

# Making Technology Visible Automotive & Transportation Technology



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## LABTECH – the International Technical Educational Company

LABTECH was formed over 30 years ago and is one of the largest Technical and Vocational educational systems designers and manufacturers in the world. Labtech's prime focus is to provide comprehensive 21st century skills infused technical and engineering learning solutions for Vocational Technical Schools, Polytechnics, Universities and Training Institutions. The development of LABTECH has been guided by professional educators from North America, Europe and Asia that have many years of experience in the field of international education.

Our Systems Approach design philosophy of "Making Technology Visible" is based on modular learning platforms and exposing key functional systems so as to clearly demonstrate the underlying technologies. We allow students to get close to technology by adopting a "hands-on" approach to training that combines theory as well as practical experiments. The result of this is that students have a clearer understanding of how technology works and its applications to industry and the work place. Many of our trainers have Fault Insertion systems that simulate common real-world faults with troubleshooting solutions facilitating real hands-on skills. Our Modular educational approach enables us to create systematic integrated solutions for varying syllabus levels, ranging from occupational skills standards and upwards to university degrees in engineering.

LABTECH has developed over 1.000 major training products which form a systematic educational program and we have exported these to over 90 countries worldwide. The technical training systems that LABTECH manufactures are made to International standards of quality and we are ISO 9001 certified in eight areas including educational research and development. LABTECH has a comprehensive R&D department and a sophisticated range of manufacturing equipment. LABTECH can assist training institution or projects by offering a complete service for equipping technology workshops or laboratories in our key technology areas including provision of training systems, educational aids, models, support tools and testing equipment.

Our training manuals are comprehensive teaching and learning guides which are student-centric and oriented for self-studies. The manuals include information on applied theory; related engineering information; set-up & operation; skills focused experiments; schematics & diagrams; along with troubleshooting solutions. We have active cooperative programs with leading educational and industrial institutions within our region who work together with us in our product research and development. Our trainers incorporate the latest technology so that education may keep pace with the changing economy.

Our manufacturing base is strategically located in a Free Trade Zone location on Batam Island nearby Singapore which allows us to easily ship all over the world. We also have marketing and distribution offices in Singapore, Malaysia, Jakarta, Australia, UK, and India in order to facilitate communications, service support and financial transactions with our customer's world wide. We also have representatives in dozens of countries who act as our local partners on project implementation. Our unique international corporate structure allows us to globally market high quality products and services at reasonable costs.

### Industry & Technology Partnerships and Memberships

Labtech has a network of industry and technology partners that enables us to widen our product offerings and better align our objectives with the end result of producing employable skills. Partnering with some of the most innovative technology companies in the world, including Microsoft and Intel. We are also members of ISTE (International Society of Technology in Education), CompTIA (Computing Technology Industry Association), IVETA (International Vocational Education & Training Association), Worlddidac. We also produce training systems for Toyota and for Schneider Electric This global network makes us uniquely aligned to meet the needs of educational institutions around the globe.



# INTRODUCTION

## LABTECH Automotive and Transportation Technology

Despite the growth of the internet and information technology over the past decade, automotive and transportation technology remains one of the largest job producing industries in the world. The market has dramatically changed along with the technology, but the need for technicians who are knowledgeable and well trained remains the same. Many of our training systems follow the NATEF/ASE curriculum from the USA and other international standards.

For over 30 years LABTECH has been designing and producing specialized training systems for automobiles, trucks, motorcycles small engines, agricultural mechanics, marine and aviation applications. Today LABTECH produces one of the most complete lines of training equipment & training systems available for transportation and power technology. We make trainers ranging from basic systems up to the latest technology including ABS braking systems, electronic fuel injection trainers, hybrid vehicle systems and electric vehicles, as well as basic and advanced Autotronics training systems.

Our overall company objective of using tangible, hands on training methods to produce employable skills is essential for students wanting to compete in this industry. Our training systems in automotive and transportation technology allow students to immediately translate knowledge obtained in the classroom, to skills needed in the workshop or factory. The result is that technicians and mechanics trained on LABTECH trainers have a head start in the workplace as they can immediately utilize skills learned as they go out into the workforce. We also have a full blended learning approach using interactive digital content.

**LABTECH range features several hundred training systems in the Automotive & Transportation Technology area starting from zero knowledge to employable skills and are arranged into sections as shown below. This catalog shows a selection of some of our more popular our training systems across the various sections. Also note that we do custom systems for our clients as well.**

### **World Class Technical Training Systems designed for education with quality built-in**

- Comprehensive manuals feature graphic learning materials to aid in student comprehension and contain both theory and practical exercises.
- Automotive Trainers have color coded parts & components along with graphic diagrams to aid in student understanding.
- Special Electronic fault insertion systems with test points embedded into the circuit diagram for troubleshooting and fault finding.
- Modular design enables trainers to be expanded or inter-connected to other units to form larger complex systems for enhanced training.
- LABTECH items use only high-quality parts, components and materials from top manufacturers and brands from around the world.
- Ergonomic and attractive design for easy learning and operation.
- Built to last long in tropical and arid environments.
- All major metal parts are powder coated for corrosion protection and durability.
- High quality fiberglass circuit boards with socketed ICs for easy replacement.
- For maintenance purposes, a circuit diagram of the trainer is provided and internal system cables feature number tags.

### **Digital TVET Content for Virtual Learning and Blended Learning:**

- Many items also have optional digital learning resources with realistic interactive simulations.
- Optional Data Acquisition Systems can facilitate higher level learning.
- 21st Century Learning Platform for blended learning.

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# CUSTOMS PROJECTS FOR INDUSTRIAL PARTNERS



**You have a project you need help with ?**

Send your details today at [request@labtech.org](mailto:request@labtech.org) and we will design it for you !



LABTECH

# ANTI LOCK BRAKING SYSTEM (ABS) TRAINING

## ABS CONTROL PANEL

## BRAKE UNIT AND ABS

# ATS - ADVANCED AUTOTRONICS SIMULATORS

STOPPING DISTANCE (m)

ROAD CONDITION

- FREE ASPHALT
- WET ASPHALT
- ICE/SNOW
- DIRTY ROAD
- SLIPPERY ROAD

VEHICLE SPEED

ABS WARNING LIGHT

ABS BLENDED SWITCH

VEHICLE SWITCH

ABS SWITCH

Modulator

Motor Cylinder

Front Wheel Speed Sensor

Rear Wheel Speed Sensor

### ABS SCANNER

ABS Scanner interface with a digital display and control buttons.

### ABS HYDRA

Pressure gauge for ABS hydraulic system.

FL

FR

FL

FR

Wheel Speed (km/h)

RL

RR

RL

RR

G1 (FL)

G2 (FR)

G3 (RL)

G4 (RR)

SLIP

SLIP

SLIP

SLIP

### FAULT TROUBLESHOOTING

- FRONT RIGHT WHEEL SENSOR OPEN CIRCUIT
- FRONT RIGHT WHEEL SENSOR SHORT CIRCUIT
- FRONT LEFT WHEEL SENSOR OPEN CIRCUIT
- FRONT LEFT WHEEL SENSOR SHORT CIRCUIT
- REAR RIGHT WHEEL SENSOR OPEN CIRCUIT
- REAR RIGHT WHEEL SENSOR SHORT CIRCUIT
- REAR LEFT WHEEL SENSOR OPEN CIRCUIT
- REAR LEFT WHEEL SENSOR SHORT CIRCUIT

## AUTOTRONICS SIMULATORS

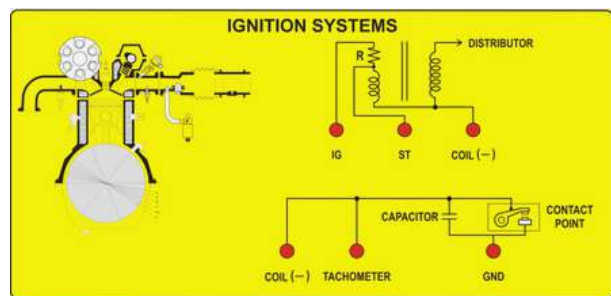
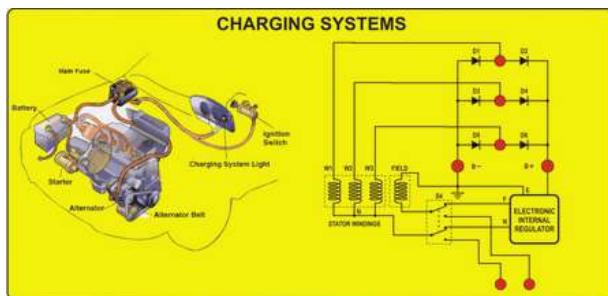
This group of Autotronics simulation systems has been developed for the training of technicians in the overall operation and diagnostics of modern Automotive electrical and electronics systems. A wide variety of systems and applications are covered by our simulators which represent the major electronic systems common to vehicles today.

### **Educational Objectives:**

- Training of technicians in the overall operation and performance of Automotive electrical and electronics systems.
- Observation of realistic real time performance that functions in the same way as the actual units.
- Observation of meters and indicators which are incorporated into the system to indicate the status and voltage levels of various test points.
- Simulation of common faults and problems; all systems feature a special fault insertion system that provides at a minimum 10 faults up to 24 faults.
- A Special panel is provided which displays the electrical circuit system. This circuit panel has test points built into the diagram and the student may use a multimeter and oscilloscope to investigate the circuit and system performance.
- These faults can be introduced individually and have an LED light to indicate fault operation, the light may also be turned off during student testing exercises.
- After testing the circuit diagram and locating the fault, the student then inputs his answer into the answer feedback panel which records the student answers so the teacher may later review the student's performance.

### **System features:**

- Computer Interface with CAI and CMS System.
- Realistic Simulation with Real Time Results and Modular Panel Layout.
- Graphic System Presentation.
- Realistic Troubleshooting Exercises with Error Answer Feedback.
- Electrical Circuit System Schematic Panel.
- Instrument Display Panel.
- Computer Interface and Networking.
- Comprehensive Courseware.



## AUTOMOTIVE ELECTRONICS TRAINER

**Model Number: ATS-ELC-1**

### **Educational Objectives:**

- Automotive Electrical Component and their symbols.
- Vehicle electrical wiring.
- Use of Automotive Electrical Testing Instruments.
- Electrical Circuit Diagrams in Automotive Electrical.
- Battery and Fuses.
- Starter and Solenoid.
- Horn and relay.
- Light Circuits: Front, side, rear, turn, reverse, brake, hazard, vanity and interior.
- Electrical circuits Troubleshooting methods.
- Diagnose and Identify electrical faults for short circuit, open circuit, bad components, intermittent, resistance problems, excessive parasitic draw and low voltage problems.
- Power usage in Automotive components.
- Repair and replace faulty components with correct/suitable components.





## **Automotive Engine Control Management Trainer**

**Model Number: ATS-ECM-1**

**Educational Objectives:**

- Engine Management Fundamentals.
- Engine Control Module (ECM) with simulated fault code reader.
- Sensors & Transducer use in Engine Management Control.
- Mechanical Actuator use in Engine Management Control.
- Electrical Circuit Diagrams in Automotive Electrical.
- Fuel system electronics and control components.
- Emission control and Exhaust system components with simulated gas analyzer.
- Ignition system electronics and control components.
- Engine Control Module (ECM) parameters.
- Engine Control Circuit Troubleshooting methods.
- Diagnose and Identify faults with help from engine diagnostic codes.
- Measurement of signals from sensors and transducer.
- Repair and replace faulty components with correct/suitable components.

## **Starting, Charging & Basic Ignition Trainer**

**Model Number: ATS-SCI-1**

**Educational Objectives:**

- Automotive Electrical Component and their symbols.
- Vehicle electrical wiring.
- Use of Automotive Electrical Testing Instruments.
- Electrical Circuit in Automotive starting system.
- Electrical Circuit in Automotive charging system.
- Electrical Circuit in Automotive Basic Ignition system.
- Starter and Solenoid.
- Alternator and Regulator.
- Ignition Distributor and Coil.
- Alternating current and Voltage Rectification.
- Electrical circuits Troubleshooting methods.
- Repair and replace faulty components with correct/ suitable components.
- Diagnose and Identify electrical faults.



## **CAN BUS Automotive Electrical Trainer**

**Model Number: ATS-CAN-1**

**Educational Objectives:**

- Automotive Electrical Components and their symbols.
- Operation of the CAN BUS system and Vehicle electrical wiring.
- Principles of Engine Management System.
- Fundamental and concept of Engine Management System.
- Diagnose and identify electrical faults for short circuit, open circuit, bad components in CAN Bus Automotive Electrical System electrical circuit through break out terminals with electrical test points.
- CAN Bus Automotive Electrical troubleshooting with automatic inserted fault by student or teacher computer.

## **Auto Air Conditioning & Heating System Trainer**

**Model Number: ATS-HCT-1**

**Educational Objectives:**

- Principles of Heating and Air Conditioning.
- Refrigeration Cycle and Fixed Orifice Tube Cycling Clutch System.
- Climate Control System Service.
- Air Distribution Control.
- Cooling System Airflow Components.
- Electrical Controls.
- Failures in Electrical Controls.
- Vehicle Ventilation, Ducting and Filtration.
- Coolant recovery systems.
- Coolant leakage checks.



## ANTI LOCK BRAKING SYSTEM (ABS) TRAINER

**Model Number: ATS-ABS-1**

**Educational Objectives:**

- Automotive Electrical Component and their symbols.
- Vehicle electrical wiring & Principles of Braking System.
- Vehicle acceleration and Deceleration.
- Effect of slip on wheel braking and stability.
- Fundamental and concept of Anti-lock Braking System.
- Dynamic operation of Anti-Lock Braking System in real time.
- ABS hydraulic circuit and solenoid operation.
- Electronic circuit and signals in ABS system.
- ABS Hydraulic modulator operation and control and troubleshooting.
- ABS Control Unit (ECU) operation and block diagram.
- Static operation of an ABS system covering pressure isolation, pressure reduction, pressure increase and pressure normal.
- Diagnose and Identify electrical faults for short circuit, open circuit, bad components in ABS system electrical circuit through break out terminals with electrical test points.
- ABS System fault code reading using on board ABS scanner using flash code LED and LCD displaying the fault information.



## VEHICLE DISPLAY & ACCESORIES TRAINER

**Model Number: ATS-VDA-1**

**Educational Objectives:**

- Automotive Electrical Component and their symbols.
- Vehicle electrical wiring.
- Measurement and display of vehicle speed.
- Cruise Control and Trip computer.
- Measurement and display of engine rpm, fuel level in fuel tank, cooling water temperature.
- Turn Light warning system, Seat belt warning system, Brake warning system, Lamp monitoring system, Air bag system, Automatic light circuits, AM/FM radio, Windscreen wipers and Door Lock and Power Windows.
- Electrical circuits Troubleshooting methods.
- Diagnose and Identify electrical faults for short circuit, open circuit, bad components, intermittent and resistance problems.
- Repair and replace faulty components with correct/ suitable components.

## ELECTRICAL COOLANT FAN TRAINER

**Model Number: ATS-ECF-1**

**Educational Objectives:**

- Flexible and comprehensive learning platform to study about electrical wiring.
- Connection in cooling systems including the operation of Fan and the control circuit.
- Engine temperature dictates when the cooling fan operates.
- Temperature sensor, relays and engine control operations.
- Troubleshooting of Automotive Engine Cooling Fan Systems.
- The vehicle speed, coolant temperature and Air Conditioning status simulation.
- The trainer consists of a miniature coolant fan motor, coolant fan relay, vehicle speed switch, A/C request switch, coolant temperature switch, connecting terminals for each component, power supply terminals and fuse block.
- Electrical faults circuit.
- Troubleshooting the coolant fan electrical system.



## DIESEL ENGINE MANAGEMENT SIMULATOR

**Model Number: ATS-DEM-1**

**Educational Objectives:**

- Automotive Electrical Component and their symbols.
- Vehicle electrical wiring & Principles of Braking System.
- Vehicle acceleration and Deceleration.
- Effect of slip on wheel braking and stability.
- Fundamental and concept of Anti-lock Braking System.
- Dynamic operation of Anti-Lock Braking System in real time.
- ABS hydraulic circuit and solenoid operation.
- Electronic circuit and signals in ABS system.
- ABS Hydraulic modulator operation and control and troubleshooting.
- ABS Control Unit (ECU) operation and block diagram.
- Static operation of an ABS system covering pressure isolation, pressure reduction, pressure increase and pressure normal.
- Diagnose and Identify electrical faults for short circuit, open circuit, bad components in ABS system electrical circuit through break out terminals with electrical test points.
- ABS System fault code reading using on board ABS scanner using flash code LED and LCD displaying the fault information.

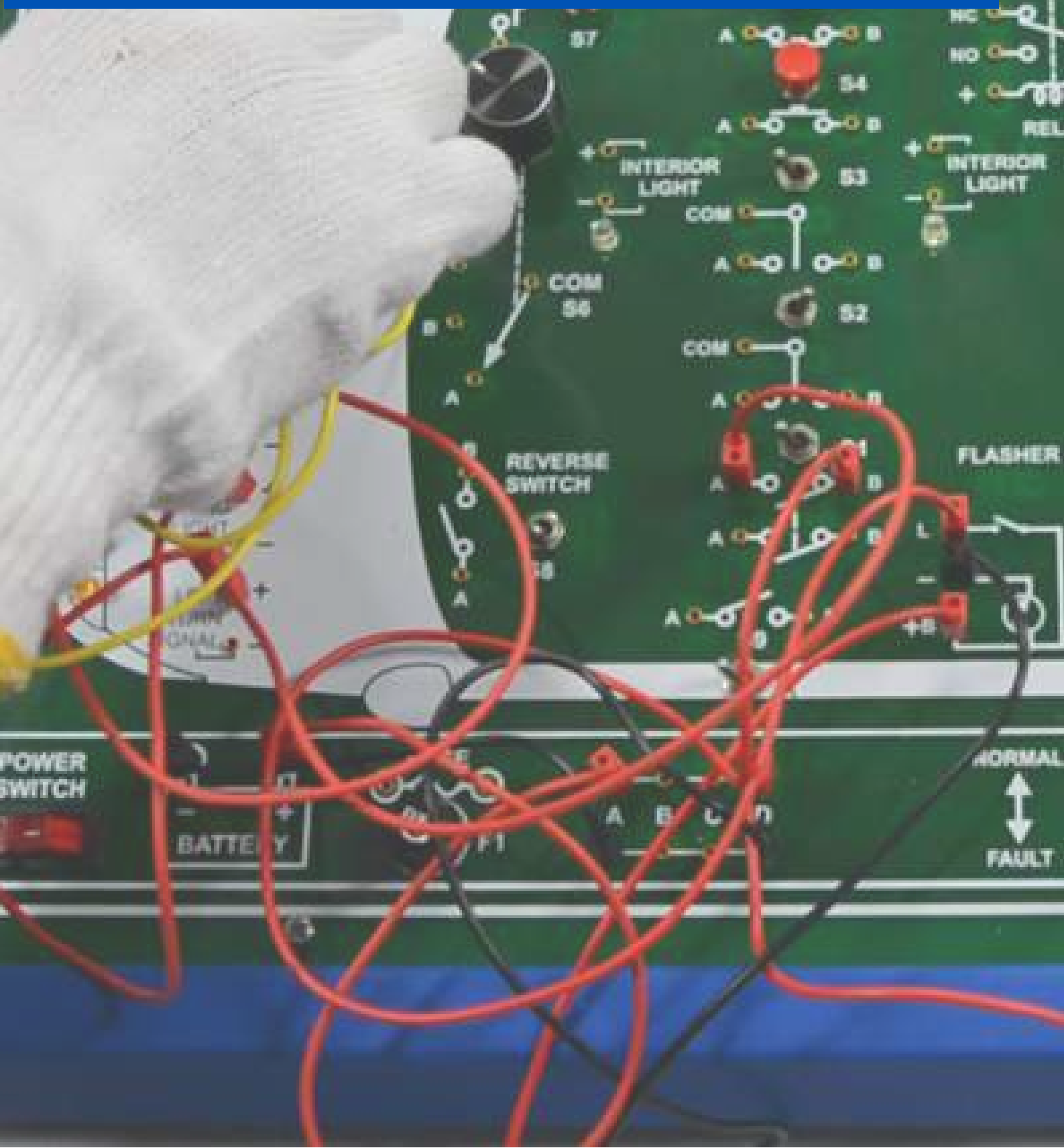


LABTECH

AUTOMOTIVE LIGHTING C

FRONT SIDE

# AAF - AUTOTRONICS FUNDAMENTALS





## AUTOMOTIVE LIGHTING CIRCUIT

**Model Number: AAF-ALC-1**

**Educational Objectives:**

- Investigating a simple vanity light circuit using multimeter.
- Troubleshoot a faulty vanity light circuit with a multimeter.
- Build an interior light circuit operated by a door contact and add a manual override.
- Troubleshoot a faulty brake (stop) light circuit with a multimeter.
- Investigating a reversing (backup) light circuit with a multimeter.
- Troubleshooting a faulty Lo/Hi beam circuit.
- Investigating flasher and it's circuit.
- Troubleshooting a faulty hazard warning circuit, turn signal circuit & park and tail circuit.
- Build a hazard warning circuit, relay-operated headlamp circuit and complete vehicle lighting system.

## AUTOMOTIVE ELECTRICAL CIRCUIT

**Model Number: AAF-AEC-1**

**Educational Objectives:**

- Understanding fundamentals of electricity : voltage, current and resistance
- Build and test series, parallel and series-parallel circuits applications in automotive electrical.
- Familiarize with types of electrical circuit faults as short, open and resistance circuit faults.
- Identify the effects of short, open and resistance circuit faults.
- Familiarization of automotive battery and understanding the internal construction of the battery.
- Diagnose faults in the battery and fuse circuit.
- Understanding the working principles of starter motor (inertia, pre-engaged type, axial and co-axial types)
- Perform measurements of voltage, current and resistance in the starter and solenoid circuit.
- Observation and troubleshooting on horn circuits.
- Identify the difference between NO and NC relays.
- Build and test turn signal and hazard circuit according to the circuit diagram.
- Build and test side (parking) light and headlamp circuit according to the circuit diagram.
- Build and test dome/interior light circuit according to the circuit diagram.
- Build and test electric cooling fan circuit according to the circuit diagram.
- Build and test blower circuit according to the circuit diagram.
- Build and test ignition system simulation circuit according to the circuit diagram.
- Familiarize with applications for each of the bulb types used in the automotive industry.
- Observe live and switched live points of the reversing (backup) light circuit by doing voltage measurement.
- Troubleshoot faults in the Brake (Stop) and Reversing (Backup) lighting circuits.



## AUTOMOTIVE ELECTRONIC CIRCUIT

**Model Number: AAF-ELC-1**

**Educational Objectives:**

- Build a simple circuit containing a battery and lamp.
- Measure DC voltage using a digital multimeter.
- Observe the operation of a switch.
- Observe the operation of a fuse.
- Observe the concept of a common ground connection.
- Build a circuit from a schematic diagram.
- Measure DC current and resistance using a digital multimeter.
- Calculate power use in lamp circuits.
- Measure voltage drops across lamps connected in series.
- Measure current through lamps connected in parallel.
- Measure voltages and currents in a series-parallel lamp circuit.
- Use a multimeter to investigate the operation of a range of switches.
- Observe the effect of different switch types on circuit operation.
- Observe switches connected in series and parallel.
- Build series, parallel and series parallel circuits with resistors.
- Apply Ohm's Law and Kirchoff's Law.
- Familiarization with diode and transistor.



## VEHICLE DISPLAY PRINCIPLES

**Model Number: AAF-VDP-1**

**Educational Objectives:**

- Study of coil type and bi-metal gauges and their basic operation.
- Familiarization of functions of speed and crankshaft (PIP) sensors.
- Observe speed sensor signal when vehicle speed varies.
- Study the operating principle of the warning indicator failure detection system.
- Diagnose faults in the coolant temperature indication circuit.
- Understand how to test gauges through the sender feed wire grounding.
- Diagnose faults in air bag system & the vehicle lighting indication system.
- Understand operation and function of the impact sensor in SRS system, fuel level sensor signals and the connection to engine ECU.
- Using oscilloscope to observe ultrasonic parking sensor signal and vehicle speed sensor signal.
- Understand operating principle of the oil pressure indication circuit and low oil level warning lamp system.
- Understanding average speed, average economy, distance to empty and time lapse calculation and application for vehicle instrument display system.



## ENGINE MANAGEMENT PRINCIPLES

**Model Number: AAF-EMP-1**

**Educational Objectives:**

- Using schematic and block diagrams in automotive electronics.
- Identify a typical ECU Voltage reference values.
- Study the functions of both crankshaft and camshaft position sensors.
- Identify correct operation of the engine coolant temperature sensor.
- Identify the advantages of computer-controlled vehicle systems.
- Convert flash type trouble codes into OBDII codes.
- Observe the influence of engine temperature to injection time.
- Recognize that air to fuel (A/F) ratio is affected by injector open time.
- Troubleshooting fuel injectors circuit and Diagnose faults.
- Recognize the operating principle of air injection (turbo system).
- Activate computer self-diagnosis for troubleshooting purposes.



## IGNITION AND CHARGING SYSTEM

**Model Number: AAF-IGC-1**

**Educational Objectives:**

- Recognize the differences in construction and operating principle between the dynamo and alternator.
- Recognize the operating principle of the transistor driver circuit for contact breaker ignition system.
- Identify types of sensors required for the ECU to generate proper timing for spark ignitions.
- Understand the dwell angle and its effect to the spark ignition and engine performance.
- Explain the function of mechanical commutator in a dynamo to rectify current.
- Identify the secondary wave patterns of each cylinder of a multi-cylinder engine.
- Measure the resistance and voltage at the coil primary and secondary windings.
- Observe the waveform of an inductive pickup ignition circuit with an oscilloscope.
- Recognize the operating principle of the ignition coil.
- Recognize the principle of the PN transistor junction.
- Diagnose faults in the rotor circuit.



## CAN BUS PRINCIPLES TRAINER

**Model Number: AAF-CBP-1**

**Educational Objectives:**

- Understand operating principle of the Can Bus system.
- Understand how to install CAN Bus analyzer software.
- Understand how to use CAN Bus analyzer software.
- Familiarization with the operation and the experiments procedures of NODE 1 - Dashboard and Instrument Panel, Combination Switch, Right Door and Left Door.
- Experiment/Troubleshooting of automotive electrical system.

## ADVANCED STARTING AND CHARGING TRAINER

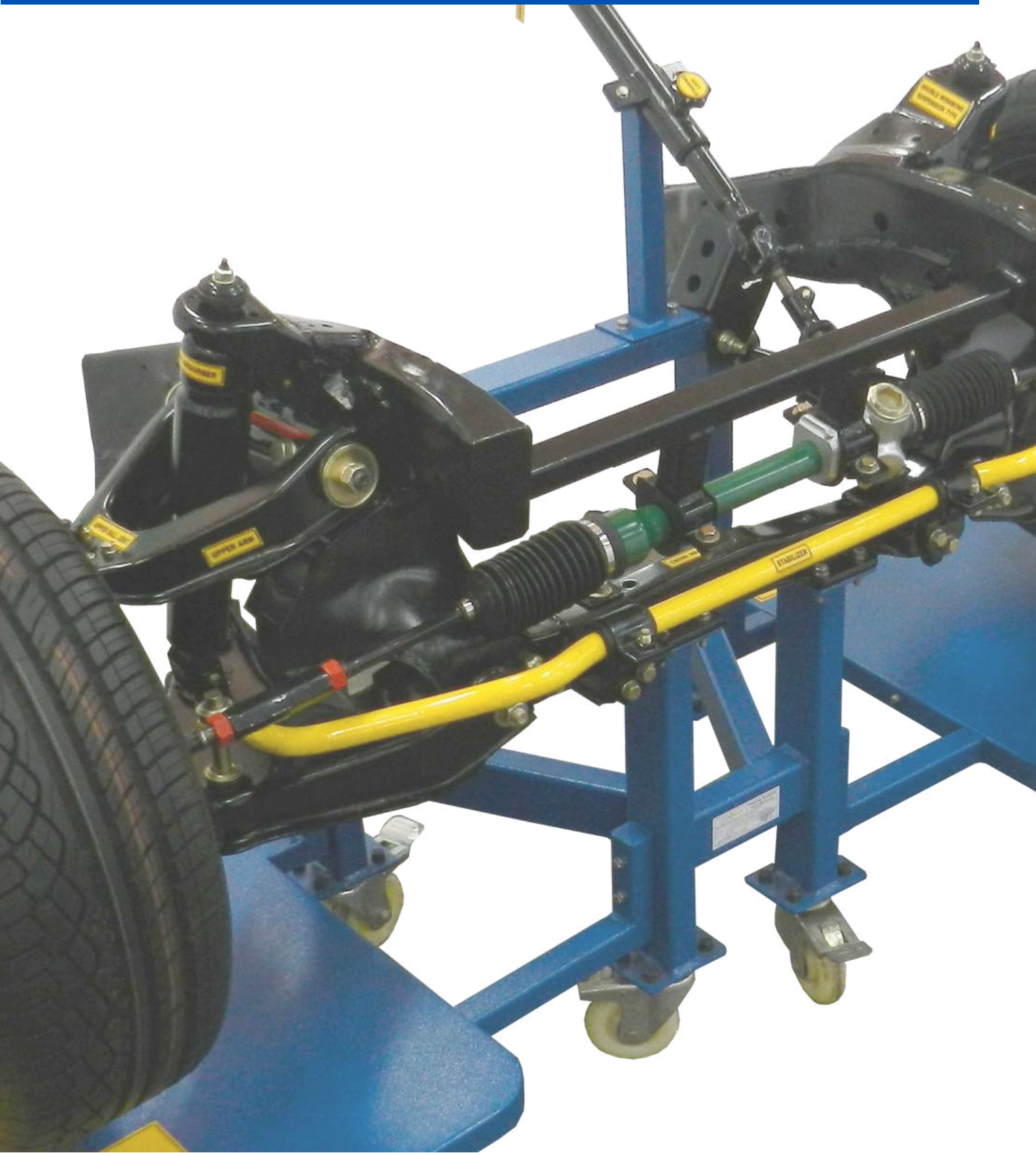
**Model Number: AAF-IGC-2**

**Educational Objectives:**

- Observe CAN Bus Conventional and Advanced Starting and Charging Systems
- Investigating of High Speed CAN Data Bus
- Observe CAN Bus Conventional and Advanced Starting and Charging System Measurements
- Observe CAN Bus Consumers Measurements
- Observe Stop Start System Measurements
- Observe CAN Data Bus Measurements
- Diagnose CAN Bus Starting and Charging Faults



# ABS - Brake, Steering & Suspension Systems



## SECTIONED FRONT SUSPENSION STEERING UNIT, WISHBONE TYPE SUSPENSION

**Model Number:**

**1. Wishbone Type Suspension**

**ABS-SSW-S**

**2. MacPherson Strut Type Suspension**

**ABS-SSM-S**

**3. Front Wheel Drive Unit**

**ABS-SSF-S**

**Educational Objectives:**

- Vehicle that are ideal for demonstrating the operation and interaction of steering and suspension mechanisms.
- Students may be exposed to the function of the stabilizer, shock absorbers, steering linkages, suspension systems, areas of alignment and adjustment, operation of brakes and more.
- Familiarization of all major components have been carefully sectioned to expose the internal working parts such as the steering gear, shock absorbers, brake system, wheel cylinders, etc.
- Study the steering mechanism is fully functional enabling authentic demonstrations.
- The unit is mounted on a sturdy steel stand, which is fitted with wheels for easy mobility. Items are supplied with a workshop/service manual for reference.



## SHOCK ABSORBER TEST STAND

**Model Number: ABS-SAT**

**Educational Objectives:**

- Test different types of Shock Absorbers (trainer includes two different types).
- Experimentation of different shock absorber's positioning (16 positions).
- Simulate different loads by applying weights to the chassis.
- Simulate different axle constructions by applying weights to the axle.
- Variable road conditions may be explored through the variable oscillation generator (rough road, smooth & level road, gently undulating road, etc).
- Observe the effects of different friction values by using the hand brake.
- Data Acquisition system to record, analyze the performance of the suspension and shock absorber.



## SUSPENSION AND SHOCK ABSORBER TRAINER

**Model Number: ABS-SAT-1**

**Educational Objectives:**

- Electronic Power Management System for shock-absorbers.
- Real shock-absorber, discharged, with an actuator.
- LED displays showing the damping status (hard/soft) of the shock-absorber.
- Single suspension model with a weight simulating the car, a spring and a shock-absorber with suspension simulation actuator.
- Acceleration sensor to provide acceleration signal for the ECU.
- Simulating different road surfaces (motorway, random, paving stones), with electric motor and brake.
- Vehicle speed sensor to provide speed signal for the ECU
- Potentiometer to control the speed of variable speed electric motor system (accelerator).
- Brake control potentiometer.
- Selector for "automatic" or "sporting" operating mode.
- Diagnostic test points.



## FRONT WHEEL ALIGNMENT TRAINER

**Model Number: ABS-FAS-T**

**Educational Objectives:**

- Study the general theory on Suspension and Steering System including different types and Alignment geometry principles.
- Learn the Pre-Alignment Check Procedures: tire pressure and wear, Front wheel bearing play and adjustment, ball joint play inspection, shock absorber wear, steering gear and linkage looseness.
- Study of Caster: determination, adjustment and correction.
- Study of Camber: determination, adjustment and correction (positive or negative).
- Study of Steering Axis inclination (angle): determination, adjustment and correction.
- Study of Alignment of Steering Gear.
- Study of Track Alignment individual and overall toe-in and toe-out.
- Study of Set back: variation of offset (as A function of caster and inclination-positive or negative values are possible).
- Effects of tire pressure on Alignment..





## ORIGINAL FRONT SUSPENSION STEERING UNITS

**Model Number:**

1. Wishbone Type Suspension Unit with Coil Springs **ABS-SSW-O (F/W, G)**
2. MacPherson Strut Type Suspension System **ABS-SSM-O (F/W, G)**
3. Front Wheel Drive Front End Unit **ABS-SSF-O (F/W, G)**

**Wheeled Base (W)**

**Rotating Stand (F)**

**The steering gear and steering wheel (G)**

**Educational Objectives:**

- The original front end steering and suspension units for skill training exercises involving the maintenance and repair of automobile front end steering and suspension.
- The Rotating Stand comes with a holding fixture to secure the front end unit to the Rotating Shaft.
- Each Front end comes with a workshop manual for repair and technical instruction.
- Special tool sets are available as an option for each type of front end, to facilitate disassembly and reassembly.

## FRONT AXLE STEERING GEOMETRY TRAINER

**Model Number: ABS-FSG-T**

**Educational Objectives:**

- Study of adjustment of the tires (wheels) and centering of the steering mechanism.
- Study of track or wheel alignment (toe-in and toe-out).
- Study of adjustment of castor and camber.
- Study of king pin angle inclination.



## BASIC POWER STEERING TRAINER

**Model Number: ABS-PSU-T1**

**Educational Objectives:**

- Demonstrate the principles and operation of typical power assisted steering systems as found on many vehicles today.
- The first type is a smaller unit which has only the functional operational parts of hydraulic type power steering system itself. It is capable of demonstrating how such systems work.
- The second and larger unit is a complete hydraulic type of power steering system mounted onto an original front end steering and suspension unit which it operates.
- The third type is a newer/more recent electronic power steering type used in modern vehicles.
- An ampere meter provides an indication of the load or power and in-line hydraulic pressure gauge monitors the pressure of the hydraulic fluid circuit.
- A resistance mechanism provides realistic operation and gives a load to the hydraulic circuit.

## POWER STEERING TRAINER AND FRONT END UNIT

**Model Number: ABS-PSU-T2**

**Educational Objectives:**

- Demonstrate the principles and operation of typical power assisted steering systems as found on many vehicles today.
- The first type is a smaller unit which has only the functional operational parts of hydraulic type power steering system itself. It is capable of demonstrating how such systems work.
- The second and larger unit is a complete hydraulic type of power steering system mounted onto an original front end steering and suspension unit which it operates.
- The third type is a newer/more recent electronic power steering type used in modern vehicles.
- An ampere meter provides an indication of the load or power and in-line hydraulic pressure gauge monitors the pressure of the hydraulic fluid circuit.
- A resistance mechanism provides realistic operation and gives a load to the hydraulic circuit.





# ELECTRONIC POWER STEERING TRAINER AND FRONT END UNIT

**Model Number: ABS-PSU-T3**

**Educational Objectives:**

- Demonstrate the principles and operation of typical power assisted steering systems as found on many vehicles today.
- The first type is a smaller unit which has only the functional operational parts of hydraulic type power steering system itself. It is capable of demonstrating how such systems work.
- The second and larger unit is a complete hydraulic type of power steering system mounted onto an original front end steering and suspension unit which it operates.
- The third type is a newer/more recent electronic power steering type used in modern vehicles.
- An ampere meter provides an indication of the load or power and in-line hydraulic pressure gauge monitors the pressure of the hydraulic fluid circuit.
- A resistance mechanism provides realistic operation and gives a load to the hydraulic circuit.



## POWER STEERING COMPONENTS

**Model Number:**

1. Original operable self-contained power steering unit (gear box)
2. Sectioned self-contained power steering unit (gear box) mounted on a base plate
3. Original operable rack and pinion type power steering unit with gear box, control valve and rack cylinder
4. Sectioned rack and pinion type power steering unit with gear box, control valve and rack. Mounted on a base plate
5. Original operable power steering hydraulic pumps
6. Sectioned power steering hydraulic pumps
7. Original operable power steering hydraulic fluid reservoir
8. Sectioned power steering hydraulic fluid reservoir

ABS-PSA-O(N/R,L/M)

ABS-PSA-S(P/R)

ABS-PSB-O(N/R,L/M)

ABS-PSB-S(P/R)

ABS-PSC-O(N/R,L/M)

ABS-PSC-S

ABS-PSD-O(N/R,L/M)

ABS-PSD-S

**New (N)**

**Reconditioned (R)**

**Unmounted (L)**

**Mounted (M)**

**Pump (P)**

**Reservoir (R)**



**Educational Objectives:**

- Understand the operable units are ideal for demonstration purpose, dismantling exercises, exhibits or replacement parts.
- The sectioned steering gear is excellent for demonstrating the function, operational principles and characteristics of the different types of systems.
- Understand all key elements have been carefully sectioned so as to clearly expose all operating mechanisms.
- Understand all sectioned units feature a handle for operation and are mounted on a base plate.

## MANUAL STEERING GEAR ASSEMBLY

**Model Number:**

1. Rack and Pinion Gearbox
2. Recirculating Ball worm and Nut Gearbox
3. Worm and Roller Gearbox
4. Worm and Sector Gearbox

ABS-SG1-O/S (N/R,L/M,W/C/A/T)

ABS-SG2-O/S (N/R,L/M,W/C/A/T)

ABS-SG3-O/S (N/R,L/M,W/C/A/T)

ABS-SG4-O/S (N/R,L/M,W/C/A/T)

**Operable (O)**

**Sectioned (S)**

**New (N)**

**Reconditioned (R)**

**Unmounted (L)**

**Mounted (M) on base plate**

**Original Steering Wheel (W)**

**Original Steering Column (C)**

**Pitman Arm (A)**

**Tie Rods (T)**



**Educational Objectives:**

- Understand the operable units are ideal for demonstration purposes, dismantling exercises, exhibits or replacement parts.
- Understand the sectioned steering gearboxes are excellent for demonstrating the function and operational principles and characteristics of the different types of gear box.
- Understand all key components have been carefully sectioned to clearly expose all operating mechanisms.
- All sectioned units feature a handle for operation and are mounted on a base plate.

## SHOCK ABSORBER UNIT

**Model Number:**

- |   |           |
|---|-----------|
| 1. Original Hydraulic shock absorber, mounted on stand        | ABS-SAH-O |
| 2. Original Gas shock absorber, mounted on stand              | ABS-SAG-O |
| 3. Original McPherson strut shock absorber, mounted on stand  | ABS-SAM-O |
| 4. Sectioned Hydraulic shock absorber, mounted on stand       | ABS-SAH-S |
| 5. Sectioned Gas shock absorber, mounted on stand             | ABS-SAG-S |
| 6. Sectioned McPherson strut shock absorber, mounted on stand | ABS-SAM-S |

**Educational Objectives:**

- The shock absorbers are individually attached on a board and secured using original shock absorber bushings.
- Understand Sectioned units have been carefully cut so as to expose all key internal parts thereby revealing internal functions and operational characteristics



## SUSPENSION SYSTEM SIMULATOR

**Model Number: ATS-SSM-1**

**Educational Objectives:**

- Introduction to car suspension system, construction, sensors and operation.
- Principles of shock absorber and suspension system.
- Fundamental and concept of suspension System.
- Diagnose and identify electrical faults for short circuit, open circuit, bad components in Suspension System electrical circuit through break out terminals with electrical test points.
- Fault insertion system troubleshooting.

## WHEEL ALIGNMENT TRAINER

**Model Number: ABS-FAS-X**

**Educational Objectives:**

- Understand the trainer has been specially designed to demonstrate the principles of vehicle chassis structure and wheel Alignment in passenger cars.
- The trainer features front suspension as well as multi link rear suspension of a vehicle which has been specially modified to facilitate instruction.
- McPherson-type front suspension and multi-link rear suspension or equivalent are integrated in the training stand.
- Understand Wheel alignment training stand is a great educational tool that allows students to introduce the different types of automobile chassis, study suspension components and angles modification, perform various measurements and other diagnostic procedures.



## STEERING AND SUSPENSION TRAINER

**Model Number: ABS-PSU-X**

**Educational Objectives:**

- Provides easy full access to suspension and steering components which is not possible in real situation in real vehicle.
- Suitable clear viewing for alignment demonstrations, measurement and adjustments.
- Identify components of a typical MacPherson strut suspension system
- Identify components of a typical rack & pinion steering system
- Identify components of a typical sway & stabilizer bar
- Service front bearing hub and wheel bearing
- Measure and adjust of Caster, Camber and Toe
- Service of Wheel & tire
- Service of Brake caliper and rotor
- Measurement of Rotor (T.I.R.) run-out and thickness
- Inspection of Brake condition
- Rack removal and installation
- Service of Inner & outer tie rod
- Service of Strut and ball joint
- Good visualization and allows actual measurement of camber, caster and SAI using the included magnetic gauge
- Easy adjustments and view the results of the changes.
- Study concept of SAI (Steering Axis Inclination)
- Study concept of Total Included Angle
- Study concept of Side-to-Side Differences in in CASTER, CAMBER and TOE.



## STEERING STRUCTURE EDUCATIONAL TRAINER

**Model Number: ABS-SSM-X**

**Educational Objectives:**

- Familiarization with suspension system
- Familiarization with steering system
- Steering wheel calibration:
  - a. Calibrate the steering wheel position
  - b. Divide steering rack movement length to the left and right
- Observation and adjustment of wheel alignment:
  - a. Observation and adjustment of camber
  - b. Observation and adjustment of caster
  - c. Observation and adjustment of toe angle and turning radius



## HYDRAULIC DUAL CIRCUIT BRAKE SYSTEM

**Model Number:**

- |   |                  |
|---|------------------|
| <b>1. HDC Brake System</b>                              | <b>ABS-HD1-T</b> |
| <b>2. HDC Brake System with Fault</b>                   | <b>ABS-HD2-T</b> |
| <b>3. Sectioned Hydraulic Dual Circuit Brake System</b> | <b>ABS-HD3-T</b> |

**Educational Objectives:**

- Demonstration of brake pedal is depressed, the hydraulic circuit is activated which controls the drum and disc brake.
- Familiarization of the major components included are the twin (Tandem) master cylinder, brake pedal unit, brake light, brake light activator switch, one disc brake unit, one drum brake unit, hand brake lever, all necessary cabling and hydraulic fluid lines. The demonstration board features a silk screened schematic of the major brake components and hydraulic operational function.
- Study of the drum brake system has been sectioned to show internal parts where possible without affecting the operational characteristics.



## HYDRAULIC BRAKE CHASSIS TRAINER

**Model Number:**

- |                                   |                   |
|-----------------------------------|-------------------|
| <b>1. Disc/Drum Brake Chassis</b> | <b>ABS-BAC1-T</b> |
| <b>2. All Drum Brake Chassis</b>  | <b>ABS-BAC2-T</b> |
| <b>3. All Disc Brake Chassis</b>  | <b>ABS-BAC3-T</b> |

**Educational Objectives:**

- The Hydraulic Brake Chassis is designed for student skills training in the operation, installation, maintenance and repair of Hydraulic Brake Systems.
- Understand the Chassis includes an integrated floor stand that is mounted on wheels for mobility.
- Understand a color schematic chart of the brake system and circuit is mounted onto the trainer for reference.
- Understand all components are fully functional and the chassis brake system can be operated as a self contained unit.



## ANTILOCK BRAKING SYSTEM TRAINER ABS

**Model Number:**

- |  |                 |
|--|-----------------|
| <b>1. Antilock Braking System</b>          | <b>BA-ABS-2</b> |
| <b>2. Antilock Braking System with TCS</b> | <b>BA-ABS-3</b> |

**Educational Objectives:**

- Four rotating wheels with wheel sensors, with digital speed display for each wheel (4 digital displays)
- 4 variable speed electrical drive systems for each wheel to control the individual speed of each wheel, master brake cylinder with pedal handle
- ABS hydraulic actuator (modulator) unit which is controlled by the on-board computer system (ECU)
- Five brake line pressure gauges to show the pressure differentials from the master brake cylinder to the individual wheels.
- Brake Master Cylinder with Vacuum assist boost mechanism and brake pedal assembly.
- The front of the trainer features precise schematic color graphic illustrations that clearly explain the operation of the entire ABS and braking system.
- A control Panel is provided with an on/off power switch, power system light (POWER ON), ABS warning light (indicated problems) and an ABS operational light (ABS ON). Also has Volt and Ampere meters to measure the DC input power and a brake light to show the operation of the braking system just as on the vehicle.
- Special Road Conditions and Performance Display Panel: The features controls for the road settings: Dry asphalt, Wet asphalt, icy/snowy. It also has a digital display that shows the stopping distance and stopping time (in seconds). Individual controls for wheel speeds, one for each wheel (four controls).



Watch the video

## PNEUMATIC AIR BRAKE TRAINER

**Model Number: ABS-CB1-T**

**Educational Objectives:**

- Study and understand the principles, operational theory and maintenance of air brake systems found on trucks or large vehicles.
- Original components are used through out the trainer and feature quick connection couplings with color-coded pneumatic hoses for exercise and examination guidance.
- Familiarization of all the major components as found on trucks and heavy vehicles so as to form a complete braking system circuit.
- Color chart showing the brake system circuit is mounted onto the trainer for reference.
- Brake drums can be rotated and have been sectioned to show the active components.
- Demonstration of vehicle movement and braking by seeing the brake shoe movement and contact to brake drums.



## VACUUM-SERVO MASTER BRAKE CYLINDER

**Model Number:**

1. Original Operable Vacuum-Servo Master Brake Cylinder
2. Sectioned Vacuum-Servo Master Brake Cylinder, mounted on a base plate

**ABS-MBS-O(N/R,L/M)  
ABS-MBS-S**

**New (N)**

**Reconditioned (R)**

**Un mounted (L)**

**Mounted (M)**

**Educational Objectives:**

- Study of a hydraulic master brake cylinder that has a vacuum assisted servo power booster attached to it to give greater braking power.
- The operable units can be used for demonstration purposes, exhibits or as replacement parts.
- The sectioned vacuum-servo master brake cylinders are excellent for demonstrating the operational principles of the vacuum assist process.
- Understand all key components have been carefully sectioned including the power chamber, booster diaphragm, slave cylinder, valves and fluid reservoirs.



## BRAKE MASTER CYLINDERS

**Model Number:**

1. Original Operable Single Stage Master Brake Cylinder
2. Sectioned Single Stage Master Brake Cylinder, mounted on a base plate
3. Original Operable Tandem (split or twin system) Master Brake Cylinder
4. Sectioned Tandem (split or twin system) Master Brake Cylinder, mounted on a base plate

**ABS-MB1-O (N/R,L/M)  
ABS-MB1-S  
ABS-MB2-O (N/R,L/M)  
ABS-MB2-S**

**New (N)**

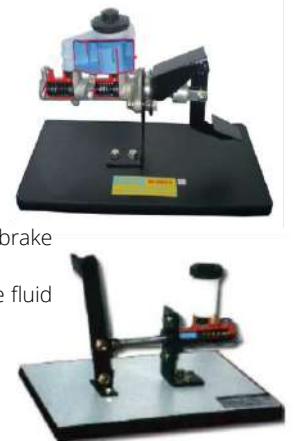
**Reconditioned (R)**

**Un mounted (L)**

**Mounted (M)**

**Educational Objectives:**

- The operable units can be used demonstration purposes, exhibits or as replacement parts.
- The sectioned brake master cylinders are excellent for demonstrating the principles of the main hydraulic brake pump operation.
- Understand all key components have been carefully sectioned including the pump plunger casing and brake fluid reservoir.
- Understand all sectioned units have a handle to activate the plunger motion.



## SECTIONED HYDRAULIC BRAKE UNITS

**Model Number:**

1. OSectioned Simplex Type Brake Unit with drum with leading and trailing brake shoes
2. Sectioned Duo-Servo (booster) Type Brake Unit with drum with leading and trailing brake shoes
3. Sectioned Duplex Type Brake Unit drums with two leading brake shoes
4. Sectioned Floating Caliper Type Disc Brake (single hydraulic cylinder on one side of brake disc)
5. Sectioned Rigid Caliper Disc Brake (dual hydraulic cylinders, one on each side of brake disc)

**Educational Objectives:**

- Understand each unit consists of one complete brake which has been carefully sectioned in order to expose all key internal parts and is mounted on a base plate.
- Drum type brakes have the drum and hydraulic wheel cylinder sectioned and come complete with brake shoes and wheel hub assembly.
- Disc brakes have the disc brake caliper assembly sectioned and come complete with disc, brake pads and wheel hub.

ABS-MSB-S

ABS-MLB-S

ABS-MDB-S  
ABS-CFC-S

ABS-CRC-S



## BRAKE TRAINING BOARDS

**Model Number:**

1. Single Disc Brake Board: consists of 1 disc brake unit and master cylinder
2. Single Drum Brake Board: consists of 1 drum brake unit and master cylinder
3. Dual Disc Brake Board: consists of 2 disc brake units and master cylinder
4. Dual Drum Brake Board: consists of 2 drum brake units and master cylinder
5. Combination Drum/Disc Brake Board: consists of 1 drum brake unit, 1 disc brake unit and 1 master cylinder
6. Servo Drum/Disc Brake Board: consists of 1 drum brake unit, 1 disc brake unit, 1 master cylinder with vacuum servo power assist Hand Brake

(L) brake light

(H) Hand Brake

**Educational Objectives:**

- Understand The brake training boards are designed for demonstration of brake operation and also for student skills training.
- Many exercises can be carried out on these training boards, such as inspection of brakes, removing/replacing shoes and pads, brake adjustment, removing/replacing hoses and tubing, brake bleeding, servicing wheel cylinders and calipers.

ABS-BTB-A (L/H)

ABS-BTB-B (L/H)

ABS-BTB-C (L/H)

ABS-BTB-D (L/H)

ABS-BTB-E (L/H)

ABS-BTB-F (L/H)



## SECTIONED ABD BRAKE BOARD

**Model Number: ABS-ABS-S**

**Educational Objectives:**

- Understand The trainer features a modern ABS braking system that consists of sectioned original automotive components which are mounted onto a demonstration board.
- Understand all the major components have been carefully sectioned to expose the internal working parts and connected together to make easy understanding of the brake assembly operation.
- The major components included are self-ventilating disc brake with wheel sensors, rear disc brake with wheel sensors, servo brake with foot control panel and brake pump, electronic control unit, and oil tank.
- The electronic control unit (ECU) is connected with wiring to the rear sensors on the disc brake and to the regulator group.
- The sectioned ABS Brake Board features a silk screened schematic of the major brake components.

## 2-WHEEL HYDRAULIC BRAKE TRAINER

**Model Number: ABS-BAC-2X**

**Educational Objectives:**

- Demonstrates full functionality of a 2-wheel hydraulic brake system.
- Provides easy access to all brake components without the confinements of a vehicle.
- Pressure gauges show actual braking pressure at each wheel.
- Many NATEF tasks can be accomplished using this trainer.
- All brake system components are accessible for complete mechanical and hydraulic repair and service.



## SECTIONED PNEUMATIC BRAKE TRAINER

**Model Number: ABS-CB1-S**

**Educational Objectives:**

- Understand Sectioned Pneumatic Air Brake Trainer provides a comprehensive system whereby the student may study and understand the principles, operational theory and maintenance of air brake systems found on trucks or large vehicles.
- Understand Sectioned items are color coded to aid in system function identification by the students.
- Understand The components are attached to panels, which are mounted on a mobile trolley. Two panels are included, one to simulate the truck (tractor) and the other for the trailer.

## PNEUMATIC AIR BRAKE TRAINER WITH

### ABS

**Model Number:**

1. Main Truck Air Brake System With Trailer Air Brake System
2. Main Truck Air Brake System Without Trailer Air Brake System

**Educational Objectives:**

- Understand the principles, operational theory and maintenance of ABS in an air brake systems found on trucks or large vehicles of 5 tons or above.
- Understand Original components are used in the trainer and the feature quick connection couplings with color-coded pneumatic hoses.
- Understand ABS Control Unit function is facilitated with a micro-controller system to send appropriate outputs to the Air Brake ABS modulator valves.
- Understand a color chart showing the brake system circuit is mounted onto the trainer for reference the components are attached to panels, which are mounted on a mobile trolley.
- Understand The wheel rotation and individual wheel speed detection is simulated using electric motor driven ABS wheel sensor assembly.
- Understand The ABS speed sensor sends the speed signal to ABS control unit which is then process the signal and sends appropriate output to ABS modulator valve to control braking force in individual brake actuator.
- Understand The trainer is complete with a comprehensive graphical training manual covering all aspects of air brake and ABS theory and functional technologies, student experiments for system configurations, diagnostics, and ABS simulations of road conditions.

**ABS-CB2-T**

**ABS-CB3-T**



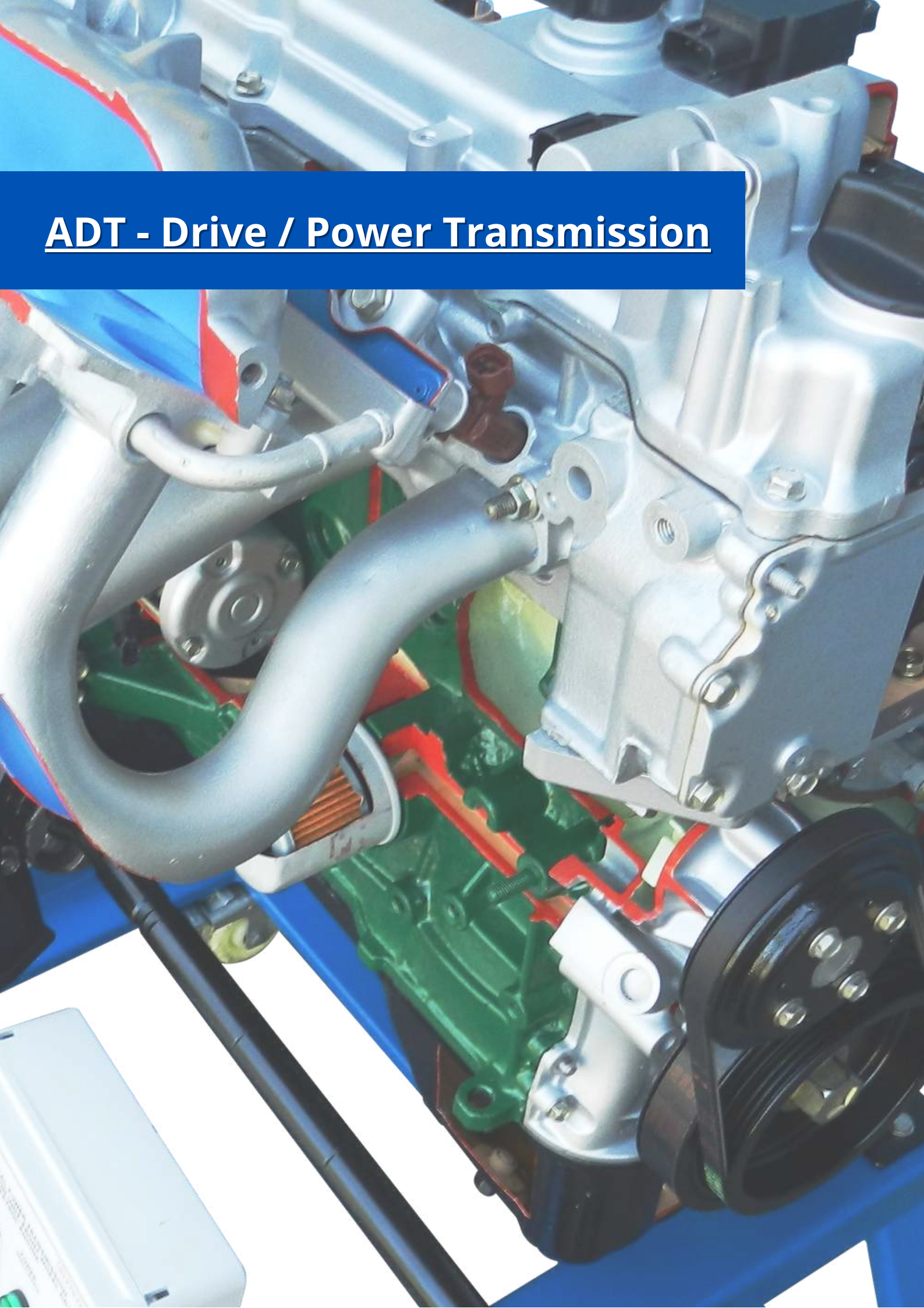
## ELECTROMECHANICAL PARKING BRAKE

**Model Number: ABS-EPB-1**

**Educational Objectives:**

- Understanding how rear-wheel brake actuators work and electromechanical parking brake works.
- Sensors and actuators in an electromechanical parking brake.
- Understanding Parking brake function.
- Dynamic pull-away assistant and emergency brake function.
- Understanding how brake boosters and hydraulic brakes work.
- Interpretation and use of technical documentation.
- Experimental investigation of the various functions for improved understanding.
- Assembly, configuration and testing of mechanical components.

# ADT - Drive / Power Transmission





## FRONT WHEEL DRIVE STEERING, SUSPENSION AND DRIVE UNIT

**Model Number:**

**1. Sectioned Front Wheel Drive Unit Manual Transmission**

**ADT-FWD-1S**

**2. Original Front Wheel Drive Unit Automatic Transmission**

**ADT-FWD-2O**

**3. Sectioned Front Wheel Drive Unit Automation Transmission**

**ADT-FWD-2S**

**Educational Objectives:**

- Understand the steering system is operable and comes with the steering wheel, steering gear box and all control linkages.
- Understand Sectioned Front End Units have been carefully cutaway to expose the internal features of all major parts including the steering gear box, transmission, disc brakes and shock absorbers.
- Understand All parts have been color coded to provide easy identification to students.

## MECHANICAL POWER TRANSMISSION DEMO UNIT

**Model Number:**

**1. Rear Wheel Drive Petrol Engine**

**ADT-PTU-1**

**2. Front Wheel Drive Petrol Engine**

**ADT-PTU-2**

**3. Front Wheel Drive Diesel Engine**

**ADT-PTU-3**

**4. Front Wheel Drive E.F.I Petrol Engine**

**ADT-PTU-4**

**5. Front Wheel Drive Common Rail Diesel Engine**

**ADT-PTU-5**

**Educational Objectives:**

- Features a sectioned engine with manual transmission that is connected to an axle/ drive system.
- System is motorized and ideal for showing the operation of the engine, clutch system, transmission and rear axle.
- The method of power transmission from the engine to the wheels may be clearly seen. Gears can be shifted and the output observed on the rear or front axle drive wheels.
- Consists of original automotive parts which have been carefully sectioned so that key internal parts and operations may be observed.
- The engine has been completely sectioned along with the transmission, differential and axle system.
- The rear wheel drive unit has the transmission connected to the rear axle by means of a shortened drive shaft.
- The engine is rotated by an electric motor at a reduced speed in order to simulate the moving parts during normal condition for observation.



## TRANSMISSION AND DRIVE SYSTEM DEMONSTRATION UNIT, REAR WHEEL DRIVE UNIT

**Model Number:**

**1. Rear Wheel Drive Unit**

**ADT-TDS-1**

**2. Front Wheel Drive Unit**

**ADT-TDS-2**

**3. Four Wheel Drive (4WD) Unit**

**ADT-TDS-3**

**Educational Objectives:**

- Familiarization of a sectioned manual transmission that is connected to an axle/ drive system.
- The system is motorized and ideal for showing the operation of the transmission, clutch system and drive axle.
- Familiarization of the method of power transmission from the engine to the wheels.
- Gears can be shifted and the output is observed on the rear or front axle drive wheels.
- Consists of original automotive parts which have been carefully sectioned so that key internal parts and operations may be observed.
- The transmission has been completely sectioned along with the differential and axle system.
- The rear-wheel-drive unit has the transmission connected to the rear axle by means of a shortened driveshaft. The rear axle includes the differential, axles and drum brakes.
- The front-wheel drive units include the transmission and differential unit as well as the drive axles, hubs and brakes.
- The transmission is rotated by an electric motor at a reduced speed for safety.





## SECTIONED TRANSMISSION FOR CLASSROOM DEMO

**Model Number:**

1. Manual transmission with 4 forward speeds and 1 reverse, for a rear wheel drive sedan
2. Manual transmission with 5 forward speeds and 1 reverse, for a rear wheel drive sedan
3. Manual transmission with 5 forward speeds and 1 reverse, for a rear wheel drive light to medium duty truck, has a twin shift mechanism
4. Manual transmission with 6 forward speeds and 1 reverse, for a rear wheel drive car, has three shift mechanisms
5. Manual transmission for a transverse mounted engine, front wheel drive sedan
6. Manual transmission for a heavy vehicle (truck) 12 speed

- ADT-TM4-S (F/B/C)  
 ADT-TM5-S (F/B/C)  
 ADT-TT5-S (F/B/C)  
 ADT-TT6-S (F/B/C)  
 ADT-TF5-S (F/B/C)  
 ADT-TTH-S (F/B/C)

- (F) floor  
 (B) bench stand.  
 (C) Comes with Clutch Plate

**Educational Objectives:**

- Familiarization Manual transmission with 4 forward speeds and 1 reverse, for a rear wheel drive sedan.
- Familiarization Manual transmission with 5 forward speeds and 1 reverse, for a rear wheel drive sedan.
- Familiarization Manual transmission with 5 forward speeds and 1 reverse, for a rear wheel drive light to medium duty truck, has a twin shift mechanism.
- Familiarization Manual transmission with 6 forward speeds and 1 reverse, for a rear wheel drive car, has three shift mechanisms.
- Familiarization Manual transmission for a transverse mounted engine, front wheel drive sedan.
- Familiarization Manual transmission for a heavy vehicle (truck) 12 speed.



## ORIGINAL TRANSMISSIONS FOR SKILL TRAINING

**Model Number:**

1. Manual transmission with 4 forward speeds and 1 reverse, rear wheel drive
2. Manual transmission with 5 forward speeds and 1 reverse, rear wheel drive
3. Manual transmission with 5 forward speeds and 1 reverse, for a rear wheel drive light to medium duty truck, has twin shifter mechanism
4. Manual transmission with 5 forward speeds and 1 reverse, for a transverse mounted engine, front wheel drive
5. Automatic transmission, rear wheel drive
6. Automatic transmission for a transverse engine front wheel drive

- ADT-TM4-O (F/B, N/R)  
 ADT-TM5-O (F/B, N/R)  
 ADT-TT5-O (F/B, N/R)  
 ADT-TF5-O (F/B, N/R)  
 ADT-TAR-O (F/B, N/R)  
 ADT-TAF-O (F/B, N/R)

- Bench Top Base (B)  
 Rotating Floor Stand (F)  
 Both New (N)  
 Reconditioned (R)

**Educational Objectives:**

- Familiarization Manual transmission with 4 forward speeds and 1 reverse, rear wheel drive.
- Familiarization Manual transmission with 5 forward speeds and 1 reverse, rear wheel drive.
- Familiarization Manual transmission with 5 forward speeds and 1 reverse, for a rear wheel drive light to medium duty truck, has twin shifter mechanism.
- Familiarization Manual transmission with 5 forward speeds and 1 reverse, for a transverse mounted engine, front wheel drive.
- Familiarization Automatic transmission, rear wheel drive.
- Familiarization Automatic transmission for a transverse engine front wheel drive.



## CLUTCH DEMONSTRATION UNIT

**Model Number:**

1. Diaphragm Spring Clutch
2. Coil Spring Clutch
3. Double Plate Hydraulic Clutch
4. Single Plate Hydraulic Clutch

- ADT-CSD-T  
 ADT-CSC-T  
 ADT-CDH-T  
 ADT-CDS-H

**Educational Objectives:**

- All units' feature original components of clutch pressure plate, clutch disc, clutch activating lever and throw out bearing.
- The features an original transmission input shaft to observe rotation of the fly wheel and power transmission input shaft.
- The features a cust and machine shaft which is sturdily built in relation to the size of the components.
- All the Clutch Demonstration Units demonstrate the operation of clutch engagement and clutch disengagement, with an easy to operate hand lever and hand crank.



## SECTIONED CLUTCH MODELS



**Model Number:**

**1. Sectioned Single Plate Diaphragm Clutch**

**ADT-CSD-S**

**2. Sectioned Single Plate Coil Spring Clutch**

**ADT-CSS-S**

**3. Sectioned Double Plate Coil Spring Clutch (with Hydraulic Actuating Cylinder)**

**ADT-CDH-S**

**4. Sectioned Hydraulic Clutch**

**ADT-CHY-S**

**Educational Objectives:**

- The sectioned Clutch Units are useful for viewing the inner working of the clutch mechanism.
- The units are made from original parts which have been carefully sectioned to expose the key operational elements.

Note: as these units have been sectioned they are not operational.

## SECTIONED TORQUE CONVERTER

**Model Number: ADT-TRC-S**

**Educational Objectives:**

- The sectioned torque converter is an original component from an automatic transmission as commonly used in passenger vehicles.
- The torque converter acts as a type of continuous and variable clutch mechanism to transmit power from the engine on through to the transmission.
- The torque converter has been carefully cut away to expose key components within the torque converter housing.
- These components are color coded to provide easy identification.
- The torque converter stator and turbine can be rotated by a hand crank.
- The unit comes complete with an original fly wheel.
- The entire unit is mounted on an base plate.



## CARDAN STAFF , UNIVERSAL JOINTS

**Model Number: ADT-CRS-O**

**Educational Objectives:**

- Study of a Carden Shaft (Drive Propeller shaft) is provided for student instruction, demonstration and practical exercises.
- The unit is a complete original carden shaft which provides the power link from the transmission to the rear axle as found on an average size sedan. A Carden (propeller) Shaft includes two universal joints.



## UNIVERSAL JOINTS

**Model Number: ADT-UNV-O**

**Educational Objectives:**

- The Universal Joint is supplied separate from the carden shaft. It is useful for instructional purposes for the demonstration of power transmission at different angel.



## SECTIONED ORIGINAL REAR AXLES

**Model Number:**

**1. Sectioned Rear Axle for Sedan with Drum Brake**

**ADT-RXS-S**

**2. Sectioned Rear Axle for Sedan with Independent Rear Suspension**

**ADT-RXI-S**

**3. Sectioned Rear Axle for Light Duty Truck with Drum Brakes**

**ADT-RXL-S**

**4. Sectioned Rear Axle for Medium Truck**

**ADT-RXM-S**

**Educational Objectives:**

- The Sectioned Rear Axles are available in a number of different types and are ideal for demonstrating the operational principles of transmission of power to the rear wheels.
- The Units come complete with universal joint mounting flange, differential, rear axle shafts, brakes and are mounted on a floor stand fitted with wheels for mobility.
- All parts have been carefully sectioned to expose key internal components and have been expertly finished in order to provide an excellent appearance.
- A wall chart is optional.



## ORIGINAL REAR AXLES FOR SKILLS TRAINING

### Model Number:

1. Original Rear Axle for Sedan with Drum Brakes
2. Original Rear Axle for Sedan with Independent Rear Suspension
3. Original Rear Axle for Light Duty Truck with Drum Brakes
4. Original Rear Axle for Medium
5. Original Rear Axle for Heavy Vehicle (truck)

- ADT-RXS-O  
ADT-RXI-O  
ADT-RXL-O  
ADT-RXM-O  
ADT-RXH-O

### Educational Objectives:

- Familiarization of a full-size rear axle.
- Demonstration of Operational principles rear axle.
- Repair and maintenances techniques for rear axle.
- Rear axle complete with the universal joint mounting flange, differential, rear axle shafts and brake.
- The rotating stamp comes with the holding fixture to secure the rear axle to the clamping device.
- Each rear axle comes with a workshop manual for repair and technical instruction.



## SECTIONED AUTOMATIC TRANSMISSIONS

### Model Number:

1. Sectioned Rear Wheel Drive Automatic Transmission With 3 Forward Speeds And 1 Reverse
2. Sectioned Rear Wheel Drive Automatic Transmission With 4 Forward Speeds And 1 Reverse
3. Sectioned Rear Wheel Drive Automatic Transmission With 5 Forward Speeds And 1 Reverse
4. Sectioned Front Wheel Drive Automatic Transmission With 3 Forward Speeds And 1 Reverse
5. Sectioned Front Wheel Drive Automatic Transmission With 4 Forward Speeds And 1 Reverse
6. Sectioned Front Wheel Drive Automatic Transmission With 5 Forward Speeds And 1 Reverse
7. Sectioned CVT (Continuous Variable Transmission) Automatic Transmission

- ADT-TAR-3S (F/B/E)  
ADT-TAR-4S (F/B/E)  
ADT-TAR-5S (F/B/E)  
ADT-TAF-3S (F/B/E)  
ADT-TAF-4S (F/B/E)  
ADT-TAF-5S (F/B/E)  
ADT-CVT-S (F/B/E)

### Educational Objectives:

- The sectioned transmissions are ideal for instruction in the classroom to aid in the explanation of design, construction operation principles and servicing techniques.
- Two models are available, one for rear wheel drive vehicles and the other for transverse mounted front wheel drive vehicles.
- Each transmission is expertly sectioned so that all key internal parts are exposed for viewing.
- The movement and operation of the parts are clearly visible including the torque converter, epicyclic braking system, multiple plate clutches and control valves.
- The sectioned areas have been painted and color coded for easy identification.
- The units are mounted either in a Rigid Steel Bench-Top Base (option B) or on a Wheeled Floor Stand (option F) for mobility around the class room. (option E) for Electronically controlled. Transmission units are operated by a crank handle.

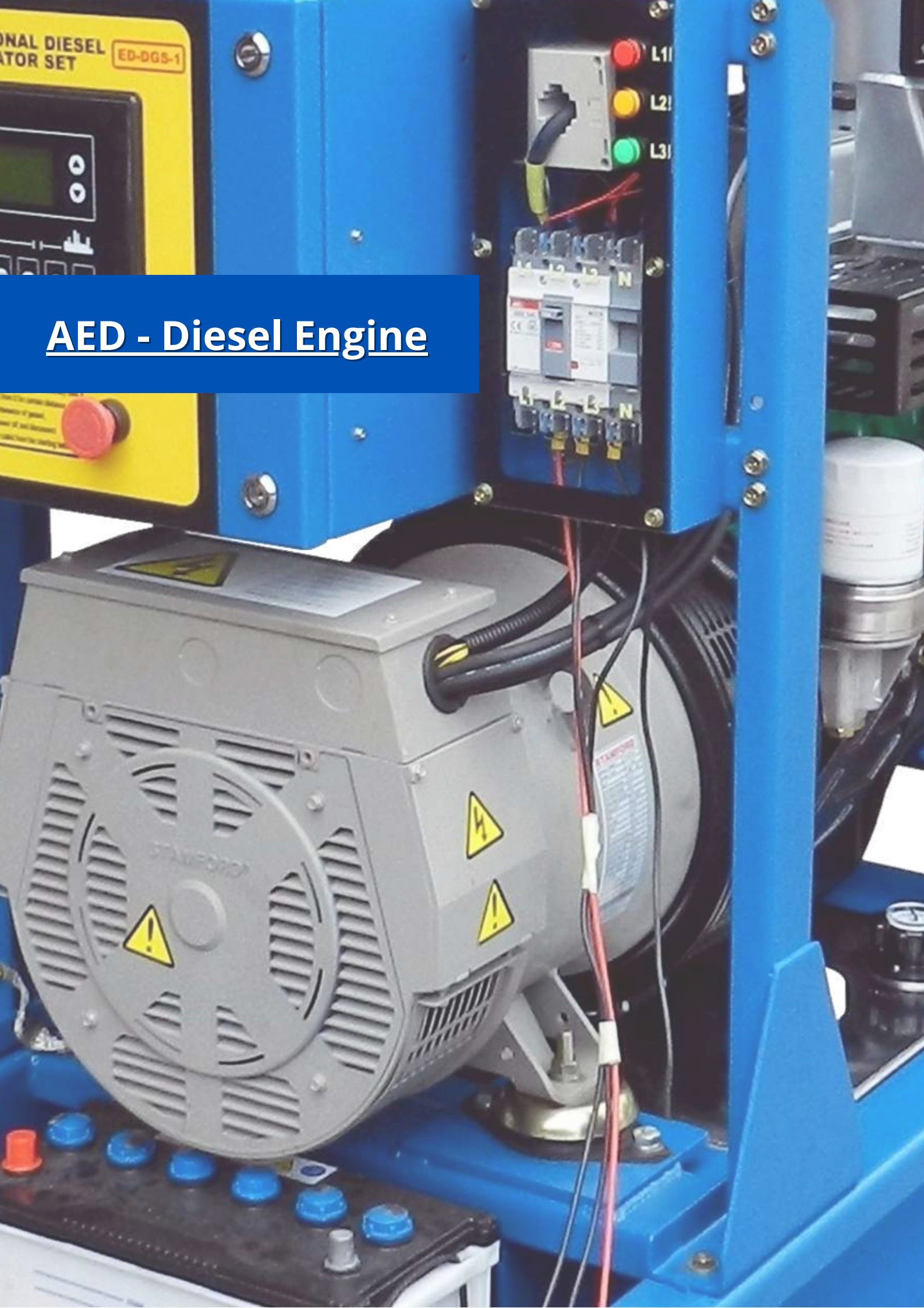


## AUTOMATIC TRANSMISSION SIMULATOR

### Model Number: ATS-TRM-1

#### Educational Objectives:

- Automotive Electrical Components and their symbols
- Vehicle electrical wiring
- Principles of Automotive Transmission System
- Fundamental and concept of Automotive Transmission System
- Diagnose and identify electrical faults for short circuit, open circuit, bad components in Automotive
- Transmission System electrical circuit through break out terminals with electrical test points.
- Automotive Transmission troubleshooting with automatic inserted fault by student or teacher computer.



## AED - Diesel Engine



## SECTIONED DIESEL ENGINE

### Model Number:

1. 4 cyl, In-Line Injection Pump, OHV
2. 4 cyl, Rotary Injection Pump, OHV
3. 4 cyl, Rotary Injection Pump, OHC
4. 4 cyl, Rotary Injection Pump, OHC, Turbo
5. 4 cyl, Common Rail, OHC, Turbo
6. 6 cyl, In-Line Injection Pump
7. 6 cyl, common rail, OHC

- AED-SDE-01 (Z, L, T)  
 AED-SDE-02 (Z, L, T)  
 AED-SDE-03 (Z, L, T)  
 AED-SDE-04 (Z, L, T)  
 AED-SDE-05 (Z, L, T)  
 AED-SDE-06 (Z, L, T)  
 AED-SDE-07 (Z, L, T)

### Educational Objectives:

- The complete engine and transmission has been carefully sectioned to expose all the internal operation details.
- All major parts have been sectioned including the engine block, transmission, alternator, fuel injection pump, starter motor, water pump, thermostat, oil filter, etc.
- Demonstrating the operation of the engine all key working parts may clearly be seen, therefore showing the student the function and inter-relationship between the components.
- Sectioned areas and color coded for easy identification.
- The engine may be turn over by a hand crank or the optional electric motor.
- Engine and transmission are mounted on a sturdy steel stand which is fitted with a wheels for easy mobility.

## DIESEL ENGINE TEST BED

### Model Number:

1. Conventional Diesel Engine

AED-IDI

### Optional Items:

1. Matched transmission and shifting mechanism for the ordered engine
2. Engine Electrical Test Point
3. Electronic Fault System
4. Turbo with intercooler system for the supplied engine
5. Fuel line modification to include a number of manual valves

AED-TBL

AED-IDI-1

AED-IDI-2

AED-IDI-3

AED-IDI-4

### Educational Objectives:

- Familiarization with Diesel Engine Components: Cooling system, Fuel System, starting and charging system.
- Operate Diesel Engine in normal operation and observe the conditions.
- Understand the function of cooling system and working principles of cooling system radiator and lubrication system.
- Observe and work with lubrication system and charging system.
- Understand the fuel system components in diesel engines.
- Observe and work with diesel engine fuel system.
- Observe and work with intercooler system.
- Understand the working principles of intercooler.
- Observe and work with diesel injector/nozzle fuel circuit.
- Understand the function and working principles of turbocharger and EGR.
- Electronic Faults Insertion System for troubleshooting test and experiments.
- Adjust the injection timing on a diesel engine for advance and retard injection timing.
- Understand the working principles of injection pump and the effect of injection timing.



## COMMON RAIL DIRECT INJECTION DIESEL ENGINE WITH FAULT SIMULATION

**Model Number:** ED-CDI

**Optional Items:**

- 1. Matched transmission and shifting mechanism for the ordered engine** AED-TBL
- 2. Electrical Test Point** AED-CDI-1
- 3. Electronic Fault System** AED-CDI-2

**Educational Objectives:**

- Familiarization with Diesel Engine Components : Cooling system, Fuel System, starting and charging system.
- Operate Diesel Engine in normal operation and observe the conditions
- Understand the function of cooling system and working principles of cooling system.
- Understand the function of radiator.
- Understand the function of lubrication system.
- Observe and work with lubrication system.
- Understand the function of glowplug and analyze the trouble symptoms on glowplug.
- Observe and work with charging system.
- Troubleshoot a charging circuit.
- Understand the fuel system components in diesel engines.
- Observe and work with diesel engine fuel system.
- Understand the work principles of injection pump and the effect of injection timing.
- Adjust the injection timing on a diesel engine for advance and retard injection timing.
- Understand the function and work principle of diesel injector/ nozzle function.
- Observe and work with diesel injector/nozzle fuel circuit
- Understand the work principles of intercooler (for ED-CDI).
- Observe and work with intercooler system (for ED-CDI)..
- Understand the function and work principles of turbocharger (for ED-CDI).
- Understand the function and work principles of EGR (Exhaust Gas Recirculation) (for ED-CDI).



## USED DIESEL ENGINES FOR SKILLS PRACTICE

**Model Number:**

- 1. Engine On Stand** AED-DRS-1
- 2. Engine and Transmission On Stand** AED-DRS-2

**Educational Objectives:**

- Training of skills for disassembly, reassembly, engine operation, repair and maintenance.
- Study of engine operation, tune-up, diagnosis, fault finding and trouble shooting.
- Familiarization of a complete engine system that can be run normally.
- Familiarization of parts of fuel system, parts of cooling system, parts of lubrication system and parts of starting and charging system.
- Familiarization parts of instrument and control panel.
- Engine is mounted on a rotating stand that can lock in different positions. Bottom of stand incorporates a built in oil drip pan.



## MARINE ENGINE TEST BEDS

**Model Number:** PM-TBL-1

**Educational Objectives:**

- The Engine Test Beds series includes fuel tank, fuel filter, oil filter, alternator, starter, fuel injection pump, battery, exhaust system with silencer and with an Instrumentation Panel with a key switch and a full range of meters and gauges.
- Understand Marine engines with sea water heat exchangers are set up with a water tank and water can be fed into the tank to allow for extended test sessions.





## DIESEL GENERATOR SET

**Model Number: AED-DGS-1**

**Educational Objectives:**

- Determines the size, type and performance characteristics of the generator set.
- Study of the function and characteristics of electrical machines.
- Familiarization of parts of diesel engine; parts of cooling system parts of lubrication and parts of starting and charging system.
- Familiar with component of the diesel generator set and the diesel generator set control parts.
- Explain the starting sequence of the Diesel Generator Set.
- Familiar Start the Diesel Generator Set properly.
- Familiar with control panel of the diesel generator set and the parameter of the generator set.
- Familiar with measurement load of the diesel generator set.
- Understand and identify temperature engine, engine speed, oil pressure and battery voltage of the diesel generator set.
- Understand the system at high temperature auto shut down.

## HEAVY DUTY ENGINE TEST BEDS

**Model Number:**

**1. Engine With Gear Box**

**AED-TBL-H**

**2. Engine Without Gear Box**

**AED-TBS-H**

**Educational Objectives:**

- The Test beds feature engines that are from Heavy equipment vehicles such as Buses, Trucks and Tractors. They are ideal for heavy equipment service training programs.
- The Engine frames are made from a sturdy structural steel construction onto which the engine is mounted. The frame is designed so that the engine is at working height and contains all the required accessories for operation.
- All Test beds feature the steel test bed frame, fuel tank, fuel filter, oil filter, alternator, starter, instrumentation and controls, fuel injection pump, heavy duty radiator, battery, air tank (for air start models only), exhaust silencer and workshop manual.
- The engines are provided according to project specifications and can be ordered either new or reconditioned.



## SECTIONED HEAVY DUTY DIESEL ENGINES

**Model Number:**

**1. 6 Cylinder, In line, 4 Stroke, 200-350HP**

**AED-SHD-01 (Z)**

**2. 6 Cylinder, V-shape, 2 Stroke, 200-350HP**

**AED-SHD-02 (Z)**

**3. 8 Cylinder, V-shape, 4 Stroke, 350-400HP**

**AED-SHD-03 (Z)**

**4. 8 Cylinder, V-shape, 2 Stroke, 350-450HP**

**AED-SHD-04 (Z)**

**5. 12 Cylinder, V-shape, 4 Stroke, 450-600HP**

**AED-SHD-05 (Z)**

**6. 12 Cylinder, V-shape, 2 Stroke, 450-650HP**

**AED-SHD-06 (Z)**

**Educational Objectives:**

- Familiar with Sectioned Heavy-Duty Diesel Engines for demonstrating the operational principles, characteristics and function of the unit.
- All major parts have been sectioned including the Motor starter, Turbocharger, Blower assembly, Oil filter, Fuel filter, Fuel pump, Alternator, Mechanical Governor, Head cylinder, Water pump, Cylinder block, etc.
- Familiarization of a full-size original Engine and all parts of Heavy Duty Diesel Engines.
- Sectioned areas and color coded for easy identification.
- Demonstrating the operation of the engine all key working parts may clearly be seen, therefore showing the student the function and inter-relationship between the components.
- The engine is rotated by an electric motor at a reduced speed in order to simulate the moving parts during normal condition for observation.
- Engine and transmission are mounted on a sturdy steel stand which is fitted with a wheel for easy mobility.



## TWO STROKE DIESEL ENGINE SIMULATOR

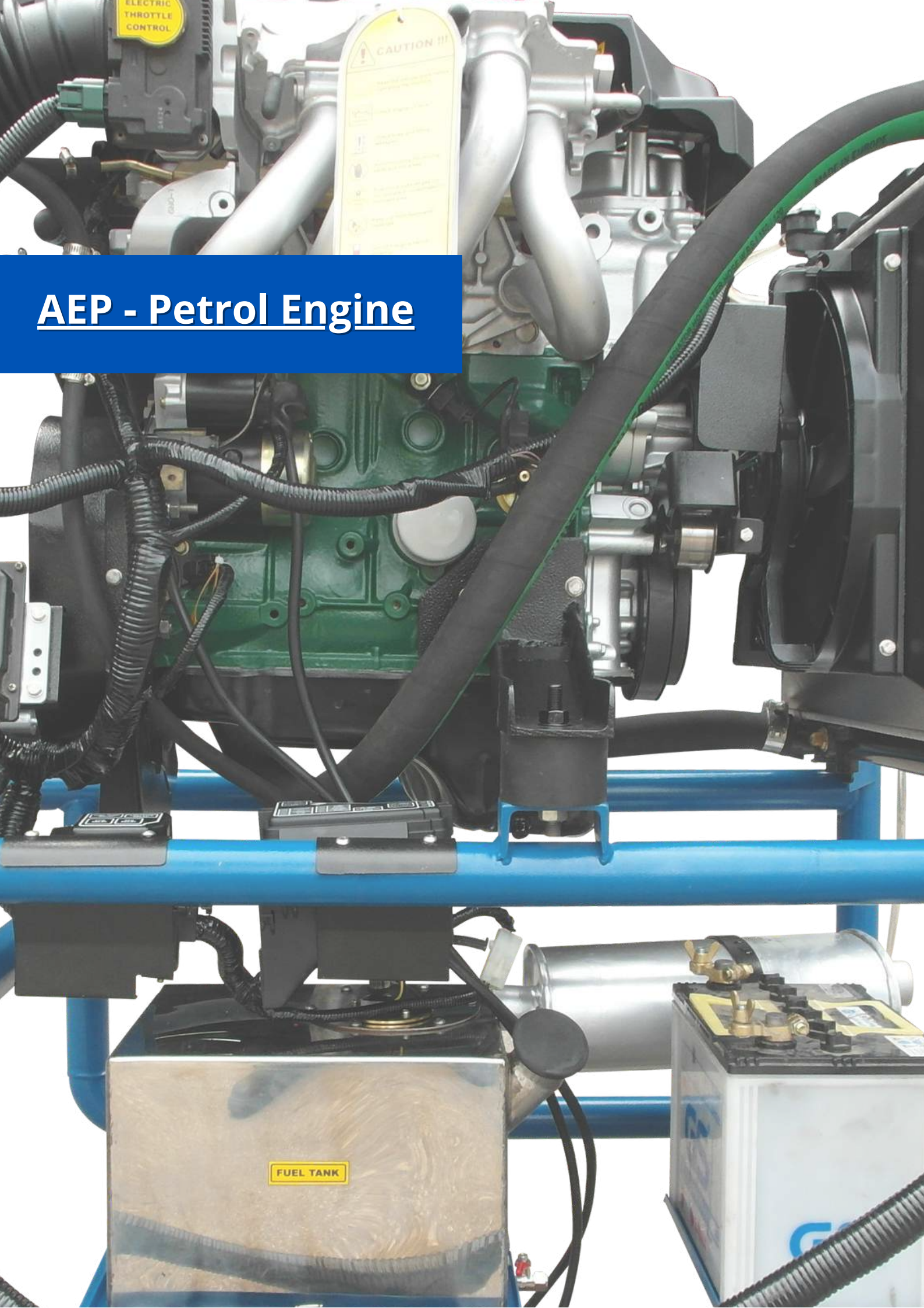
**Model Number: ATS-2DD**

**Educational Objectives:**

- Realistic Simulation of Two Stroke Diesel Engine system with Real Time Results and Modular Panel Layout.
- Graphic System Presentation of Two Stroke Diesel Engine system components with components location and identification like in the real vehicle.
- Realistic Troubleshooting Exercises with Error Answer Feedback featuring electrical test points and electronic interactive fault simulator system.
- Two Stroke Diesel Engine system schematic panel that shows clearly the complete electrical wiring with test points.
- Comprehensive Courseware for both Teacher and Student. Experiments Manuals consist of : Installation and Maintenance Guide of the trainer, health and safety guidance, Background theory in Two Stroke Diesel Engine System circuits and components, Task objectives, Practical Task step by step instruction, Question with Answer sheets, Student Job sheets.



# AEP - Petrol Engine





## SECTIONED PETROL ENGINES

**Model Number:**

<b>1.4 Stroke, 4 cylinder, In-Line, Overhead Valve, Carburetor, Engine Cooling System, Engine Lubrication System, Engine Ignition System, Engine Starting &amp; Charging System and Exhaust System</b>	<b>AEP-SPE-01 (Z/T)</b>
<b>2. 4 Stroke, 4 cylinder, In-Line, Overhead Cam, Carburetor, Engine Cooling System, Engine Lubrication System, Engine Ignition System, Engine Starting &amp; Charging System and Exhaust System</b>	<b>AEP-SPE-02 (Z/T)</b>
<b>3. 4 Stroke, 4 cylinder, In-Line, Overhead Valve, Electronic Fuel Injection (EFI) System, Electronic Ignition System, Engine Starting &amp; Charging System, Engine Cooling System (Water type), Engine Lubrication System and Exhaust System</b>	<b>AEP-SPE-03 (Z/T)</b>
<b>4. 4 Stroke, 4 cylinder, In-Line, Overhead Cam, Electronic Fuel Injection (EFI) System, Electronic Ignition System, Engine Starting &amp; Charging System, Engine Cooling System (Water type), Engine Lubrication System and Exhaust System</b>	<b>AEP-SPE-04 (Z/T)</b>
<b>5. 4 Stroke, 4 cylinder, In-Line, DOHC, Electronic Fuel Injection (EFI) System, Electronic Ignition System, Engine Starting &amp; Charging System, Engine Cooling System (Water type), Engine Lubrication System and Exhaust System</b>	<b>AEP-SPE-05 (Z/T)</b>
<b>6. 4 Stroke, 4 cylinder, In-Line, DOHC, VVT-i, Electronic Fuel Injection (EFI) System, Electronic Ignition System, Engine Starting &amp; Charging System, Engine Cooling System (Water type), Engine Lubrication System and Exhaust System</b>	<b>AEP-SPE-06 (Z/T)</b>

### **Educational Objectives:**

- The complete engine and transmission has been carefully sectioned to expose all the internal operation.
- All major parts have been sectioned including the engine block, transmission, alternator, fuel injection pump, starter motor, water pump, thermostat, oil filter, etc.
- Demonstrating the operation of the engine all key working parts may clearly be seen, therefore showing the student the function and inter-relationship between the components.
- Sectioned areas and color coded for easy identification.
- The engine may be turn over by a hand crank or the optional electric motor.
- Engine and transmission are mounted on a sturdy steel stand which is fitted with a wheels.



## PETROL ENGINE TEST BED

**Model Number:**

<b>1. Carburetor Petrol Engine (1300cc – 2000cc Engines)</b>	<b>AEP-CRE</b>
<b>2. Dual Fuel Petrol and LPG Engine (1300cc – 2000cc Engines)</b>	<b>AEP-DFE</b>

**Educational Objectives:**

- Familiarization with Carburetor type Engine Components: Cooling system, Fuel System, Ignition System, Engine Control Unit, starting and charging system.
- Familiarization with LPG fuel system Components: Vaporizer, mixer and dual fuel control (EPDFE only).
- Operate Carburetor Engine in normal operation and observe the conditions.
- Operate Dual Fuel Engine in normal operation and observe the conditions (EP-DFE only).
- Observe the ignition timing and analyzed the engine timing at different rpm
- Observe and work with carburetor fuel system components.
- Observe and work with vaporizer and mixer for LPG fuel system components (EP-DFE only).
- Observe and work with engine cooling system components.
- Observe and work with engine lubrication system components.
- Perform electrical measurement of the fuel system control circuit
- Familiarization with Engine Control unit and Sensors.
- Test and troubleshoot of spark plugs
- Test and troubleshoot ignition coil
- Test and troubleshoot electrical starting system
- Test and troubleshoot charging system



## EFI LIVE PETROL ENGINE TEST BED WITH FAULT SIMULATOR

**Model Number: AEP-EFI**

**Educational Objectives:**

- Familiarization with EFI Engine Components : Cooling , Fuel System, Ignition System, Engine Control Unit and Sensors, starting and charging system.
- Observe the operation of fuel system components and understanding the electrical connection of the fuel pump, fuel pump relay and main relay.
- Operate EFI Engine in normal operation and observe the conditions.
- Observe the ignition timing and analyze the engine timing at different rpm.
- Perform electrical measurement of the fuel pump control circuit.
- Familiarization with Engine Control unit and Sensors.
- Test and troubleshoot of fuel injectors.
- Test and troubleshoot ignition coil.
- Test and troubleshoot of Idle Air Control Valve (IACV).
- Test and troubleshoot Camshaft Position Sensor.
- Test and troubleshoot Crankshaft Position Sensor.
- Test and troubleshoot Mass Air Flow Sensor (MAF).
- Test and troubleshoot Throttle Position Sensor (TPS).
- Electronic Faults Insertion System for troubleshooting test and experiments.
- Measurement of test points.
- Reading trouble codes.



## PROGRAMMABLE EFI ENGINE WITH FAULT SIMULATION

**Model Number: AEP-EFI-P**

**Educational Objectives:**

- Familiarization with EFI Engine Components: Cooling system, Fuel System, Ignition System, Engine Control Unit, starting and charging system.
- To be able to view and to program the performance parameters of the EFI system and to the effect on the engine operation.
- Observe the operation of fuel system components and understanding the electrical connection of the fuel pump, fuel pump relay and main relay.
- Test and troubleshoot of fuel injectors, ignition coil, Idle Air Control Valve (IACV), Camshaft Position Sensor, Crankshaft Position Sensor, Mass Air Flow Sensor (MAF), Throttle Position Sensor (TPS).
- Familiar with the effect and fault symptom of faulty Engine Coolant Temperature Sensor.
- Familiar with the effect of faulty Radiator fan relay on Radiator fan activation.
- Perform electrical measurement of the fuel pump control circuit.
- Familiarization with Engine Control unit and Sensors.
- Test and troubleshoot ignition coil and fuel injectors.
- Electronic Faults Insertion System for troubleshooting test and experiments.
- Observe the ignition timing and analyze the engine timing at different rpm.
- Operate EFI Engine in normal operation and observe the conditions.
- Familiar with Programmable ECU EFI Petrol Engine Test Bed.
- Measurement of test points.



## AUTOMOTIVE TRANSAXLE TRANSMISSION

**Model Number:**

**1. Automatic Transmission W/O ECU**

**AEP-ATT-1**

**2. Automatic Transmission With ECU**

**AEP-ATT-2**

**Educational Objectives:**

- Study of modern front wheel drive automatic transaxles principles.
- Familiarization of a full-sized reconditioned engine with complete front wheel drive automatic transaxle.
- This has been mounted on engine test bed and all parts are completely functional. Also included are the drive shafts and braking system.
- The braking system is operable and can be used to provide a load to the transaxle; the engine of course drives the transaxle.
- The entire unit operates just like on the vehicle and all the parts and components are easily accessible.
- Instrumentation is provided to demonstrate the operational characteristics.
- Brake pressure gauges are provided to indicate load. The unit can be driven at different speeds and loads so that the shift changes through the gears may be observed.
- Teaching of engine operation, tune-up, diagnosis, fault finding and trouble shooting.



## LIVE PETROL ENGINE FOR REPAIR SKILLS TRAINING

**Model Number: AEP-LRS-(T)**

**Educational Objectives:**

- Training of skills for disassembly, reassembly, engine operation, repair and maintenance.
- Study of engine operation, tune-up, diagnosis, fault finding, and trouble shooting.
- Familiarization of a complete engine system that can be run normally.
- Familiarization of parts of fuel system, parts of cooling system, parts of lubrication system and parts of starting and charging system.
- Familiarization parts of instrument and control panel.
- Engine is mounted on a rotating stand that can lock in different positions. Bottom of stand incorporates a built in oil drip pan.



## USED PETROL ENGINES FOR SKILLS PRACTICE

**Model Number:**

**1. Engine on Stand**

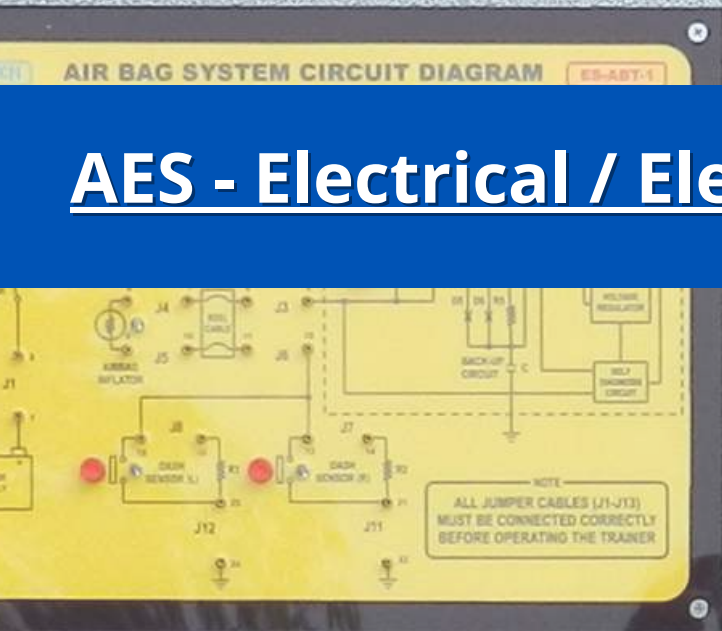
**AEP-DRS-1**

**2. Engine and Transmission on Stand**

**AEP-DRS-2**

**Educational Objectives:**

- The engines are provided for students to practice disassembly, reassembly exercises in order to build up their skills before proceeding to work on live engines.
- Familiarization of all major components such as the engine block, oil filter, alternator, distributor, coil, spark plugs, carburetor, fuel pump, water pump, fan, belts and flywheel.
- The engines are provided in good condition and have been thoroughly cleaned and painted. All engines have been test run to ensure they are operable without major defects.
- A variety of engines are available and each comes with a workshop manual for technical reference.
- As an extra feature these engine can be operated after overhaul (with the Rebuild Kits) by using the Labtech Mobile Engine Support Unit (see separate brochure for details).



## AES - Electrical / Electronic System

TOR



CABLE



FUSE



DASH SENSOR L



DASH SENSOR R



SRS CONTROL UNIT AND ARMING SENSOR



POWER INDICATOR



CAR SWITCH SIMULATOR



IGNITION SWITCH



STEERING WHEEL



## AUTO ELECTRICAL TRAINING SYSTEM (GROUP PANEL TYPE)

**Model Number: ES-EP Series**

### **Educational Objectives:**

- Realistically simulate the electrical system on an automobile.
- The unit consists of a number of modular demonstration panels, which are mounted on a wheeled stand that contains a power source and component connecting cables..
- The components featured are real original parts as commonly used in automobile typically produced by the major car.
- Demonstration of various types of wiring and to familiarize with typical car electrical systems.
- Perform actual wiring exercises with the various components.
- The Original components are mounted on clear Plexiglas panels that
- allow high visibility of all parts and wiring.



## AUTO ELECTRICAL TRAINING SYSTEM WITH COMPUTER AIDED INSTRUCTION SYSTEM

**Model Number: ES-EPX**

### **Educational Objectives:**

CAI (Computer Aided Instruction) multimedia software is included to provide more in-depth understanding of various automotive electrical circuits by using simulation features and interactive approach in delivering the theory and experiment procedures in details. The software and experiments allow the students to:

- Understand Engine Instrument operation.
- Understand voltage, current and resistance measurement in automotive electrical system.
- Understand parameters of engine sensors and function of individual automotive component



## AUTO ELECTRICAL CHASSIS

**Model Number:**

**1. Auto Electrical Chassis (Unwired)**

**ES-ECU-T**

**2. Auto Electrical Chassis (Prewired)**

**ES-ECP-T**

**3. Auto Electrical Chassis with 24 Fault Switches**

**ES-ECP-TF**

### **Educational Objectives:**

- Skills training of actual wiring of basic Automotive Electrical System as found on most vehicles.
- This unit uses original parts as they are used in the car and built onto a moveable frame.
- The component wiring is made simple to help students when doing the Exercises.
- The components are installed onto the frame and attached in approximately the same position as found on the real car.
- The components are: Headlights, Turn Signals, Horn, Brake Lights, Parking Lights, Side Marker Light, Reverse Lights, License Plate Light, Distributor for 4 Spark plugs, Ignition Coil and Alternator.
- Dashboard Panel consists of Ampere meter, Voltmeter, Tachometer, Ignition Switch, Reverse Switch, Brake Switch, Hazard Switch, Combination Switch, Horn Button, Cigarette lighter, Indicator lamps and Fuse Box.
- This Auto Electrical Chassis is completed with the test point.
- Optional Fault Insertion System for troubleshooting exercises.



## AUTOMOTIVE ELECTRICAL TRAINER INDIVIDUAL PANEL TYPE

**Model Number: AES-EX(1-9)**

**Educational Objectives:**

- The Electrical Practical Training Board System is designed to realistically simulate the electrical system on an auto mobile.
- The unit consists of a number of modular demonstration panels, which are mounted on a wheeled stand that contains a power source and component connecting cables.
- The components featured are real original parts as commonly used in automobile typically produced by the major car or component manufacturers.
- The system can be used in the classroom as a demonstration unit to show students various types of wiring and to familiarize them with typical car electrical systems. Also it can be used as a trainer with the student performing actual wiring exercises with the various components.
- The Original components are mounted on clear Plexiglas panels that allow high visibility of all parts and wiring.
- The panels are fixed vertically to a frame which is mounted on a heavy-duty cabinet that contains three storage drawers.
- The Vertical presentation of panels simulates the schematic presentation of common vehicle wiring diagrams.
- The panels feature wiring guides and icons which have been silk-screened onto the panels so as to familiarize the student with schematic type wiring diagrams.
- The wires of each component are brought to 4mm wiring terminals mounted on the panel. Connection of the components is easily accomplished by using the cables with stackable 4mm plugs that are provided. A 12 Volt DC transformer that duplicates the power as supplied by a car furnishes power to the components.



## SECTIONED IGNITION SYSTEM DEMO UNITS

**Model Number:**

- |   |                  |
|---|------------------|
| <b>1. Breaker Type with One Spark Plug</b>      | <b>ES-SIS-B1</b> |
| <b>2. Breaker Type with Four Spark Plugs</b>    | <b>ES-SIS-B4</b> |
| <b>3. Electronic Type with One Spark Plug</b>   | <b>ES-SIS-E1</b> |
| <b>4. Electronic Type with Four Spark Plugs</b> | <b>ES-SIS-E4</b> |

**Educational Objectives:**

- The unit displays components for demonstrating the construction and operation of a conventional (Breaker Point) and Electronic Type ignition systems.
- Demo units feature original parts which have been carefully sectioned in order to expose key operational features of the coil (or CDI), distributor and spark plug.
- A unique feature of this unit is that all parts have been left fully functional so that the actual operation (not a simulation) of the distributor and spark plug is observed by rotating the handle at the base of the distributor.
- The system is energized by a 12 Volt DC transformer which is activated by a real ignition key. During operation the spark plug will spark and the lamp (mounted below spark plug) will light when the distributor is in the position for firing the spark plug.
- The Demo Units are available in four models which feature either one or four plugs and conventional or electronic type ignition systems.



## MOTORIZED IGNITION SYSTEM DEMONSTRATORS

**Model Number:**

- |  |                  |
|--|------------------|
| <b>1. Conventional Braker Type Simulator</b> | <b>ES-MIS-BR</b> |
| <b>2. Electronic Distribution Simulator</b>  | <b>ES-MIS-ET</b> |
| <b>3. Electronic Ignition Simulator</b>      | <b>ES-MIS-ED</b> |

**Educational Objectives:**

- Understand the Ignition timing on Conventional Breaker Type Simulator and Timing Advance system.
- Understand the standard gap of Spark Plug.
- Understand the standard gap of contact point.
- Define the term of Conventional Breaker Type Simulator System.
- Identify the components of the Conventional Breaker Type Simulator System Trainer.
- Operate the Conventional Breaker Type Simulator System Trainer in correct ways.



## DISTRIBUTORLESS IGNITION TRAINING SYSTEM

**Model Number: ES-DIS-3**

**Educational Objectives:**

- Understand the Ignition system fundamentals
- Understand the Ignition Primary circuit wiring and components – Inspect and test
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition Secondary circuit wiring and components – Inspect and test
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition coils – Inspect and test
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition control modules – Inspect and test
- Distributorless Ignition System (DIS) – Inspect, test & troubleshoot
- Understand the Ignition Primary circuit wiring and components – Inspect and test Spark Plugs
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition System voltage wave patterns
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition timing – check and adjust
- Understand the Ignition Primary circuit wiring and components – Inspect and test Electronic Ignition system
- Understand the Ignition Primary circuit wiring and components – Inspect and test Electronic ignition systems service & diagnosis
- Understand the Ignition Primary circuit wiring and components – Inspect and test Inductive Pick up sensor and trigger devices – Inspect and test
- Understand the Diagnose no-starting
- Understand the Emissions concerns on vehicles with electronic ignition (DIS) distributorless systems.



## ORIGINAL STARTER MOTOR

**Model Number:**

- |  |                  |
|--|------------------|
| <b>1. Operable Starter (new-unmounted)</b>   | <b>ES-STN-OL</b> |
| <b>2. Operable Starter (new-mounted)</b>     | <b>ES-STN-OM</b> |
| <b>3. Operable Starter (recon-unmounted)</b> | <b>ES-STR-OL</b> |
| <b>4. Operable Starter (recon-mounted)</b>   | <b>ES-STR-OM</b> |
| <b>5. Sectioned Starter (mounted)</b>        | <b>ES-STR-SM</b> |

**Educational Objectives:**

- The operable starters are fully functional and can be provided new or reconditioned and if desired they can be mounted on a base plate.
- The operable units can be used for demonstration purposes, exhibits, as replacement parts for engines.
- The sectioned starters are excellent for showing internal construction features and for demonstrating the principles of starter motor operation.
- All of the key parts have been carefully sectioned and color coded for easy identification. Sectioned units feature wiring connections that are brought out to 4mm terminals for operation simulation. Each unit is mounted on a base plate.



## ORIGINAL ALTERNATOR

**Model Number:**

- |   |                  |
|---|------------------|
| <b>1. Operable Alternator (new-unmounted)</b>           | <b>ES-ALN-OL</b> |
| <b>2. Operable Alternator (new-mounted)</b>             | <b>ES-ALN-OM</b> |
| <b>3. Operable Alternator (used-unmounted)</b>          | <b>ES-ALR-OL</b> |
| <b>4. Operable Alternator (used-mounted)</b>            | <b>ES-ALR-OM</b> |
| <b>5. Sectioned Alternator (mounted)</b>                | <b>ES-ALN-SM</b> |
| <b>6. Sectioned Alternator with (Regulator mounted)</b> | <b>ES-ALN-SR</b> |

**Educational Objectives:**

- The operable alternators are fully functional and can be provided new or reconditioned and if desired they can be mounted on a base plate.
- The operable units can be used for demonstration purposes, exhibits, as replacement parts for engines.
- The sectioned alternators are excellent for showing internal construction features and for demonstrating the principles of electric current generation.
- All of the key parts have been carefully sectioned and color coded for easy identification. Sectioned units feature wiring connections that are brought out to 4mm terminals for operation simulation. Each unit is mounted on a base plate.



## AUTOMOTIVE ELECTRICAL TEST BENCH

**Model Number:**

**1. Automotive Electrical Test Bench For Alternators**

**AES-ETB-1 (S,V)**

**2. Automotive Electrical Test Bench For Alternators & Starters**

**AES-ETB-2 (S,V)**

**Educational Objectives:**

- Designed for educational purposes unlike most of the other units on the market which are designed for commercial shop testing.
- Observation on how the Alternators, Generators and Starter Motors work.
- Study on how Alternators, Generators and Starter Motors are to be tested.
- Study on how to make the wiring connections.
- Hands-on approach to explore the complete studying of alternator, generator and motor starter.
- Study the theory on how alternators, generators and starters are constructed and how they operate.


## AIR BAG SYSTEM TRAINER

**Model Number: AES-ABT-1**

**Educational Objectives:**

- Familiarization of components and operation details of air bag supplemental restraint systems.
- Study about the technology involved in these type of supplemental restraint systems.
- Study the internal layout and construction of a typical restraint unit.
- Demonstration of realistic faults of typical problems in the units.
- The Sectioned Driver's steering wheel shows the unit in a pre-detonation state and can be inspected by the student.
- Study the electronic connection of the system and make it operational.
- Study the operation theory of the trainer, exercises and additional information on different types of supplemental restraint systems (SRS) commonly used in vehicles today.



Watch the video 



## ALARM IMMOBILIZER AND CENTRAL DOOR LOCK TRAINER

**Model Number: AES-VIS-1**

**Educational Objectives:**

- Understand Alarm Immobilizer and Central Door Lock system.
- Operation of the Alarm Immobilizer and Central Door Lock System.
- Understand about the passive keyless entry (PKE) system and troubleshooting LF Antenna of Alarm Immobilizer and Central Door Lock.
- Understand about the Remote Keyless Entry system and its working mechanism in Alarm Immobilizer and Central Door Lock.
- Describe the working principle of the central door lock.
- Configure the electrical connections of central door lock.
- Troubleshooting central door lock system.
- Describe the working principle of central lock with remote control system.
- Configure the electrical connections of the central lock with remote control system.
- Troubleshooting control door switch/ sensor.

## VEHICLE INTEGRATED ELECTRICAL / ELECTRONIC TRAINING SYSTEM

**Model Number: AES-VET-1**

**Educational Objectives:**

- Automotive lighting system experiment: head light and parking light system, turn signal system and hazard circuit, reverse light circuit, brake light circuit, fog light circuit, horn circuit, door light and door open sender system.
- Understand the working principle and the electrical connection of Starting system, Fuel injection system, Electronic ignition system, Charging system, Windshield wiper and washer system.
- Understand the working principle and the electrical connection of Ventilation blower system.
- Understand the working principle and the electrical connection of Engine cooling system.
- Understand the working principle and the electrical connection of Fuel level indicator and oil pressure switch system.
- Fault Insertion System for troubleshooting exercises.





## DISTRIBUTORLESS IGNITION TRAINING SYSTEM

**Model Number: ES-DIS-3**

**Educational Objectives:**

- Understand the Ignition system fundamentals
- Understand the Ignition Primary circuit wiring and components – Inspect and test
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition Secondary circuit wiring and components – Inspect and test
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition coils – Inspect and test
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition control modules – Inspect and test
- Distributorless Ignition System (DIS) – Inspect, test & troubleshoot
- Understand the Ignition Primary circuit wiring and components – Inspect and test Spark Plugs
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition System voltage wave patterns
- Understand the Ignition Primary circuit wiring and components – Inspect and test Ignition timing – check and adjust
- Understand the Ignition Primary circuit wiring and components – Inspect and test Electronic Ignition system
- Understand the Ignition Primary circuit wiring and components – Inspect and test Electronic ignition systems service & diagnosis
- Understand the Ignition Primary circuit wiring and components – Inspect and test Inductive Pick up sensor and trigger devices – Inspect and test
- Understand the Diagnose no-starting
- Understand the Emissions concerns on vehicles with electronic ignition (DIS) distributorless systems.



## PASSIVE SAFETY DEVICES FOR CARS TRAINER

**Model Number: ATS-PSD-1**

**Educational Objectives:**

- Analyzed the air bag system
- Understand of Safety belt tension relay
- Understand of Fuel shut-off internal switch
- Understand of Multi function valve in the fuel tank
- Understand of Diagnose and identify faults
- Understand of Electrical Test Points measurements

## CRUISE CONTROL SYSTEM TRAINER

**Model Number: AES-CCS-1**

**Educational Objectives:**

- The Cruise Control System Trainer to demonstrate the structure and operation of cruise control system works in a vehicle.
- The trainer applies theoretical teaching and maintenance training of the Cruise Control System.
- The trainer are equipped with a control panel that explains the Location of the Cruise Control system's Electronic Components system on cars and engines, and explains the Functions and It Works of Electronic Cruise Control system components. The unit comes complete with Faults test points.
- The trainer is mounted into a demonstration board. Unit comes complete with student job sheet which provide detailed exercises.



## CENTRAL DOOR LOCK TRAINER

**Model Number: AES-EPL-X**

**Educational Objectives:**

- Observe the operation of central door lock actuators and control switches
- Test and verify a central door lock circuit.
- Diagnostic troubleshooting of common electrical problems in central door lock circuit.
- Understand the wiring diagram and able to use it to do troubleshooting and repair.

## POWER WINDOW SYSTEM TRAINER

**Model Number: AES-EPM-X**

**Educational Objectives:**

- Observe the operation of power window actuators and control switches
- Test and verify a basic power window circuit.
- Diagnostic troubleshooting of common electrical problems in power window circuit.
- Understand the wiring diagram and able to use it to do troubleshooting and repair.



## VENTILATION BLOWER MOTOR SYSTEM

**Model Number: AES-EPO-X**

**Educational Objectives:**

- Observe the operation of automobile ventilation blower motor and control switches.
- Test and verify the ventilation blower motor and control circuits.
- Diagnostic troubleshooting of common electrical problems in automobile ventilation blower motor circuit.
- Understand the wiring diagram and able to use it to do troubleshooting and repair.

## ONBOARD VEHICLE DIAGNOSTICS SYSTEM

**Model Number: AES-OB-1**

**Educational Objectives:**

- The system permits the diagnosis of emission-relevant systems
- Systematic development of trouble shooting and diagnostic strategies
- Working with test devices
- Planning fault localization and repair measures
- Evaluating and documenting test results



## HYBRID AND ELECTRIC VEHICLE AIR CON SYSTEM WITH ELECTRONIC FAULT SYSTEM

**Model Number: AHC-AC5-TH**

**Educational Objectives:**

- Familiarization and operational functions of automotive A/C system.
- Measurement of refrigerant pressures and evaporating temperatures.
- Climate control operation in automotive A/C system.
- Cabin air distribution.
- Observation of thermostatic expansion valve performance.
- Understanding and plotting thermodynamic cycle in pressure-enthalpy diagram
- Calculate the refrigeration capacity from the p-h diagram
- Calculate the coefficient of performance
- Calculate the efficiency of the compressor
- Leak testing an air conditioning system.
- Evacuating and charging automotive A/C system.
- Diagnose A/C system conditions that cause faults/problems and determine necessary action.
- Troubleshoot A/C system components ( condenser fan motor, blower fan motor, electronic circuit, sensors etc) that cause faults/problems and determine necessary action. Note : This objectives is available when optional item HC-AC5-A3 is ordered.



# AET - Engine Testing - Dynamometer



## LABTECH MODULAR DYNAMOMETER SYSTEMS

**Model Number:**

1. Hydraulic Engine Dynamometer, 100 Kw
2. Hydraulic Engine Dynamometer, 150 Kw

**AET-DHB-1**  
**AET-DHB-2**

**Instrumentation Optional:**

1. Electronic fuel rate measurement unit with fuel flow sensor
2. Electronic Air Consumption measurement with air flow sensor
3. Multipoint temperature sensors, 6 Points
4. Exhaust gas calorimeter unit with 4 temperature sensors and water flow sensor
5. Set of calibration equipment and weights
6. Coolant flow meter
7. Pressure transducer for measuring cylinder pressure (the sensor is installed in the spark-plug for petrol engine and in the fuel injector for diesel engine)

**AET-DB1**  
**AET-DB2**  
**AET-DB3**  
**AET-DB4**  
**AET-DB5**  
**AET-DB6**  
**AET-DB7**

**Educational Objectives:**

- Engine performance analysis (power curve) at wide open throttle.
- Engine performance analysis (power curve) at constant RPM and varying throttle.
- Plot BMEP Brake Mean Effective Pressure measurement against engine RPM
- Morse Test Experiment. (Requires AET-DHB-M).

\*Note: When Indirect Injection type diesel engine (AED-IDI) is used then (AED-IDI-4 Morse test fuel line modification) must be ordered as optional items for the engine test bed.

- Air Consumption Measurement and plotting air mass rate against Brake power. (Requires AET-DHB-A).
- Volumetric Efficiency and study characteristic of Vol. Eff. Against Engine speed. (Requires AET-DHB-A).
- Fuel Consumption and plot fuel mass rate against Brake power. (Requires AET-DHB-F).
- Study of Thermal Efficiency and Specific Fuel Consumption. (Requires AET-DHB-F).
- Air Fuel Ratio and study characteristic of A/F against varying load. (Requires AET-DHB-A and AET-DHB-F).
- Energy (Heat) Balance and plotting Heat Balance against Brake power. (Requires AET-DHB-A and AET-DHB-F).
- Study effect of restricted Fuel to engine power. (Requires AET-DHB-F).
- Study calculate heat transfer of engine exhaust. (Requires AET-DHB-E).
- Study effect of restricted Air Flow and Dirty Air Filter to engine power. (Requires AET-DHB-A).
- Effect of different category of Heat Range Spark Plugs. (Requires set of Spark Plugs AET-DHB-S).
- Effect of Ignition Timing to engine power. (Requires distributor type petrol engine)



Watch the video

## DATA ACQUISITION SYSTEM

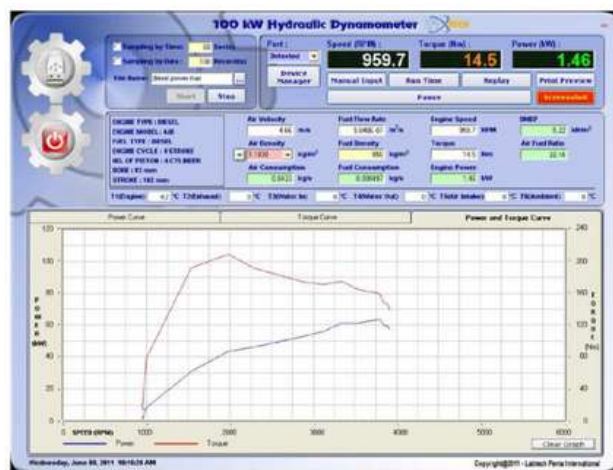
**Model Number: ET-DAS**

**Data Acquisition Component:**

1. PC Computer System **AET-DAS-1**
2. Data Acquisition and Analysis Software **AET-DAS-2**
3. Data Acquisition Board **AET-DAS-3**

**Data Acquisition and Analysis Software**

Labtech Data Acquisition System is the software tool that turns the PC into a powerful data acquisition system. It allows the PC to collect data and perform real-time analysis and display of the incoming information. The system comes set up for the dynamometer application but can allow the user to modify the system or set up custom applications to meet the schools particular requirements. The Data Analysis software is a special series of applications that are set up to allow the student output data and plot engine performance graphs and charts. The Program also lets the student to set up his own analysis charts for custom experiments and applications.



## ENGINE TEST BED MODIFICATIONS FOR ADVANCED APPLICATION WITH THE LABTECH MODULAR

### Model Number:

- |  |                |
|--|----------------|
| <b>1. For Diesel Engines</b>                 | <b>AET-TBX</b> |
| <b>2. For Petrol Engines and LPG Engines</b> | <b>EP-TBX</b>  |

### Educational Objectives:

- Understand Engine Test Beds (ED-TBS or EP-TBS) can be modified with the TBX option so as to support the advanced experiments conducted with the Modular Dynamometer System.
- Observe the TBX to do more advanced experiments such as: Power & Torque test, Morse Test, Brake Mean Effective Pressure (BMEP) test, Air Consumption analysis, Fuel Consumption analysis, Air Fuel Ratio measurement, Volumetric Efficiency Calculation, Energy (Heat) Balance Calculation, Thermal Efficiency Calculation, etc



## DYNAMOMETER (MDS) OPTIONAL EQUIPMENT

### Model Number:

- |  |                   |
|--|-------------------|
| <b>1. 4 Point Digital Temperature Meter</b>  | <b>AET-DOE-1A</b> |
| <b>2. 6 Point Digital Temperature Meter</b>  | <b>AET-DOE-1B</b> |
| <b>3. 8 Point Digital Temperature Meter</b>  | <b>AET-DOE-1C</b> |
| <b>4. 10 Point Digital Temperature Meter</b> | <b>AET-DOE-1D</b> |

### Accessories:

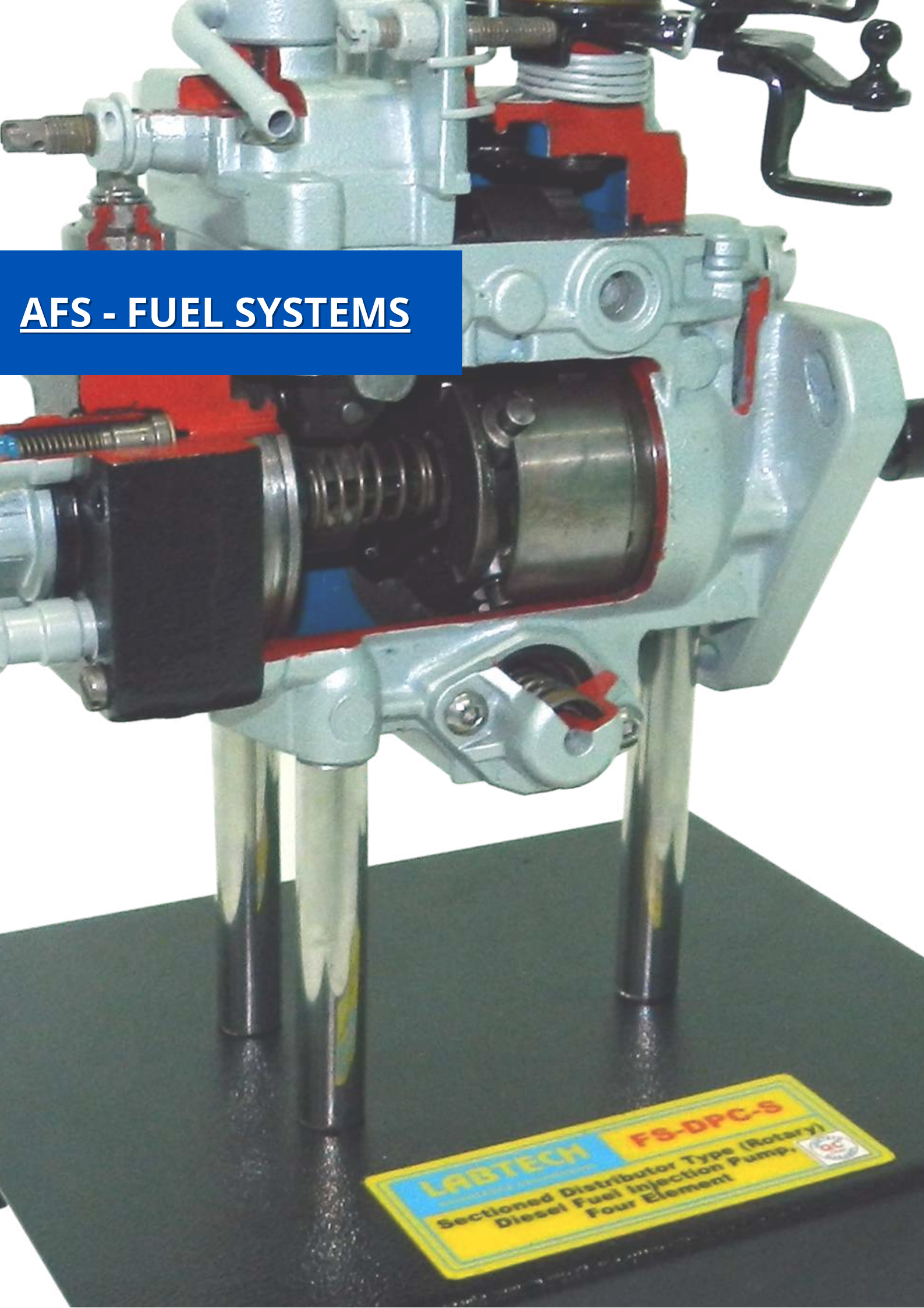
- |  |                    |
|--|--------------------|
| <b>1. Rotameter Type Fuel Meter</b>                                | <b>AET-DOE-2A</b>  |
| <b>2. Burette (Measuring Cylinder) Type Fuel Consumption Gauge</b> | <b>AET-DOE-2B</b>  |
| <b>3. Electronic Fuel Meter</b>                                    | <b>AET-DOE-2C</b>  |
| <b>4. Solenoid Operated Fuel Valve</b>                             | <b>AET-DOE-2D</b>  |
| <b>5. Air Consumption Measuring Device</b>                         | <b>AET-DOE-3</b>   |
| <b>6. Supercharger Device</b>                                      | <b>AET-DOE-4</b>   |
| <b>7. Exhaust Gas Calorimeter</b>                                  | <b>AET-DOE-5</b>   |
| <b>8. Advanced Timing analyzer</b>                                 | <b>AET-DOE-6</b>   |
| <b>9. Digital Portable Engine Analyzer (K2800)</b>                 | <b>AET-DOE-7</b>   |
| <b>11. Exhaust Gas Analyzer (K R89)</b>                            | <b>AET-DOE-8</b>   |
| <b>12. Photo-Electric Tachometer</b>                               | <b>AET-DOE-9</b>   |
| <b>13. Water Flow Meter</b>  | <b>AET-DOE-10A</b> |
| <b>14. External Cooling Towers</b>                                 | <b>AET-DOE-10B</b> |
| <b>15. Additional Drive Shaft</b>                                  | <b>AET-DOE-11</b>  |

### Educational Objectives:

- An in-line direct reading fuel meter that gives easy to read indication of fuel consumption correlated to Liters per Hour.
- Burette type fuel gauge for accurate determination of fuel consumption.
- Electric fuel meter with digital readout that can display current flow rate, totalizes the flow rate and can automatically (in conjunction with solenoid valve below) or manually control the dispensing of single or repeating batches of fuel.
- For use in conjunction with the Burette or Electrical fuel meters.
- Device for accurately measuring the air consumption of engines.
- Used as an accessories to the Air Consumption Measuring Device, this unit is an electrically driven fan, with variable speed control, which forces additional air into the intake manifold in order to achieve a supercharging effect.
- For accurately determining the heat content in exhaust gases.
- Induction timing light with built-in features to measure: initial timing, mechanical timing advance, vacuum timing advance, idle and fast idle speeds, distributor bushing wear, idle mixture adjustment and governor speeds.
- Digital electronic tester which can analyze all engine systems including electronically controlled.
- For measuring and analyzing engine exhaust gas emissions.
- Photo tachometer measures up to 10,000 RPM by utilizing reflective tape.
- A rotate meter type water flow meter which is used to measure the flow of cooling water through the engine.
- To lengthen the running time of the engine under load. This is required for extended testing.
- Extra drive shaft connecting the dynamometer to the engine.



# AFS - FUEL SYSTEMS



**LABTECH** **FS-DPC-8**  
Sectioned Distributor Type (Rotary)  
Diesel Fuel Injection Pump,  
Four Element

## MONO POINT (TBI) FUEL INJECTION TRAINER THROTTLE BODY INJECTION (TBI) TRAINER

**Model Number: AFS-MON-1**

### **Educational Objectives:**

- Designed to train technicians in the operation, theory, maintenance, servicing, and trouble shooting of fuel injection systems.
- Study on servicing works which requires special intentions in understanding the system closed loop control with various sensors inputs and the output signals for fuel management and ignition spark timing control.
- Designed to train technicians in the operation, theory, maintenance, servicing, and trouble shooting of fuel injection systems.
- Study on servicing works which requires special intentions in understanding the system closed loop control with various sensors inputs and the output signals for fuel management and ignition spark timing control.
- Learn on how to control many of the operational parameters and conditions via the numerous sensor controls. Each of the engine sensors has a signal generator to simulate various engine conditions and a corresponding electrical meter that continuously monitors the signal.
- Fuel output from the injectors can be measured through graduated cylinders and the effects of the different operating conditions may be observed through the varying fuel injection amounts.
- Programmable ECU which can be altered by the student to change performance factors.
- Electronic Fault Insertion System for troubleshooting exercise.
- Measurement of test points.



## MOTRONIC FUEL INJECTION TRAINER MULTI POINT EFI SYSTEM

**Model Number: AFS-MOT-3**

### **Educational Objectives:**

- Designed to train technicians in the operation, theory, maintenance, servicing, and trouble shooting of fuel injection systems.
- Study on servicing works which requires special intentions in understanding the system closed loop control with various sensors inputs and the output signals for fuel management and ignition spark timing control.
- Designed to train technicians in the operation, theory, maintenance, servicing, and trouble shooting of fuel injection systems.
- Study on servicing works which requires special intentions in understanding the system closed loop control with various sensors inputs and the output signals for fuel management and ignition spark timing control.
- Learn on how to control many of the operational parameters and conditions via the numerous sensor controls. Each of the engine sensors has a signal generator to simulate various engine conditions and a corresponding electrical meter that continuously monitors the signal.
- Fuel output from the injectors can be measured through graduated cylinders and the effects of the different operating conditions may be observed through the varying fuel injection amounts.
- Programmable ECU which can be altered by the student to change performance factors.
- Electronic Fault Insertion System for troubleshooting exercise.
- Measurement of test points.

## SINGLE AND DOUBLE BARREL CARBURETORS

**Model Number:**

- |  |                      |
|--|----------------------|
| 1. Original Operable Single Barrel Carburetor (single venturi)   | AFS-CBA-O (N/R, L/M) |
| 2. Sectioned Original Single Barrel Carburetor (single venturi), mounted on a wooden base              | AFS-CBA-S            |
| 3. Original Operable Double barrel Carburetor (double venturi, single body)                            | AFS-CBB-O (N/R, L/M) |
| 4. Sectioned Original Double Barrel Carburetor (double venturi, single body), mounted on a wooden base | AFS-CBB-S            |
| 5. Sectioned Fuel Circuit Set: containing sectioned carburetor, fuel pump, fuel level gauge with float | AFS-CFB-1            |

**New (N)**

**Reconditioned (R)**

**Mounted on a wooden base (M)**

**Unmounted (L)**

**Educational Objectives:**

- The operable units are fully functional and can be provided new or reconditioned and if desire can be mounted on wooden bases.
- The operable units can be used for demonstration purposes, exhibits or as replacement parts of engine.
- The sectioned single and double barrel carburetors have been carefully cut away to clearly expose all key internal parts including the fuel float, valves, idle screw, single and twin venturi tubes, fuel jets, butterfly valve and control linkages. These sectioned units are ideal for demonstrating the operational principles, fuel and air flow of typical carburetors.



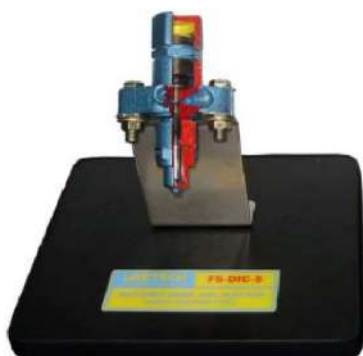
## DIESEL FUEL INJECTION PUMPS

**Model Number:**

- |   |                      |
|---|----------------------|
| 1. Operable four element IN-LINE, Diesel Fuel Injection Pump                    | AFS-DPA-O (N/R, U/M) |
| 2. Operable six element IN-LINE, Diesel Fuel Injection Pump                     | AFS-DPB-O (N/R, U/M) |
| 3. Operable four element Rotary (Distributor Type), Diesel Fuel Injection Pump  | AFS-DPC-O (N/R, U/M) |
| 4. Operable six element Rotary (Distributor Type), Diesel Fuel Injection Pump   | AFS-DPD-O (N/R, U/M) |
| 5. Operable four element CAV Type Diesel Fuel Injection Pump                    | AFS-DPE-O (N/R, U/M) |
| 6. Sectioned IN-LINE Diesel Fuel Injection Pump, four element                   | AFS-DPA-S (I/F)      |
| 7. Sectioned IN-LINE Diesel Fuel Injection Pump, six element                    | AFS-DPB-S (I/F)      |
| 8. Sectioned Distributor Type (Rotary) Diesel Fuel Injection Pump, four element | AFS-DPC-S (I/F)      |
| 9. Sectioned Distributor Type (Rotary) Diesel Fuel Injection Pump, six element  | AFS-DPD-S (I/F)      |
| 10. Sectioned CAV Type Diesel Fuel Injection Pump, four element                 | AFS-DPE-S (I/F)      |
| 11. Sectioned Diesel Fuel Pump for Diesel EFI Engine                            | AFS-DPF-SC(I/F)      |

**Educational Objectives:**

- Familiarization of design characteristics, internal construction and demonstrate operational principles.
- Study the key internal parts and components. Internal parts are nicely finished and painted and the entire unit is mounted on a wooden base.
- Study the operational principles, repair and maintenance skills.
- Study on disassembly and reassembly tasks.



## DIESEL FUEL INJECTORS

**Model Number:**

- |  |           |
|--|-----------|
| 1. Set Of 4 Sectioned Diesl Fuel Injectors | AFS-DIC-S |
| 2. Set Of 8 Diesl Fuel Injectors           | AFS-DIB-S |
| 3. Sectioned Diesl Fuel Injectors          | AFS-DIA-S |
| 4. Original Diesl Fuel Injectors           | AFS-DIA-O |

**Educational Objectives:**

- The Sectioned Injectors are ideal for instructing technicians in the construction, design and operation of the various types of diesel fuel injectors.
- The sectioned injectors are carefully cut to expose all key working parts. All injector elements and nozzles are fully visible to enable effective demonstration.



## PETROL FUEL PUMPS

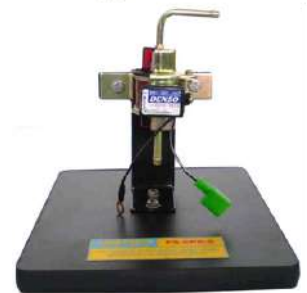
**Model Number:**

- 1. New Mechanical Fuel Pump-Operable Options include Loose (L) or Mounted (M) on a base plate**
- 2. Sectioned Mechanical Fuel Pump mounted on a base plate**
- 3. New Electrical Fuel Pump-Operable Options include Loose (L) or Mounted (M) on a base plate**
- 4. Sectioned Electrical Fuel Pump mounted on a base plate**
- 5. Sectioned Electrical Fuel Pump for EFI Petrol Engine**
- 6. Cam Operated Sectioned Mechanical Fuel Pump mounted on a base plate**
- 7. Sectioned original single carburetor and mechanical fuel pump**

**Educational Objectives:**

- The electric fuel pumps are designed to be powered by a 12 Volt DC source and serve to pump fuel from the fuel tank up to the carburetor.
- The mechanical or diaphragm type petrol fuel pump fulfills the same purpose and is normally mounted on the engine block and operated by a lever, which is run off the engine camshaft.
- The fuel pumps are available in several configurations, either as Operable units (O) or Sectioned units (S).
- The Operable fuel pumps are provided New, are fully functional and can be mounted on a base plate.
- The operable units are excellent for demonstration purposes, exhibits or as replacement parts.
- The electric pumps that are mounted on a base feature the electrical connections brought out to 4mm terminals.
- The Sectioned fuel pumps are carefully sectioned to show all key internal parts. For mechanical pump, the pump lever, pump diaphragm, diaphragm spring, valves, fuel outlet are all visible.
- Understand the electrical pump the electric motor, pump mechanism, pressure control switch, valves, fuel inlet and fuel outlet are fully exposed.
- The sectioned electric pump has the electrical connections brought out to 4mm terminals that allow the pump to be run when 12 Volt power is supplied. Sectioned units are ideal for demonstrating the operational principles and come mounted on a base plate.

**AFS-MPN-O (L/M)**  
**AFS-MPR-S**  
**AFS-EPN-O (L/M)**  
**AFS-EPR-S**  
**AFS-EPR-SC**  
**AFS-MPR-SC**  
**AFS-CMP-S**



## TURBO CHARGERS

**Model Number:**

- 1. Sectioned Turbo Charger      AFS-TUR-S**
- 2. Original Turbo Charger      AFS-TUR-O**

**Educational Objectives:**

- The turbo charger can enhance the students learning experience by showing the means by which the air intake on naturally aspirated can be boosted, thereby increasing power output.
- The sectioned units are ideal for demonstrating the construction and operation of turbo chargers.
- Understand each unit has been carefully cut open so as to reveal all key components and stages, such as the air intake, compression impeller, air outlet, exhaust gas outlet and water cooling channels.
- Understand all parts have been finished and painted (color coded) as well as mounted on a base plate.
- The original units are used turbochargers that have been opened, cleaned, painted and reassembled.
- Understand the intended purpose of the original units is not for reinstallation on vehicles but for student exercise purposes
- Study of experience in assembly, examination and reassembly of turbo chargers.



## LAMDA PROBE TRAINER DEMONSTRATION

**Model Number: AFS-LPB-T**

**Educational Objectives:**

- Familiarize with the function and operation of the Lambda probe device which is used in electronic fuel injection systems to monitor fuel mixtures in exhaust gases.
- Study and understand the important element in the control of the emission control system.
- Demonstration of real Lambda device mounted in a simulated exhaust pipe.
- A butane burner is used to simulate the exhaust gases that heats the exhaust pipe.
- The electrical meter measures the resulting output voltage.
- Several variables may be adjusted during operation.
- Study the effect of temperature and mixture upon voltage output.





## PROGRAMMABLE EFI SIMULATOR

**Model Number: AFS-EFI-S**

**Educational Objectives:**

- Introductory training for EFI (Electronic Fuel Injection) Systems.
- Designed to operate just as if it was on the vehicle. The purpose of this is to allow the student not only to familiarize himself with the operational characteristics of typical EFI systems.
- The Input/ Output connections from the ECU are brought out to terminals so that the signals can be monitored during operation.
- Electronic Faults Insertion System for troubleshooting exercises.
- Different MAPS can be utilized to test different performance parameters.
- Study the operational characteristics and theory of electronic fuel injection systems. It consists of a programmable ECU (Electronic Control Unit) which is the heart and brain of the EFI system.
- A computer can be connected which enables the student to view the operational parameters and the MAP.
- Study different operational conditions quickly and easily while associating their corresponding signals with system performance.

## ENGINE MANAGEMENT SENSOR TRAINER

**Model Number: AFS-EMS-1**

**Educational Objectives:**

- Understanding working principle and operation of Mass Air Flow sensor.
- Troubleshooting Mass Air Flow Sensor.
- Understanding working principle and operation of Idle Air Control Valve.
- Troubleshooting Idle Air Control Valve.
- Understanding working principle and operation of Idle throttle Position Control and Throttle Position Switch.
- Troubleshooting Idle Throttle Position Sensor and Crankshaft Position Sensor.
- Understanding working principle and operation of Crankshaft Position Sensor.
- Understanding working principle and operation of Camshaft Position Sensor.
- Troubleshooting Camshaft Position Sensor.
- Understand the characteristic and working principle of the Fuel injector in engine management system.
- Understanding and analyze ignition signals that is controlled by ignition system.
- Troubleshooting Oxygen Sensor & Engine coolant temperature Sensor.
- Understanding working principle and operation of Knock sensor & Speedometer sensor.
- Understanding working principle and operation of Engine coolant temperature sensor.
- Understanding working principle and operation of Oxygen Sensor.
- Troubleshooting Knock Sensor.



## SECTION STATIC MODEL

**Model Number:**

**1. Sectioned Common Rail Fuel Injection System Components AFS-SWB-2**

**2. Sectioned Petrol Fuel Injection System Components AFS-SWB-3**

**Educational Objectives:**

- Observe and learn the main component of fuel injection system.
- Understand the basic operation of fuel flow in the fuel injection system.
- Understand the fuel injection system layout.
- Identify the supply system components of fuel injection mechanism.
- Identify the distribution system components of fuel injection mechanism.
- Understand the functions of supply system components, distribution system components.
- Familiar with the injector, fuel pressure regulator and its parts.
- Understand the injector works, fuel pressure regulator works.

## COMMON RAIL FUEL INJECTION TRAINER

**Model Number: AFS-CMR-1**

**Educational Objectives:**

- Familiarize with the operational of a complete, fully operational and common rail diesel fuel injection system.
- All Original components of fuel injectors, fuel pump, Engine Control Unit and Sensors are utilized and clearly laid out on a display board that is mounted on a mobile trolley.
- Understanding use a variable speed electric motor to simulate the rotation of the vehicle engine. Meters and Indicator lamps are provided to monitor the operation of the system.
- Understanding working principle fuel injection system operation and servicing.
- Understanding the electronic control unit operation, engine starting, idle and acceleration\ control.
- Programmable ECU which can be altered by the student to change performance factors.
- Electronic Fault Insertion System for troubleshooting exercise.



Watch the video 

# AHC - Heating/ Cooling/ Air Conditioning



# TESTING PLATFORMS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT



This unit is Labtech's special equipment which is specifically designed for automotive air conditioning systems and it realistically simulates the complete air conditioning systems as found in today's automobiles. The unit has a mobile frame completed with castor wheels, refrigeration for cooling system, heating system, A/C control panel and car original dashboard with air handling system including air duct, blowers and vents, which are exactly the same as original vehicle. The unit uses real automotive parts such as an air distribution duct from the original vehicle dashboard with system controls, integral evaporator with blower, complete vent system for passenger area and windscreen area. The controls include the vent direction selector, blower (fan) speed and system operation switches.

**You have a project you need help with ?**

Send your details today at [request@labtech.org](mailto:request@labtech.org) and we will design it for you !



## **AUTO AIR CONDITIONER TRAINER**

**Model Number: AHC-AC1-T**

**Educational Objectives:**

- Automotive AC components function & operation.
- Testing AC system performance using temperature & pressure measurement.
- Introduction to automotive AC servicing.
- Leak testing an AC system.
- AC components servicing: compressor, receiver/ drier/ accumulator/ drier, hoses, piping, fittings, o-rings, seals and service valves.
- Inspect the AC condenser for air flow
- Electrical compressor
- Removing A/C compressor belts and pump.
- Evacuate and charge A/C system.
- Diagnose A/C system conditions faults and determine necessary action.



## **ADVANCED AUTOMOTIVE AIR CONDITIONING (DEMONSTRATION UNIT) WITH ELECTRONIC FAULT SYSTEM**

**Model Number: AHC-AC2-T**

**Educational Objectives:**

- Troubleshooting Dual Pressure Switch, Condenser Fan Motor, Compressor Clutch Fuse Blown, Compressor Magnetic Clutch, Thermostat and Evaporator Blower.
- Testing AC system performance using temperature and pressure measurement.
- Representation of the Refrigeration Cycle into P-h Diagram 42.
- Refrigerant Recovery, Evacuating System and Charging System.
- Belting Investigation & Replacement of AC Compressor.
- Automotive AC components function & operation.
- Condenser Fan & Compressor Speed Variation.
- Investigation & Replacement of AC Compressor.
- System Performance Analysis.
- Evaporator Blower Speed Variation.
- Manifold Gauge Set Installation.
- Leak Detection.

Watch the video

## **AUTOMOTIVE AIR CONDITIONING PUMPS**

**Model Number:**

- 1. Piston Type Original Operating Automotive Air Conditioning Pump**
- 2. Rotary Type Original Operating Automotive Air Conditioning Pump**
- 3. Swash Plate Type Original Operating Automotive Air Conditioning Pump**
- 4. Sectioned Piston Type Original Operating Automotive Air Conditioning Pump**
- 5. Sectioned Rotary Type Original Operating Automotive Air Conditioning Pump**
- 6. Sectioned Swash Plate Type Original Operating Automotive Air Conditioning Pump**

- HC-APA-O(N/R,U/M)**
- HC-APB-O(N/R,U/M)**
- HC-APC-O(N/R,U/M)**
- HC-APA-S**
- HC-APB-S**
- HC-APC-S**

**New (N)**

**Reconditioned (R)**

**Un-mounted (U)**

**Mounted (M)**

Sectioned Automotive Air conditioning Pump and Compressor trainer module has been designed to enable to learn about the principles of refrigeration and Air conditioning components, especially the compressor and pump. The demonstrating the operational principles, characteristics and function of each component. It completed with hand crank which is useful for demonstrating the internal pump operation.

**Educational Objectives:**

- Understand basic theory, observation and other references about automotive air conditioning pumps and Compressor.
- Understand about several automotive air conditioning pumps and Compressor.
- The Explain operation principle of automotive air conditioning pumps and Compressor.
- Familiar with all parts of automotive air conditioning pumps and Compressor.




## ENGINE DRIVEN AUTO AIR CONDITIONING TRAINER

**Model Number: AHC-AC3-T**

**Educational Objectives:**

- Simulates the operation of an AC system for a typical automobile.
- Observation of performance characteristics under various operating conditions.
- Operates realistically with full control over the engine speed so that the effects resulting in operational speed variations may be observed.
- Fault troubleshooting of engine AC components in refrigeration line circuit.
- Fault troubleshooting of electrical circuit in engine AC system.
- Operational, maintenance, performance, repair & troubleshooting of automotive AC systems.

Watch the video 




## AUTOMOTIVE AIR COND WITH ORIGINAL DASH BOARD WITH ELECTRONIC FAULT SYSTEM

**Model Number: AHC-AC4-T**

**Educational Objectives:**

- Diagnose A/C system conditions that cause faults and determine necessary action.
- Familiarization and operational functions of automotive A/C system.
- Measurement of refrigerant pressures and evaporating temperatures.
- Climate control operation in automotive A/C system.
- Observation of thermostatic expansion valve performance.
- Understanding and plotting thermodynamic cycle in pressure-enthalpy diagram.
- Calculate the refrigeration capacity from the p-h diagram.
- Calculate the coefficient of performance & efficiency of the compressor.
- Evacuating and charging automotive A/C system.
- Cabin air distribution.
- Leak testing an AC system.
- Troubleshoot A/C system components that cause faults and determine necessary action.
- Variable speed compressor and evaporator fan.

Watch the video 



## AUTOMOTIVE ELECTRICAL DRIVE AIR CONDITIONING TRAINER (FOR HYBRID AND ELECTRIC VEHICLES)

**Model Number: AHC-AC5-TH**

**Educational Objectives:**

- Familiarization and operational functions of automotive A/C system.
- Measurement of refrigerant pressures and evaporating temperatures.
- Climate control operation in automotive A/C system.
- Cabin air distribution.
- Observation of thermostatic expansion valve performance.
- Understanding and plotting thermodynamic cycle in pressure-enthalpy diagram
- Calculate the refrigeration capacity from the p-h diagram
- Calculate the coefficient of performance
- Calculate the efficiency of the compressor
- Leak testing an air conditioning system.
- Evacuating and charging automotive A/C system.
- Diagnose A/C system conditions that cause faults/problems and determine necessary action.
- Troubleshoot A/C system components ( condenser fan motor, blower fan motor, electronic circuit, sensors etc) that cause faults/problems and determine necessary action. Note : This objectives is available when optional item HC-AC5-A3 is ordered.



## AIR CONDITIONING TRAINERS FOR LARGE VEHICLES

**Model Number: AHC-BAC-01**

**Educational Objectives:**

- Demonstrate function & operation systems with a special emphasis on controls, maintenance and trouble shooting large vehicles AC.
- Observation of performance characteristics under various operating conditions.
- Fault troubleshooting of large engine AC components in refrigeration line circuit.
- Operates realistically with full control over the engine speed so that the effects resulting in operational speed variations may be observed.
- Fault troubleshooting of electrical circuit in large engine AC system.
- Operational, maintenance, performance, repair & troubleshooting of automotive AC systems.



## COMPUTER DATA ACQUISITION

**Model Number: HC-DAS-1**

**1. Automotive Air Con Demonstration Unit**

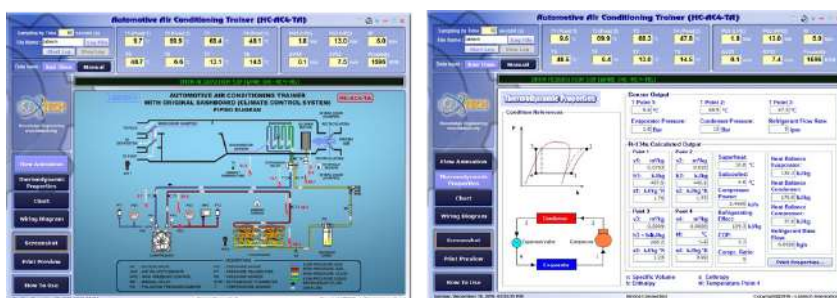
**HC-AC2**

**2. Automotive Air Con Trainer with Original Dashboard**

**HC-AC4**

**Educational Objectives:**

- Understand temperature, compressor speed, refrigerant flow, refrigerant pressure, air flow and electrical consumption can all be viewed and the data stored.
- The system consists of a PC Computer that is set up with Data Acquisition software that can process and monitor all incoming data signals.
- The software allows the signals to be seen in “real-time” as well as storing the data on the hard disk.
- Display, printing and production of basic graphs, for more complex systems.
- The user set up custom tests or monitoring procedures and to format his own graphs and outputs.



## SECTIONED AUTOMOTIVE AIR CONDITIONING SYSTEM

**Model Number: AHC-ACS-1**

**Educational Objectives:**

- Original Sectioned Automotive AC System for demonstrating the operational principles, characteristics & function of the unit.
- All sectioned areas have been color-coded for easy identification & to enhance the understanding of the operational characteristics of the units.
- Mounted on a wooden base with instructional teaching notes & schematic diagram
- Observation & understanding automotive AC system.



## AUTOMOTIVE HALF AIR CONDITIONING CAR TRAINERS

**Model Number: AHC-HCT-04**

**Educational Objectives:**

- Study of understand both the integration & operation of the car engine with the electrical, braking, steering, suspension and air conditioning systems.
- Understand all of the major systems and components including: chassis, brake system, suspension system, rear axle or front end, complete electrical system, lights (front and rear), steering system, engine, transmission, drive axles, exhaust system, instrument panel, steering wheel and air conditioning system.



# AHE - AHY/AEV - Hybrid and Electric Vehicle







## **HYBRID POWER SPLIT DEVICE TRAINER**

**Model Number: AHY-PSD**

**Educational Objectives:**

- Observation Of The Trainer
- Demonstration and Observation of The Hybrid Power Split Device on The Start Position
- Demonstration and Observation of The Hybrid Power Split Device on The Start and Low to Mid Range Speed
- Demonstration and Observation of The Hybrid Power Split Device on The Low Speed Cruising
- Demonstration and Observation of The Hybrid Power Split Device on The High Speed Cruising
- Demonstration and Observation of The Hybrid Power Split Device on The Maximum Speed
- Demonstration and Observation of The Hybrid Power Split Device on The Regenerative Braking
- Demonstration and Observation of The Hybrid Power Split Device in The Reverse Position

## **ELECTRIC VEHICLE SYSTEM SIMULATOR**

**Model Number: ATS-EVS-1**

**Educational Objectives:**

- Familiarization of Electric Vehicle System Simulator
- Understand how to operate the immobilizer key and start stop
- Observe the battery level and EV battery temperature
- Observe the parking brake and gear shift control
- Observe the road gradient and gear shift control
- Observe A/C ON-OFF, ambient air temperature selector, and A/C temperature set point
- Observe the accelerator and brake pedal
- Observe the mechanical, electrical power flow panel
- Observe the battery level on charging mode
- Troubleshooting and Electrical measurement
- Identify the function of Inverter and converter assembly used in Electric Vehicle System Simulator
- Identify the function of high voltage (HV) ECU used in Electric Vehicle System Simulator
- Observe the vehicle speed of Electric Vehicle System Simulator
- Observe the electric motor of Electric Vehicle System Simulator
- Observe the drive train simulator panel of Electric Vehicle System Simulator
- Identify the operation and construction of synchronous generator and electric motor used Electric Vehicle System Simulator
- Safety system on high voltage



## **HYBRID ENGINE SYSTEM SIMULATOR**

**Model Number: ATS-HES-1**

**Educational Objectives:**

- Identify the operation and components of hybrid systems in a vehicle Series, parallel system and series-parallel
- Identify the function of a hybrid transaxle and brake system
- Identify the operation and construction of synchronous generator and electric motor used in hybrid system vehicle
- Recognize different storage devices and technologies
- Hybrid engine
- Identify the function of speed sensor used in hybrid system vehicle
- Identify the function of Inverter and converter assembly used in hybrid system vehicle
- Identify the function of HV ECU used in hybrid system vehicle
- Module power-control
- Safety
- Routine maintenance and repairs
- roubleshoot faults in electrical system of a hybrid vehicle



## **ELECTRIC VEHICLE CHARGER TRAINER**

**Model Number:**

**1. AC Charging System (Slow Charge)**

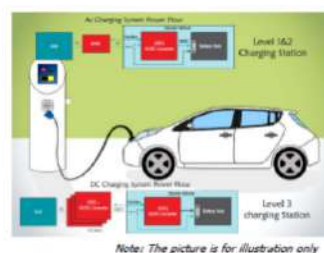
**AVE-ECT-1**

**2. DC Charging System (Quick Charge)**

**AVE-ECT-2**

**Educational Objectives:**

- Understand an electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self-contained with a battery, solar panels or an electric generator to convert fuel to electricity.
- Understand the electric grid is available almost anywhere, there are a variety of options for charging: at home, at work or on the road.





## ELECTRIC VEHICLE MOTOR TRAINER

**Model Number: AVE-REM-1**

**Educational Objectives:**

- Understand an electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self contained with a battery, solar panels or an electric generator to convert fuel to electricity.
- This Electric Motor Kit will give a student how to make an electric vehicle system.
- The kit consist of motor, controller ,battery, real axle and other accessories.



## NISSAN LEAF ELECTRIC VEHICLE MOTOR TRAINER

**Model Number:**

**1. Sectioned EV Motor System**

**AEV-SEV-1**

**2. Opearable Electric Motor System**

**AEV-OMS-1**

**Educational Objectives:**

- The Nissan Leaf electric vehicle machine (motor)training system is an excellent training device that clearly shows students the inter-relationships between all components.
- The Nissan Leaf electric vehicle machine (motor)system working in conjunction with the components of Electric Motor with the Battery and the Inverter System.
- Understand Color graphics are included to further enhance easy understanding the principle functions within the electric vehicle motor systems.

## TOYOTA PRIUS HYBRID ENGINE

**Model Number: Sectioned Prius Engine AHY-EPS-1**

**Educational Objectives:**

- The Toyota Prius Hybrid engine training system of the low fuel consumption automotive technology is an excellent training device that clearly shows students the inter-relationships between all components.
- The Toyota Prius Series-Parallel type hybrid system working in conjunction with the components of two electric motor generators (MG1 & MG2) with the Power Split Device, and includes the Inverter System.
- Understand A color coded panel depicts the system modes of Electric only, Hybrid Electrical Assist, Regenerative Braking in deceleration and Battery charging.
- The complete engine and drive train are cutaway sectioned and color code painted. The unit use original components, engine capacity approx. 1500 - 1800cc, 4 cylinder, DOHC, 16 valve.
- The engine revolves at low speed by means electric motor, single phase, 220V-50Hz.



## TOYOTA PRIUS HYBRID ENGINE

**Model Number: Running Hybrid Engine AHY-EPS-2**

**Educational Objectives:**

- The Toyota Prius Hybrid engine training system of the low fuel consumption automotive technology is an excellent training device that clearly shows students the inter-relationships between all components.
- The Toyota Prius Series-Parallel type hybrid system working in conjunction with the components of two electric motor generators (MG1 & MG2) with the Power Split Device, and includes the Inverter System.
- Understand A color coded panel depicts the system modes of Electric only, Hybrid Electrical Assist, Regenerative Braking in deceleration and Battery charging.
- The engine system is mounted on a stand and is complete ready to run. These are complete with a fuel tank, fuel filter, oil filter, alternator, starter, fuel injection pump, battery, exhaust system with silencer, and with a complete Instrumentation Panel with a key switch.
- The engine capacity approx. 1500 - 1800cc, 4 cylinder, DOHC, 16 valve.



# AIA - Instructional AIDS



**TWO STROKE DIESEL ENGINE INSTRUCTION MODEL**

**IA-12D M**



- |                   |                     |
|-------------------|---------------------|
| 1. Crank Case     | 8. Injector Nozzle  |
| 2. Crank Shaft    | 9. Air Passage      |
| 3. Connecting Rod | 10. Fuel pipe       |
| 4. Intake Port    | 11. Glow Plug       |
| 5. Piston         | 12. Fuel Pump       |
| 6. Exhaust Port   | 13. Revolver Handle |
| 7. Cylinder Block | 14. Fly Wheel       |



## TRANSMISSION PRINCIPLES TRAINER

**Model Number:**

- |                                       |                  |
|---------------------------------------|------------------|
| <b>1. Drive Systems Trainer</b>       | <b>AIA-TPT-1</b> |
| <b>2. Gear Principles Trainer</b>     | <b>AIA-TPT-2</b> |
| <b>3. Pulley Principles Trainer</b>   | <b>AIA-TPT-3</b> |
| <b>4. Sprocket Principles Trainer</b> | <b>AIA-TPT-4</b> |

**Educational Objectives:**

- Understand Drive Systems Trainer provides an easy and flexible platform to set up different configurations with the gears, pulleys and belts, and sprockets and chains. The main platform is a specially made experiment panel that allows assembly for mounting of all components.
- Understand components are used to build up a drive train with varying configurations and introduces the basic mechanical transmission components and concepts. A range of mechanism experiments can be performed and can be assembled easily and quickly using the components.



## STEERING LINKAGE TEACHING AID , PARALLEL CRANK MECHANISM



**Model Number: AIA-SLT**

**Educational Objectives:**

- This is classroom demonstration aid that is large enough for a group of students.
- It consists of a mock-up for the wheels and basic steering linkage system of a vehicle.
- The purpose is to demonstrate the operation and theory of basic tracking and alignment principles, including parallelogram and trapezium geometric alignment. The unit consists of the following components laid out on the demo board which is to be hung from the wall: two components representing wheels (pivoting) variable arm linkages between the wheels, scales for monitoring position of the wheels.

## TWO STROKE PETROL ENGINE INSTRUCTION MODEL

**Model Number: AIA-12P-M**

**Educational Objectives:**

- Demonstrating the combustion process and engine operation.
- Understand the main parts of the 2/ 4 stroke diesel/ Petrol engine.
- Understand Stroke cycle sequence of 2/ 4 stroke diesel/ Petrol Engine.
- Working principle of the 2/ 4 stroke diesel/ Petrol Engine.



## FOUR STROKE PETROL ENGINE INSTRUCTION MODEL

**Model Number: AIA-14P-M**

**Educational Objectives:**

- Demonstrating the combustion process and engine operation.
- Understand the main parts of the 2/ 4 stroke diesel/ Petrol engine.
- Understand Stroke cycle sequence of 2/ 4 stroke diesel/ Petrol Engine.
- Working principle of the 2/ 4 stroke diesel/ Petrol Engine.



## EPICYCLICAL INSTRUCTION MODEL / DIFFERENTIAL GEAR MODEL

**Model Number: AIA-ECG**

**Educational Objectives:**

- Understand Epicyclic gearing or planetary gearing is a gear system that consists of one or more outer gears, or planet gears, rotating about a central, or sun gear.
- Instructional model in a safe position on a table when it is used for the experiment.
- Instructional model can be operated by turning the hand wheel.

## DIFFERENTIAL GEAR MODEL

**Model Number: AIA-DGM**

**Educational Objectives:**

- Understand the main parts of Differential Gear on common cars with rear axle drive.
- Understand how the Differential Gear works.
- Identify the major parts of a rear drive axle assembly.
- Explain differential design variations.
- Describe the operation of a differential and functions of a rear axle assembly.



## GEARBOX WITH CLUTCH MODEL , STEERING GEAR INSTRUCTION MODEL

**Model Number: AIA-MGC**

**Educational Objectives:**

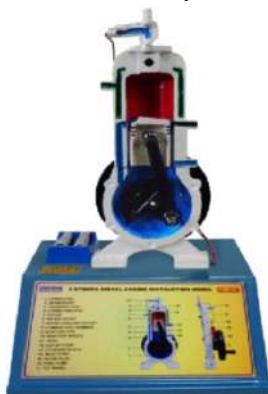
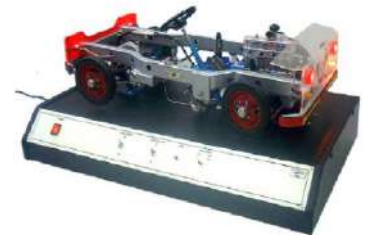
- Understand the main parts of the Model Gear Box.
- Understand Work process of Clutch System.
- Understand function of Clutch system.
- Understand Work process of Transmission.
- Understand The comparison of rotation on each transmission gear positions.

## CHASSIS WITH FLEXI GLASS ENGINE /CHASSIS WITH TRANSPARENT ENGINE

**Model Number: AIA-ICM**

**Educational Objectives:**

- This is small scale instruction vehicle that's shows most of the important part of an automobile in sectioned yet operational form.
- This unit an ideal for viewing the basic inter-relation of the parts of the engine, transmission and rear axle.
- The electric motor rotates the engine which turn the transmission. The transmission gears can be shifted with the operational clutch and the drive shaft turns the rear axle assembly.
- The 4 cylinder motor is transparent and the movement of the pistons, valve and camshaft and clearly visible.
- The Electric light flash indicate the combustion process.
- The chassis feature are suspension system, functional steering system, brake with pedal and clutch pedal.
- The electrical system includes functioning headlight, tail lights ad turn light.



## TWO STROKE DIESEL ENGINE INSTRUCTION MODEL

**Model Number: AIA-12D-M**

**Educational Objectives:**

- Demonstrating the combustion process and engine operation.
- Understand the main parts of the 2/ 4 stroke diesel/ Petrol engine.
- Understand Stroke cycle sequence of 2/ 4 stroke diesel/ Petrol Engine.
- Working principle of the 2/ 4 stroke diesel/ Petrol Engine.



## **FOUR STROKE DIESEL ENGINE INSTRUCTION MODEL**

**Model Number:** AIA-14D-M

**Educational Objectives:**

- Demonstrating the combustion process and engine operation.
- Understand the main parts of the 2/ 4 stroke diesel/ Petrol engine.
- Understand Stroke cycle sequence of 2/ 4 stroke diesel/ Petrol Engine.
- Working principle of the 2/ 4 stroke diesel/ Petrol Engine.

## **TRAFFIC SITUATION TRAINER**

**Model Number:** AIA-TLS-1

**Educational Objectives:**

- This unit is used in classroom exercises to set up various traffic situations for the instruction on proper driving, conduct and right of way. By using this tool numerous traffic situations can be explored and discussed in the class.
- The unit consists of a metal whiteboard that can be marked in various configurations. A number of magnetized miniature vehicles can be attached to the board in different positions.
- A small traffic light is used to simulate traffic signals (battery powered). The unit is mounted on an adjustable stand that can position the board either horizontally, vertically or at any angle. Unit is mounted on wheels for easy mobility around the class.



## **TRAFFIC LIGHT TRAINER**

**Model Number:** AIA-TLS-2

**Educational Objectives:**

- This is a full sized traffic light that can be used in the classroom for demonstration of how traffic lights function.
- Understand two or more units can be set up to do a classroom simulation of an intersection with the students playing the role of vehicles or pedestrians.
- The Approximately 160 cm tall. Features red, green, and yellow lights, left turn light, pedestrian walk light. Lights are controlled by a remote switch.

## **AUTOMOTIVE EDUCATIONAL CHARTS**

**Model Number:**

**1. Automotive Education      AIA-AEC-1**

**2. Driving Education          AIA-AEC-2**

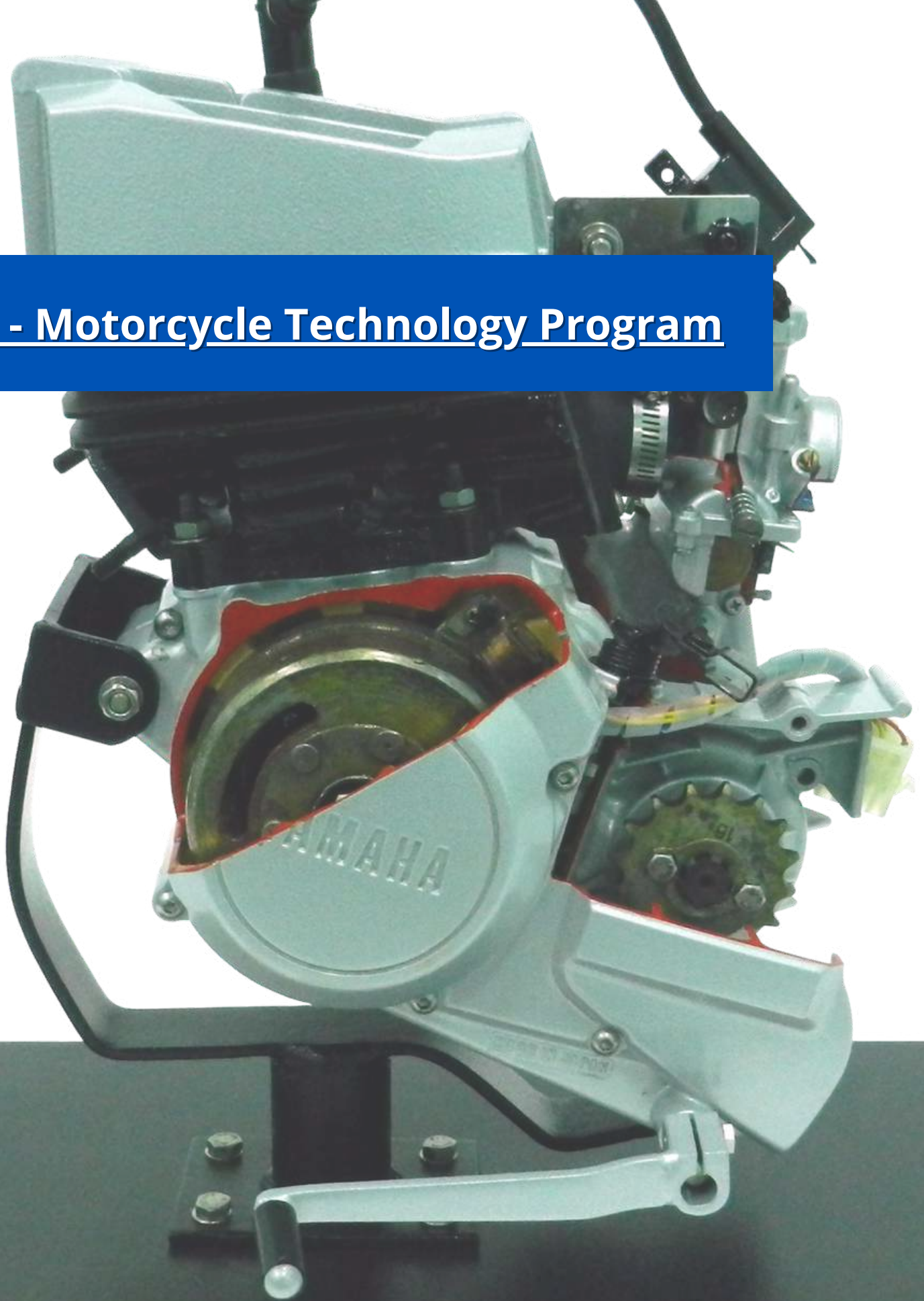
**3. Combined set of Charts    AIA-AEC-3**

**Educational Objectives:**

- It consists of educational charts mounted together as if in a book to make their display as clear as possible.
- All the major mechanical parts of the vehicle are represented. The instructor can use these charts as a time saving tool for class room presentations.
- The various sections and topics can be quickly displayed for classroom lectures.
- The charts are covered by a special plastic coating and so as to be durable and washable.
- The stand is mounted on wheels for easy transport.
- There are two locking wheels which add to the stability during use when the charts are flipped over.



# APC - Motorcycle Technology Program



**LABTECH PC-251-5B**  
Sectioned 2 Stroke Motorcycle  
Engine 1 Cylinder



## SECTIONED VESPA TYPE MOTORCYCLE ENGINE

**Model Number: APC-2VS-S (F/B)**

**Educational Objectives:**

- This sectioned engine of a Vespa type motorcycle is ideal for the demonstration of 2 stroke engine principles as well as the unusual drive system that is feature of motor scooter type motorcycles.
- The complete engine and transmission has been carefully sectioned to expose all internal details. The inside of all key parts are visible such as the magneto, piston, transmission gears, carburetor, brake, clutch, etc.
- study of the operation of the engine all major working parts may clearly be seen, therefore showing the student the function and inter-relationship between the components.
- The sectioned areas have been beautifully finished and color coded for easy identification.
- Brake, throttle, clutch and gear shifting mechanism are all fully functional.
- The engine is turned over by a hand crank (kick start mechanism).
- The engine and transmission are mounted on a sturdy steel floor (F) stand, which is fitted with wheels for easy mobility, or on a bench top stand (B). Item is supplied with a workshop/service manual for reference.

## SECTIONED MOTORCYCLE ENGINES

**Model Number:**

**APC-4S1-S Sectioned 4 Stroke Engine, 1 Cylinder**

**APC-2S1-S Sectioned 2 Stroke Engine, 1 Cylinder**

**APC-4S2-S Sectioned 4 Stroke Engine, 2 Cylinder**

**APC-2S2-S Sectioned 2 Stroke Engine, 2 Cylinder**

**Educational Objectives:**

- Original Sectioned Motorcycle Engines for demonstrating the operational principles, characteristics & function of the unit.
- Demonstration of the construction, design and operational principles of 2 stroke or 4 stroke Motorcycle Engine.
- Familiarization with the key internal parts such as the camshaft, valves (or ports), cylinder, piston, crankshaft, clutch, transmission gears, drive sprocket, carburetor venturi and fuel float.
- Observing the carburetor.
- Observing the piston, cylinder head and cylinder block.
- Observing the clutch system.
- Observing the transmission system.
- Cut away sections of the engines have been color coded for easy identification of parts and present a beautiful appearance in the classroom.
- The unit is mounted on a base plate and can be rotated by the kick starting lever.



## LIVE MOTORCYCLE ENGINES

**Model Number:**

**APC-LRS  
APC-LSS**

**1. Motor Cycle Engine On Rotating Stand**

**2. Motor Cycle Engine On Stationary Floor Stand**

**Educational Objectives:**

- Understand Live Motor cycle Engines for skill training are specifically designed to train students in the operation, tune-up, maintenance, repair and construction of two and four stroke motor cycle. A variety of engines are available providing the customer with a choice to best meet his training needs.
- Understand the rotating stand incorporates a drip pan and an engine mounting fixture which allows the engine to be rotated 360 degrees and fixed in any position. This enable easy access to all areas of the engine and is ideal for disassembly and reassembly tasks.
- Understand the stationery floor stand simulates a frame of a motor cycle and is supported by four legs. This is more realistic for servicing applications and is easier to start, although the access is some what more limited.
- Both units come complete with the engine, transmission, fuel and oil supply bottles (as required), short style exhaust silencer (muffler), ignition system and battery.
- Controls for the throttle and clutch are mounted in simulated handlebar style as on the motorcycle and come complete with control cables. Gear shift lever is as per original manufacturer's design. Engine models can be selected from our "Engine Data Sheet".





## MOTORCYCLE ELECTRICAL CHASSIS

### Model Number:

**1. Motor Cycle Electrical Chassis (Unwired)**

**APC-ECU-T**

**2. Motor Cycle Electrical Chassis (Prewired)**

**APC-ECP-T**

**3. Motor Cycle Electrical Chassis With 12 Fault Switches**

**APC-ECP-TF**

### Educational Objectives:

- The Motorcycles Electrical Chassis is designed for student skills training in actual wiring of basic electrical systems as found on most motorcycles.
- The unit consists of original motorcycle components, which are mounted onto a simulated model chassis.
- The chassis includes an integrated floor stand mounted on wheels for mobility.
- The components are attached to the chassis in approximately the same position as found on a motorcycle. All components are fully operable.
- The components include on head light, two turn signals, one horn, one tail light unit, charging system, ignition system, electric switch and brake switch.
- The dash board includes one ampere meter, one voltmeter, ignition switch, head light switch, high/low beam switch, turn signal switch, brake switch and horn button. Chassis also has a fuse for circuit protection.
- The generator system which is normally driven by the engine is rotated by an electric motor in order to simulate the
- electrical system as if the engine was running. Output of the generator is measured by the ampere and voltmeters. A motorcycle battery is provided for operating the electrical system.
- The battery can be charged by the charging system during operation.



# APS – Small Engine Technology Program



## SMALL ENGINE DYNAMOMETER TRAINING SYSTEM, 20 KW HYDRAULIC DYNO SYSTEM

Model Number : PS-DHA

Optional Equipment:

1. Fuel Tank with Flow Meter	APS-SOE-1A
2. Fuel Tank with Graduated Tube	APS-SOE-1B
3. Air Consumption Device with Manometer	APS-SOE-2
4. Portable Temperature Instrument, hand held, single probe	APS-SOE-3
5. Portable Exhaust Gas Analyzer	APS-SOE-4
6. Small Engine Ignition Analyzer	APS-SOE-5
7. Exhaust Gas Calorimeter (shown in photo) with temperature and flow sensors	APS-SOE-6
8. Electronic Digital Temperature Meter with Six Thermocouples and Selector Switch	APS-SOE-7
9. Electronic Digital Temperature Meter with Three Thermocouples & Selector Switch	APS-SOE-8
10. Electronic Digital Temperature Meter with Ten Thermocouples & Selector Switch	APS-SOE-9
11. Pressure Transducer	APS-SOE-10
12. Stop Watch (Can Be Used Only With PS-SOE-1B)	APS-SOE-11
13. Digital Instrumentation Option, this option will replace the Analog meters for the	APS-SOE-12

Instructional Materials:

1. Testing Small 4-Cycle Gasoline Engines	APS-DCM-1
2. Testing Small 2-Cycle Gasoline Engines	APS-DCM-2
3. Testing Small 4-Cycle Diesel Engines	APS-DCM-3
4. Testing Manual for Small Engine Thermodynamics includes student job sheets	APS-DCM-4

Educational Objectives:

- Small Engine Dynamometer system is designed for training students in many aspects of small engine technology.
- A wide variety of experimentation is possible which will develop the student's knowledge, including the theory and operational principles of internal combustion engines, instrumentation and testing procedures, power measurement (torque/horse power/kW), engine speed measurement, thermodynamics, plotting of engine performance curves and others.
- The Dynamometer is a unique universal testing apparatus that accommodates both vertical and horizontal shaft engines of up to 26 Hp (20 kW).
- The Small internal combustion engines of various kinds can be fitted to the system including 4-cycle petrol engines, 2 cycle petrol engines, kerosene engines, diesel engines and small motorcycle engines.



## SMALL ENGINE DYNAMOMETER DC MOTOR OR EDDY CURRENT TYPE

Model Number :

1. 5 kW Dynamometer	APS-DEC-1
2. 10 kW Dynamometer	APS-DEC-2
3. 15 kW Dynamometer	APS-DEC-3
4. 20 kW Dynamometer	APS-DEC-4

Educational Objectives:

- This small engine dynamometer is similar in function to the Labtech model PS-DHA except that the brake force mechanism is performed by an electric motor.
- The advantages of an electric motor braking system is that it provides a more precise control of the brake force and also has the ability to motor (or turn over) the engine which is useful for friction analysis studies.
- This dynamometer can be used for testing of small petrol and diesel engines as well as electric motors.
- The unit is mounted on a sturdy steel base which can be used on a bench top. Engine mounting plates are provided to allow quick set up and interchange of engines for testing.
- The built-in precision load control can accurately vary the engine load so that torque readings can be taken at different RPMs. Torque is measured by an electronic load cell and built-in torque meter. An electronic RPM meter is included for monitoring rotational speed of the engine.



## SMALL ENGINE DYNAMOMETER DATA ACQUISITION SYSTEM

**Model Number :**

- |                                     |                  |
|-------------------------------------|------------------|
| <b>1. PC Computer System</b>        | <b>APS-DAS-1</b> |
| <b>2. Data Acquisition Software</b> | <b>APS-DAS-2</b> |
| <b>3. Acquisition Board</b>         | <b>APS-DAS-3</b> |
| <b>4. Signal Conditioner</b>        | <b>APS-DAS-4</b> |

**Educational Objectives:**

- The computer system is set up to monitor and record key data values such as engine speed, torque, multiple temperature points, fuel flow, air flow and others.
- The program features a graphic interface which enables the data to be viewed "real time" as the experiments are being performed.
- During the tests, the data is stored in the computer so that a detailed analysis can be done after the experiment is completed.
- The system can be configured for a wide range of applications starting from basic monitoring of engine power (torque and speed) to higher end applications which include all of the sensors for full thermodynamic applications, should the options be chosen in the Small Engine Dynamometers chosen (pages PS01 & PS02). Includes a GUI interface which displays real time data and the data can be output to a spread-sheet program for display, printing and production of graphs.
- Data Analysis Software is set up with specific graphs and outputs to view the system performance and thermodynamics characteristics. Both the Data Acquisition Software and the Data Analysis Software are set-up and ready for use, in addition they also allow students to create their own tests as well as graphs and charts output.



## OPTIONAL EQUIPMENT FOR SMALL ENGINE DYNAMOMETER

**Model Number : PS-SOE**

**Optional Equipment:**

- |  |                    |
|--|--------------------|
| <b>1. Fuel Tank with Flow Meter</b>  | <b>APS-SOE-1A</b>  |
| <b>2. Fuel Tank with Graduated Tube</b>  | <b>APS-SOE-1B</b>  |
| <b>3. Fuel tank With Electronic Flowmeter For DAS System-For Petrol Engine</b>   | <b>APS-SOE-1C</b>  |
| <b>4. Fuel tank With Electronic Flowmeter For DAS System-For Diesel Engine</b>   | <b>APS-SOE-1BD</b> |
| <b>5. Air Consumption Device with Analog Manometer</b>   | <b>APS-SOE-2A</b>  |
| <b>6. Air Consumption Device with Electronic Manometer For DAS</b>   | <b>APS-SOE-2B</b>  |
| <b>7. Portable Temperature Instrument, hand held, single probe</b>   | <b>APS-SOE-3</b>   |
| <b>8. Portable Exhaust Gas Analyzer</b>  | <b>APS-SOE-4</b>   |
| <b>9. Small Engine Ignition Analyzer</b>   | <b>APS-SOE-5</b>   |
| <b>10. Exhaust Gas Calorimeter (shown in photo) with temperature and flow sensors</b>  | <b>APS-SOE-6</b>   |
| <b>11. Electronic Digital Temperature Meter with Six Thermocouples and Selector Switch</b>   | <b>APS-SOE-7</b>   |
| <b>12. Electronic Digital Temperature Meter with Three Thermocouples &amp; Selector Switch</b>                                     | <b>APS-SOE-8</b>   |
| <b>13. Electronic Digital Temperature Meter with Ten Thermocouples &amp; Selector Switch</b>                                       | <b>APS-SOE-9</b>   |
| <b>14. Pressure Transducer</b>   | <b>APS-SOE-10</b>  |
| <b>15. Stop Watch (Can Be Used Only With PS-SOE-1B)</b>  | <b>APS-SOE-11</b>  |
| <b>16. Digital Instrumentation Option, this option will replace the Analog meters for the Torque and RPM with Digital display.</b> | <b>APS-SOE-12</b>  |

**Educational Objectives:**

- The device consists of a drum type air baffle with a calibrated air intake orifice and a manometer for determining air intake speed and volume.
- The portable instrument is battery powered and comes complete with a universal surface temperature probe which can be used to take sport temperature readings on engines operation.
- For measuring and analyzing engine exhaust gas emissions.
- Special instrument for testing CDI and transistor ignition systems, that are commonly used on engines. Also tests conventional magneto, battery coils and condensers.
- Unit is hooked up to the small engine exhaust system. Unit consists of an exhaust system w cooled by a water jacket.
- Digital display temperature meter with 6 channels, selector switch, includes thermocouples.
- Digital display temperature meter with 3 channels, selector switch, includes thermocouples.
- Digital display temperature meter with 10 channels, selector switch, includes thermocouples.
- Pressure transducer for measuring cylinder pressures (note unit has high temperature resistan
- The Stop Watch is available for timing fuel consumption to be used with the graduated tube fuel tank.
- The option will replace the Analog meters for the Torque and RPM with Digital display.



## SECTIONED SMALL ENGINES

**Model Number :**

- |  |                  |
|--|------------------|
| <b>1. Sectioned Four Stroke Petrol Engine, 1 Cylinder</b>  | <b>APS-4PI-S</b> |
| <b>2. Sectioned Two Stroke Petrol Engine, 1 Cylinder</b>   | <b>APS-2PI-S</b> |
| <b>3. Sectioned Four Stroke Diesel Engine, 1 Cylinder</b>  | <b>APS-4DI-S</b> |
| <b>4. Sectioned Four Stroke Diesel Engine, 2 Cylinders</b> | <b>APS-4D2-S</b> |
| <b>5. Sectioned Four Stroke Petrol Engine, 2 Cylinders</b> | <b>APS-4P2-S</b> |

**Educational Objectives:**

- Demonstrating the construction, design and operational principles of small petrol and diesel engines.
- The engines are all single cylinder and range from approximately 3 to 5 HP.
- The engines may be used to study the differences in the combustion cycle between two stroke and four stroke engines. Also construction differences may be readily observed between petrol and diesel engines.
- Observe the piston, crankshaft, valve assembly (or ports), magneto, ignition system, cooling system carburetor, air intake and exhaust.
- The engines are mounted on a base plate and can be rotated by the flywheel and/or handle.



## LIVE SMALL STATIONARY ENGINES

**Model Number :**

- |   |                    |
|---|--------------------|
| <b>1. Stroke Petrol Engine With Stand</b> | <b>APS-SSE-A 2</b> |
| <b>2. Stroke Petrol Engine With Stand</b> | <b>APS-SSE-B 4</b> |
| <b>3. Stroke Diesel Engine With Stand</b> | <b>APS-SSE-C 4</b> |

**Educational Objectives:**

- Small engine training station is especially designed to train students in the operation, tune up, and repair of small stationary engines of the type used to drive small generators, water pumps lawn mowers and agricultural equipment.
- The engines are ready to run and include the starting system, built-in petrol tank, magneto based electrical system, ignition system, fuel system with carburetor and an exhaust silencer (muffler).
- The stand enables the engine to be rotated 360 degrees for ease of work.
- The stand features a special locking system that allows the engine to be secured in 8 positions.
- The stand can be optionally mounted on wheels (W) so it can be moved around the workshop.

## SECTIONED SINGLE INJECTOR DIESEL FUEL PUMP

**Model Number : APS-DPA-S**

**Educational Objectives:**

- Original single plunger type Diesel pump from a single cylinder diesel engine.
- The pump comes with a sectioned injector and is mounted on a wooden base.
- Revolving a hand crank performs operation of the pump.
- Demonstration of the adjustment of the pump volume can be accomplished by observing the setting mechanism.



## LIVE OUTBOARD ENGINES

**Model Number :**

- |   |                  |
|---|------------------|
| <b>1. Yamaha Out Board, 8 HP, Petrol</b>    | <b>APS-OBY-1</b> |
| <b>2. Yamaha Out Board, 25 HP, Petrol</b>   | <b>APS-OBY-2</b> |
| <b>3. Yamaha Out Board, 25 HP, Kerosene</b> | <b>APS-OBY-3</b> |
| <b>4. Yamaha Out Board, 40 HP, Petrol</b>   | <b>APS-OBY-4</b> |

**Educational Objectives:**

- The teaching of marine outboard technology, engine operation, construction, diagnosis, fault finding and trouble shooting.
- The engine comes complete with all operational parts including carburetion system, fuel pump, electrical system, starting system, water pump cooling system and the transmission with drive shaft and propeller.
- Understand a fuel tank with fuel hose and battery are necessary for operation of the engine.





## **SECTIONED OUTBOARD ENGINE MODEL**

### **Model Number :**

**1. 2 Cylinder Sectioned Outboard Engine( 10 to 50 Hp)**

**APS-OBE-1(Z)**

**2. 3 Cylinder Sectioned Outboard Engine (40 to 85 Hp)**

**APS-OBE-2(Z)**

**3. 4 Cylinder Sectioned Outboard Engine (100 to 150 Hp)**

**APS-OBE-3(Z)**

**4. 6 Cylinder Sectioned Outboard Engine (150 to 225 Hp)**

**APS-OBE-4(Z)**

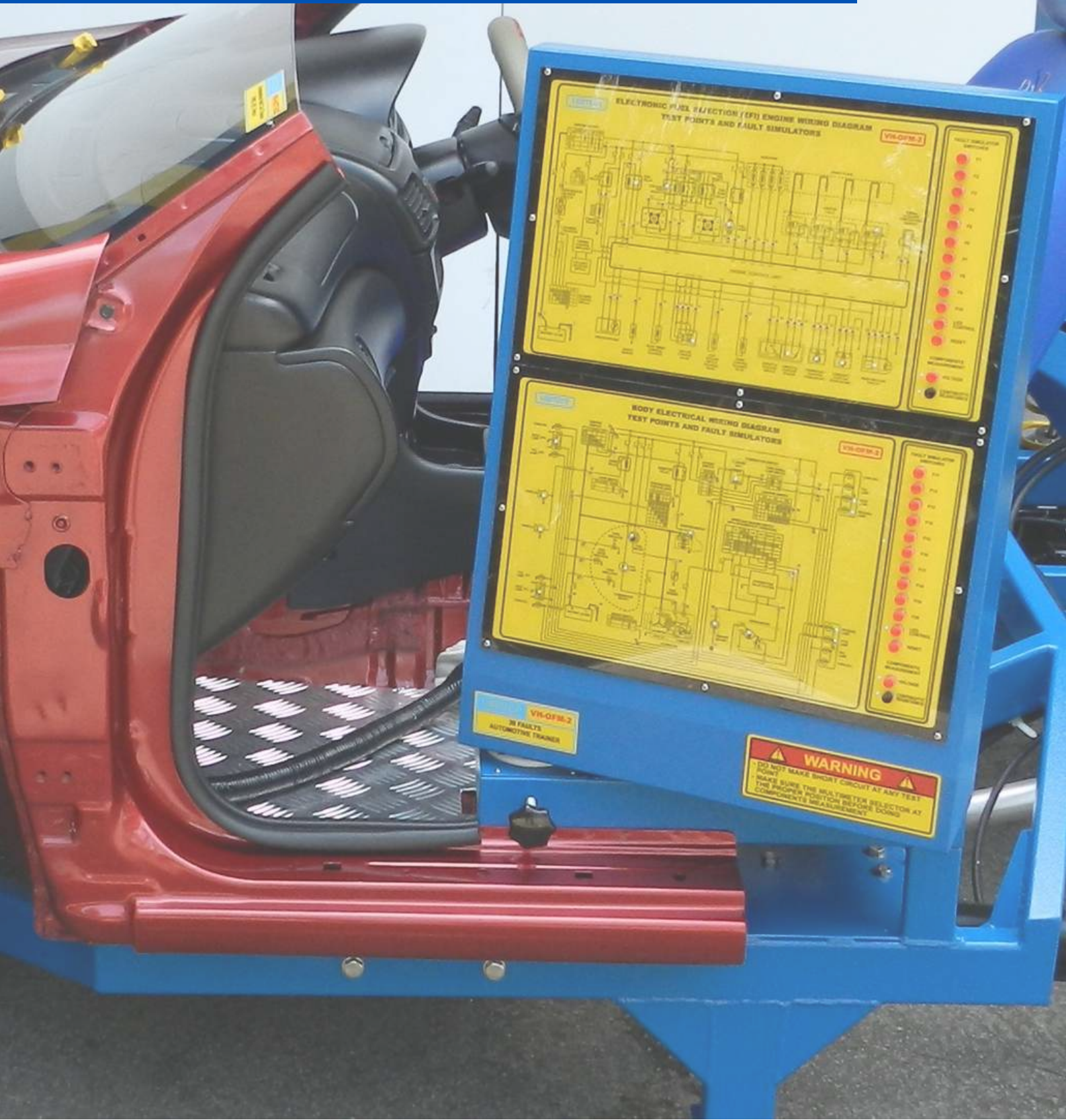
**5. Sectioned 25 Hp Diesel Engine Outboard**

**APS-OBE-5(Z)**

### **Educational Objectives:**

- The sectioned engines are ideal for demonstrating the construction, design and operational principles of marine outboard engines.
- A classroom outfitted with these sectioned engines enables the student to study the construction and operational principles of these engines.
- Observe the piston, crankshaft, valve assembly (or ports), magneto, carburetor, air intake and exhaust.
- The engine is mounted on a floor stand with wheels and can be rotated by the flywheel and/or handle.
- Option "Z" Provides the unit with a 220 VAC electric motor which can rotate the engine at reduced speed.

# AVH - Complete Vehicle Programs





## ELECTRIC VEHICLE TRAINING CHASSIS

**Model Number: Operational and drivable with electronic faults AVH-OCE-1**

**Educational Objectives:**

- Understand the trainer is fully reconditioned electric vehicles that have been specially modified so that all parts, components and wiring are easily accessible for student work.
- The trainers feature an optional electrical fault system with up to 20 faults that can be inserted for troubleshooting exercises.

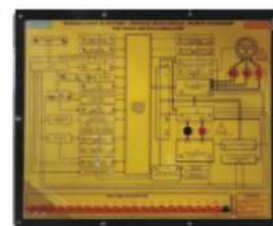


## ELECTRIC VEHICLE TRAINING CHASSIS

**Model Number: Sectioned with electronic faults AVH-SCE-1**

**Educational Objectives:**

- The Sectioned Automotive Vehicle Chassis, Electric Vehicle enables the students to learn and become more familiar about electric vehicle (EV) main component and how to operate of electric vehicle.
- Understand the body has been specially modified to expose key parts such as door mechanism, window mechanism and other areas of the chassis in order to provide easy access and observation for the student.



Watch the video 

## SECTIONED HYBRID VEHICLE WITH INTERACTIVE LEARNING SOFTWARE AND SIMULATIONS

**Model Number:**

1. Toyota Prius Gen 3 AVH-SCH-01
2. Toyota Prius Gen 4 AVH-SCH-02

**Educational Objectives:**

- The Sectioned Hybrid Prius Car features the entire hybrid drive train system of the petrol (gasoline) engine working in conjunction with the electric motor/generator systems and onwards to the Power Split Device and including the Control Electronics & Inverter System, and Battery Pack.
- The entire drive train is rotated at slow speed by a single-phase electric motor (worldwide voltages are available). All moving parts, ranging from the engine on through to the final drive at wheel hubs, are easily observed and demonstrated.
- Understand all sectioned components are color code painted for easy identification.
- The chassis is mounted on a moveable floor stand that can be moved around for instruction purposes and for storage purposes.
- Study of the functional brake system, and electrical system for vehicle lighting and signaling systems, windscreen wiper(s), etc.
- The trainer is complete with a comprehensive training and workshop manual for detailing automotive vehicle technologies, trainer operation, electrical wiring circuitry, and engine to drive train diagrams, and is complete with aspects for the repair of vehicles.
- Understand features colored LEDs that illuminate sections of the engine plus an animated LED system that shows the power use and transfer from the battery to the motor.






## SECTIONED AUTOMOTIVE VEHICLE CHASSIS

**Model Number:**

- |  |            |
|--|------------|
| 1. Petrol, OHV, Rear Drive (RWD)               | AVH-SCP-01 |
| 2. Petrol, OHC, Rear Drive (RWD)               | AVH-SCP-02 |
| 3. Petrol, OHC, Front Drive (FWD)              | AVH-SCP-03 |
| 4. Chassis 4 Wheel Drive (4WD)                 | AVH-SCW-01 |
| 5. Diesel, OHV, Rear Drive (RWD)               | AVH-SCD-01 |
| 6. Diesel, OHC, Rear Drive (RWD)               | AVH-SCD-02 |
| 7. Diesel, OHC, Front Drive (FWD)              | AVH-SCD-03 |
| 8. Diesel, OHC, Common Rail, Front Drive (FWD) | AVH-SCD-04 |



Watch the video 

**4WD is complete with Wheels and new Tires**

**Educational Objectives:**

- Study of components and parts which have been fitted onto a specifically made chassis and stand. These sectioned vehicles are excellent for showing students the inter-relationships between components of an actual vehicle.
- Demonstration of the entire drive train rotate at slow speed by a single-phase electric motor. All moving parts, ranging from the engine on though to the final drive at wheel hubs, are easily observed and demonstrated.
- All sectioned components are color code painted for easy identification.
- Many of the electromechanical systems are operational as per the original vehicle. These include a fully functional brake system and the electrical system for all vehicle lighting and signaling systems, windscreen wiper(s) and fuel tank level sensor.
- Original dashboard & steering wheel stem controls are all functional for these electrical systems and is complete with the original fuse.
- The trainer is complete with a comprehensive training and workshop manual for detailing automotive vehicle technologies, trainer operation, electrical wiring circuitry and engine to drive train diagrams and is complete with aspects for the repair of vehicles.

## SECTIONED MOTORCYCLES

**Model Number:**

- |   |           |
|---|-----------|
| 1. Two Stroke, 1 CYL, Approx. 100-150 CC                      | AVH-MCA-S |
| 2. Four Stroke, 1 CYL, Approx. 100-150 CC                     | AVH-MCB-S |
| 3. Two Stroke, 2 CYL, Approx. 125-200 CC                      | AVH-MCC-S |
| 4. Four Stroke, 2 CYL, Approx. 125-200 CC                     | AVH-MCD-S |
| 5. Two Stroke, 1 CYL, Approx. 100-175 CC (Motor Scooter Type) | AVH-MCE-S |

**Educational Objectives:**

- The Sectioned Motor cycles are produced from original full size motor cycles of Japanese make, such as Honda, Yamaha, Suzuki, Vespa, etc. These units are excellent for showing students the inter-relationships between the operational components of a complete motor cycle.
- The entire motorcycle has been expertly sectioned to show all major internal components and operational parts.
- The sectioned items include the instrumentation controls, fuel tank, seat, frame, front shock absorbers, brake system, exhaust silencer (muffler), tire, rear suspension, engine, transmission and carburetor.
- Observe the camshaft, valves, cylinder, piston, crank shaft, clutch, transmission gears, drive sprocket, carburetor venturi and fuel float.
- The engine can be rotated by the kick starting lever.
- The unit is provided with a workshop service manual.



## TRAINING AUTOMOBILE CHASSIS

**Model Number:**

- |   |            |
|---|------------|
| 1. REAR DRIVE, SEDAN, PETROL ENGINE, OHV, approx. 1400 to 1800cc  | AVH-OCP-01 |
| 2. REAR DRIVE, SEDAN, PETROL ENGINE, OHC, approx. 1400 to 1800cc  | AVH-OCP-02 |
| 3. FRONT DRIVE, SEDAN, PETROL ENGINE, OHC, approx. 1400 to 1800cc | AVH-OCP-03 |
| 4. SMALL VAN, PETROL ENGINE, approx. 1300 to 1600cc               | AVH-OCP-04 |
| 5. PICK-UP TRUCK, PETROL ENGINE, approx. 1400 to 1600cc           | AVH-OCP-05 |
| 6. REAR DRIVE, DIESEL ENGINE, OHV, approx. 1700 to 2200cc         | AVH-OCD-01 |
| 7. REAR DRIVE, DIESEL ENGINE, OHC, approx. 1700 to 2200cc         | AVH-OCD-02 |
| 8. FRONT DRIVE, DIESEL ENGINE, OHC, approx. 1700 to 2200cc        | AVH-OCD-03 |
| 9. SMALL VAN, DIESEL ENGINE, SMALL TRUCK, approx. 2000 to 3000cc  | AVH-OCD-04 |
| 10. PICK-UP TRUCK, DIESEL ENGINE, approx. 2000 to 2500cc          | AVH-OCD-05 |

**Educational Objectives:**

- Demonstration Fully reconditioned vehicles that have been specially modified so that all parts, components and wiring are easily accessible for training.
- Understand the major principles of steering and wheel alignment, tune up, lubrication servicing, brake adjustment, electrical trouble shooting and studying general system characteristics.
- Study of the major systems and components including: chassis, brake system, suspension system, rear axle, front end, fused electrical system, lights, steering engine, transmission, drive axles, exhaust system, instrument panel and steering wheel.
- Familiar with the main components of the frame and tools for installation.



## SECTIONED FARM TRACTORS

### Model Number:

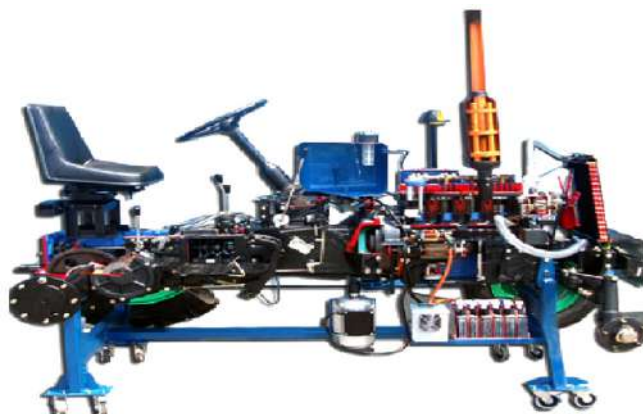
1. 2 Cylinder Diesel Engine Tractor AVH-FTS-1

2. 3 Cylinder Diesel Engine Tractor AVH-FTS-2

3. 4 Cylinder Diesel Engine Tractor AVH-FTS-3

### Educational Objectives:

- The sectioned original farm tractors as used on small and medium sized farms for general agricultural purposes.
- The power train is driven by an electric motor which rotates the engine, transmission, axle and wheels at slow speed for observation.
- Understand all key parts and components have been carefully sectioned to show internal working details and to present a beautiful appearance in the classroom.
- Sectioned items are color coded to aid in system function identification by the students.
- The tractor is fitted onto a strong steel stand with wheels so as to move easily around the classroom.
- The sectioned tractor includes all major systems such as the engine, transmission, front steering system, front and rear suspension, rear axle, front axle, seat, steering wheel, brake system, electrical system and fuel system.
- The operational systems include the brakes, electrical system and clutch system.



## AUTOMOTIVE HALF CAR TRAINERS

### Model Number:

1. Automotive Half Car Trainer FWD, Carburetor, Petro AVH-HCT-01

2. Automotive Half Car Trainer FWD, EFI, Petrol AVH-HCT-02

3. Automotive Half Car Trainer FWD, Diesel AVH-HCT-03

### Educational Objectives:

- Demonstration on half cut car bodies which have been fully reconditioned and specially modified for training.
- Understand the major principles concerning operation and service of vehicles. The student can understand both the integration & operation of the car engine with the electrical, braking, steering, suspension and air conditioning systems.
- Study of major systems and components including: chassis, brake system, suspension system, rear axle or front end, complete electrical system, lights (front and rear), steering system, engine, transmission, drive axles, exhaust system, instrument panel, steering wheel and air conditioning system.
- Observe the key parts and areas of the chassis.



Watch the video 

### Option:

#### Faults Insertion System

This option, when ordered, provides the vehicle with at least 20 of electrical faults. The faults are ideal for the teaching of trouble shooting exercises of engine system, auto electrical system, auto lighting system or the auto air conditioning system.

# AWS – Workshop Equipment



## WORKSHOP ENGINE STANDS

### Model Number:

- |  |                |
|--|----------------|
| <b>1. Regulator Twin Pedestal Stand</b>  | <b>AWS-RDH</b> |
| <b>2. With Geared Rotation Mechanism</b> | <b>AWS-RDG</b> |
| <b>3. Single Pedestal Stand</b>          | <b>AWS-RSH</b> |

### Educational Objectives:

- The twin pedestal stands features a strong central base which is mounted on wheels for mobility. Each column has a rotating 3 point universal fixture that can clamp to any engine for a total of six bolting points to the engine. This enables the engine to be firmly secured and allows for 360 degrees rotation for ease of work.
- For extra safety a four position locking pin is included which can fix the engine at 90 degrees intervals.



## ROTATING ENGINE STANDS

### Model Number:

- |  |                       |
|--|-----------------------|
| <b>1. Heavy duty stand for diesel engines and large petrol engines. Capacity 600 kg</b>                                | <b>AWS-RSH (W)</b>    |
| <b>2. Medium duty stand for light diesel and most petrol engines. Capacity 400 kg</b>                                  | <b>AWS-RSM (W)</b>    |
| <b>3. Light duty stand suitable for transmissions, small engines, motorcycle engines, etc, Capacity 200 kg</b>         | <b>AWS-RSL (W)</b>    |
| <b>4. Heavy duty stand for diesel engines and large petrol engine with a geared rotation mechanism capacity 600 kg</b> | <b>AWS-RS-HDG (W)</b> |

### (W) mounted on wheels

### Educational Objectives:

- Rotating Engine Stand has many unique features which makes it one of the best work stands available.
- Understand the stand is extremely strong and stable being made from welded tubular and structural steel.
- The extra wide base makes the stand is stable enough to support the engine without bolting it to the floor.
- The stand also incorporates a large low profile drip pan built into the base so that it is out of the way and is easily removable for draining.
- The engine mounting allows for rotation of 360 degrees.
- Understand for extra safety a 4 position locking pin is included which secures the engine at 90 degree intervals.
- The stand comes complete with a universal spindle which has bolt holes to accommodate various types of mounting brackets for different engines or objects.



## SHOP WORKBENCH

### Model Number: AWS-WB1

### Educational Objectives:

- The design consisting of welded "C" channel legs and removable "C" channel cross-joints.
- Bench top consists of 45 mm plywood that is covered by galvanized plate steel. This makes the bench ideal for heavy use and resistant to most types of solvents used in an automotive shop.



## Blending Virtual Learning with the Practical World

Labtech has two main Digital learning Systems which are available for use in the classroom and workshop. Both are designed to enhance the students learning experience and keep track of their progress and assessments. They can be used to extend the learning space into virtual learning for either the Labtech training systems or even generic subject content.

**1. Computer Aided Instructional Modules (CAI) Labtech Training Systems** - CAI modules are available for all major Automotive training systems. They present all the elements of the student manuals into a media rich e-learning format which incorporates many color photos, illustrations, videos and simulations. The student is led through the courseware on the training system, is given assessments of the theory then proceeds onto the experiments which detail the steps often including videos showing key procedures being performed. It also facilitates the student to enter in his results for review by the teacher. The CAI offers a comprehensive step-by-step program to guide the student through the use of the training system.

**2. Flexible Micro Learning Modules to match all curriculums** - Labtech's digital micro learning modules are designed as generic topical learning elements which are modular so as to integrate with most school or national curriculums. Each module deals with a distinct single learning topic which is common to most curriculums and provides enhanced learning materials for the student to explore and learn about these topics. They are provided in such a way that they can be used as supplemental learning materials to enhance the learning process or they can be incorporated into the main classroom activities. The content is organized in a systematic way and is easily accessed by the teacher and the students. Each module can be utilized according to the presentation schedule of the teacher so the materials are available when and where they need them.

**Contents of the Modules:** The modules contain realistic graphic animations and simulations of the topic selected for study. They also have information about the associated theory and science of about the topic, construction of the component, identification exercise for constituent components, illustrations of the operational processes, examples of real industry parts and videos of real systems. An assessment quiz is included which challenges the student about what he has learned. The assessment can guide the student to reflect further on parts of the topic which he may not have mastered. Students can work at their own pace and complete each module in about 20 to 45 minutes.

### Subjects Listing:

Packages are available for Basic Automotive, Advanced Automotive, Basic Electronics, Basic Electrical, Electrical Motors, Basic Refrigeration and Air Conditioning, Computer Technology, Network Technology, Basic Mechanical Mechanisms, Renewable Energy (Green Tech) and Biomedical.

### Classroom Deployment:

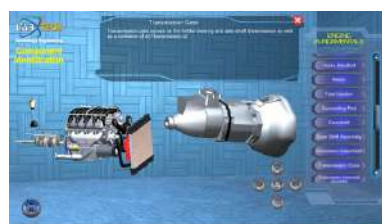
**Networked PC Multimedia Lab:** It is deployed on a classroom or school server and can be accessed by any PC. The modules are able to be accessed with the Labtech LMS system. The Labtech LMS is designed especially for Vocational and Technical Schools. The LMS content is displayed in a browser and the students and the teachers can log in. Licenses are provided for the whole school for access for the learning materials. The system also works best when the Classroom 21 CMS system is used which helps the teacher to monitor the students and to interact with them during learning.

**Tablet Cart Deployment:** The system is able to be deployed in a classroom cart configuration. This is a mobile tablet cart equipped with either 20 or 40 Android or Windows tablets, a server, a teacher laptop, the LMS, the CMS and with the software preloaded onto the system. This can solution can turn any classroom into a e-learning or blended learning environment.

### Classroom Deployment:

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# LABTECH ACADEMY - AUTOMOTIVE COURSES

Labtech's Virtual TVET interactive digital learning content is designed as self-paced topics that can be used by the teacher or student for independent learning (minimal teacher involvement). The content can be used online in the Labtech Academy ([www.labtech-academy.com](http://www.labtech-academy.com)) and the learning materials are designed to cover the introduction to automotive systems, such as basic engine fundamentals, electricity, and electronics, braking systems, wheels and drive systems, steering and suspension systems. It also goes on to develop the students' knowledge and skills leading to more advanced studies such as petrol and diesel fuel systems, engine management, transmissions, and hybrid vehicles.

The virtual learning courses feature **interactive animated 3D models** of the technical item under study. This can be done in a realistic manner and features all the major system and subsystem components. The 3D models are realistic in detail, constructed layer by layer, and "assembled" in their animated format. Many of the 3D Models can be rotated to view from all sides.

There are over 1000 Knowledge Objects consisting of Background Theory, Component Identification & Descriptions, Assembly & Disassembly, Component Animations, Functional Animations, Assessments - Reference, Identification, and Location, designed to match the different learning styles based on visual and kinaesthetic principles. Electrical Fundamentals provides learners with a thorough understanding of the principles of Electrical components and the technologies behind those components. The content has been designed to meet international training standards (**USA NATEF /ASE**, Malaysia **NOSS**, and Philippines **TESDA** etc.) and covers all the requirements that students need to be able to meet those standards.

The learning modules contain numerous activities to allow users to practice their understanding of the principles of the learning modules. This is supported by numerous assessment activities in a number of formats. Designed to work individually, in teams, or as part of classroom exercises or presentations.

For Institutions, Labtech can set up a customized TVET Learning Management System (**LMS**), which runs on any PC/Laptop/Tablet. Our TVET LMS Institutional system is ideal for running our interactive new generation learning content either on-campus or off-campus. This version of our system provides more interactions with the teachers and the school can monitor the class and students' progress.



Contact us for a FREE Demo:  
[info@labtech-academy.com](mailto:info@labtech-academy.com)

**LABTECH** Academy

Watch the video 



Labtech Training Systems are used in over 75 countries world wide through our 6 regional offices marked with a flag .

**Labtech Product Areas :**

- Air Conditioning and Refrigeration Technology
- Automotive and Transportation Technology
- Biomedical Technology
- Computer & Networks Technology
- Digital TVET Content for Virtual Learning
- Electrical Technology
- Electronics Technology
- Learning Management Systems / Classroom21 CMS
- Renewable Energy and Green Tech
- TVET Learning Management System

Labtech has obtained major Quality Certifications from TÜV Rheinland, Germany: ISO 9001:2015 Quality Management System



**ISO9001 Certification** Categories: Research, Assessment, Design and Development of Educational Training Systems, Programs and Products. Manufacturing of Educational Training Systems and Products to International Standards which includes the processes of: Production, Manufacturing Resource Planning (MRP), Quality Control and Assurance (QC/QA), International Sales & Marketing, Project Implementation and Consulting Services, Training Programs and Customer Services.

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