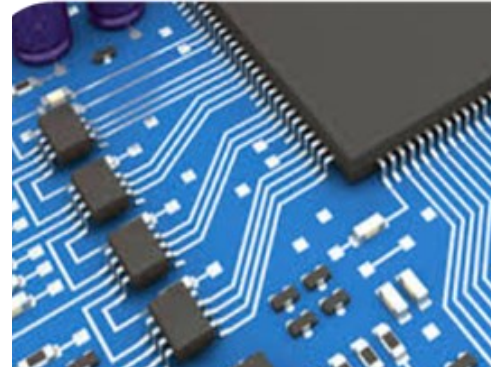


## LHP 3000

### ELECTRONICS TRAINERS

### ANALOG & DIGITAL MICROCONTROLLERS



The LHP-3000 laboratory covers all areas, theoretical and practical starting from **Basic Electronics** up to the most advanced technologies of **Industrial Electronics** including didactical software, design, simulation and assembling of electronic circuits.

The laboratory deals with a section that implements a modular, flexible and technologically advanced training program, which is continuously enriched with innovative circuits solutions. Each training system is divided into modules according to studying subjects, easy for experimenting and covers a **complete course in the fields of electricity and electronics**:

- ◆ Electricity
- ◆ Semi-conductors
- ◆ Electro-Magnetism
- ◆ Power supplies
- ◆ Analog electronics
- ◆ Digital electronics
- ◆ Digital logic
- ◆ Microprocessors
- ◆ Programmable logic

Students are given an opportunity to experience the tools and methodologies used in the professional life.

The laboratory equipment is accompanied by the appropriate software to run interactively with PC workstations, wherever this is applicable.

The didactic documentation is organized in subjects corresponding to the simulations and the experimental exercises with scope:

- A series of aims for the specific experiment and the level of knowledge that must be obtained.
- Theoretical background relevant to the lesson as well as practical examples of use.
- Tests/Questions for the students and fault testing.

The systems are accompanied by technical manuals for theory and exercises. Each one of the lab equipment is described hereinafter.

#### PT 3301 AD

Analog and Digital Electronics  
Trainer kit basic

#### PT 3301 CS

Microprocessor &  
Microcontroller Training  
System

#### PT 3000 BE

Electronics and electrical  
work bench

## PT 3301 AD Trainer

### Analog and Digital Electronics Trainer kit



The PT 3301AD is a stand-alone student universal **training platform** and includes the facilities for **training in Analog and Digital Electronics, CPU/Processor /Controller /I-O programming** as well as **sensors and transducers**. It provides a variable test platform and the necessary real electronics components for performing the required experiments in digital and analogue electronics lab course works. The electronic components circuits for every experiment are build by the students on the plug board of the trainer. The standard configuration is the PT3301 AD. PT3301 C is offered as option.

In its basic configuration, PT 3301 AD, includes two basic discrete component set: **Analog electronics** and **Digital electronics**. These are offered as a start-up set of consumables. There is a vast number of experiments provided. Experimental work is not limited to the provided experiments, the platform can accept instructors circuit designs and didactic variations as per school curriculum. **Additionally:** One dual purpose add-on kit can be provided.

**PT 3301 CS:** with 2 controller board for studying Processor and I/O programming and a set of sensors, electronic switches and transducers for electronic circuits and programming training in conjunction with the controller PT3301 C.

#### TECHNICAL CHARACTERISTICS

The PT 3301 AD trainer base facilities include:

- Speaker
- Rheostat 10K - rheostat 100k
- 10 TTL/CMOS Logic Level Inputs
- 10 Logic level inputs with LEDs (dual color) indicators
- 10 Logic level outputs with LEDs (dual color)
- Locked frequency clock generator, range 1Hz to 10N Hz, N = 1 to 6
- Function generator 20 - 200KHz, wave types Sine, Square, Triangle. Frequency and amplitude control.
- Single Pulse Generator - manual single stage switch
- Logic probe with LEDs for low and high signal
- 4 digital displays, seven segment each for DPM
- 1 single digital seven segment display
- 1 dual digital seven segment display
- Plug board 2 x 630 TIE connections, 2x200 Power / ground connections
- Fixed DC Power Supply +5V
- Fixed DC Power Supply  $\pm 12V$
- Variable DC Power Supply, range -15V - 0 - +15V
- Build-in AC power supply, any range from 0 to maximum 36V
- Digital Voltage Meter

The set comes with a multimeter and cables for 2mm terminal connections, all stored in an aluminum profile briefcase.

**Oscilloscope PT 33 OSC** can be provided optionally. Handbooks are offered in a variety of languages. The trainer comes with software simulation for circuits in experiments. Experiments can be simulated during theory presentation or student preparation. Requires a standard PC Windows 10, for the instructor.

#### DIDACTIC PROCESS

The students' interconnections can be easily integrated to all facilities during the circuit creation.

Various exercises for all component combinations and relative theory for each topic are included in documentation provided.

The PT 3301 AD comes with complete documentation. It includes theory and more than 100 experiments for Analogue and Digital circuits prior to using the actual components.

PT 3301 AD set enables the student to perform several analogue component circuit **experiments** while providing theory principals and circuit simulation for the following devices:

#### PT 3301 A Analogue Electronics Kit:

- Resistors
- Capacitors
- Inductors
- Various type of Diodes
- LEDs
- Transistor DC circuits (Bipolar and FET)
- Transistor amplifiers (Bipolar and FET)
- Bi-stage amplifier
- The transistor as a switch
- Audio amplifiers
- Operational amplifiers
- Operational amplifier applications
- Filters
- Oscillators

#### PT 3301 D Digital Electronics Kit:

- Gates: AND, OR, NOT, NAND, NOR, XOR
- Function realization and Karnaugh map
- Encoders-Decoders
- Multiplexers
- Comparators
- Adders and Subtractors
- Flip-Flops
- Registers
- Counters

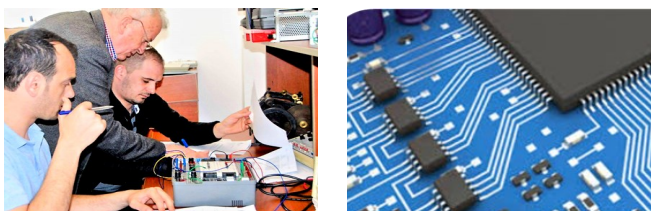
The **PT-3301 C** kit is an add-on to PT 3301 AD base unit and covers the subjects of microcomputer structure, programming in C & C++ language, hardware, peripherals, interfacing, memory, input/output ports, switches, LEDs, displays, keyboard, timer/counter, DAC, ADC, serial communication and microcontroller applications. It is a complete system to introduce the student to **microprocessors and microcontrollers structures**. It comes with **PT 3301 S** kit. of components. **Programming in C and C++.**

**PT 3301 AD** Trainer  
Analog and Digital Electronics Trainer kit

The PT 3301 AD discrete **component set** includes the following analogue and digital devices:

Analogue and Digital Component set	Qty
470Ω Resistor, 0.25W	1
1 / 3.3 / 10 / 33 / 100kΩ Resistors, 0.25W	1
1MΩ Resistor, 0.25W	1
50kΩ Variable Resistor, lay-down, with dial	1
0.005 / 0.047μF Disc Capacitors	1
10μF Electrolytic Capacitor	1
100μF Electrolytic Capacitor	1
Diode, 1N4148	1
Transistor, NPN, 2N3904	1
Light Emitting Diodes (LEDs)	1
Transformer	1
Switch, push-button	1
Buzzer , with wire connections	1
Wires with pins for connection	1
CMOS Buffer	1
Quad 2-Input NOR Gate	1
Quad 2-Input NAND Gate	1
Hex Inverter	1
Dual D-Type Positive Edge Triggered Flip Flop	1
Quad 2- Input AND Gate	1
Dual J-K FLIP- FLOP with clear	1
AD 2-Input OR Gate	1
Quad 2-Input NOR Gate	1
Triple 3-Input AND Gate	1
Dual 4- Input OR Gate	1
Dual 2-Input Exclusive OR Gate	1
Crystal 1MHz	1
Resistance 10 / 330 /5600 kΩ	1
Resistance 1 / 56 KΩ	1
Capacitor 0.001 / 0.022 / 0.033 / 0.01 μF	1
Capacitor 100 pF	1
Diode 1N4007	1

The above items are consumables and can be purchased locally in case of loss, damages or expansion of experiments. Kondle provides them as start-up consumables.



**PT 3301 CS**  
Microprocessor and Control training kit

The PT 3301 CS kit includes **2 controllers** and appropriate connection accessories which can interface with the PT 3301 base facilities and can also be interfaced together for communication and interfacing.

- **ATmega328P-PU controller** which interfaces with the facilities offered by the PT 3301 base.



- CPU: ATmega328P-PU -16 Mhz
- Working voltage: +5V
- External Vin: +6V ≤ Vin ≤ +12V
- Digital signal I/O interface: 12
- Analog signal input interface: 6
- DCI/O interface current: 20mA
- Flash Memory: 32KB
- SRAM static storage: 2KB

- **ATmega2560 Rv.3 controller** which interfaces with the facilities offered by the PT 3301 base.



- CPU: ATmega 2560 R. 3-16Mhz
- Microcontroller: ATmega2560
- Operating Voltage: 5V
- Input Voltage: 7-12V
- Input Voltage (limit): 6-20V
- Digital I/O Pins: 54 (15 PWM put)
- Analog Input Pins: 16
- Flash Memory: 256 KB
- SRAM: 8 KB

The **PT3301 CS** kit also includes a set of sensors, control switches and transducers which interface with the PT 3301 CS controllers for integration of ADC and DAC and control programming using:

- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| 3 x circuits: digital white LED     | 1 x circuit: hall magnetic sensor |
| 1 x circuit: active buzzer          | 1 x circuit: collision sensor     |
| 1 x circuit: passive buzzer         | 1 x circuit: digital push button  |
| 1 x circuit: analog temp. sensor    | 1 x circuit: capacitive switch    |
| 1 x circuit: analog sound sensor    | 1 x circuit: knock sensor         |
| 1 x circuit: photocell sensor       | 1 x circuit: digital tilt sensor  |
| 1 x circuit: water sensor           | 1 x circuit: flame sensor         |
| 1 x circuit: soil humidity sensor   | 1 x circuit: LM35 temp. sensor    |
| 1 x circuit: analog rotation sensor | 1 x circuit: vibration sensor     |
|                                     | 1 x circuit: reed switch module   |

The PT 3301 CS kits combine didactic and training documentation which includes theory, controller programming in C++ and ARD:icon (a unique GUI and icon driven programming offered by Kondle) and **experiments** in the following topics of Microprocessor, Microcontroller and Control electronics:

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Microcomputer Structure</li> <li>• ARM 32 bit microprocessor</li> <li>• Microprocessor infrastructure</li> <li>• ALU and registers</li> <li>• Microprocessor operation</li> <li>• Instruction Set</li> <li>• I/O operation and memory</li> <li>• C++ Language</li> <li>• Debugger Functions</li> <li>• Addressing Modes</li> <li>• Flags</li> </ul> | <ul style="list-style-type: none"> <li>• Serial bus interface</li> <li>• Memory classification, RAM, ROM, EPROM</li> <li>• Integrated Exercises Interrupts</li> <li>• Timing diagrams</li> <li>• I/O Ports and drivers</li> <li>• 7-segment display interfacing</li> <li>• Timer/Counter</li> <li>• A/D interfacing</li> <li>• D/A interfacing</li> <li>• Master Slave communication</li> </ul> |
|--|---|

**PT 3000 BE**

Electronics and Electrical Lab work bench

PT 3000 BE is designed for electronics laboratories and provides to the laboratory a **versatile power supply source of fix, stable and variable AC and DC outputs**, with safety terminals, with high safety features, electronic instruments and stable electric performance for the lab work of the students. The PT 3300 BE can provide work space for **group of 3 students**.



The bench consists of a **lab bench PT 3000 B** and the **single side Power Supply Unit PT 3000 BE**. The standard configuration of the PT 3000 BE is provided below. Additionally, to the provided specifications, Kondle can provide any other required by the customer power output upon customers request.

The lab bench **PT 3000 B** is made of industrial duty metal frame, rust proof painted, with a MDF top surface 30 mm thick covered protective PVC with total dimensions of about 205 x 80 x (height) 80cm and curved edges. It can hold up to 600 kg weight. The legs of the bench can be bolted on the floor for secure positioning.

The power supply unit **PT 3000 BE** is securely positioned on the surface of the PT 3000 B on the back side. It has dimension 180 x 30 x 30 cm and it has access to the unit components and circuits from the back side. The unit is powered on by Key lock switch in the front of the panel. The input is 230VAC 10/16A is supplied via safety relay escape switch and circuit breaker with indicator light for safety. The front panel includes 4 wall outlet type receptacles with protective cover, 230V/10 A installed on each side of the structure and all connected to a circuit breakers with light power on indications. All outputs are isolated and protected for overload or short circuit. All inputs to the transformers are protected by the safety relay escape switch and circuit breaker circuit of the unit. All power supplies are provided with indication light. Variable power supplies are provided with Voltage and Ampere controls and LCD display.

**PT-3000 BE** specification sheet

<b>INPUT</b>	230 VAC /16A			
<b>OUTPUTS</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>DC STABILIZED</b>	0-5 VDC / 10 A	0-25 VDC / 2A	± 5 VDC / 2A	± 15 VDC/ 2A
<b>DC VARIABLE</b>	0-30 VDC / 0-3A	0-50 VDC/ 0-5A		
<b>AC STABILIZED</b>	6 VAC/ 3 A	6 VAC/ 3 A	24 VAC/ 3 A	24 VAC/ 3 A
<b>AC VARIABLE</b>	0-25 VAC / 2 A			
<b>AC OUTLETS</b>	230 VAC 10/16A	230 VAC 10/16A	230 VAC 10/16A	230 VAC 10/16A
<b>INSTRUMENTS</b>				
<b>AC VOLTMETER</b>	0-250 VAC			
<b>DC VOLTMETER</b>	0-100 VDC			