PLC's in the 21st Century

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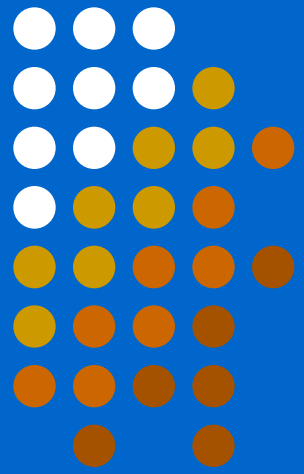
Chicago/Rockford Consultants' Network

March 30, 2009



History

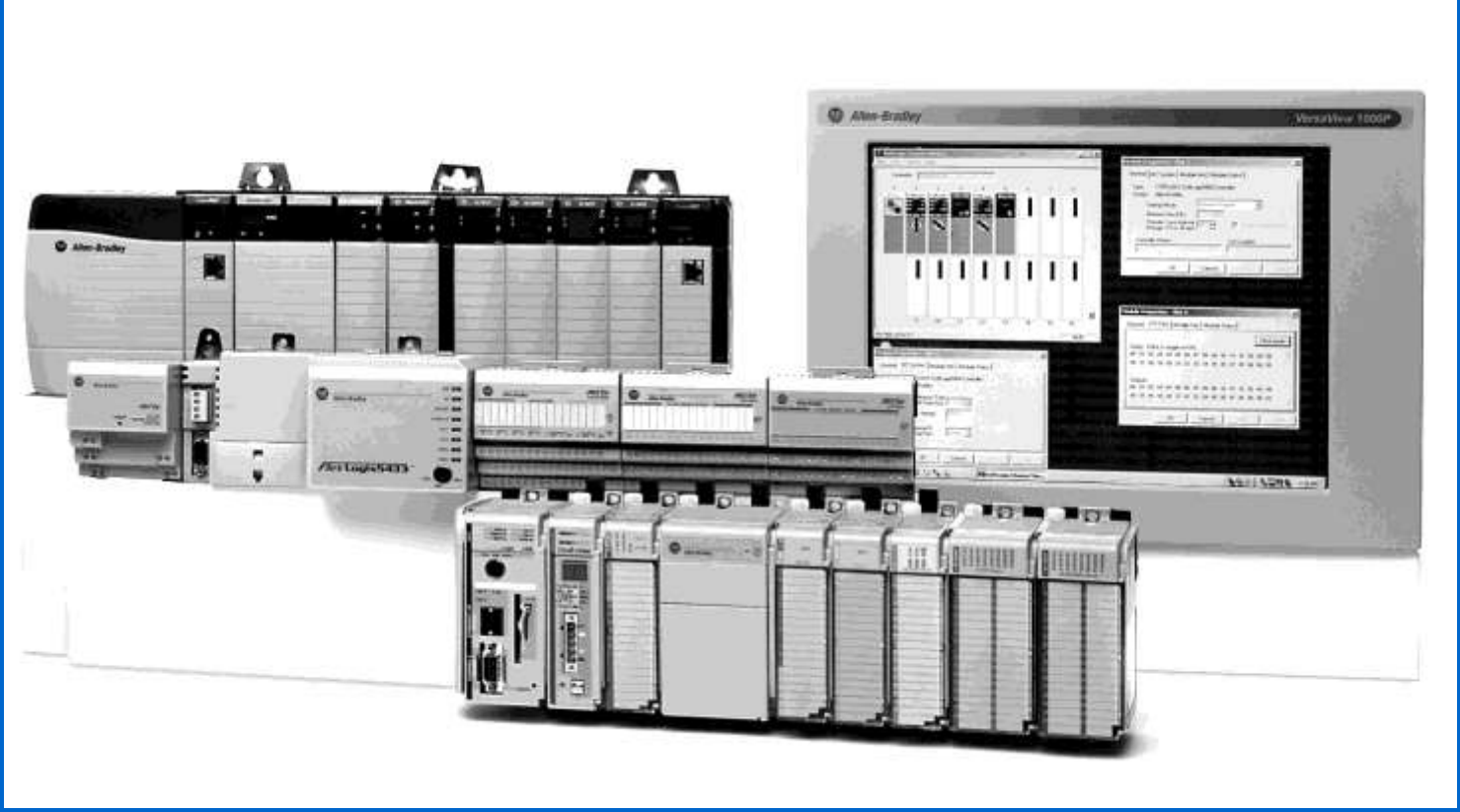
- 1968 General Motors specifies the design for a “standard machine controller”
- 1969 Modicon develops first model- “box full of relays”
- 1970-1972 Allen-Bradley
- 1971-1973 GE & Omron
- 1970’s-1980’s Siemens, Mitsubishi, Koyo, others

A/B PLC5

A/B SLC500

A/B Micrologix

A/B Control Logix



Hardware

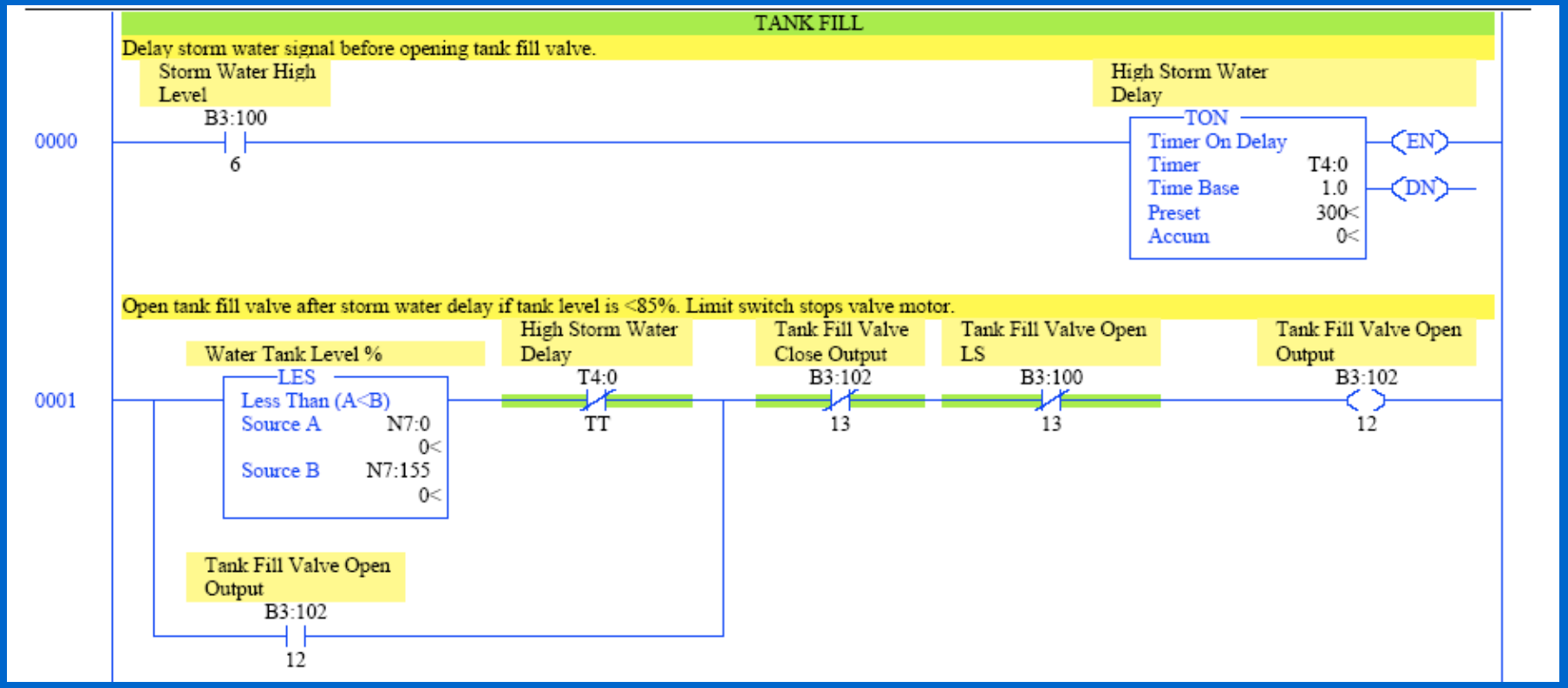
- Inputs: AC, DC Source/Sink
- Outputs: AC triac, relay, DC transistor
- Analog In: 0-5 V, 0-10V, 4-20 mA;12- bit
- Analog Out: 0-5 V, 0-10V, 4-20 mA;10-12 bit
- Communication: RS232, RS485, Modbus, Device Net, etc.
- High speed counter, motor drive, etc.

Programming Methods

IEC 61131-3

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

Ladder Logic

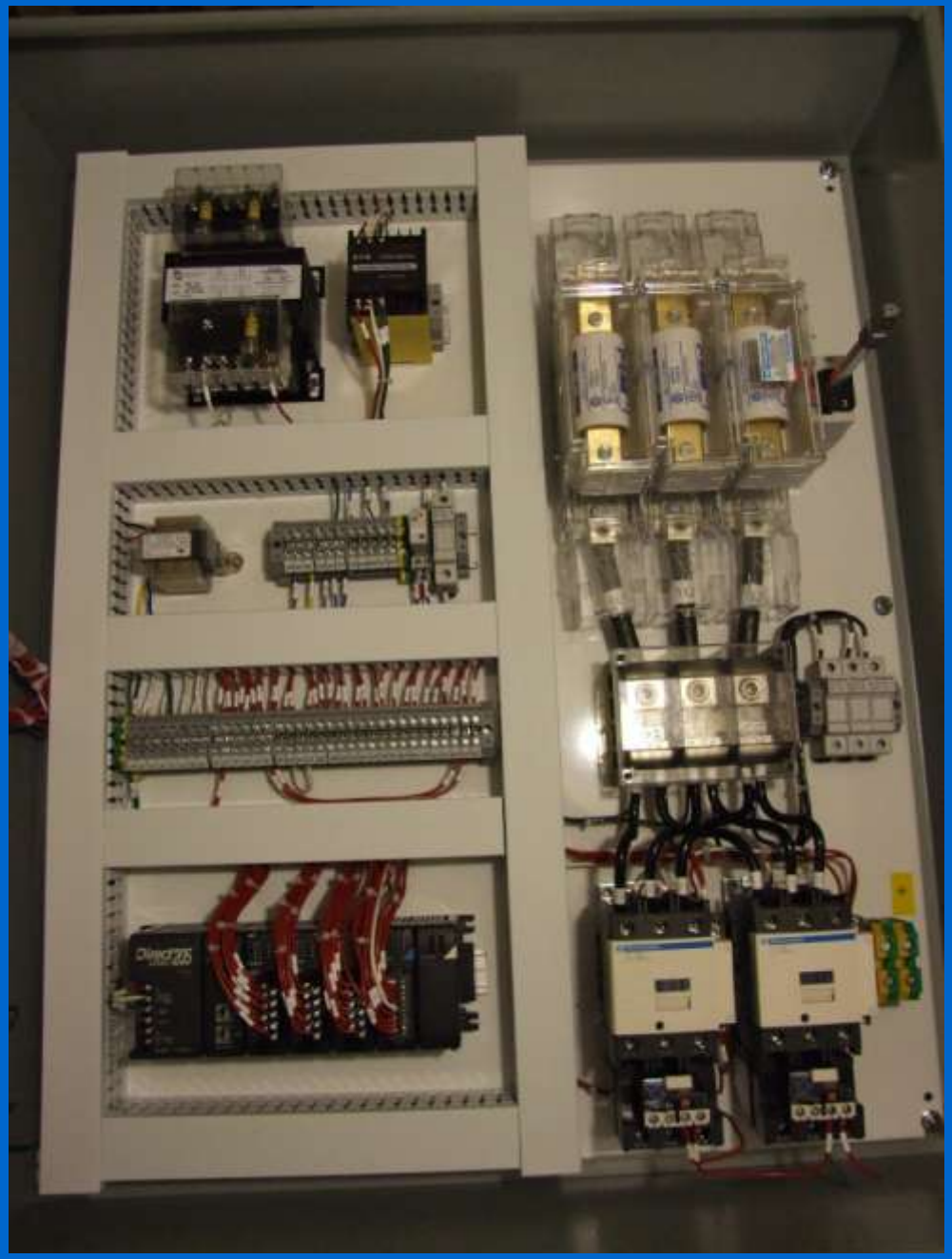


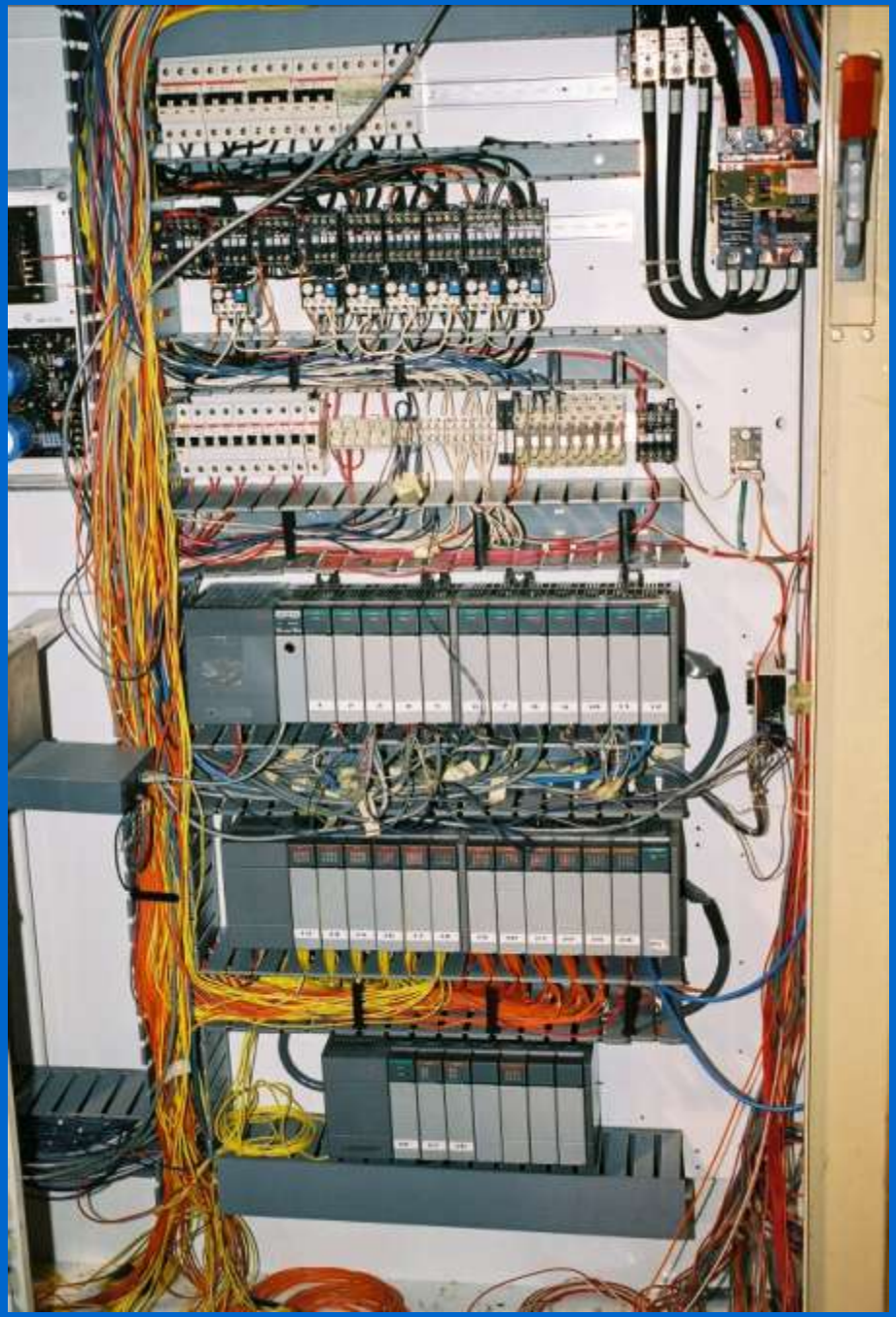
Micrologix Functions

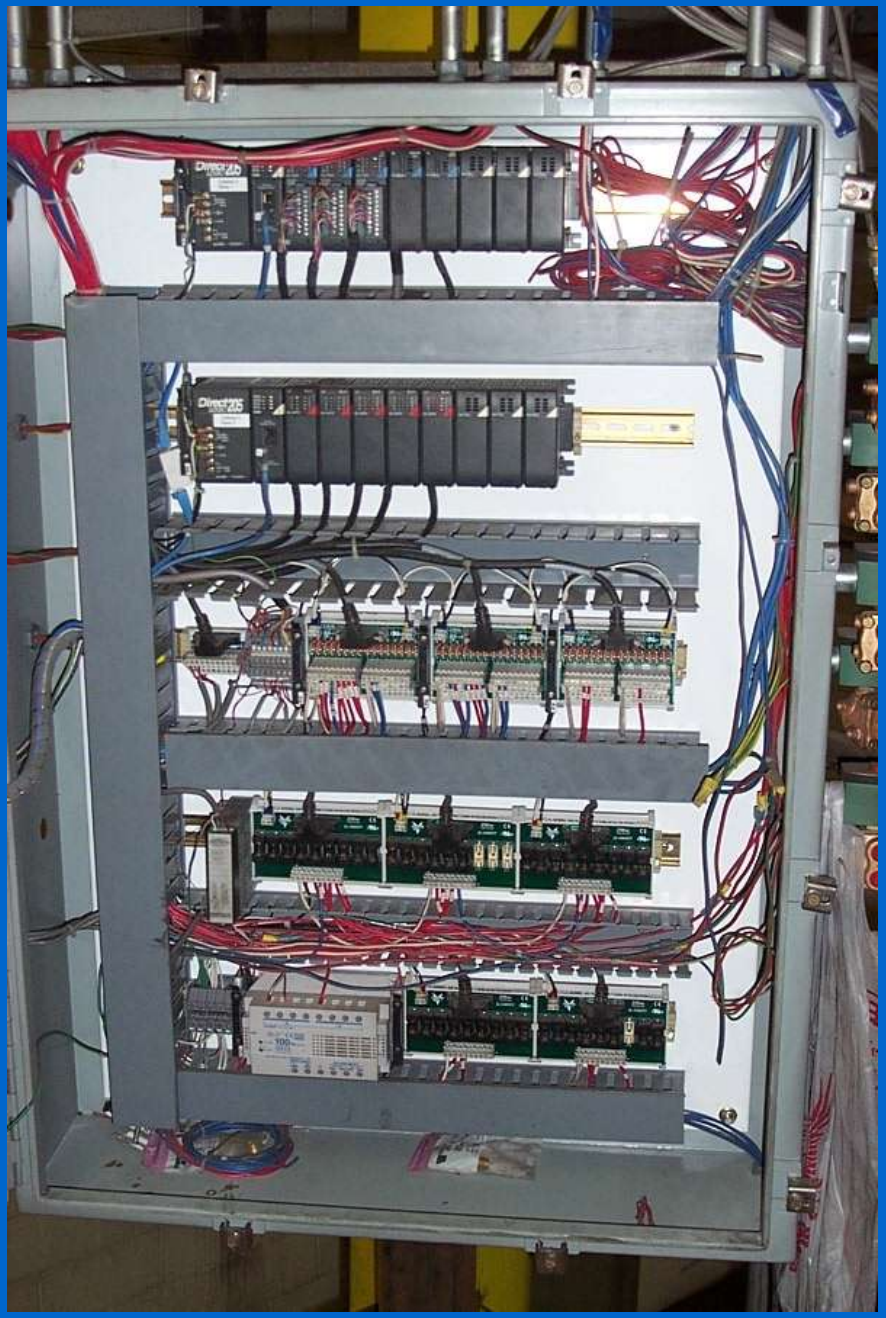
Functional Group	Description	Page
High-Speed Counter	HSL, RAC – The high-speed counter instructions (along with the HSC function file) allow you to monitor and control the high-speed outputs. Generally used with DC inputs.	5-1
High-Speed Outputs	PTO, PWM – The high-speed output instructions (along with the PTO and PWM function files) allow you to monitor and control the high-speed outputs. Generally used with FET outputs (BXB units).	6-1
Relay-Type (Bit)	XIC, XIO, OTE, OTL, OTU, OSR, ONS, OSF – The relay-type (bit) instructions monitor and control the status of bits.	7-1
Timer and Counter	TON, TOF, RTO, CTU, CTD, RES – The timer and counter instructions control operations based on time or the number of events.	8-1
Compare	EQU, NEQ, LES, LEQ, GRT, GEQ, MEQ, LIM – The compare instructions compare values by using a specific compare operation.	9-1
Math	ADD, SUB, MUL, DIV, NEG, CLR, ABS, SQR, SCL, SCP, SWP – The math instructions perform arithmetic operations.	10-1
Conversion	DCD, ENC, TOD, FRD, GCD – The conversion instructions multiplex and de-multiplex data and perform conversions between binary and decimal values.	11-1
Logical	AND, OR, XOR, NOT – The logical instructions perform bit-wise logical operations on words.	12-1
Move	MOV, MVM – The move instructions modify and move words.	13-1
File	CPW, COP, FLL, BSL, BSR, FFL, FFU, LFL, LFU – The file instructions perform operations on file data.	14-1
Sequencer	SQC, SQO, SQL – Sequencer instructions are used to control automatic assembly machines that have consistent and repeatable operations.	15-1
Program Control	JMP, LBL, JSR, SBR, RET, SUS, TND, MCR, END – The program flow instructions change the flow of ladder program execution.	16-1
Input and Output	IIM, IOM, REF – The input and output instructions allow you to selectively update data without waiting for the input and output scans.	17-1
User Interrupt	STS, INT, UID, UIE, UIF – The user interrupt instructions allow you to interrupt your program based on defined events.	18-1
Process Control	PID – The process control instruction provides closed-loop control.	19-1
ASCII	ABL, ACB, ACI, ACL, ACN, AEX, AHL, AIC, ARD, ARL, ASC, ASR, AWA, AWT – The ASCII instructions convert and write ASCII strings. They cannot be used with MicroLogix 1500 1764-LSP Series A processors.	20-1
Communications	MSG, SVC – The communication instructions read or write data to another station.	21-1
Recipe *(MicroLogix 1500 only)*	RCP – The recipe instruction allows you to transfer a data set between the recipe database and a set of user-specified data table elements.	22-1
Data Logging *(MicroLogix 1500 1764-LRP only)*	DLG – The data logging instruction allow you to capture time-stamped and date-stamped data.	22-1

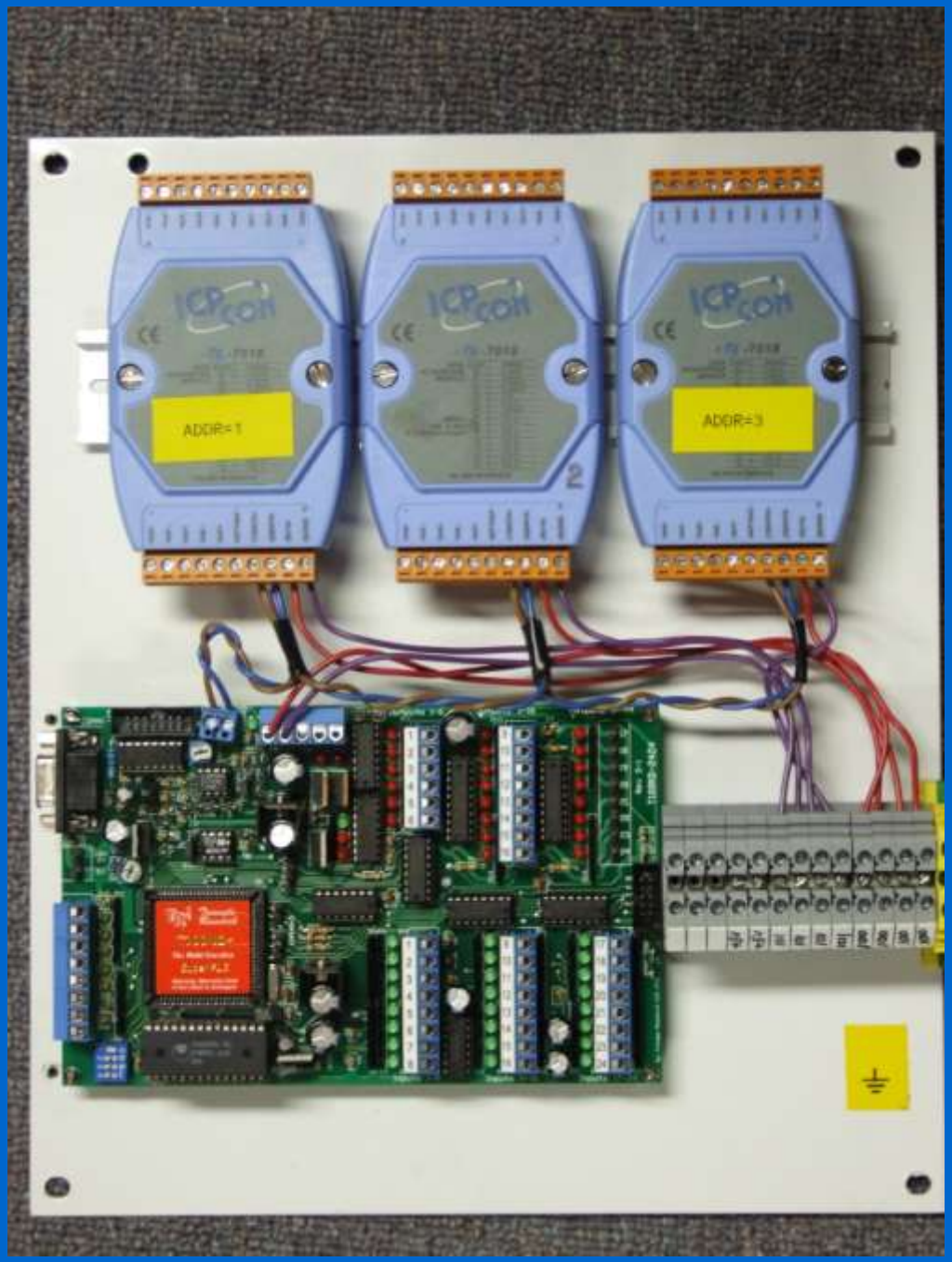
Future

- Advanced communication
- Greater processing power
- Smaller packages
- Total automation control
- Compatibility
- Safety PLC





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- Control system design
- Control panels
- PLC Programming
- Operator panel programming
- Troubleshooting
- Training
- Documentation

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