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ANALYSE DATA FROM MATLAB AND DISPLAY IT THROUGH 6800  
MICROPROCESSOR CONTROLLER

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BACHELOR OF ELECTRICAL ENGINEERING (CONTROL,  
INSTRUMENTATION AND AUTOMATION)

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ANALYSE DATA FROM MATLAB AND DISPLAY IT THROUGH 6800  
MICROPROCESSOR CONTROLLER

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This Report Is Submitted In Partial Fulfillment Of Requirements For The Degree of  
Bachelor In Electrical Engineering (Control Instrumentation and Automation)

Faculty of Electrical Engineering  
Universiti Teknikal Malaysia Melaka

MAY 2009

## SUPERVISOR'S DECLARATION

"I hereby declared that I have read through this report and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Control Instrumentation & Automation)"

Signature : .....  .....

Supervisor's Name : ..... Mazree bin Ibrahim .....

Date : ..... 6/5/2009 .....

**STUDENT DECLARATION**

“I hereby declared that this report is a result of my own work except for the excepts that  
have been cited clearly in the references.”

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Name : MUFIDAH RAZALI .....

Date : 06/05/09 .....

Specially dedicated to  
My beloved parents, sisters and brothers.  
Thank you for the endless support and encouragement

## ACKNOWLEDGEMENTS

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## ABSTRACT

The project is about to analysis data from MATLAB and displays it through 68k $\mu$ p controller. In this project, the data get from MATLAB and display to the microprocessor output. This data can be transmit or send by using serial port and MATLAB software can be use to access the port. Before MATLAB analysis the data, it can be create by using MATLAB guide. In this project, the microprocessor 68000 circuit can be used as the hardware for this project. In this circuit has 3 part connection, first part is about power address and data bus connection. Second part is about timer, clock and control bus connection then the last part is about input and output connection. Seven segments is the output device to display the sending data. Beside that, one program will be develop by using IDE68K to move the sending data from MATLAB to microprocessor, before the data can be display to seven segments.



## ABSTRAK

Sasaran projek ini adalah untuk menganalisa data dari MATLAB dan memaparkan data tersebut melalui kawalan 68000 mikropemproses. Di dalam projek ini, data akan dihantar dari MATLAB dan dipaparkan ke keluaran mikropemproses. Data tersebut akan dihantar menggunakan port bersiri dan perisian MATLAB digunakan untuk mengaktifkan port tersebut. Sebelum MATLAB menganalisa data, data tersebut hendaklah dibentuk menggunakan MATLAB GUI. Litar mikropemproses 68000 digunakan sebagai perkakasan untuk menyiapkan projek ini. Litar tersebut mengandungi tiga bahagian sambungan, sambungan pertama adalah penyambungan antara kuasa alamat dan bus data. Bahagian kedua adalah penyambungan antara timer, clock dan bus kawalan. Bahagian terakhir pula adalah penyambungan antara masukan dan keluaran. Untuk projek ini paparan tujuh ruas ( seven segment ) adalah komponen keluaran yang digunakan untuk memaparkan data yang dihantar dari MATLAB. Selain itu satu aturcara dibentuk menggunakan IDE68K untuk memindahkan data dari MATLAB ke mikropemproses sebelum data dipaparkan ke paparan tujuh ruas(seven segment).

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**LIST OF ABBREVIATIONS AND SYMBOL**

PCB	-	Printed Circuit Board
TIA/EIA	-	Telecommunications Industry Association
DTE	-	Data Terminal Equipment
DCE	-	Data Circuit-terminating Equipment
ROM	-	Read only memory
RAM	-	Read Access Memory
GUI	-	Graphic Interface Unit
EPROM		Erasable Programmable Read-Only Memory,
Hz		Herz
UV		ultra violet
OTP		one time programmable
MATLAB		Matrix Laboratory
I/O		Input output
IC		Integrated Circuit



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## **CHAPTER 1**

### **INTRODUCTION AND LITERATURE REVIEW**

This chapter explains about the project background, problem statement, project objectives, project scopes, and thesis outline and activity flow chart. Beside that this chapter also explains the literature review of this project.

#### **1.1 Project Background**

Data analysis is the process of looking at and summarizing data with the intent to extract useful information and develop conclusions. Data analysis is closely related to data mining, but data mining tends to focus on larger data sets, with less emphasis on making inference, and often uses data that was originally collected for a different purpose [6]. Have many software can be use to analyze the data but in this project the data will be analyze by using MATLAB and display the data to 68000 microprocessor.

## 1.2 Project Objective

The main core of this project is to analyze the data by using MATLAB and send through to microprocessor controller. The objective of this project is:

1. To design or develop a program that use serial port as an output terminal.
2. To create the data using MATLAB GUI.
3. To know how to display and send the data using MATLAB software.
4. To design the software for 68k $\mu$ p controller circuit, that accepts the data from MATLAB software.
5. To design the hardware for this project

## 1.3 Project Scope

In order to achieve the objective of the project, there are several scope had been outlined. The scope of this project includes:

1. Study about MATLAB GUI
2. Design the program using MATLAB GUI that create, recognize and send the alphabet to 68k $\mu$ p controller circuit.
3. Study about Microprocessor 68000.
4. Design the interface program by using assembly language in IDE 68k
5. Study about Proteus 6.0 Professional software and design the PCB board.
6. Use seven segments as the output to display the selected data.

## **1.4 Problem Statement**

This project is about to analysis data from MATLAB and displays it through 68k $\mu$ p controller. Have many methods to send the data that using serial port, in this project the problem to be studied is about how to send the data using serial port with MATLAB software base on serial port specification in your computer. Beside that, the second problem will be studied is how to interface the MATLAB programming to microprocessor. In this project, have study how to using assembly language of microprocessor 68000 that translates information supplied by MATLAB then display on output devices.

## **1.5 Literature Review**

### **1.5.1 Introduction**

Literature review has been conducted prior to undertaking this project to obtain the information on the some component and the theory about the related software that used in this project. This chapter provides the summary of literature reviews on key topics related to this project.

### **1.5.2 Serial communication**

Serial communication is the most common low-level protocol for communicating between two or more devices. Serial communication is popular transmitting data between a computer and a peripheral device such as a programmable instrument or another computer [3]. It can transfer data in low rates or transferring data over long distance. Base on the scope of this project, serial communication will be use to communicate the hardware device and software.

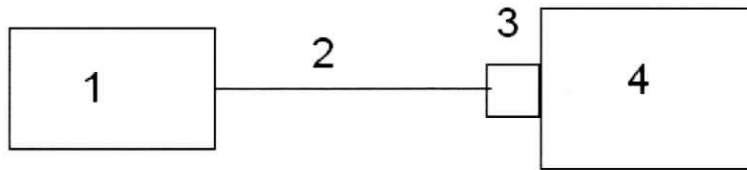


Figure 1.1 Connection for serial communication

- 1 - Instrument
- 2 - RS – 232 cable
- 3 - Serial port
- 4 - Computer

### 1.5.2.1 Serial port

Serial port is a serial communication physical interface through which information transfers in or out one bit at a time [12]. The serial port interface for connecting two devices is specified by the TIA/EIA-232C standard published by the Telecommunications Industry Association.

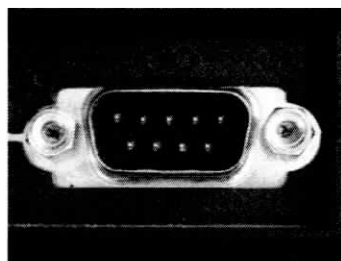


Figure 1.2 Serial Port

Serial ports consist of two signal types which are data signals and control signals. To support these signal types, as well as the signal ground, the RS-232 standard defines a 25-pin connection.[3] However, most Windows platforms use a 9-pin connection. In fact, only three pins are required for serial port communications, one for receiving data, one for transmitting data, and one for the signal ground. The following diagram (Figure 2.2) shows the pin assignment scheme for a 9-pin male connector on a DTE. The pins and signals associated with the 9-pin connector are described in the following table (Table 2.1). Refer

to the RS-232 standard for a description of the signals and pin assignments used for a 25-pin connector.

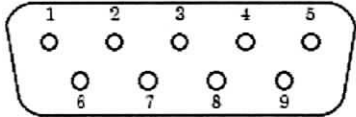


Figure 1.3 Pin assignment scheme for a 9-pin male connector

Table 1.1 Serial Port Pin and Signal Assignments

Pin	Label	Signal Name	Signal Type
1	CD	Carrier Detect	Control
2	RD	Received Data	Data
3	TD	Transmitted Data	Data
4	DTR	Data Terminal Ready	Control
5	GND	Signal Ground	Ground
6	DSR	Data Set Ready	Control
7	RTS	Request to Send	Control
8	CTS	Clear to Send	Control
9	RI	Ring Indicator	Control

Before activate the serial port in MATLAB, have to find the serial port information in their platform. It is important because the operating system provides default values for all serial port settings. However, these settings are overridden by your MATLAB code, and will



have no effect on your serial port application.[3].The serial port information can be access through the System Properties dialog. The step to access this on a Windows XP platform is:-

1. Right-click My Computer on the desktop and select Properties.
2. In the System Properties dialog, click the Hardware tab.
3. Click Device Manager.
4. In the Device Manager dialog, expand the Ports node.
5. Double-click the Communications Port (COM1) node.
6. Select the Port Settings tab.

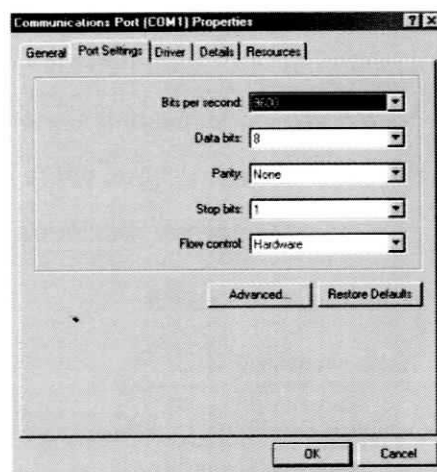


Figure 1.4 Dialog box for serial port information in your computer

### 1.5.2.2 RS322 Standard Cable

RS-232 (Recommended Standard 232) is a standard for serial binary data signals connecting between a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment) [3]. It is commonly used in computer serial ports. The RS232 standard is one of the oldest physical communication standards in computer world. The standard defines low-cost serial communication in a robust way where bits are sent sequentially on a copper line. It was originally defined for connecting devices such as computers, terminals and printers to modems. This equipment is connected through their

serial port. Nowadays, the computer to computer link with a so-called null modem cable is commonly used.

The original serial port definition limited the maximum transfer speed to 20 kbps, but practice has shown that higher bandwidth is possible. To overcome these limitations, the RS232-E standard allows much higher communication speeds than its predecessor.

The RS232 connector was originally developed to use 25 pins. In this DB25 connector pin out provisions were made for a secondary serial RS232 communication channel [8]. In practice, only one serial communication channel with accompanying handshaking is present. Only few computers have been manufactured where both serial RS232 channels are implemented.

On personal computers, the smaller DB9 version is more commonly used today. The diagrams show the signals common to both connector types in black. The defined pins only present on the larger connector are shown in red. Note, that the protective ground is assigned to a pin at the large connector where the connector outside is used for that purpose with the DB9 connector version.[8]

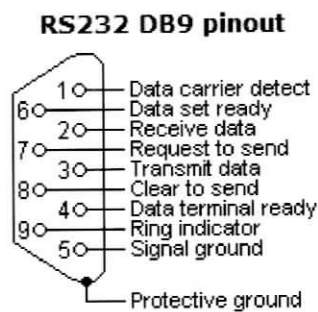


Figure 1.5 RS- 232 DB9 pin out diagram

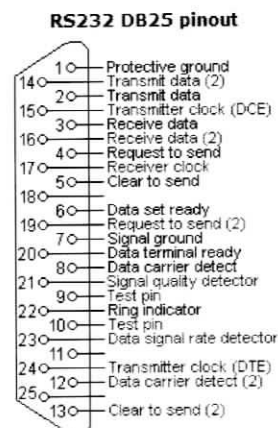


Figure 1.6 RS- 232 DB25 pin out diagram