

Analog Communication Trainer

ETEK ACS-3000

Curriculum Objectives

- To understand the basic theory of analog communication system
- Design and implementation ability training of analog modulator and demodulator
- To understand the applications of analog modulator and demodulator

Curriculum Outline

- Design and implementation of second order active filters and RF oscillators
- Design and implementation of AM and FM modulators and demodulators
- Design and implementation of DSB-SC and SSB modulators and demodulators
- Design and implementation of TDM and FDM multiplexers and demultiplexers
- Design and implementation of frequency converter and signal recovery circuits



Best communication and electronics tools



Specifications of Analog Communication Trainer (ETEK ACS-3000)

Module One: ETEK ACS-3000-01

Chapter 1: Second Order Active Filters

Experiment 1: Second Order Active Low-pass Filter (Low-pass -3 Db Frequency: 1 kHz~3 kHz.)

Experiment 2: Second Order Active High-pass Filter (High-pass -3 dB Frequency: 5 kHz~10 kHz.)

Experiment 3: Second Order Active Band-pass Filter (Center Frequency: 10 kHz~100 kHz,
Bandwidth: 6 kHz ~ 60 kHz.)

Experiment 4: Second Order Active Band-stop Filter (Cutoff Frequency: 10 kHz~100 kHz,
Bandwidth:6 kHz ~ 60 kHz.)

Chapter 2: RF Oscillators

Experiment 1: Culprits Oscillator (Oscillation Frequency: 1 MHz~9 MHz)

Experiment 2: Hartley Oscillator (Oscillation Frequency: 500 kHz~1.8 MHz)

Experiment 3: Crystal Oscillator (Oscillation Frequency: 500 kHz~1.8 MHz)

Experiment 4: Voltage Controlled Oscillator
(Oscillation Frequency: 3.5 MHz~4 MHz)

Module Two: ETEK ACS-3000-02

Chapter 3: AM Modulator

Experiment 1: Transistor AM Modulator (Carrier Signal: 1.5 kHz~2 kHz,
Audio Signal: 500 Hz~1 kHz.)

Experiment 2: MC1496 AM Modulator (Carrier Signal: 500 kHz~1 MHz,
Audio Signal: 500 Hz~1 kHz.)

Chapter 4: AM Demodulator

Experiment 1: AM Diode Detector
(Carrier Signal: 300 kHz, Audio Signal: 500 Hz~2 kHz.)

Experiment 2: AM Product Detector (Carrier Signal: 500 kHz~1 MHz,
Audio Signal: 500 Hz~1 kHz.)

Module Three: ETEK ACS-3000-03

Chapter 5: DSB-SC and SSB Modulator

Experiment 1: DSB-SC Modulator
(Carrier Signal: 100 kHz~500 kHz, Audio Signal: 500 Hz~1 kHz.)

Experiment 2: SSB Modulator
(Carrier Signal: 200 kHz, Audio Signal: 500 Hz~1 kHz.)

Chapter 6: DSB-SC and SSB Demodulator

Experiment 1: DSB-SC Product Detector
(Carrier Signal: 100 kHz~500 kHz, Audio Signal: 500 Hz~1 kHz.)

Experiment 2: SSB Product Detector (Carrier Signal: 200 kHz, Audio Signal: 500 Hz~1 kHz.)

Module Four: ETEK ACS-3000-04

Chapter 7: FM Modulator

Experiment 1: MC4046 FM Modulator (Carrier Signal: 20 kHz, Audio Signal: 1 kHz.)

Experiment 2: SN74124 FM Modulator (Carrier Signal: 20 kHz, Audio Signal: 1 kHz~ 1.5 kHz.)

Chapter 8: FM Demodulator

Experiment 1: LM565 FM Demodulator (Carrier Signal: 20 kHz, Audio Signal: 1 kHz~1.5 kHz.)

Experiment 2: MC4046 FM Demodulator (Carrier Signal: 20 kHz, Audio Signal: 1 kHz.)

Specifications of Analog Communication Trainer (ETEK ACS-3000)

Module Five: ETEK ACS-3000-05

Chapter 9: TDM Multiplexer

Experiment 1: Waveform Generator (Sine Wave Signal Generator: 13 kHz, Triangle Wave Signal Generator: 2.3 kHz, Square Wave Signal Generator: 2.3 kHz.)

Experiment 2: TDM Multiplexer

(Transmission Channels: 3 Channels, Switching Time: 500 ms~50 ms)

Chapter 10: TDM Demultiplexer

Experiment 1: TDM Demultiplexer

(Transmission Channels: 3 Channels, Switching Time: 500 ms~50 ms)

Module Six: ETEK ACS-3000-06

Chapter 11: FDM Multiplexer

Experiment 1: FDM Signal Generator

(Carrier Signal: 500 kHz~1.5 MHz, Audio Signal: 500 Hz ~1.5 kHz.)

Experiment 2: DSB-SC Modulated Signal Generator

(Carrier Signal: 500 kHz ~ 1.5 MHz, Audio Signal: 500 Hz~1.5 kHz.)

Experiment 3: FDM Multiplexer

(Modulation Type: DSB-SC Signal, Transmission Bandwidth: 2 MHz)

Chapter 12: FDM Demodulator

Experiment 1: FDM Demultiplexer

(Modulation Type: DSB-SC Signal, Demultiplexing Type: Product Demultiplexer)

Module Seven: ETEK ACS-3000-07

Chapter 13: Analog-to-digital Converter

Experiment 1: ADC0804 Analog-to-digital Converter

(Resolution: 8 bits, Analog Input Voltage: 0 V~5 V.)

Experiment 2: ADC0809 Analog-to-digital Converter

(Resolution: 8 bits, Analog Input Voltage: 0 V~5 V, Clock Frequency: 120 kHz.)

Chapter 14: Digital-to-analog Converter

Experiment 1: R-2R Digital-to-analog Converter

(Digital Input: 4 bits, Analog Output: 0 V~5 V.)

Experiment 2: Unipolar DAC 0800 Digital-to-analog Converter (Digital Input: 8 bits,

Analog Output: 0 V~5 V, Step Value: 0.019 V.)

Experiment 3: Bipolar DAC 0800 Digital-to-analog Converter (Digital Input: 8 bits,

Analog Output: -5 V~5 V, Step Value: 0.038 V.)

Module Eight: ETEK ACS-3000-08

Chapter 15: Frequency Converter

Experiment 1: Frequency Multiplier (Carrier Signal: 10 kHz.)

Experiment 2: Up/Down Frequency Converter (Carrier Signal @ LO port: 100 kHz;

Carrier Signal @ RF port: 120 kHz)

Chapter 16: Signal Recovery

Experiment 1: Carrier Signal Recovery Circuit (Carrier Signal: 10 kHz)

Experiment 2: Clock Recovery Circuit

(Clock Signal: TTL, Encoded Signal: Manchester, Clock Frequency: 5 kHz~10 kHz)