into the circuit by bolted connections to bus bars or wires, especially in outdoor switchyards. Medium-voltage circuit breakers in switchgear line-ups are often built with draw-out construction, allowed the breaker to be removed without disturbing the power circuit connections, using a motor-operated or hand-cranked mechanism to separate the breaker from its enclosure.

The others type of circuit breaker is:

1. Thermo magnetic circuit breaker
2. High voltage circuit breaker
3. Generator circuit breakers