Computer Controlled **A/D and D/A Converters Unit,** with SCADA

CADDA

② EDAS/VIS. EDIBON Data Acquisition System and Virtual Instrumentation

PATENTED SYSTEM

EDIBON **SCADA** System

Teaching Technique used

CADDA
COMPUTER CONTROLLED A/D AND D/A CONVERTERS UNIT
Equipo de Convertidores A/D y D/A, Controlado desde Computador (PC)

edibon

CADDA
ANALOG - DIGITAL CONVERSION
Conversión Analógica - Digital

CADDA
DIGITAL - ANALOG CONVERSION
Conversión Digital - Analógica

③ Data Acquisition Board

④ Software for:
- Computer Control
- Data Acquisition
- Data Management

Computer
(not included in the supply)

⑤ Cables and Accessories

⑥ Manuals

① Unit: CADDA. Computer Controlled A/D and D/A Converters Unit

* **Minimum supply always includes:** 1 + 2 + 3 + 4 + 5 + 6
(Computer not included in the supply)

Key features:

➢ **Advanced Real-Time SCADA.**

➢ **Open Control + Multicontrol + Real-Time Control.**

➢ **Specialized EDIBON Control Software based on LabVIEW.**

➢ **National Instruments Data Acquisition board (250 KS/s, kilo samples per second).**

➢ **Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.**

➢ **Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.**

➢ **Capable of doing applied research, real industrial simulation, training courses, etc.**

➢ **Remote operation and control by the user and remote control for EDIBON technical support, are always included.**

➢ **Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).**

➢ **Designed and manufactured under several quality standards.**

➢ **Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.**

➢ **This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.**

OPEN CONTROL
+
MULTICONTROL
+
REAL TIME CONTROL

POWERED BY
NATIONAL INSTRUMENTS
LabVIEW

www.edibon.com
⤷PRODUCTS
⤷2.- ELECTRONICS,
6.- MECHATRONICS, AUTOMATION & COMPUMECHATRONICS AND
14.- BIOMEDICAL ENGINEERING

For more information about Key Features, click here

PDF Adobe   You Tube

INTRODUCTION

Digitization is the conversion of an image, sound, radio communication signal, etc. into a set of binary numbers. This process is very common today and it is used in a lot of digital devices like digital cameras, digital radios, sensor measurements, etc.

The objective of the digitization is the conversion of any continuous analog signal into a discrete digital signal. The digital signals are used by digital systems like computers, smartphones or industrial controllers. The digital data also allows to create an unlimited number of copies without degradation. The digital data can be transmitted, processed and stored without losing information.

The reverse process is called digital to analog conversion, and is also very common in the digital system to rebuild the analog signals. The digital to analog conversion is used, for example, in the digital radio devices to play music.

The Computer Controlled A/D and D/A Converters Unit, "CADDA", designed by EDIBON, it covers the basic principles about analog to digital converters and digital to analog converters, and allows to displaying the results on the computer.

The unit is provided with a set of practical exercises, through which the student will understand how to work with different elements of the unit in order to obtain a complete knowledge of the concepts behind the conversion between analog and digital data.

GENERAL DESCRIPTION

The Computer Controlled A/D and D/A Converters Unit, "CADDA", unit has been designed to help the students to learn how to perform the most common procedures and study the different circuits used to convert analog signals in a digital signals and vice versa.

The unit also allows the user to study in detail other circuits related with the analog to digital conversion and digital to analog conversion, such as adder circuit, sample and hold circuit, series converter, frequency to voltage converter, etc.

The unit includes a data acquisition system to acquire multiple analog signals and show the signals on the computer. The data acquisition system allows the user to generate a variety of waveforms (with the analog outputs) in order to test the different circuits with different analog signals. The data acquisition system also allows to use 24 digital inputs/outputs configurable as inputs or outputs.

The "CADDA" unit includes the following elements:

- N-M60. Analog/Digital Converters Module.

- N-M61. Digital/Analog Converters Module.

- EDAS/VIS-0.25. EDIBON Data Acquisition System and Virtual Instrumentation (speed: 250,000 samples/s).

This Computer Controlled Unit is supplied with the EDIBON Computer Control System (SCADA), and includes: The unit itself + a Data Acquisition Board + Computer Control, Data Acquisition and Data Management Software Packages, for controlling the process and all parameters involved in the process.

UNIT ELEMENTS ALLOCATION

Analog Inputs

Analog Outputs

EDAS/VIS.
EDIBON Data Acquisition System and Virtual Instrumentation

Digitals Inputs/Ouputs

A/D converter

D/A converter
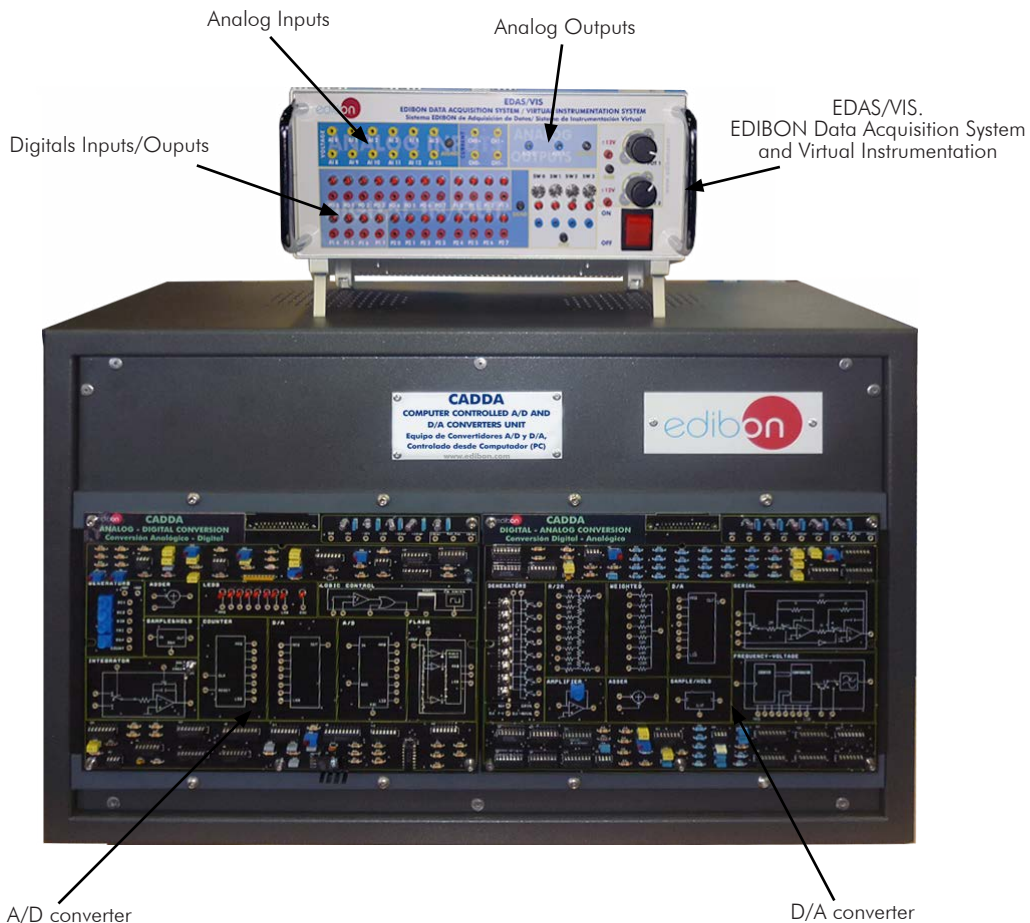
With this unit there are several options and possibilities:
  - Main items: 1, 2, 3, 4, 5 and 6.
  - Optional items: 7, 8 and 9.
 Let us describe first the main items (1 to 6):

① **CADDA. Unit:**

Unit mounted in a metallic box.

Power supply.

In this unit, the elements are separated in two parts: left part for analog to digital conversions (A/D converter board) and right part for digital to analog conversions D/A converter board).

The analog and digital signals to test the A/D and D/A converters can be generated by the circuits included in the front panel or by the unit software.

The "CADDA" unit includes the following elements:

  - N-M60. **Analog/Digital Converters Module.**

    Circuit block:

        Signal generators.
        D/A converter.
        A/D converter.
        Adder.
        Sample and hold.
        Leds.
        Logic control.
        Integrator.
        Counter.
        Flash converter.

  - N-M61. **Digital/Analog Converter Module.**

    Circuit block:

        Signal generators.
        R-2R converter.
        Weighted resistors converter.
        D/A converter.
        Serial converter.
        Amplifier.
        Adder.
        Sample and hold.
        Frequency-voltage converter.

The complete unit includes as well:

    Advanced Real-Time SCADA.

    Open Control + Multicontrol + Real-Time Control.

    Specialized EDIBON Control Software based on LabVIEW.

    National Instruments Data Acquisition board (250 KS/s, kilo samples per second).

    Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.

    Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.

    Capable of doing applied research, real industrial simulation, training courses, etc.

    Remote operation and control by the user and remote control for EDIBON technical support, are always included.

    Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).

    Designed and manufactured under several quality standards.

    Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.

    This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.

Unit: CADDA

② EDAS/VIS. EDIBON Data Acquisition System and Virtual Instrumentation:

16 Analog inputs (1 block with **12 voltage channels** and 1 block with **2 current channels** (4 connections)).

EDAS/VIS 0.25. Sampling velocity 250,000 samples per second.

Two analog outputs.

24 digital inputs/outputs, configurable as inputs or outputs, with 24 state LED indicators. These digital inputs/outputs are grouped in three ports of eight channels (P0, P1 and P3).

Four digital signal switches 0 - 5 V.

Two analog signal potentiometers 12 V.

Main ON/OFF switch.

Inside: internal power supply of 12 and 5 V. Potentiometer.

EDAS/VIS.
EDIBON Data Acquisition
System and Virtual Instrumentation

③ DAB. Data Acquisition Board:

The Data Acquisition board is part of the SCADA system.

PCI Express Data acquisition board (National Instruments) to be placed in a computer slot. Bus PCI Express.

Analog input:

Number of **channels= 16** single-ended or 8 differential. **Resolution=16 bits**, 1 in 65536.

Sampling rate up to: 250 KS/s (kilo samples per second).

Input range (V)=±10 V. Data transfers=DMA, interrupts, programmed I/0. DMA channels=6.

Analog output:

Number of **channels=2**. **Resolution=16 bits**, 1 in 65536. Maximum output rate up to: 900 KS/s.

Output range(V)=±10 V. Data transfers=DMA, interrupts, programmed I/0.

Digital Input/Output:

Number of **channels=24 inputs/outputs**. D0 or DI Sample Clock frequency: 0 to 100 MHz.

Timing: Number of **Counter/timers=4**. Resolution: Counter/timers: 32 bits.

The Data Acquisition board model may change at any moment, providing the same or better features than those required for the unit.

DAB

④ CADDA/CCSOF. Computer Control + Data Acquisition + Data Management Software:

Compatible with actual Windows operating systems. Amicable graphical frame.

Configurable software allowing the temporal/frequency representation of the different inputs and outputs. Visualization of a voltage of the circuits on the computer screen.

It allows data store in a file, print screens and reports of the signals at any time.

Measurement, analysis, visualization, representation and report of results.

Set of virtual instruments:

Oscilloscope:

Channels: 12 simultaneous. Maximum input voltage: 10 V.

All 12 input channels could be scaled to compare signal with different voltage levels.

Maximum sampling velocity: 1000 samples per second.

"Math Menu" with operations as add, rest, multiplication and division, between any of the 12 oscilloscope channels.

Function generator:

Two independent signal generators, for sinusoidal, triangular, sawtooth and square.

Channels: 2 (allowing working simultaneously). Maximum output voltage: 10 V.

Maximum output rate: 1000 samples per second.

It includes a graph where an output signal for each channel is shown.

Spectrum analyzer:

Channels: 12 (simultaneous). Maximum voltage: 10 V. Digital spectrum analyzer: based on the FFT.

Maximum sampling velocity: 1000 samples per second.

Multimeter:

Voltmeter, channels: 12 (simultaneous). Maximum voltage: 10 V RMS.

Ammeter, channels: 2 (simultaneous). Maximum ampere: 500 mA RMS per channel.

Transient analyzer.

Logic analyzer:

Number of input channels: 8. TTL Voltage level.

Clock source: 3 different sources.

This instrument allows receiving as far as 8 digital signal simultaneously at 1 Mbps.

Logic generator:

Number of transmission channels: 8. TTL voltage level.

This instrument allows generating up to 8 digital simultaneous signals of 1 Mbps.

CADDA/CCSOF

⑤ Cables and Accessories, for normal operation.

⑥ Manuals:

This unit is **supplied with 8 manuals**: Required Services, Assembly and Installation, Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.

✱References 1 to 6 are the main items: CADDA + EDAS/VIS + DAB + CADDA/CCSOF + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.

EXERCISES AND PRACTICAL POSSIBILITIES TO BE DONE WITH THE MAIN ITEMS

1.- Sampling theorem.

2.- Monopolar simple ramp converter.

3.- Monopolar double ramp converter.

4.- Monopolar binary ramp converter.

5.- A/D integrated converter. Monopolar assembly.

6.- A/D integrated converter. Bipolar assembly.

7.- Flash converter.

8.- D/A converter of weighted divider resistors.

9.- Analog switches errors.

10.- D/A converter of R-2R ladder.

11.- Current division in R-2R ladder converter.

12.- D/A converter of inverted ladder.

13.- D/A integrated converter.

14.- Serial data input D/A converter.

15.- D/A converter of pulse width modulation.

Other possibilities to be done with this unit:

16.- Many students view results simultaneously.

To view all results in real time in the classroom by means of a projector or an electronic whiteboard.

17.- Open Control, Multicontrol and Real Time Control.

This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivative parameters; etc, in real time.

18.- The Computer Control System with SCADA allows a real industrial simulation.

19.- This unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.

20.- This unit can be used for doing applied research.

21.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.

22.- Control of the CADDA unit process through the control interface box without the computer.

23.- Visualization of all the sensors values used in the CADDA unit process.

- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

- Electrical supply: single-phase 200 VAC – 240 VAC/50 Hz or 110 VAC – 127 VAC/60 Hz.

REQUIRED ELEMENTS

- AEL-PC. Touch screen and computer.
              or
- PC. PC to work with the unit.

DIMENSIONS AND WEIGHTS

CADDA:

    Unit:

        - Dimensions: 640 x 450 x 310 mm approx.

                        (25.19 x 17.71 x 12.20 inches approx.)

        - Weight: 20 Kg approx.

                        (44 pounds approx.).

EDAS/VIS. EDIBON Data Acquisition System and Virtual Instrumentation:

        - Dimensions: 310 x 220 x 145 mm approx.

                        (12.20 x 8.66 x 5.70 inches approx.)

        - Weight: 2 Kg approx.

                        (4.4 pounds approx.).

SIMILAR UNITS AVAILABLE

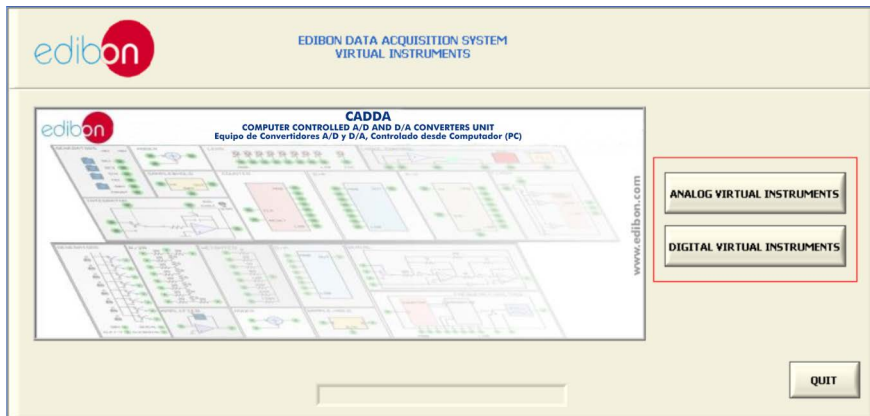<u>Offered in this catalog:</u>

- CADDA. Computer Controlled Analog/Digital and Digital/Analog Converters Study Unit.
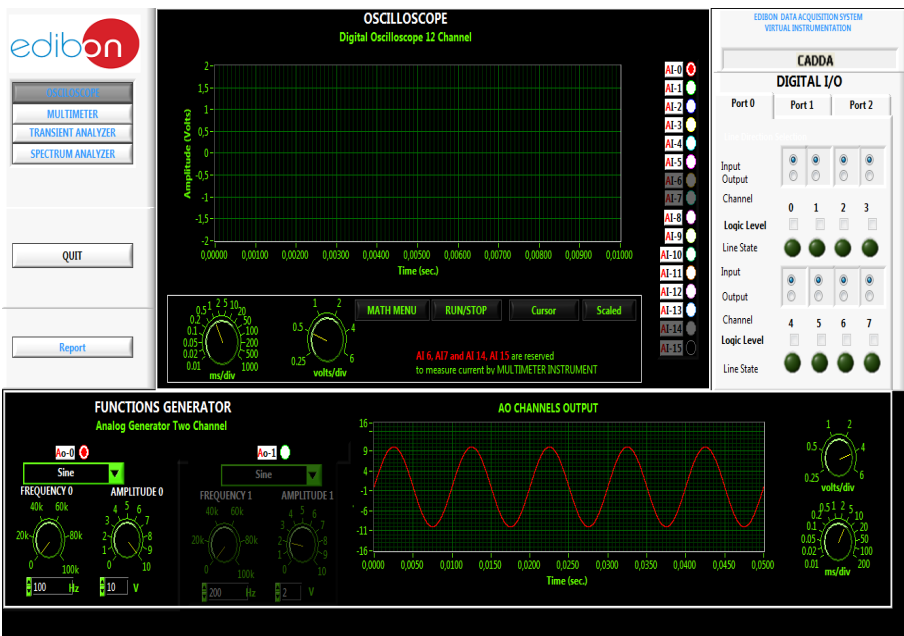
<u>Offered in other catalogs:</u>

- N-M60. Analog/Digital Converters Module.
- N-M61. Digital/Analog Converters Module.

SCADA
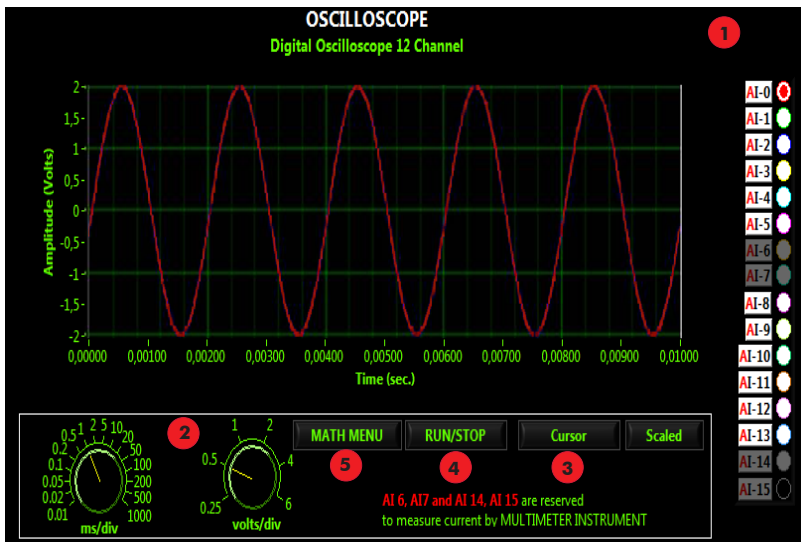## Main screen

Experimental Windows

Main screen of
analog virtual instruments

Main screen of
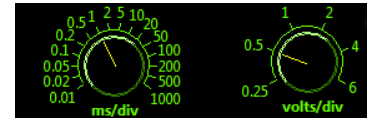digital virtual instruments

Analog Virtual Instruments Screens

Oscilloscope
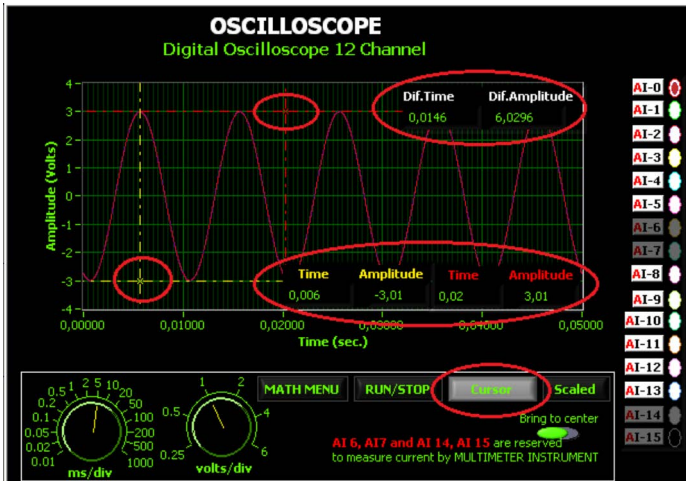

1 Channels selector
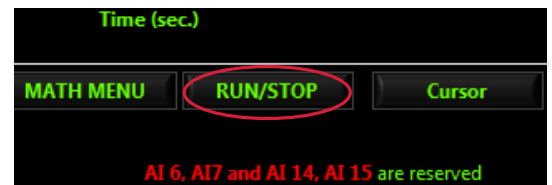

2 Handler control axis:

Let us to change the volts per division (volts-axis) and milliseconds per division (time-axis).

3 Cursors

4 Run/Stop:

The Run/Stop button lets us to hold the signal on the screen until pressing this button again. This option lets us to improve the accuracy when you work the cursors.

Two cursors appear if you press "Cursor" button on oscilloscope's screen. Also several displays appear on the screen that show the volts shift, the time shift and the difference between both. The "Bring to center" button allows us bringing the cursors to center of graph.

5 Math Menu:
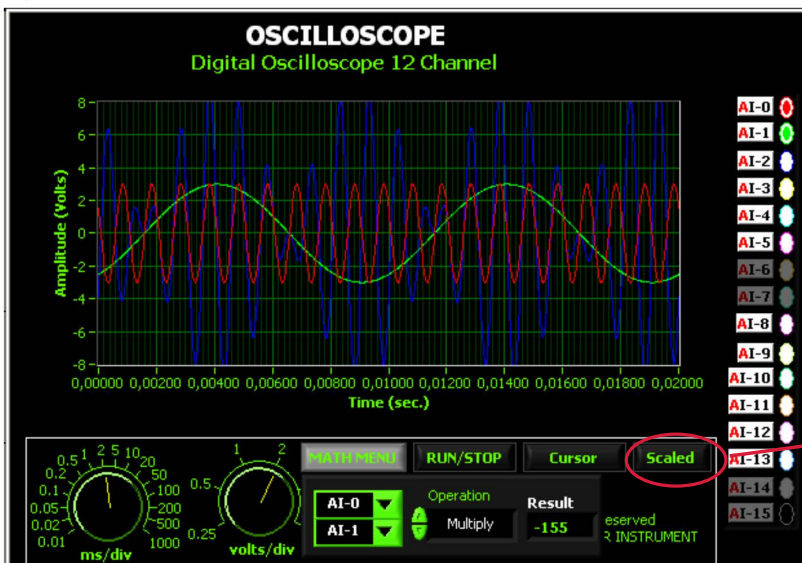
If you press the Math Menu button a box appears. This chart contains two channel selectors and an operation selector to apply between the selected channels. The result of the operation will be shown in a display and on the graph. The available operations are ADD, REST, MULTIPLICATION and DIVISION; among any of the 12 channels of the oscilloscope.
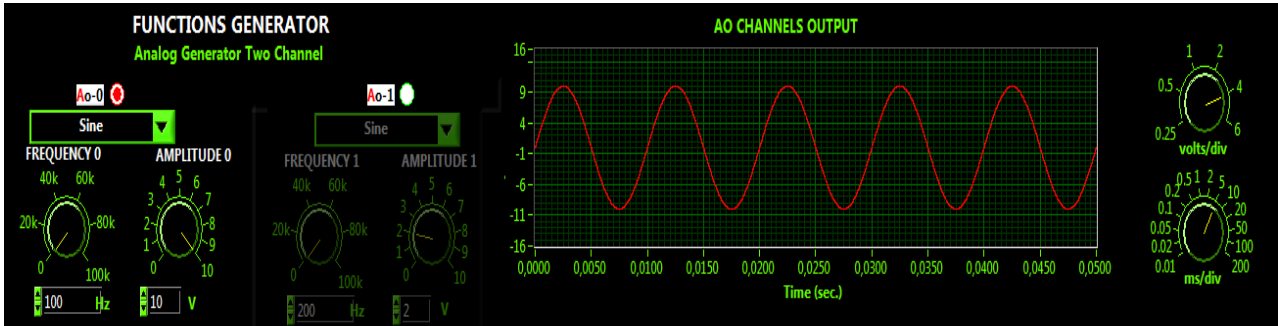
< In this screen we can see an example of multiplication between the red signal (AI-0) and green (AI-1), the blue signal of the graph is the result of the operation.
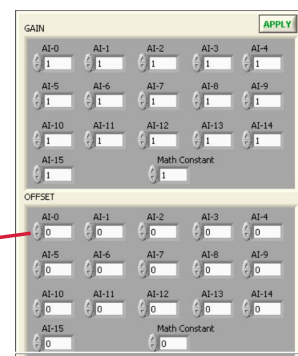
This instrument allows to scale independently each one of the channels. Like wise, the user could scale the result signal of the math operation.
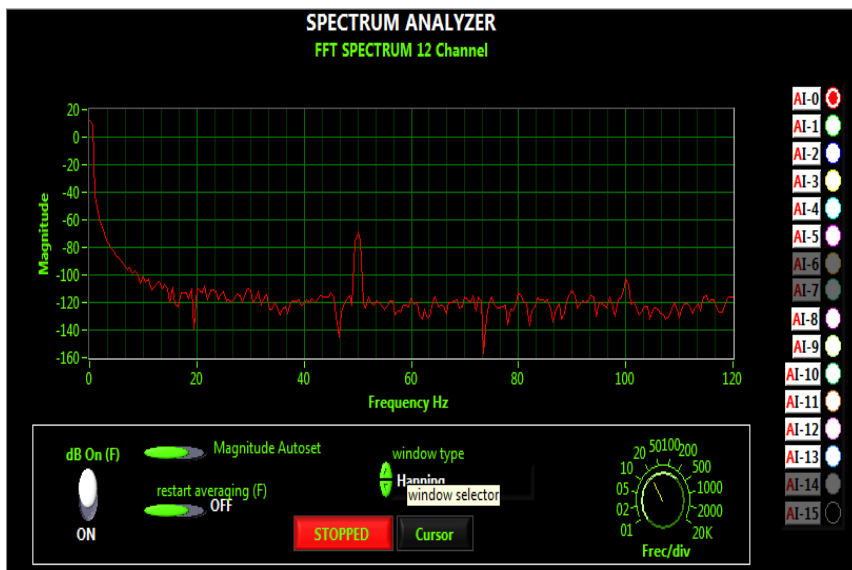
Analog Virtual Instruments Screens

Functions Generator

It has 2 channels and 4 type of functions.

Spectrum Analyzer

Digital spectrum analyzer: based in FFT, Fourier fast transformer.

It lets us to change the frequency per division through a control placed under the graph, it can show magnitude in dB, auto magnitude scaled and it can apply several windows types, (Nothing, Hanning, Hamming, Blackman-harris, exact Blackmann, Blackman, flat top, 4 term B-harris, 7 term B-harris o low sidelobe).
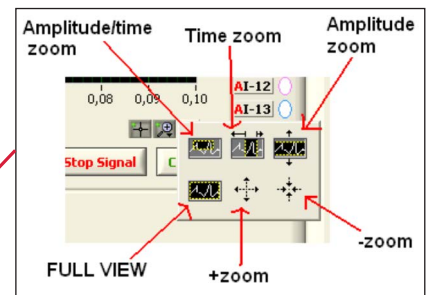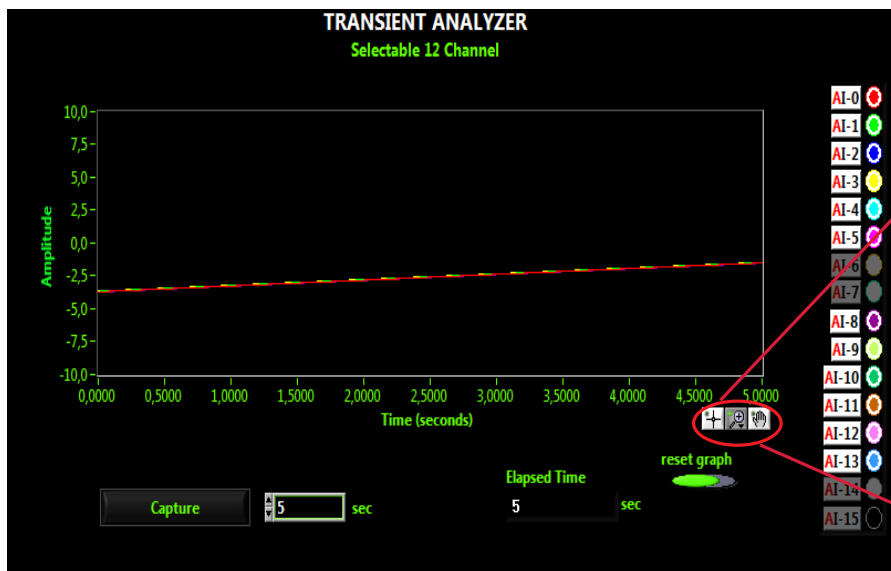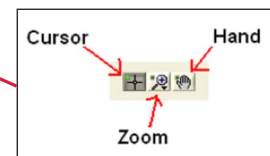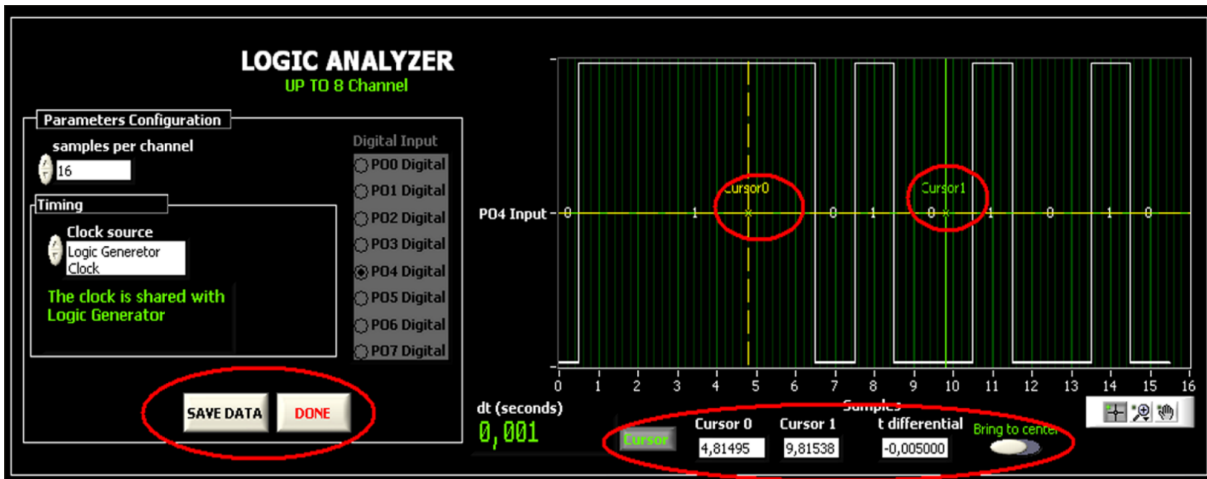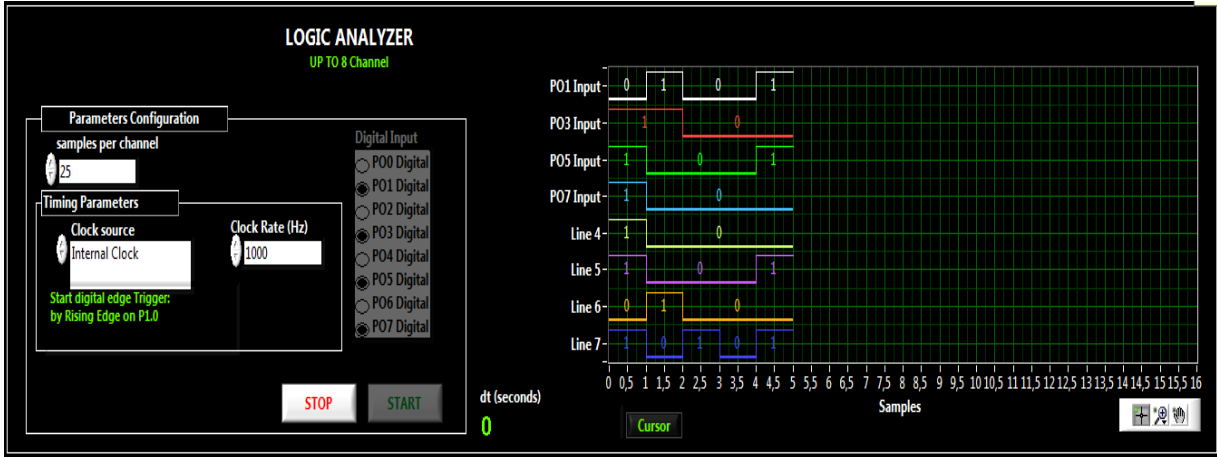
Multimeter

Voltimeter

Ammeter

Transient Analyzer

The palette is essential to manipulate the graph. This palette has three actuation modes to act on the graph.

Digital Virtual Instruments Screens

Logic Analyzer
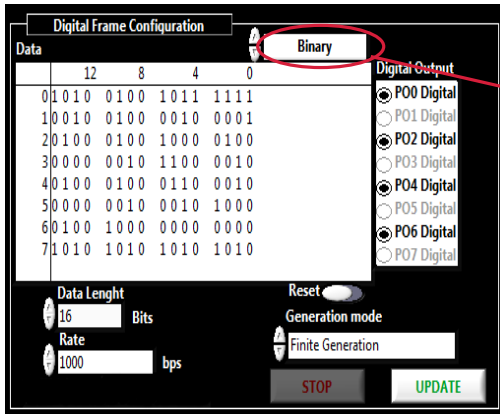
Digital Virtual Instruments Screens
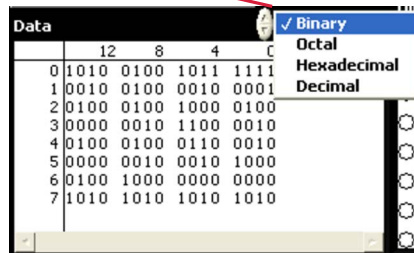
Logic Analyzer
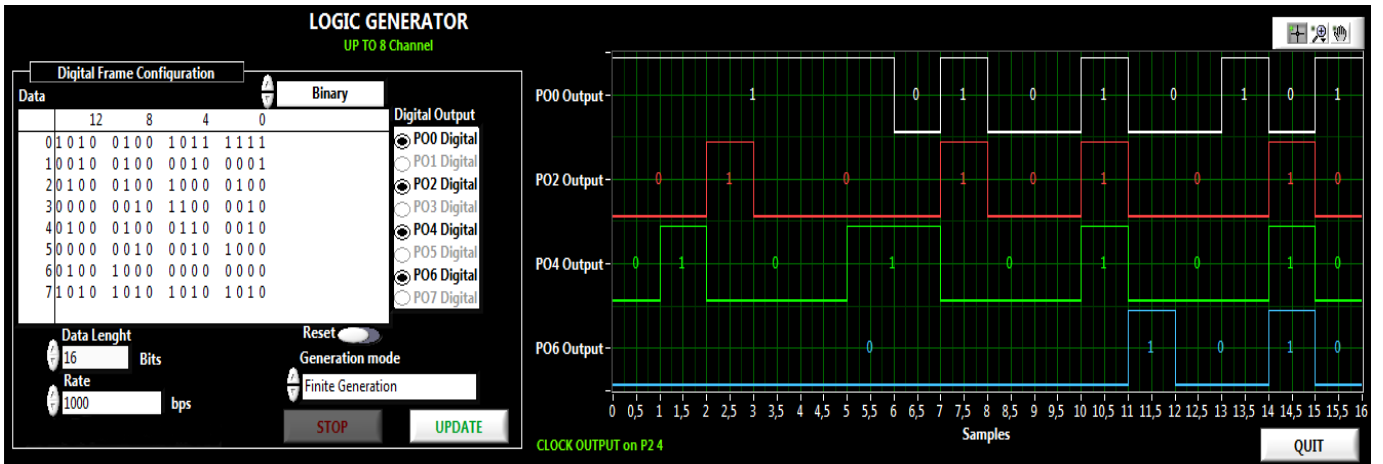
It has two generation types: finite generation and continuous generation.

Several numeric bases:
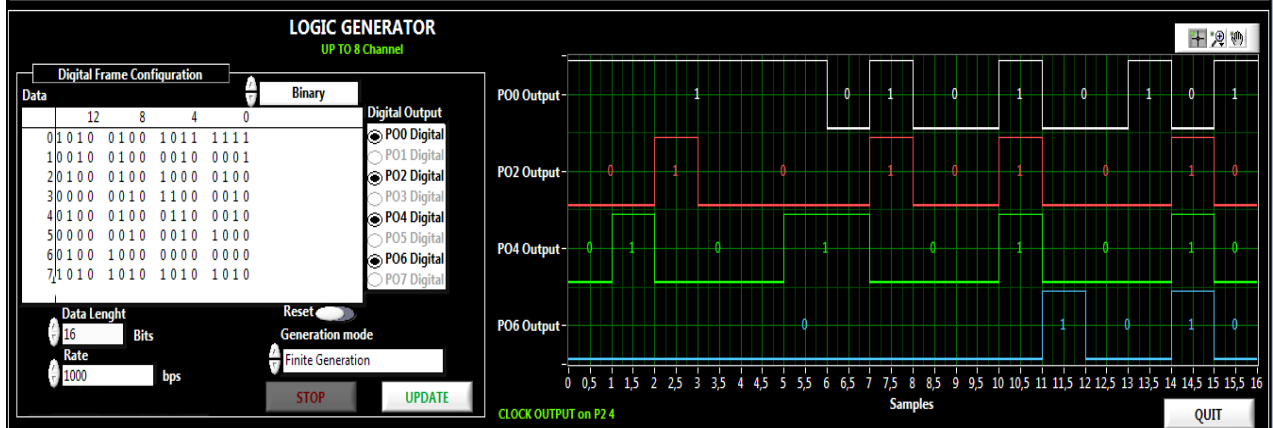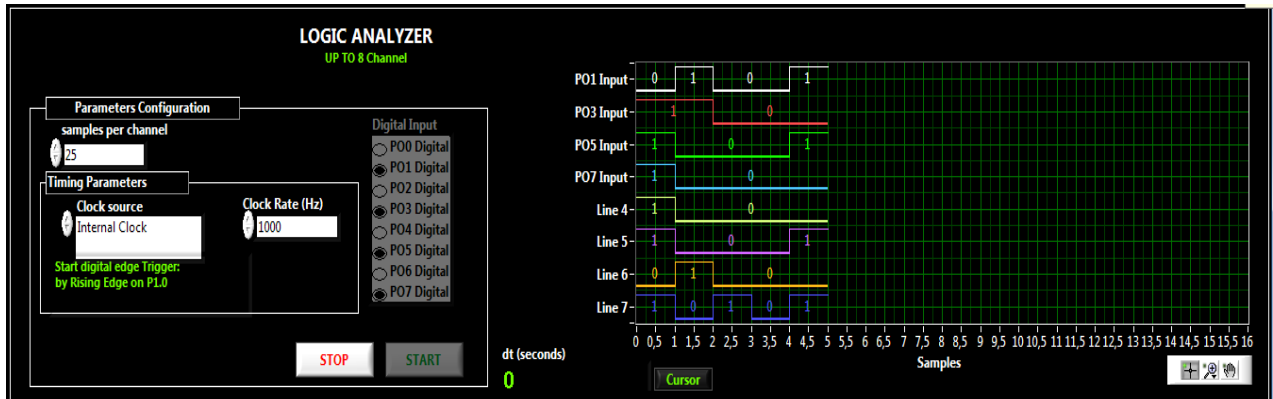- Binary.
- Octal.
- Hexadecimal.
- Decimal.

Example of digital transmission - Reception, LOOPBACK

www.edibon.com

Additionally to the main items (1 to 6) described, we can offer, as optional, other items from 7 to 9.

All these items try to give more possibilities for:

a) Technical and Vocational Education configuration. (ICAI)

b) Multipost Expansions options. (MINI ESN and ESN)

a) Technical and Vocational Education configuration

⑦ CADDA/ICAI. Interactive Computer Aided Instruction Software.

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.

This software is optional and can be used additionally to items (1 to 6).

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

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

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

- 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.
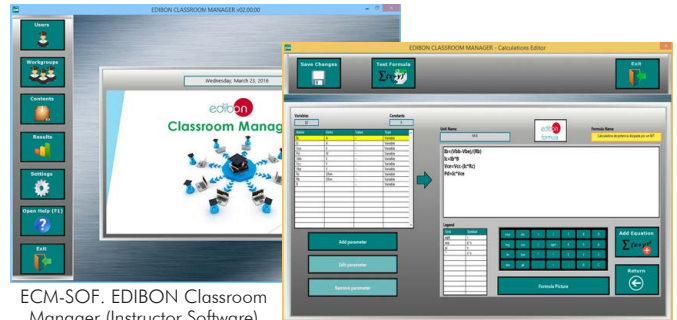
Innovative features:

• 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/interactive-computer-aided-instruction-software

Student Software

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

EPE. EDIBON Practical Exercise Program Package Main Screen
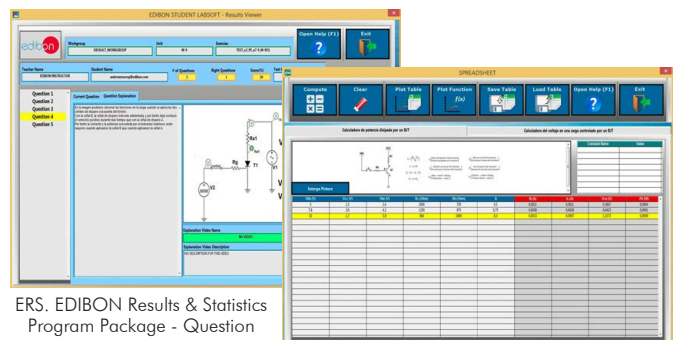
ERS. EDIBON Results & Statistics Program Package - Question Explanation

ECAL. EDIBON Calculations Program Package Main Screen

b) Multipost Expansions options

⑧ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.

MINI ESN. EDIBON Mini Scada-Net System allows up to 30 students to work with a Teaching Unit in any laboratory, simultaneously. It is useful for both, Higher Education and/or Technical and Vocational Education.

The MINI ESN system consists of the adaptation of any EDIBON Computer Controlled Unit with SCADA integrated in a local network.

This system allows to view/control the unit remotely, from any computer integrated in the local net (in the classroom), through the main computer connected to the unit. Then, the number of possible users who can work with the same unit is higher than in an usual way of working (usually only one).

Main characteristics:

- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA, connected in a local net.

- Open Control + Multicontrol + Real Time Control + Multi Student Post.

- Instructor controls and explains to all students at the same time.

- Any user/student can work doing "real time" control/multicontrol and visualisation.

- Instructor can see in the computer what any user/student is doing in the unit.

- Continuous communication between the instructor and all the users/students connected.

Main advantages:

- It allows an easier and quicker understanding.

- This system allows you can save time and cost.

- Future expansions with more EDIBON Units.

For more information see **MINI ESN** catalogue. Click on the following link:

www.edibon.com/en/edibon-scada-net/catalog

**MINI ESN.
EDIBON Mini Scada-Net System**

1 UNIT= up to 30 STUDENTS can work simultaneously

Computer Controlled Analog/Digital and Digital/Analog Converters Study Unit (CADDA)

Software for:
- Computer Control
- Data Acquisition
- Data Management

Instructors' Central Computer

Mini Scada-Net Software

LOCAL NET FOR 30 STUDENTS

OPEN CONTROL
+
MULTICONTROL
+
REAL TIME CONTROL
+
MULTI STUDENT POST

Note: The MINI ESN system can be used with any EDIBON computer controlled unit

⑨ ESN. EDIBON Scada-Net Systems.

This unit can be integrated, in the future, into a Complete Laboratory with many Units and many Students.

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

www.edibon.com/en/edibon-scada-net/catalog
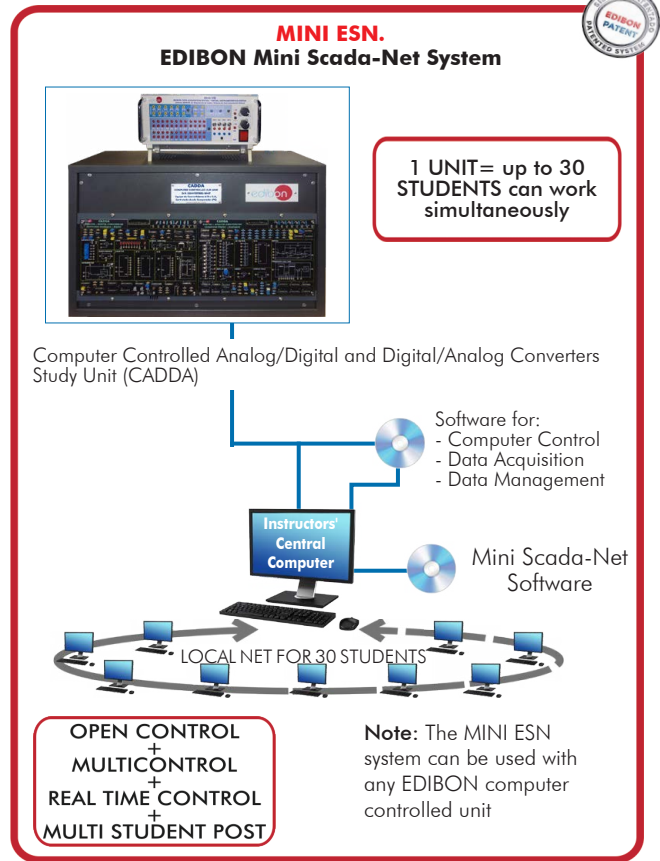
Main items (always included in the supply)

Minimum supply always includes:

① Unit: CADDA. Computer Controlled A/D and D/A Converters Unit.

② EDAS/VIS. EDIBON Data Acquisition System and Virtual Instrumentation.

③ DAB. Data Acquisition Board.

④ CADDA/CCSOF. Computer Control + Data Acquisition + Data Management Software.

⑤ Cables and Accessories, for normal operation.

⑥ Manuals.

*IMPORTANT: Under CADDA we always supply all the elements for immediate running as 1, 2, 3, 4, 5 and 6.

Optional items (supplied under specific order)

a) Technical and Vocational Education configuration

⑦ CADDA/ICAI. Interactive Computer Aided Instruction Software.

b) Multipost Expansions options

⑧ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.

⑨ ESN. EDIBON Scada-Net Systems.

①CADDA. Unit:
Unit mounted in a metallic box.
Power supply.
In this unit, the elements are separated in two parts: left part for analog to digital conversions (A/D converter board) and right part for digital to analog conversions D/A converter board).
The analog and digital signals to test the A/D and D/A converters can be generated by the circuits included in the front panel or by the unit software.
The "CADDA" unit includes the following elements:
  - N-M60. Analog/Digital Converters Module.
    Circuit block:
      Signal generators.
      D/A converter.
      A/D converter.
      Adder.
      Sample and hold.
      Leds.
      Logic control.
      Integrator.
      Counter.
      Flash converter.
  - N-M61. Digital/Analog Converter Module.
    Circuit block:
      Signal generators.
      R-2R converter.
      Weighted resistors converter.
      D/A converter.
      Serial converter.
      Amplifier.
      Adder.
      Sample and hold.
      Frequency-voltage converter.
The complete unit includes as well:
    Advanced Real-Time SCADA.
    Open Control + Multicontrol + Real-Time Control.
    Specialized EDIBON Control Software based on LabVIEW.
    National Instruments Data Acquisition board (250 KS/s, kilo samples per second).
    Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.
    Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.
    Capable of doing applied research, real industrial simulation, training courses, etc.
    Remote operation and control by the user and remote control for EDIBON technical support, are always included.
    Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).
    Designed and manufactured under several quality standards.
    Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.
    This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.

② EDAS/VIS. EDIBON Data Acquisition System and Virtual Instrumentation:
    16 Analog inputs (1 block with12 voltage channels and 1 block with 2 current channels (4 connections)).
      EDAS/VIS 0.25. Sampling velocity 250,000 samples per second for EDAS/VIS 0.25.
    Two analog outputs.
    24 digital inputs/outputs, configurable as inputs or outputs, with 24 state led indicators.
    These digital inputs/outputs are grouped in three ports of eight channels (P0, P1 and P3).
    Four digital signal switches 0 - 5 V.
    Two analog signal potentiometers 12 V.
    Main ON/OFF switch.
    Inside: Internal power supply of 12 and 5 V. Potentiometer.

③DAB. Data Acquisition Board:
The Data Acquisition board is part of the SCADA system.
PCI Express Data acquisition board (National Instruments) to be placed in a computer slot.
Analog input: Channels= 16 single-ended or 8 differential. Resolution=16 bits, 1 in 65536. Sampling rate up to: 250 KS/s (kilo samples per second).
Analog output: Channels=2. Resolution=16 bits, 1 in 65536.
Digital Input/Output: Channels=24 inputs/outputs.
The Data Acquisition board model may change at any moment, providing the same or better features than those required for the unit.

④CADDA/CCSOF. Computer Control +Data Acquisition+Data Management Software:
Configurable software allowing the temporal/frequency representation of the different inputs and outputs. Visualization of a voltage of the circuits on the computer screen.
It allows data store in a file, print screens and reports of the signals at any time. Measurement, analysis, visualization, representation and report of results.
Set of Virtual Instruments:
    Oscilloscope: Channels: 12. All 12 input channels could be scaled. "Math Menu".
    Function Generator: two independent signal generators. Channels: 2. It includes a graph where an output signal for each channel is shown.
    Spectrum Analyzer: channels: 12.
    Multimeter: Voltmeter, channels: 12. Ammeter, channels: 2.
    Transient analyzer.
    Logic analyzer: number of input channels: 8. Clock source: 3 different sources.
    Logic generator: number of transmission channels: 8.

⑤Cables and Accessories, for normal operation.

⑥Manuals:
This unit is supplied with 8 manuals: Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.

Exercises and Practical Possibilities to be done with the Main Items

1.- Sampling theorem.
2.- Monopolar simple ramp converter.
3.- Monopolar double ramp converter.
4.- Monopolar binary ramp converter.
5.- A/D integrated converter. Monopolar assembly.
6.- A/D integrated converter. Bipolar assembly.
7.- Flash converter.
8.- D/A converter of weighted divider resistors.
9.- Analog switches errors.
10.- D/A converter of R-2R ladder.
11.- Current division in R-2R ladder converter.
12.- D/A converter of inverted ladder.
13.- D/A integrated converter.
14.- Serial data input D/A converter.
15.- D/A converter of pulse width modulation.
Other possibilities to be done with this unit:
16.- Many students view results simultaneously.
    To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
17.- Open Control, Multicontrol and Real Time Control.
    This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivative parameters; etc, in real time.
18.- The Computer Control System with SCADA allows a real industrial simulation.
19.- This unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.
20.- This unit can be used for doing applied research.
21.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
22.- Control of the CADDA unit process through the control interface box without the computer.
23.- Visualization of all the sensors values used in the CADDA unit process.
- Several other exercises can be done and designed by the user.

<u>a) Technical and Vocational Education configuration</u>

⑦ **CADDA/ICAI. Interactive Computer Aided Instruction Software.**

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.

- 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.

- 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.

<u>b) Multipost Expansions options</u>

⑧ **MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.**

MINI ESN. EDIBON Mini Scada-Net System allows up to 30 students to work with a Teaching Unit in any laboratory, simultaneously.

The MINI ESN system consists of the adaptation of any EDIBON Computer Controlled Unit with SCADA integrated in a local network.

This system allows to view/control the unit remotely, from any computer integrated in the local net (in the classroom), through the main computer connected to the unit.

Main characteristics:

- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA, connected in a local net.
- Open Control + Multicontrol + Real Time Control + Multi Student Post.
- Instructor controls and explains to all students at the same time.
- Any user/student can work doing "real time" control/multicontrol and visualisation.
- Instructor can see in the computer what any user/student is doing in the unit.
- Continuous communication between the instructor and all the users/students connected.

Main advantages:

- It allows an easier and quicker understanding.
- This system allows you can save time and cost.
- Future expansions with more EDIBON Units.

The system basically will consist of:

This system is used with a Computer Controlled Unit.

- Instructor's computer.
- Students' computers.
- Local Network.
- Unit-Control Interface adaptation.
- Unit Software adaptation.
- Webcam.
- MINI ESN Software to control the whole system.
- Cables and accessories required for a normal operation.

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

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