

Key features:

- ▶ **Advanced Real-Time SCADA.**
- ▶ **Open Control + Multicontrol + Real-Time Control.**
- ▶ **Specialized EDIBON Control Software based on Labview.**
- ▶ **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, 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 CAL software helps the user perform calculations and comprehend the results.**
- ▶ **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
Products range
Units
3.-Communications

For more information about Key Features, click here:



INTRODUCTION

Antennas are the main element of aerial communications. They are the transition between a transmission line (normally a coaxial cable) and the free space, in others words, antennas convert voltages and currents of a transmission line into electromagnetic waves as efficiently as possible.

To characterize an antenna it is necessary to understand the basics of antennas and the most important parameters of antennas measurement.

The Computer Controlled Antenna Trainer "EANC" has been designed for full-automatic control of the antenna measurement through the computer PC, which allows students familiarize with automatic antenna analysis.

The "EANC" allows to learn how to perform the most common antenna measurements (radiation pattern, SWR, etc.). It also allows students to understand when it is necessary to add matching components to reach the correct matching between the antenna, the transmission line and the generator in order to improve the performance of the system.

The trainer is provided with a set of practical exercises, through which the student will understand how to work with the different elements of the unit in order to obtain a complete knowledge of the concepts behind antennas.

GENERAL DESCRIPTION

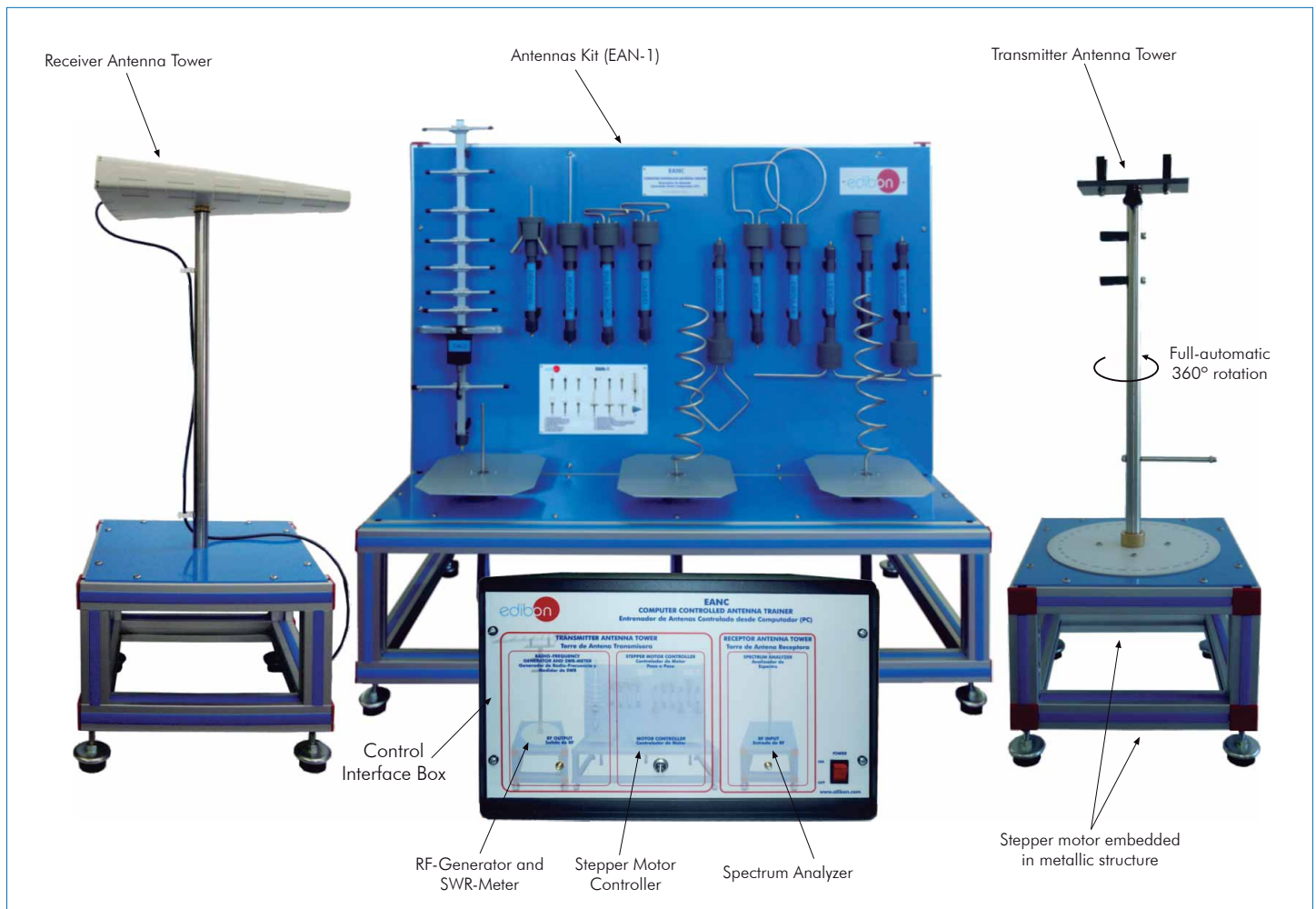
The Computer Controlled Antenna Trainer "EANC" is an advanced system that operates in conjunction with a computer (PC), which allows the control and data acquisition of the antenna measurement by means the SCADA System (control interface box + control software).

The "EANC" performs the full-automatic 360° rotation of the transmitter antenna tower, controlled by the software, for draw the antenna radiation pattern and display it in the computer (PC) window. The "EANC" also allows the full automatic frequency sweep in order to perform the bandwidth analysis of an antenna.

The "EANC" allows students to learn how to perform the essential antenna measurements: radiation pattern with the measure of the azimuth and elevation plots (electrical and magnetic planes), real time signal level, standing wave ratio (SWR), study the effectiveness of antenna through a wide range of frequencies (bandwidth), directivity and antenna's power gain. All of these measures are displayed in the computer (PC), and the student can save the results for subsequent analysis.

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

UNIT ELEMENTS ALLOCATION



With this unit there are several options and possibilities:

- Main items: 1, 2, 3, 4 and 5.
- Optional items: 6, 7, 8 and 9.

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

① EANC. Unit:

RF-Generator and SWR-Meter: (included in the Control Interface Box)

RF-Generator:

- Based on voltage controlled oscillator (VCO).
- Wide range of generated frequencies: from 600MHz to 1700MHz.
- Frequency tuning through the computer (PC).
- Frequency displayed on the computer (PC).
- 50 Ω of nominal impedance.

SWR-Meter:

- Frequency range: 600 MHz to 2.5GHz.
- Insertion loss ≥ 0.1 dB.
- SWR measurement displayed on the computer (PC).
- 50 Ω of nominal impedance.

SMA connector to transmitter antenna.

Stepper Motor Controller: (included in the Control Interface Box)

This controller allows the full-automatic 360° rotation of the transmitter antenna.

Spectrum Analyzer: (included in the Control Interface Box)

- Frequency range: 50 MHz to 6 GHz.
- Typically level range: -40 dBm to +23 dBm.
- Accuracy of +/- 0.18 dB at measurement lower than +18 dBm.
- Standing wave ratio lower than 1.2:1.
- Gain and offset self-calibration.
- 50 Ω of nominal impedance.
- SMA connector to receiver antenna.
- Frequency and power signal measurement from the computer (PC).

Two Towers of Antennas:

Receiver Antenna Tower.

Transmitter Antenna Tower. The base of this tower has a computer controlled stepper motor. The base of this tower also has a degree wheel.

EAN-1 . Antennas Kit: (included in the supply)

All antennas connect to RF-Generator through a SMA connector.

Monopole antenna:

Designed for 1200MHz transmission. $\lambda/2$ of wavelength. 50 Ω of nominal impedance.

Monopole antenna with ground plane:

Designed for 1200MHz transmission. $\lambda/2$ of wavelength. 50 Ω of nominal impedance.

Drooping monopole antenna:

Designed for 1200MHz transmission. $\lambda/4$ of wavelength. 50 Ω of nominal impedance.

Straight dipole antenna (Short $\lambda/2$):

Designed for 1300MHz transmission. $\lambda/2$ of wavelength. 50 Ω of nominal impedance.

Straight dipole antenna (Large λ):

Designed for 1300MHz transmission. λ of wavelength. 50 Ω of nominal impedance.

Folded dipole antenna (300 Ω):

Designed for 1400MHz transmission. $\lambda/2$ of wavelength. 300 Ω of nominal impedance.

Folded dipole antenna (adapted 50 Ω):

Designed for 1400MHz transmission. $\lambda/2$ of wavelength. 6:1 Balun (length: $\lambda/2$ of wavelength) inside the fixing system of the antenna. 50 Ω of nominal impedance.

Helical antenna (Right-hand circular polarization):

Designed for 1600MHz transmission. 50 Ω of nominal impedance.

Helical antenna (Left-hand circular polarization):

Designed for 1600MHz transmission. 50 Ω of nominal impedance.

Circular loop antenna:

Designed for 850MHz transmission. 50 Ω of nominal impedance.

Square loop antenna:

Designed for 850MHz transmission. 50 Ω of nominal impedance.



EANC. Unit

Continue...

Diamond loop antenna:

Designed for 850MHz transmission. 50 Ω of nominal impedance.

Microstrip patch antenna:

Designed for 5 band of frequency transmission. $\lambda/2$ of wavelength. 50 Ω of nominal impedance.

Yagi-Uda antenna:

Designed for 900MHz transmission. 9 elements Yagi-Uda antenna. 50 Ω of nominal impedance.

Log-periodic antenna:

Designed for the range between 680-2900MHz transmission. Directional antenna.

Max. transmission power: 10 W. 50 Ω of nominal impedance. VSWR (typ.): < 2:1. Gain (typ.): 7dBi.

Antennas expositor which allows the access of different antennas easily.

Space required between antennas: 2-3 m.

The complete unit includes as well:

Advanced Real-Time SCADA.

Open Control + Multicontrol + Real-Time Control.

Specialized EDIBON Control Software based on Labview.

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, 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 CAL software helps the user perform calculations and comprehend the results.

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.

Optional accessories: (NOT included in the minimum supply) (See "Optional accessories" section in page 6)

EAN-2. Antennas Kit:

Microstrip patch array antenna.

Horn antenna.

Parabolic reflector.

Log-periodic antenna.

Discone antenna.

Antennas expositor which allows the access of different antennas easily.

② EANC/CIB. Control Interface Box:

The Control Interface Box is part of the SCADA system.

The control interface box includes: the Spectrum Analyzer, the RF-Generator, the SWR-Meter and the Stepper Motor Controller. All of them connected to computer (PC) for recording, display and evaluation of data.

USB cable between the control interface box and computer.

The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole test procedure.

Simultaneous visualization in the computer of all parameters involved in the process and analysis: Received signal power value, SWR value, frequency of signal, etc.

All the parameters values are displayed on only one screen in the computer.

Real time radiation pattern representation. Storage of all the analysis data and results in a file.

Graphic representation in real time of the system responses.

Shield and filtered signals to avoid external interferences.

Real time computer control.

Open control, allowing modification of frequency of signal for the analysis of radiation patterns, etc.

Safety levels, one mechanical in the unit, another electronic in the control interface and the third one in the control software.



EANC/CIB

Continue...

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

The three softwares are part of the SCADA system.

Compatible with actual Windows operating systems.

Compatible with the industry standards.

Registration and visualization of all values and analysis measurements in an automatic and simultaneous way.

Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all antenna parameters.

Management, processing, comparison and storage of data.

Sampling velocity up to 10 KS/s (kilo samples per second).

Three selectable antenna tests: Antenna radiation pattern, Antenna bandwidth test and Power signal measurement.

Graphic representation in real time.

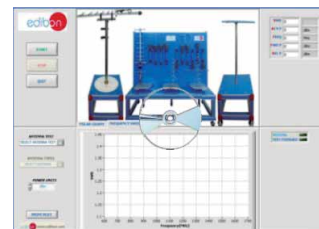
The configuration of each antenna has been memorized in the software for a quick and easy antenna study.

Comparative analysis of the obtained data, after the process with different frequencies and antennas.

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.



EANC/CCSOF

④ **Cables and Accessories**, for normal operation.

⑤ **Manuals:** This unit is **supplied with the following manuals:** Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance & Practices Manuals.

* References 1 to 5 are the main items: EANC + EANC/CIB + EANC/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 MAIN ITEMS

- 1.- Familiarization with the trainer.
- 2.- Installation, connection and familiarization with the computer control software.
- 3.- Basic principles of radiation pattern parameters measurement.
- 4.- Study of the surrounding signals.
- 5.- Distance effect over radiation power.
- 6.- Direction of maximum radiation and gain of an antenna.
- 7.- Analysis of the antenna bandwidth.
- 8.- Study of monopole antennas.
- 9.- Study of antennas with ground planes.
- 10.- Study of dipole antennas.
- 11.- Study of loop antennas (circular, square and diamond loop antennas).
- 12.- Study of circular polarization helical antennas.
- 13.- Study of Yagi-Uda antennas.
- 14.- Study of microstrip patch antennas.
- 15.- SWR measurement and conversion in Return loss and Reflected Power.
- 16.- Improvement of the performance of a system.

Additional practical possibilities to be done with the optional Antennas Kit (EAN-2):

- 17.- Study of horn antenna.
 - 18.- Study of parabolic reflector.
 - 19.- Basic principles of wide bandwidth antennas: log-periodic antenna.
 - 20.- Basic principles of wide bandwidth antennas: discone antenna.
 - 21.- Basic principles of microstrip patch array antenna.
- Other possibilities to be done with this Unit:
- 22.- Many students view results simultaneously.
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
 - 23.- Open Control, Multicontrol and Real Time Control.
 - 24.- This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
 - 25.- This unit can be used for doing applied research.
 - 26.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
 - 27.- Visualization of all parameters values used in the unit process.
- 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.
- Computer (PC).

DIMENSIONS & WEIGHTS

EANC:

Transmitter Antenna Tower:

- Dimensions: 310 x 310 x 700 mm. approx.
(12.20 x 12.20 x 27.56 inches approx.)

Receiver Antenna Tower:

- Dimensions: 310 x 310 x 700 mm. approx.
(12.20 x 12.20 x 27.56 inches approx.)

Antennas Kit (EAN-1) in expositor:

- Dimensions: 1000 x 500 x 600 mm. approx.
(39.37 x 19.69 x 23.62 inches approx.)

Control Interface Box (including RF-Generator, SWR-Meter, Stepper Motor Controller and Spectrum Analyzer):

- Dimensions: 490 x 330 x 310 mm. approx.
(19.29 x 12.99 x 12.20 inches approx.)

Total weight: 50 Kg. approx. (110 pounds approx.)

OPTIONAL ACCESSORIES

EAN-2. Antennas Kit:

All antennas connect to RF-Generator through a SMA connector.

Microstrip patch array antenna:

Designed for 1450 MHz. 50 Ω of nominal impedance.

Horn antenna:

Designed for 1500 MHz. 50 Ω of nominal impedance.

Parabolic reflector: mounted in its own tower antenna.

Log-periodic antenna:

Designed for the range between 680-2900MHz transmission. Directional antenna.

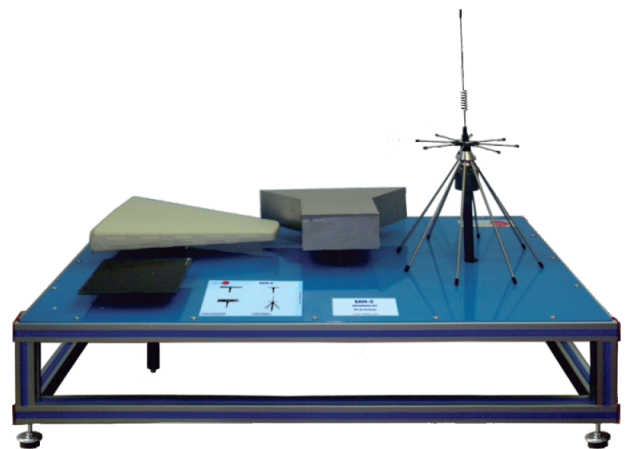
Max. transmission power: 10 W. 50 Ω of nominal impedance. VSWR (typ.): < 2:1. Gain (typ.): 7dBi.

Discone antenna:

Designed for the range between 300-3000 MHz transmission. Omnidirectional antenna.

Max. transmission power: 200 W. 50 Ω of nominal impedance. VSWR (typ.): < 2:1. Gain (typ.): 2.15dBi.

Antennas expositor which allows the access of different antennas easily.



AVAILABLE VERSIONS

-EANC. Computer Controlled Antenna Trainer.

Offered in this catalogue:

Offered in other catalogue:

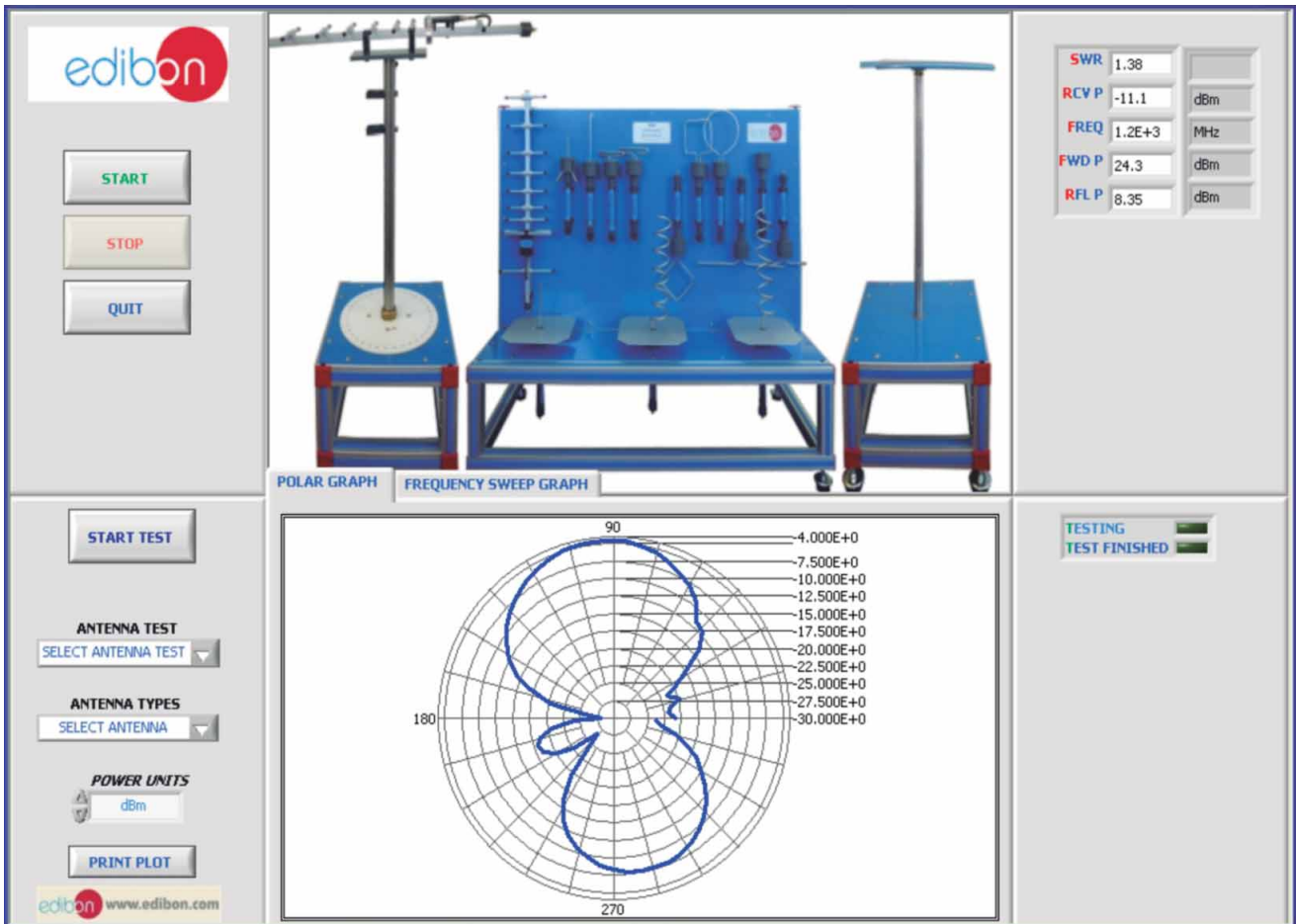
-EAN. Antenna Trainer.

SCADA
Main screen

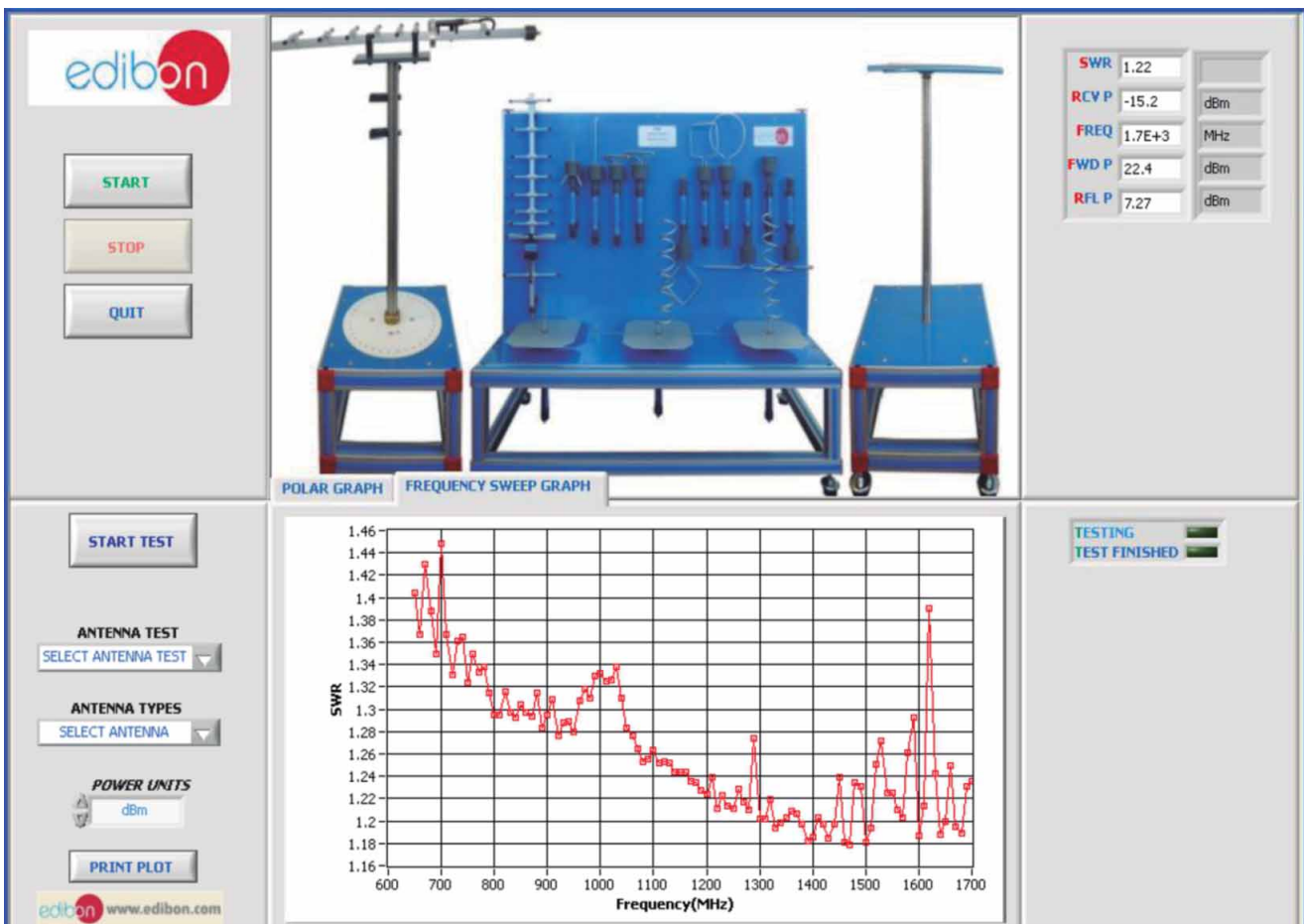
- Ⓘ Main software operation buttons.
- Ⓜ Start test, setting and print plot buttons.
- Ⓝ Antenna measurement indicators: Stationary Waves Ratio (SWR), Received Power (RCV P), Working Frequency (FREQ), Forward Power (FWD P) and Reflected Power (RFL P).
- Ⓟ Test status indicators.
- Ⓡ Real time graphics. Allows to show the radiation pattern and the frequency sweep graph.

SOME TYPICAL RESULTS

The screen below shows the azimuthal radiation pattern of a loop antenna.



The screen below shows the bandwidth analysis of a wideband antenna.



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 9.

All these items try to give more possibilities for:

- a) Technical and Vocational Education configuration. (CAI)
- b) Higher Education and/or Technical and Vocational Education configuration. (CAL)
- c) Multipost Expansions options. (Mini ESN and ESN)

a) Technical and Vocational Education configuration

⑥ EANC/CAI. Computer Aided Instruction Software System.

This complete software package includes two Softwares: the INS/SOF. Classroom Management Software (Instructor Software) and the EANC/SOF. Computer Aided Instruction Software (Student Software).

This software is optional and can be used additionally to items (1 to 5).

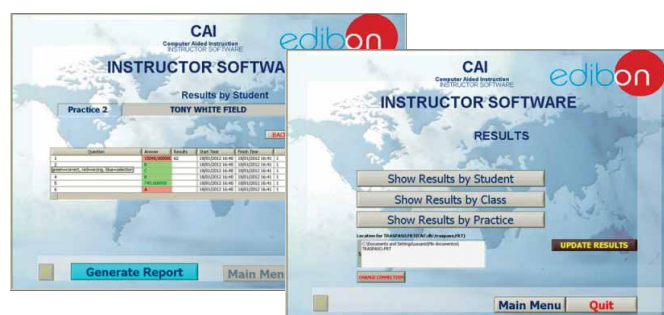
This complete software package consists of an Instructor Software (INS/SOF) totally integrated with the Student Software (EANC/SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

- INS/SOF. Classroom Management Software (Instructor Software):

The Instructor can:

- Organize Students by Classes and Groups.
- Create easily new entries or delete them.
- Create data bases with student information.
- Analyze results and make statistical comparisons.
- Generate and print reports.
- Detect student's progress and difficulties.
- ...and many other facilities.

Instructor Software



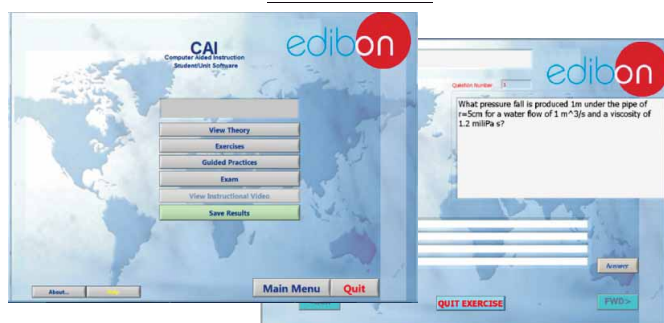
- EANC/SOF. Computer Aided Instruction Software (Student Software):

It explains how to use the unit, run the experiments and what to do at any moment.

This Software contains:

- Theory.
- Exercises.
- Guided Practices.
- Exams.

Student Software



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

www.edibon.com/products/catalogues/en/CAI.pdf

b) Higher Education and/or Technical and Vocational Education configuration

⑦ EANC/CAL. Computer Aided Learning Software (Results Calculation and Analysis).

This Computer Aided Learning Software (CAL) is a Windows based software, simple and very easy to use, specifically developed by EDIBON. It is very useful for Higher Education level.

CAL is a class assistant that helps in doing the necessary calculations to extract the right conclusions from data obtained during the experimental practices.

CAL computes the value of all the variables involved and performs the calculations.

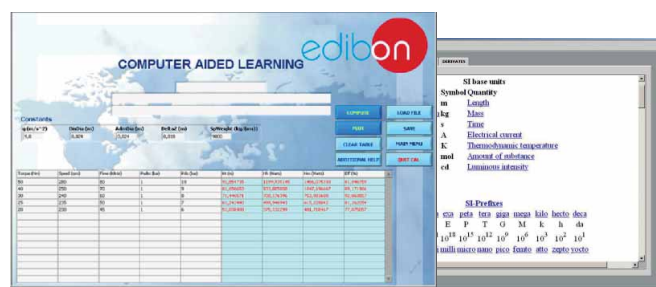
It allows to plot and print the results. Within the plotting options, any variable can be represented against any other.

Different plotting displays.

It has a wide range of information, such as constant values, unit conversion factors and integral and derivative tables.

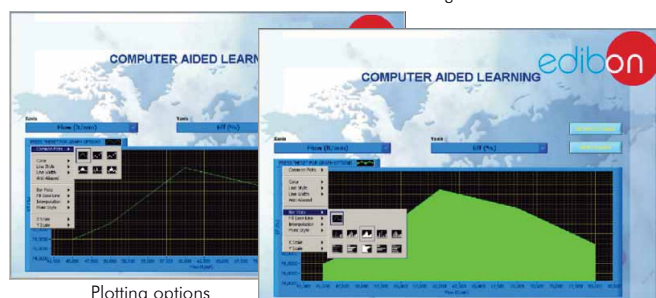
For more information see CAL catalogue. Click on the following link:

www.edibon.com/products/catalogues/en/CAL.pdf



Calculations

Information of constant values, unit conversion factors and integral and derivative tables



Plotting options

c) Multipost Expansions options

⑧ **Mini ESN. EDIBON Mini Scada-Net System.**

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 on 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:

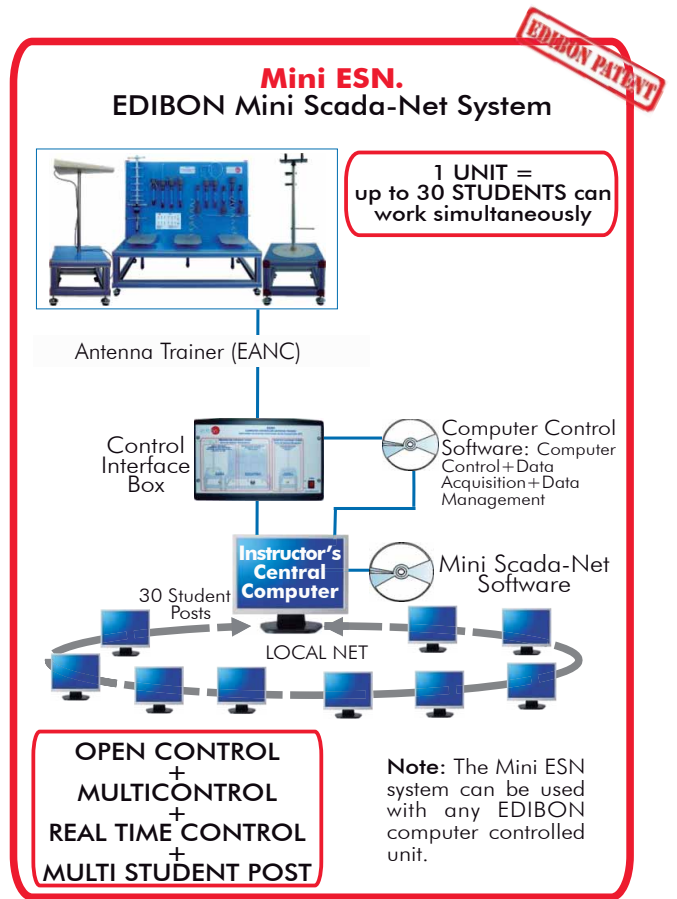
- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA, connected in a local net.
- Open Control + Multicontrol + Real Time Control + Multi Student Post.
- Instructor controls and explains to all students at the same time.
- Any user/student can work 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/products/catalogues/en/Mini-ESN.pdf



⑨ **ESN. EDIBON Scada-Net System.**

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/products/catalogues/en/units/communications/esn-electronicscommunications/ESN-ELECTRONICS_COMMUNICATIONS-ADVANCED.pdf

ORDER INFORMATION

Main items (always included in the supply)

Minimum supply always includes:

- ① Unit: EANC. Antenna Trainer.
- ② EANC/CIB. Control Interface Box.
- ③ EANC/CCSOF. Computer Control + Data Acquisition + Data Management Software.
- ④ Cables and Accessories, for normal operation.
- ⑤ Manuals.

* **IMPORTANT:** Under EANC 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 configuration
 - ⑥ EANC/CAI. Computer Aided Instruction Software System.
- b) Higher Education and/or Technical and Vocational Education configuration
 - ⑦ EANC/CAL. Computer Aided Learning Software (Results Calculation and Analysis).
- c) Multipost Expansions options
 - ⑧ Mini ESN. EDIBON Mini Scada-Net System.
 - ⑨ ESN. EDIBON Scada-Net System.

① EANC. Unit:

RF-Generator and SWR-Meter: (included in the Control Interface Box)

RF-Generator:

Based on voltage controlled oscillator (VCO). Wide range of generated frequencies: from 600MHz to 1700MHz.

Frequency tuning through the computer (PC). Frequency displayed on the computer (PC). 50 Ω of nominal impedance.

SWR-Meter: Frequency range: 600 MHz to 2.5GHz. Insertion loss ≥ 0.1 dB. SWR measurement displayed on the computer. 50 Ω of nominal impedance.

SMA connector to transmitter antenna.

Stepper Motor Controller: (included in the Control Interface Box)

This controller allows the full-automatic 360° rotation of the transmitter antenna.

Spectrum Analyzer: (included in the Control Interface Box)

Frequency range: 50 MHz to 6 GHz. Typically level range: -40 dBm to +23 dBm. Accuracy of +/- 0.18 dB at measurement lower than +18 dBm.

Standing wave ratio lower than 1.2:1. Gain and offset self-calibration. 50 Ω of nominal impedance. SMA connector to receiver antenna.

Frequency and power signal measurement from the computer (PC).

Two Towers Antennas:

Receiver Antenna Tower.

Transmitter Antenna Tower. The base of this tower has a computer controlled stepper motor. The base of this tower also has a degree wheel.

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Helical antenna (Right-hand circular polarization): Designed for 1600MHz transmission. 50 Ω of nominal impedance.

Helical antenna (Left-hand circular polarization): Designed for 1600MHz transmission. 50 Ω of nominal impedance.

Circular loop antenna: Designed for 850MHz transmission. 50 Ω of nominal impedance.

Square loop antenna: Designed for 850MHz transmission. 50 Ω of nominal impedance.

Diamond loop antenna: Designed for 850MHz transmission. 50 Ω of nominal impedance.

Microstrip patch antenna: Designed for 5 band of frequency transmission. $\lambda/2$ of wavelength. 50 Ω of nominal impedance.

Yagi-Uda antenna: Designed for 900MHz transmission. 9 elements Yagi-Uda antenna. 50 Ω of nominal impedance.

Log-periodic antenna: Designed for the range between 680-2900MHz transmission. Directional antenna. Max. transmission power: 10 W. 50 Ω of nominal impedance. VSWR (typ.): < 2:1. Gain (typ.): 7dBi.

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Horn antenna.

Parabolic reflector.

Log-periodic antenna.

Discone antenna.

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Simultaneous visualization in the computer of all parameters involved in the process and analysis: Received signal power value, SWR value, frequency of signal, etc.

Shield and filtered signals to avoid external interferences. Real time computer control.

Open control, allowing modification of frequency of signal for the analysis of radiation patterns, etc.

Safety levels, one mechanical in the unit, another electronic in the control interface and the third one in the control software.

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Compatible with the industry standards.

Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all antenna parameters.

Management, processing, comparison and storage of data.

Sampling velocity up to 10 KS/s (kilo samples per second).

Three selectable antenna tests: Antenna radiation pattern, Antenna bandwidth test and Power signal measurement.

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④ Cables and Accessories, for normal operation.

⑤ Manuals: This unit is supplied with the following manuals: Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance & Practices Manuals.

Exercises and Practical Possibilities to be done with Main Items

- 1.- Familiarization with the trainer.
- 2.- Installation, connection and familiarization with the computer control software.
- 3.- Basic principles of radiation pattern parameters measurement.
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- 13.- Study of Yagi-Uda antennas.
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- 15.- SWR measurement and conversion in Return loss and Reflected Power.
- 16.- Improvement of the performance of a system.

Additional practical possibilities to be done with the optional Antennas Kit (EAN-2):

- 17.- Study of horn antenna.
- 18.- Study of parabolic reflector.
- 19.- Basic principles of wide bandwidth antennas: log-periodic antenna.
- 20.- Basic principles of wide bandwidth antennas: discone antenna.
- 21.- Basic principles of microstrip patch array antenna.

Other possibilities to be done with this Unit:

- 22.- Many students view results simultaneously.
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
 - 23.- Open Control, Multicontrol and Real Time Control.
 - 24.- This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
 - 25.- This unit can be used for doing applied research.
 - 26.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
 - 27.- Visualization of all parameters values used in the unit process.
- Several other exercises can be done and designed by the user.

a) Technical and Vocational Education configuration

⑥ **EANC/CAI. Computer Aided Instruction Software System.**

This complete software package consists on an Instructor Software (INS/SOF) totally integrated with the Student Software (EANC/SOF).

-INS/SOF. Classroom Management Software (Instructor Software):

The Instructor can:

- Organize Students by Classes and Groups.
- Create easily new entries or delete them.
- Create data bases with student information.
- Analyze results and make statistical comparisons.
- Generate and print reports.
- Detect student's progress and difficulties.

-EANC/SOF. Computer Aided Instruction Software (Student Software):

It explains how to use the unit, run the experiments and what to do at any moment.

This Software contains:

- Theory.
- Exercises.
- Guided Practices.
- Exams.

b) Higher Education and/or Technical and Vocational Education configuration

⑦ **EANC/CAL. Computer Aided Learning Software (Results Calculation and Analysis).**

This Computer Aided Learning Software (CAL) is a Windows based software, simple and very easy to use.

CAL is a class assistant that helps in doing the necessary calculations to extract the right conclusions from data obtained during the experimental practices.

CAL computes the value of all the variables involved and performs the calculations.

It allows to plot and print the results. Within the plotting options, any variable can be represented against any other.

Different plotting displays.

It has a wide range of information, such as constant values, unit conversion factors and integral and derivative tables.

c) Multipost Expansions options

⑧ **Mini ESN. EDIBON Mini Scada-Net System.**

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 on 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 improvements of the product.



C/ Del Agua, 14. Polígono Industrial San José de Valderas.
28918 LEGANÉS. (Madrid). SPAIN.

Phone: 34-91-6199363 FAX: 34-91-6198647

E-mail: edibon@edibon.com WEB site: www.edibon.com

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