Microcomputer Training Systems

Educational Training Equipment for the 21st Century

Bulletin 274E

MCB-1A

8-Bit Microprocessor Trainer

Purpose

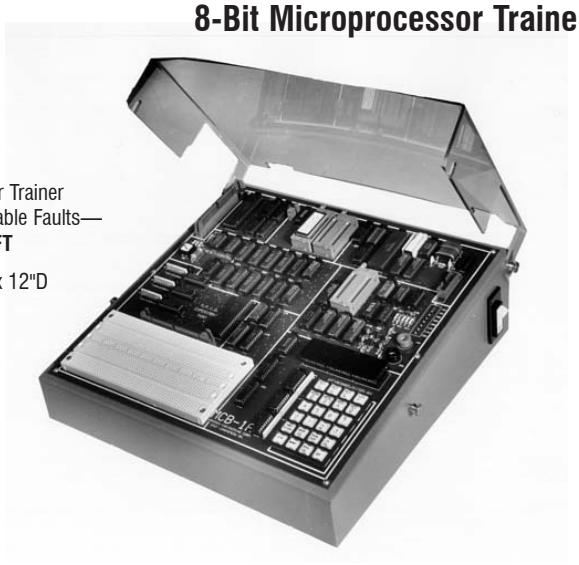
The purpose of the Hampden Single-Board Microcomputer Trainer, **Model MCB-1A**, is to assist instructors in the preparation of students for careers as technicians in fields relating to the operation and servicing of microcomputers.

Description

The **Model MCB-1A** utilizes an Intel 8085AH as the microprocessor. The Intel 8085AH contains the functions of clock generation, system bus control, and interrupt priority selection, in addition to the execution of the instruction set. The Trainer's memory section is equipped with 16K bytes RAM for program storage, an additional 4K byte RAM for stack and table storage, and 16K bytes of EPROM, 2K bytes of which contain the system monitor. Other EPROM locations are for user-derived programs as stored via an on-board EPROM programmer. Zero insertion-force sockets are used for all EPROMS. There is a complete RS-232C serial port with programmable baud rate and an 8-bit parallel I/O port, plus three additional parallel ports. The large area of solderless breadboarding space permits experimentation with a variety of computer-controlled circuits. The 24-switch keypad not only provides the means for loading and executing programs at normal speed, but for 1/2Hz RUN and Single-Stepping as well.

The following information may be displayed by the 12-character 16-segment LED indicators: address, data, condition flags, and the contents of any 8085 register. Bit LEDs display data at three of the I/O ports. Additionally, a BASIC/MiniAssembler package is available in EPROM, which can allow the student to connect a serial terminal and develop and debug programs in BASIC and mnemonic hex language.

The Hampden **Model MCB-1A** is available with 24 instructor-insertable faults accessible behind a rear-mounted locked hinged door. Specify suffix **FT** for the **Model MCB-1A** with fault switches (**Model MCB-1AFT**).



MODEL MCB-1A Microcomputer Trainer
Also available with 24 Switch-Selectable Faults—
Specify **MODEL MCB-1AFT**

Dimensions: 4"H x 12-1/2"W x 12"D
Shipping Weight: 15 lbs.

Experiment Sections

8085AH MICROPROCESSOR
is capable of accessing 64K bytes of memory and addressing up to 256 I/O locations. The crystal-controlled on-chip clock provides the 5MHz timing base. Its 246-command instruction set is compatible with the 8080/Z80.

RAM MEMORY
provides a total of 20K bytes of read/write memory capacity.

TWELVE CHARACTER DISPLAY
provides addresses and memory location contents in hexadecimal when programming, and when examining or running programs. They also display, on command, the contents in hexadecimal of any internal register of the 8085. Additionally the status of all condition flags may be displayed when desired.

THREE 8-BIT PARALLEL I/O PORTS
are provided via an Intel P8255A Programmable Peripheral Interface. The data at these bidirectional ports are displayed on binary LED's.

EPROM MEMORY
contains two zero insertion-force sockets for Erasable Programmable Read Only Memory chips. An 8K EPROM holds the control, or Monitor, program. The remainder of the EPROM locations are available for user-defined programs. An 8K byte blank EPROM is provided in addition to the unused space (6K) in the Monitor EPROM.

EPROM PROGRAMMER
provides the student with the capacity to save and reload a program via EPROM memory. Once programs have been developed, using the RAM section, they may be preserved in EPROM, which may be a #2716 2K byte, a #2732 4K byte, or a #2764 8K byte.

EXPERIMENTATION SECTION
consists of a 6-1/2" x 3-3/8" area of solderless breadboard. Sockets are arranged in a 0.1" x 0.1" grid to accomodate all DIP chips and other electronic components.

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Bulletin 274D-1E

SERIAL I/O PORT
has a complete RS-232C circuit, consisting of a serial-to-parallel/parallel-to-serial converter with control lines designed to interface the MCB-1A to most asynchronous peripherals. Fourteen different bit rates (from 50 to 9600 baud) are available, as programmed by the user on the DIP switch provided.

PARALLEL I/O PORT
is under the same control as the serial port and can be used in conjunction with it. For example, a CRT may be receiving data via the parallel port, while a printer is using the serial port. The port is software addressable via the Universal Asynchronous Receiver Transmitter (UART).

KEYPAD
consists of 16 hexadecimal keys and eight function keys. Following are the operations that may be performed:

- Loading instructions & data into memory/registers
- Examining program at every address
- Establishing breakpoint address
- Running program at full speed
- Running program at 1/2 Hz
- Running program only to breakpoint address
- Running program by single stepping
- Displaying contents of all 8085AH registers
- Displaying memory contents
- Displaying status of condition flags
- Resetting the system

ADDITIONAL EXPANSION
provided via a 50-pin socket and an optional interface card. As a consequence, unlimited expansion is possible with the MCB-1A.

Hampden Peripheral Equipment for the MCB-1A Microprocessor Trainer

Model TVT-2-1 Programming Terminal
A BASIC interpreter and Intel mnemonic assembler/disassembler has been developed for the **Model MCB-1A**. Supplied with an RS-232 terminal which plugs into the serial port of the MCB-1A, this accessory provides the student with the ability to expand their insight into the interaction between hardware and software.

Model SI-1 Serial Printer
The **Model SI-1** Serial Printer accessory consists of a serial printer, with tractor-feed and letterhead capability. This option is used in conjunction with the **MODEL TVT-2-1** Programming Terminal and is compatible with the BASIC interpreter supplied.

Model 2708E EPROM Eraser
An ultraviolet erasing lamp allows the student to erase and reuse their user-programmed EPROMs from the MCB-1A systems.

Model EBA-2 Experimental Accessories Package
Consists of the electrical and electronic components necessary for students to construct interfacing circuits. The manual includes circuits for half-wave AC control, full-wave AC control, DC control, D/A and A/D conversion, and temperature-to-digital conversion.

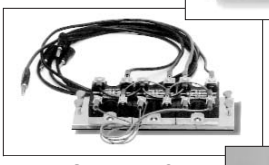
Model EBA-3 AC Relay Control Package
Consists of three AC relays suitable for control from a Digital I/O TTL-level control line, such as present on the **Model MCB-1A** trainer. Provided with Lexan base predrilled for mounting on the MCB-1A breadboard.

Model FP-2A Fault Circuit Program
The **Model FP-2A** Fault Circuit Program consists of 12 integrated circuits that have been electrically altered, but are unaltered in appearance, thereby not simulating a fault, but actually being a fault.

MODEL TVT-2-1 ↓

← MODEL 2708E EPROM

MODEL EBA-2



MODEL EBA-3

MODEL FP-2A

All Hampden units are available for operation at any voltage or frequency

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