Technical Solutions International

BEKI Modular Electricity/Electronics & Mechatronics Kit

This is a flexible training resource has been designed to provide a hands-on introduction to the basic principles of electrical, electronics and mechatronic systems . It is designed to help deliver the underpinning knowledge for a wide range of students and trainee technicians in the following areas:

- Electrical /Electronics
- Mechatronics
- Automotive electronics/diagnostics
- Electric and Hybrid vehicles
- Power/Energy

It provides the right amount of theory and practical experiments to ensure that students have a practical grasp of the concepts of electrical and electronic circuits and basic test and measurement.

Traditional training resources that cover such a broad range of technologies are large and expensive and often prohibit individual use by students, restricting the amount of hands-on training that they typically are able to undertake.

BEKI is a rugged, easy to use modular training system that has been specifically designed for use in technical and vocational training. Its compact format makes it a much more affordable solution for real hands-on skills training.

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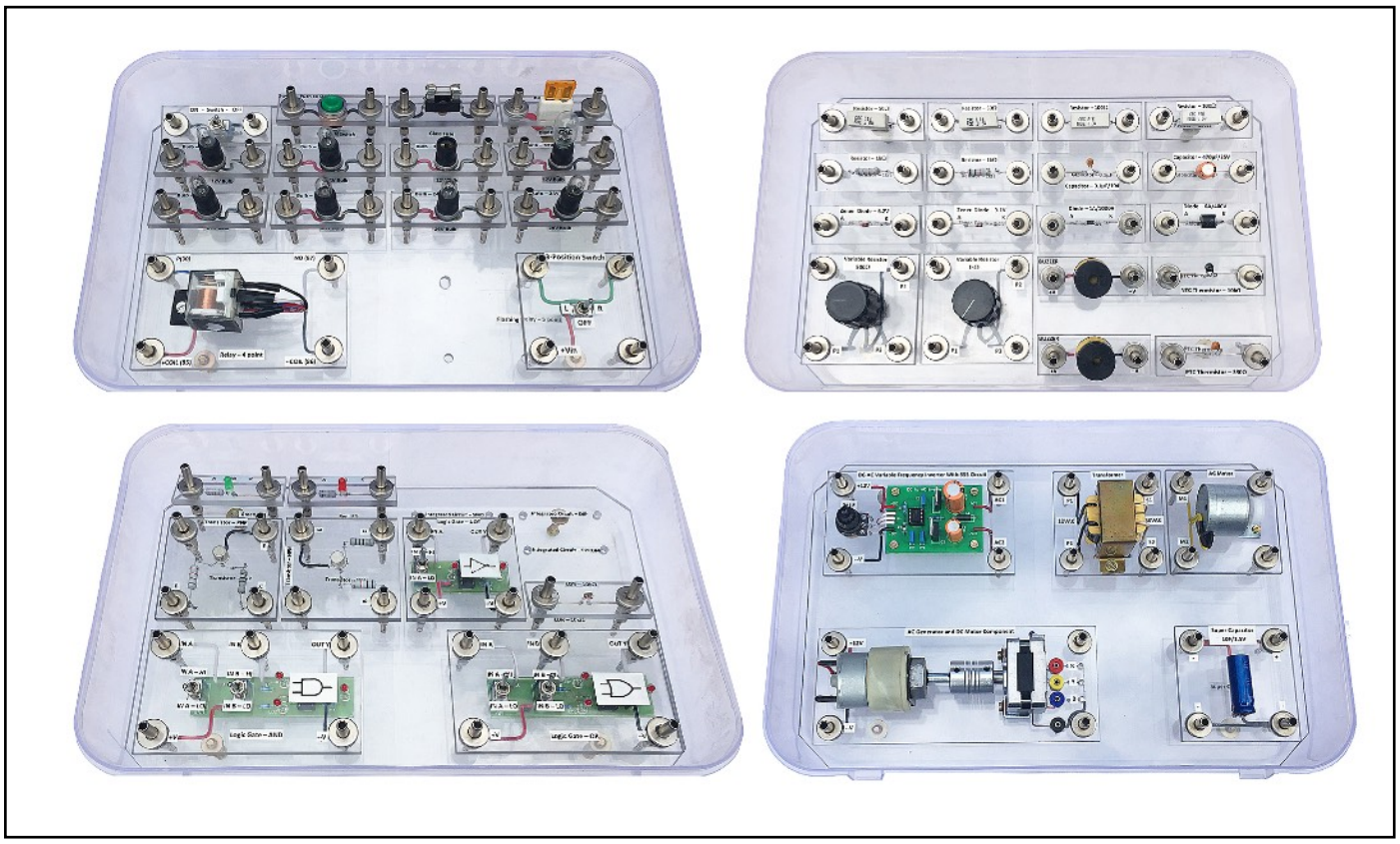
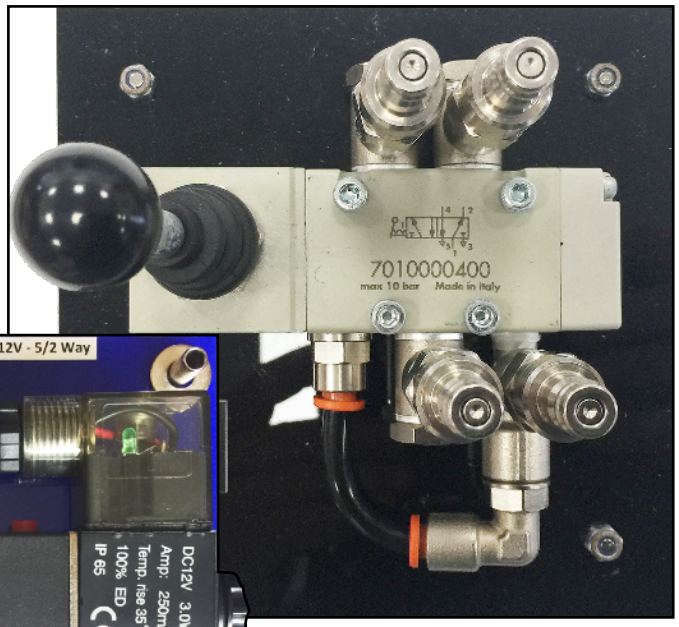
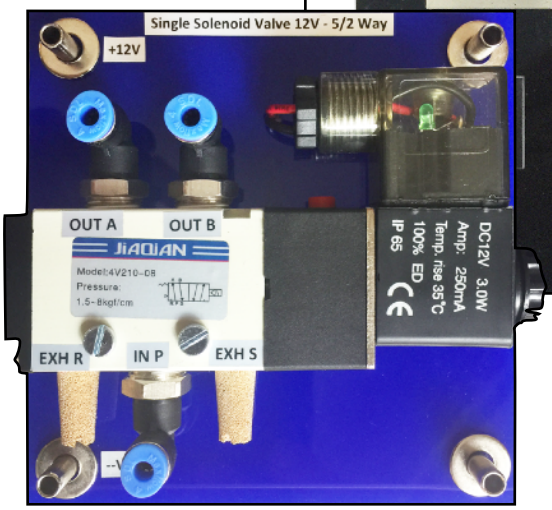


A series of component kits are available to cover the following study areas:

- Basic electricity
- AC/DC circuits
- Semiconductors and linear devices
- Basic digital logic
- Power inverters and hybrid circuits
- Automotive electrics/ electronics
- Automotive sensors and actuators
- Electric and Hybrid Electric vehicles
- Basic pneumatics
- Electro-pneumatics
- Basic hydraulics
- Electro-hydraulics





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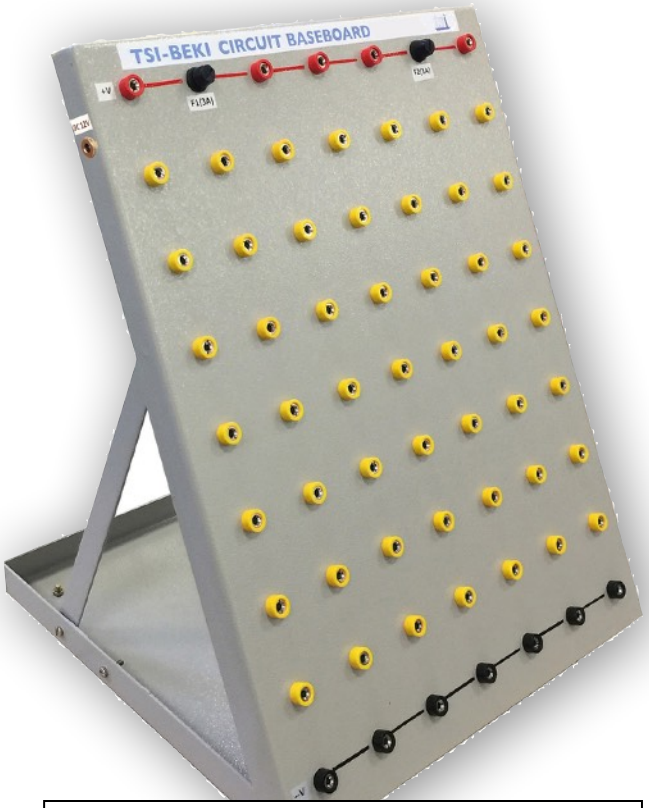
- **Folding Circuit Baseboard**
  - Adjustable struts allow the baseboard to be used as a demonstration stand by the instructor and as a hands-on work station by the trainee.
  - Ruggedly constructed from powder-coated steel
  - Matrix of 4mm sockets provide both power rails and locating points for the component carriers.
  - Separate 4.5mm power input socket
- **Carrier-mounted components**
  - Supplied in storage cases which makes them easy for the students to use.
  - Facilitates easy classroom management and storage.
- Separate power supplies for electrical, pneumatics and hydraulics



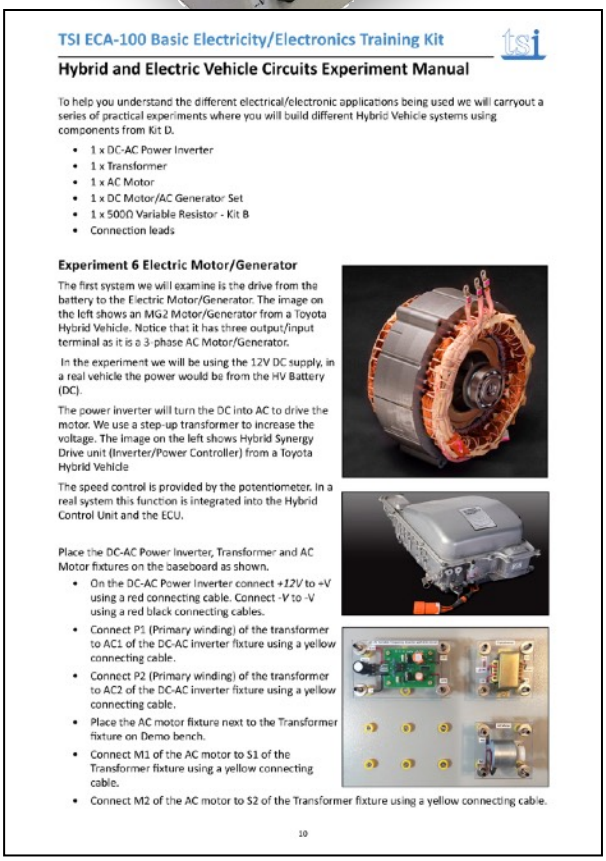
The Electricity/Electronics curriculum material is specifically written around everyday applications such as lighting, circuits, motor control, battery operations and we have even included a section on hybrid energy systems.

A complete Automotive Electrics/Electronics curriculum manual is also available.

The additional BEKI Mechatronics manuals cover typical industrial applications of pneumatic and hydraulic systems, including machinery operation, component sorting, hydraulic and air braking systems and heavy vehicle applications for hydraulic cylinders.

A separate manual for Electric and Hybrid vehicle applications is also available for use with the appropriate kits from the BEKI range.

Each manual typically provides the right amount of theory and practical experiments to ensure that students have a practical grasp of the concepts of the topic areas and use of basic test and measurement equipment.



TSI ECA-100 Basic Electricity/Electronics Training Kit

Hybrid and Electric Vehicle Circuits Experiment Manual

To help you understand the different electrical/electronic applications being used we will carryout a series of practical experiments where you will build different Hybrid Vehicle systems using components from Kit D.

- 1 x DC-AC Power Inverter
- 1 x Transformer
- 1 x AC Motor
- 1 x DC Motor/AC Generator Set
- 1 x 500Ω Variable Resistor - Kit B
- Connection leads

Experiment 6 Electric Motor/Generator

The first system we will examine is the drive from the battery to the Electric Motor/Generator. The image on the left shows an MG2 Motor/Generator from a Toyota Hybrid Vehicle. Notice that it has three output/input terminal as it is a 3-phase AC Motor/Generator.

In the experiment we will be using the 12V DC supply, in a real vehicle the power would be from the HV Battery (DC).

The power inverter will turn the DC into AC to drive the motor. We use a step-up transformer to increase the voltage. The image on the left shows Hybrid Synergy Drive unit (Inverter/Power Controller) from a Toyota Hybrid Vehicle

The speed control is provided by the potentiometer. In a real system this function is integrated into the Hybrid Control Unit and the ECU.

Place the DC-AC Power Inverter, Transformer and AC Motor fixtures on the baseboard as shown.

- On the DC-AC Power Inverter connect *+12V* to +V using a red connecting cable. Connect *-V* to -V using a red black connecting cables.
- Connect P1 (Primary winding) of the transformer to AC1 of the DC-AC inverter fixture using a yellow connecting cable.
- Connect P2 (Primary winding) of the transformer to AC2 of the DC-AC inverter fixture using a yellow connecting cable.
- Place the AC motor fixture next to the Transformer fixture on Demo bench.
- Connect M1 of the AC motor to S1 of the Transformer fixture using a yellow connecting cable.
- Connect M2 of the AC motor to S2 of the Transformer fixture using a yellow connecting cable.

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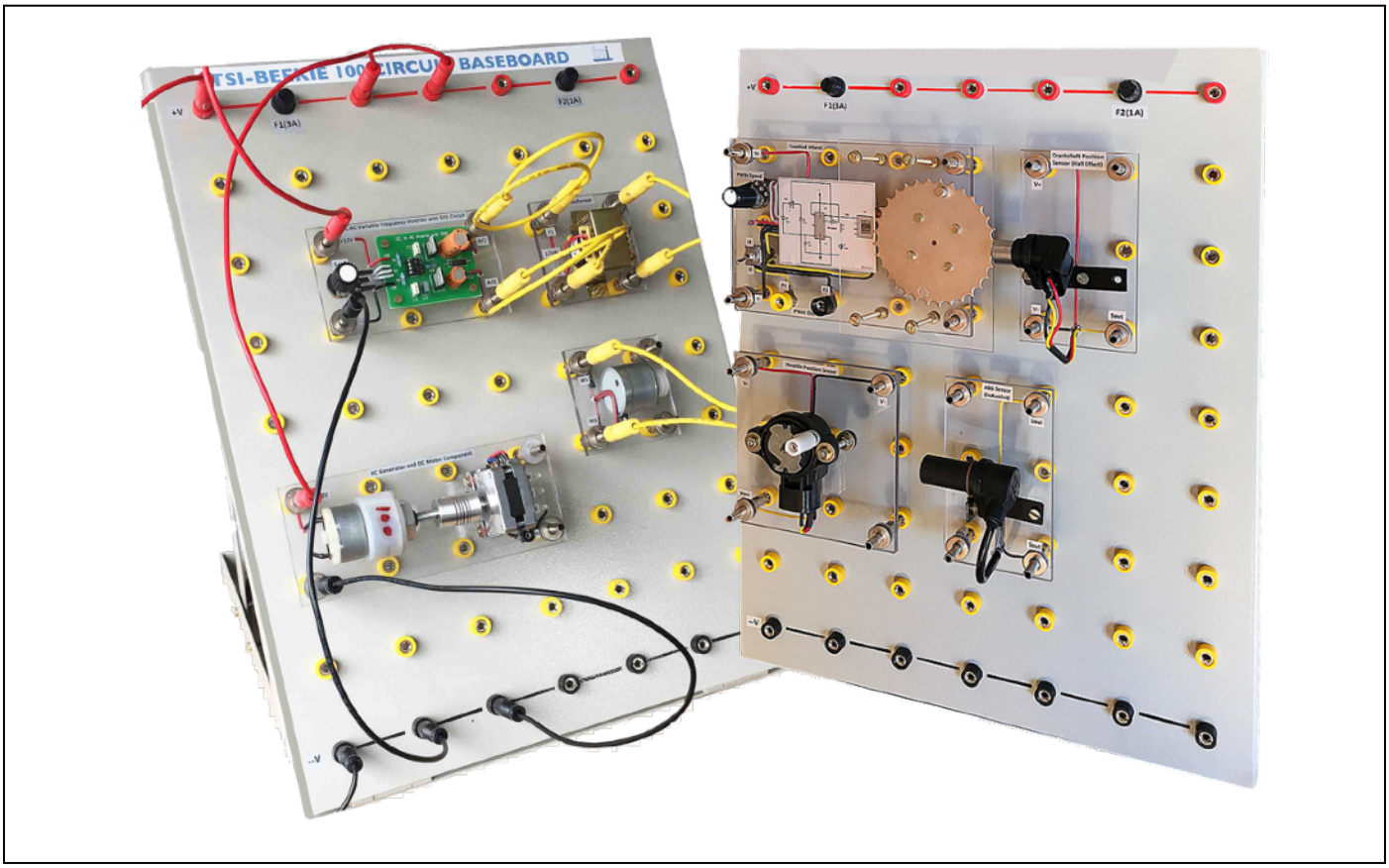

In addition to the basic automotive electrics/electronics and automotive sensors kits we also have special component set for EV/HEV technology.

This component kit contains a number of carrier mounted components that are used to perform practical experiments that mimic the operation of a hybrid energy systems as found in Electric and Hybrid vehicles as well as for Alternative energy applications.

The curriculum material presents both theory and practical work that help student develop a full understanding of the working of hybrid and electric vehicles.

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