

# Digital Signal Processor TRAINER

## MDA-DSP(TMS320C50)



### ■ FEATURE

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

- Display the **TMS320C50** internal architecture.
- Edit, Assemble, Compile, Download and program run of source file.
- Program Trace, Break functions.
- Code memory disassemble function.
- **TMS320C50 register Block & external memory Dump and Editing functions.**
- Program Scroll display function.
- Pop-up menu display.
- Program Stop to "ESC" key.
- Use to keyboard and mouse.

2. Direct input to machine language.

3. LCD display function use to keyboard.

4. LED display of current system bus status.

5. Various command function.

6. I/O Port and interrupt experiment.

7. **I/O Port experiment use to C-Language.**

8. In-Output function use to audio or analog signal.

9. **Analog signal input function use to 16bit A/D converter.**

10. **Analog signal output function use to 16bit D/A converter.**

11. Extension memory and I/O port interface connector for use.

12. + 5V, +12V, -12V 의 S.M.P.S(FREE VOLTAGE) Power

13. **Wood case**



### Program Memory 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

### Memory Mapped Register Window :

- This display the memory mapped registers. Any value within the window can be altered by positioning the cursor and typing in a new value.

### Block B2 Window :

- 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-stepping.

### Block B0-B1 Window :

- 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-stepping.

### Stack Window :

- This display the contents of stack. This window can not be written data

### File name Window :

- The current work file is display. if you change the work file, use the Work(W)-File Open(O)

## MDA-DSP(TMS320C50) Board



### DSP(Digital Signal Processor) :

- The DSP use the TMS320C50 with the clock 40[MHz].

### ROM(Read Only Memory) :

- The ROM use the EP-ROM(27C512×2). It contains the basic program to allow user to control the MDA-DSP kit with the keyboard, LCD display, data communication.

### SRAM(Static Random Access Memory) :

- The SRAM is (62256×2). The information(data) can be inserted (written) into RAM. The information can be also be read from memory or altered by user.

### LCD (Liquid Crystal Display Module) :

- The LCD display use for the data or control information display. It has the 16(Character)×4(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.

### 8251A & RS-232C :

- It use the IBM compatible PC to communicate the data.
- TLC32040 & RCA CONNECTOR →It uses the Voice quality analog data acquisition via the TLC320C40.

### AD7805/DAC712 :

- The AD7805/DAC712 with 16 bit A/D & D/A converter use to convert the analog & digital signal.

### A/D, D/A CONNECTOR :

- It is connected the four A/D, D/A channel through the multiplexer.

### STATUS LED :

- The 12 LED use to indicate the current status of the system → The DSP control bus, address bus.

### LED & SWITCH :

It use to I/O experiment.

### 8255A & I/O CONNECTOR (CON10) :

- It use to I/O experiment through the 8255A.

### XDS510 PORT :

- The 14 pin(J5) emulator connector

### I/O EXPANSION BUS :

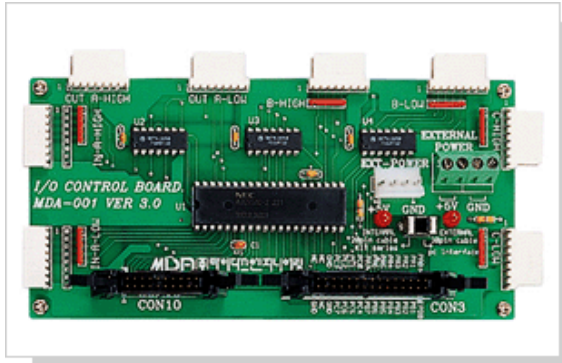
- It is used to external design(CON8, CON9).

### POWER :

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

# Optional Application Modules for MDA-Series

(MDA-EMS51, MDA-DSP, MDA-8086, MDA-Z80, MDA-EMS196)



MDA-001 I/O Control Board

## Features

- The 8255A(PPI) control
- General I/O control
- Include with I/O pins
- The research of I/O control
- Study purpose
  - 1) The 8255A control by program
  - 2) The I/O simulation

## Specifications(MDA-001)

In/Out IC	8255A × 1
Total I/O Pin	32Pin(I/O:16Pin, Output:16Pin)
Size(mm)	162 × 79
Connection Cable	20Pin × 1 or 30Pin × 1



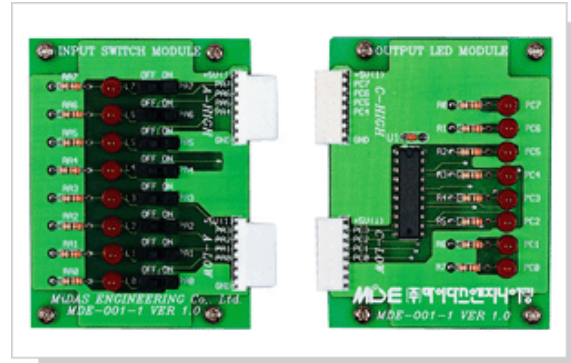
MDA-002 Voltage Control Trainer

## Features(MDA-002)

- The illumination controlled of lamp using micro computer
- Control method: phase control using photo SCR
- Changed the illumination control by program
- The research of electric power control
- Study purpose
  - 1) Phase control of A.C. voltage
  - 2) The illumination controlled of lamp by software
  - 3) The control of photo SCR and photo interrupter

## Specifications

Power	AC110V, 220V(50~60Hz)
Control	Photo SCR Phase Control
Photo Transistor Coupler	PC817
Fuse	250V / 0.5A
Connector	20Pin or 30Pin
Lamp	110V or 220V lamp
cover	Aluminum cover



MDA-001-1 I/O Simulation Board

## Features

- The I/O control connect with MDA-001
- Switch input and LED control
- Verify LED to program simulation
- The research of I/O control
- Study purpose
  - 1) The LED ON/OFF control by program
  - 2) The switch input control by program
  - 3) The I/O simulation

## Specifications(MDA-001-1)

Input Switch	8
ON/OFF Display	LED(red) × 8
Connection Pin	8Pin × 2
Size(mm)	61 × 80



MDA-003 LED Sign Board

## Features

- The 8255A(PPI) control
- General I/O control
- Include with I/O pins
- The research of I/O control
- Study purpose
  - 1) The 8255A control by program
  - 2) The I/O simulation

## Specifications(MDA-003)

LED Color / Size	RED / 5 φ
I/O Port	8255A, A,B,C Port
Power	+5V(3A)
Character	8 × 7, 4 Character
Display	English, Figure etc.
Cover	Aluminum cover
Connector	20Pin or 30Pin
Size	271(W) × 115(H) × 220(D)



MDA-004-1 Matrix Sign Board(1)

**Features**

- Dot-matrix controlled to micro computer
- Display to figure, character etc..
- Changed the color control by program
- The research of sign board structures
- Study purpose :
  - 1) The control of dot -matrix
  - 2) Various display control by software
  - 3) 16×16 dot matrix display

**Specifications(MDA-004-1)**

DOT	8×8 DOT LED ×4
Color	3 Color (Red, Green, Orange)
Character	8×8, 4 Character or 16×16, 1 Character
Control	8255A A, B, C Port and 74LS164, ULN2803
Display	English, Figure etc
Connector	20Pin or 30Pin
Power	+5V, 3A (SMPS Free voltage)
Case	Aluminum cover
Size(mm)	225(W)×250(H)×150(D)



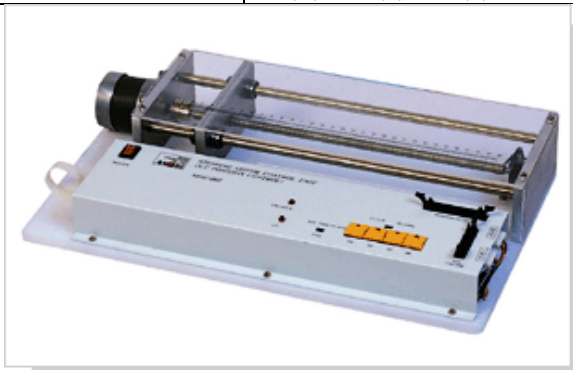
MDA-004-2 Matrix Sign Board (2)

**Features**

- Dot-matrix controlled to micro computer
- Display to figure, character etc..
- Changed the color control by program
- The research of sign board structures
- Study purpose :
  - 1) The control of dot -matrix
  - 2) Various display control by software
  - 3) 64×16 dot matrix display

**Specifications(MDA-004-2)**

DOT	8×8 DOT LED ×16
Color	3 Color (Red, Green, Orange)
Character	8×8, 16 Character or 16×16, 4 Character
Control	8255A A, B, C Port and 74LS164, ULN2803
Display	English, Figure etc
Connector	20Pin or 30Pin
Power	+5V, 3A (SMPS Free voltage)
Case	Acryl case
Size(mm)	550(W)×250(H)×150(D)



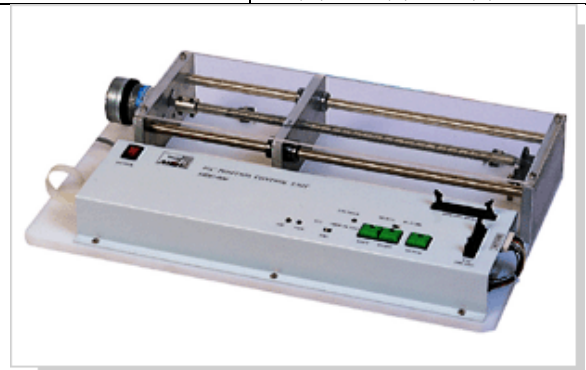
MDA-005 N.C Position Control

**Features**

- Stepping motor controlled to micro computer
- Speed and position control of stepping motor
- The research of stepping motor structures
- Study purpose :
  - 1) Control the stepping motor
  - 2) The stepping motor control by software
  - 3) Speed and position control of stepping motor by the program

**Specifications(MDA-005)**

Stepping Motor	6V, 1A, p/p
Step degree	1.8 degree / step
Power	+5V,3A(Free Voltage S.M.P.S)
Minimum Transfer	0.005mm(1mm/200Pulse)
Signal Detection	① Micro Switch : 2 ea ② Photo Rotation Encode : 1 ea
Switch	① Limit Switch :: 1 ea ② Push Button switch :: 4 ea ③ Toggle switch : 1 ea
Cover	Acryl cover with 250mm scale
Case	Aluminum cover
Size(mm)	440(W)×90(H)×280(D)



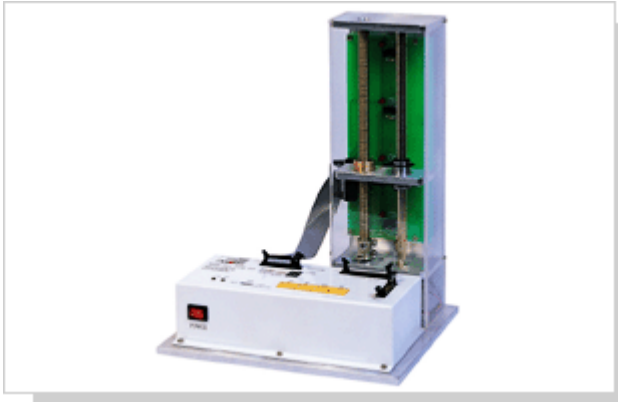
MDA-006 D.C Position Control

**Features**

- D.C motor controlled to micro computer
- Speed and position control of DC motor
- The research of DC motor structures
- Study purpose :
  - 1) Control the stepping motor
  - 2) The stepping motor control by software
  - 3) Speed and position control of stepping motor by the program

**Specifications(MDA-006)**

D.C Motor	DC, 12V, 200mA
Power	DC +5V/3A +12V/1A, -12V/0.5A (S.M.P.S Free Voltage)
Signal Detection	① Micro Switch : 2 ea ② Photo Rotation Encode : 1 ea
Table Transfer	200m/m
Minimum Transfer	0.05mm
Conveyance Capacity	5Kg
Maximum Speed	10mm/sec
Switch	① Limit Switch :: 1 ea ② Push Button switch :: 3 ea ③ Toggle switch : 1 ea
Cover	Acryl cover with 250mm scale
Case	Aluminum cover



**MDA-007 Elevator Trainer**

**Features**

- DC motor controlled to micro computer
- Speed and position control of DC motor
- The research of elevator structures
- Study purpose :
  - 1) Control the DC motor
  - 2) Elevator control by software
  - 3) Speed and position control of DC motor by program
  - 4) The control of photo interrupter

**Specifications(MDA-007)**

DC Motor	DC Motor 12V
Position Detection	Photo Interrupter
Transfer System	DC motor and Screw
Traffic Indicator	Up, Down Lamp
Floor Display	7 segment(1 Floor ~4 Floor)
Floor Input	Floor Display Switch
Power	DC +5V/3A +12V/1A, -12V/0.5A (S.M.P.S Free Voltage)
Cover	Acryl cover
Case	Aluminum cover
Size(mm)	250(W) × 335(H) × 220(D)



**MDA-012 Stepping Motor Unit**

**Features**

- Stepping motor controlled to micro computer
- Speed and position control of stepping motor
- The research of stepping motor structures
- Study purpose :
  - 1) Control the stepping motor
  - 2) The stepping motor control by software
  - 3) Speed and position control to simple hardware

**Specifications(MDA-012)**

Stepping Motor	12V, 0.36A
Step Degree	1.8 degree / step
Connection Pin	6pin
Case	Aluminum case
Size(mm)	140(W) × 115(H) × 145(D)



**MDA-013 Relay Trainer**

**Features**

- The relay control by micro computer
- The control of relay sequence
- The research of relay structures
- Study purpose :
  - 1) Control the relay
  - 2) Relay simulation control by software
  - 3) LED control to relay

**Specifications(MDA-013)**

Relay	DC 12V(2 contact point) × 8 ea
LED	10 Φ LED × 8 ea
Power	DC +5V/3A +12V/1A, -12V/0.5A (S.M.P.S Free Voltage)
Cover	Acryl cover
Case	Aluminum cover
Size(mm)	270(W) × 115(H) × 220(D)



**MDA-024 A/D Converter Trainer**

**Features**

- Uses 8 bit A/D converter, with a resolution of 8 bit
- Used advanced A/D converter technique, the conversion time 100  $\mu$ s
- Includes input voltage range selector, selectable 0-5V or -2.5V~+2.5V
- Includes 4-input multiplexer with each input selectable from the micro processor
- Two operating modes for A/D operation, stand-alone model or handshake mode selectable by a built-in hardware switch
- Includes three power supplies (+5V, +12V, -12V) on the panel
- Provides assembly language software for A/D conversion application such as digital storage scope

**Specifications(MDA-024)**

Input	Channel	4 channels
	Test Resistor	10 k $\Omega$
	Level and mode select switch	$\times$ 2ea
Output	Digital display LED	$\times$ 8 ea
	Decoder status display Led	$\times$ 8ea
	Level Meter 10 step	$\times$ 1ea
Power	DC +5V/3A +12V/1A, -12V/0.5A (S.M.P.S Free Voltage)	
Connector	30pin $\times$ 1ea, 20pin $\times$ 1ea	
Cover	Acryl cover	
Case	Aluminum cover	
Size(mm)	270(W) $\times$ 115(H) $\times$ 220(D)	



**MDA-025 D/A Converter Trainer**

**Features**

- Uses 8 bit D/A converter, with the typical setting time is 100ns
- Can be connected to computer and functioned as a programmable waveform generator
- Output voltage polarity can be selected with the output voltage range, 0-5V or -2.5V~+2.5V
- Includes three power supplies (+5V, +12V, -12V) on the panel
- Provides assembly language software to generate triangle waveform 150Hz, 72Hz

**Specifications(MDA-025)**

Input	Channel	4 channels
	Slide switch for data input	$\times$ 8ea
	Level selector slide switch	$\times$ 1ea
Output	Digital display LED	$\times$ 8 ea
	Decoder status display Led	$\times$ 8ea
	Level Meter 10 step	$\times$ 1ea
Power	DC +5V/3A +12V/1A, -12V/0.5A (S.M.P.S Free Voltage)	
Connector	30pin $\times$ 1ea, 20pin $\times$ 1ea	
Cover	Acryl cover	
Case	Aluminum cover	
Size(mm)	270(W) $\times$ 115(H) $\times$ 220(D)	



**MDA-026 Traffic Light Control Trainer**

**Features**

- Uses 16 LEDs (Green, Yellow, Red, Arrow) to simulate the traffic conditions of 4 direction traffic signals
- Includes 2 push buttons for pedestrian to cross the street
- Micro processor can be used to adjust the sequence and timing of traffic signals based on pedestrian and vehicle flow
- Micro processor chooses the optimal traffic signal timing based on road priorities and traffic condition

**Specifications(MDA-026)**

Input (signal control switch $\times$ 8ea)	Pedestrian input switch	$\times$ 2ea
	Synchronous signal switch	$\times$ 1ea
	Signal delay switch	$\times$ 1ea
	Ready switch	$\times$ 3ea
Signal display LED	Pedestrian signal RED square LED	$\times$ 8ea
	Vehicle signal RED LED	$\times$ 4ea
	Pedestrian signal GREEN square LED	$\times$ 8ea
	Vehicle signal GREEN LED	$\times$ 4ea
	Arrow signal GREEN LED	$\times$ 4ea
Power	DC +5V/3A +12V/1A, -12V/0.5A (S.M.P.S Free Voltage)	
Connector	30pin $\times$ 1ea, 20pin $\times$ 1ea	
Cover	Acryl cover	
Case	Aluminum cover	
Size(mm)	270(W) $\times$ 115(H) $\times$ 220(D)	