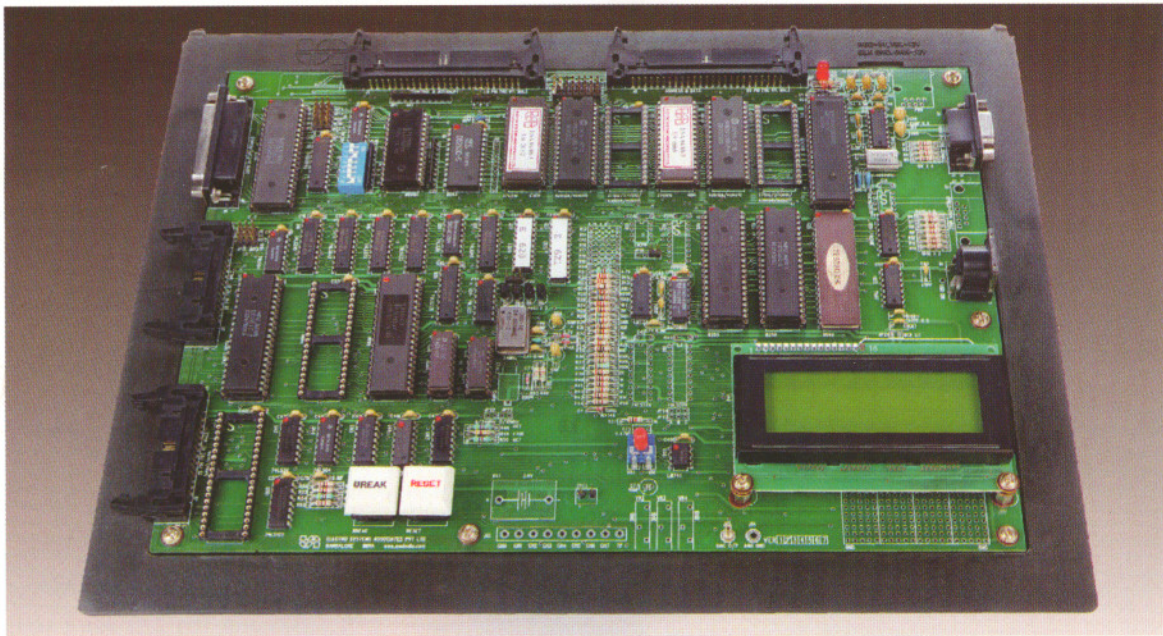# ESA 86/88-3
ADVANCED
MICROPROCESSOR TRAINER

ESA 86/88-3 is an advanced version of our popular model ESA 86/88-2. It is a powerful, general purpose 16 bit microprocessor trainer. It can be operated either with 8086 or 8088 CPU at a clock frequency of 8MHz in maximum mode. The basic system can be easily expanded through the system bus connectors. User can access full 1Mbytes of addressable memory. The powerful system firmware provides keyboard monitor, serial monitor, single-line assembler, disassembler and driver programs for parallel printer interface, PROM programmer interface in the firmware. ESA 86/88-3 is supported with comprehensive and user-friendly documentation as well as windows based communication package with online help.

ESA 86/88-3 can be operated in stand-alone mode using optional PC keyboard and LCD or with host PC through its on-board RS-232-C / RS 485 interface in serial mode. It has on-board 8 bit DAC, 12 bit ADC (optional) and dedicated Parallel Printer Interface.

ESA 86/88-3 can be connected to PC compatible host system using the Driver Software & cable supplied with the trainer. All the standard commands of the serial monitor of ESA 86/88-3 are fully supported by this package. In addition, object code files (generated using PC native tools like MASM, TASM) can be downloaded to ESA 86/88-3 from the PC, thus facilitating development of powerful application software. All these features make ESA 86/88-3 a complete single board microcomputer for development in R&D labs and industries for training in research and educational institutions.

MAIN FEATURES

★ ESA 86/88-3 operates on either in stand-alone keyboard and LCD or with host PC through its RS-232-C / RS 485 interface in serial mode.

★ Works with either 8086 or 8088 CPU in Max Mode at a frequency of 8 MHz.

★ Provision for on-board 8087 NDP.

★ Keyboard and serial monitor programs support the entry of user program, editing and debugging facilities like breakpoint, single-step and full speed execution of user program.

★ Built-in One Line Assembler, Disassembler in both serial and stand-alone modes of operation.

★ Provision for on-board memory of 1M bytes of which 896K bytes of RAM has optional battery backup.

★ On-board parallel printer port.

★ On-board 8 bit DAC using DAC 0800.

★ Provision for on-board 12 bit ADC using AD1674.

★ 48 I/O lines and three 16-bit programmable interval timers.

★ On-board Interrupt controller handles eight external interrupt sources. Provision for cascading through expansion connector.

★ Provision for system bus expansion through ribbon cable connectors.

★ Driver Software for file upload / download to / from host PC.

ACCESSORIES (OPTIONAL)

★ Power Supply : +5V@3A; ±12V @250mA; 30V@100mA.

★ PC keyboard for stand-alone mode of operation

★ 8087 Numeric Data Processor.

★ EPROM Programmer Interface (2716 through 27512)

★ Interface modules for training purpose: Keyboard, Elevator, Display, Dual DAC, 12 bit 8 Channel ADC, Logic Controller, Traffic Lights, Tone Generator, Stepper Motor, Opto Isolated Input, Opto Isolated Output, Relay Output, DC Motor Interface, Temperature Controller Interface, etc.

★ Study card modules for 8255, 8251 / 8253, 8279 and 8259.

★ On board 12 bit ADC (AD1674) with 8 channel MUX.

★ Parallel Printer cable.

★ RS 485 interfacing cable.

★ 3.6 V Ni-Cd Battery back-up for RAM.

SPECIFICATIONS

CPU

8086/8088 @ 8MHz in maximum mode
(Supplied with 8086 CPU)

CO-PROCESSOR

8087 NDP

MEMORY

6 JEDEC 32 pin sockets provide the following memory configuration :

ROM : 256K bytes (128K x 2) system firmware using 27C010.

RAM : 256K bytes using 628128 (128K X 2) upgradable to 512K bytes using 628512 (256K X 2)

EXPANSION :

RAM : 256K bytes using 628128 (128K X 2) / 512K bytes using 628512 (256K X 2)
OR

ROM : 128K bytes using 27C512 (64K X 2) to 512 K bytes using 27C020 (256K X 2)

PERIPHERALS

8255 : PPI (Programmable Peripheral Interface) : Five nos., 120 programmable I/O lines. Three 8255s are used for parallel printer interface, DAC, optional ADC and LCD. Two user available 8255s One supplied ; One optional.

8253 : Programmable Interval Timer ; Three 16 bit programmable timers available for user.

2681 : Dual channel UART used for serial communication (RS-232-C and RS 485) supporting standard baud rates upto 38400.

8042 : Universal Peripheral Interface used to interface PC keyboard in stand-alone mode

8259A : Programmable Interrupt Controller provides interrupt vectors for 8 independent interrupt sources

8288 : Bus-controller used to generate control signals

8284 : Clock-generator used to generate clock for processor and associated peripherals.

AD 1674 : 12 bit ADC, 10µs,

DAC 0800 : 8 bit DAC

INTERRUPTS

External : NMI connected to on-board switch with user defined vector INTR controlled by 8259A PIC.

Internal : Interrupt Vectors 1 (Single Step) and 3 (Breakpoint) reserved for monitor.

INTERFACE SIGNALS

CPU Bus : Demultiplexed and fully buffered, TTL compatible, Address, Data & Control signals are available on two 50 pin ribbon cable connectors.

Parallel I/O : 48 programmable parallel I/O lines (TTL Compatible) through two 26 pin ribbon cable connectors.

Serial I/O : RS-232-C through on-board 9 Pin D-type female connector.
RS 485 through on-board 9 Pin D-type male connector.

Timer Signals : Timer 0, 1, 2 signals are brought to a header.

Analog Signals : 8 analog inputs for ADC are fed through terminal blocks.
DAC output is available at a test point.

GENERAL

Power Supply

Requirement : +5V@1.5A (max)
±12V@250mA (max) for ADC, DAC

Dimensions : (L) 365mm x (B) 275 mm x (H) 55mm (Approx.)

Weight : 1300 gms (Approx.)

Housed in an ABS plastic moulded cabinet

SCOPE OF SUPPLY

1. ESA 86/88-3 Trainer
2. User's Manual with Schematics
3. Driver software (CD) for Windows & DOS.
4. RS-232-C Cable
5. MCS-86 Assembly Language Reference Card

<u>OUR PRODUCT RANGE :</u> Microprocessor Trainers for 8085, Z80, 6809, 8086/88, 68000; Microcontroller Trainers for 8031/51, 80C196 KB/KC, 68HC11, PIC Trainers and Interface Modules; DSP Trainers; Power PCs; In-Circuit Emulators; ROM Emulators; Microcomputer Development Systems; Universal Device Programmers; UV Erasers; PC compatible systems and Add-on Cards, Logic Analysers, AD/DA cards, DIO cards, etc.; Microprinters; Printer Support Products and Software Development Tools; etc.,

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NOTE : Specifications are subject to change without prior notice