

## CTD800

Design and implementation of CVSD encoder and decoder

Design and implementation of QPSK and QAM modulator and demodulator

Design and implementation of DSSS, BCH and Convolutional codes encoder and decoder

Design and implementation of GMSK modulator and demodulator

### Curriculum Objectives:

To understand the basic theory of high level digital communication.

Design and implementation ability training of digital modulator and demodulator.

Ability to research and develop the digital modulator and demodulator.

Become familiar with the application of high efficiency communication modulator circuit.



<b>A. Module CVSD :</b>	
<b>1: Modulator CVSD</b> Sampling Frequency: 32 kHz - 50 kHz; Sampling Frequency Mode: TTL Level; Audio Signal: 500 Hz - 1 kHz; Modulator Output Mode: TTL Level.	<b>2: Demodulator CVSD</b> Sampling Frequency: 32 kHz - 50 kHz; Sampling Frequency Mode: TTL Level; Audio Signal: 500 kHz - 1 kHz .
<b>B. Module QPSK:</b>	
<b>3: Modulator QPSK</b> CLK: 600 Hz - 1 kHz; CLK Mode: TTL Level; Data Rate: 300 Hz – 500 Hz; Data Mod: TTL Level; Carrier Frequency: 20 kHz.	<b>4: Demodulator QPSK</b> CLK: 600 Hz - 1 kHz; CLK Mode: TTL Level; Data Rate: 300 Hz – 500 Hz; Data Mod: TTL Level; Carrier Frequency: 20 kHz.
<b>C. Module QAM:</b>	
<b>5: Modulator QAM</b> CLK: 20 Hz ~ 200 Hz; CLK Mode: TTL Level; Data Rate: 10 Hz ~ 100 Hz; Data Mode: TTL Level; Carrier Frequency: 20 kHz; Data Generated Mode: Pseudo Random	<b>6: Demodulator QAM</b> CLK: 20 Hz ~ 200 Hz; CLK Mode: TTL Level; Data Rate: 10 Hz ~ 100 Hz; Data Mode: TTL Level; Carrier Frequency: 20 kHz; Data Generated Mode: Pseudo Random Generator.
<b>D. Module DSSS :</b>	
<b>7: DSSS Encoder</b> <b>Basic Spread Spectrum Encoder</b> Original Data Length: 4 bits; Data Input Mode: Dip Switch; Data Length of Spread Spectrum Code: 2 bits; Spread Spectrum Code Input Mode: Dip Switch; Data Length after encoded: 8 bits. <b>64 bits Spread Spectrum Encoder</b> Original Data Length: 8 bits; Data Input Mode: LED Display; Data Length of Spread Spectrum Code: 8 bits; Spread Spectrum Code Input Mode: Dip Switch; Data Length after encoded: 64 bits.	<b>8: DSSS Decoder</b> <b>64 bits Spread Spectrum Decoder</b> Data Length before Decoded: 64 bits; Data Length before Encoded: 8 bits; Original Data Display Mode: LED Display; Data Length of Spread Spectrum Code: 8 bits; Spread Spectrum Code Input Mode: Dip Switch.



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**E. Module BCH:**

**9: BCH Encoder**

**4 bits BCH Encoder**

Original Data Length: 4bits;  
 Data Length after Encoded: 7 bits;  
 Error Detection: 1 bit.

**8 bits BCH Encoder**

Original Data Length: 8bits;  
 Data Length after Encoded: 12 bits;  
 Error control: 1 bit;  
 Error Detection: 1 bit.

**10: BCH Codes Decoder**

**4 bits BCH Decoder**

Data Length after Encoded: 7 bits;  
 Original Data Length: 4 bits;  
 Error Detection: 1 bit.

**8 bits BCH Decoder**

Data Length after Encoded: 12 bits;  
 Original Data Length: 8 bits;  
 Error Control: 1 bit;  
 Error Detection: 1 bit.

**F. Module Convolutional Codes:**

**11: Convolutional Codes Encoder**

**(2, 1, 2) Convolution Codes Encoder**

Code Rate: 1/2; CLK: 1 Hz ~ 10 Hz;  
 Data Input Mode: Series Input;  
 Data Length after Encoded: 2 bits;  
 Error Detection: 1 bit.

**(2, 1, 3) Convolution Codes Encoder**

Code Rate: 1/2; CLK : 1 Hz ~ 10 Hz;  
 Data Input Mode: Series Input;  
 Data Length after Encoded: 2 bits;  
 Error Detection: 1 bit.

**12: Convolutional Codes Decoder Viterbi Decoder**

CLK: 1 Hz ~ 10 Hz;  
 Data Input Mode: Series Input;  
 Data Length after Encoded: 2 bits;  
 Error Detection: 1 bit.

**G. Module FSK:**

**13: Modulator GMSK**

CLK: 600 Hz ~ 2 kHz;  
 CLK Mode: TTL Level;  
 Data Rate: 300 Hz ~ 1 kHz;  
 Data Mode: TTL Level;  
 Carrier Frequency: 20 kHz;  
 Modulation Index: 0.5.

**14: Demodulator GMSK**

CLK: 600 Hz ~ 2 kHz;  
 CLK Mode: TTL Level;  
 Data Rate: 300 Hz ~ 1 kHz;  
 Data Mode: TTL Level;  
 Carrier Frequency: 20 kHz;  
 Modulation Index: 0.5

