

## INTRODUCTION

Automotive electronics is the branch of mechatronics focused on the electrical and electronic equipment installed in cars. The importance of electronic systems in cars has been increasing year by year till reaching one of the main parts of the automobiles today.

The electronic systems have replaced a lot of functions performed manually or by mechanical systems, like the fuel injection system, the control of emission gases, the safety system, the checking of the car liquids, the comfort system, the throttle control and a long etcetera.

The Automotive Fundamental Electrical Circuits Unit, "AV-ELC", is a group of the main electrical circuits used in all modern cars today. It offers a good introduction to the automotive electric systems.

## GENERAL DESCRIPTION

The Automotive Fundamental Electrical Circuits Unit, "AV-ELC", provides a practical solution to the introduction of electricity in the automotive field with a group of common circuits used by the automobiles today.

The circuits included in the "AV-ELC" are focused on different functions, so there are power supply circuits, rectifier circuits, lamp circuits and resistor circuits, capacitor circuits and logic gates circuits. All of these circuits are designed to provide a good introduction to automotive electric systems.

The "AV-ELC" unit is mounted on a metallic plate that can be used alone or assembled on the EDIBON workbenches.

All circuits included in the unit are isolated to understand the function of the circuits separately. Each circuit has different test points accessible through 2 mm standard lab sockets.

The "AV-ELC" circuits include a series of faults that can be inserted to different components of each circuit to allow the students to detect and understand common failures of the electrical components.

The "AV-ELC" unit is provided with a set of practical exercises, through which the student will understand how the fundamental electric circuits used in the automotive field works.



ISO 9001: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate (total safety)



Certificates ISO 14001 and ECO-Management and Audit Scheme (environmental management)



"Worlddidac Quality Charter" and Platinum Member of Worlddidac

## SPECIFICATIONS

All circuits are mounted on a metallic plate with ABS plastic case, which can stand in vertical position or be used on the surface of a table.

All circuits include several test points, with a standard 2 mm lab socket, to access and analyze each circuit component.

All circuits allow the simulation of failures in the components, inserted with toggle switches.

The circuits included in the "AV-ELC" unit are divided into the following types:

Power supply circuits:

AC power supply.

DC power supply.

Load circuits:

Different lamp circuits with the following configurations available: in series, in parallel and mixed.

Fixed resistors, linear potentiometer and logarithmic potentiometer circuit with the following configurations available: in series, in parallel and mixed.

Adjustable voltage divider.

Resistive conductor circuit with different materials: copper, constantan and nichrome.

Rectifier circuit:

Half wave and full wave rectifier circuit.

Logic gate circuit:

Circuit with the following logic gates: NOT, YES, AND, NAND, OR, NOR, XOR and XNOR.

Relay circuit:

Relay circuit with a 12V DC coil and three contacts: common, normally open and normally closed.

Temporization circuit:

Astable multivibrator circuit with 555IC.

Limit switch circuit.

Capacitor circuit:

Capacitor with the function of filter.

Capacitor with the function of energy storage.

Direct current motor:

DC motor for 12 Vdc power supply.

Protoboard plate:

Protoboard plate to assemble experimental circuits without soldering.

Components to mount a monostable multivibrator or an astable multivibrator circuit with 555IC.

Cables and Accessories, for normal operation.

Manuals: This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

## EXERCISES AND PRACTICAL POSSIBILITIES

Power supply circuits:

- 1.- Waveform study in AC.
- 2.- Study of faults in the waveform circuit.
- 3.- Study of DC signals.

Load circuits:

- 4.- Resistance measurements.
- 5.- Resistors association.
- 6.- Study of faults in the resistors circuit.
- 7.- Lamp resistance.
- 8.- Light intensity variation.
- 9.- Voltage divider ratio.

Rectifier circuit:

- 10.-Study of the diode function.
- 11.-Half wave rectifier.
- 12.-Full wave rectifier.
- 13.-Study of faults in rectifier circuits.
- 14.-Full wave rectifier with filter.

Logic gate circuit:

- 15.-Study the operation with logic gates: NOT, YES, AND, NAND, OR, NOR, XOR and XNOR.
- 16.-Study of faults in logic gates.

Relay circuit:

- 17.-Study the relays terminals.
  - 18.-Power supply of a DC relay coil.
  - 19.-Control of a relay.
  - 20.-Turn signals temporization.
  - 21.-Limit switch to connect the relay.
- Capacitor circuit:
- 22.-Study of a low-pass filter.
  - 23.-Study of a high-pass filter.
  - 24.-Frequency response of a low-pass filter.
  - 25.-Frequency response of a high-pass filter.
  - 26.-Study of faults in filters.
- Several other exercises can be done and designed by the user.

## REQUIRED SERVICES

- Electrical supply: single-phase, 220 V/50 Hz or 110 V/60 Hz.

## RECOMMENDED ACCESSORIES (Not included)

- EDAS/VIS-0.25. EDIBON Data Acquisition System / Virtual Instrumentation System (250.000 samples per second).
- EDAS/VIS-1.25. EDIBON Data Acquisition System / Virtual Instrumentation System (1.250.000 samples per second).
- EMSK. EDIBON Software Development KIT for simulation of electrical and electric circuits, Powered by NI LabVIEW.

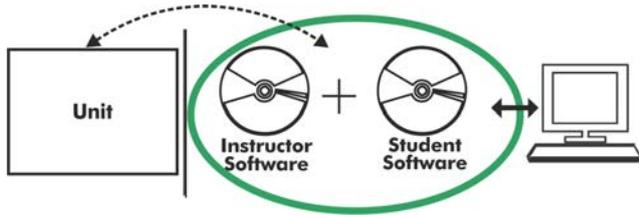
## DIMENSIONS AND WEIGHTS

AV-ELC:

-Dimensions: 550 x 250 x 300 mm approx.  
(21.65 x 9.84 x 11.81 inches approx.)

-Weight: 10 Kg approx.  
(22 pounds approx.)

**AV-ELC/ICAI. Interactive Computer Aided Instruction Software System:**



With no physical connection between unit and computer, this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

Instructor Software

**- ECM-SOF. EDIBON Classroom Manager (Instructor Software).**

ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

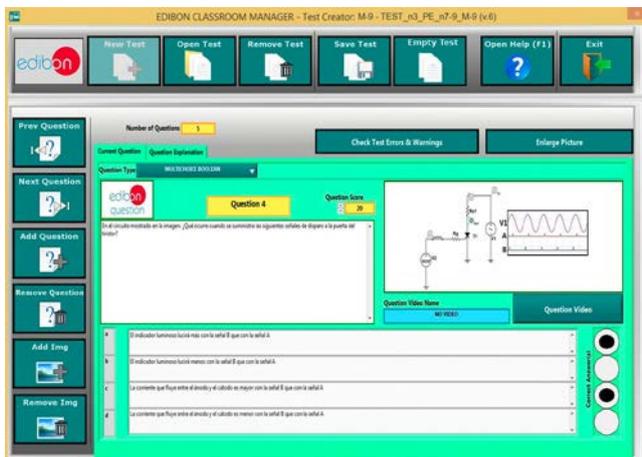
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.
- Updatable Contents.
- Report generation, User Progression Monitoring and Statistics.



ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



ECAL. EDIBON Calculations Program Package - Formula Editor Screen



ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question



ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

Optional  
Student Software

- **ESL-SOF. EDIBON Student Labsoft (Student Software).**

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

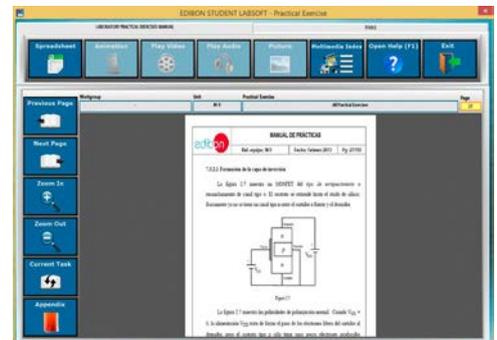
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge and progression.**
- **Test self-correction.**
- **Calculations computing and plotting.**
- **Equation System Solver Engine.**
- **User Monitoring Learning & Printable Reports.**
- **Multimedia-Supported auxiliary resources.**

For more information see ICAI catalogue. Click on the following link:

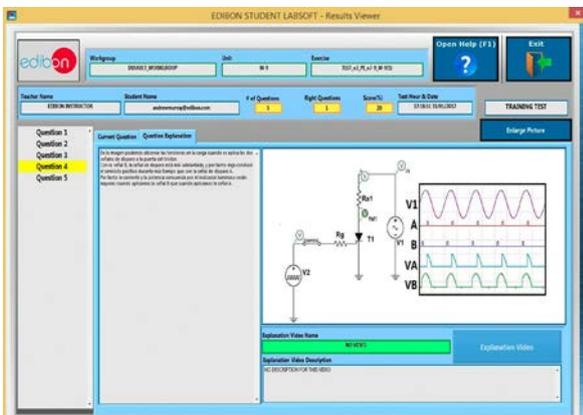
[www.edibon.com/en/files/expansion/ICAI/catalog](http://www.edibon.com/en/files/expansion/ICAI/catalog)



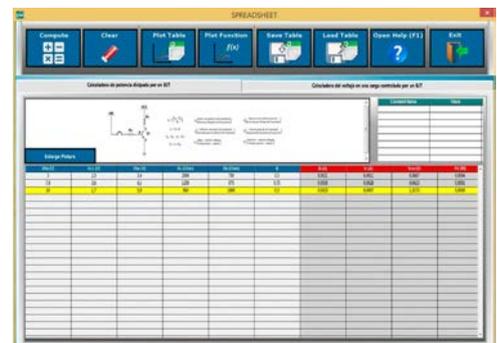
ESL-SOF. EDIBON Student LabSoft (Student Software)  
Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

\* Specifications subject to change without previous notice, due to the convenience of improvement of the product.



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REPRESENTATIVE:

