

1. Introduction

The MDA-WinEMS51 kit is shown in Figure 1-1 contains all the basic components necessary to understand 8051 microcomputer.

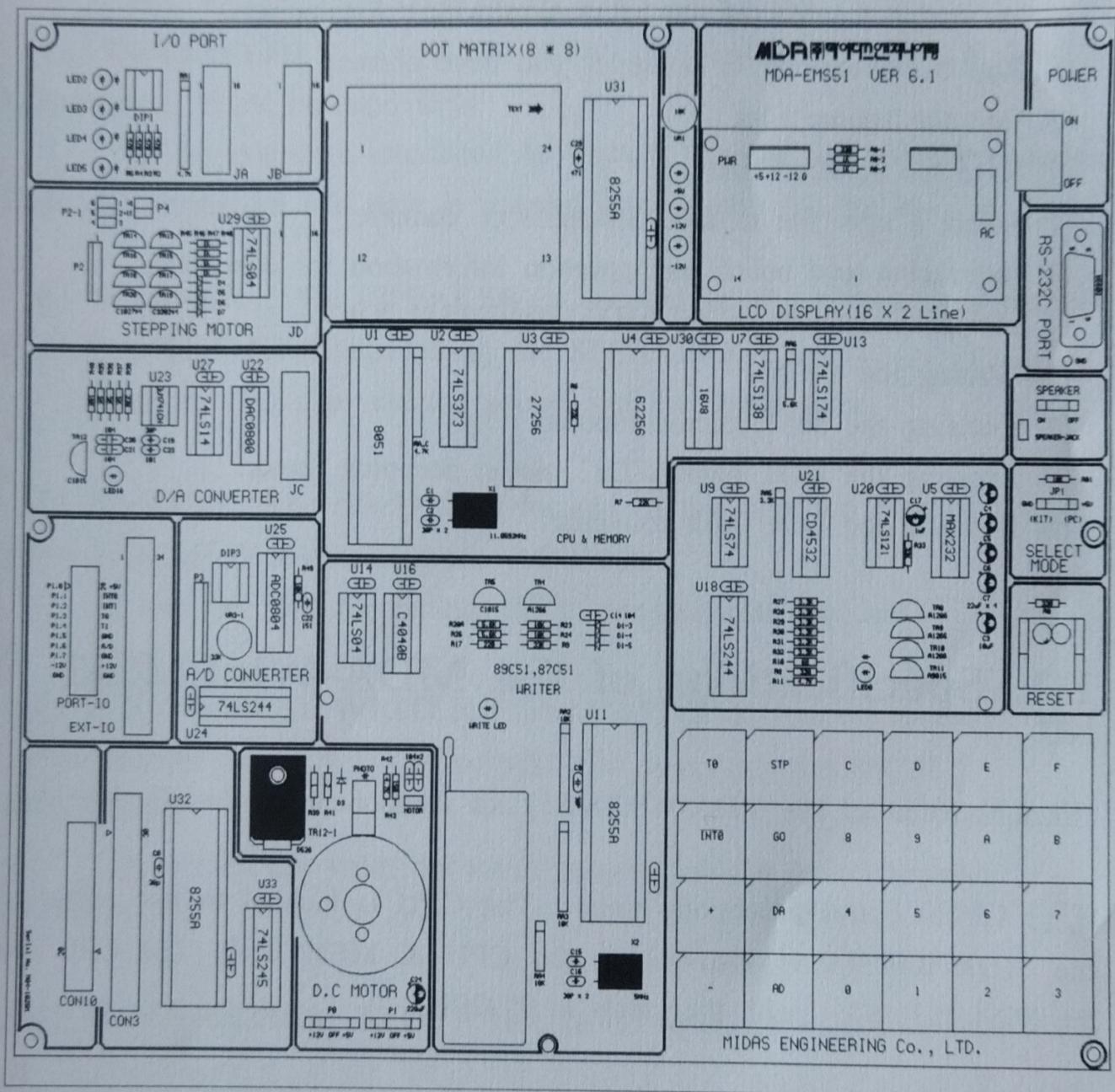


Figure 1-1 MDA-WinEMS51 Kit(main)

1. Introduction

The MDA-WinEMS51 Kit has a CPU, Memory (Monitor ROM and RAM), keyboard, a LCD display, RS- 232C, Dot matrix LED, ROM writer, etc.

A few major features of the MDA-WinEMS51 Kit include:

- (1) Run the assembler or compiler you have chosen.
- (2) Edit the source files.
- (3) Save the selected files.
- (4) Select a new file to edit, assemble or compile.
- (5) Interfacing and board configuration information for connecting peripheral devices to the MDA-WinEMS51 Kit.
- (6) Writing the 89C51
- (7) Excising the 8051 microcomputer.
- (8) Excising the DOT matrix, D.C motor, Stepping motor.
- (9) Excising the D/A, A/D converter.

1-1. Specifications of the MDA-WinEMS51 kit

Each function of the MDA-WinEMS51 kit components is described below.

1] CPU(Central processing unit) : The CPU is located to the center of the MDA-WinEMS51 kit(marking the CPU & MEMORY). The CPU use the 8051/8031/8751 with the clock 11.0592[MHz].

2] ROM(Read Only Memory) : The ROM is located to the center of the MDA-WinEMS51 kit(marking the CPU & MEMORY). It contains the basic program to allow user to control the MDA-WinEMS51 kit with the keyboard, LCD display, data communication.

3] SRAM(Static Random Access Memory) : The RAM is located to the center of the MDA-WinEMS51 kit(marking the CPU & MEMORY). Information (instructions and data) can be inserted (written) into RAM.

The information can be also be read from memory or altered by user.

[4] DISPLAY : The display is comprised of LCD display providing visual display of the data or control information. It has the 16(Character)×2(Line).

[5] KEYBOARD : It is a switch consisting of sixteen labeled hexadecimal, eight function keys.

The keyboard is interfaced to system bus by the priority encoder. Control information and data is entered into system by the key.

[6] SPEAKER : The SPEAKER is located to the right-center part of the MDA-WinEMS51 kit(marking the SPEAKER).

The speaker can test the sound and the synthesizer.

[7] RS-232C : The RS-232C is located to the right-top part of the MDA-WinEMS51 kit(marking the RS-232C).

It use the IBM compatible PC to communicate the data.

[8] 8751/AT89C51 WRITER : The WRITER is located to the center-bottom of the MDA-WinEMS51 kit (marking the 89C51 WRITER).

The writer can write the user's program to the microcomputer AT89C51.

[9] DOT MATRIX LED : The DOT MATRIX LED is located to the center-top part of the MDA-WinEMS51 kit(marking the DOT MATRIX 8 X 8). It use the dot matrix LED to understand the dot matrix structure and the principle of display. it is interfaced to system bus by the 8255A(PPI).

[10] A/D CONVERTER : The A/D converter is located to the

1. Introduction

left-center part of the MDA-WinEMS51 kit(marking the A/D CONVERTER).

The A(Analog)/D(Digital) Convert used the ADC0804 to convert the analog singial to digital singial with the ADC0804.

[11] D/A CONVERTER : The D/A converter is located to the left-center part of the MDA-WinEMS51 kit(marking the D/A CONVERTER). It used the DAC0800(8 bit D/A converter) to convert the digital signal to the analog signal and to control the D.C motor.

[12] STEPPING MOTOR DRIVER : The stepping motor driver is located to the left-upper part of the MDA-WinEMS51 kit(marking the STEPPING MOTOR). It use the stepping motor driver to control the stepping motor.

[13] D.C MOTOR : The D.C motor is located to the left-bottom of the MDA-WinEMS51 kit(marking the D.C MOTOR). It use the D/A converter to control the speed of D.C motor. It use the photo interrupter to measure the speed of D.C motor.

[14] CONNECTOR : The connector is located to the left & bottom of the MDA-WinEMS51 kit(marking the PORT-IO, EXT-IO, CON3).It use to interface the peripheral device.

[15] POWER : The POWER is located to the right-top of the MDA-WinEMS51 kit(marking the AC POWER).

The power spec. is the +5V(3A), +12V(1A), -12V(0.5A).

1-2. MDA-WinEMS51 Kit Address map

The Table 1-1 show the address map of the MDA-WinEMS51 kit.
Table 1-1

Address	Memory/I/O	Comment
0000H~6FFFH	RAM	Program/Data memory
7000H~7FFFH	ROM WRITER	
8000H~BFFFH	ROM	Monitor ROM
C000H~C003H	KEY_FLAG	Keyboard buffer clear
C004H~C007H	KEY_PORT	Keyboard buffer read
C008H~C00BH	8255A(PPI)	C008H : A PORT, 89C51 WRITER DATA BUS C009H : B PORT, LCD DATA BUS C00AH : C PORT, Control the LCD and the 89C51 writer C00BH : Control Register
C00CH~C00FH	89C51 WRITER	C00CH : Control the 89C51 writer.
C010H~C013H	SPEAKER	C010H : Control the speaker
C014H~C017H	8255A (Control the dot matrix)	C014H : A PORT C015H : B PORT C016H : C PORT C017H : Control Register
C018H~C01BH	A/D CONVERTER	C018H : Control the A/D converter
C01CH~C01FH	CON10	Control the peripheral device.
C020H~FFFFH	USER'S Region	

4. Keyboard Monitor

4-1. Introduction

This chapter describes your "interaction" or "how you communicate" with your MDA-WinEMS51 kit through the key pad monitor. The monitor program resides in 8K byte ROM.

The program is "initialize" or ready whenever power is turned on or your any time the RESET switch is pressed and allow to perform the following operations using the Keyboard and LCD display.

- (1) Examine and modify internal memory and external memory within the 8051 microcomputer.
- (2) Examine and modify memory locations.
- (3) Enter and initiate execution of your own programs.
- (4) Evaluate execution(debug) of your program through the monitor's single-step.

4-2. Using the Keyboard monitor

The MDA-WinEMS51 kit power on. The LCD display the following message.

** MDA-WinEMS51 **
8051 KIT ver3.0

If the LCD does not display this message, follow the steps below.

- (1) Move the JP1 switch to the G marking. The JP1 is located to the right-center part of the MDA-WinEMS51 kit (marking the JP1 SELECT MODE).

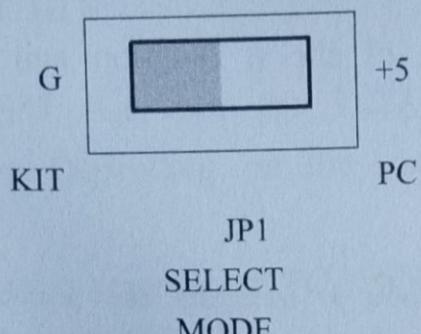


Figure 4-1 JP1

(2) Push the RESET switch. The RESET switch is located to the upper part of the MDA-WinEMS51 kit keyboard (yellow push button switch).

4-3. Keyboard

With the Keyboard monitor program, you enter both commands and data by pressing individual keys of key pad(The monitor communicates with you through the LCD display). As shown in Figure 4-2, the Keyboard is divided into two logical groups; the 16 hexadecimal keys on the right-hand side and the 6 function keys on the left hand side.

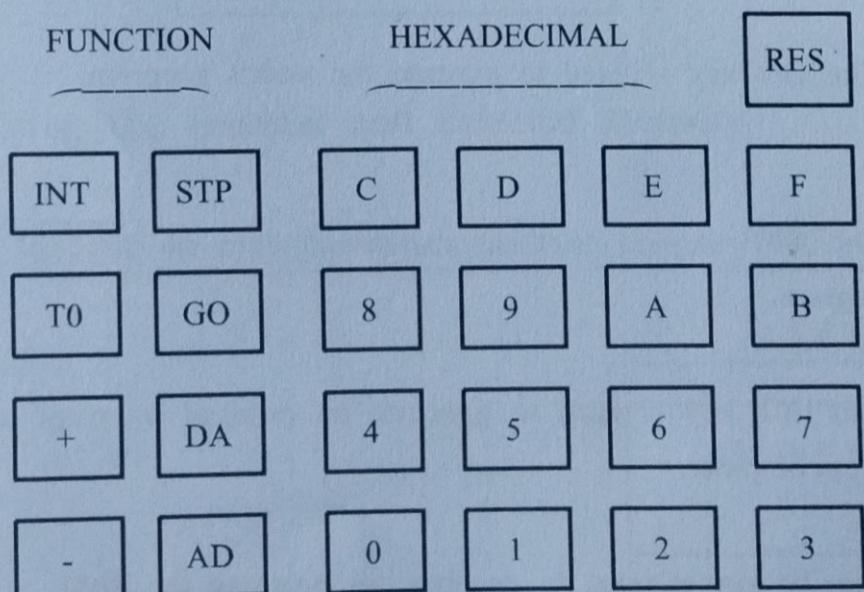
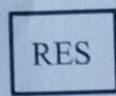


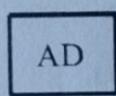
Figure 4-2 Keyboard arrangement

4. Keyboard Monitor

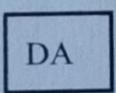
The individual operation of the 6 function and 2 experiment keys is defined below.



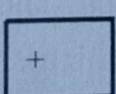
The RESET key allows to terminate any present activity and to return your MDA-WinEMS51 kit to an initialized state, MDA-WinEMS51 kit INPUT > message appears in the LCD display and monitor is ready for command entry.



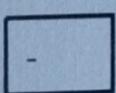
The AD key is used to enter the internal memory or external memory address.



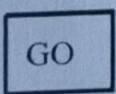
The DA key allows you to enter the data in the internal memory or external memory.



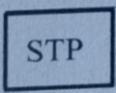
The + key is used to increase internal memory or external memory.



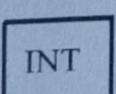
The - key is used to decrease internal memory or external memory.



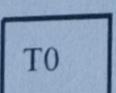
The GO key is used to execute the your's program.



The STP key is used to execute a line on time of the your's program.



The INT key is used to generate an external interrupt to the 8051 microcomputer.



The T0 key is used to generate an pulse to the 8051 microcomputer timer/counter.

4-4. LCD Display

Your MDA-WinEMS51 Kit uses the LCD display(16 x 2 lines) to communicate with you. Depending on the current state of the monitor, the information the:

- (1) Current contents of a register or PC, PSW, etc
- (2) An "echo" of a hexadecimal key entry
- (3) A monitor prompt sign
- (4) Current contents of memory location

4-5. Basic operation

When using the keyboard monitor, you will prompted through the LCD display as to the input required.

Whenever the monitor is expecting a command entry, a following message appears in the LCD display.

8051> input ?

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