The Digital Modulation Generation and Reconstruction Trainer is a versatile teaching and research platform designed for comprehensive study of analog and digital communication techniques. It integrates signal generation, transmission, and reception modules, enabling hands-on learning of modulation, sampling, encoding, multiplexing, synchronization, and error control. The modular design, along with built-in signal sources and error analysis features, makes it an essential tool for universities, technical institutes, and R&D laboratories focusing on modern communication systems.

Application / Test Facility

Enables practical demonstration and testing of:

- Sampling and modulation methods
- Digital encoding and synchronization techniques
- Error detection, correction, and control
- Time Division Multiplexing (TDM)
- Fault analysis in communication links

Product Features

Clock and Signal Generation

- **Sine Wave Generation**
  - Fixed Frequencies: 250 Hz, 500 Hz, 1 kHz, 2 kHz
  - Variable Frequency: 1 Hz – 30 Hz (0 ~ 2 Vpp)
- **Sampling Clock**
  - Frequencies: 2 kHz, 4 kHz, 8 kHz, 16 kHz, 32 kHz, 64 kHz, 128 kHz
  - Duty Cycle: Adjustable 10 – 90% (in 10% steps)

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  - DC Signal Output: 0 ~ 5 V
- **Transmitter Clock Parameters**
  - Clock Frequency: 240 kHz (fast mode)
  - Frame Frequency: 8 kHz
- **Carrier Signals**
  - Sine Waves: 500 kHz (0°), 1 MHz (0°), 1 MHz (180°)
- **Data Patterns**
  - 8-bit variable NRZ-L pattern
  - 14-bit PRBS generator

Transmitter Section

- Analog signal sampling & hold
- Natural and flat-top sampling methods
- Pulse Code Modulation (PCM)
- 4-channel analog TDM
- Parity and Hamming code generator
- ASK, FSK, PSK modulation schemes
- Audio preamplifier with microphone interface
- Delta, adaptive delta, sigma-delta, and CVSD modulation
- Signal compression techniques
- Data encoding formats: NRZ (L, M, S), Bi-phase (Manchester, Mark, Space), URZ, AMI, unipolar ↔ bipolar conversion
- PAM, PPM, PWM modulation

Receiver Section

- Low-pass Butterworth filters: 2nd order & 4th order
- 4-channel TDM de-multiplexing
- PLL-based clock recovery
- Parity and Hamming code recovery
- Pulse code demodulation
- Single-bit error detection and correction
- Data decoding formats: NRZ (L, M, S), Bi-phase (Manchester, Mark, Space), URZ, AMI
- ASK, FSK, PSK demodulation
- Delta, adaptive delta, sigma-delta, and CVSD demodulation
- Signal expansion techniques
- PAM, PPM, PWM demodulation

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.

- Audio amplifier with headphone/speaker interface

Accessories / Spares

- Patch cords and coaxial cables
- Oscilloscope probes
- Test leads

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.

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