

# MICROPROCESSOR TRAINER

## MDA-EMS51



### ■ FEATURE

#### 1. MDA-EMS51 Integration Development Environment Program.

- Display the 8051 internal architecture.
- Edit, Assemble, Compile, Download, and program running of source file.
- C-language, Assembly language source code debugging function.
- Program trace, Break function.
- Code memory disassemble function.
- 8051 Register, internal/external memory dump and editing function.
- Program scroll display function.
- Pop-up menu display.
- Program stop function by "ESC" key.
- 8751, 87C51, 89C51 writing function.
- Use to keyboard and mouse.

#### 2. I/O experiment by C-Language.

#### 3. Various I/O port experiment.

#### 4. Dot Matrix(3 color) experiment.

#### 5. DC motor, Step motor experiment by D/A Converter.

#### 6. Volt meter experiment by A/D Converter.

#### 7. Various command function.

#### 8. Sound experiment.

#### 9. 8751/89C51 Read/Write/Verify/Erase function.

#### 10. Experiment use to Micro controller test units.

#### 11. Keyboard function.

#### 12. LCD display function.(16 X 2 Line)

#### 13. +5V, +12V, -12V S.M.P.S(Free Voltage) Power.(110V/220V)

#### 14. Wood case.

## ■ Technical Specification

PC Operation Program	MDA-EMS51 Integration Development Environment Program.
Micro Controller	8031/8051/8751/89C51 Compatible
Main RAM	32KB(62256 x 1)
Monitor ROM	32KB(27256 x 1)
Display Unit	LCD(16 x 2 Line)
I/O Port	CPU I/O Port, 8255A x 1
Dot Matrix LED	8 x 8 (3 Color)
Keyboard	16 key of data, 8 key of function
Software Operation Program	MA51 Assembler, C-Compiler, Studio-51
MDA-EMS51 Integration	Display the 8051 internal architecture
Development Environment	Edit, Assemble, Compile, Download and program running of source file
Program.	C-language, Assembly language source code debugging function.



Micro controller test Unit	Bread Board x 1 Textool(40pin) x 1 Test LED x 8 Reset switch x 1	CPU(89C51) x 1 OSC(11.0592 Mhz) x 1 Test switch x 8 CPU port connector x 2
A/D, D/A Converter	ADC : ADC 0804, DAC : DAC0800 Motor : DC motor, Input sensor : Photo interrupter Input sensor : Photo interrupter	
Speaker	Speaker x 1	
Step Motor Interface	Driver T.R x 4	
Expansion connector	System bus 34pin x 1, CPU I/O pin 34pin x 1 External Interface 30pin x 1	
Micro controller Programmer	8751, 89C51 Read/Write/Verify, 89C51 Erase	
Textool	40 pin x 1	
Power	110V/220V	
Board size(mm)	310 x 265	
Wood case(mm)	100(H) x 300(D) x 430(W) ± 10(mm)	

## Integration Development Environment Program



MDA-EMS51 of Program MDA-EMS51 Integration Development Environment Program

**Program Window**

**Special function Register Window**

**Resistor Bank Window**

**Internal RAM Window**

#### The file name window.

- The current work file is displayed. If you change the work file, use the Sub-Menu WORK FILE of the Main Menu WORK.

#### The program memory window.

- The disassemble code for the program you are working on is displayed here along with a address, machine language, mnemonic code at left of each line. The yellow line at the left of the program memory window is current cursor, and is used to select a line of code for some action. The bar at the left of the program memory window is the current PC location. To change the bar, use the PC of the SFR window. The window may be scrolled up and down the vertical size of the window.
- Use the ↑,↓ key to move the cursor; the display will scroll when you reach the edges of the window.
- Press the "Page-Up", "Page-Down" key to page through the program memory.
- Use the mouse to scroll the window.
  - > Select the ▲,▼ part
  - > Click the mouse left button.
- If you set the breakpoint, follow the steps below.
  - > Move the cursor to the wanted line, press the "Enter" key.
  - >The selected line is changed the red color, so a breakpoint set.
  - > Again, move the cursor to the red color line, press the "Enter" key, so the breakpoint clear.

☞ The program memory window can not be written the data.

☞ The user program memory region of the MDA-EMS51 kit is the 2000H~9FFFH.

#### The SFR window.

- The values displayed here are updated after a breakpoint is encountered when executing normally, after every instruction while single-step. Note that the registers are now set to their default power-on value as defined by the MDA-EMS51 IDE.

#### The upper part of the SFR window

- This displays the 8051 registers. Any value within the window can be altered by positioning the cursor and typing in a new value.
  - > If you alter the PC value, the color var of the program memory window may be change the positioning line.
- The bellow part of the SFR window
  - > This displays the 8051 I/O special function registers. This window can not alter the data.

#### The internal memory window.

- This displays the 8051 internal data memory(20H~7FH).
- Any value within the window can be altered by positioning the cursor and typing in a new value.
- The values displayed here are updated after a breakpoint is encountered when executing normally, after every instruction while single-step.
- Note that the registers are now set to their default power-on value as defined by the MDA-EMS51 IDE.

#### The register bank window

- This displays the 8051 general purpose register(00H~1FH or R0~R7).
- Any value within the window can be altered by positioning the cursor and typing in a new value.
- The values displayed here are updated after a breakpoint is encountered when executing normally, after every instruction while single-step.

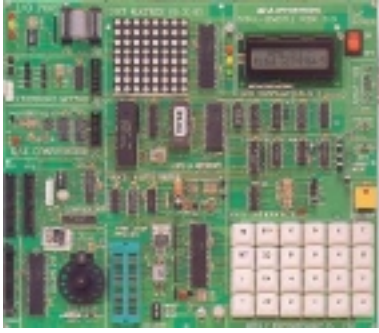
#### The SFR window.

- The values displayed here are updated after a breakpoint is encountered when executing normally, after every instruction while single-step. Note that the registers are now set to their default power-on value as defined by the MDA-WinIDE Studio-51

#### The upper part of the SFR window

- This displays the 8051 registers. Any value within the window can be altered by positioning the cursor and typing in a new value.
  - > If you alter the PC value, the color var of the program memory window may be change the positioning line.
- The bellow part of the SFR window
- This displays the 8051 I/O special function registers. This window can not alter the data.

# MDA-EMS51 Board



## CPU(Central processing unit) :

- The CPU is located to the center of the MDA-EMS51 kit(marking the CPU & MEMORY). The CPU use the 8051/8031/8751 with the clock 11.0592[MHz].

## ROM(Read Only Memory) :

- The ROM is located to the center of the MDA-EMS51 kit(Marking the CPU & MEMORY). It contains the basic program to allow user to control the MDA-EMS51 kit with the keyboard, LCD display, data communication.

## SRAM(Static Random Access Memory) :

- The RAM is located to the center of the MDA-EMS51 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.

## DISPLAY :

- The display is comprised of LCD display providing visual display of the data or control information. It has the 16(Character)\*2(Line).

## 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.

## SPEAKER :

- The SPEAKER is located to the right-center part of the MDA-EMS51 kit(marking the SPEAKER). The speaker can test the sound and the synthesizer.

## RS-232C :

- The RS-232C is located to the right-top part of the MDA-EMS51 kit(marking the RS-232C). It use the IBM compatible PC to communicate the data.

## 8751/87C51/AT80C51 WRITER :

- The WRITER is located to the center-bottom of the MDA-EMS51 kit (marking the 88C51 & 8751 WRITER). The writer can write the user's program to the microcomputer 8751, 87C51, AT89C51.

## DOT MATRIX LED :

- The DOT MATRIX LED is located to the center-top part of the MDA-EMS51 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).

## A/D CONVERTER :

- The A/D converter is located to the left-center part of the MDA-EMS51 kit(marking the A/D CONVERTER). The A(Analog)/D(Digital) Convert used the ADC0804 to convert the analog signal to digital signal with the ADC0804.

## D/A CONVERTER :

- The D/A converter is located to the left-center part of the MDA-EMS51 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.

## STEP MOTOR DRIVER :

- The step motor driver is located to the left-upper part of the MDA-EMS51 kit(marking the STEPPING MOTOR). It use the step motor driver to control the step motor.

## DC MOTOR :

- The DC motor is located to the left-bottom of the MDA-EMS51 kit(marking the DC MOTOR). It use the D/A converter to control the speed of DC motor. It use the photo interrupter to measure the speed of DC motor.

## CONNECTOR :

- The connector is located to the left & bottom of the MDA-EMS51 kit(marking the PORT-IO, EXT-IO, CON3). It use to interface the peripheral device.

## EXPERIMENT BOARD :

- The experiment board is located to the right of the MDA-EMS51 kit. It provide the experiment board to test the microcomputer(8751/87C51/AT89C51).

## POWER :

- The POWER is located to the right-top of the MDA-EMS51 kit(marking the AC POWER). The power spec. is the +5V(3A), +12V(1A), -12V(0.5A).(110V/220V)