



# INDUSTRIAL TRAINING & AUTOMATION

## **MAT**

**Length: 5 days**

## **How to Maintain Allen-Bradley PLC's**

### **Course Description**

- A 5 day class that focuses primarily on three objectives: Connect Configure and Troubleshoot. As Programmable Logic Controllers become more commonplace, electricians need to increase their skill sets to continue to maintain these control systems. A common problem among electricians attempting to perform maintenance on PLC's is identifying which cable to use, where to connect the cable, how to configure a software driver to use that connection and finally how to use RSLogix, a software tool, to aid in troubleshooting a malfunction.

### **Specific Objectives are:**

- Describe advantages/disadvantages in the use of PLCs
- Compare a relay based control system to a PLC control system
- Describe components of a PLC
- Describe memory organization of Allen-Bradley PLCs
- Describe Input/Output Memory addressing for Allen-Bradley SLC and PLC5 controllers
- Describe details of data files (status, bit, timer, counter and integer)
- Describe use of program files and scanning of ladder logic
- State the various communication standards (RS232, RS485, etc.)
- Describe the various connectors used in Allen-Bradley PLCs (DB-9, DB-25, RJ-45, 3-pin phenix, etc)
- Describe the different protocols Allen-Bradley uses for communication (DF1, DH485, DH+, RIO, Ethernet)
- Install Rockwell Software (RSLinx, RSLogix5, RSLogix500)
- State the purpose and use of copy protection used in Rockwell Software products

- Describe the purpose and use of RSLinx
- Configure drivers in RSLinx
- State the function and use of LED indicators on I/O modules and PLCs
- Install, configure and use a DH+ Network

### **Use RSLogix 500 and RSLogix 5 to:**

- Upload/download program to SLC & PLC5
- Go online to SLC & PLC5
- Monitor data tables and program logic
- Determine operating status of SLC & PLC5
- Assist in troubleshooting hardware, software or logic errors
- Perform troubleshooting exercises to isolate malfunctions in discrete and analog circuits.

### **Student Equipment**

This class will utilize 6 student demo stations provided by ITA, each consisting of:

- SLC 5/04 demo unit:
  - SLC 5/04 processor
  - (2) 16pt DC input modules
  - (2) 16pt DC output modules
  - Analog input/output combo module
- I/O Simulator
  - (8) momentary illuminated pushbuttons
  - (4) alternate action illuminated pushbuttons
  - (2) selector switches, two position
  - 4 digit BCD thumbwheel
  - 4 digit BCD LED display
  - analog potentiometer
  - analog 0-10VDC meter
- Computer Workstation
  - Dell Pentium II 400 MHz computer (Win98 or WinNt)
  - 17" Monitor
  - A/B video switch to allow students to select video on their monitor from either their computer or the instructors
  - Mouse
  - Keyboard

In addition, ITA will provide 2 PLC 5/20 processors with chassis and power supplies to afford an opportunity for those who wish to do so to upload/download programs and go online to a PLC5.

## Agenda

- Introduction
- PLC Basics (Relay vs. PLC, develop machine to be used in troubleshooting) & use of basic instructions (XIC, XIO, OTE, TON and CTU)
- PLC components
- LAB 1 - Install RSLinx
- LAB 2 - Install RSLogix 500
- LAB 3 - Install RSLogix 5
- LAB 4 - Allen-Bradley Activations
- Memory organization
- SLC I/O addressing
- SLC I/O addressing exercises
- PLC5 I/O addressing
- PLC5 I/O addressing exercises
- Data tables (status, bit, timer, counter and integer)
- Program files (structure and scanning)
- Communication basics
- Electrical standards
- Protocols
- Connectors
- Connection exercises
- LAB 5 - Configure RS-232 driver in RSLinx
- LAB 6 - Load a program into RSLogix from diskette
- LAB 7 - Download a program using RSLogix to PLC
- LAB 8 - Go Online to PLC
- DH+ network overview
- LAB 9 - Install 1784-KTX DH+/DH485 communication adapter in PC
- Install DH+ network
- LAB 10 - Configure DH+ driver in RSLinx
- Perform Downloading of programs using DH+ network
- LAB 11 - Start/Stop or Delete drivers from RSLinx
- LED Indicators
- TROUBLESHOOTING - Student downloads programs as directed, instructors insert hardware (both discrete and analog), logic and communications errors. Student is required to determine if the problem lies in the PLC OR in the field wiring using the LED indicators. If problem is in PLC, student then uses RSLogix/RSLinx to go online to identify and correct malfunction.

## NOTES

Class size is limited to a maximum of 12 students if you wish to pair students on each workstation. Otherwise, one student per station will yield a maximum class size of 6 students.