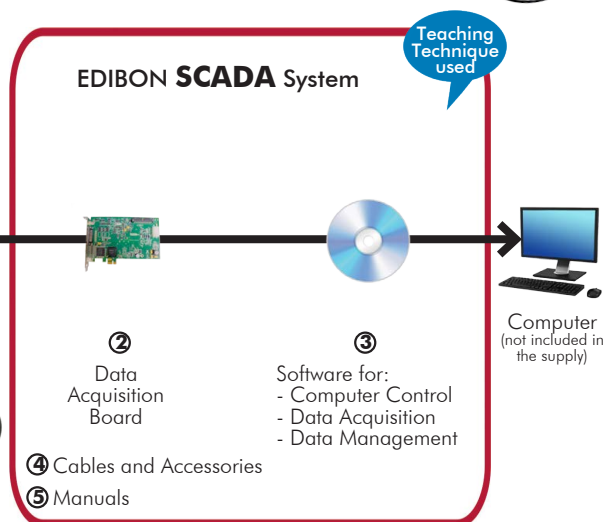




① Unit: TDS. Computer Controlled Teaching Unit for the Study of Digital Signal Processing



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

Key features:

- **Advanced Real-Time SCADA.**
- **Specialized EDIBON Control Software based on LabVIEW.**
- **National Instruments Data Acquisition board (250 KS/s, kilo samples per second).**
- **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**



www.edibon.com

PRODUCTS
➤ 2.- ELECTRONICS,
6.- MECHATRONICS,
AUTOMATION &
COMPUCEMATRONICS
AND
14.- BIOMEDICAL
ENGINEERING

For more information about key features, click here



Certificate of Approval of the
Quality Management System



European Union Certificate
(total safety)



UL and CSA Regulations
(All our products are manufactured according
to current UL and CSA regulations)



Certificate of Approval of the
Environmental Management System



Worlddidac Association
Certificate of Membership

INTRODUCTION

The Digital Signal Processing is a mathematical manipulation of the data signal to adapt and improve the input signal in some way. Some examples of the digital signal processing are: digital noise reduction, signal filtering etc.

The digital signal processing helps to reach a reliable communication links with high data transfer rates and good noise rejection.

The Computer Controlled Teaching Unit for the Study of Digital Signal Processing, "TDS", designed by EDIBON, allows to understand the principles of digital signal processing and signal analysis.

GENERAL DESCRIPTION

The Teaching Unit for the Study of Digital Signal Processing, "TDS", designed by EDIBON, allows to study the principles and more important concepts about digital signal processing, including study and practical exercises, among others, of:

- Continuous waveforms generation.

- Analyze the nature of the signals.

- Working simultaneously with two external signals.

- Signals digitalization.

- Fast Fourier Transform visualization.

- Study of the effects of the digital signal processing.

- Study of the effects of the analog and digital filters.

- To analyze the time and frequency responses, before and after the digital signal processing

- Behaviour of the generated signal or the user's voice when noise is added to the signal.Etc.

Moreover, it is possible to generate different waveforms by the software and send them to the outputs of the unit. These signals can be visualized by an external oscilloscope or be listened by the speaker.

The "TDS" unit is based on a modular design structure to allows the user a better understanding of the unit. This unit includes the following modules:

- Two Function Generators modules: Each function generator contains a waveform selector to choose one of the three different waveform shapes (sine, triangle and square) and three potentiometers to regulate the frequency, the amplitude and the duty cycle of the signal.

- Noise Generator module: It includes two different noise generators: white noise and pink noise. Each noise generator includes a potentiometer to regulate the amplitude of the noise signal.

- Microphone and Microphone Pre-Amplifier module: It allows to record and adapt the user's voice to be analyzed with the software of the unit.

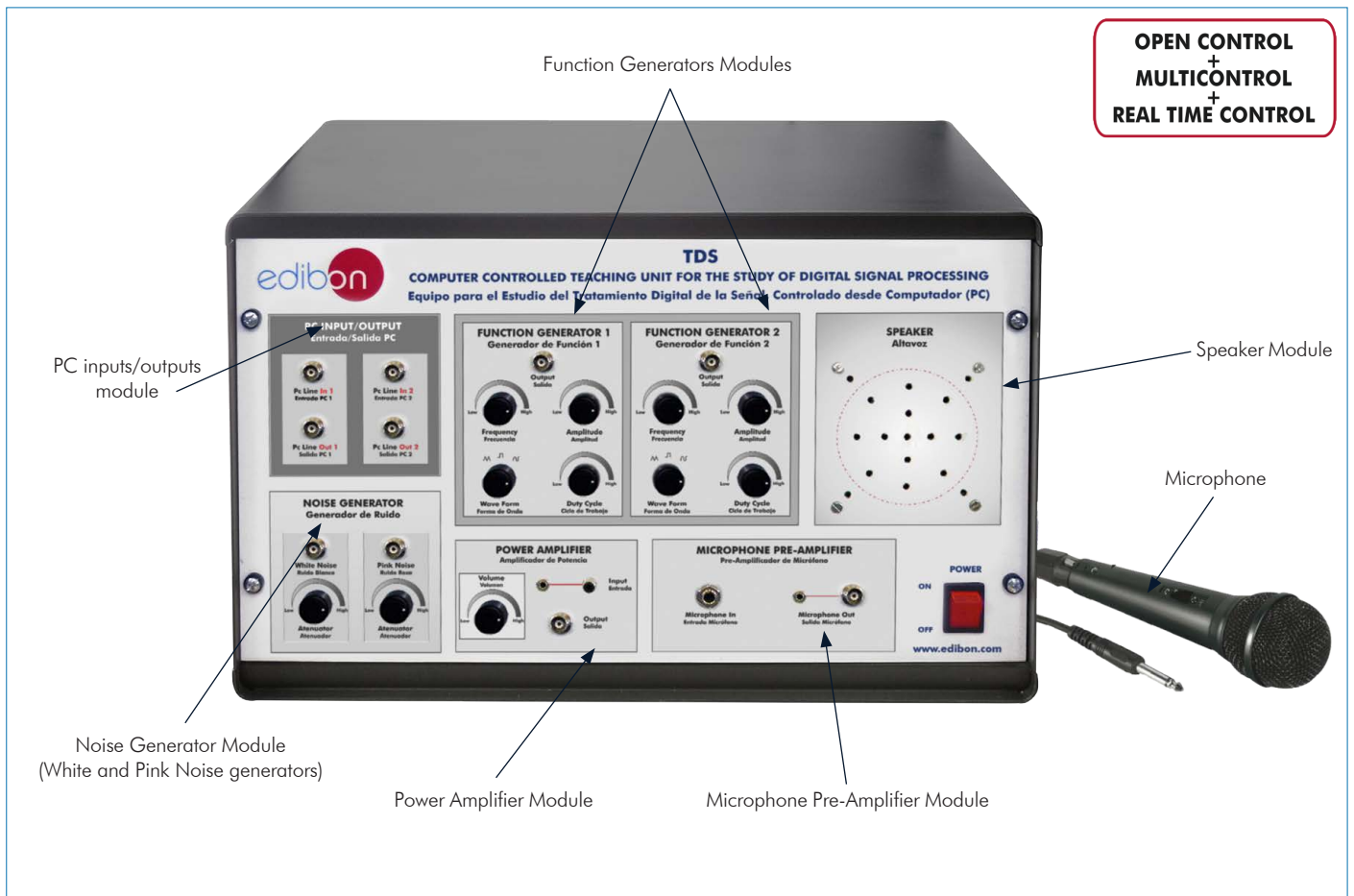
- PC Inputs/Outputs module: It allows to connect the unit with the data acquisition board (to be placed in the computer) and shows the acquired signals in the unit software. This module contains two BNC connectors for signal inputs and two BNC connectors for signal outputs.

- Power Amplifier module: It contains a potentiometer to regulate the power amplification of the signal.

- Speaker module: It allows to hear the generated signals of the unit and to study the effects of the noise and digital signal processing in the studied signal.

All connections between modules are performed through RF coaxial cable assembly.

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.



COMPLETE TECHNICAL SPECIFICATIONS (for main items)

With this unit there are several options and possibilities:

- Main items: 1, 2, 3, 4 and 5.
- Optional items: 6, 7 and 8.

Let us describe first the main items (1 to 5):

① TDS. Unit:

Unit mounted in a metallic box.

Two Function Generators modules, each one includes:

- Waveform selector: sine, square and triangular.
- Frequency, range: 20 Hz to 500 Hz.
- Amplitude potentiometer, range: ± 10 V.
- Duty cycle potentiometer, range: 0% to 100%.
- BNC output connector.

Noise Generator module:

White noise generator:

- Amplitude potentiometer, range: ± 10 V.
- BNC output connector.

Pink noise generator (also called frequency inverter or noise $1/f$):

- Amplitude potentiometer, range: ± 10 V.
- BNC output connector.

Microphone Pre-Amplifier module:

It adapts the microphone signal to be analyzed by the data acquisition system or by the speaker.

- 1/4" jack input connector for the microphone.
- BNC output connector.

Microphone:

- Impedance: 500 W.
- Frequency response: 70 Hz to 14 KHz.
- 1/4" jack connector.

Power Amplifier module, including:

- BNC input connector.
- BNC output connector.
- Potentiometer to regulate the power amplifier gain.

Speaker module:

- Impedance: 8 W.
- Nominal maximum power: 30 W.
- Frequency response: 100 Hz to 13 KHz.

PC input/output module, including:

- Two BNC input connectors.
- Two BNC output connectors.

SCSI connector to the data acquisition board (to be placed in the computer).

Possibility of working simultaneously with two external signals, facilitating operations that require more than one signal.

Moreover, it is possible to generate different waveforms by the software and send them to the outputs of the unit.

These signals can be visualized by an external oscilloscope or be listened by the speaker.

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).

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.

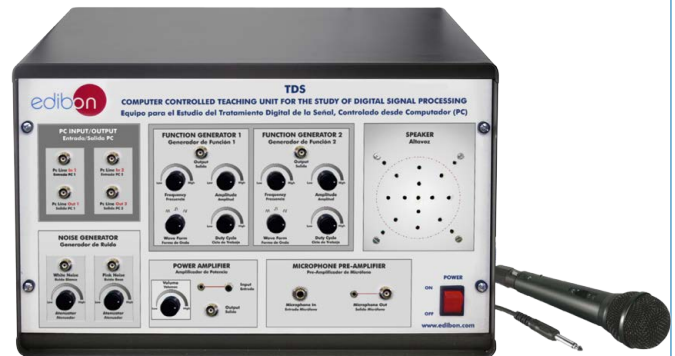
Remote operation and control by the user and remote control for EDIBON technical support, are always included.

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: TDS

② 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/O. 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/O.

Digital Input/Output:

Number of **channels**=24 inputs/outputs. DO 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

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

The three softwares are part of the SCADA system.

Compatible with 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 simultaneous way.

Management, processing, comparison and storage of data.

Two signals can be visualized simultaneously.

Two signals can be generated simultaneously.

Totally configurable digital filters: Infinite Impulse Response (IIR) filter and Finite Impulse Response (FIR) filter.

Totally configurable analog filters: Butterworth filter, Chebyshev filter, etc.

Visualization of frequency and time response of the signal before and after filter.

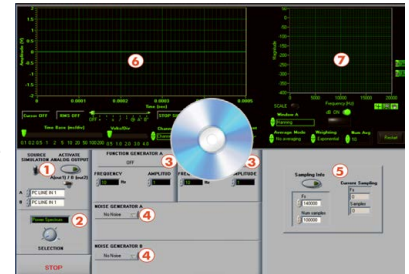
Visualization of each input signal and the signal result of the combination of the two input signals.

This signal combination allows the study of the generated signal (sine, square and triangle) or the user voice (with the microphone and microphone pre-amplifier) when a white noise or pink noise is added to the signal.

Sampling velocity up to **250 KS/s (kilo samples per second).**

Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels.

This unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit, during the process, by using a projector or an electronic whiteboard.



TDS/CCSOF

④ Cables and Accessories, for normal operation.

⑤ Manuals:

This unit is **supplied with 7 manuals**: Required Services, Assembly and Installation and Control Software, Starting-up, Safety, Maintenance & Practices Manuals.

*References 1 to 5 are the main items: TDS + DAB + TDS/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.- Continuous wave form generation, with the possibility of varying the frequency and amplitude of signals, besides of duty cycle.
 - 2.- Characterization of signals. To analyze the nature of the signals: sine, square, triangular, etc.
 - 3.- Working simultaneously with two external signals.
 - 4.- Generating signals directly by the software and send them to the unit outputs and then visualizing or listening by the speaker or an external oscilloscope.
 - 5.- Signal digitalization, permitting the most suitable sampling time, avoiding "aliasing".
 - 6.- Digitalization of signals with the possibility of adjusting the sampling frequency.
 - 7.- Fast Fourier Transforms (Power Spectrum).
 - 8.- Addition, subtraction and multiplication of signals.
 - 9.- Study of "aliasing".
 - 10.- Study of different noise types:
 - White noise.
 - $1/f$ noise.
 - 11.- Study and use of filters:
 - Possibility of filtration of any signal.
 - Reconstruction of signals through the application of filters.
 - Digital filters:
 - Finite Impulse Response (FIR) Filters and Infinite Impulse Response (IIR) Filters.
 - Analogue filters:
 - Butterworth, Chebyshev, etc.
 - Possibility to use Bartlett, Hanning, Hamming, Kaiser, Parzen, etc. windows for applying on the signal.
- Other possibilities to be done with this unit:
- 12.- Many students view results simultaneously.
 - To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
 - 13.- The Computer Control System with SCADA allows a real industrial simulation.
 - 14.- This unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.
 - 15.- This unit can be used for doing applied research.
 - 16.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
- 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.
- Computer.

DIMENSIONS AND WEIGHTS

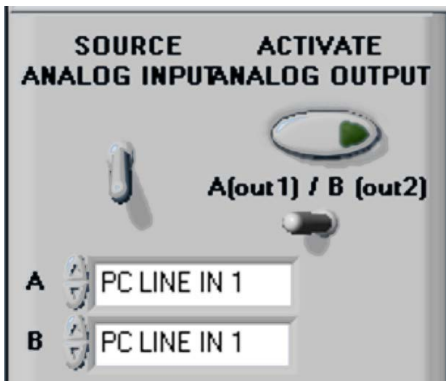
- TDS:
- Dimensions: 490 x 330 x 310 mm approx.
(19.29 x 12.99 x 12.20 inches approx.).
 - Weight: 30 Kg approx.
(66 pounds approx.).

SCADA
Main screen



This main screen is divided in different sections:

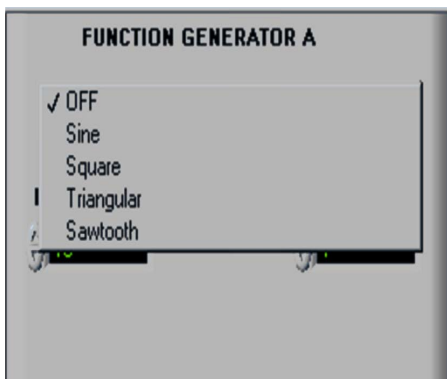
1.- Control of inputs and outputs, and source type (acquisition from the interface or simulation):



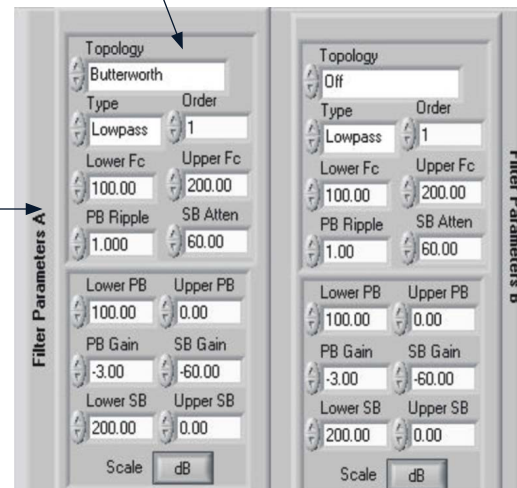
2.- Mode selection. There are 4 modes (power spectrum, filtered signals, filter information and Nyquist plot):



3.- Two Function Generators. Possibility of generating 4 different signals:

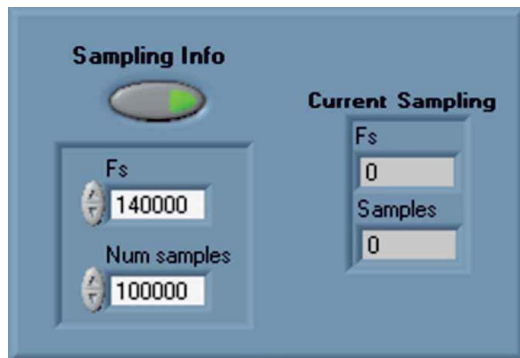


Example of Filter parameters screen

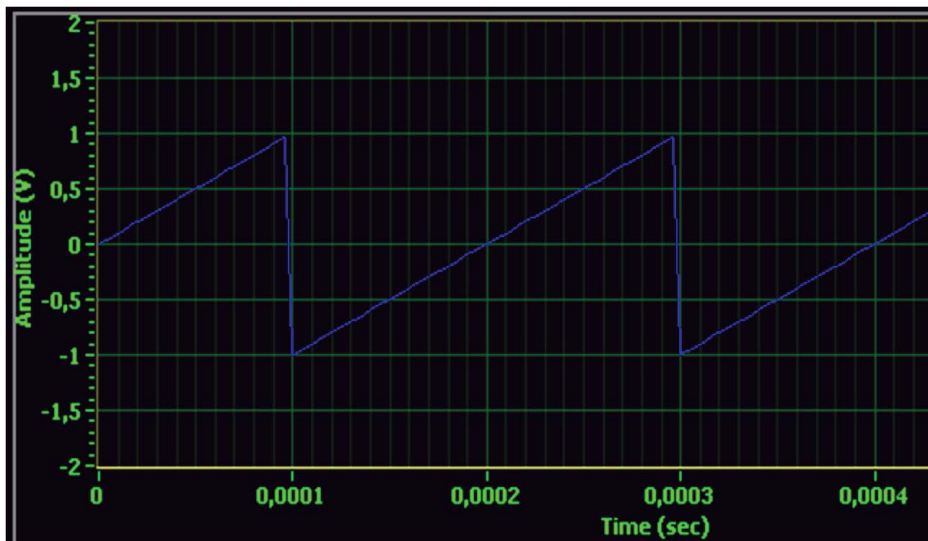


This main screen is divided in different section: (continuation)

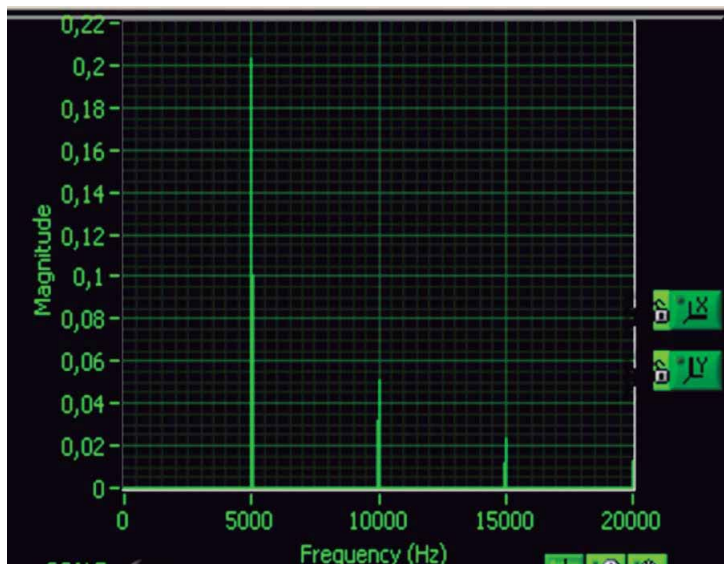
4.- Set sampling frequency.



5.- Signal/s graph visualization (in time).



6.- Signal/s graph visualization (in frequency or time).



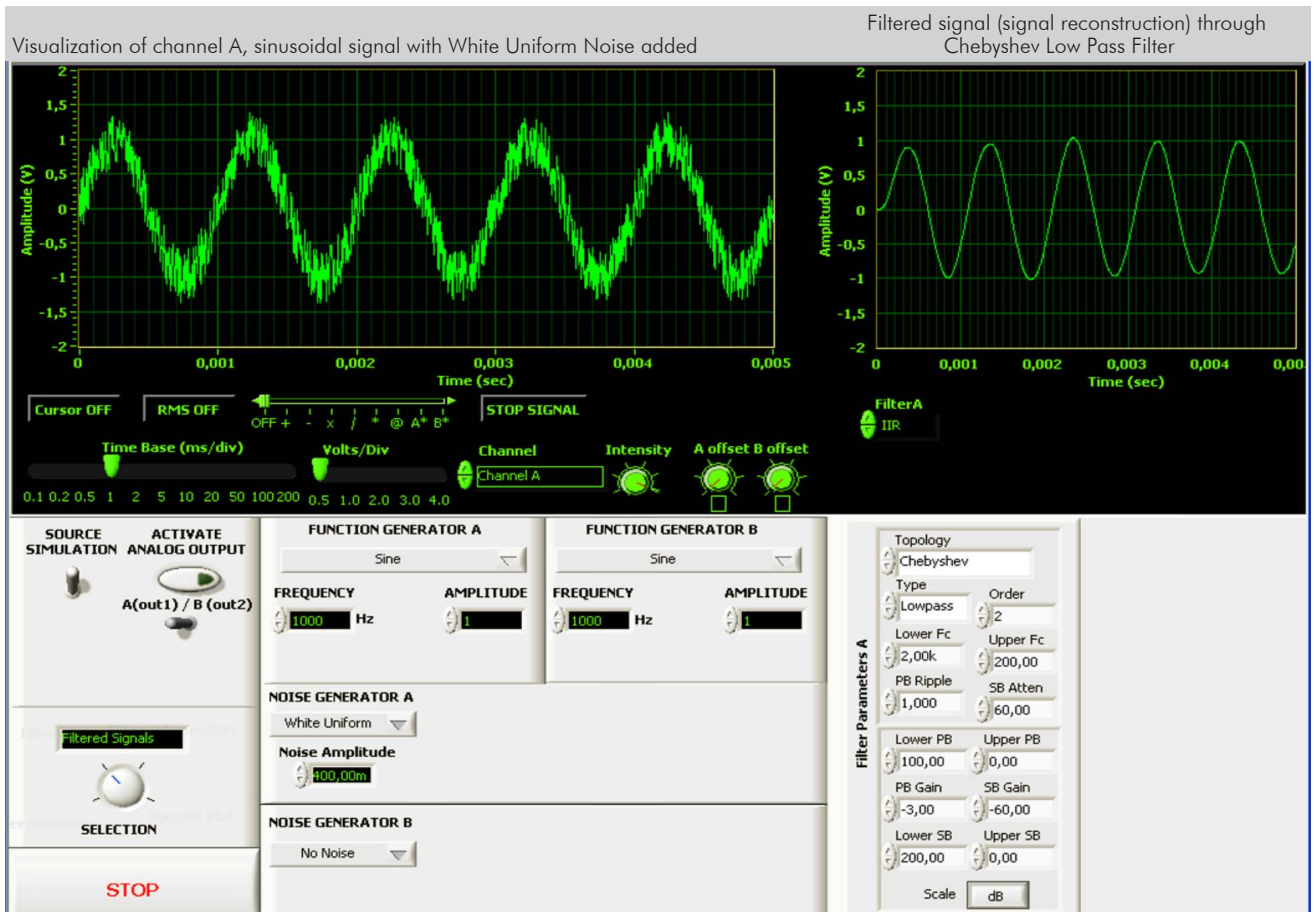
7.- Oscilloscope and spectroscope tools.



SOME REAL RESULTS OBTAINED FROM THIS UNIT



Some **real** results obtained from this unit



Some **real** results obtained from this unit

Visualization of 2 channels, A and B, simultaneously.

A= square signal of 1KHz, 1V and duty cycle=50%, and B= sinusoidal signal of 1KHz and 1V.

Power spectrum of the 2 signals



COMPLETE TECHNICAL SPECIFICATIONS (for optional items)

Additionally to the main items (1 to 5) described, we can offer, as optional, other items from 6 to 8.

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

⑥ TDS/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 5).

- 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.

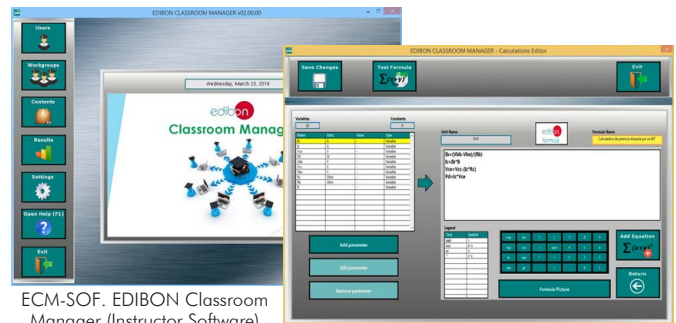
Innovative features:

- 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.

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

www.edibon.com/en/interactive-computer-aided-instruction-software

Instructor Software



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

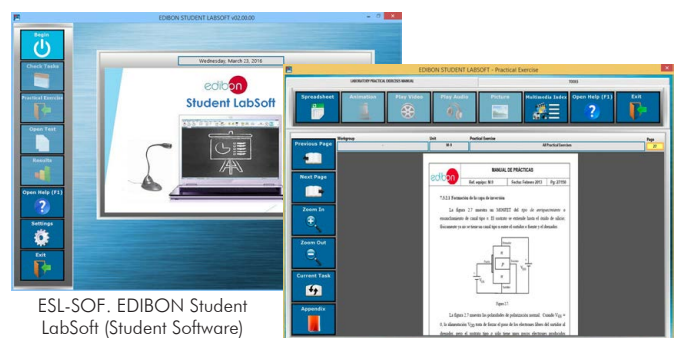
ECAL. EDIBON Calculations Program Package - Formula Editor Screen



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

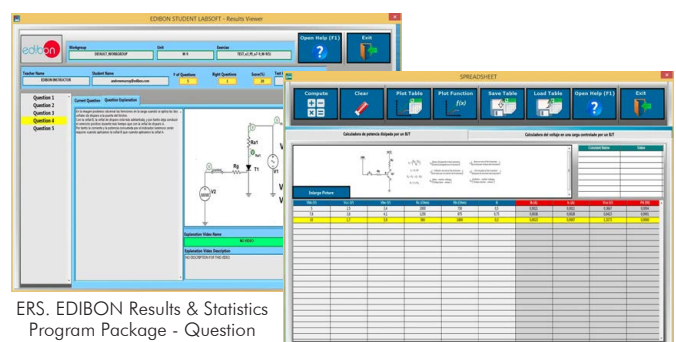
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

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

⑦ **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:

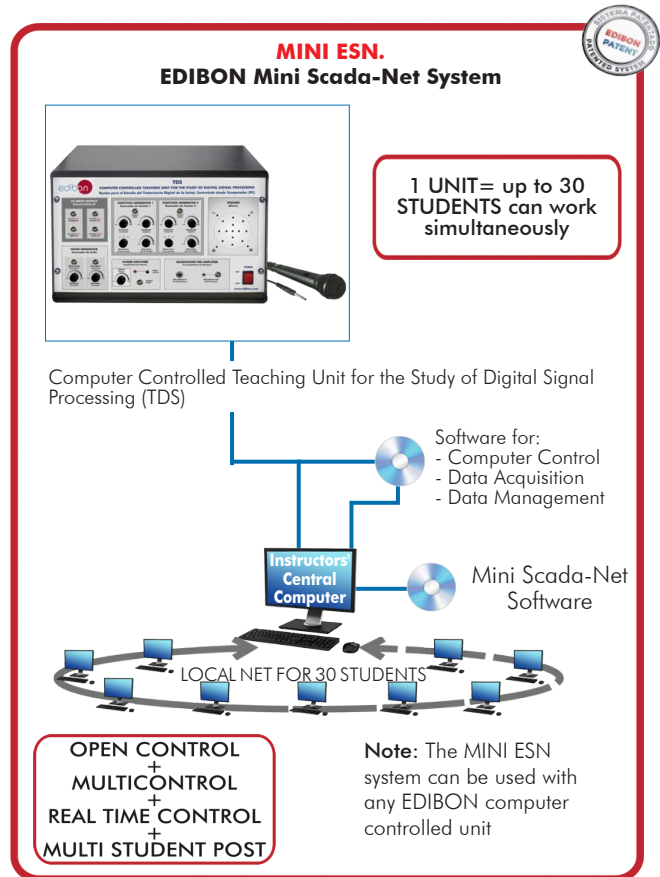
www.edibon.com/en/edibon-scada-net

⑧ **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



ORDER INFORMATION

Main items (always included in the supply)

Minimum supply always includes:

- ① **Unit: TDS. Computer Controlled Teaching Unit for the Study of Digital Signal Processing.**
- ② **DAB. Data Acquisition Board.**
- ③ **TDS/CCSOF. Computer Control + Data Acquisition + Data Management Software.**
- ④ **Cables and Accessories**, for normal operation.
- ⑤ **Manuals.**

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

Optional items (supplied under specific order)

a) Technical and Vocational Education configuration

- ⑥ TDS/ICAL. Interactive Computer Aided Instruction Software.

b) Multipost Expansions options

- ⑦ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.
- ⑧ ESN. EDIBON Scada-Net Systems.

①TDS. Unit:

Unit mounted in a metallic box.

Two Function Generators modules, each one includes:

Waveform selector: sine, square and triangular.

Frequency range: 20 Hz to 500 Hz.

Amplitude potentiometer, range: ± 10 V.

Duty cycle potentiometer, range: 0% to 100%.

BNC output connector.

Noise Generator module:

White noise generator:

Amplitude potentiometer, range: ± 10 V.

BNC output connector.

Pink noise generator (also called frequency inverter or noise 1/ f):

Amplitude potentiometer, range: ± 10 V.

BNC output connector.

Microphone Pre-Amplifier module:

It adapts the microphone signal to be analyzed by the data acquisition system or by the speaker.

1/4" jack input connector for the microphone.

BNC output connector.

Microphone:

Impedance: 500 W.

Frequency response: 70 Hz to 14 KHz.

1/4" jack connector.

Power Amplifier module, including:

BNC input connector.

BNC output connector.

Potentiometer to regulate the power amplifier gain.

Speaker module:

Impedance: 8 W.

Nominal maximum power: 30 W.

Frequency response: 100 Hz to 13 KHz.

PC input/output module, including:

Two BNC input connectors.

Two BNC output connectors.

SCSI connector to the data acquisition board (to be placed in the computer).

Possibility of working simultaneously with two external signals, facilitating operations that require more than one signal.

Moreover, it is possible to generate different waveforms by the software and send them to the outputs of the unit.

These signals can be visualized by an external oscilloscope or be listened by the speaker.

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).

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.

②DAB. 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.

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

The three softwares are part of the SCADA system.

Compatible with the industry standards.

Management, processing, comparison and storage of data.

Two signals can be visualized simultaneously.

Two signals can be generated simultaneously.

Totally configurable digital filters: Infinite Impulse Response (IIR) filter and Finite Impulse Response (FIR) filter.

Totally configurable analog filters: Butterworth filter, Chebyshev filter, etc.

Visualization of frequency and time response of the signal before and after filter.

Visualization of each input signal and the signal result of the combination of the two input signals.

This signal combination allows the study of the generated signal (sine, square and triangle) or the user voice (with the microphone and microphone pre-amplifier) when a white noise or pink noise is added to the signal.

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

Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels.

This unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit, during the process, by using a projector or an electronic whiteboard.

④Cables and Accessories, for normal operation.**⑤ Manuals:**

This unit is supplied with 7 manuals: Required services, Assembly and Installation, Control Software, Starting-up, Safety, Maintenance & Practices manuals.

Exercises and Practical Possibilities to be done with the Main Items

- 1.- Continuous wave form generation, with the possibility of varying the frequency and amplitude of signals, besides of duty cycle.
 - 2.- Characterization of signals. To analyze the nature of the signals: sine, square, triangular, etc.
 - 3.- Working simultaneously with two external signals.
 - 4.- Generating signals directly by the software and send them to the unit outputs and then visualizing or listening by the speaker or an external oscilloscope.
 - 5.- Signal digitalization, permitting the most suitable sampling time, avoiding "aliasing".
 - 6.- Digitalization of signals with the possibility of adjusting the sampling frequency.
 - 7.- Fast Fourier Transforms (Power Spectrum).
 - 8.- Addition, subtraction and multiplication of signals.
 - 9.- Study of "aliasing".
 - 10.- Study of different noise types:
 - White noise.
 - $1/f$ noise.
 - 11.- Study and use of filters:
 - Possibility of filtration of any signal.
 - Reconstruction of signals through the application of filters.
 - Digital filters:
 - Finite Impulse Response (FIR) Filters and Infinite Impulse Response (IIR) Filters.
 - Analogue filters:
 - Butterworth, Chebyshev, etc.
 - Possibility to use Bartlett, Hanning, Hamming, Kaiser, Parzen, etc. windows for applying on the signal.
- Other possibilities to be done with this unit:
- 12.- Many students view results simultaneously.
 - To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
 - 13.- The Computer Control System with SCADA allows a real industrial simulation.
 - 14.- This unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.
 - 15.- This unit can be used for doing applied research.
 - 16.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
- Several other exercises can be done and designed by the user.

a) Technical and Vocational Education configuration

⑥ TDS/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.

b) Multipost Expansions options

⑦ 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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