



## ABSTRAK

'240 Voltage Trainer' adalah projek yang telah direka untuk memudahkan pelajar untuk mempelajari serta memahami konsep bagi proses pendawaian elektrik ini juga dihasilkan adalah untuk membantu pelajar menggunakannya untuk mengintegrasikan pengetahuan dan kemahiran dalam melaksanakan tugas. Trainer ini berkonsepkan litar pendawaian elektrik 'single phase'. Dengan projek ini dapat memudahkan para pelajar disamping dapat digunakan sebagai proses pembelajaran. 240 Voltage Trainer merupakan projek yang telah direka bagi memudahkan pelajar untuk mempelajari serta memahami proses pendawaian elektrik dan mengendalinya dengan baik. Disamping itu dapat menarik minat pelajar, supaya lebih meminati bidang pendawaian elektrik. Trainer ini mengandungi papan agihan, soket *double pole*, soket 13 amp, soket 15 amp serta sambungan lampu, memudahkan pelajar mempelajari di dalam kelas DET1022 (*Electrical Wiring Class*). Dengan menggunakan papan kayu sebagai tapak trainer ini. Ini kerana papan kayu tahan lasak dan keras. Pelbagai masalah yang dihadapi seperti komponen tidak berfungsi dengan baik. Selain itu, setelah mendapat cadangan pakar, beliau menyuruh melakukan pendawaian terbuka kerana pendawaian terbuka lebih mudah pelajar melihat laluan kabel ke point tertentu. Kesimpulannya, trainer banyak membantu pembelajaran dan pelajaran sewaktu dikelas serta dapat membantu pihak pengajar dalam pengajaran mereka.

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.0 INTRODUCTION OF PROJECT**

Through the modernization that has grown rapidly, all existing facilities should be used to facilitate maximum work day. In the era of globalization, many individuals are conscious or concerned with the application of technology in everyday life regardless of sector, industry, education, or from sector jobs and organizations.

Therefore, PROJECT (EE601) is one of the subjects in the electronic communication course, it is one of the essential requirement that must be completed for Diploma students. For this project, students need to accomplish 1 circuit trainer related to diploma course taken. To fulfil the requirement the production 240 voltage Trainer made for this semester, The electrical circuit were produces with full requirement and functionality.

For this 240 voltage trainer it uses to operate in electrical engineering area, to observe single-phase power supply refers to the distribution system of electricity

power supply. In other functions, this trainer assist new students about the introduction for simple basic operation of electric circuit, in other word this trainer can be used as trainer tool by lecturer and tutor in teaching and learning process.

This trainer consist Miniature Circuit breaker (MCB), Electric Leakage Circuit Breaker (ELCB), a set of fuse distribution board, 1 unit double pole socket , 1 unit 15 amp socket, 4 unit 13 amp socket, 2 unit 13 amp ring connection, 3 unit lamp, 2 gang switch and 1 unit dimmer.

Student can observe the usage of air conditioning unit or heater unit by using 15 amp and double pole socket, other essential function students can differentiate the usage of high voltage electrical appliance and normal voltage appliance by using 15 amp socket and 13 amp socket.

The ring connection develop and commonly uses in United Kingdom. The ring connection sockets enable the uses of small diameter wires and the ring act like two circuits proceeding in opposite direction, in other words it split the distribution load of electrical usage. This circuit enable students to observe the usage of continuous electrical appliance such as , refrigerator and life support machine.

13 amp sockets are common socket that use in electrical domestic wiring all over the country, students can uses it to observe the common uses of electrical appliances such as, radio, television, hair dryer and etc.

The lamps provide students the understanding of how electric circuit functioning, this lamps socket can be change by variable variety. Dimmer switch been added to control the electrical current that been supply to socket lamp.

This trainer circuit uses the 240 volt single phase electric supply and been used commonly around the domestic house wiring. The single phase electric supply consist 1 single line for life and neutral, that suitable for common domestic house. Single-phase electrical supply system normally used by domestic consumers and small business premises.

### **1.1 OBJECTIVE**

- a) Produce a mini kit that can allow student to integrated knowledge and skill in performing task.
- b) Student able to understand and easy practice about Wiring instruction in detail
- c) Able to know more about the wiring application.

## **1.2 PROBLEM STATEMENT**

This Project aims to facilitate, and give kindness to student to learn and understand the optical basic wiring in Polytechnic. In the Polytechnic this basic is important, so from this project it can provide knowledge to students' semester 1 about essential basic formula for installation wiring circuit. Student will have high level of understanding and may use this knowledge till the last semester. This project enables to encourage student to quick studies and apply this performance of trainer kit in their own project. Therefore this project, will provides student understand more about 240 voltage trainer basic when they use this trainer

## **1.3 PROJECT SCOPE**

The scopes of work for the project will focus on 240 Voltage Trainer. 240 Volt will be used as main power supply and been connected to the electrical circuit.

- a) This project will focus on the semester 1 student polytechnic. Because this basic wiring will being use until last semester. So they able to practice how to do wiring in proper way and student easy to studies.
- b) This project also will encourage them to quick studies with this trainer and easily learn Wiring about 240 Voltage .

## **CHAPTER 2**

### **LITERATURE RESEARCH**

#### **2.1 PRODUCTION OF BOARD**

The methods we use to complete and maintain cabling installations are relatively standard procedure. The standardization of these installations is necessary because of the need to ensure acceptable system performance from increasingly complex arrangements.

In Malaysia Standard procedure wiring based and relies on IEE, as the responsible organization for providing and maintaining standards and practices within the profession. It has published a series of standards to design, install, and maintain cabling installations. These help to ensure a proper cabling installation.

Electrical wiring system is divided into two parts, namely 1 -phase wiring systems - common in residential areas (residential area) small and medium enterprises. -phase wiring systems - industrial and commercial (industrial and

commercial area) .

## **2.1.1 SYSTEM WIRING, CABLE TYPES AND SIZES**

### **2.1.2 Wiring Systems**

#### **A. Supplies to Home**

- a) Electricity is received at home ( small / medium ) is usually 1 - phase AC 240 V , 50 Hz .
- b) Supply is derived from the connection between the line ( same there are R , Y or B ) and neutral of 3 phase 4 wire system ( Y connection ) .
- c) Source 3 phase is of substations ( substation ) which close .

#### **B. Circuit User**

- a) Cables or lines that go into building directly linked to a board connector (terminal services) .
- b) At this point there is a fuse and neutral line services . This device belongs to TNB and maintaining responsibilities.
- c) After derived from main power supply, power supply will connected to the meter kilowatt hours ( Watt hour meter ) .
- d) Circuit user starts with the main switchboard (main switch board ( MSB) or proportional isolator 60 , 80 and 100A .
- e) There is a circuit breaker to earth ( ELCB - earth leakage circuit breaker or

RCCB - Residual current circuit breaker ) .

- f) Followed by the distribution fuse board or distribution boards .At this point there are three fuse distribution busbar connections live wire (live ) , neutral and earth (earth ) . Fuse - Fuse ( @ miniature circuit breakers , miniature circuit breaker ( MCB ) ) that is proportional to either 5 , 15 , 30 , 45 A or 6 , 16 and 32 A of the busbar will be linked live to the final circuit appropriate . Bar neutral and earth busbar will be connected directly to the circuit end point. There is no essential requirement to go through MCB again .The final circuit will have three main wires that live, neutral and earth.

### **C. The Type of Wiring**

- a) Wiring surface.
- b) Wiring Embedded.
- c) Wiring Tubes (conduit ) .
  - i) Steel tubes , steel and non- flexible
  - ii) Mains
  - iii) Duct

### **D. The Factors for Selection of Wiring is :**

- a) The usage of volt and suitable electrical load.
- b) Suitability of wiring environment.
- c) Cost

- d) Duration installation resistance
- e) Grooming and beauty.
- f) Surrounding circumstances.
- g) The length of time to complete.
- h) Changes or additions to the circuit in the future.
- i) Type of supply voltage
- j) Safety and approval JBE / TNB / PWD

### E. Wiring Surface ( Surface Wiring )

- a) A system in which the cable - cable used in an installation mounted on the wall surface or ceiling without any additional protection.
- b) The cable used must be coated as exposed to environmental conditions and variable damage that may occurred.

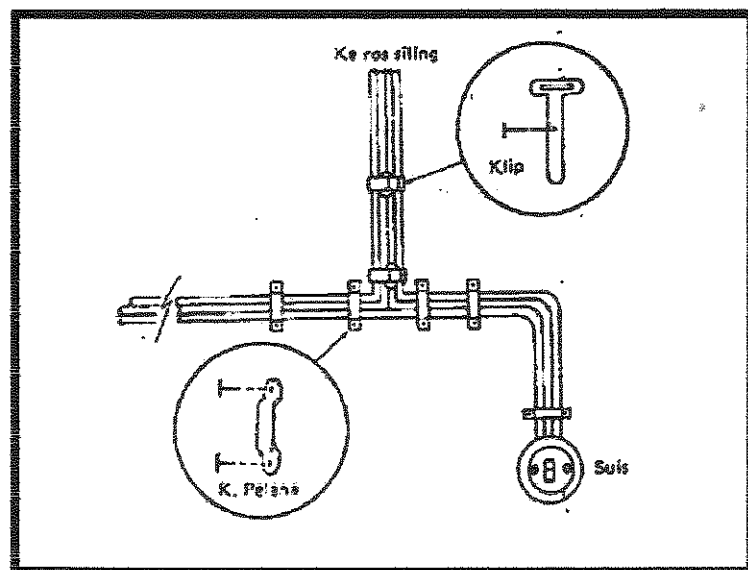


Figure 2.1 -Wiring insulated surface

- c) For surface wiring in buildings made of brick and cement, the cable will be clipped on one blade board (wooden batten), previously fitted to the

wall or ceiling.

- d) Clip types normally used are aluminum clips or lead.
- e) The advantages of this system are easy to install with minimum expenses, and additional installation can be added easily.
- f) Typically applied in residential house (Not applied in new residential areas for the purpose of security).
- g) The disadvantages of this system are it cannot tolerate extreme temperatures and humid conditions.

**F. Potential Flow Brings cable ( PVC single -core, Copper conductor )**

Luas keratan rentas	Kaedah Pemasangan (Tidak bersarung dalam dinding)		Kaedah Pemasangan (Terdedah dan diklip terus)	
mm <sup>2</sup>	2 kabel satu fasa	3 @ 4 kabel fasa	2 kabel satu fasa	3 @ 4 kabel 3 fasa
1	11	10.5	15.5	14
1.5	14.5	13.5	20	18
2.5	19.5	18	27	25
4	26	24	37	33
6	34	31	47	43
10	46	42	65	59
16	61	56	87	79
25	80	73	114	104
35	99	89	141	129
50	119	108	182	167
70	151	136	234	214
95	182	164	284	261
120	210	188	330	303
150	240	216	381	349
185	273	245	436	400
240	320	286	515	472
300	367	328	594	545

Table 2.1 : Potential flow brings cable

## 2.2 THE COMPONENT USED

- i) 13 Amp Socket - Ring
- ii) 13 Amp Socket - standard
- iii) Switch light - S1,S2 and S3
- iv) 15 Amp Socket
- v) Cable
- vi) MCCB

### 2.2.1 Socket 13 Amp



Figure 2.2 : example of 13amp socket

AC power plugs and sockets are devices that allow electrically operated equipment to be connected to the primary alternating current (AC) power supply in a building. Electrical plugs and sockets differ in voltage and

current rating, shape, size and type of connectors. The types used in each country are set by national standards, some of which are listed in the IEC technical report TR 60083, Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC. Plugs and sockets for portable appliances started becoming available in the 1880s, to replace connections to light sockets with easier to use wall-mounted outlets. A proliferation of types developed to address the issues of convenience and protection from electric shock. Today there are approximately 20 types in common use around the world, and many obsolete socket types are still found in older buildings. Co-ordination of technical standards has allowed some types of plugs to be used over wide regions to facilitate trade in electrical appliances, and for the convenience of travellers and consumers of imported electrical goods. Some multi-standard sockets allow use of several different types of plugs; improvised or unapproved adapters between incompatible sockets and plugs may not provide the full safety and performance of an approved socket and plug combination.

### 2.2.2 Switch

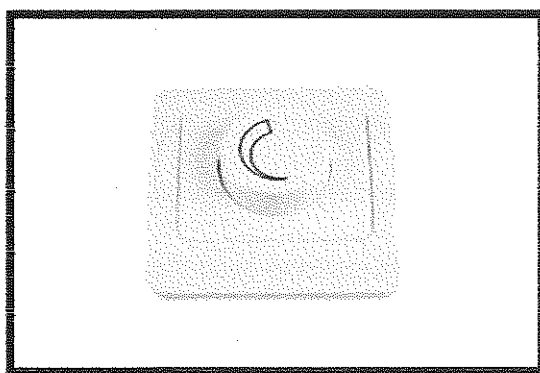


Figure 2.3 : example of switch

In electrical engineering, a switch is an electrical component that functioning to break an electrical circuit, interrupting the current or diverting it from one conductor to other. The mechanism of a switch may be operated directly by a human operator to control a circuit (for example, a light switch or a keyboard button), may be operated by a moving object such as a door-operated switch, or may be operated by some sensing element for pressure, temperature or flow. A relay is a switch that is operated by electricity. Switches are made to handle a wide range of voltages and currents; very large switches may be used to isolate high-voltage circuits in electrical substations.

### 2.2.3 Electric cable

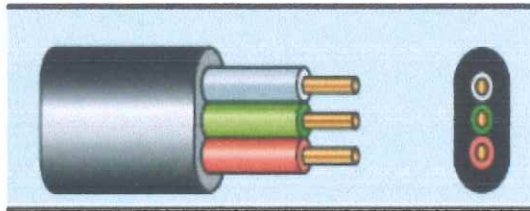


Figure 2.4 : example of electric cable

An electrical cable comprises two or more wires running side by side and bonded, twisted, or braided together to form a single assembly, the ends of which can be connected to two devices, enabling the transfer of electrical signals from one device to the other. Cables are used for a wide range of purposes, and each must be tailored for that purpose. Cables are used extensively in electronic devices for power and signal circuits. Long-distance communication takes place over undersea cables. Power cables are used for bulk transmission of alternating and direct current power, especially using high-voltage cable. Electrical cables are extensively used in building

wiring for lighting, power and control circuits permanently installed in buildings. Since all the circuit conductors required can be installed in a cable at one time, installation labor is saved compared to certain other wiring methods.

The term originally referred to a nautical line of specific length where multiple ropes, each laid clockwise, are then laid together anti-clockwise and shackled to produce a strong thick line, resistant to water absorption, that was used to anchor large ships. In mechanics, cables, otherwise known as wire ropes, are used for lifting, hauling, and towing or conveying force through tension. In electrical engineering cables are used to carry electric currents. An optical cable contains one or more optical fibers in a protective jacket that supports the fibers.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 DESCRIPTION OF FLOW CHART**

While doing work for the completion of this project, we have done some advance planning before doing this project. Flow chart below shows some of the plans for this project. A flow chart is designed for smooth running of this project as well as helps solve problems step by step. The flow chart was used in analyzing, designing, documenting or managing a process or program.

Among the items listed are looking for ideas to design the project is a set the title of the project, designing the circuits and do the wiring analysis. Furthermore, we also estimated the cost of the project, buying the components used, install components and perform soldering circuit. Circuit testing is also performed to ensure that the system functions properly. This semester this trainer is successfully done .

Then in the session the manual of using this trainer were being show for student

easy to understand more about this 240 voltage trainer.

Item	Qty.	Part Name	Cost Unit	Cost all
1	4	13Amp Socket	RM 3.00	RM 12.00
3	1	15 Amp Socket	RM 3.50	RM 3.50
4	1	board	RM 45.00	RM 45.00
6	2	Switch	RM 4.00	RM 8.00
7	3	lamp	RM 8.00	RM 24.00
8	1	MCCB	RM 103.00	RM103.00
9	1	Double pole	RM 5.00	RM 5.00
10	40	Banana plug/switch	RM 0.70	RM 28.00
11	3	Lamp holder	RM 3.00	RM 9.00
		<b>TOTAL</b>		<b>RM 237.50</b>

Table 3.1 : table of project cost

### 3.2 FLOW CHART OF THE PROJECT

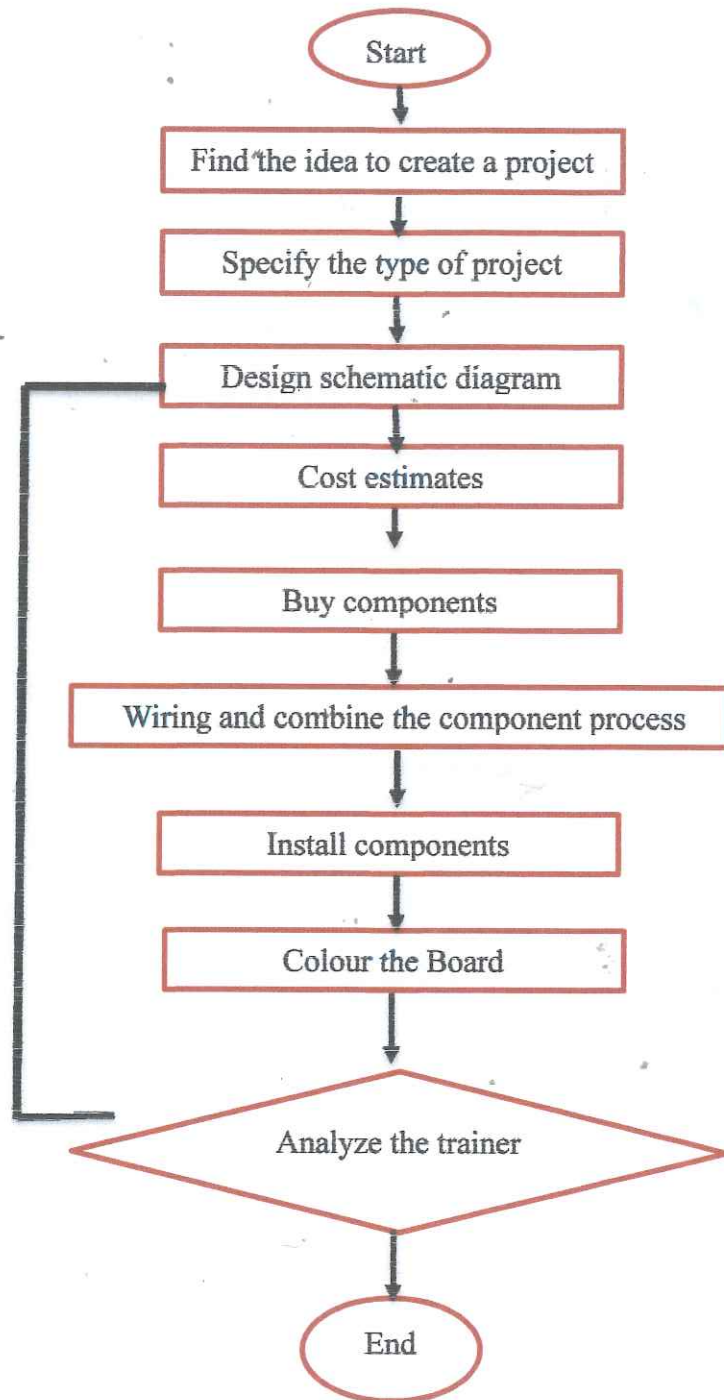


Figure 3.1 : flow chart of project

### **3.2.1 FIND THE IDEA & SPECIFY THE TYPE OF PROJECT**

After receiving a briefing from the Chief Coordinator of the Project, we had a discussion and some planning to nominate a suitable title for the project with the help of supervisor. The purpose of the discussion and planning was done to facilitate the further implementation of our projects in order to complete this project within the stipulated time. Here are the things that need to be considered:

- a) Time to complete the project
- b) Access to components
- c) The estimated cost of the project
- d) The relationship between theory and practice

This 240 Voltage Trainer is made up student able to do Electrical Wiring in simple way and know the flow of the wiring.

### **3.2.2 DESIGN & ANALYZE THE CIRCUIT:-**

The schematic diagram is made for single phase wiring Connect one terminal to power wire; opposite terminal to neutral wire.

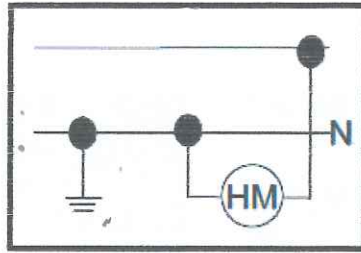


Figure 3.2 : circuit design

### 3.3 Step for prepare the Wiring Board and Painting:-

This process is done to painted the board become a trainer it is have several step for being guide to build the trainer succesfully

#### A. Step 1:-



Figure 3.3 : board before cut



Figure 3.4 : board after cut

- a) Selecting an appropriate timber to be cut and measured to be a wiring box. Selection box should be selected carefully because wood must be smooth and have been partially smoothed with tracing paper.

### B. Step 2:-



Figure 3.5 : mark the component



Figure 3.6 : plot the component

- b) after the timber has been cut well above the wood to continue the process of marking with a pencil to make a mark for each of the components to be assembled on the wooden box .
- c) Then install and tighten the components of each critical component of the timber and put on using the tools provided and screw to tighten the components so as not to fall and loose

### C. Step 3:-



Figure 3.7 : painting the board



Figure 3.8 : board after paint

- d) after installing all the necessary components , select the paint that suits

your tastes and paint it to the front of the box to make it more attractive and intact.

- e) After painting leave for a few hours so that the paint was mixed with the wood.

**D. Step 4:-**



Figure 3.9 : fitting the db board

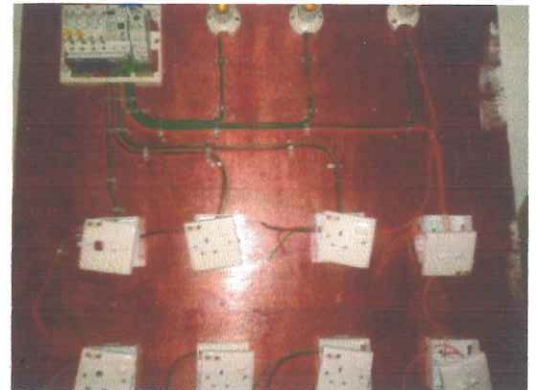


Figure 3.10 :after wire installation

- f) after painting the wood is ready to connect the left and component connections lights and switches after the connection is complete , try to verify the correct connection.