



### Technical Specification:

The Digital Logic Circuits Trainer should consist of following eight modules with Function Generator and DC Power Supply:

#### Module One:

- Chapter 1: Basic Logic Gates Circuits
- Experiment 1: Logic Gates Structure Circuits (DL, RTL, TTL, CMOS)
- Input Data Length: 2 bits; Input Data Mode: Dip Switch
- Experiment 2: Logic Gates Circuits
- Include Logic Gates: AND Gate; NAND Gate; NOT Gate; OR Gate; NOR Gate; XOR Gate
- Experiment 3: Voltage and Current Measurement (TTL, CMOS)  
 Voltage Measurement: VIH, VIL, VOH, VOL; Current Measurement: IOH, IOL
- Experiment 4: Interface between Logic Gates Circuits (TTL and CMOS Transform)  
 TTL to CMOS Transform: Input: 5 V; Output: 12 V; CMOS to TTL Transform: Input: 12 V; Output: 5 V
- Experiment 5: Transmission Delay Measurement (TTL, CMOS)  
 TTL Transmission Delay: 20.8 nS; (Maximum) CMOS Transmission Delay: 99.1 nS (Maximum)

#### Module Two:

- Chapter 2 Combinational Logic Circuits
- Experiment 1: 4 Bits Comparator Circuit
- Input Data Length: 4 bits; Input Data Mode: Dip Switch; Output Data Length: 3 bits; Data Display Mode: LED Display
- Experiment 2: 9 Bits Parity Generator  
 Input Data Length: 9 bits; Input Data Mode: Dip Switch; Output Data Length: 2 bits; Data Display Mode: LED Display
- Experiment 3: Tristate and Schmitt Gate Circuits  
 Tristate Gate: Data Length: 1 bit; Input Data Mode: Dip Switch; Schmitt Gate:

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Measurement VIH, VIL, VOH, VOL

- Experiment 4: Half Adder and Full Adder  
Half Adder: Input Data Length: 2 bits; Input Data Mode: Dip Switch  
Output Data Length: 2 bits; Data Display Mode: LED Display  
Full Adder: Input Data Length: 3 bits; Input Data Mode: Dip Switch  
Output Data Length: 2 bits; Data Display Mode: LED Display
- Experiment 5: Half Subtractor and Full Subtractor  
Half Subtractor: Input Data Length: 2 bits; Input Data Mode: Dip Switch  
Output Data Length: 2 bits; Data Display Mode: LED Display  
Full Subtractor: Input Data Length: 3 bits; Input Data Mode: Dip Switch  
Output Data Length: 2 bits; Data Display Mode: LED Display

### Module Three:

Chapter 3: Extended Combinational Logic Circuits

- Experiment 1: Arithmetic Logic Unit (ALU) Circuit  
Input Data Length: 4 bits; Input Data Mode: Dip Switch  
Output Data Length: 4 bits; Data Display Mode: LED Display; Operation instruction: 16 Types
- Experiment 2: Encoder Circuit  
Input Data Length: 8 bits; Input Data Mode: Dip Switch;  
Output Data Length: 3 bits; Data Display Mode: LED Display
- Experiment 3: Decoder Circuit  
Input Data Length: 3 bits; Input Data Mode: Dip Switch;  
Output Data Length: 8 bits; Data Display Mode: LED Display
- Experiment 4: Multiplexer Circuit  
Input Data Length: 4 bits; Input Data Mode: Dip Switch  
Output Data Length: 1 bits; Data Display Mode: LED Display
- Experiment 5: Demultiplexer Circuit  
Input Data Length: 1 bits; Input Data Mode: Dip Switch;  
Output Data Length: 4 bits; Data Display Mode: LED Display
- Experiment 6: Digitally Controlled Analog Multiplexer and Demultiplexer Circuits  
Multiplexer: Input Voltage: 0 V ~ 5 V; Input Quantity: 2; Output Voltage: 0 V ~ 5 V;  
Output Quantity: 1  
Demultiplexer: Input Voltage: 0 V ~ 5 V; Input Quantity: 1; Output Voltage: 0 V ~ 5 V;  
Output Quantity: 2

### Module Four:

Chapter 4: Clock Generator Circuit

- Experiment 1: Constructing Oscillator Circuit with Basic Logic Gates and Schmitt Gates  
Basic Logic Oscillator: Output Frequency: 3.58 MHz; Schmitt Gates Oscillator: Output Frequency: 3.58 Mhz
- Experiment 2: Voltage Controlled Oscillator Circuit (Output Frequency: 26.8 kHz ~ 35.5 kHz)
- Experiment 3: BJT Astable Multivibrator Oscillator Circuit (Output Frequency: 160 kHz)
- Experiment 4: Operational Amplifier Oscillator Circuit (Output Frequency: 2.56 kHz)
- Experiment 5: 555 Astable Multivibrator and Monostable Multivibrator Oscillator  
Astable Multivibrator: 4.75 Hz; Monostable Multivibrator: User Controlled

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**Module Five:****Chapter 5: Sequential Logic Circuits****Experiment 1: RS Flip-flop Circuit**

Input Data Length: 2 bits; Input Data Mode: Dip Switch; Output Data Length: 1 bits; Data Display Mode: LED Display

**Experiment 2: JK Flip-flop Circuit**

Input Data Length: 2 bits; Input Data Mode: Dip Switch; Output Data Length: 2 bits; Data Display Mode: LED Display

**Experiment 3: D Flip-flop Circuit**

Input Data Length: 1 bits; Input Data Mode: Dip Switch; Output Data Length: 2 bits; Data Display Mode: LED Display

**Experiment 4: Asynchronous Counter Circuit**

Output Data Length: 4 bits; Data Display Mode: LED Display

**Experiment 5: Synchronous Counter Circuit**

Input Data Mode: Dip Switch; Output Data Length: 5 bits; Data Display Mode: LED Display

**Experiment 6: Presetably Synchronous Counter Circuit**

Presetably Data Length: 4 bits; Input Data Mode: Dip Switch  
 Output Data Length: 5 bits; Data Display Mode: LED Display; Count Mode: Up Count or Down Count

**Module Six:****Chapter 6: Memory Circuits****Experiment 1: Constructing ROM Circuit with Diodes**

Store Data Length: 2 bits; Data Display Mode: LED Display

**Experiment 2: Constructing RAM Circuit with D Flip-flop**

Input Data Length: 4 bits; Input Data Mode: Dip Switch; Output Data Length: 4 bits; Data Display Mode: LED Display

**Experiment 3: Programable ROM Circuit****Experiment 4: 64 Bits RAM Circuit**

Input Data Length: 4 bits; Input Data Mode: Dip Switch; Output Data Length: 4 bits; Data Display Mode: LED Display

**Module Seven:****Chapter 7: Converter Circuits****Experiment 1: OPA ADC Circuit**

Analog Input: 0 V-5 V; Data Display Mode: LED Display; Resolution: 4 bits

**Experiment 2: ADC0804 ADC Circuit**

Analog Input: 0 V-5 V; Data Display Mode: LED Display; Resolution: 8 bits

**Experiment 3: 4 Bits R-2R DAC Circuit (Digital Input: 4 bits; Analog Output: 0 V-5 V)****Experiment 4: Unipolar DAC0800 DAC Circuit**

Digital Input: 8 bits; Input Data Mode: Dip Switch; Analog Output: 0 V - 5 V; Step Value: 0.019 V

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### Experiment 5: Bipolar DAC0800 DAC Circuit

Digital Input: 8 bits; Input Data Mode: Dip Switch; Analog Output: -5 V - 5 V; Step Value: 0.038 V

### Module Eight:

### Chapter 8: Logic Application Circuits

Experiment 1: Electronic Voting Circuit (7408, 7404, 7432, 7486)

Experiment 2: Electronic Wheel-amusement Circuit (Vcc= 12 V; IC: 555, CD4017B)

Experiment 3: Electronic Competition-answer Circuit (Vcc= 12 V; IC: CD4011 B)

Experiment 4: Traffic Light Circuit (Vcc= 12V; IC:555, CD4017B)

### Function Generator & DC Power Supply Module:

- Waveforms: Sine, Triangle, Square, TTL Pulse
- Amplitude: >10 Vpp
- Impedance: 50Ω ±10%
- Duty Control: 30% ~ 60%
- Display: 6-Digit LED Display
- Frequency Range: 10Hz to 100 kHz (4 Ranges), 100Hz to 1 MHz (4 Ranges)
- Frequency Control: Separative Coarse and Fine Tuning
- Constant Voltage Output: ±5V, ±12V
- Variable Voltage Output: 0V ~ ±15V
- Power source: 220V AC ±10%, 50Hz

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