BISMILLAH ELECTRONICS
Catalogue 2025

- Microcontroller Trainer MC-8600
- Microstrip Trainer MS-3000
- Active Microstrip Trainer MS-3000A
- Waveguide/ Microwave Trainer WT-9000
- Satellite Trainer ST-2400
- Antenna Trainer ATC-5000 (Motorized, GUI Based)
- Analog and Digital Communication Trainer CT-3000
- Phased Array Antenna Trainer PAT-9000
- Radar Training System RT-11G
- Transducers and Instrumentation Trainers
- Analog and Digital Electronics Trainers
- Power Electronics Trainer PET-400

Made in Pakistan

CERTIFICATE QUALITY

THIS CERTIFICATE IS AWARDED TO

M/s. BISMILLAH ELECTRONICS

51-A, Abu Bakar Block, New Garden Town
Lahore, Pakistan

Nexus International Certi
Management System for the above organization is accordance & found to be in compliance with NICS requirements for registration of the quality management system standard audited below.

QUALITY MANAGEMENT SYSTEM

ISO 9001:2015

Scope Of Work

Commercial Service Provider For Electrical Safety, Dielectric Withstand & Electromagnetic Compatibility Testing As Per Latest IEC Standards.

Regd. No. 14123018
Certification No. 100738905
Original Registration Date: 22 July 2022
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Expiration Date: 25 July 2025

Authorized Signatory

NEXUS INTERNATIONAL CERTIFICATION SERVICES
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Company Philosophy

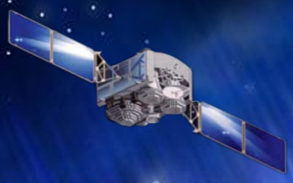
Company Profile

Bismillah Electronics" was established in 1992 by Dr. Inam Elahi Rana. Bismillah Electronics is basically a R&D based company which develops and produces customized solution in the field of Microwave Engineering, Radars, and Communication systems

.

As off shoot of our R & D activities we are also producing educational trainers for Electronics and Telecommunication labs. Our trainer are High End, affordable educational trainers to serve the local universities and engineering colleges. Our trainers are designed according to the courses, studied at international and Pakistani universities.

The basic theme is to flourish the local industry and provide better after sale service to our customers. We are also very dynamic in the sense that we keep improving the quality and performance of our trainer. Our response time to a customer is just a call away . We, at Bismillah Electronics believe that quality and indigenous is the key to success.



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MC-8600 Microcontroller Trainer

Description

MC-8600 facilitates the students in getting acquainted with practical knowledge and issues of microcontroller interfacing with different applications/modules. It's single station solution for learning, as it provides almost all commonly used applications mounted on board, and ready to get interfaced with microcontroller.

Experiments

The learning pathway is designed in modular form. Each module consists of operation theory plus series of examples followed by practice projects.

- Familiarization with MC-8600
- Data I/O Module
- Display Module
- Interrupts and Timers Module
- Serial Interface Module
- Analog Interface Module
- Motion Control Interface Module
- PID Controller Module

Optional Architectures

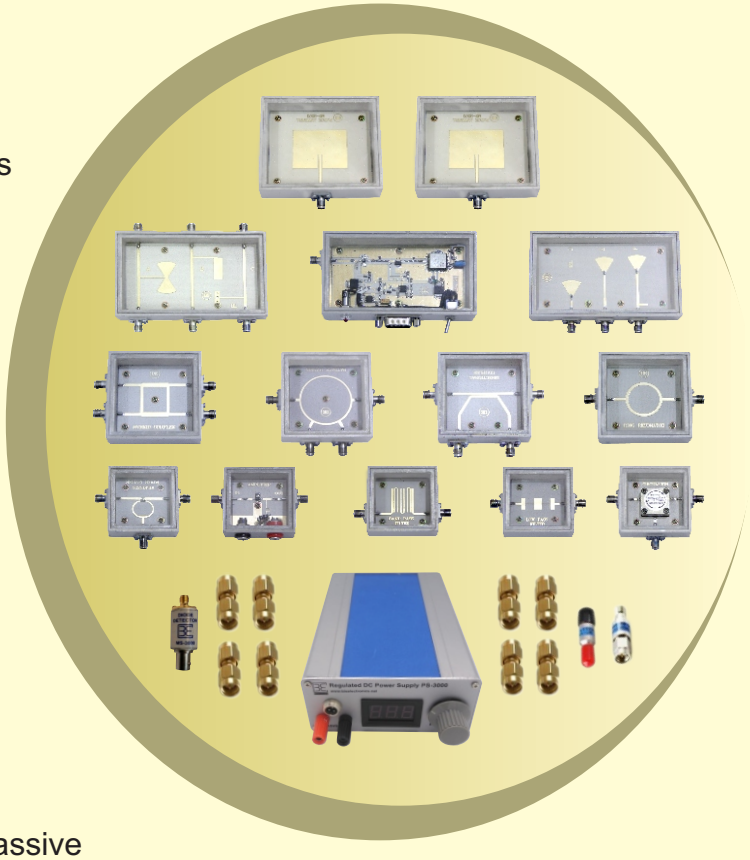
- ATMEL 89S5X Series
- ATMEL AVR Series
- MICROCHIP PIC18FXX Series

Features

- Onboard ISP Programer
- 128x64 Graphical LCD
- 16x2 Character LCD
- Seven Segment Display
- LED's and Switches Array
- Numeric Key Pad
- Serial I²C (Inter Integrated Circuit) EEPROM and RTC
- 8-Bit A/D and D/A Converter
- DC Motor Drive
- Servo Motor Drive
- Temperature Control System
- RS-232/485 Interface
- 2x Interrupt sources
- Relay control circuit
- Built in power supply
- Ethernet 10/100Mbps (optional)
- ISP based USB Programmer
- Modular Plug in Type Structure

MS-3000 Microstrip Trainer

Description



The increasing use of microwaves, in applications ranging from satellite and terrestrial communications to high-speed computing and data transmission, has resulted in a short-fall of appropriately trained engineers and technicians.

Over three quarters of all microwave circuits are now non-waveguide.The swing towards microstrip technology must be reflected in the courses offered at engineering education institutes.

BE; recognizing the urgent need for suitable training equipment, have developed a microstrip trainer which will provide the means to investigate the technology and techniques used in this important subject area.

MS-3000 Microstrip Trainer comprises of 18 passive circuit components, 2 active circuits and all the leads and connectors required to construct a variety of commonly used configurations, many of which incorporate microwave integrated circuits (MICs).

The instruction manual supplied with MS3000 provides a comprehensive introduction to the subject in a manner which avoids unnecessary mathematical analysis and provides a series of structured practical assignments.

The only items of test equipment required are a digital multi-meter and a 0-20V dc power supply.

MS-3000 Mircostrip Trainer covers the training requirements for most courses in microwave engineering at undergraduate level courses.

Features

- Latest Microwave Technology
- 3-Port Circulator
- 2.0-4.0 GHz VCO
- Gold Plated RF laminate with PTH
- No costly test equipment required
- Safe low power output
- Conveniently packed for inventory control

Microstrip Trainer MS-3000

PASSIVE COMPONENTS

2 Patch antenna
1 DC Biasing unit
1 Three-port Circulator
1 Hybrid ring (rat-race) coupler
1 Ring resonator
1 Band Pass Filter
1 Quadrature coupler
1 Unmatched loads
1 Directional coupler
1 Wilkinson power divider
3 50 ohm loads
1 Short-circuit termination.
1 10dB/5dB attenuator
1 Crystal detector
1 Low-pass filter
1 Matched load

Most of the components are packaged in bright aluminum enclosures and their interconnection is by standard SMA couplings; providing secure but easily made joints.
The trainer is designed to be used with basic test equipment: a DC power supply and a digital multimeter; in conjunction with the calibration curves supplied with each VCO and detector.
Realistic quantitative results can easily be achieved with this simple set-up; however the quality of construction allows MS3000 to be used with more sophisticated microwave test instruments if these are available.

ACTIVE COMPONENTS

1 Voltage Controlled Oscillator (VCO)
1 S-Band MMIC Amplifier
1 PIN Diode Modulator (Optional)

MISCELLANEOUS

8 SMA plug-plug connectors
1 BNC -Dual Banana Pins
1 DB(9)-Circular lead
2 4mm Banana leads.
1 Spanner.
- VCO and Detector calibration curves

The MS3000 is supplied in a well protected, aluminum robust carrying brief case

Microstrip Trainer MS-3000

The Assignment

The manual provides a series of structured and stand alone assignment; using mostly the passive components: Introduction to microstrip, microwave integrated circuit (MIC) technology and microwave measurement techniques. Further assignments encourage the student to build up complete systems incorporating the active circuits.

The individual units of both active and passive components are designer for compatibilty and easy interconnections, thus ensuring that circuits such as a Line-of-Sight Link or simple Frequency Modulated Continuous Wave (FMCW) can be built and tested with minimum difficulty.

The basic principles and techniques of microwave signal processing using microstrip are simply and comprehensively presented, so that the trainer is ideal for use by engineers and technicians working in a variety of different areas of application, including:

- **Satellite communication**
- **Radar**
- **Surveillance-Security systems**
- **Instrumentation**
- **Medical electronics**
- **Data transmission**

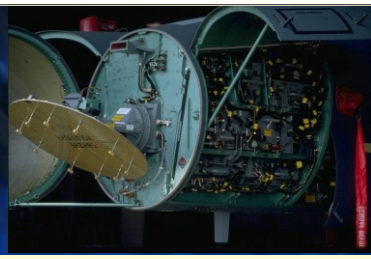
The practical work is presented under the following general headings:

- Power Source and detector action
- Action of a 3-port circulator.
- Insertion loss measurement on low-pass filter And Band Pass Filter
- Measurement of return loss, reflection coefficient and VSWR of a filter, microstrip and commercial matched loads.
- Matching investigations: reflection coefficient of unknown resistive load and its matching by 1/4 λ_g transformer and shunt stub.
- Properties of a power divider and rat-race coupler.
- Measurement of effective dielectric constant and line loss using a ring resonator.
- DC biasing and MMIC amplifier investigations.
- Quadature coupler investigations
- Microwave radio link and antenna investigations.

MS3000 Microstrip Trainer Complete Experimental Workstation

A complete workstation is also available comprising the supply and a digital multimeter.

Microstrip Trainer MS-3000



Specification

Patch antenna

Two microstip patch antenna supplied.

Centre frequency:	2.7 ±0.05GHz
Grain:	6dBi (typical)
Return loss:	-17dB
impedance:	50 ohm

Bias network

This components consist of three types of 50 bias lines. Two a.c and one d.c, all utilizing the quarter wavelength transformer.

Bias line type	Insertion loss (dB)	
	2.7GHz	Full band (2-4 GHz)
Butterfly	0.02	0.12
Pad	0.02	0.11
Direct d.c short	0.02	0.08

Three-port circulator

insertion loss:	0.4dB (max at 3GHz)
Insertion loss:	0.5dB (max 2.5 -2.9GHz)
Isolation:	16 - 24dB (full band 2.5 - 2.9GHz)

Hybrid ring (rat-race) filter

This is a standard hybrid-ring (or 'rat-race) coupler.

Center frequency:	2.7 +0.1GHz
Insertion loss (at center frequency):	-3.2dB
Bandwidth:	400MHz
Isolation	25dB (typical)
Impedance:	50

Ring resonator

A loose-coupled resonant ring designed to resonate at a fundamental frequency of approximately 2.7GHz in its n = 2 mode. This component is used to measure the dielectric constant of the printed circuit board.

Low-pass Filter

A 5-section, L-C type microstrip low-pass filter.

Pass band (nominal)	dc - 2.7GHz
Stop band:	3dB point at 3GHz (approx) rising to 20dB at 20% above cut-off.
Impedance:	50 ohm

Matched load

A quarter wavelength long terminated in a standard, 50 ohm, thick film, chip resistance.

Center frequency:	2.7GHz
Return loss:	-20dB
Input impedance:	50 ohm

Unmatched load

Three 50 ohm input lines terminated in unknown resistive loads. One incorporates a λ/4 transformer with a center frequency = 3GHz, and one uses an open-circuit shunt stub element.

Power requirements

Power supplies:	15V dc 1.5A
VCO tuning voltage:	0 - 20V dc 1.2A

Voltage controlled oscillator

The VCO is supplied with its own calibration curve and amplifier

Frequency range:	2.0 - 4.0GHz
Tuning voltage range:	1 - 20V
Power output:	10dBm (typical into 50 ohm)
Modulated output frequency:	1kHz (variable 900-1100Hz)
Modulation waveform	Square wave
Modulator indicator:	2Hz flashing LED
DC supply voltage:	15V fix (fully protected)
DC supply current:	50mA (maximum)
Supply connectors:	4mm sockets

S-band MMIC amplifier

Gain:	+12dB (typical)
Compression point:	+12dBm (typical)
Frequency range:	2 - 4GHz
Input impedance:	50 ohm
Output impedance	50 ohm
Supply voltage:	15V (fully protected)
Supply current:	40mA (typical)
Supply connectors:	4mm sockets

Band Pass Filter

Pass band :	2.5 - 2.6GHz
Band width :	100 MHz
impedance :	50 ohm

Ancillary equipment

Power Supply:	15V dc 0 - 20V dc variable 1.5 A Regulated DC Power Supply PS-3000 is recommended

Wilkinson power divider

Center frequency:	2.7GHz
Operating band:	2 - 4GHz
Insertion loss:	3.5 ±0.25dB
Isolation:	20dB (typical)
Tracking:	0.15dB (typical over full band)
Impedance:	50 ohm

Dimensions & Weight (in protective case)

Width: 430mm (17in) Height: 310mm (12in) Depth: 89mm (3.5in)
Weight: 4.5kg (9.92 lbs)

Tender Specification

A Microwave integrated Circuit trainer using microstrip components and operating in the 2 - 4GHz band. To contain 18 passive components. 3 active components and all necessary connectors and leads. Complete with instruction manual providing at least 11 assignment.

MS-3000A ACTIVE MICROSTRIP TRAINER

Description

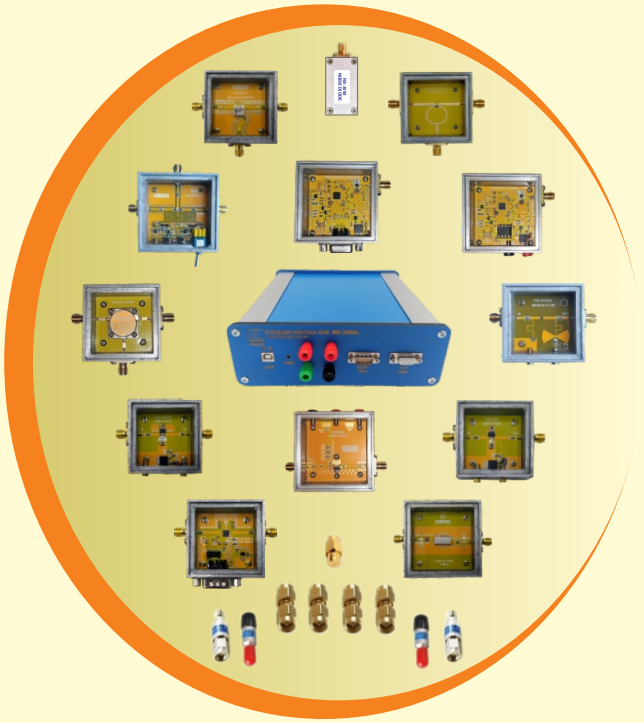
The increasing use of microwave technology, in applications ranging from satellite and terrestrial communications to high-speed computing and data transmission, has resulted in a short-fall of appropriately trained engineers and technicians.

Over the three quarters of the century, microwave circuits from bulky waveguide and coaxial components has shifted to planar structures (microstrip, stripline and more) which are low cost, and easily integrated with active circuit devices, such as diodes and transistors, to form microwave integrated circuits. The swing towards micro-strip technology must be reflected in the courses offered at engineering education institutes.

MS-3000A Enhanced Microstrip trainer comprises of Noise Source, Double Balanced Mixer, T/R switch and PIN Diode Modulator, Frequency Synthesized PLL based Microwave source, Digital Step Attenuator and set of low noise, driver and power amplifiers.

The ancillary equipment required to use this trainer is our MS-3000 microstrip trainer and spectrum analyzer (up to 4GHz). MS-3000 covers the measurement of microwave power, frequency, standing wave ratio, and impedance, as well as characterization of basic microwave components such as couplers, resonators, Wilkinson power divider, circulator, and filters.

With this advanced trainer, experiments in the measurement of P1dB, Noise Figure and OIP3 of an amplifier, phase noise of an oscillator, insertion loss, isolation and OIP3 of RF switch.



Conversion loss, Isolation and spurious response of a mixer: can be performed. The trainer provides a very low cost solution for advanced level training in the field of microwave engineering.

The manual is also well written, covering all the aspects of the experiment like theory, procedure and source of errors in the measurements.

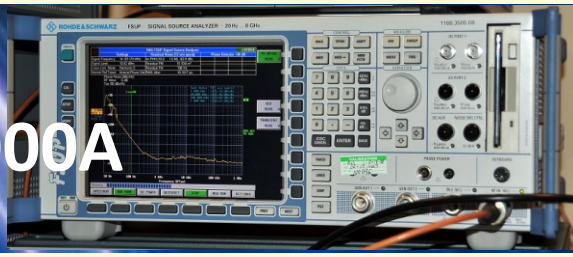
Features

- Latest Microwave Technology
- Gold Plated RF laminate with PTH
- Conveniently packed for inventory control
- GUI based computer Interface unit

Requirements

- Spectrum Analyzer upto 4GHz
- MS-3000 Trainer

Microstrip Trainer MS-3000A



List of Experiments

- Introduction to Synthesized Frequency Source,
  - Graphical User Interface,
  - Digital Step Attenuator,
  - Commuter Interface Unit
- Measurement of Noise Figure of an amplifier by using Y-Ffactor method.
- Study of Saturation and 1dB Compression Point P1dB of an amplifier.
- Measurement of 3rd order intercepts point OIP3 of an Amplifier by two-tone analysis.
- Measurements of Insertion Loss of RF BPF
- Characterization of 3-Port Circulator..
- PIN Diode Modulator investigations.
- To design Transmit / Receive switch using PIN diodes.
- Characterizations of Double balanced mixer as up-converter and down-converter
- Measurement and Characterization of the phase noise of a synthesized oscillator.
- Study of Microwave Receiver System

Accessories

- High IP3 Amplifier.
- Medium Power Amplifier.
- Low Noise Amplifier.
- Double balance Mixer.
- Synthesized Frequency Source 2000-4000MHz.
- Fix Frequency Source 2500MHz.
- T/R Switch.
- PIN Diode modulator.
- Digital Step Attenuator.
- Noise Source.
- Fix Attenuators
- 3-Port Circulator
- Computer Interface Unit
- IFSAW Filter
- Wilkinson Power Divider
- Noise Source
- GUI Software CD

Specification

Power Amplifier (GaAs HFET)
Frequency: 0.05-6GHz
Power Gain: 15dB
P1dB: 30dBm
OIP3: 43dBm
VDS=7V, IDS=200mA

Medium Power Amplifier (GaAs HBT MMIC)
Frequency: 50-3000MHz
Gain: 17dB
P1dB: 19dBm
OIP3:35dBm
VDS=4.5V, IDS=100mA

Low Noise Amplifier (GaAs E-pHEMT MMIC)
Frequency: 30-6000MHz
Gain: 15dB
NF: 1.2dB
VDS=4.5V, IDS=45mA

Frequency Mixer (Double Balanced)
LO/RF: 5-3500MHz
IF: 5-2500MHz
LO Power: +13dBm
Conversion Loss: 7dBm

Synthesized Frequency Source 2000-4000MHz
Fractional N Frequency Synthesizer up 6GHz
Software controlled GUI based
Minimum Step: 100 KHz

Fix Frequency Source
Frequency : 2500MHz
Output Power: +13dBm

PIN Diode Modulator
Frequency: 1-3000MHz
Insertion Loss: 0.2dB

Noise Source
Frequency: 10Hz to 6GHz
ENR: 30-35
Supply: 6-8V @6mA

IF SAW Filter
Centre Frequency: 70MHz
3dB Band: 5MHz
Insertion Loss: 10dB

T/R Switch
Insertion Loss: 1.2dB
Isolation: 20dB
TTL Control

Digital 6 Bit Attenuator
Frequency: DC-3000MHz
Attenuation: 0-31dB step 0.5dB
Network Loss: 4.5dB

Circulator
Frequency: 2.5-2.9GHz
Insertion Loss: 0.4dB
Isolation: 20-25dB

All the components used are Pb-free(RoHS) compliant.

WT-9000 Microwave WaveguideTrainer

Description

Microwave Trainer WT-9000 is a low cost high performance training system. It is designed to be used in two distinct ways; for teaching and demonstrating common waveguide configurations at all levels of study especially for Technical Colleges and Engineering Universities for undergraduate and graduate courses. It is also used as a design tool for those engaged in research and development of projects in communication.

This training system allows the user to investigate the principles of microwave transmission systems, such as those used in radar and communications links. It is a precision-made system, which uses waveguide components to illustrate the essential elements within this field of study. We use rectangular copper waveguide WR75. The inside of the waveguide is silver plated to make it more conductive. A standard brass flange is use to connect the components of the trainer with each other.

Features

- Stand alone, Low cost system
- 11 GHz Synthesized Frequency Source
- GUI Based Computer Interface
- Bench-top operation
- VSWR cum power meter
- WR-75 based Copper tube and Brass flange with silver plating
- Impedance and Dielectric Constant Measurements
- Gunn Diode Oscillator (Optional)
- Conveniently packed for inventory control
- More Microwave Accessories can be added on the users course requirement
- Safe low power output

Microwave Waveguide Trainer

List of Experiments

- **Introduction of a microwave waveguide bench and measurement of source frequency and wave length**
- **Measurement of Voltage and Standing Wave Ratio (VSWR)**
- **Measurement of impedance and impedance matching**
- **Horn Antenna Investigation**
- **Use of a directional coupler in power transmission and reflective measurements**
- **Series, Shunt and Hybrid T Junctions**
- **Measurement of Dielectric Constant**
- **Microwave Radio link Investigations**

Accessories

- X-Band Synthesized Source
- Waveguide Detector
- Variable Attenuator
- Fix Attenuator
- Slotted Line
- Cavity Resonator
- Stub Tuner
- Hybrid/ Magic Tee
- Series E Plane Tee
- Shunt H Plane Tee
- Matched Termination
- Waveguide Twist
- Waveguide short
- Waveguide to Coax. Adapter (2pcs)
- Pyramidal Horn Antennas (2pcs)
- Waveguide Directional Coupler
- Inductive/ Capacitive Irises
- Lens Antennas
- Antenna Azimuth Indicator
- Mounting stands
- Software CD with Manul

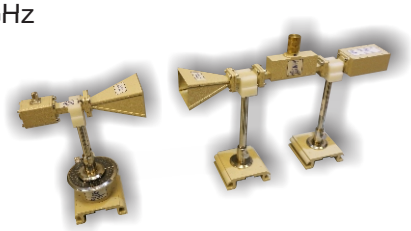
Specifications

X- Band Synthesized Source

Center Frequency: 11 GHz ± 200 MHz
Output Power: 10 mW Typical
Pulse Mode

VSWR/Power Meter

Center Frequency: 11 GHz
Band width: 10-13 GHz
USB Interface with GUI
Dynamic range: 50dB



Matched Load

S11: >25 dB
Band Width: 11-13 Ghz

Directional Coupler

Directivity: 15dB
Coupling: 20dB

Hybrid Magic Tee

S11:> 10 dB
Isolation: 20 dB
Band Width: 11-13 Ghz

Dielectric Lens Antennas

Material: PTFE
Long & Short Triangle
Half round

Phase Shifter

PIN Diode
AmplitS12: > 15 dB
Calibration: 11 GHz

Dielectric Samples

Material: PTFE & FR4
Thickness: 6mm
Interface: WR-75

Shunt H Plane Tee

S11, S22, S33:> 20 dB
S12, S13: 3.5 dB
Phase: 0º
Band Width: 11-13 GHz

Waveguide to Coax Adopter

Return Loss >20 dB
Insertion Loss: 1dB
Connector: SMA
Band Width: 11-13 GHz

Variable Attenuator

S11:> 20 dB
S12: 1-20 dB
Resolution: 1 dB
Accuracy: ± 1.5 dB

Fix Attenuator

Insertion Loss: 9 dB
Band Width: 11-13GHz
Return Loss > 20dB

Horn Antenna

Gain: 16 dB
S11: 20 dB
Beamwidth: 30º
Type: Pyramidal

Series E Plane Tee

S11, S22, S33:> 20 dB
S12, S13: 3.5 dB
Phase: 180º
Band Width: 11-13 GHz

Slotted Line

S11: > 20 dB
Insertion Loss< 0.5dB
Resolution: 0.5 mm

Inductive/Capacitive Irises

Material: Brass
Thickness: 1mm
Reactive Impedance

ST-2400 SATELLITE TRAINING SYSTEM

Description

Satellite Communication Trainer ST-2400 is a low cost high performance Satellite Communication training system. It is designed for teaching and demonstrating basic Satellite Communication techniques and concepts for Technical Colleges and Engineering Universities for undergraduate and graduate courses.

ST-2400 can be conveniently placed in the laboratory. It can be placed at an elevation position if needed. The Satellite Transponder receives signal from Uplink Transmitter and retransmit at different frequency to a Downlink Receiver. The Uplink and Downlink frequencies can carry three signals i.e. Video, Audio and Data simultaneously. Any broadband signal or Digital/Analog data or function generator waveforms can be transmitted through this Satellite link. A large number of experiments can be conducted very easily on this Trainer.

Features

- Stand alone, Affordable system
- ISM Band Operation
- Link Budget Calculations
- Safe low power output
- Variable propagation delay
- Fading Margin, Carrier to Noise Ratio
- Microphone and Speaker provided for Audio Link
- Conveniently packed for inventory control
- Helical Antennas (LHCP and RHCP) provided for polarization mismatch
- Camera and Video Interface Card provided for Video Link

SATELLITE TRAINING SYSTEM
ST-2400

List of Experiments

- Establishing a direct communication link between Uplink Transmitter and Downlink Receiver using tone signal.
- To set up an Active Satellite link and demonstrate Link Fail Operation.
- To establish an AUDIO-VIDEO satellite link between Transmitter and Receiver.
- To communicate VOICE signal through satellite link.
- To transmit and receive three separate signals (Audio, Video, Tone) simultaneously through satellite Link.
- To transmit and receive PC data through satellite link
- To study the Radiation Pattern of Helical Antenna used in Satellite Trainer
- To study the Path Loss (Effect of Distance) between Transponder and Downlink Receiver
- To Study Depolarization effect due to polarization mismatch
- To establish PC-PC Link using satellite communication Link
- Study the fading effect due to different mediums

Accessories

- Uplink Transmitter
- Downlink Receiver
- Transponder
- Helical Antenna(3 LHCP, 2 RHCP)
- Dipole Antenna
- Video Camera
- Video interface card
- Microphone
- Speaker
- Audio/Video cables
- Data cable for RS232 interface
- AC power cables
- PC Serial communication software on CD
- Cables SMA (m) to SMA (m)
- 30 dB Attenuator
- RS-232 interface with software CD

Specifications

Uplink Transmitter

Center Frequency: 2421MHz
Output Power: 10 dBm
RF.source: Syhtesized PLL

Helical Antenna

AR: 1.1
Directivity: 14.6
HPBW: 37.5º
FNBW: 83º

Downlink Receiver

Center Frequency: 2477MHz
Sensitivity:-85dBm
Path Loss: 10dB typical
RS232:

Transponder

Uplink Frequency : 4 channels in 2.4 Ghz Band ; PLL Synthesized
Downlink Frequency: 4 channels in 2.4 to 2.5 Ghz Band ;PLL Synthesized ISM Band
RF Input Z : 50 Ohms SMA
RF Output Z : 50 Ohms SMA
RF output level : 0 dBm nominal
Sensitivity : -85dBm
Spurious output : - 30 dB typical
Path Loss : 10 dB Typical
Band limiting : 16MHz fixed typical
Antennas : Helical
Power Supply : 220VAC, 50Hz
Accessories : Camera, Video to VGA converter Card, Cables BNC-BNC X2
Signal fading: Variable 25dB

Camera

Camera: Colour CCD Type
Power Supply: From Tx
Resolution: 420 Lines
Size: 1/3" CCD
Video O/P: 1Vp-p

Monitor

Screen: Colour LCD
AV input: Analog
Power Supply: Adapter
Display Mode: 16 : 9
Viewing Angle: Wide
Adjustable: Colour Brightness, Contrast,
Remote control: card style

Microphone and Speaker

Audio 1 1KHz Tone / Ext Mic
Mono Speaker

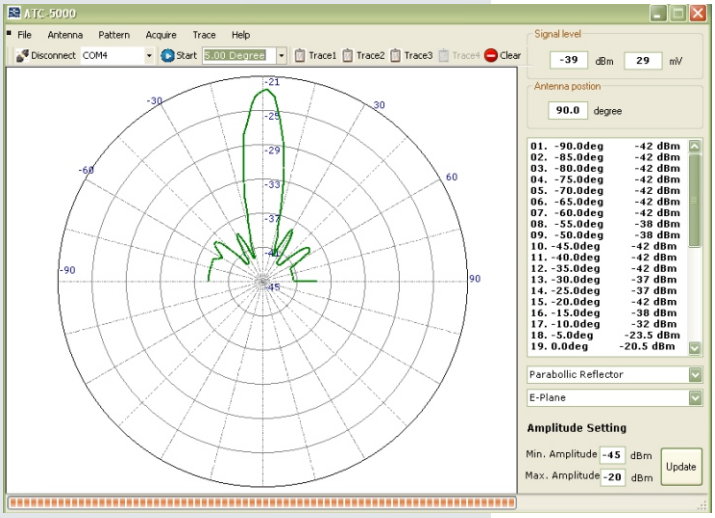
ATC-5000 ANTENNA TRAINING SYSTEM

Description

Antenna Trainer ATC-5000 is an affordable high performance antenna training system. It is designed to be used in two distinct ways; for teaching and demonstrating common antenna configurations at all levels of study especially for Technical Colleges and Engineering Universities for undergraduate and graduate courses., It is also used as a design tool for those engaged in research and development of projects in communication.

ATC-5000 is completely computerized antenna trainer that performs PC based automated rotation of receiving antennas at predefined angles and GUI-based polar plots of radiation patterns of each antenna. ATC-5000 comprises of C-Band microwave transmitter, receiver and set of eight different type of antennas.

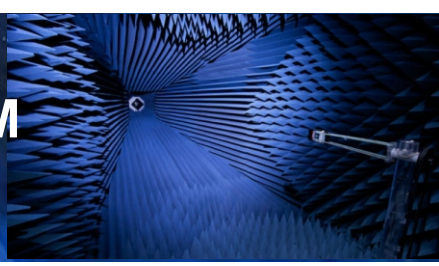
ATC-5000 software provides signal level at receiver for each rotational step, azimuthal angle, polar plot of radiation pattern and beam width of each antenna.



Features

- Stand alone, Affordable system
- 5.15GHz Synthesized Frequency Source
- No ancillary equipment required
- Bench-top operation
- Simple, robust stands for antenna mount
- Motorized azimuth antenna rotation
- GUI-based Antenna Pattern Measurement by USB interface
- Conveniently packed for inventory control
- More antennas can be added on the users course requirement
- Safe low power output

ANTENNA TRAINING SYSTEM
ATC-5000



List of Experiments

- Familiarization with Antenna Trainer
- Study of Antenna Polarization, Axial Ratio and Tilt Angle of a circularly polarized antenna.
- Study of Dipole antenna and its radiation pattern
- Study of Horn antenna and its radiation pattern
- Measurement of the Gain of Horn Antenna
- Study of Yagi antenna and its radiation pattern
- Study of Helical antenna and its radiation pattern
- Study of Microstrip Antenna and its radiation pattern
- Study of Paraboloidal Reflector Antenna and its radiation pattern
- Study of Four Element Rectangular Patch Array Antenna
- Study of Double Dipole Array Antenna
- Study of slotted line and measurement of Wavelength and Frequency
- Measurement of VSWR using Slotted line
- Measurement of Unknown Impedance

Accessories

- C-Band Transmitter
- C-Band Receiver
- Slotted Line
- Dipole Antenna
- Double Dipole Array Antenna
- Pyramidal Horn Antenna
- Yagi-Uda Antenna
- Helical Antenna
- Microstrip Antenna
- Paraboloidal Reflector Antenna
- Dipole Disk Feed
- 4 Element Microstrip Array Antenna
- Cables SMA (m) to SMA (m)
- 30 dB Attenuator
- SMA Sort and SMA-SMA Adapter
- USB interface with software CD

Specifications

C Band Transmitter

Center Frequency: 5150MHz
Output Power: +10 dBm±1dB
PLL based Synthesizes Frequency Source

C Band Receiver

Center Frequency: 5150MHz
Band width: 50MHz
Sensitivity: -30dBi
Motor rotation: 0^o to 180^o with 1.25^o , 2.5^o & 5^o step

Pyramidal Horn Antenna

Gain: 10 dBi
HP Beam width: 62^o
Polarization: Linear

Yagi-Uda Antenna

Driven elements: Four element array
Polarization: Linear

Microstrip Patch Antenna

Gain: 6dBi
Effective Angle: 125^o

Microstrip Array Antenna

Gain: 12dBi
Patch Elements: 4

Parabolic Reflector Antenna

Aperture efficiency: 50 %
Diameter: 31 cm
Directivity: 21.5dBi
Feed: Dipole disk feed

Double Dipole Array Antenna

Directivity: 7.5 dBi
Impedance: 50 Ohm
Polarization: Linear

Dipole Antenna

Directivity: 1.64
Impedance: 50 Ohm
Pattern: Omni directional
Polarization: Linear

Attenuator

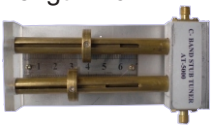
Attenuation: 30dB
Tolerance: ± 0.5dB
Peak Power: 2 watts

Helical Antenna

AR: 1.1
Directivity: 14.6
HPBW:37.5^o
FNBW:83^o

Double Stub Tuner (Optional)

Length: 7cm



CT-3000 ANALOG & DIGITAL COMMUNICATION TRAINER

Description

Communication Trainer CT-3000 is a low cost high performance communication teaching system. It is design to provide all the basic tools necessary to conduct experiments in the field of digital and analog communication engineering, it can also be used for R&D projects in communication.

Communication Trainer CT-3000 has been designed to act as basic tool for carrying out experiments in the field of communication for Technical Colleges & Engineering Universities undergraduate and graduate courses. CT-3000 has built in RF crystal oscillator, AF oscillator and regulated ±12 volts and +5 volts power supplies. In addition there is a wide variety of plug in modules available for different types of experiments to be performed.

This trainer is intended as a supplement to the textbook for communication course at junior, senior and graduate level students of electrical and electronics engineering, computer engineering and computer science. In addition, it can also be very useful for engineers from the industry who design and apply communication system in their products

CT-3000 Communication Trainer comprises of a base unit, set of 19 modules and necessary interconnecting leads to carry out about twelve experiments in the field of analog and digital communication. A comprehensive manual is also provided along with the trainer. On the request more experiment can be added in the trainer.

Features

- 10.24MHz crystal controlled RF signal source
- Low distortion 500Hz to 5KHz AF signal source
- Ext. Audio Mic and built in Speaker
- Clock with variable frequency 7Hz to 5KHz
- DC supply voltage +12V -12V 100mA and +5V at 1A
- 1 Solderless breadboard
- 6 sockets for modules
- Conveniently packed for inventory control

ANALOG & DIGITAL COMMUNICATION TRAINER
CT-3000

List of Experiments

- Familiarization with CT- 3000
- Study of the sampling theorem
- Study of two channel TDM system
- Study of Pulse Time Modulation
- Study of the FSK, PSK and ASK Modulations
- Synchronous Detection
- Study of PCM
- Study of Amplitude Modulation
- Study of Envelope Detector
- Study of Frequency Modulation
- PLL/FM Demodulator

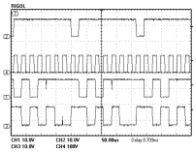
Add on Modules (Optional)

- AM-SSB modulation and demodulation
- Delta modulation
- Study of line coding and decoding techniques
- Clock and Data recovery modules
- BPSK / QPSK modulation and demodulation

Specifications

Data Generator Module

NRZ1 11010100
NRZ2 011111111
NRZ3 10101111
CLK 32KHz



4 Phase Clock Module

This module outputs pulse trains of phases 0º, 90º, 180º and 270º at J2, J3, J4 and J5 respectively when clock signal is input at terminal J1.

FM Module

This module generates frequency modulated carrier of center frequency about 88KHz at terminal J2 when AF modulating signal is applied at terminal J1.

Clock to Sine Converter Module

This module generates synchronous sine and square waves output signals with controllable amplitude and frequency 1/8th of input clock.

Sample and Hold Module

This module samples AF signal applied with sampling signal and outputs sampled signal.

Balanced Modulator

The balanced modulator multiplies two input signals. It is used in synchronous demod of PSK and AMSC signals..

Low Pass Filter Module

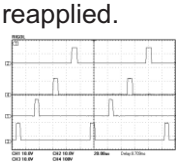
This module two 2nd order active LPF with cut off frequencies of 500Hz and 1KHz.

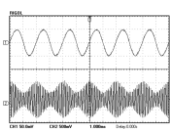
FM Carrier Synchronizer Module

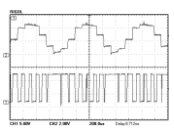
This module generates AF signal phased locked with FM carrier signal input. The simultaneous display of AF and FM signals on scope results in stable waveforms on scope.

Pulse Time Modulation Module

This module generates PWM and PPM signal when sample-and-hold AF signal and sampling signal reapplied.







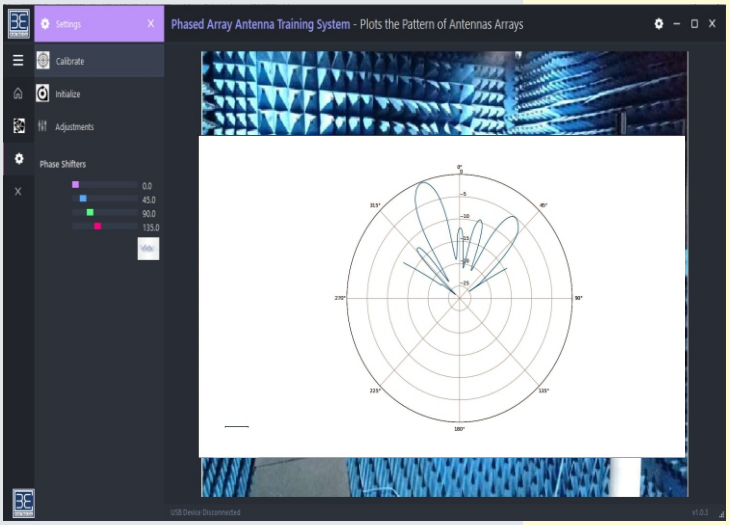
PAT-9000 Phased Array Antenna Trainer

Description

PAT-9000 is completely computerized antenna array training system that performs PC based automated rotation of receiving antennas at predefined angles and GUI-based polar plots of radiation patterns of each antenna. PAT-9000 comprises of X-Band microwave transmitter receiver and set of eight element Vivladi antennas. It is a low cost high performance antenna arrays training system that is also used as a design tool for those engaged in research and development of projects in the field of antennas.

Experiments

- Familiarization with phased array antenna trainer
- Study of phased array antenna components
- Study of Vivaldi antennas and its Radiation Pattern
- Broadside Sum pattern of linear array antenna
- Difference pattern of linear array antenna
- Broadside Sum pattern of Planar array antenna array
- Difference pattern of Planar array antenna array
- Radiation Pattern of Linear and planar Array by steering the Beam in Azimuth Plane (Clockwise) using Phase shifters
- Radiation Pattern of Linear and planar Array by steering the Beam in Azimuth Plane (Anti-Clockwise) using Phase shifters



Features

- Stand alone, Affordable system
- X-Band Frequency of operation
- GUI based PC Interface
- Safe low power output
- Digital Phase shift control
- Linear and Planner Array configuration
- Azimuth Antenna Positioner
- Antenna pattern measurement USB Interface

Specifications

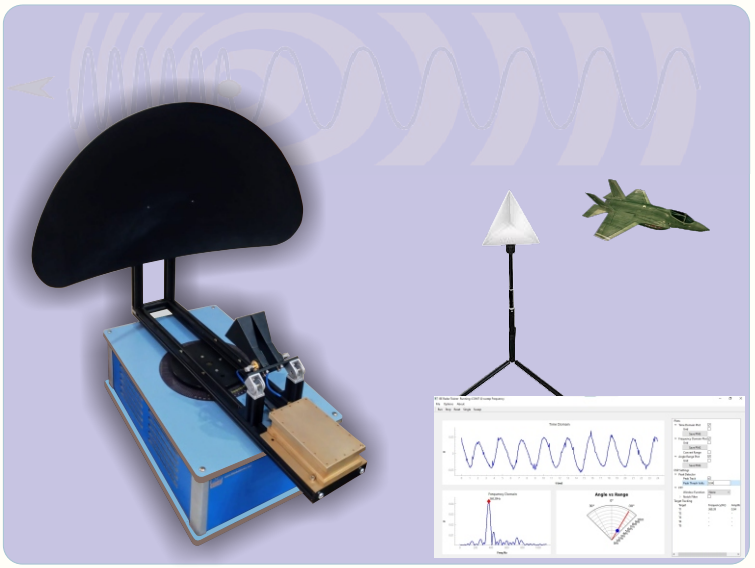
- Frequency: 10GHz ± 200MHz synthesized
- Output Power: 12dBm ± 2dB
- Tx Antenna: Vivalidi Antenna Linear/Planar Array
- No. of Elements: 8
- Rx Antenna: Pyramidal Horn Antenna
- 4 Bit Digital phase shifter 22.5° to 360°

RT-11G Radar Training System

Description

Radar training system is a use full training tool that operates safely inside a classroom or lab. RT-11G is a low cost high performance radar training system. It is designed for teaching and demonstrating basic radio and navigational Communication techniques and concepts for Technical Colleges and Engineering Universities for undergraduate and graduate courses.

The system uses customized technology to provide students with real -not simulated- hands on experience in the use of radar to detect and track passive targets at very short range in the presence of noise and clutter. The very low transmitter power allows for safe operation in a variety of training environments.



Experiments

- Study the CW/SFS working principal of Radar
- Study of time and frequency measurements with the help of moving Pendulum
- Study of Radar range equation with respect to range and RCS
- Calibration of Radar range error with fix target
- Find out the accuracy of radar by using fix target
- Study of the effect of different types of materials on Radar reception
- Determine the RPM of moving target
- Study the object counting with help of Radar
- Range calculation of fix targets, sphere and corner reflector
- Study of RCS vs Range
- Study of two targets angel and range

Features

- Stand alone, Affordable system
- X-Band frequency of operation
- GUI based PC Interface
- Safe low power output
- Time domain and frequency domain analysis
- Fix and Synthesized frequency sweep mode
- Azimuth Antenna Positioner
- Dual Trace Real time cursor measurement

Specifications

- Frequency: 10.6GHz ± 100MHz syntheized
- Output Power: 10-20 mW
- Antenna: Reflector with Tx/Rx Pyramidal Horns
- Antenna Gain: 18dB
- Sensitivity: -60dB
- Display: Real time / storage mode with FFT analysis

TRANSDUCERS AND INSTRUMENTATION TRAINERS

Temperature Transducer Trainer — TT-1000

- Introduction to Transducers and instrumentation
- Characterizations of IC Temperature Sensor
- Characterizations of NTC Thermistor
- Characterizations of PTC Thermistor
- Characterizations of K-Type Thermocouple
- Wheatstone Bridge Measurement
- Temperature controlled alarm system

Strain-Gauge Transducer Trainer — ST-1000

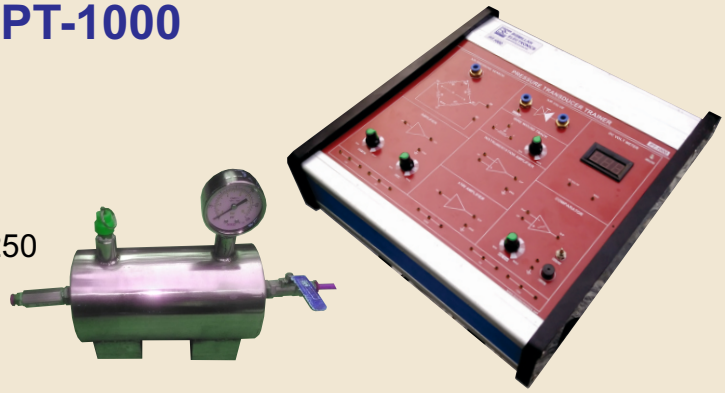
- Introduction to Transducers and instrumentation
- Characterizations of Stain-Gauge Transducer
- Study of Strain Measurement using Strain-Gauge
- Construction of weight pan using Strain-Gauge
- Determining Sensitivity of Transducer
- Wheatstone Bridge Measurement
- Determination of Linear Range of operation of Strain Measurement

Optical Transducer Trainer — OT-1000

- Introduction to Transducers and instrumentation
- Characterizations of IC Photovoltaic Cell
- Characterizations of PIN Photo diode
- Characterizations Light Dependant Resistor (LDR)
- Characterizations of Phototransitor
- Wheatstone Bridge Measurement
- Characteristics Light Controller ON/OFF system

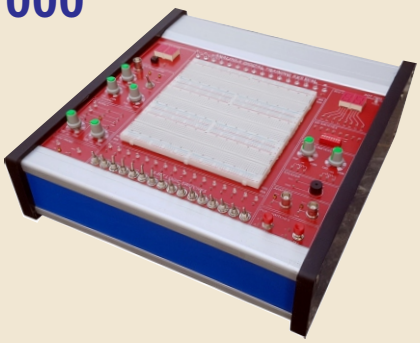
Pressure Transducer Trainer — PT-1000

- Introduction to Transducers and instrumentation
- Characterizations Pressure Sensor
- Determining Sensitivity of Sensor
- Determining the cut off of Pressure Transducer
- Working of Differential Pressure Transducer MPX4250
- Wheatstone Bridge Measurement
- Pressure Vessel 50psi



ANALOG AND DIGITAL ELECTRONICS TRAINERS

Analog and Digital Electronics Trainer — ADT-7000



- Basic Electronics Training Courses
- Advanced Electronics Circuit Design
- Analog Circuit Experiments
- Digital Circuit Experiments
- Boolean Algebra
- Basic Logic Gates
- Circuit Trouble Shooting
- Built in power supply and Function Generator

Data Acquisition Trainer — DAT-7000

- Processor: 8-Bit RISC based
- Digital I/O: 16 Channel
- Analog I/O: 8-Channel Multiplexed
- A/D Converter: 10-Bit
- D/A Converter: 8-Bit Serial SPI
- Display: 2X 7-Segment with BCD-7-Segment
- Decoder/ Driver
- Switches: 2X 8-Bit DIP Switches

Maxwell`s Bridge Trainer — MB-7000

- Four arms are provided with suitable connectors.
- One 1 KHz oscillator of fixed amplitude to feed the input to the bridge.
- On-Board Signal Circuitry
- Built in Power Supply
- Functional Block indicated on board interface,
- Null Detector with Audio Source and Speaker and DVM
- Find the unknown inductance value with set of unknown given inductances
- Measurement Range 1mH - 10mH

Wein Bridge Trainer — WB-7000

- Four arms are provided with suitable connectors
- On-Board Signal Circuitry
- Built in Power Supply
- Functional Block indicated on board interface,
- Null Detector with Audio Source and Speaker and DVM
- Find the unknown Source frequency with variable Audio Source
- Measurement Range 1 KHz – 10 KHz.

PET-400 POWER ELECTRONICS TRAINERS

- PET-400-A Single Phase Half Wave /Full Wave Rectification Circuit
- PET-400-B Three Phase Half Wave/Full Wave Rectification Circuit
- PET-400-C Single-Phase Half /Full Wave Phase Control Circuit
- PET-400-D Three Phase Half Wave / Full Wave Phase Control Circuit
- PET-400-E Sensible Circuit by IGBT (BUCK STEP-DOWN CONVERTER)
- PET-400-F Circuit by IGBT (BUCK STEP-UP CONVERTER)
- PET-400-G PWM Inverter Circuit by IGBT
- PET-400-H Square Wave Voltage Type Inverter Circuit by SCR
- PET-400-I Single –Single Cyclotron Converter Circuit by SCR
- PET-400-J Single-Phase AC Power Control Circuit by SCR

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