- 1 Introductory Concepts
- Numerical Representations
- Digital and Analog Systems
- Digital Number Systems
- Representing Binary Quantities
- Digital Circuits/Logic Circuits
- Parallel and Series Transmission
- Memory
- Digital Computers
- 2 Number Systems and Codes
- Binary-to-Decimal Conversions
- Decimal-to-Binary Conversions
- Octal Number System
- Hexadecimal Number System
- BCD Code
- Putting It All Together
- The Byte, Nibble, and Word
- Alphanumeric Codes
- Parity Method for Error Detection
- Applications
- 3 Describing Logic Circuits
- Boolean Constants and Variables
- Truth Tables
- OR Operation with OR Gates
- AND Operation with AND Gates
- NOT Operation
- Describing Logic Circuits Algebraically
- Evaluating Logic-Circuit Outputs
- Implementing Circuits from Boolean Expressions
- NOR Gates and NAND Gates
- Boolean Theorems
- DeMorgan's Theorems
- Universality of NAND Gates and NOR Gates
- Alternate Logic-Gate Representations
- Which Gate Representation to Use
- IEEE/ANSI Standard Logic Symbols
- Summary of Methods to Describe Logic Circuits
- Description Languages Versus Programming Languages
- Implementing Logic Circuits with PLDs
- HDL Format and Syntax
- Intermediate Signals
- 4 Combinational Logic Circuits
- Sum-of-Products Form
- Simplifying Logic Circuits
- Algebraic Simplification
- Designing Combinational Logic Circuits

- Karnaugh Map Method
- Exclusive-OR and Exclusive-NOR Circuits
- Parity Generator and Checker
- Enable/Disable Circuits
- Basic Characteristics of Digital ICs
- Troubleshooting Digital Systems
- Internal Digital IC Faults
- External Faults
- Troubleshooting Case Study
- Programmable Logic Devices
- Representing Data in HDL
- Truth Tables Using HDL
- Decision Control Structures in HDL
- 5 Flip-Flops and Related Devices
- NAND Gate Latch
- NOR Gate Latch
- Troubleshooting Case Study
- Clock Signals and Clocked Flip-Flops
- Clocked S-C Flip-Flop
- Clocked J-K Flip-Flop
- Clocked D Flip-Flop
- D Latch (Transparent Latch)
- Asynchronous Inputs
- IEEE/ANSI Symbols
- Flip-Flop Timing Considerations
- Potential Timing Problem in FF Circuits
- Master/Slave Flip-Flops
- Flip-Flop Applications
- Flip-Flop Synchronization
- Detecting an Input Sequence
- Data Storage and Transfer
- Serial Data Transfer: Shift Registers
- Frequency Division and Counting
- Microcomputer Application
- Schmitt-Trigger Devices
- One-Shot (Monostable Multivibrator)
- Analyzing Sequential Circuits
- Clock Generator Circuits
- Troubleshooting Flip-Flop Circuits
- Sequential Circuits Using HDL
- Edge-Triggered Devices
- HDL Circuits with Multiple Components
- 6 Digital Arithmetic: Operations and Circuits
- Binary Addition
- Representing Signed Numbers
- Addition in the 2's-Complement System

- Subtraction in the 2's-Complement System
- Multiplication of Binary Numbers
- Binary Division
- BCD Addition
- Hexadecimal Arithmetic
- Arithmetic Circuits
- Parallel Binary Adder
- Design of a Full Adder
- Complete Parallel Adder with Registers
- Carry Propagation
- Integrated-Circuit Parallel Adder
- 2's-Complement System
- BCD Adder
- ALU Integrated Circuits
- IEEE/ANSI Symbols
- Troubleshooting Case Study
- Using TTL Library Functions with HDL
- Logical Operations on Bit Arrays
- HDL Adders
- Expanding the Bit Capacity of a Circuit
- 7 Counters and Registers
- Part I
- Asynchronous (Ripple) Counters
- Counters with MOD Numbers <2 N
- IC Asynchronous Counters
- Asynchronous Down Counter
- Propagation Delay in Ripple Counters
- Synchronous (Parallel) Counters
- Synchronous Down and Up/Down Counters
- Presettable Counters
- The 74LS193/HC193
- More on the IEEE/ANSI Dependency Notation
- Decoding a Counter
- Decoding Glitches
- Cascading BCD Counters
- Synchronous Counter Design
- Basic Counters Using HDL
- Full Featured Counters in HDL
- LPM Counters
- State Machines
- Part II
- Integrated-Circuit Registers
- Parallel In/Parallel Out The 74ALS174/74HC174
- Serial In/Serial Out The 4731B
- Parallel In/Serial Out The 74ALS165/74HC165
- Serial In/Parallel Out The 74ALS164/74HC164

- IEEE/ANSI Register Symbols
- Shift Register Counters
- Troubleshooting
- HDL Registers
- HDL Ring Counters
- HDL One-Shots
- 8 Integrated-Circuit Logic Families
- Digital IC Terminology
- The TTL Logic Family
- TTL Data Sheets
- TTL Series Characteristics
- TTL Loading and Fan-Out
- Other TTL Characteristics
- MOS Technology
- Digital MOSFET Circuits
- Complementary MOS Logic
- CMOS Series Characteristics
- Low-Voltage Technology
- Open- Collector/Open-Drain Outputs
- Tristate (Three-State) Logic Outputs
- High-Speed Bus Interface Logic
- The ECL Digital IC Family
- CMOS Transmission Gate (Bilateral Switch)
- IC Interfacing
- TTL Driving CMOS
- CMOS Driving TTL
- Analog Voltage Comparators
- Troubleshooting
- 9 MSI Logic Circuits
- Decoders
- BCD-to-7-Segment Decoder/Drivers
- Liquid-Crystal Displays
- Encoders
- Troubleshooting
- Multiplexers (Data Selectors)
- Multiplexer Applications
- Demultiplexers (Data Distributors)
- More Troubleshooting
- Magnitude Comparator
- Code Converters
- Data Busing
- The 74ALS173/HC173 Tristate Register
- Data Bus Operation
- Decoders Using HDL
- The HDL 7-Segment Decoder/Driver
- Encoders Using HDL

- HDL Multiplexers and Demultiplexers
- HDL Magnitude Comparators
- HDL Code Converters
- 10 Digital System Projects Using HDL
- Small Project Management
- Stepper Motor Driver Project
- Keypad Encoder Project
- Digital Clock Project
- Frequency Counter Project
- 11 Interfacing with the Analog World
- Review of Digital Versus Analog
- Digital-to-Analog Conversion
- D/A-Converter Circuitry
- DAC Specifications
- An Integrated-Circuit DAC
- DAC Applications
- Troubleshooting DACs
- Analog-to-Digital Conversion
- Digital-Ramp ADC
- Data Acquisition
- Successive-Approximation ADC
- Flash ADCs
- Other A/D Conversion Methods
- Digital Voltmeter
- Sample-and-Hold Circuits
- Multiplexing
- Digital Storage Oscilloscope
- Digital Signal Processing (DSP)
- 12 Memory Devices
- Memory Terminology
- General Memory Operation
- CPU-Memory Connections
- Read-Only Memories
- ROM Architecture
- ROM Timing
- Types of ROMs
- Flash Memory
- ROM Applications
- Semiconductor RAM
- RAM Architecture
- Static RAM (SRAM)
- Dynamic RAM (DRAM)
- Dynamic RAM Structure and Operation
- DRAM Read/Write Cycles
- DRAM Refreshing
- DRAM Technology

- Expanding Word Size and Capacity
- Special Memory Functions
- Troubleshooting RAM Systems
- Testing ROM
- 13 Programmable Logic Device Architectures
- Digital Systems Family Tree
- Fundamentals of PLD Circuitry
- PLD Architectures
- The GAL 16V8A (Generic Array Logic)
- The Altera EPM7128S CPLD
- The Altera FLEX10K Family
- Glossary
- Answers to Selected Problems
- Index of ICs
- Index