



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 & 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

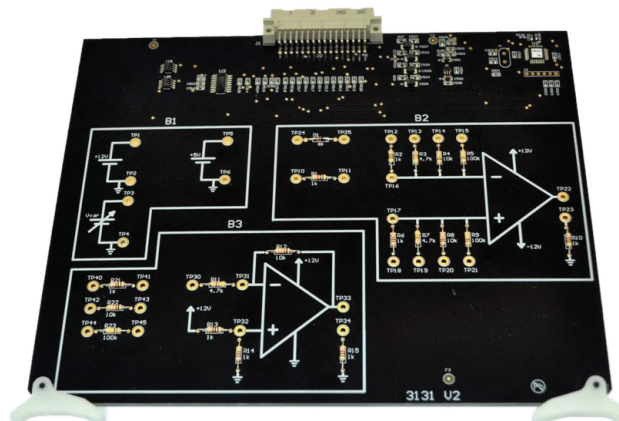
# EB-3131

## Operational Amplifiers I

The EB-3131 Operational Amplifiers I board is a comprehensive instructional module designed to introduce the student to the basic concepts of the inverting, non-inverting, summing and difference amplifiers 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-3131 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.

## EXPERIMENTS COVERED

### Inverting amplifier

- Basic concepts
- How to measure parameters
- Measure output voltage for various input voltages
- Measure input and output resistance
- Calculate voltage and current gain
- Single supply amplifier
- Measure phase shift

### Non-inverting amplifiers:

- Basic concepts
- Measure output voltage for various input voltages
- Measure input and output resistance
- Calculate voltage and current gain
- Buffer (follower) amplifier
- Measure phase shift

### Summing and difference amplifiers:

- Basic concepts
- Observe summing amplifier behavior for DC and AC input voltages
- Observe difference amplifier behavior for DC and AC input voltages

### Troubleshooting:

- 7 different fault-finding exercises

## 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.