

Section 1 - Introduction to PLCs



Section 1 includes three DVD modules. Module 1 provides a basic understanding of PLCs and shows typical applications. The second module explains the different number systems used in PLCs and shows how ASCII and BCD codes are stored in internal registers. The final module of this section thoroughly explains the logic functions and shows how they are used to implement PLC output circuits and sequences.

All of the information is related to actual applications you are likely to see in your plant.

SECTION 1 CONTENTS

Module 1: Introduction to Programmable Controllers (27:55 minutes)

- Definition
- Background
- Areas of Application
- Benefits of PLC Usage
- Principles of Operations
- Scan
- Relay Logic and the PLC
- Addressing

Module 2: Number Systems and Codes—Their Uses and Application in PLCs (25:15 minutes)

- Number Systems
 - Decimal
 - Binary
 - Octal
 - Hexadecimal
- Number System Conversion
- Binary Codes
 - ASCII
 - BCD
 - Binary Code Extended
- Binary Concepts used in PLC Systems
- Registers

Module 3: Logic Functions and Their Relationship with PLC Systems (20:56 minutes)

- Basic Logic Functions
 - AND
 - OR
 - NOT
 - Truth Tables
- Logic Function Applications & Examples as Used in PLC Systems
- PLC Circuits and Logic Contact Symbolology

PLC Fundamentals

- ✓ Completely understand PLC operation and its interaction with the outside world
- ✓ Apply PLCs to improve manufacturing, reduce costs, and cut troubleshooting time
- ✓ Avoid confusion from the start by understanding the number systems and codes used by PLCs for addressing and I/O representation
- ✓ Learn how ASCII and BCD codes are used in PLC systems—make sure everyone on your staff understands them
- ✓ Learn the relationship between a relay system and a PLC-based system using ladder diagrams—we make it easy to understand
- ✓ Configure output rungs using the three basic logic operations (AND, OR, NOT)
- ✓ Learn discrete logic as it applies to real-world PLC applications—it's the fundamental basis for developing all PLC programs
- ✓ See real-life examples that relate hardwired systems to PLC-based systems using discrete logic operations

Section 2 - Hardware

Section 2 includes three video modules and thoroughly explains the hardware section of the controller. The first module describes the CPU, I/O scan, mapping, and sequencing. The second module explains discrete (ON/OFF) I/O and the wiring and programming of these devices. The third module covers, in great detail, analog I/O including signal understanding, data representation and handling, as well as I/O interfacing and connection.

Throughout the modules, real-life control examples are presented to prepare you for proper application and troubleshooting.



PLC Operation—Know the Ins & Outs

- ✓ Avoid costly mistakes—learn the capabilities of PLCs and select the best controller for your application
- ✓ Choose the correct power supply for your PLC system and avoid intermittent power problems
- ✓ Master I/O mapping and chassis configuration and avoid problems during system implementation
- ✓ Prevent scan-time problems by following our procedure for detecting potential scan and order of execution problems
- ✓ Configure memory data tables correctly—save time and prevent future expansion problems
- ✓ Know when to use remote I/O to save money during installation
- ✓ Avoid intermittent count jump problems—learn to properly install analog transducers/transmitters
- ✓ Multiplexing I/O can save a bundle in hardware costs—we show you the best modules and devices to use for your application
- ✓ Learn all you need to know about analog control—we explain analog I/O devices, signals, representation, data handling, and interfacing
- ✓ Match the right analog input or output field device with the right analog interface module and avoid costly hardware and installation mistakes
- ✓ Transmitter...Transducer—learn the difference and avoid confusion and interfacing problems
- ✓ Understand bit resolution and how it can affect the accuracy of analog signal representation

SECTION 2 CONTENTS

Module 4: General CPU Operation, Memory System and PLC I/O Addressing (47:20 minutes)

- CPU Operation
- Processor
- Scan
- Memory System
- Memory Types
- Memory Structure
- Application Memory
- I/O Mapping and Addressing
- I/O and Memory Interaction
- Configuring Your PLC System

Module 5: Discrete Input/Output System (45:15 minutes)

- I/O System Basics
- Remote I/O System
- Discrete I/O Interfaces
- Discrete Inputs
 - Description
 - Uses and Applications
 - Connections
 - Multiplexing
- Discrete Outputs
 - Description
 - Uses and Applications
 - Connections
 - Multiplexing

Module 6: Analog Input/Output System (49:32 minutes)

- Analog Inputs
 - Signal Understanding
 - Data Representation
 - Data Handling
 - Connections
- Analog Output
 - Signal Understanding
 - Data Representation
 - Data Handling
 - Connections

Section 3 - Software/Programming



SECTION 3 CONTENTS

Module 7: PLC Instructions and Control Software Programming, Part 1 (49:59 minutes)

- Types of PLC Instructions
- Ladder Format
- Block Format
- Logic Continuity
- Basic Relay Instructions
- Ladder Scan Evaluation
- Special Input Programming
- Output Programming
- Latch/Unlatch
- Creating Control Output Sequences

Module 8: PLC Instructions and Control Software Programming, Part 2 (42:33 minutes)

- Timer Instructions, Uses, and Applications
- Counter Instructions
- Program/Flow Control Functions and Examples
- MCR (Master Control Relay)
- Jump
- GOTO Subroutine
- Register Usage
- Arithmetic: Add, Subtract, Multiply, Divide, and Square Root
- Double precision arithmetic

Module 9: PLC Instructions and Control Software Programming, Part 3 (43:40 minutes)

- Enhanced Functions
- Data Manipulation and Handling Instructions
 - Data Comparison
 - Absolute
 - Logic Matrix
 - Data Conversion
 - Set Constant
 - Logic Shift
 - Rotate
 - Examine Bit
- Data Transfer Instructions
 - Move Data
 - Table to Register
 - Register to Table
 - Block Transfer In and Out
 - ASCII Transfer
 - FIFO Transfer Sequencers
- Boolean Mnemonics, Boolean Programming

Section 3 includes three video modules that explain all the aspects of PLC programming. The first module covers the basic instructions as well as ladder format, logic continuity, and scan order evaluation. The next module progresses into how to use and apply the many different types of timers and counters. In addition, instructions that apply to PLC program flow control—GOTO, GOSUB, and MCR—are also explained. Finally, the last module wraps up programming by covering advanced functions, such as how to handle I/O data, block transfers, Boolean Mnemonics, and much more.

In order to learn how to program any PLC, the programming instructions throughout this section relate to real-life situations.

Learn to Program Any PLC

- ✓ Change hardwired logic to PLC logic—we show you how basic PLC instructions can be used to implement a system
- ✓ Eliminate electromechanical reverse flow in a PLC ladder logic implementation for proper circuit operation
- ✓ Solve the mystery of programming a normally closed input as a normally open reference in a PLC and maintain a fail-safe operation
- ✓ Solve hardwired timer circuit problems by trapping instantaneous timer contacts and ensure proper circuit operation
- ✓ Program analog equations using arithmetic instructions and correctly perform analog control
- ✓ Use flow control instructions to solve scan time problems
- ✓ Avoid troubleshooting nightmares—learn how to use subroutines to implement structured programming and pinpoint problems quickly
- ✓ Convert electromechanical master control relays into PLC MCR circuits and avoid costly programming and troubleshooting problems
- ✓ Learn how to obtain important process data from your manufacturing operation with data manipulation and transfer instructions to improve your system

Section 4 - System Implementation

Section 4 puts all the concepts learned throughout the video series into action. This module explains how to implement a PLC-based system and provides guidelines to ensure a safe installation. We use real-life examples to illustrate both the implementation and programming steps so that you can relate to actual situations seen on the shop floor.

Organize and Implement a PLC System

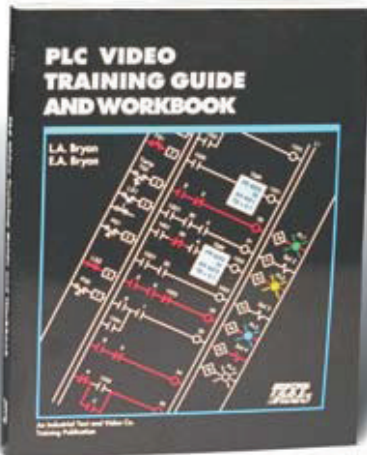
- ✓ Modernize your system—follow our four-step process to ensure a troublefree implementation
- ✓ Create meaningful documentation—learn to flowchart your system correctly
- ✓ Safeguard your PLC-based system—know which portions to leave hardwired for safety reasons
- ✓ Implement a new application—from concept to program coding—by following our six-step method
- ✓ Create effective output sequences and avoid confusion and wasted time during program coding
- ✓ Learn the benefits of good documentation—it makes troubleshooting easier



SECTION 4 CONTENTS

Module 10: PLC Control System Implementation and Programming (51:20 minutes)

- Control Definition
- Control Strategy
- Implementation Guidelines
- Program Organization/Implementation
- Flowcharting
- Configuration
- Real and Internal I/O Assignment
- Register Assignment
- Portions to Leave Hardwired
- Program Coding/Translation
- Control Program Examples and Implementation



I like the straightforward way the books are written.

—Joseph Lustig, Airco Special Gases

Video Reference Handbook

At 280 pages, the PLC Video Reference Handbook is an indispensable companion to the videos. For each of the ten video modules, the Handbook provides a brief introduction, instructional objectives, module review, video guide, and review questions/answers.

The brief introduction provides a general overview of what is covered in the module. It's followed by clear instructional objectives that list exactly what will be learned. The module review section summarizes all the topics in the tape and the video guide portion provides all of the important graphics, charts, and tables from the video. Finally, 268 review questions put your new PLC skills to the test by tackling real-life PLC applications and problems, and the separate answer section makes quizzing easy.

This Video Reference Handbook makes a great review tool and on-the-job quick reference guide.



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