Intertech
Applying Practical Skills in a Technological World

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Modicon Quantum Controller Intermediate II
Programming & Troubleshooting
Module 103

This course explores the bit level instructions and places the functionality of these instructions at your command. Register data can be viewed as numerical information, or it can be viewed as binary bits (a series of on/off signals). Clever programmers use this functionality to create very powerful "short-hand" programs. With the matrix and move, function blocks you can create functional programs that would take numerous lines of ladder logic to accomplish the same result. Programs using bit level functions deal with multiplexing, sorting, shift-registers, first-in-first out (FIFO) functions, fault diagnostics, etc. These programs usually rely on a combination of math, register manipulations and bit level manipulations. In order to troubleshoot these systems, you must understand how the various bit level function blocks operate on the bits within registers. Once you understand the bit operations, you can put together this information with the register manipulation operations and the relay operations to come up with a complete understanding of the programmable controller, and therefore have the basis for troubleshooting the programmable controller in its entirety. This is a four (4) day course. Prerequisite: Modicon Quantum/984 Intermediate I Programming & Troubleshooting or instructor approval.

Course Objectives

- Review information from the Maintenance and Troubleshooting and Intermediate I classes.
- Learn about block move, bit manipulate, bit shift, bit sense, bit clear, logical operators (and, or, exclusive or, compare, and complement), and FIFO function blocks.
- Apply function blocks to create and test your own programs in extensive hands-on lab sessions designed to stimulate a logical approach to problem solving.
- Apply knowledge to troubleshoot sub-programs selected from your own system.
- Develop logic programs and test circuits, that identify and isolate intermittent problems.
- Make use of the built-in calendar/clock, in conjunction with your word and matrix functions to log and store the date and time that the intermittent logic anomalies occur in your operating program.
- Develop troubleshooting skills for gathering data to help eliminate non-problem spots, and draw attention to possible problem spots.
- Determine if the program logic, system hardware, instrumentation or a combination of all of these is where your problem originates.
- Apply the matrix functions to practical applications, i.e. Thermocouples, RTDs, PID and other hardware functionality.
- Understand how data is formatted for interfacing with other operator devices such as main frame computers, i.e. SCADA, HMI