Table of Contents

UniTrain®

UniTrain is a multimedia e-learning system with integrated, mobile electronics lab for general education and advanced training in electrical engineering and electronics.

Project work
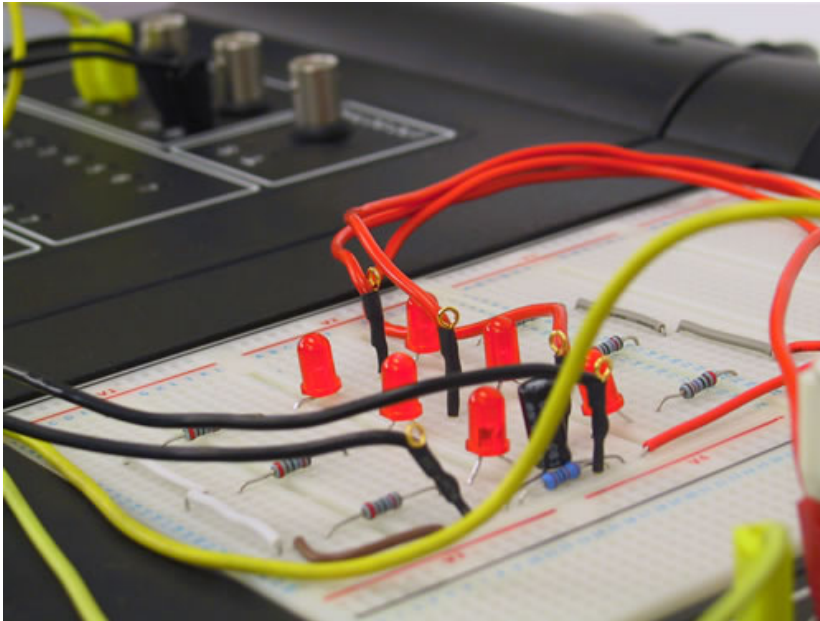
Project work

System component kits based on authentic practice offer the greatest possible freedom to experiment. The foundation component kits can be used to explore the basics of electrical and electronic systems. When combining any desired components in more advanced experiments, complex electronics applications can also be covered. Here there are virtually no limits set on the desires of the user. However, longer experimentation, assembly and disassembly times must be taken into account. The prepared component kits are assembled according to topic and each of them forms a basis for numerous experiments, as documented on the supplied CD-ROM. We especially recommend that this be combined with the NI Multisim circuit simulation software.

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
1	**UniTrain-I Breadboard system with cableset (140 pcs)**	SO4203-2C	1

Breadboard and cable set for the UniTrain-I Experimenter. The breadboard is inserted into the Experimenter and results in a convenient system for experimenting with discrete components or up to 18 integrated circuits.

- Breadboards with 2 x 948 connector sockets, contacts nickel-plated

- Dimensions: L x W x H: 166 x 118 x 9

- Including set of cables in transparent box with 5 compartments, equipped with 140 connector wires with stripped ends in 14 different lengths

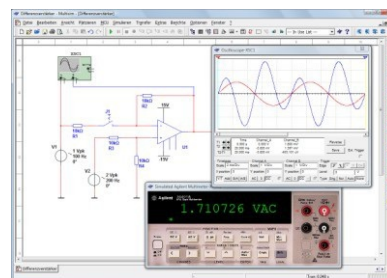- Including 4 x flexible 1mm to 2mm adapter cables, 20cm in length

Multisim from National Instruments is an intuitive software used to model circuitry with functions designed especially for training and educational purposes. Students can use the SPICE-simulation, now reputed to be industry standard for the interactive simulation of electronic circuitry, without having to master the ins and outs of SPICE-syntax and network lists. As such you can focus utterly and completely on the investigation of the circuitry and its behavior. With the assistance of interactive virtual instruments, including oscilloscopes, multimeters and current sensors, students are able to rapidly and easily project and measure circuit properties in a software environment. Multisim contains a comprehensive component database with over 10,000 elements that permits users to experiment on the most varied of circuit topologies in order to become more familiar with the operation of circuits
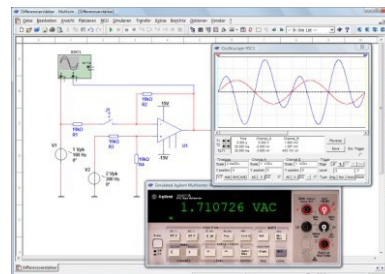
- Intuitive circuit modeling and powerful SPICE-simulation

- Expanded analysis like, e.g. Monte Carlo, temperature sweep, parameter sweep

- Interactive work with virtual instruments, including oscilloscopes, DMMs, function generators, characteristic recorders, etc.

- Database with thousands of models for the virtual realisation of analog and digital circuits

- Virtual plug-in assembly on pin board in 3D-environment prior to implementation in the lab

National Instruments Multisim software is subject to United States export control regulations.

Pos.	Product name	Bestell-Nr.	Anz.
3	**Software, NI Multisim 12, 10 licences (D, GB)**	SO2002-1B	1

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Optional Accessories:

Pos.	Product name	Bestell-Nr.	Anz.
4	**Printed circuit board for self-solderedcircuits**	SO4201-2L	1

On the rastered PCB experiments on individual topic areas the user can assemble circuits using soldered wiring connections (e.g. as soldering exericses).

- Rastered PCB for insertion into the UniTrain-I-Experimenter
- Dimensions: L x W x H: 160 x 100 x 9 mm

List of articles:

Pos.	Product name	Bestell-Nr.	Anz.
5	**UniTrain-I component kit, DC technology**	SO4204-1A	1

Includes:

- CD-ROM with LabSoft and course software
- Documentation on CD-ROM
- 26 resistors, 1 potentiometer, 1 capacitor,
- 1 NTC thermistor, 1 PTC thermistor, 1 LDR, 1 VDR

Course contents:

- Electric circuits/Ohm's law
- Kirchhoff's laws: series and parallel connection of resistors
- Circuits with mixed connection of resistors
- Voltage divider circuits with fixed/variable resistors
- Bridge circuits with resistors
- Applied circuits using NTC and PTC thermistors, VDRs and LDRs

6 UniTrain-I component kit, AC technology   SO4204-1D   1

Includes:

- CD-ROM with LabSoft and course software

- Documentation on CD-ROM

- 13 resistors, 8 capacitors, 6 inductors

- 2 potentiometers, 2 varicap diodes

Course contents:

- Capacitors and inductors in DC circuits

- Resistors, capacitors and inductors in AC circuits

- RC combinations on alternating and square-wave voltages, pulse shaping

- Resonant circuits, series-resonant circuits, parallel-resonant circuits

- Parallel-resonant circuit with variable-capacitance diode tuning

- Filter circuits: high-pass, low-pass and band-pass filters

7 UniTrain-I component kit, rectification   SO4204-1G   1

Includes:

- Documentation on CD-ROM

- 2 load resistors, 4 resistor, 10 capacitors, 9 diodes, 1 inductor

Course contents:

- Half-wave rectifier circuits with and without capacitors

- Bridge rectifiers with and without smoothing

- Investigation of the measurement of arithmetic mean value, rms value, mixed voltage and ripple voltage.

- Use of simple diode circuits for rectification

- Power comparison between half-wave and full-wave rectification

- Voltage doubling with diode circuit

| 8 | **UniTrain-I component kit, transistors as switches** | SO4204-1K | 1 |

Includes:

- Documentation on CD-ROM
- 26 resistors, 7 capacitors, 8 diodes, 6 transistors, 4 push buttons

Course contents:

- Common emitter circuit with/without negative feedback
- Common collector circuit
- Dynamic parameters
- Astable flip-flops
- Bistable flip-flops
- Monostable flip-flops

| 9 | **UniTrain-I component kit, three-phase technology** | SO4204-1N | 1 |

Includes:

- Documentation on CD-ROM
- 12 resistors, 3 capacitors

Course contents:

- Familiarisation with concepts used in three-phase systems
- Measurement of phase and line quantities
- Star and delta connection of loads
- Symmetrical and unsymmetrical loads

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10 UniTrain-I component kit, electronic components   SO4204-2A   1

Includes:

- Documentation on CD-ROM
- 20 resistors, 10 diodes, 2 potentiometers, 5 capacitors
- 1 fork-type light barrier, 1 transistor

Course contents:

- Recording the characteristic curves of silicon, germanium and Zener diodes
- Investigation of conducting and non-conducting states
- Appled circuits such as voltage stabilisation and limiting circuits
- Use of Zener diodes and photodiodes
- Investigation of characteristic and limiting values
- Bipolar transistor in a common emitter circuit
- Bipolar transistor in a common collector circuit

11 UniTrain-I component kit, transistor circuits   SO4204-2D   1

Includes:

- Documentation on CD-ROM
- 30 resistors, 8 transistors, 1 diode
- 7 potentiometers, 8 capacitors

Course contents:

- Common source and common drain circuits with field-effect transistors
- One and two-stage transistor amplifiers
- Differential amplifiers
- Fault simulation
- Constant current source with FET
- Constant current source with bipolar transistor

12 UniTrain-I component kit, operational amplifier circuits   SO4204-2G   1

Includes:

- Documentation on CD-ROM

- 20 resistors, 4 ICs, 6 potentiometers

- 6 capacitors, 2 LEDs, 3 diodes

Course contents:

- Op-amps in inverting and non-inverting modes

- Impedance converters

- Determining the characteristics and limiting values of an operation amplifier

- Comparators

- Schmitt triggers

13 UniTrain-I component kit, signal generation   SO4204-2K   1

Includes:

- Documentation on CD-ROM

- 10 resistors, 3 potentiometers

- 4 ICs, 5 capacitors

Course contents:

- Signal generator with transistor

- Wien bridge oscillator

- Comparators/integrators

- Signal generator with op amp

14 UniTrain-I component kit, basics of digital technology   SO4204-2P   1

Includes:

- Documentation on CD-ROM

- 7 ICs, 4 LEDs, 7 capacitors, 3 resistor networks

Course contents:

- Basic logic elements

- Sequential circuits

- Applied circuits from digital technology

- Design and function of JK flip flops

- Counters and frequency dividers

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15 UniTrain-I component kit, DC motors   SO4204-2Q   1

Includes:

- CD-Rom with Labsoft on CD-ROM

- Permanent magnet, resistor, LED, wire

Course contents:

- Function of a DC-Motor

- Winding of the rotor

- Commutator

- Construction of the stator