History

- 1968 General Motors specifies the design for a “standard machine controller”
- 1969 Modicon develops first model- “box full of relays”
- 1970-1972 Allen-Bradley
- 1971-1973 GE & Omron
- 1970’s-1980’s Siemens, Mitsubishi, Koyo, others
A/B PLC5
A/B SLC500
A/B Micrologix
A/B Control Logix
Hardware

- Inputs: AC, DC Source/Sink
- Outputs: AC triac, relay, DC transistor
- Analog In: 0-5 V, 0-10V, 4-20 mA; 12-bit
- Analog Out: 0-5 V, 0-10V, 4-20 mA; 10-12 bit
- Communication: RS232, RS485, Modbus, Device Net, etc.
- High speed counter, motor drive, etc.
Programming Methods

IEC 61131-3

- Relay ladder logic
- Function block diagram
- Structured text
- Instruction list
- Sequential function block
Ladder Logic

Delay storm water signal before opening tank fill valve.

Storm Water High Level
B3:100
6

High Storm Water Delay
TON
Timer On Delay
Timer T4:0
Time Base 1.0
Preset 300<
Accum 0<

Open tank fill valve after storm water delay if tank level is <85%. Limit switch stops valve motor.

Water Tank Level %

High Storm Water Delay
T4:0
TT

Tank Fill Valve Close Output
B3:102
13

Tank Fill Valve Open LS
B3:100
13

Tank Fill Valve Open Output
B3:102
12
# Micrologix Functions

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<td>HSL, RAC – The high-speed counter instructions (along with the HSC function file) allow you to monitor and control the high-speed outputs. Generally used with DC inputs.</td>
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<tr>
<td>High-Speed Outputs</td>
<td>PTO, PWM – The high-speed output instructions (along with the PTO and PWM function files) allow you to monitor and control the high-speed outputs. Generally used with FET outputs (BXB units).</td>
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<td>Relay-Type (Bit)</td>
<td>XIC, XI0, OTE, OTU, OTR, OSN, ONS, OSF – The relay-type (bit) instructions monitor and control the status of bits.</td>
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<td>Timer and Counter</td>
<td>TON, TOF, RTO, CTU, CTD, RES – The timer and counter instructions control operations based on time or the number of events.</td>
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<td>Compare</td>
<td>EQU, NEG, LES, LEQ, GRT, GEQ, MEQ, LIM – The compare instructions compare values by using a specific compare operation.</td>
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<td>Math</td>
<td>ADD, SUB, MUL, DIV, NEG, CLR, ABS, SQR, SCL, SCP, SWP – The math instructions perform arithmetic operations.</td>
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<td>Conversion</td>
<td>DCD, ENC, TOD, FRD, GCD – The conversion instructions multiplex and de-multiplex data and perform conversions between binary and decimal values.</td>
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<td>Logical</td>
<td>AND, OR, XOR, NOT – The logical instructions perform bit-wise logical operations on words.</td>
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<td>File</td>
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<td>Sequencer</td>
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<td>Program Control</td>
<td>JMP, LBL, JSR, SBR, RET, SUS, TND, MCR, END – The program flow instructions change the flow of ladder program execution.</td>
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<tr>
<td>Input and Output</td>
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<td>Process Control</td>
<td>PID – The process control instruction provides closed-loop control.</td>
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<td>ASCII</td>
<td>ABL, ACB, ACL, ACLN, AE, AH, AIC, ARD, ARL, ASC, ASR, AWA, AWI – The ASCII instructions convert and write ASCII strings. They cannot be used with MicroLogix 1500 1764-LSP Series A processors.</td>
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<td>Communications</td>
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<td>Recipe (MicroLogix 1500 only)</td>
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<td>Data Logging (MicroLogix 1500 1764-LRP only)</td>
<td>DLG – The data logging instruction allow you to capture time-stamped and date-stamped data.</td>
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Future

- Advanced communication
- Greater processing power
- Smaller packages
- Total automation control
- Compatibility
- Safety PLC
• Control system design
• Control panels
• PLC Programming
• Operator panel programming
• Troubleshooting
• Training
• Documentation