

# Programmable Logic Control Trainers

Educational Training Equipment for the 21st Century

Bulletin 296D

## H-PLC-PP-ML-1200 Programmable Logic Controls Training System



MODEL H-PLC-PP-ML-1200 Programmable Logic Controls Training System shown is the H-PLC-PP Peripheral Panel, the Allen Bradley ML-1200, the H-LTCS Laptop Computer and H-RS-LOGIX Programming and Documentation Software

### Purpose

The Hampden **Model H-PLC-PP-ML-1200** Programmable Logic Control Training System offers a complete package that provides students with an industry standard PLC and hardware that allows them to design, connect and debug real-world circuits.

The Hampden **Model H-PLC-PP-ML-1200** Programmable Logic Control Training System provides students with hands-on experience, utilizing standard commercially available programmable logic controllers interfaced with actual input and output devices.

The student gets hands-on experience with:

- Interconnection Wiring
- General Programming Information
- Ladder Diagram Programming
- Programming Trainers
- Counters and Timers
- Motor Control
- Self-Diagnostic Function
- Power Failure Protection

### Description

The Hampden **Model H-PLC-PP-ML-1200** Programmable Logic Control Training System is a complete system that utilizes an Allen-Bradley MicroLogix 1200 PLC linked with a Hampden **Model H-PLC-PP** Peripheral Panel. The Allen-Bradley PLC is a state-of-the-art, high capacity, self-contained system with 6K Word Instruction capacity, a power supply, 24 AC inputs and 16 relay outputs, mounting rack and Hampden **Model H-LTCS** Laptop Computer System in one complete package.

The Hampden **Model PLC-PP** Peripheral Panel provides input and output devices for use with the MicroLogix 1200 Programmable Logic Control. Mounted on the equipment panel are the following:

- (1) Emergency disconnect relay with reset switch
- (1) Switch, debounced
- (4) Switches, toggle
- (4) Pushbuttons, N.O. or N.C., Forward, Reverse, Stop & Blank
- (4) Lamps, 1Ø AC
- (4) Solenoids, 1Ø AC, pull type

- (1) Thermostat
- (2) Control relays, 4-pole, N.O. or N.C.
- (1) Power supply, 5V @ 1.5A DC
- (1) Motor, AC/DC Universal Series
- (1) Horn, 5V DC
- (1) Lead screw training device complete with reversible gear motor, three positioning switches and two limit switches
- (1) Experimentation section consisting of a solderless breadboard
- (1) Electromagnetic circuit protector 15 ampere, with neon pilot light indicator
- (1) Duplex receptacle, 15 ampere
- (1) Interconnection cord set (40)

The above components are brought to terminal strips which connect to the ML-1200 Programmable Logic Controller via the provided interface cables.

### Input Voltage

1Ø AC 50/60Hz via 3/c 6 ft. power cord

All Hampden units are available for operation at any voltage or frequency

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## Courseware

- Operations guide and connection exercises
- Text - Introduction to Programmable Logic Controllers by Glen A. Mazur and William J. Weindorf
- Answer Key for above
- Applications Manual – Introduction to Programmable Logic Controllers by Glen A. Mazur and William J. Weindorf
- Answer Key for above
- Operational text from Allen Bradley

The following is a list of topics covered by the supplied courseware.

- **PLC and Electrical Safety**  
Programmable Logic Controllers; PLC Safety; Electrical Shock; Electrical Properties; Current; Voltage; Resistance; Grounding; Grounding Systems; Force and Disable Safety Considerations; Electrical Noise Suppression; Static Electric Charges; PLC Enclosures; NEC® Hazardous Locations; Electrical Safety; PLC Safety; Personal Protective Equipment; Protective Clothing; Head Protection; Eye Protection; Ear Protection; Hand Protection; Foot Protection; Back Protection; Rubber Insulating Matting; Lockout/Tagout; Inspecting a PLC System.
- **Electrical Principles and PLCs**  
Programmable Logic Controllers and Electrical Principles; PLC Problems; Voltage; DC Voltage Polarity; AC Voltage; PLC Power Supply Voltage Ratings; PLC Input Voltage Ratings; PLC Output Voltage Ratings; Current; PLC Input Current Ratings; DC Input Switching; PLC Output Current Ratings; Resistance; Series Circuits; Resistance in Series Circuits; Current in Series Circuits; Voltage Drops in Series Circuits; Parallel Circuits; Resistance in Parallel Circuits; Current in Parallel Circuits; Voltage Drops in Parallel Circuits.
- **Electrical Circuits and PLCs**  
Electrical Symbols and Diagrams; Standard Electrical Symbols; PLC Programming Symbols; Pictorial Drawings; Wiring Diagrams; Line (Ladder) Diagrams; Logic Functions; AND Circuit Logic; OR Circuit Logic; NOT Circuit Logic; NOR Circuit Logic; NAND Circuit Logic; Electrical Wiring Methods; Direct Hardwiring; Hardwiring Using Terminal Strips; PLC Wiring.
- **PLC Hardware**  
PLC Development; Programmable Logic controllers; PLC Sections; PLC Input Sections; PLC Output Sections; PLC Power Supplies; PLC Central Processing Units; PLC Programming Devices; PLC Classifications; Form Factors; PLC Memory; Random Access Memory; Electrically Erasable Programmable Read-Only Memory (EEPROM); PLC Operating Cycle; Operating Cycle.
- **PLC Programming Instructions**  
PLC Programming Diagrams; Processor Files; Program Files; Data Table Files; Data Table File Addresses; Input and Output File Addresses; Status File Addresses; Bit File Addresses; Programming Diagram Logic; Bit Instructions; Scan Execution.
- **Programming PLC Timers and Counters**  
Timer and Counter Instructions; Timer Instructions; Timer Instruction Words; Timer On-Delay (TON) Instructions; Timer Off-Delay (TOF) Instructions; Retentive Timer (RTO) Instructions; Reset (RES) Instructions; Special Applications; Counter Instructions; Counter Instruction Words; Count Up (CTU) Instructions; Count Down (CTD) Instructions.
- **PLC and System Interfacing**  
Systems; Primary Systems; System Interfacing Electrical Circuits; Basic Electrical Circuits; Improving Basic Electrical Circuits; Complex Electrical Circuits; Interfacing Circuits; Interface Devices; Electromechanical Relays; Solid-State Relays; Contactor Interfaces; Motor Starter Interfaces; Electric Motor Drive Interfacing.
- **PLC Installations and Startup**  
PLC Installations; Receiving a PLC; PLC Enclosures; Electrical Noise; PLC Power Supplies; PLC Installation Safety; PLC Wiring; Initial PLC Checks; Input Section Checks; Output Section Checks; Program Checks; Final Checks.
- **PLC and System Maintenance**  
PLC System Maintenance; Visual Inspections; Energized PLC Maintenance; Battery Maintenance; PLC Software Maintenance; Equipment and Documentation Verification; Software and Program Verification.
- **Troubleshooting Principles and Test Instruments**  
Troubleshooting; Troubleshooting Methods; Troubleshooting by Knowledge and Experience; Troubleshooting Using Facility Procedures; Troubleshooting Using Manufacturer Procedures; Troubleshooting Using Manufacturer Flowcharts; Troubleshooting Using Manufacturer Help Lines; Measurement Precautions; Meter Abbreviations, Symbols, and Ratings; Electrical Test Instrument abbreviations; Electrical Test Instrument Symbols; CAT Ratings; Troubleshooting with Test Instruments; Voltage Tester Measurement Procedures; Voltage Measurement Rules; AC Voltage Measurement Procedures; DC Voltage Measurement Procedures; Advanced DMM Features; Continuity Tester Measurement Procedures; Ohmmeter Measurement Procedures; Clamp-On Ammeter Measurement Procedures; In-Line Ammeter Measurement Procedures; Infrared Temperature Meter Measurement Procedures.
- **Troubleshooting PLC Hardware**  
Troubleshooting PLC Input Sections (Modules); Input Circuit Operation; Troubleshooting Input Sections (Modules); Testing Input Sections (Modules); Monitoring Input Devices; Input Leakage Current Problems; Troubleshooting PLC Output Sections (Modules); Output Circuit Operation; Troubleshooting Output Sections (Modules); Testing Output Sections (Modules); Monitoring Output Components.
- **Troubleshooting with PLC Software**  
Programming Software; Viewing PLC Programs; Window™ Features; Programming Software Features; Debugging PLC Programs; Temporary End Instructions (TND); Cross References; Find All; Goto Data Table; Force Function; Forcing Input Devices; Forcing Output Components; Software Help Features.

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