edibon

Technical Teaching Equipment

Computer Controlled **Teaching Unit for the Study of Analog/Digital and Digital/Analog Converters**

CADDA

Always included in the supply:

EDIBON PATENT

Teaching Technique used

RTC. EDIBON Real Time Control System

② Data Acquisition Board

③ Software for:
- Computer Control
- Data Acquisition
- Data Management

④ Cables and Accessories

⑤ Manuals

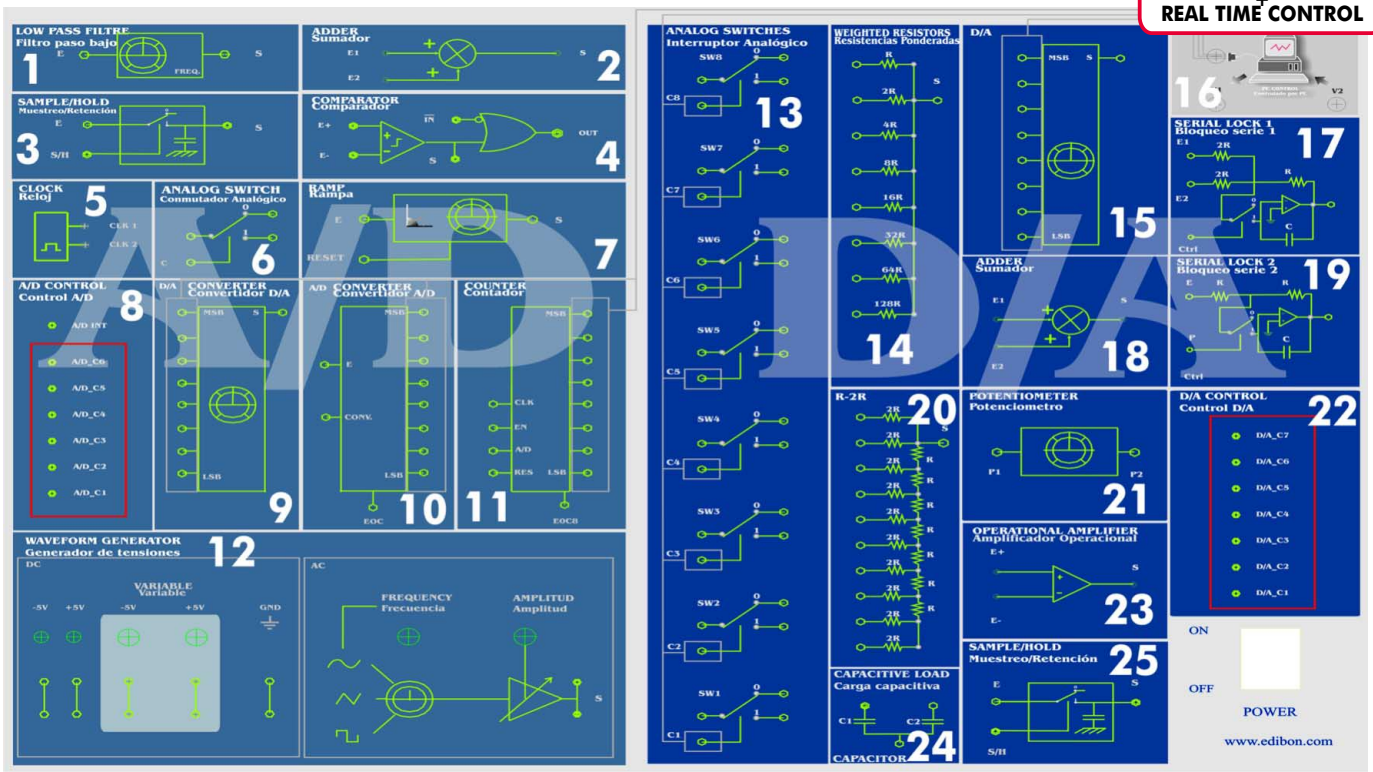
Computer (not included in the supply)

① Unit: CADDA. Teaching Unit for the Study of Analog/Digital and Digital/Analog Converters, including Control Interface.

www.edibon.com
Products
Products range
Units
2.-Electronics

PROCESS DIAGRAM AND ELEMENTS ALLOCATION

OPEN CONTROL + MULTICONTROL + REAL TIME CONTROL



Code	Description	Code	Description	Code	Description	Code	Description
1	LPF-Low pass filter.	8	A/D Control.	15	D/A.	22	D/A control.
2	Adding.	9	D/A Converter.	16	Computer Communication.	23	Operational Amplifier.
3	Sample/Hold.	10	A/D Converter.	17	Serial lock 1.	24	Capacitive Load.
4	Comparator.	11	Counter.	18	Adding.	25	Sample/Hold.
5	Clock.	12	Waveform Generator.	19	Serial lock 2.		
6	Analog Switch.	13	Analog Switches.	20	R/2R.		
7	Ramp.	14	Weighted Resistors.	21	Potentiometer.		

ISO 9001:2000 Certificate of Approval

European Union Certificate

Certificates ISO 14001: 2004 and ECO-Management and Audit Scheme (environmental management)

Worlddidac Quality Charter Certificate Worlddidac Member

SPECIFICATIONS

Items supplied as standard

① CADDA. Unit:

Metallic box.
Diagram in the front panel with similar distribution to the elements in the real unit.
In this unit, the elements are separated in two parts: lefthand part for analog to digital conversions, and right hand part for digital to analog conversions.
Analog/Digital converter board. Digital/Analog converter board.

Signal generator board, with 100 to 330 µF capacitors, 10 to 50K potentiometers and 1 to 100K resistors.
Female and male connectors, interconnections.

Power supply.

LPF-Low Pass Filter: 2nd order low pass filter, needed to convert analog signals to digital.

Adding: this module makes sum of two analog signals.

Sample/Hold: this module holds the signal during the conversion. The input is E, and the output is S. The digital S/H control input defines the operation mode: hold or sample.

Comparator: inputs E+ and E- are compared, and give the result in the digital output S: if E+>E-, S will be at high level. The gate OR inverts the input IN, to finally give the result of bit operation OUT=S+NOT (IN).

Clock: this module generates two digital clocks, CLK1 (245 Hz) and CLK2 (250 kHz).

Analog switch: by the control input C, two connections can be switched to a common point. If C='0', pin 0 is connected at common pin. Also, pin 1 is connected to common point. In this way, we can select one or other analog signal.

Ramp: this module generates a ramp, after reset pulse.

A/D control: this module generates the digital commands needed to carry out the A/D practice selected by the PC.

D/A: this module includes an integrated digital to analog converter. The conversion is quasi instantaneous (85 ns). The factor of conversion can be modified by the potentiometer. Analog output is S, and digital inputs, Most Significant Bit (MSB) to Least Significant Bit (LSB), can be controlled by PC.

A/D: this module contains an integrated analog to digital converter. The chip used, with track and hold included, is useful: by putting a digital negative transition at pin CONV, the analog signal E is internally sampled and converted, in 660ns. During conversion time, EOC takes high state, but becames low at end of conversion. At this time, PC can read output port, MSB to LSB.

Counter: this module is a 8 bit reversible and clocked counter.

Waveform generator: this module delivers different voltages needed by unit.

D/C: Two continuous voltage output: `-5V´ and `+5V.´ Two adjustable voltage output: `variable´-`5V´, and `5V´, everyone with its potentiometer to adjust voltage by 0 to -5.5V for first, and by 0 to 5.5V for second.

AC: three different waveform: sine, triangular and square, adjustable in frequency and width.

Analog switches: 8 analog switches. All are managed by a PC.

Weighted resistors: 8 resistances are connected to a common point. They are weighted as binary code, with R=1KΩ as initial value.

D/A: same module than described before "D/A".

Analog input and output for PC.

Serial lock 1: module based on an adding inverter, but became an analog memory by included commuting switch.

Adding: same module as previously described "Adding".

Serial lock 2: same module than serial lock 1, but based only on an inverter.

R/2R: stair of resistance R/2R.

Potentiometer: a single potentiometer, variable from 0 to 10 KΩ.

D/A control: this module generates the digital commands needed to realise D/A practice selected by PC.

Operational amplifier: a simple powered operational amplifier.

Two capacities of 100nF with common connection.

Sample/Hold: same module as previously described "Sample/Hold".

Control Interface.

CADDA Unit

② DAB. Data Acquisition Board:

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

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

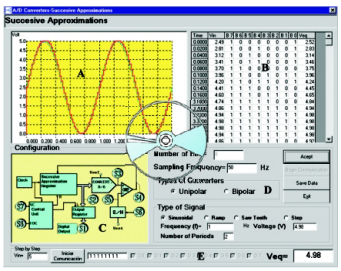
Analog output: **Channels=2**. **Resolution=16 bits**, 1 in 65536. Maximum output rate up to: 833 KS/s.
Output range(V)=±10V. Data transfers=DMA, interrupts, programmed I/0.

Digital Input/Output: Channels=24 inputs/outputs. D0 or DI Sample Clock frequency: 0 to 1 MHz.
Timing: **Counter/timers=2**. Resolution: Counter/timers: 32 bits.

DAB

③ CADDA/CCSOF. Computer Control+Data Acquisition+Data Management Software:

Compatible with all actual Windows operating systems. Graphic and intuitive simulation of the process in screen.
Compatible with the industry standards.
Registration and **visualization of all process variables in an automatic and simultaneously way.**
Flexible open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.
Management, processing, comparison and storage of data.
Sampling velocity up to 250,000 data per second.
Comparative analysis of the obtained data, after to the process and modification of the conditions during the process.



CADDA/CCSOF

④ Cables and Accessories, for normal operation.

⑤ Manuals:

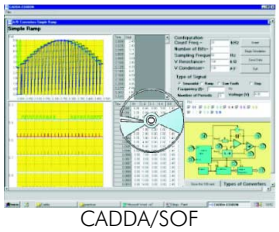
This unit is **supplied with 8 manuals**: Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance, Calibration &Practices Manuals.

✱ References 1 to 5: CADDA + DAB + CADDA/CCSOF + Cables and Accessories + Manuals are included in the minimum supply, enabling a normal operation.

Complementary items to the standard supply

Simulation Software:

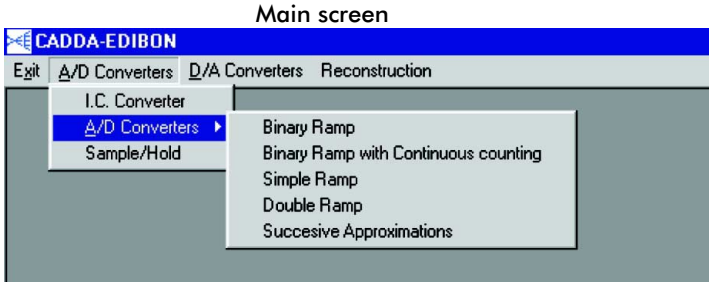
⑥ CADDA/SOF. Analog/Digital and Digital/Analog Converters Simulation Software Package.
(See CADDA/SOF Catalogue).



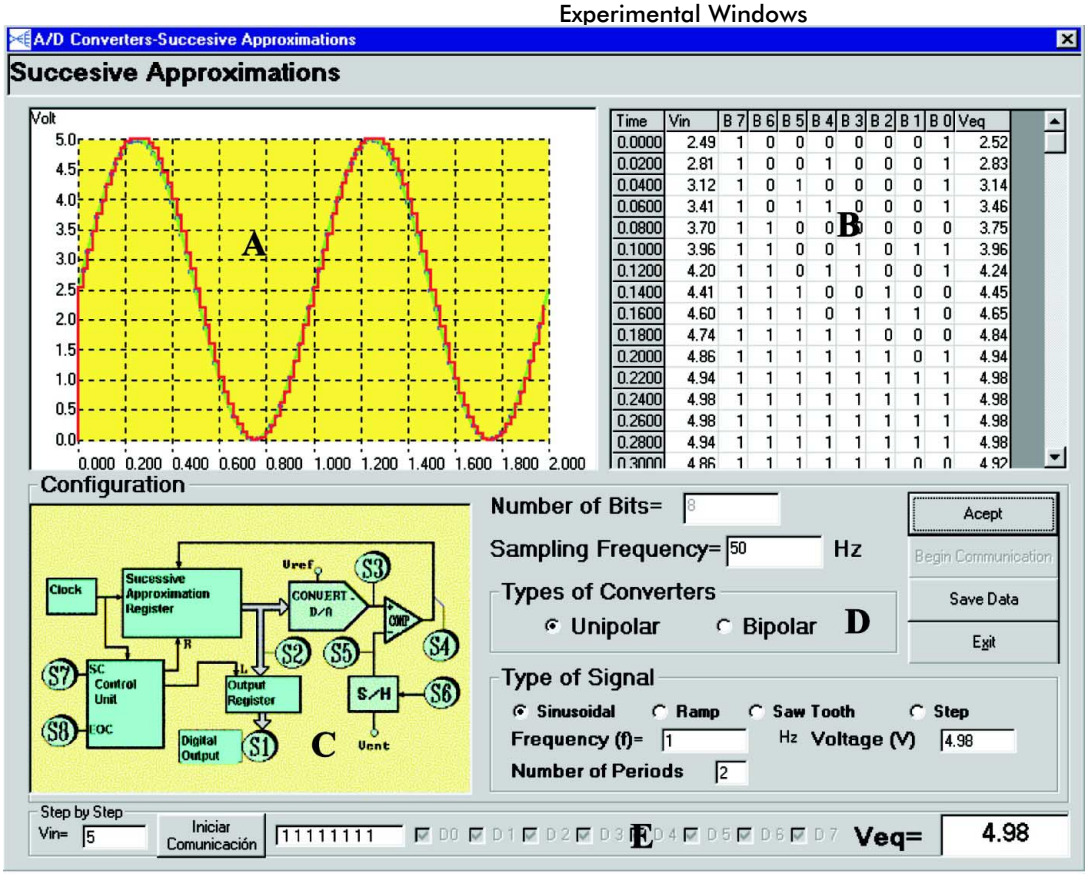
CADDA/SOF

Software Main Screens

Main screen



Experimental Windows



Analog Experimental Window

It is divided in five parts:

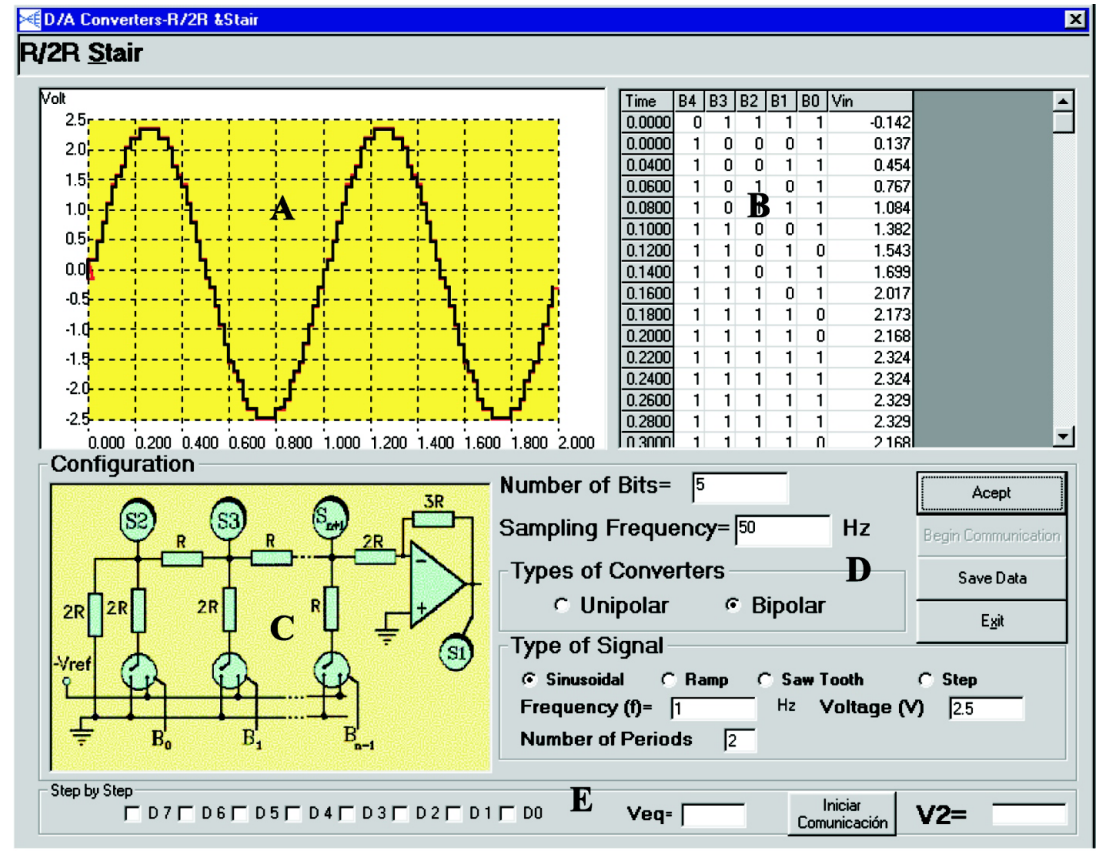
A.- Graphics representation

B.- Data table.

C.- Diagram.

D.- Setting of the experiment.

E.- Communication "step by step".



Digital Experimental Window

It is divided in five parts:

A.- Graphics representation

B.- Data table.

C.- Diagram.

D.- Setting of the experiment.

E.- Communication "step by step".

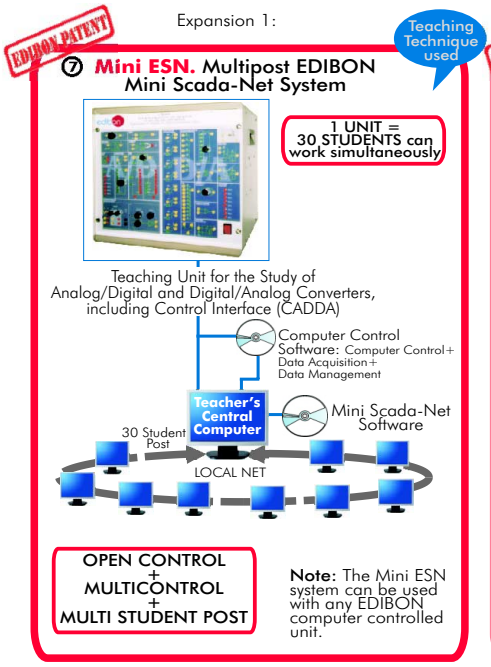
EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

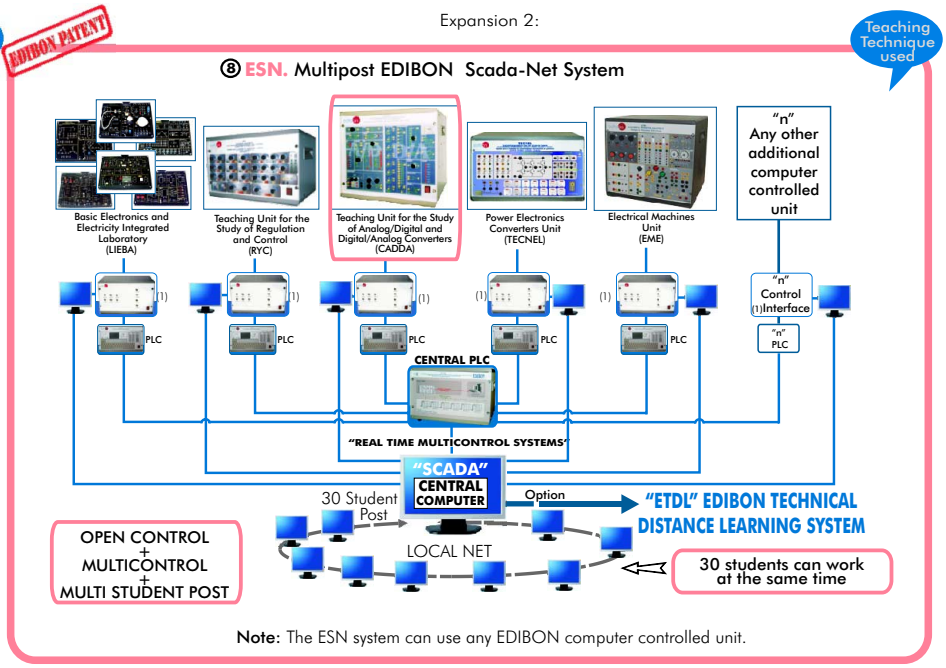
1.- Sampling theorem.
2.- Analog/Digital integrated converter. Monopolar assembly.
3.- Analog/Digital integrated converter. Bipolar assembly.
4.- Monopolar binary ramp converter.
5.- Quantification effects.
6.- Bipolar binary ramp converter.
7.- Binary ramp converter with continuous monopolar counting.
8.- Binary ramp converter with bipolar continuous counting.
9.- Monopolar simple ramp.
10.- Bipolar simple ramp converter.
11.- Monopolar double ramp converter.
12.- Double bipolar ramp converter.
13.- Monopolar converter of successive approximations.
14.- Bipolar converter of successive approximations.
15.- Integrated Digital/Analog converter. Monopolar assembly.
16.- Digital/Analog integrated converter. Bipolar assembly.
17.- Digitalization and reconstruction of monopolar signals.
18.- Digitalization and reconstruction of bipolar signals.
19.- Digital/Analog monopolar converter of weighted resistance.
20.- Digital/Analog bipolar converter of weighted resistance.
21.- Analog switches errors.
22.- R/2R monopolar stair converter.
23.- R/2R bipolar stair converter.
24.- Current division in R/2R stairs.
25.- Digital/Analog converter of monopolar inverted stair.
26.- Digital/Analog bipolar converter of inverted stair.
27.- Digital/Analog monopolar converter of series blocking.
28.- Digital/Analog bipolar converter of series blocking.
29.- Digital/Analog converter of load balance.
30.- Bipolar Digital/Analog converter of load balance.
31.- Monopolar Digital/Analog converter of pulse width modulation.
32.- Digital/Analog bipolar converter of pulse width modulation.

POSSIBILITIES OF OTHER AVAILABLE EXPANSIONS

Expansion 1:



Expansion 2:



ORDER INFORMATION

Items supplied as standard

Minimum configuration for normal operation includes:

① **Unit: CADDA. Teaching Unit for the Study of Analog/Digital and Digital/Analog Converters, including Control Interface.**
② **DAB. Data Acquisition Board.**
③ **CADDA/CCSOF. Computer Control + Data Acquisition + Data Management Software.**
④ **Cables and Accessories**, for normal operation.
⑤ **Manuals.**

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

Complementary items to the standard supply

⑥ CADDA/SOF. Analog/Digital and Digital/Analog Converters Simulation Software Package.

Expansions

⑦ Mini ESN. Multipost EDIBON Mini Scada-Net System.
⑧ ESN. Multipost EDIBON Scada-Net System.

REQUIRED SERVICES

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

DIMENSIONS & WEIGHTS

- Dimensions: 490 x 450 x 470 mm. approx.
- Weight: 40 Kg. approx.

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

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REPRESENTATIVE: