Programmable Logic Control Trainers

Educational Training Equipment for the 21st Century

Bulletin 296C

H-PLC-PP-500

Programmable Logic Controls Training System

MODEL H-PLC-PP-500 Programmable Logic Controls Training System shown with H-LTCS and H-SLC-500-RS-LOGIC Programming and Documentation Software

Purpose

The Hampden **Model H-PLC-PP-500** 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-500** 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-500 Programmable Logic Control Training System** is a complete system that utilizes an Allen-Bradley SLC-500 PLC linked with a Hampden **Model H-PLC-PP** Peripheral Panel. The Allen-Bradley SLC-500 PLC is a state-of-the-art, high capacity, self-contained system with 1000 Instruction capacity, a power supply, 18 AC inputs and 12 AC 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 SLC-500 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 SLC-500 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.

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

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H-SLC-500-RS-LOGIC Programming and Documentation Software

Purpose

The Hampden **Model H-SLC-500-RS-LOGIC** is one option that provides the ability to program the **Model H-PLC-PP-500** Programmable Logic Controls Training System.

The **H-SLC-500-RS-LOGIC** incorporates all of the latest technologies to help you maximize performance, save project development time and dollars and improve functionality. Consisting of powerful functionality and superior diagnostics, its design yields an unbeatable productivity tool. Reliable communications, combined with an industry-leading user interface, make it the programming solution for both novice and professional developers providing everything you've come to expect in a ladder logic programming software package and more:

- offline/online programming
- I/O module layout and configuration
- database editing
- symbolic addressing
- cross reference information
- advanced troubleshooting features
- reporting

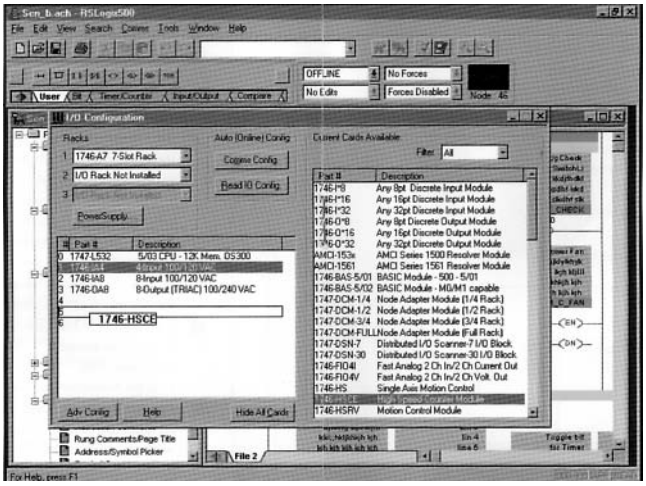
Plus point-and-click Microsoft® Windows® environment.

Features

H-SLC-500-RS-LOGIC takes full advantage of the power of Microsoft's 32-bit operating systems. When entering instructions, simply click, drag, and drop, placing the instructions on the desired rungs. The editor allows you to create several rungs at the same time and a powerful ASCII editor gives you the ability to enter rungs quickly by entering the instruction mnemonics and parameters.

- Consolidate and display all project information as a "Project Tree," with easy Point-and-Click accessibility.

I/O CONFIGURATION



- Online and offline edition sessions are limited only by the amount of RAM you have available.
- Drag instructions to the desired rung instead of typing the instructions with the keyboard. Drag-and-Drop editing lets you quickly move:
  —instructions from rung-to-rung within a project,
  —rungs from one subroutine or project to another,
  —or data table elements from one data file to another.
- Or, type the instruction mnemonics and parameters and **H-SLC-500-RS-LOGIC** creates the rung. It's that easy.
- Add addresses to instructions using:
  —Data Table Monitor,
  —Database Files,
  —or, the Address/Symbols Picker.
- Edit several rungs simultaneously, and/or program ladder logic using symbols that you have not yet assigned addresses, using the flexible *Program Editor*. This lets you concentrate on creating the application logic you need, and not on complex syntax as you enter your instructions.
- Correct program errors at your convenience by reviewing a list generated by the *Project Verifier*. This is beneficial because addresses assigned to the symbols may change. The use of symbols makes programming easier to save and reuse for other projects.

Accurate and Painless I/O Configuration

- Point-and-click or drag-and-drop a module from an all-inclusive list to assign it a slot in your configuration using the *I/O Configurator.*
- Read your I/O configuration automatically with the click of a button, reducing the possibility of placement error or incorrect module selection.
- Configure specialty modules easily using the *Advanced Configuration* options.

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Bulletin 296-2A

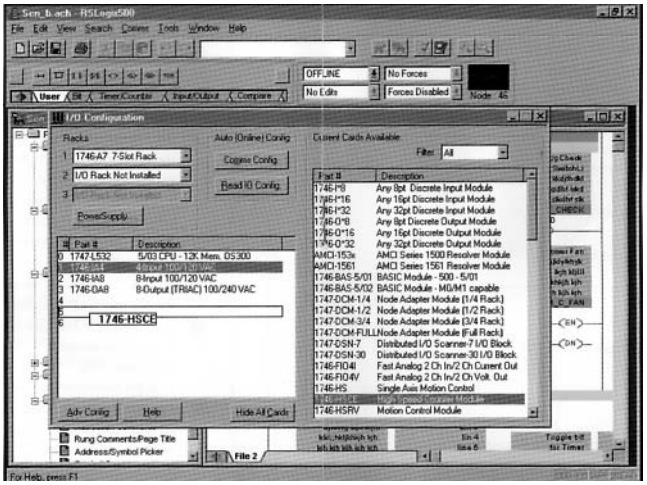
Database Editing

- Build and classify groups of symbols using the *Symbol Group Editor* so you can easily select portions of your recorded documentation to be used from project to project.
- Assign addresses or symbols to your ladder instructions using the *Symbol Picker* list and a mouse click.
- Use as much *Rung Description Text* as you need to accompany your ladder logic. Your documentation is limited only by the amount of hard disk space you have available.

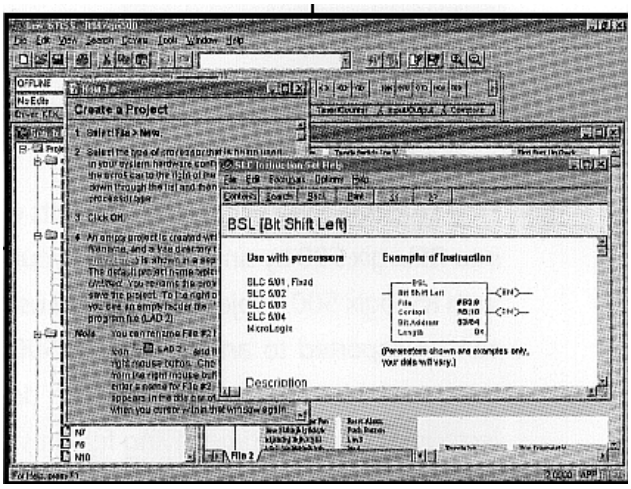
Assistance on Demand

- If you do not understand an **H-SLC500-RS-LOGIC** function or if you have a question about a processor instruction, help is just a mouse-click away.
- The **H-SLC-500-RS-LOGIC** online *Help System* is fully comprehensive; even including step-by-step instructions to lead you through many common activities and application scenarios.
- The complete SLC 500 *Instruction Set Reference* is also included for quick and easy referral.
- By simply clicking the right-mouse button on an address, symbol, instruction, rung, or other application object, the context-menu, provides immediate access to common software tools and a number of editing options. These tools save time with complex tasks because you don't have to remember the placement of functionality options in the menu bar.

ADDRESS/SYMBOL EDITOR



INSTRUCTION SET HELP



System Requirements

Hampden MODEL H-PLC-CS Computer System

Provides all necessary capabilities to perform as a learning base for the Hampden PLC Series of training systems. The computer system is American-made for the 21st century. It is a fast and rugged system built with expansion capacity for future upgrades.

Minimum Recommendations

- IBM - compatible 486/66 (Pentium™ optimal)
- 8 MB RAM (16 MB optimal)
- 8 MB of Hard Disk Space
- VGA Graphics Adapter 640 x 480 or greater resolution (800 x 600 optimal)
- Any Windows-compatible pointing device

Also Available

H-SLC-500-RS-LOGIC-LT

The "light" version of the RS-LOGIC Program. Allows all of the same functions, except "online" programming, diagnostics, and troubleshooting.

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