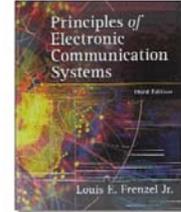


Electronics Instruction Programs

Educational Training Equipment for the 21st Century

Bulletin 286-109C

H-CAI-ECS Electronic Communication Systems



*All the necessary
components &
breadboarding apparatus
required to complete ►*

Frenzel's Principles of Electronic Communication Systems

Purpose

The Hampden **H-CAI-ECS** Electronic Communication Systems provides an introductory course in Electronic Communications including: text, courseware, and laboratory experiments at the technology level.

The student will need a good background in algebra and trigonometry fundamentals as well as courses in AC principles and circuits.

Description

The program consists of the following:

- Principles of Electronic Communications Systems - Louis Frenzel, Jr.
- Experiment Manual for Principles of Electronic Communications Systems - Louis Frenzel, Jr.
- Hampden H-CAI-ECS hardware for Electronic Communication systems

Chapter 1 - Introduction To Electronic Communications

- The Significance of Human Communications
- Communications Systems
- Types of Electronic Communications
- Modulation and Multiplexing
- The Electromagnetic Spectrum
- Bandwidth
- A Survey of Communications Applications
- Careers in the Communications Industry

Chapter 2 - Fundamentals of Electronics: A Review

- Gain, Attenuation, and Decibels
- Tuned Circuits
- Filters
- Fourier Theory

Chapter 3 - Amplitude Modulation Fundamentals

- AM Concepts
- Modulation Index and Percentage of Modulation
- Sidebands and the Frequency Domain
- AM Power
- Single-Sideband Modulation
- Classification of Radio Emissions



Chapter 4 - Amplitude Modulator and Demodulator Circuits

- Basic Principles of Amplitude Modulation
- Amplitude Modulators
- Amplitude Demodulators
- Balanced Modulators
- SSB Circuits

Chapter 5 - Fundamentals of Frequency Modulation

- Basic Principles of Frequency Modulation
- Principles of Phase Modulation
- Modulation Index and Sidebands
- Noise-Suppression Effects of FM
- Frequency Modulation versus Amplitude Modulation

Chapter 6 - FM Circuits

- Frequency Modulators
- Phase Modulators
- Frequency Demodulators

All Hampden units are available for operation at any voltage or frequency



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Chapter 7 - Digital Communication Techniques

- Digital Transmission of Data
- Parallel and Serial Transmission
- Data Conversion
- Pulse Modulation
- Digital Signal Processing

Chapter 8 - Radio Transmitters

- Transmitter Fundamentals
- Carrier Generators
- Power Amplifiers
- Impedance-Matching Networks
- Typical Transmitter Circuits

Chapter 9 - Communications Receivers

- Basic Principles of Signal Reproduction
- Superheterodyne Receivers
- Frequency Conversion
- Intermediate Frequency and Images
- Noise
- Typical Receiver Circuits
- Receivers and Transceivers

Chapter 10 - Multiplexing and Demultiplexing

- Multiplexing Principles
- Frequency-Division Multiplexing
- Time-Division Multiplexing
- Pulse-Code Modulation
- Receivers and Transceivers

Chapter 11 - The Transmission of Binary Data in Communication Systems

- Digital Codes
- Principles of Digital Transmission
- Transmission Efficiency
- Modems Concepts and Methods
- Wideband Modulation
- Broadband Modem Techniques
- Error Detection and Correction
- Protocols

Chapter 12 - Introduction to Networking and Local-Area Networks

- Network Fundamentals
- LAN Hardware
- Ethernet LANs
- Token-Ring LAN

Chapter 13 - Transmission Lines

- Transmission Line Basics
- Standing Waves
- Transmission Lines as Circuit Elements
- The Smith Chart

Chapter 14 - Antennas and Wave Propagation

- Antenna Fundamentals
- Common Antenna Types
- Radio Wave Propagation

Chapter 15 - Internet Technologies

- Internet Applications
- Internet Transmission Systems
- Storage-Area Networks
- Internet Security

Chapter 16 - Microwave Communication

- Microwave Concepts
- Microwave Lines and Devices
- Waveguides and Cavity Resonators
- Microwave Semiconductor Diodes
- Microwave Tubes
- Microwave Antennas
- Microwave Applications

Chapter 17 - Satellite Communications

- Satellite Orbits
- Satellite Communications Systems
- Satellite Subsystems
- Ground Stations
- Satellite Applications
- Global Positioning System

Chapter 18 - Telecommunications Systems

- Telephones
- Telephone System
- Facsimile
- Paging Systems
- Internet Telephony

Chapter 19 - Optical Communications

- Optical Principles
- Optical Communications Systems
- Fiber-Optic Cables
- Optical Transmitters and Receivers
- Wavelength-Division Multiplexing
- Passive Optical Networks

Chapter 20 - Cell Phone Technologies

- Cellular Telephone Systems
- Advanced Mobile Phone Systems (AMPS)
- Digital Cell Phone System

Chapter 21 - Wireless Technologies

- Wireless LAN
- PANs and Bluetooth
- ZigBee and Mesh Wireless Networks
- WiMAX and Wireless Metropolitan-Area Networks
- Infrared Wireless
- Radio-Frequency Identification and Near-Field communications
- Ultrawideband Wireless

Chapter 22 - Communications Tests and Measurements

- Communication Test Equipment
- Common Communication Tests
- Troubleshooting Techniques
- Electromagnetical Interface Testing

Experiments

Sixty-eight experiments are covered, 32 are simulated and 36 are hands-on.

Test Equipment Requirements (Purchased Separately)

- Hampden B&K 1760A Tri-Output Power supply with cord set.
- Hampden HBT-460D Digital Multimeter with probe.
- Hampden B&K 2120B Dual Trace Oscilloscope with probes.
- Hampden B&K 4011A Function Generator
- Hampden B&K 4040A Sweep Function Generator
- Hampden B&K 2005B RF Signal Generator
- Hampden B&K 1803D Frequency counter (optional)

Test equipment, not supplied, obtained locally

- FM Radio Receiver
- AM Radio Receiver
- Short Wave Receiver, 10 or 40 meter band
- PC computer with Windows® XP OS/Vista/7 or later (32 bit)

All Hampden units are available for operation at any voltage or frequency

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