



DEGEM
SYSTEMS

Electronics

Base unit
DC circuits
AC circuits
Magnetism and induction
Diodes, zeners and transistors
Bipolar and FET transistor amplifiers
Industrial semiconductors
Optoelectronic semiconductors
Electrical control circuits
Operational amplifiers
Power amplifiers
Power supplies
Oscillators & tuned amplifiers
Motor and generator control
Motor speed control
AC/DC and DC/AC conversion
3-phase motor control
Sensors & actuators
Automotive charging & ignition
Logic components
Demultiplexers, decoders & address
Sequential logic
555, ADC & DAC circuits
Logic families
AM & FM transmission
Digital modulation
Digital signal conversion
Optical communications
CAN-BUS systems
Introduction to 8-bit, 16-bit (AVR) and 32 bit (ARM) microcontrollers
Programmable logic device

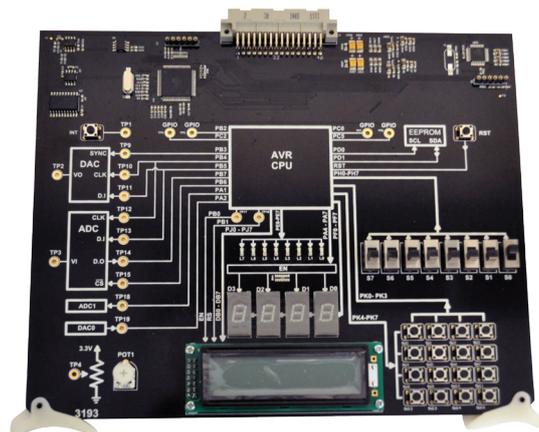
EB-3193

Introduction to 16 bit Microcontrollers and AVR

The EB-3193 Introduction to Microcontrollers board is a comprehensive instructional module designed to introduce the student to the basic concepts of 16-bit microcontroller architecture, principles of operation, addressing modes and flags, Instructions and programming to students in high schools, technical schools and colleges.

The AVR microcontroller family integrate an efficient processor with various internal peripheral devices, which offer high performance at low cost and are commonly used in state-of-the-art embedded applications. The EB-3193 course enables the student to perform a number of meaningful experiments to reinforce their comprehension of the important related concepts. The required configuration for each practical exercise and the related test equipment can be quickly wired by using the provided patch cords to connect the relevant 2-mm jacks. Since students perform a minimal amount of wiring, the possibility of a wiring error is decreased while increasing the time available for training. Manually inserted faults modify the circuits under test to provide valuable true-to-life troubleshooting exercises, which develop diagnostic skills.

A comprehensive student experiment manual provides essential theory and clearly details the experiment procedure. Optional courseware enhances the learning procedure testing the student's level of competence after reviewing the theory and then evaluates all answers to questions to test the student's level of achievement at the end of each experiment. The student may learn in the standalone mode or under the optional DCML (Degem Computer Managed Laboratory), which allows the instructor to monitor student and class progress and records pertinent records in a database for future retrieval.



Specifications

DESCRIPTION

The EB-3193 printed circuit board is designed to minimize circuit wiring time when setting up experiments. The board dimensions are 220 x 180 mm is powered by the EB-3000 base unit. The board plugs into the EB-3000 base unit via a 48-pin industrial connector.

All components are mounted on the printed circuit board and the schematic diagrams of all circuits are silk-screened to help the student identify components and system operation. The printed circuit board is solder masked for long life. The components mounted on the board are protected with a plastic cover that is permanently mounted on the EB-3000 base unit.

All major signals can be accessed from the 2-mm jacks to simplify connections within the circuit and to test equipment.. The printed circuit board can be stored in the supplied binder for convenient storage.

The 8-channel logic analyzer in the EB-3000 base unit exposes the student to real-life troubleshooting as is commonly found in modern industry.

An expansion socket provides a convenient platform to connect the EB-3193 to student project boards.

EXPERIMENTS COVERED

Architecture

- Inputs and outputs
- Clock, CPU and Memory
- I/O characteristics

Addressing modes

- Register addressing
- Immediate addressing
- Variables
- Direct / indirect addressing
- Bit manipulation

Flags

- Carry/auxiliary carry flags
- Zero and overflow flags
- Characteristics
- Observe tri-state behavior
- Time interval generation

AVR input/output units

- Direct ports
- Branching offset

C language programming

- Installing the EB-3193 software
- Basic commands and syntax
- Understanding program sources
- Modifying programs
- Compiling

AVR structure and internal peripheral devices

- Internal RAM
- Internal flash memory
- Internal EEPROM
- Analog-to digital converter
- Internal DMA controller

REQUIRED ACCESSORIES

- EB-3000 workstation with built-in digital multimeter, oscilloscope and patch cords
- Personal computer with MS-Windows

INSTRUCTIONAL MATERIALS

The experiment manual was written by pedagogical experts who train technicians in electronics technology. The student manual contains essential theory and a detailed procedure for each experiment and is available in hardcopy or electronic book formats.