Programmable Logic Controllers, Maintenance and Troubleshooting

4.5 Days, 3.2 CEUs

This course is designed to provide the student with basic information of programmable logic controllers (PLC), as well as maintenance and troubleshooting techniques necessary to keep these products running. Although the course, and lab equipment, is designed around Allen Bradley SLC and MicroLogix equipment it can be used as a basic foundation for a good understanding of all PLC equipment.

This course provides engineers, electricians, maintenance technicians, etc., with the foundation to program and troubleshoot the PLC system resulting in less downtime and increased uptime.

It is recommended that students attend our Basic Electrical Troubleshooting (BET) and our Motor Controls and Starters, Low Voltage (MCSLV) courses prior to attending.

Lab and Classroom Attire

AVO Training Institute is committed to the personal safety of each participant and require long pants and ANSI rated "safety-toe" work shoes for lab activities. Lecture courses may involve a tour of a work or shop area and for this reason open-toe shoes and shorts are not considered appropriate attire for the classroom.

Learning Objectives

To receive 3.2 CEUs, participants must attend 4.5 days of class (32 contact hours) and attain a minimum average grade of 80% ((overall grade will consist of 50% lab practice and 50% final exam). Upon completion of this course the participant will demonstrate that he/she is able to:

- Review relay control.
- Explain how peripheral devices connect to PLC.
- Interpret hard wiring diagram's connections to input/output (I/O) modules.
- Read PLC ladder logic and scan cycle.
- Use software instructions for programming techniques.
- Utilize force commands safely.
- Modify existing logic including timers, counters, etc.
- Perform actual wiring of peripheral I/O devices to their related modules.
- Establish communications with PLC using RSLinx.
- Troubleshoot software and hardware.

SCOPE

Day 1* (7 contact hours)

I. Introduction (0.5 hr)
   - A. Schedule
   - B. Course Outline

II. Review of Basic Control Devices (0.5 hr)
   - A. Control Devices, Switches and Sensors
   - B. Motor Starters

III. Identifying Sections of the MicroLogix Controller (1.5 hrs)
   - A. Input Section
   - B. Output Section
   - C. PLC Status Indicators

AM Break

   - D. Communication Port
   - E. MicroLogix Power Supply Connections
   - F. Processor Operating Modes
   - G. Typical Hardwiring of a MicroLogix

IV. How Does a Programmable Logic Controller Work? (1.5 hrs)
   - A. Scan Cycle
   - B. Addressing
   - C. Specifying Logical Addresses
   - D. Numbering System
   - E. Information Transfer

Lunch

*Class scheduling times may vary based on discussions and size of class

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3 Days, 2.1 CEUs

SCOPE (cont'd)

V. Identifying Sections of the MicroLogix Software (1.5 hrs)
- A. Force Status
- B. Instruction Palette
- C. Ladder View

PM Break

VI. Understanding and Programming Basic Control Instructions (1.5 hrs)
- A. XIC [Examine if Closed]
- B. XIO [Examine if Open]
- C. OTE [Output Energize]
- D. OTL [Output Latch]
- E. OTU [Output Unlatch]
- F. Branch Instruction

DAY 2 (7 contact hours)

VII. Creating a Program File (2 hrs)
- A. Selecting Allen Bradley MicroLogix Icon (Initialize)
- B. Processor Selection
- C. Selecting Baud Rate
- D. Verifying Project
- E. Saving Project

AM Break

VIII. Communicating with and Monitoring the Processor (3 hrs)
- A. RSLinx
- B. Communications Driver /Port

Lunch
- C. Online/Offline Mode
- D. Remote Run & Program Mode

IX. Editing the Program (2 hrs)
- A. Inserting Instructions

PM Break
- B. Deleting Instructions
- C. Modifying Instructions & Addresses

Day 3 (7 contact hours)

X. Programming & Interpreting Timer and Counter Instructions (3.5 hrs)
- A. Preset & Accumulative Values

AM Break
- B. Understanding Timer and Counter Instruction Terms

XI. Programming and Interpreting Program Control Instructions (3.5 hrs)
- A. JMP [Jump to Label]
- B. LBL {Label]

Lunch
- C. MCR [Master Control Reset]
- D. JSR [Jump to Subroutine]

PM Break
- E. SBR [Subroutine]
- F. RET [Return from Subroutine]

Day 4 (7 contact hours)

XII. Applying and Interpreting Program Control Instructions (6 hrs)
- A. EQU [Equal]
- B. NEQ [Not Equal]

AM Break
- C. LES [Less Than]
- D. LEQ [Less Than or Equal]

Lunch
- E. GRT [Greater Than]
- F. GEQ [Greater Than or Equal]

PM Break
- G. LIM [Limit Test]

XIII. Searching (1 hr)
- A. Instruction Search
- B. Symbol Search
- C. Address Search

Day 5 (half day) (4 contact hours)

XIV. Forcing I/O Instructions (3.5 hrs)
- A. Forcing Inputs & Outputs

AM Break
- A. Forcing Inputs & Outputs (cont'd)
- B. Safety Concerns

XV. Conclusion (0.5 hr)
- A. Review Material
- B. Final Exam

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