Divelbiss CORPORATION

PLC/Programming
Learning Package

- **Practical Hands-on Training**
- **Fully Illustrated Textbook**
- **Step-by-step Instruction**
- **Real World Exercises**
- **Solves-It! Plug-in PLC**
- **Trainer/Simulator**
- **EZ Ladder® Software ($200 value)**
- **Ideal for Group or Individual Study**

Divelbiss is an Ohio corporation that has been manufacturing solid state controls since 1974. Our Programmable Logic Controllers (PLCs) have been used by industry for over 30 years. Divelbiss is recognized industry wide for our many innovative solutions. For example, the patented* PLC on a Chip® technolgy allows PLC functionality to be embedded in products which, until recently, had typically been passive building blocks for machinery. In an effort to make learning PLC application and programming affordable, our Technical Services Group developed this training course for use by schools and universities. That basic course of instruction has been modified for use by companies in upgrading employee skill levels. The course is structured so it can be used for individual and/or home study as well as corporate level training.

The course material begins with an introduction to electrical control circuits and is fully illustrated to aid understanding of each topic presented. As the course progresses, I/O types and their usage is explained along with good wiring practices and networking. The balance of the material presented deals with the actual programming and covers each segment in detail. Exercises for each chapter make use of the Solves-It! PLC and development board to provide hands-on example of theory.

ORDER PART NUMBER: EHSTDY-KIT-001

The following items are included in the PLC/Programming Learning Package.

HARDWARE:
One each - Solves-It! plug-in PLC Model SI-210
One each - SI-PGM Solves-It! Programming Cable, RS-232
One each - Divelbiss part number 115-105328 Din-rail/Subplate mount socket
One each - SI-DEMO-02 Trainer/Simulator (Includes Class II transformer)
One each - Solves-It! Model SI-210 User's Manual (on CD)

SOFTWARE:
One each - EZLDCD-01 Current Release Version Standard of EZ Ladder® on CD
One each - EZ Ladder User's Manual (on CD)

COURSE MANUALS:
One each - ***PLCs & Control - A Practical Approach*** Student's Manual on CD
One each - ***PLCs & Control - A Practical Approach*** Student's Workbook on CD

*Patent 7,299,099

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The Program Outline below 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.

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 w/Safety On/Off 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

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

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

XIII. Drum Sequencer Circuits (Drum Sequencer)
What Is a Drum Sequencer
Understanding a Drum Sequencer Matrix
Application - 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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