EXPERIMENTS IN MODERN COMMUNICATIONS

Emona Telecoms-Trainer ETT-101

Multi-Experiment Single Board Telecommunications Trainer for Technical College and Technical High School Students

biskit™

EMONA INSTRUMENTS
www.ett101.com

COMPACT AND FLEXIBLE, A BREAKTHROUGH IN MODERN TELECOMMUNICATIONS EXPERIMENTING

Emona Telecoms-Trainer 101, known as "biskit"

A Single Board Trainer that Makes Teaching Telecommunications Much Easier for Teachers

- Unrivalled with a wide range of over 29 modern communications topics in one compact trainer
- Educationally well proven over many years as an excellent "hands-on" experiment system
- Dynamic visual experiment method to help younger students see the relationship between math and the real world

LEARNING-BY-DOING

Using the ETT-101, students learn fundamental concepts by actually building telecommunications experiments at the block diagram level. Theory comes to life as they build the modulation and coding schemes in carefully guided steps. No complex math required.

With the ETT-101 students learn by trying "what-if" scenarios (and are free to make mistakes) to **investigate** the telecommunications theory they learn in class. With the ETT-101, your students will learn more, and remember more.

LEARNING WITH BLOCK DIAGRAMS

By following telecommunications block-diagrams, students can patch the functional building blocks to implement a wide variety of basic modulators, encoders and other important sub-systems associated with telecommunications theory, using only one piece of lab hardware: the ETT-101.

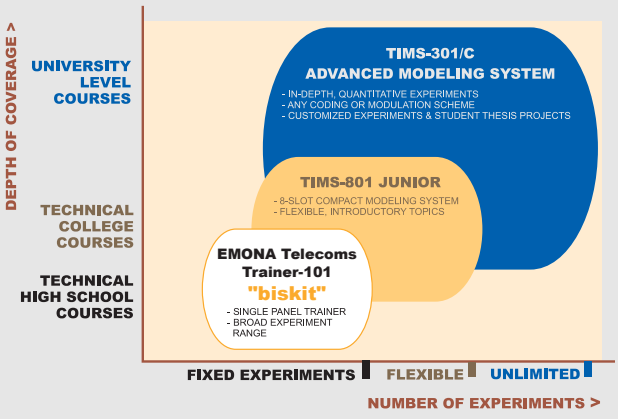
"Students patch together simple building blocks to make real communications systems"

COMPACT and EASY FOR TEACHERS

Completely self contained within a single, low-profile case, the ETT-101 requires only a standard 12V DC plug-pack. Waveforms can be displayed on whatever equipment is available to the student, such as: a low cost lab oscilloscope, or a PC-based scope, or a standard PC Sound Card with the optional Sound Card Interface box and software.

The ETT-101 accessories kit includes: 20 x stackable patch cords, User Manual, Experiments in Modern Analog and Digital Telecommunications Volume-1 and a 12V plug pack.

biskit™ - BUILDING STUDENT KNOWLEDGE IN TECHNOLOGY



EMONA Telecoms Teaching Range

The Emona Telecom's-Trainer 101, ETT-101, is one of a number of Emona's specialist telecoms laboratory teaching tools.

The EET-101 is designed for technical college and high school labs where telecoms is first introduced.

The ETT-101 is a low cost unit to cater to large student numbers who need to gain a "hands-on" appreciation of telecoms theory at a simple, introductory level.

Also displayed in the diagram are Emona's the other trainers and modeling systems.

"The ETT-101 will build the student's confidence and appreciation for math & theory"

WHAT TOPICS CAN THE ETT-101 TEACH?

TELECOMMUNICATIONS TOPICS

- Basic Analog Communications

  AM, FM, DSB, SSB, PM, PAM, TDM, PWM, Superheterodyne, Speech in Comms, PLL, QAM, SNR Concepts and more

- Digital Communications

  PCM, PCM-TDM, ASK, BPSK, FSK, GFSK, Eye Patterns, DPSK, QPSK, Spread Spectrum, Line Coding, Noise Generation, SNR Concepts and more

BASIC ACADEMIC CORE SKILLS

- Thinking Skills

  Problem solving activities, evaluating evidence, interpreting instructions, analysing evidence and drawing conclusions.

- Science Skills

  Measurement, experimental procedure, system building, electricity and waveforms.

- Math Skills

  Mathematical operators, equations, trigonometric functions, continuous and sampled functions, charts and graphs, positive and negative values.

LABORATORY MANUAL

The ETT-101 Laboratory Manual (Vol.1) provides a turn-key solution for the teacher and student alike.

The lab manual is specially written to guide younger students through hands-on experiments and help them grasp the fundamental concepts of telecommunications.

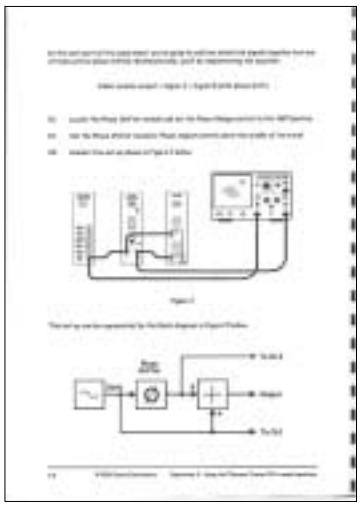
Each chapter includes background information which relates the experiment content to real-world applications.

Since telecommunications text books represent the math and concepts of telecommunications theory as "block diagrams", the "101" Lab Manual makes extensive use of block diagrams throughout.

Associated with each block diagram are detailed, step-by-step patching diagrams. Each chapter is carefully paced and constant use is made of questions to verify the student's understanding and provide feedback to the teacher.

LAB MANUAL TOPICS - VOLUME 1 (320 pages)

- Setting-up an Oscilloscope
- An Introduction to the ETT-101
- Modelling Equations
- Amplitude Modulation AM
- Double Sideband DSB Mod
- AM Demodulation
- DSB Demodulation
- SSB Modulation & Demod
- FM Modulation
- FM Demodulation
- Sampling & Reconstruction
- PCM Encoding
- PCM Decoding
- BW Limiting & Restoring Digital Signals
- ASK Mod & Demodulation
- FSK Mod & Demodulation
- BPSK Mod & Demodulation
- QPSK Mod & Demodulation
- Introduction to Spread Spectrum - DSSS modulation



Emona Telecoms-Trainer 101 Experiment Capabilities:

Analog Basics

1. Amplitude Modulation (AM)
-modulation: 2 methods
-envelope detection
-product detection (coherent)
-AM in a noisy channel

2. Double Side Band (DSB)
-suppressed carrier
-product detection (coherent)
-DSB in a noisy channel

3. Single Sideband (SSB)
-generation only (upper & lower)

4. Phase Modulation (PM)
-Armstrong's Phase modulator

5. Phase Division Modulation (PDM)
-phase division demodulation

6. Frequency Modulation (FM)
-generation by VCO (wideband)
-demodulation by PLL
-demodulation by zero crossing method

7.Pulse Amplitude Modulation(PAM)
-sampling theorem / Nyquist
-aliasing
-reconstruction
-time division multiplexing (TDM)

8. Pulse Width Modulation (PWM)

9. Speech and Audio messages
-message inversion
-message translation

10. Superheterodyne principles

Intro to Advanced Analog

11. Carrier Acquisition using PLL

12. Signal to Noise Ratio (SNR) - Intro to concept: requires optional PC-Based instrument

13. Quadrature Amplitude Modulation (QAM)
-modulation
-demodulation

Digital Basics

14. Pulse Code Modulation (PCM)
-encoding
-decoding & reconstruction
-sampling rate
-aliasing, undersampling and oversampling
-synchronization

15. Time Division Multiplexing (PCM-TDM)

16. Amplitude Shift Keying (ASK)
-modulation
-envelope recovery
-synchronous recovery

17. Binary Phase Shift Keying (BPSK)
-modulation
-demodulation

18. Frequency Shift Keying (FSK)
-modulation
-envelope recovery

19. Introduction to GFSK

20. Pulse shaping

21. Data recovery
-noisy channel (SNR) - requires optional PC-Based instrument

22. Intersymbol Interference (ISI)
-eye patterns/diagrams

Intro to Advanced Digital

23. Differential Phase Shift Keying (DPSK)
-modulation
-demodulation

24. Quadrature Phase Shift Keying (QPSK)
-modulation
-demodulation

25. Spread Spectrum (SS)
-introduction to direct sequence spread spectrum (DSSS)

26. Line coding
-NRZ-L
-Alternate Mark Inversion (AMI)
-Manchester (Bi-phase)
-Differential encoding (NRZ-M)

27. Frequency Synthesis
-with PLL

28. PN sequence spectrum display - requires optional PC-Based instrument option

29. Noise generation

Optional expansion blocks

- Student project breadboard
- Additional VCO, TPG functions
- Tuned circuits
- Constellation generation

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