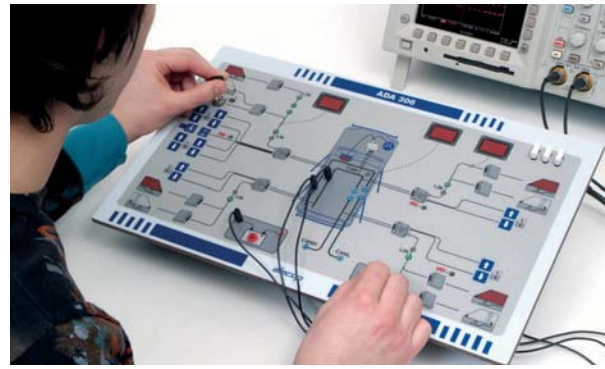
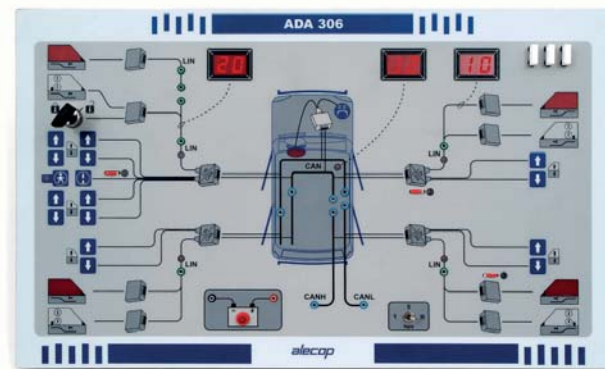


# ADA 306

## CAN and LIN Buses

Equipment for the study of data networks and multiplexed systems used in a car.



### Key Skills

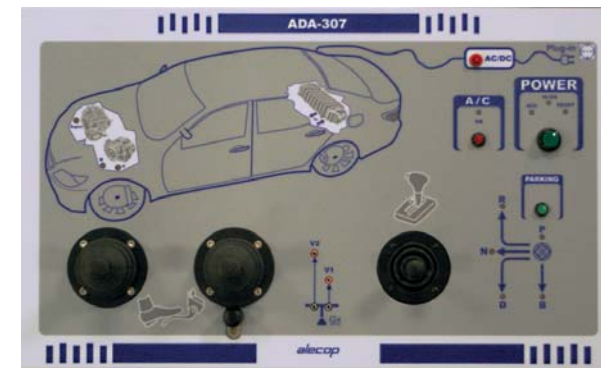
- Analysis of multiplexed systems running at full and slow speeds.
- Familiarisation with Central Locking, Electric Windows and Airbag systems.
- Handling instrumentation for checking and diagnosis of data transmission.
- Running diagnostics and repairing faults in multiplexed systems.

### Topic Coverage

- Binary logic.
- Numerical systems: binary and hexadecimal.
- Transmission of information in series.
- Layouts of data networks (Multi-Master, Master-Slave)
- CAN Bus (Transmission of differential data, voltage levels, frames, fault tolerance, etc.).
- LIN Bus (Transmission of differential data, voltage levels, LIN frames, etc.).
- Transmission of data by optical fibre.

# ADA 307

## Hybrid Vehicle Technology



### Virtual Model

The hardware trainer is a driving simulator (gear, speed, battery charge, fuel gauge). All the actions performed on the panel are represented on the software instrument panel. The ADA307 software provides information on vehicle performance in figures, graphics and gauges. The effect of various situations on hybrid vehicle performance can be assessed by programming journeys and carrying out tests. The data can be exported to Excel.



Scan the QR code\*  
to view a video or visit us in Youtube

A combination of hardware and software to familiarise students with Plug-in Hybrid Electric Vehicle (PHEV) technology.

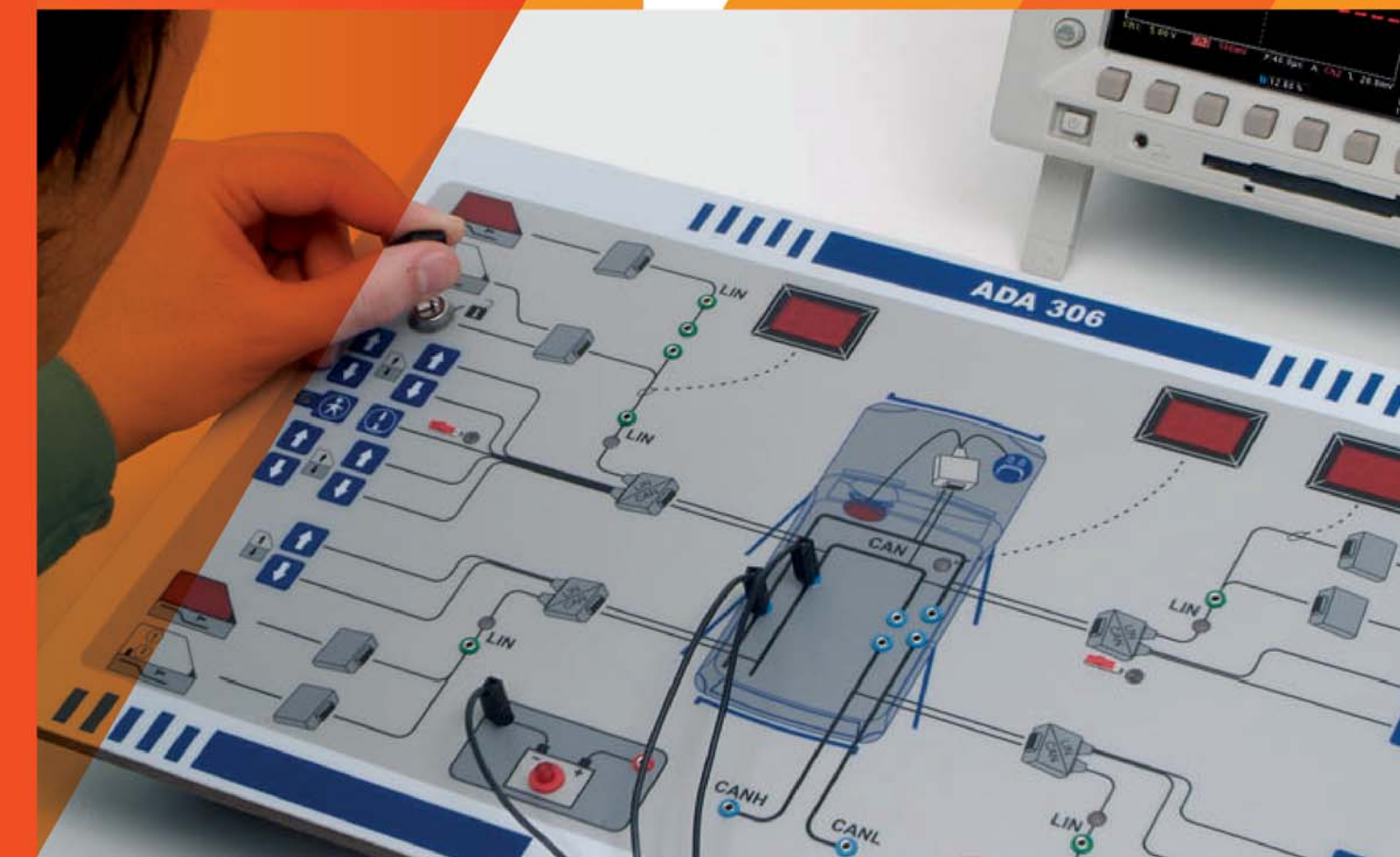
Typical journey parameters can be programmed to assess the operation and analyse the power combination of the internal combustion engine and the motor/generator. It is supplied with an application developed with MATLAB/Simulink, a user manual and practical exercises.

### Interactive Panel

The interactive panel has the same devices as a real vehicle: start switch, accelerator, brakes, speed selector, A/C switch, and battery charge button (plug-in). It reproduces the different stages in an engine operation cycle (electric motor, internal combustion engine) as well as the battery pack status (charged, depleted, generator). Measuring positions to check: Battery charge level battery voltage, battery charging current, electric motor operating voltage, vehicle speed.

# ADA Series

## AUTOMOTIVE ENGINEERING ELECTRONICS



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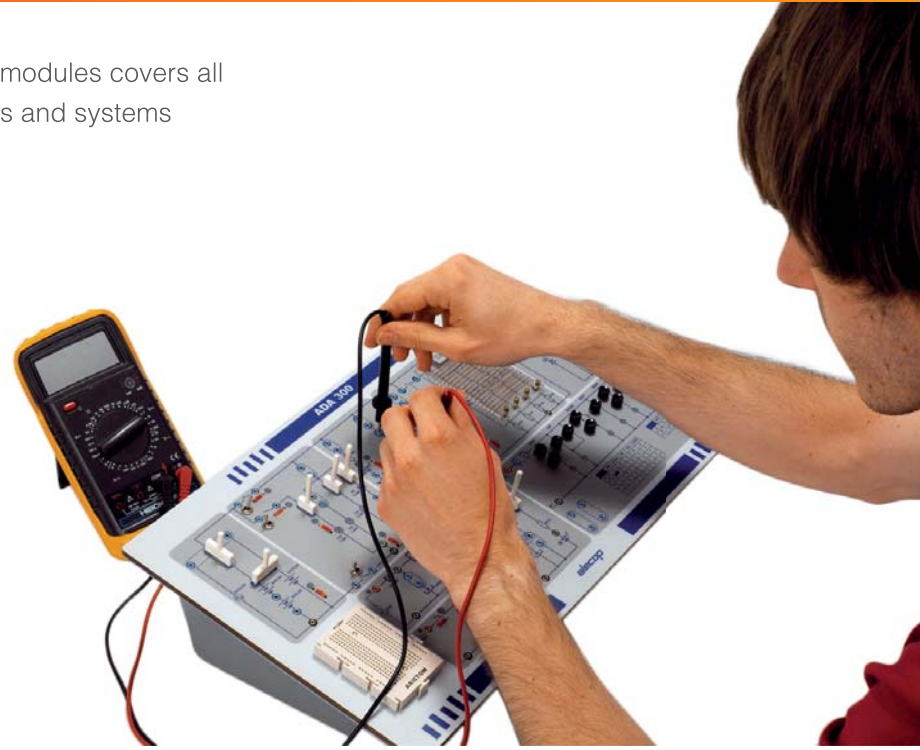


# AUTOMOBILE ELECTRONICS

The **ADA** series of self-contained training modules covers all aspects of electronic and electrical circuits and systems used on modern Automobiles.

Pre-constructed circuits, requiring the minimum of user connections, provide a detailed understanding of each topic and fault-insertion introduced diagnostic techniques.

Topic coverage includes Basic Electricity, Electronics, Sensors, the Electronic Control Unit (ECU), Actuators, multiplexed CAN and LIN bus systems and the principles of Hybrid vehicle technology. Comprehensive courseware for the student is included together with software where applicable.



## ADA 300

### Applications of Electrical Circuits in Automobiles

Equipment containing both general electrical circuits and those used specifically in cars.

#### Key Skills

- Using test equipment to measure electrical parameters and interpret the data.
- Analysing basic electric/electronic circuits and linking them to car components.
- Assembling basic electric and electronic circuits.
- Running diagnostics and repairing simple faults in car electrical systems.

#### Topic Coverage

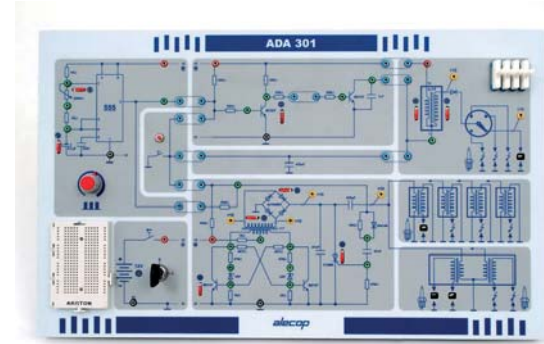
- AC and DC power supplies and batteries.
- Ohm's law: voltage, current and resistance.
- Resistances in series and in parallel, Lamps and Electrical Power.
- Characteristics of linear and logarithmic potentiometers.
- Conductor materials: Copper, nichrome and constantan.
- Study of capacitors in dc, Diodes, LEDs, Potentiometers and Relays.
- Full wave/Half wave rectification, filtering with Capacitors.
- Binary logic: AND, OR, EXOR, NOT, NOR and NAND.



## ADA 301

### Applications of Electronic Circuits in Automobiles

Equipment to study the electronics used in automobiles with particular emphasis on Ignition circuits.



#### Key Skills

- Using test equipment to measure electrical parameters and interpret the data.
- Analysing general electronic circuits and linking them to car components.

- Assembling basic electronic circuits.
- Running diagnostics and repairing simple faults in car electronic systems.

#### Topic Coverage

- Basic study of the different ignition systems used in cars.
- Study and the operation of different electronic components: Diode, Transistor, Zener Diode, Thyristor.
- Circuit to invert the polarity of the current in the transistor ignition circuit.
- Current amplifying circuit and rectifier circuit.
- Integrated circuit: NE555 Multi-vibrator.
- Generation of variable time signals.
- Generation of high voltages starting from low voltage.
- Condenser discharge circuit on coil primer.

## ADA 303

### Sensors used in Automobiles

Equipment containing 12 different sensors used to monitor and measure parameters associated with automotive systems.



#### Key Skills

- Analysis of the operation of different sensors and their application in different automobile systems.
- Testing electrical/electronic signals with and without an applied voltage.

- Diagnosis of faults in sensors: no supply, broken sensor, short circuit, failure of communication.
- Using test instruments: oscilloscope and multimeter.

#### Topic Coverage

- Technologies used in analog and digital sensor design.
- Types and characteristics of sensors: resistive, inductive, capacitive, Hall effect, optical, ultrasound, piezoresistive, hot-wire, semiconductor.
- Types of outputs: analog, digital, CAN bus, LIN bus.
- Connection to an Electronic Control Unit (ECU).
- Physical characteristics of different sensors.
- Fault generation.

## ADA 304

### The Electronic Control Unit (ECU)

Equipment to study how the ECU of a petrol engine works with a multipoint sequential injection system and static ignition.



#### Key Skills

- Analysis of how the electronic injection control unit works on an ECU- Motor.
- Analysis of the ECU input (manual or from ADA-303) and output signals.
- Testing electrical/electronic signals with without an applied voltage.
- Familiarisation with auto-diagnosis tools using DD-Car software.
- Fault Diagnosis: Broken sensor, failure in the communication bus (CAN-LIN), etc.

#### Topic Coverage

- Actuator outputs from the ECU: types, characteristics etc.
- Internal architecture of an electronic control unit.
- The operation of an electronic injection control unit, injection control algorithms.
- Injection time and ignition time (ignition angle and dwell angle).
- Auto-diagnosis in electronic injection systems, failure EOB codes.
- Reprogramming (Flash) of the electronic control unit.
- Digital to Analog and Analog to Digital conversion.

## ADA 305

### Actuators used in Automobiles

Equipment to study different types of actuator used in an automobiles



#### Key Skills

- Analysis of the operation of different actuators and their application in different automobile systems.
- Testing electrical/electronic signals with and without an applied voltage.
- Diagnosis of faults in actuators: no supply, broken sensor, short circuit, failure of communication.
- Using test instruments: oscilloscope and multimeter.
- Testing electrical/electronic signals with and without an applied voltage.
- Diagnosis of faults in actuators: no supply, broken sensor, short circuit, failure of communication.
- Using test instruments: oscilloscope and multimeter.

#### Topic Coverage

- Technologies used in the actuator design.
- Types and characteristics of actuators associated with: lighting, ignition, motor speed and position control, PWM control, on/off valve control, electromagnetics, stepper motors, acoustics.
- Types by actuator control systems (analog, digital, CAN bus, LIN bus).
- Manual control or by connection to an Electronic Control Unit (ECU) using ADA-304.
- Physical characteristics of different sensors.
- Fault generation.

#### ADA ENGINE 303 - 304 - 305

Using the ADA-303, 304 and 305 boards together is a very powerful combination which allows the student to understand the operation of the injection system of a normally aspirated or turbo engine.