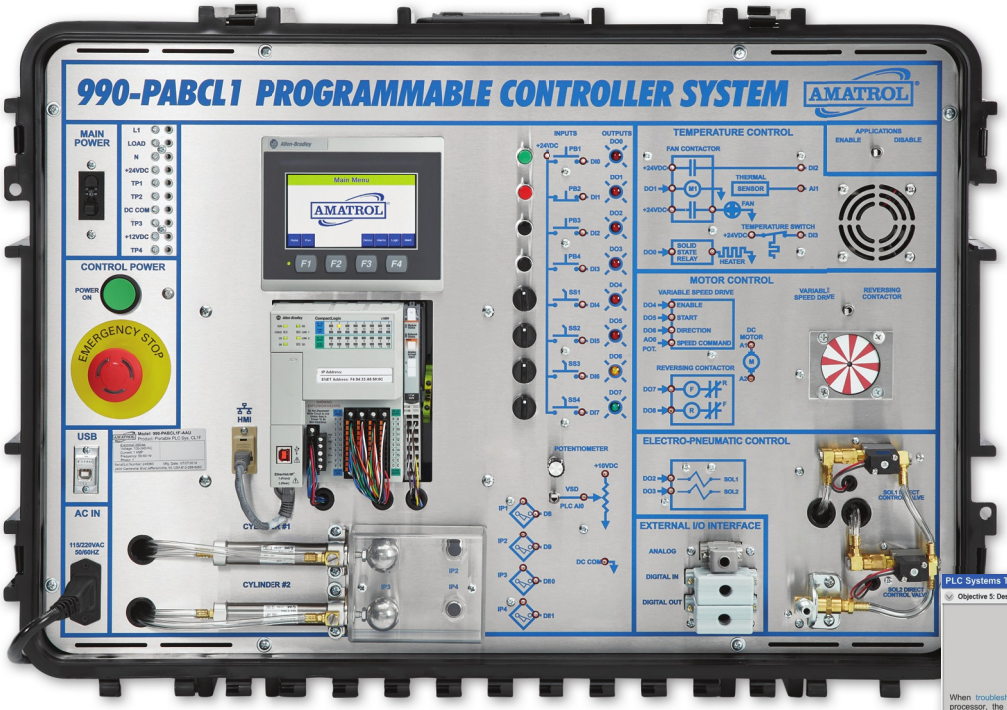
Portable PLC Troubleshooting Learning System – AB CompactLogix

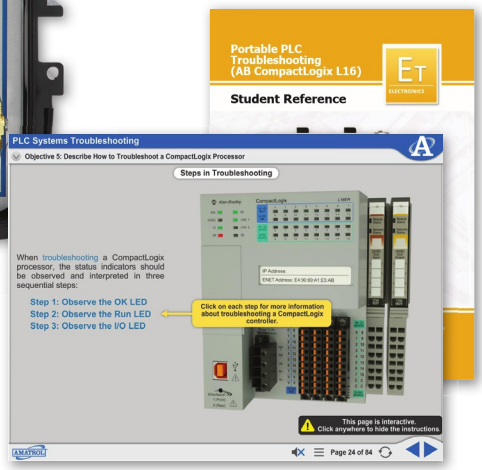
990-PABCL1F

ELECTRONICS



Portable PLC Troubleshooting Learning System – AB CompactLogix

Portable Workstation



Interactive Multimedia Curriculum and Student Reference Guide

Learning Topics:

- Programmable Controller Operation
- PLC Ethernet Communication
- Basic PLC Program Instructions
- PLC Project Elements
- PLC Motor Control
- PLC Timer Instructions
- PLC Event Sequencing
- PLC Counter Instructions
- HMI Ethernet Operation
- Component Troubleshooting
- Systems Troubleshooting

Amatrol's PLC Troubleshooting Learning System for the AB CompactLogix (990-PABCL1F) provides comprehensive PLC operation and troubleshooting knowledge in a portable format for when training space is constrained, but skill-building cannot be sacrificed! Learners will study topics like Programmable Controller Operation, PLC Ethernet Communication, Basic PLC Project Elements, PLC Motor Control, Event Sequencing, and more!

Combining training in areas such as programming, motor control, and pneumatics, the Portable PLC Troubleshooting offers learners the chance to operate the powerful Allen-Bradley L16ER CompactLogix 5370 PLC, PanelView 800 HMI terminal, and networks throughout the curriculum to build PLC training skills. The PLC training system's interactive multimedia curriculum offers an unmatched breadth and depth of knowledge and skill-building. Only Amatrol can provide this level of training using a compact, portable workstation.

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Technical Data

Complete technical specifications available upon request.

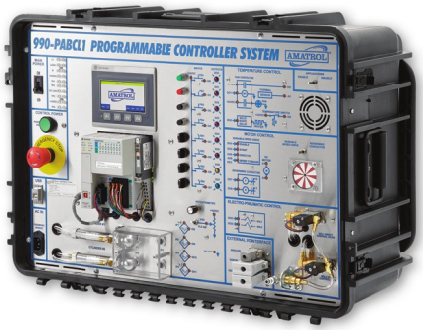
Allen-Bradley L16ER 5370 Processor
Fault Controller
Digital Inputs, 24 VDC
Digital Outputs
HMI Panel
24 VDC Power Supply
Built-In Power Supply
I/O Simulator Console
Application Panel
Mobile Carrying Case with Workstation Mounting Panel
USB Cable
Amatrol FaultPro Software (11164)
Student Curriculum – Interactive PC-Based Multimedia (M40087)
Instructor's Guide (C40087)
Installation Guide (D40087)
Student Reference Guide (H40087)
Additional Requirements:
- RS Logix 5000 Mini (82-8RSM) for education, or 82-9RSMI for all other organizations
- Computer: See requirements: http://www.amatrol.com/support/computer-requirements

Optional Requirements:
- RS Logix 5000 PLC Programming Software (82-800) for education, or 82-8000-I for all other organizations, available instead of 82-8RSM or 82-8RSMI.
- Mobile Technology Workstation (82-610)

Utilities Required:
- Electrical (100-240V / 50-60Hz / 1ph)
- Clean, filtered air (50psi)
- Air Pressure Regulator

Practice Hands-On PLC Troubleshooting and Programming

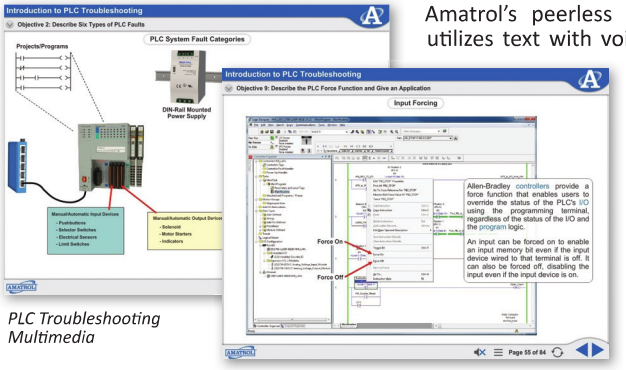
Portable PLC Troubleshooting includes an Allen-Bradley L16ER 5370 Processor & HMI Screen, two double-acting pneumatic cylinders, two control valves, a potentiometer, variable speed drive, external I/O interface, temperature control and an emergency stop button all within a portable learning system. Learners will use these components to perform troubleshooting skills on a variety of topics, such as thermostatic temperature control, variable speed motor control with feedback and electro-pneumatic controls. Learners will also practice the programming and operation of industrial PLCs.



Portable PLC Troubleshooting

Highly Engaging Interactive Multimedia for PLC Skill-Building

Portable PLC Troubleshooting's extensive multimedia curriculum begins with PLC operation and programming, and then builds onto this knowledge by advancing to topics such as analog input / output troubleshooting. By combining theoretical knowledge and hands-on skills, the learner's comprehension and retention of troubleshooting systems is greatly enhanced.



PLC Troubleshooting Multimedia

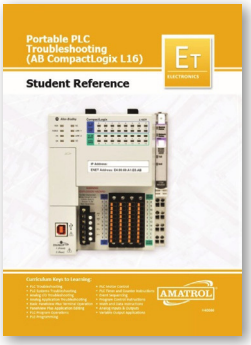
Amatrol's peerless interactive multimedia curriculum utilizes text with voiceovers, pictures, videos, stunning 3D animations, and interactive quizzes and reviews that engage learners in theoretical knowledge and concepts. This thorough, detailed curriculum begins with the basics and advances to complex concepts. Through partnerships with key industry leaders and leading educators, Amatrol developed the right balance of knowledge to train learners to work in their chosen field.

I/O Link Interface with Optional Smart Factory Capabilities

The 990-PABCL1F can be used with the Industry 4.0 Fundamentals course to serve as a PLC training device and Table Top "Smart Factory" Cell Controller. Amatrol's Smart Factory is a fully connected and flexible manufacturing system that connects its physical systems, operational information and human assets to control manufacturing, maintenance, inventory, and supply chain operations.

Fault-Pro: A World-Class Troubleshooting Teaching Tool

Portable PLC Troubleshooting uses Fault-Pro, the industry's premier program utilizing an electronic fault insertion system that is only available from Amatrol, to implant 30+ faults into the system for troubleshooting. During the learning process, Fault-Pro allows learners to insert faults in the system as they progress through the step-by-step procedures learning industrial troubleshooting methods. Then, Fault-Pro can be set to randomly select and insert a fault to test a learner's troubleshooting abilities and prepare them to solve real-world technical problems once they're in the field.



Complimentary Student Reference Guide

A sample copy of the PLC Troubleshooting AB CompactLogix Student Reference Guide is included with the learning system. Sourced from the curriculum, the Student Reference Guide supplement this course by providing a condensed, inexpensive reference tool that learners will find invaluable once they finish their training, making it the perfect course takeaway.

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Certified ISO 9001:2015

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PORTABLE PLC TROUBLESHOOTING LEARNING SYSTEM - AB COMPACTLOGIX
This system teaches PLC programming, operation, and applications and can serves as a PLC training device and Table Top Smart Factory Cell Controller for Amatrol's Tabletop Smart Factory system. This system requires: RS Logix 5000 Mini (82-RSM) and a PC. This system includes:

- Allen-Bradley L16 Processor
- Fault Controller
- Allen-Bradley Human Machine Interface
- Digital Inputs and Outputs
- 24VDC Power Supply
- Built-in Power Supply
- I/O Simulator Console
- Pneumatic Cylinders
- Temperature Control Console with Fan
- Motor Control Console Variable Speed Drive
- Electro-Pneumatic Control Console with Direct Control Valves
- Potentiometer
- Emergency E-Stop Button
- Mobile Carrying Case with Workstation Mounting Panel
- USB Cable

FaultPro Computer-Based Troubleshooting Software
FaultPro, a Windows-based software program, shall be supplied and is designed to provide an on-line interface for student troubleshooting and data-base record keeping of student responses. This software package shall give teachers the ability to create custom templates for each troubleshooting exercise so students are presented with an appropriated troubleshooting experience for each lab activity. Faults can be added or deleted to each exercise as needed.

The software shall feature online student control of the troubleshooting activity. This will allow students to set up and perform their own troubleshooting exercises for both practice and testing sessions. The program shall allow the student to initiate faults by entering a specific fault or initiating an automatic mode where the computer automatically selects a fault.

The student shall be able to enter the solution on the computer and the computer will indicate if the solution is correct, track the time spent, and number of incorrect/correct solutions.

Student responses are automatically recorded in the student database and scored according to a rubric which can be customized by the teacher. The data recorded includes: faults mastered, total time spent on each fault, and the number of tries needed to master each fault. Class statistics can also be generated so that teachers can analyze the curriculum and student skills.

Reports shall be able to be generated by student or class to show tasks accomplished and grade.

Student Curriculum
The student curriculum supplied shall be designed in a skill-based format that focuses on teaching industry- relevant tasks. This curriculum shall be designed for use in a self-directed student learning environment, which promotes a sense of rapid accomplishment and student motivation. The objectives shall be accomplished by organizing the learning material into a series of modules, which are further subdivided into three or more segments per module. All learning materials needed shall be contained in the modules including text material, laboratory equipment activities, and multimedia directions. No external text sources shall be required. The specific cognitive skills taught by each text passage shall be identified next to the passage. Each lab activity shall be identified by the industrial task taught. All activities shall be highly detailed with

step-by-step instructions to facilitate a self-directed learning environment. A combination of step-by-step enabling activities and creative, problem-solving activities shall be provided. A self-review of five to ten questions shall be provided after each segment.

The curriculum must be capable of completely self-directed and instructor directed study. All subject content as well as hands-on activities shall be included in the student curriculum. All activities must correlate directly to the hardware supplied, with detailed illustrations and diagrams.

Instructor's Guide
The instructor's guide shall contain student data sheets, data sheet solutions, self-review answers, quizzes, quiz answers, student skill record sheets, and assessment directions. The student data sheets shall be designed with data collection blanks to permit students to record data without consuming the learning activity packets. A quiz shall be provided for each packet. A question shall be provided in each quiz for each cognitive objective taught and correlated as such. All tasks listed in the packet shall be listed on personalized student record sheets. Detailed instructions and any supplemental material shall be provided for the teacher to perform live assessment of each student.

Amatrol Model No. 990-PABCL1F or equal

990-PABCL1F
PORTABLE PLC TROUBLESHOOTING LEARNING SYSTEM
(AB CompactLogix)

MODULE 1 PROGRAMMABLE CONTROLLER OPERATION

OBJECTIVE 1	Describe the function of a programmable logic controller
OBJECTIVE 2	Describe the basic components of a PLC
SKILL 1	Identify the components of a Rockwell CompactLogix PLC
OBJECTIVE 3	Describe the types of PLC programming languages
OBJECTIVE 4	Describe the basic structure of a PLC ladder logic program
OBJECTIVE 5	Describe the basic operation of a PLC
OBJECTIVE 6	Describe the basic components of Rockwell Studio 5000 PLC software
OBJECTIVE 7	Describe how to power up a Rockwell CompactLogix PLC
SKILL 2	Power Up a Rockwell CompactLogix PLC

MODULE 2 PLC ETHERNET COMMUNICATION

OBJECTIVE 1	Describe the function of a point-to-point Ethernet network
OBJECTIVE 2	Describe the basic operation of a point-to-point Ethernet network
OBJECTIVE 3	Describe Ethernet network addressing
OBJECTIVE 4	Describe the function of RSLinx software
OBJECTIVE 5	Describe how to configure an RSLinx EtherNet/IP driver
SKILL 1	Configure an RSLinx EtherNet/IP driver
OBJECTIVE 6	Describe how to download and upload a PLC project
SKILL 2	Use Rockwell Studio 5000 software to download and upload a PLC project
OBJECTIVE 7	Describe how to use Rockwell Studio 5000 software to run and monitor a PLC
SKILL 3	Use Rockwell Studio 5000 software to run and monitor a PLC program

MODULE 3 BASIC PLC PROGRAM INSTRUCTIONS

OBJECTIVE 1	Describe the operation of an absolute I/O address
OBJECTIVE 2	Describe the operation of a symbolic I/O address
OBJECTIVE 3	Describe how to interpret PLC input/output and power diagrams
OBJECTIVE 4	Describe the operation of NO and NC contact input instructions
OBJECTIVE 5	Describe the operation of a PLC output instruction
SKILL 1	Enter a PLC logic program

MODULE 4 PLC PROJECT ELEMENTS

OBJECTIVE 1	Describe the Studio 5000 CompactLogix tag system
OBJECTIVE 2	Describe how to create a Rockwell Studio 5000 PLC project
SKILL 1	Create a Rockwell Studio 5000 PLC project
OBJECTIVE 3	Describe how to enter a PLC program
SKILL 2	Enter a Rockwell Studio 5000 PLC Logic program
OBJECTIVE 4	Describe how to edit a Rockwell Studio 5000 PLC Logic program
SKILL 3	Edit a Rockwell Studio 5000 PLC Logic program
OBJECTIVE 5	Describe the function of project documentation and give an application
SKILL 4	Document a PLC program file

MODULE 5 PLC MOTOR CONTROL 1

OBJECTIVE 1	Describe the operation of a PLC-controlled constant speed electric motor
OBJECTIVE 2	Describe the operation of a PLC-controlled fluid power motor

OBJECTIVE 3	Describe the operation of input instructions that use output addresses
SKILL 1	Enter and operate a PLC program that uses an input instruction with an output address
OBJECTIVE 4	Describe the operation of PLC seal-in logic
SKILL 2	Enter and operate a PLC program that uses seal-in logic
OBJECTIVE 5	Describe the operation of internal output instructions
SKILL 3	Enter and operate a PLC program that uses internal output instructions
SKILL 4	Design a PLC program that controls two constant-speed electric motors

MODULE 6 PLC TIMER INSTRUCTIONS

OBJECTIVE 1	Describe the function of a PLC timer instruction
OBJECTIVE 2	Describe types of PLC timer instructions
OBJECTIVE 3	Describe the components of a timer instruction
OBJECTIVE 4	Describe the operation of a non-retentive on-delay PLC timer instruction
SKILL 1	Enter and operate a PLC program that uses a non-retentive on-delay timer instruction
OBJECTIVE 5	Describe the operation of a non-retentive off-delay PLC timer instruction
SKILL 2	Enter and operate a PLC program that uses a non-retentive off-delay timer instruction
OBJECTIVE 6	Describe the operation of a retentive PLC timer instruction
SKILL 3	Enter and operate a PLC program that uses a retentive timer instruction
SKILL 4	Design a PLC program that provides low-voltage starting of an electric motor

MODULE 7 PLC EVENT SEQUENCING 1

OBJECTIVE 1	Define event-driven sequencing
OBJECTIVE 2	Describe the operation of a single-cycle reciprocating cylinder PLC program
SKILL 1	Enter and operate a single-cycle reciprocating PLC program
OBJECTIVE 3	Describe the operation of a continuous-cycle reciprocating program
SKILL 2	Enter and operate a continuous-cycle actuator reciprocating program
OBJECTIVE 4	Describe the operation of a PLC program with manual and automatic modes
SKILL 3	Design a PLC program with manual and automatic modes
OBJECTIVE 5	Describe three methods of stopping a PLC-controlled machine

MODULE 8 PLC EVENT SEQUENCING 2

OBJECTIVE 1	Describe how to design a PLC sequence program using a seven-step process
OBJECTIVE 2	Describe the operation of a basic multiple actuator PLC sequence program
SKILL 1	Enter and operate a multiple actuator PLC sequence program
SKILL 2	Design a multiple actuator PLC sequence program using a seven-step design process
OBJECTIVE 3	Define time-driven sequencing and give an application
OBJECTIVE 4	Describe the operation of a time-driven sequence PLC program
SKILL 3	Enter and operate a time-driven sequence PLC program
OBJECTIVE 5	Describe the operation of a PLC program safety interlock
SKILL 4	Enter and operate a PLC program that uses a safety interlock

MODULE 9 PLC COUNTER INSTRUCTIONS

OBJECTIVE 1	Describe the function of a PLC counter instruction
OBJECTIVE 2	Describe types of PLC counter instructions
OBJECTIVE 3	Describe the operation of a PLC count up instruction

SKILL 1	Enter and operate a PLC program that uses a count up instruction
OBJECTIVE 4	Describe the operation of a PLC count down instruction
SKILL 2	Enter and operate a PLC program that uses a count down instruction
OBJECTIVE 5	Describe the operation of a PLC counter production control application
SKILL 3	Design a PLC program that uses a counter instruction

MODULE 10 HMI ETHERNET OPERATION

OBJECTIVE 1	Describe the function of an HMI panel
OBJECTIVE 2	Describe the parts of an HMI panel
OBJECTIVE 3	Describe how to connect an HMI panel in an ethernet network
SKILL 1	Connect an HMI panel in an ethernet network
OBJECTIVE 4	Describe how to configure the IP address on an HMI panel
SKILL 2	Configure an HMI panel for an ethernet network
OBJECTIVE 5	Describe how to download a project to an HMI panel
SKILL 3	Download an HMI project to an HMI panel
OBJECTIVE 6	Describe the basic operation of an HMI panel
OBJECTIVE 7	Describe how to operate a PLC project that uses an HMI panel
SKILL 4	Operate a PLC project that uses an HMI panel

MODULE 11 COMPONENT TROUBLESHOOTING

OBJECTIVE 1	Describe two levels of troubleshooting and give an application of each
OBJECTIVE 2	Describe six types of PLC faults
OBJECTIVE 3	Describe the operation of a PLC power distribution system
OBJECTIVE 4	Describe how to use the PLC's status and diagnostic indicators to troubleshoot a PLC
SKILL 1	Use status and diagnostic indicators to troubleshoot a PLC
OBJECTIVE 5	Describe how to troubleshoot PLC discrete inputs and input devices
SKILL 2	Troubleshoot PLC discrete inputs and input devices
OBJECTIVE 6	Describe how to force on a PLC output
SKILL 3	Force on a PLC output
OBJECTIVE 7	Describe how to troubleshoot PLC discrete outputs and output devices
SKILL 4	Troubleshoot PLC discrete outputs and output devices

MODULE 12 SYSTEMS TROUBLESHOOTING

OBJECTIVE 1	Describe how to troubleshoot a PLC power distribution system
SKILL 1	Troubleshoot a PLC power distribution system
OBJECTIVE 2	Describe how to troubleshoot a CompactLogix processor
OBJECTIVE 3	Describe how to identify and clear a PLC processor fault
SKILL 2	Troubleshoot and clear a PLC processor fault
OBJECTIVE 4	Describe five methods of systems troubleshooting
OBJECTIVE 5	Describe a six-step systems troubleshooting process
SKILL 3	Use a six-step systems process to troubleshoot a PLC system