About K&H

With superior design and good quality control, K&H MFG. CO., LTD. has offered high-grade educational products to the market since its foundation in 1979 in Taipei, Taiwan. Due to unbeaten track record, K&H has enjoyed a widespread reputation as a manufacturing leader in the educational field in Taiwan. Our product lines have covered widely ranging from breadboard, its accessories, and testing instruments to versatile electronic, electrical, and mechanical training equipment as well as several products with relevant fields, including information technology, telecommunication, network technology, physics, chemistry, and biomedical science.

So far, we have grown into a company of close to 200 employees in Taiwan. We have dedicated ourself to developing educational products, for example using multimedia to create an easy-to-learn, easy-to-understand, and high quality educational environment.

K&H MFG. CO., LTD. has become one of the leading professional manufacturers of educational training equipment in the world. We are making every effort to provide customers the best products with outstanding service continuously.

Scope of Business

- Project Planning
- Project Organization
- Project Implementation
- Training & Maintenance
- School System, Course and Curriculum Development
- Lab Equipment Purchasing, Installation and Testing
- Train the Instructors & Trainers
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Communication and Networking</td>
<td>1</td>
</tr>
<tr>
<td>Communication System</td>
<td>3</td>
</tr>
<tr>
<td>Microcomputer Control Equipment</td>
<td>5</td>
</tr>
<tr>
<td>Electronics Circuits Equipment</td>
<td>9</td>
</tr>
<tr>
<td>Biomedical Measurement Equipment</td>
<td>11</td>
</tr>
<tr>
<td>Industrial Control Equipment</td>
<td>12</td>
</tr>
<tr>
<td>Electrical Machine / Power Electronics</td>
<td>14</td>
</tr>
<tr>
<td>Refrigeration / Air Condition Equipment</td>
<td>15</td>
</tr>
<tr>
<td>Automatic Control Equipment</td>
<td>19</td>
</tr>
<tr>
<td>Autotronics System</td>
<td>22</td>
</tr>
<tr>
<td>Green Energy Equipment</td>
<td>23</td>
</tr>
<tr>
<td>Testing Instrument</td>
<td>25</td>
</tr>
<tr>
<td>Electronic Training Equipment &amp; Breadboard / Accessories</td>
<td>27</td>
</tr>
<tr>
<td>Aviation Training Equipment</td>
<td>32</td>
</tr>
</tbody>
</table>
DGS-200 GSM / GPS Experimental Set

Features
It’s a powerful platform for wireless communication experiments when training and integrating GSM / GPRS with GPS modules, FAX Class1, TCP / IP, NMEA0183, 3GPP TS 27.005 and 3GPP TS 27.007 protocols to be one set.

COS-100 Android APP Experiment Module

Android system, mainly used on mobile devices, is an open source operation system based on Linux kernel. Android APPs, the applications mounted on the Android system, are widely developed and used. COS-100 adopts free and open source Android SDK (Android Software Development Kit), JDK (Java Development Kit) and Eclipse (Integrated Development Environment).

COS-100 offers easy-to-follow courses available for users to learn Android APP development environment setup and Android APP programming. In addition to the introduction for basic principles of the Android development environment, experiments of some of APPs are also designed. Topics included in the course: understanding the Eclipse operating environment, capture of images from a USB UVC camera, discussion of the Android APP version compatibility issues, introduction and application of e-books, application of accelerometer, application of touch panel control. Moreover, ZigBee Transceiver Module and ZigBee Sensor Module are also provided for making experiments.

CIC-700 Lonworks Control Network System

Echelon’s LonWorks control network technology creates a new generation of control network. CIC-700 LonWorks control network training system tries to help students accelerating their steps to catch up this popular trend. It not only helps students to understand the new control network theory but also provides lots of hands on experiments to learn the implementations of the new technology.
Explosive growth in network device diversity and mobile communications, along with global adoption of networking technologies, have overwhelmed IPv4 and have driven the development of a next-generation Internet Protocol (IPv6).

In addition to providing more address space, IPv6 not only increases routing efficiency and network-layer security (built-in the IPSec encryption mechanism) but also creates new ways of addressing and more advanced QoS mechanisms, as the protocol develops.

The design purpose of ITS-200 series is to provide learners with a clear and comprehensive understanding of the protocol and operating behavior of the IPv6 specification. The complete system includes ITS-201(host:client), ITS-202(host:server) and ITS-203(router). The interaction of these three devices can perform experiment as a group or stand alone.
1. The trainer includes modules with experimental circuits. It offers the beginner complete courses of basic analog and digital communication.
2. KL-900A is equipped with power supply and signal unit. Students only have to adopt the oscilloscope to complete various experiments independently.
3. System modularity maximizes flexibility and variety for experimentation, and allows possibility for expansion and customization.

KL-900C AM / FM / ASK / FSK Transmitter & Receiver System

The KL-900C AM/FM/ASK/FSK Transmitter and Receiver System is a comprehensive and self-contained system suitable for carrying out AM/ASK and FM/FSK transmission experiments.

The complete system contains KL-900C1 and KL-900C2, separated by eight modules including:
- AM transmitter & receiver modules
- FM transmitter & receiver modules
- ASK/AM transmitter & receiver modules
- FSK/FSK transmitter & receiver modules

KL-900D Fiber-Optic Transmission Training System

Fiber-Optic communication is one of the most popular technologies in the modern days due to its high transfer speed and large capacity. KL-900D uses fiber optic as a transmission media for the whole experiment.

Four different data transmission ways (self module transmission, module-to-module transmission, PC-to-module transmission and module-to-PC transmission) and various different modulation / demodulation methods (CVSD, ASK, etc.) are introduced in the training system. Users can obtain a very clear view of how fiber-optic transmission works.
KL-910 Advanced Communication System

Features
1. Essential theories and techniques in modern communication system includes digital encoding/decoding techniques, various digital serial ports, DTMF signal system, ASK/FSK/QPSK/TDM/PAM/FDM modulation/demodulation and filters…etc.
2. KL-910 offers users not only the comprehensive experiments of advanced communication system but also various peripherals including analog/digital function generator, frequency meter, and V-F converter…etc. All of the experiments are carried out appropriately with the help of oscilloscope, spectrum analyzer and logic analyzer.

KL-900E Near Field Communication (NFC) Trainer

Features
1. 8 antenna modules
2. Adjustable antenna module holder
3. LED / LCD / BUTTON user interface
4. Standard NFC SOC Module
5. Mifare S50 card and Ultralight card
6. NDEF, NDEF vCard and P2P data transmission…etc
7. Complete learning experimental instrument that cover NFC physical to application layer

KL-920 Advanced Digital Communication System

Features
1. Complete digital transmitting data format including start bit, preamble, identifier, data with FEC coding, CRC coding, and stop bit.
2. All digital transmitting data are encoded with Manchester code before transmitting via ASK or FSK modulator.
3. Programmable data, data rate, preamble, identifier, and noise from DIP switches
4. FEC encoding, CRC mechanism, and Manchester coding can be included or ignored before wireless ISM transmission.
5. Transmit and receive 3 sets of audio signals in TDMA channel via STS-1 and STM-1 frame
6. Dual channel TDM transmission with audio signal modulated by PCM or A-Law/μ -Law compander

EMC-100 EMI Training System

Features
EMC-100 contains two parts. One is the measurement instrument which is equipped with function of measuring electromagnetic interference (EMI), including conductivity of electromagnetic interference and radiated electromagnetic interference. It provides products electromagnetic interference verification before inspection. The other part is the training modules which allow students to implement the experiments easily and learn the basic concepts of electromagnetic interference and suppression countermeasure. Beginners are able to learn electromagnetic interference theories, measurement and suppression techniques as being an EMC engineer.
MTS-Z80A helps students to understand the architecture and programming of Z-80 computer. The system contains five main parts: (1) a Z-80 CPU (2) system and user memory (3) world standard chip sets (4) input and output devices, and (5) external interface.

Students edit and make a assembly program codes from PC and observe instant results after they download and execute programs from system memory. Debug functions are also available via PC or system keypad interface.

MTS-86C helps students to understand the architecture and programming of 8086 computer. The system contains five main parts: (1) an 8086 CPU (2) system and user memory (3) world standard chip sets (4) input and output devices, and (5) external interface.

Students edit and make a assembly program codes from PC and observe instant results after they download and execute programs from system memory. Debug functions are also available via PC or system keypad interface.

MTS-33T allows students to carry out 3 types of micromouse experiments on a lab table individually including wall maze solver, line maze solver, and line follower. With provided maze wall, post, and line track pad, students can setup corresponding experiment environments efficiently and flexibly.

Learning MCU programming for micromouse is an important course topic on MTS-33T. Students can see the behavior of micromouse instantly after MCU code is programmed, downloaded and executed.

The provided simulation software allows students to create the map of line maze and wall maze so as to observe how micromouse solves the maze.

8051 is the original chip of MTS-51 family devices which is originated from Intel. This chip is a stand-alone, powerful 8-bit single-chip microcomputer and is commonly used for real-time control applications. MTS-51 microcomputer trainer is designed for learning 8051 core architecture and instructions.

MTS-52 ICE (Option)
1. 32K byte In-Circuit-Emulator
2. Toggle break point
3. Step into / step over
4. Full run
5. Register & memory editor
MTS-100 Tutor For Arduino

MTS-100 is the most powerful training system of Arduino. This system contains most popular sensors and input / output modules. Such as wifi/Bluetooth/Temperature sensor / Servo motor / Stepper motor / LCDs…etc

Students can program the Arduino code from PC and observe instant result after they upload code to Arduino main board. More than thirty example code and teaching materials are available.

MTS-887 PIC16F Training Lab

MTS-887 PIC16F Training Lab which uses Microchip’s PIC16F887 is a 8-bit microcontroller to implement various I/O control experiments. This controller contains most of the powerful functions in modern MCUs nowadays. Moreover, it can be used for automation, motor control, device measurement, and mechanical controls…etc. PIC16F is popular and well-known due to its economic cost, wide applicability, high accessibility and reliable stability.

MTS-887 contains several peripheral devices from basic LED to advanced capacitive sensing module. The integration of these devices enable end users to create and implement different kind of control experiments. Together with our user friendly experiment manual, end users can learn the control of PIC MCU more conveniently and efficiently.

LV-200 LabVIEW™ I/O Interface Lab

LV-200 LabVIEW™ I/O Interface Lab is a platform of hardware / software development. It offers a variety of I/O and peripheral devices used in real life and adopts National Instruments LabVIEW™ (G programming language) as development software. Data transfer between LV-200 Lab and computer is performed via USB interface. LV-200 also provides a comprehensive Experiment Manual which describes the operation of I/O circuits and peripheral devices as well as the programming of control programs (Virtual Instruments) using G programming language.

MTS-54 MSP430 Training Lab

MSP430 training lab is a training platform designed for learning MSP430 microcontroller from Texas Instruments (TI). The microcontroller used is MSP430F5438A, which is featured with ultralow-power and consists of several peripheral modules targeted for various analog and digital applications.

This trainer integrates various I/O devices. It’s available for several application examples, ranging from basic I/O control to advanced topics. Users will be able to learn the control of MSP430 chip in more efficient way.
CIC-310 CPLD / FPGA Prototyping Board

**Features**
1. Atmel ATF1508-15 CPLD chip, compatible with Altera MAX 7128, contains 128 microcells over 2500 usable gates which is able to reprogram over 10k times.
2. Adopting Altera MAX+PLUS II for chip development, users can use graphic or text editor (HDL syntax) to design, simulate and implement digital circuit easily.
3. The program is downloaded from PC to CPLD chip via series port with JTAG technology.
4. Provide some simple I/Os for design efficiency
5. Reserve large hardware design area best for circuit prototyping and student project implementation
6. Best solution for the shortages of budget

CI-33001C CPLD / FPGA Development System

**Features**
1. FPGA (FLEX 8000) download board (84pin)
2. I/O experiments board
3. MAX+PLUS II development software (student version)
4. Program manager software for program download and In-System-Programming
5. Experiment manual

CI-33004 CPLD / FPGA Experiment Board

**Features**
1. Atmel ATF1504-15 CPLD chip, compatible with Altera MAX 7064, contains 64 microcells over 1000 usable gates which is able to reprogram about 10k times.
2. Adopting Altera MAX+PLUS II for chip development, users can use graphic or text editor (HDL syntax) to design, simulate and implement digital circuit easily.
3. The program is downloaded from PC to CPLD chip via series port with JTAG technology.
4. Provide some simple I/Os for design efficiency
5. Suitable for new FPGA designers
6. Best solution for the shortages of budget

CIC-310 CPLD / FPGA Development System

CIC-310 CPLD/FPGA Development System is self-contained system which contains stabilized DC power supplies, Development Board and Experiment Board. CIC-310 also provides digital system designers for hardware verification which enables students to learn digital system design efficiently.

**Features**
1. FPGA (FLEX 8000) download board (84pin)
2. I/O experiments board
3. MAX+PLUS II development software (student version)
4. Program manager software for program download and In-System-Programming
5. Experiment manual

CIC-560 Advanced FPGA Development System

**Features**
1. CIC-560 is well equipped for complex digital circuit design.
2. It provides AD/DA converter, keypad, LCD display, PS/2, VGA, UART, SCI interface, LEDs, 8-digit 7-segment LED display, step motor and DC motor driver circuits.
3. Suitable for the curriculum training in electronics, electrical engineering, information, communication and automation field
4. Ideal for professional IC designers, R&D engineers, undergraduate and graduate students to learn IC design and software development
5. Develop and verify basic and advanced digital circuit, digital signal processing and CPU / MCU with large-element and multi-pin FPGA chip
CIC-910A  PSoC Training Lab

Features
CIC-910A adopts Cypress chip Cy8c27443 (28 pins) powerful Harvard architecture processor with following specialized features:
1. M8C processor speed up to 24 MHz
2. Provide 12 analog and 8 digital PSoC blocks
3. 16K bytes flash program storage with 50,000 erase/write cycles
4. 256 bytes SRAM data storage
5. Making the best trade-offs between price and performance

CIC-800A  Interface Lab

An interface is a hardware and software data transmission regulator that controls data exchange between the PC and other peripheral devices, including RS-232C, AT-BUS, IDE, SCSI, ISA, PCI, AGP, IrDA, GPIB, USB, IEEE-1394, Wireless etc...

Each interface device inherits different specifications such as transmission rate, data format, protocol and applications. Accordingly, learners can familiarize themselves with each kind of interface devices.

CIC-800A contains multi-purpose interfaces modules, inclusive of serial port (RS-232C), parallel port (Centronics) and universal serial bus (USB2.0) that can be used for various peripheral devices. Add-on modules are available for experiment purpose. The RS-232C and centronics interface firmware adopt Atmel’s chipset modules, and use Microsoft visual C++ 6.0 as developing tools.

The USB 2.0 interface firmware adopts Cypress’s chipset modules, and uses Microsoft visual C++ 6.0 as developing tools. By learning traditional and popular interfaces, users can reap the benefits. Additionally, we also provide source codes and execution files for further studying.
KL-100 Electric Circuit Lab

The KL-100 Linear Circuits Lab (1) Electric Circuits Lab is a comprehensive and self-contained system suitable for tuition and experimentation with electric circuits.

All the necessary equipment for electric circuit experiments such as power supply, function generator, analog and digital meters are installed on the main unit.

The 11 modules cover a wide variety of essential topics for electric circuit. It is indeed a time and cost saver for both students and engineers interested in training, developing and testing prototype circuits.

KL-200 Electronic Circuit Lab

Features
1. Ideal for electronic circuit experiments and design exercises
2. Integrated experimental circuit and trainer with comprehensive experiment curriculum
3. Supply complete training device with easy and effective for experiments
4. With universal breadboard for circuit designing and prototypes
5. All modules equipped with an 8-bit DIP switch for fault simulations
6. Individual keeping case of all modules for easy carrying and storage facilities

KL-210 Basic Electrical / Electronic Circuit Lab

KL-210 Basic Electrical / Electronic Circuit Lab is ideal for electrical, mechanical, automotive, science, civil & electronics engineering learning.

All the necessary equipment for electric circuit experiments such as power supply, function generator, analog and digital meters are installed on the main unit for the requirement of experiment.

The whole essential topics of electrical circuit learning are studied by different modules.
The KL-310 Advanced Digital Logic Lab is designed for students and engineers interested in developing and testing prototype circuits. The lab includes combinational logic, sequential logic, memory, ADC/DAC, experiment circuits and offers several application circuits (PWM, timer, motor control, etc.).

All the necessary equipment for digital logic experiments such as power supply, clock generator, switches, displays are built-in on the main unit. The lab has 10 experiment modules and one CPLD & breadboard experiment module.

i de@Lab-200 is a digitized based training system, which utilizes integrated Hardware Platform, Experimental Modules and Software Platform to help students to learn various electronic based subjects. Hardware Platform is composed of multiple measuring instruments such as digital storage oscilloscope, logic analyzer, frequency synthesizer, digital multi-meters and programmable power supply as well as output display unit. Experimental Modules contain versatile electronic based topics for students to carry out, including basic electricity, electronic circuits and digital logic circuits.
KL-710 Biomedical Measurement Data Acquisition System

Features
The major software allows you to edit data and control the experiment process appearing on the screen. It performs four general functions:

1. Control the data acquisition process including the analog input, analog output, digital input, digital output and trigger start.
2. Perform real-time calculation including the math functions, digital filter, wave analysis, rate detection and power spectrum.
3. Perform off-line analysis including the statistics, math functions, wave analysis, rate detection and power spectrum.
4. There are various types for saving data.

KL-730 Biomedical Measurement Training System

Features

2. The sensors and transducers used in this equipment include pressure transducer, infrared photocoupler, strain gauge, temperature sensor, surface electrode, dual element transducer and pneumotach transducer.
3. Each module has many test points for changing the frequency bandwidth and amplifier gain. Thus students can understand the correlation between physiological signal and each circuit stage.
KL-500 Industrial Electronic Trainer

The KL-500 Industrial Electronic Trainer is a self-contained training equipment allowing students to learn more than 70 experiments through a power supply unit and 16 replaceable modules.

Various types of industrial electronic devices, such as UJT, PUT, SCR, SCS, DIAC, TRIAC, JFET, MOSFET, IGBT are introduced in this system. For each device, students are able to learn its characteristic, trigger circuit. Moreover, application circuits provide students a comprehensive understanding of related knowledge in this technology field.

KL-600 Advanced Sensor Experimental System

The KL-600 Advanced Sensor Experimental System is a comprehensive sensor / transducer control training system that incorporates industrial-grade components with various control circuits and load units. Its modular and closed-loop control circuits allow implementation of open-ended, individual control loops used in industrial applications.

The KL-600 uses only industrial-standard sensors / transducers (0–10V, 4–20mA) with USB interface.

KL-620 Basic Sensor Experimental Lab

The KL-620 Basic Sensor Experimental Lab is a comprehensive sensor / transducer control training system. Its modular and closed-loop control circuits allow implementation of open-ended, individual control loops used in industrial applications.

The KL-620 uses only industrial-standard sensors / transducers (0–10V, 4–20mA) with USB interface.
ACS-1000 Analog Control System

ACS-1000, covered with many technical disciplines, explicates the central significance of Analog Control System. It applies particularly in mechanical and electrical engineering, and as well in production and process technology. It is indispensable to plant and system technology.

In the automation field, important optimization tasks would be quite impossible to be accomplished without closed-loop control technology. In line with its increasing importance, closed-loop control has become an essential subject in professional training and further education for many professions.

In the newly formulated training curriculum, this technology plays an important role covering a number of subjects in syllabuses for training in industry and the crafts.

KL-630 MEMS Training System

MEMS (Micro-electromechanical Systems) based sensors such as accelerometer, gyroscope and magnetometer are crucial components used in smart portable devices, like smart phone and tablet PC. The demand of MEMS sensors has been increased dramatically and identified as one of the most promising technologies nowadays.

K&H develop world’s first series of MEMS-based training system to facilitate students learning various MEMS functions and applications more systemically. 4 different types of MEMS based sensors are introduced in this training system, including 3-axis accelerometer, 3-axis gyroscope, barometer and magnetometer. To ensure quality results for experiment, module with XYZ-Axis Rotation Stand is specially designed to carry out three-dimensional motion experiments with operation of accelerometer and gyroscope module.
The electrical machines system leads students to distinguish the mechanical similarity and difference among all electrical machinery.

Students study and turn all kind of electrical machinery into circuit models for the foundation. Moreover, it enhances students ability for further application and control. Besides facilitating teaching, it makes students be familiar with a different kind of electrical mechanical test.

Cutaway models are made from normal electrical machines. The stator is cut away by 1/4 over the entire length to enable an optimum view of the internal construction of the machine and it is still operating. The cutaway surfaces are protected against corrosion.

<table>
<thead>
<tr>
<th>EM-3350 Cutaway Model of Electrical Machine</th>
</tr>
</thead>
</table>

Cutaway models are made from normal electrical machines. The stator is cut away by 1/4 over the entire length to enable an optimum view of the internal construction of the machine and it is still operating. The cutaway surfaces are protected against corrosion.

- DC Permanent-magnet Motor (EM-3350-1A)
- Single-phase Induction Motor (EM-3350-1C)
- DC Shunt Wound Motor (EM-3350-1D)
- DC Compound Wound Motor (EM-3350-1F)
- Three-phase Synchronous Motor (EM-3350-3A)
- Three-phase Rotor Winding Motor (EM-3350-3B)
- Three-phase Squirrel Cage Motor (EM-3350-3C)

EM-3360 AC Induction Motor Winding Training System

<table>
<thead>
<tr>
<th>PE-5000 Power Electronics Training System</th>
</tr>
</thead>
</table>

The PE-5000 is the combination of power, electronics, and control. It has a wide applications of solid-state electronics for the control and conversion of electric power. Popular circuits of power electronics contain rectifiers, choppers and inverter.

The experimental for PE-5000 modules includes converter, power supply, load, control and testing modules. These experimental modules and instruments will be introduced and demonstrated in the subsequent experiments.
KR-101 Refrigerator Model Training System

Features
1. The major elements of the refrigeration system are open for the purpose of best observation, including condenser, compressor, evaporator, capillary tube, filter and drier.
2. The system contains various electronic components and their symbols located at the front panel allowing students to use 4mm safety plug cables to construct the control circuit of the refrigeration system.
3. The control circuit of the refrigeration system are made of following electronic devices: system fuse, fan indicator, evaporator door switch...etc.
4. The system includes high pressure gauge, low pressure gauge, AC Voltmeter, AC Ammeter and temperature meter which are located at the front panel allowing students to record the status of the components during operation.
5. The refrigerant path for high pressure tube is painted red and low one blue.
6. Teacher board allows teacher to quick demonstrate the operation of the refrigeration system needless constructing the control circuits.

KR-102 Refrigerator Training System

The design principle of KR-102 is to train students the refrigerator circuit, system processing, welding copper tube, and other related skills. This device uses the actual fridge modification, and with installation by safety plug / terminals. There are three low pressure and one high pressure manual valves from the system for convenience of welding and refrigeration process exercises.

KR-270 Automotive Air Conditioner Training System

The structure of KR-270 is based on a real air conditioner of an automotive system. The evaporator is protected by plastic acrylic so that students can easily observe the internal structure of the evaporator. It also allows students to safely observe how fan door switches the function of air conditioner between cooler and heater when the system is operating.

The system adopts a three phase motor with varied speed to simulate the function of the engine so as to drive the air compressor. The circulating water originally heated by hot engine for heater application is completed by an Integrated heating coil.
KR-105 Compressor Training System

Trainees can wire the circuit of compressor personally using KR-105. Two start-up methods (current-mode and PTC) are provided in this training system. Trainees can measure and observe the signals on terminals in the start-up circuit to comprehend its operating principle. In addition, the trainer consists of a real refrigeration system. Hence, the start-up circuit can drive a real compressor when the wiring is completed. High / Low pressure gauges and voltage / current meters are embedded in front panel. The copper tubes in the system have apertures for users to measure the temperature. Each component in the system is fixed individually. A transparent acrylic cover offered can protect the components and make trainees observe the component’s structure clearly. Two fans are installed on the evaporator and the condenser respectively for adjusting evaporation and condensing conditions, which makes experiments diversified.

KR-112 Mini Ice Plant Training System

- **Features**
  1. Modern mini ice plant system, an ideal solution to understand different freezing methods (ex: ice transparency) relative to industrial level. (Air compressor is optional and locally prepared)
  2. Study the brine cycle refrigeration operation
  3. Study variable factors of Brines concentration adjustment and its influence to different frozen objects.
  4. Study the components structure and principles of ice-making system
  5. Adopting an industrial way of ice-making, KR-112 is able to produce real ice maximum 40 x 20 x 20cm.
  6. Water cooling by self-designed transparent cooling tower, which provides different fan speed, can simulate and observe the effect of heat rejection caused by environment variation.
  7. System is controlled by Human Machine Interface, PLC control or traditional switch which are optional, alternatives.

KR-351 Chilled Water Refrigeration System Control Trainer

- **Features**
  1. The commonly-used control components of chilled water unit are mounted on the panel layout for easy learning.
  2. The input vapor-pressure, which is divided into 3 mimic pressures like low-pressure, high-pressure and oil pressure, can be used and adjusted separately so the learner would have clearer understanding of functionality of each component accordingly.
**KR-115 Refrigeration Cycle and Heat Pump System**

KR-115 is designed to learn the theory of Heat Transfer in refrigeration engineering. With proper setup, KR-115 can be emulated as a Refrigeration or Heat Pump system. All system components are mounted on the front panel so students can directly observe, touch the components, and hear the noise produced by the components while it is running under either Refrigeration or Heat Pump cycle.

KR-115 offers three expansion devices available for the refrigerant to pass through; they are pressure expansion valve, capillary tube, and thermal expansion valve. Students can use the control panel to switch the preferred expanding path from three expansion devices and compare the corresponding performance under Refrigeration or Heat Pump cycle.

The state of the refrigerant can be clearly observed through 6 sight glasses at different phases of the Refrigeration / Heat Pump cycle. 5 hand valves are used to manually control the flowing direction of the refrigerant circulating through the system. Student must use the valves to lead the refrigerant to the appropriate flowing direction so that the system can operate in corresponding cooling / heating condition. If students mislead the refrigerant to wrong flowing direction, the pressure protection switches will detect the conflict and halt the compressor to prevent the system from being damaged.

**KR-201 Air Conditioner Training System**

The main composition of KR-201 is a window type air conditioner just like real one in our daily life. What makes it special is that students are able to observe the operation of the internal components and the state of the refrigerant while the air conditioner is running.

From the front panel, there are four refrigerant sight glasses, which provide students an excellent view to observe the state of the refrigerant before and after passing through four major elements Compressor, Condenser, Capillary Tube, and Evaporator.

Students can also use built-in gauges/meters to draw the Mollier diagram and so as to understand the performance of this air conditioner. Combining the observation of refrigerant state during different phase of the refrigeration cycle, KR-201 helps students to understand the operating principle of the window type air conditioner easier and faster.
### KR-221 Packaged Air Conditioner Training System

#### Features

1. The Packaged Air Conditioner Training System used is the same equipment as that of market one, teaching and market no gap.
2. Designed to facilitate the operation of the overall equipment at a glance, so you can clearly see the water pipe connection and make the students understand the direction of water flow and how to use the water pump.
3. There are flow meters and thermometers in the water pipe line, students can understand the water flow situation from the data in the state and analyze the operation of the state.
4. Designed to bring together devices that were originally installed around the building to make teaching easier and convenient for teachers to interpret the system, the trainees are more likely to understand the relevance of each device and can easily move their equipment.
5. The connection lines are extended to the front panel for easy practice and a clear understanding of how the board is connected to the line.

### KR-212 Single-Split Type Cooling / Heating Air Conditioner Training System

Due to its reducing level of indoor noise and high flexibility of installation, Split Type Air Conditioner becomes more and more popular in nowadays. KR-212 itself is a real split type air conditioner especially designed for teaching purpose. Both indoor and outdoor units are installed on the demonstration stand so students can learn the operating principle of both units at the same time. User can easily observe and record the behavior of both units while running under different setup by remote controller such as temperature, fan speed, or operating mode (cooler, heater, dehumidifier...)

Four valves are intentionally designed to be located at the front panel of the demonstration stand to allow students handily install the connection pipes (gas pipe and liquid pipe) between indoor and outdoor units. This helps students further to realize how Indoor and Outdoor Units cooperate with each other as well as to understand the refrigerant path during its circulation cycle.

Students can use the built-in gauges / meters and additional measurement tools to record the experimental data and further to draw the Psychrometric Chart and Mollier Diagram so as to understand the performance of this air conditioner.
### PLC-100
Programmable Logic Controller (FATEK PLC) Trainer

#### Features
1. Input-simulation switches function as level and pulse input for different input signal
2. Installation of output relay helps to increase load current
3. Easy-to-use, windows-based development software
4. With various peripheral devices and other devices that support external extensions, it particularly suits laboratory experiment and project implementation
5. Equipped with various simulations I/O devices for the convenience of studying and observing the results
6. Use 4mm safety sockets input/output terminals to ensure the physical safety of users
7. Easy to carry, move and store with a suitcase design

### PLC-200
Programmable Logic Controller (SIEMENS S7-200) Trainer

#### Features
1. Input-simulation switches function as level and pulse input for different input signal
2. Installation of output relay helps to increase load current
3. Easy-to-use, windows-based development software
4. With various peripheral devices and other devices that support external extensions, it particularly suits laboratory experiment and project implementation.
5. Equipped with various simulations I/O devices for studying and observing the results
6. Use 4mm safety sockets Input / Output terminals to ensure users physical safety
7. Easy to carry, move and store with a suitcase design

### PLC-210
Programmable Logic Controller (SIEMENS S7-300) Trainer

Since PLC (Programmable Logic Controller) was first introduced in 1970, it has been widely applied to various industrial uses such as machine and process controls. Designed with the latest microprocessor and electronic circuitry, today’s compact-size PLCs are commonly adopted. Besides highly reliable, modularized, user friendly, it’s with features of anti-electromagnetic interference and network connection.

The use of PLCs in automated production lines enhances system reliability, product quality, information sharing, efficiency and flexibility and thus reduces costs. PLC-210 is a self-contained trainer which consists of a SIEMENS PLC main unit and commonly used I/O devices for simulation. It offers students excellent theories and wide applications of programmable logic controllers. The trainer enables students to learn step by step from the fundamentals of PLC to more advanced controls used in the industry.

### PLC-310
Programmable Logic Controller (MITSUBISHI PLC) Trainer

Since PLC (Programmable Logic Controller) was first introduced in 1970, it has been widely applied to various industrial uses such as machine and process controls. Designed with the latest microprocessor and electronic circuitry, today’s compact-size PLCs provide the features of high reliability, high performance, high speed and networking. The use of PLCs in automated production lines improves system reliability, product quality, information sharing, efficiency and flexibility and thus reduces costs. PLC-310 is a self-contained trainer which consists of a MITSUBISHI PLC main unit, I/O devices for simulation and I/O devices that are commonly used. It provides students with a thorough understanding of the theories and applications of programmable logic controllers. The trainer enables students to learn step by step the fundamentals of PLC and more advanced controls used in industry.
It is well known that “Factory Automation” is an indispensable measure to reduce labor cost, improve production efficiency and achieve higher product quality. However, it is widely adopted by electronic, semiconductor, LCD and mechanical factories. In factory automation, “air pressuring” plays a very essential and critical role.

The “PS-1000” is launched to offer enriched knowledge from basic air pressure components, advanced air-pressure loop design to PLC-based electrical control system. The trainee can be upgraded to high-level automation engineer with the help of the “PS-1000” trainer system.
Since PLC (Programmable Logic Controller) was first introduced in 1970, it has been widely applied to various industrial uses such as machine and process controls.

The Modular Production System stations allow varying simulation of real production processes that exist in industry field. The system is universal, industry-based, modular and flexible for further expansion. Students can learn the entire process of production such as feeding, processing, etc...

Each station simplifies the training of operation and can be expanded sequentially step by step through building complex automated procedure.

It is well known that "Factory Automation" is an indispensable measure to reduce labor cost, improve production efficiency and achieve higher product quality. However, it is widely adopted by electronic, semiconductor, LCD and mechanical factories. In factory automation, oil pressuring" plays a very essential and critical role.

The "HS-2000" is launched to offer enriched knowledge from basic oil pressure components, advanced oil-pressure loop design to PLC-based electrical control system. The trainee can be upgraded to high-level automation engineer with the help of the "HS-2000" trainer system.
KL-800 Autotronic Training System

Interactive Computerized Automotive System

The whole system has been modularized to provide electronic and automotive courses with step-by-step experiments on educational technology training.

All theoretical, experimental and practical learning procedures are supported by personal computer assisted supervision and dedicated software.

The KL-800 can simulate the operation of fuel injection system, ignition system, and the control of exhaust gas, etc. Experiments include the characteristics, and operation of various sensors and actuators, monitored by microprocessor on the main unit.

Features
1. 89S51 computer interface monitor control
2. Data of fuel injection, ignition and exhaust gas can be acquired and monitored by computer.
3. Can be assembled as the injection system
4. With trouble-shooting simulation function
5. Switch-off input / output function when trouble-shooting is made

KL-800A CAN BUS Autotronic Training System

The KL-800A CAN BUS Autotronic Training System is a distributed control system supported by advanced serial bus system CAN (Controller Area Network). CAN is a multi-master bus with an open, linear structure with one bus line and equal nodes. The number of nodes is not limited by the protocol.

Each module of KL-800A system is an ECU or the interoperable device (node) on CAN BUS. Data transfer between modules is achieved by the micro - controllers over CAN BUS. When signals and data are sent to a personal computer, the computer monitoring system displays the current status and data of module on PC screen and turns on the warning light if something is wrong.

The KL-800A system can simulate the operation of fuel injection system, ignition system and exhaust gas control. Experiments include the characteristics and operation of various sensors and actuators used in automobiles.
**GES-100 Solar Cell Trainer**

The GES-100 Solar Cell Trainer is an easy and self-contained trainer designed for learning the basic configuration and characteristics of a solar cell.

Through the use of different irradiations for various load units, students study the photoelectric effect of solar cells and plot the current-voltage curve as well as charging / discharging curves.

---

**GES-300 H₂/O₂ Fuel Cell Trainer**

- **Features**
  1. GES-300 is a basic trainer of the Proton Exchange Membrane Fuel Cell (PEMFC).
  2. Open system configuration with modulized-design elements
  3. Understand the combination of water by electrolysis
  4. The voltage and current can be measured.
  5. A complete fuel cell database can be constructed for study, research and development.
  6. The brightness of the simulated sunlight is adjustable.

---

**GFC-6100 Fuel Cell Electric Vehicle Training System**

A Fuel Cell Electric Vehicle (FCEV) is a hydrogen vehicle which produces electricity to power. Its on-board electric motor uses hydrogen fuel cell. It provides an effective solution saving natural resource and alleviating environmental pollution. In the progress of fuel cell technology, the importance of the topics such as how to use fuel cell in an electric vehicle system and how to integrate fuel cell control with other subsystems has been enhanced. GFC-6100 Fuel Cell Electric Vehicle Training System is designed to demonstrate the application of fuel cells onto electric vehicles, including the FCEV mechanism, fuel cell system, hydrogen supply system, and motor controller.
Green Energy Equipment

GES-200  Wind Energy Trainer

The GES-200 Wind Energy Trainer is an easy and self-contained trainer designed for learning the basics and characteristics of wind energy.

The current-voltage characteristic curves and charging / discharging curves are obtained through the use of different wind speeds, load units and wind generators.

GES-500  Wind and Solar Hybrid System

GES-500 (Wind and Solar Hybrid System) is composed of Solar Panel, Battery Bank Module, MPPT Solar Charging Controller Module, DC-AC Inverter Module, Grid-tie Inverter Module, Wind Generator Set, Wind Energy Monitor Module, Three-phase Rectifier Module, Wind and Solar Hybrid Controller Module, Load Module and Meters. By means of combining all these control systems, a teaching platform for implementation of the wind power, solar power and hybrid experiments is presented. It can help students understand the theory of on-grid and off-grid solar power, wind power generation system, hybrid system and further create practical applications.

GFC-3100  PEM Fuel Cell Hybrid Training System

Features

1. An open system architecture & a flexible panel designed for easy replacement of parts
2. A specific fuel-cell database provided for learning and R&D application
3. Data can be displayed and stored in the software
4. Real-time operation status of the system can be observed using a digital meter
5. Safety plugs are equipped with all the input and output terminals for the purpose of easy and safe connection during experiments.
6. Polarity reversal protection is provided to prevent damage from reverse polarity of the supply voltage.
7. An effective and efficient solutions are provided for the fundamental learning of hydrogen PEM fuel cells, the method for storing hydrogen, and related safety norms.
KI-3020A  Semiconductor Curve Tracer

Curve tracing on a scope could be made easily by KI-3020A However, only a Sync. oscilloscope is required. Characteristic curves of all types of semiconductor-transistor such as FET, diodes, zener diode, SCR, TRIAC, DIAC, UJT etc, are accurately displayed. By examining these curves you can determine all of the operating characteristics of the device you are testing including gain ($\beta$), cutoff current, leakage current, output admittance and any other measurable specifications. It is far superior to the general transistor tester for checking quality. Uniquely, it is intended for testing semiconductors in production line and lab as well as making troubleshooting by technicians.

KI-3020D  Digitized Semiconductor Curve Tracer

KI-3020D is designed to create a digital curve for testing 2-pin / 3-pin semiconductor devices, such as Diodes, NPN/PNP Transistors, FET, IGBT, UJT, SCR, TRIAC, etc... All results are displayed on built-in TFT LCD screen needless additional oscilloscope or PC. It also provides the touchscreen for intuitive manipulation—simply touchscreen buttons to set up desired measuring conditions, including device type, voltage bias, or current steps, etc...

Two sets of the testing socket are available for users to switch between two devices for rapidly test and comparison. All captured curve data can be displayed on LCD screen and saved in PC.

KH-LPT80  Portable Interactive Device

Compatible with a projector, KH-LPT80 makes a display interactive and brings smooth writing and drawing experience to the new display area.

- Adjustable and portable
- For 46”~80” display
- Easy installation and quick calibration

※ Best solution is supported by a short throw projector.
※ The whiteboard and projector are not included.
DPS-1000 Series Dual DC Power Supply

DF-600 Differential Active Probe

DF-600 Differential Active Probe is a high input impedance and low input capacitance probe that is compatible with any 50Ω input oscilloscope and provides both Differential and Single-Ended measurement modes. The user can use attenuator switch to select the desired attenuation upon measurement needs.

TB-1000 Training Bench

Order Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Output Voltage</th>
<th>Output Current</th>
<th>N.W(kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPS-1303A</td>
<td>0~± 30V</td>
<td>3A</td>
<td>11.6kg</td>
</tr>
<tr>
<td>DPS-1306A</td>
<td>0~± 30V</td>
<td>6A</td>
<td>13.6kg</td>
</tr>
<tr>
<td>DPS-1603A</td>
<td>0~± 60V</td>
<td>3A</td>
<td>13.6kg</td>
</tr>
<tr>
<td>DPS-1303D</td>
<td>0~± 30V</td>
<td>3A</td>
<td>12kg</td>
</tr>
<tr>
<td>DPS-1306D</td>
<td>0~± 30V</td>
<td>6A</td>
<td>14kg</td>
</tr>
<tr>
<td>DPS-1603D</td>
<td>0~± 60V</td>
<td>3A</td>
<td>14kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Output Voltage</th>
<th>Output Current</th>
<th>N.W(kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPS-1303AF</td>
<td>0~± 30V</td>
<td>3A</td>
<td>13kg</td>
</tr>
<tr>
<td>DPS-1306AF</td>
<td>0~± 30V</td>
<td>6A</td>
<td>15kg</td>
</tr>
<tr>
<td>DPS-1603AF</td>
<td>0~± 60V</td>
<td>3A</td>
<td>15kg</td>
</tr>
<tr>
<td>DPS-1303DF</td>
<td>0~± 30V</td>
<td>3A</td>
<td>13.2kg</td>
</tr>
<tr>
<td>DPS-1306DF</td>
<td>0~± 30V</td>
<td>6A</td>
<td>15.2kg</td>
</tr>
<tr>
<td>DPS-1603DF</td>
<td>0~± 60V</td>
<td>3A</td>
<td>15.2kg</td>
</tr>
</tbody>
</table>

Dimension(H×W×L) : 133 x 300 x 345(m/m)
Electronic Training Equipment & Breadboard
/ Accessories

- **AD Series**
- **UIB Universal Interface Breadboard**
- **GL Series**
- **RH Series & KH-102**
- **SD Series**
- **PSB-01 AC/DC Power Supply**

- **Test Leads**
- **MB-85 with PLCC Test Board**
- **LA-60 Breadboard for Brick, ARDUINO**

- With Built-In Short-Proof Regulated Power Supply
  1. Power switch with lamp
  2. Just plug in and start to use
  3. Compact and light-weighted
  4. For both digital / analog circuits

For Breadboard

1. Power switch with lamp
2. Just plug in and start to use
3. Compact and light-weighted
4. For both digital / analog circuits
Electronic Training Equipment & Breadboard / Accessories

- Logic Probe
  - LP-2800
  - LP-3500

- Logic Pulser
  - LP-540H

- Logic Probe & Pulser
  - LP-2001
  - LP-1001

- SY-805
  - Computer Servicing Tool Kit(1)

- SY-703
  - Computer Servicing Tool Kit(2)

- SY-815
  - Computer Servicing Tool Kit(3)

- SY-9457
  - Computer Servicing Tool Kit(4)
Electronic Training Equipment & Breadboard / Accessories

- **Universal Project & Potting Box**
  - Universal Project Box (PX Series)
  - Potting Case (AX Series)
  - Potting Case (BX Series)
  - Circuit Box (CB-01)
  - Project Case (DX-01)
  - Project Case (EX-01)
  - Hand Held Cases
  - Universal PC Board

- **IC Test Clips**
- **IC Tools**
  - PB-16 DIP IC Extractor
  - ICS-01 IC Straightener
  - ICP-20 IC Puller
  - GX-8 PLCC Extractor

- **Breadboarding & Accessories**
  - KS-350
  - SWS-01
  - SWS-02
  - SWS-03
  - KLH-0.5 SERIES
Specifications

1. AC adaptor jack : I/P DC + 8 V, 1.5 A
2. Pulse switch : Two bounce-free push-buttons
3. Logic switch : Eight logic level switches in DIP type
4. DC O/P : DC + 5 V, 750 mA for user
5. B-023 breadboard : Solderless breadboard with 1580 interconnected tie points
6. Clip terminal : Logic probe clip terminal
7. LED display : Eight LED buffered logic level indicators.
8. BNC jacks.
10. Clock adjustment : Fine adjustment of clock frequency
11. Select switch : Clock range selection
    L : 10-40Hz. H : 1K-20KHz.

With breadboard, digital circuits, flip-flops and monostable multivibrators, counters, encoders, decoders, multiplexers, demultiplexers and sequencers, resistor, LED and 7 segments LED displays, memory devices, etc..
Electronic Theory will be taught straightly out of book accordingly.

The main objective of this trainer is to teach the student of Electronic circuits rather than focusing on the assembly of the components.

### LT-1000 Digital Learner’s Teacher

#### Features
1. With 10 modules including 18 experiments
2. Step-by-step exercises and application
3. Compatible with ETS-7000A digital-analog system and ETS-5000 advanced digital system
4. Modular can be changed easily
5. With experiment manual

#### Specifications
1. 10 experiment modules
2. Symbols of element for experimental circuit are printed on the modules.
3. Weight : 4Kg
The High Quality Training System

In Aviation field, K&H offer pilot simulator, avionics training, maintenance skill development, and troubleshooting solutions.