

PROTOTYPE 2 WAY BASIC COMMUNICATION SYSTEM BY USING
COOPER WIRE

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ABSTRACT

These projects are designed prototype two ways communication system by using cooper wire as a medium transmission. The prototype show how the communication can be held with two subscribers at another place and it seem the real system that is use at house now that only contributes for two subscribers. Subscriber A will make a call while subscriber B will receive the call. When a phone is in off hook condition, exchange will detect it and send ringing pulse to phone B. When it will pick up, the connection will be established between both phones. The communication can be made if three circuits combined together. Power supply circuit as a main circuit that supply power to all the circuit, exchange circuit that use PIC16F84A to control all the system for subscriber A and subscriber B and Subscriber Line Interface Circuit that are use to connect the telephone set. The design showed the hierarchy of the communication system.

Keyword: Cooper cable, Telephone, PIC16F84A

ABSTRAK

Projek ini adalah mereka bentuk prototaip komunikasi dua hala menggunakan wayar kuprum sebagai medium penghantarannya. Prototaip ini menunjukkan bagaimana komunikasi berlaku dikawasan yang berbeza dan ia seolah-olah sistem yang sebenar di rumah dan berhubung dengan hanya dua pengguna sahaja. Pengguna A akan membuat panggilan manakala pengguna B menerima panggilan. Apabila gagang telefon A diangkat, ibusawat akan mengesan dan menghantar nada dering kepada telefon B. Apabila gagang telefon B diangkat, maka perhubungan diantara dua pengguna berlaku. Komunikasi akan berlaku apabila tiga litar disatukan bersama. Litar bekalan kuasa yang memberi bekalan kuasa kepada semua litar, litar ibusawat dimana menggunakan PIC16F84A yang mengawal semua sistem yang berlaku diantara pengguna A dan pengguna B serta litar antaramuka pengguna yang bersambung dengan telefon set. Daripada ini ia dapat menunjukkan hieraki bagaimana proses perhubungan itu berlaku.

Kata kunci : Kabel Kuprum , Telephone , PIC16F84A

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LIST OF ABBREVIATION

SD	-	Status Detector
TN	-	Telephone Network
RG	-	Ringing Generator
SLIC	-	Subscriber Line Interface Circuit

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CHAPTER I

INTRODUCTION

This chapter covers the introduction of the project, background study regarding the project topic, project objective, the problem statement, the scope of work, and the methodology of this project.

1.1 Project Background.

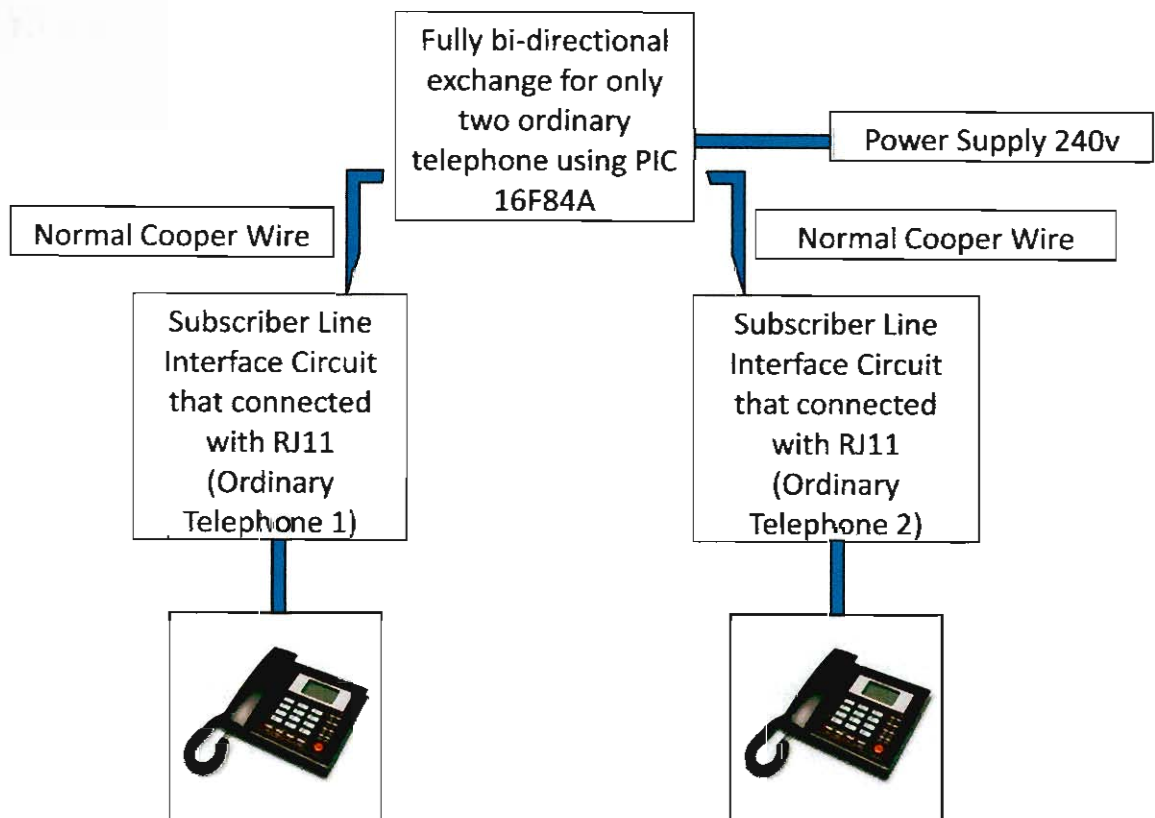
Nowadays our telephone system in our home is using copper wire as their medium transmission to make communication with other at everywhere. To show how the communication can be held, the prototype of communication will design. This prototype like our telecommunication provider with is TM. The flow of communication also designs to show 2 people can communicate from each other. For the exchange or control of the system communication PIC 16F84A are use. This PIC control 3 element below;

- i. SD – Status Detecting
- ii. TN – Telephone Network
- iii. RG – Ringing Generator

When the subscriber A want to make a call, they pick up the telephone and dialing the number to make a call to the other person, PIC check the status and make a network to connect to the subscriber B. The communication is using copper wire as their medium transmission. This medium will connect to the circuit of Subscriber Line Interface Circuit (SLIC). The SLIC constituted telephone circuit that will connect telephone set using telephone connector RJ11. To make sure this prototype can work properly, below are the other circuit that need each other to operate;

- i. Circuit of power supply dc 5v, 12v and 30v with 100v ac.
- ii. Circuit controlling unit.
- iii. Subscriber line interface circuit (SLIC).

The block diagrams below can describe briefly how the prototype of communication system operates.



1.2 Objective.

Nowadays people do not know how the communication with two people can be held. They only know to dialing number and after that they talk to the other person. Form this prototype that want to design can show the flow of telecommunication that provided from our Telekom Malaysia (TM). The main objectives of this project are;

- i. To design the model telecommunication system.
- ii. To study and understand the theory to design the best project.
- iii. To know the hierarchy of the telecommunication.
- iv. To gain more knowledge and better understanding and adeptness to produce project.
- v. To combine the idea and technology to make productive design.

1.3 Problem Statement.

Nowadays people do not know how communication can beheld with two people at different location. After apply the telephone line at TM or some vendors, they only wait at several days before the technician or vendor come to the house at installed the telephone set. Now the customer can use the telephone and dial the people that they want to talk.

The customer do not take part how communication can be held, where the subscriber line and all about the communication link. They only want the telephone set can be use, hear the dialing tone and can talk with people.

Based on the observation, the idea to design the model come out because want to show the route of how communication can be held with two people. From the telephone set at subscriber A using copper wire, through overhead and underground cable, through from exchange to the another exchange before finish at subscriber B. The prototype are show basic communication for two people.

1.4 Scope Project.

This project is focusing to build and design a model of 2 way communication that can show how the subscriber in two different places can communicate. The purpose of this project is to use a telephone set that are using now in our house and using PIC 16F48A that control this communication. Basically the model show the flow communication from subscriber A make a call , and the information will transmit using copper wire through the exchange (PIC 16F48A) before the information receive in subscriber B. This model is same with our communication using telephone at home.

1.5 Project Methodology.

Phase 1:

Study and understand the background of power supply circuit, find the information of PIC16F84A that use to make main of model, find the suitable circuit that want to make connection of communication, simulation, testing and comparing the result.

Phase 2:

Theoretical analysis all the circuit that are use to design the model to make sure all the circuit are suitable for each other and all the circuit can combine together.

Phase 3:

Simulation, test all the circuit and make optimization of the circuit.

Phase 4:

Comparing of the result based on theoretical and simulation.

1.6 Report Structure

This report discusses the theoretical analysis, designing and simulate the prototype two way communication using copper wire. Consists of five chapter, the report will cover all the matter that should be discussed in designing the project.

Chapter I give the brief information about the introduction of designing the prototype, what should be done and the software used in the design. It also includes the background of project, objective to archive from this project, problem statement, scope of this project and also the methodology.

Chapter II is about the literature review. Literature review is more about the theoretical part. The theory in design the circuit and also the component use to build the project.

Chapter III tells about methodology. Methodology is very important aspect in any work that wanted to be done. Work will be systematic and can be completed in time if we already plan what the wanted to do.

Chapter IV includes the results and discussions of the project. The result in here is the circuits that are design suitable and can connect with the other circuit. The circuit must work properly to archive the objective.

Chapter V is the conclusion and suggestion of the project. Suggestion is important to make sure the project can achieve target in other way than it is on this project.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

Literature reviews are the research about the idea to design the prototype of 2 way communication system. The process to design the model and the entire component that use in this prototype will show at this chapter. Starting from the first process of design the prototype until the prototype can work properly.

From this model it can show the people how communication can be held between two people at certain place. It likes the system that is use in Malaysia but it just like the prototype for communicates for two persons.

For this chapter it will divide for 3 important elements:

- a) Before start the project.
- b) During build the project.
- c) After design the project.

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- c) After design the project.

2.2 Before Start Project

First of all before start the project, this project come out from the observation between the customers want to apply telephone line and they ask the vendor how this communication can be held. From this, the ideas to design the prototype come and after discussion with supervisor industrial training the prototype can be design.

The idea to design this model like a real telecommunication between two telephones set those two subscribers can talk with each other. After that the design must related with study at the university that can be apply from notes and application.

When the designs are related with study at the university, student can apply the application and the student can understand the basic concept from their study. It shows the creativity of student to apply and design some work to show they want to test their knowledge by doing that.

Before design the prototype, I must know the circuit that must have and use to make sure it can work properly. There are some circuit had to design and the main circuit are power supply that are connected to the two other circuit. The other circuits are exchange circuit by using PIC16F84A which is connected to Subscriber Line Interface Circuit before through the telephone set.

Many researches have to do from discussion with supervisor, make some research from electronic books and form the internet. It must do it very properly to make sure this project will continue until the end and it not have any big problem during design the model of two way communication using copper wire. The proposal also must follow the rules because it can help to design this model.

2.3 During the Project

At this time the research of some component that are use to design the project must know briefly and know how to use and know the application. This is very important thing because some components have their own application at certain circuit. Below show the important components that are use in the three circuits.

2.3.1 Power supply circuit

2.3.1.1 Transformer step down

A transformer is a device that transfers electrical energy from one circuit to another circuit through inductively coupled conductor. A varying current in the first or primary winding creates a varying magnetic flux in the transformer's core and thus a varying magnetic field through the secondary winding. This varying magnetic field induces a varying voltage in the secondary winding. This effect is called mutual induction.

If a load is connected to the secondary, an electric current will flow in the secondary winding and electrical energy will be transferred from the primary circuit through the transformer to the load. In an ideal transformer, the induced voltage in the secondary winding (V_S) is in proportion to the primary voltage (V_P), and is given by the ratio of the number of turns in the secondary (N_S) to the number of turns in the primary (N_P) as follows: (1)

$$\frac{V_S}{V_P} = \frac{N_S}{N_P}$$

By appropriate selection of the ratio of turns, a transformer thus allows an alternating current (AC) voltage to be "stepped up" by making N_S greater than N_P , or "stepped down" by making N_S less than N_P . In the vast majority of transformers, the coils are wound around a ferromagnetic core, air-core transformers being a notable exception.