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Technical Teaching Equipment

Antenna Trainer

EAN

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Products
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Units
3.-Communications

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 "EAN" unit is the antenna trainer designed by EDIBON. It covers the basic principles about antennas. It 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.

ISO 9000: Quality Management
(for Design, Manufacturing, Commercialization and After-sales service)

European Union Certificate
(total safety)

Certificates ISO 14000 and
ECO-Management and Audit Scheme
(environmental management)

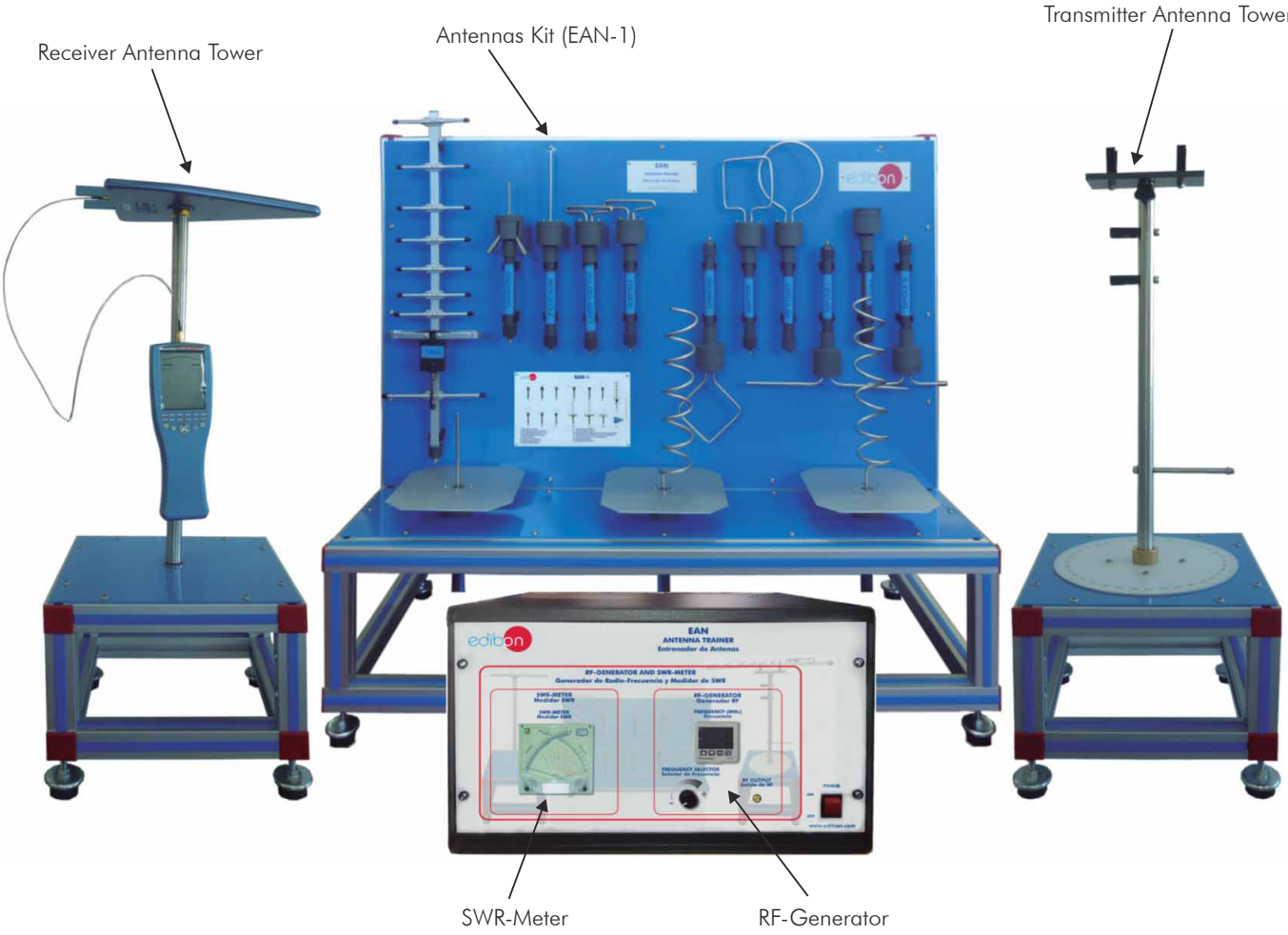
Worlddidac Quality Charter Certificate and
Worlddidac Member

GENERAL DESCRIPTION

The Antenna Trainer "EAN" is a complete and affordable unit and no extra hardware is required for complete all the practice set.

The "EAN" 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.

The trainer is divided into different blocks of elements: RF-Generator and SWR-Meter (in metallic box), Transmitter Antenna Tower, Receiver Antenna Tower and the Antennas Kits.



In the following lines there is a brief description of each block.

- RF-Generator and SWR-Meter (in metallic box):

  - RF-Generator: It generates a signal whose frequency can be controlled using the potentiometer. The selected frequency (MHz) is displayed on a digital display. The output of this block should be connected to the antenna to be characterized.

  - SWR-Meter: It allows to measure the matching quality between the RF-generator and the antenna. In order to simplify the operation with the "EAN" trainer, the SWR-Meter is internally connected to the RF-generator and the output. The SWR-meter displays the forward and reflected power and the SWR.

- Transmitter Antenna Tower: It is used to fix the antenna to be characterized. The transmitter tower has two holders to fix the antenna to characterize on horizontal and vertical positions. There is also a degree wheel to adjust the orientation of the antenna.

- Receiver Antenna Tower: It contains the following elements:

  - Receiver Tower: It is the place where the receiver antenna should be fixed. The receiver antenna consists of a logarithmic antenna included in the "EAN-1. Antennas Kit" suitable for measuring a wide range of frequencies.

  - Spectrum Analyzer: It is the instrument that takes measures of the strength of the incoming signal.

- EAN-1. Antennas Kit: the "EAN" trainer is provided with a set of antennas. The kit includes the most common types of antennas. The antennas are constructed in such a way to allow students to test them in an easy and quick way. The common parts of every antenna are: a fixing system to fix the antenna to the transmitter tower and a SMA connector to connect it to the RF generator.

SPECIFICATIONS

The Antenna Trainer "EAN" is composed of:

- RF-Generator and SWR-Meter: (in metallic box)
  - RF-Generator:
    - Based on voltage controlled oscillator (VCO).
    - Wide range of generated frequencies: from 600MHz to 1700MHz.
    - Frequency tuning through a potentiometer on the front panel.
    - Frequency display on the front panel.
    - 50 Ω of nominal impedance.
  - SWR-Meter:
    - Frequency range: 600 MHz to 2.5GHz.
    - Insertion loss ≥ 0.1dB.
    - SWR measurement through cross needle of forward and reflected RF power.
    - 50 Ω of nominal impedance.
  - SMA connector to transmitter antenna.
- Spectrum Analyzer: (located in the receiver antenna tower)
  - Frequency range: 700 MHz to 2.5GHz.
  - Typically level range: -80 dBm to 0 dBm.
  - Configurable sample time, minimum 100ms.
  - Accuracy +/- 4 dB.
  - Direct RF spectrum display.
  - Frequency and signal strength display.
  - High resolution multifunction display.
  - 50 Ω of nominal impedance.
  - SMA connector to receiver antenna.
- Two Towers of Antennas:
  - Receiver Antenna Tower.
  - Transmitter Antenna Tower. The base of this tower has screen printed marks of position (degree wheel) for help the students performing the radiations plots with different degree resolutions.
- EAN-1. Antennas Kit: (included in the supply)
  - All antennas connect to RF-Generator through a SMA connector.
  - Monopole antenna:
    - Designed for 1200MHz transmission. λ/2 of wavelength. 50 Ω of nominal impedance.
  - Monopole antenna with ground plane:
    - Designed for 1200MHz transmission. λ/2 of wavelength. 50 Ω of nominal impedance.
  - Drooping monopole antenna:
    - Designed for 1200MHz transmission. λ/4 of wavelength. 50 Ω of nominal impedance.
  - Straight dipole antenna (Short λ/2):
    - Designed for 1300MHz transmission. λ/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 (300Ω):
    - Designed for 1400MHz transmission. λ/2 of wavelength. 300 Ω of nominal impedance.
  - Folded dipole antenna (adapted 50Ω):
    - Designed for 1400MHz transmission. λ/2 of wavelength. 6:1 Balun (length: λ/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.

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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 bands of frequency transmission. λ/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 700-2500MHz transmission. Max. transmission power: 100 W. 50 Ω of nominal impedance. VSWR (typ.): <1:2. Gain (typ.): 4dBi.

Antennas expositor which allows the access of different antennas easily.

Space required between antennas: 2-3 m.

Cables and Accessories, for normal operation.

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

Optional accessories: (NOT included in the standard supply) (See "Optional accessories" section in page 5)

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.

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Familiarization with the trainer.

2.- Basic principles of radiation pattern parameters measurement.

3.- Distance effect over radiation power.

4.- Study of the surrounding signals.

5.- Direction of maximum radiation and gain of an antenna.

6.- Analysis of the antenna bandwidth.

7.- Study of monopole antennas.

8.- Study of antennas with ground planes.

9.- Study of dipole antennas.

10.-Study of loop antennas (circular, square and diamond loop antennas).

11.-Study of circular polarization helical antennas.

12.-Study of Yagi-Uda antennas.

13.-Study of microstrip patch antennas.

14.-SWR measurement and conversion in Return loss and Reflected Power.

15.-Improvement of the performance of a system.

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

16.-Study of horn antenna.

17.-Study of parabolic reflector.

18.-Basic principles of wide bandwidth antennas: log-periodic antenna.

19.-Basic principles of wide bandwidth antennas: discone antenna.

20.-Basic principles of microstrip patch array antenna.

REQUIRED SERVICES

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

DIMENSIONS & WEIGHTS

EAN:

RF-Generator and SWR-Meter (in metallic box):

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

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.)

Total weight: 45 Kg. approx. (99 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.

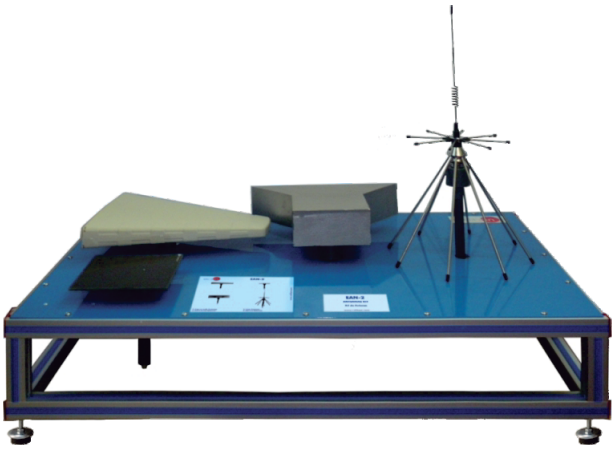
Max. transmission power: 10 W. 50 Ω of nominal impedance. VSWR (typ.): < 2:1. Gain (typ.): 7dBi.

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

Offered in this catalogue:

-EAN. Antenna Trainer.

Offered in other catalogue:

-EANC. Computer Controlled Antenna Trainer.

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

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