To achieve the optimum benefit from this study course, each student will have a personal trainer in addition to the textbook, workbook, and equipment manuals provided on the CD. This helps maximizes time for teaching as opposed to programs where resources need to be shared and/or scheduled. Portability helps make this a practical solution.

Teaching Kit (Divelbiss PN# ETS-KIT-TEACH-001) contents:

- Teaching CD PN# EDTSCD-001 (Teaching Guide, EZ Ladder Software, and Manuals)
- SI-210 Solves-It! Analog Plug-in PLC
- SI-DEMO-02 Trainer/Simulator Board for SI-210
- SI-PGM Programming Cable

Student Kit (Divelbiss PN# ETS-KIT-STDNT-001) contents:

- Student CD PN# EDTSCD-002 (Workbook, Textbook, EZ Ladder Software, and Manuals)
- SI-210 Solves-It! Analog Plug-in PLC
- SI-DEMO-02 Trainer/Simulator Board for SI-210
- SI-PGM Programming Cable

(Course materials are contained in two kits to simplify ordering.)

Additional Education Products Offered:
For more advanced engineering programs the PLC on a Chip® Development Package offers a great deal of program flexability at an extremely attractive cost. This is the same hardware and software being used for Rapid Design of PLC on a Chip® based commercial and industrial products and finds use as both lab station hardware and Senior Design Projects.

PLCDK-01 PLC on a Chip® Development Package

PLCDK-03 PLC on a Chip® Development Package (Supports keypad and display functionality.)

Optional Keypad and display units for PLCDK-03:

PLCDK-0I-2x20 2x20 LCD Display & Keypad Option for PLCDK-03

PLCDK-0I-2x40 2x40 LCD Display & Keypad Option for PLCDK-03

PLCDK-0I-4x20 4x20 LCD Display & Keypad Option for PLCDK-03

PLCDK-03 with optional keypad and desplay modules shown.

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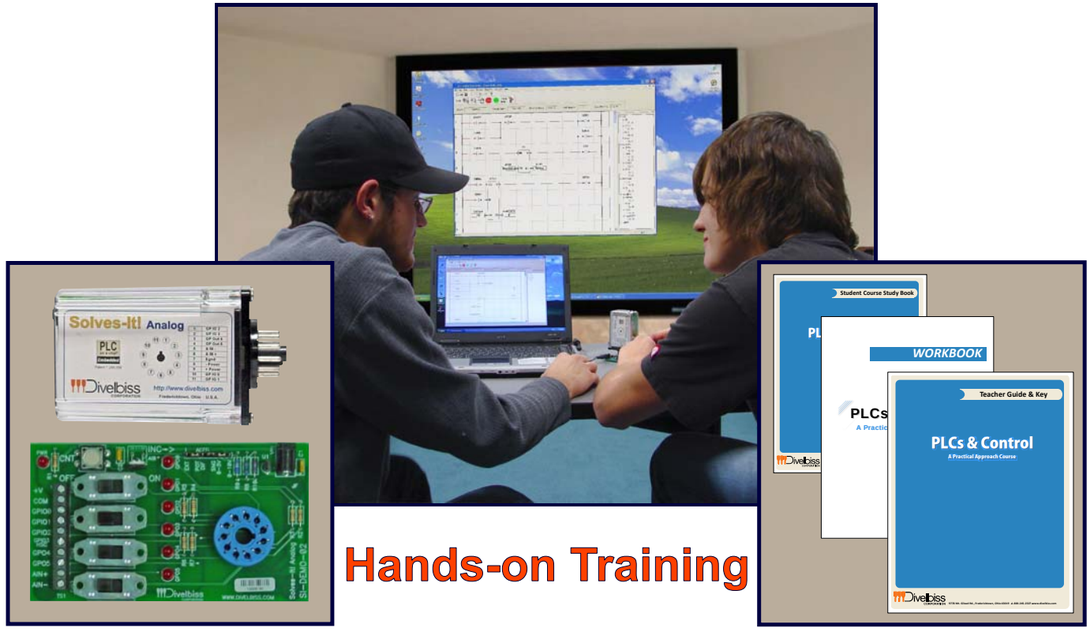
Programmable Logic Control Hardware & Courseware

Education Tools from Divelbiss Corporation



Programmable Logic Controllers and PLC programming utilizing the patented* PLC on a Chip® technology.

Divelbiss is an Ohio corporation founded in 1974 and has been manufacturing Programmable Logic Controllers (PLCs) for industry since 1976. Divelbiss is recognized by industry for our innovative solutions. The patented PLC on a Chip® allows PLC functionality to be embedded in products that have typically been passive building blocks for machinery. Cylinders, valves, and fans to name a few.

In an effort to make learning PLC application and programming more affordable, the Divelbiss Technical Services Group developed this training course for use by educators. The basic outline closely mirrors the material presented when providing training for our industrial customers. The hardware items are the same products being used worldwide in commercial and industrial control applications.

The study outline is comprised of 16 blocks which, taken in order, build on one another to teach the basics of PLCs in addition to programming a controller using ladder logic with function block. The course is designed for hands-on study using standard hardware manufactured by Divelbiss.

*Patent 7,299,099

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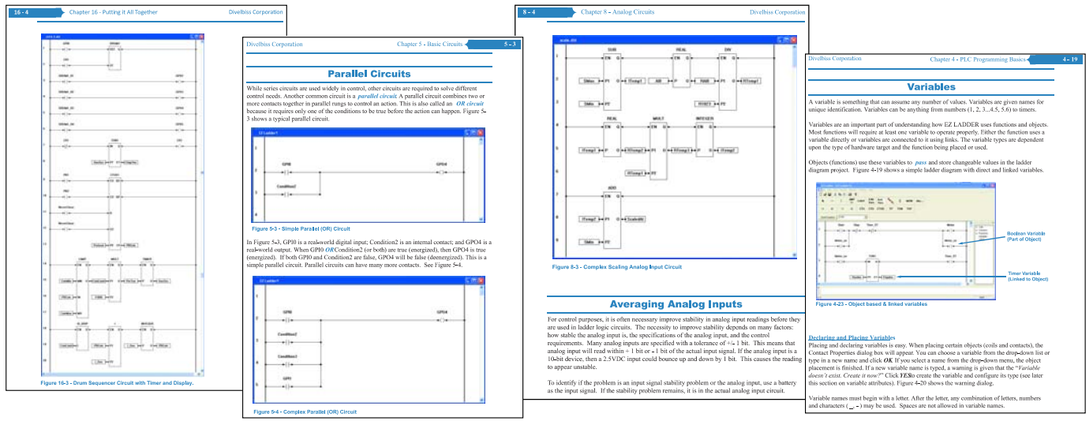
The Solves-It! (SI-210) is a plug-in PLC with a total of 6 digital I/O; two of which are dedicated outputs. The remaining four may be used as either inputs or outputs. An analog input, 4-digit display, and programmable push-buttons are also included. The PLC plugs into the trainer board. Power is supplied by the trainer's Class II transformer.

The trainer provides slide switches for input to the PLC as well as a push-button for input to the counter. A potentiometer produces the analog, and LEDs provide output status. The terminal strip provides parellel I/O points to allow other devices such as a photoelectric switch to be directly connected to the Solves-It!

The textbook is fully illustrated and uses "real world" application examples developed from our engineering case files.



The Program Outline on the following page lists topics covered in each section of the ***PLCs & Control - A Practical Approach*** course of study. The material is presented in a concise manner that makes it easily understandable. Example programs for each of the function types provide positive reenforcement for the theory covered in the section. All printed matter on the CD is in PDF format to allow access for quick reference as well as printing.

PLCs & Control - A Practical Approach

PROGRAM OUTLINE

I. PLC & Control - An Overview
Introduction to Electrical Control Circuits
Early Relay Logic Control
What Is a PLC?
Advantages to Using PLCs
What to Look for in a PLC

II. PLC/Control Digital I/O Circuits
PLC Input Circuits
PLC Output Circuits
Network I/O
Common Power Supplies

III. PLC/Control Wiring Practices
Understanding Wire Types
Wire Routing

IV. PLC Programming Basics
Ladder Logic Diagram basics
Links & Power Rails
Ladder Logic Diagram Scanning
The Solves-It! Trainer
Getting to Know EZ LADDER®
Hardware Targets
Objects & Functions
Variables
Verifying & Compiling Projects
Downloading & Running Projects

V. Basic Circuits (contacts/coils)
AND (Series) Circuit
OR (Parallel) Circuit
Combination Parallel/Series Circuits
Application - Motor Start/Stop Circuit

VI. Timer Circuits
(TON/TOFF)
Timer Circuits
Delay on Pickup Circuit
Delay on Drop-out Circuit
Combining Timer Circuits
Application - Heater Control with Safety Timers

VII. Counter Circuits
(CTU/CTD/CTUD/CNTRTMR)
Count Up Circuit
Count Down Circuit
Up/Down Counter Circuit
High Speed Counting
Application - Batch Filling

VIII. Analog Circuits with Math
(ADD/SUB/MULT/DIV/AVG/MAVG)
Analog Inputs (0-5V/0-10V/4-20mA)
Scaling Analog Inputs
Averaging Analog Inputs
Application - Stable PSI Monitor

IX. Comparison Circuits
(CMP/MIN/MAX/LIMIT/HYSTER/SEL/MUX)
Basic Comparison Circuits
Advanced Selection and Limiting Circuits
Hysteresis in Control
Application - Temperature Controller with Hysteresis

X. Bit Manipulation Circuits
(ROL/ROR/SHL/SHR/AND/OR/NOT/XOR/BIT_PACK/BIT_UNPACK)
Bit Manipulation Circuits
Packing / Unpacking Bits to/From Integers
Application - Shift Register for Conveyor Control

XI. Trigger & Latching Circuits
(RS, SR, R_TRIG, F_TRIG, LATCH, UNLATCH)
Triggering Circuits
Flip Flops
Latching / Unlatching Circuits
Application - Latching Override Circuit for Motor Lock-out

XII. Memory Types & Circuits
(EEPROM_READ / EEPROM_WRITE/Retentive)
Types of Memory - Volatile/Non-volatile
Retentive Memory
EEPROM Memory
Application - EEPROM Set point Storage/Recall

XIII. Drum Sequencer Circuits
(Drum Sequencer)
What Is a Drum Sequencer
Understanding a Drum Sequencer Matrix
Application - Drum Sequencer for Marquee Light Control

XIV. Displaying Control Values
(SI_DISP, SI_CLRDISP)
Displaying Values
Display Update Rates
Application - Create a Menu

XV. Variable Conversion Circuits
(INTEGER, REAL, BOOLEAN, TIMER)
Why Convert Variable Types
Application - Convert Real to Integer to Boolean

XVI. Putting it all Together
Application - Pump Sequencer with Menu

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