



**Ron Beaufort Training, LLC**

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**Hands-On Technical Workshops**

by Ron Beaufort

Course Specifications: **P4040**

**The PID Instruction for the PLC-5 - Troubleshooting Basic Process Control**

This **five-day, hands-on** technical workshop is specifically designed to:

- provide personnel with the basic skills required to troubleshoot and maintain Allen-Bradley PLC-5 systems which use the **PID** (Proportional-Integral-Derivative) instruction for process control
- use a common-sense **non-theoretical** approach to introduce the basic concepts of PID control to personnel having little or no background in higher mathematics

The following topics will be presented through hands-on exercises and demonstrations:

- Wiring the 120VAC control and the 4-20mA instrumentation circuits
- Programming Block Transfers for the analog input and output signals
- Configuring the 1771-IFE and 1771-OFE2 analog input and output modules
- Checking the calibration and adjusting zero and span as necessary for pulse-rate/analog converter, thermocouple transmitter and I/P transducer
- Programming and tuning the PID instruction for a flow control loop
- Programming and tuning the PID instruction for a heat control loop
- Experimenting with the individual effects of the proportional, integral, derivative, and feedforward parameters to optimize tuning for either setpoint changes or for process load upsets
- Programming controls for setpoint changes, auto/manual modes, etc.
- Programming math functions for signal scaling and for conversions between raw data values and engineering units
- Programming basic operator alarms for out-of-tolerance system parameters and for input signal faults
- Programming and experimenting with various control strategies and system hardware configurations
- Troubleshooting problems and errors in programming, configuration, wiring, calibration, loop tuning, etc.
- Systematically analyzing and tracking analog variables and math functions through the ladder logic program
- Collecting runtime process data for trend line graphing and logging
- Entry-level programming of basic HMI/SCADA operator interfaces

This course will be conducted as a laboratory workshop using the **Problem/Solution** method of instruction. There are absolutely no transparency projectors and no PowerPoint slide shows involved. Instead, all of the course material is presented through a series of hands-on exercises which each student performs on **real-world equipment**. By working through the same types of tasks which are commonly encountered in the field, students not only master the material more rapidly but also improve their **problem-solving** skills and develop the **confidence** required to apply their new abilities on the job. Most students, particularly those with a maintenance technician background, respond enthusiastically to the challenges of this dynamic style of instruction.

Students successfully completing this course will be awarded 4.0 Continuing Education units.

In order to provide each student with an **individual workstation** and with adequate instructor attention, the class size is normally limited to six students. All hands-on exercises in this course are performed on training hardware which focuses on air-flow and temperature control projects to provide experience with both fast and slow responding systems.

It is **required** that each student have a good working knowledge of the Allen-Bradley PLC-5 hardware system and the RSLogix5 software package. Existing skills **must** include the processing of analog input and output signals. Please note that this is **not** an entry-level class and students who do not have the prerequisite skills should not attend this workshop.

It is **required** that each student have a good working knowledge of Microsoft Windows and also adequate mouse and keyboard skills to enable active participation in the lab exercises. Although the pace of this workshop will **not** accommodate students who lack these skills, we offer a separate one-day hands-on computer workshop to provide these prerequisites.

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