Chapter 3 PLCs and Processing I/O

Introduction

After an introduction of PLCs in chapter one, various characteristics of the PLC need to be discussed. The purpose now is to discuss what parts constitute a modern PLC and how these parts interface. The topology of a PLC system is also discussed as to how PLCs are distributed in a manufacturing environment to best control a process efficiently.

Since each is electronic and operates using one or more microprocessors, a 5 volt power supply and CPU (central processing unit) are the core of the PLC. Included in the CPU is a computer with memory and communications hardware to communicate to a programming panel, the I/O, and to a network which is either peer-to-peer or a multimode network.

Many PLC vendors divide the work of the PLC between multiple microprocessors with coordination handled by a master microprocessor. One processor may be assigned to handle the I/O. Another may handle the networking and communication to the programming panel. A supervisory microprocessor handles the logic, scan, arithmetic, and other instructions solution of the program.

Inputs and outputs complete the PLC with inputs reporting the status of the system and outputs controlling the sequencing of the process. Inputs and outputs are of many types and forms. A simple switch can be an input. Also, a high-speed pulse input can be an input providing speed information from a motor. Inputs and outputs alike can be simple or complex in nature. Both the simple I/O as well as the more complex will be discussed in the chapter and through the rest of the book.

Overview of the PLC

Inputs form the portion of the PLC connecting switches, sensors, transducers and other devices to the processor. Typically, the input is tied to a screw terminal. The PLC program reads the status of the inputs and solves logic based on this status.

The CPU stores the program and controls communication with all peripherals including programming devices as well as the I/O. The CPU executes the programs in an orderly manner and guarantee that I/O responds per the program. The guarantee is not trivial if one is experienced with most computer operating systems.

Outputs are connected to devices that control the process. Relays, motors, solenoids and other outputs are some examples. A pulse wave PWM is one that controls stepper motors and positional movement. The PLC program can control the status of this output and thus control the motor speed and movement.

In the figures below, the simplified PLC is shown first followed by an expanded view of the PLC. Each view shows the importance of the CPU (Central Processing Unit) as well as the interconnection of the CPU to I/O (Inputs and Outputs). Other devices interact in such a way that the program executes and solves logic in a timely manner.

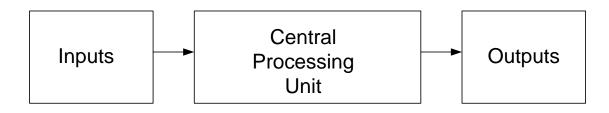


Fig. 3-1a Simplified View of the PLC

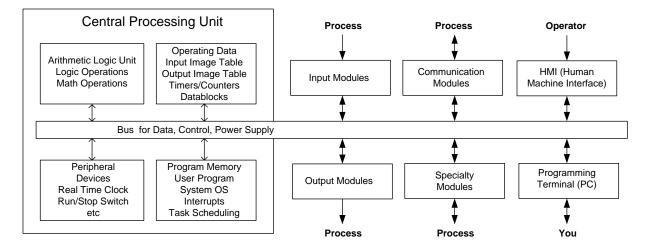


Fig. 3-1b Expanded View of the PLC

The second view gives a greater detail of data flow into and out of the PLC. As the devices and programs become more involved, the flow of data must both increase while being as secure as with simple systems. All systems may not use communication modules or specialty modules. Some may use a great number. All will use some kind of programming terminal and "you" will be responsible for providing the program to run it.

Most PLCs also have a table reserved for health status of the cpu, the I/O, and the software. This table can be monitored to find if processor errors have occurred. Status tables may be ignored for the most part until something goes wrong. When an error occurs, their use is extremely important to the programmer and to the recovery of the processor. The programmer must monitor the status table in order to determine what went wrong and to restore the processor to running condition again.

Also along-side the PLC's cpu is a watch dog timer (WDT). The WDT monitors health throughout the PLC and shuts down the I/O and program if there is a danger that the program or hardware has caused a major breakdown of the PLC's integrity to process the program and control the process. The WDT is helpless to shut down the machine being controlled if the program in the PLC is not functioning correctly due to poor programming. Care must be taken to consider all possible conditions of a program. The proper control of the machine or process under all conditions and circumstances is critical.

What Happens Electrically

Figure 3-2 demonstrates the flow of current in a simple circuit. The battery provides power to the lamp but is blocked in Fig. 3-2b because the switch is open. With an open switch, no current flows and the circuit is incomplete. When the switch closes, however, current flows and the lamp is illuminated (Fig. 3-2c). As simple as this circuit is, it contains the fundamental principle of input and output flow in a control circuit and the PLC.

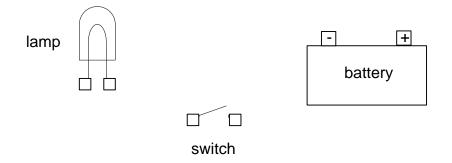


Fig. 3-2a Simple Electrical Components

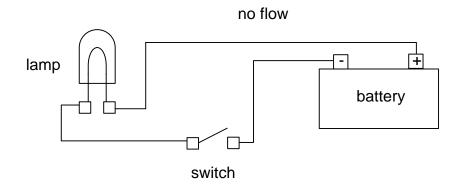


Fig. 3-2b Simple Electrical Circuit (Open, No Flow)

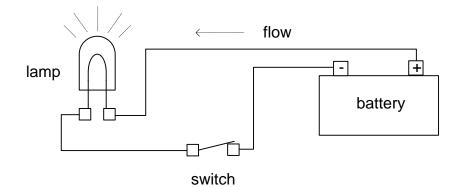


Fig. 3-2c Simple Electrical Circuit (Closed, Flow)

The schematic for these circuits resembles the circuit below (Fig. 3-2d). Symbols have replaced their physical devices but the functionality remains the same.

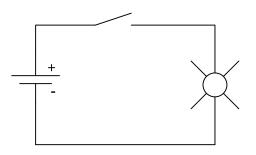


Fig. 3-2d Simple Electrical Schematic

Fig. 3-3 shows the PLC solving logic in a similar manner to the simple circuit above. The complication of additional circuits solving logic adds to the sophistication of the circuit. This allows much more sophistication in the defining of how a circuit will perform under all conditions.

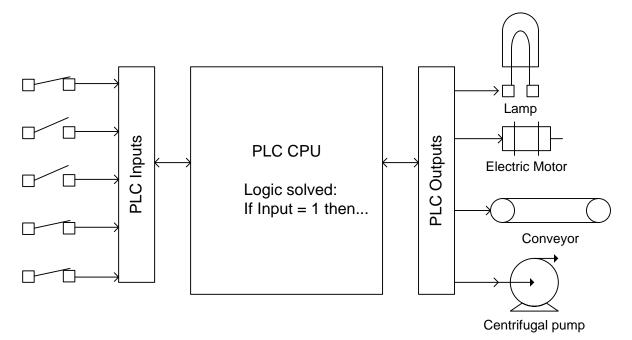


Fig. 3-3 Simple PLC Circuit with Real-World Devices

In addition to simple PLC networks such as that above, the PLC may contain network I/O allowing inputs and outputs to be communicated with at remote locations. Fig. 3-5 demonstrates this type of system.

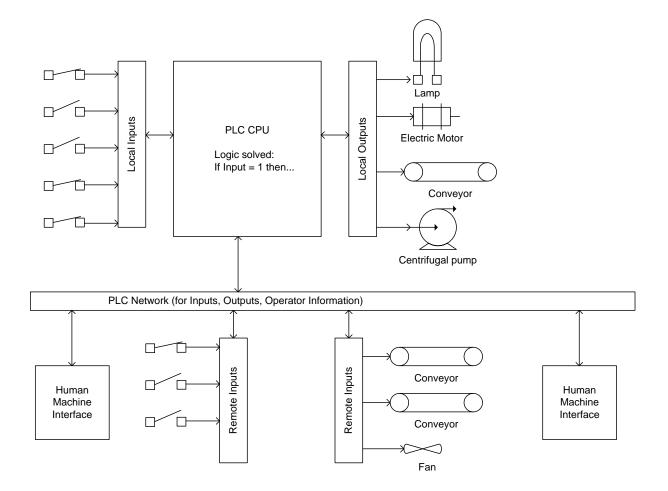


Fig. 3-4 PLC Circuit with Remote I/O

Inputs and outputs may even be communicated over wireless networks and this type of network is becoming increasingly more popular as wiring costs continue to rise and the equipment is designed for safe operation in all environments. Safe wireless networks are the latest advances in PLC equipment and offer expansion of logic into areas formerly off-limits to the PLC.

The PLC program is generated on a PC using the manufacturer's software, and temporarily stored there.

After the PC is connected with the TCP/IP interface of the PLC, the program can be transferred with a load function to the PLC's memory.

The PC is no longer needed for further program processing in the PLC except to monitor the online program observing the operation of the inputs, outputs and logic (program) linking the inputs to the outputs.

How does the PLC replace relay logic from a ladder logic diagram? Consider the following example. Pictured below is a simple generic PLC with four inputs and four outputs. One input is wired to a push button and one output is wired to an indicator light. While not exactly the same as our PLC processor, the steps of installing a program and wiring the PLC are the same.

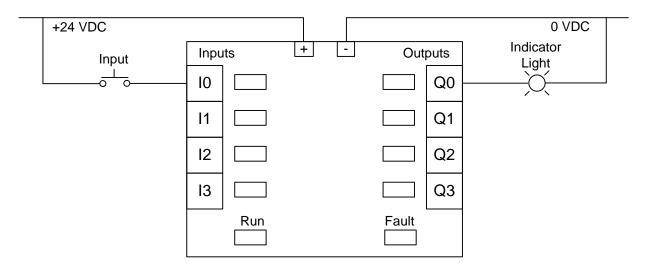


Fig. 3-5 Generic PLC Layout

Notice when wiring an input and energizing the button that the green indicator light for the input comes on:

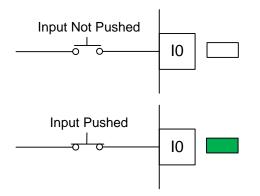


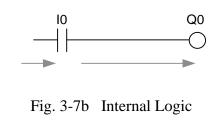
Fig. 3-6 PLC Inputs

In the program, contacts referring to the input conduct as shown below:



Fig. 3-7a Internal Logic

The program needed to create a circuit similar to the switch and light of Fig. 3-2d is shown below:



and the Run light is on:

Run

then the output will turn on and the light will turn on.

When the program shows the output on, the output LED turns on and the output terminal energizes the light as shown:

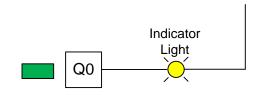


Fig. 3-8a Output Power On

When the program is turned from Run to Program, the output LED turns off and the output turns off. The outputs also turn off and the Run light goes off if a fault occurs.

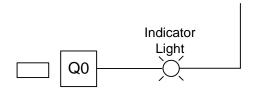
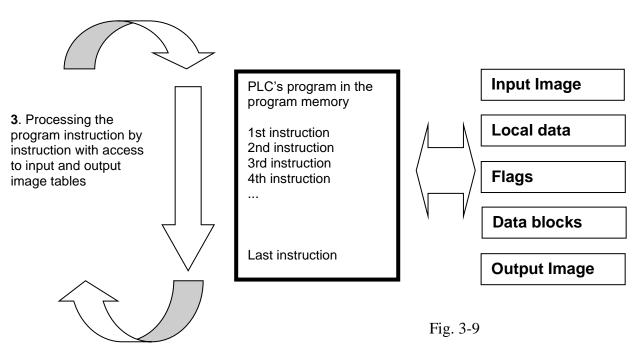


Fig. 3-8b Output Power Off

How is the Program Processed in the PLC?

The program is processed in the PLC cyclically, in the following sequence:

- 1. First, the status is transferred from the process image of the outputs to the output terminals.
- 2. The processor examines the individual inputs for high voltage or low voltage. Status of the inputs is stored in the process image of the inputs. For the inputs with the rated voltage a 1 or HIGH is stored, for those that don't the 0 or LOW is stored.
- 3. This processor then processes the program stored in the program memory. The program consists of a list of logic operations and instructions that are processed one after the other. For the required input information, the processor accesses the input table entered previously and the result of the logic operation is written into a process image of the outputs. If necessary, the processor also accesses other memory areas during program processing; for example, for local data of sub-programs, data blocks and flags.
- 4. Then, internal operating system tasks such as self-tests and communication are performed Then we return to item 1.
- 1. Transfer the status from the output image to the outputs.
- 2. Store the status of the inputs in the input image table.



Note: The time the processor needs for this sequence is called cycle time. In turn, the cycle time depends on the number and type of instructions and the processor capacity.

4. Perform internal operating system tasks (communication, self-test, etc...)

We need to discuss the types of inputs and outputs that constitute a valid PLC system. For inputs, we find:

From Liptak's Process Control: "Input Systems

Inputs are defined as real-world signals giving the controller real-time status of process variables. These signals can be analog or digital, low or high frequency, maintained or momentary. Typically they are presented to the programmable controller as a varying voltage, current, or resistance value."

Analog signals include thermocouple and resistance temperature devices. Digital signals include on-off signals from relay contacts or push buttons. Signals such as flowmeters provide frequency input with the frequency varying with the flow.

Signals to the programmable controller are input from single wire devices or from parallel signals. A thumb-wheel switch or scale system can input a four-digit number from four BCD parallel digits. Many signals such as the scale system also require a synchronization signal before data can be read.

Inputs include the following types or attributes:

DC voltage AC voltage, ranges of 50 Hz or 60 Hz available True High or True Low DC voltages Analog inputs, ranges 0-10V or 4-20 ma most popular BCD, Binary Coded Decimal Thermocouple Scale/load cells/LVDT, weight and force sensors RTD, Resistance Temperature Detector Latching Isolated or Common Neutral Intelligent (Smart with own CPU on board I/O card) Resolver Encoder Serial Communications Port

An example is the limit switch shown below:



Fig. 3-10 Picture of Limit Switch (Input)

I/O

From Liptak's Process Control:

"Outputs

There are three common categories of outputs: discrete, register, and analog. Discrete outputs can be pilot lights, solenoid valves, or annunciator windows (lamp box). Register outputs can drive panel meters or displays; analog outputs can drive signals to variable speed drives or to I/P (current to air) converters and thus to control valves."

Output signals are similar to input signals in that signals can be either analog or digital. Digital signals can be either single data or a parallel arrangement of bits. Most modules are ordered in arrangements of 4, 8, 16, or 32 devices per card.

Both input and output signals are optically isolated in designs for the US market. This protects signals from entering the interior of the PLC and allows the designer to wire circuits less carefully than in circuits without optical isolation. One main design difference between US and European PLC design is the lack of optical isolation in the European design.

Outputs include the following types or attributes:

DC voltage AC voltage, ranges of 50 Hz or 60 Hz available Isolated or Common Source True High or True Low DC voltages Analog Output Serial Communications Port Intelligent (Smart with own CPU on board I/O card) Servo Controller

While I/O modules vary in type and number, recent developments have caused even these general rules to change. Distributed I/O is an example of a small number of inputs and outputs isolated at a machine that control a portion of a machine remotely from the PLC. Typical remote I/O requires a rack, power supply and a large number of cards while distributed I/O is pre-configured for only a small number of inputs and outputs. A number of advantages occur with the use of distributed I/O in that the machine can be wired and tested in one facility, broken down and shipped to a second facility, and re-connected with very little change in the wiring. This leads to quicker start-ups and cheaper overall wiring costs. Typical distributed I/O is controlled over a communications network that is daisy-chained from device to device.

Some examples of PLC outputs include:



Fig. 3-11 Solenoid Valve (Output)

Ch 3 PLCs and Processing I/O



Fig. 3-12 Relay (Output)

The relay pictured may provide input contacts but is primarily used to turn on or off various other signals from the PLC and is connected to a PLC output to accomplish this task.

What is This?



From above, it resembles a light.



From the side, it still resembles a light but there are contacts that resemble those of a pushbutton.

Contacts for light to be connected are located here:



From the rear, it is clear that the contacts are for a pushbutton. NC refers to a normally closed and NO refers to a normally open contact.

And in fact, this is both a light and a pushbutton, commonly referred to as an illuminated pushbutton. Note that the pushbutton and light may be independent or wired to show when the button is pushed with a light on. We will in most programs require that the button be independent from the light.

Fig. 3-13 Combined Pushbutton/Pilot Light Ch 3 PLCs and Processing I/O Looking ahead in Ch. 5, we have an example of an Input/Output table. This table is organized to define the type of sensor or actuator, its function and the signal assignment. Signal assignments are made based on the condition of the program if the signal is compromised. If a wire falls off and the program responds poorly, then the signal assignment should be changed to the opposite type. Signal assignment of 1 is referenced as Normally Open and 0 referenced as Normally Closed.

The table below may be expanded to include the I/O address, ordering information, cost, and other pertinent information. This table has many uses and is important to the overall project's success.

Sensor	Function/State	Signal Assignment
Start Button	Start	1
High Level Switch	Level exceeded	0
Half Level Switch	Level exceeded	1
Temperature Switch	80° C exceeded	0

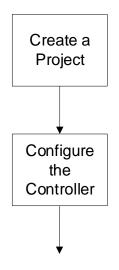
Table 3-1 (5-2a)Input Definitions

Actuator	Function/State	Signal Assignment
Agitator motor	Stirring/running	1
Fill Valve V-2	Fill tank	1
Flush Valve V-1	Empty tank	1
Heat	Heat juice	1
Done/Ready Indicator	Illuminated	1

Table 3-1 (5-2b) Output Definitions

How to Run a PLC program:

The steps to run a program in the plc is common to all plc manufacturers. It in general follows the following steps:



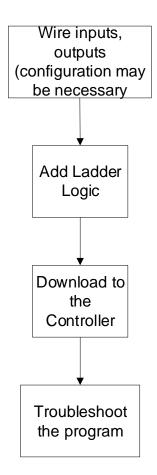


Fig. 3-14 Flow Chart of Program Development

Next we study the major brands of PLCs and begin the process of setting them up for use as a relay simulator and much more. This is the study of how to program a process and the PLC can do so much more than relays could. This is part of what will be explored.



The SIMATIC S7-1200

Fig. 3-15 Siemens S7-1200 Ch 3 PLCs and Processing I/O

Pictured below is a S7-1200 PLC from Siemens. It is a powerful new controller with many capabilities only available in more expensive models until recently.

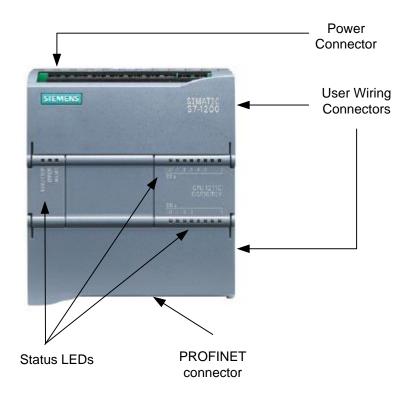


Fig. 3-16 New S7-1200 PLC from Siemens

The S7-1200 is referred to as a micro PLC and is programmed in STEP 7 Basic, the newest software offering from Siemens. The processor has capabilities of adding additional I/O to the basic unit shown above. The processor communicates to a programming panel through an Ethernet port referred to as the PROFINET interface found on the bottom of the unit. This port offers access to other controllers, a programmer's console and various HMI (Human Machine Interface) units.

Capabilities of this model – the CPU 1214C - include:

User Memory -	Work memory Load memory Retentive memory	50 Kbytes 2 Mbytes 2 Kbytes
On-board digital I/O	14 inputs	
	10 outputs	
On-board analog I/O	2 inputs	
Process image size	Inputs	1024 bytes
	Outputs	1024 bytes
Bit memory (M)		8192 bytes
SM modules expansion		8 SMs max
SB expansion		1 SB max
CM expansion		3 CMs max
High-speed counters		6 total
	Single phase	3 at 100 kHz and 3 at 30 kHz
	Quadrature phase	3 at 80 kHz and 3 at 20 kHz
Pulse outputs		2
Pulse catch inputs		14
Timedelay/cyclic interrup	ots	4 total with 1 ms resolution
Edge interrupts		12 rising and 12 falling
Real time clock	accuracy	+/- 60 sec/mon
	Ch 3 DI Ca and	Processing I/O

Execution speed	boolean	0.1 microsec/instruction
	Move Word	12 μsec/instruction
	Real Math	18 μsec/instruction
Communication		1 Ethernet port
	Data rate	10/100Mb/s
	Isolation	xfmr isolated
	Cable type	CAT5e shielded
Connections	HMI	3
	PG	1
	User program	8
	CPU to CPU	3

Specifications of the PLC include:

Digital Inputs	Number of inputs	14
	Туре	Sink/Source
	Rated voltage	24 VDC at 4 mA, nominal
	Continuous permissible	30 VDC, max
	Surge voltage	35 VDC for 0.5 sec
	Logic 1 min.	15 VDC
	Logic 0 max.	5 VDC
	Isolation	500 VAC for 1 min.
High Speed Clock	Single phase rate	100 kHz and 30 kHz
Analog Inputs	Number	2 Voltage (single-ended)
	Range	0 to 10 V
	Full-scale range	0 to 27648
	Overshoot range	27649 to 32511
	Overflow	32512 to 32767
	Resolution	10 bits
	Max withstand voltage	35 VDC
	Smoothing	None, weak, medium or strong
	Noise rejection	10, 50, or 60 Hz
	Impedance	>= 100 ΚΩ
	Isolation	None
	Accuracy	3.0% - 3.5%
	Common mode rejection	40 dB, DC to 60 Hz
	Operational signal range	
		greater than -12 V
	Cable length	100 m, twisted and shielded

Descriptions of S7-1200 Modules:

- Central modules CPU with different capacity, integrated inputs/outputs and PROFINET interface (for example, CPU1214C)



Fig. 3-17a S7-1200 (CPU 1214C)

- Signal boards SB for adding analog or digital inputs/outputs; whereby the size of the CPU does not change

(signal boards can be used with the CPUs 1211C/1212C and 1214C)



Fig. 3-17b Signal Board of S7-1200 (Analog I/O)

- SIMATIC memory cards 2MB or 24MB for storing program data and simple CPU replacement for maintenance



Fig. 3-17c Memory Card of S7-1200

Note: For this module M01, any CPU with integrated digital inputs and digital outputs is sufficient.

The SIMATIC Memory Card (MC) stores the program, data, system data, files and projects. It can be used for the following:

- Transferring a program to several CPUs
- Firmware update of CPUs, signal modules SM and communication modules CM



Fig. 3-17d Memory Card being installed

You may want to have this card on hand when you upgrade your software since the version of firmware onboard the PLC must be upgraded at the same time or you may be unable to properly link the PLC to the software in the programming terminal.

Allen-Bradley's CompactLogix L23E Programmable Automation Controllers

The following processor is the 1769-L23E-QBFC1B:



Fig. 3-18 Front View of CompactLogix L23E



Fig. 3-19 View of CompactLogix L23E with Wiring Exposed

CompactLogix programmable automation controllers (PACs) offer the benefits of the Logix Control Platform—common programming environment, common networks, and common control engine—in a smaller footprint for machine-level control applications. The new CompactLogix L23 extends these benefits into even smaller applications. The CompactLogix L23 controllers include the Logix control engine, power supply and two of the most common I/O configurations, lowering costs and simplifying configuration. Each CompactLogix L23 PAC offers 512Kb of memory, up to three tasks, four programs and embedded EtherNet/IP capabilities for ease of use. Up to two local Compact I/O or communication cards can also be added for additional flexibility.

	1769-L23E-QBFC1B
Embedded Communication Ports	Isolated Serial (DF1 or ASCII)
	Ethernet/IP with (MSG + I/O)
EtherNet/IP Connections	8 TCP/IP – 32 CIP
Memory	512 KB
Embedded I/O	16 DC in, 16 DC out, 4 Analog in, 2 Analog out, 4
	High-Speed Counters (250 kHz)
Expansion	2 Additional 1769 I/O Modules or 1 1769
	Communication Module
Tasks	3-Continuous, Periodic or Event
Programs	4
Routines	Unlimited
Languages	LD, FBD, ST, and SFC
Alarms & Events	Supported
PhaseManager	Supported
Add-on Instructions	Supported
Dimension	130x293x90mm
Power Requirements	19.2 – 31.2 VDC – 50VA

Table 3-2	CompactLogix L23E Capabilities
14010 0 2	

CompactLogix L16ER and the newer S7-1200 Processors



Fig. 3-20 L16ER in Rack

Allen Bradley's CompactLogix 5370 controllers expand the scalability of the Logix family of controllers, offer a wider variety of options, and provide best-fit alternatives for your specific application requirements. Coupled with Kinetix[®] 350, the controllers provide high performance in a compact and affordable integrated motion package for a variety of machine applications, all on one common network – EtherNet/IP. The L16ER Compact Logix processor, part of this family is shown above along with the newer Siemens S7-1200 processor. While the Siemens processor is similar to the earlier one, the A-B processor is very different. Some of the characteristics of this processor are:

The CompactLogix 5370 system provides:

- Two EtherNet/IP ports
- One USB port
- Support for local expansion modules
- Control of local and distributed I/O modules
- Use of 1784-SD1 or 1784-SD2 secure digital (SD) card for nonvolatile flash memory
- Internal energy storage solution eliminating the need for a battery

Characteristics

The CompactLogix 5370 L1 controller comes with a built-in 24V DC power supply and embedded digital I/O (16 DC inputs, 16 DC outputs). Up to eight 1734 POINT I/O expansion modules are supported. The following list the characteristics of this processor:

Characteristic	1769-L16ER-BB1B
User Memory	384 kB
Secure Digital	1 GB (standard)
Memory Card	2 GB (optional)
Communication Ports	DualPort Ethernet DLR, USB
Embaddad I/O	• 16 DC inputs
Embedded I/O	• 16 DC outputs
Module	6 expansion modules and 4
expansion	Ethernet nodes
capacity	

Network

Both A-B and Siemens have various requirements for connecting their processor to the Ethernet cable.

For the PC and the SIMATIC S7-1200 to communicate with each other, it is important that the IP addresses of both devices match.

First, we show you how to set the computer's IP address.

- From the System control, call the Network connections. Then, select the Properties of the LAN connection (→ Start → Settings → System control → Network connections→ Local Area Connection → Properties)
- 2. Select the Properties from the Internet Protocol (TCP/IP) (\rightarrow Internet Protocol (TCP/IP) \rightarrow Properties)
- 3. You can now set the IP address and the Subnet screen form, and accept with OK (\rightarrow Use the following IP address \rightarrow IP address: 192.168.0.2 \rightarrow Subnet screen form 255.255.255.0 \rightarrow OK \rightarrow Close)

MAC address:

The MAC address consists of a permanent and a variable part. The permanent part ("Basic MAC Address") identifies the manufacturer (Siemens, 3COM, ...). The variable part of the MAC address differentiates the various Ethernet stations and should be assigned uniquely world-wide. On each module, a MAC address is imprinted specified by the factory.

IP Address:

Value range for the IP-address:

The IP address consists of 4 decimal numbers from the value range 0 to 255, separated by a period. For example, 141.80.0.16

Value range for the subnet:

The subnet screen form consists of four decimal numbers from the value range 0 to 255, separated by a period. For example, 255.255.0.0

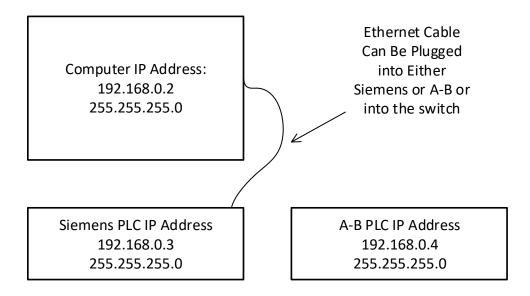
Example:

You entered the following: for the subnet screen form 255.255.255.0, for the IP address 141.30.0.5.

For setup of the A-B IP address, their BOOTP instructions on the internet give a good layout. Once the instructions for setup have been completed, the IP address is easily found using RSLinx Classic.

Once the hardware of an automation system is defined, the next step in the project cycle is to create a program. But before you start programming, it helps a whole lot if you understand the basic "structure" of the S7 PLC. This section will provide the necessary details of the CPU memory model, address areas and uses, how to add elements to a program, program structure, and what tools are available within the program editor for testing.

For our systems, the following local area network has been set up and will allow communication between PLCs and the computer:



Starting a Project and Logging onto the S7-1200

First, find the TIA V14 Button and click:



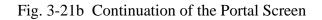
View the following:



Fig. 3-21a The Siemens Portal

Select a name of your project. Be aware that you will need to address the project from the H drive or from a stick drive.

		Totally Integrated Automation PORTAL
	Create new project	
Open existing project	Project name:	
🥚 Create new project	Path: Author:	
Migrate project	Comment:	~
Close project		
E.C		Create



Additional instruction is found on the video accompanying this text. Since the instructions vary from processor to processor, please view this video as a first step in logging on and programming the Siemens program.

Starting a Project and Logging onto the L23E-QBFC1B and L16ER Processors

First, use RSLinx to configure the EtherNet/IP Driver:

Fig. 3-22

Choose 'Communications', then 'Configure Drivers'.	Communications Station DDE/OPC Security RSWho
From the list of Available Driver Types, choose 'Ethernet/IP'	Available Driver Types: Add New RS-232 DF1 devices Ethemet devices Ethemet devices T784-KT/KTX(D)/PKTX(D)/PCMK for DH+/DH-485 devices T784-KTC(X) for ControlNet devices DF1 Polling Master Driver T784-PCC for ControlNet devices
Click 'Add New…' and then 'OK'	Add New RSLinx Classic Driver
Check 'Browse Local Subnet' and then click 'OK'	IP Address:
Verify that the driver is 'Running'. Close the 'Configure Drivers' window.	OK Cancel Acp> Hab
Verify that Ethernet/IIP is 'seeing' the PLC by clicking 'RSWho'	
뮮	RSLinx Classic Gateway - [RSWho - 1] File Edit View Communications Station DDE/OPC Security Window Help
and expanding the Ethernet link to see the specific CompactLogix processor	Workstation, USMAVPTGRIESM09 Status Status AB_DF1-1, DF1 Status AB_ETHIP-1, Ethernet

When launching Studio 5000, have the icon on your desktop or launch using Logix software. When launched, the following will appear:

👸 RSLogix 50	00						23
File Edit V	iew Search Logic	Communications	Tools Window I	lelp			
1 🖻	a % B 🖪	60		- # # %	e ve	Q Q	
No Controller No Forces No Edits Redundancy	□		Path: <none></none>			er/Counter 🔏 In	

Fig. 3-23

When starting with no program, choose New from the File menu. The New Controller dialog appears. Choose our controller,

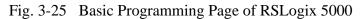
New Controller		×
Vendor:	Allen-Bradley	
Туре:	1769-L23E-QBFC1 CompactLogix5323E-QBFC1 Controller 👻	OK
Revision:	19 👻	Cancel
	Redundancy Enabled	Help
Name:	test	
Description:		
	-	
Chassis Type:	<none></none>	
Slot:	0 Safety Partner Slot: <none></none>	
Create In:	C:\RSLogix 5000\Projects	Browse

Fig. 3-24

the 1769-L23E-QBFC1 controller, add the revision level, 31 at present, add a name (text) in this example and click 'OK'

Congratulations! You have a PLC that can do absolutely nothing. There is no tag database and no program stored yet.

👸 RSLogix 5000 - test [1769-L23E-QBFC1 19.11]	
File Edit View Search Logic Communication	s Tools Window Help
1 1 1 I I I I I I I I I I I I I I I I I	🗸 🚑 🍓 🔂 🎼 📝 🛒 🍳 🔍 🛛 Select a Language
Offline Image: Controller Organizer Image: Controller Organizer	Path: <none> Favorites Add-On Safety Alarms Bit Timer/C</none>
Controller organizer Controller test Controller Tags Controller Tags Controller Fault Handler Power-Up Handler MainTask MainTask MainTask MainProgram Unscheduled Programs / Phases Motion Groups Ungrouped Axes Add-On Instructions Add-On Instructions Data Types Add-On-Defined Add-On-Defined Refered Refe	



There is, however, an I/O Configuration prepared. It includes the L23E, an Ethernet Port and some Embedded I/O. Note that there is also room for expansion I/O to the right of the processor.

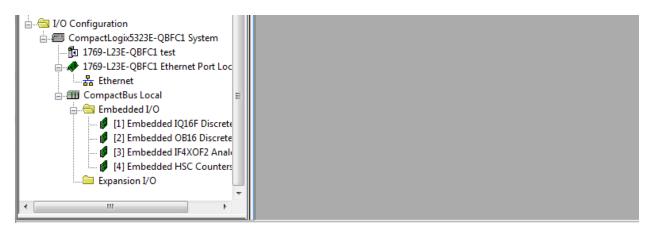


Fig. 3-26 I/O Configuration for L23E

On the left is a tree of folders. These show the controller, its tasks, any trends, data tables and the I/O configuration.

Click MainProgram and then MainRoutine to show the figure below. You are ready to program a rung of logic. Above the MainRoutine logic is the Ladder Instruction toolbar. From this toolbar, you can choose the type of contact to place in the rung of logic.

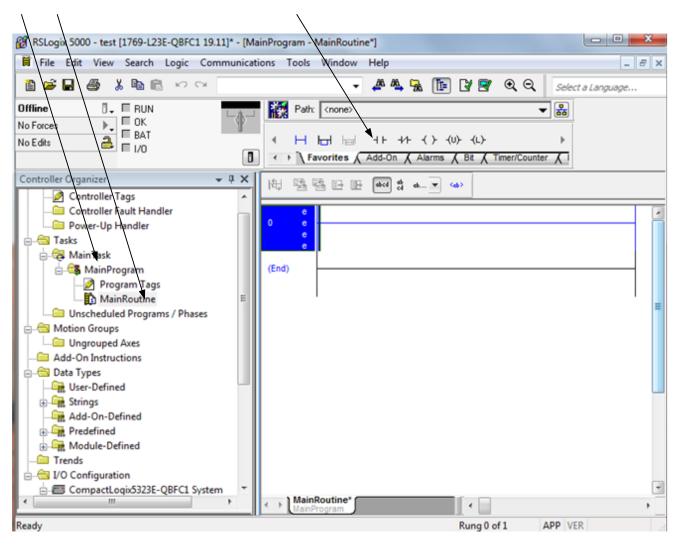


Fig. 3-27 Programming Area for RSLogix 5000

The embedded I/O may need to be configured. For instance, the 16 point input section has the following configuration screens:

Controller Organizer 🛛 🗸 🕂 🗙	Consert			
Program Tags	General Conne	ection Configuration		
🔤 🚺 MainRoutine	Type:	Embedded IQ16F 16 Point 24V DC Hig	h Speed Input	
🛄 Unscheduled Programs / Phases	Vendor:	Allen-Bradley		
🖕 😁 Motion Groups	Parent:	Local		
Ungrouped Axes	Name:	Discrete Inputs	Slot:	1
Add-On Instructions	Name.	Discrete_inputs	5001.	•
🚊 🖂 Data Types	Description:			
🚂 User-Defined				
🖶 🛱 Strings				
🚂 Add-On-Defined	- Module Defin	ition		
🖶 🗔 Predefined	Series:	None Change		
🗄 🛱 Module-Defined	Revision:	3.1		
Trends	Electronic Ke	ying: Compatible Module		
🗄 🔄 I/O Configuration 🛛 🗧	Connection:	Input		
🗄 🖅 CompactLogix5323E-QBFC1 System	Data Format:	Integer		
1769-L23E-QBFC1 test	Data Format.	integer		
🚊 🛷 1769-L23E-QBFC1 Ethernet Port Loc				
🗄 📶 CompactBus Local	Status: Offlin	е ОК	Cancel	Apply Help
🚊 🔄 Embedded I/O		OR		
🥬 [1] Embedded IQ16F Discrete				
🗊 [2] Embedded OB16 Discrete				
🦸 [3] Embedded IF4XOF2 Analı				

Fig. 3-28 Imbedded I/O Configuration Screen

General Connection Configuration
Requested Packet Interval (RPI): 20.0 ms (1.0 - 750.0)
Inhibit Module
Major Fault On Controller If Connection Fails While in Run Mode
Module Fault

G	eneral	Connection	Configuration
	Group	Fi	lter
	Group	Off to On	On to Off
	0	2.0 msec 🚽	2.0 msec 🚽
	1	2.0 msec 🔍	2.0 msec 🔍

Fig. 3-29 Filter Times for Imbedded Input Group

It is important that the student practice the programming steps outlined above to be able to start a new project, download a project to the Siemens 1200 PLC and start and stop the processor. The ability to do this will pay dividends in later labs.

The embedded I/O is addressed automatically in the 'Controller Tags' entry. This resembles the following:

Controller Organizer 🗸 🗸 🗙		Scope:	I test	•	Show:	All Tags	-	T. Enter Nan	ne F	Ther	-
End Controller test		Name	18	Value	+	Force Mask 🗧 🗲	Style	Data Type		Properties	C
Controller Tags		+-Loc-			{}	{}		AB:Embedded	1		
Controller Fault Handler		+ Loc-	al:1:1		{}	{}		AB:Embedded	L		E 🗲
Power-Up Handler		+-Loc-			{}	{}		AB:Embedded	н	Generation	
🖶 🖷 Tasks	⊪⊢	+-Loc			{}	{}		AB:Embedded	н	Name	Local:1:C
🖻 👼 MainTask	⊪⊢								н	Usage	<normal></normal>
🖶 🕞 MainProgram	⊪⊢	+-Loc			{}	{}		AB:Embedded	н	Туре	Base
Unscheduled Programs / Phases		+-Loc-			{}	{}		AB:Embedded	н	Alias	
🖨 🔄 Motion Groups		+-Loc-	al: 3:1		{}	{}		AB:Embedded	н	Base	
Ungrouped Axes		+-Loc-	al:3:0		$\{\ldots\}$	{}		AB:Embedded	н	Data	AB:Embe
Add-On Instructions		+-Loc	al:4:C		<i>{}</i>	{}		AB:Embedded	н	Scope	test
🚊 🖂 Data Types		+-Loc-	al: 4:1		{}	{}		AB:Embedded	н	Exter	Read/W
		+-Loc-	al:4:0		{}	{}		AB:Embedded	н	Style Const	N-
🛓 🙀 Strings											
🙀 Add-On-Defined									н	Requ Visible	
🕀 🙀 Predefined									н	Descri	ation
🕀 🔙 Module-Defined										Description Deta	JUON
Trends										Data Data Troduce	ord Con
🖃 😓 I/O Configuration											med Con
										Consu	neu con

Fig. 3-30 Embedded I/O Addressing

The 16 inputs from the input card section are addressed as follows:

Local:1:I.Data.0 (bit 0)

...

Scope: 🚺 test 🗸 👻	Show: All Tags		▼ 7. Ente	er Nan	ne Fi	iher	•
Name 💶 🛆	Value 🗧 🗲	Force Mask 🛛 🗲	Style	Da	^	Properties	C
. E-Local:1:C	{}	{}		AB:	1	₽	E \$
E-Local:1:I	{}	{}		AB:		Genera	
E Local:1:I.Fault	2#0000_00		Binary	DIN	11	Name	Local:1:1
E-Local:1:I.Data	2#0000_00		Binary	INT		Usage	20001.1.1
-Local:1:I.Data.0	0		Decimal	BO		Туре	Base
-Local:1:I.Data.1	0		Decimal	BO		Alias	
-Local:1:I.Data.2	0		Decimal	BO		Base	
-Local:1:I.Data.3	0		Decimal	BO		Data	INT
-Local:1:I.Data.4	0		Decimal	BO		Scope	💽 test
-Local:1:I.Data.5	0		Decimal	BO	=	Exter	Read/W
Local:1:I.Data.6	0		Decimal	BO		Style	Binary
Local:1:I.Data.7	0		Decimal	BO		Const	No
Local:1:1.Data.8	0		Decimal	BO		Requ Visible	
Local:1:I.Data.9	0		Decimal	BO		Descrip	otion
-Local:1:I.Data.10	0		Decimal	BO		• Data	
-Local:1:I.Data.11	0		Decimal	BO		• Produc	ed Con
–Local:1:I.Data.12	0		Decimal	BO		Consur	ned Con
–Local:1:I.Data.13	0		Decimal	BO			
–Local:1:I.Data.14	0		Decimal	BO			
Local:1:1.Data.15	0		Decimal	BO			
	{}	{}		AB:			
	{}	{}		AB:			

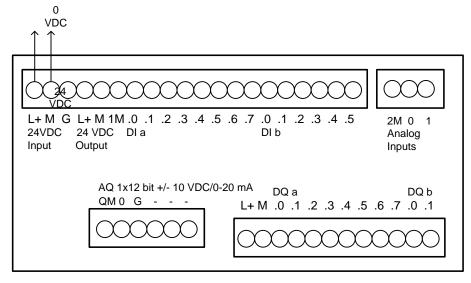
Fig. 3-31 Embedded I/O Addressing Expanded

Again, it is important to view the video for instructions about logging on and programming the A-B.

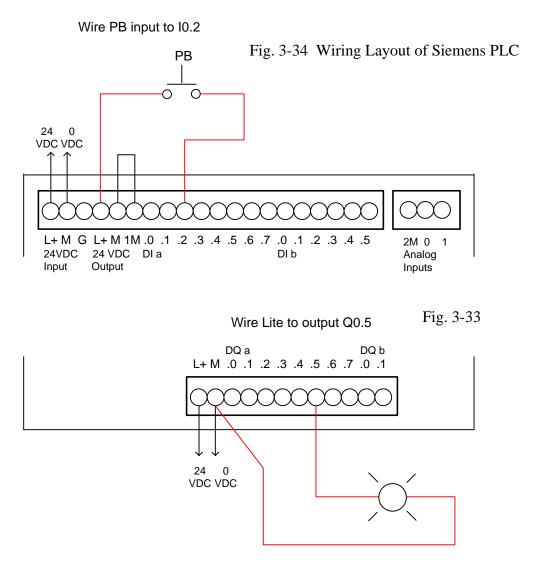
Wiring the Processor

Both Siemens and A-B require the inputs and outputs be wired properly to have a program accepted as working. Yes, there is a simulator for both but the actual wiring of the project adds a step that most will eventually appreciate the full scope of a PLC project.

Pictured first is a Siemens S7-1200 processor wired for an input and output.







Next is an A-B L23E-QBFC1B processor wired for inputs and outputs:

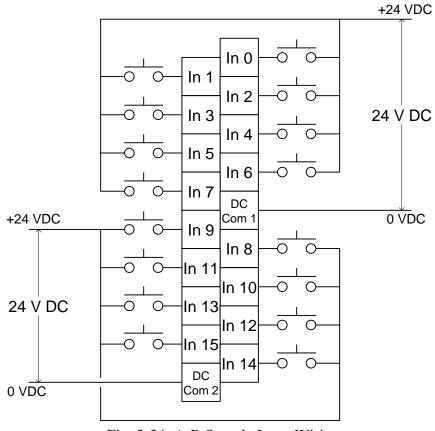


Fig. 3-34 A-B Sample Input Wiring

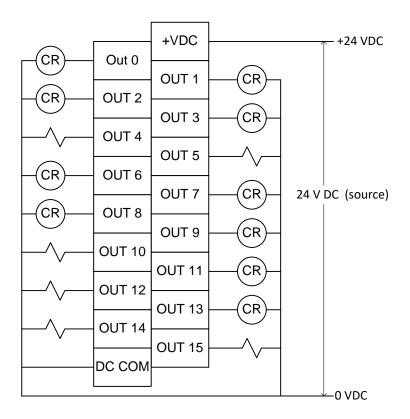
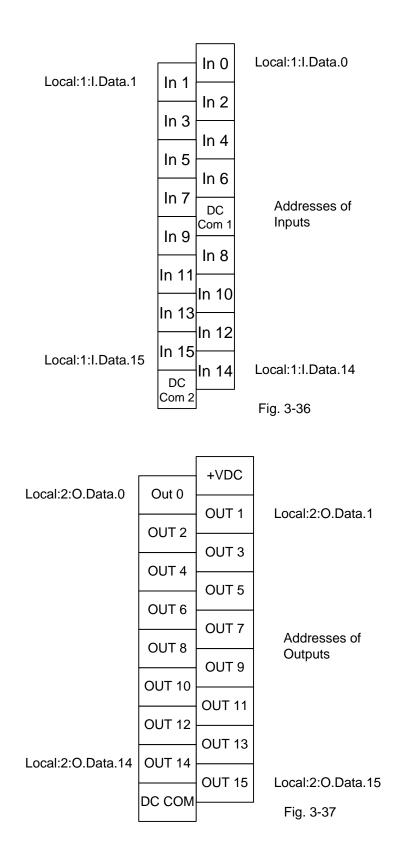


Fig. 3-35 A-B Sample Output Wiring



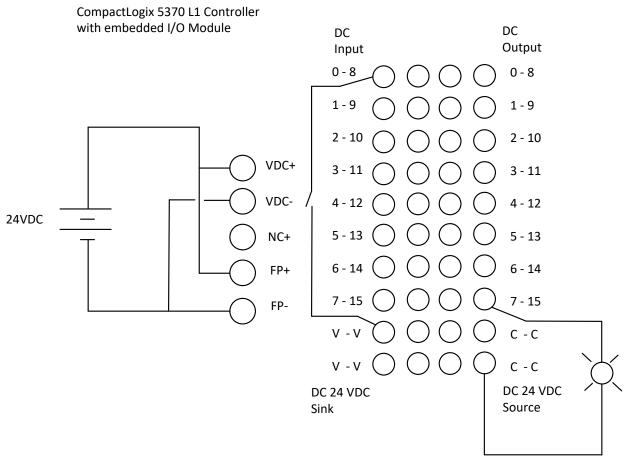


Fig. 3-38

Operating Modes of the CPU

The CPU has the following operating modes:

• In the operating mode STOP, the CPU does not execute the program, and you can load a project

• In the operating mode STARTUP, the CPU performs a startup.

• In the operating mode RUN, the program is executed cyclically. Projects can not be loaded in the CPU's RUN mode.

The CPU does not have a physical switch for changing the operating mode. The operating mode (STOP or RUN) is changed by using the button on the operator panel of the software STEP7 Basic. In addition, the operator panel is provided with the button MRES to perform a general memory reset and displays the status LEDs of the CPU.

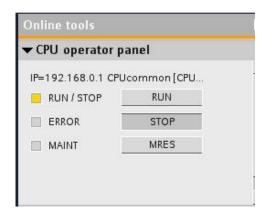


Fig. 3-39 Controlling Run/Stop Mode of CPU

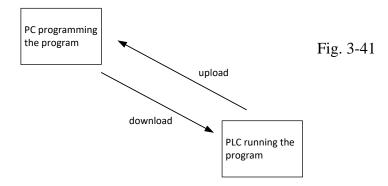
The color of the **status** LED RUN/STOP on the front of the CPU indicates its current operating mode.



In addition, there are the LEDs ERROR to indicate errors and MAINT to indicate that maintenance is required.

All the processors of Allen Bradley CompactLogix PLC have a key switch of **RUN-REM-PROG** with the following functionality. Mode of RUN allows no edits. REM PLC in the processor remote mode control allows remote programming with RSLogix 5000. Program mode or PROG PLC will stop the processor and allow downloads

Download vs Upload



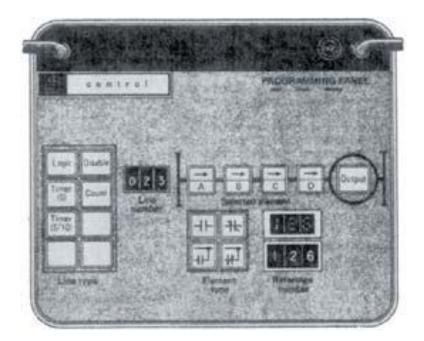


Fig. 3-42 Modicon 084 Programming Panel

The programming panel above is of the first PLC, the Modicon 084. There was a very limited group of Boolean expressions available for the programmer. All other expressions were required to be broken into a number of rungs that together represented the original Boolean expression. The four buttons for normally open, normally closed, parallel normally open and parallel normally closed were the only choices. The parallel branches were tied back to the left power bus.

The figure below shows the limited choices for each of the four contacts and how the combinations of these expressions forced the engineer to break up most logic into a number of rungs or lines of logic.

This cryptic first PLC's restrictions seem very limiting. They are. To be blunt, all PLC's force the user to make compromises with an original schematic drawing. Electricity flows in any direction but the PLC manufacturers forced power to flow left to right and never in the reverse direction. Power could flow up or down but never right to left. This compromise is still in place with all PLC manufacturers (with ladder). With the FBD programming format, lines can be drawn in any fashion and connections flow in any direction.

From Steve Jones, SHJCo, Oct 12, 2017, Control Design, "A walk down automation programming memory lane"

I first "cut my teeth" on PLCs at Rochester Products Division of General Motors in Rochester, New York, when I was asked to modify logic in some of its manufacturing machines in 1977. The first one I was given was an in-line machining center that performed drilling and tapping at various angles on automotive carburetor housings in stages. There were 65 stations in this one system controlled by four Modicon 084 programmable logic controllers (PLCs).

If you are not familiar with the 084 PLCs, these dinosaurs had core memory of about 1 k of toroid donuts per card, with one bit per donut; and the logic consisted of four contacts and a coil for every rung. The contacts could be normally open (NO) or normally closed (NC) and could be logically ORed (or not) with the left power rail. It was programmed using a Zero case enclosed programming panel using thumb wheels, push buttons and indicator lights.

We "saved" the programs by calling the central computer room and then connecting the phone to a modem, using a different Zero case, where the computer room would capture the program with a DEC PDP-8 minicomputer and then punch a paper tape for storage on a shelf. We had to hand-draw all of the logic on D-size sheets and update the drawings when the logic was changed."

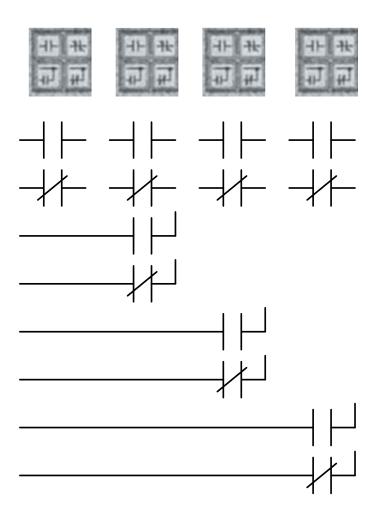
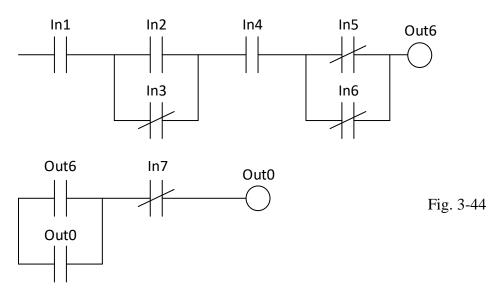


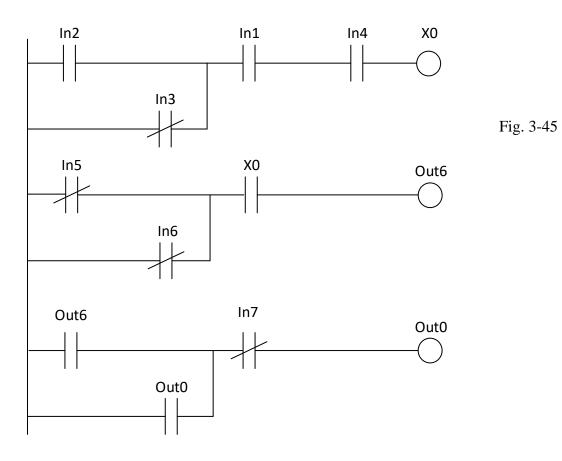
Fig. 3-43 Modicon 084 Programming Panel Boolean Logic Choices

An example program is shown in the figure below showing how the original circuit was broken into a number of simpler circuits following the restrictions outlined above.



The circuit at above is the circuit required but the programming panel above allows only four contacts and each contact after the first is either NO, NC or parallel NO or NC back to the left power bar.

The circuit above is broken down into the circuits below.



Summary

In this chapter we discuss a number of topics related to starting up a PLC project. This includes the PLC itself, what it is and how it works. Also included is a discussion of I/O, inputs and outputs, the devices that give input to the PLC program and report on the outputs of that program.

A generic PLC helped in this with an illustration of a simple light-bulb circuit and the PLC implementation of that circuit. Simple as that illustration was, it demonstrated all the aspects of describing the PLC equivalent of the original circuit.

The scanning capabilities of the PLC were discussed along with various types of inputs and outputs.

Then we discussed the specific characteristics of the PLCs used in this text. They include the Siemens S7-1200 and the Allen Bradley CompactLogix L23E and L16ER.

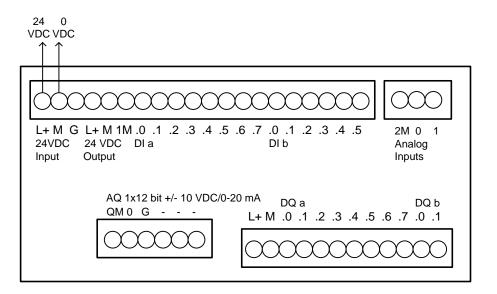
We will have the IP addresses and network system already set up for students to use but an introduction to IP addresses, subnet masks and additional information was introduced.

Finally, the starting of the programs was discussed. Most of the internal programming will be discussed in class and through videos. The text is only to be used as an over-view in this case.

Also discussed was the wiring of various inputs and outputs. Each processor has unique requirements in this area and these requirements will need to be addressed for completion of any project.

Exercises

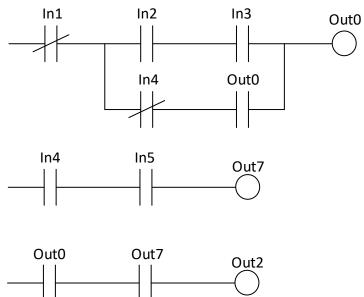
1 *For the Siemens 1200 processor below, draw the wires to connect a NO limit switch to input 11.4. Draw the wires to connect a solenoid to output Q1.0.



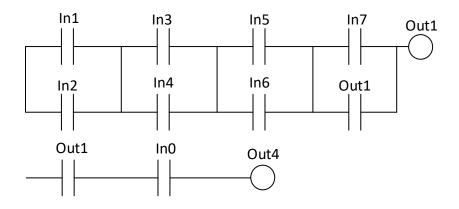
2 *For the Allen-Bradley L23E processor below, draw the wires to connect a NO limit switch to input Local:1:I.Data.3. Draw the wires to connect a solenoid to output Local:2:O.Data.2.

	ln 0	Out 0	+VDC
In 1	In 2		OUT 1
In 3	In 4	OUT 2	OUT 3
ln 5	In 6	OUT 4	OUT 5
In 7	DC Com 1	OUT 6	OUT 7
In 9	In 8	OUT 8	OUT 9
ln 11	In 10	OUT 10	OUT 11
ln 13	In 12	OUT 12	OUT 13
ln 15		OUT 14	
DC Com 2	In 14	DC COM	OUT 15

3. For the following circuit, use the original Modicon 084 programming constraints to implement a circuit that could be input into the processor:



4. For the following circuit, use the original Modicon 084 programming constraints to implement a circuit that could be input into the processor:



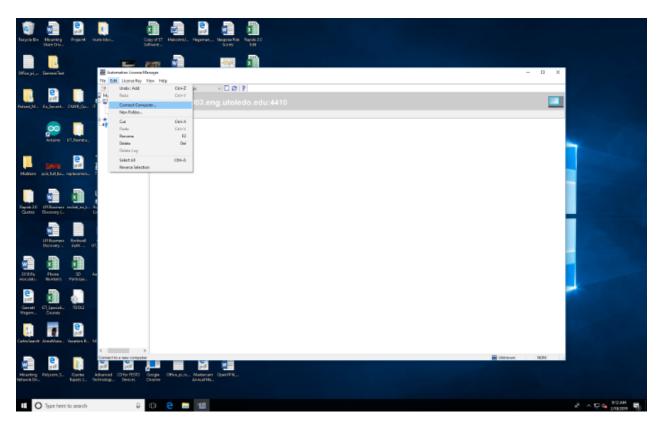
Each student must perform this <u>one-time procedure</u> via their UTAD logon if they want to have access to the Siemens device.

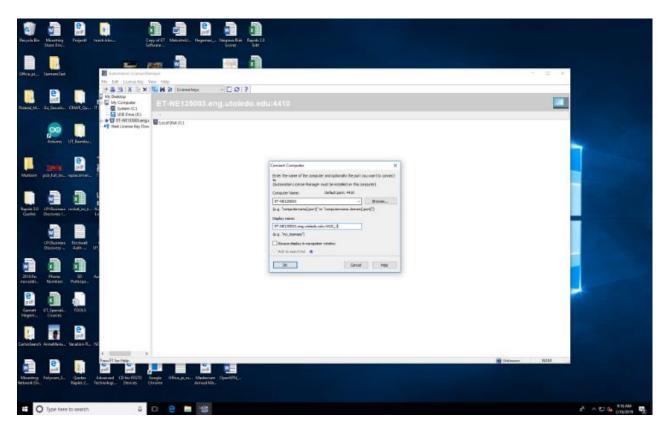
- 1) Open the Siemens Automation License Manager
- 2) Click Edit
- 3) Click Connect Computer
- 4) Click Browse
- 5) Click Entire Network
- 6) Click Microsoft Windows Network
- 7) Click UTAD
- 8) Scroll down to ET-NE135003 and click on it.
- 9) Now make sure that both check boxes are checked for *Always display in Navigation Window* and *Add to Search List*.
- 10) Click OK
- 11) Done

Now you may go on to use your Siemens device and from now on you will be connected to the Siemens license sever each time you use the Siemens portal.

Siemens Fix:

Whenever you see this, try to reconnect your computer to the license server (ET-NE135003) by the following steps;





	Thornton Dant		Automation Literas Mar	THE AT									- 1	z x	
	STOC STOC		THE EAR LILIPISE Rey VI											2 33	
	(Carried Street, Stree		XXXEX		and later and	0017								-	
1	e		Ny Desktop		and rept.	La William								and the second division of the second divisio	
		- -	Wy Computer											0	
4M-	Salarait.	CHMILO IT	System (C)											a second	
				Salve	Farty	Dentart	Sector	Rombar of Joanna	Torana key	licaran narehar	Sharidard Learns type	Conservations .	laidey.	Article 8 **	
		-	in Discriber E1	*	SMADC STOP 7	STEP 7 Professional -			30457980914879	16421030711192345		Deno	10 68y/61 CPI5 (89(5)		
	00		En Dermatten	*	SWARCSTEP 7	SPER 7 Professional.		1	50407980P14819	1041100071115234L		Detta	17 depts) (265 dept)		
	-	United by	AT that Lourse Key Dow	*	SMUTC STEP 7 SMUTC STEP 7	SPEE 7 Professional			SD45798041819	1642 1000713162548		Deno	24 daysta CHS days	-	
	Softern 1	tite hereitst.		2	SMALLS STAFT SMALLS STAFT	STEP 7 Professional			SD407R0F14019	1641 X0077 (162348.)		Dans Dans	24 days) (965 days) 24 days) (965 days)	-	
				2	INVESTIGATION	STEP 7 Professional -			SD407R0FH819	16411000711162348		Dens	24 day(x) (265 days)	-	
		100		1	BANATIC STOP 7	STEP / Professional.			SEACHADY METH	1641 100071 110234L		Serie	24 days) (245 days)		
				4	SHARTC STEP 7	SPER 7 Fechanicrat			SEASTPROFILETY	164 100071115254L		Densi	24 dayla) CH5 dave		
	postal av-			~	HAMPIC STHE 7	SPER 7 Professional -		1	SEMS/PROFILETS	16011000711152548		Cerro .	76 day(s) 0165 days	4	
	and million is			4	BANDICSTRP 7	STIP ? Fedmoeral.	141	1	SEACTROFILED	16421000711152340		Dens	26 myth2 CMS shept:	4	and the second second
				4	INMEDIC STOP 7	STEP 7 Profectional .		1.1	SD457980F14019	10/010007111525alL		Deno.	13 daylo) CHS daylo		
		- FRA - 1		4	INVOCISTIP 7	STIP ? Federarul,		1. C	90407930914819	104103071162346		Dares	30 day(s) (365 days)	4	
	w	X		4	SWATIC STOP 7	STEP 7 Professional -		1	50407900734010	16411030711192348		Deno	10 days) (245 days)	- I	
110	Ultilianen			~	SEMANC STEP 7	SPEP 7 Professional .		R.	SD4CPR0F14819	1648 100079 I M234L		Owns.	S2 disp(s) (365 disps)	-	
	Discovery C.	1		*	MMATHC STEP 7	STEP 7 Professional -			5045798093219	16/2 100171 1152 548		Deno	99 68y/61 (205 68e/2	-	
				1	SIMMETIC STEP 7	STOP 7 Professional.			SD407PR0F14819	1641100171152548		Carso	50 dayla) (365 daya)	-	1993 (Sec. 1997)
	100			~	SEARCHE STEP 7 SEARCHE STEP 7	STEP 7 Professional .			SD407R0F14819	10471000711162348		Oeno Oeno	55 dbp(c) (365 dbpc) 346 dbp(c) (365 dbpc)	-	
	w			-	SIMATIC STOP T	STEP 7 Professional.			30407M0F14019	16471000711102348		Dono	346 dayoji (365 dayo)	1000	
	LALBASTAN.	Received	1 1	-	INVATIC STEP 7	STEP 7 Professional.			SD407RDF14012	104 100071 1152546		Denu	365 step(a) (365 deys)		
	Docovety	Adding UT		-	IRMANIC STOP 7	SELF 7 Professional -			SEALPROFISEN	1642 1000797173198		Deno	905 (bool : 905 days)		
			6	-	MANATIC STEP 7	STSP ? Fedmannel.		1	SD4C0RDF1909	1641300(79117)141		Dens.	165 dayût (165 daya)		
-	and the second	100		-	UNITIC STOP 1	STEP 7 Profectional.	15.0	1.1	SEMERADE ISSUE	1645 10067911721986		Dento .	265 check1 (265 stock)		
	XE	X		-	lawking stap 7	STIP (Professional .		13	SEMETOROFIERO	16421030707172138		Caree	bill slop(s) (bill slops)	1000	
10-	Phase	20 A		-	DAMAGE STUP 7	STOP 7 Professional		1	304019900115800	10411030797172198		Deno	363 day() (363 days)	1.1	
ueri-		Participa.		-	BMADC STIP 7	STOP 7 Professional -		1. E	SD407980715802	1048 1008797172198.		Owna	365 sky(s) (365 skys)	9	
			1 8	-	SIMATIC STEP 7	SEPTPIOLESONI-		1	304098041389	104 10819/1111198.		Deno	905 (ks/s) (303 (ks/s)	·	
	100	1.1	1 2	-	SEMATIC STEP 7	STEP 7 Professional.			SD4UTROFISION	16411000397121190.		Dens	365 dep04 (365 dep1		
df	X	10		-	SMADE STEP 7 BMDC STEP 7	STEP 7 Profectional . STEP 7 Profectional .			SEASTPROF15809 SEASTPROF15809	16411000797172198.		Ceno	965 dbp()1 (365 dbps)	-	
	(Lipson).	mbis		2	SIMULTIC STOP 7	STIP 7 Professional			SE417PROF15809	16401008797171198.		Dans Dans	 Min shey(s) (Min sheye) M5 shey(s) (205 sheye) 		
10 Mar.	Caulte			-	BANKIC STEP 7	SFUP 7 Professional.			SE417980F15809	16401000797172190		Deno	265 day(s) (265 days) 265 day(s) (265 days)		
				-	SIMATIC STOP 7	STIP 7 Professoral.		1	304074071389	1041001201212184		Deno	303 shoci (303 days)	4	
		e 1		-	MMADC SZEP 7	STSP 7 Atoleannel			SD457980/1509	164-1001791171191		Detto	165 che/ut (365 che/ut)	-	
et l		DOT:		-	HABITIC STOP 7	SELF 7 Foolescorul.		1	SE457980415809	16/0100079/17/1981		Denso	265 che/c) (265 dis/c)	4	
desute	Annahista	Vacation-R., M		-	HANNING STEP 1	STIP ? Protocorrul.	15.0	- KG - G	SEMITOROFISHO	16421006797177196.	Feating .	(here)	Mill shep(s) (Mill sheps)	4	
			1	-	DIAMONG STUP 7	STEP 7 Professional	15.0	1	SE40788.0F15800	164010300797172196	Finational	Deno	365 cho(c) (365 days)	1.1.7	
				4										. *	
	e		Resear Fit Fair Histor		-	-					128	Linense keyle) 🗰 L	Jekemen 192	11	
				-	the second se	and the second se					100				

Sometimes I.T. runs tests on the network and knocks off the server. Try to reconnect when this happens. Until we get more licenses (we only have 20), we may have to suffer through this for awhile.

On screenshot 2. - where is says *Computer Name*, students should simply type in the name of the license server; *ET-NE135003* and click OK. The display name will automatically pop up and connect you.

Here are equivalent steps (when license server gets disconnected) for Rockwell (Allen-Bradley).

1. Launch FactoryTalk Activation Manager.



2. Click on Find Available Activations.

Pagela Rie merk Man. C3 Sam. DIT 112 MS. 57 Salwana	Letting by All Landson Property And				
Perpeterie methodes. Cylinia III 100 KD 57 Sebara -200 1980 - centred Lionaing	Gathing Up 131 Backman Project Rade Cran In. Decembry). Jack				
FactoryTalk Activation	Menaner	they Als			
Pone Marage Actionors Advanced					
Celebrary party	Welcome to FactoryTalk Activision!				
	You are dieps away from using your Roc do is activate your Rockwell product usin	kaol Automation product. All you have to g PactoryTalk Actuation			
Maxwerty- Copy Solo	Ready to get started?	Want to learn man?			
2010 File Andor Percedition	To activate your flactowell product, click one of the tollowing betters:	To learn more about FactoryTalk Activation before you get started, stick the following before			
CNAFE_char	Find Analable Activations	Loon Wese	6T		
Clotter Ann					
Reclevel Automation	Sougiania. Pice Inchesion Novies Inthese	the here			
Children OreckBRG PRU/Vide Natione Information	Patherset a Johnson A. Septement.				
Manating C.I.San. Del Quals Sementful H Network St. 57 12007. Daple 2.	Poprane,_ Poetling square				
Abartery Claim Device Annual A	milet.ec., Keying M.L. Propert 1 Nitrow 5.				
E O Type tere to search	0 8 8 12			r .0	D* 541.0M 2/1×2019 ₽2

3. Initially, available activations will not be shown. Click on *Update Activation Search Path* at top right on page.

toryTalk' Activation	rwanager					_		
Variage Activations Advanced								
	Detect the location that will prove	de your activations or add;	i nere activation to	cation:				Update Activation Dear
d Available Activations	Path to Artisticana							
	C Wsen/Public/Occurrent	moRockwell Automation/A	chan one					
New Activitions	 ETHE13(00) 							
nye Actualisis								
ture Activations								
tost Actual pro								
new Activations								
	Available activations:							
	Product	Setal # Expres	Activation	Version	Location Total	in Une	Dereved	Fine Version Supplied
	 Rituge 101 Per (Engl.) 	232901796 6/95/2018	HOLDFOR	1.80	CT+C23N00 HB	10	0	ana
	RSLogs 110 Pro (Engl.	2325033748 8/16/2018			ETNE135000 1		0	E 11
	RSLogia (10 Pro (Engli		RESERVENCE		ETHE135863 1		0	89
	Attices 1000 GLA Ces.	2229831096 6782018	RED GLT	3.00	ETHE21000 min	10	U	79
	RSLogia \$100 GLX Opt.	2329033746 6/15/2018	RSEK_GLK	1.00	ETHE135010 1	1	Ø.	81
	RSLeger 5800 GLX Opt.	2329033747 6/16/2018	RSEK_GLX_	1.90	ETHE13508 1		0	81
	RSLega 1900 Mini, CNJ	1635836545 mit	R50K_200 E	1.90	ETHE135863 19	t	0	81
	 Rhings (000 MUP Opt. 	2729431796 6/18/2018	ABEK MEP	1.00	ETHEZYNNS mm	a la	0	
	ROLINI 100 MLP OX	2229030746 6162918	RSIK M.P	1.90	EFNE13580 1	1	0	an
	RSLoga 6100 MLP Opt	2329031747 6/16/2018	ASSK MLP	1.00	ETNE135883 1	4	0	FY.
	 RSLagia 0000 Physical M. 	2329031796 61962318	ADDK_EPH	1100	CT4C231000 (www	0.00	0	PH
	RSLogie 5900 Phase M.	2529033748 8/16/2019	ILSEK_EPH_	1,00	ETNE135083 1	1	0	my .
	RSLegs 5900 Phase M.	2329033747 6/45/2010	RSIK_EPH	1,90	ETHE135010 1		0	311
	 Distage (100) Pro (Eng. 			T.H.	ETTE21018 we	10	0	PT
		2329033745 6/15/2018			ETHE135003 1	0	0	any
		23250333747 6/16/2019			ETHE135000 1	4	0	any .
	 Räuge Architect 	232901796 4/16/2018	REARCHERE		RIN DIRECTOR	9/0	0	#10
	RSLags Architect	2325033748 8/16/2019	REARCHERE		ETNE135000 1		0	any .
		2329033747 6/16/2018	ROARCHERE		ETHE135003 1	0	0	au
	RSLegis Achiect	12220031296 6/162018			ETREZIBIUS min	10	2	R11
	 RSLogix Viero Developer 		RSMCROD		ETHE13500 1	4	0.	811
	 RSLogia Vices Developer RSLogia Vices Developer 	2329033746 6/16/2018						B ⁽¹⁾
en mere about managing	ESLogia Viera Developer RSLogia Viera Developer RSLogia Viera Developer RSLogia Viera Developer	2329033747 6/16/2018			ETHE135013 1			
n mere about menaging	 RSLogia Vices Developer RSLogia Vices Developer 				ETNET3503 1 ETNE23900 mm	4.4	0.	

4. Click the check-box of ET-NE135003 and hit save.

O S B B O cloryTalk Activation	Vanana						
Manage Activitions Advanced	wonege.						
	Detect the location that will provide your activati	an al add a new solitation benefits					Update Activation Dearch /
and Available Activations	Path to Activations	ALC OF BALL IN HIS PLANED AT LOCALIZE.					System Photos and a state of the
Ing Analogue Accordents	C'Usen/Public/Oscument/RockwellAu	tornal und Artications					
an New Actionsisters	 ET-NE10(00) 						
er vara vezi aldore s							
onivi Actualizas							
And a constant of the							
aun Activations							
NUT ACTOR IN							
insit Actual lots		-					
ALER ACTIVITIES		Upplate Activation Search P	n			×	
onuu Activationa		Report the locations that will	provide your activations or ad-	to man inflation is	cation The North Strengton	with not provide	
NEW PERIOD IN			n the find Areteba Actual and			a set out approx	
		Selected Path to /	ativetoria				
		U. C'Used	Public/Documents/Rockwell A	ultortation Vacination			
		• 81 HEIRE	100			E3	
	Available activations	1.10					
		1					
	Product -Secial #	Dip					
	R31.000 100 Pro (210) 7109021756	6/15					
	RSLage 110 Pro (Engl. 2325033746	876					
	RSLogia 500 Pro (Engl. 2329033747	8/15					
	RSLogs 1000 GLR Opt. 2225031000	6.75					
	RSLega \$900 GLX Opt. 2329033746						
	RSLegs 5800 GLX Opt 2329033207					- I PERSONAL PROPERTY AND INCOMENTAL PROPERTY AND INCOMENT	
	RSLegx 5000 Nei, ENJ 153500545 Biblings 5000 Null Opt 2325631798		Up Di	WE	Dark	Carcel	
	R3Legis 1000 MLP Opt 2329031746		ETHE13580 1		100		
	RSLegs 6800 MLP Opt 2509031247		ETHE135883 1				
	 R3Lagia (800 Phase M. (12983-756) 		CT+C23000 into	ata D			
	RSLogin 5900 Phase M 2529031746		ETNE135883 1	1 0			
	RSLegs \$100 Phase M. 2325031047	6/16/2010 BSIK EPH 1.10	ETHE135000 1	0 0	311		
	 BSLoge (100) Pro (Eng. 2020031298) 		ETTE21008 mm	10 0	11		
	RSLegs 5000 Pilo (Eng. 2329033745		ETHE135063 1	0 0	any		
	RSLogs 5900 Pro (Eng. 2125031747		ETNE135003 1	0 D	my		
	 R3Lage Architect 2329031796 		CTHE23HID HIN	9/0 0	1949		
	RSLags Architect 2329033746		ETNET35083 1	F D			
	RSLegis Autoince 2329033747		ETHE135003 1 ETHE239003 min	0 0	9.0		
	 RSLoga Vices Developer 2125031796 RSLoga Vices Developer 2125031746 		ETHE135060 1		270 270		
	RSLoga Mera Developer 2229033747		ETNET35483 1		311		
sim mere abest managing		ATASHE RELATION IN	ETHERMON INF	ala D.	and the second		
kwell Automation	Retrust Actuations						

You will then see the available activations populate the window and you will be automatically connected to the license server.

The naming convention in Rockwell is not consistent. The license for Studio 5000 is called RSLogix 5000 in FactoryTalk.



This work is licensed under a Creative Commons Attribution 4.0 International License.