



DEGEM
SYSTEMS

Electronics

EB-3191

Introduction to Microcontrollers

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 & adders
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

The EB-3191 Introduction to Microcontrollers board is a comprehensive instructional module designed to introduce the student to the basic concepts of microprocessor and microcontroller architecture, principles of operation, addressing modes and flags. Instructions and programming to students in high schools, technical schools and colleges.

The module contains various practical circuits with which the student can perform a number of meaningful experiments, which help reinforce the student's comprehension of the related concepts. The individual circuits and the required test equipment can be quickly wired by using the provided patch cords to connect the relevant 2-mm jacks. Students perform a minimal amount of wiring, thereby reducing the setup time and the possibility of a wiring error 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-3191 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 supplied binder for convenient storage.

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

8051 machine & assembly language

- EB-3191 software installation
- Operation with a PC
- Debugger functions

8051 Input/Output units

- Direct ports
- Branching offset

Assembly programming

- Registers
- Conditional branching
- Writing in Assembly language
- Subroutines
- Break points and single step

8051 structure and instructions

- Internal RAM
- Special function registers
- Interrupts and stack
- Instruction classification
- Branching
- Look-up tables
- Subroutines and interrupts
- Timer / counter
- Serial communication

Address decoding and memory

Input and output ports

7-segment display

LCD display

Switches and keys

Matrix keyboard

A/D and D/A converters

REQUIRED ACCESSORIES

EB-3000 workstation with built-in digital multimeter, oscilloscope and patch cords

OPTIONAL ACCESSORIES

- Personal computer with MS-Windows
- DCML Degem Class Management Software

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.