edibon

Engineering and Technical Teaching Equipment

① Unit: EMIC. Computer Controlled Microwave Trainer

Computer Control System

② Control Interface Box

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

④ Cables and Accessories

⑤ Manuals

Computer (not included in the supply)

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

Key features:

➤ **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 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 **LabVIEW**

www.edibon.com
↳PRODUCTS
↳30.- COMMUNICATIONS

For more information about Key Features, click here

INTRODUCTION

Nowadays the microwave systems are widely used in many branches of the communications technologies, in military and civilian applications, because microwaves links allow reliable and long range communications. With their small wavelength allows using smaller sized antennas than other system at lower radio frequencies, this is very important in systems where the space and weight are limited, like satellite system.

The waveguide devices are efficient systems that allow signal transmission with low losses and low noise added. The only losses of these systems are caused by the stationary waves formed by mismatched loads.

The Computer Controlled Microwave Trainer, "EMIC", designed by EDIBON, allows to study different microwave waveguide configurations for introduce students the main concepts about microwave communications through waveguide and antennas systems. The "EMIC" trainer includes a software for data acquisition and parameters calculation in order to facilitate the microwave studies (SWR values and the conversion in return loss and mismatch loss, waveguide wavelength, frequency, gain of the horn antenna, etc).

The trainer is provided with a set of practical exercises, through which the student will understand how to work with different elements of the trainer in order to obtain a basic knowledge of the concepts behind the microwave communication system; stationary wave ratio (SWR) measurement in waveguide systems, attenuation, function of different waveguide components, aerial communication links, reflection and absorption of different materials, matched and mismatched load, operation with Smith chart, etc.

GENERAL DESCRIPTION

The Computer Controlled Microwave Trainer, "EMIC", integrates a microwaves measuring test bench formed by microwaves generator, a kit of different standardized (WR-90) waveguides devices (horns antennas, attenuators, etc), measure devices (Power meter, Slotted line, etc), an Control interface box to connect to the computer and a software for data acquisition and parameters calculation.

This trainer includes different components to conform many configurations of the microwave test bench, including an aerial microwaves link, Hybrid Tees's configurations, determination of unknown impedance, etc, all of them are full explained in the set of practices.

The "EMIC" allows the familiarization and experimentation with essential measurements in microwaves systems: power emission, attenuation, matched and mismatched loads, gain of a horn antenna, frequency, wavelength, stationary wave ratio (SWR), impedance, operation with Smith chart, etc.

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.

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION
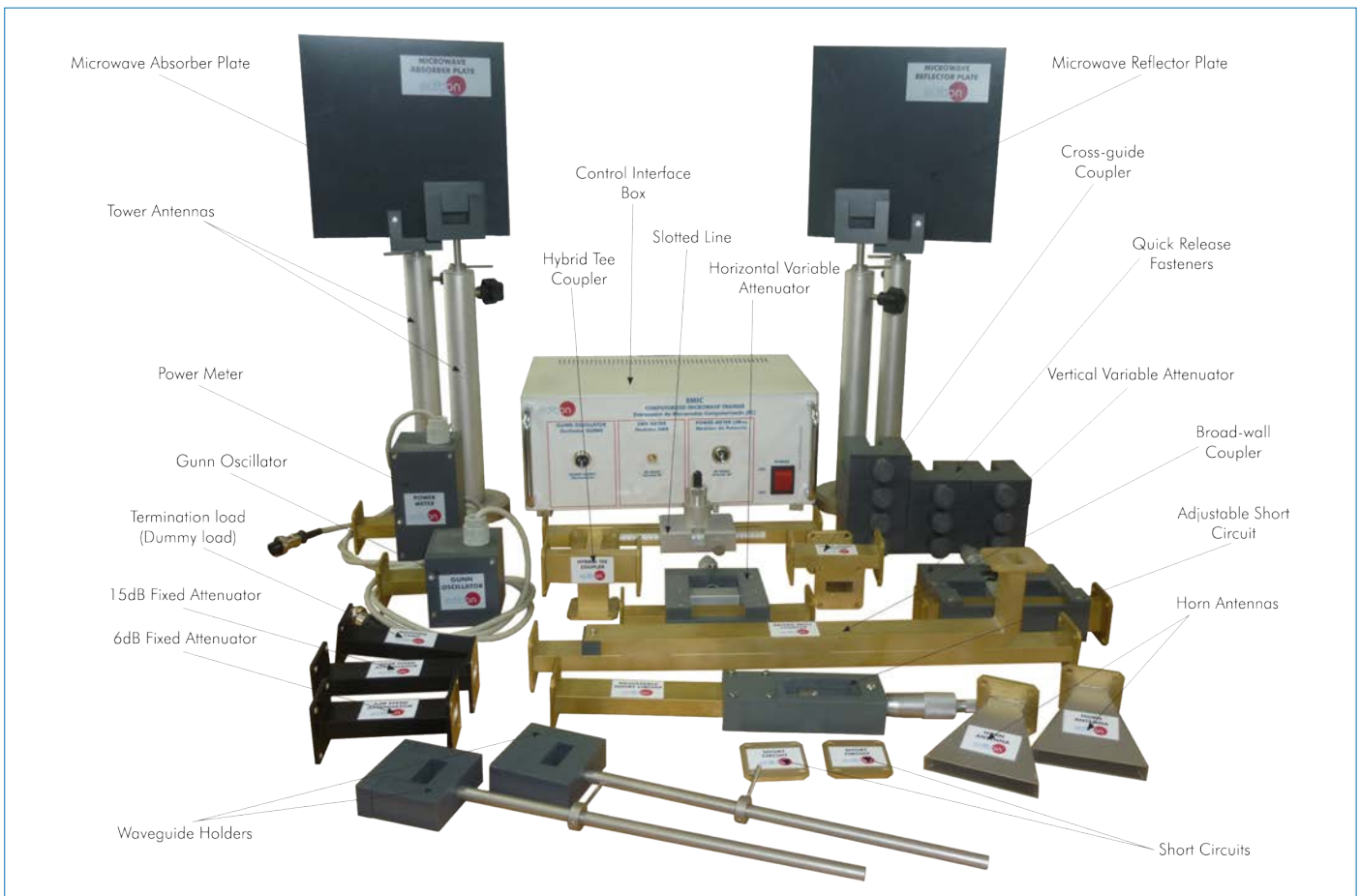
With this unit there are several options and possibilities:
- Main items: 1, 2, 3, 4 and 5.
- Optional items: 6, 7 and 8.

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

① **EMIC. Unit:**

Power meter:

Based on Thermistor. Wide frequency range: 10 – 12000 MHz.

Typically level range: -55 dBm – +18 dBm. Stability over temperature.

Slope: -25 mV/dB.

Connector to Interface box.

Slotted line:

Tunnel Diode detector mounted. Frequency range: 2 – 18 GHz. VSWR (max.): 3.5:1.

Maximum input power: 100 mW (20 dBm). Work in the quadratic detection zone.

Designed for 8.2 – 12.4 GHz (X-band). Longitudinal movable Diode detector holder.

Millimeter ruler. Waveguide in the standard size WR-90.

SMA connector to Interface box.

Gunn oscillator (Microwave signal generator):

Gunn oscillator diode. Frequency band: X band (fixed at 10.525 GHz).

Power output: 10 dBm. Waveguide in the standard size WR-90.

Connector to Interface box.

Broad-wall Waveguide Directional Coupler:

Designed for 8.2 – 12.4 GHz (X-band). Three ports (input, output and coupled).

Waveguide in the standard size WR-90.

Cross-guide Waveguide Directional Coupler:

Designed for 8.2 – 12.4 GHz (X-band). Four ports (input, output, isolated and coupled). Waveguide in the standard size WR-90.

Hybrid Tee:

Designed for 8.2 – 12.4 GHz (X-band).

3dB coupler. 4 ports (2 co-linear, sum and difference). Waveguide in the standard size WR-90.

6dB Fixed attenuator:

Designed for 8.2 – 12.4 GHz (X-band). Fixed attenuator at 6 dB. Waveguide in the standard size WR-90.

15dB Fixed attenuator:

Designed for 8.2 – 12.4 GHz (X-band). Fixed attenuator at 15 dB. Waveguide in the standard size WR-90.

Vertical variable attenuator:

Designed for 8.2 – 12.4 GHz (X-band). Precision micrometer. Waveguide in the standard size WR-90.

Horizontal variable attenuator:

Designed for 8.2 – 12.4 GHz (X-band). Precision micrometer. Waveguide in the standard size WR-90.

Termination load (Dummy load):

Designed for 8.2 – 12.4 GHz (X-band). Adapted load. Waveguide in the standard size WR-90.

Two short circuit terminations.

Two horn antennas:

Designed for 8.2 – 12.4 GHz (X-band). Sectorial horn flared in the direction of the electric plane (H-plane).

Waveguide in the standard size WR-90.

Adjustable termination:

Designed for 8.2 – 12.4 GHz (X-band). Movable short circuit. Precision micrometer. Waveguide in the standard size WR-90.

Microwave Absorber Plate: Plate with resistive material.

Microwave Reflector Plate: Plate with metallic material.

Four tower antennas with adjustable height, including each one: waveguide holder and degree disc with position indicator.

Ten quick release fasteners for an easy operation with the waveguide devices.

The complete unit includes as well:

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 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: EMIC

Complete Technical Specifications (for main items)

② EMIC/CIB. Control Interface Box:

The Control Interface Box is part of the computerized system.

SCSI cable to connect the control interface box and the computer.

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

Simultaneous visualization in the computer of all measurement of the system as Received signal power value and slotted line SWR measurement and perform of different calculations as SWR value, signal frequency, etc.

Graphic representation in real time of the system measurements.

Shield and filtered signals to avoid external interferences.

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

All measurements are displayed on only one screen in the computer.

Variable attenuators calibration graph, SWR waveform representation and Radiation pattern representation. Storage of all the analysis data and results in a file.

EMIC/CIB

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

Compatible with actual Windows operating systems.

The software allows to perform different calculations and data registration:

SWR calculation: the software allows to record the SWR performed by different termination loads and calculates the SWR value, the distance between minimum and maximum points, etc.

Power meter measurement: the software allows to record the power meter value in order to measure the real attenuation of the fixed attenuators, draw the attenuation depending of the position of the variable attenuators, study the different couplers, etc.

Antenna radiation pattern: the software also allows to draw the antenna radiation pattern with the measurement from the power meter.

Registration and visualization of the power meter and detector diode of the slotted line in an automatic and simultaneous way.

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

Management, processing, comparison and storage of data.

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.

EMIC/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: EMIC + EMIC/CIB + EMIC/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.- Familiarization with the trainer.

2.- Power emission measurement.

3.- Study of different fixed attenuators.

4.- Calibration of variable attenuators.

5.- Wavelength and frequency measurement with the waveguide slotted line.

6.- Stationary Wave Ratio (SWR) measurement.

7.- Basic principles of Smith chart.

8.- Calculate impedance, admittance and reflection coefficient.

9.- SWR values for different loads.

10.-Comparison between matched and mismatched loads.

11.-Study of the Broad-wall Waveguide Directional Coupler.

12.-Study of the Cross-guide Waveguide Directional Coupler.

13.-Study of the Hybrid Tee.

14.-Measure of power emission in free space.

15.-Measure of wavelength in free space.

16.-Radiation pattern of a horn antenna.

17.-Study of gain and directivity of a horn antenna (dBi).

18.-Reflection of a dielectric plate and metallic plate.

Other possibilities to be done with this Unit:

19.-Many students view results simultaneously.

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

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

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

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

23.-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.

DIMENSIONS AND WEIGHTS

EMIC:

  Unit:

    -Dimensions: 800 x 600 x 450 mm approx.
      (31.49 x 23.62 x 17.72 inches approx.)
    -Weight: 20 Kg approx.
      (44 pounds approx.)

  Control Interface Box:

    -Dimensions: 310 x 220 x 180 mm approx.
      (12.20 x 8.26 x 7.08 inches approx.)
    -Weight: 3 Kg approx.
      (6.61 pounds approx.)
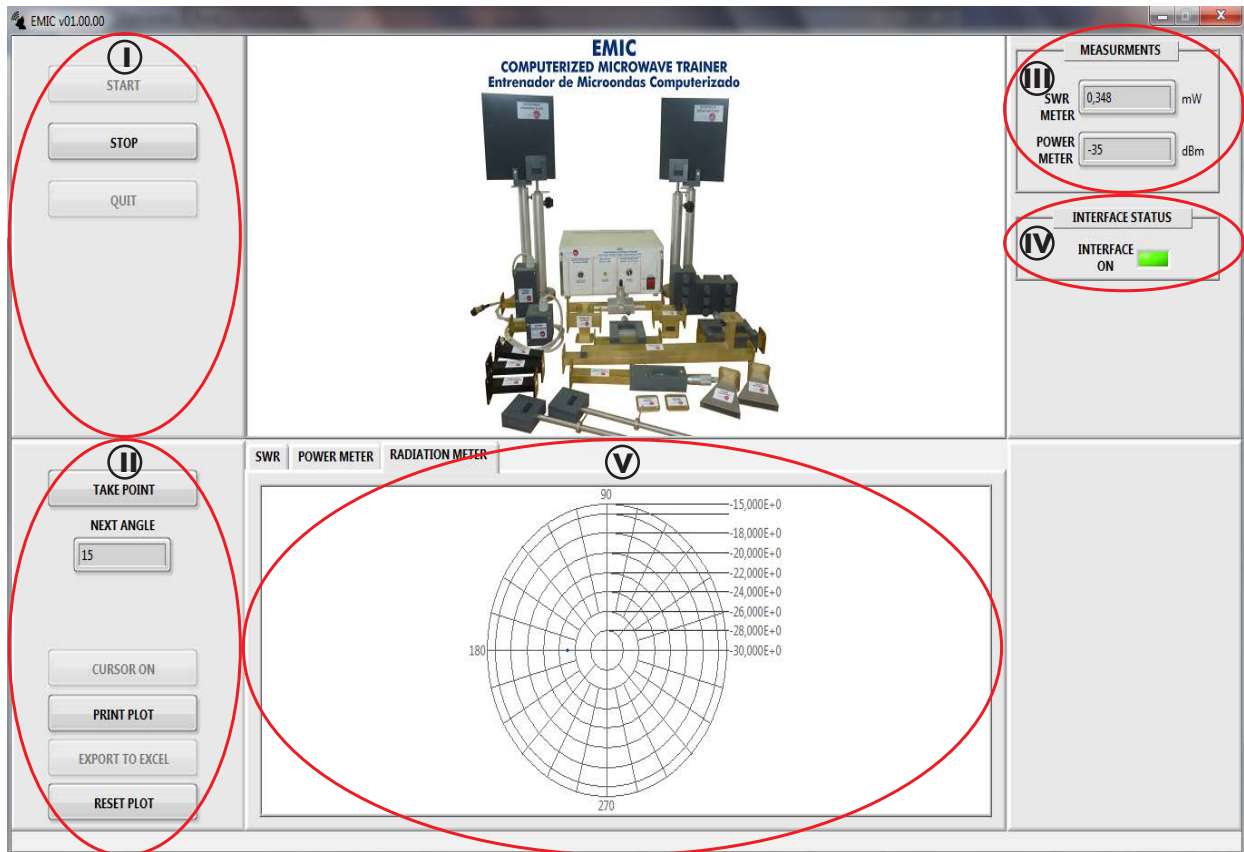
AVAILABLE VERSIONS

Offered in this catalogue:

- EMIC. Computer Controlled Microwave Trainer.

Offered in other catalogue:

- EMI. Microwave Trainer.

SOFTWARE MAIN SCREENS

Main screen

I Main software operation buttons.

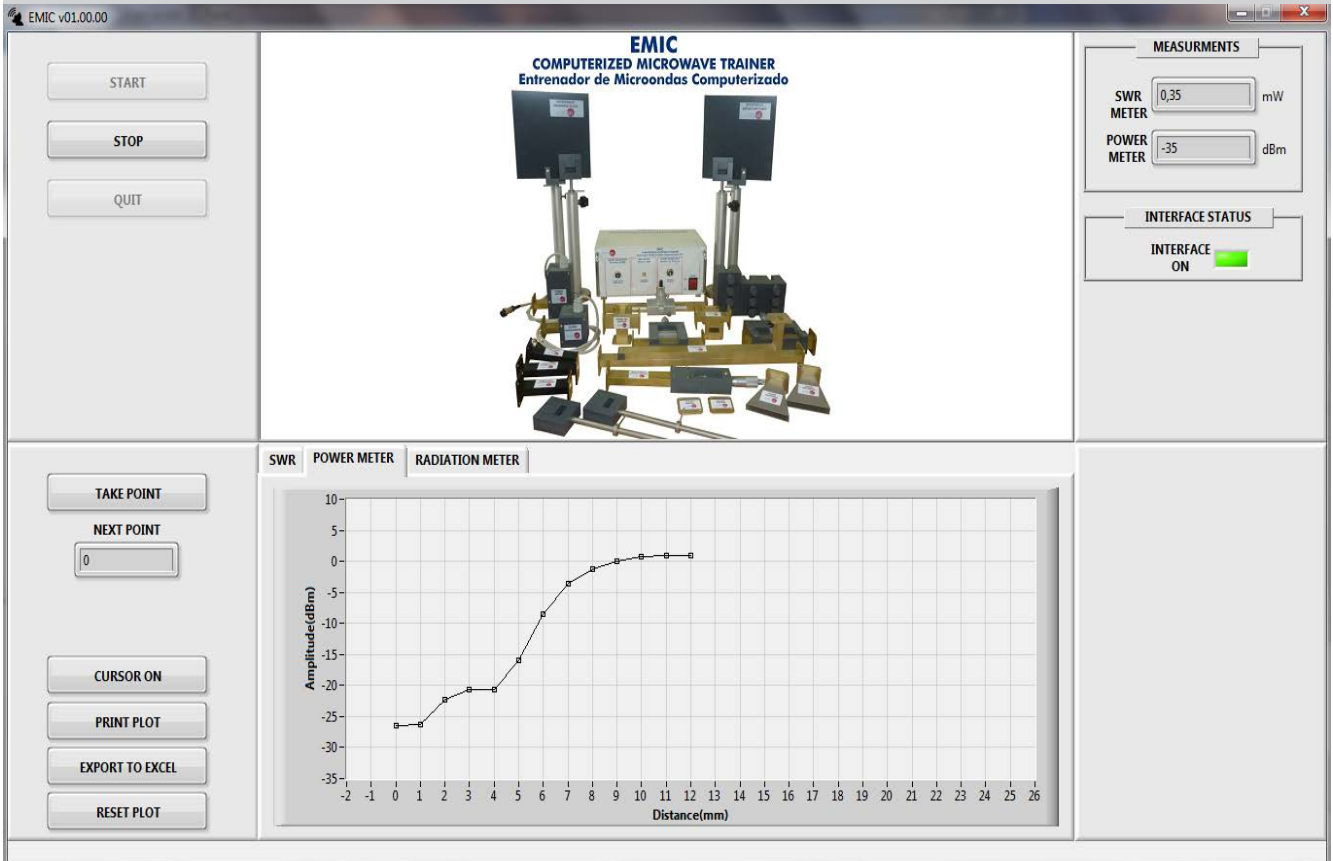II Take points, setting, export to Excel and print plot buttons.

III Microwave measurement indicators: Stationary Wave Ratio (SWR) meter value, Power meter value.
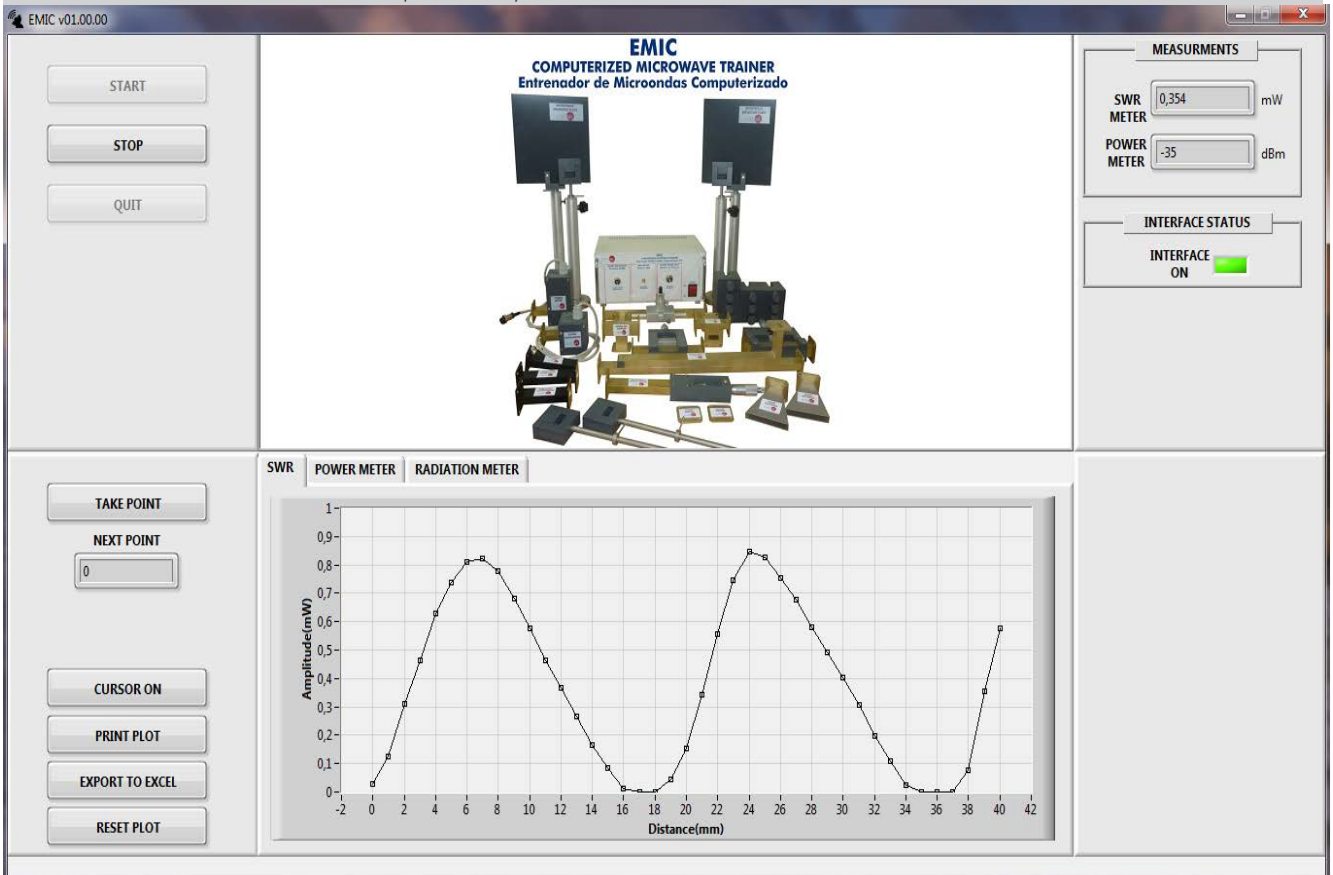
IV Interface status indicator.

V Graphics. Allows to show the power meter measurement depending of the position of the variable attenuators, SWR waveforms performed by different termination loads and the radiation pattern.

SOME **REAL** RESULTS OBTAINED FROM THIS UNIT

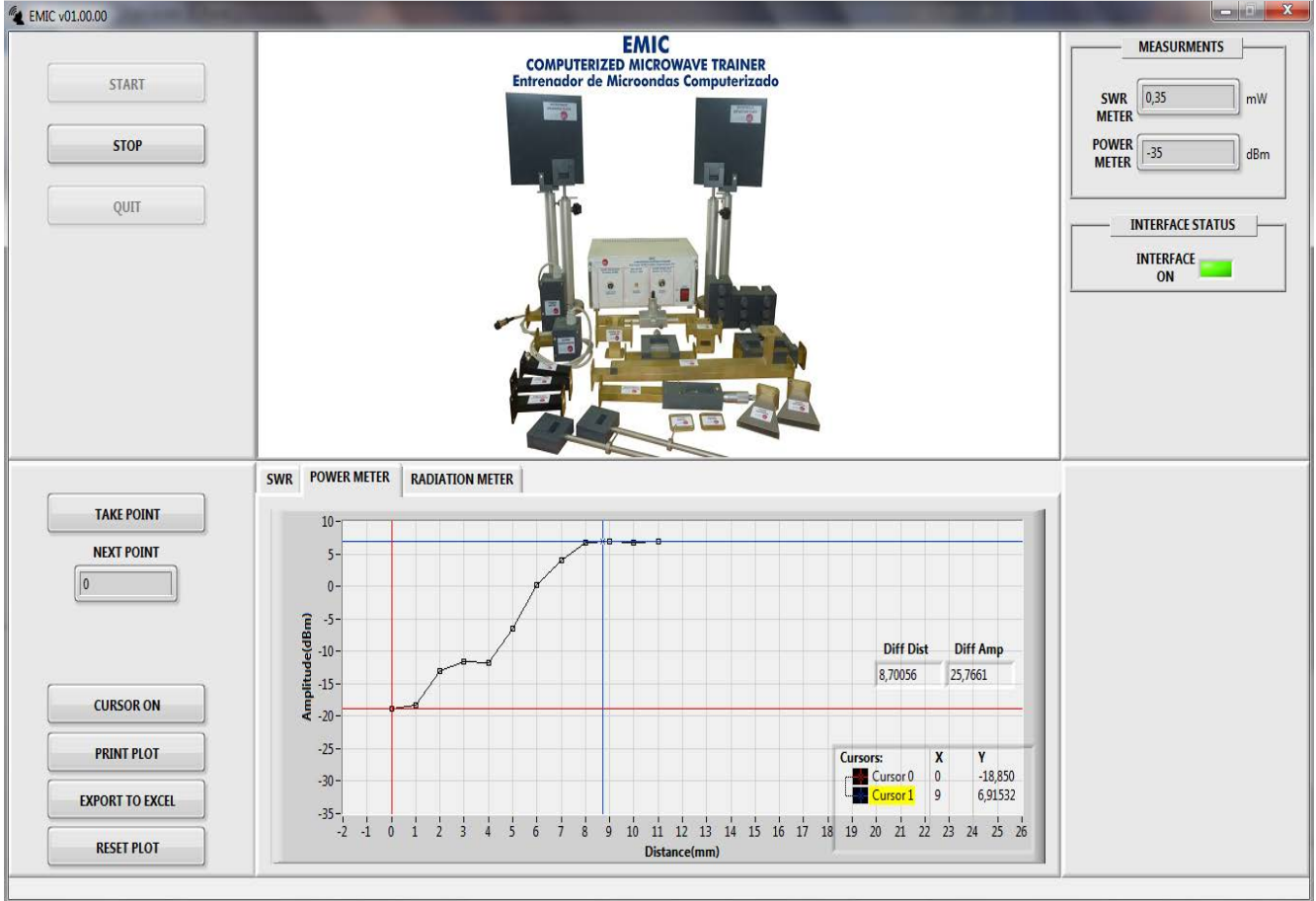The screen below shows the calibration of the Vertical Variable attenuator.

The screen below shows the SWR waveform performed by a short circuit.

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The screen below shows the calibration of the Vertical Variable attenuator with the cursors that make easy the data analysis.

The screen below shows the SWR waveform performed by a matched load, with the cursors activated to get an automatic calculation of the SWR value.

www.edibon.com
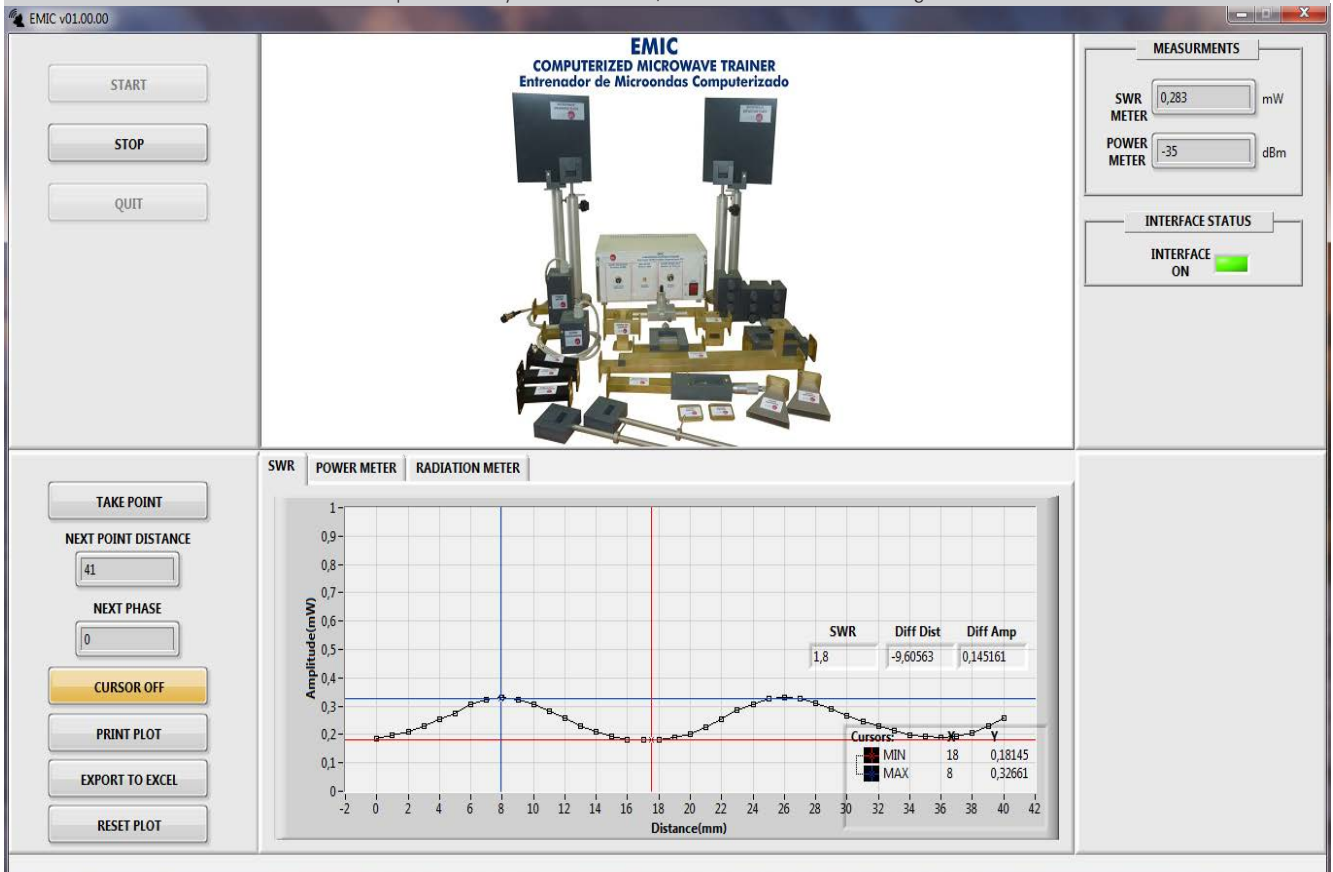
COMPLETE TECHNICAL SPECIFICATIONS (for optional items)

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 EMIC/ICAI. Interactive Computer Aided Instruction Software System.
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/files/expansion/ICAI/catalog

Instructor Software

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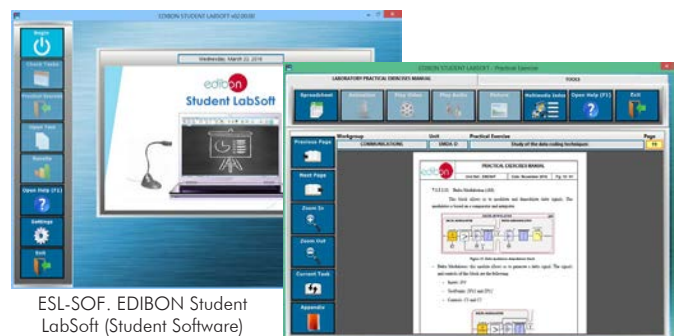

ECAL. EDIBON Calculations Program Package - Formula Editor Screen

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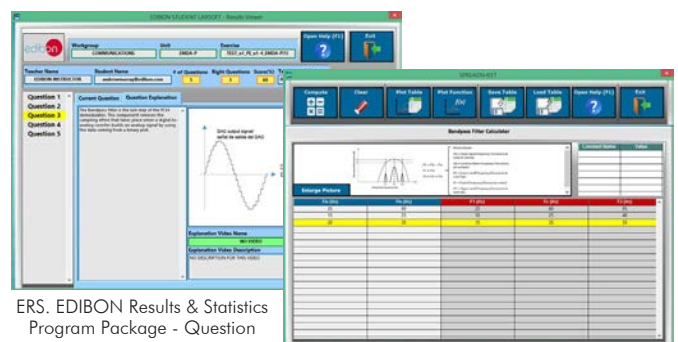

ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

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.

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/products/catalogues/en/Mini-ESN.pdf

Mini ESN.
EDIBON Mini Scada-Net System

Computer Controlled Microwave Trainer (EMIC)

1 UNIT= up to 30 STUDENTS can work simultaneously

Control Interface Box

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

⑧ 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/electronics/esn-electronicscommunications/ESN-ELECTRONICS_COMMUNICATIONS-ADVANCED.pdf
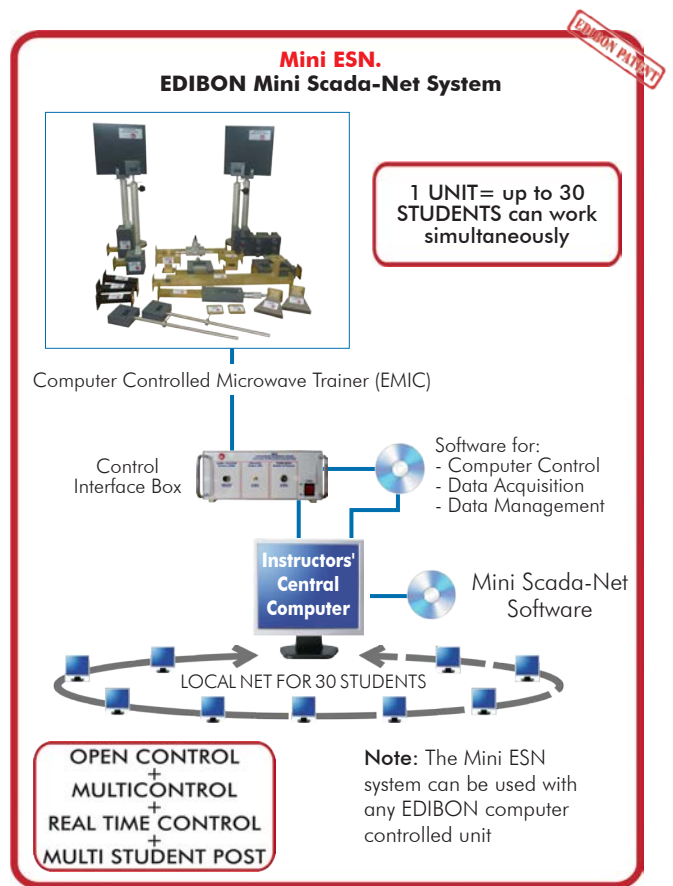
Main items (always included in the supply)

Minimum supply always includes:

① **Unit: EMIC. Computer Controlled Microwave Trainer.**

② **EMIC/CIB. Control Interface Box.**

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

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

⑤ **Manuals.**

*IMPORTANT: Under EMIC 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 EMIC/ICAI. Interactive Computer Aided Instruction Software System.

b) Multipost Expansions options

⑦ Mini ESN. EDIBON Mini Scada-Net System.

⑧ ESN. EDIBON Scada-Net System.

①EMIC. Unit:

Power meter:

Based on Thermistor. Wide frequency range: 10 – 12000 MHz.

Typically level range: -55 dBm – +18 dBm. Stability over temperature.

Slope: -25 mV/dB.

Connector to Interface box.

Slotted line:

Tunnel Diode detector mounted. Frequency range: 2 – 18 GHz. VSWR (max.): 3.5:1.

Maximum input power: 100 mW (20 dBm). Work in the quadratic detection zone.

Designed for 8.2 – 12.4 GHz (X-band). Longitudinal movable Diode detector holder.

Millimeter ruler. Waveguide in the standard size WR-90.

SMA connector to Interface box.

Gunn oscillator (Microwave signal generator):

Gunn oscillator diode. Frequency band: X band (fixed at 10.525 GHz).

Power output: 10 dBm. Waveguide in the standard size WR-90.

Connector to Interface box.

Broad-wall Waveguide Directional Coupler:

Designed for 8.2 – 12.4 GHz (X-band). Three ports (input, output and coupled).

Waveguide in the standard size WR-90.

Cross-guide Waveguide Directional Coupler:

Designed for 8.2 – 12.4 GHz (X-band). Four ports (input, output, isolated and coupled). Waveguide in the standard size WR-90.

Hybrid Tee:

Designed for 8.2 – 12.4 GHz (X-band).

3dB coupler. 4 ports (2 co-linear, sum and difference). Waveguide in the standard size WR-90.

6dB Fixed attenuator:

Designed for 8.2 – 12.4 GHz (X-band). Fixed attenuator at 6 dB. Waveguide in the standard size WR-90.

15dB Fixed attenuator:

Designed for 8.2 – 12.4 GHz (X-band). Fixed attenuator at 15 dB. Waveguide in the standard size WR-90.

Vertical variable attenuator:

Designed for 8.2 – 12.4 GHz (X-band). Precision micrometer. Waveguide in the standard size WR-90.

Horizontal variable attenuator:

Designed for 8.2 – 12.4 GHz (X-band). Precision micrometer. Waveguide in the standard size WR-90.

Termination load (Dummy load):

Designed for 8.2 – 12.4 GHz (X-band). Adapted load. Waveguide in the standard size WR-90.

Two short circuit terminations.

Two horn antennas:

Designed for 8.2 – 12.4 GHz (X-band). Sectorial horn flared in the direction of the electric plane (H-plane).

Waveguide in the standard size WR-90.

Adjustable termination:

Designed for 8.2 – 12.4 GHz (X-band). Movable short circuit. Precision micrometer. Waveguide in the standard size WR-90.

Microwave Absorber Plate: Plate with resistive material.

Microwave Reflector Plate: Plate with metallic material.

Four tower antennas with adjustable height, including each one: waveguide holder and degree disc with position indicator.

Ten quick release fasteners for an easy operation with the waveguide devices.

The complete unit includes as well:

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

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The Control Interface Box is part of the computerized system.

SCSI cable to connect the control interface box and the computer.

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

Simultaneous visualization in the computer of all measurement of the system as Received signal power value and slotted line SWR measurement and perform of different calculations as SWR value, signal frequency, etc.

Graphic representation in real time of the system measurements.

Shield and filtered signals to avoid external interferences.

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

All measurements are displayed on only one screen in the computer.

Variable attenuators calibration graph, SWR waveform representation and Radiation pattern representation. Storage of all the analysis data and results in a file.

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

Compatible with actual Windows operating systems.

The software allows to perform different calculations and data registration:

SWR calculation: the software allows to record the SWR performed by different termination loads and calculates the SWR value, the distance between minimum and maximum points, etc.

Power meter measurement: the software allows to record the power meter value in order to measure the real attenuation of the fixed attenuators, draw the attenuation depending of the position of the variable attenuators, study the different couplers, etc.

Antenna radiation pattern: the software also allows to draw the antenna radiation pattern with the measurement from the power meter.

Registration and visualization of the power meter and detector diode of the slotted line in an automatic and simultaneous way.

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

Management, processing, comparison and storage of data.

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.

⑤Manuals:

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 the Main Items

1.- Familiarization with the trainer.

2.- Power emission measurement.

3.- Study of different fixed attenuators.

4.- Calibration of variable attenuators.

5.- Wavelength and frequency measurement with the waveguide slotted line.

6.- Stationary Wave Ratio (SWR) measurement.

7.- Basic principles of Smith chart.

8.- Calculate impedance, admittance and reflection coefficient.

9.- SWR values for different loads.

10.-Comparison between matched and mismatched loads.

11.-Study of the Broad-wall Waveguide Directional Coupler.

12.-Study of the Cross-guide Waveguide Directional Coupler.

13.-Study of the Hybrid Tee.

14.-Measure of power emission in free space.

15.-Measure of wavelength in free space.

16.-Radiation pattern of a horn antenna.

17.-Study of gain and directivity of a horn antenna (dBi).

18.-Reflection of a dielectric plate and metallic plate.

Other possibilities to be done with this Unit:

19.-Many students view results simultaneously.

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

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

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

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

23.-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

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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.

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.

REPRESENTATIVE: