



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 Electronic Control Device Unit, "AV-ECD", is composed of an Electronic Control Unit (ECU) configured to work with the emulated sensors and actuators included in the unit, but the "AV-ECD" can also work in conjunction with other EDIBON units. I can work with the sensors of the EDIBON Automotive Sensors Unit, "AV-S" and with the actuators of the EDIBON Automotive Actuators Unit, "AV-A".

The Automotive Electronic Control Device Unit included in the "AV-ECD" allows the flashing of the ECU with different programs, changing the response of the ECU to different input signals, etc.

GENERAL DESCRIPTION

The Automotive Electronic Control Device Unit, "AV-ECD", provides a practical solution to the introduction of electronic control units or ECUs. The unit emulates a group of the main sensors and actuators used in modern cars to introduce the user to the ECU common functions.

The "AV-ECD" unit includes a series of emulated sensors and actuators that generate and receive the same signal like a real automotive sensors and actuators. The emulated sensors and actuators included in the unit are focused on the engine management system: knock sensor, engine coolant sensor, lambda sensor, camshaft position sensor, turbocharger boost control solenoid, electronic throttle valve, engine cooling fan, etc.

The communication protocol of the ECU varies depending on the characteristics of the sensors and actuators connected. This communication with the electronic control units can be done through CAN or LIN network protocols or through digital or analog signals.

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

All sensor and actuator 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-ECD" circuits include a series of faults, which can be inserted to the input and output signals of the ECU, to allow the students to detect and understand common failures of the electronic components.

The "AV-ECD" unit is provided with a different set of practical exercises, through which the student will understand how the electronic control units work.



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

The "AV-ECD" unit is mounted in a metallic box, which can be assembled in vertical position or used on the surface of a table.

The "AV-ECD" can work alone, but the electronic control device also allows to be connected to some sensors of the "AV-S" unit and some actuators of the "AV-A" unit in order to work with real sensors and actuators.

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

The sensor and actuator circuits allow the simulation of failures in the components, inserted with toggle switches. The system failures are indicated by the malfunction indicator lamp (MIL). The sensors and actuators can work individually or with other related sensors and actuators.

The circuits included in the "AV-ECD" unit are divided into:

Electronic control unit (ECU):

Communication with sensors and actuators through CAN or LIN network protocols or through digital or analog signals.

ECU self-diagnostic to detect failures.

Flashing of the ECU with two engine configurations: naturally aspirated and turbocharged.

Emulated sensor circuits:

Manifold absolute pressure sensor.

Knock sensor.

Accelerator pedal position sensor.

Intake air temperature sensor.

Refrigerant temperature sensor.

Exhaust Gas Recirculation (EGR) temperature sensor.

Oxygen or Lambda sensor.

Mass air flow sensor.

Crankshaft position sensor.

Camshaft position sensor.

Fuel tank pressure sensor.

Emulated actuator circuits:

Canister-purge solenoid valve.

Turbocharger boost control solenoid.

Exhaust Gas Recirculation (EGR) valve.

Spark plug.

Fuel injector.

Electronic throttle valve.

Engine cooling fan.

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

Electronic control unit (ECU):

- 1.- Communication with sensors and actuators through CAN or LIN network protocols or through digital or analog signals.
 - 2.- Performance of an ECU self-diagnostic to detect failures.
 - 3.- Understanding the Manifold Absolute Pressure (MAP) sensor signal.
 - 4.- Knock sensor signal.
 - 5.- Function of the fuel tank pressure sensor and the canister-purge solenoid valve.
 - 6.- Refrigerant temperature sensor signal.
 - 7.- Function of the Exhaust Gas Recirculation (EGR) temperature sensor.
 - 8.- Function of the Accelerator Pedal Position (APP) sensor.
 - 9.- Oxygen or Lambda sensor signal.
 - 10.-Mass air flow sensor signal.
 - 11.-Intake air temperature sensor signal.
 - 12.-Crankshaft position sensor signal.
 - 13.-Camshaft position sensor signal.
 - 14.-Checking failures in the sensor signals.
 - 15.-Turbocharger boost solenoid control signal.
 - 16.-Function of the Exhaust Gas Recirculation (EGR) valve.
 - 17.-Understanding the electronic throttle valve function.
 - 18.-Function of the fuel pump.
 - 19.-Spark plug control signal.
 - 20.-Fuel injector control signal.
 - 21.-Engine cooling fan control signal.
 - 22.-Checking failures in the actuator signals.
 - 23.-ECU self-diagnostic function.
 - 24.-Flashing the ECU with naturally aspirated engine configuration.
 - 25.-Flashing the ECU with turbocharged engine configuration.
- 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).

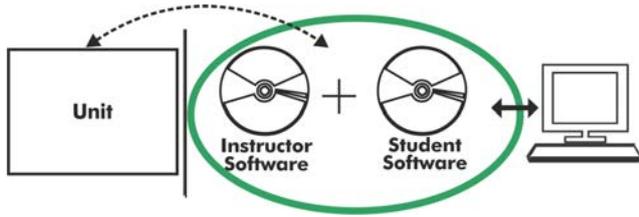
DIMENSIONS AND WEIGHTS

AV-ECD:

-Dimensions: 490 x 330 x 310 mm approx.
(118.10 x 70.86 x 66.92 inches approx.)

-Weight: 12 Kg approx.
(1410 pounds approx.)

AV-ECD/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.

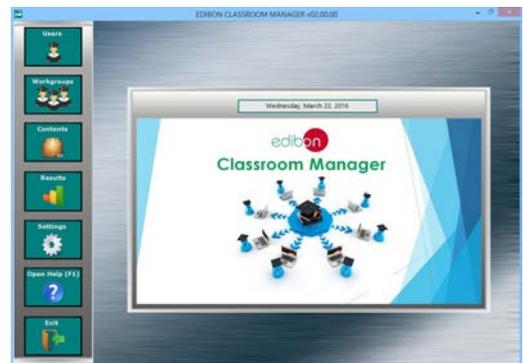
Instructor Software

- 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:

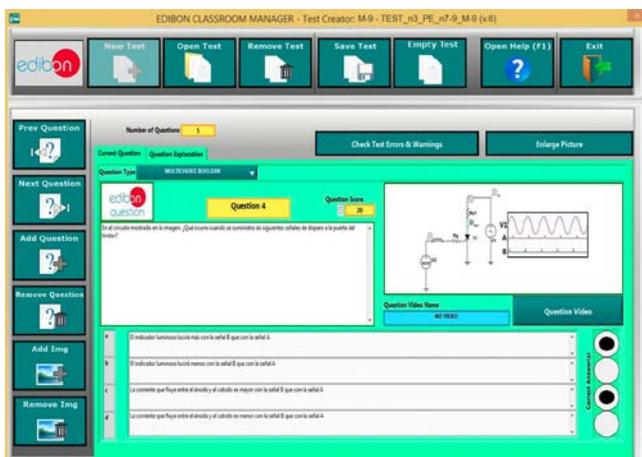
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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

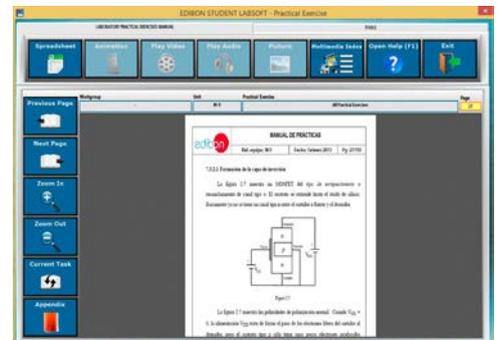
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge 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:

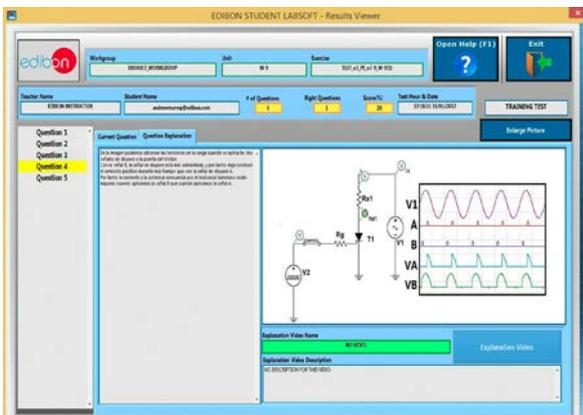
www.edibon.com/en/files/expansion/ICAI/catalog



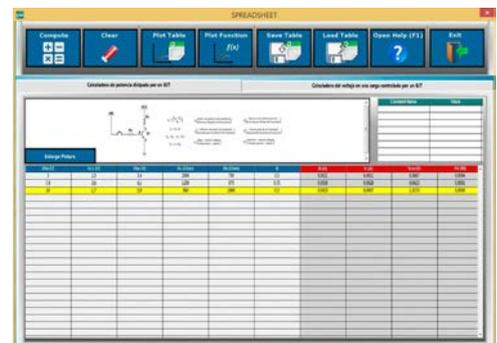
ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen



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:

